



Groundwater Monitoring 2023 Semiannual Report

for Compliance with the Michigan Part 115 CCR
Solid Waste Regulations

Erickson Station

Lansing Board of Water & Light

July 31, 2023



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Table of Abbreviations and Acronyms

Abbreviation	Definition
BTV	background threshold value
BWL	Board of Water & Light
cm/s	centimeters per second
CCR	coal combustion residuals
COI	constituent of interest
COC	constituents of concern
CWP	Clear Water Pond
EPA	Environmental Protection Agency
GPS	groundwater protection standard
LCL	lower confidence limit
MDL	method detection limit
QC	quality control
SOP	standard operating procedure
SSI/SSL	statistically significant increase/statistically significant level
TDS	total dissolved solids
TSS	total suspended solids

1.0 Introduction

The U.S. Environmental Protection Agency's (EPA) final Coal Combustion Residuals (CCR) Rule 40 CFR §257 and Michigan's Part 115 Solid Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451 (Part 115), establishes a comprehensive set of requirements for the management and disposal of CCR (or coal ash) in surface impoundments by electric utilities. Erickson Power Station (Erickson or Site) is an electrical power generation facility located at 3725 South Canal Road in Delta Township, Eaton County, Michigan owned and operated by Lansing Board of Water & Light (BWL) (**Figure 1**). The Erickson Power Station contains a single coal-fired generator that was capable of producing 165 megawatts of electricity. It was permanently shutdown November 2022. Erickson has three CCR impoundments: the Forebay, Retention Basin, and Clear Water Pond (CWP) (**Figure 2**). The three CCR impoundments are currently inactive.

The BWL CCR surface impoundments, Forebay, Retention Basin, and CWP, are not licensed under Part 115 because Michigan Department of Environment, Great Lakes, and Energy (EGLE) denied BWL's permit application; however, BWL continues to work with EGLE and develop compliance documentation for EGLE as if the impoundments were permitted under an operating permit. BWL implements both the federal and state groundwater monitoring programs concurrently to comply with both the federal CCR Rule and Part 115 solid waste rules. The Part 115 permitting application requirements included approval of a Hydrogeologic Monitoring Plan (HMP) (HDR, 2021a). The current HMP was approved by EGLE and describes the monitoring network, sampling and analysis plan, and data validation and statistical procedures for the monitoring program to comply with Part 115 solid waste rules. BWL is currently expanding the monitoring network, therefore the current HMP and the Monitoring Well Certification Network will be revised and resubmitted to EGLE in Q3 2023.

BWL completed numerous tasks in the first half of 2023 to close the impoundments and further characterize the impact to groundwater to further the assessment of corrective measures. Between January and June 2023, BWL completed the following tasks:

- Approval of the Closure Work Plan for the CCR surface impoundments;
- Additional ash sampling and analysis was completed, and a Closure Work Plan Amendment was submitted to EGLE on May 2, 2023 that included the ash analytical data as well as the microscopy verification thresholds.
- Collected Phase II background soil sample and analysis, completed statistics for soil background values, and submitted the revised Soil Background Report to EGLE on April 25, 2023 that will be used during verification of ash removal from the CCR impoundments;
- CCR impoundments dewatering and ash removal;
- Installation of ten monitoring wells including nature and extent wells, and multi-level wells to evaluate the plume extents horizontally and vertically;

- Sampling of downgradient private wells completed in the bedrock aquifer at the request of private well owners, and completion of an evaluation of this data reported under separate cover;
- Monthly monitoring of groundwater levels for monitoring wells and control points;
- Sampling and analysis of isotopes in groundwater and ash to evaluate if isotopes could help distinguish naturally occurring boron from ash impacted groundwater;
- Sampling and analysis associated with semiannual assessment monitoring as well as higher frequency background monitoring of newly installed wells; and
- Updated the groundwater flow and transport model.

This Semiannual Groundwater Monitoring Report presents these activities and the sampling and analysis completed in the first half of 2023.

2.0 Facility Description

Erickson Power Station (Erickson or Site) is an electrical power generation facility located at 3725 South Canal Road in Delta Township, Eaton County, Michigan, owned and operated by Lansing Board of Water & Light (BWL) (**Figure 1**). Erickson was retired from operations on November 27, 2022. During active operations, a single coal-fired generator was capable of producing 165 megawatts of electricity and CCR was stored in dewatering tanks (hydro-bins). After the majority of the CCR was removed from the waste stream at the hydro-bins, flow was discharged into three CCR impoundments in sequence: the Forebay, Retention Basin, and Clear Water Pond (CWP) (**Figure 2**). The plant pipelines were washed down and CCR waste disposal ceased to the CCR impoundments on December 29, 2022. The non-CCR stormwater flows to the impoundments ceased January 3, 2023.

2.1 Impoundment Closure Status

The CCR Impoundments Closure Work Plan for removal of CCR was completed in April 2022 and approved by EGLE on January 17, 2023, with the intent to later submit an amendment associated with the closure verification objectives or thresholds. Additional ash sampling and analysis was completed, and a Closure Work Plan Amendment was submitted to EGLE on May 2, 2023. The Closure Work Plan Amendment further detailed closure objectives and included the ash analytical data as well as the microscopy verification thresholds. Nine ash samples (three each from the Forebay, Retention Basin, and CWP) were collected and submitted for analysis. The microscopy verification thresholds were determined based on a ratio of CCR to native material that would reduce the expected concentration of the constituent to less than that of the established cleanup criteria.

BWL performed a site-specific background soil study as part of the development of the Closure Work Plan, approved by EGLE on January 17, 2023. Also conditional to this approval was the expansion of the Soil Background Study. BWL performed additional background soil sampling, analysis, and statistics to refine the established-site specific soil background values, and a revised Soil Background Study was submitted to EGLE on April 25, 2023. EGLE returned

comments to BWL regarding the Soil Background Study and the Closure Work Plan Amendment on June 28, 2023.

A CCR removal contractor was selected and mobilized to the site in February 2023 to begin dewatering operations from the three impoundments. The water removed from the ponds was treated on site, monitored, and discharged into nearby Lake Delta in compliance with an NPDES permit. Dewatering efforts were completed in May 2023 and ash and liner material removal commenced, with the material being transported to Granger Wood Street Landfill. Through mid-July 2023, approximately 54,200 cubic yards of material (ash, liner, and CCR impacted riprap) have been removed and disposed of offsite from all three impoundments. Closure verification efforts for the Forebay, Retention Basin and CWP have also been initiated.

HDR previously performed stability and seepage analyses at two selected cross-sections along the embankment of the Retention Basin and Clear Water Pond. The results of the previous analyses determined that the factor of safety for seepage was not adequate for the Retention Basin embankment. HDR subsequently installed two piezometers, RBPZ-1 and RBPZ-2 to further refine the seepage analysis. Data obtained indicates that at the Retention Basin, the upward gradient and heave potential at the toe of the embankment meet the minimum required factor of safety, and additional work to stabilize the embankment was not necessary. Further monitoring of the groundwater levels in the piezometers will continue through the duration of the project as well as daily monitoring of the embankments adjacent to Lake Delta.

2.2 Hydrogeology

The three CCR impoundments at Erickson Power Station are in areas underlain with unconsolidated clay, silt, sand, and gravel of glacial origin which rest upon approximately 10,000 feet of consolidated bedrock sediments composed of limestone, shale, siltstone, sandstone, salt, and gypsum. Depth to the uppermost aquifer under the impoundments is determined to be approximately 6 to 20 feet below surface. Given the bedrock surface between 36 and 61 feet below surface, the upper glacial aquifer thickness at the site is approximately between 16 and 47 feet thick. The groundwater flow direction is east directly under the impoundments and remains similar flow direction throughout the year (**Appendix A**). Recently collected data from newly installed wells MW-16A, MW-16B, and MW-16C, located on the east side of the wetlands, indicate that groundwater further east of Erickson flows west, back towards the BWL property, indicating the glacial groundwater flow direction under the wetlands on the east side of Erickson is to the north, which is consistent with the Carrier Creek Subwatershed that shows the flow north following Carrier Creek. Additional information detailing the groundwater flow direction at Erickson Power Station may be found in **Section 4.1**.

2.3 Monitoring Well Network

For monitoring between January and June 2023, the certified monitoring system for the ash impoundments includes the following wells (**Figure 3**):

- Glacial background (upgradient) wells: MW-1, MW-4, MW-11, and MW-12.
- Glacial downgradient compliance wells: MW-2, MW-3, MW-5, MW-6, MW-14.

2.3.1 Additional Wells

The certified groundwater monitoring system includes additional wells installed to evaluate groundwater further downgradient of the impoundments in response to identification of concentrations of constituents at statistically significant levels (SSLs) over groundwater protection standards in the pond compliance wells (**Figure 3**):

- Glacial downgradient wells to evaluate extent of SSLs: MW-7, MW-7C, MW-8, MW-9, MW-10, MW-13, MW-15, MW-16A, MW-16B, MW-100A, MW-100B
- Bedrock background (upgradient) wells: MW-11B, MW-12B
- Bedrock downgradient wells: MW-7B, MW-16C, MW-16D, MW-100C, and MW-100D

Ten of these wells (MW-14, MW-15, MW-16A, MW-16B, MW-16C, MW-16D, MW-100A, MW-100B, MW-100C, and MW-100D) were installed in the first half of 2023. Well MW-14 and MW-15 were installed on January 9, 2023. Wells MW-16A, MW-16B, MW-16C, and MW-16D were installed on January 25, 2023. Wells MW-100A, MW-100B, MW-100C, and MW-100D were installed on May 15, 2023. Well MW-14 was installed immediately east of the CWP to further characterize impacts originating from the CWP. To further delineate the northern extents of the exceedances in groundwater, MW-15 was installed north of MW-3. Similarly, the well series (ABCD) at MW-16 and MW-100 were installed to the east and south, respectively to further delineate the eastern and southern extents of the plume. Additional details regarding the construction of these wells can be found in **Table 1** below.

Table 1. Construction Details for Wells Installed between January and June, 2023

Well	Screen Elevation	Aquifer	Screen Lithology
MW-14	857-867	Glacial	Sand and sandy lean clay
MW-15	862-872	Glacial	Sandy lean clay, sand, and silt
MW-16A	857-867	Glacial	Lean clay with sand
MW-16B	835-845	Glacial	Silt
MW-16C	811-821	Bedrock	Shale (40%) and sandstone (60%)
MW-16D	752-762	Bedrock	Shale (100%)
MW-100A	845-855	Glacial	Clayey sand and sandy silt
MW-100B	829-839	Glacial	Silt with sand and clayey sand
MW-100C	814-824	Bedrock	Shale (90%) and sandstone (10%)
MW-100D	756-766	Bedrock	Shale (100%)

No wells were repaired or abandoned in the first half of 2023.



Figure 1. Vicinity Map for Erickson Power Station



Figure 2. Erickson Power Station Facility Layout



ERICKSON POWER STATION
EATON COUNTY, MI

Figure 3. CCR Units and Monitoring Wells

3.0 Monitoring

3.1 Groundwater

3.1.1 Frequency

Table 2 provides the well identification number, well location, and the dates and purpose of the samples collected. Assessment monitoring for Erickson during the first half of 2023 was conducted in February. The next semiannual assessment monitoring event is scheduled for August.

Between January and June 2023, ten new monitoring wells were installed. Each time new wells are installed they are developed and sampled. Wells are sampled at a 5-week frequency to establish background as quickly as practicable in each well per §257.94(b). Samples will continue to be collected for newly installed wells until eight sampling events are achieved, at which time sampling will continue on a semiannual basis or as needed for additional investigative efforts. Five background sampling events have been completed for wells MW-14 and MW-15, four background sampling events have been completed for the MW-16 series wells, and one sampling event has been completed for the MW-100 series wells. However, data analysis for the June sampling events for the MW-16 and MW-100 series wells has not been completed at the time of this report. This data will be included in the annual report for 2023.

Additional 2023 sampling events for groundwater included five (5) private well sampling efforts at the request of homeowners. Data from these events were provided to those homeowners.

Table 2. Dates of Groundwater Samples Collected for each Well in 2023 and the Required Monitoring Programs for the Erickson Impoundments

Monitoring Well I.D.	Well Location	Aquifer Monitored	Dates Monitored	Monitoring Purpose
MW-1	Background/Upgradient	Glacial	February 7, 2023	Assessment Monitoring
MW-2	Downgradient	Glacial	February 7, 2023	Assessment Monitoring
			March 22, 2023	Isotope Sampling
MW-3	Cross-Gradient	Glacial	February 7, 2023	Assessment Monitoring
MW-4	Background/Upgradient	Glacial	February 7, 2023	Assessment Monitoring
MW-5	Downgradient	Glacial	February 7, 2023	Assessment Monitoring
MW-6	Downgradient	Glacial	February 7, 2023	Assessment Monitoring
MW-7	Downgradient	Glacial	February 8, 2023	Assessment Monitoring
			March 21, 2023	Isotope Sampling
MW-7B	Downgradient	Bedrock	February 8, 2023	Assessment Monitoring
			March 21, 2023	Isotope Sampling
MW-7C	Downgradient	Glacial	February 8, 2023	Assessment Monitoring
			March 21, 2023	Isotope Sampling
MW-8	Downgradient	Glacial	February 8, 2023	Assessment Monitoring
MW-9	Downgradient	Glacial	February 8, 2023	Assessment Monitoring
MW-10	Downgradient	Glacial	February 8, 2023	Assessment Monitoring
MW-11	Background/Upgradient	Glacial	February 9, 2023	Assessment Monitoring
			March 22, 2023	Isotope Sampling
MW-11B	Background/Upgradient	Bedrock	February 9, 2023	Assessment Monitoring
			March 22, 2023	Isotope Sampling
MW-12	Background/Upgradient	Glacial	February 9, 2023	Assessment Monitoring
			March 22, 2023	Isotope Sampling
MW-12B	Background/Upgradient	Bedrock	February 9, 2023	Assessment Monitoring
			March 22, 2023	Isotope Sampling
MW-13	Downgradient Glacial Aquifer	Glacial	February 8, 2023	Background Monitoring

Monitoring Well I.D.	Well Location	Aquifer Monitored	Dates Monitored	Monitoring Purpose
MW-14 (installed January 9, 2023)	Downgradient	Glacial	January 12, 2023	Background Monitoring
			February 17, 2023	Background Monitoring and Assessment Monitoring
			March 24, 2023 April 28, 2023 June 2, 2023*	Background Monitoring
MW-15 (installed January 9, 2023)	Downgradient	Glacial	January 12, 2023	Background Monitoring
			February 17, 2023	Background Monitoring and Assessment Monitoring
			March 24, 2023 April 28, 2023 June 2, 2023*	Background Monitoring
MW-16A (installed January 25, 2023)	Downgradient	Glacial	February 2, 2023	Background Monitoring and Assessment Monitoring
			March 21, 2023	Background Monitoring and Isotope Sampling
			April 25, 2023 May 30, 2023*	Background Monitoring
MW-16B (installed January 25, 2023)	Downgradient	Glacial	February 2, 2023	Background Monitoring and Assessment Monitoring
			March 21, 2023	Background Monitoring
			April 25, 2023 May 30, 2023*	Background Monitoring and Isotope Sampling
MW-16C (installed January 25, 2023)	Downgradient	Bedrock	February 2, 2023	Background Monitoring and Assessment Monitoring
			March 21, 2023 April 25, 2023 May 30, 2023*	Background Monitoring and Isotope Sampling
			April 25, 2023 May 30, 2023*	Background Monitoring
MW-16D (installed January 25, 2023)	Downgradient	Bedrock	February 2, 2023	Background Monitoring and Assessment Monitoring
			March 21, 2023	Background Monitoring and Isotope Sampling
			April 25, 2023 May 30, 2023*	Background Monitoring
MW-100A (installed May 15, 2023)	Downgradient	Glacial	June 5, 2023*	Background Monitoring
MW-100B (installed May 15, 2023)	Downgradient	Glacial	June 5, 2023*	Background Monitoring
MW-100C (installed May 15, 2023)	Downgradient	Bedrock	June 5, 2023*	Background Monitoring
MW-100D (installed May 15, 2023)	Downgradient	Bedrock	June 5, 2023*	Background Monitoring

*Data analysis from this sampling event has yet to be completed and will be included with the annual report for 2023.

3.1.2 Water Levels and Sample Collection

Water levels were collected in each well following the Groundwater Level Monitoring Standard Operating Procedure (SOP) (HDR, 2019). Water levels were measured before purging the wells began. Wells were purged with a peristaltic pump until field parameters (pH, turbidity, conductivity, dissolved oxygen, temperature, and oxidation reduction potential) stabilized. The results of field measurements were recorded on a field data form, which is maintained as part of the field records. After field parameters stabilized, samples were collected and tested for the parameters listed in **Table 3**. For quality control, one field duplicate sample was collected during each sample event. Water samples were delivered under Chain of Custody to Merit Laboratories in East Lansing, Michigan.

3.1.3 Analytical Testing

Samples collected for background monitoring and assessment monitoring events were analyzed for the parameters listed in **Table 3**. In addition to the required list in **Table 3**, on occasion, wells were analyzed for general water quality parameters including alkalinity, magnesium, potassium, and sodium.

Table 3. Constituents of Interest

Constituents for Assessment Monitoring	
Boron	Fluoride
Calcium	Iron
Chloride	Lead
Fluoride	Lithium
pH	Mercury
Sulfate	Molybdenum
Total Dissolved Solids (TDS)	Nickel
Antimony	Selenium
Arsenic	Silver
Barium	Thallium
Beryllium	Radium 226 and 228 combined
Cadmium	Vanadium
Chromium	Zinc
Cobalt	Additional Parameters
Copper	Total Suspended Solids (TSS)

3.1.4 Data Validation and Data Management

Data validation and data management tasks were performed per the Data Management and Statistical Procedures Plan for Compliance with the Coal Combustion Residuals Rule (HDR, 2020a). Data validation was conducted to eliminate data that did not meet validation criteria and designate a data qualifier for data quality limitation discovered.

Samples and quality control (QC) were reviewed and evaluated, and no samples were rejected. Quality Control analyses were within reportable limits; however, when QC was outside limit controls, samples were reported as estimated. Field and laboratory precision and accuracy goals were nearly met for all samples analyzed. Where failures of field and laboratory precision and accuracy were outside of control limits, data was qualified as necessary. Data analyses required minimal qualifications, and data were usable, even when qualified. Laboratory reports and accompanying data validation reports for the sampling completed to date in 2023 are in **Appendix C**.

3.2 Private Well Sampling

BWL previously performed a limited sampling of downgradient private wells completed in the bedrock aquifer in 2022. Data from this sampling has been reviewed, results were provided to the owners, and findings were discussed with EGLE. The Private Well Sampling Report for Erickson Station was completed on April 16, 2023 and reported under separate cover. A summary of the report findings was subsequently distributed to private well owners and the summary as well as the entirety of the report was made accessible via the BWL website. The findings of the Private Well Sampling Report are summarized in **Section 4.2.1**.

BWL performed additional sampling of five downgradient private wells at the request of homeowners in March and May 2023. Data from these events were provided to those homeowners.

3.3 Ash and Groundwater Sampling for Isotope Study

BWL performed sampling of select wells on March 21-23, 2023 (MW-16 series sampled concurrently with the background sampling event) to investigate if isotopic data could differentiate boron originating from the ash impoundments compared to naturally occurring boron in the shale bedrock aquifer.

Groundwater

Fourteen samples, including two duplicate samples, were collected from select glacial and bedrock background wells (MW-11, MW-11B, MW-12, and MW-12B) and select glacial and bedrock downgradient wells (MW-2, MW-7, MW-7B, MW-7C, MW-16A, MW-16B, MW-16C, and MW-16D).

Ash Samples

Ash was sampled from the Forebay and Clear Water Pond CCR impoundments. Two samples of leachate were prepared from the ash from each impoundment, one was prepared via Synthetic Precipitate Leaching Procedure (SPLP, SW-846 Method 1312) and one prepared via centrifuge pore water. Ash samples were submitted to Merit Laboratory for leachate preparation before submittal to the isotope laboratory.

Groundwater and ash leachate samples for the Isotope Study were submitted under Chain of Custody to Covalent Metrology of Sunnyvale, California. Samples were analyzed for ^7Li , ^{11}B , ^{87}Rb , ^{86}Sr , $\delta(^{11}\text{B}/^{10}\text{B})$, and $\delta(^{87}\text{Sr}/^{86}\text{Sr})$. Laboratory reports for data obtained from the isotope study are in **Appendix C** and a brief discussion of the data is in **Section 4.2.1**.

4.0 Monitoring Results

4.1 Water Levels and Groundwater Flow Direction

Water levels for Erickson Power Station are provided in **Table 4** and depicted in the hydrographs in **Figures 4 and 5**. Groundwater beneath the area of the impoundments is between 863 to 875 feet amsl. Groundwater elevation fluctuated between 1.42 and 4.25 feet over the first half of 2023.

Water levels in the paired and multi-level glacial and bedrock wells is inconsistent between the sets. As shown in **Table 4**, bedrock well MW-7B has historically had a slightly higher water level than glacial paired well MW-7, indicating an upward vertical gradient, however, data collected since its installation in 2022 indicate that this trend may be seasonally dependent as the gradient has been inconsistent. Glacial wells MW-11 and MW-12 have higher water levels than the paired bedrock wells MW-11B and MW-12B (approximately 8 feet and 3 feet higher, respectively), indicating a downward vertical gradient. Similarly, groundwater elevations in the MW-16 and MW-100 series (except the D designated wells) decrease with well depth, indicating a downward vertical gradient. Wells MW-16B and MW-16C have similar elevations, while MW-16A is three feet higher; similarly, MW-100B and MW-100C have similar elevations, while MW-100A is one foot higher and MW-100D is also one foot higher. Data collected at the MW-100 series wells is limited to one sample point given its recent installation and development

Bedrock well MW-16D does not appear to be hydraulically connected to the other wells within its multi-level well series (MW-16A, MW-16B, and MW-16C) or to other bedrock wells installed at Erickson Power Station. As shown in **Table 4** and highlighted in **Figure 5**, MW-16D does not demonstrate seasonal fluctuations similar to those observed at other glacial and bedrock wells and has a substantially lower groundwater elevation than other wells despite being completed at a similar elevation and lithology as bedrock wells MW-11B, MW-12B, MW-7B, and MW-100D. However, shallower bedrock well MW-16C does have groundwater elevations that fluctuate similarly to the glacial well and other bedrock wells onsite.

Because the groundwater elevations differed between glacial wells and bedrock wells, two separate sets of potentiometric contour maps were developed, one for wells screened in the glacial aquifer and one for the wells screened in the shale/sandstone bedrock aquifer. Potentiometric surface maps were developed for the glacial and bedrock aquifers for the February and June 2023 water level measurement dates. Maps displaying the groundwater elevations at the wells and the groundwater contours and are provided in **Appendix A**. Bedrock groundwater contour maps include well MW-16C (and not well MW-16D) due to the apparent MW-16D disconnection described above, whereas MW-100D is included on the map (as opposed to MW-100C) due to the similar screened elevation as the onsite bedrock wells (MW-7B, MW-11B, and MW-12B).

The water levels and contour maps confirm that the groundwater flow direction under the impoundments for both aquifers is to the east-northeast and is consistent year-round. Recent data collected from newly installed wells MW-16A, MW-16B, and MW-16C show groundwater at



higher elevations and indicate that groundwater in the vicinity of these wells flows west back towards Erickson Station. At this time, data collected from MW-16A and MW-16B as well as surface water points collected from Carrier Creek to the north indicate that groundwater within the glacial aquifer likely flows north under the wetland on the east side of Erickson, which is consistent with the Carrier Creek Subwatershed boundary.

Data collected from MW-16C also suggest that groundwater in the bedrock aquifer flows west to east back towards Erickson Station and therefore bedrock groundwater may also turn north to the east of the impoundments and follow the Carrier Creek drainage to the north. The property owner east of Erickson has declined to allow for any monitoring on their property. BWL has designed and submitted permit applications for proposed multi-level wells in the wetland on the eastern Erickson property boundary. Data from these proposed wells will help further define the groundwater flow directions.

The potentiometric surface maps for the indicate that monitoring wells MW-1, MW-4, MW-11, MW-12 are located upgradient in the glacial aquifer and wells MW-11B and MW-12B are upgradient in the bedrock aquifer relative to the Forebay, Retention Pond, and CWP and are appropriate to represent background water quality.



Table 4. Groundwater Elevations Measured in 2023

Monitoring Well ID	Aquifer Monitored	TOC (ft amsl)	2/14/2023	3/14/2023	4/14/2023	5/15/2023	6/13/2023
MW-1	Glacial	888.74	874.40	874.52	874.62	873.89	871.70
MW-2	Glacial	885.97	866.08	867.00	867.73	866.45	865.29
MW-3	Glacial	884.81	869.93	871.41	872.70	871.24	869.52
MW-4	Glacial	889.15	870.71	872.84	873.85	872.06	870.73
MW-5	Glacial	885.50	867.32	868.32	868.60	867.95	866.53
MW-6	Glacial	885.53	865.50	866.70	867.81	865.86	864.92
MW-7	Glacial	870.144	864.96	865.45	865.68	864.95	863.89
MW-7B	Bedrock	870.28	864.37	865.11	865.79	865.22	864.38
MW-7C	Glacial	871.53	865.24	865.78	866.16	865.42	864.44
MW-8	Glacial	873.743	865.26	865.90	866.45	865.44	864.49
MW-9	Glacial	872.6	865.06	865.65	866.60	864.92	864.17
MW-10	Glacial	875.654	865.56	866.99	868.75	866.23	865.19
MW-11	Glacial	885.64	874.71	874.72	875.11	874.74	873.48
MW-11B	Bedrock	885.58	865.19	866.02	866.89	866.41	865.79
MW-12	Glacial	886.19	869.55	871.54	872.57	870.44	869.44
MW-12B	Bedrock	886.27	866.11	867.08	868.11	867.66	866.93
MW-13	Glacial	871.80	865.00	865.87	866.00	864.94	863.00
MW-14	Glacial	884.59	870.34	870.45	870.55	869.91	868.46
MW-15	Glacial	880.24	873.66	875.33	875.02	873.74	871.08
MW-16A	Glacial	877.48	870.53	871.87	872.21	870.82	869.02
MW-16B	Glacial	877.49	866.94	868.26	868.76	867.78	866.65
MW-16C	Bedrock	877.49	866.70	868.01	868.51	867.57	866.42
MW-16D	Bedrock	877.53	852.30	853.21	852.33	853.30	854.08
MW-100A	Glacial	879.77	---	---	---	---	864.20
MW-100B	Glacial	879.74	---	---	---	---	863.51
MW-100C	Bedrock	879.72	---	---	---	---	863.89
MW-100D	Bedrock	879.70	---	---	---	---	864.57

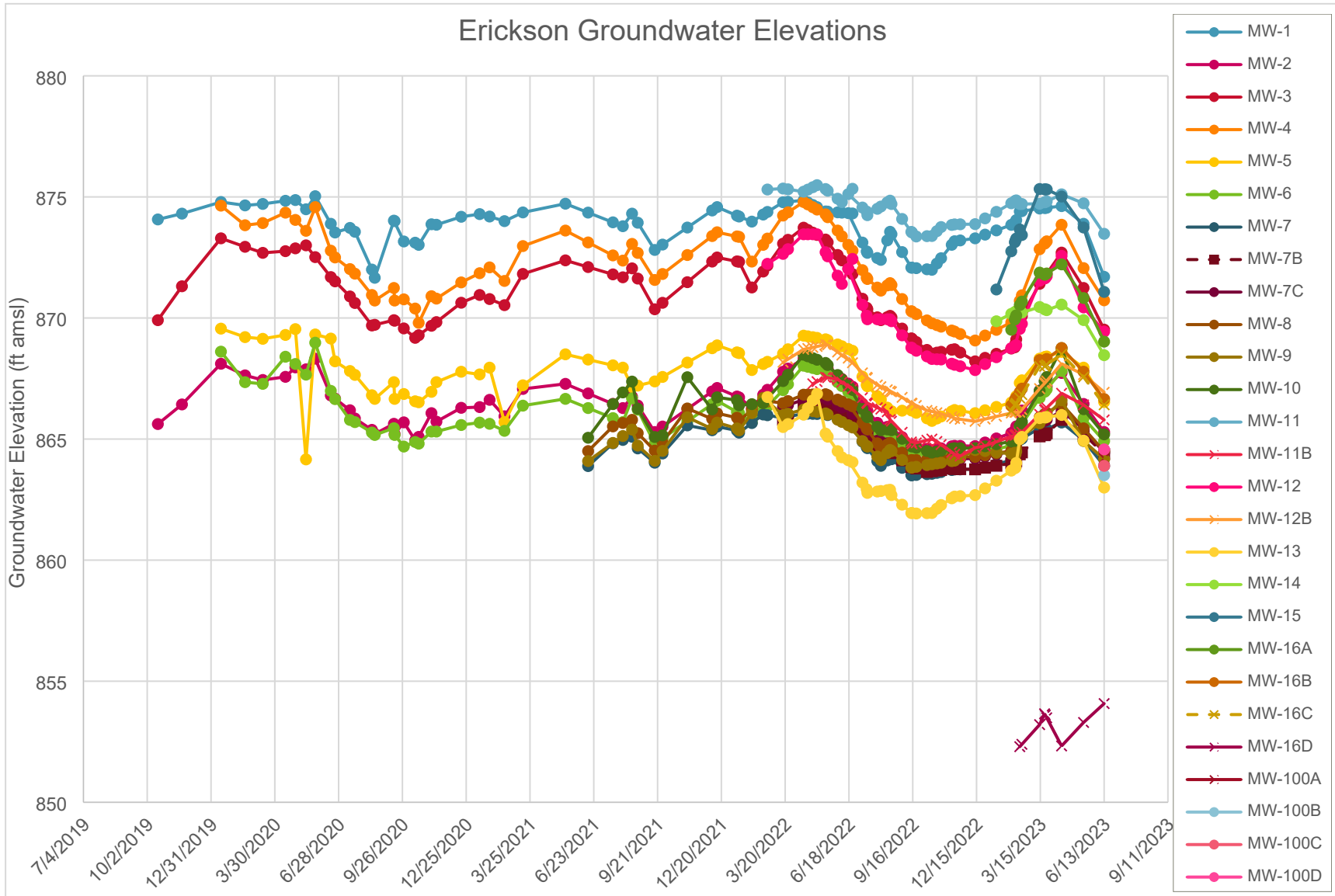


Figure 4. Erickson Power Station Groundwater Elevations

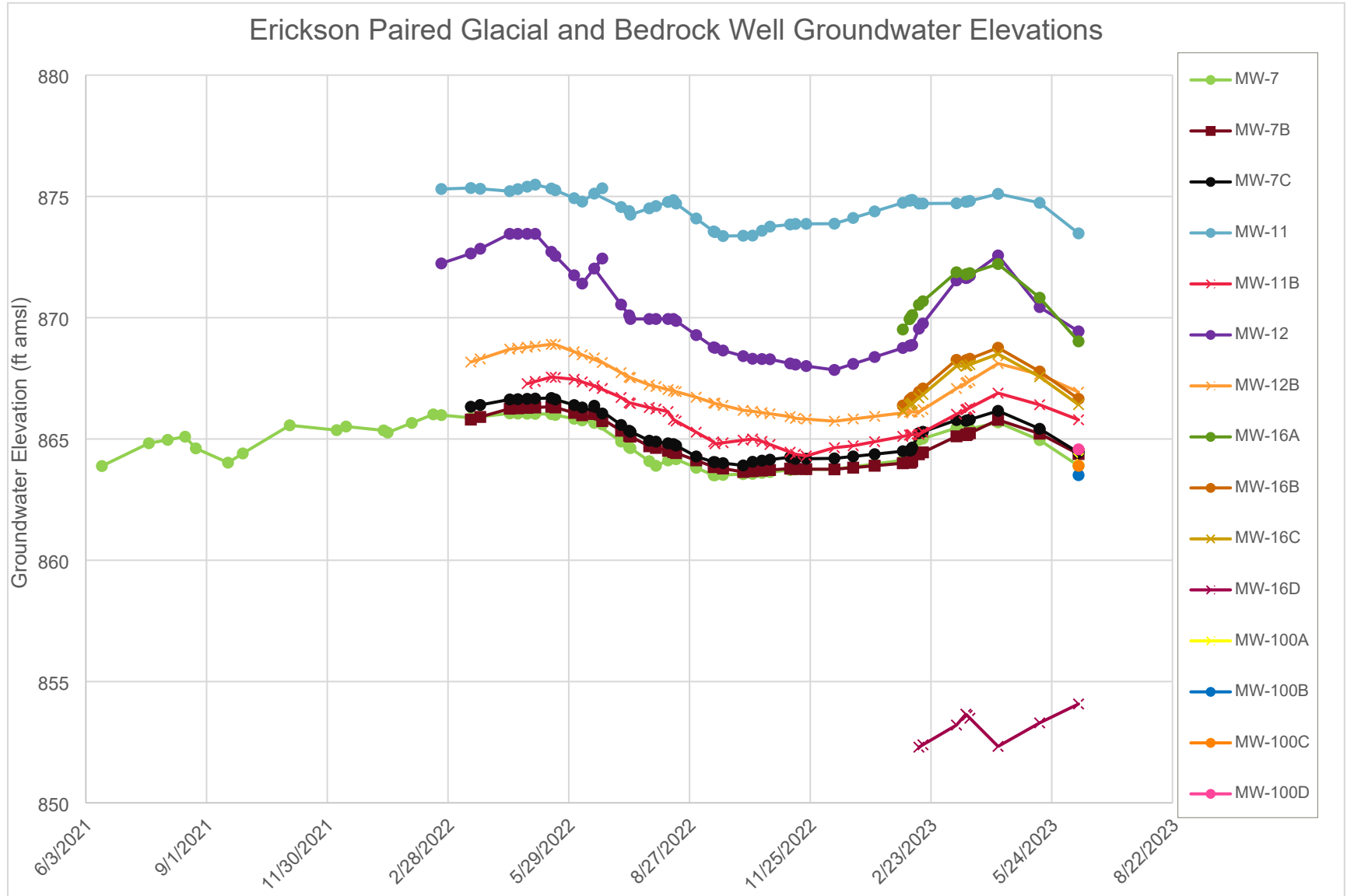


Figure 5. Erickson Power Station Paired Glacial and Bedrock Well Groundwater Elevations



4.2 Water Quality

A table summary of the analytical data is provided in **Appendix B** and laboratory reports are provided in **Appendix C**. In accordance with R 299.4441(9), Groundwater Protection Standards (GPS) were established for each detected COI.

Glacial Aquifer Background Values

Water quality data collected at MW-1 showed a possible impact from the CWP. The possible impact was observed when comparing historical sampling data from MW-1 to background well MW-4. Sample results showed MW-1 is consistently higher in concentrations of iron, lithium, sulfate, radium, boron, TDS, and TSS. Therefore, wells MW-11 and MW-12 were installed in February 2022 west of MW-1 and northwest of MW-3, respectively, to provide water quality data unimpacted by nearby BWL facilities. Wells MW-11 and MW-12 are upgradient and, as of November 2022, eight background samples had been collected. The background values for the glacial aquifer based on pooled data from wells MW-1, MW-4, MW-11, and MW-12 were updated in early 2023 and are provided in **Table 5**. The Background Report summarizing these background statistics is being finalized and will be submitted to EGLE in late summer early fall 2023.

Table 5. Background Values and Groundwater Protection Standards (Glacial Aquifer)

Parameter		Site-Specific Background Level Upper Tolerance Limit (UTL) ¹ (mg/L)	Federal Maximum Contaminant Level (mg/L)	State Non-Residential Drinking Water Cleanup Criteria for Groundwater ² (mg/L)	Groundwater Protection Standards for Site (mg/L)
Sb, total	Antimony	0.005	0.006	0.006	0.006
As, total	Arsenic	0.021	0.01	0.01	0.021
Ba, total	Barium	0.168	2	2	2
Be, total	Beryllium	0.001	0.004	0.004	0.004
B, total	Boron	0.48	NV	0.5	0.5
Cd, total	Cadmium	0.0005	0.005	0.005	0.005
Cr, total	Chromium	0.005	0.1	0.1	0.1
Co, total	Cobalt	0.005	0.063 ³	0.1	0.006
Cu, total	Copper	0.005	1.3	1	1
Fe, total	Iron	23.5	0.3	0.3	23.5
Pb, total	Lead	0.003	0.153 ³	0.004	0.004
Li, total	Lithium	0.041	0.403 ³	0.35	0.041
Hg, total	Mercury	0.0002	0.002	0.002	0.002
Mo, total	Molybdenum	0.024	1.003 ³	0.21	0.1
Ni, total	Nickel	0.021	NV	0.1	0.1
Se, total	Selenium	0.005	0.05	0.05	0.05
Ag, total	Silver	0.0005	0.1	0.098	0.098
Tl, total	Thallium	0.002	0.002	0.002	0.002
V, total	Vanadium	0.005	NV	0.062	0.062
Zn, total	Zinc	0.036	5	5	5
Ca	Calcium	188	NV	NV	188
F	Fluoride	1	4	2	2
Cl	Chloride	94.306	250	250	250
SO ₄	Sulfate	344	250	250	344
TDS	Total Dissolved Solids	1,190	500	500	1,190

Parameter		Site-Specific Background Level Upper Tolerance Limit (UTL) ¹ (mg/L)	Federal Maximum Contaminant Level (mg/L)	State Non-Residential Drinking Water Cleanup Criteria for Groundwater ² (mg/L)	Groundwater Protection Standards for Site (mg/L)
Ra226/228	Radium 226 and 228 combined	5.00 pCi/L	5 pCi/L	NV	5 pCi/L

¹ Calculated by pooling wells MW-1, MW-4, MW-11, and MW-12, through October 26, 2022. data.

² Cleanup Criteria Requirements for Response Activity (Formerly the Part 201 Generic Cleanup Criteria and Screening Levels) found in R 299.44 Generic groundwater cleanup criteria.

NV=no value

³ EPA adopted health-based value in place of MCL.

Bedrock Aquifer Background Values

Wells MW-11B and MW-12B were installed upgradient of the CCR impoundments and were completed in shale and sandstone at approximately 120 feet below ground surface. These two wells are considered background bedrock aquifer wells. The 8th background sample event for the upgradient bedrock wells was in December 2022; therefore, background threshold values were calculated in the first part of 2023. The newly developed background values for the bedrock aquifer are provided in **Table 6**. The Background Report summarizing the background statistics is being finalized and will be submitted to EGLE in early fall 2023.

Table 6. Background Values and Groundwater Protection Standards (Bedrock Aquifer)

Parameter		Site-Specific Background Level Upper Tolerance Limit (UTL) ¹ (ug/L)	Federal Maximum Contaminant Level (ug/L)	State Non-Residential Drinking Water Cleanup Criteria for Groundwater ² (ug/L)	Groundwater Protection Standards for Site (ug/L)
Sb, total	Antimony	0.005	0.006	0.006	0.006
As, total	Arsenic	0.009	0.01	0.01	0.01
Ba, total	Barium	0.081	2	2	2
Be, total	Beryllium	0.001	0.004	0.004	0.004
B, total	Boron	3.52	NV	0.5	3.52
Cd, total	Cadmium	0.0005	0.005	0.005	0.005
Cr, total	Chromium	0.005	0.1	0.1	0.1
Co, total	Cobalt	0.005	0.063 ³	0.1	0.006
Cu, total	Copper	0.005	1.3	1	1
Fe, total	Iron	3.04	0.3	0.3	3.04
Pb, total	Lead	0.003	0.153 ³	0.004	0.004
Li, total	Lithium	0.05482	0.403 ³	0.35	0.05482
Hg, total	Mercury	0.0002	0.002	0.002	0.002
Mo, total	Molybdenum	0.011	1.003 ³	0.21	0.1
Ni, total	Nickel	0.011	NV	0.1	0.1
Se, total	Selenium	0.005	0.05	0.05	0.05
Ag, total	Silver	0.0005	0.1	0.098	0.098
Tl, total	Thallium	0.002	0.002	0.002	0.002
V, total	Vanadium	0.005	NV	0.062	0.062
Zn, total	Zinc	0.042	5	5	5
Ca	Calcium	69.6	NV	NV	69.6
F	Fluoride	1	4	2	2
Cl	Chloride	5	250	250	250

Parameter		Site-Specific Background Level Upper Tolerance Limit (UTL) ¹ (ug/L)	Federal Maximum Contaminant Level (ug/L)	State Non-Residential Drinking Water Cleanup Criteria for Groundwater ² (ug/L)	Groundwater Protection Standards for Site (ug/L)
SO ₄	Sulfate	5	250	250	250
TDS	Total Dissolved Solids	380	500	500	500
Ra226/228	Radium 226 and 228 combined	5.5 pCi/L	5 pCi/L	NV	5.5 pCi/L

¹ Calculated by pooling wells MW-11B and MW-12B, through December 27, 2022 data.

² Cleanup Criteria Requirements for Response Activity (Formerly the Part 201 Generic Cleanup Criteria and Screening Levels) found in R 299.44 Generic groundwater cleanup criteria.

NV=no value

³ EPA adopted health-based value in place of MCL.

Assessment Monitoring Event – February 2023

Twenty-three (23) wells were sampled during February 2023 assessment monitoring event as presented in **Table 2**. The following wells had concentrations of one or more COIs that exceeded GPS: MW-2, MW-5, MW-6, MW-7, and MW-7C. In accordance with Michigan Rule R 299.4441, downgradient well concentrations were statistically evaluated to determine if one or more constituents are detected at SSLs above the GPS. To determine if an exceedance of a GPS value was statistically significant, the 95% lower confidence limit (95LCL) was calculated for each of the downgradient wells. Statistical output files are in **Appendix D**.

Glacial Aquifer

Wells MW-2 and MW-5 had SSLs of boron, calcium, lithium, sulfate, and TDS over the GPS (**Table 7**). Well MW-6 had SSLs of boron and lithium over the GPS, and well MW-7 had SSLs of boron, lithium, and molybdenum, over the GPS (**Table 7**). Well MW-7C had SSLs of boron, calcium, lithium, molybdenum, sulfate, and TDS over the GPS (**Table 7**). Well MW-3 also had LCL values greater than the GPS for boron, calcium, lithium, molybdenum, sulfate, and TDS; but it was calculated based on only five sample events and is therefore not yet considered an SSL due to having less than 8 sample events. Similarly, MW-14 also had LCL values greater than the GPS for boron and lithium, but this has been calculated on only four sample events and is therefore not yet considered an SSL due to having less than 8 sample events.

Table 7. SSLs for CCR Impoundments at Erickson Power Station – Calculated through the February 2023 Assessment Monitoring Event

Monitoring Well	Constituent	Boron	Calcium	Lithium	Molybdenum	Sulfate	TDS
	State GPS	0.50 mg/l	188 mg/l	0.041 mg/l	0.10 mg/l	344 mg/l	1,190 mg/l
MW-2	95% LCL	4.71	241	0.056	-	439	1,218
MW-5	95% LCL	4.29	217	0.061	-	617	1,277
MW-6	95% LCL	0.728	-	0.044	-	-	-
MW-7	95% LCL	1.70	-	0.089	0.173	-	-
MW-7C	95% LCL	6.44	234	0.126	0.388	679	1,360

"-" Denotes the LCL did not exceed GPS

Bedrock Aquifer

No bedrock aquifer wells had concentrations of COIs that demonstrated SSLs above the GPS during the February 2023 sampling event.

Background Monitoring Events

As stated above, monitoring wells installed in 2023 (MW-14, MW-15, MW-16A, MW-16B, MW-16C, MW-16D, MW-100A, MW-100B, MW-100C, and MW-100D) have been sampled on a five-week frequency after installation for the first eight sample events. Five background sampling events have been completed for wells MW-14 and MW-15, for which sampling events were completed in January, February, March, April, and June 2023. Four background sampling events have been completed for the MW-16 series wells, for which sampling events were completed in February, March, April, and May 2023. A single sampling event has been completed for the MW-100 series wells in June 2023. Data analysis for the June sampling events for the MW-16 and MW-100 series wells has not been completed at the time of this report.

Glacial Aquifer

Well MW-14 has consistently shown concentrations of boron and lithium above the GPS. Well MW-16A has also consistently shown concentrations of chloride above the GPS and concentrations of TDS near or above the GPS. No other wells at Erickson Power Station exhibit levels of chloride above the GPS; therefore, the presence and concentration of this constituent at this particular location adjacent to the road is being closely monitored. At this time, it is anticipated that the chloride is likely the result of salt applications to the road for deicing. Wells MW-16A and MW-16B do not exceed GPS for boron or any other COI (besides the chloride in MW-16A). Based on this easternmost well having no GPS exceedances of constituents with GPS exceedances at waste boundary wells, this demonstrates that the plume extent in the eastward direction is delineated and the plume extend is west of MW-16. No concentrations of COIs above the GPS have been detected in MW-15. The plume extent north of the impoundments is delineated. Wells MW-100A and MW-100B do not have GPS exceedances. The plume extent southeast the impoundments is delineated. For these background monitoring events, water quality was compared to GPS; however, these exceedances are single event exceedances and do not represent SSLs over GPS. Data from these wells compared to the GPS during the background monitoring events in 2023 may be found in **Appendix B**.

Bedrock Aquifer

Well MW-16C had no exceedances of GPS. Well MW-16D has shown consistent concentrations of boron above the established bedrock GPS; however no other parameters exceeded GPS. For these background monitoring events, water quality was compared to GPS; however, these exceedances are single event exceedances and do not represent SSLs over GPS. Wells MW-100C and MW-100D do not have GPS exceedances. Data from these wells compared to the GPS during the background monitoring events in 2023 may be found in **Appendix B**.



As described in Section 4.1, MW-16D appears to be hydraulically disconnected to the other wells at Erickson Station. In addition, a review of the impacted wells closer to the impoundment show a consistent set of parameters that exceed GPS, not solely boron. For example, at glacial wells with SSIs and SSLs over GPS, the parameters that exceed include lithium, sulfate, and TDS in addition to the boron. However, at MW-16D bedrock well, only boron exceeds the GPS. This is similar to the findings observed in the private wells completed in bedrock farther east and described in the Private Well Report. This is further data supporting the boron in the bedrock to be naturally occurring. Further, analysis of general water quality parameters from this well on a Piper Diagram suggest the water quality at MW-16D plots similarly to bedrock wells MW-7B, MW-12B, and MW-100D, and plots in a different quadrant as wells MW-16C, MW-11B, and MW-100C, and in a different quadrant than impacted glacial wells MW-3 and MW-7C, indicating they are different classes of waters. The water quality groupings of bedrock wells can be observed in the piper diagram in **Figure 6**. The bedrock wells that plot nearest each other on the piper diagram, MW-7B, MW-12B, MW-16D, and MW-100D, are also the same group of bedrock wells that have the higher concentrations of boron (≥ 3.0 mg/L boron). These same group of four wells have the highest percent of shale in the screened interval (80-100% shale) (**Figure 7**). The other group of bedrock wells that plot near each other on the piper diagram, MW-11B, MW-16C, and MW-100C, all have lower concentrations of boron (≤ 1.45 mg/L boron) and have the lowest percent of shale (more sandstone) in the screened interval (**Figure 7**). Figure 7 displays a correlation between the amount of shale in the bedrock screened zone and the boron concentration from that well. As has been suspected, the shale appears to be the naturally occurring source of boron in groundwater. This same exercise has not been possible to evaluate in the private wells due to the driller well logs grouping the bedrock lithology instead of logging it separately. For example, private well logs state “shale and sandstone” for bedrock intervals instead of separating shale intervals from sandstone intervals.

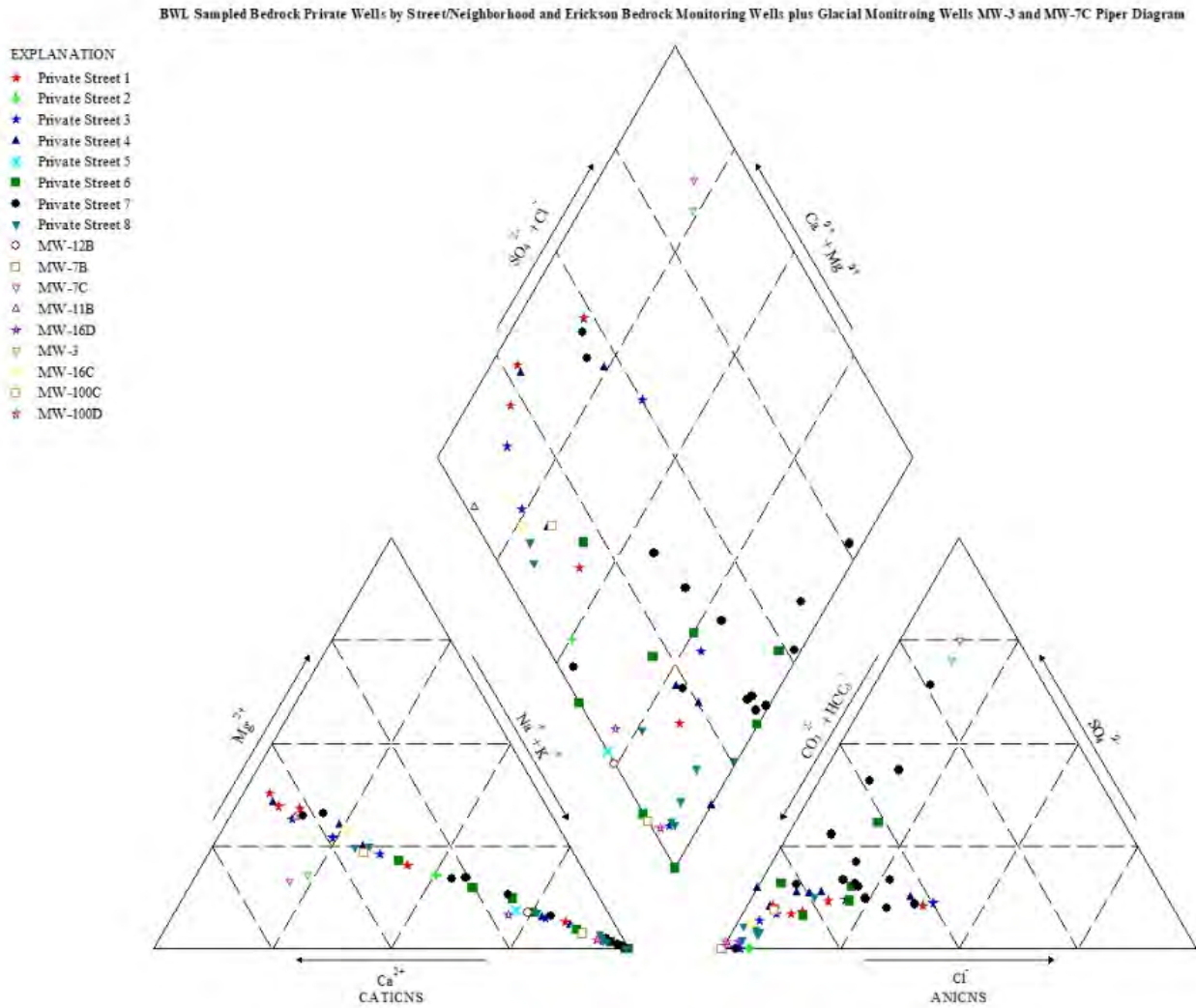


Figure 6. BWL Bedrock Wells, Private Wells, and Glacial Wells MW-3 and MW-7C Piper Diagram

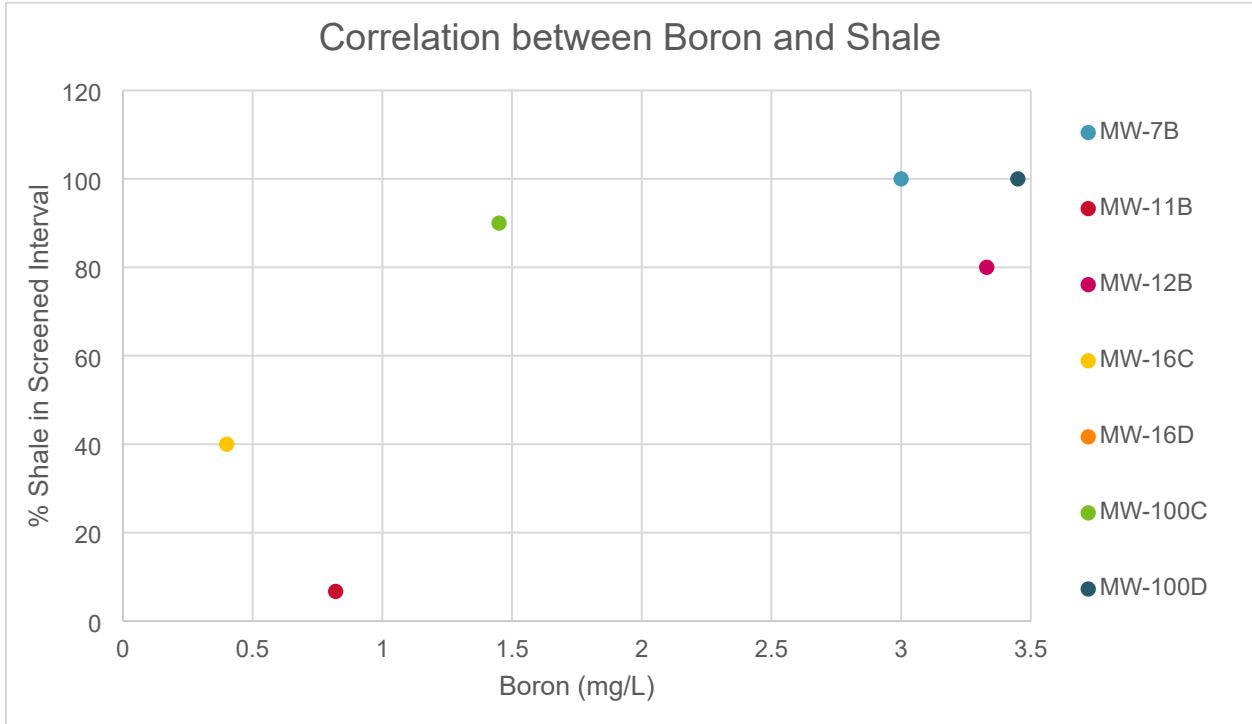
Private Well Sampling

BWL performed a limited sampling of downgradient private wells completed in the bedrock aquifer in 2022. The Private Well Sampling Report was completed on April 16, 2023 and reported under separate cover. The report reviewed data from Erickson Station and the downgradient private wells and found via multiple lines of evidence that the boron and lithium concentrations in private wells appeared to be likely naturally occurring and representative of the shale bedrock aquifer in which they are screened. Data approaches included a comparison of private well data to the background bedrock water quality observed at Erickson Station, review of concentrations relative to distance and depth, transport solutions for continuous release to groundwater, Erickson Station’s current flow and transport model, comparison of general water quality parameters between known impacted and unimpacted areas, and a review and comparison of local Ingham County and Delta Township bedrock aquifer studies. BWL

presented these data and lines of evidence were presented to the regulatory authorities with the intent of discontinuing private well sampling, which was met with verbal approval.

Isotope Study

BWL collected samples of ash leachate from the Forebay and CWP CCR impoundments and groundwater from locations that are known to be impacted and unimpacted by CCR and analyzed isotopic ratios to evaluate if there was a different isotopic signature of naturally occurring boron in the shale in the Saginaw aquifer versus boron in the groundwater from the Erickson CCR impoundments. The laboratory report for the isotope analysis is provided chronologically in **Appendix C**. The $\delta^{11}\text{B}$ versus boron concentration of the sampled wells and ash leachate are shown in **Figure 8**. As shown in **Figure 8**, the CCR leachates had lower $\delta^{11}\text{B}$ values (<4.05), which is consistent with the literature study on boron isotopic characterization of CCR that showed CCR leachate were lower (Ruhl et al, 2014). Also shown in **Figure 8**, the $\delta^{11}\text{B}$ at glacial wells impacted by the CCR impoundments (MW-2, MW-7, and MW-7C) are also lower (<4.05). Background wells (MW-11, MW-11B, MW-12, and MW-12B) and unimpacted glacial wells (MW-16A and MW-16B) have higher $\delta^{11}\text{B}$ (>4.05). Therefore, the data indicate that $\delta^{11}\text{B}$ higher than 4.05 appear to indicate naturally occurring boron. All of the bedrock wells sampled had $\delta^{11}\text{B}$ greater than 4.05, and had the highest measured $\delta^{11}\text{B}$ (4.11-4.16) indicating that the ratio of boron isotopes in the bedrock groundwater are more similar to background groundwater and unimpacted groundwater than to ash leachate and impacted groundwater from the ash leachate.



*Concentrations of boron depicted in MW-7B, MW-11B, MW-12B, MW-16C, and MW-16D are representative of the February 2023 Assessment Monitoring Event. Concentrations of boron depicted in MW-100C and MW-100D are representative of their currently unvalidated background sampling event conducted in June 2023.

Figure 7. Erickson Power Station Bedrock Well Screened Shale Percentages and Boron Concentrations

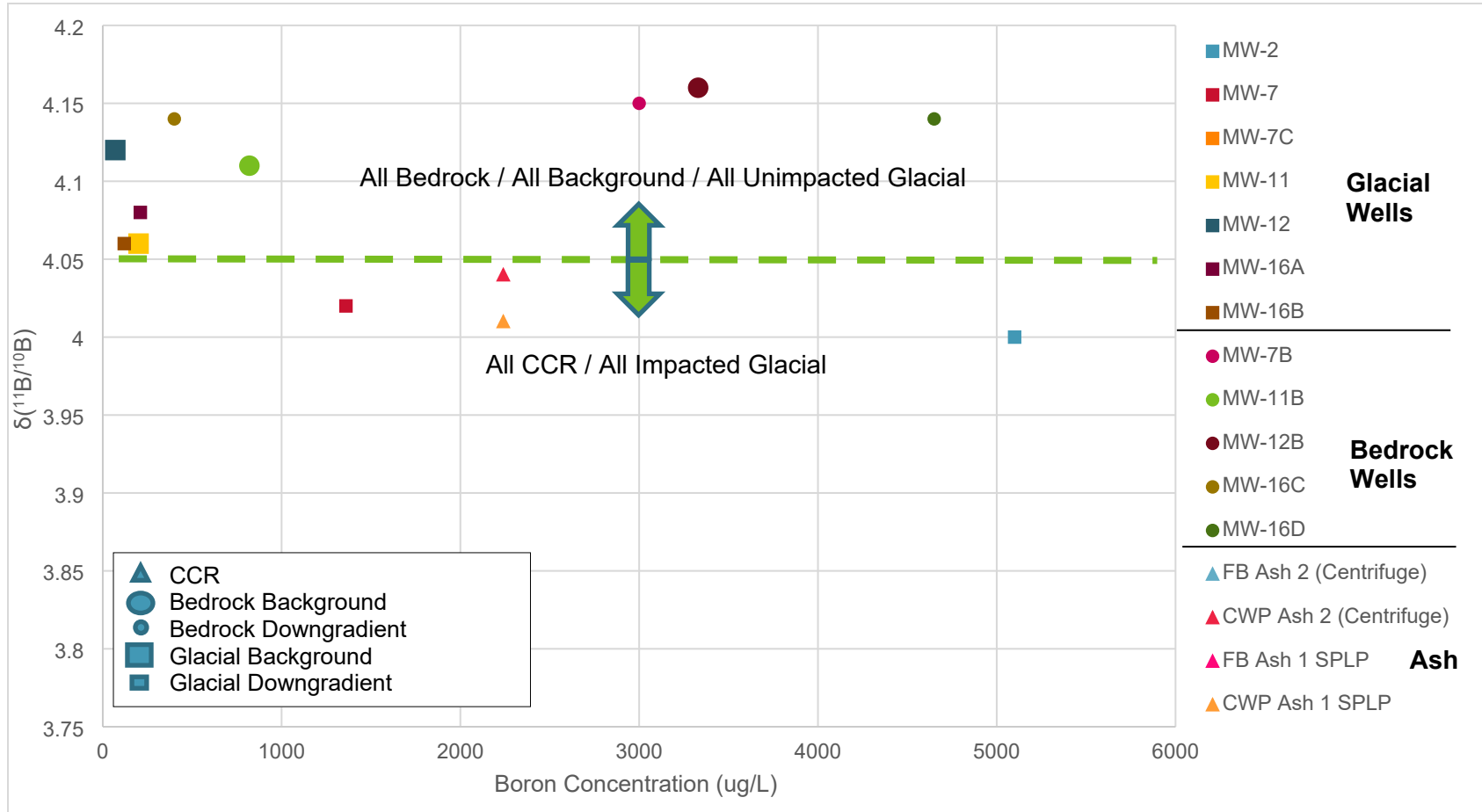


Figure 8. Boron Concentrations and Boron Isotope Ratios of Known Impacted and Unimpacted Wells and Impoundment Ash, Erickson Power Station

5.0 Remedy Selection Progress Update

BWL is moving forward with source removal to close the impoundments, and the groundwater measures evaluated in the Assessment of Corrective Measures (ACM) in November 2021 assumed the impoundment would be excavated and source removed prior to implementation of groundwater remedy measures.

Efforts to close Erickson Power Station have continued in the first half of 2023. The CCR Impoundments Closure Work Plan for removal of CCR, completed in April 2022, was approved by EGLE on January 17, 2023. Additional ash sampling and analysis was completed, and a Closure Work Plan Amendment detailing closure objectives as well as the microscopy verification thresholds was submitted to EGLE on May 2, 2023. BWL also performed supplementary work for the Soil Background Survey, which was submitted to EGLE on April 25, 2023. EGLE returned comments to BWL regarding the Soil Background Study and the Closure Work Plan Amendment on June 28, 2023.

A CCR removal contractor was selected and mobilized to the site in February 2023 to begin dewatering operations from the three impoundments. Dewatering efforts were completed in May 2023 and CCR and CCR impacted material removal commenced, with the material being transported to Granger Wood Street Landfill. Closure verification efforts for the Forebay and Retention Basin have also been initiated. The source removal is scheduled to be complete in October 2023, at which time CCR removal verification will also be completed following the Closure Work Plan. It is anticipated that the remedy selection process for addressing affected groundwater will proceed following the full implementation of the CCR source removal and evaluation of the impact of the source removal on groundwater elevations and groundwater quality.

As discussed in the ACM, to select a groundwater remedy, additional data collection and analyses is ongoing to understand off-site plume transport and potential human or ecological receptors. Potential receptors were evaluated and, at this time, the risk to private wells is considered very low. BWL has been working with adjacent and nearby landowners requesting agreements to install monitoring wells. Several of these have been turned down by landowners, and have necessitated multiple points of contact, taking time. Meanwhile BWL has been working on “work-arounds” to the extent practical, including wells on narrow BWL-owned strips of land and submitting wetland permit applications for wells in the wetlands. Ten new wells were installed for assessment and characterization of the groundwater plume at Erickson to the north, east, and south of the CCR impoundments. Groundwater data from these wells currently suggest that the plume is contained within the boundaries of these newly installed wells. In addition, BWL has proposed two sets of multi-level wells at the wetland on the east side of the property boundary. These wells require permitting to protect the wetland, which has been ongoing throughout the first half of 2023. Currently, eight new wells have been proposed and are anticipated to be installed in the second half of 2023, pending permitting:

- MW-17A, MW-17B, MW-17C, and MW-17D to be installed to the north of the clustered wells at MW-7 to confirm groundwater flow directions and delineate the northern extents

of the plume in the glacial and bedrock aquifers. Access limitations are currently being designed and a permit to access and construct in the protected wetland is in progress.

- MW-18A, MW-18B, MW-18C, and MW-18D to be installed to the east of the clustered wells at MW-7 to confirm groundwater flow directions and delineate the eastern extents of the plume in the glacial and bedrock aquifers. Access limitations are currently being designed and a permit to access and construct in the protected wetland is in progress.

Updated background threshold values for the glacial aquifer and newly developed background threshold values for the bedrock aquifer were completed in early 2023. These BTVs will be incorporated into a Background Water Quality Report and submitted to EGLE in Q3 2023.

The Private Well Sampling Report was completed and the report in full as well as a summary of its findings were distributed to EGLE, private well owners and posted for public access on BWL's website. Findings of the report concluded that concentrations of COIs observed in the private wells appear to be naturally occurring and representative of conditions of the shale bedrock aquifer and not related to Erickson Station. BWL presented to the regulatory agencies the findings of this report and their intent to not sample the private wells further at this time, which was met with verbal approval.

The groundwater flow and transport model was calibrated for the five COCs: boron, lithium, calcium, molybdenum, and sulfate. The groundwater and contaminant transport modeling objectives are to simulate the rate of movement, the contaminant delineation, and the potential offsite migration of COCs within the local groundwater system. The modeled plume has helped to site appropriate drilling locations for the proposed additional plume characterization monitoring wells that are in landowner negotiations.

Additionally, BWL will continue implementing CCR groundwater compliance schedule in conformance with §257.90 - §257.98, which includes semiannual assessment monitoring in accordance with §257.95 to monitor groundwater conditions and inform the remedy selection. The final remedy will be formally selected per §257.97 once the selected option is reviewed and commented on by EGLE and a public meeting is conducted at least 30-days prior to the final selection as required under §257.96(e).

The following activities are proposed to be completed or initiated in the next 6-month period:

- development of a Pump Test Work Plan for use in assessing corrective measures using site specific data,
- development of an MNA Sampling and Analysis Work Plan for use in assessing corrective measures using site specific data,
- continued semiannual groundwater assessment monitoring,
- installation of wetland monitoring wells pending resolution of permitting requirements, and,
- continued removal of CCR source materials and closure verification of the Erickson CCR impoundments.

6.0 Summary

The following observations are based on CCR Rule compliance groundwater monitoring program development the first half of 2023:

- Ten new monitoring wells were installed Q1 and Q2 2023 (MW-14, MW-15, MW-16A, MW-16B, MW-16C, MW-16D, MW-100A, MW-100B, MW-100C, and MW-100D).
- Water levels were measured during each sample event and monthly, starting in February 2023. Groundwater flow in the glacial aquifer is consistently east-northeast under the impoundments; however, groundwater flow further east in the vicinity of MW-16A and MW-16B appears to be flowing east to west back towards Erickson Station. Groundwater elevation data collected since the installation of MW-16A and MW-16B indicate that groundwater flows east-northeast under the impoundments and then turns north and follows the wetland and Carrier Creek to the north. This is consistent with the Carrier Creek Subwatershed.
- Groundwater flow in the bedrock aquifer shows an east-northeast flow direction under the impoundments, however contours are different than the glacial aquifer. Groundwater elevation data collected after the installation of MW-16C indicate that groundwater elevations in the immediate vicinity of MW-16C are higher than at MW-7B and seem to indicate flow northward between MW-7B and MW-16C similar to the glacial aquifer.
- New BTVs for the glacial aquifer and BTVs for the bedrock aquifer were developed in early 2023.
- Assessment monitoring was completed in February 2023 for twenty-three (23) wells. Monitoring data was statistically evaluated, and SSLs above the GPS were observed at MW-2, MW-5, MW-6, MW-7, and MW-7C for lithium and boron. Additionally, SSLs above the GPS was observed at MW-2, MW-5, and MW-7C for calcium, sulfate, and TDS, and in MW-7 and MW-7C for molybdenum. These wells are glacial wells.
- Background monitoring at a five-week frequency at the ten new monitoring wells (MW-14, MW-15, MW-16A, MW-16B, MW-16C, MW-16D, MW-100A, MW-100B, MW-100C, and MW-100D) commenced in 2023. No GPS exceedances have been observed at the MW-16 nor MW-100 glacial wells, with the exception of chloride in MW-16A which is likely from road salts, and no GPS exceedances have been observed at the MW-16 nor MW-100 bedrock wells with the exception of boron in MW-16D.
- Well MW-16D does not appear to be hydraulically connected to the currently established well network at Erickson Station. This well will continue to be monitored and sampled.
- New data associated with isotopes, bedrock lithology, and review of Piper Diagram plots all support prior indications that the boron in bedrock is naturally occurring:
 - Boron isotope data indicated that the $\delta^{11}\text{B}$ ratio in bedrock groundwater is higher and therefore more similar to the ratio in background and unimpacted wells and therefore seems to indicate the boron is naturally occurring.
 - Review of bedrock lithology in screened wells relative to boron shows correlation between the shale and boron concentration. The more shale in the screened zone of the well, the higher the boron concentration of the well.



- Piper diagram plots show none of the bedrock wells plot similarly to the impacted glacial wells and show bedrock wells plot similarly to each other depending how much shale/boron is in the well.
- Model calibration was updated for calcium, molybdenum, and sulfate transport models.
- Cleanout and closure of the CCR impoundments at Erickson Station has been initiated and is expected to be complete by October 2023.
- Erickson Power Station impoundment monitoring status is assessment monitoring and assessment of corrective measures.

7.0 References

HDR, 2019a. Groundwater Level Monitoring Standard Operating Procedure (SOP). November 18, 2019.

HDR, 2020. Determination of Statistically Significant Increases over Background. November 23, 2020.

HDR, 2020a. Erickson Power Station Statistical Procedures Plan. May 11, 2020.

HDR, 2021. Assessment Monitoring Plan (AMP). March 26, 2021.

HDR, 2021a. Hydrogeologic Monitoring Plan (HMP). March 26, 2021.

HDR, 2021b. Response Action Plan (RAP). March 26, 2021.

HDR, 2021c. Background Water Quality Statistical Certification. November 5, 2021.

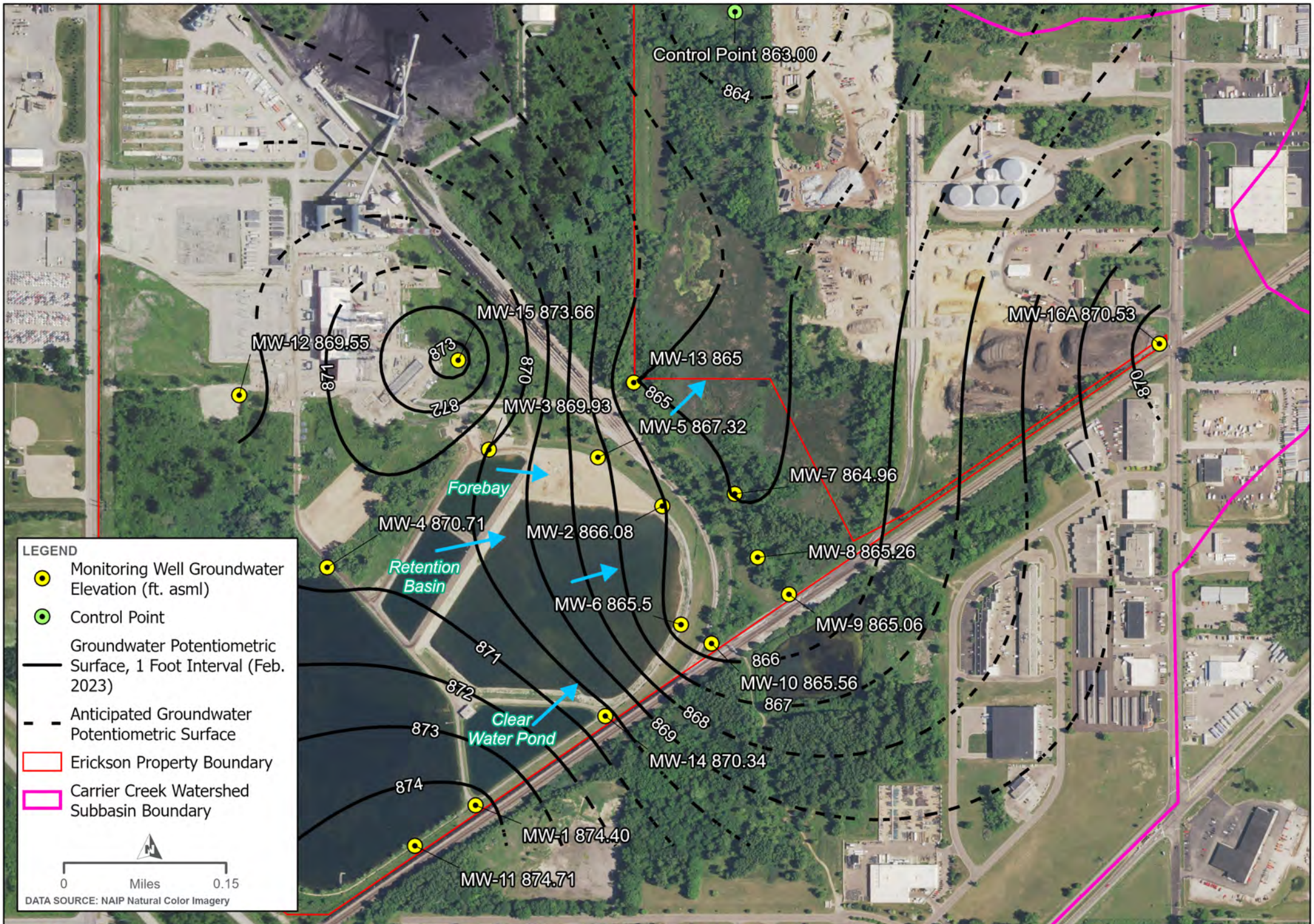
HDR, 2021d. Conceptual Site Model and Assessment of Corrective Measures. November 5, 2021

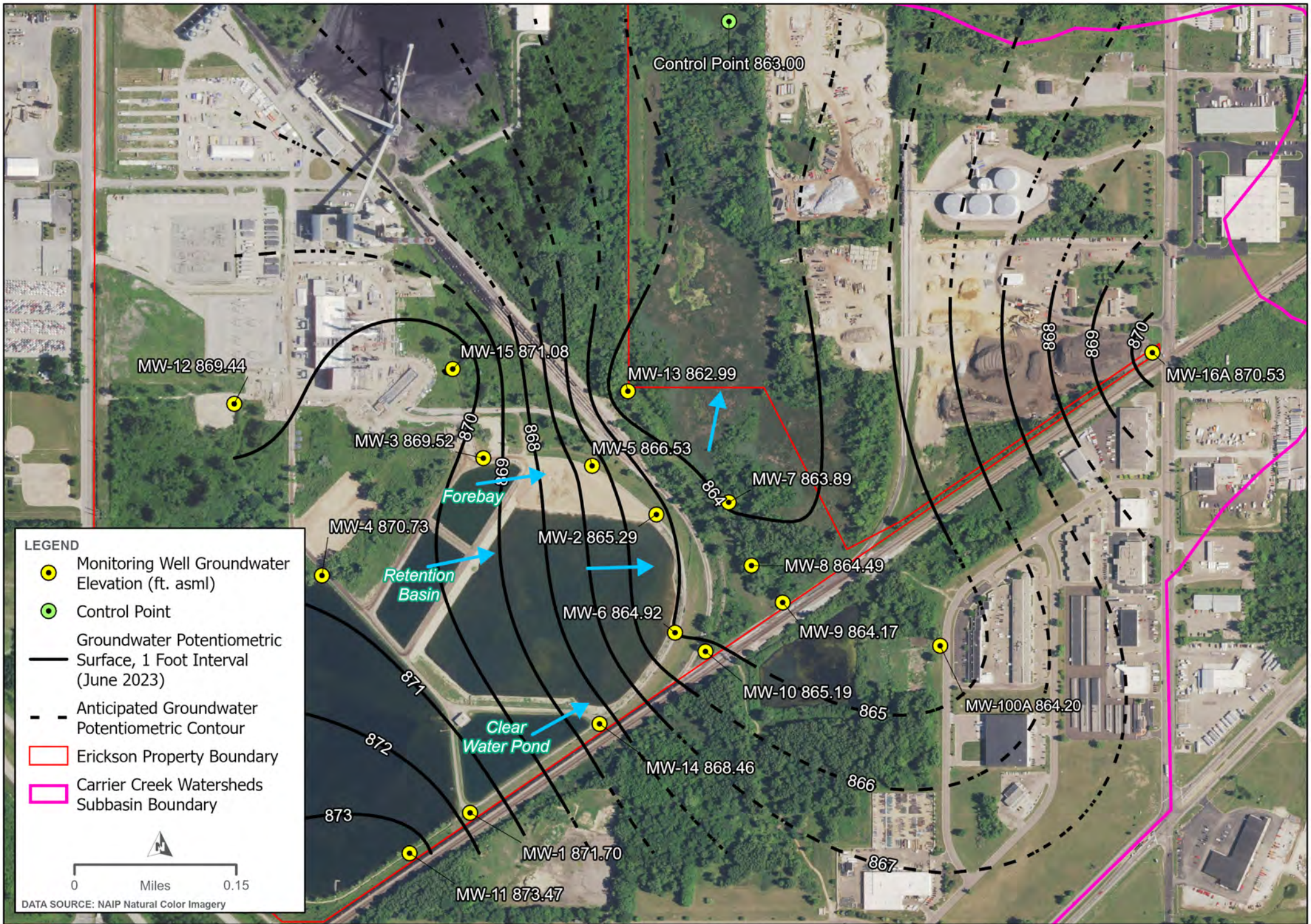
HDR, 2021e. Groundwater Monitoring System Certification, Erickson Station. November 5, 2021.

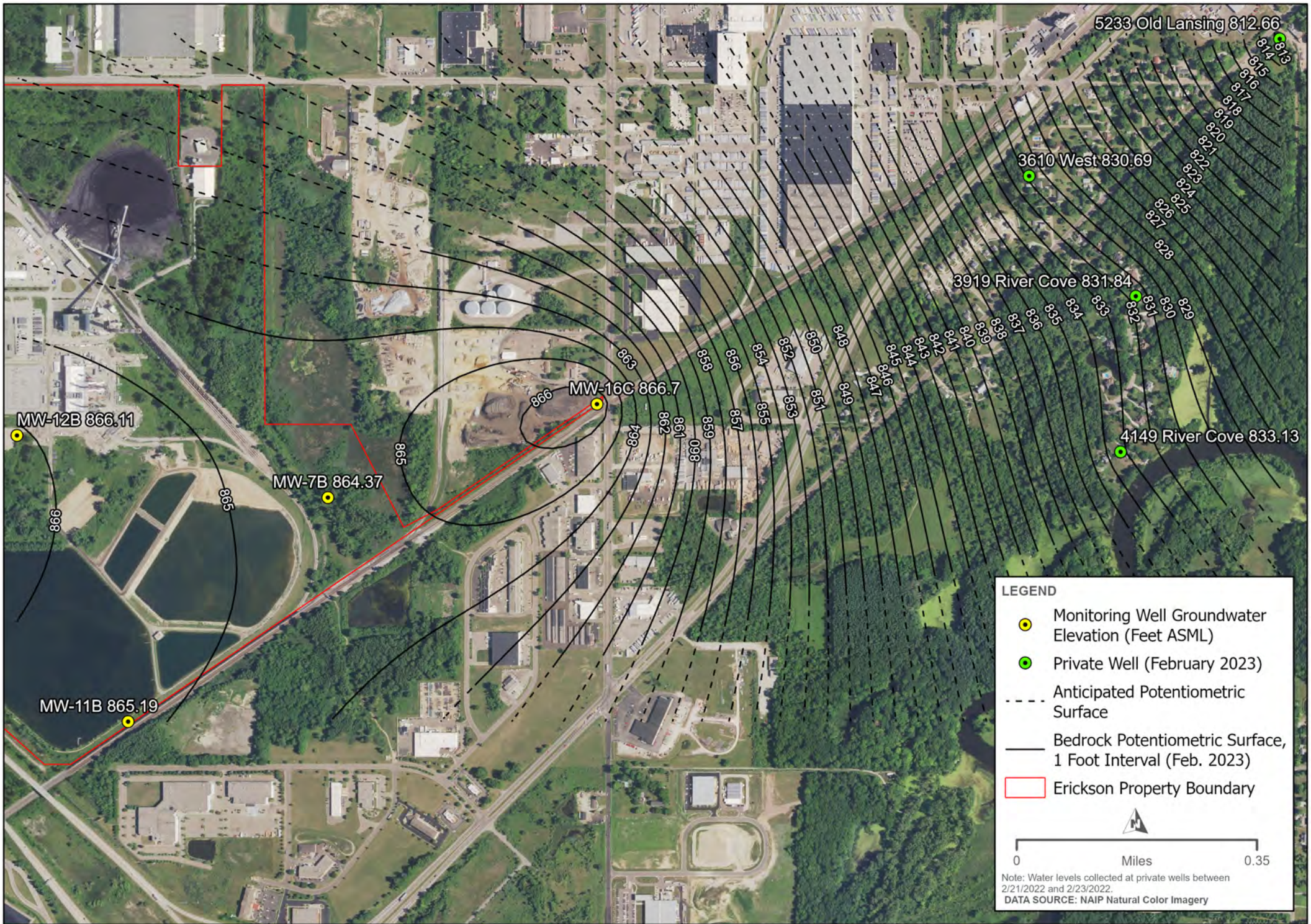
Ruhl, L. S., Dwyer, G. S., Hsu-Kim, H., Hower, J. C., and Vengosh, A, 2014. Boron and strontium isotopic characterization of coal combustion residuals: Validation of new environmental tracers. *Environmental Science & Technology*, 48(24), 14790–14798.

Appendix A

Potentiometric Surface Maps





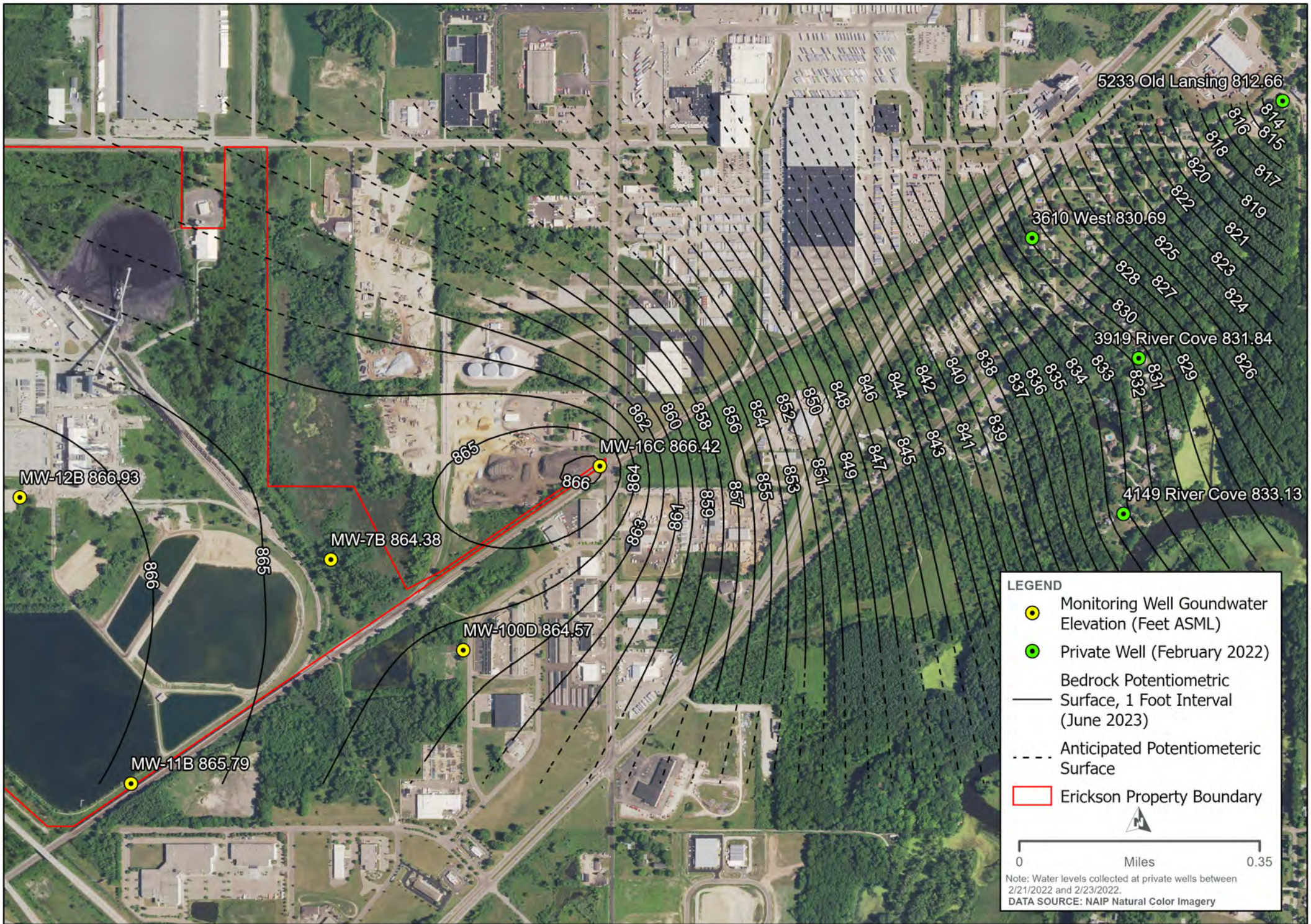


LEGEND

- Monitoring Well Groundwater Elevation (Feet ASML)
- Private Well (February 2023)
- Anticipated Potentiometric Surface
- Bedrock Potentiometric Surface, 1 Foot Interval (Feb. 2023)
- Erickson Property Boundary


0 Miles 0.35

Note: Water levels collected at private wells between 2/21/2022 and 2/23/2022.
 DATA SOURCE: NAIP Natural Color Imagery



LEGEND

- Monitoring Well Goundwater Elevation (Feet ASML)
- Private Well (February 2022)
- Bedrock Potentiometric Surface, 1 Foot Interval (June 2023)
- - - Anticipated Potentiometric Surface
- Erickson Property Boundary


 0 Miles 0.35

Note: Water levels collected at private wells between 2/21/2022 and 2/23/2022.
 DATA SOURCE: NAIP Natural Color Imagery

Appendix B

Lab Reports Summary Tables

				Sample Location:		MW-1						
				Sample Type:		Background						
				Sample Date:		11/6/2020	1/27/2021	5/4/2021	8/3/2021	2/1/2022	8/2/2022	2/7/2023
Constituent	Unit	BTVs ¹	MCL	State Program GPS	Initial A.M.	Assessment Monitoring						
Field Parameters												
pH	su	-	-	-	6.87	6.82	6.7	6.73	6.77	6.84	6.88	
Conductivity	mS/cm	-	-	-	1.205	1.240	1.2	1.185	1.188	1.208	1.098	
Turbidity	NTU	-	-	-	8.02	9.95	8.5	7.95	5.51	5.85	9.09	
Dissolved Oxygen	mg/L	-	-	-	0.21	0.09	0.1	0.08	0.07	0.14	0.22	
Temperature	°C	-	-	-	15.9	9.8	12	15.7	11.7	14.6	10.7	
Oxidation Reduction Potential	mV	-	-	-	-78.8	-27.5	-20.1	-63.4	-46.6	-95.2	-67.2	
Part 115												
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Iron	mg/L	23.5	0.3	23.5	7.12	5.45	4.84	6.61	6.92	12	9.57	
Nickel	mg/L	0.021		0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Zinc	mg/L	0.036	5	5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Appendix III												
Boron	mg/L	0.48	-	0.50	-	0.21	0.19	0.22	0.27	0.34	0.32	
Calcium	mg/L	188	-	188	-	173	156	153	166	158	150	
Chloride	mg/L	94.3	250	250	-	44	48	46	52	66	61	
Fluoride	mg/L	1.0	4	2.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
pH, Field	su	-	-	-	6.87	6.82	6.7	6.73	6.77	6.84	6.88	
Sulfate	mg/L	344	250	344	-	78	65	57	49	37	31	
Total Dissolved Solids	mg/L	1190	500	1190	-	776	760	748	746	742	546	
Appendix IV												
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Arsenic	mg/L	0.021	0.01	0.021	0.007	0.005	0.005	0.005	0.007	0.007	0.007	
Barium	mg/L	0.168	2.0	2.0	0.133	0.121	0.113	0.109	0.122	0.155	0.140	
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Fluoride	mg/L	1.0	4.0	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	
Lithium	mg/L	0.041	0.04	0.041	0.034	0.019	0.015	0.016	0.021	0.027	0.031	
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Molybdenum	mg/L	0.024	0.1	0.100	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Radium-226	pCi/L	-	-	-	0.533	0.504	0.560	0.301	0.816	0.715	0.300	
Radium-228	pCi/L	-	-	-	-0.0288	0.850	3.47	0.0172	1.76	0.891 ⁺	1.24	
Radium-226/228	pCi/L	5.00	5	5.00	0.533	1.35	4.03	0.318	2.58	1.61 ⁺	1.54	
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Total Suspended Solids	mg/L	-	-	-	19	14	14	11	13	36	32	
Bicarbonate	mg/L	-	-	-						650	636	
Carbonate	mg/L	-	-	-						<10	<10	
Hardness	mg/L	-	-	-						588	546	
Magnesium	mg/L	-	-	-						43.1	41.3	
Potassium	mg/L	-	-	-						1.14	1.08	
Sodium	mg/L	-	-	-						40.4	41.0	

				Sample Location:		MW-2						
				Sample Type:		Downgradient						
				Sample Date:		11/6/2020	1/27/2021	5/4/2021	8/3/2021	2/1/2022	8/2/2022	2/7/2023
Constituent	Unit	BTVs	MCL	State Program GPS	Initial A.M.	Assessment Monitoring						
Field Parameters												
pH	su	-	-	-	6.83	6.76	6.70	6.65	6.73	6.86	6.85	
Conductivity	mS/cm	-	-	-	1.792	1.734	1.700	1.655	1.614	1.395	1.411	
Turbidity	NTU	-	-	-	11.27	10.15	10.00	9.62	9.95	9.01	8.25	
Dissolved Oxygen	mg/L	-	-	-	0.19	0.08	0.21	0.02	0.20	1.01	0.37	
Temperature	°C	-	-	-	14.3	9.1	12.0	14.3	11.7	15.4	11.7	
Oxidation Reduction Potential	mV	-	-	-	-29.0	55.9	181.8	94.5	46.6	21	54.2	
Part 115												
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Iron	mg/L	23.5	0.3	23.5	0.54	0.49	0.55	0.66	1.93	0.93	1.30	
Nickel	mg/L	0.021		0.1	0.027	0.026	0.025	0.025	0.026	0.018	0.020	
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Zinc	mg/L	0.036	5	5	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	
Appendix III												
Boron	mg/L	0.48	-	0.50	-	5.8	5.04	6.17	5.33	4.76	5.10	
Calcium	mg/L	188	-	188	-	260	254	226	237	204	204	
Chloride	mg/L	94.3	250	250	-	94	77	79	87	87	88	
Fluoride	mg/L	1.0	4	2.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
pH, Field	su	-	-	-	6.83	6.76	6.70	6.65	6.73	6.86	6.85	
Sulfate	mg/L	344	250	344	-	506	505	504	398	330	322	
Total Dissolved Solids	mg/L	1190	500	1190	-	1320	1250	1300	1180	1020	1050	
Appendix IV												
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Arsenic	mg/L	0.021	0.01	0.021	<0.002	<0.002	<0.002	<0.002	0.004	<0.002	0.002	
Barium	mg/L	0.168	2	2.0	0.042	0.041	0.041	0.039	0.048	0.043	0.037	
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	
Lithium	mg/L	0.041	0.04	0.041	0.063	0.067	0.061	0.058	0.058	0.051	0.050	
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Molybdenum	mg/L	0.024	0.1	0.100	0.012	0.01	0.009	0.012	0.011	0.013	0.015	
Radium-226	pCi/L	-	-	-	0.539	0.296	0.366	0.170	0.630	0.290	0.184	
Radium-228	pCi/L	-	-	-	0.874	0.713	0.150	1.02	1.49	-0.338 [±]	-0.445	
Radium-226/228	pCi/L	5.00	5	5.00	1.41	1.01	0.515	1.19	2.12	0.29 [±]	0.184	
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Total Suspended Solids	mg/L	-	-	-	10	10	12	10	12	19	22	
Bicarbonate	mg/L									410	454	
Carbonate	mg/L									<10	<10	
Hardness	mg/L									654	708	
Magnesium	mg/L									50.5	50.2	
Potassium	mg/L									2.7	0.87	
Sodium	mg/L									61.6	68.3	

		Sample Location:			MW-3				
		Sample Type:			Upgradient				
		Sample Date:			5/4/2021	8/3/2021	2/1/2022	8/2/2022	2/7/2023
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring				
Field Parameters									
pH	su	-	-	-	7.20	7.15	7.23	7.27	7.28
Conductivity	mS/cm	-	-	-	1.800	1.796	1.815	1.829	1.765
Turbidity	NTU	-	-	-	2.10	8.01	4.83	5.19	4.15
Dissolved Oxygen	mg/L	-	-	-	0.10	0.03	0.16	0.17	0.35
Temperature	°C	-	-	-	12.0	14.1	10.6	14.2	12.2
Oxidation Reduction Potential	mV	-	-	-	-37.5	-65.2	-40.3	-92.1	-74.2
Part 115									
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	23.5	0.3	23.5	2.01	2.05	1.94	1.80	2.03
Nickel	mg/L	0.021		0.1	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.036	5	5	<0.005	<0.005	<0.005	<0.005	<0.005
Appendix III									
Boron	mg/L	0.48	-	0.50	5.41	6.16	5.62	5.89	5.63
Calcium	mg/L	188	-	188	243	223	255	241	248
Chloride	mg/L	94.3	250	250	89	92	94	101	102
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0
pH, Field	su	-	-	-	7.20	7.15	7.23	7.27	7.28
Sulfate	mg/L	344	250	344	698	727	682	704	727
Total Dissolved Solids	mg/L	1190	500	1190	1490	1500	1480	1440	1450
Appendix IV									
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.021	0.01	0.021	0.003	0.003	0.003	0.003	0.003
Barium	mg/L	0.168	2	2.0	0.021	0.021	0.020	0.019	0.019
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.041	0.04	0.041	0.077	0.086	0.086	0.091	0.082
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.024	0.1	0.100	0.162	0.153	0.164	0.162	0.182
Radium-226	pCi/L	-	-	-	0.437	0.152	0.554	0.355	0.566
Radium-228	pCi/L	-	-	-	0.760	0.963	1.90	2.56 ^J	1.61
Radium-226/228	pCi/L	5.00	5	5.00	1.20	1.11	2.45	2.92 ^J	2.18
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	3	1 ^U	2 ^U	4	<3
Bicarbonate	mg/L							210	215
Carbonate	mg/L							<10	<10
Hardness	mg/L							784	795
Magnesium	mg/L							45.9	46.5
Potassium	mg/L							1.67	1.67
Sodium	mg/L							111	113

				Sample Location:		MW-4										
				Sample Type:		Background										
				Sample Date:		1/27/2021	5/4/2021	8/3/2021	2/1/2022	8/2/2022	2/7/2023					
Constituent	Unit	BTVs	MCL	State Program	GPS	Assessment Monitoring										
						Field Dup	Field Dup	Field Dup	Field Dup	Field Dup	Field Dup	Field Dup	Field Dup	Field Dup	Field Dup	Field Dup
Field Parameters																
pH	su	-	-	-	7.14	7.14	7.10	7.10	7.03	7.03	7.13	7.13	7.19	7.19	7.19	7.19
Conductivity	mS/cm	-	-	-	0.900	0.900	0.910	0.910	0.884	0.884	0.911	0.911	0.429	0.429	0.882	0.882
Turbidity	NTU	-	-	-	1.57	1.57	2.00	2.00	1.84	1.84	2.54	2.54	0.75	0.75	3.28	3.28
Dissolved Oxygen	mg/L	-	-	-	0.13	0.13	0.19	0.19	0.03	0.03	0.37	0.37	0.12	0.12	0.44	0.44
Temperature	°C	-	-	-	9.7	9.7	13.0	13.0	14.4	14.4	10.6	10.6	13.8	13.8	11.5	11.5
Oxidation Reduction Potential	mV	-	-	-	-21.9	-21.9	-22.5	-22.5	-66.4	-66.4	-34.0	-34.0	-88.8	-88.8	-44.2	-44.2
Part 115																
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	23.5	0.3	23.5	1.15	1.21	1.23	1.27	1.43	1.46	1.26	1.23	1.53	1.54	1.31	1.30
Nickel	mg/L	0.021		0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.036	5	5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Appendix III																
Boron	mg/L	0.48	-	0.50	0.05	0.05	0.05	0.05	0.08	0.07	0.07	0.06	0.06	0.07	0.06	0.06
Calcium	mg/L	188	-	188	112	109	102	107	98.4	94.6	110	110	110	109	106	106
Chloride	mg/L	94.3	250	250	70	70	72	75	68	68	72	74	75	76	74	75
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
pH, Field	su	-	-	-	7.14	7.14	7.10	7.10	7.03	7.03	7.13	7.13	7.19	7.19	7.19	7.19
Sulfate	mg/L	344	250	344	57	57	56	58	52	53	54	53	51	52	56	56
Total Dissolved Solids	mg/L	1190	500	1190	522	514	532	526	568	570	548	540	554	574	532	530
Appendix IV																
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.021	0.01	0.021	0.007	0.007	0.006	0.007	0.008	0.008	0.008	0.008	0.008	0.008	0.007	0.007
Barium	mg/L	0.168	2	2.0	0.157	0.153	0.156	0.156	0.155	0.159	0.163	0.162	0.167	0.165	0.166	0.163
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.041	0.04	0.041	0.012	0.01	<0.010	0.011	0.01	0.01	0.010	0.011	0.009	0.009	0.011	0.010
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.024	0.1	0.100	<0.005	<0.005	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Radium-226	pCi/L	-	-	-	0.524 [±]	0.297 [±]	2.12	0.626	0.232 [±]	0.532 [±]	0.606 [±]	0.322 [±]	0.393	0.457	0.701	0.898
Radium-228	pCi/L	-	-	-	-0.957 [±]	0.956 [±]	2.89	-0.910	-0.362 [±]	1.81 [±]	2.17 [±]	1.41 [±]	-0.793 [±]	2.88 [±]	0.692 [±]	-0.593 [±]
Radium-226/228	pCi/L	5.00	5	5.00	0.524 [±]	1.25 [±]	5.00 [±]	0.626 [±]	0.232 [±]	2.34 [±]	2.78 [±]	1.74 [±]	0.393 [±]	3.34 [±]	1.39 [±]	0.898 [±]
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	1 ^U	<3	1 ^U	<3	1 ^U	1 ^U	2 ^U	1 ^U	3 [±]	<3 ^U	<3	<3
Bicarbonate	mg/L												400	410	406	407
Carbonate	mg/L												<10	<10	<10	<10
Hardness	mg/L												412	426	420	431
Magnesium	mg/L												39.3	38.8	38.3	38.9
Potassium	mg/L												1.41	1.41	1.39	1.41
Sodium	mg/L												28.9	28.3	28.5	28.2

				Sample Location:		MW-5							
				Sample Type:		Downgradient							
				Sample Date:		11/6/2020	1/27/2021	5/4/2021	8/3/2021	2/1/2022	8/2/2022	2/7/2023	2/7/2023
Constituent	Unit	BTVs	MCL	State Program GPS	Initial A.M.	Assessment Monitoring							
Field Parameters												Diss. Metals	
pH	su	-	-	-	7.16	7.35	6.40	7.22	7.18	7.40	7.13	7.13	
Conductivity	mS/cm	-	-	-	2.234	1.295	1.600	1.772	1.238	1.643	1.304	1.304	
Turbidity	NTU	-	-	-	18.49	15.25	21.00	9.52	14.21	20.19	23.53	23.53	
Dissolved Oxygen	mg/L	-	-	-	1.02	2.34	2.45	2.45	3.21	5.42	3.52	3.52	
Temperature	°C	-	-	-	12.5	8.6	13.0	13.3	10.1	15.3	10.5	10.5	
Oxidation Reduction Potential	mV	-	-	-	17.5	191.2	248.4	132.6	59.1	28.6	164.6	164.6	
Part 115													
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	0.019	<0.005	<0.005	<0.005	
Iron	mg/L	23.5	0.3	23.5	<0.02	0.63	0.9	1.12	4.69	0.75	0.53	<0.02	
Nickel	mg/L	0.021		0.1	0.007	0.01	0.01	0.01	0.008	0.011	0.006	0.005	
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	
Zinc	mg/L	0.036	5	5	<0.005	0.098	<0.005	0.005	0.048	0.009	0.005	<0.005	
Appendix III													
Boron	mg/L	0.48	-	0.50	-	4.61	3.66	4.82	0.37	4.29	3.53	3.26	
Calcium	mg/L	188	-	188	-	245	221	229	70.1	223	187	176	
Chloride	mg/L	94.3	250	250	-	66	73	66	43	66	56	-	
Fluoride	mg/L	1.0	4	2.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	
pH, Field	su	-	-	-	7.16	7.35	6.40	7.22	7.18	7.40	7.13	7.13	
Sulfate	mg/L	344	250	344	-	578	581	700	186	598	411	-	
Total Dissolved Solids	mg/L	1190	500	1190	-	1220	1230	1390	592	1210	984	-	
Appendix IV													
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Arsenic	mg/L	0.021	0.01	0.021	<0.002	<0.002	0.002	<0.002	0.007	<0.002	<0.002	<0.002	
Barium	mg/L	0.168	2	2.0	0.033	0.039	0.038	0.04	0.055	0.044	0.040	0.036	
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005	0.007	<0.005	<0.005	<0.005	
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	-	
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	0.014	<0.003	<0.003	<0.003	
Lithium	mg/L	0.041	0.04	0.041	0.057	0.08	0.073	0.078	0.016	0.076	0.083	0.085	
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Molybdenum	mg/L	0.024	0.1	0.100	0.032	0.054	0.05	0.039	0.010	0.063	0.055	0.055	
Radium-226	pCi/L	-	-	-	3.30	0.787	0.349	0.374	0.252	0.525	0.558	-	
Radium-228	pCi/L	-	-	-	0.921	3.2 ^l	0.726	0.271	1.54	0.33 ^h	1.22	-	
Radium-226/228	pCi/L	5.00	5	5.00	4.22	3.99 ^l	1.08	0.644	1.79	0.855 ^h	1.78	-	
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Total Suspended Solids	mg/L	-	-	-	4	7	8	4	63	17	21	-	
Bicarbonate	mg/L									280	320	-	
Carbonate	mg/L									<10	<10	-	
Hardness	mg/L									748	629	-	
Magnesium	mg/L									54.5	42.3	39.9	
Potassium	mg/L									3.77	4.44	4.06	
Sodium	mg/L									69.5	57.4	52.3	

				Sample Location:		MW-6						
				Sample Type:		Downgradient						
				Sample Date:		11/6/2020	1/27/2021	5/4/2021	8/3/2021	2/1/2022	8/2/2022	2/7/2023
Constituent	Unit	BTVs	MCL	State Program GPS	Initial A.M.	Assessment Monitoring						
Field Parameters												
pH	su	-	-	-	6.76	6.72	7.00	6.51	6.69	6.79	6.74	
Conductivity	mS/cm	-	-	-	1.169	1.178	1.000	1.022	1.045	1.091	1.224	
Turbidity	NTU	-	-	-	9.69	1.19	8.00	8.74	4.52	2.65	4.43	
Dissolved Oxygen	mg/L	-	-	-	0.18	0.12	0.10	0.07	0.08	0.44	0.19	
Temperature	°C	-	-	-	15.2	11.0	12.0	13.2	13.4	14.4	12.8	
Oxidation Reduction Potential	mV	-	-	-	12.0	122.9	70.8	168.5	68.6	18.3	30.1	
Part 115												
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Iron	mg/L	23.5	0.3	23.5	<0.02	<0.02	<0.02	0.02	0.04	0.02	<0.02	
Nickel	mg/L	0.021		0.1	0.007	0.006	0.006	0.007	0.007	<0.005	0.006	
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Zinc	mg/L	0.036	5	5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Appendix III												
Boron	mg/L	0.48	-	0.50	-	0.91	0.64	0.76	0.68	0.80	0.99	
Calcium	mg/L	188	-	188	-	191	149	146	160	169	193	
Chloride	mg/L	94.3	250	250	-	38	27	27	27	35	42	
Fluoride	mg/L	1.0	4	2.0	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
pH, Field	su	-	-	-	6.76	6.72	7.00	6.51	6.69	6.79	6.74	
Sulfate	mg/L	344	250	344	-	198	133	139	131	172	233	
Total Dissolved Solids	mg/L	1190	500	1190	-	798	658	692	688	728	866	
Appendix IV												
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Arsenic	mg/L	0.021	0.01	0.021	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Barium	mg/L	0.168	2	2.0	0.052	0.052	0.044	0.043	0.044	0.038	0.046	
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	
Lithium	mg/L	0.041	0.04	0.041	0.058	0.048	0.048	0.047	0.044	0.046	0.054	
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Molybdenum	mg/L	0.024	0.1	0.100	0.028	0.024	0.024	0.029	0.036	0.016	0.027	
Radium-226	pCi/L	-	-	-	0.343	0.263	0.320	0.116	0.571	0.0773	0.961	
Radium-228	pCi/L	-	-	-	1.36	1.72	1.13	1.30	2.04	0.324 ⁺⁺	-1.09	
Radium-226/228	pCi/L	5.00	5	5.00	1.70	1.98	1.45	1.42	2.61	0.401 ⁺⁺	0.961	
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Total Suspended Solids	mg/L	-	-	-	<3	<3	<3	2 ^U	32	<3	<3	
Bicarbonate	mg/L									480	543	
Carbonate	mg/L									<10	<10	
Hardness	mg/L									532	624	
Magnesium	mg/L									32.9	39.4	
Potassium	mg/L									6.4	6.85	
Sodium	mg/L									38.8	43.9	

			Sample Location:		MW-7	
			Sample Type:		Downgradient	
			Sample Date:		8/2/2022 2/8/2023	
Constituent	Unit	BTVs	MCL	State Program GPS	Assessment Monitoring	
Field Parameters						
pH	su	-	-	-	7.58	7.58
Conductivity	mS/cm	-	-	-	0.965	0.780
Turbidity	NTU	-	-	-	2.65	3.53
Dissolved Oxygen	mg/L	-	-	-	0.16	0.04
Temperature	°C	-	-	-	14.6	9.9
Oxidation Reduction Potential	mV	-	-	-	-129.0	-81.3
Part 115						
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005
Iron	mg/L	23.5	0.3	23.5	1.19	1.00
Nickel	mg/L	0.021		0.1	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005
Zinc	mg/L	0.036	5	5	0.007	<0.005
Appendix III						
Boron	mg/L	0.48	-	0.50	1.43	1.36
Calcium	mg/L	188	-	188	104	98.8
Chloride	mg/L	94.3	250	250	98	82
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0
pH, Field	su	-	-	-	7.58	7.58
Sulfate	mg/L	344	250	344	175	198
Total Dissolved Solids	mg/L	1190	500	1190	590	564
Appendix IV						
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005
Arsenic	mg/L	0.021	0.01	0.021	0.004	0.004
Barium	mg/L	0.168	2	2.0	0.047	0.049
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003
Lithium	mg/L	0.041	0.04	0.041	0.086	0.073
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002
Molybdenum	mg/L	0.024	0.1	0.100	0.146	0.173
Radium-226	pCi/L	-	-	-	0.568	1.06
Radium-228	pCi/L	-	-	-	1.27 [±]	4.38
Radium-226/228	pCi/L	5.00	5	5.00	1.84 [±]	5.44
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	<3	<3
Bicarbonate	mg/L				180	163
Carbonate	mg/L				<10	<10
Hardness	mg/L				305	290
Magnesium	mg/L				12.3	12.3
Potassium	mg/L				9.53	8.90
Sodium	mg/L				71.1	66.5

				Sample Location:	MW-7B											
				Sample Type:	Downgradient											
				Sample Date:	3/9/2022	4/13/2022	5/19/2022	6/23/2022	7/28/2022	9/1/2022	10/6/2022	11/10/2022	2/8/2023			
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring											Assessment Monitoring
Field Parameters						Field Dup		Field Dup								
pH	su	-	-	-	8.14	8.14	8.04	8.04	8.07	7.73	7.81	7.90	7.80	7.85	8.15	
Conductivity	mS/cm	-	-	-	0.73	0.73	0.588	0.588	0.589	0.586	0.588	0.580	0.587	0.577	0.577	
Turbidity	NTU	-	-	-	0.02	0.02	7.01	7.01	6.25	6.01	4.05	4.20	5.25	6.01	3.12	
Dissolved Oxygen	mg/L	-	-	-	0.85	0.85	0.26	0.26	0.1	0.09	0.11	0.67	0.16	0.12	0.07	
Temperature	°C	-	-	-	11.7	11.7	11.0	11.0	13.1	13.3	14.1	14.0	13.3	13.4	11.2	
Oxidation Reduction Potential	mV	-	-	-	19.2	19.2	-95.1	-95.1	-135.8	-38.8	-108.9	-117.5	-98.2	-106.9	-130.1	
Part 115																
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Iron	mg/L	3.0	0.3	3.04	0.06	0.06	0.03	0.03	0.03	0.05 ¹	0.04	0.05	0.06	0.07	0.08	
Nickel	mg/L	0.011		0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Zinc	mg/L	0.042	5	5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Appendix III																
Boron	mg/L	3.52	-	3.52	3.07	3.09	2.90	2.88	3.02	3.04	2.98	3.17	2.91	2.94	3.00	
Calcium	mg/L	69.6	-	69.6	10.2	10.4	9.59	9.28	8.24	9.22	9.25	9.14	8.73	9.24	8.77	
Chloride	mg/L	5.0	250	250	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
pH, Field	su	-	-	-	8.14	8.14	8.04	8.04	8.07	7.73	7.81	7.90	7.80	7.85	8.15	
Sulfate	mg/L	5.0	250	250	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	
Total Dissolved Solids	mg/L	380	500	500	366	366	362	370	366	362	376	356	376	368	362	
Appendix IV																
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Arsenic	mg/L	0.009	0.01	0.01	<0.002	<0.002	0.003	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Barium	mg/L	0.081	2	2.0	0.01	0.009	0.011	0.011	0.01	0.009	0.009	0.009	0.010	0.008	0.009	
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Chromium	mg/L	0.005	0.1	0.100	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Fluoride	mg/L	1.0	4	2.00	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	
Lithium	mg/L	0.055	0.04	0.055	0.034	0.035	0.028	0.029	0.031	0.031	0.032	0.032	0.032	0.032	0.032	
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Molybdenum	mg/L	0.011	0.1	0.100	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Radium-226	pCi/L	-	-	-	0.451	0.629	0.439	0.52	0.378	0.547	0.278	0.440	0.988	0.463	0.504	
Radium-228	pCi/L	-	-	-	1.270	0.536	0.872	0.428	-0.123	1.88	0.136 ¹⁺	0.286	0.103	1.30	-0.879	
Radium-226/228	pCi/L	5.5	5	5.50	1.720	1.160	1.31	0.948	0.378	2.43	0.414 ¹⁺	0.726	1.09	1.77	0.504	
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Total Suspended Solids	mg/L	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	
Bicarbonate	mg/L				390	390	390	400	400	380	390	390	390	400	418	
Carbonate	mg/L				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
Hardness	mg/L				38	40	37	51	29	31	30	29	30	29	29	
Magnesium	mg/L				2.93	3.00	2.99	2.93	2.43	2.75	2.79	2.84	2.75	2.78	2.81	
Potassium	mg/L				5.48	5.57	5.64	5.57	4.8	5.57	5.72	5.61	5.53	5.85	5.58	
Sodium	mg/L				132	131	136	133	116	135	138	140	138	137	142	

				Sample Location:	MW-7C										
				Sample Type:	Downgradient										
				Sample Date:	3/10/2022	3/10/2022	4/14/2022	5/19/2022	6/23/2022	7/28/2022	9/1/2022	10/6/2022	11/10/2022	2/8/2023	
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring										Assessment Monitoring
Field Parameters															
						Field Dup									
pH	su	-	-	-	7.32	7.32	7.51	7.49	7.28	7.24	7.30	7.23	7.35	7.41	
Conductivity	mS/cm	-	-	-	2.01	2.01	1.811	1.758	1.651	1.672	1.700	1.330	1.678	1.537	
Turbidity	NTU	-	-	-	0.02	0.02	5.87	3.95	2.59	1.97	2.80	4.20	4.01	7.29	
Dissolved Oxygen	mg/L	-	-	-	1.77	1.77	0.23	0.07	0.08	0.09	0.61	0.12	0.09	0.09	
Temperature	°C	-	-	-	12.3	12.3	11.0	13.7	13.8	14.3	16.0	13.7	13.8	11.3	
Oxidation Reduction Potential	mV	-	-	-	-39	-39	-121.4	-182.8	-110.2	-151.5	-136.4	-128.8	-120.4	-111.5	
Part 115															
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Iron	mg/L	23.5	0.3	23.5	4.15	4.11	4.34	4.28	3.77 ¹	3.84	4.11	3.81	4.11	3.67	
Nickel	mg/L	0.021		0.1	0.01	0.011	0.008	0.008	0.007	0.008	0.008	0.007	0.007	0.007	
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Zinc	mg/L	0.036	5	5	<0.005	0.007	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	
Appendix III															
Boron	mg/L	0.48	-	0.50	6.54	6.55	6.44	6.74	6.46	6.7	7.24	6.29	6.62	6.46	
Calcium	mg/L	188	-	188	277	272	255	183	245	241	247	234	243	246	
Chloride	mg/L	94.3	250	250	96	95	101	93	91	90	93	93	92	94	
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
pH, Field	su	-	-	-	7.32	7.32	7.51	7.49	7.28	7.24	7.30	7.23	7.35	7.41	
Sulfate	mg/L	344	250	344	751	761	736	723	668	660	703	675	685	687	
Total Dissolved Solids	mg/L	1190	500	1190	1500	1500	1450	1420	1360	1360	1370	1360	1360	1360	
Appendix IV															
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Arsenic	mg/L	0.021	0.01	0.021	0.007	0.007	0.006	0.007	0.006	0.006	0.006	0.006	0.005	0.006	
Barium	mg/L	0.168	2	2.0	0.045	0.046	0.043	0.046	0.041	0.042	0.047	0.041	0.044	0.041	
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	0.0007	<0.0005	<0.0005	0.0008	<0.0005	0.0009	<0.0005	
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	
Lithium	mg/L	0.041	0.04	0.041	0.132	0.129	0.121	0.130	0.127	0.138	0.137	0.128	0.125	0.125	
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Molybdenum	mg/L	0.024	0.1	0.100	0.41	0.41	0.40	0.42	0.379	0.39	0.405	0.377	0.415	0.386	
Radium-226	pCi/L	-	-	-	0.867	0.916	0.566	0.444	0.958	0.193	0.606	0.595	0.680	1.11	
Radium-228	pCi/L	-	-	-	2.790	2.110	3.090	0.550	2.35	0.58 ¹⁺	0.204	1.39	1.08	2.17	
Radium-226/228	pCi/L	5.00	5	5.00	3.660	3.030	3.650	0.994	3.31	0.773 ¹⁺	0.810	1.99	1.76	3.27	
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Total Suspended Solids	mg/L	-	-	-	27 ¹⁺	13 ¹⁺	10	9	8	<3	<3	<3	6	7	
Bicarbonate	mg/L				150	160	160	170	160	160	170	150	150	172	
Carbonate	mg/L				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	
Hardness	mg/L				840	860	812	812	777	740	764	750	754	742	
Magnesium	mg/L				44.1	44.90	43.10	33.70	40	40	42.2	42.1	41.0	42.7	
Potassium	mg/L				5.34	5.04	5.68	4.92	5.89	5.71	5.88	6.14	5.96	6.07	
Sodium	mg/L				97.9	97.1	96.8	79	94.2	95.7	99.1	95.7	98.7	99.8	

				Sample Location:		MW-8										
				Sample Type:		Downgradient										
				Sample Date:		6/15/2021	7/20/2021	8/24/2021	9/28/2021	11/2/2021	12/7/2021	1/11/2022	2/17/2022	8/2/2022	2/8/2023	
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring										Assessment Monitoring	
Field Parameters																
pH	su	-	-	-	7.78	7.00	6.99	7.24	7.03	7.12	7.26	6.99	7.18	7.18		
Conductivity	mS/cm	-	-	-	0.620	0.640	0.620	0.721	0.656	0.653	0.637	0.638	0.665	0.634		
Turbidity	NTU	-	-	-	2.24	7.00	7.18	6.53	5.25	2.95	5.43	2	4.31	6.17		
Dissolved Oxygen	mg/L	-	-	-	2.29	1.00	1.66	0.04	7.83	1.76	2.24	1.64	0.88	2.92		
Temperature	°C	-	-	-	10.7	14.0	16.4	14.3	14	11.2	9.2	5.9	14.4	9.4		
Oxidation Reduction Potential	mV	-	-	-	72.1	280.5	325.9	112.7	228.5	122	234.6	365.3	100.5	249.8		
Part 115																
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Iron	mg/L	23.5	0.3	23.5	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02		
Nickel	mg/L	0.021		0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Zinc	mg/L	0.036	5	5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Appendix III																
Boron	mg/L	0.48	-	0.50	0.11	0.10	0.08	0.21	0.08	0.05	0.04	<0.04	0.08	0.08		
Calcium	mg/L	188	-	188	91.2	94.6	89.8	86.5	93.0	98.5	98.6	100.0	95.3	104		
Chloride	mg/L	94.3	250	250	11	17	10	59	8	4.45	<5	<5	15.00	24		
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.0587	<1.0	<1.0	<1.0	<1.0		
pH, Field	su	-	-	-	7.78	7.00	6.99	7.24	7.03	7.12	7.26	6.99	7.18	7.18		
Sulfate	mg/L	344	250	344	25	35	17	48	16	13.8	11	11	15	32		
Total Dissolved Solids	mg/L	1190	500	1190	392	384	362	414	368	370	372	382	382	430		
Appendix IV																
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Arsenic	mg/L	0.021	0.01	0.021	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		
Barium	mg/L	0.168	2	2.0	0.028	0.021	0.022	0.026	0.021	0.021	0.018	0.017	0.019	0.022		
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.0587	<1.0	<1.0	<1.0	<1.0		
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003		
Lithium	mg/L	0.041	0.04	0.041	<0.010	<0.005	<0.005	0.013	0.009	0.006	<0.005	<0.005	0.005	0.007		
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002 ^U	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
Molybdenum	mg/L	0.024	0.1	0.100	<0.011	0.006	<0.005	0.013	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Radium-226	pCi/L	-	-	-	0.287	0.389	0.437	0.228	0.228 ^I	1.70	1.77	0.843	0.201	0.118		
Radium-228	pCi/L	-	-	-	0.396 ^{H+}	-0.103	0.114	0.469	1.71	0.583	4.44	2.00	3.04 ^{H+}	-0.133		
Radium-226/228	pCi/L	5.00	5	5.00	0.683 ^{H+}	0.389	0.551	0.697	1.93 ^I	2.28	6.21	2.84	3.24 ^{H+}	0.118		
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		
Total Suspended Solids	mg/L	-	-	-	<3	<3	<3	<3	<3	2 ^U	<3	<3	<3	<3		
Bicarbonate	mg/L												410	440		
Carbonate	mg/L												<10	<10		
Hardness	mg/L												347	384		
Magnesium	mg/L												28.9	31.8		
Potassium	mg/L												0.57	0.53		
Sodium	mg/L												12.7	14.2		

		Sample Location:		MW-9						
		Sample Type:		Downgradient						
		Sample Date:		1/11/2022	2/17/2022	8/2/2022	2/8/2023			
Constituent	Unit	BTVs	MCL	State	Background Monitoring				Assessment	
				Program	GPS	Field Dup		Field Dup		Monitoring
Field Parameters										
pH	su	-	-	-	7.35	7.35	7.16	7.16	7.44	7.45
Conductivity	mS/cm	-	-	-	0.455	0.455	0.471	0.471	0.420	0.424
Turbidity	NTU	-	-	-	2.89	2.89	1.6	1.6	3.44	3.01
Dissolved Oxygen	mg/L	-	-	-	6.13	6.13	6.17	6.17	3.96	6.33
Temperature	°C	-	-	-	7	7	4.7	4.7	19.2	7.3
Oxidation Reduction Potential	mV	-	-	-	260.1	260.1	380.9	380.9	99.2	252.1
Part 115										
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	23.5	0.3	23.5	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	mg/L	0.021		0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.036	5	5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Appendix III										
Boron	mg/L	0.48	-	0.50	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Calcium	mg/L	188	-	188	76.9	75.0	77.6	78	61.8	76.9
Chloride	mg/L	94.3	250	250	<5	<5	<5	<5	<5	<5
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
pH, Field	su	-	-	-	7.35	7.35	7.16	7.16	7.44	7.45
Sulfate	mg/L	344	250	344	<5	<5	<5	<5	5.00	<5
Total Dissolved Solids	mg/L	1190	500	1190	264	266	280	276	242	274
Appendix IV										
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.021	0.01	0.021	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Barium	mg/L	0.168	2	2.0	0.013	0.013	0.013	0.013	0.013	0.014
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.041	0.04	0.041	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.024	0.1	0.100	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Radium-226	pCi/L	-	-	-	0.838 [±]	1.22 [±]	0.533	0.657	0.0527	0.3720
Radium-228	pCi/L	-	-	-	1.53 [±]	-0.724 [±]	0.0438 [±]	0.283 [±]	1.88 [±]	1.60
Radium-226/228	pCi/L	5.00	5	5.00	2.37 [±]	1.22 [±]	0.576 [±]	0.940 [±]	1.94 [±]	1.97
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	<3	<3	<3	<3	<3	<3
Bicarbonate	mg/L								260	336
Carbonate	mg/L								<10	<10
Hardness	mg/L								218	261
Magnesium	mg/L								15.2	19.4
Potassium	mg/L								1.09	0.93
Sodium	mg/L								2.41	2.86

				Sample Location:	MW-10										
				Sample Type:	Downgradient										
				Sample Date:	6/15/2021	7/20/2021	8/24/2021	9/28/2021	11/2/2021	12/7/2021	1/11/2022	2/17/2022	8/2/2022	2/8/2023	2/8/2023
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring								Assessment Monitoring		
Field Parameters															
pH	su	-	-	-	7.30	6.60	6.70	6.89	6.57	6.69	6.68	6.49	6.85	6.73	6.73
Conductivity	mS/cm	-	-	-	0.725	0.71	0.741	0.664	0.78	0.753	0.807	0.784	0.691	0.679	0.679
Turbidity	NTU	-	-	-	1.79	2.3	1.95	5.99	1.29	2.09	2.98	3.76	3.57	1.88	1.88
Dissolved Oxygen	mg/L	-	-	-	2.05	3.3	3.2	2.43	2.83	2.89	3.92	3.61	2.82	4.03	4.03
Temperature	°C	-	-	-	12.0	14	15.5	15	14.2	11.6	9.7	8.6	15.4	9.5	9.5
Oxidation Reduction Potential	mV	-	-	-	121.2	240.0	330.1	164.1	230.9	147.9	283.3	391.8	98.9	238.0	238
Part 115															
Copper	mg/L	0.005	1.3	1.00	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	23.5	0.3	23.5	< 0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	mg/L	0.021		0.1	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.036	5	5	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.020	<0.005	0.01	<0.005	<0.005
Appendix III															
Boron	mg/L	0.48	-	0.50	0.05	0.05	0.06	0.05	0.07	0.05	0.06	0.05	0.05	0.04	0.05
Calcium	mg/L	188	-	188	132	128	129	113	137	128	141	142	117	136	140
Chloride	mg/L	94.3	250	250	< 5	<5	<5	<5	<5	1.03	<5	<5	<5	<5	<5
Fluoride	mg/L	1.0	4	2.0	< 1.0	<1.0	<1.0	<1.0	<1.0	0.0660	<1.0	<1.0	<1.0	<1.0	<1.0
pH, Field	su	-	-	-	7.30	6.60	6.70	6.89	6.57	6.69	6.68	6.49	6.85	6.73	6.73
Sulfate	mg/L	344	250	344	12	15	14	9	17	14.5	18	16	10	13	13
Total Dissolved Solids	mg/L	1190	500	1190	446	410	432	376	436	428	474	482	398	494	482
Appendix IV															
Antimony	mg/L	0.005	0.006	0.006	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.021	0.01	0.021	< 0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Barium	mg/L	0.168	2	2.0	0.044	0.041	0.047	0.041	0.044	0.043	0.040	0.038	0.037	0.036	0.036
Beryllium	mg/L	0.001	0.004	0.004	< 0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	< 0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.1	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.0	< 1.0	<1.0	<1.0	<1.0	<1.0	0.0660	<1.0	<1.0	<1.0	<1.0	<1.0
Lead	mg/L	0.003	0.015	0.004	< 0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.041	0.04	0.041	< 0.010	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Mercury	mg/L	0.0002	0.002	0.002	0.0002	<0.0002	<0.0002	<0.0002 ^{UJ}	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.024	0.1	0.100	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Radium-226	pCi/L	-	-	-	0.548	0.262	0.183	0.701	0.381 ¹	1.46	1.59	0.894	0.195	0.407	0.443
Radium-228	pCi/L	-	-	-	0.123 ³⁺	-0.994	0.187	-0.076	0.225	0.929	0.142	-0.916	0.402 ³⁺	-0.255 ³⁺	0.758 ³⁺
Radium-226/228	pCi/L	5.00	5	5.00	0.671 ¹⁺	0.262	0.371	0.701	0.605 ¹	2.39	1.73	0.894	0.597 ³⁺	0.407 ³⁺	1.20 ³⁺
Selenium	mg/L	0.005	0.05	0.050	< 0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	< 0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	< 3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Bicarbonate	mg/L												440	525	522
Carbonate	mg/L												<10	<10	<10
Hardness	mg/L												382	461	460
Magnesium	mg/L												23.6	29.5	29.2
Potassium	mg/L												0.73	0.62	0.70
Sodium	mg/L												2.24	2.54	2.73

			Sample Location:		MW-11												
			Sample Type:		Background												
			Sample Date:		2/23/2022	3/30/2022	5/4/2022	6/8/2022	7/13/2022	8/17/2022	9/21/2022						
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring												
					Field Dup	Field Dup	Field Dup	Field Dup	Field Dup	Field Dup	Field Dup	Field Dup	Field Dup	Field Dup	Field Dup	Field Dup	
Field Parameters																	
pH	su	-	-	-	6.84	6.84	6.64	6.64	6.78	6.76	6.76	6.73	6.73	6.88	6.88	6.91	6.91
Conductivity	mS/cm	-	-	-	1.08	1.08	1.119	1.119	1.093	1.11	1.11	1.008	1.008	1.117	1.117	1.122	1.122
Turbidity	NTU	-	-	-	9.65	9.65	8.95	8.95	9.22	6.98	6.98	3.02	3.02	4.01	4.01	5.25	5.25
Dissolved Oxygen	mg/L	-	-	-	0.01	0.01	0.07	0.07	0.06	0.56	0.56	0.08	0.08	0.21	0.21	0.18	0.18
Temperature	°C	-	-	-	9.50	9.50	9.8	9.8	12	11.3	11.3	12.8	12.8	14.4	14.4	15.7	15.7
Oxidation Reduction Potential	mV	-	-	-	-88.90	-88.90	-83.9	-83.9	-103.4	-109.6	-109.6	-97.3	-97.3	-129.8	-129.8	-122.9	-122.1
Part 115																	
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	23.5	0.3	23.5	22.2	22.0	23.2	23.0	23.50	21.4	21.9	22	21.8 ^l	21.4	20.9	21.5	20.8
Nickel	mg/L	0.021		0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.036	5	5	<0.005	<0.005	<0.005	<0.005	<0.005	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	0.006
Appendix III																	
Boron	mg/L	0.48	-	0.50	0.22	0.22	0.20	0.22	0.21	0.22	0.22	0.21	0.2	0.21	0.2	0.22	0.22
Calcium	mg/L	188	-	188	136	130	138	140	144	139	138	134	135	140	138	141	142
Chloride	mg/L	94.3	250	250	67	67	67	67	63	63	63	61	62	63	64	61	62
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
pH, Field	su	-	-	-	6.84	6.84	6.64	6.64	6.78	6.76	6.76	6.73	6.73	6.88	6.88	6.91	6.91
Sulfate	mg/L	344	250	344	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total Dissolved Solids	mg/L	1190	500	1190	632	532	642	636	612	644	654	666	644	368	344	652	658
Appendix IV																	
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.021	0.01	0.021	0.018	0.018	0.018	0.017	0.02	0.018	0.018	0.019	0.018	0.021	0.019	0.021	0.02
Barium	mg/L	0.168	2	2.0	0.147	0.146	0.144	0.145	0.146	0.142	0.144	0.143	0.147	0.15	0.146	0.167	0.165
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.041	0.04	0.041	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.024	0.1	0.100	<0.005	<0.005	<0.005	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005 ^U	0.005 ⁺
Radium-226	pCi/L	-	-	-	0.273 ⁺	0.472 ⁺	0.358 ⁺	0.603 ⁺	0.545	0.618 ^l	1.520 ^l	0.325 ⁺	0.942 ⁺	0.542 ⁺	0.971 ⁺	0.396	0.443
Radium-228	pCi/L	-	-	-	0.000 ⁺	0.248 ⁺	0.757 ⁺	-0.419 ⁺	0.479 ^l	0.573 ^l	0.630 ^l	0.925	0.383	0.0495 ⁺	0.835 ⁺	0.0525 ⁺	0.994 ⁺
Radium-226/228	pCi/L	5.00	5	5.00	0.273 ⁺	0.720 ⁺	1.11 ⁺	0.603 ⁺	1.020	1.190 ^l	2.150 ^l	1.25 ⁺	1.33 ⁺	0.591 ⁺	1.81 ⁺	0.449 ⁺	1.44 ⁺
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	48	41	32	32	23	32	31	29	28	20	23	23	20
Other																	
Bicarbonate	mg/L								610	595	593	600	610	620	630	600	620
Carbonate	mg/L								<10	<10	<10	<10	<10	<10	<10	<10	<10
Hardness	mg/L								506	495	490	503	512	529	502	512	508
Magnesium	mg/L								39.0	37.8	40.80	39.4	39.1	38.8	38.3	39.8	39.6
Potassium	mg/L								1.47	1.45	1.38	1.3	1.32	1.31	1.3	1.38	1.52
Sodium	mg/L								40.4	39.6	39.70	37.5	38.8	38.9	37	38.7	38.5

		Sample Location: MW-11						
		Sample Type: Background						
		Sample Date: 10/26/2022			2/9/2023			
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring		Assessment Monitoring	
Field Parameters								
pH	su	-	-	-	6.77	6.77	7.43	7.43
Conductivity	mS/cm	-	-	-	1.075	1.075	1.082	1.082
Turbidity	NTU	-	-	-	5.78	5.78	25.29	25.29
Dissolved Oxygen	mg/L	-	-	-	0.37	0.37	0.33	0.33
Temperature	°C	-	-	-	12.2	12.2	10.9	10.9
Oxidation Reduction Potential	mV	-	-	-	-99.1	-99.1	-191.1	-191.1
Part 115								
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	23.5	0.3	23.5	19.8	20.6	15.5	0.44
Nickel	mg/L	0.021		0.1	0.007 ⁺	<0.005 ^{UJ}	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.036	5	5	0.018 ⁺	0.006 ⁻	<0.005	<0.005
Appendix III								
Boron	mg/L	0.48	-	0.50	0.21	0.21	0.21	0.20
Calcium	mg/L	188	-	188	138	139	140	132
Chloride	mg/L	94.3	250	250	62	62	59	-
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	-
pH, Field	su	-	-	-	6.77	6.77	7.43	7.43
Sulfate	mg/L	344	250	344	<5	<5	<5	-
Total Dissolved Solids	mg/L	1190	500	1190	664	664	668	-
Appendix IV								
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.021	0.01	0.021	0.02	0.02	0.017	0.004
Barium	mg/L	0.168	2	2.0	0.158	0.154	0.151	0.105
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	-
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.041	0.04	0.041	<0.005	<0.005	0.005	<0.005
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.024	0.1	0.100	<0.005	<0.005	0.006	0.006
Radium-226	pCi/L	-	-	-	0.981	0.59	0.194	-
Radium-228	pCi/L	-	-	-	1.53	1.18	0.824	-
Radium-226/228	pCi/L	5.00	5	5.00	2.51	1.77	1.02	-
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	29	32	35	-
Other								
Bicarbonate	mg/L				601	604	645	-
Carbonate	mg/L				<10	<10	<10	-
Hardness	mg/L				512	518	509	-
Magnesium	mg/L				39.4	39.3	40.5	37.5
Potassium	mg/L				1.47	1.45	11.4	10.9
Sodium	mg/L				39.1	38.3	37.5	36.1

			Sample Location:		MW-11B											
			Sample Type:		Background											
			Sample Date:		4/28/2022	6/2/2022	7/7/2022	8/11/2022	9/15/2022	10/20/2022						
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring											
Field Parameters						Field Dup		Field Dup		Field Dup		Field Dup		Field Dup		Field Dup
pH	su	-	-	-	7.95	7.95	7.28	7.28	7.15	7.15	7.37	7.37	7.33	7.33	7.29	7.29
Conductivity	mS/cm	-	-	-	0.538	0.538	0.544	0.544	0.537	0.537	0.527	0.527	0.535	0.535	0.535	0.535
Turbidity	NTU	-	-	-	1.12	1.12	8.03	8.03	8.02	8.02	6.15	6.15	4.14	4.14	5.15	5.15
Dissolved Oxygen	mg/L	-	-	-	11.68	11.68	0.35	0.35	0.22	0.22	0.24	0.24	0.07	0.07	0.03	0.03
Temperature	°C	-	-	-	12.3	12.3	13.7	13.7	14.6	14.6	13.4	13.4	13.2	13.2	11.4	11.4
Oxidation Reduction Potential	mV	-	-	-	228	228	-74.2	-74.2	-110.4	-110.4	-158.4	-158.4	-189.3	-189.4	-138.1	-138.1
Part 115																
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	3.0	0.3	3.04	0.10	0.11	0.96	0.98	2.59	2.66	3.04	3	2.48	2.44	1.82	1.83
Nickel	mg/L	0.011		0.1	<0.005	<0.005	<0.005	<0.005	0.011 ⁺	<0.005 ^{UJ}	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.042	5	5	<0.005	<0.005	<0.005	<0.005	0.042 ⁺	<0.005 ^{UJ}	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Appendix III																
Boron	mg/L	3.5	-	3.52	0.62	0.63	0.65	0.66	0.69	0.71	0.77	0.75	0.73	0.72	0.72	0.71
Calcium	mg/L	70	-	69.6	64.6	63.9	63.8	65	66.1	66.1	66.6	65.6	64	64.7	60.3	59.9
Chloride	mg/L	5.0	250	250	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
pH, Field	su	-	-	-	7.95	7.95	7.28	7.28	7.15	7.15	7.37	7.37	7.33	7.33	7.29	7.29
Sulfate	mg/L	5.0	250	250	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total Dissolved Solids	mg/L	380	500	500	304	294	300	308	296	306	308	288	300	300	304	314
Appendix IV																
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.009	0.01	0.01	0.003	0.003	0.004	0.004	0.007	0.008	0.009	0.009	0.009	0.009	0.008	0.008
Barium	mg/L	0.081	2	2.0	0.081	0.08	0.07	0.072	0.07	0.071	0.068	0.069	0.068	0.069	0.066	0.066
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.100	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.00	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0	<1.0
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.055	0.04	0.055	0.03	0.03	0.02	0.02	0.024	0.025	0.025	0.024	0.026	0.028	0.026	0.025
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.011	0.1	0.100	<0.005	<0.005	0.01	0.01	0.007	0.007	0.007	0.006	0.006	0.006	<0.005	<0.005
Radium-226	pCi/L	-	-	-	1.010	1.440	1.72	1.79	0.638 ⁺	0.0501 ⁺	0.702	1.06	0.518	0.509	0.633	0.527
Radium-228	pCi/L	-	-	-	1.680	2.140	0.633	1.68	0.753 ⁺	0.445 ⁺	-1.33 ⁺	1.32 ⁺	0.773 ⁺	0.0951 ¹	1.33 ¹	2.60 ⁺
Radium-226/228	pCi/L	5.5	5	5.50	2.690	3.590	2.35	3.47	1.39 ⁺	0.495 ⁺	0.702 ⁺	2.38 ⁺	1.29 ⁺	0.604 ¹	1.96 ¹	3.13 ⁺
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	1.7 ^U	2.7 ^U	<3	<3	3	4	<3 ^{UJ}	4 ⁺	5	5	4	3
Other																
Bicarbonate	mg/L				350	350	350	350	350	360	370	370	350	360	360	360
Carbonate	mg/L				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Hardness	mg/L				265	265	260	260	260	260	261	258	261	258	261	260
Magnesium	mg/L				24.30	24.80	23.30	23.10	24.6	24.3	24.3	24.2	23.4	23.7	21.3	21.2
Potassium	mg/L				6.07	6.12	6.08	6.07	6.28	6.24	6.4	6.31	5.98	6.24	5.81	5.82
Sodium	mg/L				13.50	13.70	17.60	17.20	17.9	17.9	17.7	17.3	16	16.2	14.5	14.3

			Sample Location: MW-11B							
			Sample Type: Background							
			Sample Date: 11/22/2022		12/27/2022		2/9/2023			
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring				Assessment Monitoring	
Field Parameters						Field Dup		Field Dup		Field Dup
pH	su	-	-	-	7.10	7.10	7.16	7.16	7.35	7.35
Conductivity	mS/cm	-	-	-	0.532	0.532	0.515	0.515	0.522	0.522
Turbidity	NTU	-	-	-	6.15	6.15	8.45	8.45	7.12	7.12
Dissolved Oxygen	mg/L	-	-	-	0.12	0.12	0.09	0.09	0.23	0.23
Temperature	°C	-	-	-	11.8	11.8	11.4	11.4	11.9	11.9
Oxidation Reduction Potential	mV	-	-	-	-92.6	-92.6	-94.7	-94.7	-133.1	-133.1
Part 115										
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	3.0	0.3	3.04	1.32	1.3	2.3	2.25	1.23	1.24
Nickel	mg/L	0.011		0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.042	5	5	<0.005	<0.005	<0.005	<0.005	0.012 ⁺	<0.005 ^U
Appendix III										
Boron	mg/L	3.5	-	3.52	0.73	0.73	0.83	0.83	0.80	0.82
Calcium	mg/L	70	-	69.6	66.3	66.2	69.6	67	65.7	66.0
Chloride	mg/L	5.0	250	250	1.7 ^U	1.7 ^U	<5	<5	<5	<5
Fluoride	mg/L	1.0	4	2.0	<1.0	0.16 ^U	<1.0	<1.0	<1.0	<1.0
pH, Field	su	-	-	-	7.10	7.10	7.16	7.16	7.35	7.35
Sulfate	mg/L	5.0	250	250	2.58 ^U	2.78 ^U	<5	<5	<5	<5
Total Dissolved Solids	mg/L	380	500	500	294	268	294	268	292	294
Appendix IV										
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.009	0.01	0.01	0.007	0.007	0.008	0.007	0.006	0.006
Barium	mg/L	0.081	2	2.0	0.059	0.06	0.062	0.062	0.063	0.065
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.100	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.00	<1.0	0.16	<1.0	<1.0	<1.0	<1.0
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.055	0.04	0.055	0.029	0.027	0.029	0.028	0.031	0.031
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.011	0.1	0.100	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Radium-226	pCi/L	-	-	-	0.919	1.07	0.926	0.773	1.46	1.39
Radium-228	pCi/L	-	-	-	2.40 ⁺	0.745 ⁺	2.63 ⁺	0.56 ^J	0.131	0.583
Radium-226/228	pCi/L	5.5	5	5.50	3.32 ⁺	1.81 ⁺	3.56 ⁺	1.33 ^J	1.59	1.97
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	<3	<3	54 ^J +	32 ^J -	<3	<3
Other										
Bicarbonate	mg/L				360	360	371	372	378	377
Carbonate	mg/L				<10	<10	<10	<10	<10	<10
Hardness	mg/L				260	260	265	268	264	262
Magnesium	mg/L				23.9	24.1	24.4	24.5	24.4	24.7
Potassium	mg/L				6.28	6.41	6.93	6.61	6.43	6.46
Sodium	mg/L				15.8	15.9	16.2	16	16.1	16.4

Sample Location:					MW-12													
Sample Type:					Upgradient													
Sample Date:					2/23/2022	3/30/2022	5/4/2022	6/8/2022	7/13/2022	8/17/2022								
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring													
						Diss. Metals		Diss. Metals		Diss. Metals		Diss. Metals		Diss. Metals		Diss. Metals		
Field Parameters						Diss. Metals		Diss. Metals		Diss. Metals		Diss. Metals		Diss. Metals		Diss. Metals		
pH	su	-	-	-	7.22	7.22	6.81	6.81	7.26	7.26	7.24	7.24	7.02	7.02	7.24	7.24		
Conductivity	mS/cm	-	-	-	0.75	0.75	1.648	1.648	1.734	1.734	1.797	1.797	1.686	1.686	1.586	1.586		
Turbidity	NTU	-	-	-	65.25	65.25	44.12	44.12	16.45	16.45	31.26	31.26	30.26	30.26	45.15	45.15		
Dissolved Oxygen	mg/L	-	-	-	5.45	5.45	3.95	3.95	3.34	3.34	5.25	5.25	3.20	3.20	4.64	4.64		
Temperature	°C	-	-	-	8.40	8.40	8.5	8.5	12	12	15.4	15.4	16.8	16.8	16.9	16.9		
Oxidation Reduction Potential	mV	-	-	-	-113.50	-113.50	188.2	188.2	-35	-35	140.2	140.2	14.2	14.2	-17.9	-17.9		
Part 115																		
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Iron	mg/L	23.5	0.3	23.5	3.83	<0.02	2.24	<0.02	2.05	0.03	1	<0.02	1.82	0.05	1.37	0.03		
Nickel	mg/L	0.021		0.1	0.02	0.02	0.02	0.02	0.02	0.02	0.018	0.015	0.017	0.017	0.018	0.016		
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Zinc	mg/L	0.036	5	5	<0.005	0.008	0.009	0.006	0.005	<0.005	<0.005	<0.005	0.007	<0.005	0.006	<0.005		
Appendix III																		
Boron	mg/L	0.48	-	0.50	0.05	0.05	0.09	0.09	0.08	0.08	0.1	0.1	0.07	0.07	0.07	0.07		
Calcium	mg/L	188	-	188	185	188	157	147	149	143	149	144	147	143	157	148		
Chloride	mg/L	94.3	250	250	90	-	94	-	90	-	82	-	83	-	83	-		
Fluoride	mg/L	1.0	4	2.0	<1.0	-	<1.0	-	<1.0	-	<1.0	-	<1.0	-	<1.0	-		
pH, Field	su	-	-	-	7.22	7.22	6.81	6.81	7.26	7.26	7.24	7.24	7.02	7.02	7.24	7.24		
Sulfate	mg/L	344	250	344	344	-	308	-	283	-	254	-	250	-	256	-		
Total Dissolved Solids	mg/L	1190	500	1190	1090	-	1110	-	1140	-	1080	-	1090	-	1050	-		
Appendix IV																		
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Arsenic	mg/L	0.021	0.01	0.021	<0.002	<0.002	0.003	<0.002	0.004	0.002	<0.002	<0.002	0.002	<0.002	0.002	<0.002		
Barium	mg/L	0.168	2	2.0	0.069	0.059	0.074	0.068	0.07	0.064	0.064	0.064	0.067	0.06	0.064	0.06		
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Fluoride	mg/L	1.0	4	2.0	<1.0	-	<1.0	-	<1.0	-	<1.0	-	<1.0	-	<1.0	-		
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003		
Lithium	mg/L	0.041	0.04	0.041	0.02	0.018	0.021	0.018	0.023	0.021	0.025	0.022	0.022	0.019	0.019	0.018		
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		
Molybdenum	mg/L	0.024	0.1	0.100	0.013	0.011	0.024	0.024	0.023	0.024	0.019	0.018	0.017	0.017	0.014	0.014		
Radium-226	pCi/L	-	-	-	0.252	-	0.783	-	1.23	-	1.9	-	0.394 ⁺	-	0.398	-		
Radium-228	pCi/L	-	-	-	0.948	-	2.33	-	0.237	-	0.721	-	1.23	-	1.8	-		
Radium-226/228	pCi/L	5.00	5	5.00	1.200	-	3.110	-	1.46	-	2.62	-	1.63 ⁺	-	2.2	-		
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		
Total Suspended Solids	mg/L	-	-	-	24	-	39	-	22	-	17	-	50	-	23	-		
Other																		
Bicarbonate	mg/L								-	650	-	695	-	670	-	620		
Carbonate	mg/L								-	<10	-	<10	-	<10	-	<10		
Hardness	mg/L								-	572	-	565	-	566	-	609		
Magnesium	mg/L								58.80	56.40	56.40	52.80	56.2	54.5	56.2	55.7	58.8	57.6
Potassium	mg/L								3.93	3.87	3.73	3.55	3.91	3.95	3.3	3.13	3.33	3.1
Sodium	mg/L								168.00	169.00	193.00	189.00	199	195	171	167	145	138

		Sample Location: MW-12								
		Sample Type: Upgradient								
		Sample Date:			9/21/2022		10/26/2022		2/9/2023	
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring				Assessment Monitoring	
Field Parameters										
pH	su	-	-	-	7.38	7.38	7.05	7.05	7.13	7.13
Conductivity	mS/cm	-	-	-	1.600	1.600	1.387	1.387	1.391	1.391
Turbidity	NTU	-	-	-	46.25	46.25	26.20	26.20	17.01	17.01
Dissolved Oxygen	mg/L	-	-	-	1.95	1.96	3.57	3.57	2.95	2.95
Temperature	°C	-	-	-	15.9	15.9	11.8	11.8	11.5	11.5
Oxidation Reduction Potential	mV	-	-	-	15.2	15.2	155.8	155.8	-27.4	-27.4
Part 115										
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	23.5	0.3	23.5	1.25	<0.02	0.96	0.19	0.60	<0.02
Nickel	mg/L	0.021		0.1	0.018	0.017	0.018	0.015	0.017	0.016
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.036	5	5	0.008	0.005	<0.005	<0.005	<0.005	<0.005
Appendix III										
Boron	mg/L	0.48	-	0.50	0.08	0.08	0.08	0.08	0.07	0.07
Calcium	mg/L	188	-	188	154	148	156	136	143	141
Chloride	mg/L	94.3	250	250	80	-	78	-	71	-
Fluoride	mg/L	1.0	4	2.0	<1.0	-	<1.0	-	<1.0	-
pH, Field	su	-	-	-	7.38	7.38	7.05	7.05	7.13	7.13
Sulfate	mg/L	344	250	344	255	-	252	-	207	-
Total Dissolved Solids	mg/L	1190	500	1190	1020	-	1020	-	948	-
Appendix IV										
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.021	0.01	0.021	0.002	<0.002	0.002	0.002	<0.002	<0.002
Barium	mg/L	0.168	2	2.0	0.064	0.058	0.057	0.052	0.058	0.054
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005	<0.005
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.0	<1.0	-	<1.0	-	<1.0	-
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.041	0.04	0.041	0.022	0.019	0.021	0.018	0.027	0.023
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.024	0.1	0.100	0.015	0.014	0.013	0.012	0.011	0.011
Radium-226	pCi/L	-	-	-	0.739	-	0.628	-	0.836	-
Radium-228	pCi/L	-	-	-	-0.692	-	2.11	-	2.60	-
Radium-226/228	pCi/L	5.00	5	5.00	0.739	-	2.74	-	3.43	-
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	43	-	16	-	9	-
Other										
Bicarbonate	mg/L				610	-	631	-	689	-
Carbonate	mg/L				<10	-	<10	-	<10	-
Hardness	mg/L				611	-	618	-	575	-
Magnesium	mg/L				58.6	57.5	59.9	53	56.8	55.6
Potassium	mg/L				3.65	3.54	3.71	3.04	3.01	3.02
Sodium	mg/L				145	138	139	123	136	130

		Sample Location:			MW-12B														
		Sample Type:			Background														
		Sample Date:			3/8/2022	4/14/2022	5/19/2022	6/23/2022	7/28/2022	9/1/2022	10/6/2022								
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring														
					Field Dupe	Field Dupe	Field Dupe	Field Dupe	Field Dupe	Field Dupe	Field Dupe	Field Dupe	Field Dupe	Field Dupe	Field Dupe	Field Dupe			
Field Parameters																			
pH	su	-	-	-	8.00	8.00	7.68	7.86	7.86	7.51	7.51	7.50	7.50	7.60	7.60	7.50	7.50		
Conductivity	mS/cm	-	-	-	0.72	0.72	0.611	0.61	0.61	0.601	0.601	0.602	0.602	0.600	0.600	0.593	0.593		
Turbidity	NTU	-	-	-	10.2	10.2	9.89	9.72	9.72	6.89	6.89	8.35	8.35	6.70	6.70	7.15	7.15		
Dissolved Oxygen	mg/L	-	-	-	3.58	3.58	0.31	0.05	0.05	0.2	0.2	0.22	0.22	0.74	0.74	0.24	0.24		
Temperature	°C	-	-	-	10.8	10.8	10.1	12	12	12.8	12.8	14	14	13.0	13.0	12.7	12.7		
Oxidation Reduction Potential	mV	-	-	-	100.9	100.9	-80.1	-97.8	-97.8	-73.2	-73.2	-141.0	-141.0	-124.1	-124.1	-117.2	-117.2		
Part 115																			
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005 ^{UJ}	0.007 ^{JA}	<0.005	<0.005	<0.005	<0.005		
Iron	mg/L	3.0	0.3	3.04	0.34	0.36	0.24	0.33	0.33	0.3 ^I	0.28 ^I	0.29	0.3	0.37	0.37	0.41	0.34		
Nickel	mg/L	0.011		0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Zinc	mg/L	0.042	5	5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005 ^{UJ}	0.015 ^{JA}	<0.005	<0.005	<0.005	<0.005		
Appendix III																			
Boron	mg/L	3.5	-	3.52	3.25 ^I	3.2	3.16	3.34	3.30	3.32	3.38	3.37	3.37	3.52	3.35	3.22	3.3		
Calcium	mg/L	70	-	69.6	23.7	24	24	21.5	21.7	26.1	25.5	25.7	25.4	26.2	26.2	26.2	25.9		
Chloride	mg/L	5.0	250	250	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		
pH, Field	su	-	-	-	8.00	8.00	7.68	7.86	7.86	7.51	7.51	7.50	7.50	7.60	7.60	7.50	7.50		
Sulfate	mg/L	5.0	250	250	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5		
Total Dissolved Solids	mg/L	380	500	500	380	374	376	370	372	364	372	380	374	360	370	362	374		
Appendix IV																			
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Arsenic	mg/L	0.009	0.01	0.01	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		
Barium	mg/L	0.081	2	2.0	0.025	0.025	0.026	0.027	0.026	0.026	0.025	0.023	0.024	0.028	0.028	0.027	0.026		
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		
Chromium	mg/L	0.005	0.1	0.100	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Fluoride	mg/L	1.0	4	2.00	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003		
Lithium	mg/L	0.055	0.04	0.055	0.042	0.043	0.036	0.038	0.038	0.041	0.039	0.041	0.043	0.041	0.038	0.039	0.042		
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002	0.0002	<0.0002	<0.0002		
Molybdenum	mg/L	0.011	0.1	0.100	<0.005	<0.005	<0.005	0.011 ^{JA}	0.005 ^J	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Radium-226	pCi/L	-	-	-	0.480 ^{JA}	0.302 ^J	0.264	0.611	0.657	1.00 ^J	1.89 ^{JA}	0.581 ^J	2.17 ^{JA}	0.398	0.519	0.370 ^J	0.615 ^{JA}		
Radium-228	pCi/L	-	-	-	0.275 ^J	1.03 ^{JA}	0.116	0.421 ^J	1.10 ^{JA}	0.209 ^J	1.47 ^{JA}	-0.356 ^{JA}	-1.12 ^J	-0.204 ^J	1.34 ^{JA}	1.26 ^{JA}	0.165 ^{JA}		
Radium-226/228	pCi/L	5.5	5	5.50	0.755 ^J	1.33 ^{JA}	0.38	1.03 ^J	1.76 ^{JA}	1.21 ^J	3.37 ^{JA}	0.581 ^J	2.17 ^{JA}	0.398 ^J	1.86 ^{JA}	1.63 ^{JA}	0.779 ^J		
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002		
Total Suspended Solids	mg/L	-	-	-	28	31	3 ^U	7	7	5	<3	<3	<3 ^U	3 ^{JA}	1 ^U	<3			
Bicarbonate	mg/L				390	400	410	410	420	400	390	410	420	400	400	400	400		
Carbonate	mg/L				<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10		
Hardness	mg/L				96	83	99	93	96	94	97	90	90	91	95	100	90		
Magnesium	mg/L				7.5	7.36	8.12	6.63	6.68	8.31	8.14	8.22	8.02	8.33	8.65	8.39	8.33		
Potassium	mg/L				8.99	8.61	8.26	6.93	7.07	8.27	8.15	8.28	8.07	8.18	8.36	8.32	8.14		
Sodium	mg/L				116	117	109	90.9	92.4	111	107	107	107	113	115	112	109		

			Sample Location:		MW-12B		
			Sample Type:		Background		
			Sample Date:		11/10/2022	2/9/2023	
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring		Assessment Monitoring
Field Parameters							
						Field Dupe	
pH	su	-	-	-	7.61	7.61	7.71
Conductivity	mS/cm	-	-	-	0.591	0.591	0.587
Turbidity	NTU	-	-	-	6.35	6.35	8.18
Dissolved Oxygen	mg/L	-	-	-	0.18	0.18	0.29
Temperature	°C	-	-	-	13.1	13.1	10.9
Oxidation Reduction Potential	mV	-	-	-	-100.3	-100.3	-107.5
Part 115							
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005
Iron	mg/L	3.0	0.3	3.04	0.31	0.30	0.22
Nickel	mg/L	0.011		0.1	<0.005	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005
Zinc	mg/L	0.042	5	5	<0.005	<0.005	<0.005
Appendix III							
Boron	mg/L	3.5	-	3.52	3.35	3.19	3.33
Calcium	mg/L	70	-	69.6	25.7	26.2	26.3
Chloride	mg/L	5.0	250	250	<5	<5	<5
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0
pH, Field	su	-	-	-	7.61	7.61	7.71
Sulfate	mg/L	5.0	250	250	<5	<5	<5
Total Dissolved Solids	mg/L	380	500	500	358	356	356
Appendix IV							
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005
Arsenic	mg/L	0.009	0.01	0.01	<0.002	<0.002	<0.002
Barium	mg/L	0.081	2	2.0	0.025	0.025	0.025
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.100	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.00	<1.0	<1.0	<1.0
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003
Lithium	mg/L	0.055	0.04	0.055	0.04	0.037	0.043
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.011	0.1	0.100	<0.005	<0.005	<0.005
Radium-226	pCi/L	-	-	-	0.608	0.619	0.831
Radium-228	pCi/L	-	-	-	0.638	0.282	3.31
Radium-226/228	pCi/L	5.5	5	5.50	1.25	0.901	4.14
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	<3	<3	<3
Bicarbonate	mg/L				390	390	417
Carbonate	mg/L				<10	<10	<10
Hardness	mg/L				96	96	98
Magnesium	mg/L				8.2	8.15	8.61
Potassium	mg/L				8.19	8.15	7.88
Sodium	mg/L				109	110	112

			Sample Location:		MW-13										
			Sample Type:		Downgradient										
			Sample Date:		2/23/2022	3/30/2022	5/4/2022	5/4/2022	6/8/2022	7/13/2022	8/17/2022	9/21/2022	10/26/2022	2/8/2023	
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring										Assessment Monitoring
Field Parameters										Field Dupe					
pH	su	-	-	-	6.91	6.75	7.01	7.01	7.07	7.06	7.22	7.25	7.11	7.04	
Conductivity	mS/cm	-	-	-	0.78	0.73	0.549	0.549	0.585	0.661	0.595	0.635	0.624	0.672	
Turbidity	NTU	-	-	-	7.11	7.90	4.15	4.15	6.50	1.79	3.55	4.24	3.75	6.01	
Dissolved Oxygen	mg/L	-	-	-	1.31	2.61	6.23	6.23	5.42	6.21	4.94	3.83	2.39	0.65	
Temperature	°C	-	-	-	5.8	6.9	8.5	8.5	12.2	14.5	17.5	17.4	13.8	8.4	
Oxidation Reduction Potential	mV	-	-	-	163.0	151.8	96.4	96.4	101.6	66.9	89.1	84.8	216.8	61.2	
Part 115															
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Iron	mg/L	23.5	0.3	23.5	0.04	0.02	<0.02	0.02	0.08	0.03	0.02	0.03	0.04	0.06	
Nickel	mg/L	0.021		0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Zinc	mg/L	0.036	5	5	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	<0.005	<0.005	<0.005	
Appendix III															
Boron	mg/L	0.48	-	0.50	0.16	0.14	0.14	0.14	0.18	0.18	0.17	0.20	0.22	0.18	
Calcium	mg/L	188	-	188	138	128.00	95.80	97.60	96.1	107	94.1	100	101	132	
Chloride	mg/L	94.3	250	250	<5	<5	9.00	9.00	13	16	16	20	32	43	
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
pH, Field	su	-	-	-	6.91	6.75	7.01	7.01	7.07	7.06	7.22	7.25	7.11	7.04	
Sulfate	mg/L	344	250	344	32	45	16	16	17	55	33	30	22	37	
Total Dissolved Solids	mg/L	1190	500	1190	478	430	336	342	354	396	380	384	386	476	
Appendix IV															
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Arsenic	mg/L	0.021	0.01	0.021	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Barium	mg/L	0.168	2	2.0	0.030	0.03	0.02	0.02	0.023	0.027	0.029	0.027	0.028	0.028	
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	
Lithium	mg/L	0.041	0.04	0.041	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	
Molybdenum	mg/L	0.024	0.1	0.100	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Radium-226	pCi/L	-	-	-	0.300	0.755	0.322 [±]	0.149 [±]	0.657	0.291 [±]	0.402	0.286	0.392	0.00	
Radium-228	pCi/L	-	-	-	-0.842	1.320	0.0544 [±]	0.893 [±]	1.66	1.35	0.00710	-0.0026	0.291	0.188	
Radium-226/228	pCi/L	5.00	5	5.00	0.300	2.080	0.376 [±]	1.04 [±]	2.31	1.64 [±]	0.410	0.286	0.683	0.188	
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	
Total Suspended Solids	mg/L	-	-	-	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	
Other															
Bicarbonate	mg/L						340	330	349	330	320	340	351	437	
Carbonate	mg/L						<10	<10	<10	<10	<10	<10	<10	<10	
Hardness	mg/L						309	308	310	353	312	333	358	444	
Magnesium	mg/L						26.30	19.70	20.10	20.7	23.1	20.6	21.9	29.0	
Potassium	mg/L						0.75	0.69	0.70	0.83	0.779	0.78	0.82	0.76	
Sodium	mg/L						3.05	2.45	2.51	2.59	5.59	4.60	5.70	4.68	

			Sample Location:		MW-14							
			Sample Type:		Downgradient							
			Sample Date:		1/12/2023	2/17/23	3/24/23	4/28/23				
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring							
						Field Dup		Field Dup		Field Dup		Field Dup
Field Parameters												
pH	su	-	-	-	7.04	7.04	7.11	7.11	6.98	6.98	7.13	7.13
Conductivity	mS/cm	-	-	-	1.27	1.27	1.091	1.091	1.295	1.295	1.323	1.323
Turbidity	NTU	-	-	-	6.31	6.31	5.34	5.34	3.95	3.95	4.05	4.05
Dissolved Oxygen	mg/L	-	-	-	0.45	0.45	0.39	0.39	0.07	0.07	0.09	0.09
Temperature	°C	-	-	-	10.9	10.9	10.1	10.1	10.5	10.5	10.3	10.3
Oxidation Reduction Potential	mV	-	-	-	-105.6	-105.6	-89.4	-89.4	-104.3	-104.3	-124.8	-124.8
Part 115												
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	23.5	0.3	23.5	6.58	6.78	9.46	9.35	10.2	10.4	11.2	11.2 ¹
Nickel	mg/L	0.021		0.1	0.006	0.007	0.005 ¹⁺	<0.005 ^{UJ}	<0.005 ^{UJ}	0.005 ¹⁺	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.036	5	5	<0.005 ^{UJ}	0.007 ¹⁺	<0.005	<0.005	<0.005 ^{UJ}	0.013 ¹⁺	<0.005	<0.005
Appendix III												
Boron	mg/L	0.48	-	0.50	2.29	2.32	2.23	2.20	2.11	2.20	2.03	2.06
Calcium	mg/L	188	-	188	147	149	144	144	144	148	143	140 ¹
Chloride	mg/L	94.3	250	250	108	109	111	112	114	114	115	115
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
pH, Field	su	-	-	-	7.04	7.04	7.11	7.11	6.98	6.98	7.13	7.13
Sulfate	mg/L	344	250	344	30	30	22	21	748	748	17	16
Total Dissolved Solids	mg/L	1190	500	1190	774	768	732	716	<0.005	<0.005	796	782
Appendix IV												
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.021	0.01	0.021	0.004	0.004	0.006	0.005	0.005	0.006	0.006	0.005
Barium	mg/L	0.168	2	2.0	0.177	0.122	0.119	0.116	0.128	0.126	0.120	0.119
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.041	0.04	0.041	0.125	0.132	0.122	0.126	0.113	0.113	0.111	0.111
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.024	0.1	0.100	0.012	0.013	0.015	0.014	0.014	0.014	0.013	0.012
Radium-226	pCi/L	-	-	-	0.907	0.322	0.396	0.363	0.964 ¹⁺	0.321 ¹⁺	0.260 ¹⁺	1.27 ¹⁺
Radium-228	pCi/L	-	-	-	3.53	3.07	0.272 ¹⁺	1.07 ¹⁺	0.853	1.10	1.20 ¹⁺	0.807 ¹⁺
Radium-226/228	pCi/L	5.00	5	5.00	4.44	3.39	0.668 ¹⁺	1.43 ¹⁺	1.82	1.41	1.46 ¹⁺	2.08 ¹⁺
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	16	16	4 ¹	7 ¹⁺	22.2	22.0	23.4	24.3
Other												
Bicarbonate	mg/L				600	610	601	606	650	650	660	670
Carbonate	mg/L				<10	<10	<10	<10	<10	<10	<10	<10
Hardness	mg/L				556	554	498	506	536	548	566	562
Magnesium	mg/L				42.3	42.2	41.3	41.2	40.3	42.1	39.7	38.5
Potassium	mg/L				4.79	4.76	5.82	5.81	4.72	4.82	4.55	4.43
Sodium	mg/L				79.2	80.4	78.3	77.9	75.8	77.3	72.5	70.9

		Sample Location:			MW-15			
		Sample Type:			Downgradient			
		Sample Date:			1/12/2023	2/17/23	3/24/23	4/28/2023
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring			
Field Parameters								
pH	su	-	-	-	6.86	6.98	6.90	6.99
Conductivity	mS/cm	-	-	-	1.319	0.872	0.912	0.851
Turbidity	NTU	-	-	-	2.4	5.15	4.15	4.84
Dissolved Oxygen	mg/L	-	-	-	5.41	4.81	3.72	2.48
Temperature	°C	-	-	-	7.9	7.5	7.3	8.4
Oxidation Reduction Potential	mV	-	-	-	195.6	153.9	59.8	133.9
Part 115								
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	23.5	0.3	23.5	<0.02	0.04	0.02	0.03
Nickel	mg/L	0.021		0.1	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.036	5	5	<0.005	<0.005	<0.005	0.021
Appendix III								
Boron	mg/L	0.48	-	0.50	0.37	0.34	0.33	0.34
Calcium	mg/L	188	-	188	183	140	119	104
Chloride	mg/L	94.3	250	250	100	84	72	60
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0
pH, Field	su	-	-	-	6.86	6.98	6.90	6.99
Sulfate	mg/L	344	250	344	238	135	124	109
Total Dissolved Solids	mg/L	1190	500	1190	878	606	690	528
Appendix IV								
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.021	0.01	0.021	<0.002	<0.002	<0.002	<0.002
Barium	mg/L	0.168	2	2.0	0.077	0.050	0.047	0.042
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.041	0.04	0.041	0.014	<0.005	<0.005	<0.005
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.024	0.1	0.100	<0.005	<0.005	<0.005	<0.005
Radium-226	pCi/L	-	-	-	0.629	0.334	0.868	0.464
Radium-228	pCi/L	-	-	-	1.43	-0.367	-0.188	1.51 [±]
Radium-226/228	pCi/L	5.00	5	5.00	2.06	0.334	0.868	1.97 [±]
Selenium	mg/L	0.005	0.05	0.050	0.01	0.026	0.034	0.021
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	<3	<3	<3	<3
Other								
Bicarbonate	mg/L				410	354	330	330
Carbonate	mg/L				<10	<10	<10	<10
Hardness	mg/L				464	473	426	406
Magnesium	mg/L				47.2	35.1	31.1	25.7
Potassium	mg/L				0.61	<0.50	<0.50	<0.50
Sodium	mg/L				40.5	30.3	29.5	28.3

		Sample Location:			MW-16A					
		Sample Type:			Downgradient					
		Sample Date:			2/2/2023	3/21/2023	4/25/2023			
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring					
						Field Dup		Field Dup		Field Dup
Field Parameters										
pH	su	-	-	-	6.95	6.95	6.91	6.91	7.00	7.00
Conductivity	mS/cm	-	-	-	2.219	2.219	1.871	1.871	1.948	1.948
Turbidity	NTU	-	-	-	3.06	3.06	4.15	4.15	6.54	6.54
Dissolved Oxygen	mg/L	-	-	-	0.22	0.22	0.20	0.20	0.10	0.10
Temperature	°C	-	-	-	7.3	7.3	8.6	8.6	8.3	8.3
Oxidation Reduction Potential	mV	-	-	-	-51.0	-51.0	-48.6	-48.6	-65.2	-65.2
Part 115										
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Iron	mg/L	23.5	0.3	23.5	3.71	3.70	3.15	3.14	2.96	2.99
Nickel	mg/L	0.021		0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Zinc	mg/L	0.036	5	5	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Appendix III										
Boron	mg/L	0.48	-	0.50	0.21	0.21	0.11	0.11	0.10	0.10
Calcium	mg/L	188	-	188	179	176	147	150	145	148
Chloride	mg/L	94.3	250	250	383	383	405	411	391	397
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
pH, Field	su	-	-	-	6.95	6.95	6.91	6.91	7.00	7.00
Sulfate	mg/L	344	250	344	145	146	86	85	92	92
Total Dissolved Solids	mg/L	1190	500	1190	1360	1350	1180	1180	1170	1170
Appendix IV										
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Arsenic	mg/L	0.021	0.01	0.021	0.003	0.004	0.003	0.003	0.003	0.003
Barium	mg/L	0.168	2	2.0	0.160	0.156	0.118	0.119	0.108	0.111
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Lithium	mg/L	0.041	0.04	0.041	0.005 ⁺	<0.005 ^U	<0.005	<0.005	<0.005	<0.005
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.024	0.1	0.100	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Radium-226	pCi/L	-	-	-	0.385	0.325	0.510 ⁺	1.22 ⁺	0.781	0.721
Radium-228	pCi/L	-	-	-	0.178 ⁺	-0.723 ⁺	0.698	0.907	1.59 ⁺	-2.75 ⁺
Radium-226/228	pCi/L	5.00	5	5.00	0.562 ⁺	0.325 ⁺	1.21 ⁺	2.13 ⁺	2.37 ⁺	0.721 ⁺
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	7	7	<3	<3	2.0	1.6
Other										
Bicarbonate	mg/L				610	620	460	470	420	420
Carbonate	mg/L				<10	<10	<10	<10	<10	<10
Hardness	mg/L				608	605	524	522	526	519
Magnesium	mg/L				42.4	42.3	33.9	34.1	33.2	34.4
Potassium	mg/L				2.12	2.06	1.58	1.58	1.34	1.45
Sodium	mg/L				276	281	244	247	229	243

			Sample Location:		MW-16B		
			Sample Type:		Downgradient		
			Sample Date:		2/2/2023	3/21/2023	4/25/2023
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring		
Field Parameters							
pH	su	-	-	-	7.49	7.45	7.50
Conductivity	mS/cm	-	-	-	0.623	0.587	0.619
Turbidity	NTU	-	-	-	7.42	5.65	6.29
Dissolved Oxygen	mg/L	-	-	-	0.18	0.12	0.11
Temperature	°C	-	-	-	9.2	12.0	11.1
Oxidation Reduction Potential	mV	-	-	-	-125.7	-107.0	-102.1
Part 115							
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005
Iron	mg/L	23.5	0.3	23.5	0.93	0.62	0.51
Nickel	mg/L	0.021		0.1	<0.005	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005
Zinc	mg/L	0.036	5	5	<0.005	<0.005	<0.005
Appendix III							
Boron	mg/L	0.48	-	0.50	0.12	0.13	0.12
Calcium	mg/L	188	-	188	74.5	76.9	78.4
Chloride	mg/L	94.3	250	250	<5	11	5
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0
pH, Field	su	-	-	-	7.49	7.45	7.50
Sulfate	mg/L	344	250	344	18	16	16
Total Dissolved Solids	mg/L	1190	500	1190	366	366	350
Appendix IV							
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005
Arsenic	mg/L	0.021	0.01	0.021	<0.002	<0.002	<0.002
Barium	mg/L	0.168	2	2.0	0.09	0.085	0.085
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.1	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003
Lithium	mg/L	0.041	0.04	0.041	0.023	0.023	0.022
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.024	0.1	0.100	0.008	0.006	0.006
Radium-226	pCi/L	-	-	-	0.997	0.761	0.490
Radium-228	pCi/L	-	-	-	0.829	1.79	1.30 ⁺
Radium-226/228	pCi/L	5.00	5	5.00	1.83	2.56	1.79 ⁺
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	7	<3	1.4
Other							
Bicarbonate	mg/L				390	400	400
Carbonate	mg/L				<10	<10	<10
Hardness	mg/L				322	329	335
Magnesium	mg/L				29.7	32.7	33.3
Potassium	mg/L				3.81	3.17	3.00
Sodium	mg/L				24.5	15.5	12.6

			Sample Location:		MW-16C		
			Sample Type:		Downgradient		
			Sample Date:		2/2/2023	3/21/2023	4/25/2023
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring		
Field Parameters							
pH	su	-	-	-	7.44	7.46	7.41
Conductivity	mS/cm	-	-	-	0.601	0.575	0.585
Turbidity	NTU	-	-	-	34.25	7.24	6.41
Dissolved Oxygen	mg/L	-	-	-	0.10	0.17	0.12
Temperature	°C	-	-	-	9.9	11.9	11.0
Oxidation Reduction Potential	mV	-	-	-	-62.2	-103.8	-97.3
Part 115							
Copper	mg/L	0.005	1.3	1.00	<0.005	<0.005	<0.005
Iron	mg/L	3.0	0.3	3.04	0.76	1.10	0.64
Nickel	mg/L	0.011		0.1	<0.005	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005
Zinc	mg/L	0.042	5	5	<0.005	<0.005	<0.005
Appendix III							
Boron	mg/L	3.5	-	3.52	0.40	0.40	0.39
Calcium	mg/L	70	-	69.6	63.2	62.1	66.5
Chloride	mg/L	5.0	250	250	8	<5	<5
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0
pH, Field	su	-	-	-	7.44	7.46	7.41
Sulfate	mg/L	5.0	250	250	19	8	7
Total Dissolved Solids	mg/L	380	500	500	418	370	330
Appendix IV							
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005
Arsenic	mg/L	0.009	0.01	0.01	0.002	0.003	<0.002
Barium	mg/L	0.081	2	2.0	0.051	0.061	0.050
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.100	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.00	<1.0	<1.0	<1.0
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003
Lithium	mg/L	0.055	0.04	0.055	0.030	0.026	0.027
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.011	0.1	0.100	0.007	0.009	<0.005
Radium-226	pCi/L	-	-	-	0.230	0.509	0.478
Radium-228	pCi/L	-	-	-	0.0142	3.09	-0.309 [±]
Radium-226/228	pCi/L	5.5	5	5.50	0.244	3.60	0.478 [±]
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	40	11.6	1.6
Other							
Bicarbonate	mg/L				370	400	400
Carbonate	mg/L				<10	<10	<10
Hardness	mg/L				263	253	272
Magnesium	mg/L				24.4	25.6	27.3
Potassium	mg/L				3.72	3.56	3.97
Sodium	mg/L				39.4	41.4	28.5

			Sample Location:		MW-16D		
			Sample Type:		Downgradient		
			Sample Date:		2/2/2023	3/21/2023	4/25/2023
Constituent	Unit	BTVs	MCL	State Program GPS	Background Monitoring		
Field Parameters							
pH	su	-	-	-	7.67	7.56	7.73
Conductivity	mS/cm	-	-	-	0.582	0.596	0.620
Turbidity	NTU	-	-	-	8.31	7.31	4.95
Dissolved Oxygen	mg/L	-	-	-	4.82	0.39	0.38
Temperature	°C	-	-	-	8.6	8.4	3.9
Oxidation Reduction Potential	mV	-	-	-	44.3	85.9	-44.2
Part 115							
Copper	mg/L	0.005	1.3	1.00	0.010	<0.005	<0.005
Iron	mg/L	3.0	0.3	3.04	0.16	0.06	0.08
Nickel	mg/L	0.011		0.1	<0.005	<0.005	<0.005
Silver	mg/L	0.0005	0.1	0.098	<0.0005	<0.0005	<0.0005
Vanadium	mg/L	0.005		0.062	<0.005	<0.005	<0.005
Zinc	mg/L	0.042	5	5	0.11	0.271	0.183
Appendix III							
Boron	mg/L	3.5	-	3.52	4.65	4.59	4.59
Calcium	mg/L	70	-	69.6	29.3	29.0	28.9
Chloride	mg/L	5.0	250	250	6	7	8
Fluoride	mg/L	1.0	4	2.0	<1.0	<1.0	<1.0
pH, Field	su	-	-	-	7.67	7.56	7.73
Sulfate	mg/L	5.0	250	250	<5	9	13
Total Dissolved Solids	mg/L	380	500	500	366	364	380
Appendix IV							
Antimony	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005
Arsenic	mg/L	0.009	0.01	0.01	<0.002	<0.002	0.004
Barium	mg/L	0.081	2	2.0	0.037	0.036	0.038
Beryllium	mg/L	0.001	0.004	0.004	<0.001	<0.001	<0.001
Cadmium	mg/L	0.0005	0.005	0.005	<0.0005	<0.0005	<0.0005
Chromium	mg/L	0.005	0.1	0.100	<0.005	<0.005	<0.005
Cobalt	mg/L	0.005	0.006	0.006	<0.005	<0.005	<0.005
Fluoride	mg/L	1.0	4	2.00	<1.0	<1.0	<1.0
Lead	mg/L	0.003	0.015	0.004	<0.003	<0.003	<0.003
Lithium	mg/L	0.055	0.04	0.055	0.039	0.032	0.022
Mercury	mg/L	0.0002	0.002	0.002	<0.0002	<0.0002	<0.0002
Molybdenum	mg/L	0.011	0.1	0.100	0.005	0.011	0.012
Radium-226	pCi/L	-	-	-	0.591	0.763	2.21
Radium-228	pCi/L	-	-	-	1.84	0.757	1.93 ⁺
Radium-226/228	pCi/L	5.5	5	5.50	2.43	1.52	4.14 ⁺
Selenium	mg/L	0.005	0.05	0.050	<0.005	<0.005	<0.005
Thallium	mg/L	0.002	0.002	0.002	<0.002	<0.002	<0.002
Total Suspended Solids	mg/L	-	-	-	5	3.80	2.0
Other							
Bicarbonate	mg/L				380	390	380
Carbonate	mg/L				<10	<10	<10
Hardness	mg/L				96	107	103
Magnesium	mg/L				6.99	7.31	7.28
Potassium	mg/L				9.4	9.79	9.65
Sodium	mg/L				106	110	115

Footnotes:

1. BTV=UTL

Qualifiers:

U: The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted reporting limit (RL) for the sample and method.

J: The analyte was positively identified, and the associated numerical value is the approximate concentration of the analyte in the sample (due either to the quality of the data generated because certain QC criteria were not met, or to the concentration of the analyte being below the RL).

J+: Same as J, and the reported concentration is potentially biased high.

J-: Same as J, and the reported concentration is potentially biased low.

UJ: The analyte was not detected at a level greater than or equal to the adjusted method detection limit (MDL). However, the reported adjusted MDL is approximate and might be inaccurate or imprecise.

R: The sample results are unusable due to the quality of the data generated because certain criteria were not met. The analyte might or might not be present in the sample.

Appendix C

Lab Reports and Data Validation Reports



Report ID: S43837.01(03)
Generated on 01/30/2023
Replaces report S43837.01(02) generated on 01/03/2023

Report to
Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by
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2680 East Lansing Drive
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Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Lavery (johnlavery@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S43837.01-S43837.03
Project: Erickson AM MI Wells 11B
Collected Date(s): 12/27/2022
Submitted Date/Time: 12/27/2022 14:50
Sampled by: Marc Wahrer
P.O. #:

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Maya Murshak
Technical Director



General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile, and 2-chloroethylvinyl ether need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the

FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

All analyses completed



Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1 (1993)
SM2320B	Standard Method 2320 B 2011
SM2340C	Standard Method 2340 C 2011
SM2540C	Standard Method 2540 C 2015
SM2540D	Standard Method 2540 D 2015
SW3015A	SW 846 Method 3015A Revision 1 February 2007



Sample Summary (3 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S43837.01	MW-11B L212196-01	Groundwater	12/27/22 12:17
S43837.02	Field Dupe MW-11B L212196-02	Groundwater	12/27/22 12:17
S43837.03	Field Blank L212196-03	Water	12/27/22 10:50

**Lab Sample ID: S43837.01**

Sample Tag: MW-11B L212196-01

Collected Date/Time: 12/27/2022 12:17

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.1	IR
2	1L Plastic	None	Yes	3.1	IR
1	125ml Plastic	HNO3	Yes	3.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	12/29/22 12:55	CTV	
Metal Digestion	Completed	SW3015A	12/28/22 10:10	CCM	

Inorganics**Method: E300.0, Run Date: 12/28/22 10:11, Analyst: JDP**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.08	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.13	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.30	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 12/29/22 08:06, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	371	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 12/29/22 11:48, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	265	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 12/29/22 15:46, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	306	50	10	mg/L	2		

Method: SM2540D, Run Date: 12/28/22 18:50, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	54	3	1	mg/L	2		

Metals**Method: E200.8, Run Date: 12/28/22 11:20, Analyst: CCM**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.008	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.062	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.83	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	2.30	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S43837.01 (continued)

Sample Tag: MW-11B L212196-01

Method: E200.8, Run Date: 12/28/22 11:20, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.029	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 12/28/22 13:24, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	69.6	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	24.4	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	6.93	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	16.2	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 12/29/22 15:23, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 01/23/23 16:00, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S43837.02

Sample Tag: Field Dupe MW-11B L212196-02

Collected Date/Time: 12/27/2022 12:17

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.1	IR
2	1L Plastic	None	Yes	3.1	IR
1	125ml Plastic	HNO3	Yes	3.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	12/29/22 12:55	CTV	
Metal Digestion	Completed	SW3015A	12/28/22 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 12/28/22 10:24, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.08	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.13	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.30	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 12/29/22 08:10, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	372	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 12/29/22 11:54, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	268	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 12/29/22 15:46, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	300	50	10	mg/L	2		

Method: SM2540D, Run Date: 12/28/22 18:50, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	32	3	1	mg/L	1.33		

Metals

Method: E200.8, Run Date: 12/28/22 11:27, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.007	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.062	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.83	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	2.25	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S43837.02 (continued)
Sample Tag: Field Dupe MW-11B L212196-02

Method: E200.8, Run Date: 12/28/22 11:27, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.028	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 12/28/22 13:26, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	67.0	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	24.5	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	6.61	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	16.0	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 12/29/22 15:26, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 01/23/23 16:00, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S43837.03

Sample Tag: Field Blank L212196-03

Collected Date/Time: 12/27/2022 10:50

Matrix: Water

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.1	IR
2	1L Plastic	None	Yes	3.1	IR
1	125ml Plastic	HNO3	Yes	3.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	12/29/22 12:55	CTV	
Metal Digestion	Completed	SW3015A	12/28/22 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 12/28/22 10:37, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.04	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.06	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.15	mg/L	2.5	14808-79-8	

Method: SM2320B, Run Date: 12/29/22 08:14, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	Not detected	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 12/29/22 12:00, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	Not detected	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 12/29/22 15:46, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	50	10	mg/L	2		

Method: SM2540D, Run Date: 12/28/22 18:50, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 12/28/22 11:16, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S43837.03 (continued)

Sample Tag: Field Blank L212196-03

Method: E200.8, Run Date: 12/28/22 11:16, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E200.8, Run Date: 12/28/22 13:22, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	
Magnesium	Not detected	0.50	0.00480	mg/L	2	7439-95-4	
Potassium	Not detected	0.50	0.00920	mg/L	2	7440-09-7	
Sodium	Not detected	0.50	0.00340	mg/L	2	7440-23-5	

Method: E245.1, Run Date: 12/29/22 15:29, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 01/23/23 16:00, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID:S43837

Client:BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 11B

Submitted: 12/27/2022 14:50 Login User: JRM

Attention: Jennifer Caporale

Address: Board of Water & Light

P.O. Box 13007

Lansing, MI 48901

Phone: 517-702-6372

FAX:

Email: Environmental_Laboratory@LBWL.com

Selection	Description	Note
-----------	-------------	------

Sample Receiving

- | | | |
|-----|--|--|
| 01. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples are received at 4C +/- 2C Thermometer # IR 3.1 |
| 02. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Received on ice/ cooling process begun |
| 03. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples shipped |
| 04. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples left in 24 hr. drop box |
| 05. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Are there custody seals/tape or is the drop box locked |

Chain of Custody

- | | | |
|-----|--|--|
| 06. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC adequately filled out |
| 07. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC signed and relinquished to the lab |
| 08. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sample tag on bottles match COC |
| 09. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Subcontracting needed? Subcontracted to: |

Preservation

- | | | |
|-----|--|---|
| 10. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Do sample have correct chemical preservation |
| 11. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Completed pH checks on preserved samples? (no VOAs) |
| 12. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Did any samples need to be preserved in the lab? |

Bottle Conditions

- | | | |
|-----|--|---|
| 13. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | All bottles intact |
| 14. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Appropriate analytical bottles are used |
| 15. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Merit bottles used |
| 16. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sufficient sample volume received |
| 17. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples require laboratory filtration |
| 18. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples submitted within holding time |
| 19. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Do water VOC or TOX bottles contain headspace |

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S43837 Submitted: 12/27/2022 14:50

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 11B

Initial Preservation Check: 12/27/2022 15:33 JRM

Preservation Recheck (E200.8): N/A

Attention: Jennifer Caporale

Address: Board of Water & Light

P.O. Box 13007

Lansing, MI 48901

Phone: 517-702-6372

FAX:

Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S43837.01	125ml Plastic HNO3	<2			
S43837.01	1L Plastic HNO3	<2			
S43837.01	1L Plastic HNO3	<2			
S43837.02	125ml Plastic HNO3	<2			
S43837.02	1L Plastic HNO3	<2			
S43837.02	1L Plastic HNO3	<2			
S43837.03	125ml Plastic HNO3	<2			
S43837.03	1L Plastic HNO3	<2			
S43837.03	1L Plastic HNO3	<2			



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 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

REPORT TO **CHAIN OF CUSTODY RECORD** **INVOICE TO**

CONTACT NAME **Jennifer Caporale**
 COMPANY **Lansing Board of Water and Light**
 ADDRESS **PO Box 13007 48901-3007**
 CITY **Lansing** STATE **Mi** ZIP CODE **48901**
 PHONE NO. **517-702-6372** FAX NO. _____ P.O. NO. _____
 E-MAIL ADDRESS **Environmental_Laboratory@lbwl.com** QUOTE NO. _____

CONTACT NAME **Kelly Gleason** SAME
 COMPANY _____
 ADDRESS _____
 CITY _____ STATE _____ ZIP CODE _____
 PHONE NO. _____ E-MAIL ADDRESS **Kelly.Gleason@lbwl.com**

PROJECT NO./NAME **Erickson AM MI Wells 11B** SAMPLER(S) - PLEASE PRINT/SIGN NAME **Marc Wahrer**
 TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER **ASAP**
 DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER _____

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives														
	DATE	TIME				NONE	HCl	HNO ₃	H ₂ SO ₄	NaOH	MHOH	OTHER								
43837.01	12/27/20	1217	MW-11B LA12196-01	GW	5	2	3													
.02	↓	↓	Field Dupe MW- 11B ↓ - 02	GW	5	2	3													
.03	↓	1050	Field Blank ↓ - 03	DI	5	2	3													

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Total Metals	F- undistilled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	HCO ₃ , CO ₃ , Hardness	Certifications
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> DoD <input checked="" type="checkbox"/> NPDES
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Project Locations
						<input type="checkbox"/> Detroit <input type="checkbox"/> New York
						<input type="checkbox"/> Other _____
						Special Instructions
						Metals to analyse: Na, Mg, K
						B, Ca, Sb, As, Ba, Be, Cd, Cr,
						Co, Li, Hg, Mo, Pb, Se, Tl,
						Fe, Cu, Ni, Ag, V, Zn
						Please send a preliminary report

RELINQUISHED BY: *[Signature]* DATE **12-27-22** TIME **1450**
 RECEIVED BY: *[Signature]* DATE **12-27-22** TIME **1450**
 RELINQUISHED BY: _____ DATE _____ TIME _____
 RECEIVED BY: _____ DATE _____ TIME _____

RELINQUISHED BY: _____ DATE _____ TIME _____
 RECEIVED BY: _____ DATE _____ TIME _____
 SEAL NO. SEAL INTACT INITIALS
 YES NO
 SEAL NO. SEAL INTACT INITIALS
 YES NO
 NOTES: TEMP. ON ARRIVAL **3.1**

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.150
Be, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	2.5
Cl	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cr, total	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
F	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
Fe, total	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
Se, total	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
Tl, total	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
TDS	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TSS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
V, total	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005

January 30, 2023

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 605553
SDG: S43837

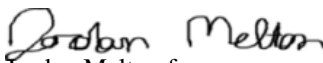
Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on December 30, 2022. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 1614.

Sincerely,


Jordan Melton for
Delaney Stone
Project Manager

Purchase Order: GELP20-0018
Enclosures



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Case Narrative

**Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S43837
Work Order: 605553**

January 30, 2023

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on December 30, 2022 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

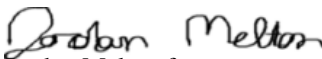
Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
605553001	S43837.01
605553002	S43837.02 Field Dupe
605553003	S43837.03 Field Blank

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.


Jordan Melton for
Delaney Stone
Project Manager

Chain of Custody and Supporting Documentation



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 Phone (517) 332-0167 Fax (517) 332-4034
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C.O.C. PAGE # 1 OF 1

WSSS3

REPORT TO

CONTACT NAME: Project Management Team
 COMPANY: Merit Laboratories
 ADDRESS: 2680 East Lansing Drive
 CITY: East Lansing STATE: MI ZIP CODE: 48823
 PHONE NO.: 517-332-0167 FAX NO.:
 E-MAIL ADDRESS: results@meritlabs.com

CHAIN OF CUSTODY RECORD

CONTACT NAME: Julie Teague
 COMPANY: Merit Laboratories
 ADDRESS: 2680 East Lansing Drive
 CITY: East Lansing STATE: MI ZIP CODE: 48823
 PHONE NO.: 517-332-0167 E-MAIL ADDRESS: juliet@meritlabs.com

INVOICE TO

PROJECT NO./NAME: S43837
 SAMPLER(S) - PLEASE PRINT/SIGN NAME:
 TURNAROUND TIME REQUIRED: 1 DAY 2 DAYS 3 DAYS STANDARD OTHER
 DELIVERABLES REQUIRED: STD LEVEL II LEVEL III LEVEL IV EDD OTHER

MATRIX: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WPIPE A=AIR W=WASTE

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR	DATE	TIME	IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives									
							NONE	H ₂ O	HNO ₃	H ₂ SO ₄	NaOH	MeOH	OTHER			
		12/27/22	1217	S43837.01	GW	2			2							
		12/27/22	1217	S43837.02 Field Dupe	GW	2			2							
		12/27/22	1050	S43837.03 Field Blank	GW	2			2							

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications	Project Locations	Special Instructions
<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water	<input type="checkbox"/> DoD <input type="checkbox"/> NPDES	* E903.1 Mod.
<input type="checkbox"/> Detroit <input type="checkbox"/> New York	<input type="checkbox"/> Other	** E904.0/SW 9320 Mod.
Please use calculation product & provide Radium 226/228 combined results on the report		
(No Ice needed)		
** Subcontracted to GEL Laboratories, Inc.		
2040 Savage Road		
Charleston, SC 29407		

RELINQUISHED BY: [Signature] DATE: 12/28/22 TIME: 1700
 RECEIVED BY: [Signature] DATE: 12/28/22 TIME: 1700

RELINQUISHED BY: [Signature] DATE: 12/30/22 TIME: 1015
 RECEIVED BY: [Signature] DATE: 12/30/22 TIME: 1015

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

SAMPLE RECEIPT & REVIEW FORM

Client: MERT SDG/AR/COC/Work Order: 605553 D.S

Received By: Thyasia Tatum Date Received: 12/30/22

Carrier and Tracking Number: 1240047703 6038000560
 FedEx Express FedEx Ground UPS Field Services Courier Other

Suspected Hazard Information Yes No *If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.

A) Shipped as a DOT Hazardous? Hazard Class Shipped: _____ UN#: _____
 If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___

B) Did the client designate the samples are to be received as radioactive? COC notation or radioactive stickers on containers equal client designation.

C) Did the RSO classify the samples as radioactive? Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr
 Classified as: Rad 1 Rad 2 Rad 3

D) Did the client designate samples are hazardous? COC notation or hazard labels on containers equal client designation.

E) Did the RSO identify possible hazards? If D or E is yes, select Hazards below.
 PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Client contacted and provided COC COC created upon receipt
3 Samples requiring cold preservation within (0 ≤ deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice Ice Packs Dry ice <u>None</u> Other: *all temperatures are recorded in Celsius TEMP: 16°C
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>IR2-20</u> Secondary Temperature Device Serial # (If Applicable):
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: If Preservation added, Lot#:
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer) Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No) Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___ Sample ID's and containers affected:
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and containers affected:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No container count on COC Other (describe)
12 Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Not relinquished Other (describe)

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials [Signature] Date 12/30/22 Page 1 of 1



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Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

WSSS3

REPORT TO
 CONTACT NAME: Project Management Team
 COMPANY: Merit Laboratories
 ADDRESS: 2680 East Lansing Drive
 CITY: East Lansing
 PHONE NO.: 517-332-0167
 E-MAIL ADDRESS: results@meritlabs.com

CHAIN OF CUSTODY RECORD
 CONTACT NAME: Julie Teague
 COMPANY: Merit Laboratories
 ADDRESS: 2680 East Lansing Drive
 CITY: East Lansing
 PHONE NO.: 517-332-0167
 E-MAIL ADDRESS: juliet@meritlabs.com

INVOICE TO

PROJECT NO./NAME: S43837

SAMPLER(S) - PLEASE PRINT/SIGN NAME

TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER

DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR	DATE	TIME	IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives							CERTIFICATIONS					
							GW=GROUNDWATER	WW=WASTEWATER	S=SOIL	L=LIQUID	SD=SOLID	H2O	HNO3		H2SO4	HOCH	OTHER		
	12/27/22	1217		S43837.01	GW	2					2								
	12/27/22	1217		S43837.02 Field Dupe	GW	2					2								
	12/27/22	1050		S43837.03 Field Blank	GW	2					2								

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Radium 226* Radium 228**

* E903.1 Mod.
** E904.0/SW 9320 Mod.

Certifications
 OHIO VAP Drinking Water
 DoD NPDES
 Project Locations
 Detroit New York
 Other _____
 Special Instructions

Please use calculation product & provide Radium 226/228 combined results on the report

(No Ice needed)
** Subcontracted to
GEL Laboratories, Inc.
2040 Savage Road
Charleston, SC 29407

RELINQUISHED BY: [Signature] DATE: 12/28/22 TIME: 1700
 RECEIVED BY: [Signature] DATE: 12/30/22 TIME: 1015
 SEAL INTACT YES NO
 INITIALS [Signature]

RELINQUISHED BY: [Signature] DATE: 12/28/22 TIME: 1700
 RECEIVED BY: [Signature] DATE: 12/30/22 TIME: 1015
 SEAL INTACT YES NO
 INITIALS [Signature]

SAMPLE RECEIPT & REVIEW FORM

Client: MERT SDG/AR/COC/Work Order: 605553 D.S

Received By: Thyasia Tatum Date Received: 12/30/22

Carrier and Tracking Number: 1240047703 6038000560

Circle Applicable:
 FedEx Express FedEx Ground UPS Field Services Courier Other

Suspected Hazard Information Yes No *If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.

A) Shipped as a DOT Hazardous? Yes No
 Hazard Class Shipped: _____ UN#: _____
 If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___

B) Did the client designate the samples are to be received as radioactive? Yes No
 COC notation or radioactive stickers on containers equal client designation.

C) Did the RSO classify the samples as radioactive? Yes No
 Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr
 Classified as: Rad 1 Rad 2 Rad 3

D) Did the client designate samples are hazardous? Yes No
 COC notation or hazard labels on containers equal client designation.

E) Did the RSO identify possible hazards? Yes No
 If D or E is yes, select Hazards below.
 PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Client contacted and provided COC COC created upon receipt
3 Samples requiring cold preservation within (0 ≤ deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice Ice Packs Dry ice <u>None</u> Other: *all temperatures are recorded in Celsius TEMP: <u>16°C</u>
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>IR2-20</u> Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer) Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No) Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___ Sample ID's and containers affected: _____
8 Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected: _____
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and containers affected: _____
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No container count on COC Other (describe)
12 Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Not relinquished Other (describe)

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials [Signature] Date 12/30/22 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 30 January 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122023-4
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2022-160
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-22-20
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S43837
Work Order #: 605553**

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2362953

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
605553001	S43837.01
605553002	S43837.02 Field Dupe
605553003	S43837.03 Field Blank
1205284349	Method Blank (MB)
1205284350	605386001(NonSDG) Sample Duplicate (DUP)
1205284351	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Preparation Information

Homogenous Matrix

Sample 1205284350 (Non SDG 605386001DUP) was non-homogenous matrix. Sample was brown and cloudy. 1205284350 (Non SDG 605386001DUP).

Quality Control (QC) Information

Method Blank Criteria

The blank result (See Below) is greater than the MDC but less than the required detection limit.

Sample	Analyte	Value
1205284349 (MB)	Radium-228	Result: 2.91 pCi/L > MDA: 2.40 pCi/L <= RDL: 3.00 pCi/L

Technical Information

Recounts

Sample 1205284351 (LCS) was recounted due to low recovery. The recount is reported.

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2362946

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
605553001	S43837.01
605553002	S43837.02 Field Dupe
605553003	S43837.03 Field Blank
1205284326	Method Blank (MB)
1205284327	605546001(NonSDG) Sample Duplicate (DUP)
1205284328	605546001(NonSDG) Matrix Spike (MS)
1205284329	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

Duplication Criteria between QC Sample and Duplicate Sample

The Sample and the Duplicate, (See Below), did not meet the relative percent difference requirement; however, they do meet the relative error ratio requirement with the value listed below.

Sample	Analyte	Value
1205284327 (Non SDG 605546001DUP)	Radium-226	RPD 45.5* (0.00%-20.00%) RER 1.74 (0-3)

Miscellaneous Information

Additional Comments

The matrix spike, 1205284328 (Non SDG 605546001MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Qualifier Definition Report for

MERI001 Merit Laboratories, Inc.

Client SDG: S43837 GEL Work Order: 605553

The Qualifiers in this report are defined as follows:

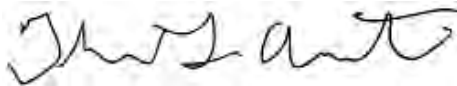
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:



Name: Theresa Austin

Date: 30 JAN 2023

Title: Group Leader

Sample Data Summary

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: January 30, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S43837.01 Project: MERI00120
Sample ID: 605553001 Client ID: MERI001
Matrix: Ground Water
Collect Date: 27-DEC-22 12:17
Receive Date: 30-DEC-22
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228		2.63	+/-1.18	1.67	3.00	pCi/L		JE1	01/13/23	0904	2362953	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		3.56	+/-1.23			pCi/L		NXL1	01/23/23	1600	2363512	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		0.926	+/-0.336	0.228	1.00	pCi/L		LXP1	01/11/23	1108	2362946	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			84.5	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: January 30, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S43837.02 Field Dupe	Project: MERI00120
Sample ID: 605553002	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 27-DEC-22 12:17	
Receive Date: 30-DEC-22	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	0.560	+/-0.717	1.22	3.00	pCi/L		JE1	01/13/23	0904	2362953	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		1.33	+/-0.786			pCi/L		NXL1	01/23/23	1600	2363512	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		0.773	+/-0.321	0.370	1.00	pCi/L		LXP1	01/11/23	1108	2362946	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			83.4	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

- | | |
|---------------------------------------|--------------------------------|
| DF: Dilution Factor | Lc/LC: Critical Level |
| DL: Detection Limit | PF: Prep Factor |
| MDA: Minimum Detectable Activity | RL: Reporting Limit |
| MDC: Minimum Detectable Concentration | SQL: Sample Quantitation Limit |

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: January 30, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S43837.03 Field Blank Project: MERI00120
Sample ID: 605553003 Client ID: MERI001
Matrix: Ground Water
Collect Date: 27-DEC-22 10:50
Receive Date: 30-DEC-22
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	1.54	+/-1.23	1.96	3.00	pCi/L		JE1	01/13/23	0904	2362953	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		2.14	+/-1.27			pCi/L		NXL1	01/23/23	1600	2363512	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		0.604	+/-0.304	0.354	1.00	pCi/L		LXP1	01/11/23	1108	2362946	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			69.9	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

Quality Control Data

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: January 30, 2023

Page 1 of 2

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: John Laverty

Workorder: 605553

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2362953										
QC1205284350	605386001	DUP									
Radium-228		1.79		3.16	pCi/L	55.3		(0% - 100%)	JE1	01/13/23	09:02
	Uncertainty	+/-1.03		+/-1.17							
QC1205284351	LCS										
Radium-228	63.9			49.3	pCi/L		77.1	(75%-125%)		01/13/23	10:19
	Uncertainty			+/-3.99							
QC1205284349	MB										
Radium-228				2.91	pCi/L					01/13/23	09:02
	Uncertainty			+/-1.57							
Rad Ra-226											
Batch	2362946										
QC1205284327	605546001	DUP									
Radium-226		1.06		1.69	pCi/L	45.5*		(0%-20%)	LXP1	01/11/23	13:00
	Uncertainty	+/-0.416		+/-0.434							
QC1205284329	LCS										
Radium-226	26.5			21.5	pCi/L		81	(75%-125%)		01/11/23	13:00
	Uncertainty			+/-1.50							
QC1205284326	MB										
Radium-226			U	0.285	pCi/L					01/11/23	11:55
	Uncertainty			+/-0.224							
QC1205284328	605546001	MS									
Radium-226	133	1.06		105	pCi/L		78.6	(75%-125%)		01/11/23	13:00
	Uncertainty	+/-0.416		+/-8.17							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- H Analytical holding time was exceeded
- < Result is less than value reported
- > Result is greater than value reported

GEL LABORATORIES LLC

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QC Summary

Workorder: 605553

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UI											
BD											
h											
R											
^											
N/A											
ND											
M											
NJ											
FA											
UJ											
Q											
K											
UL											
L											
NI											
Y											
**											
M											
J											

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 2362953 Check-list

This check-list was completed on 17-JAN-23 by Kenshalla Oston

This batch was reviewed by Rhonda Birch on 13-JAN-23 and Kenshalla Oston on 17-JAN-23.

Batch ID:
2362953

Product:
GFC28RAL

Description: Gas Flow Radium 228
GL-RAD-A-063

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?		No	
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-228 in Liquid

Batch ID: 2362953
Analyst: Jacqueline Emond (JE1)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL-RAD-A-063 REV# 5
Instrument: LUCAS-C202389980

Due Dates for Lab: 21-JAN-2023 **Package:** 29-JAN-2023 **SDG:** 23-JAN-2023

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1205284351	228	1952-B	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	Ac-228 Ingrow (date)	Ac-228 Separation (date)
1	605386001	05-JAN-2023	3	300.17	300.17	01/09/23 11:52	01/13/23 07:07
2	605482001	05-JAN-2023	3	301.35	301.35	01/09/23 11:52	01/13/23 07:07
3	605482002	05-JAN-2023	3	301.96	301.96	01/09/23 11:52	01/13/23 07:07
4	605482003	05-JAN-2023	3	304.14	304.14	01/09/23 11:52	01/13/23 07:07
5	605485001	05-JAN-2023	3	305.7	305.7	01/09/23 11:52	01/13/23 07:07
6	605487001	05-JAN-2023	3	301.1	301.1	01/09/23 11:52	01/13/23 07:07
7	605489001	05-JAN-2023	3	304.27	304.27	01/09/23 11:52	01/13/23 07:07
8	605534001	05-JAN-2023	3	301	301	01/09/23 11:52	01/13/23 07:07
9	605546001	05-JAN-2023	3	302.24	302.24	01/09/23 11:52	01/13/23 07:07
10	605547001	05-JAN-2023	3	303.93	303.93	01/09/23 11:52	01/13/23 07:07
11	605550001	05-JAN-2023	3	301.62	301.62	01/09/23 11:52	01/13/23 07:07
12	605551001	05-JAN-2023	3	301.59	301.59	01/09/23 11:52	01/13/23 07:07
13	605553001	05-JAN-2023	3	302.99	302.99	01/09/23 11:52	01/13/23 07:07
14	605553002	05-JAN-2023	3	300.5	300.5	01/09/23 11:52	01/13/23 07:07
15	605553003	05-JAN-2023	3	302.6	302.6	01/09/23 11:52	01/13/23 07:07
16	605557001	05-JAN-2023	3	300.3	300.3	01/09/23 11:52	01/13/23 07:07
17	605560001	05-JAN-2023	3	302.24	302.24	01/09/23 11:52	01/13/23 07:07
18	605564001	05-JAN-2023	3	301.17	301.17	01/09/23 11:52	01/13/23 07:07
19	605566001	05-JAN-2023	3	304.18	304.18	01/09/23 11:52	01/13/23 07:07
20	605568001	05-JAN-2023	3	301.34	301.34	01/09/23 11:52	01/13/23 07:07
21	1205284349 MB	05-JAN-2023	3		305.7	01/09/23 11:52	01/13/23 07:07
22	1205284350 DUP (605386001)	05-JAN-2023	3	302.32	302.32	01/09/23 11:52	01/13/23 07:07
23	1205284351 LCS	05-JAN-2023	3		305.7	01/09/23 11:52	01/13/23 07:07

Reagent/Solvent Lot ID	Description	Amount	Comments:
WORK 1951-D	Ba-133	.1 mL	Pipet Id: RAD-GFC-1795419 Data Entry Date2: 05-JAN-2023 00:00
REGNT 3648637	RGF-1.5M Ammonium Sulfate	10 mL	
REGNT 3532398	RGF-1M Citric Acid	5 mL	
REGNT 3648545	2M HCl	20 mL	
REGNT 3647296	RGF-50% Potassium Carbonate	2 mL	
REGNT 3648549	RGF-7M Nitric Acid	25 mL	
REGNT 3418276.6	29M HF (48-50%)	4 mL	
REGNT 3528714	500 mg/mL Neodymium Carrier	.2 mL	
REGNT 3521298	RGF-Neodymium Substrate	5 mL	
REGNT 3454370.1	Nitric Acid	5 mL	
REGNT 3465466	Barium Carrier Ra228 REG	1 mL	
REGNT 3645221.6	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL	
REGNT DGA0041	2355308	2 g	

Analytical Logbook version 1 11-04-2002

GEL Laboratories LLC

Prep Logbook

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	Ac-228 Ingrow (date)	Ac-228 Separation (date)
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Reagent/Solvent Lot ID	Description	Amount	Comments:
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Radium-228 Liquid

Filename : RA228.XLS
 File type : Excel
 Version # : 1.4.2

Tracer S/N : 1951-D
 Tracer Exp Date : 6/3/2023
 Tracer Volume Added: 0.10

Batch : 2362953
 Analyst : JAC02417
 Prep Date : 1/5/2023
 Ra-228 Method Uncertainty : 0.1268

Procedure Code : GFC28RAL
 Parmname : Radium-228
 Required MDA : 3 pCi/L
 Ra-228 Abundance : 1.00
 Halflife of Ra-228 : 5.75 years
 Halflife of Ac-228 : 6.15 hours

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	605386001.1	0.3002	1.8462E-05	12/21/2022 9:30	1284.8	1.61%	1076.0	1.76%	0.1	0.000200
2	605482001.1	0.3014	1.8482E-05	12/21/2022 10:35	1284.8	1.61%	1109.0	1.73%	0.1	0.000200
3	605482002.1	0.3020	1.8492E-05	12/21/2022 10:45	1284.8	1.61%	1017.8	1.81%	0.1	0.000200
4	605482003.1	0.3041	1.8529E-05	12/21/2022 10:35	1284.8	1.61%	972.3	1.85%	0.1	0.000200
5	605485001.1	0.3057	1.8554E-05	12/15/2022 8:00	1284.8	1.61%	1013.1	1.81%	0.1	0.000200
6	605487001.1	0.3011	1.8478E-05	10/31/2022 12:25	1284.8	1.61%	949.8	1.87%	0.1	0.000200
7	605489001.1	0.3043	1.8531E-05	12/14/2022 8:30	1284.8	1.61%	883.2	1.94%	0.1	0.000200
8	605534001.1	0.3010	1.8476E-05	12/29/2022 9:10	1284.8	1.61%	1054.5	1.78%	0.1	0.000200
9	605546001.1	0.3022	1.8497E-05	12/27/2022 8:45	1284.8	1.61%	993.5	1.83%	0.1	0.000200
10	605547001.1	0.3039	1.8525E-05	12/27/2022 9:27	1284.8	1.61%	1047.1	1.78%	0.1	0.000200
11	605550001.1	0.3016	1.8486E-05	12/27/2022 7:00	1284.8	1.61%	1033.9	1.80%	0.1	0.000200
12	605551001.1	0.3016	1.8486E-05	12/21/2022 10:40	1284.8	1.61%	1032.7	1.80%	0.1	0.000200
13	605553001.1	0.3030	1.8509E-05	12/27/2022 12:17	1284.8	1.61%	1086.2	1.75%	0.1	0.000200
14	605553002.1	0.3005	1.8468E-05	12/27/2022 12:17	1284.8	1.61%	1072.0	1.76%	0.1	0.000200
15	605553003.1	0.3026	1.8503E-05	12/27/2022 10:50	1284.8	1.61%	898.4	1.93%	0.1	0.000200
16	605557001.1	0.3003	1.8464E-05	12/13/2022 10:00	1284.8	1.61%	1099.3	1.74%	0.1	0.000200
17	605560001.1	0.3022	1.8497E-05	12/13/2022 10:15	1284.8	1.61%	1031.1	1.80%	0.1	0.000200
18	605564001.1	0.3012	1.8479E-05	12/15/2022 0:00	1284.8	1.61%	1114.6	1.73%	0.1	0.000200
19	605566001.1	0.3042	1.8529E-05	12/20/2022 7:15	1284.8	1.61%	968.4	1.86%	0.1	0.000200
20	605568001.1	0.3013	1.8482E-05	12/20/2022 10:35	1284.8	1.61%	985.2	1.84%	0.1	0.000200
21	1205284349.1	0.3057	1.8554E-05	1/5/2023 0:00	1284.8	1.61%	977.9	1.85%	0.1	0.000200
22	1205284350.1	0.3023	1.8498E-05	12/21/2022 9:30	1284.8	1.61%	1095.1	1.74%	0.1	0.000200
23	1205284351.1	0.3057	1.8554E-05	1/5/2023 0:00	1284.8	1.61%	1080.1	1.76%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-063
 Instrument SOP: GL-RAD-I-016

Count raw Data													Calculated Sample Recovery %	Sample Recovery Error %
Pos.	Detector ID	Counting Time (min.)	Gross Counts		Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction		
1	2A	60	10	65	1.083	1/13/2023 9:06	1/9/2023 11:52	1/13/2023 7:07	0.992	0.799	1.000	1.057	83.7%	1.23%
2	2B	60	7	149	2.483	1/13/2023 9:06	1/9/2023 11:52	1/13/2023 7:07	0.992	0.799	1.000	1.057	86.3%	1.22%
3	2C	60	15	151	2.517	1/13/2023 9:06	1/9/2023 11:52	1/13/2023 7:07	0.992	0.799	1.000	1.057	79.2%	1.24%
4	2D	60	13	127	2.117	1/13/2023 9:06	1/9/2023 11:52	1/13/2023 7:07	0.992	0.799	1.000	1.057	75.7%	1.26%
5	3C	60	14	78	1.300	1/13/2023 9:04	1/9/2023 11:52	1/13/2023 7:07	0.990	0.802	1.000	1.057	78.9%	1.24%
6	4C	60	5	44	0.733	1/13/2023 9:04	1/9/2023 11:52	1/13/2023 7:07	0.976	0.802	1.000	1.057	73.9%	1.27%
7	5A	60	9	92	1.533	1/13/2023 9:04	1/9/2023 11:52	1/13/2023 7:07	0.990	0.802	1.000	1.057	68.7%	1.29%
8	5B	60	9	73	1.217	1/13/2023 9:04	1/9/2023 11:52	1/13/2023 7:07	0.995	0.802	1.000	1.057	82.1%	1.23%
9	6A	60	14	86	1.433	1/13/2023 9:04	1/9/2023 11:52	1/13/2023 7:07	0.994	0.802	1.000	1.057	77.3%	1.25%
10	6B	60	20	65	1.083	1/13/2023 9:04	1/9/2023 11:52	1/13/2023 7:07	0.994	0.802	1.000	1.057	81.5%	1.23%
11	7A	60	13	44	0.733	1/13/2023 9:04	1/9/2023 11:52	1/13/2023 7:07	0.994	0.802	1.000	1.057	80.5%	1.24%
12	7B	60	15	57	0.950	1/13/2023 9:04	1/9/2023 11:52	1/13/2023 7:07	0.992	0.802	1.000	1.057	80.4%	1.24%
13	7C	60	10	96	1.600	1/13/2023 9:04	1/9/2023 11:52	1/13/2023 7:07	0.994	0.802	1.000	1.057	84.5%	1.22%
14	7D	60	9	32	0.533	1/13/2023 9:04	1/9/2023 11:52	1/13/2023 7:07	0.994	0.802	1.000	1.057	83.4%	1.23%
15	8A	60	17	70	1.167	1/13/2023 9:04	1/9/2023 11:52	1/13/2023 7:07	0.994	0.802	1.000	1.057	69.9%	1.29%
16	8C	60	13	134	2.233	1/13/2023 9:04	1/9/2023 11:52	1/13/2023 7:07	0.990	0.802	1.000	1.057	85.6%	1.22%
17	9A	60	14	64	1.067	1/13/2023 9:05	1/9/2023 11:52	1/13/2023 7:07	0.990	0.801	1.000	1.057	80.3%	1.24%
18	9C	60	14	82	1.367	1/13/2023 9:04	1/9/2023 11:52	1/13/2023 7:07	0.990	0.802	1.000	1.057	86.8%	1.22%
19	10B	60	19	60	1.000	1/13/2023 9:04	1/9/2023 11:52	1/13/2023 7:07	0.992	0.802	1.000	1.057	75.4%	1.26%
20	10D	60	17	83	1.383	1/13/2023 9:04	1/9/2023 11:52	1/13/2023 7:07	0.992	0.802	1.000	1.057	76.7%	1.25%
21	11C	60	12	135	2.250	1/13/2023 9:02	1/9/2023 11:52	1/13/2023 7:07	0.997	0.805	1.000	1.057	76.1%	1.26%
22	12A	60	11	86	1.433	1/13/2023 9:02	1/9/2023 11:52	1/13/2023 7:07	0.992	0.805	1.000	1.057	85.2%	1.22%
23	2B	60	9	774	12.900	1/13/2023 10:19	1/9/2023 11:52	1/13/2023 7:07	0.997	0.696	1.000	1.057	84.1%	1.23%

Calibration Data								
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2022	5/31/2023	0.6201	0.01914	0.619	1/7/2023 10:26	1000
2	PIC	6/1/2022	5/31/2023	0.6097	0.02111	1.633	1/7/2023 10:26	1000
3	PIC	6/1/2022	5/31/2023	0.6022	0.01274	1.348	1/7/2023 10:26	1000
4	PIC	6/1/2022	5/31/2023	0.6046	0.00745	0.977	1/7/2023 10:26	1000
5	PIC	6/1/2022	5/31/2023	0.6365	0.00988	1.431	1/7/2023 10:25	1000
6	PIC	6/1/2022	5/31/2023	0.6359	0.00889	0.502	1/7/2023 10:26	1000
7	PIC	6/1/2022	5/31/2023	0.6332	0.00851	0.931	1/7/2023 10:27	1000
8	PIC	6/1/2022	5/31/2023	0.6336	0.00426	0.825	1/7/2023 10:27	1000
9	PIC	6/1/2022	5/31/2023	0.6328	0.02228	1.027	1/7/2023 10:27	1000
10	PIC	6/1/2022	5/31/2023	0.6280	0.00851	0.931	1/7/2023 10:27	1000
11	PIC	6/1/2022	5/31/2023	0.6257	0.00594	0.479	1/7/2023 10:27	1000
12	PIC	6/1/2022	5/31/2023	0.6366	0.00627	0.582	1/7/2023 10:27	1000
13	PIC	6/1/2022	5/31/2023	0.6407	0.00790	0.877	1/7/2023 10:27	1000
14	PIC	6/1/2022	5/31/2023	0.6270	0.01113	0.386	1/7/2023 10:27	1000
15	PIC	6/1/2022	5/31/2023	0.6398	0.01579	0.818	1/7/2023 10:27	1000
16	PIC	6/1/2022	5/31/2023	0.6294	0.01955	1.411	1/7/2023 10:27	1000
17	PIC	6/1/2022	5/31/2023	0.6336	0.00758	0.570	1/7/2023 10:28	1000
18	PIC	6/1/2022	5/31/2023	0.6184	0.00584	0.716	1/7/2023 10:28	1000
19	PIC	6/1/2022	5/31/2023	0.6145	0.00652	0.619	1/7/2023 10:28	1000
20	PIC	6/1/2022	5/31/2023	0.6148	0.00557	0.881	1/7/2023 10:28	1000
21	PIC	6/1/2022	5/31/2023	0.6276	0.01278	1.534	1/7/2023 10:27	1000
22	PIC	6/1/2022	5/31/2023	0.6090	0.01964	0.602	1/7/2023 10:26	1000
23	PIC	6/1/2022	5/31/2023	0.6097	0.02111	1.633	1/7/2023 10:26	1000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : N/A
 Spike Exp Date : N/A
 Spike Activity (dpm/ml): N/A
 Spike Volume Added: N/A

LCS S/N : 1952-B
 LCS Exp Date : 8/9/2023
 LCS Activity (dpm/ml): 433.98
 LCS Volume Added: 0.10

Results																
Pos.	Decision	Critical	Required	Sample Act.		Sample Act.	Net Count	Net Count	2 SIGMA	2 SIGMA	Sample	Sample	Nominal			
	Level	Level	MDA	MDA	Conc.	Error	Rate	Rate Error	Counting	Total Prop.						
	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	%	CPM	CPM	Uncertainty	Uncertainty	QC	Type	RPD	RER	pCi/L	Recovery
1	0.9393	0.6631	3	1.5190	1.7900	29.52%	0.4643	0.1367	1.0325	1.1271		SAMPLE				
2	1.4995	1.0586	3	2.3067	3.2218	24.51%	0.8503	0.2074	1.5403	1.7428		SAMPLE				
3	1.4999	1.0589	3	2.3264	4.8750	17.89%	1.1687	0.2081	1.7011	2.0954		SAMPLE				
4	1.3219	0.9333	3	2.0825	4.9215	16.77%	1.1397	0.1904	1.6116	2.0281		SAMPLE				
5	1.4482	1.0224	3	2.2403	-0.5121	116.03%	-0.1310	0.1520	1.1644	1.1646		SAMPLE				
6	0.9433	0.6660	3	1.5469	0.9945	48.79%	0.2313	0.1128	0.9505	0.9826		SAMPLE				
7	1.3534	0.9555	3	2.1375	2.7280	27.06%	0.6023	0.1627	1.4447	1.5980		SAMPLE				
8	1.0726	0.7573	3	1.7052	1.4935	37.11%	0.3917	0.1453	1.0857	1.1480		SAMPLE				
9	1.2674	0.8948	3	1.9915	1.6409	38.93%	0.4063	0.1578	1.2494	1.3168		SAMPLE				
10	1.1473	0.8100	3	1.8119	0.5849	90.47%	0.1523	0.1378	1.0369	1.0472		SAMPLE				
11	0.8429	0.5951	3	1.3868	1.0001	44.33%	0.2543	0.1127	0.8686	0.9039		SAMPLE				
12	0.9162	0.6468	3	1.4875	1.4270	34.84%	0.3680	0.1281	0.9738	1.0371		SAMPLE				
13	1.0551	0.7449	3	1.6718	2.6304	23.00%	0.7230	0.1660	1.1834	1.3541		SAMPLE				
14	0.7308	0.5160	3	1.2218	0.5596	65.39%	0.1473	0.0963	0.7170	0.7306		SAMPLE				
15	1.2353	0.8721	3	1.9648	1.5377	40.88%	0.3487	0.1423	1.2305	1.2899		SAMPLE				
16	1.3644	0.9633	3	2.1120	3.0500	24.01%	0.8223	0.1966	1.4288	1.6233		SAMPLE				
17	0.9143	0.6455	3	1.4865	1.9422	27.31%	0.4967	0.1355	1.0382	1.1462		SAMPLE				
18	0.9722	0.6864	3	1.5582	2.4139	23.60%	0.6507	0.1533	1.1145	1.2673		SAMPLE				
19	1.0348	0.7306	3	1.6735	1.6181	34.54%	0.3810	0.1315	1.0944	1.1668		SAMPLE				
20	1.2244	0.8644	3	1.9394	2.1158	30.83%	0.5023	0.1547	1.2772	1.3824		SAMPLE				
21	1.5586	1.1004	3	2.4039	2.9094	27.65%	0.7160	0.1976	1.5735	1.7347		MB				
22	0.9128	0.6444	3	1.4788	3.1581	18.97%	0.8313	0.1565	1.1652	1.4122	605386001.1	DUP	55.3%			
23	1.7323	1.2230	3	2.6649	49.3174	4.80%	11.2670	0.4654	3.9931	13.1049		LCS			63.9470	77.1%

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
605386001	2A	60	10	65	1/13/2023 9:06	1/13/2023 10:06	PIC	2362953
605482001	2B	60	7	149	1/13/2023 9:06	1/13/2023 10:06	PIC	2362953
605482002	2C	60	15	151	1/13/2023 9:06	1/13/2023 10:06	PIC	2362953
605482003	2D	60	13	127	1/13/2023 9:06	1/13/2023 10:06	PIC	2362953
605485001	3C	60	14	78	1/13/2023 9:04	1/13/2023 10:04	PIC	2362953
605487001	4C	60	5	44	1/13/2023 9:04	1/13/2023 10:04	PIC	2362953
605489001	5A	60	9	92	1/13/2023 9:04	1/13/2023 10:04	PIC	2362953
605534001	5B	60	9	73	1/13/2023 9:04	1/13/2023 10:04	PIC	2362953
605546001	6A	60	14	86	1/13/2023 9:04	1/13/2023 10:04	PIC	2362953
605547001	6B	60	20	65	1/13/2023 9:04	1/13/2023 10:04	PIC	2362953
605550001	7A	60	13	44	1/13/2023 9:04	1/13/2023 10:04	PIC	2362953
605551001	7B	60	15	57	1/13/2023 9:04	1/13/2023 10:04	PIC	2362953
605553001	7C	60	10	96	1/13/2023 9:04	1/13/2023 10:04	PIC	2362953
605553002	7D	60	9	32	1/13/2023 9:04	1/13/2023 10:04	PIC	2362953
605553003	8A	60	17	70	1/13/2023 9:04	1/13/2023 10:04	PIC	2362953
605557001	8C	60	13	134	1/13/2023 9:04	1/13/2023 10:04	PIC	2362953
605560001	9A	60	14	64	1/13/2023 9:05	1/13/2023 10:05	PIC	2362953
605564001	9C	60	14	82	1/13/2023 9:04	1/13/2023 10:04	PIC	2362953
605566001	10B	60	19	60	1/13/2023 9:04	1/13/2023 10:04	PIC	2362953
605568001	10D	60	17	83	1/13/2023 9:04	1/13/2023 10:04	PIC	2362953
1205284349	11C	60	12	135	1/13/2023 9:02	1/13/2023 10:02	PIC	2362953
1205284350	12A	60	11	86	1/13/2023 9:02	1/13/2023 10:02	PIC	2362953
1205284351	2B	60	9	774	1/13/2023 10:19	1/13/2023 11:19	PIC	2362953

ASSAY 13-Jan-23 7:38:39
 Wizard 2480 s/n 46190630
 Protocol id 8 Ba-133
 Time limit
 Count limit
 Isotope Ba-133
 Protocol date 1/13/2023
 Run id. 6055

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF		1	93	1	180	3855	1284.77	1.61	07:38:39
605386001	2	93	2	180	3228.57	1075.96	1.76	83.75	07:41:53
605482001	3	93	3	180	3327.57	1109.02	1.73	86.32	07:45:07
605482002	4	93	4	180	3054	1017.8	1.81	79.22	07:48:21
605482003	5	93	5	180	2917.41	972.29	1.85	75.68	07:51:35
605485001	1	94	1	180	3040	1013.05	1.81	78.85	07:55:13
605487001	2	94	2	180	2850	949.82	1.87	73.93	07:58:27
605489001	3	94	3	180	2650	883.16	1.94	68.74	08:01:41
605534001	4	94	4	180	3164	1054.47	1.78	82.07	08:04:54
605546001	5	94	5	180	2981	993.49	1.83	77.33	08:08:09
605547001	1	10	1	180	3141.57	1047.08	1.78	81.50	08:11:44
605550001	2	10	2	180	3102.28	1033.86	1.8	80.47	08:14:58
605551001	3	10	3	180	3098.57	1032.66	1.8	80.38	08:18:12
605553001	4	10	4	180	3259.57	1086.23	1.75	84.55	08:21:26
605553002	5	10	5	180	3216.57	1072.03	1.76	83.44	08:24:41
605553003	1	14	1	180	2695.57	898.39	1.93	69.93	08:28:28
605557001	2	14	2	180	3298.28	1099.28	1.74	85.56	08:31:42
605560001	3	14	3	180	3093.57	1031.09	1.8	80.25	08:34:55
605564001	4	14	4	180	3344.28	1114.55	1.73	86.75	08:38:09
605566001	5	14	5	180	2905.57	968.42	1.86	75.38	08:41:24
605568001	1	19	1	180	2956.28	985.24	1.84	76.69	08:45:11
1205284349	2	19	2	180	2934.28	977.91	1.85	76.12	08:48:25
1205284350	3	19	3	180	3286	1095.13	1.74	85.24	08:51:39
1205284351	4	19	4	180	3241	1080.13	1.76	84.07	08:54:53

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 13-Jan-2023

Detectors LB4100 A1 through I4 and PIC 1A through 14D and G5400W 1W through 1Z

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
G5400W1W	Above	Beta bkg	13-Jan 03:49	60	4.167	0.611	1.924	+13.25
G5400W1W	Below	Beta eff	13-Jan 06:22	5	13685	13690	14760	-3.03
LB4100E2	Above	Beta bkg	13-Jan 04:48	60	5.250	1.385	3.072	+10.75
LB4100F1	Above	Beta bkg	13-Jan 04:48	60	14.750	0.188	2.691	+31.91
LB4100F2	Below	Alpha eff	13-Jan 05:58	5	5965	6533	7372	-7.06
LB4100F2	Above	Alpha XTalk	13-Jan 05:58	5	0.398	0.318	0.366	+6.99
LB4100F2	Above	Beta bkg	13-Jan 04:48	60	48.517	1.173	1.833	+427.40
LB4100F3	Above	Alpha bkg	13-Jan 04:48	60	0.367	0.119	0.404	+2.22
LB4100G1	Above	Alpha XTalk	13-Jan 05:51	5	1.563	0.088	0.447	+21.68
LB4100G1	Above	Beta bkg	13-Jan 04:48	60	6498	0.380	1.675	+30,105.37
LB4100G2	Above	Beta bkg	13-Jan 04:48	60	3.450	-2.58E+3	2837	-0.14
LB4100G3	need 2nd	Alpha eff	13-Jan 05:51	5	5976	5785	8229	-2.53
LB4100G3	Above	Beta bkg	13-Jan 04:48	60	4.333	0.987	2.738	+8.47
LB4100G3	Below	Beta eff	13-Jan 05:58	5	18843	19160	24060	-3.39
LB4100H1	Above	Beta bkg	13-Jan 04:48	60	3.000	0.216	2.462	+4.44
PIC1D	Above	Alpha bkg	13-Jan 08:39	60	0.417	-1.03E-1	0.386	+3.38
PIC1D	Below	Beta eff	13-Jan 05:05	5	20409	23720	25130	-17.09
PIC4B	Above	Alpha bkg	13-Jan 08:40	60	0.300	-9.02E-2	0.287	+3.21
PIC4B	Above	Beta bkg	13-Jan 08:40	60	6.500	0.083	2.861	+10.86
PIC5D	Above	Alpha bkg	13-Jan 05:24	60	0.850	-9.04E-2	0.400	+8.52
PIC6C	Above	Alpha bkg	13-Jan 05:24	60	0.883	-8.68E-2	0.350	+10.33
PIC6C	Above	Beta XTalk	13-Jan 05:17	5	5.18E-4	1.11E-4	4.78E-4	+3.66
PIC8B	Above	Alpha bkg	13-Jan 05:30	60	1.867	-1.16E-1	0.388	+20.64
PIC9B	Above	Beta bkg	13-Jan 05:36	60	3.867	-2.42E-1	2.161	+7.26
PIC9D	Below	Alpha eff	13-Jan 08:41	5	9950	10040	10860	-3.66
PIC10C	Above	Beta bkg	13-Jan 05:36	60	3.033	-3.39E-1	2.310	+4.64
PIC10C	Above	Beta XTalk	13-Jan 05:29	5	6.32E-4	9.29E-5	6.05E-4	+3.33
PIC11B	Above	Beta bkg	13-Jan 08:36	60	3.533	-2.97E-1	3.063	+3.84

PIC12B	Above	Alpha bkg	13-Jan 05:42	60	0.617	-4.23E-2	0.379	+6.38
PIC13D	Above	Beta bkg	13-Jan 05:51	60	6.450	0.259	2.562	+13.13
PIC14A	Above	Alpha bkg	13-Jan 05:51	60	0.400	-8.85E-2	0.451	+2.44
PIC14B	Above	Alpha bkg	13-Jan 05:51	60	0.450	-1.08E-1	0.400	+3.59

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100A1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC8D	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by  _____

Date 1-13-23 _____

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC

Batch ID: 2362953

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1205284350	DUP	JE1	PIC12A	JAN-13-23 09:02:26	DONE	25mm Filter	01-JUN-22 00:00
1205284349	MB	JE1	PIC11C	JAN-13-23 09:02:28	DONE	25mm Filter	01-JUN-22 00:00
605564001	SAMPLE	JE1	PIC9C	JAN-13-23 09:04:13	DONE	25mm Filter	01-JUN-22 00:00
605566001	SAMPLE	JE1	PIC10B	JAN-13-23 09:04:14	DONE	25mm Filter	01-JUN-22 00:00
605568001	SAMPLE	JE1	PIC10D	JAN-13-23 09:04:14	DONE	25mm Filter	01-JUN-22 00:00
605553003	SAMPLE	JE1	PIC8A	JAN-13-23 09:04:17	DONE	25mm Filter	01-JUN-22 00:00
605557001	SAMPLE	JE1	PIC8C	JAN-13-23 09:04:17	DONE	25mm Filter	01-JUN-22 00:00
605553001	SAMPLE	JE1	PIC7C	JAN-13-23 09:04:21	DONE	25mm Filter	01-JUN-22 00:00
605553002	SAMPLE	JE1	PIC7D	JAN-13-23 09:04:21	DONE	25mm Filter	01-JUN-22 00:00
605546001	SAMPLE	JE1	PIC6A	JAN-13-23 09:04:25	DONE	25mm Filter	01-JUN-22 00:00
605547001	SAMPLE	JE1	PIC6B	JAN-13-23 09:04:25	DONE	25mm Filter	01-JUN-22 00:00
605550001	SAMPLE	JE1	PIC7A	JAN-13-23 09:04:25	DONE	25mm Filter	01-JUN-22 00:00
605551001	SAMPLE	JE1	PIC7B	JAN-13-23 09:04:26	DONE	25mm Filter	01-JUN-22 00:00
605487001	SAMPLE	JE1	PIC4C	JAN-13-23 09:04:28	DONE	25mm Filter	01-JUN-22 00:00
605489001	SAMPLE	JE1	PIC5A	JAN-13-23 09:04:29	DONE	25mm Filter	01-JUN-22 00:00
605534001	SAMPLE	JE1	PIC5B	JAN-13-23 09:04:29	DONE	25mm Filter	01-JUN-22 00:00
605485001	SAMPLE	JE1	PIC3C	JAN-13-23 09:04:32	DONE	25mm Filter	01-JUN-22 00:00
605560001	SAMPLE	JE1	PIC9A	JAN-13-23 09:05:17	DONE	25mm Filter	01-JUN-22 00:00
605386001	SAMPLE	JE1	PIC2A	JAN-13-23 09:06:40	DONE	25mm Filter	01-JUN-22 00:00
605482001	SAMPLE	JE1	PIC2B	JAN-13-23 09:06:40	DONE	25mm Filter	01-JUN-22 00:00
605482002	SAMPLE	JE1	PIC2C	JAN-13-23 09:06:40	DONE	25mm Filter	01-JUN-22 00:00
605482003	SAMPLE	JE1	PIC2D	JAN-13-23 09:06:40	DONE	25mm Filter	01-JUN-22 00:00
1205284351	LCS	JE1	PIC2B	JAN-13-23 10:19:38	DONE	25mm Filter	01-JUN-22 00:00

Lucas Cell Raw Data

Batch 2362946 Check-list

This check-list was completed on 12-JAN-23 by Elizabeth Krouse

This batch was reviewed by Elizabeth Krouse on 12-JAN-23, Gregory Ramsay on 12-JAN-23 and Lyndsey Pace on 30-JAN-23.

Batch ID:
2362946

Product:
LUC26RAL

Description: Lucas Cell Radium 226
GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?			
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?		No	
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?			

Prep Logbook

Radium-226 in Liquid

Batch ID: 2362946
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL-RAD-A-008 REV# 15
Instrument: LUCAS-C202389980

Due Dates for Lab: 27-JAN-2023			Package: 29-JAN-2023		SDG: 30-JAN-2023	
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
LCS	1205284329	Radium-226 SPIKE	1715-G	.1	mL	
MS	1205284328	Radium-226 SPIKE	1715-G	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	End Degas (date)	CELL #	End Transfer (date)	Start Count Time (date)	Background Counts	Total Counts
1	605546001	05-JAN-2023	1	501.38	501.38	01/06/23 08:05	701	01/11/23 07:10	01/11/23 13:00	7	42
2	605547001	05-JAN-2023	1	500.88	500.88	01/06/23 08:05	804	01/11/23 07:10	01/11/23 10:32	8	32
3	605550001	05-JAN-2023	1	504.23	504.23	01/06/23 08:05	101	01/11/23 07:38	01/11/23 11:08	1	16
4	605551001	05-JAN-2023	1	501.12	501.12	01/06/23 08:05	205	01/11/23 07:38	01/11/23 11:08	6	30
5	605553001	05-JAN-2023	1	505.51	505.51	01/06/23 08:05	303	01/11/23 07:38	01/11/23 11:08	1	32
6	605553002	05-JAN-2023	1	502.52	502.52	01/06/23 08:05	503	01/11/23 07:38	01/11/23 11:08	7	39
7	605553003	05-JAN-2023	1	500.69	500.69	01/06/23 08:05	607	01/11/23 07:38	01/11/23 11:08	4	25
8	605557001	05-JAN-2023	1	503.93	503.93	01/06/23 08:05	703	01/11/23 07:38	01/11/23 11:08	4	23
9	605560001	05-JAN-2023	1	502.13	502.13	01/06/23 08:05	806	01/11/23 07:38	01/11/23 11:08	3	21
10	605564001	05-JAN-2023	1	504.36	504.36	01/06/23 08:05	102	01/11/23 08:06	01/11/23 11:55	1	14
11	605566001	05-JAN-2023	1	503.6	503.6	01/06/23 08:05	201	01/11/23 08:06	01/11/23 11:55	2	24
12	605568001	05-JAN-2023	1	501.44	501.44	01/06/23 08:05	308	01/11/23 08:06	01/11/23 11:55	3	20
13	1205284326 MB	05-JAN-2023	1	505.51	505.51	01/06/23 08:05	508	01/11/23 08:06	01/11/23 11:55	3	13
14	1205284327 DUP (605546001)	05-JAN-2023	1	500.67	500.67	01/06/23 08:05	602	01/11/23 08:06	01/11/23 13:00	1	61
15	1205284328 MS (605546001)	05-JAN-2023	1	101.03	101.03	01/06/23 08:05	706	01/11/23 08:06	01/11/23 13:00	4	650
16	1205284329 LCS	05-JAN-2023	1		505.51	01/06/23 08:05	805	01/11/23 08:06	01/11/23 13:00	1	792

Reagent/Solvent Lot ID	Description	Amount	Comments:
			Data Entry Date2: 05-JAN-2023 00:00
			Data Entry Date3: 05-JAN-2023 08:38 LUCAS-C202389980 Lyndsey Pace
			Data Entry Date4: 11-JAN-2023 10:32 LUCAS-C202389980 Lyndsey Pace
			Data Entry Date4: 11-JAN-2023 11:08 LUCAS-C202389980 Lyndsey Pace
			Data Entry Date4: 11-JAN-2023 11:08 LUCAS-C202389980 Lyndsey Pace
			Data Entry Date4: 11-JAN-2023 11:08 LUCAS-C202389980 Lyndsey Pace
			Data Entry Date4: 11-JAN-2023 11:55 LUCAS-C202389980 Lyndsey Pace
			Data Entry Date4: 11-JAN-2023 11:55 LUCAS-C202389980 Lyndsey Pace
			Data Entry Date4: 11-JAN-2023 13:00 LUCAS-C202389980 Lyndsey Pace

Radium-226 Liquid

Filename : RA226.XLS
 File type : Excel
 Version # : 1.3.2

Procedure Code : LUC26RAL
 Parmname : Radium-226
 Required MDA : 1 pCi/L
 Halflife of Ra-226 : 1600 years
 Ra-226 Abundance : 1.00
 Halflife of Rn-222 : 3.8235 days

Batch : 2362946
 Analyst : LIN01615
 Prep Date : 1/5/2023
 Ra-226 Method Uncertainty : 0.073648

Batch counted on : LUCAS CELL DETECTOR
 BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background		Cell
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Count Time (min.)	Efficiency (cpm/dpm)	
1	605546001.1	0.5014	2.0262E-05	12/27/2022 8:45	701	30	42	1.400	7	0.233	30	1.7440	
2	605547001.1	0.5009	2.0259E-05	12/27/2022 9:27	804	30	32	1.067	8	0.267	30	1.9050	
3	605550001.1	0.5042	2.0273E-05	12/27/2022 7:00	101	30	16	0.533	1	0.033	30	1.5720	
4	605551001.1	0.5011	2.0260E-05	12/21/2022 10:40	205	30	30	1.000	6	0.200	30	1.8920	
5	605553001.1	0.5055	2.0278E-05	12/27/2022 12:17	303	30	32	1.067	1	0.033	30	1.7210	
6	605553002.1	0.5025	2.0266E-05	12/27/2022 12:17	503	30	39	1.300	7	0.233	30	2.1390	
7	605553003.1	0.5007	2.0259E-05	12/27/2022 10:50	607	30	25	0.833	4	0.133	30	1.8040	
8	605557001.1	0.5039	2.0272E-05	12/13/2022 10:00	703	30	23	0.767	4	0.133	30	1.6440	
9	605560001.1	0.5021	2.0265E-05	12/13/2022 10:15	806	30	21	0.700	3	0.100	30	1.9460	
10	605564001.1	0.5044	2.0274E-05	12/15/2022 0:00	102	30	14	0.467	1	0.033	30	1.5820	
11	605566001.1	0.5036	2.0271E-05	12/20/2022 7:15	201	30	24	0.800	2	0.067	30	1.7110	
12	605568001.1	0.5014	2.0262E-05	12/20/2022 10:35	308	30	20	0.667	3	0.100	30	1.5970	
13	1205284326.1	0.5055	2.0278E-05	1/5/2023 0:00	508	30	13	0.433	3	0.100	30	1.8020	
14	1205284327.1	0.5007	2.0259E-05	12/27/2022 8:45	602	30	61	2.033	1	0.033	30	1.8620	
15	1205284328.1	0.1010	1.1433E-05	12/27/2022 8:45	706	30	650	21.667	4	0.133	30	1.5900	
16	1205284329.1	0.5055	2.0278E-05	1/5/2023 0:00	805	30	792	26.400	1	0.033	30	1.9080	

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-008
 Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrow End Date/Time	Count Start Date/Time	Rn-222 Corrections			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
6.200%	11/1/2022	10/31/2023	1/6/2023 8:05	1/11/2023 7:10	1/11/2023 13:00	0.593	0.957	1.002	1.000
9.900%	4/1/2022	3/31/2023	1/6/2023 8:05	1/11/2023 7:10	1/11/2023 10:32	0.593	0.975	1.002	1.000
1.200%	4/28/2022	4/30/2023	1/6/2023 8:05	1/11/2023 7:38	1/11/2023 11:08	0.595	0.974	1.002	1.000
3.900%	8/1/2022	7/31/2023	1/6/2023 8:05	1/11/2023 7:38	1/11/2023 11:08	0.595	0.974	1.002	1.000
7.400%	10/25/2022	10/31/2023	1/6/2023 8:05	1/11/2023 7:38	1/11/2023 11:08	0.595	0.974	1.002	1.000
5.000%	6/1/2022	5/31/2023	1/6/2023 8:05	1/11/2023 7:38	1/11/2023 11:08	0.595	0.974	1.002	1.000
3.400%	7/1/2022	6/30/2023	1/6/2023 8:05	1/11/2023 7:38	1/11/2023 11:08	0.595	0.974	1.002	1.000
9.000%	11/1/2022	10/31/2023	1/6/2023 8:05	1/11/2023 7:38	1/11/2023 11:08	0.595	0.974	1.002	1.000
7.300%	4/1/2022	3/31/2023	1/6/2023 8:05	1/11/2023 7:38	1/11/2023 11:08	0.595	0.974	1.002	1.000
6.300%	4/28/2022	4/30/2023	1/6/2023 8:05	1/11/2023 8:06	1/11/2023 11:55	0.596	0.972	1.002	1.000
8.900%	8/1/2022	7/31/2023	1/6/2023 8:05	1/11/2023 8:06	1/11/2023 11:55	0.596	0.972	1.002	1.000
9.600%	10/25/2022	10/31/2023	1/6/2023 8:05	1/11/2023 8:06	1/11/2023 11:55	0.596	0.972	1.002	1.000
4.500%	6/1/2022	5/31/2023	1/6/2023 8:05	1/11/2023 8:06	1/11/2023 11:55	0.596	0.972	1.002	1.000
5.700%	7/1/2022	6/30/2023	1/6/2023 8:05	1/11/2023 8:06	1/11/2023 13:00	0.596	0.964	1.002	1.000
2.900%	11/1/2022	10/31/2023	1/6/2023 8:05	1/11/2023 8:06	1/11/2023 13:00	0.596	0.964	1.002	1.000
7.400%	4/1/2022	3/31/2023	1/6/2023 8:05	1/11/2023 8:06	1/11/2023 13:00	0.596	0.964	1.002	1.000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1715-G
Spike Exp Date : 9/8/2023
Spike Activity (dpm/ml): 297.45
Spike Volume Added: 0.10

LCS S/N : 1715-G
LCS Exp Date : 9/8/2023
LCS Activity (dpm/ml): 297.45
LCS Volume Added: 0.10

Results																
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.2642	0.1865	1	0.4640	1.0608	20.94%	1.1667	0.2333	0.4158	0.4615		SAMPLE				
2	0.2541	0.1794	1	0.4405	0.6543	28.15%	0.8000	0.2108	0.3379	0.3731		SAMPLE				
3	0.1080	0.0762	1	0.2508	0.4916	27.51%	0.5000	0.1374	0.2648	0.2744		SAMPLE				
4	0.2211	0.1561	1	0.3944	0.6575	25.30%	0.8000	0.2000	0.3222	0.3396		SAMPLE				
5	0.0984	0.0695	1	0.2285	0.9256	19.95%	1.0333	0.1915	0.3362	0.3859		SAMPLE				
6	0.2107	0.1487	1	0.3700	0.7733	21.78%	1.0667	0.2261	0.3212	0.3484		SAMPLE				
7	0.1895	0.1338	1	0.3539	0.6039	25.87%	0.7000	0.1795	0.3035	0.3184		SAMPLE				
8	0.2066	0.1459	1	0.3858	0.5957	28.79%	0.6333	0.1732	0.3193	0.3470		SAMPLE				
9	0.1517	0.1071	1	0.2940	0.4785	28.18%	0.6000	0.1633	0.2553	0.2732		SAMPLE				
10	0.1073	0.0757	1	0.2491	0.4232	30.45%	0.4333	0.1291	0.2471	0.2599		SAMPLE				
11	0.1405	0.0992	1	0.2888	0.6632	24.83%	0.7333	0.1700	0.3013	0.3366		SAMPLE				
12	0.1851	0.1307	1	0.3587	0.5514	29.80%	0.5667	0.1599	0.3049	0.3318		SAMPLE				
13	0.1627	0.1149	1	0.3153	0.2851	40.25%	0.3333	0.1333	0.2236	0.2287		MB				
14	0.0926	0.0654	1	0.2150	1.6855	14.31%	2.0000	0.2625	0.4335	0.5316	605546001.1	DUP	45.5%	1.7394		
15	1.0744	0.7585	1	2.0062	105.3175	4.91%	21.5333	0.8524	8.1717	18.2683	605546001.1	MS			132.6230	78.6%
16	0.0895	0.0632	1	0.2078	21.4773	8.21%	26.3667	0.9387	1.4986	4.6434		LCS			26.5054	81.0%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 11-JAN-2023

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	06:52	1	1.23E+05	122759	0.45		
LUCAS2	EFF	06:56	1	1.34E+05	134140	0.34		
LUCAS3	EFF	06:59	1	1.04E+05	104153	-2.46		
LUCAS4	EFF	07:01	1	1.27E+05	127177	-1.1		
LUCAS5	EFF	07:04	1	1.33E+05	133434	0.83		
LUCAS6	EFF	07:07	1	1.30E+05	130061	-1.34		
LUCAS7	EFF	07:12	1	1.31E+05	130760	-0.15		
LUCAS8	EFF	07:13	1	1.38E+05	137522	1.61		

Reviewed by:



Elizabeth Krouse

Date: 11-JAN-23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR

Batch ID: 2362946

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
605547001	SAMPLE	LXP1	LUCAS8	JAN-11-23 10:32:42	DONE	Lucas Cell	01-APR-22 00:00
605550001	SAMPLE	LXP1	LUCAS1	JAN-11-23 11:08:08	DONE	Lucas Cell	28-APR-22 00:00
605551001	SAMPLE	LXP1	LUCAS2	JAN-11-23 11:08:08	DONE	Lucas Cell	01-AUG-22 00:00
605553001	SAMPLE	LXP1	LUCAS3	JAN-11-23 11:08:09	DONE	Lucas Cell	25-OCT-22 00:00
605553002	SAMPLE	LXP1	LUCAS5	JAN-11-23 11:08:10	DONE	Lucas Cell	01-JUN-22 00:00
605553003	SAMPLE	LXP1	LUCAS6	JAN-11-23 11:08:11	DONE	Lucas Cell	01-JUL-22 00:00
605557001	SAMPLE	LXP1	LUCAS7	JAN-11-23 11:08:11	DONE	Lucas Cell	01-NOV-22 00:00
605560001	SAMPLE	LXP1	LUCAS8	JAN-11-23 11:08:12	DONE	Lucas Cell	01-APR-22 00:00
605564001	SAMPLE	LXP1	LUCAS1	JAN-11-23 11:55:12	DONE	Lucas Cell	28-APR-22 00:00
605566001	SAMPLE	LXP1	LUCAS2	JAN-11-23 11:55:13	DONE	Lucas Cell	01-AUG-22 00:00
605568001	SAMPLE	LXP1	LUCAS3	JAN-11-23 11:55:14	DONE	Lucas Cell	25-OCT-22 00:00
1205284326	MB	LXP1	LUCAS5	JAN-11-23 11:55:15	DONE	Lucas Cell	01-JUN-22 00:00
605546001	SAMPLE	LXP1	LUCAS7	JAN-11-23 13:00:41	DONE	Lucas Cell	01-NOV-22 00:00
1205284327	DUP	LXP1	LUCAS6	JAN-11-23 13:00:41	DONE	Lucas Cell	01-JUL-22 00:00
1205284328	MS	LXP1	LUCAS7	JAN-11-23 13:00:41	DONE	Lucas Cell	01-NOV-22 00:00
1205284329	LCS	LXP1	LUCAS8	JAN-11-23 13:00:41	DONE	Lucas Cell	01-APR-22 00:00



Report ID: S44308.01(02)
Generated on 02/17/2023
Replaces report S44308.01(01) generated on 01/18/2023

Report to
Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

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Report Summary
Lab Sample ID(s): S44308.01-S44308.04
Project: Erickson AM MI Wells 14-15
Collected Date(s): 01/12/2023
Submitted Date/Time: 01/13/2023 10:29
Sampled by: Marc Wahrer
P.O. #:

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Maya Murshak
Technical Director



General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile, and 2-chloroethylvinyl ether need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the

FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

All analyses completed

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1 (1993)
SM2320B	Standard Method 2320 B 2011
SM2340C	Standard Method 2340 C 2011
SM2540C	Standard Method 2540 C 2015
SM2540D	Standard Method 2540 D 2015
SW3015A	SW 846 Method 3015A Revision 1 February 2007



Sample Summary (4 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S44308.01	MW-14 L301176-01	Groundwater	01/12/23 16:12
S44308.02	MW-15 L301176-02	Groundwater	01/12/23 14:36
S44308.03	MWT-14 L301176-03	Groundwater	01/12/23 16:12
S44308.04	Field Blank L301176-04	Groundwater	01/12/23 13:25



Analytical Laboratory Report

Final Report

Lab Sample ID: S44308.01

Sample Tag: MW-14 L301176-01

Collected Date/Time: 01/12/2023 16:12

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	1.8	IR
2	1L Plastic	None	Yes	1.8	IR
1	125ml Plastic	HNO3	Yes	1.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	01/17/23 12:29	CTV	
Metal Digestion	Completed	SW3015A	01/17/23 10:15	CCM	

Inorganics

Method: E300.0, Run Date: 01/17/23 11:02, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	108	25	0.32	mg/L	25	16887-00-6	

Method: E300.0, Run Date: 01/17/23 10:22, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	30	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 01/18/23 12:06, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	600	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 01/13/23 13:00, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	556	20	4.76	mg/L	20		

Method: SM2540C, Run Date: 01/13/23 19:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	774	50	10	mg/L	2		

Method: SM2540D, Run Date: 01/17/23 18:50, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	16	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 01/17/23 11:46, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.004	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.117	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	2.29	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Final Report

Lab Sample ID: S44308.01 (continued)

Sample Tag: MW-14 L301176-01

Method: E200.8, Run Date: 01/17/23 11:46, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	6.58	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.125	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.012	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	0.006	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 01/17/23 14:17, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	147	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	42.3	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	4.79	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	79.2	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 01/17/23 13:46, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 02/16/23 13:42, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S44308.02

Sample Tag: MW-15 L301176-02

Collected Date/Time: 01/12/2023 14:36

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	1.8	IR
2	1L Plastic	None	Yes	1.8	IR
1	125ml Plastic	HNO3	Yes	1.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	01/17/23 12:29	CTV	
Metal Digestion	Completed	SW3015A	01/17/23 10:15	CCM	

Inorganics

Method: E300.0, Run Date: 01/17/23 10:32, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 01/17/23 11:22, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	100	25	0.32	mg/L	25	16887-00-6	
Sulfate	238	25	2.6	mg/L	25	14808-79-8	

Method: SM2320B, Run Date: 01/18/23 12:10, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	410	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 01/13/23 13:02, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	464	20	4.76	mg/L	20		

Method: SM2540C, Run Date: 01/13/23 19:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	878	50	10	mg/L	2		

Method: SM2540D, Run Date: 01/17/23 18:50, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 01/17/23 11:52, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.077	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.37	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Final Report

Lab Sample ID: S44308.02 (continued)

Sample Tag: MW-15 L301176-02

Method: E200.8, Run Date: 01/17/23 11:52, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.014	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	0.010	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 01/17/23 14:19, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	183	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	47.2	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	0.61	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	40.5	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 01/17/23 13:49, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 02/16/23 13:42, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S44308.03

Sample Tag: MWT-14 L301176-03

Collected Date/Time: 01/12/2023 16:12

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	1.8	IR
2	1L Plastic	None	Yes	1.8	IR
1	125ml Plastic	HNO3	Yes	1.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	01/17/23 12:29	CTV	
Metal Digestion	Completed	SW3015A	01/17/23 10:15	CCM	

Inorganics

Method: E300.0, Run Date: 01/17/23 11:12, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	109	25	0.32	mg/L	25	16887-00-6	

Method: E300.0, Run Date: 01/17/23 10:42, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	30	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 01/18/23 12:16, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	610	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 01/13/23 13:04, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	554	20	4.76	mg/L	20		

Method: SM2540C, Run Date: 01/13/23 19:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	768	50	10	mg/L	2		

Method: SM2540D, Run Date: 01/17/23 18:50, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	16	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 01/17/23 11:59, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.004	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.122	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	2.32	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Lab Sample ID: S44308.03 (continued)

Sample Tag: MWT-14 L301176-03

Method: E200.8, Run Date: 01/17/23 11:59, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	6.78	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.132	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.013	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	0.007	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	0.007	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 01/17/23 14:21, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	149	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	42.2	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	4.76	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	80.4	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 01/17/23 13:52, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 02/16/23 13:42, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S44308.04

Sample Tag: Field Blank L301176-04

Collected Date/Time: 01/12/2023 13:25

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	1.8	IR
2	1L Plastic	None	Yes	1.8	IR
1	125ml Plastic	HNO3	Yes	1.8	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	01/17/23 12:29	CTV	
Metal Digestion	Completed	SW3015A	01/17/23 10:15	CCM	

Inorganics

Method: E300.0, Run Date: 01/17/23 10:52, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: SM2320B, Run Date: 01/18/23 12:18, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	Not detected	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 01/13/23 13:06, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	Not detected	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 01/13/23 19:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	50	10	mg/L	2		

Method: SM2540D, Run Date: 01/17/23 18:50, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 01/17/23 11:42, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S44308.04 (continued)

Sample Tag: Field Blank L301176-04

Method: E200.8, Run Date: 01/17/23 11:42, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E200.8, Run Date: 01/17/23 14:16, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	
Magnesium	Not detected	0.50	0.00480	mg/L	2	7439-95-4	
Potassium	Not detected	0.50	0.00920	mg/L	2	7440-09-7	
Sodium	Not detected	0.50	0.00340	mg/L	2	7440-23-5	

Method: E245.1, Run Date: 01/17/23 13:56, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 02/16/23 13:42, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID:S44308

Client:BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 14-15

Submitted:01/13/2023 10:29 Login User: MMC

Attention: Jennifer Caporale

Address: Board of Water & Light

P.O. Box 13007

Lansing, MI 48901

Phone: 517-702-6372

FAX:

Email: Environmental_Laboratory@LBWL.com

Selection	Description	Note
Sample Receiving		
01.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 1.8
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
Chain of Custody		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to: GEL
Preservation		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab?
Bottle Conditions		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Do water VOC or TOX bottles contain headspace

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S44308 Submitted: 01/13/2023 10:29

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 14-15

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Initial Preservation Check: 01/13/2023 12:27 MMC

Preservation Recheck (E200.8): N/A

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S44308.01	125ml Plastic HNO3	<2			
S44308.01	1L Plastic HNO3	<2			
S44308.01	1L Plastic HNO3	<2			
S44308.02	125ml Plastic HNO3	<2			
S44308.02	1L Plastic HNO3	<2			
S44308.02	1L Plastic HNO3	<2			
S44308.03	125ml Plastic HNO3	<2			
S44308.03	1L Plastic HNO3	<2			
S44308.03	1L Plastic HNO3	<2			
S44308.04	125ml Plastic HNO3	<2			
S44308.04	1L Plastic HNO3	<2			
S44308.04	1L Plastic HNO3	<2			



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 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

REPORT TO

CHAIN OF CUSTODY RECORD

INVOICE TO

CONTACT NAME Jennifer Caporale
 COMPANY Lansing Board of Water and Light
 ADDRESS PO Box 13007 48901-3007
 CITY Lansing STATE Mi ZIP CODE 48901
 PHONE NO. 517-702-6372 FAX NO. P.O. NO.
 E-MAIL ADDRESS Environmental_Laboratory@lbwl.com QUOTE NO.

CONTACT NAME Kelly Gleason SAME
 COMPANY
 ADDRESS
 CITY STATE ZIP CODE
 PHONE NO. E-MAIL ADDRESS Kelly.Gleason@lbwl.com

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

PROJECT NO./NAME Erickson AM MI Wells 14-15 SAMPLER(S) - PLEASE PRINT/SIGN NAME Marc Wahrer

TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER ASAP

DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIFE A=AIR W=WASTE

Containers & Preservatives

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	OTHER	Total Metals	F- undistilled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	HCO ₃ , CO ₃ , Hardness								
	DATE	TIME																								
4430801	01/12/23	1612	MW-14 L 301176-01	GW	5	2	3						✓	✓	✓	✓	✓	✓								
.02		1436	MW-15 -02	GW	5	2	3						✓	✓	✓	✓	✓	✓								
.03		1612	MWT-14 -03	GW	5	2	3						✓	✓	✓	✓	✓	✓								
.04		1325	Field Blank -04	di	5	2	3						✓	✓	✓	✓	✓	✓								

Certifications
 OHIO VAP Drinking Water
 DoD NPDES
 Project Locations
 Detroit New York
 Other _____
 Special Instructions

Metals to analyse: Na, Mg, K
 B, Ca, Sb, As, Ba, Be, Cd, Cr,
 Co, Li, Hg, Mo, Pb, Se, Tl,
 Fe, Cu, Ni, Ag, V, Zn
 Please send a preliminary report

RELINQUISHED BY: *Kelly Gleason* Sampler DATE 01/13/23 TIME 1029
 RECEIVED BY: *Marc Wahrer* DATE 1/13/23 TIME 1229

RELINQUISHED BY: DATE TIME
 RECEIVED BY: DATE TIME
 SEAL NO. SEAL INTACT YES NO INITIALS
 SEAL NO. SEAL INTACT YES NO INITIALS
 NOTES: TEMP. ON ARRIVAL 1.8

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total		250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.150
Be, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	2.5
Cl	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cr, total	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
F	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
Fe, total	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
Se, total	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
Tl, total	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
TDS	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TSS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
V, total	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005



February 16, 2023

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 607953
SDG: S44308

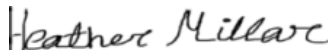
Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on January 20, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 1614.

Sincerely,


Heather Millar for
Delaney Stone
Project Manager

Purchase Order: GELP20-0018
Enclosures



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Case Narrative

**Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S44308
Work Order: 607953**

February 16, 2023

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on January 20, 2023 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

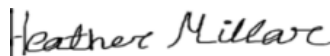
Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
607953001	S44308.01
607953002	S44308.02
607953003	S44308.03 Field Dupe
607953004	S44308.04 Field Blank

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.


Heather Millar for
Delaney Stone
Project Manager

Chain of Custody and Supporting Documentation

07953

C.O.C. PAGE # 1 OF 1

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com



REPORT TO

CHAIN OF CUSTODY RECORD

INVOICE TO

CONTACT NAME: Project Management Team
 COMPANY: Merit Laboratories
 ADDRESS: 2680 East Lansing Drive
 CITY: East Lansing
 STATE: MI ZIP CODE: 48823
 PHONE NO.: 517-332-0167
 E-MAIL ADDRESS: results@meritlabs.com

CONTACT NAME: Julie Teague
 COMPANY: Merit Laboratories
 ADDRESS: 2680 East Lansing Drive
 CITY: East Lansing
 STATE: MI ZIP CODE: 48823
 PHONE NO.: 517-332-0167
 E-MAIL ADDRESS: juliet@meritlabs.com

PROJECT NO./NAME: S44308
 ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

TURNAROUND TIME REQUIRED: 1 DAY 2 DAYS 3 DAYS STANDARD OTHER

DELIVERABLES REQUIRED: STD LEVEL II LEVEL III LEVEL IV EDD OTHER

SAMPLER(S) - PLEASE PRINT/SIGN NAME

MERIT LAB NO. FOR LAB USE ONLY	YEAR	DATE	TIME	IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives							OTHER						
							NONE	H ₂ O	HNO ₃	H ₂ SO ₄	NaOH	MOH	OTHER							
	01/12/23	1612		S44308.01	GW	2		2												
	01/12/23	1436		S44308.02	GW	2		2												
	01/12/23	1612		S44308.03 Field Dupe	GW	2		2												
	01/12/23	1325		S44308.04 Field Blank	GW	2		2												

RELINQUISHED BY: [Signature] DATE: 1/18/23 TIME: 1400

RECEIVED BY: [Signature] DATE: 1/18/23 TIME: 1730

RELINQUISHED BY: [Signature] DATE: 01-20-23 TIME: 1100

RECEIVED BY: [Signature] DATE: 01-20-23 TIME: 1100

SEAL NO. [] SEAL INTACT YES [] NO [] INITIALS []

SEAL NO. [] SEAL INTACT YES [] NO [] INITIALS []

NOTES: Radium 226* ✓ Radium 228* ✓

Certifications: OHIO VAP Drinking Water DoD NPDES Project Locations Detroit New York Other Special Instructions

* E903.1 Mod. ** E904.0/SW 9320 Mod.

Please use calculation product & provide Radium 226/228 combined results on the report

(No Ice needed) ** Subcontracted to GEL Laboratories, Inc. 2040 Savage Road Charleston, SC 29407

SAMPLE RECEIPT & REVIEW FORM

Client: <u>MERI</u>		SDG/AR/COC/Work Order: <u>607953</u>				
Received By: <u>pb</u>		Date Received: <u>1/20/23</u>				
Carrier and Tracking Number		Circle Applicable: FedEx Express FedEx Ground <input checked="" type="radio"/> UPS Field Services Courier Other <u>12 466 477 036335 8537</u>				
Suspected Hazard Information		Yes	No			
			*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.			
A) Shipped as a DOT Hazardous?			Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___			
B) Did the client designate the samples are to be received as radioactive?		<input checked="" type="checkbox"/>	COC notation or radioactive stickers on containers equal client designation.			
C) Did the RSO classify the samples as radioactive?		<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> <input checked="" type="radio"/> CPM/mR/Hr Classified as: Rad 1 Rad 2 Rad 3			
D) Did the client designate samples are hazardous?		<input checked="" type="checkbox"/>	COC notation or hazard labels on containers equal client designation.			
E) Did the RSO identify possible hazards?		<input checked="" type="checkbox"/>	If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____			
Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)	
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)	
2	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			Circle Applicable: Client contacted and provided COC COC created upon receipt	
3	Samples requiring cold preservation within (0 ≤ deg. C)?*		<input checked="" type="checkbox"/>		Preservation Method: Wet Ice Ice Packs Dry ice <input checked="" type="radio"/> None Other: _____ *all temperatures are recorded in Celsius TEMP: <u>19</u>	
4	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: <u>IR 5-21</u> Secondary Temperature Device Serial # (If Applicable): _____	
5	Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)	
6	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____	
7	Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer)	
					Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No)	
8	Samples received within holding time?	<input checked="" type="checkbox"/>			Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___	
					Sample ID's and containers affected: _____	
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			ID's and tests affected: _____	
					ID's and containers affected: _____	
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)	
					ID's and containers affected: _____	
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Circle Applicable: No container count on COC Other (describe)	
					ID's and containers affected: _____	
12	Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>				
13	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			Circle Applicable: Not relinquished Other (describe)	
Comments (Use Continuation Form if needed):						

PM (or PMA) review: Initials JM Date 1/23/23 Page 1 of

Laboratory Certifications

List of current GEL Certifications as of 16 February 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122023-4
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2022-160
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-22-20
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S44308
Work Order #: 607953**

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2373642

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
607953001	S44308.01
607953002	S44308.02
607953003	S44308.03 Field Dupe
607953004	S44308.04 Field Blank
1205303607	Method Blank (MB)
1205303608	607884001(NonSDG) Sample Duplicate (DUP)
1205303609	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2373612

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
607953001	S44308.01
607953002	S44308.02
607953003	S44308.03 Field Dupe
607953004	S44308.04 Field Blank
1205303555	Method Blank (MB)
1205303556	607884001(NonSDG) Sample Duplicate (DUP)
1205303557	607884001(NonSDG) Matrix Spike (MS)
1205303558	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments

The matrix spike, 1205303557 (Non SDG 607884001MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

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Qualifier Definition Report for

MERI001 Merit Laboratories, Inc.

Client SDG: S44308 GEL Work Order: 607953

The Qualifiers in this report are defined as follows:

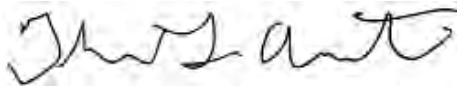
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:



Name: Theresa Austin

Date: 17 FEB 2023

Title: Group Leader

Sample Data Summary

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: February 16, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S44308.01 Project: MERI00120
Sample ID: 607953001 Client ID: MERI001
Matrix: Ground Water
Collect Date: 12-JAN-23 16:12
Receive Date: 20-JAN-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228		3.53	+/-1.18	1.48	3.00	pCi/L		JE1	02/15/23	0844	2373642	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		4.44	+/-1.25			pCi/L		NXL1	02/16/23	1342	2373640	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		0.907	+/-0.435	0.434	1.00	pCi/L		LXP1	02/12/23	0933	2373612	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			89.6	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: February 16, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S44308.02 Project: MERI00120
Sample ID: 607953002 Client ID: MERI001
Matrix: Ground Water
Collect Date: 12-JAN-23 14:36
Receive Date: 20-JAN-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228		1.43	+/-0.939	1.41	3.00	pCi/L		JE1	02/15/23	0845	2373642		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		2.06	+/-1.04			pCi/L		NXL1	02/16/23	1342	2373640		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.629	+/-0.455	0.649	1.00	pCi/L		LXP1	02/12/23	0933	2373612		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			77.8	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: February 16, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S44308.03 Field Dupe Project: MERI00120
Sample ID: 607953003 Client ID: MERI001
Matrix: Ground Water
Collect Date: 12-JAN-23 16:12
Receive Date: 20-JAN-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228		3.07	+/-1.36	1.96	3.00	pCi/L		JE1	02/15/23	0845	2373642	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		3.39	+/-1.39			pCi/L		NXL1	02/16/23	1342	2373640	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226	U	0.322	+/-0.295	0.444	1.00	pCi/L		LXP1	02/12/23	0933	2373612	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			84.5	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: February 16, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S44308.04 Field Blank Project: MERI00120
Sample ID: 607953004 Client ID: MERI001
Matrix: Ground Water
Collect Date: 12-JAN-23 13:25
Receive Date: 20-JAN-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	0.870	+/-0.906	1.50	3.00	pCi/L		JE1	02/15/23	0840	2373642	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		1.06	+/-0.944			pCi/L		NXL1	02/16/23	1342	2373640	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226	U	0.193	+/-0.267	0.462	1.00	pCi/L		LXP1	02/12/23	1007	2373612	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			86.4	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

Quality Control Data

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: February 16, 2023

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Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: John Laverty

Workorder: 607953

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2373642										
QC1205303608	607884001	DUP									
Radium-228		1.35		1.69	pCi/L	22.2		(0% - 100%)	JE1	02/15/23	08:39
	Uncertainty	+/-0.848		+/-1.08							
QC1205303609	LCS										
Radium-228	63.0			72.7	pCi/L		115	(75%-125%)		02/15/23	08:39
	Uncertainty			+/-4.37							
QC1205303607	MB										
Radium-228			U	0.853	pCi/L					02/15/23	08:39
	Uncertainty			+/-1.38							
Rad Ra-226											
Batch	2373612										
QC1205303556	607884001	DUP									
Radium-226		0.569		0.509	pCi/L	11.1		(0% - 100%)	LXP1	02/12/23	10:07
	U	+/-0.455		+/-0.346							
QC1205303558	LCS										
Radium-226	26.5			24.1	pCi/L		91	(75%-125%)		02/12/23	10:07
	Uncertainty			+/-2.02							
QC1205303555	MB										
Radium-226			U	0.412	pCi/L					02/12/23	10:07
	Uncertainty			+/-0.395							
QC1205303557	607884001	MS									
Radium-226	129 U	0.569		129	pCi/L		100	(75%-125%)		02/12/23	10:07
	Uncertainty	+/-0.455		+/-10.1							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- H Analytical holding time was exceeded
- < Result is less than value reported
- > Result is greater than value reported

GEL LABORATORIES LLC

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QC Summary

Workorder: 607953

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UI											
BD											
h											
R											
^											
N/A											
ND											
M											
NJ											
FA											
UJ											
Q											
K											
UL											
L											
NI											
Y											
**											
M											
J											

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 2373642 Check-list

This check-list was completed on 15-FEB-23 by Nat Long

This batch was reviewed by Nat Long on 15-FEB-23 and Kenshalla Oston on 16-FEB-23.

Batch ID:
2373642

Product:
GFC28RAL

Description: Gas Flow Radium 228
GL-RAD-A-063

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-228 in Liquid

Batch ID: 2373642
Analyst: Jacqueline Emond (JE1)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL-RAD-A-063 REV# 5
Instrument: LUCAS-C202389980

Due Dates for Lab: 14-FEB-2023 **Package:** 16-FEB-2023 **SDG:** 17-FEB-2023

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1205303609	228	1952-B	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	Ac-228 Ingrow (date)	Ac-228 Separation (date)
1	607884001	08-FEB-2023	3	304.46	304.46	02/10/23 15:19	02/15/23 06:56
2	607884002	08-FEB-2023	3	300.28	300.28	02/10/23 15:19	02/15/23 06:56
3	607884003	08-FEB-2023	3	304.97	304.97	02/10/23 15:19	02/15/23 06:56
4	607884004	08-FEB-2023	3	300.63	300.63	02/10/23 15:19	02/15/23 06:56
5	607884005	08-FEB-2023	3	301.74	301.74	02/10/23 15:19	02/15/23 06:56
6	607884006	08-FEB-2023	3	301.24	301.24	02/10/23 15:19	02/15/23 06:56
7	607884007	08-FEB-2023	3	300.42	300.42	02/10/23 15:19	02/15/23 06:56
8	607884008	08-FEB-2023	3	301.09	301.09	02/10/23 15:19	02/15/23 06:56
9	607884009	08-FEB-2023	3	304.64	304.64	02/10/23 15:19	02/15/23 06:56
10	607884010	08-FEB-2023	3	301.57	301.57	02/10/23 15:19	02/15/23 06:56
11	607884011	08-FEB-2023	3	300.15	300.15	02/10/23 15:19	02/15/23 06:56
12	607884012	08-FEB-2023	3	300.73	300.73	02/10/23 15:19	02/15/23 06:56
13	607884013	08-FEB-2023	3	306.79	306.79	02/10/23 15:19	02/15/23 06:56
14	607953001	08-FEB-2023	3	300.62	300.62	02/10/23 15:19	02/15/23 06:56
15	607953002	08-FEB-2023	3	303.7	303.7	02/10/23 15:19	02/15/23 06:56
16	607953003	08-FEB-2023	3	300.17	300.17	02/10/23 15:19	02/15/23 06:56
17	607953004	08-FEB-2023	3	301.46	301.46	02/10/23 15:19	02/15/23 06:56
18	1205303607 MB	08-FEB-2023	3		306.79	02/10/23 15:19	02/15/23 06:56
19	1205303608 DUP (607884001)	08-FEB-2023	3	302.17	302.17	02/10/23 15:19	02/15/23 06:56
20	1205303609 LCS	08-FEB-2023	3		306.79	02/10/23 15:19	02/15/23 06:56

Reagent/Solvent Lot ID	Description	Amount	Comments:
WORK 1951-D	Ba-133	.1 mL	Pipet Id: RAD-GFC-1795419 Data Entry Date2: 08-FEB-2023 00:00
REGNT 3858567	RGF-1.5M Ammonium Sulfate	10 mL	
REGNT 3862351	RGF-1M Citric Acid	5 mL	
REGNT 3862361	RGF-50% Potassium Carbonate	2 mL	
REGNT 3648549	RGF-7M Nitric Acid	25 mL	
REGNT DGA013123	2372406	2 g	
REGNT 3418276.6	29M HF (48-50%)	4 mL	
REGNT 3528714	500 mg/mL Neodymium Carrier	.2 mL	
REGNT 3521298	RGF-Neodymium Substrate	5 mL	
REGNT 3454370.1	Nitric Acid	5 mL	
REGNT 3465466	Barium Carrier Ra228 REG	1 mL	
REGNT 3850768	2M HCl	20 mL	
REGNT 3645221.6	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL	

Radium-228 Liquid

Filename : RA228.XLS
 File type : Excel
 Version # : 1.4.3

Tracer S/N : 1951-D
 Tracer Exp Date : 6/2/2023
 Tracer Volume Added: 0.10

Batch : 2373642
 Analyst : JAC02417
 Prep Date : 2/8/2023
 Ra-228 Method Uncertainty : 0.1268

Procedure Code : GFC28RAL
 Parmname : Radium-228
 Required MDA : 3 pCi/L
 Ra-228 Abundance : 1.00
 Halflife of Ra-228 : 5.75 years
 Halflife of Ac-228 : 6.15 hours

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	607884001.1	0.3045	1.8534E-05	1/17/2023 9:30	1235.0	1.64%	1032.0	1.80%	0.1	0.000200
2	607884002.1	0.3003	1.8464E-05	1/17/2023 11:15	1235.0	1.64%	1095.0	1.74%	0.1	0.000200
3	607884003.1	0.3050	1.8542E-05	1/17/2023 7:30	1235.0	1.64%	1024.8	1.80%	0.1	0.000200
4	607884004.1	0.3006	1.8470E-05	1/18/2023 10:40	1235.0	1.64%	1015.5	1.81%	0.1	0.000200
5	607884005.1	0.3017	1.8488E-05	1/18/2023 10:20	1235.0	1.64%	981.4	1.84%	0.1	0.000200
6	607884006.1	0.3012	1.8480E-05	1/18/2023 10:35	1235.0	1.64%	1078.9	1.76%	0.1	0.000200
7	607884007.1	0.3004	1.8466E-05	1/18/2023 11:15	1235.0	1.64%	1010.2	1.82%	0.1	0.000200
8	607884008.1	0.3011	1.8478E-05	1/18/2023 8:30	1235.0	1.64%	1007.5	1.82%	0.1	0.000200
9	607884009.1	0.3046	1.8537E-05	1/18/2023 8:30	1235.0	1.64%	1025.8	1.80%	0.1	0.000200
10	607884010.1	0.3016	1.8486E-05	1/18/2023 9:15	1235.0	1.64%	1045.5	1.79%	0.1	0.000200
11	607884011.1	0.3002	1.8462E-05	1/18/2023 9:50	1235.0	1.64%	1119.4	1.73%	0.1	0.000200
12	607884012.1	0.3007	1.8471E-05	1/18/2023 7:30	1235.0	1.64%	970.7	1.85%	0.1	0.000200
13	607884013.1	0.3068	1.8572E-05	1/19/2023 8:50	1235.0	1.64%	1041.9	1.79%	0.1	0.000200
14	607953001.1	0.3006	1.8470E-05	1/12/2023 16:12	1235.0	1.64%	1106.9	1.74%	0.1	0.000200
15	607953002.1	0.3037	1.8521E-05	1/12/2023 14:36	1235.0	1.64%	960.6	1.86%	0.1	0.000200
16	607953003.1	0.3002	1.8462E-05	1/12/2023 16:12	1235.0	1.64%	1043.7	1.79%	0.1	0.000200
17	607953004.1	0.3015	1.8484E-05	1/12/2023 13:25	1235.0	1.64%	1066.8	1.77%	0.1	0.000200
18	1205303607.1	0.3068	1.8572E-05	2/8/2023 0:00	1235.0	1.64%	987.5	1.84%	0.1	0.000200
19	1205303608.1	0.3022	1.8496E-05	1/17/2023 9:30	1235.0	1.64%	1018.4	1.81%	0.1	0.000200
20	1205303609.1	0.3068	1.8572E-05	2/8/2023 0:00	1235.0	1.64%	984.1	1.84%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-063
 Instrument SOP: GL-RAD-I-016

Count raw Data													Calculated Sample Recovery %	Sample Recovery Error %
Pos.	Detector ID	Counting Time (min.)	Gross Counts		Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction		
1	1A	60	19	47	0.783	2/15/2023 8:43	2/10/2023 15:19	2/15/2023 6:56	0.990	0.816	1.000	1.057	83.6%	2.45%
2	1B	60	15	43	0.717	2/15/2023 8:44	2/10/2023 15:19	2/15/2023 6:56	0.991	0.816	1.000	1.057	88.7%	2.41%
3	1C	60	9	78	1.300	2/15/2023 8:44	2/10/2023 15:19	2/15/2023 6:56	0.990	0.816	1.000	1.057	83.0%	2.45%
4	2A	60	14	58	0.967	2/15/2023 8:44	2/10/2023 15:19	2/15/2023 6:56	0.991	0.816	1.000	1.057	82.2%	2.46%
5	2B	60	7	138	2.300	2/15/2023 8:44	2/10/2023 15:19	2/15/2023 6:56	0.991	0.816	1.000	1.057	79.5%	2.48%
6	2C	60	13	49	0.817	2/15/2023 8:44	2/10/2023 15:19	2/15/2023 6:56	0.991	0.816	1.000	1.057	87.4%	2.42%
7	2D	60	9	113	1.883	2/15/2023 8:44	2/10/2023 15:19	2/15/2023 6:56	0.991	0.816	1.000	1.057	81.8%	2.47%
8	4C	60	10	60	1.000	2/15/2023 8:44	2/10/2023 15:19	2/15/2023 6:56	0.991	0.816	1.000	1.057	81.6%	2.47%
9	5B	60	17	51	0.850	2/15/2023 8:44	2/10/2023 15:19	2/15/2023 6:56	0.991	0.816	1.000	1.057	83.1%	2.45%
10	7B	60	14	57	0.950	2/15/2023 8:44	2/10/2023 15:19	2/15/2023 6:56	0.991	0.815	1.000	1.057	84.7%	2.44%
11	7C	60	11	74	1.233	2/15/2023 8:44	2/10/2023 15:19	2/15/2023 6:56	0.991	0.815	1.000	1.057	90.6%	2.40%
12	8A	60	18	47	0.783	2/15/2023 8:44	2/10/2023 15:19	2/15/2023 6:56	0.991	0.815	1.000	1.057	78.6%	2.49%
13	9B	60	9	65	1.083	2/15/2023 8:44	2/10/2023 15:19	2/15/2023 6:56	0.991	0.815	1.000	1.057	84.4%	2.44%
14	10A	60	15	107	1.783	2/15/2023 8:44	2/10/2023 15:19	2/15/2023 6:56	0.989	0.815	1.000	1.057	89.6%	2.41%
15	10C	60	21	51	0.850	2/15/2023 8:45	2/10/2023 15:19	2/15/2023 6:56	0.989	0.815	1.000	1.057	77.8%	2.50%
16	10D	60	30	117	1.950	2/15/2023 8:45	2/10/2023 15:19	2/15/2023 6:56	0.989	0.815	1.000	1.057	84.5%	2.44%
17	11A	60	15	59	0.983	2/15/2023 8:40	2/10/2023 15:19	2/15/2023 6:56	0.989	0.822	1.000	1.057	86.4%	2.43%
18	11B	60	27	127	2.117	2/15/2023 8:39	2/10/2023 15:19	2/15/2023 6:56	0.998	0.823	1.000	1.057	80.0%	2.48%
19	12B	60	13	74	1.233	2/15/2023 8:39	2/10/2023 15:19	2/15/2023 6:56	0.990	0.823	1.000	1.057	82.5%	2.46%
20	12A	60	18	1173	19.550	2/15/2023 8:39	2/10/2023 15:19	2/15/2023 6:56	0.998	0.823	1.000	1.057	79.7%	2.48%

Calibration Data								
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2022	5/31/2023	0.6209	0.00738	0.420	2/12/2023 12:53	1000
2	PIC	6/1/2022	5/31/2023	0.6068	0.00711	0.541	2/12/2023 12:54	1000
3	PIC	6/1/2022	5/31/2023	0.6190	0.00847	0.990	2/12/2023 12:54	1000
4	PIC	6/1/2022	5/31/2023	0.6201	0.01914	0.624	2/12/2023 12:54	1000
5	PIC	6/1/2022	5/31/2023	0.6097	0.02111	1.869	2/12/2023 12:54	1000
6	PIC	6/1/2022	5/31/2023	0.6022	0.01274	0.649	2/12/2023 12:54	1000
7	PIC	6/1/2022	5/31/2023	0.6046	0.00745	1.058	2/12/2023 12:54	1000
8	PIC	6/1/2022	5/31/2023	0.6359	0.00889	0.519	2/12/2023 12:54	1000
9	PIC	6/1/2022	5/31/2023	0.6336	0.00426	0.831	2/12/2023 12:54	1000
10	PIC	6/1/2022	5/31/2023	0.6366	0.00627	0.591	2/12/2023 12:54	1000
11	PIC	6/1/2022	5/31/2023	0.6407	0.00790	0.838	2/12/2023 12:54	1000
12	PIC	6/1/2022	5/31/2023	0.6398	0.01579	0.879	2/12/2023 12:54	1000
13	PIC	6/1/2022	5/31/2023	0.6318	0.00754	0.690	2/12/2023 12:54	1000
14	PIC	6/1/2022	5/31/2023	0.6384	0.00651	0.756	2/12/2023 12:54	1000
15	PIC	6/1/2022	5/31/2023	0.6321	0.00638	0.488	2/12/2023 12:54	1000
16	PIC	6/1/2022	5/31/2023	0.6148	0.00557	1.140	2/12/2023 12:54	1000
17	PIC	6/1/2022	5/31/2023	0.6371	0.01317	0.737	2/12/2023 12:52	1000
18	PIC	6/1/2022	5/31/2023	0.6481	0.00697	1.883	2/12/2023 12:52	1000
19	PIC	6/1/2022	5/31/2023	0.6334	0.01114	0.776	2/10/2023 16:27	500
20	PIC	6/1/2022	5/31/2023	0.6090	0.01964	0.903	2/12/2023 12:52	1000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

LCS S/N : 1952-B
LCS Exp Date : 8/9/2023
LCS Activity (dpm/ml): 429.14
LCS Volume Added: 0.10

Results																
Pos.	Decision	Critical	Required	Sample Act.		Sample Act.	Net Count	Net Count	2 SIGMA	2 SIGMA	Sample	Sample	RPD	RER	Nominal	Recovery
	Level	Level	MDA	MDA	Conc.	Error	Rate	Rate Error	Counting	Total Prop.						
	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	%	CPM	CPM	Uncertainty	Uncertainty						
1	0.7484	0.5284	3	1.2433	1.3549	32.05%	0.3633	0.1161	0.8485	0.9154		SAMPLE				
2	0.8306	0.5864	3	1.3551	0.6405	63.66%	0.1757	0.1117	0.7985	0.8149		SAMPLE				
3	1.1591	0.8183	3	1.8247	1.1660	48.62%	0.3100	0.1505	1.1097	1.1485		SAMPLE				
4	0.9401	0.6637	3	1.5195	1.3168	37.88%	0.3427	0.1294	0.9743	1.0310		SAMPLE				
5	1.7061	1.2045	3	2.6105	1.7368	46.63%	0.4310	0.2005	1.5836	1.6451		SAMPLE				
6	0.9275	0.6548	3	1.4956	0.6233	71.27%	0.1677	0.1194	0.8701	0.8845		SAMPLE				
7	1.2634	0.8920	3	1.9823	3.2734	21.98%	0.8253	0.1801	1.4003	1.6279		SAMPLE				
8	0.8418	0.5943	3	1.3773	1.8148	27.38%	0.4810	0.1311	0.9694	1.0733		SAMPLE				
9	1.0379	0.7328	3	1.6494	0.0699	644.56%	0.0190	0.1225	0.8825	0.8826		SAMPLE				
10	0.8636	0.6097	3	1.4009	1.3023	35.79%	0.3590	0.1282	0.9112	0.9691		SAMPLE				
11	0.9590	0.6771	3	1.5232	1.3373	37.08%	0.3953	0.1463	0.9697	1.0272		SAMPLE				
12	1.1323	0.7994	3	1.7939	-0.3731	123.43%	-0.0957	0.1180	0.9023	0.9024		SAMPLE				
13	0.9276	0.6549	3	1.4900	1.4182	34.90%	0.3933	0.1369	0.9676	1.0322		SAMPLE				
14	0.9252	0.6532	3	1.4782	3.5299	17.18%	1.0273	0.1746	1.1757	1.4771		SAMPLE				
15	0.8565	0.6047	3	1.4073	1.4331	33.54%	0.3620	0.1211	0.9393	1.0072		SAMPLE				
16	1.2535	0.8850	3	1.9594	3.0705	22.78%	0.8100	0.1834	1.3627	1.5691		SAMPLE				
17	0.9386	0.6627	3	1.5018	0.8696	53.20%	0.2463	0.1309	0.9055	0.9321		SAMPLE				
18	1.5516	1.0955	3	2.3735	0.8532	82.54%	0.2337	0.1928	1.3795	1.3964		MB				
19	1.0385	0.7332	3	1.6516	1.6937	32.62%	0.4573	0.1487	1.0792	1.1619	607884001.1	DUP	22.2%			
20	1.1472	0.8099	3	1.8147	72.6865	4.41%	18.6470	0.5716	4.3672	19.1240		LCS			63.0087	115.4%

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
607884001	1A	60	19	47	2/15/2023 8:43	2/15/2023 9:43	PIC	2373642
607884002	1B	60	15	43	2/15/2023 8:44	2/15/2023 9:44	PIC	2373642
607884003	1C	60	9	78	2/15/2023 8:44	2/15/2023 9:44	PIC	2373642
607884004	2A	60	14	58	2/15/2023 8:44	2/15/2023 9:44	PIC	2373642
607884005	2B	60	7	138	2/15/2023 8:44	2/15/2023 9:44	PIC	2373642
607884006	2C	60	13	49	2/15/2023 8:44	2/15/2023 9:44	PIC	2373642
607884007	2D	60	9	113	2/15/2023 8:44	2/15/2023 9:44	PIC	2373642
607884008	4C	60	10	60	2/15/2023 8:44	2/15/2023 9:44	PIC	2373642
607884009	5B	60	17	51	2/15/2023 8:44	2/15/2023 9:44	PIC	2373642
607884010	7B	60	14	57	2/15/2023 8:44	2/15/2023 9:44	PIC	2373642
607884011	7C	60	11	74	2/15/2023 8:44	2/15/2023 9:44	PIC	2373642
607884012	8A	60	18	47	2/15/2023 8:44	2/15/2023 9:44	PIC	2373642
607884013	9B	60	9	65	2/15/2023 8:44	2/15/2023 9:44	PIC	2373642
607953001	10A	60	15	107	2/15/2023 8:44	2/15/2023 9:44	PIC	2373642
607953002	10C	60	21	51	2/15/2023 8:45	2/15/2023 9:45	PIC	2373642
607953003	10D	60	30	117	2/15/2023 8:45	2/15/2023 9:45	PIC	2373642
607953004	11A	60	15	59	2/15/2023 8:40	2/15/2023 9:40	PIC	2373642
1205303607	11B	60	27	127	2/15/2023 8:39	2/15/2023 9:39	PIC	2373642
1205303608	12B	60	13	74	2/15/2023 8:39	2/15/2023 9:39	PIC	2373642
1205303609	12A	60	18	1173	2/15/2023 8:39	2/15/2023 9:39	PIC	2373642

ASSAY 15-Feb-23 7:22:08
 Wizard 2480 s/n 46190630
 Protocol id 8 Ba-133
 Time limit
 Count limit
 Isotope Ba-133
 Protocol date 2/15/2023
 Run id. 6186

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF		1	87	1	180	3705.57	1234.99	1.64	07:22:08
607884001	2	87	2	180	3096.28	1031.95	1.8	83.56	07:25:22
607884002	3	87	3	180	3285.57	1095.02	1.74	88.67	07:28:36
607884003	4	87	4	180	3075	1024.84	1.8	82.98	07:31:49
607884004	5	87	5	180	3047	1015.49	1.81	82.23	07:35:03
607884005	1	88	1	180	2945	981.41	1.84	79.47	07:38:43
607884006	2	88	2	180	3237.28	1078.91	1.76	87.36	07:41:57
607884007	3	88	3	180	3031.28	1010.21	1.82	81.80	07:45:11
607884008	4	88	4	180	3023	1007.51	1.82	81.58	07:48:25
607884009	5	88	5	180	3078	1025.84	1.8	83.06	07:51:39
607884010	1	10	1	180	3137.28	1045.51	1.79	84.66	07:55:15
607884011	2	10	2	180	3359	1119.38	1.73	90.64	07:58:29
607884012	3	10	3	180	2912.28	970.68	1.85	78.60	08:01:43
607884013	4	10	4	180	3126.28	1041.92	1.79	84.37	08:04:57
607953001	5	10	5	180	3321.28	1106.91	1.74	89.63	08:08:11
607953002	1	2	1	180	2882.28	960.61	1.86	77.78	08:12:09
607953003	2	2	2	180	3132	1043.74	1.79	84.51	08:15:22
607953004	3	2	3	180	3201	1066.81	1.77	86.38	08:18:36
1205303607	4	2	4	180	2963	987.5	1.84	79.96	08:21:50
1205303608	5	2	5	180	3055.57	1018.41	1.81	82.46	08:25:04
1205303609	1	15	1	180	2953	984.14	1.84	79.69	08:28:40

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 15-Feb-2023

Detectors LB4100 A1 through I4 and PIC 1A through 14D and G5400W 1W through 1Z

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100E2	Above	Beta bkg	15-Feb 04:39	60	2.267	1.385	3.072	+0.14
LB4100E2	need 2nd	Beta eff	15-Feb 05:41	5	14309	14120	15200	-1.95
LB4100E3	Below	Alpha XTalk	15-Feb 05:52	5	0.214	0.215	0.300	-3.05
LB4100E3	need 2nd	Beta eff	15-Feb 05:41	5	13989	13690	15550	-2.04
LB4100F2	Below	Alpha eff	15-Feb 07:59	5	6205	6533	7372	-5.35
LB4100F2	Above	Alpha XTalk	15-Feb 07:59	5	0.375	0.318	0.366	+4.15
LB4100F2	Above	Beta bkg	15-Feb 04:39	60	35.017	1.173	1.833	+304.67
LB4100F3	Above	Alpha eff	15-Feb 07:59	5	17168	11460	15350	+5.80
LB4100F3	Below	Alpha XTalk	15-Feb 07:59	5	0.290	0.328	0.439	-5.03
LB4100H1	Above	Beta bkg	15-Feb 04:39	60	3.017	0.216	2.462	+4.48
LB4100H2	Above	Alpha eff	15-Feb 07:48	5	7302	5091	7055	+3.76
PIC1D	Above	Alpha bkg	15-Feb 08:22	60	0.350	-1.03E-1	0.386	+2.56
PIC1D	need 2nd	Beta XTalk	15-Feb 04:55	5	0.009	0.001	0.011	+1.95
PIC3D	Above	Alpha bkg	15-Feb 05:07	60	0.883	-1.75E-1	0.473	+6.79
PIC3D	need 2nd	Alpha eff	15-Feb 04:54	5	10059	8165	10130	+2.78
PIC3D	Below	Alpha XTalk	15-Feb 04:54	5	0.253	0.260	0.381	-3.33
PIC3D	Above	Beta XTalk	15-Feb 05:01	5	0.017	-4.26E-4	0.001	+68.05
PIC4B	Above	Alpha bkg	15-Feb 05:08	60	0.650	-9.02E-2	0.287	+8.78
PIC6A	Above	Beta bkg	15-Feb 05:13	60	4.733	0.669	2.752	+8.71
PIC8C	Above	Alpha bkg	15-Feb 08:15	60	0.317	-1.61E-2	0.410	+1.68
PIC8C	need 2nd	Beta XTalk	15-Feb 05:12	5	0.012	7.40E-4	0.012	+2.86
PIC13A	Above	Alpha bkg	15-Feb 05:34	60	0.850	-9.05E-2	0.347	+9.90
PIC13A	Above	Beta bkg	15-Feb 05:34	60	3.350	-8.16E-2	2.573	+4.76
PIC14B	need 2nd	Alpha bkg	15-Feb 05:35	60	0.100	-1.08E-1	0.400	-0.55
PIC14B	Above	Alpha eff	15-Feb 05:21	5	9015	8474	8989	+3.30
PIC14B	Below	Alpha XTalk	15-Feb 05:21	5	0.273	0.279	0.316	-3.91
PIC14B	Above	Beta bkg	15-Feb 05:35	60	3.333	0.370	3.004	+3.75

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100A1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
PIC8D	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by Jais Burt

Date 2/15/23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC

Batch ID: 2373642

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1205303608	DUP	JE1	PIC12B	FEB-15-23 08:39:50	DONE	25mm Filter	01-JUN-22 00:00
1205303609	LCS	JE1	PIC12A	FEB-15-23 08:39:53	DONE	25mm Filter	01-JUN-22 00:00
1205303607	MB	JE1	PIC11B	FEB-15-23 08:39:59	DONE	25mm Filter	01-JUN-22 00:00
607953004	SAMPLE	JE1	PIC11A	FEB-15-23 08:40:06	DONE	25mm Filter	01-JUN-22 00:00
607884001	SAMPLE	JE1	PIC1A	FEB-15-23 08:43:59	DONE	25mm Filter	01-JUN-22 00:00
607884002	SAMPLE	JE1	PIC1B	FEB-15-23 08:44:03	DONE	25mm Filter	01-JUN-22 00:00
607884003	SAMPLE	JE1	PIC1C	FEB-15-23 08:44:07	DONE	25mm Filter	01-JUN-22 00:00
607884004	SAMPLE	JE1	PIC2A	FEB-15-23 08:44:11	DONE	25mm Filter	01-JUN-22 00:00
607884005	SAMPLE	JE1	PIC2B	FEB-15-23 08:44:15	DONE	25mm Filter	01-JUN-22 00:00
607884006	SAMPLE	JE1	PIC2C	FEB-15-23 08:44:19	DONE	25mm Filter	01-JUN-22 00:00
607884007	SAMPLE	JE1	PIC2D	FEB-15-23 08:44:23	DONE	25mm Filter	01-JUN-22 00:00
607884008	SAMPLE	JE1	PIC4C	FEB-15-23 08:44:27	DONE	25mm Filter	01-JUN-22 00:00
607884009	SAMPLE	JE1	PIC5B	FEB-15-23 08:44:34	DONE	25mm Filter	01-JUN-22 00:00
607884010	SAMPLE	JE1	PIC7B	FEB-15-23 08:44:38	DONE	25mm Filter	01-JUN-22 00:00
607884011	SAMPLE	JE1	PIC7C	FEB-15-23 08:44:41	DONE	25mm Filter	01-JUN-22 00:00
607884012	SAMPLE	JE1	PIC8A	FEB-15-23 08:44:48	DONE	25mm Filter	01-JUN-22 00:00
607884013	SAMPLE	JE1	PIC9B	FEB-15-23 08:44:51	DONE	25mm Filter	01-JUN-22 00:00
607953001	SAMPLE	JE1	PIC10A	FEB-15-23 08:44:58	DONE	25mm Filter	01-JUN-22 00:00
607953002	SAMPLE	JE1	PIC10C	FEB-15-23 08:45:04	DONE	25mm Filter	01-JUN-22 00:00
607953003	SAMPLE	JE1	PIC10D	FEB-15-23 08:45:07	DONE	25mm Filter	01-JUN-22 00:00

Lucas Cell Raw Data

Batch 2373612 Check-list

This check-list was completed on 12-FEB-23 by Lyndsey Pace

This batch was reviewed by Lyndsey Pace on 12-FEB-23 and Elizabeth Krouse on 14-FEB-23.

Batch ID:
2373612

Product:
LUC26RAL

Description: Lucas Cell Radium 226
GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-226 in Liquid

Batch ID: 2373612
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL-RAD-A-008 REV# 15
Instrument: LUCAS-C202389980

Due Dates for Lab: 14-FEB-2023			Package: 16-FEB-2023	SDG: 17-FEB-2023		
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
MS	1205303557	Radium-226 SPIKE	1715-G	.1	mL	
LCS	1205303558	Radium-226 SPIKE	1715-G	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	End Degas (date)	CELL #	End Transfer (date)	Start Count Time (date)	Background Counts	Total Counts
1	607884001	08-FEB-2023	1	504.52	504.52	02/09/23 10:15	104	02/12/23 05:40	02/12/23 09:02	6	18
2	607884002	08-FEB-2023	1	493.18	493.18	02/09/23 10:15	202	02/12/23 05:40	02/12/23 09:02	4	15
3	607884003	08-FEB-2023	1	484.38	484.38	02/09/23 10:15	304	02/12/23 05:40	02/12/23 09:02	1	8
4	607884004	08-FEB-2023	1	468.42	468.42	02/09/23 10:15	406	02/12/23 05:40	02/12/23 09:02	3	14
5	607884005	08-FEB-2023	1	488.83	488.83	02/09/23 10:15	501	02/12/23 05:40	02/12/23 09:02	2	15
6	607884006	08-FEB-2023	1	501.5	501.5	02/09/23 10:15	601	02/12/23 05:40	02/12/23 09:02	7	14
7	607884007	08-FEB-2023	1	501.1	501.1	02/09/23 10:15	708	02/12/23 05:40	02/12/23 09:02	1	10
8	607884008	08-FEB-2023	1	490.93	490.93	02/09/23 10:15	802	02/12/23 05:40	02/12/23 09:02	6	19
9	607884009	08-FEB-2023	1	465.74	465.74	02/09/23 10:15	106	02/12/23 06:05	02/12/23 09:33	6	15
10	607884010	08-FEB-2023	1	480.1	480.1	02/09/23 10:15	206	02/12/23 06:05	02/12/23 09:33	1	20
11	607884011	08-FEB-2023	1	495.54	495.54	02/09/23 10:15	303	02/12/23 06:05	02/12/23 09:33	5	8
12	607884012	08-FEB-2023	1	468.12	468.12	02/09/23 10:15	401	02/12/23 06:05	02/12/23 09:33	1	14
13	607884013	08-FEB-2023	1	493.77	493.77	02/09/23 10:15	502	02/12/23 06:05	02/12/23 09:33	1	11
14	607953001	08-FEB-2023	1	505.39	505.39	02/09/23 10:15	604	02/12/23 06:05	02/12/23 09:33	2	22
15	607953002	08-FEB-2023	1	501.53	501.53	02/09/23 10:15	704	02/12/23 06:05	02/12/23 09:33	5	18
16	607953003	08-FEB-2023	1	502.3	502.3	02/09/23 10:15	805	02/12/23 06:05	02/12/23 09:33	3	11
17	607953004	08-FEB-2023	1	503.71	503.71	02/09/23 10:15	102	02/12/23 06:25	02/12/23 10:07	2	6
18	1205303555 MB	08-FEB-2023	1	505.39	505.39	02/09/23 10:15	204	02/12/23 06:25	02/12/23 10:07	7	17
19	1205303556 DUP (607884001)	08-FEB-2023	1	503.85	503.85	02/09/23 10:15	402	02/12/23 06:25	02/12/23 10:07	1	11
20	1205303557 MS (607884001)	08-FEB-2023	1	103.66	103.66	02/09/23 10:15	505	02/12/23 06:25	02/12/23 10:07	2	634
21	1205303558 LCS	08-FEB-2023	1		505.39	02/09/23 10:15	707	02/12/23 06:25	02/12/23 10:07	1	549

Reagent/Solvent Lot ID	Description	Amount	Comments:
			Data Entry Date2: 08-FEB-2023 00:00

Radium-226 Liquid

Filename : RA226.XLS
 File type : Excel
 Version # : 1.3.2

Procedure Code : LUC26RAL
 Parmname : Radium-226
 Required MDA : 1 pCi/L
 Halflife of Ra-226 : 1600 years
 Ra-226 Abundance : 1.00
 Halflife of Rn-222 : 3.8235 days

Batch : 2373612
 Analyst : LIN01615
 Prep Date : 2/8/2023
 Ra-226 Method Uncertainty : 0.073648

Batch counted on : LUCAS CELL DETECTOR
 BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Counting		Gross Counts	Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
					Cell Number	Time (min.)						
1	607884001.1	0.5045	2.0274E-05	1/17/2023 9:30	104	30	18	0.600	6	0.200	30	1.6160
2	607884002.1	0.4932	2.0227E-05	1/17/2023 11:15	202	30	15	0.500	4	0.133	30	1.8360
3	607884003.1	0.4844	2.0188E-05	1/17/2023 7:30	304	30	8	0.267	1	0.033	30	1.8850
4	607884004.1	0.4684	2.0112E-05	1/18/2023 10:40	406	30	14	0.467	3	0.100	30	1.4650
5	607884005.1	0.4888	2.0208E-05	1/18/2023 10:20	501	30	15	0.500	2	0.067	30	1.8220
6	607884006.1	0.5015	2.0262E-05	1/18/2023 10:35	601	30	14	0.467	7	0.233	30	1.7610
7	607884007.1	0.5011	2.0260E-05	1/18/2023 11:15	708	30	10	0.333	1	0.033	30	1.6020
8	607884008.1	0.4909	2.0217E-05	1/18/2023 8:30	802	30	19	0.633	6	0.200	30	2.0910
9	607884009.1	0.4657	2.0098E-05	1/18/2023 8:30	106	30	15	0.500	6	0.200	30	1.6990
10	607884010.1	0.4801	2.0169E-05	1/18/2023 9:15	206	30	20	0.667	1	0.033	30	1.8770
11	607884011.1	0.4955	2.0237E-05	1/18/2023 9:50	303	30	8	0.267	5	0.167	30	1.7210
12	607884012.1	0.4681	2.0110E-05	1/18/2023 7:30	401	30	14	0.467	1	0.033	30	1.2390
13	607884013.1	0.4938	2.0230E-05	1/19/2023 8:50	502	30	11	0.367	1	0.033	30	1.8630
14	607953001.1	0.5054	2.0278E-05	1/12/2023 16:12	604	30	22	0.733	2	0.067	30	1.6810
15	607953002.1	0.5015	2.0262E-05	1/12/2023 14:36	704	30	18	0.600	5	0.167	30	1.5870
16	607953003.1	0.5023	2.0265E-05	1/12/2023 16:12	805	30	11	0.367	3	0.100	30	1.9080
17	607953004.1	0.5037	2.0271E-05	1/12/2023 13:25	102	30	6	0.200	2	0.067	30	1.5820
18	1205303555.1	0.5054	2.0278E-05	2/8/2023 0:00	204	30	17	0.567	7	0.233	30	1.8470
19	1205303556.1	0.5039	2.0272E-05	1/17/2023 9:30	402	30	11	0.367	1	0.033	30	1.4980
20	1205303557.1	0.1037	1.1592E-05	1/17/2023 9:30	505	30	634	21.133	2	0.067	30	1.8130
21	1205303558.1	0.5054	2.0278E-05	2/8/2023 0:00	707	30	549	18.300	1	0.033	30	1.7280

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-008
 Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrowth End Date/Time	Count Start Date/Time	Rn-222 Corrections			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
2.000%	4/28/2022	4/30/2023	2/9/2023 10:15	2/12/2023 5:40	2/12/2023 9:02	0.399	0.975	1.002	1.000
5.100%	8/1/2022	7/31/2023	2/9/2023 10:15	2/12/2023 5:40	2/12/2023 9:02	0.399	0.975	1.002	1.000
8.900%	10/25/2022	10/31/2023	2/9/2023 10:15	2/12/2023 5:40	2/12/2023 9:02	0.399	0.975	1.002	1.000
2.900%	2/1/2023	1/31/2024	2/9/2023 10:15	2/12/2023 5:40	2/12/2023 9:02	0.399	0.975	1.002	1.000
7.900%	6/1/2022	5/31/2023	2/9/2023 10:15	2/12/2023 5:40	2/12/2023 9:02	0.399	0.975	1.002	1.000
9.400%	7/1/2022	6/30/2023	2/9/2023 10:15	2/12/2023 5:40	2/12/2023 9:02	0.399	0.975	1.002	1.000
7.700%	11/1/2022	10/31/2023	2/9/2023 10:15	2/12/2023 5:40	2/12/2023 9:02	0.399	0.975	1.002	1.000
8.000%	4/1/2022	3/31/2023	2/9/2023 10:15	2/12/2023 5:40	2/12/2023 9:02	0.399	0.975	1.002	1.000
8.800%	4/28/2022	4/30/2023	2/9/2023 10:15	2/12/2023 6:05	2/12/2023 9:33	0.401	0.974	1.002	1.000
2.800%	8/1/2022	7/31/2023	2/9/2023 10:15	2/12/2023 6:05	2/12/2023 9:33	0.401	0.974	1.002	1.000
7.400%	10/25/2022	10/31/2023	2/9/2023 10:15	2/12/2023 6:05	2/12/2023 9:33	0.401	0.974	1.002	1.000
3.100%	2/1/2023	1/31/2024	2/9/2023 10:15	2/12/2023 6:05	2/12/2023 9:33	0.401	0.974	1.002	1.000
6.700%	6/1/2022	5/31/2023	2/9/2023 10:15	2/12/2023 6:05	2/12/2023 9:33	0.401	0.974	1.002	1.000
6.700%	7/1/2022	6/30/2023	2/9/2023 10:15	2/12/2023 6:05	2/12/2023 9:33	0.401	0.974	1.002	1.000
4.200%	11/1/2022	10/31/2023	2/9/2023 10:15	2/12/2023 6:05	2/12/2023 9:33	0.401	0.974	1.002	1.000
7.400%	4/1/2022	3/31/2023	2/9/2023 10:15	2/12/2023 6:05	2/12/2023 9:33	0.401	0.974	1.002	1.000
6.300%	4/28/2022	4/30/2023	2/9/2023 10:15	2/12/2023 6:25	2/12/2023 10:07	0.402	0.972	1.002	1.000
7.400%	8/1/2022	7/31/2023	2/9/2023 10:15	2/12/2023 6:25	2/12/2023 10:07	0.402	0.972	1.002	1.000
5.300%	2/1/2023	1/31/2024	2/9/2023 10:15	2/12/2023 6:25	2/12/2023 10:07	0.402	0.972	1.002	1.000
1.200%	6/1/2022	5/31/2023	2/9/2023 10:15	2/12/2023 6:25	2/12/2023 10:07	0.402	0.972	1.002	1.000
2.200%	11/1/2022	10/31/2023	2/9/2023 10:15	2/12/2023 6:25	2/12/2023 10:07	0.402	0.972	1.002	1.000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1715-G
Spike Exp Date : 9/8/2023
Spike Activity (dpm/ml): 297.44
Spike Volume Added: 0.10


LCS S/N : 1715-G
LCS Exp Date : 9/8/2023
LCS Activity (dpm/ml): 297.44
LCS Volume Added: 0.10

Results																
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.3828	0.2703	1	0.6829	0.5692	40.87%	0.4000	0.1633	0.4554	0.4633		SAMPLE				
2	0.2814	0.1987	1	0.5255	0.4698	39.95%	0.3667	0.1453	0.3649	0.3741		SAMPLE				
3	0.1396	0.0985	1	0.3241	0.2965	43.77%	0.2333	0.1000	0.2490	0.2579		SAMPLE				
4	0.3216	0.2271	1	0.6232	0.6199	37.59%	0.3667	0.1374	0.4554	0.4654		SAMPLE				
5	0.2023	0.1428	1	0.4159	0.5644	32.69%	0.4333	0.1374	0.3509	0.3707		SAMPLE				
6	0.3817	0.2695	1	0.6704	0.3065	66.14%	0.2333	0.1528	0.3933	0.3998		SAMPLE				
7	0.1587	0.1121	1	0.3686	0.4335	37.65%	0.3000	0.1106	0.3131	0.3260		SAMPLE				
8	0.3041	0.2147	1	0.5423	0.4897	39.28%	0.4333	0.1667	0.3692	0.3836		SAMPLE				
9	0.3929	0.2774	1	0.7008	0.4381	51.67%	0.3000	0.1528	0.4372	0.4482		SAMPLE				
10	0.1408	0.0994	1	0.3271	0.8121	24.28%	0.6333	0.1528	0.3839	0.4039		SAMPLE				
11	0.3328	0.2349	1	0.6054	0.1355	120.41%	0.1000	0.1202	0.3192	0.3204		SAMPLE				
12	0.2188	0.1545	1	0.5082	0.8633	29.95%	0.4333	0.1291	0.5041	0.5219		SAMPLE				
13	0.1380	0.0974	1	0.3204	0.4187	35.28%	0.3333	0.1155	0.2843	0.2958		SAMPLE				
14	0.2113	0.1492	1	0.4343	0.9068	25.39%	0.6667	0.1633	0.4353	0.4699		SAMPLE				
15	0.3566	0.2517	1	0.6487	0.6291	37.13%	0.4333	0.1599	0.4549	0.4667		SAMPLE				
16	0.2294	0.1619	1	0.4445	0.3215	47.35%	0.2667	0.1247	0.2947	0.3020		SAMPLE				
17	0.2248	0.1587	1	0.4621	0.1930	70.99%	0.1333	0.0943	0.2674	0.2699		SAMPLE				
18	0.3590	0.2535	1	0.6305	0.4118	49.55%	0.3333	0.1633	0.3954	0.4043		MB				
19	0.1678	0.1185	1	0.3898	0.5093	35.04%	0.3333	0.1155	0.3458	0.3575	607884001.1	DUP	11.1%			
20	0.9532	0.6729	1	1.9595	129.2709	4.17%	21.0667	0.8406	10.1104	21.4399	607884001.1	MS			129.2549	100.0%
21	0.1450	0.1024	1	0.3368	24.1208	4.81%	18.2667	0.7817	2.0232	4.1591		LCS			26.5107	91.0%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 12-FEB-2023

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	07:01	1	1.21E+05	121218	-1.49		
LUCAS2	EFF	06:59	1	1.34E+05	134210	0.4		
LUCAS3	EFF	06:58	1	1.10E+05	110134	0.4		
LUCAS4	EFF	06:57	1	1.27E+05	127309	-0.9		
LUCAS5	EFF	06:56	1	1.32E+05	131619	-0.98		
LUCAS6	EFF	06:54	1	1.30E+05	129955	-1.46		
LUCAS7	EFF	06:44	1	1.30E+05	130294	-0.63		
LUCAS8	EFF	06:42	1	1.24E+05	123626	-1.18		

Reviewed by: 
Lyndsey Pace

Date: 12-FEB-23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR

Batch ID: 2373612

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
607884001	SAMPLE	LXP1	LUCAS1	FEB-12-23 09:02:00	DONE	Lucas Cell	28-APR-22 00:00
607884002	SAMPLE	LXP1	LUCAS2	FEB-12-23 09:02:00	DONE	Lucas Cell	01-AUG-22 00:00
607884003	SAMPLE	LXP1	LUCAS3	FEB-12-23 09:02:00	DONE	Lucas Cell	25-OCT-22 00:00
607884004	SAMPLE	LXP1	LUCAS4	FEB-12-23 09:02:00	DONE	Lucas Cell	01-FEB-23 00:00
607884005	SAMPLE	LXP1	LUCAS5	FEB-12-23 09:02:00	DONE	Lucas Cell	01-JUN-22 00:00
607884006	SAMPLE	LXP1	LUCAS6	FEB-12-23 09:02:00	DONE	Lucas Cell	01-JUL-22 00:00
607884007	SAMPLE	LXP1	LUCAS7	FEB-12-23 09:02:00	DONE	Lucas Cell	01-NOV-22 00:00
607884008	SAMPLE	LXP1	LUCAS8	FEB-12-23 09:02:00	DONE	Lucas Cell	01-APR-22 00:00
607884009	SAMPLE	LXP1	LUCAS1	FEB-12-23 09:33:00	DONE	Lucas Cell	28-APR-22 00:00
607884010	SAMPLE	LXP1	LUCAS2	FEB-12-23 09:33:00	DONE	Lucas Cell	01-AUG-22 00:00
607884011	SAMPLE	LXP1	LUCAS3	FEB-12-23 09:33:00	DONE	Lucas Cell	25-OCT-22 00:00
607884012	SAMPLE	LXP1	LUCAS4	FEB-12-23 09:33:00	DONE	Lucas Cell	01-FEB-23 00:00
607884013	SAMPLE	LXP1	LUCAS5	FEB-12-23 09:33:00	DONE	Lucas Cell	01-JUN-22 00:00
607953001	SAMPLE	LXP1	LUCAS6	FEB-12-23 09:33:00	DONE	Lucas Cell	01-JUL-22 00:00
607953002	SAMPLE	LXP1	LUCAS7	FEB-12-23 09:33:00	DONE	Lucas Cell	01-NOV-22 00:00
607953003	SAMPLE	LXP1	LUCAS8	FEB-12-23 09:33:00	DONE	Lucas Cell	01-APR-22 00:00
607953004	SAMPLE	LXP1	LUCAS1	FEB-12-23 10:07:00	DONE	Lucas Cell	28-APR-22 00:00
1205303555	MB	LXP1	LUCAS2	FEB-12-23 10:07:00	DONE	Lucas Cell	01-AUG-22 00:00
1205303556	DUP	LXP1	LUCAS4	FEB-12-23 10:07:00	DONE	Lucas Cell	01-FEB-23 00:00
1205303557	MS	LXP1	LUCAS5	FEB-12-23 10:07:00	DONE	Lucas Cell	01-JUN-22 00:00
1205303558	LCS	LXP1	LUCAS7	FEB-12-23 10:07:00	DONE	Lucas Cell	01-NOV-22 00:00



Report ID: S44784.01(02)
Generated on 03/06/2023
Replaces report S44784.01(01) generated on 01/30/2023

Report to
Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

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Report Summary
Lab Sample ID(s): S44784.01-S44784.06
Project: Erickson Closure Ash Charaterization
Collected Date(s): 01/20/2023
Submitted Date/Time: 01/26/2023 15:45
Sampled by: HDR
P.O. #:

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Maya Murshak
Technical Director



General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile, and 2-chloroethylvinyl ether need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the

FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

All analyses completed

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Method Summary

Method	Version
E300.0	EPA Method 300.0 Revision 2.1 (1993)
SM2540B	Standard Method 2540 B 2015
SW3050B	SW 846 Method 3050B Revision 2 December 1996
SW6020A	SW 846 Method 6020A Revision 1 February 2007
SW7196A	SW 846 Method 7196A Revision 1 July 1992/SW 846 Method 3060A Revision 1 December 1996
SW7471B	SW 846 Method 7471B Revision 2 February 2007



Sample Summary (6 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S44784.01	Retention Basin A L301211-01	Soil	01/20/23 11:00
S44784.02	Retention Basin B L301211-02	Soil	01/20/23 11:00
S44784.03	Retention Basin C L301211-03	Soil	01/20/23 11:00
S44784.04	Clearwater Pond A L301211-04	Soil	01/20/23 11:30
S44784.05	Clearwater Pond B L301211-05	Soil	01/20/23 11:30
S44784.06	Clearwater Pond C L301211-06	Soil	01/20/23 11:30



Analytical Laboratory Report

Lab Sample ID: S44784.01

Sample Tag: Retention Basin A L301211-01

Collected Date/Time: 01/20/2023 11:00

Matrix: Soil

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	Plastic Bag	None	No	RT	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	01/30/23 10:05	JRH	
Mercury Digestion	Completed	SW7471B	01/27/23 13:18	CTV	

Inorganics

Method: E300.0, Run Date: 01/30/23 10:25, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride*	99	87	1.1	mg/kg	87	16887-00-6	
Fluoride (Undistilled)*	Not detected	17	1.4	mg/kg	87	16984-48-8	
Sulfate*	280	87	9.0	mg/kg	87	14808-79-8	

Method: SM2540B, Run Date: 01/27/23 15:23, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	42	1	1	%	1		

Method: SW7196A, Run Date: 01/30/23 14:15, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium VI	Not detected	2	1.2	mg/kg	200	18540-29-9	

Metals

Method: SW6020A, Run Date: 01/30/23 14:15, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium III	32.7	2.0	1.2	mg/kg	200	16065-83-1	

Method: SW6020A, Run Date: 01/30/23 11:28, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Iron	9,210	28	5.9	mg/kg	28000	7439-89-6	

Method: SW6020A, Run Date: 01/30/23 11:30, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.50	0.049	mg/kg	280	7440-36-0	
Arsenic	9.11	0.20	0.0092	mg/kg	280	7440-38-2	
Barium	184	1.0	0.0067	mg/kg	280	7440-39-3	
Beryllium	0.24	0.20	0.014	mg/kg	280	7440-41-7	
Boron	22.3	2.0	0.25	mg/kg	280	7440-42-8	
Cadmium	0.34	0.20	0.0090	mg/kg	280	7440-43-9	
Chromium	32.7	0.50	0.011	mg/kg	280	7440-47-3	
Cobalt	4.44	0.50	0.0092	mg/kg	280	7440-48-4	
Copper	22.7	0.50	0.017	mg/kg	280	7440-50-8	
Lead	8.48	0.30	0.0062	mg/kg	280	7439-92-1	
Lithium	13.3	0.20	0.051	mg/kg	280	7439-93-2	
Molybdenum	7.06	0.50	0.014	mg/kg	280	7439-98-7	
Nickel	11.5	0.50	0.021	mg/kg	280	7440-02-0	



Analytical Laboratory Report

Final Report

Lab Sample ID: S44784.01 (continued)

Sample Tag: Retention Basin A L301211-01

Method: SW6020A, Run Date: 01/30/23 11:30, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Selenium	0.80	0.40	0.12	mg/kg	280	7782-49-2	
Silver	Not detected	0.20	0.0046	mg/kg	280	7440-22-4	
Thallium	0.23	0.20	0.0053	mg/kg	280	7440-28-0	
Vanadium	39.4	0.50	0.0098	mg/kg	280	7440-62-2	
Zinc	37.3	0.50	0.053	mg/kg	280	7440-66-6	

Method: SW6020A, Run Date: 01/30/23 13:34, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium	85,100	2,275	100	mg/kg	28000	7440-70-2	
Magnesium	18,400	2,275	5.9	mg/kg	28000	7439-95-4	

Method: SW6020A, Run Date: 01/30/23 14:02, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Potassium	454	25	0.67	mg/kg	280	7440-09-7	
Sodium	280	25	0.31	mg/kg	280	7440-23-5	

Method: SW7471B, Run Date: 01/27/23 15:56, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.050	0.0028	mg/kg	144	7439-97-6	

Other / Misc.

Method: , Run Date: 02/28/23 05:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S44784.02

Sample Tag: Retention Basin B L301211-02

Collected Date/Time: 01/20/2023 11:00

Matrix: Soil

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	Plastic Bag	None	No	RT	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	01/30/23 10:05	JRH	
Mercury Digestion	Completed	SW7471B	01/27/23 13:18	CTV	

Inorganics

Method: E300.0, Run Date: 01/30/23 10:35, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride*	64	51	0.7	mg/kg	51	16887-00-6	
Fluoride (Undistilled)*	Not detected	10	0.8	mg/kg	51	16984-48-8	
Sulfate*	195	51	5.3	mg/kg	51	14808-79-8	

Method: SM2540B, Run Date: 01/27/23 15:23, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	65	1	1	%	1		

Method: SW7196A, Run Date: 01/30/23 14:20, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium VI	Not detected	2	1.2	mg/kg	200	18540-29-9	

Metals

Method: SW6020A, Run Date: 01/30/23 14:20, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium III	13.7	2.0	1.2	mg/kg	200	16065-83-1	

Method: SW6020A, Run Date: 01/30/23 11:36, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Iron	6,330	16	3.4	mg/kg	15900	7439-89-6	

Method: SW6020A, Run Date: 01/30/23 11:38, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.50	0.028	mg/kg	159	7440-36-0	
Arsenic	4.89	0.20	0.0052	mg/kg	159	7440-38-2	
Barium	101	1.0	0.0038	mg/kg	159	7440-39-3	
Beryllium	Not detected	0.20	0.0078	mg/kg	159	7440-41-7	
Boron	10.6	2.0	0.14	mg/kg	159	7440-42-8	
Cadmium	Not detected	0.20	0.0051	mg/kg	159	7440-43-9	
Chromium	13.7	0.50	0.0064	mg/kg	159	7440-47-3	
Cobalt	3.17	0.50	0.0052	mg/kg	159	7440-48-4	
Copper	10.7	0.50	0.0099	mg/kg	159	7440-50-8	
Lead	3.96	0.30	0.0035	mg/kg	159	7439-92-1	
Lithium	8.17	0.20	0.029	mg/kg	159	7439-93-2	
Molybdenum	3.59	0.50	0.0077	mg/kg	159	7439-98-7	
Nickel	8.40	0.50	0.012	mg/kg	159	7440-02-0	



Analytical Laboratory Report

Final Report

Lab Sample ID: S44784.02 (continued)
Sample Tag: Retention Basin B L301211-02

Method: SW6020A, Run Date: 01/30/23 11:38, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Selenium	0.52	0.40	0.067	mg/kg	159	7782-49-2	
Silver	Not detected	0.20	0.0026	mg/kg	159	7440-22-4	
Thallium	Not detected	0.20	0.0030	mg/kg	159	7440-28-0	
Vanadium	18.0	0.50	0.0056	mg/kg	159	7440-62-2	
Zinc	19.1	0.50	0.030	mg/kg	159	7440-66-6	

Method: SW6020A, Run Date: 01/30/23 13:35, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium	53,400	2,275	57	mg/kg	15900	7440-70-2	
Magnesium	12,100	2,275	3.4	mg/kg	15900	7439-95-4	

Method: SW6020A, Run Date: 01/30/23 14:21, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Potassium	330	25	0.76	mg/kg	318	7440-09-7	
Sodium	144	25	0.34	mg/kg	318	7440-23-5	

Method: SW7471B, Run Date: 01/27/23 15:59, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.050	0.0012	mg/kg	61	7439-97-6	

Other / Misc.

Method: , Run Date: 02/28/23 05:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S44784.03

Sample Tag: Retention Basin C L301211-03

Collected Date/Time: 01/20/2023 11:00

Matrix: Soil

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	Plastic Bag	None	No	RT	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	01/30/23 10:05	JRH	
Mercury Digestion	Completed	SW7471B	01/27/23 13:18	CTV	

Inorganics

Method: E300.0, Run Date: 01/30/23 10:45, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride*	308	143	1.8	mg/kg	143	16887-00-6	
Fluoride (Undistilled)*	Not detected	28	2.3	mg/kg	143	16984-48-8	
Sulfate*	790	143	15	mg/kg	143	14808-79-8	

Method: SM2540B, Run Date: 01/27/23 15:23, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	24	1	1	%	1		

Method: SW7196A, Run Date: 01/30/23 14:25, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium VI	Not detected	2	1.2	mg/kg	200	18540-29-9	

Metals

Method: SW6020A, Run Date: 01/30/23 14:25, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium III	71.0	2.0	1.2	mg/kg	200	16065-83-1	

Method: SW6020A, Run Date: 01/30/23 11:42, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Iron	6,520	46	9.6	mg/kg	45500	7439-89-6	

Method: SW6020A, Run Date: 01/30/23 11:44, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	Not detected	0.50	0.080	mg/kg	455	7440-36-0	
Arsenic	11.5	0.20	0.015	mg/kg	455	7440-38-2	
Barium	472	1.0	0.011	mg/kg	455	7440-39-3	
Beryllium	0.22	0.20	0.022	mg/kg	455	7440-41-7	
Boron	56.8	2.0	0.41	mg/kg	455	7440-42-8	
Cadmium	0.48	0.20	0.015	mg/kg	455	7440-43-9	
Chromium	71.0	0.50	0.018	mg/kg	455	7440-47-3	
Cobalt	2.80	0.50	0.015	mg/kg	455	7440-48-4	
Copper	37.4	0.50	0.028	mg/kg	455	7440-50-8	
Lead	4.67	0.30	0.010	mg/kg	455	7439-92-1	
Lithium	13.9	0.20	0.083	mg/kg	455	7439-93-2	
Molybdenum	11.6	0.50	0.022	mg/kg	455	7439-98-7	
Nickel	9.78	0.50	0.035	mg/kg	455	7440-02-0	



Analytical Laboratory Report

Final Report

Lab Sample ID: S44784.03 (continued)
Sample Tag: Retention Basin C L301211-03

Method: SW6020A, Run Date: 01/30/23 11:44, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Selenium	1.69	0.40	0.19	mg/kg	455	7782-49-2	
Silver	Not detected	0.20	0.0074	mg/kg	455	7440-22-4	
Thallium	0.20	0.20	0.0086	mg/kg	455	7440-28-0	
Vanadium	54.0	0.50	0.016	mg/kg	455	7440-62-2	
Zinc	32.0	1.0	0.086	mg/kg	455	7440-66-6	

Method: SW6020A, Run Date: 01/30/23 13:37, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium	94,500	2,275	160	mg/kg	45500	7440-70-2	
Magnesium	16,500	2,275	9.6	mg/kg	45500	7439-95-4	

Method: SW6020A, Run Date: 01/30/23 14:04, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Potassium	300	25	1.1	mg/kg	455	7440-09-7	
Sodium	688	25	0.50	mg/kg	455	7440-23-5	

Method: SW7471B, Run Date: 01/27/23 16:02, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.050	0.0039	mg/kg	203	7439-97-6	

Other / Misc.

Method: , Run Date: 02/28/23 05:07, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S44784.04

Sample Tag: Clearwater Pond A L301211-04

Collected Date/Time: 01/20/2023 11:30

Matrix: Soil

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	Plastic Bag	None	No	RT	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	01/30/23 10:05	JRH	
Mercury Digestion	Completed	SW7471B	01/27/23 13:18	CTV	

Inorganics

Method: E300.0, Run Date: 01/30/23 10:55, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride*	264	135	1.8	mg/kg	135	16887-00-6	
Fluoride (Undistilled)*	Not detected	27	2.2	mg/kg	135	16984-48-8	
Sulfate*	569	135	14	mg/kg	135	14808-79-8	

Method: SM2540B, Run Date: 01/27/23 15:23, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	27	1	1	%	1		

Method: SW7196A, Run Date: 01/30/23 14:30, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium VI	Not detected	2	1.2	mg/kg	200	18540-29-9	

Metals

Method: SW6020A, Run Date: 01/30/23 14:30, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium III	205	2.0	1.2	mg/kg	200	16065-83-1	

Method: SW6020A, Run Date: 01/30/23 11:48, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Barium	1,610	4.0	0.94	mg/kg	39100	7440-39-3	
Iron	16,200	40	8.3	mg/kg	39100	7439-89-6	

Method: SW6020A, Run Date: 01/30/23 11:50, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	4.22	0.50	0.068	mg/kg	391	7440-36-0	
Arsenic	161	0.20	0.013	mg/kg	391	7440-38-2	
Beryllium	11.5	0.20	0.019	mg/kg	391	7440-41-7	
Boron	48.7	2.0	0.35	mg/kg	391	7440-42-8	
Cadmium	2.81	0.20	0.013	mg/kg	391	7440-43-9	
Chromium	205	0.50	0.016	mg/kg	391	7440-47-3	
Cobalt	28.6	0.50	0.013	mg/kg	391	7440-48-4	
Copper	447	0.50	0.024	mg/kg	391	7440-50-8	
Lead	45.5	0.30	0.0086	mg/kg	391	7439-92-1	
Lithium	22.0	0.20	0.072	mg/kg	391	7439-93-2	
Molybdenum	87.2	0.50	0.019	mg/kg	391	7439-98-7	
Nickel	67.1	0.50	0.030	mg/kg	391	7440-02-0	



Analytical Laboratory Report

Final Report

Lab Sample ID: S44784.04 (continued)

Sample Tag: Clearwater Pond A L301211-04

Method: SW6020A, Run Date: 01/30/23 11:50, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Selenium	83.1	0.40	0.16	mg/kg	391	7782-49-2	
Silver	Not detected	0.20	0.0064	mg/kg	391	7440-22-4	
Thallium	4.68	0.20	0.0074	mg/kg	391	7440-28-0	
Vanadium	594	0.50	0.014	mg/kg	391	7440-62-2	
Zinc	173	0.80	0.074	mg/kg	391	7440-66-6	

Method: SW6020A, Run Date: 01/30/23 13:38, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium	17,500	2,275	140	mg/kg	39100	7440-70-2	
Magnesium	2,860	15	8.3	mg/kg	39100	7439-95-4	

Method: SW6020A, Run Date: 01/30/23 14:06, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Potassium	1,090	25	0.94	mg/kg	391	7440-09-7	
Sodium	723	25	0.43	mg/kg	391	7440-23-5	

Method: SW7471B, Run Date: 01/27/23 16:06, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	0.176	0.050	0.0039	mg/kg	204	7439-97-6	

Other / Misc.

Method: , Run Date: 02/28/23 05:08, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S44784.05

Sample Tag: Clearwater Pond B L301211-05

Collected Date/Time: 01/20/2023 11:30

Matrix: Soil

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	Plastic Bag	None	No	RT	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	01/30/23 10:05	JRH	
Mercury Digestion	Completed	SW7471B	01/27/23 13:18	CTV	

Inorganics

Method: E300.0, Run Date: 01/30/23 11:05, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride*	194	90	1.2	mg/kg	90	16887-00-6	
Fluoride (Undistilled)*	Not detected	18	1.4	mg/kg	90	16984-48-8	
Sulfate*	567	90	9.4	mg/kg	90	14808-79-8	

Method: SM2540B, Run Date: 01/27/23 15:23, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	37	1	1	%	1		

Method: SW7196A, Run Date: 01/30/23 14:35, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium VI	Not detected	2	1.2	mg/kg	200	18540-29-9	

Metals

Method: SW6020A, Run Date: 01/30/23 14:35, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium III	86.6	2.0	1.2	mg/kg	200	16065-83-1	

Method: SW6020A, Run Date: 01/30/23 11:55, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Iron	10,000	26	5.5	mg/kg	25800	7439-89-6	

Method: SW6020A, Run Date: 01/30/23 11:57, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	0.58	0.50	0.045	mg/kg	258	7440-36-0	
Arsenic	47.1	0.20	0.0085	mg/kg	258	7440-38-2	
Barium	722	1.0	0.0062	mg/kg	258	7440-39-3	
Beryllium	2.58	0.20	0.013	mg/kg	258	7440-41-7	
Boron	40.9	2.0	0.23	mg/kg	258	7440-42-8	
Cadmium	1.93	0.20	0.0083	mg/kg	258	7440-43-9	
Chromium	86.6	0.50	0.010	mg/kg	258	7440-47-3	
Cobalt	15.0	0.50	0.0085	mg/kg	258	7440-48-4	
Copper	129	0.50	0.016	mg/kg	258	7440-50-8	
Lead	14.3	0.30	0.0057	mg/kg	258	7439-92-1	
Lithium	24.5	0.20	0.047	mg/kg	258	7439-93-2	
Molybdenum	37.9	0.50	0.012	mg/kg	258	7439-98-7	
Nickel	33.5	0.50	0.020	mg/kg	258	7440-02-0	



Analytical Laboratory Report

Final Report

Lab Sample ID: S44784.05 (continued)

Sample Tag: Clearwater Pond B L301211-05

Method: SW6020A, Run Date: 01/30/23 11:57, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Selenium	14.1	0.40	0.11	mg/kg	258	7782-49-2	
Silver	Not detected	0.20	0.0042	mg/kg	258	7440-22-4	
Thallium	2.21	0.20	0.0049	mg/kg	258	7440-28-0	
Vanadium	115	0.50	0.0090	mg/kg	258	7440-62-2	
Zinc	99.5	0.50	0.049	mg/kg	258	7440-66-6	

Method: SW6020A, Run Date: 01/30/23 13:39, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium	51,600	2,275	93	mg/kg	25800	7440-70-2	
Magnesium	13,600	2,275	5.5	mg/kg	25800	7439-95-4	

Method: SW6020A, Run Date: 01/30/23 14:07, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Potassium	624	25	0.62	mg/kg	258	7440-09-7	
Sodium	568	25	0.28	mg/kg	258	7440-23-5	

Method: SW7471B, Run Date: 01/27/23 16:09, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	0.050	0.050	0.0023	mg/kg	118	7439-97-6	

Other / Misc.

Method: , Run Date: 02/28/23 05:08, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S44784.06

Sample Tag: Clearwater Pond C L301211-06

Collected Date/Time: 01/20/2023 11:30

Matrix: Soil

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	Plastic Bag	None	No	RT	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Metal Digestion	Completed	SW3050B	01/30/23 10:05	JRH	
Mercury Digestion	Completed	SW7471B	01/27/23 13:18	CTV	

Inorganics

Method: E300.0, Run Date: 01/30/23 11:15, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride*	150	75	1.0	mg/kg	75	16887-00-6	
Fluoride (Undistilled)*	Not detected	15	1.2	mg/kg	75	16984-48-8	
Sulfate*	630	75	7.8	mg/kg	75	14808-79-8	

Method: SM2540B, Run Date: 01/27/23 15:23, Analyst: MAM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Solids*	42	1	1	%	1		

Method: SW7196A, Run Date: 01/30/23 14:40, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium VI	Not detected	2	1.2	mg/kg	200	18540-29-9	

Metals

Method: SW6020A, Run Date: 01/30/23 14:40, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium III	83	2.0	1.2	mg/kg	200	16065-83-1	

Method: SW6020A, Run Date: 01/30/23 12:01, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Barium	1,070	2.3	0.53	mg/kg	22100	7440-39-3	
Iron	11,500	23	4.7	mg/kg	22100	7439-89-6	

Method: SW6020A, Run Date: 01/30/23 12:03, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony	1.29	0.50	0.039	mg/kg	221	7440-36-0	
Arsenic	66.1	0.20	0.0073	mg/kg	221	7440-38-2	
Beryllium	6.97	0.20	0.011	mg/kg	221	7440-41-7	
Boron	44.6	2.0	0.20	mg/kg	221	7440-42-8	
Cadmium	1.32	0.20	0.0071	mg/kg	221	7440-43-9	
Chromium	83.0	0.50	0.0089	mg/kg	221	7440-47-3	
Cobalt	22.4	0.50	0.0073	mg/kg	221	7440-48-4	
Copper	172	0.50	0.014	mg/kg	221	7440-50-8	
Lead	17.4	0.30	0.0049	mg/kg	221	7439-92-1	
Lithium	13.0	0.20	0.040	mg/kg	221	7439-93-2	
Molybdenum	16.1	0.50	0.011	mg/kg	221	7439-98-7	
Nickel	46.8	0.50	0.017	mg/kg	221	7440-02-0	



Analytical Laboratory Report

Final Report

Lab Sample ID: S44784.06 (continued)
Sample Tag: Clearwater Pond C L301211-06

Method: SW6020A, Run Date: 01/30/23 12:03, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Selenium	14.4	0.40	0.093	mg/kg	221	7782-49-2	
Silver	Not detected	0.20	0.0036	mg/kg	221	7440-22-4	
Thallium	1.89	0.20	0.0042	mg/kg	221	7440-28-0	
Vanadium	156	0.50	0.0077	mg/kg	221	7440-62-2	
Zinc	94.3	0.50	0.042	mg/kg	221	7440-66-6	

Method: SW6020A, Run Date: 01/30/23 13:40, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium	56,700	2,275	80	mg/kg	22100	7440-70-2	
Magnesium	8,040	2,275	4.7	mg/kg	22100	7439-95-4	

Method: SW6020A, Run Date: 01/30/23 14:08, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Potassium	757	25	0.53	mg/kg	221	7440-09-7	
Sodium	936	25	0.24	mg/kg	221	7440-23-5	

Method: SW7471B, Run Date: 01/27/23 16:12, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	0.083	0.050	0.0021	mg/kg	108	7439-97-6	

Other / Misc.

Method: , Run Date: 02/28/23 05:20, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID:S44784

Client:BWL01 (Board of Water & Light)

Project: Erickson Closure Ash Charaterization

Submitted:01/26/2023 15:45 Login User: MMC

Attention: Jennifer Caporale

Address: Board of Water & Light

P.O. Box 13007

Lansing, MI 48901

Phone: 517-702-6372

FAX:

Email: Environmental_Laboratory@LBWL.com

Selection	Description	Note
Sample Receiving		
01.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # RT
02.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
Chain of Custody		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to: GEL
Preservation		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab?
Bottle Conditions		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Do water VOC or TOX bottles contain headspace

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____



2680 East Lansing Dr., East Lansing, MI 48823
 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

REPORT TO		CHAIN OF CUSTODY RECORD				INVOICE TO
CONTACT NAME Jennifer Caporale		CONTACT NAME Beth Zimpfer		<input checked="" type="checkbox"/> SAME		
COMPANY Lansing Board of Water & Light		COMPANY				
ADDRESS PO Box 13007		ADDRESS				
CITY Lansing	STATE MI	ZIP CODE 48901		CITY	STATE	ZIP CODE
PHONE NO. 517-702-6372	FAX NO.	P.O. NO.		PHONE NO.	E-MAIL ADDRESS Beth.Zimpfer@lbwl.com	
E-MAIL ADDRESS Environmental_Laboratory@lbwl.com		QUOTE NO.				

PROJECT NO./NAME L301211 Erickson Closure Ash Charaterization		SAMPLER(S) - PLEASE PRINT/SIGN NAME HDR		ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)																
TURNAROUND TIME REQUIRED <input checked="" type="checkbox"/> 1 DAY <input type="checkbox"/> 2 DAYS <input type="checkbox"/> 3 DAYS <input type="checkbox"/> STANDARD <input checked="" type="checkbox"/> OTHER ASAP		DELIVERABLES REQUIRED <input type="checkbox"/> STD <input type="checkbox"/> LEVEL II <input checked="" type="checkbox"/> LEVEL III <input type="checkbox"/> LEVEL IV <input checked="" type="checkbox"/> EDD <input type="checkbox"/> OTHER								Certifications <input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water <input type="checkbox"/> DoD <input checked="" type="checkbox"/> NPDES Project Locations <input type="checkbox"/> Detroit <input type="checkbox"/> New York <input type="checkbox"/> Other _____ Special Instructions										
MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE		# Containers & Preservatives		Chloride, Fluoride, Sulfate	Total Solids	Chromium VI & III	Mercury	Metals (see attached list)	Radium 226 & 228											
MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	OTHER	Chloride, Fluoride, Sulfate	Total Solids	Chromium VI & III	Mercury	Metals (see attached list)	Radium 226 & 228		
	DATE	TIME																		
44784.01	01/20/23	1100	Retention Basin A L301211-01	S		1							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
.02			Retention Basin B -02	S									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
.03			Retention Basin C -03	S									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
.04		1130	Clearwater Pond A -04	S									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
.05			Clearwater Pond B -05	S									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
.06			Clearwater Pond C -06	S									<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		

See Quote ID 221221-01

RELINQUISHED BY: SIGNATURE/ORGANIZATION	<input type="checkbox"/> Sampler	DATE	TIME	RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
		1/26/23	1545			
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME	RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME
		1/26/23	1545			
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME	SEAL NO.	SEAL INTACT	INITIALS
					YES <input type="checkbox"/>	NO <input type="checkbox"/>
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME	SEAL NO.	SEAL INTACT	INITIALS
					YES <input type="checkbox"/>	NO <input type="checkbox"/>
				NOTES:	TEMP. ON ARRIVAL RT	

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Erickson Closure Ash Characterization:

Method	Analyte
E300.0	Chloride Fluoride Sulfate
Gamma method - DOE HASL 300, 4.5.2.3/Ga-01-R	Radium 226
Gamma method - DOE HASL 300, 4.5.2.3/Ga-01-R	Radium 228
SM2540B	Total Solids
SW7196A	Chromium VI
SW7471B	Mercury
SW6020A	Antimony Arsenic Barium Beryllium Boron Cadmium Calcium Chromium III Cobalt Copper Iron Lead Lithium Magnesium Molybdenum Nickel Potassium Selenium Silver Sodium Thallium Vanadium Zinc



February 28, 2023

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 609724
SDG: S44784

Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on February 06, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 1614.

Sincerely,

Jordan Melton for
Delaney Stone
Project Manager

Purchase Order: GELP20-0018
Enclosures



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Case Narrative

**Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S44784
Work Order: 609724**

February 28, 2023

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on February 06, 2023 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

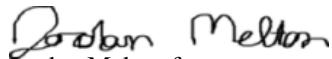
Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
609724001	S44784.01
609724002	S44784.02
609724003	S44784.03
609724004	S44784.04
609724005	S44784.05
609724006	S44784.06

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.

A handwritten signature in black ink that reads "Jordan Melton". The signature is written in a cursive style with a large initial 'J'.

Jordan Melton for
Delaney Stone
Project Manager

Chain of Custody and Supporting Documentation

009724

C.O.C. PAGE # 1 OF 1

2680 East Lansing Dr., East Lansing, MI 48823
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REPORT TO

CHAIN OF CUSTODY RECORD

INVOICE TO

CONTACT NAME: Project Management Team
 COMPANY: Merit Laboratories
 ADDRESS: 2680 East Lansing Drive
 CITY: East Lansing
 STATE: MI ZIP CODE: 48823
 PHONE NO.: 517-332-0167
 FAX NO.:
 E-MAIL ADDRESS: results@meritlabs.com

CONTACT NAME: Julie Teague
 COMPANY: Merit Laboratories
 ADDRESS: 2680 East Lansing Drive
 CITY: East Lansing
 STATE: MI ZIP CODE: 48823
 PHONE NO.: 517-332-0167
 E-MAIL ADDRESS: juliet@meritlabs.com

PROJECT NO./NAME: S44784
 SAMPLER(S) - PLEASE PRINT/SIGN NAME

TURNAROUND TIME REQUIRED: 1 DAY 2 DAYS 3 DAYS STANDARD OTHER
 DELIVERABLES REQUIRED: STD LEVEL II LEVEL III LEVEL IV EDD OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WPIPE A=AIR W=WASTE

MERIT LAB NO. FOR LAB USE ONLY	YEAR	DATE	TIME	IDENTIFICATION-DESCRIPTION	MATERIALS	# Containers & Preservatives								
						OTHER	WATER	SOIL	SOLID	LIQUID	OTHER			
		1/20/23	1100	S44784.01	S	1	1							
		1/20/23	1100	S44784.02	S	1	1							
		1/20/23	1100	S44784.03	S	1	1							
		1/20/23	1130	S44784.04	S	1	1							
		1/20/23	1130	S44784.05	S	1	1							
		1/20/23	1130	S44784.06	S	1	1							

ANALYSIS: (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications	Special Instructions
<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water	*Ra-226, Ra-228, and Pb-210
<input type="checkbox"/> DoD <input type="checkbox"/> NPDES	Method: DOE HASL
Project Locations	300 4.5.2.3/GA-01-R
<input type="checkbox"/> Detroit <input type="checkbox"/> New York	
<input type="checkbox"/> Other	
Notes: ** Subcontracted to	GEL Laboratories, Inc.
	2040 Savage Road
	Charleston, SC 29407

RELINQUISHED BY: [Signature] DATE: 1/20/23 TIME: 1700
 RECEIVED BY: [Signature] DATE: 1/20/23 TIME: 1700
 SEAL NO. [] SEAL INTACT YES [] NO []
 INITIALS [] INITIALS []

SAMPLE RECEIPT & REVIEW FORM

Client: MERI	SDG/AR/COC/Work Order: <u>609724</u>
Received By: Stacy Boone	Date Received: 02.06.23
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground <u>UPS</u> Field Services Courier Other 1Z 466 477 03 6390 3116

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
A) Shipped as a DOT Hazardous?		<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___
B) Did the client designate the samples are to be received as radioactive?		<input checked="" type="checkbox"/>	COC notation or radioactive stickers on containers equal client designation.
C) Did the RSO classify the samples as radioactive?		<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>9</u> CPM / mR/Hr Classified as: Rad 1 Rad 2 Rad 3
D) Did the client designate samples are hazardous?		<input checked="" type="checkbox"/>	COC notation or hazard labels on containers equal client designation.
E) Did the RSO identify possible hazards?		<input checked="" type="checkbox"/>	If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____

Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Client contacted and provided COC COC created upon receipt
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice Ice Packs Dry ice None Other: _____ *all temperatures are recorded in Celsius TEMP: <u>19°c</u>
4	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>IR3-22</u> Secondary Temperature Device Serial # (If Applicable): _____
5	Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____ If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer)
7	Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No) Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___ Sample ID's and containers affected: _____
8	Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected: _____
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and containers affected: _____
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No container count on COC Other (describe)
12	Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
13	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Not relinquished Other (describe)

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials JM Date 2/6/23 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 28 February 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122023-4
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2022-160
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-22-20
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S44784
Work Order #: 609724**

Product: Dry Weight

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 24

Preparation Batch: 2379496

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
609724001	S44784.01
609724002	S44784.02
609724003	S44784.03
609724004	S44784.04
609724005	S44784.05
609724006	S44784.06

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: GammaSpec, Gamma, Solid (Ra226/228, Pb-210)

Analytical Method: DOE HASL 300, 4.5.2.3/Ga-01-R

Analytical Procedure: GL-RAD-A-013 REV# 27

Analytical Batch: 2379916

Preparation Method: Dry Soil Prep

Preparation Procedure: GL-RAD-A-021 REV# 24

Preparation Batch: 2379496

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
609724001	S44784.01
609724002	S44784.02
609724003	S44784.03
609724004	S44784.04
609724005	S44784.05
609724006	S44784.06
1205313910	Method Blank (MB)

1205313911 609724001(S44784.01) Sample Duplicate (DUP)
1205313912 Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on a "dry weight" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Qualifier Information

Qualifier	Reason	Analyte	Sample	Client Sample
UI	Results are considered a false positive due to high counting uncertainty.	Radium-228	609724002	S44784.02

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

Moisture LogBook

Batch: 2379496

Analyst: MU1

Date/Time: 06-FEB-2023

Procedure Code: ___PREPD

Procedure Description: Dry Soil Prep GL-RAD-A-021

Lab Sop: GL-RAD-A-021

Sample St Sample Id Rpd(%)

Sample Id	Sample Type	Original Hsn	Balance	Run Time	Container Wt	Initial Wt	Final Wt (g)	Net Initial Wt (g)	Net Final Wt (g)	Moisture (%)
609724001	SAMPLE		SP- C234673837	18:01	13.2	381.41	186.66	368.21	173.46	52.891
609724002	SAMPLE		SP- C234673837	18:01	13.18	705.08	418.64	691.9	405.46	41.399
609724003	SAMPLE		SP- C234673837	18:01	13.11	466.89	121.32	453.78	108.21	76.153
609724004	SAMPLE		SP- C234673837	18:01	13.02	453.99	133.83	440.97	120.81	72.603
609724005	SAMPLE		SP- C234673837	18:01	13.07	503.99	174.33	490.92	161.26	67.151
609724006	SAMPLE		SP- C234673837	18:01	13.04	586.53	240.94	573.49	227.9	60.26

Comments:

A) Result = (Net Initial - Net Final) / Net Initial * 100

Note: Aliquot is used for the determination of the effective MDL and PQL in LIMS

Evaporative Loss LogBook

GEL Laboratories LLC

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Qualifier Definition Report for

MERI001 Merit Laboratories, Inc.

Client SDG: S44784 GEL Work Order: 609724

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- UI Gamma Spectroscopy--Uncertain identification

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: 

Name: Kenshalla Oston

Date: 06 MAR 2023

Title: Analyst I

Sample Data Summary

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: March 6, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S44784.01 Project: MERI00120
Sample ID: 609724001 Client ID: MERI001
Matrix: Solid
Collect Date: 20-JAN-23 11:00
Receive Date: 06-FEB-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis													
Gammaspec, Gamma, Solid (Ra226/228, Pb-210) "Dry Weight Corrected"													
Lead-210	U	0.161	+/-4.31	8.01		pCi/g		RXF2	02/28/23	0506	2379916		1
Radium-226		0.646	+/-0.174	0.138		pCi/g							
Radium-228		0.703	+/-0.251	0.184		pCi/g							

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MU1	02/06/23	1801	2379496

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	DOE HASL 300, 4.5.2.3/Ga-01-R	

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: March 6, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S44784.02 Project: MERI00120
Sample ID: 609724002 Client ID: MERI001
Matrix: Solid
Collect Date: 20-JAN-23 11:00
Receive Date: 06-FEB-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis													
Gammaspec, Gamma, Solid (Ra226/228, Pb-210) "Dry Weight Corrected"													
Lead-210	U	-1.18	+/-1.98	3.36		pCi/g		RXF2	02/28/23	0506	2379916		1
Radium-226		0.710	+/-0.130	0.0638		pCi/g							
Radium-228	UI	0.000	+/-0.262	0.210		pCi/g							

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MU1	02/06/23	1801	2379496

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	DOE HASL 300, 4.5.2.3/Ga-01-R	

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: March 6, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S44784.03 Project: MERI00120
Sample ID: 609724003 Client ID: MERI001
Matrix: Solid
Collect Date: 20-JAN-23 11:00
Receive Date: 06-FEB-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis													
Gammaspec, Gamma, Solid (Ra226/228, Pb-210) "Dry Weight Corrected"													
Lead-210		3.85	+/-1.21	0.701		pCi/g		RXF2	02/28/23	0507	2379916		1
Radium-226		0.650	+/-0.217	0.212		pCi/g							
Radium-228		0.564	+/-0.373	0.477		pCi/g							

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MU1	02/06/23	1801	2379496

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	DOE HASL 300, 4.5.2.3/Ga-01-R	

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: March 6, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID:	S44784.04	Project:	MERI00120
Sample ID:	609724004	Client ID:	MERI001
Matrix:	Solid		
Collect Date:	20-JAN-23 11:30		
Receive Date:	06-FEB-23		
Collector:	Client		

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis													
Gammaspec, Gamma, Solid (Ra226/228, Pb-210) "Dry Weight Corrected"													
Lead-210	U	-6.84	+/-25.9	41.1		pCi/g		RXF2	02/28/23	0508	2379916		1
Radium-226		5.48	+/-0.596	0.304		pCi/g							
Radium-228		3.35	+/-0.724	0.535		pCi/g							

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MU1	02/06/23	1801	2379496

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	DOE HASL 300, 4.5.2.3/Ga-01-R	

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: March 6, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S44784.05 Project: MERI00120
Sample ID: 609724005 Client ID: MERI001
Matrix: Solid
Collect Date: 20-JAN-23 11:30
Receive Date: 06-FEB-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis													
Gammaspec, Gamma, Solid (Ra226/228, Pb-210) "Dry Weight Corrected"													
Lead-210	U	5.22	+/-15.5	28.6		pCi/g		RXF2	02/28/23	0508	2379916		1
Radium-226		2.36	+/-0.285	0.204		pCi/g							
Radium-228		1.51	+/-0.575	0.490		pCi/g							

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MU1	02/06/23	1801	2379496

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	DOE HASL 300, 4.5.2.3/Ga-01-R	

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: March 6, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S44784.06 Project: MERI00120
Sample ID: 609724006 Client ID: MERI001
Matrix: Solid
Collect Date: 20-JAN-23 11:30
Receive Date: 06-FEB-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gamma Spec Analysis													
Gammaspec, Gamma, Solid (Ra226/228, Pb-210) "Dry Weight Corrected"													
Lead-210	U	12.5	+/-17.4	23.3		pCi/g		RXF2	02/28/23	0520	2379916		1
Radium-226		3.90	+/-0.462	0.279		pCi/g							
Radium-228		2.59	+/-0.603	0.529		pCi/g							

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
Dry Soil Prep	Dry Soil Prep GL-RAD-A-021	MU1	02/06/23	1801	2379496

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	DOE HASL 300, 4.5.2.3/Ga-01-R	

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

Quality Control Data

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: March 6, 2023

Page 1 of 2

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: John Laverty
Workorder: 609724

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gamma Spec											
Batch	2379916										
QC1205313911	609724001 DUP										
Lead-210	U	0.161	U	-4.69	pCi/g	N/A		N/A	RXF2	02/28/23	06:51
	Uncertainty	+/-4.31		+/-10.3							
Radium-226		0.646		0.562	pCi/g	13.9		(0% - 100%)			
	Uncertainty	+/-0.174		+/-0.186							
Radium-228		0.703	U	0.337	pCi/g	61.7		(0% - 100%)			
	Uncertainty	+/-0.251		+/-0.299							
QC1205313912	LCS										
Americium-241	484			542	pCi/g		112	(75%-125%)		02/28/23	06:58
	Uncertainty			+/-13.5							
Cesium-137	155			155	pCi/g		100	(75%-125%)			
	Uncertainty			+/-3.20							
Cobalt-60	69.6			68.1	pCi/g		97.9	(75%-125%)			
	Uncertainty			+/-2.52							
Lead-210				4560	pCi/g						
	Uncertainty			+/-355							
Radium-226			U	0.102	pCi/g						
	Uncertainty			+/-1.03							
Radium-228				4.42	pCi/g						
	Uncertainty			+/-4.40							
QC1205313910	MB										
Lead-210			U	2.44	pCi/g					02/28/23	05:21
	Uncertainty			+/-4.06							
Radium-226			U	-0.0250	pCi/g						
	Uncertainty			+/-0.0522							
Radium-228			U	-0.0464	pCi/g						
	Uncertainty			+/-0.105							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 609724

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
U		Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.									
J		Value is estimated									
X		Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
H		Analytical holding time was exceeded									
<		Result is less than value reported									
>		Result is greater than value reported									
UI		Gamma Spectroscopy--Uncertain identification									
BD		Results are either below the MDC or tracer recovery is low									
h		Preparation or preservation holding time was exceeded									
R		Sample results are rejected									
^		RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.									
N/A		RPD or %Recovery limits do not apply.									
ND		Analyte concentration is not detected above the detection limit									
M		M if above MDC and less than LLD									
NJ		Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier									
FA		Failed analysis.									
UJ		Gamma Spectroscopy--Uncertain identification									
Q		One or more quality control criteria have not been met. Refer to the applicable narrative or DER.									
K		Analyte present. Reported value may be biased high. Actual value is expected to be lower.									
UL		Not considered detected. The associated number is the reported concentration, which may be inaccurate due to a low bias.									
L		Analyte present. Reported value may be biased low. Actual value is expected to be higher.									
NI		See case narrative									
Y		Other specific qualifiers were required to properly define the results. Consult case narrative.									
**		Analyte is a Tracer compound									
M		REMP Result > MDC/CL and < RDL									
J		See case narrative for an explanation									

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gamma Spectroscopy Raw Data

Batch 2379916 Check-list

This check-list was completed on 28-FEB-23 by Tim Winters

This batch was reviewed by Spencer Collins on 28-FEB-23 and Tim Winters on 28-FEB-23.

Batch ID: 2379916

Product: GSCGAMMS

Description: Gamma Spec Solid RAD A-013

#	Criteria	Yes	No	Comments
Preparation Information				
1	Did any sample(s) require dilution?		No	
2	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
3	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
4	Are instrument source checks within limits?	Yes		
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were any additional radionuclides added that were not requested by the client?		No	
7	Were all the samples prepared/analyzed within the required holding time period?	Yes		
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Gamma Spectroscopy

Batch ID: 2379916
Analyst: Rebekah Futch (RXF2)
Method: DOE HASL 300, 4.5.2.3/Ga-01-R
Lab SOP: GL-RAD-A-013 REV# 27
Instrument: No instrument-manual method

Due Dates for Lab: 04-MAR-2023			Package: 05-MAR-2023	SDG: 06-MAR-2023		
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
LCS	1205313912	84680-278	1556	1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/g)	Dry or Wet	Unadjusted Aliquot (g)	Aliquot (g)	Adjusted Aliquot (g)
1	609724001	08-FEB-2023	.1	Dry to Dry	96.81	96.81	96.81
2	609724002	08-FEB-2023	.1	Dry to Dry	137.48	137.48	137.48
3	609724003	08-FEB-2023	.1	Dry to Dry	64.87	64.87	64.87
4	609724004	08-FEB-2023	.1	Dry to Dry	64.74	64.74	64.74
5	609724005	08-FEB-2023	.1	Dry to Dry	74.06	74.06	74.06
6	609724006	08-FEB-2023	.1	Dry to Dry	72.05	72.05	72.05
7	1205313910 MB	08-FEB-2023	.1	Dry to Wet	137.48	137.48	137.48
8	1205313911 DUP (609724001)	08-FEB-2023	.1	Dry to Dry	96.81	96.81	96.81
9	1205313912 LCS	08-FEB-2023	.1	Dry to Wet	115	115	115

Reagent/Solvent Lot ID	Description	Amount	Comments:
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VAX/VMS Nuclide Identification Report Generated 28-FEB-2023 06:06:48.22

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                          *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724001.CNF;1
Background file  : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM28.CNF;603
Background date  : 26-FEB-2023 09:14:06
Sample date     : 20-JAN-2023 11:00:00 Acquisition date : 28-FEB-2023 05:06:13
Sample ID      : G609724001 Sample quantity   : 9.68100E+01 GRAM
Detector name   : GAM28 Detector geometry: CAN
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:00.37 0.0%
Energy tolerance : 1.50000 keV Analyst Initials : RXF2
Abundance limit  : 75.00000 Sensitivity    : 3.00000
Batch ID        : 2379916 Detector SN#    :
Matrix Spike ID : LCS ID :
*****

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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	63.39*	11	58	0.60	127.21	124	6	3.10E-03	122.4	
2	2	74.59	74	59	1.19	149.60	144	18	2.05E-02	21.7	7.90E-01
3	2	77.09	77	63	1.20	154.58	144	18	2.15E-02	20.9	
4	0	83.83*	32	110	1.61	168.07	161	11	8.81E-03	67.2	
5	0	87.41	61	55	1.69	175.21	172	7	1.69E-02	24.4	
6	0	91.83*	44	100	0.96	184.05	179	11	1.22E-02	51.2	
7	0	147.64	15	54	1.14	295.60	292	6	4.17E-03	81.6	
8	0	185.72*	19	82	1.31	371.73	368	9	5.36E-03	94.6	
9	0	210.02*	18	68	1.76	420.30	414	10	4.93E-03	91.6	
10	0	225.40	35	53	1.89	451.05	445	13	9.73E-03	45.8	
11	0	232.32	13	29	1.25	464.88	462	6	3.50E-03	73.0	
12	0	238.49*	123	97	1.14	477.22	472	9	3.43E-02	17.3	
13	0	241.51*	33	50	1.56	483.25	481	7	9.16E-03	42.0	
14	0	262.49	17	29	1.42	525.19	523	7	4.83E-03	55.1	
15	2	270.69	27	42	1.51	541.58	537	22	7.52E-03	44.8	2.61E+00
16	2	273.66	15	38	1.51	547.52	537	22	4.19E-03	79.3	
17	2	277.41	27	34	1.52	555.03	537	22	7.48E-03	43.5	
18	0	295.53*	81	44	1.15	591.25	586	10	2.26E-02	18.3	
19	0	338.30*	43	38	2.58	676.75	672	12	1.20E-02	33.7	
20	0	351.83*	120	36	1.06	703.79	698	12	3.35E-02	13.7	
21	0	441.42	24	13	3.73	882.91	877	13	6.59E-03	37.5	
22	0	463.85	27	17	1.67	927.75	921	12	7.51E-03	36.6	
23	0	499.42	17	22	4.10	998.86	989	16	4.81E-03	67.1	
24	0	511.11*	34	23	3.06	1022.22	1015	18	9.45E-03	49.1	
25	0	550.35	16	13	2.25	1100.67	1091	13	4.45E-03	52.6	
26	0	562.13	16	18	2.86	1124.23	1118	15	4.46E-03	63.6	
27	0	583.32*	43	31	1.39	1166.59	1161	14	1.18E-02	33.6	
28	0	598.71	35	9	2.89	1197.36	1188	17	9.58E-03	25.8	
29	0	609.13*	85	27	1.11	1218.19	1213	11	2.36E-02	16.6	
30	0	637.85	19	2	0.56	1275.62	1271	11	5.22E-03	28.4	
31	0	643.66	17	6	2.33	1287.24	1282	11	4.81E-03	35.7	
32	0	859.80	20	6	1.28	1719.41	1714	11	5.42E-03	32.5	
33	0	911.07*	46	4	1.77	1821.93	1814	14	1.27E-02	18.2	
34	0	937.54	8	4	1.39	1874.87	1872	7	2.08E-03	55.2	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
35	0	963.13	12	4	1.56	1926.04	1921	9	3.30E-03	43.0	
36	0	969.06	20	7	3.44	1937.90	1931	14	5.56E-03	35.9	
37	0	982.07	11	3	0.76	1963.91	1957	12	3.15E-03	42.2	
38	0	1052.58	8	5	0.78	2104.91	2102	7	2.30E-03	57.0	
39	0	1057.05	7	0	1.35	2113.86	2111	6	1.94E-03	37.8	
40	0	1227.64	13	12	6.21	2455.00	2446	16	3.66E-03	64.9	
41	0	1276.69	10	0	0.73	2553.10	2550	7	2.78E-03	31.6	
42	0	1407.69	9	0	1.46	2815.11	2809	10	2.50E-03	33.3	
43	0	1460.26*	188	0	1.78	2920.26	2914	13	5.23E-02	7.4	
44	0	1763.58*	12	3	0.78	3526.97	3520	13	3.46E-03	43.4	

Flag: "*" = Peak area was modified by background subtraction

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724001.CNF;1
Analyses by : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4
Sample title : RXF2
Sample date : 20-JAN-2023 11:00:00 Acquisition date : 28-FEB-2023 05:06:13
Sample ID : G609724001 Sample quantity : 96.810 GRAM
Sample type : SOLID Sample geometry :
Detector name : GAMMA28 Detector geometry: CAN
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:00.37 0.0%
Energy tolerance : 1.50 keV Half life ratio : 10.00
Errors propagated: No Systematic Error : 0.00 %
Efficiency type : Empirical Efficiencies at : Peak Energy
Abundance limit : 75.00

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	175	10.66*	1.214E+00	1.051E+01	1.051E+01	14.90
CD-109	88.03	58	3.70*	5.762E+00	2.120E+00	2.247E+00	48.85
SN-126	64.28	11	9.60	3.029E+00	2.865E-01	2.865E-01	244.81
	86.94	58	8.90	5.762E+00	8.812E-01	8.812E-01	48.85
	87.57	58	37.00*	5.762E+00	2.120E-01	2.120E-01	48.85
TL-208	277.37	26	6.60	4.535E+00	6.617E-01	6.617E-01	86.92
	583.19	40	85.00*	2.653E+00	1.378E-01	1.378E-01	67.11
	860.56	18	12.50	1.921E+00	5.901E-01	5.901E-01	64.97
BI-211	72.87	-----	1.23	4.331E+00	-----	Line Not Found	-----
	351.06	114	12.92*	3.845E+00	1.779E+00	1.779E+00	27.49
PB-212	74.82	71	10.28	4.541E+00	1.179E+00	1.179E+00	43.43
	77.11	74	17.10	4.825E+00	6.988E-01	6.988E-01	41.76
	238.63	117	43.60*	5.023E+00	4.147E-01	4.147E-01	34.61
	300.09	-----	3.30	4.296E+00	-----	Line Not Found	-----
BI-213	440.45	22	25.94*	3.271E+00	2.045E-01	2.045E-01	75.07
BI-214	609.32	80	45.49*	2.565E+00	5.306E-01	5.306E-01	33.23
	1120.29	-----	14.92	1.517E+00	-----	Line Not Found	-----
	1764.49	12	15.30	1.074E+00	5.473E-01	5.473E-01	86.81
PB-214	74.82	71	5.80	4.541E+00	2.089E+00	2.090E+00	43.43
	77.11	74	9.70	4.825E+00	1.232E+00	1.232E+00	41.76
	87.09	58	3.41	5.762E+00	2.300E+00	2.300E+00	48.85
	242.00	31	7.25	4.981E+00	6.727E-01	6.727E-01	84.08
	295.22	77	18.42	4.342E+00	7.476E-01	7.476E-01	36.51
RN-222	351.93	114	35.60*	3.845E+00	6.456E-01	6.456E-01	27.49
	609.32	80	45.49*	2.565E+00	5.306E-01	5.306E-01	33.23
	1120.29	-----	14.92	1.517E+00	-----	Line Not Found	-----
	1764.49	12	15.30	1.074E+00	5.473E-01	5.473E-01	86.81
RA-224	240.99	31	4.10*	4.981E+00	1.189E+00	1.189E+00	84.08
RA-226	74.82	71	5.80	4.541E+00	2.089E+00	2.090E+00	43.43
	77.11	74	9.70	4.825E+00	1.232E+00	1.232E+00	41.76
	87.09	58	3.41	5.762E+00	2.300E+00	2.300E+00	48.85
	242.00	31	7.25	4.981E+00	6.727E-01	6.727E-01	84.08
	295.22	77	18.42	4.342E+00	7.476E-01	7.476E-01	36.51
AC-228	351.93	114	35.60*	3.845E+00	6.456E-01	6.456E-01	27.49
	105.21	-----	1.10	6.589E+00	-----	Line Not Found	-----
	338.32	41	11.27	3.952E+00	7.116E-01	7.116E-01	67.49
	835.71	-----	1.61	1.970E+00	-----	Line Not Found	-----
	911.20	43	25.80*	1.826E+00	7.029E-01	7.029E-01	36.46
	968.97	19	15.80	1.728E+00	5.319E-01	5.319E-01	71.76
RA-228	105.21	-----	1.10	6.589E+00	-----	Line Not Found	-----
	338.32	41	11.27	3.952E+00	7.116E-01	7.116E-01	67.49
	835.71	-----	1.61	1.970E+00	-----	Line Not Found	-----
	911.20	43	25.80*	1.826E+00	7.029E-01	7.029E-01	36.46
	968.97	19	15.80	1.728E+00	5.319E-01	5.319E-01	71.76
TH-228	74.82	71	10.28	4.541E+00	1.179E+00	1.179E+00	43.43
	77.11	74	17.10	4.825E+00	6.988E-01	6.988E-01	41.76
	238.63	117	43.60*	5.023E+00	4.147E-01	4.147E-01	34.61
	300.09	-----	3.30	4.296E+00	-----	Line Not Found	-----
TH-230	74.82	71	5.80	4.541E+00	2.089E+00	2.089E+00	43.43

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
	77.11	74	9.70	4.825E+00	1.232E+00	1.232E+00	41.76
	87.09	58	3.41	5.762E+00	2.300E+00	2.300E+00	48.85
	242.00	31	7.25	4.981E+00	6.727E-01	6.727E-01	84.08
	295.22	77	18.42	4.342E+00	7.476E-01	7.476E-01	36.51
	351.93	114	35.60*	3.845E+00	6.456E-01	6.456E-01	27.49
TH-232	105.21	-----	1.10	6.589E+00	-----	Line Not Found	-----
	338.32	41	11.27	3.952E+00	7.116E-01	7.116E-01	67.49
	835.71	-----	1.61	1.970E+00	-----	Line Not Found	-----
	911.20	43	25.80*	1.826E+00	7.029E-01	7.029E-01	36.46
	968.97	19	15.80	1.728E+00	5.319E-01	5.319E-01	71.76
TH-234	63.29	11	3.70*	3.029E+00	7.432E-01	7.432E-01	244.81
	92.59	42	4.23	6.051E+00	1.272E+00	1.272E+00	102.33
U-234	74.82	71	5.80	4.541E+00	2.089E+00	2.089E+00	43.43
	77.11	74	9.70	4.825E+00	1.232E+00	1.232E+00	41.76
	87.09	58	3.41	5.762E+00	2.300E+00	2.300E+00	48.85
	242.00	31	7.25	4.981E+00	6.727E-01	6.727E-01	84.08
	295.22	77	18.42	4.342E+00	7.476E-01	7.476E-01	36.51
	351.93	114	35.60*	3.845E+00	6.456E-01	6.456E-01	27.49
U-238	63.29	11	3.70*	3.029E+00	7.432E-01	7.432E-01	244.81
	92.59	42	4.23	6.051E+00	1.272E+00	1.272E+00	102.33
AM-243	43.53	-----	5.90	4.782E-01	-----	Line Not Found	-----
	74.66	71	67.20*	4.541E+00	1.803E-01	1.803E-01	43.43
ANH-511	511.00	32	100.00*	2.936E+00	8.464E-02	8.464E-02	98.11

Flag: "*" = Keyline

```

*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                          *
*****
*                               DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724001.CNF;1
* Acquisition date   : 28-FEB-2023 05:06:13 Sensitivity      : 3.000
* Detector ID       : GAM28 Energy tolerance: 1.500
* Elapsed live time : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time : 0 01:00:00.37 Half life ratio : *****
* Sample date       : 20-JAN-2023 11:00:00 Analyst initials: RXF2
* Sample ID         : G609724001 Sample Quantity : 9.6810E+01 GRAM
* Batch Number      : 2379916 Wet Weight : 0.00000
* Wet wt corr       : 1.00000 Dry Weight : 0.00000
* Nuclide Library   : SOLID.NLB;17
*****
*                               CALIBRATION INFORMATION                          *
*
* Eff. Cal. date    : 2-JUN-2022 10:12:36 Eff. Geometry   : CAN
* Eff. File         : DKA100:[CANBERRA.GAMMA]EFF_GAM28_CAN.CNF;16
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
K-40	1.051E+01	1.534E+00	7.096E-01
CD-109	2.247E+00	1.076E+00	1.168E+00
SN-126	2.120E-01	1.015E-01	1.107E-01
TL-208	1.378E-01	9.064E-02	7.069E-02
BI-211	1.779E+00	4.792E-01	3.793E-01
PB-212	4.147E-01	1.407E-01	1.195E-01
BI-213	2.045E-01	1.505E-01	1.530E-01
BI-214	5.306E-01	1.728E-01	1.753E-01
PB-214	6.456E-01	1.739E-01	1.380E-01
RN-222	5.306E-01	1.728E-01	1.753E-01
RA-224	1.189E+00	9.800E-01	1.351E+00
RA-226	6.456E-01	1.739E-01	1.380E-01
AC-228	7.029E-01	2.512E-01	1.844E-01
RA-228	7.029E-01	2.512E-01	1.844E-01
TH-228	4.147E-01	1.407E-01	1.195E-01
TH-230	6.456E-01	1.739E-01	1.379E-01
TH-232	7.029E-01	2.512E-01	1.844E-01
TH-234	7.432E-01	1.783E+00	2.458E+00
U-234	6.456E-01	1.739E-01	1.379E-01
U-238	7.432E-01	1.783E+00	2.458E+00
AM-243	1.803E-01	7.676E-02	8.392E-02
ANH-511	8.464E-02	8.139E-02	4.498E-02

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L.	Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)	
BE-7	-1.323E-01		3.720E-01	6.882E-01	NOT IDENT.
NA-22	-2.980E-02		4.313E-02	5.876E-02	NOT IDENT.
NA-24	0.000E+00		1.675E+17	0.000E+00	SHORT HLIF
AL-26	-1.156E-02		3.204E-02	6.237E-02	NOT IDENT.
SC-46	-9.557E-04		5.207E-02	9.889E-02	NOT IDENT.
V-48	2.599E-01		2.151E-01	4.254E-01	FAIL ABUN
CR-51	8.130E-01		5.866E-01	1.329E+00	NOT IDENT.
MN-52	-7.308E-01		3.346E+00	7.096E+00	NOT IDENT.

MN-54	3.653E-03	3.488E-02	6.950E-02	NOT IDENT.
CO-56	-2.397E-02	5.145E-02	8.870E-02	NOT IDENT.
MN-56	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
CO-57	-4.378E-04	2.384E-02	4.298E-02	NOT IDENT.
CO-58	5.634E-03	4.255E-02	8.668E-02	NOT IDENT.
FE-59	-3.208E-02	1.095E-01	2.156E-01	NOT IDENT.
CO-60	-2.214E-02	3.980E-02	7.165E-02	NOT IDENT.
ZN-65	-5.553E-02	1.199E-01	2.182E-01	NOT IDENT.
GE-68	1.016E+00	1.470E+00	3.286E+00	NOT IDENT.
AS-73	-1.386E-01	1.073E+00	1.970E+00	NOT IDENT.
AS-74	1.101E-02	2.230E-01	4.351E-01	NOT IDENT.
SE-75	-7.609E-03	6.211E-02	9.722E-02	NOT IDENT.
BR-77	0.000E+00	2.164E+04	0.000E+00	SHORT HLIF
SR-82	-1.233E-01	6.991E-01	1.285E+00	NOT IDENT.
RB-83	3.887E-02	8.400E-02	1.738E-01	NOT IDENT.
RB-84	4.957E-02	1.130E-01	2.384E-01	NOT IDENT.
KR-85	4.593E+00	6.217E+00	1.341E+01	NOT IDENT.
SR-85	3.094E-02	4.219E-02	9.095E-02	NOT IDENT.
RB-86	1.273E+00	2.148E+00	4.713E+00	NOT IDENT.
Y-88	-2.296E-02	3.834E-02	6.471E-02	NOT IDENT.
Y-91	-1.241E+01	2.600E+01	4.782E+01	NOT IDENT.
NB-94	-2.110E-02	3.422E-02	5.779E-02	NOT IDENT.
NB-95	-7.231E-03	5.996E-02	1.104E-01	NOT IDENT.
NB-95M	7.450E-02	2.180E-01	3.213E-01	NOT IDENT.
ZR-95	-1.785E-03	1.066E-01	2.005E-01	NOT IDENT.
NB-97	0.000E+00	1.412E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	2.070E+16	0.000E+00	SHORT HLIF
MO-99	0.000E+00	4.868E+03	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
RH-101	-6.632E-03	2.952E-02	5.163E-02	NOT IDENT.
RH-102	1.558E-02	6.054E-02	1.199E-01	NOT IDENT.
RU-103	7.277E-02	6.039E-02	1.358E-01	FAIL ABUN
RH-106	2.218E-01	3.139E-01	6.800E-01	NOT IDENT.
RU-106	2.218E-01	3.139E-01	6.800E-01	NOT IDENT.
AG-108M	6.243E-03	3.061E-02	6.039E-02	NOT IDENT.
AG-110	4.591E-01	6.694E-01	1.483E+00	NOT IDENT.
AG-110M	-5.928E-03	5.649E-02	1.057E-01	FAIL ABUN
SN-113	8.555E-03	5.128E-02	1.009E-01	NOT IDENT.
CD-115	0.000E+00	1.574E+04	0.000E+00	SHORT HLIF
SN-117M	-5.690E-02	1.781E-01	3.042E-01	NOT IDENT.
SB-122	0.000E+00	7.390E+02	0.000E+00	SHORT HLIF
TE-123M	-5.649E-03	3.235E-02	5.616E-02	NOT IDENT.
SB-124	-8.572E-04	6.544E-02	1.689E-01	NOT IDENT.
SB-125	1.910E-02	8.949E-02	1.783E-01	FAIL ABUN
TE-125M	4.542E+00	1.132E+01	2.140E+01	NOT IDENT.
I-126	-5.822E-01	6.582E-01	1.035E+00	NOT IDENT.
SB-126	-3.731E-01	5.713E-01	9.543E-01	NOT IDENT.
SB-127	0.000E+00	7.254E+01	0.000E+00	SHORT HLIF
I-131	-6.209E-01	8.568E-01	1.499E+00	FAIL ABUN
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	0.000E+00	1.269E+02	0.000E+00	SHORT HLIF
BA-133	2.098E-02	3.947E-02	7.630E-02	FAIL ABUN
I-133	0.000E+00	8.938E+11	0.000E+00	SHORT HLIF
CS-134	-1.709E-02	4.772E-02	8.401E-02	FAIL ABUN
I-135	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
CS-136	1.833E-01	4.018E-01	8.358E-01	FAIL ABUN
BA-137M	-5.979E-03	3.873E-02	7.162E-02	NOT IDENT.
CS-137	-6.316E-03	4.091E-02	7.566E-02	NOT IDENT.
LA-138	2.040E-02	3.805E-02	1.039E-01	NOT IDENT.
CE-139	4.616E-03	3.298E-02	5.928E-02	NOT IDENT.
BA-140	-1.746E-01	1.044E+00	1.944E+00	NOT IDENT.
LA-140	1.164E-01	2.312E-01	6.260E-01	NOT IDENT.
CE-141	-1.142E-01	1.205E-01	1.787E-01	NOT IDENT.
CE-143	0.000E+00	1.870E+07	0.000E+00	SHORT HLIF
CE-144	2.230E-03	1.937E-01	3.476E-01	NOT IDENT.
PM-144	-3.149E-02	4.206E-02	6.907E-02	NOT IDENT.
PR-144	-2.397E+00	3.185E+00	5.226E+00	NOT IDENT.
PM-146	-2.545E-03	3.815E-02	7.382E-02	NOT IDENT.
ND-147	1.867E+00	2.268E+00	5.014E+00	FAIL ABUN
PM-147	7.794E+00	6.581E+02	1.192E+03	NOT IDENT.
PM-149	0.000E+00	1.624E+05	0.000E+00	SHORT HLIF
EU-150	1.758E-02	2.837E-02	5.406E-02	FAIL ABUN
EU-152	3.122E-02	9.412E-02	1.828E-01	FAIL ABUN
GD-153	-2.655E-02	8.793E-02	1.556E-01	NOT IDENT.
EU-154	-9.179E-02	1.185E-01	1.516E-01	NOT IDENT.
EU-155	2.316E-02	9.539E-02	1.772E-01	FAIL ABUN
TB-160	6.822E-02	1.640E-01	3.451E-01	FAIL ABUN
HO-166M	-2.818E-02	6.862E-02	1.204E-01	FAIL ABUN

TM-171	1.255E+01	1.723E+01	3.497E+01	NOT IDENT.
HF-172	8.863E-02	1.736E-01	3.303E-01	FAIL ABUN
LU-172	6.187E-02	6.489E-02	1.540E-01	FAIL ABUN
LU-176	3.367E-03	2.370E-02	4.701E-02	FAIL ABUN
HF-181	1.523E-02	6.214E-02	1.249E-01	NOT IDENT.
TA-182	2.652E-02	2.021E-01	3.842E-01	NOT IDENT.
RE-183	-2.204E-01	2.484E-01	4.168E-01	NOT IDENT.
RE-184	-1.339E-01	1.862E-01	2.959E-01	NOT IDENT.
W-188	4.768E-02	1.006E+01	1.747E+01	FAIL ABUN
IR-192	-3.398E-03	3.905E-02	7.532E-02	FAIL ABUN
HG-203	-1.404E-02	5.752E-02	9.673E-02	NOT IDENT.
TL-204	-3.180E-01	4.765E+00	8.004E+00	FAIL ABUN
BI-207	1.349E-02	4.793E-02	1.047E-01	FAIL ABUN
BI-210	1.605E-01	4.313E+00	8.009E+00	NOT IDENT.
PB-210	1.605E-01	4.313E+00	8.009E+00	NOT IDENT.
PB-211	-2.600E-01	7.233E-01	1.324E+00	NOT IDENT.
BI-212	2.694E-01	5.248E-01	1.112E+00	NOT IDENT.
RN-219	2.271E-01	3.772E-01	7.899E-01	FAIL ABUN
RA-223	-4.288E-01	5.496E-01	9.620E-01	FAIL ABUN
AC-225	-3.647E-01	3.043E+00	5.264E+00	NOT IDENT.
AC-227	4.942E-02	2.417E-01	4.396E-01	NOT IDENT.
TH-227	4.942E-02	2.417E-01	4.396E-01	NOT IDENT.
TH-229	-8.343E-02	4.940E-01	8.552E-01	FAIL ABUN
PA-231	-1.353E-01	4.741E-01	8.834E-01	NOT IDENT.
TH-231	-4.288E-01	5.496E-01	9.620E-01	FAIL ABUN
PA-233	5.592E-02	6.335E-02	1.338E-01	NOT IDENT.
PA-234	-2.558E-02	3.518E-01	6.527E-01	NOT IDENT.
PA-234M	6.063E+00	5.812E+00	1.305E+01	NOT IDENT.
U-235	2.795E-02	2.184E-01	3.742E-01	FAIL ABUN
NP-237	5.592E-02	6.335E-02	1.338E-01	NOT IDENT.
NP-238	0.000E+00	5.305E+04	0.000E+00	SHORT HLIF
NP-239	2.990E-02	2.127E-01	3.951E-01	FAIL ABUN
PU-239	2.660E+02	2.997E+02	5.910E+02	NOT IDENT.
AM-241	-3.707E-02	1.590E-01	2.856E-01	NOT IDENT.
CM-243	-1.086E-02	9.161E-02	1.644E-01	FAIL ABUN
BK-247	7.069E-02	8.150E-02	1.529E-01	FAIL ABUN
CM-247	5.754E-04	3.483E-02	6.770E-02	FAIL ABUN
CF-249	-7.740E-04	3.752E-02	7.259E-02	NOT IDENT.
CF-251	-4.882E-04	1.270E-01	2.244E-01	NOT IDENT.

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	175	10.66*	1.214E+00	1.051E+01	1.051E+01	14.90
CD-109	88.03	58	3.70*	5.762E+00	2.120E+00	2.247E+00	48.85
SN-126	64.28	11	9.60	3.029E+00	2.865E-01	2.865E-01	244.81
	86.94	58	8.90	5.762E+00	8.812E-01	8.812E-01	48.85
	87.57	58	37.00*	5.762E+00	2.120E-01	2.120E-01	48.85
TL-208	277.37	26	6.60	4.535E+00	6.617E-01	6.617E-01	86.92
	583.19	40	85.00*	2.653E+00	1.378E-01	1.378E-01	67.11
	860.56	18	12.50	1.921E+00	5.901E-01	5.901E-01	64.97
BI-211	72.87	-----	1.23	4.331E+00	-----	Line Not Found	-----
	351.06	114	12.92*	3.845E+00	1.779E+00	1.779E+00	27.49
PB-212	74.82	71	10.28	4.541E+00	1.179E+00	1.179E+00	43.43
	77.11	74	17.10	4.825E+00	6.988E-01	6.988E-01	41.76
	238.63	117	43.60*	5.023E+00	4.147E-01	4.147E-01	34.61
	300.09	-----	3.30	4.296E+00	-----	Line Not Found	-----
BI-213	440.45	22	25.94*	3.271E+00	2.045E-01	2.045E-01	75.07
BI-214	609.32	80	45.49*	2.565E+00	5.306E-01	5.306E-01	33.23
	1120.29	-----	14.92	1.517E+00	-----	Line Not Found	-----
	1764.49	12	15.30	1.074E+00	5.473E-01	5.473E-01	86.81
PB-214	74.82	71	5.80	4.541E+00	2.089E+00	2.090E+00	43.43
	77.11	74	9.70	4.825E+00	1.232E+00	1.232E+00	41.76
	87.09	58	3.41	5.762E+00	2.300E+00	2.300E+00	48.85
	242.00	31	7.25	4.981E+00	6.727E-01	6.727E-01	84.08
	295.22	77	18.42	4.342E+00	7.476E-01	7.476E-01	36.51
	351.93	114	35.60*	3.845E+00	6.456E-01	6.456E-01	27.49
RN-222	609.32	80	45.49*	2.565E+00	5.306E-01	5.306E-01	33.23
	1120.29	-----	14.92	1.517E+00	-----	Line Not Found	-----
	1764.49	12	15.30	1.074E+00	5.473E-01	5.473E-01	86.81
RA-224	240.99	31	4.10*	4.981E+00	1.189E+00	1.189E+00	84.08
RA-226	74.82	71	5.80	4.541E+00	2.089E+00	2.090E+00	43.43
	77.11	74	9.70	4.825E+00	1.232E+00	1.232E+00	41.76
	87.09	58	3.41	5.762E+00	2.300E+00	2.300E+00	48.85
	242.00	31	7.25	4.981E+00	6.727E-01	6.727E-01	84.08
	295.22	77	18.42	4.342E+00	7.476E-01	7.476E-01	36.51
	351.93	114	35.60*	3.845E+00	6.456E-01	6.456E-01	27.49
AC-228	105.21	-----	1.10	6.589E+00	-----	Line Not Found	-----
	338.32	41	11.27	3.952E+00	7.116E-01	7.116E-01	67.49
	835.71	-----	1.61	1.970E+00	-----	Line Not Found	-----
	911.20	43	25.80*	1.826E+00	7.029E-01	7.029E-01	36.46
	968.97	19	15.80	1.728E+00	5.319E-01	5.319E-01	71.76
RA-228	105.21	-----	1.10	6.589E+00	-----	Line Not Found	-----
	338.32	41	11.27	3.952E+00	7.116E-01	7.116E-01	67.49
	835.71	-----	1.61	1.970E+00	-----	Line Not Found	-----
	911.20	43	25.80*	1.826E+00	7.029E-01	7.029E-01	36.46
	968.97	19	15.80	1.728E+00	5.319E-01	5.319E-01	71.76
TH-228	74.82	71	10.28	4.541E+00	1.179E+00	1.179E+00	43.43
	77.11	74	17.10	4.825E+00	6.988E-01	6.988E-01	41.76
	238.63	117	43.60*	5.023E+00	4.147E-01	4.147E-01	34.61

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
	300.09	-----	3.30	4.296E+00	-----	Line Not Found	-----
TH-230	74.82	71	5.80	4.541E+00	2.089E+00	2.089E+00	43.43
	77.11	74	9.70	4.825E+00	1.232E+00	1.232E+00	41.76
	87.09	58	3.41	5.762E+00	2.300E+00	2.300E+00	48.85
	242.00	31	7.25	4.981E+00	6.727E-01	6.727E-01	84.08
	295.22	77	18.42	4.342E+00	7.476E-01	7.476E-01	36.51
	351.93	114	35.60*	3.845E+00	6.456E-01	6.456E-01	27.49
TH-232	105.21	-----	1.10	6.589E+00	-----	Line Not Found	-----
	338.32	41	11.27	3.952E+00	7.116E-01	7.116E-01	67.49
	835.71	-----	1.61	1.970E+00	-----	Line Not Found	-----
	911.20	43	25.80*	1.826E+00	7.029E-01	7.029E-01	36.46
	968.97	19	15.80	1.728E+00	5.319E-01	5.319E-01	71.76
TH-234	63.29	11	3.70*	3.029E+00	7.432E-01	7.432E-01	244.81
	92.59	42	4.23	6.051E+00	1.272E+00	1.272E+00	102.33
U-234	74.82	71	5.80	4.541E+00	2.089E+00	2.089E+00	43.43
	77.11	74	9.70	4.825E+00	1.232E+00	1.232E+00	41.76
	87.09	58	3.41	5.762E+00	2.300E+00	2.300E+00	48.85
	242.00	31	7.25	4.981E+00	6.727E-01	6.727E-01	84.08
	295.22	77	18.42	4.342E+00	7.476E-01	7.476E-01	36.51
	351.93	114	35.60*	3.845E+00	6.456E-01	6.456E-01	27.49
U-238	63.29	11	3.70*	3.029E+00	7.432E-01	7.432E-01	244.81
	92.59	42	4.23	6.051E+00	1.272E+00	1.272E+00	102.33
AM-243	43.53	-----	5.90	4.782E-01	-----	Line Not Found	-----
	74.66	71	67.20*	4.541E+00	1.803E-01	1.803E-01	43.43
ANH-511	511.00	32	100.00*	2.936E+00	8.464E-02	8.464E-02	98.11

Flag: "*" = Keyline

Total number of lines in spectrum 44
 Number of unidentified lines 12
 Number of lines tentatively identified by NID 32 72.73%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.25E+09Y	1.00	1.051E+01	1.051E+01	0.157E+01	14.90	
CD-109	461.40D	1.06	2.120E+00	2.247E+00	1.098E+00	48.85	
SN-126	2.30E+05Y	1.00	2.120E-01	2.120E-01	1.035E-01	48.85	
TL-208	1.41E+10Y	1.00	1.378E-01	1.378E-01	0.925E-01	67.11	
BI-211	7.04E+08Y	1.00	1.779E+00	1.779E+00	0.489E+00	27.49	
PB-212	1.41E+10Y	1.00	4.147E-01	4.147E-01	1.435E-01	34.61	
BI-213	7340.00Y	1.00	2.045E-01	2.045E-01	1.536E-01	75.07	
BI-214	1600.00Y	1.00	5.306E-01	5.306E-01	1.763E-01	33.23	
PB-214	1600.00Y	1.00	6.456E-01	6.456E-01	1.775E-01	27.49	
RN-222	1600.00Y	1.00	5.306E-01	5.306E-01	1.763E-01	33.23	
RA-224	1.41E+10Y	1.00	1.189E+00	1.189E+00	1.000E+00	84.08	
RA-226	1600.00Y	1.00	6.456E-01	6.456E-01	1.775E-01	27.49	
AC-228	1.41E+10Y	1.00	7.029E-01	7.029E-01	2.563E-01	36.46	
RA-228	1.41E+10Y	1.00	7.029E-01	7.029E-01	2.563E-01	36.46	
TH-228	1.41E+10Y	1.00	4.147E-01	4.147E-01	1.435E-01	34.61	
TH-230	7.54E+04Y	1.00	6.456E-01	6.456E-01	1.775E-01	27.49	
TH-232	1.41E+10Y	1.00	7.029E-01	7.029E-01	2.563E-01	36.46	
TH-234	4.47E+09Y	1.00	7.432E-01	7.432E-01	18.20E-01	244.81	
U-234	2.45E+05Y	1.00	6.456E-01	6.456E-01	1.775E-01	27.49	
U-238	4.47E+09Y	1.00	7.432E-01	7.432E-01	18.20E-01	244.81	
AM-243	7370.00Y	1.00	1.803E-01	1.803E-01	0.783E-01	43.43	
ANH-511	1.00E+09Y	1.00	8.464E-02	8.464E-02	8.305E-02	98.11	
Total Activity :			2.448E+01	2.461E+01			

Grand Total Activity : 2.448E+01 2.461E+01

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	83.83	30	105	1.61	168.07	161	11	8.81E-03	****	5.48E+00	T
0	147.64	14	52	1.14	295.60	292	6	4.17E-03	****	6.53E+00	
0	185.72	18	78	1.31	371.73	368	9	5.36E-03	****	5.87E+00	T
0	210.02	17	64	1.76	420.30	414	10	4.93E-03	****	5.45E+00	T
0	225.40	33	50	1.89	451.05	445	13	9.73E-03	91.5	5.21E+00	
0	232.32	12	28	1.25	464.88	462	6	3.50E-03	****	5.11E+00	
0	262.49	16	27	1.42	525.19	523	7	4.83E-03	****	4.71E+00	
2	270.69	26	40	1.51	541.58	537	22	7.52E-03	89.5	4.61E+00	T
2	273.66	14	36	1.51	547.52	537	22	4.19E-03	****	4.58E+00	T
0	463.85	26	16	1.67	927.75	921	12	7.51E-03	73.2	3.15E+00	T
0	499.42	16	20	4.10	998.86	989	16	4.81E-03	****	2.99E+00	
0	550.35	15	12	2.25	1100.67	1091	13	4.45E-03	****	2.78E+00	
0	562.13	15	17	2.86	1124.23	1118	15	4.46E-03	****	2.73E+00	T
0	598.71	32	8	2.89	1197.36	1188	17	9.58E-03	51.6	2.60E+00	
0	637.85	18	2	0.56	1275.62	1271	11	5.22E-03	56.8	2.47E+00	T
0	643.66	16	5	2.33	1287.24	1282	11	4.81E-03	71.4	2.45E+00	
0	937.54	7	3	1.39	1874.87	1872	7	2.08E-03	****	1.78E+00	T
0	963.13	11	4	1.56	1926.04	1921	9	3.30E-03	86.1	1.74E+00	T
0	982.07	11	2	0.76	1963.91	1957	12	3.15E-03	84.5	1.71E+00	T
0	1052.58	8	4	0.78	2104.91	2102	7	2.30E-03	****	1.60E+00	
0	1057.05	7	0	1.35	2113.86	2111	6	1.94E-03	75.6	1.60E+00	
0	1227.64	12	11	6.21	2455.00	2446	16	3.66E-03	****	1.40E+00	
0	1276.69	9	0	0.73	2553.10	2550	7	2.78E-03	63.2	1.35E+00	
0	1407.69	8	0	1.46	2815.11	2809	10	2.50E-03	66.7	1.25E+00	T

Flags: "T" = Tentatively associated

```

*****
*
*               GEL Laboratories LLC
*               2040 Savage Road
*               Charleston, SC 29407
*
*****
*
*               DETECTOR AND SAMPLE DATA
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724001.CNF;1
* Acquisition date   : 28-FEB-2023 05:06:13 Sensitivity      : 3.000
* Detector ID       : GAM28 Energy tolerance: 1.500
* Elapsed live time : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time : 0 01:00:00.37 Half life ratio  : *****
* Sample date       : 20-JAN-2023 11:00:00 Nuclide Library : SOLID
* Sample ID         : G609724001 Analyst initials: RXF2
* Batch Number      : 2379916 Sample Quantity : 9.6810E+01 GRAM
* Wet wt corr       : 1.00000 Wet Weight      : 0.00000
*                   Dry Weight      : 0.00000
*****
*
*               CALIBRATION INFORMATION
*
* Eff. Cal. date    : 2-JUN-2022 10:12:36 Eff. Geometry   : CAN
* Eff. File         : DKA100:[CANBERRA.GAMMA]EFF_GAM28_CAN.CNF;16
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)
K-40	2.746E-01
CD-109	5.327E-01
SN-126	5.052E-02
TL-208	3.075E-02
BI-211	1.688E-01
PB-212	5.500E-02
BI-213	6.426E-02
BI-214	7.875E-02
PB-214	6.140E-02
RN-222	7.875E-02
RA-224	6.251E-01
RA-226	6.140E-02
AC-228	7.013E-02
RA-228	7.013E-02
TH-228	5.500E-02
TH-230	6.139E-02
TH-232	7.013E-02
TH-234	1.136E+00
U-234	6.139E-02
U-238	1.136E+00
AM-243	3.857E-02
ANH-511	1.895E-02

---- Non-Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)	
BE-7	2.907E-01	NOT IDENT.
NA-22	2.149E-02	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	2.137E-02	NOT IDENT.
SC-46	4.178E-02	NOT IDENT.
V-48	1.799E-01	FAIL ABUN
CR-51	5.974E-01	NOT IDENT.
MN-52	2.514E+00	NOT IDENT.
MN-54	2.901E-02	NOT IDENT.

CO-56	3.679E-02	NOT IDENT.
MN-56	0.000E+00	SHORT HLIF
CO-57	1.952E-02	NOT IDENT.
CO-58	3.580E-02	NOT IDENT.
FE-59	8.598E-02	NOT IDENT.
CO-60	2.776E-02	NOT IDENT.
ZN-65	9.408E-02	NOT IDENT.
GE-68	1.416E+00	NOT IDENT.
AS-73	8.956E-01	NOT IDENT.
AS-74	1.870E-01	NOT IDENT.
SE-75	4.391E-02	NOT IDENT.
BR-77	0.000E+00	SHORT HLIF
SR-82	5.478E-01	NOT IDENT.
RB-83	7.604E-02	NOT IDENT.
RB-84	1.010E-01	NOT IDENT.
KR-85	5.880E+00	NOT IDENT.
SR-85	3.988E-02	NOT IDENT.
RB-86	2.033E+00	NOT IDENT.
Y-88	1.956E-02	NOT IDENT.
Y-91	1.947E+01	NOT IDENT.
NB-94	2.434E-02	NOT IDENT.
NB-95	4.774E-02	NOT IDENT.
NB-95M	1.481E-01	NOT IDENT.
ZR-95	8.671E-02	NOT IDENT.
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	SHORT HLIF
RH-101	2.351E-02	NOT IDENT.
RH-102	5.237E-02	NOT IDENT.
RU-103	6.037E-02	FAIL ABUN
RH-106	2.955E-01	NOT IDENT.
RU-106	2.955E-01	NOT IDENT.
AG-108M	2.673E-02	NOT IDENT.
AG-110	6.352E-01	NOT IDENT.
AG-110M	4.436E-02	FAIL ABUN
SN-113	4.477E-02	NOT IDENT.
CD-115	0.000E+00	SHORT HLIF
SN-117M	1.385E-01	NOT IDENT.
SB-122	0.000E+00	SHORT HLIF
TE-123M	2.564E-02	NOT IDENT.
SB-124	5.339E-02	NOT IDENT.
SB-125	7.844E-02	FAIL ABUN
TE-125M	9.782E+00	NOT IDENT.
I-126	4.115E-01	NOT IDENT.
SB-126	4.011E-01	NOT IDENT.
SB-127	0.000E+00	SHORT HLIF
I-131	6.529E-01	FAIL ABUN
I-132	0.000E+00	SHORT HLIF
TE-132	0.000E+00	SHORT HLIF
BA-133	3.373E-02	FAIL ABUN
I-133	0.000E+00	SHORT HLIF
CS-134	3.588E-02	FAIL ABUN
I-135	0.000E+00	SHORT HLIF
CS-136	3.558E-01	FAIL ABUN
BA-137M	3.099E-02	NOT IDENT.
CS-137	3.274E-02	NOT IDENT.
LA-138	3.906E-02	NOT IDENT.
CE-139	2.711E-02	NOT IDENT.
BA-140	8.479E-01	NOT IDENT.
LA-140	2.343E-01	NOT IDENT.
CE-141	8.187E-02	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.585E-01	NOT IDENT.
PM-144	2.965E-02	NOT IDENT.
PR-144	2.243E+00	NOT IDENT.
PM-146	3.186E-02	NOT IDENT.
ND-147	2.186E+00	FAIL ABUN
PM-147	5.409E+02	NOT IDENT.
PM-149	0.000E+00	SHORT HLIF
EU-150	2.432E-02	FAIL ABUN
EU-152	8.137E-02	FAIL ABUN
GD-153	7.146E-02	NOT IDENT.
EU-154	5.372E-02	NOT IDENT.
EU-155	8.100E-02	FAIL ABUN
TB-160	1.460E-01	FAIL ABUN
HO-166M	5.172E-02	FAIL ABUN
TM-171	1.588E+01	NOT IDENT.

HF-172	1.510E-01	FAIL ABUN
LU-172	6.594E-02	FAIL ABUN
LU-176	2.089E-02	FAIL ABUN
HF-181	5.451E-02	NOT IDENT.
TA-182	1.575E-01	NOT IDENT.
RE-183	1.884E-01	NOT IDENT.
RE-184	1.163E-01	NOT IDENT.
W-188	7.872E+00	FAIL ABUN
IR-192	3.330E-02	FAIL ABUN
HG-203	4.335E-02	NOT IDENT.
TL-204	3.673E+00	FAIL ABUN
BI-207	4.357E-02	FAIL ABUN
BI-210	3.676E+00	NOT IDENT.
PB-210	3.676E+00	NOT IDENT.
PB-211	5.832E-01	NOT IDENT.
BI-212	4.860E-01	NOT IDENT.
RN-219	3.500E-01	FAIL ABUN
RA-223	4.171E-01	FAIL ABUN
AC-225	2.381E+00	NOT IDENT.
AC-227	1.970E-01	NOT IDENT.
TH-227	1.970E-01	NOT IDENT.
TH-229	3.866E-01	FAIL ABUN
PA-231	3.965E-01	NOT IDENT.
TH-231	4.171E-01	FAIL ABUN
PA-233	6.048E-02	NOT IDENT.
PA-234	2.774E-01	NOT IDENT.
PA-234M	5.790E+00	NOT IDENT.
U-235	1.727E-01	FAIL ABUN
NP-237	6.048E-02	NOT IDENT.
NP-238	0.000E+00	SHORT HLIF
NP-239	1.782E-01	FAIL ABUN
PU-239	2.711E+02	NOT IDENT.
AM-241	1.310E-01	NOT IDENT.
CM-243	7.460E-02	FAIL ABUN
BK-247	6.905E-02	FAIL ABUN
CM-247	2.973E-02	FAIL ABUN
CF-249	3.191E-02	NOT IDENT.
CF-251	1.022E-01	NOT IDENT.

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
*                               DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724001.CNF;1
* Acquisition date   : 28-FEB-2023 05:06:13 Sensitivity      : 3.000
* Detector ID        : GAM28 Energy tolerance: 1.500
* Elapsed live time  : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time  : 0 01:00:00.37 Half life ratio : *****
* Sample date        : 20-JAN-2023 11:00:00 Nuclide Library : SOLID
* Sample ID          : G609724001 Analyst initials: RXF2
* Batch Number       : 2379916 Sample Quantity : 9.6810E+01 GRAM
*                               Quantity Err(%) : 1.0330E-03 %
* Wet wt corr        : 1.00000 Wet Weight : 0.00000
*                               Dry Weight  : 0.00000
*****
*                               CALIBRATION INFORMATION                         *
*
* Eff. Cal. date     : 2-JUN-2022 10:12:36 Eff. Geometry   : CAN
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM28_CAN.CNF;16
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
K-40	1.051E+01	1.824E+00	1.824E+00
CD-109	2.247E+00	1.098E+00	1.098E+00
SN-126	2.120E-01	1.030E-01	1.030E-01
TL-208	1.378E-01	9.147E-02	9.147E-02
BI-211	1.779E+00	5.021E-01	5.021E-01
PB-212	4.147E-01	1.447E-01	1.447E-01
BI-213	2.045E-01	1.516E-01	1.516E-01
BI-214	5.306E-01	1.791E-01	1.791E-01
PB-214	6.456E-01	1.819E-01	1.819E-01
RN-222	5.306E-01	1.791E-01	1.791E-01
RA-224	1.189E+00	9.849E-01	9.849E-01
RA-226	6.456E-01	1.819E-01	1.819E-01
AC-228	7.029E-01	2.603E-01	2.603E-01
RA-228	7.029E-01	2.603E-01	2.603E-01
TH-228	4.147E-01	1.447E-01	1.447E-01
TH-230	6.456E-01	1.819E-01	1.819E-01
TH-232	7.029E-01	2.603E-01	2.603E-01
TH-234	7.432E-01	1.791E+00	1.791E+00
U-234	6.456E-01	1.819E-01	1.819E-01
U-238	7.432E-01	1.791E+00	1.791E+00
AM-243	1.803E-01	7.808E-02	7.808E-02
ANH-511	8.464E-02	8.173E-02	8.173E-02

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	-1.323E-01	3.722E-01	3.769E-01	NOT IDENT.
NA-22	-2.980E-02	4.321E-02	4.525E-02	NOT IDENT.
NA-24	-2.039E+16	1.675E+17	0.000E+00	SHORT HLIF
AL-26	-1.156E-02	3.205E-02	3.247E-02	NOT IDENT.
SC-46	-9.557E-04	5.207E-02	5.207E-02	NOT IDENT.
V-48	2.599E-01	2.164E-01	2.461E-01	FAIL ABUN
CR-51	8.130E-01	5.902E-01	6.947E-01	NOT IDENT.
MN-52	-7.308E-01	3.347E+00	3.363E+00	NOT IDENT.

MN-54	3.653E-03	3.488E-02	3.492E-02	NOT IDENT.
CO-56	-2.397E-02	5.150E-02	5.262E-02	NOT IDENT.
MN-56	-1.000E+41	2.148E+41	0.000E+00	SHORT HLIF
CO-57	-4.378E-04	2.384E-02	2.385E-02	NOT IDENT.
CO-58	5.634E-03	4.255E-02	4.263E-02	NOT IDENT.
FE-59	-3.208E-02	1.095E-01	1.105E-01	NOT IDENT.
CO-60	-2.214E-02	3.985E-02	4.108E-02	NOT IDENT.
ZN-65	-5.553E-02	1.200E-01	1.226E-01	NOT IDENT.
GE-68	1.016E+00	1.472E+00	1.542E+00	NOT IDENT.
AS-73	-1.386E-01	1.073E+00	1.075E+00	NOT IDENT.
AS-74	1.101E-02	2.230E-01	2.231E-01	NOT IDENT.
SE-75	-7.609E-03	6.211E-02	6.221E-02	NOT IDENT.
BR-77	6.381E+04	7.479E+04	8.013E+04	SHORT HLIF
SR-82	-1.233E-01	6.992E-01	7.014E-01	NOT IDENT.
RB-83	3.887E-02	8.422E-02	8.603E-02	NOT IDENT.
RB-84	4.957E-02	1.131E-01	1.153E-01	NOT IDENT.
KR-85	4.593E+00	6.230E+00	6.566E+00	NOT IDENT.
SR-85	3.094E-02	4.228E-02	4.453E-02	NOT IDENT.
RB-86	1.273E+00	2.151E+00	2.226E+00	NOT IDENT.
Y-88	-2.296E-02	3.838E-02	3.975E-02	NOT IDENT.
Y-91	-1.241E+01	2.602E+01	2.662E+01	NOT IDENT.
NB-94	-2.110E-02	3.427E-02	3.557E-02	NOT IDENT.
NB-95	-7.231E-03	5.997E-02	6.005E-02	NOT IDENT.
NB-95M	7.450E-02	2.182E-01	2.207E-01	NOT IDENT.
ZR-95	-1.785E-03	1.066E-01	1.066E-01	NOT IDENT.
NB-97	1.000E+41	1.415E+41	0.000E+00	SHORT HLIF
ZR-97	6.609E+15	2.071E+16	0.000E+00	SHORT HLIF
MO-99	-3.002E+03	4.877E+03	5.061E+03	SHORT HLIF
TC-99M	-1.000E+41	5.904E+41	0.000E+00	SHORT HLIF
RH-101	-6.632E-03	2.955E-02	2.970E-02	NOT IDENT.
RH-102	1.558E-02	6.056E-02	6.097E-02	NOT IDENT.
RU-103	7.277E-02	6.076E-02	6.905E-02	FAIL ABUN
RH-106	2.218E-01	3.147E-01	3.302E-01	NOT IDENT.
RU-106	2.218E-01	3.147E-01	3.302E-01	NOT IDENT.
AG-108M	6.243E-03	3.062E-02	3.075E-02	NOT IDENT.
AG-110	4.591E-01	6.706E-01	7.018E-01	NOT IDENT.
AG-110M	-5.928E-03	5.649E-02	5.655E-02	FAIL ABUN
SN-113	8.555E-03	5.129E-02	5.143E-02	NOT IDENT.
CD-115	-1.953E+03	1.574E+04	1.576E+04	SHORT HLIF
SN-117M	-5.690E-02	1.781E-01	1.800E-01	NOT IDENT.
SB-122	-7.070E+01	7.390E+02	7.397E+02	SHORT HLIF
TE-123M	-5.649E-03	3.235E-02	3.245E-02	NOT IDENT.
SB-124	-8.572E-04	6.544E-02	6.544E-02	NOT IDENT.
SB-125	1.910E-02	8.950E-02	8.992E-02	FAIL ABUN
TE-125M	4.542E+00	1.133E+01	1.151E+01	NOT IDENT.
I-126	-5.822E-01	6.607E-01	7.109E-01	NOT IDENT.
SB-126	-3.731E-01	5.733E-01	5.975E-01	NOT IDENT.
SB-127	1.544E+01	7.260E+01	7.293E+01	SHORT HLIF
I-131	-6.209E-01	8.584E-01	9.029E-01	FAIL ABUN
I-132	-1.000E+41	3.488E+41	0.000E+00	SHORT HLIF
TE-132	1.766E+01	1.269E+02	1.271E+02	SHORT HLIF
BA-133	2.098E-02	3.950E-02	4.062E-02	FAIL ABUN
I-133	-2.133E+11	8.955E+11	9.006E+11	SHORT HLIF
CS-134	-1.709E-02	4.774E-02	4.836E-02	FAIL ABUN
I-135	2.550E+40	4.893E+41	0.000E+00	SHORT HLIF
CS-136	1.833E-01	4.024E-01	4.108E-01	FAIL ABUN
BA-137M	-5.979E-03	3.873E-02	3.882E-02	NOT IDENT.
CS-137	-6.316E-03	4.091E-02	4.101E-02	NOT IDENT.
LA-138	2.040E-02	3.810E-02	3.919E-02	NOT IDENT.
CE-139	4.616E-03	3.299E-02	3.306E-02	NOT IDENT.
BA-140	-1.746E-01	1.044E+00	1.047E+00	NOT IDENT.
LA-140	1.164E-01	2.314E-01	2.373E-01	NOT IDENT.
CE-141	-1.142E-01	1.209E-01	1.314E-01	NOT IDENT.
CE-143	8.108E+06	1.871E+07	1.907E+07	SHORT HLIF
CE-144	2.230E-03	1.937E-01	1.937E-01	NOT IDENT.
PM-144	-3.149E-02	4.215E-02	4.448E-02	NOT IDENT.
PR-144	-2.397E+00	3.192E+00	3.370E+00	NOT IDENT.
PM-146	-2.545E-03	3.815E-02	3.817E-02	NOT IDENT.
ND-147	1.867E+00	2.274E+00	2.425E+00	FAIL ABUN
PM-147	7.794E+00	6.581E+02	6.581E+02	NOT IDENT.
PM-149	-8.305E+04	1.629E+05	1.672E+05	SHORT HLIF
EU-150	1.758E-02	2.841E-02	2.949E-02	FAIL ABUN
EU-152	3.122E-02	9.416E-02	9.520E-02	FAIL ABUN
GD-153	-2.655E-02	8.795E-02	8.876E-02	NOT IDENT.
EU-154	-9.179E-02	1.188E-01	1.258E-01	NOT IDENT.
EU-155	2.316E-02	9.541E-02	9.598E-02	FAIL ABUN
TB-160	6.822E-02	1.642E-01	1.670E-01	FAIL ABUN
HO-166M	-2.818E-02	6.867E-02	6.984E-02	FAIL ABUN

TM-171	1.255E+01	1.728E+01	1.818E+01	NOT IDENT.
HF-172	8.863E-02	1.743E-01	1.788E-01	FAIL ABUN
LU-172	6.187E-02	6.536E-02	7.106E-02	FAIL ABUN
LU-176	3.367E-03	2.370E-02	2.375E-02	FAIL ABUN
HF-181	1.523E-02	6.216E-02	6.254E-02	NOT IDENT.
TA-182	2.652E-02	2.021E-01	2.024E-01	NOT IDENT.
RE-183	-2.204E-01	2.498E-01	2.688E-01	NOT IDENT.
RE-184	-1.339E-01	1.868E-01	1.963E-01	NOT IDENT.
W-188	4.768E-02	1.006E+01	1.006E+01	FAIL ABUN
IR-192	-3.398E-03	3.905E-02	3.908E-02	FAIL ABUN
HG-203	-1.404E-02	5.753E-02	5.788E-02	NOT IDENT.
TL-204	-3.180E-01	4.765E+00	4.768E+00	FAIL ABUN
BI-207	1.349E-02	4.794E-02	4.833E-02	FAIL ABUN
BI-210	1.605E-01	4.313E+00	4.313E+00	NOT IDENT.
PB-210	1.605E-01	4.313E+00	4.313E+00	NOT IDENT.
PB-211	-2.600E-01	7.237E-01	7.331E-01	NOT IDENT.
BI-212	2.694E-01	5.254E-01	5.393E-01	NOT IDENT.
RN-219	2.271E-01	3.787E-01	3.923E-01	FAIL ABUN
RA-223	-4.288E-01	5.510E-01	5.839E-01	FAIL ABUN
AC-225	-3.647E-01	3.043E+00	3.048E+00	NOT IDENT.
AC-227	4.942E-02	2.418E-01	2.428E-01	NOT IDENT.
TH-227	4.942E-02	2.418E-01	2.428E-01	NOT IDENT.
TH-229	-8.343E-02	4.940E-01	4.955E-01	FAIL ABUN
PA-231	-1.353E-01	4.751E-01	4.790E-01	NOT IDENT.
TH-231	-4.288E-01	5.510E-01	5.839E-01	FAIL ABUN
PA-233	5.592E-02	6.352E-02	6.834E-02	NOT IDENT.
PA-234	-2.558E-02	3.531E-01	3.533E-01	NOT IDENT.
PA-234M	6.063E+00	5.838E+00	6.446E+00	NOT IDENT.
U-235	2.795E-02	2.184E-01	2.187E-01	FAIL ABUN
NP-237	5.592E-02	6.352E-02	6.834E-02	NOT IDENT.
NP-238	1.530E+04	5.307E+04	5.352E+04	SHORT HLIF
NP-239	2.990E-02	2.127E-01	2.132E-01	FAIL ABUN
PU-239	2.660E+02	3.004E+02	3.234E+02	NOT IDENT.
AM-241	-3.707E-02	1.590E-01	1.599E-01	NOT IDENT.
CM-243	-1.086E-02	9.162E-02	9.175E-02	FAIL ABUN
BK-247	7.069E-02	8.285E-02	8.876E-02	FAIL ABUN
CM-247	5.754E-04	3.483E-02	3.483E-02	FAIL ABUN
CF-249	-7.740E-04	3.752E-02	3.752E-02	NOT IDENT.
CF-251	-4.882E-04	1.270E-01	1.270E-01	NOT IDENT.

 * GEL Laboratories LLC *
 * 2040 Savage Road *
 * Charleston, SC 29407 *
 * GAMMA SPECTROSCOPY BACKGROUND REPORT *

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	30.1813	85.43	46.1572	131.20	37.7189
45.60	38.6313	86.55	46.2502	133.02	38.8922
46.54	34.1184	86.79	36.2115	133.52	35.6753
49.72	0.0000	86.94	36.2214	136.00	41.2169
51.35	45.7496	87.09	36.2310	136.47	46.6691
51.87	33.6558	87.57	36.2620	140.51	0.0000
52.39	22.4662	88.03	36.2917	143.76	35.0615
52.97	26.2482	88.34	22.1905	144.24	36.5448
53.44	35.6636	88.47	22.1955	145.44	49.7770
54.07	38.5382	89.96	22.2538	152.43	29.9062
57.36	0.0000	1093.63	40.5096	153.25	26.6100
57.53	39.8052	91.11	40.5426	323.87	28.8612
57.98	44.5903	92.59	40.6464	156.02	31.1497
59.27	40.9171	93.35	40.6995	158.56	40.1721
59.32	40.9217	94.56	47.5803	159.00	40.1929
59.54	45.7031	94.65	47.5877	162.33	41.4726
60.96	47.1241	94.67	47.5892	162.66	40.3676
61.17	53.5175	94.87	47.6052	163.33	44.8883
62.93	49.8900	97.43	40.9799	165.86	36.0166
63.29	49.9296	98.43	38.9953	176.31	42.1405
63.58	43.5560	98.44	38.9962	176.60	42.1540
64.28	39.7736	99.53	37.0099	177.52	35.3542
66.73	42.5632	100.11	42.1902	181.07	0.0000
67.24	46.4828	102.03	31.9993	181.52	41.2372
125.81	46.5260	103.18	34.1267	184.41	39.8342
67.75	46.5330	103.37	34.1370	143.76	46.0272
68.89	47.6160	105.21	34.2367	193.51	32.4848
69.67	35.0398	105.31	34.2422	197.03	47.7403
70.82	42.9275	106.12	37.4027	198.01	26.8082
70.83	42.9285	106.47	37.4233	201.83	24.5722
72.81	43.1013	109.28	31.3223	203.43	30.4719
72.87	43.1064	111.00	39.7795	205.31	26.6154
74.66	43.2605	111.76	0.0000	210.85	39.3550
74.82	43.2739	114.06	31.5502	215.65	23.7234
74.97	43.2870	116.30	0.0000	218.12	32.1029
77.11	43.4683	116.74	26.3966	222.11	28.6443
78.74	43.6046	119.76	27.5736	227.09	20.3844
79.69	31.7698	121.12	34.0034	227.38	20.3898
80.03	31.7900	121.22	31.8828	228.16	0.0000
80.12	31.7957	121.78	28.7176	228.18	27.2068
80.19	31.7998	122.06	32.9853	116.74	27.2068
80.57	31.8225	122.92	37.2871	235.69	38.6743
81.00	31.8484	123.07	34.0981	235.96	38.6841
81.07	45.7880	265.00	30.9282	238.63	45.2402
81.75	41.8596	125.81	29.9514	238.98	0.0000
82.47	41.9157	127.23	38.5852	240.99	51.0023
83.79	42.0176	127.91	36.4761	242.00	35.6529
84.00	42.0340	129.30	26.8719	244.70	30.8646

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.40	0.0000	344.28	17.8994	563.25	11.9199
252.80	17.1774	345.93	22.1361	564.24	0.0000
254.15	0.0000	351.06	22.0373	569.33	11.9546
256.23	22.1502	351.93	22.0505	946.00	11.9556
260.90	0.0000	355.39	0.0000	569.70	11.9565
264.66	31.3969	356.01	13.2666	583.19	15.0403
264.80	31.4007	364.49	24.0150	584.27	15.0476
265.00	16.5291	366.42	0.0000	595.83	12.1021
269.46	22.3973	372.51	27.7179	427.87	12.1279
270.03	22.4077	375.05	12.5382	602.52	0.0000
271.23	22.4297	377.52	14.3522	604.72	9.1132
273.65	22.4736	356.01	21.6152	607.14	19.7666
276.40	22.5242	388.16	18.0619	609.32	26.3809
277.37	22.5417	388.63	21.6807	610.33	22.8397
277.60	22.5456	391.69	19.0069	614.28	12.2026
278.00	26.3122	264.66	16.3824	618.01	17.3161
279.20	28.8455	401.81	13.6618	620.36	9.1769
279.54	31.3622	402.40	17.3111	621.93	8.1628
279.70	31.3667	404.85	22.8119	630.19	0.0000
280.46	33.8967	410.95	12.8219	631.29	13.3190
283.69	26.8509	413.71	18.3476	633.25	12.3047
284.31	26.0251	414.70	10.0972	634.78	13.8521
285.41	32.7690	423.72	15.6885	635.95	6.1597
285.90	0.0000	427.09	14.7949	636.99	6.1624
287.50	31.1397	427.87	15.7269	657.50	6.2166
290.67	27.8424	433.94	17.6393	657.76	5.1811
293.27	0.0000	439.40	8.3818	657.90	0.0000
351.93	29.6338	440.45	9.3186	661.66	15.5682
295.96	29.6509	453.88	14.0848	664.57	0.0000
879.38	25.4663	463.37	12.2713	666.33	12.4790
299.98	25.4932	468.07	7.0978	666.50	11.4400
300.09	25.4956	473.00	0.0000	667.71	0.0000
300.13	25.4962	475.06	10.4497	677.62	11.4928
301.36	29.7734	476.78	10.4595	685.70	0.0000
302.85	28.9552	477.60	13.3178	692.65	0.0000
256.23	23.0224	482.18	13.3509	695.00	15.7837
304.85	23.0284	487.02	14.3411	696.49	21.0571
306.78	19.6454	492.35	0.0000	696.51	21.0571
308.46	25.6567	497.08	8.6505	697.00	20.0081
311.90	18.0054	505.52	7.2403	697.30	21.0636
316.51	20.6475	507.63	0.0000	697.49	21.0653
319.41	17.2428	511.00	9.6810	702.65	15.8319
320.08	10.3506	514.00	9.6960	706.68	16.9147
321.04	18.1263	514.00	9.6960	711.68	16.9486
323.87	23.3525	520.40	11.6729	720.70	15.9454
325.23	18.1810	520.69	0.0000	721.93	0.0000
328.76	16.4909	522.65	0.0000	722.78	8.5114
333.37	15.6742	527.90	0.0000	722.91	10.6396
333.97	18.2943	528.26	11.7188	723.31	14.8978
334.37	22.2207	529.59	18.5671	724.19	14.9029
338.28	22.7183	529.87	0.0000	727.33	7.4606
338.32	22.7188	531.02	7.8232	733.00	7.4771
311.90	23.6283	537.26	17.6572	735.93	10.6938
340.48	23.6283	546.56	0.0000	333.97	12.8398
340.55	23.6294	552.55	10.3770	739.50	0.0000

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
744.23	7.5093	949.00	11.5169	1384.29	2.9138
747.24	13.9622	667.71	0.0000	1408.01	4.6875
748.06	16.1151	962.31	5.2044	1434.09	2.9471
752.31	13.9892	964.08	0.0000	1435.80	0.9827
753.82	12.9204	966.17	0.0000	1457.56	0.0000
756.73	14.0125	911.20	6.9534	1460.82	3.9531
756.80	14.0130	983.53	10.4773	1489.16	4.9722
884.68	14.0505	984.45	0.0000	1505.03	3.9917
765.81	15.1422	1274.44	14.0239	1584.12	10.1483
766.42	15.1456	1001.03	7.0222	1596.21	1.0173
766.84	10.8199	1002.74	12.2949	1620.50	2.0449
772.60	0.0000	1004.73	11.4238	1621.92	7.1594
776.52	13.0308	507.63	0.0000	1678.03	0.0000
739.50	0.0000	1025.87	0.0000	1690.97	1.0370
778.90	15.2157	1028.54	0.0000	1750.46	0.0000
783.70	0.0000	1037.84	6.2122	1764.49	1.6829
788.74	13.0894	1038.76	0.0000	1063.66	3.1589
792.07	9.8287	631.29	11.5662	1771.35	1.0532
795.86	15.3102	1048.07	7.1206	1791.20	0.0000
810.06	7.6944	1049.04	9.9723	1808.65	3.1818
810.29	9.8936	1050.41	2.8502	1810.72	0.0000
344.28	9.8943	1063.66	6.2587	1836.06	3.1979
810.76	6.5969	1077.00	8.0782		
815.77	14.3187	1077.34	7.1812		
1048.07	6.6152	1085.87	5.3990		
832.01	12.1857	1093.63	4.5090		
834.85	7.7622	1099.45	7.2261		
835.71	13.3105	1112.07	9.9708		
836.80	0.0000	1112.84	11.7860		
846.75	0.0000	1115.54	18.1470		
846.77	12.2483	1120.29	10.9021		
856.80	13.4082	1120.55	10.9028		
860.56	4.4751	1221.41	18.1750		
871.09	10.1049	1129.67	9.1089		
873.19	4.4943	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	6.7556	1173.23	14.7461		
880.51	11.2634	1177.95	9.2279		
881.60	6.7605	1189.05	8.3298		
883.24	11.2736	1204.77	10.2225		
884.68	10.1514	1221.41	5.9734		
889.28	10.1667	1231.02	5.9883		
894.76	7.9220	1235.36	14.0506		
898.04	14.7282	1238.28	4.6869		
900.72	4.5356	1260.41	0.0000		
903.28	10.2140	1271.87	8.8229		
911.20	3.4135	1274.44	7.5674		
912.08	3.4144	1274.54	7.5679		
923.98	0.0000	1291.59	2.8499		
926.50	6.8608	1298.22	0.0000		
929.11	5.7222	1312.11	7.6377		
935.54	3.4403	1332.49	7.6753		
937.49	9.1800	1362.66	0.0000		
944.13	11.4994	1365.19	4.8346		
946.00	11.5059	1368.63	0.0000		

VAX/VMS Nuclide Identification Report Generated 28-FEB-2023 06:07:30.71

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                          *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724002.CNF;1
Background file : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM30.CNF;654
Background date : 26-FEB-2023 09:14:17
Sample date     : 20-JAN-2023 11:00:00 Acquisition date : 28-FEB-2023 05:06:43
Sample ID      : G609724002 Sample quantity   : 1.37480E+02 GRAM
Detector name  : GAM30 Detector geometry: CAN
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:01.17 0.0%
Energy tolerance : 1.50000 keV Analyst Initials : RXF2
Abundance limit : 75.00000 Sensitivity : 3.00000
Batch ID       : 2379916 Detector SN# :
Matrix Spike ID : LCS ID :
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	52.10	70	150	8.73	104.75	95	20	1.94E-02	44.5	
2	2	74.84*	64	104	1.22	150.26	147	13	1.78E-02	29.7	1.19E+00
3	2	77.05*	115	93	1.23	154.70	147	13	3.20E-02	17.6	
4	0	86.91	38	104	0.77	174.43	172	7	1.06E-02	47.0	
5	0	92.82*	38	98	0.94	186.28	184	8	1.07E-02	51.6	
6	0	160.60	30	59	1.74	321.98	318	9	8.22E-03	50.2	
7	2	185.84*	35	61	1.41	372.51	367	17	9.66E-03	44.5	1.85E+00
8	2	187.83	22	55	1.41	376.49	367	17	6.06E-03	70.1	
9	4	238.64*	153	56	1.14	478.23	472	17	4.24E-02	11.7	2.35E+00
10	4	240.99	23	50	1.17	482.93	472	17	6.41E-03	69.3	
11	4	242.07	30	47	1.14	485.10	472	17	8.36E-03	47.0	
12	0	271.70	31	82	4.16	544.41	537	17	8.73E-03	68.0	
13	0	295.40	118	33	1.10	591.87	587	11	3.28E-02	13.2	
14	0	338.71*	32	31	1.83	678.58	675	9	9.00E-03	36.8	
15	0	351.78*	181	21	1.24	704.75	698	14	5.02E-02	9.3	
16	0	356.48	8	15	0.60	714.17	711	7	2.30E-03	83.2	
17	0	410.59	16	27	1.63	822.50	814	11	4.38E-03	69.1	
18	0	511.10*	12	35	2.77	1023.75	1017	15	3.29E-03	145.8	
19	0	529.30	10	9	1.63	1060.18	1056	7	2.73E-03	62.3	
20	0	575.82	6	10	0.87	1153.33	1151	7	1.65E-03	94.2	
21	0	583.07*	55	27	1.62	1167.85	1162	12	1.52E-02	24.0	
22	2	604.67	23	18	1.83	1211.09	1204	38	6.41E-03	43.4	1.49E+00
23	2	609.18*	103	21	1.59	1220.11	1204	38	2.86E-02	13.2	
24	0	656.86	11	9	2.16	1315.58	1310	9	3.13E-03	56.4	
25	0	723.14*	12	27	3.50	1448.29	1438	14	3.36E-03	97.7	
26	0	881.88	14	9	1.23	1766.14	1759	12	3.92E-03	50.1	
27	0	912.47*	19	29	1.96	1827.39	1818	13	5.39E-03	63.6	
28	0	969.10	18	10	0.85	1940.79	1937	7	4.93E-03	38.4	
29	0	1070.95	9	1	0.95	2144.71	2142	6	2.43E-03	40.0	
30	0	1119.83*	27	12	2.59	2242.58	2236	12	7.58E-03	32.6	
31	0	1128.46	8	6	1.42	2259.87	2252	11	2.08E-03	70.7	
32	0	1158.35	10	6	1.10	2319.71	2315	9	2.65E-03	58.6	
33	0	1219.73	14	6	0.55	2442.63	2438	11	3.75E-03	43.3	
34	0	1460.72*	290	0	1.91	2925.17	2919	15	8.05E-02	5.9	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
35	0	1729.88	13	0	0.73	3464.15	3459	10	3.61E-03	27.7	
36	0	1764.74*	21	0	1.79	3533.96	3529	9	5.75E-03	23.7	

Flag: "*" = Peak area was modified by background subtraction

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724002.CNF;1
Analyses by : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4
Sample title : RXF2
Sample date : 20-JAN-2023 11:00:00 Acquisition date : 28-FEB-2023 05:06:43
Sample ID : G609724002 Sample quantity : 137.48 GRAM
Sample type : SOLID Sample geometry :
Detector name : GAMMA30 Detector geometry: CAN
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:01.17 0.0%
Energy tolerance : 1.50 keV Half life ratio : 10.00
Errors propagated: No Systematic Error : 0.00 %
Efficiency type : Empirical Efficiencies at : Peak Energy
Abundance limit : 75.00

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	277	10.66*	1.291E+00	1.100E+01	1.100E+01	11.88
AS-73	53.44	86	10.30*	2.099E+00	2.178E+00	3.044E+00	88.99
RB-84	881.60	14	68.90*	2.001E+00	5.580E-02	1.266E-01	100.24
CD-109	88.03	45	3.70*	6.713E+00	9.949E-01	1.055E+00	94.01
AG-110	657.50	12	4.50*	2.581E+00	5.411E-01	6.026E-01	112.79
SN-126	64.28	-----	9.60	4.127E+00	-----	Line Not Found	-----
	86.94	45	8.90	6.713E+00	4.136E-01	4.136E-01	94.01
	87.57	45	37.00*	6.713E+00	9.949E-02	9.949E-02	94.01
TM-171	51.35	86	0.27	2.099E+00	8.308E+01	8.632E+01	88.99
	52.39	86	0.47*	2.099E+00	4.773E+01	4.959E+01	88.99
	66.73	-----	0.14	4.504E+00	-----	Line Not Found	-----
TL-208	277.37	-----	6.60	4.980E+00	-----	Line Not Found	-----
	583.19	56	85.00*	2.846E+00	1.274E-01	1.274E-01	47.91
	860.56	-----	12.50	2.045E+00	-----	Line Not Found	-----
BI-211	72.87	-----	1.23	5.352E+00	-----	Line Not Found	-----
	351.06	194	12.92*	4.193E+00	1.957E+00	1.957E+00	18.66
PB-212	74.82	77	10.28	5.591E+00	7.329E-01	7.329E-01	59.42
	77.11	138	17.10	5.841E+00	7.546E-01	7.546E-01	35.28
	238.63	169	43.60*	5.529E+00	3.825E-01	3.825E-01	23.40
	300.09	-----	3.30	4.707E+00	-----	Line Not Found	-----
BI-214	609.32	106	45.49*	2.746E+00	4.631E-01	4.631E-01	26.31
	1120.29	27	14.92	1.616E+00	6.045E-01	6.045E-01	65.10
	1764.49	19	15.30	1.134E+00	6.129E-01	6.129E-01	47.40
PB-214	74.82	77	5.80	5.591E+00	1.299E+00	1.299E+00	59.42
	77.11	138	9.70	5.841E+00	1.330E+00	1.330E+00	35.28
	87.09	45	3.41	6.713E+00	1.079E+00	1.080E+00	94.01
	242.00	33	7.25	5.476E+00	4.578E-01	4.578E-01	93.92
	295.22	128	18.42	4.761E+00	8.000E-01	8.000E-01	26.35
	351.93	194	35.60*	4.193E+00	7.101E-01	7.101E-01	18.66
RN-222	609.32	106	45.49*	2.746E+00	4.631E-01	4.631E-01	26.31
	1120.29	27	14.92	1.616E+00	6.045E-01	6.045E-01	65.10
	1764.49	19	15.30	1.134E+00	6.129E-01	6.129E-01	47.40
RA-224	240.99	26	4.10*	5.492E+00	6.191E-01	6.191E-01	138.55
RA-226	74.82	77	5.80	5.591E+00	1.299E+00	1.299E+00	59.42
	77.11	138	9.70	5.841E+00	1.330E+00	1.330E+00	35.28
	87.09	45	3.41	6.713E+00	1.079E+00	1.080E+00	94.01
	242.00	33	7.25	5.476E+00	4.578E-01	4.578E-01	93.92
	295.22	128	18.42	4.761E+00	8.000E-01	8.000E-01	26.35
	351.93	194	35.60*	4.193E+00	7.101E-01	7.101E-01	18.66
AC-228	105.21	-----	1.10	7.480E+00	-----	Line Not Found	-----
	338.32	35	11.27	4.311E+00	3.924E-01	3.924E-01	73.62
	835.71	-----	1.61	2.099E+00	-----	Line Not Found	-----
	911.20	19	25.80*	1.941E+00	2.105E-01	2.105E-01	127.22
	968.97	18	15.80	1.839E+00	3.304E-01	3.304E-01	76.73
RA-228	105.21	-----	1.10	7.480E+00	-----	Line Not Found	-----
	338.32	35	11.27	4.311E+00	3.924E-01	3.924E-01	73.62
	835.71	-----	1.61	2.099E+00	-----	Line Not Found	-----
	911.20	19	25.80*	1.941E+00	2.105E-01	2.105E-01	127.22
	968.97	18	15.80	1.839E+00	3.304E-01	3.304E-01	76.73

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
TH-228	74.82	77	10.28	5.591E+00	7.329E-01	7.329E-01	59.42
	77.11	138	17.10	5.841E+00	7.546E-01	7.546E-01	35.28
	238.63	169	43.60*	5.529E+00	3.825E-01	3.825E-01	23.40
	300.09	-----	3.30	4.707E+00	-----	Line Not Found	-----
TH-230	74.82	77	5.80	5.591E+00	1.299E+00	1.299E+00	59.42
	77.11	138	9.70	5.841E+00	1.330E+00	1.330E+00	35.28
	87.09	45	3.41	6.713E+00	1.079E+00	1.079E+00	94.01
	242.00	33	7.25	5.476E+00	4.578E-01	4.578E-01	93.92
	295.22	128	18.42	4.761E+00	8.000E-01	8.000E-01	26.35
TH-232	351.93	194	35.60*	4.193E+00	7.101E-01	7.101E-01	18.66
	105.21	-----	1.10	7.480E+00	-----	Line Not Found	-----
	338.32	35	11.27	4.311E+00	3.924E-01	3.924E-01	73.62
	835.71	-----	1.61	2.099E+00	-----	Line Not Found	-----
U-234	911.20	19	25.80*	1.941E+00	2.105E-01	2.105E-01	127.22
	968.97	18	15.80	1.839E+00	3.304E-01	3.304E-01	76.73
	74.82	77	5.80	5.591E+00	1.299E+00	1.299E+00	59.42
	77.11	138	9.70	5.841E+00	1.330E+00	1.330E+00	35.28
	87.09	45	3.41	6.713E+00	1.079E+00	1.079E+00	94.01
AM-243	242.00	33	7.25	5.476E+00	4.578E-01	4.578E-01	93.92
	295.22	128	18.42	4.761E+00	8.000E-01	8.000E-01	26.35
	351.93	194	35.60*	4.193E+00	7.101E-01	7.101E-01	18.66
	43.53	-----	5.90	8.649E-01	-----	Line Not Found	-----
ANH-511	74.66	77	67.20*	5.591E+00	1.121E-01	1.121E-01	59.42
ANH-511	511.00	12	100.00*	3.160E+00	2.138E-02	2.138E-02	291.64

Flag: "*" = Keyline

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*****
*
*           GEL Laboratories LLC
*           2040 Savage Road
*           Charleston, SC 29407
*****
*
*           DETECTOR AND SAMPLE DATA
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724002.CNF;1
* Acquisition date   : 28-FEB-2023 05:06:43 Sensitivity      : 3.000
* Detector ID        : GAM30 Energy tolerance: 1.500
* Elapsed live time  : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time  : 0 01:00:01.17 Half life ratio  : *****
* Sample date        : 20-JAN-2023 11:00:00 Analyst initials: RXF2
* Sample ID          : G609724002 Sample Quantity : 1.3748E+02 GRAM
* Batch Number       : 2379916 Wet Weight      : 0.00000
* Wet wt corr        : 1.00000 Dry Weight       : 0.00000
* Nuclide Library    : SOLID.NLB;17
*****
*
*           CALIBRATION INFORMATION
*
* Eff. Cal. date     : 19-SEP-2022 10:46:20 Eff. Geometry   : CAN
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM30_CAN.CNF;14
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
K-40	1.100E+01	1.281E+00	3.657E-01
AS-73	3.044E+00	2.654E+00	1.042E+00
RB-84	1.266E-01	1.243E-01	1.659E-01
CD-109	1.055E+00	9.715E-01	1.089E+00
AG-110	6.026E-01	6.660E-01	1.169E+00
SN-126	9.949E-02	9.166E-02	9.368E-02
TM-171	4.959E+01	4.325E+01	1.834E+01
TL-208	1.274E-01	5.981E-02	4.912E-02
BI-211	1.957E+00	3.577E-01	1.753E-01
PB-212	3.825E-01	8.773E-02	7.701E-02
BI-214	4.631E-01	1.194E-01	9.807E-02
PB-214	7.101E-01	1.298E-01	6.376E-02
RN-222	4.631E-01	1.194E-01	9.807E-02
RA-224	6.191E-01	8.406E-01	8.250E-01
RA-226	7.101E-01	1.298E-01	6.376E-02
AC-228	2.105E-01	2.624E-01	2.103E-01
RA-228	2.105E-01	2.624E-01	2.103E-01
TH-228	3.825E-01	8.773E-02	7.701E-02
TH-230	7.101E-01	1.298E-01	6.376E-02
TH-232	2.105E-01	2.624E-01	2.103E-01
U-234	7.101E-01	1.298E-01	6.376E-02
AM-243	1.121E-01	6.528E-02	6.346E-02
ANH-511	2.138E-02	6.111E-02	4.273E-02

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L.	Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)	
BE-7	3.165E-01		3.149E-01	6.984E-01	NOT IDENT.
NA-22	-2.224E-02		2.672E-02	4.515E-02	NOT IDENT.
NA-24	0.000E+00		7.378E+16	0.000E+00	SHORT HLIF
AL-26	-6.567E-03		2.146E-02	4.349E-02	FAIL ABUN
SC-46	-3.395E-03		2.710E-02	5.343E-02	FAIL ABUN
V-48	3.437E-02		1.208E-01	2.579E-01	NOT IDENT.
CR-51	-2.982E-02		4.669E-01	9.219E-01	NOT IDENT.

MN-52	-1.334E+00	2.623E+00	4.933E+00	NOT IDENT.
MN-54	2.275E-02	2.731E-02	6.078E-02	NOT IDENT.
CO-56	-1.478E-02	3.394E-02	6.052E-02	NOT IDENT.
MN-56	0.000E+00	1.866E+41	0.000E+00	SHORT HLIF
CO-57	-2.738E-03	1.728E-02	3.197E-02	NOT IDENT.
CO-58	2.554E-03	3.534E-02	7.003E-02	NOT IDENT.
FE-59	3.600E-02	9.478E-02	2.061E-01	NOT IDENT.
CO-60	1.484E-02	3.349E-02	7.335E-02	NOT IDENT.
ZN-65	2.359E-02	5.373E-02	1.155E-01	NOT IDENT.
GE-68	1.249E+00	9.266E-01	2.320E+00	NOT IDENT.
AS-74	1.108E-01	1.700E-01	3.592E-01	NOT IDENT.
SE-75	8.650E-03	3.346E-02	6.880E-02	NOT IDENT.
BR-77	0.000E+00	1.350E+04	0.000E+00	SHORT HLIF
SR-82	-2.808E-01	4.179E-01	7.086E-01	NOT IDENT.
RB-83	-2.241E-02	4.954E-02	9.231E-02	FAIL ABUN
KR-85	3.147E+00	4.263E+00	8.912E+00	NOT IDENT.
SR-85	2.135E-02	2.896E-02	6.054E-02	NOT IDENT.
RB-86	1.561E+00	1.392E+00	3.347E+00	NOT IDENT.
Y-88	1.375E-03	3.216E-02	7.145E-02	NOT IDENT.
Y-91	-4.164E+00	2.124E+01	4.132E+01	NOT IDENT.
NB-94	2.710E-03	2.373E-02	4.709E-02	NOT IDENT.
NB-95	6.545E-03	4.133E-02	8.129E-02	NOT IDENT.
NB-95M	-1.953E-02	1.249E-01	2.023E-01	NOT IDENT.
ZR-95	2.597E-02	5.422E-02	1.197E-01	FAIL ABUN
NB-97	0.000E+00	1.105E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	1.744E+16	0.000E+00	SHORT HLIF
MO-99	0.000E+00	2.873E+03	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
RH-101	-6.257E-03	2.178E-02	3.948E-02	NOT IDENT.
RH-102	2.979E-02	3.907E-02	8.571E-02	NOT IDENT.
RU-103	1.390E-02	3.572E-02	7.669E-02	FAIL ABUN
RH-106	1.628E-02	2.686E-01	4.756E-01	NOT IDENT.
RU-106	1.628E-02	2.686E-01	4.756E-01	NOT IDENT.
AG-108M	-5.723E-03	1.931E-02	3.697E-02	FAIL ABUN
AG-110M	4.494E-02	3.203E-02	8.103E-02	FAIL ABUN
SN-113	-1.226E-02	3.349E-02	6.368E-02	NOT IDENT.
CD-115	0.000E+00	1.400E+04	0.000E+00	SHORT HLIF
SN-117M	2.151E-03	1.289E-01	2.208E-01	NOT IDENT.
SB-122	0.000E+00	5.288E+02	0.000E+00	SHORT HLIF
TE-123M	1.074E-02	2.278E-02	4.138E-02	NOT IDENT.
SB-124	-1.616E-02	6.822E-02	1.432E-01	FAIL ABUN
SB-125	3.165E-02	6.438E-02	1.353E-01	NOT IDENT.
TE-125M	-1.978E+00	7.979E+00	1.472E+01	NOT IDENT.
I-126	7.517E-02	5.667E-01	1.127E+00	NOT IDENT.
SB-126	2.157E-01	4.547E-01	9.271E-01	NOT IDENT.
SB-127	0.000E+00	6.130E+01	0.000E+00	SHORT HLIF
I-131	7.057E-02	5.025E-01	1.043E+00	NOT IDENT.
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	0.000E+00	8.495E+01	0.000E+00	SHORT HLIF
BA-133	1.897E-02	3.094E-02	5.249E-02	FAIL ABUN
I-133	0.000E+00	7.484E+11	0.000E+00	SHORT HLIF
CS-134	1.994E-02	3.074E-02	6.602E-02	FAIL ABUN
I-135	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
CS-136	1.224E-01	2.371E-01	5.427E-01	NOT IDENT.
BA-137M	2.881E-02	2.409E-02	5.604E-02	NOT IDENT.
CS-137	3.043E-02	2.545E-02	5.920E-02	NOT IDENT.
LA-138	9.793E-04	2.481E-02	6.024E-02	NOT IDENT.
CE-139	-3.607E-03	1.983E-02	3.620E-02	NOT IDENT.
BA-140	-6.425E-02	5.599E-01	1.111E+00	NOT IDENT.
LA-140	3.817E-02	2.015E-01	4.674E-01	NOT IDENT.
CE-141	8.465E-03	6.934E-02	1.302E-01	NOT IDENT.
CE-143	0.000E+00	1.186E+07	0.000E+00	SHORT HLIF
CE-144	-3.488E-02	1.277E-01	2.327E-01	NOT IDENT.
PM-144	6.665E-03	2.419E-02	4.966E-02	NOT IDENT.
PR-144	5.050E-01	1.833E+00	3.763E+00	NOT IDENT.
PM-146	2.737E-02	2.689E-02	6.118E-02	NOT IDENT.
ND-147	-5.470E-01	1.853E+00	3.093E+00	NOT IDENT.
PM-147	-2.206E+02	4.614E+02	8.255E+02	NOT IDENT.
PM-149	0.000E+00	9.948E+04	0.000E+00	SHORT HLIF
EU-150	-3.837E-03	1.944E-02	3.600E-02	FAIL ABUN
EU-152	1.510E-02	5.851E-02	1.217E-01	NOT IDENT.
GD-153	2.580E-02	5.475E-02	1.026E-01	NOT IDENT.
EU-154	-8.419E-02	7.949E-02	1.244E-01	FAIL ABUN
EU-155	-5.907E-02	6.141E-02	1.043E-01	FAIL ABUN
TB-160	-1.887E-02	1.505E-01	2.495E-01	FAIL ABUN
HO-166M	-7.935E-03	3.640E-02	6.968E-02	FAIL ABUN
HF-172	-1.155E-01	1.396E-01	2.418E-01	FAIL ABUN
LU-172	9.111E-03	5.191E-02	1.081E-01	FAIL ABUN

LU-176	-3.803E-03	1.684E-02	3.297E-02	FAIL ABUN
HF-181	1.661E-02	3.477E-02	7.688E-02	NOT IDENT.
TA-182	5.125E-02	1.540E-01	3.039E-01	FAIL ABUN
RE-183	-6.021E-02	1.572E-01	2.714E-01	NOT IDENT.
RE-184	-2.360E-02	1.284E-01	2.441E-01	NOT IDENT.
W-188	2.746E+00	6.386E+00	1.225E+01	NOT IDENT.
IR-192	-7.340E-03	2.854E-02	5.547E-02	FAIL ABUN
HG-203	-6.040E-03	3.344E-02	6.600E-02	NOT IDENT.
TL-204	-2.899E+00	3.242E+00	5.730E+00	NOT IDENT.
BI-207	-4.452E-03	4.152E-02	8.295E-02	FAIL ABUN
BI-210	-1.180E+00	1.976E+00	3.364E+00	NOT IDENT.
PB-210	-1.180E+00	1.976E+00	3.364E+00	NOT IDENT.
PB-211	1.891E-02	5.434E-01	9.731E-01	NOT IDENT.
BI-212	5.337E-02	4.386E-01	8.140E-01	NOT IDENT.
BI-213	-2.815E-02	6.323E-02	1.187E-01	NOT IDENT.
RN-219	7.642E-02	2.764E-01	5.668E-01	FAIL ABUN
RA-223	-1.540E-02	4.324E-01	8.577E-01	FAIL ABUN
AC-225	4.309E-02	2.066E+00	3.785E+00	NOT IDENT.
AC-227	-1.211E-01	1.957E-01	3.248E-01	NOT IDENT.
TH-227	-1.211E-01	1.957E-01	3.248E-01	NOT IDENT.
TH-229	1.315E-01	3.558E-01	6.789E-01	FAIL ABUN
PA-231	2.989E-01	3.024E-01	6.660E-01	NOT IDENT.
TH-231	-1.540E-02	4.324E-01	8.577E-01	FAIL ABUN
PA-233	-1.345E-02	4.575E-02	8.762E-02	NOT IDENT.
PA-234	-1.571E-02	2.534E-01	4.770E-01	FAIL ABUN
PA-234M	-3.403E-01	3.838E+00	7.146E+00	NOT IDENT.
TH-234	-1.844E-02	8.064E-01	1.591E+00	FAIL ABUN
U-235	5.799E-02	1.342E-01	2.593E-01	FAIL ABUN
NP-237	-1.345E-02	4.575E-02	8.762E-02	NOT IDENT.
NP-238	0.000E+00	2.992E+04	0.000E+00	SHORT HLIF
U-238	-1.844E-02	8.064E-01	1.591E+00	FAIL ABUN
NP-239	-6.129E-03	1.498E-01	2.840E-01	NOT IDENT.
PU-239	8.679E+01	2.196E+02	4.271E+02	NOT IDENT.
AM-241	3.254E-02	9.426E-02	1.876E-01	NOT IDENT.
CM-243	9.988E-03	6.387E-02	1.234E-01	NOT IDENT.
BK-247	3.501E-03	5.597E-02	1.080E-01	NOT IDENT.
CM-247	1.208E-02	2.454E-02	5.182E-02	NOT IDENT.
CF-249	8.291E-03	2.747E-02	5.646E-02	NOT IDENT.
CF-251	1.918E-02	8.399E-02	1.592E-01	NOT IDENT.

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	277	10.66*	1.291E+00	1.100E+01	1.100E+01	11.88
AS-73	53.44	86	10.30*	2.099E+00	2.178E+00	3.044E+00	88.99
RB-84	881.60	14	68.90*	2.001E+00	5.580E-02	1.266E-01	100.24
CD-109	88.03	45	3.70*	6.713E+00	9.949E-01	1.055E+00	94.01
AG-110	657.50	12	4.50*	2.581E+00	5.411E-01	6.026E-01	112.79
SN-126	64.28	-----	9.60	4.127E+00	-----	Line Not Found	-----
	86.94	45	8.90	6.713E+00	4.136E-01	4.136E-01	94.01
	87.57	45	37.00*	6.713E+00	9.949E-02	9.949E-02	94.01
TM-171	51.35	86	0.27	2.099E+00	8.308E+01	8.632E+01	88.99
	52.39	86	0.47*	2.099E+00	4.773E+01	4.959E+01	88.99
	66.73	-----	0.14	4.504E+00	-----	Line Not Found	-----
TL-208	277.37	-----	6.60	4.980E+00	-----	Line Not Found	-----
	583.19	56	85.00*	2.846E+00	1.274E-01	1.274E-01	47.91
	860.56	-----	12.50	2.045E+00	-----	Line Not Found	-----
BI-211	72.87	-----	1.23	5.352E+00	-----	Line Not Found	-----
	351.06	194	12.92*	4.193E+00	1.957E+00	1.957E+00	18.66
PB-212	74.82	77	10.28	5.591E+00	7.329E-01	7.329E-01	59.42
	77.11	138	17.10	5.841E+00	7.546E-01	7.546E-01	35.28
	238.63	169	43.60*	5.529E+00	3.825E-01	3.825E-01	23.40
	300.09	-----	3.30	4.707E+00	-----	Line Not Found	-----
BI-214	609.32	106	45.49*	2.746E+00	4.631E-01	4.631E-01	26.31
	1120.29	27	14.92	1.616E+00	6.045E-01	6.045E-01	65.10
	1764.49	19	15.30	1.134E+00	6.129E-01	6.129E-01	47.40
PB-214	74.82	77	5.80	5.591E+00	1.299E+00	1.299E+00	59.42
	77.11	138	9.70	5.841E+00	1.330E+00	1.330E+00	35.28
	87.09	45	3.41	6.713E+00	1.079E+00	1.080E+00	94.01
	242.00	33	7.25	5.476E+00	4.578E-01	4.578E-01	93.92
	295.22	128	18.42	4.761E+00	8.000E-01	8.000E-01	26.35
RN-222	351.93	194	35.60*	4.193E+00	7.101E-01	7.101E-01	18.66
	609.32	106	45.49*	2.746E+00	4.631E-01	4.631E-01	26.31
	1120.29	27	14.92	1.616E+00	6.045E-01	6.045E-01	65.10
	1764.49	19	15.30	1.134E+00	6.129E-01	6.129E-01	47.40
RA-224	240.99	26	4.10*	5.492E+00	6.191E-01	6.191E-01	138.55
RA-226	74.82	77	5.80	5.591E+00	1.299E+00	1.299E+00	59.42
	77.11	138	9.70	5.841E+00	1.330E+00	1.330E+00	35.28
	87.09	45	3.41	6.713E+00	1.079E+00	1.080E+00	94.01
	242.00	33	7.25	5.476E+00	4.578E-01	4.578E-01	93.92
	295.22	128	18.42	4.761E+00	8.000E-01	8.000E-01	26.35
	351.93	194	35.60*	4.193E+00	7.101E-01	7.101E-01	18.66
AC-228	105.21	-----	1.10	7.480E+00	-----	Line Not Found	-----
	338.32	35	11.27	4.311E+00	3.924E-01	3.924E-01	73.62
	835.71	-----	1.61	2.099E+00	-----	Line Not Found	-----
	911.20	19	25.80*	1.941E+00	2.105E-01	2.105E-01	127.22
	968.97	18	15.80	1.839E+00	3.304E-01	3.304E-01	76.73
RA-228	105.21	-----	1.10	7.480E+00	-----	Line Not Found	-----
	338.32	35	11.27	4.311E+00	3.924E-01	3.924E-01	73.62
	835.71	-----	1.61	2.099E+00	-----	Line Not Found	-----

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
TH-228	911.20	19	25.80*	1.941E+00	2.105E-01	2.105E-01	127.22
	968.97	18	15.80	1.839E+00	3.304E-01	3.304E-01	76.73
	74.82	77	10.28	5.591E+00	7.329E-01	7.329E-01	59.42
	77.11	138	17.10	5.841E+00	7.546E-01	7.546E-01	35.28
	238.63	169	43.60*	5.529E+00	3.825E-01	3.825E-01	23.40
TH-230	300.09	-----	3.30	4.707E+00	-----	Line Not Found	-----
	74.82	77	5.80	5.591E+00	1.299E+00	1.299E+00	59.42
	77.11	138	9.70	5.841E+00	1.330E+00	1.330E+00	35.28
	87.09	45	3.41	6.713E+00	1.079E+00	1.079E+00	94.01
	242.00	33	7.25	5.476E+00	4.578E-01	4.578E-01	93.92
TH-232	295.22	128	18.42	4.761E+00	8.000E-01	8.000E-01	26.35
	351.93	194	35.60*	4.193E+00	7.101E-01	7.101E-01	18.66
	105.21	-----	1.10	7.480E+00	-----	Line Not Found	-----
	338.32	35	11.27	4.311E+00	3.924E-01	3.924E-01	73.62
	835.71	-----	1.61	2.099E+00	-----	Line Not Found	-----
U-234	911.20	19	25.80*	1.941E+00	2.105E-01	2.105E-01	127.22
	968.97	18	15.80	1.839E+00	3.304E-01	3.304E-01	76.73
	74.82	77	5.80	5.591E+00	1.299E+00	1.299E+00	59.42
	77.11	138	9.70	5.841E+00	1.330E+00	1.330E+00	35.28
	87.09	45	3.41	6.713E+00	1.079E+00	1.079E+00	94.01
AM-243	242.00	33	7.25	5.476E+00	4.578E-01	4.578E-01	93.92
	295.22	128	18.42	4.761E+00	8.000E-01	8.000E-01	26.35
	351.93	194	35.60*	4.193E+00	7.101E-01	7.101E-01	18.66
	43.53	-----	5.90	8.649E-01	-----	Line Not Found	-----
	74.66	77	67.20*	5.591E+00	1.121E-01	1.121E-01	59.42
ANH-511	511.00	12	100.00*	3.160E+00	2.138E-02	2.138E-02	291.64

Flag: "*" = Keyline

Total number of lines in spectrum 36
 Number of unidentified lines 7
 Number of lines tentatively identified by NID 29 80.56%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.25E+09Y	1.00	1.100E+01	1.100E+01	0.131E+01	11.88	
AS-73	80.30D	1.40	2.178E+00	3.044E+00	2.708E+00	88.99	
RB-84	32.82D	2.27	5.580E-02	1.266E-01	1.269E-01	100.24	
CD-109	461.40D	1.06	9.949E-01	1.055E+00	0.991E+00	94.01	
AG-110	249.76D	1.11	5.411E-01	6.026E-01	6.796E-01	112.79	
SN-126	2.30E+05Y	1.00	9.949E-02	9.949E-02	9.353E-02	94.01	
TM-171	1.92Y	1.04	4.773E+01	4.959E+01	4.413E+01	88.99	
TL-208	1.41E+10Y	1.00	1.274E-01	1.274E-01	0.610E-01	47.91	
BI-211	7.04E+08Y	1.00	1.957E+00	1.957E+00	0.365E+00	18.66	
PB-212	1.41E+10Y	1.00	3.825E-01	3.825E-01	0.895E-01	23.40	
BI-214	1600.00Y	1.00	4.631E-01	4.631E-01	1.219E-01	26.31	
PB-214	1600.00Y	1.00	7.101E-01	7.101E-01	1.325E-01	18.66	
RN-222	1600.00Y	1.00	4.631E-01	4.631E-01	1.219E-01	26.31	
RA-224	1.41E+10Y	1.00	6.191E-01	6.191E-01	8.578E-01	138.55	
RA-226	1600.00Y	1.00	7.101E-01	7.101E-01	1.325E-01	18.66	
AC-228	1.41E+10Y	1.00	2.105E-01	2.105E-01	2.678E-01	127.22	
RA-228	1.41E+10Y	1.00	2.105E-01	2.105E-01	2.678E-01	127.22	
TH-228	1.41E+10Y	1.00	3.825E-01	3.825E-01	0.895E-01	23.40	
TH-230	7.54E+04Y	1.00	7.101E-01	7.101E-01	1.325E-01	18.66	
TH-232	1.41E+10Y	1.00	2.105E-01	2.105E-01	2.678E-01	127.22	
U-234	2.45E+05Y	1.00	7.101E-01	7.101E-01	1.325E-01	18.66	
AM-243	7370.00Y	1.00	1.121E-01	1.121E-01	0.666E-01	59.42	
ANH-511	1.00E+09Y	1.00	2.138E-02	2.138E-02	6.236E-02	291.64	
Total Activity :			7.060E+01	7.352E+01			

Grand Total Activity : 7.060E+01 7.352E+01

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	92.82	46	116	0.94	186.28	184	8	1.07E-02	****	7.06E+00	T
0	160.60	34	68	1.74	321.98	318	9	8.22E-03	****	7.00E+00	
2	185.84	39	69	1.41	372.51	367	17	9.66E-03	89.1	6.48E+00	T
2	187.83	25	62	1.41	376.49	367	17	6.06E-03	****	6.44E+00	
0	271.70	34	89	4.16	544.41	537	17	8.73E-03	****	5.05E+00	T
0	356.48	9	16	0.60	714.17	711	7	2.30E-03	****	4.15E+00	T
0	410.59	17	29	1.63	822.50	814	11	4.38E-03	****	3.74E+00	T
0	529.30	10	10	1.63	1060.18	1056	7	2.73E-03	****	3.07E+00	T
0	575.82	6	10	0.87	1153.33	1151	7	1.65E-03	****	2.87E+00	
2	604.67	24	19	1.83	1211.09	1204	38	6.41E-03	86.7	2.76E+00	T
0	723.14	12	28	3.50	1448.29	1438	14	3.36E-03	****	2.38E+00	T
0	1070.95	9	1	0.95	2144.71	2142	6	2.43E-03	80.0	1.68E+00	
0	1128.46	7	5	1.42	2259.87	2252	11	2.08E-03	****	1.61E+00	T
0	1158.35	9	6	1.10	2319.71	2315	9	2.65E-03	****	1.57E+00	
0	1219.73	13	5	0.55	2442.63	2438	11	3.75E-03	86.5	1.50E+00	
0	1729.88	12	0	0.73	3464.15	3459	10	3.61E-03	55.5	1.15E+00	

Flags: "T" = Tentatively associated

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*****
*
*               GEL Laboratories LLC
*               2040 Savage Road
*               Charleston, SC 29407
*
*****
*
*               DETECTOR AND SAMPLE DATA
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724002.CNF;1
* Acquisition date   : 28-FEB-2023 05:06:43 Sensitivity      : 3.000
* Detector ID       : GAM30 Energy tolerance: 1.500
* Elapsed live time : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time : 0 01:00:01.17 Half life ratio  : *****
* Sample date       : 20-JAN-2023 11:00:00 Nuclide Library : SOLID
* Sample ID         : G609724002 Analyst initials: RXF2
* Batch Number      : 2379916 Sample Quantity  : 1.3748E+02 GRAM
* Wet wt corr       : 1.00000 Wet Weight       : 0.00000
*                   Dry Weight      : 0.00000
*****
*
*               CALIBRATION INFORMATION
*
* Eff. Cal. date    : 19-SEP-2022 10:46:20 Eff. Geometry   : CAN
* Eff. File         : DKA100:[CANBERRA.GAMMA]EFF_GAM30_CAN.CNF;14
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)
K-40	1.290E-01
AS-73	4.750E-01
RB-84	7.068E-02
CD-109	5.118E-01
AG-110	5.122E-01
SN-126	4.374E-02
TM-171	8.361E+00
TL-208	2.145E-02
BI-211	7.364E-02
PB-212	3.533E-02
BI-214	4.301E-02
PB-214	2.678E-02
RN-222	4.301E-02
RA-224	3.786E-01
RA-226	2.678E-02
AC-228	9.025E-02
RA-228	9.025E-02
TH-228	3.533E-02
TH-230	2.678E-02
TH-232	9.025E-02
U-234	2.678E-02
AM-243	2.965E-02
ANH-511	1.898E-02

---- Non-Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)	
BE-7	3.132E-01	NOT IDENT.
NA-22	1.728E-02	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	1.513E-02	FAIL ABUN
SC-46	2.153E-02	FAIL ABUN
V-48	1.069E-01	NOT IDENT.
CR-51	4.159E-01	NOT IDENT.
MN-52	1.773E+00	NOT IDENT.

MN-54	2.651E-02	NOT IDENT.
CO-56	2.515E-02	NOT IDENT.
MN-56	0.000E+00	SHORT HLIF
CO-57	1.467E-02	NOT IDENT.
CO-58	2.991E-02	NOT IDENT.
FE-59	8.840E-02	NOT IDENT.
CO-60	3.127E-02	NOT IDENT.
ZN-65	4.763E-02	NOT IDENT.
GE-68	1.008E+00	NOT IDENT.
AS-74	1.589E-01	NOT IDENT.
SE-75	3.125E-02	NOT IDENT.
BR-77	0.000E+00	SHORT HLIF
SR-82	2.902E-01	NOT IDENT.
RB-83	3.880E-02	FAIL ABUN
KR-85	3.899E+00	NOT IDENT.
SR-85	2.649E-02	NOT IDENT.
RB-86	1.456E+00	NOT IDENT.
Y-88	2.711E-02	NOT IDENT.
Y-91	1.768E+01	NOT IDENT.
NB-94	2.046E-02	NOT IDENT.
NB-95	3.561E-02	NOT IDENT.
NB-95M	9.272E-02	NOT IDENT.
ZR-95	5.067E-02	FAIL ABUN
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	SHORT HLIF
RH-101	1.820E-02	NOT IDENT.
RH-102	3.772E-02	NOT IDENT.
RU-103	3.325E-02	FAIL ABUN
RH-106	2.077E-01	NOT IDENT.
RU-106	2.077E-01	NOT IDENT.
AG-108M	1.615E-02	FAIL ABUN
AG-110M	3.478E-02	FAIL ABUN
SN-113	2.803E-02	NOT IDENT.
CD-115	0.000E+00	SHORT HLIF
SN-117M	1.013E-01	NOT IDENT.
SB-122	0.000E+00	SHORT HLIF
TE-123M	1.906E-02	NOT IDENT.
SB-124	5.073E-02	FAIL ABUN
SB-125	6.043E-02	NOT IDENT.
TE-125M	6.750E+00	NOT IDENT.
I-126	4.920E-01	NOT IDENT.
SB-126	4.121E-01	NOT IDENT.
SB-127	0.000E+00	SHORT HLIF
I-131	4.567E-01	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	0.000E+00	SHORT HLIF
BA-133	2.328E-02	FAIL ABUN
I-133	0.000E+00	SHORT HLIF
CS-134	2.887E-02	FAIL ABUN
I-135	0.000E+00	SHORT HLIF
CS-136	2.295E-01	NOT IDENT.
BA-137M	2.476E-02	NOT IDENT.
CS-137	2.615E-02	NOT IDENT.
LA-138	2.147E-02	NOT IDENT.
CE-139	1.640E-02	NOT IDENT.
BA-140	4.719E-01	NOT IDENT.
LA-140	1.809E-01	NOT IDENT.
CE-141	6.009E-02	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.061E-01	NOT IDENT.
PM-144	2.153E-02	NOT IDENT.
PR-144	1.631E+00	NOT IDENT.
PM-146	2.719E-02	NOT IDENT.
ND-147	1.329E+00	NOT IDENT.
PM-147	3.759E+02	NOT IDENT.
PM-149	0.000E+00	SHORT HLIF
EU-150	1.618E-02	FAIL ABUN
EU-152	5.409E-02	NOT IDENT.
GD-153	4.719E-02	NOT IDENT.
EU-154	4.735E-02	FAIL ABUN
EU-155	4.715E-02	FAIL ABUN
TB-160	1.068E-01	FAIL ABUN
HO-166M	2.909E-02	FAIL ABUN
HF-172	1.115E-01	FAIL ABUN
LU-172	4.662E-02	FAIL ABUN
LU-176	1.473E-02	FAIL ABUN

HF-181	3.309E-02	NOT IDENT.
TA-182	1.287E-01	FAIL ABUN
RE-183	1.249E-01	NOT IDENT.
RE-184	1.007E-01	NOT IDENT.
W-188	5.545E+00	NOT IDENT.
IR-192	2.481E-02	FAIL ABUN
HG-203	2.964E-02	NOT IDENT.
TL-204	2.667E+00	NOT IDENT.
BI-207	3.557E-02	FAIL ABUN
BI-210	1.533E+00	NOT IDENT.
PB-210	1.533E+00	NOT IDENT.
PB-211	4.335E-01	NOT IDENT.
BI-212	3.596E-01	NOT IDENT.
BI-213	5.112E-02	NOT IDENT.
RN-219	2.532E-01	FAIL ABUN
RA-223	3.861E-01	FAIL ABUN
AC-225	1.724E+00	NOT IDENT.
AC-227	1.471E-01	NOT IDENT.
TH-227	1.471E-01	NOT IDENT.
TH-229	3.120E-01	FAIL ABUN
PA-231	3.027E-01	NOT IDENT.
TH-231	3.861E-01	FAIL ABUN
PA-233	3.949E-02	NOT IDENT.
PA-234	2.055E-01	FAIL ABUN
PA-234M	3.076E+00	NOT IDENT.
TH-234	7.421E-01	FAIL ABUN
U-235	1.201E-01	FAIL ABUN
NP-237	3.949E-02	NOT IDENT.
NP-238	0.000E+00	SHORT HLIF
U-238	7.421E-01	FAIL ABUN
NP-239	1.291E-01	NOT IDENT.
PU-239	1.973E+02	NOT IDENT.
AM-241	8.731E-02	NOT IDENT.
CM-243	5.672E-02	NOT IDENT.
BK-247	4.907E-02	NOT IDENT.
CM-247	2.314E-02	NOT IDENT.
CF-249	2.528E-02	NOT IDENT.
CF-251	7.290E-02	NOT IDENT.

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*****
*
*           GEL Laboratories LLC
*           2040 Savage Road
*           Charleston, SC 29407
*****
*
*           DETECTOR AND SAMPLE DATA
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724002.CNF;1
* Acquisition date   : 28-FEB-2023 05:06:43 Sensitivity      : 3.000
* Detector ID        : GAM30 Energy tolerance: 1.500
* Elapsed live time  : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time  : 0 01:00:01.17 Half life ratio  : *****
* Sample date        : 20-JAN-2023 11:00:00 Nuclide Library : SOLID
* Sample ID          : G609724002 Analyst initials: RXF2
* Batch Number       : 2379916 Sample Quantity : 1.3748E+02 GRAM
*                   : Quantity Err(%) : 1.4548E-03 %
* Wet wt corr        : 1.00000 Wet Weight      : 0.00000
*                   : Dry Weight       : 0.00000
*****
*
*           CALIBRATION INFORMATION
*
* Eff. Cal. date     : 19-SEP-2022 10:46:20 Eff. Geometry   : CAN
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM30_CAN.CNF;14
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
K-40	1.100E+01	1.624E+00	1.624E+00
AS-73	3.044E+00	2.729E+00	2.729E+00
RB-84	1.266E-01	1.248E-01	1.248E-01
CD-109	1.055E+00	9.774E-01	9.774E-01
AG-110	6.026E-01	6.683E-01	6.683E-01
SN-126	9.949E-02	9.206E-02	9.206E-02
TM-171	4.959E+01	4.351E+01	4.351E+01
TL-208	1.274E-01	6.093E-02	6.093E-02
BI-211	1.957E+00	3.908E-01	3.908E-01
PB-212	3.825E-01	9.265E-02	9.265E-02
BI-214	4.631E-01	1.267E-01	1.267E-01
PB-214	7.101E-01	1.414E-01	1.414E-01
RN-222	4.631E-01	1.267E-01	1.267E-01
RA-224	6.191E-01	8.420E-01	8.420E-01
RA-226	7.101E-01	1.414E-01	1.414E-01
AC-228	2.105E-01	2.631E-01	2.631E-01
RA-228	2.105E-01	2.631E-01	2.631E-01
TH-228	3.825E-01	9.265E-02	9.265E-02
TH-230	7.101E-01	1.414E-01	1.414E-01
TH-232	2.105E-01	2.631E-01	2.631E-01
U-234	7.101E-01	1.414E-01	1.414E-01
AM-243	1.121E-01	6.589E-02	6.589E-02
ANH-511	2.138E-02	6.114E-02	6.114E-02

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	3.165E-01	3.161E-01	3.468E-01	NOT IDENT.
NA-22	-2.224E-02	2.679E-02	2.860E-02	NOT IDENT.
NA-24	3.903E+16	7.389E+16	0.000E+00	SHORT HLIF
AL-26	-6.567E-03	2.146E-02	2.166E-02	FAIL ABUN
SC-46	-3.395E-03	2.710E-02	2.714E-02	FAIL ABUN
V-48	3.437E-02	1.208E-01	1.218E-01	NOT IDENT.
CR-51	-2.982E-02	4.670E-01	4.671E-01	NOT IDENT.

MN-52	-1.334E+00	2.626E+00	2.694E+00	NOT IDENT.
MN-54	2.275E-02	2.738E-02	2.924E-02	NOT IDENT.
CO-56	-1.478E-02	3.396E-02	3.461E-02	NOT IDENT.
MN-56	-1.000E+41	1.868E+41	0.000E+00	SHORT HLIF
CO-57	-2.738E-03	1.728E-02	1.732E-02	NOT IDENT.
CO-58	2.554E-03	3.534E-02	3.536E-02	NOT IDENT.
FE-59	3.600E-02	9.485E-02	9.623E-02	NOT IDENT.
CO-60	1.484E-02	3.351E-02	3.417E-02	NOT IDENT.
ZN-65	2.359E-02	5.376E-02	5.480E-02	NOT IDENT.
GE-68	1.249E+00	9.322E-01	1.089E+00	NOT IDENT.
AS-74	1.108E-01	1.705E-01	1.776E-01	NOT IDENT.
SE-75	8.650E-03	3.347E-02	3.370E-02	NOT IDENT.
BR-77	5.887E+04	6.739E+04	7.243E+04	SHORT HLIF
SR-82	-2.808E-01	4.186E-01	4.374E-01	NOT IDENT.
RB-83	-2.241E-02	4.967E-02	5.068E-02	FAIL ABUN
KR-85	3.147E+00	4.272E+00	4.502E+00	NOT IDENT.
SR-85	2.135E-02	2.903E-02	3.058E-02	NOT IDENT.
RB-86	1.561E+00	1.398E+00	1.565E+00	NOT IDENT.
Y-88	1.375E-03	3.216E-02	3.216E-02	NOT IDENT.
Y-91	-4.164E+00	2.124E+01	2.133E+01	NOT IDENT.
NB-94	2.710E-03	2.373E-02	2.377E-02	NOT IDENT.
NB-95	6.545E-03	4.133E-02	4.144E-02	NOT IDENT.
NB-95M	-1.953E-02	1.249E-01	1.252E-01	NOT IDENT.
ZR-95	2.597E-02	5.427E-02	5.552E-02	FAIL ABUN
NB-97	1.000E+41	1.109E+41	0.000E+00	SHORT HLIF
ZR-97	8.414E+15	1.745E+16	0.000E+00	SHORT HLIF
MO-99	1.045E+03	2.875E+03	2.913E+03	SHORT HLIF
TC-99M	-1.000E+41	6.089E+41	0.000E+00	SHORT HLIF
RH-101	-6.257E-03	2.181E-02	2.199E-02	NOT IDENT.
RH-102	2.979E-02	3.922E-02	4.146E-02	NOT IDENT.
RU-103	1.390E-02	3.575E-02	3.629E-02	FAIL ABUN
RH-106	1.628E-02	2.686E-01	2.687E-01	NOT IDENT.
RU-106	1.628E-02	2.686E-01	2.687E-01	NOT IDENT.
AG-108M	-5.723E-03	1.932E-02	1.949E-02	FAIL ABUN
AG-110M	4.494E-02	3.230E-02	3.812E-02	FAIL ABUN
SN-113	-1.226E-02	3.351E-02	3.396E-02	NOT IDENT.
CD-115	1.147E+04	1.405E+04	1.497E+04	SHORT HLIF
SN-117M	2.151E-03	1.289E-01	1.289E-01	NOT IDENT.
SB-122	-2.249E+02	5.292E+02	5.388E+02	SHORT HLIF
TE-123M	1.074E-02	2.279E-02	2.330E-02	NOT IDENT.
SB-124	-1.616E-02	6.823E-02	6.862E-02	FAIL ABUN
SB-125	3.165E-02	6.444E-02	6.600E-02	NOT IDENT.
TE-125M	-1.978E+00	7.980E+00	8.030E+00	NOT IDENT.
I-126	7.517E-02	5.668E-01	5.678E-01	NOT IDENT.
SB-126	2.157E-01	4.555E-01	4.658E-01	NOT IDENT.
SB-127	2.444E+00	6.130E+01	6.131E+01	SHORT HLIF
I-131	7.057E-02	5.026E-01	5.036E-01	NOT IDENT.
I-132	1.000E+41	4.882E+41	0.000E+00	SHORT HLIF
TE-132	1.112E+01	8.496E+01	8.511E+01	SHORT HLIF
BA-133	1.897E-02	3.098E-02	3.214E-02	FAIL ABUN
I-133	6.131E+11	7.646E+11	8.131E+11	SHORT HLIF
CS-134	1.994E-02	3.080E-02	3.208E-02	FAIL ABUN
I-135	-3.413E+40	4.750E+41	0.000E+00	SHORT HLIF
CS-136	1.224E-01	2.375E-01	2.438E-01	NOT IDENT.
BA-137M	2.881E-02	2.424E-02	2.750E-02	NOT IDENT.
CS-137	3.043E-02	2.560E-02	2.905E-02	NOT IDENT.
LA-138	9.793E-04	2.481E-02	2.482E-02	NOT IDENT.
CE-139	-3.607E-03	1.985E-02	1.991E-02	NOT IDENT.
BA-140	-6.425E-02	5.599E-01	5.606E-01	NOT IDENT.
LA-140	3.817E-02	2.015E-01	2.023E-01	NOT IDENT.
CE-141	8.465E-03	6.935E-02	6.945E-02	NOT IDENT.
CE-143	-3.452E+06	1.187E+07	1.197E+07	SHORT HLIF
CE-144	-3.488E-02	1.277E-01	1.287E-01	NOT IDENT.
PM-144	6.665E-03	2.420E-02	2.438E-02	NOT IDENT.
PR-144	5.050E-01	1.833E+00	1.847E+00	NOT IDENT.
PM-146	2.737E-02	2.705E-02	2.973E-02	NOT IDENT.
ND-147	-5.470E-01	1.854E+00	1.870E+00	NOT IDENT.
PM-147	-2.206E+02	4.616E+02	4.722E+02	NOT IDENT.
PM-149	6.414E+02	9.948E+04	9.948E+04	SHORT HLIF
EU-150	-3.837E-03	1.944E-02	1.951E-02	FAIL ABUN
EU-152	1.510E-02	5.852E-02	5.892E-02	NOT IDENT.
GD-153	2.580E-02	5.479E-02	5.601E-02	NOT IDENT.
EU-154	-8.419E-02	7.981E-02	8.837E-02	FAIL ABUN
EU-155	-5.907E-02	6.163E-02	6.714E-02	FAIL ABUN
TB-160	-1.887E-02	1.505E-01	1.508E-01	FAIL ABUN
HO-166M	-7.935E-03	3.640E-02	3.658E-02	FAIL ABUN
HF-172	-1.155E-01	1.410E-01	1.503E-01	FAIL ABUN
LU-172	9.111E-03	5.192E-02	5.208E-02	FAIL ABUN

LU-176	-3.803E-03	1.684E-02	1.693E-02	FAIL ABUN
HF-181	1.661E-02	3.480E-02	3.560E-02	NOT IDENT.
TA-182	5.125E-02	1.541E-01	1.558E-01	FAIL ABUN
RE-183	-6.021E-02	1.574E-01	1.597E-01	NOT IDENT.
RE-184	-2.360E-02	1.284E-01	1.289E-01	NOT IDENT.
W-188	2.746E+00	6.395E+00	6.514E+00	NOT IDENT.
IR-192	-7.340E-03	2.855E-02	2.874E-02	FAIL ABUN
HG-203	-6.040E-03	3.344E-02	3.355E-02	NOT IDENT.
TL-204	-2.899E+00	3.255E+00	3.508E+00	NOT IDENT.
BI-207	-4.452E-03	4.153E-02	4.157E-02	FAIL ABUN
BI-210	-1.180E+00	1.979E+00	2.049E+00	NOT IDENT.
PB-210	-1.180E+00	1.979E+00	2.049E+00	NOT IDENT.
PB-211	1.891E-02	5.434E-01	5.434E-01	NOT IDENT.
BI-212	5.337E-02	4.387E-01	4.393E-01	NOT IDENT.
BI-213	-2.815E-02	6.328E-02	6.454E-02	NOT IDENT.
RN-219	7.642E-02	2.766E-01	2.788E-01	FAIL ABUN
RA-223	-1.540E-02	4.324E-01	4.325E-01	FAIL ABUN
AC-225	4.309E-02	2.066E+00	2.066E+00	NOT IDENT.
AC-227	-1.211E-01	1.965E-01	2.039E-01	NOT IDENT.
TH-227	-1.211E-01	1.965E-01	2.039E-01	NOT IDENT.
TH-229	1.315E-01	3.560E-01	3.609E-01	FAIL ABUN
PA-231	2.989E-01	3.096E-01	3.376E-01	NOT IDENT.
TH-231	-1.540E-02	4.324E-01	4.325E-01	FAIL ABUN
PA-233	-1.345E-02	4.576E-02	4.616E-02	NOT IDENT.
PA-234	-1.571E-02	2.541E-01	2.542E-01	FAIL ABUN
PA-234M	-3.403E-01	3.838E+00	3.841E+00	NOT IDENT.
TH-234	-1.844E-02	8.064E-01	8.064E-01	FAIL ABUN
U-235	5.799E-02	1.343E-01	1.368E-01	FAIL ABUN
NP-237	-1.345E-02	4.576E-02	4.616E-02	NOT IDENT.
NP-238	3.957E+03	2.992E+04	2.998E+04	SHORT HLIF
U-238	-1.844E-02	8.064E-01	8.064E-01	FAIL ABUN
NP-239	-6.129E-03	1.498E-01	1.498E-01	NOT IDENT.
PU-239	8.679E+01	2.197E+02	2.232E+02	NOT IDENT.
AM-241	3.254E-02	9.430E-02	9.543E-02	NOT IDENT.
CM-243	9.988E-03	6.388E-02	6.404E-02	NOT IDENT.
BK-247	3.501E-03	5.597E-02	5.600E-02	NOT IDENT.
CM-247	1.208E-02	2.464E-02	2.523E-02	NOT IDENT.
CF-249	8.291E-03	2.749E-02	2.774E-02	NOT IDENT.
CF-251	1.918E-02	8.402E-02	8.447E-02	NOT IDENT.

 * GEL Laboratories LLC *
 * 2040 Savage Road *
 * Charleston, SC 29407 *
 * GAMMA SPECTROSCOPY BACKGROUND REPORT *

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	43.5563	85.43	49.4399	131.20	41.7811
45.60	35.5319	86.55	66.0415	133.02	46.2836
46.54	47.0602	86.79	66.0674	133.52	40.7985
49.72	0.0000	86.94	66.0835	136.00	42.0287
51.35	35.6950	87.09	66.0996	136.47	40.9464
51.87	35.7370	87.57	66.1514	140.51	0.0000
52.39	35.7790	88.03	81.3717	143.76	39.0717
52.97	35.8254	88.34	81.4125	144.24	39.0936
53.44	35.8629	88.47	86.9506	145.44	45.8597
54.07	35.9129	89.96	74.7076	152.43	43.9738
57.36	0.0000	1093.63	72.7109	153.25	45.1428
57.53	50.8509	91.11	74.8444	323.87	44.0619
57.98	52.2042	92.59	58.3481	156.02	37.3581
59.27	57.9071	93.35	58.4174	158.56	40.8691
59.32	57.9129	94.56	37.6246	159.00	36.3457
59.54	53.0294	94.65	37.6298	162.33	54.7170
60.96	60.0790	94.67	37.6309	162.66	54.7361
61.17	66.0165	94.87	37.6427	163.33	36.5171
62.93	64.2741	97.43	34.9909	165.86	34.3277
63.29	50.4667	98.43	32.5908	176.31	31.2340
63.58	47.5257	98.44	32.5915	176.60	37.0293
64.28	64.4471	99.53	43.1752	177.52	35.9057
66.73	54.7935	100.11	41.1048	181.07	0.0000
67.24	66.8144	102.03	40.1648	181.52	31.0116
125.81	69.8649	103.18	39.1739	184.41	32.6561
67.75	69.8740	103.37	40.2437	143.76	32.6984
68.89	63.0236	105.21	46.7228	193.51	36.4776
69.67	64.1182	105.31	46.7295	197.03	47.2260
70.82	81.3238	106.12	43.5941	198.01	33.0889
70.83	81.3257	106.47	42.5522	201.83	43.8816
72.81	65.8358	109.28	45.9263	203.43	42.7593
72.87	65.8428	111.00	39.6134	205.31	45.2137
74.66	67.7422	111.76	0.0000	210.85	33.4841
74.82	67.7616	114.06	35.4804	215.65	42.0362
74.97	67.7795	116.30	0.0000	218.12	34.9061
77.11	68.0382	116.74	34.5305	222.11	20.5341
78.74	54.3144	119.76	37.9205	227.09	43.6718
79.69	55.7640	121.12	43.4158	227.38	43.6827
80.03	50.3526	121.22	43.4213	228.16	0.0000
80.12	50.3609	121.78	42.3670	228.18	35.2132
80.19	50.3669	122.06	44.5560	116.74	35.2132
80.57	43.5889	122.92	44.6060	235.69	43.9920
81.00	50.4369	123.07	42.4384	235.96	44.0019
81.07	50.4429	265.00	49.0062	238.63	41.6497
81.75	53.2310	125.81	57.8774	238.98	0.0000
82.47	61.4960	127.23	52.5123	240.99	41.7311
83.79	46.5663	127.91	41.6083	242.00	41.7659
84.00	47.9527	129.30	41.6814	244.70	31.1885

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.40	0.0000	344.28	18.5168	563.25	10.8926
252.80	30.9799	345.93	13.2404	564.24	0.0000
254.15	0.0000	351.06	9.2984	569.33	17.8726
256.23	42.2479	351.93	9.3035	946.00	21.8460
260.90	0.0000	355.39	0.0000	569.70	21.8478
264.66	29.1852	356.01	13.3249	583.19	15.9837
264.80	29.1880	364.49	15.1811	584.27	15.9909
265.00	32.0289	366.42	0.0000	595.83	10.0444
269.46	27.6188	372.51	16.1528	427.87	15.0970
270.03	27.6309	375.05	21.5703	602.52	0.0000
271.23	27.6558	377.52	13.5013	604.72	17.1397
273.65	27.7068	356.01	19.8766	607.14	17.1570
276.40	31.5498	388.16	20.8330	609.32	17.1729
277.37	29.0469	388.63	19.9330	610.33	17.1805
277.60	23.9993	391.69	22.6913	614.28	17.2089
278.00	30.3245	264.66	26.4588	618.01	17.2352
279.20	28.6654	401.81	20.0857	620.36	18.2673
279.54	29.5156	402.40	17.3525	621.93	15.2325
279.70	29.5191	404.85	21.9497	630.19	0.0000
280.46	33.7557	410.95	16.5192	631.29	10.1941
283.69	25.3772	413.71	16.5450	633.25	16.3236
284.31	22.8499	414.70	22.0723	634.78	16.3340
285.41	27.1029	423.72	16.6370	635.95	18.3845
285.90	0.0000	427.09	24.0756	636.99	17.3708
287.50	33.0824	427.87	17.6014	657.50	16.9988
290.67	24.2313	433.94	19.5183	657.76	17.0009
293.27	0.0000	439.40	19.5760	657.90	0.0000
351.93	22.1782	440.45	17.7217	661.66	7.2236
295.96	22.1898	453.88	10.3331	664.57	0.0000
879.38	28.2164	463.37	20.7682	666.33	14.4734
299.98	32.0961	468.07	24.6035	666.50	15.5084
300.09	29.5305	473.00	0.0000	667.71	0.0000
300.13	29.5312	475.06	30.3893	677.62	14.5378
301.36	19.7048	476.78	19.9601	685.70	0.0000
302.85	30.0169	477.60	13.3124	692.65	0.0000
256.23	29.1932	482.18	8.5776	695.00	19.8612
304.85	29.2001	487.02	12.4200	696.49	11.5053
306.78	26.6595	492.35	0.0000	696.51	11.5053
308.46	29.2734	497.08	10.5614	697.00	13.5999
311.90	29.3433	505.52	23.1377	697.30	12.5552
316.51	27.7038	507.63	0.0000	697.49	8.3708
319.41	27.7585	511.00	21.2655	702.65	13.6289
320.08	29.5065	514.00	8.7122	706.68	9.4497
321.04	30.3943	514.00	8.7122	711.68	10.5192
323.87	27.8418	520.40	13.5933	720.70	15.8319
325.23	33.9631	520.69	0.0000	721.93	0.0000
328.76	29.6788	522.65	0.0000	722.78	15.8441
333.37	34.1464	527.90	0.0000	722.91	15.8447
333.97	29.4301	528.26	20.4659	723.31	20.6013
334.37	22.3410	529.59	16.0905	724.19	25.3643
338.28	28.9858	529.87	0.0000	727.33	17.7755
338.32	28.9865	531.02	16.1005	733.00	12.7231
311.90	15.8331	537.26	11.7437	735.93	11.6750
340.48	15.8331	546.56	0.0000	333.97	9.5577
340.55	15.8335	552.55	20.6958	739.50	0.0000

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
744.23	10.6458	949.00	18.2148	1384.29	6.6808
747.24	17.0514	667.71	0.0000	1408.01	1.9187
748.06	12.7925	962.31	14.8583	1434.09	4.8239
752.31	12.8120	964.08	12.3504	1435.80	1.9303
753.82	8.5459	966.17	6.8655	1457.56	0.0000
756.73	6.4160	911.20	16.0326	1460.82	1.9407
756.80	6.4163	983.53	5.7503	1489.16	1.9523
884.68	17.1536	984.45	0.0000	1505.03	5.8762
765.81	15.0191	1274.44	5.7715	1584.12	5.9711
766.42	15.0225	1001.03	13.8706	1596.21	2.9927
766.84	8.5856	1002.74	8.0952	1620.50	0.0000
772.60	0.0000	1004.73	9.2568	1621.92	1.0026
776.52	12.9219	507.63	0.0000	1678.03	0.0000
739.50	0.0000	1025.87	0.0000	1690.97	3.0478
778.90	9.6995	1028.54	0.0000	1750.46	0.0000
783.70	0.0000	1037.84	7.0078	1764.49	4.1191
788.74	11.8956	1038.76	0.0000	1063.66	2.0618
792.07	12.9917	631.29	3.5125	1771.35	3.0932
795.86	9.7566	1048.07	6.1494	1791.20	0.0000
810.06	14.1611	1049.04	11.4234	1808.65	3.1141
810.29	11.9834	1050.41	10.5483	1810.72	0.0000
344.28	11.9843	1063.66	13.2330	1836.06	3.1293
810.76	10.8956	1077.00	5.3126		
815.77	9.8229	1077.34	3.5420		
1048.07	13.1089	1085.87	7.9882		
832.01	15.3626	1093.63	11.5623		
834.85	7.6887	1099.45	8.9081		
835.71	12.0854	1112.07	8.9374		
836.80	0.0000	1112.84	5.1081		
846.75	0.0000	1115.54	4.2940		
846.77	12.1293	1120.29	9.8526		
856.80	16.5942	1120.55	10.7490		
860.56	11.0763	1221.41	9.5566		
871.09	5.5568	1129.67	14.3662		
873.19	12.2331	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	13.3716	1173.23	11.8035		
880.51	11.1471	1177.95	9.9996		
881.60	11.1507	1189.05	9.1162		
883.24	11.7147	1204.77	13.7274		
884.68	1.6743	1221.41	7.3516		
889.28	6.7068	1231.02	8.2897		
894.76	13.4365	1235.36	13.8309		
898.04	6.7251	1238.28	11.9947		
900.72	10.0961	1260.41	0.0000		
903.28	8.9814	1271.87	8.3716		
911.20	12.3799	1274.44	11.1687		
912.08	12.3831	1274.54	9.3073		
923.98	0.0000	1291.59	9.3445		
926.50	5.6537	1298.22	0.0000		
929.11	4.5265	1312.11	2.8169		
935.54	9.0706	1332.49	7.5469		
937.49	10.2107	1362.66	0.0000		
944.13	13.6411	1365.19	4.7516		
946.00	13.6489	1368.63	0.0000		

VAX/VMS Nuclide Identification Report Generated 28-FEB-2023 06:08:13.02

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724003.CNF;1
Background file : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM38.CNF;51
Background date : 26-FEB-2023 09:14:48
Sample date     : 20-JAN-2023 11:00:00 Acquisition date : 28-FEB-2023 05:07:24
Sample ID      : G609724003 Sample quantity   : 6.48700E+01 GRAM
Detector name  : GAM38 Detector geometry: CAN
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:00.21 0.0%
Energy tolerance : 1.50000 keV Analyst Initials : RXF2
Abundance limit : 75.00000 Sensitivity : 3.00000
Batch ID       : 2379916 Detector SN# :
Matrix Spike ID : LCS ID :
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	46.43*	132	68	1.09	92.84	88	11	3.67E-02	16.0	
2	0	64.01*	36	64	2.28	128.02	123	9	1.01E-02	47.1	
3	2	74.95*	54	69	0.93	149.90	146	14	1.50E-02	28.9	4.35E-01
4	2	77.16*	90	61	0.98	154.32	146	14	2.49E-02	18.3	
5	4	84.61*	5	59	1.21	169.23	165	27	1.29E-03	291.7	2.78E+00
6	4	87.38*	33	53	1.22	174.77	165	27	9.04E-03	42.3	
7	4	89.89	26	47	1.23	179.78	165	27	7.34E-03	49.5	
8	4	92.87*	12	41	1.24	185.75	165	27	3.30E-03	123.9	
9	0	144.06*	13	57	1.23	288.16	283	11	3.58E-03	118.9	
10	0	159.25	24	21	1.62	318.55	315	7	6.55E-03	38.4	
11	0	186.16*	20	53	0.93	372.38	367	9	5.67E-03	73.4	
12	0	200.72	13	30	1.36	401.52	397	9	3.61E-03	82.1	
13	0	209.26	16	47	3.97	418.61	411	11	4.48E-03	85.7	
14	4	238.59*	86	28	1.28	477.29	471	31	2.38E-02	16.1	1.04E+00
15	4	241.66	36	35	1.66	483.42	471	31	9.93E-03	39.9	
16	0	275.18	17	21	0.67	550.46	547	8	4.62E-03	53.1	
17	0	295.03*	31	24	1.22	590.18	584	12	8.52E-03	37.6	
18	0	316.12	12	19	0.65	632.37	629	10	3.37E-03	71.2	
19	4	323.64	15	13	1.83	647.40	644	17	4.10E-03	49.5	2.14E+00
20	4	327.72	16	28	1.84	655.57	644	17	4.54E-03	61.5	
21	0	338.83*	24	31	2.77	677.81	673	12	6.59E-03	52.1	
22	0	352.00*	68	19	1.47	704.15	700	8	1.88E-02	17.0	
23	0	464.42	10	3	1.11	929.01	926	7	2.88E-03	42.1	
24	0	511.17*	43	15	2.05	1022.51	1013	20	1.19E-02	32.5	
25	0	583.09*	35	15	1.90	1166.36	1159	12	9.82E-03	28.6	
26	0	596.90*	9	2	0.95	1193.98	1190	7	2.63E-03	43.9	
27	0	609.09*	51	13	1.24	1218.37	1214	11	1.42E-02	20.4	
28	0	622.41	11	0	0.98	1245.00	1240	9	3.06E-03	30.2	
29	0	626.57	5	5	0.72	1253.32	1248	7	1.44E-03	84.2	
30	0	643.12	15	8	3.37	1286.42	1280	15	4.11E-03	48.4	
31	0	845.20	9	0	0.73	1690.56	1687	8	2.50E-03	33.3	
32	0	868.83	5	7	3.28	1737.79	1730	9	1.45E-03	100.1	
33	0	910.57*	16	2	0.84	1821.27	1816	10	4.48E-03	33.7	
34	0	949.99	11	0	1.06	1900.09	1895	9	3.06E-03	30.2	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
35	0	969.03	17	2	1.46	1938.16	1933	10	4.61E-03	30.3	
36	0	1120.11	11	5	1.08	2240.23	2233	10	2.95E-03	50.2	
37	0	1460.37*	48	6	1.47	2920.45	2914	11	1.35E-02	17.9	

Flag: "*" = Peak area was modified by background subtraction

```

Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724003.CNF;1
Analyses by       : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4,INTERF V2.4
Sample title      : RXF2
Sample date       : 20-JAN-2023 11:00:00 Acquisition date : 28-FEB-2023 05:07:24
Sample ID        : G609724003 Sample quantity   : 64.870 GRAM
Sample type      : SOLID Sample geometry    :
Detector name    : GAMMA38 Detector geometry: CAN
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:00.21 0.0%
Energy tolerance : 1.50 keV Half life ratio   : 10.00
Errors propagated: No Systematic Error   : 0.00 %
Efficiency type  : Empirical Efficiencies at  : Peak Energy
Abundance limit  : 75.00
    
```

Interference Report

Interfering		Interfered	
Nuclide	Line	Nuclide	Line
U-235	143.76	CE-141	145.44

Nuclide Type:

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error	Status
K-40	1460.82	10.66*	7.417E-01	6.472E+00	6.472E+00	35.73	OK
AS-74	595.83	59.00*	1.710E+00	9.445E-02	4.286E-01	87.72	OK
	634.78	15.40	1.611E+00	----- Line	Not Found	-----	Absent
RH-106	621.93	9.93*	1.642E+00	6.811E-01	7.321E-01	60.30	OK
	1050.41	1.56	1.000E+00	----- Line	Not Found	-----	Absent
RU-106	621.93	9.93*	1.642E+00	6.811E-01	7.321E-01	60.30	OK
	1050.41	1.56	1.000E+00	----- Line	Not Found	-----	Absent
CD-109	88.03	3.70*	7.548E+00	1.050E+00	1.113E+00	84.50	OK
SN-117M	156.02	2.11	5.705E+00	----- Line	Not Found	-----	Absent
	158.56	86.40*	5.624E+00	4.531E-02	3.270E-01	76.73	OK
TE-123M	159.00	84.00*	5.624E+00	4.661E-02	5.839E-02	76.73	OK
SN-126	64.28	9.60	7.735E+00	4.319E-01	4.319E-01	94.19	OK
	86.94	8.90	7.548E+00	4.365E-01	4.365E-01	84.50	OK
	87.57	37.00*	7.548E+00	1.050E-01	1.050E-01	84.50	OK
CE-141	145.44	48.29*	6.014E+00	2.378E-02	5.435E-02	423.00	OK
TL-208	277.37	6.60	3.568E+00	----- Line	Not Found	-----	Absent
	583.19	85.00*	1.749E+00	2.391E-01	2.391E-01	57.11	OK
	860.56	12.50	1.204E+00	----- Line	Not Found	-----	Absent
BI-210	46.54	4.25*	7.018E+00	3.837E+00	3.850E+00	32.02	OK
PB-210	46.54	4.25*	7.018E+00	3.837E+00	3.850E+00	32.02	OK
BI-211	72.87	1.23	7.756E+00	----- Line	Not Found	-----	Absent
	351.06	12.92*	2.854E+00	1.791E+00	1.791E+00	34.08	OK
PB-212	74.82	10.28	7.741E+00	6.064E-01	6.064E-01	57.73	OK
	77.11	17.10	7.719E+00	6.073E-01	6.073E-01	36.63	OK
	238.63	43.60*	4.082E+00	4.599E-01	4.599E-01	32.22	OK
	300.09	3.30	3.318E+00	----- Line	Not Found	-----	Absent
BI-214	609.32	45.49*	1.676E+00	6.737E-01	6.738E-01	40.89	OK
	1120.29	14.92	9.430E-01	7.867E-01	7.867E-01	100.49	OK
	1764.49	15.30	6.264E-01	----- Line	Not Found	-----	Absent
PB-214	74.82	5.80	7.741E+00	1.075E+00	1.075E+00	57.73	OK
	77.11	9.70	7.719E+00	1.071E+00	1.071E+00	36.63	OK
	87.09	3.41	7.548E+00	1.139E+00	1.139E+00	84.50	OK
	242.00	7.25	4.037E+00	1.170E+00	1.170E+00	79.77	OK
	295.22	18.42	3.371E+00	4.782E-01	4.782E-01	75.15	OK
	351.93	35.60*	2.854E+00	6.500E-01	6.501E-01	34.08	OK
RN-222	609.32	45.49*	1.676E+00	6.737E-01	6.738E-01	40.89	OK
	1120.29	14.92	9.430E-01	7.867E-01	7.867E-01	100.49	OK
	1764.49	15.30	6.264E-01	----- Line	Not Found	-----	Absent
RA-224	240.99	4.10*	4.037E+00	2.069E+00	2.069E+00	79.77	OK
RA-226	74.82	5.80	7.741E+00	1.075E+00	1.075E+00	57.73	OK
	77.11	9.70	7.719E+00	1.071E+00	1.071E+00	36.63	OK
	87.09	3.41	7.548E+00	1.139E+00	1.139E+00	84.50	OK
	242.00	7.25	4.037E+00	1.170E+00	1.170E+00	79.77	OK
	295.22	18.42	3.371E+00	4.782E-01	4.782E-01	75.15	OK
	351.93	35.60*	2.854E+00	6.500E-01	6.501E-01	34.08	OK
AC-228	105.21	1.10	7.103E+00	----- Line	Not Found	-----	Absent
	338.32	11.27	2.960E+00	6.942E-01	6.942E-01	104.18	OK
	835.71	1.61	1.238E+00	----- Line	Not Found	-----	Absent
	911.20	25.80*	1.142E+00	5.641E-01	5.641E-01	67.46	OK

Nuclide Type:

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error	Status
	968.97	15.80	1.078E+00	1.008E+00	1.008E+00	60.52	OK
RA-228	105.21	1.10	7.103E+00	----- Line	Not Found	-----	Absent
	338.32	11.27	2.960E+00	6.942E-01	6.942E-01	104.18	OK
	835.71	1.61	1.238E+00	----- Line	Not Found	-----	Absent
	911.20	25.80*	1.142E+00	5.641E-01	5.641E-01	67.46	OK
TH-228	968.97	15.80	1.078E+00	1.008E+00	1.008E+00	60.52	OK
	74.82	10.28	7.741E+00	6.064E-01	6.064E-01	57.73	OK
	77.11	17.10	7.719E+00	6.073E-01	6.073E-01	36.63	OK
	238.63	43.60*	4.082E+00	4.599E-01	4.599E-01	32.22	OK
	300.09	3.30	3.318E+00	----- Line	Not Found	-----	Absent
TH-229	85.43	14.70	7.604E+00	3.727E-02	3.727E-02	583.42	OK
	88.47	24.00	7.548E+00	1.619E-01	1.619E-01	84.50	OK
	193.51	4.41*	4.862E+00	----- Line	Not Found	-----	Absent
	210.85	2.80	4.535E+00	----- Line	Not Found	-----	Absent
TH-230	74.82	5.80	7.741E+00	1.075E+00	1.075E+00	57.73	OK
	77.11	9.70	7.719E+00	1.071E+00	1.071E+00	36.63	OK
	87.09	3.41	7.548E+00	1.139E+00	1.139E+00	84.50	OK
	242.00	7.25	4.037E+00	1.170E+00	1.170E+00	79.77	OK
	295.22	18.42	3.371E+00	4.782E-01	4.782E-01	75.15	OK
	351.93	35.60*	2.854E+00	6.500E-01	6.500E-01	34.08	OK
TH-232	105.21	1.10	7.103E+00	----- Line	Not Found	-----	Absent
	338.32	11.27	2.960E+00	6.942E-01	6.942E-01	104.18	OK
	835.71	1.61	1.238E+00	----- Line	Not Found	-----	Absent
	911.20	25.80*	1.142E+00	5.641E-01	5.641E-01	67.46	OK
TH-234	968.97	15.80	1.078E+00	1.008E+00	1.008E+00	60.52	OK
	63.29	3.70*	7.735E+00	1.121E+00	1.121E+00	94.19	OK
	92.59	4.23	7.425E+00	3.422E-01	3.422E-01	247.76	OK
U-234	74.82	5.80	7.741E+00	1.075E+00	1.075E+00	57.73	OK
	77.11	9.70	7.719E+00	1.071E+00	1.071E+00	36.63	OK
	87.09	3.41	7.548E+00	1.139E+00	1.139E+00	84.50	OK
	242.00	7.25	4.037E+00	1.170E+00	1.170E+00	79.77	OK
	295.22	18.42	3.371E+00	4.782E-01	4.782E-01	75.15	OK
	351.93	35.60*	2.854E+00	6.500E-01	6.500E-01	34.08	OK
U-235	89.96	3.47	7.494E+00	9.170E-01	9.170E-01	98.94	OK
	93.35	5.60	7.425E+00	2.585E-01	2.585E-01	247.76	OK
	143.76	10.96*	6.022E+00	----- Line	Not Found	-----	<<INT Reject
	163.33	5.08	5.525E+00	----- Line	Not Found	-----	Absent
	185.72	57.20	5.012E+00	6.712E-02	6.712E-02	146.78	OK
	205.31	5.01	4.636E+00	----- Line	Not Found	-----	Absent
U-238	63.29	3.70*	7.735E+00	1.121E+00	1.121E+00	94.19	OK
	92.59	4.23	7.425E+00	3.422E-01	3.422E-01	247.76	OK
AM-243	43.53	5.90	6.765E+00	----- Line	Not Found	-----	Absent
	74.66	67.20*	7.741E+00	9.276E-02	9.276E-02	57.73	OK
ANH-511	511.00	100.00*	1.988E+00	2.154E-01	2.154E-01	65.07	OK

Flag: "*" = Keyline

 * GEL Laboratories LLC *
 * 2040 Savage Road *
 * Charleston, SC 29407 *

DETECTOR AND SAMPLE DATA

* Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724003.CNF;1 *
 * Acquisition date : 28-FEB-2023 05:07:24 Sensitivity : 3.000 *
 * Detector ID : GAM38 Energy tolerance: 1.500 *
 * Elapsed live time: 0 01:00:00.00 Abundance limit : 75.000 *
 * Elapsed real time: 0 01:00:00.21 Half life ratio : ***** *
 * Sample date : 20-JAN-2023 11:00:00 Analyst initials: RXF2 *
 * Sample ID : G609724003 Sample Quantity : 6.4870E+01 GRAM *
 * Batch Number : 2379916 Wet Weight : 0.00000 *
 * Wet wt corr : 1.00000 Dry Weight : 0.00000 *
 * Nuclide Library : SOLID.NLB;17 *

CALIBRATION INFORMATION

* Eff. Cal. date : 31-MAY-2022 06:05:07 Eff. Geometry : CAN *
 * Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM38_CAN.CNF;2 *

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
 Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
K-40	6.472E+00	2.266E+00	1.930E+00
AS-74	4.286E-01	3.685E-01	6.417E-01
RH-106	7.321E-01	4.327E-01	2.000E-01
RU-106	7.321E-01	4.327E-01	2.000E-01
CD-109	1.113E+00	9.216E-01	1.106E+00
SN-117M	3.270E-01	2.459E-01	3.966E-01
TE-123M	5.839E-02	4.391E-02	7.100E-02
SN-126	1.050E-01	8.694E-02	1.042E-01
CE-141	5.435E-02	2.253E-01	2.217E-01
TL-208	2.391E-01	1.339E-01	9.987E-02
BI-210	3.850E+00	1.208E+00	7.006E-01
PB-210	3.850E+00	1.208E+00	7.006E-01
BI-211	1.791E+00	5.982E-01	5.822E-01
PB-212	4.599E-01	1.452E-01	1.468E-01
BI-214	6.738E-01	2.700E-01	2.609E-01
PB-214	6.501E-01	2.171E-01	2.119E-01
RN-222	6.738E-01	2.700E-01	2.609E-01
RA-224	2.069E+00	1.617E+00	1.577E+00
RA-226	6.501E-01	2.171E-01	2.119E-01
AC-228	5.641E-01	3.729E-01	4.770E-01
RA-228	5.641E-01	3.729E-01	4.770E-01
TH-228	4.599E-01	1.452E-01	1.468E-01
TH-229	4.129E-01	6.880E-01	1.321E+00
TH-230	6.500E-01	2.171E-01	2.119E-01
TH-232	5.641E-01	3.729E-01	4.770E-01
TH-234	1.121E+00	1.034E+00	9.609E-01
U-234	6.500E-01	2.171E-01	2.119E-01
U-235	1.818E-01	4.236E-01	5.051E-01
U-238	1.121E+00	1.034E+00	9.609E-01
AM-243	9.276E-02	5.247E-02	6.049E-02
ANH-511	2.154E-01	1.374E-01	1.048E-01

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L.	Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)
---------	-------------------------------------	------	----------------------------	--------------------

BE-7	3.351E-01	7.716E-01	1.596E+00	NOT IDENT.
NA-22	2.232E-02	6.750E-02	1.615E-01	NOT IDENT.
NA-24	0.000E+00	4.243E+17	0.000E+00	SHORT HLIF
AL-26	2.003E-02	8.202E-02	2.004E-01	NOT IDENT.
SC-46	-5.958E-02	7.469E-02	1.234E-01	FAIL ABUN
V-48	2.408E-01	3.206E-01	8.053E-01	NOT IDENT.
CR-51	1.219E-01	1.293E+00	1.882E+00	NOT IDENT.
MN-52	-1.104E+00	1.086E+01	2.174E+01	NOT IDENT.
MN-54	8.305E-03	7.948E-02	1.633E-01	NOT IDENT.
CO-56	2.775E-02	1.049E-01	2.044E-01	NOT IDENT.
MN-56	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
CO-57	8.097E-03	3.100E-02	5.756E-02	NOT IDENT.
CO-58	3.566E-02	1.041E-01	2.228E-01	NOT IDENT.
FE-59	-4.037E-02	2.272E-01	4.541E-01	NOT IDENT.
CO-60	2.393E-02	9.252E-02	2.001E-01	NOT IDENT.
ZN-65	-1.053E-02	1.830E-01	3.279E-01	NOT IDENT.
GE-68	-4.217E-01	2.594E+00	5.131E+00	NOT IDENT.
AS-73	1.148E-01	3.418E-01	5.639E-01	NOT IDENT.
SE-75	-3.711E-02	7.067E-02	1.132E-01	NOT IDENT.
BR-77	0.000E+00	2.235E+04	0.000E+00	SHORT HLIF
SR-82	-3.404E-01	1.377E+00	2.455E+00	NOT IDENT.
RB-83	-3.550E-02	1.561E-01	2.877E-01	NOT IDENT.
RB-84	-1.050E-01	2.061E-01	3.781E-01	NOT IDENT.
KR-85	1.052E+01	1.485E+01	3.050E+01	NOT IDENT.
SR-85	7.119E-02	1.009E-01	2.071E-01	NOT IDENT.
RB-86	-1.649E+00	4.047E+00	7.412E+00	NOT IDENT.
Y-88	-4.657E-02	6.861E-02	9.797E-02	NOT IDENT.
Y-91	-7.339E+00	4.646E+01	9.376E+01	NOT IDENT.
NB-94	1.518E-03	6.319E-02	1.217E-01	NOT IDENT.
NB-95	-9.402E-03	1.317E-01	2.384E-01	NOT IDENT.
NB-95M	-2.578E-02	2.316E-01	3.681E-01	NOT IDENT.
ZR-95	-7.796E-02	1.877E-01	3.220E-01	NOT IDENT.
NB-97	0.000E+00	1.684E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	4.042E+16	0.000E+00	SHORT HLIF
MO-99	0.000E+00	1.019E+04	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
RH-101	-1.434E-02	3.985E-02	6.835E-02	NOT IDENT.
RH-102	3.855E-02	9.513E-02	2.027E-01	NOT IDENT.
RU-103	3.104E-02	1.126E-01	2.259E-01	FAIL ABUN
AG-108M	-2.277E-02	3.968E-02	6.970E-02	NOT IDENT.
AG-110	1.388E+00	1.465E+00	3.336E+00	NOT IDENT.
AG-110M	5.622E-03	7.994E-02	1.765E-01	NOT IDENT.
SN-113	4.228E-02	7.330E-02	1.579E-01	NOT IDENT.
CD-115	0.000E+00	2.909E+04	0.000E+00	SHORT HLIF
SB-122	0.000E+00	1.101E+03	0.000E+00	SHORT HLIF
SB-124	6.551E-03	2.227E-01	5.330E-01	NOT IDENT.
SB-125	1.181E-01	1.642E-01	3.479E-01	FAIL ABUN
TE-125M	-1.215E+01	1.353E+01	2.192E+01	NOT IDENT.
I-126	-3.027E-01	1.549E+00	2.826E+00	NOT IDENT.
SB-126	-9.570E-01	9.780E-01	1.363E+00	NOT IDENT.
SB-127	0.000E+00	1.768E+02	0.000E+00	SHORT HLIF
I-131	-1.683E-02	1.410E+00	2.726E+00	NOT IDENT.
I-132	0.000E+00	1.067E+41	0.000E+00	SHORT HLIF
TE-132	0.000E+00	1.670E+02	0.000E+00	SHORT HLIF
BA-133	4.291E-02	7.809E-02	1.531E-01	FAIL ABUN
I-133	0.000E+00	1.564E+12	0.000E+00	SHORT HLIF
CS-134	-6.286E-03	6.518E-02	1.270E-01	NOT IDENT.
I-135	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
CS-136	-5.330E-01	6.390E-01	1.008E+00	NOT IDENT.
BA-137M	1.964E-02	7.372E-02	1.465E-01	NOT IDENT.
CS-137	2.075E-02	7.788E-02	1.548E-01	NOT IDENT.
LA-138	7.915E-02	1.301E-01	3.148E-01	NOT IDENT.
CE-139	3.029E-02	4.355E-02	8.405E-02	NOT IDENT.
BA-140	4.967E-01	1.913E+00	3.802E+00	NOT IDENT.
LA-140	-8.987E-01	6.304E-01	6.447E-01	FAIL ABUN
CE-143	0.000E+00	2.870E+07	0.000E+00	SHORT HLIF
CE-144	-3.943E-02	2.146E-01	3.822E-01	NOT IDENT.
PM-144	2.697E-02	5.878E-02	1.279E-01	NOT IDENT.
PR-144	2.060E+00	4.459E+00	9.705E+00	NOT IDENT.
PM-146	1.224E-02	7.037E-02	1.407E-01	NOT IDENT.
ND-147	3.022E+00	3.855E+00	8.833E+00	FAIL ABUN
PM-147	1.950E+02	8.892E+02	1.638E+03	NOT IDENT.
PM-149	0.000E+00	2.377E+05	0.000E+00	SHORT HLIF
EU-150	4.642E-03	4.091E-02	7.398E-02	FAIL ABUN
EU-152	2.284E-02	1.702E-01	3.031E-01	NOT IDENT.
GD-153	-4.448E-02	8.612E-02	1.357E-01	NOT IDENT.
EU-154	5.451E-02	1.857E-01	4.425E-01	NOT IDENT.

EU-155	2.729E-02	9.500E-02	1.810E-01	FAIL ABUN
TB-160	1.591E-01	3.206E-01	7.251E-01	FAIL ABUN
HO-166M	5.702E-04	1.337E-01	2.509E-01	NOT IDENT.
TM-171	-3.291E+00	6.003E+00	8.579E+00	NOT IDENT.
HF-172	1.235E-01	2.190E-01	4.210E-01	FAIL ABUN
LU-172	-1.221E-01	1.199E-01	1.710E-01	FAIL ABUN
LU-176	-1.988E-02	4.787E-02	7.684E-02	FAIL ABUN
HF-181	5.028E-02	1.299E-01	2.604E-01	NOT IDENT.
TA-182	-1.145E-01	4.369E-01	8.211E-01	FAIL ABUN
RE-183	1.494E-02	8.626E-02	1.634E-01	NOT IDENT.
RE-184	1.499E-01	3.436E-01	7.902E-01	NOT IDENT.
W-188	-4.241E+00	1.235E+01	1.861E+01	FAIL ABUN
IR-192	6.499E-02	9.068E-02	1.137E-01	FAIL ABUN
HG-203	-4.395E-02	9.987E-02	1.452E-01	NOT IDENT.
TL-204	5.187E-01	3.043E+00	5.621E+00	NOT IDENT.
BI-207	-1.781E-02	7.906E-02	1.603E-01	FAIL ABUN
PB-211	-5.195E-01	1.420E+00	2.541E+00	NOT IDENT.
BI-212	3.045E-02	1.281E+00	2.350E+00	NOT IDENT.
BI-213	-6.925E-02	1.837E-01	3.305E-01	NOT IDENT.
RN-219	-2.067E-01	6.982E-01	1.277E+00	NOT IDENT.
RA-223	1.166E+00	1.132E+00	2.283E+00	FAIL ABUN
AC-225	-2.296E+00	4.270E+00	6.913E+00	NOT IDENT.
AC-227	2.163E-01	3.507E-01	6.869E-01	NOT IDENT.
TH-227	2.163E-01	3.507E-01	6.869E-01	NOT IDENT.
PA-231	-1.415E-01	8.229E-01	1.383E+00	NOT IDENT.
TH-231	1.166E+00	1.132E+00	2.283E+00	FAIL ABUN
PA-233	7.758E-02	8.084E-02	1.763E-01	NOT IDENT.
PA-234	3.071E-01	4.608E-01	1.117E+00	FAIL ABUN
PA-234M	-6.875E+00	1.065E+01	1.947E+01	NOT IDENT.
NP-237	7.758E-02	8.084E-02	1.763E-01	NOT IDENT.
NP-238	0.000E+00	7.288E+04	0.000E+00	SHORT HLIF
NP-239	-2.322E-02	3.051E-01	5.450E-01	NOT IDENT.
PU-239	3.199E+02	4.396E+02	8.398E+02	NOT IDENT.
AM-241	4.059E-03	5.933E-02	1.042E-01	NOT IDENT.
CM-243	-2.049E-02	9.007E-02	1.618E-01	NOT IDENT.
BK-247	-1.796E-02	1.135E-01	1.959E-01	FAIL ABUN
CM-247	-2.064E-02	7.141E-02	1.296E-01	NOT IDENT.
CF-249	9.188E-03	6.131E-02	1.221E-01	NOT IDENT.
CF-251	-2.948E-02	1.815E-01	3.138E-01	NOT IDENT.

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected Decay Corr		2-Sigma
					pCi/GRAM	pCi/GRAM	
K-40	1460.82	44	10.66*	7.417E-01	6.472E+00	6.472E+00	35.73
AS-74	595.83	8	59.00*	1.710E+00	9.445E-02	4.286E-01	87.72
	634.78	-----	15.40	1.611E+00	-----	Line Not Found	-----
RH-106	621.93	10	9.93*	1.642E+00	6.811E-01	7.321E-01	60.30
	1050.41	-----	1.56	1.000E+00	-----	Line Not Found	-----
RU-106	621.93	10	9.93*	1.642E+00	6.811E-01	7.321E-01	60.30
	1050.41	-----	1.56	1.000E+00	-----	Line Not Found	-----
CD-109	88.03	25	3.70*	7.548E+00	1.050E+00	1.113E+00	84.50
SN-117M	156.02	-----	2.11	5.705E+00	-----	Line Not Found	-----
	158.56	19	86.40*	5.624E+00	4.531E-02	3.270E-01	76.73
TE-123M	159.00	19	84.00*	5.624E+00	4.661E-02	5.839E-02	76.73
SN-126	64.28	28	9.60	7.735E+00	4.319E-01	4.319E-01	94.19
	86.94	25	8.90	7.548E+00	4.365E-01	4.365E-01	84.50
	87.57	25	37.00*	7.548E+00	1.050E-01	1.050E-01	84.50
CE-141	145.44	10	48.29*	6.014E+00	4.126E-02	9.431E-02	237.76
TL-208	277.37	-----	6.60	3.568E+00	-----	Line Not Found	-----
	583.19	31	85.00*	1.749E+00	2.391E-01	2.391E-01	57.11
	860.56	-----	12.50	1.204E+00	-----	Line Not Found	-----
BI-210	46.54	99	4.25*	7.018E+00	3.837E+00	3.850E+00	32.02
PB-210	46.54	99	4.25*	7.018E+00	3.837E+00	3.850E+00	32.02
BI-211	72.87	-----	1.23	7.756E+00	-----	Line Not Found	-----
	351.06	57	12.92*	2.854E+00	1.791E+00	1.791E+00	34.08
PB-212	74.82	42	10.28	7.741E+00	6.064E-01	6.064E-01	57.73
	77.11	69	17.10	7.719E+00	6.073E-01	6.073E-01	36.63
	238.63	71	43.60*	4.082E+00	4.599E-01	4.599E-01	32.22
	300.09	-----	3.30	3.318E+00	-----	Line Not Found	-----
BI-214	609.32	44	45.49*	1.676E+00	6.737E-01	6.738E-01	40.89
	1120.29	10	14.92	9.430E-01	7.867E-01	7.867E-01	100.49
	1764.49	-----	15.30	6.264E-01	-----	Line Not Found	-----
PB-214	74.82	42	5.80	7.741E+00	1.075E+00	1.075E+00	57.73
	77.11	69	9.70	7.719E+00	1.071E+00	1.071E+00	36.63
	87.09	25	3.41	7.548E+00	1.139E+00	1.139E+00	84.50
	242.00	30	7.25	4.037E+00	1.170E+00	1.170E+00	79.77
	295.22	26	18.42	3.371E+00	4.782E-01	4.782E-01	75.15
	351.93	57	35.60*	2.854E+00	6.500E-01	6.501E-01	34.08
RN-222	609.32	44	45.49*	1.676E+00	6.737E-01	6.738E-01	40.89
	1120.29	10	14.92	9.430E-01	7.867E-01	7.867E-01	100.49
	1764.49	-----	15.30	6.264E-01	-----	Line Not Found	-----
RA-224	240.99	30	4.10*	4.037E+00	2.069E+00	2.069E+00	79.77
RA-226	74.82	42	5.80	7.741E+00	1.075E+00	1.075E+00	57.73
	77.11	69	9.70	7.719E+00	1.071E+00	1.071E+00	36.63
	87.09	25	3.41	7.548E+00	1.139E+00	1.139E+00	84.50
	242.00	30	7.25	4.037E+00	1.170E+00	1.170E+00	79.77
	295.22	26	18.42	3.371E+00	4.782E-01	4.782E-01	75.15
	351.93	57	35.60*	2.854E+00	6.500E-01	6.501E-01	34.08
AC-228	105.21	-----	1.10	7.103E+00	-----	Line Not Found	-----
	338.32	20	11.27	2.960E+00	6.942E-01	6.942E-01	104.18

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
	835.71	-----	1.61	1.238E+00	-----	Line Not Found	-----
	911.20	14	25.80*	1.142E+00	5.641E-01	5.641E-01	67.46
	968.97	15	15.80	1.078E+00	1.008E+00	1.008E+00	60.52
RA-228	105.21	-----	1.10	7.103E+00	-----	Line Not Found	-----
	338.32	20	11.27	2.960E+00	6.942E-01	6.942E-01	104.18
	835.71	-----	1.61	1.238E+00	-----	Line Not Found	-----
	911.20	14	25.80*	1.142E+00	5.641E-01	5.641E-01	67.46
	968.97	15	15.80	1.078E+00	1.008E+00	1.008E+00	60.52
TH-228	74.82	42	10.28	7.741E+00	6.064E-01	6.064E-01	57.73
	77.11	69	17.10	7.719E+00	6.073E-01	6.073E-01	36.63
	238.63	71	43.60*	4.082E+00	4.599E-01	4.599E-01	32.22
	300.09	-----	3.30	3.318E+00	-----	Line Not Found	-----
TH-229	85.43	4	14.70	7.604E+00	3.727E-02	3.727E-02	583.42
	88.47	25	24.00	7.548E+00	1.619E-01	1.619E-01	84.50
	193.51	-----	4.41*	4.862E+00	-----	Line Not Found	-----
	210.85	-----	2.80	4.535E+00	-----	Line Not Found	-----
TH-230	74.82	42	5.80	7.741E+00	1.075E+00	1.075E+00	57.73
	77.11	69	9.70	7.719E+00	1.071E+00	1.071E+00	36.63
	87.09	25	3.41	7.548E+00	1.139E+00	1.139E+00	84.50
	242.00	30	7.25	4.037E+00	1.170E+00	1.170E+00	79.77
	295.22	26	18.42	3.371E+00	4.782E-01	4.782E-01	75.15
	351.93	57	35.60*	2.854E+00	6.500E-01	6.500E-01	34.08
TH-232	105.21	-----	1.10	7.103E+00	-----	Line Not Found	-----
	338.32	20	11.27	2.960E+00	6.942E-01	6.942E-01	104.18
	835.71	-----	1.61	1.238E+00	-----	Line Not Found	-----
	911.20	14	25.80*	1.142E+00	5.641E-01	5.641E-01	67.46
	968.97	15	15.80	1.078E+00	1.008E+00	1.008E+00	60.52
TH-234	63.29	28	3.70*	7.735E+00	1.121E+00	1.121E+00	94.19
	92.59	9	4.23	7.425E+00	3.422E-01	3.422E-01	247.76
U-234	74.82	42	5.80	7.741E+00	1.075E+00	1.075E+00	57.73
	77.11	69	9.70	7.719E+00	1.071E+00	1.071E+00	36.63
	87.09	25	3.41	7.548E+00	1.139E+00	1.139E+00	84.50
	242.00	30	7.25	4.037E+00	1.170E+00	1.170E+00	79.77
	295.22	26	18.42	3.371E+00	4.782E-01	4.782E-01	75.15
	351.93	57	35.60*	2.854E+00	6.500E-01	6.500E-01	34.08
U-235	89.96	21	3.47	7.494E+00	9.170E-01	9.170E-01	98.94
	93.35	9	5.60	7.425E+00	2.585E-01	2.585E-01	247.76
	143.76	10	10.96*	6.014E+00	1.818E-01	1.818E-01	237.76
	163.33	-----	5.08	5.525E+00	-----	Line Not Found	-----
	185.72	17	57.20	5.012E+00	6.712E-02	6.712E-02	146.78
	205.31	-----	5.01	4.636E+00	-----	Line Not Found	-----
U-238	63.29	28	3.70*	7.735E+00	1.121E+00	1.121E+00	94.19
	92.59	9	4.23	7.425E+00	3.422E-01	3.422E-01	247.76
AM-243	43.53	-----	5.90	6.765E+00	-----	Line Not Found	-----
	74.66	42	67.20*	7.741E+00	9.276E-02	9.276E-02	57.73
ANH-511	511.00	37	100.00*	1.988E+00	2.154E-01	2.154E-01	65.07

Flag: "*" = Keyline

Total number of lines in spectrum 37
 Number of unidentified lines 5
 Number of lines tentatively identified by NID 32 86.49%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.25E+09Y	1.00	6.472E+00	6.472E+00	2.312E+00	35.73	
AS-74	17.77D	4.54	9.445E-02	4.286E-01	3.760E-01	87.72	
RH-106	371.80D	1.07	6.811E-01	7.321E-01	4.415E-01	60.30	
RU-106	371.80D	1.07	6.811E-01	7.321E-01	4.415E-01	60.30	
CD-109	461.40D	1.06	1.050E+00	1.113E+00	0.940E+00	84.50	
SN-117M	13.60D	7.22	4.531E-02	3.270E-01	2.509E-01	76.73	
TE-123M	119.20D	1.25	4.661E-02	5.839E-02	4.481E-02	76.73	
SN-126	2.30E+05Y	1.00	1.050E-01	1.050E-01	0.887E-01	84.50	
CE-141	32.51D	2.29	4.126E-02	9.431E-02	22.42E-02	237.76	
TL-208	1.41E+10Y	1.00	2.391E-01	2.391E-01	1.366E-01	57.11	
BI-210	22.20Y	1.00	3.837E+00	3.850E+00	1.232E+00	32.02	
PB-210	22.20Y	1.00	3.837E+00	3.850E+00	1.232E+00	32.02	
BI-211	7.04E+08Y	1.00	1.791E+00	1.791E+00	0.610E+00	34.08	
PB-212	1.41E+10Y	1.00	4.599E-01	4.599E-01	1.482E-01	32.22	
BI-214	1600.00Y	1.00	6.737E-01	6.738E-01	2.755E-01	40.89	
PB-214	1600.00Y	1.00	6.500E-01	6.501E-01	2.216E-01	34.08	
RN-222	1600.00Y	1.00	6.737E-01	6.738E-01	2.755E-01	40.89	
RA-224	1.41E+10Y	1.00	2.069E+00	2.069E+00	1.650E+00	79.77	
RA-226	1600.00Y	1.00	6.500E-01	6.501E-01	2.216E-01	34.08	
AC-228	1.41E+10Y	1.00	5.641E-01	5.641E-01	3.805E-01	67.46	
RA-228	1.41E+10Y	1.00	5.641E-01	5.641E-01	3.805E-01	67.46	
TH-228	1.41E+10Y	1.00	4.599E-01	4.599E-01	1.482E-01	32.22	
TH-229	7340.00Y	1.00	1.619E-01	1.619E-01	1.368E-01	84.50	K
TH-230	7.54E+04Y	1.00	6.500E-01	6.500E-01	2.215E-01	34.08	
TH-232	1.41E+10Y	1.00	5.641E-01	5.641E-01	3.805E-01	67.46	
TH-234	4.47E+09Y	1.00	1.121E+00	1.121E+00	1.055E+00	94.19	
U-234	2.45E+05Y	1.00	6.500E-01	6.500E-01	2.215E-01	34.08	
U-235	7.04E+08Y	1.00	1.818E-01	1.818E-01	4.322E-01	237.76	
U-238	4.47E+09Y	1.00	1.121E+00	1.121E+00	1.055E+00	94.19	
AM-243	7370.00Y	1.00	9.276E-02	9.276E-02	5.355E-02	57.73	
ANH-511	1.00E+09Y	1.00	2.154E-01	2.154E-01	1.402E-01	65.07	
Total Activity :			3.044E+01	3.131E+01			

Grand Total Activity : 3.044E+01 3.131E+01

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	200.72	11	25	1.36	401.52	397	9	3.61E-03	****	4.72E+00	T
0	209.26	13	38	3.97	418.61	411	11	4.48E-03	****	4.56E+00	
0	275.18	14	18	0.67	550.46	547	8	4.62E-03	****	3.59E+00	T
0	316.12	10	16	0.65	632.37	629	10	3.37E-03	****	3.16E+00	T
4	323.64	12	11	1.83	647.40	644	17	4.10E-03	99.1	3.09E+00	T
4	327.72	14	24	1.84	655.57	644	17	4.54E-03	****	3.06E+00	T
0	464.42	9	2	1.11	929.01	926	7	2.88E-03	84.2	2.18E+00	T
0	626.57	5	4	0.72	1253.32	1248	7	1.44E-03	****	1.63E+00	
0	643.12	13	7	3.37	1286.42	1280	15	4.11E-03	96.7	1.59E+00	
0	845.20	8	0	0.73	1690.56	1687	8	2.50E-03	66.7	1.23E+00	
0	868.83	5	6	3.28	1737.79	1730	9	1.45E-03	****	1.19E+00	
0	949.99	10	0	1.06	1900.09	1895	9	3.06E-03	60.3	1.10E+00	T

Flags: "T" = Tentatively associated


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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
*                               DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724003.CNF;1
* Acquisition date   : 28-FEB-2023 05:07:24 Sensitivity      : 3.000
* Detector ID       : GAM38 Energy tolerance: 1.500
* Elapsed live time : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time : 0 01:00:00.21 Half life ratio : *****
* Sample date       : 20-JAN-2023 11:00:00 Nuclide Library : SOLID
* Sample ID        : G609724003 Analyst initials: RXF2
* Batch Number     : 2379916 Sample Quantity : 6.4870E+01 GRAM
* Wet wt corr      : 1.00000 Wet Weight : 0.00000
*                               Dry Weight : 0.00000
*****
*                               CALIBRATION INFORMATION                         *
*
* Eff. Cal. date    : 31-MAY-2022 06:05:07 Eff. Geometry   : CAN
* Eff. File         : DKA100:[CANBERRA.GAMMA]EFF_GAM38_CAN.CNF;2
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)
K-40	7.708E-01
AS-74	2.529E-01
RH-106	0.000E+00
RU-106	0.000E+00
CD-109	4.975E-01
SN-117M	1.764E-01
TE-123M	3.158E-02
SN-126	4.684E-02
CE-141	9.916E-02
TL-208	3.976E-02
BI-210	3.015E-01
PB-210	3.015E-01
BI-211	2.506E-01
PB-212	6.503E-02
BI-214	1.106E-01
PB-214	9.120E-02
RN-222	1.106E-01
RA-224	6.988E-01
RA-226	9.120E-02
AC-228	1.868E-01
RA-228	1.868E-01
TH-228	6.503E-02
TH-229	5.912E-01
TH-230	9.119E-02
TH-232	1.868E-01
TH-234	4.295E-01
U-234	9.119E-02
U-235	2.302E-01
U-238	4.295E-01
AM-243	2.744E-02
ANH-511	4.483E-02

---- Non-Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)
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BE-7	6.853E-01	NOT IDENT.
NA-22	6.195E-02	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	7.501E-02	NOT IDENT.
SC-46	4.373E-02	FAIL ABUN
V-48	3.255E-01	NOT IDENT.
CR-51	8.136E-01	NOT IDENT.
MN-52	8.380E+00	NOT IDENT.
MN-54	6.828E-02	NOT IDENT.
CO-56	8.459E-02	NOT IDENT.
MN-56	0.000E+00	SHORT HLIF
CO-57	2.591E-02	NOT IDENT.
CO-58	9.389E-02	NOT IDENT.
FE-59	1.755E-01	NOT IDENT.
CO-60	8.075E-02	NOT IDENT.
ZN-65	1.283E-01	NOT IDENT.
GE-68	2.030E+00	NOT IDENT.
AS-73	2.555E-01	NOT IDENT.
SE-75	4.808E-02	NOT IDENT.
BR-77	0.000E+00	SHORT HLIF
SR-82	1.009E+00	NOT IDENT.
RB-83	1.204E-01	NOT IDENT.
RB-84	1.465E-01	NOT IDENT.
KR-85	1.348E+01	NOT IDENT.
SR-85	9.152E-02	NOT IDENT.
RB-86	2.942E+00	NOT IDENT.
Y-88	1.590E-02	NOT IDENT.
Y-91	3.632E+01	NOT IDENT.
NB-94	5.044E-02	NOT IDENT.
NB-95	1.020E-01	NOT IDENT.
NB-95M	1.619E-01	NOT IDENT.
ZR-95	1.298E-01	NOT IDENT.
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	SHORT HLIF
RH-101	3.076E-02	NOT IDENT.
RH-102	8.430E-02	NOT IDENT.
RU-103	9.686E-02	FAIL ABUN
AG-108M	2.771E-02	NOT IDENT.
AG-110	1.427E+00	NOT IDENT.
AG-110M	6.839E-02	NOT IDENT.
SN-113	6.759E-02	NOT IDENT.
CD-115	0.000E+00	SHORT HLIF
SB-122	0.000E+00	SHORT HLIF
SB-124	1.889E-01	NOT IDENT.
SB-125	1.520E-01	FAIL ABUN
TE-125M	9.713E+00	NOT IDENT.
I-126	1.174E+00	NOT IDENT.
SB-126	5.071E-01	NOT IDENT.
SB-127	0.000E+00	SHORT HLIF
I-131	1.173E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	0.000E+00	SHORT HLIF
BA-133	6.794E-02	FAIL ABUN
I-133	0.000E+00	SHORT HLIF
CS-134	4.928E-02	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	3.571E-01	NOT IDENT.
BA-137M	6.234E-02	NOT IDENT.
CS-137	6.586E-02	NOT IDENT.
LA-138	1.263E-01	NOT IDENT.
CE-139	3.791E-02	NOT IDENT.
BA-140	1.632E+00	NOT IDENT.
LA-140	1.286E-01	FAIL ABUN
CE-143	0.000E+00	SHORT HLIF
CE-144	1.679E-01	NOT IDENT.
PM-144	5.281E-02	NOT IDENT.
PR-144	4.009E+00	NOT IDENT.
PM-146	5.982E-02	NOT IDENT.
ND-147	3.721E+00	FAIL ABUN
PM-147	7.392E+02	NOT IDENT.
PM-149	0.000E+00	SHORT HLIF
EU-150	3.178E-02	FAIL ABUN
EU-152	1.321E-01	NOT IDENT.
GD-153	6.010E-02	NOT IDENT.
EU-154	1.686E-01	NOT IDENT.
EU-155	8.052E-02	FAIL ABUN

TB-160	3.004E-01	FAIL ABUN
HO-166M	1.060E-01	NOT IDENT.
TM-171	3.855E+00	NOT IDENT.
HF-172	1.897E-01	FAIL ABUN
LU-172	5.931E-02	FAIL ABUN
LU-176	3.350E-02	FAIL ABUN
HF-181	1.135E-01	NOT IDENT.
TA-182	3.283E-01	FAIL ABUN
RE-183	7.351E-02	NOT IDENT.
RE-184	3.209E-01	NOT IDENT.
W-188	7.706E+00	FAIL ABUN
IR-192	4.858E-02	FAIL ABUN
HG-203	6.342E-02	NOT IDENT.
TL-204	2.568E+00	NOT IDENT.
BI-207	5.941E-02	FAIL ABUN
PB-211	1.111E+00	NOT IDENT.
BI-212	1.014E+00	NOT IDENT.
BI-213	1.400E-01	NOT IDENT.
RN-219	5.479E-01	NOT IDENT.
RA-223	1.020E+00	FAIL ABUN
AC-225	3.021E+00	NOT IDENT.
AC-227	3.025E-01	NOT IDENT.
TH-227	3.025E-01	NOT IDENT.
PA-231	6.072E-01	NOT IDENT.
TH-231	1.020E+00	FAIL ABUN
PA-233	7.603E-02	NOT IDENT.
PA-234	4.433E-01	FAIL ABUN
PA-234M	7.998E+00	NOT IDENT.
NP-237	7.603E-02	NOT IDENT.
NP-238	0.000E+00	SHORT HLIF
NP-239	2.452E-01	NOT IDENT.
PU-239	3.836E+02	NOT IDENT.
AM-241	4.680E-02	NOT IDENT.
CM-243	7.106E-02	NOT IDENT.
BK-247	8.457E-02	FAIL ABUN
CM-247	5.651E-02	NOT IDENT.
CF-249	5.232E-02	NOT IDENT.
CF-251	1.404E-01	NOT IDENT.

```

*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                          *
*****
*                               DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724003.CNF;1
* Acquisition date   : 28-FEB-2023 05:07:24 Sensitivity      : 3.000
* Detector ID        : GAM38 Energy tolerance: 1.500
* Elapsed live time  : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time  : 0 01:00:00.21 Half life ratio : *****
* Sample date        : 20-JAN-2023 11:00:00 Nuclide Library : SOLID
* Sample ID          : G609724003 Analyst initials: RXF2
* Batch Number       : 2379916 Sample Quantity : 6.4870E+01 GRAM
*                               Quantity Err(%) : 1.5415E-03 %
* Wet wt corr        : 1.00000 Wet Weight      : 0.00000
*                               Dry Weight       : 0.00000
*****
*                               CALIBRATION INFORMATION                         *
*
* Eff. Cal. date     : 31-MAY-2022 06:05:07 Eff. Geometry   : CAN
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM38_CAN.CNF;2
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
K-40	6.472E+00	2.332E+00	2.332E+00
AS-74	4.286E-01	3.719E-01	3.719E-01
RH-106	7.321E-01	4.397E-01	4.397E-01
RU-106	7.321E-01	4.397E-01	4.397E-01
CD-109	1.113E+00	9.282E-01	9.282E-01
SN-117M	3.270E-01	2.476E-01	2.476E-01
TE-123M	5.839E-02	4.421E-02	4.421E-02
SN-126	1.050E-01	8.739E-02	8.739E-02
CE-141	5.438E-02	2.254E-01	2.254E-01
TL-208	2.391E-01	1.358E-01	1.358E-01
BI-210	3.850E+00	1.258E+00	1.258E+00
PB-210	3.850E+00	1.258E+00	1.258E+00
BI-211	1.791E+00	6.158E-01	6.158E-01
PB-212	4.599E-01	1.503E-01	1.503E-01
BI-214	6.738E-01	2.778E-01	2.778E-01
PB-214	6.501E-01	2.233E-01	2.233E-01
RN-222	6.738E-01	2.778E-01	2.778E-01
RA-224	2.069E+00	1.627E+00	1.627E+00
RA-226	6.501E-01	2.233E-01	2.233E-01
AC-228	5.641E-01	3.759E-01	3.759E-01
RA-228	5.641E-01	3.759E-01	3.759E-01
TH-228	4.599E-01	1.503E-01	1.503E-01
TH-229	4.129E-01	6.890E-01	6.890E-01
TH-230	6.500E-01	2.232E-01	2.232E-01
TH-232	5.641E-01	3.759E-01	3.759E-01
TH-234	1.121E+00	1.064E+00	1.064E+00
U-234	6.500E-01	2.232E-01	2.232E-01
U-235	1.818E-01	4.239E-01	4.239E-01
U-238	1.121E+00	1.064E+00	1.064E+00
AM-243	9.276E-02	5.297E-02	5.297E-02
ANH-511	2.154E-01	1.388E-01	1.388E-01

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)
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BE-7	3.351E-01	7.722E-01	7.869E-01	NOT IDENT.
NA-22	2.232E-02	6.752E-02	6.827E-02	NOT IDENT.
NA-24	-1.148E+17	4.245E+17	0.000E+00	SHORT HLIF
AL-26	2.003E-02	8.203E-02	8.253E-02	NOT IDENT.
SC-46	-5.958E-02	7.484E-02	7.951E-02	FAIL ABUN
V-48	2.408E-01	3.211E-01	3.390E-01	NOT IDENT.
CR-51	1.219E-01	1.293E+00	1.294E+00	NOT IDENT.
MN-52	-1.104E+00	1.086E+01	1.087E+01	NOT IDENT.
MN-54	8.305E-03	7.949E-02	7.957E-02	NOT IDENT.
CO-56	2.775E-02	1.049E-01	1.056E-01	NOT IDENT.
MN-56	1.000E+41	3.713E+41	0.000E+00	SHORT HLIF
CO-57	8.097E-03	3.101E-02	3.122E-02	NOT IDENT.
CO-58	3.566E-02	1.041E-01	1.054E-01	NOT IDENT.
FE-59	-4.037E-02	2.272E-01	2.279E-01	NOT IDENT.
CO-60	2.393E-02	9.254E-02	9.317E-02	NOT IDENT.
ZN-65	-1.053E-02	1.830E-01	1.831E-01	NOT IDENT.
GE-68	-4.217E-01	2.594E+00	2.601E+00	NOT IDENT.
AS-73	1.148E-01	3.427E-01	3.465E-01	NOT IDENT.
SE-75	-3.711E-02	7.072E-02	7.268E-02	NOT IDENT.
BR-77	7.079E+04	8.251E+04	8.847E+04	SHORT HLIF
SR-82	-3.404E-01	1.377E+00	1.386E+00	NOT IDENT.
RB-83	-3.550E-02	1.562E-01	1.570E-01	NOT IDENT.
RB-84	-1.050E-01	2.063E-01	2.117E-01	NOT IDENT.
KR-85	1.052E+01	1.489E+01	1.562E+01	NOT IDENT.
SR-85	7.119E-02	1.011E-01	1.061E-01	NOT IDENT.
RB-86	-1.649E+00	4.049E+00	4.116E+00	NOT IDENT.
Y-88	-4.657E-02	6.870E-02	7.183E-02	NOT IDENT.
Y-91	-7.339E+00	4.647E+01	4.658E+01	NOT IDENT.
NB-94	1.518E-03	6.319E-02	6.319E-02	NOT IDENT.
NB-95	-9.402E-03	1.317E-01	1.317E-01	NOT IDENT.
NB-95M	-2.578E-02	2.316E-01	2.319E-01	NOT IDENT.
ZR-95	-7.796E-02	1.878E-01	1.911E-01	NOT IDENT.
NB-97	1.000E+41	1.686E+41	0.000E+00	SHORT HLIF
ZR-97	7.733E+15	4.043E+16	0.000E+00	SHORT HLIF
MO-99	-1.103E+03	1.019E+04	1.020E+04	SHORT HLIF
TC-99M	-1.000E+41	3.690E+41	0.000E+00	SHORT HLIF
RH-101	-1.434E-02	3.995E-02	4.047E-02	NOT IDENT.
RH-102	3.855E-02	9.524E-02	9.681E-02	NOT IDENT.
RU-103	3.104E-02	1.126E-01	1.135E-01	FAIL ABUN
AG-108M	-2.277E-02	3.973E-02	4.104E-02	NOT IDENT.
AG-110	1.388E+00	1.471E+00	1.598E+00	NOT IDENT.
AG-110M	5.622E-03	7.995E-02	7.999E-02	NOT IDENT.
SN-113	4.228E-02	7.338E-02	7.582E-02	NOT IDENT.
CD-115	-1.713E+04	2.915E+04	3.016E+04	SHORT HLIF
SB-122	-7.713E+02	1.104E+03	1.157E+03	SHORT HLIF
SB-124	6.551E-03	2.227E-01	2.228E-01	NOT IDENT.
SB-125	1.181E-01	1.645E-01	1.729E-01	FAIL ABUN
TE-125M	-1.215E+01	1.357E+01	1.464E+01	NOT IDENT.
I-126	-3.027E-01	1.550E+00	1.556E+00	NOT IDENT.
SB-126	-9.570E-01	9.860E-01	1.076E+00	NOT IDENT.
SB-127	9.969E+01	1.779E+02	1.835E+02	SHORT HLIF
I-131	-1.683E-02	1.410E+00	1.410E+00	NOT IDENT.
I-132	1.000E+41	2.619E+41	0.000E+00	SHORT HLIF
TE-132	1.068E+02	1.675E+02	1.743E+02	SHORT HLIF
BA-133	4.291E-02	7.817E-02	8.053E-02	FAIL ABUN
I-133	2.946E+11	1.566E+12	1.571E+12	SHORT HLIF
CS-134	-6.286E-03	6.518E-02	6.524E-02	NOT IDENT.
I-135	-1.000E+41	2.264E+41	0.000E+00	SHORT HLIF
CS-136	-5.330E-01	6.416E-01	6.851E-01	NOT IDENT.
BA-137M	1.964E-02	7.374E-02	7.427E-02	NOT IDENT.
CS-137	2.075E-02	7.790E-02	7.846E-02	NOT IDENT.
LA-138	7.915E-02	1.303E-01	1.351E-01	NOT IDENT.
CE-139	3.029E-02	4.404E-02	4.610E-02	NOT IDENT.
BA-140	4.967E-01	1.913E+00	1.926E+00	NOT IDENT.
LA-140	-8.987E-01	6.342E-01	7.526E-01	FAIL ABUN
CE-143	5.856E+06	2.871E+07	2.883E+07	SHORT HLIF
CE-144	-3.943E-02	2.146E-01	2.154E-01	NOT IDENT.
PM-144	2.697E-02	5.884E-02	6.008E-02	NOT IDENT.
PR-144	2.060E+00	4.463E+00	4.559E+00	NOT IDENT.
PM-146	1.224E-02	7.038E-02	7.059E-02	NOT IDENT.
ND-147	3.022E+00	3.866E+00	4.099E+00	FAIL ABUN
PM-147	1.950E+02	8.894E+02	8.937E+02	NOT IDENT.
PM-149	-1.381E+05	2.386E+05	2.466E+05	SHORT HLIF
EU-150	4.642E-03	4.092E-02	4.097E-02	FAIL ABUN
EU-152	2.284E-02	1.702E-01	1.706E-01	NOT IDENT.
GD-153	-4.448E-02	8.621E-02	8.851E-02	NOT IDENT.
EU-154	5.451E-02	1.858E-01	1.874E-01	NOT IDENT.

EU-155	2.729E-02	9.504E-02	9.583E-02	FAIL ABUN
TB-160	1.591E-01	3.209E-01	3.288E-01	FAIL ABUN
HO-166M	5.702E-04	1.337E-01	1.337E-01	NOT IDENT.
TM-171	-3.291E+00	6.010E+00	6.191E+00	NOT IDENT.
HF-172	1.235E-01	2.201E-01	2.270E-01	FAIL ABUN
LU-172	-1.221E-01	1.208E-01	1.328E-01	FAIL ABUN
LU-176	-1.988E-02	4.789E-02	4.872E-02	FAIL ABUN
HF-181	5.028E-02	1.300E-01	1.320E-01	NOT IDENT.
TA-182	-1.145E-01	4.370E-01	4.400E-01	FAIL ABUN
RE-183	1.494E-02	8.628E-02	8.654E-02	NOT IDENT.
RE-184	1.499E-01	3.439E-01	3.505E-01	NOT IDENT.
W-188	-4.241E+00	1.236E+01	1.250E+01	FAIL ABUN
IR-192	6.499E-02	9.081E-02	9.542E-02	FAIL ABUN
HG-203	-4.395E-02	9.992E-02	1.019E-01	NOT IDENT.
TL-204	5.187E-01	3.044E+00	3.053E+00	NOT IDENT.
BI-207	-1.781E-02	7.907E-02	7.948E-02	FAIL ABUN
PB-211	-5.195E-01	1.421E+00	1.440E+00	NOT IDENT.
BI-212	3.045E-02	1.281E+00	1.281E+00	NOT IDENT.
BI-213	-6.925E-02	1.838E-01	1.864E-01	NOT IDENT.
RN-219	-2.067E-01	6.988E-01	7.050E-01	NOT IDENT.
RA-223	1.166E+00	1.137E+00	1.252E+00	FAIL ABUN
AC-225	-2.296E+00	4.277E+00	4.401E+00	NOT IDENT.
AC-227	2.163E-01	3.521E-01	3.653E-01	NOT IDENT.
TH-227	2.163E-01	3.521E-01	3.653E-01	NOT IDENT.
PA-231	-1.415E-01	8.235E-01	8.260E-01	NOT IDENT.
TH-231	1.166E+00	1.137E+00	1.252E+00	FAIL ABUN
PA-233	7.758E-02	8.107E-02	8.829E-02	NOT IDENT.
PA-234	3.071E-01	5.799E-01	5.962E-01	FAIL ABUN
PA-234M	-6.875E+00	1.066E+01	1.111E+01	NOT IDENT.
NP-237	7.758E-02	8.107E-02	8.829E-02	NOT IDENT.
NP-238	7.416E+04	7.312E+04	8.040E+04	SHORT HLIF
NP-239	-2.322E-02	3.051E-01	3.053E-01	NOT IDENT.
PU-239	3.199E+02	4.406E+02	4.636E+02	NOT IDENT.
AM-241	4.059E-03	5.933E-02	5.936E-02	NOT IDENT.
CM-243	-2.049E-02	9.010E-02	9.057E-02	NOT IDENT.
BK-247	-1.796E-02	1.136E-01	1.139E-01	FAIL ABUN
CM-247	-2.064E-02	7.151E-02	7.212E-02	NOT IDENT.
CF-249	9.188E-03	6.132E-02	6.146E-02	NOT IDENT.
CF-251	-2.948E-02	1.815E-01	1.820E-01	NOT IDENT.

 * GEL Laboratories LLC *
 * 2040 Savage Road *
 * Charleston, SC 29407 *
 * GAMMA SPECTROSCOPY BACKGROUND REPORT *

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	18.2854	85.43	26.5667	131.20	24.3445
45.60	12.7930	86.55	26.6594	133.02	23.5031
46.54	12.8528	86.79	26.6790	133.52	19.7644
49.72	0.0000	86.94	26.6917	136.00	29.3350
51.35	32.1441	87.09	26.7039	136.47	24.6285
51.87	24.8977	87.57	26.7434	140.51	0.0000
52.39	32.2966	88.03	26.7810	143.76	24.0509
52.97	17.6623	88.34	26.8064	144.24	24.0746
53.44	22.1243	88.47	26.8169	145.44	24.1344
54.07	23.6652	89.96	26.9380	152.43	18.6034
57.36	0.0000	1093.63	26.9929	153.25	29.4214
57.53	24.7717	91.11	27.0308	323.87	35.3727
57.98	24.8184	92.59	27.1494	156.02	17.0916
59.27	28.7324	93.35	27.2100	158.56	21.8003
59.32	28.7383	94.56	27.3059	159.00	21.8187
59.54	25.2318	94.65	27.3130	162.33	21.2920
60.96	27.4084	94.67	27.3145	162.66	21.3053
61.17	25.3997	94.87	27.3303	163.33	24.9985
62.93	23.7878	97.43	27.5308	165.86	19.0887
63.29	23.8215	98.43	18.9808	176.31	26.6197
63.58	23.8486	98.44	18.9813	176.60	26.6336
64.28	23.9137	99.53	19.9044	177.52	26.6768
66.73	21.8028	100.11	23.4038	181.07	0.0000
67.24	27.0458	102.03	15.6849	181.52	33.0620
125.81	27.3510	103.18	15.7339	184.41	23.8812
67.75	27.3579	103.37	20.1148	143.76	23.9342
68.89	44.7430	105.21	18.4566	193.51	16.8672
69.67	28.3401	105.31	18.4614	197.03	18.3775
70.82	34.7822	106.12	22.9061	198.01	21.2384
70.83	34.7835	106.47	16.7546	201.83	29.9149
72.81	38.2148	109.28	32.8676	203.43	25.7062
72.87	38.2229	111.00	26.7673	205.31	30.0790
74.66	32.0523	111.76	0.0000	210.85	26.0032
74.82	32.0703	114.06	26.9749	215.65	25.1012
74.97	32.0868	116.30	0.0000	218.12	23.0027
77.11	32.3224	116.74	28.0597	222.11	18.7310
78.74	32.4997	119.76	29.1780	227.09	27.7451
79.69	31.5152	121.12	26.5288	227.38	23.3155
80.03	31.5500	121.22	25.6200	228.16	0.0000
80.12	31.5597	121.78	24.7380	228.18	14.4498
80.19	31.5671	122.06	23.8376	116.74	14.4498
80.57	34.3310	122.92	29.3982	235.69	19.4717
81.00	24.5567	123.07	29.4087	235.96	16.4821
81.07	24.5622	265.00	31.2916	238.63	20.3030
81.75	32.8220	125.81	20.3481	238.98	0.0000
82.47	36.1884	127.23	32.4778	240.99	20.3687
83.79	26.4297	127.91	29.7404	242.00	20.3969
84.00	26.4473	129.30	26.1047	244.70	20.4716

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.40	0.0000	344.28	14.0474	563.25	7.1191
252.80	16.8612	345.93	11.0862	564.24	0.0000
254.15	0.0000	351.06	12.8577	569.33	8.1686
256.23	11.5479	351.93	12.8687	946.00	8.1696
260.90	0.0000	355.39	0.0000	569.70	8.1706
264.66	16.3426	356.01	14.4713	583.19	5.1516
264.80	16.3456	364.49	13.0280	584.27	3.0931
265.00	15.1816	366.42	0.0000	595.83	4.6740
269.46	24.6619	372.51	9.6272	427.87	10.9388
270.03	23.5040	375.05	7.8959	602.52	0.0000
271.23	17.2618	377.52	16.7077	604.72	12.5337
273.65	18.8877	356.01	11.4990	607.14	12.5522
276.40	18.9512	388.16	10.6565	609.32	10.4744
277.37	17.3925	388.63	13.3264	610.33	10.4810
277.60	15.8158	391.69	7.1273	614.28	12.6079
278.00	15.8236	264.66	19.7585	618.01	0.0000
279.20	22.1849	401.81	15.2835	620.36	3.1637
279.54	23.7793	402.40	16.1913	621.93	0.0000
279.70	23.7842	404.85	18.0290	630.19	0.0000
280.46	17.8542	410.95	11.7818	631.29	5.3078
283.69	20.3136	413.71	10.9016	633.25	8.5023
284.31	11.9577	414.70	6.3647	634.78	7.4463
285.41	17.9604	423.72	10.0791	635.95	9.5804
285.90	0.0000	427.09	11.9458	636.99	2.5564
287.50	9.6025	427.87	9.1949	657.50	4.3123
290.67	11.2445	433.94	9.2417	657.76	4.3130
293.27	0.0000	439.40	11.1404	657.90	0.0000
351.93	15.7450	440.45	13.9374	661.66	8.6452
295.96	15.7585	453.88	9.3931	664.57	0.0000
879.38	19.4536	463.37	12.7766	666.33	9.7522
299.98	19.4844	468.07	5.6993	666.50	9.7529
300.09	19.4868	473.00	0.0000	667.71	0.0000
300.13	19.4878	475.06	11.4604	677.62	4.3621
301.36	19.5151	476.78	10.5193	685.70	0.0000
302.85	18.3261	477.60	8.6122	692.65	0.0000
256.23	9.7922	482.18	11.5229	695.00	12.1123
304.85	9.7959	487.02	8.6739	696.49	4.4082
306.78	20.8614	492.35	0.0000	696.51	4.4082
308.46	15.9830	497.08	9.7101	697.00	4.4093
311.90	4.9365	505.52	7.3279	697.30	6.6152
316.51	11.1635	507.63	0.0000	697.49	6.6160
319.41	11.6131	511.00	11.7711	702.65	7.7403
320.08	12.4518	514.00	11.7964	706.68	7.7574
321.04	9.9717	514.00	11.7964	711.68	10.0009
323.87	13.3359	520.40	10.8630	720.70	10.0492
325.23	13.3551	520.69	0.0000	721.93	0.0000
328.76	13.4053	522.65	0.0000	722.78	6.7070
333.37	16.8376	527.90	0.0000	722.91	5.5896
333.97	11.3725	528.26	7.9443	723.31	3.3544
334.37	11.3772	529.59	8.9458	724.19	11.1865
338.28	18.6158	529.87	0.0000	727.33	11.2052
338.32	18.6162	531.02	3.9798	733.00	7.8673
311.90	18.6574	537.26	9.9927	735.93	6.7537
340.48	18.6574	546.56	0.0000	333.97	9.0120
340.55	18.6587	552.55	14.1367	739.50	0.0000

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
744.23	7.9135	949.00	5.9676	1384.29	3.2580
747.24	9.0579	667.71	0.0000	1408.01	1.0936
748.06	4.5309	962.31	3.7505	1434.09	4.4077
752.31	6.8113	964.08	6.0051	1435.80	2.2050
753.82	3.4083	966.17	6.0104	1457.56	0.0000
756.73	9.1022	911.20	2.8206	1460.82	5.3297
756.80	9.1025	983.53	1.8915	1489.16	4.4768
884.68	13.7036	984.45	0.0000	1505.03	3.3724
765.81	12.5737	1274.44	8.5556	1584.12	2.7558
766.42	12.5773	1001.03	9.5245	1596.21	4.6077
766.84	11.4364	1002.74	5.7186	1620.50	0.9273
772.60	0.0000	1004.73	6.6768	1621.92	0.0000
776.52	9.1937	507.63	0.0000	1678.03	0.0000
739.50	0.0000	1025.87	0.0000	1690.97	1.8879
778.90	11.5059	1028.54	0.0000	1750.46	0.0000
783.70	0.0000	1037.84	4.8312	1764.49	4.8047
788.74	10.4059	1038.76	0.0000	1063.66	2.8868
792.07	3.4744	631.29	3.8782	1771.35	1.9250
795.86	4.6410	1048.07	6.7906	1791.20	0.0000
810.06	6.1333	1049.04	6.7932	1808.65	1.9419
810.29	6.1342	1050.41	0.9709	1810.72	0.0000
344.28	7.0110	1063.66	3.9033	1836.06	1.9542
810.76	7.0120	1077.00	7.8457		
815.77	7.9074	1077.34	5.8850		
1048.07	6.1583	1085.87	6.8876		
832.01	7.9687	1093.63	7.8940		
834.85	7.9791	1099.45	4.9445		
835.71	8.8693	1112.07	5.9604		
836.80	0.0000	1112.84	9.2747		
846.75	0.0000	1115.54	4.7745		
846.77	5.7057	1120.29	1.5942		
856.80	10.7476	1120.55	1.5943		
860.56	7.1772	1221.41	4.7845		
871.09	7.2117	1129.67	4.9988		
873.19	5.4139	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	4.5241	1173.23	3.0454		
880.51	7.2422	1177.95	7.1175		
881.60	7.2458	1189.05	4.0828		
883.24	4.5319	1204.77	4.1045		
884.68	3.6278	1221.41	7.2230		
889.28	6.3617	1231.02	5.1758		
894.76	2.7330	1235.36	10.3662		
898.04	5.4739	1238.28	4.1504		
900.72	4.5670	1260.41	0.0000		
903.28	3.6577	1271.87	4.1960		
911.20	4.4043	1274.44	2.0997		
912.08	4.4061	1274.54	2.0997		
923.98	0.0000	1291.59	4.2224		
926.50	7.3892	1298.22	0.0000		
929.11	7.3972	1312.11	4.2498		
935.54	2.7816	1332.49	4.2766		
937.49	5.5677	1362.66	0.0000		
944.13	6.2036	1365.19	3.2395		
946.00	1.4900	1368.63	0.0000		

VAX/VMS Nuclide Identification Report Generated 28-FEB-2023 06:08:55.83

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                                 *
*                               Charleston, SC 29407                            *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724004.CNF;1
Background file : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM40.CNF;443
Background date : 26-FEB-2023 09:14:53
Sample date     : 20-JAN-2023 11:30:00 Acquisition date : 28-FEB-2023 05:08:05
Sample ID      : G609724004 Sample quantity   : 6.47400E+01 GRAM
Detector name  : GAM40 Detector geometry   : CAN
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:00.52 0.0%
Energy tolerance : 1.50000 keV Analyst Initials : RXF2
Abundance limit : 75.00000 Sensitivity : 3.00000
Batch ID      : 2379916 Detector SN# :
Matrix Spike ID : LCS ID :
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	63.07*	77	228	0.91	127.21	123	10	2.13E-02	38.9	
2	3	74.78	185	147	0.96	150.66	144	19	5.14E-02	12.6	1.64E+00
3	3	77.07	353	144	1.04	155.25	144	19	9.82E-02	7.7	
4	2	87.22	142	142	1.23	175.57	165	29	3.95E-02	16.1	2.22E+00
5	2	89.88*	93	134	1.24	180.89	165	29	2.58E-02	23.7	
6	2	92.81*	199	123	1.19	186.77	165	29	5.53E-02	12.4	
7	0	98.91	50	164	1.41	198.97	194	11	1.39E-02	51.5	
8	2	127.62	25	112	1.31	256.45	254	11	6.93E-03	66.8	1.23E+01
9	2	129.50	39	120	1.19	260.22	254	11	1.08E-02	49.9	
10	0	144.04*	13	147	1.36	289.32	285	8	3.55E-03	170.5	
11	0	154.81	21	123	1.17	310.89	307	7	5.95E-03	88.8	
12	0	185.89*	201	219	1.22	373.13	367	13	5.58E-02	16.9	
13	0	209.34	64	115	0.76	420.08	416	9	1.79E-02	32.4	
14	3	238.80*	589	78	1.16	479.04	472	19	1.64E-01	4.9	2.00E+00
15	3	242.10	263	76	1.62	485.65	472	19	7.30E-02	9.6	
16	0	250.32	43	106	3.47	502.11	495	13	1.20E-02	51.8	
17	0	270.14	65	91	1.06	541.78	537	10	1.82E-02	29.9	
18	0	295.23*	359	132	1.29	592.00	585	14	9.97E-02	8.6	
19	0	300.55	23	69	0.71	602.66	599	7	6.30E-03	65.5	
20	0	315.51	30	82	5.20	632.61	625	14	8.32E-03	67.3	
21	0	323.91	22	64	0.93	649.42	645	8	6.07E-03	67.5	
22	0	328.67	39	60	1.10	658.94	655	9	1.07E-02	39.8	
23	0	339.06	98	126	1.25	679.74	673	14	2.72E-02	26.3	
24	0	352.16*	656	132	1.32	705.95	698	16	1.82E-01	5.5	
25	0	410.08	27	49	1.56	821.88	816	9	7.39E-03	51.4	
26	0	430.35	51	58	2.58	862.45	857	16	1.43E-02	35.5	
27	0	442.87	29	36	4.35	887.52	881	13	8.06E-03	46.4	
28	0	463.49	41	40	1.21	928.79	923	10	1.14E-02	32.8	
29	0	511.48*	58	30	1.36	1024.82	1018	15	1.60E-02	29.6	
30	0	535.63	16	10	0.89	1073.14	1069	7	4.37E-03	42.3	
31	0	556.48	27	52	9.03	1114.87	1101	22	7.40E-03	73.3	
32	5	570.26*	21	38	2.39	1142.43	1137	14	5.93E-03	56.5	4.57E+00
33	5	573.22	8	18	1.14	1148.36	1137	14	2.22E-03	87.1	
34	0	583.55*	156	53	1.24	1169.04	1163	13	4.34E-02	12.6	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
35	0	609.60*	451	32	1.24	1221.16	1214	13	1.25E-01	5.3	
36	0	668.10*	10	33	3.11	1338.21	1328	12	2.91E-03	115.0	
37	1	675.34	15	15	1.71	1352.69	1347	24	4.21E-03	50.7	1.26E+00
38	1	679.15	14	8	1.71	1360.31	1347	24	3.91E-03	55.0	
39	0	722.49	7	31	0.81	1447.01	1440	11	2.07E-03	148.1	
40	0	727.60*	55	24	1.93	1457.24	1450	12	1.53E-02	22.7	
41	0	768.57*	34	25	1.85	1539.21	1534	11	9.45E-03	33.5	
42	0	787.76	19	19	1.24	1577.58	1571	11	5.17E-03	53.3	
43	0	791.83	5	10	0.46	1585.73	1581	7	1.46E-03	109.7	
44	0	796.19	48	14	5.37	1594.46	1587	18	1.33E-02	23.2	
45	0	807.24	15	23	1.36	1616.56	1609	13	4.04E-03	72.8	
46	0	810.82	9	9	1.27	1623.73	1621	7	2.43E-03	66.0	
47	0	815.39	26	9	3.94	1632.87	1627	12	7.30E-03	30.0	
48	0	848.34*	4	16	0.53	1698.77	1692	10	1.04E-03	253.7	
49	0	861.38*	19	18	1.23	1724.86	1720	9	5.34E-03	46.7	
50	0	885.46	11	9	1.33	1773.01	1769	9	2.97E-03	62.9	
51	4	911.56*	125	14	2.11	1825.21	1819	26	3.48E-02	11.0	9.37E-01
52	4	916.24	15	9	2.48	1834.58	1819	26	4.23E-03	69.9	
53	0	935.52	48	16	2.42	1873.13	1866	18	1.34E-02	25.0	
54	0	956.69	9	13	2.36	1915.48	1906	13	2.36E-03	93.6	
55	1	965.12	15	6	1.89	1932.34	1928	20	4.12E-03	47.4	9.67E-01
56	1	969.38	62	12	1.89	1940.86	1928	20	1.71E-02	17.2	
57	0	1024.35	18	6	3.88	2050.78	2045	12	5.00E-03	36.0	
58	0	1120.60*	91	13	1.14	2243.24	2237	13	2.52E-02	13.5	
59	0	1155.48	21	10	4.96	2312.98	2306	13	5.91E-03	37.2	
60	0	1212.75	22	18	2.91	2427.49	2420	22	6.04E-03	52.6	
61	0	1237.80*	32	11	0.77	2477.58	2471	14	8.82E-03	28.7	
62	0	1299.41	11	5	0.86	2600.73	2596	9	3.11E-03	45.7	
63	0	1332.18	6	5	0.95	2666.24	2659	9	1.72E-03	74.4	
64	0	1378.31	27	8	0.97	2758.45	2751	15	7.36E-03	29.7	
65	0	1401.70	11	2	0.56	2805.19	2801	8	3.09E-03	37.1	
66	0	1408.48	16	0	2.16	2818.75	2814	9	4.44E-03	25.0	
67	0	1461.32*	148	3	2.38	2924.35	2918	12	4.10E-02	8.8	
68	0	1510.68	6	11	0.67	3023.00	3015	11	1.67E-03	114.6	
69	0	1589.96	11	6	1.41	3181.43	3174	11	2.92E-03	53.1	
70	0	1730.56	18	6	1.06	3462.35	3455	13	4.94E-03	37.8	
71	0	1765.46*	59	3	2.19	3532.06	3525	14	1.65E-02	15.2	
72	0	1848.29	16	3	0.65	3697.54	3691	12	4.44E-03	33.1	

Flag: "*" = Peak area was modified by background subtraction

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Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724004.CNF;1
Analyses by       : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4,INTERF V2.4
Sample title      : RXF2
Sample date       : 20-JAN-2023 11:30:00 Acquisition date : 28-FEB-2023 05:08:05
Sample ID        : G609724004 Sample quantity   : 64.740 GRAM
Sample type      : SOLID Sample geometry    :
Detector name    : GAMMA40 Detector geometry: CAN
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:00.52 0.0%
Energy tolerance : 1.50 keV Half life ratio   : 10.00
Errors propagated: No Systematic Error    : 0.00 %
Efficiency type  : Empirical Efficiencies at  : Peak Energy
Abundance limit  : 75.00
    
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Interference Report

Interfering		Interfered	
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Nuclide	Line	Nuclide	Line
U-235	143.76	CE-141	145.44

Nuclide Type:

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error	Status
K-40	1460.82	10.66*	9.718E-01	1.508E+01	1.508E+01	17.59	OK
CO-58	810.76	99.45*	1.671E+00	5.400E-02	7.889E-02	131.92	OK
CD-109	88.03	3.70*	4.340E+00	7.993E+00	8.472E+00	32.20	OK
SN-126	64.28	9.60	1.753E+00	4.032E+00	4.032E+00	77.73	OK
	86.94	8.90	4.340E+00	3.323E+00	3.323E+00	32.20	OK
	87.57	37.00*	4.340E+00	7.993E-01	7.993E-01	32.20	OK
TL-208	277.37	6.60	3.918E+00	----- Line	Not Found	-----	Absent
	583.19	85.00*	2.232E+00	8.304E-01	8.304E-01	25.22	OK
	860.56	12.50	1.579E+00	1.003E+00	1.003E+00	93.44	OK
BI-211	72.87	1.23	2.915E+00	----- Line	Not Found	-----	Absent
	351.06	12.92*	3.295E+00	1.510E+01	1.510E+01	11.10	OK
BI-212	727.33	6.67*	1.845E+00	4.574E+00	4.574E+00	45.47	OK
	1620.50	1.47	9.040E-01	----- Line	Not Found	-----	Absent
PB-212	74.82	10.28	3.132E+00	5.134E+00	5.134E+00	25.29	OK
	77.11	17.10	3.383E+00	5.470E+00	5.470E+00	15.34	OK
	238.63	43.60*	4.351E+00	2.976E+00	2.976E+00	9.74	OK
	300.09	3.30	3.698E+00	1.804E+00	1.804E+00	130.96	OK
BI-214	609.32	45.49*	2.152E+00	4.649E+00	4.649E+00	10.64	OK
	1120.29	14.92	1.228E+00	5.166E+00	5.166E+00	26.96	OK
	1764.49	15.30	8.633E-01	4.809E+00	4.809E+00	30.37	OK
PB-214	74.82	5.80	3.132E+00	9.100E+00	9.100E+00	25.29	OK
	77.11	9.70	3.383E+00	9.643E+00	9.643E+00	15.34	OK
	87.09	3.41	4.340E+00	8.673E+00	8.673E+00	32.20	OK
	242.00	7.25	4.310E+00	8.061E+00	8.061E+00	19.14	OK
	295.22	18.42	3.746E+00	5.045E+00	5.045E+00	17.29	OK
	351.93	35.60*	3.295E+00	5.480E+00	5.481E+00	11.10	OK
RN-222	609.32	45.49*	2.152E+00	4.649E+00	4.649E+00	10.64	OK
	1120.29	14.92	1.228E+00	5.166E+00	5.166E+00	26.96	OK
	1764.49	15.30	8.633E-01	4.809E+00	4.809E+00	30.37	OK
RA-224	240.99	4.10*	4.310E+00	1.425E+01	1.425E+01	19.14	OK
RA-226	74.82	5.80	3.132E+00	9.100E+00	9.100E+00	25.29	OK
	77.11	9.70	3.383E+00	9.643E+00	9.643E+00	15.34	OK
	87.09	3.41	4.340E+00	8.673E+00	8.673E+00	32.20	OK
	242.00	7.25	4.310E+00	8.061E+00	8.061E+00	19.14	OK
	295.22	18.42	3.746E+00	5.045E+00	5.045E+00	17.29	OK
	351.93	35.60*	3.295E+00	5.480E+00	5.481E+00	11.10	OK
AC-228	105.21	1.10	5.356E+00	----- Line	Not Found	-----	Absent
	338.32	11.27	3.388E+00	2.509E+00	2.509E+00	52.63	OK
	835.71	1.61	1.625E+00	----- Line	Not Found	-----	Absent
	911.20	25.80*	1.497E+00	3.346E+00	3.346E+00	22.07	OK
	968.97	15.80	1.411E+00	2.858E+00	2.858E+00	34.44	OK
RA-228	105.21	1.10	5.356E+00	----- Line	Not Found	-----	Absent
	338.32	11.27	3.388E+00	2.509E+00	2.509E+00	52.63	OK
	835.71	1.61	1.625E+00	----- Line	Not Found	-----	Absent
	911.20	25.80*	1.497E+00	3.346E+00	3.346E+00	22.07	OK
	968.97	15.80	1.411E+00	2.858E+00	2.858E+00	34.44	OK
TH-228	74.82	10.28	3.132E+00	5.134E+00	5.134E+00	25.29	OK
	77.11	17.10	3.383E+00	5.470E+00	5.470E+00	15.34	OK
	238.63	43.60*	4.351E+00	2.976E+00	2.976E+00	9.74	OK

Nuclide Type:

Nuclide	Energy	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error	Status
	300.09	3.30	3.698E+00	1.804E+00	1.804E+00	130.96	OK
TH-230	74.82	5.80	3.132E+00	9.100E+00	9.100E+00	25.29	OK
	77.11	9.70	3.383E+00	9.643E+00	9.643E+00	15.34	OK
	87.09	3.41	4.340E+00	8.673E+00	8.673E+00	32.20	OK
	242.00	7.25	4.310E+00	8.061E+00	8.061E+00	19.14	OK
	295.22	18.42	3.746E+00	5.045E+00	5.045E+00	17.29	OK
	351.93	35.60*	3.295E+00	5.480E+00	5.480E+00	11.10	OK
PA-231	283.69	1.70	3.855E+00	----- Line	Not Found	-----	Absent
	301.36	5.35*	3.698E+00	1.113E+00	1.113E+00	130.96	OK
TH-232	105.21	1.10	5.356E+00	----- Line	Not Found	-----	Absent
	338.32	11.27	3.388E+00	2.509E+00	2.509E+00	52.63	OK
	835.71	1.61	1.625E+00	----- Line	Not Found	-----	Absent
	911.20	25.80*	1.497E+00	3.346E+00	3.346E+00	22.07	OK
	968.97	15.80	1.411E+00	2.858E+00	2.858E+00	34.44	OK
TH-234	63.29	3.70*	1.753E+00	1.046E+01	1.046E+01	77.73	OK
	92.59	4.23	4.746E+00	8.975E+00	8.975E+00	24.77	OK
U-234	74.82	5.80	3.132E+00	9.100E+00	9.100E+00	25.29	OK
	77.11	9.70	3.383E+00	9.643E+00	9.643E+00	15.34	OK
	87.09	3.41	4.340E+00	8.673E+00	8.673E+00	32.20	OK
	242.00	7.25	4.310E+00	8.061E+00	8.061E+00	19.14	OK
	295.22	18.42	3.746E+00	5.045E+00	5.045E+00	17.29	OK
	351.93	35.60*	3.295E+00	5.480E+00	5.480E+00	11.10	OK
U-235	89.96	3.47	4.544E+00	5.331E+00	5.331E+00	47.48	OK
	93.35	5.60	4.746E+00	6.779E+00	6.779E+00	24.77	OK
	143.76	10.96*	5.658E+00	1.918E-01	1.918E-01	341.03	OK
	163.33	5.08	5.430E+00	----- Line	Not Found	-----	Absent
	185.72	57.20	5.096E+00	6.507E-01	6.507E-01	33.84	OK
	205.31	5.01	4.805E+00	----- Line	Not Found	-----	Absent
U-238	63.29	3.70*	1.753E+00	1.046E+01	1.046E+01	77.73	OK
	92.59	4.23	4.746E+00	8.975E+00	8.975E+00	24.77	OK
AM-243	43.53	5.90	1.547E-01	----- Line	Not Found	-----	Absent
	74.66	67.20*	3.132E+00	7.854E-01	7.854E-01	25.29	OK
ANH-511	511.00	100.00*	2.483E+00	2.327E-01	2.327E-01	59.24	OK

Flag: "*" = Keyline

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                          *
*****
*                               DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724004.CNF;1
* Acquisition date   : 28-FEB-2023 05:08:05 Sensitivity      : 3.000
* Detector ID       : GAM40 Energy tolerance: 1.500
* Elapsed live time: 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time: 0 01:00:00.52 Half life ratio : *****
* Sample date       : 20-JAN-2023 11:30:00 Analyst initials: RXF2
* Sample ID         : G609724004 Sample Quantity : 6.4740E+01 GRAM
* Batch Number      : 2379916 Wet Weight : 0.00000
* Wet wt corr       : 1.00000 Dry Weight : 0.00000
* Nuclide Library   : SOLID.NLB;17
*****
*                               CALIBRATION INFORMATION                         *
*
* Eff. Cal. date    : 25-OCT-2022 08:28:28 Eff. Geometry   : CAN
* Eff. File         : DKA100:[CANBERRA.GAMMA]EFF_GAM40_CAN.CNF;12
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
K-40	1.508E+01	2.599E+00	1.629E+00
CO-58	7.889E-02	1.020E-01	2.624E-01
CD-109	8.472E+00	2.674E+00	3.266E+00
SN-126	7.993E-01	2.522E-01	3.106E-01
TL-208	8.304E-01	2.053E-01	1.504E-01
BI-211	1.510E+01	1.642E+00	8.344E-01
BI-212	4.574E+00	2.038E+00	2.023E+00
PB-212	2.976E+00	2.842E-01	2.271E-01
BI-214	4.649E+00	4.850E-01	2.581E-01
PB-214	5.481E+00	5.960E-01	3.035E-01
RN-222	4.649E+00	4.850E-01	2.581E-01
RA-224	1.425E+01	2.674E+00	2.434E+00
RA-226	5.481E+00	5.960E-01	3.035E-01
AC-228	3.346E+00	7.237E-01	5.354E-01
RA-228	3.346E+00	7.237E-01	5.354E-01
TH-228	2.976E+00	2.842E-01	2.271E-01
TH-230	5.480E+00	5.960E-01	3.034E-01
PA-231	1.113E+00	1.428E+00	1.950E+00
TH-232	3.346E+00	7.237E-01	5.354E-01
TH-234	1.046E+01	7.968E+00	8.043E+00
U-234	5.480E+00	5.960E-01	3.034E-01
U-235	1.918E-01	6.409E-01	8.068E-01
U-238	1.046E+01	7.968E+00	8.043E+00
AM-243	7.854E-01	1.947E-01	2.618E-01
ANH-511	2.327E-01	1.351E-01	1.191E-01

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L.	Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)	
BE-7	-3.524E-01		9.951E-01	1.738E+00	NOT IDENT.
NA-22	-5.242E-02		1.014E-01	1.803E-01	NOT IDENT.
NA-24	0.000E+00		2.577E+17	0.000E+00	SHORT HLIF
AL-26	2.543E-02		7.665E-02	1.753E-01	NOT IDENT.
SC-46	2.881E-02		1.196E-01	2.073E-01	FAIL ABUN

V-48	-6.897E-03	4.575E-01	8.370E-01	NOT IDENT.
CR-51	1.318E+00	1.855E+00	2.796E+00	NOT IDENT.
MN-52	1.024E+01	1.082E+01	2.553E+01	FAIL ABUN
MN-54	1.068E-02	9.427E-02	1.735E-01	NOT IDENT.
CO-56	7.742E-02	1.194E-01	2.381E-01	FAIL ABUN
MN-56	0.000E+00	1.535E+41	0.000E+00	SHORT HLIF
CO-57	1.406E-02	6.404E-02	1.081E-01	NOT IDENT.
FE-59	1.306E-01	2.818E-01	5.924E-01	NOT IDENT.
CO-60	6.299E-02	9.179E-02	1.992E-01	FAIL ABUN
ZN-65	2.724E-01	1.824E-01	4.316E-01	NOT IDENT.
GE-68	-1.587E+00	2.957E+00	5.301E+00	NOT IDENT.
AS-73	2.861E+00	5.120E+00	8.959E+00	NOT IDENT.
AS-74	-1.190E-01	5.355E-01	9.397E-01	NOT IDENT.
SE-75	5.438E-02	1.262E-01	2.160E-01	NOT IDENT.
BR-77	0.000E+00	4.348E+04	0.000E+00	SHORT HLIF
SR-82	-1.000E+00	1.472E+00	2.383E+00	NOT IDENT.
RB-83	3.459E-02	1.662E-01	3.178E-01	NOT IDENT.
RB-84	1.803E-02	3.180E-01	5.284E-01	NOT IDENT.
KR-85	2.078E+01	1.722E+01	3.291E+01	NOT IDENT.
SR-85	1.408E-01	1.169E-01	2.235E-01	NOT IDENT.
RB-86	-2.262E+00	4.216E+00	7.558E+00	NOT IDENT.
Y-88	-1.722E-03	7.107E-02	1.616E-01	NOT IDENT.
Y-91	-2.655E+01	5.197E+01	9.348E+01	NOT IDENT.
NB-94	3.692E-02	7.802E-02	1.505E-01	NOT IDENT.
NB-95	-1.013E-01	1.592E-01	2.232E-01	NOT IDENT.
NB-95M	-1.054E-01	4.597E-01	6.683E-01	NOT IDENT.
ZR-95	9.567E-02	2.512E-01	4.723E-01	NOT IDENT.
NB-97	0.000E+00	1.371E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	4.542E+16	0.000E+00	SHORT HLIF
MO-99	0.000E+00	1.060E+04	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
RH-101	6.055E-02	7.925E-02	1.277E-01	FAIL ABUN
RH-102	4.795E-02	1.342E-01	2.546E-01	NOT IDENT.
RU-103	2.894E-02	1.451E-01	2.693E-01	FAIL ABUN
RH-106	7.804E-01	7.696E-01	1.578E+00	NOT IDENT.
RU-106	7.804E-01	7.696E-01	1.578E+00	NOT IDENT.
AG-108M	-2.609E-02	6.602E-02	1.151E-01	FAIL ABUN
AG-110	7.942E-01	1.832E+00	3.520E+00	NOT IDENT.
AG-110M	1.098E-01	1.354E-01	2.632E-01	FAIL ABUN
SN-113	7.641E-03	1.243E-01	2.260E-01	NOT IDENT.
CD-115	0.000E+00	3.993E+04	0.000E+00	SHORT HLIF
SN-117M	3.209E-03	4.978E-01	8.135E-01	FAIL ABUN
SB-122	0.000E+00	2.029E+03	0.000E+00	SHORT HLIF
TE-123M	1.701E-02	8.448E-02	1.405E-01	NOT IDENT.
SB-124	-1.655E-01	3.013E-01	5.257E-01	FAIL ABUN
SB-125	1.276E-01	2.434E-01	4.243E-01	FAIL ABUN
TE-125M	-3.134E+00	3.289E+01	5.409E+01	NOT IDENT.
I-126	1.486E+00	1.982E+00	3.918E+00	NOT IDENT.
SB-126	8.839E-01	1.519E+00	2.687E+00	NOT IDENT.
SB-127	0.000E+00	1.931E+02	0.000E+00	SHORT HLIF
I-131	-2.511E-01	1.963E+00	3.534E+00	NOT IDENT.
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	0.000E+00	2.940E+02	0.000E+00	SHORT HLIF
BA-133	2.220E-02	1.090E-01	1.821E-01	NOT IDENT.
I-133	0.000E+00	2.130E+12	0.000E+00	SHORT HLIF
CS-134	0.000E+00	1.587E-01	2.433E-01	FAIL ABUN
I-135	0.000E+00	1.534E+41	0.000E+00	SHORT HLIF
CS-136	5.176E-02	8.700E-01	1.708E+00	FAIL ABUN
BA-137M	-1.938E-02	9.121E-02	1.423E-01	NOT IDENT.
CS-137	-2.047E-02	9.636E-02	1.503E-01	NOT IDENT.
LA-138	3.531E-02	1.290E-01	2.761E-01	FAIL ABUN
CE-139	-8.833E-02	8.556E-02	1.283E-01	NOT IDENT.
BA-140	-1.116E+00	2.291E+00	3.427E+00	NOT IDENT.
LA-140	-3.304E-01	7.750E-01	1.409E+00	FAIL ABUN
CE-141	9.945E-02	3.324E-01	4.131E-01	FAIL ABUN
CE-143	0.000E+00	4.701E+07	0.000E+00	SHORT HLIF
CE-144	2.653E-01	5.402E-01	8.631E-01	NOT IDENT.
PM-144	-7.136E-02	8.153E-02	1.283E-01	NOT IDENT.
PR-144	-5.387E+00	6.180E+00	9.732E+00	NOT IDENT.
PM-146	3.538E-02	1.005E-01	1.891E-01	NOT IDENT.
ND-147	5.419E-01	6.177E+00	1.028E+01	FAIL ABUN
PM-147	1.138E+02	1.717E+03	2.874E+03	NOT IDENT.
PM-149	0.000E+00	3.502E+05	0.000E+00	SHORT HLIF
EU-150	-5.455E-02	7.500E-02	1.114E-01	FAIL ABUN
EU-152	-1.817E-01	2.346E-01	3.441E-01	FAIL ABUN
GD-153	3.457E-01	3.486E-01	3.653E-01	FAIL ABUN
EU-154	-1.406E-01	2.850E-01	5.093E-01	FAIL ABUN
EU-155	4.265E-02	2.574E-01	4.336E-01	FAIL ABUN

TB-160	1.835E-01	3.611E-01	7.355E-01	FAIL ABUN
HO-166M	-2.294E-03	1.266E-01	2.326E-01	FAIL ABUN
TM-171	1.110E+01	9.338E+01	1.588E+02	NOT IDENT.
HF-172	-4.742E-02	5.056E-01	7.658E-01	FAIL ABUN
LU-172	7.358E-02	1.495E-01	3.128E-01	FAIL ABUN
LU-176	4.666E-02	6.262E-02	1.200E-01	FAIL ABUN
HF-181	1.517E-01	1.572E-01	3.133E-01	NOT IDENT.
TA-182	-3.560E-01	4.385E-01	5.829E-01	FAIL ABUN
RE-183	-1.922E-02	1.084E+00	1.816E+00	NOT IDENT.
RE-184	1.712E-01	4.454E-01	8.738E-01	FAIL ABUN
W-188	-2.226E+01	2.325E+01	3.376E+01	FAIL ABUN
IR-192	1.420E-01	1.873E-01	1.677E-01	FAIL ABUN
HG-203	5.871E-02	1.252E-01	2.343E-01	NOT IDENT.
TL-204	-9.316E-01	1.647E+01	2.530E+01	NOT IDENT.
BI-207	-8.786E-02	1.186E-01	2.064E-01	FAIL ABUN
BI-210	-6.838E+00	2.590E+01	4.113E+01	NOT IDENT.
PB-210	-6.838E+00	2.590E+01	4.113E+01	NOT IDENT.
PB-211	6.592E-01	1.993E+00	3.354E+00	NOT IDENT.
BI-213	4.038E-02	2.552E-01	4.285E-01	NOT IDENT.
RN-219	-7.089E-01	1.008E+00	1.693E+00	FAIL ABUN
RA-223	1.525E+00	2.019E+00	3.239E+00	FAIL ABUN
AC-225	3.932E-01	7.353E+00	1.211E+01	NOT IDENT.
AC-227	2.577E-01	6.445E-01	1.094E+00	FAIL ABUN
TH-227	2.577E-01	6.445E-01	1.094E+00	FAIL ABUN
TH-229	2.005E-01	1.342E+00	2.219E+00	FAIL ABUN
TH-231	1.525E+00	2.019E+00	3.239E+00	FAIL ABUN
PA-233	7.543E-02	1.593E-01	2.754E-01	FAIL ABUN
PA-234	-8.814E-02	6.929E-01	1.241E+00	FAIL ABUN
PA-234M	4.093E+00	9.699E+00	1.936E+01	NOT IDENT.
NP-237	7.543E-02	1.593E-01	2.754E-01	FAIL ABUN
NP-238	0.000E+00	1.126E+05	0.000E+00	SHORT HLIF
NP-239	-8.143E-02	6.560E-01	1.077E+00	FAIL ABUN
PU-239	9.923E+02	9.702E+02	1.515E+03	FAIL ABUN
AM-241	-1.343E-01	6.749E-01	1.030E+00	NOT IDENT.
CM-243	-5.433E-02	2.782E-01	4.202E-01	FAIL ABUN
BK-247	2.535E-02	1.976E-01	3.282E-01	NOT IDENT.
CM-247	-5.081E-02	9.308E-02	1.590E-01	NOT IDENT.
CF-249	1.729E-02	1.038E-01	1.892E-01	NOT IDENT.
CF-251	1.624E-01	3.309E-01	5.624E-01	NOT IDENT.

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	135	10.66*	9.718E-01	1.508E+01	1.508E+01	17.59
CO-58	810.76	8	99.45*	1.671E+00	5.400E-02	7.889E-02	131.92
CD-109	88.03	111	3.70*	4.340E+00	7.993E+00	8.472E+00	32.20
SN-126	64.28	58	9.60	1.753E+00	4.032E+00	4.032E+00	77.73
	86.94	111	8.90	4.340E+00	3.323E+00	3.323E+00	32.20
	87.57	111	37.00*	4.340E+00	7.993E-01	7.993E-01	32.20
CE-141	145.44	10	48.29*	5.658E+00	4.353E-02	9.945E-02	341.03
TL-208	277.37	-----	6.60	3.918E+00	-----	Line Not Found	-----
	583.19	136	85.00*	2.232E+00	8.304E-01	8.304E-01	25.22
	860.56	17	12.50	1.579E+00	1.003E+00	1.003E+00	93.44
BI-211	72.87	-----	1.23	2.915E+00	-----	Line Not Found	-----
	351.06	554	12.92*	3.295E+00	1.510E+01	1.510E+01	11.10
BI-212	727.33	49	6.67*	1.845E+00	4.574E+00	4.574E+00	45.47
	1620.50	-----	1.47	9.040E-01	-----	Line Not Found	-----
PB-212	74.82	143	10.28	3.132E+00	5.134E+00	5.134E+00	25.29
	77.11	273	17.10	3.383E+00	5.470E+00	5.470E+00	15.34
	238.63	487	43.60*	4.351E+00	2.976E+00	2.976E+00	9.74
	300.09	19	3.30	3.698E+00	1.804E+00	1.804E+00	130.96
BI-214	609.32	392	45.49*	2.152E+00	4.649E+00	4.649E+00	10.64
	1120.29	82	14.92	1.228E+00	5.166E+00	5.166E+00	26.96
	1764.49	55	15.30	8.633E-01	4.809E+00	4.809E+00	30.37
PB-214	74.82	143	5.80	3.132E+00	9.100E+00	9.100E+00	25.29
	77.11	273	9.70	3.383E+00	9.643E+00	9.643E+00	15.34
	87.09	111	3.41	4.340E+00	8.673E+00	8.673E+00	32.20
	242.00	217	7.25	4.310E+00	8.061E+00	8.061E+00	19.14
	295.22	300	18.42	3.746E+00	5.045E+00	5.045E+00	17.29
	351.93	554	35.60*	3.295E+00	5.480E+00	5.481E+00	11.10
RN-222	609.32	392	45.49*	2.152E+00	4.649E+00	4.649E+00	10.64
	1120.29	82	14.92	1.228E+00	5.166E+00	5.166E+00	26.96
	1764.49	55	15.30	8.633E-01	4.809E+00	4.809E+00	30.37
RA-224	240.99	217	4.10*	4.310E+00	1.425E+01	1.425E+01	19.14
RA-226	74.82	143	5.80	3.132E+00	9.100E+00	9.100E+00	25.29
	77.11	273	9.70	3.383E+00	9.643E+00	9.643E+00	15.34
	87.09	111	3.41	4.340E+00	8.673E+00	8.673E+00	32.20
	242.00	217	7.25	4.310E+00	8.061E+00	8.061E+00	19.14
	295.22	300	18.42	3.746E+00	5.045E+00	5.045E+00	17.29
	351.93	554	35.60*	3.295E+00	5.480E+00	5.481E+00	11.10
AC-228	105.21	-----	1.10	5.356E+00	-----	Line Not Found	-----
	338.32	83	11.27	3.388E+00	2.509E+00	2.509E+00	52.63
	835.71	-----	1.61	1.625E+00	-----	Line Not Found	-----
	911.20	111	25.80*	1.497E+00	3.346E+00	3.346E+00	22.07
	968.97	55	15.80	1.411E+00	2.858E+00	2.858E+00	34.44
RA-228	105.21	-----	1.10	5.356E+00	-----	Line Not Found	-----
	338.32	83	11.27	3.388E+00	2.509E+00	2.509E+00	52.63
	835.71	-----	1.61	1.625E+00	-----	Line Not Found	-----
	911.20	111	25.80*	1.497E+00	3.346E+00	3.346E+00	22.07
	968.97	55	15.80	1.411E+00	2.858E+00	2.858E+00	34.44

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
TH-228	74.82	143	10.28	3.132E+00	5.134E+00	5.134E+00	25.29
	77.11	273	17.10	3.383E+00	5.470E+00	5.470E+00	15.34
	238.63	487	43.60*	4.351E+00	2.976E+00	2.976E+00	9.74
	300.09	19	3.30	3.698E+00	1.804E+00	1.804E+00	130.96
TH-230	74.82	143	5.80	3.132E+00	9.100E+00	9.100E+00	25.29
	77.11	273	9.70	3.383E+00	9.643E+00	9.643E+00	15.34
	87.09	111	3.41	4.340E+00	8.673E+00	8.673E+00	32.20
	242.00	217	7.25	4.310E+00	8.061E+00	8.061E+00	19.14
	295.22	300	18.42	3.746E+00	5.045E+00	5.045E+00	17.29
	351.93	554	35.60*	3.295E+00	5.480E+00	5.480E+00	11.10
PA-231	283.69	-----	1.70	3.855E+00	-----	Line Not Found	-----
	301.36	19	5.35*	3.698E+00	1.113E+00	1.113E+00	130.96
TH-232	105.21	-----	1.10	5.356E+00	-----	Line Not Found	-----
	338.32	83	11.27	3.388E+00	2.509E+00	2.509E+00	52.63
	835.71	-----	1.61	1.625E+00	-----	Line Not Found	-----
TH-234	911.20	111	25.80*	1.497E+00	3.346E+00	3.346E+00	22.07
	968.97	55	15.80	1.411E+00	2.858E+00	2.858E+00	34.44
	63.29	58	3.70*	1.753E+00	1.046E+01	1.046E+01	77.73
	92.59	155	4.23	4.746E+00	8.975E+00	8.975E+00	24.77
U-234	74.82	143	5.80	3.132E+00	9.100E+00	9.100E+00	25.29
	77.11	273	9.70	3.383E+00	9.643E+00	9.643E+00	15.34
	87.09	111	3.41	4.340E+00	8.673E+00	8.673E+00	32.20
	242.00	217	7.25	4.310E+00	8.061E+00	8.061E+00	19.14
	295.22	300	18.42	3.746E+00	5.045E+00	5.045E+00	17.29
	351.93	554	35.60*	3.295E+00	5.480E+00	5.480E+00	11.10
U-235	89.96	72	3.47	4.544E+00	5.331E+00	5.331E+00	47.48
	93.35	155	5.60	4.746E+00	6.779E+00	6.779E+00	24.77
	143.76	10	10.96*	5.658E+00	1.918E-01	1.918E-01	341.03
	163.33	-----	5.08	5.430E+00	-----	Line Not Found	-----
	185.72	164	57.20	5.096E+00	6.507E-01	6.507E-01	33.84
U-238	205.31	-----	5.01	4.805E+00	-----	Line Not Found	-----
	63.29	58	3.70*	1.753E+00	1.046E+01	1.046E+01	77.73
AM-243	92.59	155	4.23	4.746E+00	8.975E+00	8.975E+00	24.77
	43.53	-----	5.90	1.547E-01	-----	Line Not Found	-----
ANH-511	74.66	143	67.20*	3.132E+00	7.854E-01	7.854E-01	25.29
	511.00	50	100.00*	2.483E+00	2.327E-01	2.327E-01	59.24

Flag: "*" = Keyline

Total number of lines in spectrum 72
 Number of unidentified lines 23
 Number of lines tentatively identified by NID 49 68.06%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.25E+09Y	1.00	1.508E+01	1.508E+01	0.265E+01	17.59	
CO-58	70.86D	1.46	5.400E-02	7.889E-02	10.41E-02	131.92	
CD-109	461.40D	1.06	7.993E+00	8.472E+00	2.728E+00	32.20	
SN-126	2.30E+05Y	1.00	7.993E-01	7.993E-01	2.574E-01	32.20	
CE-141	32.51D	2.28	4.353E-02	9.945E-02	33.92E-02	341.03	
TL-208	1.41E+10Y	1.00	8.304E-01	8.304E-01	2.094E-01	25.22	
BI-211	7.04E+08Y	1.00	1.510E+01	1.510E+01	0.168E+01	11.10	
BI-212	1.41E+10Y	1.00	4.574E+00	4.574E+00	2.080E+00	45.47	
PB-212	1.41E+10Y	1.00	2.976E+00	2.976E+00	0.290E+00	9.74	
BI-214	1600.00Y	1.00	4.649E+00	4.649E+00	0.495E+00	10.64	
PB-214	1600.00Y	1.00	5.480E+00	5.481E+00	0.608E+00	11.10	
RN-222	1600.00Y	1.00	4.649E+00	4.649E+00	0.495E+00	10.64	
RA-224	1.41E+10Y	1.00	1.425E+01	1.425E+01	0.273E+01	19.14	
RA-226	1600.00Y	1.00	5.480E+00	5.481E+00	0.608E+00	11.10	
AC-228	1.41E+10Y	1.00	3.346E+00	3.346E+00	0.738E+00	22.07	
RA-228	1.41E+10Y	1.00	3.346E+00	3.346E+00	0.738E+00	22.07	
TH-228	1.41E+10Y	1.00	2.976E+00	2.976E+00	0.290E+00	9.74	
TH-230	7.54E+04Y	1.00	5.480E+00	5.480E+00	0.608E+00	11.10	
PA-231	7.04E+08Y	1.00	1.113E+00	1.113E+00	1.457E+00	130.96	
TH-232	1.41E+10Y	1.00	3.346E+00	3.346E+00	0.738E+00	22.07	
TH-234	4.47E+09Y	1.00	1.046E+01	1.046E+01	0.813E+01	77.73	
U-234	2.45E+05Y	1.00	5.480E+00	5.480E+00	0.608E+00	11.10	
U-235	7.04E+08Y	1.00	1.918E-01	1.918E-01	6.540E-01	341.03	
U-238	4.47E+09Y	1.00	1.046E+01	1.046E+01	0.813E+01	77.73	
AM-243	7370.00Y	1.00	7.854E-01	7.854E-01	1.986E-01	25.29	
ANH-511	1.00E+09Y	1.00	2.327E-01	2.327E-01	1.378E-01	59.24	
Total Activity :			1.292E+02	1.297E+02			

Grand Total Activity : 1.292E+02 1.297E+02

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	98.91	39	128	1.41	198.97	194	11	1.39E-02	****	5.09E+00	T
2	127.62	20	89	1.31	256.45	254	11	6.93E-03	****	5.72E+00	T
2	129.50	31	96	1.19	260.22	254	11	1.08E-02	99.8	5.72E+00	T
0	154.81	17	99	1.17	310.89	307	7	5.95E-03	****	5.54E+00	T
0	209.34	53	94	0.76	420.08	416	9	1.79E-02	64.8	4.75E+00	
0	250.32	36	88	3.47	502.11	495	13	1.20E-02	****	4.21E+00	
0	270.14	54	75	1.06	541.78	537	10	1.82E-02	59.7	3.99E+00	T
0	315.51	25	69	5.20	632.61	625	14	8.32E-03	****	3.57E+00	T
0	323.91	18	54	0.93	649.42	645	8	6.07E-03	****	3.50E+00	T
0	328.67	32	51	1.10	658.94	655	9	1.07E-02	79.7	3.47E+00	T
0	410.08	23	42	1.56	821.88	816	9	7.39E-03	****	2.94E+00	T
0	430.35	44	49	2.58	862.45	857	16	1.43E-02	71.1	2.84E+00	
0	442.87	25	31	4.35	887.52	881	13	8.06E-03	92.8	2.78E+00	
0	463.49	35	34	1.21	928.79	923	10	1.14E-02	65.7	2.68E+00	T
0	535.63	14	9	0.89	1073.14	1069	7	4.37E-03	84.7	2.39E+00	
0	556.48	23	45	9.03	1114.87	1101	22	7.40E-03	****	2.32E+00	
5	570.26	19	33	2.39	1142.43	1137	14	5.93E-03	****	2.27E+00	T
5	573.22	7	15	1.14	1148.36	1137	14	2.22E-03	****	2.26E+00	
0	668.10	9	28	3.11	1338.21	1328	12	2.91E-03	****	1.99E+00	T
1	675.34	13	13	1.71	1352.69	1347	24	4.21E-03	****	1.97E+00	
1	679.15	12	7	1.71	1360.31	1347	24	3.91E-03	****	1.96E+00	
0	722.49	7	27	0.81	1447.01	1440	11	2.07E-03	****	1.86E+00	T
0	768.57	30	22	1.85	1539.21	1534	11	9.45E-03	66.9	1.76E+00	
0	787.76	16	17	1.24	1577.58	1571	11	5.17E-03	****	1.72E+00	T
0	791.83	5	9	0.46	1585.73	1581	7	1.46E-03	****	1.71E+00	T
0	796.19	42	13	5.37	1594.46	1587	18	1.33E-02	46.3	1.70E+00	T
0	807.24	13	21	1.36	1616.56	1609	13	4.04E-03	****	1.68E+00	
0	815.39	23	8	3.94	1632.87	1627	12	7.30E-03	59.9	1.66E+00	T
0	848.34	3	15	0.53	1698.77	1692	10	1.04E-03	****	1.60E+00	
0	885.46	10	8	1.33	1773.01	1769	9	2.97E-03	****	1.54E+00	T
4	916.24	14	8	2.48	1834.58	1819	26	4.23E-03	****	1.49E+00	
0	935.52	43	14	2.42	1873.13	1866	18	1.34E-02	50.0	1.46E+00	T
0	956.69	8	11	2.36	1915.48	1906	13	2.36E-03	****	1.43E+00	
1	965.12	13	5	1.89	1932.34	1928	20	4.12E-03	94.7	1.42E+00	T
0	1024.35	16	5	3.88	2050.78	2045	12	5.00E-03	72.0	1.34E+00	
0	1155.48	19	9	4.96	2312.98	2306	13	5.91E-03	74.4	1.19E+00	
0	1212.75	20	17	2.91	2427.49	2420	22	6.04E-03	****	1.14E+00	
0	1237.80	29	10	0.77	2477.58	2471	14	8.82E-03	57.3	1.12E+00	T
0	1299.41	10	4	0.86	2600.73	2596	9	3.11E-03	91.4	1.07E+00	T
0	1332.18	6	4	0.95	2666.24	2659	9	1.72E-03	****	1.05E+00	T
0	1378.31	24	7	0.97	2758.45	2751	15	7.36E-03	59.5	1.02E+00	
0	1401.70	10	2	0.56	2805.19	2801	8	3.09E-03	74.2	1.00E+00	
0	1408.48	15	0	2.16	2818.75	2814	9	4.44E-03	50.0	1.00E+00	T
0	1510.68	5	10	0.67	3023.00	3015	11	1.67E-03	****	9.48E-01	
0	1589.96	10	5	1.41	3181.43	3174	11	2.92E-03	****	9.15E-01	
0	1730.56	16	6	1.06	3462.35	3455	13	4.94E-03	75.5	8.71E-01	
0	1848.29	15	3	0.65	3697.54	3691	12	4.44E-03	66.1	8.48E-01	

Flags: "T" = Tentatively associated

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*****
*
*           GEL Laboratories LLC
*           2040 Savage Road
*           Charleston, SC 29407
*****
*
*           DETECTOR AND SAMPLE DATA
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724004.CNF;1
* Acquisition date   : 28-FEB-2023 05:08:05 Sensitivity      : 3.000
* Detector ID        : GAM40 Energy tolerance: 1.500
* Elapsed live time  : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time  : 0 01:00:00.52 Half life ratio  : *****
* Sample date        : 20-JAN-2023 11:30:00 Nuclide Library : SOLID
* Sample ID          : G609724004 Analyst initials: RXF2
* Batch Number       : 2379916 Sample Quantity  : 6.4740E+01 GRAM
* Wet wt corr        : 1.00000 Wet Weight       : 0.00000
* Dry Weight         : 0.00000
*****
*
*           CALIBRATION INFORMATION
*
* Eff. Cal. date     : 25-OCT-2022 08:28:28 Eff. Geometry   : CAN
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM40_CAN.CNF;12
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)
K-40	6.665E-01
CO-58	1.179E-01
CD-109	1.538E+00
SN-126	1.463E-01
TL-208	6.725E-02
BI-211	3.821E-01
BI-212	8.882E-01
PB-212	1.057E-01
BI-214	1.136E-01
PB-214	1.390E-01
RN-222	1.136E-01
RA-224	1.133E+00
RA-226	1.390E-01
AC-228	2.282E-01
RA-228	2.282E-01
TH-228	1.057E-01
TH-230	1.390E-01
PA-231	8.992E-01
TH-232	2.282E-01
TH-234	3.801E+00
U-234	1.390E-01
U-235	3.796E-01
U-238	3.801E+00
AM-243	1.240E-01
ANH-511	5.346E-02

---- Non-Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)	
BE-7	7.777E-01	NOT IDENT.
NA-22	7.568E-02	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	6.957E-02	NOT IDENT.
SC-46	8.995E-02	FAIL ABUN
V-48	3.595E-01	NOT IDENT.

CR-51	1.285E+00	NOT IDENT.
MN-52	1.086E+01	FAIL ABUN
MN-54	7.655E-02	NOT IDENT.
CO-56	1.056E-01	FAIL ABUN
MN-56	0.000E+00	SHORT HLIF
CO-57	5.072E-02	NOT IDENT.
FE-59	2.566E-01	NOT IDENT.
CO-60	8.476E-02	FAIL ABUN
ZN-65	1.885E-01	NOT IDENT.
GE-68	2.239E+00	NOT IDENT.
AS-73	4.216E+00	NOT IDENT.
AS-74	4.169E-01	NOT IDENT.
SE-75	1.002E-01	NOT IDENT.
BR-77	0.000E+00	SHORT HLIF
SR-82	1.024E+00	NOT IDENT.
RB-83	1.402E-01	NOT IDENT.
RB-84	2.318E-01	NOT IDENT.
KR-85	1.504E+01	NOT IDENT.
SR-85	1.021E-01	NOT IDENT.
RB-86	3.193E+00	NOT IDENT.
Y-88	5.726E-02	NOT IDENT.
Y-91	3.862E+01	NOT IDENT.
NB-94	6.726E-02	NOT IDENT.
NB-95	9.844E-02	NOT IDENT.
NB-95M	3.134E-01	NOT IDENT.
ZR-95	2.123E-01	NOT IDENT.
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	SHORT HLIF
RH-101	6.000E-02	FAIL ABUN
RH-102	1.141E-01	NOT IDENT.
RU-103	1.217E-01	FAIL ABUN
RH-106	7.115E-01	NOT IDENT.
RU-106	7.115E-01	NOT IDENT.
AG-108M	5.165E-02	FAIL ABUN
AG-110	1.574E+00	NOT IDENT.
AG-110M	1.165E-01	FAIL ABUN
SN-113	1.034E-01	NOT IDENT.
CD-115	0.000E+00	SHORT HLIF
SN-117M	3.844E-01	FAIL ABUN
SB-122	0.000E+00	SHORT HLIF
TE-123M	6.624E-02	NOT IDENT.
SB-124	2.055E-01	FAIL ABUN
SB-125	1.940E-01	FAIL ABUN
TE-125M	2.546E+01	NOT IDENT.
I-126	1.775E+00	NOT IDENT.
SB-126	1.210E+00	NOT IDENT.
SB-127	0.000E+00	SHORT HLIF
I-131	1.604E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	0.000E+00	SHORT HLIF
BA-133	8.363E-02	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	1.108E-01	FAIL ABUN
I-135	0.000E+00	SHORT HLIF
CS-136	7.417E-01	FAIL ABUN
BA-137M	6.272E-02	NOT IDENT.
CS-137	6.626E-02	NOT IDENT.
LA-138	1.143E-01	FAIL ABUN
CE-139	6.000E-02	NOT IDENT.
BA-140	1.500E+00	NOT IDENT.
LA-140	5.592E-01	FAIL ABUN
CE-141	1.942E-01	FAIL ABUN
CE-143	0.000E+00	SHORT HLIF
CE-144	4.061E-01	NOT IDENT.
PM-144	5.558E-02	NOT IDENT.
PR-144	4.217E+00	NOT IDENT.
PM-146	8.596E-02	NOT IDENT.
ND-147	4.589E+00	FAIL ABUN
PM-147	1.344E+03	NOT IDENT.
PM-149	0.000E+00	SHORT HLIF
EU-150	5.113E-02	FAIL ABUN
EU-152	1.551E-01	FAIL ABUN
GD-153	1.714E-01	FAIL ABUN
EU-154	2.141E-01	FAIL ABUN
EU-155	2.037E-01	FAIL ABUN
TB-160	3.204E-01	FAIL ABUN

HO-166M	1.014E-01	FAIL ABUN
TM-171	7.452E+01	NOT IDENT.
HF-172	3.592E-01	FAIL ABUN
LU-172	1.363E-01	FAIL ABUN
LU-176	5.562E-02	FAIL ABUN
HF-181	1.431E-01	NOT IDENT.
TA-182	2.280E-01	FAIL ABUN
RE-183	8.553E-01	NOT IDENT.
RE-184	3.803E-01	FAIL ABUN
W-188	1.544E+01	FAIL ABUN
IR-192	7.655E-02	FAIL ABUN
HG-203	1.088E-01	NOT IDENT.
TL-204	1.195E+01	NOT IDENT.
BI-207	8.728E-02	FAIL ABUN
BI-210	1.934E+01	NOT IDENT.
PB-210	1.934E+01	NOT IDENT.
PB-211	1.543E+00	NOT IDENT.
BI-213	1.935E-01	NOT IDENT.
RN-219	7.706E-01	FAIL ABUN
RA-223	1.512E+00	FAIL ABUN
AC-225	5.641E+00	NOT IDENT.
AC-227	5.094E-01	FAIL ABUN
TH-227	5.094E-01	FAIL ABUN
TH-229	1.042E+00	FAIL ABUN
TH-231	1.512E+00	FAIL ABUN
PA-233	1.269E-01	FAIL ABUN
PA-234	5.328E-01	FAIL ABUN
PA-234M	8.352E+00	NOT IDENT.
NP-237	1.269E-01	FAIL ABUN
NP-238	0.000E+00	SHORT HLIF
NP-239	5.056E-01	FAIL ABUN
PU-239	7.170E+02	FAIL ABUN
AM-241	4.851E-01	NOT IDENT.
CM-243	1.968E-01	FAIL ABUN
BK-247	1.518E-01	NOT IDENT.
CM-247	7.249E-02	NOT IDENT.
CF-249	8.720E-02	NOT IDENT.
CF-251	2.649E-01	NOT IDENT.


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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                          *
*****
*                               DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724004.CNF;1
* Acquisition date   : 28-FEB-2023 05:08:05 Sensitivity      : 3.000
* Detector ID       : GAM40 Energy tolerance: 1.500
* Elapsed live time : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time : 0 01:00:00.52 Half life ratio : *****
* Sample date       : 20-JAN-2023 11:30:00 Nuclide Library : SOLID
* Sample ID        : G609724004 Analyst initials: RXF2
* Batch Number     : 2379916 Sample Quantity : 6.4740E+01 GRAM
*                               Quantity Err(%) : 1.5446E-03 %
* Wet wt corr      : 1.00000 Wet Weight      : 0.00000
*                               Dry Weight     : 0.00000
*****
*                               CALIBRATION INFORMATION                         *
*
* Eff. Cal. date    : 25-OCT-2022 08:28:28 Eff. Geometry   : CAN
* Eff. File         : DKA100:[CANBERRA.GAMMA]EFF_GAM40_CAN.CNF;12
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
K-40	1.508E+01	3.022E+00	3.022E+00
CO-58	7.889E-02	1.022E-01	1.022E-01
CD-109	8.472E+00	2.866E+00	2.866E+00
SN-126	7.993E-01	2.670E-01	2.670E-01
TL-208	8.304E-01	2.173E-01	2.173E-01
BI-211	1.510E+01	2.181E+00	2.181E+00
BI-212	4.574E+00	2.079E+00	2.079E+00
PB-212	2.976E+00	4.012E-01	4.012E-01
BI-214	4.649E+00	6.248E-01	6.248E-01
PB-214	5.481E+00	7.866E-01	7.866E-01
RN-222	4.649E+00	6.248E-01	6.248E-01
RA-224	1.425E+01	3.005E+00	3.005E+00
RA-226	5.481E+00	7.866E-01	7.866E-01
AC-228	3.346E+00	7.984E-01	7.984E-01
RA-228	3.346E+00	7.984E-01	7.984E-01
TH-228	2.976E+00	4.012E-01	4.012E-01
TH-230	5.480E+00	7.866E-01	7.866E-01
PA-231	1.113E+00	1.451E+00	1.451E+00
TH-232	3.346E+00	7.984E-01	7.984E-01
TH-234	1.046E+01	8.374E+00	8.374E+00
U-234	5.480E+00	7.866E-01	7.866E-01
U-235	1.918E-01	6.411E-01	6.411E-01
U-238	1.046E+01	8.374E+00	8.374E+00
AM-243	7.854E-01	2.129E-01	2.129E-01
ANH-511	2.327E-01	1.366E-01	1.366E-01

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	-3.524E-01	9.956E-01	1.008E+00	NOT IDENT.
NA-22	-5.242E-02	1.015E-01	1.042E-01	NOT IDENT.
NA-24	1.332E+17	2.582E+17	0.000E+00	SHORT HLIF
AL-26	2.543E-02	7.667E-02	7.753E-02	NOT IDENT.
SC-46	2.881E-02	1.196E-01	1.203E-01	FAIL ABUN

V-48	-6.897E-03	4.575E-01	4.575E-01	NOT IDENT.
CR-51	1.318E+00	1.859E+00	1.952E+00	NOT IDENT.
MN-52	1.024E+01	1.086E+01	1.180E+01	FAIL ABUN
MN-54	1.068E-02	9.428E-02	9.440E-02	NOT IDENT.
CO-56	7.742E-02	1.196E-01	1.246E-01	FAIL ABUN
MN-56	1.000E+41	1.538E+41	0.000E+00	SHORT HLIF
CO-57	1.406E-02	6.405E-02	6.437E-02	NOT IDENT.
FE-59	1.306E-01	2.822E-01	2.883E-01	NOT IDENT.
CO-60	6.299E-02	9.201E-02	9.629E-02	FAIL ABUN
ZN-65	2.724E-01	1.839E-01	2.211E-01	NOT IDENT.
GE-68	-1.587E+00	2.960E+00	3.046E+00	NOT IDENT.
AS-73	2.861E+00	5.167E+00	5.326E+00	NOT IDENT.
AS-74	-1.190E-01	5.357E-01	5.383E-01	NOT IDENT.
SE-75	5.438E-02	1.263E-01	1.287E-01	NOT IDENT.
BR-77	4.554E+05	5.129E+05	5.525E+05	SHORT HLIF
SR-82	-1.000E+00	1.475E+00	1.542E+00	NOT IDENT.
RB-83	3.459E-02	1.663E-01	1.670E-01	NOT IDENT.
RB-84	1.803E-02	3.180E-01	3.181E-01	NOT IDENT.
KR-85	2.078E+01	1.732E+01	1.969E+01	NOT IDENT.
SR-85	1.408E-01	1.176E-01	1.336E-01	NOT IDENT.
RB-86	-2.262E+00	4.220E+00	4.342E+00	NOT IDENT.
Y-88	-1.722E-03	7.107E-02	7.108E-02	NOT IDENT.
Y-91	-2.655E+01	5.202E+01	5.338E+01	NOT IDENT.
NB-94	3.692E-02	7.809E-02	7.984E-02	NOT IDENT.
NB-95	-1.013E-01	1.594E-01	1.658E-01	NOT IDENT.
NB-95M	-1.054E-01	4.598E-01	4.623E-01	NOT IDENT.
ZR-95	9.567E-02	2.514E-01	2.551E-01	NOT IDENT.
NB-97	1.000E+41	1.374E+41	0.000E+00	SHORT HLIF
ZR-97	2.861E+16	4.549E+16	0.000E+00	SHORT HLIF
MO-99	-2.968E+03	1.061E+04	1.069E+04	SHORT HLIF
TC-99M	1.000E+41	2.884E+41	0.000E+00	SHORT HLIF
RH-101	6.055E-02	8.008E-02	8.460E-02	FAIL ABUN
RH-102	4.795E-02	1.343E-01	1.360E-01	NOT IDENT.
RU-103	2.894E-02	1.452E-01	1.457E-01	FAIL ABUN
RH-106	7.804E-01	7.732E-01	8.495E-01	NOT IDENT.
RU-106	7.804E-01	7.732E-01	8.495E-01	NOT IDENT.
AG-108M	-2.609E-02	6.606E-02	6.710E-02	FAIL ABUN
AG-110	7.942E-01	1.833E+00	1.868E+00	NOT IDENT.
AG-110M	1.098E-01	1.358E-01	1.446E-01	FAIL ABUN
SN-113	7.641E-03	1.243E-01	1.243E-01	NOT IDENT.
CD-115	1.675E+04	3.997E+04	4.068E+04	SHORT HLIF
SN-117M	3.209E-03	4.978E-01	4.978E-01	FAIL ABUN
SB-122	-2.403E+02	2.029E+03	2.032E+03	SHORT HLIF
TE-123M	1.701E-02	8.449E-02	8.484E-02	NOT IDENT.
SB-124	-1.655E-01	3.017E-01	3.108E-01	FAIL ABUN
SB-125	1.276E-01	2.437E-01	2.504E-01	FAIL ABUN
TE-125M	-3.134E+00	3.289E+01	3.292E+01	NOT IDENT.
I-126	1.486E+00	1.987E+00	2.097E+00	NOT IDENT.
SB-126	8.839E-01	1.522E+00	1.574E+00	NOT IDENT.
SB-127	7.202E+01	1.936E+02	1.963E+02	SHORT HLIF
I-131	-2.511E-01	1.963E+00	1.966E+00	NOT IDENT.
I-132	1.000E+41	3.286E+41	0.000E+00	SHORT HLIF
TE-132	-1.328E+02	2.945E+02	3.005E+02	SHORT HLIF
BA-133	2.220E-02	1.090E-01	1.095E-01	NOT IDENT.
I-133	1.255E+12	2.154E+12	2.227E+12	SHORT HLIF
CS-134	3.496E-01	1.618E-01	2.259E-01	FAIL ABUN
I-135	-1.000E+41	1.769E+41	0.000E+00	SHORT HLIF
CS-136	5.176E-02	8.700E-01	8.703E-01	FAIL ABUN
BA-137M	-1.938E-02	9.122E-02	9.164E-02	NOT IDENT.
CS-137	-2.047E-02	9.637E-02	9.681E-02	NOT IDENT.
LA-138	3.531E-02	1.290E-01	1.300E-01	FAIL ABUN
CE-139	-8.833E-02	8.756E-02	9.619E-02	NOT IDENT.
BA-140	-1.116E+00	2.294E+00	2.348E+00	NOT IDENT.
LA-140	-3.304E-01	7.756E-01	7.897E-01	FAIL ABUN
CE-141	9.945E-02	3.325E-01	3.355E-01	FAIL ABUN
CE-143	5.127E+07	4.730E+07	5.264E+07	SHORT HLIF
CE-144	2.653E-01	5.407E-01	5.538E-01	NOT IDENT.
PM-144	-7.136E-02	8.174E-02	8.785E-02	NOT IDENT.
PR-144	-5.387E+00	6.197E+00	6.655E+00	NOT IDENT.
PM-146	3.538E-02	1.006E-01	1.018E-01	NOT IDENT.
ND-147	5.419E-01	6.177E+00	6.182E+00	FAIL ABUN
PM-147	1.138E+02	1.717E+03	1.718E+03	NOT IDENT.
PM-149	-3.131E+04	3.503E+05	3.505E+05	SHORT HLIF
EU-150	-5.455E-02	7.518E-02	7.910E-02	FAIL ABUN
EU-152	-1.817E-01	2.353E-01	2.492E-01	FAIL ABUN
GD-153	3.457E-01	3.501E-01	3.832E-01	FAIL ABUN
EU-154	-1.406E-01	2.853E-01	2.923E-01	FAIL ABUN
EU-155	4.265E-02	2.575E-01	2.582E-01	FAIL ABUN

TB-160	1.835E-01	3.616E-01	3.709E-01	FAIL ABUN
HO-166M	-2.294E-03	1.266E-01	1.266E-01	FAIL ABUN
TM-171	1.110E+01	9.340E+01	9.353E+01	NOT IDENT.
HF-172	-4.742E-02	5.056E-01	5.061E-01	FAIL ABUN
LU-172	7.358E-02	1.498E-01	1.534E-01	FAIL ABUN
LU-176	4.666E-02	6.279E-02	6.622E-02	FAIL ABUN
HF-181	1.517E-01	1.578E-01	1.720E-01	NOT IDENT.
TA-182	-3.560E-01	4.396E-01	4.680E-01	FAIL ABUN
RE-183	-1.922E-02	1.084E+00	1.084E+00	NOT IDENT.
RE-184	1.712E-01	4.459E-01	4.525E-01	FAIL ABUN
W-188	-2.226E+01	2.347E+01	2.552E+01	FAIL ABUN
IR-192	1.420E-01	1.878E-01	1.984E-01	FAIL ABUN
HG-203	5.871E-02	1.253E-01	1.281E-01	NOT IDENT.
TL-204	-9.316E-01	1.647E+01	1.648E+01	NOT IDENT.
BI-207	-8.786E-02	1.189E-01	1.253E-01	FAIL ABUN
BI-210	-6.838E+00	2.592E+01	2.610E+01	NOT IDENT.
PB-210	-6.838E+00	2.592E+01	2.610E+01	NOT IDENT.
PB-211	6.592E-01	1.994E+00	2.016E+00	NOT IDENT.
BI-213	4.038E-02	2.553E-01	2.559E-01	NOT IDENT.
RN-219	-7.089E-01	1.014E+00	1.063E+00	FAIL ABUN
RA-223	1.525E+00	2.025E+00	2.139E+00	FAIL ABUN
AC-225	3.932E-01	7.353E+00	7.355E+00	NOT IDENT.
AC-227	2.577E-01	6.458E-01	6.561E-01	FAIL ABUN
TH-227	2.577E-01	6.458E-01	6.561E-01	FAIL ABUN
TH-229	2.005E-01	1.342E+00	1.345E+00	FAIL ABUN
TH-231	1.525E+00	2.025E+00	2.139E+00	FAIL ABUN
PA-233	7.543E-02	1.595E-01	1.631E-01	FAIL ABUN
PA-234	-8.814E-02	7.003E-01	7.014E-01	FAIL ABUN
PA-234M	4.093E+00	9.707E+00	9.881E+00	NOT IDENT.
NP-237	7.543E-02	1.595E-01	1.631E-01	FAIL ABUN
NP-238	-1.061E+03	1.126E+05	1.126E+05	SHORT HLIF
NP-239	-8.143E-02	6.560E-01	6.571E-01	FAIL ABUN
PU-239	9.923E+02	9.732E+02	1.071E+03	FAIL ABUN
AM-241	-1.343E-01	6.752E-01	6.779E-01	NOT IDENT.
CM-243	-5.433E-02	2.783E-01	2.793E-01	FAIL ABUN
BK-247	2.535E-02	1.977E-01	1.980E-01	NOT IDENT.
CM-247	-5.081E-02	9.356E-02	9.632E-02	NOT IDENT.
CF-249	1.729E-02	1.038E-01	1.041E-01	NOT IDENT.
CF-251	1.624E-01	3.316E-01	3.395E-01	NOT IDENT.

 * GEL Laboratories LLC *
 * 2040 Savage Road *
 * Charleston, SC 29407 *
 * GAMMA SPECTROSCOPY BACKGROUND REPORT *

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	74.5593	85.43	86.7852	131.20	89.9500
45.60	79.6428	86.55	86.9512	133.02	66.8933
46.54	83.5889	86.79	86.9863	133.52	71.3008
49.72	0.0000	86.94	87.0085	136.00	78.8236
51.35	70.3187	87.09	87.0306	136.47	72.2983
51.87	63.7449	87.57	87.1009	140.51	0.0000
52.39	75.2535	88.03	87.1686	143.76	85.1093
52.97	86.8010	88.34	87.2135	144.24	85.1599
53.44	71.6171	88.47	87.2324	145.44	70.8848
54.07	68.8519	89.96	87.4492	152.43	98.2762
57.36	0.0000	1093.63	87.5469	153.25	87.9370
57.53	75.1706	91.11	87.6146	323.87	82.8119
57.98	88.7498	92.59	87.8262	156.02	88.2185
59.27	92.8685	93.35	87.9349	158.56	97.8471
59.32	92.8784	94.56	88.1058	159.00	85.5186
59.54	92.9227	94.65	88.1185	162.33	108.4277
60.96	82.8486	94.67	88.1211	162.66	100.5596
61.17	82.8857	94.87	88.1497	163.33	71.2355
62.93	98.4658	97.43	71.9126	165.86	96.3811
63.29	98.5392	98.43	72.0247	176.31	94.0317
63.58	98.5981	98.44	72.0263	176.60	88.3251
64.28	98.7405	99.53	72.1480	177.52	74.6326
66.73	89.0791	100.11	72.2131	181.07	0.0000
67.24	97.0384	102.03	79.3897	181.52	67.6427
125.81	97.1227	103.18	66.9712	184.41	82.1068
67.75	96.4800	103.37	78.1558	143.76	82.2162
68.89	102.6178	105.21	73.4735	193.51	75.8595
69.67	114.6335	105.31	75.5843	197.03	84.3201
70.82	97.7212	106.12	80.9307	198.01	82.0569
70.83	97.7234	106.47	82.0240	201.83	81.1837
72.81	105.3846	109.28	88.6989	203.43	74.2386
72.87	105.3967	111.00	94.2128	205.31	67.6818
74.66	105.7517	111.76	0.0000	210.85	56.9604
74.82	105.7833	114.06	88.2464	215.65	60.7897
74.97	105.8124	116.30	0.0000	218.12	60.9275
77.11	106.2309	116.74	82.1761	222.11	55.1528
78.74	106.5455	119.76	70.7313	227.09	52.9899
79.69	100.6859	121.12	67.6417	227.38	59.0264
80.03	100.7462	121.22	67.6508	228.16	0.0000
80.12	100.7637	121.78	72.0008	228.18	65.0956
80.19	98.7604	122.06	72.0279	116.74	65.0956
80.57	98.8269	122.92	69.9591	235.69	82.5108
81.00	100.9209	123.07	77.5091	235.96	76.0575
81.07	100.9338	265.00	79.7271	238.63	60.8238
81.75	86.9068	125.81	79.2337	238.98	0.0000
82.47	101.1826	127.23	75.7737	240.99	60.9459
83.79	86.5410	127.91	75.8418	242.00	60.9985
84.00	86.5723	129.30	75.9793	244.70	48.9099

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.40	0.0000	344.28	42.1230	563.25	26.0971
252.80	41.0334	345.93	35.5800	564.24	0.0000
254.15	0.0000	351.06	39.6661	569.33	29.7375
256.23	51.8473	351.93	39.6881	946.00	29.7400
260.90	0.0000	355.39	0.0000	569.70	29.7437
264.66	45.9858	356.01	38.4661	583.19	23.9385
264.80	48.4763	364.49	34.6741	584.27	23.9502
265.00	48.4846	366.42	0.0000	595.83	22.0671
269.46	47.4072	372.51	34.8486	427.87	24.1230
270.03	47.4293	375.05	44.7479	602.52	0.0000
271.23	47.4733	377.52	34.9565	604.72	28.6971
273.65	56.3242	356.01	39.5912	607.14	18.1436
276.40	64.3891	388.16	43.3027	609.32	18.1604
277.37	61.0888	388.63	38.8034	610.33	18.1685
277.60	61.1007	391.69	37.9702	614.28	16.6826
278.00	58.6068	264.66	36.3558	618.01	20.2539
279.20	47.7667	401.81	46.3848	620.36	30.4114
279.54	49.4560	402.40	45.4905	621.93	15.2155
279.70	49.4620	404.85	38.2676	630.19	0.0000
280.46	56.2014	410.95	41.1465	631.29	20.3678
283.69	41.2032	413.71	42.5853	633.25	26.4993
284.31	47.1121	414.70	34.8210	634.78	22.4368
285.41	48.8348	423.72	39.6056	635.95	13.2645
285.90	0.0000	427.09	20.7632	636.99	16.3327
287.50	43.0084	427.87	29.0814	657.50	18.5295
290.67	58.3254	433.94	31.4959	657.76	17.5022
293.27	0.0000	439.40	23.6935	657.90	0.0000
351.93	44.5276	440.45	26.4961	661.66	21.6545
295.96	44.5522	453.88	28.0945	664.57	0.0000
879.38	66.3187	463.37	24.4723	666.33	18.5962
299.98	58.7255	468.07	27.1746	666.50	18.5977
300.09	58.7311	473.00	0.0000	667.71	0.0000
300.13	58.7325	475.06	17.9934	677.62	19.7182
301.36	47.2832	476.78	29.3842	685.70	0.0000
302.85	52.4512	477.60	29.3961	692.65	0.0000
256.23	58.4055	482.18	22.8120	695.00	19.8527
304.85	53.8087	487.02	25.7272	696.49	25.0918
306.78	40.1984	492.35	0.0000	696.51	25.0918
308.46	49.6656	497.08	26.8162	697.00	25.0967
311.90	37.3403	505.52	28.8531	697.30	19.8705
316.51	40.4757	507.63	0.0000	697.49	18.8262
319.41	46.5985	511.00	26.0379	702.65	17.8156
320.08	28.4903	514.00	18.8327	706.68	20.9920
321.04	43.1956	514.00	18.8327	711.68	15.7745
323.87	49.8586	520.40	16.4694	720.70	18.9946
325.23	51.9849	520.69	0.0000	721.93	0.0000
328.76	53.1516	522.65	0.0000	722.78	12.6729
333.37	36.5911	527.90	0.0000	722.91	12.6733
333.97	57.5231	528.26	20.4224	723.31	12.6753
334.37	54.9238	529.59	21.4083	724.19	12.6797
338.28	34.0893	529.87	0.0000	727.33	17.4554
338.32	34.0901	531.02	21.9095	733.00	19.0825
311.90	34.1393	537.26	23.4395	735.93	12.7354
340.48	34.1393	546.56	0.0000	333.97	20.1759
340.55	34.1409	552.55	26.5594	739.50	0.0000

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
744.23	22.3561	949.00	6.8406	1384.29	10.7290
747.24	18.1178	667.71	0.0000	1408.01	0.0000
748.06	15.9912	962.31	12.0197	1434.09	3.8745
752.31	19.2188	964.08	10.3081	1435.80	5.8140
753.82	22.4347	966.17	10.3143	1457.56	0.0000
756.73	21.3892	911.20	10.3231	1460.82	6.8197
756.80	21.3892	983.53	12.6722	1489.16	4.9008
884.68	14.4756	984.45	0.0000	1505.03	6.2941
765.81	28.9698	1274.44	10.4070	1584.12	7.9971
766.42	20.9274	1001.03	9.2637	1596.21	8.0166
766.84	16.1005	1002.74	11.5853	1620.50	3.0209
772.60	0.0000	1004.73	12.7514	1621.92	8.0581
776.52	20.4650	507.63	0.0000	1678.03	0.0000
739.50	0.0000	1025.87	0.0000	1690.97	8.1670
778.90	16.1700	1028.54	0.0000	1750.46	0.0000
783.70	0.0000	1037.84	12.2885	1764.49	3.1053
788.74	0.0000	1038.76	0.0000	1063.66	4.9737
792.07	0.0000	631.29	15.8390	1771.35	0.0000
795.86	6.5071	1048.07	14.0850	1791.20	0.0000
810.06	0.0000	1049.04	15.8489	1808.65	3.1304
810.29	0.0000	1050.41	18.4980	1810.72	0.0000
344.28	0.0000	1063.66	15.0306	1836.06	2.0973
810.76	26.1631	1077.00	15.0856		
815.77	6.5520	1077.34	15.0877		
1048.07	13.1167	1085.87	12.4542		
832.01	21.9613	1093.63	10.6978		
834.85	17.5859	1099.45	9.8217		
835.71	17.5911	1112.07	12.5431		
836.80	0.0000	1112.84	16.1301		
846.75	0.0000	1115.54	2.8697		
846.77	13.2422	1120.29	14.3662		
856.80	13.2866	1120.55	14.3672		
860.56	22.1720	1221.41	14.3701		
871.09	8.8994	1129.67	14.4023		
873.19	16.6980	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	8.9235	1173.23	13.6569		
880.51	10.7121	1177.95	12.7618		
881.60	15.0688	1189.05	13.7128		
883.24	25.1285	1204.77	11.9320		
884.68	13.4082	1221.41	11.7977		
889.28	11.7493	1231.02	4.9274		
894.76	8.9678	1235.36	8.8787		
898.04	13.4658	1238.28	9.2554		
900.72	11.2309	1260.41	0.0000		
903.28	11.2402	1271.87	6.5322		
911.20	11.2683	1274.44	14.0057		
912.08	11.2712	1274.54	14.0067		
923.98	0.0000	1291.59	7.5005		
926.50	14.7192	1298.22	0.0000		
929.11	20.3965	1312.11	7.5371		
935.54	6.8125	1332.49	10.6025		
937.49	6.8167	1362.66	0.0000		
944.13	9.1074	1365.19	7.6304		
946.00	13.6689	1368.63	0.0000		

VAX/VMS Nuclide Identification Report Generated 28-FEB-2023 06:09:38.90

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                          *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724005.CNF;1
Background file : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM43.CNF;552
Background date : 26-FEB-2023 09:15:03
Sample date     : 20-JAN-2023 11:30:00 Acquisition date : 28-FEB-2023 05:08:59
Sample ID      : G609724005 Sample quantity   : 7.40600E+01 GRAM
Detector name  : GAM43 Detector geometry: CAN
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:00.62 0.0%
Energy tolerance : 1.50000 keV Analyst Initials : RXF2
Abundance limit : 75.00000 Sensitivity : 3.00000
Batch ID       : 2379916 Detector SN# :
Matrix Spike ID : LCS ID :
*****

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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	1	74.36*	101	71	0.84	148.93	143	18	2.79E-02	16.6	1.30E+00
2	1	76.48*	178	73	0.88	153.17	143	18	4.95E-02	10.5	
3	0	86.82	62	110	1.14	173.87	171	6	1.71E-02	30.1	
4	3	89.56	36	77	1.14	179.37	177	12	1.01E-02	39.7	1.68E+00
5	3	92.10*	69	122	1.33	184.45	177	12	1.91E-02	32.5	
6	0	98.97	28	43	1.31	198.19	196	5	7.67E-03	40.3	
7	0	128.84	20	81	0.91	258.00	254	8	5.64E-03	79.6	
8	0	176.09	23	81	1.31	352.59	348	9	6.28E-03	74.8	
9	0	185.94*	71	144	1.24	372.32	367	11	1.98E-02	35.7	
10	0	196.76	35	88	1.01	393.97	389	11	9.64E-03	55.1	
11	0	238.67*	295	144	1.06	477.86	473	9	8.21E-02	9.5	
12	0	242.01	94	77	1.12	484.55	482	8	2.61E-02	19.8	
13	0	270.05	61	59	3.91	540.68	534	14	1.69E-02	29.8	
14	0	295.24*	217	48	1.20	591.12	585	12	6.03E-02	9.4	
15	0	327.79*	27	40	2.26	656.25	653	9	7.62E-03	46.1	
16	0	339.33*	33	89	0.86	679.36	673	12	9.19E-03	59.1	
17	0	351.96*	335	23	1.21	704.64	699	10	9.29E-02	6.1	
18	3	463.02	24	33	2.33	926.94	922	15	6.64E-03	48.2	1.69E+00
19	3	466.63	15	6	1.35	934.15	922	15	4.24E-03	42.9	
20	0	511.22*	41	34	3.58	1023.40	1015	19	1.15E-02	42.3	
21	0	535.54	33	29	0.61	1072.06	1062	19	9.03E-03	43.1	
22	0	554.32	23	9	3.45	1109.65	1103	13	6.51E-03	34.1	
23	0	573.60	10	23	1.28	1148.24	1142	10	2.78E-03	94.3	
24	0	583.65*	80	33	1.66	1168.35	1163	11	2.22E-02	18.1	
25	0	609.67*	240	28	1.64	1220.42	1214	15	6.67E-02	8.0	
26	0	633.53	24	13	4.53	1268.16	1260	18	6.73E-03	40.8	
27	0	728.06*	35	21	3.07	1457.32	1450	17	9.65E-03	35.5	
28	0	807.33	11	12	0.89	1615.92	1607	16	3.04E-03	77.1	
29	0	912.14	67	20	2.96	1825.62	1818	16	1.85E-02	19.4	
30	0	970.33	37	19	1.91	1942.04	1935	13	1.04E-02	29.2	
31	0	993.32	14	6	1.15	1988.04	1982	12	3.89E-03	44.0	
32	0	1122.04	50	12	2.40	2245.53	2236	17	1.38E-02	21.8	
33	0	1379.96	16	7	0.71	2761.35	2753	14	4.49E-03	42.6	
34	0	1409.15	9	2	0.63	2819.73	2814	10	2.40E-03	48.1	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
35	0	1462.26*	168	5	2.92	2925.95	2915	20	4.65E-02	8.5	
36	0	1767.25	26	3	1.65	3535.73	3527	16	7.29E-03	22.9	

Flag: "*" = Peak area was modified by background subtraction

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724005.CNF;1
Analyses by : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4
Sample title : RXF2
Sample date : 20-JAN-2023 11:30:00 Acquisition date : 28-FEB-2023 05:08:59
Sample ID : G609724005 Sample quantity : 74.060 GRAM
Sample type : SOLID Sample geometry :
Detector name : GAMMA43 Detector geometry: CAN
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:00.62 0.0%
Energy tolerance : 1.50 keV Half life ratio : 10.00
Errors propagated: No Systematic Error : 0.00 %
Efficiency type : Empirical Efficiencies at : Peak Energy
Abundance limit : 75.00

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	154	10.66*	1.008E+00	1.451E+01	1.451E+01	17.06
CD-109	88.03	51	3.70*	4.717E+00	2.969E+00	3.147E+00	60.19
SN-126	64.28	-----	9.60	2.046E+00	-----	Line Not Found	-----
	86.94	51	8.90	4.717E+00	1.234E+00	1.234E+00	60.19
	87.57	51	37.00*	4.717E+00	2.969E-01	2.969E-01	60.19
TL-208	277.37	-----	6.60	4.237E+00	-----	Line Not Found	-----
	583.19	71	85.00*	2.346E+00	3.615E-01	3.615E-01	36.29
	860.56	-----	12.50	1.654E+00	-----	Line Not Found	-----
BI-211	72.87	83	1.23	3.355E+00	2.039E+01	2.039E+01	33.22
	351.06	292	12.92*	3.527E+00	6.507E+00	6.507E+00	12.29
BI-212	727.33	31	6.67*	1.932E+00	2.450E+00	2.450E+00	71.07
	1620.50	-----	1.47	9.333E-01	-----	Line Not Found	-----
PB-212	74.82	83	10.28	3.355E+00	2.439E+00	2.439E+00	33.22
	77.11	147	17.10	3.615E+00	2.416E+00	2.416E+00	20.91
	238.63	255	43.60*	4.739E+00	1.249E+00	1.249E+00	18.90
	300.09	-----	3.30	3.990E+00	-----	Line Not Found	-----
PB-214	74.82	83	5.80	3.355E+00	4.323E+00	4.323E+00	33.22
	77.11	147	9.70	3.615E+00	4.259E+00	4.259E+00	20.91
	87.09	51	3.41	4.717E+00	3.221E+00	3.221E+00	60.19
	242.00	81	7.25	4.691E+00	2.414E+00	2.414E+00	39.68
	295.22	189	18.42	4.040E+00	2.570E+00	2.570E+00	18.81
	351.93	292	35.60*	3.527E+00	2.361E+00	2.361E+00	12.29
RA-224	240.99	81	4.10*	4.691E+00	4.268E+00	4.268E+00	39.68
RA-226	74.82	83	5.80	3.355E+00	4.323E+00	4.323E+00	33.22
	77.11	147	9.70	3.615E+00	4.259E+00	4.259E+00	20.91
	87.09	51	3.41	4.717E+00	3.221E+00	3.221E+00	60.19
	242.00	81	7.25	4.691E+00	2.414E+00	2.414E+00	39.68
	295.22	189	18.42	4.040E+00	2.570E+00	2.570E+00	18.81
	351.93	292	35.60*	3.527E+00	2.361E+00	2.361E+00	12.29
AC-228	105.21	-----	1.10	5.899E+00	-----	Line Not Found	-----
	338.32	29	11.27	3.628E+00	7.163E-01	7.163E-01	118.13
	835.71	-----	1.61	1.700E+00	-----	Line Not Found	-----
	911.20	60	25.80*	1.564E+00	1.514E+00	1.514E+00	38.75
	968.97	34	15.80	1.474E+00	1.477E+00	1.477E+00	58.33
RA-228	105.21	-----	1.10	5.899E+00	-----	Line Not Found	-----
	338.32	29	11.27	3.628E+00	7.163E-01	7.163E-01	118.13
	835.71	-----	1.61	1.700E+00	-----	Line Not Found	-----
	911.20	60	25.80*	1.564E+00	1.514E+00	1.514E+00	38.75
	968.97	34	15.80	1.474E+00	1.477E+00	1.477E+00	58.33
TH-228	74.82	83	10.28	3.355E+00	2.439E+00	2.439E+00	33.22
	77.11	147	17.10	3.615E+00	2.416E+00	2.416E+00	20.91
	238.63	255	43.60*	4.739E+00	1.249E+00	1.249E+00	18.90
	300.09	-----	3.30	3.990E+00	-----	Line Not Found	-----
TH-229	85.43	51	14.70	4.717E+00	7.473E-01	7.473E-01	60.19
	88.47	30	24.00	4.956E+00	2.579E-01	2.579E-01	79.30
	193.51	-----	4.41*	5.464E+00	-----	Line Not Found	-----
	210.85	-----	2.80	5.169E+00	-----	Line Not Found	-----
TH-230	74.82	83	5.80	3.355E+00	4.323E+00	4.323E+00	33.22
	77.11	147	9.70	3.615E+00	4.259E+00	4.259E+00	20.91

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
	87.09	51	3.41	4.717E+00	3.221E+00	3.221E+00	60.19
	242.00	81	7.25	4.691E+00	2.414E+00	2.414E+00	39.68
	295.22	189	18.42	4.040E+00	2.570E+00	2.570E+00	18.81
	351.93	292	35.60*	3.527E+00	2.361E+00	2.361E+00	12.29
TH-232	105.21	-----	1.10	5.899E+00	-----	Line Not Found	-----
	338.32	29	11.27	3.628E+00	7.163E-01	7.163E-01	118.13
	835.71	-----	1.61	1.700E+00	-----	Line Not Found	-----
	911.20	60	25.80*	1.564E+00	1.514E+00	1.514E+00	38.75
	968.97	34	15.80	1.474E+00	1.477E+00	1.477E+00	58.33
U-234	74.82	83	5.80	3.355E+00	4.323E+00	4.323E+00	33.22
	77.11	147	9.70	3.615E+00	4.259E+00	4.259E+00	20.91
	87.09	51	3.41	4.717E+00	3.221E+00	3.221E+00	60.19
	242.00	81	7.25	4.691E+00	2.414E+00	2.414E+00	39.68
	295.22	189	18.42	4.040E+00	2.570E+00	2.570E+00	18.81
	351.93	292	35.60*	3.527E+00	2.361E+00	2.361E+00	12.29
U-235	89.96	30	3.47	4.956E+00	1.784E+00	1.784E+00	79.30
	93.35	57	5.60	5.157E+00	2.008E+00	2.008E+00	64.92
	143.76	-----	10.96*	6.248E+00	-----	Line Not Found	-----
	163.33	-----	5.08	5.984E+00	-----	Line Not Found	-----
	185.72	61	57.20	5.597E+00	1.929E-01	1.929E-01	71.38
	205.31	-----	5.01	5.262E+00	-----	Line Not Found	-----
AM-243	43.53	-----	5.90	1.643E-01	-----	Line Not Found	-----
	74.66	83	67.20*	3.355E+00	3.731E-01	3.731E-01	33.22
ANH-511	511.00	37	100.00*	2.620E+00	1.418E-01	1.418E-01	84.65

Flag: "*" = Keyline

```

*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                          *
*****
*                               DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724005.CNF;1
* Acquisition date   : 28-FEB-2023 05:08:59 Sensitivity      : 3.000
* Detector ID        : GAM43 Energy tolerance: 1.500
* Elapsed live time  : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time  : 0 01:00:00.62 Half life ratio : *****
* Sample date        : 20-JAN-2023 11:30:00 Analyst initials: RXF2
* Sample ID          : G609724005 Sample Quantity : 7.4060E+01 GRAM
* Batch Number       : 2379916 Wet Weight : 0.00000
* Wet wt corr        : 1.00000 Dry Weight : 0.00000
* Nuclide Library    : SOLID.NLB;17
*****
*                               CALIBRATION INFORMATION                         *
*
* Eff. Cal. date     : 26-JUL-2022 10:46:43 Eff. Geometry   : CAN
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM43_CAN.CNF;20
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
K-40	1.451E+01	2.427E+00	1.352E+00
CD-109	3.147E+00	1.856E+00	2.247E+00
SN-126	2.969E-01	1.751E-01	2.136E-01
TL-208	3.615E-01	1.286E-01	1.214E-01
BI-211	6.507E+00	7.838E-01	5.606E-01
BI-212	2.450E+00	1.707E+00	1.713E+00
PB-212	1.249E+00	2.315E-01	1.931E-01
PB-214	2.361E+00	2.845E-01	2.039E-01
RA-224	4.268E+00	1.660E+00	2.278E+00
RA-226	2.361E+00	2.845E-01	2.039E-01
AC-228	1.514E+00	5.748E-01	4.902E-01
RA-228	1.514E+00	5.748E-01	4.902E-01
TH-228	1.249E+00	2.315E-01	1.931E-01
TH-229	1.464E-01	7.702E-01	1.307E+00
TH-230	2.361E+00	2.844E-01	2.039E-01
TH-232	1.514E+00	5.748E-01	4.902E-01
U-234	2.361E+00	2.844E-01	2.039E-01
U-235	3.702E-02	3.560E-01	5.968E-01
AM-243	3.731E-01	1.215E-01	1.703E-01
ANH-511	1.418E-01	1.177E-01	9.360E-02

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L.	Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)	
BE-7	2.536E-01		7.869E-01	1.527E+00	NOT IDENT.
NA-22	2.004E-02		7.963E-02	1.612E-01	NOT IDENT.
NA-24	0.000E+00		3.199E+17	0.000E+00	SHORT HLIF
AL-26	-4.630E-02		6.619E-02	1.092E-01	NOT IDENT.
SC-46	-2.249E-02		9.418E-02	1.751E-01	FAIL ABUN
V-48	1.558E-01		3.035E-01	6.600E-01	NOT IDENT.
CR-51	6.857E-01		1.139E+00	2.160E+00	NOT IDENT.
MN-52	2.187E-01		8.436E+00	1.749E+01	NOT IDENT.
MN-54	-1.782E-02		8.654E-02	1.509E-01	NOT IDENT.
CO-56	-3.559E-03		8.959E-02	1.656E-01	NOT IDENT.

MN-56	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
CO-57	-9.396E-03	4.268E-02	7.098E-02	NOT IDENT.
CO-58	-2.633E-02	9.230E-02	1.396E-01	NOT IDENT.
FE-59	-1.799E-01	2.437E-01	4.050E-01	NOT IDENT.
CO-60	-6.452E-02	7.781E-02	1.213E-01	NOT IDENT.
ZN-65	-2.196E-01	2.284E-01	2.836E-01	NOT IDENT.
GE-68	9.126E-01	2.237E+00	4.704E+00	NOT IDENT.
AS-73	1.413E+00	3.274E+00	6.058E+00	NOT IDENT.
AS-74	9.636E-02	3.927E-01	7.615E-01	FAIL ABUN
SE-75	-2.788E-02	9.322E-02	1.442E-01	NOT IDENT.
BR-77	0.000E+00	3.542E+04	0.000E+00	SHORT HLIF
SR-82	-2.743E-01	1.201E+00	2.132E+00	NOT IDENT.
RB-83	5.022E-02	1.648E-01	3.168E-01	NOT IDENT.
RB-84	-5.738E-02	2.194E-01	4.012E-01	NOT IDENT.
KR-85	1.879E+01	1.418E+01	2.931E+01	NOT IDENT.
SR-85	1.274E-01	9.631E-02	1.991E-01	NOT IDENT.
RB-86	3.153E-01	3.292E+00	6.533E+00	NOT IDENT.
Y-88	-1.395E-03	7.380E-02	1.606E-01	NOT IDENT.
Y-91	1.701E+01	5.188E+01	1.037E+02	NOT IDENT.
NB-94	4.923E-02	6.718E-02	1.340E-01	NOT IDENT.
NB-95	3.401E-02	1.114E-01	2.100E-01	NOT IDENT.
NB-95M	2.515E-01	2.744E-01	4.868E-01	NOT IDENT.
ZR-95	1.352E-01	1.468E-01	3.193E-01	NOT IDENT.
NB-97	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	4.018E+16	0.000E+00	SHORT HLIF
MO-99	0.000E+00	9.249E+03	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
RH-101	-3.240E-03	5.001E-02	7.794E-02	FAIL ABUN
RH-102	2.592E-02	9.416E-02	1.837E-01	NOT IDENT.
RU-103	3.463E-02	1.000E-01	1.972E-01	FAIL ABUN
RH-106	8.205E-02	5.548E-01	1.064E+00	NOT IDENT.
RU-106	8.205E-02	5.548E-01	1.064E+00	NOT IDENT.
AG-108M	-6.109E-03	5.531E-02	9.557E-02	NOT IDENT.
AG-110	7.427E-01	1.441E+00	2.854E+00	NOT IDENT.
AG-110M	-2.180E-02	9.195E-02	1.732E-01	NOT IDENT.
SN-113	1.446E-02	8.843E-02	1.599E-01	NOT IDENT.
CD-115	0.000E+00	2.658E+04	0.000E+00	SHORT HLIF
SN-117M	7.591E-02	2.964E-01	5.055E-01	NOT IDENT.
SB-122	0.000E+00	1.436E+03	0.000E+00	SHORT HLIF
TE-123M	1.947E-02	5.242E-02	9.048E-02	NOT IDENT.
SB-124	3.768E-02	2.378E-01	5.091E-01	NOT IDENT.
SB-125	-3.774E-02	1.882E-01	3.193E-01	FAIL ABUN
TE-125M	8.377E+00	1.918E+01	3.432E+01	NOT IDENT.
I-126	1.533E+00	1.448E+00	3.040E+00	NOT IDENT.
SB-126	2.075E-01	1.243E+00	2.144E+00	NOT IDENT.
SB-127	0.000E+00	1.755E+02	0.000E+00	SHORT HLIF
I-131	1.350E+00	1.369E+00	2.771E+00	NOT IDENT.
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	0.000E+00	1.872E+02	0.000E+00	SHORT HLIF
BA-133	4.669E-02	7.328E-02	1.295E-01	NOT IDENT.
I-133	0.000E+00	1.397E+12	0.000E+00	SHORT HLIF
CS-134	1.073E-01	8.364E-02	1.795E-01	NOT IDENT.
I-135	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
CS-136	6.093E-01	6.555E-01	1.463E+00	FAIL ABUN
BA-137M	-7.509E-02	6.366E-02	9.572E-02	NOT IDENT.
CS-137	-7.933E-02	6.725E-02	1.011E-01	NOT IDENT.
LA-138	2.176E-02	1.033E-01	2.231E-01	NOT IDENT.
CE-139	3.217E-02	5.221E-02	9.241E-02	NOT IDENT.
BA-140	1.639E+00	1.582E+00	3.379E+00	NOT IDENT.
LA-140	-4.743E-01	5.790E-01	9.358E-01	FAIL ABUN
CE-141	-3.694E-02	1.767E-01	2.886E-01	NOT IDENT.
CE-143	0.000E+00	3.649E+07	0.000E+00	SHORT HLIF
CE-144	-8.934E-02	2.993E-01	4.925E-01	NOT IDENT.
PM-144	5.419E-02	6.510E-02	1.339E-01	NOT IDENT.
PR-144	4.156E+00	4.940E+00	1.017E+01	NOT IDENT.
PM-146	6.342E-03	8.042E-02	1.421E-01	FAIL ABUN
ND-147	1.408E+00	3.978E+00	7.261E+00	FAIL ABUN
PM-147	7.706E+02	1.153E+03	2.089E+03	NOT IDENT.
PM-149	0.000E+00	2.663E+05	0.000E+00	SHORT HLIF
EU-150	-3.156E-02	5.397E-02	7.771E-02	FAIL ABUN
EU-152	-2.512E-01	2.223E-01	2.900E-01	FAIL ABUN
GD-153	-4.464E-02	1.449E-01	2.239E-01	NOT IDENT.
EU-154	4.582E-02	2.206E-01	4.439E-01	NOT IDENT.
EU-155	8.663E-02	1.687E-01	3.026E-01	FAIL ABUN
TB-160	4.829E-02	2.997E-01	5.978E-01	FAIL ABUN
HO-166M	-3.765E-02	9.809E-02	1.720E-01	NOT IDENT.
TM-171	1.644E+01	5.774E+01	1.062E+02	NOT IDENT.
HF-172	-1.502E-01	3.228E-01	4.766E-01	FAIL ABUN

LU-172	5.423E-02	1.320E-01	2.673E-01	FAIL ABUN
LU-176	3.794E-02	4.318E-02	8.454E-02	FAIL ABUN
HF-181	-3.549E-02	1.130E-01	2.045E-01	NOT IDENT.
TA-182	-1.217E-02	4.702E-01	8.703E-01	FAIL ABUN
RE-183	-2.778E-01	7.075E-01	1.216E+00	NOT IDENT.
RE-184	1.141E-02	3.516E-01	6.886E-01	NOT IDENT.
W-188	-1.046E+01	1.719E+01	2.509E+01	NOT IDENT.
IR-192	-2.346E-02	8.187E-02	1.405E-01	FAIL ABUN
HG-203	8.020E-03	9.048E-02	1.632E-01	FAIL ABUN
TL-204	-2.835E+00	1.046E+01	1.654E+01	NOT IDENT.
BI-207	-8.085E-03	9.776E-02	1.858E-01	FAIL ABUN
BI-210	5.221E+00	1.550E+01	2.861E+01	NOT IDENT.
PB-210	5.221E+00	1.550E+01	2.861E+01	NOT IDENT.
PB-211	6.113E-01	1.273E+00	2.375E+00	NOT IDENT.
BI-213	1.327E-01	2.034E-01	3.833E-01	NOT IDENT.
BI-214	0.000E+00	3.317E-01	7.334E-01	FAIL ABUN
RN-219	2.123E-01	7.349E-01	1.339E+00	FAIL ABUN
RN-222	0.000E+00	3.317E-01	7.334E-01	FAIL ABUN
RA-223	1.278E+00	1.190E+00	2.180E+00	FAIL ABUN
AC-225	-1.389E+00	4.925E+00	8.466E+00	NOT IDENT.
AC-227	-2.560E-01	4.200E-01	7.097E-01	NOT IDENT.
TH-227	-2.560E-01	4.200E-01	7.097E-01	NOT IDENT.
PA-231	1.193E-01	8.537E-01	1.534E+00	NOT IDENT.
TH-231	1.278E+00	1.190E+00	2.180E+00	FAIL ABUN
PA-233	-5.444E-02	9.834E-02	1.650E-01	FAIL ABUN
PA-234	4.475E-02	5.593E-01	1.096E+00	FAIL ABUN
PA-234M	-4.376E+00	8.815E+00	1.555E+01	NOT IDENT.
TH-234	1.347E+00	3.210E+00	5.892E+00	FAIL ABUN
NP-237	-5.444E-02	9.834E-02	1.650E-01	FAIL ABUN
NP-238	0.000E+00	7.420E+04	0.000E+00	SHORT HLIF
U-238	1.347E+00	3.210E+00	5.892E+00	FAIL ABUN
NP-239	-1.942E-01	4.202E-01	6.843E-01	FAIL ABUN
PU-239	4.346E+02	6.783E+02	1.019E+03	FAIL ABUN
AM-241	1.725E-01	4.059E-01	7.404E-01	NOT IDENT.
CM-243	-4.261E-02	1.773E-01	2.972E-01	FAIL ABUN
BK-247	-6.669E-02	1.468E-01	2.219E-01	NOT IDENT.
CM-247	3.468E-03	7.059E-02	1.244E-01	NOT IDENT.
CF-249	6.805E-04	7.241E-02	1.278E-01	NOT IDENT.
CF-251	1.959E-01	2.871E-01	3.687E-01	FAIL ABUN

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	154	10.66*	1.008E+00	1.451E+01	1.451E+01	17.06
CD-109	88.03	51	3.70*	4.717E+00	2.969E+00	3.147E+00	60.19
SN-126	64.28	-----	9.60	2.046E+00	-----	Line Not Found	-----
	86.94	51	8.90	4.717E+00	1.234E+00	1.234E+00	60.19
	87.57	51	37.00*	4.717E+00	2.969E-01	2.969E-01	60.19
TL-208	277.37	-----	6.60	4.237E+00	-----	Line Not Found	-----
	583.19	71	85.00*	2.346E+00	3.615E-01	3.615E-01	36.29
	860.56	-----	12.50	1.654E+00	-----	Line Not Found	-----
BI-211	72.87	83	1.23	3.355E+00	2.039E+01	2.039E+01	33.22
	351.06	292	12.92*	3.527E+00	6.507E+00	6.507E+00	12.29
BI-212	727.33	31	6.67*	1.932E+00	2.450E+00	2.450E+00	71.07
	1620.50	-----	1.47	9.333E-01	-----	Line Not Found	-----
PB-212	74.82	83	10.28	3.355E+00	2.439E+00	2.439E+00	33.22
	77.11	147	17.10	3.615E+00	2.416E+00	2.416E+00	20.91
	238.63	255	43.60*	4.739E+00	1.249E+00	1.249E+00	18.90
	300.09	-----	3.30	3.990E+00	-----	Line Not Found	-----
PB-214	74.82	83	5.80	3.355E+00	4.323E+00	4.323E+00	33.22
	77.11	147	9.70	3.615E+00	4.259E+00	4.259E+00	20.91
	87.09	51	3.41	4.717E+00	3.221E+00	3.221E+00	60.19
	242.00	81	7.25	4.691E+00	2.414E+00	2.414E+00	39.68
	295.22	189	18.42	4.040E+00	2.570E+00	2.570E+00	18.81
	351.93	292	35.60*	3.527E+00	2.361E+00	2.361E+00	12.29
RA-224	240.99	81	4.10*	4.691E+00	4.268E+00	4.268E+00	39.68
RA-226	74.82	83	5.80	3.355E+00	4.323E+00	4.323E+00	33.22
	77.11	147	9.70	3.615E+00	4.259E+00	4.259E+00	20.91
	87.09	51	3.41	4.717E+00	3.221E+00	3.221E+00	60.19
	242.00	81	7.25	4.691E+00	2.414E+00	2.414E+00	39.68
	295.22	189	18.42	4.040E+00	2.570E+00	2.570E+00	18.81
	351.93	292	35.60*	3.527E+00	2.361E+00	2.361E+00	12.29
AC-228	105.21	-----	1.10	5.899E+00	-----	Line Not Found	-----
	338.32	29	11.27	3.628E+00	7.163E-01	7.163E-01	118.13
	835.71	-----	1.61	1.700E+00	-----	Line Not Found	-----
	911.20	60	25.80*	1.564E+00	1.514E+00	1.514E+00	38.75
	968.97	34	15.80	1.474E+00	1.477E+00	1.477E+00	58.33
RA-228	105.21	-----	1.10	5.899E+00	-----	Line Not Found	-----
	338.32	29	11.27	3.628E+00	7.163E-01	7.163E-01	118.13
	835.71	-----	1.61	1.700E+00	-----	Line Not Found	-----
	911.20	60	25.80*	1.564E+00	1.514E+00	1.514E+00	38.75
	968.97	34	15.80	1.474E+00	1.477E+00	1.477E+00	58.33
TH-228	74.82	83	10.28	3.355E+00	2.439E+00	2.439E+00	33.22
	77.11	147	17.10	3.615E+00	2.416E+00	2.416E+00	20.91
	238.63	255	43.60*	4.739E+00	1.249E+00	1.249E+00	18.90
	300.09	-----	3.30	3.990E+00	-----	Line Not Found	-----
TH-229	85.43	51	14.70	4.717E+00	7.473E-01	7.473E-01	60.19
	88.47	30	24.00	4.956E+00	2.579E-01	2.579E-01	79.30
	193.51	-----	4.41*	5.464E+00	-----	Line Not Found	-----
	210.85	-----	2.80	5.169E+00	-----	Line Not Found	-----

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
TH-230	74.82	83	5.80	3.355E+00	4.323E+00	4.323E+00	33.22
	77.11	147	9.70	3.615E+00	4.259E+00	4.259E+00	20.91
	87.09	51	3.41	4.717E+00	3.221E+00	3.221E+00	60.19
	242.00	81	7.25	4.691E+00	2.414E+00	2.414E+00	39.68
	295.22	189	18.42	4.040E+00	2.570E+00	2.570E+00	18.81
TH-232	351.93	292	35.60*	3.527E+00	2.361E+00	2.361E+00	12.29
	105.21	-----	1.10	5.899E+00	-----	Line Not Found	-----
	338.32	29	11.27	3.628E+00	7.163E-01	7.163E-01	118.13
	835.71	-----	1.61	1.700E+00	-----	Line Not Found	-----
	911.20	60	25.80*	1.564E+00	1.514E+00	1.514E+00	38.75
U-234	968.97	34	15.80	1.474E+00	1.477E+00	1.477E+00	58.33
	74.82	83	5.80	3.355E+00	4.323E+00	4.323E+00	33.22
	77.11	147	9.70	3.615E+00	4.259E+00	4.259E+00	20.91
	87.09	51	3.41	4.717E+00	3.221E+00	3.221E+00	60.19
	242.00	81	7.25	4.691E+00	2.414E+00	2.414E+00	39.68
U-235	295.22	189	18.42	4.040E+00	2.570E+00	2.570E+00	18.81
	351.93	292	35.60*	3.527E+00	2.361E+00	2.361E+00	12.29
	89.96	30	3.47	4.956E+00	1.784E+00	1.784E+00	79.30
	93.35	57	5.60	5.157E+00	2.008E+00	2.008E+00	64.92
	143.76	-----	10.96*	6.248E+00	-----	Line Not Found	-----
AM-243	163.33	-----	5.08	5.984E+00	-----	Line Not Found	-----
	185.72	61	57.20	5.597E+00	1.929E-01	1.929E-01	71.38
	205.31	-----	5.01	5.262E+00	-----	Line Not Found	-----
	43.53	-----	5.90	1.643E-01	-----	Line Not Found	-----
	74.66	83	67.20*	3.355E+00	3.731E-01	3.731E-01	33.22
ANH-511	511.00	37	100.00*	2.620E+00	1.418E-01	1.418E-01	84.65

Flag: "*" = Keyline

Total number of lines in spectrum 36
 Number of unidentified lines 7
 Number of lines tentatively identified by NID 29 80.56%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.25E+09Y	1.00	1.451E+01	1.451E+01	0.248E+01	17.06	
CD-109	461.40D	1.06	2.969E+00	3.147E+00	1.894E+00	60.19	
SN-126	2.30E+05Y	1.00	2.969E-01	2.969E-01	1.787E-01	60.19	
TL-208	1.41E+10Y	1.00	3.615E-01	3.615E-01	1.312E-01	36.29	
BI-211	7.04E+08Y	1.00	6.507E+00	6.507E+00	0.800E+00	12.29	
BI-212	1.41E+10Y	1.00	2.450E+00	2.450E+00	1.741E+00	71.07	
PB-212	1.41E+10Y	1.00	1.249E+00	1.249E+00	0.236E+00	18.90	
PB-214	1600.00Y	1.00	2.361E+00	2.361E+00	0.290E+00	12.29	
RA-224	1.41E+10Y	1.00	4.268E+00	4.268E+00	1.693E+00	39.68	
RA-226	1600.00Y	1.00	2.361E+00	2.361E+00	0.290E+00	12.29	
AC-228	1.41E+10Y	1.00	1.514E+00	1.514E+00	0.587E+00	38.75	
RA-228	1.41E+10Y	1.00	1.514E+00	1.514E+00	0.587E+00	38.75	
TH-228	1.41E+10Y	1.00	1.249E+00	1.249E+00	0.236E+00	18.90	
TH-229	7340.00Y	1.00	2.579E-01	2.579E-01	2.046E-01	79.30	K
TH-230	7.54E+04Y	1.00	2.361E+00	2.361E+00	0.290E+00	12.29	
TH-232	1.41E+10Y	1.00	1.514E+00	1.514E+00	0.587E+00	38.75	
U-234	2.45E+05Y	1.00	2.361E+00	2.361E+00	0.290E+00	12.29	
U-235	7.04E+08Y	1.00	1.929E-01	1.929E-01	1.377E-01	71.38	K
AM-243	7370.00Y	1.00	3.731E-01	3.731E-01	1.240E-01	33.22	
ANH-511	1.00E+09Y	1.00	1.418E-01	1.418E-01	1.201E-01	84.65	
Total Activity :			4.882E+01	4.900E+01			

Grand Total Activity : 4.882E+01 4.900E+01

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	98.97	23	36	1.31	198.19	196	5	7.67E-03	80.7	5.60E+00	T
0	128.84	17	68	0.91	258.00	254	8	5.64E-03	****	6.32E+00	T
0	176.09	19	69	1.31	352.59	348	9	6.28E-03	****	5.77E+00	T
0	196.76	30	76	1.01	393.97	389	11	9.64E-03	****	5.41E+00	T
0	270.05	53	51	3.91	540.68	534	14	1.69E-02	59.6	4.32E+00	T
0	327.79	24	35	2.26	656.25	653	9	7.62E-03	92.1	3.73E+00	T
3	463.02	21	29	2.33	926.94	922	15	6.64E-03	96.5	2.84E+00	T
3	466.63	13	5	1.35	934.15	922	15	4.24E-03	85.8	2.82E+00	T
0	535.54	29	25	0.61	1072.06	1062	19	9.03E-03	86.2	2.52E+00	
0	554.32	21	8	3.45	1109.65	1103	13	6.51E-03	68.1	2.45E+00	
0	573.60	9	20	1.28	1148.24	1142	10	2.78E-03	****	2.38E+00	
0	609.67	214	25	1.64	1220.42	1214	15	6.67E-02	16.0	2.26E+00	T
0	633.53	22	11	4.53	1268.16	1260	18	6.73E-03	81.6	2.19E+00	T
0	807.33	10	11	0.89	1615.92	1607	16	3.04E-03	****	1.76E+00	
0	993.32	13	5	1.15	1988.04	1982	12	3.89E-03	88.1	1.44E+00	
0	1122.04	45	11	2.40	2245.53	2236	17	1.38E-02	43.5	1.28E+00	T
0	1379.96	15	6	0.71	2761.35	2753	14	4.49E-03	85.2	1.06E+00	
0	1409.15	8	2	0.63	2819.73	2814	10	2.40E-03	96.2	1.04E+00	T
0	1767.25	24	3	1.65	3535.73	3527	16	7.29E-03	45.8	8.85E-01	

Flags: "T" = Tentatively associated

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*****
*
*           GEL Laboratories LLC
*           2040 Savage Road
*           Charleston, SC 29407
*****
*
*           DETECTOR AND SAMPLE DATA
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724005.CNF;1
* Acquisition date   : 28-FEB-2023 05:08:59 Sensitivity      : 3.000
* Detector ID        : GAM43 Energy tolerance: 1.500
* Elapsed live time  : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time  : 0 01:00:00.62 Half life ratio  : *****
* Sample date        : 20-JAN-2023 11:30:00 Nuclide Library : SOLID
* Sample ID          : G609724005 Analyst initials: RXF2
* Batch Number       : 2379916 Sample Quantity  : 7.4060E+01 GRAM
* Wet wt corr        : 1.00000 Wet Weight       : 0.00000
*                               Dry Weight        : 0.00000
*****
*
*           CALIBRATION INFORMATION
*
* Eff. Cal. date     : 26-JUL-2022 10:46:43 Eff. Geometry   : CAN
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM43_CAN.CNF;20
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)
K-40	5.510E-01
CD-109	1.046E+00
SN-126	9.944E-02
TL-208	5.403E-02
BI-211	2.513E-01
BI-212	7.529E-01
PB-212	9.020E-02
PB-214	9.142E-02
RA-224	1.071E+00
RA-226	9.142E-02
AC-228	2.120E-01
RA-228	2.120E-01
TH-228	9.020E-02
TH-229	5.987E-01
TH-230	9.142E-02
TH-232	2.120E-01
U-234	9.142E-02
U-235	2.793E-01
AM-243	7.944E-02
ANH-511	4.173E-02

---- Non-Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)	
BE-7	6.874E-01	NOT IDENT.
NA-22	6.841E-02	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	3.912E-02	NOT IDENT.
SC-46	7.603E-02	FAIL ABUN
V-48	2.804E-01	NOT IDENT.
CR-51	9.874E-01	NOT IDENT.
MN-52	7.138E+00	NOT IDENT.
MN-54	6.687E-02	NOT IDENT.
CO-56	7.150E-02	NOT IDENT.
MN-56	0.000E+00	SHORT HLIF

CO-57	3.281E-02	NOT IDENT.
CO-58	5.858E-02	NOT IDENT.
FE-59	1.692E-01	NOT IDENT.
CO-60	4.813E-02	NOT IDENT.
ZN-65	1.188E-01	NOT IDENT.
GE-68	2.007E+00	NOT IDENT.
AS-73	2.809E+00	NOT IDENT.
AS-74	3.363E-01	FAIL ABUN
SE-75	6.570E-02	NOT IDENT.
BR-77	0.000E+00	SHORT HLIF
SR-82	9.256E-01	NOT IDENT.
RB-83	1.428E-01	NOT IDENT.
RB-84	1.733E-01	NOT IDENT.
KR-85	1.348E+01	NOT IDENT.
SR-85	9.152E-02	NOT IDENT.
RB-86	2.774E+00	NOT IDENT.
Y-88	6.010E-02	NOT IDENT.
Y-91	4.504E+01	NOT IDENT.
NB-94	6.030E-02	NOT IDENT.
NB-95	9.395E-02	NOT IDENT.
NB-95M	2.265E-01	NOT IDENT.
ZR-95	1.396E-01	NOT IDENT.
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	SHORT HLIF
RH-101	3.586E-02	FAIL ABUN
RH-102	8.079E-02	NOT IDENT.
RU-103	8.778E-02	FAIL ABUN
RH-106	4.670E-01	NOT IDENT.
RU-106	4.670E-01	NOT IDENT.
AG-108M	4.288E-02	NOT IDENT.
AG-110	1.271E+00	NOT IDENT.
AG-110M	7.388E-02	NOT IDENT.
SN-113	7.200E-02	NOT IDENT.
CD-115	0.000E+00	SHORT HLIF
SN-117M	2.347E-01	NOT IDENT.
SB-122	0.000E+00	SHORT HLIF
TE-123M	4.201E-02	NOT IDENT.
SB-124	2.058E-01	NOT IDENT.
SB-125	1.445E-01	FAIL ABUN
TE-125M	1.588E+01	NOT IDENT.
I-126	1.365E+00	NOT IDENT.
SB-126	9.599E-01	NOT IDENT.
SB-127	0.000E+00	SHORT HLIF
I-131	1.251E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	0.000E+00	SHORT HLIF
BA-133	5.861E-02	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	8.066E-02	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	6.371E-01	FAIL ABUN
BA-137M	4.079E-02	NOT IDENT.
CS-137	4.309E-02	NOT IDENT.
LA-138	9.148E-02	NOT IDENT.
CE-139	4.286E-02	NOT IDENT.
BA-140	1.511E+00	NOT IDENT.
LA-140	3.446E-01	FAIL ABUN
CE-141	1.344E-01	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	2.257E-01	NOT IDENT.
PM-144	5.979E-02	NOT IDENT.
PR-144	4.542E+00	NOT IDENT.
PM-146	6.388E-02	FAIL ABUN
ND-147	3.169E+00	FAIL ABUN
PM-147	9.695E+02	NOT IDENT.
PM-149	0.000E+00	SHORT HLIF
EU-150	3.509E-02	FAIL ABUN
EU-152	1.311E-01	FAIL ABUN
GD-153	1.028E-01	NOT IDENT.
EU-154	1.879E-01	NOT IDENT.
EU-155	1.406E-01	FAIL ABUN
TB-160	2.591E-01	FAIL ABUN
HO-166M	7.348E-02	NOT IDENT.
TM-171	4.905E+01	NOT IDENT.
HF-172	2.192E-01	FAIL ABUN
LU-172	1.168E-01	FAIL ABUN

LU-176	3.867E-02	FAIL ABUN
HF-181	9.092E-02	NOT IDENT.
TA-182	3.820E-01	FAIL ABUN
RE-183	5.641E-01	NOT IDENT.
RE-184	2.968E-01	NOT IDENT.
W-188	1.137E+01	NOT IDENT.
IR-192	6.423E-02	FAIL ABUN
HG-203	7.476E-02	FAIL ABUN
TL-204	7.694E+00	NOT IDENT.
BI-207	7.952E-02	FAIL ABUN
BI-210	1.327E+01	NOT IDENT.
PB-210	1.327E+01	NOT IDENT.
PB-211	1.077E+00	NOT IDENT.
BI-213	1.744E-01	NOT IDENT.
BI-214	3.539E-01	FAIL ABUN
RN-219	6.064E-01	FAIL ABUN
RN-222	3.539E-01	FAIL ABUN
RA-223	1.002E+00	FAIL ABUN
AC-225	3.898E+00	NOT IDENT.
AC-227	3.240E-01	NOT IDENT.
TH-227	3.240E-01	NOT IDENT.
PA-231	7.048E-01	NOT IDENT.
TH-231	1.002E+00	FAIL ABUN
PA-233	7.364E-02	FAIL ABUN
PA-234	4.741E-01	FAIL ABUN
PA-234M	6.660E+00	NOT IDENT.
TH-234	2.764E+00	FAIL ABUN
NP-237	7.364E-02	FAIL ABUN
NP-238	0.000E+00	SHORT HLIF
U-238	2.764E+00	FAIL ABUN
NP-239	3.157E-01	FAIL ABUN
PU-239	4.767E+02	FAIL ABUN
AM-241	3.453E-01	NOT IDENT.
CM-243	1.379E-01	FAIL ABUN
BK-247	1.009E-01	NOT IDENT.
CM-247	5.639E-02	NOT IDENT.
CF-249	5.773E-02	NOT IDENT.
CF-251	1.711E-01	FAIL ABUN

```

*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
*                               DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724005.CNF;1
* Acquisition date   : 28-FEB-2023 05:08:59 Sensitivity      : 3.000
* Detector ID        : GAM43 Energy tolerance: 1.500
* Elapsed live time  : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time  : 0 01:00:00.62 Half life ratio : *****
* Sample date        : 20-JAN-2023 11:30:00 Nuclide Library : SOLID
* Sample ID          : G609724005 Analyst initials: RXF2
* Batch Number       : 2379916 Sample Quantity : 7.4060E+01 GRAM
*                               Quantity Err(%) : 1.3503E-03 %
* Wet wt corr        : 1.00000 Wet Weight : 0.00000
*                               Dry Weight  : 0.00000
*****
*                               CALIBRATION INFORMATION                          *
*
* Eff. Cal. date     : 26-JUL-2022 10:46:43 Eff. Geometry   : CAN
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM43_CAN.CNF;20
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
K-40	1.451E+01	2.799E+00	2.799E+00
CD-109	3.147E+00	1.883E+00	1.883E+00
SN-126	2.969E-01	1.770E-01	1.770E-01
TL-208	3.615E-01	1.325E-01	1.325E-01
BI-211	6.507E+00	9.411E-01	9.411E-01
BI-212	2.450E+00	1.722E+00	1.722E+00
PB-212	1.249E+00	2.526E-01	2.526E-01
PB-214	2.361E+00	3.394E-01	3.394E-01
RA-224	4.268E+00	1.695E+00	1.695E+00
RA-226	2.361E+00	3.394E-01	3.394E-01
AC-228	1.514E+00	5.957E-01	5.957E-01
RA-228	1.514E+00	5.957E-01	5.957E-01
TH-228	1.249E+00	2.526E-01	2.526E-01
TH-229	1.464E-01	7.703E-01	7.703E-01
TH-230	2.361E+00	3.394E-01	3.394E-01
TH-232	1.514E+00	5.957E-01	5.957E-01
U-234	2.361E+00	3.394E-01	3.394E-01
U-235	3.702E-02	3.560E-01	3.560E-01
AM-243	3.731E-01	1.256E-01	1.256E-01
ANH-511	1.418E-01	1.183E-01	1.183E-01

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	2.536E-01	7.872E-01	7.955E-01	NOT IDENT.
NA-22	2.004E-02	7.965E-02	8.016E-02	NOT IDENT.
NA-24	1.008E+17	3.201E+17	0.000E+00	SHORT HLIF
AL-26	-4.630E-02	6.628E-02	6.949E-02	NOT IDENT.
SC-46	-2.249E-02	9.420E-02	9.475E-02	FAIL ABUN
V-48	1.558E-01	3.039E-01	3.119E-01	NOT IDENT.
CR-51	6.857E-01	1.140E+00	1.181E+00	NOT IDENT.
MN-52	2.187E-01	8.436E+00	8.436E+00	NOT IDENT.
MN-54	-1.782E-02	8.656E-02	8.693E-02	NOT IDENT.
CO-56	-3.559E-03	8.959E-02	8.960E-02	NOT IDENT.

MN-56	-1.000E+41	2.106E+42	0.000E+00	SHORT HLIF
CO-57	-9.396E-03	4.269E-02	4.290E-02	NOT IDENT.
CO-58	-2.633E-02	9.233E-02	9.309E-02	NOT IDENT.
FE-59	-1.799E-01	2.445E-01	2.576E-01	NOT IDENT.
CO-60	-6.452E-02	7.804E-02	8.328E-02	NOT IDENT.
ZN-65	-2.196E-01	2.292E-01	2.496E-01	NOT IDENT.
GE-68	9.126E-01	2.238E+00	2.276E+00	NOT IDENT.
AS-73	1.413E+00	3.289E+00	3.350E+00	NOT IDENT.
AS-74	9.636E-02	3.929E-01	3.953E-01	FAIL ABUN
SE-75	-2.788E-02	9.324E-02	9.409E-02	NOT IDENT.
BR-77	1.912E+05	2.173E+05	2.338E+05	SHORT HLIF
SR-82	-2.743E-01	1.201E+00	1.208E+00	NOT IDENT.
RB-83	5.022E-02	1.650E-01	1.666E-01	NOT IDENT.
RB-84	-5.738E-02	2.195E-01	2.210E-01	NOT IDENT.
KR-85	1.879E+01	1.427E+01	1.660E+01	NOT IDENT.
SR-85	1.274E-01	9.695E-02	1.127E-01	NOT IDENT.
RB-86	3.153E-01	3.292E+00	3.296E+00	NOT IDENT.
Y-88	-1.395E-03	7.380E-02	7.380E-02	NOT IDENT.
Y-91	1.701E+01	5.189E+01	5.246E+01	NOT IDENT.
NB-94	4.923E-02	6.732E-02	7.089E-02	NOT IDENT.
NB-95	3.401E-02	1.115E-01	1.125E-01	NOT IDENT.
NB-95M	2.515E-01	2.755E-01	2.980E-01	NOT IDENT.
ZR-95	1.352E-01	1.473E-01	1.594E-01	NOT IDENT.
NB-97	1.000E+41	2.233E+41	0.000E+00	SHORT HLIF
ZR-97	3.237E+16	4.028E+16	0.000E+00	SHORT HLIF
MO-99	-1.352E+03	9.250E+03	9.270E+03	SHORT HLIF
TC-99M	-1.000E+41	4.360E+41	0.000E+00	SHORT HLIF
RH-101	-3.240E-03	5.002E-02	5.004E-02	FAIL ABUN
RH-102	2.592E-02	9.421E-02	9.493E-02	NOT IDENT.
RU-103	3.463E-02	1.001E-01	1.013E-01	FAIL ABUN
RH-106	8.205E-02	5.548E-01	5.560E-01	NOT IDENT.
RU-106	8.205E-02	5.548E-01	5.560E-01	NOT IDENT.
AG-108M	-6.109E-03	5.531E-02	5.538E-02	NOT IDENT.
AG-110	7.427E-01	1.443E+00	1.481E+00	NOT IDENT.
AG-110M	-2.180E-02	9.198E-02	9.250E-02	NOT IDENT.
SN-113	1.446E-02	8.844E-02	8.868E-02	NOT IDENT.
CD-115	8.780E+02	2.658E+04	2.659E+04	SHORT HLIF
SN-117M	7.591E-02	2.964E-01	2.984E-01	NOT IDENT.
SB-122	-4.249E+01	1.436E+03	1.436E+03	SHORT HLIF
TE-123M	1.947E-02	5.245E-02	5.318E-02	NOT IDENT.
SB-124	3.768E-02	2.378E-01	2.384E-01	NOT IDENT.
SB-125	-3.774E-02	1.882E-01	1.890E-01	FAIL ABUN
TE-125M	8.377E+00	1.919E+01	1.956E+01	NOT IDENT.
I-126	1.533E+00	1.456E+00	1.611E+00	NOT IDENT.
SB-126	2.075E-01	1.244E+00	1.247E+00	NOT IDENT.
SB-127	-7.547E+01	1.761E+02	1.794E+02	SHORT HLIF
I-131	1.350E+00	1.373E+00	1.502E+00	NOT IDENT.
I-132	1.000E+41	5.356E+41	0.000E+00	SHORT HLIF
TE-132	5.961E+01	1.873E+02	1.892E+02	SHORT HLIF
BA-133	4.669E-02	7.337E-02	7.633E-02	NOT IDENT.
I-133	-5.262E+11	1.404E+12	1.424E+12	SHORT HLIF
CS-134	1.073E-01	8.425E-02	9.716E-02	NOT IDENT.
I-135	-1.000E+41	3.296E+41	0.000E+00	SHORT HLIF
CS-136	6.093E-01	6.594E-01	7.143E-01	FAIL ABUN
BA-137M	-7.509E-02	6.400E-02	7.240E-02	NOT IDENT.
CS-137	-7.933E-02	6.761E-02	7.648E-02	NOT IDENT.
LA-138	2.176E-02	1.033E-01	1.038E-01	NOT IDENT.
CE-139	3.217E-02	5.265E-02	5.461E-02	NOT IDENT.
BA-140	1.639E+00	1.589E+00	1.752E+00	NOT IDENT.
LA-140	-4.743E-01	5.804E-01	6.185E-01	FAIL ABUN
CE-141	-3.694E-02	1.767E-01	1.775E-01	NOT IDENT.
CE-143	5.961E+07	3.677E+07	4.554E+07	SHORT HLIF
CE-144	-8.934E-02	2.994E-01	3.021E-01	NOT IDENT.
PM-144	5.419E-02	6.528E-02	6.970E-02	NOT IDENT.
PR-144	4.156E+00	4.954E+00	5.297E+00	NOT IDENT.
PM-146	6.342E-03	8.042E-02	8.048E-02	FAIL ABUN
ND-147	1.408E+00	3.980E+00	4.031E+00	FAIL ABUN
PM-147	7.706E+02	1.155E+03	1.206E+03	NOT IDENT.
PM-149	-1.715E+04	2.663E+05	2.664E+05	SHORT HLIF
EU-150	-3.156E-02	5.403E-02	5.587E-02	FAIL ABUN
EU-152	-2.512E-01	2.234E-01	2.504E-01	FAIL ABUN
GD-153	-4.464E-02	1.450E-01	1.463E-01	NOT IDENT.
EU-154	4.582E-02	2.207E-01	2.216E-01	NOT IDENT.
EU-155	8.663E-02	1.689E-01	1.733E-01	FAIL ABUN
TB-160	4.829E-02	2.997E-01	3.005E-01	FAIL ABUN
HO-166M	-3.765E-02	9.816E-02	9.961E-02	NOT IDENT.
TM-171	1.644E+01	5.778E+01	5.825E+01	NOT IDENT.
HF-172	-1.502E-01	3.239E-01	3.309E-01	FAIL ABUN

LU-172	5.423E-02	1.322E-01	1.344E-01	FAIL ABUN
LU-176	3.794E-02	4.327E-02	4.653E-02	FAIL ABUN
HF-181	-3.549E-02	1.131E-01	1.142E-01	NOT IDENT.
TA-182	-1.217E-02	4.702E-01	4.702E-01	FAIL ABUN
RE-183	-2.778E-01	7.084E-01	7.193E-01	NOT IDENT.
RE-184	1.141E-02	3.516E-01	3.516E-01	NOT IDENT.
W-188	-1.046E+01	1.724E+01	1.788E+01	NOT IDENT.
IR-192	-2.346E-02	8.189E-02	8.257E-02	FAIL ABUN
HG-203	8.020E-03	9.049E-02	9.056E-02	FAIL ABUN
TL-204	-2.835E+00	1.047E+01	1.055E+01	NOT IDENT.
BI-207	-8.085E-03	9.776E-02	9.783E-02	FAIL ABUN
BI-210	5.221E+00	1.552E+01	1.569E+01	NOT IDENT.
PB-210	5.221E+00	1.552E+01	1.569E+01	NOT IDENT.
PB-211	6.113E-01	1.274E+00	1.304E+00	NOT IDENT.
BI-213	1.327E-01	2.037E-01	2.123E-01	NOT IDENT.
BI-214	2.110E+00	3.804E-01	1.024E+00	FAIL ABUN
RN-219	2.123E-01	7.355E-01	7.417E-01	FAIL ABUN
RN-222	2.110E+00	3.804E-01	1.024E+00	FAIL ABUN
RA-223	1.278E+00	1.195E+00	1.327E+00	FAIL ABUN
AC-225	-1.389E+00	4.927E+00	4.967E+00	NOT IDENT.
AC-227	-2.560E-01	4.217E-01	4.372E-01	NOT IDENT.
TH-227	-2.560E-01	4.217E-01	4.372E-01	NOT IDENT.
PA-231	1.193E-01	8.541E-01	8.558E-01	NOT IDENT.
TH-231	1.278E+00	1.195E+00	1.327E+00	FAIL ABUN
PA-233	-5.444E-02	9.843E-02	1.014E-01	FAIL ABUN
PA-234	4.475E-02	5.616E-01	5.620E-01	FAIL ABUN
PA-234M	-4.376E+00	8.825E+00	9.042E+00	NOT IDENT.
TH-234	1.347E+00	3.225E+00	3.282E+00	FAIL ABUN
NP-237	-5.444E-02	9.843E-02	1.014E-01	FAIL ABUN
NP-238	-4.134E+02	7.420E+04	7.420E+04	SHORT HLIF
U-238	1.347E+00	3.225E+00	3.282E+00	FAIL ABUN
NP-239	-1.942E-01	4.207E-01	4.297E-01	FAIL ABUN
PU-239	4.346E+02	6.792E+02	7.069E+02	FAIL ABUN
AM-241	1.725E-01	4.063E-01	4.137E-01	NOT IDENT.
CM-243	-4.261E-02	1.773E-01	1.784E-01	FAIL ABUN
BK-247	-6.669E-02	1.475E-01	1.505E-01	NOT IDENT.
CM-247	3.468E-03	7.059E-02	7.061E-02	NOT IDENT.
CF-249	6.805E-04	7.241E-02	7.241E-02	NOT IDENT.
CF-251	1.959E-01	2.883E-01	3.015E-01	FAIL ABUN

 * GEL Laboratories LLC *
 * 2040 Savage Road *
 * Charleston, SC 29407 *
 * GAMMA SPECTROSCOPY BACKGROUND REPORT *

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	54.3828	85.43	106.9368	131.20	49.1569
45.60	55.8578	86.55	92.9513	133.02	47.1314
46.54	48.7219	86.79	93.0272	133.52	46.0649
49.72	0.0000	86.94	93.0763	136.00	50.8619
51.35	46.6083	87.09	93.1239	136.47	58.8396
51.87	48.4330	87.57	61.0899	140.51	0.0000
52.39	43.4503	88.03	61.1855	143.76	63.2992
52.97	40.1606	88.34	61.2498	144.24	56.4559
53.44	46.2513	88.47	61.2767	145.44	65.8515
54.07	52.4119	89.96	54.3005	152.43	62.1854
57.36	0.0000	1093.63	54.4235	153.25	37.6128
57.53	60.2916	91.11	54.5082	323.87	53.0022
57.98	63.9221	92.59	54.7734	156.02	69.7618
59.27	57.2613	93.35	58.9267	158.56	51.1176
59.32	55.5122	94.56	60.5017	159.00	48.7845
59.54	55.5689	94.65	56.4845	162.33	41.9347
60.96	75.4629	94.67	56.4883	162.66	45.5599
61.17	74.6462	94.87	56.5242	163.33	52.8267
62.93	66.2797	97.43	48.8438	165.86	42.2381
63.29	54.7229	98.43	46.2741	176.31	48.0454
63.58	56.5893	98.44	46.2758	176.60	48.0722
64.28	76.5846	99.53	46.4318	177.52	51.0385
66.73	63.7360	100.11	49.2510	181.07	0.0000
67.24	72.0856	102.03	48.1631	181.52	58.0620
125.81	67.6480	103.18	60.0669	184.41	53.3724
67.75	64.0100	103.37	60.1010	143.76	53.5013
68.89	65.2327	105.21	47.9271	193.51	36.8801
69.67	60.2192	105.31	47.9411	197.03	49.4797
70.82	65.4391	106.12	50.1445	198.01	49.5647
70.83	65.4424	106.47	53.3330	201.83	43.3556
72.81	64.4059	109.28	43.2244	203.43	72.4575
72.87	64.4211	111.00	51.9111	205.31	59.7089
74.66	64.8733	111.76	0.0000	210.85	57.6446
74.82	64.9139	114.06	49.1501	215.65	44.8948
74.97	64.9512	116.30	0.0000	218.12	46.8419
77.11	65.4840	116.74	57.0456	222.11	46.2511
78.74	65.8846	119.76	50.9982	227.09	43.9242
79.69	62.6028	121.12	39.2028	227.38	43.0474
80.03	62.6801	121.22	42.4807	228.16	0.0000
80.12	62.7020	121.78	49.0883	228.18	41.3047
80.19	61.4380	122.06	54.5822	116.74	41.3047
80.57	61.5229	122.92	59.0806	235.69	40.8723
81.00	75.7408	123.07	49.2531	235.96	43.6147
81.07	75.7600	265.00	47.1385	238.63	67.0520
81.75	91.3931	125.81	54.3772	238.98	0.0000
82.47	82.2737	127.23	45.7228	240.99	82.3920
83.79	62.2383	127.91	50.9730	242.00	42.6326
84.00	62.2842	129.30	51.1499	244.70	44.1821

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.40	0.0000	344.28	53.1717	563.25	15.1172
252.80	36.3181	345.93	25.0669	564.24	0.0000
254.15	0.0000	351.06	25.2051	569.33	12.1449
256.23	47.7230	351.93	25.2285	946.00	12.1465
260.90	0.0000	355.39	0.0000	569.70	12.1480
264.66	41.1813	356.01	20.5866	583.19	22.0321
264.80	41.1892	364.49	15.9766	584.27	22.0482
265.00	42.6210	366.42	0.0000	595.83	16.4236
269.46	41.9259	372.51	20.4032	427.87	20.3527
270.03	41.9572	375.05	25.8389	602.52	0.0000
271.23	42.0252	377.52	25.9028	604.72	21.7684
273.65	27.3084	356.01	32.5824	607.14	18.6885
276.40	43.2751	388.16	29.4483	609.32	16.5704
277.37	39.4785	388.63	27.2797	610.33	16.5813
277.60	33.7111	391.69	25.1722	614.28	23.4697
278.00	26.9832	264.66	18.7660	618.01	14.7038
279.20	38.6076	401.81	26.5220	620.36	19.6350
279.54	41.5215	402.40	30.9600	621.93	15.7236
279.70	41.5303	404.85	24.3816	630.19	0.0000
280.46	40.6038	410.95	25.6359	631.29	14.8293
283.69	34.9490	413.71	21.2316	633.25	14.8476
284.31	39.8347	414.70	24.6063	634.78	14.8618
285.41	43.7823	423.72	22.5541	635.95	14.8727
285.90	0.0000	427.09	24.8847	636.99	9.5250
287.50	34.1434	427.87	33.9575	657.50	16.0776
290.67	42.6053	433.94	27.3135	657.76	17.0851
293.27	0.0000	439.40	28.5884	657.90	0.0000
351.93	39.4002	440.45	24.0364	661.66	25.1846
295.96	39.4368	453.88	25.4738	664.57	0.0000
879.38	35.6074	463.37	30.6389	666.33	13.1333
299.98	43.1000	468.07	15.4671	666.50	13.1345
300.09	43.1053	473.00	0.0000	667.71	0.0000
300.13	43.1079	475.06	29.1681	677.62	12.2051
301.36	40.6914	476.78	20.3577	685.70	0.0000
302.85	40.7648	477.60	23.0285	692.65	0.0000
256.23	46.8241	482.18	25.7812	695.00	18.4955
304.85	46.8432	487.02	26.7737	696.49	13.3694
306.78	24.9746	492.35	0.0000	696.51	13.3698
308.46	34.0339	497.08	17.9919	697.00	9.2585
311.90	31.1577	505.52	17.3859	697.30	7.2023
316.51	43.4532	507.63	0.0000	697.49	7.2032
319.41	35.4885	511.00	22.7335	702.65	17.5453
320.08	28.4124	514.00	22.7859	706.68	20.6897
321.04	41.6506	514.00	22.7859	711.68	15.5612
323.87	24.4600	520.40	23.8124	720.70	22.2448
325.23	32.1537	520.69	0.0000	721.93	0.0000
328.76	38.9440	522.65	0.0000	722.78	20.0438
333.37	26.7839	527.90	0.0000	722.91	20.0449
333.97	40.2029	528.26	13.2662	723.31	18.3788
334.37	34.0333	529.59	14.7544	724.19	16.7163
338.28	38.3234	529.87	0.0000	727.33	17.7922
338.32	38.3256	531.02	11.8160	733.00	6.7193
311.90	45.1647	537.26	12.0562	735.93	8.4128
340.48	45.1647	546.56	0.0000	333.97	19.9973
340.55	45.1682	552.55	16.5032	739.50	0.0000

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
744.23	19.0151	949.00	11.2061	1384.29	7.2992
747.24	11.6395	667.71	0.0000	1408.01	11.0288
748.06	11.6445	962.31	16.4366	1434.09	6.4842
752.31	18.0376	964.08	15.6661	1435.80	5.5608
753.82	12.7430	966.17	21.9519	1457.56	0.0000
756.73	7.4450	911.20	17.8969	1460.82	6.5357
756.80	5.3181	983.53	6.6346	1489.16	4.7070
884.68	16.0153	984.45	0.0000	1505.03	9.4572
765.81	20.3064	1274.44	11.1172	1584.12	8.7012
766.42	23.5200	1001.03	17.1861	1596.21	7.7598
766.84	20.3174	1002.74	8.5992	1620.50	4.8818
772.60	0.0000	1004.73	12.4316	1621.92	6.8371
776.52	17.1973	507.63	0.0000	1678.03	0.0000
739.50	0.0000	1025.87	0.0000	1690.97	4.9725
778.90	10.7617	1028.54	0.0000	1750.46	0.0000
783.70	0.0000	1037.84	8.7236	1764.49	5.2100
788.74	15.1437	1038.76	0.0000	1063.66	5.2174
792.07	31.4232	631.29	6.8089	1771.35	6.9584
795.86	10.8566	1048.07	6.8130	1791.20	0.0000
810.06	12.2476	1049.04	12.6579	1808.65	6.1440
810.29	12.2490	1050.41	12.6642	1810.72	0.0000
344.28	12.2500	1063.66	12.7309	1836.06	3.0922
810.76	12.2521	1077.00	9.8447		
815.77	10.9671	1077.34	7.8766		
1048.07	12.0803	1085.87	11.8541		
832.01	13.2671	1093.63	11.8898		
834.85	23.2501	1099.45	15.8883		
835.71	22.1521	1112.07	11.0867		
836.80	0.0000	1112.84	8.7333		
846.75	0.0000	1115.54	21.6466		
846.77	12.2498	1120.29	11.0097		
856.80	21.2614	1120.55	11.0107		
860.56	8.9683	1221.41	11.0140		
871.09	11.7171	1129.67	10.0439		
873.19	14.4355	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	12.6680	1173.23	8.1645		
880.51	13.5798	1177.95	11.2449		
881.60	15.3984	1189.05	10.2637		
883.24	11.7844	1204.77	11.3529		
884.68	13.6066	1221.41	17.6475		
889.28	17.2716	1231.02	16.6641		
894.76	20.0498	1235.36	21.9044		
898.04	10.0399	1238.28	16.7063		
900.72	18.2769	1260.41	0.0000		
903.28	12.8088	1271.87	13.7287		
911.20	13.7736	1274.44	8.4559		
912.08	13.7791	1274.54	8.4559		
923.98	0.0000	1291.59	15.9448		
926.50	6.4721	1298.22	0.0000		
929.11	24.0671	1312.11	10.7012		
935.54	16.7098	1332.49	11.8492		
937.49	20.4402	1362.66	0.0000		
944.13	13.0457	1365.19	6.5303		
946.00	13.0563	1368.63	0.0000		

VAX/VMS Nuclide Identification Report Generated 28-FEB-2023 06:21:15.94

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724006.CNF;1
Background file : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM02.CNF;562
Background date : 27-FEB-2023 04:48:05
Sample date     : 20-JAN-2023 11:30:00 Acquisition date : 28-FEB-2023 05:20:47
Sample ID      : G609724006 Sample quantity   : 7.20500E+01 GRAM
Detector name  : GAM02 Detector geometry   : CAN
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:01.21 0.0%
Energy tolerance : 1.50000 keV Analyst Initials : RXF2
Abundance limit : 75.00000 Sensitivity : 3.00000
Batch ID      : 2379916 Detector SN# :
Matrix Spike ID : LCS ID :
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	47.10*	33	168	1.83	94.96	91	8	9.19E-03	71.3	
2	0	63.06*	34	176	0.93	126.91	124	8	9.46E-03	73.2	
3	1	75.00*	195	207	1.11	150.78	144	19	5.42E-02	14.6	3.37E+00
4	1	77.09	320	164	1.00	154.98	144	19	8.88E-02	8.6	
5	1	79.20	40	181	1.22	159.20	144	19	1.11E-02	61.5	
6	2	87.34*	104	177	1.37	175.47	165	30	2.90E-02	24.2	3.47E+00
7	2	89.86*	99	160	1.37	180.52	165	30	2.74E-02	25.5	
8	2	92.69*	130	118	1.20	186.18	165	30	3.60E-02	19.5	
9	2	94.38	36	124	1.39	189.56	165	30	9.94E-03	74.9	
10	0	98.58*	11	146	1.35	197.97	195	8	2.99E-03	200.3	
11	0	143.78*	28	146	0.92	288.40	286	9	7.66E-03	82.8	
12	0	164.21*	46	131	3.90	329.27	325	11	1.27E-02	51.8	
13	0	185.93*	166	130	1.32	372.72	368	10	4.62E-02	16.0	
14	0	209.37	15	165	1.11	419.62	415	9	4.22E-03	154.9	
15	2	238.72*	466	76	1.28	478.33	472	17	1.30E-01	5.7	3.11E+00
16	2	241.90	197	82	1.38	484.70	472	17	5.48E-02	10.6	
17	0	270.17	40	102	1.27	541.24	537	10	1.11E-02	50.1	
18	0	290.89	28	81	0.61	582.68	577	11	7.79E-03	65.4	
19	4	295.45*	373	52	1.63	591.81	587	20	1.04E-01	6.1	6.12E+00
20	4	299.78	56	56	2.09	600.48	587	20	1.55E-02	34.4	
21	0	329.48	82	95	1.77	659.88	651	19	2.28E-02	30.6	
22	0	338.52	112	85	1.21	677.97	671	13	3.12E-02	19.3	
23	0	352.13*	504	104	1.17	705.20	700	12	1.40E-01	6.0	
24	0	463.53	40	57	1.40	928.01	922	14	1.10E-02	43.2	
25	0	511.70*	22	69	1.19	1024.35	1017	13	6.03E-03	94.3	
26	0	583.50*	126	51	1.50	1167.93	1161	12	3.50E-02	14.6	
27	0	609.47*	369	55	1.58	1219.87	1212	14	1.02E-01	6.8	
28	0	688.41	13	17	0.59	1377.72	1371	10	3.51E-03	67.9	
29	0	712.39	14	13	1.29	1425.68	1422	7	3.89E-03	51.3	
30	0	727.73	42	19	1.78	1456.35	1452	11	1.17E-02	26.2	
31	0	768.15*	44	25	1.15	1537.17	1532	12	1.22E-02	27.7	
32	0	786.67	13	19	0.50	1574.20	1568	9	3.57E-03	68.6	
33	0	795.42	23	28	0.54	1591.70	1587	14	6.39E-03	53.1	
34	0	805.72	24	19	2.73	1612.29	1607	11	6.66E-03	40.8	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
35	0	854.45	19	10	3.71	1709.73	1704	11	5.18E-03	41.3	
36	0	860.54	25	6	2.29	1721.91	1718	8	6.90E-03	26.4	
37	0	911.20*	108	11	1.39	1823.19	1817	14	2.99E-02	11.9	
38	0	934.56*	15	17	2.13	1869.89	1865	10	4.30E-03	57.8	
39	5	964.69	30	15	2.70	1930.13	1925	19	8.30E-03	29.7	3.83E+00
40	5	969.01	54	17	1.91	1938.76	1925	19	1.50E-02	20.4	
41	0	1120.47*	85	23	1.39	2241.52	2234	13	2.35E-02	16.2	
42	0	1170.50	24	7	1.36	2341.52	2334	14	6.67E-03	31.0	
43	0	1237.98	20	15	2.43	2476.41	2471	9	5.50E-03	42.4	
44	0	1461.10*	107	14	1.32	2922.30	2916	14	2.98E-02	12.6	
45	0	1510.30	12	2	1.03	3020.62	3014	11	3.26E-03	39.5	
46	0	1685.17	9	0	0.50	3370.00	3365	11	2.50E-03	33.3	
47	0	1764.62*	62	0	2.40	3528.73	3521	15	1.71E-02	13.9	
48	0	1821.10	9	0	1.87	3641.56	3637	9	2.50E-03	33.3	
49	0	1848.14*	4	6	3.35	3695.58	3687	13	1.22E-03	131.8	

Flag: "*" = Peak area was modified by background subtraction

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724006.CNF;1
Analyses by : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4
Sample title : RXF2
Sample date : 20-JAN-2023 11:30:00 Acquisition date : 28-FEB-2023 05:20:47
Sample ID : G609724006 Sample quantity : 72.050 GRAM
Sample type : SOLID Sample geometry :
Detector name : GAMMA2 Detector geometry: CAN
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:01.21 0.0%
Energy tolerance : 1.50 keV Half life ratio : 10.00
Errors propagated: No Systematic Error : 0.00 %
Efficiency type : Empirical Efficiencies at : Peak Energy
Abundance limit : 75.00

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	99	10.66*	1.001E+00	9.627E+00	9.627E+00	25.30
CD-109	88.03	85	3.70*	4.815E+00	4.994E+00	5.294E+00	48.36
SN-126	64.28	28	9.60	2.267E+00	1.317E+00	1.317E+00	146.31
	86.94	85	8.90	4.815E+00	2.076E+00	2.076E+00	48.36
	87.57	85	37.00*	4.815E+00	4.994E-01	4.994E-01	48.36
TL-208	277.37	-----	6.60	3.910E+00	-----	Line Not Found	-----
	583.19	112	85.00*	2.224E+00	6.155E-01	6.155E-01	29.24
	860.56	22	12.50	1.597E+00	1.166E+00	1.166E+00	52.77
BI-210	46.54	26	4.25*	5.217E-01	1.241E+01	1.245E+01	142.54
PB-210	46.54	26	4.25*	5.217E-01	1.241E+01	1.245E+01	142.54
BI-211	72.87	-----	1.23	3.466E+00	-----	Line Not Found	-----
	351.06	437	12.92*	3.279E+00	1.075E+01	1.075E+01	12.09
BI-212	727.33	38	6.67*	1.851E+00	3.170E+00	3.170E+00	52.41
	1620.50	-----	1.47	9.280E-01	-----	Line Not Found	-----
PB-212	74.82	159	10.28	3.702E+00	4.350E+00	4.350E+00	29.16
	77.11	260	17.10	3.924E+00	4.044E+00	4.044E+00	17.10
	238.63	398	43.60*	4.355E+00	2.186E+00	2.186E+00	11.44
	300.09	48	3.30	3.694E+00	4.118E+00	4.118E+00	68.88
BI-214	609.32	327	45.49*	2.147E+00	3.487E+00	3.488E+00	13.68
	1120.29	77	14.92	1.257E+00	4.277E+00	4.277E+00	32.44
	1764.49	57	15.30	8.813E-01	4.393E+00	4.393E+00	27.71
PB-214	74.82	159	5.80	3.702E+00	7.711E+00	7.711E+00	29.16
	77.11	260	9.70	3.924E+00	7.130E+00	7.130E+00	17.10
	87.09	85	3.41	4.815E+00	5.419E+00	5.419E+00	48.36
	242.00	168	7.25	4.314E+00	5.612E+00	5.613E+00	21.23
	295.22	322	18.42	3.733E+00	4.873E+00	4.873E+00	12.20
	351.93	437	35.60*	3.279E+00	3.902E+00	3.902E+00	12.09
RN-222	609.32	327	45.49*	2.147E+00	3.487E+00	3.488E+00	13.68
	1120.29	77	14.92	1.257E+00	4.277E+00	4.277E+00	32.44
	1764.49	57	15.30	8.813E-01	4.393E+00	4.393E+00	27.71
RA-224	240.99	168	4.10*	4.314E+00	9.924E+00	9.924E+00	21.23
RA-226	74.82	159	5.80	3.702E+00	7.711E+00	7.711E+00	29.16
	77.11	260	9.70	3.924E+00	7.130E+00	7.130E+00	17.10
	87.09	85	3.41	4.815E+00	5.419E+00	5.419E+00	48.36
	242.00	168	7.25	4.314E+00	5.612E+00	5.613E+00	21.23
	295.22	322	18.42	3.733E+00	4.873E+00	4.873E+00	12.20
	351.93	437	35.60*	3.279E+00	3.902E+00	3.902E+00	12.09
AC-228	105.21	-----	1.10	5.666E+00	-----	Line Not Found	-----
	338.32	97	11.27	3.376E+00	2.668E+00	2.668E+00	38.62
	835.71	-----	1.61	1.640E+00	-----	Line Not Found	-----
	911.20	97	25.80*	1.517E+00	2.585E+00	2.585E+00	23.79
	968.97	49	15.80	1.435E+00	2.237E+00	2.237E+00	40.89
RA-228	105.21	-----	1.10	5.666E+00	-----	Line Not Found	-----
	338.32	97	11.27	3.376E+00	2.668E+00	2.668E+00	38.62
	835.71	-----	1.61	1.640E+00	-----	Line Not Found	-----
	911.20	97	25.80*	1.517E+00	2.585E+00	2.585E+00	23.79
	968.97	49	15.80	1.435E+00	2.237E+00	2.237E+00	40.89
TH-228	74.82	159	10.28	3.702E+00	4.350E+00	4.350E+00	29.16
	77.11	260	17.10	3.924E+00	4.044E+00	4.044E+00	17.10

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
	238.63	398	43.60*	4.355E+00	2.186E+00	2.186E+00	11.44
	300.09	48	3.30	3.694E+00	4.118E+00	4.118E+00	68.88
TH-230	74.82	159	5.80	3.702E+00	7.711E+00	7.711E+00	29.16
	77.11	260	9.70	3.924E+00	7.130E+00	7.130E+00	17.10
	87.09	85	3.41	4.815E+00	5.419E+00	5.419E+00	48.36
	242.00	168	7.25	4.314E+00	5.612E+00	5.612E+00	21.23
	295.22	322	18.42	3.733E+00	4.873E+00	4.873E+00	12.20
	351.93	437	35.60*	3.279E+00	3.902E+00	3.902E+00	12.09
TH-232	105.21	-----	1.10	5.666E+00	-----	Line Not Found	-----
	338.32	97	11.27	3.376E+00	2.668E+00	2.668E+00	38.62
	835.71	-----	1.61	1.640E+00	-----	Line Not Found	-----
	911.20	97	25.80*	1.517E+00	2.585E+00	2.585E+00	23.79
	968.97	49	15.80	1.435E+00	2.237E+00	2.237E+00	40.89
TH-234	63.29	28	3.70*	2.267E+00	3.418E+00	3.418E+00	146.31
	92.59	107	4.23	5.156E+00	5.091E+00	5.091E+00	39.00
U-234	74.82	159	5.80	3.702E+00	7.711E+00	7.711E+00	29.16
	77.11	260	9.70	3.924E+00	7.130E+00	7.130E+00	17.10
	87.09	85	3.41	4.815E+00	5.419E+00	5.419E+00	48.36
	242.00	168	7.25	4.314E+00	5.612E+00	5.612E+00	21.23
	295.22	322	18.42	3.733E+00	4.873E+00	4.873E+00	12.20
	351.93	437	35.60*	3.279E+00	3.902E+00	3.902E+00	12.09
U-235	89.96	81	3.47	4.986E+00	4.874E+00	4.874E+00	50.98
	93.35	107	5.60	5.156E+00	3.845E+00	3.845E+00	39.00
	143.76	23	10.96*	5.769E+00	3.802E-01	3.802E-01	165.62
	163.33	38	5.08	5.481E+00	1.435E+00	1.435E+00	103.56
	185.72	141	57.20	5.130E+00	4.995E-01	4.995E-01	31.92
	205.31	-----	5.01	4.824E+00	-----	Line Not Found	-----
U-238	63.29	28	3.70*	2.267E+00	3.418E+00	3.418E+00	146.31
	92.59	107	4.23	5.156E+00	5.091E+00	5.091E+00	39.00
AM-243	43.53	-----	5.90	2.935E-01	-----	Line Not Found	-----
	74.66	159	67.20*	3.702E+00	6.655E-01	6.655E-01	29.16
ANH-511	511.00	19	100.00*	2.469E+00	8.076E-02	8.076E-02	188.65

Flag: "*" = Keyline


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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                          *
*****
*                               DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724006.CNF;1
* Acquisition date   : 28-FEB-2023 05:20:47 Sensitivity      : 3.000
* Detector ID        : GAM02 Energy tolerance: 1.500
* Elapsed live time  : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time  : 0 01:00:01.21 Half life ratio : *****
* Sample date        : 20-JAN-2023 11:30:00 Analyst initials: RXF2
* Sample ID          : G609724006 Sample Quantity : 7.2050E+01 GRAM
* Batch Number       : 2379916 Wet Weight : 0.00000
* Wet wt corr        : 1.00000 Dry Weight : 0.00000
* Nuclide Library    : SOLID.NLB;17
*****
*                               CALIBRATION INFORMATION                         *
*
* Eff. Cal. date     : 23-SEP-2022 06:33:35 Eff. Geometry   : CAN
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM02_CAN.CNF;17
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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
K-40	9.627E+00	2.387E+00	1.817E+00
CD-109	5.294E+00	2.509E+00	3.086E+00
SN-126	4.994E-01	2.367E-01	2.930E-01
TL-208	6.155E-01	1.764E-01	1.543E-01
BI-210	1.245E+01	1.740E+01	2.325E+01
PB-210	1.245E+01	1.740E+01	2.325E+01
BI-211	1.075E+01	1.274E+00	7.669E-01
BI-212	3.170E+00	1.628E+00	1.996E+00
PB-212	2.186E+00	2.451E-01	2.141E-01
BI-214	3.488E+00	4.676E-01	2.802E-01
PB-214	3.902E+00	4.624E-01	2.789E-01
RN-222	3.488E+00	4.676E-01	2.802E-01
RA-224	9.924E+00	2.065E+00	2.295E+00
RA-226	3.902E+00	4.624E-01	2.789E-01
AC-228	2.585E+00	6.027E-01	5.287E-01
RA-228	2.585E+00	6.027E-01	5.287E-01
TH-228	2.186E+00	2.451E-01	2.141E-01
TH-230	3.902E+00	4.624E-01	2.789E-01
TH-232	2.585E+00	6.027E-01	5.287E-01
TH-234	3.418E+00	4.901E+00	5.703E+00
U-234	3.902E+00	4.624E-01	2.789E-01
U-235	3.802E-01	6.172E-01	7.233E-01
U-238	3.418E+00	4.901E+00	5.703E+00
AM-243	6.655E-01	1.902E-01	2.339E-01
ANH-511	8.076E-02	1.493E-01	1.233E-01

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L.	Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)	
BE-7	5.258E-01		1.105E+00	2.033E+00	NOT IDENT.
NA-22	-2.192E-02		9.169E-02	1.664E-01	NOT IDENT.
NA-24	0.000E+00		3.321E+17	0.000E+00	SHORT HLIF
AL-26	-2.268E-03		7.086E-02	1.494E-01	NOT IDENT.
SC-46	5.685E-02		1.192E-01	2.354E-01	FAIL ABUN

V-48	-1.693E-01	3.862E-01	6.859E-01	NOT IDENT.
CR-51	1.371E-01	1.460E+00	2.614E+00	NOT IDENT.
MN-52	-6.118E+00	9.816E+00	1.620E+01	FAIL ABUN
MN-54	-3.831E-02	8.522E-02	1.508E-01	NOT IDENT.
CO-56	7.663E-03	1.060E-01	2.026E-01	FAIL ABUN
MN-56	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
CO-57	9.786E-03	5.590E-02	9.280E-02	NOT IDENT.
CO-58	8.496E-02	1.108E-01	2.139E-01	NOT IDENT.
FE-59	-2.869E-02	2.795E-01	5.221E-01	NOT IDENT.
CO-60	-1.539E-02	8.741E-02	1.615E-01	NOT IDENT.
ZN-65	3.350E-02	2.142E-01	3.681E-01	NOT IDENT.
GE-68	-1.594E+00	2.176E+00	3.590E+00	NOT IDENT.
AS-73	2.609E+00	3.381E+00	5.896E+00	NOT IDENT.
AS-74	-2.132E-01	5.410E-01	9.009E-01	NOT IDENT.
SE-75	2.747E-02	1.099E-01	1.993E-01	NOT IDENT.
BR-77	0.000E+00	3.760E+04	0.000E+00	SHORT HLIF
SR-82	-7.481E-01	1.225E+00	2.137E+00	NOT IDENT.
RB-83	-7.511E-04	1.881E-01	3.337E-01	NOT IDENT.
RB-84	6.179E-02	2.709E-01	5.230E-01	NOT IDENT.
KR-85	7.164E+00	7.770E+01	2.945E+01	NOT IDENT.
SR-85	4.836E-02	1.203E-01	2.000E-01	NOT IDENT.
RB-86	-2.008E+00	3.166E+00	5.376E+00	NOT IDENT.
Y-88	3.183E-02	1.191E-01	2.533E-01	NOT IDENT.
Y-91	2.594E+01	5.813E+01	1.165E+02	NOT IDENT.
NB-94	5.838E-02	7.898E-02	1.585E-01	NOT IDENT.
NB-95	1.702E-01	1.270E-01	2.615E-01	NOT IDENT.
NB-95M	-8.097E-02	3.613E-01	5.627E-01	NOT IDENT.
ZR-95	2.645E-02	1.920E-01	3.714E-01	NOT IDENT.
NB-97	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	6.048E+16	0.000E+00	SHORT HLIF
MO-99	0.000E+00	1.062E+04	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
RH-101	-8.577E-02	7.583E-02	1.116E-01	NOT IDENT.
RH-102	1.279E-01	1.211E-01	2.457E-01	FAIL ABUN
RU-103	-3.502E-02	1.306E-01	2.222E-01	FAIL ABUN
RH-106	-3.210E-01	7.954E-01	1.318E+00	NOT IDENT.
RU-106	-3.210E-01	7.954E-01	1.318E+00	NOT IDENT.
AG-108M	6.284E-02	6.122E-02	1.221E-01	NOT IDENT.
AG-110	-7.503E-01	1.571E+00	2.582E+00	NOT IDENT.
AG-110M	-3.102E-02	1.453E-01	2.617E-01	NOT IDENT.
SN-113	-1.350E-01	1.315E-01	2.074E-01	NOT IDENT.
CD-115	0.000E+00	3.883E+04	0.000E+00	SHORT HLIF
SN-117M	1.126E-01	4.024E-01	7.274E-01	NOT IDENT.
SB-122	0.000E+00	1.673E+03	0.000E+00	SHORT HLIF
TE-123M	7.703E-03	7.010E-02	1.257E-01	NOT IDENT.
SB-124	9.294E-02	1.879E-01	4.479E-01	NOT IDENT.
SB-125	-4.625E-02	2.176E-01	3.750E-01	FAIL ABUN
TE-125M	3.773E+00	2.944E+01	4.845E+01	NOT IDENT.
I-126	1.423E+00	1.786E+00	3.475E+00	NOT IDENT.
SB-126	6.337E-01	1.213E+00	2.414E+00	NOT IDENT.
SB-127	0.000E+00	1.869E+02	0.000E+00	SHORT HLIF
I-131	1.293E+00	2.171E+00	4.028E+00	FAIL ABUN
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	0.000E+00	2.761E+02	0.000E+00	SHORT HLIF
BA-133	-1.525E-02	1.095E-01	1.699E-01	NOT IDENT.
I-133	0.000E+00	1.990E+12	0.000E+00	SHORT HLIF
CS-134	1.520E-01	1.581E-01	2.210E-01	FAIL ABUN
I-135	0.000E+00	1.581E+41	0.000E+00	SHORT HLIF
CS-136	-5.259E-01	7.342E-01	1.223E+00	NOT IDENT.
BA-137M	3.237E-02	7.024E-02	1.346E-01	NOT IDENT.
CS-137	3.420E-02	7.421E-02	1.422E-01	NOT IDENT.
LA-138	-2.827E-02	1.256E-01	2.313E-01	NOT IDENT.
CE-139	-9.670E-03	6.938E-02	1.227E-01	NOT IDENT.
BA-140	-1.373E+00	2.288E+00	3.718E+00	NOT IDENT.
LA-140	-5.461E-01	6.892E-01	1.167E+00	FAIL ABUN
CE-141	2.817E-02	2.353E-01	3.836E-01	NOT IDENT.
CE-143	0.000E+00	4.342E+07	0.000E+00	SHORT HLIF
CE-144	-2.132E-02	4.717E-01	7.621E-01	FAIL ABUN
PM-144	-5.870E-02	7.279E-02	1.237E-01	NOT IDENT.
PR-144	-4.483E+00	5.510E+00	9.352E+00	NOT IDENT.
PM-146	9.208E-02	9.793E-02	1.904E-01	NOT IDENT.
ND-147	1.525E+00	5.185E+00	9.633E+00	FAIL ABUN
PM-147	8.921E+02	1.611E+03	2.751E+03	NOT IDENT.
PM-149	0.000E+00	3.668E+05	0.000E+00	SHORT HLIF
EU-150	5.009E-03	7.392E-02	9.523E-02	FAIL ABUN
EU-152	9.227E-02	2.377E-01	4.319E-01	FAIL ABUN
GD-153	6.537E-02	2.567E-01	3.091E-01	FAIL ABUN
EU-154	-7.209E-02	2.545E-01	4.582E-01	NOT IDENT.

EU-155	1.208E-01	2.470E-01	4.173E-01	FAIL ABUN
TB-160	1.219E-02	3.636E-01	6.923E-01	FAIL ABUN
HO-166M	1.276E-01	1.282E-01	2.784E-01	FAIL ABUN
TM-171	-5.543E+01	6.270E+01	9.688E+01	NOT IDENT.
HF-172	5.842E-01	4.102E-01	7.459E-01	FAIL ABUN
LU-172	8.598E-03	1.201E-01	2.354E-01	FAIL ABUN
LU-176	-3.576E-02	5.446E-02	9.087E-02	FAIL ABUN
HF-181	4.120E-02	1.429E-01	2.623E-01	NOT IDENT.
TA-182	5.230E-01	3.957E-01	9.162E-01	FAIL ABUN
RE-183	1.695E-02	7.928E-01	1.311E+00	NOT IDENT.
RE-184	7.250E-02	4.796E-01	9.141E-01	NOT IDENT.
W-188	2.435E+01	3.120E+01	4.002E+01	FAIL ABUN
IR-192	3.516E-02	9.713E-02	1.777E-01	FAIL ABUN
HG-203	4.039E-02	1.327E-01	2.386E-01	NOT IDENT.
TL-204	2.815E-01	1.473E+01	2.224E+01	FAIL ABUN
BI-207	1.499E-02	1.009E-01	1.987E-01	FAIL ABUN
PB-211	3.198E-01	1.636E+00	2.946E+00	NOT IDENT.
BI-213	1.379E-01	2.329E-01	4.395E-01	NOT IDENT.
RN-219	-2.848E-01	1.009E+00	1.721E+00	FAIL ABUN
RA-223	-6.699E-01	1.531E+00	2.298E+00	FAIL ABUN
AC-225	-9.476E+00	6.880E+00	1.071E+01	NOT IDENT.
AC-227	7.281E-02	5.588E-01	1.001E+00	FAIL ABUN
TH-227	7.281E-02	5.588E-01	1.001E+00	FAIL ABUN
TH-229	1.572E+00	1.151E+00	2.213E+00	FAIL ABUN
PA-231	1.198E+00	1.153E+00	2.041E+00	NOT IDENT.
TH-231	-6.699E-01	1.531E+00	2.298E+00	FAIL ABUN
PA-233	7.567E-02	1.352E-01	2.533E-01	FAIL ABUN
PA-234	-1.392E-01	6.932E-01	1.266E+00	FAIL ABUN
PA-234M	-5.532E+00	1.064E+01	1.816E+01	NOT IDENT.
NP-237	7.567E-02	1.352E-01	2.533E-01	FAIL ABUN
NP-238	0.000E+00	8.817E+04	0.000E+00	SHORT HLIF
NP-239	-3.994E-01	6.161E-01	9.498E-01	FAIL ABUN
PU-239	1.490E+02	7.961E+02	1.304E+03	NOT IDENT.
AM-241	7.723E-02	5.176E-01	7.970E-01	NOT IDENT.
CM-243	-9.812E-02	2.604E-01	4.119E-01	FAIL ABUN
BK-247	2.816E-02	1.851E-01	3.181E-01	NOT IDENT.
CM-247	1.313E-02	9.042E-02	1.611E-01	NOT IDENT.
CF-249	1.433E-01	9.785E-02	1.943E-01	NOT IDENT.
CF-251	2.037E-02	2.647E-01	4.747E-01	NOT IDENT.

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	99	10.66*	1.001E+00	9.627E+00	9.627E+00	25.30
CD-109	88.03	85	3.70*	4.815E+00	4.994E+00	5.294E+00	48.36
SN-126	64.28	28	9.60	2.267E+00	1.317E+00	1.317E+00	146.31
	86.94	85	8.90	4.815E+00	2.076E+00	2.076E+00	48.36
	87.57	85	37.00*	4.815E+00	4.994E-01	4.994E-01	48.36
TL-208	277.37	-----	6.60	3.910E+00	-----	Line Not Found	-----
	583.19	112	85.00*	2.224E+00	6.155E-01	6.155E-01	29.24
	860.56	22	12.50	1.597E+00	1.166E+00	1.166E+00	52.77
BI-210	46.54	26	4.25*	5.217E-01	1.241E+01	1.245E+01	142.54
PB-210	46.54	26	4.25*	5.217E-01	1.241E+01	1.245E+01	142.54
BI-211	72.87	-----	1.23	3.466E+00	-----	Line Not Found	-----
	351.06	437	12.92*	3.279E+00	1.075E+01	1.075E+01	12.09
BI-212	727.33	38	6.67*	1.851E+00	3.170E+00	3.170E+00	52.41
	1620.50	-----	1.47	9.280E-01	-----	Line Not Found	-----
PB-212	74.82	159	10.28	3.702E+00	4.350E+00	4.350E+00	29.16
	77.11	260	17.10	3.924E+00	4.044E+00	4.044E+00	17.10
	238.63	398	43.60*	4.355E+00	2.186E+00	2.186E+00	11.44
	300.09	48	3.30	3.694E+00	4.118E+00	4.118E+00	68.88
BI-214	609.32	327	45.49*	2.147E+00	3.487E+00	3.488E+00	13.68
	1120.29	77	14.92	1.257E+00	4.277E+00	4.277E+00	32.44
	1764.49	57	15.30	8.813E-01	4.393E+00	4.393E+00	27.71
PB-214	74.82	159	5.80	3.702E+00	7.711E+00	7.711E+00	29.16
	77.11	260	9.70	3.924E+00	7.130E+00	7.130E+00	17.10
	87.09	85	3.41	4.815E+00	5.419E+00	5.419E+00	48.36
	242.00	168	7.25	4.314E+00	5.612E+00	5.613E+00	21.23
	295.22	322	18.42	3.733E+00	4.873E+00	4.873E+00	12.20
	351.93	437	35.60*	3.279E+00	3.902E+00	3.902E+00	12.09
RN-222	609.32	327	45.49*	2.147E+00	3.487E+00	3.488E+00	13.68
	1120.29	77	14.92	1.257E+00	4.277E+00	4.277E+00	32.44
	1764.49	57	15.30	8.813E-01	4.393E+00	4.393E+00	27.71
RA-224	240.99	168	4.10*	4.314E+00	9.924E+00	9.924E+00	21.23
RA-226	74.82	159	5.80	3.702E+00	7.711E+00	7.711E+00	29.16
	77.11	260	9.70	3.924E+00	7.130E+00	7.130E+00	17.10
	87.09	85	3.41	4.815E+00	5.419E+00	5.419E+00	48.36
	242.00	168	7.25	4.314E+00	5.612E+00	5.613E+00	21.23
	295.22	322	18.42	3.733E+00	4.873E+00	4.873E+00	12.20
	351.93	437	35.60*	3.279E+00	3.902E+00	3.902E+00	12.09
AC-228	105.21	-----	1.10	5.666E+00	-----	Line Not Found	-----
	338.32	97	11.27	3.376E+00	2.668E+00	2.668E+00	38.62
	835.71	-----	1.61	1.640E+00	-----	Line Not Found	-----
	911.20	97	25.80*	1.517E+00	2.585E+00	2.585E+00	23.79
	968.97	49	15.80	1.435E+00	2.237E+00	2.237E+00	40.89
RA-228	105.21	-----	1.10	5.666E+00	-----	Line Not Found	-----
	338.32	97	11.27	3.376E+00	2.668E+00	2.668E+00	38.62
	835.71	-----	1.61	1.640E+00	-----	Line Not Found	-----
	911.20	97	25.80*	1.517E+00	2.585E+00	2.585E+00	23.79
	968.97	49	15.80	1.435E+00	2.237E+00	2.237E+00	40.89

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
TH-228	74.82	159	10.28	3.702E+00	4.350E+00	4.350E+00	29.16
	77.11	260	17.10	3.924E+00	4.044E+00	4.044E+00	17.10
	238.63	398	43.60*	4.355E+00	2.186E+00	2.186E+00	11.44
	300.09	48	3.30	3.694E+00	4.118E+00	4.118E+00	68.88
TH-230	74.82	159	5.80	3.702E+00	7.711E+00	7.711E+00	29.16
	77.11	260	9.70	3.924E+00	7.130E+00	7.130E+00	17.10
	87.09	85	3.41	4.815E+00	5.419E+00	5.419E+00	48.36
	242.00	168	7.25	4.314E+00	5.612E+00	5.612E+00	21.23
	295.22	322	18.42	3.733E+00	4.873E+00	4.873E+00	12.20
	351.93	437	35.60*	3.279E+00	3.902E+00	3.902E+00	12.09
TH-232	105.21	-----	1.10	5.666E+00	-----	Line Not Found	-----
	338.32	97	11.27	3.376E+00	2.668E+00	2.668E+00	38.62
	835.71	-----	1.61	1.640E+00	-----	Line Not Found	-----
	911.20	97	25.80*	1.517E+00	2.585E+00	2.585E+00	23.79
TH-234	968.97	49	15.80	1.435E+00	2.237E+00	2.237E+00	40.89
	63.29	28	3.70*	2.267E+00	3.418E+00	3.418E+00	146.31
U-234	92.59	107	4.23	5.156E+00	5.091E+00	5.091E+00	39.00
	74.82	159	5.80	3.702E+00	7.711E+00	7.711E+00	29.16
U-235	77.11	260	9.70	3.924E+00	7.130E+00	7.130E+00	17.10
	87.09	85	3.41	4.815E+00	5.419E+00	5.419E+00	48.36
	242.00	168	7.25	4.314E+00	5.612E+00	5.612E+00	21.23
	295.22	322	18.42	3.733E+00	4.873E+00	4.873E+00	12.20
	351.93	437	35.60*	3.279E+00	3.902E+00	3.902E+00	12.09
	89.96	81	3.47	4.986E+00	4.874E+00	4.874E+00	50.98
	93.35	107	5.60	5.156E+00	3.845E+00	3.845E+00	39.00
U-238	143.76	23	10.96*	5.769E+00	3.802E-01	3.802E-01	165.62
	163.33	38	5.08	5.481E+00	1.435E+00	1.435E+00	103.56
	185.72	141	57.20	5.130E+00	4.995E-01	4.995E-01	31.92
	205.31	-----	5.01	4.824E+00	-----	Line Not Found	-----
AM-243	63.29	28	3.70*	2.267E+00	3.418E+00	3.418E+00	146.31
	92.59	107	4.23	5.156E+00	5.091E+00	5.091E+00	39.00
ANH-511	43.53	-----	5.90	2.935E-01	-----	Line Not Found	-----
	74.66	159	67.20*	3.702E+00	6.655E-01	6.655E-01	29.16
	511.00	19	100.00*	2.469E+00	8.076E-02	8.076E-02	188.65

Flag: "*" = Keyline

Total number of lines in spectrum 49
 Number of unidentified lines 9
 Number of lines tentatively identified by NID 40 81.63%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.25E+09Y	1.00	9.627E+00	9.627E+00	2.435E+00	25.30	
CD-109	461.40D	1.06	4.994E+00	5.294E+00	2.560E+00	48.36	
SN-126	2.30E+05Y	1.00	4.994E-01	4.994E-01	2.415E-01	48.36	
TL-208	1.41E+10Y	1.00	6.155E-01	6.155E-01	1.800E-01	29.24	
BI-210	22.20Y	1.00	1.241E+01	1.245E+01	1.775E+01	142.54	
PB-210	22.20Y	1.00	1.241E+01	1.245E+01	1.775E+01	142.54	
BI-211	7.04E+08Y	1.00	1.075E+01	1.075E+01	0.130E+01	12.09	
BI-212	1.41E+10Y	1.00	3.170E+00	3.170E+00	1.662E+00	52.41	
PB-212	1.41E+10Y	1.00	2.186E+00	2.186E+00	0.250E+00	11.44	
BI-214	1600.00Y	1.00	3.487E+00	3.488E+00	0.477E+00	13.68	
PB-214	1600.00Y	1.00	3.902E+00	3.902E+00	0.472E+00	12.09	
RN-222	1600.00Y	1.00	3.487E+00	3.488E+00	0.477E+00	13.68	
RA-224	1.41E+10Y	1.00	9.924E+00	9.924E+00	2.107E+00	21.23	
RA-226	1600.00Y	1.00	3.902E+00	3.902E+00	0.472E+00	12.09	
AC-228	1.41E+10Y	1.00	2.585E+00	2.585E+00	0.615E+00	23.79	
RA-228	1.41E+10Y	1.00	2.585E+00	2.585E+00	0.615E+00	23.79	
TH-228	1.41E+10Y	1.00	2.186E+00	2.186E+00	0.250E+00	11.44	
TH-230	7.54E+04Y	1.00	3.902E+00	3.902E+00	0.472E+00	12.09	
TH-232	1.41E+10Y	1.00	2.585E+00	2.585E+00	0.615E+00	23.79	
TH-234	4.47E+09Y	1.00	3.418E+00	3.418E+00	5.001E+00	146.31	
U-234	2.45E+05Y	1.00	3.902E+00	3.902E+00	0.472E+00	12.09	
U-235	7.04E+08Y	1.00	3.802E-01	3.802E-01	6.298E-01	165.62	
U-238	4.47E+09Y	1.00	3.418E+00	3.418E+00	5.001E+00	146.31	
AM-243	7370.00Y	1.00	6.655E-01	6.655E-01	1.941E-01	29.16	
ANH-511	1.00E+09Y	1.00	8.076E-02	8.076E-02	15.23E-02	188.65	
Total Activity :			1.071E+02	1.075E+02			

Grand Total Activity : 1.071E+02 1.075E+02

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
1	79.20	33	148	1.22	159.20	144	19	1.11E-02	****	4.13E+00	T
2	94.38	29	102	1.39	189.56	165	30	9.94E-03	****	5.25E+00	T
0	98.58	9	120	1.35	197.97	195	8	2.99E-03	****	5.44E+00	T
0	209.37	13	140	1.11	419.62	415	9	4.22E-03	****	4.76E+00	T
0	270.17	34	88	1.27	541.24	537	10	1.11E-02	****	3.99E+00	T
0	290.89	24	70	0.61	582.68	577	11	7.79E-03	****	3.78E+00	T
0	329.48	71	82	1.77	659.88	651	19	2.28E-02	61.1	3.44E+00	T
0	463.53	35	50	1.40	928.01	922	14	1.10E-02	86.4	2.66E+00	T
0	688.41	11	15	0.59	1377.72	1371	10	3.51E-03	****	1.94E+00	
0	712.39	12	12	1.29	1425.68	1422	7	3.89E-03	****	1.88E+00	T
0	768.15	39	22	1.15	1537.17	1532	12	1.22E-02	55.4	1.77E+00	T
0	786.67	12	17	0.50	1574.20	1568	9	3.57E-03	****	1.73E+00	
0	795.42	21	25	0.54	1591.70	1587	14	6.39E-03	****	1.71E+00	T
0	805.72	22	17	2.73	1612.29	1607	11	6.66E-03	81.7	1.69E+00	
0	854.45	17	9	3.71	1709.73	1704	11	5.18E-03	82.6	1.61E+00	
0	934.56	14	15	2.13	1869.89	1865	10	4.30E-03	****	1.48E+00	T
5	964.69	27	14	2.70	1930.13	1925	19	8.30E-03	59.3	1.44E+00	T
0	1170.50	22	6	1.36	2341.52	2334	14	6.67E-03	62.1	1.21E+00	
0	1237.98	18	14	2.43	2476.41	2471	9	5.50E-03	84.8	1.15E+00	T
0	1510.30	11	2	1.03	3020.62	3014	11	3.26E-03	79.0	9.75E-01	
0	1685.17	8	0	0.50	3370.00	3365	11	2.50E-03	66.7	9.05E-01	
0	1821.10	8	0	1.87	3641.56	3637	9	2.50E-03	66.7	8.67E-01	
0	1848.14	4	6	3.35	3695.58	3687	13	1.22E-03	****	8.61E-01	

Flags: "T" = Tentatively associated

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*****
*
*               GEL Laboratories LLC
*               2040 Savage Road
*               Charleston, SC 29407
*
*****
*
*               DETECTOR AND SAMPLE DATA
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724006.CNF;1
* Acquisition date   : 28-FEB-2023 05:20:47 Sensitivity      : 3.000
* Detector ID       : GAM02 Energy tolerance: 1.500
* Elapsed live time : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time : 0 01:00:01.21 Half life ratio  : *****
* Sample date       : 20-JAN-2023 11:30:00 Nuclide Library : SOLID
* Sample ID        : G609724006 Analyst initials: RXF2
* Batch Number     : 2379916 Sample Quantity  : 7.2050E+01 GRAM
* Wet wt corr      : 1.00000 Wet Weight      : 0.00000
* Dry Weight       : 0.00000
*****
*
*               CALIBRATION INFORMATION
*
* Eff. Cal. date    : 23-SEP-2022 06:33:35 Eff. Geometry   : CAN
* Eff. File         : DKA100:[CANBERRA.GAMMA]EFF_GAM02_CAN.CNF;17
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)
K-40	7.790E-01
CD-109	1.465E+00
SN-126	1.391E-01
TL-208	6.991E-02
BI-210	1.097E+01
PB-210	1.097E+01
BI-211	3.515E-01
BI-212	8.872E-01
PB-212	9.995E-02
BI-214	1.261E-01
PB-214	1.278E-01
RN-222	1.261E-01
RA-224	1.072E+00
RA-226	1.278E-01
AC-228	2.292E-01
RA-228	2.292E-01
TH-228	9.995E-02
TH-230	1.278E-01
TH-232	2.292E-01
TH-234	2.695E+00
U-234	1.278E-01
U-235	3.405E-01
U-238	2.695E+00
AM-243	1.116E-01
ANH-511	5.613E-02

---- Non-Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)	
BE-7	9.334E-01	NOT IDENT.
NA-22	7.053E-02	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	5.873E-02	NOT IDENT.
SC-46	1.055E-01	FAIL ABUN
V-48	2.906E-01	NOT IDENT.

CR-51	1.204E+00	NOT IDENT.
MN-52	6.432E+00	FAIL ABUN
MN-54	6.626E-02	NOT IDENT.
CO-56	8.931E-02	FAIL ABUN
MN-56	0.000E+00	SHORT HLIF
CO-57	4.348E-02	NOT IDENT.
CO-58	9.497E-02	NOT IDENT.
FE-59	2.261E-01	NOT IDENT.
CO-60	6.777E-02	NOT IDENT.
ZN-65	1.600E-01	NOT IDENT.
GE-68	1.432E+00	NOT IDENT.
AS-73	2.786E+00	NOT IDENT.
AS-74	4.024E-01	NOT IDENT.
SE-75	9.258E-02	NOT IDENT.
BR-77	0.000E+00	SHORT HLIF
SR-82	9.184E-01	NOT IDENT.
RB-83	1.499E-01	NOT IDENT.
RB-84	2.326E-01	NOT IDENT.
KR-85	1.344E+01	NOT IDENT.
SR-85	9.126E-02	NOT IDENT.
RB-86	2.170E+00	NOT IDENT.
Y-88	1.058E-01	NOT IDENT.
Y-91	5.112E+01	NOT IDENT.
NB-94	7.208E-02	NOT IDENT.
NB-95	1.190E-01	NOT IDENT.
NB-95M	2.625E-01	NOT IDENT.
ZR-95	1.642E-01	NOT IDENT.
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	SHORT HLIF
RH-101	5.237E-02	NOT IDENT.
RH-102	1.109E-01	FAIL ABUN
RU-103	9.932E-02	FAIL ABUN
RH-106	5.890E-01	NOT IDENT.
RU-106	5.890E-01	NOT IDENT.
AG-108M	5.568E-02	NOT IDENT.
AG-110	1.123E+00	NOT IDENT.
AG-110M	1.174E-01	NOT IDENT.
SN-113	9.499E-02	NOT IDENT.
CD-115	0.000E+00	SHORT HLIF
SN-117M	3.436E-01	NOT IDENT.
SB-122	0.000E+00	SHORT HLIF
TE-123M	5.926E-02	NOT IDENT.
SB-124	1.735E-01	NOT IDENT.
SB-125	1.709E-01	FAIL ABUN
TE-125M	2.286E+01	NOT IDENT.
I-126	1.571E+00	NOT IDENT.
SB-126	1.087E+00	NOT IDENT.
SB-127	0.000E+00	SHORT HLIF
I-131	1.866E+00	FAIL ABUN
I-132	0.000E+00	SHORT HLIF
TE-132	0.000E+00	SHORT HLIF
BA-133	7.820E-02	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	1.008E-01	FAIL ABUN
I-135	0.000E+00	SHORT HLIF
CS-136	5.119E-01	NOT IDENT.
BA-137M	5.971E-02	NOT IDENT.
CS-137	6.308E-02	NOT IDENT.
LA-138	9.483E-02	NOT IDENT.
CE-139	5.761E-02	NOT IDENT.
BA-140	1.665E+00	NOT IDENT.
LA-140	4.561E-01	FAIL ABUN
CE-141	1.808E-01	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	3.584E-01	FAIL ABUN
PM-144	5.413E-02	NOT IDENT.
PR-144	4.091E+00	NOT IDENT.
PM-146	8.736E-02	NOT IDENT.
ND-147	4.314E+00	FAIL ABUN
PM-147	1.294E+03	NOT IDENT.
PM-149	0.000E+00	SHORT HLIF
EU-150	4.346E-02	FAIL ABUN
EU-152	2.006E-01	FAIL ABUN
GD-153	1.450E-01	FAIL ABUN
EU-154	1.936E-01	NOT IDENT.
EU-155	1.973E-01	FAIL ABUN

TB-160	3.039E-01	FAIL ABUN
HO-166M	1.258E-01	FAIL ABUN
TM-171	4.550E+01	NOT IDENT.
HF-172	3.521E-01	FAIL ABUN
LU-172	9.999E-02	FAIL ABUN
LU-176	4.145E-02	FAIL ABUN
HF-181	1.188E-01	NOT IDENT.
TA-182	4.026E-01	FAIL ABUN
RE-183	6.208E-01	NOT IDENT.
RE-184	4.067E-01	NOT IDENT.
W-188	1.870E+01	FAIL ABUN
IR-192	8.219E-02	FAIL ABUN
HG-203	1.117E-01	NOT IDENT.
TL-204	1.059E+01	FAIL ABUN
BI-207	8.530E-02	FAIL ABUN
PB-211	1.351E+00	NOT IDENT.
BI-213	2.008E-01	NOT IDENT.
RN-219	7.913E-01	FAIL ABUN
RA-223	1.052E+00	FAIL ABUN
AC-225	4.982E+00	NOT IDENT.
AC-227	4.662E-01	FAIL ABUN
TH-227	4.662E-01	FAIL ABUN
TH-229	1.046E+00	FAIL ABUN
PA-231	9.520E-01	NOT IDENT.
TH-231	1.052E+00	FAIL ABUN
PA-233	1.169E-01	FAIL ABUN
PA-234	5.551E-01	FAIL ABUN
PA-234M	7.905E+00	NOT IDENT.
NP-237	1.169E-01	FAIL ABUN
NP-238	0.000E+00	SHORT HLIF
NP-239	4.462E-01	FAIL ABUN
PU-239	6.163E+02	NOT IDENT.
AM-241	3.783E-01	NOT IDENT.
CM-243	1.945E-01	FAIL ABUN
BK-247	1.479E-01	NOT IDENT.
CM-247	7.421E-02	NOT IDENT.
CF-249	9.041E-02	NOT IDENT.
CF-251	2.226E-01	NOT IDENT.

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*****
*
*               GEL Laboratories LLC
*               2040 Savage Road
*               Charleston, SC 29407
*****
*
*               DETECTOR AND SAMPLE DATA
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G609724006.CNF;1
* Acquisition date   : 28-FEB-2023 05:20:47 Sensitivity      : 3.000
* Detector ID       : GAM02 Energy tolerance: 1.500
* Elapsed live time : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time : 0 01:00:01.21 Half life ratio  : *****
* Sample date       : 20-JAN-2023 11:30:00 Nuclide Library : SOLID
* Sample ID         : G609724006 Analyst initials: RXF2
* Batch Number      : 2379916 Sample Quantity : 7.2050E+01 GRAM
*                   Quantity Err(%) : 1.3879E-03 %
* Wet wt corr       : 1.00000 Wet Weight      : 0.00000
*                   Dry Weight      : 0.00000
*****
*
*               CALIBRATION INFORMATION
*
* Eff. Cal. date    : 23-SEP-2022 06:33:35 Eff. Geometry   : CAN
* Eff. File         : DKA100:[CANBERRA.GAMMA]EFF_GAM02_CAN.CNF;17
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
K-40	9.627E+00	2.634E+00	2.634E+00
CD-109	5.294E+00	2.577E+00	2.577E+00
SN-126	4.994E-01	2.417E-01	2.417E-01
TL-208	6.155E-01	1.839E-01	1.839E-01
BI-210	1.245E+01	1.746E+01	1.746E+01
PB-210	1.245E+01	1.746E+01	1.746E+01
BI-211	1.075E+01	1.595E+00	1.595E+00
BI-212	3.170E+00	1.653E+00	1.653E+00
PB-212	2.186E+00	3.129E-01	3.129E-01
BI-214	3.488E+00	5.520E-01	5.520E-01
PB-214	3.902E+00	5.755E-01	5.755E-01
RN-222	3.488E+00	5.520E-01	5.520E-01
RA-224	9.924E+00	2.249E+00	2.249E+00
RA-226	3.902E+00	5.755E-01	5.755E-01
AC-228	2.585E+00	6.554E-01	6.554E-01
RA-228	2.585E+00	6.554E-01	6.554E-01
TH-228	2.186E+00	3.129E-01	3.129E-01
TH-230	3.902E+00	5.755E-01	5.755E-01
TH-232	2.585E+00	6.554E-01	6.554E-01
TH-234	3.418E+00	4.968E+00	4.968E+00
U-234	3.902E+00	5.755E-01	5.755E-01
U-235	3.802E-01	6.178E-01	6.178E-01
U-238	3.418E+00	4.968E+00	4.968E+00
AM-243	6.655E-01	2.007E-01	2.007E-01
ANH-511	8.076E-02	1.495E-01	1.495E-01

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	5.258E-01	1.106E+00	1.131E+00	NOT IDENT.
NA-22	-2.192E-02	9.172E-02	9.225E-02	NOT IDENT.
NA-24	-7.104E+15	3.321E+17	0.000E+00	SHORT HLIF
AL-26	-2.268E-03	7.086E-02	7.087E-02	NOT IDENT.
SC-46	5.685E-02	1.193E-01	1.221E-01	FAIL ABUN

V-48	-1.693E-01	3.865E-01	3.939E-01	NOT IDENT.
CR-51	1.371E-01	1.460E+00	1.461E+00	NOT IDENT.
MN-52	-6.118E+00	9.840E+00	1.022E+01	FAIL ABUN
MN-54	-3.831E-02	8.529E-02	8.703E-02	NOT IDENT.
CO-56	7.663E-03	1.060E-01	1.061E-01	FAIL ABUN
MN-56	1.000E+41	1.213E+42	0.000E+00	SHORT HLIF
CO-57	9.786E-03	5.590E-02	5.608E-02	NOT IDENT.
CO-58	8.496E-02	1.110E-01	1.174E-01	NOT IDENT.
FE-59	-2.869E-02	2.795E-01	2.798E-01	NOT IDENT.
CO-60	-1.539E-02	8.743E-02	8.771E-02	NOT IDENT.
ZN-65	3.350E-02	2.143E-01	2.148E-01	NOT IDENT.
GE-68	-1.594E+00	2.180E+00	2.295E+00	NOT IDENT.
AS-73	2.609E+00	3.432E+00	3.628E+00	NOT IDENT.
AS-74	-2.132E-01	5.415E-01	5.500E-01	NOT IDENT.
SE-75	2.747E-02	1.100E-01	1.107E-01	NOT IDENT.
BR-77	3.354E+05	3.782E+05	4.073E+05	SHORT HLIF
SR-82	-7.481E-01	1.227E+00	1.273E+00	NOT IDENT.
RB-83	-7.511E-04	1.881E-01	1.881E-01	NOT IDENT.
RB-84	6.179E-02	2.709E-01	2.724E-01	NOT IDENT.
KR-85	7.164E+00	1.772E+01	1.801E+01	NOT IDENT.
SR-85	4.836E-02	1.203E-01	1.223E-01	NOT IDENT.
RB-86	-2.008E+00	3.171E+00	3.298E+00	NOT IDENT.
Y-88	3.183E-02	1.192E-01	1.200E-01	NOT IDENT.
Y-91	2.594E+01	5.817E+01	5.933E+01	NOT IDENT.
NB-94	5.838E-02	7.913E-02	8.339E-02	NOT IDENT.
NB-95	1.702E-01	1.279E-01	1.492E-01	NOT IDENT.
NB-95M	-8.097E-02	3.614E-01	3.633E-01	NOT IDENT.
ZR-95	2.645E-02	1.920E-01	1.924E-01	NOT IDENT.
NB-97	-1.000E+41	2.967E+41	0.000E+00	SHORT HLIF
ZR-97	-1.748E+16	6.050E+16	0.000E+00	SHORT HLIF
MO-99	1.184E+03	1.062E+04	1.063E+04	SHORT HLIF
TC-99M	1.000E+41	4.655E+41	0.000E+00	SHORT HLIF
RH-101	-8.577E-02	7.752E-02	8.663E-02	NOT IDENT.
RH-102	1.279E-01	1.219E-01	1.348E-01	FAIL ABUN
RU-103	-3.502E-02	1.306E-01	1.316E-01	FAIL ABUN
RH-106	-3.210E-01	7.959E-01	8.090E-01	NOT IDENT.
RU-106	-3.210E-01	7.959E-01	8.090E-01	NOT IDENT.
AG-108M	6.284E-02	6.145E-02	6.766E-02	NOT IDENT.
AG-110	-7.503E-01	1.572E+00	1.608E+00	NOT IDENT.
AG-110M	-3.102E-02	1.453E-01	1.460E-01	NOT IDENT.
SN-113	-1.350E-01	1.320E-01	1.453E-01	NOT IDENT.
CD-115	-1.839E+04	3.888E+04	3.975E+04	SHORT HLIF
SN-117M	1.126E-01	4.025E-01	4.056E-01	NOT IDENT.
SB-122	7.489E+02	1.674E+03	1.708E+03	SHORT HLIF
TE-123M	7.703E-03	7.010E-02	7.019E-02	NOT IDENT.
SB-124	9.294E-02	1.881E-01	1.927E-01	NOT IDENT.
SB-125	-4.625E-02	2.176E-01	2.186E-01	FAIL ABUN
TE-125M	3.773E+00	2.944E+01	2.949E+01	NOT IDENT.
I-126	1.423E+00	1.791E+00	1.902E+00	NOT IDENT.
SB-126	6.337E-01	1.216E+00	1.249E+00	NOT IDENT.
SB-127	-1.192E+00	1.869E+02	1.869E+02	SHORT HLIF
I-131	1.293E+00	2.174E+00	2.251E+00	FAIL ABUN
I-132	1.000E+41	4.469E+42	0.000E+00	SHORT HLIF
TE-132	-1.176E+01	2.761E+02	2.762E+02	SHORT HLIF
BA-133	-1.525E-02	1.096E-01	1.098E-01	NOT IDENT.
I-133	1.756E+12	2.039E+12	2.188E+12	SHORT HLIF
CS-134	1.520E-01	1.587E-01	1.728E-01	FAIL ABUN
I-135	-1.000E+41	1.811E+41	0.000E+00	SHORT HLIF
CS-136	-5.259E-01	7.366E-01	7.739E-01	NOT IDENT.
BA-137M	3.237E-02	7.029E-02	7.179E-02	NOT IDENT.
CS-137	3.420E-02	7.426E-02	7.584E-02	NOT IDENT.
LA-138	-2.827E-02	1.256E-01	1.262E-01	NOT IDENT.
CE-139	-9.670E-03	6.941E-02	6.955E-02	NOT IDENT.
BA-140	-1.373E+00	2.291E+00	2.373E+00	NOT IDENT.
LA-140	-5.461E-01	6.914E-01	7.339E-01	FAIL ABUN
CE-141	2.817E-02	2.353E-01	2.357E-01	NOT IDENT.
CE-143	8.259E+07	4.411E+07	5.773E+07	SHORT HLIF
CE-144	-2.132E-02	4.718E-01	4.718E-01	FAIL ABUN
PM-144	-5.870E-02	7.296E-02	7.761E-02	NOT IDENT.
PR-144	-4.483E+00	5.523E+00	5.881E+00	NOT IDENT.
PM-146	9.208E-02	9.840E-02	1.068E-01	NOT IDENT.
ND-147	1.525E+00	5.187E+00	5.232E+00	FAIL ABUN
PM-147	8.921E+02	1.612E+03	1.662E+03	NOT IDENT.
PM-149	-1.021E+05	3.671E+05	3.700E+05	SHORT HLIF
EU-150	5.009E-03	7.392E-02	7.396E-02	FAIL ABUN
EU-152	9.227E-02	2.379E-01	2.415E-01	FAIL ABUN
GD-153	6.537E-02	2.567E-01	2.584E-01	FAIL ABUN
EU-154	-7.209E-02	2.546E-01	2.567E-01	NOT IDENT.

EU-155	1.208E-01	2.473E-01	2.532E-01	FAIL ABUN
TB-160	1.219E-02	3.636E-01	3.637E-01	FAIL ABUN
HO-166M	1.276E-01	1.288E-01	1.410E-01	FAIL ABUN
TM-171	-5.543E+01	6.312E+01	6.789E+01	NOT IDENT.
HF-172	5.842E-01	4.223E-01	4.977E-01	FAIL ABUN
LU-172	8.598E-03	1.201E-01	1.202E-01	FAIL ABUN
LU-176	-3.576E-02	5.455E-02	5.689E-02	FAIL ABUN
HF-181	4.120E-02	1.429E-01	1.441E-01	NOT IDENT.
TA-182	5.230E-01	3.985E-01	4.630E-01	FAIL ABUN
RE-183	1.695E-02	7.928E-01	7.928E-01	NOT IDENT.
RE-184	7.250E-02	4.796E-01	4.808E-01	NOT IDENT.
W-188	2.435E+01	3.138E+01	3.325E+01	FAIL ABUN
IR-192	3.516E-02	9.719E-02	9.847E-02	FAIL ABUN
HG-203	4.039E-02	1.327E-01	1.340E-01	NOT IDENT.
TL-204	2.815E-01	1.473E+01	1.473E+01	FAIL ABUN
BI-207	1.499E-02	1.009E-01	1.011E-01	FAIL ABUN
PB-211	3.198E-01	1.637E+00	1.643E+00	NOT IDENT.
BI-213	1.379E-01	2.332E-01	2.414E-01	NOT IDENT.
RN-219	-2.848E-01	1.009E+00	1.018E+00	FAIL ABUN
RA-223	-6.699E-01	1.533E+00	1.562E+00	FAIL ABUN
AC-225	-9.476E+00	6.959E+00	8.166E+00	NOT IDENT.
AC-227	7.281E-02	5.589E-01	5.599E-01	FAIL ABUN
TH-227	7.281E-02	5.589E-01	5.599E-01	FAIL ABUN
TH-229	1.572E+00	1.158E+00	1.357E+00	FAIL ABUN
PA-231	1.198E+00	1.185E+00	1.302E+00	NOT IDENT.
TH-231	-6.699E-01	1.533E+00	1.562E+00	FAIL ABUN
PA-233	7.567E-02	1.354E-01	1.396E-01	FAIL ABUN
PA-234	-1.392E-01	7.113E-01	7.141E-01	FAIL ABUN
PA-234M	-5.532E+00	1.065E+01	1.094E+01	NOT IDENT.
NP-237	7.567E-02	1.354E-01	1.396E-01	FAIL ABUN
NP-238	1.767E+04	8.818E+04	8.854E+04	SHORT HLIF
NP-239	-3.994E-01	6.174E-01	6.431E-01	FAIL ABUN
PU-239	1.490E+02	7.962E+02	7.990E+02	NOT IDENT.
AM-241	7.723E-02	5.177E-01	5.189E-01	NOT IDENT.
CM-243	-9.812E-02	2.606E-01	2.643E-01	FAIL ABUN
BK-247	2.816E-02	1.852E-01	1.857E-01	NOT IDENT.
CM-247	1.313E-02	9.045E-02	9.064E-02	NOT IDENT.
CF-249	1.433E-01	9.909E-02	1.183E-01	NOT IDENT.
CF-251	2.037E-02	2.647E-01	2.648E-01	NOT IDENT.

 * GEL Laboratories LLC *
 * 2040 Savage Road *
 * Charleston, SC 29407 *
 * GAMMA SPECTROSCOPY BACKGROUND REPORT *

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	105.5464	85.43	115.7225	131.20	89.5428
45.60	100.6290	86.55	115.9551	133.02	84.9098
46.54	95.3539	86.79	116.0044	133.52	84.9664
49.72	0.0000	86.94	116.0358	136.00	98.6434
51.35	88.1445	87.09	116.0663	136.47	101.1411
51.87	86.1572	87.57	116.1650	140.51	0.0000
52.39	96.7884	88.03	116.2598	143.76	86.1082
52.97	83.2299	88.34	116.3232	144.24	86.1606
53.44	70.6684	88.47	116.3499	145.44	86.2909
54.07	87.6781	89.96	116.6530	152.43	88.2852
57.36	0.0000	1093.63	116.7908	153.25	89.6188
57.53	100.1142	91.11	116.8856	323.87	85.9847
57.98	105.5489	92.59	117.1825	156.02	112.3984
59.27	100.5147	93.35	117.3344	158.56	90.1923
59.32	95.5355	94.56	117.5741	159.00	87.7328
59.54	111.2760	94.65	117.5921	162.33	78.0118
60.96	100.1832	94.67	117.5961	162.66	89.3697
61.17	100.2302	94.87	117.6360	163.33	82.3017
62.93	99.1835	97.43	64.4390	165.86	82.5430
63.29	99.2616	98.43	93.7438	176.31	78.4074
63.58	99.3244	98.44	93.7451	176.60	77.5801
64.28	98.0336	99.53	93.9123	177.52	74.2452
66.73	94.1999	100.11	107.8697	181.07	0.0000
67.24	111.7105	102.03	100.4748	181.52	68.1408
125.81	115.4442	103.18	99.8850	184.41	70.9328
67.75	115.4604	103.37	108.0478	143.76	82.6553
68.89	135.3875	105.21	87.3882	193.51	65.1047
69.67	126.8573	105.31	87.4020	197.03	80.1509
70.82	131.5393	106.12	87.5130	198.01	56.6846
70.83	131.5421	106.47	101.5701	201.83	82.2921
72.81	141.9726	109.28	89.1129	203.43	80.6703
72.87	141.9894	111.00	101.1028	205.31	77.7472
74.66	142.4933	111.76	0.0000	210.85	71.5465
74.82	142.5385	114.06	99.2053	215.65	59.4558
74.97	142.5799	116.30	0.0000	218.12	90.7286
77.11	143.1734	116.74	98.4124	222.11	74.9996
78.74	143.6192	119.76	69.0719	227.09	69.9662
79.69	143.8780	121.12	69.2064	227.38	67.2935
80.03	140.6205	121.22	69.2166	228.16	0.0000
80.12	140.6455	121.78	75.2432	228.18	77.2201
80.19	140.6637	122.06	69.2994	116.74	77.2201
80.57	118.4203	122.92	84.9354	235.69	70.5169
81.00	140.8767	123.07	86.1498	235.96	70.5344
81.07	140.8954	265.00	88.6191	238.63	66.1711
81.75	141.0732	125.81	58.8552	238.98	0.0000
82.47	112.1124	127.23	110.7208	240.99	66.3100
83.79	115.3794	127.91	99.9835	242.00	66.3694
84.00	115.4240	129.30	85.6906	244.70	58.7805

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.40	0.0000	344.28	49.2035	563.25	22.2689
252.80	44.9695	345.93	50.2446	564.24	0.0000
254.15	0.0000	351.06	40.5329	569.33	22.3324
256.23	58.9076	351.93	40.5571	946.00	22.3340
260.90	0.0000	355.39	0.0000	569.70	18.9860
264.66	51.9098	356.01	47.6113	583.19	31.4670
264.80	60.2591	364.49	41.8940	584.27	42.1646
265.00	55.6323	366.42	0.0000	595.83	29.3886
269.46	61.4211	372.51	35.0947	427.87	16.9916
270.03	61.4493	375.05	48.2090	602.52	0.0000
271.23	61.5098	377.52	36.2139	604.72	25.5341
273.65	51.8257	356.01	33.3297	607.14	27.2666
276.40	68.3187	388.16	32.4069	609.32	27.2930
277.37	59.0061	388.63	39.5078	610.33	27.3047
277.60	59.0164	391.69	59.8823	614.28	29.0621
278.00	51.5390	264.66	36.7412	618.01	18.2650
279.20	65.6578	401.81	49.0225	620.36	25.1403
279.54	77.8724	402.40	42.9100	621.93	29.7324
279.70	77.8817	404.85	37.8582	630.19	0.0000
280.46	74.1734	410.95	33.8903	631.29	14.9270
283.69	55.5370	413.71	43.2040	633.25	17.2382
284.31	64.9823	414.70	38.0832	634.78	25.2987
285.41	59.3829	423.72	36.2169	635.95	18.4082
285.90	0.0000	427.09	36.2889	636.99	11.5104
287.50	43.9022	427.87	39.4171	657.50	20.9004
290.67	55.3674	433.94	20.8187	657.76	19.7413
293.27	0.0000	439.40	29.2379	657.90	0.0000
351.93	41.3149	440.45	28.2101	661.66	15.1206
295.96	41.3388	453.88	26.3189	664.57	0.0000
879.38	41.4211	463.37	22.2241	666.33	18.6465
299.98	41.4654	468.07	33.4220	666.50	18.6478
300.09	41.4689	473.00	0.0000	667.71	0.0000
300.13	41.4698	475.06	41.5367	677.62	32.4913
301.36	41.5087	476.78	33.0466	685.70	0.0000
302.85	44.4206	477.60	34.1276	692.65	0.0000
256.23	35.8673	482.18	26.7278	695.00	19.4554
304.85	33.0070	487.02	25.7246	696.49	26.5466
306.78	47.9055	492.35	0.0000	696.51	26.5466
308.46	40.2902	497.08	25.8604	697.00	25.6671
311.90	37.5075	505.52	42.2064	697.30	24.7845
316.51	44.3894	507.63	0.0000	697.49	24.7863
319.41	52.2191	511.00	34.7282	702.65	23.0634
320.08	44.5045	514.00	29.3467	706.68	24.3700
321.04	41.6309	514.00	29.3467	711.68	18.6948
323.87	48.0206	520.40	26.1699	720.70	20.5482
325.23	45.1547	520.69	0.0000	721.93	0.0000
328.76	39.4272	522.65	0.0000	722.78	30.0429
333.37	35.1599	527.90	0.0000	722.91	30.0439
333.97	35.1746	528.26	24.0840	723.31	27.1873
334.37	35.1848	529.59	16.4319	724.19	25.7651
338.28	42.6309	529.87	0.0000	727.33	21.4966
338.32	42.6318	531.02	20.8284	733.00	17.2354
311.90	48.5846	537.26	34.0866	735.93	21.5684
340.48	48.5846	546.56	0.0000	333.97	16.1856
340.55	48.5866	552.55	21.0480	739.50	0.0000

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
744.23	18.9326	949.00	14.5139	1384.29	7.6127
747.24	21.6621	667.71	0.0000	1408.01	15.3082
748.06	24.3773	962.31	27.9826	1434.09	9.8992
752.31	24.4160	964.08	15.5547	1435.80	8.8027
753.82	19.9059	966.17	15.5645	1457.56	0.0000
756.73	18.1165	911.20	15.5781	1460.82	12.1716
756.80	18.1171	983.53	14.6700	1489.16	7.7938
884.68	17.4387	984.45	0.0000	1505.03	3.5752
765.81	10.1797	1274.44	11.7814	1584.12	11.8155
766.42	17.4551	1001.03	17.6979	1596.21	10.0230
766.84	21.8218	1002.74	14.7556	1620.50	7.3258
772.60	0.0000	1004.73	17.7171	1621.92	5.4958
776.52	19.1626	507.63	0.0000	1678.03	0.0000
739.50	0.0000	1025.87	0.0000	1690.97	1.5479
778.90	18.2660	1028.54	0.0000	1750.46	0.0000
783.70	0.0000	1037.84	13.9163	1764.49	4.7097
788.74	23.4648	1038.76	0.0000	1063.66	1.5716
792.07	20.5570	631.29	14.9478	1771.35	4.7158
795.86	20.2175	1048.07	15.9512	1791.20	0.0000
810.06	13.3009	1049.04	18.9478	1808.65	4.7488
810.29	14.7798	1050.41	15.9619	1810.72	0.0000
344.28	14.7808	1063.66	11.0161	1836.06	6.6821
810.76	11.8258	1077.00	11.0584		
815.77	20.3618	1077.34	11.0591		
1048.07	11.1174	1085.87	12.0938		
832.01	18.6169	1093.63	10.1001		
834.85	23.2941	1099.45	13.1516		
835.71	21.4369	1112.07	13.1976		
836.80	0.0000	1112.84	10.4445		
846.75	0.0000	1115.54	13.0070		
846.77	17.7766	1120.29	16.2803		
856.80	7.5107	1120.55	16.2813		
860.56	9.6689	1221.41	19.5422		
871.09	17.9244	1129.67	15.3021		
873.19	21.7134	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	17.0283	1173.23	14.8632		
880.51	17.0349	1177.95	13.4348		
881.60	18.9343	1189.05	16.5840		
883.24	23.6809	1204.77	12.4885		
884.68	28.4308	1221.41	5.2261		
889.28	18.9825	1231.02	16.7646		
894.76	14.2630	1235.36	8.3916		
898.04	16.1819	1238.28	20.1551		
900.72	16.1964	1260.41	0.0000		
903.28	20.0240	1271.87	12.7031		
911.20	14.3399	1274.44	12.7112		
912.08	14.3436	1274.54	12.7119		
923.98	0.0000	1291.59	5.3189		
926.50	11.5283	1298.22	0.0000		
929.11	15.3843	1312.11	6.4146		
935.54	20.0402	1332.49	10.7434		
937.49	13.8828	1362.66	0.0000		
944.13	15.4575	1365.19	8.6616		
946.00	19.3335	1368.63	0.0000		

VAX/VMS Nuclide Identification Report Generated 28-FEB-2023 06:21:59.58

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                            *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205313910.CNF;1
Background file  : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM33.CNF;568
Background date  : 26-FEB-2023 09:14:32
Sample date      : 8-FEB-2023 00:00:00. Acquisition date : 28-FEB-2023 05:21:28
Sample ID        : G1205313910. Sample quantity   : 1.37480E+02 GRAM
Detector name    : GAM33. Detector geometry: CAN
Elapsed live time: 0 01:00:00.00. Elapsed real time: 0 01:00:00.75 0.0%
Energy tolerance : 1.50000 keV. Analyst Initials  : RXF2
Abundance limit  : 75.00000. Sensitivity          : 3.00000
Batch ID         : 2379916. Detector SN#         :
Matrix Spike ID  :. LCS ID                       :
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	92.76*	5	66	1.15	185.13	179	13	1.36E-03	400.6	
2	0	121.20	24	21	1.39	242.06	238	7	6.56E-03	39.0	
3	1	185.99*	2	25	1.35	371.76	366	26	5.74E-04	586.5	1.73E+00
4	1	194.13	19	21	1.36	388.04	366	26	5.34E-03	46.8	
5	0	238.54*	6	12	1.39	476.94	473	7	1.60E-03	142.5	
6	0	269.40*	5	19	0.96	538.73	535	8	1.48E-03	153.3	
7	0	282.48	32	41	5.30	564.90	553	24	8.83E-03	56.7	
8	0	314.85	11	13	0.63	629.71	627	7	3.15E-03	59.4	
9	0	388.60	11	12	1.54	777.35	773	10	3.08E-03	66.4	
10	0	484.21	10	1	1.47	968.74	966	6	2.70E-03	37.4	
11	0	520.59	14	0	0.55	1041.57	1036	10	3.89E-03	26.7	
12	0	564.69*	16	3	1.31	1129.87	1124	12	4.41E-03	35.9	
13	0	633.07	8	4	1.06	1266.75	1261	8	2.22E-03	55.9	
14	0	711.65	8	3	1.49	1424.08	1421	6	2.17E-03	50.4	
15	0	715.12	8	3	0.70	1431.02	1427	8	2.17E-03	55.8	
16	0	785.60	6	4	1.24	1572.13	1567	8	1.78E-03	66.3	
17	0	960.02	7	3	1.31	1921.36	1915	9	2.07E-03	52.1	

Flag: "*" = Peak area was modified by background subtraction

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205313910.CNF;1
Analyses by : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4
Sample title : RXF2
Sample date : 8-FEB-2023 00:00:00 Acquisition date : 28-FEB-2023 05:21:28
Sample ID : G1205313910 Sample quantity : 137.48 GRAM
Sample type : SOLID Sample geometry :
Detector name : GAMMA33 Detector geometry: CAN
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:00.75 0.0%
Energy tolerance : 1.50 keV Half life ratio : 10.00
Errors propagated: No Systematic Error : 0.00 %
Efficiency type : Empirical Efficiencies at : Peak Energy
Abundance limit : 75.00

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
CO-57	122.06	27	85.60*	5.943E+00	2.946E-02	3.102E-02	78.01
	136.47	-----	10.68	5.896E+00	-----	Line Not Found	-----
BR-77	238.98	6	23.10*	4.417E+00	3.408E-02	1.249E+01	285.00
	520.69	15	22.40	2.546E+00	1.397E-01	5.121E+01	53.45
SB-122	564.24	16	70.67*	2.394E+00	5.302E-02	9.223E+00	71.82
	692.65	-----	3.85	2.037E+00	-----	Line Not Found	-----
PM-147	121.22	27	0.00*	5.943E+00	8.848E+02	8.978E+02	78.01
CF-249	252.80	-----	2.50	4.245E+00	-----	Line Not Found	-----
	333.37	-----	14.60	3.500E+00	-----	Line Not Found	-----
	388.16	12	66.00*	3.143E+00	3.112E-02	3.112E-02	132.87

Flag: "*" = Keyline

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                          *
*****
*                               DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205313910.CNF;1
* Acquisition date   : 28-FEB-2023 05:21:28 Sensitivity      : 3.000
* Detector ID       : GAM33 Energy tolerance: 1.500
* Elapsed live time : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time : 0 01:00:00.75 Half life ratio : *****
* Sample date       : 8-FEB-2023 00:00:00 Analyst initials: RXF2
* Sample ID         : G1205313910 Sample Quantity : 1.3748E+02 GRAM
* Batch Number      : 2379916 Wet Weight : 0.00000
* Wet wt corr       : 1.00000 Dry Weight : 0.00000
* Nuclide Library   : SOLID.NLB;17
*****
*                               CALIBRATION INFORMATION                         *
*
* Eff. Cal. date    : 25-JUL-2022 07:37:58 Eff. Geometry   : CAN
* Eff. File         : DKA100:[CANBERRA.GAMMA]EFF_GAM33_CAN.CNF;15
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
CO-57	3.102E-02	2.371E-02	2.477E-02
BR-77	1.249E+01	3.489E+01	4.715E+01
SB-122	9.223E+00	6.491E+00	9.218E+00
PM-147	8.978E+02	6.864E+02	7.550E+02
CF-249	3.112E-02	4.052E-02	5.477E-02

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L.	Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)	
BE-7	-1.251E-01		1.619E-01	2.754E-01	NOT IDENT.
NA-22	6.154E-03		2.065E-02	5.195E-02	NOT IDENT.
NA-24	0.000E+00		1.774E+08	0.000E+00	SHORT HLIF
AL-26	-4.438E-04		1.682E-02	4.293E-02	NOT IDENT.
K-40	-1.146E-01		3.178E-01	7.253E-01	NOT IDENT.
SC-46	-8.367E-04		2.084E-02	4.426E-02	NOT IDENT.
V-48	-8.054E-03		4.162E-02	9.121E-02	NOT IDENT.
CR-51	-1.076E-01		2.126E-01	4.063E-01	NOT IDENT.
MN-52	-6.219E-02		1.219E-01	1.689E-01	NOT IDENT.
MN-54	-3.287E-03		2.383E-02	4.654E-02	NOT IDENT.
CO-56	-3.667E-03		2.231E-02	4.476E-02	NOT IDENT.
MN-56	0.000E+00		1.960E+41	0.000E+00	SHORT HLIF
CO-58	-2.074E-02		3.178E-02	5.302E-02	NOT IDENT.
FE-59	-1.931E-02		4.339E-02	8.674E-02	NOT IDENT.
CO-60	6.174E-03		1.688E-02	4.678E-02	NOT IDENT.
ZN-65	-2.581E-02		5.160E-02	9.792E-02	NOT IDENT.
GE-68	-6.470E-01		6.866E-01	1.078E+00	NOT IDENT.
AS-73	-9.552E-01		6.735E-01	1.015E+00	NOT IDENT.
AS-74	1.965E-02		8.456E-02	1.746E-01	NOT IDENT.
SE-75	1.594E-03		2.749E-02	5.490E-02	FAIL ABUN
SR-82	-1.753E-01		2.483E-01	4.076E-01	NOT IDENT.
RB-83	8.184E-02		4.287E-02	9.882E-02	FAIL ABUN
RB-84	-1.108E-03		5.058E-02	1.023E-01	NOT IDENT.
KR-85	-5.442E+00		7.825E+00	1.358E+01	NOT IDENT.
SR-85	-3.057E-02		4.375E-02	7.591E-02	NOT IDENT.

RB-86	-2.308E-01	4.829E-01	9.435E-01	NOT IDENT.
Y-88	1.239E-02	3.326E-02	8.082E-02	NOT IDENT.
Y-91	-1.398E+01	1.331E+01	1.995E+01	NOT IDENT.
NB-94	1.010E-02	2.223E-02	4.870E-02	NOT IDENT.
NB-95	-3.637E-03	2.588E-02	5.103E-02	NOT IDENT.
NB-95M	-5.293E-02	7.442E-02	1.198E-01	NOT IDENT.
ZR-95	3.779E-02	5.037E-02	1.178E-01	NOT IDENT.
NB-97	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	2.455E+08	0.000E+00	SHORT HLIF
MO-99	-1.491E+01	2.905E+01	5.131E+01	NOT IDENT.
TC-99M	0.000E+00	2.891E+22	0.000E+00	SHORT HLIF
RH-101	-3.026E-03	1.739E-02	3.258E-02	NOT IDENT.
RH-102	7.350E-03	3.748E-02	7.263E-02	NOT IDENT.
RU-103	-8.483E-06	2.556E-02	5.295E-02	NOT IDENT.
RH-106	5.045E-02	2.670E-01	5.379E-01	NOT IDENT.
RU-106	5.045E-02	2.670E-01	5.379E-01	NOT IDENT.
AG-108M	5.306E-03	2.152E-02	4.294E-02	NOT IDENT.
CD-109	5.644E-01	4.774E-01	1.006E+00	NOT IDENT.
AG-110	4.153E-02	4.068E-01	8.709E-01	NOT IDENT.
AG-110M	-1.562E-03	3.296E-02	6.626E-02	NOT IDENT.
SN-113	1.130E-03	3.335E-02	6.126E-02	NOT IDENT.
CD-115	-1.412E+01	3.272E+01	6.128E+01	NOT IDENT.
SN-117M	-1.347E-03	3.437E-02	6.616E-02	NOT IDENT.
TE-123M	-4.746E-03	1.405E-02	2.552E-02	NOT IDENT.
SB-124	-1.576E-02	3.090E-02	4.055E-02	NOT IDENT.
SB-125	-2.145E-02	5.194E-02	9.904E-02	NOT IDENT.
TE-125M	-2.214E+00	5.848E+00	1.067E+01	NOT IDENT.
I-126	-1.042E-01	2.373E-01	4.252E-01	FAIL ABUN
SB-126	1.446E-02	5.630E-02	1.515E-01	NOT IDENT.
SN-126	1.644E-02	5.108E-02	9.501E-02	NOT IDENT.
SB-127	2.313E-01	1.888E+00	4.038E+00	NOT IDENT.
I-131	-1.977E-02	1.195E-01	2.366E-01	NOT IDENT.
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	-6.594E-01	1.174E+00	2.249E+00	NOT IDENT.
BA-133	-5.815E-03	2.273E-02	4.525E-02	NOT IDENT.
I-133	0.000E+00	2.083E+05	0.000E+00	SHORT HLIF
CS-134	-2.042E-02	2.348E-02	3.510E-02	FAIL ABUN
I-135	0.000E+00	1.287E+21	0.000E+00	SHORT HLIF
CS-136	5.671E-03	9.740E-02	2.094E-01	NOT IDENT.
BA-137M	-4.086E-03	2.284E-02	4.445E-02	NOT IDENT.
CS-137	-4.316E-03	2.413E-02	4.696E-02	NOT IDENT.
LA-138	-1.177E-05	2.139E-02	5.695E-02	NOT IDENT.
CE-139	-4.003E-03	1.900E-02	3.455E-02	NOT IDENT.
BA-140	2.307E-02	2.209E-01	4.616E-01	NOT IDENT.
LA-140	-2.970E-03	1.082E-01	2.252E-01	NOT IDENT.
CE-141	-1.492E-02	4.099E-02	7.342E-02	NOT IDENT.
CE-143	0.000E+00	7.868E+02	0.000E+00	SHORT HLIF
CE-144	8.057E-02	1.138E-01	2.401E-01	NOT IDENT.
PM-144	5.878E-03	2.1023E-02	4.431E-02	NOT IDENT.
PR-144	4.411E-01	1.518E+00	3.325E+00	NOT IDENT.
PM-146	1.384E-02	2.513E-02	5.694E-02	FAIL ABUN
ND-147	1.848E-01	4.590E-01	1.026E+00	NOT IDENT.
PM-149	-4.033E+01	2.445E+02	4.965E+02	NOT IDENT.
EU-150	8.515E-03	1.690E-02	3.692E-02	NOT IDENT.
EU-152	-3.254E-02	6.064E-02	1.133E-01	FAIL ABUN
GD-153	-3.003E-03	4.721E-02	8.475E-02	NOT IDENT.
EU-154	2.003E-02	5.947E-02	1.502E-01	NOT IDENT.
EU-155	-6.269E-02	6.332E-02	1.038E-01	NOT IDENT.
TB-160	1.846E-02	7.756E-02	1.743E-01	NOT IDENT.
HO-166M	4.026E-02	3.974E-02	9.990E-02	FAIL ABUN
TM-171	9.229E+00	1.404E+01	3.171E+01	NOT IDENT.
HF-172	-3.217E-03	9.483E-02	1.840E-01	NOT IDENT.
LU-172	-7.970E-03	3.905E-02	8.093E-02	FAIL ABUN
LU-176	-4.711E-03	1.409E-02	2.782E-02	NOT IDENT.
HF-181	-6.914E-03	2.801E-02	4.889E-02	NOT IDENT.
TA-182	-3.048E-02	1.004E-01	2.034E-01	NOT IDENT.
RE-183	-7.843E-02	1.698E-01	3.168E-01	NOT IDENT.
RE-184	-2.145E-02	6.607E-02	1.386E-01	NOT IDENT.
W-188	-8.047E-01	3.998E+00	7.728E+00	NOT IDENT.
IR-192	9.210E-03	2.353E-02	4.716E-02	NOT IDENT.
HG-203	2.320E-02	2.650E-02	5.961E-02	NOT IDENT.
TL-204	-1.207E+00	2.675E+00	4.970E+00	NOT IDENT.
BI-207	-1.522E-03	3.638E-02	7.950E-02	NOT IDENT.
TL-208	-2.488E-02	2.646E-02	4.929E-02	NOT IDENT.
BI-210	2.436E+00	4.063E+00	8.814E+00	NOT IDENT.
PB-210	2.436E+00	4.063E+00	8.814E+00	NOT IDENT.
BI-211	-9.986E-02	1.421E-01	2.606E-01	NOT IDENT.
PB-211	-4.116E-01	4.087E-01	6.623E-01	NOT IDENT.

BI-212	2.571E-01	3.219E-01	7.582E-01	NOT IDENT.
PB-212	1.806E-02	5.044E-02	8.438E-02	FAIL ABUN
BI-213	-3.897E-03	5.156E-02	1.080E-01	NOT IDENT.
BI-214	1.665E-03	5.167E-02	1.048E-01	NOT IDENT.
PB-214	-2.497E-02	5.222E-02	9.919E-02	NOT IDENT.
RN-219	1.116E-01	2.415E-01	5.350E-01	NOT IDENT.
RN-222	1.665E-03	5.167E-02	1.048E-01	NOT IDENT.
RA-223	2.425E-01	3.787E-01	8.510E-01	FAIL ABUN
RA-224	8.672E-02	3.779E-01	7.385E-01	NOT IDENT.
AC-225	-4.595E-03	4.850E-01	9.988E-01	NOT IDENT.
RA-226	-2.497E-02	5.222E-02	9.919E-02	NOT IDENT.
AC-227	3.293E-02	1.465E-01	3.115E-01	NOT IDENT.
TH-227	3.293E-02	1.465E-01	3.115E-01	NOT IDENT.
AC-228	-4.637E-02	1.053E-01	2.116E-01	NOT IDENT.
RA-228	-4.637E-02	1.053E-01	2.116E-01	NOT IDENT.
TH-228	1.806E-02	5.044E-02	8.438E-02	FAIL ABUN
TH-229	5.301E-01	4.861E-01	6.138E-01	FAIL ABUN
TH-230	-2.497E-02	5.222E-02	9.919E-02	NOT IDENT.
PA-231	1.734E-01	2.379E-01	5.572E-01	FAIL ABUN
TH-231	2.425E-01	3.787E-01	8.510E-01	FAIL ABUN
TH-232	-4.637E-02	1.053E-01	2.116E-01	NOT IDENT.
PA-233	1.776E-02	4.156E-02	8.383E-02	NOT IDENT.
PA-234	7.114E-02	1.884E-01	4.409E-01	NOT IDENT.
PA-234M	-8.298E-01	3.160E+00	7.051E+00	NOT IDENT.
TH-234	-8.452E-02	1.114E+00	2.428E+00	FAIL ABUN
U-234	-2.497E-02	5.222E-02	9.919E-02	NOT IDENT.
U-235	-8.939E-02	1.385E-01	2.495E-01	FAIL ABUN
NP-237	1.776E-02	4.156E-02	8.383E-02	NOT IDENT.
NP-238	9.790E+00	4.402E+01	1.132E+02	NOT IDENT.
U-238	-8.452E-02	1.114E+00	2.428E+00	FAIL ABUN
NP-239	-5.541E-02	1.279E-01	2.322E-01	NOT IDENT.
PU-239	8.235E+01	1.973E+02	3.990E+02	NOT IDENT.
AM-241	5.580E-02	1.180E-01	2.490E-01	NOT IDENT.
AM-243	2.663E-02	3.226E-02	6.863E-02	NOT IDENT.
CM-243	3.630E-02	5.791E-02	1.231E-01	NOT IDENT.
BK-247	2.472E-02	4.971E-02	1.015E-01	FAIL ABUN
CM-247	8.739E-03	2.184E-02	4.808E-02	NOT IDENT.
CF-251	-1.755E-02	8.511E-02	1.538E-01	NOT IDENT.
ANH-511	-9.910E-02	4.213E-02	8.690E-02	NOT IDENT.

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
CO-57	122.06	27	85.60*	5.943E+00	2.946E-02	3.102E-02	78.01
	136.47	-----	10.68	5.896E+00	-----	Line Not Found	-----
BR-77	238.98	6	23.10*	4.417E+00	3.408E-02	1.249E+01	285.00
	520.69	15	22.40	2.546E+00	1.397E-01	5.121E+01	53.45
SB-122	564.24	16	70.67*	2.394E+00	5.302E-02	9.223E+00	71.82
	692.65	-----	3.85	2.037E+00	-----	Line Not Found	-----
PM-147	121.22	27	0.00*	5.943E+00	8.848E+02	8.978E+02	78.01
CF-249	252.80	-----	2.50	4.245E+00	-----	Line Not Found	-----
	333.37	-----	14.60	3.500E+00	-----	Line Not Found	-----
	388.16	12	66.00*	3.143E+00	3.112E-02	3.112E-02	132.87

Flag: "*" = Keyline

Total number of lines in spectrum 17
 Number of unidentified lines 5
 Number of lines tentatively identified by NID 12 70.59%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CO-57	271.74D	1.05	2.946E-02	3.102E-02	2.420E-02	78.01	
BR-77	2.38D	367.	3.408E-02	1.249E+01	3.561E+01	285.00	
SB-122	2.72D	174.	5.302E-02	9.223E+00	6.624E+00	71.82	
PM-147	2.62Y	1.01	8.848E+02	8.978E+02	7.004E+02	78.01	
CF-249	351.00Y	1.00	3.112E-02	3.112E-02	4.135E-02	132.87	

Total Activity : 8.849E+02 9.196E+02

Grand Total Activity : 8.849E+02 9.196E+02

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	92.76	6	78	1.15	185.13	179	13	1.36E-03	****	5.18E+00	T
1	185.99	2	28	1.35	371.76	366	26	5.74E-04	****	5.18E+00	T
1	194.13	22	23	1.36	388.04	366	26	5.34E-03	93.6	5.05E+00	T
0	269.40	6	21	0.96	538.73	535	8	1.48E-03	****	4.06E+00	T
0	282.48	35	45	5.30	564.90	553	24	8.83E-03	****	3.93E+00	T
0	314.85	12	14	0.63	629.71	627	7	3.15E-03	****	3.64E+00	
0	484.21	10	1	1.47	968.74	966	6	2.70E-03	74.8	2.69E+00	
0	633.07	8	4	1.06	1266.75	1261	8	2.22E-03	****	2.19E+00	T
0	711.65	8	3	1.49	1424.08	1421	6	2.17E-03	****	1.99E+00	T
0	715.12	8	3	0.70	1431.02	1427	8	2.17E-03	****	1.98E+00	
0	785.60	6	4	1.24	1572.13	1567	8	1.78E-03	****	1.83E+00	
0	960.02	7	3	1.31	1921.36	1915	9	2.07E-03	****	1.53E+00	

Flags: "T" = Tentatively associated

```

*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
*                               DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205313910.CNF;1
* Acquisition date   : 28-FEB-2023 05:21:28 Sensitivity      : 3.000
* Detector ID       : GAM33 Energy tolerance: 1.500
* Elapsed live time : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time : 0 01:00:00.75 Half life ratio : *****
* Sample date       : 8-FEB-2023 00:00:00 Nuclide Library : SOLID
* Sample ID        : G1205313910 Analyst initials: RXF2
* Batch Number     : 2379916 Sample Quantity : 1.3748E+02 GRAM
* Wet wt corr      : 1.00000 Wet Weight : 0.00000
*                               Dry Weight : 0.00000
*****
*                               CALIBRATION INFORMATION                         *
*
* Eff. Cal. date    : 25-JUL-2022 07:37:58 Eff. Geometry   : CAN
* Eff. File        : DKA100:[CANBERRA.GAMMA]EFF_GAM33_CAN.CNF;15
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
 Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)
CO-57	1.078E-02
BR-77	2.082E+01
SB-122	3.834E+00
PM-147	3.311E+02
CF-249	2.373E-02

---- Non-Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)	
BE-7	1.029E-01	NOT IDENT.
NA-22	1.965E-02	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	1.357E-02	NOT IDENT.
K-40	2.976E-01	NOT IDENT.
SC-46	1.675E-02	NOT IDENT.
V-48	3.363E-02	NOT IDENT.
CR-51	1.677E-01	NOT IDENT.
MN-52	0.000E+00	NOT IDENT.
MN-54	1.877E-02	NOT IDENT.
CO-56	1.715E-02	NOT IDENT.
MN-56	0.000E+00	SHORT HLIF
CO-58	2.136E-02	NOT IDENT.
FE-59	3.005E-02	NOT IDENT.
CO-60	1.687E-02	NOT IDENT.
ZN-65	3.733E-02	NOT IDENT.
GE-68	3.626E-01	NOT IDENT.
AS-73	4.174E-01	NOT IDENT.
AS-74	7.506E-02	NOT IDENT.
SE-75	2.390E-02	FAIL ABUN
SR-82	1.571E-01	NOT IDENT.
RB-83	4.166E-02	FAIL ABUN
RB-84	4.109E-02	NOT IDENT.
KR-85	6.114E+00	NOT IDENT.
SR-85	3.416E-02	NOT IDENT.
RB-86	3.393E-01	NOT IDENT.

Y-88	3.131E-02	NOT IDENT.
Y-91	7.067E+00	NOT IDENT.
NB-94	2.062E-02	NOT IDENT.
NB-95	2.052E-02	NOT IDENT.
NB-95M	5.127E-02	NOT IDENT.
ZR-95	4.982E-02	NOT IDENT.
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	2.036E+01	NOT IDENT.
TC-99M	0.000E+00	SHORT HLIF
RH-101	1.435E-02	NOT IDENT.
RH-102	3.013E-02	NOT IDENT.
RU-103	2.197E-02	NOT IDENT.
RH-106	2.336E-01	NOT IDENT.
RU-106	2.336E-01	NOT IDENT.
AG-108M	1.859E-02	NOT IDENT.
CD-109	4.584E-01	NOT IDENT.
AG-110	3.523E-01	NOT IDENT.
AG-110M	2.654E-02	NOT IDENT.
SN-113	2.641E-02	NOT IDENT.
CD-115	2.471E+01	NOT IDENT.
SN-117M	2.862E-02	NOT IDENT.
TE-123M	1.092E-02	NOT IDENT.
SB-124	0.000E+00	NOT IDENT.
SB-125	4.073E-02	NOT IDENT.
TE-125M	4.701E+00	NOT IDENT.
I-126	1.804E-01	FAIL ABUN
SB-126	5.368E-02	NOT IDENT.
SN-126	4.315E-02	NOT IDENT.
SB-127	1.639E+00	NOT IDENT.
I-131	1.020E-01	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	9.711E-01	NOT IDENT.
BA-133	1.895E-02	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	1.262E-02	FAIL ABUN
I-135	0.000E+00	SHORT HLIF
CS-136	8.562E-02	NOT IDENT.
BA-137M	1.827E-02	NOT IDENT.
CS-137	1.930E-02	NOT IDENT.
LA-138	1.800E-02	NOT IDENT.
CE-139	1.534E-02	NOT IDENT.
BA-140	1.934E-01	NOT IDENT.
LA-140	8.938E-02	NOT IDENT.
CE-141	3.246E-02	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.077E-01	NOT IDENT.
PM-144	1.829E-02	NOT IDENT.
PR-144	1.372E+00	NOT IDENT.
PM-146	2.430E-02	FAIL ABUN
ND-147	4.308E-01	NOT IDENT.
PM-149	2.123E+02	NOT IDENT.
EU-150	1.619E-02	NOT IDENT.
EU-152	4.827E-02	FAIL ABUN
GD-153	3.713E-02	NOT IDENT.
EU-154	5.720E-02	NOT IDENT.
EU-155	4.540E-02	NOT IDENT.
TB-160	6.900E-02	NOT IDENT.
HO-166M	4.299E-02	FAIL ABUN
TM-171	1.396E+01	NOT IDENT.
HF-172	8.025E-02	NOT IDENT.
LU-172	3.162E-02	FAIL ABUN
LU-176	1.171E-02	NOT IDENT.
HF-181	1.959E-02	NOT IDENT.
TA-182	7.653E-02	NOT IDENT.
RE-183	1.400E-01	NOT IDENT.
RE-184	5.130E-02	NOT IDENT.
W-188	3.261E+00	NOT IDENT.
IR-192	2.051E-02	NOT IDENT.
HG-203	2.661E-02	NOT IDENT.
TL-204	2.167E+00	NOT IDENT.
BI-207	3.261E-02	NOT IDENT.
TL-208	2.085E-02	NOT IDENT.
BI-210	3.957E+00	NOT IDENT.
PB-210	3.957E+00	NOT IDENT.
BI-211	1.129E-01	NOT IDENT.
PB-211	2.653E-01	NOT IDENT.
BI-212	3.216E-01	NOT IDENT.

PB-212	3.822E-02	FAIL ABUN
BI-213	4.383E-02	NOT IDENT.
BI-214	4.505E-02	NOT IDENT.
PB-214	4.326E-02	NOT IDENT.
RN-219	2.301E-01	NOT IDENT.
RN-222	4.505E-02	NOT IDENT.
RA-223	3.721E-01	FAIL ABUN
RA-224	3.267E-01	NOT IDENT.
AC-225	4.410E-01	NOT IDENT.
RA-226	4.326E-02	NOT IDENT.
AC-227	1.366E-01	NOT IDENT.
TH-227	1.366E-01	NOT IDENT.
AC-228	8.778E-02	NOT IDENT.
RA-228	8.778E-02	NOT IDENT.
TH-228	3.822E-02	FAIL ABUN
TH-229	2.725E-01	FAIL ABUN
TH-230	4.326E-02	NOT IDENT.
PA-231	2.406E-01	FAIL ABUN
TH-231	3.721E-01	FAIL ABUN
TH-232	8.778E-02	NOT IDENT.
PA-233	3.652E-02	NOT IDENT.
PA-234	1.804E-01	NOT IDENT.
PA-234M	2.925E+00	NOT IDENT.
TH-234	1.118E+00	FAIL ABUN
U-234	4.326E-02	NOT IDENT.
U-235	1.127E-01	FAIL ABUN
NP-237	3.652E-02	NOT IDENT.
NP-238	4.181E+01	NOT IDENT.
U-238	1.118E+00	FAIL ABUN
NP-239	9.959E-02	NOT IDENT.
PU-239	1.789E+02	NOT IDENT.
AM-241	1.118E-01	NOT IDENT.
AM-243	3.110E-02	NOT IDENT.
CM-243	5.499E-02	NOT IDENT.
BK-247	4.453E-02	FAIL ABUN
CM-247	2.060E-02	NOT IDENT.
CF-251	6.851E-02	NOT IDENT.
ANH-511	4.054E-02	NOT IDENT.

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*****
*
*           GEL Laboratories LLC
*           2040 Savage Road
*           Charleston, SC 29407
*****
*
*           DETECTOR AND SAMPLE DATA
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205313910.CNF;1
* Acquisition date   : 28-FEB-2023 05:21:28 Sensitivity      : 3.000
* Detector ID        : GAM33 Energy tolerance: 1.500
* Elapsed live time  : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time  : 0 01:00:00.75 Half life ratio  : *****
* Sample date        : 8-FEB-2023 00:00:00 Nuclide Library : SOLID
* Sample ID          : G1205313910 Analyst initials: RXF2
* Batch Number       : 2379916 Sample Quantity : 1.3748E+02 GRAM
*                   : Quantity Err(%) : 1.4548E-03 %
* Wet wt corr        : 1.00000 Wet Weight      : 0.00000
*                   : Dry Weight       : 0.00000
*****
*
*           CALIBRATION INFORMATION
*
* Eff. Cal. date     : 25-JUL-2022 07:37:58 Eff. Geometry   : CAN
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM33_CAN.CNF;15
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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
CO-57	3.102E-02	2.386E-02	2.386E-02
BR-77	1.249E+01	3.566E+01	3.566E+01
SB-122	9.223E+00	6.539E+00	6.539E+00
PM-147	8.978E+02	6.905E+02	6.905E+02
CF-249	3.112E-02	4.066E-02	4.066E-02

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	-1.251E-01	1.622E-01	1.717E-01	NOT IDENT.
NA-22	6.154E-03	2.065E-02	2.084E-02	NOT IDENT.
NA-24	1.380E+08	1.779E+08	1.885E+08	SHORT HLIF
AL-26	-4.438E-04	1.682E-02	1.682E-02	NOT IDENT.
K-40	-1.146E-01	3.180E-01	3.222E-01	NOT IDENT.
SC-46	-8.367E-04	2.084E-02	2.085E-02	NOT IDENT.
V-48	-8.054E-03	4.163E-02	4.179E-02	NOT IDENT.
CR-51	-1.076E-01	2.128E-01	2.182E-01	NOT IDENT.
MN-52	-6.219E-02	1.220E-01	1.252E-01	NOT IDENT.
MN-54	-3.287E-03	2.384E-02	2.388E-02	NOT IDENT.
CO-56	-3.667E-03	2.231E-02	2.237E-02	NOT IDENT.
MN-56	-1.000E+41	5.372E+41	0.000E+00	SHORT HLIF
CO-58	-2.074E-02	3.184E-02	3.318E-02	NOT IDENT.
FE-59	-1.931E-02	4.344E-02	4.430E-02	NOT IDENT.
CO-60	6.174E-03	1.689E-02	1.712E-02	NOT IDENT.
ZN-65	-2.581E-02	5.164E-02	5.293E-02	NOT IDENT.
GE-68	-6.470E-01	6.888E-01	7.480E-01	NOT IDENT.
AS-73	-9.552E-01	7.090E-01	8.295E-01	NOT IDENT.
AS-74	1.965E-02	8.458E-02	8.505E-02	NOT IDENT.
SE-75	1.594E-03	2.749E-02	2.750E-02	FAIL ABUN
SR-82	-1.753E-01	2.488E-01	2.611E-01	NOT IDENT.
RB-83	8.184E-02	4.474E-02	5.799E-02	FAIL ABUN
RB-84	-1.108E-03	5.058E-02	5.058E-02	NOT IDENT.
KR-85	-5.442E+00	7.839E+00	8.214E+00	NOT IDENT.
SR-85	-3.057E-02	4.382E-02	4.594E-02	NOT IDENT.

RB-86	-2.308E-01	4.833E-01	4.944E-01	NOT IDENT.
Y-88	1.239E-02	3.327E-02	3.374E-02	NOT IDENT.
Y-91	-1.398E+01	1.336E+01	1.477E+01	NOT IDENT.
NB-94	1.010E-02	2.225E-02	2.271E-02	NOT IDENT.
NB-95	-3.637E-03	2.588E-02	2.593E-02	NOT IDENT.
NB-95M	-5.293E-02	7.463E-02	7.835E-02	NOT IDENT.
ZR-95	3.779E-02	5.048E-02	5.328E-02	NOT IDENT.
NB-97	-1.000E+41	7.287E+41	0.000E+00	SHORT HLIF
ZR-97	-4.635E+08	2.487E+08	3.248E+08	SHORT HLIF
MO-99	-1.491E+01	2.908E+01	2.984E+01	NOT IDENT.
TC-99M	8.167E+21	2.893E+22	0.000E+00	SHORT HLIF
RH-101	-3.026E-03	1.740E-02	1.745E-02	NOT IDENT.
RH-102	7.350E-03	3.749E-02	3.764E-02	NOT IDENT.
RU-103	-8.483E-06	2.556E-02	2.556E-02	NOT IDENT.
RH-106	5.045E-02	2.671E-01	2.680E-01	NOT IDENT.
RU-106	5.045E-02	2.671E-01	2.680E-01	NOT IDENT.
AG-108M	5.306E-03	2.153E-02	2.166E-02	NOT IDENT.
CD-109	5.644E-01	4.816E-01	5.447E-01	NOT IDENT.
AG-110	4.153E-02	4.068E-01	4.073E-01	NOT IDENT.
AG-110M	-1.562E-03	3.296E-02	3.297E-02	NOT IDENT.
SN-113	1.130E-03	3.336E-02	3.336E-02	NOT IDENT.
CD-115	-1.412E+01	3.275E+01	3.336E+01	NOT IDENT.
SN-117M	-1.347E-03	3.437E-02	3.437E-02	NOT IDENT.
TE-123M	-4.746E-03	1.406E-02	1.422E-02	NOT IDENT.
SB-124	-1.576E-02	3.093E-02	3.173E-02	NOT IDENT.
SB-125	-2.145E-02	5.197E-02	5.286E-02	NOT IDENT.
TE-125M	-2.214E+00	5.851E+00	5.935E+00	NOT IDENT.
I-126	-1.042E-01	2.375E-01	2.421E-01	FAIL ABUN
SB-126	1.446E-02	5.633E-02	5.671E-02	NOT IDENT.
SN-126	1.644E-02	5.111E-02	5.164E-02	NOT IDENT.
SB-127	2.313E-01	1.889E+00	1.892E+00	NOT IDENT.
I-131	-1.977E-02	1.195E-01	1.198E-01	NOT IDENT.
I-132	1.000E+41	2.548E+41	0.000E+00	SHORT HLIF
TE-132	-6.594E-01	1.176E+00	1.213E+00	NOT IDENT.
BA-133	-5.815E-03	2.274E-02	2.289E-02	NOT IDENT.
I-133	3.459E+04	2.084E+05	2.090E+05	SHORT HLIF
CS-134	-2.042E-02	2.355E-02	2.528E-02	FAIL ABUN
I-135	-4.043E+20	1.301E+21	0.000E+00	SHORT HLIF
CS-136	5.671E-03	9.740E-02	9.743E-02	NOT IDENT.
BA-137M	-4.086E-03	2.285E-02	2.292E-02	NOT IDENT.
CS-137	-4.316E-03	2.414E-02	2.421E-02	NOT IDENT.
LA-138	-1.177E-05	2.139E-02	2.139E-02	NOT IDENT.
CE-139	-4.003E-03	1.902E-02	1.911E-02	NOT IDENT.
BA-140	2.307E-02	2.209E-01	2.212E-01	NOT IDENT.
LA-140	-2.970E-03	1.082E-01	1.082E-01	NOT IDENT.
CE-141	-1.492E-02	4.101E-02	4.156E-02	NOT IDENT.
CE-143	-1.377E+02	7.869E+02	7.893E+02	SHORT HLIF
CE-144	8.057E-02	1.141E-01	1.197E-01	NOT IDENT.
PM-144	5.878E-03	2.024E-02	2.041E-02	NOT IDENT.
PR-144	4.411E-01	1.519E+00	1.532E+00	NOT IDENT.
PM-146	1.384E-02	2.517E-02	2.593E-02	FAIL ABUN
ND-147	1.848E-01	4.593E-01	4.668E-01	NOT IDENT.
PM-149	-4.033E+01	2.446E+02	2.453E+02	NOT IDENT.
EU-150	8.515E-03	1.691E-02	1.734E-02	NOT IDENT.
EU-152	-3.254E-02	6.071E-02	6.245E-02	FAIL ABUN
GD-153	-3.003E-03	4.721E-02	4.723E-02	NOT IDENT.
EU-154	2.003E-02	5.950E-02	6.018E-02	NOT IDENT.
EU-155	-6.269E-02	6.361E-02	6.961E-02	NOT IDENT.
TB-160	1.846E-02	7.758E-02	7.803E-02	NOT IDENT.
HO-166M	4.026E-02	3.990E-02	4.384E-02	FAIL ABUN
TM-171	9.229E+00	1.410E+01	1.470E+01	NOT IDENT.
HF-172	-3.217E-03	9.483E-02	9.484E-02	NOT IDENT.
LU-172	-7.970E-03	3.906E-02	3.923E-02	FAIL ABUN
LU-176	-4.711E-03	1.410E-02	1.425E-02	NOT IDENT.
HF-181	-6.914E-03	2.801E-02	2.819E-02	NOT IDENT.
TA-182	-3.048E-02	1.005E-01	1.014E-01	NOT IDENT.
RE-183	-7.843E-02	1.701E-01	1.738E-01	NOT IDENT.
RE-184	-2.145E-02	6.611E-02	6.681E-02	NOT IDENT.
W-188	-8.047E-01	3.999E+00	4.016E+00	NOT IDENT.
IR-192	9.210E-03	2.354E-02	2.390E-02	NOT IDENT.
HG-203	2.320E-02	2.656E-02	2.855E-02	NOT IDENT.
TL-204	-1.207E+00	2.679E+00	2.734E+00	NOT IDENT.
BI-207	-1.522E-03	3.638E-02	3.638E-02	NOT IDENT.
TL-208	-2.488E-02	2.654E-02	2.882E-02	NOT IDENT.
BI-210	2.436E+00	4.072E+00	4.218E+00	NOT IDENT.
PB-210	2.436E+00	4.072E+00	4.218E+00	NOT IDENT.
BI-211	-9.986E-02	1.424E-01	1.493E-01	NOT IDENT.
PB-211	-4.116E-01	4.103E-01	4.503E-01	NOT IDENT.

BI-212	2.571E-01	3.227E-01	3.429E-01	NOT IDENT.
PB-212	1.806E-02	5.046E-02	5.111E-02	FAIL ABUN
BI-213	-3.897E-03	5.156E-02	5.159E-02	NOT IDENT.
BI-214	1.665E-03	5.167E-02	5.167E-02	NOT IDENT.
PB-214	-2.497E-02	5.226E-02	5.346E-02	NOT IDENT.
RN-219	1.116E-01	2.420E-01	2.472E-01	NOT IDENT.
RN-222	1.665E-03	5.167E-02	5.167E-02	NOT IDENT.
RA-223	2.425E-01	3.793E-01	3.948E-01	FAIL ABUN
RA-224	8.672E-02	3.780E-01	3.800E-01	NOT IDENT.
AC-225	-4.595E-03	4.850E-01	4.850E-01	NOT IDENT.
RA-226	-2.497E-02	5.226E-02	5.346E-02	NOT IDENT.
AC-227	3.293E-02	1.466E-01	1.473E-01	NOT IDENT.
TH-227	3.293E-02	1.466E-01	1.473E-01	NOT IDENT.
AC-228	-4.637E-02	1.054E-01	1.075E-01	NOT IDENT.
RA-228	-4.637E-02	1.054E-01	1.075E-01	NOT IDENT.
TH-228	1.806E-02	5.046E-02	5.111E-02	FAIL ABUN
TH-229	5.301E-01	4.882E-01	5.436E-01	FAIL ABUN
TH-230	-2.497E-02	5.226E-02	5.346E-02	NOT IDENT.
PA-231	1.734E-01	2.411E-01	2.534E-01	FAIL ABUN
TH-231	2.425E-01	3.793E-01	3.948E-01	FAIL ABUN
TH-232	-4.637E-02	1.054E-01	1.075E-01	NOT IDENT.
PA-233	1.776E-02	4.159E-02	4.235E-02	NOT IDENT.
PA-234	7.114E-02	2.053E-01	2.078E-01	NOT IDENT.
PA-234M	-8.298E-01	3.161E+00	3.183E+00	NOT IDENT.
TH-234	-8.452E-02	1.115E+00	1.115E+00	FAIL ABUN
U-234	-2.497E-02	5.226E-02	5.346E-02	NOT IDENT.
U-235	-8.939E-02	1.388E-01	1.445E-01	FAIL ABUN
NP-237	1.776E-02	4.159E-02	4.235E-02	NOT IDENT.
NP-238	9.790E+00	4.403E+01	4.425E+01	NOT IDENT.
U-238	-8.452E-02	1.115E+00	1.115E+00	FAIL ABUN
NP-239	-5.541E-02	1.280E-01	1.304E-01	NOT IDENT.
PU-239	8.235E+01	1.974E+02	2.009E+02	NOT IDENT.
AM-241	5.580E-02	1.182E-01	1.208E-01	NOT IDENT.
AM-243	2.663E-02	3.236E-02	3.452E-02	NOT IDENT.
CM-243	3.630E-02	5.806E-02	6.032E-02	NOT IDENT.
BK-247	2.472E-02	4.999E-02	5.121E-02	FAIL ABUN
CM-247	8.739E-03	2.190E-02	2.225E-02	NOT IDENT.
CF-251	-1.755E-02	8.514E-02	8.551E-02	NOT IDENT.
ANH-511	-9.910E-02	4.298E-02	6.199E-02	NOT IDENT.

 * GEL Laboratories LLC *
 * 2040 Savage Road *
 * Charleston, SC 29407 *
 * GAMMA SPECTROSCOPY BACKGROUND REPORT *

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	21.9474	85.43	27.0647	131.20	28.8410
45.60	23.0596	86.55	27.1133	133.02	23.1238
46.54	18.0867	86.79	27.1235	133.52	16.1963
49.72	27.3289	86.94	30.3857	136.00	20.8856
51.35	15.2379	87.09	31.4785	136.47	13.9316
51.87	14.2383	87.57	27.5193	140.51	15.1642
52.39	11.2000	88.03	17.3932	143.76	26.9296
52.97	17.3309	88.34	20.3020	144.24	25.7729
53.44	22.4510	88.47	30.4592	145.44	24.6350
54.07	15.3282	89.96	37.7992	152.43	23.6459
57.36	0.0000	90.64	28.3794	153.25	18.9338
57.53	20.5865	91.11	28.3998	154.21	11.8460
57.98	25.7568	92.59	28.4645	156.02	18.9910
59.27	19.6267	93.35	28.4974	158.56	14.2824
59.32	19.6286	94.56	28.5494	159.00	15.4798
59.54	19.6373	94.65	28.5533	162.33	19.1196
60.96	34.2040	94.67	28.5541	162.66	19.1262
61.17	36.2920	94.87	14.6475	163.33	20.3359
62.93	19.7696	97.43	17.6442	165.86	23.9880
63.29	17.7010	98.43	14.3570	176.31	23.0325
63.58	20.8363	98.44	14.3572	176.60	19.4014
64.28	30.2535	99.53	14.3801	177.52	25.4877
66.73	18.8656	100.11	22.1419	181.07	27.6070
67.24	19.9327	102.03	19.9829	181.52	21.1205
67.68	15.7492	103.18	14.4558	184.41	18.3289
67.75	15.7512	103.37	15.5721	185.72	18.3522
68.89	15.7845	105.21	30.1099	193.51	18.4884
69.67	17.9148	105.31	30.1140	197.03	24.7321
70.82	21.1201	106.12	18.9822	198.01	16.5031
70.83	21.1206	106.47	17.8744	201.83	14.9048
72.81	28.6142	109.28	23.5513	203.43	17.4143
72.87	28.6171	111.00	25.8550	205.31	19.9358
74.66	15.9486	111.76	24.7562	210.85	15.8606
74.82	15.9531	114.06	27.0903	215.65	15.9275
74.97	23.4040	116.30	20.3780	218.12	19.3220
77.11	26.6941	116.74	16.9915	222.11	15.1734
78.74	36.4046	119.76	18.1957	227.09	19.4701
79.69	22.5213	121.12	17.0883	227.38	20.3215
80.03	17.1687	121.22	17.0905	228.16	19.4877
80.12	15.0250	121.78	15.2024	228.18	19.4879
80.19	15.0268	122.06	15.2078	235.69	20.4619
80.57	16.1103	122.92	16.7470	235.96	20.4666
81.00	20.4210	123.07	16.7501	238.63	19.2290
81.07	19.3484	123.68	12.1913	238.98	19.2345
81.75	23.6748	125.81	16.0441	240.99	12.8439
82.47	25.8578	127.23	20.6644	242.00	16.7106
83.79	16.1959	127.91	20.6820	244.70	12.0233
84.00	14.0412	129.30	19.5663	252.40	16.4166

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.80	16.4219	351.06	13.8760	569.33	7.7612
254.15	0.0000	351.93	12.9578	569.50	7.7618
256.23	14.7324	355.39	0.0000	569.70	7.7625
260.90	14.7854	356.01	11.1348	583.19	10.4102
264.66	14.6532	364.49	14.9229	584.27	8.3317
264.80	14.6545	366.42	10.2713	595.83	10.4659
265.00	11.7779	372.51	9.3715	600.60	10.4867
269.46	14.0055	375.05	10.3241	602.52	0.0000
270.03	14.4492	377.52	8.4593	604.72	8.4036
271.23	19.7214	383.85	8.4906	607.14	11.5667
273.65	14.4882	388.16	14.1861	609.32	6.3147
276.40	13.1976	388.63	14.1901	610.33	4.2116
277.37	7.9243	391.69	12.7933	614.28	6.3276
277.60	7.9255	400.66	11.4299	618.01	14.7873
278.00	13.2132	401.81	8.5779	620.36	13.7443
279.20	13.2248	402.40	8.5807	621.93	12.6948
279.54	13.2278	404.85	12.4113	630.19	0.0000
279.70	13.2297	410.95	10.5374	631.29	6.3716
280.46	13.2367	413.71	6.7159	633.25	11.1588
283.69	13.2678	414.70	6.7196	634.78	9.5706
284.31	13.2736	423.72	8.6818	635.95	3.1917
285.41	13.2840	427.09	9.6639	636.99	3.8316
285.90	13.2889	427.87	10.6348	657.50	5.3648
287.50	10.6431	433.94	10.6692	657.76	5.3654
290.67	11.7337	439.40	11.6729	657.90	0.0000
293.27	0.0000	440.45	6.8129	661.66	8.5977
295.22	13.3765	453.88	6.8604	664.57	0.0000
295.96	9.8146	463.37	7.8786	666.33	15.0732
298.58	17.8772	468.07	12.8328	666.50	15.0738
299.98	12.5263	473.00	11.8750	667.71	0.0000
300.09	12.5271	475.06	7.9248	677.62	10.8130
300.13	11.6326	476.78	4.9572	685.70	5.4232
301.36	7.1647	477.60	7.9347	692.65	8.6995
302.85	13.4476	482.18	7.4556	695.00	5.4421
304.50	11.6678	487.02	8.9680	696.49	5.4451
304.85	9.8750	492.35	8.9912	696.51	5.4451
306.78	12.5847	497.08	8.0104	697.00	5.4462
308.46	9.8994	505.52	12.0640	697.30	4.3574
311.90	10.8242	507.63	0.0000	697.49	4.3577
316.51	10.8577	511.00	26.2060	702.65	6.5491
319.41	11.9665	514.00	38.3556	706.68	8.7451
320.08	11.7904	514.00	38.3556	711.68	8.2135
321.04	11.7979	520.40	3.0371	720.70	1.0988
323.87	10.0014	520.69	3.0375	721.93	0.0000
325.23	21.8408	522.65	0.0000	722.78	7.6970
328.76	17.3301	527.90	9.1428	722.91	7.6976
333.37	16.4670	1093.63	9.1443	723.31	5.4991
333.97	11.8974	529.59	7.1165	724.19	4.4006
334.37	11.9003	529.87	0.0000	727.33	4.4056
338.28	15.6010	531.02	6.1040	733.00	6.6218
338.32	15.6013	537.26	8.1618	735.93	7.7337
340.48	11.0278	546.56	0.0000	737.46	5.5269
340.55	11.0283	552.55	10.2722	739.50	8.8496
344.28	16.5813	563.25	8.2568	744.23	7.7565
345.93	13.8318	564.24	8.2601	747.24	8.8740

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
748.06	6.6575	954.55	0.0000	1408.01	2.9868
752.31	5.5562	962.31	4.2775	1434.09	1.0012
753.82	10.0063	964.08	5.3496	1435.80	1.0015
756.73	4.4518	966.17	8.0294	1457.56	0.0000
756.80	4.4520	968.97	5.3571	1460.82	3.0203
763.94	5.5788	983.53	3.5864	1489.16	3.0381
765.81	6.6990	984.45	1.7937	1505.03	1.0160
766.42	4.4668	996.26	5.3990	1584.12	3.0965
766.84	3.3506	1001.03	3.6042	1596.21	5.1730
772.60	0.0000	1002.74	5.4089	1620.50	3.1185
776.52	8.9648	1004.73	9.9221	1621.92	3.1192
777.92	5.6057	1021.30	0.0000	1678.03	0.0000
778.90	1.1215	1025.87	4.5367	1690.97	1.0534
783.70	1.6851	1028.54	1.8160	1750.46	0.0000
788.74	5.0638	1037.84	4.5517	1764.49	3.2029
792.07	2.2531	1038.76	0.0000	1770.23	1.0687
795.86	7.8961	1046.59	4.5624	1771.35	3.2067
801.95	7.9120	1048.07	6.3901	1791.20	0.0000
810.06	14.7340	1049.04	4.5654	1808.65	1.0760
810.29	14.7350	1050.41	4.5673	1810.72	0.0000
810.45	14.7356	1063.66	3.6670	1836.06	2.1624
810.76	11.3363	1077.00	4.5999		
815.77	7.9485	1077.34	6.4407		
818.51	6.8193	1085.87	5.5331		
832.01	5.7078	1093.63	5.5444		
834.85	6.8557	1099.45	3.7019		
835.71	3.4288	1112.07	3.7141		
836.80	0.0000	1112.84	4.6436		
846.75	0.0000	1115.54	6.5052		
846.77	4.5881	1120.29	2.7914		
856.80	8.0550	1120.55	2.7916		
860.56	2.3042	1121.30	3.7229		
871.09	1.1559	1129.67	7.4619		
873.19	6.9399	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	3.4767	1173.23	1.8861		
880.51	5.7965	1177.95	0.0000		
881.60	5.7985	1189.05	0.9467		
883.24	2.3206	1204.77	8.5534		
884.68	5.8040	1221.41	4.7711		
889.28	3.4874	1231.02	2.8693		
894.76	6.9866	1235.36	4.7873		
898.04	5.8280	1238.28	1.9161		
900.72	5.8329	1260.41	0.0000		
903.28	4.3781	1271.87	1.9314		
911.20	6.1440	1274.44	1.9326		
912.08	6.1457	1274.54	1.9326		
923.98	3.5244	1291.59	1.9403		
926.50	5.2906	1298.22	0.0000		
929.11	2.6474	1312.11	0.9747		
935.54	8.8416	1332.49	0.9792		
937.49	6.1927	1362.66	0.0000		
944.13	3.5457	1365.19	5.9180		
946.00	4.4345	1368.63	0.0000		
949.00	5.3262	1384.29	0.9905		

VAX/VMS Nuclide Identification Report Generated 28-FEB-2023 07:51:29.38

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                          *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205313911.CNF;1
Background file : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM03.CNF;669
Background date : 26-FEB-2023 09:12:40
Sample date     : 20-JAN-2023 11:00:00 Acquisition date : 28-FEB-2023 06:51:01
Sample ID      : G1205313911 Sample quantity   : 9.68100E+01 GRAM
Detector name  : GAM03 Detector geometry: CAN
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:00.33 0.0%
Energy tolerance : 1.50000 keV Analyst Initials : RXF2
Abundance limit : 75.00000 Sensitivity : 3.00000
Batch ID       : 2379916 Detector SN# :
Matrix Spike ID : LCS ID :
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	62.84*	21	100	1.56	125.29	119	12	5.80E-03	101.9	
2	3	74.57	64	95	1.73	148.73	143	17	1.77E-02	32.8	1.95E+00
3	3	77.32	72	80	1.44	154.23	143	17	1.99E-02	27.1	
4	0	92.47*	16	142	1.27	184.51	179	12	4.39E-03	166.6	
5	0	111.91*	37	92	3.74	223.39	217	13	1.03E-02	56.4	
6	0	185.94*	26	50	1.29	371.38	366	10	7.28E-03	62.2	
7	0	211.29	57	65	6.29	422.06	415	16	1.59E-02	33.9	
8	1	238.61*	174	36	1.66	476.68	468	22	4.83E-02	10.8	2.17E+00
9	1	241.61	54	29	1.74	482.68	468	22	1.50E-02	30.9	
10	0	294.96*	70	51	1.37	589.34	583	12	1.95E-02	24.0	
11	0	328.73	34	25	1.15	656.86	651	13	9.43E-03	35.3	
12	0	338.35*	34	25	1.79	676.09	672	9	9.50E-03	33.9	
13	0	351.70*	90	46	1.15	702.77	696	11	2.50E-02	16.9	
14	0	376.94	20	33	3.30	753.24	743	15	5.57E-03	66.8	
15	2	413.70	20	8	2.15	826.75	803	33	5.52E-03	42.3	1.66E+00
16	2	416.90	16	3	1.45	833.15	803	33	4.31E-03	28.6	
17	0	422.06	28	12	5.41	843.46	837	15	7.85E-03	32.1	
18	0	510.53*	15	37	2.13	1020.37	1013	16	4.11E-03	115.2	
19	0	553.56	17	15	1.22	1106.40	1100	13	4.84E-03	52.8	
20	0	583.13*	49	15	1.41	1165.53	1159	12	1.37E-02	22.6	
21	0	608.81*	94	20	2.18	1216.88	1211	13	2.62E-02	14.6	
22	0	645.71	6	9	0.53	1290.67	1285	12	1.57E-03	114.4	
23	0	676.61	13	14	4.42	1352.46	1345	16	3.67E-03	65.5	
24	0	726.65	9	12	2.29	1452.53	1447	9	2.60E-03	72.7	
25	0	741.34	14	7	0.77	1481.90	1477	9	3.95E-03	42.3	
26	0	768.92	11	24	1.07	1537.07	1529	14	2.94E-03	103.8	
27	0	872.49	5	12	0.99	1744.20	1736	12	1.39E-03	145.6	
28	0	902.96	5	7	0.92	1805.13	1798	9	1.48E-03	97.8	
29	0	910.97*	18	11	0.92	1821.17	1813	11	5.06E-03	45.2	
30	0	934.61	6	8	0.86	1868.44	1861	11	1.68E-03	100.4	
31	0	953.74	15	3	0.59	1906.71	1899	14	4.06E-03	37.6	
32	0	970.09	11	17	0.97	1939.40	1931	13	3.18E-03	78.4	
33	0	1001.22*	12	16	0.55	2001.68	1993	20	3.38E-03	87.2	
34	0	1099.16	12	6	1.10	2197.56	2190	12	3.33E-03	50.0	

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
35	0	1153.37	4	9	1.37	2306.00	2300	9	1.11E-03	144.2	
36	5	1179.04	17	0	2.87	2357.36	2352	13	4.68E-03	25.2	6.56E-01
37	5	1181.35	9	0	1.78	2361.98	2352	13	2.39E-03	32.8	
38	0	1225.73	4	7	0.55	2450.75	2443	10	1.10E-03	137.9	
39	0	1236.77	20	12	0.91	2472.84	2464	16	5.59E-03	44.4	
40	0	1460.06*	173	0	2.09	2919.54	2912	15	4.81E-02	7.7	
41	0	1763.31	24	0	1.75	3526.29	3517	14	6.67E-03	20.4	

Flag: "*" = Peak area was modified by background subtraction

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205313911.CNF;1
Analyses by : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4
Sample title : RXF2
Sample date : 20-JAN-2023 11:00:00 Acquisition date : 28-FEB-2023 06:51:01
Sample ID : G1205313911 Sample quantity : 96.810 GRAM
Sample type : SOLID Sample geometry :
Detector name : GAMMA3 Detector geometry: CAN
Elapsed live time: 0 01:00:00.00 Elapsed real time: 0 01:00:00.33 0.0%
Energy tolerance : 1.50 keV Half life ratio : 10.00
Errors propagated: No Systematic Error : 0.00 %
Efficiency type : Empirical Efficiencies at : Peak Energy
Abundance limit : 75.00

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	162	10.66*	1.013E+00	1.160E+01	1.160E+01	15.48
TL-208	277.37	-----	6.60	3.962E+00	-----	Line Not Found	-----
	583.19	46	85.00*	2.224E+00	1.899E-01	1.899E-01	45.29
	860.56	-----	12.50	1.600E+00	-----	Line Not Found	-----
BI-211	72.87	-----	1.23	3.165E+00	-----	Line Not Found	-----
	351.06	85	12.92*	3.309E+00	1.547E+00	1.547E+00	33.78
BI-212	727.33	9	6.67*	1.853E+00	5.514E-01	5.514E-01	145.46
	1620.50	-----	1.47	9.391E-01	-----	Line Not Found	-----
PB-212	74.82	61	10.28	3.355E+00	1.374E+00	1.374E+00	65.69
	77.11	69	17.10	3.648E+00	8.556E-01	8.556E-01	54.29
	238.63	165	43.60*	4.422E+00	6.636E-01	6.636E-01	21.50
	300.09	-----	3.30	3.734E+00	-----	Line Not Found	-----
BI-214	609.32	89	45.49*	2.147E+00	7.048E-01	7.048E-01	29.13
	1120.29	-----	14.92	1.267E+00	-----	Line Not Found	-----
	1764.49	22	15.30	8.908E-01	1.270E+00	1.271E+00	40.82
PB-214	74.82	61	5.80	3.355E+00	2.435E+00	2.435E+00	65.69
	77.11	69	9.70	3.648E+00	1.508E+00	1.508E+00	54.29
	87.09	-----	3.41	4.534E+00	-----	Line Not Found	-----
	242.00	51	7.25	4.383E+00	1.252E+00	1.252E+00	61.87
	295.22	67	18.42	3.783E+00	7.414E-01	7.415E-01	48.00
	351.93	85	35.60*	3.309E+00	5.614E-01	5.615E-01	33.78
RN-222	609.32	89	45.49*	2.147E+00	7.048E-01	7.048E-01	29.13
	1120.29	-----	14.92	1.267E+00	-----	Line Not Found	-----
	1764.49	22	15.30	8.908E-01	1.270E+00	1.271E+00	40.82
RA-224	240.99	51	4.10*	4.383E+00	2.214E+00	2.214E+00	61.87
RA-226	74.82	61	5.80	3.355E+00	2.435E+00	2.435E+00	65.69
	77.11	69	9.70	3.648E+00	1.508E+00	1.508E+00	54.29
	87.09	-----	3.41	4.534E+00	-----	Line Not Found	-----
	242.00	51	7.25	4.383E+00	1.252E+00	1.252E+00	61.87
	295.22	67	18.42	3.783E+00	7.414E-01	7.415E-01	48.00
	351.93	85	35.60*	3.309E+00	5.614E-01	5.615E-01	33.78
AC-228	105.21	-----	1.10	5.511E+00	-----	Line Not Found	-----
	338.32	32	11.27	3.408E+00	6.535E-01	6.535E-01	67.77
	835.71	-----	1.61	1.642E+00	-----	Line Not Found	-----
	911.20	17	25.80*	1.522E+00	3.367E-01	3.367E-01	90.47
	968.97	11	15.80	1.439E+00	3.659E-01	3.659E-01	156.83
RA-228	105.21	-----	1.10	5.511E+00	-----	Line Not Found	-----
	338.32	32	11.27	3.408E+00	6.535E-01	6.535E-01	67.77
	835.71	-----	1.61	1.642E+00	-----	Line Not Found	-----
	911.20	17	25.80*	1.522E+00	3.367E-01	3.367E-01	90.47
	968.97	11	15.80	1.439E+00	3.659E-01	3.659E-01	156.83
TH-228	74.82	61	10.28	3.355E+00	1.374E+00	1.374E+00	65.69
	77.11	69	17.10	3.648E+00	8.556E-01	8.556E-01	54.29
	238.63	165	43.60*	4.422E+00	6.636E-01	6.636E-01	21.50
	300.09	-----	3.30	3.734E+00	-----	Line Not Found	-----
TH-230	74.82	61	5.80	3.355E+00	2.435E+00	2.435E+00	65.69
	77.11	69	9.70	3.648E+00	1.508E+00	1.508E+00	54.29
	87.09	-----	3.41	4.534E+00	-----	Line Not Found	-----
	242.00	51	7.25	4.383E+00	1.252E+00	1.252E+00	61.87

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
	295.22	67	18.42	3.783E+00	7.414E-01	7.414E-01	48.00
	351.93	85	35.60*	3.309E+00	5.614E-01	5.614E-01	33.78
TH-232	105.21	-----	1.10	5.511E+00	-----	Line Not Found	-----
	338.32	32	11.27	3.408E+00	6.535E-01	6.535E-01	67.77
	835.71	-----	1.61	1.642E+00	-----	Line Not Found	-----
	911.20	17	25.80*	1.522E+00	3.367E-01	3.367E-01	90.47
	968.97	11	15.80	1.439E+00	3.659E-01	3.659E-01	156.83
TH-234	63.29	20	3.70*	1.976E+00	2.132E+00	2.132E+00	203.87
	92.59	15	4.23	4.910E+00	5.652E-01	5.652E-01	333.22
U-234	74.82	61	5.80	3.355E+00	2.435E+00	2.435E+00	65.69
	77.11	69	9.70	3.648E+00	1.508E+00	1.508E+00	54.29
	87.09	-----	3.41	4.534E+00	-----	Line Not Found	-----
	242.00	51	7.25	4.383E+00	1.252E+00	1.252E+00	61.87
	295.22	67	18.42	3.783E+00	7.414E-01	7.414E-01	48.00
	351.93	85	35.60*	3.309E+00	5.614E-01	5.614E-01	33.78
U-238	63.29	20	3.70*	1.976E+00	2.132E+00	2.132E+00	203.87
	92.59	15	4.23	4.910E+00	5.652E-01	5.652E-01	333.22
AM-243	43.53	-----	5.90	2.343E-01	-----	Line Not Found	-----
	74.66	61	67.20*	3.355E+00	2.102E-01	2.102E-01	65.69
ANH-511	511.00	14	100.00*	2.475E+00	4.368E-02	4.368E-02	230.37

Flag: "*" = Keyline

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                           *
*****
*                               DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205313911.CNF;1
* Acquisition date   : 28-FEB-2023 06:51:01 Sensitivity      : 3.000
* Detector ID        : GAM03 Energy tolerance: 1.500
* Elapsed live time  : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time  : 0 01:00:00.33 Half life ratio : *****
* Sample date        : 20-JAN-2023 11:00:00 Analyst initials: RXF2
* Sample ID          : G1205313911 Sample Quantity : 9.6810E+01 GRAM
* Batch Number       : 2379916 Wet Weight : 0.00000
* Wet wt corr        : 1.00000 Dry Weight : 0.00000
* Nuclide Library    : SOLID.NLB;17
*****
*                               CALIBRATION INFORMATION                         *
*
* Eff. Cal. date     : 12-OCT-2022 09:50:42 Eff. Geometry   : CAN
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM03_CAN.CNF;29
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
K-40	1.160E+01	1.760E+00	8.566E-01
TL-208	1.899E-01	8.429E-02	8.546E-02
BI-211	1.547E+00	5.121E-01	5.618E-01
BI-212	5.514E-01	7.860E-01	1.454E+00
PB-212	6.636E-01	1.398E-01	1.151E-01
BI-214	7.048E-01	2.012E-01	1.874E-01
PB-214	5.615E-01	1.858E-01	1.769E-01
RN-222	7.048E-01	2.012E-01	1.874E-01
RA-224	2.214E+00	1.343E+00	1.234E+00
RA-226	5.615E-01	1.858E-01	1.769E-01
AC-228	3.367E-01	2.985E-01	3.715E-01
RA-228	3.367E-01	2.985E-01	3.715E-01
TH-228	6.636E-01	1.398E-01	1.151E-01
TH-230	5.614E-01	1.858E-01	1.769E-01
TH-232	3.367E-01	2.985E-01	3.715E-01
TH-234	2.132E+00	4.260E+00	3.763E+00
U-234	5.614E-01	1.858E-01	1.769E-01
U-238	2.132E+00	4.260E+00	3.763E+00
AM-243	2.102E-01	1.353E-01	1.281E-01
ANH-511	4.368E-02	9.861E-02	6.942E-02

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L.	Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)	
BE-7	5.902E-02		4.881E-01	9.722E-01	NOT IDENT.
NA-22	-1.211E-02		5.741E-02	1.104E-01	NOT IDENT.
NA-24	0.000E+00		2.397E+17	0.000E+00	SHORT HLIF
AL-26	6.785E-03		4.745E-02	1.052E-01	NOT IDENT.
SC-46	-2.690E-03		7.544E-02	1.404E-01	NOT IDENT.
V-48	-7.087E-02		2.942E-01	5.290E-01	NOT IDENT.
CR-51	-4.529E-01		8.734E-01	1.459E+00	NOT IDENT.
MN-52	6.460E+00		6.045E+00	1.534E+01	FAIL ABUN
MN-54	4.250E-02		4.428E-02	1.012E-01	NOT IDENT.
CO-56	-4.625E-02		5.905E-02	9.479E-02	NOT IDENT.

MN-56	0.000E+00	1.286E+41	0.000E+00	SHORT HLIF
CO-57	-3.305E-02	3.038E-02	5.009E-02	NOT IDENT.
CO-58	-2.510E-02	5.962E-02	1.059E-01	NOT IDENT.
FE-59	2.189E-01	2.146E-01	4.061E-01	FAIL ABUN
CO-60	5.080E-02	4.671E-02	1.190E-01	NOT IDENT.
ZN-65	-9.803E-02	1.316E-01	2.264E-01	NOT IDENT.
GE-68	1.776E+00	1.666E+00	3.959E+00	NOT IDENT.
AS-73	9.150E-01	2.261E+00	3.984E+00	NOT IDENT.
AS-74	-3.396E-01	3.116E-01	4.914E-01	NOT IDENT.
SE-75	3.228E-02	6.180E-02	1.186E-01	NOT IDENT.
BR-77	0.000E+00	2.198E+04	0.000E+00	SHORT HLIF
SR-82	-3.700E-01	7.689E-01	1.349E+00	NOT IDENT.
RB-83	8.389E-03	1.070E-01	2.089E-01	FAIL ABUN
RB-84	4.490E-02	1.679E-01	3.317E-01	NOT IDENT.
KR-85	7.601E+00	1.067E+01	1.993E+01	NOT IDENT.
SR-85	5.160E-02	7.255E-02	1.355E-01	NOT IDENT.
RB-86	2.616E+00	2.279E+00	5.540E+00	NOT IDENT.
Y-88	2.266E-02	4.647E-02	1.237E-01	NOT IDENT.
Y-91	1.281E+00	2.411E+01	5.191E+01	NOT IDENT.
NB-94	-8.486E-03	4.854E-02	8.897E-02	FAIL ABUN
NB-95	-3.064E-02	8.242E-02	1.326E-01	NOT IDENT.
NB-95M	2.841E-01	1.998E-01	4.042E-01	NOT IDENT.
ZR-95	-7.695E-02	1.294E-01	2.206E-01	NOT IDENT.
NB-97	0.000E+00	1.400E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	3.306E+16	0.000E+00	SHORT HLIF
MO-99	0.000E+00	8.615E+03	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
RH-101	1.969E-02	3.814E-02	7.296E-02	NOT IDENT.
RH-102	-2.634E-02	7.455E-02	1.347E-01	NOT IDENT.
RU-103	-3.445E-02	7.488E-02	1.351E-01	NOT IDENT.
RH-106	-1.864E-02	4.045E-01	7.763E-01	NOT IDENT.
RU-106	-1.864E-02	4.045E-01	7.763E-01	NOT IDENT.
AG-108M	-3.156E-03	3.614E-02	6.907E-02	NOT IDENT.
CD-109	1.955E-01	1.215E+00	2.036E+00	NOT IDENT.
AG-110	1.070E+00	1.076E+00	2.326E+00	NOT IDENT.
AG-110M	3.809E-02	8.449E-02	1.692E-01	FAIL ABUN
SN-113	1.018E-02	6.750E-02	1.313E-01	NOT IDENT.
CD-115	0.000E+00	2.176E+04	0.000E+00	SHORT HLIF
SN-117M	-1.400E-01	2.350E-01	4.028E-01	NOT IDENT.
SB-122	0.000E+00	1.064E+03	0.000E+00	SHORT HLIF
TE-123M	-1.793E-02	4.067E-02	7.079E-02	NOT IDENT.
SB-124	2.487E-02	1.251E-01	2.975E-01	NOT IDENT.
SB-125	-1.118E-02	1.071E-01	1.826E-01	NOT IDENT.
TE-125M	2.858E+00	1.685E+01	2.851E+01	NOT IDENT.
I-126	-3.911E-02	9.432E-01	1.809E+00	NOT IDENT.
SB-126	-1.279E-01	6.576E-01	1.073E+00	FAIL ABUN
SN-126	-5.372E-03	1.157E-01	1.902E-01	FAIL ABUN
SB-127	0.000E+00	1.318E+02	0.000E+00	SHORT HLIF
I-131	-6.546E-01	1.328E+00	2.203E+00	NOT IDENT.
I-132	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
TE-132	0.000E+00	1.445E+02	0.000E+00	SHORT HLIF
BA-133	2.632E-02	5.973E-02	1.032E-01	NOT IDENT.
I-133	0.000E+00	1.277E+12	0.000E+00	SHORT HLIF
CS-134	2.368E-02	6.251E-02	1.249E-01	NOT IDENT.
I-135	0.000E+00	1.270E+41	0.000E+00	SHORT HLIF
CS-136	-5.833E-03	4.550E-01	9.214E-01	FAIL ABUN
BA-137M	-1.762E-02	5.071E-02	9.095E-02	NOT IDENT.
CS-137	-1.862E-02	5.357E-02	9.608E-02	NOT IDENT.
LA-138	5.194E-02	7.331E-02	1.765E-01	NOT IDENT.
CE-139	-1.833E-02	3.729E-02	6.472E-02	NOT IDENT.
BA-140	-4.903E-01	1.271E+00	2.303E+00	NOT IDENT.
LA-140	-1.516E-01	3.480E-01	6.510E-01	FAIL ABUN
CE-141	6.227E-02	1.351E-01	2.534E-01	NOT IDENT.
CE-143	0.000E+00	2.887E+07	0.000E+00	SHORT HLIF
CE-144	7.638E-02	2.596E-01	4.854E-01	NOT IDENT.
PM-144	-3.477E-03	4.994E-02	9.348E-02	NOT IDENT.
PR-144	-2.236E-01	3.791E+00	7.106E+00	NOT IDENT.
PM-146	-3.863E-02	5.398E-02	9.383E-02	NOT IDENT.
ND-147	-1.393E+00	3.355E+00	6.049E+00	FAIL ABUN
PM-147	-3.095E+02	8.968E+02	1.599E+03	NOT IDENT.
PM-149	0.000E+00	2.021E+05	0.000E+00	SHORT HLIF
EU-150	2.768E-02	4.634E-02	6.778E-02	FAIL ABUN
EU-152	2.250E-02	1.509E-01	2.708E-01	NOT IDENT.
GD-153	-1.227E-02	1.275E-01	2.140E-01	NOT IDENT.
EU-154	-3.262E-02	1.610E-01	3.101E-01	FAIL ABUN
EU-155	-3.560E-02	1.296E-01	2.332E-01	NOT IDENT.
TB-160	-9.943E-02	2.231E-01	3.896E-01	FAIL ABUN
HO-166M	-1.484E-02	7.430E-02	1.383E-01	NOT IDENT.

TM-171	-3.831E+01	4.335E+01	6.574E+01	NOT IDENT.
HF-172	9.610E-02	2.286E-01	4.352E-01	FAIL ABUN
LU-172	-3.121E-02	9.528E-02	1.523E-01	FAIL ABUN
LU-176	1.340E-02	3.139E-02	6.016E-02	NOT IDENT.
HF-181	2.080E-02	8.340E-02	1.655E-01	NOT IDENT.
TA-182	-7.045E-02	3.123E-01	5.069E-01	NOT IDENT.
RE-183	1.600E-01	4.624E-01	8.194E-01	NOT IDENT.
RE-184	1.419E-01	2.718E-01	5.243E-01	FAIL ABUN
W-188	-6.944E+00	1.351E+01	1.972E+01	FAIL ABUN
IR-192	2.083E-02	5.598E-02	1.054E-01	FAIL ABUN
HG-203	1.153E-04	7.068E-02	1.267E-01	NOT IDENT.
TL-204	-2.857E+00	7.827E+00	1.262E+01	NOT IDENT.
BI-207	0.000E+00	6.443E-02	1.305E-01	FAIL ABUN
BI-210	-4.689E+00	1.029E+01	1.672E+01	NOT IDENT.
PB-210	-4.689E+00	1.029E+01	1.672E+01	NOT IDENT.
PB-211	2.826E-01	9.108E-01	1.650E+00	NOT IDENT.
BI-213	4.194E-03	1.416E-01	2.712E-01	NOT IDENT.
RN-219	-8.543E-02	5.013E-01	8.367E-01	NOT IDENT.
RA-223	8.499E-02	8.702E-01	1.423E+00	FAIL ABUN
AC-225	-9.374E-01	3.974E+00	6.632E+00	NOT IDENT.
AC-227	-1.138E-01	3.317E-01	5.724E-01	NOT IDENT.
TH-227	-1.138E-01	3.317E-01	5.724E-01	NOT IDENT.
TH-229	-4.469E-01	6.013E-01	1.005E+00	FAIL ABUN
PA-231	3.915E-01	6.720E-01	1.270E+00	NOT IDENT.
TH-231	8.499E-02	8.702E-01	1.423E+00	FAIL ABUN
PA-233	3.255E-02	8.264E-02	1.561E-01	NOT IDENT.
PA-234	3.246E-01	4.033E-01	8.551E-01	FAIL ABUN
PA-234M	7.502E+00	1.282E+01	1.501E+01	FAIL ABUN
U-235	-1.657E-01	2.748E-01	4.776E-01	FAIL ABUN
NP-237	3.255E-02	8.264E-02	1.561E-01	NOT IDENT.
NP-238	0.000E+00	6.658E+04	0.000E+00	SHORT HLIF
NP-239	-3.393E-02	3.691E-01	6.019E-01	NOT IDENT.
PU-239	-1.407E+02	4.136E+02	7.336E+02	FAIL ABUN
AM-241	-4.715E-02	2.840E-01	4.734E-01	NOT IDENT.
CM-243	6.640E-02	1.253E-01	2.427E-01	NOT IDENT.
BK-247	6.852E-02	9.573E-02	1.879E-01	NOT IDENT.
CM-247	-1.683E-02	4.652E-02	7.454E-02	NOT IDENT.
CF-249	3.468E-02	5.235E-02	1.073E-01	NOT IDENT.
CF-251	-5.807E-02	1.478E-01	2.582E-01	NOT IDENT.

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
K-40	1460.82	162	10.66*	1.013E+00	1.160E+01	1.160E+01	15.48
TL-208	277.37	-----	6.60	3.962E+00	-----	Line Not Found	-----
	583.19	46	85.00*	2.224E+00	1.899E-01	1.899E-01	45.29
	860.56	-----	12.50	1.600E+00	-----	Line Not Found	-----
BI-211	72.87	-----	1.23	3.165E+00	-----	Line Not Found	-----
	351.06	85	12.92*	3.309E+00	1.547E+00	1.547E+00	33.78
BI-212	727.33	9	6.67*	1.853E+00	5.514E-01	5.514E-01	145.46
	1620.50	-----	1.47	9.391E-01	-----	Line Not Found	-----
PB-212	74.82	61	10.28	3.355E+00	1.374E+00	1.374E+00	65.69
	77.11	69	17.10	3.648E+00	8.556E-01	8.556E-01	54.29
	238.63	165	43.60*	4.422E+00	6.636E-01	6.636E-01	21.50
	300.09	-----	3.30	3.734E+00	-----	Line Not Found	-----
BI-214	609.32	89	45.49*	2.147E+00	7.048E-01	7.048E-01	29.13
	1120.29	-----	14.92	1.267E+00	-----	Line Not Found	-----
	1764.49	22	15.30	8.908E-01	1.270E+00	1.271E+00	40.82
PB-214	74.82	61	5.80	3.355E+00	2.435E+00	2.435E+00	65.69
	77.11	69	9.70	3.648E+00	1.508E+00	1.508E+00	54.29
	87.09	-----	3.41	4.534E+00	-----	Line Not Found	-----
	242.00	51	7.25	4.383E+00	1.252E+00	1.252E+00	61.87
	295.22	67	18.42	3.783E+00	7.414E-01	7.415E-01	48.00
	351.93	85	35.60*	3.309E+00	5.614E-01	5.615E-01	33.78
RN-222	609.32	89	45.49*	2.147E+00	7.048E-01	7.048E-01	29.13
	1120.29	-----	14.92	1.267E+00	-----	Line Not Found	-----
	1764.49	22	15.30	8.908E-01	1.270E+00	1.271E+00	40.82
RA-224	240.99	51	4.10*	4.383E+00	2.214E+00	2.214E+00	61.87
RA-226	74.82	61	5.80	3.355E+00	2.435E+00	2.435E+00	65.69
	77.11	69	9.70	3.648E+00	1.508E+00	1.508E+00	54.29
	87.09	-----	3.41	4.534E+00	-----	Line Not Found	-----
	242.00	51	7.25	4.383E+00	1.252E+00	1.252E+00	61.87
	295.22	67	18.42	3.783E+00	7.414E-01	7.415E-01	48.00
	351.93	85	35.60*	3.309E+00	5.614E-01	5.615E-01	33.78
AC-228	105.21	-----	1.10	5.511E+00	-----	Line Not Found	-----
	338.32	32	11.27	3.408E+00	6.535E-01	6.535E-01	67.77
	835.71	-----	1.61	1.642E+00	-----	Line Not Found	-----
	911.20	17	25.80*	1.522E+00	3.367E-01	3.367E-01	90.47
	968.97	11	15.80	1.439E+00	3.659E-01	3.659E-01	156.83
RA-228	105.21	-----	1.10	5.511E+00	-----	Line Not Found	-----
	338.32	32	11.27	3.408E+00	6.535E-01	6.535E-01	67.77
	835.71	-----	1.61	1.642E+00	-----	Line Not Found	-----
	911.20	17	25.80*	1.522E+00	3.367E-01	3.367E-01	90.47
	968.97	11	15.80	1.439E+00	3.659E-01	3.659E-01	156.83
TH-228	74.82	61	10.28	3.355E+00	1.374E+00	1.374E+00	65.69
	77.11	69	17.10	3.648E+00	8.556E-01	8.556E-01	54.29
	238.63	165	43.60*	4.422E+00	6.636E-01	6.636E-01	21.50
	300.09	-----	3.30	3.734E+00	-----	Line Not Found	-----
TH-230	74.82	61	5.80	3.355E+00	2.435E+00	2.435E+00	65.69
	77.11	69	9.70	3.648E+00	1.508E+00	1.508E+00	54.29

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
	87.09	-----	3.41	4.534E+00	-----	Line Not Found	-----
	242.00	51	7.25	4.383E+00	1.252E+00	1.252E+00	61.87
	295.22	67	18.42	3.783E+00	7.414E-01	7.414E-01	48.00
	351.93	85	35.60*	3.309E+00	5.614E-01	5.614E-01	33.78
TH-232	105.21	-----	1.10	5.511E+00	-----	Line Not Found	-----
	338.32	32	11.27	3.408E+00	6.535E-01	6.535E-01	67.77
	835.71	-----	1.61	1.642E+00	-----	Line Not Found	-----
	911.20	17	25.80*	1.522E+00	3.367E-01	3.367E-01	90.47
	968.97	11	15.80	1.439E+00	3.659E-01	3.659E-01	156.83
TH-234	63.29	20	3.70*	1.976E+00	2.132E+00	2.132E+00	203.87
	92.59	15	4.23	4.910E+00	5.652E-01	5.652E-01	333.22
U-234	74.82	61	5.80	3.355E+00	2.435E+00	2.435E+00	65.69
	77.11	69	9.70	3.648E+00	1.508E+00	1.508E+00	54.29
	87.09	-----	3.41	4.534E+00	-----	Line Not Found	-----
	242.00	51	7.25	4.383E+00	1.252E+00	1.252E+00	61.87
	295.22	67	18.42	3.783E+00	7.414E-01	7.414E-01	48.00
	351.93	85	35.60*	3.309E+00	5.614E-01	5.614E-01	33.78
U-238	63.29	20	3.70*	1.976E+00	2.132E+00	2.132E+00	203.87
	92.59	15	4.23	4.910E+00	5.652E-01	5.652E-01	333.22
AM-243	43.53	-----	5.90	2.343E-01	-----	Line Not Found	-----
	74.66	61	67.20*	3.355E+00	2.102E-01	2.102E-01	65.69
ANH-511	511.00	14	100.00*	2.475E+00	4.368E-02	4.368E-02	230.37

Flag: "*" = Keyline

Total number of lines in spectrum 41
 Number of unidentified lines 8
 Number of lines tentatively identified by NID 33 80.49%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
K-40	1.25E+09Y	1.00	1.160E+01	1.160E+01	0.180E+01	15.48	
TL-208	1.41E+10Y	1.00	1.899E-01	1.899E-01	0.860E-01	45.29	
BI-211	7.04E+08Y	1.00	1.547E+00	1.547E+00	0.523E+00	33.78	
BI-212	1.41E+10Y	1.00	5.514E-01	5.514E-01	8.020E-01	145.46	
PB-212	1.41E+10Y	1.00	6.636E-01	6.636E-01	1.427E-01	21.50	
BI-214	1600.00Y	1.00	7.048E-01	7.048E-01	2.053E-01	29.13	
PB-214	1600.00Y	1.00	5.614E-01	5.615E-01	1.896E-01	33.78	
RN-222	1600.00Y	1.00	7.048E-01	7.048E-01	2.053E-01	29.13	
RA-224	1.41E+10Y	1.00	2.214E+00	2.214E+00	1.370E+00	61.87	
RA-226	1600.00Y	1.00	5.614E-01	5.615E-01	1.896E-01	33.78	
AC-228	1.41E+10Y	1.00	3.367E-01	3.367E-01	3.046E-01	90.47	
RA-228	1.41E+10Y	1.00	3.367E-01	3.367E-01	3.046E-01	90.47	
TH-228	1.41E+10Y	1.00	6.636E-01	6.636E-01	1.427E-01	21.50	
TH-230	7.54E+04Y	1.00	5.614E-01	5.614E-01	1.896E-01	33.78	
TH-232	1.41E+10Y	1.00	3.367E-01	3.367E-01	3.046E-01	90.47	
TH-234	4.47E+09Y	1.00	2.132E+00	2.132E+00	4.347E+00	203.87	
U-234	2.45E+05Y	1.00	5.614E-01	5.614E-01	1.896E-01	33.78	
U-238	4.47E+09Y	1.00	2.132E+00	2.132E+00	4.347E+00	203.87	
AM-243	7370.00Y	1.00	2.102E-01	2.102E-01	1.381E-01	65.69	
ANH-511	1.00E+09Y	1.00	4.368E-02	4.368E-02	10.06E-02	230.37	
Total Activity :			2.661E+01	2.661E+01			

Grand Total Activity : 2.661E+01 2.661E+01

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	111.91	36	88	3.74	223.39	217	13	1.03E-02	****	5.69E+00	T
0	185.94	25	48	1.29	371.38	366	10	7.28E-03	****	5.20E+00	T
0	211.29	55	61	6.29	422.06	415	16	1.59E-02	67.8	4.81E+00	T
0	328.73	32	24	1.15	656.86	651	13	9.43E-03	70.6	3.48E+00	T
0	376.94	19	31	3.30	753.24	743	15	5.57E-03	****	3.14E+00	T
2	413.70	19	8	2.15	826.75	803	33	5.52E-03	84.6	2.92E+00	T
2	416.90	15	3	1.45	833.15	803	33	4.31E-03	57.2	2.90E+00	
0	422.06	27	11	5.41	843.46	837	15	7.85E-03	64.2	2.87E+00	
0	553.56	16	14	1.22	1106.40	1100	13	4.84E-03	****	2.32E+00	T
0	645.71	5	9	0.53	1290.67	1285	12	1.57E-03	****	2.05E+00	
0	676.61	12	13	4.42	1352.46	1345	16	3.67E-03	****	1.97E+00	T
0	741.34	13	6	0.77	1481.90	1477	9	3.95E-03	84.6	1.82E+00	
0	768.92	10	23	1.07	1537.07	1529	14	2.94E-03	****	1.77E+00	
0	872.49	5	11	0.99	1744.20	1736	12	1.39E-03	****	1.58E+00	T
0	902.96	5	6	0.92	1805.13	1798	9	1.48E-03	****	1.53E+00	T
0	934.61	6	7	0.86	1868.44	1861	11	1.68E-03	****	1.49E+00	T
0	953.74	14	3	0.59	1906.71	1899	14	4.06E-03	75.3	1.46E+00	T
0	1001.22	11	15	0.55	2001.68	1993	20	3.38E-03	****	1.40E+00	T
0	1099.16	11	6	1.10	2197.56	2190	12	3.33E-03	****	1.29E+00	T
0	1153.37	4	8	1.37	2306.00	2300	9	1.11E-03	****	1.23E+00	
5	1179.04	16	0	2.87	2357.36	2352	13	4.68E-03	50.4	1.21E+00	T
5	1181.35	8	0	1.78	2361.98	2352	13	2.39E-03	65.7	1.21E+00	
0	1225.73	4	7	0.55	2450.75	2443	10	1.10E-03	****	1.17E+00	
0	1236.77	19	11	0.91	2472.84	2464	16	5.59E-03	88.9	1.16E+00	T

Flags: "T" = Tentatively associated

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*****
*
*           GEL Laboratories LLC
*           2040 Savage Road
*           Charleston, SC 29407
*****
*
*           DETECTOR AND SAMPLE DATA
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205313911.CNF;1
* Acquisition date   : 28-FEB-2023 06:51:01 Sensitivity      : 3.000
* Detector ID       : GAM03 Energy tolerance: 1.500
* Elapsed live time : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time : 0 01:00:00.33 Half life ratio : *****
* Sample date       : 20-JAN-2023 11:00:00 Nuclide Library : SOLID
* Sample ID         : G1205313911 Analyst initials: RXF2
* Batch Number      : 2379916 Sample Quantity : 9.6810E+01 GRAM
* Wet wt corr       : 1.00000 Wet Weight : 0.00000
* Dry Weight        : 0.00000
*****
*
*           CALIBRATION INFORMATION
*
* Eff. Cal. date    : 12-OCT-2022 09:50:42 Eff. Geometry   : CAN
* Eff. File         : DKA100:[CANBERRA.GAMMA]EFF_GAM03_CAN.CNF;29
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)
K-40	3.321E-01
TL-208	3.724E-02
BI-211	2.567E-01
BI-212	6.430E-01
PB-212	5.218E-02
BI-214	8.310E-02
PB-214	7.963E-02
RN-222	8.310E-02
RA-224	5.593E-01
RA-226	7.963E-02
AC-228	1.593E-01
RA-228	1.593E-01
TH-228	5.218E-02
TH-230	7.963E-02
TH-232	1.593E-01
TH-234	1.743E+00
U-234	7.963E-02
U-238	1.743E+00
AM-243	5.947E-02
ANH-511	3.052E-02

---- Non-Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)	
BE-7	4.229E-01	NOT IDENT.
NA-22	4.577E-02	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	4.076E-02	NOT IDENT.
SC-46	6.102E-02	NOT IDENT.
V-48	2.251E-01	NOT IDENT.
CR-51	6.517E-01	NOT IDENT.
MN-52	6.421E+00	FAIL ABUN
MN-54	4.373E-02	NOT IDENT.
CO-56	3.832E-02	NOT IDENT.
MN-56	0.000E+00	SHORT HLIF

CO-57	2.275E-02	NOT IDENT.
CO-58	4.389E-02	NOT IDENT.
FE-59	1.769E-01	FAIL ABUN
CO-60	4.986E-02	NOT IDENT.
ZN-65	9.517E-02	NOT IDENT.
GE-68	1.708E+00	NOT IDENT.
AS-73	1.842E+00	NOT IDENT.
AS-74	2.090E-01	NOT IDENT.
SE-75	5.395E-02	NOT IDENT.
BR-77	0.000E+00	SHORT HLIF
SR-82	5.608E-01	NOT IDENT.
RB-83	9.153E-02	FAIL ABUN
RB-84	1.440E-01	NOT IDENT.
KR-85	8.987E+00	NOT IDENT.
SR-85	6.110E-02	NOT IDENT.
RB-86	2.382E+00	NOT IDENT.
Y-88	4.640E-02	NOT IDENT.
Y-91	2.063E+01	NOT IDENT.
NB-94	3.903E-02	FAIL ABUN
NB-95	5.735E-02	NOT IDENT.
NB-95M	1.879E-01	NOT IDENT.
ZR-95	9.406E-02	NOT IDENT.
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	0.000E+00	SHORT HLIF
TC-99M	0.000E+00	SHORT HLIF
RH-101	3.382E-02	NOT IDENT.
RH-102	5.828E-02	NOT IDENT.
RU-103	5.858E-02	NOT IDENT.
RH-106	3.349E-01	NOT IDENT.
RU-106	3.349E-01	NOT IDENT.
AG-108M	3.046E-02	NOT IDENT.
CD-109	9.536E-01	NOT IDENT.
AG-110	1.036E+00	NOT IDENT.
AG-110M	7.442E-02	FAIL ABUN
SN-113	5.904E-02	NOT IDENT.
CD-115	0.000E+00	SHORT HLIF
SN-117M	1.859E-01	NOT IDENT.
SB-122	0.000E+00	SHORT HLIF
TE-123M	3.264E-02	NOT IDENT.
SB-124	1.114E-01	NOT IDENT.
SB-125	7.869E-02	NOT IDENT.
TE-125M	1.317E+01	NOT IDENT.
I-126	7.777E-01	NOT IDENT.
SB-126	4.448E-01	FAIL ABUN
SN-126	8.900E-02	FAIL ABUN
SB-127	0.000E+00	SHORT HLIF
I-131	9.885E-01	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	0.000E+00	SHORT HLIF
BA-133	4.646E-02	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	5.511E-02	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	3.860E-01	FAIL ABUN
BA-137M	3.971E-02	NOT IDENT.
CS-137	4.195E-02	NOT IDENT.
LA-138	7.281E-02	NOT IDENT.
CE-139	2.950E-02	NOT IDENT.
BA-140	1.004E+00	NOT IDENT.
LA-140	2.307E-01	FAIL ABUN
CE-141	1.182E-01	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	2.251E-01	NOT IDENT.
PM-144	4.089E-02	NOT IDENT.
PR-144	3.110E+00	NOT IDENT.
PM-146	4.096E-02	NOT IDENT.
ND-147	2.641E+00	FAIL ABUN
PM-147	7.351E+02	NOT IDENT.
PM-149	0.000E+00	SHORT HLIF
EU-150	3.075E-02	FAIL ABUN
EU-152	1.237E-01	NOT IDENT.
GD-153	9.930E-02	NOT IDENT.
EU-154	1.286E-01	FAIL ABUN
EU-155	1.075E-01	NOT IDENT.
TB-160	1.629E-01	FAIL ABUN
HO-166M	5.897E-02	NOT IDENT.
TM-171	3.013E+01	NOT IDENT.

HF-172	2.013E-01	FAIL ABUN
LU-172	6.289E-02	FAIL ABUN
LU-176	2.706E-02	NOT IDENT.
HF-181	7.336E-02	NOT IDENT.
TA-182	2.121E-01	NOT IDENT.
RE-183	3.782E-01	NOT IDENT.
RE-184	2.241E-01	FAIL ABUN
W-188	8.866E+00	FAIL ABUN
IR-192	4.767E-02	FAIL ABUN
HG-203	5.762E-02	NOT IDENT.
TL-204	5.854E+00	NOT IDENT.
BI-207	5.475E-02	FAIL ABUN
BI-210	7.733E+00	NOT IDENT.
PB-210	7.733E+00	NOT IDENT.
PB-211	7.324E-01	NOT IDENT.
BI-213	1.212E-01	NOT IDENT.
RN-219	3.657E-01	NOT IDENT.
RA-223	6.378E-01	FAIL ABUN
AC-225	3.031E+00	NOT IDENT.
AC-227	2.602E-01	NOT IDENT.
TH-227	2.602E-01	NOT IDENT.
TH-229	4.562E-01	FAIL ABUN
PA-231	5.831E-01	NOT IDENT.
TH-231	6.378E-01	FAIL ABUN
PA-233	7.061E-02	NOT IDENT.
PA-234	3.689E-01	FAIL ABUN
PA-234M	6.623E+00	FAIL ABUN
U-235	2.225E-01	FAIL ABUN
NP-237	7.061E-02	NOT IDENT.
NP-238	0.000E+00	SHORT HLIF
NP-239	2.783E-01	NOT IDENT.
PU-239	3.388E+02	FAIL ABUN
AM-241	2.185E-01	NOT IDENT.
CM-243	1.122E-01	NOT IDENT.
BK-247	8.554E-02	NOT IDENT.
CM-247	3.243E-02	NOT IDENT.
CF-249	4.851E-02	NOT IDENT.
CF-251	1.179E-01	NOT IDENT.

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                          *
*****
*                               DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205313911.CNF;1
* Acquisition date   : 28-FEB-2023 06:51:01 Sensitivity      : 3.000
* Detector ID       : GAM03 Energy tolerance: 1.500
* Elapsed live time : 0 01:00:00.00 Abundance limit : 75.000
* Elapsed real time : 0 01:00:00.33 Half life ratio : *****
* Sample date      : 20-JAN-2023 11:00:00 Nuclide Library : SOLID
* Sample ID       : G1205313911 Analyst initials: RXF2
* Batch Number    : 2379916 Sample Quantity : 9.6810E+01 GRAM
*                               Quantity Err(%) : 1.0330E-03 %
* Wet wt corr     : 1.00000 Wet Weight      : 0.00000
*                               Dry Weight     : 0.00000
*****
*                               CALIBRATION INFORMATION                         *
*
* Eff. Cal. date    : 12-OCT-2022 09:50:42 Eff. Geometry   : CAN
* Eff. File        : DKA100:[CANBERRA.GAMMA]EFF_GAM03_CAN.CNF;29
*****

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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
K-40	1.160E+01	2.063E+00	2.063E+00
TL-208	1.899E-01	8.600E-02	8.600E-02
BI-211	1.547E+00	5.327E-01	5.327E-01
BI-212	5.514E-01	7.875E-01	7.875E-01
PB-212	6.636E-01	1.524E-01	1.524E-01
BI-214	7.048E-01	2.107E-01	2.107E-01
PB-214	5.615E-01	1.931E-01	1.931E-01
RN-222	7.048E-01	2.107E-01	2.107E-01
RA-224	2.214E+00	1.358E+00	1.358E+00
RA-226	5.615E-01	1.931E-01	1.931E-01
AC-228	3.367E-01	3.000E-01	3.000E-01
RA-228	3.367E-01	3.000E-01	3.000E-01
TH-228	6.636E-01	1.524E-01	1.524E-01
TH-230	5.614E-01	1.931E-01	1.931E-01
TH-232	3.367E-01	3.000E-01	3.000E-01
TH-234	2.132E+00	4.288E+00	4.288E+00
U-234	5.614E-01	1.931E-01	1.931E-01
U-238	2.132E+00	4.288E+00	4.288E+00
AM-243	2.102E-01	1.364E-01	1.364E-01
ANH-511	4.368E-02	9.869E-02	9.869E-02

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	5.902E-02	4.881E-01	4.888E-01	NOT IDENT.
NA-22	-1.211E-02	5.742E-02	5.767E-02	NOT IDENT.
NA-24	-3.938E+16	2.397E+17	0.000E+00	SHORT HLIF
AL-26	6.785E-03	4.745E-02	4.755E-02	NOT IDENT.
SC-46	-2.690E-03	7.544E-02	7.545E-02	NOT IDENT.
V-48	-7.087E-02	2.943E-01	2.960E-01	NOT IDENT.
CR-51	-4.529E-01	8.744E-01	8.979E-01	NOT IDENT.
MN-52	6.460E+00	6.072E+00	6.734E+00	FAIL ABUN
MN-54	4.250E-02	4.443E-02	4.838E-02	NOT IDENT.
CO-56	-4.625E-02	5.918E-02	6.275E-02	NOT IDENT.

MN-56	-1.000E+41	1.289E+41	0.000E+00	SHORT HLIF
CO-57	-3.305E-02	3.048E-02	3.392E-02	NOT IDENT.
CO-58	-2.510E-02	5.966E-02	6.073E-02	NOT IDENT.
FE-59	2.189E-01	2.157E-01	2.372E-01	FAIL ABUN
CO-60	5.080E-02	4.692E-02	5.221E-02	NOT IDENT.
ZN-65	-9.803E-02	1.319E-01	1.391E-01	NOT IDENT.
GE-68	1.776E+00	1.672E+00	1.854E+00	NOT IDENT.
AS-73	9.150E-01	2.269E+00	2.306E+00	NOT IDENT.
AS-74	-3.396E-01	3.139E-01	3.492E-01	NOT IDENT.
SE-75	3.228E-02	6.188E-02	6.357E-02	NOT IDENT.
BR-77	1.043E+05	1.193E+05	1.283E+05	SHORT HLIF
SR-82	-3.700E-01	7.695E-01	7.874E-01	NOT IDENT.
RB-83	8.389E-03	1.070E-01	1.071E-01	FAIL ABUN
RB-84	4.490E-02	1.680E-01	1.692E-01	NOT IDENT.
KR-85	7.601E+00	1.069E+01	1.123E+01	NOT IDENT.
SR-85	5.160E-02	7.270E-02	7.633E-02	NOT IDENT.
RB-86	2.616E+00	2.289E+00	2.575E+00	NOT IDENT.
Y-88	2.266E-02	4.651E-02	4.761E-02	NOT IDENT.
Y-91	1.281E+00	2.411E+01	2.412E+01	NOT IDENT.
NB-94	-8.486E-03	4.854E-02	4.869E-02	FAIL ABUN
NB-95	-3.064E-02	8.246E-02	8.361E-02	NOT IDENT.
NB-95M	2.841E-01	2.021E-01	2.393E-01	NOT IDENT.
ZR-95	-7.695E-02	1.296E-01	1.342E-01	NOT IDENT.
NB-97	1.000E+41	1.402E+41	0.000E+00	SHORT HLIF
ZR-97	3.035E+16	3.318E+16	0.000E+00	SHORT HLIF
MO-99	1.548E+02	8.615E+03	8.616E+03	SHORT HLIF
TC-99M	-1.000E+41	7.750E+41	0.000E+00	SHORT HLIF
RH-101	1.969E-02	3.832E-02	3.933E-02	NOT IDENT.
RH-102	-2.634E-02	7.461E-02	7.555E-02	NOT IDENT.
RU-103	-3.445E-02	7.495E-02	7.654E-02	NOT IDENT.
RH-106	-1.864E-02	4.045E-01	4.046E-01	NOT IDENT.
RU-106	-1.864E-02	4.045E-01	4.046E-01	NOT IDENT.
AG-108M	-3.156E-03	3.614E-02	3.617E-02	NOT IDENT.
CD-109	1.955E-01	1.215E+00	1.218E+00	NOT IDENT.
AG-110	1.070E+00	1.080E+00	1.183E+00	NOT IDENT.
AG-110M	3.809E-02	8.456E-02	8.628E-02	FAIL ABUN
SN-113	1.018E-02	6.750E-02	6.766E-02	NOT IDENT.
CD-115	-5.741E+03	2.177E+04	2.192E+04	SHORT HLIF
SN-117M	-1.400E-01	2.353E-01	2.436E-01	NOT IDENT.
SB-122	-1.647E+02	1.064E+03	1.067E+03	SHORT HLIF
TE-123M	-1.793E-02	4.069E-02	4.148E-02	NOT IDENT.
SB-124	2.487E-02	1.251E-01	1.256E-01	NOT IDENT.
SB-125	-1.118E-02	1.071E-01	1.072E-01	NOT IDENT.
TE-125M	2.858E+00	1.685E+01	1.690E+01	NOT IDENT.
I-126	-3.911E-02	9.432E-01	9.433E-01	NOT IDENT.
SB-126	-1.279E-01	6.577E-01	6.603E-01	FAIL ABUN
SN-126	-5.372E-03	1.157E-01	1.157E-01	FAIL ABUN
SB-127	-1.207E+02	1.340E+02	1.446E+02	SHORT HLIF
I-131	-6.546E-01	1.329E+00	1.362E+00	NOT IDENT.
I-132	-1.000E+41	3.508E+41	0.000E+00	SHORT HLIF
TE-132	2.901E+01	1.445E+02	1.451E+02	SHORT HLIF
BA-133	2.632E-02	5.978E-02	6.094E-02	NOT IDENT.
I-133	-1.534E+11	1.278E+12	1.280E+12	SHORT HLIF
CS-134	2.368E-02	6.254E-02	6.344E-02	NOT IDENT.
I-135	-1.000E+41	1.547E+41	0.000E+00	SHORT HLIF
CS-136	-5.833E-03	4.550E-01	4.550E-01	FAIL ABUN
BA-137M	-1.762E-02	5.074E-02	5.135E-02	NOT IDENT.
CS-137	-1.862E-02	5.360E-02	5.425E-02	NOT IDENT.
LA-138	5.194E-02	7.345E-02	7.709E-02	NOT IDENT.
CE-139	-1.833E-02	3.749E-02	3.839E-02	NOT IDENT.
BA-140	-4.903E-01	1.272E+00	1.291E+00	NOT IDENT.
LA-140	-1.516E-01	3.482E-01	3.548E-01	FAIL ABUN
CE-141	6.227E-02	1.352E-01	1.381E-01	NOT IDENT.
CE-143	4.047E+07	2.915E+07	3.438E+07	SHORT HLIF
CE-144	7.638E-02	2.596E-01	2.619E-01	NOT IDENT.
PM-144	-3.477E-03	4.994E-02	4.996E-02	NOT IDENT.
PR-144	-2.236E-01	3.791E+00	3.792E+00	NOT IDENT.
PM-146	-3.863E-02	5.415E-02	5.688E-02	NOT IDENT.
ND-147	-1.393E+00	3.357E+00	3.415E+00	FAIL ABUN
PM-147	-3.095E+02	8.971E+02	9.078E+02	NOT IDENT.
PM-149	4.686E+04	2.022E+05	2.033E+05	SHORT HLIF
EU-150	2.768E-02	4.641E-02	4.806E-02	FAIL ABUN
EU-152	2.250E-02	1.509E-01	1.512E-01	NOT IDENT.
GD-153	-1.227E-02	1.275E-01	1.276E-01	NOT IDENT.
EU-154	-3.262E-02	1.610E-01	1.617E-01	FAIL ABUN
EU-155	-3.560E-02	1.296E-01	1.306E-01	NOT IDENT.
TB-160	-9.943E-02	2.233E-01	2.278E-01	FAIL ABUN
HO-166M	-1.484E-02	7.431E-02	7.461E-02	NOT IDENT.

TM-171	-3.831E+01	4.356E+01	4.686E+01	NOT IDENT.
HF-172	9.610E-02	2.292E-01	2.333E-01	FAIL ABUN
LU-172	-3.121E-02	9.536E-02	9.639E-02	FAIL ABUN
LU-176	1.340E-02	3.142E-02	3.199E-02	NOT IDENT.
HF-181	2.080E-02	8.342E-02	8.395E-02	NOT IDENT.
TA-182	-7.045E-02	3.123E-01	3.139E-01	NOT IDENT.
RE-183	1.600E-01	4.627E-01	4.683E-01	NOT IDENT.
RE-184	1.419E-01	2.723E-01	2.797E-01	FAIL ABUN
W-188	-6.944E+00	1.354E+01	1.390E+01	FAIL ABUN
IR-192	2.083E-02	5.602E-02	5.680E-02	FAIL ABUN
HG-203	1.153E-04	7.068E-02	7.068E-02	NOT IDENT.
TL-204	-2.857E+00	7.832E+00	7.937E+00	NOT IDENT.
BI-207	0.000E+00	6.443E-02	0.000E+00	FAIL ABUN
BI-210	-4.689E+00	1.030E+01	1.051E+01	NOT IDENT.
PB-210	-4.689E+00	1.030E+01	1.051E+01	NOT IDENT.
PB-211	2.826E-01	9.111E-01	9.200E-01	NOT IDENT.
BI-213	4.194E-03	1.416E-01	1.416E-01	NOT IDENT.
RN-219	-8.543E-02	5.015E-01	5.030E-01	NOT IDENT.
RA-223	8.499E-02	8.703E-01	8.711E-01	FAIL ABUN
AC-225	-9.374E-01	3.975E+00	3.998E+00	NOT IDENT.
AC-227	-1.138E-01	3.322E-01	3.361E-01	NOT IDENT.
TH-227	-1.138E-01	3.322E-01	3.361E-01	NOT IDENT.
TH-229	-4.469E-01	6.023E-01	6.351E-01	FAIL ABUN
PA-231	3.915E-01	6.780E-01	7.006E-01	NOT IDENT.
TH-231	8.499E-02	8.703E-01	8.711E-01	FAIL ABUN
PA-233	3.255E-02	8.270E-02	8.399E-02	NOT IDENT.
PA-234	3.246E-01	5.487E-01	5.679E-01	FAIL ABUN
PA-234M	7.502E+00	1.284E+01	1.328E+01	FAIL ABUN
U-235	-1.657E-01	2.751E-01	2.850E-01	FAIL ABUN
NP-237	3.255E-02	8.270E-02	8.399E-02	NOT IDENT.
NP-238	1.073E+04	6.659E+04	6.676E+04	SHORT HLIF
NP-239	-3.393E-02	3.691E-01	3.694E-01	NOT IDENT.
PU-239	-1.407E+02	4.137E+02	4.185E+02	FAIL ABUN
AM-241	-4.715E-02	2.841E-01	2.849E-01	NOT IDENT.
CM-243	6.640E-02	1.255E-01	1.290E-01	NOT IDENT.
BK-247	6.852E-02	9.688E-02	1.017E-01	NOT IDENT.
CM-247	-1.683E-02	4.663E-02	4.724E-02	NOT IDENT.
CF-249	3.468E-02	5.250E-02	5.477E-02	NOT IDENT.
CF-251	-5.807E-02	1.479E-01	1.502E-01	NOT IDENT.

 * GEL Laboratories LLC *
 * 2040 Savage Road *
 * Charleston, SC 29407 *
 * GAMMA SPECTROSCOPY BACKGROUND REPORT *

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	51.0042	85.43	74.1071	131.20	51.8624
45.60	48.8309	86.55	76.8981	133.02	52.9272
46.54	61.1813	86.79	79.5813	133.52	49.1774
49.72	0.0000	86.94	79.6014	136.00	50.2789
51.35	49.5116	87.09	79.6211	136.47	46.5112
51.87	48.3319	87.57	71.7163	140.51	0.0000
52.39	57.0750	88.03	69.1125	143.76	62.2480
52.97	54.6660	88.34	63.8291	144.24	48.8688
53.44	39.7996	88.47	63.8427	145.44	54.6963
54.07	39.8562	89.96	82.6649	152.43	38.6979
57.36	0.0000	1093.63	69.4084	153.25	41.6396
57.53	48.9470	91.11	61.4465	323.87	41.6851
57.98	41.4567	92.59	61.5928	156.02	48.5708
59.27	51.6491	93.35	61.6676	158.56	60.4006
59.32	51.6546	94.56	55.0700	159.00	55.5568
59.54	51.6787	94.65	59.1079	162.33	38.1530
60.96	53.0975	94.67	59.1096	162.66	30.3378
61.17	53.1207	94.87	59.1284	163.33	35.2570
62.93	53.3140	97.43	48.5711	165.86	44.1930
63.29	53.3531	98.43	49.5469	176.31	53.6243
63.58	53.3846	98.44	49.5478	176.60	57.6135
64.28	56.0061	99.53	47.8258	177.52	43.7489
66.73	48.6057	100.11	56.8996	181.07	0.0000
67.24	62.7386	102.03	44.3838	181.52	46.4248
125.81	56.3854	103.18	45.3674	184.41	30.0397
67.75	61.5198	103.37	40.8424	143.76	46.1217
68.89	56.5180	105.21	47.3242	193.51	45.4683
69.67	43.7389	105.31	47.3313	197.03	46.6378
70.82	63.1734	106.12	46.4761	198.01	51.7564
70.83	63.1749	106.47	45.1323	201.83	41.7599
72.81	56.0776	109.28	45.3161	203.43	57.1245
72.87	56.0839	111.00	45.8865	205.31	38.3205
74.66	56.2697	111.76	0.0000	210.85	43.1407
74.82	56.2862	114.06	52.5361	215.65	35.5925
74.97	56.3017	116.30	0.0000	218.12	42.1862
77.11	56.5209	116.74	52.7316	222.11	46.6951
78.74	53.6333	119.76	39.9440	227.09	40.6468
79.69	53.7234	121.12	50.2539	227.38	40.6571
80.03	53.7549	121.22	50.2608	228.16	0.0000
80.12	53.7640	121.78	47.5041	228.18	33.3831
80.19	55.0821	122.06	52.1807	116.74	33.3831
80.57	55.1189	122.92	46.6433	235.69	31.4999
81.00	64.3536	123.07	46.6525	235.96	31.5070
81.07	64.3615	265.00	46.6904	238.63	31.5784
81.75	69.6976	125.81	43.0756	238.98	0.0000
82.47	74.7881	127.23	44.0931	240.99	31.6412
83.79	53.6663	127.91	42.2542	242.00	31.6681
84.00	53.6856	129.30	55.4992	244.70	30.1522

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.40	0.0000	344.28	35.2761	563.25	20.1624
252.80	30.8857	345.93	32.4661	564.24	0.0000
254.15	0.0000	351.06	37.7165	569.33	17.3293
256.23	39.5154	351.93	27.4458	946.00	17.3304
260.90	0.0000	355.39	0.0000	569.70	17.3320
264.66	25.8037	356.01	20.6378	583.19	15.4990
264.80	25.8066	364.49	33.4280	584.27	9.3038
265.00	23.6597	366.42	0.0000	595.83	23.3767
269.46	28.0588	372.51	29.5394	427.87	21.4730
270.03	24.8324	375.05	23.2043	602.52	0.0000
271.23	33.5007	377.52	19.1725	604.72	17.2090
273.65	37.8939	356.01	18.6628	607.14	17.2267
276.40	32.5488	388.16	21.0498	609.32	20.5738
277.37	27.1439	388.63	15.7917	610.33	21.9543
277.60	32.5781	391.69	24.6098	614.28	14.1372
278.00	31.5016	264.66	21.2054	618.01	16.7162
279.20	33.7051	401.81	18.3904	620.36	14.7643
279.54	33.7139	402.40	19.8116	621.93	13.7889
279.70	34.8053	404.85	17.0057	630.19	0.0000
280.46	33.7372	410.95	17.0654	631.29	17.7979
283.69	33.8192	413.71	17.0921	633.25	21.7711
284.31	31.6515	414.70	17.1018	634.78	17.8237
285.41	33.8621	423.72	11.4592	635.95	20.8045
285.90	0.0000	427.09	12.9160	636.99	20.8135
287.50	26.2568	427.87	14.3572	657.50	10.9936
290.67	36.1877	433.94	19.8076	657.76	13.9932
293.27	0.0000	439.40	19.8667	657.90	0.0000
351.93	28.6062	440.45	23.4923	661.66	20.0214
295.96	34.6761	453.88	24.5722	664.57	0.0000
879.38	39.7053	463.37	11.8904	666.33	13.0385
299.98	43.0569	468.07	18.3377	666.50	13.0393
300.09	43.0601	473.00	0.0000	667.71	0.0000
300.13	43.0617	475.06	12.8830	677.62	17.1266
301.36	32.0486	476.78	8.2892	685.70	0.0000
302.85	33.1891	477.60	13.8210	692.65	0.0000
256.23	31.0129	482.18	17.5475	695.00	20.2850
304.85	31.0203	487.02	24.9973	696.49	17.2521
306.78	21.0785	492.35	0.0000	696.51	17.2527
308.46	32.2102	497.08	19.5404	697.00	14.2106
311.90	24.4944	505.52	20.9299	697.30	11.1668
316.51	24.5732	507.63	0.0000	697.49	11.1675
319.41	29.0987	511.00	17.8006	702.65	19.3276
320.08	31.3519	514.00	18.0141	706.68	17.3196
321.04	22.4089	514.00	18.0142	711.68	13.2698
323.87	23.5746	520.40	15.9992	720.70	9.8323
325.23	32.0237	520.69	0.0000	721.93	0.0000
328.76	19.1475	522.65	0.0000	722.78	6.5602
333.37	16.9470	527.90	0.0000	722.91	6.5604
333.97	20.3445	528.26	18.8934	723.31	6.5613
334.37	16.9583	529.59	17.9604	724.19	3.2817
338.28	27.2036	529.87	0.0000	727.33	19.7139
338.32	27.2041	531.02	20.8103	733.00	17.4913
311.90	32.3507	537.26	19.9227	735.93	13.1844
340.48	32.3507	546.56	0.0000	333.97	8.2449
340.55	32.3524	552.55	15.2871	739.50	0.0000

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
744.23	23.1431	949.00	5.3077	1384.29	7.9207
747.24	14.4802	667.71	0.0000	1408.01	6.9672
748.06	11.3807	962.31	7.4013	1434.09	2.0020
752.31	9.3257	964.08	8.8862	1435.80	3.0041
753.82	12.4413	966.17	14.2270	1457.56	0.0000
756.73	17.6438	911.20	10.0116	1460.82	4.0271
756.80	17.6443	983.53	13.4066	1489.16	5.0642
884.68	18.3138	984.45	0.0000	1505.03	6.0976
765.81	13.3281	1274.44	17.9419	1584.12	7.2297
766.42	11.6645	1001.03	8.9834	1596.21	4.1412
766.84	16.6660	1002.74	8.9878	1620.50	1.0403
772.60	0.0000	1004.73	7.1945	1621.92	1.0406
776.52	12.5427	507.63	0.0000	1678.03	0.0000
739.50	0.0000	1025.87	0.0000	1690.97	2.1092
778.90	12.5533	1028.54	0.0000	1750.46	0.0000
783.70	0.0000	1037.84	9.0786	1764.49	0.0000
788.74	16.7954	1038.76	0.0000	1063.66	3.2108
792.07	9.4584	631.29	10.0106	1771.35	4.2820
795.86	10.5234	1048.07	9.1045	1791.20	0.0000
810.06	11.6324	1049.04	7.2855	1808.65	3.2332
810.29	10.5756	1050.41	10.0214	1810.72	0.0000
344.28	10.5762	1063.66	9.1440	1836.06	1.0831
810.76	11.6351	1077.00	3.6711		
815.77	10.5954	1077.34	4.5894		
1048.07	11.6660	1085.87	10.1197		
832.01	14.9152	1093.63	10.7558		
834.85	5.3319	1099.45	6.1559		
835.71	8.5336	1112.07	9.2651		
836.80	0.0000	1112.84	11.1205		
846.75	0.0000	1115.54	16.6922		
846.77	12.8474	1120.29	13.9277		
856.80	22.5573	1120.55	12.0713		
860.56	19.3585	1221.41	8.3588		
871.09	6.4750	1129.67	6.5157		
873.19	5.1835	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	12.9847	1173.23	9.4141		
880.51	10.8246	1177.95	7.8544		
881.60	11.9111	1189.05	8.5069		
883.24	10.8340	1204.77	4.7446		
884.68	13.0067	1221.41	11.1169		
889.28	15.1967	1231.02	9.5513		
894.76	10.8737	1235.36	14.3423		
898.04	17.4160	1238.28	12.7578		
900.72	6.9723	1260.41	0.0000		
903.28	14.5374	1271.87	9.6465		
911.20	12.2418	1274.44	9.6523		
912.08	10.4956	1274.54	9.6528		
923.98	0.0000	1291.59	5.8151		
926.50	13.8060	1298.22	0.0000		
929.11	5.2756	1312.11	2.9216		
935.54	7.0480	1332.49	1.9569		
937.49	1.7630	1362.66	0.0000		
944.13	11.0413	1365.19	3.9434		
946.00	5.8921	1368.63	0.0000		

VAX/VMS Nuclide Identification Report Generated 28-FEB-2023 07:14:04.33

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                          *
*****
Configuration   : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205313912.CNF;1
Background file : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]BKG_GAM01.CNF;776
Background date : 26-FEB-2023 09:12:30
Sample date     : 8-FEB-2023 00:00:00. Acquisition date : 28-FEB-2023 06:58:38
Sample ID      : G1205313912. Sample quantity : 1.15000E+02 GRAM
Detector name  : GAM01. Detector geometry: CAN
Elapsed live time: 0 00:15:00.00. Elapsed real time: 0 00:15:01.81 0.2%
Energy tolerance : 1.50000 keV. Analyst Initials : RXF2
Abundance limit : 75.00000. Sensitivity : 3.00000
Batch ID       : 2379916. Detector SN# :
Matrix Spike ID : LCS ID :
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BACKGROUND CORRECTED SAMPLE PEAK REPORT

Pk	It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	Fit
1	0	35.57*	551	713	1.52	71.25	68	8	6.12E-01	9.7	
2	0	46.48	3258	3160	1.23	93.05	87	13	3.62E+00	4.0	
3	0	59.53	12753	2888	1.24	119.12	112	14	1.42E+01	1.3	
4	0	87.52	140	491	1.31	175.06	172	7	1.55E-01	27.7	
5	0	661.63*	10137	241	1.58	1322.38	1314	17	1.13E+01	1.1	
6	0	746.52	20	108	0.97	1492.05	1487	10	2.21E-02	101.1	
7	0	912.19*	67	217	4.97	1823.19	1816	16	7.42E-02	50.8	
8	0	1173.21	3202	66	1.90	2344.94	2337	18	3.56E+00	1.9	
9	0	1332.49	2850	8	1.87	2663.35	2655	17	3.17E+00	1.9	
10	0	1353.35	8	12	0.61	2705.06	2698	10	9.17E-03	86.8	
11	0	1450.28	8	2	1.78	2898.83	2894	8	8.83E-03	47.1	
12	0	1464.22	10	0	1.06	2926.70	2923	8	1.11E-02	31.6	

Flag: "*" = Peak area was modified by background subtraction

Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205313912.CNF;1
Analyses by : PEAK V16.9,PEAKEFF V2.2,ENBACK V1.6,NID V3.4
Sample title : RXF2
Sample date : 8-FEB-2023 00:00:00 Acquisition date : 28-FEB-2023 06:58:38
Sample ID : G1205313912 Sample quantity : 115.00 GRAM
Sample type : SOLID Sample geometry :
Detector name : GAMMA1 Detector geometry: CAN
Elapsed live time: 0 00:15:00.00 Elapsed real time: 0 00:15:01.81 0.2%
Energy tolerance : 1.50 keV Half life ratio : 10.00
Errors propagated: No Systematic Error : 0.00 %
Efficiency type : Empirical Efficiencies at : Peak Energy
Abundance limit : 75.00

Interference Report

No interference correction performed

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
CO-60	1173.23	3050	99.85	1.167E+00	6.834E+01	6.884E+01	3.73
	1332.49	2699	99.98*	1.042E+00	6.764E+01	6.813E+01	3.78
CD-109	88.03	148	3.70*	4.926E+00	2.127E+01	2.193E+01	55.37
SN-126	64.28	-----	9.60	2.459E+00	-----	Line Not Found	-----
	86.94	148	8.90	4.926E+00	8.843E+00	8.843E+00	55.37
	87.57	148	37.00*	4.926E+00	2.127E+00	2.127E+00	55.37
BA-137M	661.66	9900	89.90*	1.962E+00	1.466E+02	1.467E+02	2.11
CS-137	661.66	9900	85.10*	1.962E+00	1.548E+02	1.550E+02	2.11
BI-210	46.54	3547	4.25*	4.785E-01	4.555E+03	4.563E+03	7.94
PB-210	46.54	3547	4.25*	4.785E-01	4.555E+03	4.563E+03	7.94
AM-241	59.54	13752	35.90*	1.846E+00	5.420E+02	5.421E+02	2.53

Flag: "*" = Keyline

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*****
*                               GEL Laboratories LLC                               *
*                               2040 Savage Road                               *
*                               Charleston, SC 29407                          *
*****
*
*                               DETECTOR AND SAMPLE DATA                       *
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205313912.CNF;1
* Acquisition date   : 28-FEB-2023 06:58:38 Sensitivity      : 3.000
* Detector ID       : GAM01 Energy tolerance: 1.500
* Elapsed live time : 0 00:15:00.00 Abundance limit : 75.000
* Elapsed real time : 0 00:15:01.81 Half life ratio : *****
* Sample date       : 8-FEB-2023 00:00:00 Analyst initials: RXF2
* Sample ID        : G1205313912 Sample Quantity : 1.1500E+02 GRAM
* Batch Number     : 2379916 Wet Weight : 0.00000
* Wet wt corr      : 1.00000 Dry Weight : 0.00000
* Nuclide Library  : SOLID.NLB;17
*****
*
*                               CALIBRATION INFORMATION                         *
*
* Eff. Cal. date    : 14-JUN-2022 06:30:26 Eff. Geometry   : CAN
* Eff. File         : DKA100:[CANBERRA.GAMMA]EFF_GAM01_CAN.CNF;17
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Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Cnt uncert (1.96-sigma)	MDA (pCi/GRAM)
CO-60	6.813E+01	2.521E+00	5.722E-01
CD-109	2.193E+01	1.190E+01	1.429E+01
SN-126	2.127E+00	1.154E+00	1.369E+00
BA-137M	1.467E+02	3.031E+00	7.747E-01
CS-137	1.550E+02	3.202E+00	8.184E-01
BI-210	4.563E+03	3.551E+02	2.161E+02
PB-210	4.563E+03	3.551E+02	2.161E+02
AM-241	5.421E+02	1.345E+01	5.914E+00

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L.	Cnt Uncert (1.96-sigma)	MDA (pCi/GRAM)	
BE-7	6.728E+00		5.955E+00	1.075E+01	NOT IDENT.
NA-22	-1.893E-01		2.639E-01	4.525E-01	NOT IDENT.
NA-24	0.000E+00		1.143E+09	0.000E+00	SHORT HLIF
AL-26	-1.251E-01		2.237E-01	3.886E-01	NOT IDENT.
K-40	3.401E-01		1.280E+00	3.034E+00	NOT IDENT.
SC-46	6.280E-02		5.864E-01	1.075E+00	NOT IDENT.
V-48	-3.208E-01		1.237E+00	2.212E+00	NOT IDENT.
CR-51	-2.330E+00		5.668E+00	9.833E+00	NOT IDENT.
MN-52	3.397E-01		2.140E+00	4.636E+00	NOT IDENT.
MN-54	6.368E-02		4.720E-01	8.714E-01	NOT IDENT.
CO-56	-2.905E-02		5.495E-01	1.003E+00	NOT IDENT.
MN-56	0.000E+00		1.960E+41	0.000E+00	SHORT HLIF
CO-57	-1.215E-01		2.745E-01	4.945E-01	NOT IDENT.
CO-58	2.257E-02		5.376E-01	9.246E-01	NOT IDENT.
FE-59	-7.888E-01		1.397E+00	2.428E+00	NOT IDENT.
ZN-65	7.958E-01		1.155E+00	2.180E+00	NOT IDENT.
GE-68	1.346E+01		1.854E+01	3.493E+01	NOT IDENT.
AS-73	-6.731E+00		2.837E+01	4.718E+01	NOT IDENT.
AS-74	-1.219E+00		1.379E+00	2.253E+00	NOT IDENT.
SE-75	5.242E-02		5.865E-01	1.045E+00	NOT IDENT.
BR-77	2.644E+02		4.657E+02	8.490E+02	NOT IDENT.
SR-82	3.472E-01		4.691E+00	8.129E+00	NOT IDENT.

RB-83	-2.194E-01	1.014E+00	1.740E+00	NOT IDENT.
RB-84	5.511E-01	1.054E+00	1.983E+00	NOT IDENT.
KR-85	-1.071E+02	9.565E+01	1.560E+02	NOT IDENT.
SR-85	-5.995E-01	5.352E-01	8.728E-01	NOT IDENT.
RB-86	1.569E+01	1.389E+01	2.677E+01	NOT IDENT.
Y-88	-1.378E-01	2.397E-01	4.142E-01	NOT IDENT.
Y-91	-2.163E+02	1.576E+02	2.444E+02	NOT IDENT.
NB-94	6.638E-02	3.493E-01	6.172E-01	NOT IDENT.
NB-95	-4.177E-01	5.394E-01	8.721E-01	NOT IDENT.
NB-95M	-6.338E-01	1.444E+00	2.535E+00	NOT IDENT.
ZR-95	-1.626E-01	9.010E-01	1.533E+00	NOT IDENT.
NB-97	0.000E+00	1.960E+41	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	3.757E+09	0.000E+00	SHORT HLIF
MO-99	-5.315E+02	5.377E+02	8.546E+02	NOT IDENT.
TC-99M	0.000E+00	5.671E+23	0.000E+00	SHORT HLIF
RH-101	1.622E-01	3.374E-01	6.243E-01	NOT IDENT.
RH-102	-2.713E-02	6.741E-01	1.166E+00	NOT IDENT.
RU-103	-1.347E-01	6.684E-01	1.147E+00	NOT IDENT.
RH-106	-2.039E+00	4.176E+00	6.993E+00	NOT IDENT.
RU-106	-2.039E+00	4.176E+00	6.993E+00	NOT IDENT.
AG-108M	7.530E-02	5.020E-01	8.758E-01	NOT IDENT.
AG-110	6.153E+00	1.097E+01	1.762E+01	NOT IDENT.
AG-110M	-9.841E-02	7.026E-01	1.271E+00	NOT IDENT.
SN-113	-2.687E-01	6.906E-01	1.187E+00	NOT IDENT.
CD-115	-3.201E+02	7.925E+02	1.345E+03	NOT IDENT.
SN-117M	-2.319E-01	7.209E-01	1.293E+00	NOT IDENT.
SB-122	-8.189E+01	9.581E+01	1.583E+02	NOT IDENT.
TE-123M	-1.468E-01	3.041E-01	5.419E-01	NOT IDENT.
SB-124	-2.082E-01	4.953E-01	9.150E-01	NOT IDENT.
SB-125	1.119E-01	1.520E+00	2.647E+00	NOT IDENT.
TE-125M	1.878E+01	1.099E+02	2.025E+02	NOT IDENT.
I-126	-2.681E-01	3.599E+00	5.524E+00	NOT IDENT.
SB-126	1.553E+00	2.323E+00	4.202E+00	NOT IDENT.
SB-127	-1.046E+01	3.570E+01	6.071E+01	NOT IDENT.
I-131	-1.752E+00	2.639E+00	4.500E+00	NOT IDENT.
I-132	0.000E+00	1.015E+41	0.000E+00	SHORT HLIF
TE-132	3.708E+00	2.672E+01	4.793E+01	NOT IDENT.
BA-133	-2.537E-01	5.890E-01	1.015E+00	NOT IDENT.
I-133	0.000E+00	5.084E+06	0.000E+00	SHORT HLIF
CS-134	-1.372E-01	5.144E-01	8.646E-01	NOT IDENT.
I-135	0.000E+00	1.520E+22	0.000E+00	SHORT HLIF
CS-136	8.090E-01	1.919E+00	3.571E+00	NOT IDENT.
LA-138	4.184E-02	2.640E-01	5.719E-01	NOT IDENT.
CE-139	-1.345E-01	3.131E-01	5.584E-01	NOT IDENT.
BA-140	4.261E+00	4.636E+00	8.483E+00	NOT IDENT.
LA-140	-8.577E-02	5.481E-01	1.109E+00	NOT IDENT.
CE-141	-2.287E-01	7.166E-01	1.288E+00	NOT IDENT.
CE-143	0.000E+00	2.033E+04	0.000E+00	SHORT HLIF
CE-144	-1.694E+00	2.021E+00	3.582E+00	NOT IDENT.
PM-144	-7.822E-02	3.658E-01	6.254E-01	NOT IDENT.
PR-144	-5.564E+00	2.748E+01	4.701E+01	NOT IDENT.
PM-146	-3.132E-01	7.717E-01	1.312E+00	FAIL ABUN
ND-147	2.299E-01	1.059E+01	1.842E+01	NOT IDENT.
PM-147	-2.372E+02	7.852E+03	1.434E+04	NOT IDENT.
PM-149	1.444E+03	5.842E+03	1.046E+04	NOT IDENT.
EU-150	1.375E-01	3.583E-01	6.409E-01	NOT IDENT.
EU-152	-5.793E-01	1.299E+00	2.243E+00	NOT IDENT.
GD-153	3.622E-01	9.194E-01	1.710E+00	NOT IDENT.
EU-154	-4.353E-01	7.400E-01	1.301E+00	NOT IDENT.
EU-155	-6.264E-01	1.132E+00	2.041E+00	FAIL ABUN
TB-160	-4.220E-01	1.926E+00	3.471E+00	FAIL ABUN
HO-166M	-1.393E-01	7.217E-01	1.229E+00	NOT IDENT.
TM-171	-5.104E+02	5.779E+02	9.478E+02	NOT IDENT.
HF-172	-6.899E-02	2.056E+00	3.746E+00	NOT IDENT.
LU-172	5.137E-02	9.410E-01	1.702E+00	FAIL ABUN
LU-176	-2.997E-01	3.512E-01	5.993E-01	FAIL ABUN
HF-181	-5.203E-01	7.665E-01	1.285E+00	NOT IDENT.
TA-182	4.037E-01	1.384E+00	2.692E+00	NOT IDENT.
RE-183	0.000E+00	8.265E+00	1.811E+01	FAIL ABUN
RE-184	1.523E-01	2.107E+00	3.837E+00	NOT IDENT.
W-188	-1.310E+01	9.370E+01	1.652E+02	NOT IDENT.
IR-192	-2.401E-01	4.754E-01	8.222E-01	NOT IDENT.
HG-203	2.541E-01	4.969E-01	9.004E-01	NOT IDENT.
TL-204	-2.087E+01	6.182E+01	1.023E+02	NOT IDENT.
BI-207	-7.091E-01	7.481E-01	1.270E+00	NOT IDENT.
TL-208	-2.591E-01	4.468E-01	7.476E-01	NOT IDENT.
BI-211	1.399E+00	2.821E+00	5.057E+00	NOT IDENT.
PB-211	-4.329E-01	1.083E+01	1.886E+01	NOT IDENT.

BI-212	6.273E-01	5.365E+00	9.433E+00	NOT IDENT.
PB-212	5.055E-02	6.710E-01	1.202E+00	NOT IDENT.
BI-213	7.660E-01	1.834E+00	3.226E+00	NOT IDENT.
BI-214	-3.153E-01	8.352E-01	1.417E+00	NOT IDENT.
PB-214	1.023E-01	1.026E+00	1.810E+00	FAIL ABUN
RN-219	1.379E+00	6.288E+00	1.105E+01	NOT IDENT.
RN-222	-3.153E-01	8.352E-01	1.417E+00	NOT IDENT.
RA-223	3.840E-01	8.494E+00	1.501E+01	NOT IDENT.
RA-224	-3.072E-01	7.263E+00	1.292E+01	NOT IDENT.
AC-225	-3.952E+00	1.008E+01	1.777E+01	NOT IDENT.
RA-226	1.023E-01	1.026E+00	1.810E+00	FAIL ABUN
AC-227	-5.551E-01	3.101E+00	5.482E+00	NOT IDENT.
TH-227	-5.551E-01	3.101E+00	5.482E+00	NOT IDENT.
AC-228	0.000E+00	4.397E+00	3.809E+00	FAIL ABUN
RA-228	0.000E+00	4.397E+00	3.809E+00	FAIL ABUN
TH-228	5.055E-02	6.710E-01	1.202E+00	NOT IDENT.
TH-229	-9.088E-01	6.098E+00	1.089E+01	FAIL ABUN
TH-230	1.023E-01	1.026E+00	1.810E+00	FAIL ABUN
PA-231	-9.991E-01	5.988E+00	1.052E+01	NOT IDENT.
TH-231	3.840E-01	8.494E+00	1.501E+01	NOT IDENT.
TH-232	0.000E+00	4.397E+00	3.809E+00	FAIL ABUN
PA-233	-2.366E-01	8.789E-01	1.535E+00	NOT IDENT.
PA-234	-7.089E-01	4.825E+00	8.648E+00	NOT IDENT.
PA-234M	-2.896E+01	6.412E+01	1.133E+02	NOT IDENT.
TH-234	9.538E+00	1.860E+01	2.964E+01	NOT IDENT.
U-234	1.023E-01	1.026E+00	1.810E+00	FAIL ABUN
U-235	-3.228E-01	2.037E+00	3.687E+00	NOT IDENT.
NP-237	-2.366E-01	8.789E-01	1.535E+00	NOT IDENT.
NP-238	-1.095E+03	1.595E+03	2.772E+03	NOT IDENT.
U-238	9.538E+00	1.860E+01	2.964E+01	NOT IDENT.
NP-239	-3.295E-01	2.734E+00	4.987E+00	NOT IDENT.
PU-239	4.664E+02	3.497E+03	6.406E+03	NOT IDENT.
AM-243	-2.076E-01	6.257E-01	1.034E+00	NOT IDENT.
CM-243	7.008E-01	1.180E+00	2.202E+00	NOT IDENT.
BK-247	3.763E-03	1.018E+00	1.809E+00	NOT IDENT.
CM-247	2.954E-01	5.799E-01	1.031E+00	NOT IDENT.
CF-249	-1.798E-01	5.839E-01	1.008E+00	NOT IDENT.
CF-251	6.186E-01	1.361E+00	2.496E+00	NOT IDENT.
ANH-511	9.658E-02	4.180E-01	7.486E-01	NOT IDENT.

Nuclide Line Activity Report

Nuclide Type:

Nuclide	Energy	Area	%Abn	%Eff	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	2-Sigma %Error
CO-60	1173.23	3050	99.85	1.167E+00	6.834E+01	6.884E+01	3.73
	1332.49	2699	99.98*	1.042E+00	6.764E+01	6.813E+01	3.78
CD-109	88.03	148	3.70*	4.926E+00	2.127E+01	2.193E+01	55.37
SN-126	64.28	-----	9.60	2.459E+00	-----	Line Not Found	-----
	86.94	148	8.90	4.926E+00	8.843E+00	8.843E+00	55.37
	87.57	148	37.00*	4.926E+00	2.127E+00	2.127E+00	55.37
BA-137M	661.66	9900	89.90*	1.962E+00	1.466E+02	1.467E+02	2.11
CS-137	661.66	9900	85.10*	1.962E+00	1.548E+02	1.550E+02	2.11
BI-210	46.54	3547	4.25*	4.785E-01	4.555E+03	4.563E+03	7.94
PB-210	46.54	3547	4.25*	4.785E-01	4.555E+03	4.563E+03	7.94
AM-241	59.54	13752	35.90*	1.846E+00	5.420E+02	5.421E+02	2.53

Flag: "*" = Keyline

Total number of lines in spectrum 12
 Number of unidentified lines 4
 Number of lines tentatively identified by NID 8 66.67%

Nuclide Type :

Nuclide	Hlife	Decay	Uncorrected pCi/GRAM	Decay Corr pCi/GRAM	Decay Corr 2-Sigma Error	2-Sigma %Error	Flags
CO-60	5.27Y	1.01	6.764E+01	6.813E+01	0.257E+01	3.78	
CD-109	461.40D	1.03	2.127E+01	2.193E+01	1.214E+01	55.37	
SN-126	2.30E+05Y	1.00	2.127E+00	2.127E+00	1.178E+00	55.37	
BA-137M	30.08Y	1.00	1.466E+02	1.467E+02	0.031E+02	2.11	
CS-137	30.08Y	1.00	1.548E+02	1.550E+02	0.033E+02	2.11	
BI-210	22.20Y	1.00	4.555E+03	4.563E+03	0.362E+03	7.94	
PB-210	22.20Y	1.00	4.555E+03	4.563E+03	0.362E+03	7.94	
AM-241	432.60Y	1.00	5.420E+02	5.421E+02	0.137E+02	2.53	
Total Activity :			1.004E+04	1.006E+04			

Grand Total Activity : 1.004E+04 1.006E+04

Flags: "K" = Keyline not found "M" = Manually accepted
 "E" = Manually edited "A" = Nuclide specific abn. limit

It	Energy	Area	Bkgnd	FWHM	Channel	Left	Pw	Cts/Sec	%Err	%Eff	Flags
0	35.57	606	785	1.52	71.25	68	8	6.12E-01	19.3	4.25E-02	
0	746.52	19	105	0.97	1492.05	1487	10	2.21E-02	****	1.77E+00	T
0	912.19	64	209	4.97	1823.19	1816	16	7.42E-02	****	1.47E+00	T
0	1353.35	8	11	0.61	2705.06	2698	10	9.17E-03	****	1.03E+00	
0	1450.28	8	2	1.78	2898.83	2894	8	8.83E-03	94.1	9.71E-01	
0	1464.22	9	0	1.06	2926.70	2923	8	1.11E-02	63.2	9.64E-01	

Flags: "T" = Tentatively associated


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*****
*
*               GEL Laboratories LLC
*               2040 Savage Road
*               Charleston, SC 29407
*****
*
*               DETECTOR AND SAMPLE DATA
*
* Configuration      : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205313912.CNF;1
* Acquisition date   : 28-FEB-2023 06:58:38 Sensitivity      : 3.000
* Detector ID        : GAM01 Energy tolerance: 1.500
* Elapsed live time  : 0 00:15:00.00 Abundance limit : 75.000
* Elapsed real time  : 0 00:15:01.81 Half life ratio  : *****
* Sample date        : 8-FEB-2023 00:00:00 Nuclide Library : SOLID
* Sample ID          : G1205313912 Analyst initials: RXF2
* Batch Number       : 2379916 Sample Quantity : 1.1500E+02 GRAM
* Wet wt corr        : 1.00000 Wet Weight      : 0.00000
*                   Dry Weight      : 0.00000
*****
*
*               CALIBRATION INFORMATION
*
* Eff. Cal. date     : 14-JUN-2022 06:30:26 Eff. Geometry   : CAN
* Eff. File          : DKA100:[CANBERRA.GAMMA]EFF_GAM01_CAN.CNF;17
*****

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Combined Critical Level Report

NOTE: Not all "Identified Nuclides" are valid.
Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)
CO-60	2.522E-01
CD-109	6.946E+00
SN-126	6.651E-01
BA-137M	3.674E-01
CS-137	3.881E-01
BI-210	1.064E+02
PB-210	1.064E+02
AM-241	2.904E+00

---- Non-Identified Nuclides ----

Nuclide	Lc (pCi/GRAM)	
BE-7	5.207E+00	NOT IDENT.
NA-22	1.933E-01	NOT IDENT.
NA-24	0.000E+00	SHORT HLIF
AL-26	1.523E-01	NOT IDENT.
K-40	1.175E+00	NOT IDENT.
SC-46	5.099E-01	NOT IDENT.
V-48	1.045E+00	NOT IDENT.
CR-51	4.749E+00	NOT IDENT.
MN-52	1.873E+00	NOT IDENT.
MN-54	4.128E-01	NOT IDENT.
CO-56	4.747E-01	NOT IDENT.
MN-56	0.000E+00	SHORT HLIF
CO-57	2.400E-01	NOT IDENT.
CO-58	4.361E-01	NOT IDENT.
FE-59	1.146E+00	NOT IDENT.
ZN-65	1.030E+00	NOT IDENT.
GE-68	1.656E+01	NOT IDENT.
AS-73	2.323E+01	NOT IDENT.
AS-74	1.065E+00	NOT IDENT.
SE-75	5.061E-01	NOT IDENT.
BR-77	4.115E+02	NOT IDENT.
SR-82	3.826E+00	NOT IDENT.
RB-83	8.316E-01	NOT IDENT.

RB-84	9.399E-01	NOT IDENT.
KR-85	7.463E+01	NOT IDENT.
SR-85	4.176E-01	NOT IDENT.
RB-86	1.271E+01	NOT IDENT.
Y-88	1.585E-01	NOT IDENT.
Y-91	1.071E+02	NOT IDENT.
NB-94	2.897E-01	NOT IDENT.
NB-95	4.107E-01	NOT IDENT.
NB-95M	1.228E+00	NOT IDENT.
ZR-95	7.205E-01	NOT IDENT.
NB-97	0.000E+00	SHORT HLIF
ZR-97	0.000E+00	SHORT HLIF
MO-99	4.001E+02	NOT IDENT.
TC-99M	0.000E+00	SHORT HLIF
RH-101	3.034E-01	NOT IDENT.
RH-102	5.520E-01	NOT IDENT.
RU-103	5.511E-01	NOT IDENT.
RH-106	3.319E+00	NOT IDENT.
RU-106	3.319E+00	NOT IDENT.
AG-108M	4.239E-01	NOT IDENT.
AG-110	8.394E+00	NOT IDENT.
AG-110M	6.021E-01	NOT IDENT.
SN-113	5.729E-01	NOT IDENT.
CD-115	6.425E+02	NOT IDENT.
SN-117M	6.261E-01	NOT IDENT.
SB-122	7.525E+01	NOT IDENT.
TE-123M	2.626E-01	NOT IDENT.
SB-124	3.503E-01	NOT IDENT.
SB-125	1.281E+00	NOT IDENT.
TE-125M	9.838E+01	NOT IDENT.
I-126	2.599E+00	NOT IDENT.
SB-126	1.989E+00	NOT IDENT.
SB-127	2.841E+01	NOT IDENT.
I-131	2.172E+00	NOT IDENT.
I-132	0.000E+00	SHORT HLIF
TE-132	2.325E+01	NOT IDENT.
BA-133	4.901E-01	NOT IDENT.
I-133	0.000E+00	SHORT HLIF
CS-134	4.072E-01	NOT IDENT.
I-135	0.000E+00	SHORT HLIF
CS-136	1.687E+00	NOT IDENT.
LA-138	2.311E-01	NOT IDENT.
CE-139	2.704E-01	NOT IDENT.
BA-140	4.056E+00	NOT IDENT.
LA-140	4.314E-01	NOT IDENT.
CE-141	6.248E-01	NOT IDENT.
CE-143	0.000E+00	SHORT HLIF
CE-144	1.735E+00	NOT IDENT.
PM-144	2.931E-01	NOT IDENT.
PR-144	2.204E+01	NOT IDENT.
PM-146	6.357E-01	FAIL ABUN
ND-147	8.803E+00	NOT IDENT.
PM-147	6.959E+03	NOT IDENT.
PM-149	5.056E+03	NOT IDENT.
EU-150	3.097E-01	NOT IDENT.
EU-152	1.081E+00	NOT IDENT.
GD-153	8.315E-01	NOT IDENT.
EU-154	5.574E-01	NOT IDENT.
EU-155	9.912E-01	FAIL ABUN
TB-160	1.642E+00	FAIL ABUN
HO-166M	5.794E-01	NOT IDENT.
TM-171	4.663E+02	NOT IDENT.
HF-172	1.820E+00	NOT IDENT.
LU-172	8.055E-01	FAIL ABUN
LU-176	2.893E-01	FAIL ABUN
HF-181	6.189E-01	NOT IDENT.
TA-182	1.215E+00	NOT IDENT.
RE-183	8.983E+00	FAIL ABUN
RE-184	1.827E+00	NOT IDENT.
W-188	7.976E+01	NOT IDENT.
IR-192	3.966E-01	NOT IDENT.
HG-203	4.352E-01	NOT IDENT.
TL-204	4.975E+01	NOT IDENT.
BI-207	5.983E-01	NOT IDENT.
TL-208	3.549E-01	NOT IDENT.
BI-211	2.445E+00	NOT IDENT.
PB-211	9.111E+00	NOT IDENT.
BI-212	4.425E+00	NOT IDENT.

PB-212	5.825E-01	NOT IDENT.
BI-213	1.564E+00	NOT IDENT.
BI-214	6.718E-01	NOT IDENT.
PB-214	8.750E-01	FAIL ABUN
RN-219	5.347E+00	NOT IDENT.
RN-222	6.718E-01	NOT IDENT.
RA-223	7.249E+00	NOT IDENT.
RA-224	6.263E+00	NOT IDENT.
AC-225	8.617E+00	NOT IDENT.
RA-226	8.750E-01	FAIL ABUN
AC-227	2.652E+00	NOT IDENT.
TH-227	2.652E+00	NOT IDENT.
AC-228	1.812E+00	FAIL ABUN
RA-228	1.812E+00	FAIL ABUN
TH-228	5.825E-01	NOT IDENT.
TH-229	5.289E+00	FAIL ABUN
TH-230	8.749E-01	FAIL ABUN
PA-231	5.083E+00	NOT IDENT.
TH-231	7.249E+00	NOT IDENT.
TH-232	1.812E+00	FAIL ABUN
PA-233	7.419E-01	NOT IDENT.
PA-234	4.119E+00	NOT IDENT.
PA-234M	5.354E+01	NOT IDENT.
TH-234	1.441E+01	NOT IDENT.
U-234	8.749E-01	FAIL ABUN
U-235	1.788E+00	NOT IDENT.
NP-237	7.419E-01	NOT IDENT.
NP-238	1.309E+03	NOT IDENT.
U-238	1.441E+01	NOT IDENT.
NP-239	2.419E+00	NOT IDENT.
PU-239	3.109E+03	NOT IDENT.
AM-243	5.027E-01	NOT IDENT.
CM-243	1.071E+00	NOT IDENT.
BK-247	8.758E-01	NOT IDENT.
CM-247	4.989E-01	NOT IDENT.
CF-249	4.863E-01	NOT IDENT.
CF-251	1.210E+00	NOT IDENT.
ANH-511	3.599E-01	NOT IDENT.

 * GEL Laboratories LLC *
 * 2040 Savage Road *
 * Charleston, SC 29407 *

DETECTOR AND SAMPLE DATA

* Configuration : DKA100:[CANBERRA.GAMMA.ARCHIVE.GAMMA]G1205313912.CNF;1 *
 * Acquisition date : 28-FEB-2023 06:58:38 Sensitivity : 3.000 *
 * Detector ID : GAM01 Energy tolerance: 1.500 *
 * Elapsed live time: 0 00:15:00.00 Abundance limit : 75.000 *
 * Elapsed real time: 0 00:15:01.81 Half life ratio : ***** *
 * Sample date : 8-FEB-2023 00:00:00 Nuclide Library : SOLID *
 * Sample ID : G1205313912 Analyst initials: RXF2 *
 * Batch Number : 2379916 Sample Quantity : 1.1500E+02 GRAM *
 * Quantity Err(%) : 1.7391E-03 % *
 * Wet wt corr : 1.00000 Wet Weight : 0.00000 *
 * Dry Weight : 0.00000 *

CALIBRATION INFORMATION

* Eff. Cal. date : 14-JUN-2022 06:30:26 Eff. Geometry : CAN *
 * Eff. File : DKA100:[CANBERRA.GAMMA]EFF_GAM01_CAN.CNF;17 *

Combined Activity-MDA Report

NOTE: Not all "Identified Nuclides" are valid.
 Please refer to Certificate of Analysis.

---- Identified Nuclides ----

Nuclide	Activity (pCi/GRAM)	Act Error (1.96-sigma)	TPU (1.96-sigma)
CO-60	6.813E+01	7.166E+00	7.166E+00
CD-109	2.193E+01	1.214E+01	1.214E+01
SN-126	2.127E+00	1.172E+00	1.172E+00
BA-137M	1.467E+02	1.293E+01	1.293E+01
CS-137	1.550E+02	1.365E+01	1.365E+01
BI-210	4.563E+03	6.286E+02	6.286E+02
PB-210	4.563E+03	6.286E+02	6.286E+02
AM-241	5.421E+02	6.292E+01	6.292E+01

---- Non-Identified Nuclides ----

Nuclide	Key-Line Activity (pCi/GRAM)	K.L Act error (1.96-sigma)	TPU (1.96-sigma)	
BE-7	6.728E+00	5.984E+00	6.709E+00	NOT IDENT.
NA-22	-1.893E-01	2.644E-01	2.779E-01	NOT IDENT.
NA-24	-4.560E+08	1.144E+09	1.162E+09	SHORT HLIF
AL-26	-1.251E-01	2.240E-01	2.309E-01	NOT IDENT.
K-40	3.401E-01	1.281E+00	1.290E+00	NOT IDENT.
SC-46	6.280E-02	5.865E-01	5.871E-01	NOT IDENT.
V-48	-3.208E-01	1.238E+00	1.246E+00	NOT IDENT.
CR-51	-2.330E+00	5.672E+00	5.768E+00	NOT IDENT.
MN-52	3.397E-01	2.140E+00	2.145E+00	NOT IDENT.
MN-54	6.368E-02	4.720E-01	4.729E-01	NOT IDENT.
CO-56	-2.905E-02	5.495E-01	5.496E-01	NOT IDENT.
MN-56	-1.000E+41	1.748E+42	0.000E+00	SHORT HLIF
CO-57	-1.215E-01	2.747E-01	2.801E-01	NOT IDENT.
CO-58	2.257E-02	5.376E-01	5.377E-01	NOT IDENT.
FE-59	-7.888E-01	1.399E+00	1.444E+00	NOT IDENT.
ZN-65	7.958E-01	1.157E+00	1.212E+00	NOT IDENT.
GE-68	1.346E+01	1.858E+01	1.954E+01	NOT IDENT.
AS-73	-6.731E+00	2.841E+01	2.857E+01	NOT IDENT.
AS-74	-1.219E+00	1.386E+00	1.491E+00	NOT IDENT.
SE-75	5.242E-02	5.865E-01	5.870E-01	NOT IDENT.
BR-77	2.644E+02	4.913E+02	5.055E+02	NOT IDENT.
SR-82	3.472E-01	4.691E+00	4.694E+00	NOT IDENT.

RB-83	-2.194E-01	1.014E+00	1.019E+00	NOT IDENT.
RB-84	5.511E-01	1.055E+00	1.084E+00	NOT IDENT.
KR-85	-1.071E+02	9.612E+01	1.076E+02	NOT IDENT.
SR-85	-5.995E-01	5.378E-01	6.019E-01	NOT IDENT.
RB-86	1.569E+01	1.396E+01	1.565E+01	NOT IDENT.
Y-88	-1.378E-01	2.399E-01	2.478E-01	NOT IDENT.
Y-91	-2.163E+02	1.587E+02	1.862E+02	NOT IDENT.
NB-94	6.638E-02	3.494E-01	3.507E-01	NOT IDENT.
NB-95	-4.177E-01	5.408E-01	5.726E-01	NOT IDENT.
NB-95M	-6.338E-01	1.445E+00	1.473E+00	NOT IDENT.
ZR-95	-1.626E-01	9.012E-01	9.041E-01	NOT IDENT.
NB-97	1.000E+41	2.553E+41	0.000E+00	SHORT HLIF
ZR-97	3.273E+09	3.768E+09	4.047E+09	SHORT HLIF
MO-99	-5.315E+02	5.402E+02	5.909E+02	NOT IDENT.
TC-99M	-2.245E+23	5.677E+23	0.000E+00	SHORT HLIF
RH-101	1.622E-01	3.388E-01	3.466E-01	NOT IDENT.
RH-102	-2.713E-02	6.741E-01	6.742E-01	NOT IDENT.
RU-103	-1.347E-01	6.685E-01	6.713E-01	NOT IDENT.
RH-106	-2.039E+00	4.180E+00	4.280E+00	NOT IDENT.
RU-106	-2.039E+00	4.180E+00	4.280E+00	NOT IDENT.
AG-108M	7.530E-02	5.021E-01	5.032E-01	NOT IDENT.
AG-110	6.153E+00	1.098E+01	1.133E+01	NOT IDENT.
AG-110M	-9.841E-02	7.027E-01	7.041E-01	NOT IDENT.
SN-113	-2.687E-01	6.909E-01	7.015E-01	NOT IDENT.
CD-115	-3.201E+02	7.932E+02	8.062E+02	NOT IDENT.
SN-117M	-2.319E-01	7.211E-01	7.287E-01	NOT IDENT.
SB-122	-8.189E+01	9.609E+01	1.029E+02	NOT IDENT.
TE-123M	-1.468E-01	3.043E-01	3.114E-01	NOT IDENT.
SB-124	-2.082E-01	4.957E-01	5.045E-01	NOT IDENT.
SB-125	1.119E-01	1.520E+00	1.521E+00	NOT IDENT.
TE-125M	1.878E+01	1.099E+02	1.102E+02	NOT IDENT.
I-126	-2.681E-01	3.599E+00	3.601E+00	NOT IDENT.
SB-126	1.553E+00	2.332E+00	2.434E+00	NOT IDENT.
SB-127	-1.046E+01	3.572E+01	3.603E+01	NOT IDENT.
I-131	-1.752E+00	2.644E+00	2.759E+00	NOT IDENT.
I-132	1.000E+41	1.613E+41	0.000E+00	SHORT HLIF
TE-132	3.708E+00	2.672E+01	2.678E+01	NOT IDENT.
BA-133	-2.537E-01	5.893E-01	6.003E-01	NOT IDENT.
I-133	-1.959E+06	5.093E+06	5.169E+06	SHORT HLIF
CS-134	-1.372E-01	5.145E-01	5.182E-01	NOT IDENT.
I-135	1.029E+22	1.595E+22	0.000E+00	SHORT HLIF
CS-136	8.090E-01	1.921E+00	1.955E+00	NOT IDENT.
LA-138	4.184E-02	2.640E-01	2.647E-01	NOT IDENT.
CE-139	-1.345E-01	3.144E-01	3.202E-01	NOT IDENT.
BA-140	4.261E+00	4.651E+00	5.032E+00	NOT IDENT.
LA-140	-8.577E-02	5.481E-01	5.495E-01	NOT IDENT.
CE-141	-2.287E-01	7.168E-01	7.241E-01	NOT IDENT.
CE-143	-5.406E+02	2.033E+04	2.034E+04	SHORT HLIF
CE-144	-1.694E+00	2.026E+00	2.165E+00	NOT IDENT.
PM-144	-7.822E-02	3.659E-01	3.676E-01	NOT IDENT.
PR-144	-5.564E+00	2.748E+01	2.759E+01	NOT IDENT.
PM-146	-3.132E-01	7.724E-01	7.852E-01	FAIL ABUN
ND-147	2.299E-01	1.059E+01	1.059E+01	NOT IDENT.
PM-147	-2.372E+02	7.852E+03	7.853E+03	NOT IDENT.
PM-149	1.444E+03	5.846E+03	5.883E+03	NOT IDENT.
EU-150	1.375E-01	3.584E-01	3.638E-01	NOT IDENT.
EU-152	-5.793E-01	1.300E+00	1.326E+00	NOT IDENT.
GD-153	3.622E-01	9.199E-01	9.343E-01	NOT IDENT.
EU-154	-4.353E-01	7.411E-01	7.666E-01	NOT IDENT.
EU-155	-6.264E-01	1.133E+00	1.168E+00	FAIL ABUN
TB-160	-4.220E-01	1.926E+00	1.935E+00	FAIL ABUN
HO-166M	-1.393E-01	7.219E-01	7.246E-01	NOT IDENT.
TM-171	-5.104E+02	5.816E+02	6.255E+02	NOT IDENT.
HF-172	-6.899E-02	2.056E+00	2.056E+00	NOT IDENT.
LU-172	5.137E-02	9.411E-01	9.413E-01	FAIL ABUN
LU-176	-2.997E-01	3.520E-01	3.771E-01	FAIL ABUN
HF-181	-5.203E-01	7.678E-01	8.029E-01	NOT IDENT.
TA-182	4.037E-01	1.385E+00	1.396E+00	NOT IDENT.
RE-183	1.973E+02	2.804E+01	9.324E+01	FAIL ABUN
RE-184	1.523E-01	2.108E+00	2.109E+00	NOT IDENT.
W-188	-1.310E+01	9.371E+01	9.390E+01	NOT IDENT.
IR-192	-2.401E-01	4.757E-01	4.879E-01	NOT IDENT.
HG-203	2.541E-01	4.973E-01	5.103E-01	NOT IDENT.
TL-204	-2.087E+01	6.187E+01	6.258E+01	NOT IDENT.
BI-207	-7.091E-01	7.508E-01	8.160E-01	NOT IDENT.
TL-208	-2.591E-01	4.474E-01	4.624E-01	NOT IDENT.
BI-211	1.399E+00	2.823E+00	2.893E+00	NOT IDENT.
PB-211	-4.329E-01	1.083E+01	1.084E+01	NOT IDENT.

BI-212	6.273E-01	5.365E+00	5.373E+00	NOT IDENT.
PB-212	5.055E-02	6.710E-01	6.714E-01	NOT IDENT.
BI-213	7.660E-01	1.836E+00	1.868E+00	NOT IDENT.
BI-214	-3.153E-01	8.356E-01	8.476E-01	NOT IDENT.
PB-214	1.023E-01	1.026E+00	1.027E+00	FAIL ABUN
RN-219	1.379E+00	6.291E+00	6.322E+00	NOT IDENT.
RN-222	-3.153E-01	8.356E-01	8.476E-01	NOT IDENT.
RA-223	3.840E-01	8.494E+00	8.496E+00	NOT IDENT.
RA-224	-3.072E-01	7.263E+00	7.264E+00	NOT IDENT.
AC-225	-3.952E+00	1.008E+01	1.024E+01	NOT IDENT.
RA-226	1.023E-01	1.026E+00	1.027E+00	FAIL ABUN
AC-227	-5.551E-01	3.102E+00	3.112E+00	NOT IDENT.
TH-227	-5.551E-01	3.102E+00	3.112E+00	NOT IDENT.
AC-228	4.420E+00	4.421E+00	4.849E+00	FAIL ABUN
RA-228	4.420E+00	4.421E+00	4.849E+00	FAIL ABUN
TH-228	5.055E-02	6.710E-01	6.714E-01	NOT IDENT.
TH-229	-9.088E-01	6.098E+00	6.112E+00	FAIL ABUN
TH-230	1.023E-01	1.026E+00	1.027E+00	FAIL ABUN
PA-231	-9.991E-01	5.992E+00	6.009E+00	NOT IDENT.
TH-231	3.840E-01	8.494E+00	8.496E+00	NOT IDENT.
TH-232	4.420E+00	4.421E+00	4.849E+00	FAIL ABUN
PA-233	-2.366E-01	8.792E-01	8.856E-01	NOT IDENT.
PA-234	-7.089E-01	4.893E+00	4.903E+00	NOT IDENT.
PA-234M	-2.896E+01	6.418E+01	6.549E+01	NOT IDENT.
TH-234	9.538E+00	1.873E+01	1.922E+01	NOT IDENT.
U-234	1.023E-01	1.026E+00	1.027E+00	FAIL ABUN
U-235	-3.228E-01	2.037E+00	2.042E+00	NOT IDENT.
NP-237	-2.366E-01	8.792E-01	8.856E-01	NOT IDENT.
NP-238	-1.095E+03	1.598E+03	1.673E+03	NOT IDENT.
U-238	9.538E+00	1.873E+01	1.922E+01	NOT IDENT.
NP-239	-3.295E-01	2.734E+00	2.738E+00	NOT IDENT.
PU-239	4.664E+02	3.498E+03	3.504E+03	NOT IDENT.
AM-243	-2.076E-01	6.260E-01	6.330E-01	NOT IDENT.
CM-243	7.008E-01	1.183E+00	1.224E+00	NOT IDENT.
BK-247	3.763E-03	1.018E+00	1.018E+00	NOT IDENT.
CM-247	2.954E-01	5.824E-01	5.975E-01	NOT IDENT.
CF-249	-1.798E-01	5.842E-01	5.898E-01	NOT IDENT.
CF-251	6.186E-01	1.363E+00	1.391E+00	NOT IDENT.
ANH-511	9.658E-02	4.181E-01	4.203E-01	NOT IDENT.

 * GEL Laboratories LLC *
 * 2040 Savage Road *
 * Charleston, SC 29407 *
 * GAMMA SPECTROSCOPY BACKGROUND REPORT *

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
43.53	1112.1882	85.43	418.8875	131.20	333.8203
45.60	1212.9191	86.55	397.7790	133.02	349.1454
46.54	1214.7585	86.79	397.8835	133.52	352.7806
49.72	1123.2795	86.94	397.9516	136.00	345.6742
51.35	1180.1584	87.09	380.9475	136.47	351.0507
51.87	1246.3491	87.57	381.1499	140.51	359.2505
52.39	1286.7517	88.03	396.3492	143.76	351.4323
52.97	1297.4314	88.34	396.4846	144.24	349.8128
53.44	1317.4839	88.47	396.5402	145.44	358.0709
54.07	1355.8402	89.96	390.9236	152.43	357.4289
57.36	0.0000	90.64	377.4189	153.25	355.8925
57.53	950.9570	91.11	362.5575	154.21	337.5530
57.98	951.5597	92.59	387.0091	156.02	329.1613
59.27	953.2834	93.35	392.3542	158.56	324.4766
59.32	953.3498	94.56	405.4505	159.00	344.1483
59.54	953.6421	94.65	405.4898	162.33	302.2357
60.96	955.5135	94.67	405.4971	162.66	301.4181
61.17	955.7878	94.87	405.5831	163.33	324.7689
62.93	388.0817	97.43	385.6222	165.86	326.2811
63.29	360.7672	98.43	402.8797	176.31	291.8683
63.58	368.9988	98.44	402.8846	176.60	303.6408
64.28	379.0628	99.53	405.8682	177.52	304.7446
66.73	422.9460	100.11	427.2155	181.07	320.8846
67.24	393.9544	102.03	397.5976	181.52	333.6443
67.68	377.0935	103.18	393.8220	184.41	375.0991
67.75	377.1266	103.37	393.8976	185.72	375.4444
68.89	392.3477	105.21	403.1078	193.51	373.8189
69.67	409.8659	105.31	403.1489	197.03	373.7975
70.82	441.0928	106.12	393.2773	198.01	372.2139
70.83	441.0983	106.47	393.4139	201.83	368.5777
72.81	445.8736	109.28	378.3060	203.43	353.3670
72.87	445.9069	111.00	374.6688	205.31	347.3690
74.66	430.8804	111.76	374.0871	210.85	334.7883
74.82	430.9658	114.06	344.0906	215.65	328.4176
74.97	428.5801	116.30	349.1053	218.12	352.0984
77.11	440.7999	116.74	349.2481	222.11	349.2642
78.74	442.8909	119.76	351.0857	227.09	356.8651
79.69	409.9469	121.12	360.1372	227.38	348.5439
80.03	395.2381	121.22	360.1691	228.16	335.6543
80.12	395.2819	121.78	386.2168	228.18	335.6616
80.19	395.3159	122.06	380.2786	235.69	328.7626
80.57	410.3686	122.92	380.5747	235.96	350.3625
81.00	440.3428	123.07	362.5012	238.63	319.0198
81.07	440.3780	123.68	365.2906	238.98	298.4420
81.75	468.0372	125.81	383.2921	240.99	330.7448
82.47	443.5767	127.23	365.5797	242.00	322.4802
83.79	413.1357	127.91	355.3988	244.70	309.8097
84.00	411.5750	129.30	354.0958	252.40	278.0894

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
252.80	276.2629	351.06	258.7252	569.33	113.7799
254.15	0.0000	351.93	267.7905	569.50	113.7842
256.23	297.6586	355.39	0.0000	569.70	114.8765
260.90	317.4536	356.01	274.2783	583.19	133.8956
264.66	300.9818	364.49	282.3500	584.27	130.6787
264.80	301.0075	366.42	282.5967	595.83	126.7995
265.00	299.1343	372.51	265.2783	600.60	113.8558
269.46	298.9203	375.05	251.4954	602.52	0.0000
270.03	301.8754	377.52	258.8196	604.72	129.3554
271.23	283.9120	383.85	264.5906	607.14	106.4174
273.65	268.0200	388.16	264.0745	609.32	120.7601
276.40	261.7083	388.63	268.1756	610.33	109.8185
277.37	255.1331	391.69	277.6513	614.28	119.8530
277.60	258.9999	400.66	275.6644	618.01	90.2714
278.00	240.8276	401.81	276.8145	620.36	126.6937
279.20	253.4619	402.40	272.8145	621.93	131.1634
279.54	265.9937	404.85	272.0736	630.19	0.0000
279.70	266.0163	410.95	263.5797	631.29	106.1250
280.46	284.3773	413.71	303.7676	633.25	107.2936
283.69	259.8486	414.70	313.1034	634.78	104.0250
284.31	251.2667	423.72	287.5651	635.95	101.8491
285.41	274.5340	427.09	294.1287	636.99	102.9902
285.90	272.6765	427.87	292.1643	657.50	113.6667
287.50	273.8770	433.94	293.9178	657.76	113.6750
290.67	265.6397	439.40	304.8910	657.90	0.0000
293.27	0.0000	440.45	308.1249	661.66	112.6921
295.22	270.1393	453.88	341.9787	664.57	0.0000
295.96	264.4354	463.37	365.1459	666.33	87.1533
298.58	282.2496	468.07	333.4080	666.50	87.1565
299.98	253.3376	473.00	301.5703	667.71	0.0000
300.09	253.3482	475.06	319.6195	677.62	86.3242
300.13	253.3535	476.78	257.9617	685.70	78.6646
301.36	271.9678	477.60	253.8459	692.65	74.3198
302.85	272.1786	482.18	251.1319	695.00	91.2733
304.50	256.8403	487.02	234.7416	696.49	80.0397
304.85	256.8833	492.35	208.8362	696.51	80.0397
306.78	294.1477	497.08	211.3118	697.00	75.5413
308.46	302.1983	505.52	203.4844	697.30	71.0365
311.90	289.0504	507.63	0.0000	697.49	67.6587
316.51	266.2227	511.00	177.3424	702.65	73.4053
319.41	271.5053	514.00	206.2355	706.68	80.2737
320.08	280.4199	514.00	206.2355	711.68	95.1084
321.04	249.1631	520.40	163.0232	720.70	86.2731
323.87	266.2088	520.69	172.6260	721.93	0.0000
325.23	282.1127	522.65	0.0000	722.78	78.3718
328.76	271.7661	527.90	167.7260	722.91	78.3746
333.37	255.5907	528.26	136.7656	723.31	86.3350
333.97	252.7031	529.59	157.1385	724.19	102.2644
334.37	252.7552	529.87	0.0000	727.33	72.7865
338.28	274.9854	531.02	151.8688	733.00	76.3210
338.32	274.9910	537.26	126.4745	735.93	68.4033
340.48	263.3915	546.56	0.0000	737.46	82.1191
340.55	263.3969	552.55	151.9238	739.50	98.1392
344.28	259.8945	563.25	153.5560	744.23	89.1274
345.93	256.1261	564.24	148.1993	747.24	75.4800

ENERGY	MDA COUNTS	ENERGY	MDA COUNTS	ENERGY	MDA COUNTS
748.06	99.5176	954.55	0.0000	1408.01	5.9381
752.31	69.8586	962.31	116.8039	1434.09	4.9707
753.82	93.9483	964.08	125.0035	1435.80	4.9722
756.73	85.9955	966.17	123.2500	1457.56	0.0000
756.80	85.9985	968.97	109.7301	1460.82	1.5979
763.94	76.9753	983.53	102.8132	1489.16	10.0348
765.81	109.1982	984.45	114.6682	1505.03	6.0370
766.42	100.0203	996.26	102.1973	1584.12	7.1342
766.84	81.6344	1001.03	111.4412	1596.21	5.1059
772.60	0.0000	1002.74	110.5720	1620.50	3.0753
776.52	84.1538	1004.73	95.9926	1621.92	3.0760
777.92	98.0253	1021.30	0.0000	1678.03	0.0000
778.90	85.3608	1025.87	88.1777	1690.97	6.2179
783.70	82.0042	1028.54	80.8779	1750.46	0.0000
788.74	85.5866	1037.84	96.7007	1764.49	2.0955
792.07	96.0802	1038.76	0.0000	1770.23	4.1946
795.86	95.0160	1046.59	77.5042	1771.35	5.2441
801.95	97.4907	1048.07	86.7595	1791.20	0.0000
1093.63	100.0254	1049.04	96.0083	1808.65	8.4360
810.29	100.0289	1050.41	95.1166	1810.72	0.0000
810.45	100.0359	1063.66	113.9086	1836.06	7.4106
810.76	90.7366	1077.00	84.5127		
815.77	103.6667	1077.34	91.0197		
818.51	101.4080	1085.87	96.7700		
832.01	104.3937	1093.63	102.5208		
834.85	103.5921	1099.45	108.2473		
835.71	106.2480	1112.07	114.1442		
836.80	0.0000	1112.84	105.7375		
846.75	0.0000	1115.54	80.5200		
846.77	106.5471	1120.29	91.8451		
856.80	117.4100	1120.55	83.4158		
860.56	100.7311	1121.30	78.7397		
871.09	132.0029	1129.67	75.1221		
873.19	102.8240	1131.51	0.0000		
875.33	0.0000	1147.95	0.0000		
879.38	110.0818	1173.23	46.4190		
880.51	108.3361	1177.95	31.8589		
881.60	96.8187	1189.05	31.3605		
883.24	116.4080	1204.77	36.2234		
884.68	110.2256	1221.41	24.8654		
889.28	111.2404	1231.02	23.9532		
894.76	100.6958	1235.36	19.1785		
898.04	107.9096	1238.28	19.1895		
900.72	121.3657	1260.41	0.0000		
903.28	128.5840	1271.87	14.4836		
911.20	108.2531	1274.44	18.3552		
912.08	108.2752	1274.54	19.3213		
923.98	130.1186	1291.59	16.4760		
926.50	138.2795	1298.22	0.0000		
929.11	142.8564	1312.11	15.5654		
935.54	131.3768	1332.49	18.5535		
937.49	133.2352	1362.66	0.0000		
944.13	132.5414	1365.19	5.8934		
946.00	138.9139	1368.63	0.0000		
949.00	147.1367	1384.29	12.8127		

Continuing Calibration Data

Review of Gamma Spectrometer QA results (Daily calibration & background checks)

28-FEB-2023 09:23:45

Run Date	Detector	Parameter	Flag	Status	Comments
28-FEB-23	GAM01	All Parameters Passed			
28-FEB-23	GAM02	All Parameters Passed			
28-FEB-23	GAM03	All Parameters Passed			
28-FEB-23	GAM04	Cal Check NLACTVTY-1332	Investigate		
28-FEB-23	GAM05	All Parameters Passed			
28-FEB-23	GAM06	Cal Check PSFWHM-59	Investigate		
28-FEB-23	GAM07	All Parameters Passed			
28-FEB-23	GAM08	All Parameters Passed			
28-FEB-23	GAM09	All Parameters Passed			
23-FEB-23	GAM10	Cal Check may not have run since 28-FEB-2023			Not Run
17-FEB-23	GAM10	Bkg Check may not have run since 28-FEB-2023			Not Run
28-FEB-23	GAM11	All Parameters Passed			
28-FEB-23	GAM12	All Parameters Passed			
28-FEB-23	GAM14	All Parameters Passed			
28-FEB-23	GAM16	All Parameters Passed			
28-FEB-23	GAM18	All Parameters Passed			
28-FEB-23	GAM19	Cal Check PSFWHM-1332	Investigate		
28-FEB-23	GAM20	Cal Check PSFWHM-662	Investigate		
	GAM21	Cal Check may not have run since 28-FEB-2023			Detector locked out.
	GAM21	Bkg Check may not have run since 28-FEB-2023			Detector locked out.
	GAM22	Cal Check may not have run since 28-FEB-2023			Detector locked out.
05-APR-20	GAM22	Bkg Check may not have run since 28-FEB-2023			Detector locked out.
28-FEB-23	GAM23	Cal Check NLACTVTY-1332	Investigate		
28-FEB-23	GAM24	All Parameters Passed			
28-FEB-23	GAM27	All Parameters Passed			
28-FEB-23	GAM28	All Parameters Passed			
28-FEB-23	GAM29	All Parameters Passed			
28-FEB-23	GAM30	All Parameters Passed			
28-FEB-23	GAM31	All Parameters Passed			
28-FEB-23	GAM32	Cal Check PSFWHM-1332	Investigate		
28-FEB-23	GAM33	Bkg Check BACKRATE	Investigate		
28-FEB-23	GAM34	All Parameters Passed			
28-FEB-23	GAM36	Cal Check NLACTVTY-59	Investigate		
28-FEB-23	GAM36	Cal Check NLACTVTY-662	Investigate		
28-FEB-23	GAM38	All Parameters Passed			
28-FEB-23	GAM40	All Parameters Passed			
28-FEB-23	GAM41	All Parameters Passed			
28-FEB-23	GAM43	All Parameters Passed			
31-DEC-22	GAM44	Cal Check may not have run since 28-FEB-2023			Detector locked out.

15-JAN-23	GAM44	Bkg Check may not have run since 28-FEB-2023			Detector locked out.
28-FEB-23	GAM45	All Parameters Passed			
28-FEB-23	GAM46	All Parameters Passed			
28-FEB-23	GAM47	All Parameters Passed			
28-FEB-23	GAM53	Cal Check NLACTVTY-662	Investigate		
28-FEB-23	XRAY1	Cal Check NLACTVTY-29	Investigate		
28-FEB-23	XRAY2	All Parameters Passed			
28-FEB-23	XRAY3	All Parameters Passed			
28-FEB-23	XRAY4	Cal Check PSFWHM-29	Investigate		
28-FEB-23	XRAY4	Cal Check PSFWHM-34	Action	Approved	Low FWHM, approved for use.
28-FEB-23	XRAY4	Cal Check PSFWHM-40	Action	Approved	Low FWHM, approved for use.
28-FEB-23	XRAY4	Cal Check NLACTVTY-29	Investigate		
28-FEB-23	XRAY6	All Parameters Passed			
28-FEB-23	XRAY7	All Parameters Passed			

APPROVAL DATE: 28-FEB-2023

APPROVAL TIME: 09:51:22

APPROVED BY: Rebekah Futch

PROCEDURE # GL-RAD-I-001

The Investigate flag does not indicate a lockout and is approved for use. Action flags that have not been approved are locked out of service.

Runlogs

Instrument Run Log

Instrument Type: **GAMMA SPECTROMETER**

Batch ID: **2379916**

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
609724001	SAMPLE	RXF2	GAM28	FEB-28-23 05:06:13	DONE CAN		02-JUN-22 00:00
609724002	SAMPLE	RXF2	GAM30	FEB-28-23 05:06:43	DONE CAN		19-SEP-22 00:00
609724003	SAMPLE	RXF2	GAM38	FEB-28-23 05:07:24	DONE CAN		31-MAY-22 00:00
609724004	SAMPLE	RXF2	GAM40	FEB-28-23 05:08:05	DONE CAN		25-OCT-22 00:00
609724005	SAMPLE	RXF2	GAM43	FEB-28-23 05:08:59	DONE CAN		26-JUL-22 00:00
609724006	SAMPLE	RXF2	GAM02	FEB-28-23 05:20:47	DONE CAN		23-SEP-22 00:00
1205313910	MB	RXF2	GAM33	FEB-28-23 05:21:28	DONE CAN		25-JUL-22 00:00
1205313911	DUP	RXF2	GAM03	FEB-28-23 06:51:01	DONE CAN		12-OCT-22 00:00
1205313912	LCS	RXF2	GAM01	FEB-28-23 06:58:38	DONE CAN		14-JUN-22 00:00



Analytical Laboratory Report

Final Report

Report ID: S44989.01(02)
Generated on 03/09/2023
Replaces report S44989.01(01) generated on 02/07/2023

Report to
Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

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John Lavery (johnlavery@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S44989.01-S44989.07
Project: Erickson AM MI Wells 16A-16D
Collected Date(s): 02/02/2023
Submitted Date/Time: 02/03/2023 10:50
Sampled by: Marc Wahrer
P.O. #:

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Maya Murshak
Technical Director



General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile, and 2-chloroethylvinyl ether need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the

FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

All analyses completed



Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1 (1993)
SM2320B	Standard Method 2320 B 2011
SM2340C	Standard Method 2340 C 2011
SM2540C	Standard Method 2540 C 2015
SM2540D	Standard Method 2540 D 2015
SW3015A	SW 846 Method 3015A Revision 1 February 2007



Sample Summary (7 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S44989.01	MW-16A L301214-01	Groundwater	02/02/23 09:35
S44989.02	MW-16B L301214-02	Groundwater	02/02/23 11:10
S44989.03	MW-16C L301214-03	Groundwater	02/02/23 14:08
S44989.04	MW-16D L301214-04	Groundwater	02/02/23 16:08
S44989.05	MWT- L301214-05	Groundwater	02/02/23 09:35
S44989.06	Field blank - L301214-06	Groundwater	02/02/23 08:15
S44989.07	Equipment Blank - L301214-07	Groundwater	02/02/23 08:30



Analytical Laboratory Report

Final Report

Lab Sample ID: S44989.01

Sample Tag: MW-16A L301214-01

Collected Date/Time: 02/02/2023 09:35

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.1	IR
2	1L Plastic	None	Yes	2.1	IR
1	250ml Plastic	HNO3	Yes	2.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/07/23 12:06	CTV	
Metal Digestion	Completed	SW3015A	02/07/23 09:40	CCM	

Inorganics

Method: E300.0, Run Date: 02/03/23 13:58, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 02/03/23 15:18, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	383	25	0.32	mg/L	25	16887-00-6	
Sulfate	145	25	2.6	mg/L	25	14808-79-8	

Method: SM2320B, Run Date: 02/03/23 15:06, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	610	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/03/23 13:00, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	608	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 02/03/23 16:30, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,360	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/06/23 17:15, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	7	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/07/23 11:15, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.003	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.160	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.21	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Final Report

Lab Sample ID: S44989.01 (continued)

Sample Tag: MW-16A L301214-01

Method: E200.8, Run Date: 02/07/23 11:15, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	3.71	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.005	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/07/23 13:14, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	179	2.5	0.217	mg/L	25	7440-70-2	
Magnesium	42.4	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	2.12	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	276	2.5	0.0425	mg/L	25	7440-23-5	

Method: E245.1, Run Date: 02/07/23 13:26, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/08/23 14:25, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S44989.02

Sample Tag: MW-16B L301214-02

Collected Date/Time: 02/02/2023 11:10

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.1	IR
2	1L Plastic	None	Yes	2.1	IR
1	250ml Plastic	HNO3	Yes	2.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/07/23 12:06	CTV	
Metal Digestion	Completed	SW3015A	02/07/23 09:40	CCM	

Inorganics

Method: E300.0, Run Date: 02/03/23 14:08, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	18	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/03/23 15:10, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	390	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/03/23 13:02, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	322	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 02/03/23 16:30, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	366	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/06/23 17:15, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	7	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/07/23 11:19, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.090	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.12	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	0.93	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S44989.02 (continued)

Sample Tag: MW-16B L301214-02

Method: E200.8, Run Date: 02/07/23 11:19, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.023	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.008	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/07/23 13:17, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	74.5	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	29.7	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	3.81	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	24.5	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/07/23 13:30, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/08/23 14:25, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

**Lab Sample ID: S44989.03**

Sample Tag: MW-16C L301214-03

Collected Date/Time: 02/02/2023 14:08

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.1	IR
2	1L Plastic	None	Yes	2.1	IR
1	250ml Plastic	HNO3	Yes	2.1	IR
1	250ml Plastic	None	Yes	2.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/07/23 12:06	CTV	
Mercury Digestion	Completed	E245.1	02/07/23 12:06	CTV	
Metal Digestion	Completed	SW3015A	02/07/23 09:40	CCM	
Metal Digestion	Completed	SW3015A	02/07/23 09:40	CCM	

Inorganics**Method: E300.0, Run Date: 02/03/23 14:18, Analyst: JDP**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	8	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	19	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/03/23 15:12, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	370	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/03/23 13:08, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	263	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 02/03/23 16:30, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	418	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/06/23 17:15, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	40	3	1	mg/L	2		

Metals**Method: E200.8, Run Date: 02/07/23 11:22, Analyst: CCM**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.002	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.051	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.40	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Lab Sample ID: S44989.03 (continued)

Sample Tag: MW-16C L301214-03

Method: E200.8, Run Date: 02/07/23 11:22, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	0.76	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.030	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.007	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/07/23 11:25, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony, Dissolved*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic, Dissolved	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium, Dissolved	0.048	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium, Dissolved	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron, Dissolved	0.40	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium, Dissolved	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium, Dissolved	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt, Dissolved	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper, Dissolved	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron, Dissolved	0.02	0.02	0.00192	mg/L	5	7439-89-6	
Lead, Dissolved	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium, Dissolved*	0.029	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum, Dissolved	0.007	0.005	0.000217	mg/L	5	7439-98-7	
Nickel, Dissolved	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium, Dissolved	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver, Dissolved	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium, Dissolved	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium, Dissolved	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc, Dissolved	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/07/23 13:18, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	63.2	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	24.4	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	3.72	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	39.4	0.50	0.00850	mg/L	5	7440-23-5	

Method: E200.8, Run Date: 02/07/23 13:20, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium, Dissolved*	63.5	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium, Dissolved	23.2	0.50	0.0120	mg/L	5	7439-95-4	
Potassium, Dissolved	3.64	0.50	0.0230	mg/L	5	7440-09-7	
Sodium, Dissolved	38.7	0.50	0.00850	mg/L	5	7440-23-5	



Analytical Laboratory Report

Final Report

Lab Sample ID: S44989.03 (continued)

Sample Tag: MW-16C L301214-03

Method: E245.1, Run Date: 02/07/23 13:43, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury, Dissolved	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Method: E245.1, Run Date: 02/07/23 13:33, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/08/23 14:25, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S44989.04

Sample Tag: MW-16D L301214-04

Collected Date/Time: 02/02/2023 16:08

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.1	IR
2	1L Plastic	None	Yes	2.1	IR
1	250ml Plastic	HNO3	Yes	2.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/07/23 12:06	CTV	
Metal Digestion	Completed	SW3015A	02/07/23 09:40	CCM	

Inorganics

Method: E300.0, Run Date: 02/03/23 14:28, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	6	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/03/23 15:18, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	380	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/03/23 13:10, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	96	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 02/03/23 16:30, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	366	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/06/23 17:15, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	5	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/07/23 11:29, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.037	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	4.65	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	0.010	0.005	0.000377	mg/L	5	7440-50-8	
Iron	0.16	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S44989.04 (continued)

Sample Tag: MW-16D L301214-04

Method: E200.8, Run Date: 02/07/23 11:29, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.039	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.005	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	0.011	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/07/23 13:21, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	29.3	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	6.99	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	9.40	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	106	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/07/23 13:46, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/08/23 14:25, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S44989.05

Sample Tag: MWT- L301214-05

Collected Date/Time: 02/02/2023 09:35

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.1	IR
2	1L Plastic	None	Yes	2.1	IR
1	250ml Plastic	HNO3	Yes	2.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/07/23 12:06	CTV	
Metal Digestion	Completed	SW3015A	02/07/23 09:40	CCM	

Inorganics

Method: E300.0, Run Date: 02/03/23 14:38, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 02/03/23 15:39, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	383	25	0.32	mg/L	25	16887-00-6	
Sulfate	146	25	2.6	mg/L	25	14808-79-8	

Method: SM2320B, Run Date: 02/03/23 15:20, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	620	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/03/23 13:12, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	605	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 02/03/23 16:30, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,350	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/06/23 17:15, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	7	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/07/23 11:32, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.004	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.156	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.21	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Lab Sample ID: S44989.05 (continued)

Sample Tag: MWT- L301214-05

Method: E200.8, Run Date: 02/07/23 11:32, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	3.70	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/07/23 13:23, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	176	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	42.3	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	2.06	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	281	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/07/23 13:49, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/08/23 14:25, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S44989.06

Sample Tag: Field blank - L301214-06

Collected Date/Time: 02/02/2023 08:15

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.1	IR
2	1L Plastic	None	Yes	2.1	IR
1	250ml Plastic	HNO3	Yes	2.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/07/23 12:06	CTV	
Metal Digestion	Completed	SW3015A	02/07/23 09:40	CCM	

Inorganics

Method: E300.0, Run Date: 02/03/23 14:48, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: SM2320B, Run Date: 02/03/23 15:22, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	Not detected	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/03/23 13:14, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	Not detected	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 02/03/23 16:30, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/06/23 17:15, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/07/23 11:10, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S44989.06 (continued)

Sample Tag: Field blank - L301214-06

Method: E200.8, Run Date: 02/07/23 11:10, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E200.8, Run Date: 02/07/23 13:12, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	
Magnesium	Not detected	0.50	0.00480	mg/L	2	7439-95-4	
Potassium	Not detected	0.50	0.00920	mg/L	2	7440-09-7	
Sodium	Not detected	0.50	0.00340	mg/L	2	7440-23-5	

Method: E245.1, Run Date: 02/07/23 13:53, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/08/23 14:25, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S44989.07

Sample Tag: Equipment Blank - L301214-07

Collected Date/Time: 02/02/2023 08:30

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.1	IR
2	1L Plastic	None	Yes	2.1	IR
1	250ml Plastic	HNO3	Yes	2.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/07/23 12:06	CTV	
Metal Digestion	Completed	SW3015A	02/07/23 09:40	CCM	

Inorganics

Method: E300.0, Run Date: 02/03/23 14:58, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: SM2320B, Run Date: 02/03/23 15:24, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	Not detected	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/03/23 13:16, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	Not detected	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 02/03/23 16:30, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/06/23 17:15, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/07/23 11:12, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S44989.07 (continued)
Sample Tag: Equipment Blank - L301214-07

Method: E200.8, Run Date: 02/07/23 11:12, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E200.8, Run Date: 02/07/23 13:13, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	
Magnesium	Not detected	0.50	0.00480	mg/L	2	7439-95-4	
Potassium	Not detected	0.50	0.00920	mg/L	2	7440-09-7	
Sodium	Not detected	0.50	0.00340	mg/L	2	7440-23-5	

Method: E245.1, Run Date: 02/07/23 13:56, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/08/23 14:25, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID:S44989

Client:BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 16A-16D

Submitted:02/03/2023 10:50 Login User: PFD

Attention: Jennifer Caporale

Address: Board of Water & Light

P.O. Box 13007

Lansing, MI 48901

Phone: 517-702-6372

FAX:

Email: Environmental_Laboratory@LBWL.com

Selection	Description	Note
-----------	-------------	------

Sample Receiving

- | | | | |
|-----|--|--|--------|
| 01. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples are received at 4C +/- 2C Thermometer # | IR 2.1 |
| 02. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Received on ice/ cooling process begun | |
| 03. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples shipped | |
| 04. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples left in 24 hr. drop box | |
| 05. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Are there custody seals/tape or is the drop box locked | |

Chain of Custody

- | | | | |
|-----|--|--|-----|
| 06. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC adequately filled out | |
| 07. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC signed and relinquished to the lab | |
| 08. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sample tag on bottles match COC | |
| 09. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Subcontracting needed? Subcontracted to: | GEL |

Preservation

- | | | | |
|-----|--|---|------------|
| 10. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Do sample have correct chemical preservation | |
| 11. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Completed pH checks on preserved samples? (no VOAs) | |
| 12. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Did any samples need to be preserved in the lab? | Sample .03 |

Bottle Conditions

- | | | | |
|-----|--|---|------------|
| 13. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | All bottles intact | |
| 14. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Appropriate analytical bottles are used | |
| 15. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Merit bottles used | |
| 16. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sufficient sample volume received | |
| 17. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples require laboratory filtration | Sample .03 |
| 18. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples submitted within holding time | |
| 19. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Do water VOC or TOX bottles contain headspace | |

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S44989 Submitted: 02/03/2023 10:50

Attention: Jennifer Caporale
 Address: Board of Water & Light
 P.O. Box 13007
 Lansing, MI 48901

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 16A-16D

Initial Preservation Check: 02/03/2023 12:52 PFD

Phone: 517-702-6372 FAX:
 Email: Environmental_Laboratory@LBWL.com

Preservation Recheck (E200.8): N/A

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S44989.01	125ml Plastic HNO3	<2			
S44989.01	1L Plastic HNO3	<2			
S44989.01	1L Plastic HNO3	<2			
S44989.02	125ml Plastic HNO3	<2			
S44989.02	1L Plastic HNO3	<2			
S44989.02	1L Plastic HNO3	<2			
S44989.03	125ml Plastic HNO3	<2			
S44989.03	1L Plastic HNO3	<2			
S44989.03	1L Plastic HNO3	<2			
S44989.04	125ml Plastic HNO3	<2			
S44989.04	1L Plastic HNO3	<2			
S44989.04	1L Plastic HNO3	<2			
S44989.05	125ml Plastic HNO3	<2			
S44989.05	1L Plastic HNO3	<2			
S44989.05	1L Plastic HNO3	<2			
S44989.06	125ml Plastic HNO3	<2			
S44989.06	1L Plastic HNO3	<2			
S44989.06	1L Plastic HNO3	<2			
S44989.07	125ml Plastic HNO3	<2			
S44989.07	1L Plastic HNO3	<2			
S44989.07	1L Plastic HNO3	<2			



2680 East Lansing Dr., East Lansing, MI 48823
 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

REPORT TO **CHAIN OF CUSTODY RECORD** **INVOICE TO**

CONTACT NAME **Jennifer Caporale**
 COMPANY **Lansing Board of Water and Light**
 ADDRESS **PO Box 13007 48901-3007**
 CITY **Lansing** STATE **Mi** ZIP CODE **48901**
 PHONE NO. **517-702-6372** FAX NO. _____ P.O. NO. _____
 E-MAIL ADDRESS **Environmental_Laboratory@lbwl.com** QUOTE NO. _____

CONTACT NAME **Beth Zimpfer** SAME
 COMPANY _____
 ADDRESS _____
 CITY _____ STATE _____ ZIP CODE _____
 PHONE NO. _____ E-MAIL ADDRESS **Beth.Zimpfer@lbwl.com**

PROJECT NO./NAME **Erickson AM MI Wells 14-15** SAMPLER(S) - PLEASE PRINT/SIGN NAME **Marc Wahrer**
 TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER **ASAP**
 DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER _____

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives								Total Metals	F- undistilled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	HCO3, CO3, Hardness	Dissolved Metals	Certifications	Project Locations	Special Instructions
	DATE	TIME				NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER											
	2/2/23	935	MW-16A L301214-01	GW	5	2	3															Metals to analyse: Na, Mg, K	
		1110	MW-16B -02	GW	5	2	3															B, Ca, Sb, As, Ba, Be, Cd, Cr,	
		1408	MW-16C -03	GW	5	2	3															Co, Li, Hg, Mo, Pb, Se, Tl,	
		1608	MW16-D -04	GW	5	2	3															Fe, Cu, Ni, Ag, V, Zn	
		935	MWT- -05	GW	5	2	3															Please send a preliminary report	
		815	Field Blank -06	DI	5	2	3															Dissolved metals = some	
		830	Equipment Blank -07	DI	5	2	3															analyses as f. metals	

RELINQUISHED BY: _____ DATE **2-3-23** TIME **10:50**
 SIGNATURE/ORGANIZATION *[Signature]*
 RECEIVED BY: _____ DATE **2/3/23** TIME **10:50**
 SIGNATURE/ORGANIZATION *[Signature]*

RELINQUISHED BY: _____ DATE _____ TIME _____
 SIGNATURE/ORGANIZATION _____
 RECEIVED BY: _____ DATE _____ TIME _____
 SIGNATURE/ORGANIZATION _____

SEAL NO. _____ SEAL INTACT YES NO INITIALS _____
 SEAL NO. _____ SEAL INTACT YES NO INITIALS _____

NOTES: TEMP. ON ARRIVAL **2.1**

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.150
Be, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cl	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cr, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
F	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Fe, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Pb, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Li, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Hg, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Mo, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
RA226/228	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Se, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ag, total	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
SO4	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Tl, total	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TDS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
TSS	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
V, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total							



February 27, 2023

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 610325
SDG: S44989


Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on February 09, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 1614.

Sincerely,


Jordan Melton for
Delaney Stone
Project Manager

Purchase Order: GELP20-0018
Enclosures



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Case Narrative

**Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S44989
Work Order: 610325**

February 27, 2023

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on February 09, 2023 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

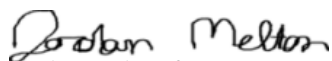
Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
610325001	S44989.01
610325002	S44989.02
610325003	S44989.03
610325004	S44989.04
610325005	S44989.05
610325006	S44989.06
610325007	S44989.07

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.

A handwritten signature in black ink that reads "Jordan Melton". The signature is written in a cursive style with a large initial 'J'.

Jordan Melton for
Delaney Stone
Project Manager

Chain of Custody and Supporting Documentation



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 Phone (517) 332-0167 Fax (517) 332-4034
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C.O.C. PAGE # 1 OF 1

REPORT TO PROJECT MANAGEMENT TEAM
INVOICE TO MERIT LABORATORIES

CONTACT NAME: Project Management Team
 COMPANY: Merit Laboratories

CONTACT NAME: Julie Teague
 COMPANY: Merit Laboratories

ADDRESS: 2680 East Lansing Drive
 ADDRESS: 2680 East Lansing Drive

CITY: East Lansing
 CITY: East Lansing

STATE: MI
 STATE: MI

ZIP CODE: 48823
 ZIP CODE: 48823

PHONE NO.: 517-332-0167
 PHONE NO.: 517-332-0167

E-MAIL ADDRESS: results@meritlabs.com
 E-MAIL ADDRESS: juliet@meritlabs.com

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR	DATE	TIME	IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	H ₂ O ₂	H ₂ SO ₄	HNO ₃	MOON	OTHER	# Containers & Preservatives	ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)	
															Radium 226*	Radium 228**
	2/2/23	0935		S44989.01	GW	2								2	✓	✓
	2/2/23	1110		S44989.02	GW	2								2	✓	✓
	2/2/23	1408		S44989.03	GW	2								2	✓	✓
	2/2/23	1608		S44989.04	GW	2								2	✓	✓
	2/2/23	0935		S44989.05	GW	2								2	✓	✓
	2/2/23	0815		S44989.06	GW	2								2	✓	✓
	2/2/23	0830		S44989.07	GW	2								2	✓	✓

TURNAROUND TIME REQUIRED: 1 DAY 2 DAYS 3 DAYS STANDARD OTHER

DELIVERABLES REQUIRED: STD LEVEL I LEVEL II LEVEL III LEVEL IV EDD OTHER

MATRIX: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIFE A=AIR W=WASTE

PROJECT NO./NAME: S44989
 SAMPLER(S) - PLEASE PRINT/SIGN NAME: _____

RELINQUISHED BY: [Signature]
 RECEIVED BY: [Signature]
 RELINQUISHED BY: [Signature]
 RECEIVED BY: [Signature]

DATE: 2/2/23 1700
 DATE: 2/2/23 1700

SEAL NO. []
 SEAL NO. []

SEAL INTACT YES [] NO []
 SEAL INTACT YES [] NO []

INITIALS []
 INITIALS []

NOTES: Radium 226*
 Radium 228**

CERTIFICATIONS:
 OHIO VAP Drinking Water
 DoD NPDES
 Project Locations:
 Detroit New York
 Other _____
 Special Instructions:
 * E903.1 Mod.
 ** E904.0/SW 9320 Mod.

Please use calculation product & provide Radium 226/228 combined results on the report
 (No Ice needed)
 ** Subcontracted to
 GEL Laboratories, Inc.
 2040 Savage Road
 Charleston, SC 29407

SAMPLE RECEIPT & REVIEW FORM DS

Client: <u>MERI</u>		SDG/AR/COC/Work Order: <u>610325</u>			
Received By: <u>MVH</u>		Date Received: <u>07.09.2023</u>			
Carrier and Tracking Number		Circle Applicable: FedEx Express FedEx Ground <u>UPS</u> Field Services Courier Other			
		<u>124664770362566448</u>			
Suspected Hazard Information		Yes	No		
*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.					
A) Shipped as a DOT Hazardous?		<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___		
B) Did the client designate the samples are to be received as radioactive?		<input checked="" type="checkbox"/>	COC notation or radioactive stickers on containers equal client designation.		
C) Did the RSO classify the samples as radioactive?		<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> <u>CPM</u> / mR/Hr Classified as: Rad 1 Rad 2 Rad 3		
D) Did the client designate samples are hazardous?		<input checked="" type="checkbox"/>	COC notation or hazard labels on containers equal client designation.		
E) Did the RSO identify possible hazards?		<input checked="" type="checkbox"/>	If D or E is yes, select Hazards below. PCBs Flammable Foreign Soil RCRA Asbestos Beryllium Other:		
Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Client contacted and provided COC COC created upon receipt
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice Ice Packs Dry ice <u>None</u> Other: *all temperatures are recorded in Celsius TEMP: <u>21</u>
4	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>IR2-21</u> Secondary Temperature Device Serial # (If Applicable):
5	Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: If Preservation added, Lot#:
7	Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer)
					Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No)
					Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___ Sample ID's and containers affected:
8	Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and containers affected:
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No container count on COC Other (describe)
12	Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
13	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: <u>Not relinquished</u> Other (describe)
Comments (Use Continuation Form if needed): <u>MVH 1023</u>					

PM (or PMA) review: Initials HM Date 21/11/23 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 27 February 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122023-4
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2022-160
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-22-20
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S44989
Work Order #: 610325**

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2387212

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
610325001	S44989.01
610325002	S44989.02
610325003	S44989.03
610325004	S44989.04
610325005	S44989.05
610325006	S44989.06
610325007	S44989.07
1205326653	Method Blank (MB)
1205326654	610267001(NonSDG) Sample Duplicate (DUP)
1205326655	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2387191

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
610325001	S44989.01
610325002	S44989.02
610325003	S44989.03
610325004	S44989.04
610325005	S44989.05
610325006	S44989.06
610325007	S44989.07
1205326596	Method Blank (MB)

1205326597	609996001(NonSDG) Sample Duplicate (DUP)
1205326598	609996001(NonSDG) Matrix Spike (MS)
1205326599	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Preparation Information

Homogenous Matrix

Samples 1205326597 (Non SDG 609996001DUP) and 1205326598 (Non SDG 609996001MS) were non-homogenous matrix.

Miscellaneous Information

Additional Comments

The matrix spike, 1205326598 (Non SDG 609996001MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

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Qualifier Definition Report for

MERI001 Merit Laboratories, Inc.

Client SDG: S44989 GEL Work Order: 610325

The Qualifiers in this report are defined as follows:

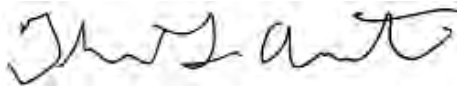
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:



Name: Theresa Austin

Date: 09 MAR 2023

Title: Group Leader

Sample Data Summary

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: March 8, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Lavery
 Project: Routine Analysis

Client Sample ID: S44989.01	Project: MERI00120
Sample ID: 610325001	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 02-FEB-23 09:35	
Receive Date: 09-FEB-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.178	+/-1.19	2.15	3.00	pCi/L		JE1	03/08/23	0913	2387212		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.562	+/-1.23			pCi/L		NXL1	03/08/23	1425	2387217		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.385	+/-0.300	0.409	1.00	pCi/L		LXP1	03/08/23	1036	2387191		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			94.8	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

- | | |
|---------------------------------------|--------------------------------|
| DF: Dilution Factor | Lc/LC: Critical Level |
| DL: Detection Limit | PF: Prep Factor |
| MDA: Minimum Detectable Activity | RL: Reporting Limit |
| MDC: Minimum Detectable Concentration | SQL: Sample Quantitation Limit |

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Certificate of Analysis

Report Date: March 8, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S44989.02 Project: MERI00120
Sample ID: 610325002 Client ID: MERI001
Matrix: Ground Water
Collect Date: 02-FEB-23 11:10
Receive Date: 09-FEB-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.829	+/-0.959	1.61	3.00	pCi/L		JE1	03/08/23	0913	2387212		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.83	+/-1.04			pCi/L		NXL1	03/08/23	1425	2387217		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.997	+/-0.394	0.296	1.00	pCi/L		LXP1	03/08/23	1100	2387191		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			88.2	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: March 8, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S44989.03 Project: MERI00120
Sample ID: 610325003 Client ID: MERI001
Matrix: Ground Water
Collect Date: 02-FEB-23 14:08
Receive Date: 09-FEB-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	0.0142	+/-1.25	2.28	3.00	pCi/L		JE1	03/08/23	0914	2387212	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		0.244	+/-1.27			pCi/L		NXL1	03/08/23	1425	2387217	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226	U	0.230	+/-0.223	0.321	1.00	pCi/L		LXP1	03/08/23	1100	2387191	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			86.6	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: March 8, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S44989.04 Project: MERI00120
Sample ID: 610325004 Client ID: MERI001
Matrix: Ground Water
Collect Date: 02-FEB-23 16:08
Receive Date: 09-FEB-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.84	+/-1.34	2.12	3.00	pCi/L		JE1	03/08/23	0914	2387212		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		2.43	+/-1.39			pCi/L		NXL1	03/08/23	1425	2387217		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.591	+/-0.391	0.502	1.00	pCi/L		LXP1	03/08/23	1100	2387191		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			77.9	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: March 8, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S44989.05	Project: MERI00120
Sample ID: 610325005	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 02-FEB-23 09:35	
Receive Date: 09-FEB-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	-0.723	+/-0.714	1.53	3.00	pCi/L		JE1	03/08/23	0914	2387212		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.325	+/-0.752			pCi/L		NXL1	03/08/23	1425	2387217		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.325	+/-0.235	0.252	1.00	pCi/L		LXP1	03/08/23	1100	2387191		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			96	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

- | | |
|---------------------------------------|--------------------------------|
| DF: Dilution Factor | Lc/LC: Critical Level |
| DL: Detection Limit | PF: Prep Factor |
| MDA: Minimum Detectable Activity | RL: Reporting Limit |
| MDC: Minimum Detectable Concentration | SQL: Sample Quantitation Limit |

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Certificate of Analysis

Report Date: March 8, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S44989.06 Project: MERI00120
Sample ID: 610325006 Client ID: MERI001
Matrix: Ground Water
Collect Date: 02-FEB-23 08:15
Receive Date: 09-FEB-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	-0.184	+/-0.947	1.82	3.00	pCi/L		JE1	03/08/23	0914	2387212		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.492	+/-1.00			pCi/L		NXL1	03/08/23	1425	2387217		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.492	+/-0.321	0.397	1.00	pCi/L		LXP1	03/08/23	1100	2387191		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer	Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer		GFPC Ra228, Liquid "As Received"			83.6	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 8, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S44989.07 Project: MERI00120
Sample ID: 610325007 Client ID: MERI001
Matrix: Ground Water
Collect Date: 02-FEB-23 08:30
Receive Date: 09-FEB-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.438	+/-1.04	1.85	3.00	pCi/L		JE1	03/08/23	0914	2387212		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.850	+/-1.09			pCi/L		NXL1	03/08/23	1425	2387217		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.413	+/-0.322	0.439	1.00	pCi/L		LXP1	03/08/23	1100	2387191		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			79.6	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

Quality Control Data

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: March 8, 2023

Page 1 of 2

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: John Laverty

Workorder: 610325

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2387212										
QC1205326654	610267001	DUP									
Radium-228	U	0.876	U	1.52	pCi/L	N/A		N/A	JE1	03/08/23	09:13
	Uncertainty	+/-1.15		+/-1.48							
QC1205326655	LCS										
Radium-228	63.2			63.0	pCi/L		99.8	(75%-125%)		03/08/23	09:13
	Uncertainty			+/-4.18							
QC1205326653	MB										
Radium-228			U	-0.106	pCi/L					03/08/23	09:13
	Uncertainty			+/-1.02							
Rad Ra-226											
Batch	2387191										
QC1205326597	609996001	DUP									
Radium-226				0.983	pCi/L	5.59		(0% - 100%)	LXP1	03/08/23	11:22
	Uncertainty			+/-0.430							
QC1205326599	LCS										
Radium-226	26.6			22.1	pCi/L		83.1	(75%-125%)		03/08/23	11:22
	Uncertainty			+/-1.86							
QC1205326596	MB										
Radium-226			U	0.166	pCi/L					03/08/23	11:22
	Uncertainty			+/-0.265							
QC1205326598	609996001	MS									
Radium-226	134	0.983		104	pCi/L		77.3	(75%-125%)		03/08/23	11:22
	Uncertainty			+/-8.23							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- H Analytical holding time was exceeded
- < Result is less than value reported
- > Result is greater than value reported

GEL LABORATORIES LLC

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QC Summary

Workorder: 610325

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UI											
BD											
h											
R											
^											
N/A											
ND											
M											
NJ											
FA											
UJ											
Q											
K											
UL											
L											
NI											
Y											
**											
M											
J											

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 2387212 Check-list

This check-list was completed on 08-MAR-23 by Nat Long

This batch was reviewed by Kenshalla Oston on 08-MAR-23 and Nat Long on 08-MAR-23.

Batch ID:
2387212

Product:
GFC28RAL

Description: Gas Flow Radium 228
GL-RAD-A-063

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-228 in Liquid

Batch ID: 2387212
Analyst: Jacqueline Emond (JE1)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL-RAD-A-063 REV# 5
Instrument: LUCAS-C202389980

Due Dates for Lab: 06-MAR-2023			Package: 08-MAR-2023	SDG: 09-MAR-2023		
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
LCS	1205326655	228	1952-B	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	Ac-228 Ingrow (date)	Ac-228 Separation (date)
1	610267001	01-MAR-2023	3	300.62	300.62	03/02/23 14:42	03/08/23 07:05
2	610325001	01-MAR-2023	3	300.75	300.75	03/02/23 14:42	03/08/23 07:05
3	610325002	01-MAR-2023	3	303.9	303.9	03/02/23 14:42	03/08/23 07:05
4	610325003	01-MAR-2023	3	301.89	301.89	03/02/23 14:42	03/08/23 07:05
5	610325004	01-MAR-2023	3	303.1	303.1	03/02/23 14:42	03/08/23 07:05
6	610325005	01-MAR-2023	3	302.04	302.04	03/02/23 14:42	03/08/23 07:05
7	610325006	01-MAR-2023	3	300.27	300.27	03/02/23 14:42	03/08/23 07:05
8	610325007	01-MAR-2023	3	301.45	301.45	03/02/23 14:42	03/08/23 07:05
9	610447001	01-MAR-2023	3	301.17	301.17	03/02/23 14:42	03/08/23 07:05
10	610447002	01-MAR-2023	3	302.3	302.3	03/02/23 14:42	03/08/23 07:05
11	610447003	01-MAR-2023	3	301.17	301.17	03/02/23 14:42	03/08/23 07:05
12	610449001	01-MAR-2023	3	300.81	300.81	03/02/23 14:42	03/08/23 07:05
13	1205326653 MB	01-MAR-2023	3		303.9	03/02/23 14:42	03/08/23 07:05
14	1205326654 DUP (610267001)	01-MAR-2023	3	302.74	302.74	03/02/23 14:42	03/08/23 07:05
15	1205326655 LCS	01-MAR-2023	3		303.9	03/02/23 14:42	03/08/23 07:05

Reagent/Solvent Lot ID	Description	Amount	Comments:
WORK 1951-E	Ba-133	.1 mL	Pipet Id: RAD-GFC-1795419 Data Entry Date2: 01-MAR-2023 00:00
REGNT 3862351	RGF-1M Citric Acid	5 mL	
REGNT 3850768	2M HCl	20 mL	
REGNT 3864851	RGF-7M Nitric Acid	25 mL	
REGNT DGA013123	2372406	2 g	
REGNT 3418276.6	29M HF (48-50%)	4 mL	
REGNT 3528714	500 mg/mL Neodymium Carrier	.2 mL	
REGNT 3521298	RGF-Neodymium Subtrate	5 mL	
REGNT 3855914.1	Nitric Acid	5 mL	
REGNT 3871043	RGF-1.5M Ammonium Sulfate	10 mL	
REGNT 3465466	Barium Carrier Ra228 REG	1 mL	
REGNT 3869397	RGF-50% Potassium Carbonate	2 mL	
REGNT 3857883.6	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL	

Radium-228 Liquid

Filename : RA228.XLS
 File type : Excel
 Version # : 1.4.3

Tracer S/N : 1951-E
 Tracer Exp Date : 1/10/2024
 Tracer Volume Added: 0.10

Batch : 2387212
 Analyst : JAC02417
 Prep Date : 3/1/2023
 Ra-228 Method Uncertainty : 0.1268

Procedure Code : GFC28RAL
 Parmname : Radium-228
 Required MDA : 3 pCi/L
 Ra-228 Abundance : 1.00
 Halflife of Ra-228 : 5.75 years
 Halflife of Ac-228 : 6.15 hours

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	610267001.1	0.3006	1.8470E-05	2/6/2023 15:00	1196.3	1.67%	846.8	1.98%	0.1	0.000200
2	610325001.1	0.3008	1.8472E-05	2/2/2023 9:35	1196.3	1.67%	1134.4	1.71%	0.1	0.000200
3	610325002.1	0.3039	1.8525E-05	2/2/2023 11:10	1196.3	1.67%	1054.8	1.78%	0.1	0.000200
4	610325003.1	0.3019	1.8491E-05	2/2/2023 14:08	1196.3	1.67%	1035.8	1.79%	0.1	0.000200
5	610325004.1	0.3031	1.8511E-05	2/2/2023 16:08	1196.3	1.67%	931.5	1.89%	0.1	0.000200
6	610325005.1	0.3020	1.8494E-05	2/2/2023 9:35	1196.3	1.67%	1148.8	1.70%	0.1	0.000200
7	610325006.1	0.3003	1.8464E-05	2/2/2023 8:15	1196.3	1.67%	1000.4	1.83%	0.1	0.000200
8	610325007.1	0.3015	1.8484E-05	2/2/2023 8:30	1196.3	1.67%	952.2	1.87%	0.1	0.000200
9	610447001.1	0.3012	1.8479E-05	2/2/2023 12:15	1196.3	1.67%	1029.5	1.80%	0.1	0.000200
10	610447002.1	0.3023	1.8498E-05	2/2/2023 12:55	1196.3	1.67%	1004.4	1.82%	0.1	0.000200
11	610447003.1	0.3012	1.8479E-05	2/2/2023 14:40	1196.3	1.67%	926.2	1.90%	0.1	0.000200
12	610449001.1	0.3008	1.8473E-05	2/1/2023 12:25	1196.3	1.67%	1071.3	1.76%	0.1	0.000200
13	1205326653.1	0.3039	1.8525E-05	3/1/2023 0:00	1196.3	1.67%	873.2	1.95%	0.1	0.000200
14	1205326654.1	0.3027	1.8505E-05	2/6/2023 15:00	1196.3	1.67%	882.1	1.94%	0.1	0.000200
15	1205326655.1	0.3039	1.8525E-05	3/1/2023 0:00	1196.3	1.67%	958.9	1.86%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-063
 Instrument SOP: GL-RAD-I-016

Count raw Data													Calculated	Sample
Pos.	Detector ID	Counting Time (min.)	Gross Counts		Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Recovery %	Sample Recovery Error %
			Alpha	Beta										
1	2A	60	6	55	0.917	3/8/2023 9:13	3/2/2023 14:42	3/8/2023 7:05	0.990	0.785	1.000	1.057	70.8%	2.61%
2	2B	60	3	101	1.683	3/8/2023 9:13	3/2/2023 14:42	3/8/2023 7:05	0.989	0.785	1.000	1.057	94.8%	2.41%
3	2C	60	9	57	0.950	3/8/2023 9:13	3/2/2023 14:42	3/8/2023 7:05	0.989	0.785	1.000	1.057	88.2%	2.46%
4	2D	60	4	91	1.517	3/8/2023 9:14	3/2/2023 14:42	3/8/2023 7:05	0.989	0.785	1.000	1.057	86.6%	2.46%
5	4A	60	6	86	1.433	3/8/2023 9:14	3/2/2023 14:42	3/8/2023 7:05	0.989	0.785	1.000	1.057	77.9%	2.54%
6	4C	60	3	40	0.667	3/8/2023 9:14	3/2/2023 14:42	3/8/2023 7:05	0.989	0.785	1.000	1.057	96.0%	2.40%
7	5A	60	9	53	0.883	3/8/2023 9:14	3/2/2023 14:42	3/8/2023 7:05	0.989	0.784	1.000	1.057	83.6%	2.49%
8	5B	60	14	59	0.983	3/8/2023 9:14	3/2/2023 14:42	3/8/2023 7:05	0.989	0.784	1.000	1.057	79.6%	2.52%
9	5C	60	10	39	0.650	3/8/2023 9:14	3/2/2023 14:42	3/8/2023 7:05	0.989	0.784	1.000	1.057	86.1%	2.47%
10	6A	60	10	102	1.700	3/8/2023 9:14	3/2/2023 14:42	3/8/2023 7:05	0.989	0.784	1.000	1.057	84.0%	2.49%
11	6C	60	6	64	1.067	3/8/2023 9:14	3/2/2023 14:42	3/8/2023 7:05	0.989	0.784	1.000	1.057	77.4%	2.55%
12	7B	60	5	65	1.083	3/8/2023 9:14	3/2/2023 14:42	3/8/2023 7:05	0.989	0.784	1.000	1.057	89.5%	2.44%
13	7C	60	6	50	0.833	3/8/2023 9:13	3/2/2023 14:42	3/8/2023 7:05	0.998	0.785	1.000	1.057	73.0%	2.58%
14	8B	60	14	108	1.800	3/8/2023 9:13	3/2/2023 14:42	3/8/2023 7:05	0.990	0.785	1.000	1.057	73.7%	2.58%
15	8C	60	51	1037	17.283	3/8/2023 9:13	3/2/2023 14:42	3/8/2023 7:05	0.998	0.785	1.000	1.057	80.1%	2.52%

Calibration Data								
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2022	5/31/2023	0.6201	0.01914	0.728	3/3/2023 18:12	1000
2	PIC	6/1/2022	5/31/2023	0.6097	0.02111	1.633	3/3/2023 18:12	1000
3	PIC	6/1/2022	5/31/2023	0.6022	0.01274	0.732	3/3/2023 18:12	1000
4	PIC	6/1/2022	5/31/2023	0.6046	0.00745	1.513	3/3/2023 18:12	1000
5	PIC	6/1/2022	5/31/2023	0.6013	0.01123	1.008	3/3/2023 18:12	1000
6	PIC	6/1/2022	5/31/2023	0.6359	0.00889	0.884	3/3/2023 18:13	1000
7	PIC	6/1/2022	5/31/2023	0.6332	0.00851	0.931	3/3/2023 18:13	1000
8	PIC	6/1/2022	5/31/2023	0.6336	0.00426	0.875	3/3/2023 18:13	1000
9	PIC	6/1/2022	5/31/2023	0.6242	0.00657	0.587	3/3/2023 18:13	1000
10	PIC	6/1/2022	5/31/2023	0.6328	0.02228	1.308	3/3/2023 18:08	1000
11	PIC	6/1/2022	5/31/2023	0.6123	0.01970	0.940	3/3/2023 18:08	1000
12	PIC	6/1/2022	5/31/2023	0.6366	0.00627	0.556	3/3/2023 18:10	1000
13	PIC	6/1/2022	5/31/2023	0.6407	0.00790	0.858	3/3/2023 18:10	1000
14	PIC	6/1/2022	5/31/2023	0.6437	0.02148	1.443	3/3/2023 18:11	1000
15	PIC	6/1/2022	5/31/2023	0.6294	0.01955	1.393	3/3/2023 18:11	1000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

* - RPD changed to 0% due to sample & dup activity below MDA

LCS S/N : 1952-B
LCS Exp Date : 8/9/2023
LCS Activity (dpm/ml): 426.17
LCS Volume Added: 0.10

Results														2 SIGMA		2 SIGMA	
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	Counting Uncertainty pCi/L	Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery	
1	1.2269	0.8662	3	1.9645	0.8760	67.13%	0.1887	0.1265	1.1513	1.1730		SAMPLE					
2	1.3966	0.9860	3	2.1484	0.1776	342.34%	0.0503	0.1723	1.1917	1.1926		SAMPLE					
3	1.0076	0.7114	3	1.6129	0.8290	59.10%	0.2180	0.1287	0.9593	0.9822		SAMPLE					
4	1.4796	1.0446	3	2.2834	0.0142	4463.97%	0.0037	0.1637	1.2460	1.2462		SAMPLE					
5	1.3450	0.9496	3	2.1155	1.8399	37.20%	0.4253	0.1578	1.3378	1.4174		SAMPLE					
6	0.9692	0.6842	3	1.5349	-0.7234	50.46%	-0.2173	0.1095	0.7145	0.7146		SAMPLE					
7	1.1542	0.8149	3	1.8228	-0.1841	262.49%	-0.0477	0.1251	0.9472	0.9473		SAMPLE					
8	1.1703	0.8263	3	1.8545	0.4377	121.31%	0.1083	0.1314	1.0404	1.0463		SAMPLE					
9	0.9010	0.6361	3	1.4620	0.2392	169.65%	0.0630	0.1069	0.7953	0.7976		SAMPLE					
10	1.3549	0.9566	3	2.1044	1.4995	44.05%	0.3920	0.1722	1.2909	1.3472		SAMPLE					
11	1.2922	0.9123	3	2.0398	0.5451	108.06%	0.1267	0.1368	1.1540	1.1625		SAMPLE					
12	0.8280	0.5845	3	1.3484	1.8907	25.99%	0.5273	0.1364	0.9587	1.0717		SAMPLE					
13	1.2271	0.8664	3	1.9466	-0.1055	492.32%	-0.0247	0.1214	1.0182	1.0183		MB					
14	1.5859	1.1196	3	2.4524	1.5218	49.78%	0.3570	0.1773	1.4816	1.5324	610267001.1	DUP	* 0.0%				
15	1.4498	1.0236	3	2.2455	63.0284	4.65%	15.8903	0.5380	4.1826	16.6839		LCS			63.1686	99.8%	

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
610267001	2A	60	6	55	3/8/2023 9:13	3/8/2023 10:13	PIC	2387212
610325001	2B	60	3	101	3/8/2023 9:13	3/8/2023 10:13	PIC	2387212
610325002	2C	60	9	57	3/8/2023 9:13	3/8/2023 10:13	PIC	2387212
610325003	2D	60	4	91	3/8/2023 9:14	3/8/2023 10:14	PIC	2387212
610325004	4A	60	6	86	3/8/2023 9:14	3/8/2023 10:14	PIC	2387212
610325005	4C	60	3	40	3/8/2023 9:14	3/8/2023 10:14	PIC	2387212
610325006	5A	60	9	53	3/8/2023 9:14	3/8/2023 10:14	PIC	2387212
610325007	5B	60	14	59	3/8/2023 9:14	3/8/2023 10:14	PIC	2387212
610447001	5C	60	10	39	3/8/2023 9:14	3/8/2023 10:14	PIC	2387212
610447002	6A	60	10	102	3/8/2023 9:14	3/8/2023 10:14	PIC	2387212
610447003	6C	60	6	64	3/8/2023 9:14	3/8/2023 10:14	PIC	2387212
610449001	7B	60	5	65	3/8/2023 9:14	3/8/2023 10:14	PIC	2387212
1205326653	7C	60	6	50	3/8/2023 9:13	3/8/2023 10:13	PIC	2387212
1205326654	8B	60	14	108	3/8/2023 9:13	3/8/2023 10:13	PIC	2387212
1205326655	8C	60	51	1037	3/8/2023 9:13	3/8/2023 10:13	PIC	2387212

ASSAY 8-Mar-23 7:27:45
 Wizard 2480 s/n 46190630
 Protocol id 9 Ba-133_1
 Time limit
 Count limit
 Isotope Ba-133_1
 Protocol date 3/8/2023
 Run id. 6289

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF		1	92	1	180	3589.57	1196.33	1.67	07:27:45
610267001	2	92	2	180	2541	846.84	1.98	70.79	07:30:59
610325001	3	92	3	180	3403.57	1134.43	1.71	94.83	07:34:13
610325002	4	92	4	180	3165	1054.84	1.78	88.17	07:37:27
610325003	5	92	5	180	3107.85	1035.76	1.79	86.58	07:40:41
610325004	1	2	1	180	2795	931.49	1.89	77.86	07:44:17
610325005	2	2	2	180	3447.28	1148.82	1.7	96.03	07:47:31
610325006	3	2	3	180	3001.57	1000.37	1.83	83.62	07:50:45
610325007	4	2	4	180	2857	952.18	1.87	79.59	07:53:59
610447001	5	2	5	180	3089	1029.54	1.8	86.06	07:57:13
610447002	1	15	1	180	3013.57	1004.35	1.82	83.95	08:00:49
610447003	2	15	2	180	2779.28	926.22	1.9	77.42	08:04:02
610449001	3	15	3	180	3214.28	1071.27	1.76	89.55	08:07:16
1205326653	4	15	4	180	2620.28	873.21	1.95	72.99	08:10:30
1205326654	5	15	5	180	2646.57	882.05	1.94	73.73	08:13:45
1205326655	1	5	1	180	2877	958.85	1.86	80.15	08:17:32

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 08-Mar-2023

Detectors LB4100 A1 through I4 and PIC 1A through 14D and G5400W 1W through 1Z and LB4200 OA1 through OA1

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100E2	Above	Beta bkg	08-Mar 04:42	60	2.317	1.385	3.072	+0.31
LB4100F1	Above	Beta bkg	08-Mar 04:42	60	2.550	0.188	2.691	+2.66
LB4100F2	Below	Alpha eff	08-Mar 06:16	5	6207	6533	7372	-5.33
LB4100F2	Above	Alpha XTalk	08-Mar 06:16	5	0.378	0.318	0.366	+4.50
LB4100F2	Above	Beta bkg	08-Mar 04:42	60	27.250	1.173	1.833	+234.06
LB4100G1	need 2nd	Alpha eff	08-Mar 06:09	5	9753	7975	12090	-0.41
LB4100G1	need 2nd	Alpha XTalk	08-Mar 06:09	5	0.269	0.088	0.447	+0.03
LB4100G1	need 2nd	Beta bkg	08-Mar 04:43	60	1.417	0.380	1.675	+1.80
LB4100G2	need 2nd	Beta bkg	08-Mar 04:43	60	1.750	1.168	2.328	+0.01
LB4100G3	need 2nd	Beta bkg	08-Mar 04:43	60	1.733	0.987	2.738	-0.44
LB4100H1	Above	Beta bkg	08-Mar 04:42	60	2.567	0.216	2.462	+3.28
LB4200OA1	need 2nd	Alpha bkg	08-Mar 10:07	60	0.00E+0			#NUM!
LB4200OA1	Above	Beta bkg	08-Mar 10:07	60	0.550			#NUM!
PIC3D	Below	Alpha XTalk	08-Mar 09:04	5	0.242	0.260	0.381	-3.87
PIC3D	Above	Beta XTalk	08-Mar 10:53	5	0.012	-4.26E-4	0.001	+48.92
PIC13A	Above	Alpha bkg	08-Mar 10:46	60	1.950	-9.05E-2	0.347	+24.98

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100A1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4200OA1	Alpha eff, Alpha XTalk, Beta eff, Beta XTalk

Reviewed by 

Date 3-8-23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC

Batch ID: 2387212

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1205326653	MB	JE1	PIC7C	MAR-08-23 09:13:36	DONE	25mm Filter	01-JUN-22 00:00
1205326654	DUP	JE1	PIC8B	MAR-08-23 09:13:40	DONE	25mm Filter	01-JUN-22 00:00
1205326655	LCS	JE1	PIC8C	MAR-08-23 09:13:44	DONE	25mm Filter	01-JUN-22 00:00
610267001	SAMPLE	JE1	PIC2A	MAR-08-23 09:13:48	DONE	25mm Filter	01-JUN-22 00:00
610325001	SAMPLE	JE1	PIC2B	MAR-08-23 09:13:52	DONE	25mm Filter	01-JUN-22 00:00
610325002	SAMPLE	JE1	PIC2C	MAR-08-23 09:13:55	DONE	25mm Filter	01-JUN-22 00:00
610325003	SAMPLE	JE1	PIC2D	MAR-08-23 09:14:02	DONE	25mm Filter	01-JUN-22 00:00
610325004	SAMPLE	JE1	PIC4A	MAR-08-23 09:14:06	DONE	25mm Filter	01-JUN-22 00:00
610325005	SAMPLE	JE1	PIC4C	MAR-08-23 09:14:09	DONE	25mm Filter	01-JUN-22 00:00
610325006	SAMPLE	JE1	PIC5A	MAR-08-23 09:14:18	DONE	25mm Filter	01-JUN-22 00:00
610325007	SAMPLE	JE1	PIC5B	MAR-08-23 09:14:21	DONE	25mm Filter	01-JUN-22 00:00
610447001	SAMPLE	JE1	PIC5C	MAR-08-23 09:14:27	DONE	25mm Filter	01-JUN-22 00:00
610447002	SAMPLE	JE1	PIC6A	MAR-08-23 09:14:30	DONE	25mm Filter	01-JUN-22 00:00
610447003	SAMPLE	JE1	PIC6C	MAR-08-23 09:14:36	DONE	25mm Filter	01-JUN-22 00:00
610449001	SAMPLE	JE1	PIC7B	MAR-08-23 09:14:45	DONE	25mm Filter	01-JUN-22 00:00

Lucas Cell Raw Data

Batch 2387191 Check-list

This check-list was completed on 08-MAR-23 by Lyndsey Pace

This batch was reviewed by Gregory Ramsay on 08-MAR-23 and Lyndsey Pace on 08-MAR-23.

Batch ID:
2387191

Product:
LUC26RAL

Description: Lucas Cell Radium 226
GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-226 in Liquid

Batch ID: 2387191
Analyst: Lyndsey Pace (LXP1)
 Prep: Jacqueline Emond (JE1)
Method: EPA 903.1 Modified
Lab SOP: GL-RAD-A-008 REV# 15
Instrument: LUCAS-C202389980

Due Dates for Lab: 05-MAR-2023			Package: 07-MAR-2023		SDG: 08-MAR-2023	
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
LCS	1205326599	Radium-226 SPIKE	1715-G	.1	mL	
MS	1205326598	Radium-226 SPIKE	1715-G	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	End Degas (date)	CELL #	End Transfer (date)	Start Count Time (date)	Background Counts	Total Counts
1	609996001	01-MAR-2023	1	502.07	502.07	03/02/23 09:55	703	03/08/23 07:11	03/08/23 10:36	3	25
2	610267001	01-MAR-2023	1	500.96	500.96	03/02/23 09:55	804	03/08/23 07:11	03/08/23 10:36	3	8
3	610325001	01-MAR-2023	1	501.32	501.32	03/02/23 09:55	107	03/08/23 07:38	03/08/23 10:36	4	12
4	610325002	01-MAR-2023	1	501.41	501.41	03/02/23 09:55	206	03/08/23 07:38	03/08/23 11:00	2	28
5	610325003	01-MAR-2023	1	503.94	503.94	03/02/23 09:55	303	03/08/23 07:38	03/08/23 11:00	2	7
6	610325004	01-MAR-2023	1	500.33	500.33	03/02/23 09:55	403	03/08/23 07:38	03/08/23 11:00	5	16
7	610325005	01-MAR-2023	1	500.75	500.75	03/02/23 09:55	508	03/08/23 07:38	03/08/23 11:00	1	9
8	610325006	01-MAR-2023	1	500.63	500.63	03/02/23 09:55	601	03/08/23 07:38	03/08/23 11:00	4	15
9	610325007	01-MAR-2023	1	500.54	500.54	03/02/23 09:55	706	03/08/23 07:38	03/08/23 11:00	4	12
10	610447001	01-MAR-2023	1	501.5	501.5	03/02/23 09:55	803	03/08/23 07:38	03/08/23 11:00	1	22
11	610447002	01-MAR-2023	1	503.49	503.49	03/02/23 09:55	105	03/08/23 08:07	03/08/23 11:00	4	30
12	610447003	01-MAR-2023	1	500.78	500.78	03/02/23 09:55	205	03/08/23 08:07	03/08/23 11:22	4	55
13	610449001	01-MAR-2023	1	500.05	500.05	03/02/23 09:55	308	03/08/23 08:07	03/08/23 11:22	8	7
14	610894001	01-MAR-2023	1	500.41	500.41	03/02/23 09:55	402	03/08/23 08:07	03/08/23 11:22	3	34
15	611029001	01-MAR-2023	1	500.27	500.27	03/02/23 09:55	505	03/08/23 08:07	03/08/23 11:22	4	9
16	1205326596 MB	01-MAR-2023	1	503.94	503.94	03/02/23 09:55	604	03/08/23 08:07	03/08/23 11:22	6	8
17	1205326597 DUP (609996001)	01-MAR-2023	1	501.59	501.59	03/02/23 09:55	707	03/08/23 08:07	03/08/23 11:22	2	27
18	1205326598 MS (609996001)	01-MAR-2023	1	100.1	100.1	03/02/23 09:55	802	03/08/23 08:07	03/08/23 11:22	3	625
19	1205326599 LCS	01-MAR-2023	1		503.94	03/02/23 09:55	106	03/08/23 08:35	03/08/23 11:22	2	543

Reagent/Solvent Lot ID	Description	Amount	Comments:
			Data Entry Date2: 01-MAR-2023 00:00

Radium-226 Liquid

Filename : RA226.XLS
 File type : Excel
 Version # : 1.3.2

Procedure Code : LUC26RAL
 Parmname : Radium-226
 Required MDA : 1 pCi/L
 Halfife of Ra-226 : 1600 years
 Ra-226 Abundance : 1.00
 Halflife of Rn-222: 3.8235 days

Batch : 2387191
 Analyst : LXP1
 Prep Date : 3/1/2023
 Ra-226 Method Uncertainty : 0.073648

Batch counted on : LUCAS CELL DETECTOR
 BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Count Time (min.)	Cell Efficiency (cpm/dpm)
1	609996001.1	0.5021	2.0264E-05	2/7/2023 13:45	703	20	25	1.250	3	0.100	30	1.6440
2	610267001.1	0.5010	2.0260E-05	2/6/2023 15:00	804	20	8	0.400	3	0.100	30	1.9050
3	610325001.1	0.5013	2.0261E-05	2/2/2023 9:35	107	20	12	0.600	4	0.133	30	1.6990
4	610325002.1	0.5014	2.0262E-05	2/2/2023 11:10	206	20	28	1.400	2	0.067	30	1.8770
5	610325003.1	0.5039	2.0272E-05	2/2/2023 14:08	303	20	7	0.350	2	0.067	30	1.7210
6	610325004.1	0.5003	2.0257E-05	2/2/2023 16:08	403	20	16	0.800	5	0.167	30	1.5070
7	610325005.1	0.5008	2.0259E-05	2/2/2023 9:35	508	20	9	0.450	1	0.033	30	1.8020
8	610325006.1	0.5006	2.0258E-05	2/2/2023 8:15	601	20	15	0.750	4	0.133	30	1.7610
9	610325007.1	0.5005	2.0258E-05	2/2/2023 8:30	706	20	12	0.600	4	0.133	30	1.5900
10	610447001.1	0.5015	2.0262E-05	2/2/2023 12:15	803	20	22	1.100	1	0.033	30	2.0020
11	610447002.1	0.5035	2.0270E-05	2/2/2023 12:55	105	20	30	1.500	4	0.133	30	1.5830
12	610447003.1	0.5008	2.0259E-05	2/2/2023 14:40	205	20	55	2.750	4	0.133	30	1.8920
13	610449001.1	0.5001	2.0256E-05	2/1/2023 12:25	308	20	7	0.350	8	0.267	30	1.5970
14	610894001.1	0.5004	2.0258E-05	2/9/2023 12:30	402	20	34	1.700	3	0.100	30	1.4980
15	611029001.1	0.5003	2.0257E-05	2/8/2023 12:30	505	20	9	0.450	4	0.133	30	1.8130
16	1205326596.1	0.5039	2.0272E-05	3/1/2023 0:00	604	20	8	0.400	6	0.200	30	1.6810
17	1205326597.1	0.5016	2.0262E-05	2/7/2023 13:45	707	20	27	1.350	2	0.067	30	1.7280
18	1205326598.1	0.1001	1.1376E-05	2/7/2023 13:45	802	20	625	31.250	3	0.100	30	2.0910
19	1205326599.1	0.5039	2.0272E-05	3/1/2023 0:00	106	20	543	27.150	2	0.067	30	1.6990

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-008
 Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrowth End Date/Time	Count Start Date/Time	Rn-222 Corrections			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
9.000%	11/1/2022	10/31/2023	3/2/2023 9:55	3/8/2023 7:11	3/8/2023 10:36	0.656	0.975	1.001	1.000
9.900%	4/1/2022	3/31/2023	3/2/2023 9:55	3/8/2023 7:11	3/8/2023 10:36	0.656	0.975	1.001	1.000
3.900%	4/28/2022	4/30/2023	3/2/2023 9:55	3/8/2023 7:38	3/8/2023 10:36	0.657	0.978	1.001	1.000
2.800%	8/1/2022	7/31/2023	3/2/2023 9:55	3/8/2023 7:38	3/8/2023 11:00	0.657	0.975	1.001	1.000
7.400%	10/25/2022	10/31/2023	3/2/2023 9:55	3/8/2023 7:38	3/8/2023 11:00	0.657	0.975	1.001	1.000
6.100%	2/1/2023	1/31/2024	3/2/2023 9:55	3/8/2023 7:38	3/8/2023 11:00	0.657	0.975	1.001	1.000
4.500%	6/1/2022	5/31/2023	3/2/2023 9:55	3/8/2023 7:38	3/8/2023 11:00	0.657	0.975	1.001	1.000
9.400%	7/1/2022	6/30/2023	3/2/2023 9:55	3/8/2023 7:38	3/8/2023 11:00	0.657	0.975	1.001	1.000
2.900%	11/1/2022	10/31/2023	3/2/2023 9:55	3/8/2023 7:38	3/8/2023 11:00	0.657	0.975	1.001	1.000
7.300%	4/1/2022	3/31/2023	3/2/2023 9:55	3/8/2023 7:38	3/8/2023 11:00	0.657	0.975	1.001	1.000
0.500%	4/28/2022	4/30/2023	3/2/2023 9:55	3/8/2023 8:07	3/8/2023 11:00	0.658	0.978	1.001	1.000
3.900%	8/1/2022	7/31/2023	3/2/2023 9:55	3/8/2023 8:07	3/8/2023 11:22	0.658	0.976	1.001	1.000
9.600%	10/25/2022	10/31/2023	3/2/2023 9:55	3/8/2023 8:07	3/8/2023 11:22	0.658	0.976	1.001	1.000
5.300%	2/1/2023	1/31/2024	3/2/2023 9:55	3/8/2023 8:07	3/8/2023 11:22	0.658	0.976	1.001	1.000
1.200%	6/1/2022	5/31/2023	3/2/2023 9:55	3/8/2023 8:07	3/8/2023 11:22	0.658	0.976	1.001	1.000
6.700%	7/1/2022	6/30/2023	3/2/2023 9:55	3/8/2023 8:07	3/8/2023 11:22	0.658	0.976	1.001	1.000
2.200%	11/1/2022	10/31/2023	3/2/2023 9:55	3/8/2023 8:07	3/8/2023 11:22	0.658	0.976	1.001	1.000
8.000%	4/1/2022	3/31/2023	3/2/2023 9:55	3/8/2023 8:07	3/8/2023 11:22	0.658	0.976	1.001	1.000
8.800%	4/28/2022	4/30/2023	3/2/2023 9:55	3/8/2023 8:35	3/8/2023 11:22	0.660	0.979	1.001	1.000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1715-G
Spike Exp Date : 9/8/2023
Spike Activity (dpm/ml): 297.43
Spike Volume Added: 0.10

LCS S/N : 1715-G
LCS Exp Date : 9/8/2023
LCS Activity (dpm/ml): 297.43
LCS Volume Added: 0.10


Results																
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.1818	0.1284	1	0.3849	0.9830	24.06%	1.1500	0.2566	0.4299	0.4848		SAMPLE				
2	0.1572	0.1110	1	0.3329	0.2218	51.87%	0.3000	0.1528	0.2213	0.2278		SAMPLE				
3	0.2024	0.1429	1	0.4094	0.3846	39.96%	0.4667	0.1856	0.2998	0.3063		SAMPLE				
4	0.1299	0.0917	1	0.2956	0.9974	20.35%	1.3333	0.2687	0.3940	0.4231		SAMPLE				
5	0.1410	0.0995	1	0.3208	0.2300	50.11%	0.2833	0.1404	0.2234	0.2283		SAMPLE				
6	0.2564	0.1810	1	0.5021	0.5914	34.25%	0.6333	0.2134	0.3906	0.4060		SAMPLE				
7	0.0958	0.0676	1	0.2523	0.3251	37.15%	0.4167	0.1537	0.2350	0.2413		SAMPLE				
8	0.1961	0.1385	1	0.3967	0.4924	34.52%	0.6167	0.2048	0.3206	0.3406		SAMPLE				
9	0.2173	0.1534	1	0.4395	0.4128	39.88%	0.4667	0.1856	0.3218	0.3281		SAMPLE				
10	0.0861	0.0608	1	0.2268	0.7480	23.38%	1.0667	0.2369	0.3256	0.3593		SAMPLE				
11	0.2157	0.1523	1	0.4364	1.2005	20.63%	1.3667	0.2819	0.4853	0.5154		SAMPLE				
12	0.1820	0.1285	1	0.3681	1.9389	14.92%	2.6167	0.3768	0.5472	0.6322		SAMPLE				
13	0.3054	0.2156	1	0.5630	0.0733	195.17%	0.0833	0.1624	0.2799	0.2805		SAMPLE				
14	0.1992	0.1406	1	0.4218	1.4985	19.32%	1.6000	0.2972	0.5456	0.6072		SAMPLE				
15	0.1901	0.1342	1	0.3845	0.2451	51.85%	0.3167	0.1641	0.2490	0.2516		SAMPLE				
16	0.2493	0.1760	1	0.4763	0.1657	81.92%	0.2000	0.1633	0.2653	0.2672		MB				
17	0.1407	0.0993	1	0.3201	1.0395	20.69%	1.2833	0.2640	0.4192	0.4475	609996001.1	DUP	5.6%			
18	0.7134	0.5037	1	1.5105	104.4831	8.95%	31.1500	1.2513	8.2265	23.7392	609996001.1	MS			133.8484	77.3%
19	0.1416	0.1000	1	0.3223	22.0888	9.80%	27.0833	1.1661	1.8640	5.3063		LCS			26.5863	83.1%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 08-MAR-2023

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	07:40	1	1.22E+05	122295	0.41		
LUCAS2	EFF	07:39	1	1.34E+05	133894	0.15		
LUCAS3	EFF	07:36	1	1.05E+05	105087	-1.6		
LUCAS4	EFF	07:35	1	1.28E+05	127949	0.07		
LUCAS5	EFF	07:34	1	1.33E+05	133186	0.58		
LUCAS6	EFF	07:33	1	1.31E+05	131349	0.36		
LUCAS7	EFF	07:32	1	1.32E+05	131538	1.13		
LUCAS8	EFF	07:30	1	1.36E+05	136054	0.8		

Reviewed by:


Lyndsey Pace

Date: 08-MAR-23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR

Batch ID: 2387191

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
609996001	SAMPLE	LXP1	LUCAS7	MAR-08-23 10:36:00	DONE	Lucas Cell	01-NOV-22 00:00
610267001	SAMPLE	LXP1	LUCAS8	MAR-08-23 10:36:00	DONE	Lucas Cell	01-APR-22 00:00
610325001	SAMPLE	LXP1	LUCAS1	MAR-08-23 10:36:00	DONE	Lucas Cell	28-APR-22 00:00
610325002	SAMPLE	LXP1	LUCAS2	MAR-08-23 11:00:00	DONE	Lucas Cell	01-AUG-22 00:00
610325003	SAMPLE	LXP1	LUCAS3	MAR-08-23 11:00:00	DONE	Lucas Cell	25-OCT-22 00:00
610325004	SAMPLE	LXP1	LUCAS4	MAR-08-23 11:00:00	DONE	Lucas Cell	01-FEB-23 00:00
610325005	SAMPLE	LXP1	LUCAS5	MAR-08-23 11:00:00	DONE	Lucas Cell	01-JUN-22 00:00
610325006	SAMPLE	LXP1	LUCAS6	MAR-08-23 11:00:00	DONE	Lucas Cell	01-JUL-22 00:00
610325007	SAMPLE	LXP1	LUCAS7	MAR-08-23 11:00:00	DONE	Lucas Cell	01-NOV-22 00:00
610447001	SAMPLE	LXP1	LUCAS8	MAR-08-23 11:00:00	DONE	Lucas Cell	01-APR-22 00:00
610447002	SAMPLE	LXP1	LUCAS1	MAR-08-23 11:00:00	DONE	Lucas Cell	28-APR-22 00:00
610447003	SAMPLE	LXP1	LUCAS2	MAR-08-23 11:22:00	DONE	Lucas Cell	01-AUG-22 00:00
610449001	SAMPLE	LXP1	LUCAS3	MAR-08-23 11:22:00	DONE	Lucas Cell	25-OCT-22 00:00
610894001	SAMPLE	LXP1	LUCAS4	MAR-08-23 11:22:00	DONE	Lucas Cell	01-FEB-23 00:00
611029001	SAMPLE	LXP1	LUCAS5	MAR-08-23 11:22:00	DONE	Lucas Cell	01-JUN-22 00:00
1205326596	MB	LXP1	LUCAS6	MAR-08-23 11:22:00	DONE	Lucas Cell	01-JUL-22 00:00
1205326597	DUP	LXP1	LUCAS7	MAR-08-23 11:22:00	DONE	Lucas Cell	01-NOV-22 00:00
1205326598	MS	LXP1	LUCAS8	MAR-08-23 11:22:00	DONE	Lucas Cell	01-APR-22 00:00
1205326599	LCS	LXP1	LUCAS1	MAR-08-23 11:22:00	DONE	Lucas Cell	28-APR-22 00:00



Report ID: S45134.01(02)
Generated on 03/13/2023
Replaces report S45134.01(01) generated on 02/10/2023

Report to
Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by
Merit Laboratories, Inc.
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East Lansing, MI 48823

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Contacts for report questions:
John Lavery (johnlavery@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S45134.01-S45134.08
Project: Erickson AM MI Wells 1-6
Collected Date(s): 02/07/2023
Submitted Date/Time: 02/08/2023 15:45
Sampled by: Marc Wahrer
P.O. #:

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Maya Murshak
Technical Director



General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile, and 2-chloroethylvinyl ether need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the

FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

All analyses completed



Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1 (1993)
SM2320B	Standard Method 2320 B 2011
SM2340C	Standard Method 2340 C 2011
SM2540C	Standard Method 2540 C 2015
SM2540D	Standard Method 2540 D 2015
SW3015A	SW 846 Method 3015A Revision 1 February 2007



Sample Summary (8 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S45134.01	MW-1 L302144-01	Groundwater	02/07/23 13:52
S45134.02	MW-2 L302144-02	Groundwater	02/07/23 17:00
S45134.03	MW-3 L302144-03	Groundwater	02/07/23 10:18
S45134.04	MW-4 L302144-04	Groundwater	02/07/23 11:49
S45134.05	MW-5 L302144-05	Groundwater	02/07/23 17:35
S45134.06	MW-6 L302144-06	Groundwater	02/07/23 15:29
S45134.07	MWT-4 L302144-07	Groundwater	02/07/23 11:49
S45134.08	Field Blank L302144-08	Groundwater	02/07/23 07:55



Analytical Laboratory Report

Lab Sample ID: S45134.01

Sample Tag: MW-1 L302144-01

Collected Date/Time: 02/07/2023 13:52

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.1	IR
2	1L Plastic	None	Yes	3.1	IR
1	250ml Plastic	HNO3	Yes	3.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/09/23 12:54	CTV	
Metal Digestion	Completed	SW3015A	02/09/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/09/23 12:11, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	61	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	31	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 07:06, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	636	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/09/23 18:08, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	546	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/08/23 21:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	686	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 12:20, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	32	3	1	mg/L	4		

Metals

Method: E200.8, Run Date: 02/09/23 11:53, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.007	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.140	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.32	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	9.57	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45134.01 (continued)

Sample Tag: MW-1 L302144-01

Method: E200.8, Run Date: 02/09/23 11:53, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.031	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/09/23 14:04, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	150	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	41.3	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	1.08	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	41.0	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/09/23 14:25, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/13/23 08:38, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S45134.02

Sample Tag: MW-2 L302144-02

Collected Date/Time: 02/07/2023 17:00

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.1	IR
2	1L Plastic	None	Yes	3.1	IR
1	250ml Plastic	HNO3	Yes	3.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/09/23 12:54	CTV	
Metal Digestion	Completed	SW3015A	02/09/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/09/23 12:21, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 02/09/23 13:31, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	88	25	0.32	mg/L	25	16887-00-6	
Sulfate	322	25	2.6	mg/L	25	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 07:10, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	454	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/09/23 18:10, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	708	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/08/23 21:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,050	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 12:20, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	22	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/09/23 11:59, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.002	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.037	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	5.10	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Lab Sample ID: S45134.02 (continued)

Sample Tag: MW-2 L302144-02

Method: E200.8, Run Date: 02/09/23 11:59, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	1.30	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.050	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.015	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	0.020	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/09/23 14:05, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	204	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	50.2	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	0.87	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	68.3	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/09/23 14:28, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/13/23 08:38, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S45134.03

Sample Tag: MW-3 L302144-03

Collected Date/Time: 02/07/2023 10:18

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.1	IR
2	1L Plastic	None	Yes	3.1	IR
1	250ml Plastic	HNO3	Yes	3.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/09/23 12:54	CTV	
Metal Digestion	Completed	SW3015A	02/09/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/09/23 12:31, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 02/09/23 13:41, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	102	50	0.65	mg/L	50	16887-00-6	
Sulfate	727	50	5.2	mg/L	50	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 07:14, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	215	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/09/23 18:12, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	795	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/08/23 21:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,450	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 12:20, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/09/23 12:04, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.003	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.019	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	5.63	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45134.03 (continued)

Sample Tag: MW-3 L302144-03

Method: E200.8, Run Date: 02/09/23 12:04, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	2.03	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.082	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.182	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/09/23 14:07, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	248	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	46.5	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	1.67	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	113	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/09/23 14:38, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/13/23 08:38, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S45134.04

Sample Tag: MW-4 L302144-04

Collected Date/Time: 02/07/2023 11:49

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.1	IR
2	1L Plastic	None	Yes	3.1	IR
1	250ml Plastic	HNO3	Yes	3.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/09/23 12:54	CTV	
Metal Digestion	Completed	SW3015A	02/09/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/09/23 12:41, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	74	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	56	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 07:16, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	406	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/09/23 18:14, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	420	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/08/23 21:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	532	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 12:20, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/09/23 12:10, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.007	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.166	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.06	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	1.31	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45134.04 (continued)

Sample Tag: MW-4 L302144-04

Method: E200.8, Run Date: 02/09/23 12:10, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.011	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/09/23 14:08, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	106	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	38.3	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	1.39	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	28.5	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/09/23 14:42, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/13/23 08:38, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S45134.05

Sample Tag: MW-5 L302144-05

Collected Date/Time: 02/07/2023 17:35

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.1	IR
2	1L Plastic	None	Yes	3.1	IR
1	250ml Plastic	HNO3	Yes	3.1	IR
1	250ml Plastic	None	Yes	3.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/09/23 12:54	CTV	
Mercury Digestion	Completed	E245.1	02/09/23 12:54	CTV	
Metal Digestion	Completed	SW3015A	02/09/23 10:10	CCM	
Metal Digestion	Completed	SW3015A	02/09/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/09/23 14:41, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfate	411	25	2.6	mg/L	25	14808-79-8	

Method: E300.0, Run Date: 02/09/23 12:51, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	56	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: SM2320B, Run Date: 02/10/23 07:18, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	320	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/09/23 18:16, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	629	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/08/23 21:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	984	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 12:20, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	21	3	1	mg/L	1.33		

Metals

Method: E200.8, Run Date: 02/09/23 12:13, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.040	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	



Analytical Laboratory Report

Lab Sample ID: S45134.05 (continued)

Sample Tag: MW-5 L302144-05

Method: E200.8, Run Date: 02/09/23 12:13, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Boron	3.53	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	0.53	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.083	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.055	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	0.006	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	0.005	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/09/23 12:17, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony, Dissolved*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	f
Arsenic, Dissolved	Not detected	0.002	0.000255	mg/L	5	7440-38-2	f
Barium, Dissolved	0.036	0.005	0.000162	mg/L	5	7440-39-3	f
Beryllium, Dissolved	Not detected	0.001	0.000215	mg/L	5	7440-41-7	f
Boron, Dissolved	3.26	0.04	0.00175	mg/L	5	7440-42-8	f
Cadmium, Dissolved	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	f
Chromium, Dissolved	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	f
Cobalt, Dissolved	Not detected	0.005	0.000108	mg/L	5	7440-48-4	f
Copper, Dissolved	Not detected	0.005	0.000377	mg/L	5	7440-50-8	f
Iron, Dissolved	Not detected	0.02	0.00192	mg/L	5	7439-89-6	f
Lead, Dissolved	Not detected	0.003	0.000190	mg/L	5	7439-92-1	f
Lithium, Dissolved*	0.085	0.005	0.00163	mg/L	5	7439-93-2	f
Molybdenum, Dissolved	0.055	0.005	0.000217	mg/L	5	7439-98-7	f
Nickel, Dissolved	0.005	0.005	0.000250	mg/L	5	7440-02-0	f
Selenium, Dissolved	Not detected	0.005	0.00209	mg/L	5	7782-49-2	f
Silver, Dissolved	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	f
Thallium, Dissolved	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	f
Vanadium, Dissolved	Not detected	0.005	0.000139	mg/L	5	7440-62-2	f
Zinc, Dissolved	Not detected	0.005	0.000730	mg/L	5	7440-66-6	f

Method: E200.8, Run Date: 02/09/23 14:10, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	187	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	42.3	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	4.44	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	57.4	0.50	0.00850	mg/L	5	7440-23-5	

Method: E200.8, Run Date: 02/09/23 14:11, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium, Dissolved*	176	0.50	0.0435	mg/L	5	7440-70-2	f
Magnesium, Dissolved	39.9	0.50	0.0120	mg/L	5	7439-95-4	f

f-Filtered and preserved in lab



Analytical Laboratory Report

Final Report

Lab Sample ID: S45134.05 (continued)

Sample Tag: MW-5 L302144-05

Method: E200.8, Run Date: 02/09/23 14:11, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Potassium, Dissolved	4.06	0.50	0.0230	mg/L	5	7440-09-7	f
Sodium, Dissolved	52.3	0.50	0.00850	mg/L	5	7440-23-5	f

Method: E245.1, Run Date: 02/09/23 14:48, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury, Dissolved	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	f

Method: E245.1, Run Date: 02/09/23 14:45, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/13/23 08:38, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

f-Filtered and preserved in lab

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S45134.06

Sample Tag: MW-6 L302144-06

Collected Date/Time: 02/07/2023 15:29

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.1	IR
2	1L Plastic	None	Yes	3.1	IR
1	250ml Plastic	HNO3	Yes	3.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/09/23 12:54	CTV	
Metal Digestion	Completed	SW3015A	02/09/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/09/23 14:51, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfate	233	10	1.0	mg/L	10	14808-79-8	

Method: E300.0, Run Date: 02/09/23 13:01, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	42	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: SM2320B, Run Date: 02/10/23 07:20, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	543	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/09/23 18:18, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	624	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/08/23 21:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	866	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 12:20, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/09/23 12:21, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.046	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.99	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45134.06 (continued)

Sample Tag: MW-6 L302144-06

Method: E200.8, Run Date: 02/09/23 12:21, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.054	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.027	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	0.006	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/09/23 14:13, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	193	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	39.4	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	6.85	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	43.9	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/09/23 14:52, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/13/23 08:38, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S45134.07

Sample Tag: MWT-4 L302144-07

Collected Date/Time: 02/07/2023 11:49

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.1	IR
2	1L Plastic	None	Yes	3.1	IR
1	250ml Plastic	HNO3	Yes	3.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/09/23 12:54	CTV	
Metal Digestion	Completed	SW3015A	02/09/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/09/23 13:11, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	75	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	56	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 07:22, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	407	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/09/23 18:26, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	431	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/08/23 21:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	530	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 12:20, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/09/23 12:24, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.007	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.163	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.06	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	1.30	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45134.07 (continued)

Sample Tag: MWT-4 L302144-07

Method: E200.8, Run Date: 02/09/23 12:24, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.010	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/09/23 14:21, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	106	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	38.9	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	1.41	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	28.2	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/09/23 14:55, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/13/23 08:38, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S45134.08

Sample Tag: Field Blank L302144-08

Collected Date/Time: 02/07/2023 07:55

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.1	IR
2	1L Plastic	None	Yes	3.1	IR
1	250ml Plastic	HNO3	Yes	3.1	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/09/23 12:54	CTV	
Metal Digestion	Completed	SW3015A	02/09/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/09/23 13:21, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 07:24, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	Not detected	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/09/23 18:28, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	Not detected	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/08/23 21:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 12:20, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/09/23 11:48, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45134.08 (continued)

Sample Tag: Field Blank L302144-08

Method: E200.8, Run Date: 02/09/23 11:48, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E200.8, Run Date: 02/09/23 14:02, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	
Magnesium	Not detected	0.50	0.00480	mg/L	2	7439-95-4	
Potassium	Not detected	0.50	0.00920	mg/L	2	7440-09-7	
Sodium	Not detected	0.50	0.00340	mg/L	2	7440-23-5	

Method: E245.1, Run Date: 02/09/23 14:58, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/13/23 08:38, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID:S45134

Client:BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 1-6

Submitted:02/08/2023 15:45 Login User: PFD

Attention: Jennifer Caporale

Address: Board of Water & Light

P.O. Box 13007

Lansing, MI 48901

Phone: 517-702-6372

FAX:

Email: Environmental_Laboratory@LBWL.com

Selection	Description	Note
Sample Receiving		
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 3.1
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
Chain of Custody		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to:
Preservation		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab? .05 Metals
Bottle Conditions		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration .05 Metals
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Do water VOC or TOX bottles contain headspace

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S45134 Submitted: 02/08/2023 15:45

Attention: Jennifer Caporale
 Address: Board of Water & Light
 P.O. Box 13007
 Lansing, MI 48901

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 1-6

Initial Preservation Check: 02/08/2023 16:44 PFD

Phone: 517-702-6372 FAX:
 Email: Environmental_Laboratory@LBWL.com

Preservation Recheck (E200.8): N/A

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S45134.01	1L Plastic HNO3	<2			
S45134.01	1L Plastic HNO3	<2			
S45134.01	250ml Plastic HNO3	<2			
S45134.02	1L Plastic HNO3	<2			
S45134.02	1L Plastic HNO3	<2			
S45134.02	250ml Plastic HNO3	<2			
S45134.03	1L Plastic HNO3	<2			
S45134.03	1L Plastic HNO3	<2			
S45134.03	250ml Plastic HNO3	<2			
S45134.04	1L Plastic HNO3	<2			
S45134.04	1L Plastic HNO3	<2			
S45134.04	250ml Plastic HNO3	<2			
S45134.05	1L Plastic HNO3	<2			
S45134.05	1L Plastic HNO3	<2			
S45134.05	250ml Plastic HNO3	<2			
S45134.06	1L Plastic HNO3	<2			
S45134.06	1L Plastic HNO3	<2			
S45134.06	250ml Plastic HNO3	<2			
S45134.07	1L Plastic HNO3	<2			
S45134.07	1L Plastic HNO3	<2			
S45134.07	250ml Plastic HNO3	<2			
S45134.08	1L Plastic HNO3	<2			
S45134.08	1L Plastic HNO3	<2			
S45134.08	250ml Plastic HNO3	<2			



2680 East Lansing Dr., East Lansing, MI 48823
 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

REPORT TO **CHAIN OF CUSTODY RECORD** **INVOICE TO**

CONTACT NAME **Jennifer Caporale**
 COMPANY **Lansing Board of Water and Light**
 ADDRESS **PO Box 13007 48901-3007**
 CITY **Lansing** STATE **Mi** ZIP CODE **48901**
 PHONE NO. **517-702-6372** FAX NO. _____ P.O. NO. _____
 E-MAIL ADDRESS **Environmental_Laboratory@lbwl.com** QUOTE NO. _____

CONTACT NAME **Beth Zimpfer** SAME
 COMPANY _____
 ADDRESS _____
 CITY _____ STATE _____ ZIP CODE _____
 PHONE NO. _____ E-MAIL ADDRESS **Beth.Zimpfer@lbwl.com**

PROJECT NO./NAME **Erickson AM MI Wells 1-6** SAMPLER(S) - PLEASE PRINT/SIGN NAME **Marc Wahrer**
 TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER **ASAP**
 DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER _____

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WPE A=AIR W=WASTE
 # Containers & Preservatives

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	OTHER	Total Metals	F- undistilled, Cl-, SO ₄ , TDS	Radium 226	Radium 228	TSS	HCO ₃ , CO ₃ , Hardness	dissolved Metals				Certifications <input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water <input type="checkbox"/> DoD <input checked="" type="checkbox"/> NPDES Project Locations <input type="checkbox"/> Detroit <input type="checkbox"/> New York <input type="checkbox"/> Other _____ Special Instructions
	DATE	TIME																					
45134.01	02/07/23	1352	MW-1 L302144-01	GW	5	2	3						✓	✓	✓	✓	✓	✓	✓				Metals to analyse: Na, Mg, K
.02		1700	MW-2 -02	GW	5	2	3						✓	✓	✓	✓	✓	✓	✓				B, Ca, Sb, As, Ba, Be, Cd, Cr,
.03		1018	MW-3 -03	GW	5	2	3						✓	✓	✓	✓	✓	✓	✓				Co, Li, Hg, Mo, Pb, Se, Tl,
.04		1149	MW-4 -04	GW	5	2	3						✓	✓	✓	✓	✓	✓	✓				Fe, Cu, Ni, Ag, V, Zn
.05		1735	MW-5 -05	GW	5	2	3						✓	✓	✓	✓	✓	✓	✓				Please send a preliminary report
.06		1529	MW-6 -06	GW	5	2	3						✓	✓	✓	✓	✓	✓	✓				
.07		1149	MWT-4 -07	GW	5	2	3						✓	✓	✓	✓	✓	✓	✓				Dissolved metals are the same as total.
.08		0755	Field Blank -08	DI	5	2	3						✓	✓	✓	✓	✓	✓	✓				

RELINQUISHED BY: *[Signature]* Sampler DATE **2-8-23** TIME **1545**
 RECEIVED BY: *[Signature]* DATE **2/8/23** TIME **1545**
 RELINQUISHED BY: _____ DATE _____ TIME _____
 RECEIVED BY: _____ DATE _____ TIME _____

RELINQUISHED BY: _____ DATE _____ TIME _____
 RECEIVED BY: _____ DATE _____ TIME _____
 SEAL NO. SEAL INTACT YES NO INITIALS _____
 SEAL NO. SEAL INTACT YES NO INITIALS _____
 NOTES: TEMP. ON ARRIVAL **3.1**

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.150
Be, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	2.5
Cl	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cr, total	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
F	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
Fe, total	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
Se, total	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
Tl, total	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
TDS	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TSS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
V, total	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005

March 13, 2023

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 610687
SDG: S45134

Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on February 13, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 1614.

Sincerely,



Jordan Melton for
Delaney Stone
Project Manager

Purchase Order: GELP20-0018
Enclosures



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Case Narrative

**Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S45134
Work Order: 610687**

March 13, 2023

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on February 13, 2023 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. Sample was received out of pH. Client approved for preservation. *610687004(S45134.04)*.

Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
610687001	S45134.01
610687002	S45134.02
610687003	S45134.03
610687004	S45134.04
610687005	S45134.05
610687006	S45134.06
610687007	S45134.07
610687008	S45134.08

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.

A handwritten signature in black ink that reads "Jordan Melton". The signature is written in a cursive style with a large initial 'J'.

Jordan Melton for
Delaney Stone
Project Manager

Chain of Custody and Supporting Documentation

SAMPLE RECEIPT & REVIEW FORM DS

Client: <u>MERI</u>		SDG/AR/COC/Work Order: <u>610287</u>	
Received By: <u>MVH</u>		Date Received: <u>02-13-2023</u>	
Carrier and Tracking Number		Circle-Applicable: FedEx Express FedEx Ground <u>UPS</u> Field Services Courier Other <u>1240064770362195189</u>	
Suspected Hazard Information		Yes	No
*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.			
A) Shipped as a DOT Hazardous?		<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___
B) Did the client designate the samples are to be received as radioactive?		<input checked="" type="checkbox"/>	COC notation or radioactive stickers on containers equal client designation.
C) Did the RSO classify the samples as radioactive?		<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>00</u> CPM/mR/Hr Classified as: Rad 1 Rad 2 Rad 3
D) Did the client designate samples are hazardous?		<input checked="" type="checkbox"/>	COC notation or hazard labels on containers equal client designation.
E) Did the RSO identify possible hazards?		<input checked="" type="checkbox"/>	If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____
Sample Receipt Criteria		Yes	NA
		No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	Circle Applicable: Client contacted and provided COC COC created upon receipt
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	Preservation Method: Wet Ice Ice Packs Dry ice None Other: _____ *all temperatures are recorded in Celsius <u>TEMP: 21</u>
4	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	Temperature Device Serial #: <u>JR2-21</u> Secondary Temperature Device Serial # (If Applicable): _____
5	Sample containers intact and sealed?	<input checked="" type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	Sample ID's and Containers Affected: <u>S45134.04</u> If Preservation added, Lot#: _____
7	Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer)
			Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No)
			Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___ Sample ID's and containers affected: _____
8	Samples received within holding time?	<input checked="" type="checkbox"/>	ID's and tests affected: _____
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	ID's and containers affected: _____
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	Circle Applicable: No container count on COC Other (describe)
12	Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>	
13	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	Circle Applicable: Not relinquished Other (describe)
Comments (Use Continuation Form if needed):			

PM (or PMA) review: Initials JM Date 2/14/23 Page 1 of 1

Jordan Melton

From: Patrick Dean <pdean@meritlabs.com>
Sent: Monday, February 13, 2023 2:27 PM
To: Jordan Melton
Cc: John Lavery; RESULTS; Team Stone
Subject: Re: S45134.04 did not hold pH

Follow Up Flag: Follow up
Flag Status: Completed

[EXTERNAL EMAIL] DO NOT CLICK links or attachments unless you recognize the sender and know the content is safe.

Jordan,

Will the report be flagged? If it isn't please represerve the sample.

On Mon, Feb 13, 2023 at 2:22 PM Patrick Dean <pdean@meritlabs.com> wrote:

Jordan,

I will reach out to our client.

On Mon, Feb 13, 2023 at 2:15 PM Jordan Melton <Jordan.Melton@gel.com> wrote:

Hello Patrick,

It may affect results, but we do recommend samples having a pH<2 for Rad 226 and Rad 228 analysis. We can attempt preservation, or we can run as is.

Thanks,

Jordan Melton

GEL Laboratories LLC

Project Manager Assistant

From: Patrick Dean <pdean@meritlabs.com>
Sent: Monday, February 13, 2023 2:10 PM
To: John Lavery <johnlavery@meritlabs.com>; Jordan Melton <Jordan.Melton@gel.com>
Cc: RESULTS <results@meritlabs.com>; Team Stone <Team.Stone@gel.com>
Subject: Re: S45134.04 did not hold pH

Jordan,

Would adding more preservative effect results?

Thanks,
Patrick

On Mon, Feb 13, 2023 at 1:56 PM John Lavery <johnlavery@meritlabs.com> wrote:

----- Forwarded message -----

From: **Jordan Melton** <Jordan.Melton@gel.com>

Date: Mon, Feb 13, 2023 at 1:40 PM

Subject: S45134.04 did not hold pH

To: John Lavery <johnlavery@meritlabs.com>

CC: Team Stone <Team.Stone@gel.com>

Good afternoon,

GEL received SDG S45134 this morning however, sample S45134.04 did not hold preservation. Please advise on how you would like to proceed.

Thank you,

Jordan Melton
Project Manager Assistant



[2040 Savage Road, Charleston, SC 29407](#) | [P.O. Box 30712, Charleston, SC 29417](#)

Office Main: 843.556.8171 | Office Fax: 843.769.7383

E-Mail: Jordan.Melton@gel.com | Website: www.gel.com

Follow us on [LinkedIn](#)

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--

John Laverty

Merit Laboratories, Inc.

2680 East Lansing Drive East Lansing, MI 48823

Direct: (517) 827-2730 Cell: (517) 763-6976

johnlaverty@meritlabs.com

This message is intended only for the addressed person(s) and may contain privileged, confidential, and/or disclosure exempt information. Dissemination, distribution, or copying of this communication is strictly prohibited by any other than the intended recipient or an agent or employee thereof. If you have received this communication in error, please notify us immediately and delete this message.

--

Patrick Dean

Merit Laboratories, Inc.

2680 East Lansing Drive | East Lansing, MI 48823

(517) 332-0167 x128 | Direct: (517) 827-2740

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Laboratory Certifications

List of current GEL Certifications as of 13 March 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122023-4
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2022-160
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-22-20
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S45134
Work Order #: 610687**

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2387247

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
610687001	S45134.01
610687002	S45134.02
610687003	S45134.03
610687004	S45134.04
610687005	S45134.05
610687006	S45134.06
610687007	S45134.07
610687008	S45134.08
1205326726	Method Blank (MB)
1205326727	609452001(NonSDG) Sample Duplicate (DUP)
1205326728	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments

Sample results verify with historical activity.

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2387198

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
610687001	S45134.01
610687002	S45134.02

610687003	S45134.03
610687004	S45134.04
610687005	S45134.05
610687006	S45134.06
610687007	S45134.07
610687008	S45134.08
1205326616	Method Blank (MB)
1205326617	609452001(NonSDG) Sample Duplicate (DUP)
1205326618	609452001(NonSDG) Matrix Spike (MS)
1205326619	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments

The matrix spike, 1205326618 (Non SDG 609452001MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Qualifier Definition Report for

MERI001 Merit Laboratories, Inc.

Client SDG: S45134 GEL Work Order: 610687

The Qualifiers in this report are defined as follows:

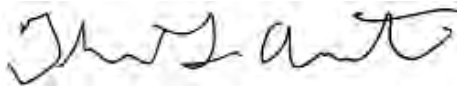
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:



Name: Theresa Austin

Date: 13 MAR 2023

Title: Group Leader

Sample Data Summary

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: March 13, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Laverty
 Project: Routine Analysis

Client Sample ID: S45134.01	Project: MERI00120
Sample ID: 610687001	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 07-FEB-23 13:52	
Receive Date: 13-FEB-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.24	+/-1.39	2.32	3.00	pCi/L		JE1	03/09/23	1043	2387247		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.54	+/-1.41			pCi/L		NXL1	03/13/23	0838	2387244		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.300	+/-0.270	0.411	1.00	pCi/L		LXP1	03/12/23	0917	2387198		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			78.2	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

- | | |
|---------------------------------------|--------------------------------|
| DF: Dilution Factor | Lc/LC: Critical Level |
| DL: Detection Limit | PF: Prep Factor |
| MDA: Minimum Detectable Activity | RL: Reporting Limit |
| MDC: Minimum Detectable Concentration | SQL: Sample Quantitation Limit |

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 13, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S45134.02 Project: MERI00120
Sample ID: 610687002 Client ID: MERI001
Matrix: Ground Water
Collect Date: 07-FEB-23 17:00
Receive Date: 13-FEB-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	-0.445	+/-1.20	2.41	3.00	pCi/L		JE1	03/09/23	1043	2387247		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.184	+/-1.22			pCi/L		NXL1	03/13/23	0838	2387244		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.184	+/-0.216	0.352	1.00	pCi/L		LXP1	03/12/23	0917	2387198		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			57.2	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 13, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S45134.03 Project: MERI00120
Sample ID: 610687003 Client ID: MERI001
Matrix: Ground Water
Collect Date: 07-FEB-23 10:18
Receive Date: 13-FEB-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	1.61	+/-1.48	2.40	3.00	pCi/L		JE1	03/09/23	1043	2387247	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		2.18	+/-1.51			pCi/L		NXL1	03/13/23	0838	2387244	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		0.566	+/-0.336	0.387	1.00	pCi/L		LXP1	03/12/23	0917	2387198	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			59.5	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: March 13, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S45134.04 Project: MERI00120
Sample ID: 610687004 Client ID: MERI001
Matrix: Ground Water
Collect Date: 07-FEB-23 11:49
Receive Date: 13-FEB-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	0.692	+/-1.27	2.22	3.00	pCi/L		JE1	03/09/23	1043	2387247	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		1.39	+/-1.31			pCi/L		NXL1	03/13/23	0838	2387244	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		0.701	+/-0.340	0.369	1.00	pCi/L		LXP1	03/12/23	0917	2387198	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			72.1	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 13, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S45134.05 Project: MERI00120
Sample ID: 610687005 Client ID: MERI001
Matrix: Ground Water
Collect Date: 07-FEB-23 17:35
Receive Date: 13-FEB-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.22	+/-1.32	2.21	3.00	pCi/L		JE1	03/09/23	1043	2387247		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.78	+/-1.36			pCi/L		NXL1	03/13/23	0838	2387244		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.558	+/-0.295	0.314	1.00	pCi/L		LXP1	03/12/23	0917	2387198		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			56.6	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 13, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Laverty
 Project: Routine Analysis

Client Sample ID: S45134.06	Project: MERI00120
Sample ID: 610687006	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 07-FEB-23 15:29	
Receive Date: 13-FEB-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	-1.09	+/-1.16	2.65	3.00	pCi/L		JE1	03/09/23	1043	2387247	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		0.961	+/-1.23			pCi/L		NXL1	03/13/23	0838	2387244	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		0.961	+/-0.419	0.425	1.00	pCi/L		LXP1	03/12/23	0917	2387198	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			45.6	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 13, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Lavery
 Project: Routine Analysis

Client Sample ID: S45134.07	Project: MERI00120
Sample ID: 610687007	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 07-FEB-23 11:49	
Receive Date: 13-FEB-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	-0.593	+/-1.18	2.31	3.00	pCi/L		JE1	03/09/23	1043	2387247		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.898	+/-1.24			pCi/L		NXL1	03/13/23	0838	2387244		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.898	+/-0.377	0.395	1.00	pCi/L		LXP1	03/12/23	0917	2387198		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			76.3	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: March 13, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S45134.08 Project: MERI00120
Sample ID: 610687008 Client ID: MERI001
Matrix: Ground Water
Collect Date: 07-FEB-23 07:55
Receive Date: 13-FEB-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	-0.0728	+/-1.11	2.17	3.00	pCi/L		JE1	03/09/23	1043	2387247	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		0.179	+/-1.13			pCi/L		NXL1	03/13/23	0838	2387244	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226	U	0.179	+/-0.253	0.441	1.00	pCi/L		LXP1	03/12/23	0949	2387198	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			56.5	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

Quality Control Data

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: March 13, 2023

Page 1 of 2

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: John Laverty

Workorder: 610687

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2387247										
QC1205326727	609452001	DUP									
Radium-228	U	-0.308	U	1.30	pCi/L	N/A		N/A	JE1	03/09/23	10:42
	Uncertainty	+/-1.10		+/-1.38							
QC1205326728	LCS										
Radium-228	62.6			65.2	pCi/L		104	(75%-125%)		03/09/23	10:42
	Uncertainty			+/-4.40							
QC1205326726	MB										
Radium-228			U	-0.360	pCi/L					03/09/23	10:41
	Uncertainty			+/-1.12							
Rad Ra-226											
Batch	2387198										
QC1205326617	609452001	DUP									
Radium-226		0.828		0.696	pCi/L	17.4		(0% - 100%)	LXP1	03/12/23	09:49
	Uncertainty	+/-0.353		+/-0.386							
QC1205326619	LCS										
Radium-226	26.4			25.2	pCi/L		95.6	(75%-125%)		03/12/23	10:21
	Uncertainty			+/-1.91							
QC1205326616	MB										
Radium-226			U	0.225	pCi/L					03/12/23	09:49
	Uncertainty			+/-0.247							
QC1205326618	609452001	MS									
Radium-226	129	0.828		111	pCi/L		84.9	(75%-125%)		03/12/23	09:49
	Uncertainty	+/-0.353		+/-8.55							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- H Analytical holding time was exceeded
- < Result is less than value reported
- > Result is greater than value reported

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 610687

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UI											
BD											
h											
R											
^											
N/A											
ND											
M											
NJ											
FA											
UJ											
Q											
K											
UL											
L											
NI											
Y											
**											
M											
J											

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 2387247 Check-list

This check-list was completed on 09-MAR-23 by Nat Long

This batch was reviewed by Nat Long on 09-MAR-23 and Lois Buist on 10-MAR-23.

Batch ID:
2387247

Product:
GFC28RAL

Description: Gas Flow Radium 228
GL-RAD-A-063

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-228 in Liquid

Batch ID: 2387247
Analyst: Jacqueline Emond (JE1)
 Prep: Lyndsey Pace (LXP1)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL-RAD-A-063 REV# 5
Instrument: LUCAS-C202389980

Due Dates for Lab: 08-MAR-2023 **Package:** 12-MAR-2023 **SDG:** 10-MAR-2023

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1205326728	228	1952-B	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	Ac-228 Ingrow (date)	Ac-228 Separation (date)
1	609452001	03-MAR-2023	3	301.55	301.55	03/06/23 13:52	03/09/23 08:30
2	609452002	03-MAR-2023	3	303.13	303.13	03/06/23 13:52	03/09/23 08:30
3	609452003	03-MAR-2023	3	300.84	300.84	03/06/23 13:52	03/09/23 08:30
4	609452004	03-MAR-2023	3	301.57	301.57	03/06/23 13:52	03/09/23 08:30
5	609452005	03-MAR-2023	3	300.55	300.55	03/06/23 13:52	03/09/23 08:30
6	609452006	03-MAR-2023	3	301.46	301.46	03/06/23 13:52	03/09/23 08:30
7	609452007	03-MAR-2023	3	303.27	303.27	03/06/23 13:52	03/09/23 08:30
8	609452008	03-MAR-2023	3	302.22	302.22	03/06/23 13:52	03/09/23 08:30
9	609452009	03-MAR-2023	3	303.28	303.28	03/06/23 13:52	03/09/23 08:30
10	610687001	03-MAR-2023	3	303.58	303.58	03/06/23 13:52	03/09/23 08:30
11	610687002	03-MAR-2023	3	305.87	305.87	03/06/23 13:52	03/09/23 08:30
12	610687003	03-MAR-2023	3	304.95	304.95	03/06/23 13:52	03/09/23 08:30
13	610687004	03-MAR-2023	3	304.53	304.53	03/06/23 13:52	03/09/23 08:30
14	610687005	03-MAR-2023	3	305.49	305.49	03/06/23 13:52	03/09/23 08:30
15	610687006	03-MAR-2023	3	300.47	300.47	03/06/23 13:52	03/09/23 08:30
16	610687007	03-MAR-2023	3	305.63	305.63	03/06/23 13:52	03/09/23 08:30
17	610687008	03-MAR-2023	3	306.22	306.22	03/06/23 13:52	03/09/23 08:30
18	610893001	03-MAR-2023	3	305.21	305.21	03/06/23 13:52	03/09/23 08:30
19	610893002	03-MAR-2023	3	301.02	301.02	03/06/23 13:52	03/09/23 08:30
20	1205326726 MB	03-MAR-2023	3		306.22	03/06/23 13:52	03/09/23 08:30
21	1205326727 DUP (609452001)	03-MAR-2023	3	305.44	305.44	03/06/23 13:52	03/09/23 08:30
22	1205326728 LCS	03-MAR-2023	3		306.22	03/06/23 13:52	03/09/23 08:30

Reagent/Solvent Lot ID	Description	Amount	Comments:
WORK 1951-E	Ba-133	.1 mL	Pipet Id: RAD-GFC-1795419 Data Entry Date2: 03-MAR-2023 00:00
REGNT 3873289	RGF-1.5M Ammonium Sulfate	10 mL	
REGNT 3862351	RGF-1M Citric Acid	5 mL	
REGNT 3873685	2M HCl	20 mL	
REGNT 3873277	RGF-50% Potassium Carbonate	2 mL	
REGNT 3864851	RGF-7M Nitric Acid	25 mL	
REGNT DGA013123	2372406	2 g	
REGNT 3418276.6	29M HF (48-50%)	4 mL	
REGNT 3528714	500 mg/mL Neodymium Carrier	.2 mL	
REGNT 3521298	RGF-Neodymium Substrate	5 mL	
REGNT 3855914.1	Nitric Acid	5 mL	
REGNT 3465466	Barium Carrier Ra228 REG	1 mL	
REGNT 3857883.6	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL	

Radium-228 Liquid

Filename : RA228.XLS
 File type : Excel
 Version # : 1.4.3

Tracer S/N : 1951-E
 Tracer Exp Date : 1/10/2024
 Tracer Volume Added: 0.10

Batch : 2387247
 Analyst : JAC02417
 Prep Date : 3/3/2023
 Ra-228 Method Uncertainty : 0.1268

Procedure Code : GFC28RAL
 Parmname : Radium-228
 Required MDA : 3 pCi/L
 Ra-228 Abundance : 1.00
 Halflife of Ra-228 : 5.75 years
 Halflife of Ac-228 : 6.15 hours

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	609452001.1	0.3016	1.8485E-05	2/1/2023 9:34	1226.8	1.65%	663.9	2.24%	0.1	0.000200
2	609452002.1	0.3031	1.8512E-05	2/1/2023 11:13	1226.8	1.65%	902.2	1.92%	0.1	0.000200
3	609452003.1	0.3008	1.8473E-05	2/1/2023 12:32	1226.8	1.65%	1040.3	1.79%	0.1	0.000200
4	609452004.1	0.3016	1.8486E-05	2/1/2023 13:44	1226.8	1.65%	622.3	2.31%	0.1	0.000200
5	609452005.1	0.3006	1.8468E-05	2/1/2023 14:52	1226.8	1.65%	858.1	1.97%	0.1	0.000200
6	609452006.1	0.3015	1.8484E-05	2/2/2023 9:42	1226.8	1.65%	1002.5	1.82%	0.1	0.000200
7	609452007.1	0.3033	1.8514E-05	2/2/2023 11:13	1226.8	1.65%	668.6	2.23%	0.1	0.000200
8	609452008.1	0.3022	1.8497E-05	2/2/2023 11:18	1226.8	1.65%	820.0	2.02%	0.1	0.000200
9	609452009.1	0.3033	1.8514E-05	2/2/2023 13:21	1226.8	1.65%	858.0	1.97%	0.1	0.000200
10	610687001.1	0.3036	1.8519E-05	2/7/2023 13:52	1226.8	1.65%	959.9	1.86%	0.1	0.000200
11	610687002.1	0.3059	1.8557E-05	2/7/2023 17:00	1226.8	1.65%	701.2	2.18%	0.1	0.000200
12	610687003.1	0.3050	1.8542E-05	2/7/2023 10:18	1226.8	1.65%	729.3	2.14%	0.1	0.000200
13	610687004.1	0.3045	1.8535E-05	2/7/2023 11:49	1226.8	1.65%	885.1	1.94%	0.1	0.000200
14	610687005.1	0.3055	1.8551E-05	2/7/2023 17:35	1226.8	1.65%	694.7	2.19%	0.1	0.000200
15	610687006.1	0.3005	1.8467E-05	2/7/2023 15:29	1226.8	1.65%	558.9	2.44%	0.1	0.000200
16	610687007.1	0.3056	1.8553E-05	2/7/2023 11:49	1226.8	1.65%	935.6	1.89%	0.1	0.000200
17	610687008.1	0.3062	1.8563E-05	2/7/2023 7:55	1226.8	1.65%	692.5	2.19%	0.1	0.000200
18	610893001.1	0.3052	1.8546E-05	2/8/2023 11:41	1226.8	1.65%	830.9	2.00%	0.1	0.000200
19	610893002.1	0.3010	1.8476E-05	2/8/2023 11:46	1226.8	1.65%	1021.3	1.81%	0.1	0.000200
20	1205326726.1	0.3062	1.8563E-05	3/3/2023 0:00	1226.8	1.65%	806.0	2.03%	0.1	0.000200
21	1205326727.1	0.3054	1.8550E-05	2/1/2023 9:34	1226.8	1.65%	910.7	1.91%	0.1	0.000200
22	1205326728.1	0.3062	1.8563E-05	3/3/2023 0:00	1226.8	1.65%	962.7	1.86%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-063
 Instrument SOP: GL-RAD-I-016

Count raw Data														Calculated	Sample
Pos.	Detector ID	Counting Time (min.)	Gross Counts		Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Recovery %	Recovery Error %	
			Alpha	Beta											
1	5D	60	1	29	0.483	3/9/2023 10:42	3/6/2023 13:52	3/9/2023 8:30	0.988	0.780	0.999	1.057	54.1%	2.80%	
2	1C	60	6	59	0.983	3/9/2023 10:42	3/6/2023 13:52	3/9/2023 8:30	0.988	0.780	0.999	1.057	73.5%	2.55%	
3	2D	60	16	282	4.700	3/9/2023 10:42	3/6/2023 13:52	3/9/2023 8:30	0.988	0.780	0.999	1.057	84.8%	2.45%	
4	3B	60	14	40	0.667	3/9/2023 10:42	3/6/2023 13:52	3/9/2023 8:30	0.988	0.780	0.999	1.057	50.7%	2.85%	
5	4B	60	15	67	1.117	3/9/2023 10:42	3/6/2023 13:52	3/9/2023 8:30	0.988	0.780	0.999	1.057	69.9%	2.59%	
6	8C	60	8	99	1.650	3/9/2023 10:42	3/6/2023 13:52	3/9/2023 8:30	0.988	0.779	0.999	1.057	81.7%	2.47%	
7	1D	60	2	59	0.983	3/9/2023 10:42	3/6/2023 13:52	3/9/2023 8:30	0.989	0.779	0.999	1.057	54.5%	2.79%	
8	4C	60	2	57	0.950	3/9/2023 10:42	3/6/2023 13:52	3/9/2023 8:30	0.989	0.779	0.999	1.057	66.8%	2.62%	
9	6C	60	7	62	1.033	3/9/2023 10:42	3/6/2023 13:52	3/9/2023 8:30	0.989	0.779	0.999	1.057	69.9%	2.59%	
10	8B	60	9	105	1.750	3/9/2023 10:43	3/6/2023 13:52	3/9/2023 8:30	0.990	0.779	0.999	1.057	78.2%	2.50%	
11	2A	60	4	39	0.650	3/9/2023 10:43	3/6/2023 13:52	3/9/2023 8:30	0.990	0.779	0.999	1.057	57.2%	2.75%	
12	2C	60	9	61	1.017	3/9/2023 10:43	3/6/2023 13:52	3/9/2023 8:30	0.990	0.779	0.999	1.057	59.5%	2.72%	
13	8A	60	29	74	1.233	3/9/2023 10:43	3/6/2023 13:52	3/9/2023 8:30	0.990	0.778	0.999	1.057	72.1%	2.56%	
14	5C	60	9	48	0.800	3/9/2023 10:43	3/6/2023 13:52	3/9/2023 8:30	0.990	0.778	0.999	1.057	56.6%	2.76%	
15	1A	60	8	22	0.367	3/9/2023 10:43	3/6/2023 13:52	3/9/2023 8:30	0.990	0.778	0.999	1.057	45.6%	2.96%	
16	6A	60	8	70	1.167	3/9/2023 10:43	3/6/2023 13:52	3/9/2023 8:30	0.990	0.778	0.999	1.057	76.3%	2.52%	
17	1B	60	9	31	0.517	3/9/2023 10:43	3/6/2023 13:52	3/9/2023 8:30	0.990	0.778	0.999	1.057	56.5%	2.76%	
18	5A	60	6	67	1.117	3/9/2023 10:43	3/6/2023 13:52	3/9/2023 8:30	0.990	0.778	0.999	1.057	67.7%	2.61%	
19	6B	60	13	125	2.083	3/9/2023 10:44	3/6/2023 13:52	3/9/2023 8:30	0.990	0.777	0.999	1.057	83.2%	2.47%	
20	5B	60	13	48	0.800	3/9/2023 10:41	3/6/2023 13:52	3/9/2023 8:30	0.998	0.780	0.999	1.057	65.7%	2.63%	
21	3C	60	10	93	1.550	3/9/2023 10:42	3/6/2023 13:52	3/9/2023 8:30	0.988	0.780	0.999	1.057	74.2%	2.54%	
22	2B	60	48	1035	17.250	3/9/2023 10:42	3/6/2023 13:52	3/9/2023 8:30	0.998	0.780	0.999	1.057	78.5%	2.50%	

Calibration Data								
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2022	5/31/2023	0.6236	0.00925	0.534	3/3/2023 18:13	1000
2	PIC	6/1/2022	5/31/2023	0.6190	0.00847	1.046	3/3/2023 18:12	1000
3	PIC	6/1/2022	5/31/2023	0.6046	0.00745	1.513	3/3/2023 18:12	1000
4	PIC	6/1/2022	5/31/2023	0.6245	0.01614	0.530	3/3/2023 18:12	1000
5	PIC	6/1/2022	5/31/2023	0.6400	0.01519	0.995	3/3/2023 18:12	1000
6	PIC	6/1/2022	5/31/2023	0.6294	0.01955	1.393	3/3/2023 18:11	1000
7	PIC	6/1/2022	5/31/2023	0.6048	0.00692	0.515	3/3/2023 18:12	1000
8	PIC	6/1/2022	5/31/2023	0.6359	0.00889	0.884	3/3/2023 18:13	1000
9	PIC	6/1/2022	5/31/2023	0.6123	0.01970	0.940	3/3/2023 18:08	1000
10	PIC	6/1/2022	5/31/2023	0.6437	0.02148	1.443	3/3/2023 18:11	1000
11	PIC	6/1/2022	5/31/2023	0.6201	0.01914	0.728	3/3/2023 18:12	1000
12	PIC	6/1/2022	5/31/2023	0.6022	0.01274	0.732	3/3/2023 18:12	1000
13	PIC	6/1/2022	5/31/2023	0.6398	0.01579	1.076	3/3/2023 18:11	1000
14	PIC	6/1/2022	5/31/2023	0.6242	0.00657	0.587	3/3/2023 18:13	1000
15	PIC	6/1/2022	5/31/2023	0.6209	0.00738	0.516	3/3/2023 18:12	1000
16	PIC	6/1/2022	5/31/2023	0.6328	0.02228	1.308	3/3/2023 18:08	1000
17	PIC	6/1/2022	5/31/2023	0.6068	0.00711	0.529	3/3/2023 18:12	1000
18	PIC	6/1/2022	5/31/2023	0.6332	0.00851	0.931	3/3/2023 18:13	1000
19	PIC	6/1/2022	5/31/2023	0.6280	0.00851	1.415	3/3/2023 18:08	1000
20	PIC	6/1/2022	5/31/2023	0.6336	0.00426	0.875	3/3/2023 18:13	1000
21	PIC	6/1/2022	5/31/2023	0.6365	0.00988	1.246	3/3/2023 18:12	1000
22	PIC	6/1/2022	5/31/2023	0.6097	0.02111	1.633	3/3/2023 18:12	1000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

* - RPD changed to 0% due to sample & dup activity below MDA

LCS S/N : 1952-B
LCS Exp Date : 8/9/2023
LCS Activity (dpm/ml): 425.89
LCS Volume Added: 0.10

Results																
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	1.3749	0.9707	3	2.2451	-0.3078	182.94%	-0.0507	0.0927	1.1036	1.1039		SAMPLE				
2	1.4194	1.0021	3	2.2283	-0.2808	210.72%	-0.0627	0.1320	1.1598	1.1599		SAMPLE				
3	1.5274	1.0784	3	2.3572	12.7787	9.23%	3.1870	0.2826	2.2207	3.9280		SAMPLE				
4	1.4597	1.0305	3	2.3848	0.8848	79.01%	0.1367	0.1079	1.3691	1.3878		SAMPLE				
5	1.4203	1.0028	3	2.2354	0.5594	115.13%	0.1217	0.1400	1.2618	1.2699		SAMPLE				
6	1.4583	1.0296	3	2.2586	1.0253	66.21%	0.2570	0.1700	1.3292	1.3549		SAMPLE				
7	1.3757	0.9712	3	2.2520	2.8989	27.91%	0.4683	0.1300	1.5774	1.7418		SAMPLE				
8	1.4026	0.9903	3	2.2214	0.3179	195.92%	0.0660	0.1293	1.2207	1.2234		SAMPLE				
9	1.4308	1.0102	3	2.2586	0.4448	144.43%	0.0933	0.1348	1.2587	1.2639		SAMPLE				
10	1.5034	1.0614	3	2.3249	1.2407	57.08%	0.3070	0.1750	1.3858	1.4220		SAMPLE				
11	1.5065	1.0636	3	2.4123	-0.4447	137.89%	-0.0780	0.1075	1.2015	1.2018		SAMPLE				
12	1.5004	1.0593	3	2.4018	1.6120	46.80%	0.2847	0.1330	1.4756	1.5320		SAMPLE				
13	1.4131	0.9976	3	2.2152	0.6921	93.53%	0.1573	0.1471	1.2680	1.2803		SAMPLE				
14	1.3591	0.9595	3	2.2054	1.2200	55.46%	0.2130	0.1180	1.3245	1.3605		SAMPLE				
15	1.6192	1.1432	3	2.6502	-1.0869	54.60%	-0.1493	0.0814	1.1613	1.1617		SAMPLE				
16	1.4860	1.0491	3	2.3080	-0.5929	101.98%	-0.1413	0.1441	1.1846	1.1847		SAMPLE				
17	1.3290	0.9383	3	2.1716	-0.0728	775.17%	-0.0123	0.0956	1.1056	1.1059		SAMPLE				
18	1.4126	0.9973	3	2.2311	0.8777	75.34%	0.1857	0.1398	1.2953	1.3144		SAMPLE				
19	1.4491	1.0231	3	2.2428	2.6289	28.56%	0.6683	0.1901	1.4656	1.6103		SAMPLE				
20	1.3906	0.9818	3	2.2036	-0.3600	158.95%	-0.0750	0.1192	1.1215	1.1217		MB				
21	1.4806	1.0453	3	2.3047	1.3020	54.20%	0.3040	0.1646	1.3814	1.4205	609452001.1	DUP	* 0.0%			
22	1.6535	1.1674	3	2.5436	65.2481	4.75%	15.6170	0.5377	4.4033	17.3169		LCS			62.6486	104.1%

ASSAY 9-Mar-23 9:07:53
 Wizard 2480 s/n 46190630
 Protocol id 9 Ba-133_1
 Time limit
 Count limit
 Isotope Ba-133_1
 Protocol date 3/9/2023
 Run id. 6300

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF		1	94	1	180	3681	1226.8	1.65	09:07:53
609452001	2	94	2	180	1992.13	663.92	2.24	54.12	09:11:07
609452002	3	94	3	180	2707.28	902.19	1.92	73.54	09:14:21
609452003	4	94	4	180	3121	1040.25	1.79	84.79	09:17:35
609452004	5	94	5	180	1867.28	622.28	2.31	50.72	09:20:49
609452005	1	10	1	180	2574.57	858.05	1.97	69.94	09:24:25
609452006	2	10	2	180	3008	1002.47	1.82	81.71	09:27:39
609452007	3	10	3	180	2006	668.6	2.23	54.50	09:30:53
609452008	4	10	4	180	2460.28	819.95	2.02	66.84	09:34:06
609452009	5	10	5	180	2574.44	858	1.97	69.94	09:37:21
610687001	1	11	1	180	2880.28	959.93	1.86	78.25	09:40:58
610687002	2	11	2	180	2104	701.18	2.18	57.16	09:44:12
610687003	3	11	3	180	2188.57	729.34	2.14	59.45	09:47:26
610687004	4	11	4	180	2656	885.11	1.94	72.15	09:50:40
610687005	5	11	5	180	2084.28	694.68	2.19	56.63	09:53:54
610687006	1	14	1	180	1677	558.89	2.44	45.56	09:57:43
610687007	2	14	2	180	2807.28	935.6	1.89	76.26	10:00:57
610687008	3	14	3	180	2078	692.54	2.19	56.45	10:04:11
610893001	4	14	4	180	2493	830.88	2	67.73	10:07:25
610893002	5	14	5	180	3064.28	1021.27	1.81	83.25	10:10:39
1205326726	1	21	1	180	2418.28	806	2.03	65.70	10:14:26
1205326727	2	21	2	180	2732.85	910.73	1.91	74.24	10:17:40
1205326728	3	21	3	180	2888.57	962.7	1.86	78.47	10:20:54

END OF ASSAY

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
609452001	5D	60	1	29	3/9/2023 10:42	3/9/2023 11:42	PIC	2387247
609452002	1C	60	6	59	3/9/2023 10:42	3/9/2023 11:42	PIC	2387247
609452003	2D	60	16	282	3/9/2023 10:42	3/9/2023 11:42	PIC	2387247
609452004	3B	60	14	40	3/9/2023 10:42	3/9/2023 11:42	PIC	2387247
609452005	4B	60	15	67	3/9/2023 10:42	3/9/2023 11:42	PIC	2387247
609452006	8C	60	8	99	3/9/2023 10:42	3/9/2023 11:42	PIC	2387247
609452007	1D	60	2	59	3/9/2023 10:42	3/9/2023 11:42	PIC	2387247
609452008	4C	60	2	57	3/9/2023 10:42	3/9/2023 11:42	PIC	2387247
609452009	6C	60	7	62	3/9/2023 10:42	3/9/2023 11:42	PIC	2387247
610687001	8B	60	9	105	3/9/2023 10:43	3/9/2023 11:43	PIC	2387247
610687002	2A	60	4	39	3/9/2023 10:43	3/9/2023 11:43	PIC	2387247
610687003	2C	60	9	61	3/9/2023 10:43	3/9/2023 11:43	PIC	2387247
610687004	8A	60	29	74	3/9/2023 10:43	3/9/2023 11:43	PIC	2387247
610687005	5C	60	9	48	3/9/2023 10:43	3/9/2023 11:43	PIC	2387247
610687006	1A	60	8	22	3/9/2023 10:43	3/9/2023 11:43	PIC	2387247
610687007	6A	60	8	70	3/9/2023 10:43	3/9/2023 11:43	PIC	2387247
610687008	1B	60	9	31	3/9/2023 10:43	3/9/2023 11:43	PIC	2387247
610893001	5A	60	6	67	3/9/2023 10:43	3/9/2023 11:43	PIC	2387247
610893002	6B	60	13	125	3/9/2023 10:44	3/9/2023 11:44	PIC	2387247
1205326726	5B	60	13	48	3/9/2023 10:41	3/9/2023 11:41	PIC	2387247
1205326727	3C	60	10	93	3/9/2023 10:42	3/9/2023 11:42	PIC	2387247
1205326728	2B	60	48	1035	3/9/2023 10:42	3/9/2023 11:42	PIC	2387247

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 09-Mar-2023

Detectors LB4100 A1 through I4 and PIC 1A through 14D and G5400W 1W through 1Z and LB4200 OA1 through OA1

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100E2	Above	Beta bkg	09-Mar 04:48	60	2.033	1.385	3.072	-0.69
LB4100F2	Below	Alpha eff	09-Mar 05:57	5	6060	6533	7372	-6.38
LB4100F2	Above	Alpha XTalk	09-Mar 05:57	5	0.382	0.318	0.366	+5.08
LB4100F2	Above	Beta bkg	09-Mar 04:48	60	24.717	1.173	1.833	+211.03
LB4100H1	Above	Beta bkg	09-Mar 04:48	60	2.700	0.216	2.462	+3.64
PIC3D	Below	Alpha XTalk	09-Mar 05:07	5	0.249	0.260	0.381	-3.56
PIC3D	Above	Beta XTalk	09-Mar 05:14	5	0.010	-4.26E-4	0.001	+42.14
PIC13A	Above	Alpha bkg	09-Mar 05:47	60	1.967	-9.05E-2	0.347	+25.21
PIC14D	Below	Beta XTalk	09-Mar 10:46	5	0.012	0.013	0.018	-4.11

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100A1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4200OA1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by  _____

Date 3-9-23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC

Batch ID: 2387247

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1205326726	MB	JE1	PIC5B	MAR-09-23 10:41:58	DONE	25mm Filter	01-JUN-22 00:00
1205326727	DUP	JE1	PIC3C	MAR-09-23 10:42:05	DONE	25mm Filter	01-JUN-22 00:00
1205326728	LCS	JE1	PIC2B	MAR-09-23 10:42:08	DONE	25mm Filter	01-JUN-22 00:00
609452001	SAMPLE	JE1	PIC5D	MAR-09-23 10:42:13	DONE	25mm Filter	01-JUN-22 00:00
609452002	SAMPLE	JE1	PIC1C	MAR-09-23 10:42:18	DONE	25mm Filter	01-JUN-22 00:00
609452003	SAMPLE	JE1	PIC2D	MAR-09-23 10:42:22	DONE	25mm Filter	01-JUN-22 00:00
609452004	SAMPLE	JE1	PIC3B	MAR-09-23 10:42:26	DONE	25mm Filter	01-JUN-22 00:00
609452005	SAMPLE	JE1	PIC4B	MAR-09-23 10:42:33	DONE	25mm Filter	01-JUN-22 00:00
609452006	SAMPLE	JE1	PIC8C	MAR-09-23 10:42:41	DONE	25mm Filter	01-JUN-22 00:00
609452007	SAMPLE	JE1	PIC1D	MAR-09-23 10:42:48	DONE	25mm Filter	01-JUN-22 00:00
609452008	SAMPLE	JE1	PIC4C	MAR-09-23 10:42:52	DONE	25mm Filter	01-JUN-22 00:00
609452009	SAMPLE	JE1	PIC6C	MAR-09-23 10:42:58	DONE	25mm Filter	01-JUN-22 00:00
610687001	SAMPLE	JE1	PIC8B	MAR-09-23 10:43:04	DONE	25mm Filter	01-JUN-22 00:00
610687002	SAMPLE	JE1	PIC2A	MAR-09-23 10:43:11	DONE	25mm Filter	01-JUN-22 00:00
610687003	SAMPLE	JE1	PIC2C	MAR-09-23 10:43:17	DONE	25mm Filter	01-JUN-22 00:00
610687004	SAMPLE	JE1	PIC8A	MAR-09-23 10:43:21	DONE	25mm Filter	01-JUN-22 00:00
610687005	SAMPLE	JE1	PIC5C	MAR-09-23 10:43:29	DONE	25mm Filter	01-JUN-22 00:00
610687006	SAMPLE	JE1	PIC1A	MAR-09-23 10:43:37	DONE	25mm Filter	01-JUN-22 00:00
610687007	SAMPLE	JE1	PIC6A	MAR-09-23 10:43:44	DONE	25mm Filter	01-JUN-22 00:00
610687008	SAMPLE	JE1	PIC1B	MAR-09-23 10:43:50	DONE	25mm Filter	01-JUN-22 00:00
610893001	SAMPLE	JE1	PIC5A	MAR-09-23 10:43:57	DONE	25mm Filter	01-JUN-22 00:00
610893002	SAMPLE	JE1	PIC6B	MAR-09-23 10:44:07	DONE	25mm Filter	01-JUN-22 00:00

Lucas Cell Raw Data

Batch 2387198 Check-list

This check-list was completed on 13-MAR-23 by Lyndsey Pace

This batch was reviewed by Gregory Ramsay on 13-MAR-23 and Lyndsey Pace on 13-MAR-23.

Batch ID:
2387198

Product:
LUC26RAL

Description: Lucas Cell Radium 226
GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-226 in Liquid

Batch ID: 2387198
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL-RAD-A-008 REV# 15
Instrument: LUCAS-C202389980

Due Dates for Lab: 08-MAR-2023			Package: 12-MAR-2023		SDG: 10-MAR-2023	
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
LCS	1205326619	Radium-226 SPIKE	1715-G	.1	mL	
MS	1205326618	Radium-226 SPIKE	1715-G	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	End Degas (date)	CELL #	End Transfer (date)	Start Count Time (date)	Background Counts	Total Counts
1	609452001	03-MAR-2023	1	502.31	502.31	03/08/23 09:45	107	03/12/23 05:45	03/12/23 08:45	1	24
2	609452002	03-MAR-2023	1	502.82	502.82	03/08/23 09:45	208	03/12/23 05:45	03/12/23 08:45	6	25
3	609452003	03-MAR-2023	1	503.56	503.56	03/08/23 09:45	303	03/12/23 05:45	03/12/23 08:45	7	133
4	609452004	03-MAR-2023	1	501.75	501.75	03/08/23 09:45	403	03/12/23 05:45	03/12/23 08:45	3	33
5	609452005	03-MAR-2023	1	506.97	506.97	03/08/23 09:45	502	03/12/23 05:45	03/12/23 08:45	1	18
6	609452006	03-MAR-2023	1	505.4	505.4	03/08/23 09:45	604	03/12/23 05:45	03/12/23 08:45	1	14
7	609452007	03-MAR-2023	1	506.72	506.72	03/08/23 09:45	703	03/12/23 05:45	03/12/23 08:45	5	33
8	609452008	03-MAR-2023	1	501.57	501.57	03/08/23 09:45	802	03/12/23 05:45	03/12/23 08:45	6	28
9	609452009	03-MAR-2023	1	502.31	502.31	03/08/23 09:45	101	03/12/23 06:10	03/12/23 09:17	5	16
10	610687001	03-MAR-2023	1	500.18	500.18	03/08/23 09:45	202	03/12/23 06:10	03/12/23 09:17	4	13
11	610687002	03-MAR-2023	1	507.74	507.74	03/08/23 09:45	301	03/12/23 06:10	03/12/23 09:17	2	7
12	610687003	03-MAR-2023	1	506.5	506.5	03/08/23 09:45	402	03/12/23 06:10	03/12/23 09:17	2	16
13	610687004	03-MAR-2023	1	503.69	503.69	03/08/23 09:45	501	03/12/23 06:10	03/12/23 09:17	3	24
14	610687005	03-MAR-2023	1	501.75	501.75	03/08/23 09:45	602	03/12/23 06:10	03/12/23 09:17	2	19
15	610687006	03-MAR-2023	1	501.71	501.71	03/08/23 09:45	706	03/12/23 06:10	03/12/23 09:17	3	28
16	610687007	03-MAR-2023	1	500.85	500.85	03/08/23 09:45	805	03/12/23 06:10	03/12/23 09:17	4	32
17	610687008	03-MAR-2023	1	502.77	502.77	03/08/23 09:45	106	03/12/23 06:35	03/12/23 09:49	4	9
18	610893001	03-MAR-2023	1	506.68	506.68	03/08/23 09:45	201	03/12/23 06:35	03/12/23 09:49	4	19
19	610893002	03-MAR-2023	1	501.36	501.36	03/08/23 09:45	408	03/12/23 06:35	03/12/23 09:49	1	24
20	1205326616 MB	03-MAR-2023	1		507.74	03/08/23 09:45	503	03/12/23 06:35	03/12/23 09:49	6	14
21	1205326617 DUP (609452001)	03-MAR-2023	1	504.21	504.21	03/08/23 09:45	701	03/12/23 06:35	03/12/23 09:49	6	26
22	1205326618 MS (609452001)	03-MAR-2023	1	103.74	103.74	03/08/23 09:45	801	03/12/23 06:35	03/12/23 09:49	1	645
23	1205326619 LCS	03-MAR-2023	1		507.74	03/08/23 09:45	104	03/12/23 07:00	03/12/23 10:21	4	682

Reagent/Solvent Lot ID	Description	Amount	Comments:
			Data Entry Date2: 03-MAR-2023 00:00

Radium-226 Liquid

Filename : RA226.XLS
 File type : Excel
 Version # : 1.3.2

Procedure Code : LUC26RAL
 Parmname : Radium-226
 Required MDA : 1 pCi/L
 Halflife of Ra-226 : 1600 years
 Ra-226 Abundance : 1.00
 Halflife of Rn-222 : 3.8235 days

Batch : 2387198
 Analyst : LIN01615
 Prep Date : 3/3/2023
 Ra-226 Method Uncertainty : 0.073648

Batch counted on : LUCAS CELL DETECTOR
 BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Count Time (min.)	Cell Efficiency (cpm/dpm)
1	609452001.1	0.5023	2.0265E-05	2/1/2023 9:34	107	30	24	0.800	1	0.033	30	1.6990
2	609452002.1	0.5028	2.0267E-05	2/1/2023 11:13	208	30	25	0.833	6	0.200	30	1.7740
3	609452003.1	0.5036	2.0270E-05	2/1/2023 12:32	303	30	133	4.433	7	0.233	30	1.7210
4	609452004.1	0.5018	2.0263E-05	2/1/2023 13:44	403	30	33	1.100	3	0.100	30	1.5070
5	609452005.1	0.5070	2.0284E-05	2/1/2023 14:52	502	30	18	0.600	1	0.033	30	1.8630
6	609452006.1	0.5054	2.0278E-05	2/2/2023 9:42	604	30	14	0.467	1	0.033	30	1.6810
7	609452007.1	0.5067	2.0283E-05	2/2/2023 11:13	703	30	33	1.100	5	0.167	30	1.6440
8	609452008.1	0.5016	2.0262E-05	2/2/2023 11:18	802	30	28	0.933	6	0.200	30	2.0910
9	609452009.1	0.5023	2.0265E-05	2/2/2023 13:21	101	30	16	0.533	5	0.167	30	1.5720
10	610687001.1	0.5002	2.0257E-05	2/7/2023 13:52	202	30	13	0.433	4	0.133	30	1.8360
11	610687002.1	0.5077	2.0287E-05	2/7/2023 17:00	301	30	7	0.233	2	0.067	30	1.6430
12	610687003.1	0.5065	2.0282E-05	2/7/2023 10:18	402	30	16	0.533	2	0.067	30	1.4980
13	610687004.1	0.5037	2.0271E-05	2/7/2023 11:49	501	30	24	0.800	3	0.100	30	1.8220
14	610687005.1	0.5018	2.0263E-05	2/7/2023 17:35	602	30	19	0.633	2	0.067	30	1.8620
15	610687006.1	0.5017	2.0263E-05	2/7/2023 15:29	706	30	28	0.933	3	0.100	30	1.5900
16	610687007.1	0.5009	2.0259E-05	2/7/2023 11:49	805	30	32	1.067	4	0.133	30	1.9080
17	610687008.1	0.5028	2.0267E-05	2/7/2023 7:55	106	30	9	0.300	4	0.133	30	1.6990
18	610893001.1	0.5067	2.0283E-05	2/8/2023 11:41	201	30	19	0.633	4	0.133	30	1.7110
19	610893002.1	0.5014	2.0261E-05	2/8/2023 11:46	408	30	24	0.800	1	0.033	30	1.5020
20	1205326616.1	0.5077	2.0287E-05	3/3/2023 0:00	503	30	14	0.467	6	0.200	30	2.1390
21	1205326617.1	0.5042	2.0273E-05	2/1/2023 9:34	701	30	26	0.867	6	0.200	30	1.7440
22	1205326618.1	0.1037	1.1597E-05	2/1/2023 9:34	801	30	645	21.500	1	0.033	30	1.7180
23	1205326619.1	0.5077	2.0287E-05	3/3/2023 0:00	104	30	682	22.733	4	0.133	30	1.6160

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-008
 Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrow End Date/Time	Count Start Date/Time	Rn-222 Corrections			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
3.900%	4/28/2022	4/30/2023	3/8/2023 9:45	3/12/2023 5:45	3/12/2023 8:45	0.501	0.978	1.002	1.000
5.500%	8/1/2022	7/31/2023	3/8/2023 9:45	3/12/2023 5:45	3/12/2023 8:45	0.501	0.978	1.002	1.000
7.400%	10/25/2022	10/31/2023	3/8/2023 9:45	3/12/2023 5:45	3/12/2023 8:45	0.501	0.978	1.002	1.000
6.100%	2/1/2023	1/31/2024	3/8/2023 9:45	3/12/2023 5:45	3/12/2023 8:45	0.501	0.978	1.002	1.000
6.700%	6/1/2022	5/31/2023	3/8/2023 9:45	3/12/2023 5:45	3/12/2023 8:45	0.501	0.978	1.002	1.000
6.700%	7/1/2022	6/30/2023	3/8/2023 9:45	3/12/2023 5:45	3/12/2023 8:45	0.501	0.978	1.002	1.000
9.000%	11/1/2022	10/31/2023	3/8/2023 9:45	3/12/2023 5:45	3/12/2023 8:45	0.501	0.978	1.002	1.000
8.000%	4/1/2022	3/31/2023	3/8/2023 9:45	3/12/2023 5:45	3/12/2023 8:45	0.501	0.978	1.002	1.000
1.200%	4/28/2022	4/30/2023	3/8/2023 9:45	3/12/2023 6:10	3/12/2023 9:17	0.502	0.977	1.002	1.000
5.100%	8/1/2022	7/31/2023	3/8/2023 9:45	3/12/2023 6:10	3/12/2023 9:17	0.502	0.977	1.002	1.000
4.500%	10/25/2022	10/31/2023	3/8/2023 9:45	3/12/2023 6:10	3/12/2023 9:17	0.502	0.977	1.002	1.000
5.300%	2/1/2023	1/31/2024	3/8/2023 9:45	3/12/2023 6:10	3/12/2023 9:17	0.502	0.977	1.002	1.000
7.900%	6/1/2022	5/31/2023	3/8/2023 9:45	3/12/2023 6:10	3/12/2023 9:17	0.502	0.977	1.002	1.000
5.700%	7/1/2022	6/30/2023	3/8/2023 9:45	3/12/2023 6:10	3/12/2023 9:17	0.502	0.977	1.002	1.000
2.900%	11/1/2022	10/31/2023	3/8/2023 9:45	3/12/2023 6:10	3/12/2023 9:17	0.502	0.977	1.002	1.000
7.400%	4/1/2022	3/31/2023	3/8/2023 9:45	3/12/2023 6:10	3/12/2023 9:17	0.502	0.977	1.002	1.000
8.800%	4/28/2022	4/30/2023	3/8/2023 9:45	3/12/2023 6:35	3/12/2023 9:49	0.504	0.976	1.002	1.000
8.900%	8/1/2022	7/31/2023	3/8/2023 9:45	3/12/2023 6:35	3/12/2023 9:49	0.504	0.976	1.002	1.000
7.000%	2/1/2023	1/31/2024	3/8/2023 9:45	3/12/2023 6:35	3/12/2023 9:49	0.504	0.976	1.002	1.000
5.000%	6/1/2022	5/31/2023	3/8/2023 9:45	3/12/2023 6:35	3/12/2023 9:49	0.504	0.976	1.002	1.000
6.200%	11/1/2022	10/31/2023	3/8/2023 9:45	3/12/2023 6:35	3/12/2023 9:49	0.504	0.976	1.002	1.000
5.000%	4/1/2022	3/31/2023	3/8/2023 9:45	3/12/2023 6:35	3/12/2023 9:49	0.504	0.976	1.002	1.000
2.000%	4/28/2022	4/30/2023	3/8/2023 9:45	3/12/2023 7:00	3/12/2023 10:21	0.506	0.975	1.002	1.000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1715-G
Spike Exp Date : 9/8/2023
Spike Activity (dpm/ml): 297.43
Spike Volume Added: 0.10

LCS S/N : 1715-G
LCS Exp Date : 9/8/2023
LCS Activity (dpm/ml): 297.43
LCS Volume Added: 0.10


Results																
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.1186	0.0837	1	0.2755	0.8280	22.09%	0.7667	0.1667	0.3528	0.3778		SAMPLE				
2	0.2780	0.1963	1	0.4959	0.6544	29.82%	0.6333	0.1856	0.3759	0.3939		SAMPLE				
3	0.3091	0.2182	1	0.5428	4.4668	11.96%	4.2000	0.3944	0.8221	1.2294		SAMPLE				
4	0.2319	0.1637	1	0.4493	1.2189	20.91%	1.0000	0.2000	0.4778	0.5296		SAMPLE				
5	0.1072	0.0757	1	0.2489	0.5530	26.50%	0.5667	0.1453	0.2779	0.2981		SAMPLE				
6	0.1192	0.0841	1	0.2767	0.4701	30.54%	0.4333	0.1291	0.2745	0.2894		SAMPLE				
7	0.2717	0.1918	1	0.4943	1.0326	23.78%	0.9333	0.2055	0.4456	0.5039		SAMPLE				
8	0.2364	0.1669	1	0.4217	0.6445	27.69%	0.7333	0.1944	0.3348	0.3619		SAMPLE				
9	0.2860	0.2019	1	0.5203	0.4270	41.68%	0.3667	0.1528	0.3487	0.3542		SAMPLE				
10	0.2200	0.1553	1	0.4108	0.3004	46.10%	0.3000	0.1374	0.2698	0.2749		SAMPLE				
11	0.1712	0.1209	1	0.3520	0.1837	60.17%	0.1667	0.1000	0.2161	0.2183		SAMPLE				
12	0.1883	0.1329	1	0.3870	0.5656	30.76%	0.4667	0.1414	0.3360	0.3507		SAMPLE				
13	0.1906	0.1346	1	0.3694	0.7014	25.97%	0.7000	0.1732	0.3402	0.3712		SAMPLE				
14	0.1529	0.1079	1	0.3143	0.5578	27.55%	0.5667	0.1528	0.2947	0.3118		SAMPLE				
15	0.2193	0.1548	1	0.4250	0.9607	22.46%	0.8333	0.1856	0.4193	0.4450		SAMPLE				
16	0.2114	0.1492	1	0.3947	0.8982	22.67%	0.9333	0.2000	0.3772	0.4196		SAMPLE				
17	0.2360	0.1666	1	0.4406	0.1790	72.65%	0.1667	0.1202	0.2530	0.2562		SAMPLE				
18	0.2325	0.1642	1	0.4341	0.5292	33.19%	0.5000	0.1599	0.3316	0.3526		SAMPLE				
19	0.1338	0.0945	1	0.3108	0.9342	22.84%	0.7667	0.1667	0.3980	0.4394		SAMPLE				
20	0.2273	0.1605	1	0.4054	0.2253	56.12%	0.2667	0.1491	0.2468	0.2500		MB				
21	0.2807	0.1982	1	0.5008	0.6957	28.96%	0.6667	0.1886	0.3857	0.4074	609452001.1	DUP	17.4%			
22	0.5655	0.3992	1	1.3133	110.5191	6.37%	21.4667	0.8472	8.5492	21.0929	609452001.1	MS			129.1530	84.9%
23	0.2451	0.1731	1	0.4577	25.2171	4.35%	22.6000	0.8731	1.9093	4.2276		LCS			26.3872	95.6%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 12-MAR-2023

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	07:08	1	1.21E+05	121249	-0.68		
LUCAS2	EFF	07:05	1	1.34E+05	134007	0.24		
LUCAS3	EFF	07:01	1	1.04E+05	104036	-2		
LUCAS4	EFF	06:59	1	1.28E+05	127668	-0.35		
LUCAS5	EFF	06:51	1	1.33E+05	132724	0.12		
LUCAS6	EFF	06:50	1	1.30E+05	129726	-0.95		
LUCAS7	EFF	06:44	1	1.31E+05	130778	0.1		
LUCAS8	EFF	06:33	1	1.24E+05	124265	-1.65		

Reviewed by:


Lyndsey Pace

Date: 13-MAR-23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR

Batch ID: 2387198

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
609452001	SAMPLE	LXP1	LUCAS1	MAR-12-23 08:45:00	DONE	Lucas Cell	28-APR-22 00:00
609452002	SAMPLE	LXP1	LUCAS2	MAR-12-23 08:45:00	DONE	Lucas Cell	01-AUG-22 00:00
609452003	SAMPLE	LXP1	LUCAS3	MAR-12-23 08:45:00	DONE	Lucas Cell	25-OCT-22 00:00
609452004	SAMPLE	LXP1	LUCAS4	MAR-12-23 08:45:00	DONE	Lucas Cell	01-FEB-23 00:00
609452005	SAMPLE	LXP1	LUCAS5	MAR-12-23 08:45:00	DONE	Lucas Cell	01-JUN-22 00:00
609452006	SAMPLE	LXP1	LUCAS6	MAR-12-23 08:45:00	DONE	Lucas Cell	01-JUL-22 00:00
609452007	SAMPLE	LXP1	LUCAS7	MAR-12-23 08:45:00	DONE	Lucas Cell	01-NOV-22 00:00
609452008	SAMPLE	LXP1	LUCAS8	MAR-12-23 08:45:00	DONE	Lucas Cell	01-APR-22 00:00
609452009	SAMPLE	LXP1	LUCAS1	MAR-12-23 09:17:00	DONE	Lucas Cell	28-APR-22 00:00
610687001	SAMPLE	LXP1	LUCAS2	MAR-12-23 09:17:00	DONE	Lucas Cell	01-AUG-22 00:00
610687002	SAMPLE	LXP1	LUCAS3	MAR-12-23 09:17:00	DONE	Lucas Cell	25-OCT-22 00:00
610687003	SAMPLE	LXP1	LUCAS4	MAR-12-23 09:17:00	DONE	Lucas Cell	01-FEB-23 00:00
610687004	SAMPLE	LXP1	LUCAS5	MAR-12-23 09:17:00	DONE	Lucas Cell	01-JUN-22 00:00
610687005	SAMPLE	LXP1	LUCAS6	MAR-12-23 09:17:00	DONE	Lucas Cell	01-JUL-22 00:00
610687006	SAMPLE	LXP1	LUCAS7	MAR-12-23 09:17:00	DONE	Lucas Cell	01-NOV-22 00:00
610687007	SAMPLE	LXP1	LUCAS8	MAR-12-23 09:17:00	DONE	Lucas Cell	01-APR-22 00:00
610687008	SAMPLE	LXP1	LUCAS1	MAR-12-23 09:49:00	DONE	Lucas Cell	28-APR-22 00:00
610893001	SAMPLE	LXP1	LUCAS2	MAR-12-23 09:49:00	DONE	Lucas Cell	01-AUG-22 00:00
610893002	SAMPLE	LXP1	LUCAS4	MAR-12-23 09:49:00	DONE	Lucas Cell	01-FEB-23 00:00
1205326616	MB	LXP1	LUCAS5	MAR-12-23 09:49:00	DONE	Lucas Cell	01-JUN-22 00:00
1205326617	DUP	LXP1	LUCAS7	MAR-12-23 09:49:00	DONE	Lucas Cell	01-NOV-22 00:00
1205326618	MS	LXP1	LUCAS8	MAR-12-23 09:49:00	DONE	Lucas Cell	01-APR-22 00:00
1205326619	LCS	LXP1	LUCAS1	MAR-12-23 10:21:00	DONE	Lucas Cell	28-APR-22 00:00



Report ID: S45182.01(02)
Generated on 03/30/2023
Replaces report S45182.01(01) generated on 02/13/2023

Report to
Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

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Report Summary
Lab Sample ID(s): S45182.01-S45182.09
Project: Erickson AM MI Wells 7-10
Collected Date(s): 02/08/2023
Submitted Date/Time: 02/09/2023 13:55
Sampled by: Marc Wahrer
P.O. #:

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Maya Murshak
Technical Director



General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile, and 2-chloroethylvinyl ether need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the

FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

All analyses completed

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1 (1993)
SM2320B	Standard Method 2320 B 2011
SM2340C	Standard Method 2340 C 2011
SM2540C	Standard Method 2540 C 2015
SM2540D	Standard Method 2540 D 2015
SW3015A	SW 846 Method 3015A Revision 1 February 2007



Sample Summary (9 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S45182.01	MW-7 L302145-01	Groundwater	02/08/23 13:40
S45182.02	MW-8 L302145-02	Groundwater	02/08/23 12:23
S45182.03	MW-9 L302145-03	Groundwater	02/08/23 11:06
S45182.04	MW-10 L302145-04	Groundwater	02/08/23 09:11
S45182.05	MW-7B L302145-05	Groundwater	02/08/23 14:53
S45182.06	MW-7C L302145-06	Groundwater	02/08/23 16:04
S45182.07	MWT-10 L302145-07	Groundwater	02/08/23 09:11
S45182.08	Field Blank L302145-08	Water	02/08/23 08:15
S45182.09	MW-13 L302145-09	Groundwater	02/08/23 17:22



Analytical Laboratory Report

Lab Sample ID: S45182.01

Sample Tag: MW-7 L302145-01

Collected Date/Time: 02/08/2023 13:40

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.0	IR
2	1L Plastic	None	Yes	2.0	IR
1	250ml Plastic	HNO3	Yes	2.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/13/23 12:07	CTV	
Metal Digestion	Completed	SW3015A	02/10/23 10:00	CCM	

Inorganics

Method: E300.0, Run Date: 02/10/23 10:48, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 02/10/23 12:49, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	82	10	0.13	mg/L	10	16887-00-6	
Sulfate	198	10	1.0	mg/L	10	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 10:36, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	163	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/13/23 11:28, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	290	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/10/23 20:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	564	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 18:45, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/10/23 12:09, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.004	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.049	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	1.36	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45182.01 (continued)

Sample Tag: MW-7 L302145-01

Method: E200.8, Run Date: 02/10/23 12:09, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	1.00	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.073	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.173	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/10/23 15:31, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	98.8	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	12.3	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	8.90	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	66.5	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/13/23 13:08, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/30/23 12:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S45182.02

Sample Tag: MW-8 L302145-02

Collected Date/Time: 02/08/2023 12:23

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.0	IR
2	1L Plastic	None	Yes	2.0	IR
1	250ml Plastic	HNO3	Yes	2.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/13/23 12:07	CTV	
Metal Digestion	Completed	SW3015A	02/10/23 10:00	CCM	

Inorganics

Method: E300.0, Run Date: 02/10/23 10:58, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	24	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	32	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 10:40, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	440	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/13/23 11:36, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	384	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/10/23 20:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	430	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 18:45, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/10/23 12:13, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.022	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.08	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45182.02 (continued)

Sample Tag: MW-8 L302145-02

Method: E200.8, Run Date: 02/10/23 12:13, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.007	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/10/23 15:33, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	104	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	31.8	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	0.53	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	14.2	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/13/23 13:18, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/30/23 12:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S45182.03

Sample Tag: MW-9 L302145-03

Collected Date/Time: 02/08/2023 11:06

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.0	IR
2	1L Plastic	None	Yes	2.0	IR
1	250ml Plastic	HNO3	Yes	2.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/13/23 12:07	CTV	
Metal Digestion	Completed	SW3015A	02/10/23 10:00	CCM	

Inorganics

Method: E300.0, Run Date: 02/10/23 11:09, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 10:44, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	336	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/13/23 11:38, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	261	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/10/23 20:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	274	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 18:45, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/10/23 12:17, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.014	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	Not detected	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45182.03 (continued)

Sample Tag: MW-9 L302145-03

Method: E200.8, Run Date: 02/10/23 12:17, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/10/23 15:34, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	76.9	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	19.4	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	0.93	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	2.86	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/13/23 13:21, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/30/23 12:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S45182.04

Sample Tag: MW-10 L302145-04

Collected Date/Time: 02/08/2023 09:11

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.0	IR
2	1L Plastic	None	Yes	2.0	IR
1	250ml Plastic	HNO3	Yes	2.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/13/23 12:07	CTV	
Metal Digestion	Completed	SW3015A	02/10/23 10:00	CCM	

Inorganics

Method: E300.0, Run Date: 02/10/23 11:19, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	13	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 10:46, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	525	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/13/23 11:40, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	461	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/10/23 20:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	494	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 18:45, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/10/23 12:20, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.036	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.04	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45182.04 (continued)

Sample Tag: MW-10 L302145-04

Method: E200.8, Run Date: 02/10/23 12:20, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/10/23 15:36, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	136	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	29.5	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	0.62	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	2.54	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/13/23 13:25, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/30/23 12:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S45182.05

Sample Tag: MW-7B L302145-05

Collected Date/Time: 02/08/2023 14:53

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.0	IR
2	1L Plastic	None	Yes	2.0	IR
1	250ml Plastic	HNO3	Yes	2.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/13/23 12:07	CTV	
Metal Digestion	Completed	SW3015A	02/10/23 10:00	CCM	

Inorganics

Method: E300.0, Run Date: 02/10/23 11:29, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 10:48, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	418	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/13/23 11:42, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	29	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/10/23 20:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	362	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 18:45, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/10/23 12:23, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.009	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	3.00	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	0.08	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45182.05 (continued)

Sample Tag: MW-7B L302145-05

Method: E200.8, Run Date: 02/10/23 12:23, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.032	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/10/23 15:38, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	8.77	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	2.81	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	5.58	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	142	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/13/23 13:28, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/30/23 12:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S45182.06

Sample Tag: MW-7C L302145-06

Collected Date/Time: 02/08/2023 16:04

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.0	IR
2	1L Plastic	None	Yes	2.0	IR
1	250ml Plastic	HNO3	Yes	2.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/13/23 12:07	CTV	
Metal Digestion	Completed	SW3015A	02/10/23 10:00	CCM	

Inorganics

Method: E300.0, Run Date: 02/10/23 11:39, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 02/10/23 13:09, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	94	50	0.65	mg/L	50	16887-00-6	
Sulfate	687	50	5.2	mg/L	50	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 10:50, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	172	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/13/23 11:44, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	742	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/10/23 20:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,360	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 18:45, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	7	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/10/23 12:26, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.006	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.041	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	6.46	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Lab Sample ID: S45182.06 (continued)

Sample Tag: MW-7C L302145-06

Method: E200.8, Run Date: 02/10/23 12:26, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	3.67	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.125	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.386	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	0.007	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/10/23 15:39, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	246	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	42.7	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	6.07	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	99.8	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/13/23 13:38, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/30/23 12:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S45182.07

Sample Tag: MWT-10 L302145-07

Collected Date/Time: 02/08/2023 09:11

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.0	IR
2	1L Plastic	None	Yes	2.0	IR
1	250ml Plastic	HNO3	Yes	2.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/13/23 12:07	CTV	
Metal Digestion	Completed	SW3015A	02/10/23 10:00	CCM	

Inorganics

Method: E300.0, Run Date: 02/10/23 11:49, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	13	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 10:52, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	522	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/13/23 11:46, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	460	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/10/23 20:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	482	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 18:45, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/10/23 12:32, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.036	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.05	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	Not detected	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45182.07 (continued)

Sample Tag: MWT-10 L302145-07

Method: E200.8, Run Date: 02/10/23 12:32, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/10/23 15:41, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	140	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	29.2	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	0.70	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	2.73	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/13/23 13:41, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/30/23 12:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S45182.08

Sample Tag: Field Blank L302145-08

Collected Date/Time: 02/08/2023 08:15

Matrix: Water

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.0	IR
2	1L Plastic	None	Yes	2.0	IR
1	250ml Plastic	HNO3	Yes	2.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/13/23 12:07	CTV	
Metal Digestion	Completed	SW3015A	02/10/23 10:00	CCM	

Inorganics

Method: E300.0, Run Date: 02/10/23 11:59, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 10:54, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	Not detected	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/13/23 11:48, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	Not detected	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/10/23 20:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 18:45, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/10/23 12:03, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45182.08 (continued)

Sample Tag: Field Blank L302145-08

Method: E200.8, Run Date: 02/10/23 12:03, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E200.8, Run Date: 02/10/23 15:30, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	
Magnesium	Not detected	0.50	0.00480	mg/L	2	7439-95-4	
Potassium	Not detected	0.50	0.00920	mg/L	2	7440-09-7	
Sodium	Not detected	0.50	0.00340	mg/L	2	7440-23-5	

Method: E245.1, Run Date: 02/13/23 13:44, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/30/23 12:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

**Lab Sample ID: S45182.09**

Sample Tag: MW-13 L302145-09

Collected Date/Time: 02/08/2023 17:22

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.0	IR
2	1L Plastic	None	Yes	2.0	IR
1	250ml Plastic	HNO3	Yes	2.0	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/13/23 12:07	CTV	
Metal Digestion	Completed	SW3015A	02/10/23 10:00	CCM	

Inorganics**Method: E300.0, Run Date: 02/10/23 12:09, Analyst: JDP**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	43	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	37	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 10:56, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	437	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/13/23 11:50, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	444	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/10/23 20:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	476	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/10/23 18:45, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals**Method: E200.8, Run Date: 02/10/23 12:36, Analyst: CCM**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.028	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.18	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	0.06	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45182.09 (continued)

Sample Tag: MW-13 L302145-09

Method: E200.8, Run Date: 02/10/23 12:36, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/10/23 15:42, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	132	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	29.0	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	0.76	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	4.68	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/13/23 13:48, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/30/23 12:06, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID:S45182

Client:BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 7-10

Submitted:02/09/2023 13:55 Login User: PFD

Attention: Jennifer Caporale

Address: Board of Water & Light

P.O. Box 13007

Lansing, MI 48901

Phone: 517-702-6372

FAX:

Email: Environmental_Laboratory@LBWL.com

Selection	Description	Note
Sample Receiving		
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 2.0
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
Chain of Custody		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to: GEL
Preservation		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab?
Bottle Conditions		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Do water VOC or TOX bottles contain headspace

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S45182 Submitted: 02/09/2023 13:55

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 7-10

Initial Preservation Check: 02/09/2023 16:59 PFD

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Preservation Recheck (E200.8): N/A

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S45182.01	1L Plastic HNO3	<2			
S45182.01	1L Plastic HNO3	<2			
S45182.01	250ml Plastic HNO3	<2			
S45182.02	1L Plastic HNO3	<2			
S45182.02	1L Plastic HNO3	<2			
S45182.02	250ml Plastic HNO3	<2			
S45182.03	1L Plastic HNO3	<2			
S45182.03	1L Plastic HNO3	<2			
S45182.03	250ml Plastic HNO3	<2			
S45182.04	1L Plastic HNO3	<2			
S45182.04	1L Plastic HNO3	<2			
S45182.04	250ml Plastic HNO3	<2			
S45182.05	1L Plastic HNO3	<2			
S45182.05	1L Plastic HNO3	<2			
S45182.05	250ml Plastic HNO3	<2			
S45182.06	1L Plastic HNO3	<2			
S45182.06	1L Plastic HNO3	<2			
S45182.06	250ml Plastic HNO3	<2			
S45182.07	1L Plastic HNO3	<2			
S45182.07	1L Plastic HNO3	<2			
S45182.07	250ml Plastic HNO3	<2			
S45182.08	1L Plastic HNO3	<2			
S45182.08	1L Plastic HNO3	<2			
S45182.08	250ml Plastic HNO3	<2			
S45182.09	1L Plastic HNO3	<2			
S45182.09	1L Plastic HNO3	<2			
S45182.09	250ml Plastic HNO3	<2			



2680 East Lansing Dr., East Lansing, MI 48823
 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

REPORT TO **CHAIN OF CUSTODY RECORD** **INVOICE TO**

CONTACT NAME Jennifer Caporale			CONTACT NAME Beth Zimpfer <input checked="" type="checkbox"/> SAME		
COMPANY Lansing Board of Water and Light			COMPANY		
ADDRESS PO Box 13007 48901-3007			ADDRESS		
CITY Lansing	STATE Mi	ZIP CODE 48901	CITY	STATE	ZIP CODE
PHONE NO. 517-702-6372	FAX NO.	P.O. NO.	PHONE NO.	E-MAIL ADDRESS Beth.Zimpfer@lbwl.com	
E-MAIL ADDRESS Environmental_Laboratory@lbwl.com			QUOTE NO.		

PROJECT NO./NAME Erickson AM MI Wells 7-10		SAMPLER(S) - PLEASE PRINT/SIGN NAME Marc Wahrer		ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)						Certifications <input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water <input type="checkbox"/> DoD <input checked="" type="checkbox"/> NPDES Project Locations <input type="checkbox"/> Detroit <input type="checkbox"/> New York <input type="checkbox"/> Other _____ Special Instructions			
TURNAROUND TIME REQUIRED <input type="checkbox"/> 1 DAY <input checked="" type="checkbox"/> 2 DAYS <input type="checkbox"/> 3 DAYS <input type="checkbox"/> STANDARD <input checked="" type="checkbox"/> OTHER ASAP				# Containers & Preservatives		Total Metals	F- undistilled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	HCO3, CO3, Hardness		
DELIVERABLES REQUIRED <input type="checkbox"/> STD <input type="checkbox"/> LEVEL II <input checked="" type="checkbox"/> LEVEL III <input type="checkbox"/> LEVEL IV <input checked="" type="checkbox"/> EDD <input type="checkbox"/> OTHER _____													
MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID SL=SLUDGE DW=DRINKING WATER O=OIL WP=WPE A=AIR W=WASTE													

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER	Total Metals	F- undistilled, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	HCO3, CO3, Hardness						
	DATE	TIME																						
4518201	02/01/23	1340	MW-7 L302145-01	GW	5	2	3						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						Metals to analyse: Na, Mg, K
.02		1223	MW-8 -02	GW	5	2	3						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						B, Ca, Sb, As, Ba, Be, Cd, Cr,
.03		1106	MW-9 -03	GW	5	2	3						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						Co, Li, Hg, Mo, Pb, Se, Tl,
.04		0911	MW-10 -04	GW	5	2	3						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						Fe, Cu, Ni, Ag, V, Zn
.05		1453	MW-7B -05	GW	5	2	3						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						Please send a preliminary report
.06		1604	MW-7C -06	GW	5	2	3						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
.07		0911	MWT-10 -07	GW	5	2	3						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
.08		0815	Field Blank -08	DI	5	2	3						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						
.09		1722	MW-13 -09	GW	5	2	3						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						

RELINQUISHED BY: SIGNATURE/ORGANIZATION <i>[Signature]</i>	<input type="checkbox"/> Sampler	DATE 2/9/23	TIME 1355	RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION <i>[Signature]</i>		DATE 2/9/23	TIME 1355	RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RELINQUISHED BY: SIGNATURE/ORGANIZATION		DATE	TIME	SEAL NO.	SEAL INTACT YES <input type="checkbox"/> NO <input type="checkbox"/>	INITIALS
RECEIVED BY: SIGNATURE/ORGANIZATION		DATE	TIME	SEAL NO.	SEAL INTACT YES <input type="checkbox"/> NO <input type="checkbox"/>	INITIALS
				NOTES:	TEMP. ON ARRIVAL 2.0	

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6mos	0.150
Be, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	2.5
Cl	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cr, total	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
F	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
Fe, total	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
Se, total	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
Ti, total	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
TDS	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TSS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
V, total	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005

March 23, 2023

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 612576
SDG: S45182

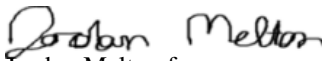
Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on March 01, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 1614.

Sincerely,


Jordan Melton for
Delaney Stone
Project Manager

Purchase Order: GELP20-0018
Enclosures



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Case Narrative

**Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S45182
Work Order: 612576**

March 23, 2023

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on March 01, 2023 for analysis. The samples were delivered with proper chain of custody documentation and signatures. Sample was received half empty 612576008(S45182.08). There are no additional comments concerning sample receipt.

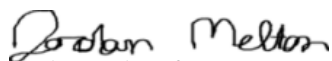
Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
612576001	S45182.01
612576002	S45182.02
612576003	S45182.03
612576004	S45182.04
612576005	S45182.05
612576006	S45182.06
612576007	S45182.07
612576008	S45182.08
612576009	S45182.09

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.

A handwritten signature in black ink that reads "Jordan Melton". The signature is written in a cursive style with a large initial 'J'.

Jordan Melton for
Delaney Stone
Project Manager

Chain of Custody and Supporting Documentation

612576

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com



C.O.C. PAGE # 1 OF 1

REPORT TO

CHAIN OF CUSTODY RECORD

INVOICE TO

CONTACT NAME: Julie Teague **NAME**

COMPANY: Merit Laboratories

ADDRESS: 2680 East Lansing Drive STATE: MI ZIP CODE: 48823

CITY: East Lansing

PHONE NO.: 517-332-0167 E-MAIL ADDRESS: juliet@meritlabs.com

PROJECT NO./NAME: S45182

TURNAROUND TIME REQUIRED: 1 DAY 2 DAYS 3 DAYS STANDARD OTHER

DELIVERABLES REQUIRED: STD LEVEL I LEVEL II LEVEL III LEVEL IV EDD OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIFE A=AIR W=WASTE

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR	DATE	TIME	IDENTIFICATION-DESCRIPTION	# Containers & Preservatives							OTHER				
					NO. OF BOTTLES	NONE	HO	HO	HO	HO	HO		HO			
	2/8/23	1340		S45182.01	GW	2	2									
	2/8/23	1223		S45182.02	GW	2	2									
	2/8/23	1106		S45182.03	GW	2	2									
	2/8/23	0911		S45182.04	GW	2	2									
	2/8/23	1453		S45182.05	GW	2	2									
	2/8/23	1604		S45182.06	GW	2	2									
	2/8/23	0911		S45182.07	GW	2	2									
	2/8/23	0815		S45182.08	GW	2	2									
	2/8/23	1722		S45182.09	GW	2	2									

RELINQUISHED BY: [Signature] DATE: 2/13/23 TIME: 1200

SIGNATURE/Organization: [Signature]

RECEIVED BY: [Signature] DATE: 2/13/23 TIME: 1000

SIGNATURE/Organization: [Signature]

RELINQUISHED BY: _____ DATE: _____ TIME: _____

SIGNATURE/Organization: _____

SEAL NO. _____ SEAL INTACT YES NO

INITIALS _____ INITIALS _____

DATE: 3/1/23 TIME: 1000

NOTES: _____ TEMP. ON ARRIVAL: _____

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications
 OHIO VAP Drinking Water
 DoD NPDES
 Project Locations
 Detroit New York
 Other
 Special Instructions
 * E903.1 Mod.
 ** E904.0/SW 9320 Mod.
 Please use calculation product & provide Radium 226/228 combined results on the report
 (No Ice needed)
 ** Subcontracted to
 GEL Laboratories, Inc.
 2040 Savage Road
 Charleston, SC 29407

RELINQUISHED BY: _____ SIGNATURE/Organization: _____

RECEIVED BY: _____ SIGNATURE/Organization: _____

RELINQUISHED BY: _____ SIGNATURE/Organization: _____

RECEIVED BY: _____ SIGNATURE/Organization: _____

SEAL NO. _____ SEAL INTACT YES NO

INITIALS _____ INITIALS _____

DATE: _____ TIME: _____

NOTES: _____ TEMP. ON ARRIVAL: _____

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE



Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: **MERI** SDG/AR/COC/Work Order: **612576**

Received By: **Stacy Boone** Date Received: **MARCH 1, 2023**

Carrier and Tracking Number
FedEx Express FedEx Ground UPS Field Services Courier Other
12 466 477 03 6210 0413

Suspected Hazard Information
*If Net Counts > 100cpm on samples not marked "inactive", contact the Radiation Safety Group for further investigation.
A) Shipped as a DOT Hazardous? Yes No Hazard Class Shipped: UN#: If UN2910, is the Radioactive Shipment Survey Compliant? Yes ___ No ___
B) Did the client designate the samples are to be received as radioactive? Yes No COC notation or radioactive stickers on containers equal client designation.
C) Did the RSO classify the samples as radioactive? Yes No Maximum Net Counts Observed* (Observed Counts - Area Background Counts): ___ CPM / mR/Hr Classified as: Rad 1 Rad 2 Rad 3
D) Did the client designate samples are hazardous? Yes No COC notation or hazard labels on containers equal client designation.
E) Did the RSO identify possible hazards? Yes No If D or E is yes, select Hazards below: PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			Circle Applicable: Client contacted and provided COC COC created upon receipt
3 Samples requiring cold preservation within (0 ≤ deg. C)?*	<input checked="" type="checkbox"/>			Preservation Method: Wet Ice Ice Packs Dry ice None Other: TEMP: 21C *all temperatures are recorded in Celsius
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: IR3-22 Secondary Temperature Device Serial # (If Applicable):
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe) 545182.08 1 of 2 ALMOST EMPTY
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's and Containers Affected: If Preservation added, Lot#: If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer) Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No) Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
8 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			ID's and containers affected:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Circle Applicable: No container count on COC Other (describe)
12 Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>			Circle Applicable: Not relinquished Other (describe)
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials **JM** Date **3-1-23** Page **1** of **1**

Laboratory Certifications

List of current GEL Certifications as of 23 March 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122023-4
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2022-160
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-22-20
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S45182
Work Order #: 612576**

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2397396

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
612576001	S45182.01
612576002	S45182.02
612576003	S45182.03
612576004	S45182.04
612576005	S45182.05
612576006	S45182.06
612576007	S45182.07
612576008	S45182.08
612576009	S45182.09
1205343479	Method Blank (MB)
1205343480	612576001(S45182.01) Sample Duplicate (DUP)
1205343481	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

Duplication Criteria between QC Sample and Duplicate Sample

The Sample and the Duplicate, (See Below), did not meet the relative percent difference requirement; however, they do meet the relative error ratio requirement with the value listed below.

Sample	Analyte	Value
1205343480 (S45182.01DUP)	Radium-228	RPD 103* (0.0%-100.0%) RER 2.77 (0-3)

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2397378

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
612576001	S45182.01
612576002	S45182.02
612576003	S45182.03
612576004	S45182.04
612576005	S45182.05
612576006	S45182.06
612576007	S45182.07
612576008	S45182.08
612576009	S45182.09
1205343412	Method Blank (MB)
1205343413	612576001(S45182.01) Sample Duplicate (DUP)
1205343414	612576001(S45182.01) Matrix Spike (MS)
1205343415	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments

The matrix spike, 1205343414 (S45182.01MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

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Qualifier Definition Report for

MERI001 Merit Laboratories, Inc.

Client SDG: S45182 GEL Work Order: 612576

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:



Name: Theresa Austin

Date: 30 MAR 2023

Title: Group Leader

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 30, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Lavery
 Project: Routine Analysis

Client Sample ID: S45182.01	Project: MERI00120
Sample ID: 612576001	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 08-FEB-23 13:40	
Receive Date: 01-MAR-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228		4.38	+/-1.49	1.88	3.00	pCi/L		JE1	03/27/23	1501	2397396		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		5.44	+/-1.62			pCi/L		NXL1	03/30/23	1206	2397753		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		1.06	+/-0.633	0.540	1.00	pCi/L		LXP1	03/30/23	0933	2397378		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			73.3	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

- | | |
|---------------------------------------|--------------------------------|
| DF: Dilution Factor | Lc/LC: Critical Level |
| DL: Detection Limit | PF: Prep Factor |
| MDA: Minimum Detectable Activity | RL: Reporting Limit |
| MDC: Minimum Detectable Concentration | SQL: Sample Quantitation Limit |

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 30, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S45182.02 Project: MERI00120
Sample ID: 612576002 Client ID: MERI001
Matrix: Ground Water
Collect Date: 08-FEB-23 12:23
Receive Date: 01-MAR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	-0.133	+/-0.817	1.62	3.00	pCi/L		JE1	03/27/23	1501	2397396	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		0.118	+/-0.870			pCi/L		NXL1	03/30/23	1206	2397753	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226	U	0.118	+/-0.299	0.625	1.00	pCi/L		LXP1	03/30/23	0933	2397378	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			78.7	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: March 30, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive
 East Lansing, Michigan 48823
 Contact: John Laverty
 Project: Routine Analysis

Client Sample ID: S45182.03	Project: MERI00120
Sample ID: 612576003	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 08-FEB-23 11:06	
Receive Date: 01-MAR-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.60	+/-1.13	1.76	3.00	pCi/L		JE1	03/27/23	1501	2397396		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.97	+/-1.23			pCi/L		NXL1	03/30/23	1206	2397753		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.372	+/-0.482	0.809	1.00	pCi/L		LXP1	03/30/23	0950	2397378		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			82.4	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 30, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Lavery
 Project: Routine Analysis

Client Sample ID: S45182.04	Project: MERI00120
Sample ID: 612576004	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 08-FEB-23 09:11	
Receive Date: 01-MAR-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	-0.255	+/-0.795	1.63	3.00	pCi/L		JE1	03/27/23	1501	2397396		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.407	+/-0.935			pCi/L		NXL1	03/30/23	1206	2397753		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.407	+/-0.492	0.812	1.00	pCi/L		LXP1	03/30/23	1008	2397378		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			76.5	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: March 30, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S45182.05 Project: MERI00120
Sample ID: 612576005 Client ID: MERI001
Matrix: Ground Water
Collect Date: 08-FEB-23 14:53
Receive Date: 01-MAR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	-0.879	+/-1.16	2.39	3.00	pCi/L		JE1	03/27/23	1501	2397396		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.504	+/-1.26			pCi/L		NXL1	03/30/23	1206	2397753		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.504	+/-0.494	0.731	1.00	pCi/L		LXP1	03/30/23	1008	2397378		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			65.4	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: March 30, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S45182.06 Project: MERI00120
Sample ID: 612576006 Client ID: MERI001
Matrix: Ground Water
Collect Date: 08-FEB-23 16:04
Receive Date: 01-MAR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228		2.17	+/-1.34	2.02	3.00	pCi/L		JE1	03/27/23	1501	2397396	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		3.27	+/-1.55			pCi/L		NXL1	03/30/23	1206	2397753	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		1.11	+/-0.777	1.00	1.00	pCi/L		LXP1	03/30/23	1008	2397378	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			70.5	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: March 30, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S45182.07	Project: MERI00120
Sample ID: 612576007	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 08-FEB-23 09:11	
Receive Date: 01-MAR-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	0.758	+/-0.957	1.63	3.00	pCi/L		JE1	03/27/23	1501	2397396	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		1.20	+/-1.03			pCi/L		NXL1	03/30/23	1206	2397753	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226	U	0.443	+/-0.394	0.471	1.00	pCi/L		LXP1	03/30/23	1008	2397378	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			76.3	(15%-125%)

Notes:
Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 30, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S45182.08 Project: MERI00120
Sample ID: 612576008 Client ID: MERI001
Matrix: Ground Water
Collect Date: 08-FEB-23 08:15
Receive Date: 01-MAR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	-0.909	+/-1.33	2.62	3.00	pCi/L		JE1	03/27/23	1501	2397396	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		1.46	+/-1.51			pCi/L		NXL1	03/30/23	1206	2397753	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		1.46	+/-0.701	0.490	1.00	pCi/L		LXP1	03/30/23	1008	2397378	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			71.2	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: March 30, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S45182.09 Project: MERI00120
Sample ID: 612576009 Client ID: MERI001
Matrix: Ground Water
Collect Date: 08-FEB-23 17:22
Receive Date: 01-MAR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.188	+/-0.643	1.22	3.00	pCi/L		JE1	03/27/23	1501	2397396		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.188	+/-0.682			pCi/L		NXL1	03/30/23	1206	2397753		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.000	+/-0.226	0.663	1.00	pCi/L		LXP1	03/30/23	1008	2397378		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			82.5	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

Quality Control Data

GEL LABORATORIES LLC

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QC Summary

Report Date: March 30, 2023

Page 1 of 2

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan
Contact: John Laverty

Workorder: 612576

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2397396										
QC1205343480	612576001	DUP									
Radium-228		4.38		1.41	pCi/L	103*		(0% - 100%)	JE1	03/27/23	15:01
	Uncertainty	+/-1.49		+/-0.915							
QC1205343481	LCS										
Radium-228	62.5			57.4	pCi/L		91.9	(75%-125%)		03/27/23	15:06
	Uncertainty			+/-3.90							
QC1205343479	MB										
Radium-228			U	0.222	pCi/L					03/27/23	15:01
	Uncertainty			+/-0.791							
Rad Ra-226											
Batch	2397378										
QC1205343413	612576001	DUP									
Radium-226		1.06		1.30	pCi/L	20.1		(0% - 100%)	LXP1	03/30/23	10:26
	Uncertainty	+/-0.633		+/-0.689							
QC1205343415	LCS										
Radium-226	26.5			26.1	pCi/L		98.7	(75%-125%)		03/30/23	10:26
	Uncertainty			+/-2.97							
QC1205343412	MB										
Radium-226			U	0.159	pCi/L					03/30/23	10:26
	Uncertainty			+/-0.292							
QC1205343414	612576001	MS									
Radium-226	133	1.06		105	pCi/L		78.2	(75%-125%)		03/30/23	10:26
	Uncertainty	+/-0.633		+/-12.3							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- H Analytical holding time was exceeded
- < Result is less than value reported
- > Result is greater than value reported

GEL LABORATORIES LLC

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QC Summary

Workorder: 612576

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Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UI											
BD											
h											
R											
^											
N/A											
ND											
M											
NJ											
FA											
UJ											
Q											
K											
UL											
L											
NI											
Y											
**											
M											
J											

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 2397396 Check-list

This check-list was completed on 27-MAR-23 by Nat Long

This batch was reviewed by Nat Long on 27-MAR-23 and Kenshalla Oston on 28-MAR-23.

Batch ID:
2397396

Product:
GFC28RAL

Description: Gas Flow Radium 228
GL-RAD-A-063

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?		No	
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-228 in Liquid

Batch ID: 2397396
Analyst: Jacqueline Emond (JE1)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL-RAD-A-063 REV# 5
Instrument: LUCAS-C202389980

Due Dates for Lab: 26-MAR-2023			Package: 28-MAR-2023	SDG: 29-MAR-2023		
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
LCS	1205343481	228	1952-B	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	Ac-228 Ingrow (date)	Ac-228 Separation (date)
1	612576001	22-MAR-2023	3	300.88	300.88	03/23/23 18:42	03/27/23 12:58
2	612576002	22-MAR-2023	3	301.77	301.77	03/23/23 18:42	03/27/23 12:58
3	612576003	22-MAR-2023	3	301.42	301.42	03/23/23 18:42	03/27/23 12:58
4	612576004	22-MAR-2023	3	300.08	300.08	03/23/23 18:42	03/27/23 12:58
5	612576005	22-MAR-2023	3	304.65	304.65	03/23/23 18:42	03/27/23 12:58
6	612576006	22-MAR-2023	3	302.42	302.42	03/23/23 18:42	03/27/23 12:58
7	612576007	22-MAR-2023	3	303.15	303.15	03/23/23 18:42	03/27/23 12:58
8	612576008	22-MAR-2023	3	301.25	301.25	03/23/23 18:42	03/27/23 12:58
9	612576009	22-MAR-2023	3	301.8	301.8	03/23/23 18:42	03/27/23 12:58
10	612583001	22-MAR-2023	3	301.47	301.47	03/23/23 18:42	03/27/23 12:58
11	612583002	22-MAR-2023	3	301.62	301.62	03/23/23 18:42	03/27/23 12:58
12	612583003	22-MAR-2023	3	301.84	301.84	03/23/23 18:42	03/27/23 12:58
13	612583004	22-MAR-2023	3	303.63	303.63	03/23/23 18:42	03/27/23 12:58
14	612583005	22-MAR-2023	3	305.11	305.11	03/23/23 18:42	03/27/23 12:58
15	612583006	22-MAR-2023	3	303.97	303.97	03/23/23 18:42	03/27/23 12:58
16	1205343479 MB	22-MAR-2023	3		305.11	03/23/23 18:42	03/27/23 12:58
17	1205343480 DUP (612576001)	22-MAR-2023	3	300.6	300.6	03/23/23 18:42	03/27/23 12:58
18	1205343481 LCS	22-MAR-2023	3		305.11	03/23/23 18:42	03/27/23 12:58

Reagent/Solvent Lot ID	Description	Amount	Comments:
WORK 1951-E	Ba-133	.1 mL	Pipet Id: RAD-GFC-1795419 Data Entry Date2: 22-MAR-2023 00:00
REGNT 3879554	RGF-1.5M Ammonium Sulfate	10 mL	
REGNT 3862351	RGF-1M Citric Acid	5 mL	
REGNT 3878183	2M HCl	20 mL	
REGNT 3883537	RGF-50% Potassium Carbonate	2 mL	
REGNT 3878163	RGF-7M Nitric Acid	25 mL	
REGNT 3857893.11	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL	
REGNT DGA030723	2396801	2 g	
REGNT 3867075.26	RGF-Hydrofluoric Acid	4 mL	
REGNT 3528714	500 mg/mL Neodymium Carrier	.2 mL	
REGNT 3521298	RGF-Neodymium Substrate	5 mL	
REGNT 3875878.6	Nitric Acid	5 mL	
REGNT 3465466	Barium Carrier Ra228 REG	1 mL	

Radium-228 Liquid

Filename : RA228.XLS
 File type : Excel
 Version # : 1.4.3

Tracer S/N : 1951-E
 Tracer Exp Date : 1/10/2024
 Tracer Volume Added: 0.10

Batch : 2397396
 Analyst : JAC02417
 Prep Date : 3/22/2023
 Ra-228 Method Uncertainty : 0.1268

Procedure Code : GFC28RAL
 Parmname : Radium-228
 Required MDA : 3 pCi/L
 Ra-228 Abundance : 1.00
 Halflife of Ra-228 : 5.75 years
 Halflife of Ac-228 : 6.15 hours

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	612576001.1	0.3009	1.8474E-05	2/8/2023 13:40	1218.3	1.65%	892.7	1.93%	0.1	0.000200
2	612576002.1	0.3018	1.8489E-05	2/8/2023 12:23	1218.3	1.65%	959.3	1.86%	0.1	0.000200
3	612576003.1	0.3014	1.8483E-05	2/8/2023 11:06	1218.3	1.65%	1003.8	1.82%	0.1	0.000200
4	612576004.1	0.3001	1.8460E-05	2/8/2023 9:11	1218.3	1.65%	932.0	1.89%	0.1	0.000200
5	612576005.1	0.3047	1.8537E-05	2/8/2023 14:53	1218.3	1.65%	797.1	2.04%	0.1	0.000200
6	612576006.1	0.3024	1.8500E-05	2/8/2023 16:04	1218.3	1.65%	859.0	1.97%	0.1	0.000200
7	612576007.1	0.3032	1.8512E-05	2/8/2023 9:11	1218.3	1.65%	929.3	1.89%	0.1	0.000200
8	612576008.1	0.3013	1.8480E-05	2/8/2023 8:15	1218.3	1.65%	867.5	1.96%	0.1	0.000200
9	612576009.1	0.3018	1.8489E-05	2/8/2023 17:22	1218.3	1.65%	1005.1	1.82%	0.1	0.000200
10	612583001.1	0.3015	1.8484E-05	2/9/2023 12:58	1218.3	1.65%	1072.3	1.76%	0.1	0.000200
11	612583002.1	0.3016	1.8486E-05	2/9/2023 17:10	1218.3	1.65%	871.7	1.96%	0.1	0.000200
12	612583003.1	0.3018	1.8490E-05	2/9/2023 14:23	1218.3	1.65%	819.9	2.02%	0.1	0.000200
13	612583004.1	0.3036	1.8520E-05	2/9/2023 15:40	1218.3	1.65%	797.8	2.04%	0.1	0.000200
14	612583005.1	0.3051	1.8544E-05	2/9/2023 14:23	1218.3	1.65%	898.5	1.93%	0.1	0.000200
15	612583006.1	0.3040	1.8526E-05	2/9/2023 9:30	1218.3	1.65%	897.9	1.93%	0.1	0.000200
16	1205343479.1	0.3051	1.8544E-05	3/22/2023 0:00	1218.3	1.65%	1005.3	1.82%	0.1	0.000200
17	1205343480.1	0.3006	1.8469E-05	2/8/2023 13:40	1218.3	1.65%	1041.3	1.79%	0.1	0.000200
18	1205343481.1	0.3051	1.8544E-05	3/22/2023 0:00	1218.3	1.65%	962.5	1.86%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-063
 Instrument SOP: GL-RAD-I-016

Count raw Data														
Pos.	Detector ID	Counting Time (min.)	Gross Counts		Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
			Alpha	Beta										
1	1A	60	11	100	1.667	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.793	1.000	1.057	73.3%	2.55%
2	1B	60	13	31	0.517	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.793	1.000	1.057	78.7%	2.50%
3	1C	60	8	70	1.167	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.793	1.000	1.057	82.4%	2.47%
4	1D	60	2	27	0.450	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.793	1.000	1.057	76.5%	2.52%
5	2A	60	8	45	0.750	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.793	1.000	1.057	65.4%	2.64%
6	2C	60	9	69	1.150	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.793	1.000	1.057	70.5%	2.59%
7	3B	60	4	44	0.733	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	76.3%	2.52%
8	3C	60	5	73	1.217	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	71.2%	2.58%
9	3D	60	4	21	0.350	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	82.5%	2.47%
10	4A	60	12	53	0.883	3/27/2023 15:02	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	88.0%	2.43%
11	4C	60	4	77	1.283	3/27/2023 15:02	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	71.5%	2.58%
12	4D	60	5	33	0.550	3/27/2023 15:02	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	67.3%	2.62%
13	5A	60	5	93	1.550	3/27/2023 15:02	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	65.5%	2.64%
14	5B	60	14	57	0.950	3/27/2023 15:02	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	73.7%	2.55%
15	5C	60	10	38	0.633	3/27/2023 15:02	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	73.7%	2.55%
16	5D	60	5	36	0.600	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.998	0.793	1.000	1.057	82.5%	2.47%
17	7A	60	6	51	0.850	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.793	1.000	1.057	85.5%	2.45%
18	7B	60	10	906	15.100	3/27/2023 15:06	3/23/2023 18:42	3/27/2023 12:58	0.998	0.786	1.000	1.057	79.0%	2.50%

Calibration Data								
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2022	5/31/2023	0.6209	0.00738	0.684	3/24/2023 18:31	500
2	PIC	6/1/2022	5/31/2023	0.6068	0.00711	0.548	3/24/2023 18:31	500
3	PIC	6/1/2022	5/31/2023	0.6190	0.00847	0.764	3/24/2023 18:31	500
4	PIC	6/1/2022	5/31/2023	0.6048	0.00692	0.508	3/24/2023 18:31	500
5	PIC	6/1/2022	5/31/2023	0.6201	0.01914	0.928	3/24/2023 18:33	500
6	PIC	6/1/2022	5/31/2023	0.6022	0.01274	0.694	3/24/2023 18:33	500
7	PIC	6/1/2022	5/31/2023	0.6245	0.01614	0.554	3/24/2023 18:31	500
8	PIC	6/1/2022	5/31/2023	0.6365	0.00988	1.420	3/24/2023 18:31	500
9	PIC	6/1/2022	5/31/2023	0.5999	0.02297	0.304	3/24/2023 18:32	500
10	PIC	6/1/2022	5/31/2023	0.6013	0.01123	0.668	3/24/2023 18:32	500
11	PIC	6/1/2022	5/31/2023	0.6359	0.00889	0.700	3/24/2023 18:32	500
12	PIC	6/1/2022	5/31/2023	0.5954	0.00773	0.524	3/24/2023 18:32	500
13	PIC	6/1/2022	5/31/2023	0.6332	0.00851	0.868	3/24/2023 18:32	500
14	PIC	6/1/2022	5/31/2023	0.6336	0.00426	0.814	3/24/2023 18:32	500
15	PIC	6/1/2022	5/31/2023	0.6242	0.00657	0.640	3/24/2023 18:32	500
16	PIC	6/1/2022	5/31/2023	0.6236	0.00925	0.542	3/24/2023 18:32	500
17	PIC	6/1/2022	5/31/2023	0.6257	0.00594	0.478	3/24/2023 18:28	500
18	PIC	6/1/2022	5/31/2023	0.6366	0.00627	0.592	3/24/2023 18:29	500

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

LCS S/N : 1952-B
LCS Exp Date : 8/9/2023
LCS Activity (dpm/ml): 423.23
LCS Volume Added: 0.10

Results																2 SIGMA		2 SIGMA	
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	Sample Act. MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	Counting Uncertainty pCi/L	Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery			
1	1.1733	0.8284	3	1.8796	4.3793	17.58%	0.9827	0.1707	1.4912	1.8602		SAMPLE							
2	0.9972	0.7040	3	1.6196	-0.1326	314.45%	-0.0313	0.0985	0.8171	0.8173		SAMPLE							
3	1.1046	0.7799	3	1.7582	1.5985	36.06%	0.4027	0.1448	1.1268	1.1976		SAMPLE							
4	0.9974	0.7041	3	1.6281	-0.2550	159.13%	-0.0580	0.0923	0.7951	0.7953		SAMPLE							
5	1.5143	1.0691	3	2.3851	-0.8789	67.39%	-0.1780	0.1198	1.1596	1.1598		SAMPLE							
6	1.2606	0.8900	3	2.0176	2.1675	31.57%	0.4560	0.1434	1.3357	1.4454		SAMPLE							
7	1.0018	0.7073	3	1.6260	0.7582	64.45%	0.1793	0.1155	0.9568	0.9762		SAMPLE							
8	1.6966	1.1978	3	2.6192	-0.9094	74.83%	-0.2033	0.1520	1.3328	1.3329		SAMPLE							
9	0.7174	0.5065	3	1.2174	0.1880	174.51%	0.0460	0.0803	0.6430	0.6448		SAMPLE							
10	0.9957	0.7030	3	1.5973	0.8241	58.91%	0.2153	0.1267	0.9505	0.9733		SAMPLE							
11	1.1849	0.8365	3	1.8955	2.5951	26.02%	0.5833	0.1510	1.3163	1.4723		SAMPLE							
12	1.1635	0.8214	3	1.8953	0.1313	388.73%	0.0260	0.1011	1.0002	1.0007		SAMPLE							
13	1.4389	1.0159	3	2.2743	3.3087	24.50%	0.6820	0.1660	1.5789	1.7892		SAMPLE							
14	1.2307	0.8689	3	1.9520	0.5828	97.20%	0.1360	0.1321	1.1098	1.1196		SAMPLE							
15	1.1130	0.7858	3	1.7900	-0.0291	1631.87%	-0.0067	0.1088	0.9319	0.9320		SAMPLE							
16	0.8980	0.6340	3	1.4595	0.2222	181.54%	0.0580	0.1053	0.7906	0.7926		MB							
17	0.8351	0.5896	3	1.3689	1.4115	33.15%	0.3720	0.1230	0.9145	0.9820	612576001.1	DUP	102.5%	2.7653					
18	0.9695	0.6845	3	1.5669	57.4284	4.32%	14.5080	0.5028	3.9013	15.0784		LCS			62.4835	91.9%			

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
612576001	1A	60	11	100	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576002	1B	60	13	31	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576003	1C	60	8	70	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576004	1D	60	2	27	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576005	2A	60	8	45	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576006	2C	60	9	69	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576007	3B	60	4	44	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576008	3C	60	5	73	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576009	3D	60	4	21	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612583001	4A	60	12	53	3/27/2023 15:02	3/27/2023 16:02	PIC	2397396
612583002	4C	60	4	77	3/27/2023 15:02	3/27/2023 16:02	PIC	2397396
612583003	4D	60	5	33	3/27/2023 15:02	3/27/2023 16:02	PIC	2397396
612583004	5A	60	5	93	3/27/2023 15:02	3/27/2023 16:02	PIC	2397396
612583005	5B	60	14	57	3/27/2023 15:02	3/27/2023 16:02	PIC	2397396
612583006	5C	60	10	38	3/27/2023 15:02	3/27/2023 16:02	PIC	2397396
1205343479	5D	60	5	36	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
1205343480	7A	60	6	51	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
1205343481	7B	60	10	906	3/27/2023 15:06	3/27/2023 16:06	PIC	2397396

ASSAY 27-Mar-23 13:34:27
 Wizard 2480 s/n 46190630
 Protocol id 8 Ba-133
 Time limit
 Count limit
 Isotope Ba-133
 Protocol date 3/27/2023
 Run id. 6396

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF		1	93	1	180	3655.57	1218.34	1.65	01:34:27
612576001	2	93	2	180	2678.57	892.69	1.93	73.27	01:37:40
612576002	3	93	3	180	2878.28	959.28	1.86	78.74	01:40:54
612576003	4	93	4	180	3012	1003.75	1.82	82.39	01:44:08
612576004	5	93	5	180	2796.57	932.04	1.89	76.50	01:47:23
612576005	1	14	1	180	2391.57	797.06	2.04	65.42	01:50:58
612576006	2	14	2	180	2577.57	859.04	1.97	70.51	01:54:12
612576007	3	14	3	180	2788.57	929.28	1.89	76.27	01:57:26
612576008	4	14	4	180	2603	867.52	1.96	71.21	02:00:40
612576009	5	14	5	180	3016	1005.14	1.82	82.50	02:03:54
612583001	1	2	1	180	3217.57	1072.3	1.76	88.01	02:07:31
612583002	2	2	2	180	2615.57	871.71	1.96	71.55	02:10:45
612583003	3	2	3	180	2460	819.89	2.02	67.30	02:13:58
612583004	4	2	4	180	2393.57	797.8	2.04	65.48	02:17:12
612583005	5	2	5	180	2695.85	898.47	1.93	73.75	02:20:27
612583006	1	10	1	180	2694	897.86	1.93	73.70	02:24:09
1205343479	2	10	2	180	3016.28	1005.27	1.82	82.51	02:27:23
1205343480	3	10	3	180	3124.28	1041.3	1.79	85.47	02:30:37
1205343481	4	10	4	180	2888	962.51	1.86	79.00	02:33:51

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 27-Mar-2023

Detectors LB4100 A1 through I4 and PIC 1A through 14D and G5400W 1W through 1Z and LB4200 OA1 through OA1

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100E2	Above	Beta bkg	27-Mar 06:45	60	2.817	1.385	3.072	+2.09
LB4100E3	Above	Beta bkg	27-Mar 06:45	60	2.600	0.484	2.814	+2.45
LB4100F1	Above	Beta bkg	27-Mar 06:45	60	3.333	0.188	2.691	+4.54
LB4100F2	Below	Alpha eff	27-Mar 05:41	5	6168	6533	7372	-5.61
LB4100F2	Above	Alpha XTalk	27-Mar 05:41	5	0.373	0.318	0.366	+3.86
LB4100F2	Above	Beta bkg	27-Mar 06:45	60	51.550	1.173	1.833	+454.97
LB4100F3	need 2nd	Beta bkg	27-Mar 06:45	60	1.700	0.185	2.570	+0.81
LB4100G1	Above	Beta bkg	27-Mar 06:46	60	3438	0.380	1.675	+15,926.73
LB4100G2	Above	Beta bkg	27-Mar 06:46	60	2.417	1.168	2.328	+3.46
LB4100G3	Above	Beta bkg	27-Mar 06:46	60	2.167	0.987	2.738	+1.04
LB4100H1	Above	Beta bkg	27-Mar 06:45	60	3.200	0.216	2.462	+4.97
LB4100H3	Above	Beta bkg	27-Mar 06:45	60	3.000	-8.10E-1	3.745	+2.02
PIC4B	Above	Alpha bkg	27-Mar 07:00	60	0.450	-9.58E-2	0.436	+3.16
PIC4B	Above	Beta bkg	27-Mar 07:00	60	2.467	-2.76E-1	1.864	+4.69
PIC4B	Below	Beta eff	27-Mar 05:48	5	12957	19730	21460	-26.49
PIC4B	Above	Beta XTalk	27-Mar 05:48	5	0.010	2.14E-4	7.66E-4	+105.36
PIC6B	Above	Beta bkg	27-Mar 10:07	60	3.683	0.389	2.636	+5.80
PIC8A	Above	Beta bkg	27-Mar 06:14	60	3.000	-2.72E-1	2.644	+3.73
PIC12C	Above	Beta bkg	27-Mar 06:26	60	2.433	0.142	2.845	+2.09

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100A1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

LB4100I1 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I2 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I3 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I4 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4200OA1 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by Lois Buis

Date 3/27/2023

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC

Batch ID: 2397396

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1205343479	MB	JE1	PIC5D	MAR-27-23 15:01:13	DONE	25mm Filter	01-JUN-22 00:00
1205343480	DUP	JE1	PIC7A	MAR-27-23 15:01:24	DONE	25mm Filter	01-JUN-22 00:00
612576001	SAMPLE	JE1	PIC1A	MAR-27-23 15:01:25	DONE	25mm Filter	01-JUN-22 00:00
612576002	SAMPLE	JE1	PIC1B	MAR-27-23 15:01:29	DONE	25mm Filter	01-JUN-22 00:00
612576003	SAMPLE	JE1	PIC1C	MAR-27-23 15:01:33	DONE	25mm Filter	01-JUN-22 00:00
612576004	SAMPLE	JE1	PIC1D	MAR-27-23 15:01:36	DONE	25mm Filter	01-JUN-22 00:00
612576005	SAMPLE	JE1	PIC2A	MAR-27-23 15:01:40	DONE	25mm Filter	01-JUN-22 00:00
612576006	SAMPLE	JE1	PIC2C	MAR-27-23 15:01:46	DONE	25mm Filter	01-JUN-22 00:00
612576007	SAMPLE	JE1	PIC3B	MAR-27-23 15:01:50	DONE	25mm Filter	01-JUN-22 00:00
612576008	SAMPLE	JE1	PIC3C	MAR-27-23 15:01:53	DONE	25mm Filter	01-JUN-22 00:00
612576009	SAMPLE	JE1	PIC3D	MAR-27-23 15:01:56	DONE	25mm Filter	01-JUN-22 00:00
612583001	SAMPLE	JE1	PIC4A	MAR-27-23 15:02:02	DONE	25mm Filter	01-JUN-22 00:00
612583002	SAMPLE	JE1	PIC4C	MAR-27-23 15:02:05	DONE	25mm Filter	01-JUN-22 00:00
612583003	SAMPLE	JE1	PIC4D	MAR-27-23 15:02:11	DONE	25mm Filter	01-JUN-22 00:00
612583004	SAMPLE	JE1	PIC5A	MAR-27-23 15:02:19	DONE	25mm Filter	01-JUN-22 00:00
612583005	SAMPLE	JE1	PIC5B	MAR-27-23 15:02:24	DONE	25mm Filter	01-JUN-22 00:00
612583006	SAMPLE	JE1	PIC5C	MAR-27-23 15:02:27	DONE	25mm Filter	01-JUN-22 00:00
1205343481	LCS	JE1	PIC7B	MAR-27-23 15:06:25	DONE	25mm Filter	01-JUN-22 00:00

Lucas Cell Raw Data

Batch 2397378 Check-list

This check-list was completed on 30-MAR-23 by Lyndsey Pace

This batch was reviewed by Elizabeth Krouse on 30-MAR-23 and Lyndsey Pace on 30-MAR-23.

Batch ID:
2397378

Product:
LUC26RAL

Description: Lucas Cell Radium 226
GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-226 in Liquid

Batch ID: 2397378
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL-RAD-A-008 REV# 15
Instrument: LUCAS-C202389980

Due Dates for Lab: 26-MAR-2023			Package: 28-MAR-2023	SDG: 29-MAR-2023		
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
MS	1205343414	Radium-226 SPIKE	1715-G	.1	mL	
LCS	1205343415	Radium-226 SPIKE	1715-G	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	End Degas (date)	CELL #	End Transfer (date)	Start Count Time (date)	Background Counts	Total Counts
1	612576001	22-MAR-2023	1	500.62	500.62	03/27/23 09:15	703	03/30/23 06:12	03/30/23 09:33	1	12
2	612576002	22-MAR-2023	1	506.46	506.46	03/27/23 09:15	804	03/30/23 06:12	03/30/23 09:33	3	3
3	612576003	22-MAR-2023	1	502.08	502.08	03/27/23 09:15	104	03/30/23 06:40	03/30/23 09:50	4	6
4	612576004	22-MAR-2023	1	502.97	502.97	03/27/23 09:15	204	03/30/23 06:40	03/30/23 10:08	6	8
5	612576005	22-MAR-2023	1	500.72	500.72	03/27/23 09:15	302	03/30/23 06:40	03/30/23 10:08	4	8
6	612576006	22-MAR-2023	1	500.23	500.23	03/27/23 09:15	408	03/30/23 06:40	03/30/23 10:08	6	14
7	612576007	22-MAR-2023	1	504.44	504.44	03/27/23 09:15	502	03/30/23 06:40	03/30/23 10:08	1	6
8	612576008	22-MAR-2023	1	500.76	500.76	03/27/23 09:15	607	03/30/23 06:40	03/30/23 10:08	1	18
9	612576009	22-MAR-2023	1	500.34	500.34	03/27/23 09:15	708	03/30/23 06:40	03/30/23 10:08	2	1
10	612583001	22-MAR-2023	1	500.33	500.33	03/27/23 09:15	806	03/30/23 06:40	03/30/23 10:08	3	4
11	612583002	22-MAR-2023	1	501.17	501.17	03/27/23 09:15	106	03/30/23 07:08	03/30/23 10:08	1	10
12	612583003	22-MAR-2023	1	504.54	504.54	03/27/23 09:15	202	03/30/23 07:08	03/30/23 10:26	2	19
13	612583004	22-MAR-2023	1	503.43	503.43	03/27/23 09:15	304	03/30/23 07:08	03/30/23 10:26	3	12
14	612583005	22-MAR-2023	1	505.26	505.26	03/27/23 09:15	402	03/30/23 07:08	03/30/23 10:26	8	18
15	612583006	22-MAR-2023	1	501.2	501.2	03/27/23 09:15	503	03/30/23 07:08	03/30/23 10:26	4	2
16	1205343412 MB	22-MAR-2023	1		506.46	03/27/23 09:15	602	03/30/23 07:08	03/30/23 10:26	2	3
17	1205343413 DUP (612576001)	22-MAR-2023	1	502.64	502.64	03/27/23 09:15	707	03/30/23 07:08	03/30/23 10:26	2	16
18	1205343414 MS (612576001)	22-MAR-2023	1	100.46	100.46	03/27/23 09:15	803	03/30/23 07:08	03/30/23 10:26	2	283
19	1205343415 LCS	22-MAR-2023	1		506.46	03/27/23 09:15	107	03/30/23 07:35	03/30/23 10:26	5	304

Reagent/Solvent Lot ID	Description	Amount	Comments:
			Data Entry Date2: 22-MAR-2023 00:00

Radium-226 Liquid

Filename : RA226.XLS
 File type : Excel
 Version # : 1.3.2

Procedure Code : LUC26RAL
 Parmname : Radium-226
 Required MDA : 1 pCi/L
 Halflife of Ra-226 : 1600 years
 Ra-226 Abundance : 1.00
 Halflife of Rn-222 : 3.8235 days

Batch : 2397378
 Analyst : LIN01615
 Prep Date : 3/22/2023
 Ra-226 Method Uncertainty : 0.073648

Batch counted on : LUCAS CELL DETECTOR
 BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Count Time (min.)	Cell Efficiency (cpm/dpm)
1	612576001.1	0.5006	2.0258E-05	2/8/2023 13:40	703	15	12	0.800	1	0.033	30	1.6440
2	612576002.1	0.5065	2.0282E-05	2/8/2023 12:23	804	15	3	0.200	3	0.100	30	1.9050
3	612576003.1	0.5021	2.0264E-05	2/8/2023 11:06	104	15	6	0.400	4	0.133	30	1.6160
4	612576004.1	0.5030	2.0268E-05	2/8/2023 9:11	204	15	8	0.533	6	0.200	30	1.8470
5	612576005.1	0.5007	2.0259E-05	2/8/2023 14:53	302	15	8	0.533	4	0.133	30	1.7980
6	612576006.1	0.5002	2.0257E-05	2/8/2023 16:04	408	15	14	0.933	6	0.200	30	1.5020
7	612576007.1	0.5044	2.0274E-05	2/8/2023 9:11	502	15	6	0.400	1	0.033	30	1.8630
8	612576008.1	0.5008	2.0259E-05	2/8/2023 8:15	607	15	18	1.200	1	0.033	30	1.8040
9	612576009.1	0.5003	2.0257E-05	2/8/2023 17:22	708	15	1	0.067	2	0.067	30	1.6020
10	612583001.1	0.5003	2.0257E-05	2/9/2023 12:58	806	15	4	0.267	3	0.100	30	1.9460
11	612583002.1	0.5012	2.0261E-05	2/9/2023 17:10	106	15	10	0.667	1	0.033	30	1.6990
12	612583003.1	0.5045	2.0274E-05	2/9/2023 14:23	202	15	19	1.267	2	0.067	30	1.8360
13	612583004.1	0.5034	2.0270E-05	2/9/2023 15:40	304	15	12	0.800	3	0.100	30	1.8850
14	612583005.1	0.5053	2.0277E-05	2/9/2023 14:23	402	15	18	1.200	8	0.267	30	1.4980
15	612583006.1	0.5012	2.0261E-05	2/9/2023 9:30	503	15	2	0.133	4	0.133	30	2.1390
16	1205343412.1	0.5065	2.0282E-05	3/22/2023 0:00	602	15	3	0.200	2	0.067	30	1.8620
17	1205343413.1	0.5026	2.0267E-05	2/8/2023 13:40	707	15	16	1.067	2	0.067	30	1.7280
18	1205343414.1	0.1005	1.1398E-05	2/8/2023 13:40	803	15	283	18.867	2	0.067	30	2.0020
19	1205343415.1	0.5065	2.0282E-05	3/22/2023 0:00	107	15	304	20.267	5	0.167	30	1.6990

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-008
 Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrow End Date/Time	Count Start Date/Time	Rn-222 Corrections			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
9.000%	11/1/2022	10/31/2023	3/27/2023 9:15	3/30/2023 6:12	3/30/2023 9:33	0.406	0.975	1.001	1.000
9.900%	4/1/2022	3/31/2023	3/27/2023 9:15	3/30/2023 6:12	3/30/2023 9:33	0.406	0.975	1.001	1.000
2.000%	4/28/2022	4/30/2023	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 9:50	0.408	0.976	1.001	1.000
7.400%	8/1/2022	7/31/2023	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 10:08	0.408	0.974	1.001	1.000
3.300%	10/25/2022	10/31/2023	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 10:08	0.408	0.974	1.001	1.000
7.000%	2/1/2023	1/31/2024	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 10:08	0.408	0.974	1.001	1.000
6.700%	6/1/2022	5/31/2023	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 10:08	0.408	0.974	1.001	1.000
3.400%	7/1/2022	6/30/2023	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 10:08	0.408	0.974	1.001	1.000
7.700%	11/1/2022	10/31/2023	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 10:08	0.408	0.974	1.001	1.000
7.300%	4/1/2022	3/31/2023	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 10:08	0.408	0.974	1.001	1.000
8.800%	4/28/2022	4/30/2023	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:08	0.410	0.978	1.001	1.000
5.100%	8/1/2022	7/31/2023	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:26	0.410	0.975	1.001	1.000
8.900%	10/25/2022	10/31/2023	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:26	0.410	0.975	1.001	1.000
5.300%	2/1/2023	1/31/2024	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:26	0.410	0.975	1.001	1.000
5.000%	6/1/2022	5/31/2023	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:26	0.410	0.975	1.001	1.000
5.700%	7/1/2022	6/30/2023	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:26	0.410	0.975	1.001	1.000
2.200%	11/1/2022	10/31/2023	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:26	0.410	0.975	1.001	1.000
7.300%	4/1/2022	3/31/2023	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:26	0.410	0.975	1.001	1.000
3.900%	4/28/2022	4/30/2023	3/27/2023 9:15	3/30/2023 7:35	3/30/2023 10:26	0.412	0.979	1.001	1.000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1715-G
Spike Exp Date : 9/8/2023
Spike Activity (dpm/ml): 297.43
Spike Volume Added: 0.10

LCS S/N : 1715-G
LCS Exp Date : 9/8/2023
LCS Activity (dpm/ml): 297.43
LCS Volume Added: 0.10


Results																
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.1862	0.1315	1	0.5397	1.0612	31.74%	0.7667	0.2333	0.6330	0.6776		SAMPLE				
2	0.2751	0.1942	1	0.6246	0.1181	129.48%	0.1000	0.1291	0.2988	0.3001		SAMPLE				
3	0.3753	0.2650	1	0.8089	0.3720	66.17%	0.2667	0.1764	0.4822	0.4854		SAMPLE				
4	0.4023	0.2841	1	0.8123	0.4070	62.09%	0.3333	0.2055	0.4918	0.4988		SAMPLE				
5	0.3390	0.2393	1	0.7306	0.5040	50.11%	0.4000	0.2000	0.4939	0.5003		SAMPLE				
6	0.4975	0.3512	1	1.0044	1.1071	36.47%	0.7333	0.2625	0.7766	0.8073		SAMPLE				
7	0.1624	0.1146	1	0.4707	0.4426	45.95%	0.3667	0.1667	0.3943	0.4036		SAMPLE				
8	0.1689	0.1193	1	0.4896	1.4649	24.65%	1.1667	0.2848	0.7009	0.7386		SAMPLE				
9	0.2692	0.1901	1	0.6632	0.000E+00	0.00%	0.0000	0.0816	0.2265	0.2267		SAMPLE				
10	0.2714	0.1916	1	0.6163	0.1942	87.48%	0.1667	0.1453	0.3318	0.3341		SAMPLE				
11	0.1777	0.1254	1	0.5150	0.8365	34.83%	0.6333	0.2134	0.5525	0.5837		SAMPLE				
12	0.2315	0.1634	1	0.5702	1.4601	25.06%	1.2000	0.2944	0.7021	0.7474		SAMPLE				
13	0.2767	0.1954	1	0.6283	0.8314	35.15%	0.7000	0.2380	0.5542	0.5853		SAMPLE				
14	0.5666	0.4000	1	1.0979	1.3899	32.38%	0.9333	0.2981	0.8702	0.9046		SAMPLE				
15	0.2829	0.1997	1	0.6097	0.000E+00	0.00%	0.0000	0.1155	0.2379	0.2380		SAMPLE				
16	0.2274	0.1605	1	0.5601	0.1594	93.71%	0.1333	0.1247	0.2922	0.2936		MB				
17	0.2469	0.1743	1	0.6081	1.2977	27.17%	1.0000	0.2708	0.6888	0.7160	612576001.1	DUP	20.1%			
18	1.0662	0.7527	1	2.6263	105.3599	9.43%	18.8000	1.1225	12.3299	24.7100	612576001.1	MS			133.3686	78.2%
19	0.3908	0.2759	1	0.8116	26.1108	6.98%	20.1000	1.1648	2.9656	5.1947		LCS			26.4533	98.7%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 30-MAR-2023

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	07:37	1	1.19E+05	119307	-1.83		
LUCAS2	EFF	07:36	1	1.34E+05	134035	0.26		
LUCAS3	EFF	07:35	1	1.00E+05	100006	-2.52		
LUCAS4	EFF	07:33	1	1.28E+05	128494	0.9		
LUCAS5	EFF	07:32	1	1.33E+05	133444	0.84		
LUCAS6	EFF	07:31	1	1.29E+05	129492	-1.29		
LUCAS7	EFF	07:29	1	1.34E+05	133959	2.48		
LUCAS8	EFF	07:27	1	1.23E+05	123440	-1.82		

Reviewed by:


Lyndsey Pace

Date: 30-MAR-23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR

Batch ID: 2397378

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
612576001	SAMPLE	LXP1	LUCAS7	MAR-30-23 09:33:00	DONE	Lucas Cell	01-NOV-22 00:00
612576002	SAMPLE	LXP1	LUCAS8	MAR-30-23 09:33:00	DONE	Lucas Cell	01-APR-22 00:00
612576003	SAMPLE	LXP1	LUCAS1	MAR-30-23 09:50:00	DONE	Lucas Cell	28-APR-22 00:00
612576004	SAMPLE	LXP1	LUCAS2	MAR-30-23 10:08:00	DONE	Lucas Cell	01-AUG-22 00:00
612576005	SAMPLE	LXP1	LUCAS3	MAR-30-23 10:08:00	DONE	Lucas Cell	25-OCT-22 00:00
612576006	SAMPLE	LXP1	LUCAS4	MAR-30-23 10:08:00	DONE	Lucas Cell	01-FEB-23 00:00
612576007	SAMPLE	LXP1	LUCAS5	MAR-30-23 10:08:00	DONE	Lucas Cell	01-JUN-22 00:00
612576008	SAMPLE	LXP1	LUCAS6	MAR-30-23 10:08:00	DONE	Lucas Cell	01-JUL-22 00:00
612576009	SAMPLE	LXP1	LUCAS7	MAR-30-23 10:08:00	DONE	Lucas Cell	01-NOV-22 00:00
612583001	SAMPLE	LXP1	LUCAS8	MAR-30-23 10:08:00	DONE	Lucas Cell	01-APR-22 00:00
612583002	SAMPLE	LXP1	LUCAS1	MAR-30-23 10:08:00	DONE	Lucas Cell	28-APR-22 00:00
612583003	SAMPLE	LXP1	LUCAS2	MAR-30-23 10:26:00	DONE	Lucas Cell	01-AUG-22 00:00
612583004	SAMPLE	LXP1	LUCAS3	MAR-30-23 10:26:00	DONE	Lucas Cell	25-OCT-22 00:00
612583005	SAMPLE	LXP1	LUCAS4	MAR-30-23 10:26:00	DONE	Lucas Cell	01-FEB-23 00:00
612583006	SAMPLE	LXP1	LUCAS5	MAR-30-23 10:26:00	DONE	Lucas Cell	01-JUN-22 00:00
1205343412	MB	LXP1	LUCAS6	MAR-30-23 10:26:00	DONE	Lucas Cell	01-JUL-22 00:00
1205343413	DUP	LXP1	LUCAS7	MAR-30-23 10:26:00	DONE	Lucas Cell	01-NOV-22 00:00
1205343414	MS	LXP1	LUCAS8	MAR-30-23 10:26:00	DONE	Lucas Cell	01-APR-22 00:00
1205343415	LCS	LXP1	LUCAS1	MAR-30-23 10:26:00	DONE	Lucas Cell	28-APR-22 00:00



Report ID: S45204.01(03)
Generated on 03/31/2023
Replaces report S45204.01(02) generated on 02/14/2023

Report to
Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

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John Lavery (johnlavery@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary
Lab Sample ID(s): S45204.01-S45204.06
Project: Erickson AM MI Wells 11-13
Collected Date(s): 02/09/2023
Submitted Date/Time: 02/10/2023 09:28
Sampled by: Marc Wahrer
P.O. #:

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Maya Murshak
Technical Director



General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile, and 2-chloroethylvinyl ether need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the

FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

All analyses completed



Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1 (1993)
SM2320B	Standard Method 2320 B 2011
SM2340C	Standard Method 2340 C 2011
SM2540C	Standard Method 2540 C 2015
SM2540D	Standard Method 2540 D 2015
SW3015A	SW 846 Method 3015A Revision 1 February 2007



Sample Summary (6 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S45204.01	MW-11 L302146-01	Groundwater	02/09/23 12:58
S45204.02	MW-12 L302146-02	Groundwater	02/09/23 17:10
S45204.03	MW-11B L302146-04	Groundwater	02/09/23 14:23
S45204.04	MW-12B L302146-05	Groundwater	02/09/23 15:40
S45204.05	MWT-11B L302146-06	Groundwater	02/09/23 14:23
S45204.06	Field Blank L302146-07	Water	02/09/23 09:30



Analytical Laboratory Report

Final Report

Lab Sample ID: S45204.01

Sample Tag: MW-11 L302146-01

Collected Date/Time: 02/09/2023 12:58

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.2	IR
2	1L Plastic	None	Yes	2.2	IR
1	250ml Plastic	HNO3	Yes	2.2	IR
1	250ml Plastic	None	Yes	2.2	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/13/23 12:07	CTV	
Mercury Digestion	Completed	E245.1	02/13/23 13:41	CTV	
Metal Digestion	Completed	SW3015A	02/13/23 10:10	CCM	
Metal Digestion	Completed	SW3015A	02/13/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/13/23 09:12, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	59	5	0.08	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.13	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.30	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 14:06, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	645	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/13/23 12:30, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	509	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/10/23 20:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	668	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/13/23 19:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	35	3	1	mg/L	2		

Metals

Method: E200.8, Run Date: 02/13/23 11:55, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.017	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.151	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.21	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Lab Sample ID: S45204.01 (continued)

Sample Tag: MW-11 L302146-01

Method: E200.8, Run Date: 02/13/23 11:55, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	15.5	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.005	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.006	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/13/23 12:01, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony, Dissolved*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	f
Arsenic, Dissolved	0.004	0.002	0.000255	mg/L	5	7440-38-2	f
Barium, Dissolved	0.105	0.005	0.000162	mg/L	5	7440-39-3	f
Beryllium, Dissolved	Not detected	0.001	0.000215	mg/L	5	7440-41-7	f
Boron, Dissolved	0.20	0.04	0.00175	mg/L	5	7440-42-8	f
Cadmium, Dissolved	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	f
Chromium, Dissolved	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	f
Cobalt, Dissolved	Not detected	0.005	0.000108	mg/L	5	7440-48-4	f
Copper, Dissolved	Not detected	0.005	0.000377	mg/L	5	7440-50-8	f
Iron, Dissolved	0.44	0.02	0.00192	mg/L	5	7439-89-6	f
Lead, Dissolved	Not detected	0.003	0.000190	mg/L	5	7439-92-1	f
Lithium, Dissolved*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	f
Molybdenum, Dissolved	0.006	0.005	0.000217	mg/L	5	7439-98-7	f
Nickel, Dissolved	Not detected	0.005	0.000250	mg/L	5	7440-02-0	f
Selenium, Dissolved	Not detected	0.005	0.00209	mg/L	5	7782-49-2	f
Silver, Dissolved	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	f
Thallium, Dissolved	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	f
Vanadium, Dissolved	Not detected	0.005	0.000139	mg/L	5	7440-62-2	f
Zinc, Dissolved	Not detected	0.005	0.000730	mg/L	5	7440-66-6	f

Method: E200.8, Run Date: 02/13/23 14:10, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	140	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	40.5	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	11.4	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	37.5	0.50	0.00850	mg/L	5	7440-23-5	

Method: E200.8, Run Date: 02/13/23 14:11, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium, Dissolved*	132	0.50	0.0435	mg/L	5	7440-70-2	f
Magnesium, Dissolved	37.5	0.50	0.0120	mg/L	5	7439-95-4	f
Potassium, Dissolved	10.9	0.50	0.0230	mg/L	5	7440-09-7	f
Sodium, Dissolved	36.1	0.50	0.00850	mg/L	5	7440-23-5	f

f-Filtered and preserved in lab



Analytical Laboratory Report

Final Report

Lab Sample ID: S45204.01 (continued)

Sample Tag: MW-11 L302146-01

Method: E245.1, Run Date: 02/13/23 15:20, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury, Dissolved	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	f

Method: E245.1, Run Date: 02/13/23 13:51, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/30/23 17:15, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

f-Filtered and preserved in lab

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S45204.02

Sample Tag: MW-12 L302146-02

Collected Date/Time: 02/09/2023 17:10

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.2	IR
2	1L Plastic	None	Yes	2.2	IR
1	250ml Plastic	HNO3	Yes	2.2	IR
1	250ml Plastic	None	Yes	2.2	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/13/23 12:07	CTV	
Mercury Digestion	Completed	E245.1	02/13/23 13:41	CTV	
Metal Digestion	Completed	SW3015A	02/13/23 10:10	CCM	
Metal Digestion	Completed	SW3015A	02/13/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/13/23 09:25, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.13	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 02/13/23 10:29, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	71	10	0.16	mg/L	10	16887-00-6	
Sulfate	207	10	0.59	mg/L	10	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 14:10, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	689	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/13/23 12:32, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	575	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/10/23 20:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	948	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/13/23 19:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	9	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/13/23 12:05, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.058	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	

Lab Sample ID: S45204.02 (continued)

Sample Tag: MW-12 L302146-02

Method: E200.8, Run Date: 02/13/23 12:05, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Boron	0.07	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	0.60	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.027	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.011	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	0.017	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/13/23 12:08, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony, Dissolved*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	f
Arsenic, Dissolved	Not detected	0.002	0.000255	mg/L	5	7440-38-2	f
Barium, Dissolved	0.054	0.005	0.000162	mg/L	5	7440-39-3	f
Beryllium, Dissolved	Not detected	0.001	0.000215	mg/L	5	7440-41-7	f
Boron, Dissolved	0.07	0.04	0.00175	mg/L	5	7440-42-8	f
Cadmium, Dissolved	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	f
Chromium, Dissolved	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	f
Cobalt, Dissolved	Not detected	0.005	0.000108	mg/L	5	7440-48-4	f
Copper, Dissolved	Not detected	0.005	0.000377	mg/L	5	7440-50-8	f
Iron, Dissolved	Not detected	0.02	0.00192	mg/L	5	7439-89-6	f
Lead, Dissolved	Not detected	0.003	0.000190	mg/L	5	7439-92-1	f
Lithium, Dissolved*	0.023	0.005	0.00163	mg/L	5	7439-93-2	f
Molybdenum, Dissolved	0.011	0.005	0.000217	mg/L	5	7439-98-7	f
Nickel, Dissolved	0.016	0.005	0.000250	mg/L	5	7440-02-0	f
Selenium, Dissolved	Not detected	0.005	0.00209	mg/L	5	7782-49-2	f
Silver, Dissolved	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	f
Thallium, Dissolved	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	f
Vanadium, Dissolved	Not detected	0.005	0.000139	mg/L	5	7440-62-2	f
Zinc, Dissolved	Not detected	0.005	0.000730	mg/L	5	7440-66-6	f

Method: E200.8, Run Date: 02/13/23 14:13, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	143	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	56.8	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	3.01	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	136	0.50	0.00850	mg/L	5	7440-23-5	

Method: E200.8, Run Date: 02/13/23 14:14, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium, Dissolved*	141	0.50	0.0435	mg/L	5	7440-70-2	f
Magnesium, Dissolved	55.6	0.50	0.0120	mg/L	5	7439-95-4	f

f-Filtered and preserved in lab



Analytical Laboratory Report

Final Report

Lab Sample ID: S45204.02 (continued)

Sample Tag: MW-12 L302146-02

Method: E200.8, Run Date: 02/13/23 14:14, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Potassium, Dissolved	3.02	0.50	0.0230	mg/L	5	7440-09-7	f
Sodium, Dissolved	130	0.50	0.00850	mg/L	5	7440-23-5	f

Method: E245.1, Run Date: 02/13/23 15:23, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury, Dissolved	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	f

Method: E245.1, Run Date: 02/13/23 13:54, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/30/23 17:15, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

f-Filtered and preserved in lab

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S45204.03

Sample Tag: MW-11B L302146-04

Collected Date/Time: 02/09/2023 14:23

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.2	IR
2	1L Plastic	None	Yes	2.2	IR
1	250ml Plastic	HNO3	Yes	2.2	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/13/23 12:07	CTV	
Metal Digestion	Completed	SW3015A	02/13/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/13/23 09:38, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.08	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.13	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.30	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 14:14, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	378	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/13/23 12:34, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	264	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/10/23 20:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	292	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/13/23 19:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/13/23 12:12, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.006	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.063	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.80	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	1.23	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45204.03 (continued)

Sample Tag: MW-11B L302146-04

Method: E200.8, Run Date: 02/13/23 12:12, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.031	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	0.012	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/13/23 14:16, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	65.7	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	24.4	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	6.43	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	16.1	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/13/23 13:58, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/30/23 17:15, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S45204.04

Sample Tag: MW-12B L302146-05

Collected Date/Time: 02/09/2023 15:40

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.2	IR
2	1L Plastic	None	Yes	2.2	IR
1	250ml Plastic	HNO3	Yes	2.2	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/13/23 12:07	CTV	
Metal Digestion	Completed	SW3015A	02/13/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/13/23 09:51, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.08	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.13	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.30	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 14:16, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	417	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/13/23 12:36, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	98	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/10/23 20:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	356	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/13/23 19:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/13/23 12:15, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.025	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	3.33	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	0.22	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45204.04 (continued)

Sample Tag: MW-12B L302146-05

Method: E200.8, Run Date: 02/13/23 12:15, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.043	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/13/23 14:17, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	26.3	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	8.61	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	7.88	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	112	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/13/23 14:01, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/30/23 17:15, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S45204.05

Sample Tag: MWT-11B L302146-06

Collected Date/Time: 02/09/2023 14:23

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.2	IR
2	1L Plastic	None	Yes	2.2	IR
1	250ml Plastic	HNO3	Yes	2.2	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/13/23 12:07	CTV	
Metal Digestion	Completed	SW3015A	02/13/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/13/23 10:03, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.08	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.13	mg/L	5	16984-48-8	
Sulfate	Not detected	5	0.30	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 14:18, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	377	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/13/23 12:38, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	262	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/10/23 20:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	294	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/13/23 19:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/13/23 12:19, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.006	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.065	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.82	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	1.24	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45204.05 (continued)

Sample Tag: MWT-11B L302146-06

Method: E200.8, Run Date: 02/13/23 12:19, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.031	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/13/23 14:19, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	66.0	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	24.7	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	6.46	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	16.4	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/13/23 14:04, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/30/23 17:15, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S45204.06

Sample Tag: Field Blank L302146-07

Collected Date/Time: 02/09/2023 09:30

Matrix: Water

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.2	IR
2	1L Plastic	None	Yes	2.2	IR
1	250ml Plastic	HNO3	Yes	2.2	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/13/23 12:07	CTV	
Metal Digestion	Completed	SW3015A	02/13/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/13/23 10:16, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.04	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.06	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.15	mg/L	2.5	14808-79-8	

Method: SM2320B, Run Date: 02/10/23 14:20, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	Not detected	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/13/23 12:40, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	Not detected	10	0.238	mg/L	10		

Method: SM2540C, Run Date: 02/10/23 20:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/13/23 19:00, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/13/23 11:51, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45204.06 (continued)

Sample Tag: Field Blank L302146-07

Method: E200.8, Run Date: 02/13/23 11:51, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E200.8, Run Date: 02/13/23 14:07, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	
Magnesium	Not detected	0.50	0.00480	mg/L	2	7439-95-4	
Potassium	Not detected	0.50	0.00920	mg/L	2	7440-09-7	
Sodium	Not detected	0.50	0.00340	mg/L	2	7440-23-5	

Method: E245.1, Run Date: 02/13/23 14:14, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.0000160	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/30/23 17:15, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID:S45204

Client:BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 11-13

Submitted:02/10/2023 09:28 Login User: MMC

Attention: Jennifer Caporale

Address: Board of Water & Light

P.O. Box 13007

Lansing, MI 48901

Phone: 517-702-6372

FAX:

Email: Environmental_Laboratory@LBWL.com

Selection	Description	Note
Sample Receiving		
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 2.2
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
Chain of Custody		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to: GEL
Preservation		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab? Sample .01/.02
Bottle Conditions		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration Sample .01/.02
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Do water VOC or TOX bottles contain headspace

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S45204 Submitted: 02/10/2023 09:28

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 11-13

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Initial Preservation Check: 02/10/2023 11:26 MMC

Preservation Recheck (E200.8): N/A

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S45204.01	1L Plastic HNO3	<2			
S45204.01	1L Plastic HNO3	<2			
S45204.01	250ml Plastic HNO3	<2			
S45204.02	1L Plastic HNO3	<2			
S45204.02	1L Plastic HNO3	<2			
S45204.02	250ml Plastic HNO3	<2			
S45204.03	1L Plastic HNO3	<2			
S45204.03	1L Plastic HNO3	<2			
S45204.03	250ml Plastic HNO3	<2			
S45204.04	1L Plastic HNO3	<2			
S45204.04	1L Plastic HNO3	<2			
S45204.04	250ml Plastic HNO3	<2			
S45204.05	1L Plastic HNO3	<2			
S45204.05	1L Plastic HNO3	<2			
S45204.05	250ml Plastic HNO3	<2			
S45204.06	1L Plastic HNO3	<2			
S45204.06	1L Plastic HNO3	<2			
S45204.06	250ml Plastic HNO3	<2			



2680 East Lansing Dr., East Lansing, MI 48823
 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

REPORT TO **CHAIN OF CUSTODY RECORD** **INVOICE TO**

CONTACT NAME Jennifer Caporale
 COMPANY Lansing Board of Water and Light
 ADDRESS PO Box 13007 48901-3007
 CITY Lansing STATE Mi ZIP CODE 48901
 PHONE NO. 517-702-6372 FAX NO. P.O. NO.
 E-MAIL ADDRESS Environmental_Laboratory@lbwl.com QUOTE NO.

CONTACT NAME Beth Zimpfer SAME
 COMPANY
 ADDRESS
 CITY STATE ZIP CODE
 PHONE NO. E-MAIL ADDRESS Beth.Zimpfer@lbwl.com

PROJECT NO./NAME Erickson AM MI Wells 11-13 SAMPLER(S) - PLEASE PRINT/SIGN NAME Marc Wahrer

TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER ASAP

DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER

MATRIX GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 CODE: SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIFE A=AIR W=WASTE

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives								Total Metals	F- undissisted, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	Dissolved Metals	HCO3, CO3, Hardness				Certifications
	DATE	TIME				NONE	HCl	HNO3	H2SO4	NH4OH	MnOH	OTHER	OHIO VAP											
45204.01	02/09/13	1358	MW-11 L302146-01	GW	5	2	3							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water	
.02	↓	1710	MW-12 -02	GW	6	3	3							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input type="checkbox"/> DoD <input checked="" type="checkbox"/> NPDES	
	JSC 02/09/13		MW-13 N/A -03	GW	5	2	3							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				Project Locations	
.03	02/09/13	1423	MW-11B -04	GW	5	2	3							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input type="checkbox"/> Detroit <input type="checkbox"/> New York	
.04	↓	1540	MW-12B -05	GW	5	2	3							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<input type="checkbox"/> Other	
.05	↓	1423	MWT-11B -06	GW	5	2	3							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				Special Instructions	
.06	↓	0930	Field Blank -07	DI	5	2	3							<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				Metals to analyse: Na, Mg, K	
																							B, Ca, Sb, As, Ba, Be, Cd, Cr,	
																							Co, Li, Hg, Mo, Pb, Se, Tl,	
																							Fe, Cu, Ni, Ag, V, Zn	
																							Please send a preliminary report	
																							The analytes for dissolved metals are	
																							same metals that are analysed for total.	

RELINQUISHED BY: *[Signature]* Sampler DATE 2-10-23 TIME 0928
 RECEIVED BY: *[Signature]* DATE 2/10/23 TIME 0928

RELINQUISHED BY: DATE TIME
 RECEIVED BY: DATE TIME

RELINQUISHED BY: DATE TIME
 RECEIVED BY: DATE TIME

SEAL NO. SEAL INTACT YES NO INITIALS
 SEAL NO. SEAL INTACT YES NO INITIALS

NOTES: TEMP. ON ARRIVAL 2.2

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.150
Be, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	2.5
Cl	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cr, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
F	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Fe, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Pb, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Li, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Hg, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Mo, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
RA226/228	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Se, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ag, total	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
SO4	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Tl, total	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TDS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
TSS	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
V, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005



March 23, 2023

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 612583
SDG: S45204

Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on March 01, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 1614.

Sincerely,

Jordan Melton for
Delaney Stone
Project Manager

Purchase Order: GELP20-0018
Enclosures



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Case Narrative

**Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S45204
Work Order: 612583**

March 23, 2023

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on March 01, 2023 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

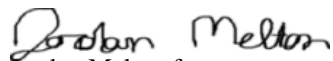
Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
612583001	S45204.01
612583002	S45204.02
612583003	S45204.03
612583004	S45204.04
612583005	S45204.05
612583006	S45204.06

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.

A handwritten signature in black ink that reads "Jordan Melton". The signature is written in a cursive style with a large initial 'J'.

Jordan Melton for
Delaney Stone
Project Manager

Chain of Custody and Supporting Documentation



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Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1
612583

REPORT TO

CHAIN OF CUSTODY RECORD

INVOICE TO

CONTACT NAME Project Management Team
 COMPANY Merit Laboratories
 ADDRESS 2680 East Lansing Drive
 CITY East Lansing STATE MI ZIP CODE 48823
 PHONE NO. 517-332-0167 FAX NO.
 E-MAIL ADDRESS results@meritlabs.com

CONTACT NAME Julie Teague
 COMPANY Merit Laboratories
 ADDRESS 2680 East Lansing Drive
 CITY East Lansing STATE MI ZIP CODE 48823
 PHONE NO. 517-332-0167 E-MAIL ADDRESS juliet@meritlabs.com

PROJECT NO./NAME S45204 SAMPLER(S) - PLEASE PRINT/SIGN NAME
 TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER
 DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)
 Certifications
 OHIO VAP Drinking Water
 DoD NPDES
 Project Locations
 Detroit New York
 Other
 Special Instructions
 * E903.1 Mod.
 ** E904.0/SW 9320 Mod.

MTRIX CODE	YEAR	DATE	TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	MTRIX	# Containers & Preservatives					Notes	
						GW	SL	HW	HNO	HO		H2O
GW	2/9/23	1258		S45204.01	GW	2						Radium 226 *
GW	2/9/23	1710		S45204.02	GW	2						Radium 226 *
GW	2/9/23	1423		S45204.03	GW	2						Radium 226 *
GW	2/9/23	1540		S45204.04	GW	2						Radium 226 *
GW	2/9/23	1423		S45204.05	GW	2						Radium 226 *
GW	2/9/23	0930		S45204.06	GW	2						Radium 226 *

RELINQUISHED BY: [Signature] SIGNATURE/ORGANIZATION
 RECEIVED BY: [Signature] SIGNATURE/ORGANIZATION
 SEAL NO. 31123 SEAL INTACT INITIALS [Initials]
 DATE 2/9/23 TIME 1700 DATE 2/9/23 TIME 1700
 NOTES: 31123 TEMP. ON ARRIVAL _____
 (No Ice needed)
 ** Subcontracted to
 GEL Laboratories, Inc.
 2040 Savage Road
 Charleston, SC 29407



Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: **MERI** SDG/AR/COC/Work Order: **612583**

Received By: **Stacy Boone** Date Received: **MARCH 1, 2023**

Carrier and Tracking Number
FedEx Express FedEx Ground UPS Field Services Courier Other
1Z 466 477 03 6210 0413

Suspected Hazard Information
*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
A) Shipped as a DOT Hazardous? Hazard Class Shipped: UN#: IF UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___
B) Did the client designate the samples are to be received as radioactive? COC notation or radioactive stickers on containers equal client designation.
C) Did the RSO classify the samples as radioactive? Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 2 CPM / mSv/hr Classified as: Rad 1 Rad 2 Rad 3
D) Did the client designate samples are hazardous? COC notation or hazard labels on containers equal client designation.
E) Did the RSO identify possible hazards? If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			Circle Applicable: Client contacted and provided COC COC created upon receipt
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>			Preservation Method: Wet Ice Ice Packs Dry Ice None Other: TEMP: 21C *all temperatures are recorded in Celsius
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: IR3-22 Secondary Temperature Device Serial # (If Applicable):
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe) 545182.08 1 of 2 ALMOST EMPTY
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's and Containers Affected: If Preservation added, Leak: If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer) Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No) Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___
7 Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>			Sample ID's and containers affected:
8 Samples received within holding time?	<input checked="" type="checkbox"/>			ID's and tests affected:
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			ID's and containers affected:
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Circle Applicable: No container count on COC Other (describe)
12 Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>			Circle Applicable: Not relinquished Other (describe)
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials **JM** Date **3-1-23** Page **1** of **1**

Laboratory Certifications

List of current GEL Certifications as of 23 March 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122023-4
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2022-160
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-22-20
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S45204
Work Order #: 612583**

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2397396

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
612583001	S45204.01
612583002	S45204.02
612583003	S45204.03
612583004	S45204.04
612583005	S45204.05
612583006	S45204.06
1205343479	Method Blank (MB)
1205343480	612576001(S45182.01) Sample Duplicate (DUP)
1205343481	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Preparation Information

Homogenous Matrix

Sample 612583001 (S45204.01) was non-homogenous matrix. yellowish tint 612583001 (S45204.01).

Quality Control (QC) Information

Duplication Criteria between QC Sample and Duplicate Sample

The Sample and the Duplicate, (See Below), did not meet the relative percent difference requirement; however, they do meet the relative error ratio requirement with the value listed below.

Sample	Analyte	Value
1205343480 (S45182.01DUP)	Radium-228	RPD 103* (0.0%-100.0%) RER 2.77 (0-3)

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2397378

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
612583001	S45204.01
612583002	S45204.02
612583003	S45204.03
612583004	S45204.04
612583005	S45204.05
612583006	S45204.06
1205343412	Method Blank (MB)
1205343413	612576001(S45182.01) Sample Duplicate (DUP)
1205343414	612576001(S45182.01) Matrix Spike (MS)
1205343415	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Preparation Information

Homogenous Matrix

Sample 612583001 (S45204.01) was non-homogenous matrix. Sample 612583001 (S45204.01) is tinted yellow.

Miscellaneous Information

Additional Comments

The matrix spike, 1205343414 (S45182.01MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

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Qualifier Definition Report for

MERI001 Merit Laboratories, Inc.

Client SDG: S45204 GEL Work Order: 612583

The Qualifiers in this report are defined as follows:

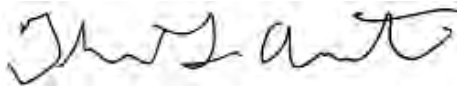
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:



Name: Theresa Austin

Date: 30 MAR 2023

Title: Group Leader

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 30, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Laverty
 Project: Routine Analysis

Client Sample ID: S45204.01	Project: MERI00120
Sample ID: 612583001	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 09-FEB-23 12:58	
Receive Date: 01-MAR-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.824	+/-0.951	1.60	3.00	pCi/L		JE1	03/27/23	1502	2397396		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.02	+/-1.01			pCi/L		NXL1	03/30/23	1206	2397753		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.194	+/-0.332	0.616	1.00	pCi/L		LXP1	03/30/23	1008	2397378		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			88	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 30, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S45204.02 Project: MERI00120
Sample ID: 612583002 Client ID: MERI001
Matrix: Ground Water
Collect Date: 09-FEB-23 17:10
Receive Date: 01-MAR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228		2.60	+/-1.32	1.90	3.00	pCi/L		JE1	03/27/23	1502	2397396	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		3.43	+/-1.43			pCi/L		NXL1	03/30/23	1206	2397753	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		0.836	+/-0.553	0.515	1.00	pCi/L		LXP1	03/30/23	1008	2397378	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			71.5	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 30, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S45204.03 Project: MERI00120
Sample ID: 612583003 Client ID: MERI001
Matrix: Ground Water
Collect Date: 09-FEB-23 14:23
Receive Date: 01-MAR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	0.131	+/-1.00	1.90	3.00	pCi/L		JE1	03/27/23	1502	2397396	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		1.59	+/-1.22			pCi/L		NXL1	03/30/23	1206	2397753	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		1.46	+/-0.702	0.570	1.00	pCi/L		LXP1	03/30/23	1026	2397378	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			67.3	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: March 30, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Laverty
 Project: Routine Analysis

Client Sample ID: S45204.04	Project: MERI00120
Sample ID: 612583004	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 09-FEB-23 15:40	
Receive Date: 01-MAR-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228		3.31	+/-1.58	2.27	3.00	pCi/L		JE1		03/27/23	1502	2397396	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		4.14	+/-1.67			pCi/L		NXL1		03/30/23	1206	2397753	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.831	+/-0.554	0.628	1.00	pCi/L		LXP1		03/30/23	1026	2397378	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			65.5	(15%-125%)

Notes:
 Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: March 30, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Laverty
 Project: Routine Analysis

Client Sample ID: S45204.05	Project: MERI00120
Sample ID: 612583005	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 09-FEB-23 14:23	
Receive Date: 01-MAR-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.583	+/-1.11	1.95	3.00	pCi/L		JE1	03/27/23	1502	2397396		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.97	+/-1.41			pCi/L		NXL1	03/30/23	1206	2397753		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		1.39	+/-0.870	1.10	1.00	pCi/L		LXP1	03/30/23	1026	2397378		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			73.7	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: March 30, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S45204.06 Project: MERI00120
Sample ID: 612583006 Client ID: MERI001
Matrix: Ground Water
Collect Date: 09-FEB-23 09:30
Receive Date: 01-MAR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	-0.0291	+/-0.932	1.79	3.00	pCi/L		JE1	03/27/23	1502	2397396	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		0.000	+/-0.962			pCi/L		NXL1	03/30/23	1206	2397753	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226	U	0.000	+/-0.238	0.610	1.00	pCi/L		LXP1	03/30/23	1026	2397378	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			73.7	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

Quality Control Data

GEL LABORATORIES LLC

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QC Summary

Report Date: March 30, 2023

Page 1 of 2

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: John Laverty

Workorder: 612583

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2397396										
QC1205343480	612576001	DUP									
Radium-228		4.38		1.41	pCi/L	103*		(0% - 100%)	JE1	03/27/23	15:01
	Uncertainty	+/-1.49		+/-0.915							
QC1205343481	LCS										
Radium-228	62.5			57.4	pCi/L		91.9	(75%-125%)		03/27/23	15:06
	Uncertainty			+/-3.90							
QC1205343479	MB										
Radium-228			U	0.222	pCi/L					03/27/23	15:01
	Uncertainty			+/-0.791							
Rad Ra-226											
Batch	2397378										
QC1205343413	612576001	DUP									
Radium-226		1.06		1.30	pCi/L	20.1		(0% - 100%)	LXP1	03/30/23	10:26
	Uncertainty	+/-0.633		+/-0.689							
QC1205343415	LCS										
Radium-226	26.5			26.1	pCi/L		98.7	(75%-125%)		03/30/23	10:26
	Uncertainty			+/-2.97							
QC1205343412	MB										
Radium-226			U	0.159	pCi/L					03/30/23	10:26
	Uncertainty			+/-0.292							
QC1205343414	612576001	MS									
Radium-226	133	1.06		105	pCi/L		78.2	(75%-125%)		03/30/23	10:26
	Uncertainty	+/-0.633		+/-12.3							

- Notes:**
- Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).
 - The Qualifiers in this report are defined as follows:
 - U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
 - J Value is estimated
 - X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
 - H Analytical holding time was exceeded
 - < Result is less than value reported
 - > Result is greater than value reported

GEL LABORATORIES LLC

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QC Summary

Workorder: 612583

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UI											
BD											
h											
R											
^											
N/A											
ND											
M											
NJ											
FA											
UJ											
Q											
K											
UL											
L											
NI											
Y											
**											
M											
J											

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 2397396 Check-list

This check-list was completed on 27-MAR-23 by Nat Long

This batch was reviewed by Nat Long on 27-MAR-23 and Kenshalla Oston on 28-MAR-23.

Batch ID:
2397396

Product:
GFC28RAL

Description: Gas Flow Radium 228
GL-RAD-A-063

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?		No	
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-228 in Liquid

Batch ID: 2397396
Analyst: Jacqueline Emond (JE1)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL-RAD-A-063 REV# 5
Instrument: LUCAS-C202389980

Due Dates for Lab: 26-MAR-2023			Package: 28-MAR-2023	SDG: 29-MAR-2023		
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
LCS	1205343481	228	1952-B	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	Ac-228 Ingrow (date)	Ac-228 Separation (date)
1	612576001	22-MAR-2023	3	300.88	300.88	03/23/23 18:42	03/27/23 12:58
2	612576002	22-MAR-2023	3	301.77	301.77	03/23/23 18:42	03/27/23 12:58
3	612576003	22-MAR-2023	3	301.42	301.42	03/23/23 18:42	03/27/23 12:58
4	612576004	22-MAR-2023	3	300.08	300.08	03/23/23 18:42	03/27/23 12:58
5	612576005	22-MAR-2023	3	304.65	304.65	03/23/23 18:42	03/27/23 12:58
6	612576006	22-MAR-2023	3	302.42	302.42	03/23/23 18:42	03/27/23 12:58
7	612576007	22-MAR-2023	3	303.15	303.15	03/23/23 18:42	03/27/23 12:58
8	612576008	22-MAR-2023	3	301.25	301.25	03/23/23 18:42	03/27/23 12:58
9	612576009	22-MAR-2023	3	301.8	301.8	03/23/23 18:42	03/27/23 12:58
10	612583001	22-MAR-2023	3	301.47	301.47	03/23/23 18:42	03/27/23 12:58
11	612583002	22-MAR-2023	3	301.62	301.62	03/23/23 18:42	03/27/23 12:58
12	612583003	22-MAR-2023	3	301.84	301.84	03/23/23 18:42	03/27/23 12:58
13	612583004	22-MAR-2023	3	303.63	303.63	03/23/23 18:42	03/27/23 12:58
14	612583005	22-MAR-2023	3	305.11	305.11	03/23/23 18:42	03/27/23 12:58
15	612583006	22-MAR-2023	3	303.97	303.97	03/23/23 18:42	03/27/23 12:58
16	1205343479 MB	22-MAR-2023	3		305.11	03/23/23 18:42	03/27/23 12:58
17	1205343480 DUP (612576001)	22-MAR-2023	3	300.6	300.6	03/23/23 18:42	03/27/23 12:58
18	1205343481 LCS	22-MAR-2023	3		305.11	03/23/23 18:42	03/27/23 12:58

Reagent/Solvent Lot ID	Description	Amount	Comments:
WORK 1951-E	Ba-133	.1 mL	Pipet Id: RAD-GFC-1795419 Data Entry Date2: 22-MAR-2023 00:00
REGNT 3879554	RGF-1.5M Ammonium Sulfate	10 mL	
REGNT 3862351	RGF-1M Citric Acid	5 mL	
REGNT 3878183	2M HCl	20 mL	
REGNT 3883537	RGF-50% Potassium Carbonate	2 mL	
REGNT 3878163	RGF-7M Nitric Acid	25 mL	
REGNT 3857893.11	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL	
REGNT DGA030723	2396801	2 g	
REGNT 3867075.26	RGF-Hydrofluoric Acid	4 mL	
REGNT 3528714	500 mg/mL Neodymium Carrier	.2 mL	
REGNT 3521298	RGF-Neodymium Substrate	5 mL	
REGNT 3875878.6	Nitric Acid	5 mL	
REGNT 3465466	Barium Carrier Ra228 REG	1 mL	

Radium-228 Liquid

Filename : RA228.XLS
 File type : Excel
 Version # : 1.4.3

Tracer S/N : 1951-E
 Tracer Exp Date : 1/10/2024
 Tracer Volume Added: 0.10

Batch : 2397396
 Analyst : JAC02417
 Prep Date : 3/22/2023
 Ra-228 Method Uncertainty : 0.1268

Procedure Code : GFC28RAL
 Parmname : Radium-228
 Required MDA : 3 pCi/L
 Ra-228 Abundance : 1.00
 Halflife of Ra-228 : 5.75 years
 Halflife of Ac-228 : 6.15 hours

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	612576001.1	0.3009	1.8474E-05	2/8/2023 13:40	1218.3	1.65%	892.7	1.93%	0.1	0.000200
2	612576002.1	0.3018	1.8489E-05	2/8/2023 12:23	1218.3	1.65%	959.3	1.86%	0.1	0.000200
3	612576003.1	0.3014	1.8483E-05	2/8/2023 11:06	1218.3	1.65%	1003.8	1.82%	0.1	0.000200
4	612576004.1	0.3001	1.8460E-05	2/8/2023 9:11	1218.3	1.65%	932.0	1.89%	0.1	0.000200
5	612576005.1	0.3047	1.8537E-05	2/8/2023 14:53	1218.3	1.65%	797.1	2.04%	0.1	0.000200
6	612576006.1	0.3024	1.8500E-05	2/8/2023 16:04	1218.3	1.65%	859.0	1.97%	0.1	0.000200
7	612576007.1	0.3032	1.8512E-05	2/8/2023 9:11	1218.3	1.65%	929.3	1.89%	0.1	0.000200
8	612576008.1	0.3013	1.8480E-05	2/8/2023 8:15	1218.3	1.65%	867.5	1.96%	0.1	0.000200
9	612576009.1	0.3018	1.8489E-05	2/8/2023 17:22	1218.3	1.65%	1005.1	1.82%	0.1	0.000200
10	612583001.1	0.3015	1.8484E-05	2/9/2023 12:58	1218.3	1.65%	1072.3	1.76%	0.1	0.000200
11	612583002.1	0.3016	1.8486E-05	2/9/2023 17:10	1218.3	1.65%	871.7	1.96%	0.1	0.000200
12	612583003.1	0.3018	1.8490E-05	2/9/2023 14:23	1218.3	1.65%	819.9	2.02%	0.1	0.000200
13	612583004.1	0.3036	1.8520E-05	2/9/2023 15:40	1218.3	1.65%	797.8	2.04%	0.1	0.000200
14	612583005.1	0.3051	1.8544E-05	2/9/2023 14:23	1218.3	1.65%	898.5	1.93%	0.1	0.000200
15	612583006.1	0.3040	1.8526E-05	2/9/2023 9:30	1218.3	1.65%	897.9	1.93%	0.1	0.000200
16	1205343479.1	0.3051	1.8544E-05	3/22/2023 0:00	1218.3	1.65%	1005.3	1.82%	0.1	0.000200
17	1205343480.1	0.3006	1.8469E-05	2/8/2023 13:40	1218.3	1.65%	1041.3	1.79%	0.1	0.000200
18	1205343481.1	0.3051	1.8544E-05	3/22/2023 0:00	1218.3	1.65%	962.5	1.86%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-063
 Instrument SOP: GL-RAD-I-016

Count raw Data														
Pos.	Detector ID	Counting Time (min.)	Gross Counts		Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Calculated Sample Recovery %	Sample Recovery Error %
			Alpha	Beta										
1	1A	60	11	100	1.667	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.793	1.000	1.057	73.3%	2.55%
2	1B	60	13	31	0.517	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.793	1.000	1.057	78.7%	2.50%
3	1C	60	8	70	1.167	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.793	1.000	1.057	82.4%	2.47%
4	1D	60	2	27	0.450	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.793	1.000	1.057	76.5%	2.52%
5	2A	60	8	45	0.750	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.793	1.000	1.057	65.4%	2.64%
6	2C	60	9	69	1.150	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.793	1.000	1.057	70.5%	2.59%
7	3B	60	4	44	0.733	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	76.3%	2.52%
8	3C	60	5	73	1.217	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	71.2%	2.58%
9	3D	60	4	21	0.350	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	82.5%	2.47%
10	4A	60	12	53	0.883	3/27/2023 15:02	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	88.0%	2.43%
11	4C	60	4	77	1.283	3/27/2023 15:02	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	71.5%	2.58%
12	4D	60	5	33	0.550	3/27/2023 15:02	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	67.3%	2.62%
13	5A	60	5	93	1.550	3/27/2023 15:02	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	65.5%	2.64%
14	5B	60	14	57	0.950	3/27/2023 15:02	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	73.7%	2.55%
15	5C	60	10	38	0.633	3/27/2023 15:02	3/23/2023 18:42	3/27/2023 12:58	0.985	0.792	1.000	1.057	73.7%	2.55%
16	5D	60	5	36	0.600	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.998	0.793	1.000	1.057	82.5%	2.47%
17	7A	60	6	51	0.850	3/27/2023 15:01	3/23/2023 18:42	3/27/2023 12:58	0.985	0.793	1.000	1.057	85.5%	2.45%
18	7B	60	10	906	15.100	3/27/2023 15:06	3/23/2023 18:42	3/27/2023 12:58	0.998	0.786	1.000	1.057	79.0%	2.50%

Calibration Data								
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2022	5/31/2023	0.6209	0.00738	0.684	3/24/2023 18:31	500
2	PIC	6/1/2022	5/31/2023	0.6068	0.00711	0.548	3/24/2023 18:31	500
3	PIC	6/1/2022	5/31/2023	0.6190	0.00847	0.764	3/24/2023 18:31	500
4	PIC	6/1/2022	5/31/2023	0.6048	0.00692	0.508	3/24/2023 18:31	500
5	PIC	6/1/2022	5/31/2023	0.6201	0.01914	0.928	3/24/2023 18:33	500
6	PIC	6/1/2022	5/31/2023	0.6022	0.01274	0.694	3/24/2023 18:33	500
7	PIC	6/1/2022	5/31/2023	0.6245	0.01614	0.554	3/24/2023 18:31	500
8	PIC	6/1/2022	5/31/2023	0.6365	0.00988	1.420	3/24/2023 18:31	500
9	PIC	6/1/2022	5/31/2023	0.5999	0.02297	0.304	3/24/2023 18:32	500
10	PIC	6/1/2022	5/31/2023	0.6013	0.01123	0.668	3/24/2023 18:32	500
11	PIC	6/1/2022	5/31/2023	0.6359	0.00889	0.700	3/24/2023 18:32	500
12	PIC	6/1/2022	5/31/2023	0.5954	0.00773	0.524	3/24/2023 18:32	500
13	PIC	6/1/2022	5/31/2023	0.6332	0.00851	0.868	3/24/2023 18:32	500
14	PIC	6/1/2022	5/31/2023	0.6336	0.00426	0.814	3/24/2023 18:32	500
15	PIC	6/1/2022	5/31/2023	0.6242	0.00657	0.640	3/24/2023 18:32	500
16	PIC	6/1/2022	5/31/2023	0.6236	0.00925	0.542	3/24/2023 18:32	500
17	PIC	6/1/2022	5/31/2023	0.6257	0.00594	0.478	3/24/2023 18:28	500
18	PIC	6/1/2022	5/31/2023	0.6366	0.00627	0.592	3/24/2023 18:29	500

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

LCS S/N : 1952-B
LCS Exp Date : 8/9/2023
LCS Activity (dpm/ml): 423.23
LCS Volume Added: 0.10

Results																2 SIGMA		2 SIGMA	
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	Sample Act. MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	Counting Uncertainty pCi/L	Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery			
1	1.1733	0.8284	3	1.8796	4.3793	17.58%	0.9827	0.1707	1.4912	1.8602		SAMPLE							
2	0.9972	0.7040	3	1.6196	-0.1326	314.45%	-0.0313	0.0985	0.8171	0.8173		SAMPLE							
3	1.1046	0.7799	3	1.7582	1.5985	36.06%	0.4027	0.1448	1.1268	1.1976		SAMPLE							
4	0.9974	0.7041	3	1.6281	-0.2550	159.13%	-0.0580	0.0923	0.7951	0.7953		SAMPLE							
5	1.5143	1.0691	3	2.3851	-0.8789	67.39%	-0.1780	0.1198	1.1596	1.1598		SAMPLE							
6	1.2606	0.8900	3	2.0176	2.1675	31.57%	0.4560	0.1434	1.3357	1.4454		SAMPLE							
7	1.0018	0.7073	3	1.6260	0.7582	64.45%	0.1793	0.1155	0.9568	0.9762		SAMPLE							
8	1.6966	1.1978	3	2.6192	-0.9094	74.83%	-0.2033	0.1520	1.3328	1.3329		SAMPLE							
9	0.7174	0.5065	3	1.2174	0.1880	174.51%	0.0460	0.0803	0.6430	0.6448		SAMPLE							
10	0.9957	0.7030	3	1.5973	0.8241	58.91%	0.2153	0.1267	0.9505	0.9733		SAMPLE							
11	1.1849	0.8365	3	1.8955	2.5951	26.02%	0.5833	0.1510	1.3163	1.4723		SAMPLE							
12	1.1635	0.8214	3	1.8953	0.1313	388.73%	0.0260	0.1011	1.0002	1.0007		SAMPLE							
13	1.4389	1.0159	3	2.2743	3.3087	24.50%	0.6820	0.1660	1.5789	1.7892		SAMPLE							
14	1.2307	0.8689	3	1.9520	0.5828	97.20%	0.1360	0.1321	1.1098	1.1196		SAMPLE							
15	1.1130	0.7858	3	1.7900	-0.0291	1631.87%	-0.0067	0.1088	0.9319	0.9320		SAMPLE							
16	0.8980	0.6340	3	1.4595	0.2222	181.54%	0.0580	0.1053	0.7906	0.7926		MB							
17	0.8351	0.5896	3	1.3689	1.4115	33.15%	0.3720	0.1230	0.9145	0.9820	612576001.1	DUP	102.5%	2.7653					
18	0.9695	0.6845	3	1.5669	57.4284	4.32%	14.5080	0.5028	3.9013	15.0784		LCS			62.4835	91.9%			

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
612576001	1A	60	11	100	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576002	1B	60	13	31	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576003	1C	60	8	70	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576004	1D	60	2	27	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576005	2A	60	8	45	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576006	2C	60	9	69	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576007	3B	60	4	44	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576008	3C	60	5	73	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612576009	3D	60	4	21	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
612583001	4A	60	12	53	3/27/2023 15:02	3/27/2023 16:02	PIC	2397396
612583002	4C	60	4	77	3/27/2023 15:02	3/27/2023 16:02	PIC	2397396
612583003	4D	60	5	33	3/27/2023 15:02	3/27/2023 16:02	PIC	2397396
612583004	5A	60	5	93	3/27/2023 15:02	3/27/2023 16:02	PIC	2397396
612583005	5B	60	14	57	3/27/2023 15:02	3/27/2023 16:02	PIC	2397396
612583006	5C	60	10	38	3/27/2023 15:02	3/27/2023 16:02	PIC	2397396
1205343479	5D	60	5	36	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
1205343480	7A	60	6	51	3/27/2023 15:01	3/27/2023 16:01	PIC	2397396
1205343481	7B	60	10	906	3/27/2023 15:06	3/27/2023 16:06	PIC	2397396

ASSAY 27-Mar-23 13:34:27
 Wizard 2480 s/n 46190630
 Protocol id 8 Ba-133
 Time limit
 Count limit
 Isotope Ba-133
 Protocol date 3/27/2023
 Run id. 6396

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF		1	93	1	180	3655.57	1218.34	1.65	01:34:27
612576001	2	93	2	180	2678.57	892.69	1.93	73.27	01:37:40
612576002	3	93	3	180	2878.28	959.28	1.86	78.74	01:40:54
612576003	4	93	4	180	3012	1003.75	1.82	82.39	01:44:08
612576004	5	93	5	180	2796.57	932.04	1.89	76.50	01:47:23
612576005	1	14	1	180	2391.57	797.06	2.04	65.42	01:50:58
612576006	2	14	2	180	2577.57	859.04	1.97	70.51	01:54:12
612576007	3	14	3	180	2788.57	929.28	1.89	76.27	01:57:26
612576008	4	14	4	180	2603	867.52	1.96	71.21	02:00:40
612576009	5	14	5	180	3016	1005.14	1.82	82.50	02:03:54
612583001	1	2	1	180	3217.57	1072.3	1.76	88.01	02:07:31
612583002	2	2	2	180	2615.57	871.71	1.96	71.55	02:10:45
612583003	3	2	3	180	2460	819.89	2.02	67.30	02:13:58
612583004	4	2	4	180	2393.57	797.8	2.04	65.48	02:17:12
612583005	5	2	5	180	2695.85	898.47	1.93	73.75	02:20:27
612583006	1	10	1	180	2694	897.86	1.93	73.70	02:24:09
1205343479	2	10	2	180	3016.28	1005.27	1.82	82.51	02:27:23
1205343480	3	10	3	180	3124.28	1041.3	1.79	85.47	02:30:37
1205343481	4	10	4	180	2888	962.51	1.86	79.00	02:33:51

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 27-Mar-2023

Detectors LB4100 A1 through I4 and PIC 1A through 14D and G5400W 1W through 1Z and LB4200 OA1 through OA1

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100E2	Above	Beta bkg	27-Mar 06:45	60	2.817	1.385	3.072	+2.09
LB4100E3	Above	Beta bkg	27-Mar 06:45	60	2.600	0.484	2.814	+2.45
LB4100F1	Above	Beta bkg	27-Mar 06:45	60	3.333	0.188	2.691	+4.54
LB4100F2	Below	Alpha eff	27-Mar 05:41	5	6168	6533	7372	-5.61
LB4100F2	Above	Alpha XTalk	27-Mar 05:41	5	0.373	0.318	0.366	+3.86
LB4100F2	Above	Beta bkg	27-Mar 06:45	60	51.550	1.173	1.833	+454.97
LB4100F3	need 2nd	Beta bkg	27-Mar 06:45	60	1.700	0.185	2.570	+0.81
LB4100G1	Above	Beta bkg	27-Mar 06:46	60	3438	0.380	1.675	+15,926.73
LB4100G2	Above	Beta bkg	27-Mar 06:46	60	2.417	1.168	2.328	+3.46
LB4100G3	Above	Beta bkg	27-Mar 06:46	60	2.167	0.987	2.738	+1.04
LB4100H1	Above	Beta bkg	27-Mar 06:45	60	3.200	0.216	2.462	+4.97
LB4100H3	Above	Beta bkg	27-Mar 06:45	60	3.000	-8.10E-1	3.745	+2.02
PIC4B	Above	Alpha bkg	27-Mar 07:00	60	0.450	-9.58E-2	0.436	+3.16
PIC4B	Above	Beta bkg	27-Mar 07:00	60	2.467	-2.76E-1	1.864	+4.69
PIC4B	Below	Beta eff	27-Mar 05:48	5	12957	19730	21460	-26.49
PIC4B	Above	Beta XTalk	27-Mar 05:48	5	0.010	2.14E-4	7.66E-4	+105.36
PIC6B	Above	Beta bkg	27-Mar 10:07	60	3.683	0.389	2.636	+5.80
PIC8A	Above	Beta bkg	27-Mar 06:14	60	3.000	-2.72E-1	2.644	+3.73
PIC12C	Above	Beta bkg	27-Mar 06:26	60	2.433	0.142	2.845	+2.09

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100A1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

LB4100I1 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I2 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I3 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I4 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4200OA1 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by Lois Buis

Date 3/27/2023

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC

Batch ID: 2397396

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1205343479	MB	JE1	PIC5D	MAR-27-23 15:01:13	DONE	25mm Filter	01-JUN-22 00:00
1205343480	DUP	JE1	PIC7A	MAR-27-23 15:01:24	DONE	25mm Filter	01-JUN-22 00:00
612576001	SAMPLE	JE1	PIC1A	MAR-27-23 15:01:25	DONE	25mm Filter	01-JUN-22 00:00
612576002	SAMPLE	JE1	PIC1B	MAR-27-23 15:01:29	DONE	25mm Filter	01-JUN-22 00:00
612576003	SAMPLE	JE1	PIC1C	MAR-27-23 15:01:33	DONE	25mm Filter	01-JUN-22 00:00
612576004	SAMPLE	JE1	PIC1D	MAR-27-23 15:01:36	DONE	25mm Filter	01-JUN-22 00:00
612576005	SAMPLE	JE1	PIC2A	MAR-27-23 15:01:40	DONE	25mm Filter	01-JUN-22 00:00
612576006	SAMPLE	JE1	PIC2C	MAR-27-23 15:01:46	DONE	25mm Filter	01-JUN-22 00:00
612576007	SAMPLE	JE1	PIC3B	MAR-27-23 15:01:50	DONE	25mm Filter	01-JUN-22 00:00
612576008	SAMPLE	JE1	PIC3C	MAR-27-23 15:01:53	DONE	25mm Filter	01-JUN-22 00:00
612576009	SAMPLE	JE1	PIC3D	MAR-27-23 15:01:56	DONE	25mm Filter	01-JUN-22 00:00
612583001	SAMPLE	JE1	PIC4A	MAR-27-23 15:02:02	DONE	25mm Filter	01-JUN-22 00:00
612583002	SAMPLE	JE1	PIC4C	MAR-27-23 15:02:05	DONE	25mm Filter	01-JUN-22 00:00
612583003	SAMPLE	JE1	PIC4D	MAR-27-23 15:02:11	DONE	25mm Filter	01-JUN-22 00:00
612583004	SAMPLE	JE1	PIC5A	MAR-27-23 15:02:19	DONE	25mm Filter	01-JUN-22 00:00
612583005	SAMPLE	JE1	PIC5B	MAR-27-23 15:02:24	DONE	25mm Filter	01-JUN-22 00:00
612583006	SAMPLE	JE1	PIC5C	MAR-27-23 15:02:27	DONE	25mm Filter	01-JUN-22 00:00
1205343481	LCS	JE1	PIC7B	MAR-27-23 15:06:25	DONE	25mm Filter	01-JUN-22 00:00

Lucas Cell Raw Data

Batch 2397378 Check-list

This check-list was completed on 30-MAR-23 by Lyndsey Pace

This batch was reviewed by Elizabeth Krouse on 30-MAR-23 and Lyndsey Pace on 30-MAR-23.

Batch ID:
2397378

Product:
LUC26RAL

Description: Lucas Cell Radium 226
GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-226 in Liquid

Batch ID: 2397378
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL-RAD-A-008 REV# 15
Instrument: LUCAS-C202389980

Due Dates for Lab: 26-MAR-2023			Package: 28-MAR-2023	SDG: 29-MAR-2023		
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
MS	1205343414	Radium-226 SPIKE	1715-G	.1	mL	
LCS	1205343415	Radium-226 SPIKE	1715-G	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	End Degas (date)	CELL #	End Transfer (date)	Start Count Time (date)	Background Counts	Total Counts
1	612576001	22-MAR-2023	1	500.62	500.62	03/27/23 09:15	703	03/30/23 06:12	03/30/23 09:33	1	12
2	612576002	22-MAR-2023	1	506.46	506.46	03/27/23 09:15	804	03/30/23 06:12	03/30/23 09:33	3	3
3	612576003	22-MAR-2023	1	502.08	502.08	03/27/23 09:15	104	03/30/23 06:40	03/30/23 09:50	4	6
4	612576004	22-MAR-2023	1	502.97	502.97	03/27/23 09:15	204	03/30/23 06:40	03/30/23 10:08	6	8
5	612576005	22-MAR-2023	1	500.72	500.72	03/27/23 09:15	302	03/30/23 06:40	03/30/23 10:08	4	8
6	612576006	22-MAR-2023	1	500.23	500.23	03/27/23 09:15	408	03/30/23 06:40	03/30/23 10:08	6	14
7	612576007	22-MAR-2023	1	504.44	504.44	03/27/23 09:15	502	03/30/23 06:40	03/30/23 10:08	1	6
8	612576008	22-MAR-2023	1	500.76	500.76	03/27/23 09:15	607	03/30/23 06:40	03/30/23 10:08	1	18
9	612576009	22-MAR-2023	1	500.34	500.34	03/27/23 09:15	708	03/30/23 06:40	03/30/23 10:08	2	1
10	612583001	22-MAR-2023	1	500.33	500.33	03/27/23 09:15	806	03/30/23 06:40	03/30/23 10:08	3	4
11	612583002	22-MAR-2023	1	501.17	501.17	03/27/23 09:15	106	03/30/23 07:08	03/30/23 10:08	1	10
12	612583003	22-MAR-2023	1	504.54	504.54	03/27/23 09:15	202	03/30/23 07:08	03/30/23 10:26	2	19
13	612583004	22-MAR-2023	1	503.43	503.43	03/27/23 09:15	304	03/30/23 07:08	03/30/23 10:26	3	12
14	612583005	22-MAR-2023	1	505.26	505.26	03/27/23 09:15	402	03/30/23 07:08	03/30/23 10:26	8	18
15	612583006	22-MAR-2023	1	501.2	501.2	03/27/23 09:15	503	03/30/23 07:08	03/30/23 10:26	4	2
16	1205343412 MB	22-MAR-2023	1		506.46	03/27/23 09:15	602	03/30/23 07:08	03/30/23 10:26	2	3
17	1205343413 DUP (612576001)	22-MAR-2023	1	502.64	502.64	03/27/23 09:15	707	03/30/23 07:08	03/30/23 10:26	2	16
18	1205343414 MS (612576001)	22-MAR-2023	1	100.46	100.46	03/27/23 09:15	803	03/30/23 07:08	03/30/23 10:26	2	283
19	1205343415 LCS	22-MAR-2023	1		506.46	03/27/23 09:15	107	03/30/23 07:35	03/30/23 10:26	5	304

Reagent/Solvent Lot ID	Description	Amount	Comments:
			Data Entry Date2: 22-MAR-2023 00:00

Radium-226 Liquid

Filename : RA226.XLS
 File type : Excel
 Version # : 1.3.2

Procedure Code : LUC26RAL
 Parmname : Radium-226
 Required MDA : 1 pCi/L
 Halflife of Ra-226 : 1600 years
 Ra-226 Abundance : 1.00
 Halflife of Rn-222 : 3.8235 days

Batch : 2397378
 Analyst : LIN01615
 Prep Date : 3/22/2023
 Ra-226 Method Uncertainty : 0.073648

Batch counted on : LUCAS CELL DETECTOR
 BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Count Time (min.)	Cell Efficiency (cpm/dpm)
1	612576001.1	0.5006	2.0258E-05	2/8/2023 13:40	703	15	12	0.800	1	0.033	30	1.6440
2	612576002.1	0.5065	2.0282E-05	2/8/2023 12:23	804	15	3	0.200	3	0.100	30	1.9050
3	612576003.1	0.5021	2.0264E-05	2/8/2023 11:06	104	15	6	0.400	4	0.133	30	1.6160
4	612576004.1	0.5030	2.0268E-05	2/8/2023 9:11	204	15	8	0.533	6	0.200	30	1.8470
5	612576005.1	0.5007	2.0259E-05	2/8/2023 14:53	302	15	8	0.533	4	0.133	30	1.7980
6	612576006.1	0.5002	2.0257E-05	2/8/2023 16:04	408	15	14	0.933	6	0.200	30	1.5020
7	612576007.1	0.5044	2.0274E-05	2/8/2023 9:11	502	15	6	0.400	1	0.033	30	1.8630
8	612576008.1	0.5008	2.0259E-05	2/8/2023 8:15	607	15	18	1.200	1	0.033	30	1.8040
9	612576009.1	0.5003	2.0257E-05	2/8/2023 17:22	708	15	1	0.067	2	0.067	30	1.6020
10	612583001.1	0.5003	2.0257E-05	2/9/2023 12:58	806	15	4	0.267	3	0.100	30	1.9460
11	612583002.1	0.5012	2.0261E-05	2/9/2023 17:10	106	15	10	0.667	1	0.033	30	1.6990
12	612583003.1	0.5045	2.0274E-05	2/9/2023 14:23	202	15	19	1.267	2	0.067	30	1.8360
13	612583004.1	0.5034	2.0270E-05	2/9/2023 15:40	304	15	12	0.800	3	0.100	30	1.8850
14	612583005.1	0.5053	2.0277E-05	2/9/2023 14:23	402	15	18	1.200	8	0.267	30	1.4980
15	612583006.1	0.5012	2.0261E-05	2/9/2023 9:30	503	15	2	0.133	4	0.133	30	2.1390
16	1205343412.1	0.5065	2.0282E-05	3/22/2023 0:00	602	15	3	0.200	2	0.067	30	1.8620
17	1205343413.1	0.5026	2.0267E-05	2/8/2023 13:40	707	15	16	1.067	2	0.067	30	1.7280
18	1205343414.1	0.1005	1.1398E-05	2/8/2023 13:40	803	15	283	18.867	2	0.067	30	2.0020
19	1205343415.1	0.5065	2.0282E-05	3/22/2023 0:00	107	15	304	20.267	5	0.167	30	1.6990

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-008
 Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrow End Date/Time	Count Start Date/Time	Rn-222 Corrections			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
9.000%	11/1/2022	10/31/2023	3/27/2023 9:15	3/30/2023 6:12	3/30/2023 9:33	0.406	0.975	1.001	1.000
9.900%	4/1/2022	3/31/2023	3/27/2023 9:15	3/30/2023 6:12	3/30/2023 9:33	0.406	0.975	1.001	1.000
2.000%	4/28/2022	4/30/2023	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 9:50	0.408	0.976	1.001	1.000
7.400%	8/1/2022	7/31/2023	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 10:08	0.408	0.974	1.001	1.000
3.300%	10/25/2022	10/31/2023	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 10:08	0.408	0.974	1.001	1.000
7.000%	2/1/2023	1/31/2024	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 10:08	0.408	0.974	1.001	1.000
6.700%	6/1/2022	5/31/2023	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 10:08	0.408	0.974	1.001	1.000
3.400%	7/1/2022	6/30/2023	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 10:08	0.408	0.974	1.001	1.000
7.700%	11/1/2022	10/31/2023	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 10:08	0.408	0.974	1.001	1.000
7.300%	4/1/2022	3/31/2023	3/27/2023 9:15	3/30/2023 6:40	3/30/2023 10:08	0.408	0.974	1.001	1.000
8.800%	4/28/2022	4/30/2023	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:08	0.410	0.978	1.001	1.000
5.100%	8/1/2022	7/31/2023	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:26	0.410	0.975	1.001	1.000
8.900%	10/25/2022	10/31/2023	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:26	0.410	0.975	1.001	1.000
5.300%	2/1/2023	1/31/2024	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:26	0.410	0.975	1.001	1.000
5.000%	6/1/2022	5/31/2023	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:26	0.410	0.975	1.001	1.000
5.700%	7/1/2022	6/30/2023	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:26	0.410	0.975	1.001	1.000
2.200%	11/1/2022	10/31/2023	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:26	0.410	0.975	1.001	1.000
7.300%	4/1/2022	3/31/2023	3/27/2023 9:15	3/30/2023 7:08	3/30/2023 10:26	0.410	0.975	1.001	1.000
3.900%	4/28/2022	4/30/2023	3/27/2023 9:15	3/30/2023 7:35	3/30/2023 10:26	0.412	0.979	1.001	1.000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1715-G
Spike Exp Date : 9/8/2023
Spike Activity (dpm/ml): 297.43
Spike Volume Added: 0.10

LCS S/N : 1715-G
LCS Exp Date : 9/8/2023
LCS Activity (dpm/ml): 297.43
LCS Volume Added: 0.10


Results																
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.1862	0.1315	1	0.5397	1.0612	31.74%	0.7667	0.2333	0.6330	0.6776		SAMPLE				
2	0.2751	0.1942	1	0.6246	0.1181	129.48%	0.1000	0.1291	0.2988	0.3001		SAMPLE				
3	0.3753	0.2650	1	0.8089	0.3720	66.17%	0.2667	0.1764	0.4822	0.4854		SAMPLE				
4	0.4023	0.2841	1	0.8123	0.4070	62.09%	0.3333	0.2055	0.4918	0.4988		SAMPLE				
5	0.3390	0.2393	1	0.7306	0.5040	50.11%	0.4000	0.2000	0.4939	0.5003		SAMPLE				
6	0.4975	0.3512	1	1.0044	1.1071	36.47%	0.7333	0.2625	0.7766	0.8073		SAMPLE				
7	0.1624	0.1146	1	0.4707	0.4426	45.95%	0.3667	0.1667	0.3943	0.4036		SAMPLE				
8	0.1689	0.1193	1	0.4896	1.4649	24.65%	1.1667	0.2848	0.7009	0.7386		SAMPLE				
9	0.2692	0.1901	1	0.6632	0.000E+00	0.00%	0.0000	0.0816	0.2265	0.2267		SAMPLE				
10	0.2714	0.1916	1	0.6163	0.1942	87.48%	0.1667	0.1453	0.3318	0.3341		SAMPLE				
11	0.1777	0.1254	1	0.5150	0.8365	34.83%	0.6333	0.2134	0.5525	0.5837		SAMPLE				
12	0.2315	0.1634	1	0.5702	1.4601	25.06%	1.2000	0.2944	0.7021	0.7474		SAMPLE				
13	0.2767	0.1954	1	0.6283	0.8314	35.15%	0.7000	0.2380	0.5542	0.5853		SAMPLE				
14	0.5666	0.4000	1	1.0979	1.3899	32.38%	0.9333	0.2981	0.8702	0.9046		SAMPLE				
15	0.2829	0.1997	1	0.6097	0.000E+00	0.00%	0.0000	0.1155	0.2379	0.2380		SAMPLE				
16	0.2274	0.1605	1	0.5601	0.1594	93.71%	0.1333	0.1247	0.2922	0.2936		MB				
17	0.2469	0.1743	1	0.6081	1.2977	27.17%	1.0000	0.2708	0.6888	0.7160	612576001.1	DUP	20.1%			
18	1.0662	0.7527	1	2.6263	105.3599	9.43%	18.8000	1.1225	12.3299	24.7100	612576001.1	MS			133.3686	78.2%
19	0.3908	0.2759	1	0.8116	26.1108	6.98%	20.1000	1.1648	2.9656	5.1947		LCS			26.4533	98.7%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 30-MAR-2023

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	07:37	1	1.19E+05	119307	-1.83		
LUCAS2	EFF	07:36	1	1.34E+05	134035	0.26		
LUCAS3	EFF	07:35	1	1.00E+05	100006	-2.52		
LUCAS4	EFF	07:33	1	1.28E+05	128494	0.9		
LUCAS5	EFF	07:32	1	1.33E+05	133444	0.84		
LUCAS6	EFF	07:31	1	1.29E+05	129492	-1.29		
LUCAS7	EFF	07:29	1	1.34E+05	133959	2.48		
LUCAS8	EFF	07:27	1	1.23E+05	123440	-1.82		

Reviewed by:


Lyndsey Pace

Date: 30-MAR-23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR

Batch ID: 2397378

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
612576001	SAMPLE	LXP1	LUCAS7	MAR-30-23 09:33:00	DONE	Lucas Cell	01-NOV-22 00:00
612576002	SAMPLE	LXP1	LUCAS8	MAR-30-23 09:33:00	DONE	Lucas Cell	01-APR-22 00:00
612576003	SAMPLE	LXP1	LUCAS1	MAR-30-23 09:50:00	DONE	Lucas Cell	28-APR-22 00:00
612576004	SAMPLE	LXP1	LUCAS2	MAR-30-23 10:08:00	DONE	Lucas Cell	01-AUG-22 00:00
612576005	SAMPLE	LXP1	LUCAS3	MAR-30-23 10:08:00	DONE	Lucas Cell	25-OCT-22 00:00
612576006	SAMPLE	LXP1	LUCAS4	MAR-30-23 10:08:00	DONE	Lucas Cell	01-FEB-23 00:00
612576007	SAMPLE	LXP1	LUCAS5	MAR-30-23 10:08:00	DONE	Lucas Cell	01-JUN-22 00:00
612576008	SAMPLE	LXP1	LUCAS6	MAR-30-23 10:08:00	DONE	Lucas Cell	01-JUL-22 00:00
612576009	SAMPLE	LXP1	LUCAS7	MAR-30-23 10:08:00	DONE	Lucas Cell	01-NOV-22 00:00
612583001	SAMPLE	LXP1	LUCAS8	MAR-30-23 10:08:00	DONE	Lucas Cell	01-APR-22 00:00
612583002	SAMPLE	LXP1	LUCAS1	MAR-30-23 10:08:00	DONE	Lucas Cell	28-APR-22 00:00
612583003	SAMPLE	LXP1	LUCAS2	MAR-30-23 10:26:00	DONE	Lucas Cell	01-AUG-22 00:00
612583004	SAMPLE	LXP1	LUCAS3	MAR-30-23 10:26:00	DONE	Lucas Cell	25-OCT-22 00:00
612583005	SAMPLE	LXP1	LUCAS4	MAR-30-23 10:26:00	DONE	Lucas Cell	01-FEB-23 00:00
612583006	SAMPLE	LXP1	LUCAS5	MAR-30-23 10:26:00	DONE	Lucas Cell	01-JUN-22 00:00
1205343412	MB	LXP1	LUCAS6	MAR-30-23 10:26:00	DONE	Lucas Cell	01-JUL-22 00:00
1205343413	DUP	LXP1	LUCAS7	MAR-30-23 10:26:00	DONE	Lucas Cell	01-NOV-22 00:00
1205343414	MS	LXP1	LUCAS8	MAR-30-23 10:26:00	DONE	Lucas Cell	01-APR-22 00:00
1205343415	LCS	LXP1	LUCAS1	MAR-30-23 10:26:00	DONE	Lucas Cell	28-APR-22 00:00



Report ID: S45490.01(02)
Generated on 03/21/2023
Replaces report S45490.01(01) generated on 02/21/2023

Report to
Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

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Report Summary
Lab Sample ID(s): S45490.01-S45490.04
Project: Erickson AM MI Wells 14-15
Collected Date(s): 02/17/2023
Submitted Date/Time: 02/17/2023 15:02
Sampled by: Marc Wahrer
P.O. #:

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Maya Murshak
Technical Director



General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile, and 2-chloroethylvinyl ether need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the

FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

All analyses completed



Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1 (1993)
SM2320B	Standard Method 2320 B 2011
SM2340C	Standard Method 2340 C 2011
SM2540C	Standard Method 2540 C 2015
SM2540D	Standard Method 2540 D 2015
SW3015A	SW 846 Method 3015A Revision 1 February 2007



Sample Summary (4 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S45490.01	MW-14 L302181-01	Groundwater	02/17/23 11:15
S45490.02	MW-15 L302181-02	Groundwater	02/17/23 13:10
S45490.03	MWT-14 L302181-03	Groundwater	02/17/23 11:15
S45490.04	Field Blank L302181-04	Water	02/17/23 10:20



Analytical Laboratory Report

Final Report

Lab Sample ID: S45490.01

Sample Tag: MW-14 L302181-01

Collected Date/Time: 02/17/2023 11:15

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	5.7	IR
2	1L Plastic	None	Yes	5.7	IR
1	250ml Plastic	HNO3	Yes	5.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/20/23 12:58	CTV	
Metal Digestion	Completed	SW3015A	02/20/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/20/23 10:12, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	111	10	0.13	mg/L	10	16887-00-6	

Method: E300.0, Run Date: 02/20/23 09:27, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	22	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/20/23 08:06, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	601	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/21/23 12:00, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	498	10	0.238	mg/L	1		

Method: SM2540C, Run Date: 02/17/23 19:20, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	732	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/20/23 17:30, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	4	3	1	mg/L	5		

Metals

Method: E200.8, Run Date: 02/20/23 11:33, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.006	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.119	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	2.23	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Lab Sample ID: S45490.01 (continued)

Sample Tag: MW-14 L302181-01

Method: E200.8, Run Date: 02/20/23 11:33, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	9.46	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.122	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.015	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	0.005	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/20/23 13:26, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	144	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	41.3	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	5.82	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	78.3	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/20/23 15:26, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/20/23 13:20, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S45490.02

Sample Tag: MW-15 L302181-02

Collected Date/Time: 02/17/2023 13:10

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	5.7	IR
2	1L Plastic	None	Yes	5.7	IR
1	250ml Plastic	HNO3	Yes	5.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/20/23 12:58	CTV	
Metal Digestion	Completed	SW3015A	02/20/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/20/23 09:37, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: E300.0, Run Date: 02/20/23 10:34, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	84	10	0.13	mg/L	10	16887-00-6	
Sulfate	135	10	1.0	mg/L	10	14808-79-8	

Method: SM2320B, Run Date: 02/20/23 08:10, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	354	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/21/23 13:07, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	473	10	0.238	mg/L	1		

Method: SM2540C, Run Date: 02/17/23 19:20, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	606	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/20/23 17:30, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/20/23 11:38, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.050	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.34	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45490.02 (continued)

Sample Tag: MW-15 L302181-02

Method: E200.8, Run Date: 02/20/23 11:38, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	0.04	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	0.026	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/20/23 13:29, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	140	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	35.1	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	Not detected	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	30.3	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/20/23 15:29, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/20/23 13:20, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Lab Sample ID: S45490.03

Sample Tag: MWT-14 L302181-03
 Collected Date/Time: 02/17/2023 11:15
 Matrix: Groundwater
 COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	5.7	IR
2	1L Plastic	None	Yes	5.7	IR
1	250ml Plastic	HNO3	Yes	5.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/20/23 12:58	CTV	
Metal Digestion	Completed	SW3015A	02/20/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/20/23 11:14, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	112	10	0.13	mg/L	10	16887-00-6	

Method: E300.0, Run Date: 02/20/23 09:47, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	21	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 02/20/23 08:14, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	606	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/21/23 13:14, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	506	10	0.238	mg/L	1		

Method: SM2540C, Run Date: 02/17/23 19:20, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	716	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/20/23 17:30, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	7	3	1	mg/L	2.86		

Metals

Method: E200.8, Run Date: 02/20/23 11:42, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.005	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.116	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	2.20	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Final Report

Lab Sample ID: S45490.03 (continued)

Sample Tag: MWT-14 L302181-03

Method: E200.8, Run Date: 02/20/23 11:42, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	9.35	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.126	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.014	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 02/20/23 13:31, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	144	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	41.2	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	5.81	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	77.9	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 02/20/23 15:33, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/20/23 13:20, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S45490.04

Sample Tag: Field Blank L302181-04

Collected Date/Time: 02/17/2023 10:20

Matrix: Water

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	5.7	IR
2	1L Plastic	None	Yes	5.7	IR
1	250ml Plastic	HNO3	Yes	5.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	02/20/23 12:58	CTV	
Metal Digestion	Completed	SW3015A	02/20/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 02/20/23 09:47, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: E300.0, Run Date: 02/20/23 09:57, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	

Method: SM2320B, Run Date: 02/20/23 08:16, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	Not detected	10	0.5	mg/L	1	71-52-3	
Carbonate*	Not detected	10	0.5	mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 02/21/23 13:17, Analyst: PJH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	Not detected	10	0.238	mg/L	1		

Method: SM2540C, Run Date: 02/17/23 19:20, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	50	10	mg/L	2		

Method: SM2540D, Run Date: 02/20/23 17:30, Analyst: SSM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 02/20/23 11:23, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	



Analytical Laboratory Report

Lab Sample ID: S45490.04 (continued)

Sample Tag: Field Blank L302181-04

Method: E200.8, Run Date: 02/20/23 11:23, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E200.8, Run Date: 02/20/23 13:24, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	
Magnesium	Not detected	0.50	0.00480	mg/L	2	7439-95-4	
Potassium	Not detected	0.50	0.00920	mg/L	2	7440-09-7	
Sodium	Not detected	0.50	0.00340	mg/L	2	7440-23-5	

Method: E245.1, Run Date: 02/20/23 15:36, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 03/20/23 13:20, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID:S45490

Client:BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 14-15

Submitted:02/17/2023 15:02 Login User: MMC

Attention: Jennifer Caporale

Address: Board of Water & Light

P.O. Box 13007

Lansing, MI 48901

Phone: 517-702-6372

FAX:

Email: Environmental_Laboratory@LBWL.com

Selection	Description	Note
Sample Receiving		
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 5.7
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
Chain of Custody		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to: GEL
Preservation		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab?
Bottle Conditions		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Do water VOC or TOX bottles contain headspace

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S45490 Submitted: 02/17/2023 15:02

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 14-15

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Initial Preservation Check: 02/17/2023 15:20 MMC

Preservation Recheck (E200.8): N/A

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S45490.01	1L Plastic HNO3	<2			
S45490.01	1L Plastic HNO3	<2			
S45490.01	250ml Plastic HNO3	<2			
S45490.02	1L Plastic HNO3	<2			
S45490.02	1L Plastic HNO3	<2			
S45490.02	250ml Plastic HNO3	<2			
S45490.03	1L Plastic HNO3	<2			
S45490.03	1L Plastic HNO3	<2			
S45490.03	250ml Plastic HNO3	<2			
S45490.04	1L Plastic HNO3	<2			
S45490.04	1L Plastic HNO3	<2			
S45490.04	250ml Plastic HNO3	<2			



2680 East Lansing Dr., East Lansing, MI 48823
 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

REPORT TO **CHAIN OF CUSTODY RECORD** **INVOICE TO**

CONTACT NAME Jennifer Caporale
 COMPANY Lansing Board of Water and Light
 ADDRESS PO Box 13007 48901-3007
 CITY Lansing STATE Mi ZIP CODE 48901
 PHONE NO. 517-702-6372 FAX NO. P.O. NO.
 E-MAIL ADDRESS Environmental_Laboratory@lbwl.com QUOTE NO.

CONTACT NAME Beth Zimpfer FAME
 COMPANY
 ADDRESS
 CITY STATE ZIP CODE
 PHONE NO. E-MAIL ADDRESS Beth.Zimpfer@lbwl.com

PROJECT NO./NAME Erickson AM MI Wells 14-15 SAMPLER(S) - PLEASE PRINT/SIGN NAME Marc Wahrer
 TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER ASAP
 DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER

MATRIX GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 CODE: SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives							Total Metals	F-undisfiltered, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	HCO3, CO3, Hardness	Certifications	Project Locations	Special Instructions
	DATE	TIME				NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER									
45490.01	02/17/23	1115	MW-14 L302181-01	GW	5	2	3						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water	<input type="checkbox"/> Detroit <input type="checkbox"/> New York	Metals to analyse: Na, Mg, K	
.02	02/17/23	1310	MW-15 L302181-02	GW	5	2	3						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/> DoD <input checked="" type="checkbox"/> NPDES		B, Ca, Sb, As, Ba, Be, Cd, Cr,	
.03	02/17/23	1115	MWT-14 L302181-03	GW	5	2	3						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Co, Li, Hg, Mo, Pb, Se, Tl,	
.04	02/17/23	1020	Field Blank L302181-04	di	5	2	3						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			Fe, Cu, Ni, Ag, V, Zn	
																				Please send a preliminary report	

RELINQUISHED BY: *[Signature]* Sampler DATE 2/17/23 TIME 1502
 RECEIVED BY: *[Signature]* DATE 2/17/23 TIME 1502
 RELINQUISHED BY: DATE TIME
 RECEIVED BY: DATE TIME

RELINQUISHED BY: DATE TIME
 RECEIVED BY: DATE TIME
 SEAL NO. SEAL INTACT INITIALS
 YES NO
 SEAL NO. SEAL INTACT INITIALS
 YES NO
 NOTES: TEMP. ON ARRIVAL 5.7

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total		250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.150
Be, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	2.5
Cl	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cr, total	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
F	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
Fe, total	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	Nitric Acid	SM 7500	6 mos	2.0 combined
Se, total	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
Tl, total	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
TDS	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TSS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
V, total	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005



March 20, 2023

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 611797
SDG: S45490

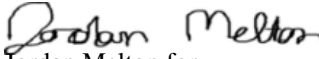
Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on February 22, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 1614.

Sincerely,


Jordan Melton for
Delaney Stone
Project Manager

Purchase Order: GELP20-0018
Enclosures



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Case Narrative

**Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S45490
Work Order: 611797**

March 20, 2023

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on February 22, 2023 for analysis. Chain of Custody form did not contain a relinquished signature. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

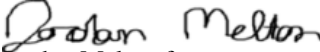
Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
611797001	S45490.01
611797002	S45490.02
611797003	S45490.03
611797004	S45490.04

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.


Jordan Melton for
Delaney Stone
Project Manager

Chain of Custody and Supporting Documentation



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 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

611797

REPORT TO

CHAIN OF CUSTODY RECORD

INVOICE TO

CONTACT NAME **Project Management Team**
 COMPANY **Merit Laboratories**
 ADDRESS **2680 East Lansing Drive**
 CITY **East Lansing** STATE **MI** ZIP CODE **48823**
 PHONE NO. **517-332-0167** FAX NO. _____
 E-MAIL ADDRESS **results@meritlabs.com** QUOTE NO. _____

CONTACT NAME **Julie Teague**
 COMPANY **Merit Laboratories**
 ADDRESS **2680 East Lansing Drive**
 CITY **East Lansing** STATE **MI** ZIP CODE **48823**
 PHONE NO. **517-332-0167** E-MAIL ADDRESS **juliet@meritlabs.com**

PROJECT NO./NAME **S45490** SAMPLER(S) - PLEASE PRINT/SIGN NAME _____
 TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER _____
 DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER _____

MATRIX CODE: **GW=GROUNDWATER** **WW=WASTEWATER** **S=SOIL** **L=LQUID** **SD=SOLID**
SL=SLUDGE **DW=DRINKING WATER** **O=OIL** **WP=WPE** **A=AIR** **W=WASTE**

MERIT LAB NO. FOR LAB USE ONLY	YEAR		IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives								
	DATE	TIME				HCl	HNO ₃	H ₂ O ₂	NaOH	MeOH	OTHER			
	2/17/23	1115	S45490.01	GW	2									
	2/17/23	1310	S45490.02	GW	2									
	2/17/23	1115	S45490.03	GW	2									
	2/17/23	1020	S45490.04	GW	2									

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Certifications	Project Locations	Special Instructions
<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water	<input type="checkbox"/> NPDES	<input type="checkbox"/> New York
<input type="checkbox"/> DoD	<input type="checkbox"/> Detroit	<input type="checkbox"/> Other _____
Radium 226*	<input checked="" type="checkbox"/>	* E903.1 Mod.
Radium 228**	<input checked="" type="checkbox"/>	** E904.0/SW 9320 Mod.
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Please use calculation product & provide Radium 226/228 combined results on the report
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	(No Ice needed)
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	** Subcontracted to GEL Laboratories, Inc. 2040 Savage Road Charleston, SC 29407

RELINQUISHED BY: *M Chalcraft* DATE _____ TIME _____
 RECEIVED BY: *UPS* DATE _____ TIME _____
 RELINQUISHED BY: *Hayden* DATE **2/22/23** TIME **1:40**
 RECEIVED BY: _____ DATE _____ TIME _____

RELINQUISHED BY: _____ DATE _____ TIME _____
 RECEIVED BY: _____ DATE _____ TIME _____
 SEAL NO. _____ SEAL INTACT YES NO
 INITIALS _____
 SEAL NO. _____ SEAL INTACT YES NO
 INITIALS _____
 NOTES: _____ TEMP. ON ARRIVAL _____

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE



Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM

Client: **MERI** SDG/AR/COC/Work Order: **611797**
 Received By: **Stacy Boone** Date Received: **FEB 22, 2023**
 Carrier and Tracking Number: **1Z 466 477 03 6322 6250**
 FedEx Express FedEx Ground UPS Field Services Courier Other

Suspected Hazard Information Yes No *If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.

A) Shipped as a DOT Hazardous? Hazard Class Shipped: UN#: If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___

B) Did the client designate the samples are to be received as radioactive? COC notation or radioactive stickers on containers equal client designation.

C) Did the RSO classify the samples as radioactive? Maximum Net Counts Observed* (Observed Counts - Area Background Counts): CPM / mR/Hr
 Classified as: Rad 1 Rad 2 Rad 3

D) Did the client designate samples are hazardous? COC notation or hazard labels on containers equal client designation.

E) Did the RSO identify possible hazards? If D or E is yes, select Hazards below.
 PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Client contacted and provided COC COC created upon receipt
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice Ice Packs Dry ice <u>None</u> Other: TEMP: 19°C *all temperatures are recorded in Celsius
4	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>IR3-22</u> Secondary Temperature Device Serial # (If Applicable):
5	Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: If Preservation added, Lot#: If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer) Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No)
7	Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___ Sample ID's and containers affected:
8	Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	ID's and containers affected:
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No container count on COC Other (describe)
12	Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Not relinquished Other (describe)
13	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials JM Date 2/22/23 Page 1 of 2

Laboratory Certifications

List of current GEL Certifications as of 20 March 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122023-4
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2022-160
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-22-20
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S45490
Work Order #: 611797**

Product: Radium-226+Radium-228 Calculation

Analytical Method: Calculation

Analytical Procedure: GL-RAD-D-003 REV# 45

Analytical Batch: 2393678

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
611797001	S45490.01
611797002	S45490.02
611797003	S45490.03
611797004	S45490.04

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2393679

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
611797001	S45490.01
611797002	S45490.02
611797003	S45490.03
611797004	S45490.04
1205336988	Method Blank (MB)
1205336989	611797001(S45490.01) Sample Duplicate (DUP)
1205336990	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2393661

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
611797001	S45490.01
611797002	S45490.02
611797003	S45490.03
611797004	S45490.04
1205336926	Method Blank (MB)
1205336927	611624001(NonSDG) Sample Duplicate (DUP)
1205336928	611624001(NonSDG) Matrix Spike (MS)
1205336929	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments

The matrix spike, 1205336928 (Non SDG 611624001MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

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Qualifier Definition Report for

MERI001 Merit Laboratories, Inc.

Client SDG: S45490 GEL Work Order: 611797

The Qualifiers in this report are defined as follows:

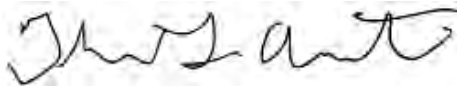
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:



Name: Theresa Austin

Date: 20 MAR 2023

Title: Group Leader

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 20, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Lavery
 Project: Routine Analysis

Client Sample ID: S45490.01	Project: MERI00120
Sample ID: 611797001	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 17-FEB-23 11:15	
Receive Date: 22-FEB-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.272	+/-1.04	1.92	3.00	pCi/L			JE1	03/15/23	1121	2393679	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.668	+/-1.10			pCi/L		1	NXL1	03/20/23	1320	2393678	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.396	+/-0.364	0.570	1.00	pCi/L			LXP1	03/17/23	1035	2393661	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			74.6	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

- | | |
|---------------------------------------|--------------------------------|
| DF: Dilution Factor | Lc/LC: Critical Level |
| DL: Detection Limit | PF: Prep Factor |
| MDA: Minimum Detectable Activity | RL: Reporting Limit |
| MDC: Minimum Detectable Concentration | SQL: Sample Quantitation Limit |

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 20, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Lavery
 Project: Routine Analysis

Client Sample ID: S45490.02	Project: MERI00120
Sample ID: 611797002	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 17-FEB-23 13:10	
Receive Date: 22-FEB-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	-0.367	+/-1.06	2.09	3.00	pCi/L			JE1	03/15/23	1121	2393679	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.334	+/-1.09			pCi/L		1	NXL1	03/20/23	1320	2393678	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.334	+/-0.259	0.319	1.00	pCi/L			LXP1	03/17/23	1035	2393661	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			75.3	(15%-125%)

Notes:
 Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: March 20, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Laverty
 Project: Routine Analysis

Client Sample ID: S45490.03	Project: MERI00120
Sample ID: 611797003	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 17-FEB-23 11:15	
Receive Date: 22-FEB-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.07	+/-0.988	1.61	3.00	pCi/L			JE1	03/15/23	1121	2393679	1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.43	+/-1.06			pCi/L		1	NXL1	03/20/23	1320	2393678	2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.363	+/-0.375	0.580	1.00	pCi/L			LXP1	03/17/23	1035	2393661	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			87.6	(15%-125%)

Notes:
 Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: March 20, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Laverty
 Project: Routine Analysis

Client Sample ID: S45490.04	Project: MERI00120
Sample ID: 611797004	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 17-FEB-23 10:20	
Receive Date: 22-FEB-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.896	+/-1.13	1.92	3.00	pCi/L		JE1	03/15/23	1121	2393679		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.27	+/-1.17			pCi/L		1 NXL1	03/20/23	1320	2393678		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.375	+/-0.295	0.399	1.00	pCi/L		LXP1	03/17/23	1035	2393661		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			68.3	(15%-125%)

Notes:
 Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

Quality Control Data

GEL LABORATORIES LLC

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QC Summary

Report Date: March 20, 2023

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Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: John Laverty

Workorder: 611797

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2393679										
QC1205336989	611797001	DUP									
Radium-228	U	0.272	U	0.969	pCi/L	N/A		N/A	JE1	03/15/23	11:21
	Uncertainty	+/-1.04		+/-0.853							
QC1205336990	LCS										
Radium-228	63.4			66.8	pCi/L		105	(75%-125%)		03/15/23	11:21
	Uncertainty			+/-4.53							
QC1205336988	MB										
Radium-228			U	0.668	pCi/L					03/15/23	11:21
	Uncertainty			+/-1.12							
Rad Ra-226											
Batch	2393661										
QC1205336927	611624001	DUP									
Radium-226		1.43		0.491	pCi/L	97.6		(0% - 100%)	LXP1	03/17/23	11:14
	Uncertainty	+/-0.546		+/-0.321							
QC1205336929	LCS										
Radium-226	26.5			22.0	pCi/L		83.2	(75%-125%)		03/17/23	11:17
	Uncertainty			+/-2.00							
QC1205336926	MB										
Radium-226			U	0.492	pCi/L					03/17/23	11:14
	Uncertainty			+/-0.431							
QC1205336928	611624001	MS									
Radium-226	133	1.43		120	pCi/L		88.7	(75%-125%)		03/17/23	11:14
	Uncertainty	+/-0.546		+/-9.89							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- H Analytical holding time was exceeded
- < Result is less than value reported
- > Result is greater than value reported

GEL LABORATORIES LLC

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QC Summary

Workorder: 611797

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UI											
BD											
h											
R											
^											
N/A											
ND											
M											
NJ											
FA											
UJ											
Q											
K											
UL											
L											
NI											
Y											
**											
M											
J											

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 2393679 Check-list

This check-list was completed on 15-MAR-23 by Kenshalla Oston

This batch was reviewed by Kenshalla Oston on 15-MAR-23 and Rhonda Birch on 15-MAR-23.

Batch ID:
2393679

Product:
GFC28RAL

Description: Gas Flow Radium 228
GL-RAD-A-063

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?	Yes		
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-228 in Liquid

Batch ID: 2393679
Analyst: Jacqueline Emond (JE1)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL-RAD-A-063 REV# 5
Instrument: LUCAS-C202389980

Due Dates for Lab: 19-MAR-2023			Package: 21-MAR-2023	SDG: 21-MAR-2023		
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
LCS	1205336990	228	1952-B	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	Ac-228 Ingrow (date)	Ac-228 Separation (date)
1	611797001	09-MAR-2023	3	300.56	300.56	03/13/23 14:03	03/15/23 08:34
2	611797002	09-MAR-2023	3	300.28	300.28	03/13/23 14:03	03/15/23 08:34
3	611797003	09-MAR-2023	3	300.98	300.98	03/13/23 14:03	03/15/23 08:34
4	611797004	09-MAR-2023	3	301.62	301.62	03/13/23 14:03	03/15/23 08:34
5	613018001	09-MAR-2023	3	301.98	301.98	03/13/23 14:03	03/15/23 08:34
6	613018002	09-MAR-2023	3	302.11	302.11	03/13/23 14:03	03/15/23 08:34
7	1205336988 MB	09-MAR-2023	3	302.11	302.11	03/13/23 14:03	03/15/23 08:34
8	1205336989 DUP (611797001)	09-MAR-2023	3	301.77	301.77	03/13/23 14:03	03/15/23 08:34
9	1205336990 LCS	09-MAR-2023	3		302.11	03/13/23 14:03	03/15/23 08:34

Reagent/Solvent Lot ID	Description	Amount	Comments:
WORK 1951-D	Ba-133	.1 mL	Pipet Id: RAD-GFC-1795419 Data Entry Date2: 10-MAR-2023 16:25 LUCAS-C202389980 Jacqueline Emond Data Entry Date3: 09-MAR-2023 00:00
REGNT 3877362	RGF-1.5M Ammonium Sulfate	10 mL	
REGNT 3862351	RGF-1M Citric Acid	5 mL	
REGNT 3878183	2M HCl	20 mL	
REGNT 3877480	RGF-50% Potassium Carbonate	2 mL	
REGNT 3878163	RGF-7M Nitric Acid	25 mL	
REGNT 3857893.11	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL	
REGNT DGA030723	2396801	2 g	
REGNT 3867075.26	RGF-Hydrofluoric Acid	4 mL	
REGNT 3528714	500 mg/mL Neodymium Carrier	.2 mL	
REGNT 3521298	RGF-Neodymium Substrate	5 mL	
REGNT 3454413.21	Nitric Acid	5 mL	
REGNT 3465466	Barium Carrier Ra228 REG	1 mL	

Radium-228 Liquid

Filename : RA228.XLS
 File type : Excel
 Version # : 1.4.3

Tracer S/N : 1951-D
 Tracer Exp Date : 6/3/2023
 Tracer Volume Added: 0.10

Batch : 2393679
 Analyst : JAC02417
 Prep Date : 3/9/2023
 Ra-228 Method Uncertainty : 0.1268

Procedure Code : GFC28RAL
 Parmname : Radium-228
 Required MDA : 3 pCi/L
 Ra-228 Abundance : 1.00
 Halflife of Ra-228 : 5.75 years
 Halflife of Ac-228 : 6.15 hours

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	611797001.1	0.3006	1.8469E-05	2/17/2023 11:15	1174.9	1.68%	876.7	1.95%	0.1	0.000200
2	611797002.1	0.3003	1.8464E-05	2/17/2023 13:10	1174.9	1.68%	884.6	1.94%	0.1	0.000200
3	611797003.1	0.3010	1.8476E-05	2/17/2023 11:15	1174.9	1.68%	1029.8	1.80%	0.1	0.000200
4	611797004.1	0.3016	1.8486E-05	2/17/2023 10:20	1174.9	1.68%	802.0	2.04%	0.1	0.000200
5	613018001.1	0.3020	1.8493E-05	2/21/2023 8:42	1174.9	1.68%	868.1	1.96%	0.1	0.000200
6	613018002.1	0.3021	1.8495E-05	2/21/2023 8:53	1174.9	1.68%	890.2	1.93%	0.1	0.000200
7	1205336988.1	0.3021	1.8495E-05	3/9/2023 0:00	1174.9	1.68%	747.9	2.11%	0.1	0.000200
8	1205336989.1	0.3018	1.8489E-05	2/17/2023 11:15	1174.9	1.68%	1057.5	1.78%	0.1	0.000200
9	1205336990.1	0.3021	1.8495E-05	3/9/2023 0:00	1174.9	1.68%	888.9	1.94%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-063
 Instrument SOP: GL-RAD-I-016

Count raw Data													Calculated	Sample
Pos.	Detector ID	Counting Time (min.)	Gross Counts		Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Recovery %	Sample Recovery Error %
			Alpha	Beta										
1	4D	60	4	37	0.617	3/15/2023 11:21	3/13/2023 14:03	3/15/2023 8:34	0.991	0.730	0.992	1.057	74.6%	2.59%
2	5B	60	9	43	0.717	3/15/2023 11:21	3/13/2023 14:03	3/15/2023 8:34	0.991	0.730	0.992	1.057	75.3%	2.58%
3	5C	60	8	52	0.867	3/15/2023 11:21	3/13/2023 14:03	3/15/2023 8:34	0.991	0.730	0.992	1.057	87.6%	2.48%
4	5D	60	6	41	0.683	3/15/2023 11:21	3/13/2023 14:03	3/15/2023 8:34	0.991	0.730	0.992	1.057	68.3%	2.66%
5	6A	60	16	91	1.517	3/15/2023 11:21	3/13/2023 14:03	3/15/2023 8:34	0.993	0.730	0.992	1.057	73.9%	2.60%
6	6B	60	13	64	1.067	3/15/2023 11:21	3/13/2023 14:03	3/15/2023 8:34	0.993	0.730	0.992	1.057	75.8%	2.57%
7	7A	60	2	36	0.600	3/15/2023 11:21	3/13/2023 14:03	3/15/2023 8:34	0.998	0.731	0.992	1.057	63.7%	2.71%
8	7B	60	10	43	0.717	3/15/2023 11:21	3/13/2023 14:03	3/15/2023 8:34	0.991	0.730	0.992	1.057	90.0%	2.46%
9	7C	60	13	945	15.750	3/15/2023 11:21	3/13/2023 14:03	3/15/2023 8:34	0.998	0.730	0.992	1.057	75.7%	2.58%

Calibration Data								
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2022	5/31/2023	0.5954	0.00773	0.562	3/13/2023 18:43	500
2	PIC	6/1/2022	5/31/2023	0.6336	0.00426	0.796	3/10/2023 17:27	500
3	PIC	6/1/2022	5/31/2023	0.6242	0.00657	0.602	3/10/2023 16:28	500
4	PIC	6/1/2022	5/31/2023	0.6236	0.00925	0.510	3/10/2023 17:28	500
5	PIC	6/1/2022	5/31/2023	0.6328	0.02228	1.206	3/10/2023 15:02	1000
6	PIC	6/1/2022	5/31/2023	0.6280	0.00851	1.827	3/11/2023 10:23	1000
7	PIC	6/1/2022	5/31/2023	0.6257	0.00594	0.478	3/10/2023 16:28	500
8	PIC	6/1/2022	5/31/2023	0.6366	0.00627	0.464	3/10/2023 16:28	500
9	PIC	6/1/2022	5/31/2023	0.6407	0.00790	0.906	3/10/2023 16:28	500

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

* - RPD changed to 0% due to sample & dup activity below MDA

LCS S/N : 1952-B
LCS Exp Date : 8/9/2023
LCS Activity (dpm/ml): 425.05
LCS Volume Added: 0.10

Results Pos.	Decision	Critical	Required	Sample Act.		Sample Act.	Net Count	Net Count	2 SIGMA	2 SIGMA	Sample	Sample	RPD	RER	Nominal	Recovery
	Level	Level	MDA	MDA	Conc.	Error	Rate	Rate Error	Counting	Total Prop.						
	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	%	CPM	CPM	Uncertainty	Uncertainty						
1	1.1857	0.8371	3	1.9226	0.2716	195.35%	0.0547	0.1068	1.0398	1.0421		SAMPLE				
2	1.3155	0.9287	3	2.0891	-0.3674	146.68%	-0.0793	0.1163	1.0562	1.0564		SAMPLE				
3	0.9955	0.7028	3	1.6072	1.0667	47.33%	0.2647	0.1251	0.9882	1.0245		SAMPLE				
4	1.1752	0.8297	3	1.9179	0.8960	64.33%	0.1733	0.1114	1.1286	1.1515		SAMPLE				
5	1.5970	1.1275	3	2.4898	1.4588	52.50%	0.3107	0.1627	1.4978	1.5441		SAMPLE				
6	1.9308	1.3632	3	2.9570	-3.5071	18.61%	-0.7603	0.1400	1.2658	1.2660		SAMPLE				
7	1.2051	0.8508	3	1.9754	0.6680	85.84%	0.1220	0.1047	1.1233	1.1361		MB				
8	0.8317	0.5872	3	1.3662	0.9691	44.98%	0.2527	0.1135	0.8529	0.8876	611797001.1	DUP	* 0.0%			
9	1.3637	0.9628	3	2.1506	66.8048	4.39%	14.8440	0.5141	4.5349	17.5704		LCS			63.3753	105.4%

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
611797001	4D	60	4	37	3/15/2023 11:21	3/15/2023 12:21	PIC	2393679
611797002	5B	60	9	43	3/15/2023 11:21	3/15/2023 12:21	PIC	2393679
611797003	5C	60	8	52	3/15/2023 11:21	3/15/2023 12:21	PIC	2393679
611797004	5D	60	6	41	3/15/2023 11:21	3/15/2023 12:21	PIC	2393679
613018001	6A	60	16	91	3/15/2023 11:21	3/15/2023 12:21	PIC	2393679
613018002	6B	60	13	64	3/15/2023 11:21	3/15/2023 12:21	PIC	2393679
1205336988	7A	60	2	36	3/15/2023 11:21	3/15/2023 12:21	PIC	2393679
1205336989	7B	60	10	43	3/15/2023 11:21	3/15/2023 12:21	PIC	2393679
1205336990	7C	60	13	945	3/15/2023 11:21	3/15/2023 12:21	PIC	2393679

ASSAY 15-Mar-23 10:47:49
 Wizard 2480 s/n 46190630
 Protocol id 8 Ba-133
 Time limit
 Count limit
 Isotope Ba-133
 Protocol date 3/15/2023
 Run id. 6336

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF		1	95	1	180	3525.28	1174.92	1.68	10:47:49
611797001	2	95	2	180	2630.57	876.68	1.95	74.62	10:51:03
611797002	3	95	3	180	2654.28	884.6	1.94	75.29	10:54:17
611797003	4	95	4	180	3090	1029.77	1.8	87.65	10:57:31
611797004	5	95	5	180	2406.57	802.03	2.04	68.26	11:00:45
613018001	1	5	1	180	2604.57	868.05	1.96	73.88	11:04:22
613018002	2	5	2	180	2671	890.17	1.93	75.76	11:07:36
1205336988	3	5	3	180	2244	747.86	2.11	63.65	11:10:50
1205336989	4	5	4	180	3173	1057.52	1.78	90.01	11:14:04
1205336990	5	5	5	180	2667.28	888.87	1.94	75.65	11:17:17

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 15-Mar-2023


Detectors LB4100 A1 through I4 and PIC 1A through 14D and G5400W 1W through 1Z and LB4200 OA1 through OA1

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100E2	Above	Beta bkg	15-Mar 03:30	60	2.150	1.385	3.072	-0.28
LB4100F2	Above	Alpha bkg	15-Mar 03:30	60	0.300	0.042	0.294	+3.16
LB4100F2	Below	Alpha eff	15-Mar 04:40	5	5994	6533	7372	-6.86
LB4100F2	Above	Alpha XTalk	15-Mar 04:40	5	0.388	0.318	0.366	+5.79
LB4100F2	Above	Beta bkg	15-Mar 03:30	60	20.600	1.173	1.833	+173.61
LB4100G1	need 2nd	Beta bkg	15-Mar 03:31	60	1.017	0.380	1.675	-0.05
LB4100G1	Below	Beta eff	15-Mar 04:40	5	12745	12880	18320	-3.15
LB4100G3	Below	Alpha eff	15-Mar 04:33	5	4708	5785	8229	-5.65
LB4100G3	Above	Alpha XTalk	15-Mar 04:33	5	0.556	0.275	0.391	+11.50
LB4100G3	Below	Beta eff	15-Mar 04:40	5	16478	19160	24060	-6.28
LB4100H1	Above	Beta bkg	15-Mar 03:30	60	2.933	0.216	2.462	+4.26
PIC12C	Above	Beta bkg	15-Mar 09:03	60	2.517	0.142	2.845	+2.27
PIC13A	Above	Alpha bkg	15-Mar 12:35	60	0.317	-9.05E-2	0.347	+2.58

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100A1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4200OA1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by 
 Date 3/15/23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC

Batch ID: 2393679

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1205336988	MB	JE1	PIC7A	MAR-15-23 11:21:08	DONE	25mm Filter	01-JUN-22 00:00
1205336989	DUP	JE1	PIC7B	MAR-15-23 11:21:13	DONE	25mm Filter	01-JUN-22 00:00
1205336990	LCS	JE1	PIC7C	MAR-15-23 11:21:17	DONE	25mm Filter	01-JUN-22 00:00
611797001	SAMPLE	JE1	PIC4D	MAR-15-23 11:21:24	DONE	25mm Filter	01-JUN-22 00:00
611797002	SAMPLE	JE1	PIC5B	MAR-15-23 11:21:28	DONE	25mm Filter	01-JUN-22 00:00
611797003	SAMPLE	JE1	PIC5C	MAR-15-23 11:21:32	DONE	25mm Filter	01-JUN-22 00:00
611797004	SAMPLE	JE1	PIC5D	MAR-15-23 11:21:36	DONE	25mm Filter	01-JUN-22 00:00
613018001	SAMPLE	JE1	PIC6A	MAR-15-23 11:21:40	DONE	25mm Filter	01-JUN-22 00:00
613018002	SAMPLE	JE1	PIC6B	MAR-15-23 11:21:44	DONE	25mm Filter	01-JUN-22 00:00

Lucas Cell Raw Data

Batch 2393661 Check-list

This check-list was completed on 19-MAR-23 by Lyndsey Pace

This batch was reviewed by Gregory Ramsay on 17-MAR-23 and Lyndsey Pace on 19-MAR-23.

Batch ID:
2393661

Product:
LUC26RAL

Description: Lucas Cell Radium 226
GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous		No	
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-226 in Liquid

Batch ID: 2393661
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL-RAD-A-008 REV# 15
Instrument: LUCAS-C202389980

Due Dates for Lab: 19-MAR-2023			Package: 21-MAR-2023		SDG: 21-MAR-2023	
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
MS	1205336928	Radium-226 SPIKE	1715-G	.1	mL	
LCS	1205336929	Radium-226 SPIKE	1715-G	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	End Degas (date)	CELL #	End Transfer (date)	Start Count Time (date)	Background Counts	Total Counts
1	611624001	09-MAR-2023	.999	501.34	501.34	03/14/23 09:20	607	03/17/23 06:10	03/17/23 09:10	5	39
2	611626001	09-MAR-2023	.999	506.04	506.04	03/14/23 09:20	708	03/17/23 06:10	03/17/23 09:10	3	82
3	611627001	09-MAR-2023	.999	500	500	03/14/23 09:20	106	03/17/23 06:41	03/17/23 09:48	4	12
4	611628001	09-MAR-2023	.999	500.6	500.6	03/14/23 09:20	201	03/17/23 06:41	03/17/23 09:48	8	15
5	611629001	09-MAR-2023	.999	503.68	503.68	03/14/23 09:20	308	03/17/23 06:41	03/17/23 09:48	8	15
6	611630001	09-MAR-2023	.999	502.64	502.64	03/14/23 09:20	403	03/17/23 06:41	03/17/23 09:48	4	12
7	611632001	09-MAR-2023	.999	501.18	501.18	03/14/23 09:20	506	03/17/23 06:41	03/17/23 09:48	4	17
8	611634001	09-MAR-2023	.999	503.91	503.91	03/14/23 09:20	604	03/17/23 06:41	03/17/23 09:48	2	26
9	611635001	09-MAR-2023	.999	504.76	504.76	03/14/23 09:20	704	03/17/23 06:41	03/17/23 09:48	5	20
10	611718001	09-MAR-2023	.999	503.84	503.84	03/14/23 09:20	105	03/17/23 07:15	03/17/23 10:35	3	7
11	611797001	09-MAR-2023	1	505.74	505.74	03/14/23 09:20	206	03/17/23 07:15	03/17/23 10:35	6	16
12	611797002	09-MAR-2023	1	500.93	500.93	03/14/23 09:20	302	03/17/23 07:15	03/17/23 10:35	1	9
13	611797003	09-MAR-2023	1	501.65	501.65	03/14/23 09:20	401	03/17/23 07:15	03/17/23 10:35	2	8
14	611797004	09-MAR-2023	1	500.41	500.41	03/14/23 09:20	508	03/17/23 07:15	03/17/23 10:35	2	11
15	611829001	09-MAR-2023	.999	501.97	501.97	03/14/23 09:20	608	03/17/23 07:15	03/17/23 10:35	1	29
16	611846001	09-MAR-2023	.999	500.88	500.88	03/14/23 09:20	707	03/17/23 07:15	03/17/23 10:35	2	17
17	611846002	09-MAR-2023	.999	500.3	500.3	03/14/23 09:20	805	03/17/23 07:15	03/17/23 10:35	3	2
18	611846003	09-MAR-2023	.999	500.17	500.17	03/14/23 09:20	101	03/17/23 07:51	03/17/23 11:14	2	11
19	613018001	09-MAR-2023	1	500.81	500.81	03/14/23 09:20	208	03/17/23 07:51	03/17/23 11:14	3	23
20	613018002	09-MAR-2023	1	500.22	500.22	03/14/23 09:20	303	03/17/23 07:51	03/17/23 11:14	3	43
21	1205336926 MB	09-MAR-2023	.999		506.04	03/14/23 09:20	408	03/17/23 07:51	03/17/23 11:14	5	15
22	1205336927 DUP (611624001)	09-MAR-2023	.999	501.11	501.11	03/14/23 09:20	501	03/17/23 07:51	03/17/23 11:14	2	14
23	1205336928 MS (611624001)	09-MAR-2023	.999	100.52	100.52	03/14/23 09:20	601	03/17/23 07:51	03/17/23 11:14	2	569
24	1205336929 LCS	09-MAR-2023	.999		506.04	03/14/23 09:20	706	03/17/23 07:51	03/17/23 11:17	3	477

Reagent/Solvent Lot ID	Description	Amount	Comments:
			Data Entry Date2: 09-MAR-2023 00:00

Radium-226 Liquid

Filename : RA226.XLS
 File type : Excel
 Version # : 1.3.2

Batch : 2393661
Analyst : LIN01615
Prep Date : 3/9/2023
Ra-226 Method Uncertainty : 0.073648

Procedure Code : LUC26RAL
Parmname : Radium-226
Required MDA : 1 pCi/L
Halfife of Ra-226 : 1600 years
Ra-226 Abundance : 1.00
Halfife of Rn-222 : 3.8235 days

Batch counted on : LUCAS CELL DETECTOR
BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Count Time (min.)	Cell Efficiency (cpm/dpm)
1	611624001.1	0.5013	2.0261E-05	2/16/2023 12:00	607	30	39	1.300	5	0.167	30	1.8040
2	611626001.1	0.5060	2.0280E-05	2/15/2023 12:00	708	30	82	2.733	3	0.100	30	1.6020
3	611627001.1	0.5000	2.0256E-05	2/15/2023 13:00	106	30	12	0.400	4	0.133	30	1.6990
4	611628001.1	0.5006	2.0258E-05	2/15/2023 10:50	201	30	15	0.500	8	0.267	30	1.7110
5	611629001.1	0.5037	2.0271E-05	2/16/2023 11:30	308	30	15	0.500	8	0.267	30	1.5970
6	611630001.1	0.5026	2.0267E-05	2/15/2023 14:30	403	30	12	0.400	4	0.133	30	1.5070
7	611632001.1	0.5012	2.0261E-05	2/16/2023 13:00	506	30	17	0.567	4	0.133	30	1.7710
8	611634001.1	0.5039	2.0272E-05	2/16/2023 10:30	604	30	26	0.867	2	0.067	30	1.6810
9	611635001.1	0.5048	2.0275E-05	2/15/2023 13:45	704	30	20	0.667	5	0.167	30	1.5870
10	611718001.1	0.5038	2.0272E-05	2/15/2023 10:15	105	30	7	0.233	3	0.100	30	1.5830
11	611797001.1	0.5057	2.0279E-05	2/17/2023 11:15	206	30	16	0.533	6	0.200	30	1.8770
12	611797002.1	0.5009	2.0260E-05	2/17/2023 13:10	302	30	9	0.300	1	0.033	30	1.7980
13	611797003.1	0.5017	2.0263E-05	2/17/2023 11:15	401	30	8	0.267	2	0.067	30	1.2390
14	611797004.1	0.5004	2.0258E-05	2/17/2023 10:20	508	30	11	0.367	2	0.067	30	1.8020
15	611829001.1	0.5020	2.0264E-05	2/16/2023 12:00	608	30	29	0.967	1	0.033	30	1.7970
16	611846001.1	0.5009	2.0259E-05	2/15/2023 12:45	707	30	17	0.567	2	0.067	30	1.7280
17	611846002.1	0.5003	2.0257E-05	2/15/2023 13:30	805	30	2	0.067	3	0.100	30	1.9080
18	611846003.1	0.5002	2.0257E-05	2/15/2023 14:50	101	30	11	0.367	2	0.067	30	1.5720
19	613018001.1	0.5008	2.0259E-05	2/21/2023 8:42	208	30	23	0.767	3	0.100	30	1.7740
20	613018002.1	0.5002	2.0257E-05	2/21/2023 8:53	303	30	43	1.433	3	0.100	30	1.7210
21	1205336926.1	0.5060	2.0280E-05	3/9/2023 0:00	408	30	15	0.500	5	0.167	30	1.5020
22	1205336927.1	0.5011	2.0260E-05	2/16/2023 12:00	501	30	14	0.467	2	0.067	30	1.8220
23	1205336928.1	0.1005	1.1402E-05	2/16/2023 12:00	601	30	569	18.967	2	0.067	30	1.7610
24	1205336929.1	0.5060	2.0280E-05	3/9/2023 0:00	706	30	477	15.900	3	0.100	30	1.5900

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-008
 Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrow End Date/Time	Count Start Date/Time	Rn-222 Corrections			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
3.400%	7/1/2022	6/30/2023	3/14/2023 9:20	3/17/2023 6:10	3/17/2023 9:10	0.405	0.978	1.002	1.000
7.700%	11/1/2022	10/31/2023	3/14/2023 9:20	3/17/2023 6:10	3/17/2023 9:10	0.405	0.978	1.002	1.000
8.800%	4/28/2022	4/30/2023	3/14/2023 9:20	3/17/2023 6:41	3/17/2023 9:48	0.408	0.977	1.002	1.000
8.900%	8/1/2022	7/31/2023	3/14/2023 9:20	3/17/2023 6:41	3/17/2023 9:48	0.408	0.977	1.002	1.000
9.600%	10/25/2022	10/31/2023	3/14/2023 9:20	3/17/2023 6:41	3/17/2023 9:48	0.408	0.977	1.002	1.000
6.100%	2/1/2023	1/31/2024	3/14/2023 9:20	3/17/2023 6:41	3/17/2023 9:48	0.408	0.977	1.002	1.000
5.300%	6/1/2022	5/31/2023	3/14/2023 9:20	3/17/2023 6:41	3/17/2023 9:48	0.408	0.977	1.002	1.000
6.700%	7/1/2022	6/30/2023	3/14/2023 9:20	3/17/2023 6:41	3/17/2023 9:48	0.408	0.977	1.002	1.000
4.200%	11/1/2022	10/31/2023	3/14/2023 9:20	3/17/2023 6:41	3/17/2023 9:48	0.408	0.977	1.002	1.000
0.500%	4/28/2022	4/30/2023	3/14/2023 9:20	3/17/2023 7:15	3/17/2023 10:35	0.410	0.975	1.002	1.000
2.800%	8/1/2022	7/31/2023	3/14/2023 9:20	3/17/2023 7:15	3/17/2023 10:35	0.410	0.975	1.002	1.000
3.300%	10/25/2022	10/31/2023	3/14/2023 9:20	3/17/2023 7:15	3/17/2023 10:35	0.410	0.975	1.002	1.000
3.100%	2/1/2023	1/31/2024	3/14/2023 9:20	3/17/2023 7:15	3/17/2023 10:35	0.410	0.975	1.002	1.000
4.500%	6/1/2022	5/31/2023	3/14/2023 9:20	3/17/2023 7:15	3/17/2023 10:35	0.410	0.975	1.002	1.000
6.300%	7/1/2022	6/30/2023	3/14/2023 9:20	3/17/2023 7:15	3/17/2023 10:35	0.410	0.975	1.002	1.000
2.200%	11/1/2022	10/31/2023	3/14/2023 9:20	3/17/2023 7:15	3/17/2023 10:35	0.410	0.975	1.002	1.000
7.400%	4/1/2022	3/31/2023	3/14/2023 9:20	3/17/2023 7:15	3/17/2023 10:35	0.410	0.975	1.002	1.000
1.200%	4/28/2022	4/30/2023	3/14/2023 9:20	3/17/2023 7:51	3/17/2023 11:14	0.413	0.975	1.002	1.000
5.500%	8/1/2022	7/31/2023	3/14/2023 9:20	3/17/2023 7:51	3/17/2023 11:14	0.413	0.975	1.002	1.000
7.400%	10/25/2022	10/31/2023	3/14/2023 9:20	3/17/2023 7:51	3/17/2023 11:14	0.413	0.975	1.002	1.000
7.000%	2/1/2023	1/31/2024	3/14/2023 9:20	3/17/2023 7:51	3/17/2023 11:14	0.413	0.975	1.002	1.000
7.900%	6/1/2022	5/31/2023	3/14/2023 9:20	3/17/2023 7:51	3/17/2023 11:14	0.413	0.975	1.002	1.000
9.400%	7/1/2022	6/30/2023	3/14/2023 9:20	3/17/2023 7:51	3/17/2023 11:14	0.413	0.975	1.002	1.000
2.900%	11/1/2022	10/31/2023	3/14/2023 9:20	3/17/2023 7:51	3/17/2023 11:17	0.413	0.974	1.002	1.000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1715-G
Spike Exp Date : 9/8/2023
Spike Activity (dpm/ml): 297.43
Spike Volume Added: 0.10

LCS S/N : 1715-G
LCS Exp Date : 9/8/2023
LCS Activity (dpm/ml): 297.43
LCS Volume Added: 0.10

Results																
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.3092	0.2183	1	0.5625	1.4269	19.80%	1.1333	0.2211	0.5456	0.5909		SAMPLE				
2	0.2672	0.1887	1	0.5178	3.6987	13.98%	2.6333	0.3073	0.8460	1.1456		SAMPLE				
3	0.2930	0.2069	1	0.5472	0.3557	50.77%	0.2667	0.1333	0.3486	0.3577		SAMPLE				
4	0.4110	0.2902	1	0.7127	0.3087	69.09%	0.2333	0.1599	0.4145	0.4204		SAMPLE				
5	0.4377	0.3090	1	0.7589	0.3287	69.18%	0.2333	0.1599	0.4414	0.4482		SAMPLE				
6	0.3286	0.2320	1	0.6136	0.3989	50.37%	0.2667	0.1333	0.3910	0.3980		SAMPLE				
7	0.2805	0.1980	1	0.5237	0.5532	35.65%	0.4333	0.1528	0.3822	0.3947		SAMPLE				
8	0.2078	0.1467	1	0.4272	1.0702	23.04%	0.8000	0.1764	0.4625	0.5075		SAMPLE				
9	0.3474	0.2453	1	0.6320	0.7073	33.60%	0.5000	0.1667	0.4621	0.4768		SAMPLE				
10	0.2691	0.1900	1	0.5214	0.1886	79.06%	0.1333	0.1054	0.2922	0.2935		SAMPLE				
11	0.3197	0.2257	1	0.5703	0.3961	46.99%	0.3333	0.1563	0.3641	0.3693		SAMPLE				
12	0.1376	0.0971	1	0.3195	0.3340	39.67%	0.2667	0.1054	0.2588	0.2641		SAMPLE				
13	0.2819	0.1990	1	0.5796	0.3630	52.80%	0.2000	0.1054	0.3750	0.3792		SAMPLE				
14	0.1943	0.1372	1	0.3995	0.3753	40.31%	0.3000	0.1202	0.2947	0.3014		SAMPLE				
15	0.1374	0.0970	1	0.3190	1.1672	20.55%	0.9333	0.1826	0.4475	0.4994		SAMPLE				
16	0.2024	0.1429	1	0.4162	0.6517	29.14%	0.5000	0.1453	0.3712	0.3839		SAMPLE				
17	0.2248	0.1587	1	0.4356	-0.0394	223.73%	-0.0333	0.0745	0.1726	0.1728		SAMPLE				
18	0.2215	0.1564	1	0.4554	0.4278	40.08%	0.3000	0.1202	0.3359	0.3417		SAMPLE				
19	0.2401	0.1695	1	0.4652	0.8413	26.08%	0.6667	0.1700	0.4204	0.4469		SAMPLE				
20	0.2478	0.1749	1	0.4801	1.7365	18.50%	1.3333	0.2261	0.5771	0.6777		SAMPLE				
21	0.3623	0.2558	1	0.6591	0.4917	45.27%	0.3333	0.1491	0.4310	0.4420		MB				
22	0.1907	0.1347	1	0.3921	0.4912	34.26%	0.4000	0.1333	0.3209	0.3373	611624001.1	DUP	97.6%			
23	0.9839	0.6946	1	2.0226	119.7089	10.30%	18.9000	0.7965	9.8882	29.7121	611624001.1	MS			133.2878	88.7%
24	0.2652	0.1872	1	0.5138	22.0245	5.46%	15.8000	0.7303	1.9953	3.9567		LCS			26.4757	83.2%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 17-MAR-2023

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	08:39	1	1.19E+05	119152	-1.98		
LUCAS2	EFF	08:40	1	1.32E+05	132244	-1.13		
LUCAS3	EFF	08:42	1	1.02E+05	102205	-1.41		
LUCAS4	EFF	08:43	1	1.28E+05	127847	-0.08		
LUCAS5	EFF	08:45	1	1.34E+05	133930	1.32		
LUCAS6	EFF	08:46	1	1.29E+05	129167	-1.7		
LUCAS7	EFF	09:46	1	1.31E+05	131183	0.65		
LUCAS8	EFF	08:51	1	1.37E+05	136679	0.93		

Reviewed by:



Elizabeth Krouse

Date: 17-MAR-23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR

Batch ID: 2393661

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
611624001	SAMPLE	LXP1	LUCAS6	MAR-17-23 09:10:00	DONE	Lucas Cell	01-JUL-22 00:00
611626001	SAMPLE	LXP1	LUCAS7	MAR-17-23 09:10:00	DONE	Lucas Cell	01-NOV-22 00:00
611627001	SAMPLE	LXP1	LUCAS1	MAR-17-23 09:48:00	DONE	Lucas Cell	28-APR-22 00:00
611628001	SAMPLE	LXP1	LUCAS2	MAR-17-23 09:48:00	DONE	Lucas Cell	01-AUG-22 00:00
611629001	SAMPLE	LXP1	LUCAS3	MAR-17-23 09:48:00	DONE	Lucas Cell	25-OCT-22 00:00
611630001	SAMPLE	LXP1	LUCAS4	MAR-17-23 09:48:00	DONE	Lucas Cell	01-FEB-23 00:00
611632001	SAMPLE	LXP1	LUCAS5	MAR-17-23 09:48:00	DONE	Lucas Cell	01-JUN-22 00:00
611634001	SAMPLE	LXP1	LUCAS6	MAR-17-23 09:48:00	DONE	Lucas Cell	01-JUL-22 00:00
611635001	SAMPLE	LXP1	LUCAS7	MAR-17-23 09:48:00	DONE	Lucas Cell	01-NOV-22 00:00
611718001	SAMPLE	LXP1	LUCAS1	MAR-17-23 10:35:00	DONE	Lucas Cell	28-APR-22 00:00
611797001	SAMPLE	LXP1	LUCAS2	MAR-17-23 10:35:00	DONE	Lucas Cell	01-AUG-22 00:00
611797002	SAMPLE	LXP1	LUCAS3	MAR-17-23 10:35:00	DONE	Lucas Cell	25-OCT-22 00:00
611797003	SAMPLE	LXP1	LUCAS4	MAR-17-23 10:35:00	DONE	Lucas Cell	01-FEB-23 00:00
611797004	SAMPLE	LXP1	LUCAS5	MAR-17-23 10:35:00	DONE	Lucas Cell	01-JUN-22 00:00
611829001	SAMPLE	LXP1	LUCAS6	MAR-17-23 10:35:00	DONE	Lucas Cell	01-JUL-22 00:00
611846001	SAMPLE	LXP1	LUCAS7	MAR-17-23 10:35:00	DONE	Lucas Cell	01-NOV-22 00:00
611846002	SAMPLE	LXP1	LUCAS8	MAR-17-23 10:35:00	DONE	Lucas Cell	01-APR-22 00:00
611846003	SAMPLE	LXP1	LUCAS1	MAR-17-23 11:14:00	DONE	Lucas Cell	28-APR-22 00:00
613018001	SAMPLE	LXP1	LUCAS2	MAR-17-23 11:14:00	DONE	Lucas Cell	01-AUG-22 00:00
613018002	SAMPLE	LXP1	LUCAS3	MAR-17-23 11:14:00	DONE	Lucas Cell	25-OCT-22 00:00
1205336926	MB	LXP1	LUCAS4	MAR-17-23 11:14:00	DONE	Lucas Cell	01-FEB-23 00:00
1205336927	DUP	LXP1	LUCAS5	MAR-17-23 11:14:00	DONE	Lucas Cell	01-JUN-22 00:00
1205336928	MS	LXP1	LUCAS6	MAR-17-23 11:14:00	DONE	Lucas Cell	01-JUL-22 00:00
1205336929	LCS	LXP1	LUCAS7	MAR-17-23 11:17:00	DONE	Lucas Cell	01-NOV-22 00:00



Lansing Board of Water and Light
Environmental Services Laboratory (MI00079)
Cert ID:3760
1232 Haco Dr.
Lansing, Michigan 48901
24 April 2023

BWL - Erickson Station
Attn: Cheryl Louden
3725 S. Canal
Lansing, MI 48917

Project: Erickson AM MI

Dear Cheryl Louden,

Enclosed is a copy of the laboratory report for the following work order(s) received by Lansing Board of Water and Light Environmental Services Laboratory:

Work Order
L303200

Received
3/22/2023 8:30:00AM

Account Number

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in blue ink that reads "Jennifer Caporale".

Jennifer Caporale, Supervisor



Analytical Report

Client: BWL - Erickson Station
Address: 3725 S. Canal
 Lansing MI, 48917

Client Project Manager: Cheryl Louden

Report Date: 04/24/2023

Sample Name: MW-16A

Lab #: L303200-01 Ground Water

Collected: 21-Mar-23 11:08

By: Marc Wahrer

Analyte	Reporting			Dilution	Regulatory Limit	Analysis Date/Time	By	Method	Notes
	Result	Limit	Units						
Conductivity	1900	1.0	uS/cm	1		21-Mar-23 11:08	maw	SM 2510B	
Dissolved oxygen	0.200	0.100	mg/L	1		21-Mar-23 11:08	maw	FIELD	
Milliliters Purged	200		ml/min	1		21-Mar-23 11:08	maw	FIELD	
Oxidation Reduction Potential	-48.60	-999.0	mV	1		21-Mar-23 11:08	maw	FIELD	
pH	6.9	7.0	pH Units	1		21-Mar-23 11:08	maw	SM 4500H+B	
Temperature	8.6		°C	1		21-Mar-23 11:08	maw	SM 2550B	
Turbidity	4.2	0.10	NTU	1		21-Mar-23 11:08	maw	SM 2130B	

Sample Name: MW-16B

Lab #: L303200-02 Ground Water

Collected: 21-Mar-23 14:44

By: Marc Wahrer

Analyte	Reporting			Dilution	Regulatory Limit	Analysis Date/Time	By	Method	Notes
	Result	Limit	Units						
Conductivity	590	1.0	uS/cm	1		21-Mar-23 14:44	maw	SM 2510B	
Dissolved oxygen	0.120	0.100	mg/L	1		21-Mar-23 14:44	maw	FIELD	
Milliliters Purged	210		ml/min	1		21-Mar-23 14:44	maw	FIELD	
Oxidation Reduction Potential	-107.0	-999.0	mV	1		21-Mar-23 14:44	maw	FIELD	
pH	7.4	7.0	pH Units	1		21-Mar-23 14:44	maw	SM 4500H+B	
Temperature	12		°C	1		21-Mar-23 14:44	maw	SM 2550B	
Turbidity	5.6	0.10	NTU	1		21-Mar-23 14:44	maw	SM 2130B	

Sample Name: MW-16C

Lab #: L303200-03 Ground Water

Collected: 21-Mar-23 13:17

By: Marc Wahrer

Analyte	Reporting			Dilution	Regulatory Limit	Analysis Date/Time	By	Method	Notes
	Result	Limit	Units						
Conductivity	580	1.0	uS/cm	1		21-Mar-23 13:17	maw	SM 2510B	
Dissolved oxygen	0.170	0.100	mg/L	1		21-Mar-23 13:17	maw	FIELD	
Milliliters Purged	200		ml/min	1		21-Mar-23 13:17	maw	FIELD	
Oxidation Reduction Potential	-103.8	-999.0	mV	1		21-Mar-23 13:17	maw	FIELD	
pH	7.5	7.0	pH Units	1		21-Mar-23 13:17	maw	SM 4500H+B	
Temperature	12		°C	1		21-Mar-23 13:17	maw	SM 2550B	
Turbidity	7.3	0.10	NTU	1		21-Mar-23 13:17	maw	SM 2130B	



Analytical Report

Client: BWL - Erickson Station
Address: 3725 S. Canal
 Lansing MI, 48917

Client Project Manager: Cheryl Louden

Report Date: 04/24/2023

Sample Name: MW-16D

Lab #: L303200-04 Ground Water

Collected: 21-Mar-23 14:06

By: Marc Wahrer

Analyte	Reporting			Dilution	Regulatory Limit	Analysis Date/Time	By	Method	Notes
	Result	Limit	Units						
Conductivity	600	1.0	uS/cm	1		21-Mar-23 14:06	maw	SM 2510B	
Dissolved oxygen	0.390	0.100	mg/L	1		21-Mar-23 14:06	maw	FIELD	
Milliliters Purged	0.00		ml/min	1		21-Mar-23 14:06	maw	FIELD	
Oxidation Reduction Potential	85.90	-999.0	mV	1		21-Mar-23 14:06	maw	FIELD	
pH	7.6	7.0	pH Units	1		21-Mar-23 14:06	maw	SM 4500H+B	
Temperature	8.4		°C	1		21-Mar-23 14:06	maw	SM 2550B	
Turbidity	7.3	0.10	NTU	1		21-Mar-23 14:06	maw	SM 2130B	



Analytical Report

Client: BWL - Erickson Station

Client Project Manager: Cheryl Louden

Report Date: 04/24/2023

Address: 3725 S. Canal
Lansing MI, 48917

Approved By: _____

Jennifer Caporale

Notes and Definitions

- AL Action Level (Action Level = Regulatory Limit)
 - MCL Maximum Contaminant Level
 - PEL Permissible Exposure Limit (Permissible Exposure Limit = Regulatory Limit)
 - RPD Relative Percent Difference
 - OT Odor Threshold
 - ND Non Detect is less than the reporting limit value
- All drinking water regulatory limits are MCL's with the exception of Lead and Copper unless otherwise noted.



Report ID: S46568.01(02)
Generated on 04/21/2023
Replaces report S46568.01(01) generated on 03/24/2023

Report to
Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by
Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Lavery (johnlavery@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary
Lab Sample ID(s): S46568.01-S46568.06
Project: Erickson AM MI Wells 16A-16D
Collected Date(s): 03/21/2023
Submitted Date/Time: 03/22/2023 16:04
Sampled by: Marc Wahrer
P.O. #:

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Maya Murshak
Technical Director



General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile, and 2-chloroethylvinyl ether need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the

FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

All analyses completed



Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1 (1993)
SM2320B	Standard Method 2320 B 2011
SM2340C	Standard Method 2340 C 2011
SM2540C	Standard Method 2540 C 2015
SM2540D	Standard Method 2540 D 2015
SW3015A	SW 846 Method 3015A Revision 1 February 2007



Sample Summary (6 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S46568.01	MW-16A	Groundwater	03/21/23 11:08
S46568.02	MW-16B	Groundwater	03/21/23 14:44
S46568.03	MW-16C	Groundwater	03/21/23 13:17
S46568.04	MW-16D	Groundwater	03/21/23 14:06
S46568.05	MWT-16A	Groundwater	03/21/23 11:08
S46568.06	Field Blank	Water	03/21/23 08:05



Analytical Laboratory Report

Final Report

Lab Sample ID: S46568.01

Sample Tag: MW-16A

Collected Date/Time: 03/21/2023 11:08

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	1.6	IR
2	1L Plastic	None	Yes	1.6	IR
1	250ml Plastic	HNO3	Yes	1.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	03/23/23 13:00	CTV	
Metal Digestion	Completed	SW3015A	03/23/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 03/23/23 10:27, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	405	100	1.3	mg/L	100	16887-00-6	

Method: E300.0, Run Date: 03/23/23 09:27, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	86	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 03/23/23 14:06, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	460	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 03/23/23 13:42, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	524	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 03/24/23 17:10, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,180	50	1	mg/L	2		

Method: SM2540D, Run Date: 03/22/23 19:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 03/23/23 11:32, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.003	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.118	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.11	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Final Report

Lab Sample ID: S46568.01 (continued)

Sample Tag: MW-16A

Method: E200.8, Run Date: 03/23/23 11:32, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	3.15	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 03/23/23 13:29, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	147	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	33.9	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	1.58	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	244	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 03/23/23 15:49, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 04/19/23 10:12, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S46568.02

Sample Tag: MW-16B

Collected Date/Time: 03/21/2023 14:44

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	1.6	IR
2	1L Plastic	None	Yes	1.6	IR
1	250ml Plastic	HNO3	Yes	1.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	03/23/23 13:00	CTV	
Metal Digestion	Completed	SW3015A	03/23/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 03/23/23 09:37, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	11	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	16	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 03/23/23 14:10, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	400	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 03/23/23 13:44, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	329	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 03/24/23 17:10, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	366	50	1	mg/L	2		

Method: SM2540D, Run Date: 03/22/23 19:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 03/23/23 11:36, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.085	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.13	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	0.62	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S46568.02 (continued)

Sample Tag: MW-16B

Method: E200.8, Run Date: 03/23/23 11:36, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.023	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.006	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 03/23/23 13:31, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	76.9	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	32.7	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	3.17	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	15.5	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 03/23/23 15:53, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 04/19/23 10:12, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S46568.03

Sample Tag: MW-16C

Collected Date/Time: 03/21/2023 13:17

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	1.6	IR
2	1L Plastic	None	Yes	1.6	IR
1	250ml Plastic	HNO3	Yes	1.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	03/23/23 13:00	CTV	
Metal Digestion	Completed	SW3015A	03/23/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 03/23/23 09:47, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	8	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 03/23/23 14:16, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	400	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 03/23/23 13:50, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	253	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 03/24/23 17:10, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	370	50	1	mg/L	2		

Method: SM2540D, Run Date: 03/22/23 19:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	11.6	3	1	mg/L	2		

Metals

Method: E200.8, Run Date: 03/23/23 11:39, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.003	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.061	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.40	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	1.10	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S46568.03 (continued)

Sample Tag: MW-16C

Method: E200.8, Run Date: 03/23/23 11:39, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.026	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.009	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 03/23/23 13:32, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	62.1	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	25.6	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	3.56	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	41.4	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 03/23/23 15:56, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 04/19/23 10:12, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S46568.04

Sample Tag: MW-16D

Collected Date/Time: 03/21/2023 14:06

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	1.6	IR
2	1L Plastic	None	Yes	1.6	IR
1	250ml Plastic	HNO3	Yes	1.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	03/23/23 13:00	CTV	
Metal Digestion	Completed	SW3015A	03/23/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 03/23/23 09:57, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	7	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	9	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 03/23/23 14:18, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	390	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 03/23/23 13:52, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	107	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 03/24/23 17:10, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	364	50	1	mg/L	2		

Method: SM2540D, Run Date: 03/22/23 19:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	3.80	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 03/23/23 11:42, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.036	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	4.59	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	0.06	0.02	0.00192	mg/L	5	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S46568.04 (continued)

Sample Tag: MW-16D

Method: E200.8, Run Date: 03/23/23 11:42, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.032	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.011	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	0.271	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 03/23/23 13:34, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	29.0	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	7.31	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	9.79	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	110	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 03/23/23 15:59, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 04/19/23 10:13, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Final Report

Lab Sample ID: S46568.05

Sample Tag: MWT-16A

Collected Date/Time: 03/21/2023 11:08

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	1.6	IR
2	1L Plastic	None	Yes	1.6	IR
1	250ml Plastic	HNO3	Yes	1.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	03/23/23 13:00	CTV	
Metal Digestion	Completed	SW3015A	03/23/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 03/23/23 11:08, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	411	100	1.3	mg/L	100	16887-00-6	

Method: E300.0, Run Date: 03/23/23 10:07, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	85	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 03/23/23 14:20, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	470	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 03/23/23 13:54, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	522	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 03/24/23 17:10, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,180	50	1	mg/L	2		

Method: SM2540D, Run Date: 03/22/23 19:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 03/23/23 11:49, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.003	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.119	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.11	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Final Report

Lab Sample ID: S46568.05 (continued)

Sample Tag: MWT-16A

Method: E200.8, Run Date: 03/23/23 11:49, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	3.14	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 03/23/23 13:37, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	150	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	34.1	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	1.58	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	247	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 03/23/23 16:02, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 04/19/23 10:13, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S46568.06

Sample Tag: Field Blank

Collected Date/Time: 03/21/2023 08:05

Matrix: Water

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	1.6	IR
2	1L Plastic	None	Yes	1.6	IR
1	250ml Plastic	HNO3	Yes	1.6	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	03/23/23 13:00	CTV	
Metal Digestion	Completed	SW3015A	03/23/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 03/23/23 10:17, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: SM2320B, Run Date: 03/23/23 14:22, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	Not detected	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 03/23/23 13:56, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	Not detected	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 03/24/23 17:10, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	50	1	mg/L	2		

Method: SM2540D, Run Date: 03/22/23 19:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 03/23/23 11:29, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S46568.06 (continued)

Sample Tag: Field Blank

Method: E200.8, Run Date: 03/23/23 11:29, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E200.8, Run Date: 03/23/23 13:27, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	
Magnesium	Not detected	0.50	0.00480	mg/L	2	7439-95-4	
Potassium	Not detected	0.50	0.00920	mg/L	2	7440-09-7	
Sodium	Not detected	0.50	0.00340	mg/L	2	7440-23-5	

Method: E245.1, Run Date: 03/23/23 16:06, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 04/19/23 10:13, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID:S46568

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Client:BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 16A-16D

Submitted:03/22/2023 16:04 Login User: MMC

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Selection	Description	Note
-----------	-------------	------

Sample Receiving

- | | | |
|-----|--|--|
| 01. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples are received at 4C +/- 2C Thermometer # IR 1.6 |
| 02. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Received on ice/ cooling process begun |
| 03. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples shipped |
| 04. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples left in 24 hr. drop box |
| 05. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Are there custody seals/tape or is the drop box locked |

Chain of Custody

- | | | |
|-----|--|--|
| 06. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC adequately filled out |
| 07. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | COC signed and relinquished to the lab |
| 08. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sample tag on bottles match COC |
| 09. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Subcontracting needed? Subcontracted to: GEL |

Preservation

- | | | |
|-----|--|---|
| 10. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Do sample have correct chemical preservation |
| 11. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Completed pH checks on preserved samples? (no VOAs) |
| 12. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Did any samples need to be preserved in the lab? |

Bottle Conditions

- | | | |
|-----|--|---|
| 13. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | All bottles intact |
| 14. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Appropriate analytical bottles are used |
| 15. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Merit bottles used |
| 16. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Sufficient sample volume received |
| 17. | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A | Samples require laboratory filtration |
| 18. | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A | Samples submitted within holding time |
| 19. | <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A | Do water VOC or TOX bottles contain headspace |

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S46568 Submitted: 03/22/2023 16:04

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 16A-16D

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Initial Preservation Check: 03/22/2023 16:39 MMC

Preservation Recheck (E200.8): N/A

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S46568.01	1L Plastic HNO3	<2			
S46568.01	1L Plastic HNO3	<2			
S46568.01	250ml Plastic HNO3	<2			
S46568.02	1L Plastic HNO3	<2			
S46568.02	1L Plastic HNO3	<2			
S46568.02	250ml Plastic HNO3	<2			
S46568.03	1L Plastic HNO3	<2			
S46568.03	1L Plastic HNO3	<2			
S46568.03	250ml Plastic HNO3	<2			
S46568.04	1L Plastic HNO3	<2			
S46568.04	1L Plastic HNO3	<2			
S46568.04	250ml Plastic HNO3	<2			
S46568.05	1L Plastic HNO3	<2			
S46568.05	1L Plastic HNO3	<2			
S46568.05	250ml Plastic HNO3	<2			
S46568.06	1L Plastic HNO3	<2			
S46568.06	1L Plastic HNO3	<2			
S46568.06	250ml Plastic HNO3	<2			



2680 East Lansing Dr., East Lansing, MI 48823
 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

REPORT TO **CHAIN OF CUSTODY RECORD** **INVOICE TO**

CONTACT NAME Jennifer Caporale			CONTACT NAME Beth Zimpfer <input checked="" type="checkbox"/> SAME		
COMPANY Lansing Board of Water and Light			COMPANY		
ADDRESS PO Box 13007 48901-3007			ADDRESS		
CITY Lansing	STATE Mi	ZIP CODE 48901	CITY	STATE	ZIP CODE
PHONE NO. 517-702-6372	FAX NO.	P.O. NO.	PHONE NO.	E-MAIL ADDRESS Beth.Zimpfer@lbwl.com	
E-MAIL ADDRESS Environmental_Laboratory@lbwl.com		QUOTE NO.			

PROJECT NO./NAME **Erickson AM MI Wells 16A-16D** SAMPLER(S) - PLEASE PRINT/SIGN NAME **Marc Wahrer**

TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER **ASAP**

DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIFE A=AIR W=WASTE

Containers & Preservatives

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	OTHER	Total Metals	F- undissolved, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	HCO ₃ , CO ₃ , Hardness	Certifications		Project Locations		Special Instructions
	DATE	TIME																	<input type="checkbox"/> OHIO VAP	<input type="checkbox"/> Drinking Water	<input type="checkbox"/> DoD	<input checked="" type="checkbox"/> NPDES	
46568.01	03/21/23	1108	MW-16A	GW	5	2	3						✓	✓	✓	✓	✓	✓		<input type="checkbox"/>	<input type="checkbox"/>	Metals to analyse: Na, Mg, K	
02		1444	MW-16B	GW	5	2	3						✓	✓	✓	✓	✓	✓		<input type="checkbox"/>	<input type="checkbox"/>	B, Ca, Sb, As, Ba, Be, Cd, Cr,	
03		1317	MW-16C	GW	5	2	3						✓	✓	✓	✓	✓	✓		<input type="checkbox"/>	<input type="checkbox"/>	Co, Li, Hg, Mo, Pb, Se, Tl,	
04		1406	MW16-D	GW	5	2	3						✓	✓	✓	✓	✓	✓		<input type="checkbox"/>	<input type="checkbox"/>	Fe, Cu, Ni, Ag, V, Zn	
05		1108	MWT-16A	GW	5	2	3						✓	✓	✓	✓	✓	✓		<input type="checkbox"/>	<input type="checkbox"/>	Please send a preliminary report	
06	↓	0805	Field Blank	DI	5	2	3						✓	✓	✓	✓	✓	✓		<input type="checkbox"/>	<input type="checkbox"/>		
			Equipment Blank	DI	5	2	3						✓	✓	✓	✓	✓	✓		<input type="checkbox"/>	<input type="checkbox"/>		

RELINQUISHED BY: SIGNATURE/ORGANIZATION <i>[Signature]</i> DATE 3-22-23 TIME 1604	RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION <i>M. [Signature]</i> DATE 3/22/23 TIME 1604	RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RELINQUISHED BY: SIGNATURE/ORGANIZATION	SEAL NO.	SEAL INTACT YES <input type="checkbox"/> NO <input type="checkbox"/>	INITIALS
RECEIVED BY: SIGNATURE/ORGANIZATION	SEAL NO.	SEAL INTACT YES <input type="checkbox"/> NO <input type="checkbox"/>	INITIALS
	NOTES:		TEMP. ON ARRIVAL 1.6

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total		250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.150
Be, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	2.5
Cl	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cr, total	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
F	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
Fe, total	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
Se, total	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
Tl, total	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
TDS	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TSS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
V, total	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005

April 19, 2023

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 615636
SDG: S46568

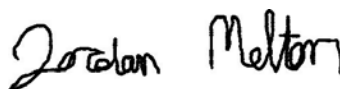
Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on March 24, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 1614.

Sincerely,



Jordan Melton for
Delaney Stone
Project Manager

Purchase Order: GELP20-0018
Enclosures



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Case Narrative

**Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S46568
Work Order: 615636**

April 19, 2023

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on March 24, 2023 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

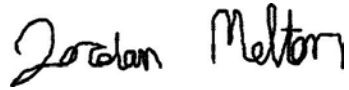
Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
615636001	S46568.01
615636002	S46568.02
615636003	S46568.03
615636004	S46568.04
615636005	S46568.05
615636006	S46568.06

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.

A handwritten signature in black ink that reads "Jordan Melton". The signature is written in a cursive style with a large, prominent "J" and "M".

Jordan Melton for
Delaney Stone
Project Manager

Chain of Custody and Supporting Documentation

015636

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com



C.O.C. PAGE # 1 OF 1

REPORT TO		CHAIN OF CUSTODY RECORD		INVOICE TO	
CONTACT NAME Project Management Team		CONTACT NAME Julie Teague		CONTACT NAME []	
COMPANY Merit Laboratories		COMPANY Merit Laboratories		COMPANY Merit Laboratories	
ADDRESS 2680 East Lansing Drive		ADDRESS 2680 East Lansing Drive		ADDRESS 2680 East Lansing Drive	
CITY East Lansing		CITY East Lansing		CITY East Lansing	
PHONE NO. 517-332-0167		PHONE NO. 517-332-0167		PHONE NO. 517-332-0167	
FAX NO.		FAX NO.		FAX NO.	
E-MAIL ADDRESS results@meritlabs.com		E-MAIL ADDRESS juliet@meritlabs.com		E-MAIL ADDRESS juliet@meritlabs.com	
PROJECT NO./NAME S46568		PROJECT NO./NAME S46568		PROJECT NO./NAME S46568	
TURNAROUND TIME REQUIRED <input type="checkbox"/> 1 DAY <input type="checkbox"/> 2 DAYS <input type="checkbox"/> 3 DAYS <input checked="" type="checkbox"/> STANDARD <input type="checkbox"/> OTHER		TURNAROUND TIME REQUIRED <input type="checkbox"/> 1 DAY <input type="checkbox"/> 2 DAYS <input type="checkbox"/> 3 DAYS <input checked="" type="checkbox"/> STANDARD <input type="checkbox"/> OTHER		TURNAROUND TIME REQUIRED <input type="checkbox"/> 1 DAY <input type="checkbox"/> 2 DAYS <input type="checkbox"/> 3 DAYS <input checked="" type="checkbox"/> STANDARD <input type="checkbox"/> OTHER	
DELIVERABLES REQUIRED <input type="checkbox"/> STD <input type="checkbox"/> LEVEL I <input type="checkbox"/> LEVEL II <input type="checkbox"/> LEVEL III <input checked="" type="checkbox"/> LEVEL IV <input type="checkbox"/> EDD <input type="checkbox"/> OTHER		DELIVERABLES REQUIRED <input type="checkbox"/> STD <input type="checkbox"/> LEVEL I <input type="checkbox"/> LEVEL II <input type="checkbox"/> LEVEL III <input checked="" type="checkbox"/> LEVEL IV <input type="checkbox"/> EDD <input type="checkbox"/> OTHER		DELIVERABLES REQUIRED <input type="checkbox"/> STD <input type="checkbox"/> LEVEL I <input type="checkbox"/> LEVEL II <input type="checkbox"/> LEVEL III <input checked="" type="checkbox"/> LEVEL IV <input type="checkbox"/> EDD <input type="checkbox"/> OTHER	
MATRIX CODE GW=GROUNDWATER SL=SLUDGE WW=WASTEWATER DW=DRINKING WATER S=SOIL WP=WIPE L=LIQUID A=AIR SD=SOLID W=WASTE		MATRIX CODE GW=GROUNDWATER SL=SLUDGE WW=WASTEWATER DW=DRINKING WATER S=SOIL WP=WIPE L=LIQUID A=AIR SD=SOLID W=WASTE		MATRIX CODE GW=GROUNDWATER SL=SLUDGE WW=WASTEWATER DW=DRINKING WATER S=SOIL WP=WIPE L=LIQUID A=AIR SD=SOLID W=WASTE	
YEAR		YEAR		YEAR	
DATE		DATE		DATE	
TIME		TIME		TIME	
3/21/23 1108		3/21/23 1108		3/21/23 1108	
3/21/23 1444		3/21/23 1444		3/21/23 1444	
3/21/23 1317		3/21/23 1317		3/21/23 1317	
3/21/23 1406		3/21/23 1406		3/21/23 1406	
3/21/23 1108		3/21/23 1108		3/21/23 1108	
3/21/23 0805		3/21/23 0805		3/21/23 0805	
IDENTIFICATION-DESCRIPTION		IDENTIFICATION-DESCRIPTION		IDENTIFICATION-DESCRIPTION	
S46568.01		S46568.01		S46568.01	
S46568.02		S46568.02		S46568.02	
S46568.03		S46568.03		S46568.03	
S46568.04		S46568.04		S46568.04	
S46568.05		S46568.05		S46568.05	
S46568.06		S46568.06		S46568.06	
SAMPLE TAG		SAMPLE TAG		SAMPLE TAG	
MTRX		MTRX		MTRX	
GW 2		GW 2		GW 2	
GW 2		GW 2		GW 2	
GW 2		GW 2		GW 2	
GW 2		GW 2		GW 2	
GW 2		GW 2		GW 2	
DI 2		DI 2		DI 2	
# OF BOTTLES		# OF BOTTLES		# OF BOTTLES	
2		2		2	
2		2		2	
2		2		2	
2		2		2	
2		2		2	
2		2		2	
NONE		NONE		NONE	
HCl		HCl		HCl	
HNO3		HNO3		HNO3	
H2SO4		H2SO4		H2SO4	
NaOH		NaOH		NaOH	
MeOH		MeOH		MeOH	
OTHER		OTHER		OTHER	
Radium 226 *		Radium 226 *		Radium 226 *	
✓		✓		✓	
✓		✓		✓	
✓		✓		✓	
✓		✓		✓	
✓		✓		✓	
✓		✓		✓	
✓		✓		✓	
Radium 228 **		Radium 228 **		Radium 228 **	
✓		✓		✓	
✓		✓		✓	
✓		✓		✓	
✓		✓		✓	
✓		✓		✓	
✓		✓		✓	
* E903.1 Mod.		* E903.1 Mod.		* E903.1 Mod.	
** E904.0/SW 9320 Mod.		** E904.0/SW 9320 Mod.		** E904.0/SW 9320 Mod.	
Please use calculation product & provide Radium 226/228 combined results on the report		Please use calculation product & provide Radium 226/228 combined results on the report		Please use calculation product & provide Radium 226/228 combined results on the report	
(No Ice needed)		(No Ice needed)		(No Ice needed)	
** Subcontracted to		** Subcontracted to		** Subcontracted to	
GEL Laboratories, Inc.		GEL Laboratories, Inc.		GEL Laboratories, Inc.	
2040 Savage Road		2040 Savage Road		2040 Savage Road	
Charleston, SC 29407		Charleston, SC 29407		Charleston, SC 29407	
CERTIFICATIONS		CERTIFICATIONS		CERTIFICATIONS	
<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water		<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water		<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water	
<input type="checkbox"/> DoD <input type="checkbox"/> NPDES		<input type="checkbox"/> DoD <input type="checkbox"/> NPDES		<input type="checkbox"/> DoD <input type="checkbox"/> NPDES	
Project Locations		Project Locations		Project Locations	
<input type="checkbox"/> Detroit <input type="checkbox"/> New York		<input type="checkbox"/> Detroit <input type="checkbox"/> New York		<input type="checkbox"/> Detroit <input type="checkbox"/> New York	
<input type="checkbox"/> Other		<input type="checkbox"/> Other		<input type="checkbox"/> Other	
Special Instructions		Special Instructions		Special Instructions	
ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)		ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)		ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)	
RELINQUISHED BY: SIGNATURE/Organization		RELINQUISHED BY: SIGNATURE/Organization		RELINQUISHED BY: SIGNATURE/Organization	
RECEIVED BY: SIGNATURE/Organization		RECEIVED BY: SIGNATURE/Organization		RECEIVED BY: SIGNATURE/Organization	
RELINQUISHED BY: SIGNATURE/Organization		RELINQUISHED BY: SIGNATURE/Organization		RELINQUISHED BY: SIGNATURE/Organization	
RECEIVED BY: SIGNATURE/Organization		RECEIVED BY: SIGNATURE/Organization		RECEIVED BY: SIGNATURE/Organization	
DATE		DATE		DATE	
TIME		TIME		TIME	
3/21/23 1100		3/21/23 1100		3/21/23 1100	
3/21/23 1700		3/21/23 1700		3/21/23 1700	
DATE		DATE		DATE	
TIME		TIME		TIME	
3/20/200		3/20/200		3/20/200	
INITIALS		INITIALS		INITIALS	
SEAL INTACT YES <input type="checkbox"/> NO <input type="checkbox"/>		SEAL INTACT YES <input type="checkbox"/> NO <input type="checkbox"/>		SEAL INTACT YES <input type="checkbox"/> NO <input type="checkbox"/>	
SEAL INTACT YES <input type="checkbox"/> NO <input type="checkbox"/>		SEAL INTACT YES <input type="checkbox"/> NO <input type="checkbox"/>		SEAL INTACT YES <input type="checkbox"/> NO <input type="checkbox"/>	
NOTES		NOTES		NOTES	
TEMP. ON ARRIVAL		TEMP. ON ARRIVAL		TEMP. ON ARRIVAL	

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Rev 5/18/12



SAMPLE RECEIPT & REVIEW FORM

Client: **MERI** SDG/AR/COC/Work Order: **615-636**

Received By: **SNS** Date Received: **3/24/23** Circle Applicable: UPS FedEx Express FedEx Ground Field Services Courier Other

Carrier and Tracking Number
124664770363794377

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
A) Shipped as a DOT Hazardous?		<input checked="" type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___
B) Did the client designate the samples are to be received as radioactive?		<input checked="" type="checkbox"/>	COC notation or radioactive stickers on containers equal client designation.
C) Did the RSO classify the samples as radioactive?		<input checked="" type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u> </u> <u>CPM</u> /mR/Hr Classified as: Rad 1 Rad 2 Rad 3
D) Did the client designate samples are hazardous?		<input checked="" type="checkbox"/>	COC notation or hazard labels on containers equal client designation.
E) Did the RSO identify possible hazards?		<input checked="" type="checkbox"/>	If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____

Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1 Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2 Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>			Circle Applicable: Client contacted and provided COC COC created upon receipt
3 Samples requiring cold preservation within (0 ≤ deg. C)?*			<input checked="" type="checkbox"/>	Preservation Method: Wet Ice Ice Packs Dry Ice <input checked="" type="checkbox"/> None Other: _____ *all temperatures are recorded in Celsius TEMP: 20C
4 Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>			Temperature Device Serial #: IR1-23 Secondary Temperature Device Serial # (If Applicable): _____
5 Sample containers intact and sealed?	<input checked="" type="checkbox"/>			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6 Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>			Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____
7 Do any samples require Volatile Analysis?			<input checked="" type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer)
				Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No)
				Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___
8 Samples received within holding time?	<input checked="" type="checkbox"/>			Sample ID's and containers affected: _____
9 Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>			ID's and tests affected: _____
10 Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>			Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11 Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>			Circle Applicable: No container count on COC Other (describe)
12 Are sample containers identifiable as GEL provided by use of GEL labels?			<input checked="" type="checkbox"/>	
13 COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>			Circle Applicable: Not relinquished Other (describe)

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials **MB** Date **3/27/23** Page **1** of **1**

Laboratory Certifications

List of current GEL Certifications as of 19 April 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122023-4
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2022-160
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-22-20
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S46568
Work Order #: 615636**

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2406255

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
615636001	S46568.01
615636002	S46568.02
615636003	S46568.03
615636004	S46568.04
615636005	S46568.05
615636006	S46568.06
1205361131	Method Blank (MB)
1205361132	615636001(S46568.01) Sample Duplicate (DUP)
1205361133	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2406215

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
615636001	S46568.01
615636002	S46568.02
615636003	S46568.03
615636004	S46568.04
615636005	S46568.05
615636006	S46568.06
1205361072	Method Blank (MB)
1205361073	615636001(S46568.01) Sample Duplicate (DUP)
1205361074	615636001(S46568.01) Matrix Spike (MS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments

The matrix spike, 1205361074 (S46568.01MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

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Qualifier Definition Report for

MERI001 Merit Laboratories, Inc.

Client SDG: S46568 GEL Work Order: 615636

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:



Name: Theresa Austin

Date: 20 APR 2023

Title: Group Leader

Sample Data Summary

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: April 19, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S46568.01 Project: MERI00120
Sample ID: 615636001 Client ID: MERI001
Matrix: Ground Water
Collect Date: 21-MAR-23 11:08
Receive Date: 24-MAR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	0.698	+/-1.04	1.81	3.00	pCi/L		JE1	04/12/23	1012	2406255	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		1.21	+/-1.12			pCi/L		NXL1	04/19/23	0904	2407931	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226	U	0.510	+/-0.408	0.611	1.00	pCi/L		LXP1	04/16/23	0946	2406215	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			77	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: April 19, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S46568.02 Project: MERI00120
Sample ID: 615636002 Client ID: MERI001
Matrix: Ground Water
Collect Date: 21-MAR-23 14:44
Receive Date: 24-MAR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	1.79	+/-1.21	1.88	3.00	pCi/L		JE1	04/12/23	1012	2406255	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		2.56	+/-1.27			pCi/L		NXL1	04/19/23	0904	2407931	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		0.761	+/-0.377	0.384	1.00	pCi/L		LXP1	04/16/23	0946	2406215	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			85.3	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: April 19, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S46568.03 Project: MERI00120
Sample ID: 615636003 Client ID: MERI001
Matrix: Ground Water
Collect Date: 21-MAR-23 13:17
Receive Date: 24-MAR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228		3.09	+/-1.22	1.58	3.00	pCi/L		JE1	04/12/23	1012	2406255	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		3.60	+/-1.29			pCi/L		NXL1	04/19/23	0904	2407931	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226	U	0.509	+/-0.423	0.626	1.00	pCi/L		LXP1	04/16/23	0946	2406215	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			87.6	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: April 19, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Laverty
 Project: Routine Analysis

Client Sample ID: S46568.04	Project: MERI00120
Sample ID: 615636004	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 21-MAR-23 14:06	
Receive Date: 24-MAR-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.757	+/-1.15	2.00	3.00	pCi/L		JE1	04/12/23	1013	2406255		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.52	+/-1.25			pCi/L		NXL1	04/19/23	0904	2407931		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.763	+/-0.484	0.685	1.00	pCi/L		LXP1	04/16/23	0946	2406215		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			80.7	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

- | | |
|---------------------------------------|--------------------------------|
| DF: Dilution Factor | Lc/LC: Critical Level |
| DL: Detection Limit | PF: Prep Factor |
| MDA: Minimum Detectable Activity | RL: Reporting Limit |
| MDC: Minimum Detectable Concentration | SQL: Sample Quantitation Limit |

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: April 19, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S46568.05 Project: MERI00120
Sample ID: 615636005 Client ID: MERI001
Matrix: Ground Water
Collect Date: 21-MAR-23 11:08
Receive Date: 24-MAR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	0.907	+/-1.12	1.89	3.00	pCi/L		JE1	04/12/23	1013	2406255	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		2.13	+/-1.22			pCi/L		NXL1	04/19/23	0904	2407931	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		1.22	+/-0.478	0.347	1.00	pCi/L		LXP1	04/16/23	0946	2406215	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			84.9	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: April 19, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive
 East Lansing, Michigan 48823
 Contact: John Lavery
 Project: Routine Analysis

Client Sample ID: S46568.06	Project: MERI00120
Sample ID: 615636006	Client ID: MERI001
Matrix: Water	
Collect Date: 21-MAR-23 08:05	
Receive Date: 24-MAR-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	0.765	+/-1.37	2.40	3.00	pCi/L		JE1	04/12/23	1013	2406255	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		1.07	+/-1.41			pCi/L		NXL1	04/19/23	0904	2407931	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226	U	0.305	+/-0.331	0.536	1.00	pCi/L		LXP1	04/16/23	0946	2406215	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			73	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

- | | |
|---------------------------------------|--------------------------------|
| DF: Dilution Factor | Lc/LC: Critical Level |
| DL: Detection Limit | PF: Prep Factor |
| MDA: Minimum Detectable Activity | RL: Reporting Limit |
| MDC: Minimum Detectable Concentration | SQL: Sample Quantitation Limit |

Quality Control Data

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: April 19, 2023

Page 1 of 2

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan
Contact: John Laverty

Workorder: 615636

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2406255										
QC1205361132	615636001	DUP									
Radium-228	U	0.698	U	-0.124	pCi/L	N/A		N/A	JE1	04/12/23	10:12
	Uncertainty	+/-1.04		+/-1.16							
QC1205361133	LCS										
Radium-228	80.5			77.5	pCi/L		96.3	(75%-125%)		04/12/23	10:12
	Uncertainty			+/-4.66							
QC1205361131	MB										
Radium-228			U	0.285	pCi/L					04/12/23	10:12
	Uncertainty			+/-0.956							
Rad Ra-226											
Batch	2406215										
QC1205361073	615636001	DUP									
Radium-226	U	0.510		0.660	pCi/L	25.7		(0% - 100%)	LXP1	04/16/23	10:17
	Uncertainty	+/-0.408		+/-0.433							
QC1205361075	LCS										
Radium-226	26.4			24.1	pCi/L		91.2	(75%-125%)		04/16/23	10:51
	Uncertainty			+/-2.07							
QC1205361072	MB										
Radium-226			U	0.288	pCi/L					04/16/23	10:17
	Uncertainty			+/-0.351							
QC1205361074	615636001	MS									
Radium-226	103 U	0.510		94.0	pCi/L		91.3	(75%-125%)		04/16/23	10:17
	Uncertainty	+/-0.408		+/-8.37							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- H Analytical holding time was exceeded
- < Result is less than value reported
- > Result is greater than value reported

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 615636

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UI											
BD											
h											
R											
^											
N/A											
ND											
M											
NJ											
FA											
UJ											
Q											
K											
UL											
L											
NI											
Y											
**											
M											
J											

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 2406255 Check-list

This check-list was completed on 12-APR-23 by Nat Long

This batch was reviewed by Lois Buist on 12-APR-23 and Nat Long on 12-APR-23.

Batch ID:
2406255

Product:
GFC28RAL

Description: Gas Flow Radium 228
GL-RAD-A-063

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-228 in Liquid

Batch ID: 2406255
Analyst: Jacqueline Winston (JE1)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL-RAD-A-063 REV# 5
Instrument: LUCAS-C202389980

Due Dates for Lab: 18-APR-2023			Package: 20-APR-2023		SDG: 21-APR-2023	
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
LCS	1205361133	228	2051-B	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	Ac-228 Ingrow (date)	Ac-228 Separation (date)
1	615636001	05-APR-2023	3	302.6	302.6	04/06/23 14:16	04/12/23 07:06
2	615636002	05-APR-2023	3	308.31	308.31	04/06/23 14:16	04/12/23 07:06
3	615636003	05-APR-2023	3	304.68	304.68	04/06/23 14:16	04/12/23 07:06
4	615636004	05-APR-2023	3	312.87	312.87	04/06/23 14:16	04/12/23 07:06
5	615636005	05-APR-2023	3	304.81	304.81	04/06/23 14:16	04/12/23 07:06
6	615636006	05-APR-2023	3	306.96	306.96	04/06/23 14:16	04/12/23 07:06
7	616069001	05-APR-2023	3	300.56	300.56	04/06/23 14:16	04/12/23 07:06
8	616069002	05-APR-2023	3	307.04	307.04	04/06/23 14:16	04/12/23 07:06
9	616069003	05-APR-2023	3	307.44	307.44	04/06/23 14:16	04/12/23 07:06
10	616069004	05-APR-2023	3	307.7	307.7	04/06/23 14:16	04/12/23 07:06
11	1205361131 MB	05-APR-2023	3		312.87	04/06/23 14:16	04/12/23 07:06
12	1205361132 DUP (615636001)	05-APR-2023	3	306.8	306.8	04/06/23 14:16	04/12/23 07:06
13	1205361133 LCS	05-APR-2023	3		312.87	04/06/23 14:16	04/12/23 07:06

Reagent/Solvent Lot ID	Description	Amount	Comments:
WORK 1951-E	Ba-133	.1 mL	Pipet Id: RAD-GFC-1795419 Data Entry Date2: 05-APR-2023 00:00
REGNT 3887296	RGF-1.5M Ammonium Sulfate	10 mL	
REGNT 3885444	RGF-1M Citric Acid	5 mL	
REGNT 3887348	2M HCl	20 mL	
REGNT 3889999	RGF-50% Potassium Carbonate	2 mL	
REGNT 3884583	RGF-7M Nitric Acid	25 mL	
REGNT 3857893.11	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL	
REGNT DGA030723	2396801	2 g	
REGNT 3867057.17	RGF-Hydrofluoric Acid	4 mL	
REGNT 3528714	500 mg/mL Neodymium Carrier	.2 mL	
REGNT 3887517	RGF-Neodymium Substrate	5 mL	
REGNT 3465466	Barium Carrier Ra228 REG	1 mL	
REGNT 3879639.10	Nitric Acid	5 mL	

Radium-228 Liquid

Filename : RA228.XLS
 File type : Excel
 Version # : 1.4.3

Tracer S/N : 1951-E
 Tracer Exp Date : 1/10/2024
 Tracer Volume Added: 0.10

Batch : 2406255
 Analyst : JAC02417
 Prep Date : 4/5/2023
 Ra-228 Method Uncertainty : 0.1268

Procedure Code : GFC28RAL
 Parmname : Radium-228
 Required MDA : 3 pCi/L
 Ra-228 Abundance : 1.00
 Halflife of Ra-228 : 5.75 years
 Halflife of Ac-228 : 6.15 hours

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	615636001.1	0.3026	1.8503E-05	3/21/2023 11:08	1196.5	1.67%	920.8	1.90%	0.1	0.000200
2	615636002.1	0.3083	1.8596E-05	3/21/2023 14:44	1196.5	1.67%	1020.9	1.81%	0.1	0.000200
3	615636003.1	0.3047	1.8537E-05	3/21/2023 13:17	1196.5	1.67%	1048.5	1.78%	0.1	0.000200
4	615636004.1	0.3129	1.8668E-05	3/21/2023 14:06	1196.5	1.67%	965.9	1.86%	0.1	0.000200
5	615636005.1	0.3048	1.8540E-05	3/21/2023 11:08	1196.5	1.67%	1015.7	1.81%	0.1	0.000200
6	615636006.1	0.3070	1.8575E-05	3/21/2023 8:05	1196.5	1.67%	873.7	1.95%	0.1	0.000200
7	616069001.1	0.3006	1.8469E-05	3/24/2023 12:42	1196.5	1.67%	1004.7	1.82%	0.1	0.000200
8	616069002.1	0.3070	1.8576E-05	3/24/2023 14:35	1196.5	1.67%	947.5	1.88%	0.1	0.000200
9	616069003.1	0.3074	1.8582E-05	3/24/2023 12:42	1196.5	1.67%	1102.4	1.74%	0.1	0.000200
10	616069004.1	0.3077	1.8587E-05	3/24/2023 11:45	1196.5	1.67%	941.6	1.88%	0.1	0.000200
11	1205361131.1	0.3129	1.8668E-05	4/5/2023 0:00	1196.5	1.67%	915.0	1.91%	0.1	0.000200
12	1205361132.1	0.3068	1.8572E-05	3/21/2023 11:08	1196.5	1.67%	828.9	2.01%	0.1	0.000200
13	1205361133.1	0.3129	1.8668E-05	4/5/2023 0:00	1196.5	1.67%	975.3	1.85%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-063
 Instrument SOP: GL-RAD-I-016

Count raw Data													Calculated	Sample
Pos.	Detector ID	Counting Time (min.)	Gross Counts		Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Recovery %	Sample Recovery Error %
			Alpha	Beta										
1	1B	60	10	40	0.667	4/12/2023 10:12	4/6/2023 14:16	4/12/2023 7:06	0.993	0.704	1.000	1.057	77.0%	2.55%
2	1C	60	6	73	1.217	4/12/2023 10:12	4/6/2023 14:16	4/12/2023 7:06	0.993	0.704	1.000	1.057	85.3%	2.48%
3	1D	60	7	75	1.250	4/12/2023 10:12	4/6/2023 14:16	4/12/2023 7:06	0.993	0.704	1.000	1.057	87.6%	2.46%
4	2A	60	8	60	1.000	4/12/2023 10:13	4/6/2023 14:16	4/12/2023 7:06	0.993	0.704	1.000	1.057	80.7%	2.52%
5	2C	60	16	56	0.933	4/12/2023 10:13	4/6/2023 14:16	4/12/2023 7:06	0.993	0.704	1.000	1.057	84.9%	2.48%
6	2D	60	7	63	1.050	4/12/2023 10:13	4/6/2023 14:16	4/12/2023 7:06	0.993	0.703	1.000	1.057	73.0%	2.58%
7	4A	60	9	42	0.700	4/12/2023 10:13	4/6/2023 14:16	4/12/2023 7:06	0.994	0.703	1.000	1.057	84.0%	2.49%
8	4C	60	14	56	0.933	4/12/2023 10:13	4/6/2023 14:16	4/12/2023 7:06	0.994	0.703	1.000	1.057	79.2%	2.53%
9	4D	60	6	51	0.850	4/12/2023 10:13	4/6/2023 14:16	4/12/2023 7:06	0.994	0.703	1.000	1.057	92.1%	2.43%
10	5C	60	10	40	0.667	4/12/2023 10:13	4/6/2023 14:16	4/12/2023 7:06	0.994	0.703	1.000	1.057	78.7%	2.53%
11	7B	60	7	39	0.650	4/12/2023 10:12	4/6/2023 14:16	4/12/2023 7:06	0.998	0.704	1.000	1.057	76.5%	2.55%
12	1A	60	8	42	0.700	4/12/2023 10:12	4/6/2023 14:16	4/12/2023 7:06	0.993	0.704	1.000	1.057	69.3%	2.63%
13	7C	60	31	1175	19.583	4/12/2023 10:12	4/6/2023 14:16	4/12/2023 7:06	0.998	0.704	1.000	1.057	81.5%	2.51%

Calibration Data								
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2022	5/31/2023	0.6068	0.00711	0.522	4/7/2023 18:45	500
2	PIC	6/1/2022	5/31/2023	0.6190	0.00847	0.788	4/7/2023 18:45	500
3	PIC	6/1/2022	5/31/2023	0.6048	0.00692	0.518	4/7/2023 18:45	500
4	PIC	6/1/2022	5/31/2023	0.6201	0.01914	0.826	4/7/2023 18:45	500
5	PIC	6/1/2022	5/31/2023	0.6022	0.01274	0.726	4/7/2023 18:46	500
6	PIC	6/1/2022	5/31/2023	0.6046	0.00745	0.898	4/7/2023 18:46	500
7	PIC	6/1/2022	5/31/2023	0.6013	0.01123	0.510	4/7/2023 18:46	500
8	PIC	6/1/2022	5/31/2023	0.6359	0.00889	0.976	4/7/2023 18:46	500
9	PIC	6/1/2022	5/31/2023	0.5954	0.00773	0.578	4/7/2023 18:46	500
10	PIC	6/1/2022	5/31/2023	0.6242	0.00657	0.548	4/7/2023 18:47	500
11	PIC	6/1/2022	5/31/2023	0.6366	0.00627	0.586	4/7/2023 18:43	500
12	PIC	6/1/2022	5/31/2023	0.6209	0.00738	0.724	4/7/2023 18:45	500
13	PIC	6/1/2022	5/31/2023	0.6407	0.00790	0.898	4/7/2023 18:43	500

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

* - RPD changed to 0% due to sample & dup activity below MDA

LCS S/N : 2051-B
LCS Exp Date : 3/27/2024
LCS Activity (dpm/ml): 559.43
LCS Volume Added: 0.10

Results														2 SIGMA		2 SIGMA	
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	Counting Uncertainty pCi/L	Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery	
1	1.1091	0.7830	3	1.8071	0.6976	76.26%	0.1447	0.1103	1.0420	1.0570		SAMPLE					
2	1.1829	0.8351	3	1.8795	1.7943	34.59%	0.4287	0.1478	1.2128	1.2955		SAMPLE					
3	0.9672	0.6828	3	1.5767	3.0900	20.36%	0.7320	0.1479	1.2236	1.4528		SAMPLE					
4	1.2594	0.8892	3	1.9960	0.7574	77.85%	0.1740	0.1353	1.1548	1.1710		SAMPLE					
5	1.1871	0.8381	3	1.8950	0.9074	62.96%	0.2073	0.1304	1.1186	1.1422		SAMPLE					
6	1.5182	1.0719	3	2.3954	0.7650	91.43%	0.1520	0.1389	1.3702	1.3840		SAMPLE					
7	1.0209	0.7207	3	1.6660	0.8532	59.34%	0.1900	0.1126	0.9913	1.0148		SAMPLE					
8	1.3862	0.9786	3	2.1777	-0.1881	310.13%	-0.0427	0.1323	1.1431	1.1432		SAMPLE					
9	0.9781	0.6905	3	1.5831	1.0992	45.58%	0.2720	0.1238	0.9805	1.0193		SAMPLE					
10	1.0629	0.7504	3	1.7263	0.5352	93.14%	0.1187	0.1105	0.9767	0.9861		SAMPLE					
11	1.0844	0.7656	3	1.7537	0.2848	171.22%	0.0640	0.1096	0.9557	0.9584		MB					
12	1.3982	0.9871	3	2.2323	-0.1239	477.17%	-0.0240	0.1145	1.1586	1.1588	615636001.1	DUP	* 0.0%				
13	1.2516	0.8837	3	1.9748	77.5274	4.04%	18.6853	0.5729	4.6588	20.2217		LCS			80.5428	96.3%	

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
615636001	1B	60	10	40	4/12/2023 10:12	4/12/2023 11:12	PIC	2406255
615636002	1C	60	6	73	4/12/2023 10:12	4/12/2023 11:12	PIC	2406255
615636003	1D	60	7	75	4/12/2023 10:12	4/12/2023 11:12	PIC	2406255
615636004	2A	60	8	60	4/12/2023 10:13	4/12/2023 11:13	PIC	2406255
615636005	2C	60	16	56	4/12/2023 10:13	4/12/2023 11:13	PIC	2406255
615636006	2D	60	7	63	4/12/2023 10:13	4/12/2023 11:13	PIC	2406255
616069001	4A	60	9	42	4/12/2023 10:13	4/12/2023 11:13	PIC	2406255
616069002	4C	60	14	56	4/12/2023 10:13	4/12/2023 11:13	PIC	2406255
616069003	4D	60	6	51	4/12/2023 10:13	4/12/2023 11:13	PIC	2406255
616069004	5C	60	10	40	4/12/2023 10:13	4/12/2023 11:13	PIC	2406255
1205361131	7B	60	7	39	4/12/2023 10:12	4/12/2023 11:12	PIC	2406255
1205361132	1A	60	8	42	4/12/2023 10:12	4/12/2023 11:12	PIC	2406255
1205361133	7C	60	31	1175	4/12/2023 10:12	4/12/2023 11:12	PIC	2406255

ASSAY 12-Apr-23 7:36:07
 Wizard 2480 s/n 46190630
 Protocol id 8 Ba-133
 Time limit
 Count limit
 Isotope Ba-133
 Protocol date 4/12/2023
 Run id. 6479

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF		1	87	1	180	3590.28	1196.48	1.67	07:36:07
615636001	2	87	2	180	2762.85	920.78	1.9	76.96	07:39:21
615636002	3	87	3	180	3063.28	1020.86	1.81	85.32	07:42:35
615636003	4	87	4	180	3145.85	1048.54	1.78	87.64	07:45:49
615636004	5	87	5	180	2898.28	965.87	1.86	80.73	07:49:03
615636005	1	1	1	180	3047.57	1015.7	1.81	84.89	07:52:39
615636006	2	1	2	180	2621.57	873.72	1.95	73.02	07:55:53
616069001	3	1	3	180	3014.57	1004.7	1.82	83.97	07:59:06
616069002	4	1	4	180	2843	947.52	1.88	79.19	08:02:20
616069003	5	1	5	180	3308	1102.42	1.74	92.14	08:05:35
616069004	1	15	1	180	2825.28	941.63	1.88	78.70	08:09:10
1205361131	2	15	2	180	2745.57	914.99	1.91	76.47	08:12:24
1205361132	3	15	3	180	2487.28	828.87	2.01	69.28	08:15:38
1205361133	4	15	4	180	2926.28	975.28	1.85	81.51	08:18:52

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 12-Apr-2023

Detectors LB4100 A1 through I4 and PIC 1A through 14D and G5400W 1W through 1Z and LB4200 OA1 through OA1

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100E2	Above	Beta bkg	12-Apr 04:09	60	2.383	1.385	3.072	+0.55
LB4100E2	need 2nd	Beta eff	12-Apr 05:22	5	14211	14120	15200	-2.50
LB4100E4	Above	Beta bkg	12-Apr 06:28	60	2.150	1.058	2.464	+1.66
LB4100F2	Above	Alpha bkg	12-Apr 04:09	60	0.383	0.042	0.294	+5.15
LB4100F2	Below	Alpha eff	12-Apr 05:13	5	6016	6533	7372	-6.69
LB4100F2	Above	Alpha XTalk	12-Apr 05:13	5	0.386	0.318	0.366	+5.55
LB4100F2	Above	Beta bkg	12-Apr 04:09	60	21.933	1.173	1.833	+185.73
LB4100F2	Below	Beta eff	12-Apr 05:22	5	14989	15040	15710	-3.46
LB4100F3	Above	Alpha bkg	12-Apr 04:09	60	0.333	0.059	0.442	+1.30
LB4100G1	need 2nd	Alpha eff	12-Apr 05:23	5	8596	7975	12090	-2.09
LB4100G1	Above	Beta bkg	12-Apr 04:10	60	793	0.380	1.675	+3,671.02
LB4100G3	Above	Beta bkg	12-Apr 04:10	60	2.050	0.987	2.738	+0.64
LB4100H1	Above	Beta bkg	12-Apr 04:09	60	2.283	0.216	2.462	+2.52
PIC2B	Above	Beta bkg	12-Apr 07:38	60	2.200	-5.22E-1	2.315	+2.76
PIC4B	Above	Alpha bkg	12-Apr 09:07	60	0.400	0.127	0.391	+3.21
PIC6B	Above	Alpha bkg	12-Apr 09:14	60	0.433	-6.69E-2	0.412	+3.26
PIC12C	Above	Beta bkg	12-Apr 06:03	60	3.650	0.142	2.845	+4.79
PIC14B	Above	Beta bkg	12-Apr 06:14	60	7.383	-7.38E-1	2.727	+11.06
PIC14C	Above	Beta bkg	12-Apr 06:14	60	2.500	-1.36E+0	4.189	+1.17

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100A1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

LB4100I2 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I3 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I4 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4200OA1 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by 

Date 4/12/23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC

Batch ID: 2406255

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1205361131	MB	JE1	PIC7B	APR-12-23 10:12:30	DONE	25mm Filter	01-JUN-22 00:00
1205361132	DUP	JE1	PIC1A	APR-12-23 10:12:35	DONE	25mm Filter	01-JUN-22 00:00
1205361133	LCS	JE1	PIC7C	APR-12-23 10:12:37	DONE	25mm Filter	01-JUN-22 00:00
615636001	SAMPLE	JE1	PIC1B	APR-12-23 10:12:47	DONE	25mm Filter	01-JUN-22 00:00
615636002	SAMPLE	JE1	PIC1C	APR-12-23 10:12:54	DONE	25mm Filter	01-JUN-22 00:00
615636003	SAMPLE	JE1	PIC1D	APR-12-23 10:12:58	DONE	25mm Filter	01-JUN-22 00:00
615636004	SAMPLE	JE1	PIC2A	APR-12-23 10:13:05	DONE	25mm Filter	01-JUN-22 00:00
615636005	SAMPLE	JE1	PIC2C	APR-12-23 10:13:12	DONE	25mm Filter	01-JUN-22 00:00
615636006	SAMPLE	JE1	PIC2D	APR-12-23 10:13:15	DONE	25mm Filter	01-JUN-22 00:00
616069001	SAMPLE	JE1	PIC4A	APR-12-23 10:13:19	DONE	25mm Filter	01-JUN-22 00:00
616069002	SAMPLE	JE1	PIC4C	APR-12-23 10:13:26	DONE	25mm Filter	01-JUN-22 00:00
616069003	SAMPLE	JE1	PIC4D	APR-12-23 10:13:29	DONE	25mm Filter	01-JUN-22 00:00
616069004	SAMPLE	JE1	PIC5C	APR-12-23 10:13:32	DONE	25mm Filter	01-JUN-22 00:00

Lucas Cell Raw Data

Batch 2406215 Check-list

This check-list was completed on 17-APR-23 by Lyndsey Pace

This batch was reviewed by Gregory Ramsay on 17-APR-23 and Lyndsey Pace on 17-APR-23.

Batch ID:
2406215

Product:
LUC26RAL

Description: Lucas Cell Radium 226
GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-226 in Liquid

Batch ID: 2406215
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL-RAD-A-008 REV# 15
Instrument: LUCAS-C202389980

Due Dates for Lab: 18-APR-2023			Package: 20-APR-2023		SDG: 21-APR-2023	
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
LCS	1205361075	Radium-226 SPIKE	1715-G	.1	mL	
MS	1205361074	Radium-226 SPIKE	1715-G	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	End Degas (date)	CELL #	End Transfer (date)	Start Count Time (date)	Background Counts	Total Counts
1	615636001	05-APR-2023	1	507.93	507.93	04/13/23 10:04	208	04/16/23 06:25	04/16/23 09:46	6	18
2	615636002	05-APR-2023	1	506.57	506.57	04/13/23 10:04	304	04/16/23 06:25	04/16/23 09:46	2	21
3	615636003	05-APR-2023	1	502.26	502.26	04/13/23 10:04	402	04/16/23 06:25	04/16/23 09:46	4	14
4	615636004	05-APR-2023	1	501.22	501.22	04/13/23 10:04	508	04/16/23 06:25	04/16/23 09:46	8	26
5	615636005	05-APR-2023	1	502.3	502.3	04/13/23 10:04	604	04/16/23 06:25	04/16/23 09:46	1	28
6	615636006	05-APR-2023	1	503.32	503.32	04/13/23 10:04	701	04/16/23 06:25	04/16/23 09:46	4	11
7	616069001	05-APR-2023	1	502.87	502.87	04/13/23 10:04	801	04/16/23 06:25	04/16/23 09:46	5	23
8	616069002	05-APR-2023	1	501.92	501.92	04/13/23 10:04	101	04/16/23 06:55	04/16/23 10:17	3	21
9	616069003	05-APR-2023	1	504.99	504.99	04/13/23 10:04	206	04/16/23 06:55	04/16/23 10:17	6	14
10	616069004	05-APR-2023	1	503.24	503.24	04/13/23 10:04	408	04/16/23 06:55	04/16/23 10:17	2	12
11	1205361072 MB	05-APR-2023	1		507.93	04/13/23 10:04	501	04/16/23 06:55	04/16/23 10:17	6	13
12	1205361073 DUP (615636001)	05-APR-2023	1	507.79	507.79	04/13/23 10:04	706	04/16/23 06:55	04/16/23 10:17	4	18
13	1205361074 MS (615636001)	05-APR-2023	1	130.12	130.12	04/13/23 10:04	802	04/16/23 06:55	04/16/23 10:17	4	497
14	1205361075 LCS	05-APR-2023	1		507.93	04/13/23 10:04	104	04/16/23 07:15	04/16/23 10:51	1	521

Reagent/Solvent Lot ID	Description	Amount	Comments:
			Data Entry Date2: 05-APR-2023 00:00

Radium-226 Liquid

Filename : RA226.XLS
 File type : Excel
 Version # : 1.3.2

Batch : 2406215
Analyst : LIN01615
Prep Date : 4/5/2023
Ra-226 Method Uncertainty : 0.073648

Procedure Code : LUC26RAL
Parmname : Radium-226
Required MDA : 1 pCi/L
Halfife of Ra-226 : 1600 years
Ra-226 Abundance : 1.00
Halfife of Rn-222 : 3.8235 days

Batch counted on : LUCAS CELL DETECTOR
BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Count Time (min.)	Cell Efficiency (cpm/dpm)
1	615636001.1	0.5079	2.0288E-05	3/21/2023 11:08	208	30	18	0.600	6	0.200	30	1.7740
2	615636002.1	0.5066	2.0282E-05	3/21/2023 14:44	304	30	21	0.700	2	0.067	30	1.8850
3	615636003.1	0.5023	2.0265E-05	3/21/2023 13:17	402	30	14	0.467	4	0.133	30	1.4980
4	615636004.1	0.5012	2.0261E-05	3/21/2023 14:06	508	30	26	0.867	8	0.267	30	1.8020
5	615636005.1	0.5023	2.0265E-05	3/21/2023 11:08	604	30	28	0.933	1	0.033	30	1.6810
6	615636006.1	0.5033	2.0269E-05	3/21/2023 8:05	701	30	11	0.367	4	0.133	30	1.7440
7	616069001.1	0.5029	2.0268E-05	3/24/2023 12:42	801	30	23	0.767	5	0.167	30	1.4200
8	616069002.1	0.5019	2.0264E-05	3/24/2023 14:35	101	30	21	0.700	3	0.100	30	1.5720
9	616069003.1	0.5050	2.0276E-05	3/24/2023 12:42	206	30	14	0.467	6	0.200	30	1.8770
10	616069004.1	0.5032	2.0269E-05	3/24/2023 11:45	408	30	12	0.400	2	0.067	30	1.5020
11	1205361072.1	0.5079	2.0288E-05	4/5/2023 0:00	501	30	13	0.433	6	0.200	30	1.8220
12	1205361073.1	0.5078	2.0287E-05	3/21/2023 11:08	706	30	18	0.600	4	0.133	30	1.5900
13	1205361074.1	0.1301	1.3068E-05	3/21/2023 11:08	802	30	497	16.567	4	0.133	30	1.5330
14	1205361075.1	0.5079	2.0288E-05	4/5/2023 0:00	104	30	521	17.367	1	0.033	30	1.6160

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-008
 Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrow End Date/Time	Count Start Date/Time	Rn-222 Corrections			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
5.500%	8/1/2022	7/31/2023	4/13/2023 10:04	4/16/2023 6:25	4/16/2023 9:46	0.403	0.975	1.002	1.000
8.900%	10/25/2022	10/31/2023	4/13/2023 10:04	4/16/2023 6:25	4/16/2023 9:46	0.403	0.975	1.002	1.000
5.300%	2/1/2023	1/31/2024	4/13/2023 10:04	4/16/2023 6:25	4/16/2023 9:46	0.403	0.975	1.002	1.000
4.500%	6/1/2022	5/31/2023	4/13/2023 10:04	4/16/2023 6:25	4/16/2023 9:46	0.403	0.975	1.002	1.000
6.700%	7/1/2022	6/30/2023	4/13/2023 10:04	4/16/2023 6:25	4/16/2023 9:46	0.403	0.975	1.002	1.000
6.200%	11/1/2022	10/31/2023	4/13/2023 10:04	4/16/2023 6:25	4/16/2023 9:46	0.403	0.975	1.002	1.000
3.200%	4/8/2023	3/31/2024	4/13/2023 10:04	4/16/2023 6:25	4/16/2023 9:46	0.403	0.975	1.002	1.000
1.200%	4/28/2022	4/30/2023	4/13/2023 10:04	4/16/2023 6:55	4/16/2023 10:17	0.406	0.975	1.002	1.000
2.800%	8/1/2022	7/31/2023	4/13/2023 10:04	4/16/2023 6:55	4/16/2023 10:17	0.406	0.975	1.002	1.000
7.000%	2/1/2023	1/31/2024	4/13/2023 10:04	4/16/2023 6:55	4/16/2023 10:17	0.406	0.975	1.002	1.000
7.900%	6/1/2022	5/31/2023	4/13/2023 10:04	4/16/2023 6:55	4/16/2023 10:17	0.406	0.975	1.002	1.000
2.900%	11/1/2022	10/31/2023	4/13/2023 10:04	4/16/2023 6:55	4/16/2023 10:17	0.406	0.975	1.002	1.000
6.100%	4/8/2023	3/31/2024	4/13/2023 10:04	4/16/2023 6:55	4/16/2023 10:17	0.406	0.975	1.002	1.000
2.000%	4/28/2022	4/30/2023	4/13/2023 10:04	4/16/2023 7:15	4/16/2023 10:51	0.407	0.973	1.002	1.000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1715-G
Spike Exp Date : 9/8/2023
Spike Activity (dpm/ml): 297.42
Spike Volume Added: 0.10


LCS S/N : 1715-G
LCS Exp Date : 9/8/2023
LCS Activity (dpm/ml): 297.42
LCS Volume Added: 0.10

Results																
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.3427	0.2420	1	0.6113	0.5095	41.19%	0.4000	0.1633	0.4077	0.4179		SAMPLE				
2	0.1867	0.1318	1	0.3839	0.7613	26.76%	0.6333	0.1599	0.3766	0.4142		SAMPLE				
3	0.3351	0.2366	1	0.6258	0.5085	42.76%	0.3333	0.1414	0.4229	0.4324		SAMPLE				
4	0.3948	0.2787	1	0.6846	0.7625	32.71%	0.6000	0.1944	0.4841	0.5010		SAMPLE				
5	0.1493	0.1054	1	0.3468	1.2234	21.04%	0.9000	0.1795	0.4783	0.5346		SAMPLE				
6	0.2873	0.2028	1	0.5364	0.3051	55.67%	0.2333	0.1291	0.3309	0.3358		SAMPLE				
7	0.3948	0.2787	1	0.7182	0.9645	29.57%	0.6000	0.1764	0.5557	0.5761		SAMPLE				
8	0.2753	0.1943	1	0.5333	0.8681	27.24%	0.6000	0.1633	0.4631	0.4802		SAMPLE				
9	0.3240	0.2288	1	0.5780	0.3212	55.97%	0.2667	0.1491	0.3519	0.3554		SAMPLE				
10	0.2346	0.1656	1	0.4823	0.5034	38.07%	0.3333	0.1247	0.3692	0.3826		SAMPLE				
11	0.3319	0.2343	1	0.5920	0.2878	62.77%	0.2333	0.1453	0.3513	0.3565		MB				
12	0.3106	0.2193	1	0.5800	0.6598	33.63%	0.4667	0.1563	0.4333	0.4452	615636001.1	DUP	25.7%			
13	1.2572	0.8876	1	2.3475	94.0487	7.60%	16.4333	0.7461	8.3691	19.5138	615636001.1	MS			102.9631	91.3%
14	0.1525	0.1076	1	0.3541	24.0608	4.83%	17.3333	0.7616	2.0720	4.1528		LCS			26.3763	91.2%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 16-APR-2023

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	07:13	1	1.19E+05	119159	-0.66		
LUCAS2	EFF	07:07	1	1.34E+05	134180	0.37		
LUCAS3	EFF	07:00	1	97638	97638	-2.49		
LUCAS4	EFF	06:51	1	1.29E+05	129040	1.73		
LUCAS5	EFF	06:49	1	1.33E+05	132999	0.4		
LUCAS6	EFF	06:46	1	1.31E+05	130751	1.09		
LUCAS7	EFF	06:44	1	1.33E+05	133353	0.25		
LUCAS8	EFF	06:40	1	1.20E+05	120435	-2.45		

Reviewed by: 
Lyndsey Pace

Date: 16-APR-23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR

Batch ID: 2406215

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
615636001	SAMPLE	LXP1	LUCAS2	APR-16-23 09:46:00	DONE	Lucas Cell	01-AUG-22 00:00
615636002	SAMPLE	LXP1	LUCAS3	APR-16-23 09:46:00	DONE	Lucas Cell	25-OCT-22 00:00
615636003	SAMPLE	LXP1	LUCAS4	APR-16-23 09:46:00	DONE	Lucas Cell	01-FEB-23 00:00
615636004	SAMPLE	LXP1	LUCAS5	APR-16-23 09:46:00	DONE	Lucas Cell	01-JUN-22 00:00
615636005	SAMPLE	LXP1	LUCAS6	APR-16-23 09:46:00	DONE	Lucas Cell	01-JUL-22 00:00
615636006	SAMPLE	LXP1	LUCAS7	APR-16-23 09:46:00	DONE	Lucas Cell	01-NOV-22 00:00
616069001	SAMPLE	LXP1	LUCAS8	APR-16-23 09:46:00	DONE	Lucas Cell	08-APR-23 00:00
616069002	SAMPLE	LXP1	LUCAS1	APR-16-23 10:17:00	DONE	Lucas Cell	28-APR-22 00:00
616069003	SAMPLE	LXP1	LUCAS2	APR-16-23 10:17:00	DONE	Lucas Cell	01-AUG-22 00:00
616069004	SAMPLE	LXP1	LUCAS4	APR-16-23 10:17:00	DONE	Lucas Cell	01-FEB-23 00:00
1205361072	MB	LXP1	LUCAS5	APR-16-23 10:17:00	DONE	Lucas Cell	01-JUN-22 00:00
1205361073	DUP	LXP1	LUCAS7	APR-16-23 10:17:00	DONE	Lucas Cell	01-NOV-22 00:00
1205361074	MS	LXP1	LUCAS8	APR-16-23 10:17:00	DONE	Lucas Cell	08-APR-23 00:00
1205361075	LCS	LXP1	LUCAS1	APR-16-23 10:51:00	DONE	Lucas Cell	28-APR-22 00:00



Environmental Laboratory
1232 Haco Drive
Lansing
Michigan, 48910

CHAIN OF CUSTODY

Page 1 of 1

Phone: (517)702-6372

Lab Work Order Number L303200

Client Name BWL - Erickson Station		Project Name Erickson AM MI Wells 16A-D		Requested Analyses						Requested Turn Around			
Client Contact Cheryl Louden		Project Number [none]		Ag:: As:: B:: Ba:: Be:: Ca:: Cd:: Cr:: Co:: Cu:: Fe:: Hg:: Li:: Mo:: Ni:: Pb:: Sb:: Se:: Si:: Tl:: V:: Zn:: Na:: K:: Mg	TSS, HCO3, CO3, Hardness	Cl-IC:: F-ISE:: SO4:: TDS	Radium 226 and Radium 228					Rush requests subject to additional charge.	
Address 3725 S. Canal		Project Description										Rush requests subject to lab approval.	
City Lansing		PO Number 30926 10021											
State/Zip MI, 48917		Shipped By											
Phone (517) 702-6396	Fax (517) 702-6373	Tracking Number											
Sampler Marc Wahrer													

Sample Name or Field ID	Sampled Date	Sampled Time	Sample Type Grab/Composite	Matrix Code	Container Count	Preservation Code				Sample	Comments
						b	a	a	b		
MW-16A	03/21/23	1108	G	GW	5	1	1	1	2		
MW-16B		1444	G	GW	5	1	1	1	2		
MW-16C		1317	G	GW	5	1	1	1	2		
MW-16D		1406	G	GW	5	1	1	1	2		
MWT-16A		1108	G	GW	5	1	1	1	2		
Field Blank		0905	G	DI	5	1	1	1	2		
Equipment Blank			G	DI	5	1	1	1	2		No equipment blank JSC 03/22/23

Relinquished By 	Date/Time 3-21-23 1945	Received By J. Caporale	Date/Time 03/21/23 0830	
Relinquished By	Date/Time	Received By	Date/Time	Comments
Relinquished By	Date/Time	Received By	Date/Time	
Cooler Numbers and Temperatures E0776 1.0°C (in fridge w/ ice in cooler)				

Matrix Codes

DI=Deionized Water, GW=Ground Water

Preserv. Codes

a=None, b=0.5% HNO3



Report ID: S46674.01(02)
Generated on 04/21/2023
Replaces report S46674.01(01) generated on 03/29/2023

Report to
Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by
Merit Laboratories, Inc.
2680 East Lansing Drive
East Lansing, MI 48823

Phone: (517) 332-0167 FAX: (517) 332-6333

Contacts for report questions:
John Lavery (johnlavery@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary

Lab Sample ID(s): S46674.01-S46674.04
Project: Erickson AM MI Wells 14-15
Collected Date(s): 03/24/2023
Submitted Date/Time: 03/24/2023 15:50
Sampled by: Marc Wahrer
P.O. #:

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- Method Summary (Page 4)
- Sample Summary (Page 5)

Maya Murshak
Technical Director



Lansing Board of Water and Light
Environmental Services Laboratory (MI00079)

Cert ID:3760

1232 Haco Dr.

Lansing, Michigan 48901

24 April 2023

BWL - Erickson Station

Attn: Cheryl Loudon

3725 S. Canal

Lansing, MI 48917

Project: Erickson AM MI

Dear Cheryl Loudon,

Enclosed is a copy of the laboratory report for the following work order(s) received by Lansing Board of Water and Light Environmental Services Laboratory:

Work Order

L303201

Received

3/24/2023 3:33:00PM

Account Number

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in blue ink that reads "Jennifer Caporale".

Jennifer Caporale, Supervisor



Analytical Report

Client: BWL - Erickson Station
Address: 3725 S. Canal
 Lansing MI, 48917

Client Project Manager: Cheryl Louden

Report Date: 04/24/2023

Sample Name: MW-14

Lab #: L303201-01 Ground Water

Collected: 24-Mar-23 12:42

By: Marc Wahrer

Analyte	Reporting			Dilution	Regulatory Limit	Analysis Date/Time	By	Method	Notes
	Result	Limit	Units						
Conductivity	1300	1.0	uS/cm	1		24-Mar-23 12:42	maw	SM 2510B	
Dissolved oxygen	ND	0.100	mg/L	1		24-Mar-23 12:42	maw	FIELD	
Milliliters Purged	200		ml/min	1		24-Mar-23 12:42	maw	FIELD	
Oxidation Reduction Potential	-104.3	-999.0	mV	1		24-Mar-23 12:42	maw	FIELD	
pH	7.0	7.0	pH Units	1		24-Mar-23 12:42	maw	SM 4500H+B	
Temperature	10		°C	1		24-Mar-23 12:42	maw	SM 2550B	
Turbidity	4.0	0.10	NTU	1		24-Mar-23 12:42	maw	SM 2130B	

Sample Name: MW-15

Lab #: L303201-02 Ground Water

Collected: 24-Mar-23 14:35

By: Marc Wahrer

Analyte	Reporting			Dilution	Regulatory Limit	Analysis Date/Time	By	Method	Notes
	Result	Limit	Units						
Conductivity	910	1.0	uS/cm	1		24-Mar-23 14:35	maw	SM 2510B	
Dissolved oxygen	3.72	0.100	mg/L	1		24-Mar-23 14:35	maw	FIELD	
Milliliters Purged	200		ml/min	1		24-Mar-23 14:35	maw	FIELD	
Oxidation Reduction Potential	59.80	-999.0	mV	1		24-Mar-23 14:35	maw	FIELD	
pH	6.9	7.0	pH Units	1		24-Mar-23 14:35	maw	SM 4500H+B	
Temperature	7.3		°C	1		24-Mar-23 14:35	maw	SM 2550B	
Turbidity	4.2	0.10	NTU	1		24-Mar-23 14:35	maw	SM 2130B	



Analytical Report

Client: BWL - Erickson Station

Client Project Manager: Cheryl Louden

Report Date: 04/24/2023

Address: 3725 S. Canal
Lansing MI, 48917

Approved By: _____

Jennifer Caporale

Notes and Definitions

- AL Action Level (Action Level = Regulatory Limit)
 - MCL Maximum Contaminant Level
 - PEL Permissible Exposure Limit (Permissible Exposure Limit = Regulatory Limit)
 - RPD Relative Percent Difference
 - OT Odor Threshold
 - ND Non Detect is less than the reporting limit value
- All drinking water regulatory limits are MCL's with the exception of Lead and Copper unless otherwise noted.



General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile, and 2-chloroethylvinyl ether need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the

FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

All analyses completed

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1 (1993)
SM2320B	Standard Method 2320 B 2011
SM2340C	Standard Method 2340 C 2011
SM2540C	Standard Method 2540 C 2015
SM2540D	Standard Method 2540 D 2015
SW3015A	SW 846 Method 3015A Revision 1 February 2007



Sample Summary (4 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S46674.01	MW-14	Groundwater	03/24/23 12:42
S46674.02	MW-15	Groundwater	03/24/23 14:35
S46674.03	MWT-14	Groundwater	03/24/23 12:42
S46674.04	Field Blank	Water	03/24/23 11:45



Analytical Laboratory Report

Final Report

Lab Sample ID: S46674.01

Sample Tag: MW-14

Collected Date/Time: 03/24/2023 12:42

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	5.9	IR
2	1L Plastic	None	Yes	5.9	IR
1	250ml Plastic	HNO3	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	03/27/23 12:25	CTV	
Metal Digestion	Completed	SW3015A	03/27/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 03/27/23 11:14, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	114	10	0.13	mg/L	10	16887-00-6	

Method: E300.0, Run Date: 03/27/23 10:33, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	18	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 03/27/23 17:06, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	650	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 03/27/23 16:20, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	536	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 03/27/23 17:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	748	100	1	mg/L	4		

Method: SM2540D, Run Date: 03/27/23 17:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	22.2	3	1	mg/L	2		

Metals

Method: E200.8, Run Date: 03/27/23 12:46, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.005	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.128	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	2.11	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Final Report

Lab Sample ID: S46674.01 (continued)

Sample Tag: MW-14

Method: E200.8, Run Date: 03/27/23 12:46, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	10.2	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.113	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.014	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 03/27/23 15:59, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	144	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	40.3	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	4.72	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	75.8	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 03/27/23 14:17, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 04/19/23 09:04, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S46674.02

Sample Tag: MW-15

Collected Date/Time: 03/24/2023 14:35

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	5.9	IR
2	1L Plastic	None	Yes	5.9	IR
1	250ml Plastic	HNO3	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	03/27/23 12:25	CTV	
Metal Digestion	Completed	SW3015A	03/27/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 03/27/23 11:44, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfate	124	10	1.0	mg/L	10	14808-79-8	

Method: E300.0, Run Date: 03/27/23 10:43, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	72	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	

Method: SM2320B, Run Date: 03/27/23 17:10, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	330	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 03/27/23 16:22, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	426	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 03/27/23 17:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	690	50	1	mg/L	2		

Method: SM2540D, Run Date: 03/27/23 17:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 03/27/23 12:52, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.047	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.33	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Final Report

Lab Sample ID: S46674.02 (continued)

Sample Tag: MW-15

Method: E200.8, Run Date: 03/27/23 12:52, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	0.02	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	0.034	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 03/27/23 16:01, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	119	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	31.1	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	Not detected	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	29.5	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 03/27/23 14:20, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 04/19/23 09:04, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S46674.03

Sample Tag: MWT-14

Collected Date/Time: 03/24/2023 12:42

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	5.9	IR
2	1L Plastic	None	Yes	5.9	IR
1	250ml Plastic	HNO3	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	03/27/23 12:25	CTV	
Metal Digestion	Completed	SW3015A	03/27/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 03/27/23 11:24, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	114	10	0.13	mg/L	10	16887-00-6	

Method: E300.0, Run Date: 03/27/23 10:54, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	18	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 03/27/23 17:16, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	650	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 03/27/23 16:24, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	548	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 03/27/23 17:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	748	100	1	mg/L	4		

Method: SM2540D, Run Date: 03/27/23 17:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	22.0	3	1	mg/L	2		

Metals

Method: E200.8, Run Date: 03/27/23 12:55, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.006	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.126	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	2.20	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	



Analytical Laboratory Report

Lab Sample ID: S46674.03 (continued)

Sample Tag: MWT-14

Method: E200.8, Run Date: 03/27/23 12:55, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	10.4	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.113	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.014	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	0.005	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	0.013	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 03/27/23 16:02, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	148	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	42.1	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	4.82	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	77.3	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 03/27/23 14:23, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 04/19/23 09:04, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Analytical Laboratory Report

Lab Sample ID: S46674.04

Sample Tag: Field Blank

Collected Date/Time: 03/24/2023 11:45

Matrix: Water

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	5.9	IR
2	1L Plastic	None	Yes	5.9	IR
1	250ml Plastic	HNO3	Yes	5.9	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	03/27/23 12:25	CTV	
Metal Digestion	Completed	SW3015A	03/27/23 10:10	CCM	

Inorganics

Method: E300.0, Run Date: 03/27/23 11:04, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: SM2320B, Run Date: 03/27/23 17:18, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	Not detected	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 03/27/23 16:26, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	Not detected	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 03/27/23 17:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	50	1	mg/L	2		

Method: SM2540D, Run Date: 03/27/23 17:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals

Method: E200.8, Run Date: 03/27/23 11:42, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	



Analytical Laboratory Report

Final Report

Lab Sample ID: S46674.04 (continued)

Sample Tag: Field Blank

Method: E200.8, Run Date: 03/27/23 11:42, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E200.8, Run Date: 03/27/23 15:33, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	
Magnesium	Not detected	0.50	0.00480	mg/L	2	7439-95-4	
Potassium	Not detected	0.50	0.00920	mg/L	2	7440-09-7	
Sodium	Not detected	0.50	0.00340	mg/L	2	7440-23-5	

Method: E245.1, Run Date: 03/27/23 14:27, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 04/19/23 09:04, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID:S46674

Client:BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 14-15

Submitted:03/24/2023 15:50 Login User: MMC

Attention: Jennifer Caporale

Address: Board of Water & Light

P.O. Box 13007

Lansing, MI 48901

Phone: 517-702-6372

FAX:

Email: Environmental_Laboratory@LBWL.com

Selection	Description	Note
Sample Receiving		
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 5.9
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
Chain of Custody		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to: GEL
Preservation		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab?
Bottle Conditions		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Do water VOC or TOX bottles contain headspace

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S46674 Submitted: 03/24/2023 15:50

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 14-15

Initial Preservation Check: 03/24/2023 16:02 MMC

Preservation Recheck (E200.8): N/A

Attention: Jennifer Caporale

Address: Board of Water & Light

P.O. Box 13007

Lansing, MI 48901

Phone: 517-702-6372

FAX:

Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S46674.01	1L Plastic HNO3	<2			
S46674.01	1L Plastic HNO3	<2			
S46674.01	250ml Plastic HNO3	<2			
S46674.02	1L Plastic HNO3	<2			
S46674.02	1L Plastic HNO3	<2			
S46674.02	250ml Plastic HNO3	<2			
S46674.03	1L Plastic HNO3	<2			
S46674.03	1L Plastic HNO3	<2			
S46674.03	250ml Plastic HNO3	<2			
S46674.04	1L Plastic HNO3	<2			
S46674.04	1L Plastic HNO3	<2			
S46674.04	250ml Plastic HNO3	<2			



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 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

REPORT TO

CHAIN OF CUSTODY RECORD

INVOICE TO

CONTACT NAME **Jennifer Caporale**
 COMPANY **Lansing Board of Water and Light**
 ADDRESS **PO Box 13007 48901-3007**
 CITY **Lansing** STATE **Mi** ZIP CODE **48901**
 PHONE NO. **517-702-6372** FAX NO. P.O. NO.
 E-MAIL ADDRESS **Environmental_Laboratory@lbwl.com** QUOTE NO.

CONTACT NAME **Beth Zimpfer** SAME
 COMPANY
 ADDRESS
 CITY STATE ZIP CODE
 PHONE NO. E-MAIL ADDRESS **Beth.Zimpfer@lbwl.com**

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

PROJECT NO./NAME **Erickson AM MI Wells 14-15** SAMPLER(S) - PLEASE PRINT/SIGN NAME **Marc Wahrer**
 TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER **ASAP**
 DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER
 MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WPE A=AIR W=WASTE # Containers & Preservatives

Total Metals	F- undissolved, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	HCO3, CO3, Hardness
--------------	-------------------------------	------------	------------	-----	---------------------

Certifications
 OHIO VAP Drinking Water
 DoD NPDES
 Project Locations
 Detroit New York
 Other

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER	Total Metals	F- undissolved, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	HCO3, CO3, Hardness							Special Instructions	
	DATE	TIME																								
46674.01	2/21/23	1242	MW-14	GW	5	2	3						✓	✓	✓	✓	✓	✓								Metals to analyse: Na, Mg, K
.02		1435	MW-15	GW	5	2	3						✓	✓	✓	✓	✓	✓								B, Ca, Sb, As, Ba, Be, Cd, Cr,
.03		1242	MWT-14	GW	5	2	3						✓	✓	✓	✓	✓	✓								Co, Li, Hg, Mo, Pb, Se, Tl,
.04		1145	Field Blank	di	5	2	3						✓	✓	✓	✓	✓	✓								Fe, Cu, Ni, Ag, V, Zn
																										Please send a preliminary report

RELINQUISHED BY: *[Signature]* DATE **3-24-23** TIME **1550**
 SIGNATURE/ORGANIZATION
 RECEIVED BY: *[Signature]* DATE **3/24/23** TIME **1550**
 SIGNATURE/ORGANIZATION

RELINQUISHED BY: DATE TIME
 SIGNATURE/ORGANIZATION
 RECEIVED BY: DATE TIME
 SIGNATURE/ORGANIZATION
 SEAL NO. SEAL INTACT INITIALS
 YES NO
 SEAL NO. SEAL INTACT INITIALS
 YES NO
 NOTES: TEMP. ON ARRIVAL **5.9**

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.150
Be, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	2.5
Cl	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cr, total	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
F	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
Fe, total	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
Se, total	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
Tl, total	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
TDS	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TSS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
V, total	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005

April 19, 2023

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 616069
SDG: S46674

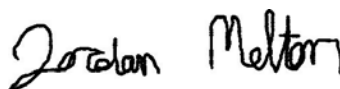
Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on March 29, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 1614.

Sincerely,



Jordan Melton for
Delaney Stone
Project Manager

Purchase Order: GELP20-0018
Enclosures



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Case Narrative

**Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S46674
Work Order: 616069**

April 19, 2023

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on March 29, 2023 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

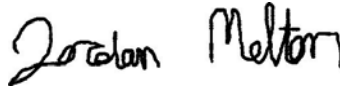
Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
616069001	S46674.01
616069002	S46674.02
616069003	S46674.03
616069004	S46674.04

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.



Jordan Melton for
Delaney Stone
Project Manager

Chain of Custody and Supporting Documentation

016069

C.O.C. PAGE # 1 OF 1

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Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com



REPORT TO

CONTACT NAME Project Management Team
COMPANY Merit Laboratories

ADDRESS 2680 East Lansing Drive

CITY East Lansing
PHONE NO. 517-332-0167
E-MAIL ADDRESS results@meritlabs.com

STATE MI ZIP CODE 48823
P.O. NO.
QUOTE NO.

CHAIN OF CUSTODY RECORD

CONTACT NAME Julie Teague
COMPANY Merit Laboratories

ADDRESS 2680 East Lansing Drive

CITY East Lansing
PHONE NO. 517-332-0167
E-MAIL ADDRESS juliet@meritlabs.com

STATE MI ZIP CODE 48823

INVOICE TO

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

PROJECT NO./NAME S46674 SAMPLER(S) - PLEASE PRINT/SIGN NAME

TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER
DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
SL=SLUDGE DW=DRINKING WATER O=OIL WP=WPIPE A=AIR W=WASTE

MERIT LAB NO. FOR LAB USE ONLY	YEAR	DATE	TIME	IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives												
							NONE	H ₂ O	HNO ₃	H ₂ SO ₄	N ₂ H ₄	M ₂ O ₆	OTHER						
	3/24/23	1242		S46674.01	GW	2		2											
	3/24/23	1435		S46674.02	GW	2		2											
	3/24/23	1242		S46674.03	GW	2		2											
	3/24/23	1145		S46674.04	GW	2		2											

Certifications
 OHIO VAP Drinking Water
 DoD NPDES
Project Locations
 Detroit New York
 Other _____
Special Instructions
* E903.1 Mod.
** E904.0/SW 9320 Mod.
Please use calculation product & provide Radium 226/228 combined results on the report

(No Ice needed)

** Subcontracted to

GEL Laboratories, Inc.

2040 Savage Road

Charleston, SC 29407

RELINQUISHED BY: SIGNATURE/Organization		DATE	3/27/23	TIME	17:00
RECEIVED BY: SIGNATURE/Organization		DATE	3/27/23	TIME	17:00
RELINQUISHED BY: SIGNATURE/Organization		DATE		TIME	
RECEIVED BY: SIGNATURE/Organization		DATE		TIME	

RELINQUISHED BY: SIGNATURE/Organization		DATE	3/29/23	TIME	1000
RECEIVED BY: SIGNATURE/Organization		DATE	3/29/23	TIME	1000
SEAL NO.		SEAL INTACT	YES <input type="checkbox"/> NO <input type="checkbox"/>	INITIALS	
SEAL NO.		SEAL INTACT	YES <input type="checkbox"/> NO <input type="checkbox"/>	INITIALS	
NOTES: Stay Boon					
TEMP. ON ARRIVAL					

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

SAMPLE RECEIPT & REVIEW FORM

Client: MER/		SDG/AR/COC/Work Order: 616069				
Received By: Stacy Boone		Date Received: MARCH 29, 2023				
Carrier and Tracking Number		Circle Applicable: FedEx Express FedEx Ground <u>UPS</u> Field Services Courier Other				
		1Z 466 477 03 6331 3478				
Suspected Hazard Information	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.				
A) Shipped as a DOT Hazardous?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Hazard Class Shipped: _____ UN#: _____ If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___				
B) Did the client designate the samples to be received as radioactive?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	COC notation or radioactive stickers on containers equal client designation.				
C) Did the RSO classify the samples as radioactive?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): <u>0</u> CPM / mR/hr Classified as: Rad 1 Rad 2 Rad 3				
D) Did the client designate samples are hazardous?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	COC notation or hazard labels on containers equal client designation.				
E) Did the RSO identify possible hazards?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	If D or E is yes, select Hazards below. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:				
Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)	
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)	
2	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Client contacted and provided COC COC created upon receipt	
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Preservation Method: Wet Ice Ice Packs Dry ice None Other: <u> </u> *all temperatures are recorded in Celsius TEMP: <u>18°</u>	
4	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Temperature Device Serial #: <u>IR3-22</u> Secondary Temperature Device Serial # (If Applicable):	
5	Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)	
6	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and Containers Affected: If Preservation added, Lot#:	
7	Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA freezer)	
					Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No)	
					Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___	
8	Samples received within holding time?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Sample ID's and containers affected:	
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	ID's and containers affected:	
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)	
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: No container count on COC Other (describe)	
12	Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
13	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Circle Applicable: Not relinquished Other (describe)	
Comments (Use Continuation Form if needed):						

PM (or PMA) review: Initials JM Date 3-29-23 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 19 April 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122023-4
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2022-160
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-22-20
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S46674
Work Order #: 616069**

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2406255

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
616069001	S46674.01
616069002	S46674.02
616069003	S46674.03
616069004	S46674.04
1205361131	Method Blank (MB)
1205361132	615636001(S46568.01) Sample Duplicate (DUP)
1205361133	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2406215

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
616069001	S46674.01
616069002	S46674.02
616069003	S46674.03
616069004	S46674.04
1205361072	Method Blank (MB)
1205361073	615636001(S46568.01) Sample Duplicate (DUP)
1205361074	615636001(S46568.01) Matrix Spike (MS)
1205361075	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information**Additional Comments**

The matrix spike, 1205361074 (S46568.01MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Qualifier Definition Report for

MERI001 Merit Laboratories, Inc.

Client SDG: S46674 GEL Work Order: 616069

The Qualifiers in this report are defined as follows:

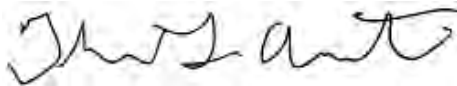
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:



Name: Theresa Austin

Date: 21 APR 2023

Title: Group Leader

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: April 21, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Laverty
 Project: Routine Analysis

Client Sample ID: S46674.01	Project: MERI00120
Sample ID: 616069001	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 24-MAR-23 12:42	
Receive Date: 29-MAR-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.853	+/-0.991	1.67	3.00	pCi/L		JE1	04/12/23	1013	2406255		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.82	+/-1.14			pCi/L		NXL1	04/19/23	0904	2407931		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.964	+/-0.556	0.718	1.00	pCi/L		LXP1	04/16/23	0946	2406215		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			84	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

- | | |
|---------------------------------------|--------------------------------|
| DF: Dilution Factor | Lc/LC: Critical Level |
| DL: Detection Limit | PF: Prep Factor |
| MDA: Minimum Detectable Activity | RL: Reporting Limit |
| MDC: Minimum Detectable Concentration | SQL: Sample Quantitation Limit |

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: April 21, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S46674.02 Project: MERI00120
Sample ID: 616069002 Client ID: MERI001
Matrix: Ground Water
Collect Date: 24-MAR-23 14:35
Receive Date: 29-MAR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	-0.188	+/-1.14	2.18	3.00	pCi/L		JE1	04/12/23	1013	2406255	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		0.868	+/-1.23			pCi/L		NXL1	04/19/23	0904	2407931	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		0.868	+/-0.463	0.533	1.00	pCi/L		LXP1	04/16/23	1017	2406215	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			79.2	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: April 21, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S46674.03 Project: MERI00120
Sample ID: 616069003 Client ID: MERI001
Matrix: Ground Water
Collect Date: 24-MAR-23 12:42
Receive Date: 29-MAR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	1.10	+/-0.980	1.58	3.00	pCi/L		JE1	04/12/23	1013	2406255	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		1.42	+/-1.04			pCi/L		NXL1	04/19/23	0904	2407931	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226	U	0.321	+/-0.352	0.578	1.00	pCi/L		LXP1	04/16/23	1017	2406215	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			92.1	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: April 21, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S46674.04 Project: MERI00120
Sample ID: 616069004 Client ID: MERI001
Matrix: Ground Water
Collect Date: 24-MAR-23 11:45
Receive Date: 29-MAR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time Batch	Method
Rad Gas Flow Proportional Counting												
GFPC Ra228, Liquid "As Received"												
Radium-228	U	0.535	+/-0.977	1.73	3.00	pCi/L		JE1	04/12/23	1013	2406255	1
Radium-226+Radium-228 Calculation "See Parent Products"												
Radium-226+228 Sum		1.04	+/-1.04			pCi/L		NXL1	04/19/23	0904	2407931	2
Rad Radium-226												
Lucas Cell, Ra226, Liquid "As Received"												
Radium-226		0.503	+/-0.369	0.482	1.00	pCi/L		LXP1	04/16/23	1017	2406215	3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			78.7	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

Quality Control Data

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: April 21, 2023

Page 1 of 2

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan
Contact: John Laverty

Workorder: 616069

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2406255										
QC1205361132	615636001	DUP									
Radium-228	U	0.698	U	-0.124	pCi/L	N/A		N/A	JE1	04/12/23	10:12
	Uncertainty	+/-1.04		+/-1.16							
QC1205361133	LCS										
Radium-228	80.5			77.5	pCi/L		96.3	(75%-125%)		04/12/23	10:12
	Uncertainty			+/-4.66							
QC1205361131	MB										
Radium-228			U	0.285	pCi/L					04/12/23	10:12
	Uncertainty			+/-0.956							
Rad Ra-226											
Batch	2406215										
QC1205361073	615636001	DUP									
Radium-226	U	0.510		0.660	pCi/L	25.7		(0% - 100%)	LXP1	04/16/23	10:17
	Uncertainty	+/-0.408		+/-0.433							
QC1205361075	LCS										
Radium-226	26.4			24.1	pCi/L		91.2	(75%-125%)		04/16/23	10:51
	Uncertainty			+/-2.07							
QC1205361072	MB										
Radium-226			U	0.288	pCi/L					04/16/23	10:17
	Uncertainty			+/-0.351							
QC1205361074	615636001	MS									
Radium-226	103 U	0.510		94.0	pCi/L		91.3	(75%-125%)		04/16/23	10:17
	Uncertainty	+/-0.408		+/-8.37							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- H Analytical holding time was exceeded
- < Result is less than value reported
- > Result is greater than value reported

GEL LABORATORIES LLC

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QC Summary

Workorder: 616069

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Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UI											
BD											
h											
R											
^											
N/A											
ND											
M											
NJ											
FA											
UJ											
Q											
K											
UL											
L											
NI											
Y											
**											
M											
J											

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 2406255 Check-list

This check-list was completed on 12-APR-23 by Nat Long

This batch was reviewed by Lois Buist on 12-APR-23 and Nat Long on 12-APR-23.

Batch ID:
2406255

Product:
GFC28RAL

Description: Gas Flow Radium 228
GL-RAD-A-063

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-228 in Liquid

Batch ID: 2406255
Analyst: Jacqueline Winston (JE1)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL-RAD-A-063 REV# 5
Instrument: LUCAS-C202389980

Due Dates for Lab: 18-APR-2023			Package: 20-APR-2023		SDG: 21-APR-2023	
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
LCS	1205361133	228	2051-B	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	Ac-228 Ingrow (date)	Ac-228 Separation (date)
1	615636001	05-APR-2023	3	302.6	302.6	04/06/23 14:16	04/12/23 07:06
2	615636002	05-APR-2023	3	308.31	308.31	04/06/23 14:16	04/12/23 07:06
3	615636003	05-APR-2023	3	304.68	304.68	04/06/23 14:16	04/12/23 07:06
4	615636004	05-APR-2023	3	312.87	312.87	04/06/23 14:16	04/12/23 07:06
5	615636005	05-APR-2023	3	304.81	304.81	04/06/23 14:16	04/12/23 07:06
6	615636006	05-APR-2023	3	306.96	306.96	04/06/23 14:16	04/12/23 07:06
7	616069001	05-APR-2023	3	300.56	300.56	04/06/23 14:16	04/12/23 07:06
8	616069002	05-APR-2023	3	307.04	307.04	04/06/23 14:16	04/12/23 07:06
9	616069003	05-APR-2023	3	307.44	307.44	04/06/23 14:16	04/12/23 07:06
10	616069004	05-APR-2023	3	307.7	307.7	04/06/23 14:16	04/12/23 07:06
11	1205361131 MB	05-APR-2023	3		312.87	04/06/23 14:16	04/12/23 07:06
12	1205361132 DUP (615636001)	05-APR-2023	3	306.8	306.8	04/06/23 14:16	04/12/23 07:06
13	1205361133 LCS	05-APR-2023	3		312.87	04/06/23 14:16	04/12/23 07:06

Reagent/Solvent Lot ID	Description	Amount	Comments:
WORK 1951-E	Ba-133	.1 mL	Pipet Id: RAD-GFC-1795419 Data Entry Date2: 05-APR-2023 00:00
REGNT 3887296	RGF-1.5M Ammonium Sulfate	10 mL	
REGNT 3885444	RGF-1M Citric Acid	5 mL	
REGNT 3887348	2M HCl	20 mL	
REGNT 3889999	RGF-50% Potassium Carbonate	2 mL	
REGNT 3884583	RGF-7M Nitric Acid	25 mL	
REGNT 3857893.11	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL	
REGNT DGA030723	2396801	2 g	
REGNT 3867057.17	RGF-Hydrofluoric Acid	4 mL	
REGNT 3528714	500 mg/mL Neodymium Carrier	.2 mL	
REGNT 3887517	RGF-Neodymium Substrate	5 mL	
REGNT 3465466	Barium Carrier Ra228 REG	1 mL	
REGNT 3879639.10	Nitric Acid	5 mL	

Radium-228 Liquid

Filename : RA228.XLS
 File type : Excel
 Version # : 1.4.3

Tracer S/N : 1951-E
 Tracer Exp Date : 1/10/2024
 Tracer Volume Added: 0.10

Batch : 2406255
 Analyst : JAC02417
 Prep Date : 4/5/2023
 Ra-228 Method Uncertainty : 0.1268

Procedure Code : GFC28RAL
 Parmname : Radium-228
 Required MDA : 3 pCi/L
 Ra-228 Abundance : 1.00
 Halflife of Ra-228 : 5.75 years
 Halflife of Ac-228 : 6.15 hours

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	615636001.1	0.3026	1.8503E-05	3/21/2023 11:08	1196.5	1.67%	920.8	1.90%	0.1	0.000200
2	615636002.1	0.3083	1.8596E-05	3/21/2023 14:44	1196.5	1.67%	1020.9	1.81%	0.1	0.000200
3	615636003.1	0.3047	1.8537E-05	3/21/2023 13:17	1196.5	1.67%	1048.5	1.78%	0.1	0.000200
4	615636004.1	0.3129	1.8668E-05	3/21/2023 14:06	1196.5	1.67%	965.9	1.86%	0.1	0.000200
5	615636005.1	0.3048	1.8540E-05	3/21/2023 11:08	1196.5	1.67%	1015.7	1.81%	0.1	0.000200
6	615636006.1	0.3070	1.8575E-05	3/21/2023 8:05	1196.5	1.67%	873.7	1.95%	0.1	0.000200
7	616069001.1	0.3006	1.8469E-05	3/24/2023 12:42	1196.5	1.67%	1004.7	1.82%	0.1	0.000200
8	616069002.1	0.3070	1.8576E-05	3/24/2023 14:35	1196.5	1.67%	947.5	1.88%	0.1	0.000200
9	616069003.1	0.3074	1.8582E-05	3/24/2023 12:42	1196.5	1.67%	1102.4	1.74%	0.1	0.000200
10	616069004.1	0.3077	1.8587E-05	3/24/2023 11:45	1196.5	1.67%	941.6	1.88%	0.1	0.000200
11	1205361131.1	0.3129	1.8668E-05	4/5/2023 0:00	1196.5	1.67%	915.0	1.91%	0.1	0.000200
12	1205361132.1	0.3068	1.8572E-05	3/21/2023 11:08	1196.5	1.67%	828.9	2.01%	0.1	0.000200
13	1205361133.1	0.3129	1.8668E-05	4/5/2023 0:00	1196.5	1.67%	975.3	1.85%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-063
 Instrument SOP: GL-RAD-I-016

Count raw Data													Calculated Sample Recovery %	Sample Recovery Error %
Pos.	Detector ID	Counting Time (min.)	Gross Counts		Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction		
1	1B	60	10	40	0.667	4/12/2023 10:12	4/6/2023 14:16	4/12/2023 7:06	0.993	0.704	1.000	1.057	77.0%	2.55%
2	1C	60	6	73	1.217	4/12/2023 10:12	4/6/2023 14:16	4/12/2023 7:06	0.993	0.704	1.000	1.057	85.3%	2.48%
3	1D	60	7	75	1.250	4/12/2023 10:12	4/6/2023 14:16	4/12/2023 7:06	0.993	0.704	1.000	1.057	87.6%	2.46%
4	2A	60	8	60	1.000	4/12/2023 10:13	4/6/2023 14:16	4/12/2023 7:06	0.993	0.704	1.000	1.057	80.7%	2.52%
5	2C	60	16	56	0.933	4/12/2023 10:13	4/6/2023 14:16	4/12/2023 7:06	0.993	0.704	1.000	1.057	84.9%	2.48%
6	2D	60	7	63	1.050	4/12/2023 10:13	4/6/2023 14:16	4/12/2023 7:06	0.993	0.703	1.000	1.057	73.0%	2.58%
7	4A	60	9	42	0.700	4/12/2023 10:13	4/6/2023 14:16	4/12/2023 7:06	0.994	0.703	1.000	1.057	84.0%	2.49%
8	4C	60	14	56	0.933	4/12/2023 10:13	4/6/2023 14:16	4/12/2023 7:06	0.994	0.703	1.000	1.057	79.2%	2.53%
9	4D	60	6	51	0.850	4/12/2023 10:13	4/6/2023 14:16	4/12/2023 7:06	0.994	0.703	1.000	1.057	92.1%	2.43%
10	5C	60	10	40	0.667	4/12/2023 10:13	4/6/2023 14:16	4/12/2023 7:06	0.994	0.703	1.000	1.057	78.7%	2.53%
11	7B	60	7	39	0.650	4/12/2023 10:12	4/6/2023 14:16	4/12/2023 7:06	0.998	0.704	1.000	1.057	76.5%	2.55%
12	1A	60	8	42	0.700	4/12/2023 10:12	4/6/2023 14:16	4/12/2023 7:06	0.993	0.704	1.000	1.057	69.3%	2.63%
13	7C	60	31	1175	19.583	4/12/2023 10:12	4/6/2023 14:16	4/12/2023 7:06	0.998	0.704	1.000	1.057	81.5%	2.51%

Calibration Data								
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2022	5/31/2023	0.6068	0.00711	0.522	4/7/2023 18:45	500
2	PIC	6/1/2022	5/31/2023	0.6190	0.00847	0.788	4/7/2023 18:45	500
3	PIC	6/1/2022	5/31/2023	0.6048	0.00692	0.518	4/7/2023 18:45	500
4	PIC	6/1/2022	5/31/2023	0.6201	0.01914	0.826	4/7/2023 18:45	500
5	PIC	6/1/2022	5/31/2023	0.6022	0.01274	0.726	4/7/2023 18:46	500
6	PIC	6/1/2022	5/31/2023	0.6046	0.00745	0.898	4/7/2023 18:46	500
7	PIC	6/1/2022	5/31/2023	0.6013	0.01123	0.510	4/7/2023 18:46	500
8	PIC	6/1/2022	5/31/2023	0.6359	0.00889	0.976	4/7/2023 18:46	500
9	PIC	6/1/2022	5/31/2023	0.5954	0.00773	0.578	4/7/2023 18:46	500
10	PIC	6/1/2022	5/31/2023	0.6242	0.00657	0.548	4/7/2023 18:47	500
11	PIC	6/1/2022	5/31/2023	0.6366	0.00627	0.586	4/7/2023 18:43	500
12	PIC	6/1/2022	5/31/2023	0.6209	0.00738	0.724	4/7/2023 18:45	500
13	PIC	6/1/2022	5/31/2023	0.6407	0.00790	0.898	4/7/2023 18:43	500

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

* - RPD changed to 0% due to sample & dup activity below MDA

LCS S/N : 2051-B
LCS Exp Date : 3/27/2024
LCS Activity (dpm/ml): 559.43
LCS Volume Added: 0.10

Results														2 SIGMA		2 SIGMA	
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	Counting Uncertainty pCi/L	Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery	
1	1.1091	0.7830	3	1.8071	0.6976	76.26%	0.1447	0.1103	1.0420	1.0570		SAMPLE					
2	1.1829	0.8351	3	1.8795	1.7943	34.59%	0.4287	0.1478	1.2128	1.2955		SAMPLE					
3	0.9672	0.6828	3	1.5767	3.0900	20.36%	0.7320	0.1479	1.2236	1.4528		SAMPLE					
4	1.2594	0.8892	3	1.9960	0.7574	77.85%	0.1740	0.1353	1.1548	1.1710		SAMPLE					
5	1.1871	0.8381	3	1.8950	0.9074	62.96%	0.2073	0.1304	1.1186	1.1422		SAMPLE					
6	1.5182	1.0719	3	2.3954	0.7650	91.43%	0.1520	0.1389	1.3702	1.3840		SAMPLE					
7	1.0209	0.7207	3	1.6660	0.8532	59.34%	0.1900	0.1126	0.9913	1.0148		SAMPLE					
8	1.3862	0.9786	3	2.1777	-0.1881	310.13%	-0.0427	0.1323	1.1431	1.1432		SAMPLE					
9	0.9781	0.6905	3	1.5831	1.0992	45.58%	0.2720	0.1238	0.9805	1.0193		SAMPLE					
10	1.0629	0.7504	3	1.7263	0.5352	93.14%	0.1187	0.1105	0.9767	0.9861		SAMPLE					
11	1.0844	0.7656	3	1.7537	0.2848	171.22%	0.0640	0.1096	0.9557	0.9584		MB					
12	1.3982	0.9871	3	2.2323	-0.1239	477.17%	-0.0240	0.1145	1.1586	1.1588	615636001.1	DUP	* 0.0%				
13	1.2516	0.8837	3	1.9748	77.5274	4.04%	18.6853	0.5729	4.6588	20.2217		LCS			80.5428	96.3%	

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
615636001	1B	60	10	40	4/12/2023 10:12	4/12/2023 11:12	PIC	2406255
615636002	1C	60	6	73	4/12/2023 10:12	4/12/2023 11:12	PIC	2406255
615636003	1D	60	7	75	4/12/2023 10:12	4/12/2023 11:12	PIC	2406255
615636004	2A	60	8	60	4/12/2023 10:13	4/12/2023 11:13	PIC	2406255
615636005	2C	60	16	56	4/12/2023 10:13	4/12/2023 11:13	PIC	2406255
615636006	2D	60	7	63	4/12/2023 10:13	4/12/2023 11:13	PIC	2406255
616069001	4A	60	9	42	4/12/2023 10:13	4/12/2023 11:13	PIC	2406255
616069002	4C	60	14	56	4/12/2023 10:13	4/12/2023 11:13	PIC	2406255
616069003	4D	60	6	51	4/12/2023 10:13	4/12/2023 11:13	PIC	2406255
616069004	5C	60	10	40	4/12/2023 10:13	4/12/2023 11:13	PIC	2406255
1205361131	7B	60	7	39	4/12/2023 10:12	4/12/2023 11:12	PIC	2406255
1205361132	1A	60	8	42	4/12/2023 10:12	4/12/2023 11:12	PIC	2406255
1205361133	7C	60	31	1175	4/12/2023 10:12	4/12/2023 11:12	PIC	2406255

ASSAY 12-Apr-23 7:36:07
 Wizard 2480 s/n 46190630
 Protocol id 8 Ba-133
 Time limit
 Count limit
 Isotope Ba-133
 Protocol date 4/12/2023
 Run id. 6479

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF		1	87	1	180	3590.28	1196.48	1.67	07:36:07
615636001	2	87	2	180	2762.85	920.78	1.9	76.96	07:39:21
615636002	3	87	3	180	3063.28	1020.86	1.81	85.32	07:42:35
615636003	4	87	4	180	3145.85	1048.54	1.78	87.64	07:45:49
615636004	5	87	5	180	2898.28	965.87	1.86	80.73	07:49:03
615636005	1	1	1	180	3047.57	1015.7	1.81	84.89	07:52:39
615636006	2	1	2	180	2621.57	873.72	1.95	73.02	07:55:53
616069001	3	1	3	180	3014.57	1004.7	1.82	83.97	07:59:06
616069002	4	1	4	180	2843	947.52	1.88	79.19	08:02:20
616069003	5	1	5	180	3308	1102.42	1.74	92.14	08:05:35
616069004	1	15	1	180	2825.28	941.63	1.88	78.70	08:09:10
1205361131	2	15	2	180	2745.57	914.99	1.91	76.47	08:12:24
1205361132	3	15	3	180	2487.28	828.87	2.01	69.28	08:15:38
1205361133	4	15	4	180	2926.28	975.28	1.85	81.51	08:18:52

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 12-Apr-2023

Detectors LB4100 A1 through I4 and PIC 1A through 14D and G5400W 1W through 1Z and LB4200 OA1 through OA1

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100E2	Above	Beta bkg	12-Apr 04:09	60	2.383	1.385	3.072	+0.55
LB4100E2	need 2nd	Beta eff	12-Apr 05:22	5	14211	14120	15200	-2.50
LB4100E4	Above	Beta bkg	12-Apr 06:28	60	2.150	1.058	2.464	+1.66
LB4100F2	Above	Alpha bkg	12-Apr 04:09	60	0.383	0.042	0.294	+5.15
LB4100F2	Below	Alpha eff	12-Apr 05:13	5	6016	6533	7372	-6.69
LB4100F2	Above	Alpha XTalk	12-Apr 05:13	5	0.386	0.318	0.366	+5.55
LB4100F2	Above	Beta bkg	12-Apr 04:09	60	21.933	1.173	1.833	+185.73
LB4100F2	Below	Beta eff	12-Apr 05:22	5	14989	15040	15710	-3.46
LB4100F3	Above	Alpha bkg	12-Apr 04:09	60	0.333	0.059	0.442	+1.30
LB4100G1	need 2nd	Alpha eff	12-Apr 05:23	5	8596	7975	12090	-2.09
LB4100G1	Above	Beta bkg	12-Apr 04:10	60	793	0.380	1.675	+3,671.02
LB4100G3	Above	Beta bkg	12-Apr 04:10	60	2.050	0.987	2.738	+0.64
LB4100H1	Above	Beta bkg	12-Apr 04:09	60	2.283	0.216	2.462	+2.52
PIC2B	Above	Beta bkg	12-Apr 07:38	60	2.200	-5.22E-1	2.315	+2.76
PIC4B	Above	Alpha bkg	12-Apr 09:07	60	0.400	0.127	0.391	+3.21
PIC6B	Above	Alpha bkg	12-Apr 09:14	60	0.433	-6.69E-2	0.412	+3.26
PIC12C	Above	Beta bkg	12-Apr 06:03	60	3.650	0.142	2.845	+4.79
PIC14B	Above	Beta bkg	12-Apr 06:14	60	7.383	-7.38E-1	2.727	+11.06
PIC14C	Above	Beta bkg	12-Apr 06:14	60	2.500	-1.36E+0	4.189	+1.17

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100A1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

LB4100I2 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I3 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I4 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4200OA1 Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by 

Date 4/12/23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC

Batch ID: 2406255

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1205361131	MB	JE1	PIC7B	APR-12-23 10:12:30	DONE	25mm Filter	01-JUN-22 00:00
1205361132	DUP	JE1	PIC1A	APR-12-23 10:12:35	DONE	25mm Filter	01-JUN-22 00:00
1205361133	LCS	JE1	PIC7C	APR-12-23 10:12:37	DONE	25mm Filter	01-JUN-22 00:00
615636001	SAMPLE	JE1	PIC1B	APR-12-23 10:12:47	DONE	25mm Filter	01-JUN-22 00:00
615636002	SAMPLE	JE1	PIC1C	APR-12-23 10:12:54	DONE	25mm Filter	01-JUN-22 00:00
615636003	SAMPLE	JE1	PIC1D	APR-12-23 10:12:58	DONE	25mm Filter	01-JUN-22 00:00
615636004	SAMPLE	JE1	PIC2A	APR-12-23 10:13:05	DONE	25mm Filter	01-JUN-22 00:00
615636005	SAMPLE	JE1	PIC2C	APR-12-23 10:13:12	DONE	25mm Filter	01-JUN-22 00:00
615636006	SAMPLE	JE1	PIC2D	APR-12-23 10:13:15	DONE	25mm Filter	01-JUN-22 00:00
616069001	SAMPLE	JE1	PIC4A	APR-12-23 10:13:19	DONE	25mm Filter	01-JUN-22 00:00
616069002	SAMPLE	JE1	PIC4C	APR-12-23 10:13:26	DONE	25mm Filter	01-JUN-22 00:00
616069003	SAMPLE	JE1	PIC4D	APR-12-23 10:13:29	DONE	25mm Filter	01-JUN-22 00:00
616069004	SAMPLE	JE1	PIC5C	APR-12-23 10:13:32	DONE	25mm Filter	01-JUN-22 00:00

Lucas Cell Raw Data

Batch 2406215 Check-list

This check-list was completed on 17-APR-23 by Lyndsey Pace

This batch was reviewed by Gregory Ramsay on 17-APR-23 and Lyndsey Pace on 17-APR-23.

Batch ID:
2406215

Product:
LUC26RAL

Description: Lucas Cell Radium 226
GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-226 in Liquid

Batch ID: 2406215
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL-RAD-A-008 REV# 15
Instrument: LUCAS-C202389980

Due Dates for Lab: 18-APR-2023			Package: 20-APR-2023		SDG: 21-APR-2023	
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
LCS	1205361075	Radium-226 SPIKE	1715-G	.1	mL	
MS	1205361074	Radium-226 SPIKE	1715-G	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	End Degas (date)	CELL #	End Transfer (date)	Start Count Time (date)	Background Counts	Total Counts
1	615636001	05-APR-2023	1	507.93	507.93	04/13/23 10:04	208	04/16/23 06:25	04/16/23 09:46	6	18
2	615636002	05-APR-2023	1	506.57	506.57	04/13/23 10:04	304	04/16/23 06:25	04/16/23 09:46	2	21
3	615636003	05-APR-2023	1	502.26	502.26	04/13/23 10:04	402	04/16/23 06:25	04/16/23 09:46	4	14
4	615636004	05-APR-2023	1	501.22	501.22	04/13/23 10:04	508	04/16/23 06:25	04/16/23 09:46	8	26
5	615636005	05-APR-2023	1	502.3	502.3	04/13/23 10:04	604	04/16/23 06:25	04/16/23 09:46	1	28
6	615636006	05-APR-2023	1	503.32	503.32	04/13/23 10:04	701	04/16/23 06:25	04/16/23 09:46	4	11
7	616069001	05-APR-2023	1	502.87	502.87	04/13/23 10:04	801	04/16/23 06:25	04/16/23 09:46	5	23
8	616069002	05-APR-2023	1	501.92	501.92	04/13/23 10:04	101	04/16/23 06:55	04/16/23 10:17	3	21
9	616069003	05-APR-2023	1	504.99	504.99	04/13/23 10:04	206	04/16/23 06:55	04/16/23 10:17	6	14
10	616069004	05-APR-2023	1	503.24	503.24	04/13/23 10:04	408	04/16/23 06:55	04/16/23 10:17	2	12
11	1205361072 MB	05-APR-2023	1		507.93	04/13/23 10:04	501	04/16/23 06:55	04/16/23 10:17	6	13
12	1205361073 DUP (615636001)	05-APR-2023	1	507.79	507.79	04/13/23 10:04	706	04/16/23 06:55	04/16/23 10:17	4	18
13	1205361074 MS (615636001)	05-APR-2023	1	130.12	130.12	04/13/23 10:04	802	04/16/23 06:55	04/16/23 10:17	4	497
14	1205361075 LCS	05-APR-2023	1		507.93	04/13/23 10:04	104	04/16/23 07:15	04/16/23 10:51	1	521

Reagent/Solvent Lot ID	Description	Amount	Comments:
			Data Entry Date2: 05-APR-2023 00:00

Radium-226 Liquid

Filename : RA226.XLS
 File type : Excel
 Version # : 1.3.2

Procedure Code : LUC26RAL
 Parmname : Radium-226
 Required MDA : 1 pCi/L
 Halflife of Ra-226 : 1600 years
 Ra-226 Abundance : 1.00
 Halflife of Rn-222 : 3.8235 days

Batch : 2406215
 Analyst : LIN01615
 Prep Date : 4/5/2023
 Ra-226 Method Uncertainty : 0.073648

Batch counted on : LUCAS CELL DETECTOR
 BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting		Gross CPM	Background Counts	Background CPM	Background Count Time (min.)	Cell Efficiency (cpm/dpm)
						Time (min.)	Gross Counts					
1	615636001.1	0.5079	2.0288E-05	3/21/2023 11:08	208	30	18	0.600	6	0.200	30	1.7740
2	615636002.1	0.5066	2.0282E-05	3/21/2023 14:44	304	30	21	0.700	2	0.067	30	1.8850
3	615636003.1	0.5023	2.0265E-05	3/21/2023 13:17	402	30	14	0.467	4	0.133	30	1.4980
4	615636004.1	0.5012	2.0261E-05	3/21/2023 14:06	508	30	26	0.867	8	0.267	30	1.8020
5	615636005.1	0.5023	2.0265E-05	3/21/2023 11:08	604	30	28	0.933	1	0.033	30	1.6810
6	615636006.1	0.5033	2.0269E-05	3/21/2023 8:05	701	30	11	0.367	4	0.133	30	1.7440
7	616069001.1	0.5029	2.0268E-05	3/24/2023 12:42	801	30	23	0.767	5	0.167	30	1.4200
8	616069002.1	0.5019	2.0264E-05	3/24/2023 14:35	101	30	21	0.700	3	0.100	30	1.5720
9	616069003.1	0.5050	2.0276E-05	3/24/2023 12:42	206	30	14	0.467	6	0.200	30	1.8770
10	616069004.1	0.5032	2.0269E-05	3/24/2023 11:45	408	30	12	0.400	2	0.067	30	1.5020
11	1205361072.1	0.5079	2.0288E-05	4/5/2023 0:00	501	30	13	0.433	6	0.200	30	1.8220
12	1205361073.1	0.5078	2.0287E-05	3/21/2023 11:08	706	30	18	0.600	4	0.133	30	1.5900
13	1205361074.1	0.1301	1.3068E-05	3/21/2023 11:08	802	30	497	16.567	4	0.133	30	1.5330
14	1205361075.1	0.5079	2.0288E-05	4/5/2023 0:00	104	30	521	17.367	1	0.033	30	1.6160

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-008
 Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrow End Date/Time	Count Start Date/Time	Rn-222 Corrections			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
5.500%	8/1/2022	7/31/2023	4/13/2023 10:04	4/16/2023 6:25	4/16/2023 9:46	0.403	0.975	1.002	1.000
8.900%	10/25/2022	10/31/2023	4/13/2023 10:04	4/16/2023 6:25	4/16/2023 9:46	0.403	0.975	1.002	1.000
5.300%	2/1/2023	1/31/2024	4/13/2023 10:04	4/16/2023 6:25	4/16/2023 9:46	0.403	0.975	1.002	1.000
4.500%	6/1/2022	5/31/2023	4/13/2023 10:04	4/16/2023 6:25	4/16/2023 9:46	0.403	0.975	1.002	1.000
6.700%	7/1/2022	6/30/2023	4/13/2023 10:04	4/16/2023 6:25	4/16/2023 9:46	0.403	0.975	1.002	1.000
6.200%	11/1/2022	10/31/2023	4/13/2023 10:04	4/16/2023 6:25	4/16/2023 9:46	0.403	0.975	1.002	1.000
3.200%	4/8/2023	3/31/2024	4/13/2023 10:04	4/16/2023 6:25	4/16/2023 9:46	0.403	0.975	1.002	1.000
1.200%	4/28/2022	4/30/2023	4/13/2023 10:04	4/16/2023 6:55	4/16/2023 10:17	0.406	0.975	1.002	1.000
2.800%	8/1/2022	7/31/2023	4/13/2023 10:04	4/16/2023 6:55	4/16/2023 10:17	0.406	0.975	1.002	1.000
7.000%	2/1/2023	1/31/2024	4/13/2023 10:04	4/16/2023 6:55	4/16/2023 10:17	0.406	0.975	1.002	1.000
7.900%	6/1/2022	5/31/2023	4/13/2023 10:04	4/16/2023 6:55	4/16/2023 10:17	0.406	0.975	1.002	1.000
2.900%	11/1/2022	10/31/2023	4/13/2023 10:04	4/16/2023 6:55	4/16/2023 10:17	0.406	0.975	1.002	1.000
6.100%	4/8/2023	3/31/2024	4/13/2023 10:04	4/16/2023 6:55	4/16/2023 10:17	0.406	0.975	1.002	1.000
2.000%	4/28/2022	4/30/2023	4/13/2023 10:04	4/16/2023 7:15	4/16/2023 10:51	0.407	0.973	1.002	1.000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1715-G
Spike Exp Date : 9/8/2023
Spike Activity (dpm/ml): 297.42
Spike Volume Added: 0.10


LCS S/N : 1715-G
LCS Exp Date : 9/8/2023
LCS Activity (dpm/ml): 297.42
LCS Volume Added: 0.10

Results																
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.3427	0.2420	1	0.6113	0.5095	41.19%	0.4000	0.1633	0.4077	0.4179		SAMPLE				
2	0.1867	0.1318	1	0.3839	0.7613	26.76%	0.6333	0.1599	0.3766	0.4142		SAMPLE				
3	0.3351	0.2366	1	0.6258	0.5085	42.76%	0.3333	0.1414	0.4229	0.4324		SAMPLE				
4	0.3948	0.2787	1	0.6846	0.7625	32.71%	0.6000	0.1944	0.4841	0.5010		SAMPLE				
5	0.1493	0.1054	1	0.3468	1.2234	21.04%	0.9000	0.1795	0.4783	0.5346		SAMPLE				
6	0.2873	0.2028	1	0.5364	0.3051	55.67%	0.2333	0.1291	0.3309	0.3358		SAMPLE				
7	0.3948	0.2787	1	0.7182	0.9645	29.57%	0.6000	0.1764	0.5557	0.5761		SAMPLE				
8	0.2753	0.1943	1	0.5333	0.8681	27.24%	0.6000	0.1633	0.4631	0.4802		SAMPLE				
9	0.3240	0.2288	1	0.5780	0.3212	55.97%	0.2667	0.1491	0.3519	0.3554		SAMPLE				
10	0.2346	0.1656	1	0.4823	0.5034	38.07%	0.3333	0.1247	0.3692	0.3826		SAMPLE				
11	0.3319	0.2343	1	0.5920	0.2878	62.77%	0.2333	0.1453	0.3513	0.3565		MB				
12	0.3106	0.2193	1	0.5800	0.6598	33.63%	0.4667	0.1563	0.4333	0.4452	615636001.1	DUP	25.7%			
13	1.2572	0.8876	1	2.3475	94.0487	7.60%	16.4333	0.7461	8.3691	19.5138	615636001.1	MS			102.9631	91.3%
14	0.1525	0.1076	1	0.3541	24.0608	4.83%	17.3333	0.7616	2.0720	4.1528		LCS			26.3763	91.2%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 16-APR-2023

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	07:13	1	1.19E+05	119159	-0.66		
LUCAS2	EFF	07:07	1	1.34E+05	134180	0.37		
LUCAS3	EFF	07:00	1	97638	97638	-2.49		
LUCAS4	EFF	06:51	1	1.29E+05	129040	1.73		
LUCAS5	EFF	06:49	1	1.33E+05	132999	0.4		
LUCAS6	EFF	06:46	1	1.31E+05	130751	1.09		
LUCAS7	EFF	06:44	1	1.33E+05	133353	0.25		
LUCAS8	EFF	06:40	1	1.20E+05	120435	-2.45		

Reviewed by: 
Lyndsey Pace

Date: 16-APR-23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR

Batch ID: 2406215

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
615636001	SAMPLE	LXP1	LUCAS2	APR-16-23 09:46:00	DONE	Lucas Cell	01-AUG-22 00:00
615636002	SAMPLE	LXP1	LUCAS3	APR-16-23 09:46:00	DONE	Lucas Cell	25-OCT-22 00:00
615636003	SAMPLE	LXP1	LUCAS4	APR-16-23 09:46:00	DONE	Lucas Cell	01-FEB-23 00:00
615636004	SAMPLE	LXP1	LUCAS5	APR-16-23 09:46:00	DONE	Lucas Cell	01-JUN-22 00:00
615636005	SAMPLE	LXP1	LUCAS6	APR-16-23 09:46:00	DONE	Lucas Cell	01-JUL-22 00:00
615636006	SAMPLE	LXP1	LUCAS7	APR-16-23 09:46:00	DONE	Lucas Cell	01-NOV-22 00:00
616069001	SAMPLE	LXP1	LUCAS8	APR-16-23 09:46:00	DONE	Lucas Cell	08-APR-23 00:00
616069002	SAMPLE	LXP1	LUCAS1	APR-16-23 10:17:00	DONE	Lucas Cell	28-APR-22 00:00
616069003	SAMPLE	LXP1	LUCAS2	APR-16-23 10:17:00	DONE	Lucas Cell	01-AUG-22 00:00
616069004	SAMPLE	LXP1	LUCAS4	APR-16-23 10:17:00	DONE	Lucas Cell	01-FEB-23 00:00
1205361072	MB	LXP1	LUCAS5	APR-16-23 10:17:00	DONE	Lucas Cell	01-JUN-22 00:00
1205361073	DUP	LXP1	LUCAS7	APR-16-23 10:17:00	DONE	Lucas Cell	01-NOV-22 00:00
1205361074	MS	LXP1	LUCAS8	APR-16-23 10:17:00	DONE	Lucas Cell	08-APR-23 00:00
1205361075	LCS	LXP1	LUCAS1	APR-16-23 10:51:00	DONE	Lucas Cell	28-APR-22 00:00



Environmental Laboratory
 1232 Haco Drive
 Lansing
 Michigan, 48910

CHAIN OF CUSTODY

Page 1 of 1

Phone: (517)702-6372

Lab Work Order Number L303201

Client Name BWL - Erickson Station		Project Name Erickson AM MI Wells 14-15		Requested Analyses								Requested Turn Around		
Client Contact Cheryl Louden		Project Number [none]		Ag:: As:: B:: Ba:: Be:: Ca:: Cd:: Cr:: Co:: Cu:: Fe:: Hg:: Li:: Mo:: Ni:: Pb:: Sb:: Se:: Ti:: V:: Zn:: Na:: K:: Mg	TSS, HCO3, CO3, Hardness	Cl-IC:: F-ISE:: SO4:: TDS	Radium 226 and Radium 228							Rush requests subject to additional charge. Rush requests subject to lab approval.
Address 3725 S. Canal		Project Description												
City Lansing		PO Number 30926 10021												
State/Zip MI, 48917		Shipped By												
Phone (517) 702-6396	Fax (517) 702-6373	Tracking Number												
Sampler Marc Wahrer														

Sample Name or Field ID	Sampled Date	Sampled Time	Sample Type Grab/Composite	Matrix Code	Container Count	Preservation Code				Sample	Comments
						b	a	a	b		
MW-14	03/24/23	1242	G	GW	5	1	1	1	2		
MW-15	↓	1435	G	GW	5	1	1	1	2		
MWT-1A	↓	1242	G	GW	5	1	1	1	2		
Field Blank	↓	1145	G	DI	5	1	1	1	2		

Relinquished By 	Date/Time 3-24-23 1533	Received By 	Date/Time 3/24/23 1533	Comments
Relinquished By	Date/Time	Received By	Date/Time	
Relinquished By	Date/Time	Received By	Date/Time	
Cooler Numbers and Temperatures				

Matrix Codes: DI=Deionized Water, GW=Ground Water Preserv. Codes: a=None, b=0.5% HNO3



Lansing Board of Water and Light
Environmental Services Laboratory (MI00079)

Cert ID: 3760

1232 Haco Dr.

Lansing, Michigan 48901

03 April 2023

BWL - Erickson Station

Attn: Cheryl Louden

3725 S. Canal

Lansing, MI 48917

Project: General Lab

Dear Cheryl Louden,

Enclosed is a copy of the laboratory report for the following work order(s) received by Lansing Board of Water and Light Environmental Services Laboratory:

Work Order	Received	Account Number
L303217	3/22/2023 8:30:00AM	30926 10021
L303220	3/22/2023 3:23:00PM	30926 10021
L303222	3/23/2023 3:00:00PM	30926 10021
L303223	3/23/2023 3:00:00PM	30926 10021

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in blue ink that reads "Jennifer Caporale".

Jennifer Caporale, Supervisor

Note: Added additional report to the end of original report on 06/29/23 JSC



**COVALENT
METROLOGY**

**CM000027054
ICP-MS Analysis Report**

03/31/2023

Created by: Adlai Katzenberg, Ph.D.

Reviewed by: Nanette Jarenwattananon, Ph.D.

covalentmetrology.com

Table of Contents

Results Summary	3
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<u>Instrument Description</u>	5-7
<u>Analytical Terminology</u>	8-9
<u>Metrology Summary</u>	10

Sample Description and Objective

- 20 sample of groundwater were received for analysis by ICPMS:
Goal: Quantify ^7Li , ^{11}B , ^{86}Sr , ^{87}Sr , and $^{87}\text{Sr}/^{86}\text{Sr}$ ratio
- Sample was diluted 100X in deionized water
- Deionized water was used as a process blank to assess impurities that are due to sample preparation steps and reagents - and is used for background correction of samples.
- All concentrations are reported with respect to the as-received (un-diluted) samples

Results Summary

- Li concentrations were below 100 ng/mL, except in one sample: L30322-01A
- Average $^{87}\text{Sr}/^{86}\text{Sr}$ ratio was 0.52, with a low of 0.51 and a high of 0.55

Analytical Results

4

All results are listed in ppb (ng/mL)

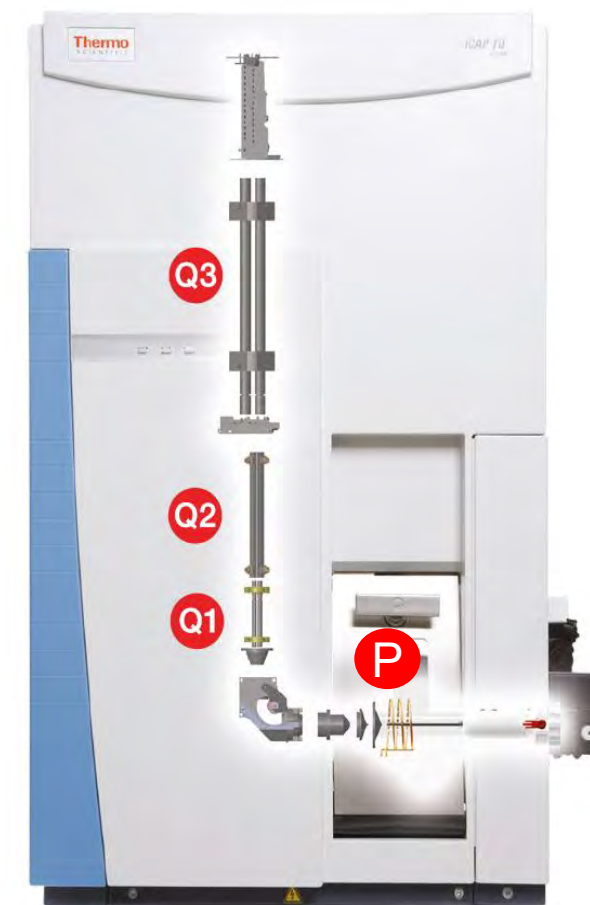
Element / Isotope	Instrument Mode	FieldBlank 3-22-23 0815	MW-11 3-22-23 1304	MW-16D 3-21-23 1406	MW-12B 3-22-23 1019	MW-16B 3-21-23 1444	MW-12 3-22-23	L303223-01A
⁷ Li	SQ-KED	N.D.	67.68	31.29	34.69	17.45	12.56	N.D.
¹¹ B	SQ-KED	N.D.	N.D.	4418.66	3111.84	154.31	65.20	1334.04
⁸⁶ Sr	SQ-KED	N.D.	492.01	1211.11	775.78	888.43	391.79	2903.30
⁸⁷ Sr	SQ-KED	N.D.	270.32	616.22	411.06	456.29	201.82	1517.54
⁸⁷ Sr/ ⁸⁶ Sr Ratio		-----	0.55	0.51	0.53	0.51	0.52	0.52

Element / Isotope	Instrument Mode	MW-11B 3-22-23 1404	MWF-12B 3-22-23 1019	MW-7 3-21-23 1732	MW-16C 3-21-23 1317	MW-7B 3-21-23 1830	MW-16A 3-21-23 1108	L303223-02A
⁷ Li	SQ-KED	19.58	31.92	52.57	18.30	13.62	N.D.	N.D.
¹¹ B	SQ-KED	996.08	3153.90	1448.23	386.16	2842.92	108.79	1026.18
⁸⁶ Sr	SQ-KED	1320.00	758.88	1103.10	914.80	298.39	453.62	2656.78
⁸⁷ Sr	SQ-KED	682.51	397.79	575.61	477.04	153.94	236.39	1394.17
⁸⁷ Sr/ ⁸⁶ Sr Ratio		0.52	0.52	0.52	0.52	0.52	0.52	0.52

Element / Isotope	Instrument Mode	MW-7C 3-21-23 1926	MWT-16A 3-21-23 1108	L30322-01A	FB 3-21-23 0805	L30322-02A	MW-2 3-22-23 1140
⁷ Li	SQ-KED	93.00	N.D.	1126.74	N.D.	45.33	23.62
¹¹ B	SQ-KED	5864.84	145.05	644.25	10.03	125.76	5017.11
⁸⁶ Sr	SQ-KED	1579.83	469.46	332.68	N.D.	586.08	445.73
⁸⁷ Sr	SQ-KED	821.03	244.43	174.32	N.D.	305.79	234.40
⁸⁷ Sr/ ⁸⁶ Sr Ratio		0.52	0.52	0.52	-----	0.52	0.53

N.D. = not detected at or above the method detection limit

- Analytical work was performed on a Thermo Scientific iCAP triple quadrupole inductively coupled plasma mass spectrometer – TQ-ICP-MS.
- To remove interferences from analysis matrix, instrument can use a variety of instrument modes as described below and on next page.
 - After ionization in plasma (P), quadrupole 1 (Q1) works as a selective mass filter for ions entering instrument.
 - Using hydrogen, helium, oxygen or ammonia gas, selective reaction chemistry- or collision interference removal takes place in Q2. When no gases are used, cell is in pass-through mode.
 - Q3 is the final mass filter after collisions/reactions in Q2 before the product (analyte) ions are counted by detector.
 - Reactive gases either form a product ion with the analyte that is interference free (mass shift mode) or reacts with the interference to remove the interference signal from the analyte (on mass mode).
 - The mass analyzer quadrupole (Q3) is either set to the original analyte mass (on-mass analysis) or the product ion mass (mass shift mode).



The Thermo Scientific
iCAP TQ ICP-MS System

- The dual mode detector has a linear dynamic range of ~10 orders of magnitude, making it possible to determine ppt- to ppm concentrations in one analysis run with appropriate standard curve set up.
- For most analytical work, instrument is used in pulse counting mode for ppt to ppb (pg/mL to ng/mL) trace element analysis.
- Semi-quantitative analysis was performed for the following element set:

Li, B, Sr.

Table A: TQ-ICP-MS Instrument Modes

Instrument Mode	Description	Reaction Mechanism
SQ-N/A	Single quadrupole mode, no collision or reaction gases	(none)
SQ-KED	SQ mode using helium as collision gas with kinetic energy discrimination	Gas collisions, remove polyatomic interferences
SQ-He	SQ mode using helium as collision gas	Gas collisions, remove polyatomic interferences
SQ-H ₂	SQ mode using hydrogen as reaction gas	Gas reaction, remove polyatomic interferences
TQ-O ₂	Triple quadrupole mode using oxygen as reaction gas	On-mass or mass shift
TQ-NH ₃	Triple quadrupole mode using ammonia as reaction gas	On-mass or mass shift

Table B: Analytical Terminology

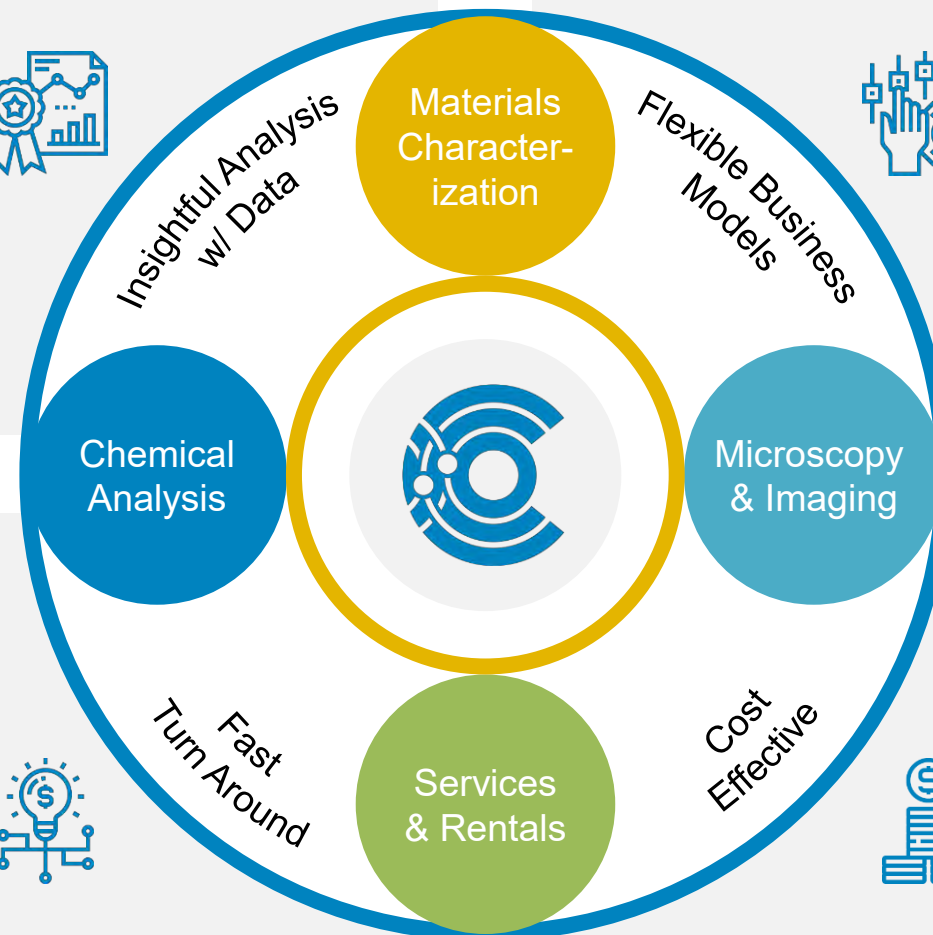
SD	Standard deviation for n replicate measurements	$SD = \sqrt{\frac{1}{n-1} \cdot \sum_{i=1}^n (x_i - \bar{x})^2}$
SQL	Method quantitation limit where SD_{Blank} is the standard deviation for the calibration blank measured 10 times	$SQL = \left(\frac{10 \times SD_{Blank}}{a_1} \right) \times TDF$
a_1, a_0	Slope and intercept of the calibration function	$f(x) = a_1x + a_0$
TDF	Total dilution factor	$TDF = \frac{V_S + V_D}{V_S} = \frac{\text{Total volume of sample + diluent}}{\text{Volume of sample}}$
$C_{m,i}$	Measured concentration or mass fraction where X_i is the mean value of n replicate measurements of element (or isotope) i	$C_{m,i} = X_i \pm U_{m,i}$
$U_{m,i}$	Measurement uncertainty, expressed as a 95% confidence interval of the mean measured value X_i . t = Student's t -value for $n-1$ replicate measurements; SD_i is the standard deviation for element (or isotope) i .	$U_{m,i} = \frac{t \cdot SD_i}{\sqrt{n}}$

Table C: Commonly Used Concentration or Mass Fraction Units

Common Name	Description	Fraction	Liquid Concentration		Solids Mass Fractions	
ppq	Parts per quadrillion	10^{-15}	fg/mL	pg/L	fg/g	pg/kg
ppt	Parts per trillion	10^{-12}	pg/mL	ng/L	pg/g	ng/kg
ppb	Parts per billion	10^{-9}	ng/mL	ug/L	ng/g	ug/kg
ppm	Parts per million	10^{-6}	ug/mL	mg/L	ug/g	mg/kg
% wt	Weight percent	10^{-2}	n/a	n/a	10,000 ug/g	10,000 mg/kg

1. All sample preparation and analysis was done by according to ISO/IEC 17025 - *General requirements for the competence of testing and calibration laboratories* – by trained personnel familiar with this standard.
2. Class A glass volumetric flasks are calibrated according to ASTM-E288 - *Standard Specification for Laboratory Glass Volumetric Flasks*.
3. Polymethyl pentene PMP Class A volumetric flasks are calibrated according to ISO 4787 - *Laboratory glassware - Volumetric instruments - Methods for testing of capacity and for use*.
4. Pipettes were checked before use and met specifications using a balance calibrated using ISO/IEC 17025 and ANSI/NCLZ-36.1-2013 accredited calibration weights.
5. Analytical standards are all NIST-traceable.

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- Advanced Analysis and Interpretation
- Expert Advisory Services



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- Sample Pick-Up in Bay Area
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- Operational excellence
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Environmental Laboratory
 1232 Haco Drive
 Lansing
 Michigan, 48910


CHAIN OF CUSTODY

Phone: (517)702-6372

Lab Work Order Number L303217

Client Name BWL - Erickson Station		Project Name General Lab		Requested Analyses						Requested Turn Around			
Client Contact Cheryl Louden		Project Number [none]		6(11)B, (7)Li, (87)Sr,(86), Sr,(87)Sr/(86)Sr ratio									Rush requests subject to additional charge Rush requests subject to lab approval.
Address 3725 S. Canal		Project Description General Lab Analysis											
City Lansing		PO Number											
State/Zip MI, 48917		Shipped By											
Phone (517) 702-6396	Fax (517) 702-6373	Tracking Number											
Sampler Marc Wahrer													

Sample Name or Field ID	Sampled Date	Sampled Time	Sample Type Grab/Composite	Matrix Code	Container Count	Preservation Code										Sample	Comments
						a											
MW-16A	03/21/2023	11:08	G	GW	1	1											Send to Covalent Metrology
MW-16B	03/21/2023	14:44	G	GW	1	1											Send to Covalent Metrology
MW-16C	03/21/2023	13:17	G	GW	1	1											Send to Covalent Metrology
MW-16D	03/21/2023	14:06	G	GW	1	1											Send to Covalent Metrology
MWT-16A	03/21/2023	11:08	G	GW	1	1											Send to Covalent Metrology
MW-7	03/21/2023	17:32	G	GW	1	1											Send to Covalent Metrology
MW-7B	03/21/2023	18:30	G	GW	1	1											Send to Covalent Metrology
MW-7C	03/21/2023	19:26	G	GW	1	1											Send to Covalent Metrology
Field Blank	03/21/2023	08:05	G	GW	1	1											Send to Covalent Metrology

Relinquished By  MAW	Date/Time 3/21/23 1945	Received By Jennifer Caporale	Date/Time 3/22/2023 8:30	
Relinquished By	Date/Time	Received By	Date/Time	Comments
Relinquished By	Date/Time	Received By	Date/Time	
Cooler Numbers and Temperatures E0776 at 1 °C				



Environmental Laboratory
 1232 Haco Drive
 Lansing
 Michigan, 48910

CHAIN OF CUSTODY

Phone: (517)702-6372

Lab Work Order Number L303220

Client Name BWL - Erickson Station		Project Name General Lab		Requested Analyses								Requested Turn Around			
Client Contact Cheryl Louden		Project Number [none]		δ(11)B, (7)Li, (87)Sr, (86)Sr, (87)Sr/(86)Sr ratio											Rush requests subject to additional charge. Rush requests subject to lab approval.
Address 3725 S. Canal		Project Description General Lab Analysis													
City Lansing		PO Number													
State/Zip MI, 48917		Shipped By													
Phone (517) 702-6396	Fax (517) 702-6373	Tracking Number													
Sampler Marc Wahrer															

Sample Name or Field ID	Sampled Date	Sampled Time	Sample Type Grab/Composite	Matrix Code	Container Count	Preservation Code										Sample	Comments
						a											
MW-2	03/22/2023	11:40	G	GW	1	1											Send to Covalent Metrology
MW-11	03/22/2023	13:04	G	GW	1	1											Send to Covalent Metrology
MW-11B	03/22/2023	14:04	G	GW	1	1											Send to Covalent Metrology
MW-12	03/22/2023	14:20	G	GW	1	1											Send to Covalent Metrology
MW-12B	03/22/2023	10:19	G	GW	1	1											Send to Covalent Metrology
MWT-12B	03/22/2023	10:19	G	GW	1	1											Send to Covalent Metrology
Field blank	03/22/2023	08:15	G	GW	1	1											Send to Covalent Metrology

Relinquished By 	Date/Time 3/22/2023 15:23	Received By Jennifer Caporale	Date/Time 3/22/2023 15:23	Comments
Relinquished By	Date/Time	Received By	Date/Time	
Relinquished By	Date/Time	Received By	Date/Time	
Cooler Numbers and Temperatures E0776 at 1.3 °C				



Environmental Laboratory
 1232 Haco Drive
 Lansing
 Michigan, 48910

CHAIN OF CUSTODY

Phone: (517)702-6372

Lab Work Order Number L303222

Client Name BWL - Erickson Station		Project Name General Lab		Requested Analyses						Requested Turn Around			
Client Contact Cheryl Louden		Project Number [none]		To Merit for SPLP Isotope Analysis sent to Covalent Metrology									Rush requests subject to additional charge Rush requests subject to lab approval.
Address 3725 S. Canal		Project Description General Lab Analysis											
City Lansing		PO Number											
State/Zip MI, 48917		Shipped By											
Phone (517) 702-6396	Fax (517) 702-6373	Tracking Number											
Sampler HDR													

Sample Name or Field ID	Sampled Date	Sampled Time	Sample Type Grab/Composite	Matrix Code	Container Count	Preservation Code						Sample	Comments
						a	a						
FB Ash 1	3/23/2023	1345	G	S	1	x	x						
CWP Ash 1	3/23/2023	1405	G	S	1	x	x						

Relinquished By 	Date/Time 3/23/23 15:00	Received By 	Date/Time 3-23-23 1500	Comments
Relinquished By	Date/Time	Received By	Date/Time	
Relinquished By	Date/Time	Received By	Date/Time	
Cooler Numbers and Temperatures E0776 8-6°C				



Environmental Laboratory
 1232 Haco Drive
 Lansing
 Michigan, 48910

CHAIN OF CUSTODY

Page 1 of 1

Phone: (517)702-6372

Lab Work Order Number L303223

Client Name BWL - Erickson Station		Project Name General Lab		Requested Analyses								Requested Turn Around				
Client Contact Cheryl Louden		Project Number [none]		Centrifuge before going to Covalent Metrology	Isotope Analysis sent to Covalent Metrology											Rush requests subject to additional charge. Rush requests subject to lab approval.
Address 3725 S. Canal		Project Description General Lab Analysis														
City Lansing		PO Number														
State/Zip MI, 48917		Shipped By														
Phone (517) 702-6396	Fax (517) 702-6373	Tracking Number														
Sampler HDR																

Sample Name or Field ID	Sampled Date	Sampled Time	Sample Type Grab/Composite	Matrix Code	Container Count	Preservation Code								Sample	Comments
						a	a								
FB Ash 2	3/23/2023	1350	G	S	1	x	x								
CWP Ash 2	3/23/2023	1415	G	S	1	x	x								

Relinquished By 	Date/Time 3/23/23 15:00	Received By 	Date/Time 3-23-23 1500	
Relinquished By	Date/Time	Received By	Date/Time	Comments
Relinquished By	Date/Time	Received By	Date/Time	
Cooler Numbers and Temperatures E0776 8.6°C				



2680 East Lansing Dr., East Lansing, MI 48823
 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE 1 OF 1

REPORT TO

CONTACT NAME: Jennifer Caporale
 COMPANY: Lansing Board of Water and Light
 ADDRESS: PO Box 13007 48901-3007
 CITY: Lansing STATE: MI ZIP CODE: 48901
 PHONE NO.: 517-702-6372 FAX NO.: P.O. NO.:
 E-MAIL ADDRESS: Environmental_Laboratory@lbwl.com QUOTE NO.:

CHAIN OF CUSTODY RECORD

INVOICE TO

CONTACT NAME: Beth Zimpfer
 COMPANY:
 ADDRESS:
 CITY:
 PHONE NO.:
 E-MAIL ADDRESS: Beth.Zimpfer@lbwl.com

PROJECT NO./NAME: Erickson SPLP SAMPLER(S) - PLEASE PRINT/SIGN NAME:
 TURNAROUND TIME REQUIRED: 1 DAY 2 DAYS 3 DAYS STANDARD OTHER ASAP
 DELIVERABLES REQUIRED: STD LEVEL II LEVEL III LEVEL IV EDD OTHER

MATRIX CODE: GW-GROUNDWATER WW-WASTEWATER S-SOIL L-LIQUID SD-SOLID
 SL-SLUDGE DW-DRINKING WATER O-OIL WP-WIPE A-AIR W-WASTE

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MOUNT	# OF BOTTLES	PHONE	# Containers & Preservatives							SPLP, Send back to LBWL					
	DATE	TIME					NO	NO.	NO.	NO.	NO.	NO.	ORDER						
46672.01	3-23-23	1345	FB Ash I L303222-01	S	1														
.02	3-23-23	1405	CWP Ash I L303222-02	S	1														

SPLP, Send back to LBWL

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

Volatiles
 OHIO VAP Drinking Water
 DoD PCBs
 Specific Metals
 Heavy New York
 Special Instructions

**SPLP ASTM
Leach Performed**

Return

RELINQUISHED BY: *[Signature]* DATE: 3/24/23 TIME: 1543
 RECEIVED BY: *[Signature]* DATE: 3/24/23 TIME: 1543


RELINQUISHED BY: *[Signature]* DATE: 3/28/23 TIME: 1505
 RECEIVED BY: *J. Caporale* DATE: 03/28/23 TIME: 1505

RELINQUISHED BY: *[Signature]* DATE: 3/28/23 TIME: 1430
 RECEIVED BY: *[Signature]* DATE: TIME:

SEAL NO. SEAL INTACT INITIALS NOTES TEMP ON ARRIVAL
 YES NO 13.6
 YES NO

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Sending to Covalent + Metrology 03/29/23 JSC 03/28/23

Covalent Internal Chain of Custody			
Analysis by ICPMS	Qty	Description of Sample	Date/Time Sampled
$\delta(11)\text{B}, \text{b}(7)\text{Li}, (87)\text{Sr}, (86)\text{Sr}$ $(87)\text{Sr}/(86)\text{Sr}$ ratio 	1	MW-16A L303217-01	3/21/23 1108
	1	MW-16B L303217-02	3/21/23 1444
	1	MW-16C L303217-03	3/21/23 1317
	1	MW-16D L303217-04	3/21/23 1406
	1	MWT-16A L303217-05	3/21/23 1108
	1	MW-7 L303217-06	3/21/23 1732
	1	MW-7B L303217-07	3/21/23 1830
	1	MW-7C L303217-08	3/21/23 1926
	1	Field Blank L303217-09	3/21/23 0805

Client ID	Date/Time	Released by	Received By	Comments
CM000027054				
Quote Q-10878				

1. To be kept with Client Sample
2. File with sample until;
 - a. Return of Sample/Job
 - b. Disposal per request



Covalent Internal Chain of Custody			
Analysis by ICPMS	Qty	Description of Sample	Date/Time Sampled
$\delta(11)\text{B}, \text{b}(7)\text{Li}, (87)\text{Sr}, (86)\text{Sr}$ (87)Sr/(86)Sr ratio	1	MW-2 L303220-01	3/22/23 1140
	1	MW-11 L303220-02	3/22/23 1304
	1	MW-11B L303220-03	3/22/23 1404
	1	MW-12 L303220-04	3/22/23 1420
	1	MW-12B L303220-05	3/22/23 1019
	1	MWT-12B L303220-06	3/22/23 1019
	1	Field Blank L303220-07	3/22/23 0815
	1	FB Ash 1 SPLP L303222-01	3/23/23 1345
	1	CWP Ash 1 SPLP L303222-02	3/23/23 1405
	1	FB Ash 2 L303223-01	3/23/23 1350
	1	CWP Ash 2 L303223-02	3/23/23 1415

Client ID	Date/Time	Released by	Received By	Comments
CM000027054				
Quote Q-10878				

1. To be kept with Client Sample
2. File with sample until;
 - a. Return of Sample/Job
 - b. Disposal per request





**COVALENT
METROLOGY**

CM000028749
ICP-MS Analysis Report

06/15/2023

Created by: Joern T. Larsen, M.S.

Reviewed by: Adlai Katzenberg, Ph.D.

covalentmetrology.com

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Results Summary	3
Analytical Results	4
<u>Instrument Description</u>	5-7
<u>Analytical Terminology</u>	8-9
<u>Metrology Summary</u>	10

Sample Description and Objective

- 20 sample of groundwater were received for analysis by ICPMS:
Goal: Quantify ^7Li , ^{11}B , ^{86}Sr , ^{87}Sr , $^{87}\text{Sr}/^{86}\text{Sr}$ ratio, and $^{11}\text{B}/^{10}\text{B}$ ratio.
- Sample was diluted 100X in deionized water
- Deionized water was used as a process blank to assess impurities that are due to sample preparation steps and reagents - and is used for background correction of samples.
- All concentrations are reported with respect to the as-received (un-diluted) samples

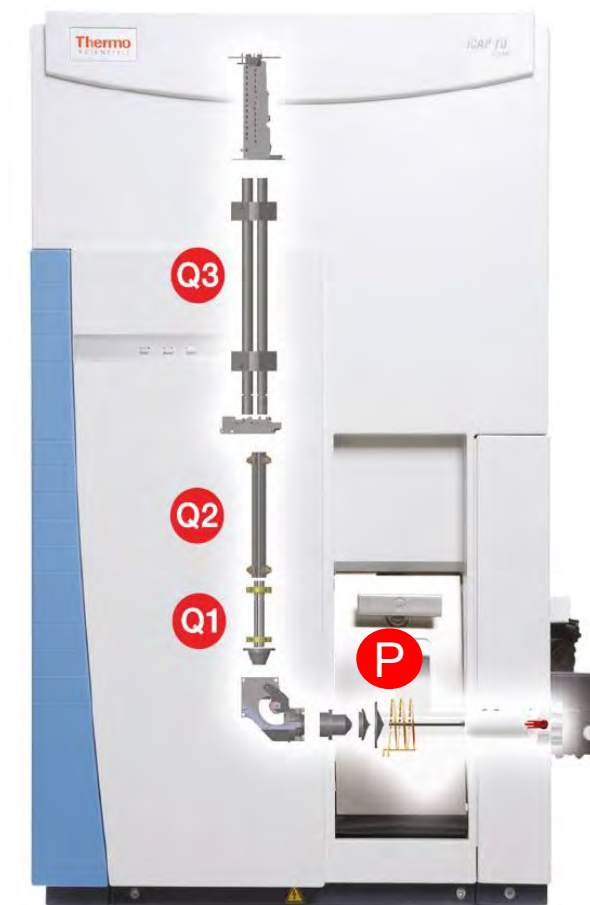
Analytical Results

		FieldBlank 3-22-23 0815			MW-11 3-22-23 1304			MW-16D 3-21-23 1406			MW-12B 3-22-23 1019			MW-16B 3-21-23 1444			MW-12 3-22-23			L303223-01A		
Element /	Instrument	C _m	U _m	U _m	C _m	U _m	U _m	C _m	U _m	U _m	C _m	U _m	U _m	C _m	U _m	U _m	C _m	U _m	U _m	C _m	U _m	U _m
Isotope	Mode	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)
⁷ Li	SQ-N/A	Trace	> 0.044	-	3.58	0.03	0.84	19.7	0.3	1.5	21.8	0.4	2	14	0.6	4.3	12.2	0.2	1.4	0.819	0.04	4.9
¹¹ B	SQ-N/A	2.29	0.39	17	143	4	2.7	5040	60	1.2	3610	60	1.8	153	3	2.1	71.9	1.8	2.5	618	9	1.4
⁸⁷ Rb	SQ-KED	< 0.3	-	-	81.7	3.4	4.1	168	5	3.2	108	3	2.6	113	4	3.3	53.5	1.7	3.1	47.7	1.5	3.1
⁸⁶ Sr	TQ-O2	< 2	-	-	286	13	4.7	825	37	4.5	522	19	3.7	561	15	2.6	268	14	5.3	235	10	4.1
δ(¹¹ B/ ¹⁰ B)	SQ-N/A IR Mode	4.03	0.02	0.5	4.06	0.02	0.5	4.14	0.02	0.5	4.16	0.02	0.5	4.09	0.02	0.5	4.12	0.02	0.5	3.77	0.02	0.5
δ(⁸⁷ Sr/ ⁸⁶ Sr)	TQ-O2-IR Mode	-	-	-	0.717	0.001	0.2	0.709	0.001	0.2	0.714	0.001	0.2	0.712	0.001	0.2	0.718	0.001	0.2	0.724	0.001	0.2

		MW-11B 3-22-23 1404			MWF-12B 3-22-23 1019			MW-7 3-21-23 1732			MW-16C 3-21-23 1317			MW-7B 3-21-23 1830			MW-16A 3-21-23 1108			L303223-02A		
Element /	Instrument	C _m	U _m	U _m	C _m	U _m	U _m	C _m	U _m	U _m	C _m	U _m	U _m	C _m	U _m	U _m	C _m	U _m	U _m	C _m	U _m	U _m
Isotope	Mode	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)
⁷ Li	SQ-N/A	21.4	0.5	2.2	22.9	0.5	2.4	48.2	1.3	2.7	16.4	0.5	3.3	18.1	0.1	0.82	1.77	0.02	0.86	8.20	0.42	5.1
¹¹ B	SQ-N/A	1100	10	1.3	3040	40	1.5	1720	20	1.1	464	6	1.4	3110	50	1.5	111	3	2.5	1110	10	1.2
⁸⁷ Rb	SQ-KED	169	4	2.1	89.5	3.3	3.6	171	6	3.3	127	4	3.2	46.0	1.6	3.5	63.3	2.1	3.4	390	14	3.6
⁸⁶ Sr	TQ-O2	830	29	3.5	429	19	4.5	856	24	2.9	623	20	3.3	223	10	4.4	316	13	4.2	1880	50	2.9
δ(¹¹ B/ ¹⁰ B)	SQ-N/A IR Mode	4.11	0.02	0.5	4.17	0.02	0.5	4.02	0.02	0.5	4.08	0.02	0.5	4.15	0.02	0.5	4.08	0.02	0.5	4.04	0.02	0.5
δ(⁸⁷ Sr/ ⁸⁶ Sr)	TQ-O2-IR Mode	0.709	0.001	0.2	0.710	0.001	0.2	0.711	0.001	0.2	0.713	0.001	0.2	0.711	0.001	0.2	0.720	0.001	0.2	0.715	0.001	0.2

		MW-7C 3-21-23 1926			MWT-16A 3-21-23 1108			L30322-01A			FB 3-21-23 0805			L30322-02A			MW-2 3-22-23 1140		
Element /	Instrument	C _m	U _m	U _m	C _m	U _m	U _m	C _m	U _m	U _m	C _m	U _m	U _m	C _m	U _m	U _m	C _m	U _m	U _m
Isotope	Mode	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)	(ng/mL)	(ng/mL)	(%)
⁷ Li	SQ-N/A	72.8	1.7	2.4	1.75	0.02	1.3	0.792	0.020	2.5	< 0.05	-	-	44.8	2.0	4.4	25.3	0.3	1.3
¹¹ B	SQ-N/A	6440	60	0.88	110	3	3.1	1350	30	2	6.69	0.63	9.4	129	3	2	4180	50	1.2
⁸⁷ Rb	SQ-KED	239	7	2.9	63.6	1.9	3	391	10	2.5	< 0.3	-	-	78.4	2.8	3.6	52.1	2.4	4.6
⁸⁶ Sr	TQ-O2	1170	30	2.9	316	14	4.6	1890	50	2.8	< 2	-	-	386	14	3.8	256	10	3.9
δ(¹¹ B/ ¹⁰ B)	SQ-N/A IR Mode	4.03	0.02	0.5	4.05	0.02	0.5	4.02	0.02	0.5	4.03	0.02	0.5	4.01	0.02	0.5	4.00	0.02	0.5
δ(⁸⁷ Sr/ ⁸⁶ Sr)	TQ-O2-IR Mode	0.715	0.001	0.2	0.710	0.001	0.2	0.716	0.001	0.2	-	-	-	0.719	0.001	0.2	0.717	0.001	0.2

- Analytical work was performed on a Thermo Scientific iCAP triple quadrupole inductively coupled plasma mass spectrometer – TQ-ICP-MS.
- To remove interferences from analysis matrix, instrument can use a variety of instrument modes as described below and on next page.
 - After ionization in plasma (P), quadrupole 1 (Q1) works as a selective mass filter for ions entering instrument.
 - Using hydrogen, helium, oxygen or ammonia gas, selective reaction chemistry- or collision interference removal takes place in Q2. When no gases are used, cell is in pass-through mode.
 - Q3 is the final mass filter after collisions/reactions in Q2 before the product (analyte) ions are counted by detector.
 - Reactive gases either form a product ion with the analyte that is interference free (mass shift mode) or reacts with the interference to remove the interference signal from the analyte (on mass mode).
 - The mass analyzer quadrupole (Q3) is either set to the original analyte mass (on-mass analysis) or the product ion mass (mass shift mode).



The Thermo Scientific
iCAP TQ ICP-MS System

- The dual mode detector has a linear dynamic range of ~10 orders of magnitude, making it possible to determine ppt- to ppm concentrations in one analysis run with appropriate standard curve set up.
- For most analytical work, instrument is used in pulse counting mode for ppt to ppb (pg/mL to ng/mL) trace element analysis.
- Semi-quantitative analysis was performed for the following element set:

Li, B, Sr.

Table A: TQ-ICP-MS Instrument Modes

Instrument Mode	Description	Reaction Mechanism
SQ-N/A	Single quadrupole mode, no collision or reaction gases	(none)
SQ-KED	SQ mode using helium as collision gas with kinetic energy discrimination	Gas collisions, remove polyatomic interferences
SQ-He	SQ mode using helium as collision gas	Gas collisions, remove polyatomic interferences
SQ-H ₂	SQ mode using hydrogen as reaction gas	Gas reaction, remove polyatomic interferences
TQ-O ₂	Triple quadrupole mode using oxygen as reaction gas	On-mass or mass shift
TQ-NH ₃	Triple quadrupole mode using ammonia as reaction gas	On-mass or mass shift

Table B: Analytical Terminology

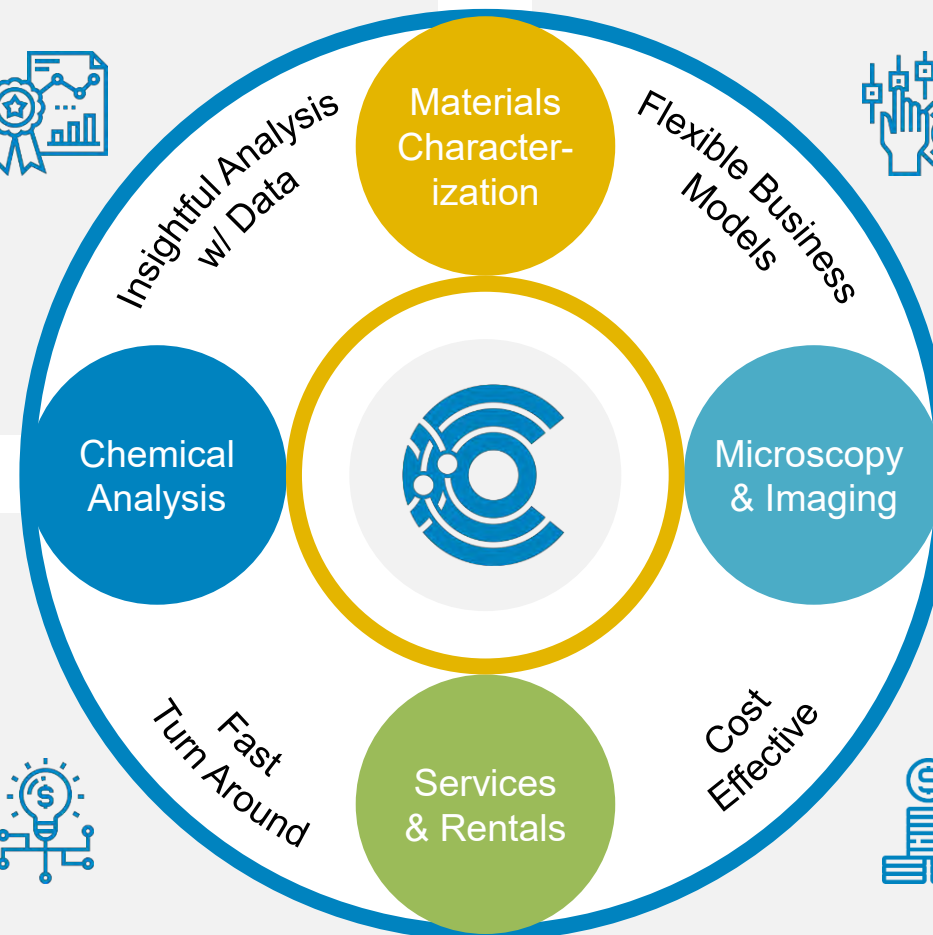
SD	Standard deviation for n replicate measurements	$SD = \sqrt{\frac{1}{n-1} \cdot \sum_{i=1}^n (x_i - \bar{x})^2}$
SQL	Method quantitation limit where SD_{Blank} is the standard deviation for the calibration blank measured 10 times	$SQL = \left(\frac{10 \times SD_{Blank}}{a_1} \right) \times TDF$
a_1, a_0	Slope and intercept of the calibration function	$f(x) = a_1x + a_0$
TDF	Total dilution factor	$TDF = \frac{V_S + V_D}{V_S} = \frac{\text{Total volume of sample + diluent}}{\text{Volume of sample}}$
$C_{m,i}$	Measured concentration or mass fraction where X_i is the mean value of n replicate measurements of element (or isotope) i	$C_{m,i} = X_i \pm U_{m,i}$
$U_{m,i}$	Measurement uncertainty, expressed as a 95% confidence interval of the mean measured value X_i . t = Student's t -value for $n-1$ replicate measurements; SD_i is the standard deviation for element (or isotope) i .	$U_{m,i} = \frac{t \cdot SD_i}{\sqrt{n}}$

Table C: Commonly Used Concentration or Mass Fraction Units

Common Name	Description	Fraction	Liquid Concentration		Solids Mass Fractions	
ppq	Parts per quadrillion	10^{-15}	fg/mL	pg/L	fg/g	pg/kg
ppt	Parts per trillion	10^{-12}	pg/mL	ng/L	pg/g	ng/kg
ppb	Parts per billion	10^{-9}	ng/mL	ug/L	ng/g	ug/kg
ppm	Parts per million	10^{-6}	ug/mL	mg/L	ug/g	mg/kg
% wt	Weight percent	10^{-2}	n/a	n/a	10,000 ug/g	10,000 mg/kg

1. All sample preparation and analysis was done by according to ISO/IEC 17025 - *General requirements for the competence of testing and calibration laboratories* – by trained personnel familiar with this standard.
2. Class A glass volumetric flasks are calibrated according to ASTM-E288 - *Standard Specification for Laboratory Glass Volumetric Flasks*.
3. Polymethyl pentene PMP Class A volumetric flasks are calibrated according to ISO 4787 - *Laboratory glassware - Volumetric instruments - Methods for testing of capacity and for use*.
4. Pipettes were checked before use and met specifications using a balance calibrated using ISO/IEC 17025 and ANSI/NCLZ-36.1-2013 accredited calibration weights.
5. Analytical standards are all NIST-traceable.

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Report ID: S47857.01(03)
Generated on 06/28/2023
Replaces report S47857.01(02) generated on 05/26/2023

Report to
Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by
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Contacts for report questions:
John Lavery (johnlavery@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary
Lab Sample ID(s): S47857.01-S47857.06
Project: Erickson AM MI Wells 16A-16D
Collected Date(s): 04/25/2023
Submitted Date/Time: 04/26/2023 09:34
Sampled by: Marc Wahrer
P.O. #:

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Sample Summary (Page 5)

Maya Murshak
Technical Director



General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile, and 2-chloroethylvinyl ether need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the

FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

Sample tag for .05 corrected to match COC per client request



Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1 (1993)
SM2320B	Standard Method 2320 B 2011
SM2340C	Standard Method 2340 C 2011
SM2540C	Standard Method 2540 C 2015
SM2540D	Standard Method 2540 D 2015
SW3015A	SW 846 Method 3015A Revision 1 February 2007



Sample Summary (6 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S47857.01	MW-16A L304234-01	Groundwater	04/25/23 12:36
S47857.02	MW-16B L304234-02	Groundwater	04/25/23 14:32
S47857.03	MW-16C L304234-03	Groundwater	04/25/23 15:54
S47857.04	MW-16D L304234-04	Groundwater	04/25/23 11:39
S47857.05	MWT-16A L304234-05	Groundwater	04/25/23 12:36
S47857.06	Field Blank L304234-06	Groundwater	04/25/23 09:25

**Lab Sample ID: S47857.01**

Sample Tag: MW-16A L304234-01

Collected Date/Time: 04/25/2023 12:36

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.3	IR
2	1L Plastic	None	Yes	2.3	IR
1	250ml Plastic	HNO3	Yes	2.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	04/27/23 13:42	CTV	
Metal Digestion	Completed	SW3015A	04/27/23 09:45	CCM	

Inorganics**Method: E300.0, Run Date: 04/26/23 13:09, Analyst: JDP**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	391	50	0.65	mg/L	50	16887-00-6	

Method: E300.0, Run Date: 04/26/23 11:38, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	92	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 04/27/23 12:24, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	420	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 04/26/23 15:18, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	526	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 04/26/23 17:45, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,170	50	12	mg/L	2		

Method: SM2540D, Run Date: 04/26/23 17:45, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	2.0	3	1	mg/L	1		b

Metals**Method: E200.8, Run Date: 04/27/23 11:31, Analyst: CCM**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.003	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.108	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.10	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	

b-Value detected less than reporting limit, but greater than MDL



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S47857.01 (continued)

Sample Tag: MW-16A L304234-01

Method: E200.8, Run Date: 04/27/23 11:31, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	2.96	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 04/27/23 13:43, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	145	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	33.2	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	1.34	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	229	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 04/27/23 16:00, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 05/25/23 11:51, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

**Lab Sample ID: S47857.02**

Sample Tag: MW-16B L304234-02

Collected Date/Time: 04/25/2023 14:32

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.3	IR
2	1L Plastic	None	Yes	2.3	IR
1	250ml Plastic	HNO3	Yes	2.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	04/27/23 13:42	CTV	
Metal Digestion	Completed	SW3015A	04/27/23 09:45	CCM	

Inorganics**Method: E300.0, Run Date: 04/26/23 11:48, Analyst: JDP**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	5	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	16	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 04/27/23 12:26, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	400	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 04/26/23 15:20, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	335	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 04/26/23 17:45, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	350	50	12	mg/L	2		

Method: SM2540D, Run Date: 04/26/23 17:45, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	1.4	3	1	mg/L	1		b

Metals**Method: E200.8, Run Date: 04/27/23 11:35, Analyst: CCM**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.085	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.12	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	

b-Value detected less than reporting limit, but greater than MDL



Lab Sample ID: S47857.02 (continued)

Sample Tag: MW-16B L304234-02

Method: E200.8, Run Date: 04/27/23 11:35, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Iron	0.51	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.022	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.006	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 04/27/23 13:44, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	78.4	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	33.3	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	3.00	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	12.6	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 04/27/23 16:03, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 05/25/23 11:52, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Lab Sample ID: S47857.03

Sample Tag: MW-16C L304234-03

Collected Date/Time: 04/25/2023 15:54

Matrix: Groundwater

COC Reference:

Sample Containers

Table with 6 columns: #, Type, Preservative(s), Refrigerated?, Arrival Temp. (C), Thermometer #. Rows include 1L Plastic and 250ml Plastic containers.

Extraction / Prep.

Table with 6 columns: Parameter, Result, Method, Run Date, Analyst, Flags. Rows include Mercury Digestion and Metal Digestion.

Inorganics

Method: E300.0, Run Date: 04/26/23 11:58, Analyst: JDP

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Rows include Chloride, Fluoride (Undistilled), and Sulfate.

Method: SM2320B, Run Date: 04/27/23 12:28, Analyst: JKB

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Rows include Bicarbonate* and Carbonate*.

Method: SM2340C, Run Date: 04/26/23 15:22, Analyst: JKB

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Row includes Hardness.

Method: SM2540C, Run Date: 04/26/23 17:45, Analyst: MDG

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Row includes Total Dissolved Solids.

Method: SM2540D, Run Date: 04/26/23 17:45, Analyst: MDG

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Row includes Total Suspended Solids.

Metals

Method: E200.8, Run Date: 04/27/23 11:39, Analyst: CCM

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Rows include Antimony*, Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium, Cobalt, and Copper.

b-Value detected less than reporting limit, but greater than MDL



Lab Sample ID: S47857.03 (continued)

Sample Tag: MW-16C L304234-03

Method: E200.8, Run Date: 04/27/23 11:39, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Iron	0.64	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.027	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 04/27/23 13:46, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	66.5	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	27.3	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	3.97	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	28.5	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 04/27/23 16:06, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 05/25/23 11:52, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

**Lab Sample ID: S47857.04**

Sample Tag: MW-16D L304234-04

Collected Date/Time: 04/25/2023 11:39

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.3	IR
2	1L Plastic	None	Yes	2.3	IR
1	250ml Plastic	HNO3	Yes	2.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	04/27/23 13:42	CTV	
Metal Digestion	Completed	SW3015A	04/27/23 09:45	CCM	

Inorganics**Method: E300.0, Run Date: 04/26/23 12:08, Analyst: JDP**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	8	5	0.06	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	13	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 04/27/23 12:30, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	380	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 04/26/23 15:24, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	103	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 04/26/23 17:45, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	380	50	12	mg/L	2		

Method: SM2540D, Run Date: 04/26/23 17:45, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	2.0	3	1	mg/L	1		b

Metals**Method: E200.8, Run Date: 04/27/23 11:42, Analyst: CCM**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.004	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.038	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	4.59	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	

b-Value detected less than reporting limit, but greater than MDL



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S47857.04 (continued)

Sample Tag: MW-16D L304234-04

Method: E200.8, Run Date: 04/27/23 11:42, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Iron	0.08	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	0.022	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	0.012	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	0.183	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 04/27/23 13:47, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	28.9	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	7.28	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	9.65	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	115	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 04/27/23 16:10, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 05/25/23 11:52, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

**Lab Sample ID: S47857.05**

Sample Tag: MWT-16A L304234-05

Collected Date/Time: 04/25/2023 12:36

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.3	IR
2	1L Plastic	None	Yes	2.3	IR
1	250ml Plastic	HNO3	Yes	2.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	04/27/23 13:42	CTV	
Metal Digestion	Completed	SW3015A	04/27/23 09:45	CCM	

Inorganics**Method: E300.0, Run Date: 04/26/23 13:19, Analyst: JDP**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	397	50	0.65	mg/L	50	16887-00-6	

Method: E300.0, Run Date: 04/26/23 12:18, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.08	mg/L	5	16984-48-8	
Sulfate	92	5	0.52	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 04/27/23 12:32, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	420	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 04/26/23 15:26, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	519	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 04/26/23 17:45, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	1,170	50	12	mg/L	2		

Method: SM2540D, Run Date: 04/26/23 17:45, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	1.6	3	1	mg/L	1		b

Metals**Method: E200.8, Run Date: 04/27/23 11:47, Analyst: CCM**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00255	mg/L	5	7440-36-0	
Arsenic	0.003	0.002	0.000255	mg/L	5	7440-38-2	
Barium	0.111	0.005	0.000162	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.000215	mg/L	5	7440-41-7	
Boron	0.10	0.04	0.00175	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.000190	mg/L	5	7440-43-9	

b-Value detected less than reporting limit, but greater than MDL



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S47857.05 (continued)

Sample Tag: MWT-16A L304234-05

Method: E200.8, Run Date: 04/27/23 11:47, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chromium	Not detected	0.005	0.0000965	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.000108	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.000377	mg/L	5	7440-50-8	
Iron	2.99	0.02	0.00192	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.000190	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.00163	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.000217	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.000250	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.00209	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.0000675	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.0000855	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.000139	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.000730	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 04/27/23 13:49, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	148	0.50	0.0435	mg/L	5	7440-70-2	
Magnesium	34.4	0.50	0.0120	mg/L	5	7439-95-4	
Potassium	1.45	0.50	0.0230	mg/L	5	7440-09-7	
Sodium	243	0.50	0.00850	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 04/27/23 16:13, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 05/25/23 11:52, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

**Lab Sample ID: S47857.06**

Sample Tag: Field Blank L304234-06
 Collected Date/Time: 04/25/2023 09:25
 Matrix: Groundwater
 COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	2.3	IR
2	1L Plastic	None	Yes	2.3	IR
1	250ml Plastic	HNO3	Yes	2.3	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	04/27/23 13:42	CTV	
Metal Digestion	Completed	SW3015A	04/27/23 09:45	CCM	

Inorganics**Method: E300.0, Run Date: 04/26/23 12:28, Analyst: JDP**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	Not detected	2.5	0.03	mg/L	2.5	16887-00-6	
Fluoride (Undistilled)	Not detected	0.5	0.04	mg/L	2.5	16984-48-8	
Sulfate	Not detected	2.5	0.26	mg/L	2.5	14808-79-8	

Method: SM2320B, Run Date: 04/27/23 12:34, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	Not detected	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 04/26/23 15:28, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	Not detected	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 04/26/23 17:45, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	Not detected	50	12	mg/L	2		

Method: SM2540D, Run Date: 04/26/23 17:45, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals**Method: E200.8, Run Date: 04/27/23 11:19, Analyst: CCM**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.00102	mg/L	2	7440-36-0	
Arsenic	Not detected	0.002	0.000102	mg/L	2	7440-38-2	
Barium	Not detected	0.005	0.0000648	mg/L	2	7440-39-3	
Beryllium	Not detected	0.001	0.0000862	mg/L	2	7440-41-7	
Boron	Not detected	0.04	0.000702	mg/L	2	7440-42-8	
Cadmium	Not detected	0.0005	0.0000760	mg/L	2	7440-43-9	
Chromium	Not detected	0.005	0.0000386	mg/L	2	7440-47-3	
Cobalt	Not detected	0.005	0.0000434	mg/L	2	7440-48-4	
Copper	Not detected	0.005	0.000150	mg/L	2	7440-50-8	
Iron	Not detected	0.02	0.000768	mg/L	2	7439-89-6	



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S47857.06 (continued)

Sample Tag: Field Blank L304234-06

Method: E200.8, Run Date: 04/27/23 11:19, Analyst: CCM (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.0000760	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.000654	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.0000868	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.000100	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.000838	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.0000270	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.0000342	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.0000558	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.000292	mg/L	2	7440-66-6	

Method: E200.8, Run Date: 04/27/23 13:37, Analyst: CCM

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.0174	mg/L	2	7440-70-2	
Magnesium	Not detected	0.50	0.00480	mg/L	2	7439-95-4	
Potassium	Not detected	0.50	0.00920	mg/L	2	7440-09-7	
Sodium	Not detected	0.50	0.00340	mg/L	2	7440-23-5	

Method: E245.1, Run Date: 04/27/23 16:16, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 05/25/23 11:52, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID:S47857

Client:BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 16A-16D

Submitted:04/26/2023 09:34 Login User: MMC

Attention: Jennifer Caporale

Address: Board of Water & Light

P.O. Box 13007

Lansing, MI 48901

Phone: 517-702-6372

FAX:

Email: Environmental_Laboratory@LBWL.com

Selection	Description	Note
Sample Receiving		
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 2.3
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
Chain of Custody		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to: GEL
Preservation		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab?
Bottle Conditions		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Do water VOC or TOX bottles contain headspace

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S47857 Submitted: 04/26/2023 09:34

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 16A-16D

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Initial Preservation Check: 04/26/2023 10:14 MMC

Preservation Recheck (E200.8): N/A

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S47857.01	1L Plastic HNO3	<2			
S47857.01	1L Plastic HNO3	<2			
S47857.01	250ml Plastic HNO3	<2			
S47857.02	1L Plastic HNO3	<2			
S47857.02	1L Plastic HNO3	<2			
S47857.02	250ml Plastic HNO3	<2			
S47857.03	1L Plastic HNO3	<2			
S47857.03	1L Plastic HNO3	<2			
S47857.03	250ml Plastic HNO3	<2			
S47857.04	1L Plastic HNO3	<2			
S47857.04	1L Plastic HNO3	<2			
S47857.04	250ml Plastic HNO3	<2			
S47857.05	1L Plastic HNO3	<2			
S47857.05	1L Plastic HNO3	<2			
S47857.05	250ml Plastic HNO3	<2			
S47857.06	1L Plastic HNO3	<2			
S47857.06	1L Plastic HNO3	<2			
S47857.06	250ml Plastic HNO3	<2			



2680 East Lansing Dr., East Lansing, MI 48823
 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

REPORT TO		CHAIN OF CUSTODY RECORD		INVOICE TO	
CONTACT NAME Jennifer Caporale		CONTACT NAME Beth Zimpfer		<input checked="" type="checkbox"/> SAME	
COMPANY Lansing Board of Water and Light		COMPANY			
ADDRESS PO Box 13007 48901-3007		ADDRESS			
CITY Lansing	STATE Mi	ZIP CODE 48901	CITY	STATE	ZIP CODE
PHONE NO. 517-702-6372	FAX NO.	P.O. NO.	PHONE NO.	E-MAIL ADDRESS Beth.Zimpfer@lbwl.com	
E-MAIL ADDRESS Environmental_Laboratory@lbwl.com		QUOTE NO.			

PROJECT NO./NAME Erickson AM MI Wells 16A-16D		SAMPLER(S) - PLEASE PRINT/SIGN NAME Marc Wahrer		ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)												Certifications <input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water <input type="checkbox"/> DoD <input checked="" type="checkbox"/> NPDES Project Locations <input type="checkbox"/> Detroit <input type="checkbox"/> New York <input type="checkbox"/> Other _____ Special Instructions													
TURNAROUND TIME REQUIRED <input type="checkbox"/> 1 DAY <input checked="" type="checkbox"/> 2 DAYS <input type="checkbox"/> 3 DAYS <input type="checkbox"/> STANDARD <input checked="" type="checkbox"/> OTHER ASAP DELIVERABLES REQUIRED <input type="checkbox"/> STD <input type="checkbox"/> LEVEL II <input checked="" type="checkbox"/> LEVEL III <input type="checkbox"/> LEVEL IV <input checked="" type="checkbox"/> EDD <input type="checkbox"/> OTHER _____		MATRIX GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID CODE: SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIFE A=AIR W=WASTE # Containers & Preservatives NONE HCl HNO ₃ H ₂ SO ₄ NaOH MeOH OTHER																											
MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	NONE	HCl	HNO ₃	H ₂ SO ₄	NaOH	MeOH	OTHER	Total Metals	F- undissited, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	HCO ₃ , CO ₃ , Hardness											
	DATE	TIME																											
47857.01	04/25/23	1236	MW-16A L304234-01	GW	5	2	3						✓	✓	✓	✓	✓	✓											Metals to analyse: Na, Mg, K
.02	04/25/23	1432	MW-16B L304234-02	GW	5	2	3						✓	✓	✓	✓	✓	✓											B, Ca, Sb, As, Ba, Be, Cd, Cr,
.03	04/25/23	155A	MW-16C L304234-03	GW	5	2	3						✓	✓	✓	✓	✓	✓											Co, Li, Hg, Mo, Pb, Se, Tl,
.04	04/25/23	1139	MW16-D L304234-04	GW	5	2	3						✓	✓	✓	✓	✓	✓											Fe, Cu, Ni, Ag, V, Zn
.05	04/25/23	1236	MWT-16A L304234-05	GW	5	2	3						✓	✓	✓	✓	✓	✓											Please send a preliminary report
.06	04/25/23	0985	Field Blank L304234-06	DI	5	2	3						✓	✓	✓	✓	✓	✓											

RELINQUISHED BY: SIGNATURE/ORGANIZATION:	<input checked="" type="checkbox"/> Sampler	DATE 4/26/23	TIME 0934	RELINQUISHED BY: SIGNATURE/ORGANIZATION:	DATE	TIME	
RECEIVED BY: SIGNATURE/ORGANIZATION:		DATE 4/26/23	TIME 0934	RECEIVED BY: SIGNATURE/ORGANIZATION:	DATE	TIME	
RELINQUISHED BY: SIGNATURE/ORGANIZATION:		DATE	TIME	SEAL NO.	SEAL INTACT YES <input type="checkbox"/> NO <input type="checkbox"/>	INITIALS	NOTES: TEMP. ON ARRIVAL
RECEIVED BY: SIGNATURE/ORGANIZATION:		DATE	TIME	SEAL NO.	SEAL INTACT YES <input type="checkbox"/> NO <input type="checkbox"/>	INITIALS	

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.150
Be, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	2.5
Cl	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cr, total	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
F	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
Fe, total	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
Se, total	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
Tl, total	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
TDS	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TSS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
V, total	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005



May 25, 2023

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 620147
SDG: S47857

Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on April 28, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 1614.

Sincerely,

Jordan Melton for
Delaney Stone
Project Manager

Purchase Order: GELP20-0018
Enclosures



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Case Narrative

**Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S47857
Work Order: 620147**

May 25, 2023

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on April 28, 2023 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

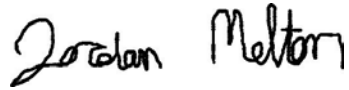
Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
620147001	S47857.01
620147002	S47857.02
620147003	S47857.03
620147004	S47857.04
620147005	S47857.05
620147006	S47857.06

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.

A handwritten signature in black ink that reads "Jordan Melton". The signature is written in a cursive style with a large, prominent "J" and "M".

Jordan Melton for
Delaney Stone
Project Manager

Chain of Custody and Supporting Documentation

620147



2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com

C.O.C. PAGE # 1 OF 1

REPORT TO

CONTACT NAME Project Management Team

COMPANY Merit Laboratories

ADDRESS 2680 East Lansing Drive

CITY East Lansing

PHONE NO. 517-332-0167

E-MAIL ADDRESS results@meritlabs.com

CHAIN OF CUSTODY RECORD

CONTACT NAME Julie Teague

COMPANY Merit Laboratories

ADDRESS 2680 East Lansing Drive

CITY East Lansing

PHONE NO. 517-332-0167

E-MAIL ADDRESS juliet@meritlabs.com

INVOICE TO

SAME

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

PROJECT NO./NAME S47857

TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER

DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
SL=SLUDGE DW=DRINKING WATER O=OIL WP=WPIPE A=AIR W=WASTE

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR	DATE	TIME	IDENTIFICATION-DESCRIPTION	SAMPLE TAG	# Containers & Preservatives									
						NONE	H ₂ O	HNO ₃	H ₂ SO ₄	NaOH	MeOH	OTHER			
		4/25/23	1236	S47857.01	GW	2									
		4/25/23	1432	S47857.02	GW	2									
		4/25/23	1554	S47857.03	GW	2									
		4/25/23	1139	S47857.04	GW	2									
		4/25/23	1236	S47857.05	GW	2									
		4/25/23	0925	S47857.06	DI	2									

Certifications
 OHIO VAP Drinking Water
 DoD NPDES
 Project Locations
 Detroit New York
 Other
 Special Instructions
 * E903.1 Mod.
 ** E904.0/SW 9320 Mod.

Please use calculation product & provide Radium 226/228 combined results on the report
 (No Ice needed)
 ** Subcontracted to
 GEL Laboratories, Inc.
 2040 Savage Road
 Charleston, SC 29407

RELINQUISHED BY: M. Culbert
 SIGNATURE/ORGANIZATION: WPS
 RECEIVED BY: GEL
 SIGNATURE/ORGANIZATION: GEL
 SEAL NO. INITIALS
 SEAL INTACT YES NO
 SEAL NO. INITIALS
 SEAL INTACT YES NO

RELINQUISHED BY: SIGNATURE/ORGANIZATION
 RECEIVED BY: SIGNATURE/ORGANIZATION
 SEAL NO. INITIALS
 SEAL INTACT YES NO
 SEAL NO. INITIALS
 SEAL INTACT YES NO

DATE 4/26/23 TIME 1700
 DATE 4/26/23 TIME 1700
 DATE DATE TIME
 DATE DATE TIME

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

SAMPLE RECEIPT & REVIEW FORM

Client: MERI SDG/AR/COC/Work Order: 620197

Received By: QG Date Received: 4/28/23

Carrier and Tracking Number

Circle Applicable:
 FedEx Express FedEx Ground UPS Field Services Courier Other

Suspected Hazard Information

*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.

A) Shipped as a DOT Hazardous? Yes No
 Hazard Class Shipped: _____ UN#: _____
 If UN2910, Is the Radioactive Shipment Survey Compliant? Yes ___ No ___

B) Did the client designate the samples are to be received as radioactive? Yes No
 COC notation or radioactive stickers on containers equal client designation.

C) Did the RSO classify the samples as radioactive? Yes No
 Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 CPM / mR/Hr
 Classified as: **Rad 1** **Rad 2** **Rad 3**

D) Did the client designate samples are hazardous? Yes No
 COC notation or hazard labels on containers equal client designation.

E) Did the RSO identify possible hazards? Yes No
 If D or E is yes, select Hazards below.
 PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other: _____

Sample Receipt Criteria		Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Client contacted and provided COC COC created upon receipt
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Preservation Method: Wet Ice Ice Packs Dry ice None Other: _____ *all temperatures are recorded in Celsius TEMP: _____
4	Daily check performed and passed on IR temperature gun?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Temperature Device Serial #: <u>4275</u> Secondary Temperature Device Serial # (If Applicable): _____
5	Sample containers intact and sealed?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Sample ID's and Containers Affected: _____ If Preservation added, Lot#: _____
7	Do any samples require Volatile Analysis?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If Yes, are Encores or Soil Kits present for solids? Yes ___ No ___ NA ___ (If yes, take to VOA Freezer) Do liquid VOA vials contain acid preservation? Yes ___ No ___ NA ___ (If unknown, select No) Are liquid VOA vials free of headspace? Yes ___ No ___ NA ___ Sample ID's and containers affected: _____
8	Samples received within holding time?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	ID's and tests affected: _____
9	Sample ID's on COC match ID's on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	ID's and containers affected: _____
10	Date & time on COC match date & time on bottles?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: No dates on containers No times on containers COC missing info Other (describe)
11	Number of containers received match number indicated on COC?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: No container count on COC Other (describe)
12	Are sample containers identifiable as GEL provided by use of GEL labels?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
13	COC form is properly signed in relinquished/received sections?	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Circle Applicable: Not relinquished Other (describe)

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials AM Date 5/1/23 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 25 May 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122023-4
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2022-160
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-22-20
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S47857
Work Order #: 620147

Product: Radium-226+Radium-228 Calculation

Analytical Method: Calculation

Analytical Procedure: GL-RAD-D-003 REV# 45

Analytical Batch: 2429541

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
620147001	S47857.01
620147002	S47857.02
620147003	S47857.03
620147004	S47857.04
620147005	S47857.05
620147006	S47857.06

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2423921

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
620147001	S47857.01
620147002	S47857.02
620147003	S47857.03
620147004	S47857.04
620147005	S47857.05
620147006	S47857.06
1205394668	Method Blank (MB)
1205394669	620147001(S47857.01) Sample Duplicate (DUP)
1205394670	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

Method Blank Criteria

The blank result (See Below) is greater than the MDC but less than the required detection limit.

Sample	Analyte	Value
1205394668 (MB)	Radium-228	Result: 2.74 pCi/L > MDA: 2.68 pCi/L <= RDL: 3.00 pCi/L

Technical Information

Negative > 3 sigma TPU

Sample result was more negative than the three sigma TPU. The background control chart was examined and the detector was determined to be fully functional.

Sample	Analyte	Value
620147005 (S47857.05)	Radium-228	Negative Result > 3 sigma value

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2423881

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
620147001	S47857.01
620147002	S47857.02
620147003	S47857.03
620147004	S47857.04
620147005	S47857.05
620147006	S47857.06
1205394583	Method Blank (MB)
1205394584	620147001(S47857.01) Sample Duplicate (DUP)
1205394585	620147001(S47857.01) Matrix Spike (MS)
1205394586	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and

procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments

The matrix spike, 1205394585 (S47857.01MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

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Qualifier Definition Report for

MERI001 Merit Laboratories, Inc.

Client SDG: S47857 GEL Work Order: 620147

The Qualifiers in this report are defined as follows:

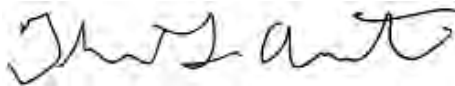
- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature:



Name: Theresa Austin

Date: 26 MAY 2023

Title: Analyst III - Data Validator

Sample Data Summary

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: May 26, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S47857.01 Project: MERI00120
Sample ID: 620147001 Client ID: MERI001
Matrix: Ground Water
Collect Date: 25-APR-23 12:36
Receive Date: 28-APR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.59	+/-1.32	2.14	3.00	pCi/L		JE1	05/25/23	1151	2423921		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		2.37	+/-1.44			pCi/L		NXL1	05/25/23	1342	2429541		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.781	+/-0.587	0.771	1.00	pCi/L		LXP1	05/23/23	0901	2423881		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			87.4	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: May 26, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Laverty
 Project: Routine Analysis

Client Sample ID: S47857.02	Project: MERI00120
Sample ID: 620147002	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 25-APR-23 14:32	
Receive Date: 28-APR-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.30	+/-1.10	1.78	3.00	pCi/L		JE1	05/25/23	1152	2423921		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.79	+/-1.16			pCi/L		NXL1	05/25/23	1342	2429541		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		0.490	+/-0.371	0.458	1.00	pCi/L		LXP1	05/23/23	0901	2423881		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			82	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: May 26, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S47857.03	Project: MERI00120
Sample ID: 620147003	Client ID: MERI001
Matrix: Ground Water	
Collect Date: 25-APR-23 15:54	
Receive Date: 28-APR-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	-0.309	+/-0.716	1.50	3.00	pCi/L		JE1	05/25/23	1152	2423921		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.478	+/-0.832			pCi/L		NXL1	05/25/23	1342	2429541		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.478	+/-0.423	0.594	1.00	pCi/L		LXP1	05/23/23	0901	2423881		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			78	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: May 26, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823
Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S47857.04 Project: MERI00120
Sample ID: 620147004 Client ID: MERI001
Matrix: Ground Water
Collect Date: 25-APR-23 11:39
Receive Date: 28-APR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.93	+/-1.25	1.93	3.00	pCi/L		JE1	05/25/23	1152	2423921		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		4.14	+/-1.50			pCi/L		NXL1	05/25/23	1342	2429541		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		2.21	+/-0.828	0.595	1.00	pCi/L		LXP1	05/23/23	0901	2423881		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			75.2	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

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Certificate of Analysis

Report Date: May 26, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S47857.05 Project: MERI00120
Sample ID: 620147005 Client ID: MERI001
Matrix: Ground Water
Collect Date: 25-APR-23 12:36
Receive Date: 28-APR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	-2.75	+/-0.892	2.19	3.00	pCi/L		JE1	05/25/23	1152	2423921		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		0.721	+/-1.06			pCi/L		NXL1	05/25/23	1342	2429541		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.721	+/-0.577	0.799	1.00	pCi/L		LXP1	05/23/23	0901	2423881		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer	Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer		GFPC Ra228, Liquid "As Received"			87.7	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

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Certificate of Analysis

Report Date: May 26, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S47857.06 Project: MERI00120
Sample ID: 620147006 Client ID: MERI001
Matrix: Water
Collect Date: 25-APR-23 09:25
Receive Date: 28-APR-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.43	+/-1.05	1.63	3.00	pCi/L		JE1	05/25/23	1152	2423921		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.75	+/-1.10			pCi/L		NXL1	05/25/23	1342	2429541		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.323	+/-0.322	0.420	1.00	pCi/L		LXP1	05/23/23	0937	2423881		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			73.7	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

Quality Control Data

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: May 26, 2023

Page 1 of 2

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: John Laverty

Workorder: 620147

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2423921										
QC1205394669	620147001	DUP									
Radium-228	U	1.59		2.61	pCi/L	49		(0% - 100%)	JE1	05/25/23	11:50
	Uncertainty	+/-1.32		+/-1.06							
QC1205394670	LCS										
Radium-228	80.5			67.9	pCi/L		84.3	(75%-125%)		05/25/23	11:50
	Uncertainty			+/-4.15							
QC1205394668	MB										
Radium-228				2.74	pCi/L					05/25/23	11:52
	Uncertainty			+/-1.72							
Rad Ra-226											
Batch	2423881										
QC1205394584	620147001	DUP									
Radium-226		0.781		0.685	pCi/L	13		(0% - 100%)	LXP1	05/23/23	09:36
	Uncertainty	+/-0.587		+/-0.517							
QC1205394586	LCS										
Radium-226	26.5			27.9	pCi/L		106	(75%-125%)		05/23/23	10:11
	Uncertainty			+/-2.93							
QC1205394583	MB										
Radium-226			U	-0.0693	pCi/L					05/23/23	09:37
	Uncertainty			+/-0.192							
QC1205394585	620147001	MS									
Radium-226	134	0.781		124	pCi/L		92.2	(75%-125%)		05/23/23	09:36
	Uncertainty	+/-0.587		+/-14.6							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- H Analytical holding time was exceeded
- < Result is less than value reported
- > Result is greater than value reported

GEL LABORATORIES LLC

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QC Summary

Workorder: 620147

Page 2 of 2

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UI											
BD											
h											
R											
^											
N/A											
ND											
M											
NJ											
FA											
UJ											
Q											
K											
UL											
L											
NI											
Y											
**											
M											
J											

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 2423921 Check-list

This check-list was completed on 25-MAY-23 by Rhonda Birch

This batch was reviewed by Rhonda Birch on 25-MAY-23 and Kenshalla Oston on 26-MAY-23.

Batch ID:
2423921

Product:
GFC28RAL

Description: Gas Flow Radium 228
GL-RAD-A-063

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?	Yes		
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?		No	
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-228 in Liquid

Batch ID: 2423921

Analyst: Jacqueline Winston (JE1)
 Prep: Lyndsey Pace (LXP1)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL-RAD-A-063 REV# 5
Instrument: LUCAS-C202389980

Due Dates for Lab: 23-MAY-2023

Package: 25-MAY-2023

SDG: 26-MAY-2023

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1205394670	228	2051-B	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	Ac-228 Ingrow (date)	Ac-228 Separation (date)
1	620147001	16-MAY-2023	3	301.36	301.36	05/17/23 15:25	05/25/23 09:46
2	620147002	16-MAY-2023	3	301	301	05/17/23 15:25	05/25/23 09:46
3	620147003	16-MAY-2023	3	305.79	305.79	05/17/23 15:25	05/25/23 09:46
4	620147004	16-MAY-2023	3	300.64	300.64	05/17/23 15:25	05/25/23 09:46
5	620147005	16-MAY-2023	3	303.97	303.97	05/17/23 15:25	05/25/23 09:46
6	620147006	16-MAY-2023	3	300.88	300.88	05/17/23 15:25	05/25/23 09:46
7	620562001	16-MAY-2023	3	306.78	306.78	05/17/23 15:25	05/25/23 09:46
8	620562002	16-MAY-2023	3	308.91	308.91	05/17/23 15:25	05/25/23 09:46
9	620562003	16-MAY-2023	3	300.38	300.38	05/17/23 15:25	05/25/23 09:46
10	620562004	16-MAY-2023	3	306.86	306.86	05/17/23 15:25	05/25/23 09:46
11	1205394668 MB	16-MAY-2023	3		308.91	05/17/23 15:25	05/25/23 09:46
12	1205394669 DUP (620147001)	16-MAY-2023	3	303.46	303.46	05/17/23 15:25	05/25/23 09:46
13	1205394670 LCS	16-MAY-2023	3		308.91	05/17/23 15:25	05/25/23 09:46

Reagent/Solvent Lot ID	Description	Amount	Comments:
WORK 1951-E	Ba-133	.1 mL	Pipet Id: RAD-GFC-1795419 Data Entry Date2: 16-MAY-2023 00:00
REGNT 3909714	RGF-1.5M Ammonium Sulfate	10 mL	
REGNT 3906586	RGF-1M Citric Acid	5 mL	
REGNT 3910170	2M HCl	20 mL	
REGNT 3907858	RGF-50% Potassium Carbonate	2 mL	
REGNT 3903777	RGF-7M Nitric Acid	25 mL	
REGNT DGA042223	2418797	2 g	
REGNT 3885305.13	RGF-Hydrofluoric Acid	4 mL	
REGNT 3528714	500 mg/mL Neodymium Carrier	.2 mL	
REGNT 3887517	RGF-Neodymium Substrate	5 mL	
REGNT 3908482.6	Nitric Acid	5 mL	
REGNT 3911267	Barium Carrier Ra228 REG	1 mL	
REGNT 3907855	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL	

Radium-228 Liquid

Filename : RA228.XLS
 File type : Excel
 Version # : 1.4.3

Tracer S/N : 1951-E
 Tracer Exp Date : 9/16/2023
 Tracer Volume Added: 0.10

Batch : 2423921
 Analyst : JAC02417
 Prep Date : 5/16/2023
 Ra-228 Method Uncertainty : 0.1268

Procedure Code : GFC28RAL
 Parmname : Radium-228
 Required MDA : 3 pCi/L
 Ra-228 Abundance : 1.00
 Halflife of Ra-228 : 5.75 years
 Halflife of Ac-228 : 6.15 hours

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	620147001.1	0.3014	1.8482E-05	4/25/2023 12:36	1173.6	1.69%	1026.1	1.80%	0.1	0.000200
2	620147002.1	0.3010	1.8476E-05	4/25/2023 14:32	1173.6	1.69%	961.9	1.86%	0.1	0.000200
3	620147003.1	0.3058	1.8556E-05	4/25/2023 15:54	1173.6	1.69%	914.8	1.91%	0.1	0.000200
4	620147004.1	0.3006	1.8470E-05	4/25/2023 11:39	1173.6	1.69%	882.2	1.94%	0.1	0.000200
5	620147005.1	0.3040	1.8526E-05	4/25/2023 12:36	1173.6	1.69%	1029.5	1.80%	0.1	0.000200
6	620147006.1	0.3009	1.8474E-05	4/25/2023 9:25	1173.6	1.69%	864.6	1.96%	0.1	0.000200
7	620562001.1	0.3068	1.8572E-05	4/28/2023 11:42	1173.6	1.69%	1086.8	1.75%	0.1	0.000200
8	620562002.1	0.3089	1.8606E-05	4/28/2023 13:54	1173.6	1.69%	900.2	1.92%	0.1	0.000200
9	620562003.1	0.3004	1.8465E-05	4/28/2023 11:42	1173.6	1.69%	985.0	1.84%	0.1	0.000200
10	620562004.1	0.3069	1.8573E-05	4/28/2023 10:30	1173.6	1.69%	917.8	1.91%	0.1	0.000200
11	1205394668.1	0.3089	1.8606E-05	5/16/2023 0:00	1173.6	1.69%	637.8	2.29%	0.1	0.000200
12	1205394669.1	0.3035	1.8517E-05	4/25/2023 12:36	1173.6	1.69%	1012.8	1.81%	0.1	0.000200
13	1205394670.1	0.3089	1.8606E-05	5/16/2023 0:00	1173.6	1.69%	941.3	1.88%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-063
 Instrument SOP: GL-RAD-I-016

Count raw Data													Calculated	Sample
Pos.	Detector ID	Counting Time (min.)	Gross Counts		Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Recovery %	Sample Recovery Error %
			Alpha	Beta										
1	2C	60	20	101	1.683	5/25/2023 11:51	5/17/2023 15:25	5/25/2023 9:46	0.990	0.790	1.000	1.057	87.4%	2.49%
2	5B	60	19	69	1.150	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.990	0.788	1.000	1.057	82.0%	2.53%
3	5C	60	12	25	0.417	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.990	0.788	1.000	1.057	78.0%	2.57%
4	5D	60	13	73	1.217	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.990	0.788	1.000	1.057	75.2%	2.59%
5	6A	60	9	46	0.767	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.990	0.788	1.000	1.057	87.7%	2.49%
6	7A	60	12	50	0.833	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.990	0.788	1.000	1.057	73.7%	2.60%
7	8B	60	3	76	1.267	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.991	0.789	1.000	1.057	92.6%	2.45%
8	8D	60	8	100	1.667	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.991	0.788	1.000	1.057	76.7%	2.57%
9	9D	60	10	41	0.683	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.991	0.788	1.000	1.057	83.9%	2.51%
10	10D	60	15	61	1.017	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.991	0.788	1.000	1.057	78.2%	2.57%
11	5A	70	12	104	1.486	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.997	0.788	1.000	1.067	54.3%	2.86%
12	11C	60	13	73	1.217	5/25/2023 11:50	5/17/2023 15:25	5/25/2023 9:46	0.990	0.791	1.000	1.057	86.3%	2.49%
13	11D	60	13	1097	18.283	5/25/2023 11:50	5/17/2023 15:25	5/25/2023 9:46	0.997	0.791	1.000	1.057	80.2%	2.54%

Calibration Data								
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2022	5/31/2023	0.6022	0.01274	1.270	5/19/2023 17:48	500
2	PIC	6/1/2022	5/31/2023	0.6336	0.00426	0.818	5/19/2023 17:48	500
3	PIC	6/1/2022	5/31/2023	0.6242	0.00657	0.492	5/22/2023 17:12	500
4	PIC	6/1/2022	5/31/2023	0.6236	0.00925	0.772	5/19/2023 17:48	500
5	PIC	6/1/2022	5/31/2023	0.6328	0.02228	1.526	5/19/2023 17:48	500
6	PIC	6/1/2022	5/31/2023	0.6257	0.00594	0.508	5/19/2023 17:48	500
7	PIC	6/1/2022	5/31/2023	0.6437	0.02148	0.908	5/19/2023 17:48	500
8	PIC	6/1/2022	5/31/2023	0.6347	0.00609	1.294	5/19/2023 17:48	500
9	PIC	6/1/2022	5/31/2023	0.6330	0.02610	0.472	5/19/2023 17:48	500
10	PIC	6/1/2022	5/31/2023	0.6148	0.00557	0.586	5/19/2023 17:48	500
11	PIC	6/1/2022	5/31/2023	0.6332	0.00851	1.010	5/19/2023 17:48	500
12	PIC	6/1/2022	5/31/2023	0.6276	0.01278	0.510	5/20/2023 16:07	500
13	PIC	6/1/2022	5/31/2023	0.6372	0.01068	0.540	5/21/2023 11:41	500

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

LCS S/N : 2051-B
LCS Exp Date : 3/27/2024
LCS Activity (dpm/ml): 551.91
LCS Volume Added: 0.10

Results																
Pos.	Decision	Critical	Required	Sample Act.		Net Count	Net Count	2 SIGMA		2 SIGMA		Sample	Sample	Nominal		
	Level	Level	MDA	MDA	Conc.	Error	Rate	Rate Error	Counting	Total Prop.	QC			Type	RPD	RER
	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	%	CPM	CPM	Uncertainty	Uncertainty						
1	1.3766	0.9719	3	2.1356	1.5861	42.41%	0.4133	0.1749	1.3155	1.3761			SAMPLE			
2	1.1242	0.7937	3	1.7826	1.2963	43.52%	0.3320	0.1442	1.1038	1.1517			SAMPLE			
3	0.9161	0.6468	3	1.4986	-0.3091	118.23%	-0.0753	0.0890	0.7160	0.7162			SAMPLE			
4	1.2116	0.8554	3	1.9273	1.9261	33.33%	0.4447	0.1477	1.2542	1.3464			SAMPLE			
5	1.4227	1.0044	3	2.1897	-2.7471	16.90%	-0.7593	0.1258	0.8921	0.8923			SAMPLE			
6	0.9987	0.7051	3	1.6302	1.4320	37.62%	0.3253	0.1221	1.0532	1.1142			SAMPLE			
7	1.0108	0.7136	3	1.5939	1.1952	42.34%	0.3587	0.1514	0.9889	1.0354			SAMPLE			
8	1.4675	1.0361	3	2.2748	1.5103	46.83%	0.3727	0.1743	1.3841	1.4363			SAMPLE			
9	0.8354	0.5898	3	1.3706	0.8072	52.67%	0.2113	0.1111	0.8314	0.8572			SAMPLE			
10	1.0074	0.7112	3	1.6292	1.7803	31.36%	0.4307	0.1346	1.0906	1.1805			SAMPLE			
11	1.7200	1.2143	3	2.6753	2.7381	32.19%	0.4757	0.1525	1.7200	1.8566			MB			
12	0.8410	0.5938	3	1.3725	2.6143	20.84%	0.7067	0.1459	1.0582	1.2500	620147001.1		DUP	49.0%		
13	0.8948	0.6318	3	1.4548	67.8730	4.16%	17.7433	0.5530	4.1461	17.7539			LCS		80.4789	84.3%

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
620147001	2C	60	20	101	5/25/2023 11:51	5/25/2023 12:51	PIC	2423921
620147002	5B	60	19	69	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620147003	5C	60	12	25	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620147004	5D	60	13	73	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620147005	6A	60	9	46	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620147006	7A	60	12	50	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620562001	8B	60	3	76	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620562002	8D	60	8	100	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620562003	9D	60	10	41	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620562004	10D	60	15	61	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
1205394668	5A	70	12	104	5/25/2023 11:52	5/25/2023 13:02	PIC	2423921
1205394669	11C	60	13	73	5/25/2023 11:50	5/25/2023 12:50	PIC	2423921
1205394670	11D	60	13	1097	5/25/2023 11:50	5/25/2023 12:50	PIC	2423921

ASSAY 25-May-23 10:07:52
 Wizard 2480 s/n 46190630
 Protocol id 8 Ba-133
 Time limit
 Count limit
 Isotope Ba-133
 Protocol date 5/25/2023
 Run id. 6694

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF		1	95	1	180	3521.28	1173.56	1.69	10:07:52
	620147001	2	95	2	180	3079	1026.11	1.8	87.44 10:11:06
	620147002	3	95	3	180	2886.28	961.92	1.86	81.97 10:14:20
	620147003	4	95	4	180	2745	914.84	1.91	77.95 10:17:33
	620147004	5	95	5	180	2647	882.17	1.94	75.17 10:20:48
	620147005	1	10	1	180	3089.28	1029.5	1.8	87.72 10:24:20
	620147006	2	10	2	180	2594.28	864.62	1.96	73.67 10:27:34
	620562001	3	10	3	180	3261	1086.75	1.75	92.60 10:30:48
	620562002	4	10	4	180	2701	900.18	1.92	76.71 10:34:01
	620562003	5	10	5	180	2955.57	985.03	1.84	83.94 10:37:16
	620562004	1	14	1	180	2754	917.84	1.91	78.21 10:40:51
	1205394668	2	14	2	180	1914	637.82	2.29	54.35 10:44:05
	1205394669	3	14	3	180	3039	1012.82	1.81	86.30 10:47:19
	1205394670	4	14	4	180	2824.57	941.33	1.88	80.21 10:50:33

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 25-May-2023

Detectors LB4100 A1 through I4 and PIC 1A through 14D and G5400W 1W through 1Z and LB4200 GA1 through OD4

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100E2	Above	Beta bkg	25-May 04:14	60	2.317	1.385	3.072	+0.31
LB4100F1	Above	Beta bkg	25-May 04:14	60	2.600	0.188	2.691	+2.78
LB4100F2	Above	Beta bkg	25-May 04:14	60	3.383	1.173	1.833	+17.09
LB4100F4	need 2nd	Alpha bkg	25-May 04:14	60	0.217	-2.75E-2	0.313	+1.30
LB4100F4	Above	Beta bkg	25-May 04:14	60	2.917	-7.15E-2	3.199	+2.48
LB4100G1	Above	Alpha XTalk	25-May 05:17	5	0.753	0.088	0.447	+8.12
LB4100G1	Above	Beta bkg	25-May 04:14	60	3779	0.380	1.675	+17,505.51
LB4100G1	Above	Beta eff	25-May 05:24	5	19912	12880	18320	+4.76
LB4100H2	Above	Alpha bkg	25-May 12:24	60	0.300	-1.10E-1	0.243	+3.96
LB4200OA1	need 2nd	Alpha eff	25-May 06:11	5	11290	11120	11630	-1.00
LB4200OA1	need 2nd	Beta bkg	25-May 08:33	60	1.267	-9.98E-2	1.494	+2.14
LB4200OA2	Above	Beta bkg	25-May 03:17	60	1.983	0.241	1.025	+10.33
LB4200OA3	Above	Alpha bkg	25-May 03:17	60	0.417	0.014	0.814	+0.02
LB4200OA3	Below	Alpha eff	25-May 06:11	5	9678	9726	9942	-4.33
LB4200OA3	Above	Beta XTalk	25-May 07:53	5	0.002	7.71E-4	0.002	+4.51
LB4200OA4	Above	Beta bkg	25-May 08:33	60	1.500	0.044	1.346	+3.71
LB4200OA4	need 2nd	Beta eff	25-May 07:53	5	16972	16800	17680	-1.83
LB4200OA4	Above	Beta XTalk	25-May 07:53	5	0.002	7.19E-4	0.002	+3.72
LB4200OB1	need 2nd	Beta XTalk	25-May 07:53	5	0.003	0.001	0.004	+2.62
LB4200OB2	Above	Alpha bkg	25-May 03:17	60	0.383	0.049	0.542	+1.07
LB4200OB2	Below	Alpha eff	25-May 06:11	5	9645	9676	10040	-3.50
LB4200OB2	Above	Beta bkg	25-May 03:17	60	1.433	0.176	1.400	+3.16
LB4200OB3	Above	Alpha bkg	25-May 03:17	60	0.550	-2.51E-1	0.957	+0.98
LB4200OB3	need 2nd	Alpha eff	25-May 06:11	5	21500	21460	22180	-2.67
LB4200OB3	Above	Beta bkg	25-May 03:17	60	1.817	0.031	1.553	+4.04
LB4200OC1	Above	Alpha bkg	25-May 03:17	60	0.650	-3.01E-1	1.067	+1.17
LB4200OC1	Below	Alpha eff	25-May 07:38	5	11063	11120	11520	-3.85
LB4200OC1	Above	Alpha XTalk	25-May 07:38	5	0.207	0.183	0.203	+4.23
LB4200OC1	Above	Beta bkg	25-May 03:17	60	1.500	0.288	1.060	+6.42
LB4200OC2	Above	Beta bkg	25-May 08:33	60	2.133	0.275	1.220	+8.80

LB4200OC3	Above	Alpha bkg	25-May 03:17	60	0.833	-2.99E-1	1.153	+1.68
LB4200OC3	Below	Alpha eff	25-May 07:38	5	9597	9651	9914	-4.24
LB4200OC3	Above	Beta bkg	25-May 03:17	60	1.400	0.316	1.139	+4.90
LB4200OC3	Above	Beta XTalk	25-May 06:11	5	0.003	0.001	0.003	+5.09
LB4200OD1	Above	Beta XTalk	25-May 06:11	5	0.002	5.69E-4	0.002	+3.94
LB4200OD2	Above	Alpha bkg	25-May 03:17	60	0.417	-2.30E-1	0.829	+0.66
LB4200OD2	Above	Alpha XTalk	25-May 07:38	5	0.215	0.185	0.211	+3.89
LB4200OD3	Above	Alpha bkg	25-May 03:17	60	0.367	-3.01E-1	1.146	-0.23
LB4200OD3	Below	Alpha eff	25-May 07:38	5	21694	21710	22170	-3.21
LB4200OD4	Below	Alpha eff	25-May 07:38	5	17957	18070	18550	-4.41
PIC4A	Above	Alpha bkg	25-May 13:41	60	0.383	-5.84E-2	0.311	+4.17
PIC4B	Above	Alpha bkg	25-May 04:45	60	1.033	-8.41E-1	2.241	+0.65
PIC4B	need 2nd	Beta eff	25-May 04:37	5	13841	10440	27300	-1.79
PIC6B	Above	Alpha eff	25-May 12:23	5	9686	8319	9448	+4.26
PIC6B	Below	Beta eff	25-May 14:03	5	16495	16860	22460	-3.39
PIC7B	Above	Beta bkg	25-May 07:30	60	2.483	0.146	1.265	+9.53
PIC7C	need 2nd	Beta eff	25-May 14:03	5	19514	19410	21710	-2.73
PIC10C	Above	Alpha bkg	25-May 05:05	60	0.717	-1.05E-1	0.324	+8.49
PIC10C	Above	Beta bkg	25-May 05:05	60	9.117	-3.39E-1	2.310	+18.42
PIC10C	Above	Beta XTalk	25-May 04:59	5	6.46E-4	9.29E-5	6.05E-4	+3.49
PIC12B	Above	Alpha bkg	25-May 08:46	60	0.333	-8.27E-2	0.413	+2.03
PIC12B	Above	Beta bkg	25-May 08:46	60	2.817	-5.75E-1	2.641	+3.33
PIC14B	Above	Alpha eff	25-May 05:00	5	9390	8571	9265	+4.08
PIC14B	Above	Beta bkg	25-May 05:19	60	6.800	-4.03E-1	2.348	+12.71

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100A1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

LB4100I4

Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by *Lois Buist*

Date 5/25/23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC

Batch ID: 2423921

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1205394669	DUP	JE1	PIC11C	MAY-25-23 11:50:42	DONE	25mm Filter	01-JUN-22 00:00
1205394670	LCS	JE1	PIC11D	MAY-25-23 11:50:42	DONE	25mm Filter	01-JUN-22 00:00
620147001	SAMPLE	JE1	PIC2C	MAY-25-23 11:51:28	DONE	25mm Filter	01-JUN-22 00:00
620562001	SAMPLE	JE1	PIC8B	MAY-25-23 11:52:25	DONE	25mm Filter	01-JUN-22 00:00
620562002	SAMPLE	JE1	PIC8D	MAY-25-23 11:52:31	DONE	25mm Filter	01-JUN-22 00:00
620562003	SAMPLE	JE1	PIC9D	MAY-25-23 11:52:38	DONE	25mm Filter	01-JUN-22 00:00
620147002	SAMPLE	JE1	PIC5B	MAY-25-23 11:52:48	DONE	25mm Filter	01-JUN-22 00:00
620147003	SAMPLE	JE1	PIC5C	MAY-25-23 11:52:48	DONE	25mm Filter	01-JUN-22 00:00
620147004	SAMPLE	JE1	PIC5D	MAY-25-23 11:52:48	DONE	25mm Filter	01-JUN-22 00:00
620147005	SAMPLE	JE1	PIC6A	MAY-25-23 11:52:48	DONE	25mm Filter	01-JUN-22 00:00
1205394668	MB	JE1	PIC5A	MAY-25-23 11:52:48	DONE	25mm Filter	01-JUN-22 00:00
620147006	SAMPLE	JE1	PIC7A	MAY-25-23 11:52:52	DONE	25mm Filter	01-JUN-22 00:00
620562004	SAMPLE	JE1	PIC10D	MAY-25-23 11:52:53	DONE	25mm Filter	01-JUN-22 00:00

Lucas Cell Raw Data

Batch 2423881 Check-list

This check-list was completed on 23-MAY-23 by Lyndsey Pace

This batch was reviewed by Elizabeth Krouse on 23-MAY-23 and Lyndsey Pace on 23-MAY-23.

Batch ID:
2423881

Product:
LUC26RAL

Description: Lucas Cell Radium 226
GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-226 in Liquid

Batch ID: 2423881
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL-RAD-A-008 REV# 15
Instrument: LUCAS-C202389980

Due Dates for Lab: 23-MAY-2023			Package: 25-MAY-2023		SDG: 26-MAY-2023	
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
MS	1205394585	Radium-226 SPIKE	1715-G	.1	mL	
LCS	1205394586	Radium-226 SPIKE	1715-G	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	End Degas (date)	CELL #	End Transfer (date)	Start Count Time (date)	Background Counts	Total Counts
1	620147001	16-MAY-2023	1	502.48	502.48	05/19/23 10:02	402	05/23/23 05:29	05/23/23 09:01	5	12
2	620147002	16-MAY-2023	1	501.8	501.8	05/19/23 10:02	503	05/23/23 05:29	05/23/23 09:01	3	10
3	620147003	16-MAY-2023	1	504.59	504.59	05/19/23 10:02	608	05/23/23 05:29	05/23/23 09:01	4	9
4	620147004	16-MAY-2023	1	502.3	502.3	05/19/23 10:02	703	05/23/23 05:29	05/23/23 09:01	3	31
5	620147005	16-MAY-2023	1	501.49	501.49	05/19/23 10:02	805	05/23/23 05:29	05/23/23 09:01	6	12
6	620147006	16-MAY-2023	1	501.43	501.43	05/19/23 10:02	107	05/23/23 05:56	05/23/23 09:37	1	5
7	620562001	16-MAY-2023	1	501.97	501.97	05/19/23 10:02	205	05/23/23 05:56	05/23/23 09:37	2	5
8	620562002	16-MAY-2023	1	502.6	502.6	05/19/23 10:02	303	05/23/23 05:56	05/23/23 09:37	5	9
9	620562003	16-MAY-2023	1	500.34	500.34	05/19/23 10:02	408	05/23/23 05:56	05/23/23 09:37	1	16
10	620562004	16-MAY-2023	1	500.56	500.56	05/19/23 10:02	506	05/23/23 05:56	05/23/23 09:37	4	5
11	1205394583 MB	16-MAY-2023	1		506.02	05/19/23 10:02	601	05/23/23 05:56	05/23/23 09:37	4	1
12	1205394584 DUP (620147001)	16-MAY-2023	1	506.02	506.02	05/19/23 10:02	708	05/23/23 05:56	05/23/23 09:36	4	11
13	1205394585 MS (620147001)	16-MAY-2023	1	100.04	100.04	05/19/23 10:02	801	05/23/23 05:56	05/23/23 09:36	8	290
14	1205394586 LCS	16-MAY-2023	1		506.02	05/19/23 10:02	105	05/23/23 06:21	05/23/23 10:11	4	354

Reagent/Solvent Lot ID	Description	Amount	Comments:
			Data Entry Date2: 16-MAY-2023 00:00

Radium-226 Liquid

Filename : RA226.XLS
 File type : Excel
 Version # : 1.3.2

Procedure Code : LUC26RAL
 Parmname : Radium-226
 Required MDA : 1 pCi/L
 Halflife of Ra-226 : 1600 years
 Ra-226 Abundance : 1.00
 Halflife of Rn-222 : 3.8235 days

Batch : 2423881
 Analyst : LIN01615
 Prep Date : 5/16/2023
 Ra-226 Method Uncertainty : 0.073648

Batch counted on : LUCAS CELL DETECTOR
 BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Count Time (min.)	Cell Efficiency (cpm/dpm)
1	620147001.1	0.5025	2.0266E-05	4/25/2023 12:36	402	15	12	0.800	5	0.167	30	1.4980
2	620147002.1	0.5018	2.0263E-05	4/25/2023 14:32	503	15	10	0.667	3	0.100	30	2.1390
3	620147003.1	0.5046	2.0275E-05	4/25/2023 15:54	608	15	9	0.600	4	0.133	30	1.7970
4	620147004.1	0.5023	2.0265E-05	4/25/2023 11:39	703	15	31	2.067	3	0.100	30	1.6440
5	620147005.1	0.5015	2.0262E-05	4/25/2023 12:36	805	15	12	0.800	6	0.200	30	1.5410
6	620147006.1	0.5014	2.0262E-05	4/25/2023 9:25	107	15	5	0.333	1	0.033	30	1.7160
7	620562001.1	0.5020	2.0264E-05	4/28/2023 11:42	205	15	5	0.333	2	0.067	30	1.8920
8	620562002.1	0.5026	2.0266E-05	4/28/2023 13:54	303	15	9	0.600	5	0.167	30	1.7210
9	620562003.1	0.5003	2.0257E-05	4/28/2023 11:42	408	15	16	1.067	1	0.033	30	1.5020
10	620562004.1	0.5006	2.0258E-05	4/28/2023 10:30	506	15	5	0.333	4	0.133	30	1.7710
11	1205394583.1	0.5060	2.0280E-05	5/16/2023 0:00	601	15	1	0.067	4	0.133	30	1.7610
12	1205394584.1	0.5060	2.0280E-05	4/25/2023 12:36	708	15	11	0.733	4	0.133	30	1.6020
13	1205394585.1	0.1000	1.1373E-05	4/25/2023 12:36	801	15	290	19.333	8	0.267	30	1.4200
14	1205394586.1	0.5060	2.0280E-05	5/16/2023 0:00	105	15	354	23.600	4	0.133	30	1.5340

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-008
 Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrow End Date/Time	Count Start Date/Time	Rn-222 Corrections			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
5.300%	2/1/2023	1/31/2024	5/19/2023 10:02	5/23/2023 5:29	5/23/2023 9:01	0.499	0.974	1.001	1.000
5.000%	6/1/2022	5/31/2023	5/19/2023 10:02	5/23/2023 5:29	5/23/2023 9:01	0.499	0.974	1.001	1.000
6.300%	7/1/2022	6/30/2023	5/19/2023 10:02	5/23/2023 5:29	5/23/2023 9:01	0.499	0.974	1.001	1.000
9.000%	11/1/2022	10/31/2023	5/19/2023 10:02	5/23/2023 5:29	5/23/2023 9:01	0.499	0.974	1.001	1.000
9.600%	4/8/2023	3/31/2024	5/19/2023 10:02	5/23/2023 5:29	5/23/2023 9:01	0.499	0.974	1.001	1.000
8.100%	5/1/2023	4/30/2024	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:37	0.501	0.973	1.001	1.000
3.900%	8/1/2022	7/31/2023	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:37	0.501	0.973	1.001	1.000
7.400%	10/25/2022	10/31/2023	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:37	0.501	0.973	1.001	1.000
7.000%	2/1/2023	1/31/2024	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:37	0.501	0.973	1.001	1.000
5.300%	6/1/2022	5/31/2023	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:37	0.501	0.973	1.001	1.000
9.400%	7/1/2022	6/30/2023	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:37	0.501	0.973	1.001	1.000
7.700%	11/1/2022	10/31/2023	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:36	0.501	0.973	1.001	1.000
3.200%	4/8/2023	3/31/2024	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:36	0.501	0.973	1.001	1.000
7.900%	5/1/2023	4/30/2024	5/19/2023 10:02	5/23/2023 6:21	5/23/2023 10:11	0.502	0.971	1.001	1.000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1715-G
Spike Exp Date : 9/8/2023
Spike Activity (dpm/ml): 297.41
Spike Volume Added: 0.10

LCS S/N : 1715-G
LCS Exp Date : 9/8/2023
LCS Activity (dpm/ml): 297.41
LCS Volume Added: 0.10


Results																
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.3710	0.2619	1	0.7705	0.7811	38.68%	0.6333	0.2427	0.5866	0.6029		SAMPLE				
2	0.2015	0.1423	1	0.4575	0.4901	38.90%	0.5667	0.2186	0.3706	0.3803		SAMPLE				
3	0.2755	0.1945	1	0.5937	0.4778	45.61%	0.4667	0.2108	0.4231	0.4327		SAMPLE				
4	0.2619	0.1849	1	0.5947	2.2110	21.11%	1.9667	0.3756	0.8277	0.9691		SAMPLE				
5	0.3958	0.2795	1	0.7992	0.7208	41.94%	0.6000	0.2449	0.5768	0.6016		SAMPLE				
6	0.1448	0.1022	1	0.4198	0.3229	51.56%	0.3000	0.1528	0.3223	0.3297		SAMPLE				
7	0.1855	0.1310	1	0.4571	0.2601	58.76%	0.2667	0.1563	0.2989	0.3019		SAMPLE				
8	0.3221	0.2274	1	0.6690	0.4640	49.81%	0.4333	0.2134	0.4480	0.4579		SAMPLE				
9	0.1658	0.1171	1	0.4806	1.2736	26.93%	1.0333	0.2687	0.6492	0.6970		SAMPLE				
10	0.2811	0.1985	1	0.6059	0.2090	81.82%	0.2000	0.1633	0.3344	0.3365		SAMPLE				
11	0.2797	0.1974	1	0.6028	-0.0693	141.73%	-0.0667	0.0943	0.1921	0.1922		MB				
12	0.3074	0.2170	1	0.6625	0.6855	39.25%	0.6000	0.2309	0.5171	0.5366	620147001.1	DUP	13.0%			
13	2.4806	1.7513	1	4.8066	124.3068	6.78%	19.0667	1.1392	14.5571	24.3859	620147001.1	MS			133.9165	92.2%
14	0.3204	0.2262	1	0.6906	27.9458	9.54%	23.4667	1.2561	2.9319	6.6025		LCS			26.4746	105.6%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 23-MAY-2023

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	07:52	1	1.19E+05	118574	-1.26		
LUCAS2	EFF	07:51	1	1.33E+05	133145	-0.43		
LUCAS3	EFF	07:50	1	95454	95454	-1.81		
LUCAS4	EFF	07:48	1	1.29E+05	128812	1.38		
LUCAS5	EFF	07:47	1	1.34E+05	133702	1.1		
LUCAS6	EFF	07:46	1	1.30E+05	129668	-0.3		
LUCAS7	EFF	07:45	1	1.34E+05	134068	1.4		
LUCAS8	EFF	07:44	1	1.22E+05	121738	-1.47		

Reviewed by:


Lyndsey Pace

Date: 23-MAY-23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR

Batch ID: 2423881

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
620147001	SAMPLE	LXP1	LUCAS4	MAY-23-23 09:01:00	DONE	Lucas Cell	01-FEB-23 00:00
620147002	SAMPLE	LXP1	LUCAS5	MAY-23-23 09:01:00	DONE	Lucas Cell	01-JUN-22 00:00
620147003	SAMPLE	LXP1	LUCAS6	MAY-23-23 09:01:00	DONE	Lucas Cell	01-JUL-22 00:00
620147004	SAMPLE	LXP1	LUCAS7	MAY-23-23 09:01:00	DONE	Lucas Cell	01-NOV-22 00:00
620147005	SAMPLE	LXP1	LUCAS8	MAY-23-23 09:01:00	DONE	Lucas Cell	08-APR-23 00:00
1205394584	DUP	LXP1	LUCAS7	MAY-23-23 09:36:00	DONE	Lucas Cell	01-NOV-22 00:00
1205394585	MS	LXP1	LUCAS8	MAY-23-23 09:36:00	DONE	Lucas Cell	08-APR-23 00:00
620147006	SAMPLE	LXP1	LUCAS1	MAY-23-23 09:37:00	DONE	Lucas Cell	01-MAY-23 00:00
620562001	SAMPLE	LXP1	LUCAS2	MAY-23-23 09:37:00	DONE	Lucas Cell	01-AUG-22 00:00
620562002	SAMPLE	LXP1	LUCAS3	MAY-23-23 09:37:00	DONE	Lucas Cell	25-OCT-22 00:00
620562003	SAMPLE	LXP1	LUCAS4	MAY-23-23 09:37:00	DONE	Lucas Cell	01-FEB-23 00:00
620562004	SAMPLE	LXP1	LUCAS5	MAY-23-23 09:37:00	DONE	Lucas Cell	01-JUN-22 00:00
1205394583	MB	LXP1	LUCAS6	MAY-23-23 09:37:00	DONE	Lucas Cell	01-JUL-22 00:00
1205394586	LCS	LXP1	LUCAS1	MAY-23-23 10:11:00	DONE	Lucas Cell	01-MAY-23 00:00



Report ID: S48012.01(03)
Generated on 06/28/2023
Replaces report S48012.01(02) generated on 05/31/2023

Report to
Attention: Jennifer Caporale
Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Report produced by
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Contacts for report questions:
John Lavery (johnlavery@meritlabs.com)
Barbara Ball (bball@meritlabs.com)

Report Summary
Lab Sample ID(s): S48012.01-S48012.04
Project: Erickson AM MI Wells 14-15
Collected Date(s): 04/28/2023
Submitted Date/Time: 04/28/2023 15:20
Sampled by: Marc Wahrer
P.O. #:

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Maya Murshak
Technical Director



General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

When MDL results are provided, then 'Not detected' indicates that parameter was not found at a level equal to or greater than the MDL.

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples for acrolein and acrylonitrile, and 2-chloroethylvinyl ether need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request.

Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

PFAS requirement: Section 9.3.8 of U.S. EPA Method 537.1 states "If the method analyte(s) found in the Field Sample is present in the

FRB at a concentration greater than 1/3 the MRL, then all samples collected with that FRB are invalid and must be recollected and reanalyzed."

Samples submitted without an accompanying FRB may not be acceptable for compliance purposes.

Wisconsin PFAs analysis: MDL = LOD; RL = LOQ. LOD and LOQ are adjusted for dilution.

Report Narrative

Sample tag for .03 revised per client request

Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001
Pennsylvania DEP	#68-05884
Wisconsin DNR	FID# 399147320

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
B	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
H	Sample submitted and run outside of holding time
I	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
M	Result reported to MDL not RDL
O	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
T	No correction for total solids
X	Elevated reporting limit due to matrix interference
Y	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
e	Reported value estimated due to interference
j	Analyte also found in associated method blank
p	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
x	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Method Summary

Method	Version
E200.8	EPA Method 200.8 Revision 5.4
E245.1	EPA Method 245.1 Revision 3.0
E300.0	EPA Method 300.0 Revision 2.1 (1993)
SM2320B	Standard Method 2320 B 2011
SM2340C	Standard Method 2340 C 2011
SM2540C	Standard Method 2540 C 2015
SM2540D	Standard Method 2540 D 2015
SW3015A	SW 846 Method 3015A Revision 1 February 2007



Sample Summary (4 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S48012.01	MW-14 L304235-01	Groundwater	04/28/23 11:42
S48012.02	MW-15 L304235-02	Groundwater	04/28/23 13:54
S48012.03	MWT-14 L304235-03	Groundwater	04/28/23 11:42
S48012.04	Field Blank L304235-04	Groundwater	04/28/23 10:30



Lab Sample ID: S48012.01

Sample Tag: MW-14 L304235-01

Collected Date/Time: 04/28/2023 11:42

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.7	IR
2	1L Plastic	None	Yes	3.7	IR
1	250ml Plastic	HNO3	Yes	3.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	05/02/23 13:57	CTV	
Metal Digestion	Completed	SW3015A	05/01/23 10:10	JRH	

Inorganics

Method: E300.0, Run Date: 05/01/23 10:30, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	115	10	0.16	mg/L	10	16887-00-6	

Method: E300.0, Run Date: 05/01/23 08:57, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.13	mg/L	5	16984-48-8	
Sulfate	17	5	0.30	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 05/01/23 10:46, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	660	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 05/01/23 11:22, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	566	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 04/28/23 18:45, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	796	50	12	mg/L	2		

Method: SM2540D, Run Date: 05/01/23 17:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	23.4	3	1	mg/L	1.4		

Metals

Method: E200.8, Run Date: 05/01/23 11:38, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.0026	mg/L	5	7440-36-0	
Arsenic	0.006	0.002	0.00026	mg/L	5	7440-38-2	
Barium	0.120	0.005	0.00016	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.00022	mg/L	5	7440-41-7	
Boron	2.03	0.04	0.0018	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.00019	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.000097	mg/L	5	7440-47-3	



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S48012.01 (continued)

Sample Tag: MW-14 L304235-01

Method: E200.8, Run Date: 05/01/23 11:38, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.00011	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.00038	mg/L	5	7440-50-8	
Iron	11.2	0.02	0.0019	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.00019	mg/L	5	7439-92-1	
Lithium*	0.111	0.005	0.0016	mg/L	5	7439-93-2	
Molybdenum	0.013	0.005	0.00022	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.00025	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.0021	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.000068	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.000086	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.00014	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.00073	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 05/01/23 15:17, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	143	0.50	0.044	mg/L	5	7440-70-2	
Magnesium	39.7	0.50	0.012	mg/L	5	7439-95-4	
Potassium	4.55	0.50	0.023	mg/L	5	7440-09-7	
Sodium	72.5	0.50	0.0085	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 05/02/23 15:15, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 05/25/23 13:42, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

**Lab Sample ID: S48012.02**

Sample Tag: MW-15 L304235-02

Collected Date/Time: 04/28/2023 13:54

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.7	IR
2	1L Plastic	None	Yes	3.7	IR
1	250ml Plastic	HNO3	Yes	3.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	05/02/23 13:57	CTV	
Metal Digestion	Completed	SW3015A	05/01/23 10:10	JRH	

Inorganics**Method: E300.0, Run Date: 05/01/23 09:10, Analyst: JDP**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	60	5	0.08	mg/L	5	16887-00-6	
Fluoride (Undistilled)	Not detected	1.0	0.13	mg/L	5	16984-48-8	
Sulfate	109	5	0.30	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 05/01/23 10:48, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	330	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 05/01/23 11:24, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	406	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 04/28/23 18:45, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	528	50	12	mg/L	2		

Method: SM2540D, Run Date: 05/01/23 17:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	Not detected	3	1	mg/L	1		

Metals**Method: E200.8, Run Date: 05/01/23 11:40, Analyst: JRH**

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.0026	mg/L	5	7440-36-0	
Arsenic	Not detected	0.002	0.00026	mg/L	5	7440-38-2	
Barium	0.042	0.005	0.00016	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.00022	mg/L	5	7440-41-7	
Boron	0.34	0.04	0.0018	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.00019	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.000097	mg/L	5	7440-47-3	
Cobalt	Not detected	0.005	0.00011	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.00038	mg/L	5	7440-50-8	
Iron	0.03	0.02	0.0019	mg/L	5	7439-89-6	



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S48012.02 (continued)

Sample Tag: MW-15 L304235-02

Method: E200.8, Run Date: 05/01/23 11:40, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.00019	mg/L	5	7439-92-1	
Lithium*	Not detected	0.005	0.0016	mg/L	5	7439-93-2	
Molybdenum	Not detected	0.005	0.00022	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.00025	mg/L	5	7440-02-0	
Selenium	0.021	0.005	0.0021	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.000068	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.000086	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.00014	mg/L	5	7440-62-2	
Zinc	0.021	0.005	0.00073	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 05/01/23 15:19, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	104	0.50	0.044	mg/L	5	7440-70-2	
Magnesium	25.7	0.50	0.012	mg/L	5	7439-95-4	
Potassium	Not detected	0.50	0.023	mg/L	5	7440-09-7	
Sodium	28.3	0.50	0.0085	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 05/02/23 15:25, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 05/25/23 13:42, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Lab Sample ID: S48012.03

Sample Tag: MWT-14 L304235-03

Collected Date/Time: 04/28/2023 11:42

Matrix: Groundwater

COC Reference:

Sample Containers

#	Type	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
2	1L Plastic	HNO3	Yes	3.7	IR
2	1L Plastic	None	Yes	3.7	IR
1	250ml Plastic	HNO3	Yes	3.7	IR

Extraction / Prep.

Parameter	Result	Method	Run Date	Analyst	Flags
Mercury Digestion	Completed	E245.1	05/02/23 13:57	CTV	
Metal Digestion	Completed	SW3015A	05/01/23 10:10	JRH	

Inorganics

Method: E300.0, Run Date: 05/01/23 10:43, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Chloride	115	10	0.16	mg/L	10	16887-00-6	

Method: E300.0, Run Date: 05/01/23 09:23, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Fluoride (Undistilled)	Not detected	1.0	0.13	mg/L	5	16984-48-8	
Sulfate	16	5	0.30	mg/L	5	14808-79-8	

Method: SM2320B, Run Date: 05/01/23 10:50, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Bicarbonate*	670	10	0.504	mg/L	1	71-52-3	
Carbonate*	Not detected	10		mg/L	1	3812-32-6	

Method: SM2340C, Run Date: 05/01/23 11:26, Analyst: JKB

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Hardness	562	10	2.38	mg/L	10		

Method: SM2540C, Run Date: 04/28/23 18:45, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Dissolved Solids	782	50	12	mg/L	2		

Method: SM2540D, Run Date: 05/01/23 17:30, Analyst: MDG

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Total Suspended Solids	24.3	3	1	mg/L	1.3		

Metals

Method: E200.8, Run Date: 05/01/23 11:42, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Antimony*	Not detected	0.005	0.0026	mg/L	5	7440-36-0	
Arsenic	0.005	0.002	0.00026	mg/L	5	7440-38-2	
Barium	0.119	0.005	0.00016	mg/L	5	7440-39-3	
Beryllium	Not detected	0.001	0.00022	mg/L	5	7440-41-7	
Boron	2.06	0.04	0.0018	mg/L	5	7440-42-8	
Cadmium	Not detected	0.0005	0.00019	mg/L	5	7440-43-9	
Chromium	Not detected	0.005	0.000097	mg/L	5	7440-47-3	



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S48012.03 (continued)

Sample Tag: MWT-14 L304235-03

Method: E200.8, Run Date: 05/01/23 11:42, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Cobalt	Not detected	0.005	0.00011	mg/L	5	7440-48-4	
Copper	Not detected	0.005	0.00038	mg/L	5	7440-50-8	
Iron	11.2	0.02	0.0019	mg/L	5	7439-89-6	
Lead	Not detected	0.003	0.00019	mg/L	5	7439-92-1	
Lithium*	0.111	0.005	0.0016	mg/L	5	7439-93-2	
Molybdenum	0.012	0.005	0.00022	mg/L	5	7439-98-7	
Nickel	Not detected	0.005	0.00025	mg/L	5	7440-02-0	
Selenium	Not detected	0.005	0.0021	mg/L	5	7782-49-2	
Silver	Not detected	0.0005	0.000068	mg/L	5	7440-22-4	
Thallium	Not detected	0.002	0.000086	mg/L	5	7440-28-0	
Vanadium	Not detected	0.005	0.00014	mg/L	5	7440-62-2	
Zinc	Not detected	0.005	0.00073	mg/L	5	7440-66-6	

Method: E200.8, Run Date: 05/01/23 15:20, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	140	0.50	0.044	mg/L	5	7440-70-2	
Magnesium	38.5	0.50	0.012	mg/L	5	7439-95-4	
Potassium	4.43	0.50	0.023	mg/L	5	7440-09-7	
Sodium	70.9	0.50	0.0085	mg/L	5	7440-23-5	

Method: E245.1, Run Date: 05/02/23 15:29, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 05/25/23 13:42, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.



Lab Sample ID: S48012.04

Sample Tag: Field Blank L304235-04
Collected Date/Time: 04/28/2023 10:30
Matrix: Groundwater
COC Reference:

Sample Containers

Table with 6 columns: #, Type, Preservative(s), Refrigerated?, Arrival Temp. (C), Thermometer #. Rows include 1L Plastic and 250ml Plastic containers.

Extraction / Prep.

Table with 6 columns: Parameter, Result, Method, Run Date, Analyst, Flags. Rows include Mercury Digestion and Metal Digestion.

Inorganics

Method: E300.0, Run Date: 05/01/23 09:36, Analyst: JDP

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Rows include Chloride, Fluoride (Undistilled), and Sulfate.

Method: SM2320B, Run Date: 05/01/23 10:52, Analyst: JKB

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Rows include Bicarbonate* and Carbonate*.

Method: SM2340C, Run Date: 05/01/23 11:28, Analyst: JKB

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Row includes Hardness.

Method: SM2540C, Run Date: 04/28/23 18:45, Analyst: MDG

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Row includes Total Dissolved Solids.

Method: SM2540D, Run Date: 05/01/23 17:30, Analyst: MDG

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Row includes Total Suspended Solids.

Metals

Method: E200.8, Run Date: 05/01/23 11:32, Analyst: JRH

Table with 8 columns: Parameter, Result, RL, MDL, Units, Dilution, CAS#, Flags. Rows include Antimony*, Arsenic, Barium, Beryllium, Boron, Cadmium, Chromium, Cobalt, Copper, and Iron.



Analytical Laboratory Report

Supplemental Report

Lab Sample ID: S48012.04 (continued)

Sample Tag: Field Blank L304235-04

Method: E200.8, Run Date: 05/01/23 11:32, Analyst: JRH (continued)

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Lead	Not detected	0.003	0.000076	mg/L	2	7439-92-1	
Lithium*	Not detected	0.005	0.00065	mg/L	2	7439-93-2	
Molybdenum	Not detected	0.005	0.000087	mg/L	2	7439-98-7	
Nickel	Not detected	0.005	0.00010	mg/L	2	7440-02-0	
Selenium	Not detected	0.005	0.00084	mg/L	2	7782-49-2	
Silver	Not detected	0.0005	0.000027	mg/L	2	7440-22-4	
Thallium	Not detected	0.002	0.000034	mg/L	2	7440-28-0	
Vanadium	Not detected	0.005	0.000056	mg/L	2	7440-62-2	
Zinc	Not detected	0.005	0.00029	mg/L	2	7440-66-6	

Method: E200.8, Run Date: 05/01/23 15:14, Analyst: JRH

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Calcium*	Not detected	0.50	0.017	mg/L	2	7440-70-2	
Magnesium	Not detected	0.50	0.0048	mg/L	2	7439-95-4	
Potassium	Not detected	0.50	0.0092	mg/L	2	7440-09-7	
Sodium	Not detected	0.50	0.0034	mg/L	2	7440-23-5	

Method: E245.1, Run Date: 05/02/23 15:32, Analyst: CTV

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Mercury	Not detected	0.0002	0.000016	mg/L	1	7439-97-6	

Other / Misc.

Method: , Run Date: 05/25/23 13:42, Analyst: GEL

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Radiological Analyses*	Completed				1		O

O-Analysis performed by outside laboratory. See attached report.

Merit Laboratories Login Checklist

Lab Set ID:S48012

Client:BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 14-15

Submitted:04/28/2023 15:20 Login User: PFD

Attention: Jennifer Caporale

Address: Board of Water & Light

P.O. Box 13007

Lansing, MI 48901

Phone: 517-702-6372

FAX:

Email: Environmental_Laboratory@LBWL.com

Selection	Description	Note
Sample Receiving		
01.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples are received at 4C +/- 2C Thermometer # IR 3.7
02.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Received on ice/ cooling process begun
03.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples shipped
04.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples left in 24 hr. drop box
05.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Are there custody seals/tape or is the drop box locked
Chain of Custody		
06.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC adequately filled out
07.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	COC signed and relinquished to the lab
08.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sample tag on bottles match COC
09.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Subcontracting needed? Subcontracted to: GEL
Preservation		
10.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Do sample have correct chemical preservation
11.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Completed pH checks on preserved samples? (no VOAs)
12.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Did any samples need to be preserved in the lab?
Bottle Conditions		
13.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	All bottles intact
14.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Appropriate analytical bottles are used
15.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Merit bottles used
16.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Sufficient sample volume received
17.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	Samples require laboratory filtration
18.	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	Samples submitted within holding time
19.	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	Do water VOC or TOX bottles contain headspace

Corrective action for all exceptions is to call the client and to notify the project manager.

Client Review By: _____ Date: _____

Merit Laboratories Bottle Preservation Check

Lab Set ID: S48012 Submitted: 04/28/2023 15:20

Client: BWL01 (Board of Water & Light)

Project: Erickson AM MI Wells 14-15

Attention: Jennifer Caporale
Address: Board of Water & Light
P.O. Box 13007
Lansing, MI 48901

Initial Preservation Check: 04/28/2023 16:53 PFD

Preservation Recheck (E200.8): N/A

Phone: 517-702-6372 FAX:
Email: Environmental_Laboratory@LBWL.com

Sample ID	Bottle / Preservation	pH (Orig)	Add ml	pH (New)	Notes
S48012.01	1L Plastic HNO3	<2			
S48012.01	1L Plastic HNO3	<2			
S48012.01	250ml Plastic HNO3	<2			
S48012.02	1L Plastic HNO3	<2			
S48012.02	1L Plastic HNO3	<2			
S48012.02	250ml Plastic HNO3	<2			
S48012.03	1L Plastic HNO3	<2			
S48012.03	1L Plastic HNO3	<2			
S48012.03	250ml Plastic HNO3	<2			
S48012.04	1L Plastic HNO3	<2			
S48012.04	1L Plastic HNO3	<2			
S48012.04	250ml Plastic HNO3	<2			



2680 East Lansing Dr., East Lansing, MI 48823
 Phone (517) 332-0167 Fax (517) 332-4034
 www.meritlabs.com

C.O.C. PAGE # 1 OF 1

REPORT TO **CHAIN OF CUSTODY RECORD** **INVOICE TO**

CONTACT NAME **Jennifer Caporale**
 COMPANY **Lansing Board of Water and Light**
 ADDRESS **PO Box 13007 48901-3007**
 CITY **Lansing** STATE **Mi** ZIP CODE **48901**
 PHONE NO. **517-702-6372** FAX NO. _____ P.O. NO. _____
 E-MAIL ADDRESS **Environmental_Laboratory@lbwl.com** QUOTE NO. _____

CONTACT NAME **Beth Zimpfer** SAME
 COMPANY _____
 ADDRESS _____
 CITY _____ STATE _____ ZIP CODE _____
 PHONE NO. _____ E-MAIL ADDRESS **Beth.Zimpfer@lbwl.com**

PROJECT NO./NAME **Erickson AM MI Wells 14-15** SAMPLER(S) - PLEASE PRINT/SIGN NAME **Marc Wahrer**
 TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER **ASAP**
 DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER _____

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
 SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIFE A=AIR W=WASTE

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR		SAMPLE TAG IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives							Total Metals	F- undissolved, Cl-, SO4, TDS	Radium 226	Radium 228	TSS	HCO3, CO3, Hardness	Certifications	Project Locations	Special Instructions
	DATE	TIME				NONE	HCl	HNO3	H2SO4	NaOH	MeOH	OTHER									
480201	04/28/23	1142	MW-14 L304235-01	GW	5	2	3											<input type="checkbox"/> OHIO VAP <input type="checkbox"/> Drinking Water	<input type="checkbox"/> Detroit <input type="checkbox"/> New York	Metals to analyse: Na, Mg, K	
.02	04/28/23	1354	MW-15 L304235-02	GW	5	2	3											<input type="checkbox"/> DoD <input checked="" type="checkbox"/> NPDES		B, Ca, Sb, As, Ba, Be, Cd, Cr,	
.03	04/28/23	1142	MWT- L304235-03	GW	5	2	3													Co, Li, Hg, Mo, Pb, Se, Tl,	
.04	04/28/23	1030	Field Blank L304235-04	DI	5	2	3													Fe, Cu, Ni, Ag, V, Zn	
																				Please send a preliminary report	

RELINQUISHED BY: Sampler DATE **4/28/23** TIME **1520**
 RECEIVED BY: DATE **4/28/23** TIME **1520**

RELINQUISHED BY: _____ DATE _____ TIME _____
 RECEIVED BY: _____ DATE _____ TIME _____
 SEAL NO. _____ SEAL INTACT YES NO INITIALS _____
 SEAL NO. _____ SEAL INTACT YES NO INITIALS _____
 NOTES: TEMP. ON ARRIVAL **3.7**

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

Reporting Limits to go to Merit with COC

Sb, total	Antimony	250 mL plastic	mg/L	Nitric Acid	200.7	6 mos	0.005
As, total	Arsenic	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
Ba, total	Beryllium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.150
Be, total	Boron	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.001
B, total	Cadmium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.04
Cd, total	Calcium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
Ca	Chloride	250 mL plastic	mg/L	Chill	300.0	28 d	10
Cr, total	Chromium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Co, total	Cobalt	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Cu, total	Copper	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
F	Fluoride	250 mL plastic	mg/L	None	9056	28 d	1.0
Fe, total	Iron	250 mL plastic	mg/L	Nitric Acid	300.0	6 mos	0.02
Pb, total	Lead	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.003
Li, total	Lithium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Hg, total	Mercury	250 mL plastic	mg/L	HNO3	245.1	28 d	0.0002
Mo, total	Molybdenum	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ni, total	Nickel	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
RA226/228	Radium 226 and 228 combined	(2) 1 L plastic	pCi/L	HNO3	SM 7500	6 mos	2.0 combined
Se, total	Selenium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Ag, total	Silver	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.0005
SO4	Sulfate	250 mL plastic	mg/L	Chill	300.0	28 d	10
Tl, total	Thallium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.002
TDS	Total Dissolved Solids	1 L plastic	mg/L	None	SM 2540C	NA	20
TSS	Total Suspended Solids	1 L plastic	mg/L	None	SM 2540D	NA	3
V, total	Vanadium	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005
Zn, total	Zinc	250 mL plastic	mg/L	Nitric Acid	200.8	6 mos	0.005



May 26, 2023

John Laverty
Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan 48823

Re: Routine Analysis
Work Order: 620562
SDG: S48012

Dear John Laverty:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on May 03, 2023. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Test results for NELAP or ISO 17025 accredited tests are verified to meet the requirements of those standards, with any exceptions noted. The results reported relate only to the items tested and to the sample as received by the laboratory. These results may not be reproduced except as full reports without approval by the laboratory. Copies of GEL's accreditations and certifications can be found on our website at www.gel.com.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 1614.

Sincerely,

Jordan Melton for
Delaney Stone
Project Manager

Purchase Order: GELP20-0018
Enclosures



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Case Narrative

**Receipt Narrative
for
Merit Laboratories, Inc.
SDG: S48012
Work Order: 620562**

May 26, 2023

Laboratory Identification:

GEL Laboratories LLC
2040 Savage Road
Charleston, South Carolina 29407
(843) 556-8171

Summary:

Sample receipt: The samples arrived at GEL Laboratories LLC, Charleston, South Carolina on May 03, 2023 for analysis. The samples were delivered with proper chain of custody documentation and signatures. All sample containers arrived without any visible signs of tampering or breakage. There are no additional comments concerning sample receipt.

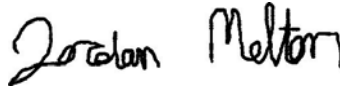
Sample Identification: The laboratory received the following samples:

<u>Laboratory ID</u>	<u>Client ID</u>
620562001	S48012.01
620562002	S48012.02
620562003	S48012.03
620562004	S48012.04

Case Narrative:

Sample analyses were conducted using methodology as outlined in GEL's Standard Operating Procedures. Any technical or administrative problems during analysis, data review, and reduction are contained in the analytical case narratives in the enclosed data package.

The enclosed data package contains the following sections: Case Narrative, Chain of Custody, Cooler Receipt Checklist, Data Package Qualifier Definitions and data from the following fractions: Radiochemistry.



Jordan Melton for
Delaney Stone
Project Manager

Chain of Custody and Supporting Documentation

620562

C.O.C. PAGE # 1 OF 1

2680 East Lansing Dr., East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-4034
www.meritlabs.com



REPORT TO

CONTACT NAME Project Management Team
COMPANY Merit Laboratories
ADDRESS 2680 East Lansing Drive
CITY East Lansing MI 48823
PHONE NO. 517-332-0167
FAX NO.
E-MAIL ADDRESS results@meritlabs.com

CHAIN OF CUSTODY RECORD

CONTACT NAME Julie Teague
COMPANY Merit Laboratories
ADDRESS 2680 East Lansing Drive
CITY East Lansing MI 48823
PHONE NO. 517-332-0167
E-MAIL ADDRESS juliet@meritlabs.com

INVOICE TO

CONTACT NAME
COMPANY
ADDRESS
CITY
STATE MI
ZIP CODE 48823
E-MAIL ADDRESS

ANALYSIS (ATTACH LIST IF MORE SPACE IS REQUIRED)

MERIT LAB NO. <small>FOR LAB USE ONLY</small>	YEAR	DATE	TIME	IDENTIFICATION-DESCRIPTION	MATRIX	# OF BOTTLES	# Containers & Preservatives					OTHER	
							NONE	H ₂ O	HNO ₃	H ₂ SO ₄	NaOH		MgOH
	4/28/23	1142		S48012.01	GW	2							
	4/28/23	1354		S48012.02	GW	2							
	4/28/23	1142		S48012.03	GW	2							
	4/28/23	1030		S48012.04	DI	2							

PROJECT NO./NAME S48012

TURNAROUND TIME REQUIRED 1 DAY 2 DAYS 3 DAYS STANDARD OTHER

DELIVERABLES REQUIRED STD LEVEL II LEVEL III LEVEL IV EDD OTHER

MATRIX CODE: GW=GROUNDWATER WW=WASTEWATER S=SOIL L=LIQUID SD=SOLID
SL=SLUDGE DW=DRINKING WATER O=OIL WP=WIPE A=AIR W=WASTE

SAMPLER(S) - PLEASE PRINT/SIGN NAME

Certifications
 OHIO VAP Drinking Water
 DoD NPDES
Project Locations
 Detroit New York
 Other
Special Instructions
* E903.1 Mod.
** E904.0/SW 9320 Mod.

Please use calculation product & provide Radium 226/228 combined results on the report
(No Ice needed)
** Subcontracted to GEL Laboratories, Inc.
2040 Savage Road
Charleston, SC 29407

RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE 5/1/23	TIME 1700	RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE 5/1/23	TIME 1700
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE 5/1/23	TIME 1700	RECEIVED BY: SIGNATURE/ORGANIZATION	DATE 5/1/23	TIME 1700
RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME	RELINQUISHED BY: SIGNATURE/ORGANIZATION	DATE	TIME
RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME	RECEIVED BY: SIGNATURE/ORGANIZATION	DATE	TIME

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

SAMPLE RECEIPT & REVIEW FORM

Client: <u>MEVA</u>		SDG/AR/COC/Work Order: <u>620562</u>	
Received By: <u>MVH</u>		Date Received: <u>05-03-23</u>	
Carrier and Tracking Number		FedEx Express FedEx Ground <u>UPS</u> Field Services Courier Other <u>124664770361126746</u>	
Suspected Hazard Information		Yes	No
A) Shipped as a DOT Hazardous?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
B) Did the client designate the samples are to be received as radioactive?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
C) Did the RSO classify the samples as radioactive?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
D) Did the client designate samples are hazardous?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
E) Did the RSO identify possible hazards?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sample Receipt Criteria		Yes	NA
1 Shipping containers received intact and sealed?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
2 Chain of custody documents included with shipment?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
3 Samples requiring cold preservation within (0 ≤ 6 deg. C)?*		<input checked="" type="checkbox"/>	<input type="checkbox"/>
4 Daily check performed and passed on IR temperature gun?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
5 Sample containers intact and sealed?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
6 Samples requiring chemical preservation at proper pH?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
7 Do any samples require Volatile Analysis?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
8 Samples received within holding time?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
9 Sample ID's on COC match ID's on bottles?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
10 Date & time on COC match date & time on bottles?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
11 Number of containers received match number indicated on COC?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
12 Are sample containers identifiable as GEL provided by use of GEL labels?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
13 COC form is properly signed in relinquished/received sections?		<input checked="" type="checkbox"/>	<input type="checkbox"/>
Comments (Use Continuation Form if needed):			

PM (or PMA) review: Initials JM Date 5-5-23 Page 1 of 1

Laboratory Certifications

List of current GEL Certifications as of 26 May 2023

State	Certification
Alabama	42200
Alaska	17-018
Alaska Drinking Water	SC00012
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana Drinking Water	LA024
Louisiana NELAP	03046 (AI33904)
Maine	2019020
Maryland	270
Massachusetts	M-SC012
Massachusetts PFAS Approv	Letter
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122023-4
New Hampshire NELAP	2054
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	2022-160
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S. Carolina Radiochem	10120002
Sanitation Districts of L	9255651
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-22-20
Utah NELAP	SC000122022-37
Vermont	VT87156
Virginia NELAP	460202
Washington	C780

Radiological Analysis

Case Narrative

**Radiochemistry
Technical Case Narrative
Merit Laboratories, Inc.
SDG #: S48012
Work Order #: 620562**

Product: Radium-226+Radium-228 Calculation

Analytical Method: Calculation

Analytical Procedure: GL-RAD-D-003 REV# 45

Analytical Batch: 2429541

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
620562001	S48012.01
620562002	S48012.02
620562003	S48012.03
620562004	S48012.04

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

There are no exceptions, anomalies or deviations from the specified methods. All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable.

Product: GFPC Ra228, Liquid

Analytical Method: EPA 904.0/SW846 9320 Modified

Analytical Procedure: GL-RAD-A-063 REV# 5

Analytical Batch: 2423921

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
620562001	S48012.01
620562002	S48012.02
620562003	S48012.03
620562004	S48012.04
1205394668	Method Blank (MB)
1205394669	620147001(S47857.01) Sample Duplicate (DUP)
1205394670	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Quality Control (QC) Information

Method Blank Criteria

The blank result (See Below) is greater than the MDC but less than the required detection limit.

Sample	Analyte	Value
1205394668 (MB)	Radium-228	Result: 2.74 pCi/L > MDA: 2.68 pCi/L <= RDL: 3.00 pCi/L

Product: Lucas Cell, Ra226, Liquid

Analytical Method: EPA 903.1 Modified

Analytical Procedure: GL-RAD-A-008 REV# 15

Analytical Batch: 2423881

The following samples were analyzed using the above methods and analytical procedure(s).

<u>GEL Sample ID#</u>	<u>Client Sample Identification</u>
620562001	S48012.01
620562002	S48012.02
620562003	S48012.03
620562004	S48012.04
1205394583	Method Blank (MB)
1205394584	620147001(S47857.01) Sample Duplicate (DUP)
1205394585	620147001(S47857.01) Matrix Spike (MS)
1205394586	Laboratory Control Sample (LCS)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Miscellaneous Information

Additional Comments

The matrix spike, 1205394585 (S47857.01MS), aliquot was reduced to conserve sample volume.

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Qualifier Definition Report for

MERI001 Merit Laboratories, Inc.

Client SDG: S48012 GEL Work Order: 620562

The Qualifiers in this report are defined as follows:

- * A quality control analyte recovery is outside of specified acceptance criteria
- ** Analyte is a Tracer compound
- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

Review/Validation

GEL requires all analytical data to be verified by a qualified data reviewer. In addition, all CLP-like deliverables receive a third level review of the fractional data package.

The following data validator verified the information presented in this data report:

Signature: 

Name: Kenshalla Oston

Date: 31 MAY 2023

Title: Analyst I

Sample Data Summary

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: May 31, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Laverty
Project: Routine Analysis

Client Sample ID: S48012.01 Project: MERI00120
Sample ID: 620562001 Client ID: MERI001
Matrix: Ground Water
Collect Date: 28-APR-23 11:42
Receive Date: 03-MAY-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.20	+/-0.989	1.59	3.00	pCi/L		JE1	05/25/23	1152	2423921		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.46	+/-1.03			pCi/L		NXL1	05/25/23	1342	2429541		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.260	+/-0.299	0.457	1.00	pCi/L		LXP1	05/23/23	0937	2423881		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			92.6	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: May 31, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S48012.02 Project: MERI00120
Sample ID: 620562002 Client ID: MERI001
Matrix: Ground Water
Collect Date: 28-APR-23 13:54
Receive Date: 03-MAY-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	1.51	+/-1.38	2.27	3.00	pCi/L		JE1	05/25/23	1152	2423921		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.97	+/-1.45			pCi/L		NXL1	05/25/23	1342	2429541		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.464	+/-0.448	0.669	1.00	pCi/L		LXP1	05/23/23	0937	2423881		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			76.7	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: May 31, 2023

Company : Merit Laboratories Inc.
Address : 2680 East Lansing Drive

East Lansing, Michigan 48823

Contact: John Lavery
Project: Routine Analysis

Client Sample ID: S48012.03 Project: MERI00120
Sample ID: 620562003 Client ID: MERI001
Matrix: Ground Water
Collect Date: 28-APR-23 11:42
Receive Date: 03-MAY-23
Collector: Client

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228	U	0.807	+/-0.831	1.37	3.00	pCi/L		JE1	05/25/23	1152	2423921		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		2.08	+/-1.05			pCi/L		NXL1	05/25/23	1342	2429541		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226		1.27	+/-0.649	0.481	1.00	pCi/L		LXP1	05/23/23	0937	2423881		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			83.9	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

DF: Dilution Factor Lc/LC: Critical Level
DL: Detection Limit PF: Prep Factor
MDA: Minimum Detectable Activity RL: Reporting Limit
MDC: Minimum Detectable Concentration SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: May 31, 2023

Company : Merit Laboratories Inc.
 Address : 2680 East Lansing Drive

 East Lansing, Michigan 48823
 Contact: John Lavery
 Project: Routine Analysis

Client Sample ID: S48012.04	Project: MERI00120
Sample ID: 620562004	Client ID: MERI001
Matrix: Water	
Collect Date: 28-APR-23 10:30	
Receive Date: 03-MAY-23	
Collector: Client	

Parameter	Qualifier	Result	Uncertainty	MDC	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
Rad Gas Flow Proportional Counting													
GFPC Ra228, Liquid "As Received"													
Radium-228		1.78	+/-1.09	1.63	3.00	pCi/L		JE1	05/25/23	1152	2423921		1
Radium-226+Radium-228 Calculation "See Parent Products"													
Radium-226+228 Sum		1.99	+/-1.14			pCi/L		NXL1	05/25/23	1342	2429541		2
Rad Radium-226													
Lucas Cell, Ra226, Liquid "As Received"													
Radium-226	U	0.209	+/-0.334	0.606	1.00	pCi/L		LXP1	05/23/23	0937	2423881		3

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 904.0/SW846 9320 Modified	
2	Calculation	
3	EPA 903.1 Modified	

Surrogate/Tracer Recovery	Test	Result	Nominal	Recovery%	Acceptable Limits
Barium-133 Tracer	GFPC Ra228, Liquid "As Received"			78.2	(15%-125%)

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

Column headers are defined as follows:

- | | |
|---------------------------------------|--------------------------------|
| DF: Dilution Factor | Lc/LC: Critical Level |
| DL: Detection Limit | PF: Prep Factor |
| MDA: Minimum Detectable Activity | RL: Reporting Limit |
| MDC: Minimum Detectable Concentration | SQL: Sample Quantitation Limit |

Quality Control Data

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: May 31, 2023

Page 1 of 2

Merit Laboratories Inc.
2680 East Lansing Drive
East Lansing, Michigan

Contact: John Laverty

Workorder: 620562

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Rad Gas Flow											
Batch	2423921										
QC1205394669	620147001	DUP									
Radium-228	U	1.59		2.61	pCi/L	49		(0% - 100%)	JE1	05/25/23	11:50
	Uncertainty	+/-1.32		+/-1.06							
QC1205394670	LCS										
Radium-228	80.5			67.9	pCi/L		84.3	(75%-125%)		05/25/23	11:50
	Uncertainty			+/-4.15							
QC1205394668	MB										
Radium-228				2.74	pCi/L					05/25/23	11:52
	Uncertainty			+/-1.72							
Rad Ra-226											
Batch	2423881										
QC1205394584	620147001	DUP									
Radium-226		0.781		0.685	pCi/L	13		(0% - 100%)	LXP1	05/23/23	09:36
	Uncertainty	+/-0.587		+/-0.517							
QC1205394586	LCS										
Radium-226	26.5			27.9	pCi/L		106	(75%-125%)		05/23/23	10:11
	Uncertainty			+/-2.93							
QC1205394583	MB										
Radium-226			U	-0.0693	pCi/L					05/23/23	09:37
	Uncertainty			+/-0.192							
QC1205394585	620147001	MS									
Radium-226	134	0.781		124	pCi/L		92.2	(75%-125%)		05/23/23	09:36
	Uncertainty	+/-0.587		+/-14.6							

Notes:

Counting Uncertainty is calculated at the 95% confidence level (1.96-sigma).

The Qualifiers in this report are defined as follows:

- U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
- J Value is estimated
- X Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
- H Analytical holding time was exceeded
- < Result is less than value reported
- > Result is greater than value reported

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: 620562

Page 2 of 2

Parname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
UI											
BD											
h											
R											
^											
N/A											
ND											
M											
NJ											
FA											
UJ											
Q											
K											
UL											
L											
NI											
Y											
**											
M											
J											

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.

^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.

* Indicates that a Quality Control parameter was not within specifications.

For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Gas Flow Raw Data

Batch 2423921 Check-list

This check-list was completed on 25-MAY-23 by Rhonda Birch

This batch was reviewed by Rhonda Birch on 25-MAY-23 and Kenshalla Oston on 26-MAY-23.

Batch ID:
2423921

Product:
GFC28RAL

Description: Gas Flow Radium 228
GL-RAD-A-063

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?	Yes		
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?		No	
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
11	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
12	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-228 in Liquid

Batch ID: 2423921

Analyst: Jacqueline Winston (JE1)
 Prep: Lyndsey Pace (LXP1)
Method: EPA 904.0/SW846 9320 Modified
Lab SOP: GL-RAD-A-063 REV# 5
Instrument: LUCAS-C202389980

Due Dates for Lab: 23-MAY-2023

Package: 25-MAY-2023

SDG: 26-MAY-2023

Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units
LCS	1205394670	228	2051-B	.1	mL

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	Ac-228 Ingrow (date)	Ac-228 Separation (date)
1	620147001	16-MAY-2023	3	301.36	301.36	05/17/23 15:25	05/25/23 09:46
2	620147002	16-MAY-2023	3	301	301	05/17/23 15:25	05/25/23 09:46
3	620147003	16-MAY-2023	3	305.79	305.79	05/17/23 15:25	05/25/23 09:46
4	620147004	16-MAY-2023	3	300.64	300.64	05/17/23 15:25	05/25/23 09:46
5	620147005	16-MAY-2023	3	303.97	303.97	05/17/23 15:25	05/25/23 09:46
6	620147006	16-MAY-2023	3	300.88	300.88	05/17/23 15:25	05/25/23 09:46
7	620562001	16-MAY-2023	3	306.78	306.78	05/17/23 15:25	05/25/23 09:46
8	620562002	16-MAY-2023	3	308.91	308.91	05/17/23 15:25	05/25/23 09:46
9	620562003	16-MAY-2023	3	300.38	300.38	05/17/23 15:25	05/25/23 09:46
10	620562004	16-MAY-2023	3	306.86	306.86	05/17/23 15:25	05/25/23 09:46
11	1205394668 MB	16-MAY-2023	3		308.91	05/17/23 15:25	05/25/23 09:46
12	1205394669 DUP (620147001)	16-MAY-2023	3	303.46	303.46	05/17/23 15:25	05/25/23 09:46
13	1205394670 LCS	16-MAY-2023	3		308.91	05/17/23 15:25	05/25/23 09:46

Reagent/Solvent Lot ID	Description	Amount	Comments:
WORK 1951-E	Ba-133	.1 mL	Pipet Id: RAD-GFC-1795419 Data Entry Date2: 16-MAY-2023 00:00
REGNT 3909714	RGF-1.5M Ammonium Sulfate	10 mL	
REGNT 3906586	RGF-1M Citric Acid	5 mL	
REGNT 3910170	2M HCl	20 mL	
REGNT 3907858	RGF-50% Potassium Carbonate	2 mL	
REGNT 3903777	RGF-7M Nitric Acid	25 mL	
REGNT DGA042223	2418797	2 g	
REGNT 3885305.13	RGF-Hydrofluoric Acid	4 mL	
REGNT 3528714	500 mg/mL Neodymium Carrier	.2 mL	
REGNT 3887517	RGF-Neodymium Subtrate	5 mL	
REGNT 3908482.6	Nitric Acid	5 mL	
REGNT 3911267	Barium Carrier Ra228 REG	1 mL	
REGNT 3907855	Acetic Acid Glacial ACS Poly Coated Bottle	10 mL	

Radium-228 Liquid

Filename : RA228.XLS
 File type : Excel
 Version # : 1.4.3

Tracer S/N : 1951-E
 Tracer Exp Date : 9/16/2023
 Tracer Volume Added: 0.10

Batch : 2423921
 Analyst : JAC02417
 Prep Date : 5/16/2023
 Ra-228 Method Uncertainty : 0.1268

Procedure Code : GFC28RAL
 Parmname : Radium-228
 Required MDA : 3 pCi/L
 Ra-228 Abundance : 1.00
 Halflife of Ra-228 : 5.75 years
 Halflife of Ac-228 : 6.15 hours

Geometry: 25mm Filter

Sample Characteristics					Tracer Calculations		Tracer Samp.		Tracer	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Tracer Ref. Activity (CPM)	Tracer Ref. Count Uncertainty (%)	Tracer Samp. Activity (CPM)	Tracer Samp. Count Uncertainty (%)	Tracer Aliquot (mL)	Tracer Aliquot StDev. (mL)
1	620147001.1	0.3014	1.8482E-05	4/25/2023 12:36	1173.6	1.69%	1026.1	1.80%	0.1	0.000200
2	620147002.1	0.3010	1.8476E-05	4/25/2023 14:32	1173.6	1.69%	961.9	1.86%	0.1	0.000200
3	620147003.1	0.3058	1.8556E-05	4/25/2023 15:54	1173.6	1.69%	914.8	1.91%	0.1	0.000200
4	620147004.1	0.3006	1.8470E-05	4/25/2023 11:39	1173.6	1.69%	882.2	1.94%	0.1	0.000200
5	620147005.1	0.3040	1.8526E-05	4/25/2023 12:36	1173.6	1.69%	1029.5	1.80%	0.1	0.000200
6	620147006.1	0.3009	1.8474E-05	4/25/2023 9:25	1173.6	1.69%	864.6	1.96%	0.1	0.000200
7	620562001.1	0.3068	1.8572E-05	4/28/2023 11:42	1173.6	1.69%	1086.8	1.75%	0.1	0.000200
8	620562002.1	0.3089	1.8606E-05	4/28/2023 13:54	1173.6	1.69%	900.2	1.92%	0.1	0.000200
9	620562003.1	0.3004	1.8465E-05	4/28/2023 11:42	1173.6	1.69%	985.0	1.84%	0.1	0.000200
10	620562004.1	0.3069	1.8573E-05	4/28/2023 10:30	1173.6	1.69%	917.8	1.91%	0.1	0.000200
11	1205394668.1	0.3089	1.8606E-05	5/16/2023 0:00	1173.6	1.69%	637.8	2.29%	0.1	0.000200
12	1205394669.1	0.3035	1.8517E-05	4/25/2023 12:36	1173.6	1.69%	1012.8	1.81%	0.1	0.000200
13	1205394670.1	0.3089	1.8606E-05	5/16/2023 0:00	1173.6	1.69%	941.3	1.88%	0.1	0.000200

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-063
 Instrument SOP: GL-RAD-I-016

Count raw Data													Calculated	Sample
Pos.	Detector ID	Counting Time (min.)	Gross Counts		Beta cpm	Count Start Date/Time	Ac-228 Ingrowth Date/Time	Ac-228 Decay Date/Time	Ra-228 Decay	Ac-228 Decay	Ac-228 Ingrowth	Ac-228 Count Correction	Recovery %	Sample Recovery Error %
			Alpha	Beta										
1	2C	60	20	101	1.683	5/25/2023 11:51	5/17/2023 15:25	5/25/2023 9:46	0.990	0.790	1.000	1.057	87.4%	2.49%
2	5B	60	19	69	1.150	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.990	0.788	1.000	1.057	82.0%	2.53%
3	5C	60	12	25	0.417	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.990	0.788	1.000	1.057	78.0%	2.57%
4	5D	60	13	73	1.217	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.990	0.788	1.000	1.057	75.2%	2.59%
5	6A	60	9	46	0.767	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.990	0.788	1.000	1.057	87.7%	2.49%
6	7A	60	12	50	0.833	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.990	0.788	1.000	1.057	73.7%	2.60%
7	8B	60	3	76	1.267	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.991	0.789	1.000	1.057	92.6%	2.45%
8	8D	60	8	100	1.667	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.991	0.788	1.000	1.057	76.7%	2.57%
9	9D	60	10	41	0.683	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.991	0.788	1.000	1.057	83.9%	2.51%
10	10D	60	15	61	1.017	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.991	0.788	1.000	1.057	78.2%	2.57%
11	5A	70	12	104	1.486	5/25/2023 11:52	5/17/2023 15:25	5/25/2023 9:46	0.997	0.788	1.000	1.067	54.3%	2.86%
12	11C	60	13	73	1.217	5/25/2023 11:50	5/17/2023 15:25	5/25/2023 9:46	0.990	0.791	1.000	1.057	86.3%	2.49%
13	11D	60	13	1097	18.283	5/25/2023 11:50	5/17/2023 15:25	5/25/2023 9:46	0.997	0.791	1.000	1.057	80.2%	2.54%

Calibration Data								
Pos.	Counted on	Calibration Date	Calibration Due Date	Detector Efficiency (cpm/dpm)	Detector Efficiency Error (cpm/dpm)	Bkg cpm	Weekly Bkg Count Start Date/Time	Bkg Count Time (min.)
1	PIC	6/1/2022	5/31/2023	0.6022	0.01274	1.270	5/19/2023 17:48	500
2	PIC	6/1/2022	5/31/2023	0.6336	0.00426	0.818	5/19/2023 17:48	500
3	PIC	6/1/2022	5/31/2023	0.6242	0.00657	0.492	5/22/2023 17:12	500
4	PIC	6/1/2022	5/31/2023	0.6236	0.00925	0.772	5/19/2023 17:48	500
5	PIC	6/1/2022	5/31/2023	0.6328	0.02228	1.526	5/19/2023 17:48	500
6	PIC	6/1/2022	5/31/2023	0.6257	0.00594	0.508	5/19/2023 17:48	500
7	PIC	6/1/2022	5/31/2023	0.6437	0.02148	0.908	5/19/2023 17:48	500
8	PIC	6/1/2022	5/31/2023	0.6347	0.00609	1.294	5/19/2023 17:48	500
9	PIC	6/1/2022	5/31/2023	0.6330	0.02610	0.472	5/19/2023 17:48	500
10	PIC	6/1/2022	5/31/2023	0.6148	0.00557	0.586	5/19/2023 17:48	500
11	PIC	6/1/2022	5/31/2023	0.6332	0.00851	1.010	5/19/2023 17:48	500
12	PIC	6/1/2022	5/31/2023	0.6276	0.01278	0.510	5/20/2023 16:07	500
13	PIC	6/1/2022	5/31/2023	0.6372	0.01068	0.540	5/21/2023 11:41	500

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : N/A
Spike Exp Date : N/A
Spike Activity (dpm/ml): N/A
Spike Volume Added: N/A

LCS S/N : 2051-B
LCS Exp Date : 3/27/2024
LCS Activity (dpm/ml): 551.91
LCS Volume Added: 0.10

Results																
Pos.	Decision	Critical	Required	Sample Act.		Net Count	Net Count	2 SIGMA		2 SIGMA		Sample	Sample	Nominal		
	Level	Level	MDA	MDA	Conc.	Error	Rate	Rate Error	Counting	Total Prop.	QC			Type	RPD	RER
	pCi/L	pCi/L	pCi/L	pCi/L	pCi/L	%	CPM	CPM	Uncertainty	Uncertainty						
1	1.3766	0.9719	3	2.1356	1.5861	42.41%	0.4133	0.1749	1.3155	1.3761			SAMPLE			
2	1.1242	0.7937	3	1.7826	1.2963	43.52%	0.3320	0.1442	1.1038	1.1517			SAMPLE			
3	0.9161	0.6468	3	1.4986	-0.3091	118.23%	-0.0753	0.0890	0.7160	0.7162			SAMPLE			
4	1.2116	0.8554	3	1.9273	1.9261	33.33%	0.4447	0.1477	1.2542	1.3464			SAMPLE			
5	1.4227	1.0044	3	2.1897	-2.7471	16.90%	-0.7593	0.1258	0.8921	0.8923			SAMPLE			
6	0.9987	0.7051	3	1.6302	1.4320	37.62%	0.3253	0.1221	1.0532	1.1142			SAMPLE			
7	1.0108	0.7136	3	1.5939	1.1952	42.34%	0.3587	0.1514	0.9889	1.0354			SAMPLE			
8	1.4675	1.0361	3	2.2748	1.5103	46.83%	0.3727	0.1743	1.3841	1.4363			SAMPLE			
9	0.8354	0.5898	3	1.3706	0.8072	52.67%	0.2113	0.1111	0.8314	0.8572			SAMPLE			
10	1.0074	0.7112	3	1.6292	1.7803	31.36%	0.4307	0.1346	1.0906	1.1805			SAMPLE			
11	1.7200	1.2143	3	2.6753	2.7381	32.19%	0.4757	0.1525	1.7200	1.8566			MB			
12	0.8410	0.5938	3	1.3725	2.6143	20.84%	0.7067	0.1459	1.0582	1.2500	620147001.1		DUP	49.0%		
13	0.8948	0.6318	3	1.4548	67.8730	4.16%	17.7433	0.5530	4.1461	17.7539			LCS		80.4789	84.3%

SampleID	Instr	Time (min.)	Alpha Counts	Beta Counts	Count Start Time	Count End Time	Machine	Batch ID
620147001	2C	60	20	101	5/25/2023 11:51	5/25/2023 12:51	PIC	2423921
620147002	5B	60	19	69	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620147003	5C	60	12	25	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620147004	5D	60	13	73	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620147005	6A	60	9	46	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620147006	7A	60	12	50	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620562001	8B	60	3	76	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620562002	8D	60	8	100	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620562003	9D	60	10	41	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
620562004	10D	60	15	61	5/25/2023 11:52	5/25/2023 12:52	PIC	2423921
1205394668	5A	70	12	104	5/25/2023 11:52	5/25/2023 13:02	PIC	2423921
1205394669	11C	60	13	73	5/25/2023 11:50	5/25/2023 12:50	PIC	2423921
1205394670	11D	60	13	1097	5/25/2023 11:50	5/25/2023 12:50	PIC	2423921

ASSAY 25-May-23 10:07:52
 Wizard 2480 s/n 46190630
 Protocol id 8 Ba-133
 Time limit
 Count limit
 Isotope Ba-133
 Protocol date 5/25/2023
 Run id. 6694

Samp_ID	POS	RACK	BATCH	TIME	COUNTS	CPM	ERROR	% RECOVERY	COUNT TIME
REF		1	95	1	180	3521.28	1173.56	1.69	10:07:52
	620147001	2	95	2	180	3079	1026.11	1.8	87.44 10:11:06
	620147002	3	95	3	180	2886.28	961.92	1.86	81.97 10:14:20
	620147003	4	95	4	180	2745	914.84	1.91	77.95 10:17:33
	620147004	5	95	5	180	2647	882.17	1.94	75.17 10:20:48
	620147005	1	10	1	180	3089.28	1029.5	1.8	87.72 10:24:20
	620147006	2	10	2	180	2594.28	864.62	1.96	73.67 10:27:34
	620562001	3	10	3	180	3261	1086.75	1.75	92.60 10:30:48
	620562002	4	10	4	180	2701	900.18	1.92	76.71 10:34:01
	620562003	5	10	5	180	2955.57	985.03	1.84	83.94 10:37:16
	620562004	1	14	1	180	2754	917.84	1.91	78.21 10:40:51
	1205394668	2	14	2	180	1914	637.82	2.29	54.35 10:44:05
	1205394669	3	14	3	180	3039	1012.82	1.81	86.30 10:47:19
	1205394670	4	14	4	180	2824.57	941.33	1.88	80.21 10:50:33

END OF ASSAY

Continuing Calibration Data

Gas Flow Proportional Counter Checks for 25-May-2023

Detectors LB4100 A1 through I4 and PIC 1A through 14D and G5400W 1W through 1Z and LB4200 GA1 through OD4

Short Name	Status	Parmname	Run Time	Count Time	CPM or dec	Low Limit	High Limit	Stdev
LB4100E2	Above	Beta bkg	25-May 04:14	60	2.317	1.385	3.072	+0.31
LB4100F1	Above	Beta bkg	25-May 04:14	60	2.600	0.188	2.691	+2.78
LB4100F2	Above	Beta bkg	25-May 04:14	60	3.383	1.173	1.833	+17.09
LB4100F4	need 2nd	Alpha bkg	25-May 04:14	60	0.217	-2.75E-2	0.313	+1.30
LB4100F4	Above	Beta bkg	25-May 04:14	60	2.917	-7.15E-2	3.199	+2.48
LB4100G1	Above	Alpha XTalk	25-May 05:17	5	0.753	0.088	0.447	+8.12
LB4100G1	Above	Beta bkg	25-May 04:14	60	3779	0.380	1.675	+17,505.51
LB4100G1	Above	Beta eff	25-May 05:24	5	19912	12880	18320	+4.76
LB4100H2	Above	Alpha bkg	25-May 12:24	60	0.300	-1.10E-1	0.243	+3.96
LB4200OA1	need 2nd	Alpha eff	25-May 06:11	5	11290	11120	11630	-1.00
LB4200OA1	need 2nd	Beta bkg	25-May 08:33	60	1.267	-9.98E-2	1.494	+2.14
LB4200OA2	Above	Beta bkg	25-May 03:17	60	1.983	0.241	1.025	+10.33
LB4200OA3	Above	Alpha bkg	25-May 03:17	60	0.417	0.014	0.814	+0.02
LB4200OA3	Below	Alpha eff	25-May 06:11	5	9678	9726	9942	-4.33
LB4200OA3	Above	Beta XTalk	25-May 07:53	5	0.002	7.71E-4	0.002	+4.51
LB4200OA4	Above	Beta bkg	25-May 08:33	60	1.500	0.044	1.346	+3.71
LB4200OA4	need 2nd	Beta eff	25-May 07:53	5	16972	16800	17680	-1.83
LB4200OA4	Above	Beta XTalk	25-May 07:53	5	0.002	7.19E-4	0.002	+3.72
LB4200OB1	need 2nd	Beta XTalk	25-May 07:53	5	0.003	0.001	0.004	+2.62
LB4200OB2	Above	Alpha bkg	25-May 03:17	60	0.383	0.049	0.542	+1.07
LB4200OB2	Below	Alpha eff	25-May 06:11	5	9645	9676	10040	-3.50
LB4200OB2	Above	Beta bkg	25-May 03:17	60	1.433	0.176	1.400	+3.16
LB4200OB3	Above	Alpha bkg	25-May 03:17	60	0.550	-2.51E-1	0.957	+0.98
LB4200OB3	need 2nd	Alpha eff	25-May 06:11	5	21500	21460	22180	-2.67
LB4200OB3	Above	Beta bkg	25-May 03:17	60	1.817	0.031	1.553	+4.04
LB4200OC1	Above	Alpha bkg	25-May 03:17	60	0.650	-3.01E-1	1.067	+1.17
LB4200OC1	Below	Alpha eff	25-May 07:38	5	11063	11120	11520	-3.85
LB4200OC1	Above	Alpha XTalk	25-May 07:38	5	0.207	0.183	0.203	+4.23
LB4200OC1	Above	Beta bkg	25-May 03:17	60	1.500	0.288	1.060	+6.42
LB4200OC2	Above	Beta bkg	25-May 08:33	60	2.133	0.275	1.220	+8.80

LB4200OC3	Above	Alpha bkg	25-May 03:17	60	0.833	-2.99E-1	1.153	+1.68
LB4200OC3	Below	Alpha eff	25-May 07:38	5	9597	9651	9914	-4.24
LB4200OC3	Above	Beta bkg	25-May 03:17	60	1.400	0.316	1.139	+4.90
LB4200OC3	Above	Beta XTalk	25-May 06:11	5	0.003	0.001	0.003	+5.09
LB4200OD1	Above	Beta XTalk	25-May 06:11	5	0.002	5.69E-4	0.002	+3.94
LB4200OD2	Above	Alpha bkg	25-May 03:17	60	0.417	-2.30E-1	0.829	+0.66
LB4200OD2	Above	Alpha XTalk	25-May 07:38	5	0.215	0.185	0.211	+3.89
LB4200OD3	Above	Alpha bkg	25-May 03:17	60	0.367	-3.01E-1	1.146	-0.23
LB4200OD3	Below	Alpha eff	25-May 07:38	5	21694	21710	22170	-3.21
LB4200OD4	Below	Alpha eff	25-May 07:38	5	17957	18070	18550	-4.41
PIC4A	Above	Alpha bkg	25-May 13:41	60	0.383	-5.84E-2	0.311	+4.17
PIC4B	Above	Alpha bkg	25-May 04:45	60	1.033	-8.41E-1	2.241	+0.65
PIC4B	need 2nd	Beta eff	25-May 04:37	5	13841	10440	27300	-1.79
PIC6B	Above	Alpha eff	25-May 12:23	5	9686	8319	9448	+4.26
PIC6B	Below	Beta eff	25-May 14:03	5	16495	16860	22460	-3.39
PIC7B	Above	Beta bkg	25-May 07:30	60	2.483	0.146	1.265	+9.53
PIC7C	need 2nd	Beta eff	25-May 14:03	5	19514	19410	21710	-2.73
PIC10C	Above	Alpha bkg	25-May 05:05	60	0.717	-1.05E-1	0.324	+8.49
PIC10C	Above	Beta bkg	25-May 05:05	60	9.117	-3.39E-1	2.310	+18.42
PIC10C	Above	Beta XTalk	25-May 04:59	5	6.46E-4	9.29E-5	6.05E-4	+3.49
PIC12B	Above	Alpha bkg	25-May 08:46	60	0.333	-8.27E-2	0.413	+2.03
PIC12B	Above	Beta bkg	25-May 08:46	60	2.817	-5.75E-1	2.641	+3.33
PIC14B	Above	Alpha eff	25-May 05:00	5	9390	8571	9265	+4.08
PIC14B	Above	Beta bkg	25-May 05:19	60	6.800	-4.03E-1	2.348	+12.71

INSTRUMENTS NOT LISTED HAVE PASSED ALL QUALITY ASSURANCE PARAMETERS

The following detectors may not have properly transferred to the LIMS system

LB4100A1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100A3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100C4	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I1	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I2	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk
LB4100I3	Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

LB4100I4

Alpha bkg, Alpha eff, Alpha XTalk, Beta bkg, Beta eff, Beta XTalk

Reviewed by *Lois Buist*

Date 5/25/23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: GFPC

Batch ID: 2423921

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
1205394669	DUP	JE1	PIC11C	MAY-25-23 11:50:42	DONE	25mm Filter	01-JUN-22 00:00
1205394670	LCS	JE1	PIC11D	MAY-25-23 11:50:42	DONE	25mm Filter	01-JUN-22 00:00
620147001	SAMPLE	JE1	PIC2C	MAY-25-23 11:51:28	DONE	25mm Filter	01-JUN-22 00:00
620562001	SAMPLE	JE1	PIC8B	MAY-25-23 11:52:25	DONE	25mm Filter	01-JUN-22 00:00
620562002	SAMPLE	JE1	PIC8D	MAY-25-23 11:52:31	DONE	25mm Filter	01-JUN-22 00:00
620562003	SAMPLE	JE1	PIC9D	MAY-25-23 11:52:38	DONE	25mm Filter	01-JUN-22 00:00
620147002	SAMPLE	JE1	PIC5B	MAY-25-23 11:52:48	DONE	25mm Filter	01-JUN-22 00:00
620147003	SAMPLE	JE1	PIC5C	MAY-25-23 11:52:48	DONE	25mm Filter	01-JUN-22 00:00
620147004	SAMPLE	JE1	PIC5D	MAY-25-23 11:52:48	DONE	25mm Filter	01-JUN-22 00:00
620147005	SAMPLE	JE1	PIC6A	MAY-25-23 11:52:48	DONE	25mm Filter	01-JUN-22 00:00
1205394668	MB	JE1	PIC5A	MAY-25-23 11:52:48	DONE	25mm Filter	01-JUN-22 00:00
620147006	SAMPLE	JE1	PIC7A	MAY-25-23 11:52:52	DONE	25mm Filter	01-JUN-22 00:00
620562004	SAMPLE	JE1	PIC10D	MAY-25-23 11:52:53	DONE	25mm Filter	01-JUN-22 00:00

Lucas Cell Raw Data

Batch 2423881 Check-list

This check-list was completed on 23-MAY-23 by Lyndsey Pace

This batch was reviewed by Elizabeth Krouse on 23-MAY-23 and Lyndsey Pace on 23-MAY-23.

Batch ID:
2423881

Product:
LUC26RAL

Description: Lucas Cell Radium 226
GL-RAD-A-008

#	Criteria	Yes	No	Comments
Preparation Information				
1	Were all of the samples homogenous? Include sample description if not homogenous	Yes		
2	Was the preservation correct for this analysis?	Yes		
Internal Checklist Information				
3	Are instrument source checks within limits?	Yes		
4	Has an Aliquot Correction been completed for this batch?		No	
5	Have sample historical results been reviewed for this batch?	Yes		
Technical Information				
6	Were all the samples prepared/analyzed within the required holding time period?	Yes		
7	Are any sample results more negative than 3xTPU?		No	
Quality Control (QC) Information				
8	Was the method blank (MB) within the acceptance criteria?	Yes		
9	Were the laboratory control sample (LCS/LCSD) recoveries within the acceptance limits?	Yes		
10	Were the matrix spike (MS/MSD) recoveries within the acceptance limits?	Yes		
11	Were the relative percent differences and/or error (RPD/RER) between the sample and its duplicate within acceptable limits?	Yes		
12	Has the method required detection limit been met?	Yes		
Miscellaneous Information				
13	Are sample-specific MDA/MDC calculated and reported?	Yes		

Prep Logbook

Radium-226 in Liquid

Batch ID: 2423881
Analyst: Lyndsey Pace (LXP1)
Method: EPA 903.1 Modified
Lab SOP: GL-RAD-A-008 REV# 15
Instrument: LUCAS-C202389980

Due Dates for Lab: 23-MAY-2023			Package: 25-MAY-2023		SDG: 26-MAY-2023	
Type	Sample Id	Description	Serial Number	Spike Amount	Spike Units	
MS	1205394585	Radium-226 SPIKE	1715-G	.1	mL	
LCS	1205394586	Radium-226 SPIKE	1715-G	.1	mL	

#	Sample ID	Prep Date	Min RDL (pCi/L)	Unadjusted Aliquot (g)	Aliquot (mL)	End Degas (date)	CELL #	End Transfer (date)	Start Count Time (date)	Background Counts	Total Counts
1	620147001	16-MAY-2023	1	502.48	502.48	05/19/23 10:02	402	05/23/23 05:29	05/23/23 09:01	5	12
2	620147002	16-MAY-2023	1	501.8	501.8	05/19/23 10:02	503	05/23/23 05:29	05/23/23 09:01	3	10
3	620147003	16-MAY-2023	1	504.59	504.59	05/19/23 10:02	608	05/23/23 05:29	05/23/23 09:01	4	9
4	620147004	16-MAY-2023	1	502.3	502.3	05/19/23 10:02	703	05/23/23 05:29	05/23/23 09:01	3	31
5	620147005	16-MAY-2023	1	501.49	501.49	05/19/23 10:02	805	05/23/23 05:29	05/23/23 09:01	6	12
6	620147006	16-MAY-2023	1	501.43	501.43	05/19/23 10:02	107	05/23/23 05:56	05/23/23 09:37	1	5
7	620562001	16-MAY-2023	1	501.97	501.97	05/19/23 10:02	205	05/23/23 05:56	05/23/23 09:37	2	5
8	620562002	16-MAY-2023	1	502.6	502.6	05/19/23 10:02	303	05/23/23 05:56	05/23/23 09:37	5	9
9	620562003	16-MAY-2023	1	500.34	500.34	05/19/23 10:02	408	05/23/23 05:56	05/23/23 09:37	1	16
10	620562004	16-MAY-2023	1	500.56	500.56	05/19/23 10:02	506	05/23/23 05:56	05/23/23 09:37	4	5
11	1205394583 MB	16-MAY-2023	1		506.02	05/19/23 10:02	601	05/23/23 05:56	05/23/23 09:37	4	1
12	1205394584 DUP (620147001)	16-MAY-2023	1	506.02	506.02	05/19/23 10:02	708	05/23/23 05:56	05/23/23 09:36	4	11
13	1205394585 MS (620147001)	16-MAY-2023	1	100.04	100.04	05/19/23 10:02	801	05/23/23 05:56	05/23/23 09:36	8	290
14	1205394586 LCS	16-MAY-2023	1		506.02	05/19/23 10:02	105	05/23/23 06:21	05/23/23 10:11	4	354

Reagent/Solvent Lot ID	Description	Amount	Comments:
			Data Entry Date2: 16-MAY-2023 00:00

Radium-226 Liquid

Filename : RA226.XLS
 File type : Excel
 Version # : 1.3.2

Batch : 2423881
Analyst : LIN01615
Prep Date : 5/16/2023
Ra-226 Method Uncertainty : 0.073648

Procedure Code : LUC26RAL
Parmname : Radium-226
Required MDA : 1 pCi/L
Halfife of Ra-226 : 1600 years
Ra-226 Abundance : 1.00
Halfife of Rn-222: 3.8235 days

Batch counted on : LUCAS CELL DETECTOR
BKG Count time : 30 min

Sample Characteristics					Count Raw Data						Background	
Pos.	Sample ID	Sample Aliquot L	Sample Aliquot StDev. L	Sample Date/Time	Cell Number	Counting Time (min.)	Gross Counts	Gross CPM	Background Counts	Background CPM	Count Time (min.)	Cell Efficiency (cpm/dpm)
1	620147001.1	0.5025	2.0266E-05	4/25/2023 12:36	402	15	12	0.800	5	0.167	30	1.4980
2	620147002.1	0.5018	2.0263E-05	4/25/2023 14:32	503	15	10	0.667	3	0.100	30	2.1390
3	620147003.1	0.5046	2.0275E-05	4/25/2023 15:54	608	15	9	0.600	4	0.133	30	1.7970
4	620147004.1	0.5023	2.0265E-05	4/25/2023 11:39	703	15	31	2.067	3	0.100	30	1.6440
5	620147005.1	0.5015	2.0262E-05	4/25/2023 12:36	805	15	12	0.800	6	0.200	30	1.5410
6	620147006.1	0.5014	2.0262E-05	4/25/2023 9:25	107	15	5	0.333	1	0.033	30	1.7160
7	620562001.1	0.5020	2.0264E-05	4/28/2023 11:42	205	15	5	0.333	2	0.067	30	1.8920
8	620562002.1	0.5026	2.0266E-05	4/28/2023 13:54	303	15	9	0.600	5	0.167	30	1.7210
9	620562003.1	0.5003	2.0257E-05	4/28/2023 11:42	408	15	16	1.067	1	0.033	30	1.5020
10	620562004.1	0.5006	2.0258E-05	4/28/2023 10:30	506	15	5	0.333	4	0.133	30	1.7710
11	1205394583.1	0.5060	2.0280E-05	5/16/2023 0:00	601	15	1	0.067	4	0.133	30	1.7610
12	1205394584.1	0.5060	2.0280E-05	4/25/2023 12:36	708	15	11	0.733	4	0.133	30	1.6020
13	1205394585.1	0.1000	1.1373E-05	4/25/2023 12:36	801	15	290	19.333	8	0.267	30	1.4200
14	1205394586.1	0.5060	2.0280E-05	5/16/2023 0:00	105	15	354	23.600	4	0.133	30	1.5340

Pipet, 0.1 ml Stdev : +/- 0.000200 ml
 Pipet, 0.5 ml Stdev : +/- 0.001000 ml
 Pipet, 1 ml Stdev : +/- 0.002000 ml

Analytical SOP: GL-RAD-A-008
 Instrument SOP: GL-RAD-I-007

Cell Efficiency Error (%)	Cell Calibration Date	Cell Calibration Due Date	De-Gas Date/Time	Rn-222 Ingrowth End Date/Time	Count Start Date/Time	Rn-222 Corrections			Ra-226 Decay
						De-Gas to Ingrowth	Ingrowth to Count	During Count	
5.300%	2/1/2023	1/31/2024	5/19/2023 10:02	5/23/2023 5:29	5/23/2023 9:01	0.499	0.974	1.001	1.000
5.000%	6/1/2022	5/31/2023	5/19/2023 10:02	5/23/2023 5:29	5/23/2023 9:01	0.499	0.974	1.001	1.000
6.300%	7/1/2022	6/30/2023	5/19/2023 10:02	5/23/2023 5:29	5/23/2023 9:01	0.499	0.974	1.001	1.000
9.000%	11/1/2022	10/31/2023	5/19/2023 10:02	5/23/2023 5:29	5/23/2023 9:01	0.499	0.974	1.001	1.000
9.600%	4/8/2023	3/31/2024	5/19/2023 10:02	5/23/2023 5:29	5/23/2023 9:01	0.499	0.974	1.001	1.000
8.100%	5/1/2023	4/30/2024	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:37	0.501	0.973	1.001	1.000
3.900%	8/1/2022	7/31/2023	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:37	0.501	0.973	1.001	1.000
7.400%	10/25/2022	10/31/2023	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:37	0.501	0.973	1.001	1.000
7.000%	2/1/2023	1/31/2024	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:37	0.501	0.973	1.001	1.000
5.300%	6/1/2022	5/31/2023	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:37	0.501	0.973	1.001	1.000
9.400%	7/1/2022	6/30/2023	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:37	0.501	0.973	1.001	1.000
7.700%	11/1/2022	10/31/2023	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:36	0.501	0.973	1.001	1.000
3.200%	4/8/2023	3/31/2024	5/19/2023 10:02	5/23/2023 5:56	5/23/2023 9:36	0.501	0.973	1.001	1.000
7.900%	5/1/2023	4/30/2024	5/19/2023 10:02	5/23/2023 6:21	5/23/2023 10:11	0.502	0.971	1.001	1.000

Notes:

- 1 - Results are decay corrected to Sample Date/Time
- 2 - Reference date for Spike Activity (dpm/ml) is the batch Prep Date
- 3 - Spike Nominals are decay corrected to Sample Date/Time

Spike S/N : 1715-G
Spike Exp Date : 9/8/2023
Spike Activity (dpm/ml): 297.41
Spike Volume Added: 0.10

LCS S/N : 1715-G
LCS Exp Date : 9/8/2023
LCS Activity (dpm/ml): 297.41
LCS Volume Added: 0.10


Results																
Pos.	Decision Level pCi/L	Critical Level pCi/L	Required MDA pCi/L	MDA pCi/L	Sample Act. Conc. pCi/L	Sample Act. Error %	Net Count Rate CPM	Net Count Rate Error CPM	2 SIGMA Counting Uncertainty pCi/L	2 SIGMA Total Prop. Uncertainty pCi/L	Sample QC	Sample Type	RPD	RER	Nominal pCi/L	Recovery
1	0.3710	0.2619	1	0.7705	0.7811	38.68%	0.6333	0.2427	0.5866	0.6029		SAMPLE				
2	0.2015	0.1423	1	0.4575	0.4901	38.90%	0.5667	0.2186	0.3706	0.3803		SAMPLE				
3	0.2755	0.1945	1	0.5937	0.4778	45.61%	0.4667	0.2108	0.4231	0.4327		SAMPLE				
4	0.2619	0.1849	1	0.5947	2.2110	21.11%	1.9667	0.3756	0.8277	0.9691		SAMPLE				
5	0.3958	0.2795	1	0.7992	0.7208	41.94%	0.6000	0.2449	0.5768	0.6016		SAMPLE				
6	0.1448	0.1022	1	0.4198	0.3229	51.56%	0.3000	0.1528	0.3223	0.3297		SAMPLE				
7	0.1855	0.1310	1	0.4571	0.2601	58.76%	0.2667	0.1563	0.2989	0.3019		SAMPLE				
8	0.3221	0.2274	1	0.6690	0.4640	49.81%	0.4333	0.2134	0.4480	0.4579		SAMPLE				
9	0.1658	0.1171	1	0.4806	1.2736	26.93%	1.0333	0.2687	0.6492	0.6970		SAMPLE				
10	0.2811	0.1985	1	0.6059	0.2090	81.82%	0.2000	0.1633	0.3344	0.3365		SAMPLE				
11	0.2797	0.1974	1	0.6028	-0.0693	141.73%	-0.0667	0.0943	0.1921	0.1922		MB				
12	0.3074	0.2170	1	0.6625	0.6855	39.25%	0.6000	0.2309	0.5171	0.5366	620147001.1	DUP	13.0%			
13	2.4806	1.7513	1	4.8066	124.3068	6.78%	19.0667	1.1392	14.5571	24.3859	620147001.1	MS			133.9165	92.2%
14	0.3204	0.2262	1	0.6906	27.9458	9.54%	23.4667	1.2561	2.9319	6.6025		LCS			26.4746	105.6%

Continuing Calibration Data

Ludlum Alpha Scintillation Counter Checks for 23-MAY-2023

Short Name	Parmname	Run Time	Count Time	Counts	CPM	Stdev	Status	Comments
LUCAS1	EFF	07:52	1	1.19E+05	118574	-1.26		
LUCAS2	EFF	07:51	1	1.33E+05	133145	-0.43		
LUCAS3	EFF	07:50	1	95454	95454	-1.81		
LUCAS4	EFF	07:48	1	1.29E+05	128812	1.38		
LUCAS5	EFF	07:47	1	1.34E+05	133702	1.1		
LUCAS6	EFF	07:46	1	1.30E+05	129668	-0.3		
LUCAS7	EFF	07:45	1	1.34E+05	134068	1.4		
LUCAS8	EFF	07:44	1	1.22E+05	121738	-1.47		

Reviewed by:


Lyndsey Pace

Date: 23-MAY-23

GEL Laboratories LLC

Runlogs

Instrument Run Log

Instrument Type: LUCAS CELL DETECTOR

Batch ID: 2423881

Sample ID	Sample Type	Analyst	Instrument	Run Date	Status	Geometry	Calibration Date
620147001	SAMPLE	LXP1	LUCAS4	MAY-23-23 09:01:00	DONE	Lucas Cell	01-FEB-23 00:00
620147002	SAMPLE	LXP1	LUCAS5	MAY-23-23 09:01:00	DONE	Lucas Cell	01-JUN-22 00:00
620147003	SAMPLE	LXP1	LUCAS6	MAY-23-23 09:01:00	DONE	Lucas Cell	01-JUL-22 00:00
620147004	SAMPLE	LXP1	LUCAS7	MAY-23-23 09:01:00	DONE	Lucas Cell	01-NOV-22 00:00
620147005	SAMPLE	LXP1	LUCAS8	MAY-23-23 09:01:00	DONE	Lucas Cell	08-APR-23 00:00
1205394584	DUP	LXP1	LUCAS7	MAY-23-23 09:36:00	DONE	Lucas Cell	01-NOV-22 00:00
1205394585	MS	LXP1	LUCAS8	MAY-23-23 09:36:00	DONE	Lucas Cell	08-APR-23 00:00
620147006	SAMPLE	LXP1	LUCAS1	MAY-23-23 09:37:00	DONE	Lucas Cell	01-MAY-23 00:00
620562001	SAMPLE	LXP1	LUCAS2	MAY-23-23 09:37:00	DONE	Lucas Cell	01-AUG-22 00:00
620562002	SAMPLE	LXP1	LUCAS3	MAY-23-23 09:37:00	DONE	Lucas Cell	25-OCT-22 00:00
620562003	SAMPLE	LXP1	LUCAS4	MAY-23-23 09:37:00	DONE	Lucas Cell	01-FEB-23 00:00
620562004	SAMPLE	LXP1	LUCAS5	MAY-23-23 09:37:00	DONE	Lucas Cell	01-JUN-22 00:00
1205394583	MB	LXP1	LUCAS6	MAY-23-23 09:37:00	DONE	Lucas Cell	01-JUL-22 00:00
1205394586	LCS	LXP1	LUCAS1	MAY-23-23 10:11:00	DONE	Lucas Cell	01-MAY-23 00:00



Data Verification & Validation Report

Lansing Board of Water & Light – Erickson Power Station

Sampling Event (dates and purpose): New Wells MW-14 & MW-15 – Background Round 1 – January 2023

Data Package Number: S44308.01
Data Validator: Aryka Thomson

Lab Report Date: 03/01/2023
Data Validation Completion Date: 03/02/2023

General Overall Assessment:

- Data are usable without qualification.
 Data are usable with qualification (as noted below).
 Some or all data are unusable (as noted below).

Wells planned for sampling:

Well ID	Planned for Sampling
MW-1	
MW-2	
MW-3	
MW-4	
MW-5	
MW-6	
MW-7	
MW-7B	
MW-7C	
MW-8	
MW-9	
MW-10	
MW-11	
MW-11B	
MW-12	
MW-12B	
MW-13	
MW-14	X
MW-15	X

Data Summary

Sample ID	Matrix	Lab ID	Date Collected	App III Metals	App IV Metals	Part 115 Metals	Anions	TDS TSS	Rad-226 Rad-228	Diss. Metals
MW-14	GW	S44308.01	01/12/2023	X	X	X	X	X	X	
MW-15	GW	S44308.02	01/12/2023	X	X	X	X	X	X	
MWT-14	QC	S44308.03	01/12/2023	X	X	X	X	X	X	

Other analytes requested for analysis: Na, Mg, K, HCO₃, CO₃, hardness

Any planned sampling or analysis NOT completed? If yes, explain: _____

Data Verification & Validation Checklist

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Field Data							
Sample Collection Field Forms	X		Purging performed as required in the Groundwater Monitoring Plan	X			
Field Calibration Records	X		Field instruments calibrated daily according to manufacturer specifications	X			
Chain of Custody	X		Accurately reflect samples, collection dates/times, analyses, bottles, etc.	X			
Field decontamination documentation	N/A		Record of decontamination for non-dedicated sampling equipment			X	
Drilling logs	X		N/A	-	-	-	
Well construction logs	X		N/A	-	-	-	
Well development field forms	X		N/A	-	-	-	
Analytical Data Package							
Cover Sheet	X		N/A	-	-	-	
Case Narrative	X		Summarizes sample receipt and any exceptions to QC acceptance criteria	X			
Internal Laboratory Chain of Custody forms	X		Analyses as requested; accurate transcription of field COC	X			
Sample Chronology and Consistency	X		Accurate representation of dates, times of receipt, preparation, and analysis	X			
Communication Records with Lab	X		N/A	-	-	-	
EDD Format Consistency	X		EDD format and content as requested	X			
Sample Identification, Results Nomenclature, and Data Qualifier Consistency	X		All included in final report	X			
Method Detection Limit Consistency	X		MDLs consistent between samples		X		Dilution varies for sulfate
Instrument Calibration Records	X		Present and no nonconformance noted	X			
Laboratory Report Complete	X		Includes QC component	X			
Holding Times	X		Analyses performed within allowed holding time	X			

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Method	X		Method as requested	X			
Reporting Limits	X		RLs as requested	X			RLs for TDS, chloride, and hardness were not met
			MDLs<RLs	X			
			MDLs<GPS			X	
QC Validation							
Evaluate Accuracy							
Matrix Spike (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Laboratory Control Sample (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Evaluate Precision							
Matrix Spike Duplicate (RPD)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Field Duplicate (RPD)	X		RPD ≤ 20%		X		Zinc non-detect in parent and detected in field duplicate
Evaluate Representativeness							
Equipment Blanks (if applicable)	N/A		Non-detect (<RL)			X	
QC Verification							
Verify Instrument Calibration & Analytical Process							
Initial Calibration Verification	X		Laboratory-determined	-	-	-	
Continuing Calibration Verification	X		Laboratory-determined	-	-	-	
Initial Calibration Blank	X		Laboratory-determined	-	-	-	
Continuing Calibration Blank	X		Laboratory-determined	-	-	-	
Serial Dilutions	X		Laboratory-determined	-	-	-	High recovery for Al, Ni, Mo, and As
Post-Digestion Spikes	X		Laboratory-determined	-	-	-	
Internal Standards	X		Laboratory-determined	-	-	-	
Laboratory Duplicate (RPD)	X		Laboratory-determined	-	-	-	Lab-generated duplicate outside control limits for Rad-226; does not affect project samples
Method Blanks	X		Laboratory-determined	-	-	-	
Evaluate Completeness (# usable measurements/ # unusable measurements)							
Completeness	X		100%	X			

Other instances of nonconformance to QC control limits noted on case narrative: None

Comments:

Zinc was non-detect in the parent sample MW-14 but detected in the field duplicate MWT-14. Zinc required qualification as estimated but not detected (UJ) in the parent sample MW-14 and as estimated with high bias (J+) in the field duplicate MWT-14.

Data Verification & Validation Report

Lansing Board of Water & Light – Erickson Power Station

Sampling Event (dates and purpose): Wells MW-1-MW-6 – Semi-Annual Assessment Monitoring – February 2023

Data Package Number: S45134.01
Data Validator: Aryka Thomson

Lab Report Date: 03/22/2023
Data Validation Completion Date: 04/04/2023

General Overall Assessment:

- Data are usable without qualification.
 Data are usable with qualification (as noted below).
 Some or all data are unusable (as noted below).

Wells planned for sampling:

Well ID	Planned for Sampling
MW-1	X
MW-2	X
MW-3	X
MW-4	X
MW-5	X
MW-6	X
MW-7	
MW-7B	
MW-7C	
MW-8	
MW-9	
MW-10	
MW-11	
MW-11B	
MW-12	
MW-12B	
MW-13	
MW-14	
MW-15	
MW-16A	
MW-16B	
MW-16C	
MW-16D	

Data Summary

Sample ID	Matrix	Lab ID	Date Collected	App III Metals	App IV Metals	Part 115 Metals	Anions	TDS TSS	Rad-226 Rad-228	Diss. Metals
MW-1	GW	S45134.01	02/07/2023	X	X	X	X	X	X	
MW-2	GW	S45134.02	02/07/2023	X	X	X	X	X	X	
MW-3	GW	S45134.03	02/07/2023	X	X	X	X	X	X	
MW-4	GW	S45134.04	02/07/2023	X	X	X	X	X	X	
MW-5	GW	S45134.05	02/07/2023	X	X	X	X	X	X	X
MW-6	GW	S45134.06	02/07/2023	X	X	X	X	X	X	
MWT-4	QC	S45134.07	02/07/2023	X	X	X	X	X	X	

Other analytes requested for analysis: Na, Mg, K, HCO₃, CO₃, hardness

Any planned sampling or analysis NOT completed? If yes, explain: _____

Data Verification & Validation Checklist

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Field Data							
Sample Collection Field Forms	X		Purging performed as required in the Groundwater Monitoring Plan		X		MW-5 turbidity > 10 NTU. An additional container was collected for dissolved metals analysis.
Field Calibration Records	X		Field instruments calibrated daily according to manufacturer specifications	X			
Chain of Custody	X		Accurately reflect samples, collection dates/times, analyses, bottles, etc.	X			
Field decontamination documentation	N/A		Record of decontamination for non-dedicated sampling equipment			X	
Drilling logs	X		N/A	-	-	-	
Well construction logs	X		N/A	-	-	-	
Well development field forms	X		N/A	-	-	-	
Analytical Data Package							
Cover Sheet	X		N/A	-	-	-	
Case Narrative	X		Summarizes sample receipt and any exceptions to QC acceptance criteria	X			
Internal Laboratory Chain of Custody forms	X		Analyses as requested; accurate transcription of field COC	X			
Sample Chronology and Consistency	X		Accurate representation of dates, times of receipt, preparation, and analysis	X			
Communication Records with Lab	X		N/A	-	-	-	
EDD Format Consistency	X		EDD format and content as requested	X			
Sample Identification, Results Nomenclature, and Data Qualifier Consistency	X		All included in final report	X			
Method Detection Limit Consistency	X		MDLs consistent between samples		X		Dilution varies for chloride and sulfate
Instrument Calibration Records	X		Present and no nonconformance noted	X			
Laboratory Report Complete	X		Includes QC component	X			
Holding Times	X		Analyses performed within allowed holding time	X			

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Method	X		Method as requested	X			
Reporting Limits	X		RLs as requested		X		RLs for TDS, chloride, and sulfate were not met
			MDLs<RLs	X			
			MDLs<GPS			X	
QC Validation							
Evaluate Accuracy							
Matrix Spike (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Laboratory Control Sample (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Evaluate Precision							
Matrix Spike Duplicate (RPD)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Field Duplicate (RPD)	X		RPD ≤ 20%		X		Combined Radium 226+228 RPD 22%
Evaluate Representativeness							
Equipment Blanks (if applicable)	X		Non-detect (<RL)			X	
QC Verification							
Verify Instrument Calibration & Analytical Process							
Initial Calibration Verification	X		Laboratory-determined	-	-	-	
Continuing Calibration Verification	X		Laboratory-determined	-	-	-	
Initial Calibration Blank	X		Laboratory-determined	-	-	-	
Continuing Calibration Blank	X		Laboratory-determined	-	-	-	
Serial Dilutions	X		Laboratory-determined	-	-	-	High recovery for Al, As, K, and Li
Post-Digestion Spikes	X		Laboratory-determined	-	-	-	
Internal Standards	X		Laboratory-determined	-	-	-	
Laboratory Duplicate (RPD)	X		Laboratory-determined	-	-	-	
Method Blanks	X		Laboratory-determined	-	-	-	
Evaluate Completeness (# usable measurements/ # unusable measurements)							
Completeness	X		100%	X			

Other instances of nonconformance to QC control limits noted on case narrative: Radium samples were received with pH > 2. Lab correspondence revealed these results would be flagged if needed. No results were flagged.

Comments:

Combined Radium 226+228 RPD was 22%. Radium-228 and combined radium required qualification as estimated with high bias (J+) in the parent sample MW-4 and as estimated with low bias (J-) in the field duplicate MWT-4.



Data Verification & Validation Report

Lansing Board of Water & Light – Erickson Power Station

Sampling Event (dates and purpose): Semiannual Assessment Monitoring – February 2023

Data Package Number: S45182.01

Lab Report Date: 04/03/2023

Data Validator: Aryka Thomson

Data Validation Completion Date: 04/09/2023

General Overall Assessment:

Data are usable without qualification.

Data are usable with qualification (as noted below).

Some or all data are unusable (as noted below).

Wells planned for sampling:

Well ID	Planned for Sampling
MW-1	
MW-2	
MW-3	
MW-4	
MW-5	
MW-6	
MW-7	X
MW-7B	X
MW-7C	X
MW-8	X
MW-9	X
MW-10	X
MW-11	
MW-11B	
MW-12	
MW-12B	
MW-13	X
MW-14	
MW-15	
MW-16A	
MW-16B	
MW-16C	
MW-16D	

Data Summary

Sample ID	Matrix	Lab ID	Date Collected	App III Metals	App IV Metals	Part 115 Metals	Anions	TDS TSS	Rad-226 Rad-228	Diss. Metals
MW-7	GW	S45182.01	02/08/2023	X	X	X	X	X	X	
MW-7B	GW	S45182.05	02/08/2023	X	X	X	X	X	X	
MW-7C	GW	S45182.06	02/08/2023	X	X	X	X	X	X	
MW-8	GW	S45182.02	02/08/2023	X	X	X	X	X	X	
MW-9	GW	S45182.03	02/08/2023	X	X	X	X	X	X	
MW-10	GW	S45182.04	02/08/2023	X	X	X	X	X	X	
MW-13	GW	S45182.09	02/08/2023	X	X	X	X	X	X	
MWT-10	QC	S45182.07	02/08/2023	X	X	X	X	X	X	

Other analytes requested for analysis: Na, Mg, K, HCO₃, CO₃, hardness

Any planned sampling or analysis NOT completed? If yes, explain: _____

Data Verification & Validation Checklist

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Field Data							
Sample Collection Field Forms	X		Purging performed as required in the Groundwater Monitoring Plan	X			
Field Calibration Records	X		Field instruments calibrated daily according to manufacturer specifications	X			
Chain of Custody	X		Accurately reflect samples, collection dates/times, analyses, bottles, etc.	X			
Field decontamination documentation	X		Record of decontamination for non-dedicated sampling equipment			X	
Drilling logs	X		N/A	-	-	-	
Well construction logs	X		N/A	-	-	-	
Well development field forms	X		N/A	-	-	-	
Analytical Data Package							
Cover Sheet	X		N/A	-	-	-	
Case Narrative	X		Summarizes sample receipt and any exceptions to QC acceptance criteria	X			
Internal Laboratory Chain of Custody forms	X		Analyses as requested; accurate transcription of field COC	X			
Sample Chronology and Consistency	X		Accurate representation of dates, times of receipt, preparation, and analysis	X			
Communication Records with Lab	X		N/A	-	-	-	
EDD Format Consistency	X		EDD format and content as requested	X			
Sample Identification, Results Nomenclature, and Data Qualifier Consistency	X		All included in final report	X			
Method Detection Limit Consistency	X		MDLs consistent between samples		X		Dilution varies for chloride and sulfate
Instrument Calibration Records	X		Present and no nonconformance noted	X			
Laboratory Report Complete	X		Includes QC component	X			
Holding Times	X		Analyses performed within allowed holding time	X			

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Method	X		Method as requested	X			
Reporting Limits	X		RLs as requested	X			RLs for TDS, chloride, and sulfate were not met
			MDLs<RLs	X			
			MDLs<GPS	X			
QC Validation							
Evaluate Accuracy							
Matrix Spike (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Laboratory Control Sample (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Evaluate Precision							
Matrix Spike Duplicate (RPD)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Field Duplicate (RPD)	X		RPD ≤ 20%		X		Combined Radium 226+228 RPD 49%
Evaluate Representativeness							
Equipment Blanks (if applicable)	X		Non-detect (<RL)	X			
QC Verification							
Verify Instrument Calibration & Analytical Process							
Initial Calibration Verification	X		Laboratory-determined	-	-	-	
Continuing Calibration Verification	X		Laboratory-determined	-	-	-	
Initial Calibration Blank	X		Laboratory-determined	-	-	-	
Continuing Calibration Blank	X		Laboratory-determined	-	-	-	
Serial Dilutions	X		Laboratory-determined	-	-	-	High recovery for As and Mo
Post-Digestion Spikes	X		Laboratory-determined	-	-	-	
Internal Standards	X		Laboratory-determined	-	-	-	
Laboratory Duplicate (RPD)	X		Laboratory-determined	-	-	-	
Method Blanks	X		Laboratory-determined	-	-	-	
Evaluate Completeness (# usable measurements/ # unusable measurements)							
Completeness	X		100%	X			

Other instances of nonconformance to QC control limits noted on case narrative:

Rad-228 in the sample 1205343480 and duplicate S45182.01DUP did not meet the relative percent difference requirement; however, they do meet the relative error ratio requirement. No qualification was required.

Comments:

Radium 228 and Combined Radium 226+228 RPD was 201% and 49%, respectively. Radium-228 and Combined Radium 226+228 in the parent sample required qualification as estimated with low bias (J-) in the parent sample MW-10 and as estimated with high bias (J+) in the field duplicate MWT-10.



Data Verification & Validation Report

Lansing Board of Water & Light – Erickson Power Station

Sampling Event (dates and purpose): Semiannual Assessment Monitoring – February 2023

Data Package Number: S45204.01

Lab Report Date: 04/03/2023

Data Validator: Aryka Thomson

Data Validation Completion Date: 04/09/2023

General Overall Assessment:

Data are usable without qualification.

Data are usable with qualification (as noted below).

Some or all data are unusable (as noted below).

Wells planned for sampling:

Well ID	Planned for Sampling
MW-1	
MW-2	
MW-3	
MW-4	
MW-5	
MW-6	
MW-7	
MW-7B	
MW-7C	
MW-8	
MW-9	
MW-10	
MW-11	X
MW-11B	X
MW-12	X
MW-12B	X
MW-13	
MW-14	
MW-15	
MW-16A	
MW-16B	
MW-16C	
MW-16D	

Data Summary

Sample ID	Matrix	Lab ID	Date Collected	App III Metals	App IV Metals	Part 115 Metals	Anions	TDS TSS	Rad-226 Rad-228	Diss. Metals
MW-11	GW	S45204.01	02/09/2023	X	X	X	X	X	X	X
MW-11B	GW	S45204.03	02/09/2023	X	X	X	X	X	X	
MW-12	GW	S45204.02	02/09/2023	X	X	X	X	X	X	X
MW-12B	GW	S45204.04	02/09/2023	X	X	X	X	X	X	
MWT-11B	QC	S45204.05	02/09/2023	X	X	X	X	X	X	

Other analytes requested for analysis: Na, Mg, K, HCO₃, CO₃, hardness

Any planned sampling or analysis NOT completed? If yes, explain: _____

Data Verification & Validation Checklist

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Field Data							
Sample Collection Field Forms	X		Purging performed as required in the Groundwater Monitoring Plan		X		MW-11 and MW-12 turbidity > 10 NTU. An additional container was collected for dissolved metals analysis.
Field Calibration Records	X		Field instruments calibrated daily according to manufacturer specifications	X			
Chain of Custody	X		Accurately reflect samples, collection dates/times, analyses, bottles, etc.	X			
Field decontamination documentation	X		Record of decontamination for non-dedicated sampling equipment			X	
Drilling logs	X		N/A	-	-	-	
Well construction logs	X		N/A	-	-	-	
Well development field forms	X		N/A	-	-	-	
Analytical Data Package							
Cover Sheet	X		N/A	-	-	-	
Case Narrative	X		Summarizes sample receipt and any exceptions to QC acceptance criteria	X			
Internal Laboratory Chain of Custody forms	X		Analyses as requested; accurate transcription of field COC	X			
Sample Chronology and Consistency	X		Accurate representation of dates, times of receipt, preparation, and analysis	X			
Communication Records with Lab	X		N/A	-	-	-	
EDD Format Consistency	X		EDD format and content as requested	X			
Sample Identification, Results Nomenclature, and Data Qualifier Consistency	X		All included in final report	X			
Method Detection Limit Consistency	X		MDLs consistent between samples		X		Dilution varies for calcium and sulfate
Instrument Calibration Records	X		Present and no nonconformance noted	X			
Laboratory Report Complete	X		Includes QC component	X			
Holding Times	X		Analyses performed within allowed holding time	X			

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Method	X		Method as requested	X			
Reporting Limits	X		RLs as requested	X			RLs for TDS were not met
			MDLs<RLs	X			
			MDLs<GPS	X			
QC Validation							
Evaluate Accuracy							
Matrix Spike (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Laboratory Control Sample (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Evaluate Precision							
Matrix Spike Duplicate (RPD)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Field Duplicate (RPD)	X		RPD ≤ 20%		X		Zinc detected in parent and non-detect in field duplicate
Evaluate Representativeness							
Equipment Blanks (if applicable)	X		Non-detect (<RL)	X			
QC Verification							
Verify Instrument Calibration & Analytical Process							
Initial Calibration Verification	X		Laboratory-determined	-	-	-	
Continuing Calibration Verification	X		Laboratory-determined	-	-	-	
Initial Calibration Blank	X		Laboratory-determined	-	-	-	
Continuing Calibration Blank	X		Laboratory-determined	-	-	-	
Serial Dilutions	X		Laboratory-determined	-	-	-	High recovery for Al and Mo
Post-Digestion Spikes	X		Laboratory-determined	-	-	-	
Internal Standards	X		Laboratory-determined	-	-	-	
Laboratory Duplicate (RPD)	X		Laboratory-determined	-	-	-	
Method Blanks	X		Laboratory-determined	-	-	-	
Evaluate Completeness (# usable measurements/ # unusable measurements)							
Completeness	X		100%	X			

Other instances of nonconformance to QC control limits noted on case narrative:

Sample 612583001 (S45204.01) was non-homogenous matrix. Yellowish tint 612583001 (S45204.01).

Rad-228 in the sample 1205343480 and duplicate S45182.01DUP did not meet the relative percent difference requirement; however, they do meet the relative error ratio requirement. No qualification was required.

Comments:

Zinc was detected in the parent sample MW-11B but not detected in the field duplicate MWT-11B. Zinc required qualification as estimated with high bias (J+) in the parent sample MW-11B and as estimated but not detected (UJ) in the field duplicate MWT-11B.

Data Verification & Validation Report

Lansing Board of Water & Light – Erickson Power Station

Sampling Event (dates and purpose): Wells MW-14 and MW-15 – Semi-Annual Assessment Monitoring and Background Round 2 – February 2023

Data Package Number: S45490.01
 Data Validator: Andrew Byks

Lab Report Date: 3/21/2023
 Data Validation Completion Date: 4/9/2023

General Overall Assessment:

- Data are usable without qualification.
 Data are usable with qualification (as noted below).
 Some or all data are unusable (as noted below).

Wells planned for sampling:

Well ID	Planned for Sampling
MW-1	
MW-2	
MW-3	
MW-4	
MW-5	
MW-6	
MW-7	
MW-7B	
MW-7C	
MW-8	
MW-9	
MW-10	
MW-11	
MW-11B	
MW-12	
MW-12B	
MW-13	
MW-14	X
MW-15	X
MW-16A	
MW-16B	
MW-16C	
MW-16D	

Data Summary

Sample ID	Matrix	Lab ID	Date Collected	App III Metals	App IV Metals	Part 115 Metals	Anions	TDS TSS	Rad-226 Rad-228	Diss. Metals
MW-14	GW	S45490.01	2/17/23	X	X	X	X	X	X	
MW-15	GW	S45490.02	2/17/23	X	X	X	X	X	X	
MWT-14	GW	S45490.03	2/17/23	X	X	X	X	X	X	

Other analytes requested for analysis: Na, Mg, K, HCO₃, CO₃, Hardness

Any planned sampling or analysis NOT completed? If yes, explain: _____

Data Verification & Validation Checklist

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Field Data							
Sample Collection Field Forms	X		Purging performed as required in the Groundwater Monitoring Plan	X			
Field Calibration Records	X		Field instruments calibrated daily according to manufacturer specifications	X			
Chain of Custody	X		Accurately reflect samples, collection dates/times, analyses, bottles, etc.	X			
Field decontamination documentation	N/A		Record of decontamination for non-dedicated sampling equipment			X	
Drilling logs	X		N/A	-	-	-	
Well construction logs	X		N/A	-	-	-	
Well development field forms	X		N/A	-	-	-	
Analytical Data Package							
Cover Sheet	X		N/A	-	-	-	
Case Narrative	X		Summarizes sample receipt and any exceptions to QC acceptance criteria	X			
Internal Laboratory Chain of Custody forms	X		Analyses as requested; accurate transcription of field COC	X			
Sample Chronology and Consistency	X		Accurate representation of dates, times of receipt, preparation, and analysis	X			
Communication Records with Lab	X		N/A	-	-	-	
EDD Format Consistency	X		EDD format and content as requested	X			
Sample Identification, Results Nomenclature, and Data Qualifier Consistency	X		All included in final report	X			
Method Detection Limit Consistency	X		MDLs consistent between samples		X		Dilution varies for sulfate.
Instrument Calibration Records	X		Present and no nonconformance noted	X			
Laboratory Report Complete	X		Includes QC component	X			
Holding Times	X		Analyses performed within allowed holding time	X			

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Method	X		Method as requested	X			
Reporting Limits	X		RLs as requested		X		RLs for TDS were not met.
			MDLs<RLs	X			
			MDLs<GPS			X	
QC Validation							
Evaluate Accuracy							
Matrix Spike (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Laboratory Control Sample (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Evaluate Precision							
Matrix Spike Duplicate (RPD)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Field Duplicate (RPD)	X		RPD ≤ 20%		X		TSS RPD is 27%, Rad-228 and Combined Rad RPD is 59% and 36%, respectively. Nickel detected in the parent sample and non-detect in the -duplicate sample.
Evaluate Representativeness							
Equipment Blanks (if applicable)	N/A		Non-detect (<RL)			X	
QC Verification							
Verify Instrument Calibration & Analytical Process							
Initial Calibration Verification	X		Laboratory-determined	-	-	-	
Continuing Calibration Verification	X		Laboratory-determined	-	-	-	
Initial Calibration Blank	X		Laboratory-determined	-	-	-	
Continuing Calibration Blank	X		Laboratory-determined	-	-	-	
Serial Dilutions	X		Laboratory-determined	-	-	-	High recovery for Al, Mo, As, and K
Post-Digestion Spikes	X		Laboratory-determined	-	-	-	
Internal Standards	X		Laboratory-determined	-	-	-	
Laboratory Duplicate (RPD)	X		Laboratory-determined	-	-	-	
Method Blanks	X		Laboratory-determined	-	-	-	
Evaluate Completeness (# usable measurements/ # unusable measurements)							
Completeness	X		100%	X			

Other instances of nonconformance to QC control limits noted on case narrative: None

Comments:

TSS RPD was 27%. TSS required qualification as estimated with low bias (J-) in the parent sample MW-14 and as estimated with high bias (J+) in the field duplicate MWT-14.

Radium 228 and Combined Radium 226+228 RPD was 59% and 36%, respectively. Radium-228 and Combined Radium 226+228 in the parent sample required qualification as estimated with low bias (J-) in the parent sample MW-14 and as estimated with high bias (J+) in the field duplicate MWT-14.

Nickel was detected in the parent sample MW-14 but non-detect in the field duplicate MWT-14. Nickel required qualification as estimated with high bias (J+) in the parent sample and as estimated but not detected (UJ) in the field duplicate MWT-14.



Data Verification & Validation Report

Lansing Board of Water & Light – Erickson Power Station

Sampling Event (dates and purpose): New Wells MW-16A/B/C/D – Background Round 1 – February 2023

Data Package Number: S44989.01
Data Validator: Aryka Thomson

Lab Report Date: 03/21/2023
Data Validation Completion Date: 04/03/2023

General Overall Assessment:

- Data are usable without qualification.
- Data are usable with qualification (as noted below).
- Some or all data are unusable (as noted below).

Wells planned for sampling:

Well ID	Planned for Sampling
MW-1	
MW-2	
MW-3	
MW-4	
MW-5	
MW-6	
MW-7	
MW-7B	
MW-7C	
MW-8	
MW-9	
MW-10	
MW-11	
MW-11B	
MW-12	
MW-12B	
MW-13	
MW-14	
MW-15	
MW-16A	X
MW-16B	X
MW-16C	X
MW-16D	X

Data Summary

Sample ID	Matrix	Lab ID	Date Collected	App III Metals	App IV Metals	Part 115 Metals	Anions	TDS TSS	Rad-226 Rad-228	Diss. Metals
MW-16A	GW	S44989.01	02/02/2023	X	X	X	X	X	X	
MW-16B	GW	S44989.02	02/02/2023	X	X	X	X	X	X	
MW-16C	GW	S44989.03	02/02/2023	X	X	X	X	X	X	X
MW-16D	GW	S44989.04	02/02/2023	X	X	X	X	X	X	
MWT-16A	QC	S44989.05	02/02/2023	X	X	X	X	X	X	
EB (MW-16D)	QC	S44989.07	02/02/2023	X	X	X	X	X	X	

Other analytes requested for analysis: Na, Mg, K, HCO₃, CO₃, hardness

Any planned sampling or analysis NOT completed? If yes, explain: _____

Data Verification & Validation Checklist

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Field Data							
Sample Collection Field Forms	X		Purging performed as required in the Groundwater Monitoring Plan		X		MW-16C turbidity > 10 NTU. An additional container was collected for dissolved metals analysis.
Field Calibration Records	X		Field instruments calibrated daily according to manufacturer specifications	X			
Chain of Custody	X		Accurately reflect samples, collection dates/times, analyses, bottles, etc.	X			
Field decontamination documentation		X	Record of decontamination for non-dedicated sampling equipment		X		Decontamination was not documented. A dedicated pump has since been installed.
Drilling logs	X		N/A	-	-	-	
Well construction logs	X		N/A	-	-	-	
Well development field forms	X		N/A	-	-	-	
Analytical Data Package							
Cover Sheet	X		N/A	-	-	-	
Case Narrative	X		Summarizes sample receipt and any exceptions to QC acceptance criteria	X			
Internal Laboratory Chain of Custody forms	X		Analyses as requested; accurate transcription of field COC	X			
Sample Chronology and Consistency	X		Accurate representation of dates, times of receipt, preparation, and analysis	X			
Communication Records with Lab	X		N/A	-	-	-	
EDD Format Consistency	X		EDD format and content as requested	X			
Sample Identification, Results Nomenclature, and Data Qualifier Consistency	X		All included in final report	X			
Method Detection Limit Consistency	X		MDLs consistent between samples		X		Dilution varies for calcium, sodium, and sulfate
Instrument Calibration Records	X		Present and no nonconformance noted	X			
Laboratory Report Complete	X		Includes QC component	X			
Holding Times	X		Analyses performed within allowed holding time	X			

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Method	X		Method as requested	X			
Reporting Limits	X		RLs as requested	X			RLs for TDS, chloride, sodium, and sulfate were not met
			MDLs<RLs		X		RL=MDL for carbonate
			MDLs<GPS			X	
QC Validation							
Evaluate Accuracy							
Matrix Spike (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Laboratory Control Sample (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Evaluate Precision							
Matrix Spike Duplicate (RPD)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Field Duplicate (RPD)	X		RPD ≤ 20%		X		Lithium detected in parent and non-detect in field duplicate Combined Radium 226+228 RPD 27%
Evaluate Representativeness							
Equipment Blanks (if applicable)	X		Non-detect (<RL)	X			
QC Verification							
Verify Instrument Calibration & Analytical Process							
Initial Calibration Verification	X		Laboratory-determined	-	-	-	
Continuing Calibration Verification	X		Laboratory-determined	-	-	-	
Initial Calibration Blank	X		Laboratory-determined	-	-	-	
Continuing Calibration Blank	X		Laboratory-determined	-	-	-	
Serial Dilutions	X		Laboratory-determined	-	-	-	High recovery for Al and Li
Post-Digestion Spikes	X		Laboratory-determined	-	-	-	
Internal Standards	X		Laboratory-determined	-	-	-	
Laboratory Duplicate (RPD)	X		Laboratory-determined	-	-	-	
Method Blanks	X		Laboratory-determined	-	-	-	
Evaluate Completeness (# usable measurements/ # unusable measurements)							
Completeness	X		100%	X			

Other instances of nonconformance to QC control limits noted on case narrative: None

Comments:

Lithium was detected in the parent sample MW-16A but not detected in the field duplicate MWT-16A. Lithium required qualification as estimated with high bias (J+) in the parent sample MW-16A and as estimated but not detected (UJ) in the field duplicate MWT-16A.

Combined Radium 226+228 RPD was 27%. Radium-228 required qualification as estimated with high bias (J+) in the parent sample MW-16A and as estimated with low bias (J-) in the field duplicate MWT-16A. Combined Radium 226+228 was lower in the parent sample and higher in the field duplicate. This was resolved by qualifying the Combined Radium in both MW-16A and MWT-16A as estimated (J) with no bias.



Data Verification & Validation Report

Lansing Board of Water & Light – Erickson Power Station

Sampling Event (dates and purpose): New Wells: MW-14-15 – Background Round 3 – March 2023

Data Package Number: S46674.01

Lab Report Date: 04/24/2023

Data Validator: Andrew Byks

Data Validation Completion Date: 06/04/2023

General Overall Assessment:

Data are usable without qualification.

Data are usable with qualification (as noted below).

Some or all data are unusable (as noted below).

Wells planned for sampling:

Well ID	Planned for Sampling
MW-1	
MW-2	
MW-3	
MW-4	
MW-5	
MW-6	
MW-7	
MW-7B	
MW-7C	
MW-8	
MW-9	
MW-10	
MW-11	
MW-11B	
MW-12	
MW-12B	
MW-13	
MW-14	X
MW-15	X
MW-16A	
MW-16B	
MW-16C	
MW-16D	

Data Summary

Sample ID	Matrix	Lab ID	Date Collected	App III Metals	App IV Metals	Part 115 Metals	Anions	TDS TSS	Rad-226 Rad-228	Diss. Metals
MW-14	GW	S46674.01	03/24/2023	X	X	X	X	X	X	
MW-15	GW	S46674.02	03/24/2023	X	X	X	X	X	X	
MWT-14	QC	S46674.03	03/24/2023	X	X	X	X	X	X	
EB (MW-14)	QC	S46674.04	03/24/2023	X	X	X	X	X	X	

Other analytes requested for analysis: Na, Mg, K, HCO₃, CO₃, hardness

Any planned sampling or analysis NOT completed? If yes, explain: _____

Data Verification & Validation Checklist

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Field Data							
Sample Collection Field Forms	X		Purging performed as required in the Groundwater Monitoring Plan	X			
Field Calibration Records	X		Field instruments calibrated daily according to manufacturer specifications	X			
Chain of Custody	X		Accurately reflect samples, collection dates/times, analyses, bottles, etc.	X			
Field decontamination documentation	N/A		Record of decontamination for non-dedicated sampling equipment			X	
Drilling logs	X		N/A	-	-	-	
Well construction logs	X		N/A	-	-	-	
Well development field forms	X		N/A	-	-	-	
Analytical Data Package							
Cover Sheet	X		N/A	-	-	-	
Case Narrative	X		Summarizes sample receipt and any exceptions to QC acceptance criteria	X			
Internal Laboratory Chain of Custody forms	X		Analyses as requested; accurate transcription of field COC	X			
Sample Chronology and Consistency	X		Accurate representation of dates, times of receipt, preparation, and analysis	X			
Communication Records with Lab	X		N/A	-	-	-	
EDD Format Consistency	X		EDD format and content as requested	X			
Sample Identification, Results Nomenclature, and Data Qualifier Consistency	X		All included in final report	X			
Method Detection Limit Consistency	X		MDLs consistent between samples		X		Dilution varies for multiple analytes across samples
Instrument Calibration Records	X		Present and no nonconformance noted	X			
Laboratory Report Complete	X		Includes QC component	X			
Holding Times	X		Analyses performed within allowed holding time	X			

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Method	X		Method as requested	X			
Reporting Limits	X		RLs as requested	X			RLs for sulfate, TDS were not met
			MDLs<RLs		X		RL=MDL for carbonate
			MDLs<GPS			X	
QC Validation							
Evaluate Accuracy							
Matrix Spike (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Laboratory Control Sample (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Evaluate Precision							
Matrix Spike Duplicate (RPD)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Field Duplicate (RPD)	X		RPD ≤ 20%		X		Lithium detected in parent and non-detect in field duplicate Combined Radium 226+228 RPD 27%
Evaluate Representativeness							
Equipment Blanks (if applicable)	X		Non-detect (<RL)	X			
QC Verification							
Verify Instrument Calibration & Analytical Process							
Initial Calibration Verification	X		Laboratory-determined	-	-	-	
Continuing Calibration Verification	X		Laboratory-determined	-	-	-	
Initial Calibration Blank	X		Laboratory-determined	-	-	-	
Continuing Calibration Blank	X		Laboratory-determined	-	-	-	
Serial Dilutions	X		Laboratory-determined	-	-	-	
Post-Digestion Spikes	X		Laboratory-determined	-	-	-	
Internal Standards	X		Laboratory-determined	-	-	-	
Laboratory Duplicate (RPD)	X		Laboratory-determined	-	-	-	
Method Blanks	X		Laboratory-determined	-	-	-	
Evaluate Completeness (# usable measurements/ # unusable measurements)							
Completeness	X		100%	X			

Other instances of nonconformance to QC control limits noted on case narrative: None

Comments:

Nickel was not detected in parent sample MW-14 but detected in the field duplicate MWT-14. Nickel required qualification as estimated but not detected (UJ) in the parent sample MW-14 and as estimated with high bias (J+) in the field duplicate MWT-14.

Zinc was not detected in parent sample MW-14 but detected in the field duplicate MWT-14. Zinc required qualification as estimated but not detected (UJ) in the parent sample MW-14 and as estimated with high bias (J+) in the field duplicate MWT-14.

The RPD for Radium 226 was 50%. Radium-226 required qualification as estimated with high bias (J+) in the parent sample MW-14 and as estimated with low bias (J-) in field duplicate MWT-14.



Data Verification & Validation Report

Lansing Board of Water & Light – Erickson Power Station

Sampling Event (dates and purpose): New Wells: MW-16A/B/C/D – Background Round 2 – March 2023

Data Package Number: S46568.01
Data Validator: Andrew Byks

Lab Report Date: 04/24/2023
Data Validation Completion Date: 06/04/2023

General Overall Assessment:

- Data are usable without qualification.
- Data are usable with qualification (as noted below).
- Some or all data are unusable (as noted below).

Wells planned for sampling:

Well ID	Planned for Sampling
MW-1	
MW-2	
MW-3	
MW-4	
MW-5	
MW-6	
MW-7	
MW-7B	
MW-7C	
MW-8	
MW-9	
MW-10	
MW-11	
MW-11B	
MW-12	
MW-12B	
MW-13	
MW-14	
MW-15	
MW-16A	X
MW-16B	X
MW-16C	X
MW-16D	X

Data Summary

Sample ID	Matrix	Lab ID	Date Collected	App III Metals	App IV Metals	Part 115 Metals	Anions	TDS TSS	Rad-226 Rad-228	Diss. Metals
MW-16A	GW	S46568.01	03/21/2023	X	X	X	X	X	X	
MW-16B	GW	S46568.02	03/21/2023	X	X	X	X	X	X	
MW-16C	GW	S46568.03	03/21/2023	X	X	X	X	X	X	
MW-16D	GW	S46568.04	03/21/2023	X	X	X	X	X	X	
MWT-16A	QC	S46568.05	03/21/2023	X	X	X	X	X	X	
EB (MW-16D)	QC	S46568.06	03/21/2023	X	X	X	X	X	X	

Other analytes requested for analysis: Na, Mg, K, HCO₃, CO₃, hardness

Any planned sampling or analysis NOT completed? If yes, explain: _____

Data Verification & Validation Checklist

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Field Data							
Sample Collection Field Forms	X		Purging performed as required in the Groundwater Monitoring Plan	X			
Field Calibration Records	X		Field instruments calibrated daily according to manufacturer specifications	X			
Chain of Custody	X		Accurately reflect samples, collection dates/times, analyses, bottles, etc.	X			
Field decontamination documentation		X	Record of decontamination for non-dedicated sampling equipment		X		Decontamination was not documented. A dedicated pump has since been installed.
Drilling logs	X		N/A	-	-	-	
Well construction logs	X		N/A	-	-	-	
Well development field forms	X		N/A	-	-	-	
Analytical Data Package							
Cover Sheet	X		N/A	-	-	-	
Case Narrative	X		Summarizes sample receipt and any exceptions to QC acceptance criteria	X			
Internal Laboratory Chain of Custody forms	X		Analyses as requested; accurate transcription of field COC	X			
Sample Chronology and Consistency	X		Accurate representation of dates, times of receipt, preparation, and analysis	X			
Communication Records with Lab	X		N/A	-	-	-	
EDD Format Consistency	X		EDD format and content as requested	X			
Sample Identification, Results Nomenclature, and Data Qualifier Consistency	X		All included in final report	X			
Method Detection Limit Consistency	X		MDLs consistent between samples		X		Dilution varies for multiple analytes across samples
Instrument Calibration Records	X		Present and no nonconformance noted	X			
Laboratory Report Complete	X		Includes QC component	X			
Holding Times	X		Analyses performed within allowed holding time	X			

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Method	X		Method as requested	X			
Reporting Limits	X		RLs as requested	X			RLs for TDS were not met
			MDLs<RLs		X		RL=MDL for carbonate, TSS, and Alkalinity
			MDLs<GPS			X	
QC Validation							
Evaluate Accuracy							
Matrix Spike (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Laboratory Control Sample (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Evaluate Precision							
Matrix Spike Duplicate (RPD)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Field Duplicate (RPD)	X		RPD ≤ 20%		X		Radium 226 and Combined Radium 226+228 RPD 41%, 28% respectively
Evaluate Representativeness							
Equipment Blanks (if applicable)	X		Non-detect (<RL)	X			
QC Verification							
Verify Instrument Calibration & Analytical Process							
Initial Calibration Verification	X		Laboratory-determined	-	-	-	
Continuing Calibration Verification	X		Laboratory-determined	-	-	-	
Initial Calibration Blank	X		Laboratory-determined	-	-	-	
Continuing Calibration Blank	X		Laboratory-determined	-	-	-	
Serial Dilutions	X		Laboratory-determined	-	-	-	
Post-Digestion Spikes	X		Laboratory-determined	-	-	-	
Internal Standards	X		Laboratory-determined	-	-	-	
Laboratory Duplicate (RPD)	X		Laboratory-determined	-	-	-	
Method Blanks	X		Laboratory-determined	-	-	-	
Evaluate Completeness (# usable measurements/ # unusable measurements)							
Completeness	X		100%	X			

Other instances of nonconformance to QC control limits noted on case narrative: None

Comments:

The RPDs for Radium 226 and Combined Radium 226+228 RPD were 41.04% and 27.54%, respectively. Radium-228 and Combined Radium 226+228 required qualification as estimated with low bias (J-) in the parent sample MW-16A and as estimated with high bias (J+) in field duplicate MWT-16A.



Data Verification & Validation Report

Lansing Board of Water & Light – Erickson Power Station

Sampling Event (dates and purpose): New Wells: MW-14-15 – Background Round 4 – April 2023

Data Package Number: S48012.01

Lab Report Date: 06/13/2023

Data Validator: Aryka Thomson

Data Validation Completion Date: 06/28/2023

General Overall Assessment:

Data are usable without qualification.

Data are usable with qualification (as noted below).

Some or all data are unusable (as noted below).

Wells planned for sampling:

Well ID	Planned for Sampling
MW-1	
MW-2	
MW-3	
MW-4	
MW-5	
MW-6	
MW-7	
MW-7B	
MW-7C	
MW-8	
MW-9	
MW-10	
MW-11	
MW-11B	
MW-12	
MW-12B	
MW-13	
MW-14	X
MW-15	X
MW-16A	
MW-16B	
MW-16C	
MW-16D	

Data Summary

Sample ID	Matrix	Lab ID	Date Collected	App III Metals	App IV Metals	Part 115 Metals	Anions	TDS TSS	Rad-226 Rad-228	Diss. Metals
MW-14	GW	S48012.01	04/28/2023	X	X	X	X	X	X	
MW-15	GW	S48012.02	04/28/2023	X	X	X	X	X	X	
MWT-14	QC	S48012.03	04/28/2023	X	X	X	X	X	X	

Other analytes requested for analysis: Na, Mg, K, HCO₃, CO₃, hardness

Any planned sampling or analysis NOT completed? If yes, explain: _____

Data Verification & Validation Checklist

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Field Data							
Sample Collection Field Forms	X		Purging performed as required in the Groundwater Monitoring Plan	X			
Field Calibration Records	X		Field instruments calibrated daily according to manufacturer specifications	X			
Chain of Custody	X		Accurately reflect samples, collection dates/times, analyses, bottles, etc.	X			
Field decontamination documentation	N/A		Record of decontamination for non-dedicated sampling equipment			X	
Drilling logs	X		N/A	-	-	-	
Well construction logs	X		N/A	-	-	-	
Well development field forms	X		N/A	-	-	-	
Analytical Data Package							
Cover Sheet	X		N/A	-	-	-	
Case Narrative	X		Summarizes sample receipt and any exceptions to QC acceptance criteria	X			
Internal Laboratory Chain of Custody forms	X		Analyses as requested; accurate transcription of field COC	X			
Sample Chronology and Consistency	X		Accurate representation of dates, times of receipt, preparation, and analysis	X			
Communication Records with Lab	X		N/A	-	-	-	
EDD Format Consistency	X		EDD format and content as requested	X			
Sample Identification, Results Nomenclature, and Data Qualifier Consistency	X		All included in final report	X			
Method Detection Limit Consistency	X		MDLs consistent between samples		X		Dilution varies for Cl- across samples
Instrument Calibration Records	X		Present and no nonconformance noted	X			
Laboratory Report Complete	X		Includes QC component	X			
Holding Times	X		Analyses performed within allowed holding time	X			

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Method	X		Method as requested	X			
Reporting Limits	X		RLs as requested		X		RLs for TDS were not met
			MDLs<RLs		X		RL=MDL for carbonate
			MDLs<GPS			X	
QC Validation							
Evaluate Accuracy							
Matrix Spike (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table		X		Ca and Fe recovered outside control limits in one sample
Laboratory Control Sample (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Evaluate Precision							
Matrix Spike Duplicate (RPD)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Field Duplicate (RPD)	X		RPD ≤ 20%		X		Rad-226 RPD outside control limits at 66%
Evaluate Representativeness							
Equipment Blanks (if applicable)	X		Non-detect (<RL)	X			
QC Verification							
Verify Instrument Calibration & Analytical Process							
Initial Calibration Verification	X		Laboratory-determined	-	-	-	
Continuing Calibration Verification	X		Laboratory-determined	-	-	-	
Initial Calibration Blank	X		Laboratory-determined	-	-	-	
Continuing Calibration Blank	X		Laboratory-determined	-	-	-	
Serial Dilutions	X		Laboratory-determined	-	-	-	Al, As, Mo, and Pb had recoveries outside control limits
Post-Digestion Spikes	X		Laboratory-determined	-	-	-	
Internal Standards	X		Laboratory-determined	-	-	-	
Laboratory Duplicate (RPD)	X		Laboratory-determined	-	-	-	
Method Blanks	X		Laboratory-determined	-	-	-	Rad-228 detected in MB
Evaluate Completeness (# usable measurements/ # unusable measurements)							
Completeness	X		100%	X			

Other instances of nonconformance to QC control limits noted on case narrative:

The matrix spike (48012.03) associated with Run Batch MT5-23-0501A had high recovery for Iron. MWT-14 required qualification as estimated (J) for iron.

The matrix spike (48012.03) associated with Run Batch MT5-23-0501 had high recovery for Calcium. MWT-14 required qualification as estimated (J) for calcium.

Method blank MB 1205394668 result is greater than the MDC but less than the required detection limit for Rad-228. Result: 2.74 pCi/L > MDA: 2.68 pCi/L ≤ RDL: 3.00 pCi/L. Rad-228 and consequently combined radium in all samples required qualification as estimated with high bias (J+).

Comments: The COC missed the “-14” identifier for MWT-14 (field duplicate of MW-14). The lab reports and EDD have “MWT-“ as the sample ID. A revision was requested on 6/28 and a revised lab report and EDD was received the same day.

Rad-226 RPD was outside control limits at 66%. Rad-226 and consequently combined radium in parent sample MW-14 required qualification as estimated with low bias (J-) and as estimated with high bias (J+) in field duplicate MWT-14. The MB detection required qualification of Rad-228 and combined radium in all samples as estimated with high bias (J+). This was resolved by qualifying combined radium in MW-14 as estimated with no bias (J).



Data Verification & Validation Report

Lansing Board of Water & Light – Erickson Power Station

Sampling Event (dates and purpose): New Wells: MW-16A/B/C/D – Background Round 3 – April 2023

Data Package Number: S47857.01

Lab Report Date: 06/16/2023

Data Validator: Aryka Thomson

Data Validation Completion Date: 06/28/2023

General Overall Assessment:

Data are usable without qualification.

Data are usable with qualification (as noted below).

Some or all data are unusable (as noted below).

Wells planned for sampling:

Well ID	Planned for Sampling
MW-1	
MW-2	
MW-3	
MW-4	
MW-5	
MW-6	
MW-7	
MW-7B	
MW-7C	
MW-8	
MW-9	
MW-10	
MW-11	
MW-11B	
MW-12	
MW-12B	
MW-13	
MW-14	
MW-15	
MW-16A	X
MW-16B	X
MW-16C	X
MW-16D	X

Data Summary

Sample ID	Matrix	Lab ID	Date Collected	App III Metals	App IV Metals	Part 115 Metals	Anions	TDS TSS	Rad-226 Rad-228	Diss. Metals
MW-16A	GW	S47857.01	04/25/2023	X	X	X	X	X	X	
MW-16B	GW	S47857.02	04/25/2023	X	X	X	X	X	X	
MW-16C	GW	S47857.03	04/25/2023	X	X	X	X	X	X	
MW-16D	GW	S47857.04	04/25/2023	X	X	X	X	X	X	
MWT-16A	QC	S47857.05	04/25/2023	X	X	X	X	X	X	

Other analytes requested for analysis: Na, Mg, K, HCO₃, CO₃, hardness

Any planned sampling or analysis NOT completed? If yes, explain: _____

Data Verification & Validation Checklist

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Field Data							
Sample Collection Field Forms	X		Purging performed as required in the Groundwater Monitoring Plan	X			
Field Calibration Records	X		Field instruments calibrated daily according to manufacturer specifications	X			
Chain of Custody	X		Accurately reflect samples, collection dates/times, analyses, bottles, etc.	X			
Field decontamination documentation	X		Record of decontamination for non-dedicated sampling equipment	X			
Drilling logs	X		N/A	-	-	-	
Well construction logs	X		N/A	-	-	-	
Well development field forms	X		N/A	-	-	-	
Analytical Data Package							
Cover Sheet	X		N/A	-	-	-	
Case Narrative	X		Summarizes sample receipt and any exceptions to QC acceptance criteria	X			
Internal Laboratory Chain of Custody forms	X		Analyses as requested; accurate transcription of field COC	X			
Sample Chronology and Consistency	X		Accurate representation of dates, times of receipt, preparation, and analysis	X			
Communication Records with Lab	X		N/A	-	-	-	
EDD Format Consistency	X		EDD format and content as requested	X			
Sample Identification, Results Nomenclature, and Data Qualifier Consistency	X		All included in final report	X			
Method Detection Limit Consistency	X		MDLs consistent between samples		X		Dilution varies for chloride across samples
Instrument Calibration Records	X		Present and no nonconformance noted	X			
Laboratory Report Complete	X		Includes QC component	X			
Holding Times	X		Analyses performed within allowed holding time	X			

Review Category	Verify Complete		Validation Criteria	Criteria Met?			Description of Nonconformance and Qualification (if applicable)
	Yes	No		Yes	No	N/A	
Method	X		Method as requested	X			
Reporting Limits	X		RLs as requested		X		RLs for chloride, TDS were not met
			MDLs<RLs		X		RL=MDL for carbonate
			MDLs<GPS			X	
QC Validation							
Evaluate Accuracy							
Matrix Spike (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Laboratory Control Sample (Recovery)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Evaluate Precision							
Matrix Spike Duplicate (RPD)	X		See "Minimum QC Procedures for Project Parameters" table	X			
Field Duplicate (RPD)	X		RPD ≤ 20%		X		Radium 228 and Combined Radium 226+228 RPD 374%, 53% respectively
Evaluate Representativeness							
Equipment Blanks (if applicable)	X		Non-detect (<RL)	X			
QC Verification							
Verify Instrument Calibration & Analytical Process							
Initial Calibration Verification	X		Laboratory-determined	-	-	-	
Continuing Calibration Verification	X		Laboratory-determined	-	-	-	
Initial Calibration Blank	X		Laboratory-determined	-	-	-	
Continuing Calibration Blank	X		Laboratory-determined	-	-	-	
Serial Dilutions	X		Laboratory-determined	-	-	-	K had recoveries outside control limits
Post-Digestion Spikes	X		Laboratory-determined	-	-	-	
Internal Standards	X		Laboratory-determined	-	-	-	
Laboratory Duplicate (RPD)	X		Laboratory-determined	-	-	-	
Method Blanks	X		Laboratory-determined	-	-	-	
Evaluate Completeness (# usable measurements/ # unusable measurements)							
Completeness	X		100%	X			

Other instances of nonconformance to QC control limits noted on case narrative:

Method blank MB 1205394668 result is greater than the MDC but less than the required detection limit for Rad-228. Result: 2.74 pCi/L > MDA: 2.68 pCi/L ≤ RDL: 3.00 pCi/L. Rad-228 and consequently combined radium in all samples required qualification as estimated with high bias (J+).

Comments:

The RPDs for Radium 228 and Combined Radium 226+228 RPD were 374% and 53%, respectively. Radium-228 and Combined Radium 226+228 required qualification as estimated with high bias (J+) in the

parent sample MW-16A and as estimated with low bias (J-) in field duplicate MWT-16A. The high bias qualification due to the MB has been resolved to a qualification as estimated (J) with no bias in field duplicate MWT-16A.

Sample ID S47857.05 was incorrectly tagged as MW-16A. A revision was requested on 6/28 to revise the sample tag to MWT-16A. A revised lab report and EDD was received the same day.

Appendix D

Statistical Output Reports



Table 1: Summary Statistics, Non-Detects Included

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Date Range	Distributions Fit ^a	Recommended Distribution	Mean	Median	Minimum	Maximum	SD	CV	MAD/0.675	Skewness	Kurtosis
1_01	MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	42	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.100	0.0700	0.0500	0.220	0.0605	0.604	0.0148	1.31	-0.0651
1_02	MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	42	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	133	140	98.4	188	22.2	0.167	17.8	0.210	-0.247
1_03	MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	33	0	0%	2020-04-28 to 2023-02-09	Gamma; Lognormal	Gamma	72.1	71.0	59.0	94.0	8.77	0.122	5.93	0.853	0.329
1_04	MW-4, MW-11, MW-12	Appendix III	Fluoride	mg/L	33	33	100%	2020-04-28 to 2023-02-09		Nonparametric	1.00	1.00	1.00	1.00	0	0	0	NA	NA
1_05	MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	33	9	27%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	100	57.0	5.00	344	108	1.08	77.0	1.05	-0.499
1_06	MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	708	612	368	1140	229	0.323	94.8	0.899	-0.783
1_07	MW-4, MW-11, MW-12	Appendix III	pH, Field	su	43	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	7.11	7.13	6.64	7.87	0.226	0.0318	0.163	0.357	1.98
2_04	MW-4, MW-11, MW-12	Appendix IV	Fluoride	mg/L	34	34	100%	2020-04-28 to 2023-02-09		Nonparametric	1.00	1.00	1.00	1.00	0	0	0	NA	NA
2_08	MW-4, MW-11, MW-12	Appendix IV	Antimony	mg/L	43	43	100%	2020-04-28 to 2023-02-09		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
2_09	MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	43	10	23%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.00774	0.00700	0.00200	0.0210	0.00648	0.836	0.00741	0.973	-0.393
2_10	MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	43	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.117	0.146	0.0520	0.167	0.0474	0.405	0.0296	-0.307	-1.90
2_11	MW-4, MW-11, MW-12	Appendix IV	Beryllium	mg/L	43	43	100%	2020-04-28 to 2023-02-09		Nonparametric	0.00100	0.00100	0.00100	0.00100	0	0	0	NA	NA
2_13	MW-4, MW-11, MW-12	Appendix IV	Cadmium	mg/L	43	43	100%	2020-04-28 to 2023-02-09		Nonparametric	0.000709	0.000500	0.000500	0.00500	0.000959	1.35	0	4.46	18.8
2_15	MW-4, MW-11, MW-12	Appendix IV	Chromium	mg/L	43	42	98%	2020-04-28 to 2023-02-09		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
2_16	MW-4, MW-11, MW-12	Appendix IV	Cobalt	mg/L	43	43	100%	2020-04-28 to 2023-02-09		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
2_18	MW-4, MW-11, MW-12	Appendix IV	Lead	mg/L	43	43	100%	2020-04-28 to 2023-02-09		Nonparametric	0.00300	0.00300	0.00300	0.00300	0	0	0	NA	NA
2_19	MW-4, MW-11, MW-12	Appendix IV	Lithium	mg/L	43	11	26%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.0135	0.0100	0.00500	0.0270	0.00683	0.507	0.00741	0.284	-1.35
2_21	MW-4, MW-11, MW-12	Appendix IV	Mercury	mg/L	43	43	100%	2020-04-28 to 2023-02-09		Nonparametric	0.000200	0.000200	0.000200	0.000200	0	0	0	NA	NA
2_22	MW-4, MW-11, MW-12	Appendix IV	Molybdenum	mg/L	43	22	51%	2020-04-28 to 2023-02-09	Gamma; Lognormal; Normal	Nonparametric	0.00986	0.00500	0.00500	0.0240	0.00634	0.643	0	1.03	-0.151
2_24	MW-4, MW-11, MW-12	Appendix IV	Radium-226	pCi/L	28	0	0%	2020-04-28 to 2023-02-09	Gamma; Lognormal	Gamma	0.683	0.603	0.194	2.12	0.444	0.650	0.307	2.06	4.66
2_25	MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	27	0	0%	2020-04-28 to 2023-02-09	Gamma; Lognormal; Normal	Normal	1.80	1.46	0.393	5.00	1.07	0.594	0.947	1.14	1.51
2_26	MW-4, MW-11, MW-12	Appendix IV	Radium-228	pCi/L	27	0	0%	2020-04-28 to 2023-02-09	Normal	Nonparametric	1.05	0.863	-0.793	2.89	0.961	0.912	0.935	0.116	-0.451
2_27	MW-4, MW-11, MW-12	Appendix IV	Selenium	mg/L	43	43	100%	2020-04-28 to 2023-02-09		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
2_29	MW-4, MW-11, MW-12	Appendix IV	Thallium	mg/L	43	43	100%	2020-04-28 to 2023-02-09		Nonparametric	0.00200	0.00200	0.00200	0.00200	0	0	0	NA	NA
2_30	MW-4, MW-11, MW-12	Appendix IV	Total Suspended Solids	mg/L	34	7	21%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	16.2	12.5	1.00	50.0	15.6	0.962	15.6	0.670	-0.781
5_37	MW-4, MW-11, MW-12	Part 115	Copper	mg/L	43	43	100%	2020-04-28 to 2023-02-09		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
5_38	MW-4, MW-11, MW-12	Part 115	Iron	mg/L	43	5	12%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	5.27	1.31	0.0200	23.5	8.37	1.59	1.05	1.51	0.394
5_39	MW-4, MW-11, MW-12	Part 115	Nickel	mg/L	43	24	56%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.0103	0.00500	0.00500	0.0210	0.00635	0.615	0	0.419	-1.78
5_40	MW-4, MW-11, MW-12	Part 115	Silver	mg/L	43	43	100%	2020-04-28 to 2023-02-09		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA
5_41	MW-4, MW-11, MW-12	Part 115	Vanadium	mg/L	43	43	100%	2020-04-28 to 2023-02-09		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
5_42	MW-4, MW-11, MW-12	Part 115	Zinc	mg/L	43	29	67%	2020-04-28 to 2023-02-09	Lognormal	Nonparametric	0.00647	0.00500	0.00500	0.0310	0.00446	0.690	0	4.59	23.2

^a Non-detects are excluded from goodness-of-fit tests.



Table 2: Summary Statistics, Non-Detects Excluded

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Date Range	Distributions Fit	Recommended Distribution	Mean	Median	Minimum	Maximum	SD	CV	MAD/0.675	Skewness	Kurtosis
1_01	MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	42	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.100	0.0700	0.0500	0.220	0.0605	0.604	0.0148	1.31	-0.0651
1_02	MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	42	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	133	140	98.4	188	22.2	0.167	17.8	0.210	-0.247
1_03	MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	33	0	0%	2020-04-28 to 2023-02-09	Gamma; Lognormal	Gamma	72.1	71.0	59.0	94.0	8.77	0.122	5.93	0.853	0.329
1_05	MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	33	9	27%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	136	58.0	51.0	344	107	0.789	4.44	0.713	-1.36
1_06	MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	708	612	368	1140	229	0.323	94.8	0.899	-0.783
1_07	MW-4, MW-11, MW-12	Appendix III	pH, Field	su	43	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	7.11	7.13	6.64	7.87	0.226	0.0318	0.163	0.357	1.98
2_09	MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	43	10	23%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.00948	0.00800	0.00200	0.0210	0.00645	0.680	0.00593	0.664	-0.934
2_10	MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	43	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.117	0.146	0.0520	0.167	0.0474	0.405	0.0296	-0.307	-1.90
2_15	MW-4, MW-11, MW-12	Appendix IV	Chromium	mg/L	43	42	98%	2020-04-28 to 2023-02-09		Nonparametric	0.00500	0.00500	0.00500	0.00500	NA	NA	0	NA	NA
2_19	MW-4, MW-11, MW-12	Appendix IV	Lithium	mg/L	43	11	26%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.0159	0.0180	0.00500	0.0270	0.00611	0.383	0.00815	-0.0482	-1.41
2_22	MW-4, MW-11, MW-12	Appendix IV	Molybdenum	mg/L	43	22	51%	2020-04-28 to 2023-02-09	Gamma; Lognormal; Normal	Nonparametric	0.0150	0.0140	0.00500	0.0240	0.00559	0.374	0.00444	0.225	-0.533
2_24	MW-4, MW-11, MW-12	Appendix IV	Radium-226	pCi/L	28	0	0%	2020-04-28 to 2023-02-09	Gamma; Lognormal	Gamma	0.683	0.603	0.194	2.12	0.444	0.650	0.307	2.06	4.66
2_25	MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	27	0	0%	2020-04-28 to 2023-02-09	Gamma; Lognormal; Normal	Normal	1.80	1.46	0.393	5.00	1.07	0.594	0.947	1.14	1.51
2_26	MW-4, MW-11, MW-12	Appendix IV	Radium-228	pCi/L	27	0	0%	2020-04-28 to 2023-02-09	Normal	Nonparametric	1.05	0.863	-0.793	2.89	0.961	0.912	0.935	0.116	-0.451
2_30	MW-4, MW-11, MW-12	Appendix IV	Total Suspended Solids	mg/L	34	7	21%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	19.6	22.0	1.00	50.0	15.8	0.805	19.3	0.287	-1.01
5_38	MW-4, MW-11, MW-12	Part 115	Iron	mg/L	43	5	12%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	5.96	1.33	0.0300	23.5	8.68	1.46	0.519	1.32	-0.169
5_39	MW-4, MW-11, MW-12	Part 115	Nickel	mg/L	43	24	56%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.0171	0.0180	0.00700	0.0210	0.00290	0.170	0.00148	-2.34	8.18
5_42	MW-4, MW-11, MW-12	Part 115	Zinc	mg/L	43	29	67%	2020-04-28 to 2023-02-09	Lognormal	Nonparametric	0.00950	0.00750	0.00500	0.0310	0.00704	0.741	0.00222	2.61	7.18



Table 3: Goodness-of-Fit Tests, Non-Detects Excluded

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Normal		Lognormal		Gamma				Log-SD (NDs excl.)	ProUCL Distributions Fit	Recommended Distribution				
								S-W		Lilliefors		S-W		Lilliefors					K-S		A-D	
								Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value				Stat.	p-Value	Stat.	p-Value
1_01	MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	42	0	0%	0.688	0.000	0.321	0.000	0.795	0.000	0.258	0.000	0.287	< 0.01	4.421	< 0.01	0.501	Nonparametric	Nonparametric
1_02	MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	42	0	0%	0.914	0.004	0.168	0.004	0.912	0.003	0.200	0.000	0.190	< 0.01	1.716	< 0.01	0.168	Nonparametric	Nonparametric
1_03	MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	33	0	0%	0.926	0.026	0.202	0.001	0.949	0.121	0.179	0.009	0.187	< 0.01	0.701	0.05 <= p < 0.10	0.118	Gamma; Lognormal	Gamma
1_04	MW-4, MW-11, MW-12	Appendix III	Fluoride	mg/L	33	33	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
1_05	MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	33	9	27%	0.713	0.000	0.385	0.000	0.700	0.000	0.374	0.000	0.386	< 0.01	3.603	< 0.01	0.771	Nonparametric	Nonparametric
1_06	MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	0.788	0.000	0.296	0.000	0.838	0.000	0.243	0.000	0.263	< 0.01	2.827	< 0.01	0.300	Nonparametric	Nonparametric
1_07	MW-4, MW-11, MW-12	Appendix III	pH, Field	su	43	0	0%	0.925	0.008	0.139	0.036	0.930	0.011	0.145	0.023	0.144	0.01 <= p < 0.05	1.146	< 0.01	0.032	Nonparametric	Nonparametric
2_04	MW-4, MW-11, MW-12	Appendix IV	Fluoride	mg/L	34	34	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_08	MW-4, MW-11, MW-12	Appendix IV	Antimony	mg/L	43	43	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_09	MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	43	10	23%	0.851	0.000	0.257	0.000	0.886	0.002	0.161	0.030	0.163	0.01 <= p < 0.05	1.164	< 0.01	0.788	Nonparametric	Nonparametric
2_10	MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	43	0	0%	0.754	0.000	0.282	0.000	0.750	0.000	0.315	0.000	0.308	< 0.01	5.011	< 0.01	0.464	Nonparametric	Nonparametric
2_11	MW-4, MW-11, MW-12	Appendix IV	Beryllium	mg/L	43	43	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_13	MW-4, MW-11, MW-12	Appendix IV	Cadmium	mg/L	43	43	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_15	MW-4, MW-11, MW-12	Appendix IV	Chromium	mg/L	43	42	98%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_16	MW-4, MW-11, MW-12	Appendix IV	Cobalt	mg/L	43	43	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_18	MW-4, MW-11, MW-12	Appendix IV	Lead	mg/L	43	43	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_19	MW-4, MW-11, MW-12	Appendix IV	Lithium	mg/L	43	11	26%	0.905	0.008	0.197	0.003	0.889	0.003	0.245	0.000	0.233	< 0.01	1.629	< 0.01	0.430	Nonparametric	Nonparametric
2_21	MW-4, MW-11, MW-12	Appendix IV	Mercury	mg/L	43	43	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_22	MW-4, MW-11, MW-12	Appendix IV	Molybdenum	mg/L	43	22	51%	0.944	0.267	0.139	0.359	0.927	0.120	0.149	0.262	0.123	>= 0.10	0.356	>= 0.10	0.420	Gamma; Lognormal; Normal	Nonparametric
2_24	MW-4, MW-11, MW-12	Appendix IV	Radium-226	pCi/L	28	0	0%	0.780	0.000	0.219	0.001	0.969	0.564	0.114	0.464	0.141	>= 0.10	0.640	0.05 <= p < 0.10	0.550	Gamma; Lognormal	Gamma
2_25	MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	27	0	0%	0.912	0.025	0.151	0.115	0.983	0.931	0.091	0.814	0.102	>= 0.10	0.232	>= 0.10	0.611	Gamma; Lognormal; Normal	Normal
2_26	MW-4, MW-11, MW-12	Appendix IV	Radium-228	pCi/L	27	0	0%	0.970	0.595	0.136	0.223	NA	NA	NA	NA	NA	NA	NA	NA	NA	Normal	Nonparametric
2_27	MW-4, MW-11, MW-12	Appendix IV	Selenium	mg/L	43	43	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_29	MW-4, MW-11, MW-12	Appendix IV	Thallium	mg/L	43	43	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_30	MW-4, MW-11, MW-12	Appendix IV	Total Suspended Solids	mg/L	34	7	21%	0.908	0.020	0.187	0.016	0.813	0.000	0.254	0.000	0.203	0.01 <= p < 0.05	1.572	< 0.01	1.449	Nonparametric	Nonparametric
5_37	MW-4, MW-11, MW-12	Part 115	Copper	mg/L	43	43	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
5_38	MW-4, MW-11, MW-12	Part 115	Iron	mg/L	43	5	12%	0.609	0.000	0.403	0.000	0.842	0.000	0.222	0.000	0.291	< 0.01	3.759	< 0.01	1.730	Nonparametric	Nonparametric
5_39	MW-4, MW-11, MW-12	Part 115	Nickel	mg/L	43	24	56%	0.755	0.000	0.230	0.010	0.608	0.000	0.266	0.001	0.257	< 0.01	2.103	< 0.01	0.229	Nonparametric	Nonparametric
5_40	MW-4, MW-11, MW-12	Part 115	Silver	mg/L	43	43	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
5_41	MW-4, MW-11, MW-12	Part 115	Vanadium	mg/L	43	43	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
5_42	MW-4, MW-11, MW-12	Part 115	Zinc	mg/L	43	29	67%	0.639	0.000	0.329	0.000	0.828	0.011	0.208	0.105	0.252	0.01 <= p < 0.05	1.226	< 0.01	0.519	Lognormal	Nonparametric

Note: p-values above 0.05 suggest a fit to the tested distribution; a distribution passes its GOF test when at least one of the two p-values is above 0.05.



Table 4: Autocorrelation Tests, Non-Detects Excluded

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Autocorrelation	Box-Ljung p-value	Sig.
1_01	MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	42	0	0%	-0.161	0.281	
1_02	MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	42	0	0%	0.672	0.000	***
1_03	MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	33	0	0%	-0.626	0.000	***
1_05	MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	33	9	27%	0.543	0.005	**
1_06	MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	-0.109	0.513	
1_07	MW-4, MW-11, MW-12	Appendix III	pH, Field	su	43	0	0%	0.093	0.527	
2_09	MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	43	10	23%	-0.337	0.043	*
2_10	MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	43	0	0%	0.232	0.116	
2_15	MW-4, MW-11, MW-12	Appendix IV	Chromium	mg/L	43	42	98%	NA	NA	
2_19	MW-4, MW-11, MW-12	Appendix IV	Lithium	mg/L	43	11	26%	0.517	0.002	**
2_22	MW-4, MW-11, MW-12	Appendix IV	Molybdenum	mg/L	43	22	51%	0.662	0.001	**
2_24	MW-4, MW-11, MW-12	Appendix IV	Radium-226	pCi/L	28	0	0%	-0.121	0.500	
2_25	MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	27	0	0%	-0.137	0.451	
2_26	MW-4, MW-11, MW-12	Appendix IV	Radium-228	pCi/L	27	0	0%	-0.170	0.351	
2_30	MW-4, MW-11, MW-12	Appendix IV	Total Suspended Solids	mg/L	34	7	21%	0.324	0.075	
5_38	MW-4, MW-11, MW-12	Part 115	Iron	mg/L	43	5	12%	-0.270	0.084	
5_39	MW-4, MW-11, MW-12	Part 115	Nickel	mg/L	43	24	56%	0.074	0.729	
5_42	MW-4, MW-11, MW-12	Part 115	Zinc	mg/L	43	29	67%	-0.087	0.717	

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 5: Outlier Counts by Date

Date	Count
2020-05-26	1
2021-05-04	1
2022-02-23	4
2022-03-30	3
2022-05-04	3
2022-06-08	4
2022-07-13	3
2022-08-17	4
2022-09-21	3
2022-10-26	4
2023-02-09	3

Table 6: Outliers Identified at the 1% Significance Level, Non-Detects Excluded

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	No. Detects	Date	Value
1_01	MW-11	Appendix III	Boron	mg/L	42	0	0%	42	2022-02-23	0.220
1_01	MW-11	Appendix III	Boron	mg/L	42	0	0%	42	2022-06-08	0.220
1_01	MW-11	Appendix III	Boron	mg/L	42	0	0%	42	2022-09-21	0.220
1_01	MW-11	Appendix III	Boron	mg/L	42	0	0%	42	2022-05-04	0.210
1_01	MW-11	Appendix III	Boron	mg/L	42	0	0%	42	2022-07-13	0.210
1_01	MW-11	Appendix III	Boron	mg/L	42	0	0%	42	2022-08-17	0.210
1_01	MW-11	Appendix III	Boron	mg/L	42	0	0%	42	2022-10-26	0.210
1_01	MW-11	Appendix III	Boron	mg/L	42	0	0%	42	2023-02-09	0.210
1_01	MW-11	Appendix III	Boron	mg/L	42	0	0%	42	2022-03-30	0.200
1_06	MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	33	2022-05-04	1140
1_06	MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	33	2022-03-30	1110
1_06	MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	33	2022-02-23	1090
1_06	MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	33	2022-07-13	1090
1_06	MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	33	2022-06-08	1080
1_06	MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	33	2022-08-17	1050
1_06	MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	33	2022-09-21	1020
1_06	MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	33	2022-10-26	1020
1_06	MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	33	2023-02-09	948
1_06	MW-11	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	33	2022-08-17	368
2_24	MW-4	Appendix IV	Radium-226	pCi/L	28	0	0%	28	2021-05-04	2.12
2_24	MW-12	Appendix IV	Radium-226	pCi/L	28	0	0%	28	2022-06-08	1.90
5_38	MW-11	Part 115	Iron	mg/L	43	5	12%	38	2022-05-04	23.5
5_38	MW-11	Part 115	Iron	mg/L	43	5	12%	38	2022-03-30	23.2
5_38	MW-11	Part 115	Iron	mg/L	43	5	12%	38	2022-02-23	22.2
5_38	MW-11	Part 115	Iron	mg/L	43	5	12%	38	2022-07-13	22.0
5_38	MW-11	Part 115	Iron	mg/L	43	5	12%	38	2022-09-21	21.5

(Table continues on next page)



Table 6: Outliers Identified at the 1% Significance Level, Non-Detects Excluded (*continued*)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	No. Detects	Date	Value
5_38	MW-11	Part 115	Iron	mg/L	43	5	12%	38	2022-06-08	21.4
5_38	MW-11	Part 115	Iron	mg/L	43	5	12%	38	2022-08-17	21.4
5_38	MW-11	Part 115	Iron	mg/L	43	5	12%	38	2022-10-26	19.8
5_38	MW-11	Part 115	Iron	mg/L	43	5	12%	38	2023-02-09	15.5
5_38	MW-12	Part 115	Iron	mg/L	43	5	12%	38	2022-02-23	3.83
5_39	MW-11	Part 115	Nickel	mg/L	43	24	56%	19	2022-10-26	0.00700
5_42	MW-4	Part 115	Zinc	mg/L	43	29	67%	14	2020-05-26	0.0310



Table 7: Seasonality Tests

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full							Without Non-Detects									
						Sample Size					p-Value		Sample Size					p-Value				
						Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	
1_01	MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	0%	9	9	14	10	42	0.601	NA	0.991	0.933	9	9	14	10	42	0.601	0.991	0.933
1_02	MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	0%	9	9	14	10	42	0.864	NA	0.737	0.795	9	9	14	10	42	0.864	0.737	0.795
1_03	MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	0%	7	7	11	8	33	0.735	NA	0.668	0.702	7	7	11	8	33	0.735	0.668	0.702
1_04	MW-4, MW-11, MW-12	Appendix III	Fluoride	mg/L	100%	7	7	11	8	33	NA	NA	0.303	NA	NA	NA	NA	NA	NA	NA	NA	NA
1_05	MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	27%	7	7	11	8	33	0.883	NA	0.990	1.000	5	5	8	6	24	0.694	0.972	0.990
1_06	MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	0%	7	7	11	8	33	0.979	NA	0.988	0.987	7	7	11	8	33	0.979	0.988	0.987
1_07	MW-4, MW-11, MW-12	Appendix III	pH, Field	su	0%	9	9	14	11	43	0.485	NA	0.210	0.209	9	9	14	11	43	0.485	0.210	0.209
2_04	MW-4, MW-11, MW-12	Appendix IV	Fluoride	mg/L	100%	7	7	11	9	34	NA	NA	0.285	NA	NA	NA	NA	NA	NA	NA	NA	NA
2_08	MW-4, MW-11, MW-12	Appendix IV	Antimony	mg/L	100%	9	9	14	11	43	NA	NA	0.293	0.293	NA	NA	NA	NA	NA	NA	NA	NA
2_09	MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	23%	9	9	14	11	43	0.811	NA	0.978	0.973	5	8	10	10	33	0.632	0.841	0.681
2_10	MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	0%	9	9	14	11	43	0.953	NA	0.973	0.985	9	9	14	11	43	0.953	0.973	0.985
2_11	MW-4, MW-11, MW-12	Appendix IV	Beryllium	mg/L	100%	9	9	14	11	43	NA	NA	0.293	NA	NA	NA	NA	NA	NA	NA	NA	NA
2_13	MW-4, MW-11, MW-12	Appendix IV	Cadmium	mg/L	100%	9	9	14	11	43	0.052	NA	0.045 *	0.045 *	NA	NA	NA	NA	NA	NA	NA	NA
2_15	MW-4, MW-11, MW-12	Appendix IV	Chromium	mg/L	98%	9	9	14	11	43	NA	NA	0.293	0.293	0	0	1	0	1	NA	NA	NA
2_16	MW-4, MW-11, MW-12	Appendix IV	Cobalt	mg/L	100%	9	9	14	11	43	NA	NA	0.293	0.293	NA	NA	NA	NA	NA	NA	NA	NA
2_18	MW-4, MW-11, MW-12	Appendix IV	Lead	mg/L	100%	9	9	14	11	43	NA	NA	0.293	0.293	NA	NA	NA	NA	NA	NA	NA	NA
2_19	MW-4, MW-11, MW-12	Appendix IV	Lithium	mg/L	26%	9	9	14	11	43	0.920	NA	0.956	0.984	8	5	10	9	32	0.832	0.751	0.781
2_21	MW-4, MW-11, MW-12	Appendix IV	Mercury	mg/L	100%	9	9	14	11	43	NA	NA	0.293	0.293	NA	NA	NA	NA	NA	NA	NA	NA
2_22	MW-4, MW-11, MW-12	Appendix IV	Molybdenum	mg/L	51%	9	9	14	11	43	0.656	NA	0.227	0.590	5	4	7	5	21	0.003 **	0.000 ***	0.003 **
2_24	MW-4, MW-11, MW-12	Appendix IV	Radium-226	pCi/L	0%	6	6	8	8	28	0.107	NA	0.205	0.127	6	6	8	8	28	0.107	0.205	0.127
2_25	MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	0%	5	7	8	7	27	0.909	NA	0.855	0.897	5	7	8	7	27	0.909	0.855	0.897
2_26	MW-4, MW-11, MW-12	Appendix IV	Radium-228	pCi/L	0%	5	7	8	7	27	0.749	NA	0.748	NA	5	7	8	7	27	0.749	0.748	NA
2_27	MW-4, MW-11, MW-12	Appendix IV	Selenium	mg/L	100%	9	9	14	11	43	NA	NA	0.293	0.293	NA	NA	NA	NA	NA	NA	NA	NA
2_29	MW-4, MW-11, MW-12	Appendix IV	Thallium	mg/L	100%	9	9	14	11	43	NA	NA	0.293	0.293	NA	NA	NA	NA	NA	NA	NA	NA
2_30	MW-4, MW-11, MW-12	Appendix IV	Total Suspended Solids	mg/L	21%	7	7	11	9	34	0.962	NA	0.959	0.975	6	6	8	7	27	0.952	0.947	0.933
5_37	MW-4, MW-11, MW-12	Part 115	Copper	mg/L	100%	9	9	14	11	43	NA	NA	0.293	0.293	NA	NA	NA	NA	NA	NA	NA	NA
5_38	MW-4, MW-11, MW-12	Part 115	Iron	mg/L	12%	9	9	14	11	43	0.914	NA	0.985	0.997	7	8	13	10	38	0.940	0.976	0.898
5_39	MW-4, MW-11, MW-12	Part 115	Nickel	mg/L	56%	9	9	14	11	43	0.912	NA	0.946	0.979	4	4	6	5	19	0.184	0.212	0.274
5_40	MW-4, MW-11, MW-12	Part 115	Silver	mg/L	100%	9	9	14	11	43	NA	NA	0.293	0.293	NA	NA	NA	NA	NA	NA	NA	NA
5_41	MW-4, MW-11, MW-12	Part 115	Vanadium	mg/L	100%	9	9	14	11	43	NA	NA	0.293	0.293	NA	NA	NA	NA	NA	NA	NA	NA
5_42	MW-4, MW-11, MW-12	Part 115	Zinc	mg/L	67%	9	9	14	11	43	0.694	NA	0.399	0.464	1	4	4	5	14	0.980	0.752	0.883

*** p < 0.001, ** p < 0.01, * p < 0.05



Table 8: Spatial Variability Tests

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full									Without Non-Detects										
						Sample Size				p-Value					Sample Size				p-Value						
						MW-11	MW-12	MW-4	Total	Kruskal-Wallis	ANOVA	Log ANOVA	MW-11	MW-12	MW-4	Total	Kruskal-Wallis	ANOVA	Log ANOVA						
1_01	MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	0%	9	18	15	42	0.000	***	0.000	***	0.000	***	9	18	15	42	0.000	***	0.000	***	0.000	***
1_02	MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	0%	9	18	15	42	0.000	***	0.000	***	0.000	***	9	18	15	42	0.000	***	0.000	***	0.000	***
1_03	MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	0%	9	9	15	33	0.000	***	0.000	***	0.000	***	9	9	15	33	0.000	***	0.000	***	0.000	***
1_04	MW-4, MW-11, MW-12	Appendix III	Fluoride	mg/L	100%	9	9	15	33	NA		0.564		NA		NA	NA	NA	NA	NA		NA		NA	
1_05	MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	27%	9	9	15	33	0.000	***	0.000	***	0.000	***	0	9	15	24	0.000	***	0.000	***	0.000	***
1_06	MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	0%	9	9	15	33	0.000	***	0.000	***	0.000	***	9	9	15	33	0.000	***	0.000	***	0.000	***
1_07	MW-4, MW-11, MW-12	Appendix III	pH, Field	su	0%	9	18	16	43	0.003	**	0.000	***	0.000	***	9	18	16	43	0.003	**	0.000	***	0.000	***
2_04	MW-4, MW-11, MW-12	Appendix IV	Fluoride	mg/L	100%	9	9	16	34	NA		0.584		NA		NA	NA	NA	NA	NA		NA		NA	
2_08	MW-4, MW-11, MW-12	Appendix IV	Antimony	mg/L	100%	9	18	16	43	NA		0.440		0.440		NA	NA	NA	NA	NA		NA		NA	
2_09	MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	23%	9	18	16	43	0.000	***	0.000	***	0.000	***	9	8	16	33	0.000	***	0.000	***	0.000	***
2_10	MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	0%	9	18	16	43	0.000	***	0.000	***	0.000	***	9	18	16	43	0.000	***	0.000	***	0.000	***
2_11	MW-4, MW-11, MW-12	Appendix IV	Beryllium	mg/L	100%	9	18	16	43	NA		0.440		NA		NA	NA	NA	NA	NA		NA		NA	
2_13	MW-4, MW-11, MW-12	Appendix IV	Cadmium	mg/L	100%	9	18	16	43	0.241		0.246		0.246		NA	NA	NA	NA	NA		NA		NA	
2_15	MW-4, MW-11, MW-12	Appendix IV	Chromium	mg/L	98%	9	18	16	43	NA		0.440		0.440		1	0	0	1	NA		NA		NA	
2_16	MW-4, MW-11, MW-12	Appendix IV	Cobalt	mg/L	100%	9	18	16	43	NA		0.440		0.440		NA	NA	NA	NA	NA		NA		NA	
2_18	MW-4, MW-11, MW-12	Appendix IV	Lead	mg/L	100%	9	18	16	43	NA		0.440		0.440		NA	NA	NA	NA	NA		NA		NA	
2_19	MW-4, MW-11, MW-12	Appendix IV	Lithium	mg/L	26%	9	18	16	43	0.000	***	0.000	***	0.000	***	1	18	13	32	0.000	***	0.000	***	0.000	***
2_21	MW-4, MW-11, MW-12	Appendix IV	Mercury	mg/L	100%	9	18	16	43	NA		0.440		0.440		NA	NA	NA	NA	NA		NA		NA	
2_22	MW-4, MW-11, MW-12	Appendix IV	Molybdenum	mg/L	51%	9	18	16	43	0.000	***	0.000	***	0.000	***	1	18	2	21	0.024	*	0.012	*	0.000	***
2_24	MW-4, MW-11, MW-12	Appendix IV	Radium-226	pCi/L	0%	6	9	13	28	0.402		0.491		0.388		6	9	13	28	0.402		0.491		0.388	
2_25	MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	0%	6	9	12	27	0.221		0.401		0.366		6	9	12	27	0.221		0.401		0.366	
2_26	MW-4, MW-11, MW-12	Appendix IV	Radium-228	pCi/L	0%	6	9	12	27	0.582		0.723		NA		6	9	12	27	0.582		0.723		NA	
2_27	MW-4, MW-11, MW-12	Appendix IV	Selenium	mg/L	100%	9	18	16	43	NA		0.440		0.440		NA	NA	NA	NA	NA		NA		NA	
2_29	MW-4, MW-11, MW-12	Appendix IV	Thallium	mg/L	100%	9	18	16	43	NA		0.440		0.440		NA	NA	NA	NA	NA		NA		NA	
2_30	MW-4, MW-11, MW-12	Appendix IV	Total Suspended Solids	mg/L	21%	9	9	16	34	0.000	***	0.000	***	0.000	***	9	9	9	27	0.000	***	0.000	***	0.000	***
5_37	MW-4, MW-11, MW-12	Part 115	Copper	mg/L	100%	9	18	16	43	NA		0.440		0.440		NA	NA	NA	NA	NA		NA		NA	
5_38	MW-4, MW-11, MW-12	Part 115	Iron	mg/L	12%	9	18	16	43	0.000	***	0.000	***	0.000	***	9	13	16	38	0.000	***	0.000	***	0.000	***
5_39	MW-4, MW-11, MW-12	Part 115	Nickel	mg/L	56%	9	18	16	43	0.000	***	0.000	***	0.000	***	1	18	0	19	0.090		0.000	***	0.000	***
5_40	MW-4, MW-11, MW-12	Part 115	Silver	mg/L	100%	9	18	16	43	NA		0.440		0.440		NA	NA	NA	NA	NA		NA		NA	
5_41	MW-4, MW-11, MW-12	Part 115	Vanadium	mg/L	100%	9	18	16	43	NA		0.440		0.440		NA	NA	NA	NA	NA		NA		NA	
5_42	MW-4, MW-11, MW-12	Part 115	Zinc	mg/L	67%	9	18	16	43	0.775		0.701		0.854		3	8	3	14	0.280		0.167		0.189	

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 9: Trend Tests: Lognormal MLE and MK

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Type	Method	Slope	p-value	Trend
1_01	MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	42	0	0%	Nonparametric	MK	0.0000251	0.005	↑
1_02	MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	42	0	0%	Nonparametric	MK	0.0377	0.011	↔
1_03	MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	33	0	0%	Parametric	Lognormal MLE	0.0000141	0.815	↔
1_05	MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	33	9	27%	Nonparametric	MK	-0.00487	0.245	↔
1_06	MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	Nonparametric	MK	0.131	0.015	↔
1_07	MW-4, MW-11, MW-12	Appendix III	pH, Field	su	43	0	0%	Nonparametric	MK	-0.0000336	0.644	↔
2_09	MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	43	10	23%	Nonparametric	MK	0	0.243	↔
2_10	MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	43	0	0%	Nonparametric	MK	-0.0000445	0.000	↓
2_24	MW-4, MW-11, MW-12	Appendix IV	Radium-226	pCi/L	28	0	0%	Parametric	Lognormal MLE	-0.0000503	0.867	↔
2_25	MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	27	0	0%	Parametric	Lognormal MLE	0.000159	0.640	↔
2_26	MW-4, MW-11, MW-12	Appendix IV	Radium-228	pCi/L	27	0	0%	Nonparametric	MK	0.000132	0.933	↔
2_30	MW-4, MW-11, MW-12	Appendix IV	Total Suspended Solids	mg/L	34	7	21%	Nonparametric	MK	0.0233	0.006	↑
5_38	MW-4, MW-11, MW-12	Part 115	Iron	mg/L	43	5	12%	Nonparametric	MK	0	0.950	↔

Table 10: Trend Tests: Piecewise Linear-Linear

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Line 1			Line 2			Break 1	R-Squared	Overall Trend
								Slope	p-Value	Trend	Slope	p-Value	Trend			
1_01	MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	42	0	0%	0.0000989	0.017	↔	-0.0000636	0.729	↔	2022-06-08	0.176	↔
1_02	MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	42	0	0%	0.0704	0.000	↑	-0.0353	0.283	↔	2022-03-20	0.504	↔
1_03	MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	33	0	0%	0.0111	0.187	↔	-0.0294	0.229	↔	2022-03-30	0.104	↔
1_05	MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	33	9	27%	0.138	0.187	↔	-0.147	0.623	↔	2022-04-22	0.094	↔
1_06	MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	0.450	0.014	↔	-0.376	0.572	↔	2022-05-22	0.264	↔
1_07	MW-4, MW-11, MW-12	Appendix III	pH, Field	su	43	0	0%	-0.000433	0.022	↔	0.000678	0.177	↔	2022-03-30	0.173	↔
2_09	MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	43	10	23%	0.0000181	0.812	↔	-0.00000832	0.844	↔	2020-09-14	0.005	↔
2_10	MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	43	0	0%	-0.000102	0.001	↓	0.0000353	0.784	↔	2022-06-08	0.334	↔
2_13	MW-4, MW-11, MW-12	Appendix IV	Cadmium	mg/L	43	43	100%	-0.0000000000000641	1.000	↔	0.00150	0.000	↑	2023-02-06	0.650	↔
2_22	MW-4, MW-11, MW-12	Appendix IV	Molybdenum	mg/L	43	22	51%	0.0000152	0.001	↑	-0.0000225	0.136	↔	2022-05-04	0.311	↔
2_24	MW-4, MW-11, MW-12	Appendix IV	Radium-226	pCi/L	28	0	0%	0.00209	0.128	↔	-0.000993	0.293	↔	2021-05-04	0.132	↔
2_25	MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	27	0	0%	0.00477	0.411	↔	-0.00213	0.206	↔	2021-05-03	0.112	↔
2_30	MW-4, MW-11, MW-12	Appendix IV	Total Suspended Solids	mg/L	34	7	21%	0.0395	0.000	↑	-0.0588	0.183	↔	2022-07-12	0.499	↔
5_38	MW-4, MW-11, MW-12	Part 115	Iron	mg/L	43	5	12%	0.0112	0.077	↔	-0.0119	0.596	↔	2022-05-18	0.105	↔
5_39	MW-4, MW-11, MW-12	Part 115	Nickel	mg/L	43	24	56%	0.0000142	0.004	↑	-0.00000671	0.602	↔	2022-04-20	0.296	↔
5_42	MW-4, MW-11, MW-12	Part 115	Zinc	mg/L	43	29	67%	-0.0000869	0.202	↔	0.000000578	0.816	↔	2020-08-17	0.180	↔



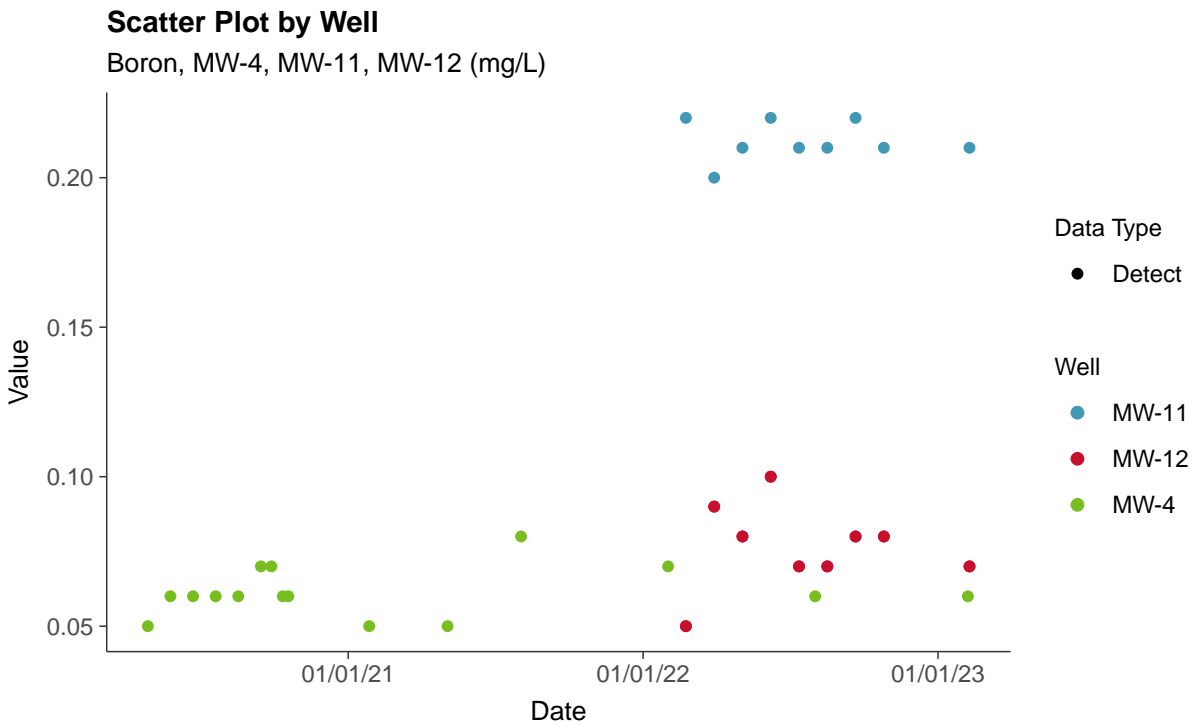
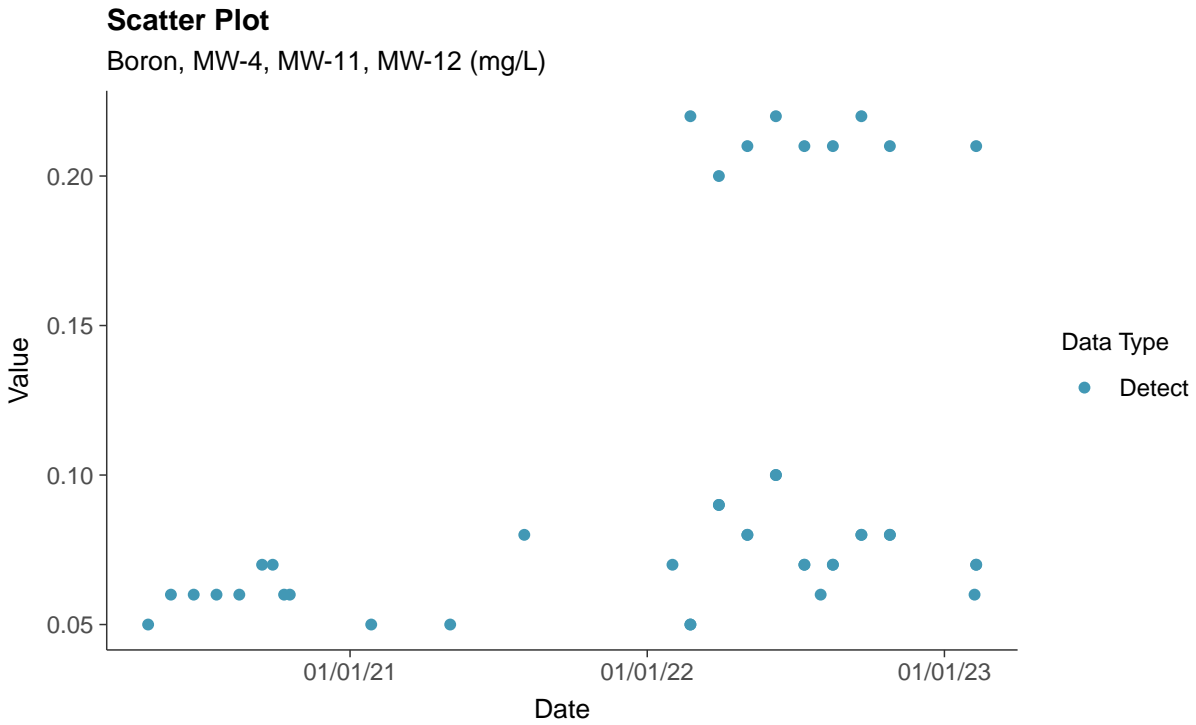
Table 11: Trend Tests: Piecewise Linear-Linear-Linear

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Line 1			Line 2			Line 3			Break 1	Break 2	R-Squared	Overall Trend
								Slope	p-Value	Trend	Slope	p-Value	Trend	Slope	p-Value	Trend				
1_01	MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	42	0	0%	0.0000192	0.880	↔	0.000828	0.425	↔	-0.0000747	0.580	↔	2022-01-17	2022-03-30	0.198	↔
1_03	MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	33	0	0%	-0.00484	0.854	↔	0.0341	0.518	↔	-0.0340	0.119	↔	2021-07-15	2022-03-29	0.127	↔
1_06	MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	33	0	0%	-0.0925	0.880	↔	1.30	0.218	↔	-0.451	0.435	↔	2021-07-24	2022-04-11	0.305	↔
1_07	MW-4, MW-11, MW-12	Appendix III	pH, Field	su	43	0	0%	0.00120	0.321	↔	-0.000677	0.108	↔	0.000738	0.089	↔	2020-10-19	2022-03-23	0.222	↔
2_09	MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	43	10	23%	0.0000183	0.815	↔	-0.000000412	0.932	↔	-0.00000820	0.998	↔	2020-09-06	2022-10-26	0.006	↔
2_13	MW-4, MW-11, MW-12	Appendix IV	Cadmium	mg/L	43	43	100%	0.0000000141	0.997	↔	-0.00000000783	0.993	↔	0.0000216	0.960	↔	2020-12-28	2022-10-26	0.481	↔
2_19	MW-4, MW-11, MW-12	Appendix IV	Lithium	mg/L	43	11	26%	0.00000325	0.827	↔	0.0000535	0.659	↔	0.000000152	0.992	↔	2022-01-20	2022-04-04	0.133	↔
2_24	MW-4, MW-11, MW-12	Appendix IV	Radium-226	pCi/L	28	0	0%	-0.00353	0.477	↔	0.00406	0.378	↔	-0.00141	0.045	↔	2020-08-28	2021-05-03	0.227	↔
2_25	MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	27	0	0%	0.00807	0.025	↔	-0.0108	0.616	↔	0.00240	0.403	↔	2021-07-29	2022-05-03	0.254	↔
2_26	MW-4, MW-11, MW-12	Appendix IV	Radium-228	pCi/L	27	0	0%	0.00482	0.133	↔	-0.0156	0.188	↔	0.00354	0.257	↔	2021-11-17	2022-05-09	0.218	↔
5_42	MW-4, MW-11, MW-12	Part 115	Zinc	mg/L	43	29	67%	-0.0000821	0.239	↔	-0.00000576	0.933	↔	0.00000159	0.724	↔	2020-08-17	2021-01-26	0.182	↔



Appendix III: Boron, MW-4, MW-11, MW-12

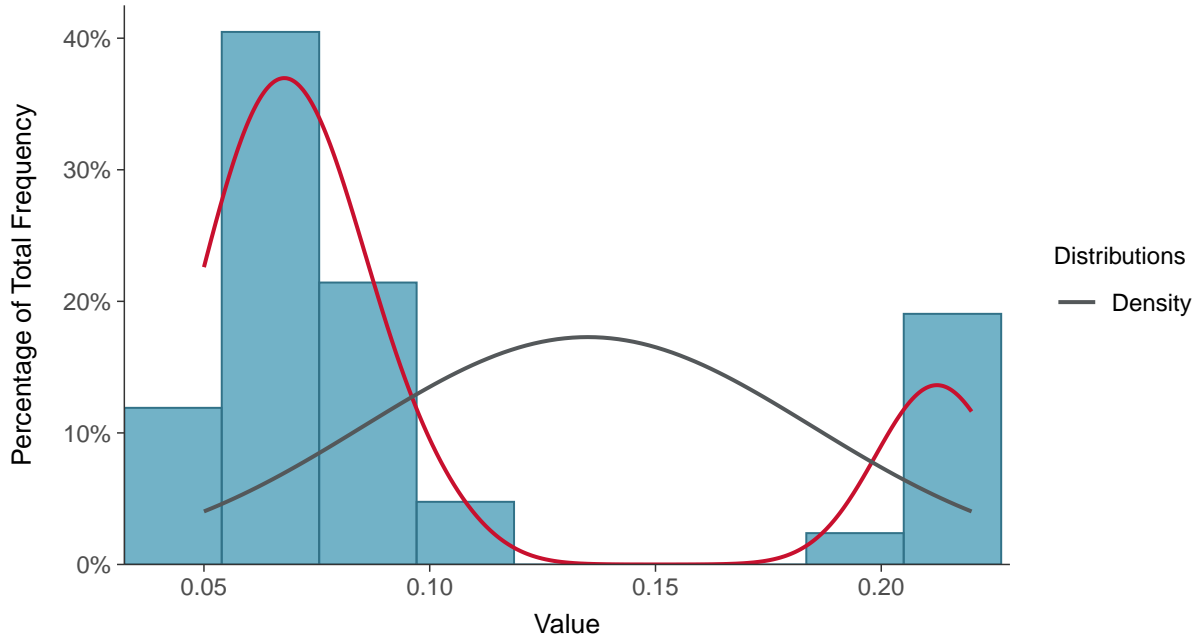
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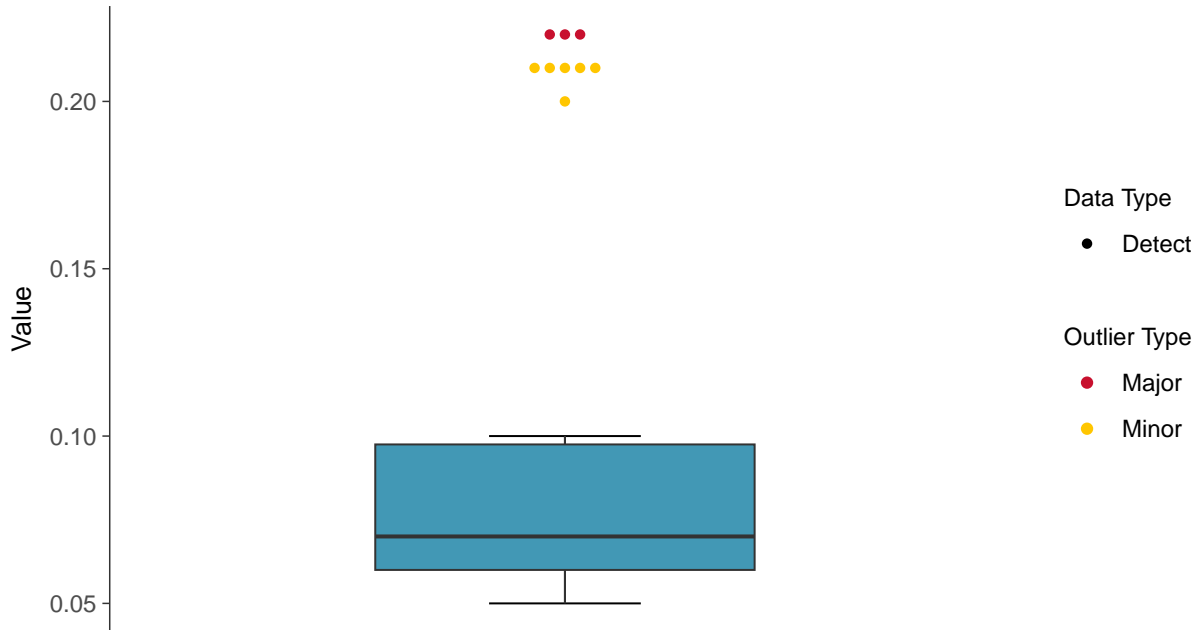
Histogram

Boron, MW-4, MW-11, MW-12 (mg/L)



Boxplot

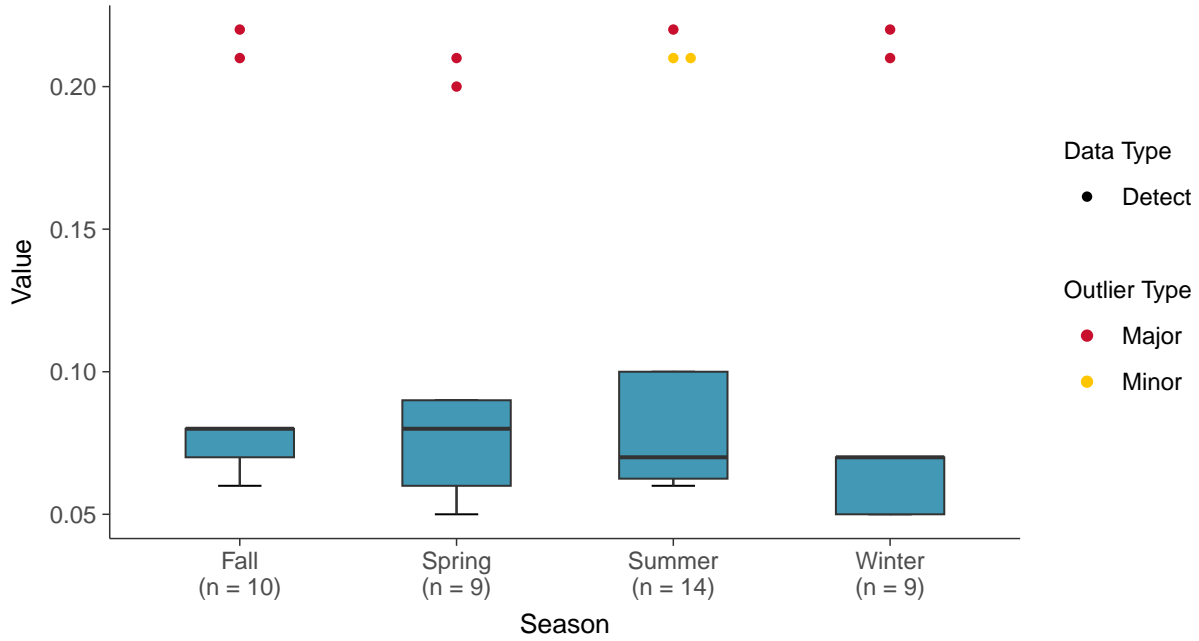
Boron, MW-4, MW-11, MW-12 (mg/L)





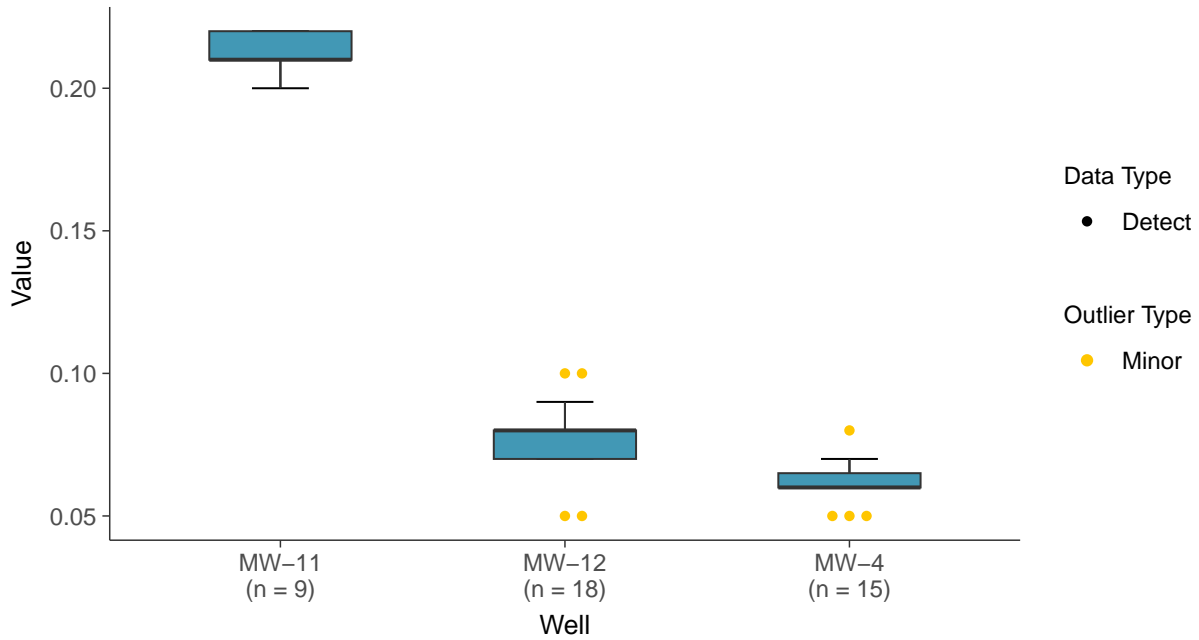
Boxplot by Season

Boron, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

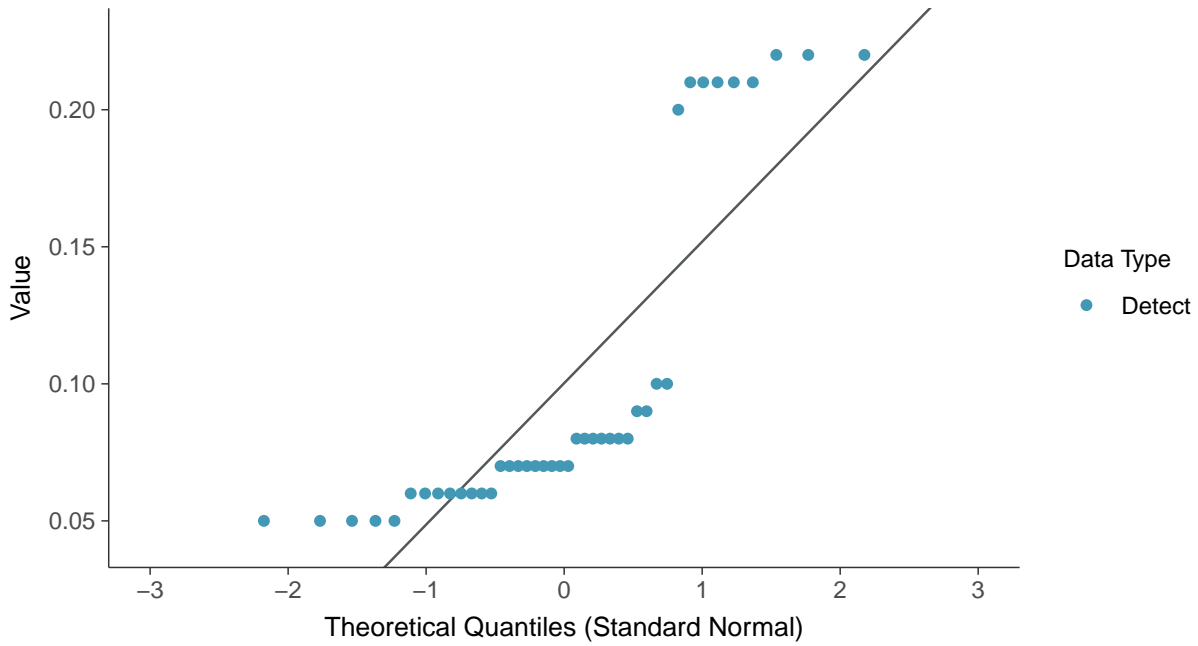
Boron, MW-4, MW-11, MW-12 (mg/L)





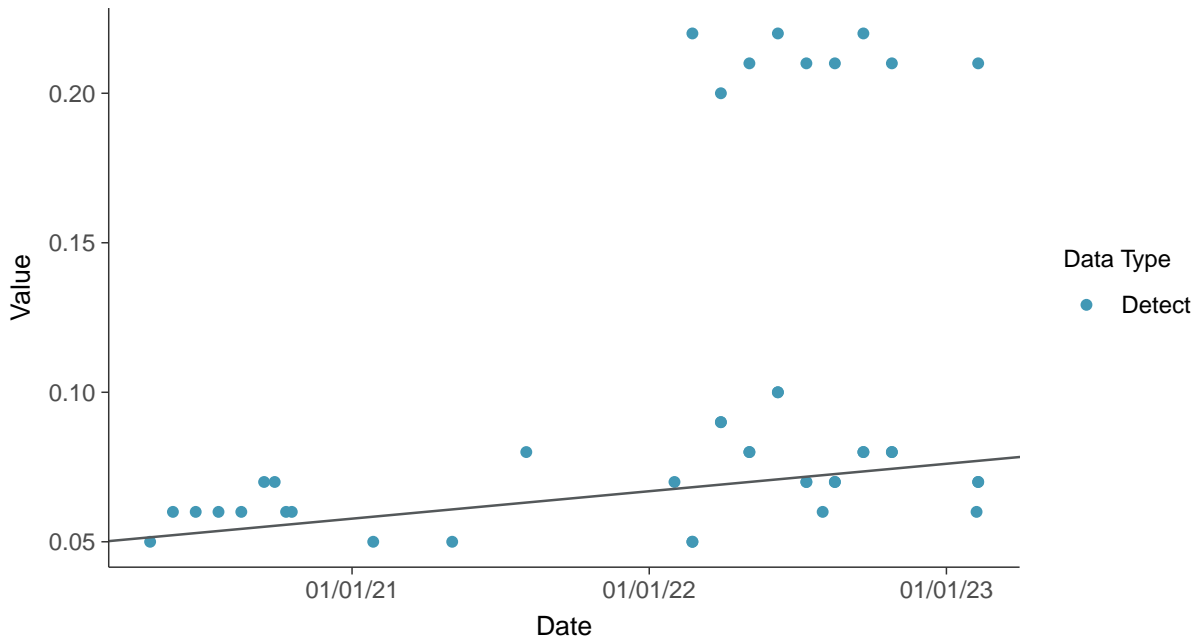
Normal Q-Q plot

Boron, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

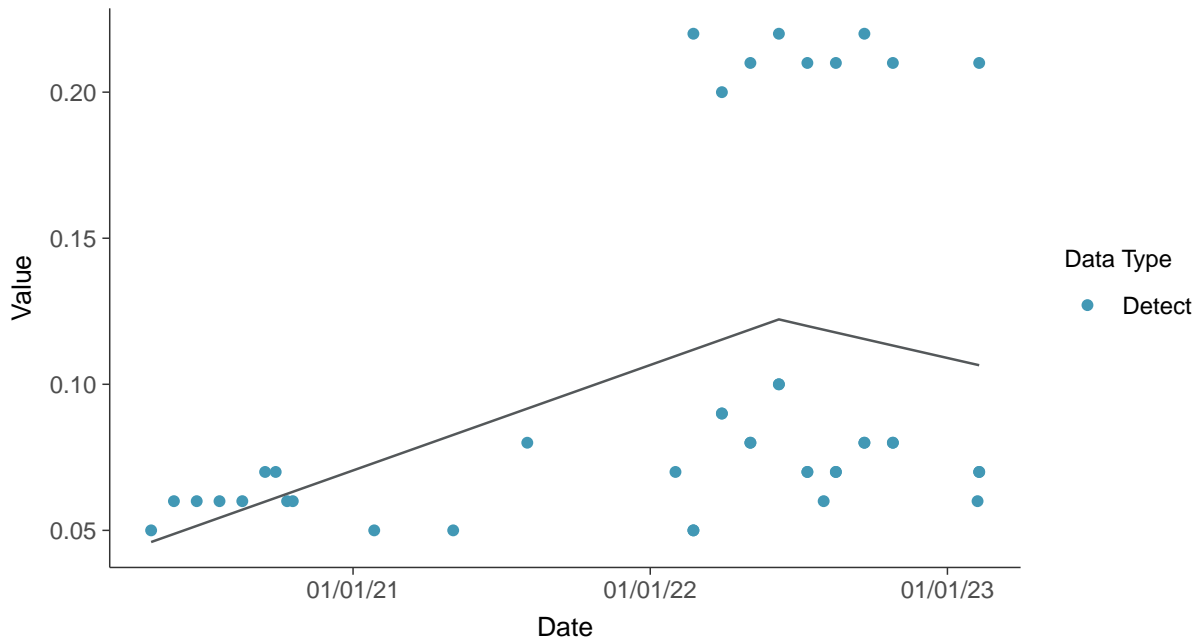
Boron, MW-4, MW-11, MW-12 (mg/L)





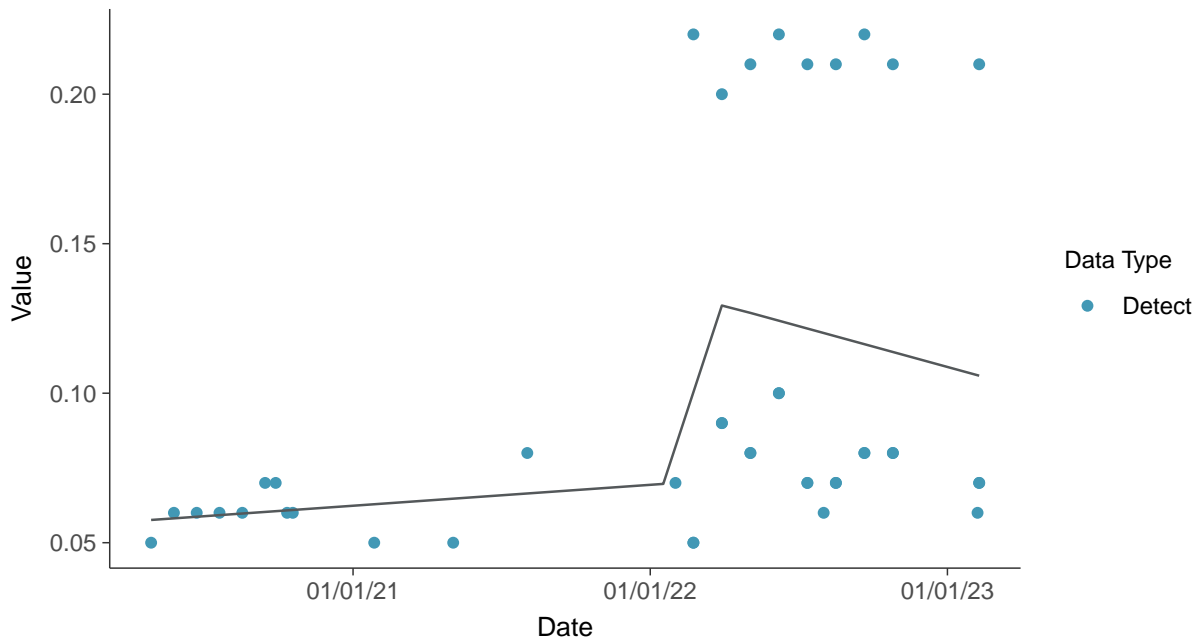
Trend Regression: Piecewise Linear-Linear

Boron, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Boron, MW-4, MW-11, MW-12 (mg/L)



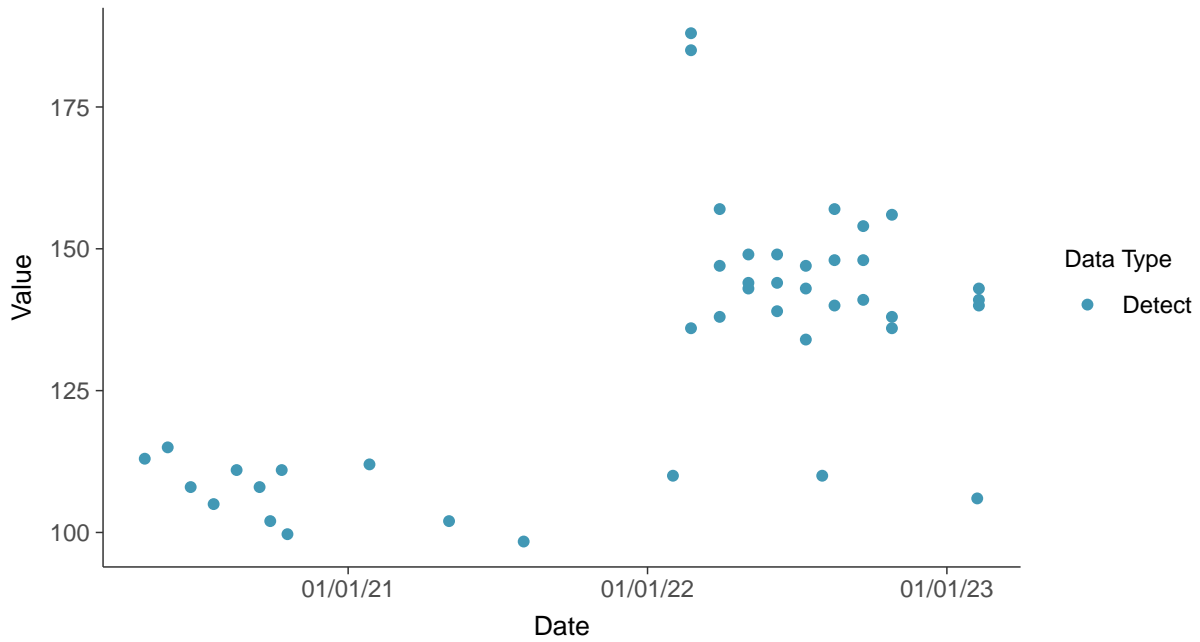


Appendix III: Calcium, MW-4, MW-11, MW-12

ID: 1_02

Scatter Plot

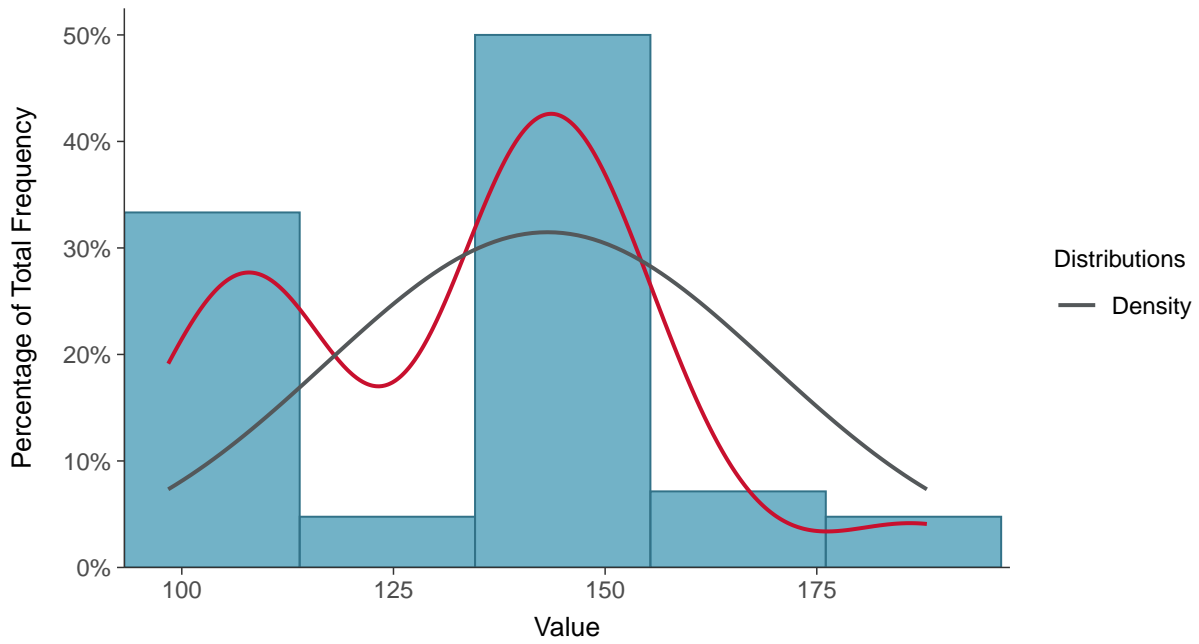
Calcium, MW-4, MW-11, MW-12 (mg/L)





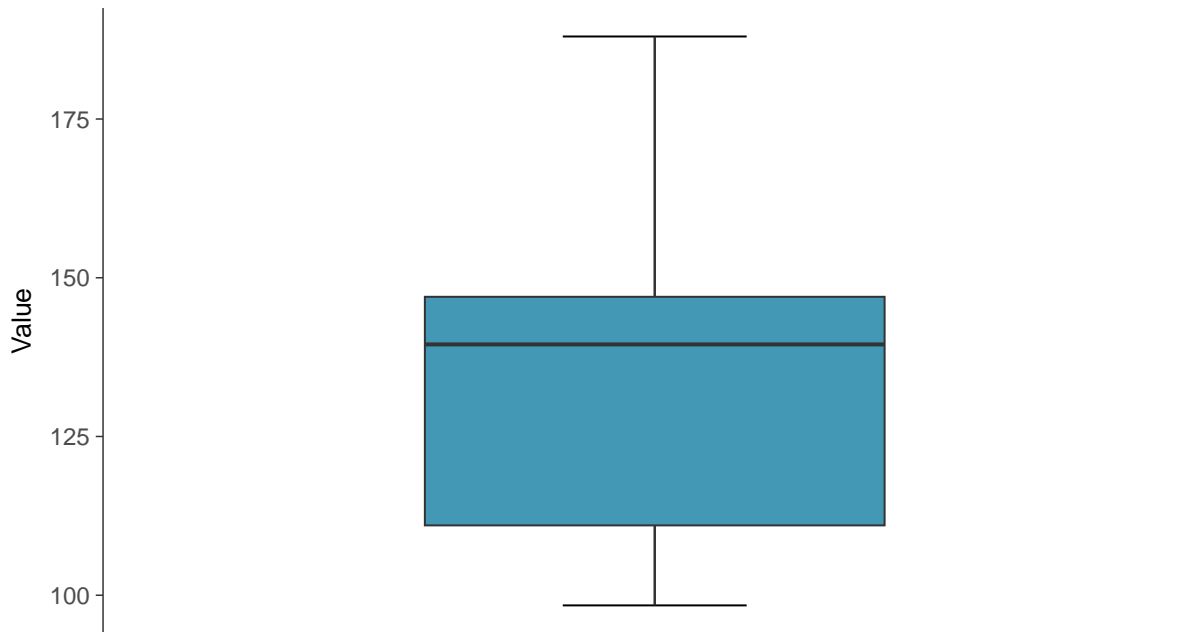
Histogram

Calcium, MW-4, MW-11, MW-12 (mg/L)



Boxplot

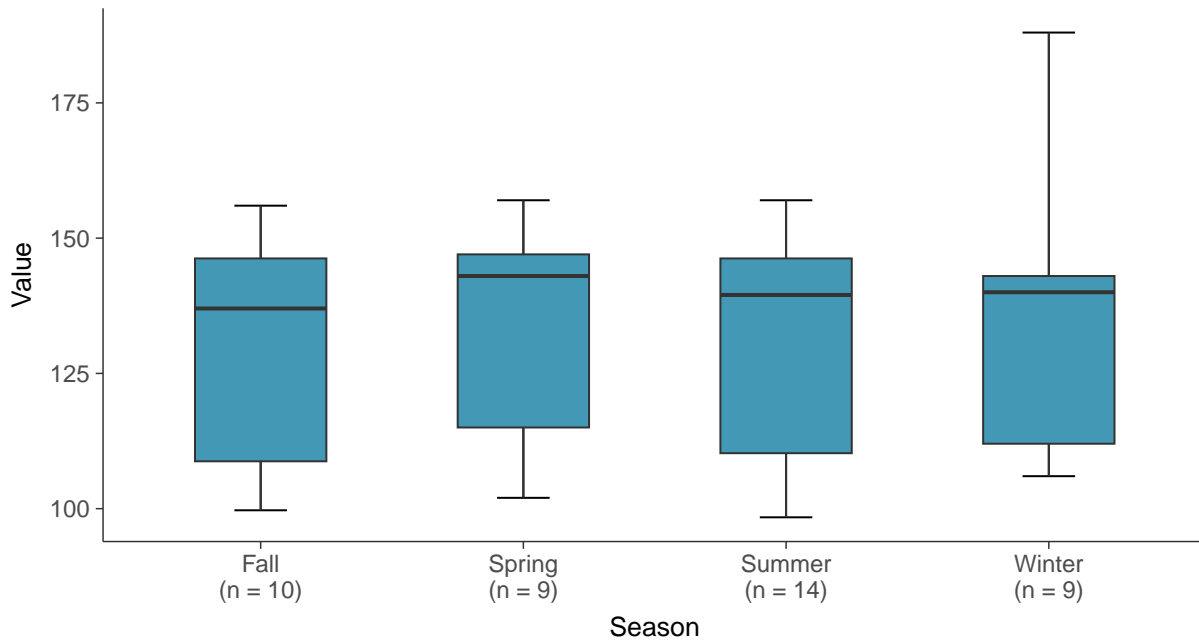
Calcium, MW-4, MW-11, MW-12 (mg/L)





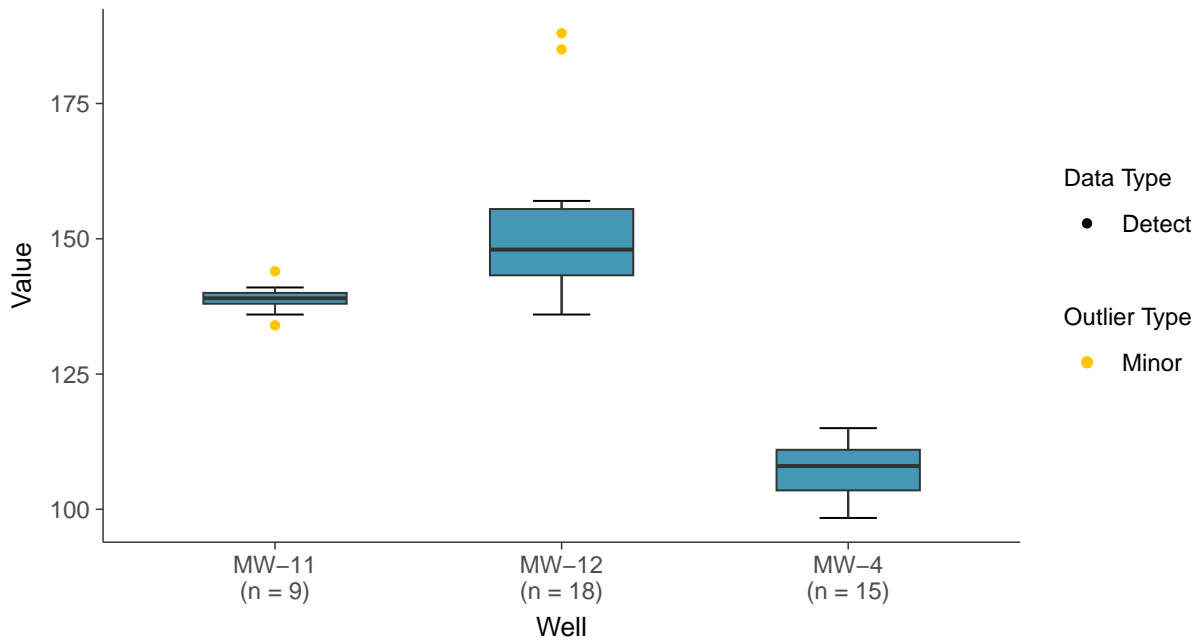
Boxplot by Season

Calcium, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

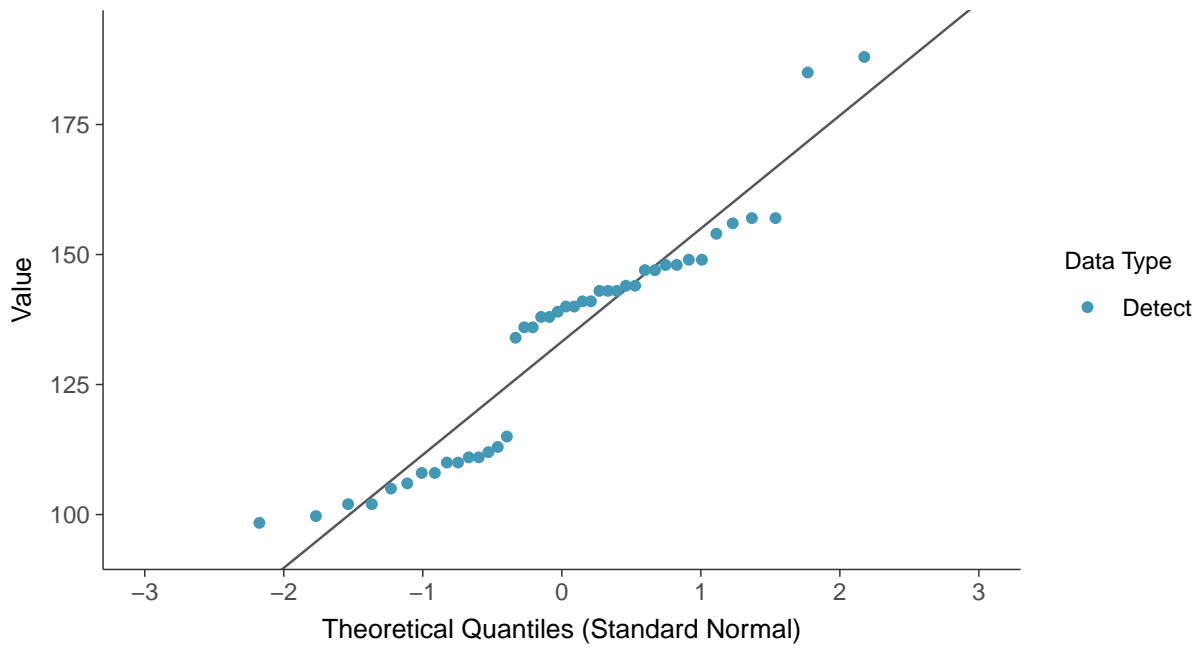
Calcium, MW-4, MW-11, MW-12 (mg/L)





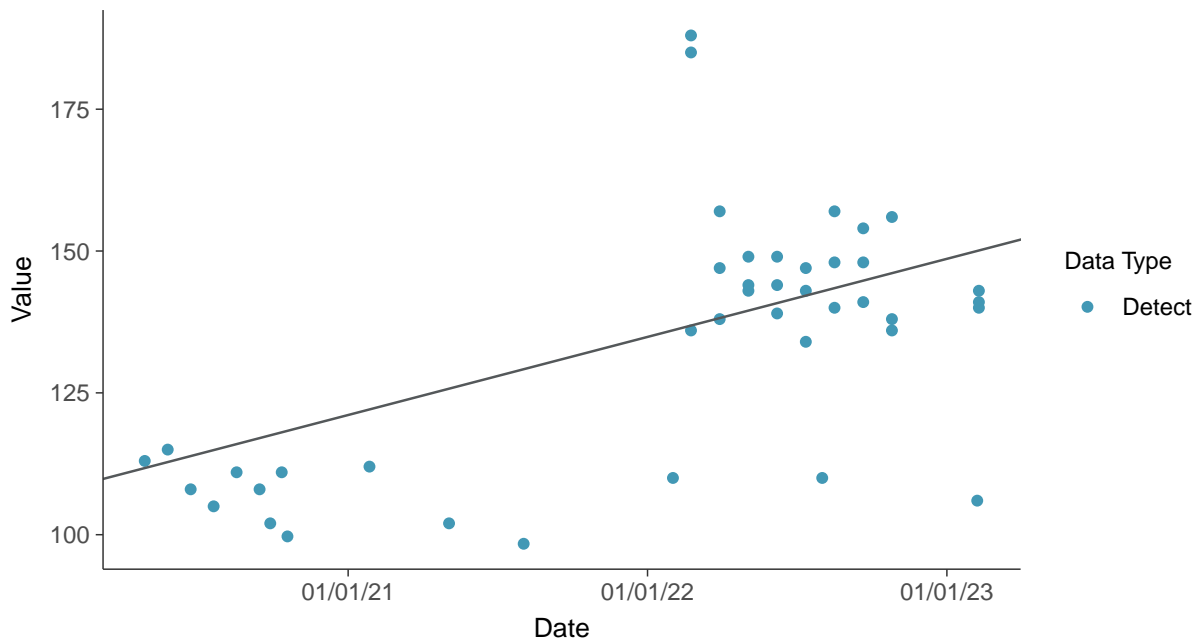
Normal Q-Q plot

Calcium, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

Calcium, MW-4, MW-11, MW-12 (mg/L)



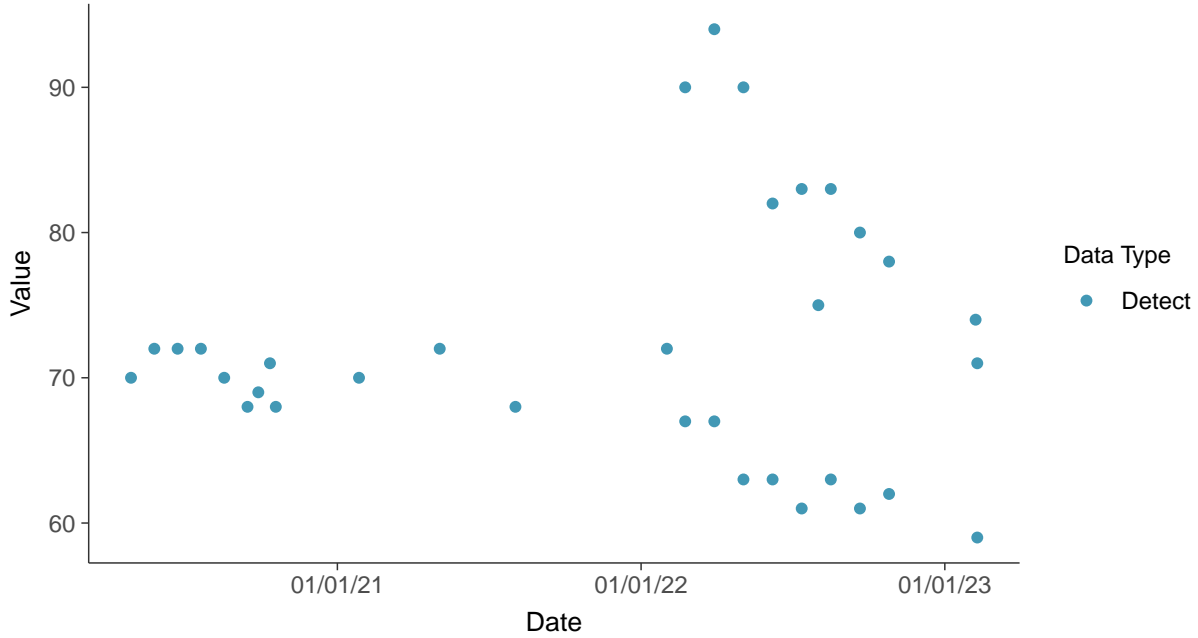


Appendix III: Chloride, MW-4, MW-11, MW-12

ID: 1_03

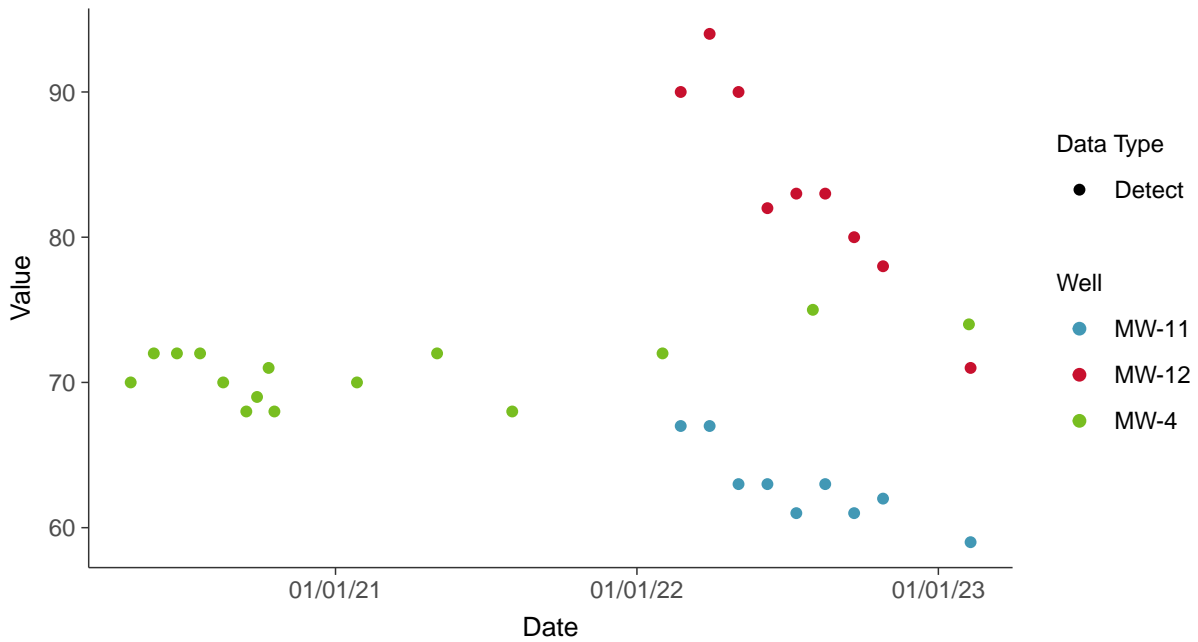
Scatter Plot

Chloride, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

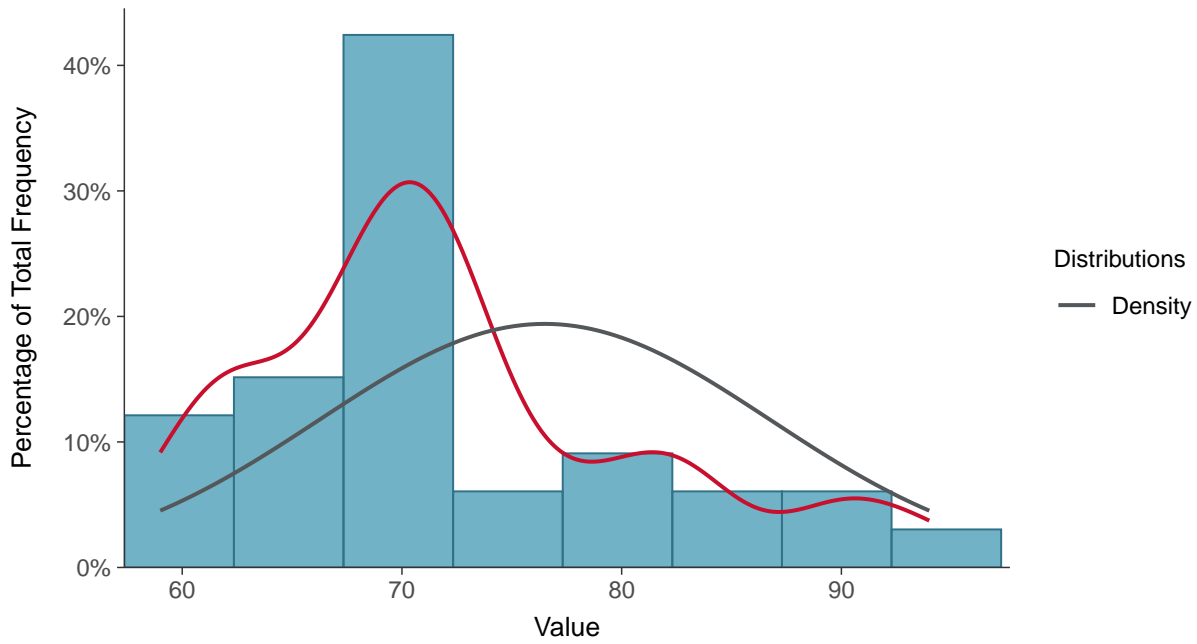
Chloride, MW-4, MW-11, MW-12 (mg/L)





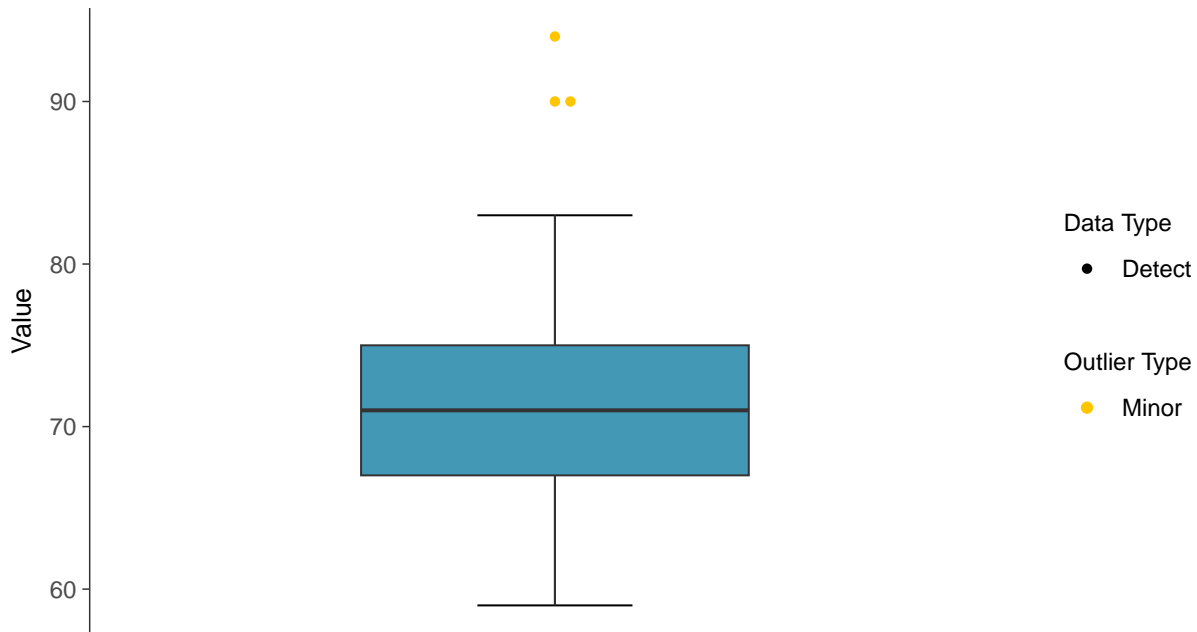
Histogram

Chloride, MW-4, MW-11, MW-12 (mg/L)



Boxplot

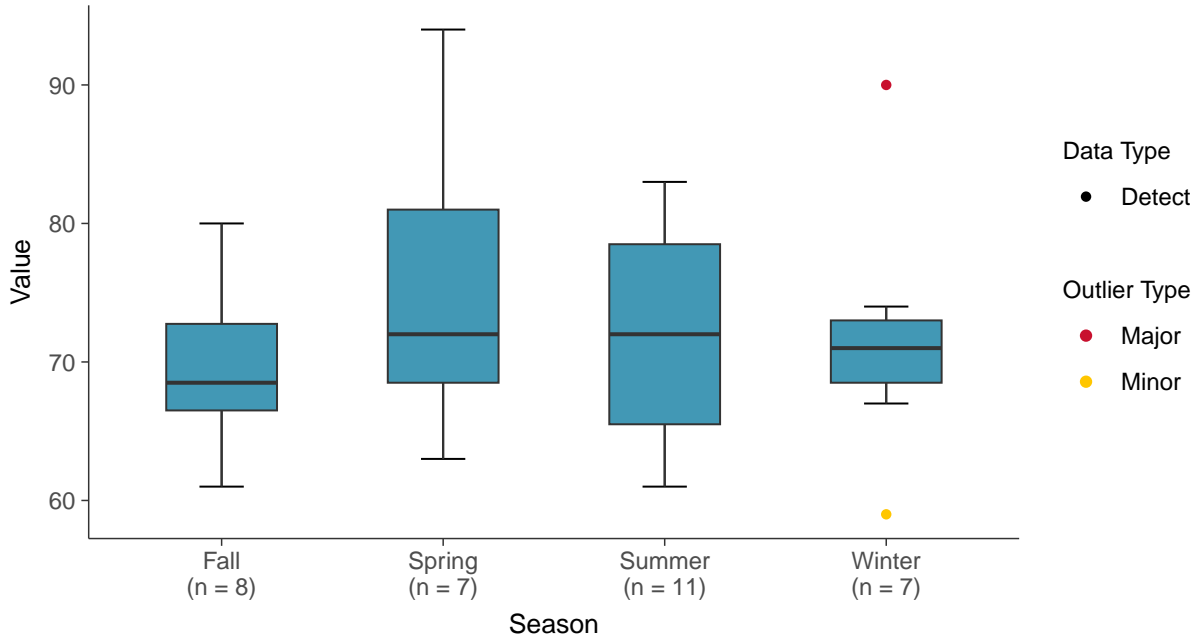
Chloride, MW-4, MW-11, MW-12 (mg/L)





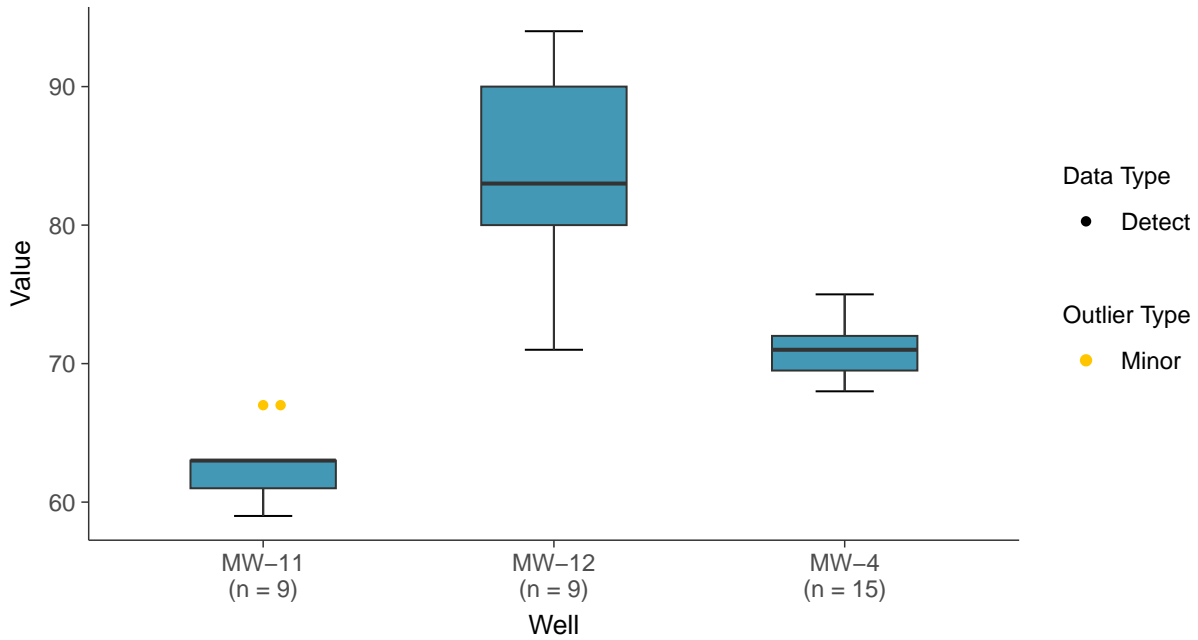
Boxplot by Season

Chloride, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

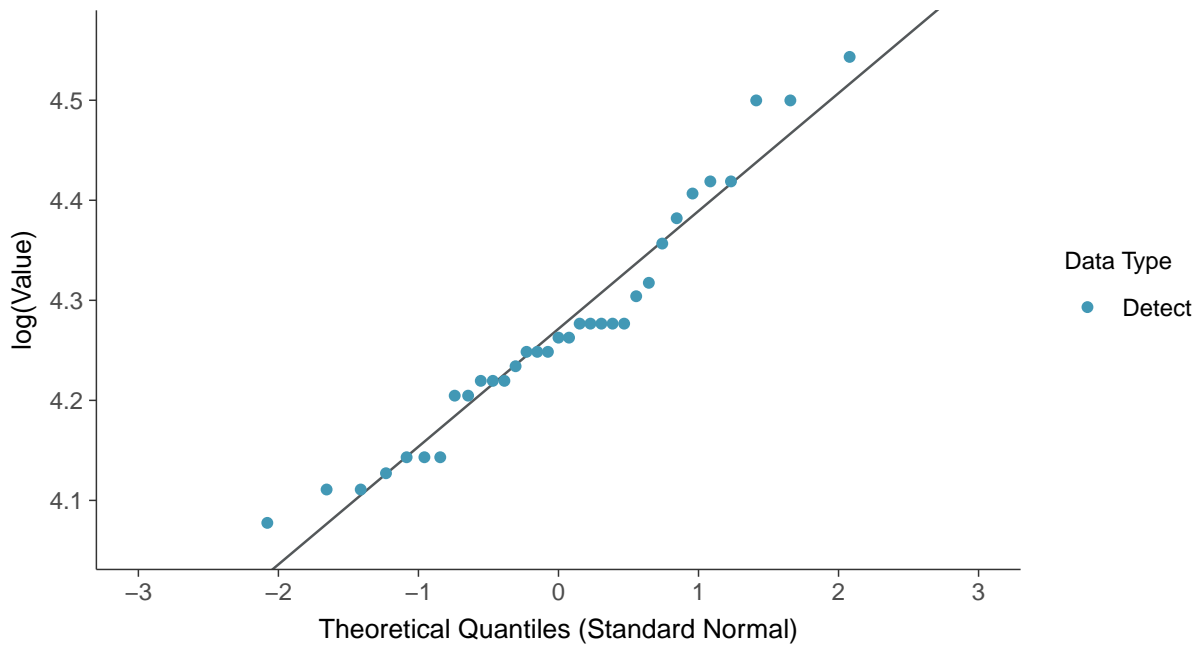
Chloride, MW-4, MW-11, MW-12 (mg/L)





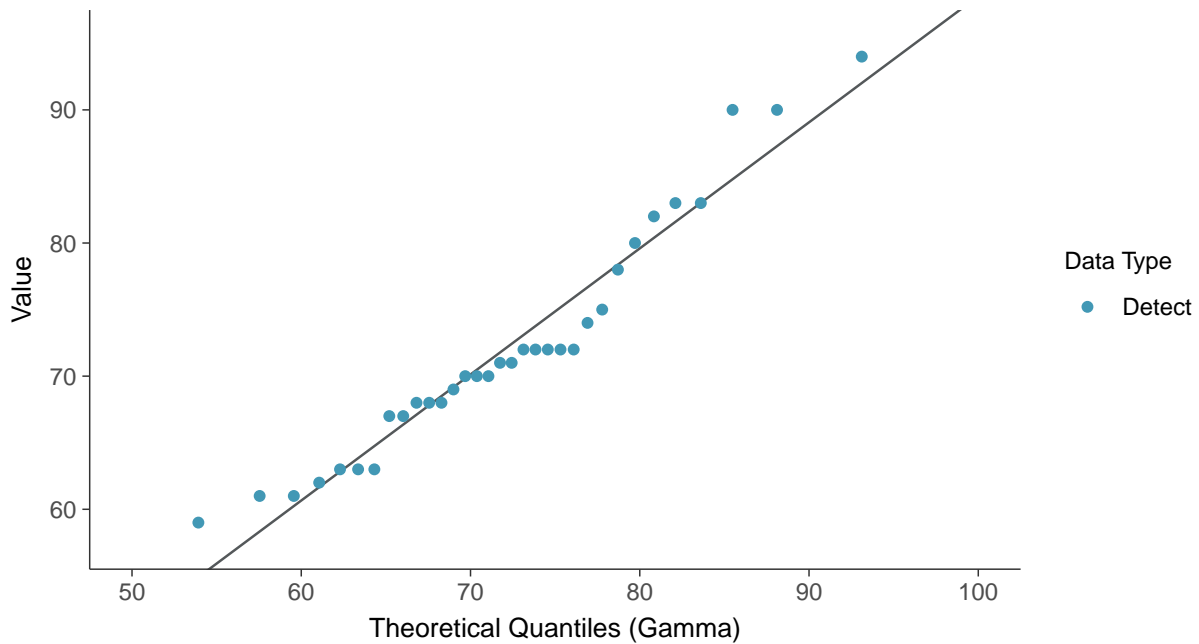
Lognormal Q-Q plot

Chloride, MW-4, MW-11, MW-12 (mg/L)



Gamma Q-Q plot

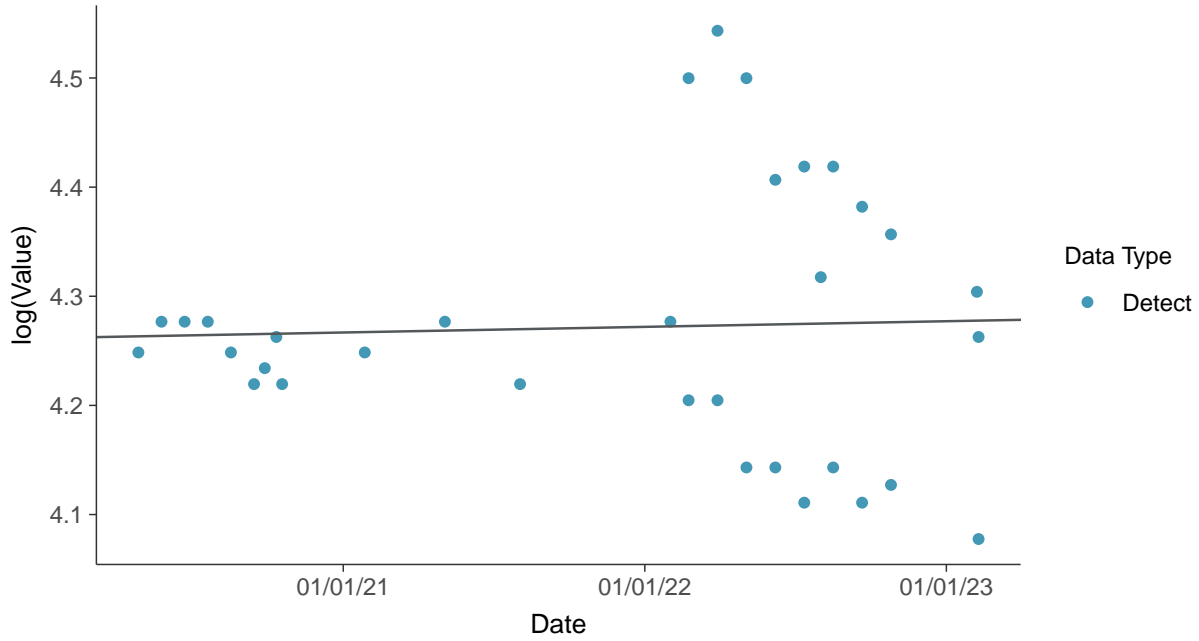
Chloride, MW-4, MW-11, MW-12 (mg/L)





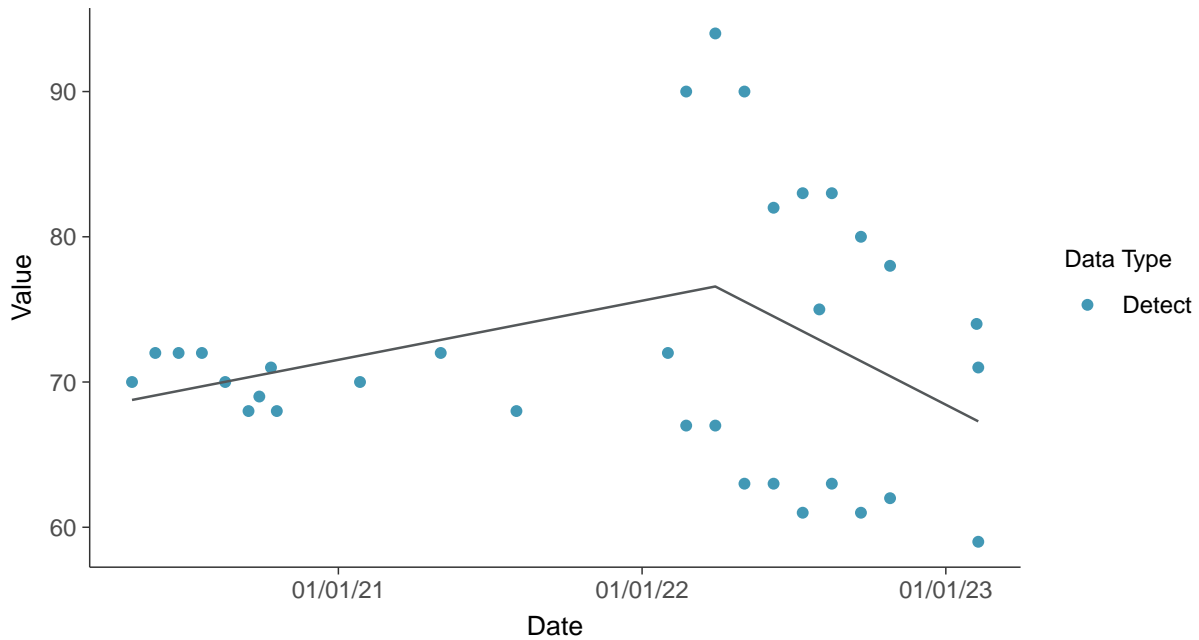
Trend Regression: Lognormal MLE

Chloride, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Piecewise Linear-Linear

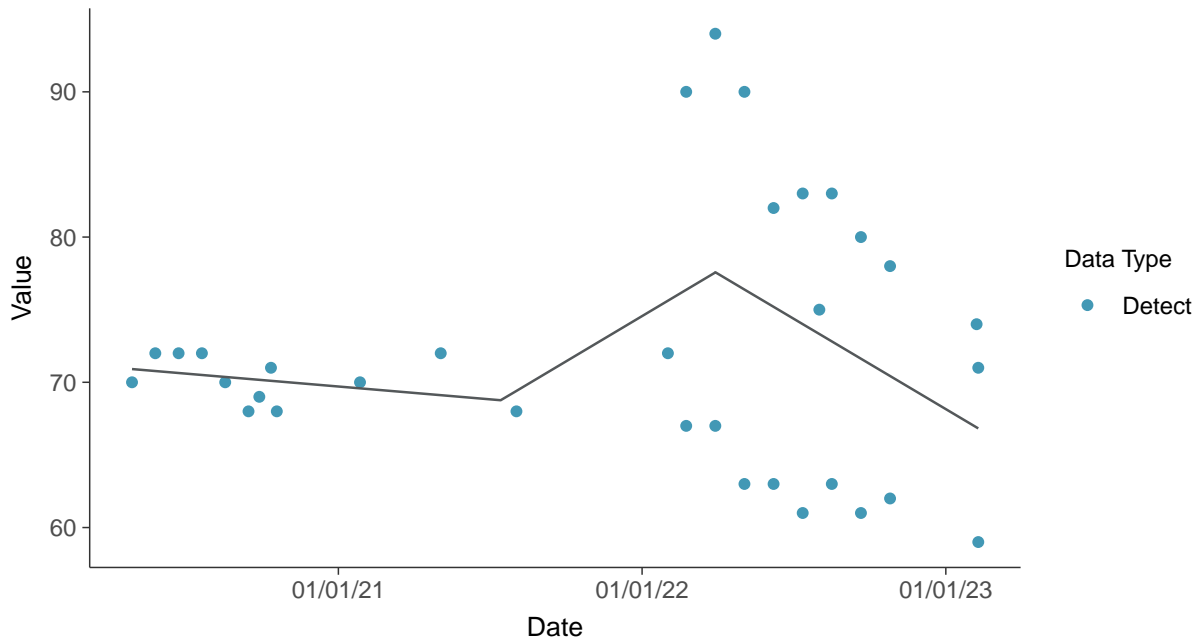
Chloride, MW-4, MW-11, MW-12 (mg/L)





Trend Regression: Piecewise Linear-Linear-Linear

Chloride, MW-4, MW-11, MW-12 (mg/L)



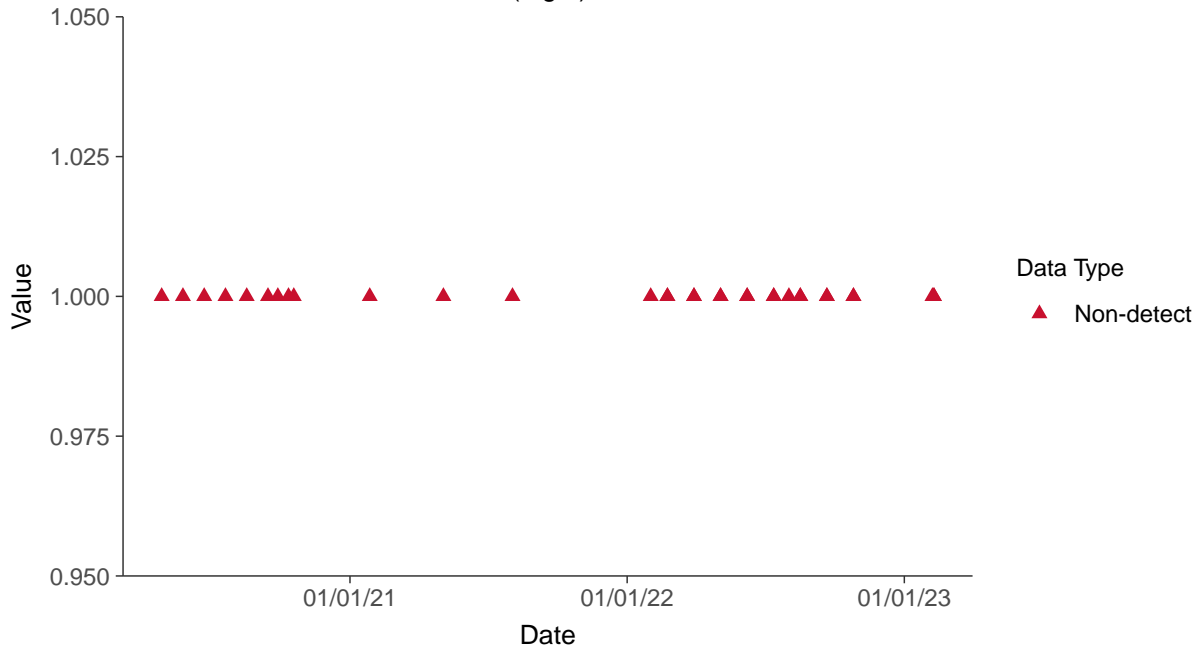


Appendix III: Fluoride, MW-4, MW-11, MW-12

ID: 1_04

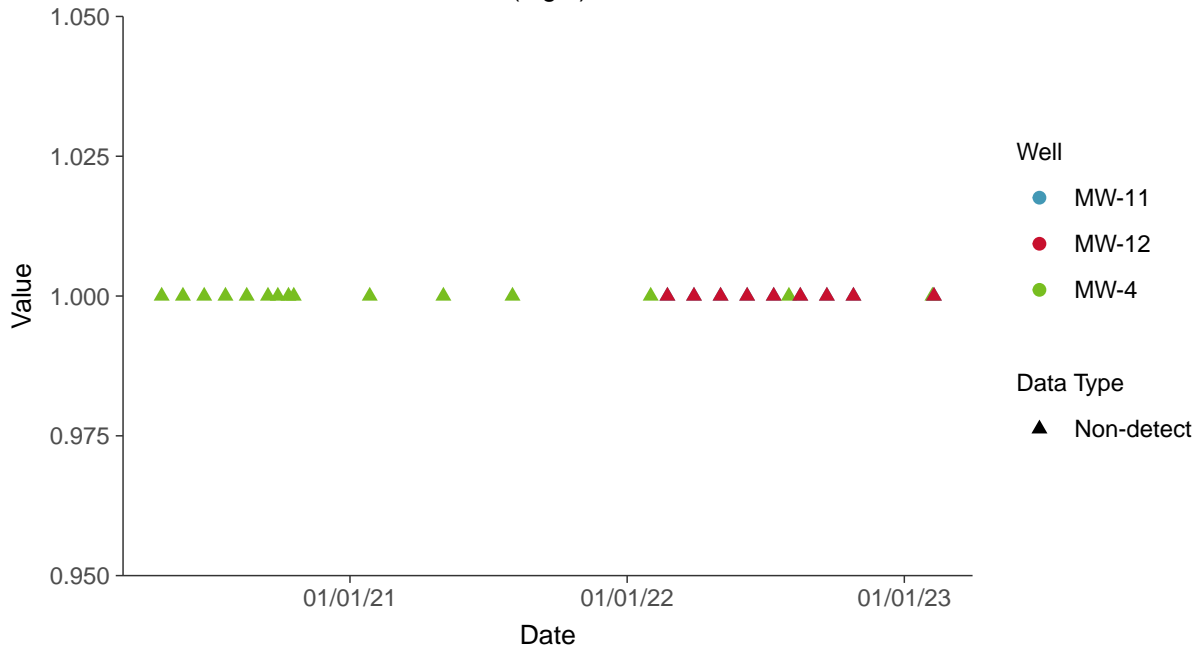
Scatter Plot

Fluoride, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

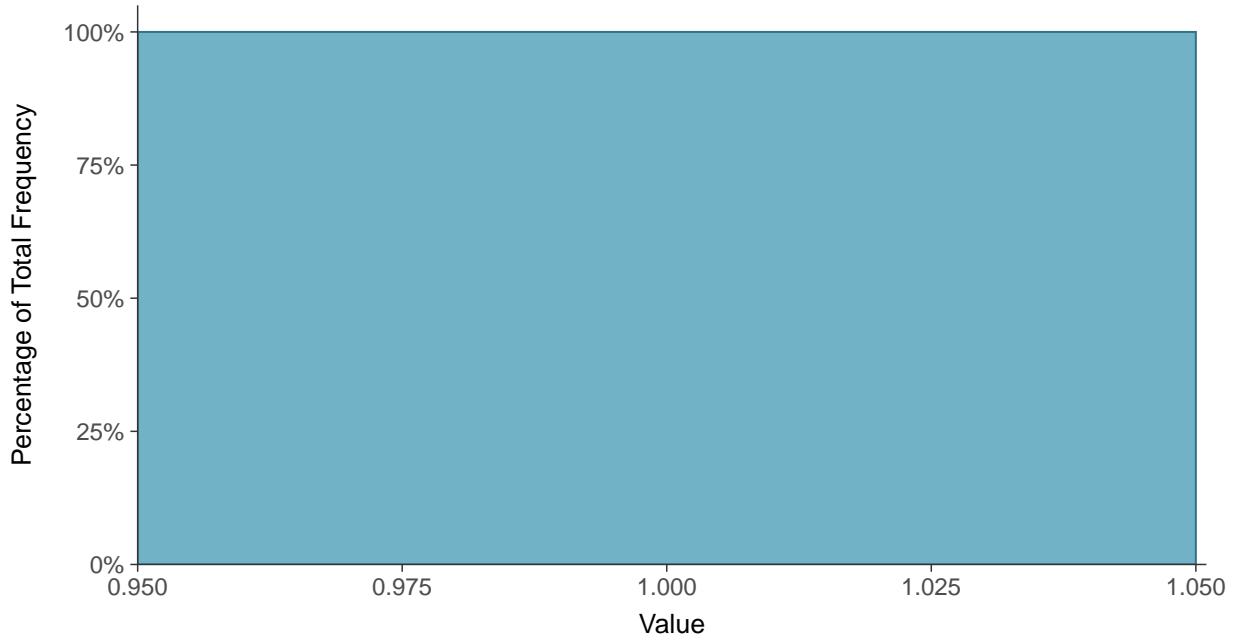
Fluoride, MW-4, MW-11, MW-12 (mg/L)





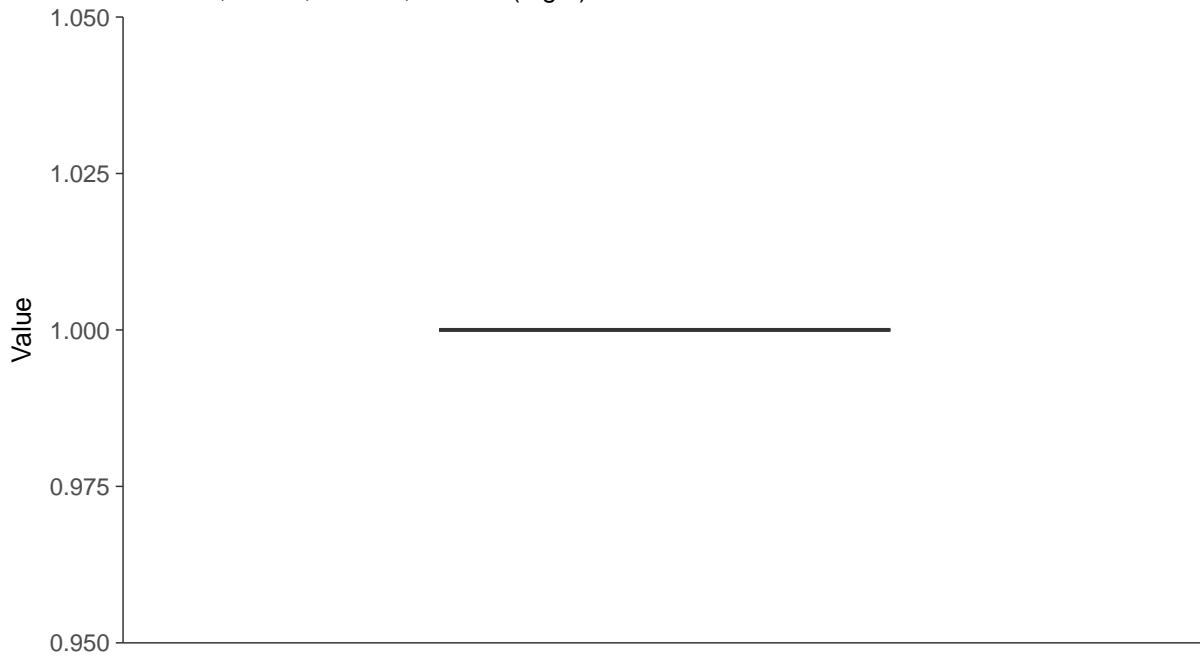
Histogram

Fluoride, MW-4, MW-11, MW-12 (mg/L)



Boxplot

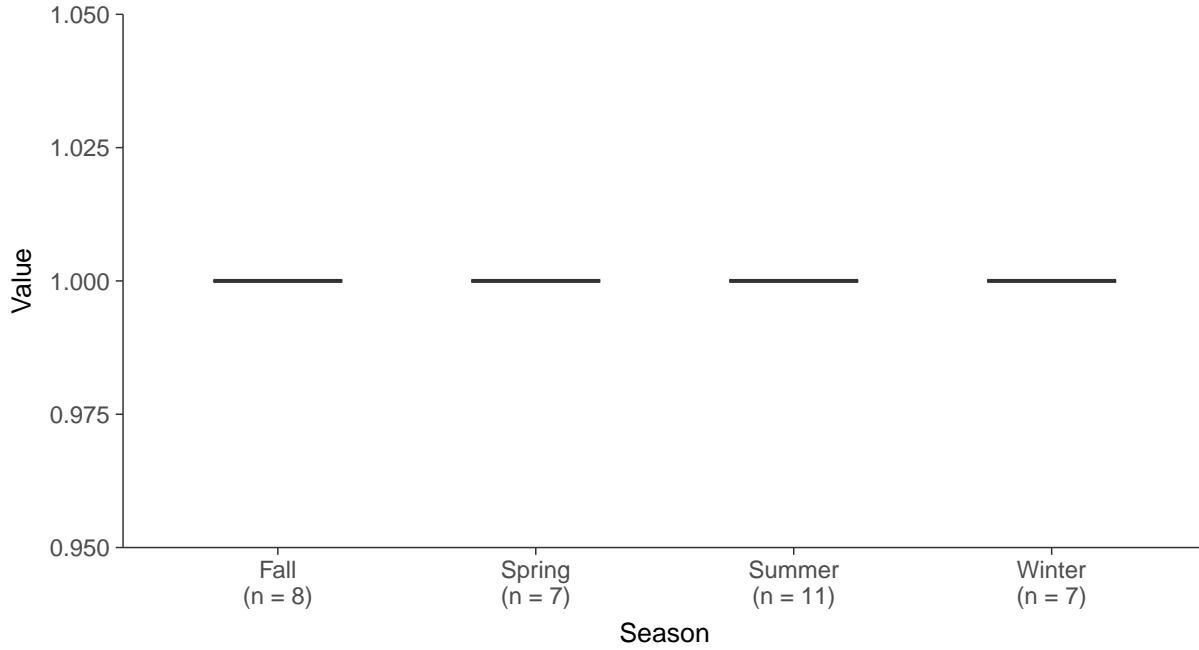
Fluoride, MW-4, MW-11, MW-12 (mg/L)





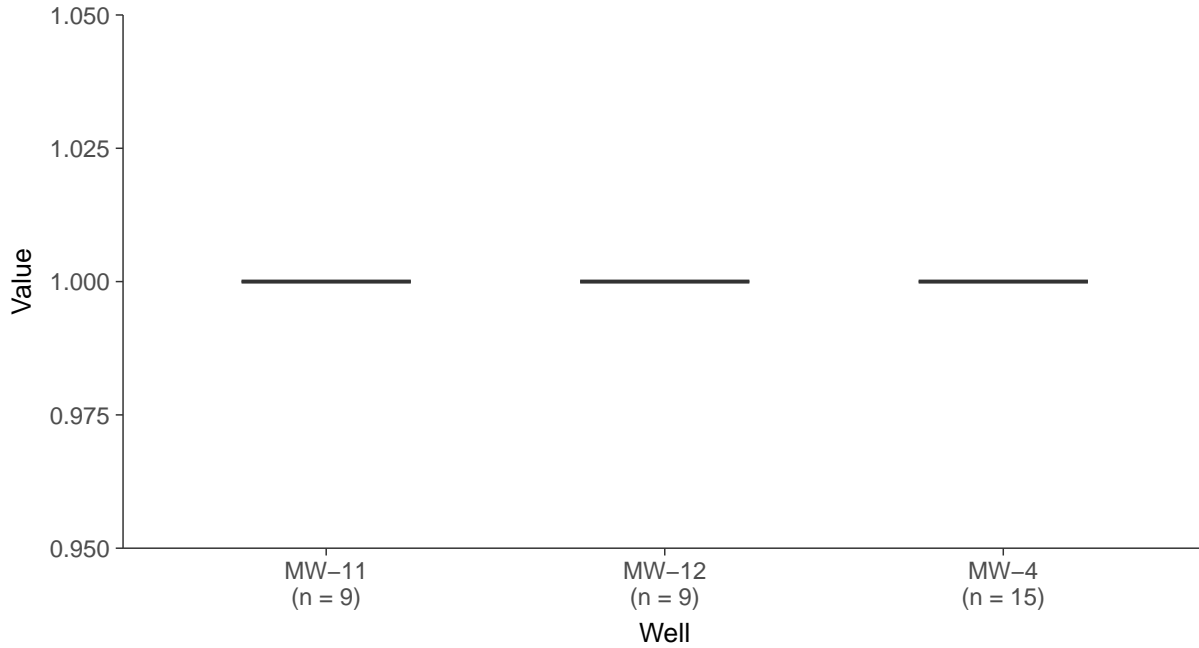
Boxplot by Season

Fluoride, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Fluoride, MW-4, MW-11, MW-12 (mg/L)



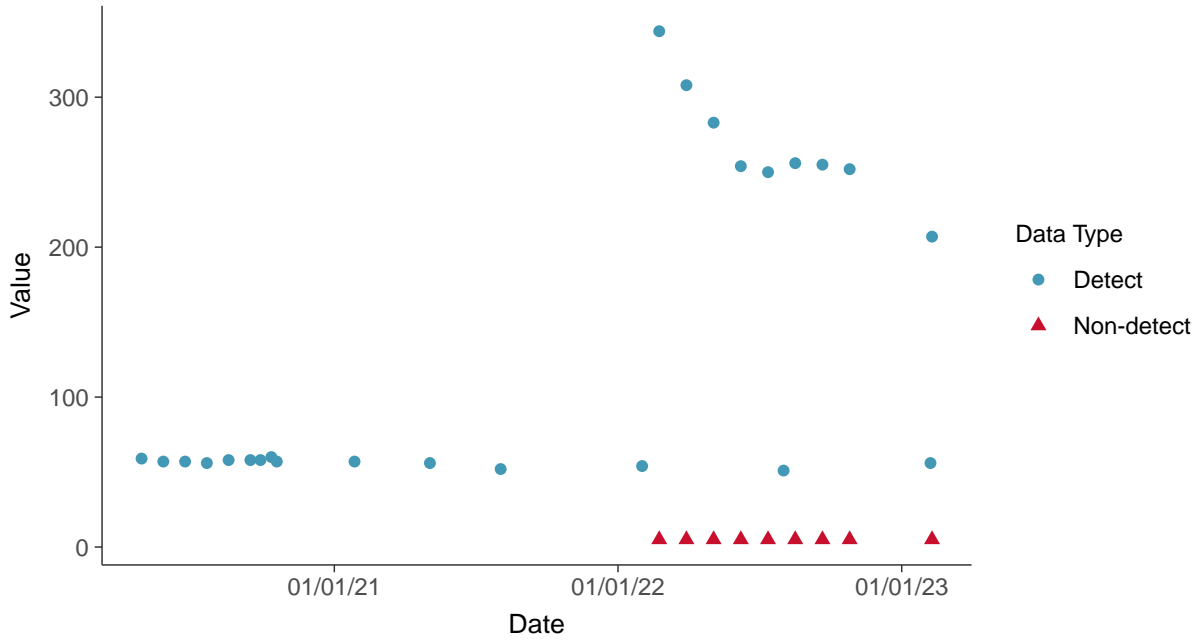


Appendix III: Sulfate, MW-4, MW-11, MW-12

ID: 1_05

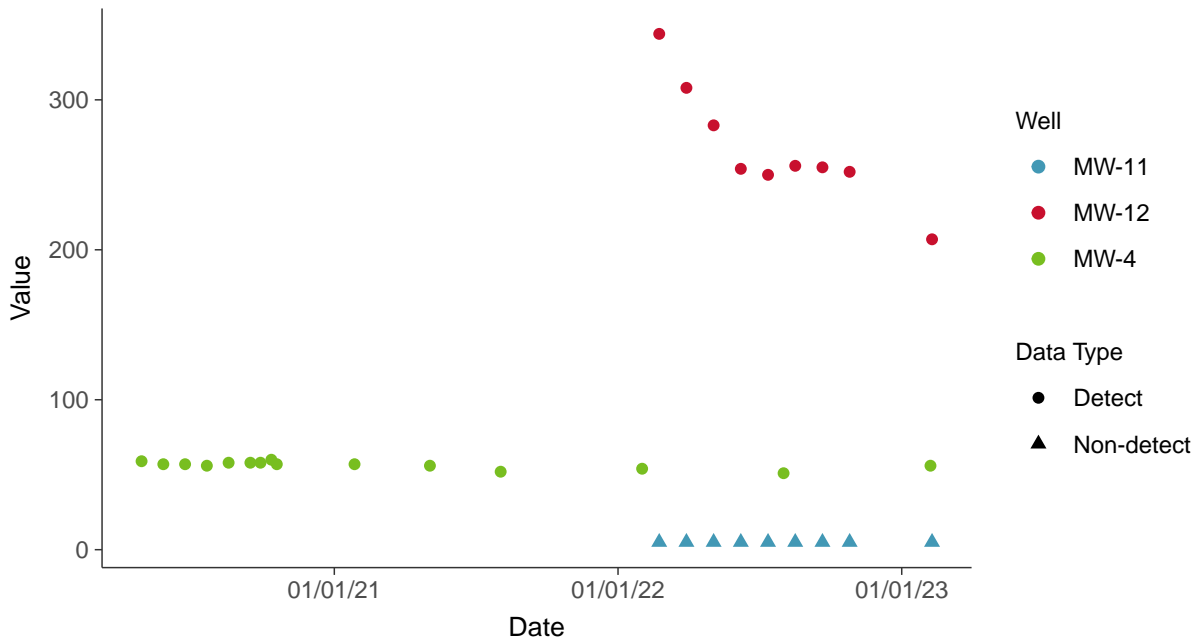
Scatter Plot

Sulfate, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

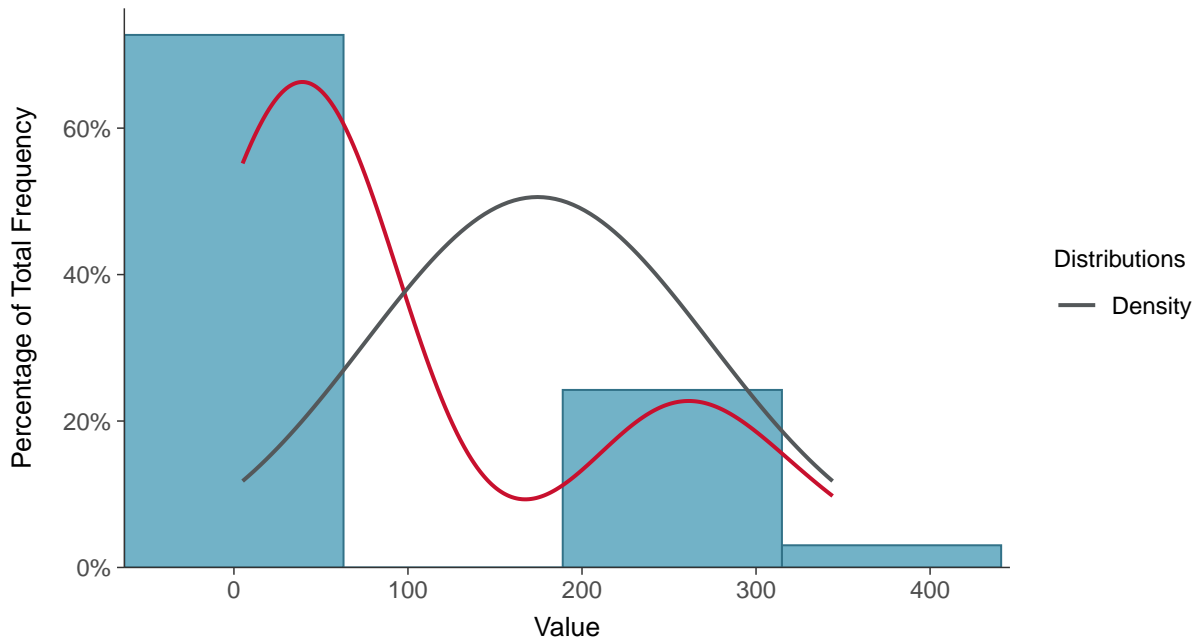
Sulfate, MW-4, MW-11, MW-12 (mg/L)





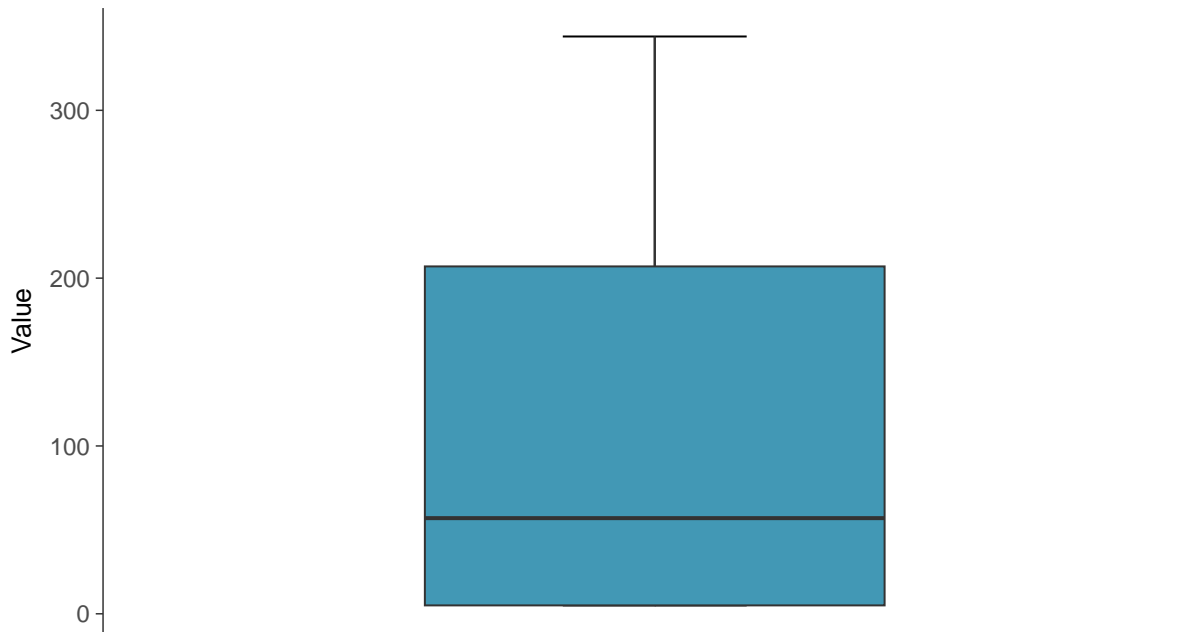
Histogram

Sulfate, MW-4, MW-11, MW-12 (mg/L)



Boxplot

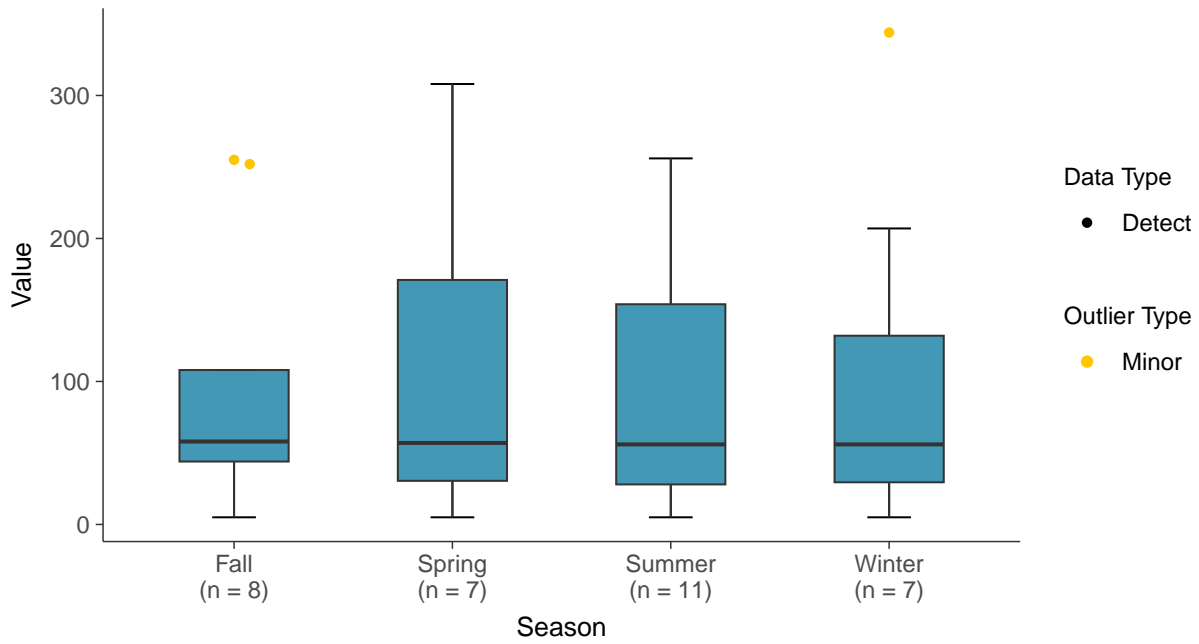
Sulfate, MW-4, MW-11, MW-12 (mg/L)





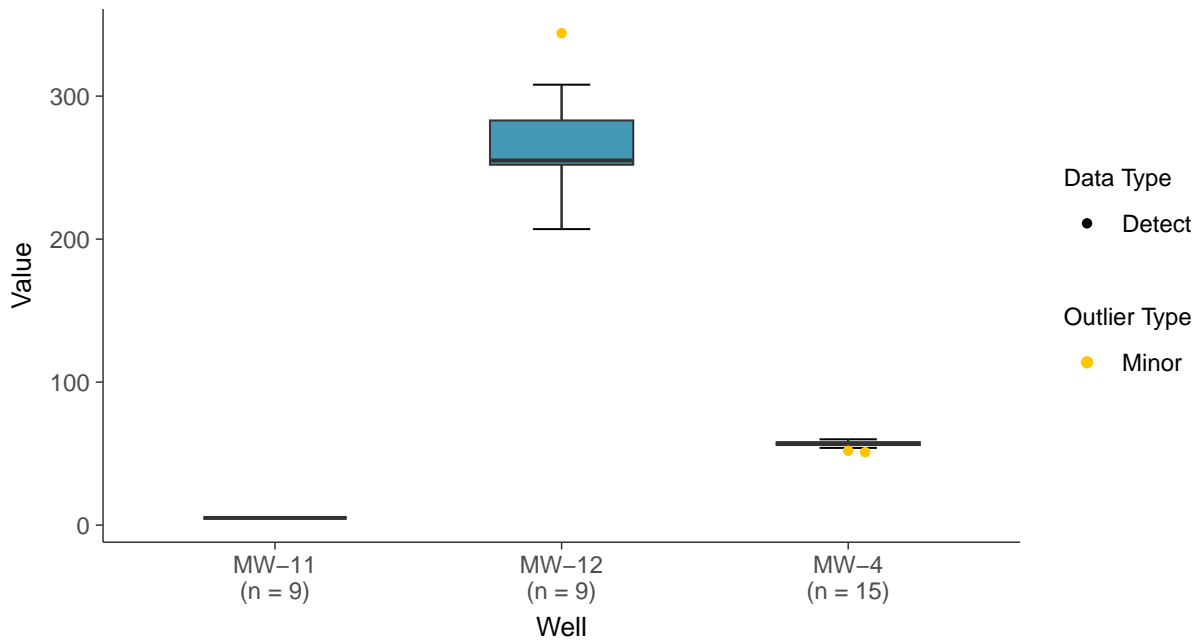
Boxplot by Season

Sulfate, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

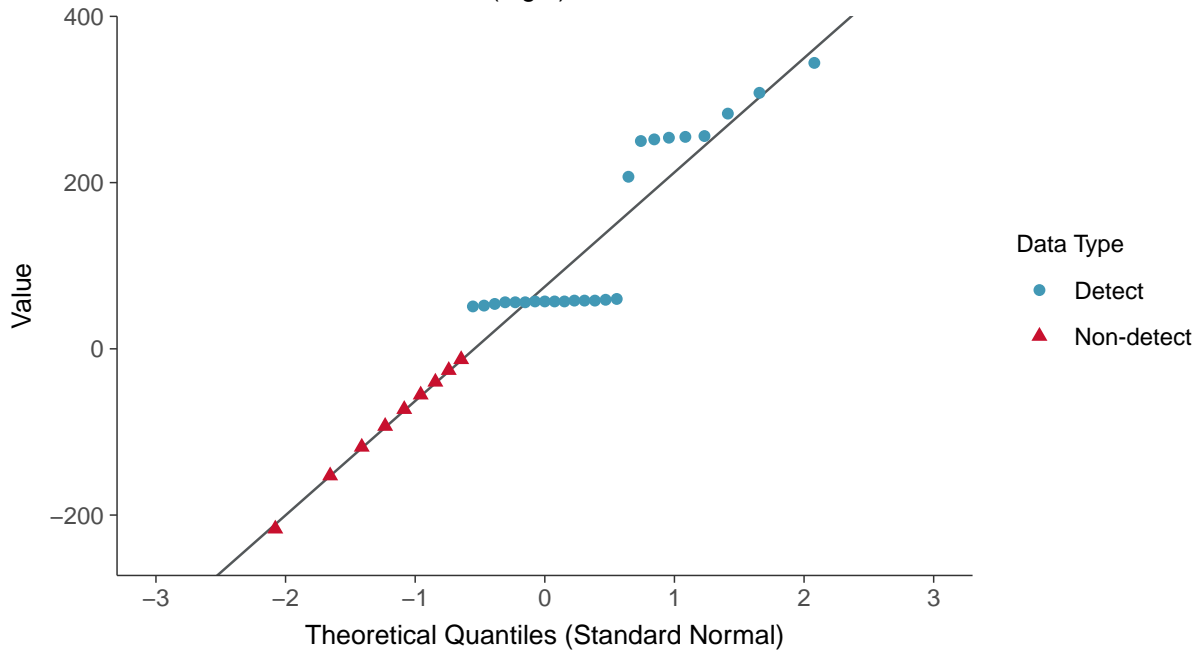
Sulfate, MW-4, MW-11, MW-12 (mg/L)





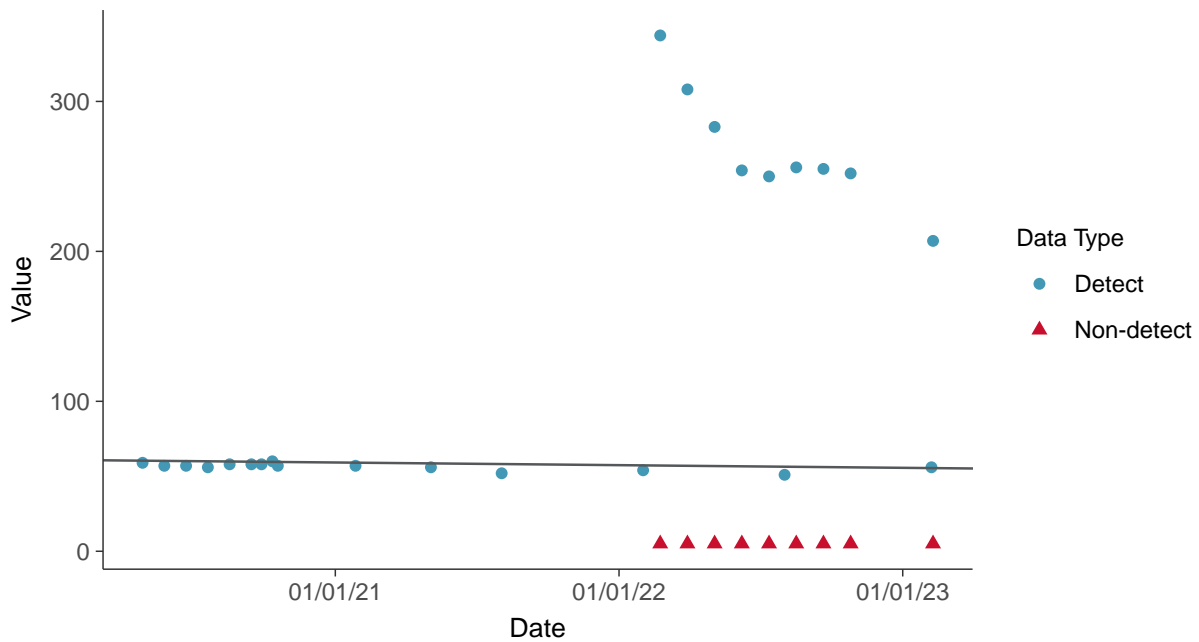
Normal Q-Q plot using ROS Imputed Estimates

Sulfate, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

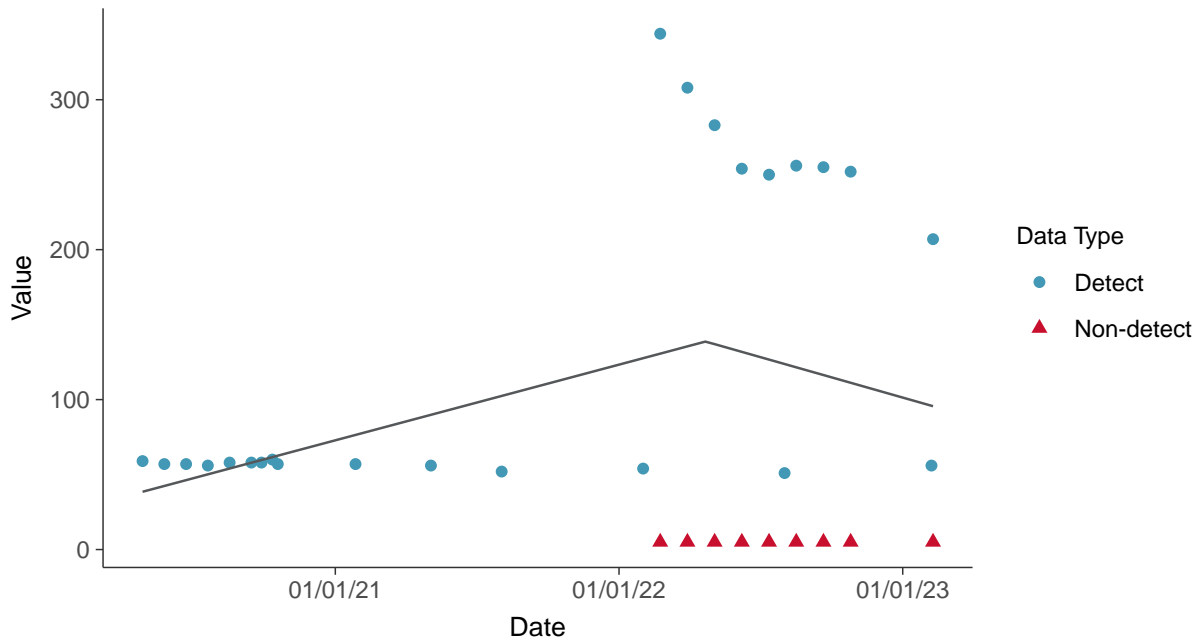
Sulfate, MW-4, MW-11, MW-12 (mg/L)





Trend Regression: Piecewise Linear-Linear

Sulfate, MW-4, MW-11, MW-12 (mg/L)



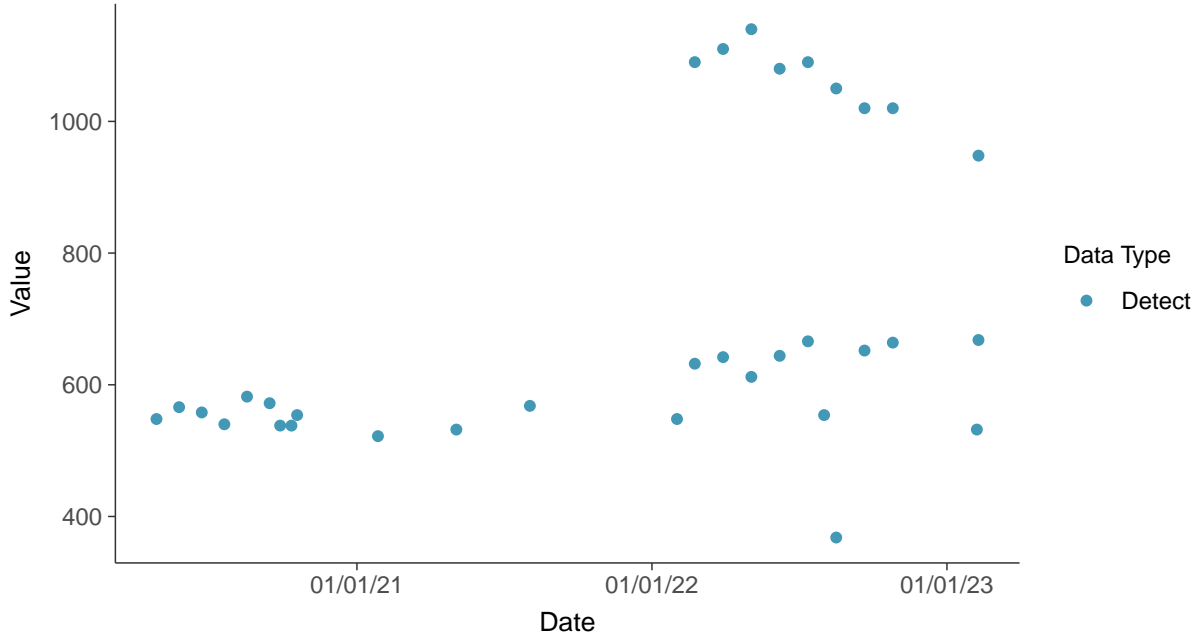


Appendix III: Total Dissolved Solids, MW-4, MW-11, MW-12

ID: 1_06

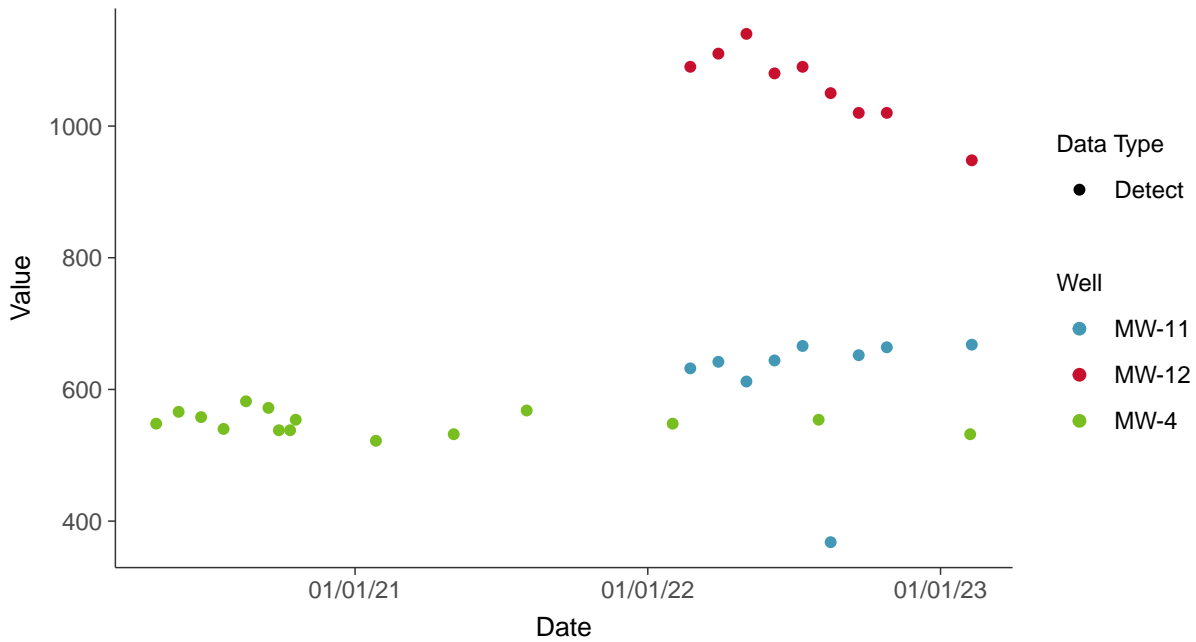
Scatter Plot

Total Dissolved Solids, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

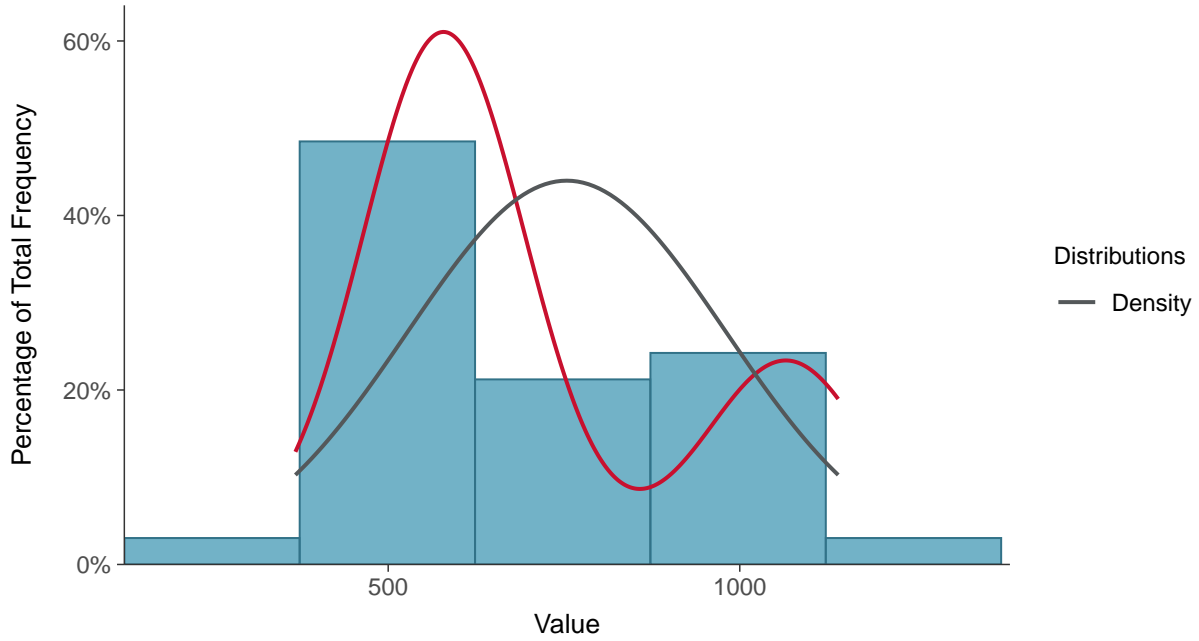
Total Dissolved Solids, MW-4, MW-11, MW-12 (mg/L)





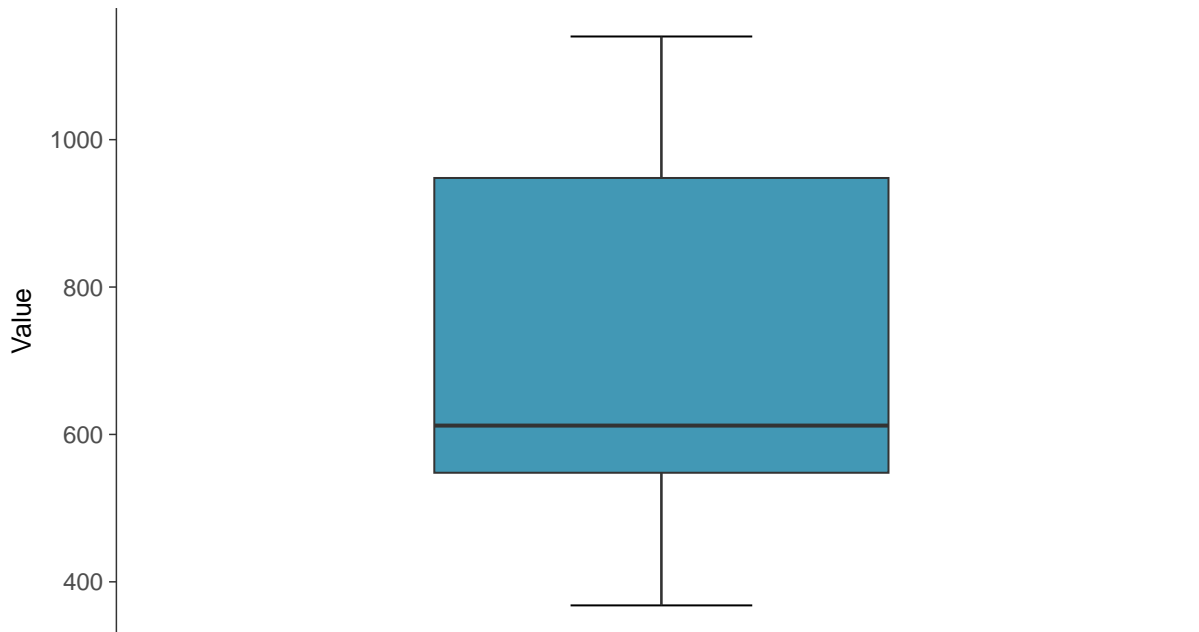
Histogram

Total Dissolved Solids, MW-4, MW-11, MW-12 (mg/L)



Boxplot

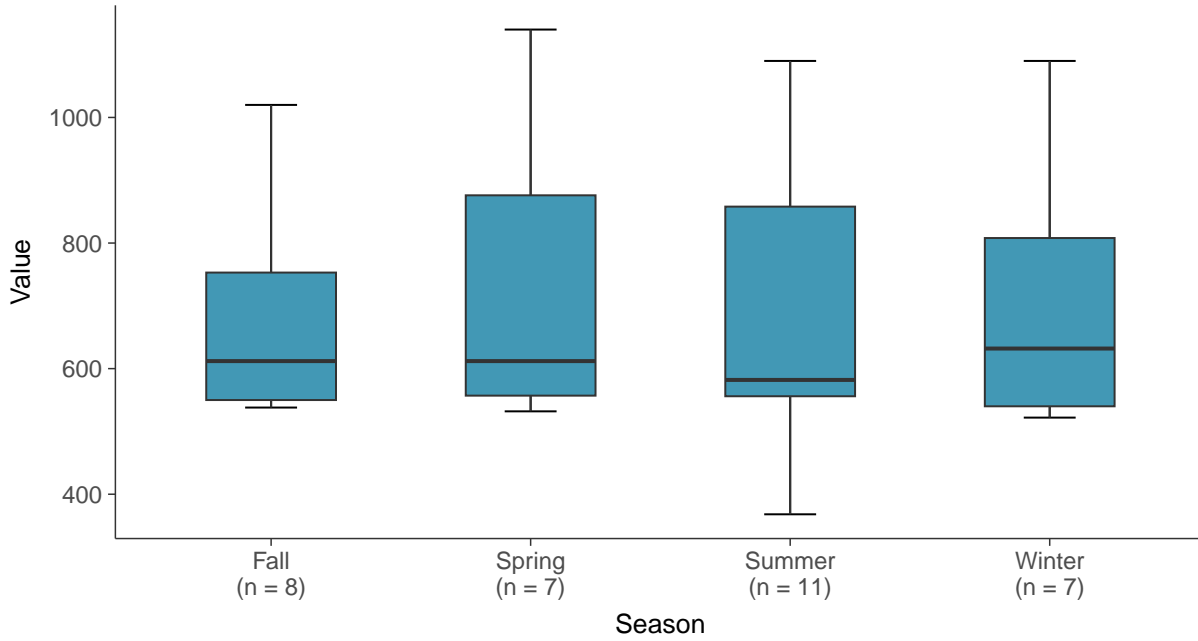
Total Dissolved Solids, MW-4, MW-11, MW-12 (mg/L)





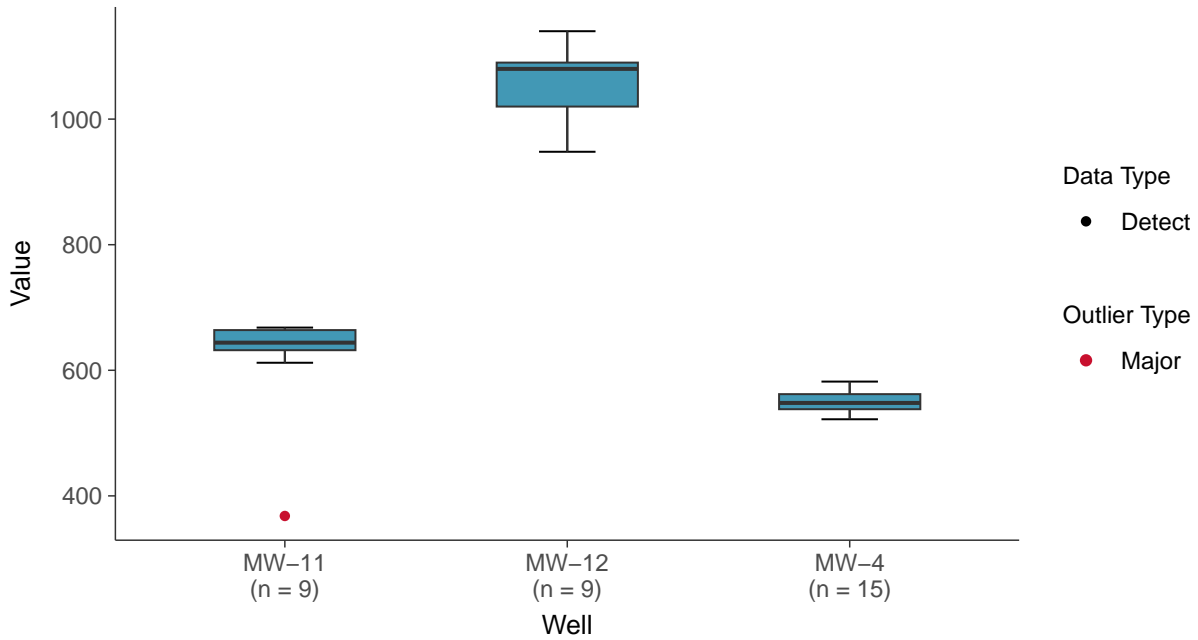
Boxplot by Season

Total Dissolved Solids, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

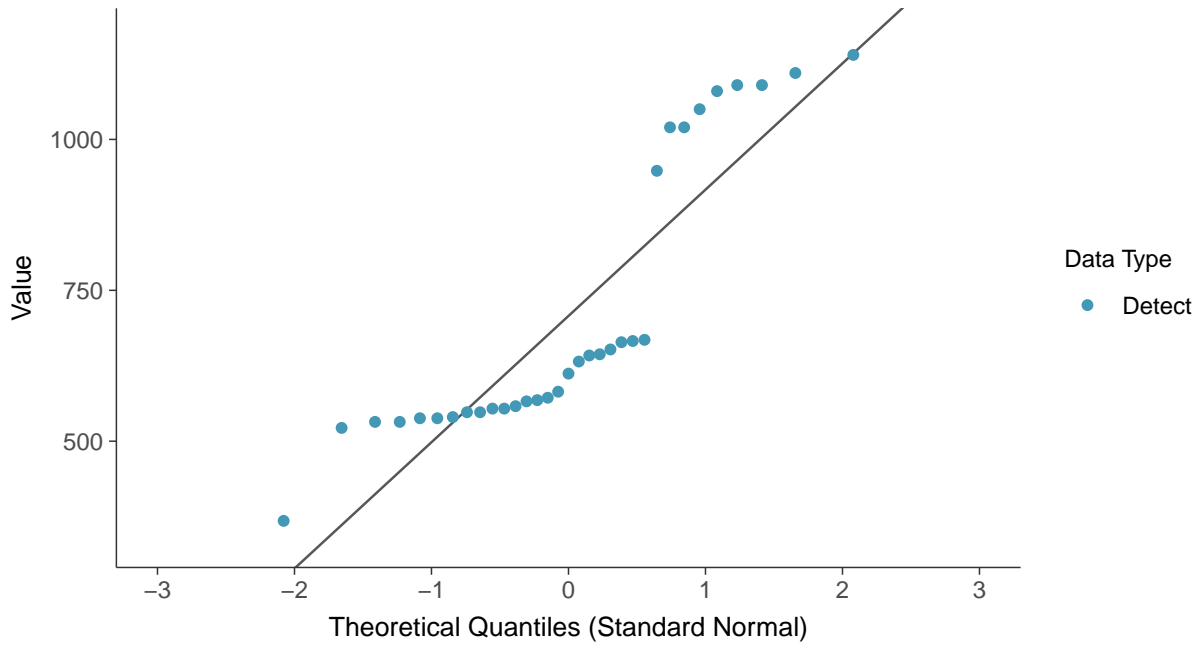
Total Dissolved Solids, MW-4, MW-11, MW-12 (mg/L)





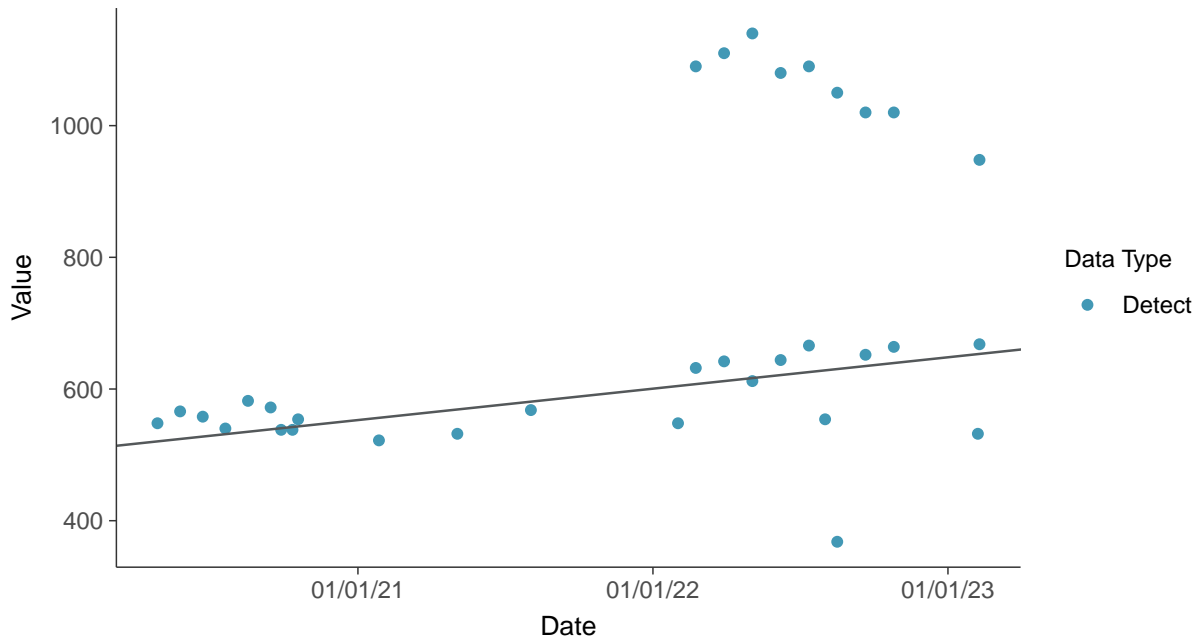
Normal Q-Q plot

Total Dissolved Solids, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

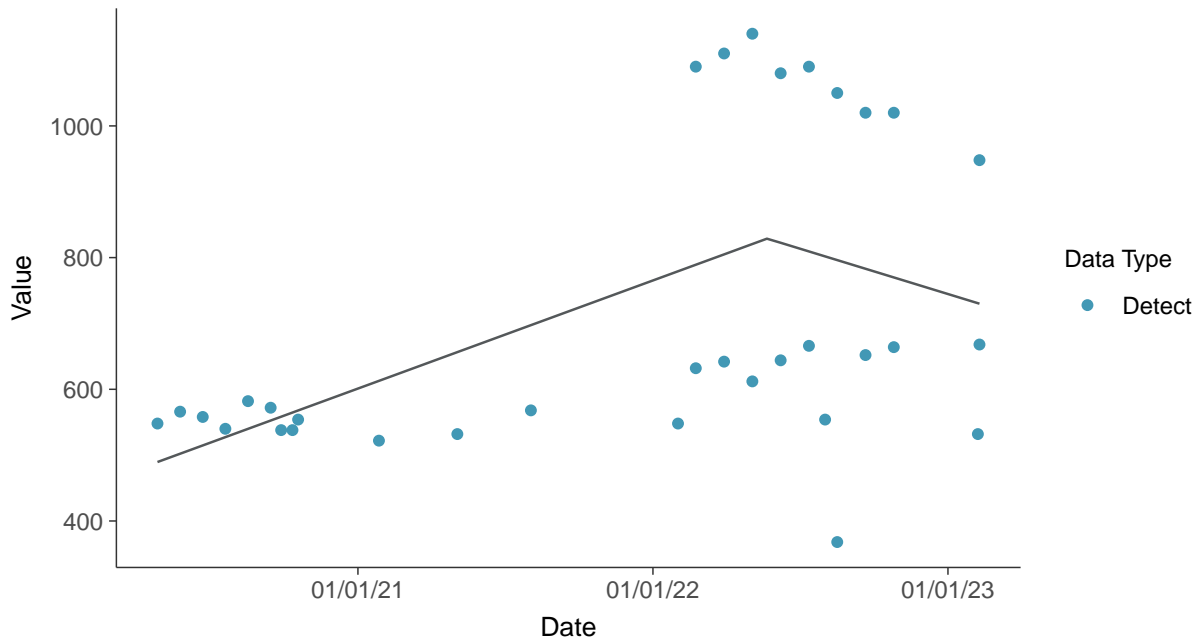
Total Dissolved Solids, MW-4, MW-11, MW-12 (mg/L)





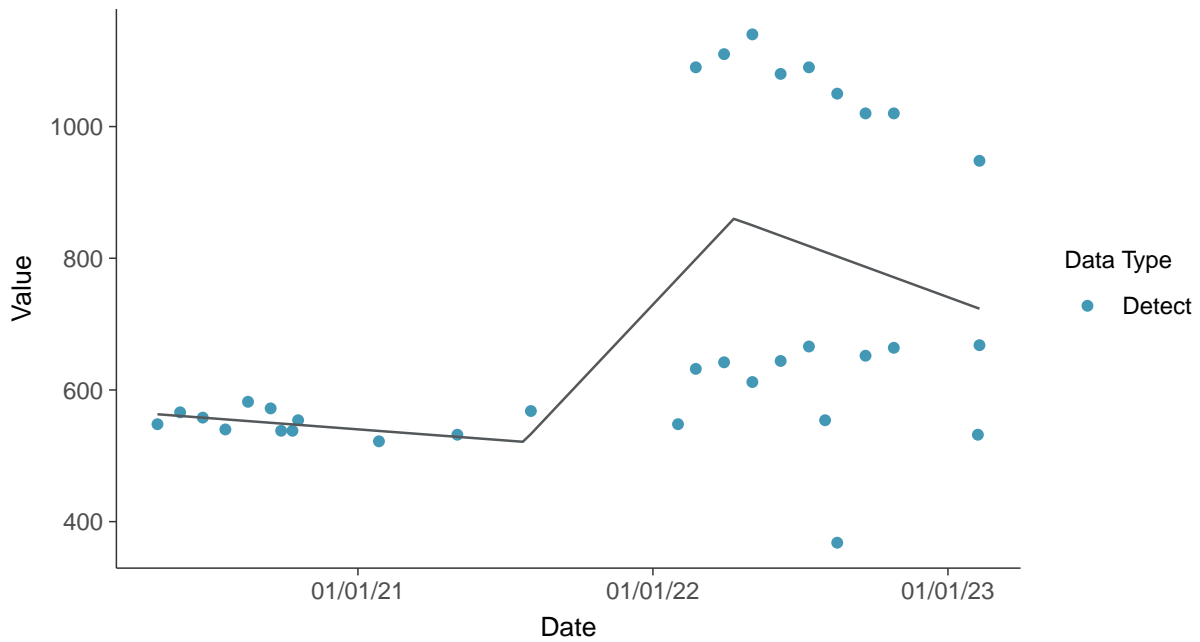
Trend Regression: Piecewise Linear-Linear

Total Dissolved Solids, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Total Dissolved Solids, MW-4, MW-11, MW-12 (mg/L)



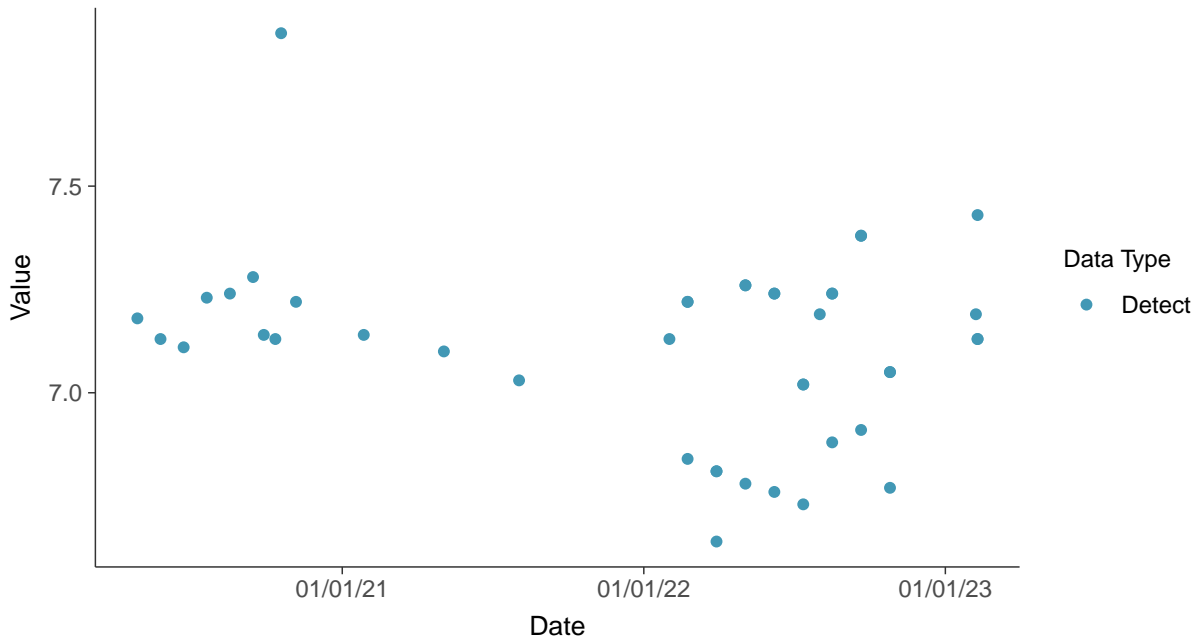


Appendix III: pH, Field, MW-4, MW-11, MW-12

ID: 1_07

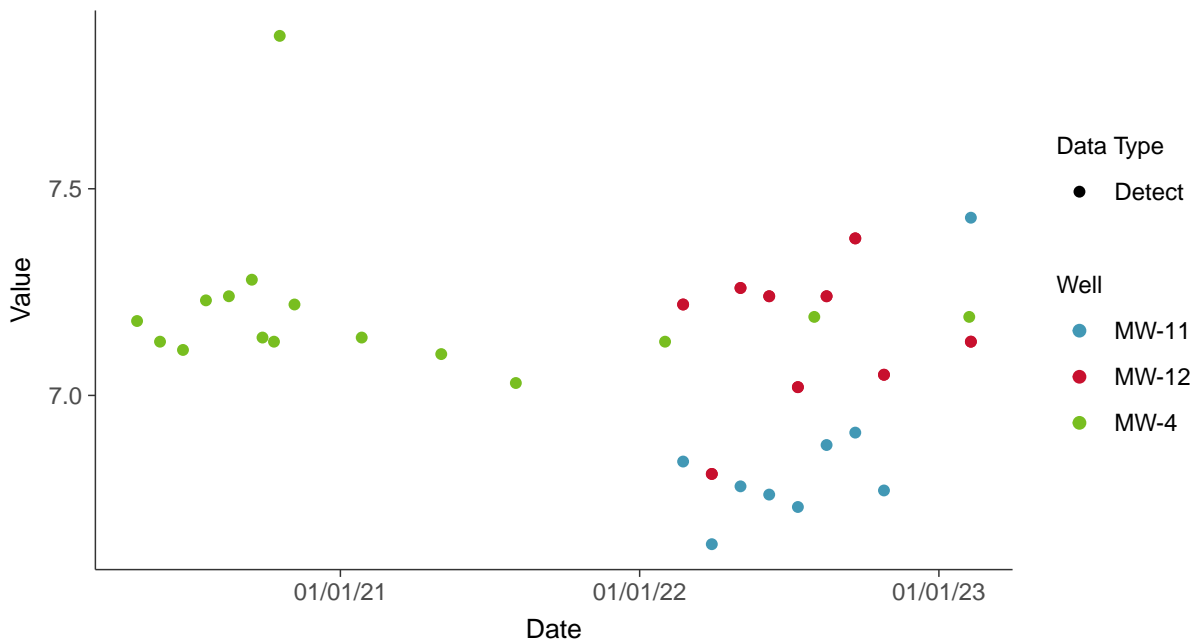
Scatter Plot

pH, Field, MW-4, MW-11, MW-12 (su)



Scatter Plot by Well

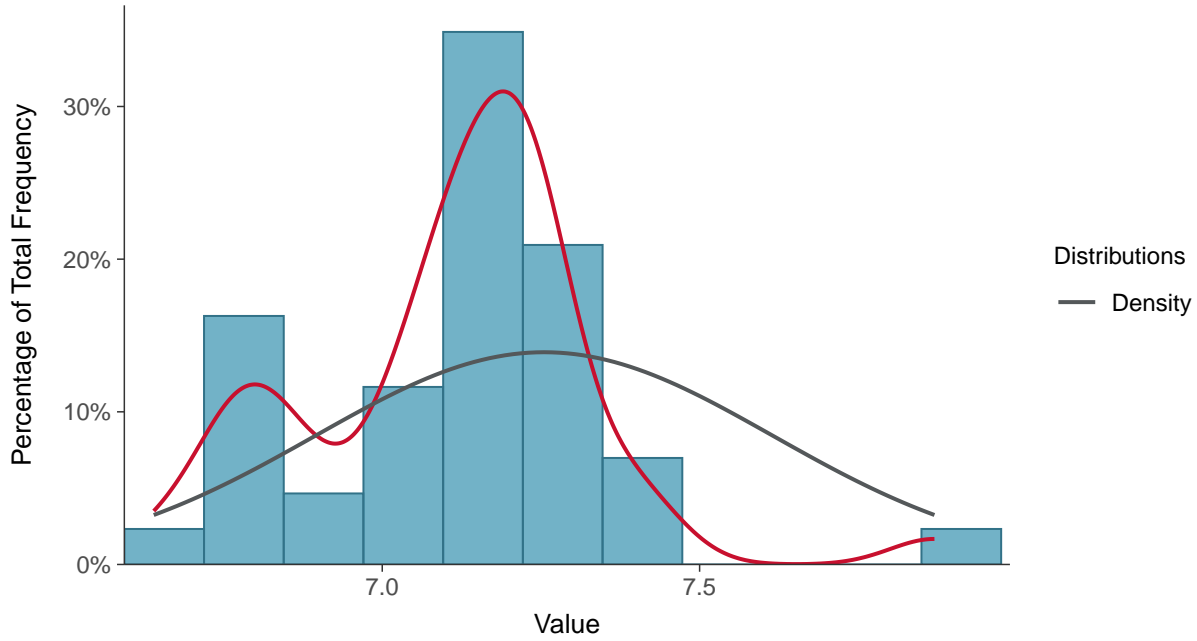
pH, Field, MW-4, MW-11, MW-12 (su)





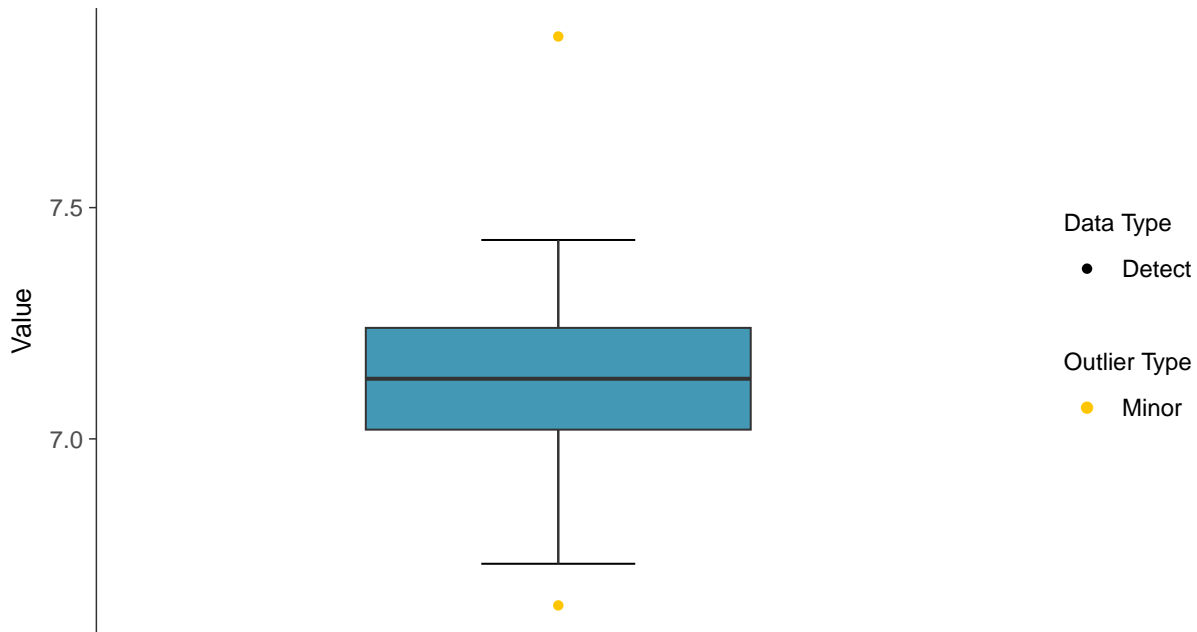
Histogram

pH, Field, MW-4, MW-11, MW-12 (su)



Boxplot

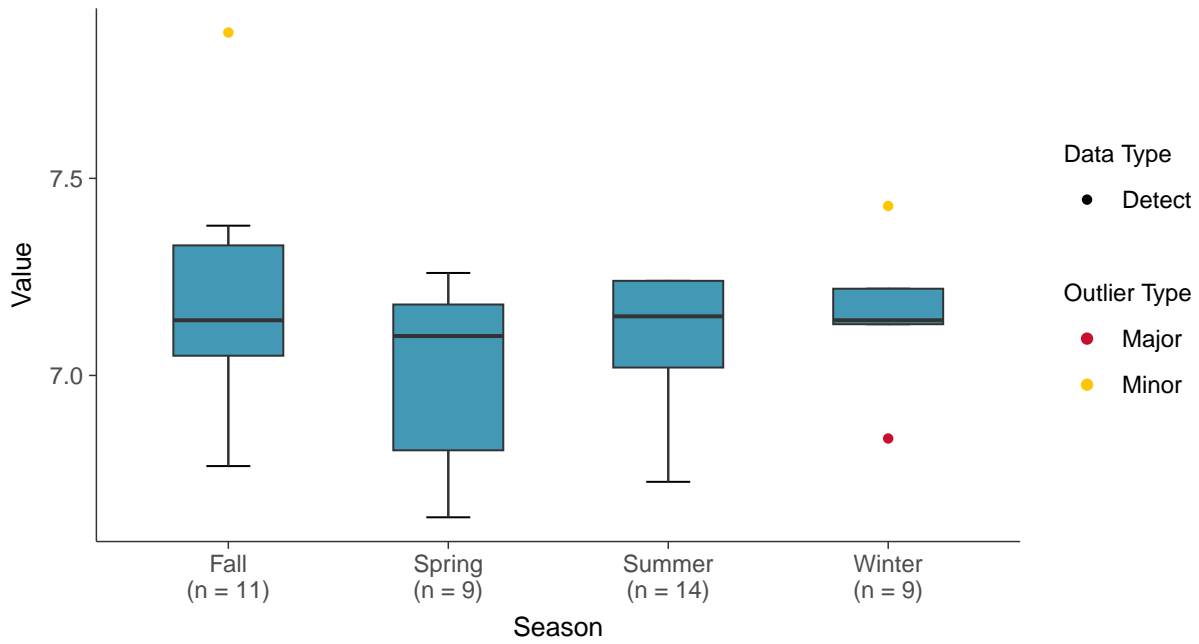
pH, Field, MW-4, MW-11, MW-12 (su)





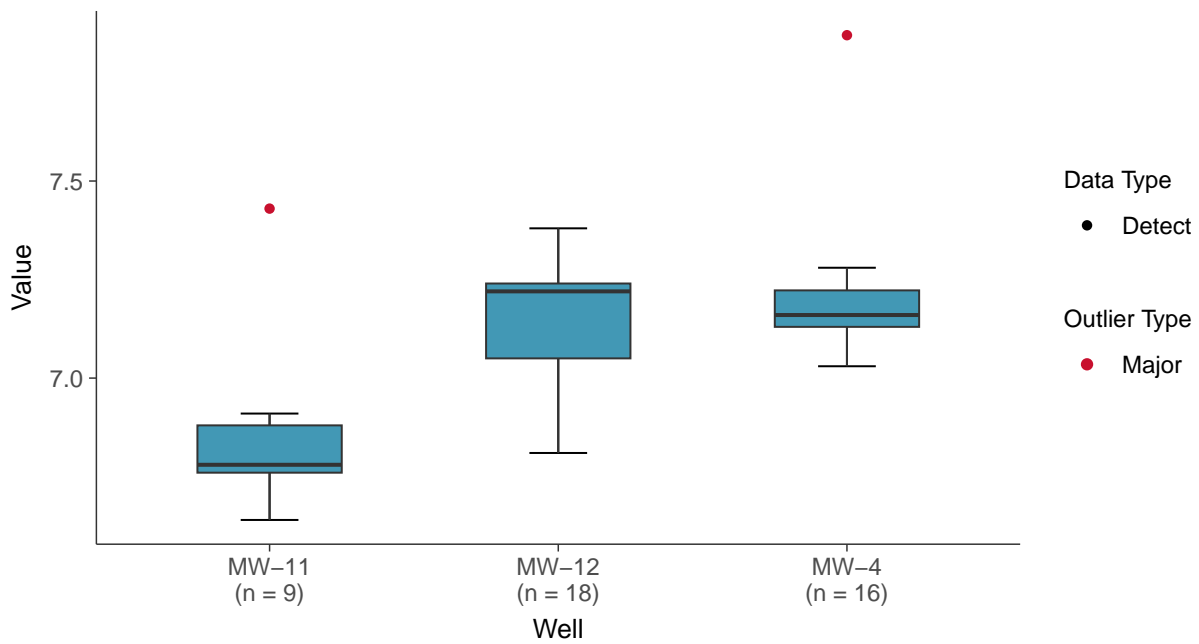
Boxplot by Season

pH, Field, MW-4, MW-11, MW-12 (su)



Boxplot by Well

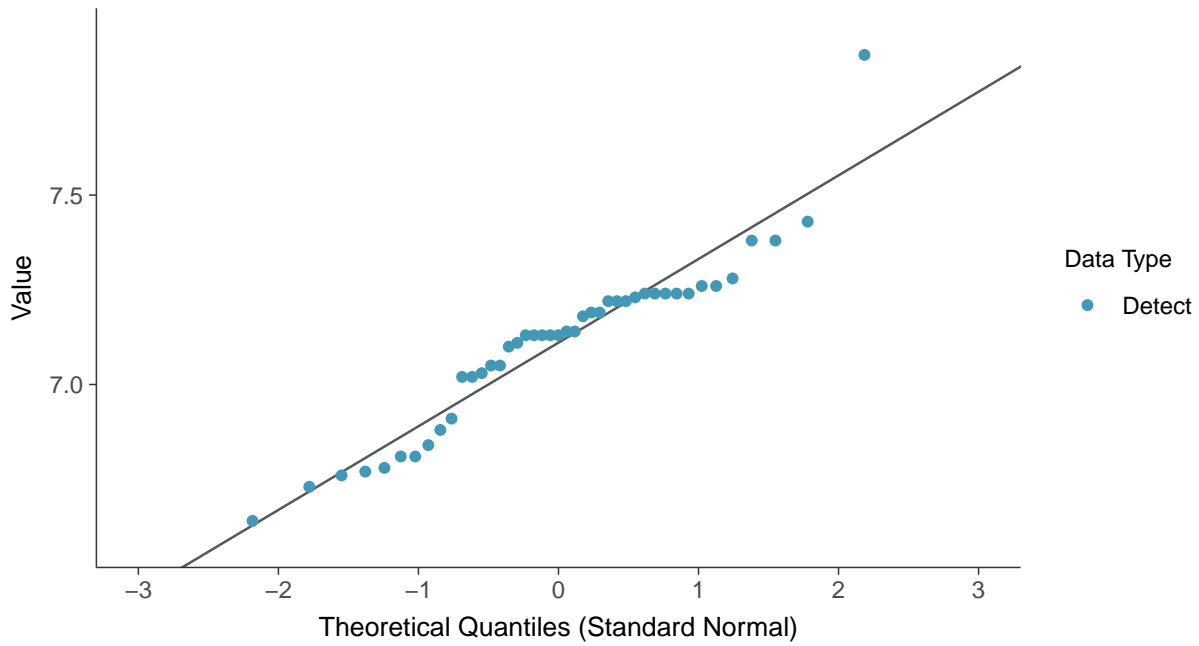
pH, Field, MW-4, MW-11, MW-12 (su)





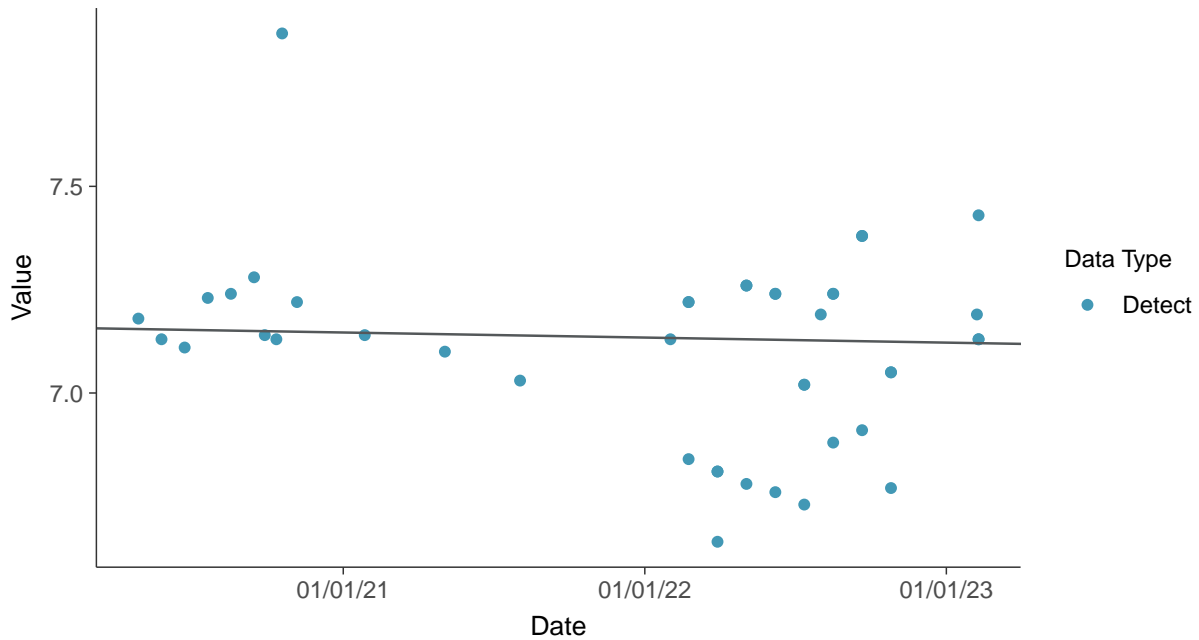
Normal Q-Q plot

pH, Field, MW-4, MW-11, MW-12 (su)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

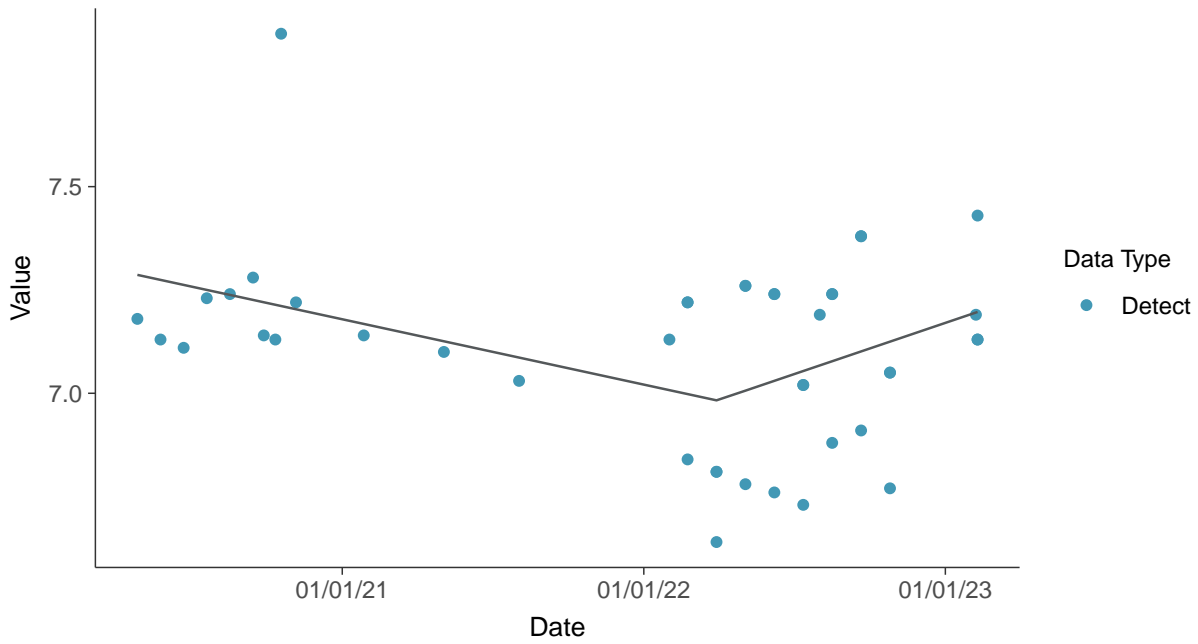
pH, Field, MW-4, MW-11, MW-12 (su)





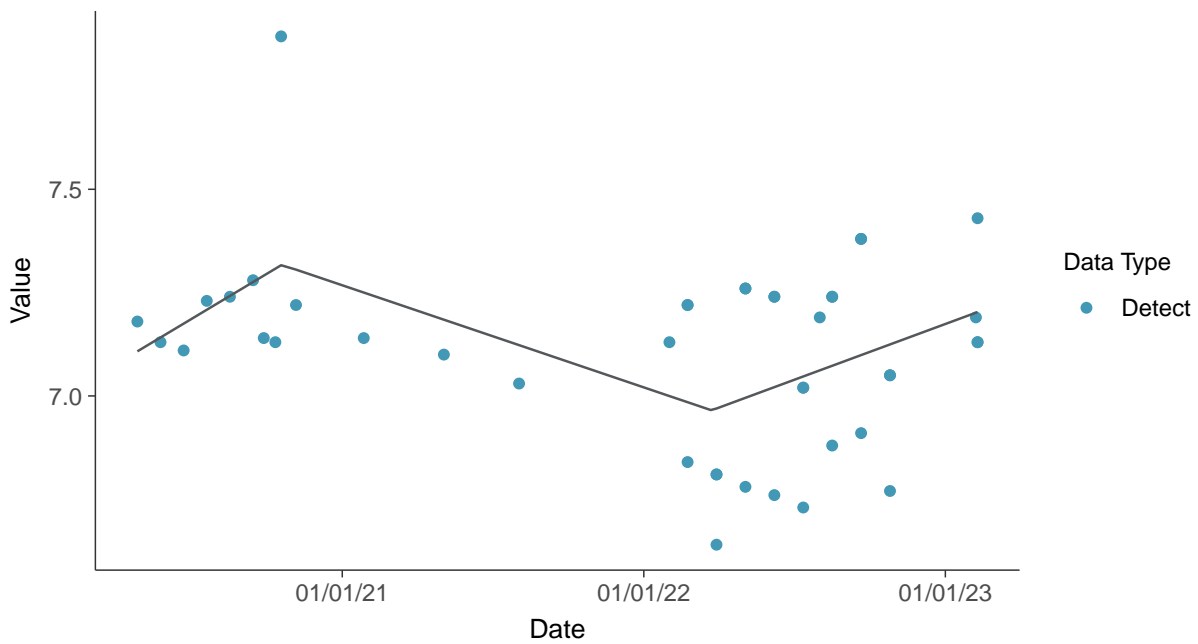
Trend Regression: Piecewise Linear-Linear

pH, Field, MW-4, MW-11, MW-12 (su)



Trend Regression: Piecewise Linear-Linear-Linear

pH, Field, MW-4, MW-11, MW-12 (su)



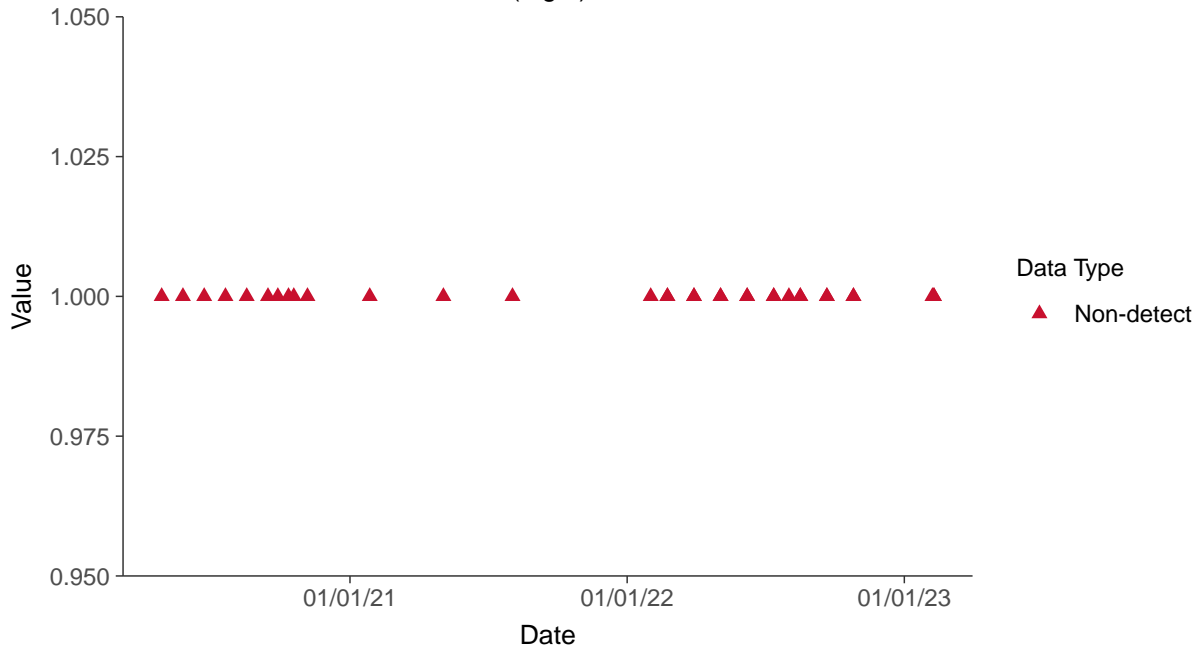


Appendix IV: Fluoride, MW-4, MW-11, MW-12

ID: 2_04

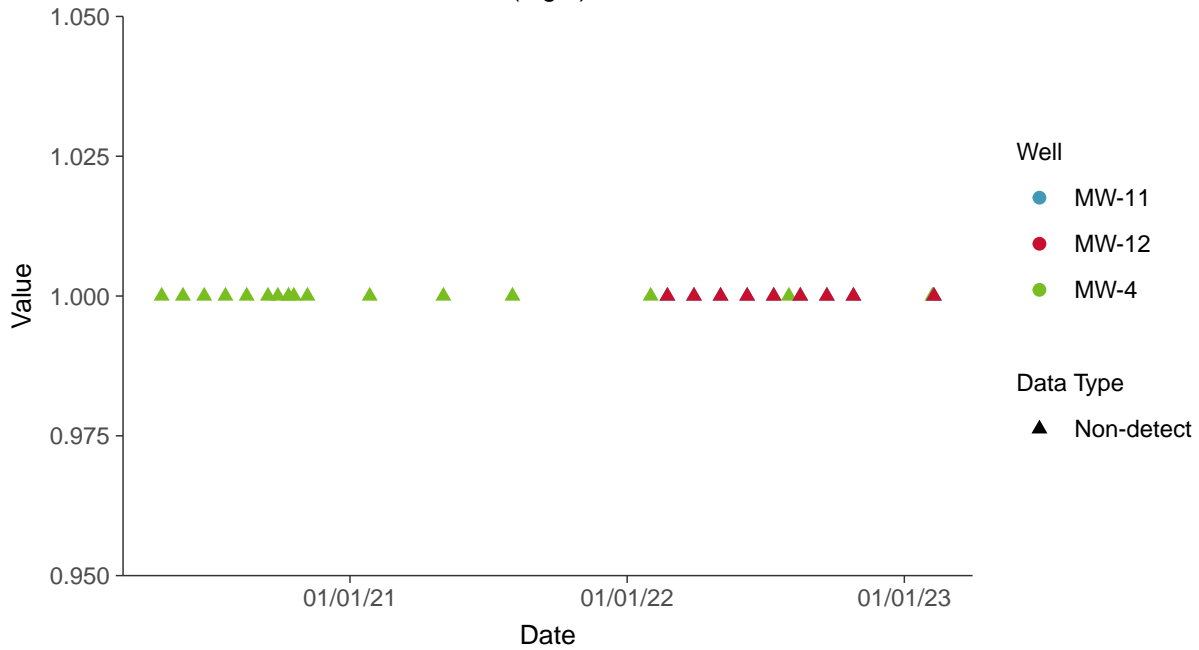
Scatter Plot

Fluoride, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

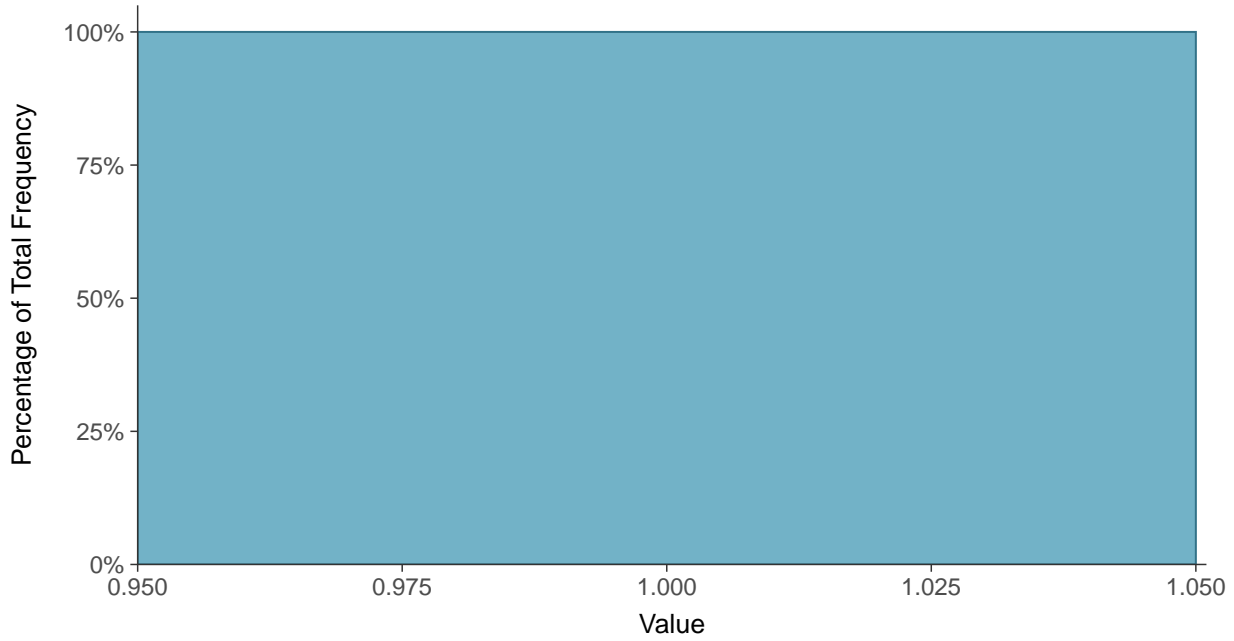
Fluoride, MW-4, MW-11, MW-12 (mg/L)





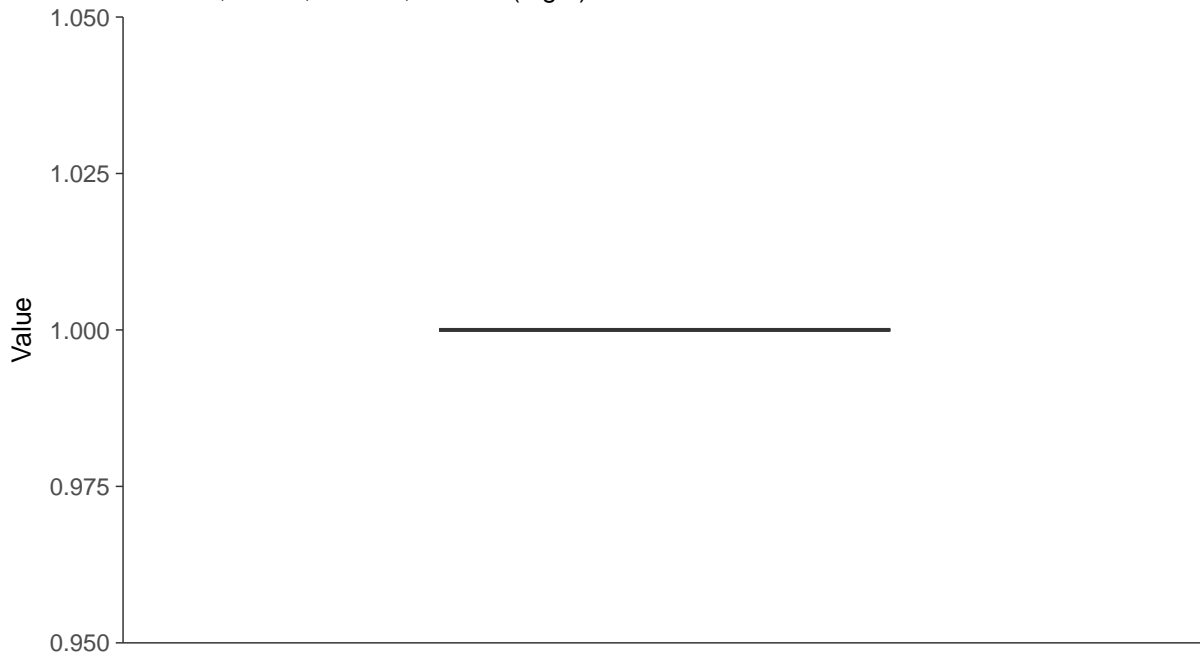
Histogram

Fluoride, MW-4, MW-11, MW-12 (mg/L)



Boxplot

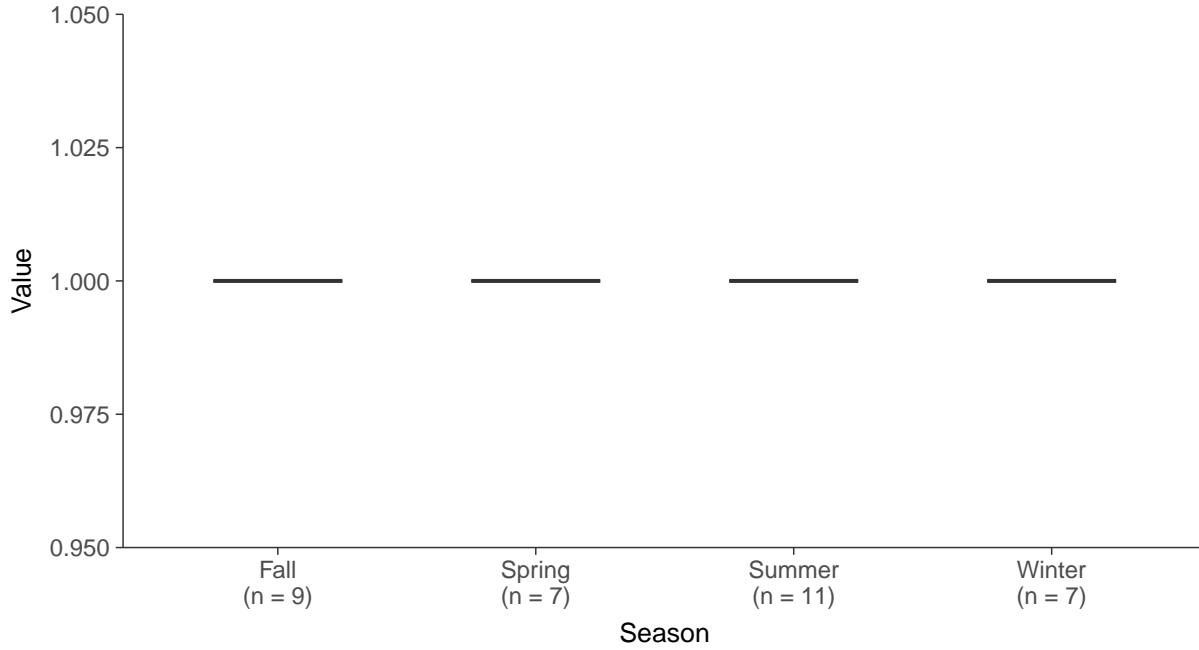
Fluoride, MW-4, MW-11, MW-12 (mg/L)





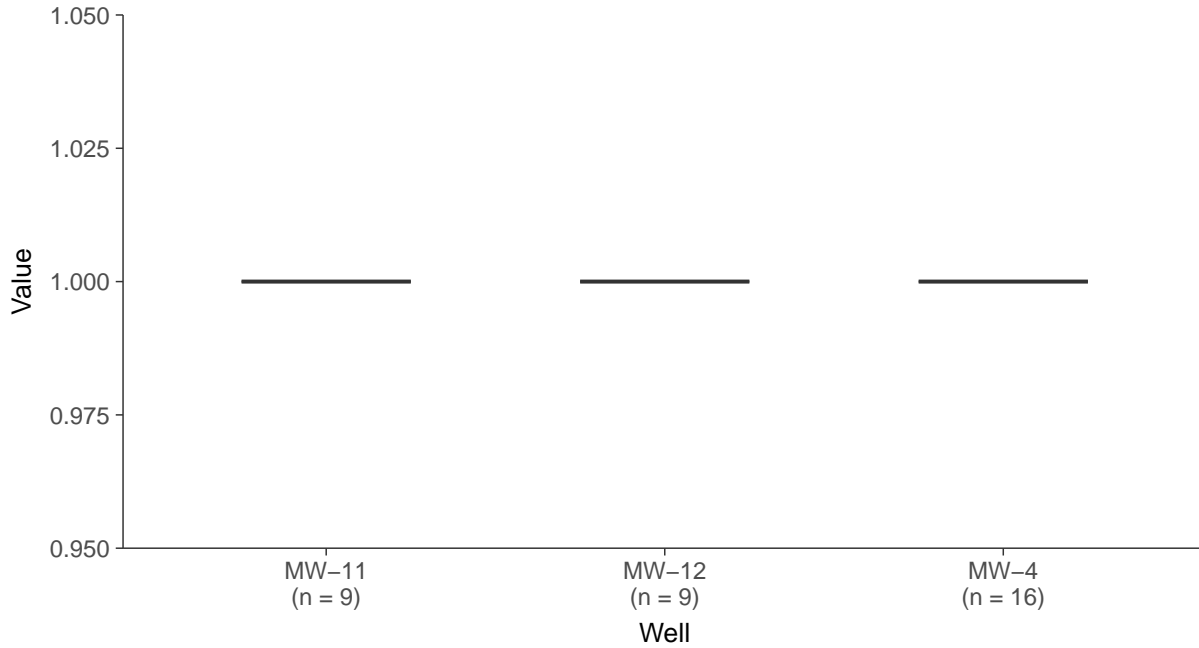
Boxplot by Season

Fluoride, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Fluoride, MW-4, MW-11, MW-12 (mg/L)



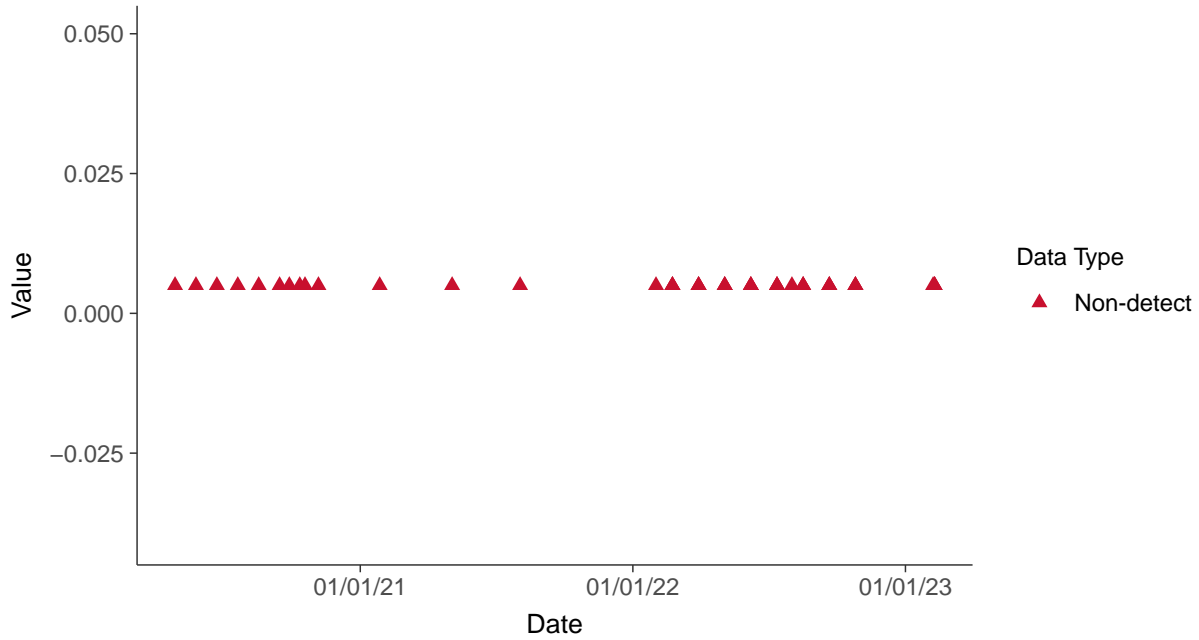


Appendix IV: Antimony, MW-4, MW-11, MW-12

ID: 2_08

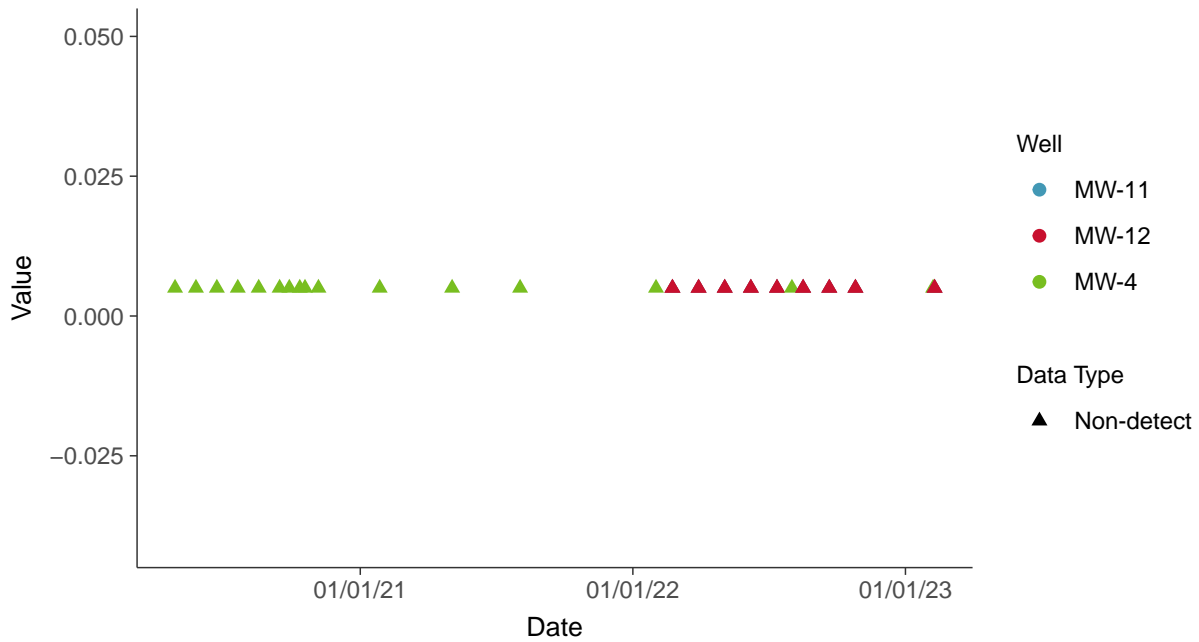
Scatter Plot

Antimony, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

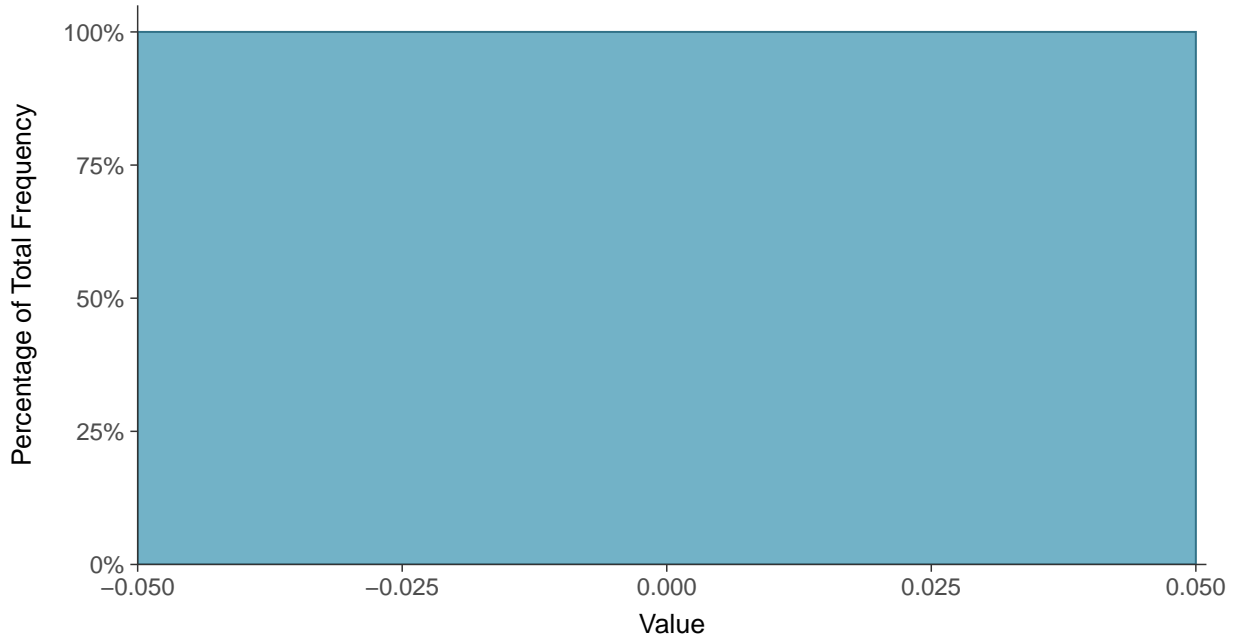
Antimony, MW-4, MW-11, MW-12 (mg/L)





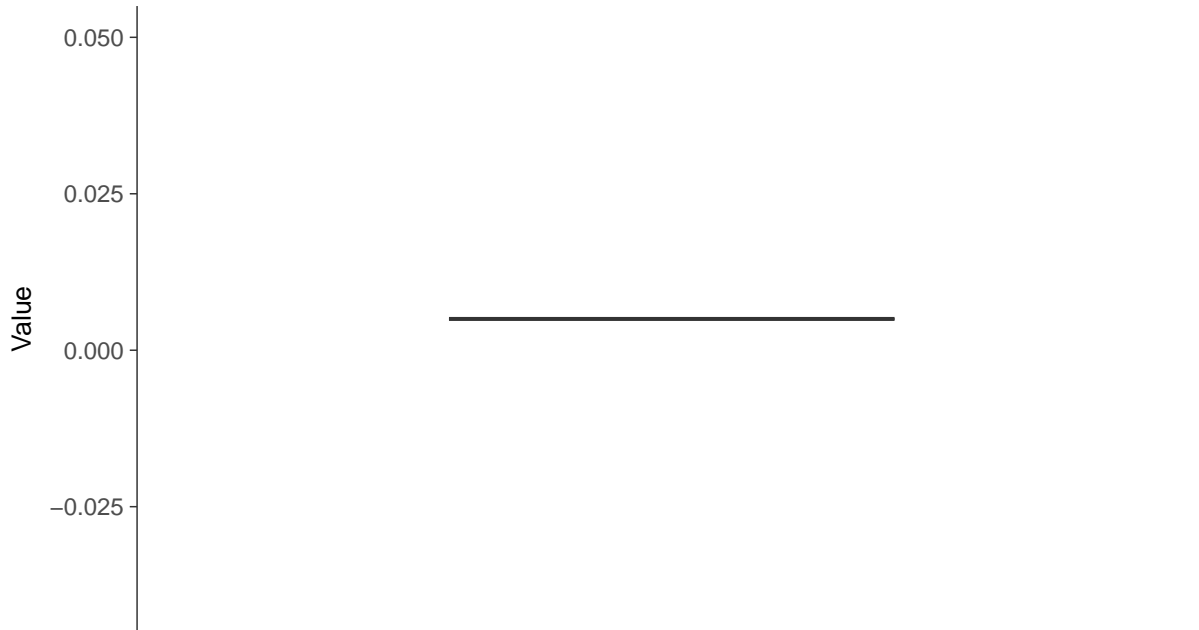
Histogram

Antimony, MW-4, MW-11, MW-12 (mg/L)



Boxplot

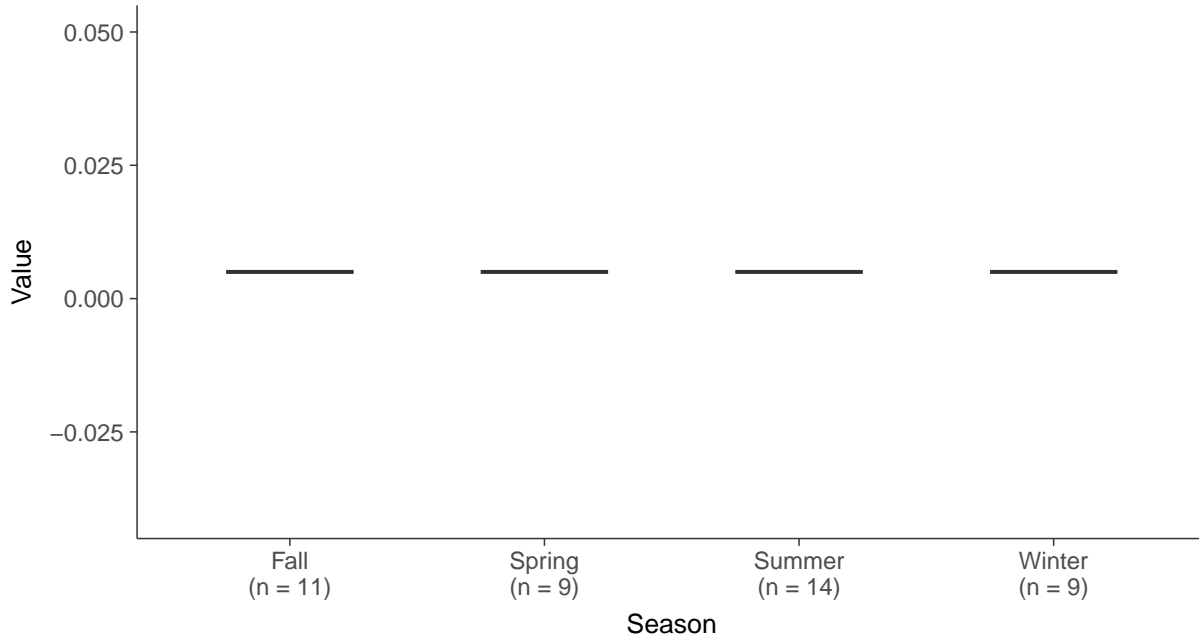
Antimony, MW-4, MW-11, MW-12 (mg/L)





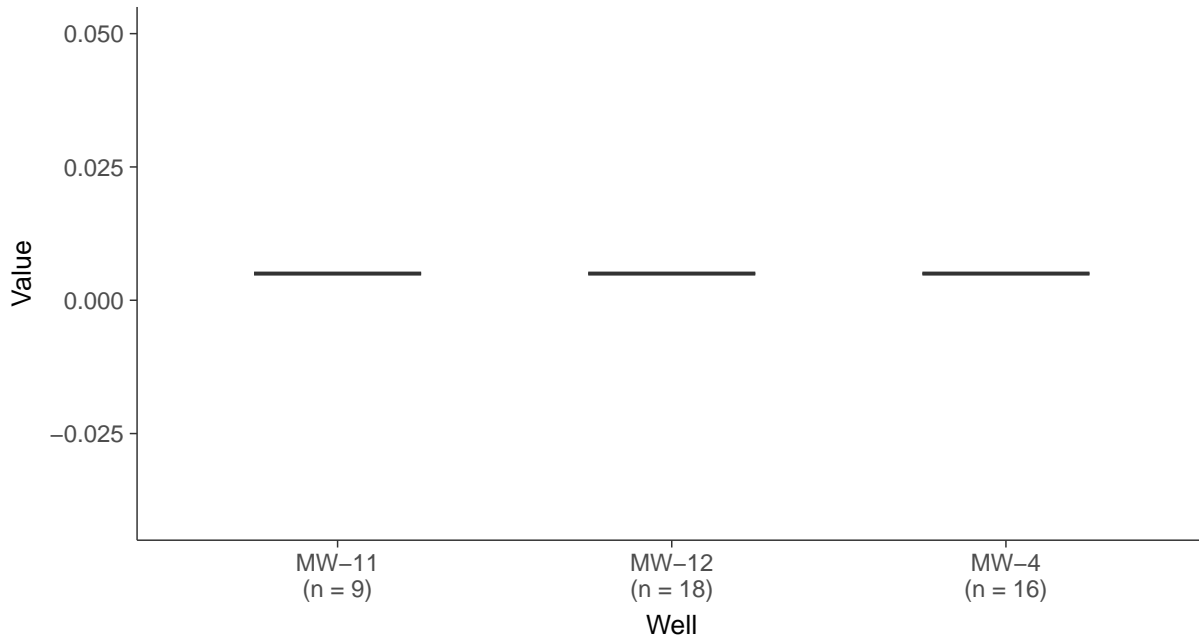
Boxplot by Season

Antimony, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Antimony, MW-4, MW-11, MW-12 (mg/L)



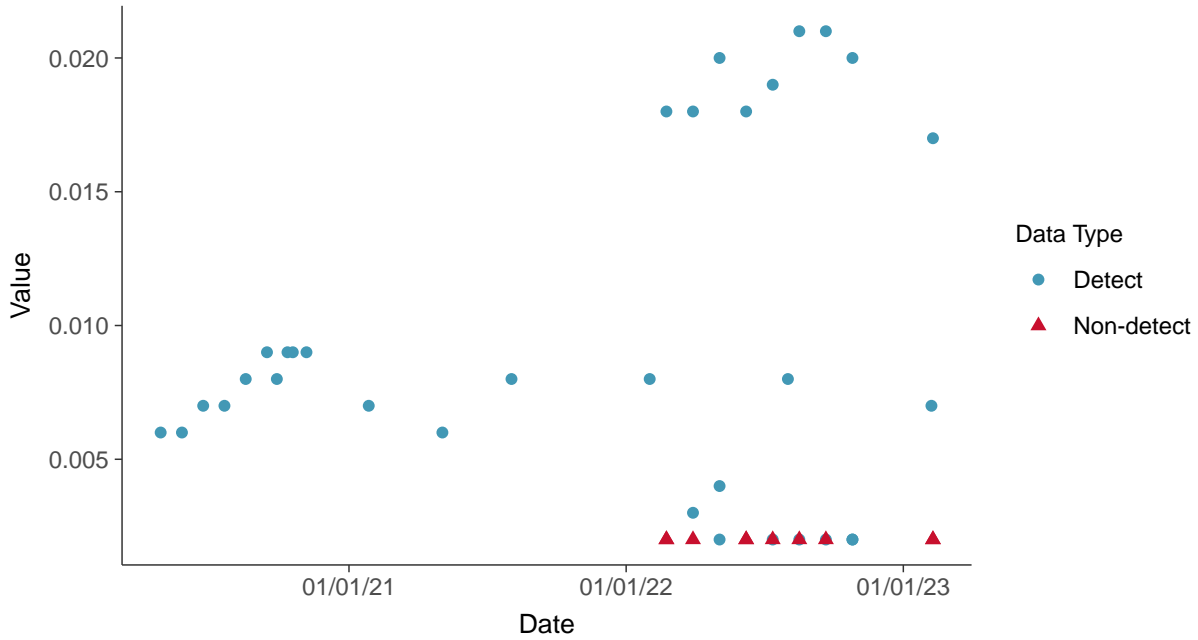


Appendix IV: Arsenic, MW-4, MW-11, MW-12

ID: 2_09

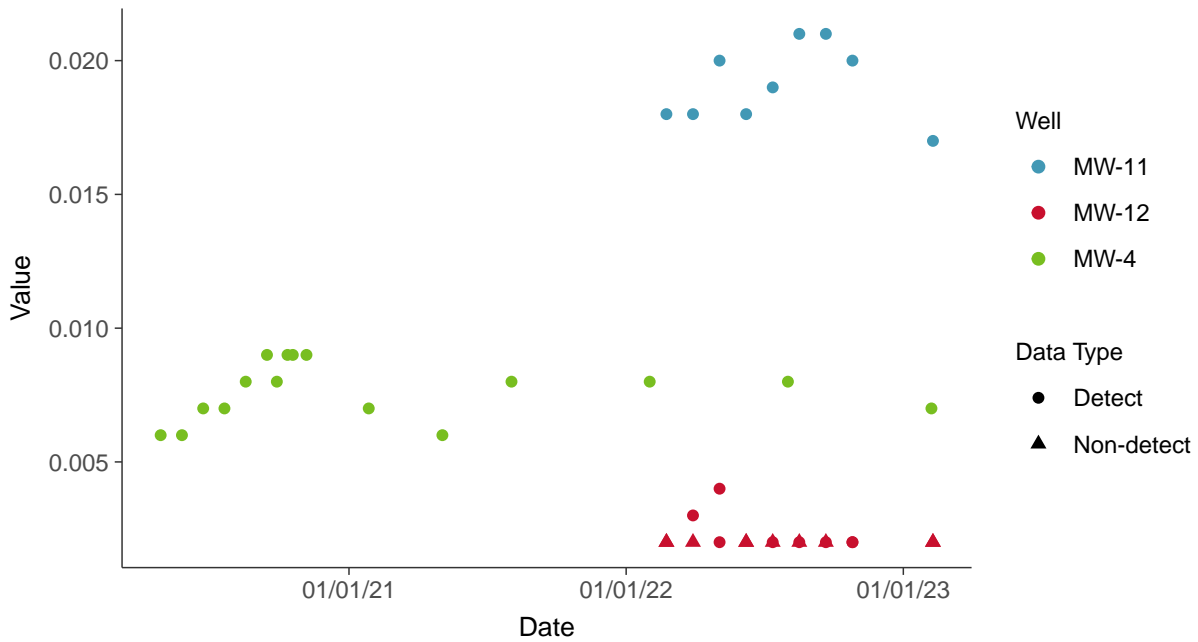
Scatter Plot

Arsenic, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

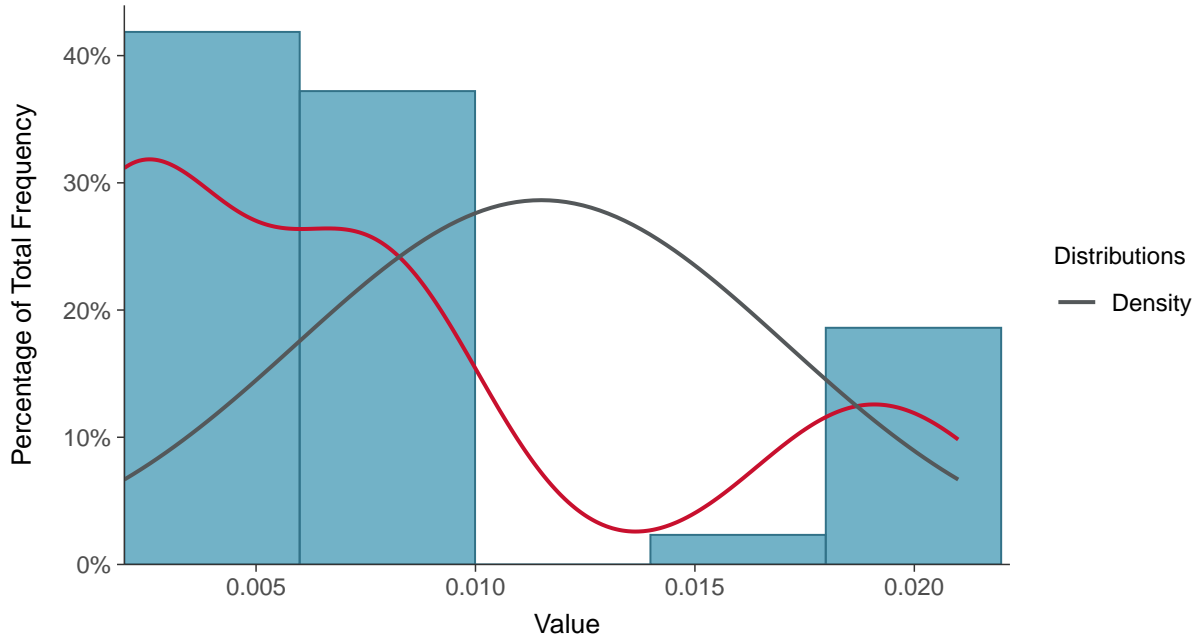
Arsenic, MW-4, MW-11, MW-12 (mg/L)





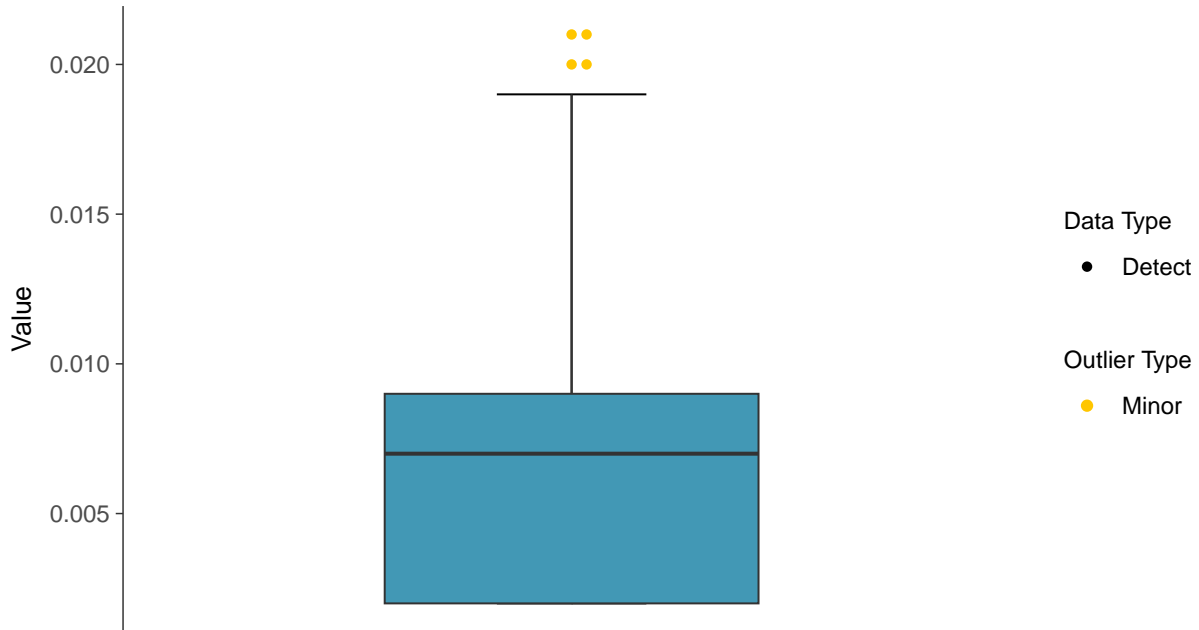
Histogram

Arsenic, MW-4, MW-11, MW-12 (mg/L)



Boxplot

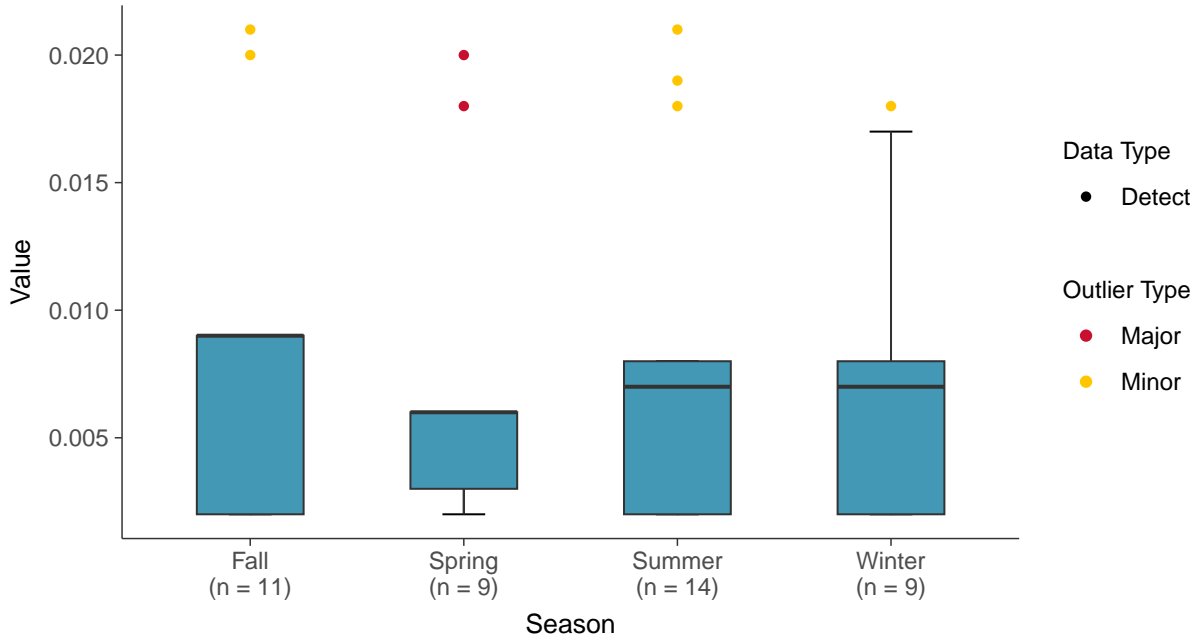
Arsenic, MW-4, MW-11, MW-12 (mg/L)





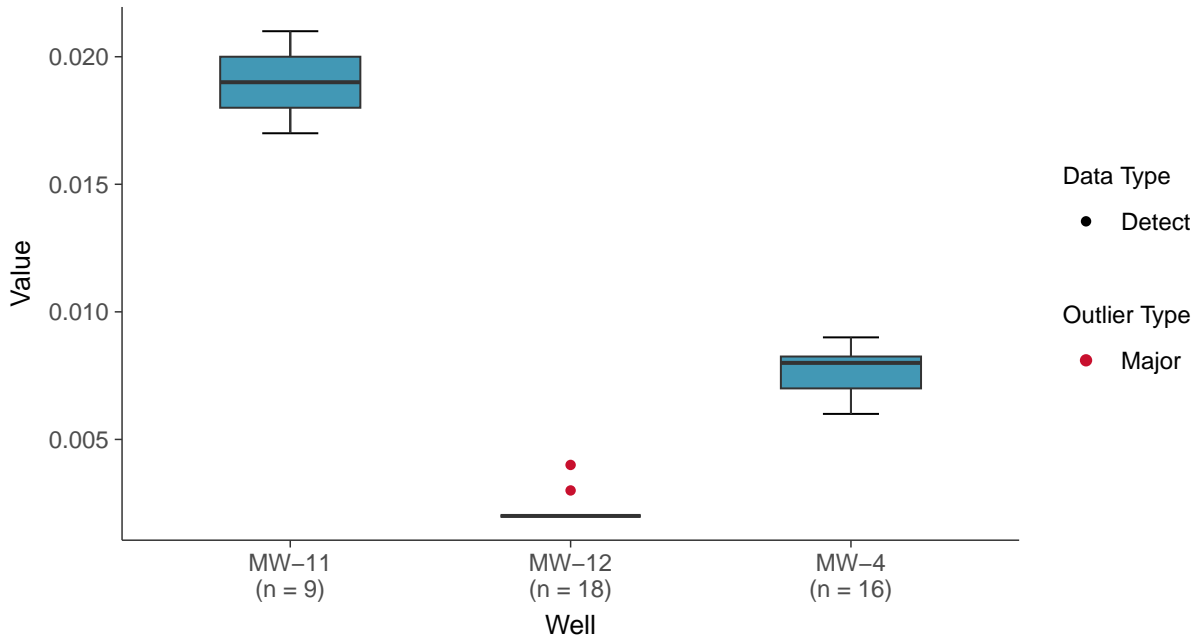
Boxplot by Season

Arsenic, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

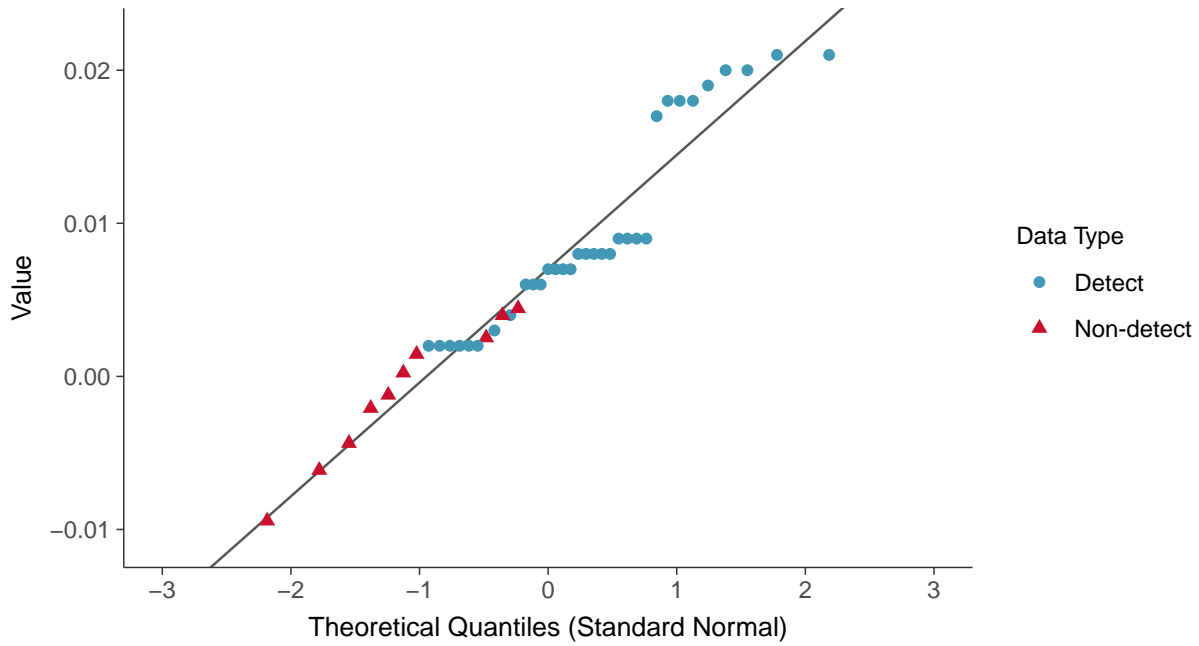
Arsenic, MW-4, MW-11, MW-12 (mg/L)





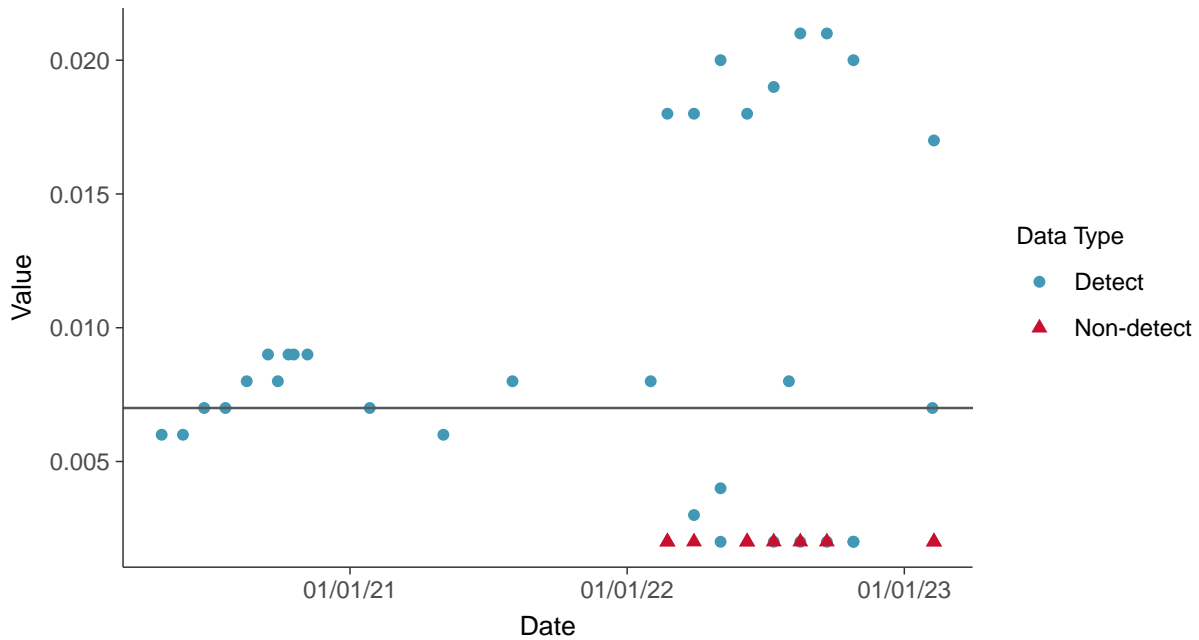
Normal Q-Q plot using ROS Imputed Estimates

Arsenic, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

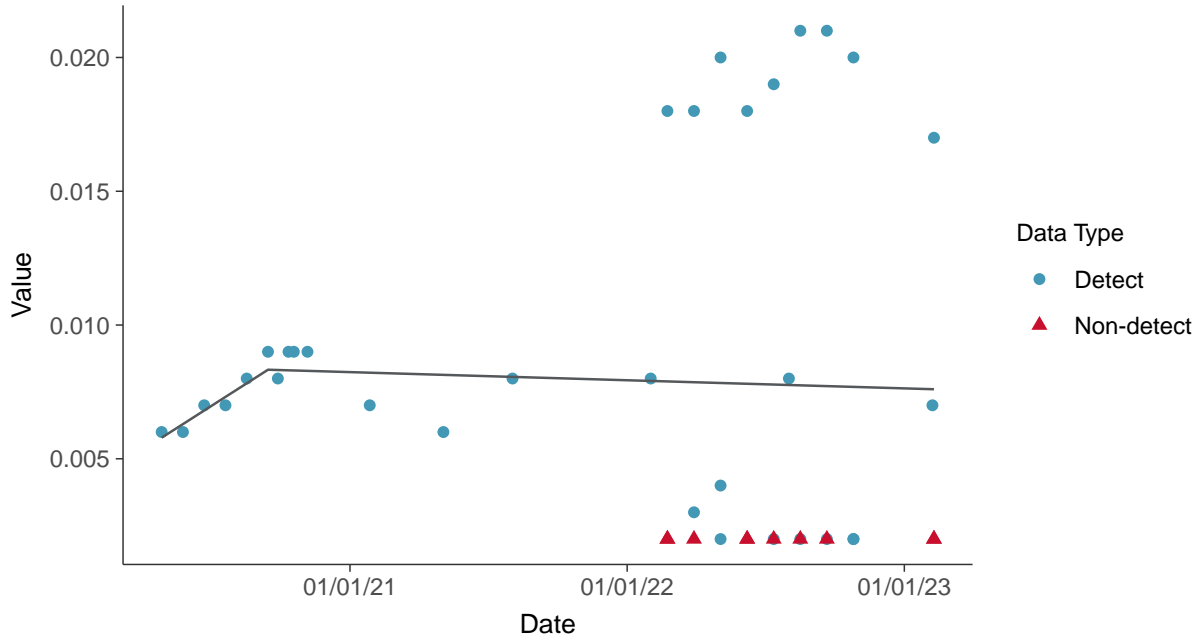
Arsenic, MW-4, MW-11, MW-12 (mg/L)





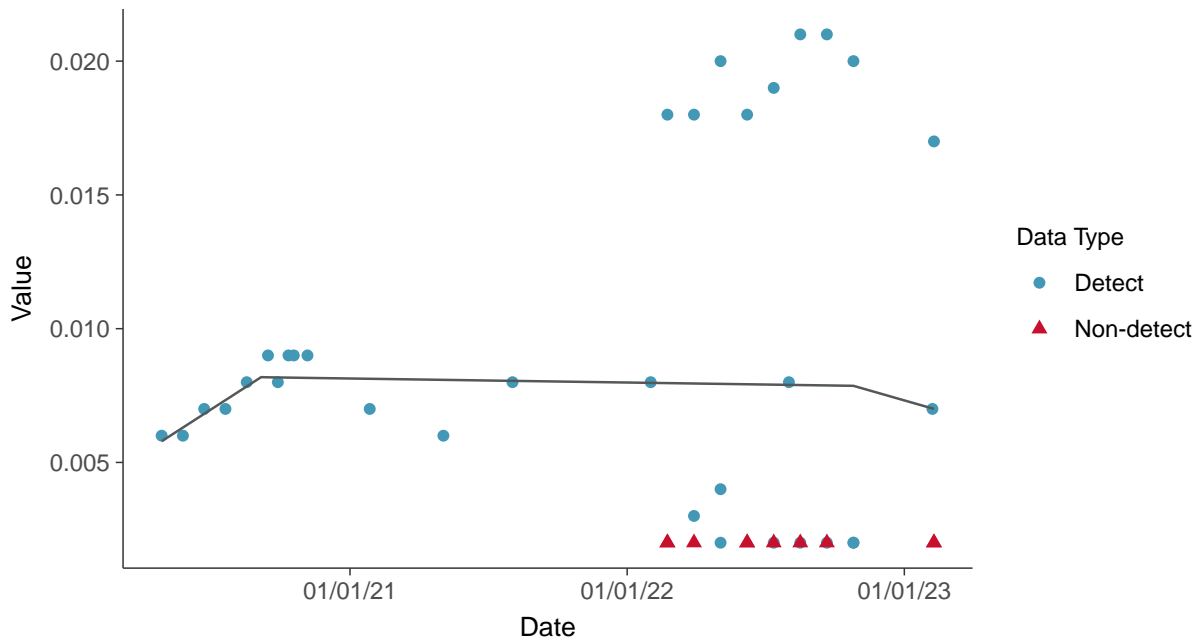
Trend Regression: Piecewise Linear-Linear

Arsenic, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Arsenic, MW-4, MW-11, MW-12 (mg/L)



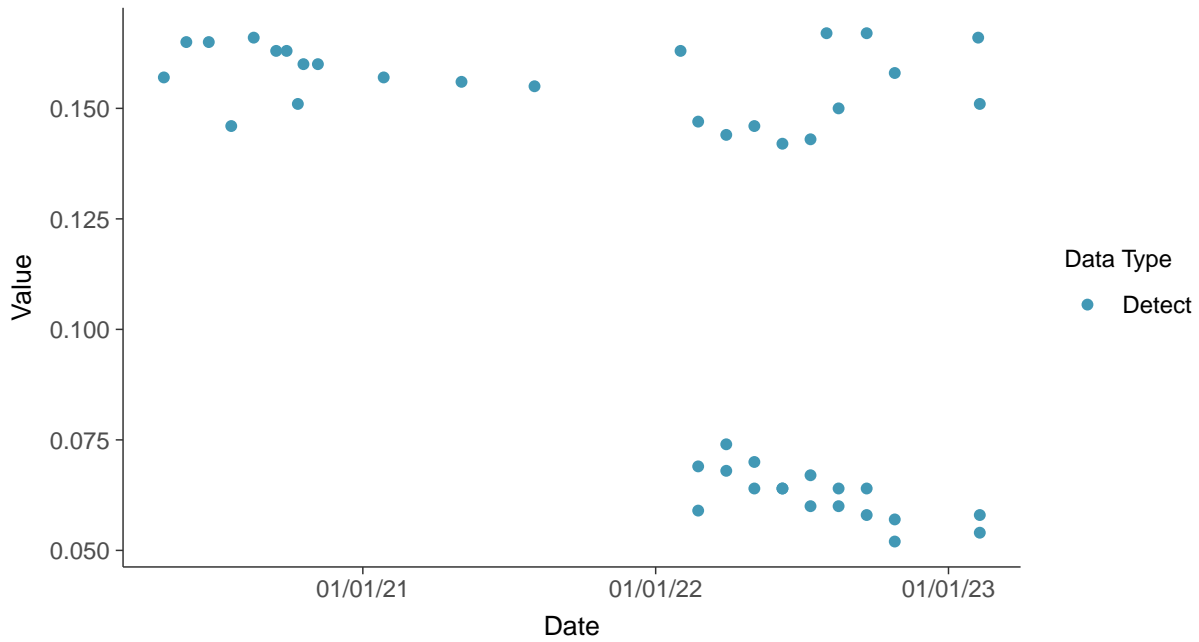


Appendix IV: Barium, MW-4, MW-11, MW-12

ID: 2_10

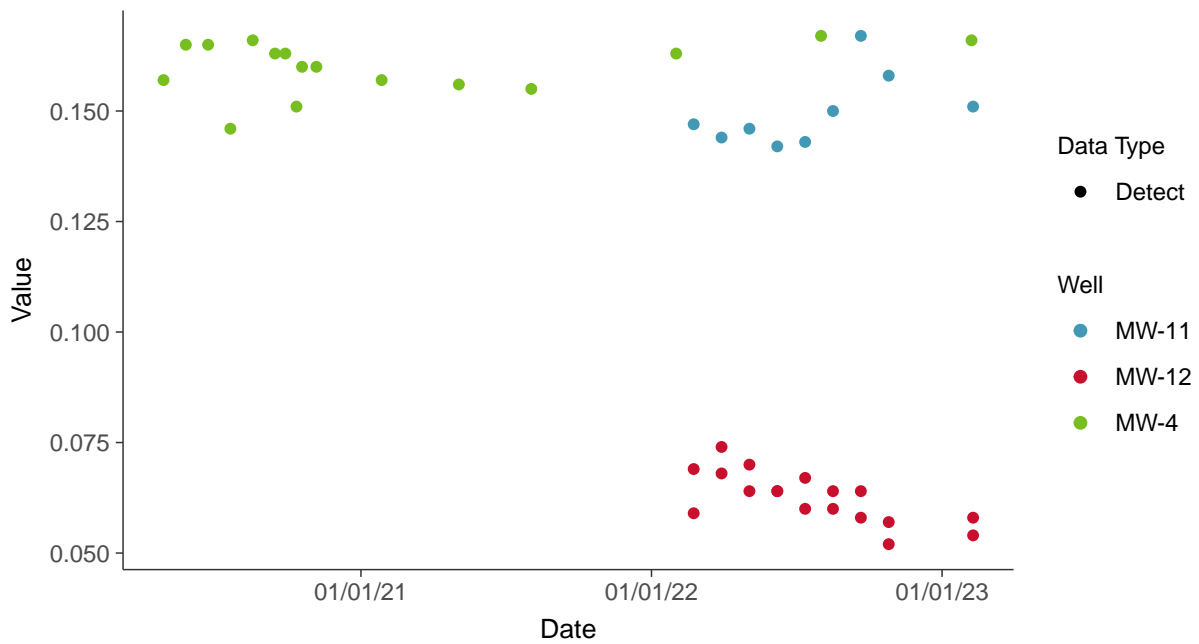
Scatter Plot

Barium, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

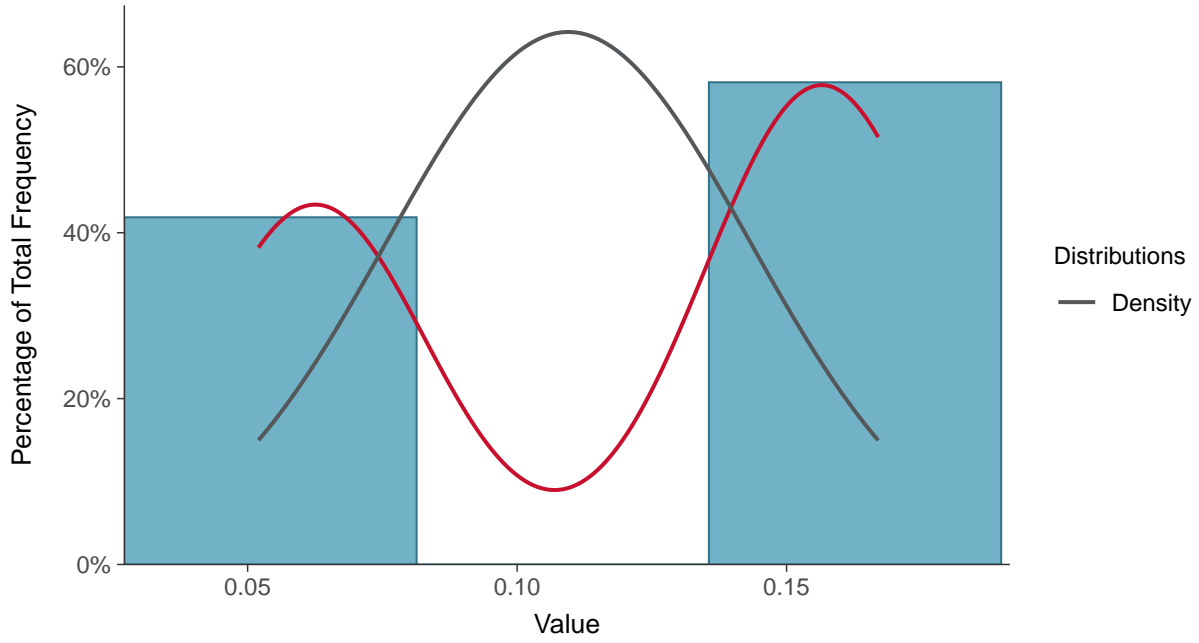
Barium, MW-4, MW-11, MW-12 (mg/L)





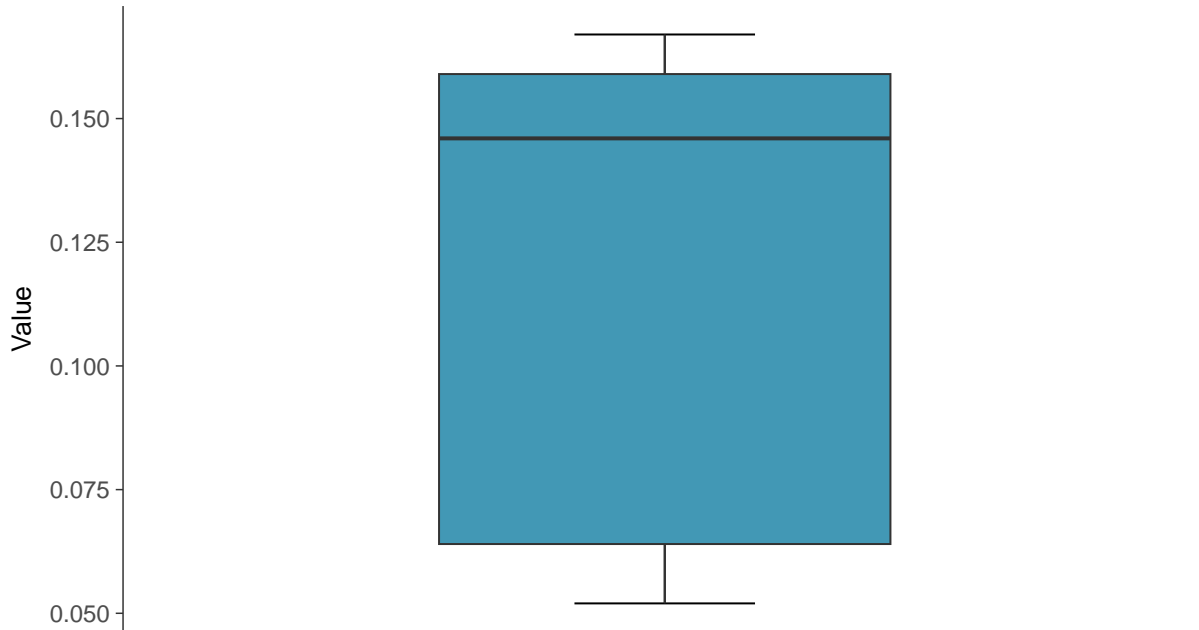
Histogram

Barium, MW-4, MW-11, MW-12 (mg/L)



Boxplot

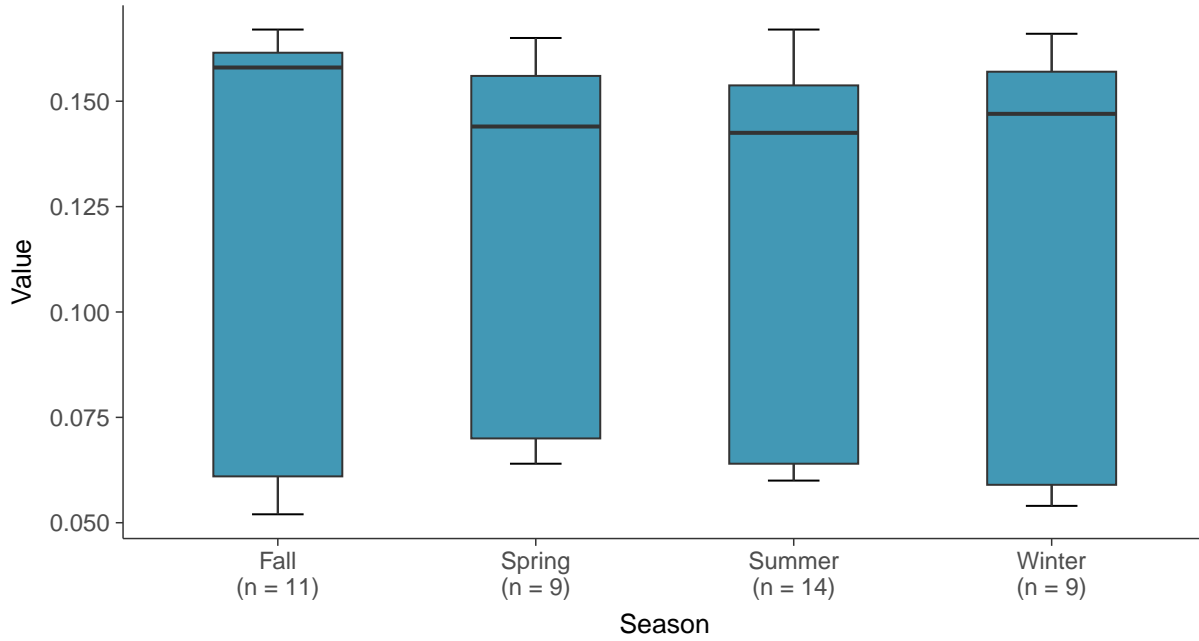
Barium, MW-4, MW-11, MW-12 (mg/L)





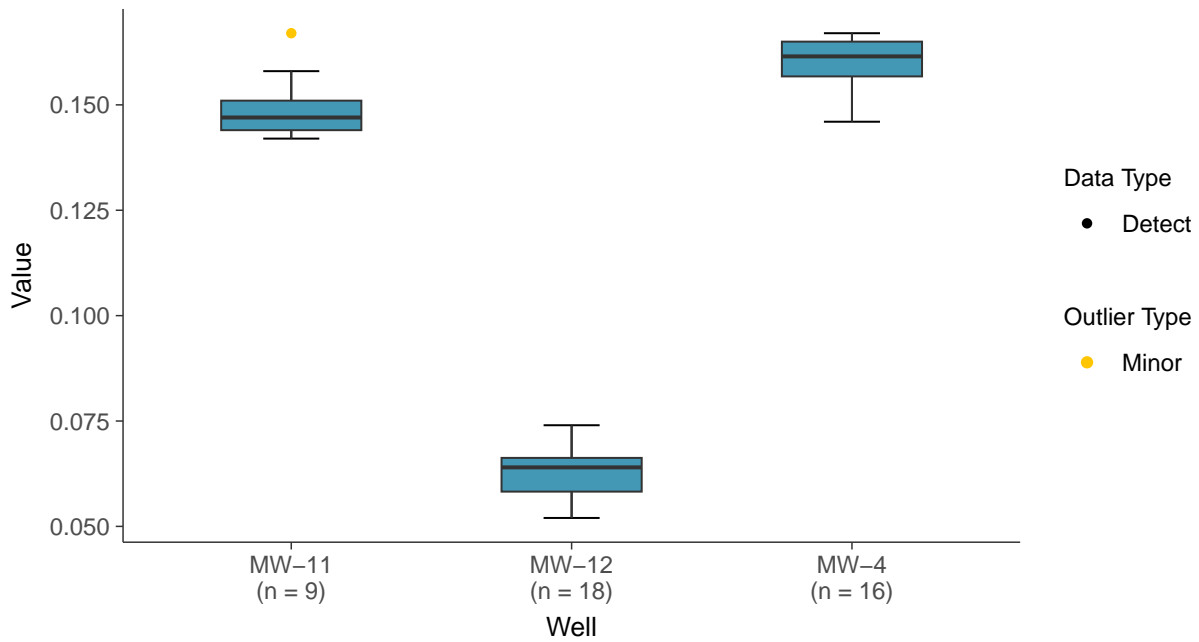
Boxplot by Season

Barium, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

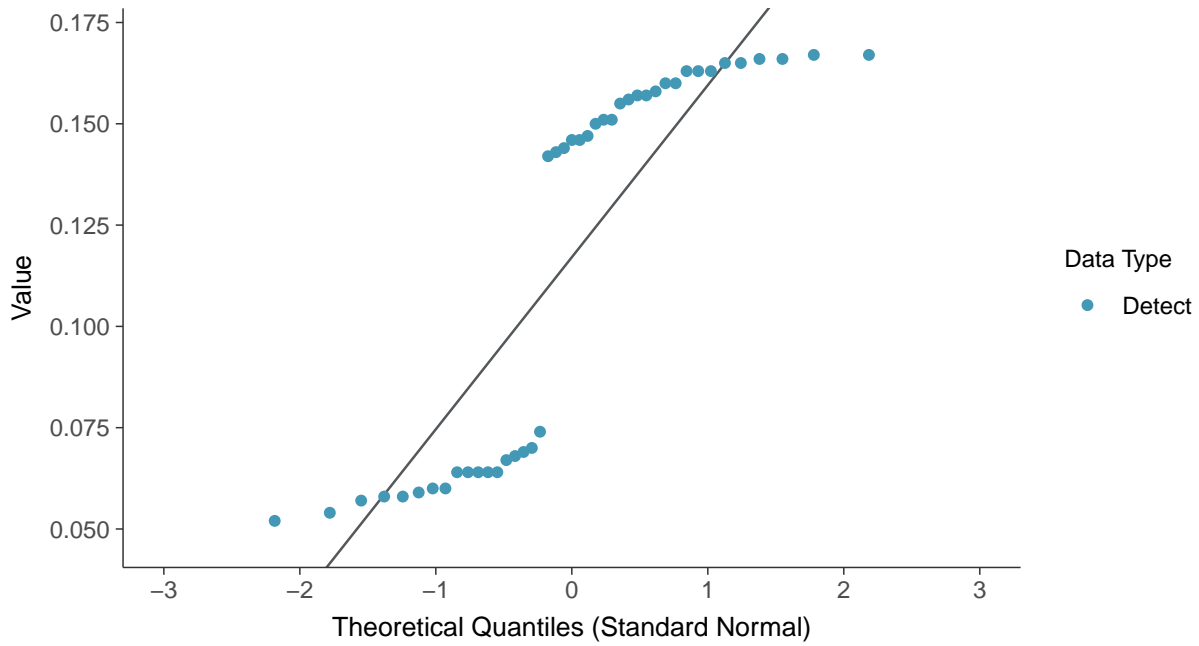
Barium, MW-4, MW-11, MW-12 (mg/L)





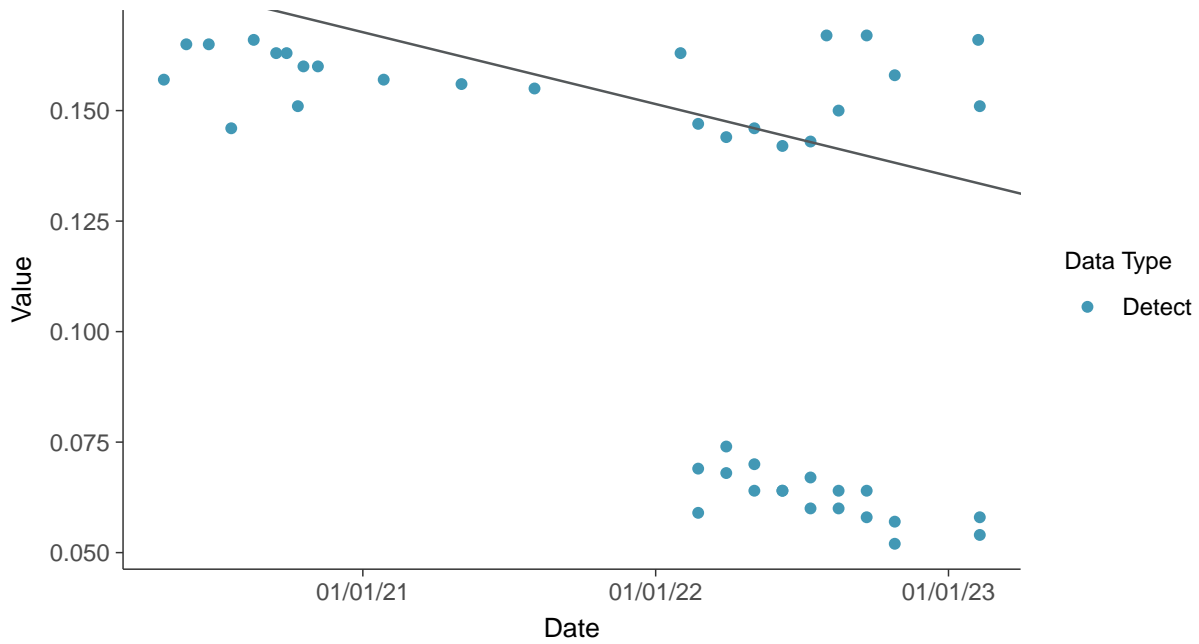
Normal Q-Q plot

Barium, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

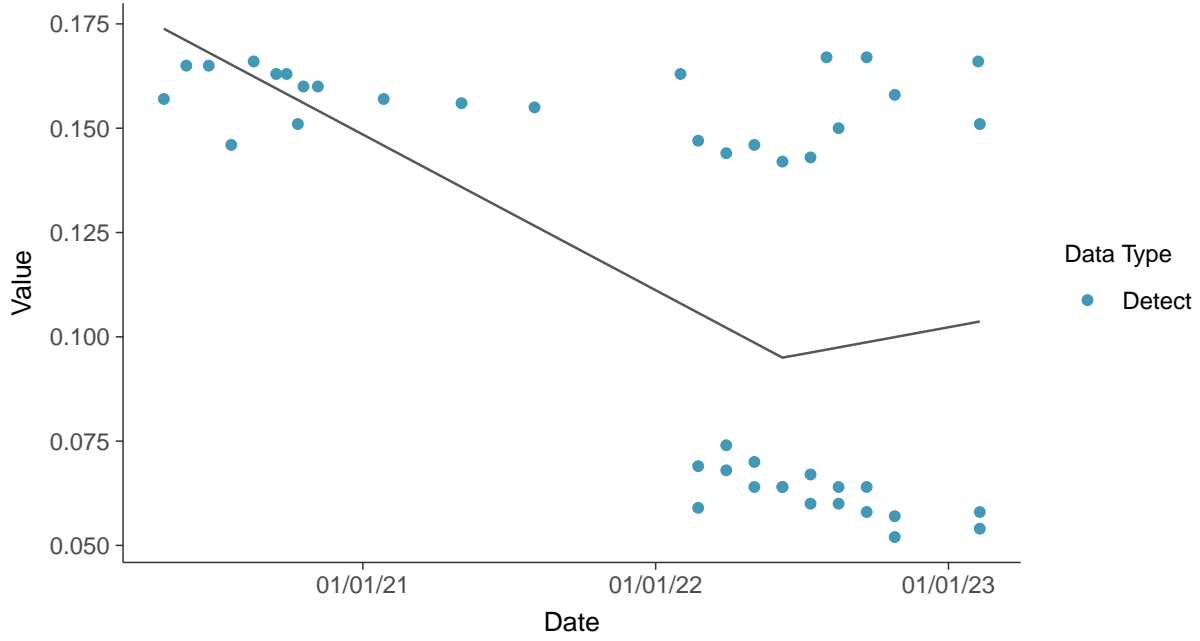
Barium, MW-4, MW-11, MW-12 (mg/L)





Trend Regression: Piecewise Linear-Linear

Barium, MW-4, MW-11, MW-12 (mg/L)



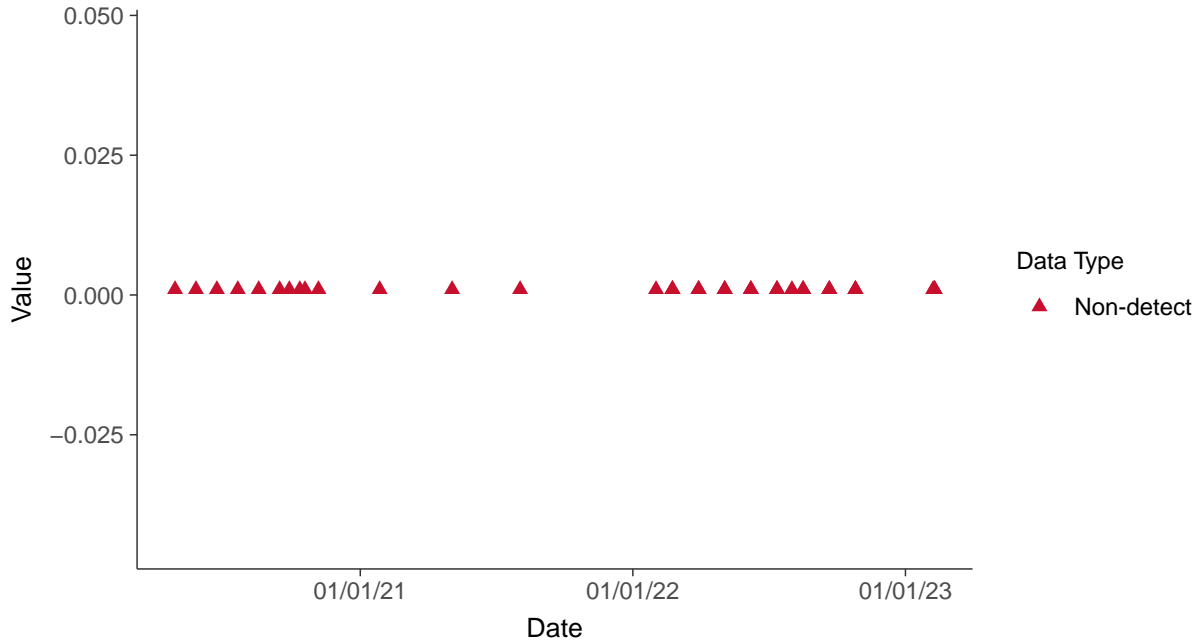


Appendix IV: Beryllium, MW-4, MW-11, MW-12

ID: 2_11

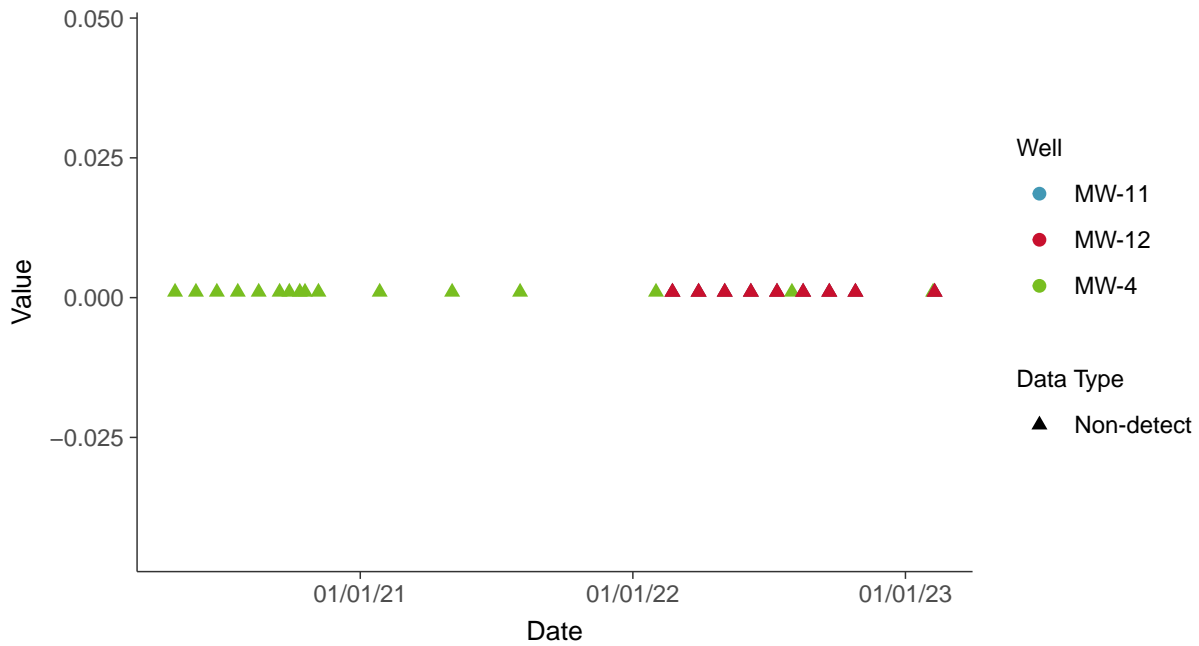
Scatter Plot

Beryllium, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

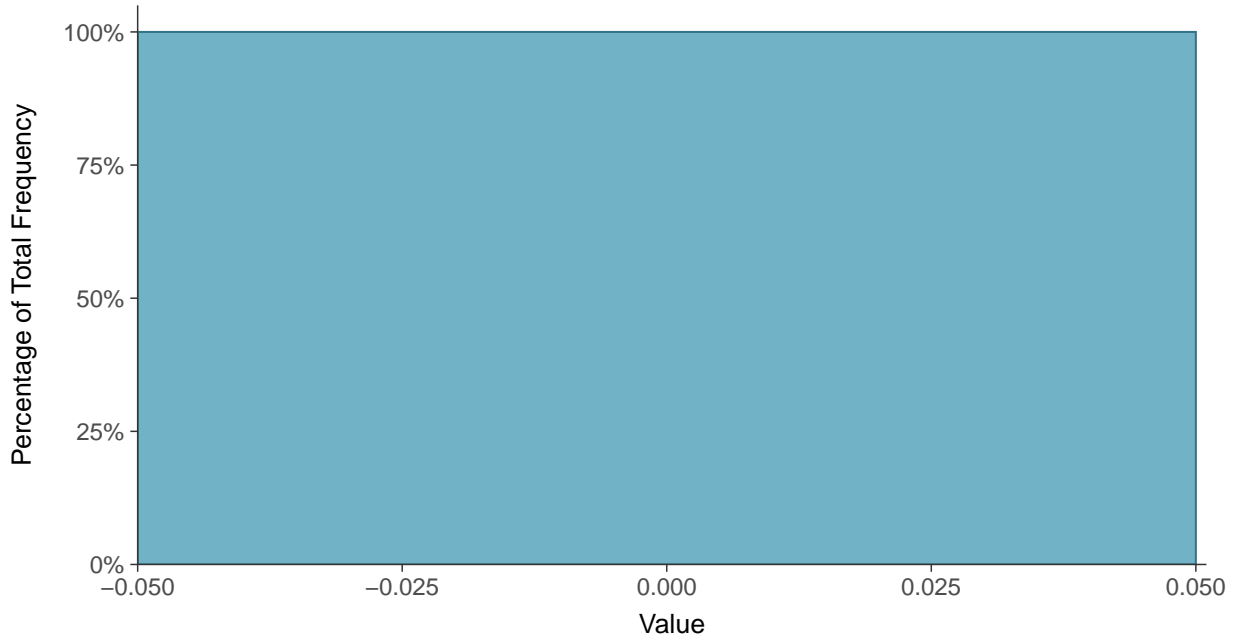
Beryllium, MW-4, MW-11, MW-12 (mg/L)





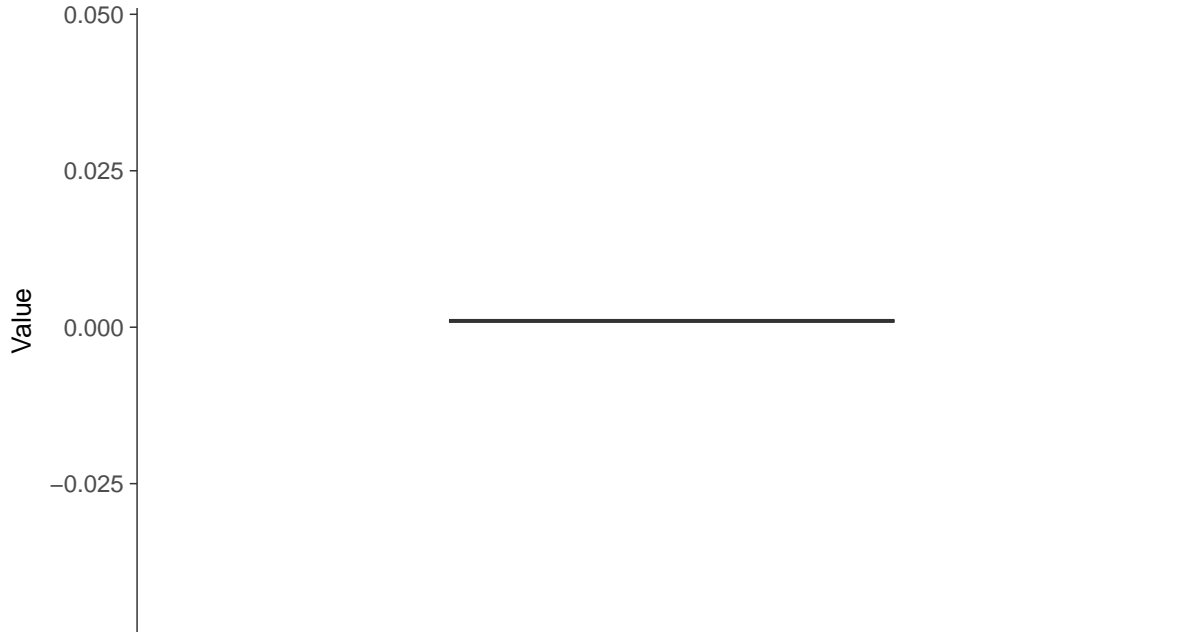
Histogram

Beryllium, MW-4, MW-11, MW-12 (mg/L)



Boxplot

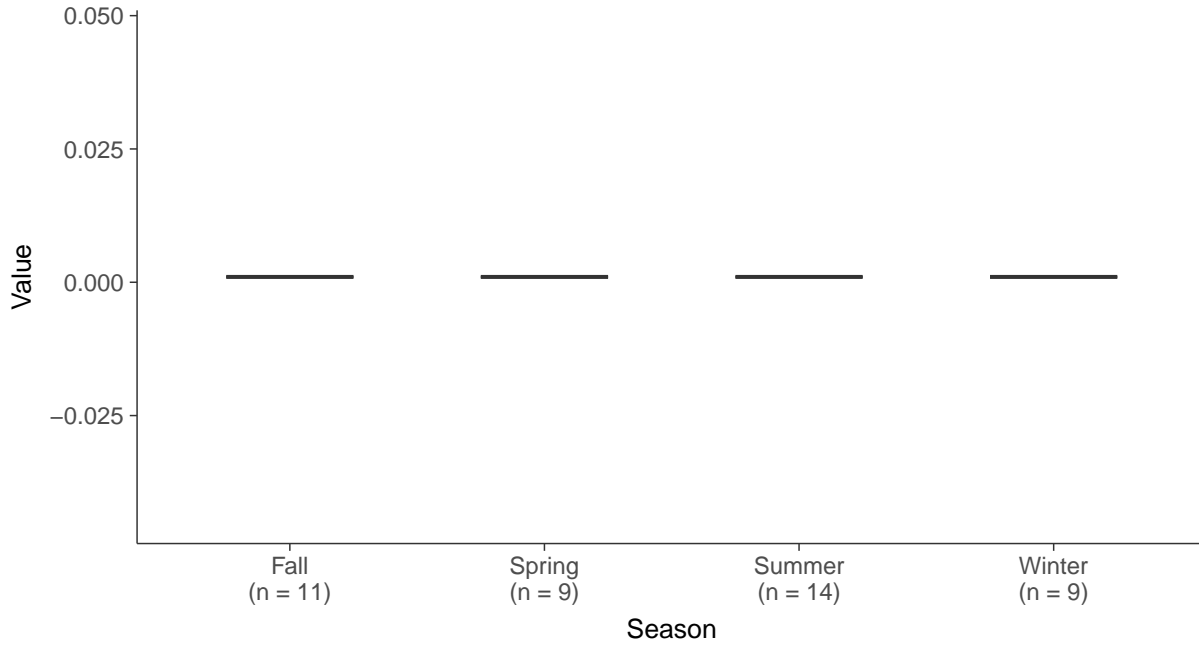
Beryllium, MW-4, MW-11, MW-12 (mg/L)





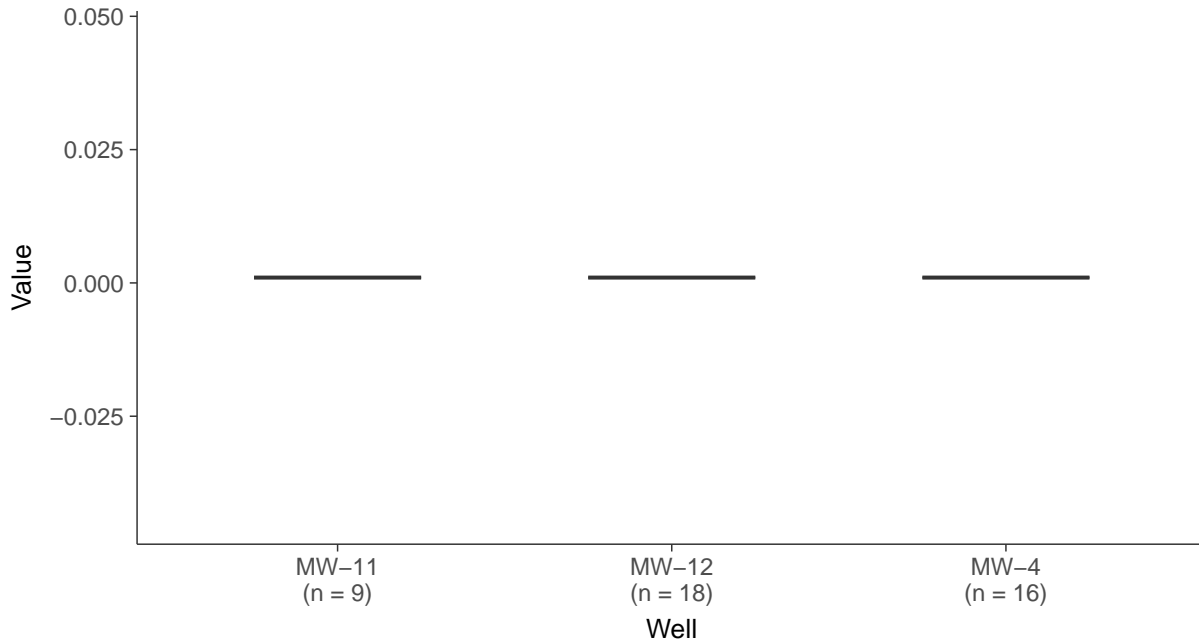
Boxplot by Season

Beryllium, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Beryllium, MW-4, MW-11, MW-12 (mg/L)



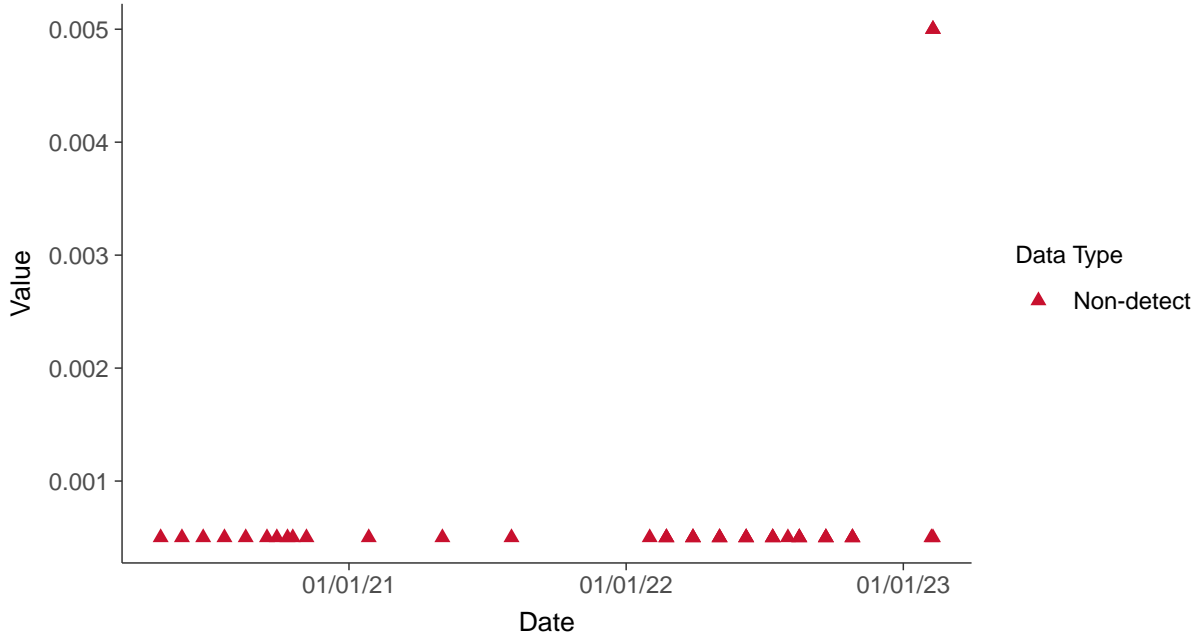


Appendix IV: Cadmium, MW-4, MW-11, MW-12

ID: 2_13

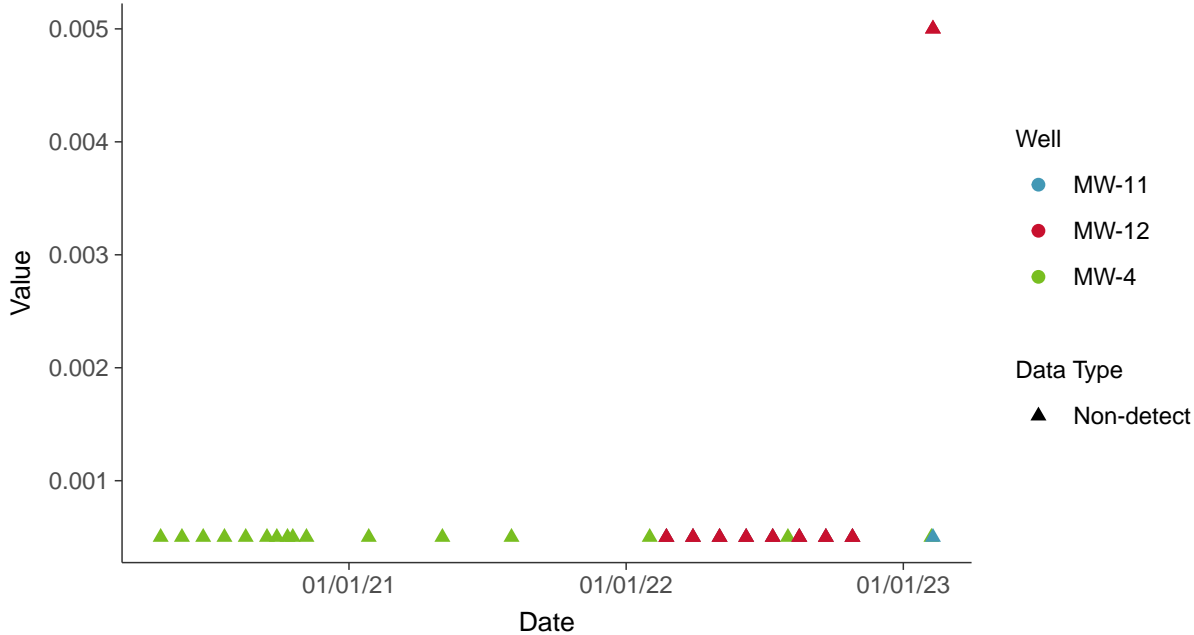
Scatter Plot

Cadmium, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

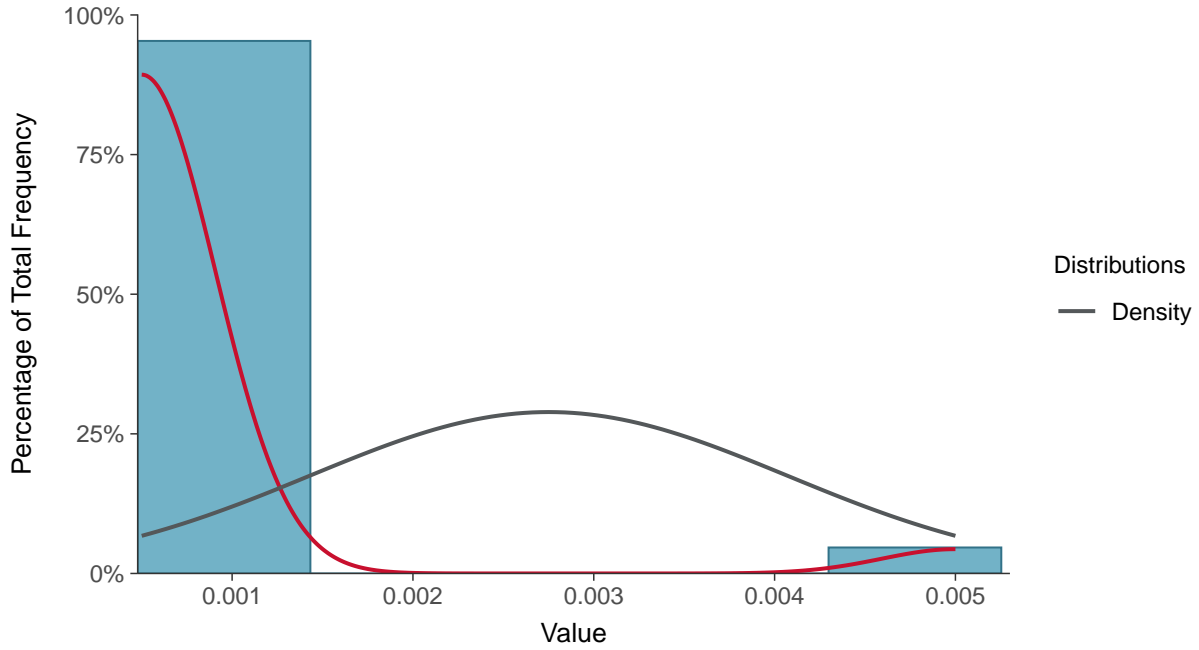
Cadmium, MW-4, MW-11, MW-12 (mg/L)





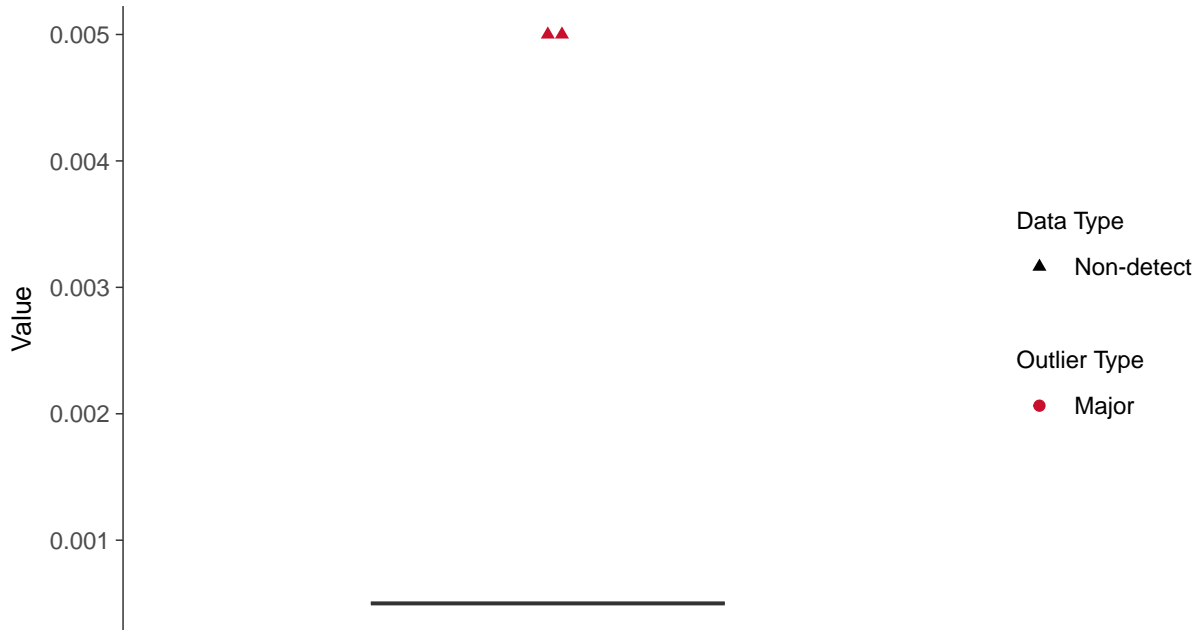
Histogram

Cadmium, MW-4, MW-11, MW-12 (mg/L)



Boxplot

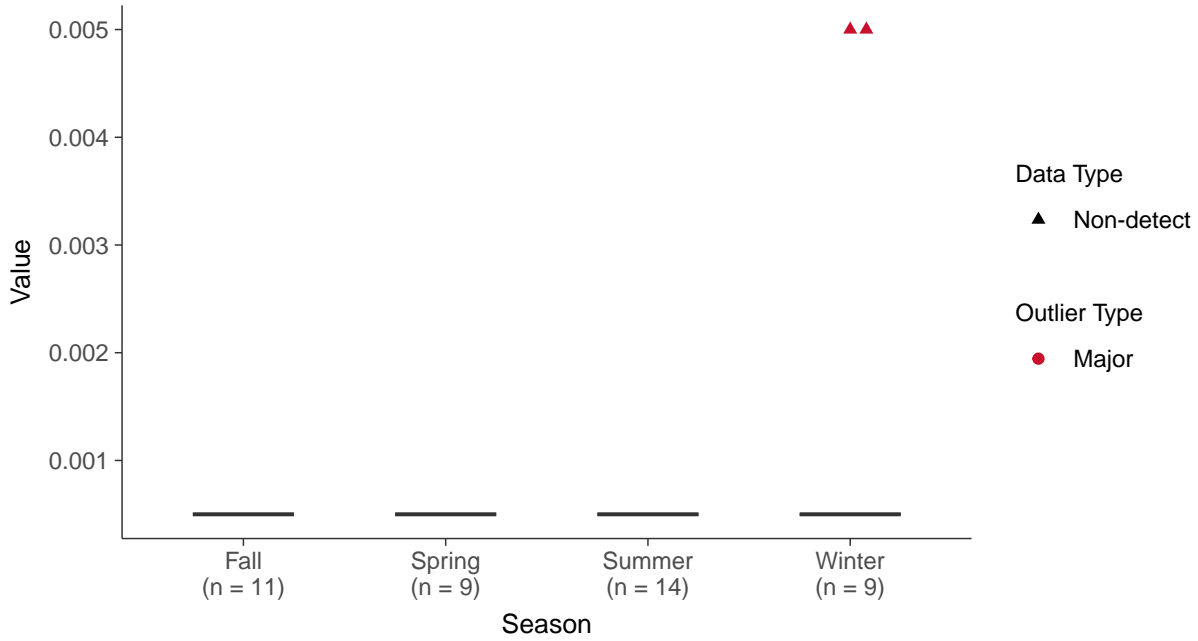
Cadmium, MW-4, MW-11, MW-12 (mg/L)





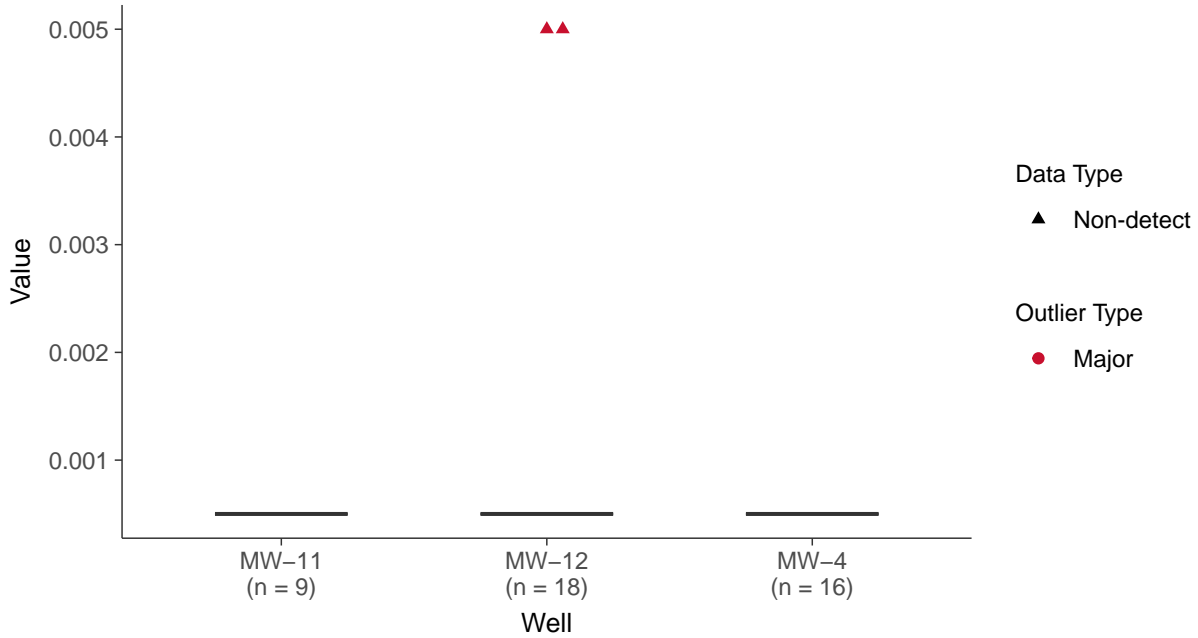
Boxplot by Season

Cadmium, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

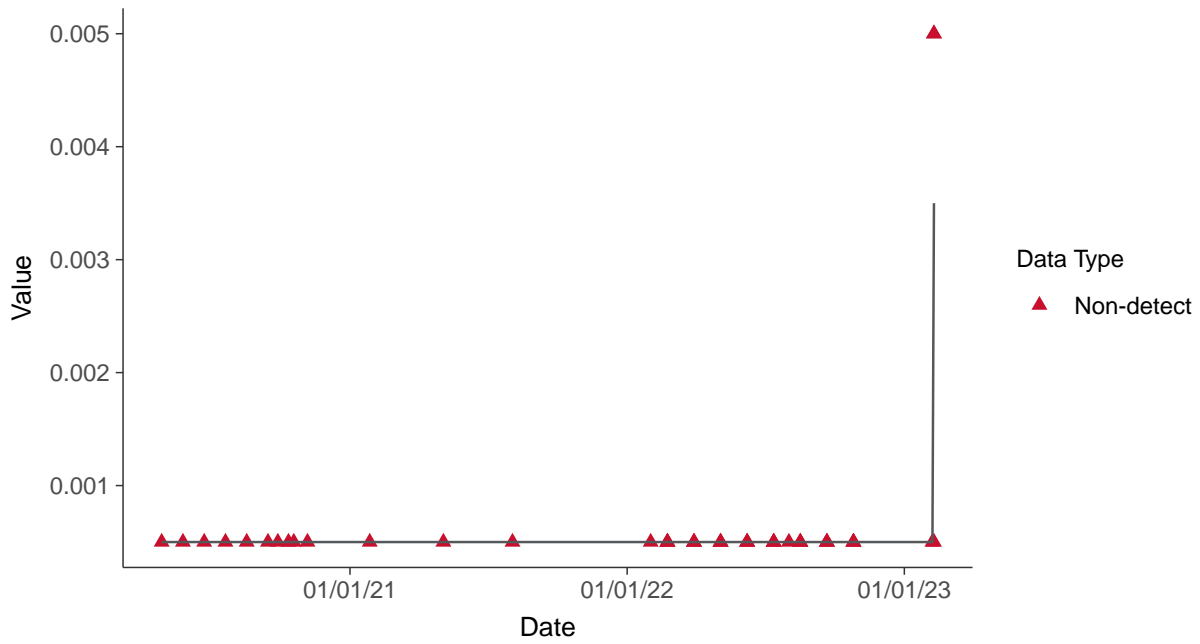
Cadmium, MW-4, MW-11, MW-12 (mg/L)





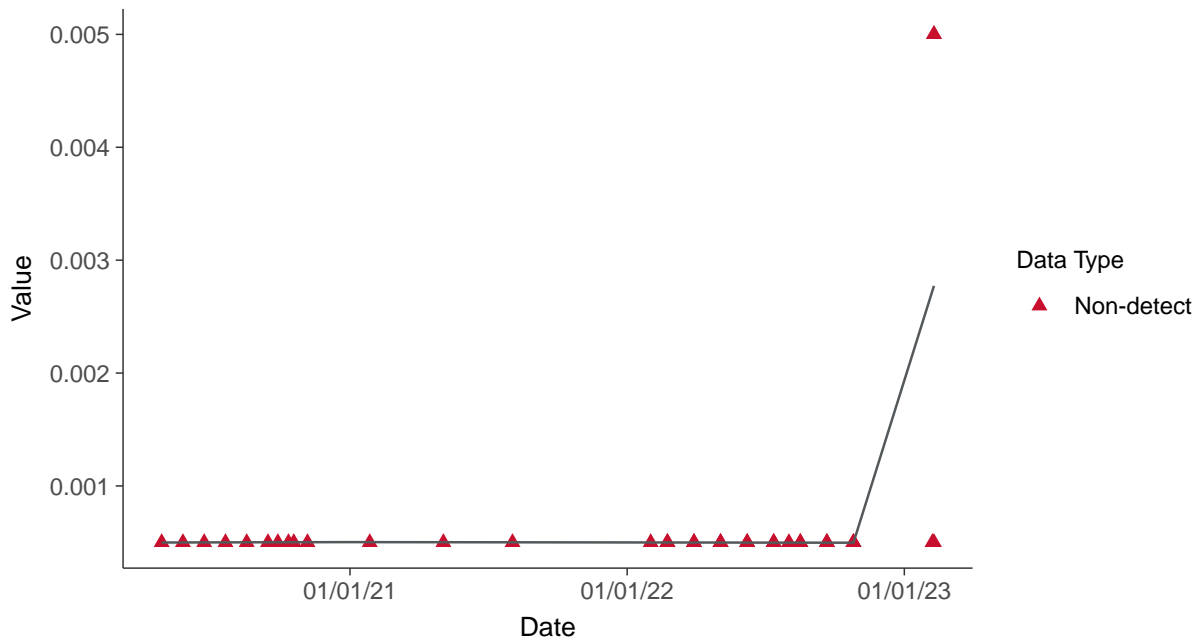
Trend Regression: Piecewise Linear-Linear

Cadmium, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Cadmium, MW-4, MW-11, MW-12 (mg/L)



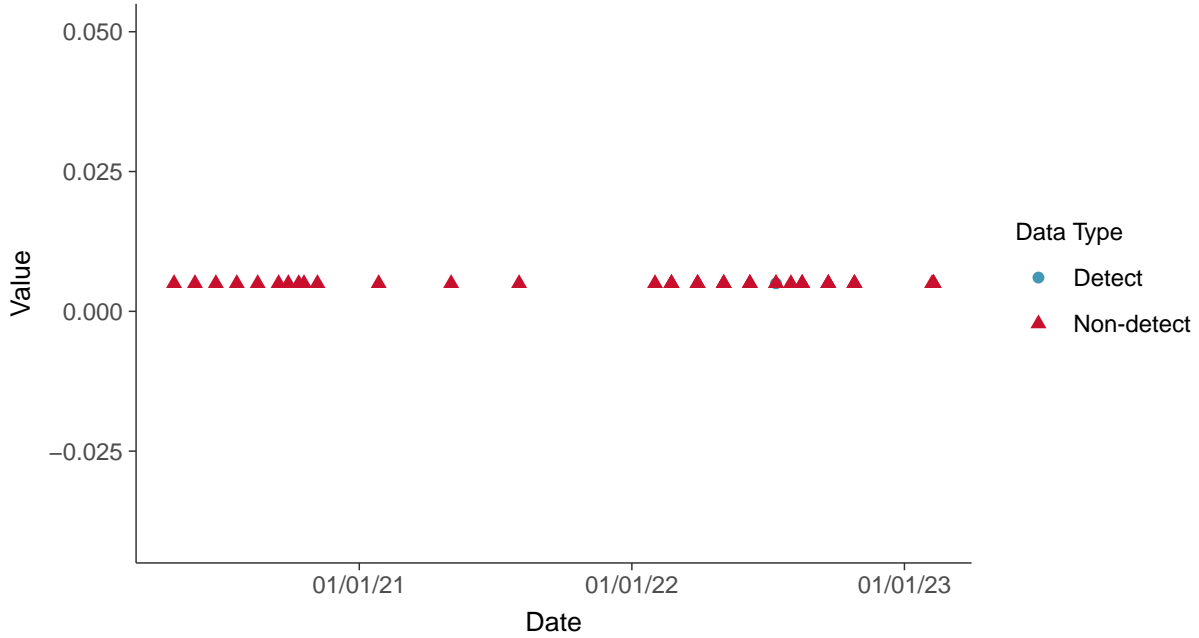


Appendix IV: Chromium, MW-4, MW-11, MW-12

ID: 2_15

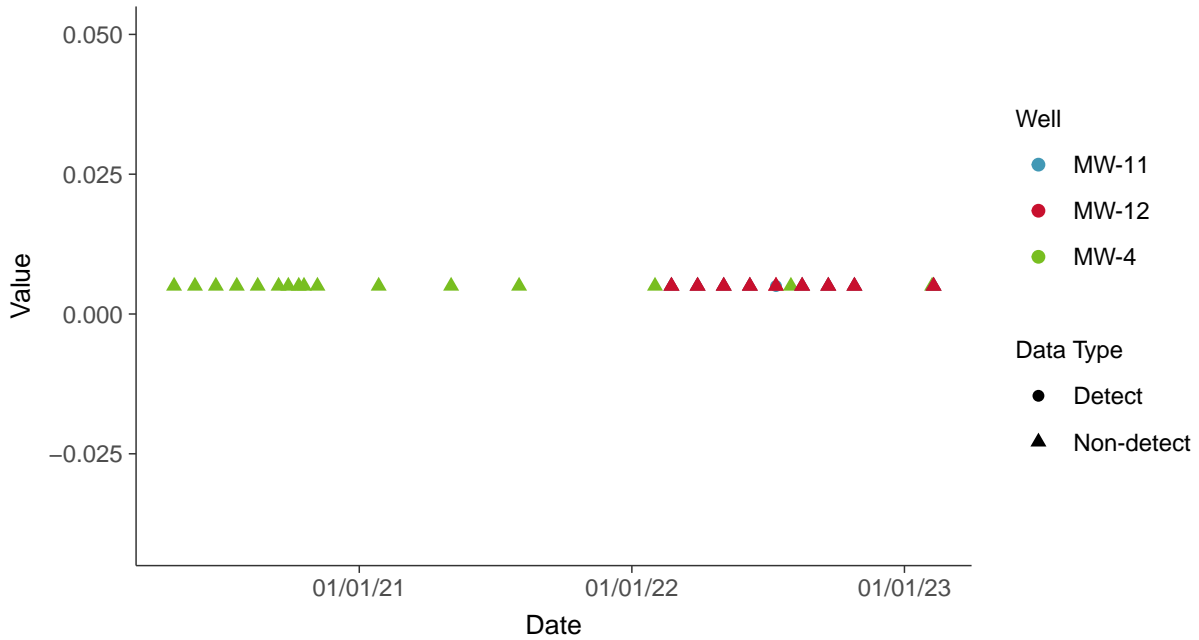
Scatter Plot

Chromium, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

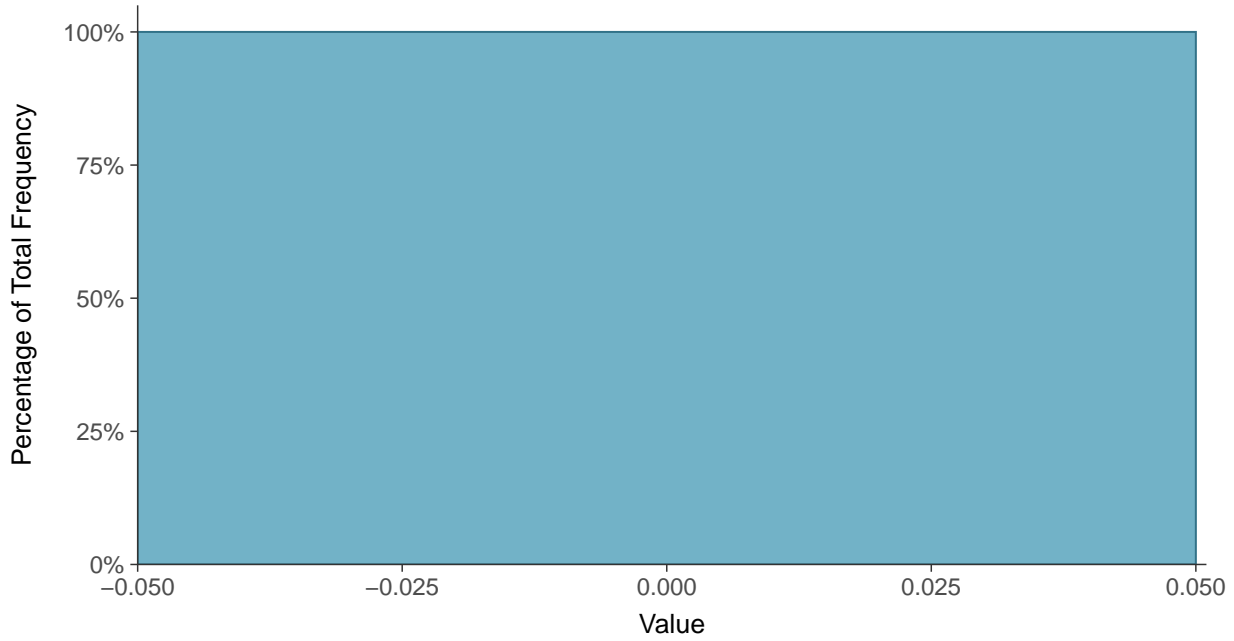
Chromium, MW-4, MW-11, MW-12 (mg/L)





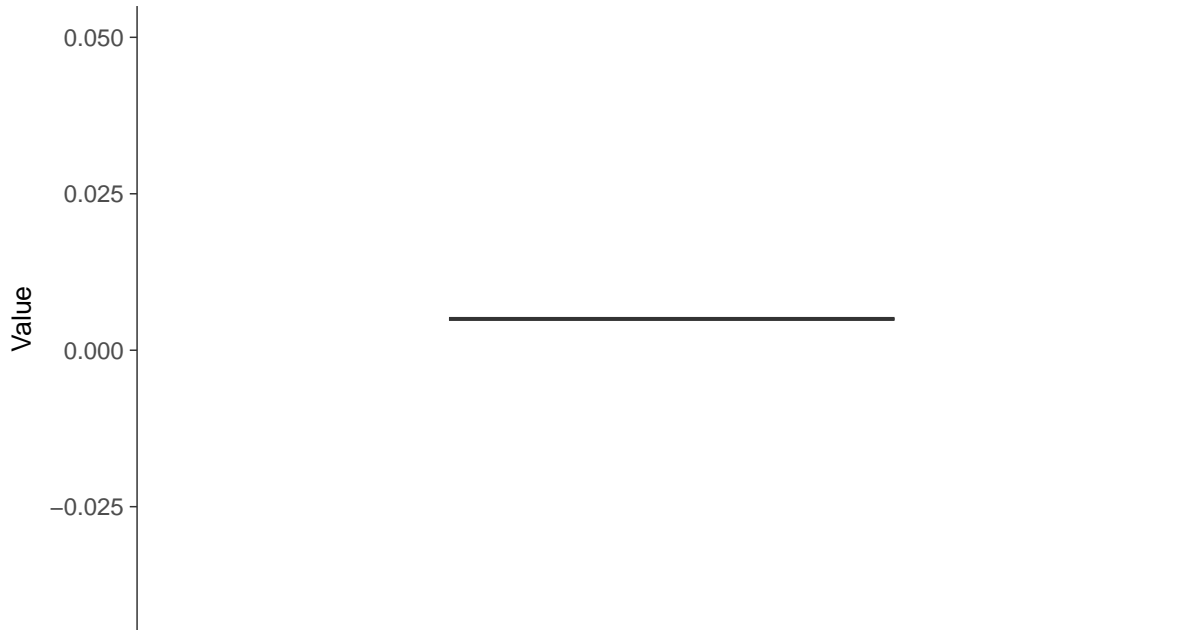
Histogram

Chromium, MW-4, MW-11, MW-12 (mg/L)



Boxplot

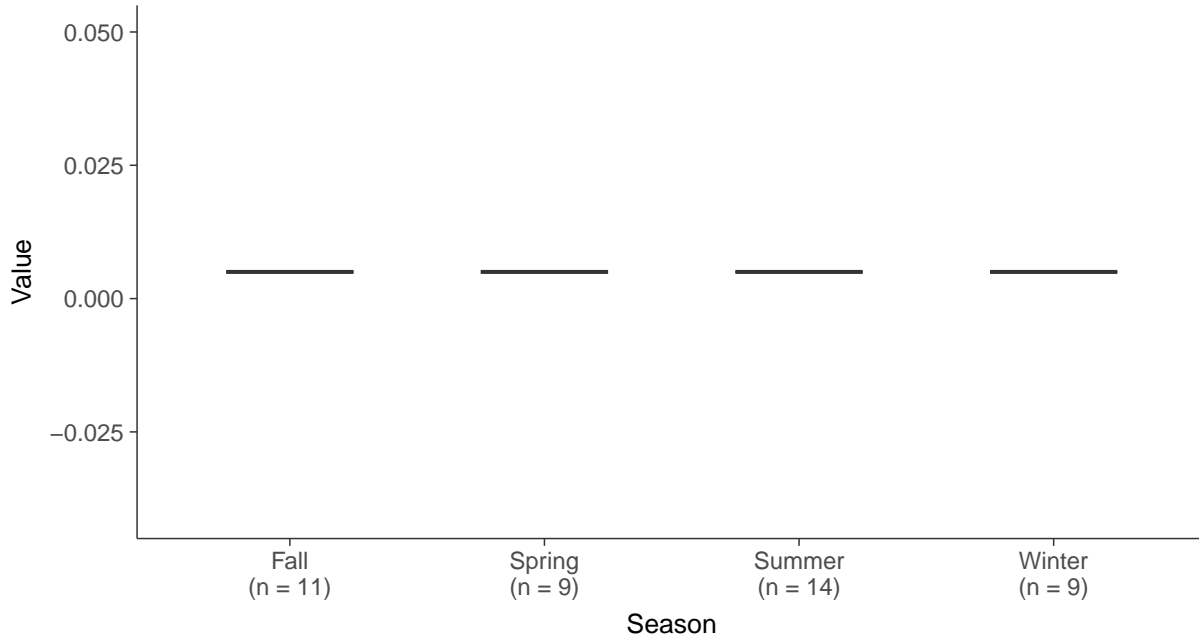
Chromium, MW-4, MW-11, MW-12 (mg/L)





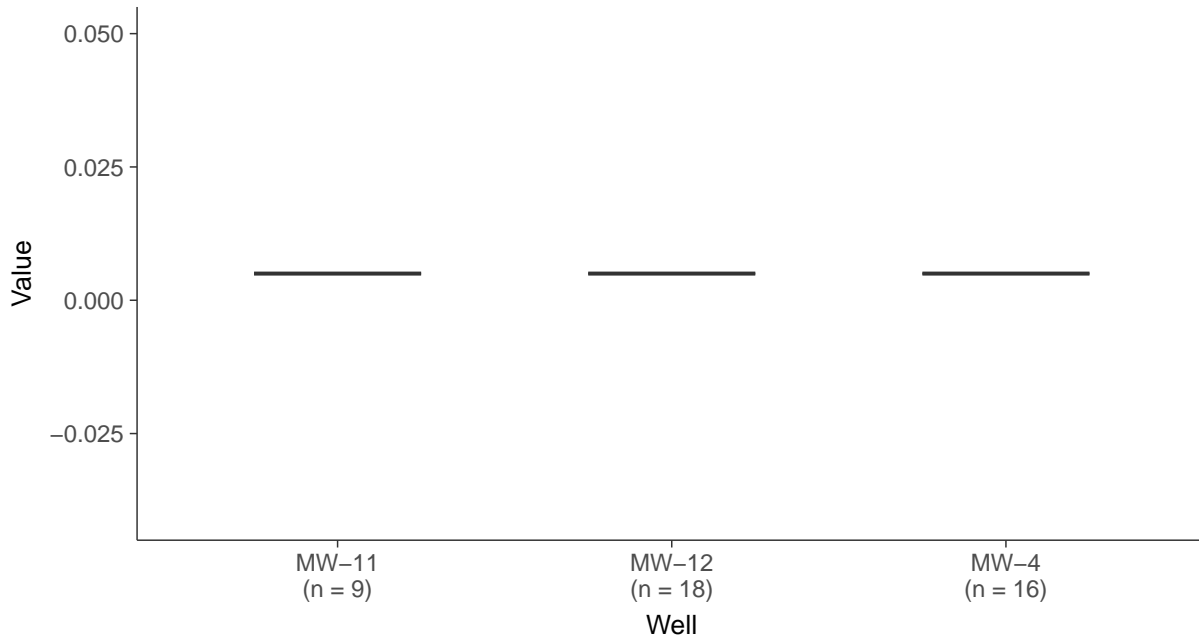
Boxplot by Season

Chromium, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Chromium, MW-4, MW-11, MW-12 (mg/L)



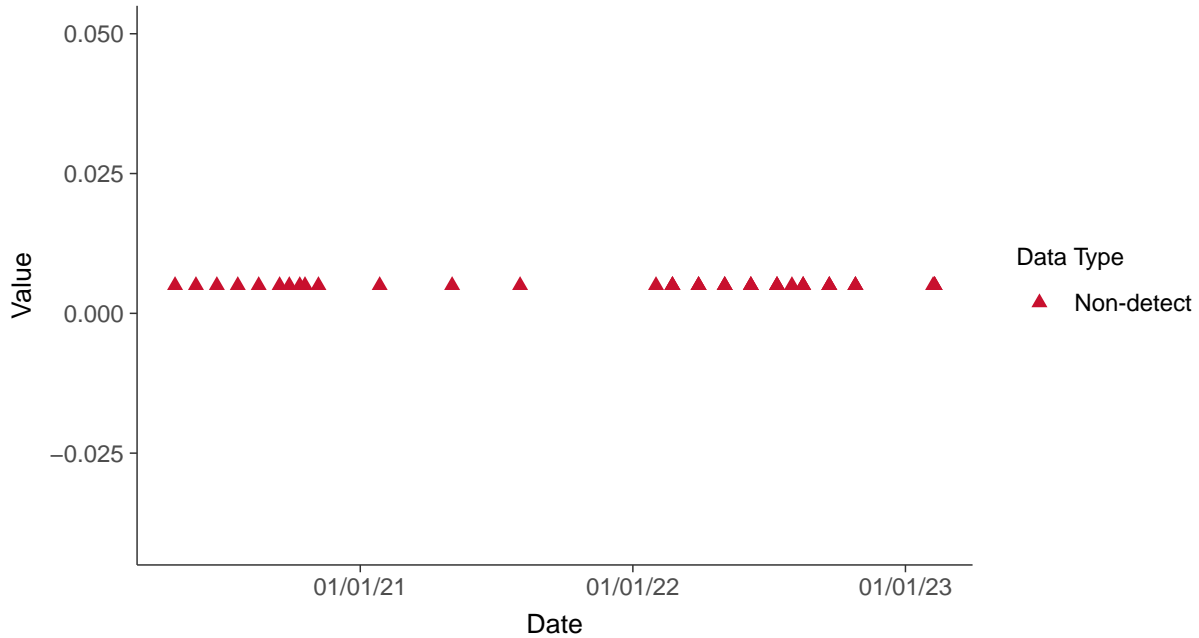


Appendix IV: Cobalt, MW-4, MW-11, MW-12

ID: 2_16

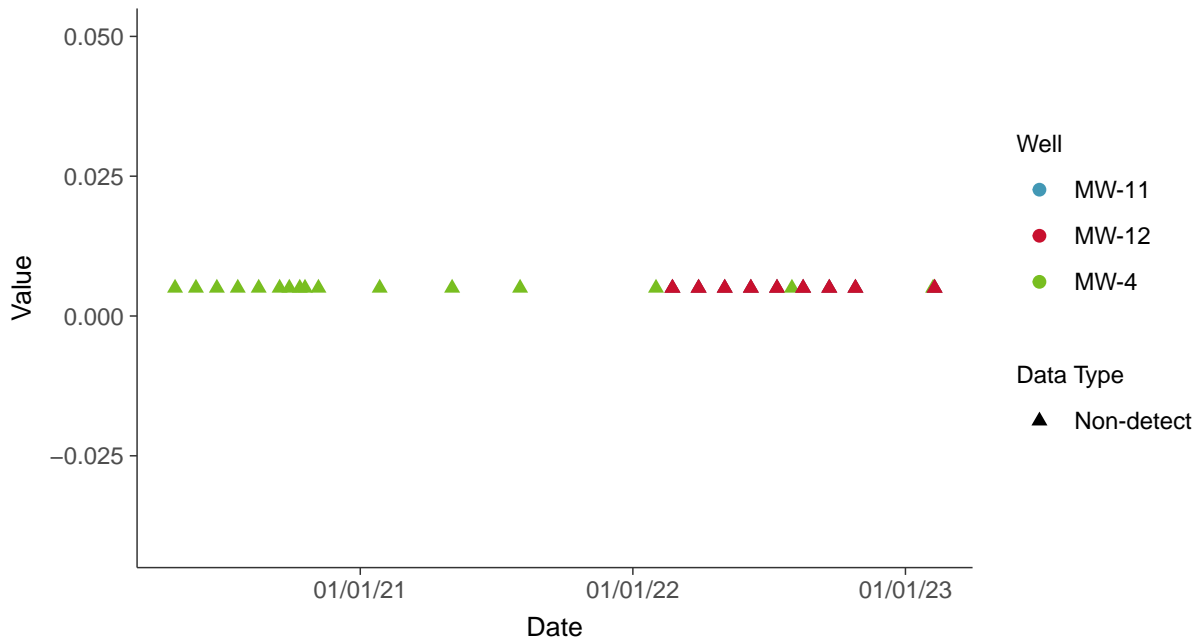
Scatter Plot

Cobalt, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

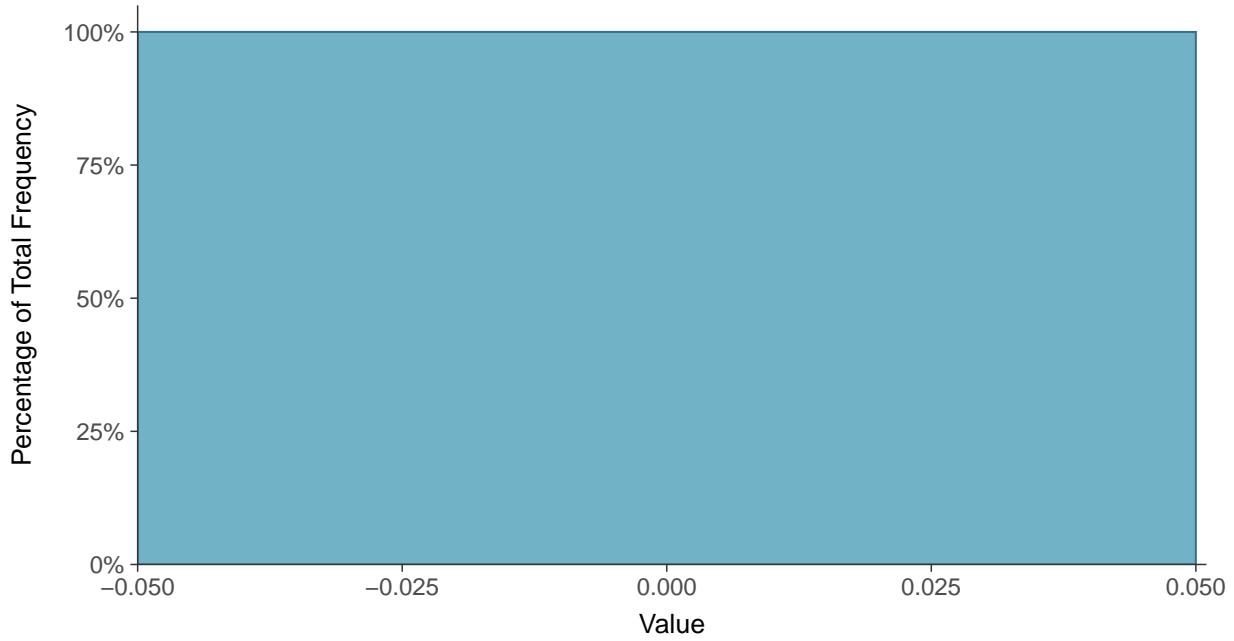
Cobalt, MW-4, MW-11, MW-12 (mg/L)





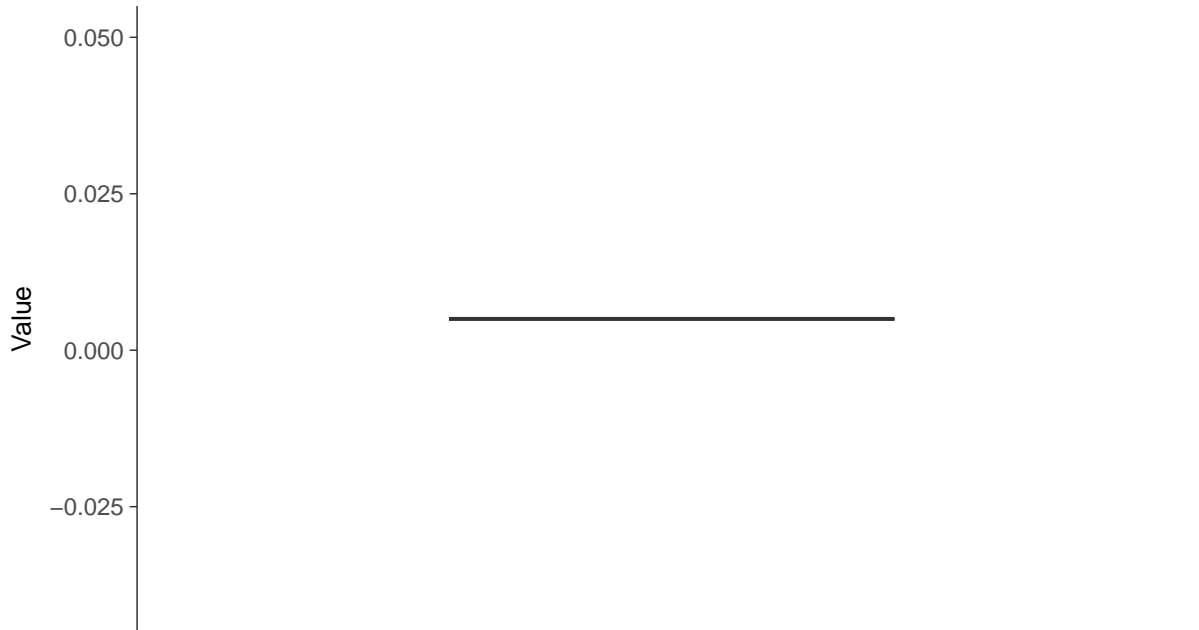
Histogram

Cobalt, MW-4, MW-11, MW-12 (mg/L)



Boxplot

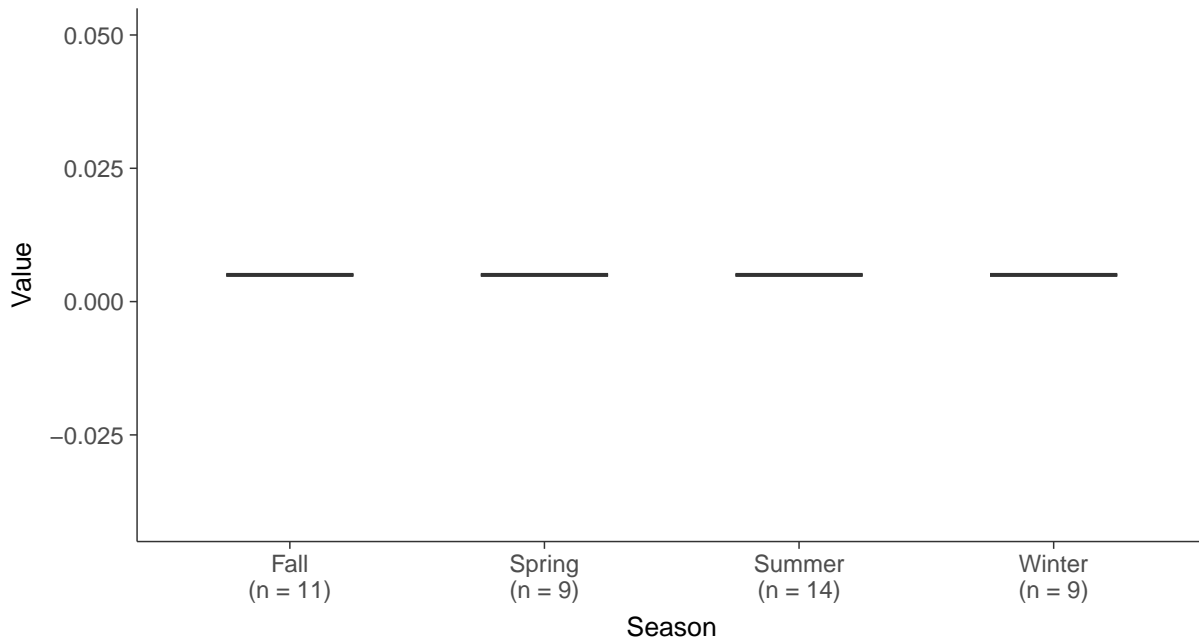
Cobalt, MW-4, MW-11, MW-12 (mg/L)





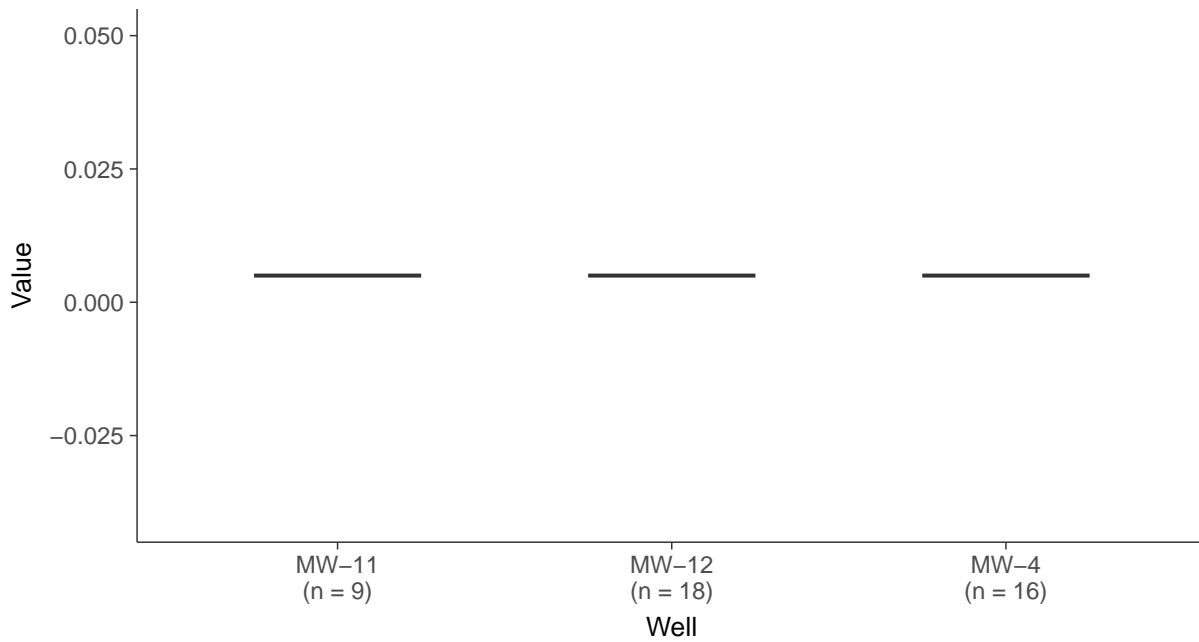
Boxplot by Season

Cobalt, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Cobalt, MW-4, MW-11, MW-12 (mg/L)



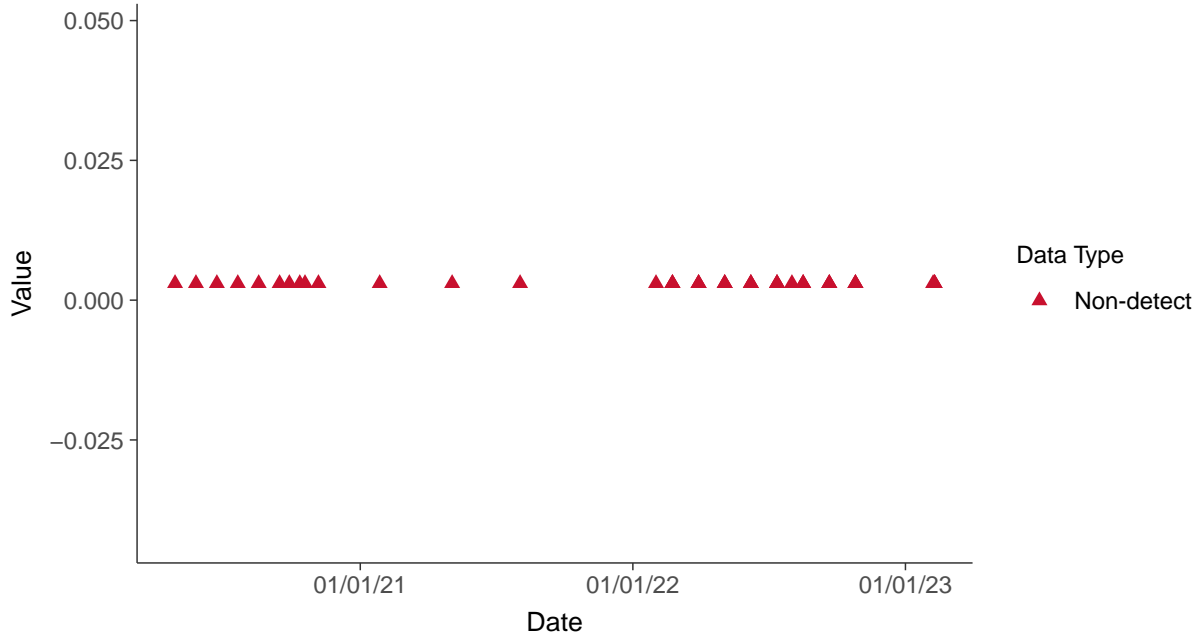


Appendix IV: Lead, MW-4, MW-11, MW-12

ID: 2_18

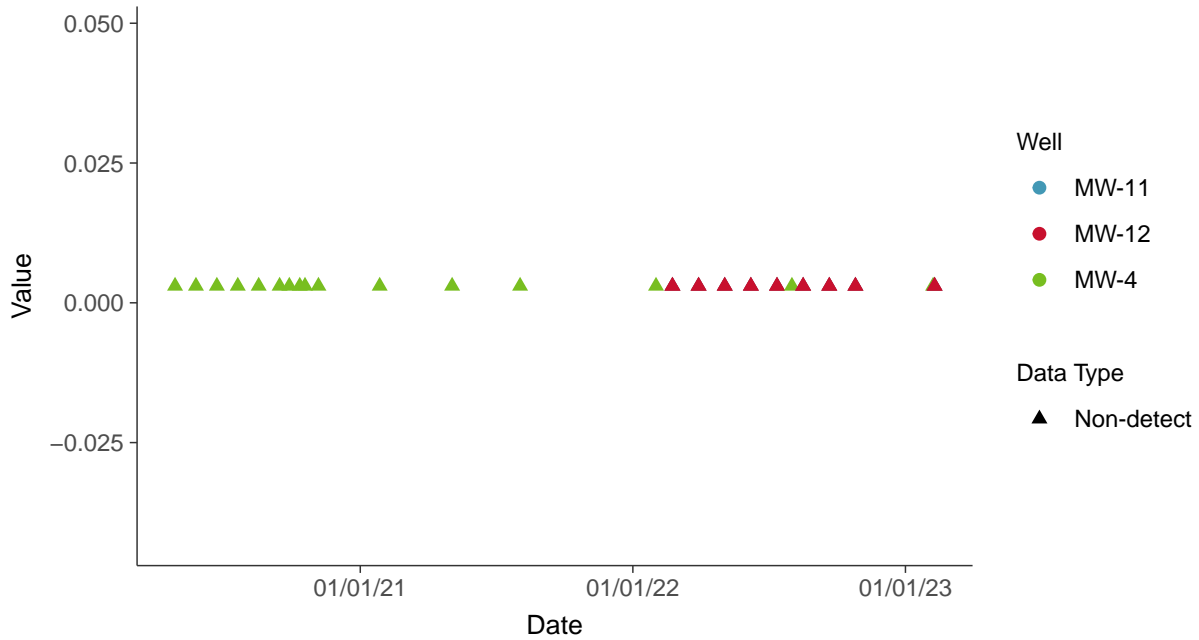
Scatter Plot

Lead, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

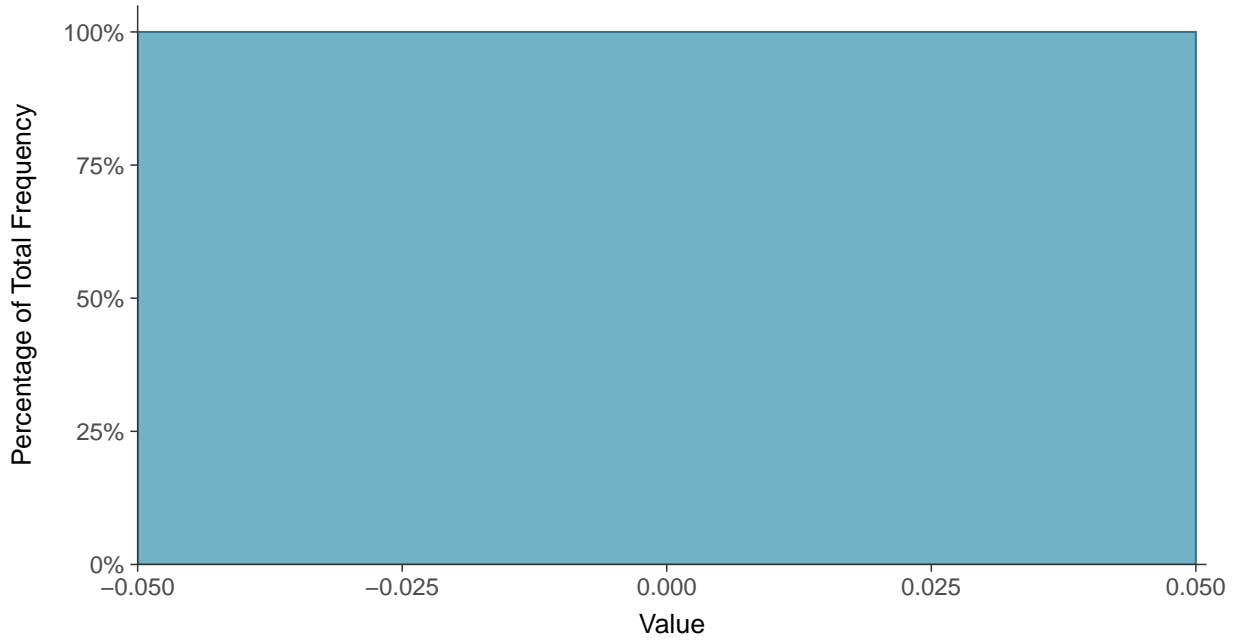
Lead, MW-4, MW-11, MW-12 (mg/L)





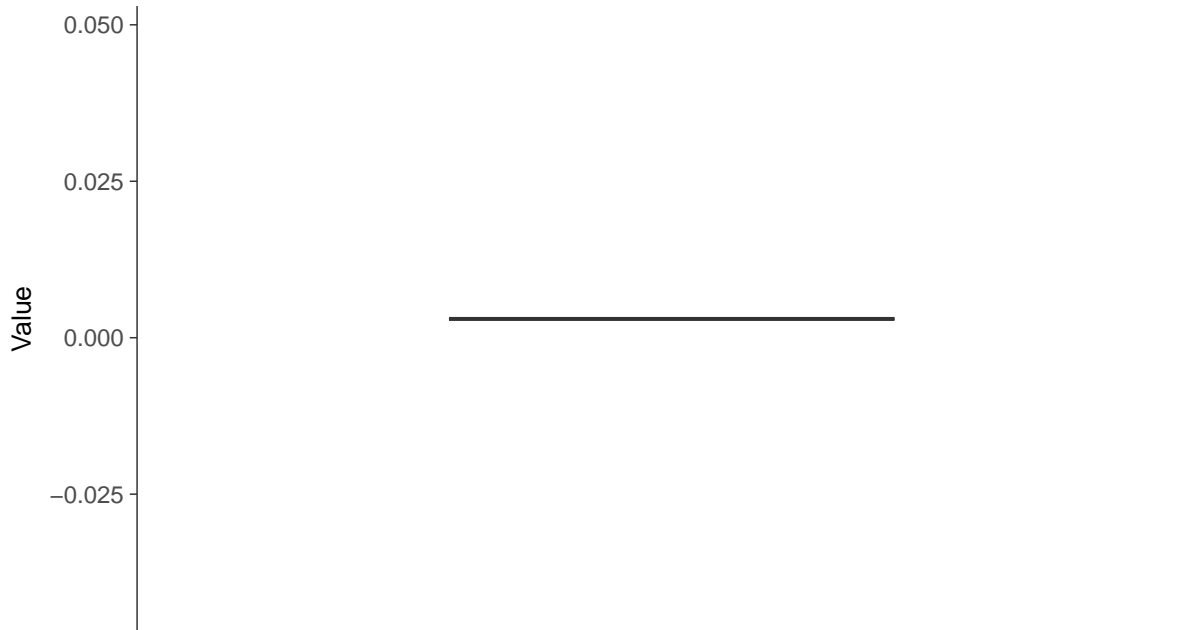
Histogram

Lead, MW-4, MW-11, MW-12 (mg/L)



Boxplot

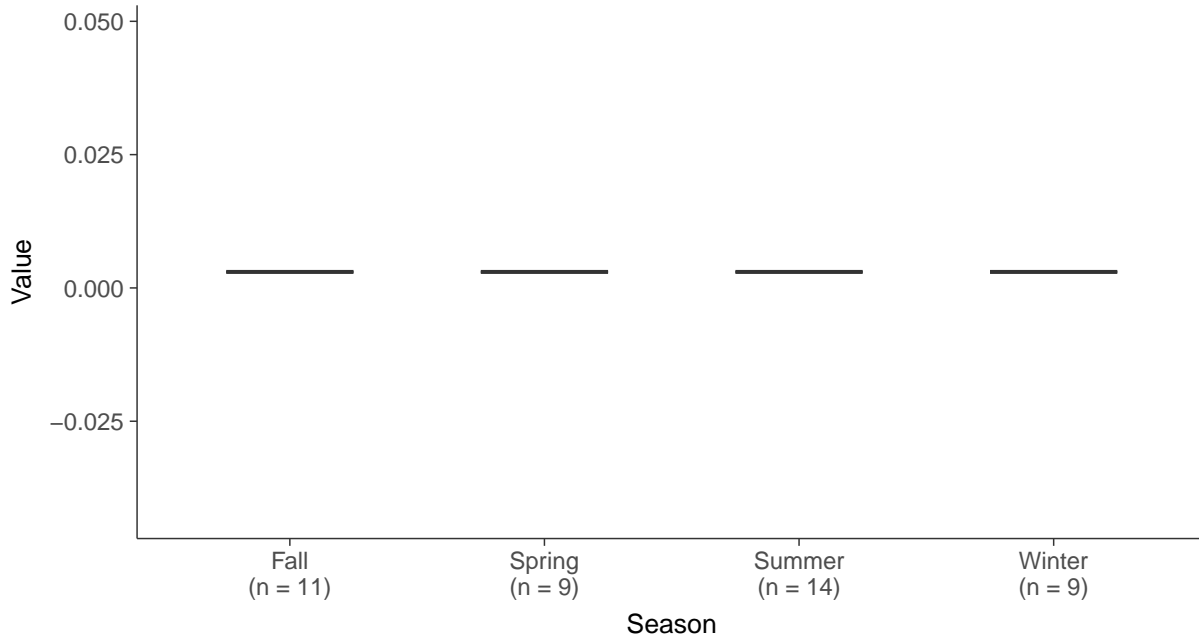
Lead, MW-4, MW-11, MW-12 (mg/L)





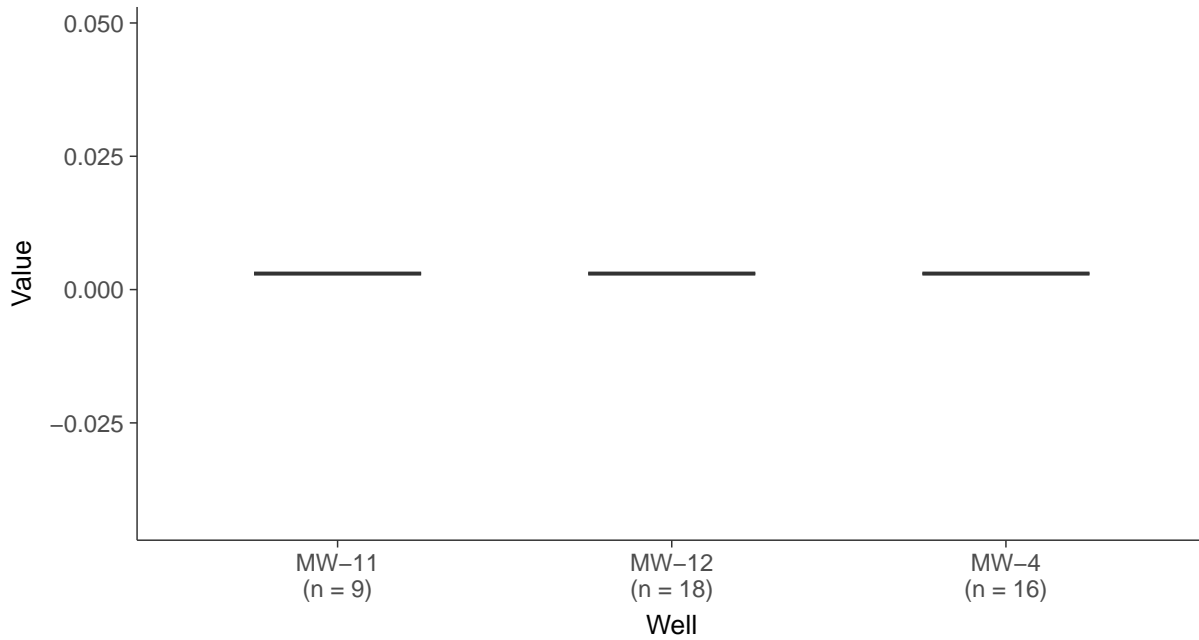
Boxplot by Season

Lead, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Lead, MW-4, MW-11, MW-12 (mg/L)



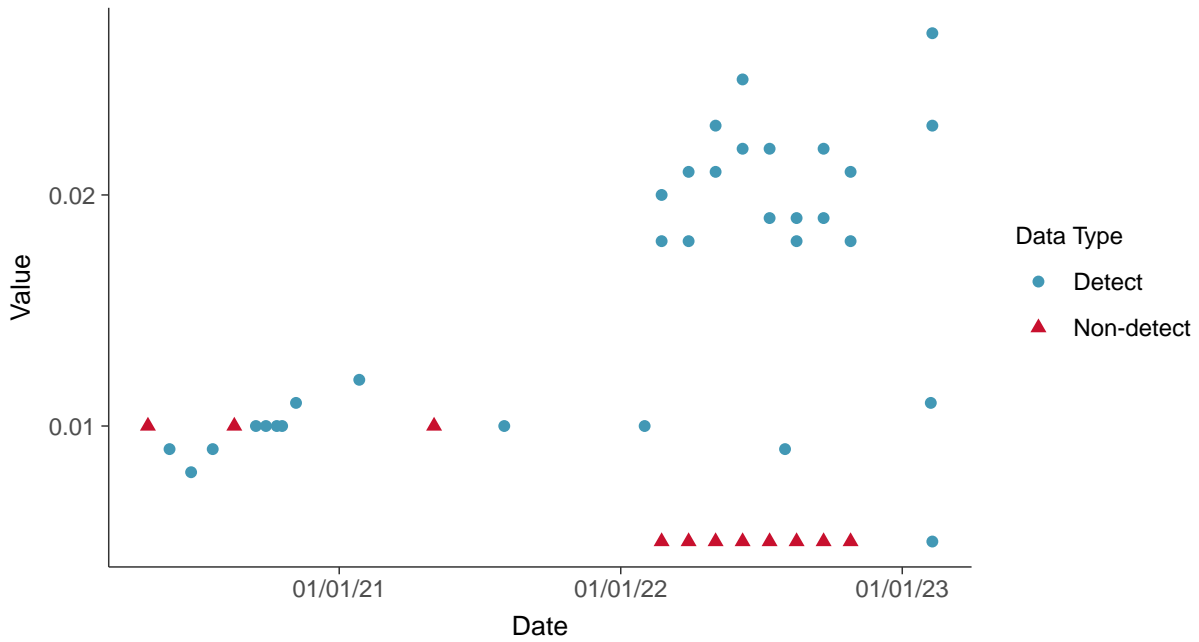


Appendix IV: Lithium, MW-4, MW-11, MW-12

ID: 2_19

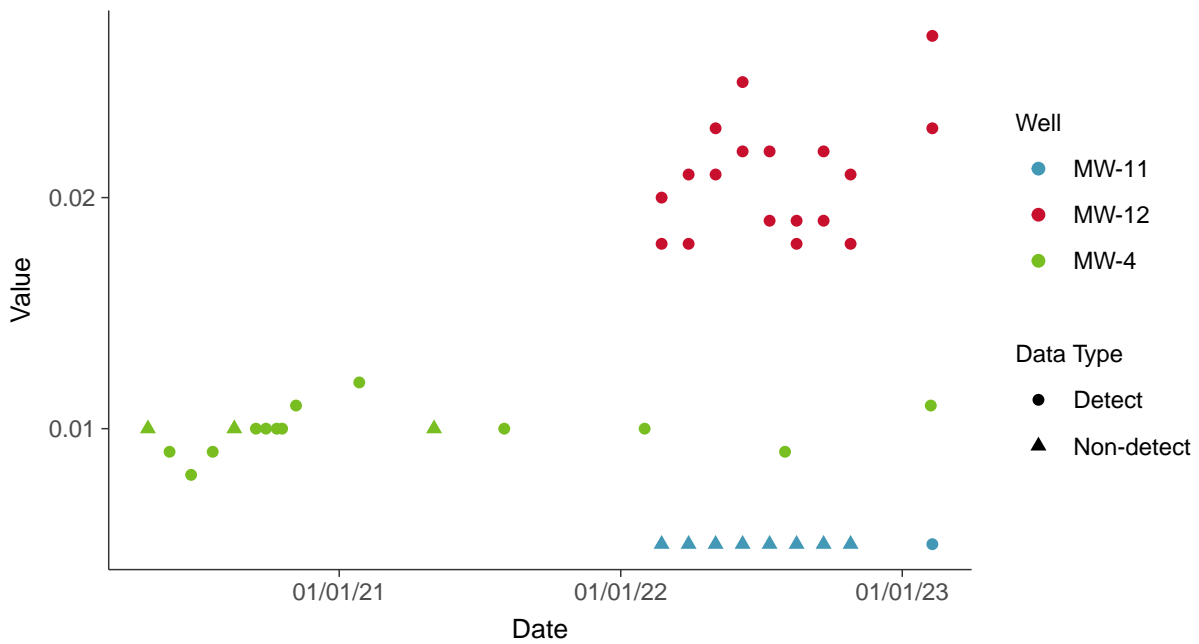
Scatter Plot

Lithium, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

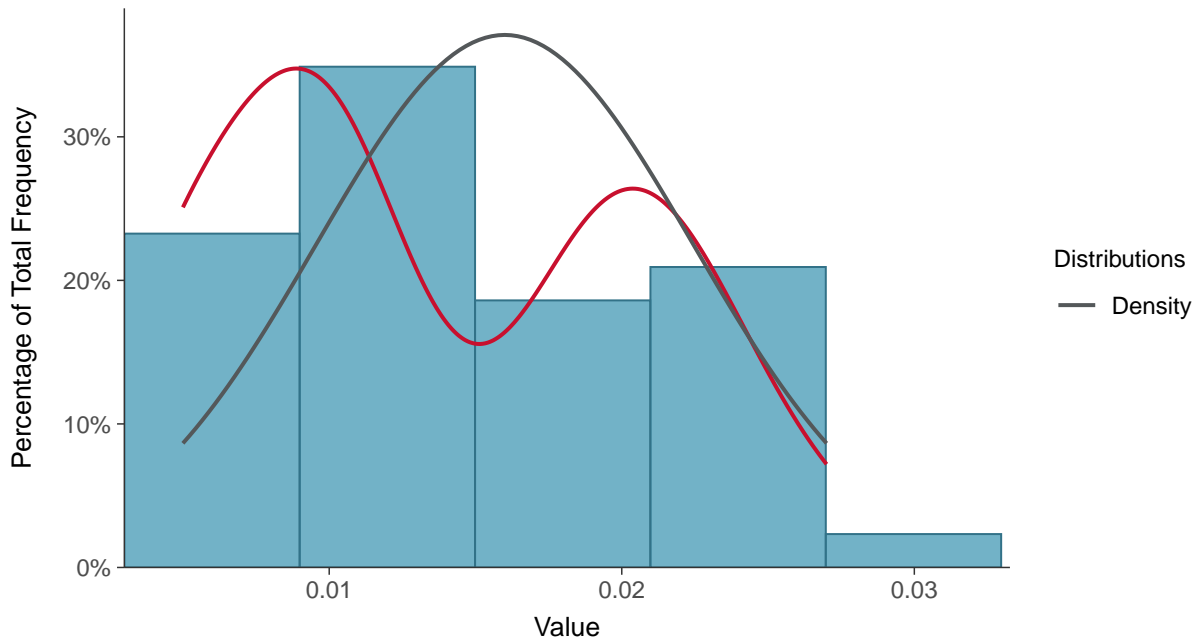
Lithium, MW-4, MW-11, MW-12 (mg/L)





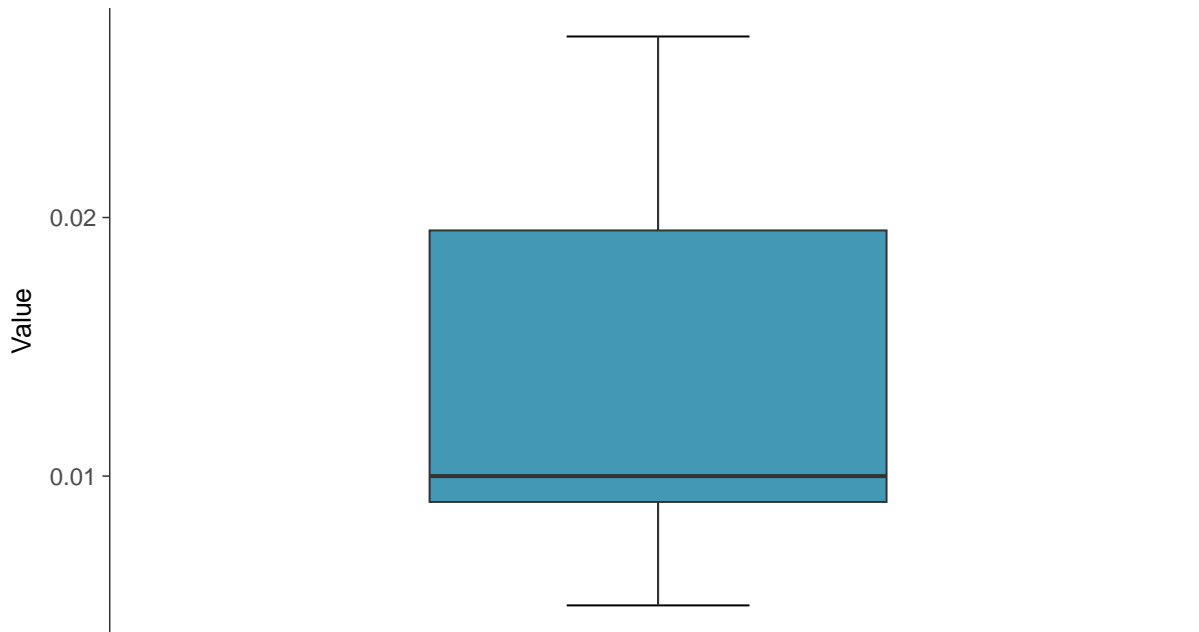
Histogram

Lithium, MW-4, MW-11, MW-12 (mg/L)



Boxplot

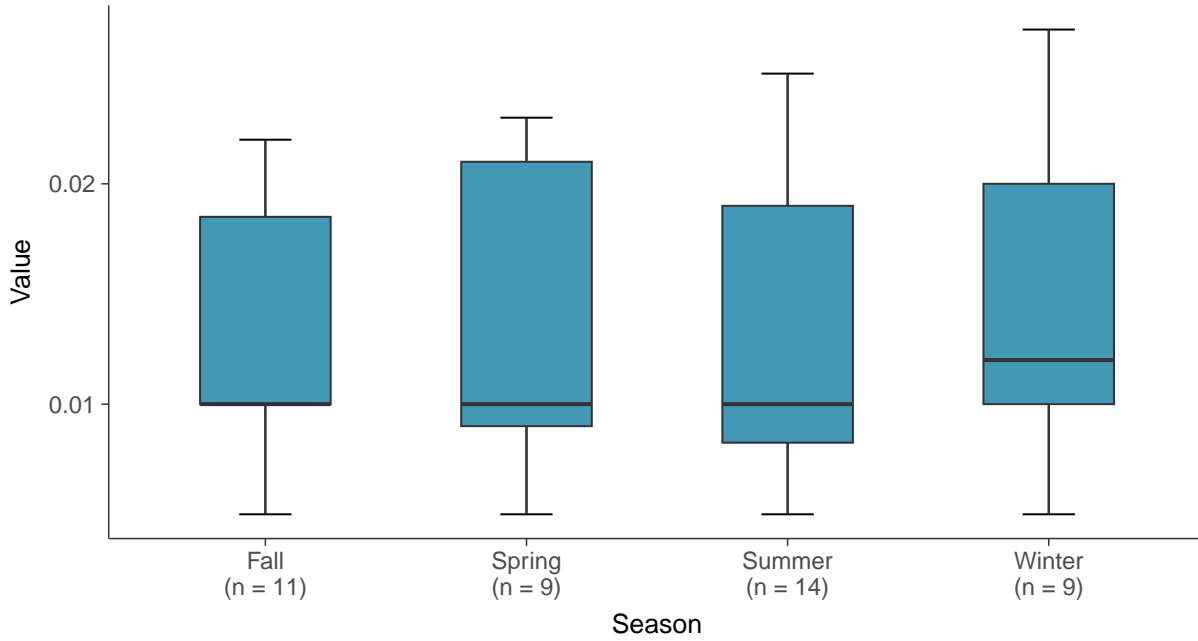
Lithium, MW-4, MW-11, MW-12 (mg/L)





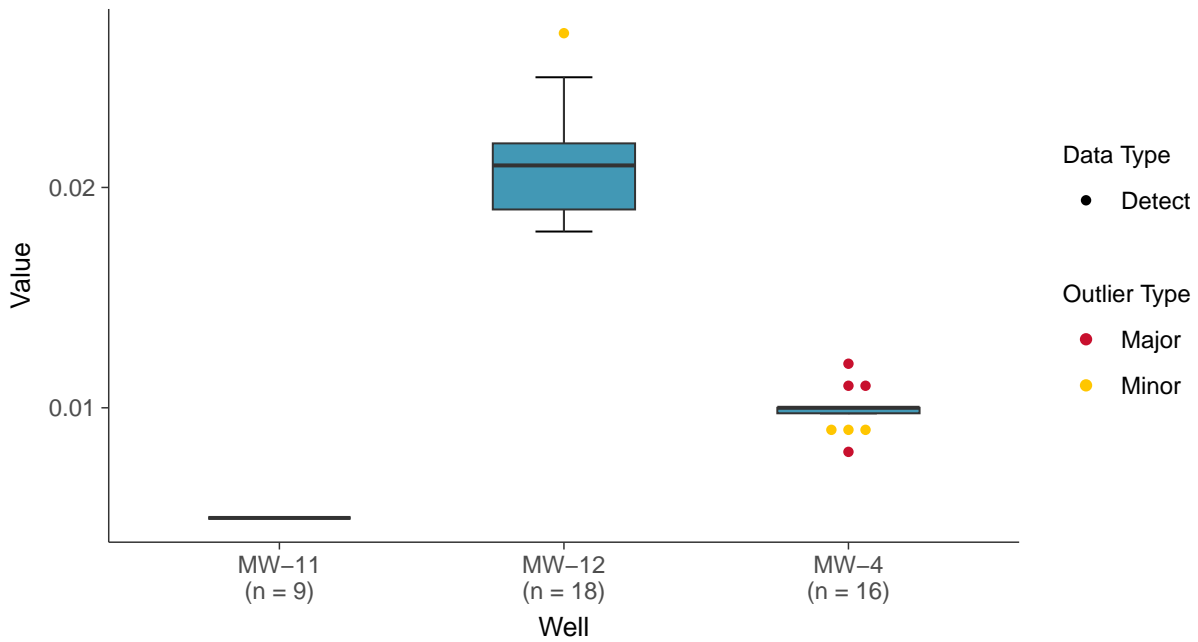
Boxplot by Season

Lithium, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

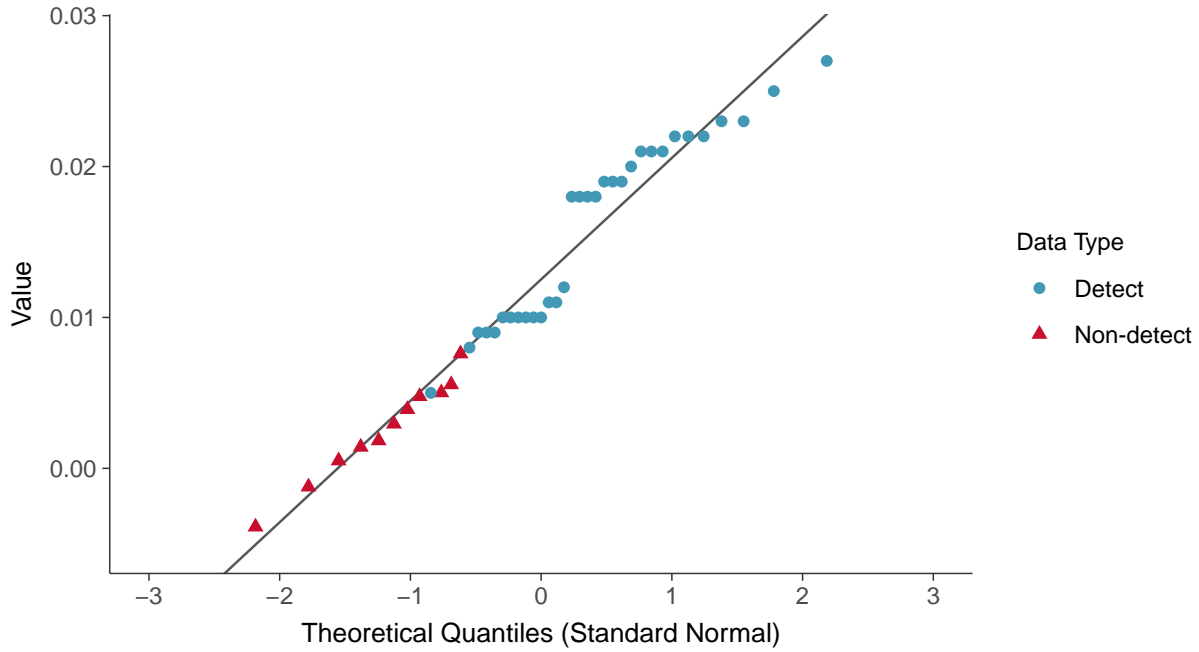
Lithium, MW-4, MW-11, MW-12 (mg/L)





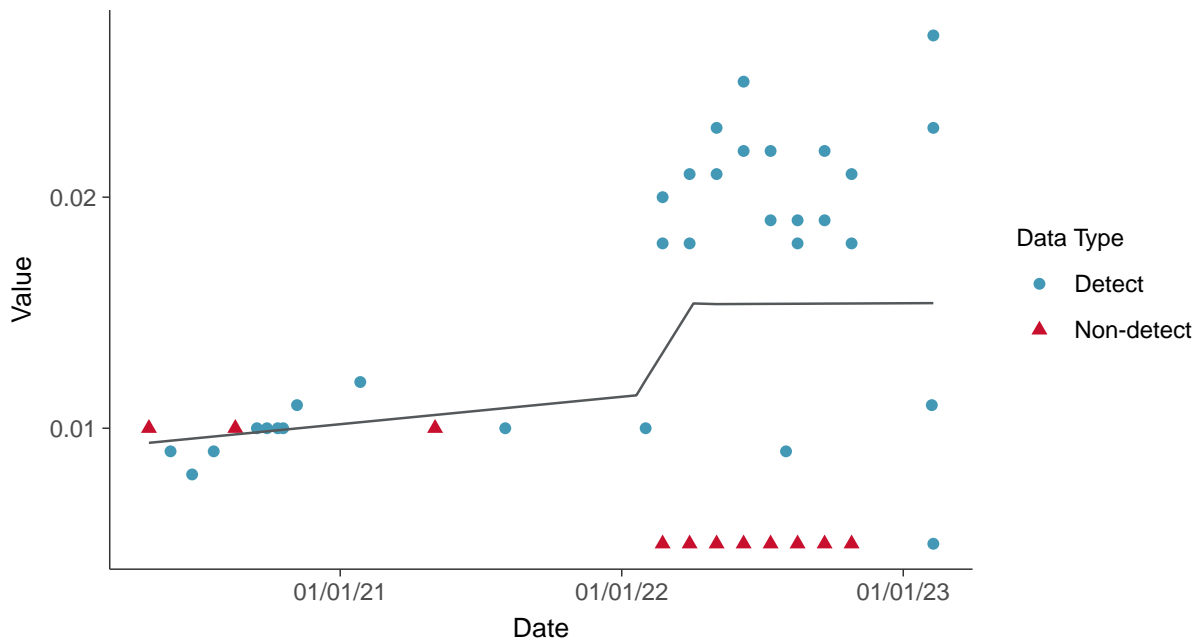
Normal Q-Q plot using ROS Imputed Estimates

Lithium, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Lithium, MW-4, MW-11, MW-12 (mg/L)



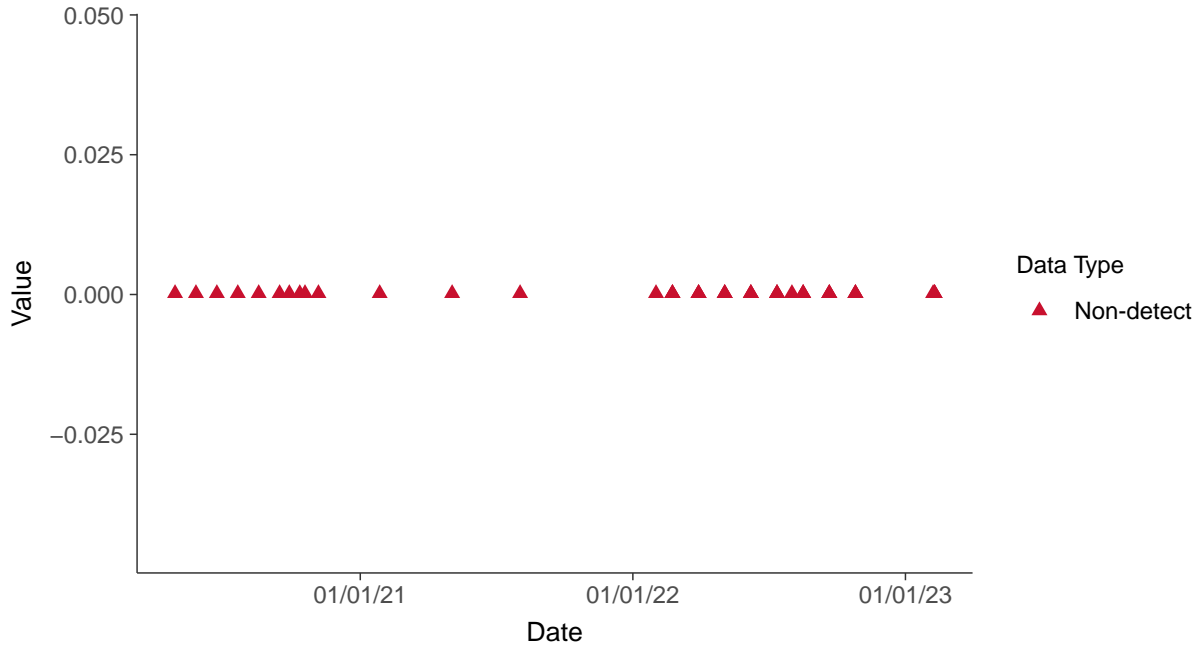


Appendix IV: Mercury, MW-4, MW-11, MW-12

ID: 2_21

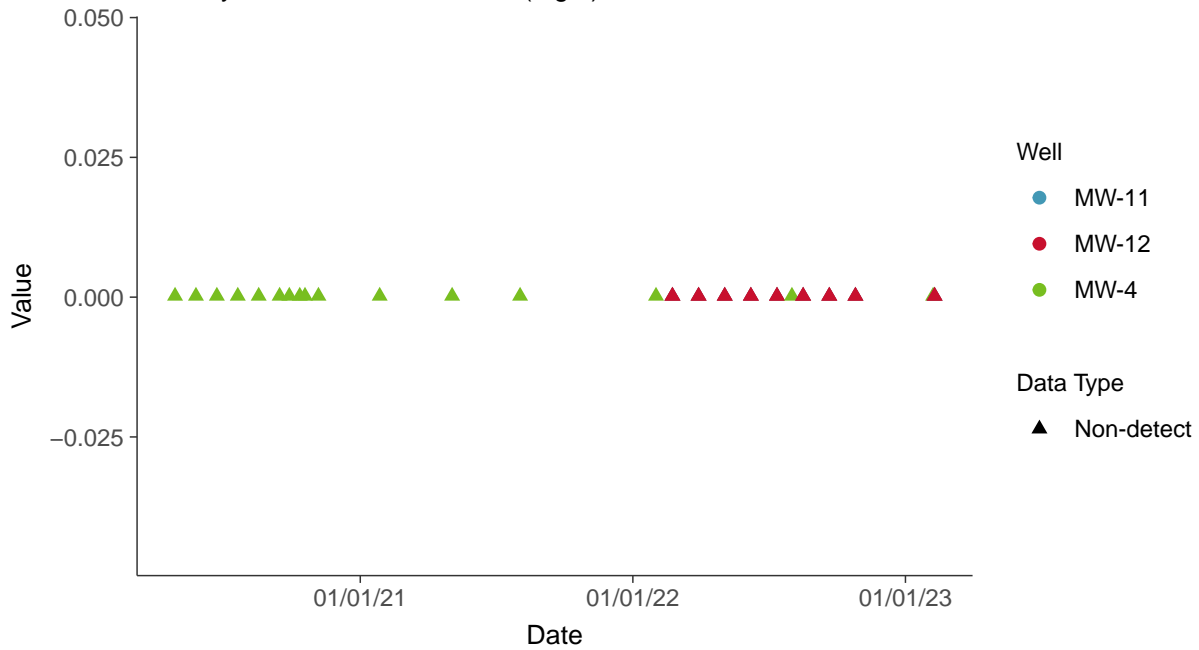
Scatter Plot

Mercury, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

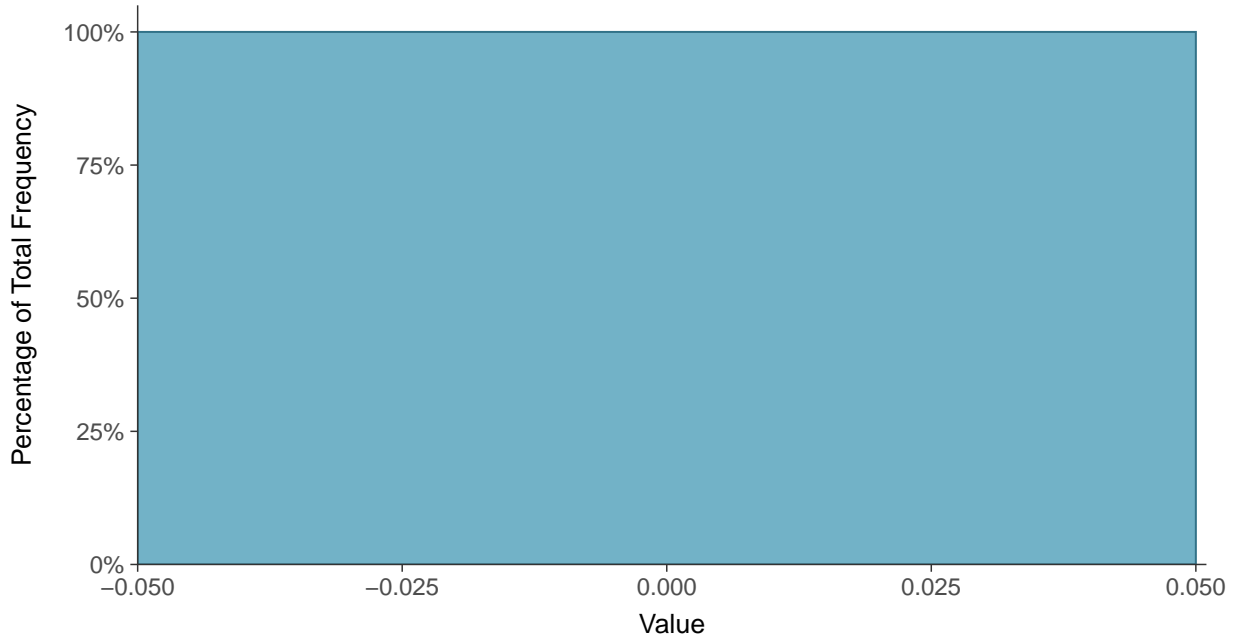
Mercury, MW-4, MW-11, MW-12 (mg/L)





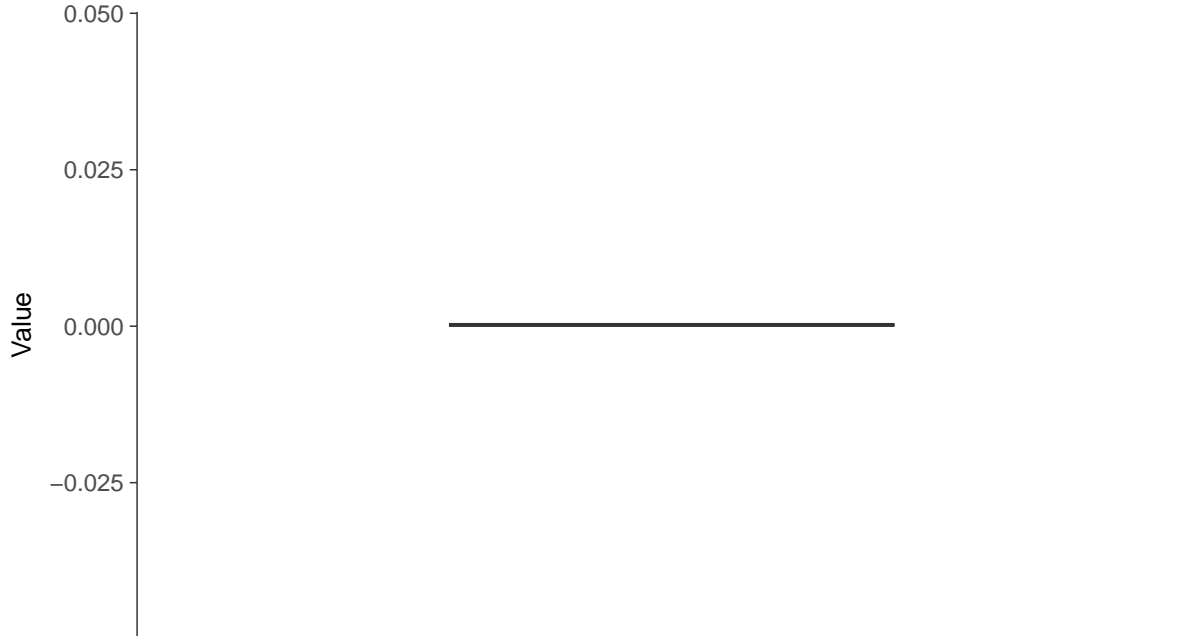
Histogram

Mercury, MW-4, MW-11, MW-12 (mg/L)



Boxplot

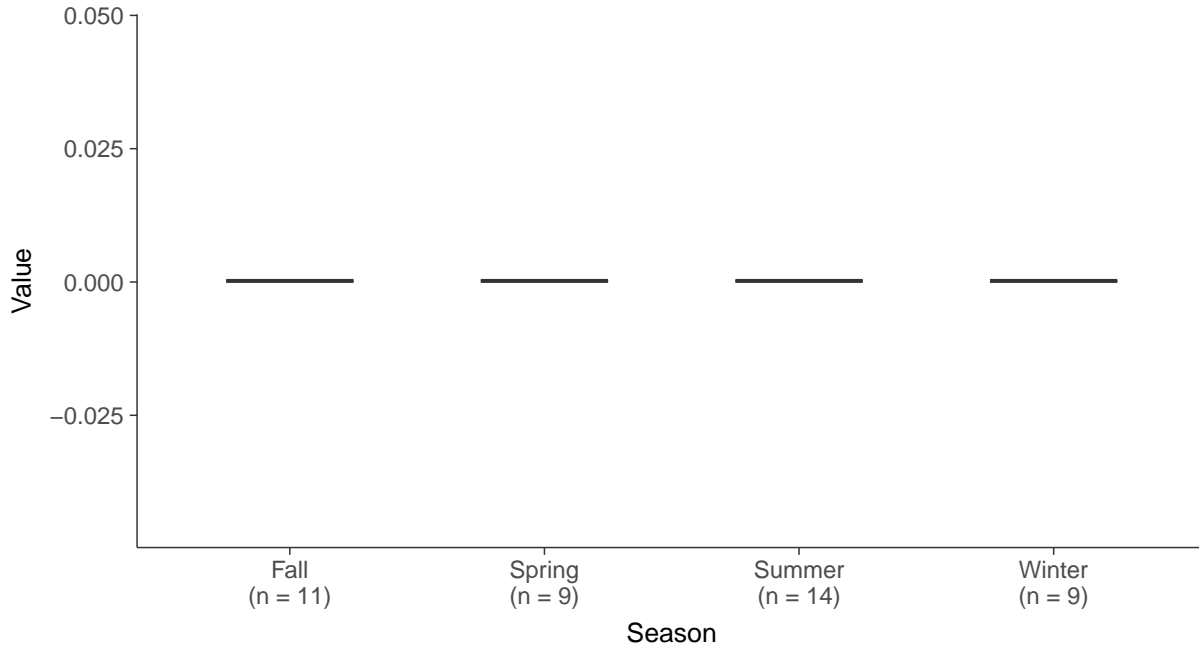
Mercury, MW-4, MW-11, MW-12 (mg/L)





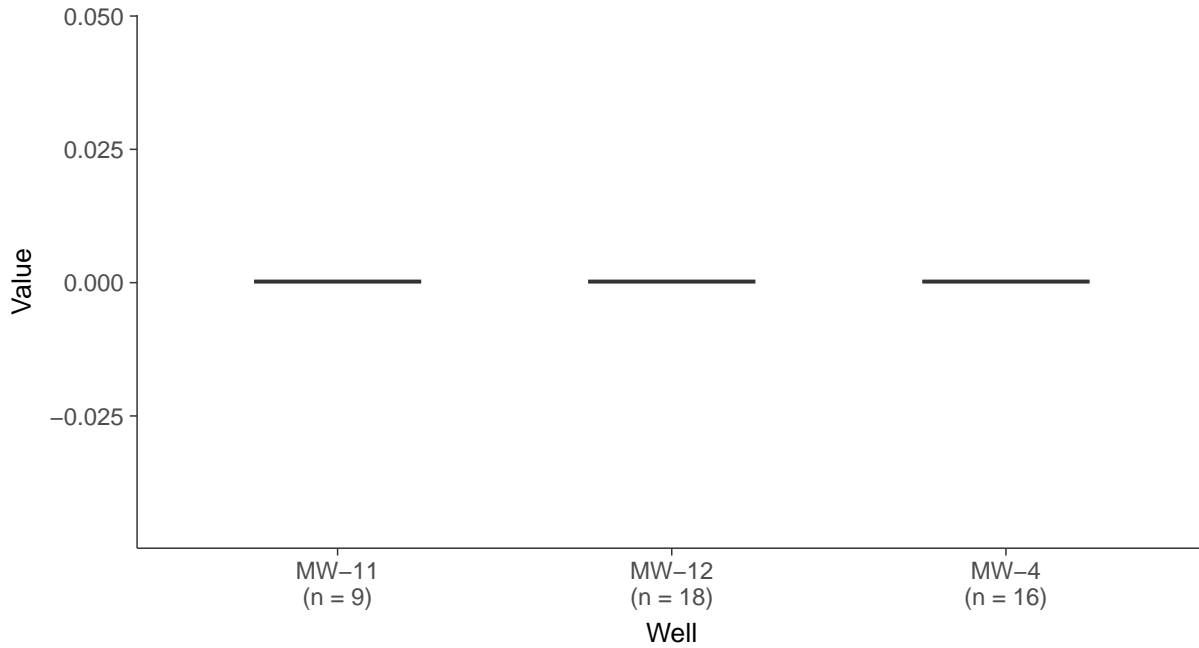
Boxplot by Season

Mercury, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

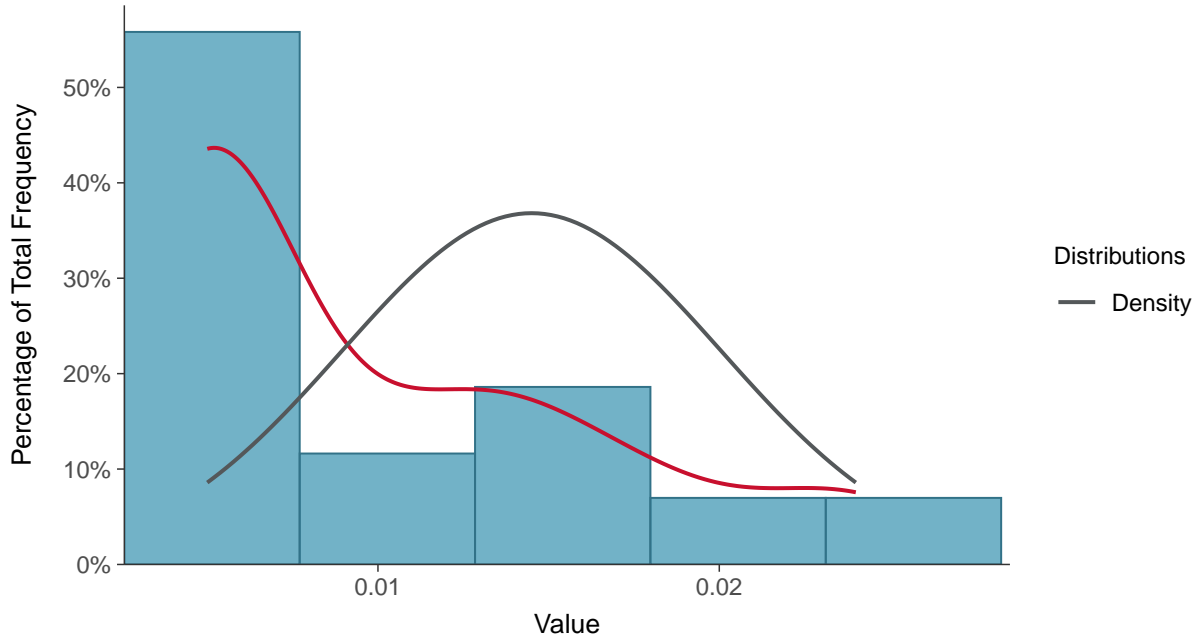
Mercury, MW-4, MW-11, MW-12 (mg/L)





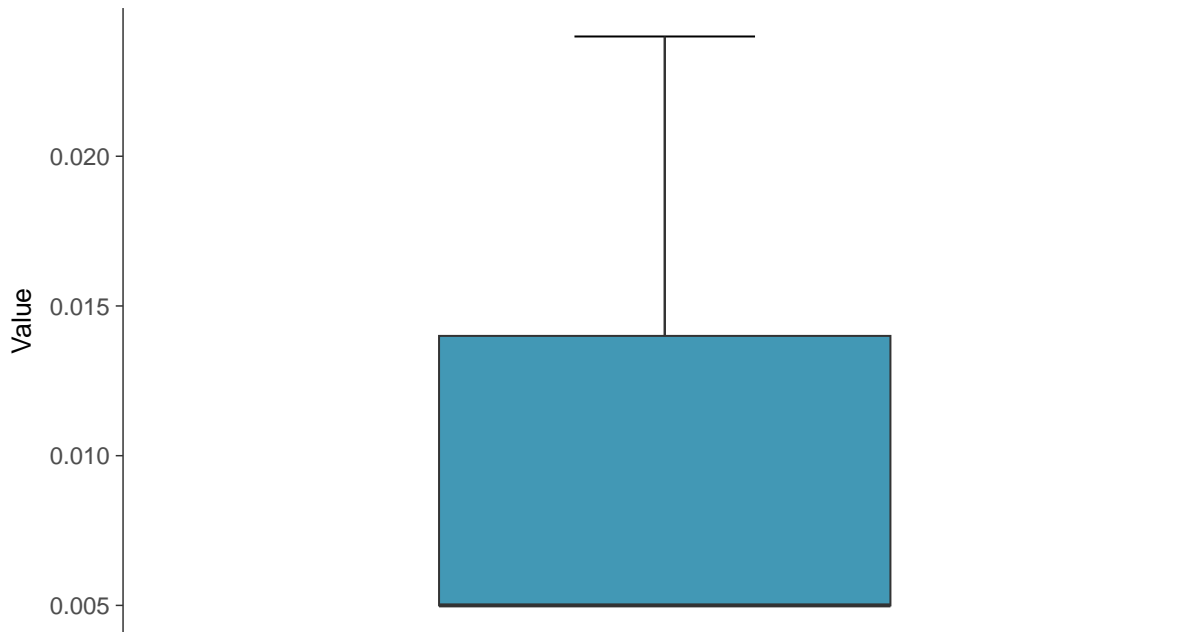
Histogram

Molybdenum, MW-4, MW-11, MW-12 (mg/L)



Boxplot

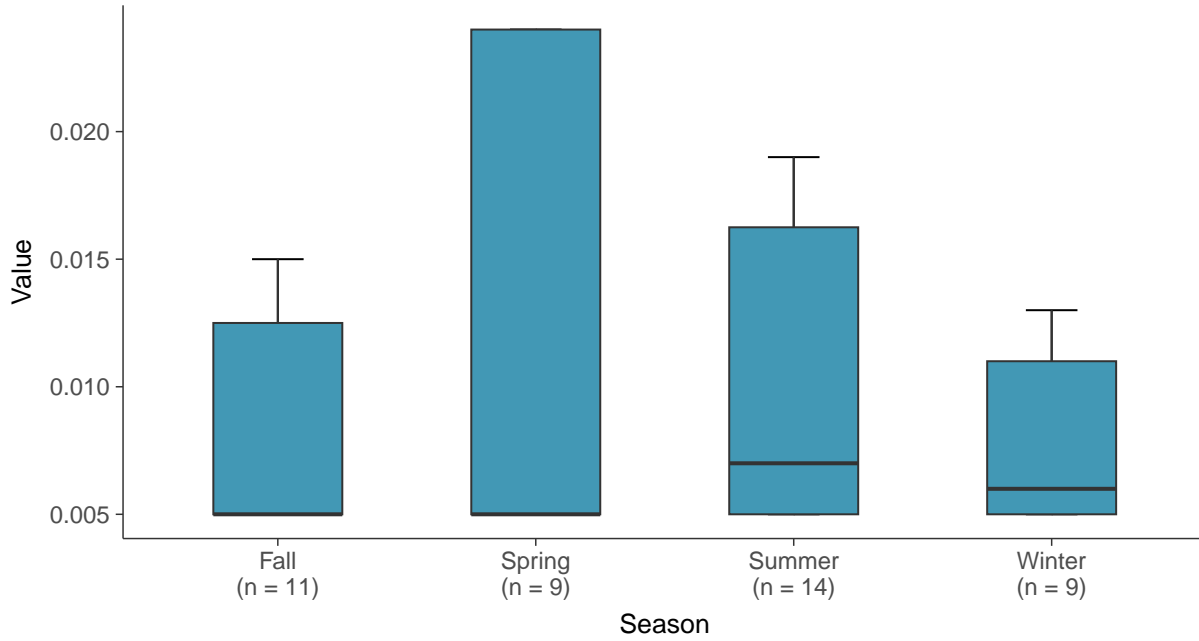
Molybdenum, MW-4, MW-11, MW-12 (mg/L)





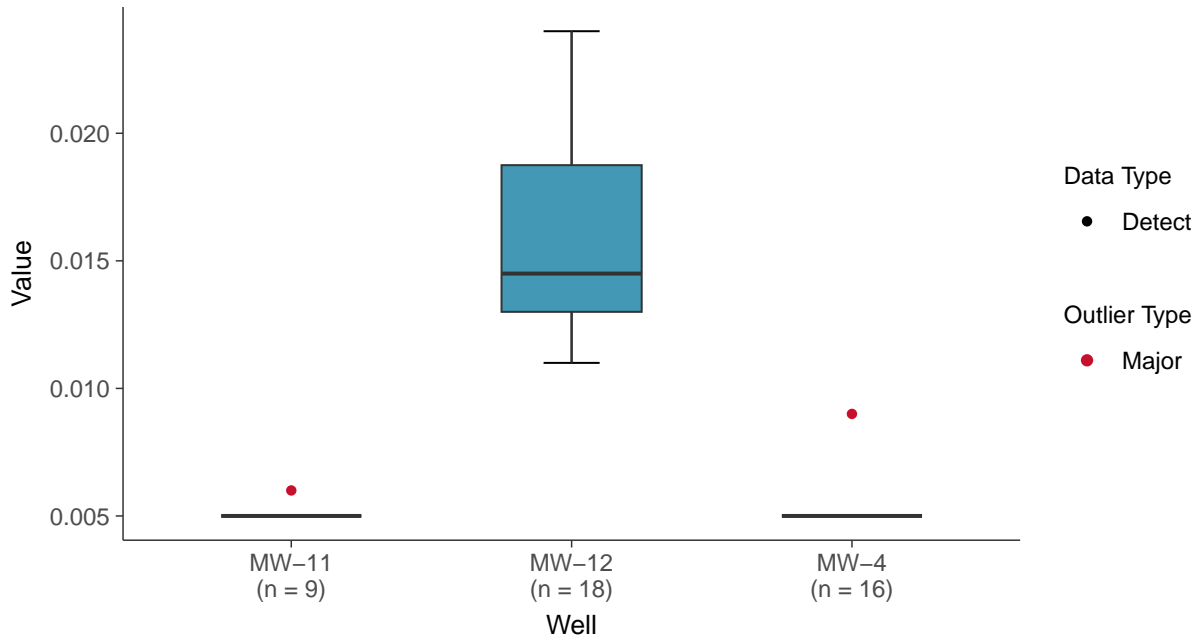
Boxplot by Season

Molybdenum, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Molybdenum, MW-4, MW-11, MW-12 (mg/L)



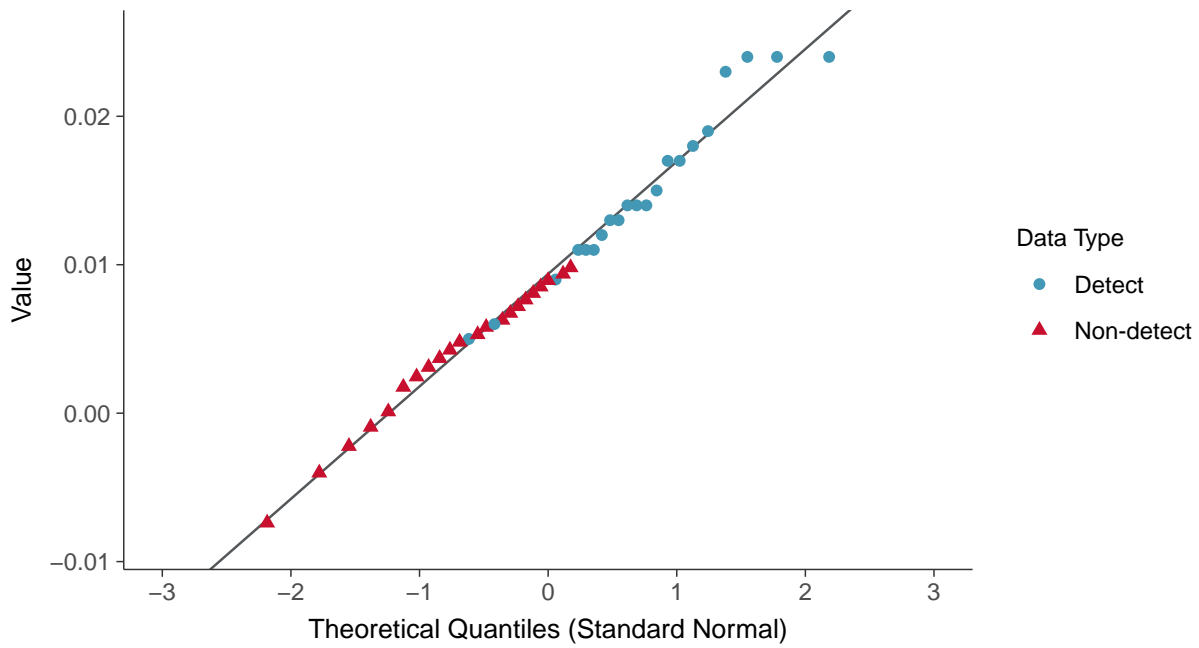
Data Type
● Detect
● Major

Outlier Type
● Major



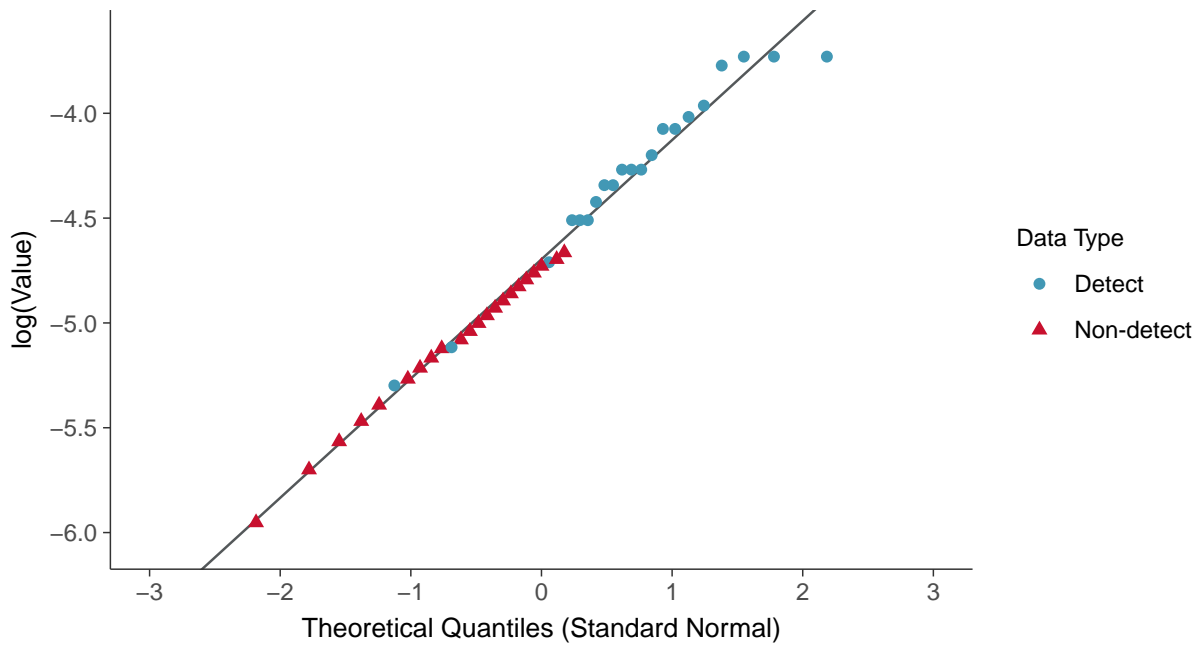
Normal Q-Q plot using ROS Imputed Estimates

Molybdenum, MW-4, MW-11, MW-12 (mg/L)



Lognormal Q-Q plot using ROS Imputed Estimates

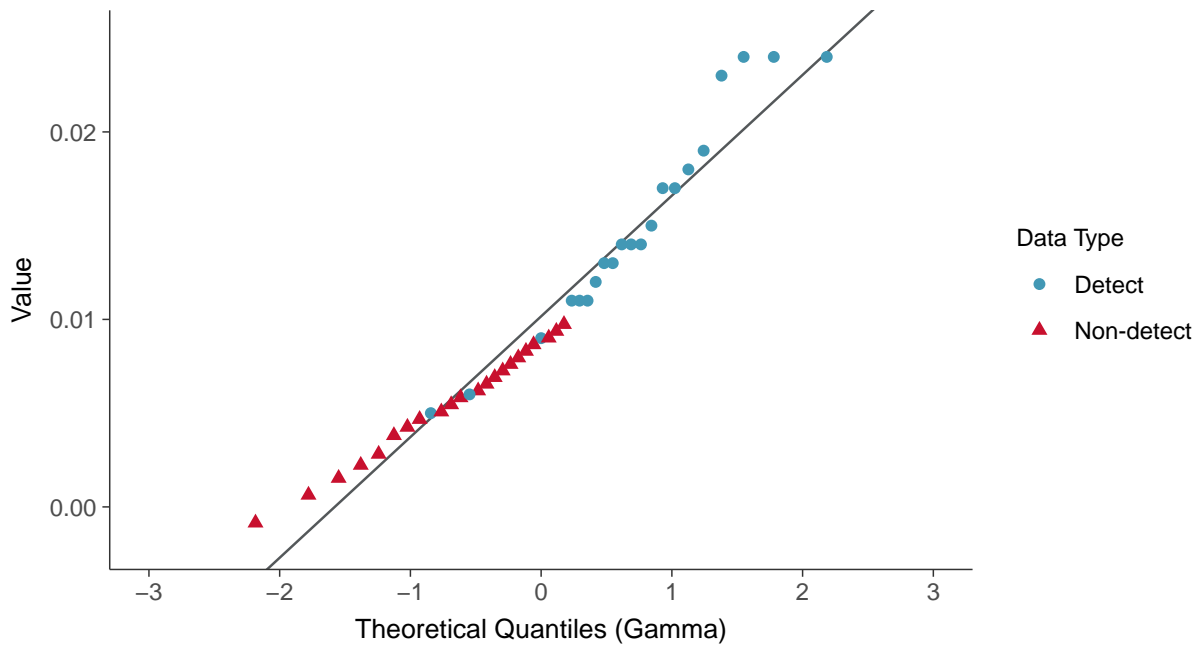
Molybdenum, MW-4, MW-11, MW-12 (mg/L)





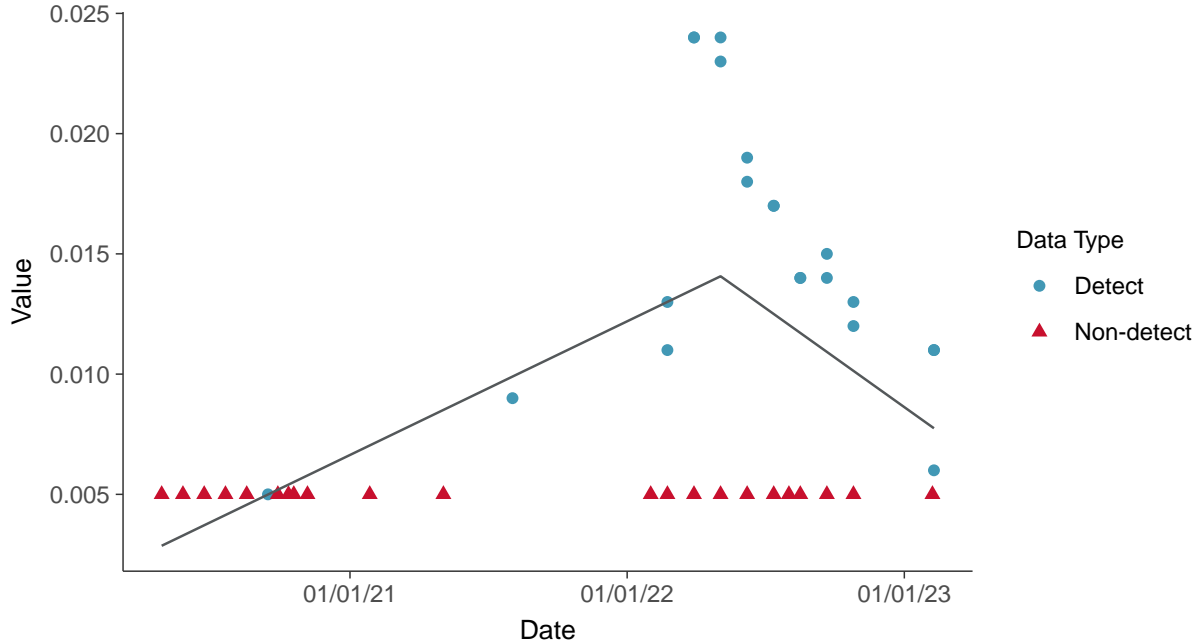
Gamma Q-Q plot using ROS Imputed Estimates

Molybdenum, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Piecewise Linear-Linear

Molybdenum, MW-4, MW-11, MW-12 (mg/L)



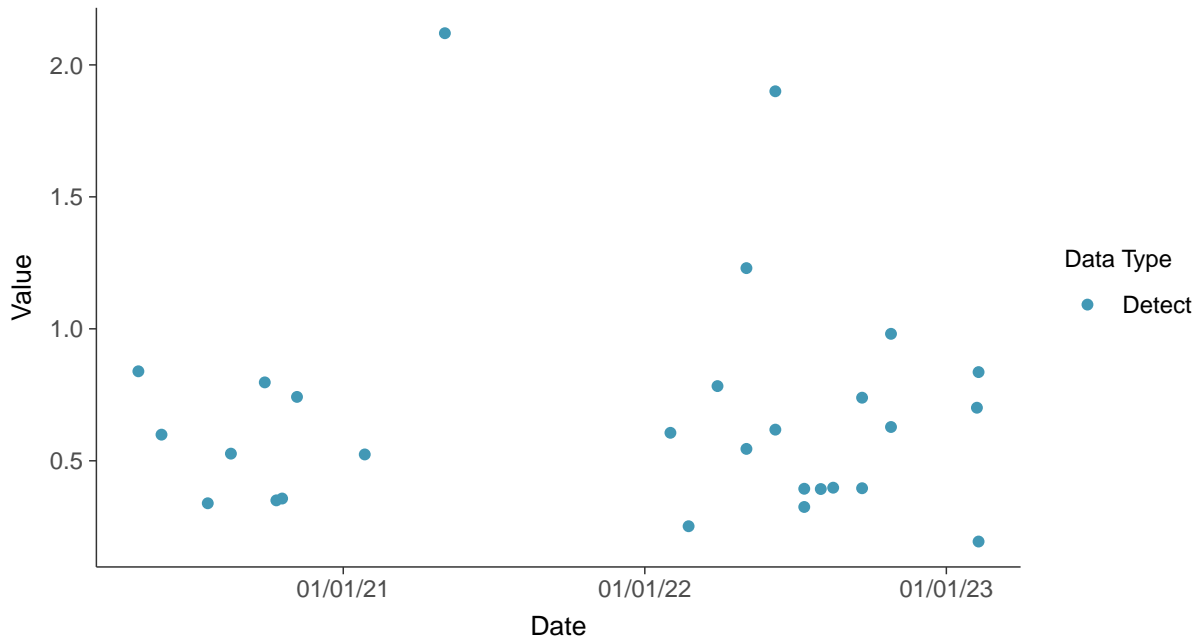


Appendix IV: Radium-226, MW-4, MW-11, MW-12

ID: 2_24

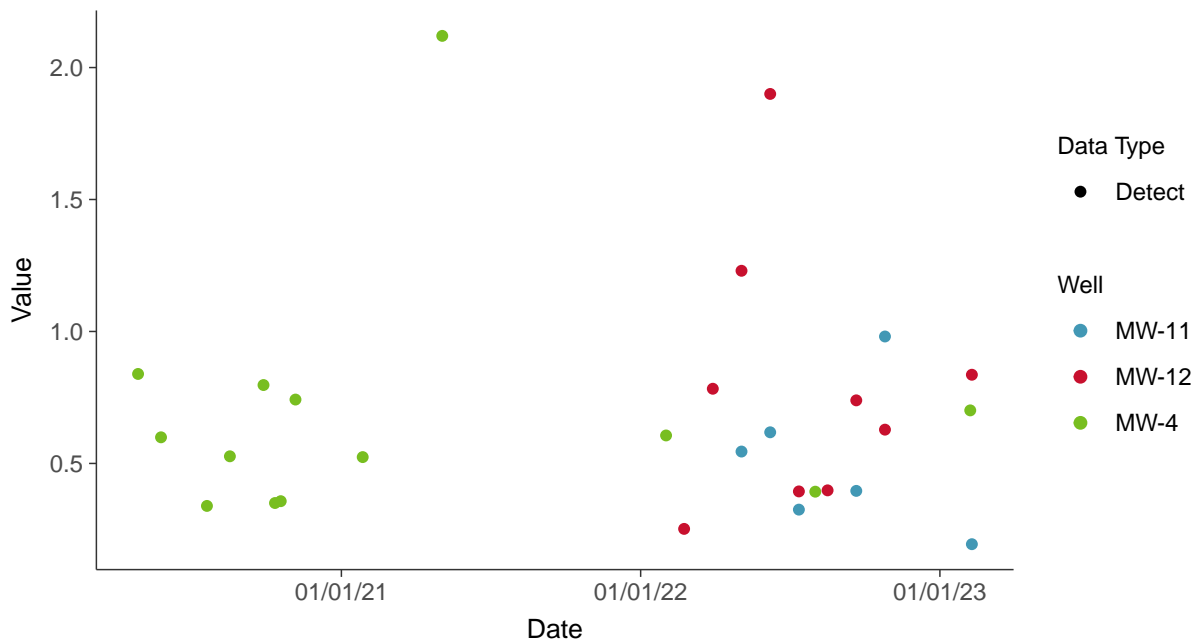
Scatter Plot

Radium-226, MW-4, MW-11, MW-12 (pCi/L)



Scatter Plot by Well

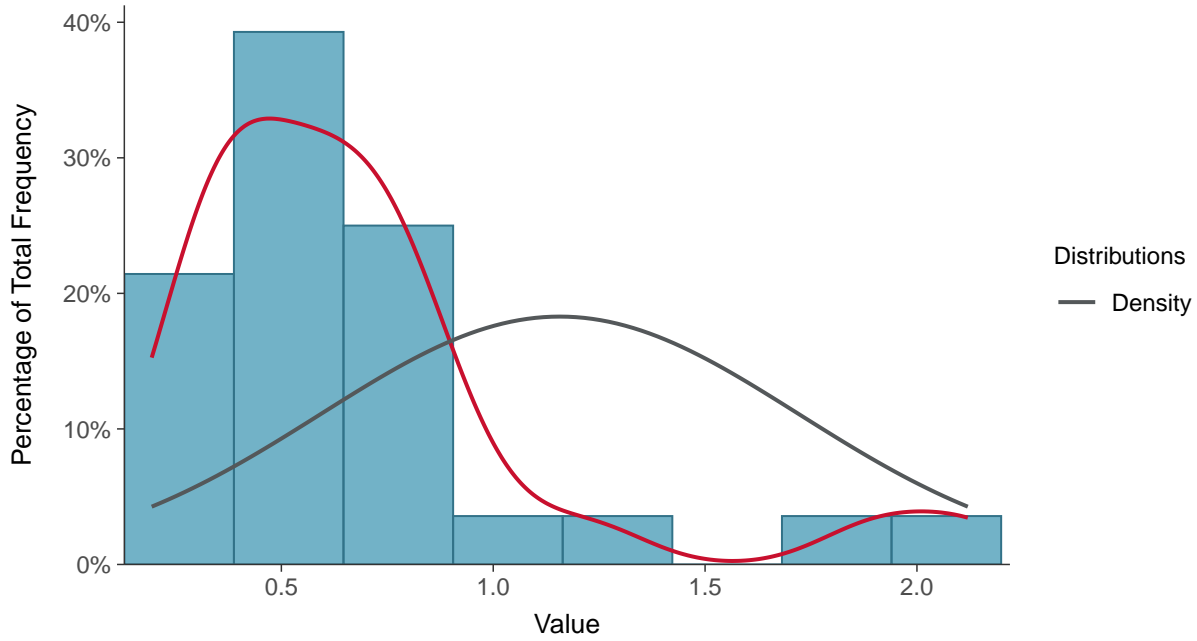
Radium-226, MW-4, MW-11, MW-12 (pCi/L)





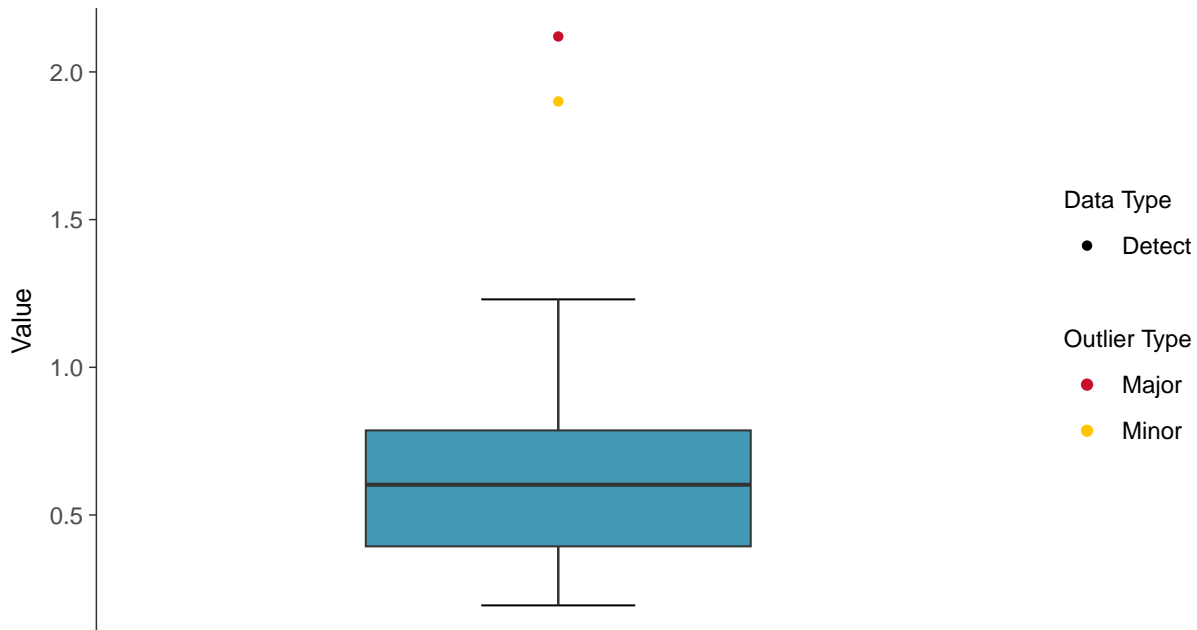
Histogram

Radium-226, MW-4, MW-11, MW-12 (pCi/L)



Boxplot

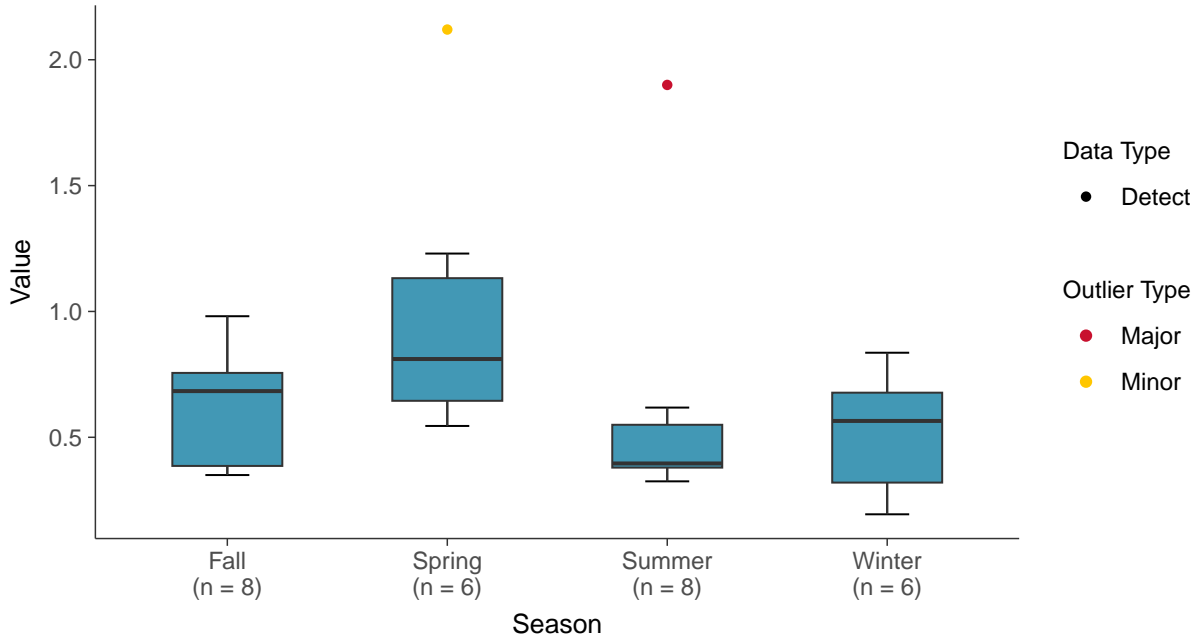
Radium-226, MW-4, MW-11, MW-12 (pCi/L)





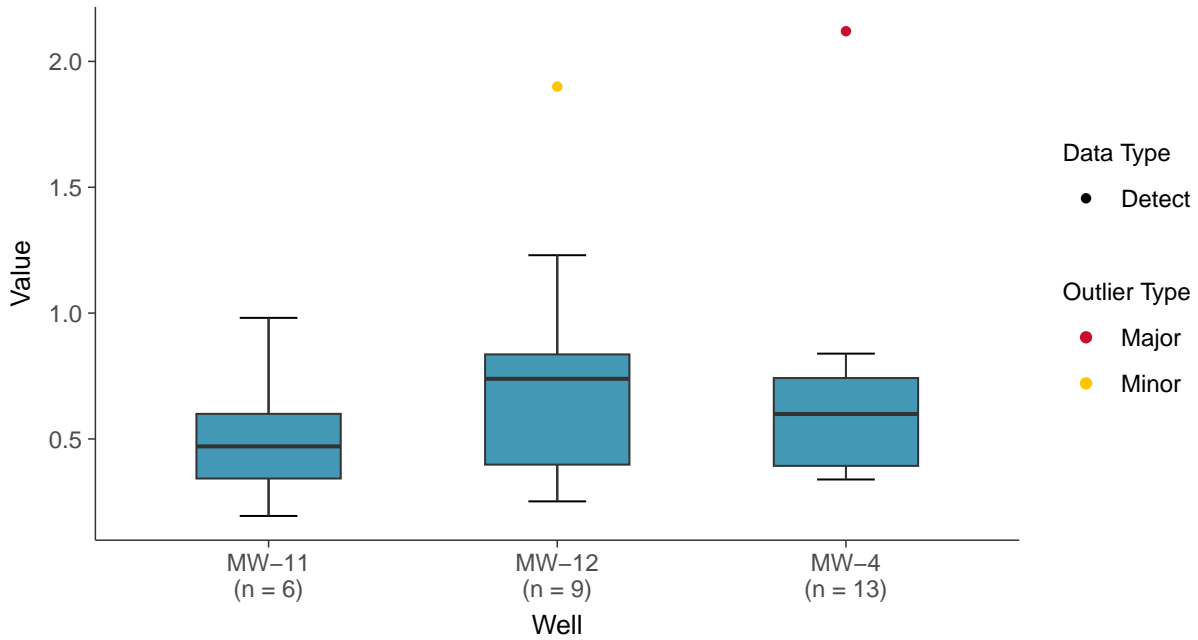
Boxplot by Season

Radium-226, MW-4, MW-11, MW-12 (pCi/L)



Boxplot by Well

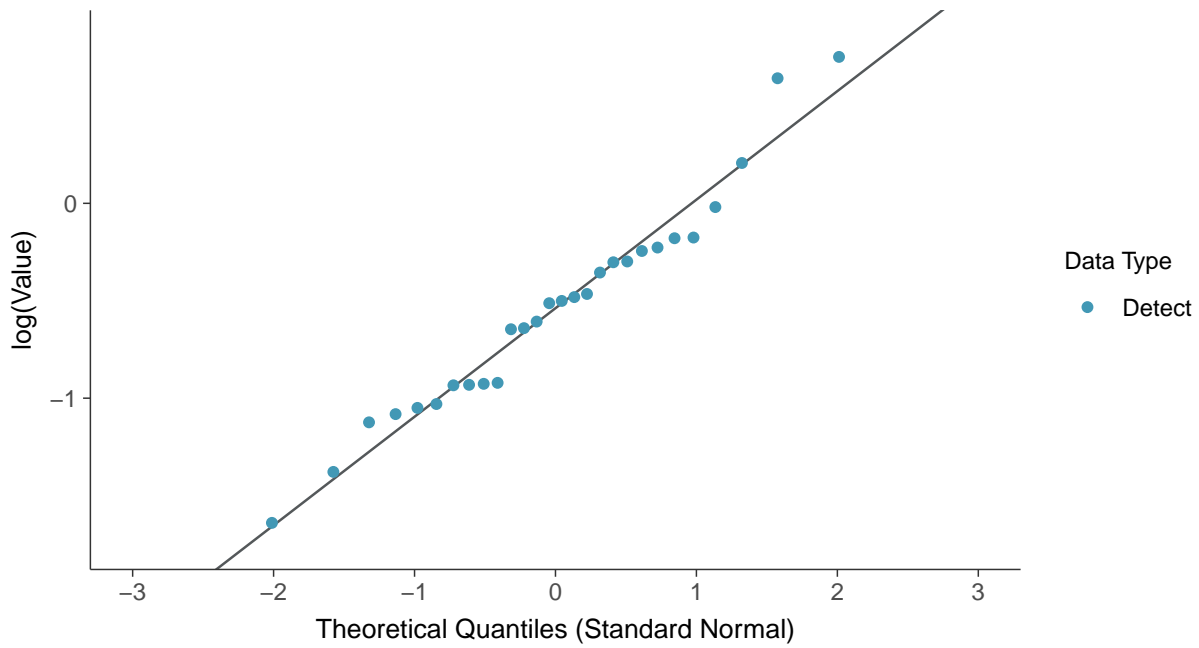
Radium-226, MW-4, MW-11, MW-12 (pCi/L)





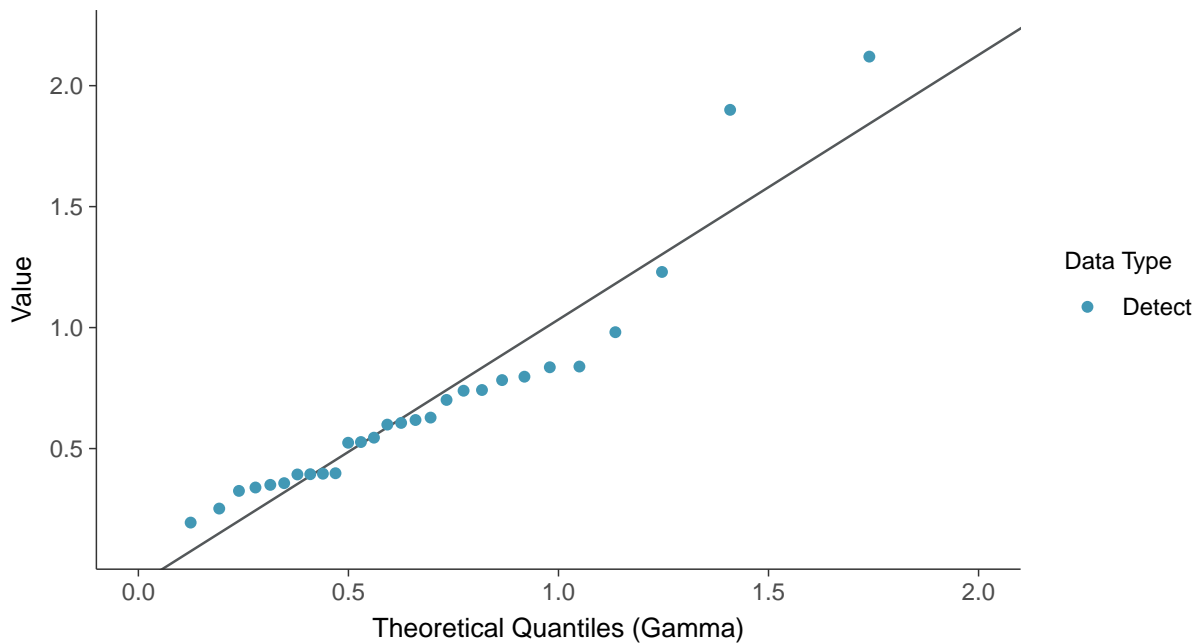
Lognormal Q-Q plot

Radium-226, MW-4, MW-11, MW-12 (pCi/L)



Gamma Q-Q plot

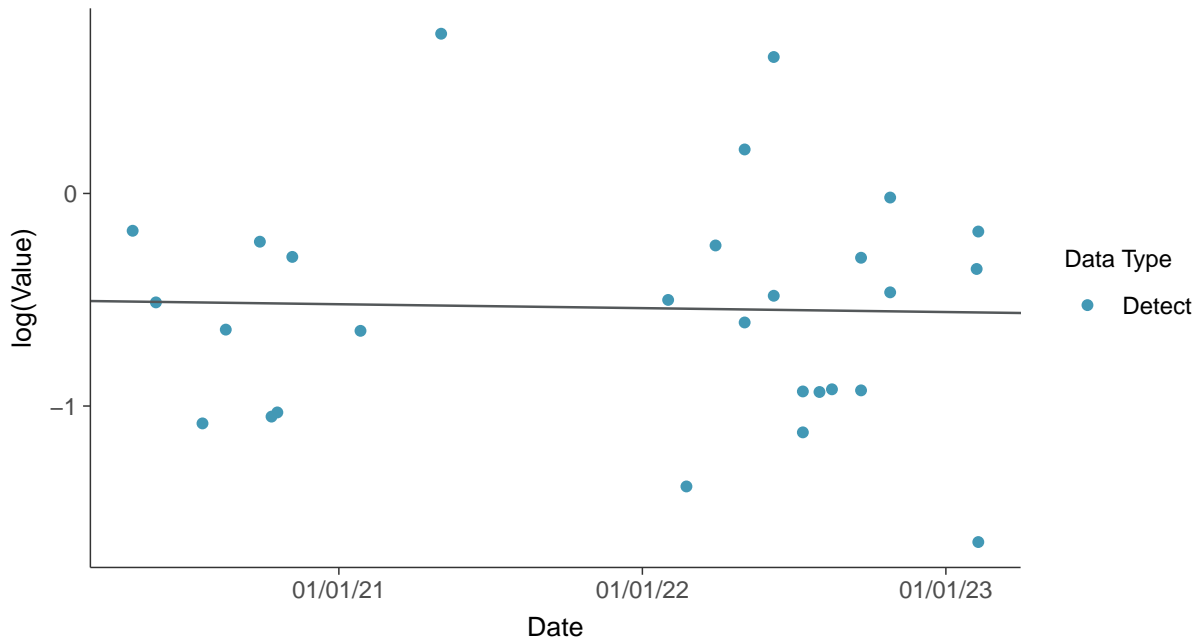
Radium-226, MW-4, MW-11, MW-12 (pCi/L)





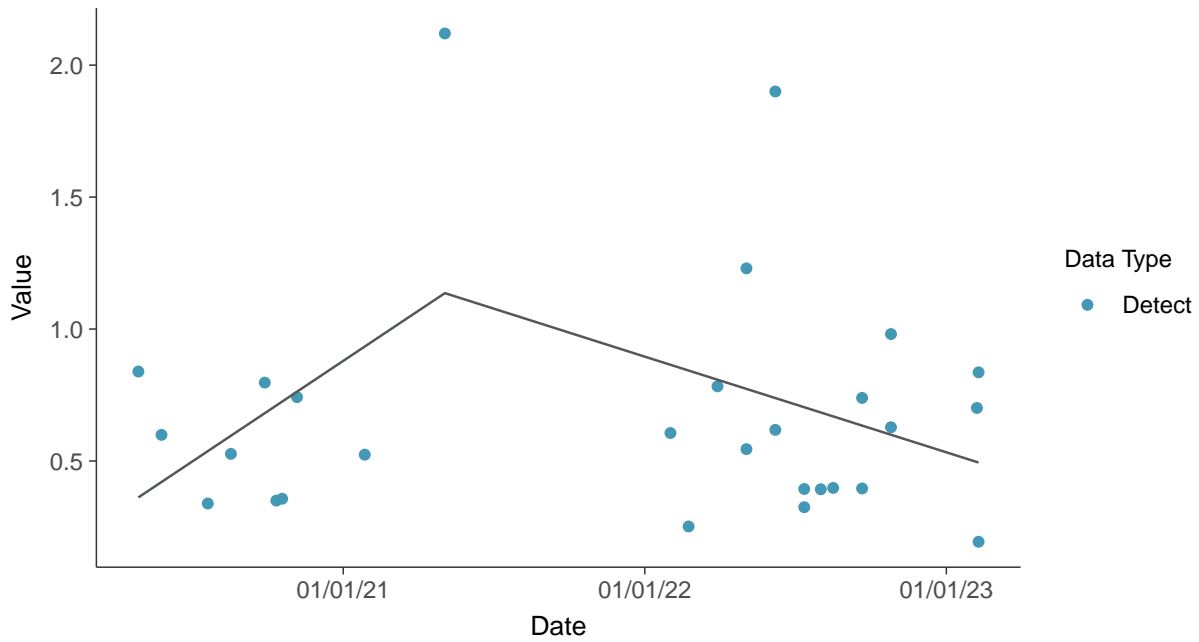
Trend Regression: Lognormal MLE

Radium-226, MW-4, MW-11, MW-12 (pCi/L)



Trend Regression: Piecewise Linear-Linear

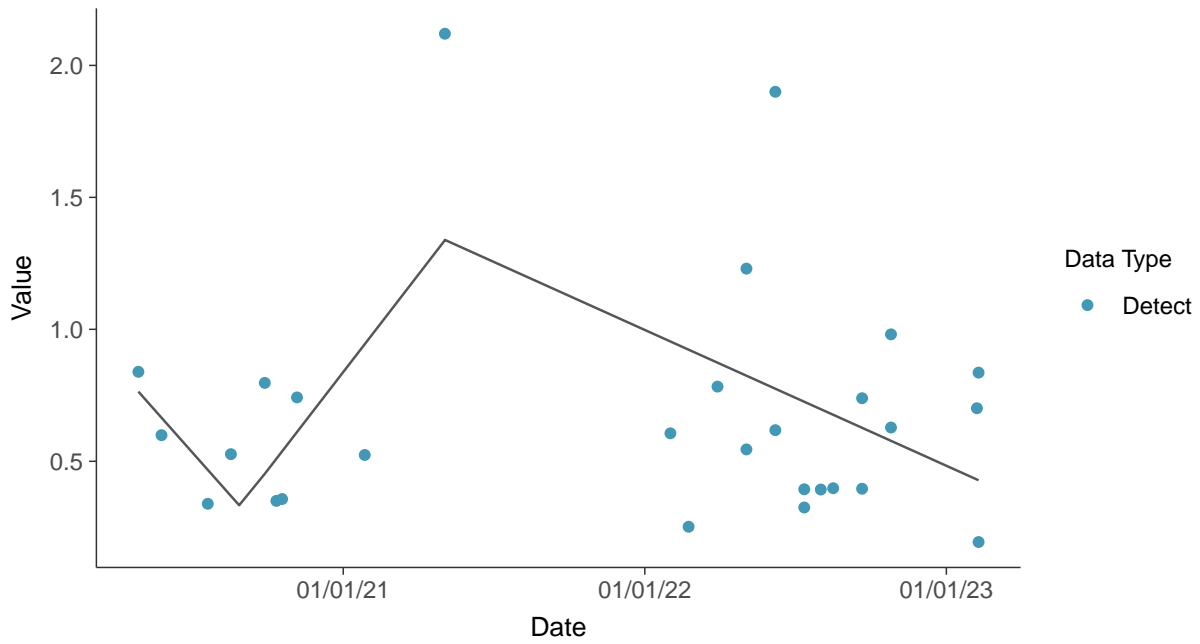
Radium-226, MW-4, MW-11, MW-12 (pCi/L)





Trend Regression: Piecewise Linear-Linear-Linear

Radium-226, MW-4, MW-11, MW-12 (pCi/L)



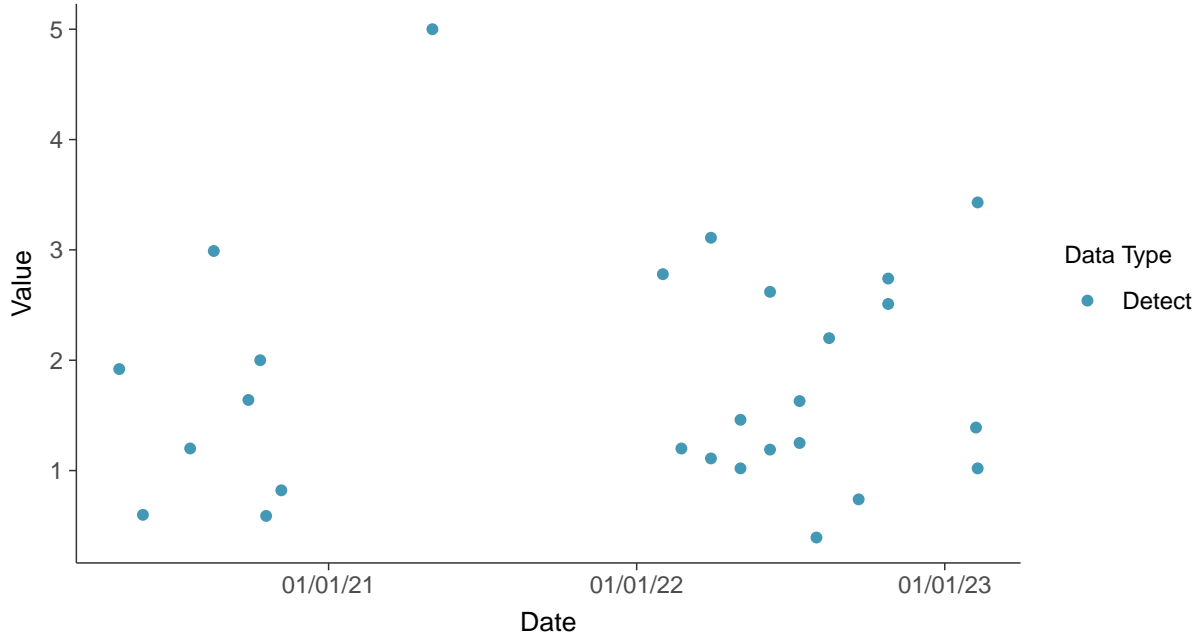


Appendix IV: Radium-226/228, MW-4, MW-11, MW-12

ID: 2_25

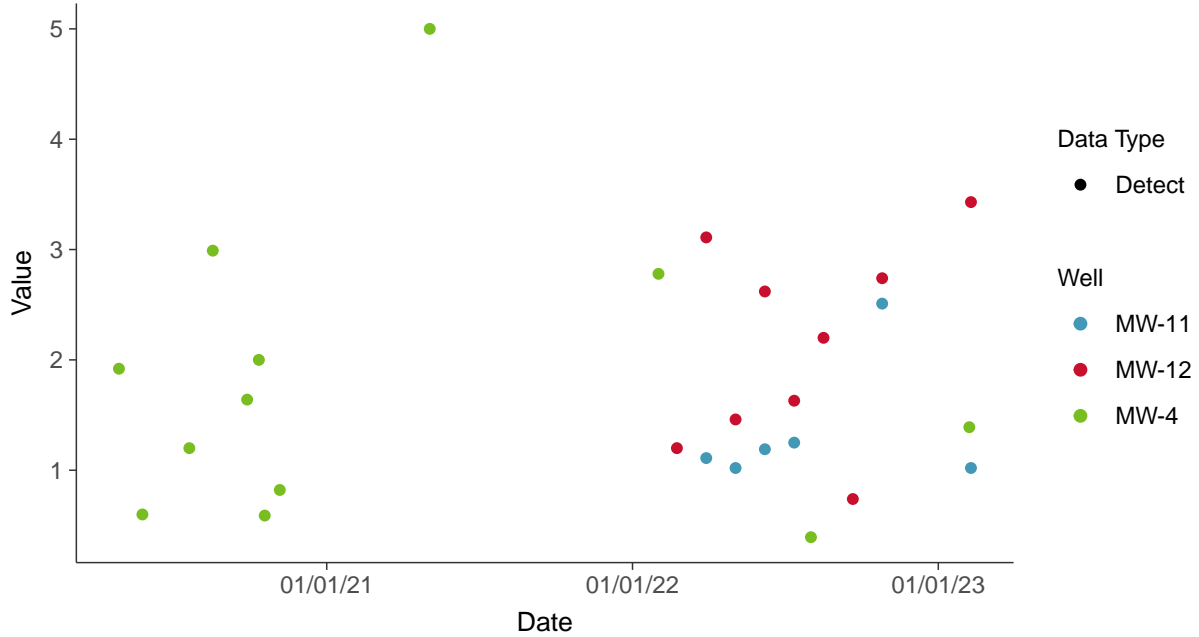
Scatter Plot

Radium-226/228, MW-4, MW-11, MW-12 (pCi/L)



Scatter Plot by Well

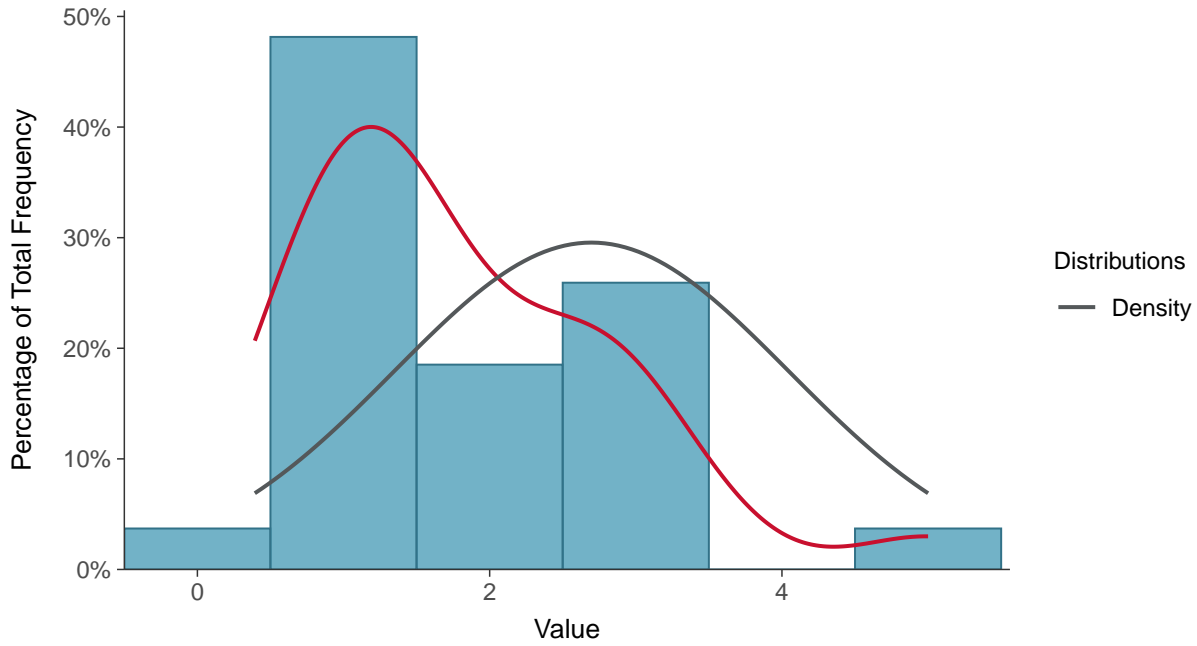
Radium-226/228, MW-4, MW-11, MW-12 (pCi/L)





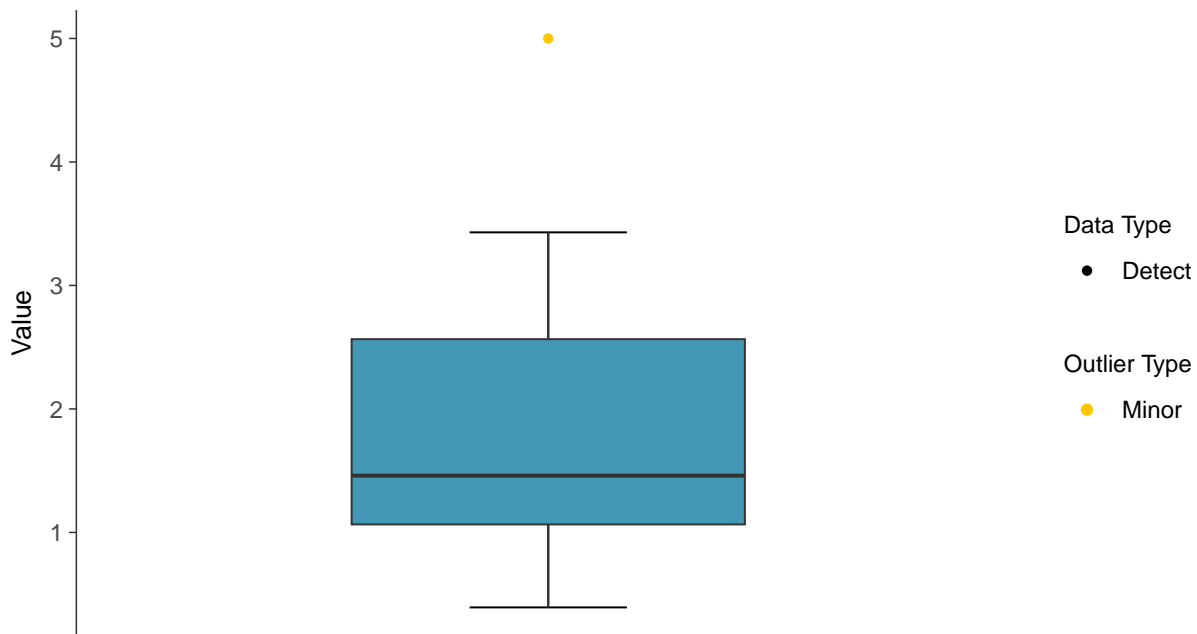
Histogram

Radium-226/228, MW-4, MW-11, MW-12 (pCi/L)



Boxplot

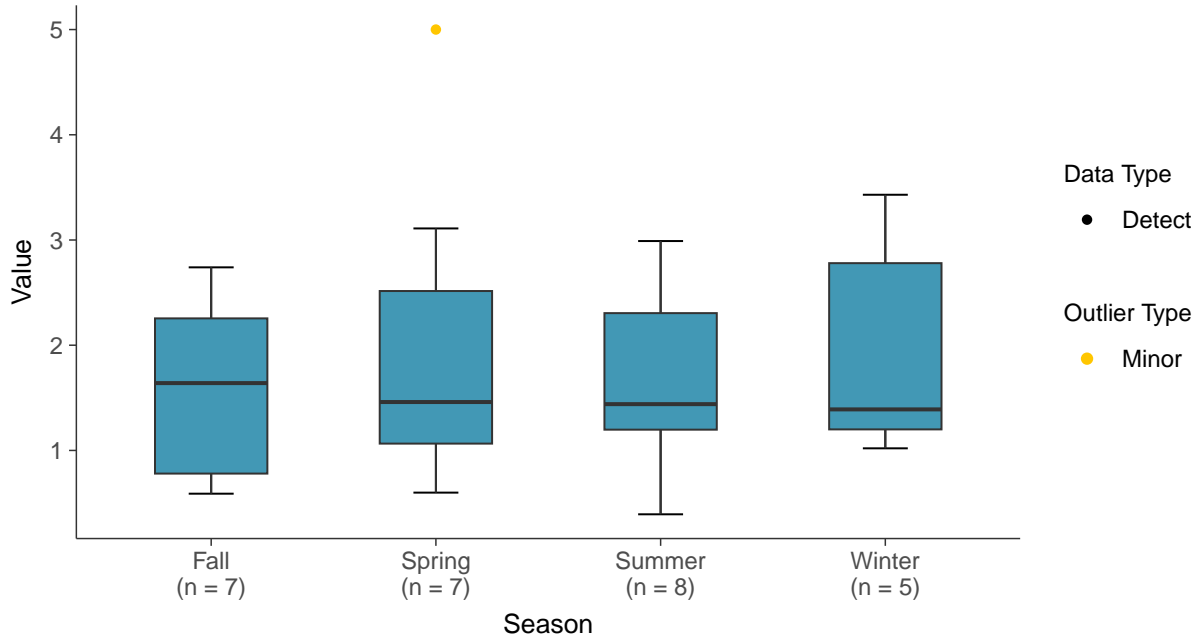
Radium-226/228, MW-4, MW-11, MW-12 (pCi/L)





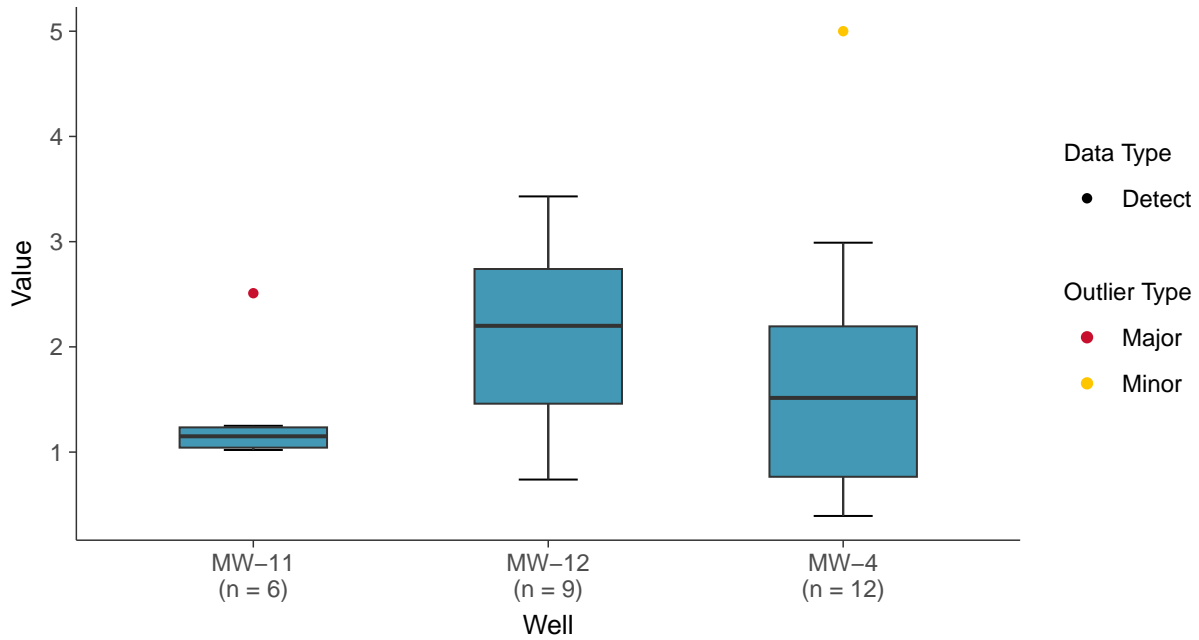
Boxplot by Season

Radium-226/228, MW-4, MW-11, MW-12 (pCi/L)



Boxplot by Well

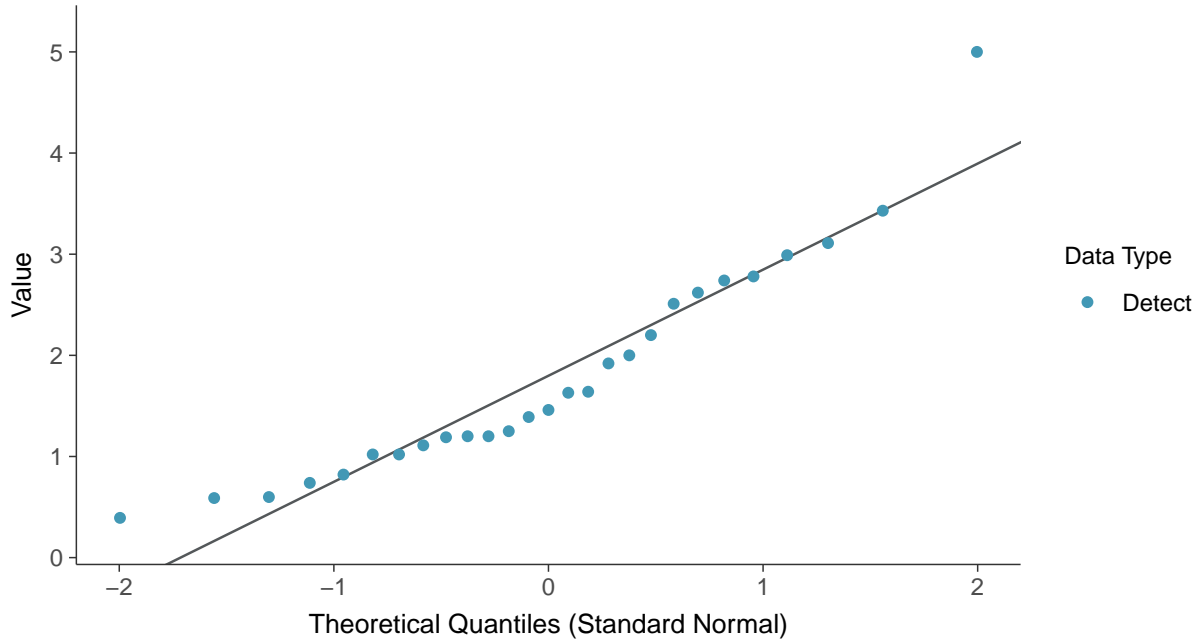
Radium-226/228, MW-4, MW-11, MW-12 (pCi/L)





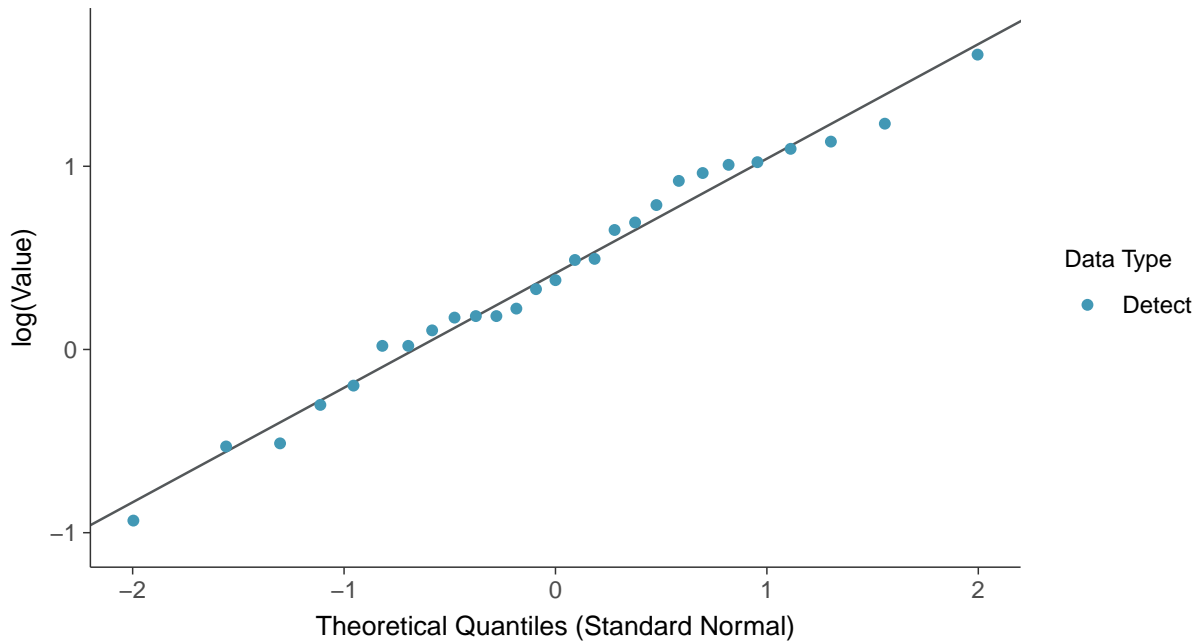
Normal Q-Q plot

Radium-226/228, MW-4, MW-11, MW-12 (pCi/L)



Lognormal Q-Q plot

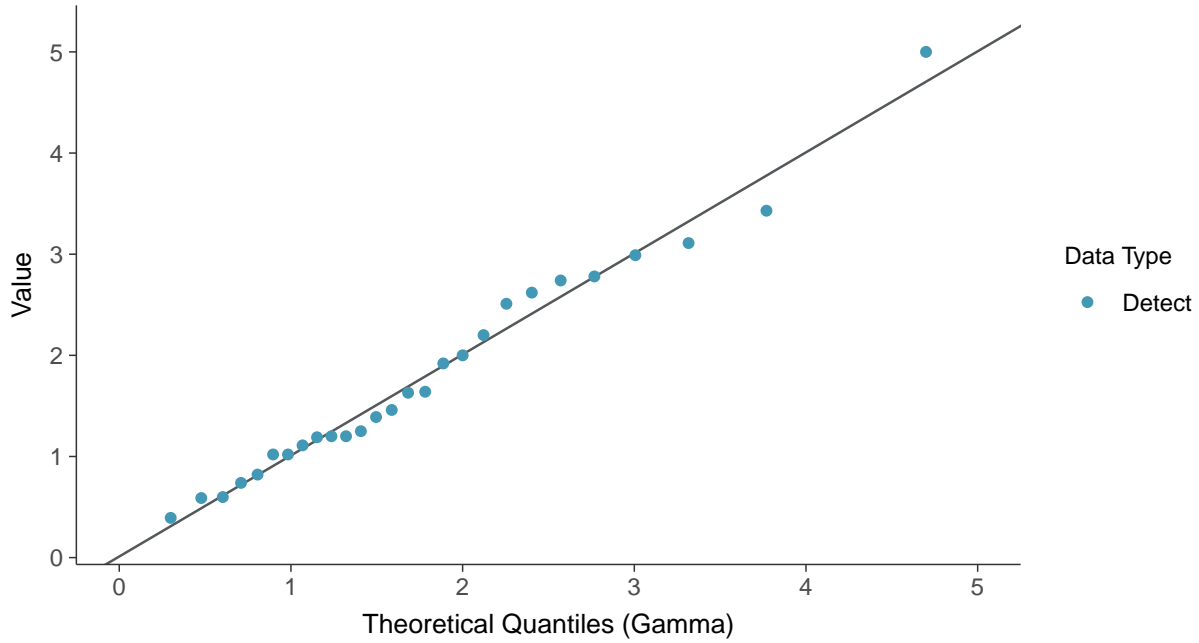
Radium-226/228, MW-4, MW-11, MW-12 (pCi/L)





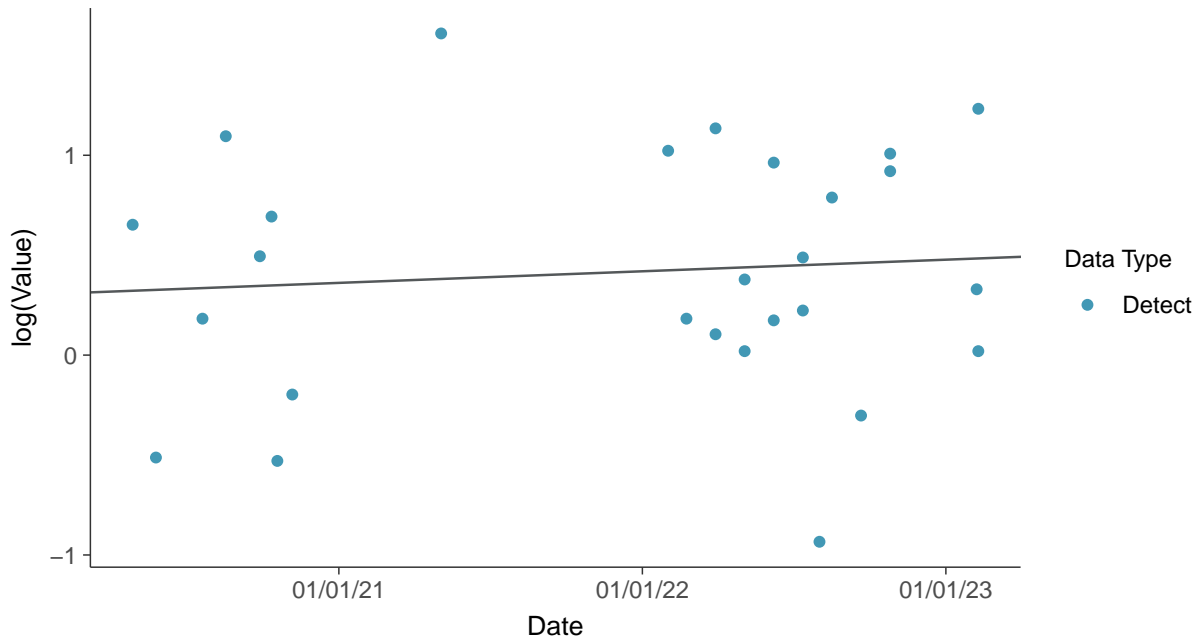
Gamma Q-Q plot

Radium-226/228, MW-4, MW-11, MW-12 (pCi/L)



Trend Regression: Lognormal MLE

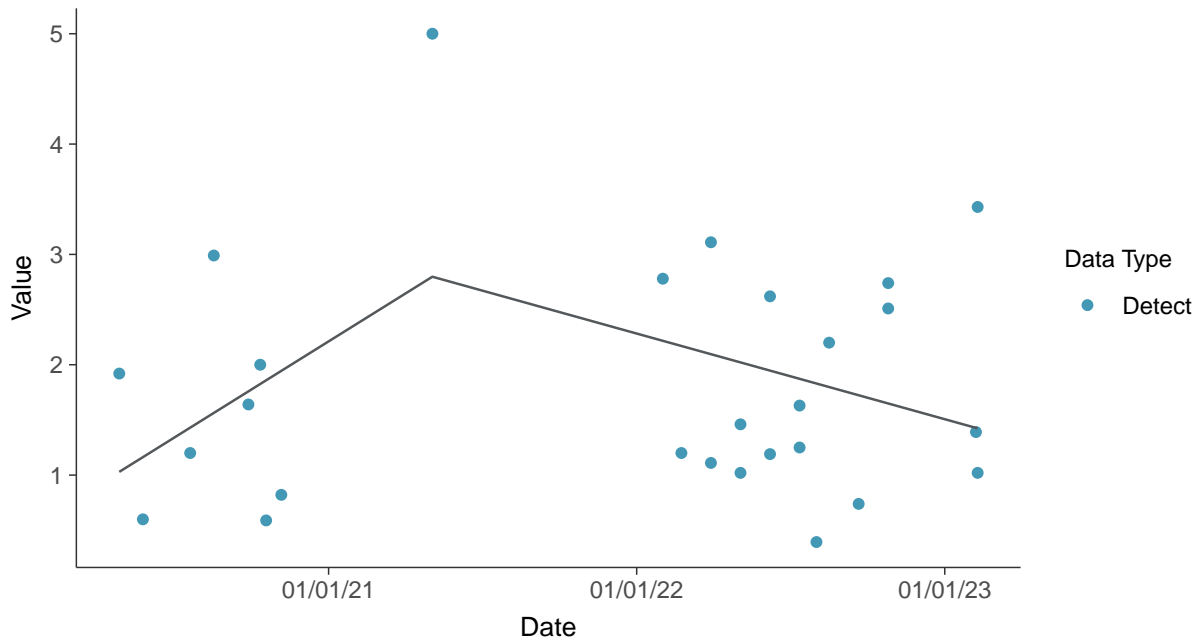
Radium-226/228, MW-4, MW-11, MW-12 (pCi/L)





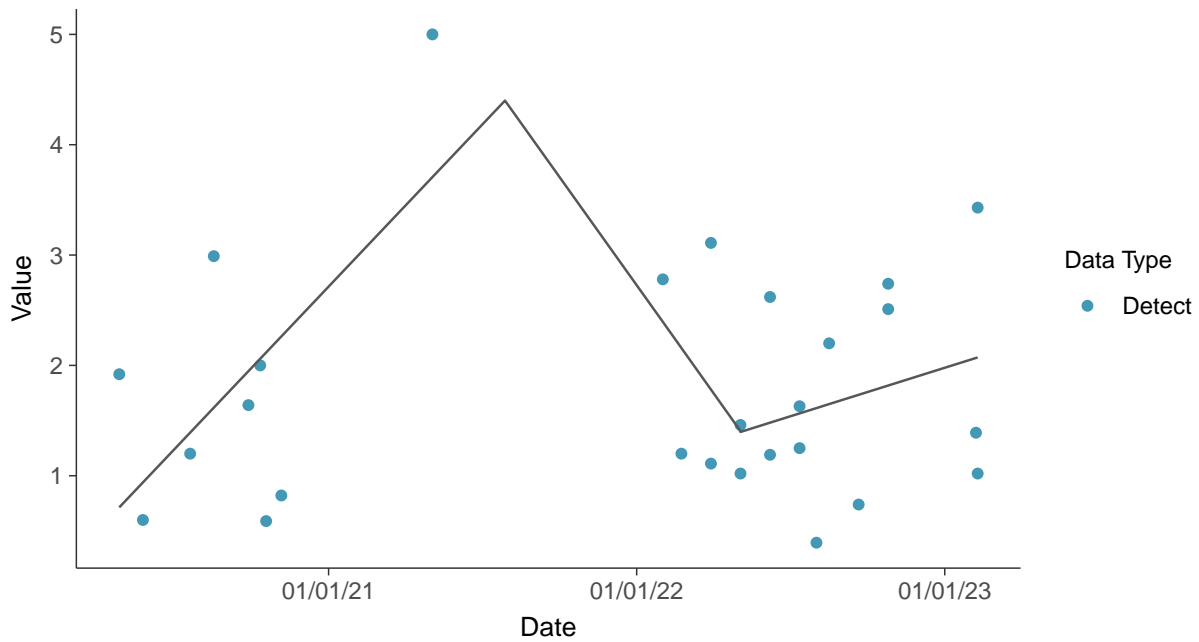
Trend Regression: Piecewise Linear-Linear

Radium-226/228, MW-4, MW-11, MW-12 (pCi/L)



Trend Regression: Piecewise Linear-Linear-Linear

Radium-226/228, MW-4, MW-11, MW-12 (pCi/L)



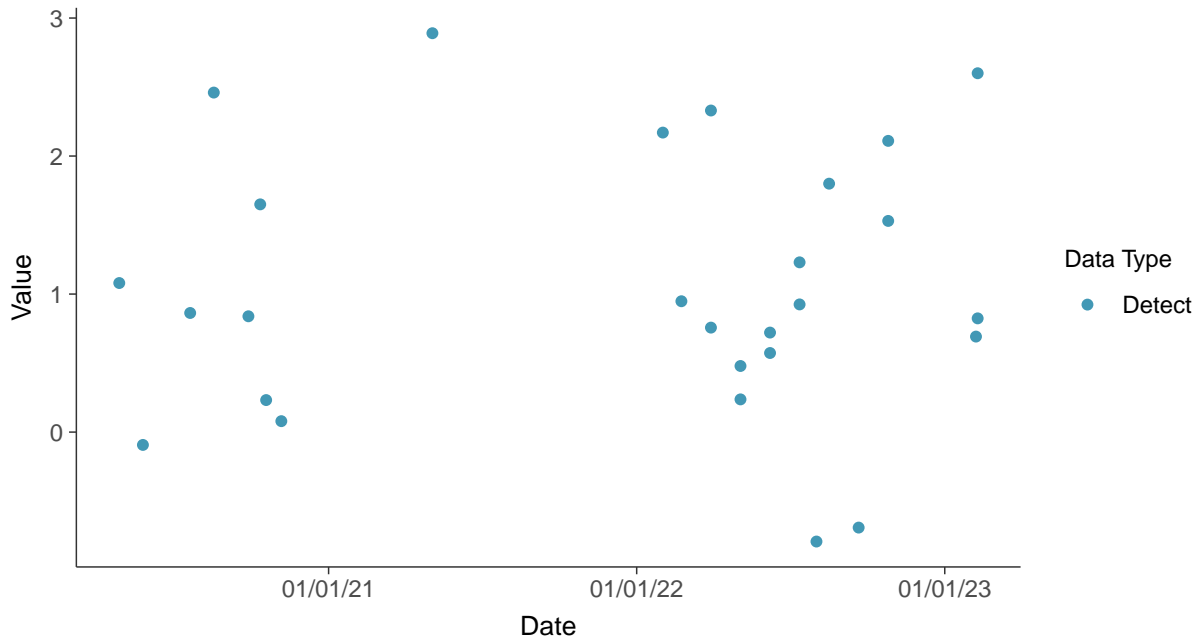


Appendix IV: Radium-228, MW-4, MW-11, MW-12

ID: 2_26

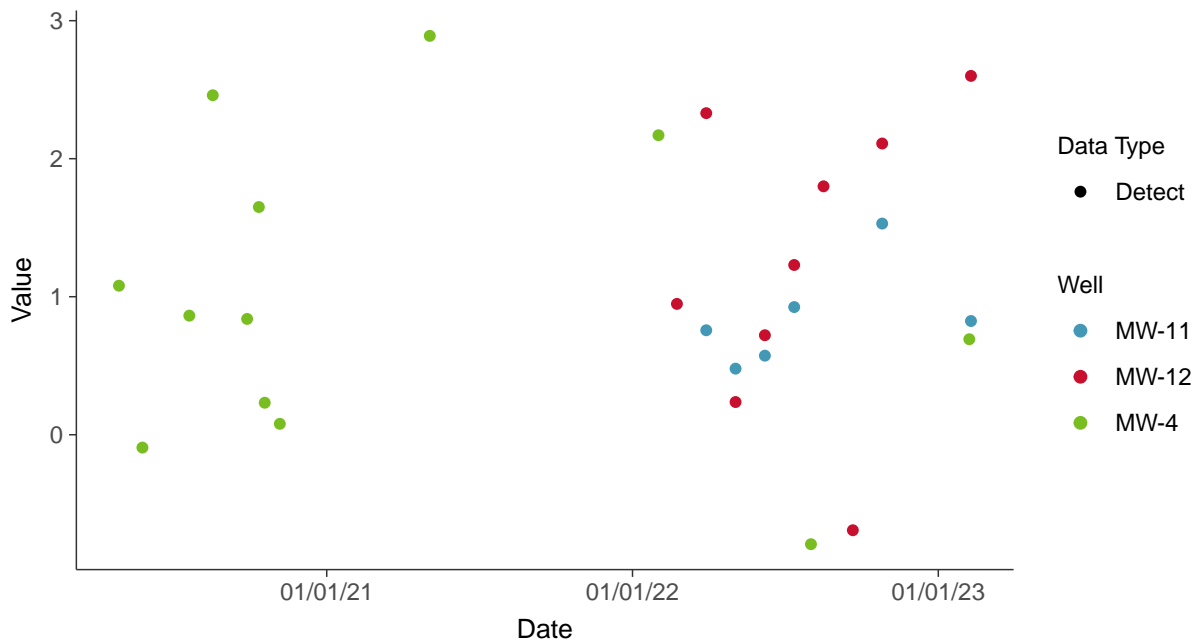
Scatter Plot

Radium-228, MW-4, MW-11, MW-12 (pCi/L)



Scatter Plot by Well

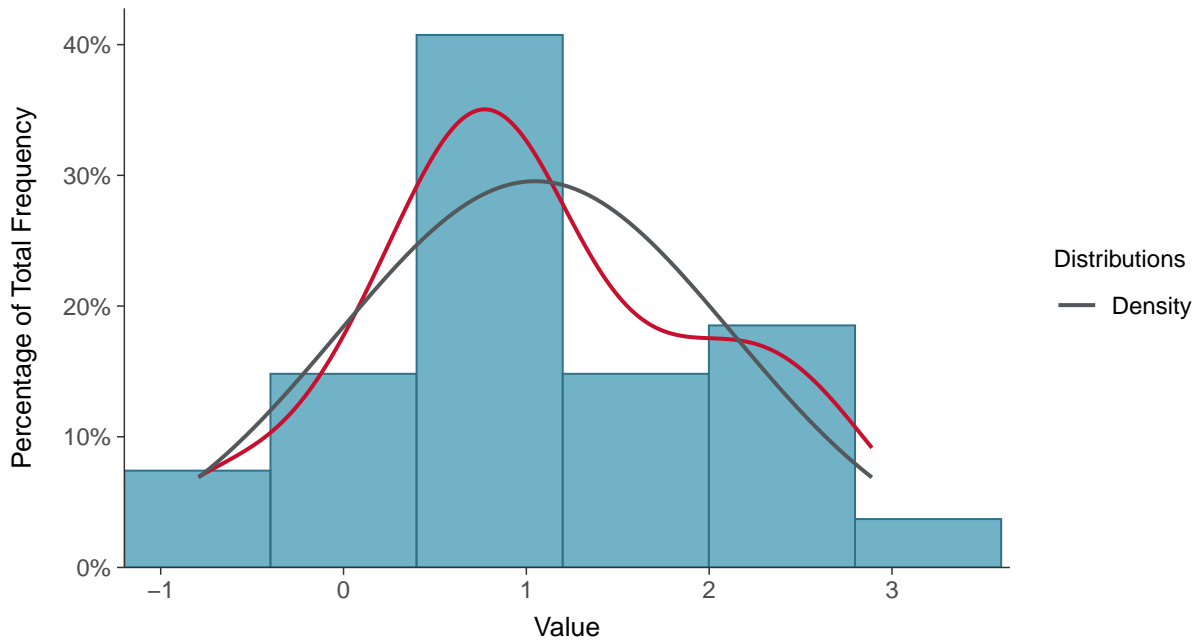
Radium-228, MW-4, MW-11, MW-12 (pCi/L)





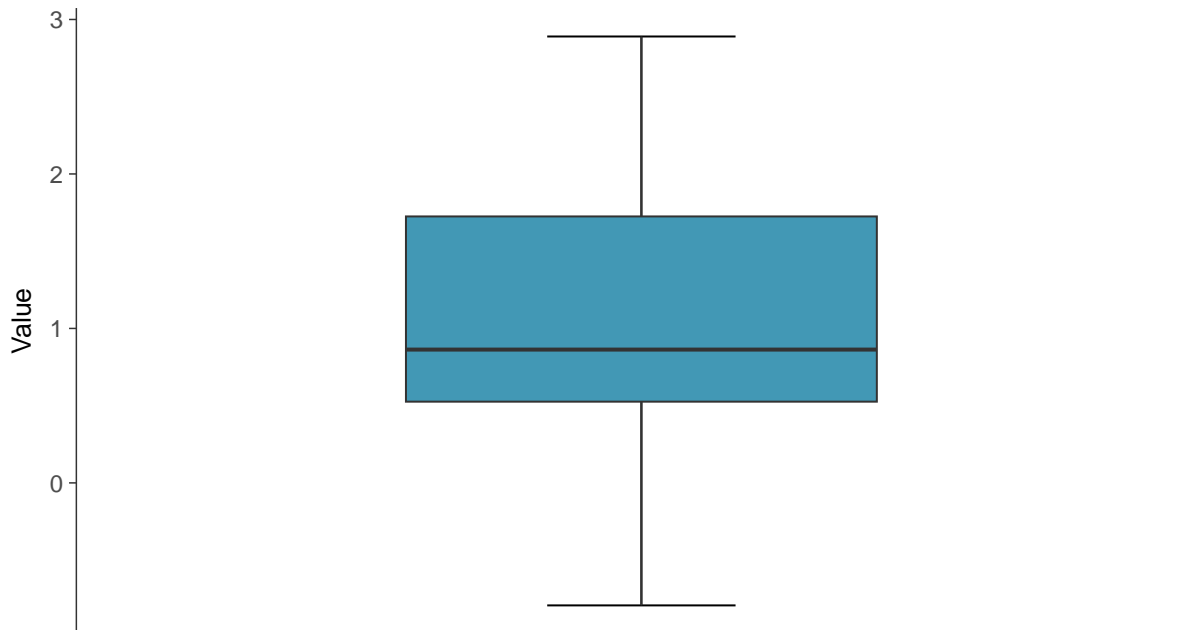
Histogram

Radium-228, MW-4, MW-11, MW-12 (pCi/L)



Boxplot

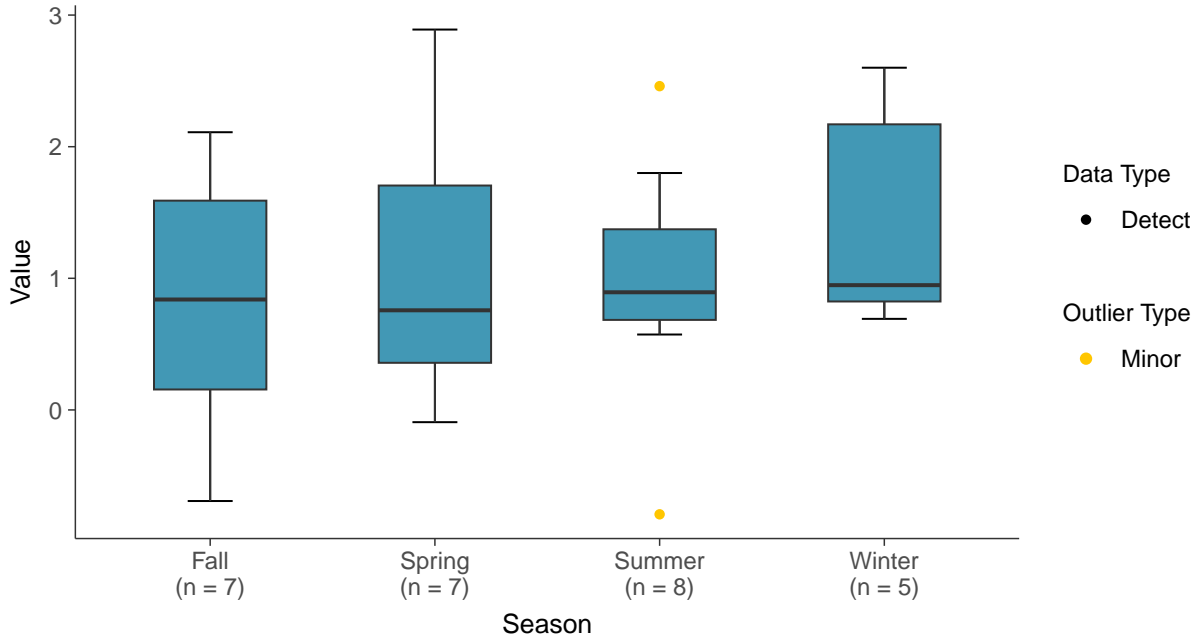
Radium-228, MW-4, MW-11, MW-12 (pCi/L)





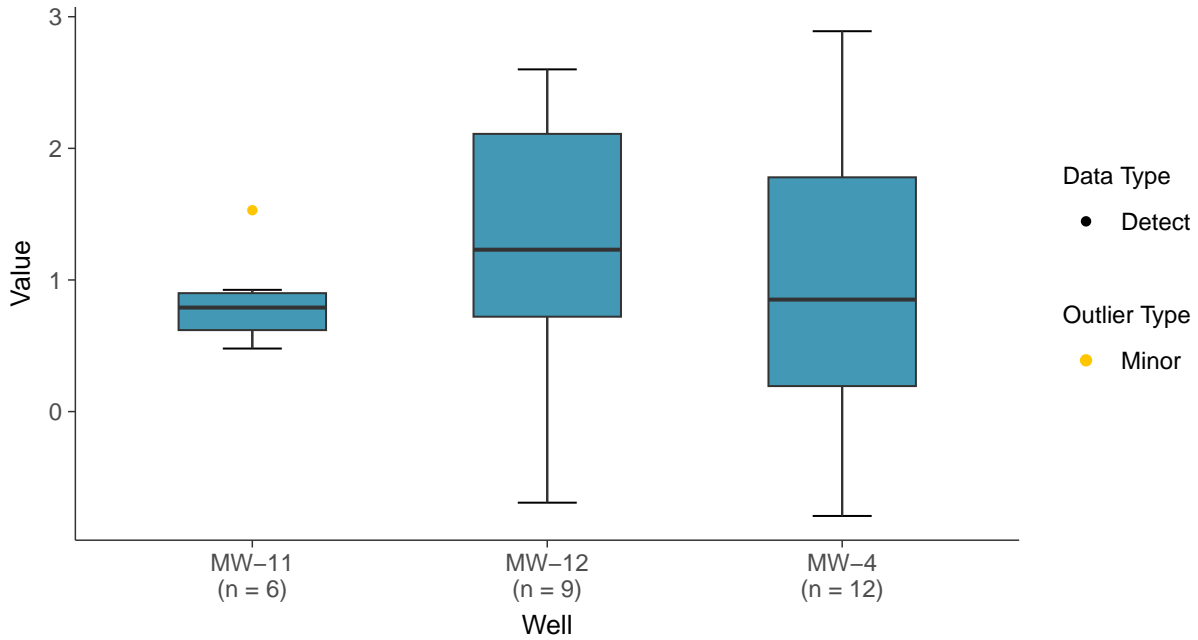
Boxplot by Season

Radium-228, MW-4, MW-11, MW-12 (pCi/L)



Boxplot by Well

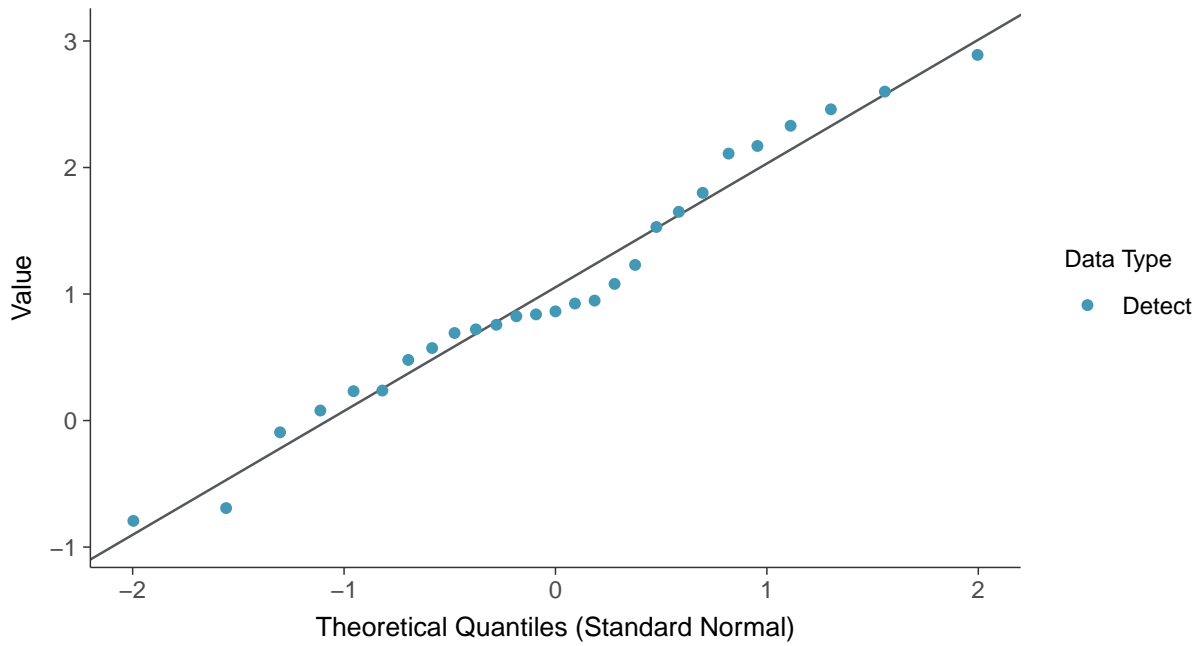
Radium-228, MW-4, MW-11, MW-12 (pCi/L)





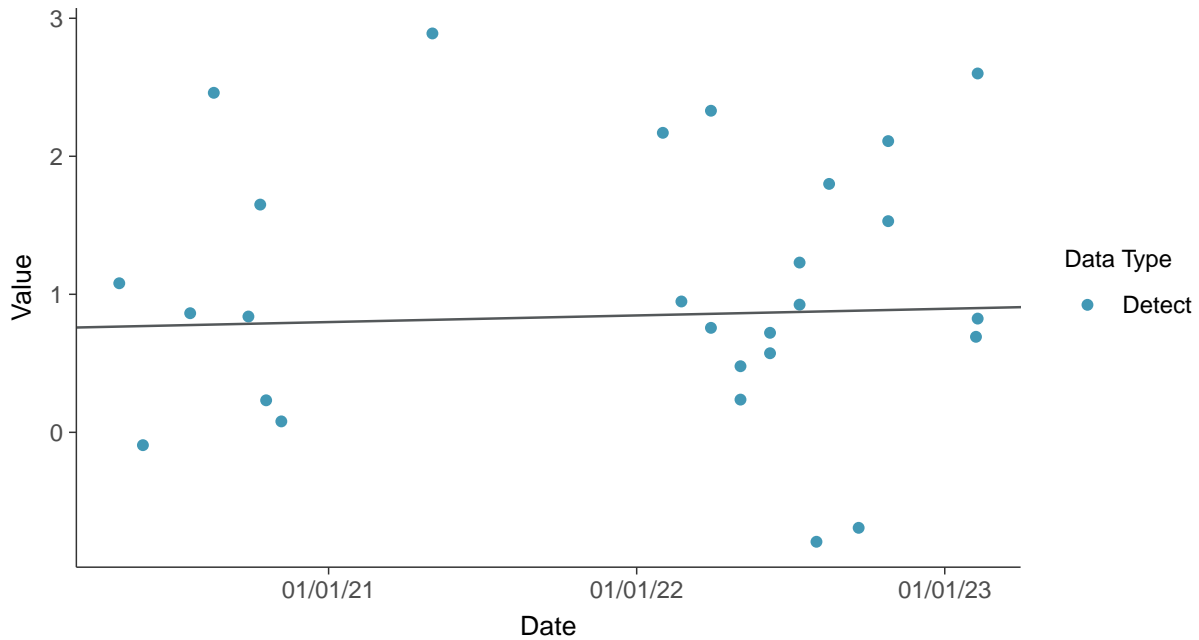
Normal Q-Q plot

Radium-228, MW-4, MW-11, MW-12 (pCi/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

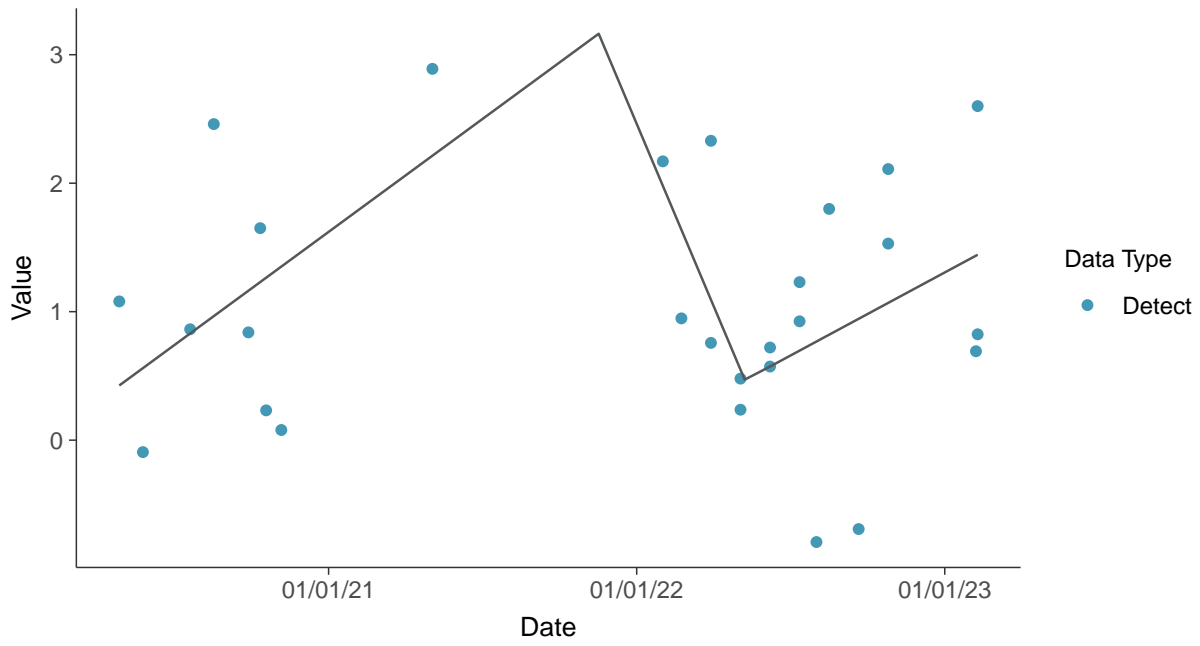
Radium-228, MW-4, MW-11, MW-12 (pCi/L)





Trend Regression: Piecewise Linear-Linear-Linear

Radium-228, MW-4, MW-11, MW-12 (pCi/L)



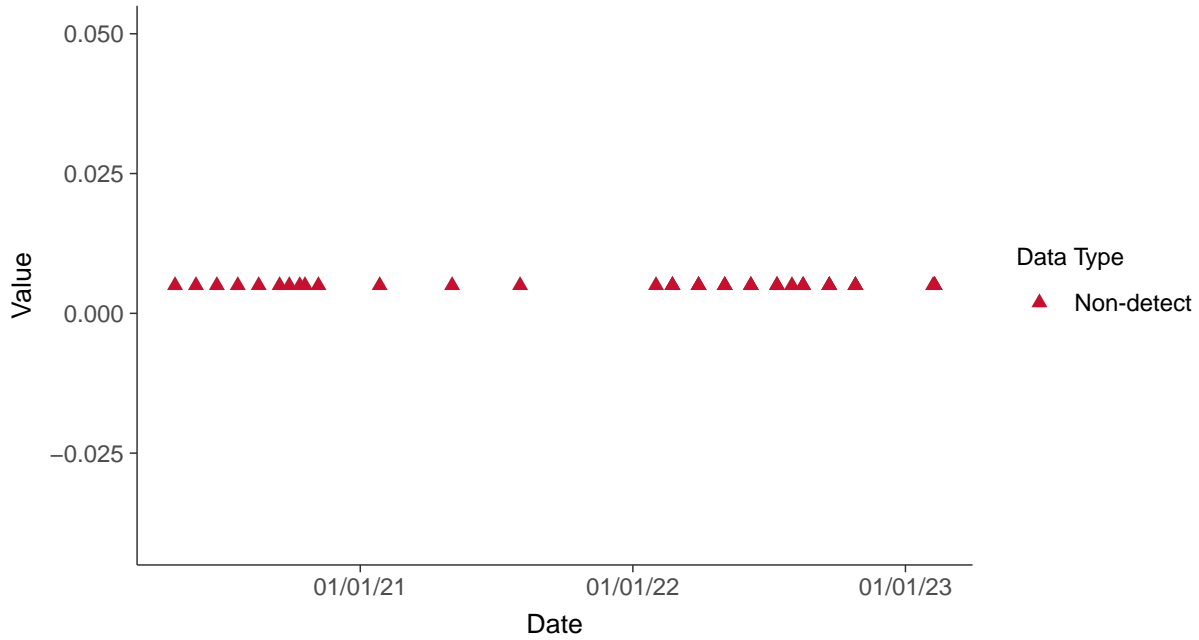


Appendix IV: Selenium, MW-4, MW-11, MW-12

ID: 2_27

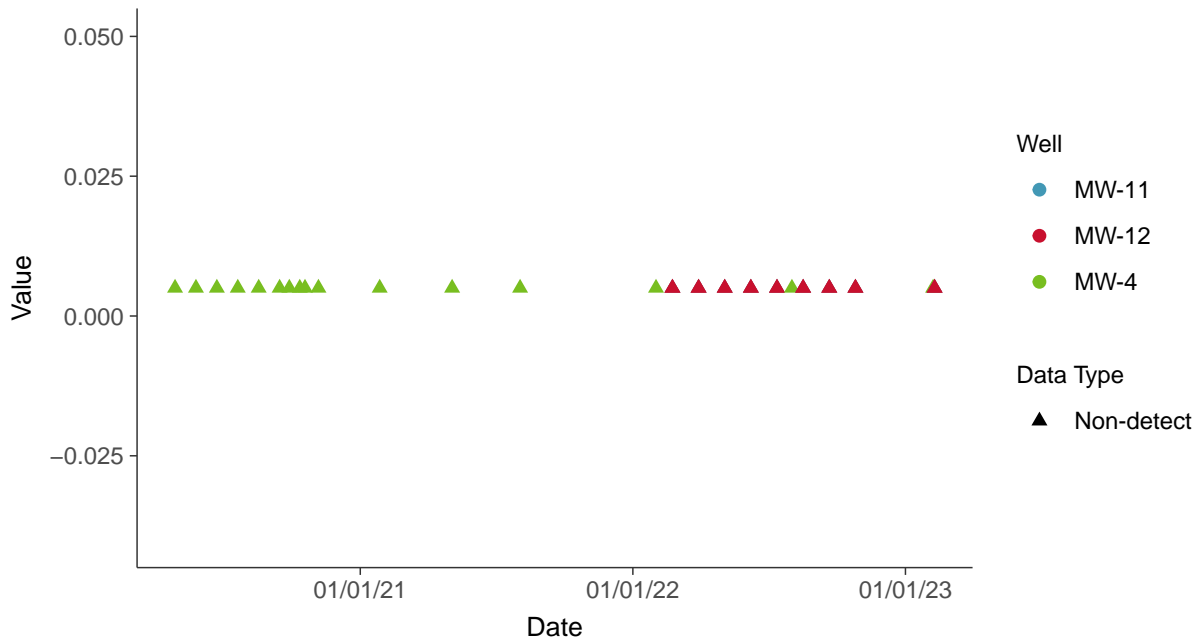
Scatter Plot

Selenium, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

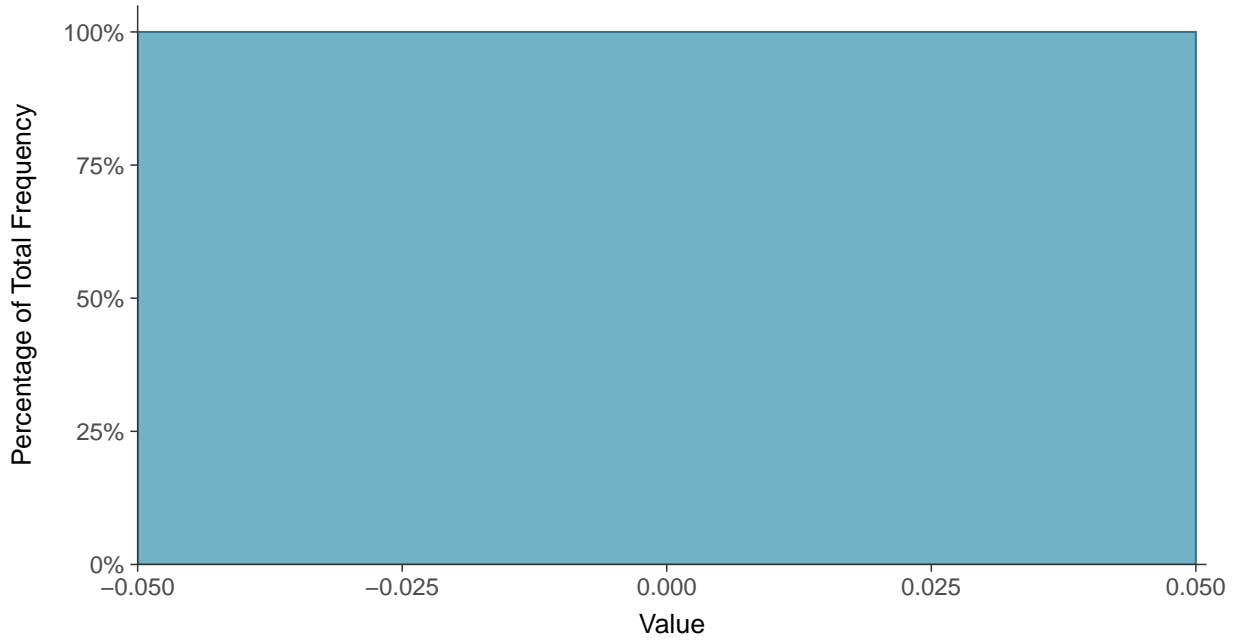
Selenium, MW-4, MW-11, MW-12 (mg/L)





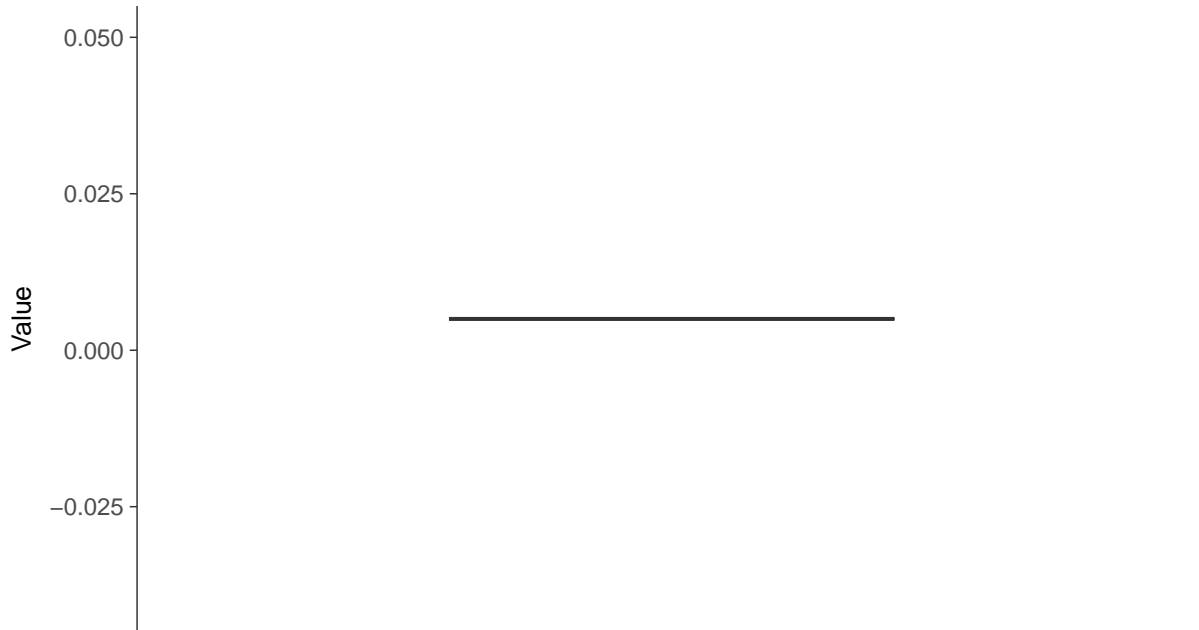
Histogram

Selenium, MW-4, MW-11, MW-12 (mg/L)



Boxplot

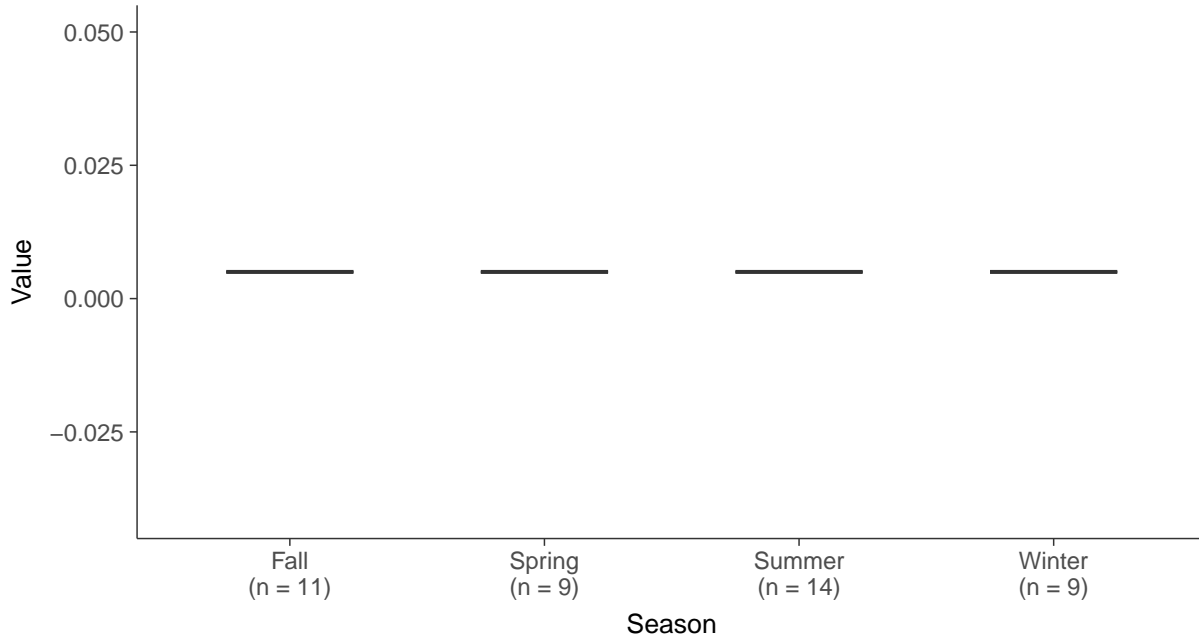
Selenium, MW-4, MW-11, MW-12 (mg/L)





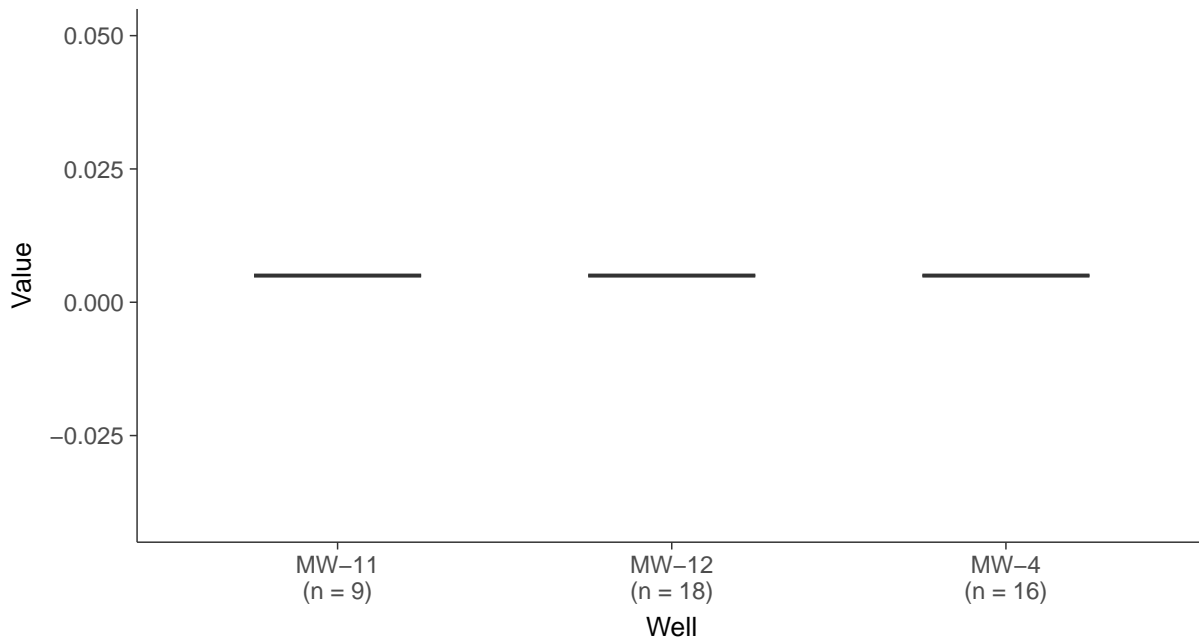
Boxplot by Season

Selenium, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Selenium, MW-4, MW-11, MW-12 (mg/L)



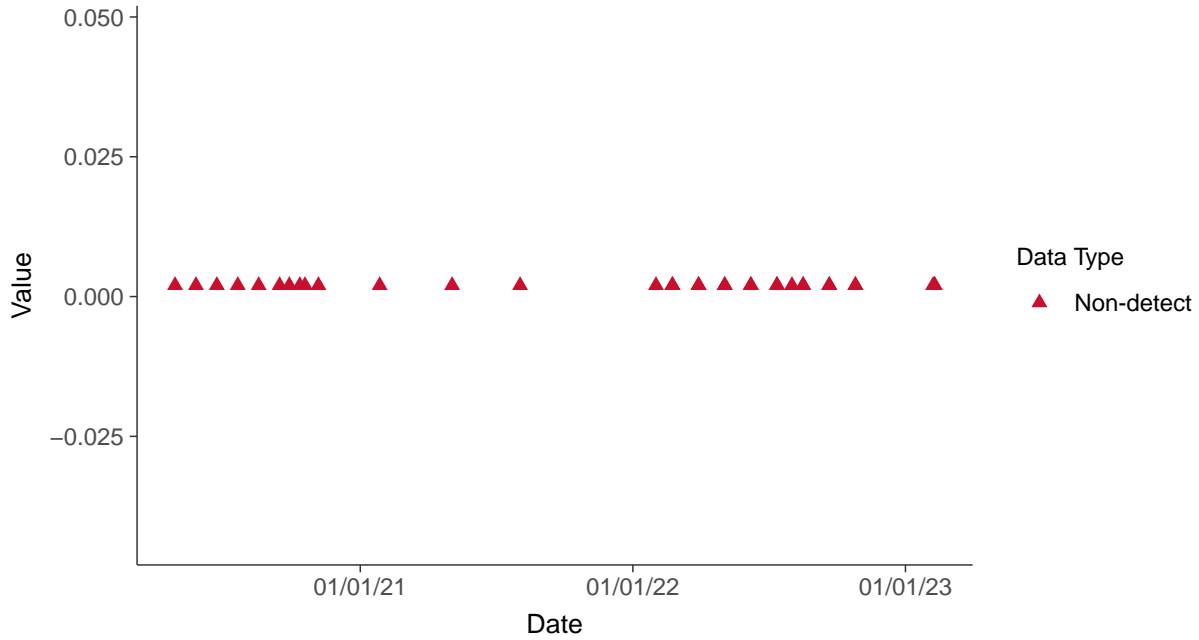


Appendix IV: Thallium, MW-4, MW-11, MW-12

ID: 2_29

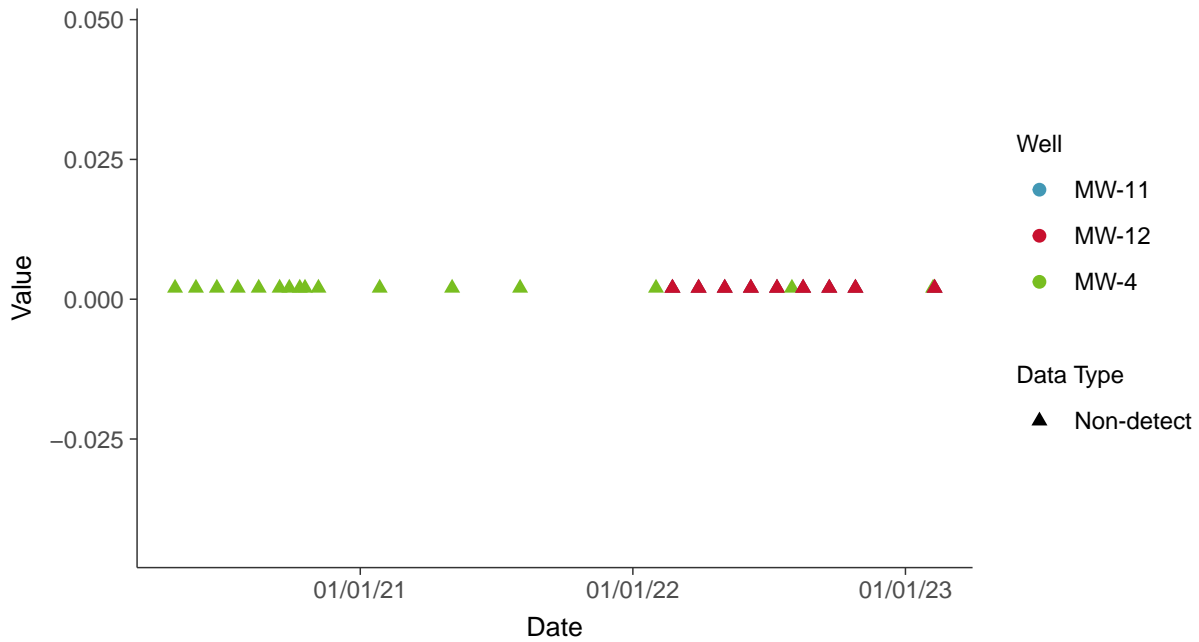
Scatter Plot

Thallium, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

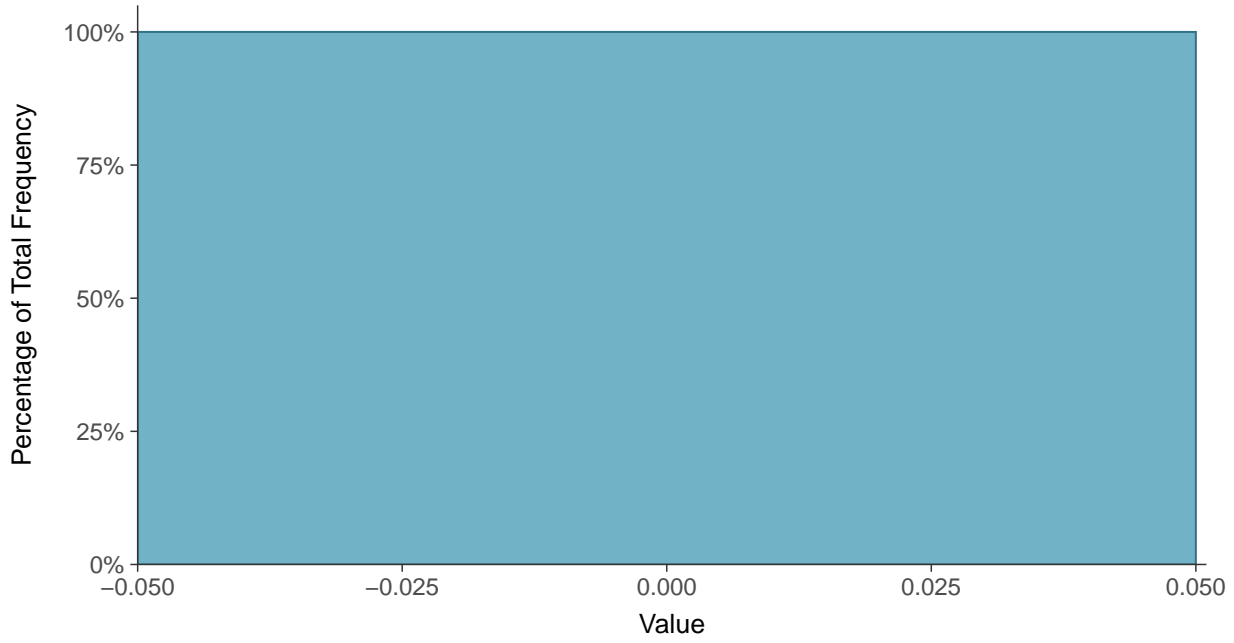
Thallium, MW-4, MW-11, MW-12 (mg/L)





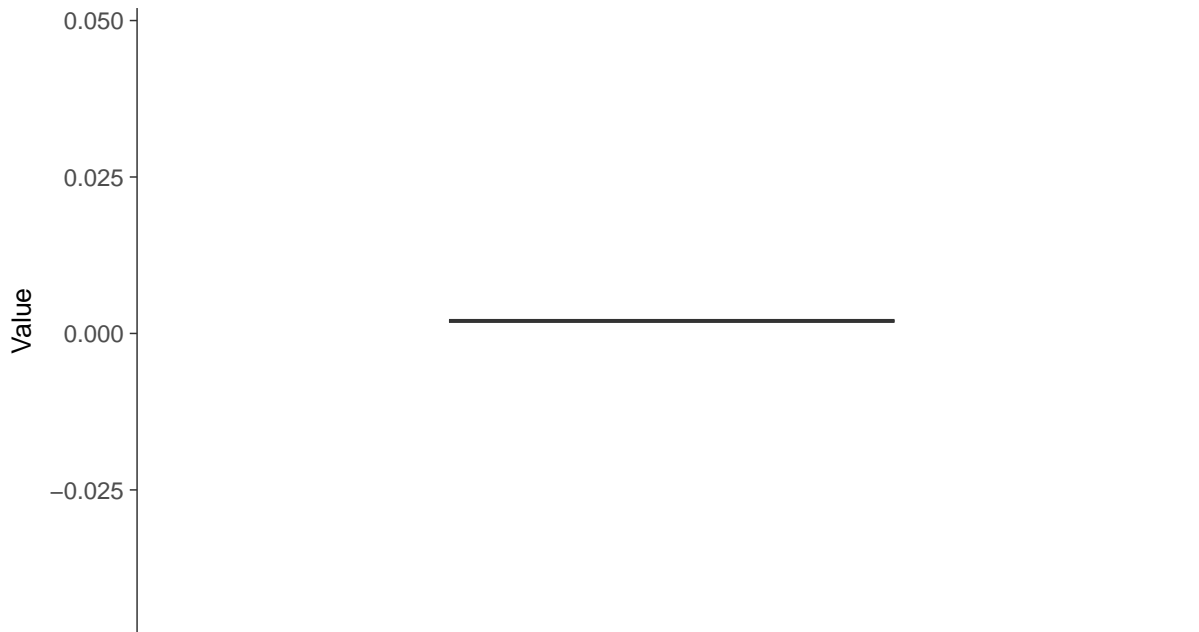
Histogram

Thallium, MW-4, MW-11, MW-12 (mg/L)



Boxplot

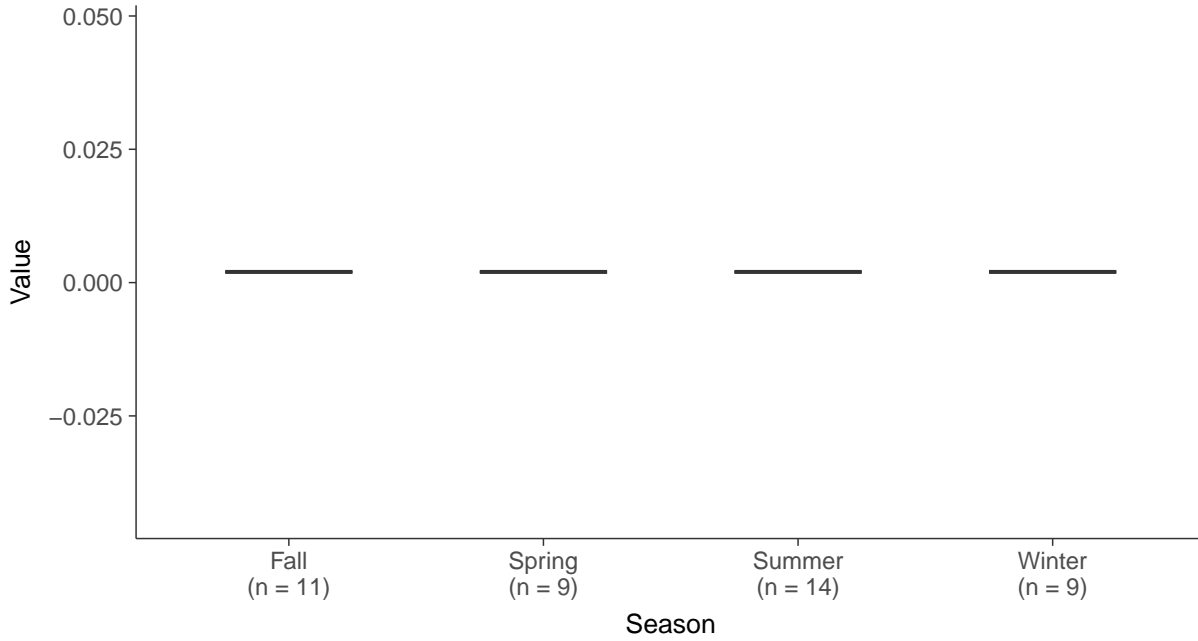
Thallium, MW-4, MW-11, MW-12 (mg/L)





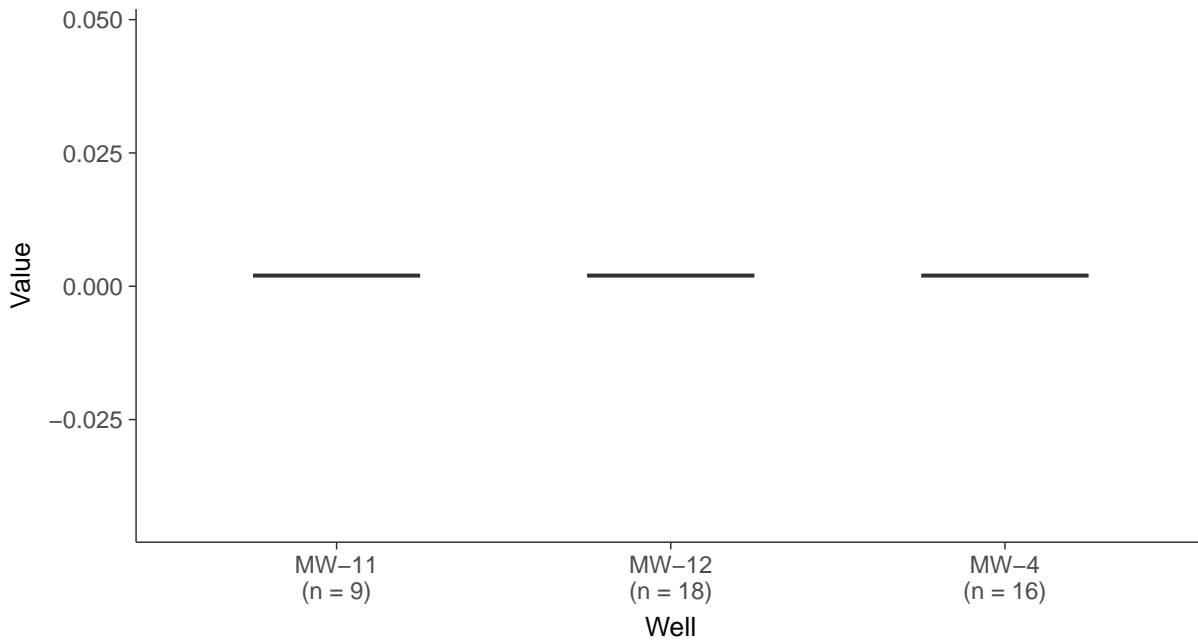
Boxplot by Season

Thallium, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

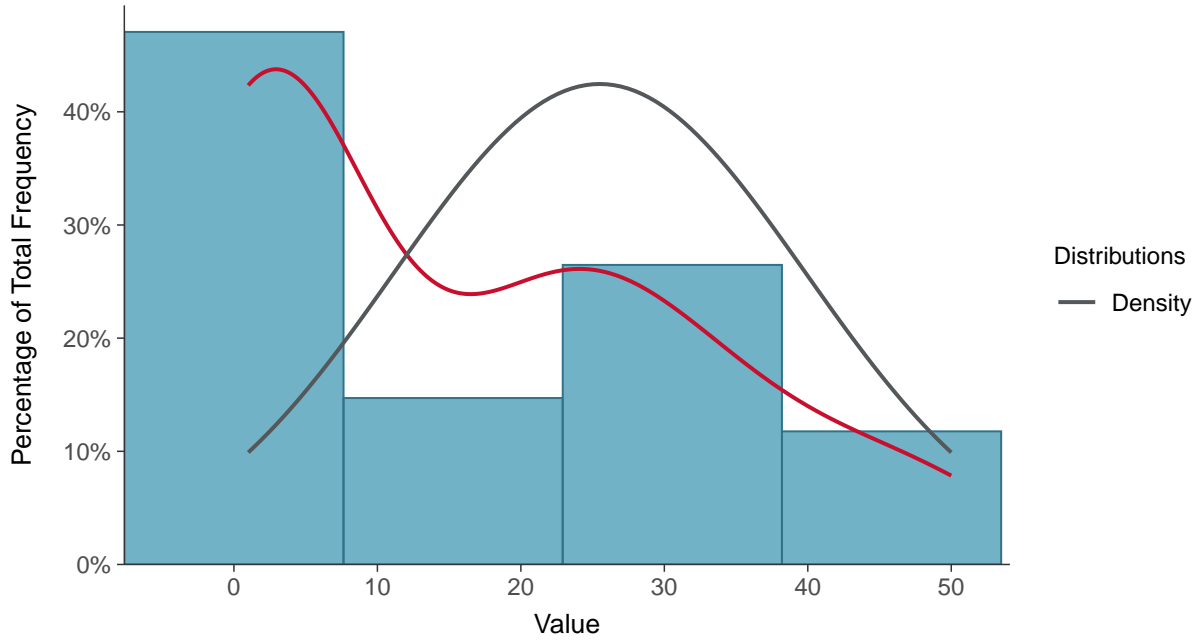
Thallium, MW-4, MW-11, MW-12 (mg/L)





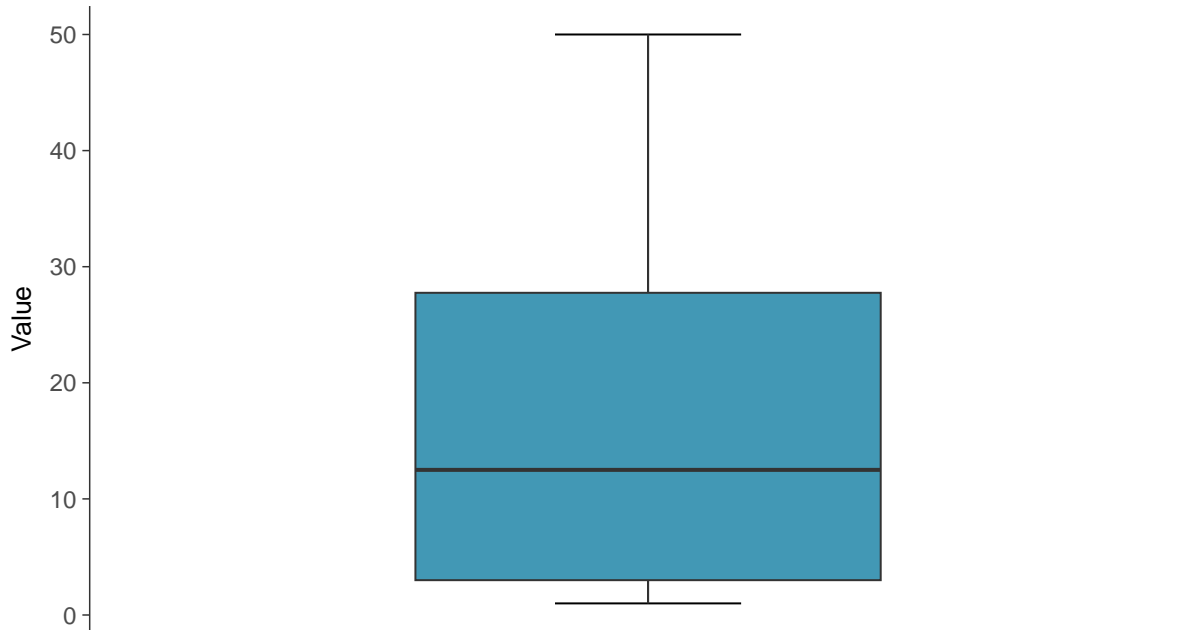
Histogram

Total Suspended Solids, MW-4, MW-11, MW-12 (mg/L)



Boxplot

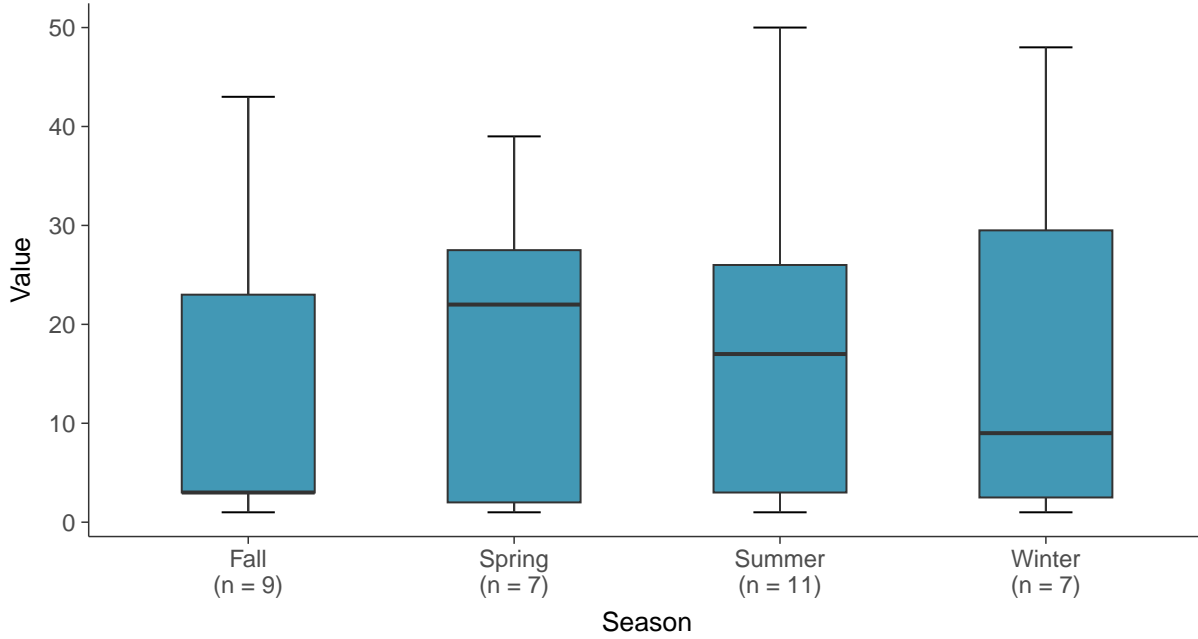
Total Suspended Solids, MW-4, MW-11, MW-12 (mg/L)





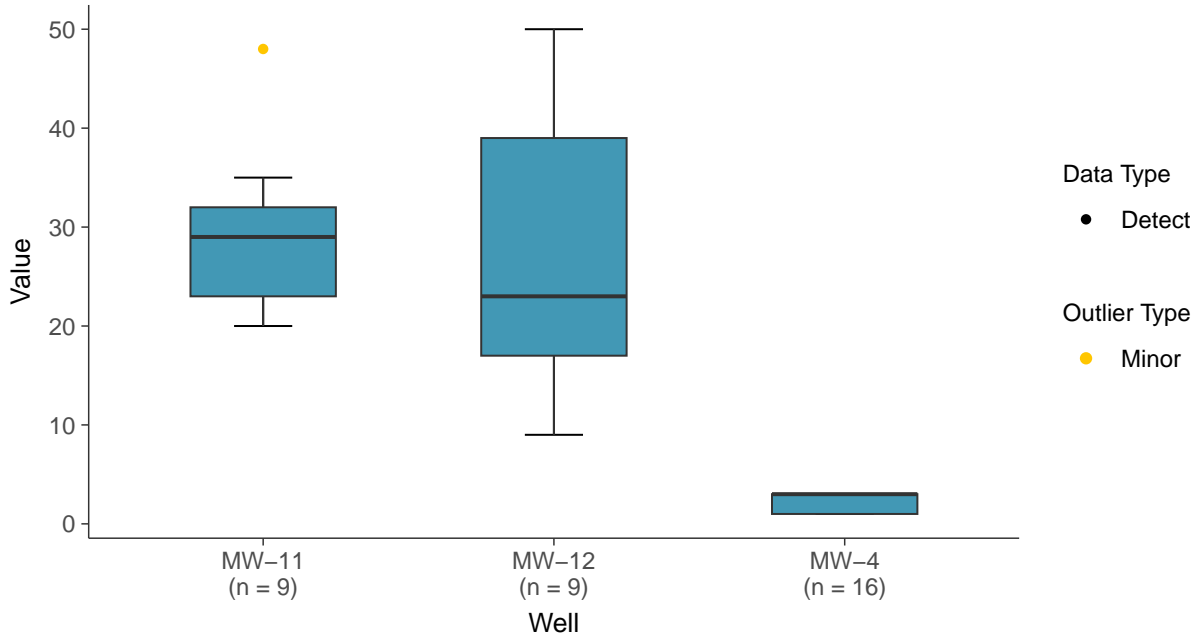
Boxplot by Season

Total Suspended Solids, MW-4, MW-11, MW-12 (mg/L)



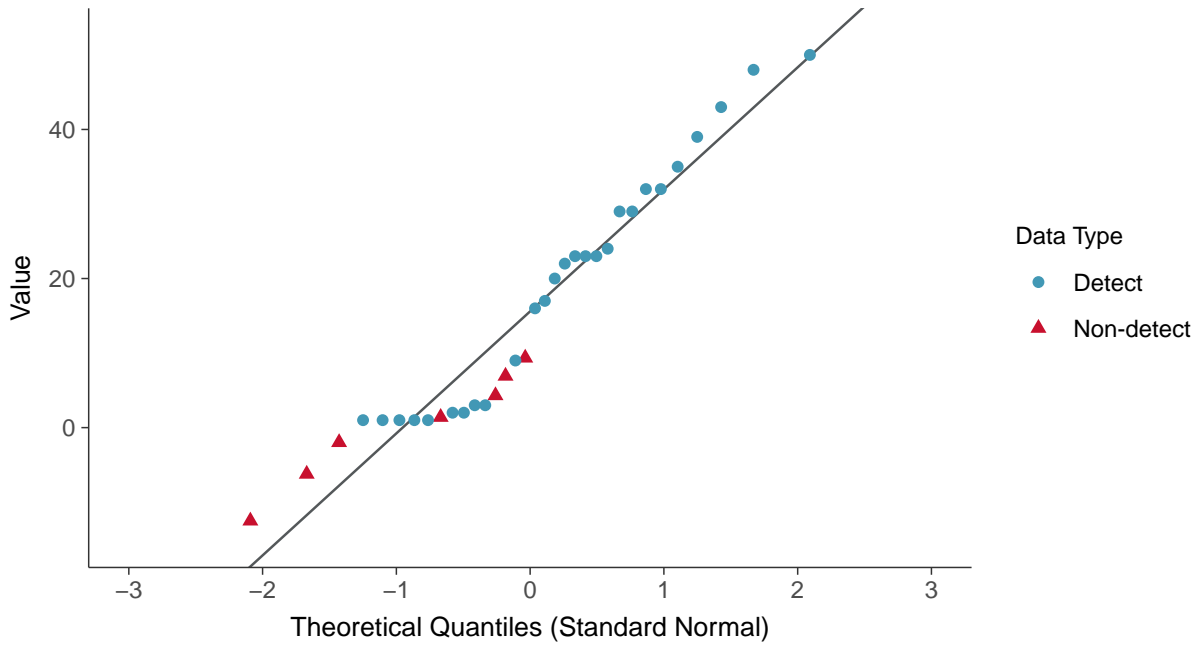
Boxplot by Well

Total Suspended Solids, MW-4, MW-11, MW-12 (mg/L)

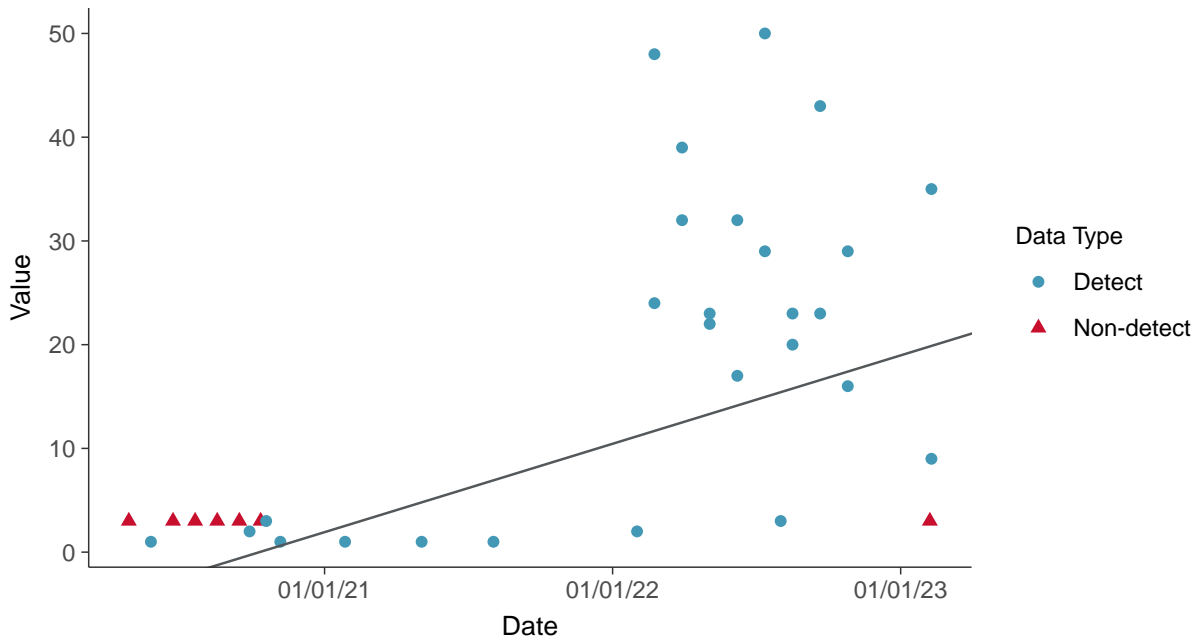




Normal Q-Q plot using ROS Imputed Estimates
 Total Suspended Solids, MW-4, MW-11, MW-12 (mg/L)



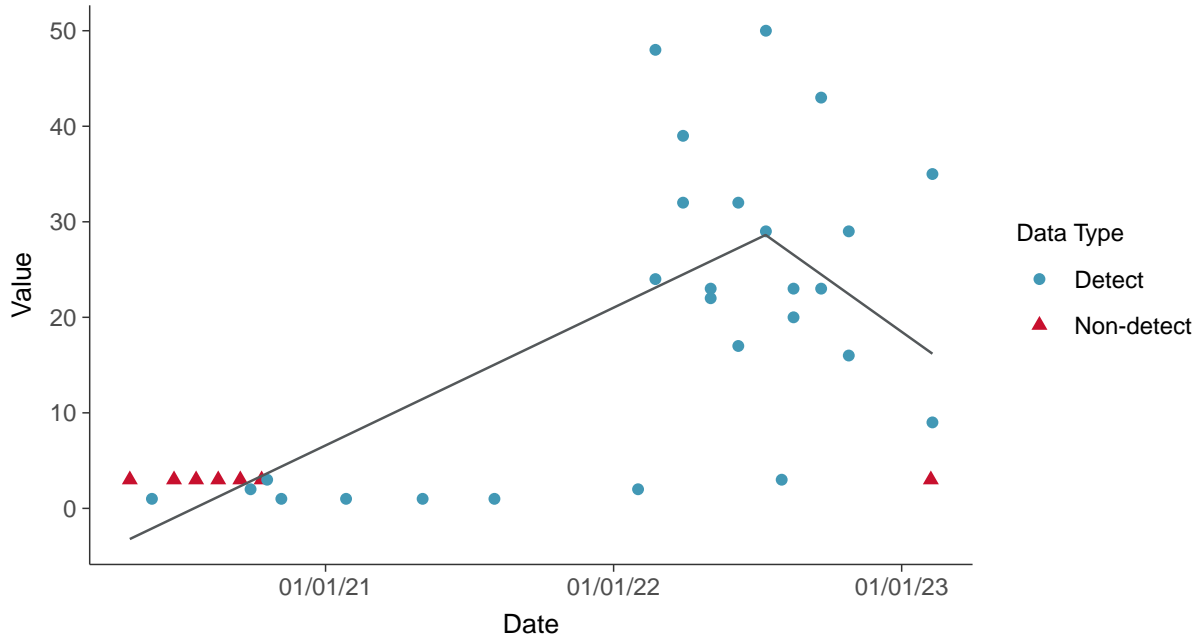
Trend Regression: Mann-Kendall/Theil-Sen Estimate
 Total Suspended Solids, MW-4, MW-11, MW-12 (mg/L)





Trend Regression: Piecewise Linear-Linear

Total Suspended Solids, MW-4, MW-11, MW-12 (mg/L)



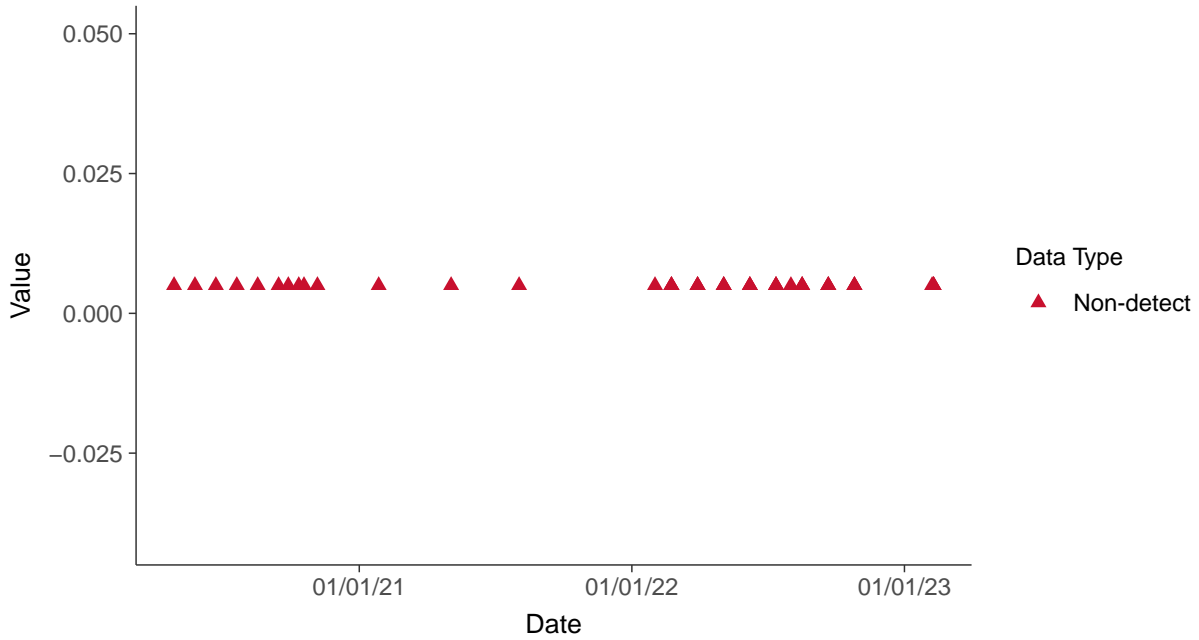


Part 115: Copper, MW-4, MW-11, MW-12

ID: 5_37

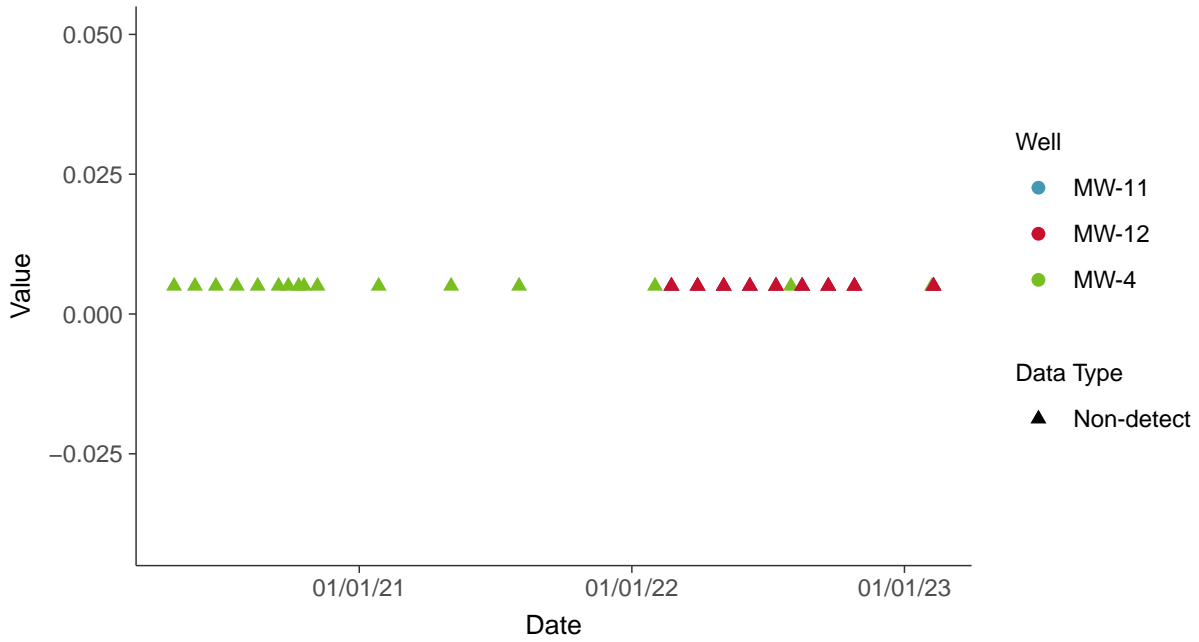
Scatter Plot

Copper, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

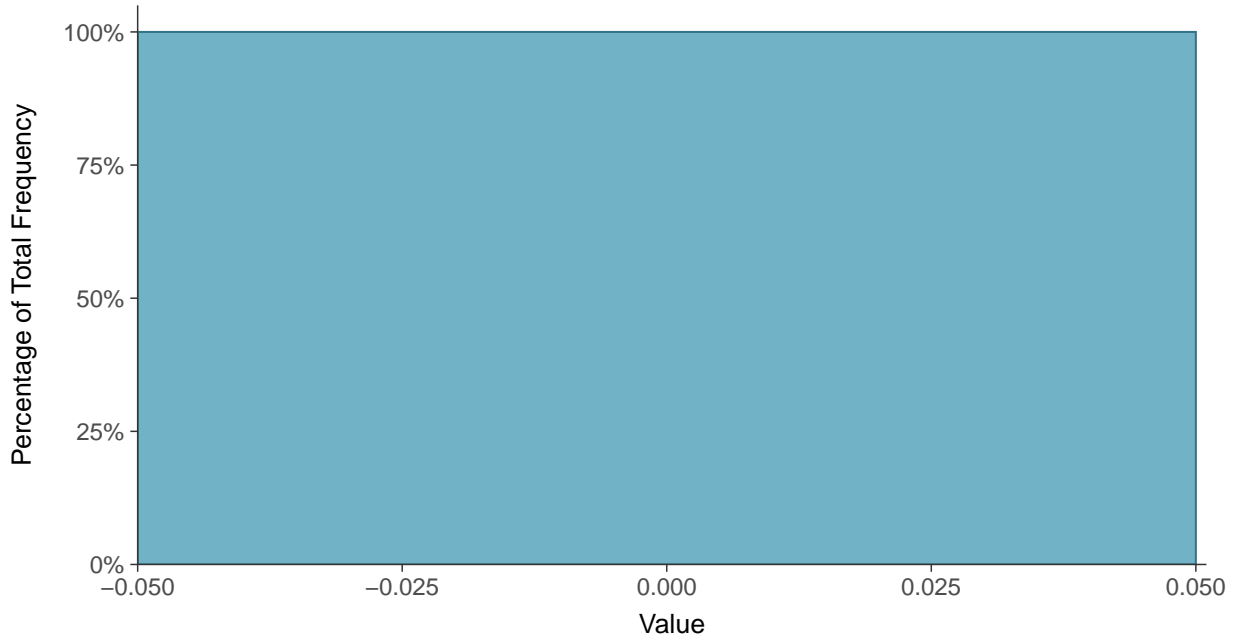
Copper, MW-4, MW-11, MW-12 (mg/L)





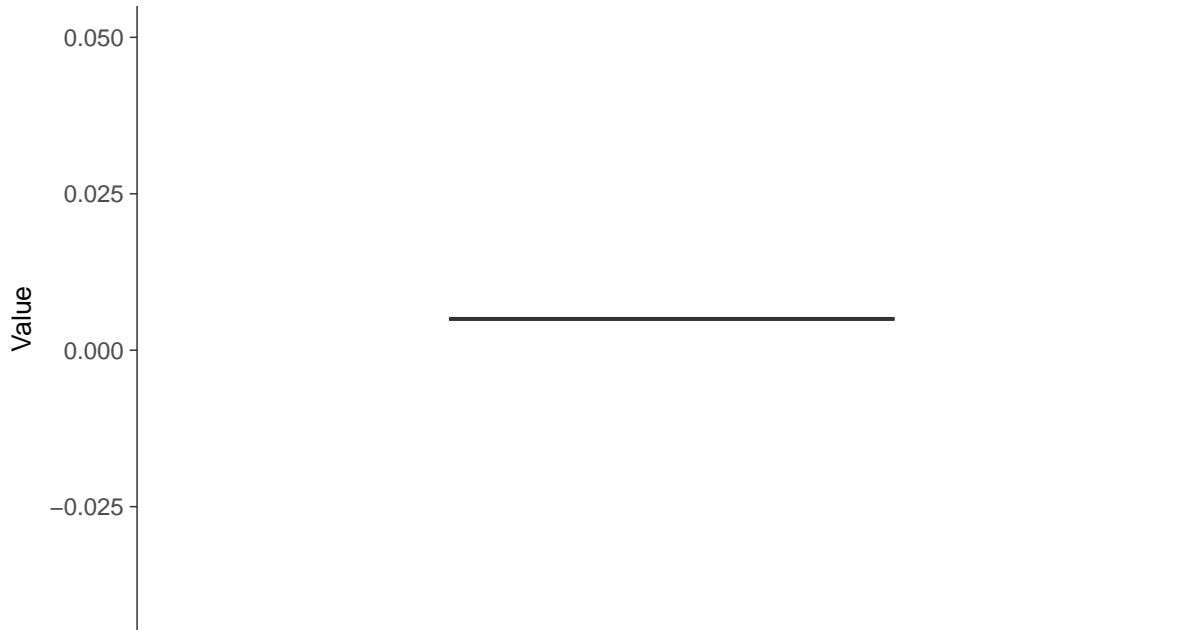
Histogram

Copper, MW-4, MW-11, MW-12 (mg/L)



Boxplot

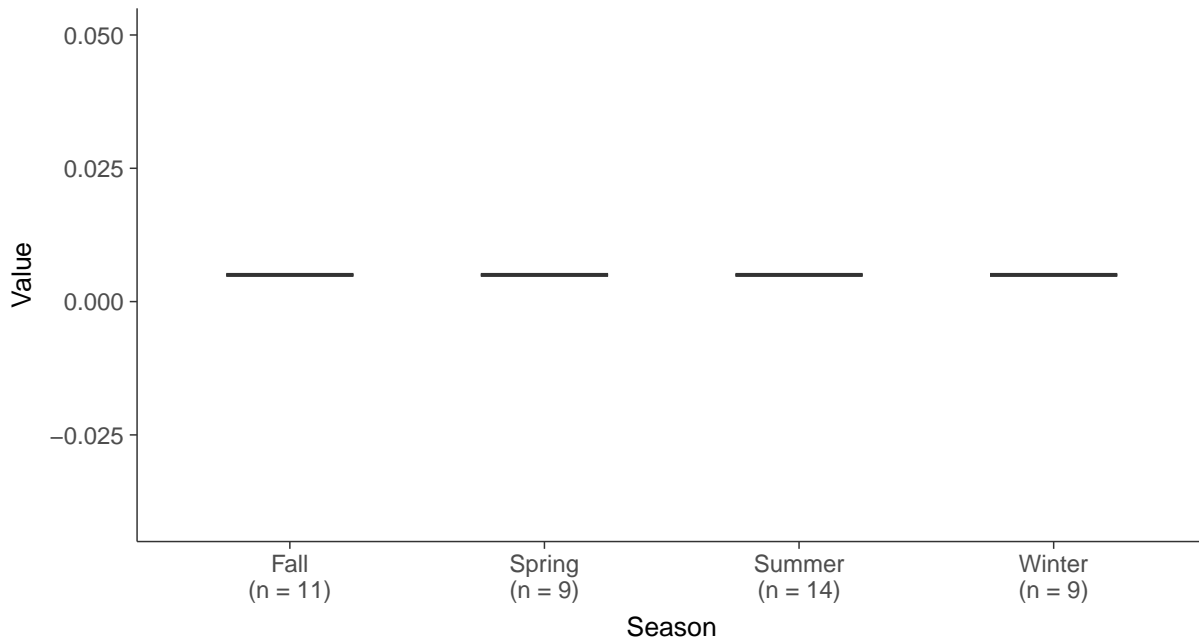
Copper, MW-4, MW-11, MW-12 (mg/L)





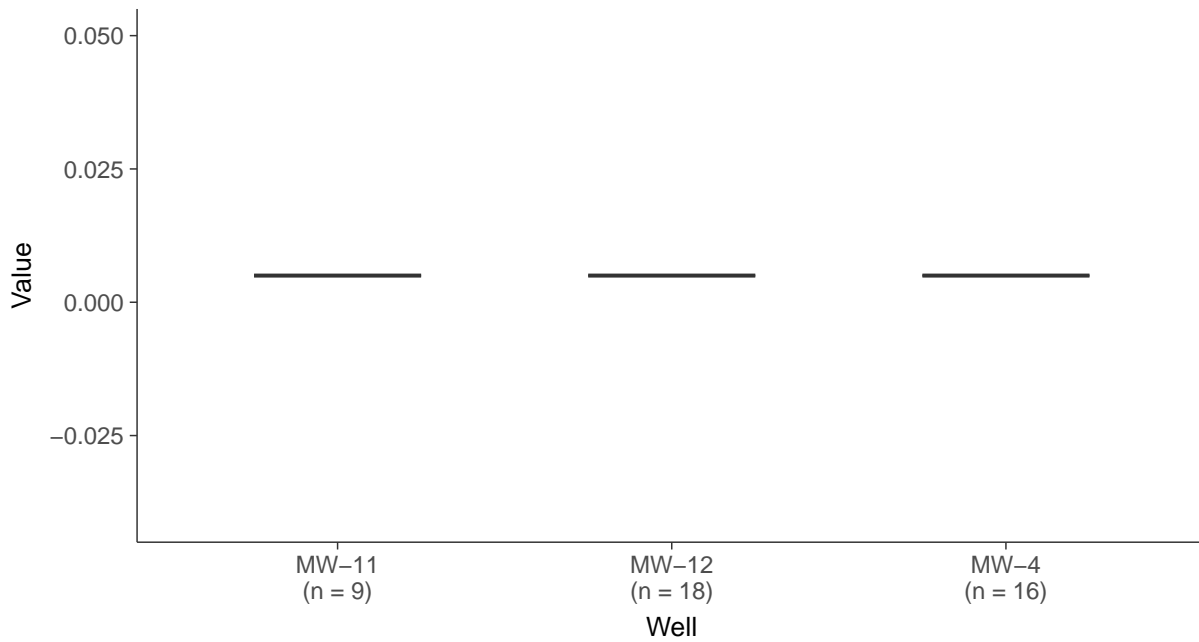
Boxplot by Season

Copper, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Copper, MW-4, MW-11, MW-12 (mg/L)



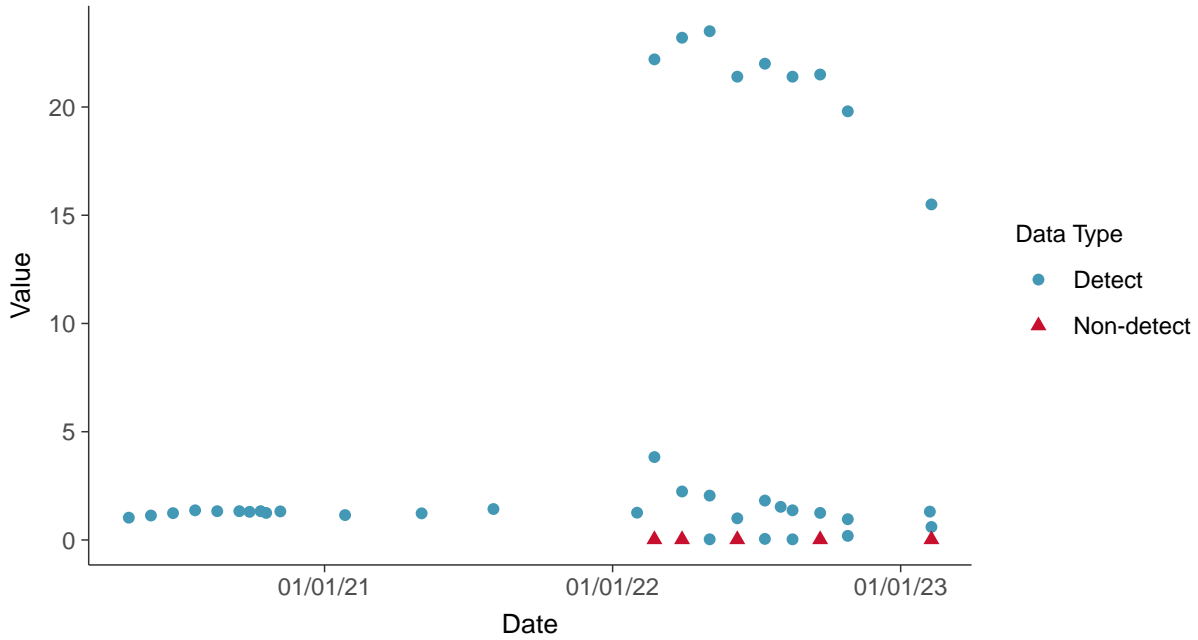


Part 115: Iron, MW-4, MW-11, MW-12

ID: 5_38

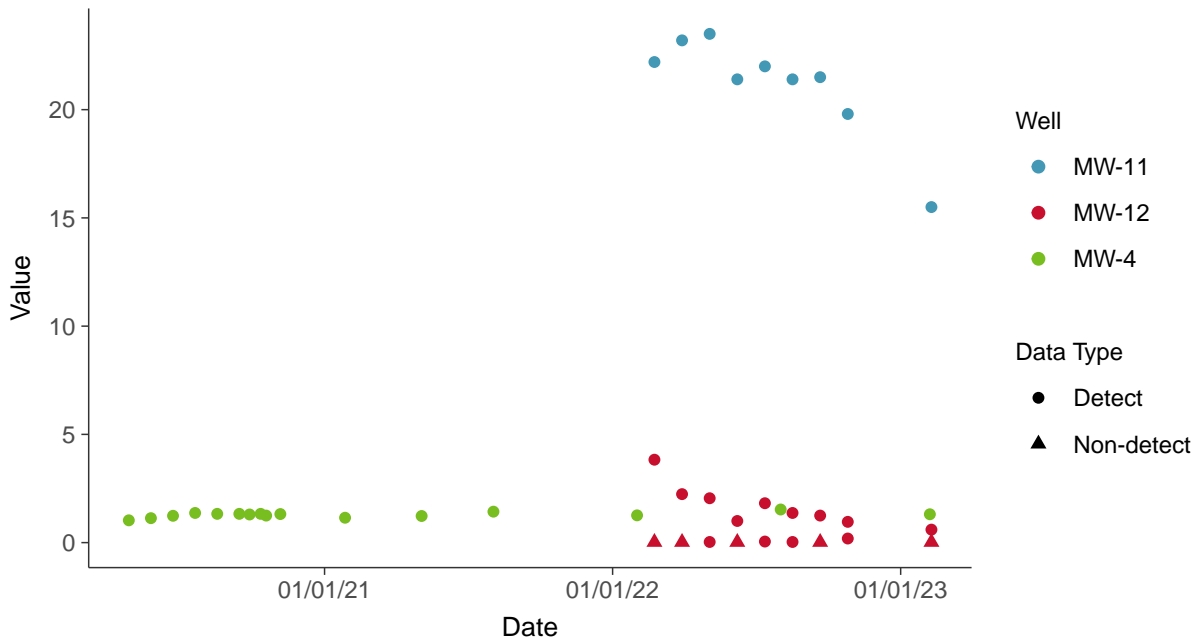
Scatter Plot

Iron, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

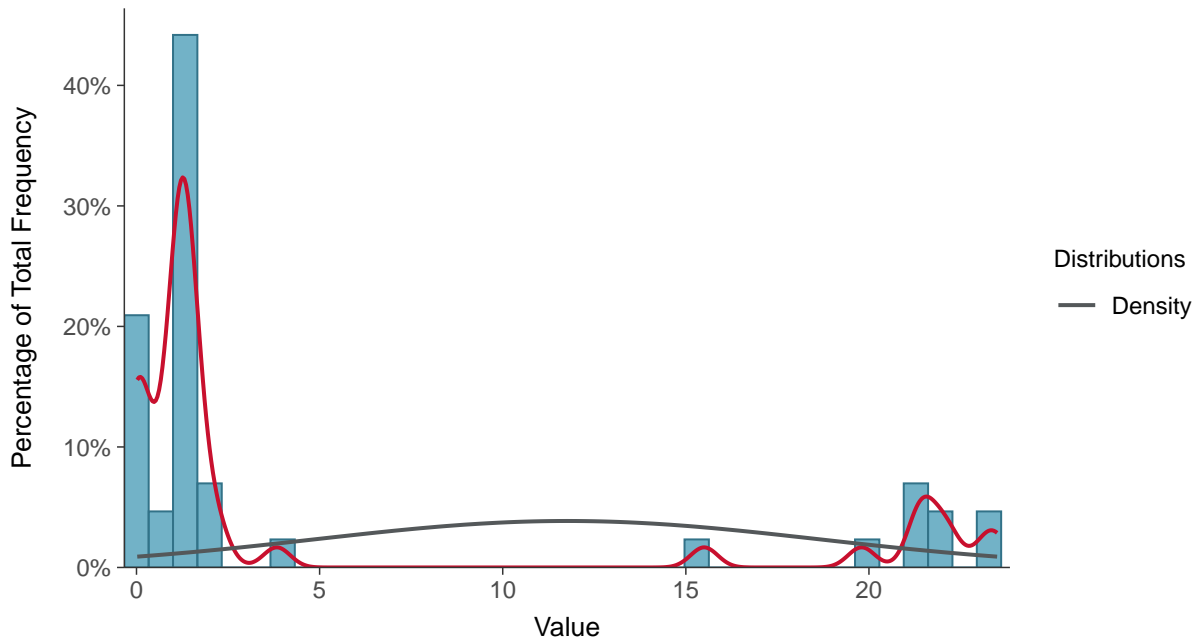
Iron, MW-4, MW-11, MW-12 (mg/L)





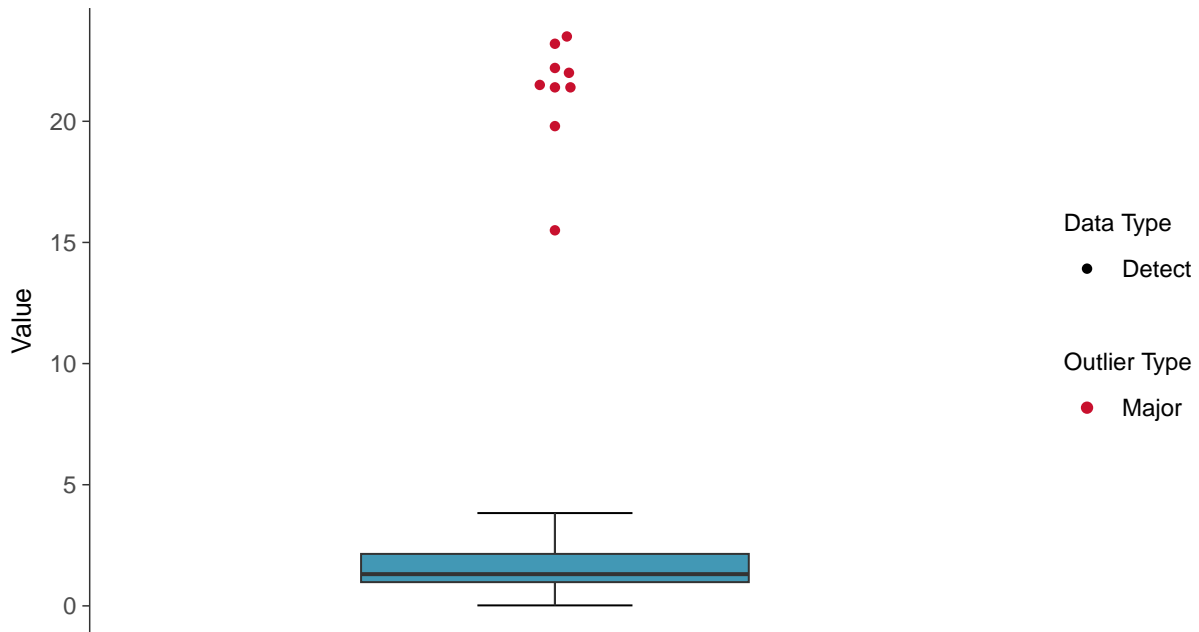
Histogram

Iron, MW-4, MW-11, MW-12 (mg/L)



Boxplot

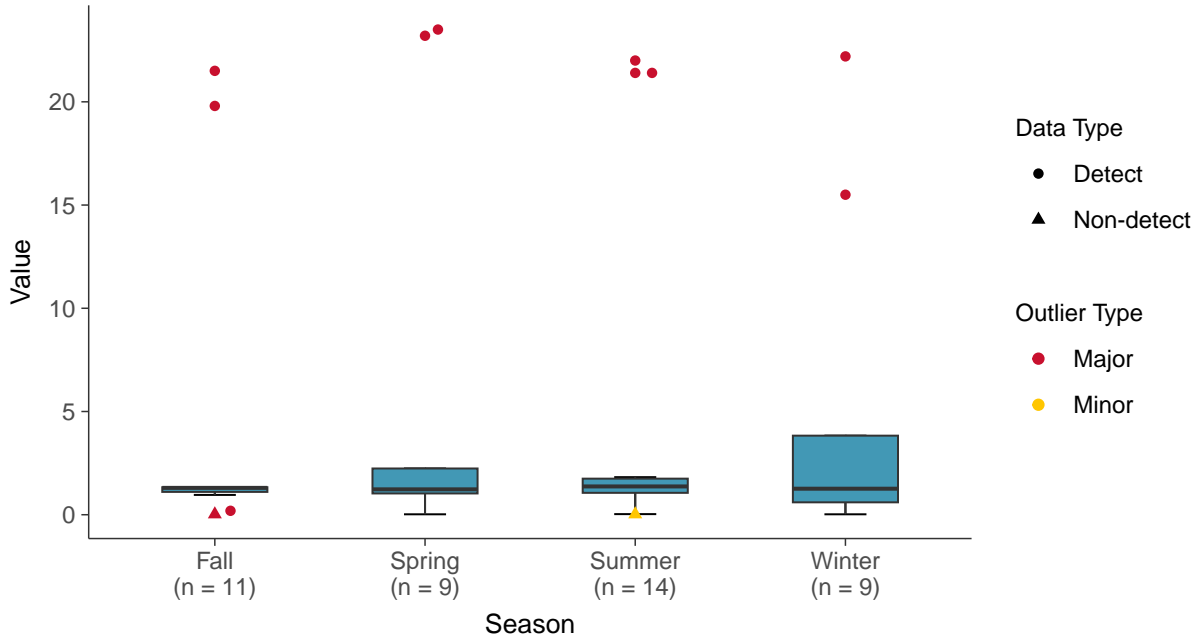
Iron, MW-4, MW-11, MW-12 (mg/L)





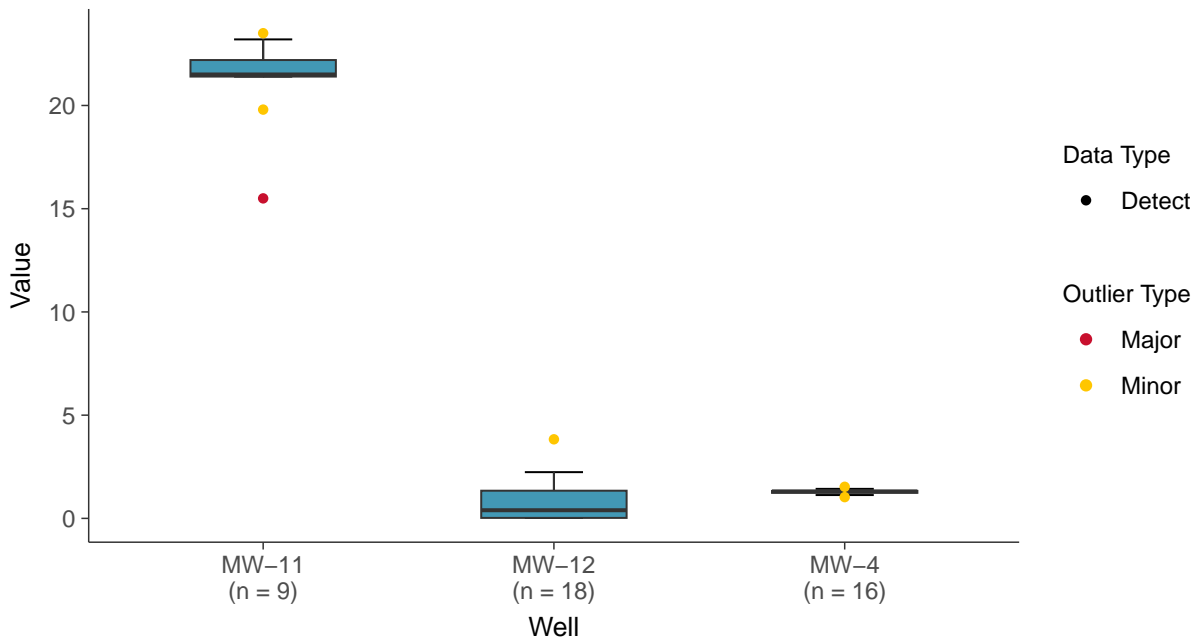
Boxplot by Season

Iron, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

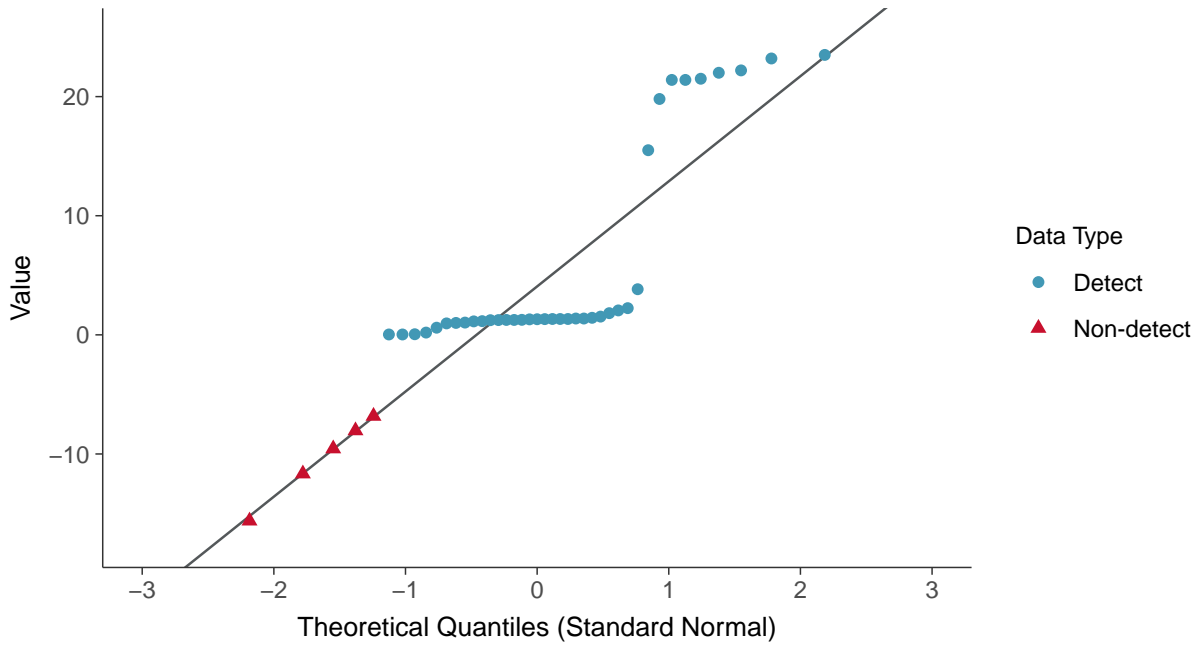
Iron, MW-4, MW-11, MW-12 (mg/L)





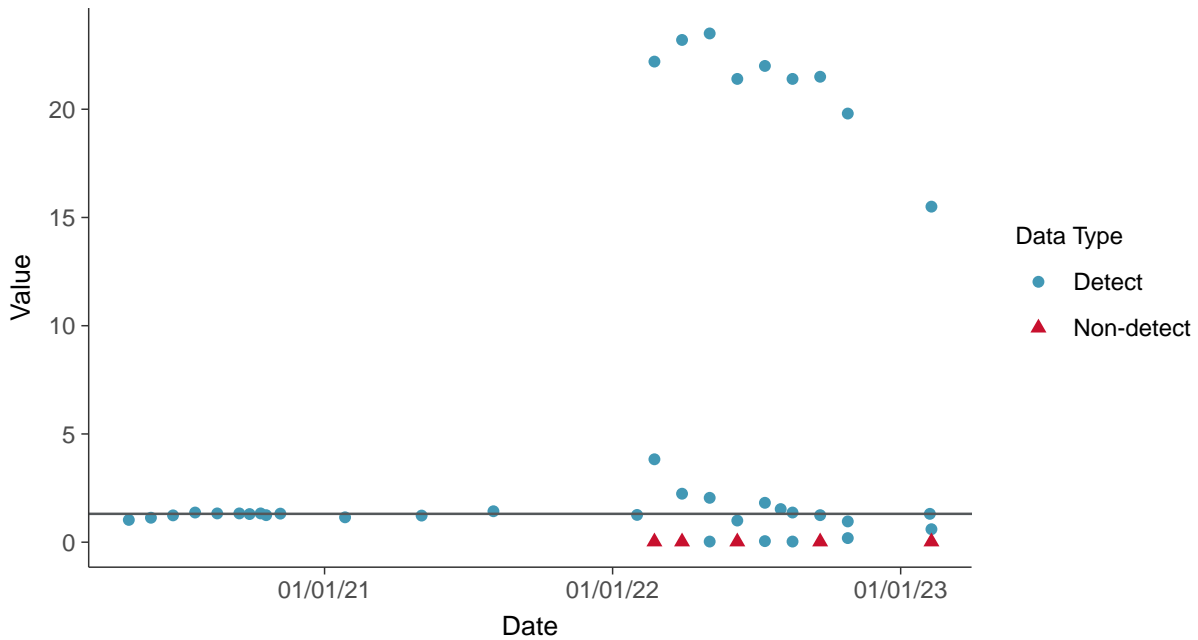
Normal Q-Q plot using ROS Imputed Estimates

Iron, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

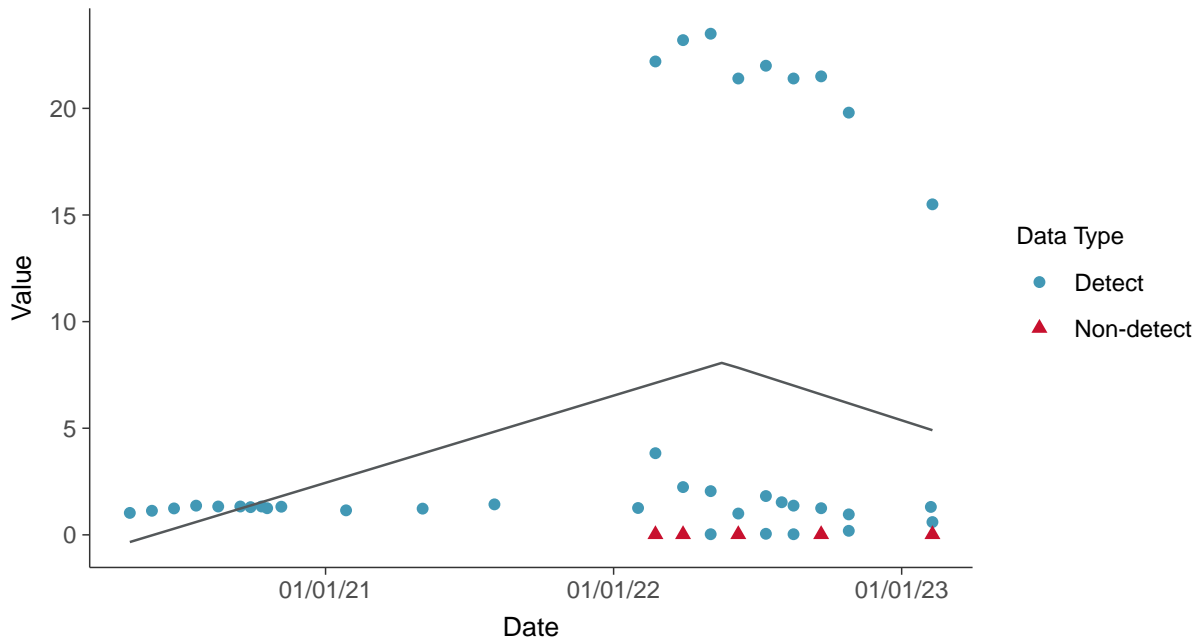
Iron, MW-4, MW-11, MW-12 (mg/L)





Trend Regression: Piecewise Linear-Linear

Iron, MW-4, MW-11, MW-12 (mg/L)



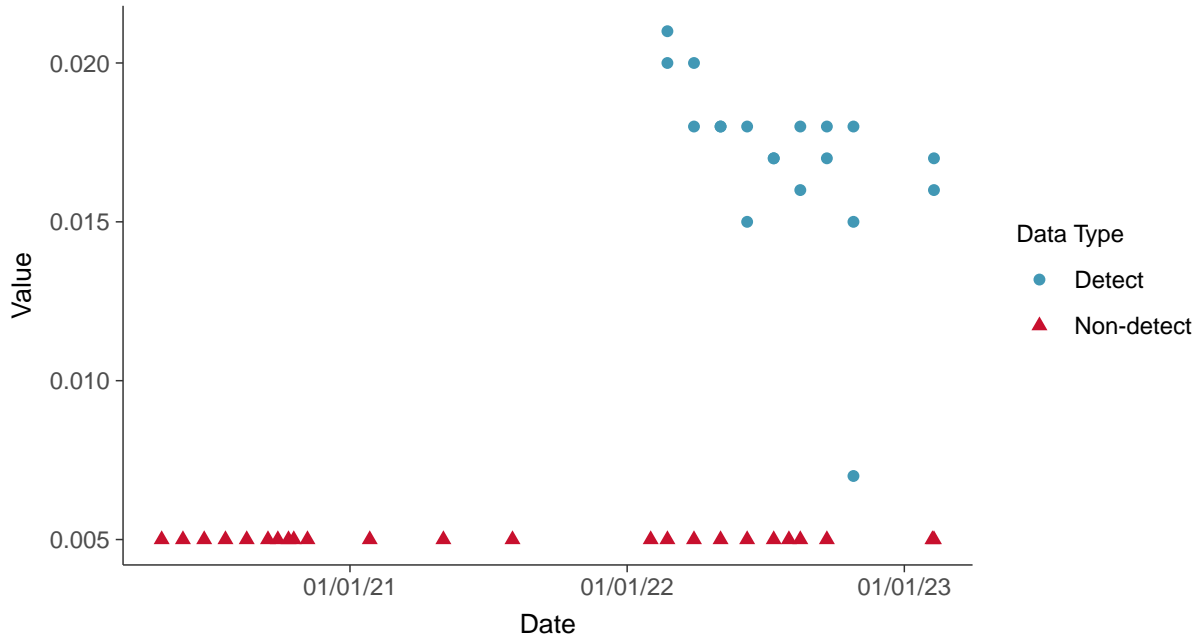


Part 115: Nickel, MW-4, MW-11, MW-12

ID: 5_39

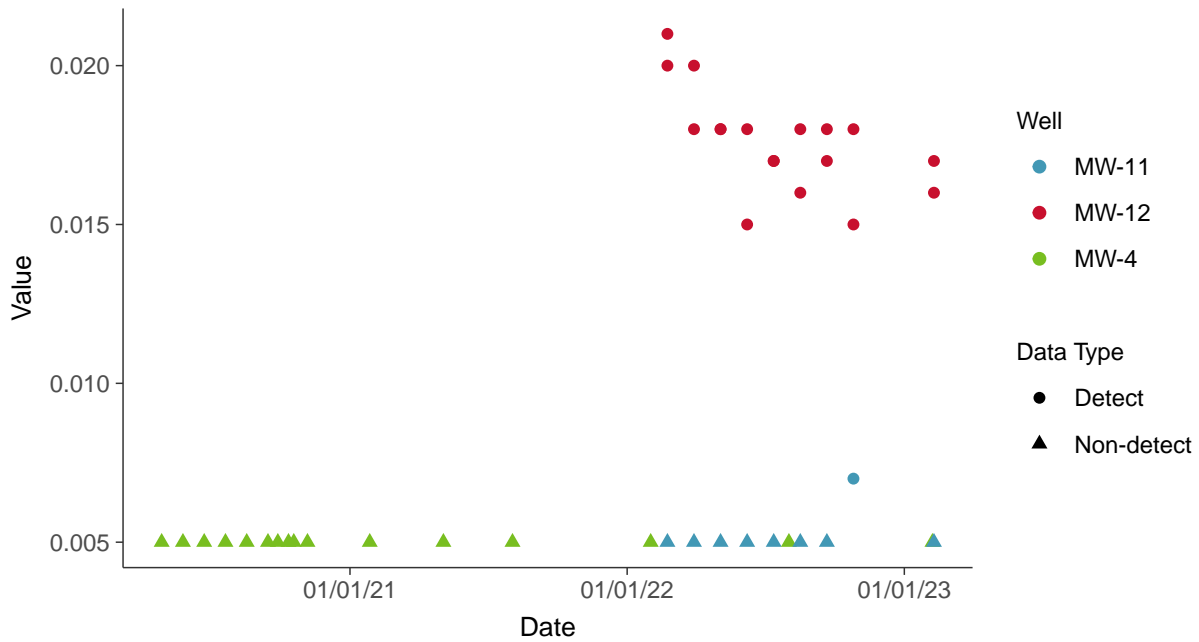
Scatter Plot

Nickel, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

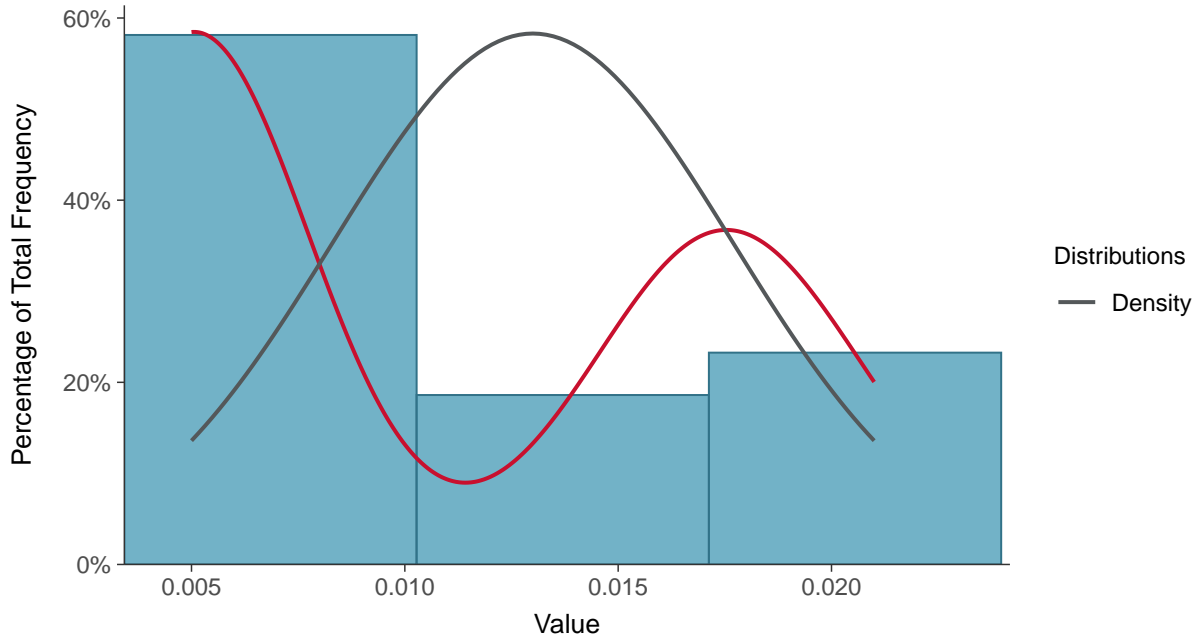
Nickel, MW-4, MW-11, MW-12 (mg/L)





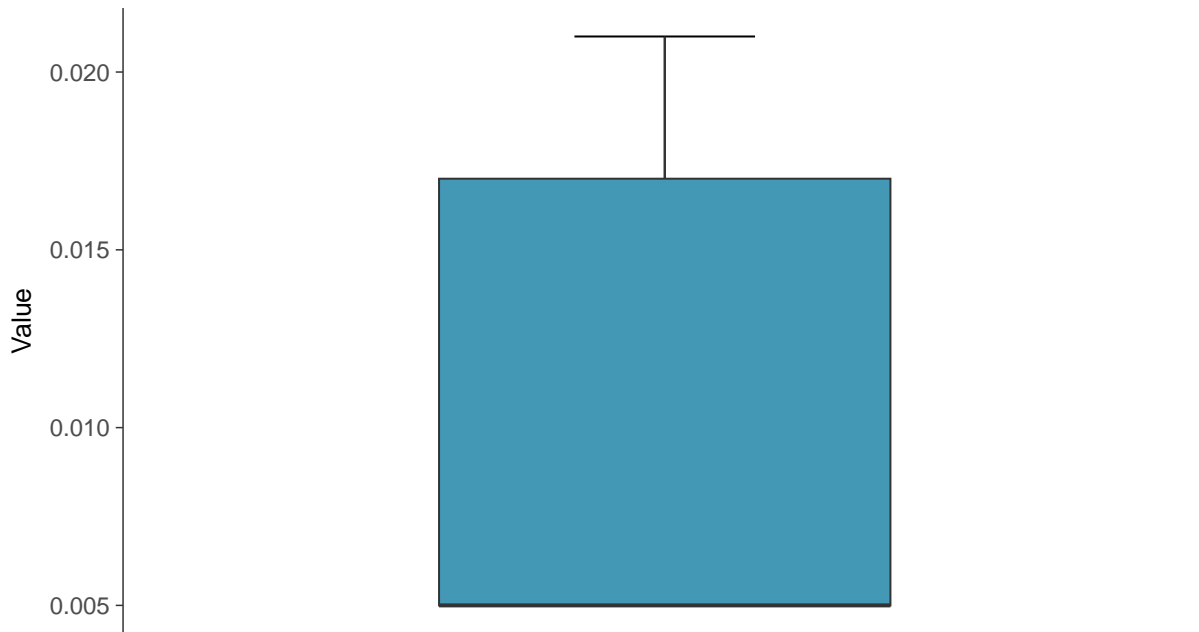
Histogram

Nickel, MW-4, MW-11, MW-12 (mg/L)



Boxplot

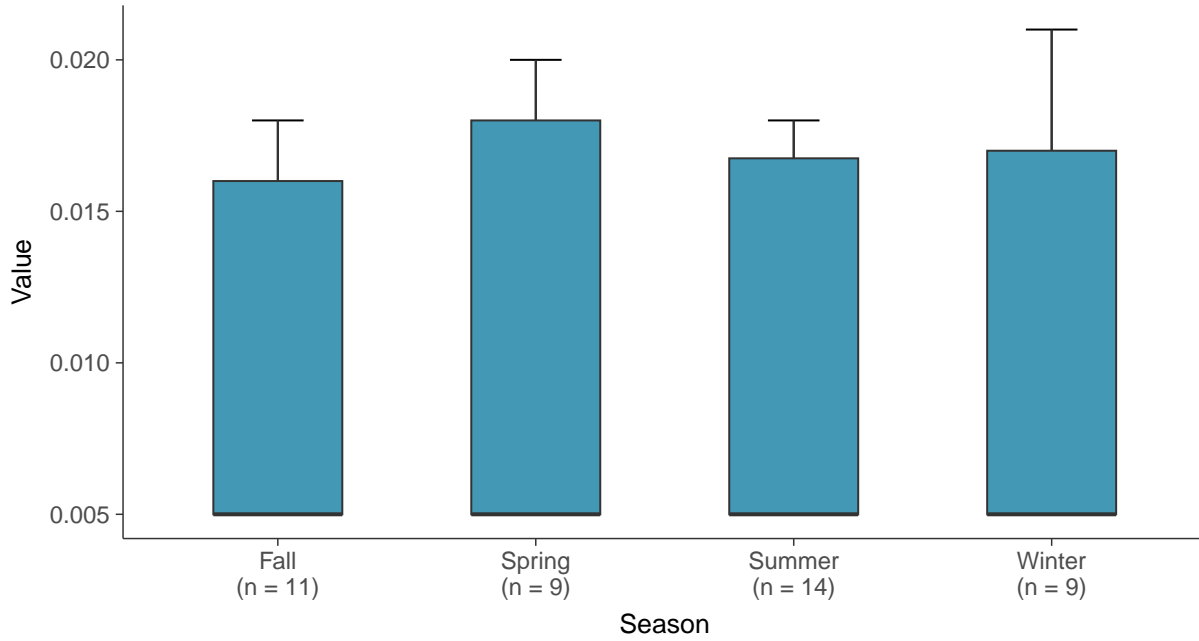
Nickel, MW-4, MW-11, MW-12 (mg/L)





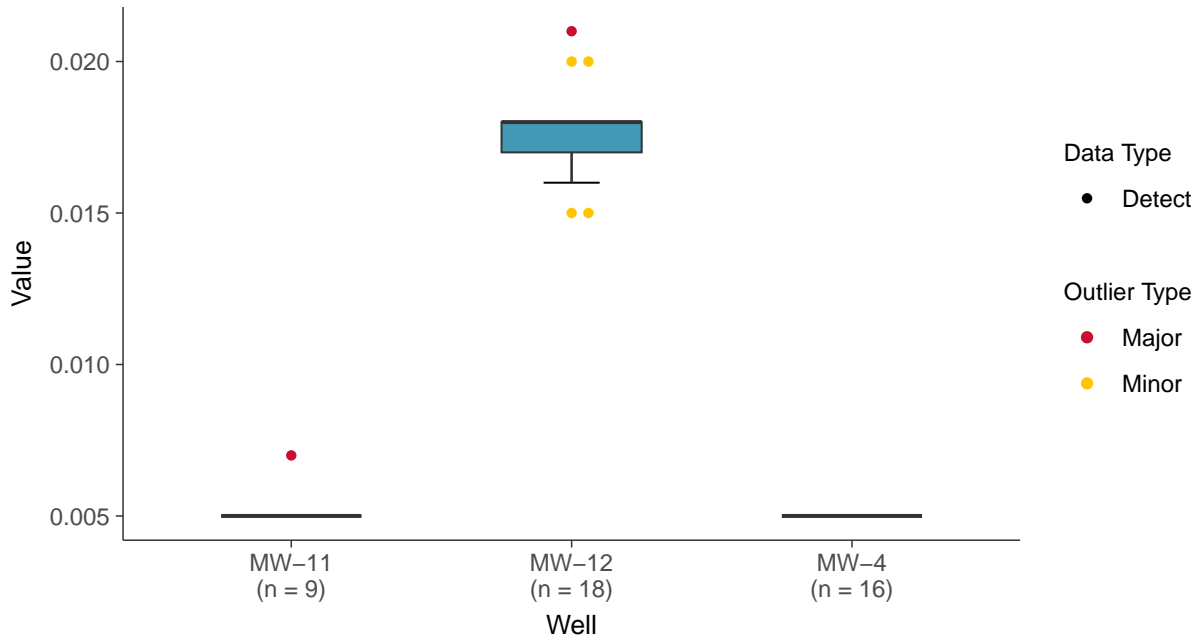
Boxplot by Season

Nickel, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

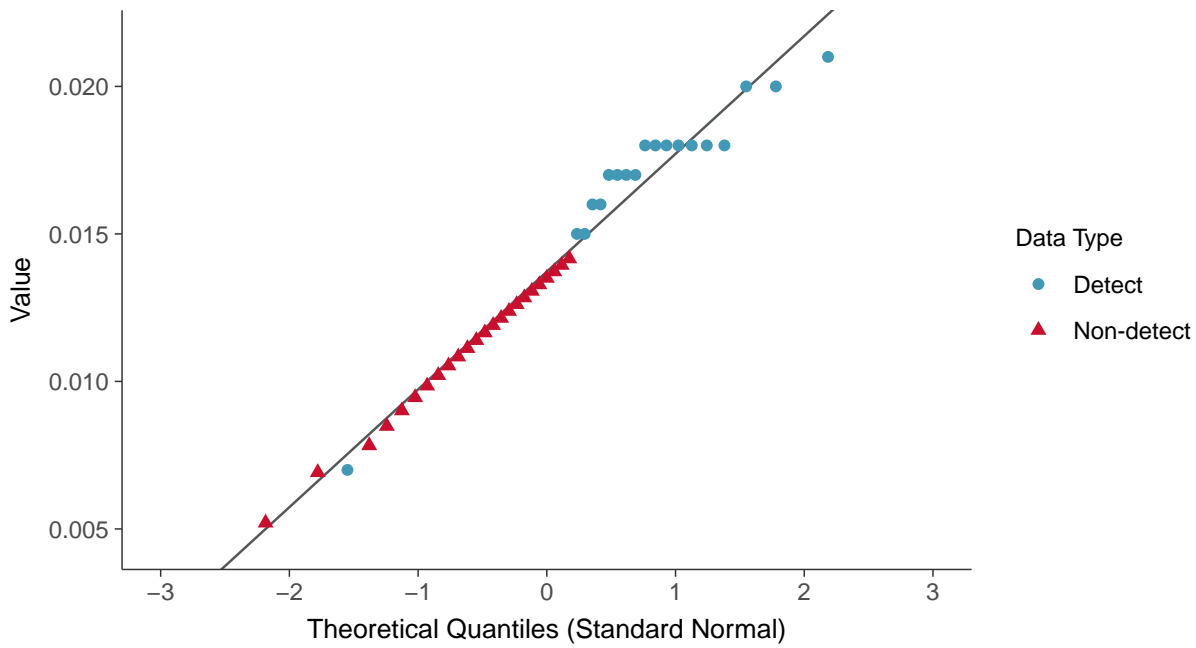
Nickel, MW-4, MW-11, MW-12 (mg/L)





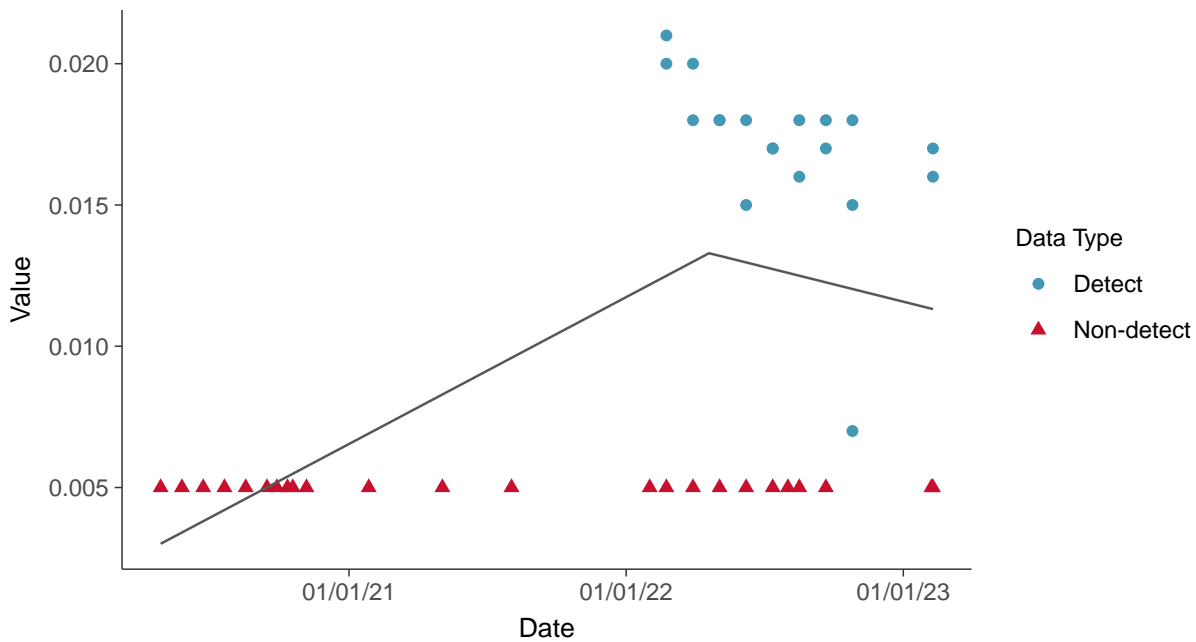
Normal Q-Q plot using ROS Imputed Estimates

Nickel, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Piecewise Linear-Linear

Nickel, MW-4, MW-11, MW-12 (mg/L)



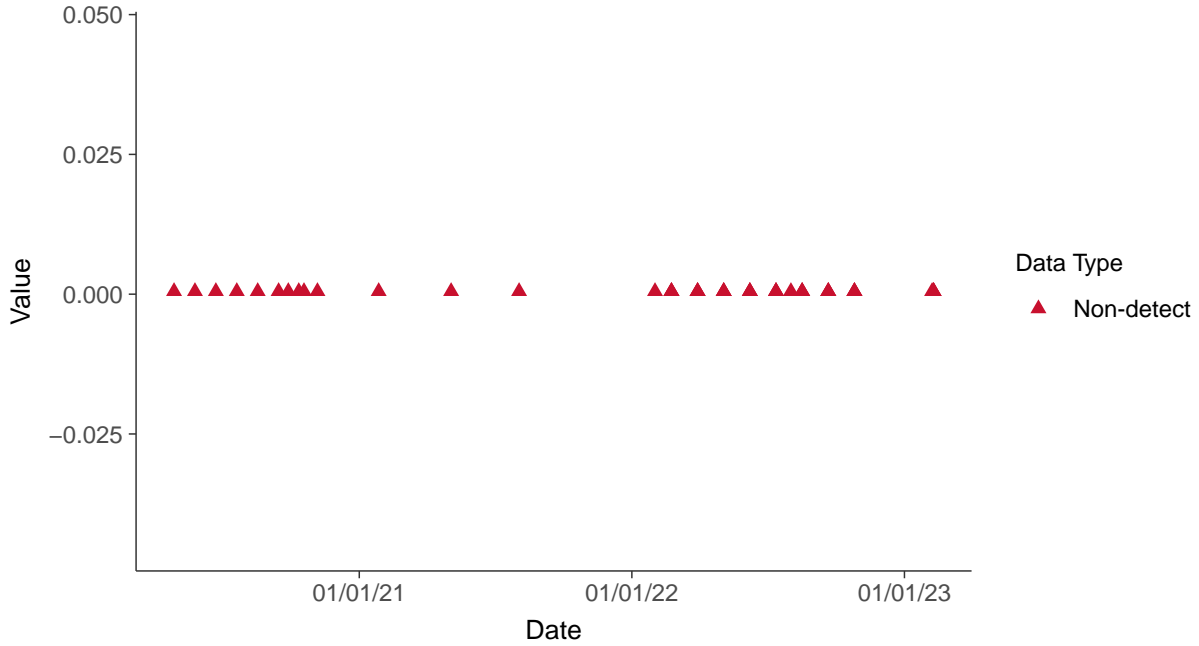


Part 115: Silver, MW-4, MW-11, MW-12

ID: 5_40

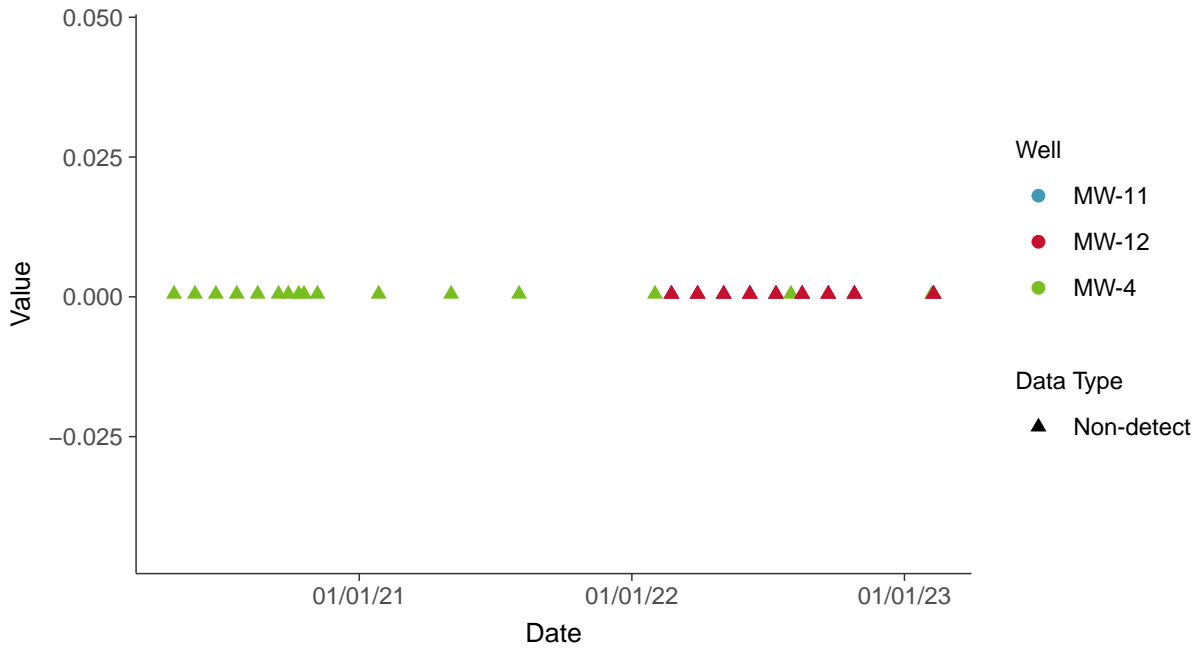
Scatter Plot

Silver, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

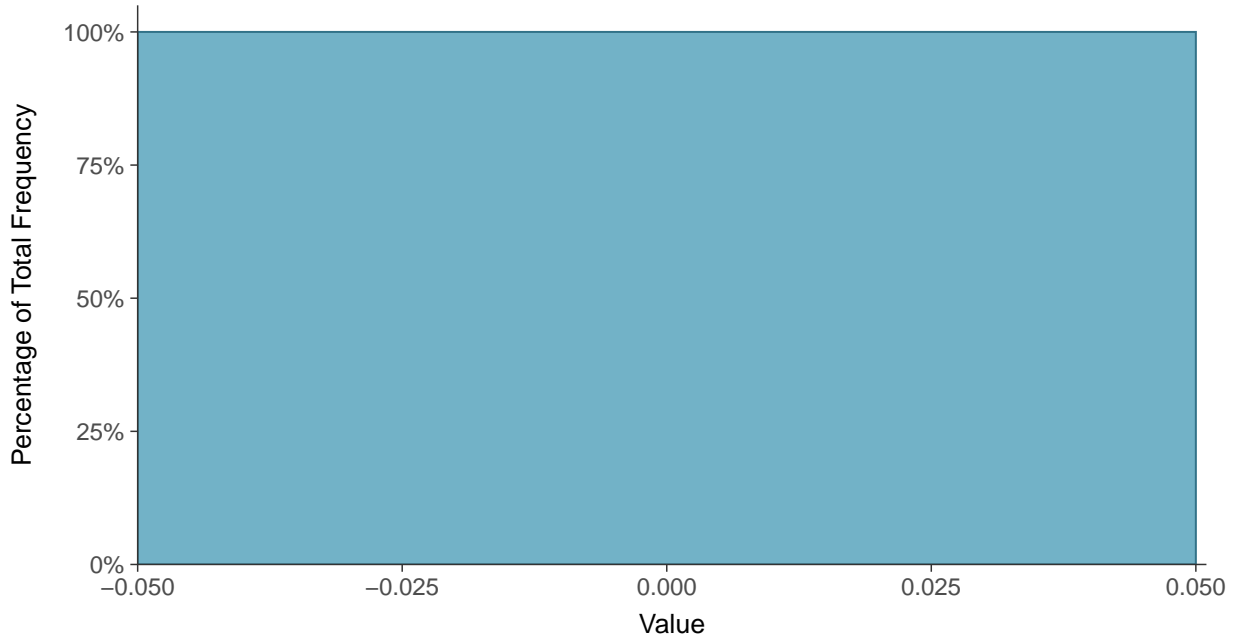
Silver, MW-4, MW-11, MW-12 (mg/L)





Histogram

Silver, MW-4, MW-11, MW-12 (mg/L)



Boxplot

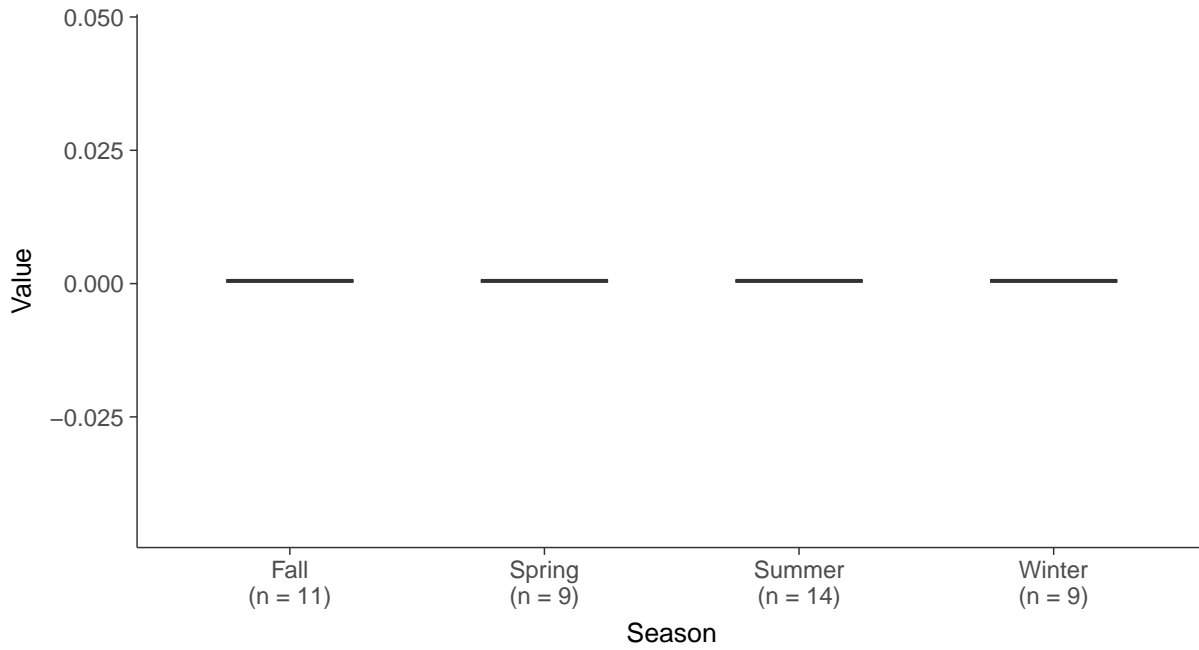
Silver, MW-4, MW-11, MW-12 (mg/L)





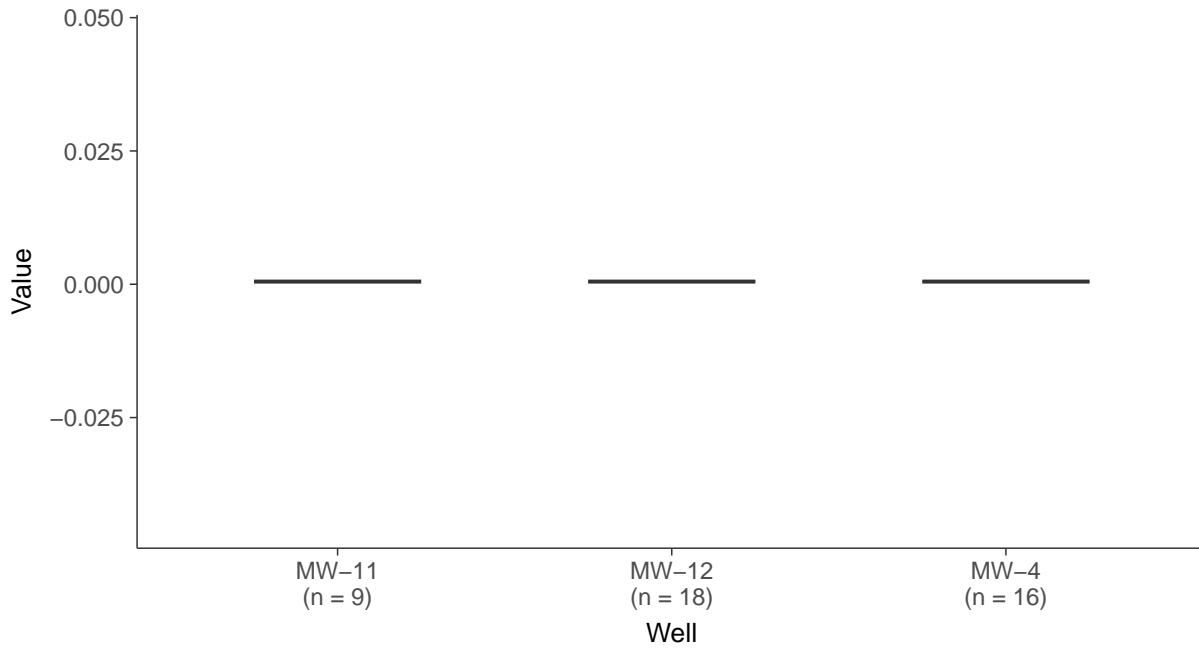
Boxplot by Season

Silver, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Silver, MW-4, MW-11, MW-12 (mg/L)



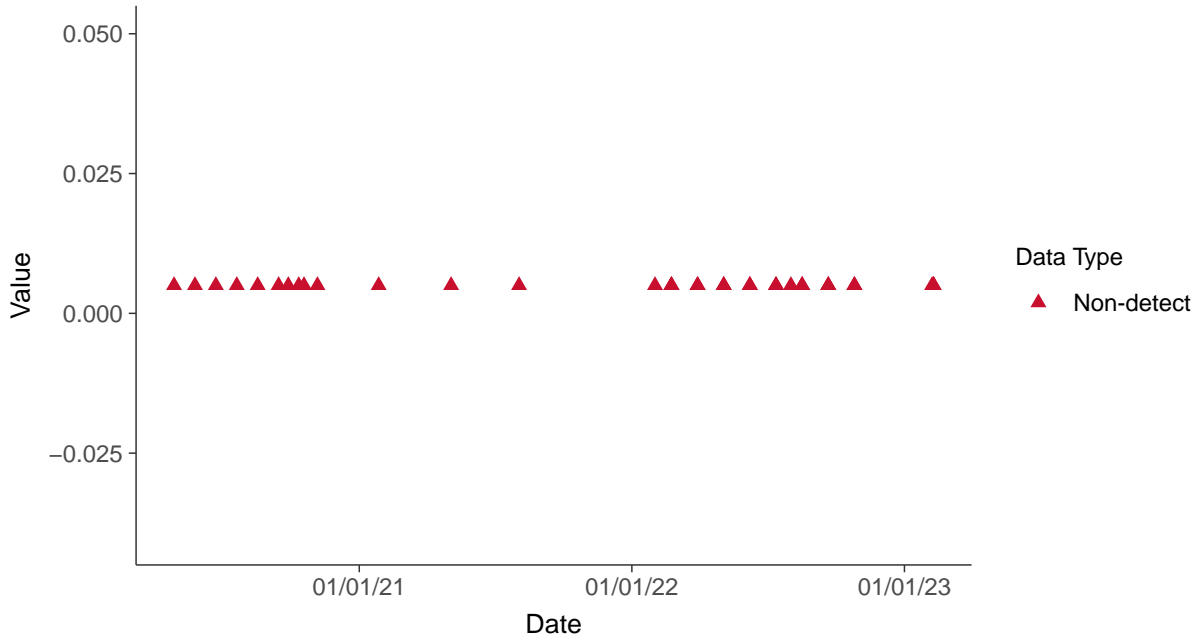


Part 115: Vanadium, MW-4, MW-11, MW-12

ID: 5_41

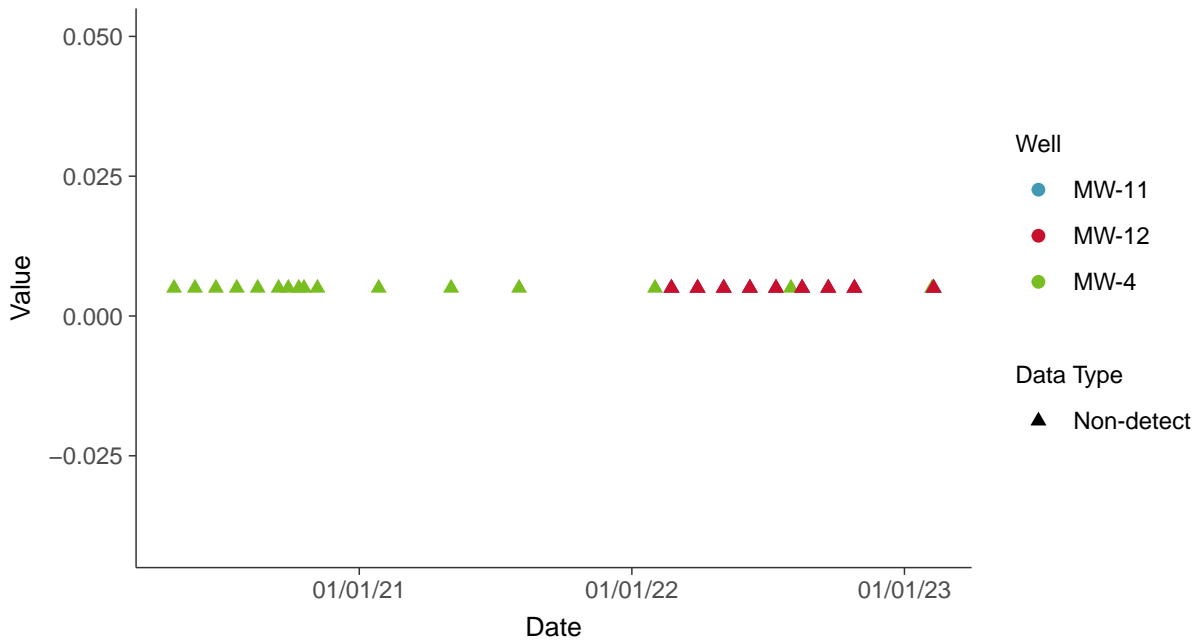
Scatter Plot

Vanadium, MW-4, MW-11, MW-12 (mg/L)



Scatter Plot by Well

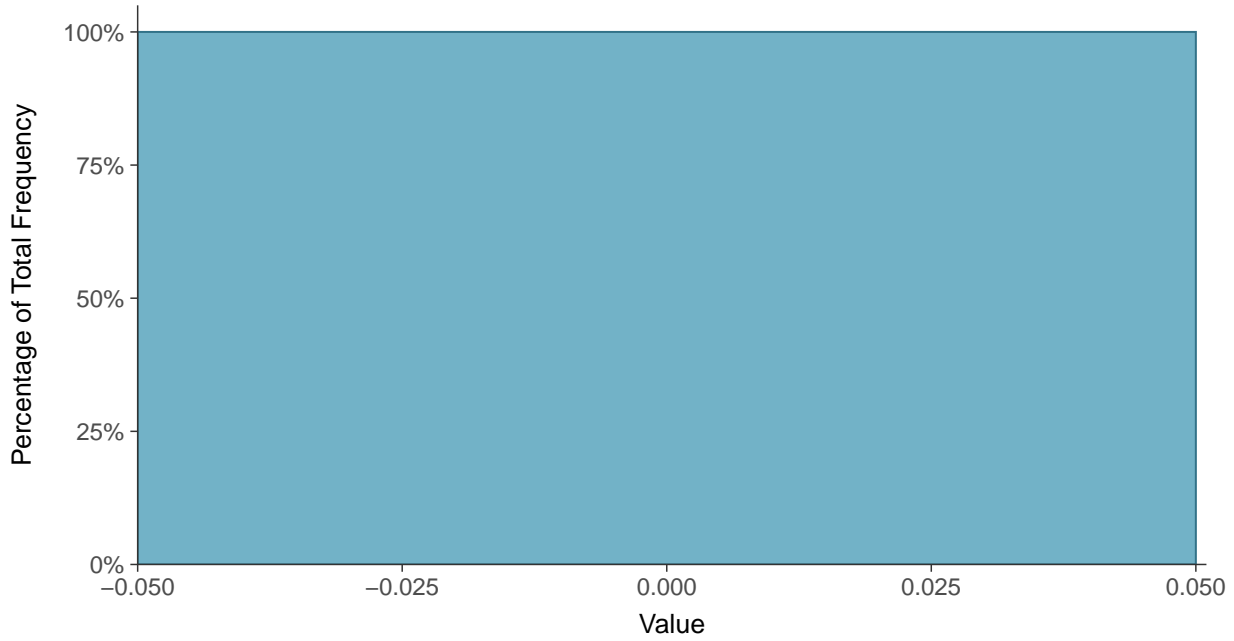
Vanadium, MW-4, MW-11, MW-12 (mg/L)





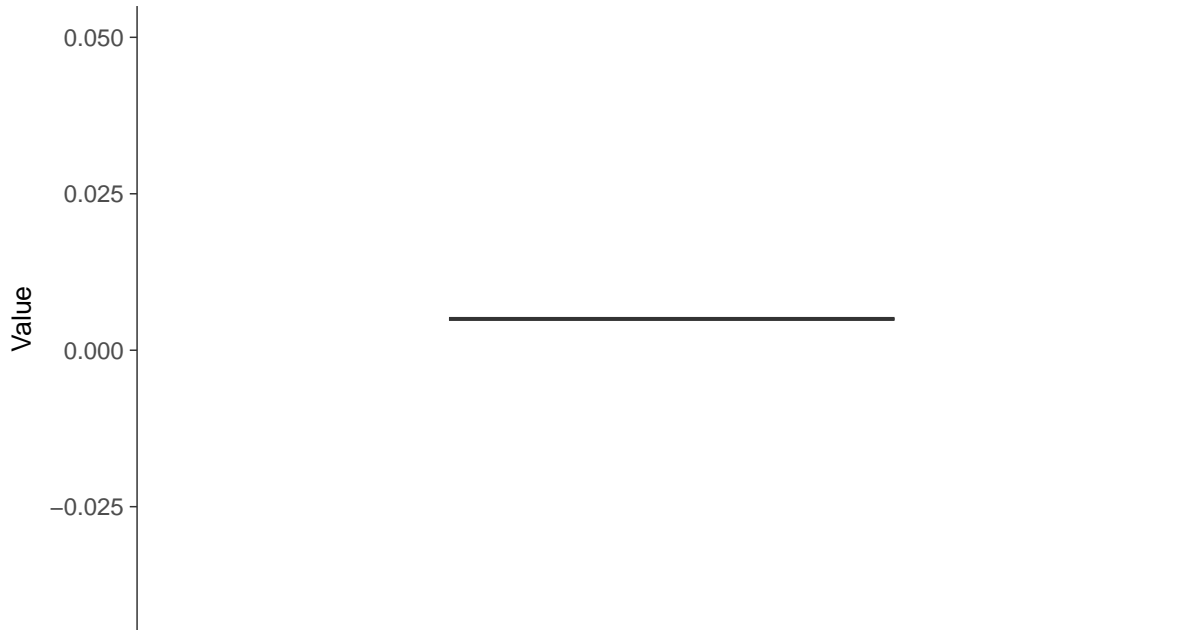
Histogram

Vanadium, MW-4, MW-11, MW-12 (mg/L)



Boxplot

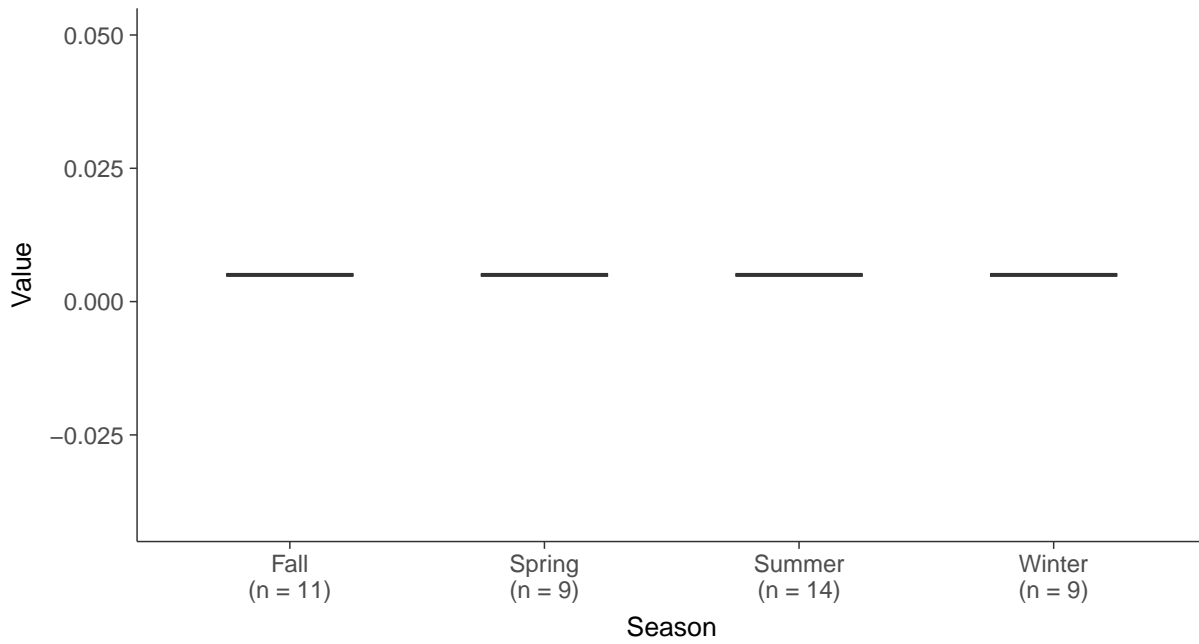
Vanadium, MW-4, MW-11, MW-12 (mg/L)





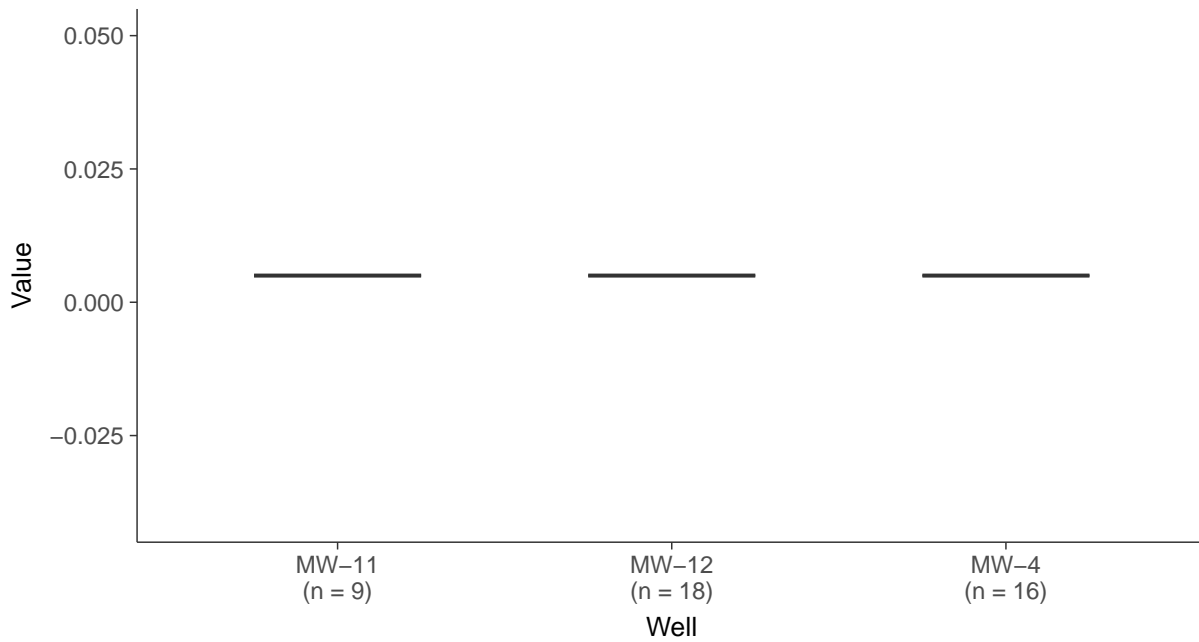
Boxplot by Season

Vanadium, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

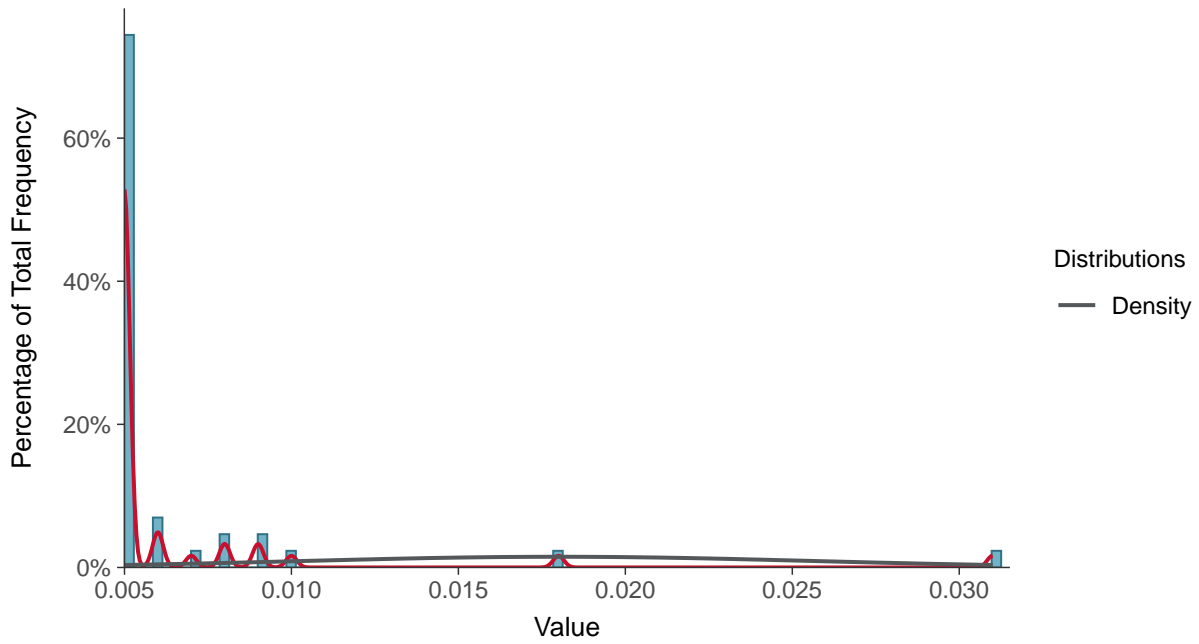
Vanadium, MW-4, MW-11, MW-12 (mg/L)





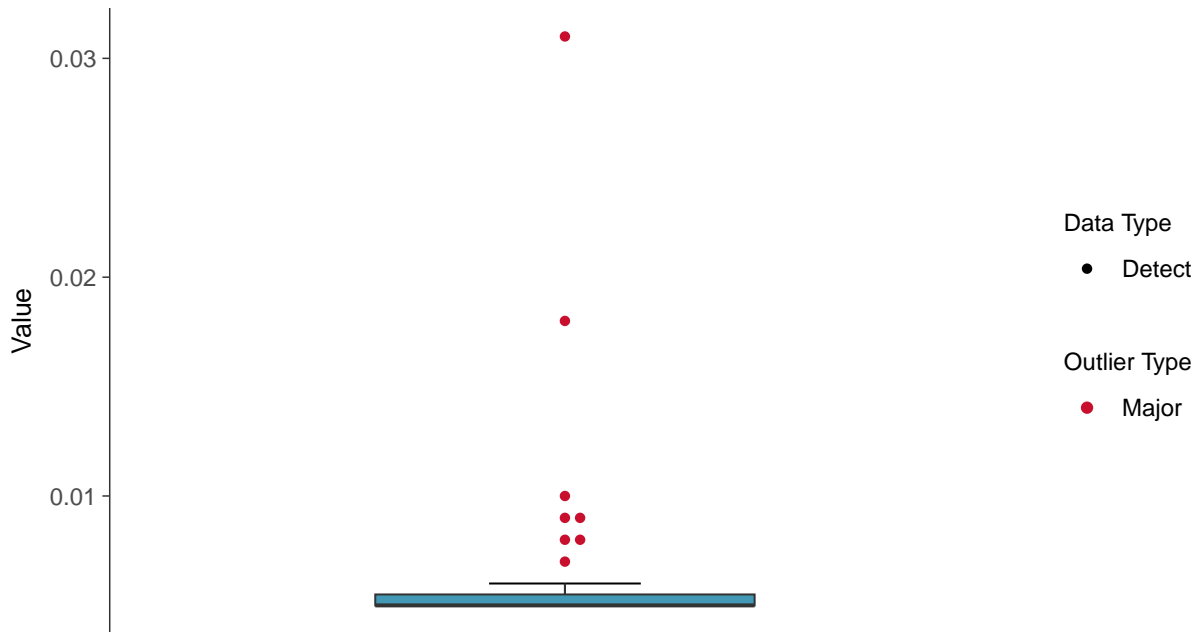
Histogram

Zinc, MW-4, MW-11, MW-12 (mg/L)



Boxplot

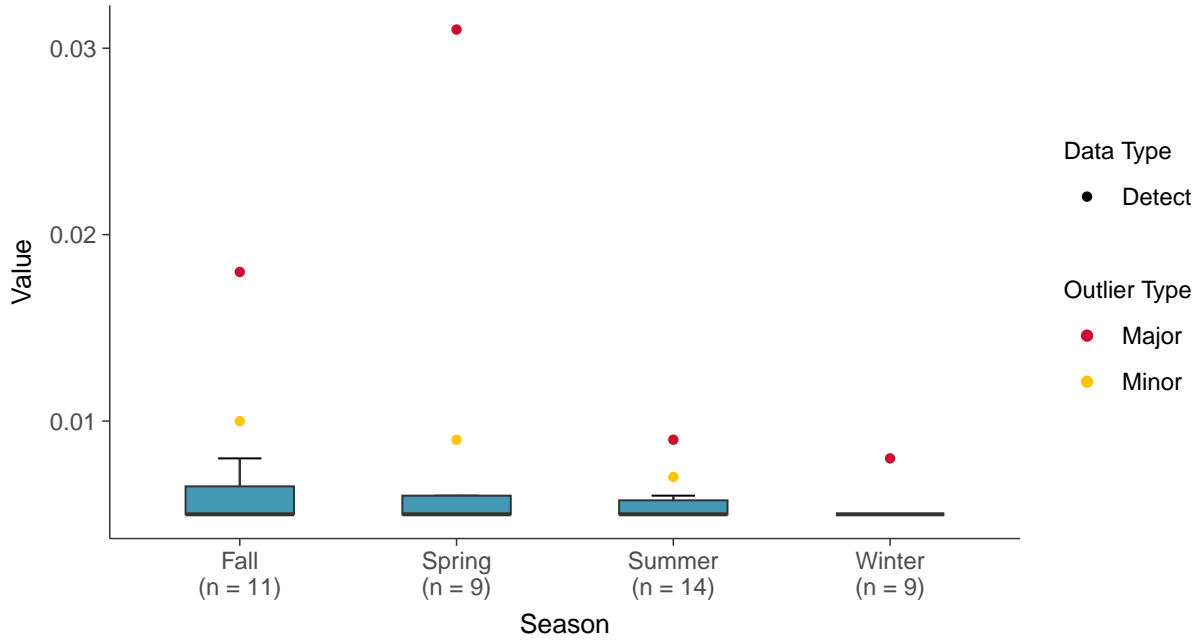
Zinc, MW-4, MW-11, MW-12 (mg/L)





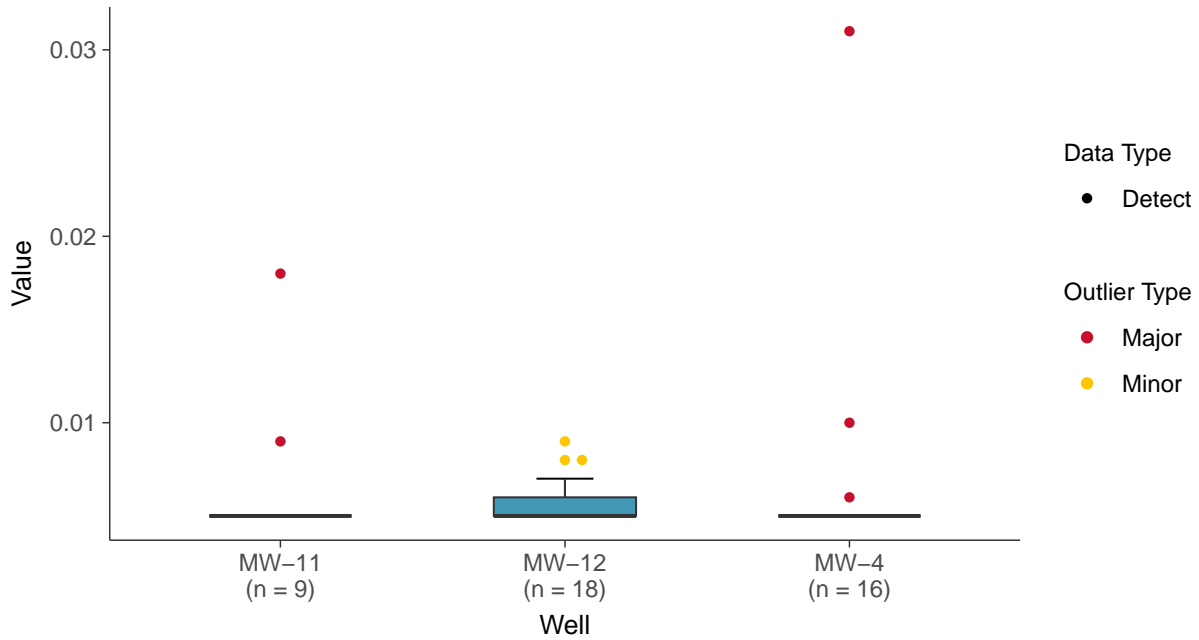
Boxplot by Season

Zinc, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

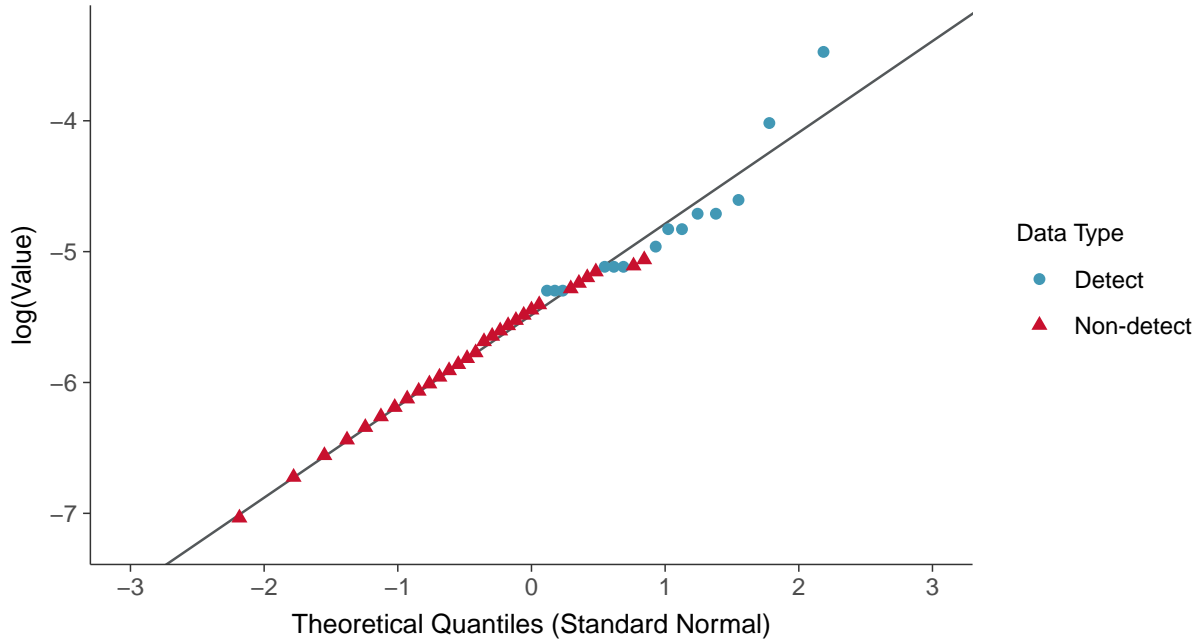
Zinc, MW-4, MW-11, MW-12 (mg/L)





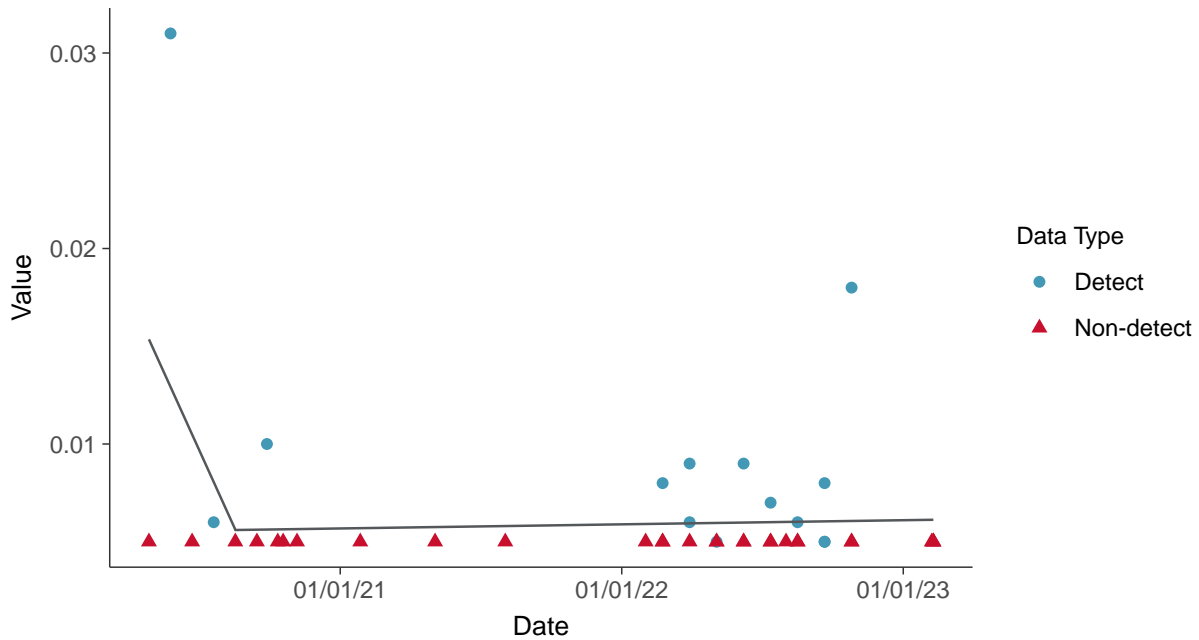
Lognormal Q-Q plot using ROS Imputed Estimates

Zinc, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Piecewise Linear-Linear

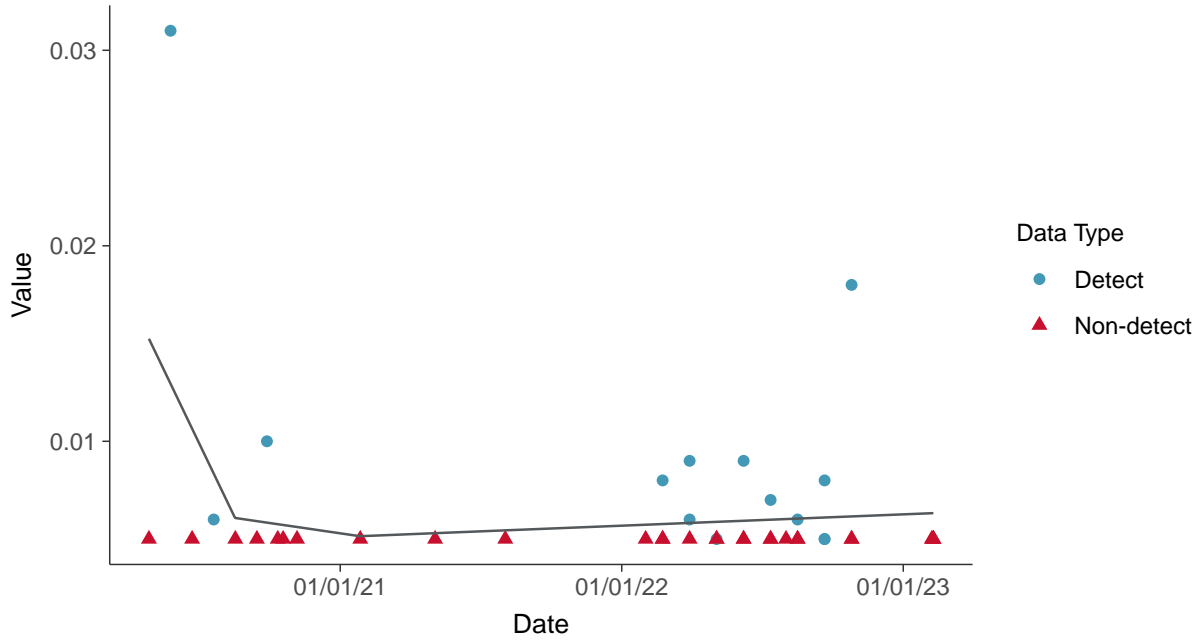
Zinc, MW-4, MW-11, MW-12 (mg/L)





Trend Regression: Piecewise Linear-Linear-Linear

Zinc, MW-4, MW-11, MW-12 (mg/L)

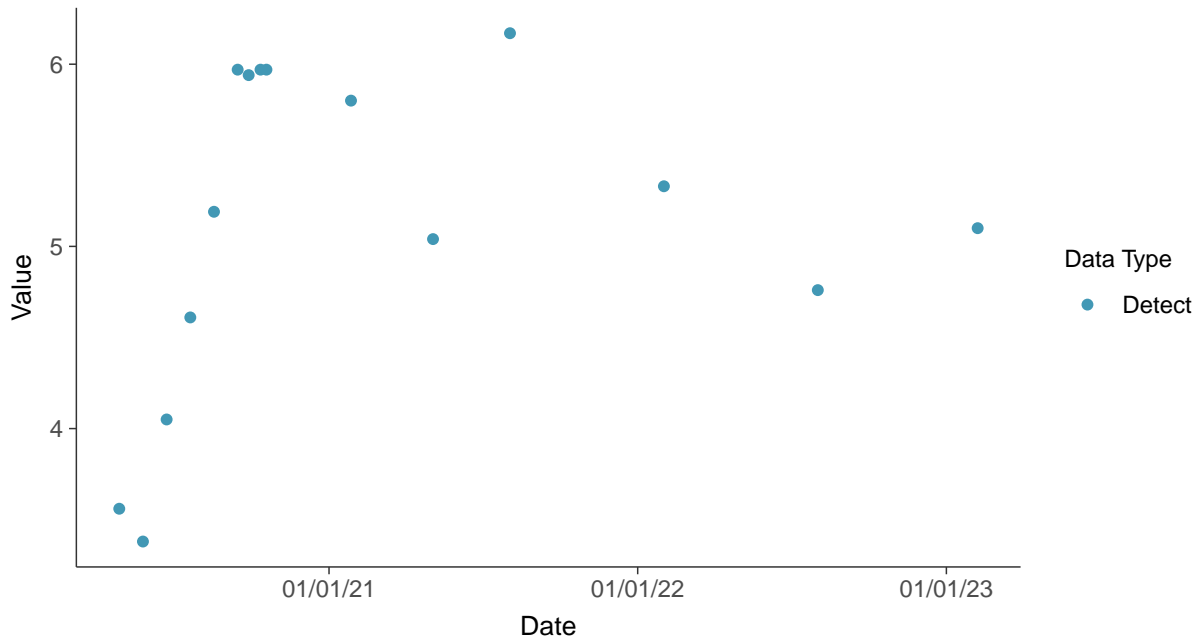


Appendix III: Boron, MW-2

ID: 02_1_01

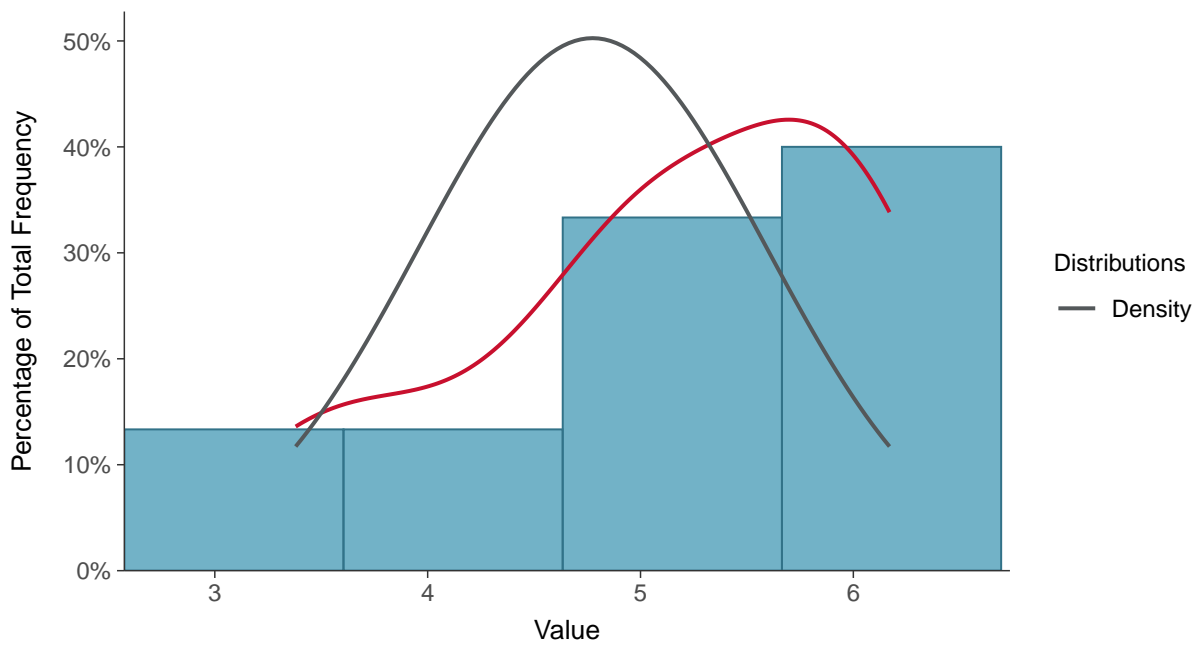
Scatter Plot

Boron, MW-2 (mg/L)



Histogram

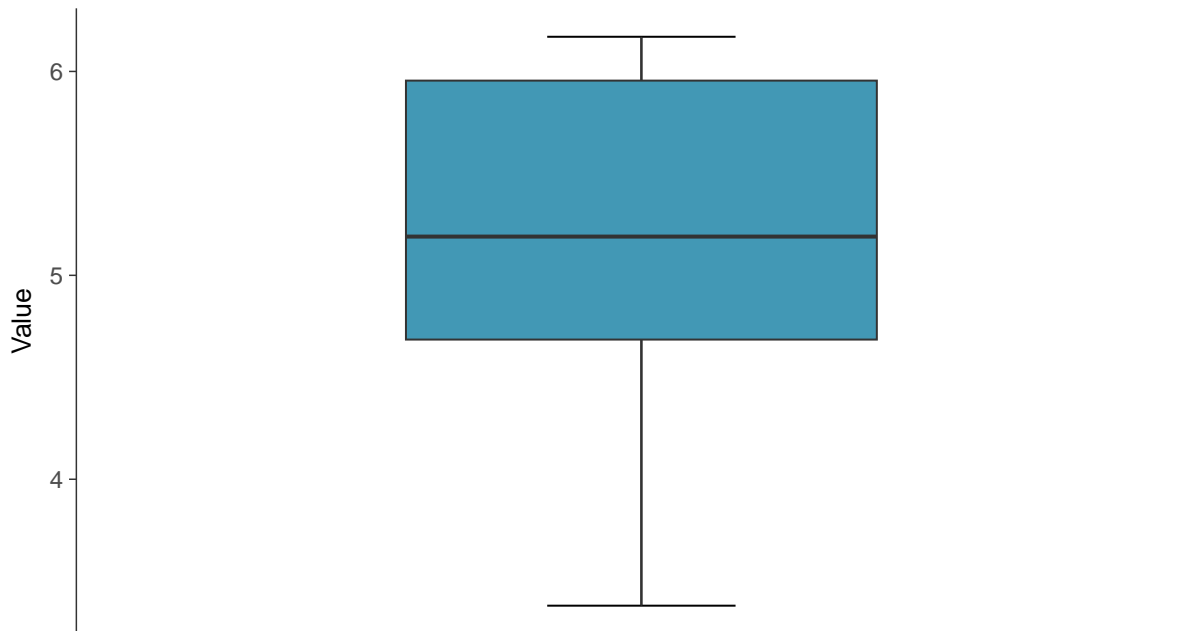
Boron, MW-2 (mg/L)





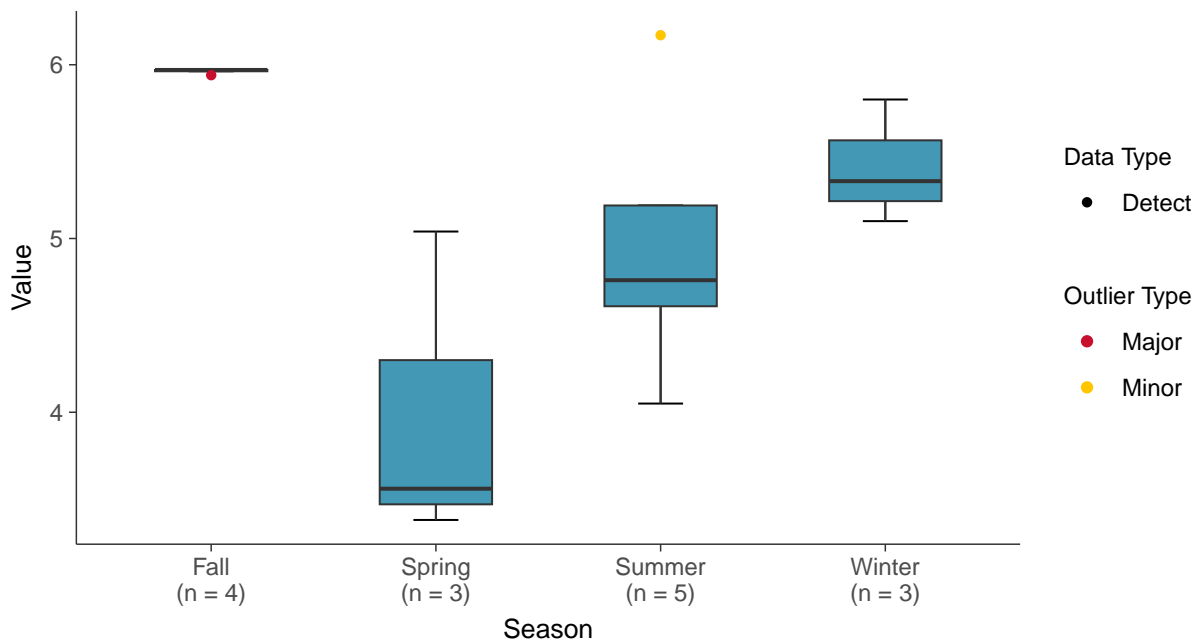
Boxplot

Boron, MW-2 (mg/L)



Boxplot by Season

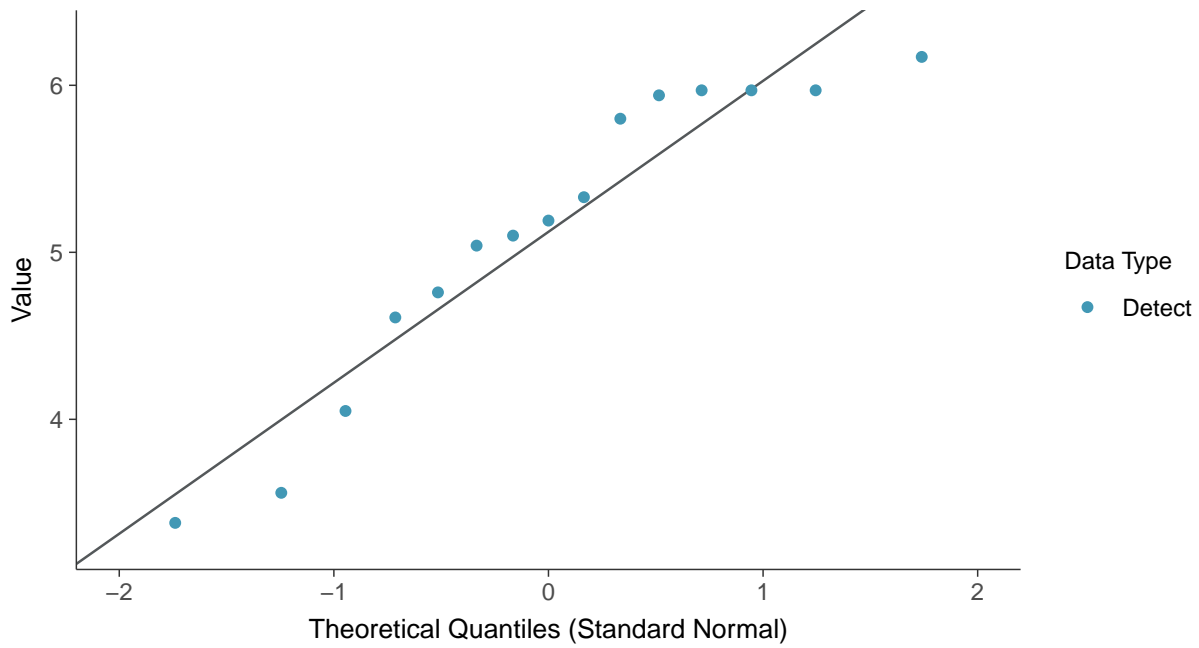
Boron, MW-2 (mg/L)





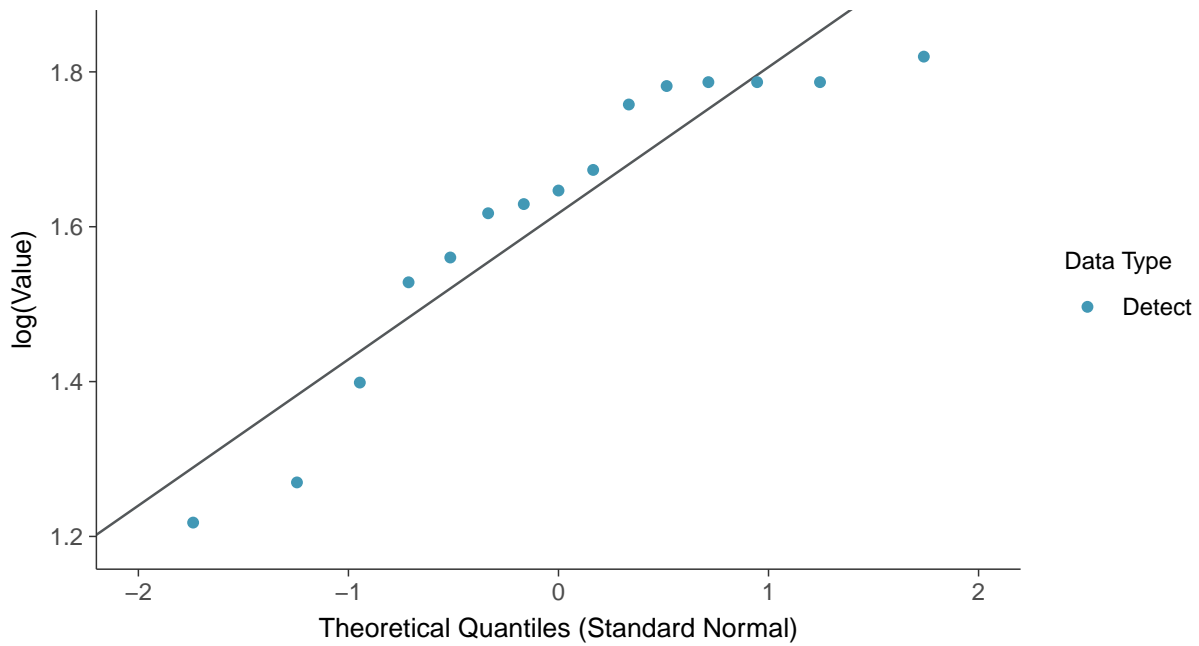
Normal Q-Q plot

Boron, MW-2 (mg/L)



Lognormal Q-Q plot

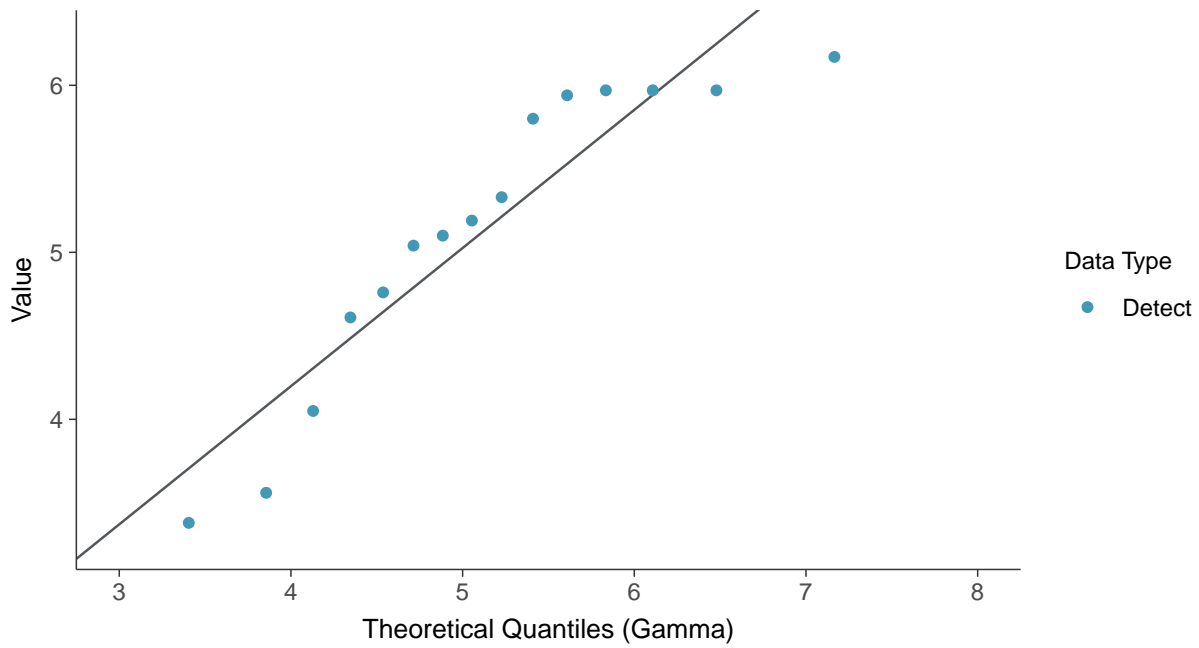
Boron, MW-2 (mg/L)





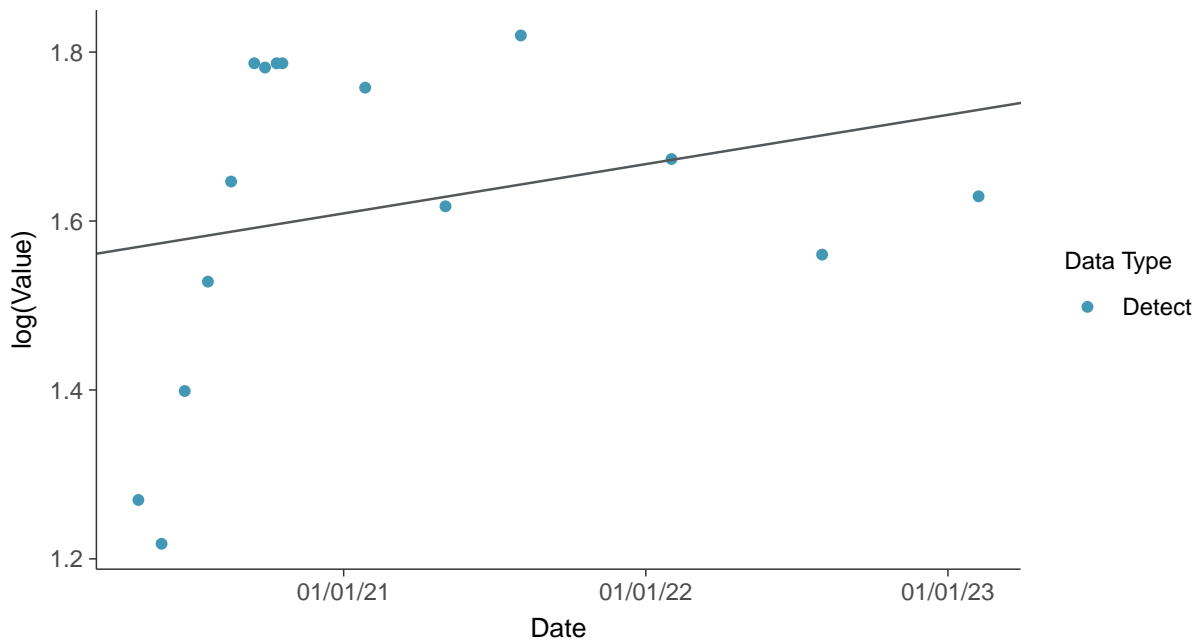
Gamma Q-Q plot

Boron, MW-2 (mg/L)



Trend Regression: Lognormal MLE

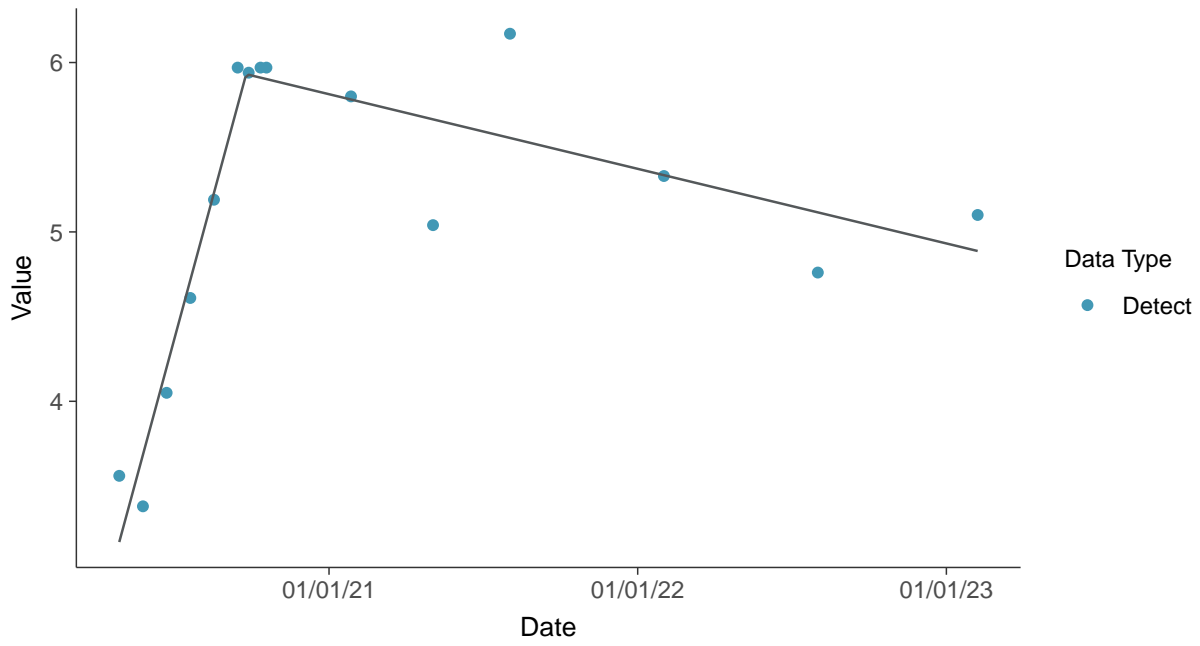
Boron, MW-2 (mg/L)





Trend Regression: Piecewise Linear-Linear

Boron, MW-2 (mg/L)



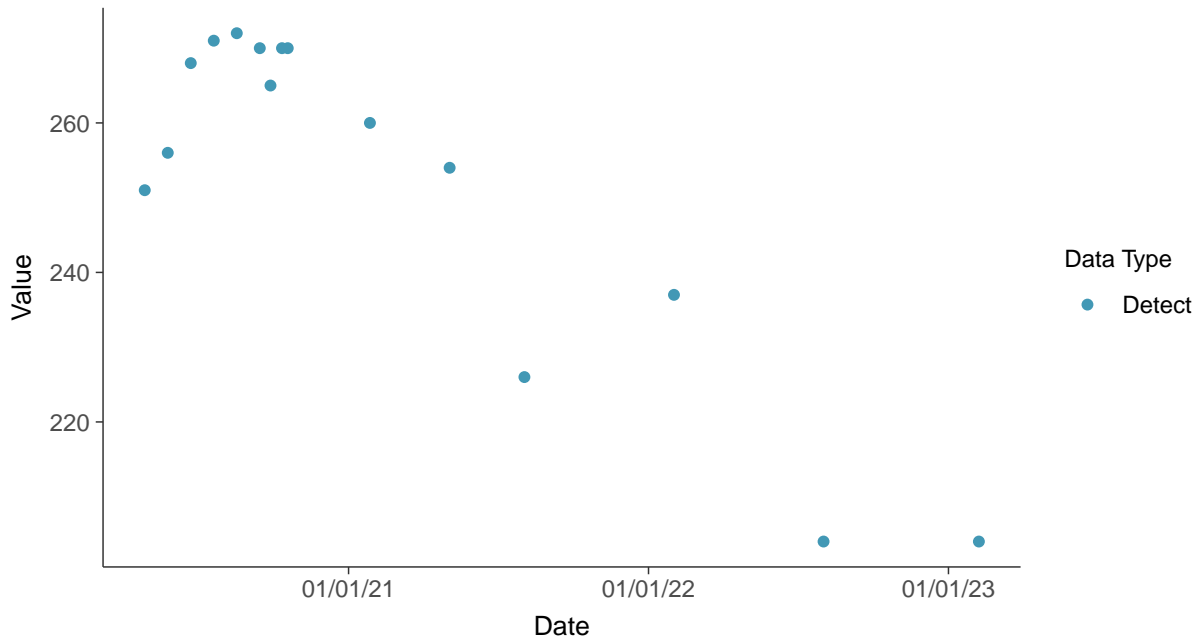


Appendix III: Calcium, MW-2

ID: 02_1_02

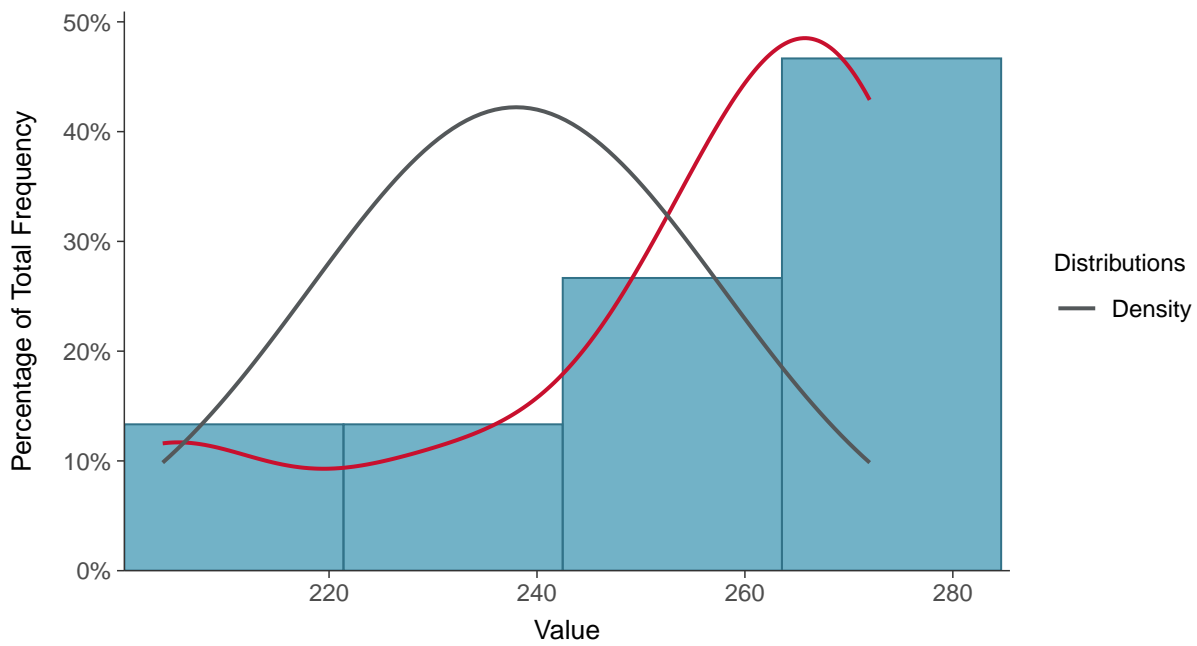
Scatter Plot

Calcium, MW-2 (mg/L)



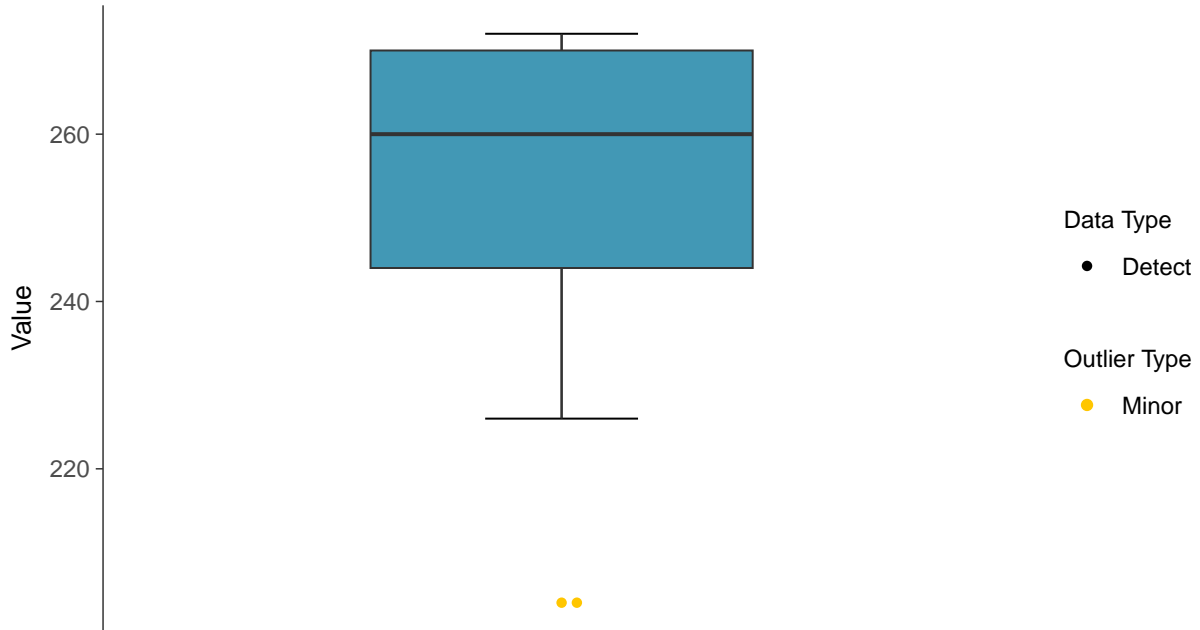
Histogram

Calcium, MW-2 (mg/L)



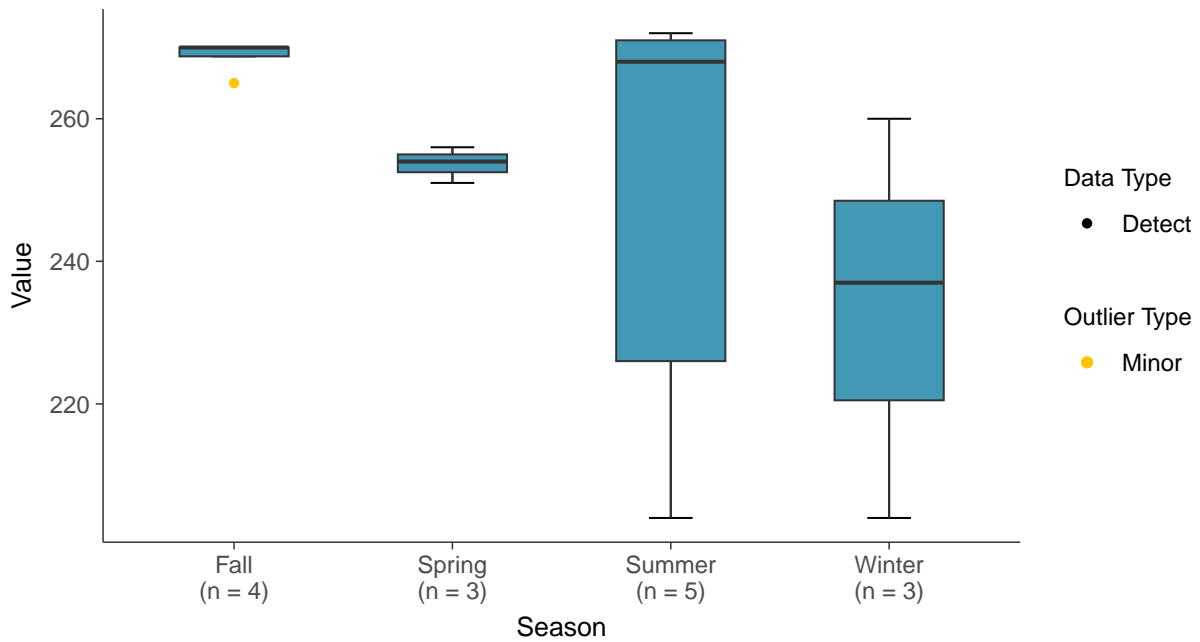
Boxplot

Calcium, MW-2 (mg/L)



Boxplot by Season

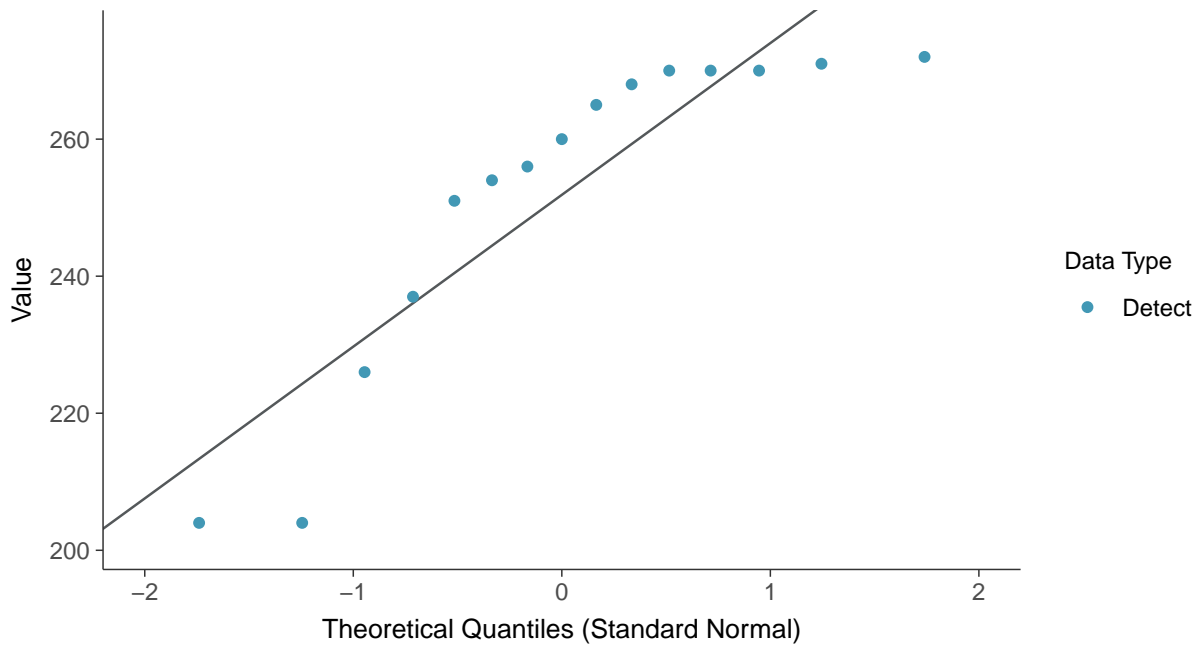
Calcium, MW-2 (mg/L)





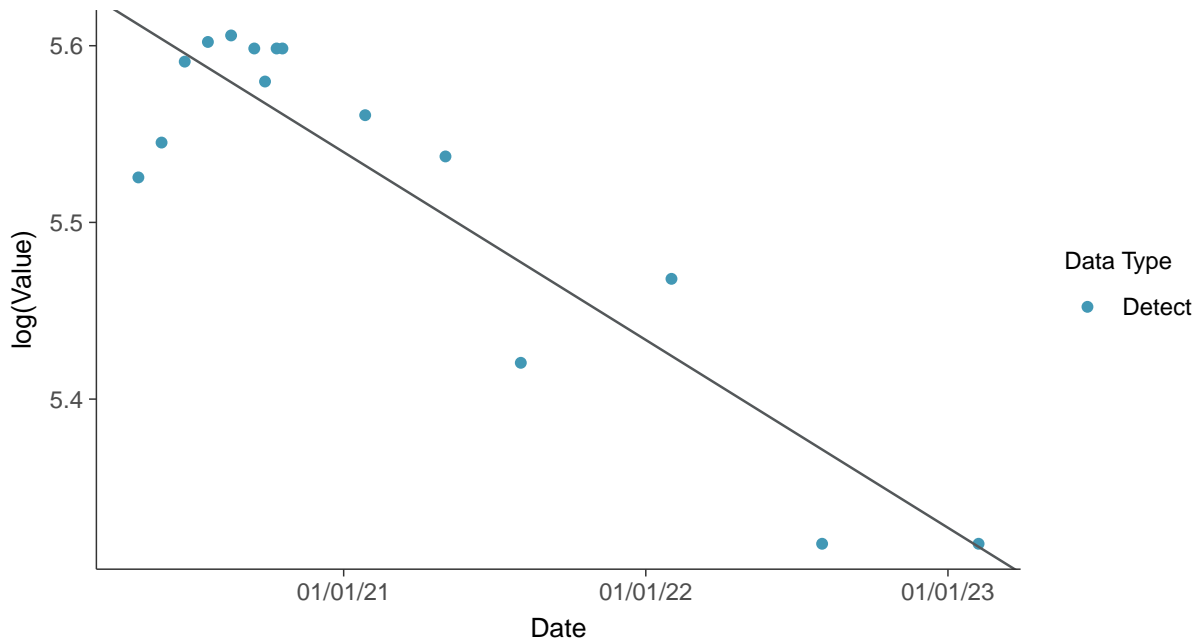
Normal Q-Q plot

Calcium, MW-2 (mg/L)



Trend Regression: Lognormal MLE

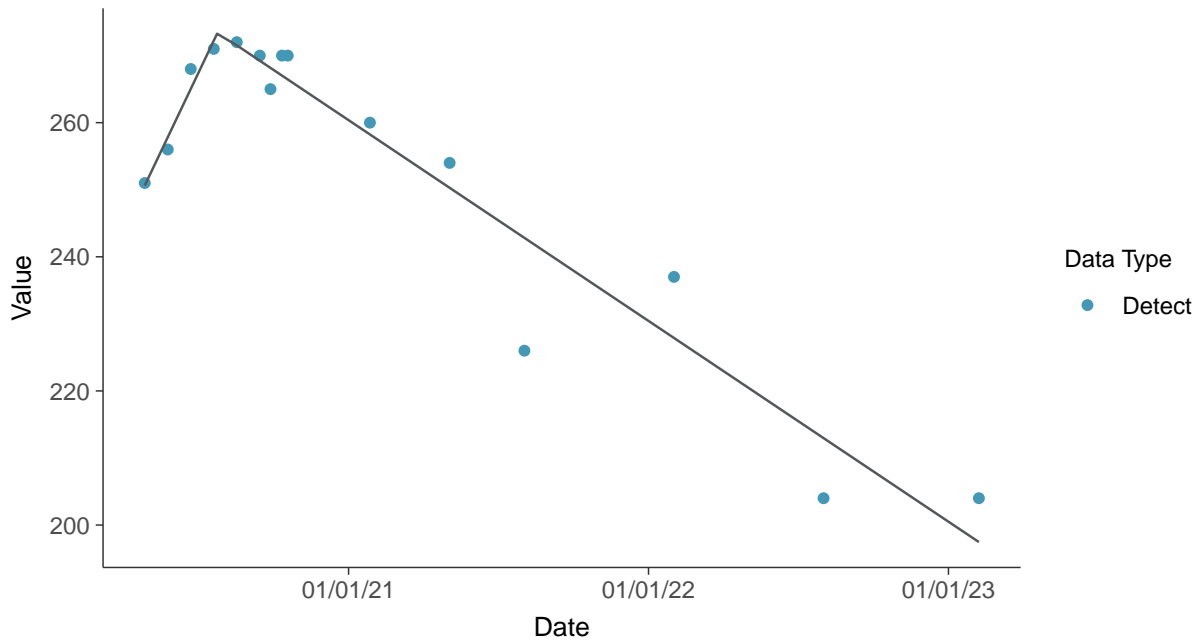
Calcium, MW-2 (mg/L)





Trend Regression: Piecewise Linear-Linear

Calcium, MW-2 (mg/L)

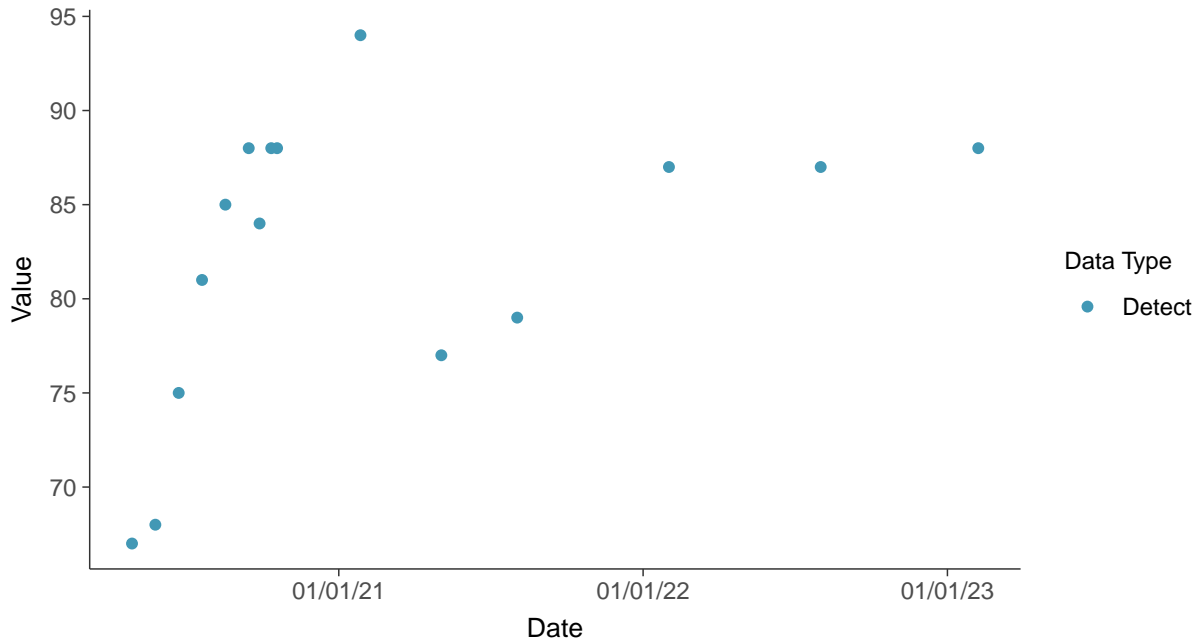


Appendix III: Chloride, MW-2

ID: 02_1_03

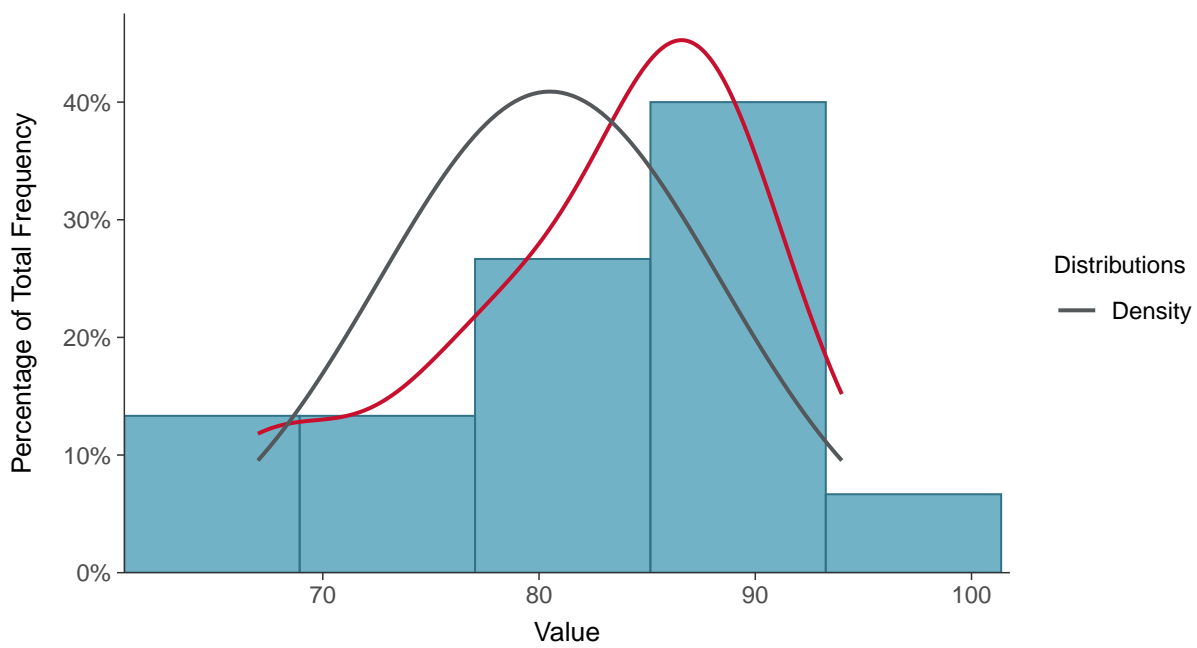
Scatter Plot

Chloride, MW-2 (mg/L)



Histogram

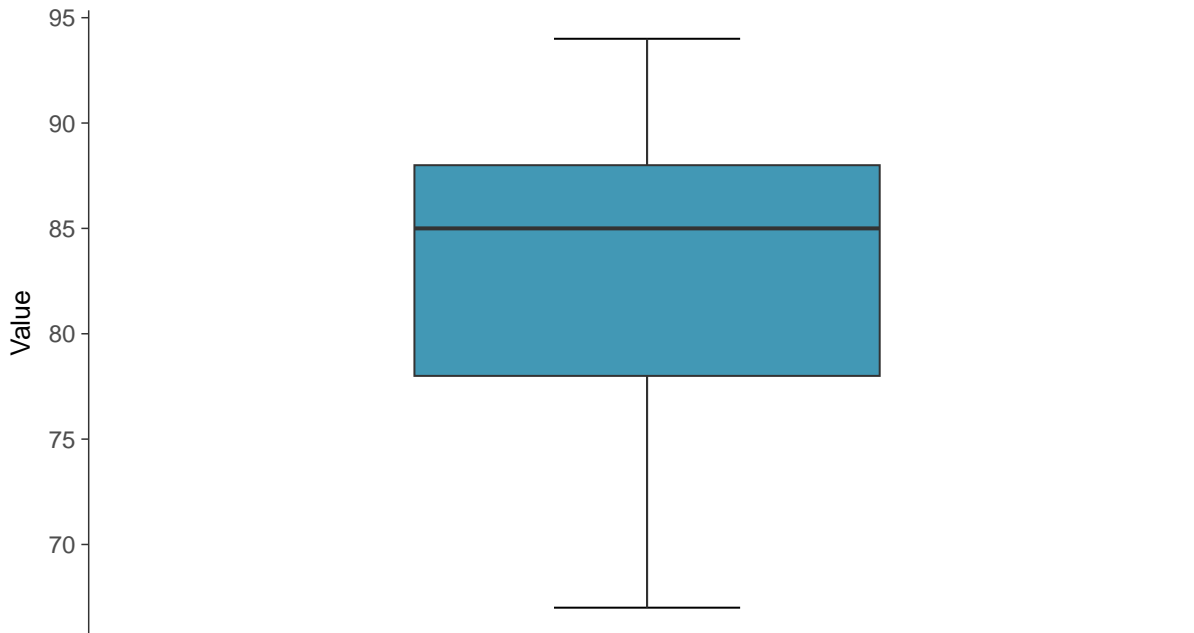
Chloride, MW-2 (mg/L)





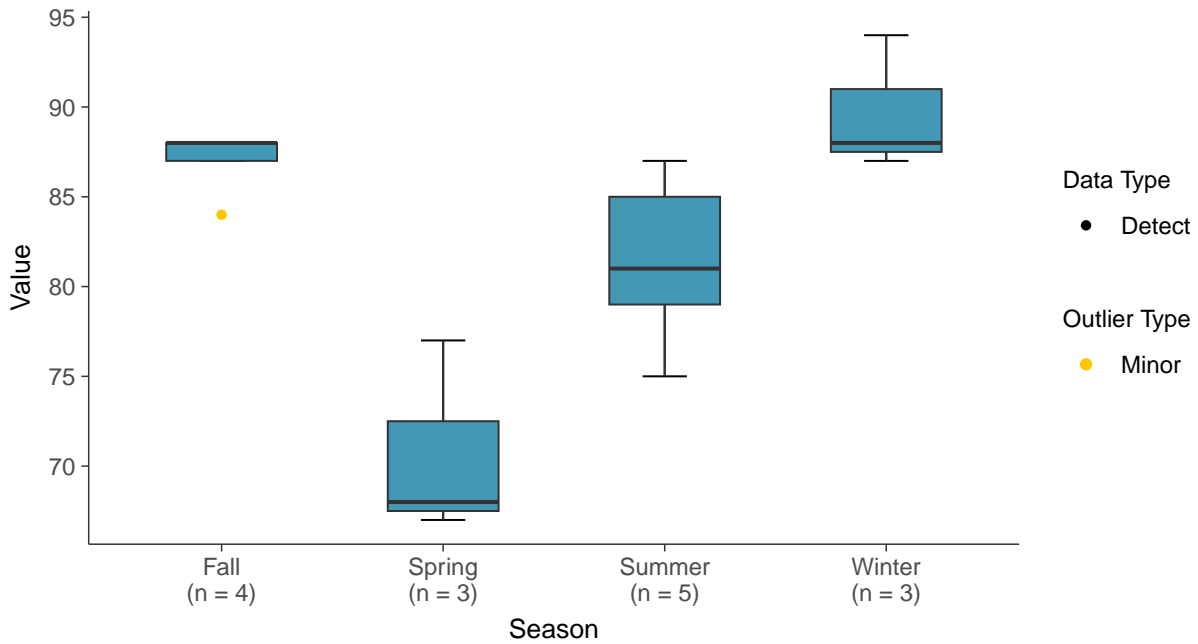
Boxplot

Chloride, MW-2 (mg/L)



Boxplot by Season

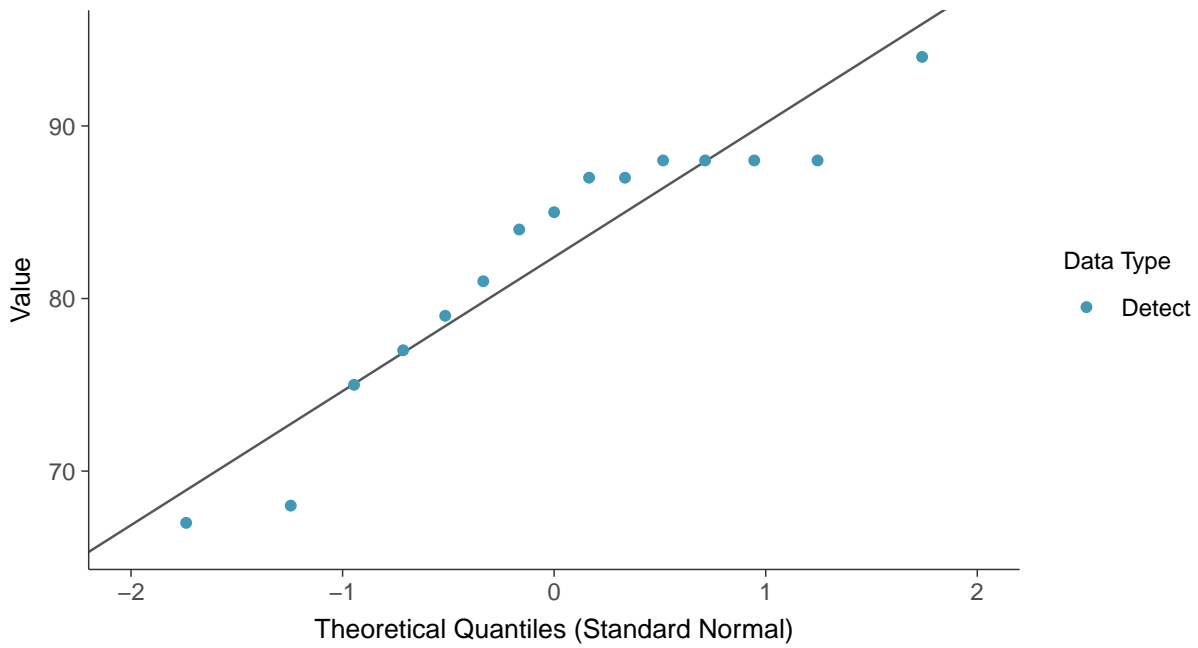
Chloride, MW-2 (mg/L)





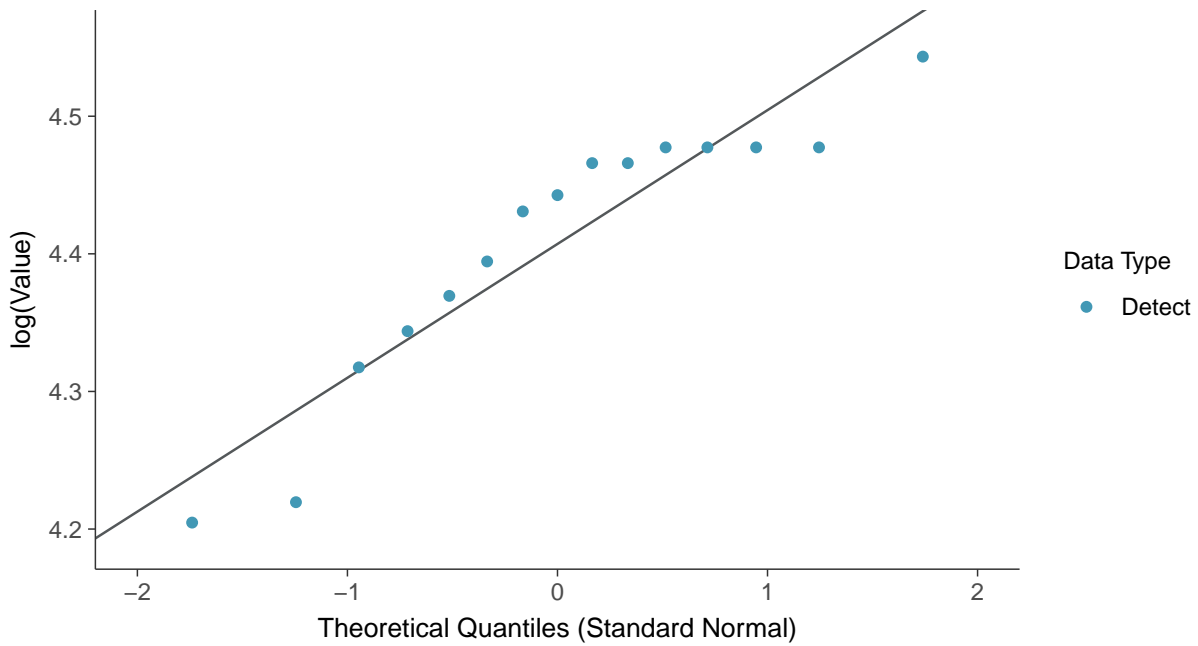
Normal Q-Q plot

Chloride, MW-2 (mg/L)



Lognormal Q-Q plot

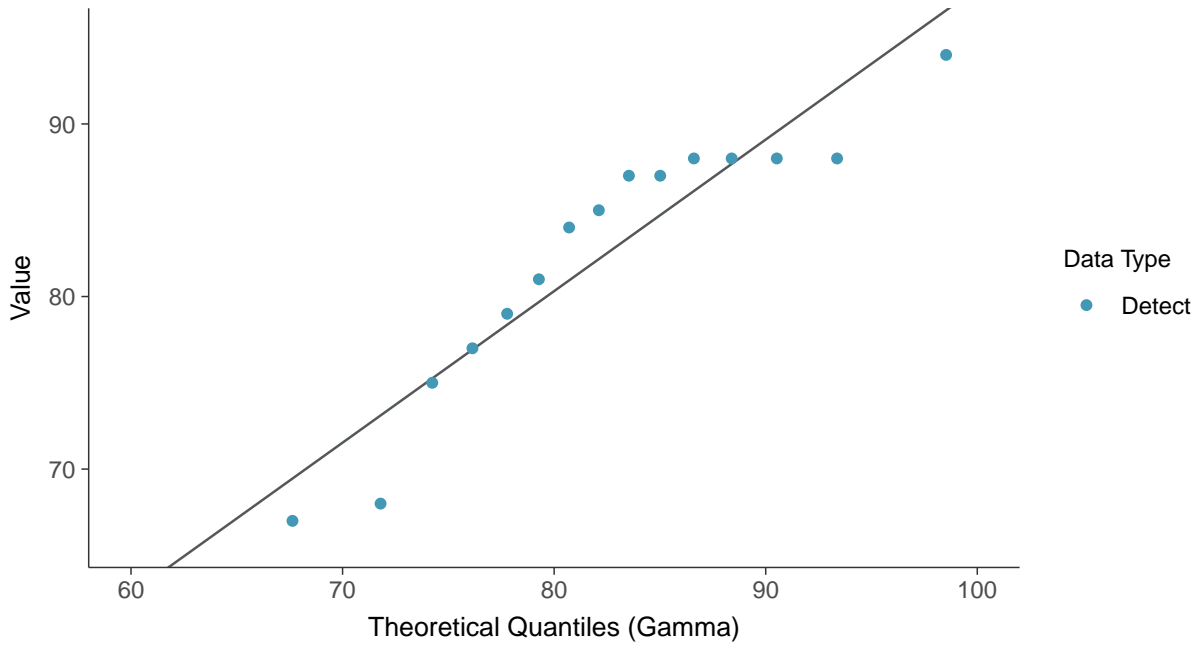
Chloride, MW-2 (mg/L)





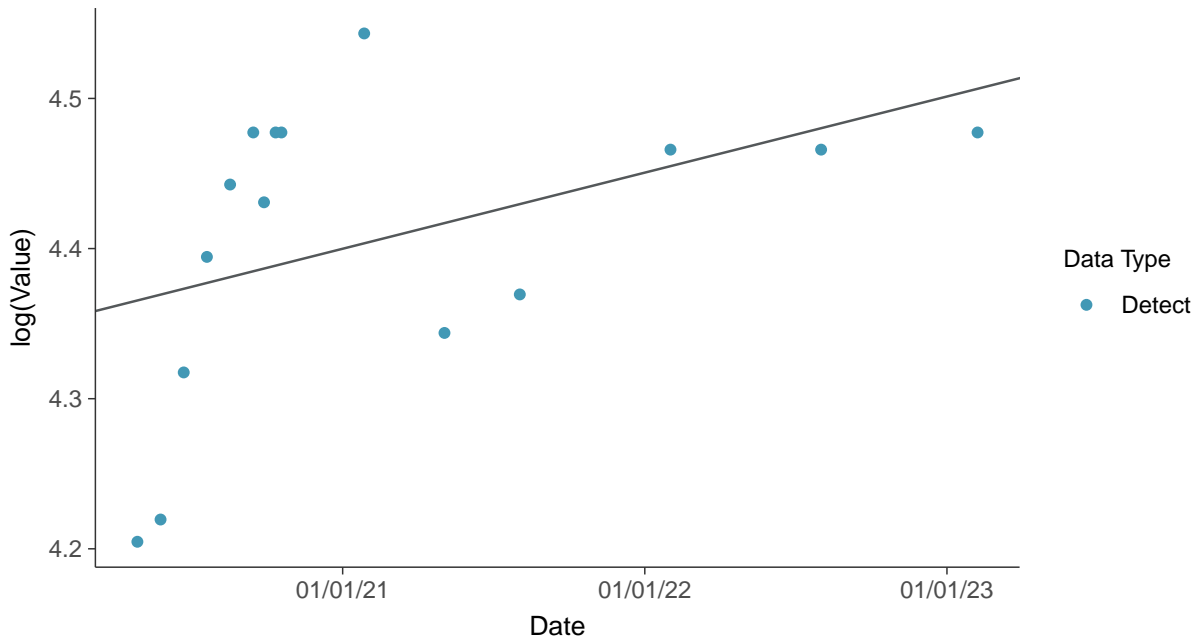
Gamma Q-Q plot

Chloride, MW-2 (mg/L)



Trend Regression: Lognormal MLE

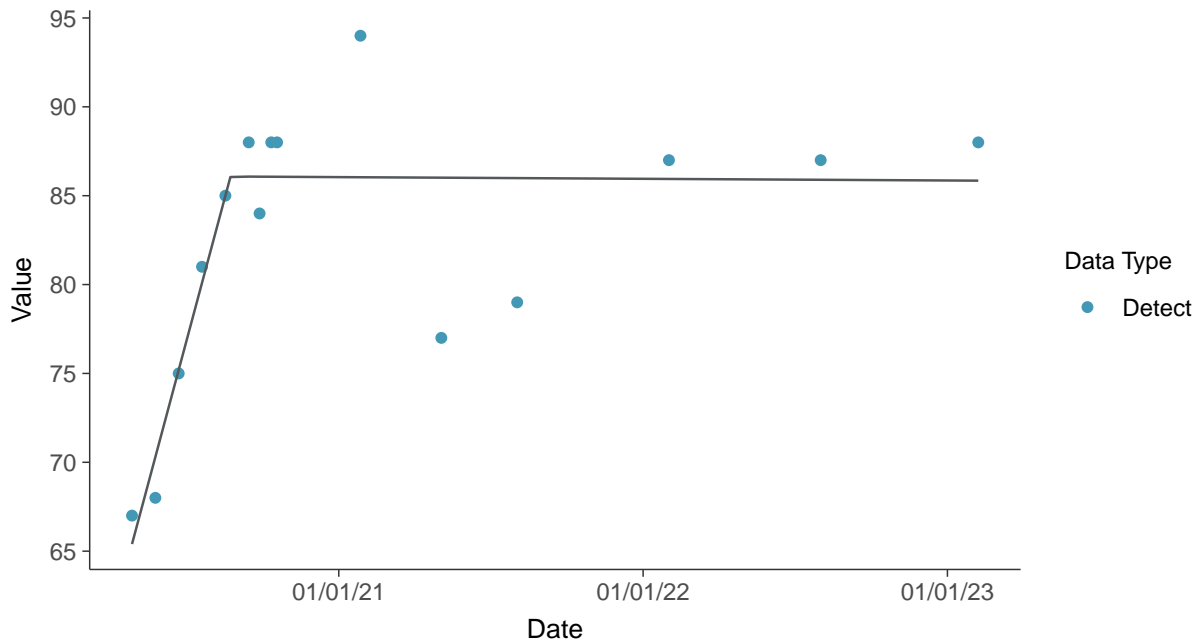
Chloride, MW-2 (mg/L)





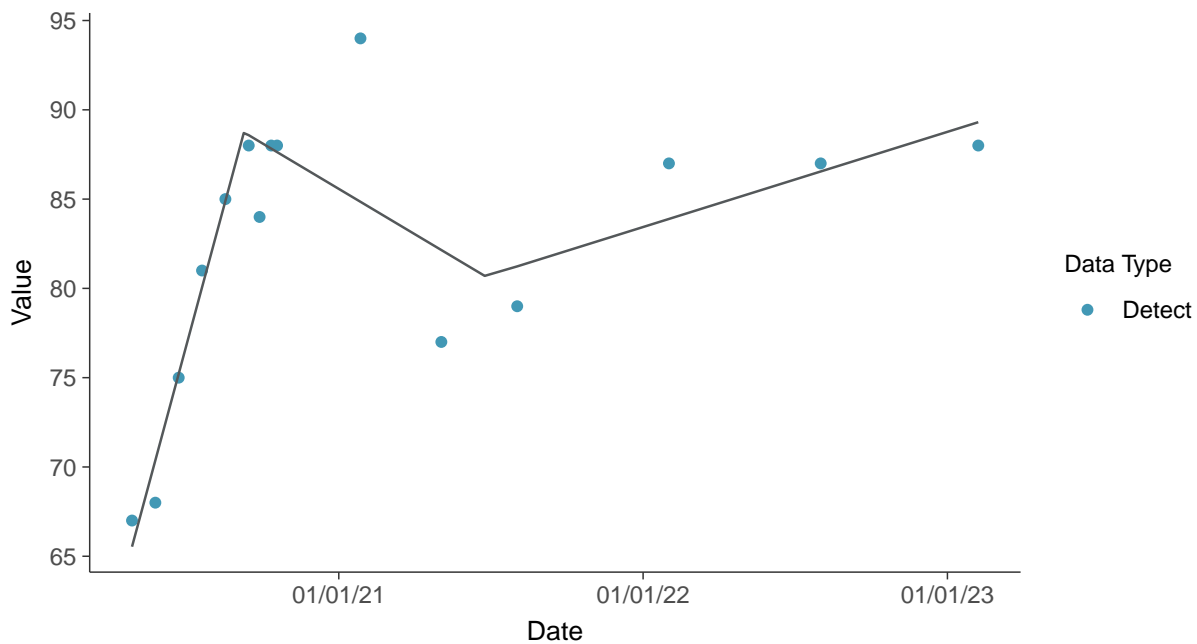
Trend Regression: Piecewise Linear-Linear

Chloride, MW-2 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Chloride, MW-2 (mg/L)

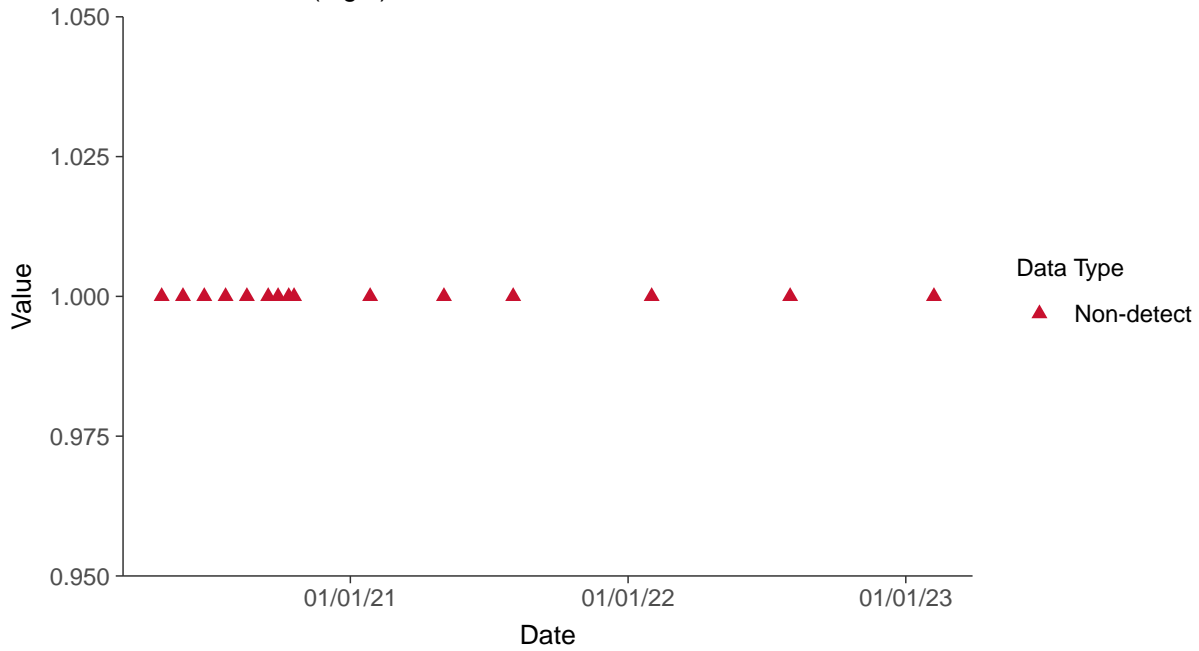


Appendix III: Fluoride, MW-2

ID: 02_1_04

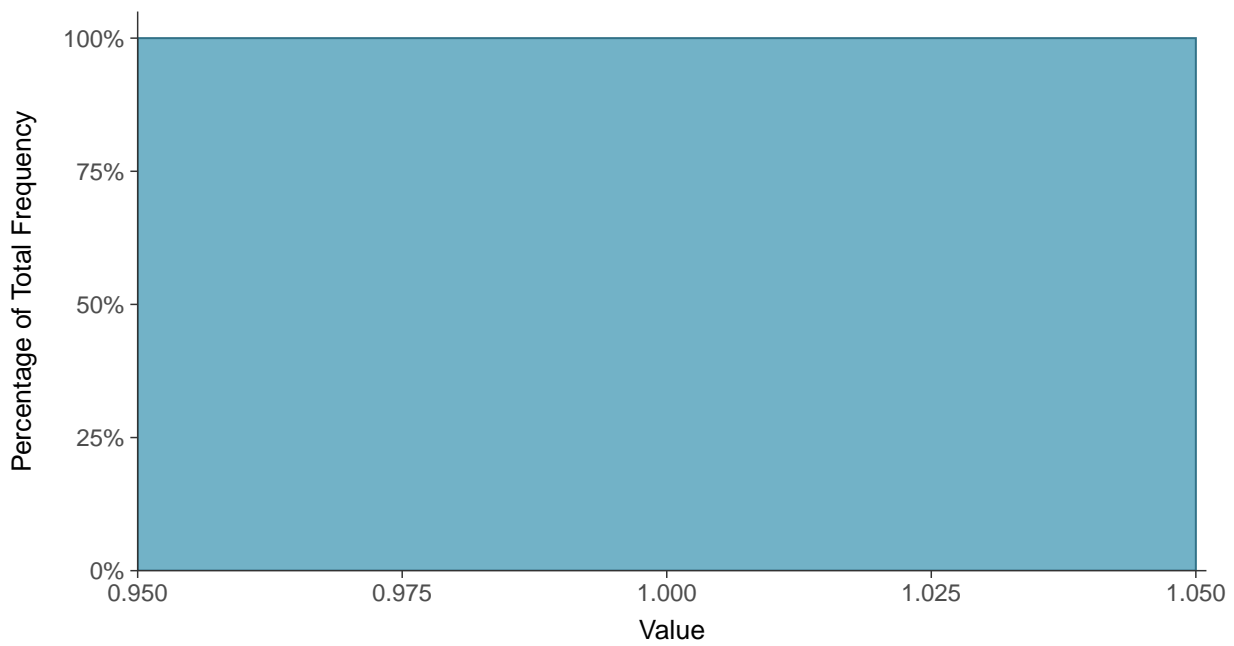
Scatter Plot

Fluoride, MW-2 (mg/L)



Histogram

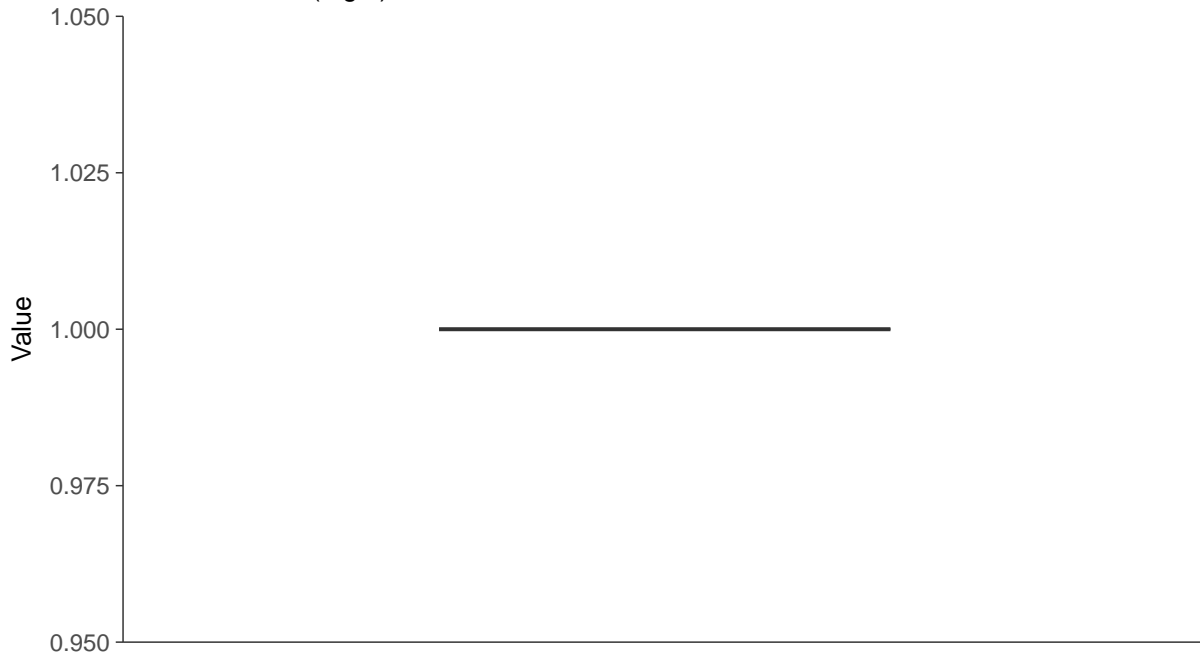
Fluoride, MW-2 (mg/L)





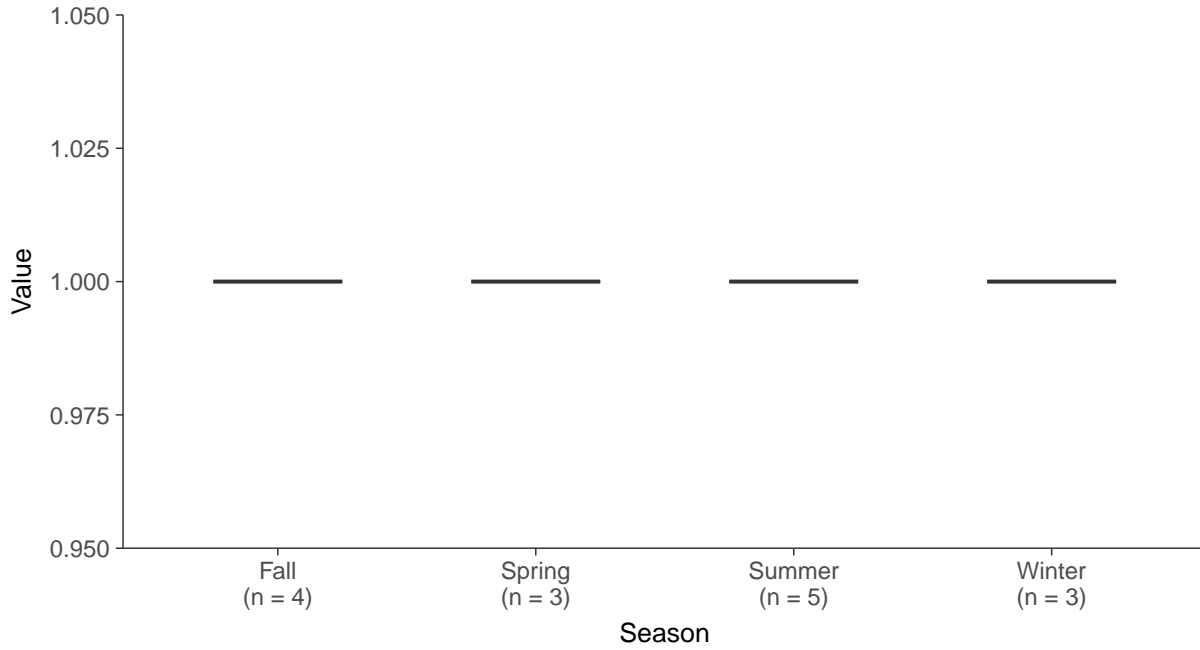
Boxplot

Fluoride, MW-2 (mg/L)



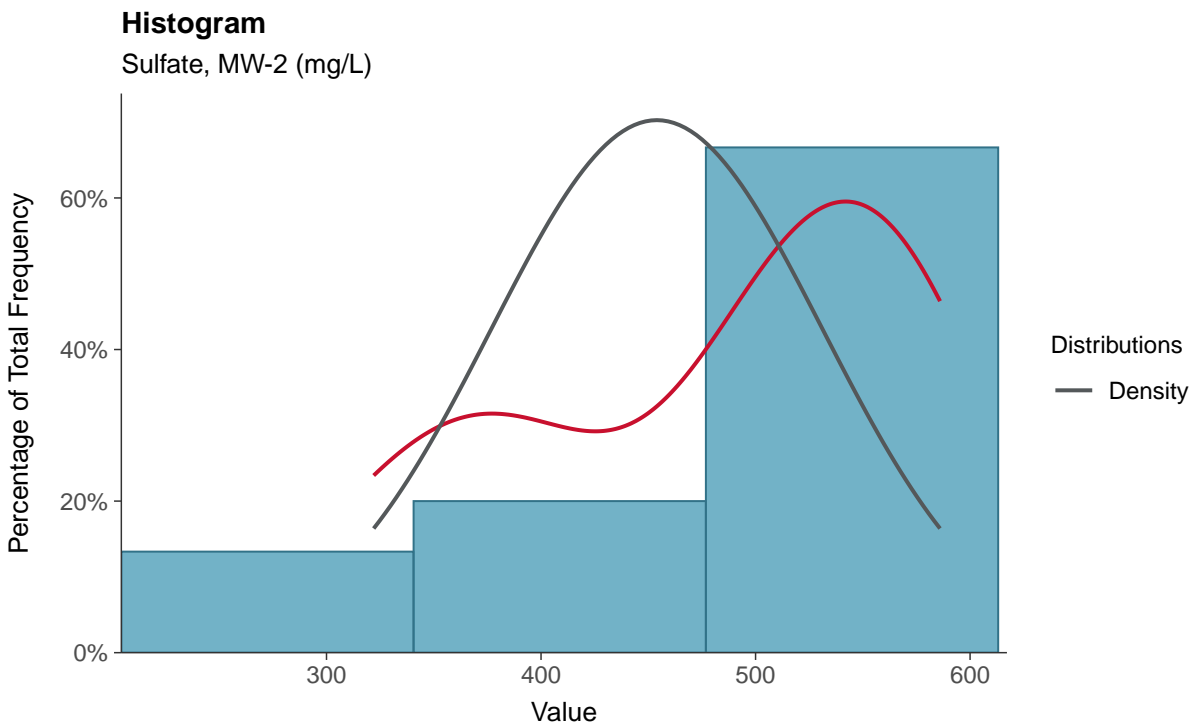
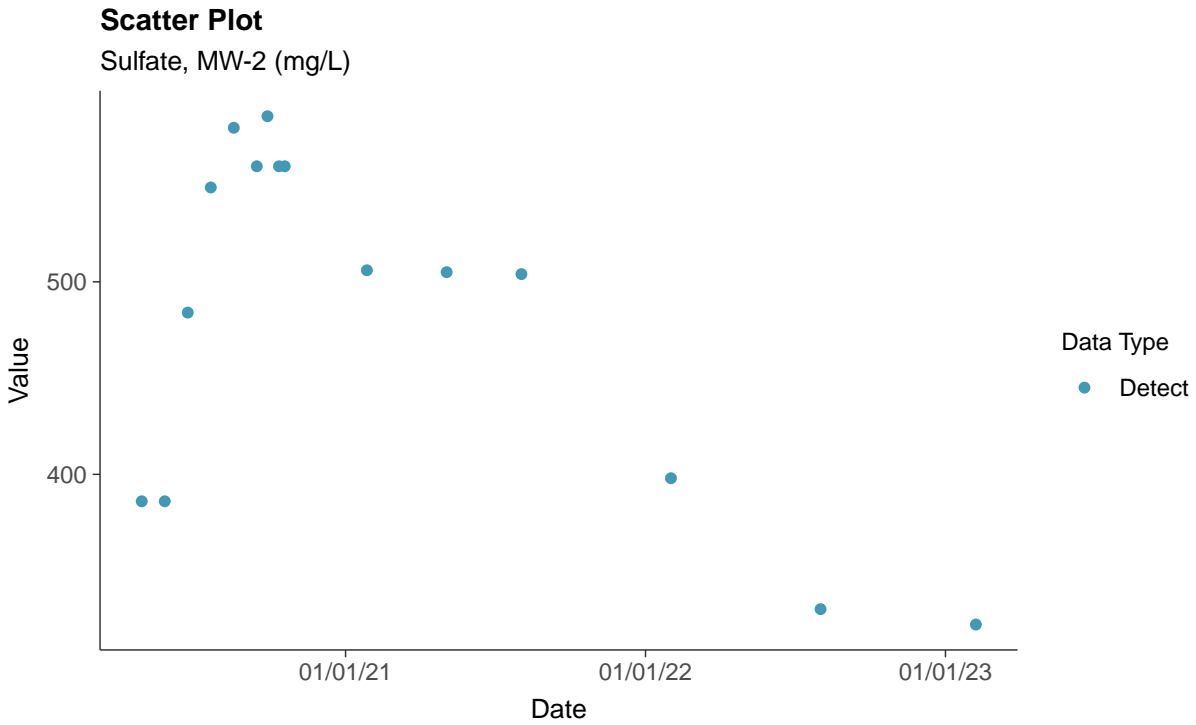
Boxplot by Season

Fluoride, MW-2 (mg/L)



Appendix III: Sulfate, MW-2

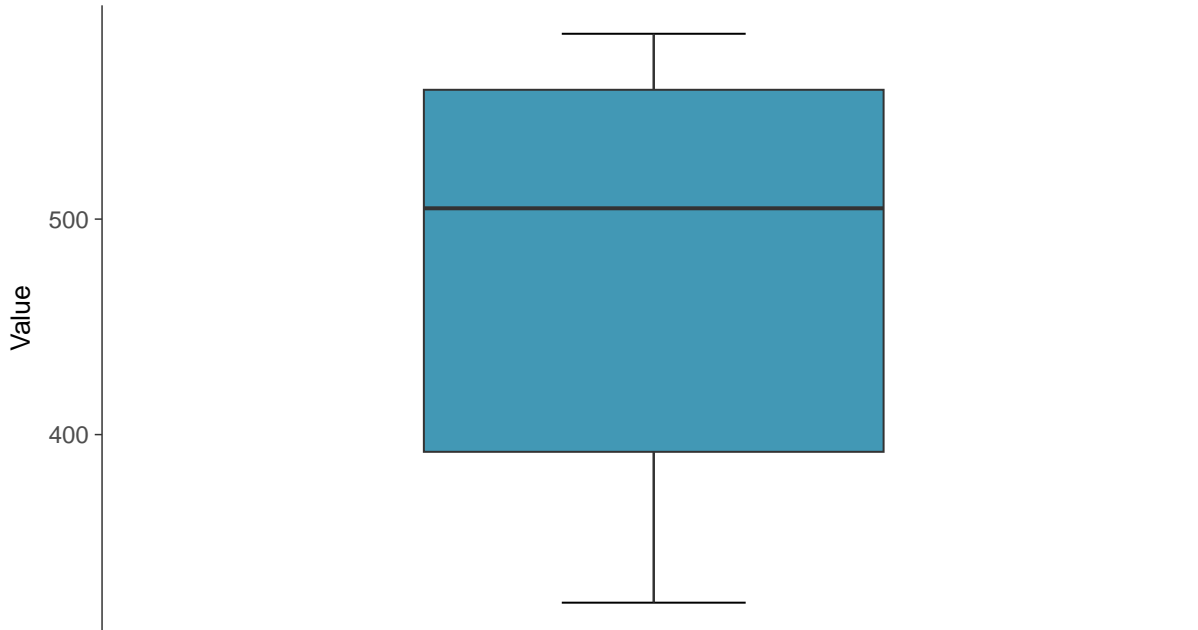
ID: 02_1_05





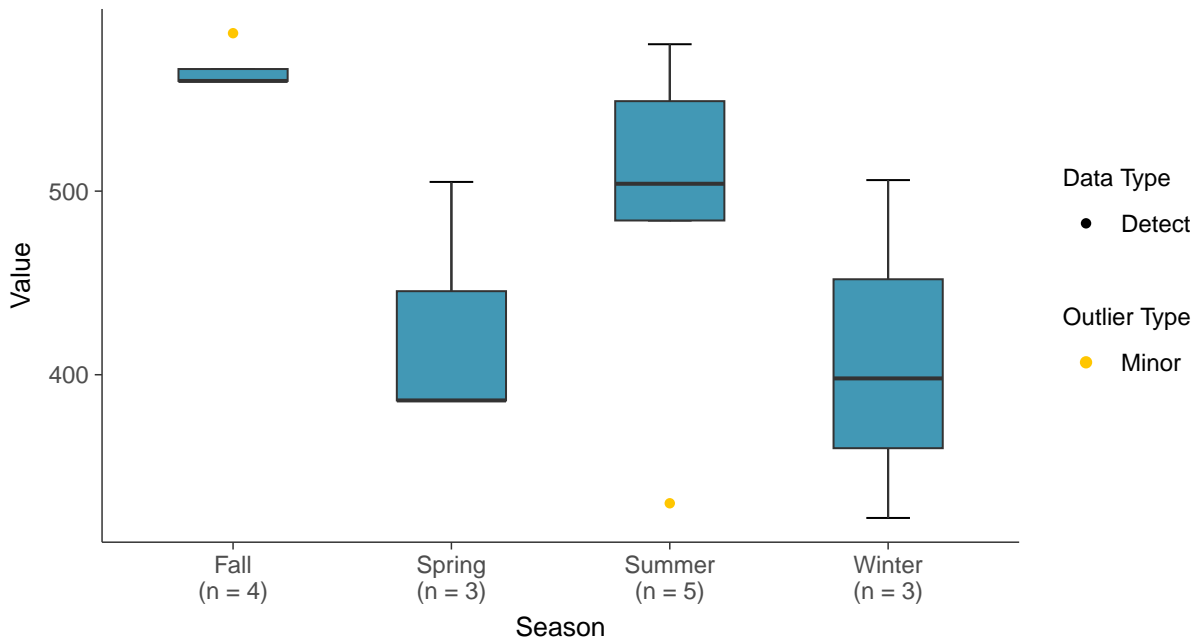
Boxplot

Sulfate, MW-2 (mg/L)



Boxplot by Season

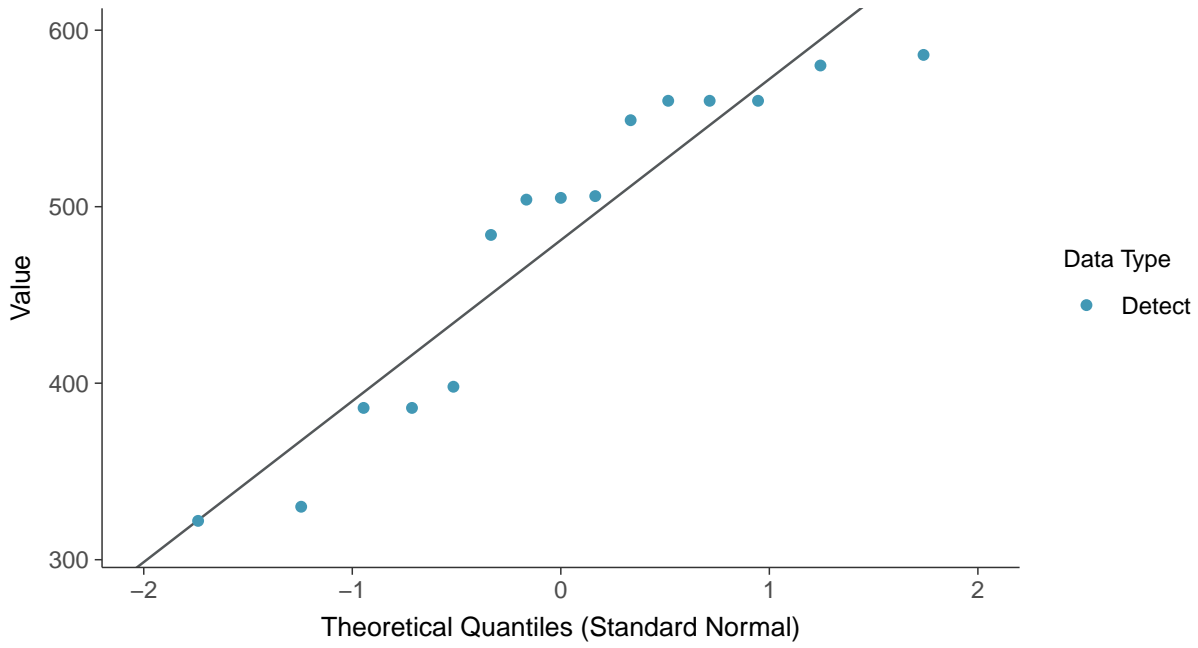
Sulfate, MW-2 (mg/L)





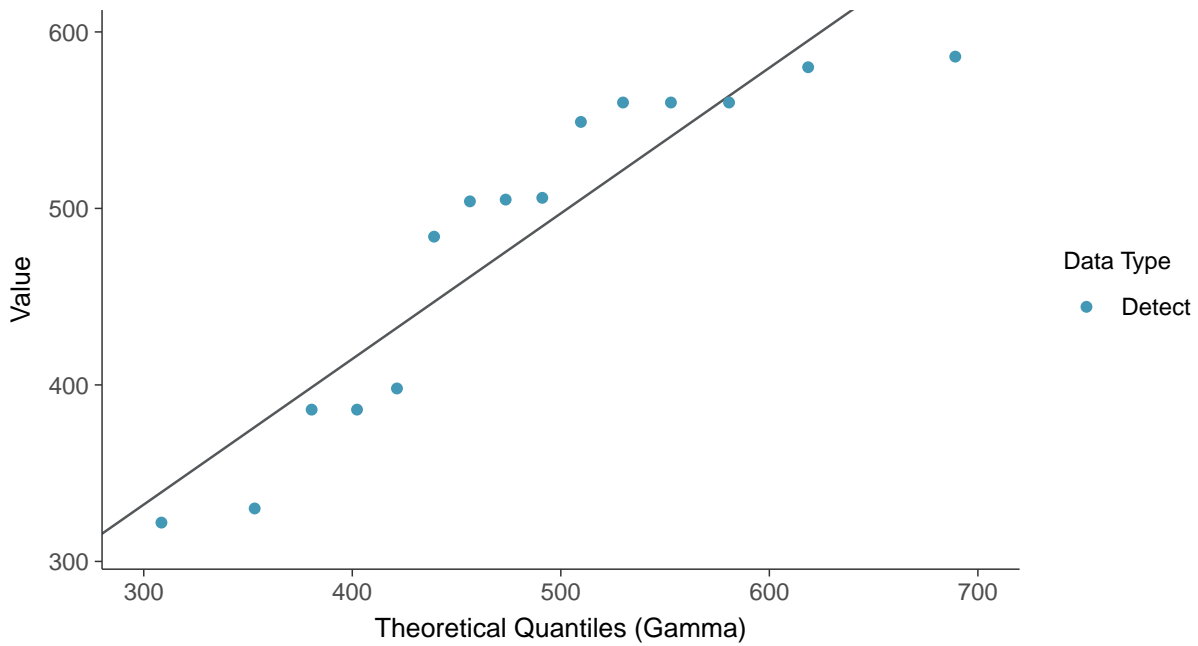
Normal Q-Q plot

Sulfate, MW-2 (mg/L)



Gamma Q-Q plot

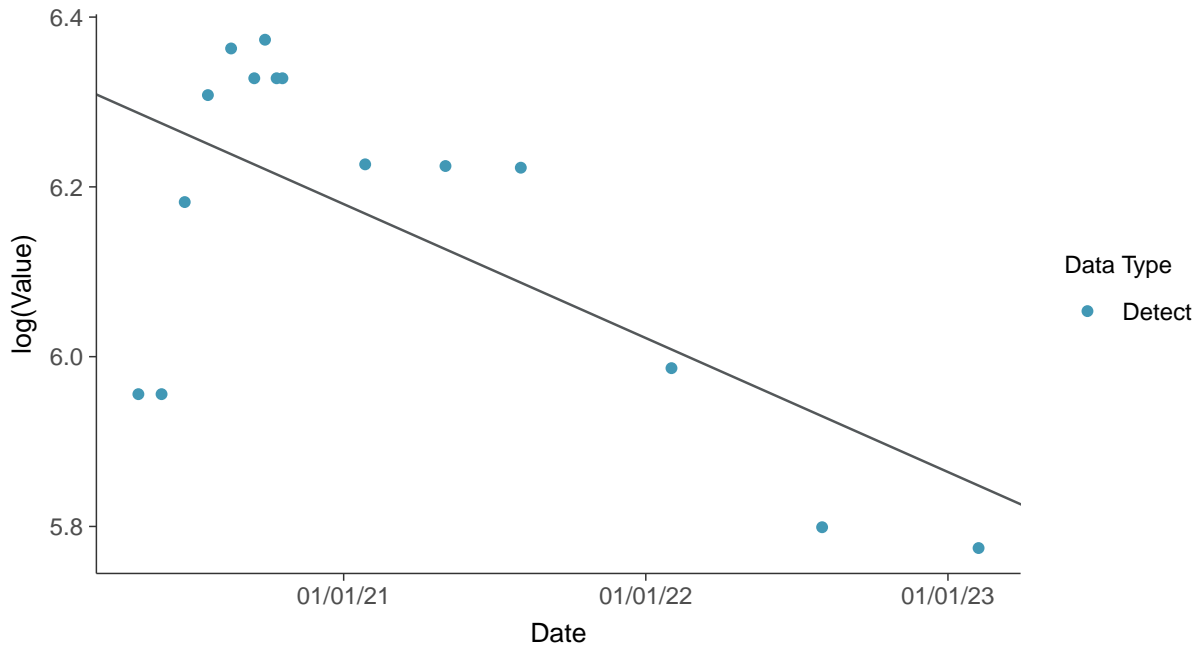
Sulfate, MW-2 (mg/L)





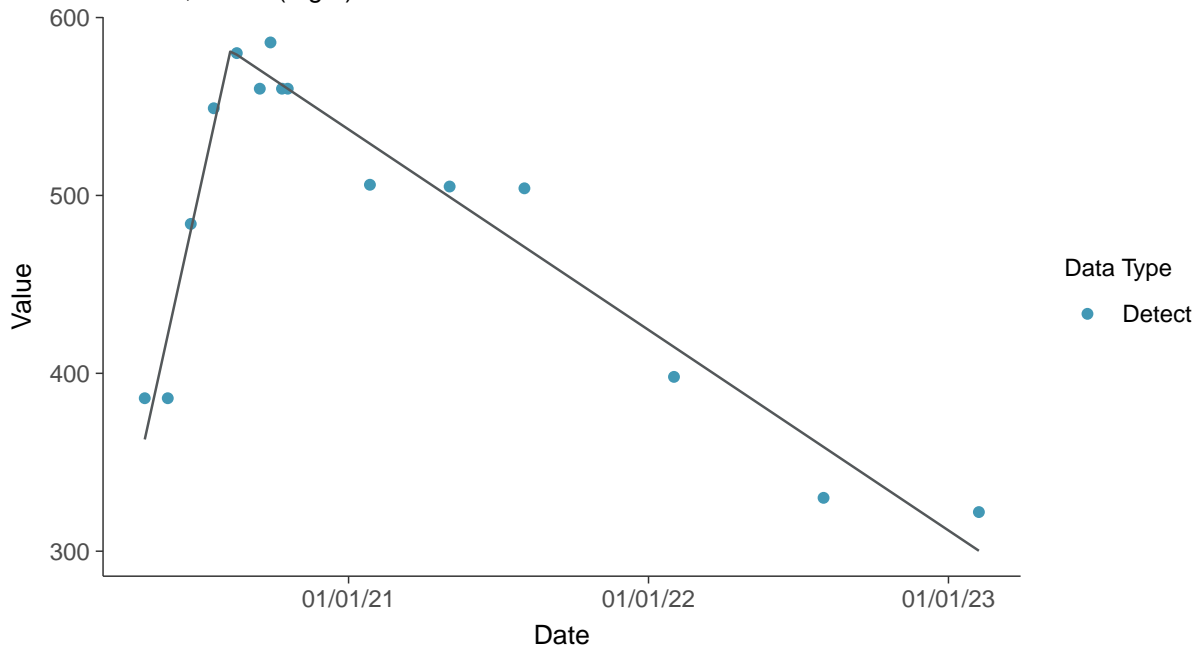
Trend Regression: Lognormal MLE

Sulfate, MW-2 (mg/L)



Trend Regression: Piecewise Linear-Linear

Sulfate, MW-2 (mg/L)



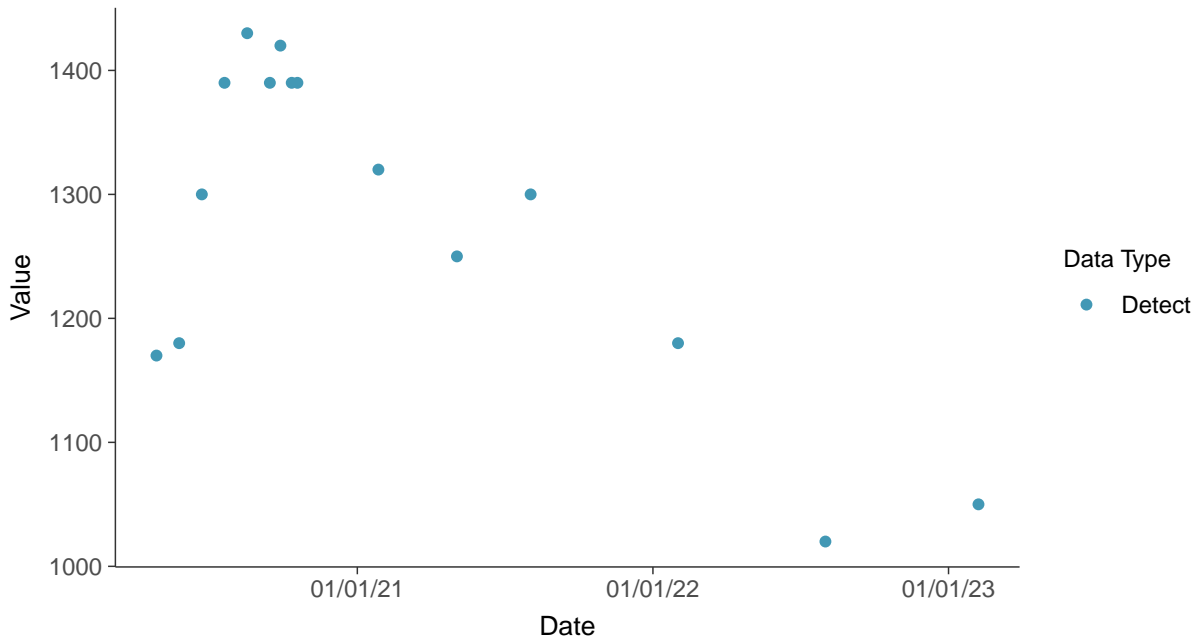


Appendix III: Total Dissolved Solids, MW-2

ID: 02_1_06

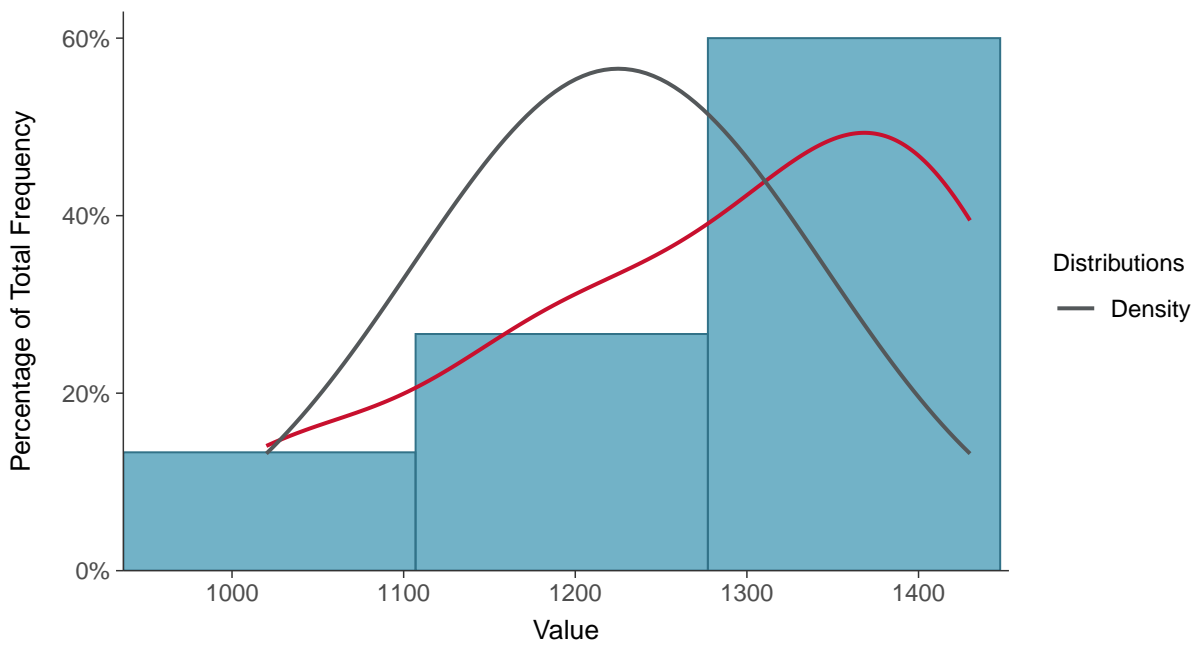
Scatter Plot

Total Dissolved Solids, MW-2 (mg/L)



Histogram

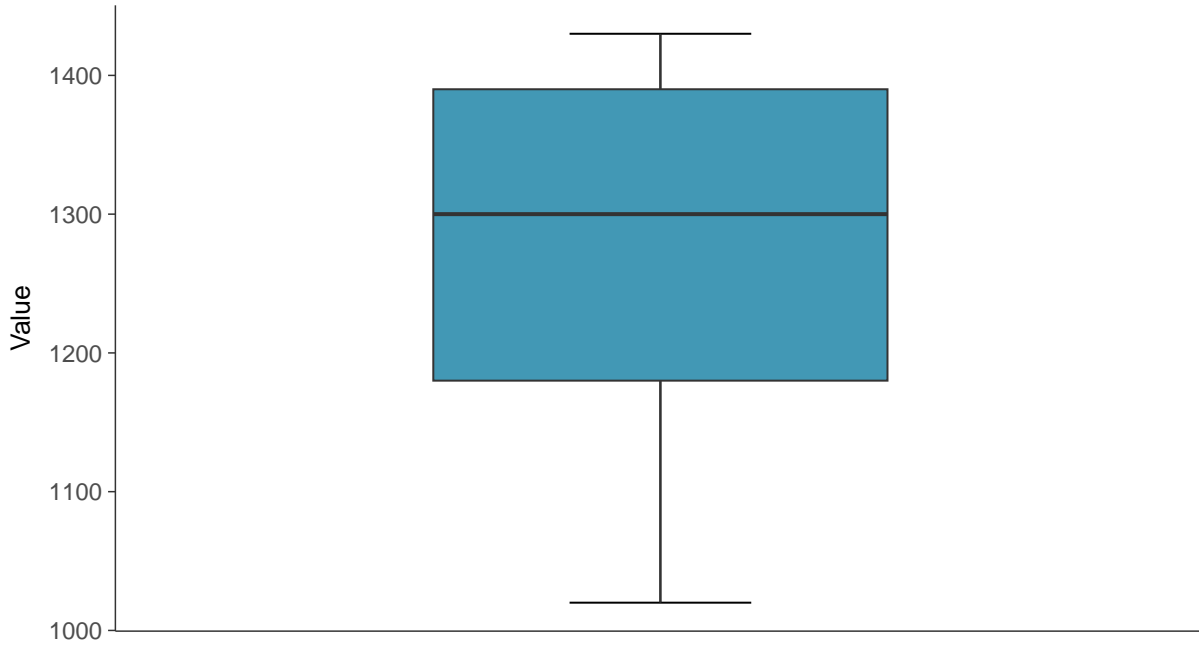
Total Dissolved Solids, MW-2 (mg/L)





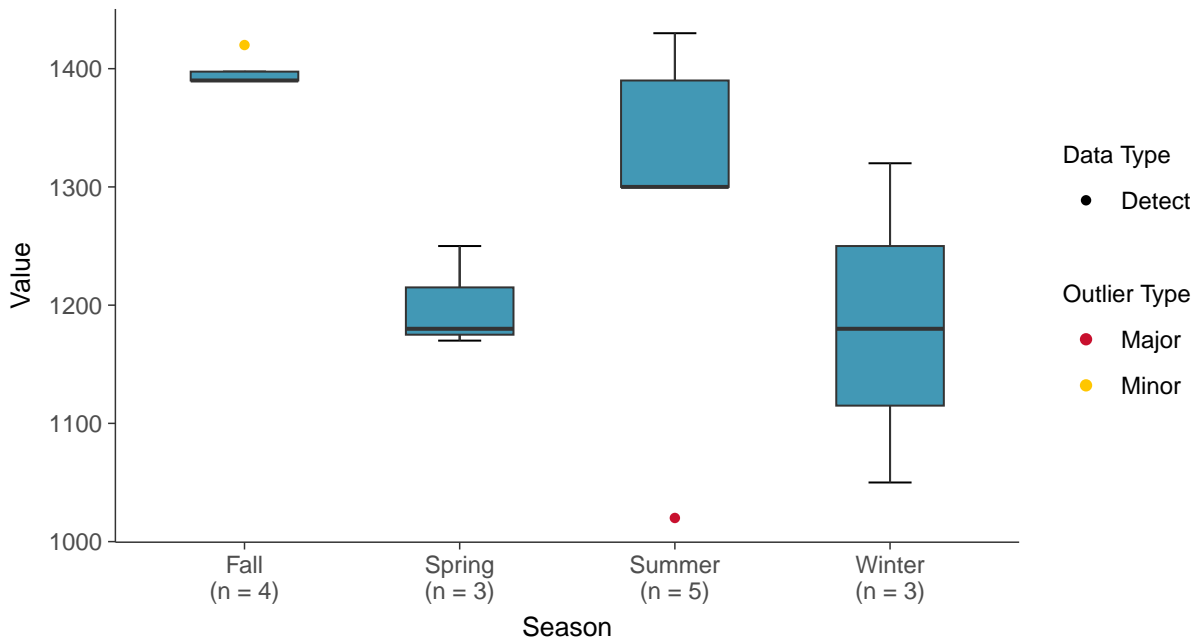
Boxplot

Total Dissolved Solids, MW-2 (mg/L)



Boxplot by Season

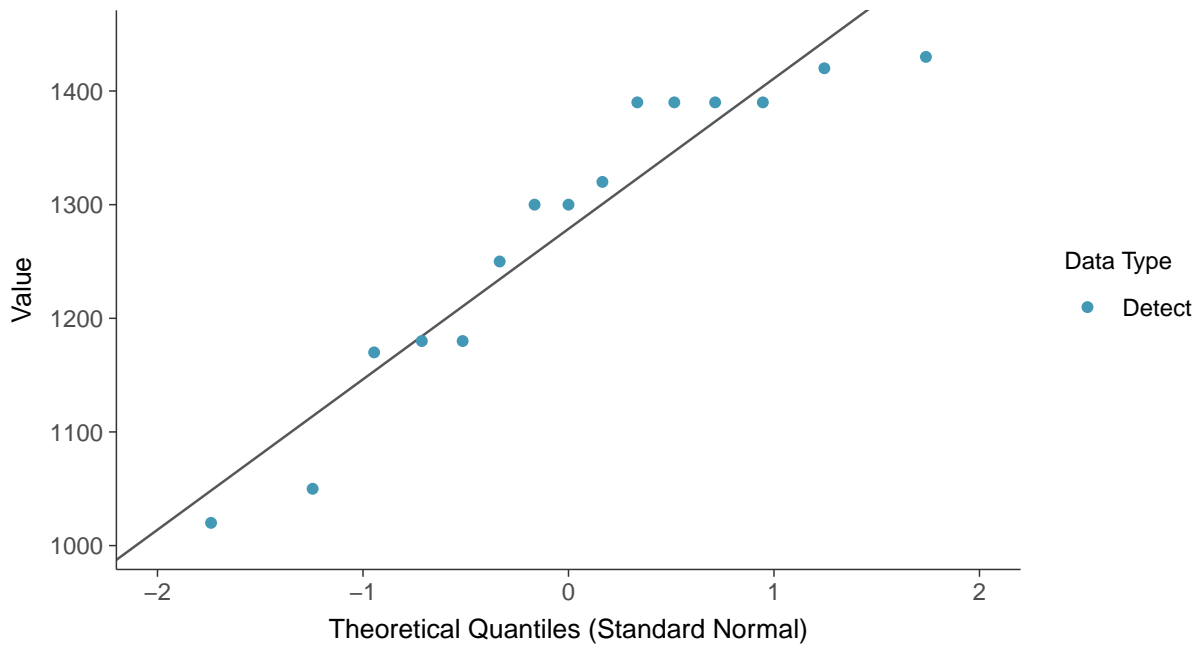
Total Dissolved Solids, MW-2 (mg/L)





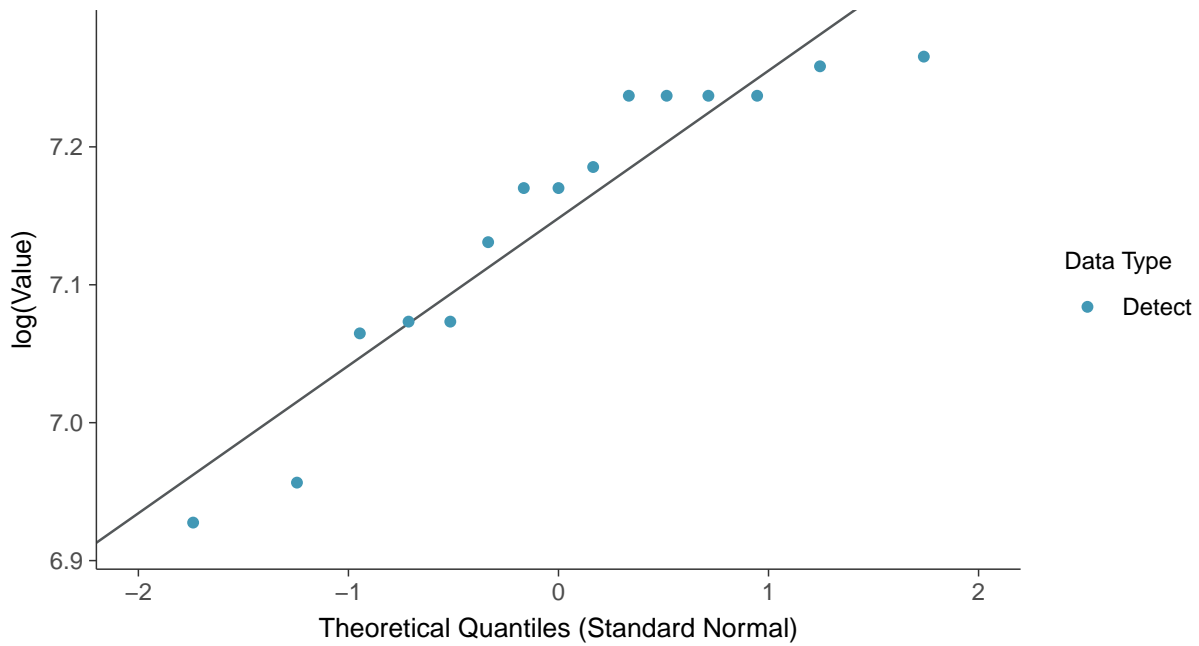
Normal Q-Q plot

Total Dissolved Solids, MW-2 (mg/L)



Lognormal Q-Q plot

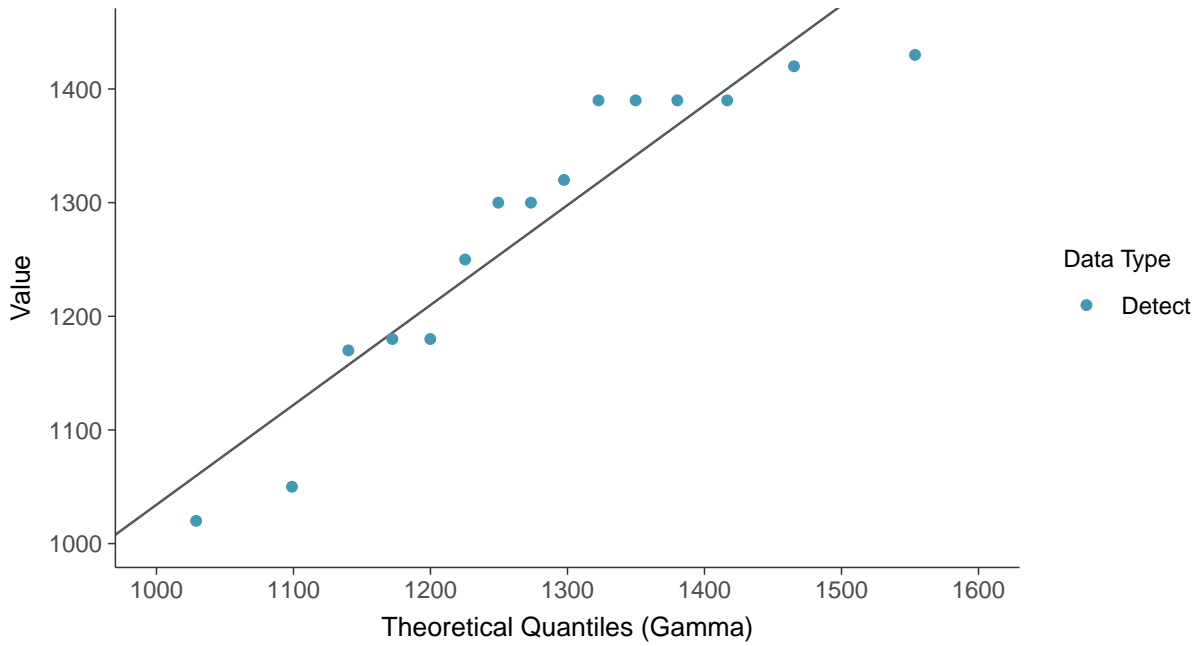
Total Dissolved Solids, MW-2 (mg/L)





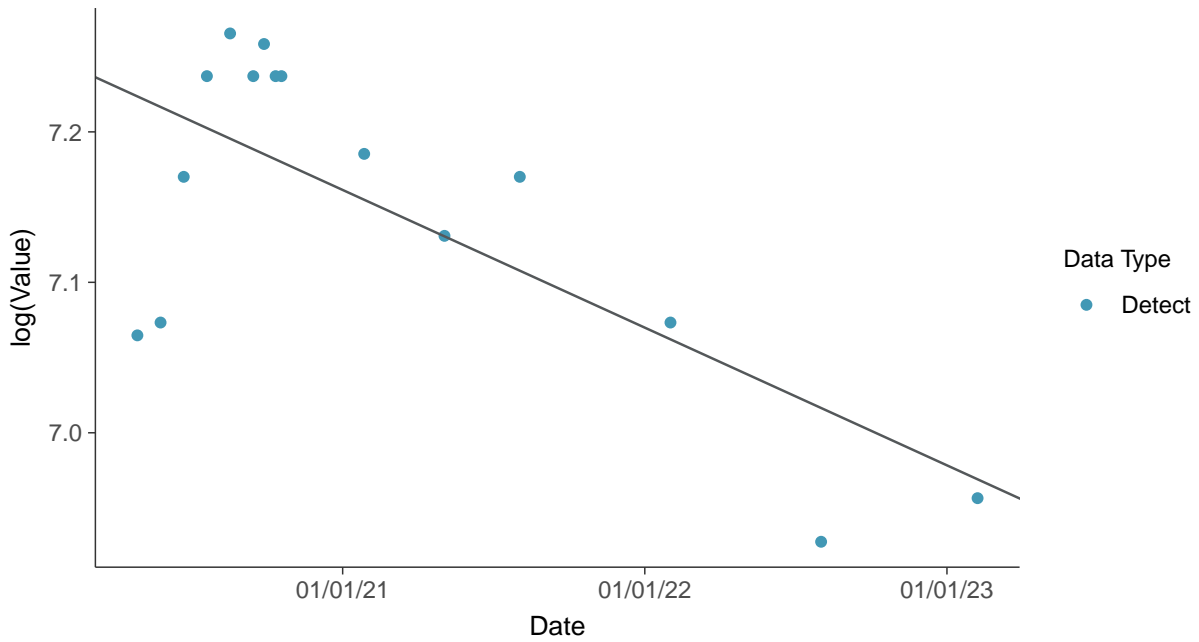
Gamma Q-Q plot

Total Dissolved Solids, MW-2 (mg/L)



Trend Regression: Lognormal MLE

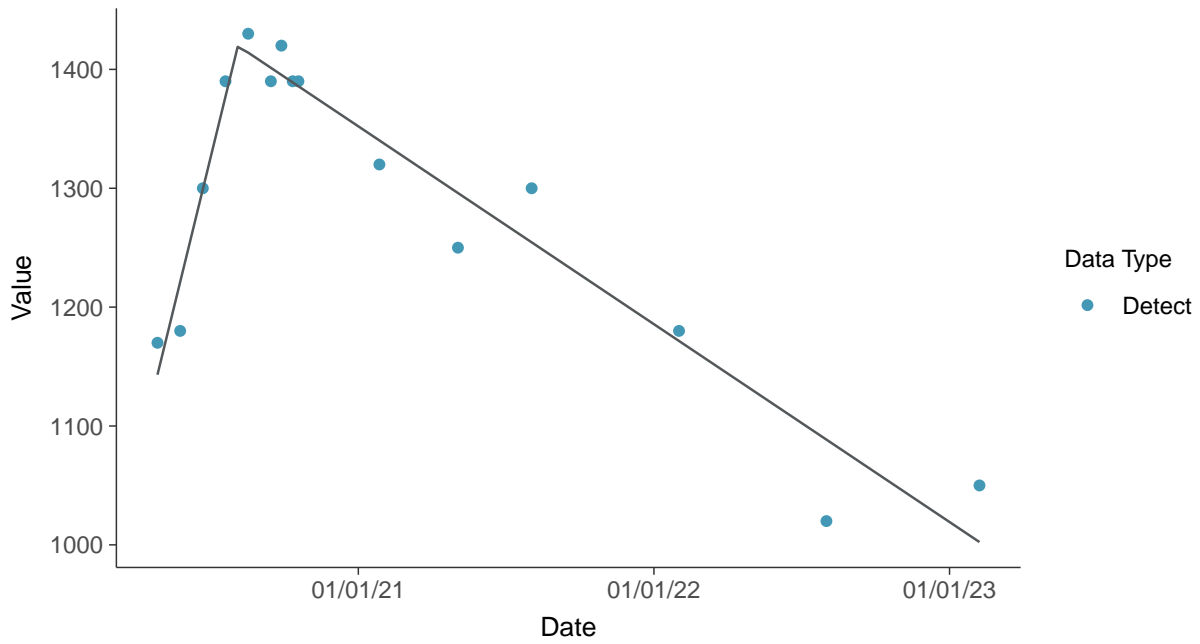
Total Dissolved Solids, MW-2 (mg/L)





Trend Regression: Piecewise Linear-Linear

Total Dissolved Solids, MW-2 (mg/L)



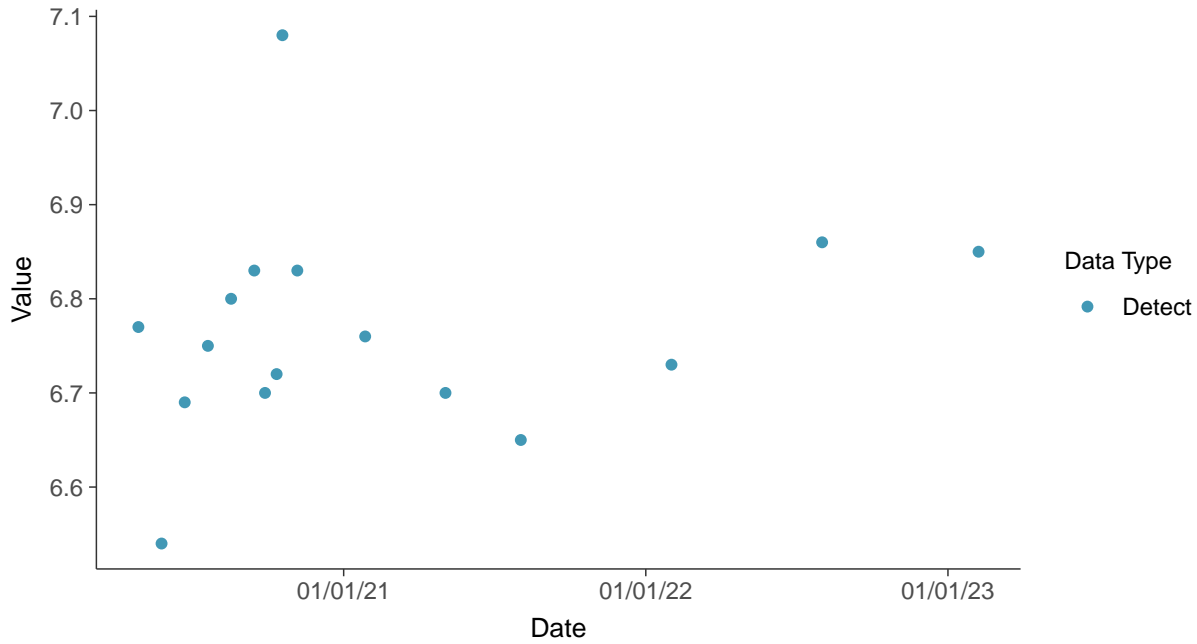


Appendix III: pH, Field, MW-2

ID: 02_1_07

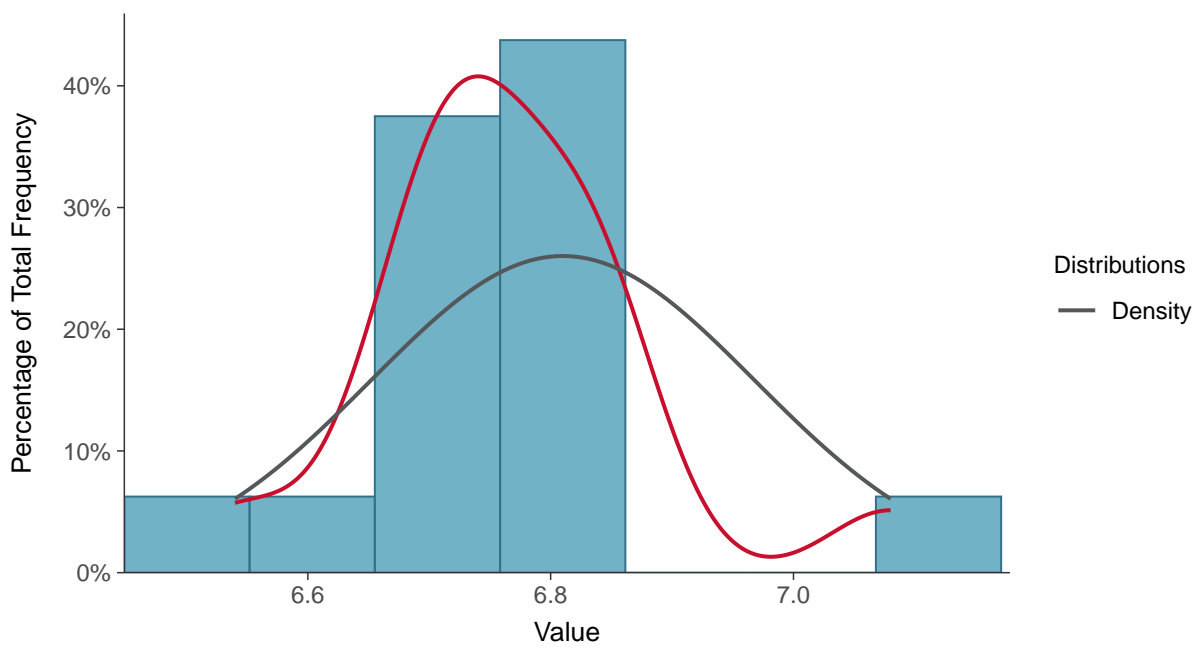
Scatter Plot

pH, Field, MW-2 (su)



Histogram

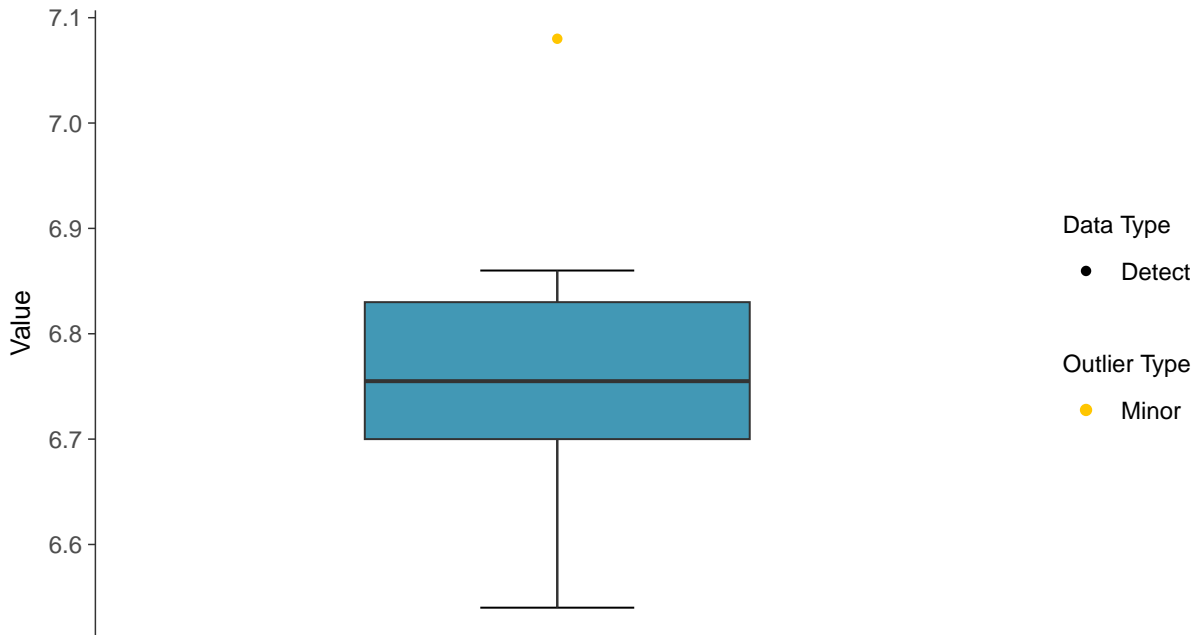
pH, Field, MW-2 (su)





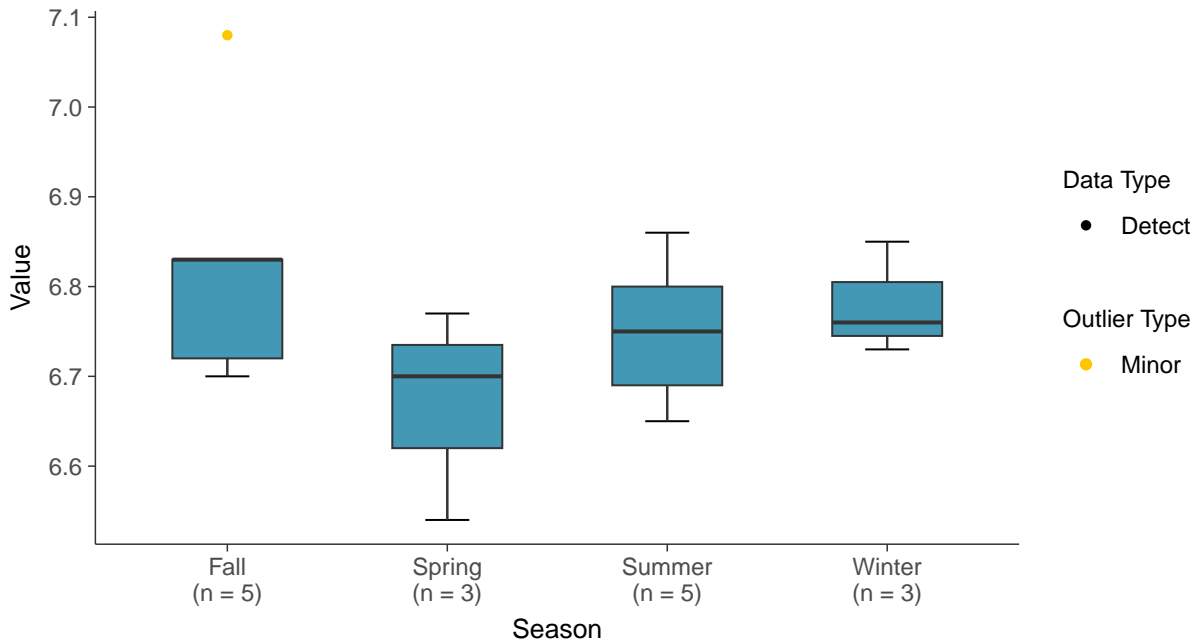
Boxplot

pH, Field, MW-2 (su)



Boxplot by Season

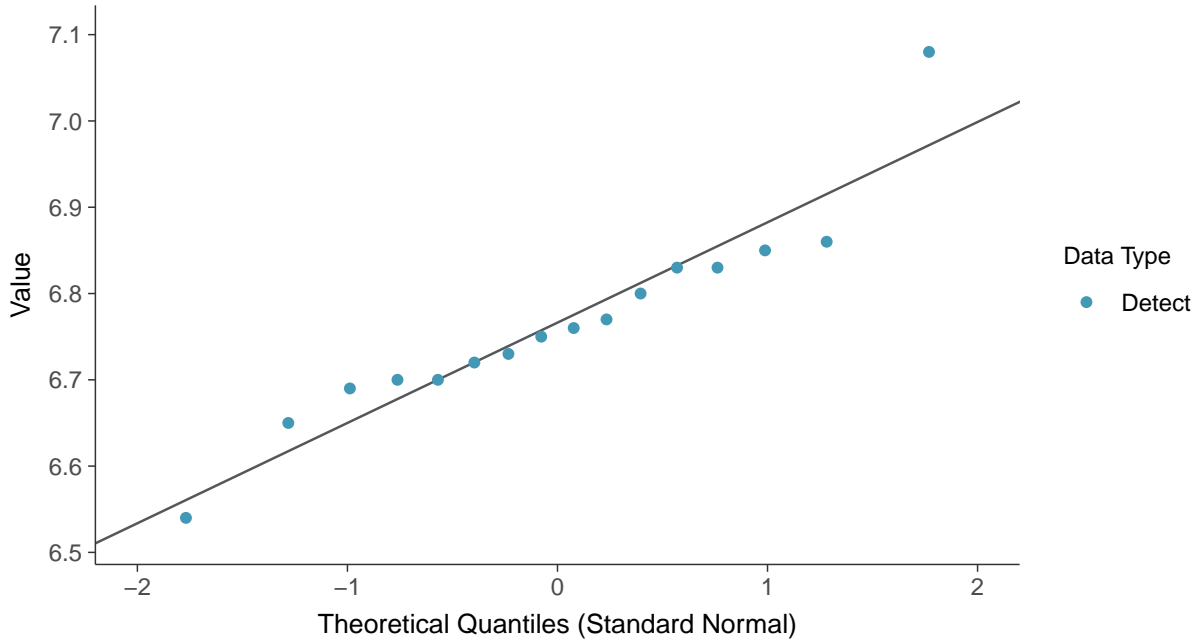
pH, Field, MW-2 (su)





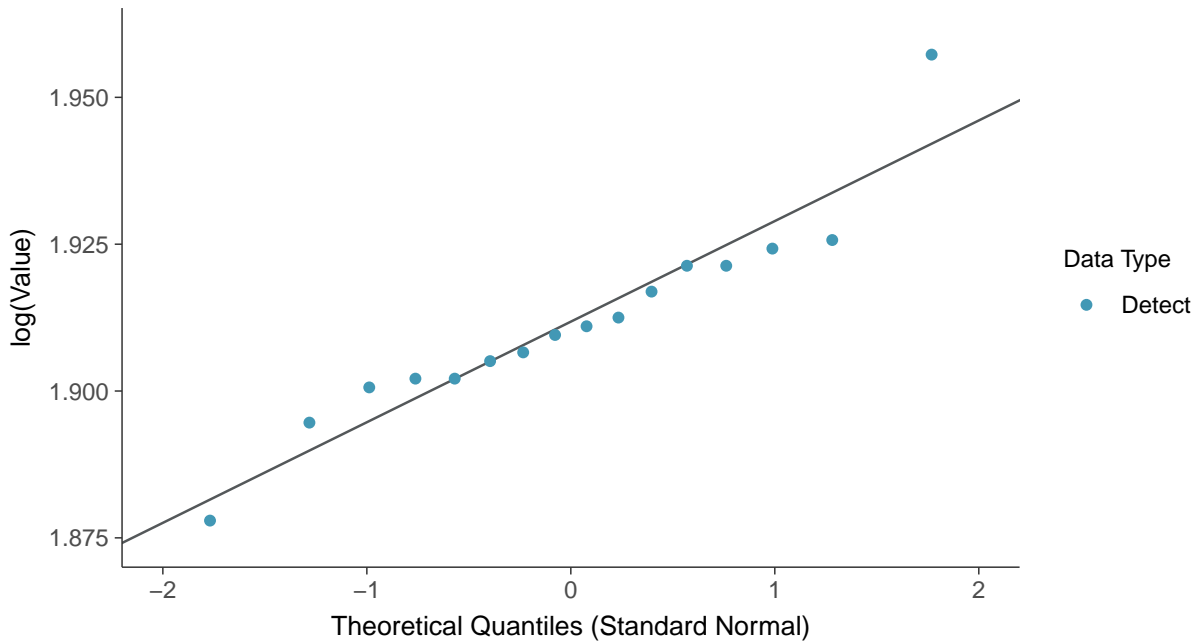
Normal Q-Q plot

pH, Field, MW-2 (su)



Lognormal Q-Q plot

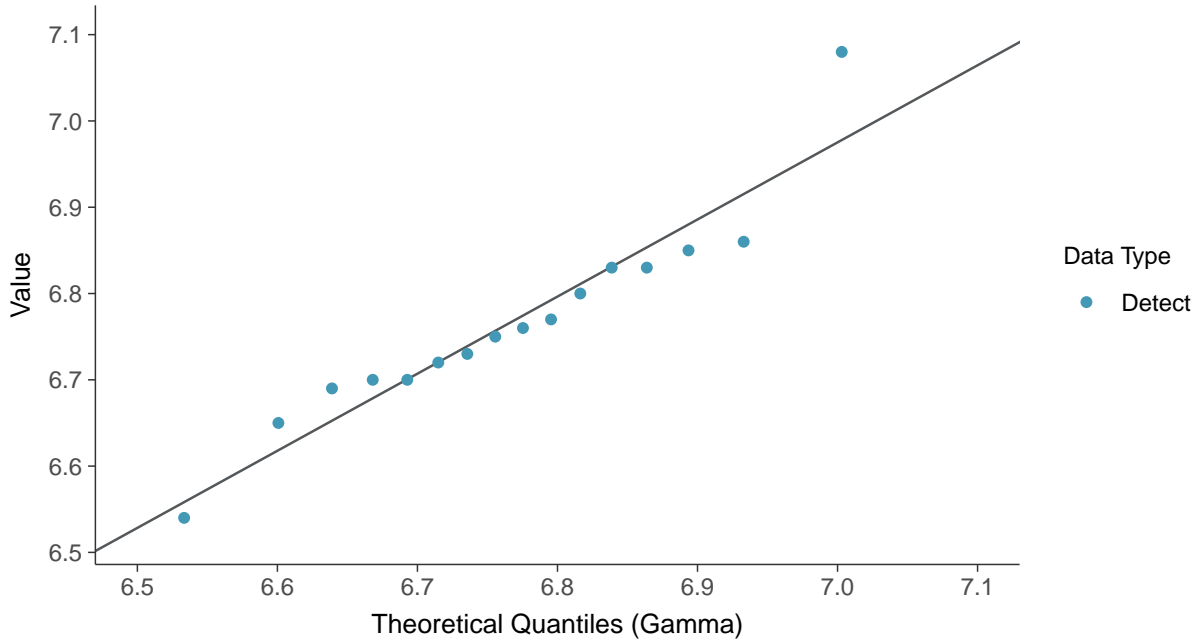
pH, Field, MW-2 (su)





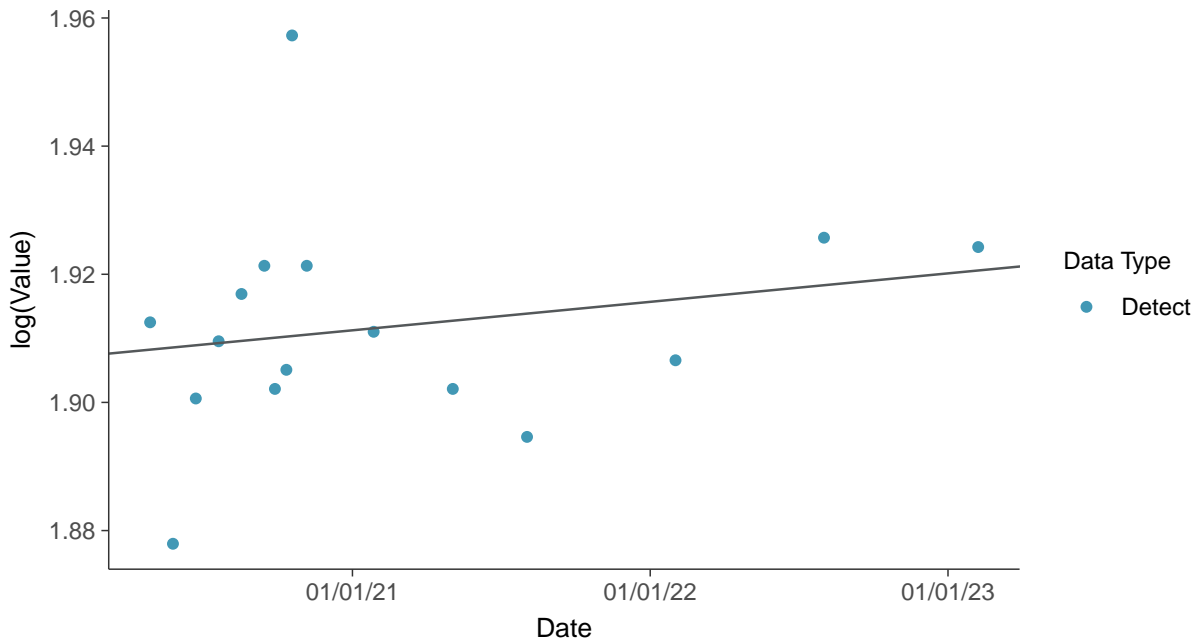
Gamma Q-Q plot

pH, Field, MW-2 (su)



Trend Regression: Lognormal MLE

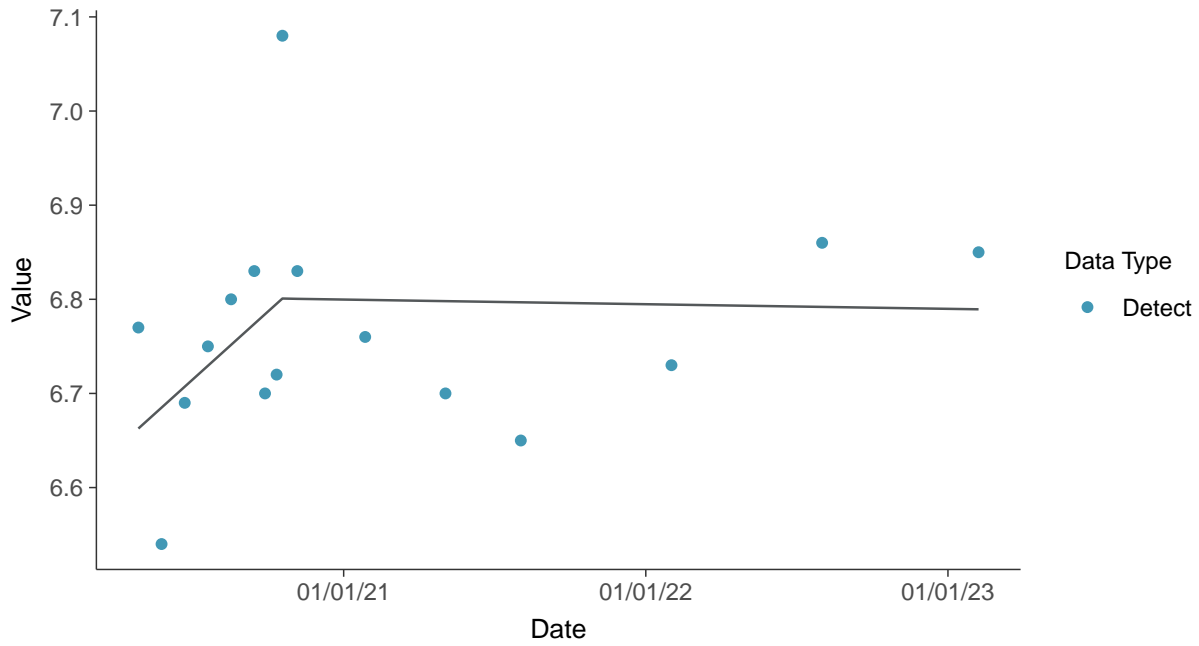
pH, Field, MW-2 (su)





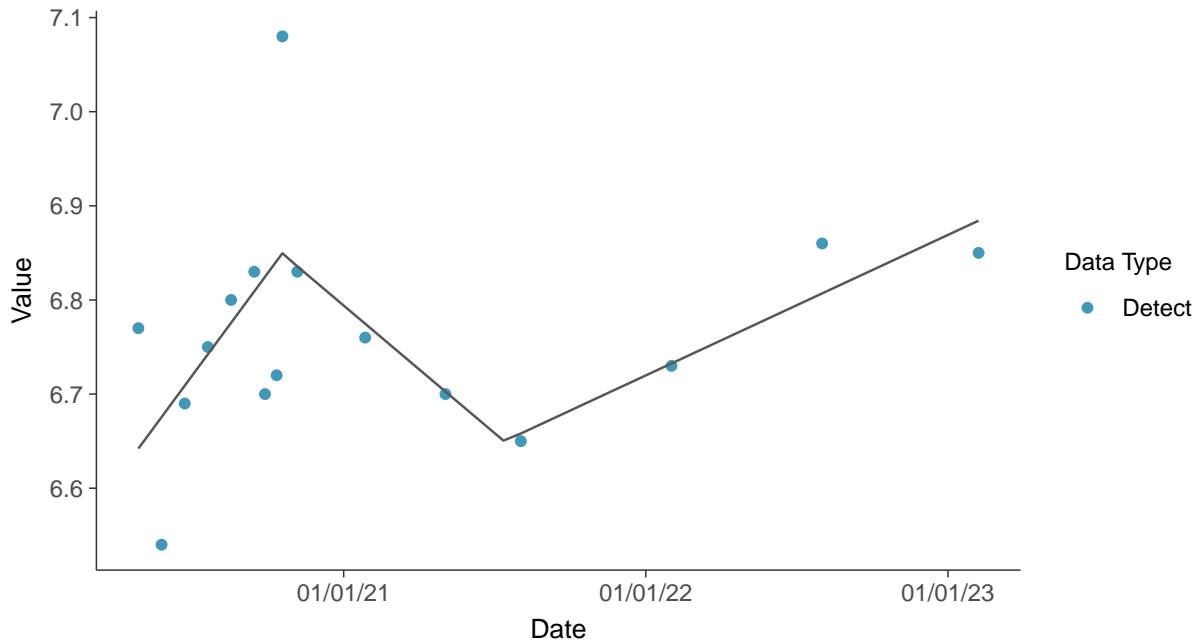
Trend Regression: Piecewise Linear-Linear

pH, Field, MW-2 (su)



Trend Regression: Piecewise Linear-Linear-Linear

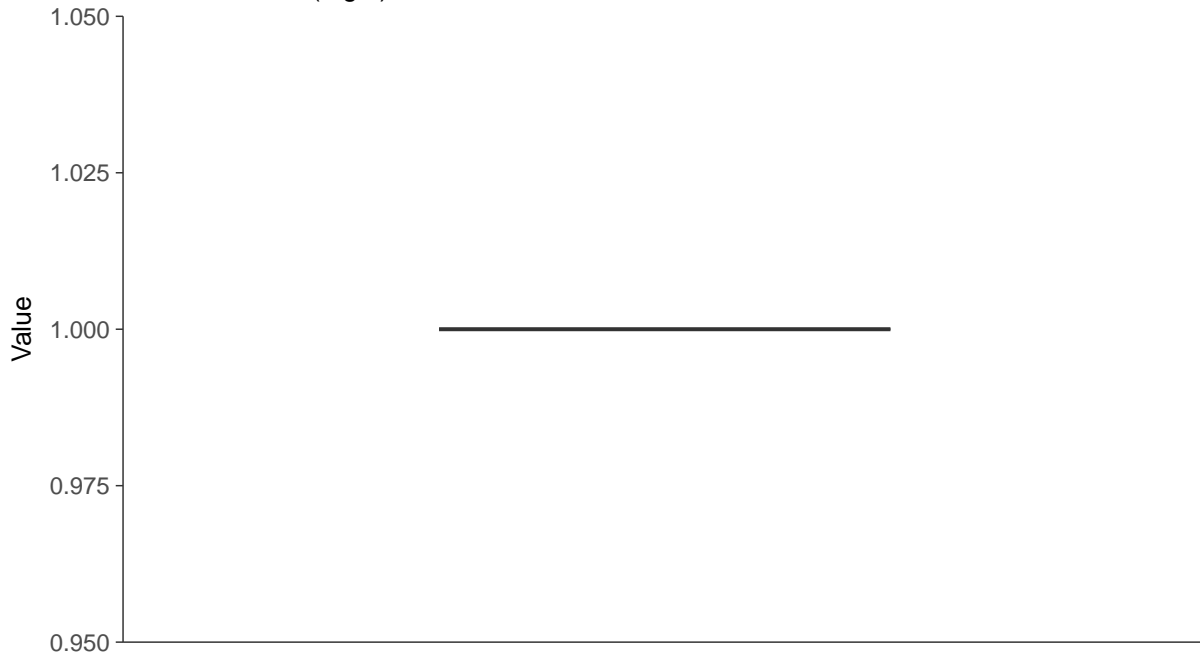
pH, Field, MW-2 (su)





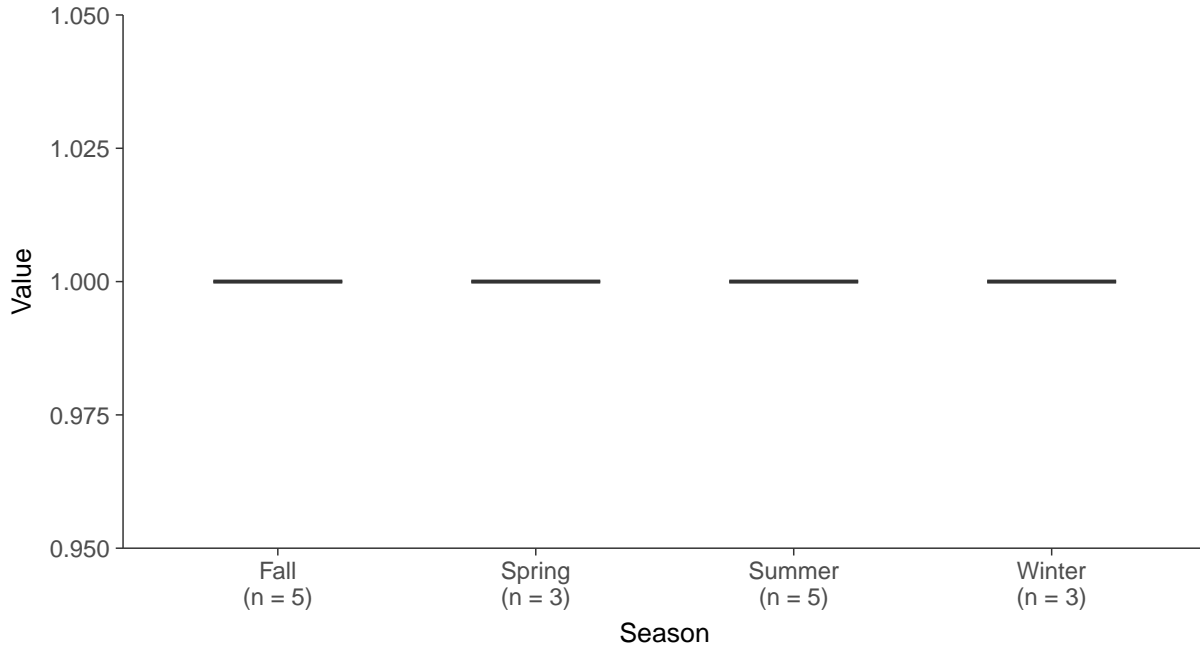
Boxplot

Fluoride, MW-2 (mg/L)



Boxplot by Season

Fluoride, MW-2 (mg/L)





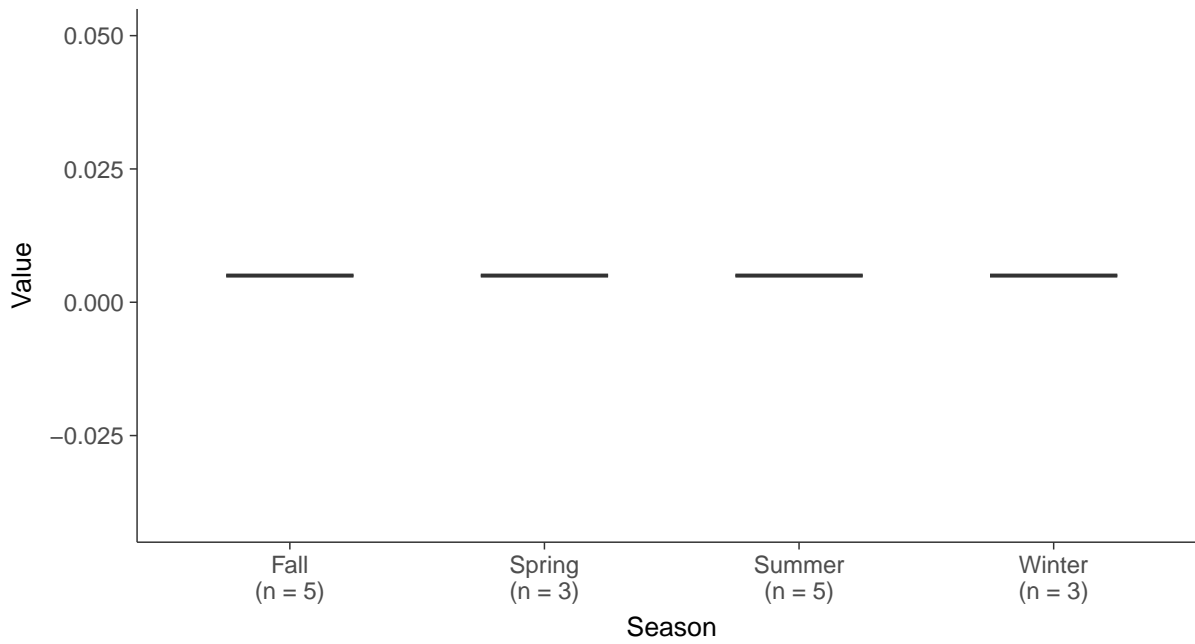
Boxplot

Antimony, MW-2 (mg/L)



Boxplot by Season

Antimony, MW-2 (mg/L)



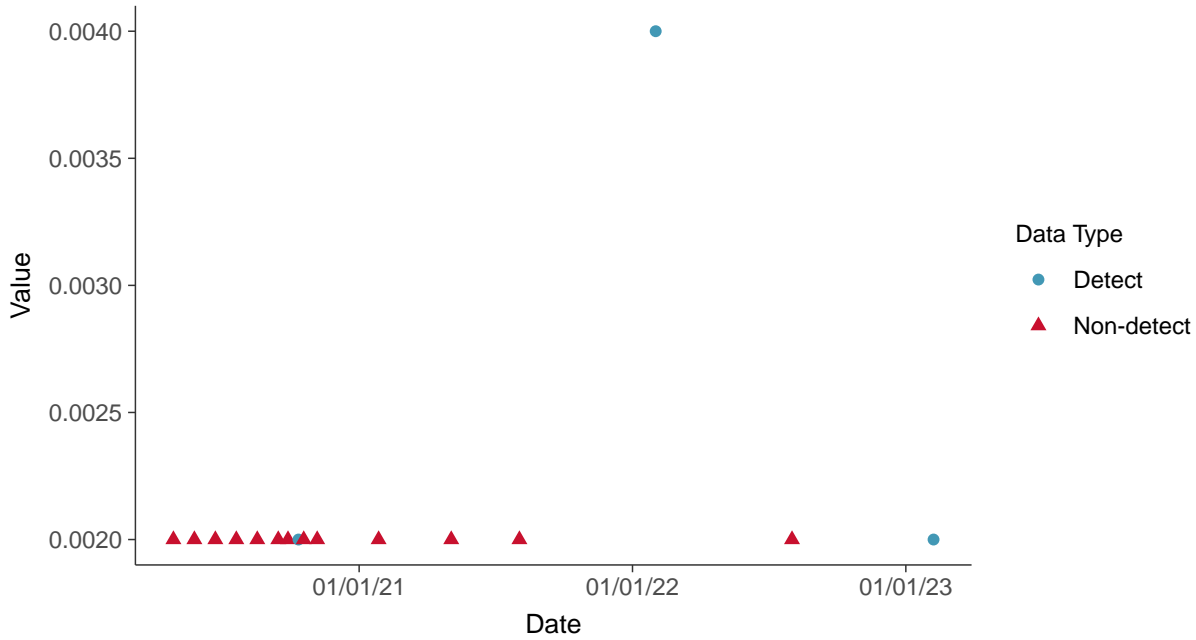


Appendix IV: Arsenic, MW-2

ID: 02_2_09

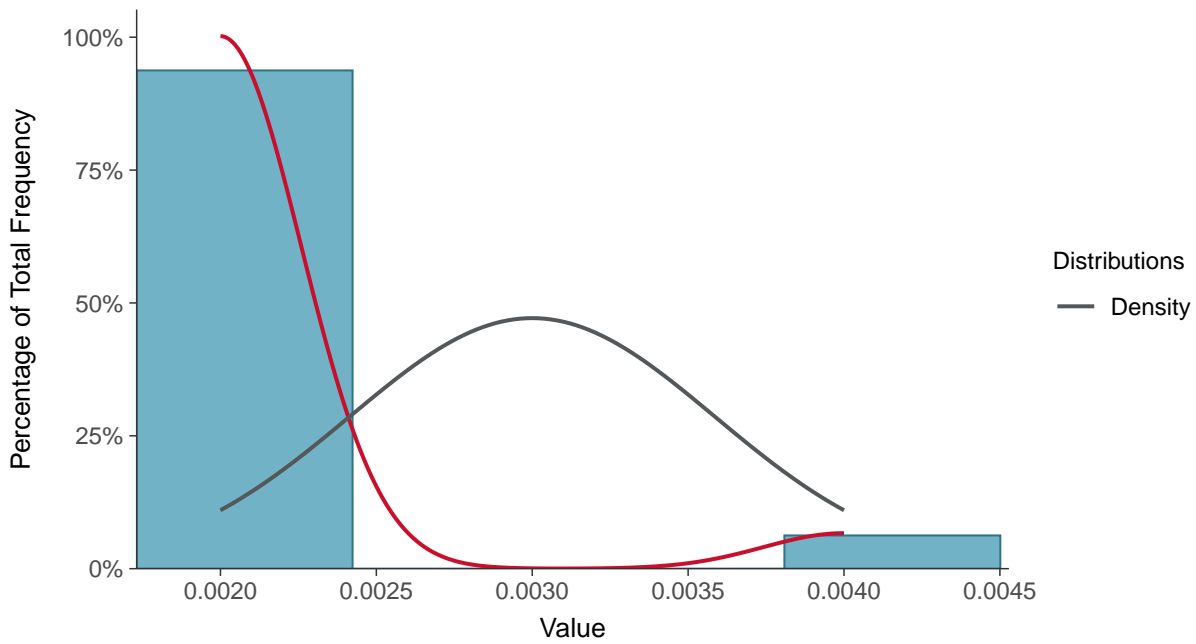
Scatter Plot

Arsenic, MW-2 (mg/L)



Histogram

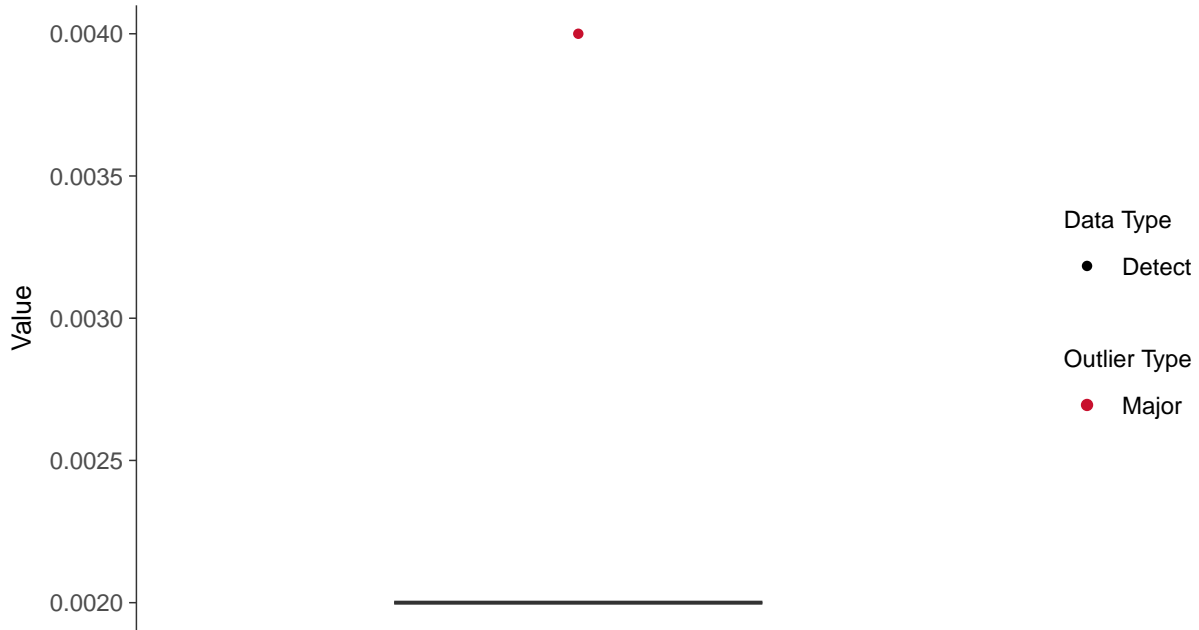
Arsenic, MW-2 (mg/L)





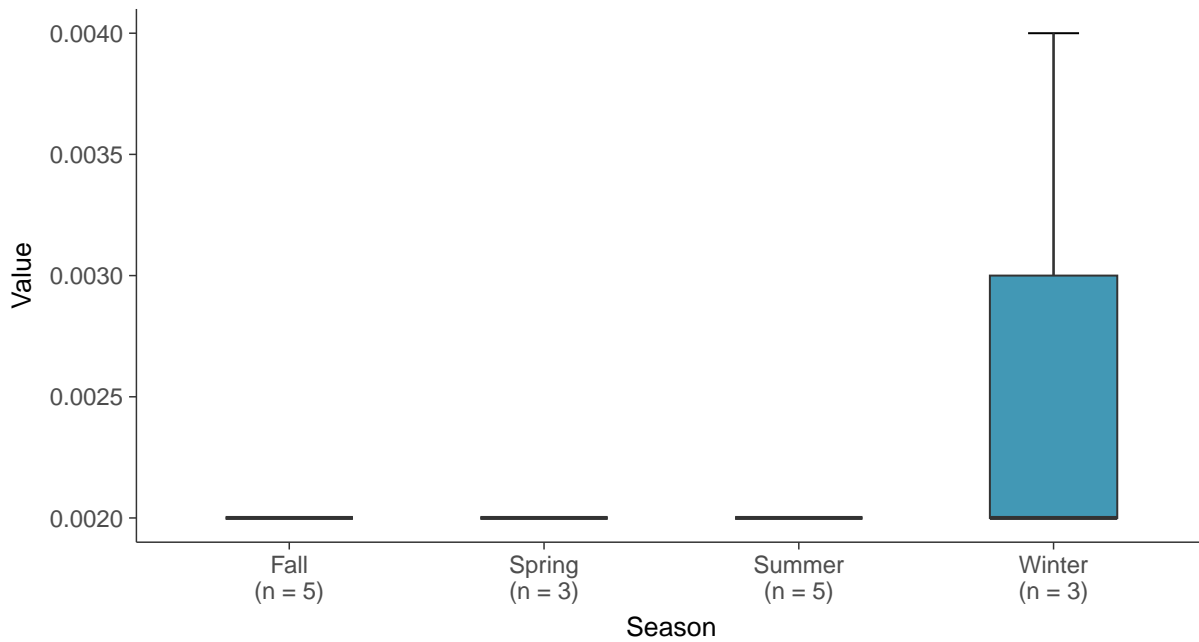
Boxplot

Arsenic, MW-2 (mg/L)



Boxplot by Season

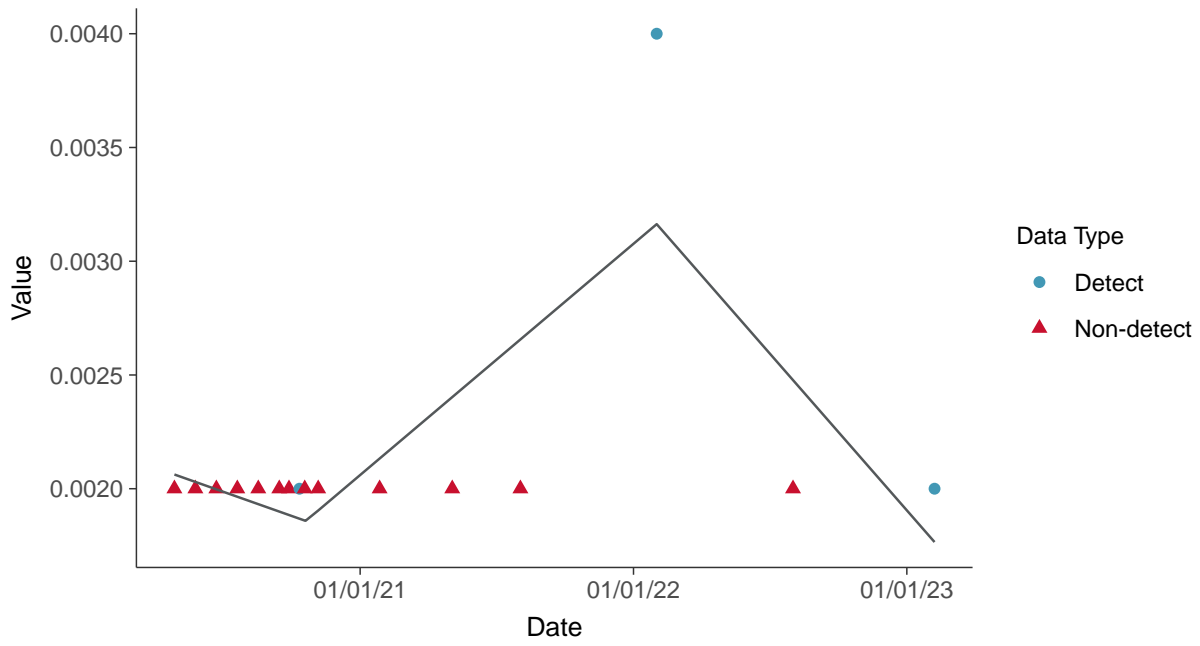
Arsenic, MW-2 (mg/L)





Trend Regression: Piecewise Linear-Linear-Linear

Arsenic, MW-2 (mg/L)

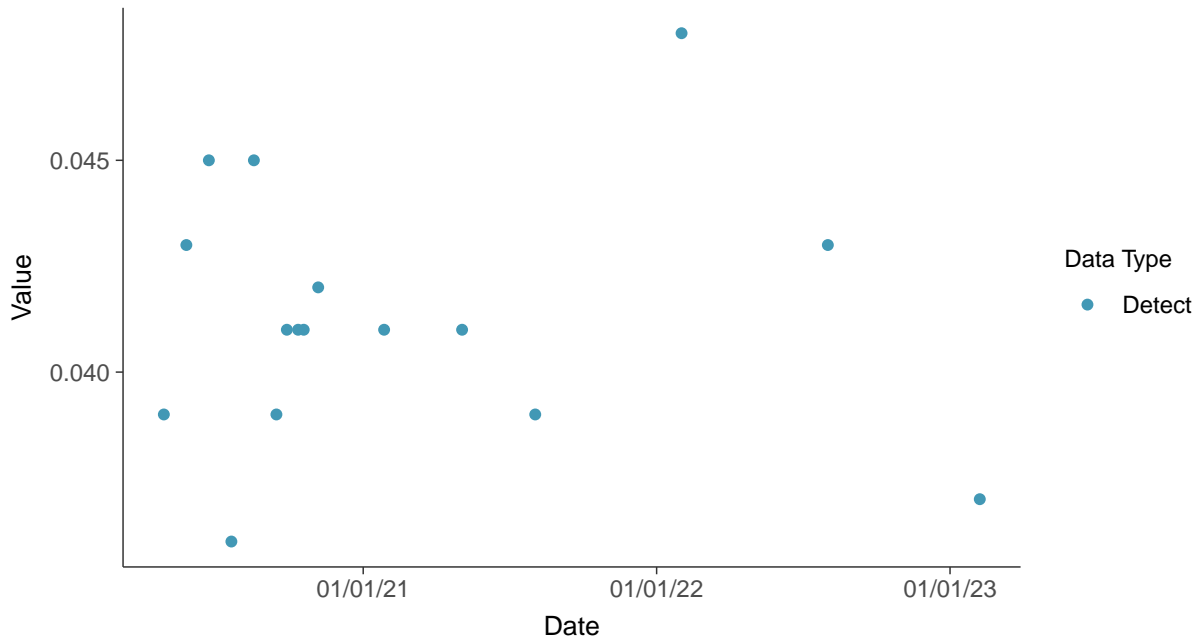


Appendix IV: Barium, MW-2

ID: 02_2_10

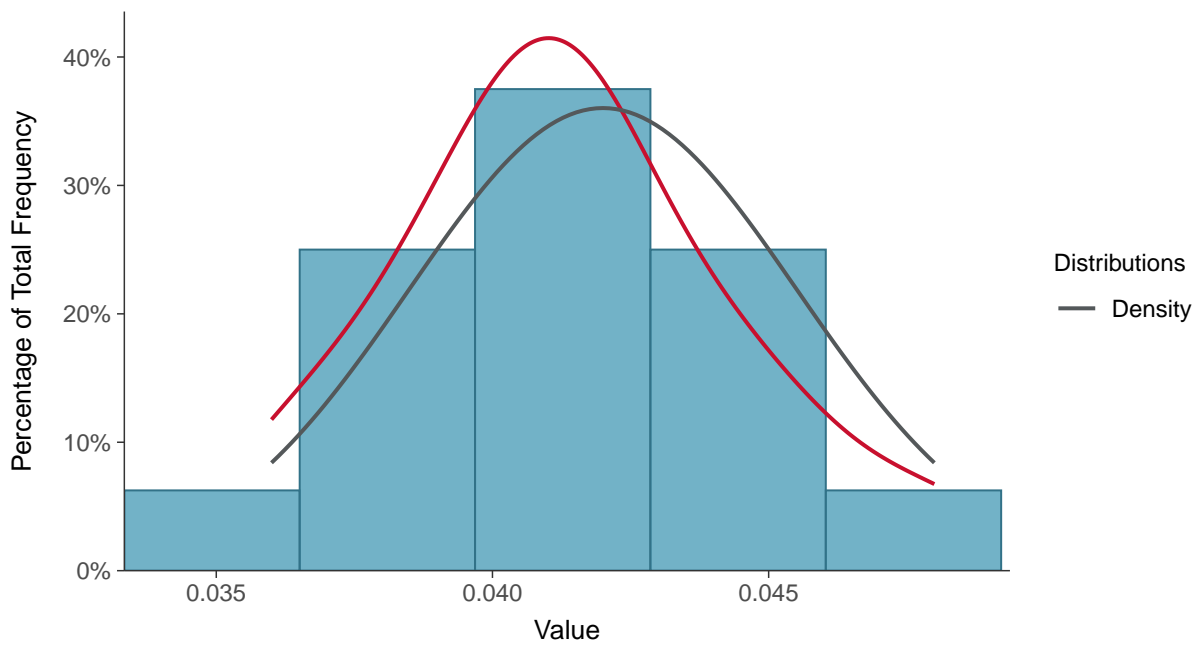
Scatter Plot

Barium, MW-2 (mg/L)



Histogram

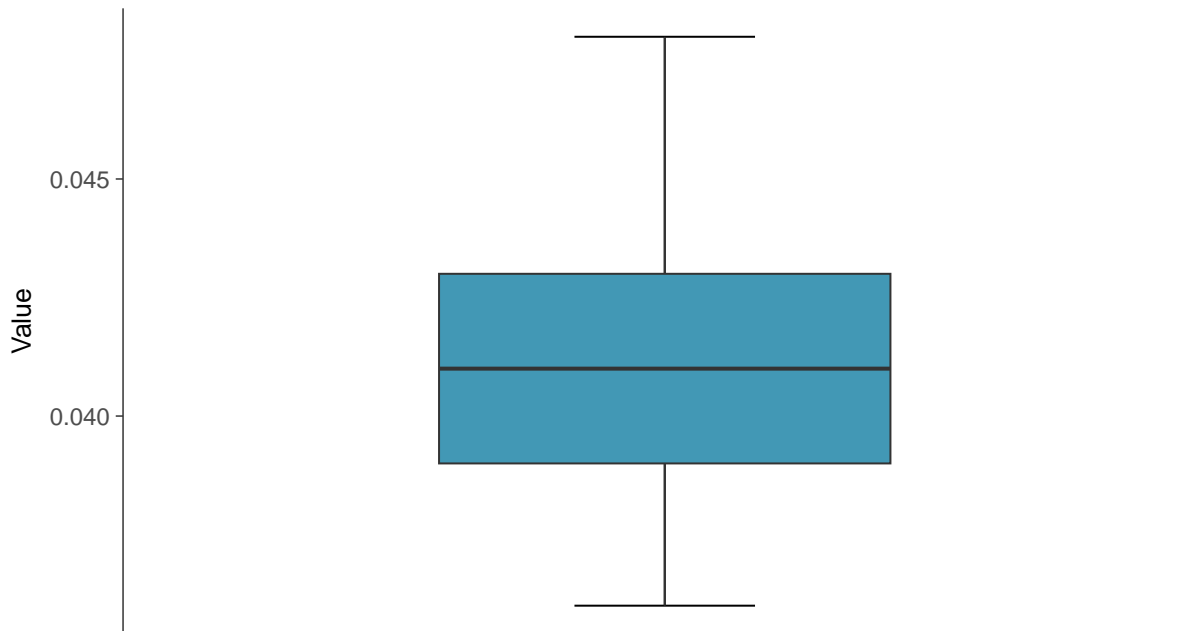
Barium, MW-2 (mg/L)





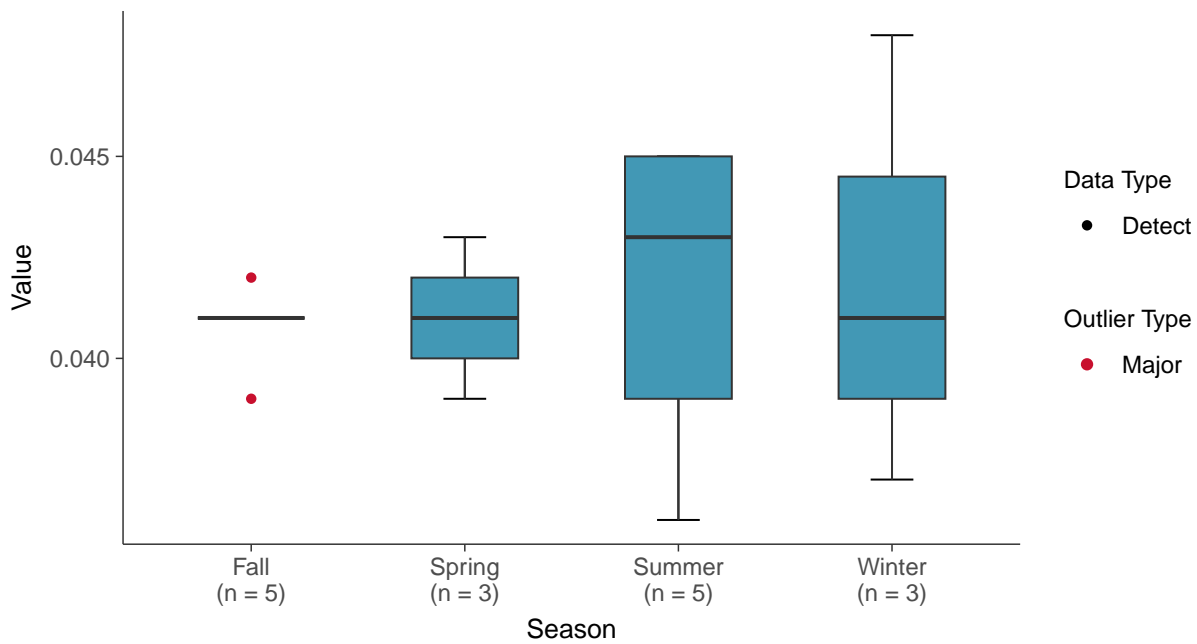
Boxplot

Barium, MW-2 (mg/L)



Boxplot by Season

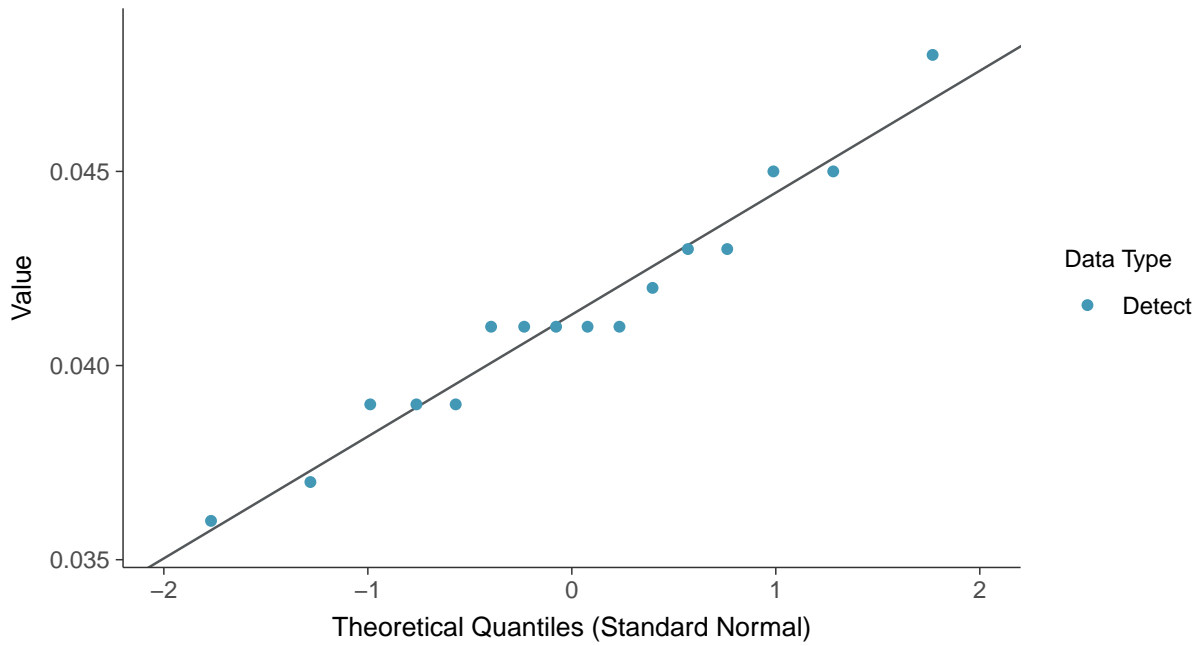
Barium, MW-2 (mg/L)





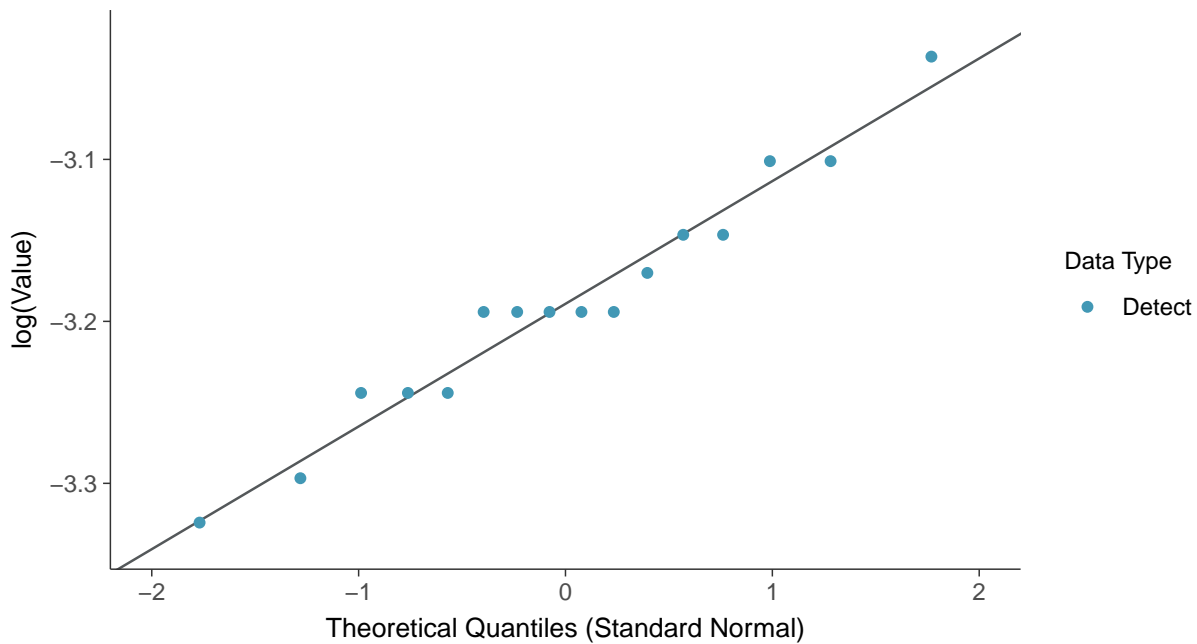
Normal Q-Q plot

Barium, MW-2 (mg/L)



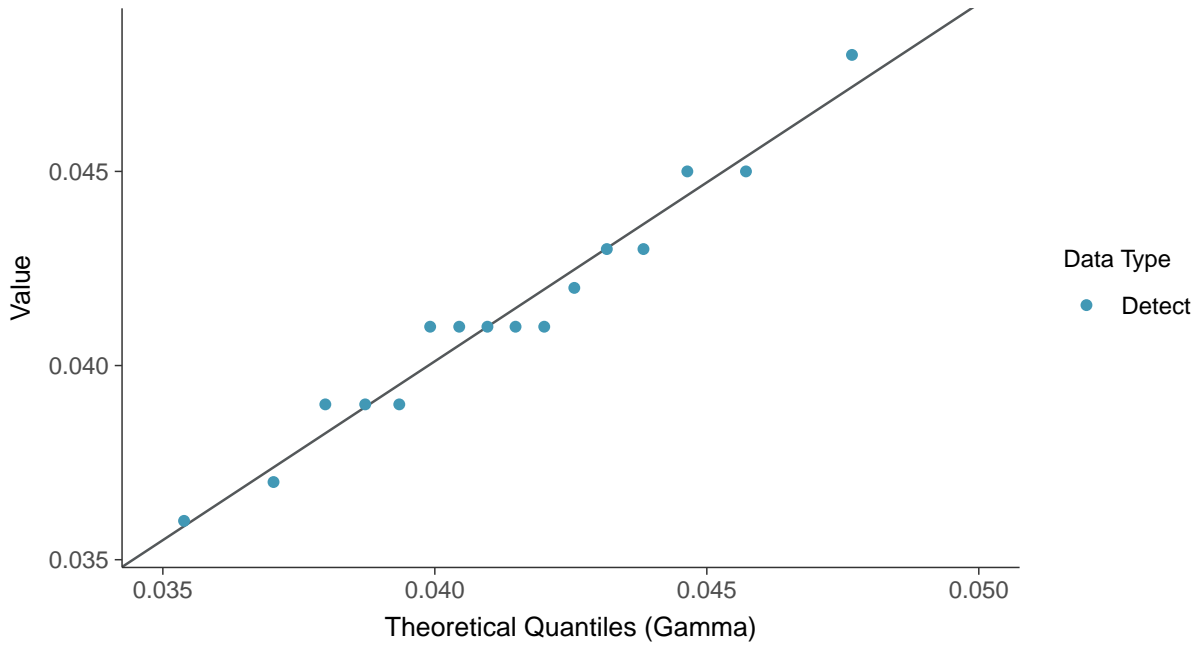
Lognormal Q-Q plot

Barium, MW-2 (mg/L)

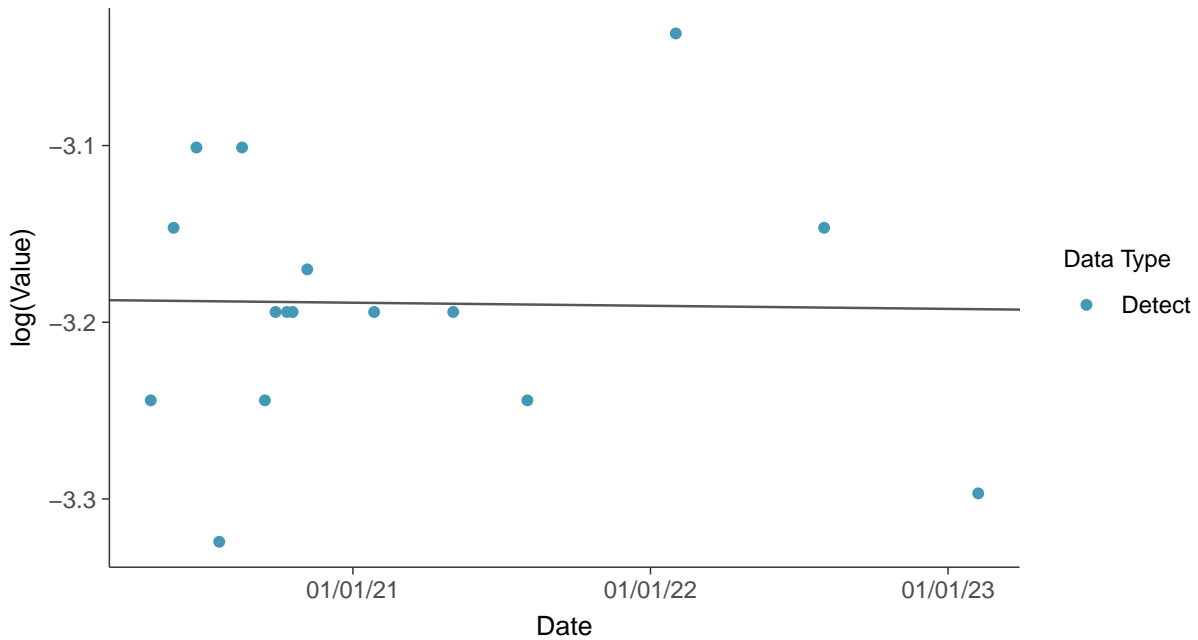




Gamma Q-Q plot
Barium, MW-2 (mg/L)



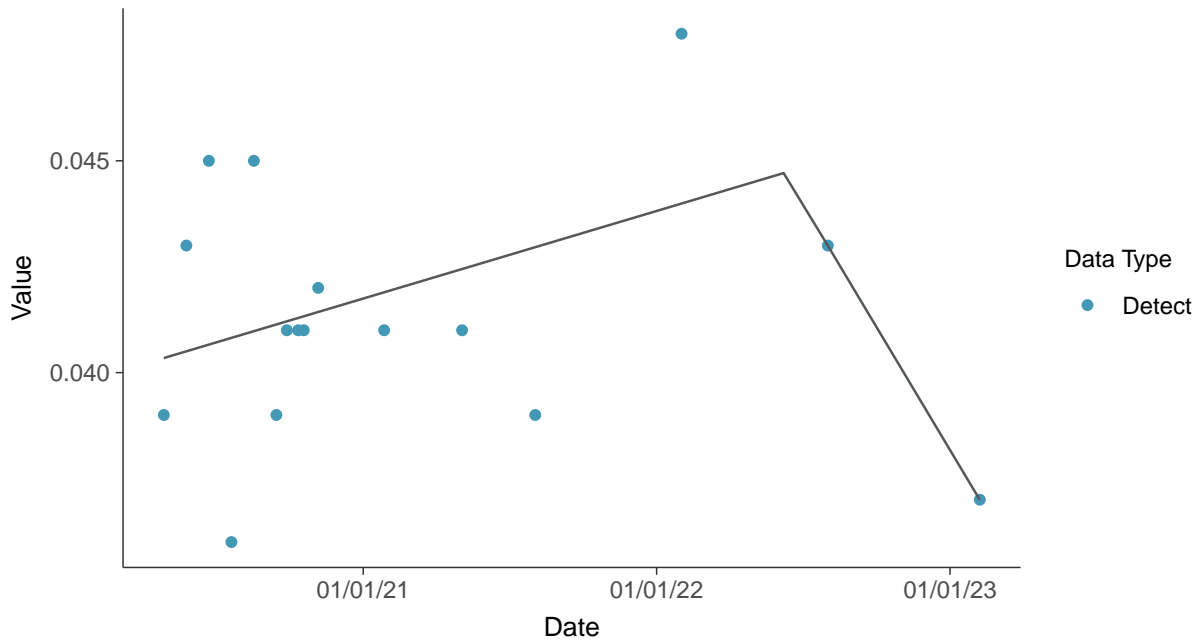
Trend Regression: Lognormal MLE
Barium, MW-2 (mg/L)





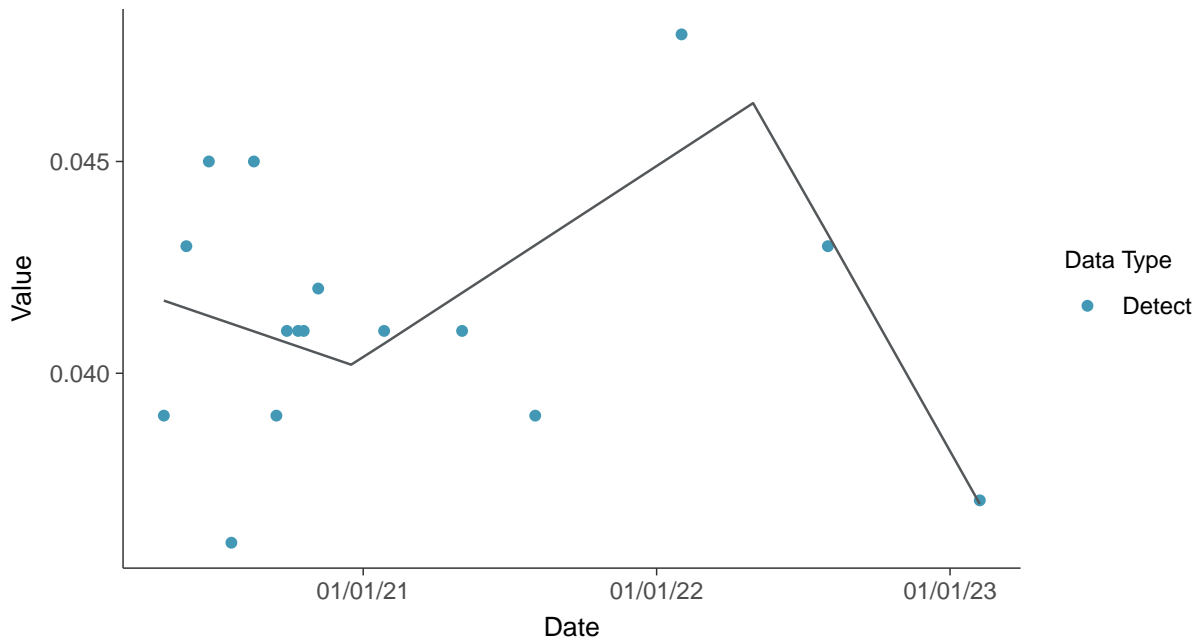
Trend Regression: Piecewise Linear-Linear

Barium, MW-2 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Barium, MW-2 (mg/L)

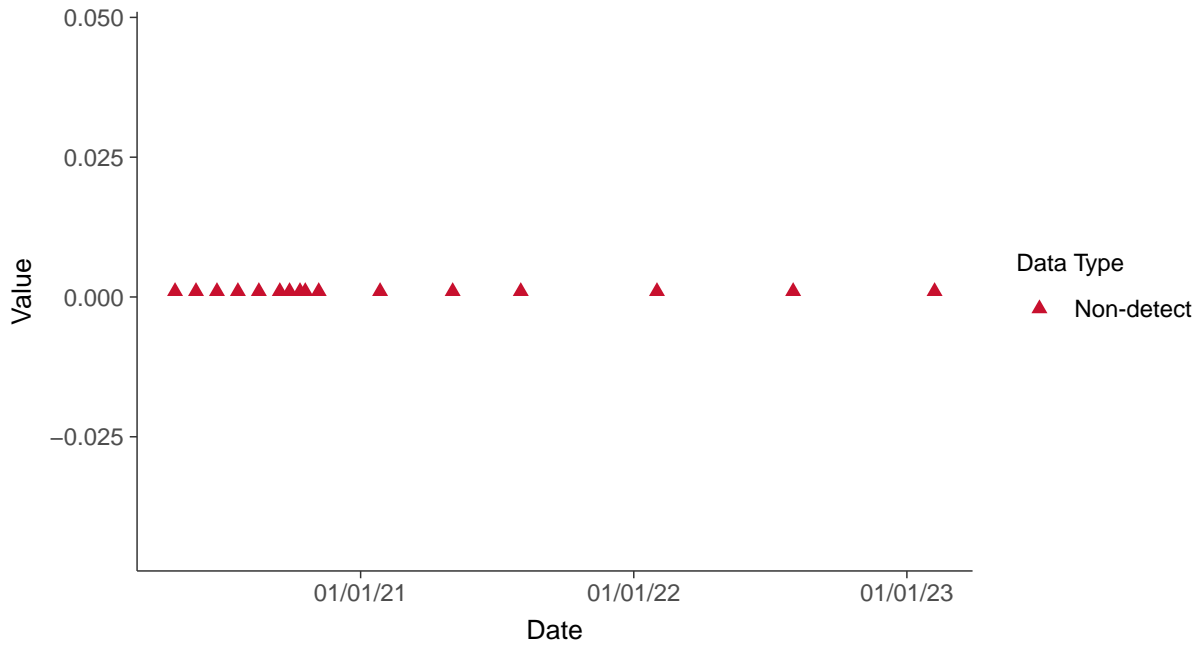


Appendix IV: Beryllium, MW-2

ID: 02_2_11

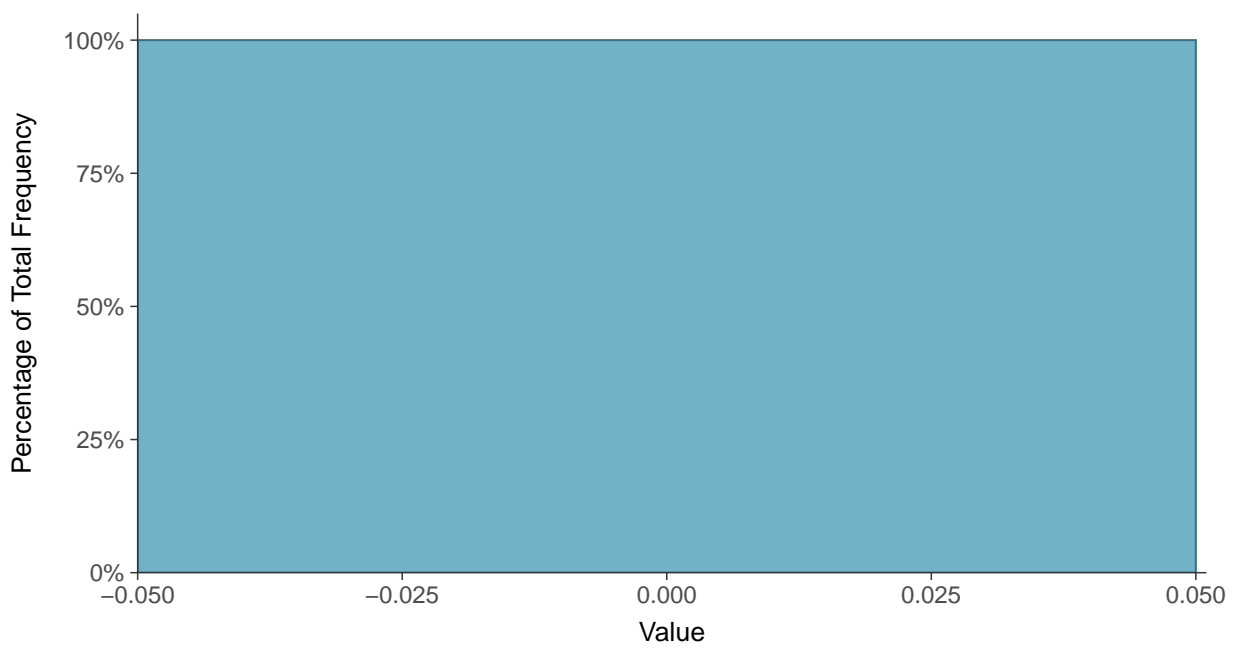
Scatter Plot

Beryllium, MW-2 (mg/L)



Histogram

Beryllium, MW-2 (mg/L)





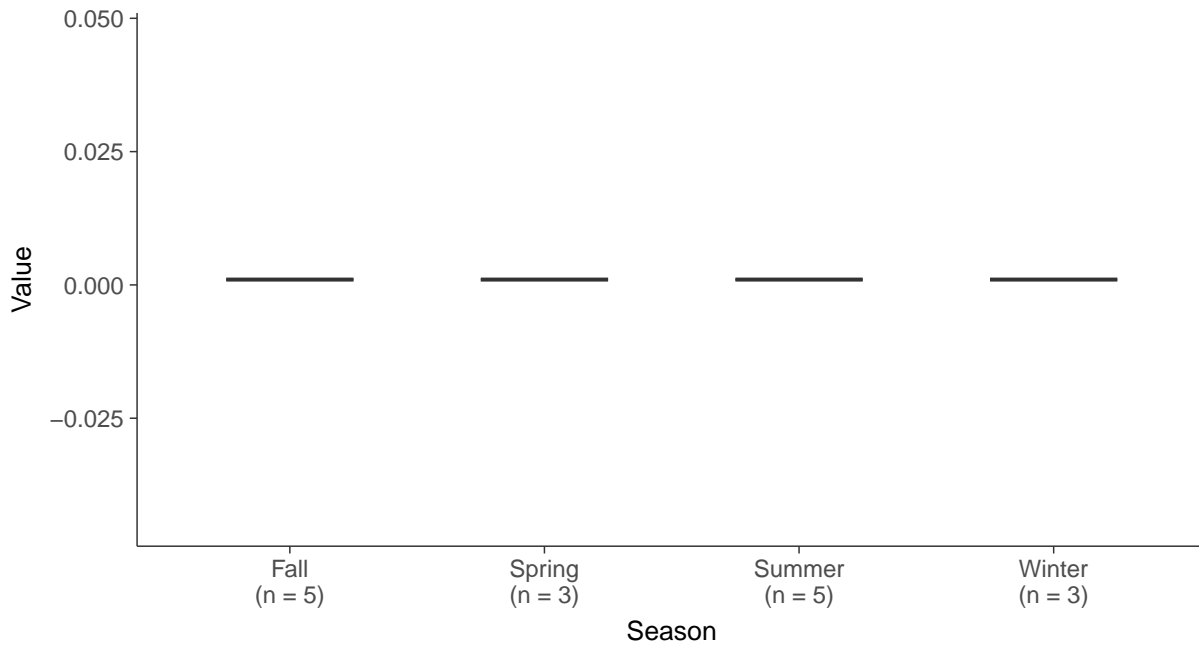
Boxplot

Beryllium, MW-2 (mg/L)



Boxplot by Season

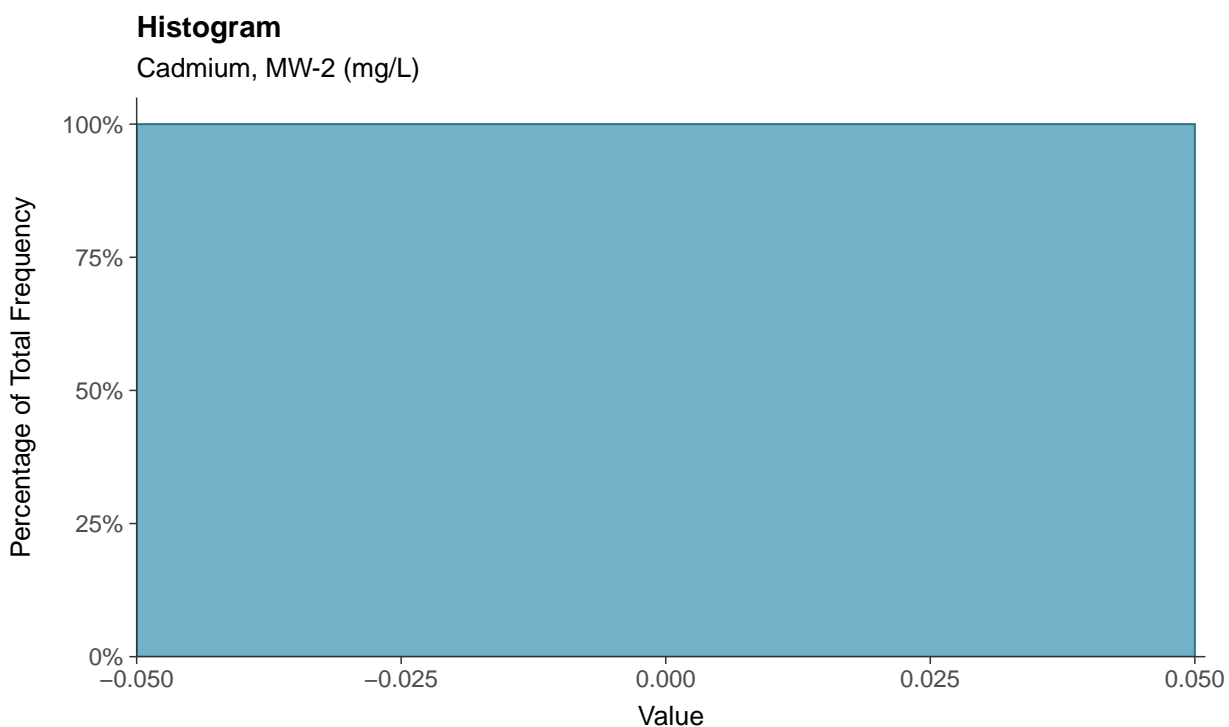
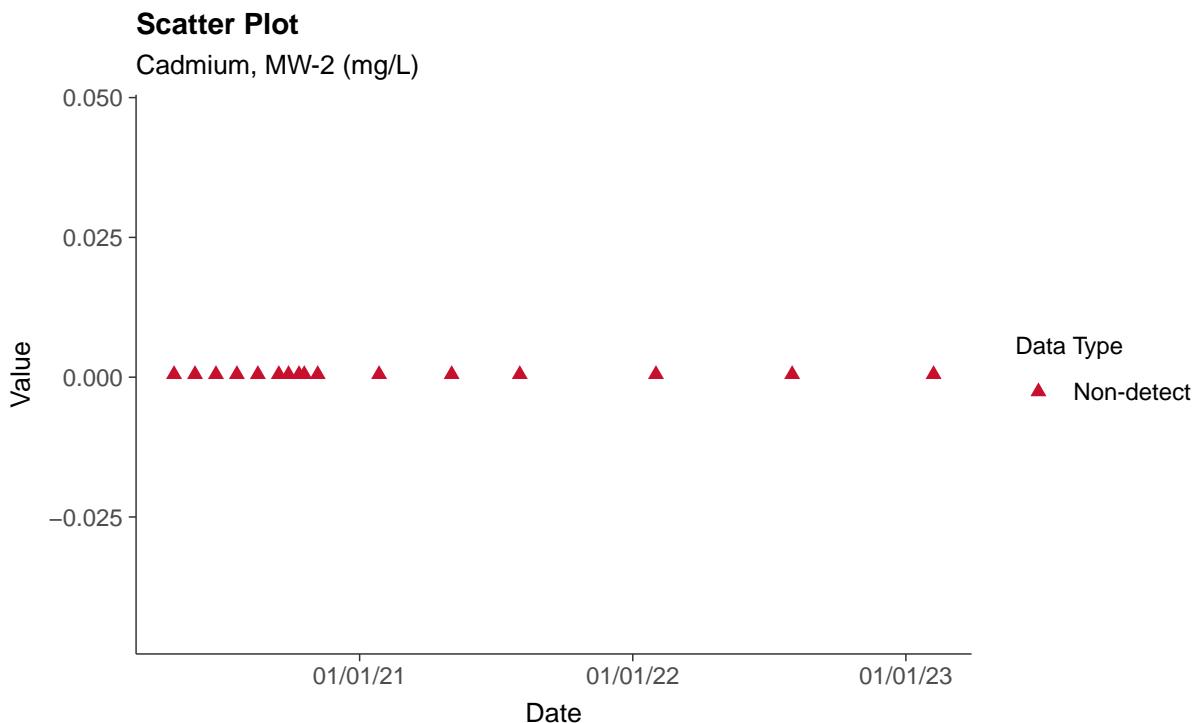
Beryllium, MW-2 (mg/L)





Appendix IV: Cadmium, MW-2

ID: 02_2_13





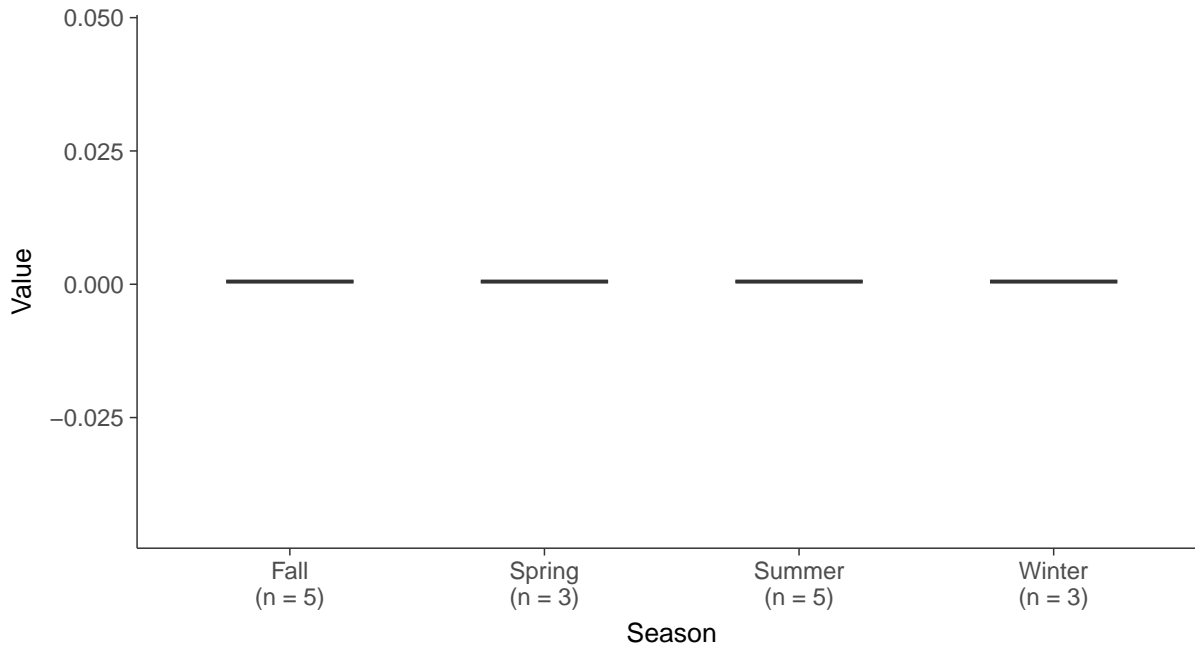
Boxplot

Cadmium, MW-2 (mg/L)



Boxplot by Season

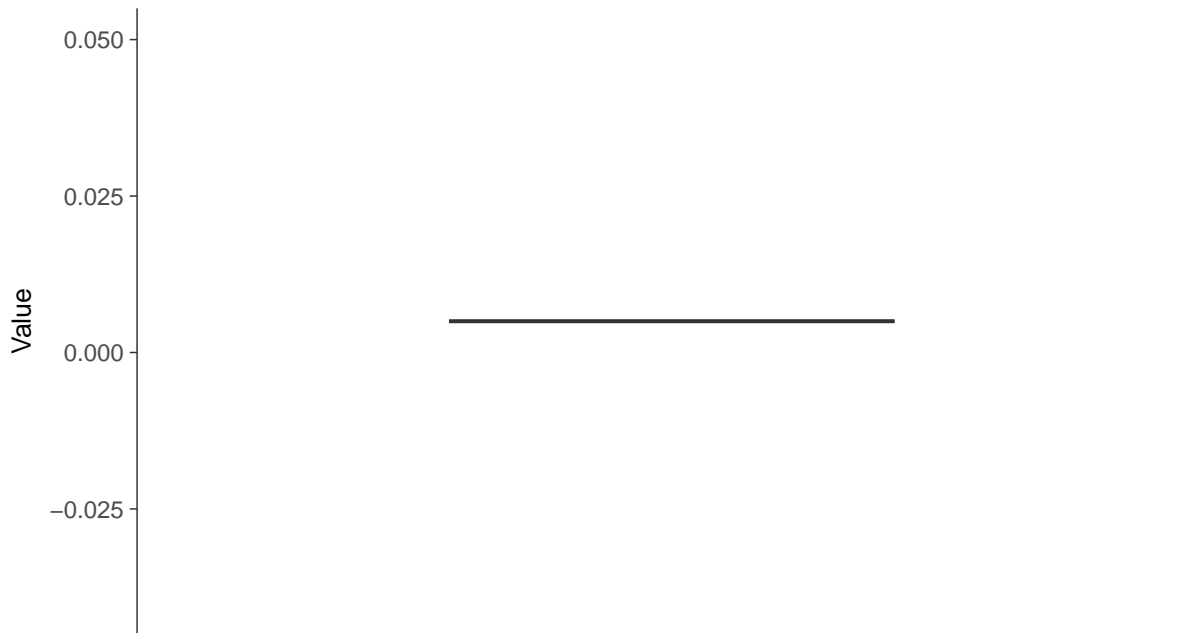
Cadmium, MW-2 (mg/L)





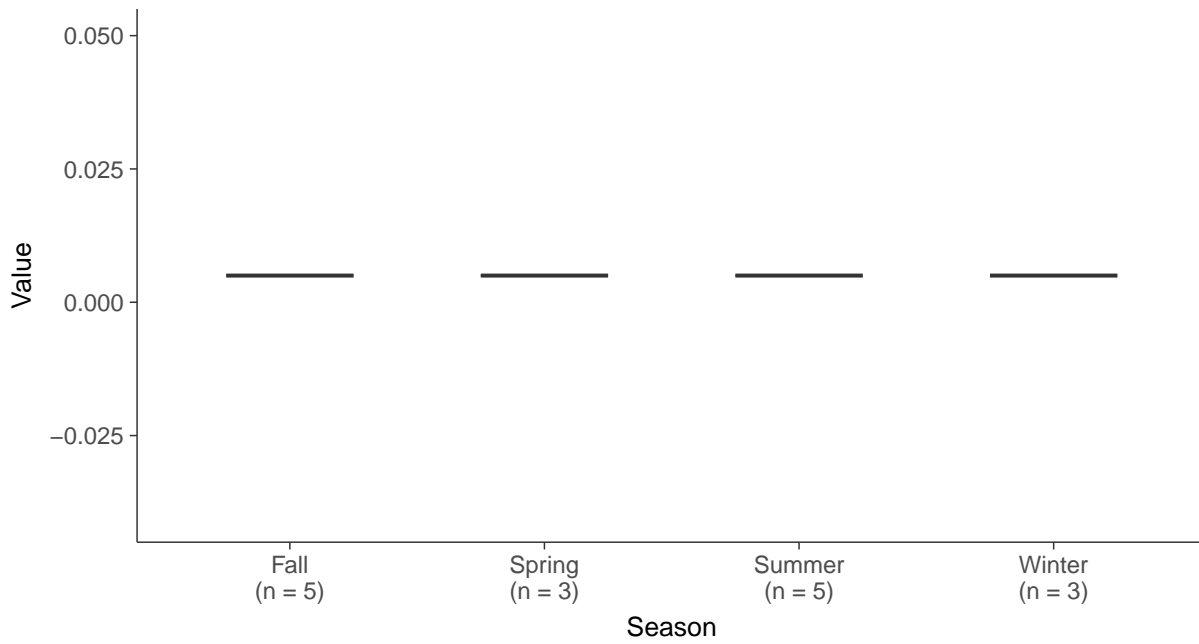
Boxplot

Chromium, MW-2 (mg/L)



Boxplot by Season

Chromium, MW-2 (mg/L)





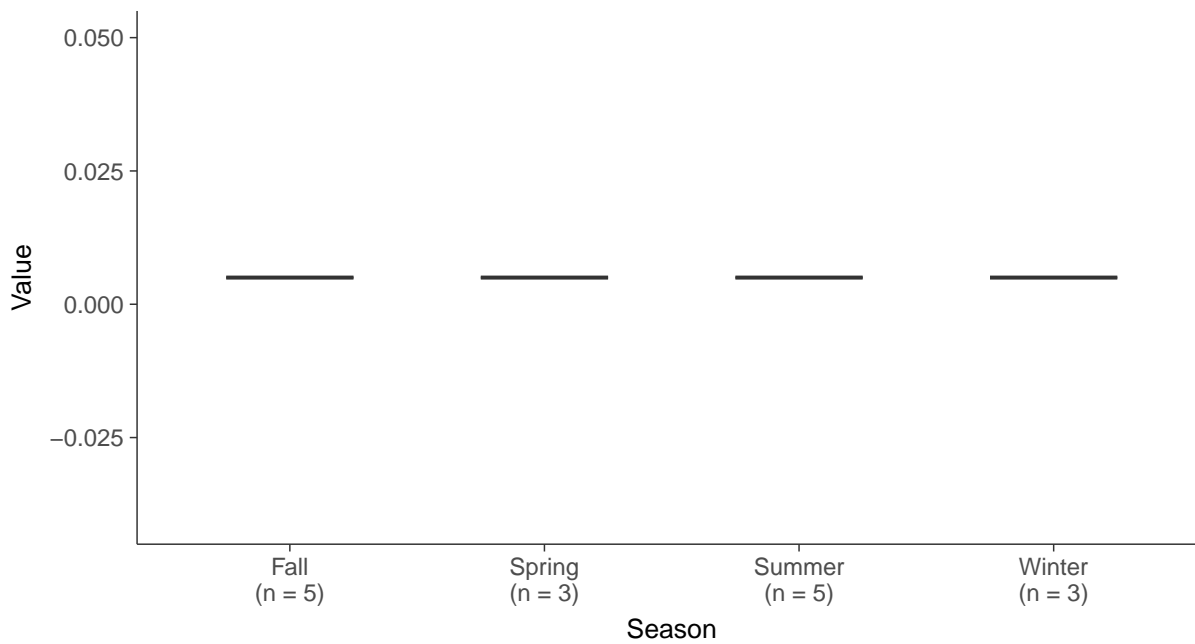
Boxplot

Cobalt, MW-2 (mg/L)



Boxplot by Season

Cobalt, MW-2 (mg/L)





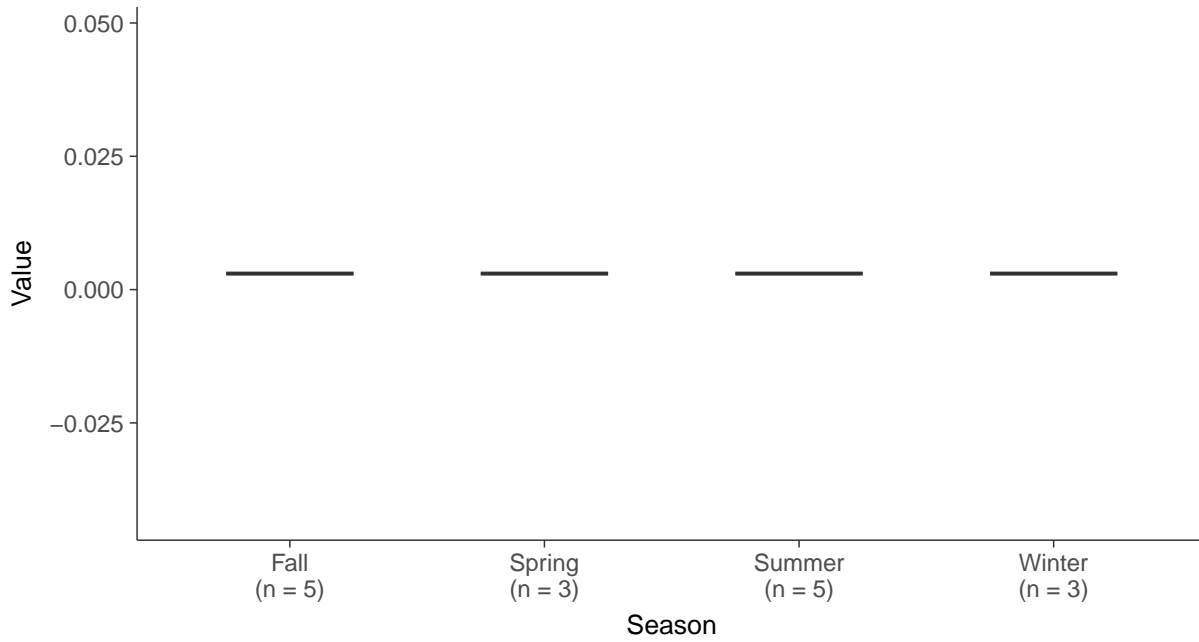
Boxplot

Lead, MW-2 (mg/L)



Boxplot by Season

Lead, MW-2 (mg/L)



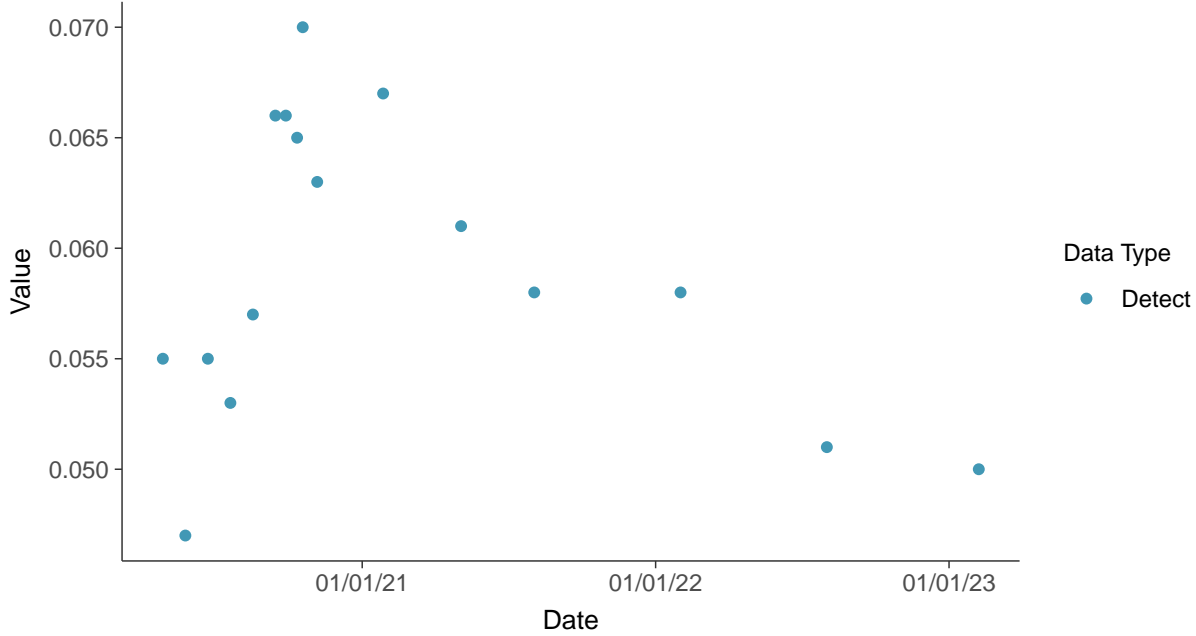


Appendix IV: Lithium, MW-2

ID: 02_2_19

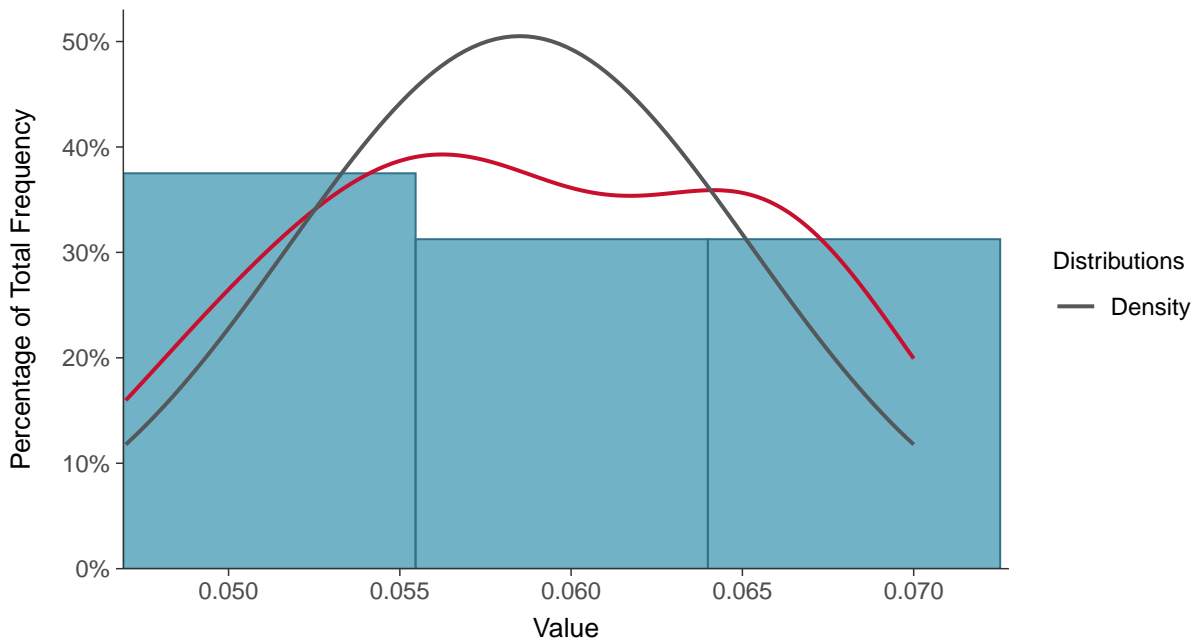
Scatter Plot

Lithium, MW-2 (mg/L)



Histogram

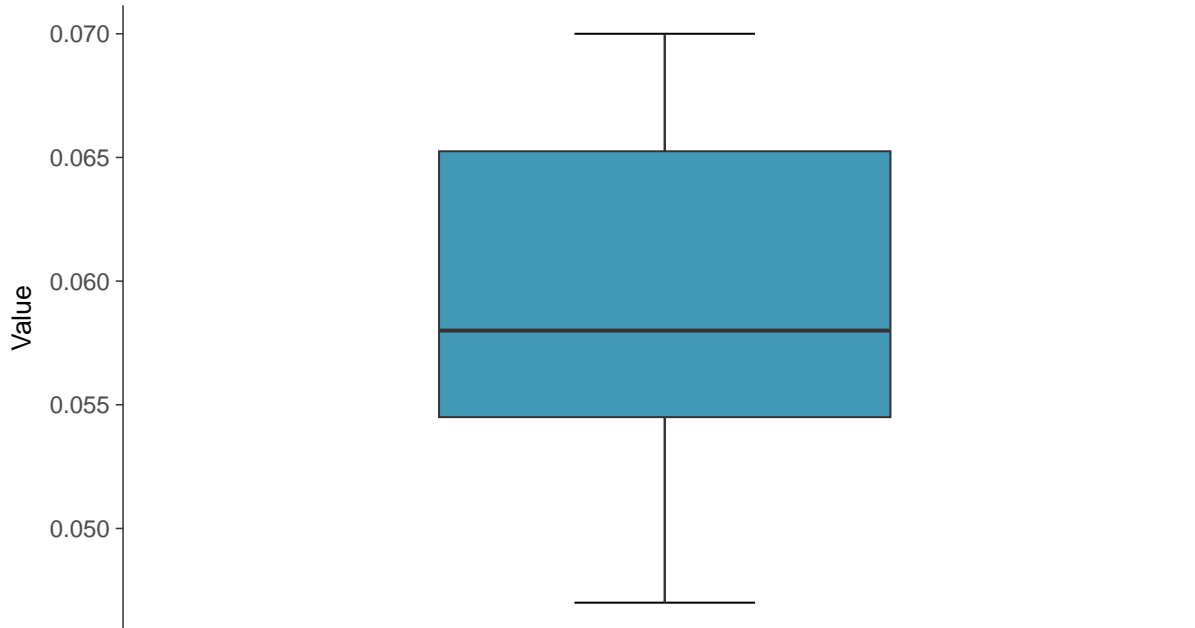
Lithium, MW-2 (mg/L)





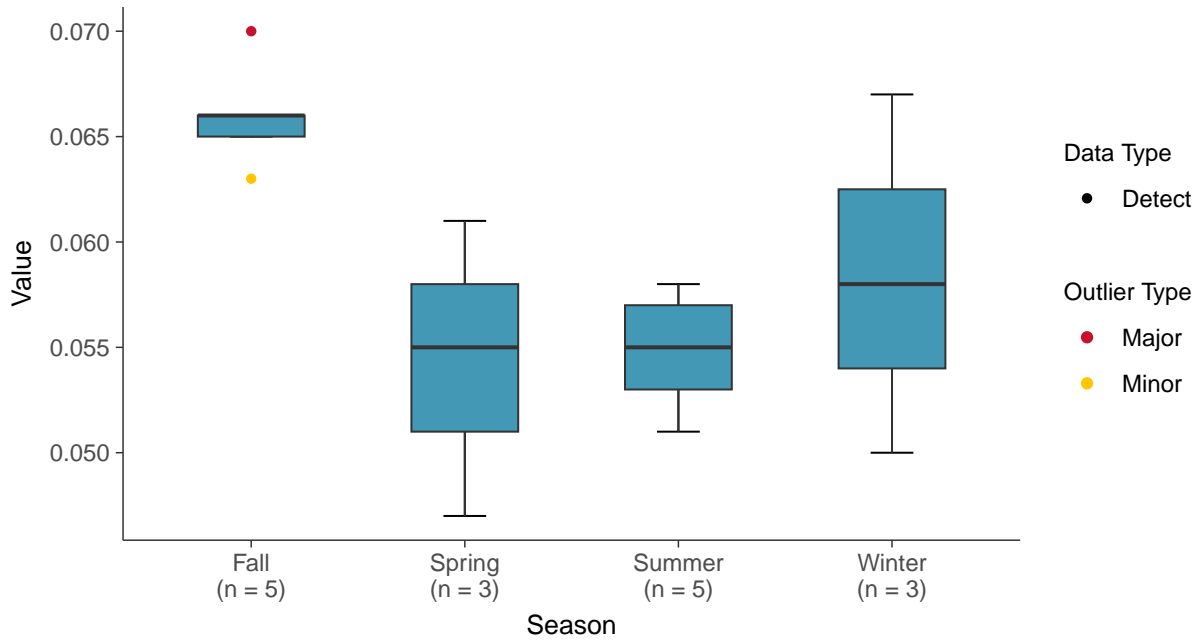
Boxplot

Lithium, MW-2 (mg/L)



Boxplot by Season

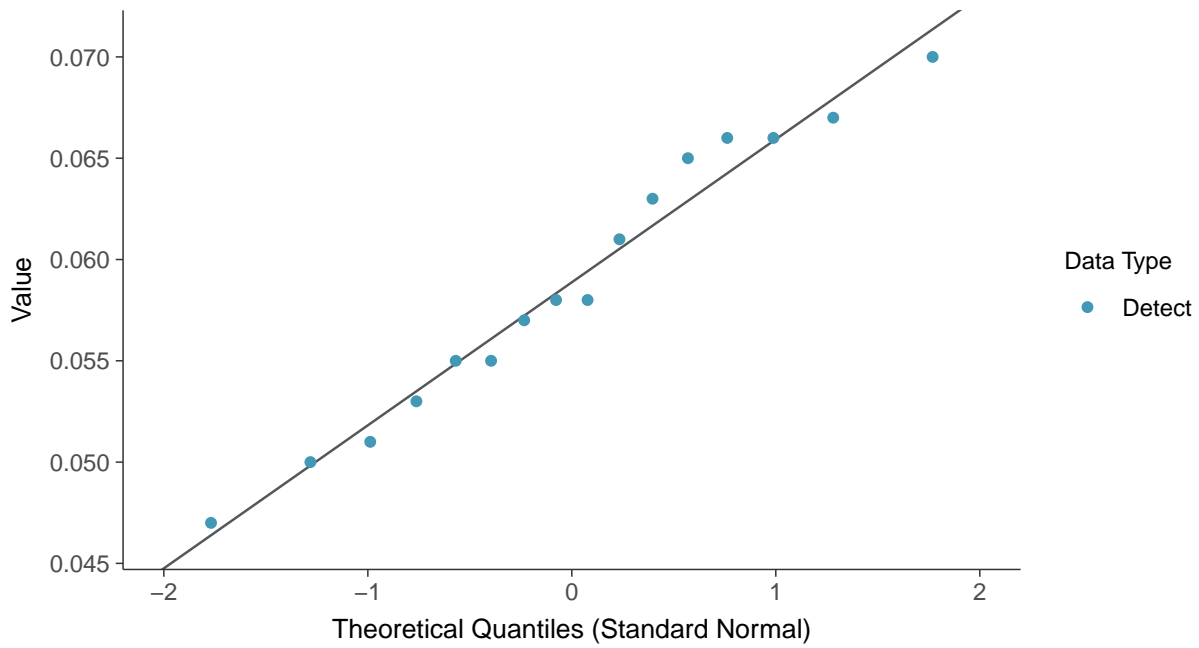
Lithium, MW-2 (mg/L)





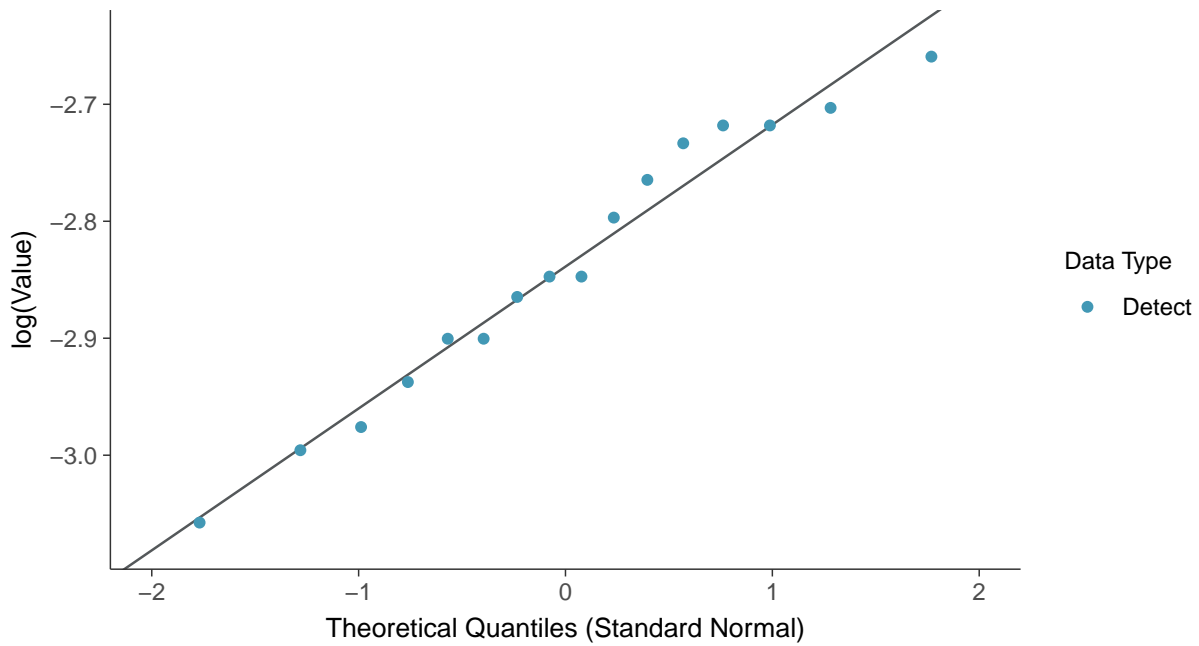
Normal Q-Q plot

Lithium, MW-2 (mg/L)



Lognormal Q-Q plot

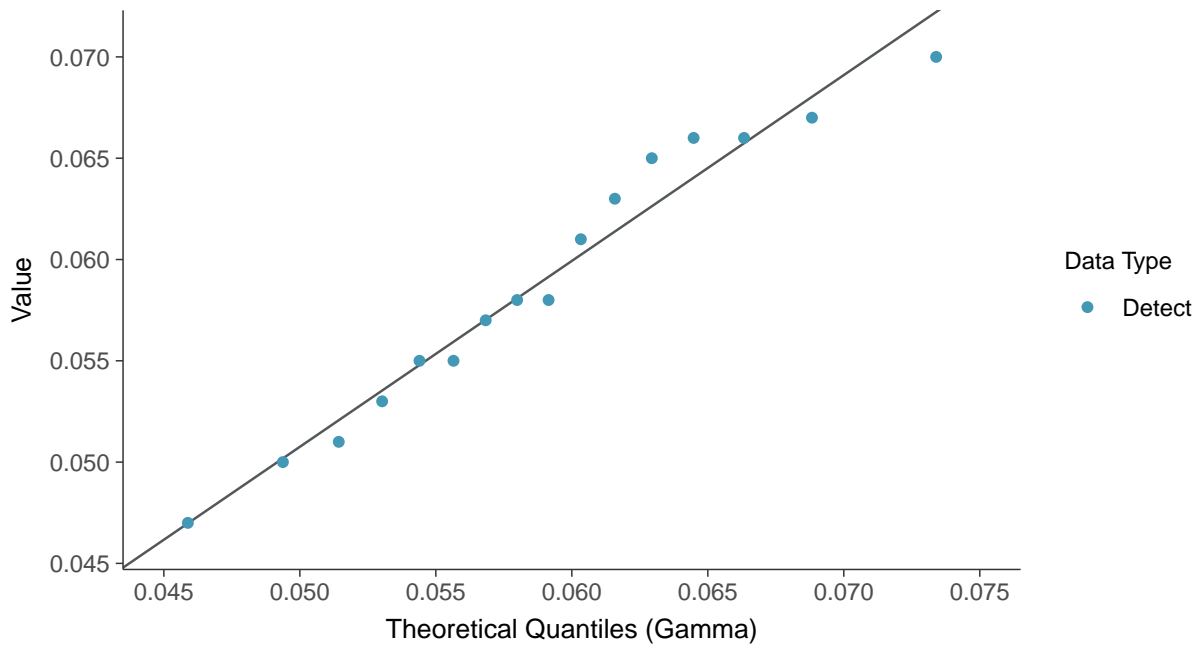
Lithium, MW-2 (mg/L)





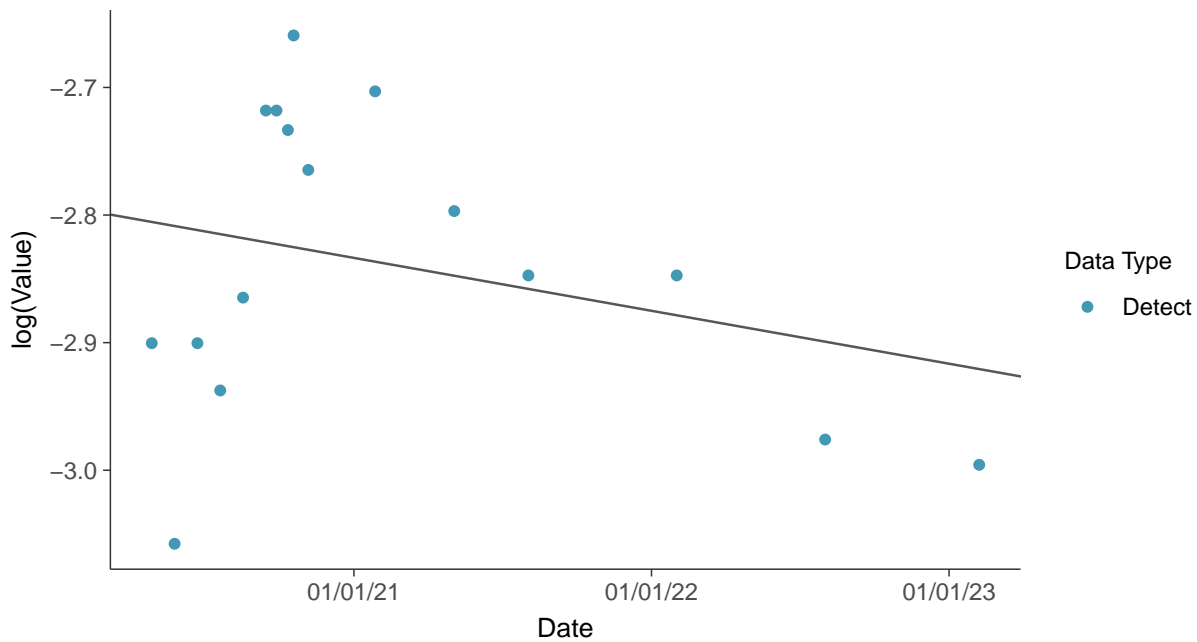
Gamma Q-Q plot

Lithium, MW-2 (mg/L)



Trend Regression: Lognormal MLE

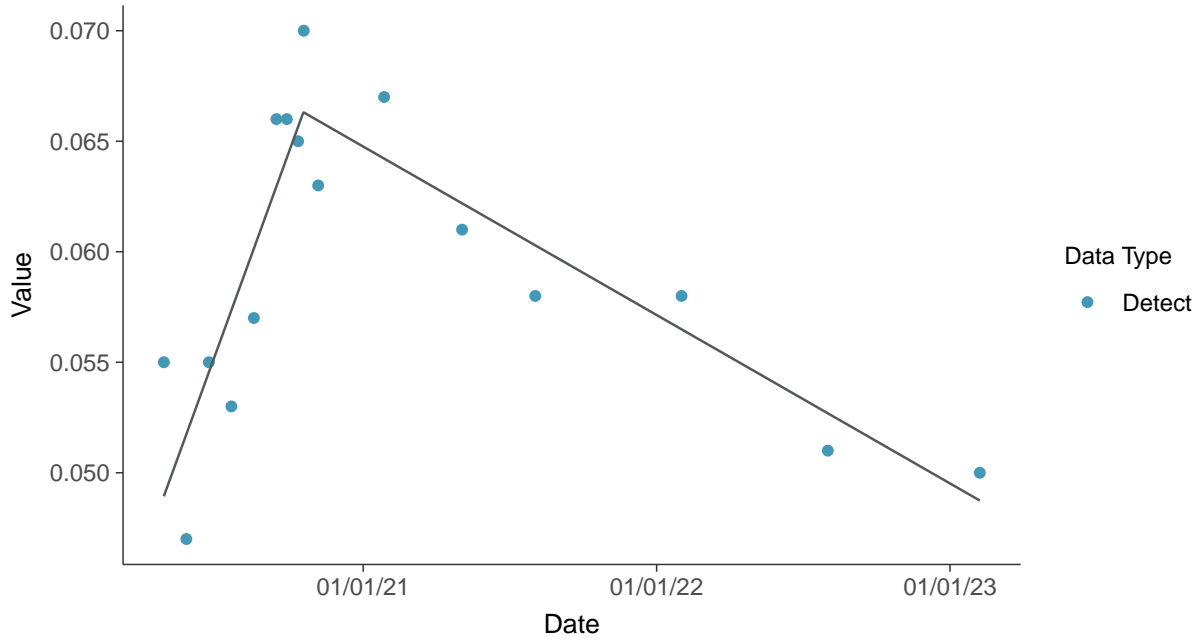
Lithium, MW-2 (mg/L)





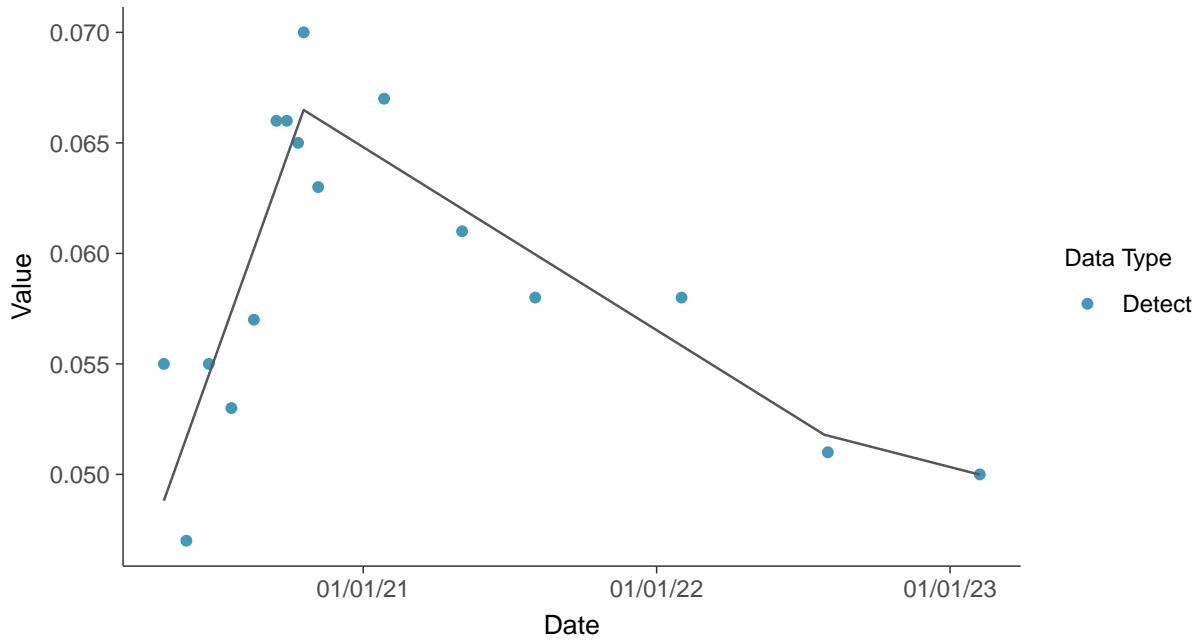
Trend Regression: Piecewise Linear-Linear

Lithium, MW-2 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

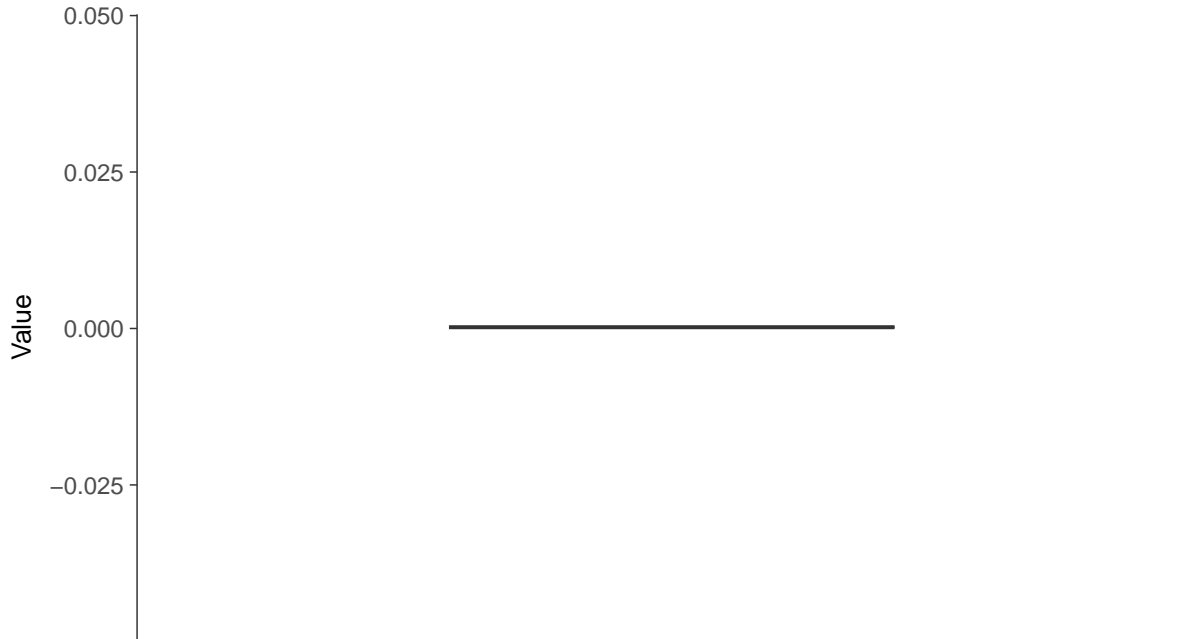
Lithium, MW-2 (mg/L)





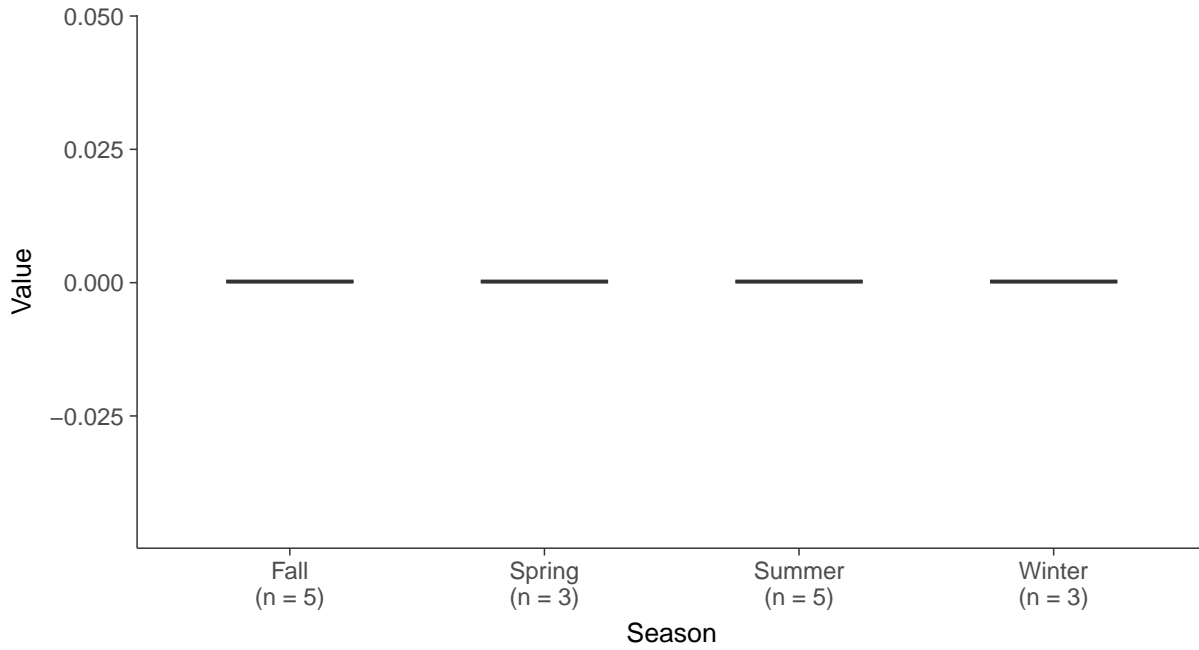
Boxplot

Mercury, MW-2 (mg/L)



Boxplot by Season

Mercury, MW-2 (mg/L)



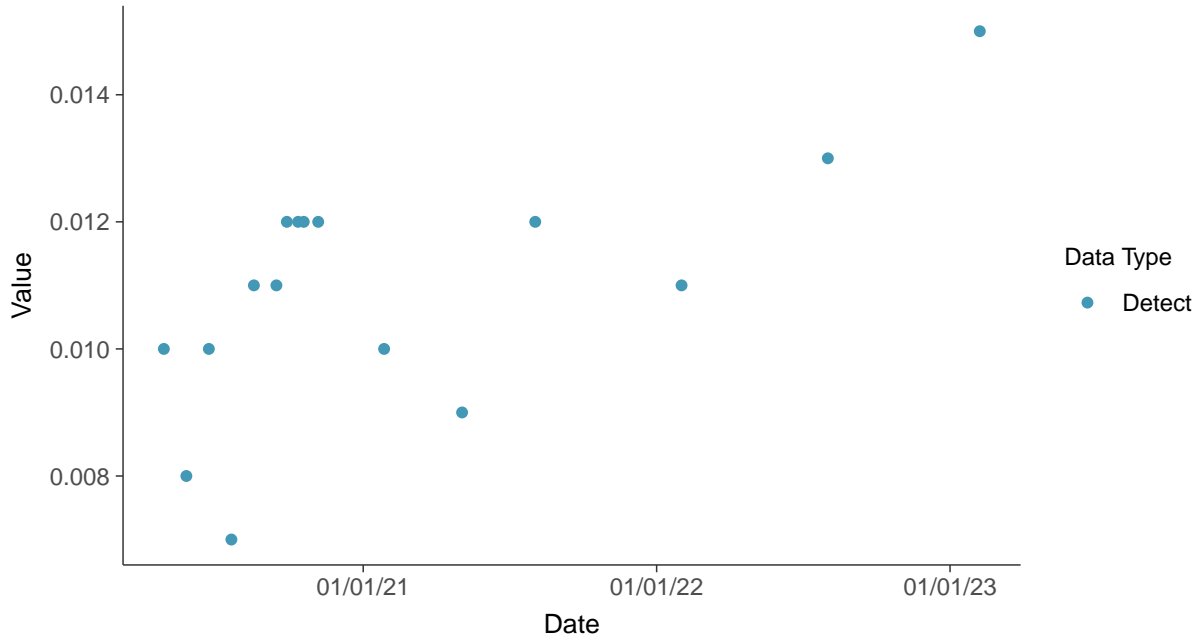


Appendix IV: Molybdenum, MW-2

ID: 02_2_22

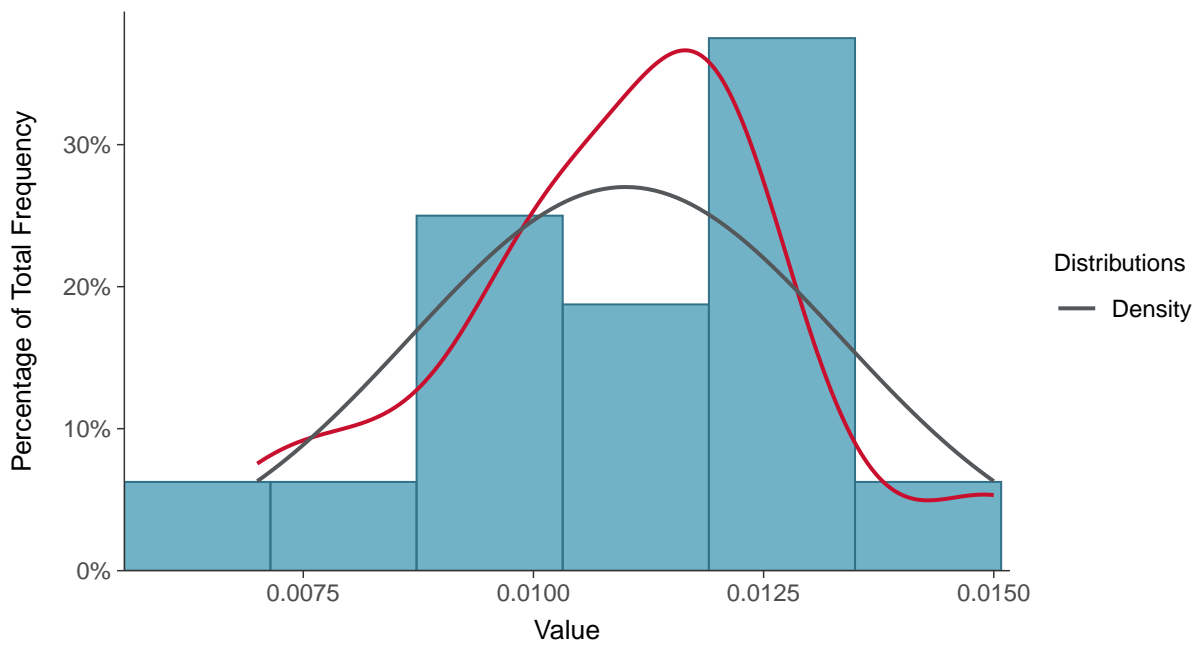
Scatter Plot

Molybdenum, MW-2 (mg/L)



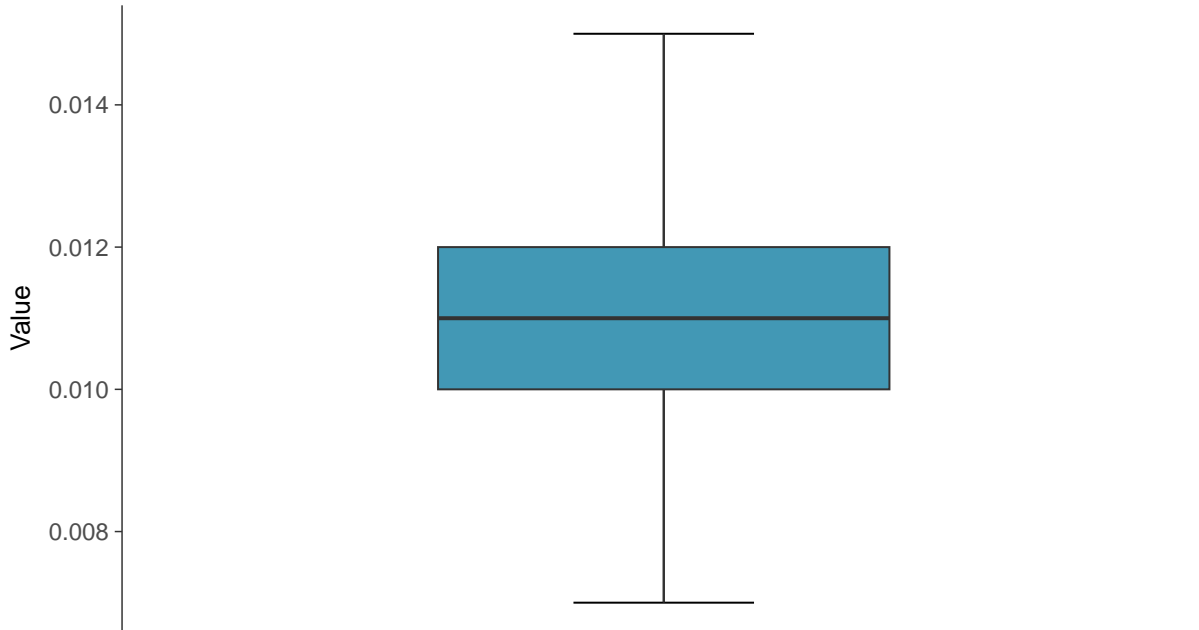
Histogram

Molybdenum, MW-2 (mg/L)



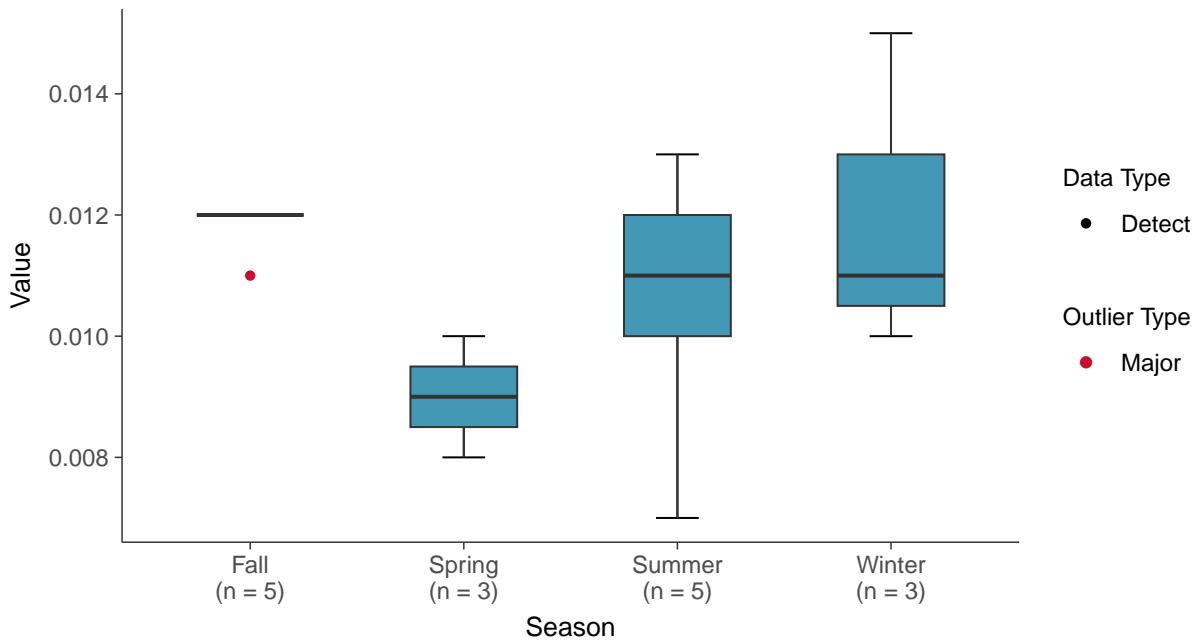
Boxplot

Molybdenum, MW-2 (mg/L)



Boxplot by Season

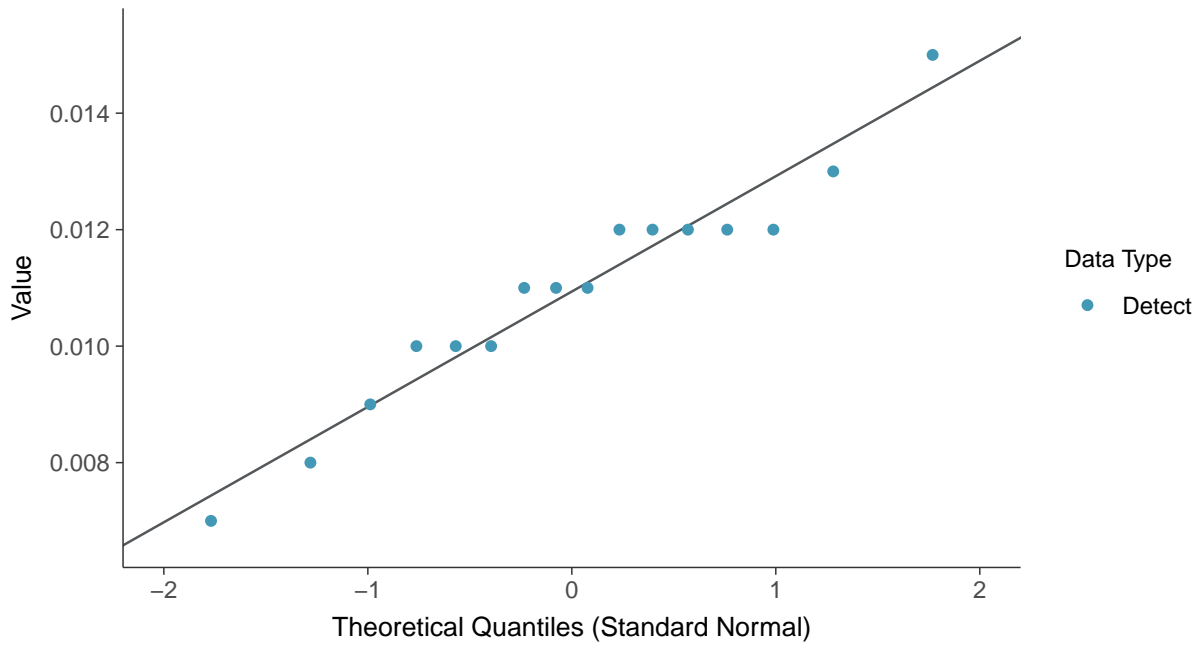
Molybdenum, MW-2 (mg/L)





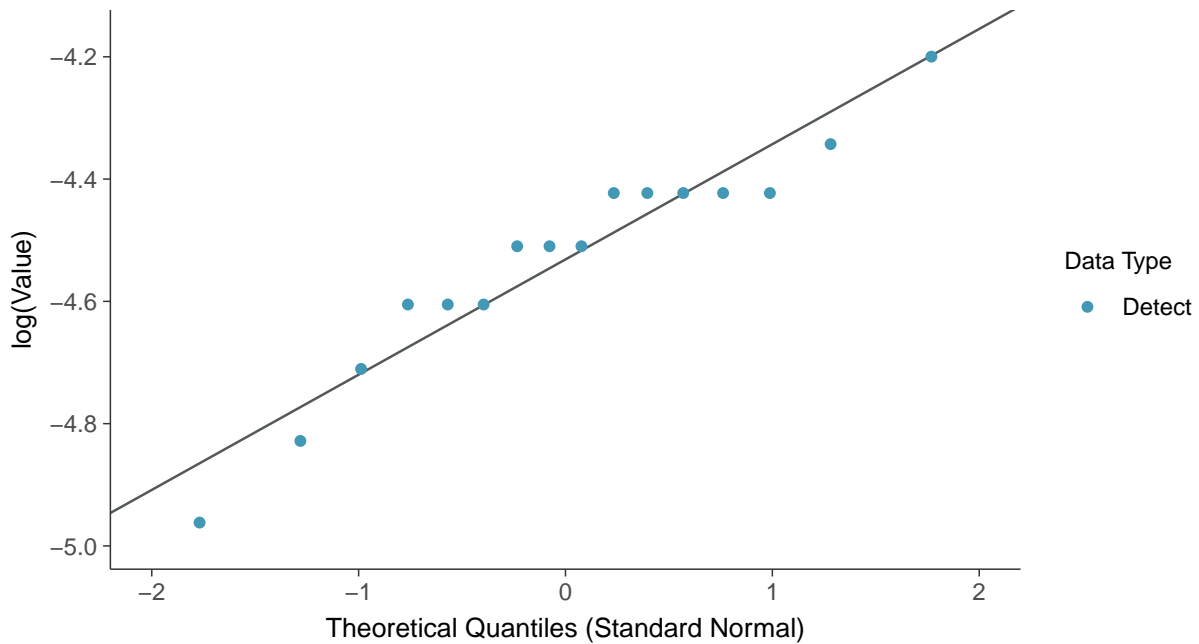
Normal Q-Q plot

Molybdenum, MW-2 (mg/L)



Lognormal Q-Q plot

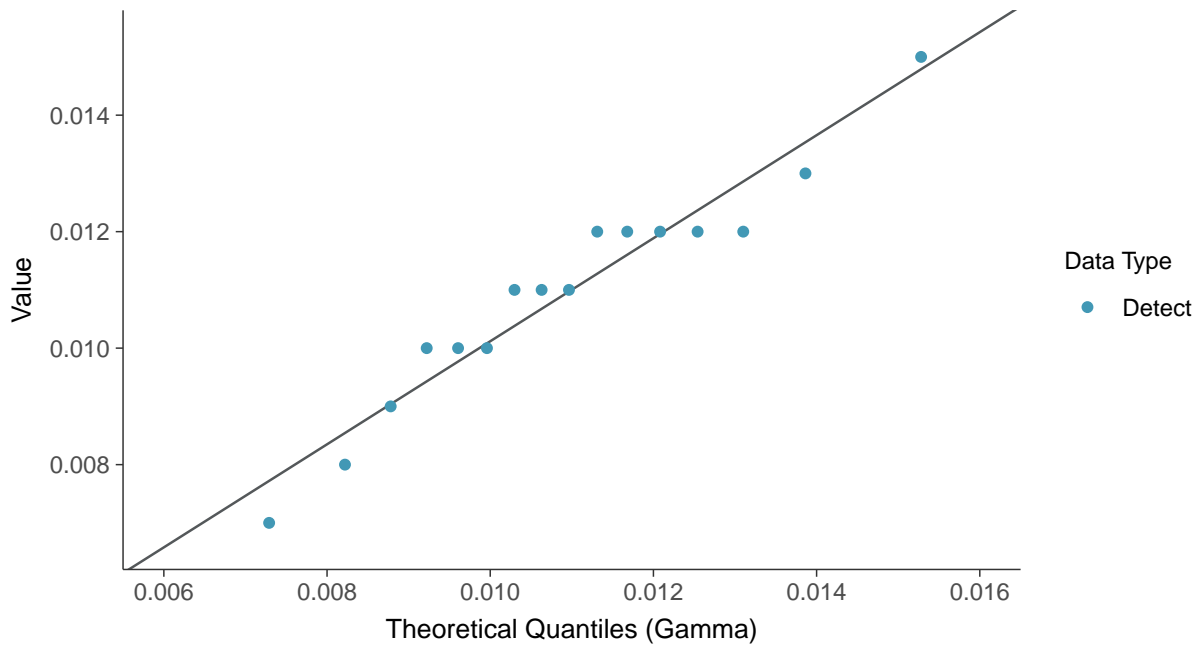
Molybdenum, MW-2 (mg/L)





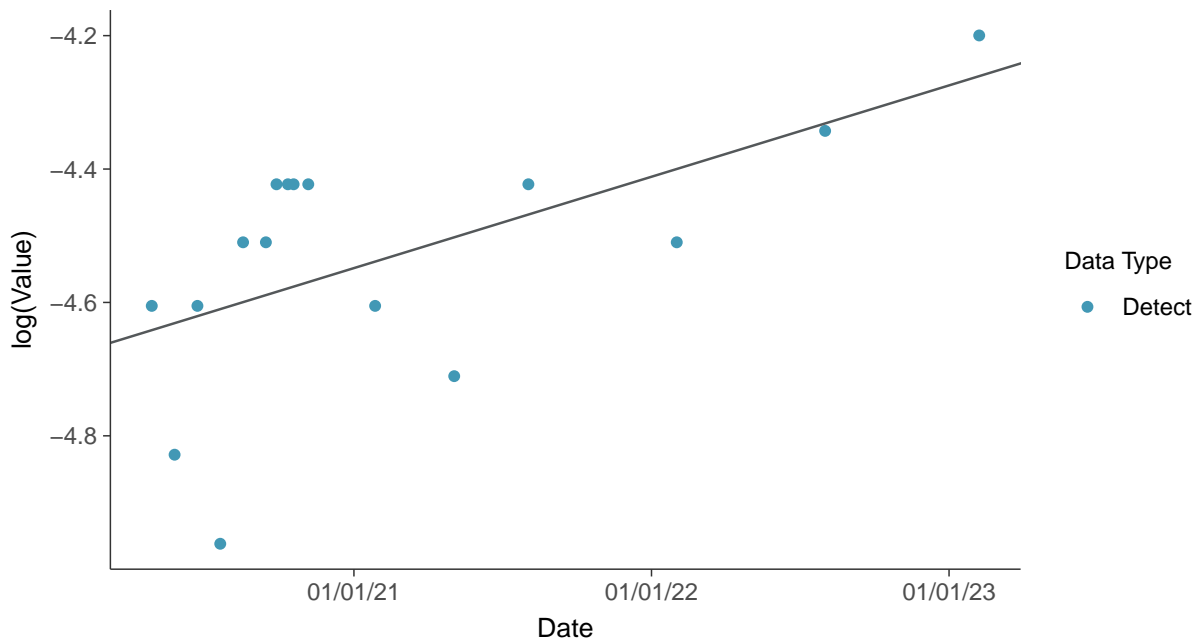
Gamma Q-Q plot

Molybdenum, MW-2 (mg/L)



Trend Regression: Lognormal MLE

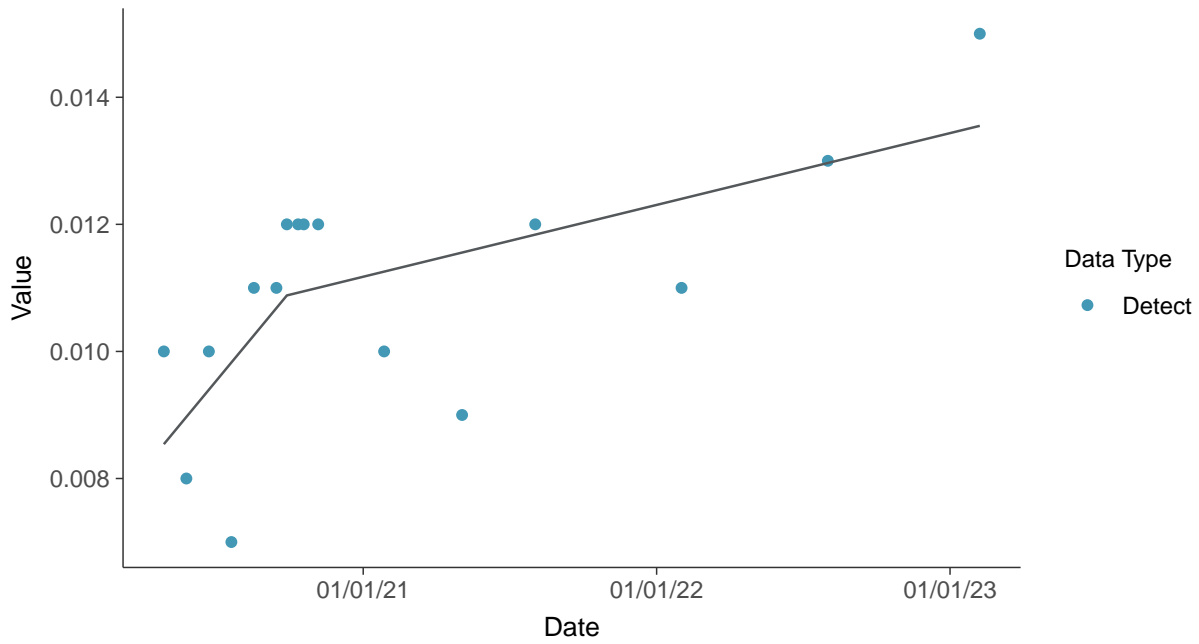
Molybdenum, MW-2 (mg/L)





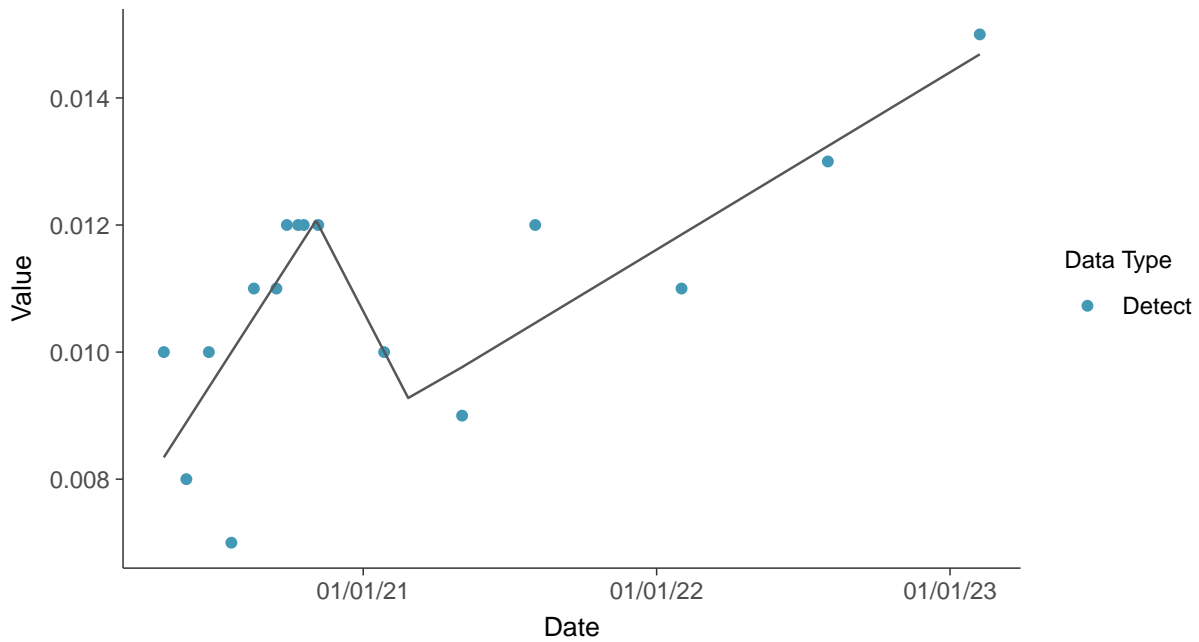
Trend Regression: Piecewise Linear-Linear

Molybdenum, MW-2 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Molybdenum, MW-2 (mg/L)



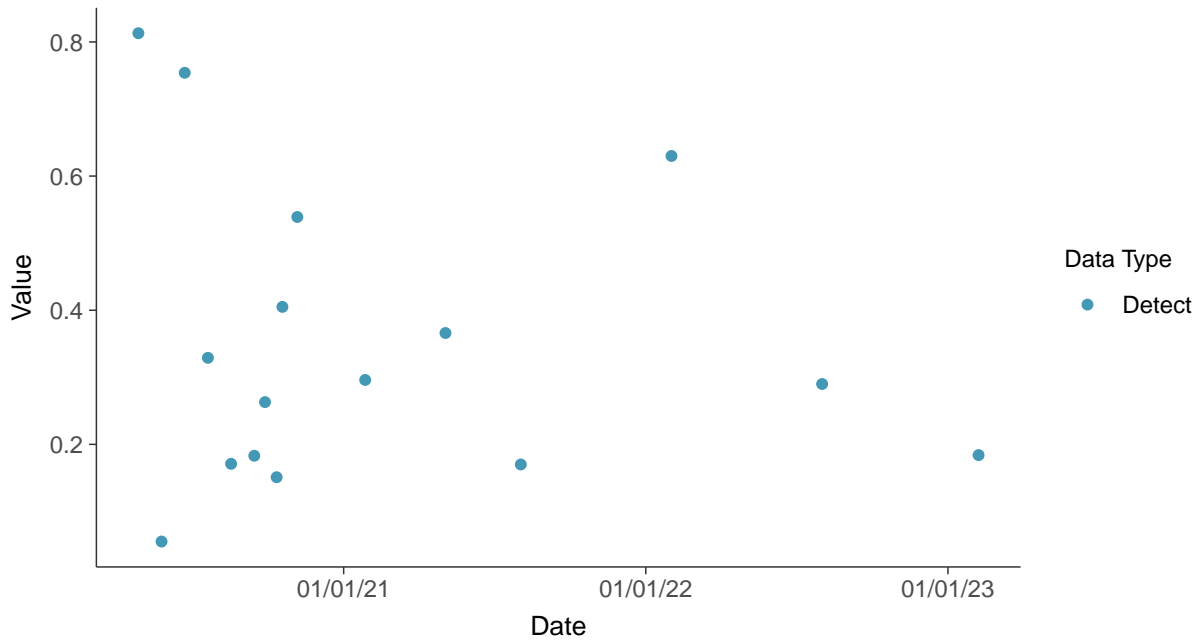


Appendix IV: Radium-226, MW-2

ID: 02_2_24

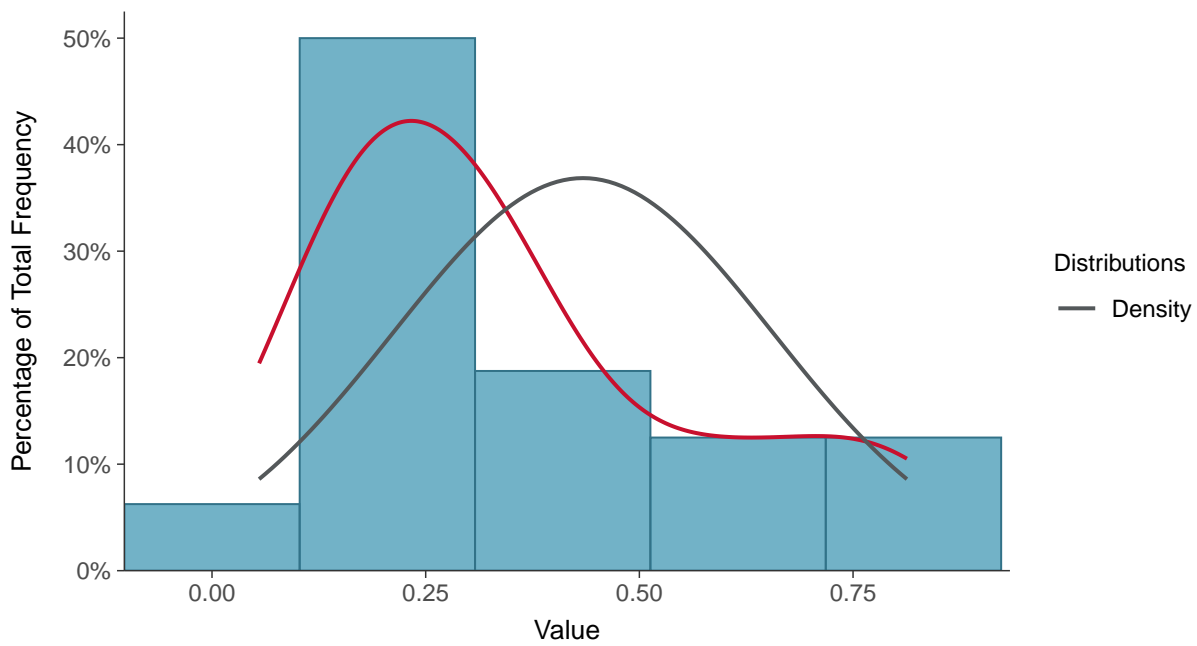
Scatter Plot

Radium-226, MW-2 (pCi/L)



Histogram

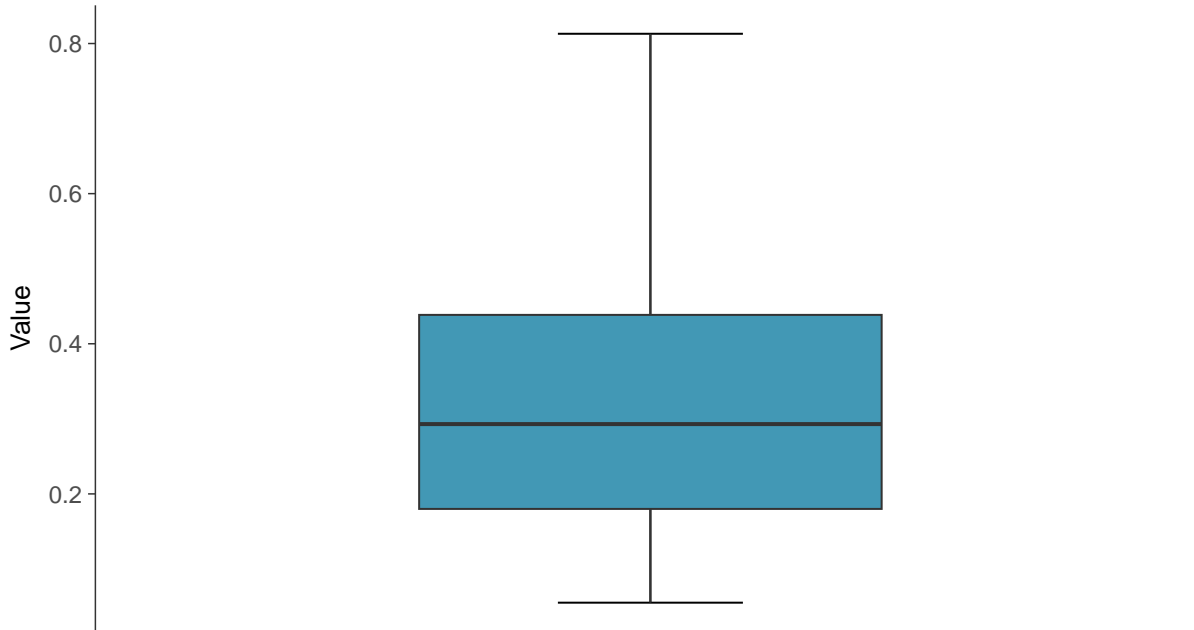
Radium-226, MW-2 (pCi/L)





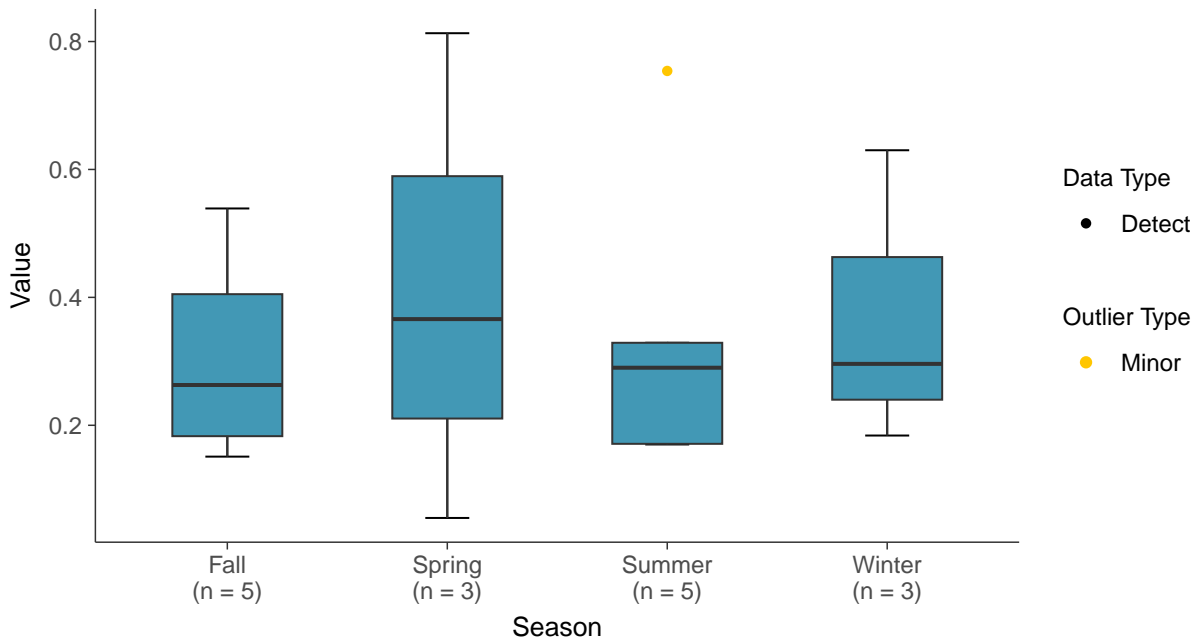
Boxplot

Radium-226, MW-2 (pCi/L)



Boxplot by Season

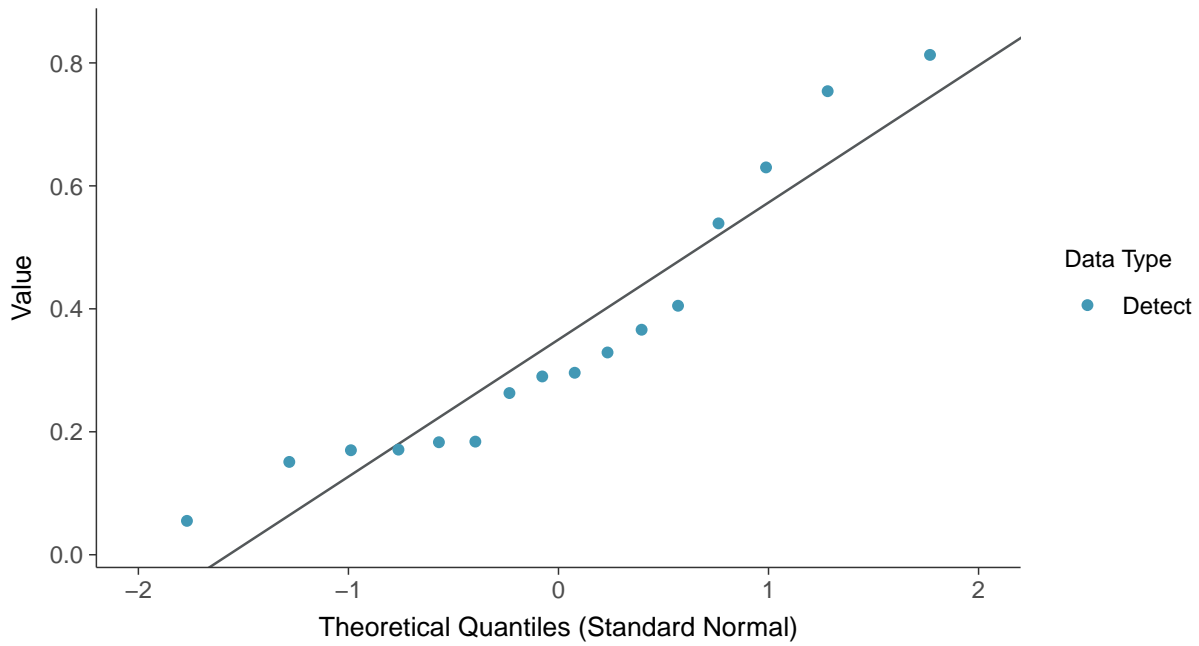
Radium-226, MW-2 (pCi/L)





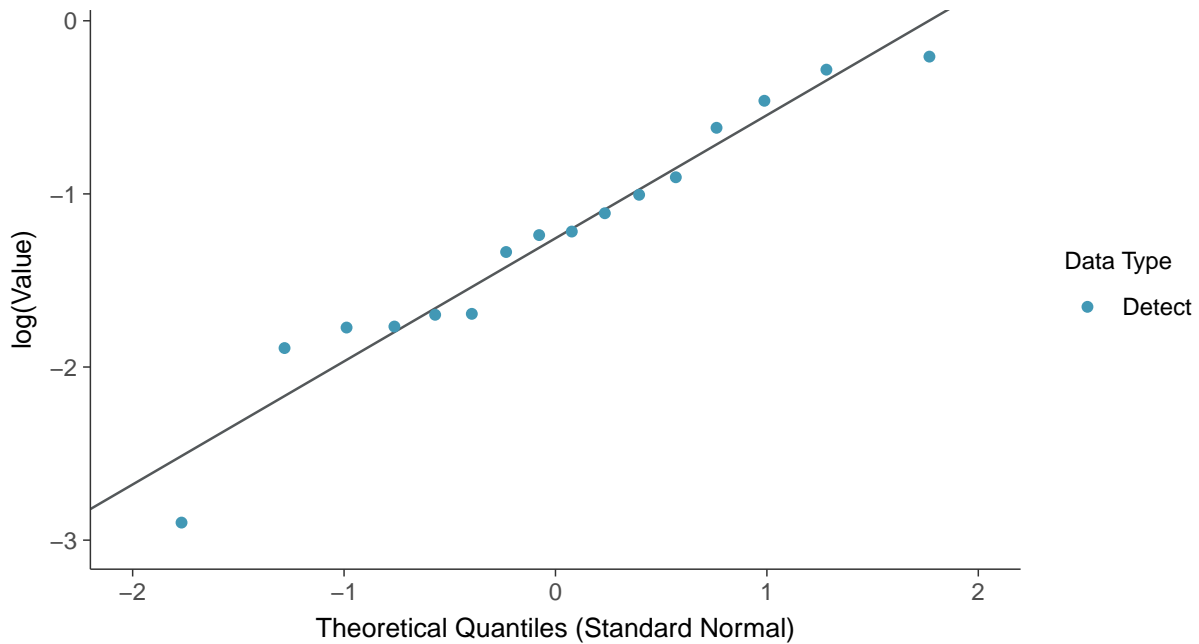
Normal Q-Q plot

Radium-226, MW-2 (pCi/L)



Lognormal Q-Q plot

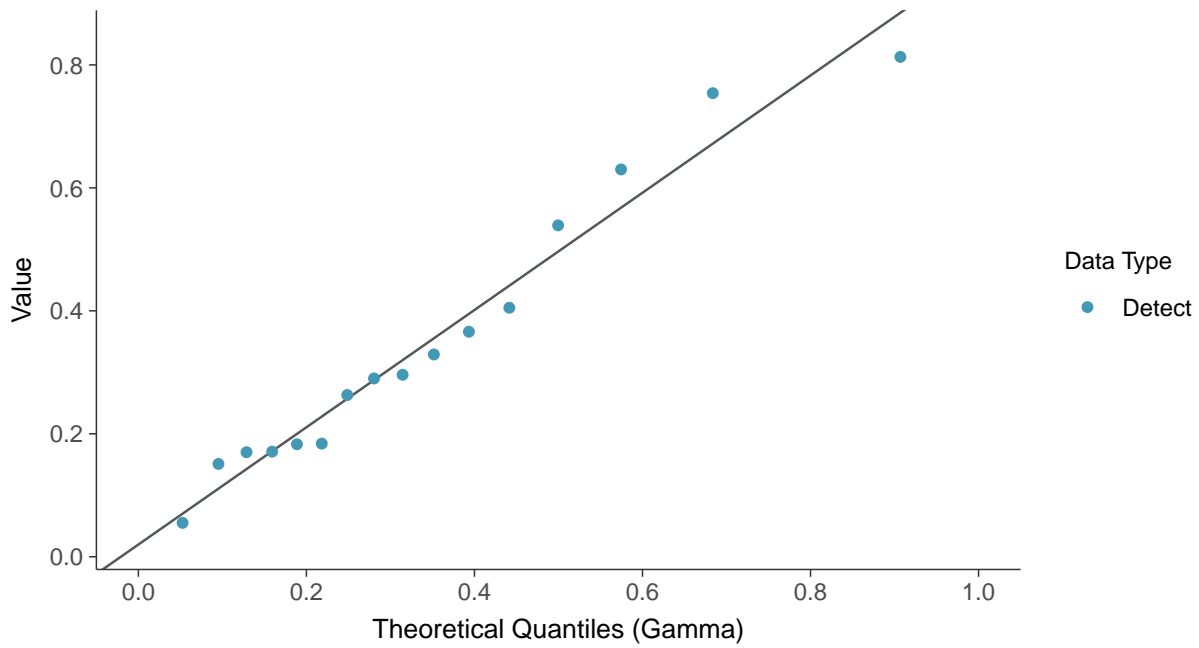
Radium-226, MW-2 (pCi/L)





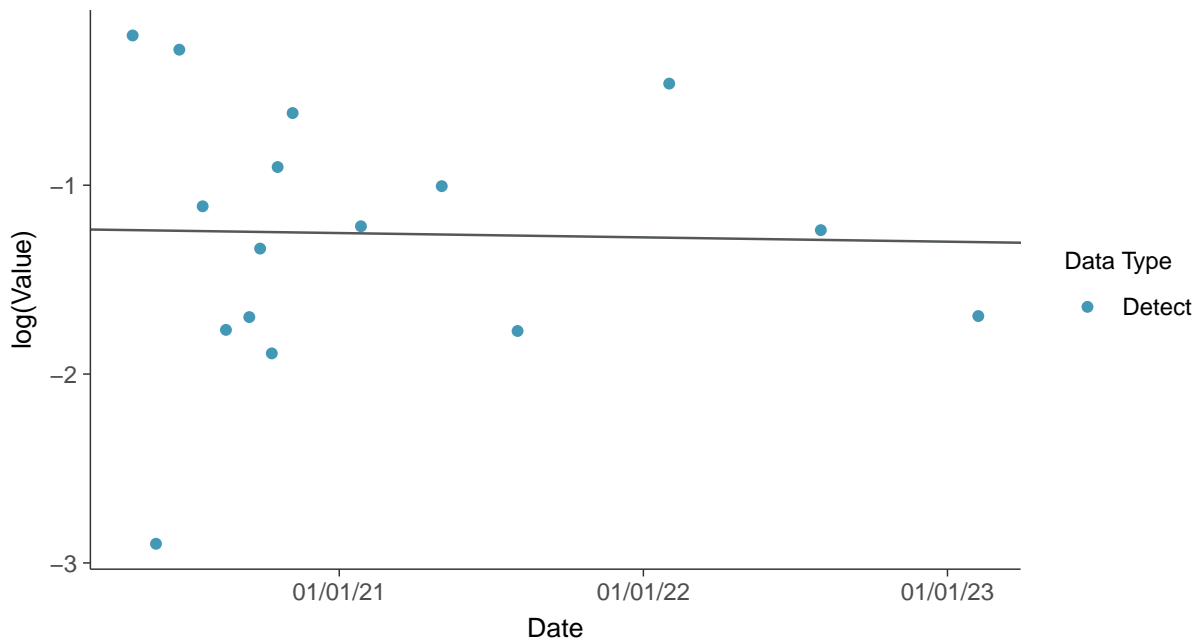
Gamma Q-Q plot

Radium-226, MW-2 (pCi/L)



Trend Regression: Lognormal MLE

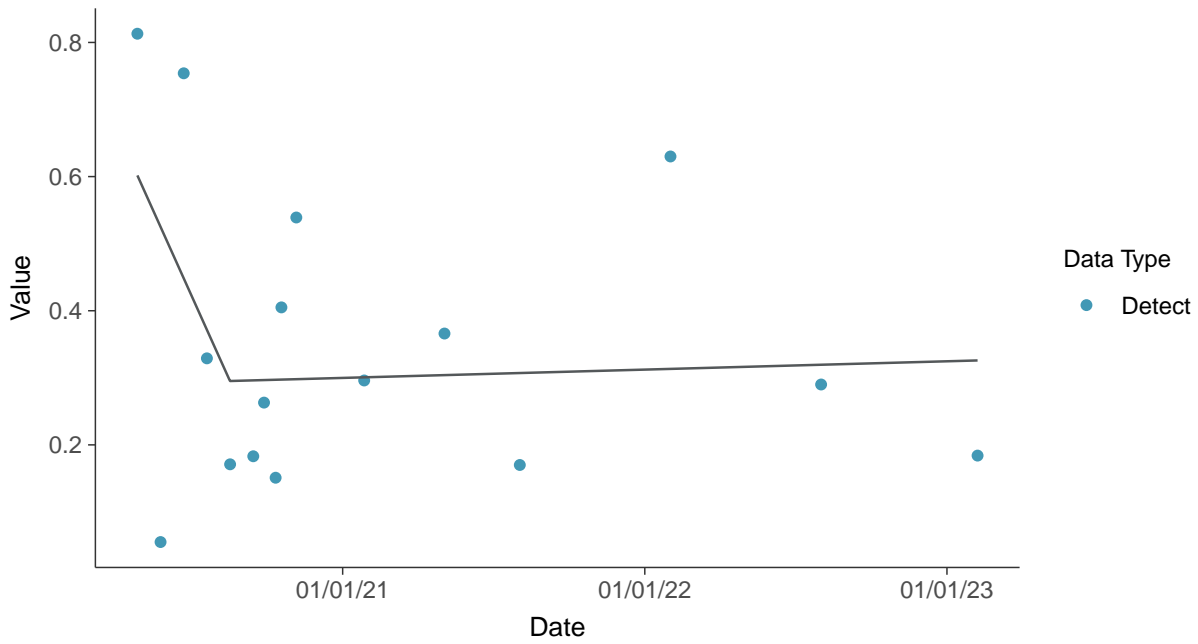
Radium-226, MW-2 (pCi/L)





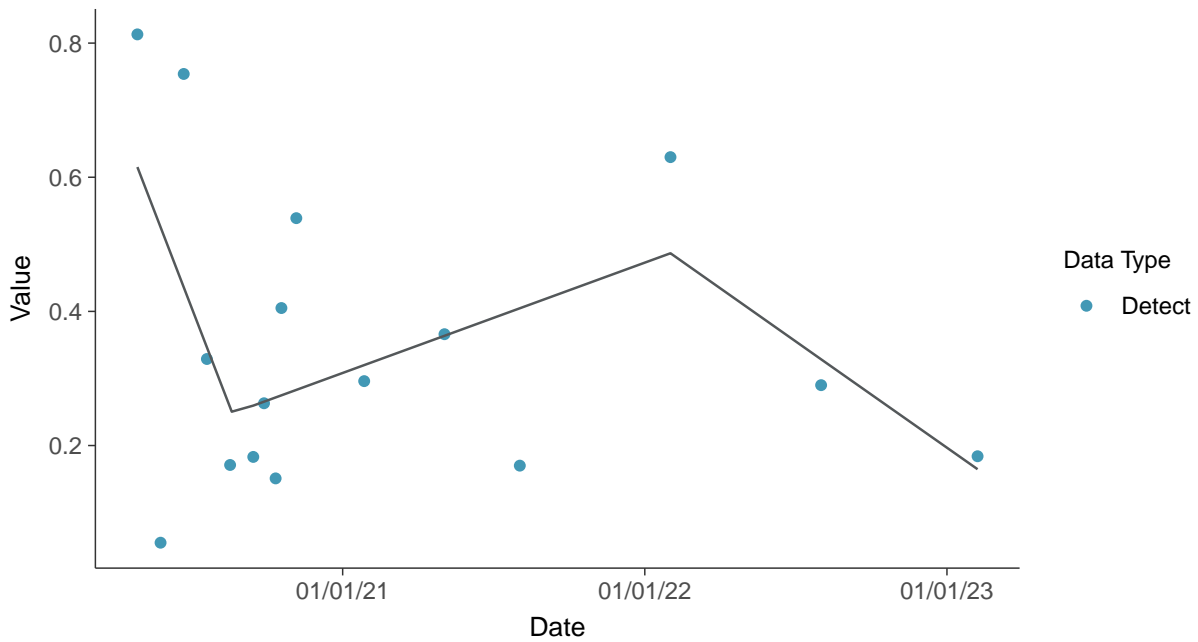
Trend Regression: Piecewise Linear-Linear

Radium-226, MW-2 (pCi/L)



Trend Regression: Piecewise Linear-Linear-Linear

Radium-226, MW-2 (pCi/L)



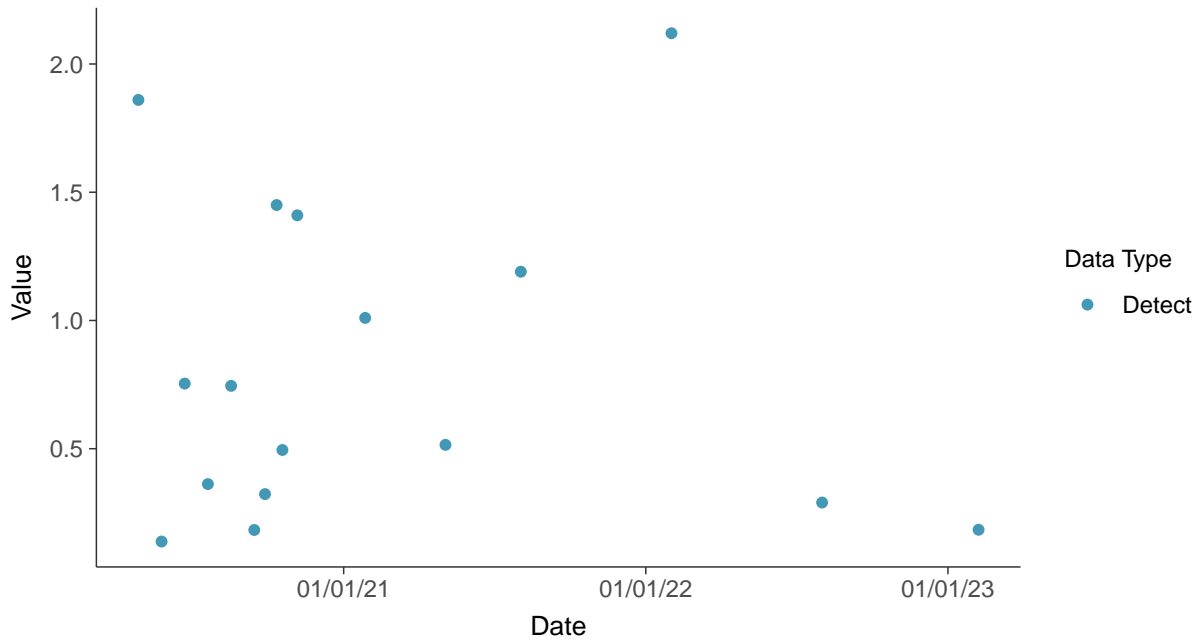


Appendix IV: Radium-226/228, MW-2

ID: 02_2_25

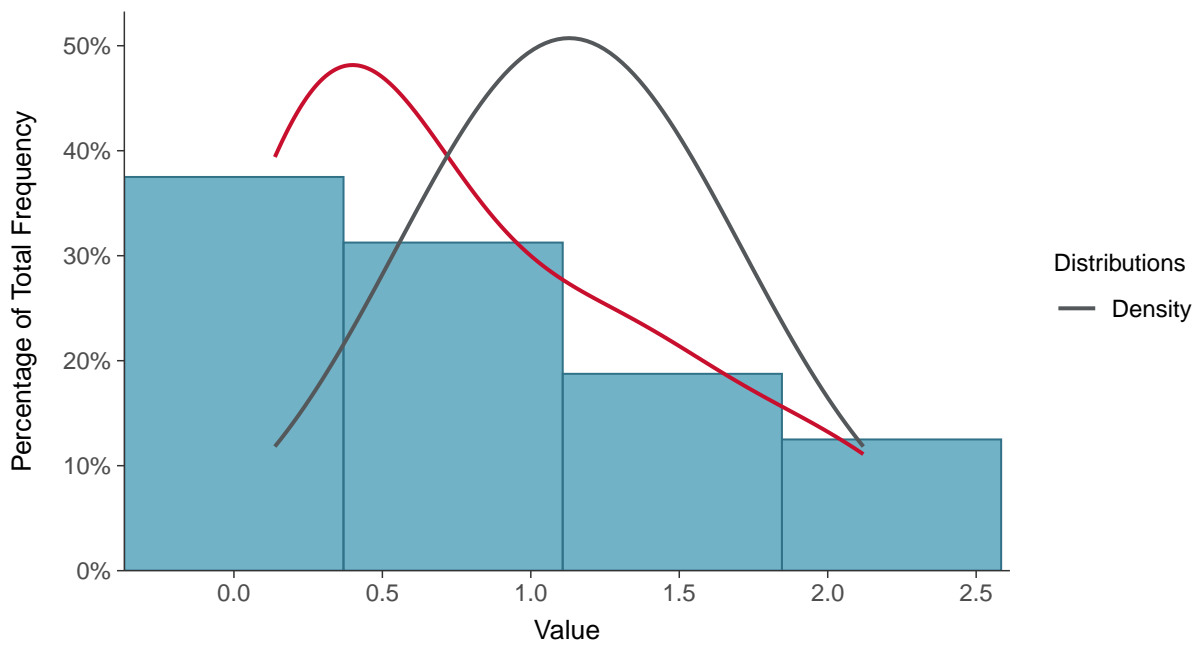
Scatter Plot

Radium-226/228, MW-2 (pCi/L)



Histogram

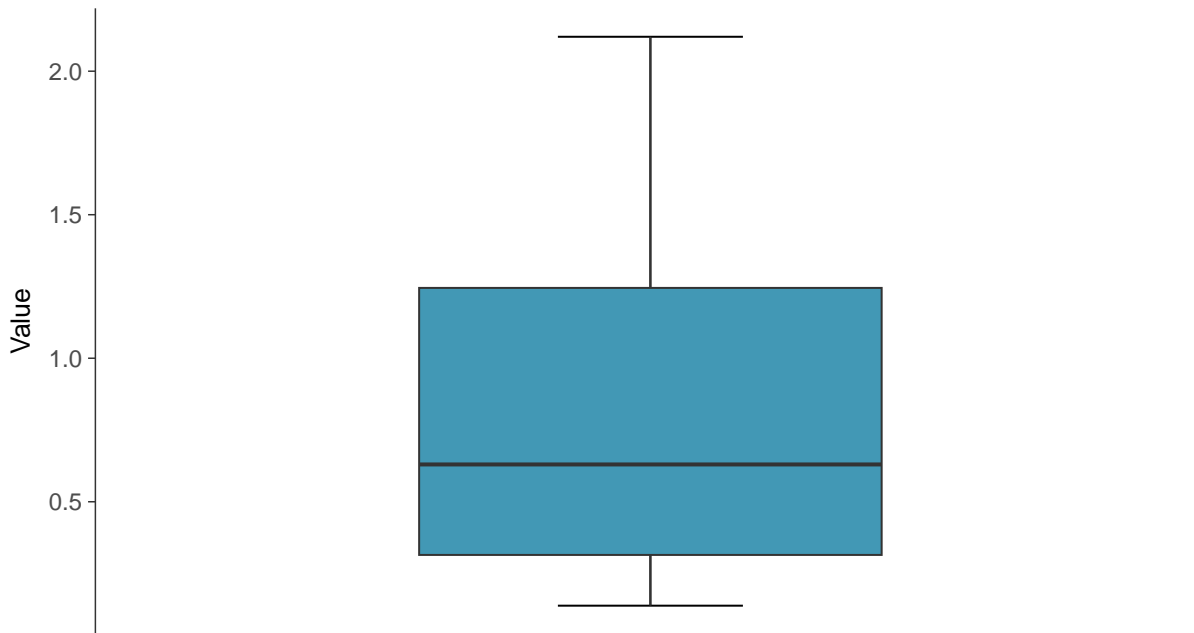
Radium-226/228, MW-2 (pCi/L)





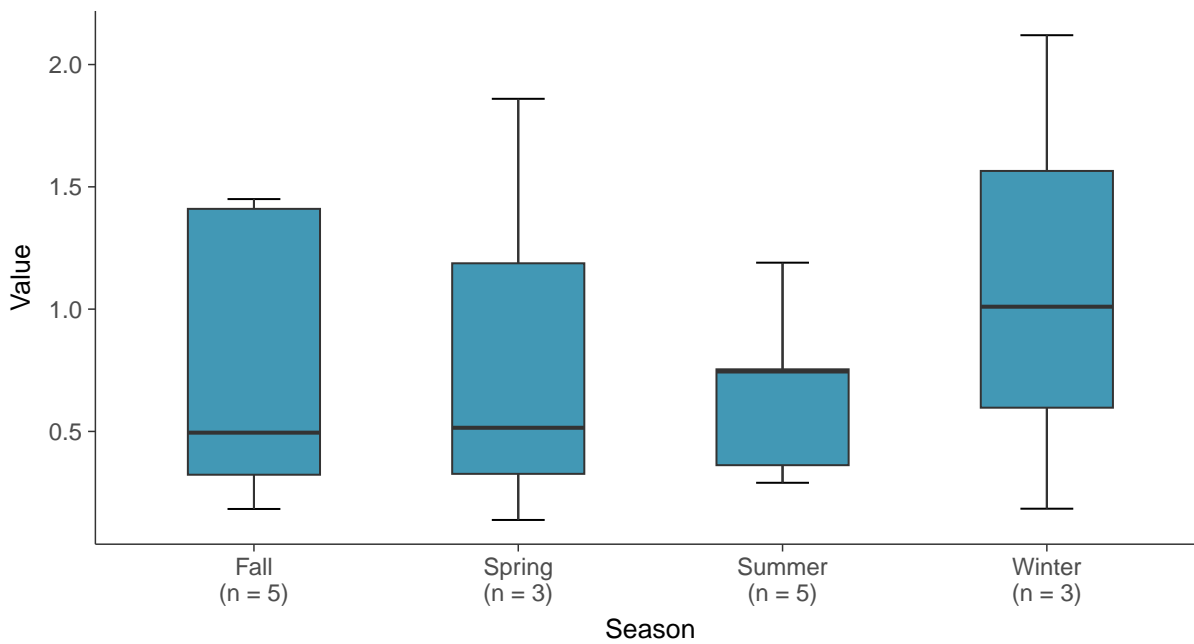
Boxplot

Radium-226/228, MW-2 (pCi/L)



Boxplot by Season

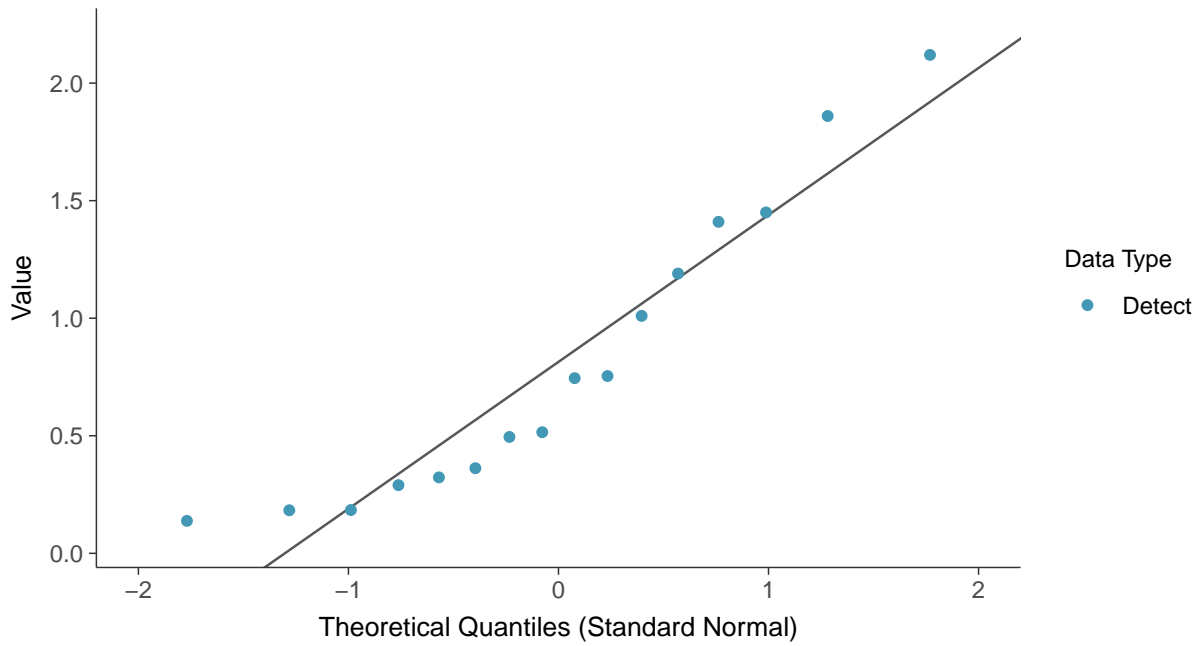
Radium-226/228, MW-2 (pCi/L)





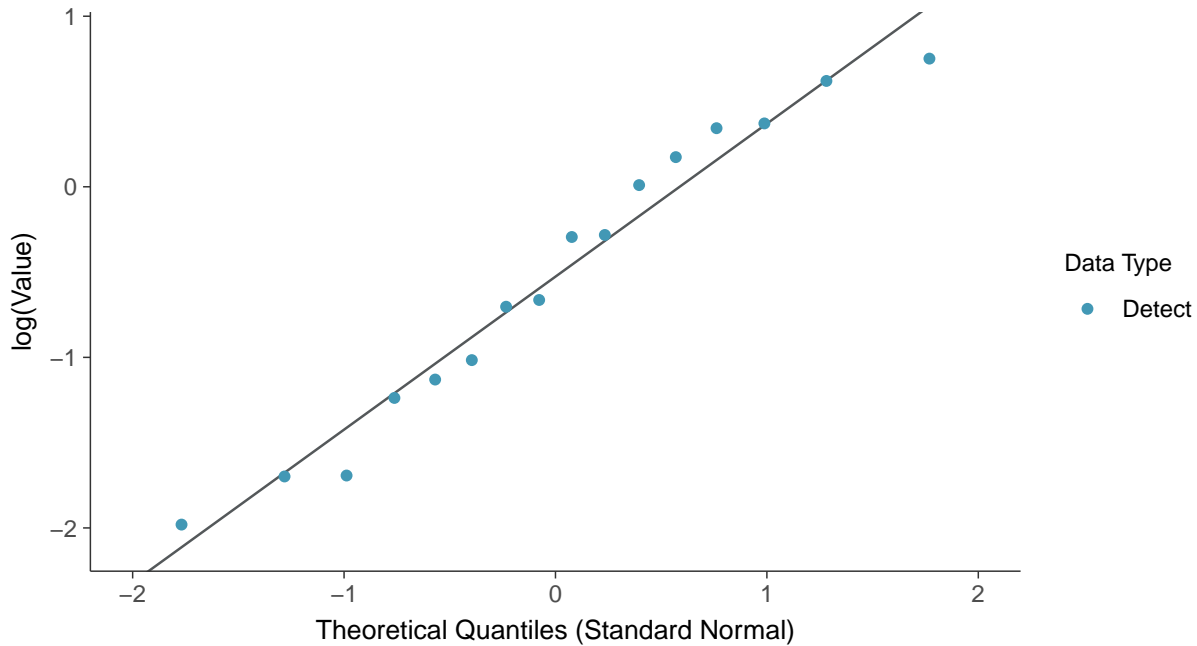
Normal Q-Q plot

Radium-226/228, MW-2 (pCi/L)



Lognormal Q-Q plot

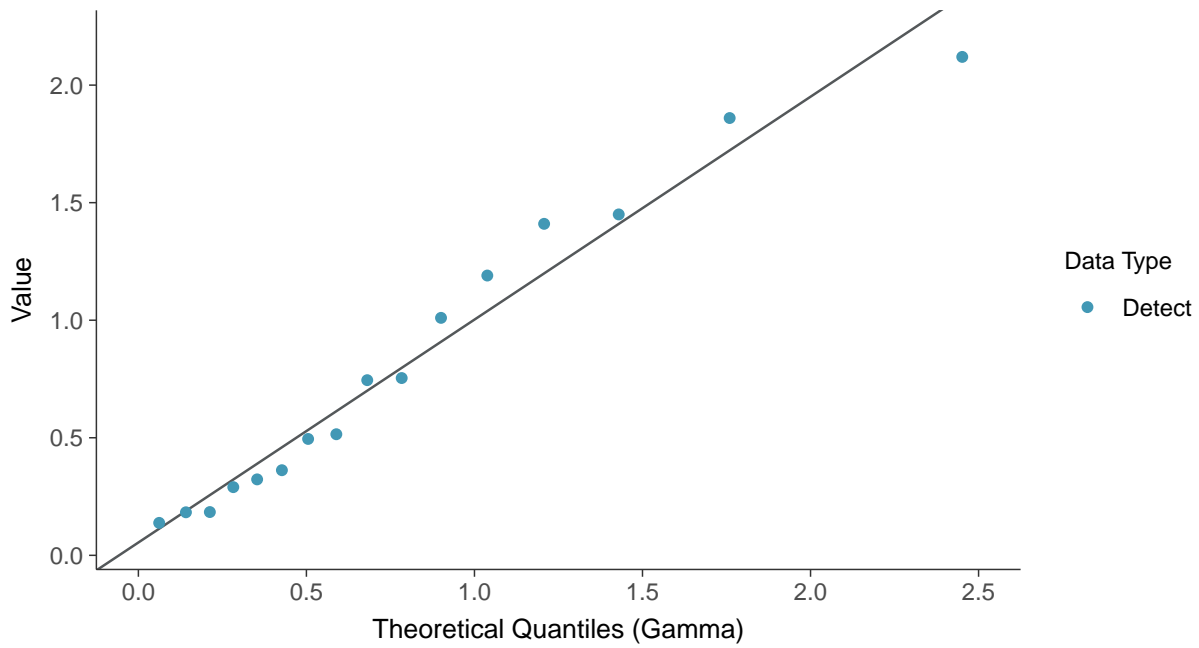
Radium-226/228, MW-2 (pCi/L)





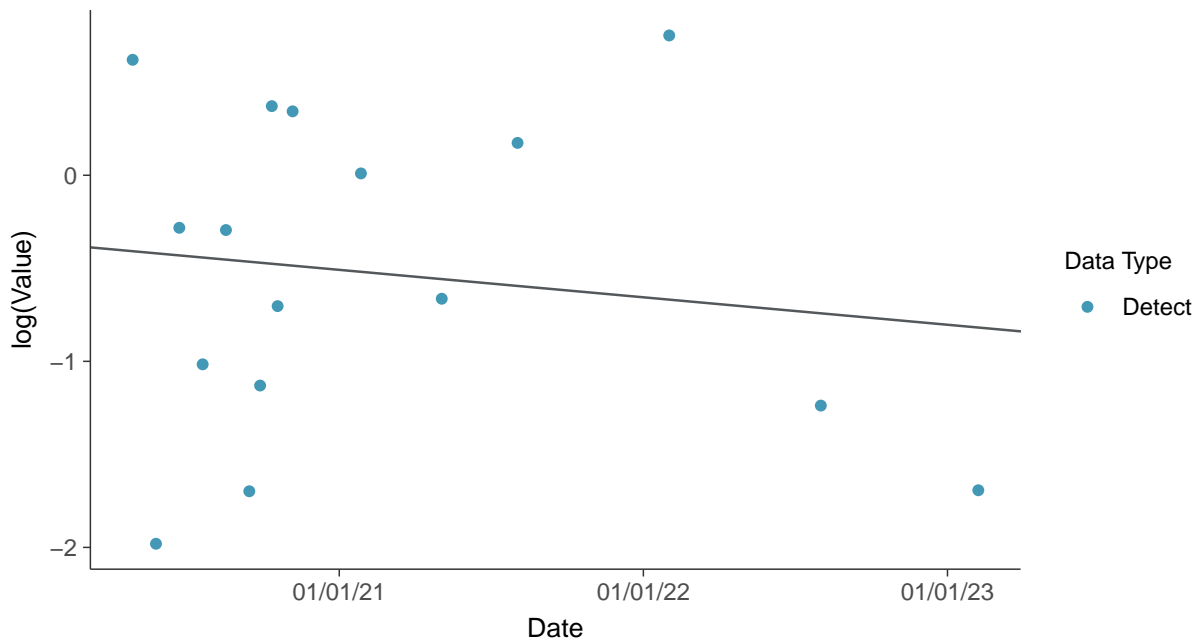
Gamma Q-Q plot

Radium-226/228, MW-2 (pCi/L)



Trend Regression: Lognormal MLE

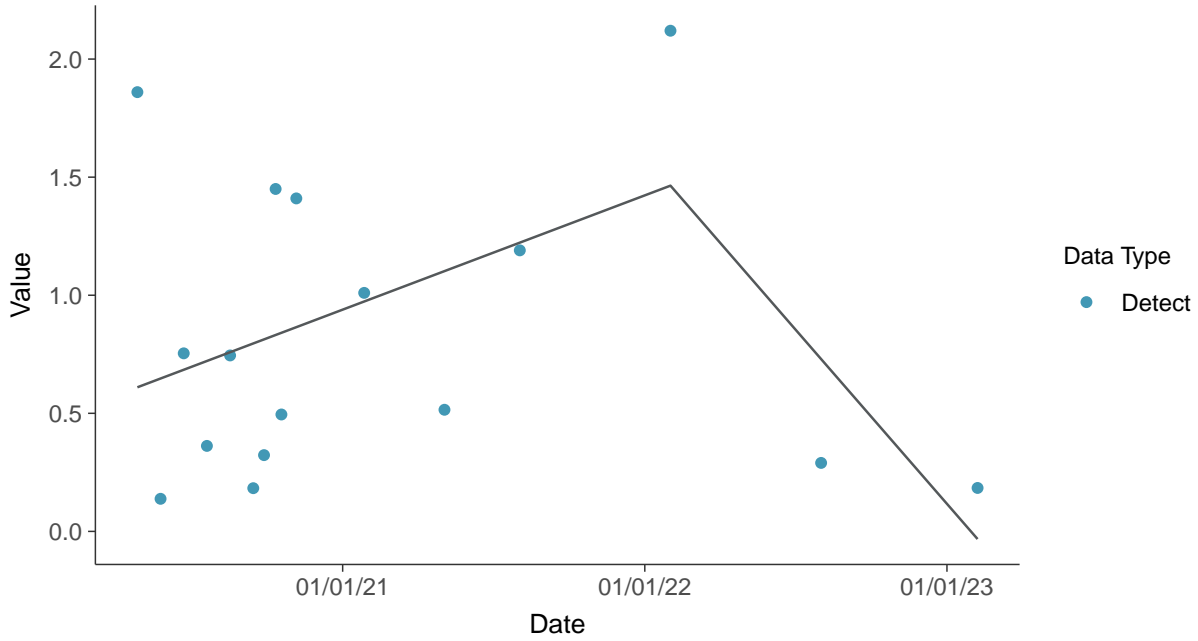
Radium-226/228, MW-2 (pCi/L)





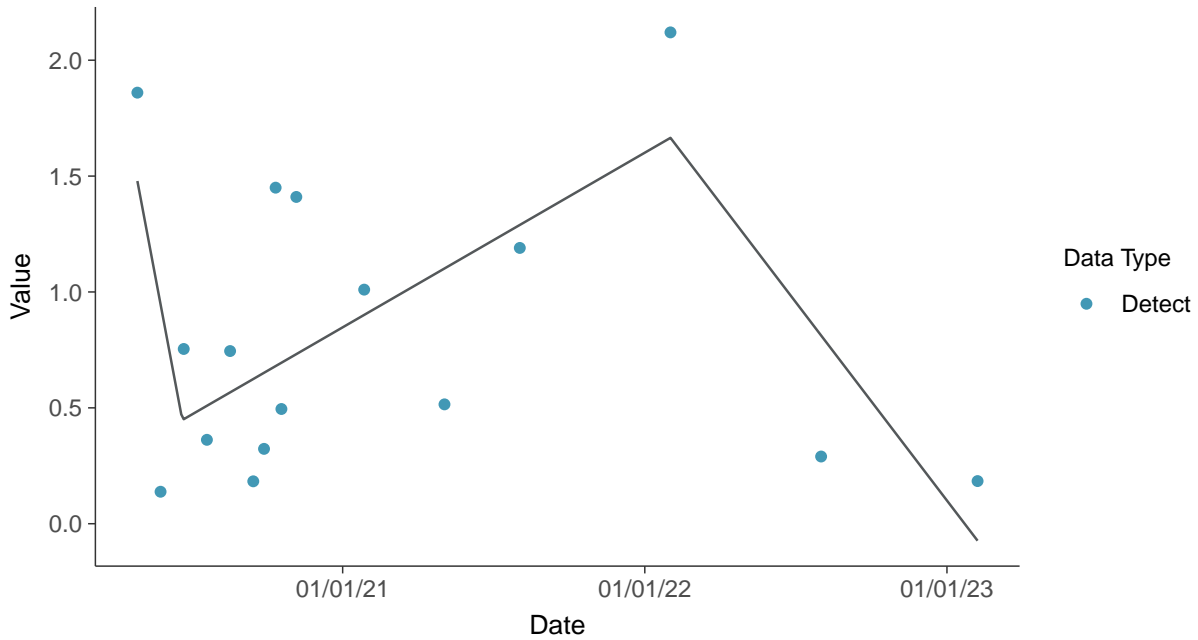
Trend Regression: Piecewise Linear-Linear

Radium-226/228, MW-2 (pCi/L)



Trend Regression: Piecewise Linear-Linear-Linear

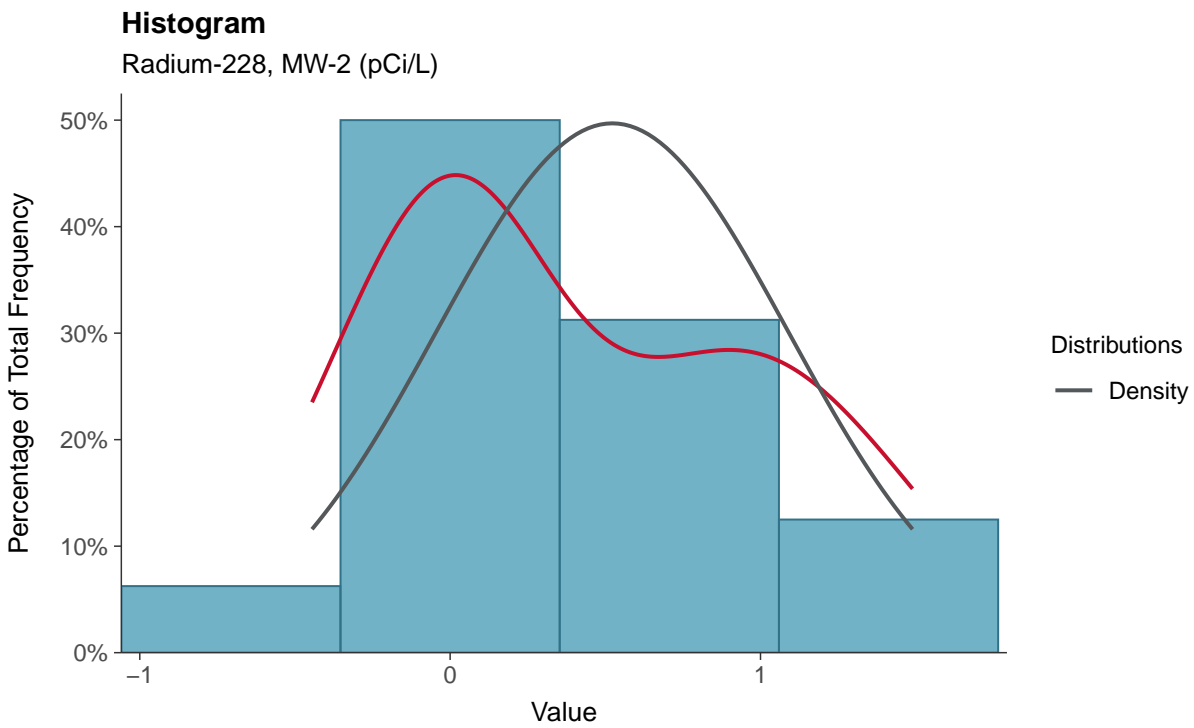
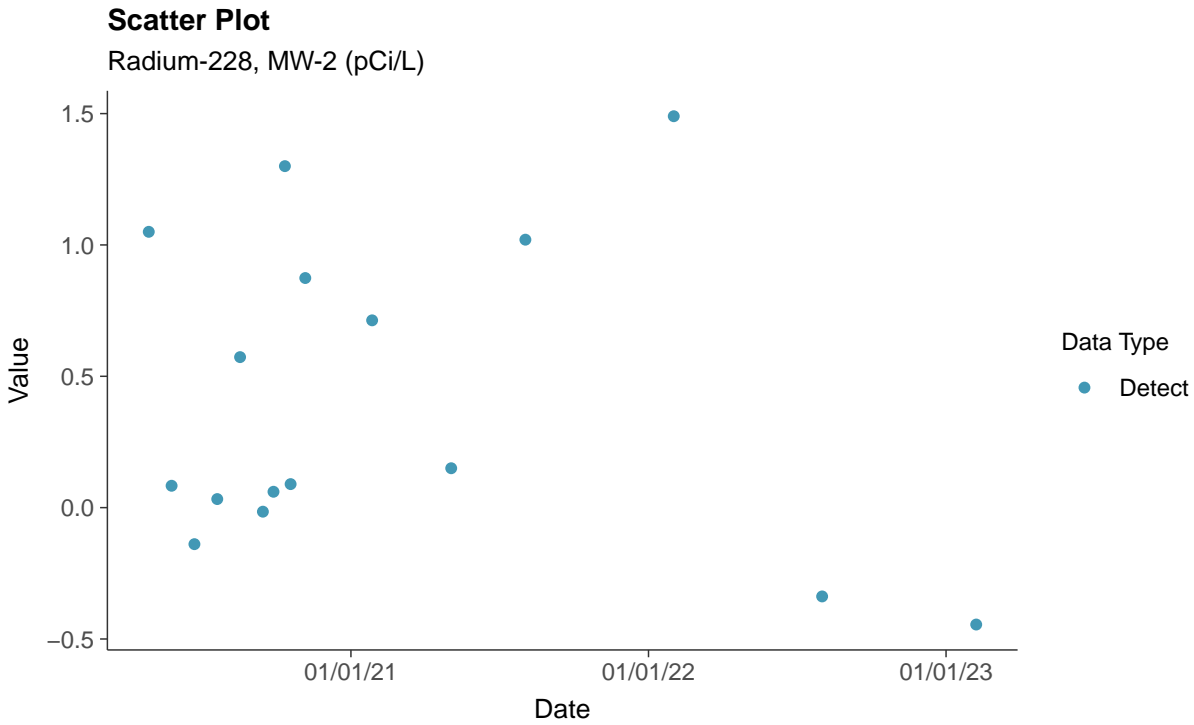
Radium-226/228, MW-2 (pCi/L)





Appendix IV: Radium-228, MW-2

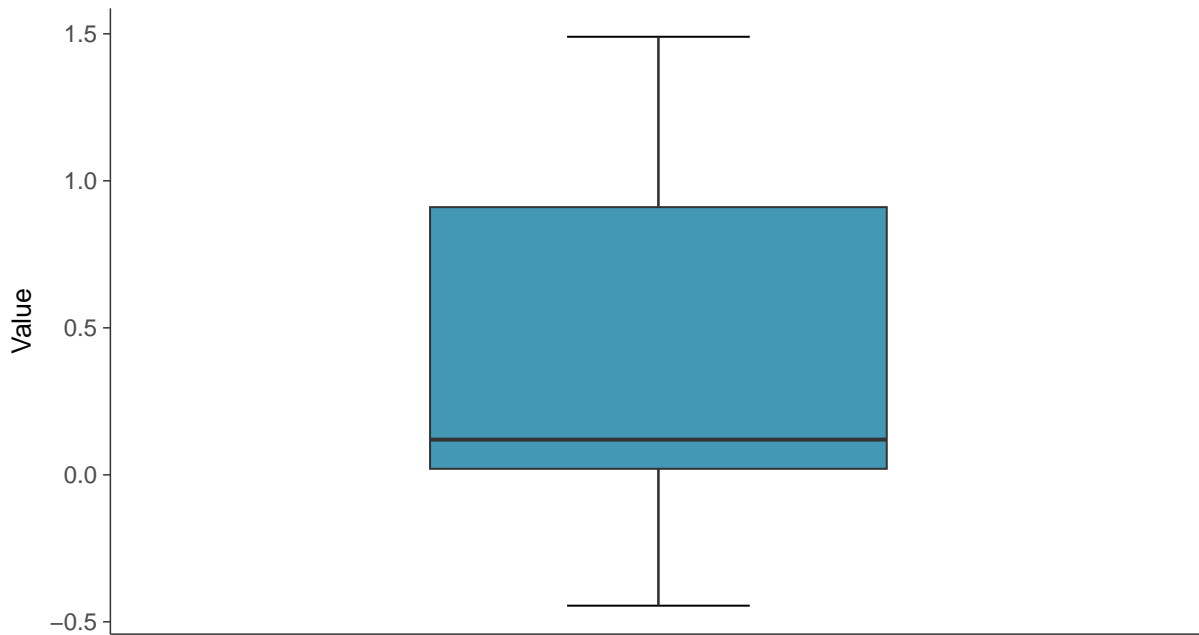
ID: 02_2_26





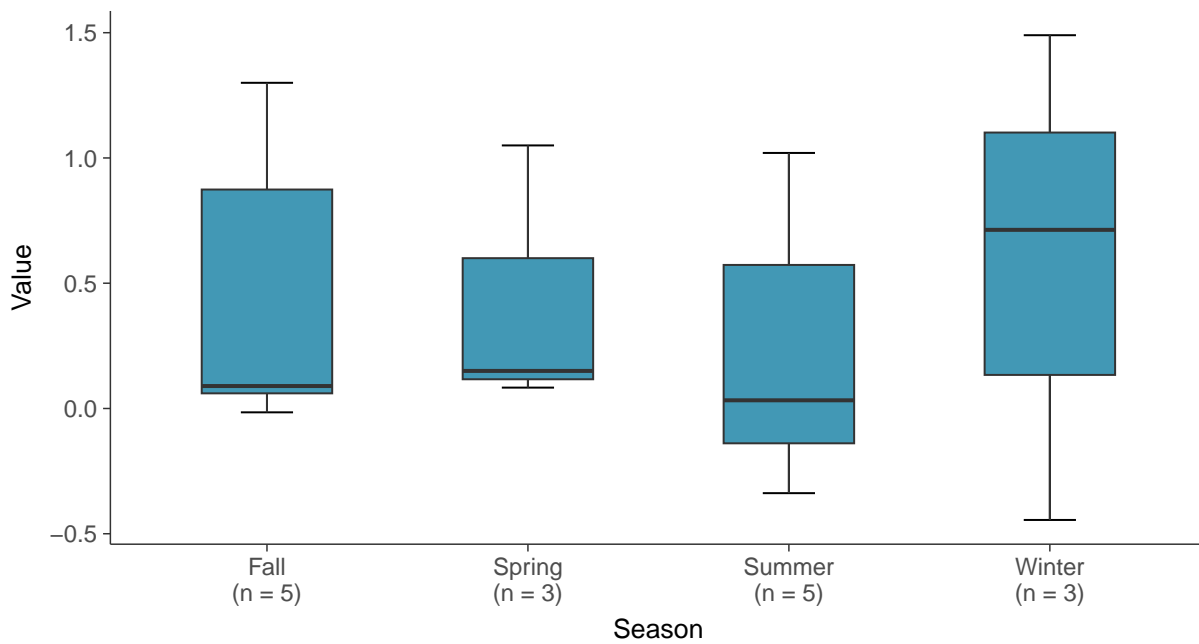
Boxplot

Radium-228, MW-2 (pCi/L)



Boxplot by Season

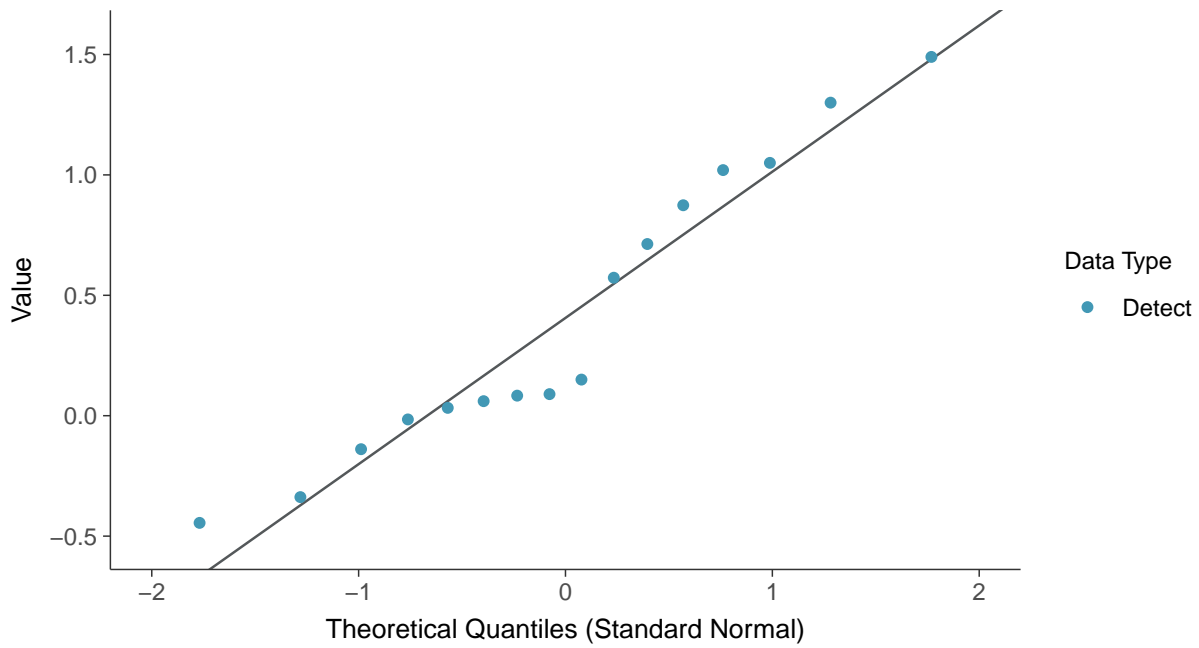
Radium-228, MW-2 (pCi/L)





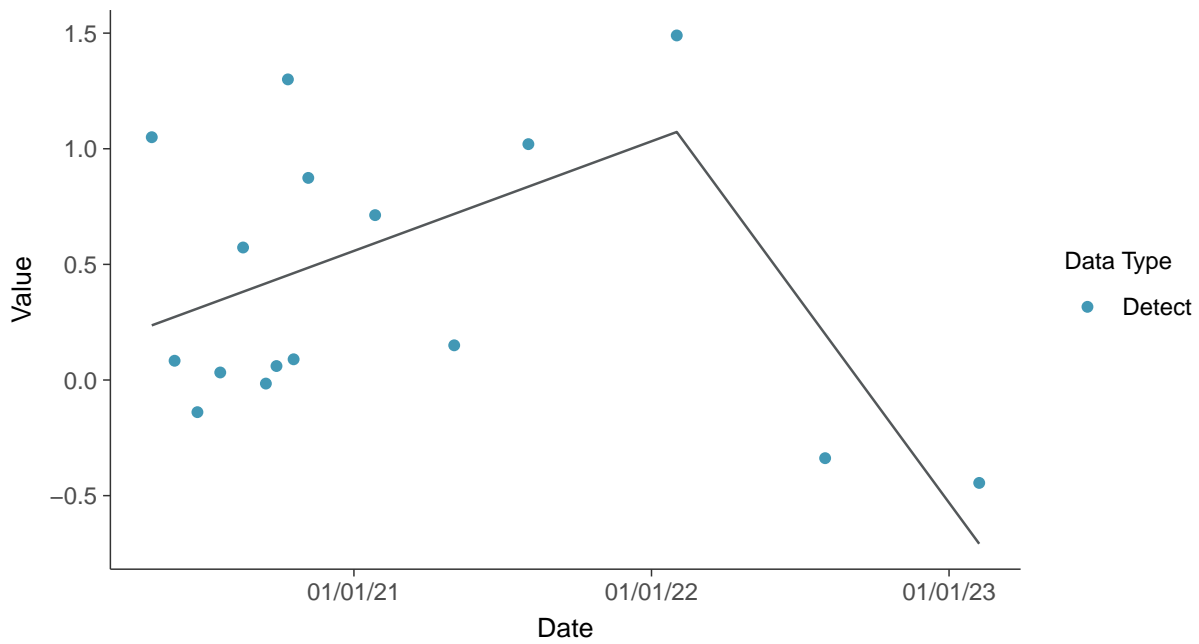
Normal Q-Q plot

Radium-228, MW-2 (pCi/L)



Trend Regression: Piecewise Linear-Linear

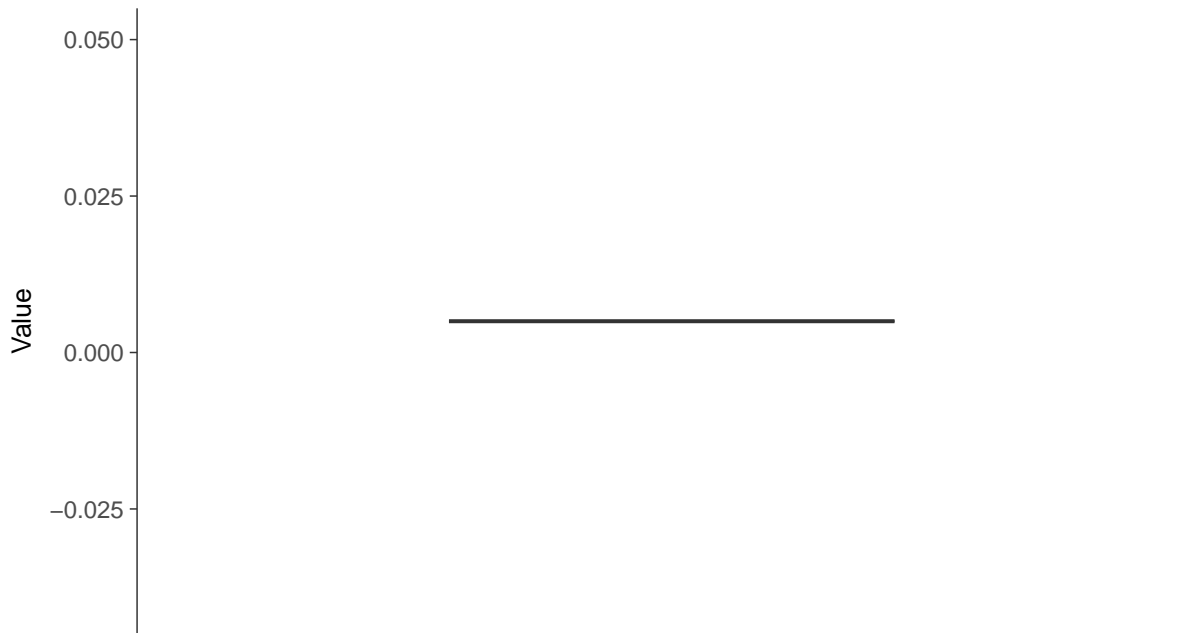
Radium-228, MW-2 (pCi/L)





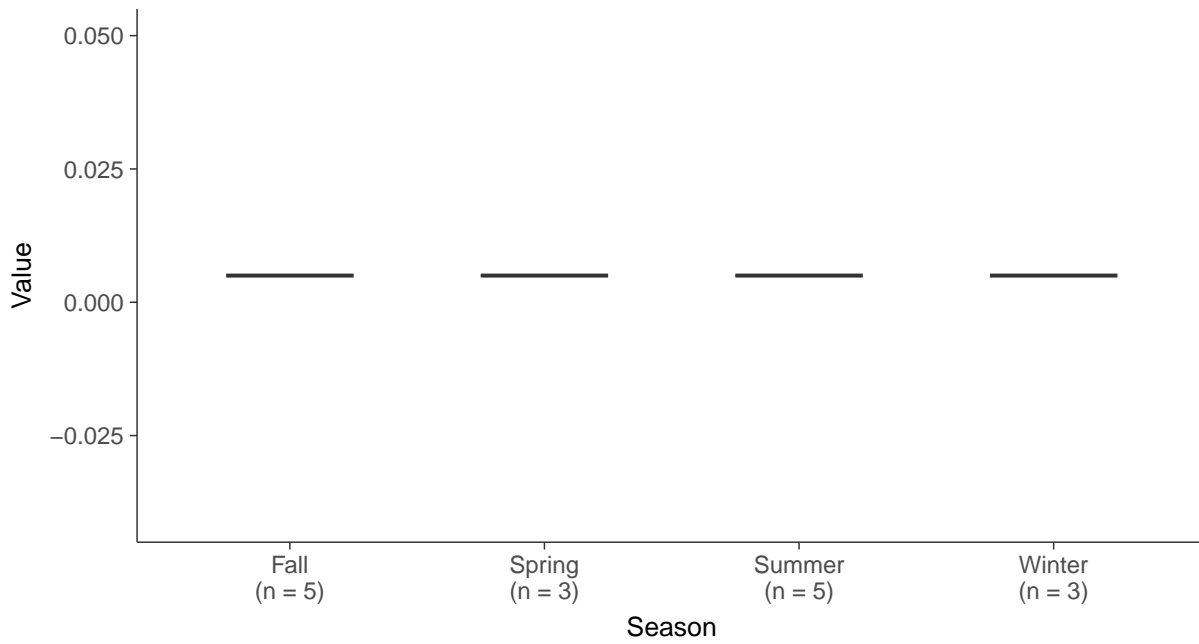
Boxplot

Selenium, MW-2 (mg/L)



Boxplot by Season

Selenium, MW-2 (mg/L)



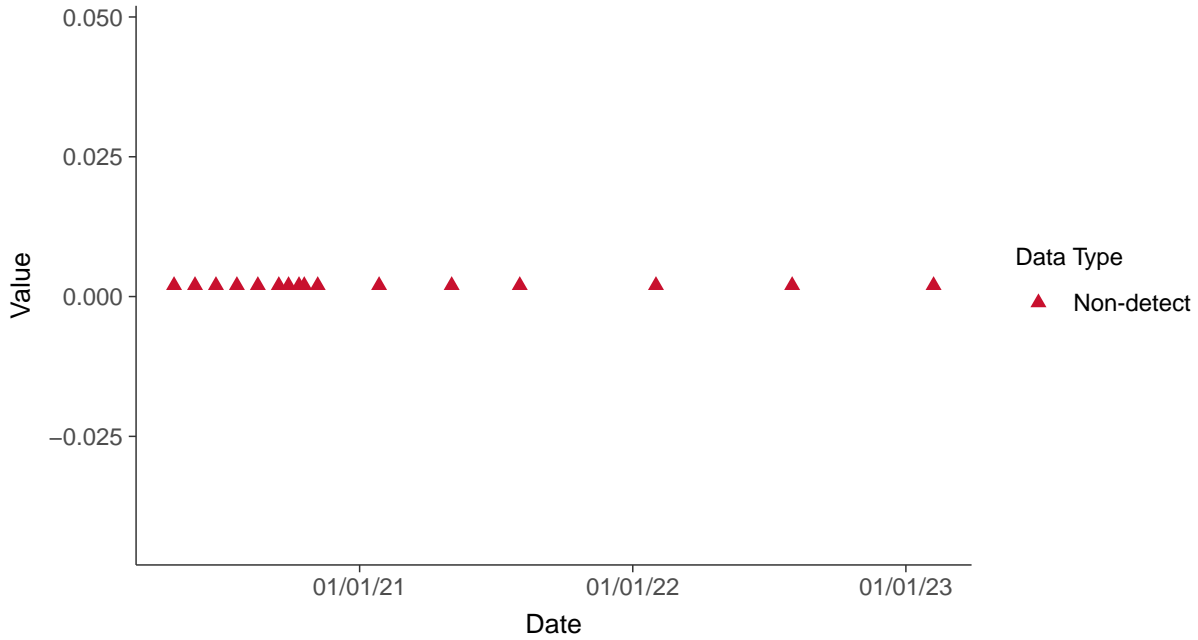


Appendix IV: Thallium, MW-2

ID: 02_2_29

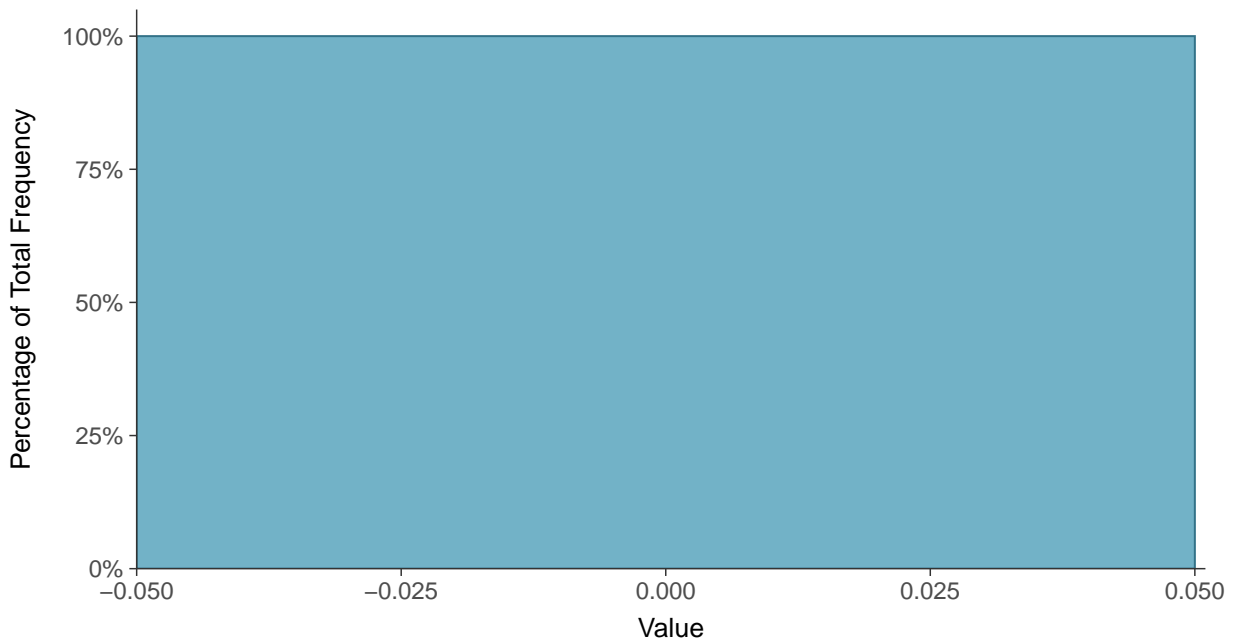
Scatter Plot

Thallium, MW-2 (mg/L)



Histogram

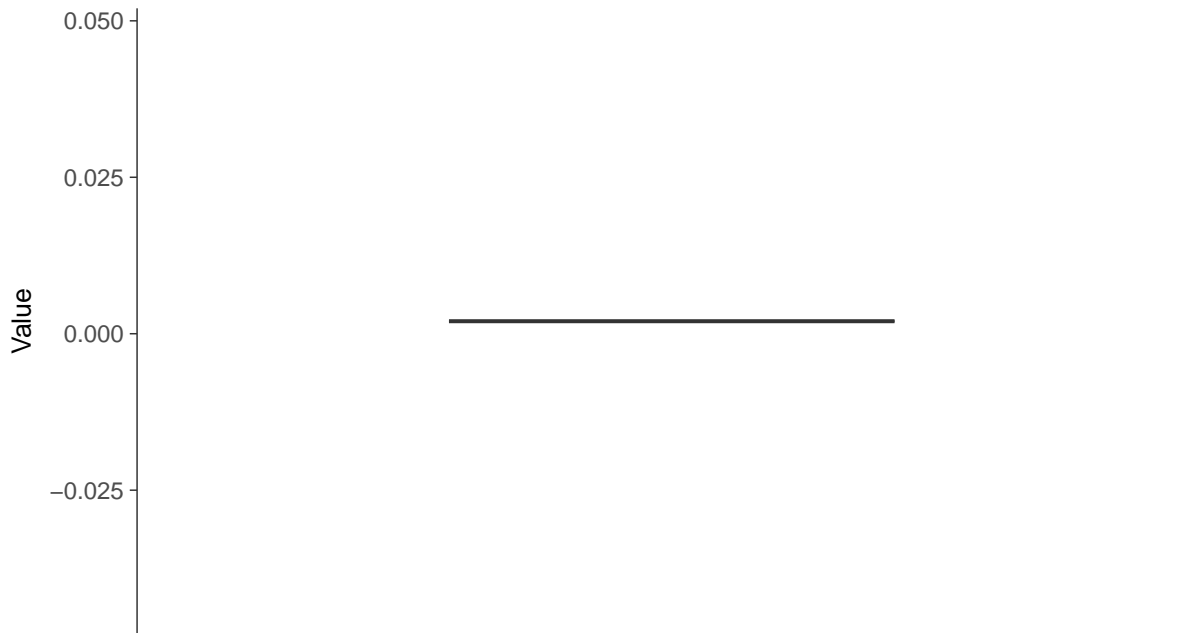
Thallium, MW-2 (mg/L)





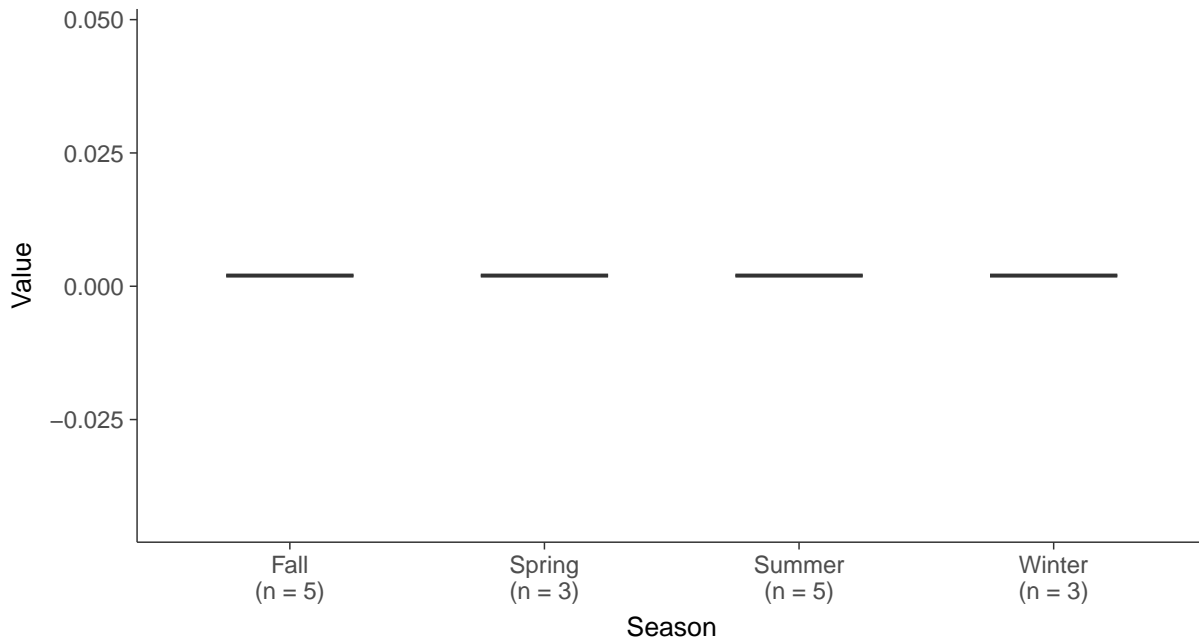
Boxplot

Thallium, MW-2 (mg/L)



Boxplot by Season

Thallium, MW-2 (mg/L)

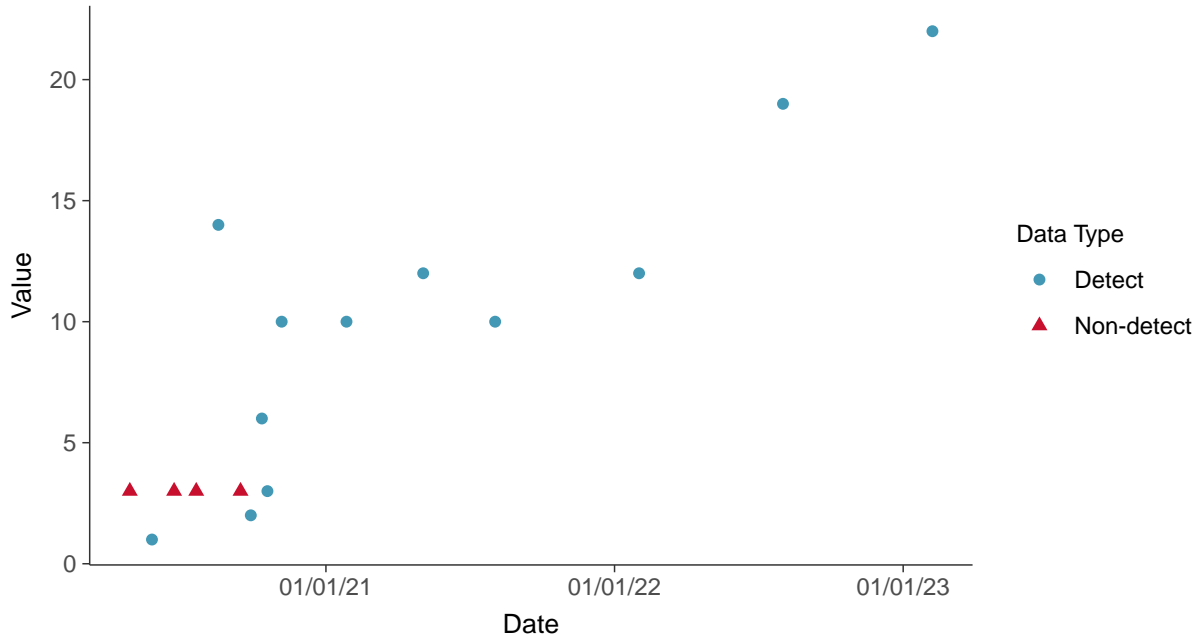


Appendix IV: Total Suspended Solids, MW-2

ID: 02_2_30

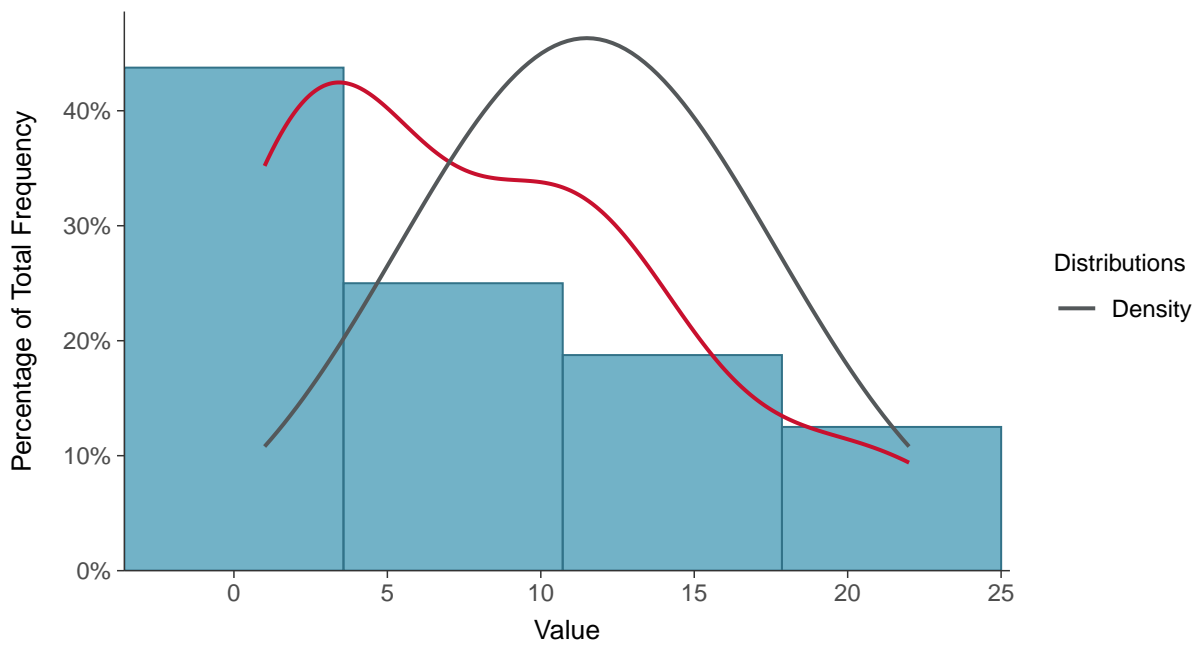
Scatter Plot

Total Suspended Solids, MW-2 (mg/L)



Histogram

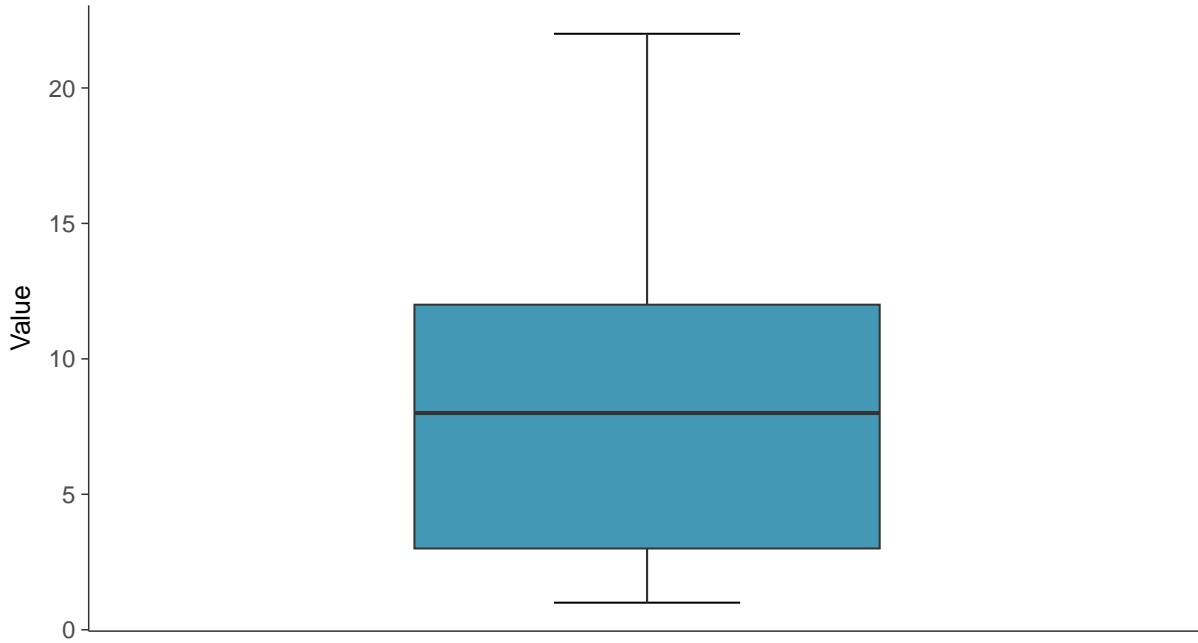
Total Suspended Solids, MW-2 (mg/L)





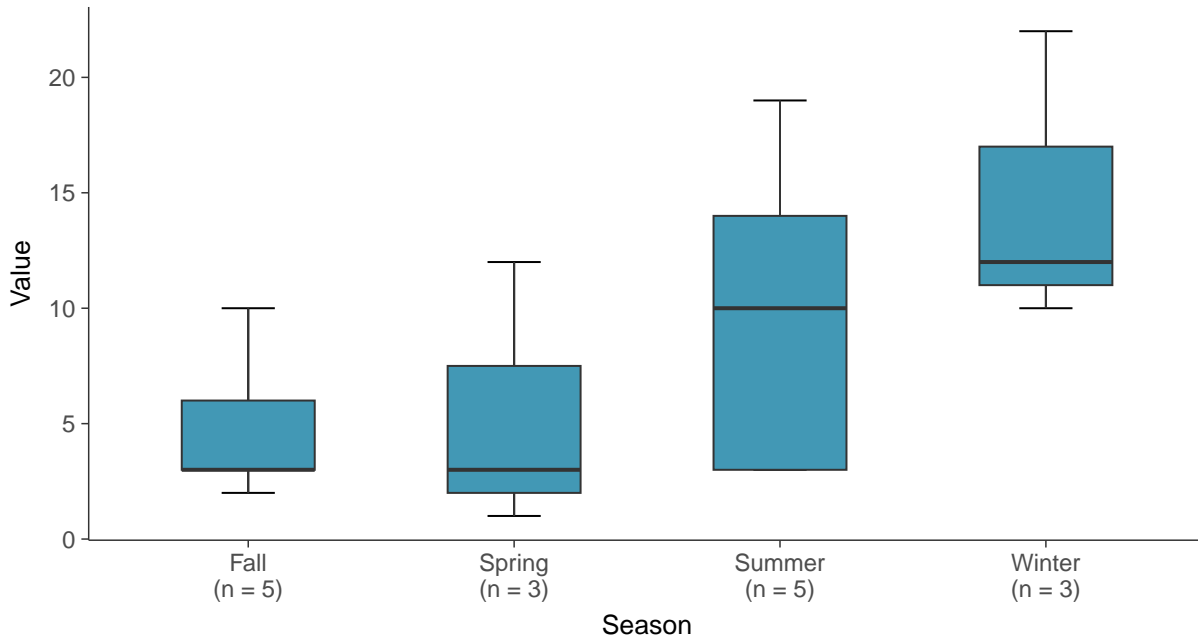
Boxplot

Total Suspended Solids, MW-2 (mg/L)



Boxplot by Season

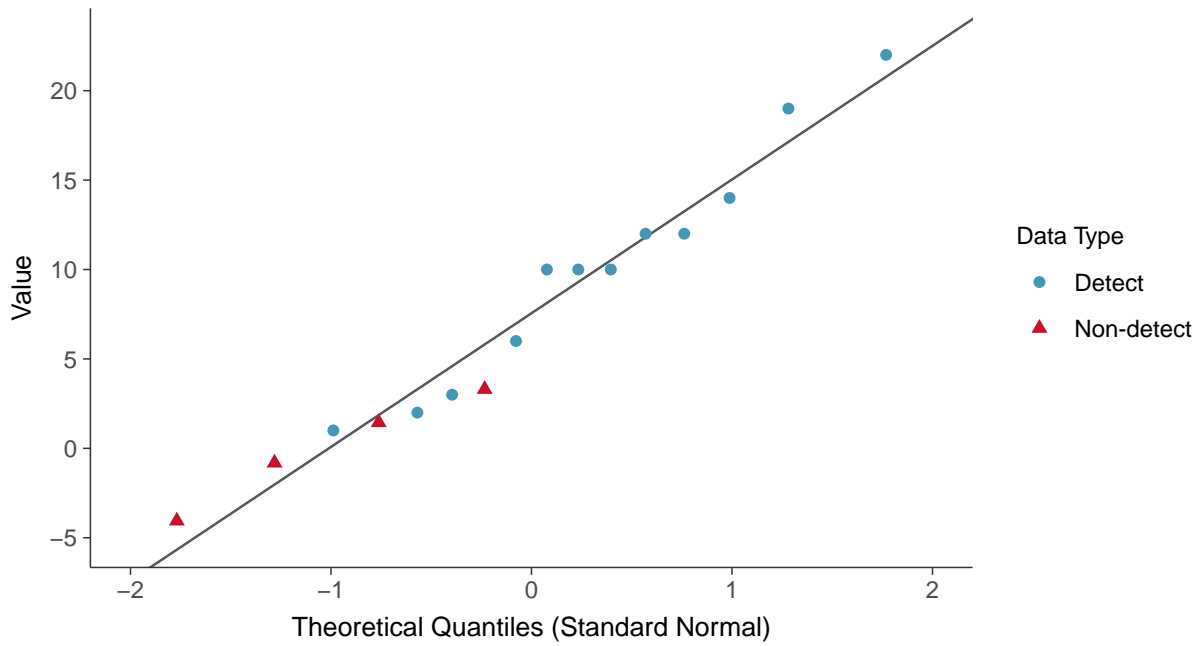
Total Suspended Solids, MW-2 (mg/L)





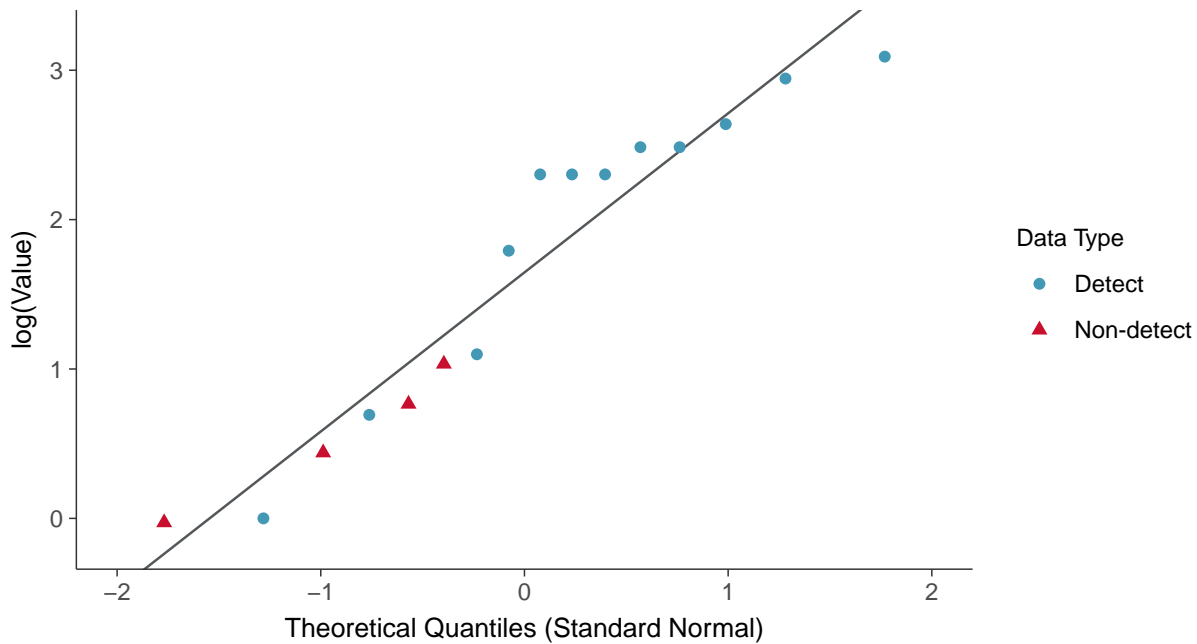
Normal Q-Q plot using ROS Imputed Estimates

Total Suspended Solids, MW-2 (mg/L)



Lognormal Q-Q plot using ROS Imputed Estimates

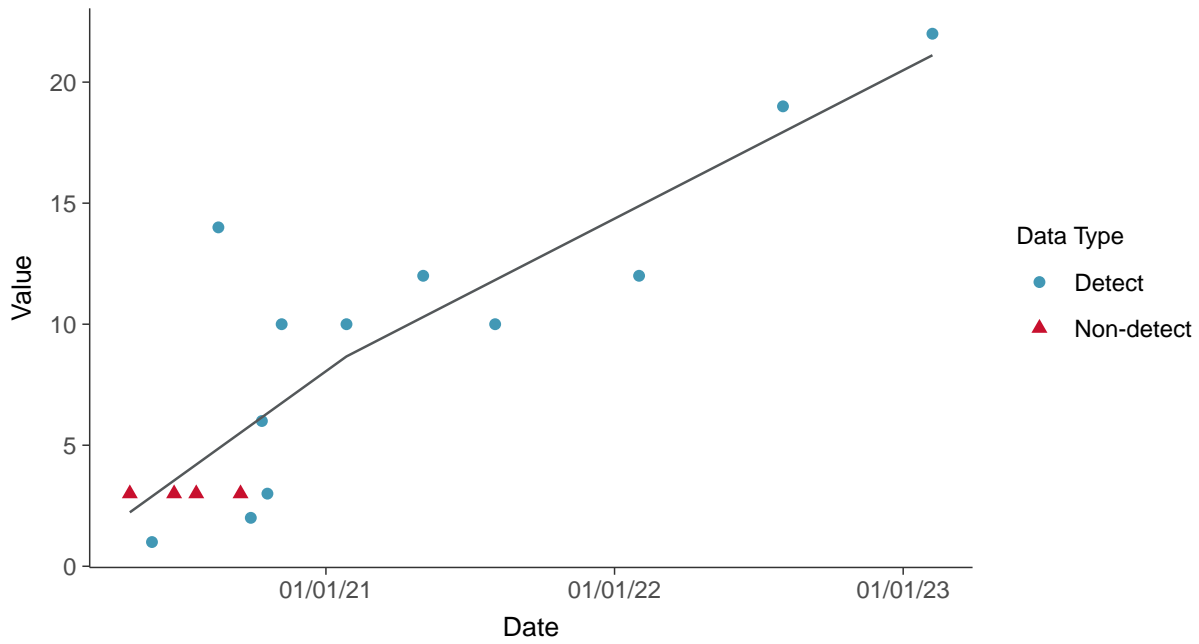
Total Suspended Solids, MW-2 (mg/L)





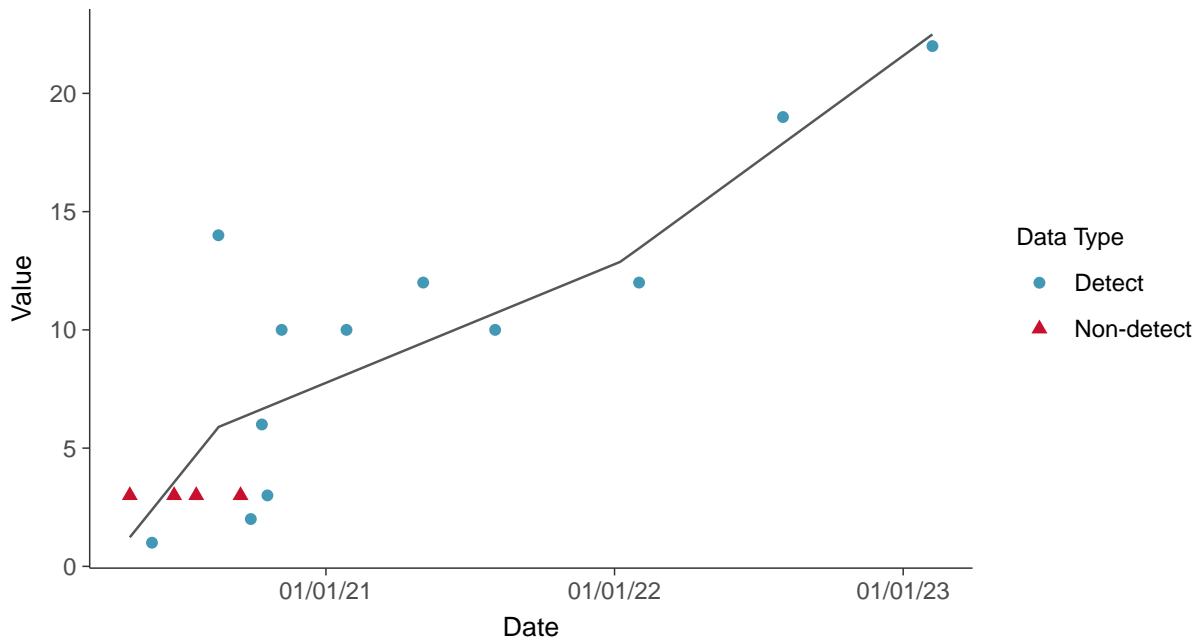
Trend Regression: Piecewise Linear-Linear

Total Suspended Solids, MW-2 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Total Suspended Solids, MW-2 (mg/L)



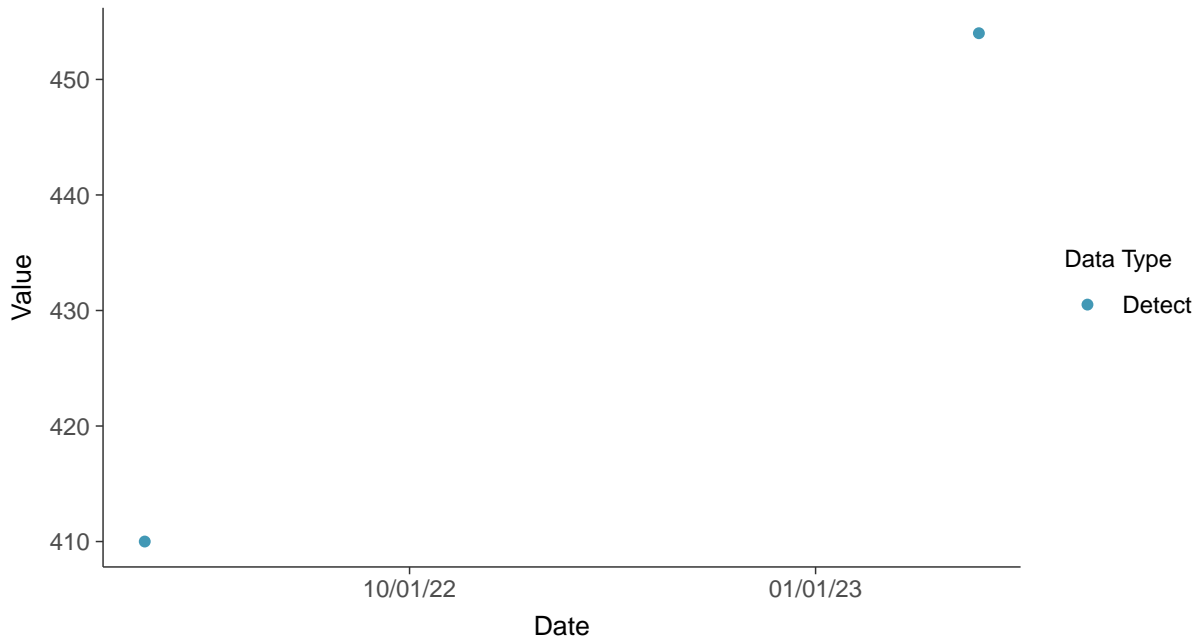


Other: Bicarbonate, MW-2

ID: 02_3_12

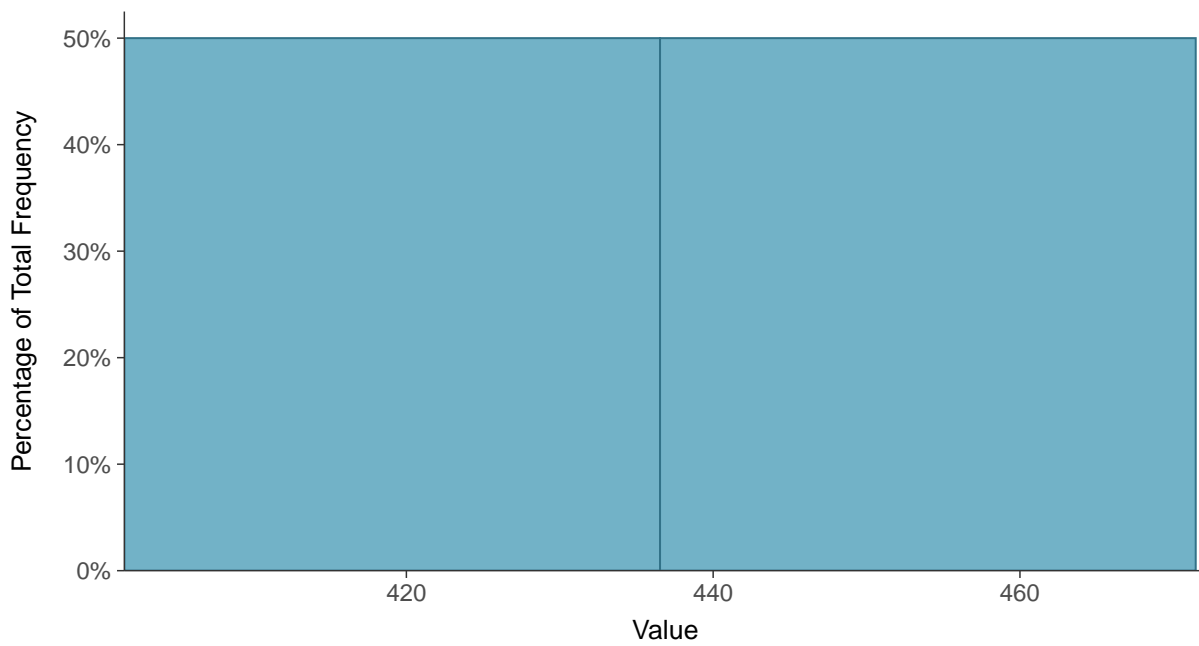
Scatter Plot

Bicarbonate, MW-2 (mg/L)



Histogram

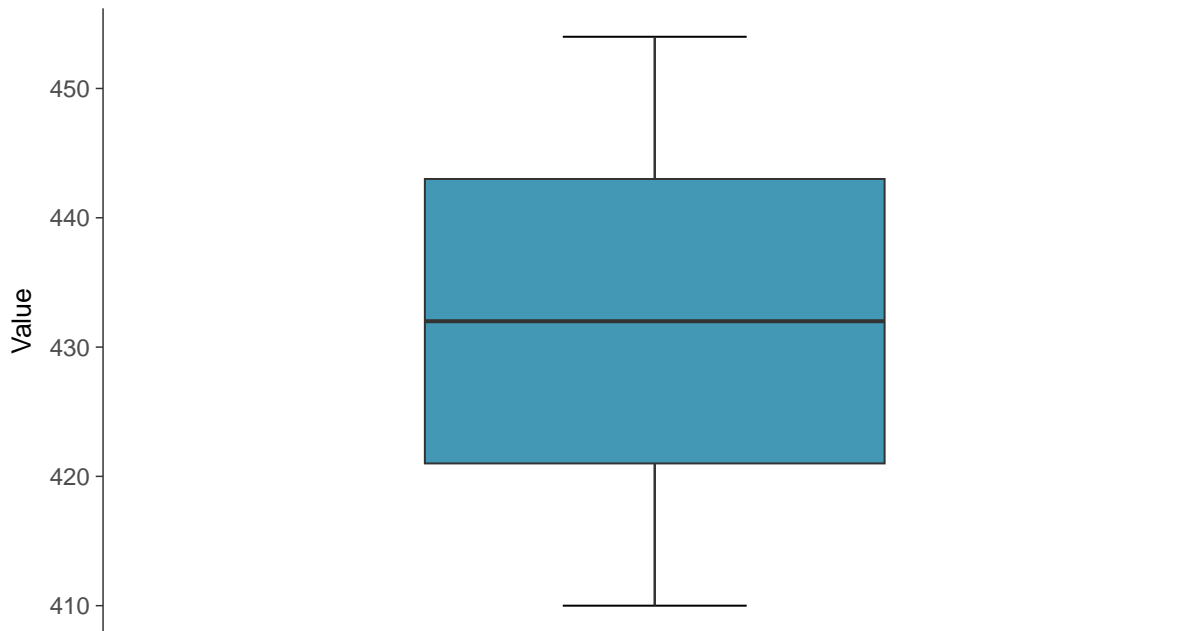
Bicarbonate, MW-2 (mg/L)





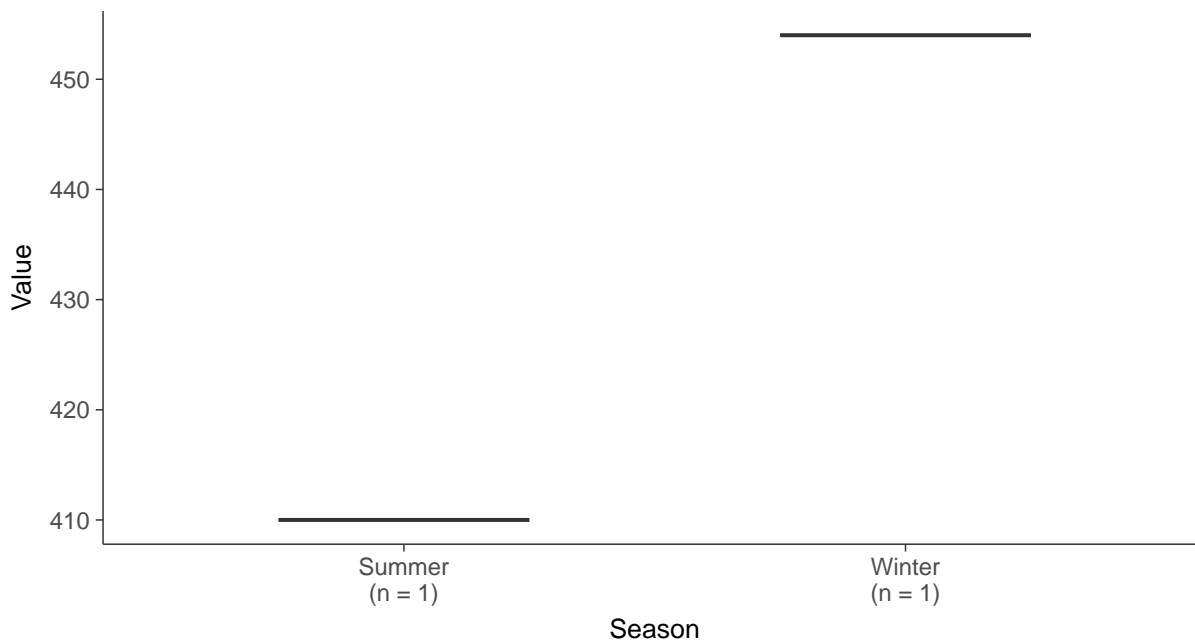
Boxplot

Bicarbonate, MW-2 (mg/L)



Boxplot by Season

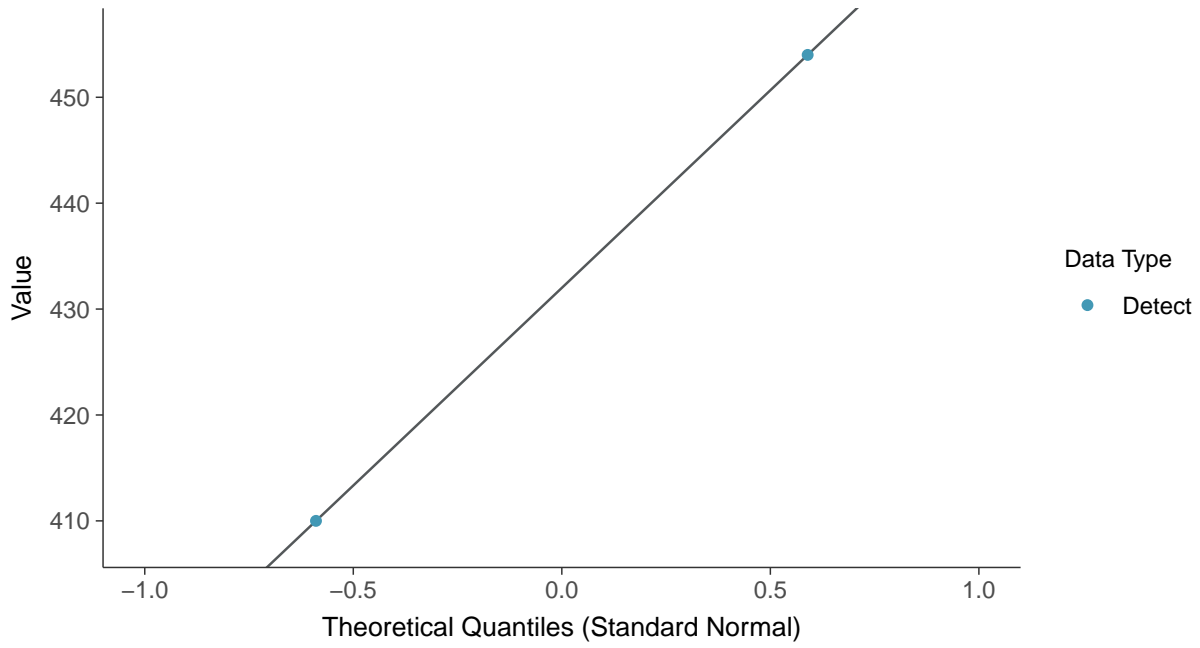
Bicarbonate, MW-2 (mg/L)





Normal Q-Q plot

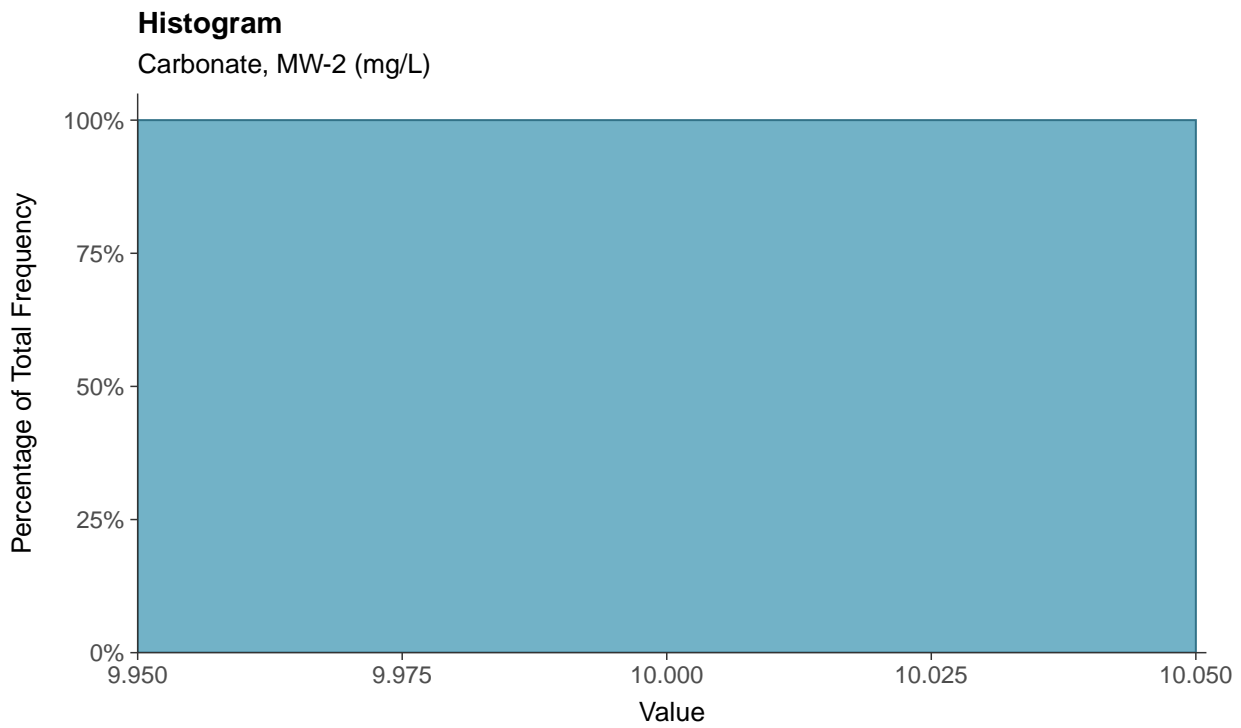
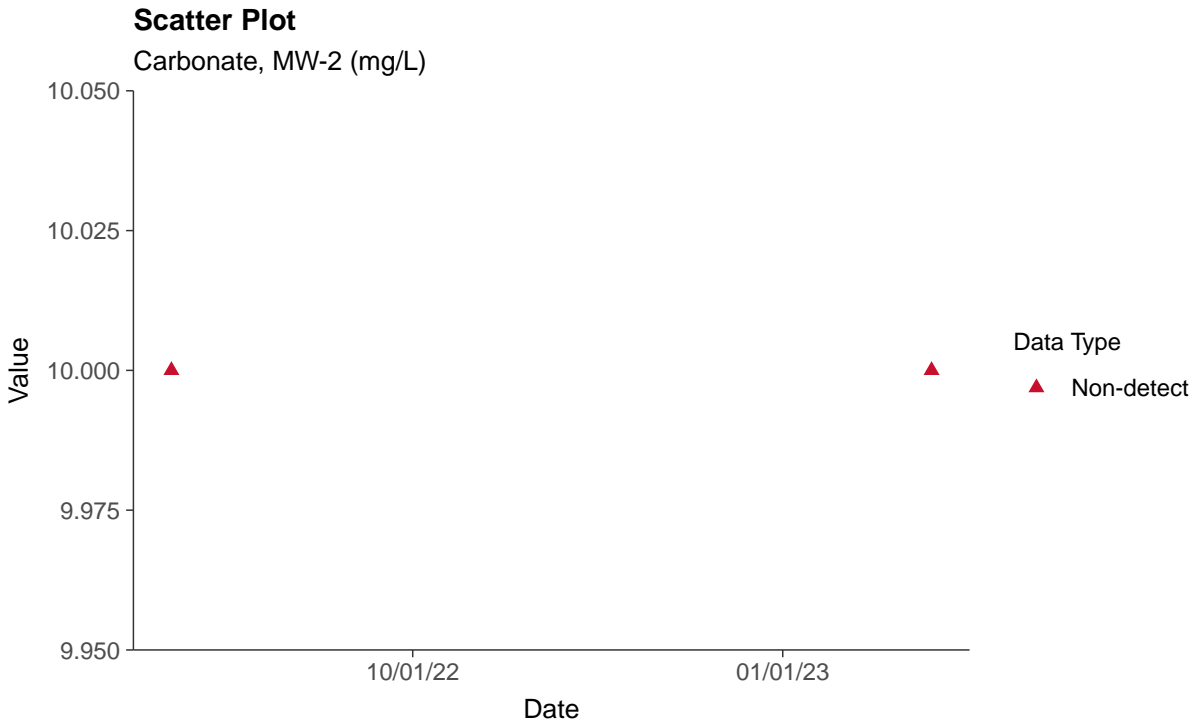
Bicarbonate, MW-2 (mg/L)





Other: Carbonate, MW-2

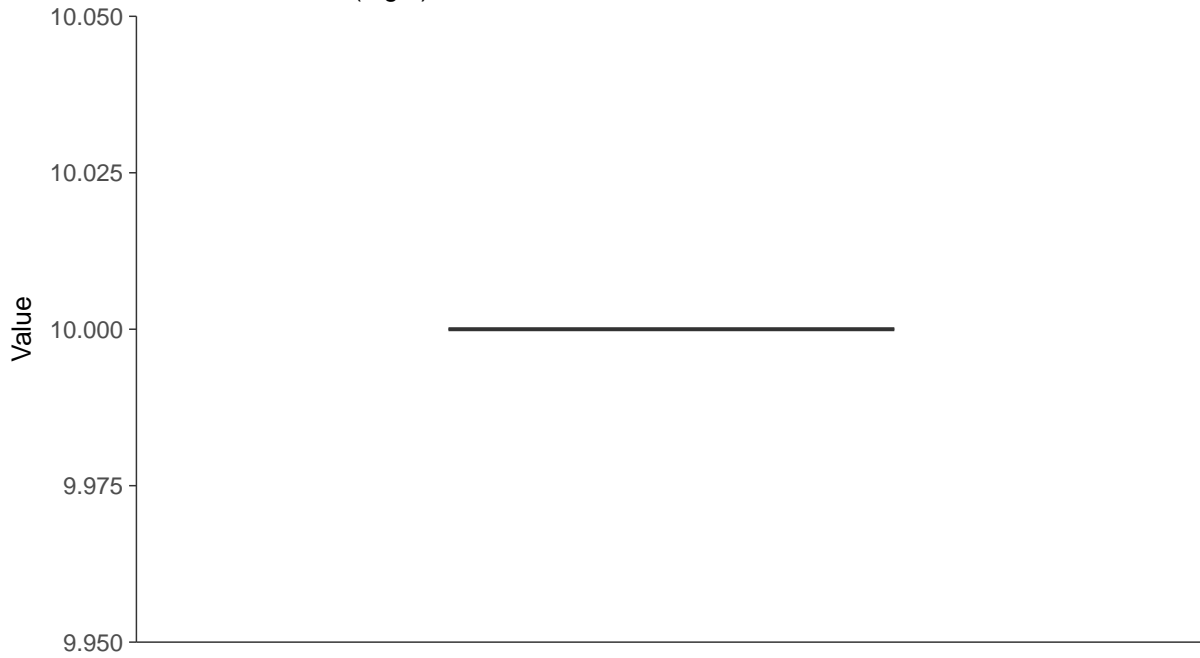
ID: 02_3_14





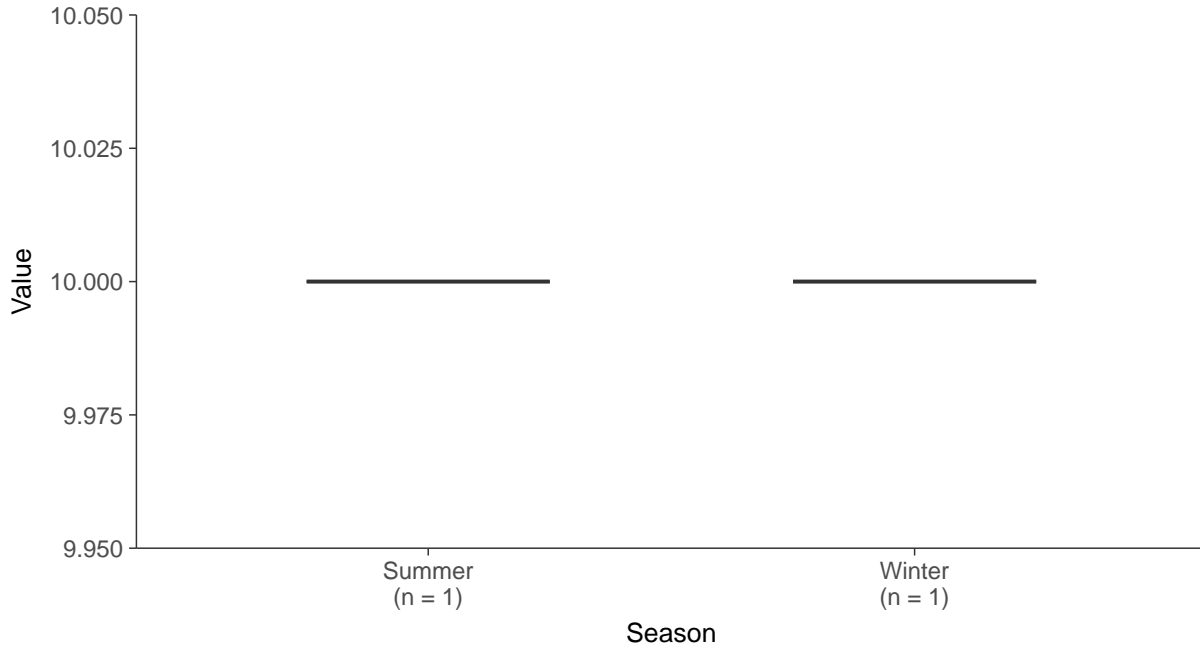
Boxplot

Carbonate, MW-2 (mg/L)



Boxplot by Season

Carbonate, MW-2 (mg/L)



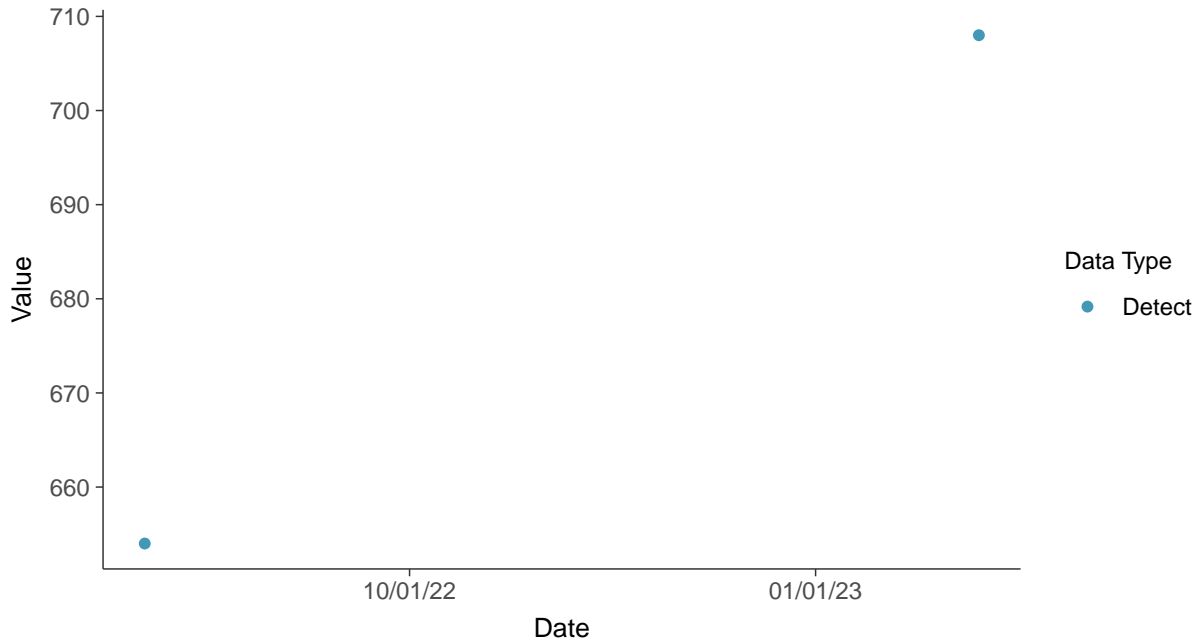


Other: Hardness, MW-2

ID: 02_3_17

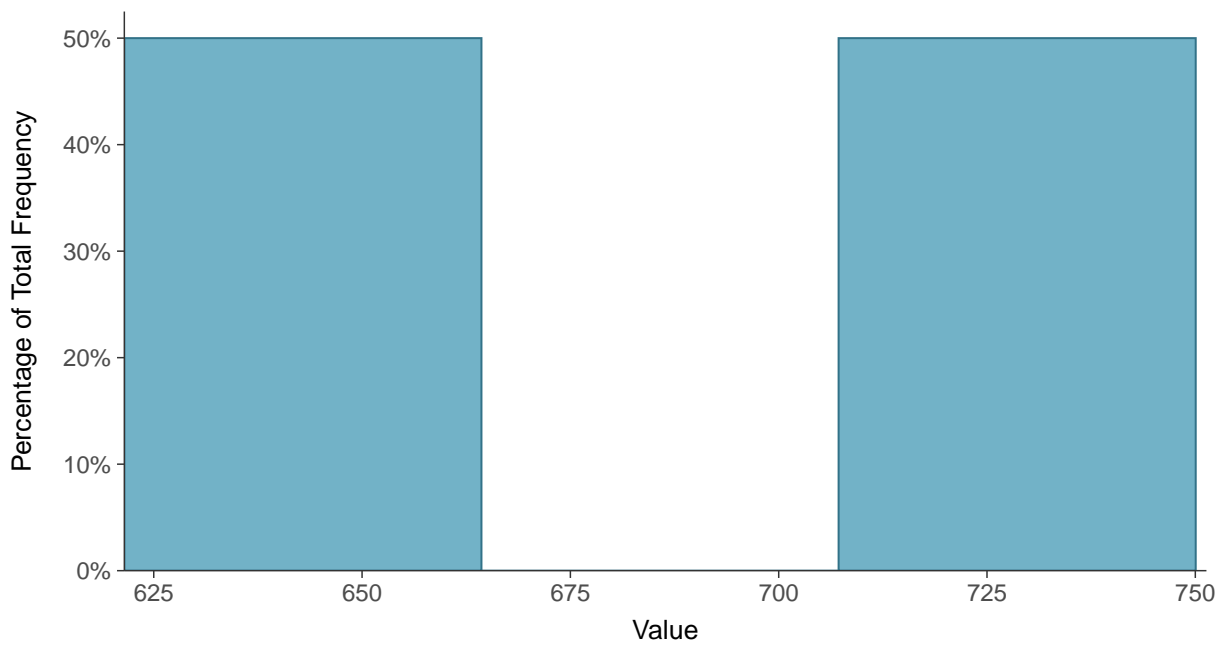
Scatter Plot

Hardness, MW-2 (mg/L)



Histogram

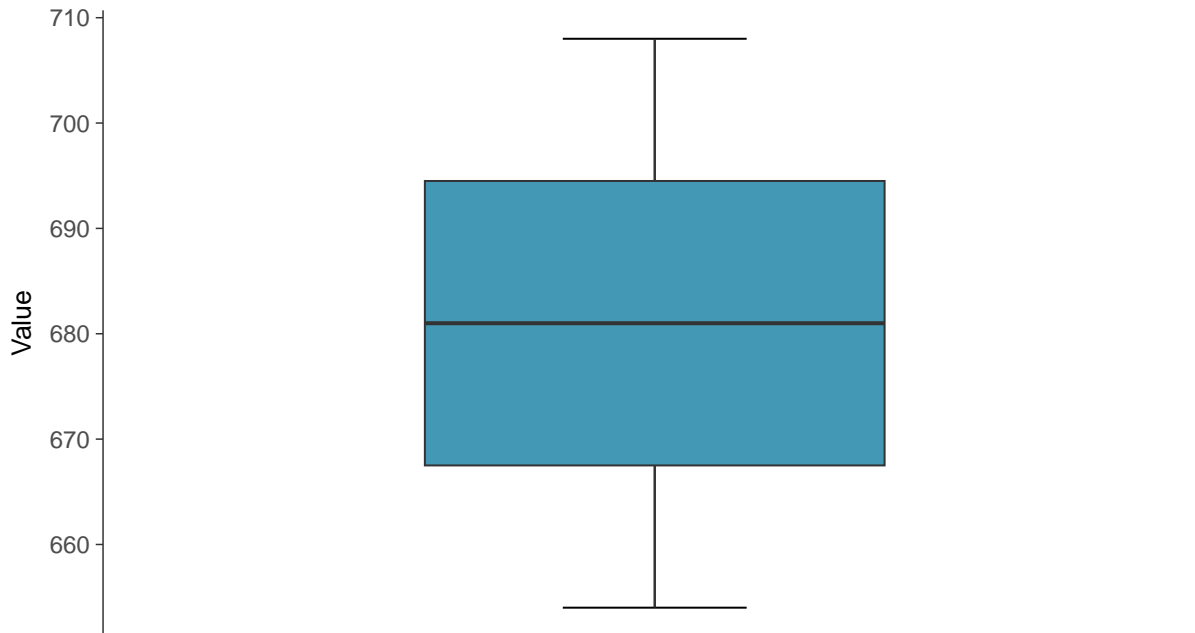
Hardness, MW-2 (mg/L)





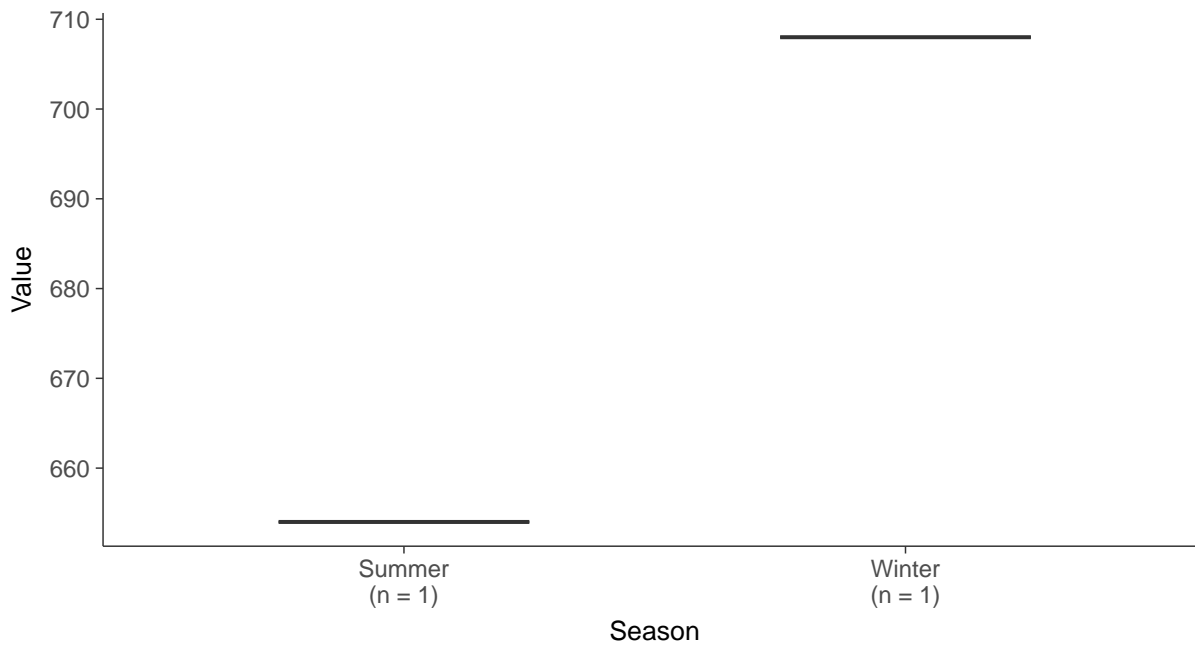
Boxplot

Hardness, MW-2 (mg/L)



Boxplot by Season

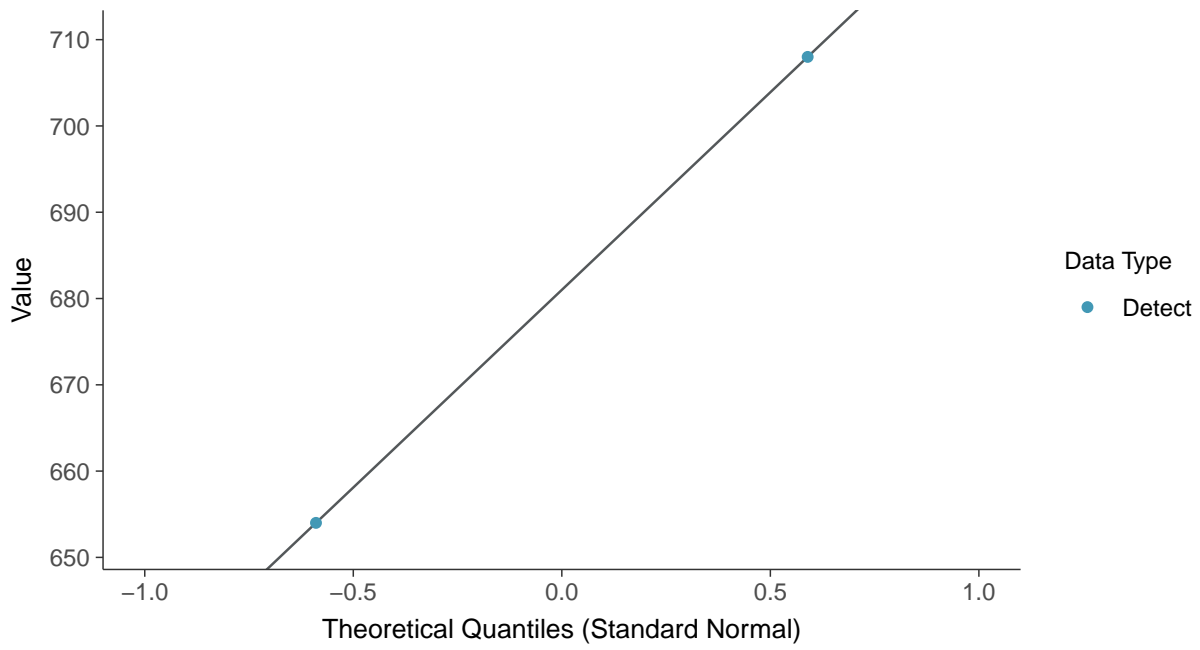
Hardness, MW-2 (mg/L)





Normal Q-Q plot

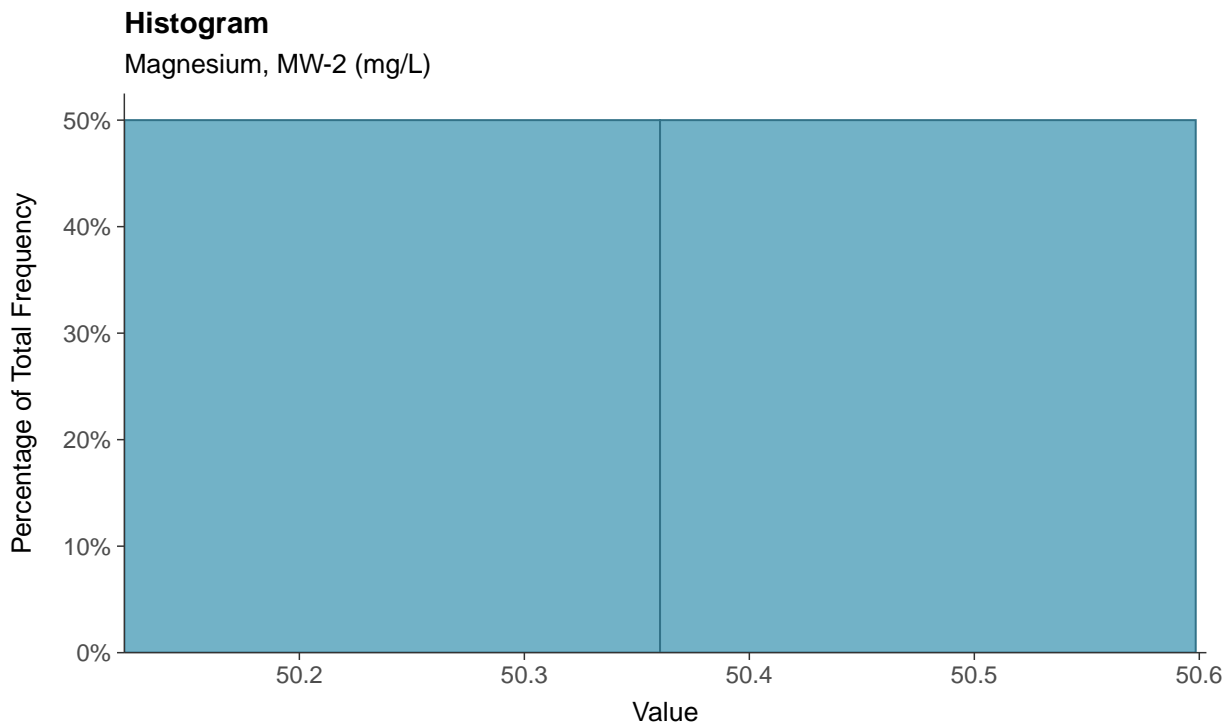
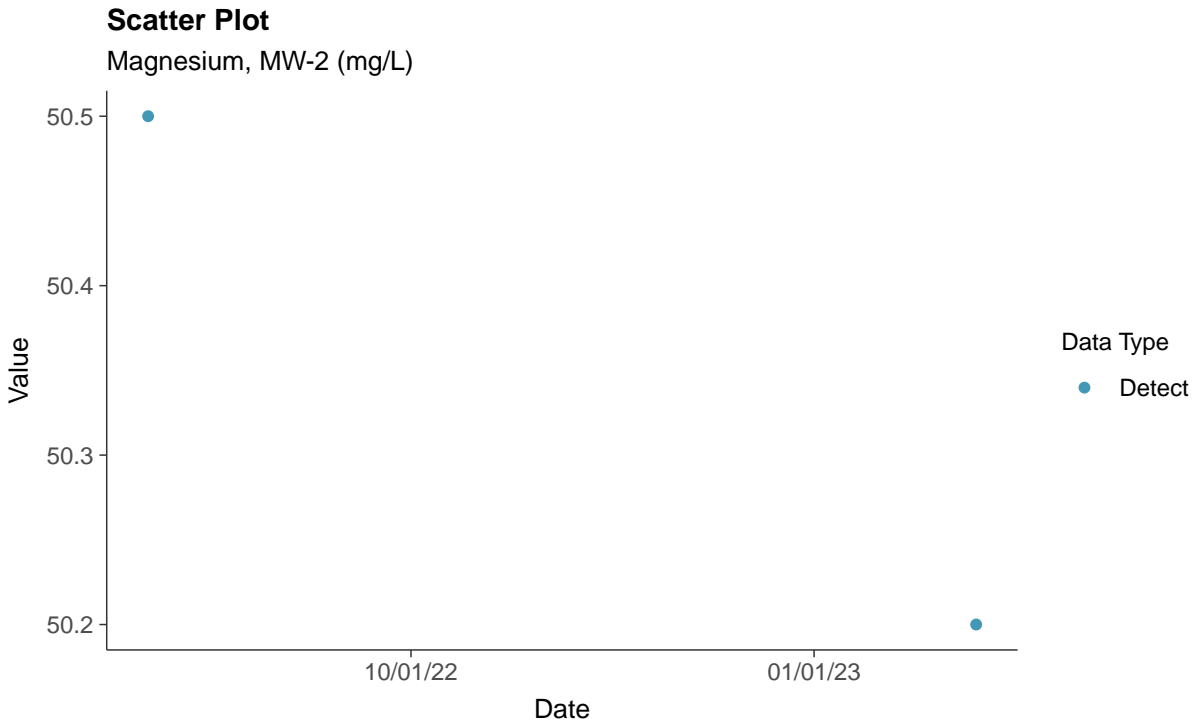
Hardness, MW-2 (mg/L)





Other: Magnesium, MW-2

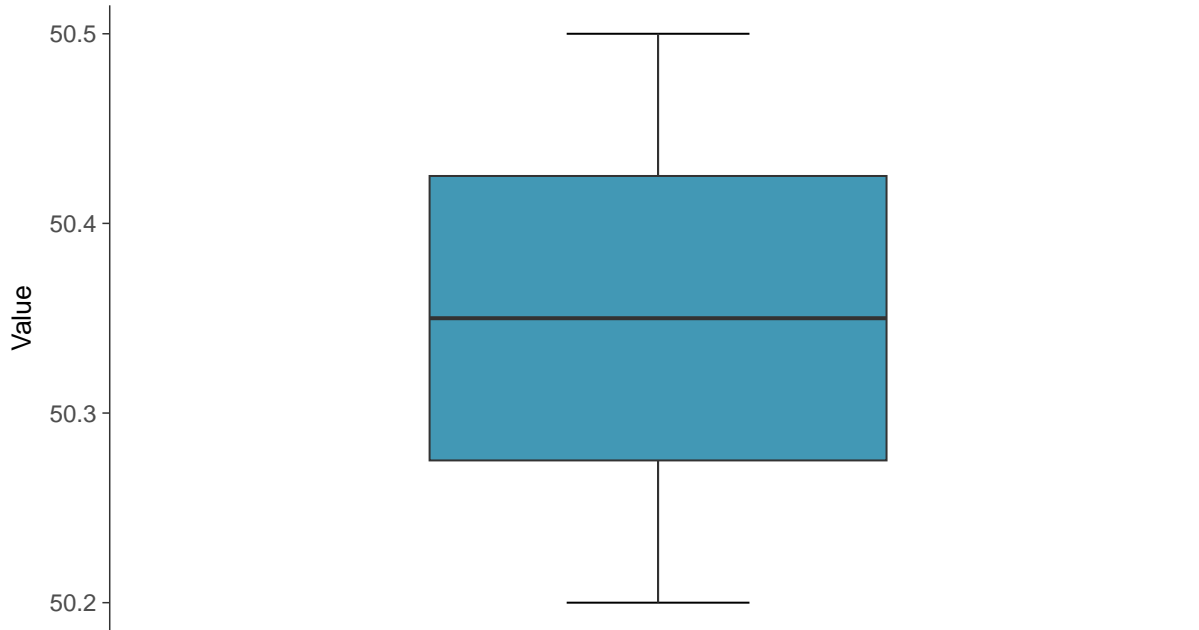
ID: 02_3_20





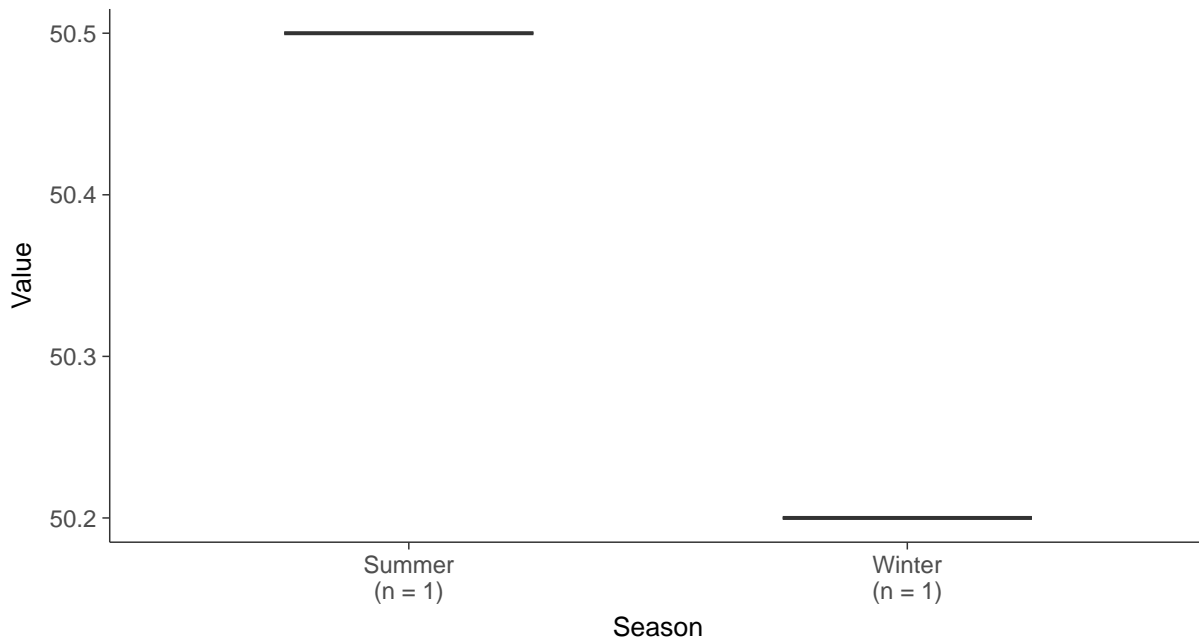
Boxplot

Magnesium, MW-2 (mg/L)



Boxplot by Season

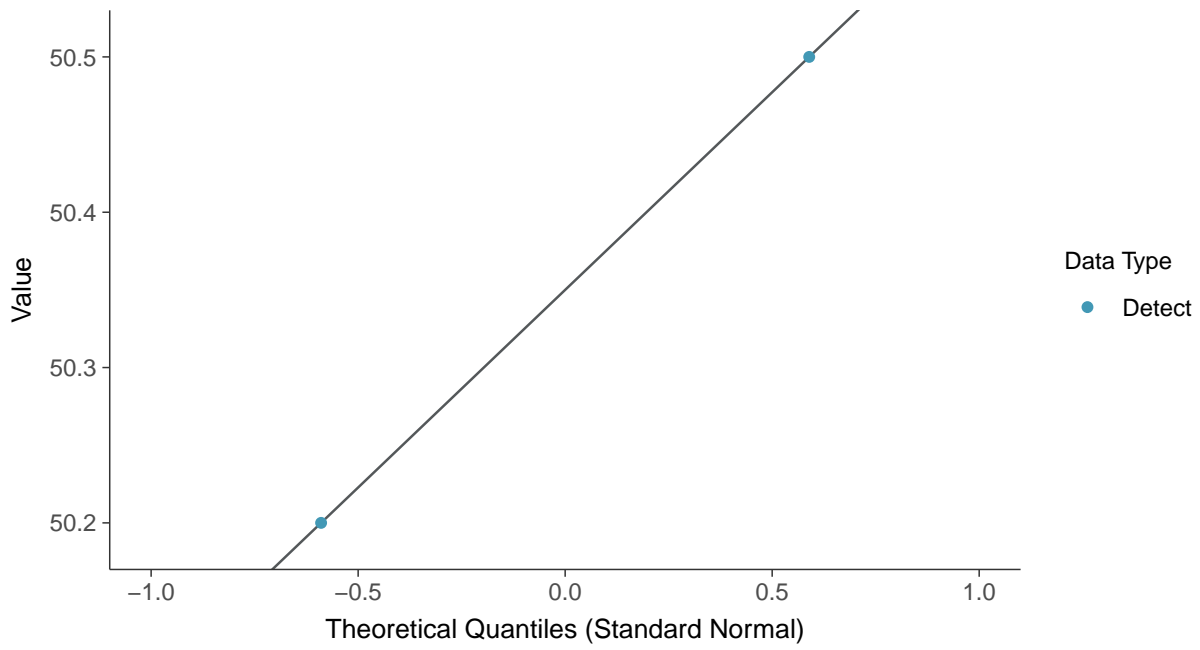
Magnesium, MW-2 (mg/L)





Downgradient Wells MW-2, MW-3, MW-5, MW-6, MW-7, MW-7B, MW-8, MW-9, MW-10, MW-13, MW-14, MW-15

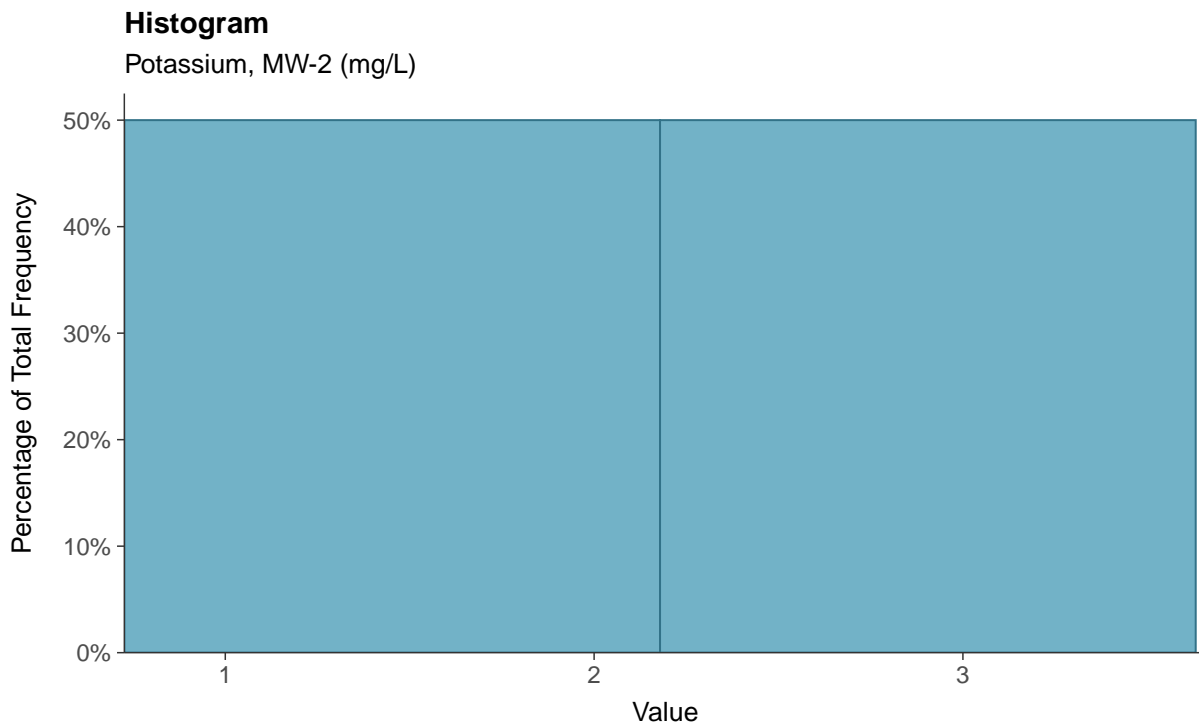
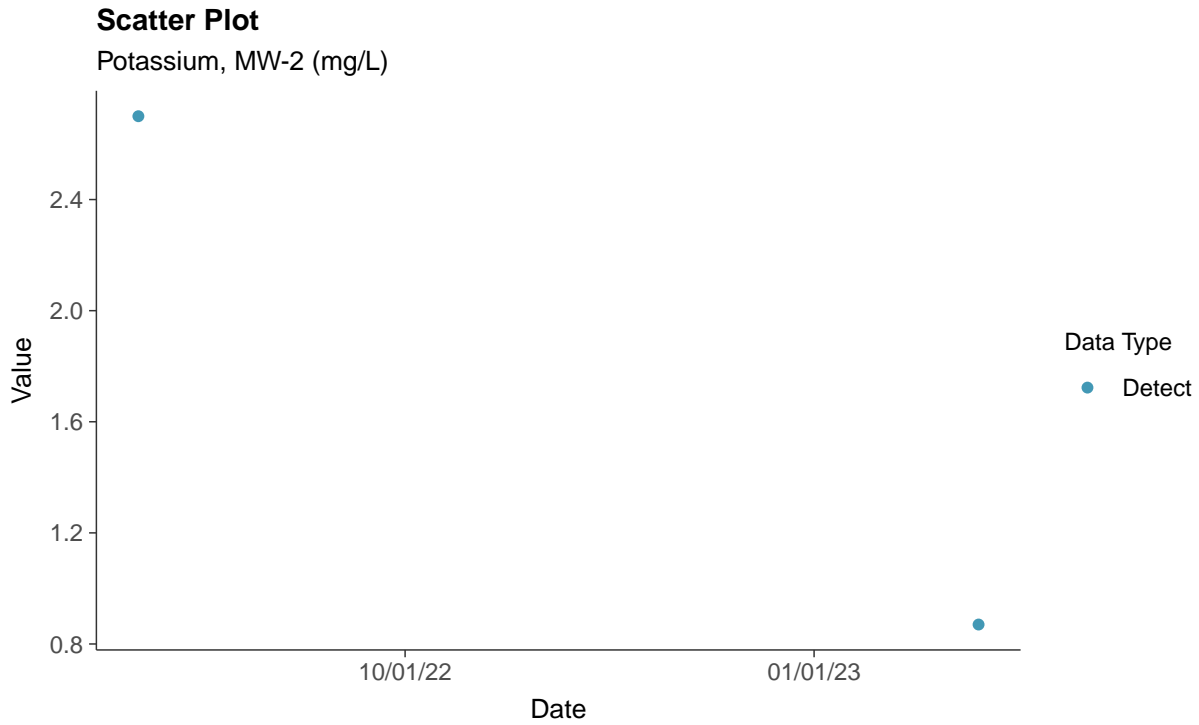
Normal Q-Q plot
Magnesium, MW-2 (mg/L)





Other: Potassium, MW-2

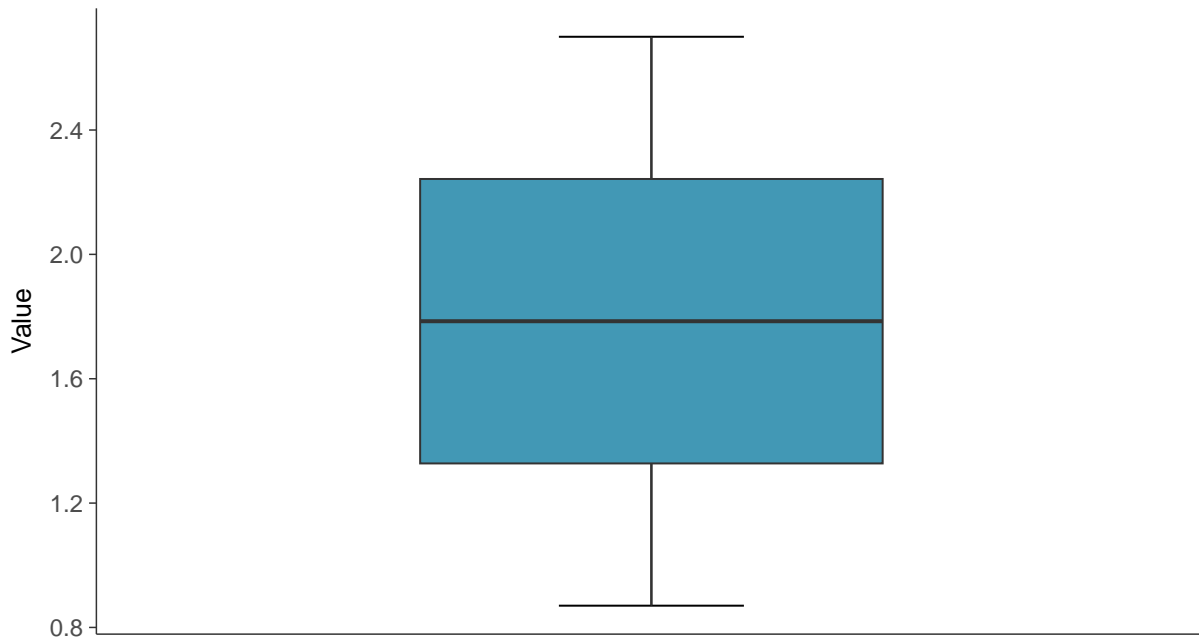
ID: 02_3_23





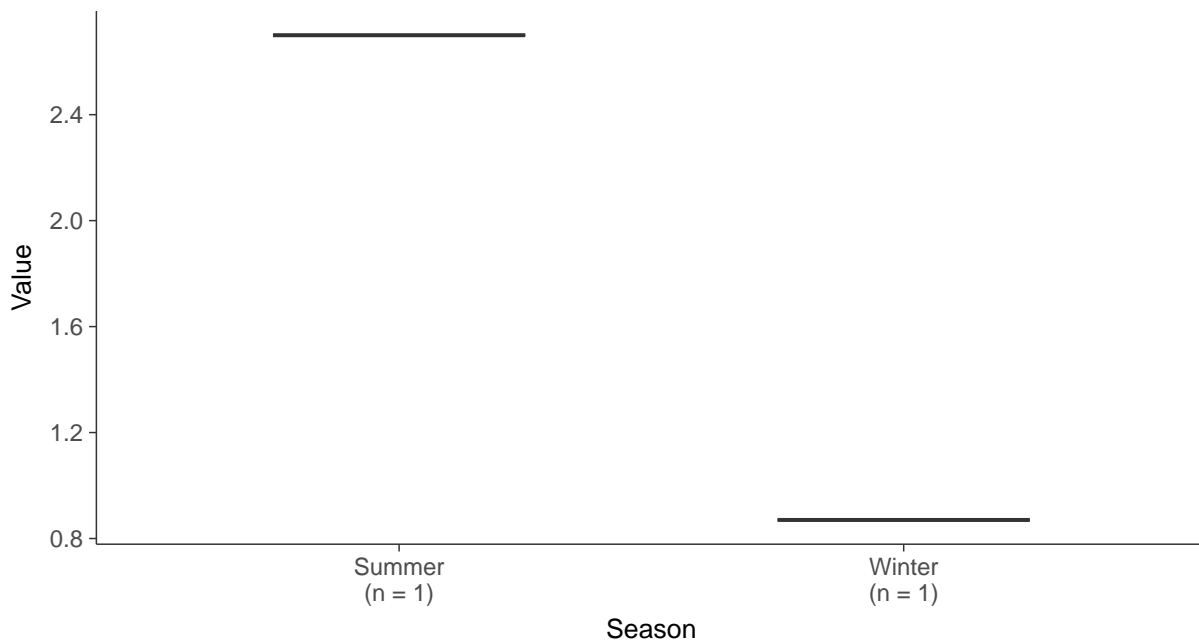
Boxplot

Potassium, MW-2 (mg/L)



Boxplot by Season

Potassium, MW-2 (mg/L)

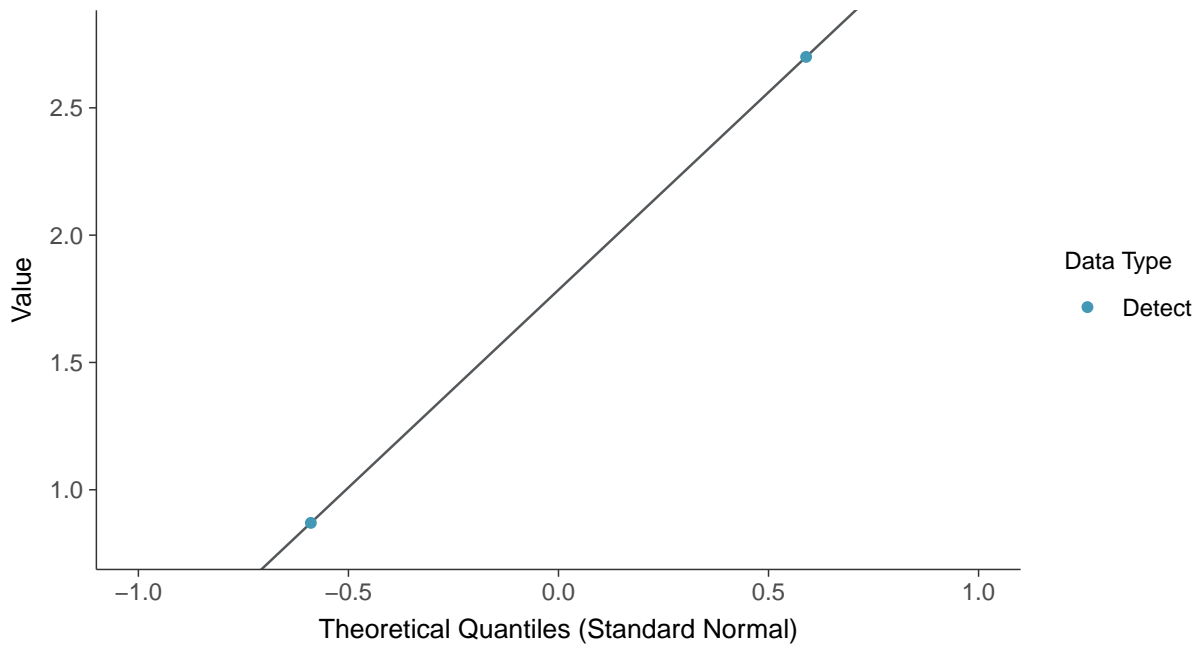




Downgradient Wells MW-2, MW-3, MW-5, MW-6, MW-7, MW-7B, MW-8, MW-9, MW-10, MW-13, MW-14, MW-15

Normal Q-Q plot

Potassium, MW-2 (mg/L)



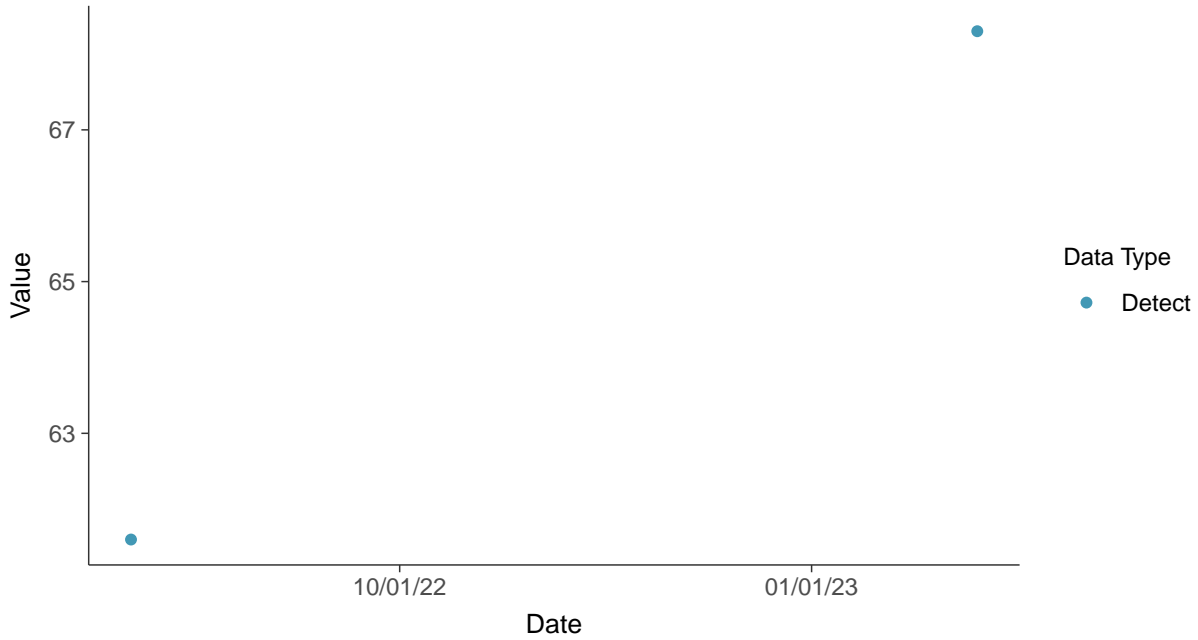


Other: Sodium, MW-2

ID: 02_3_28

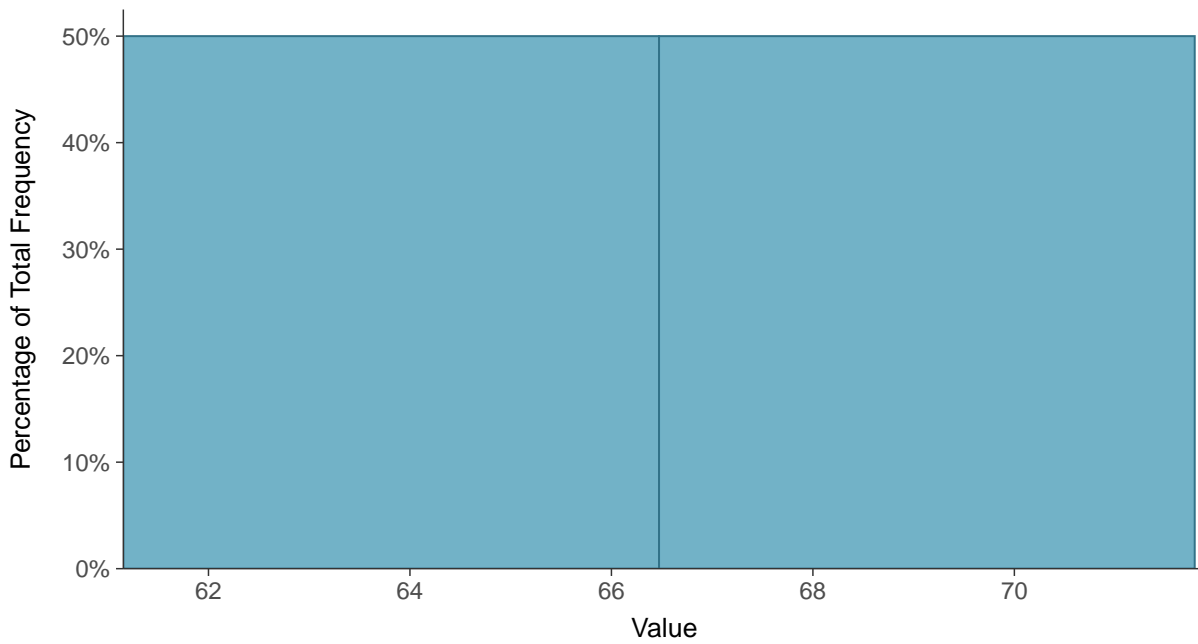
Scatter Plot

Sodium, MW-2 (mg/L)



Histogram

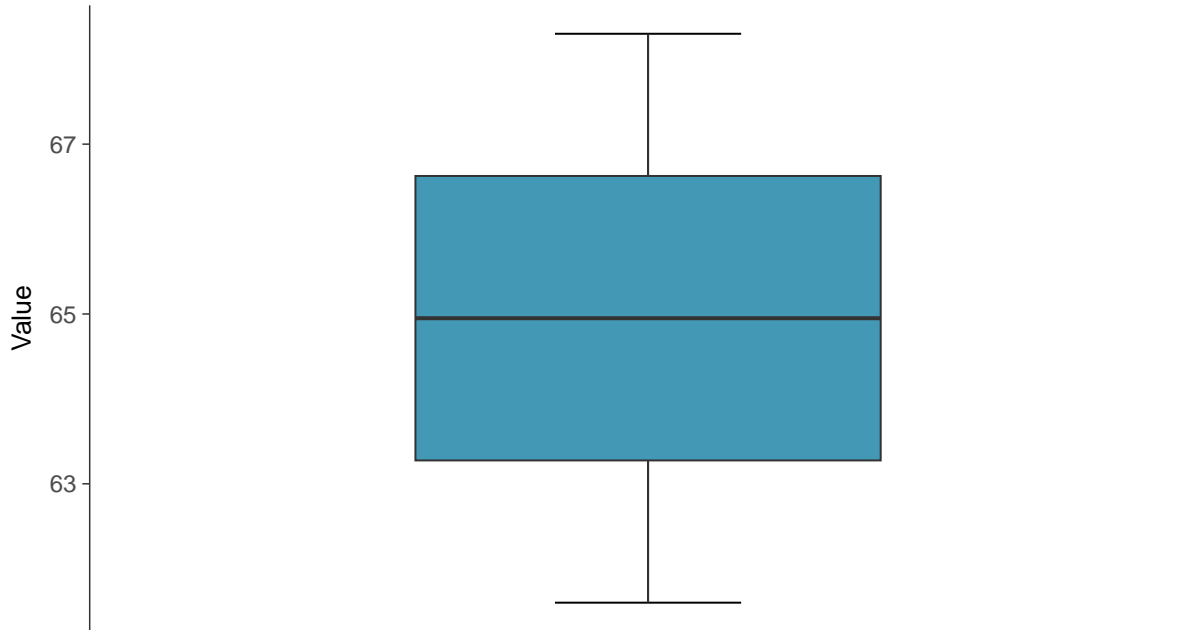
Sodium, MW-2 (mg/L)





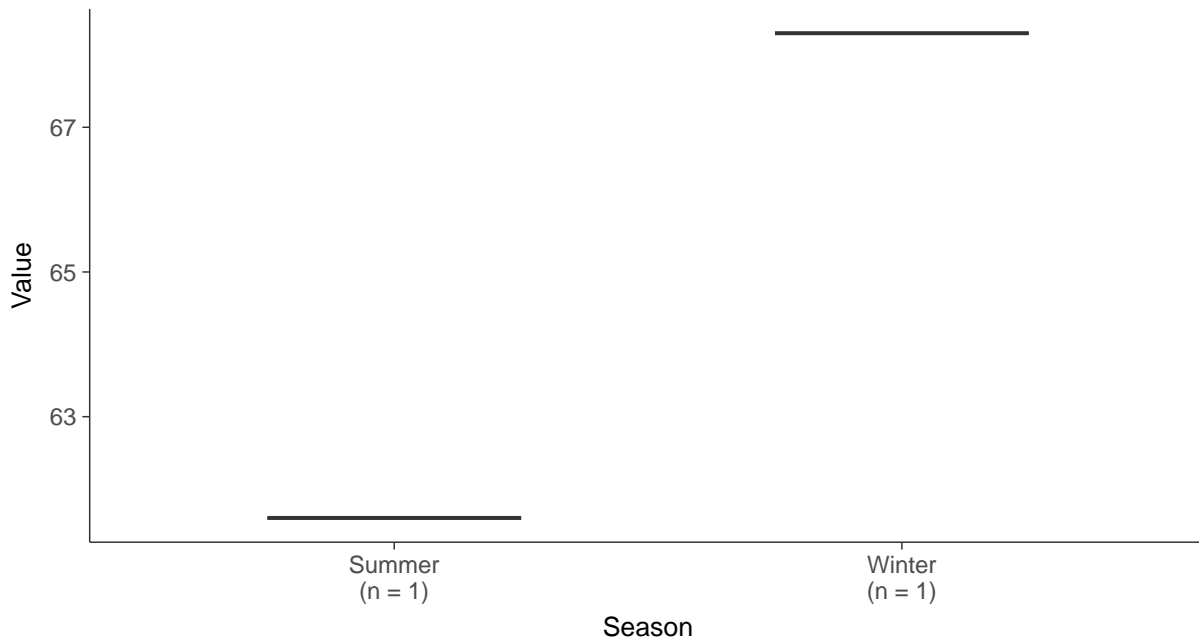
Boxplot

Sodium, MW-2 (mg/L)



Boxplot by Season

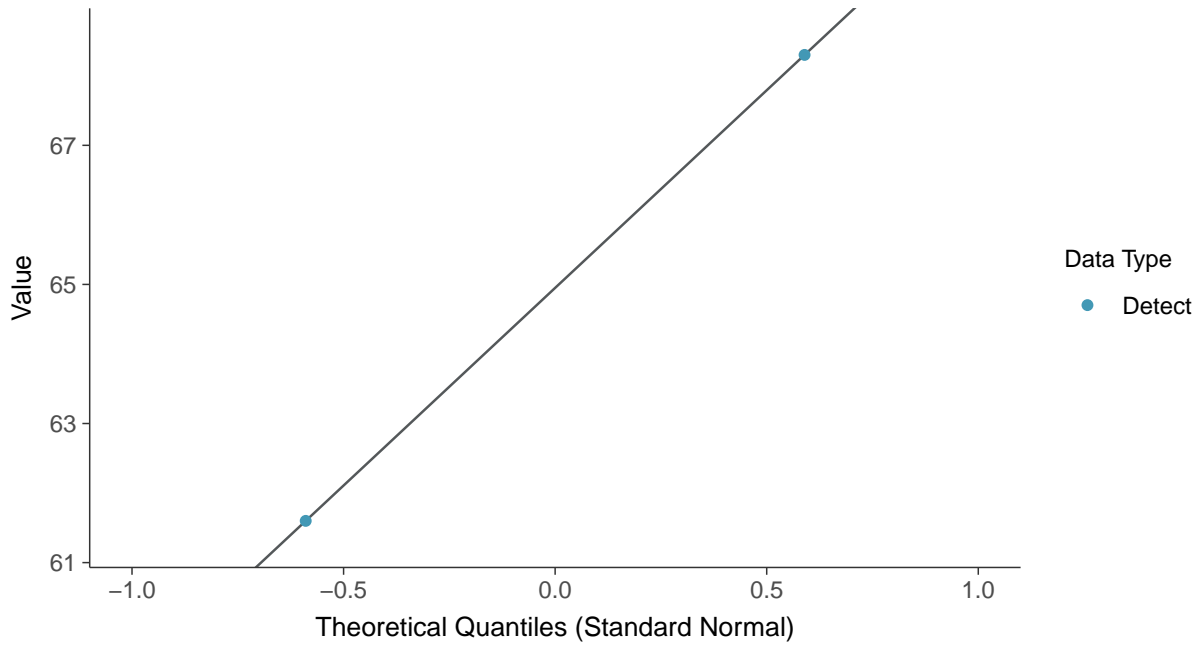
Sodium, MW-2 (mg/L)





Normal Q-Q plot

Sodium, MW-2 (mg/L)



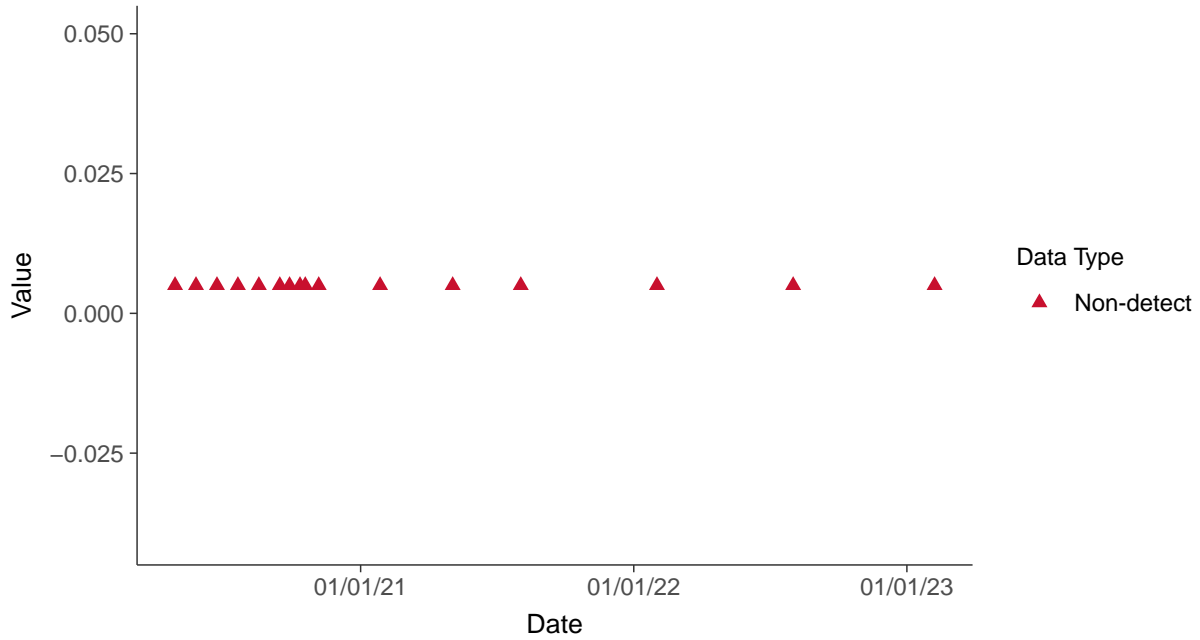


Part 115: Copper, MW-2

ID: 02_5_37

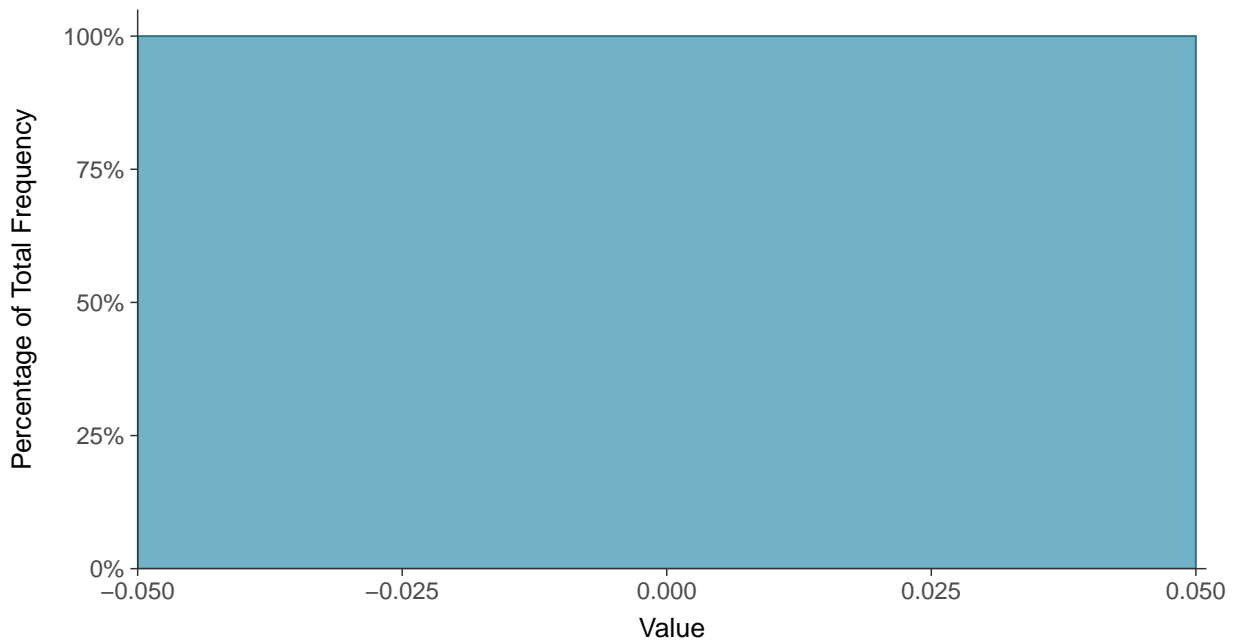
Scatter Plot

Copper, MW-2 (mg/L)



Histogram

Copper, MW-2 (mg/L)





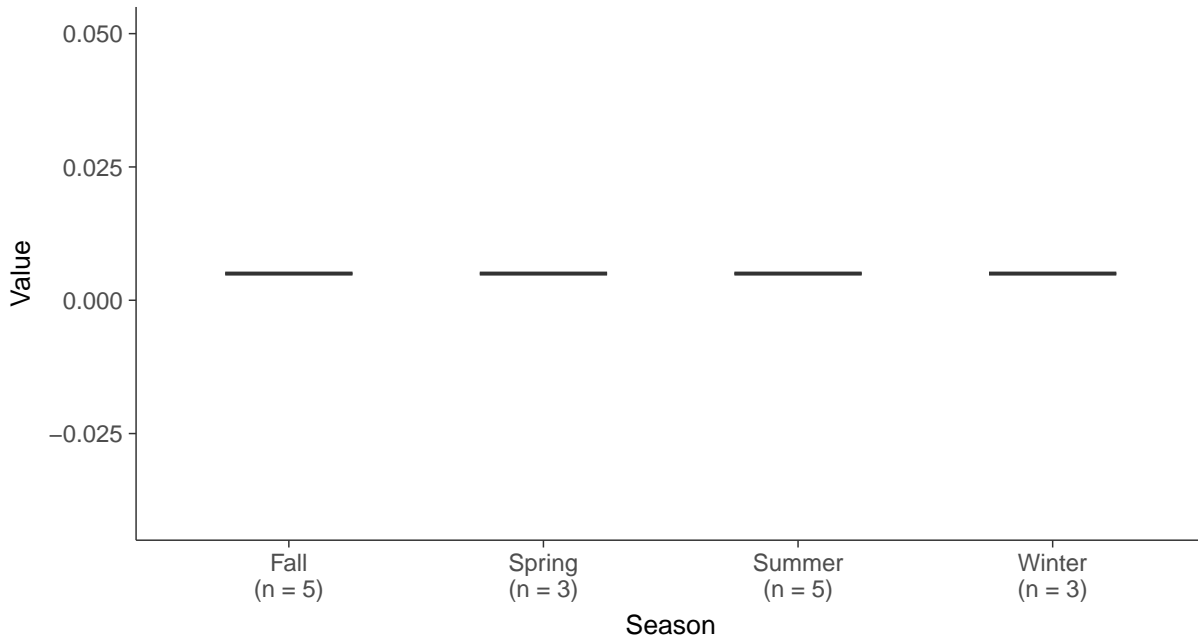
Boxplot

Copper, MW-2 (mg/L)



Boxplot by Season

Copper, MW-2 (mg/L)



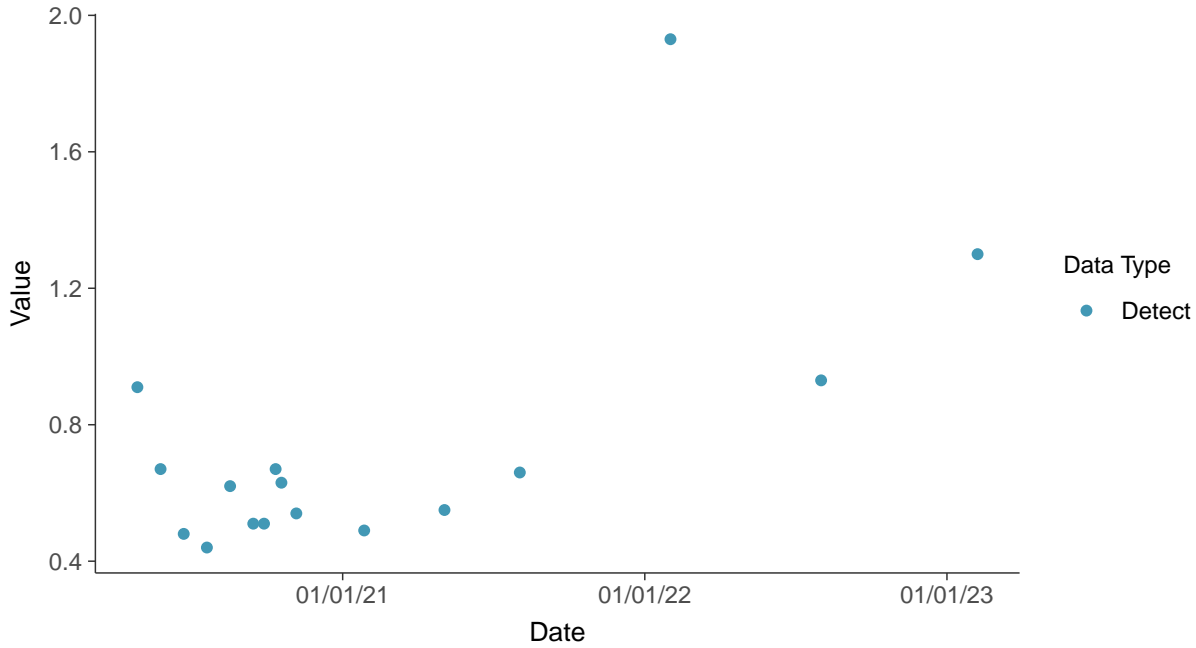


Part 115: Iron, MW-2

ID: 02_5_38

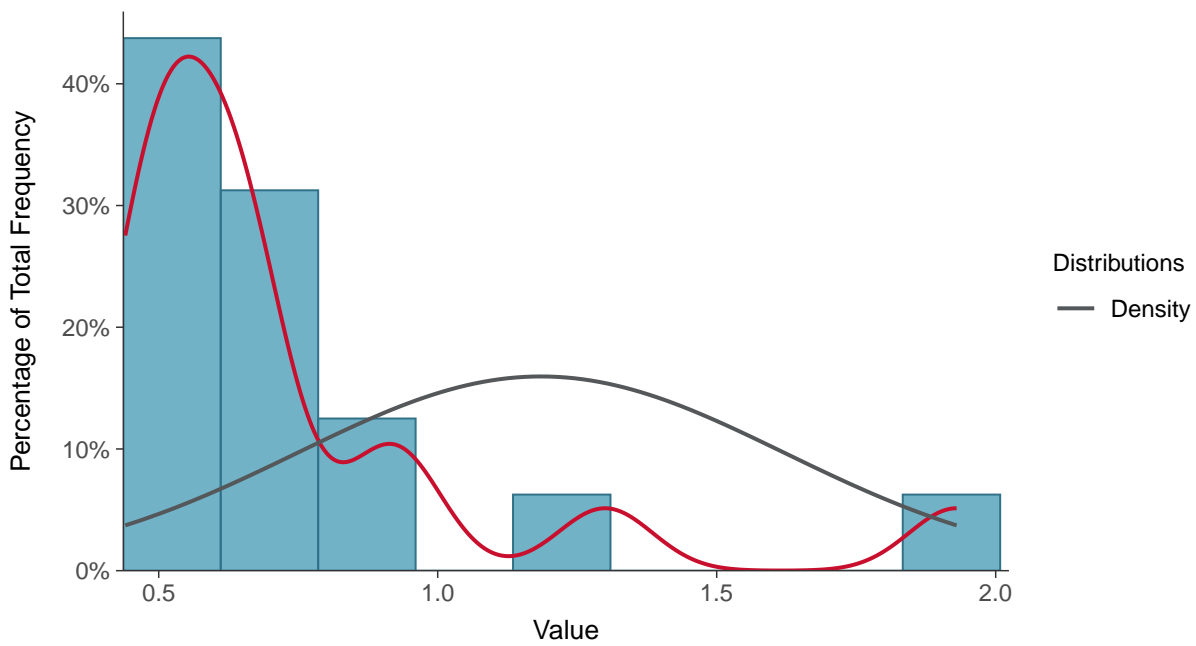
Scatter Plot

Iron, MW-2 (mg/L)



Histogram

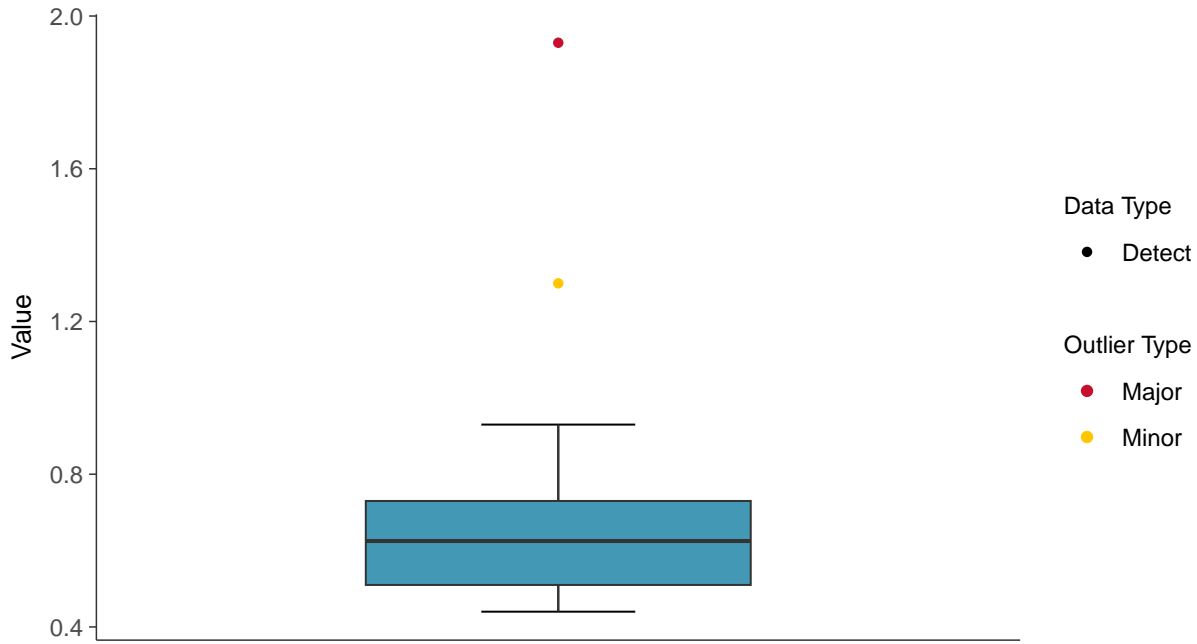
Iron, MW-2 (mg/L)





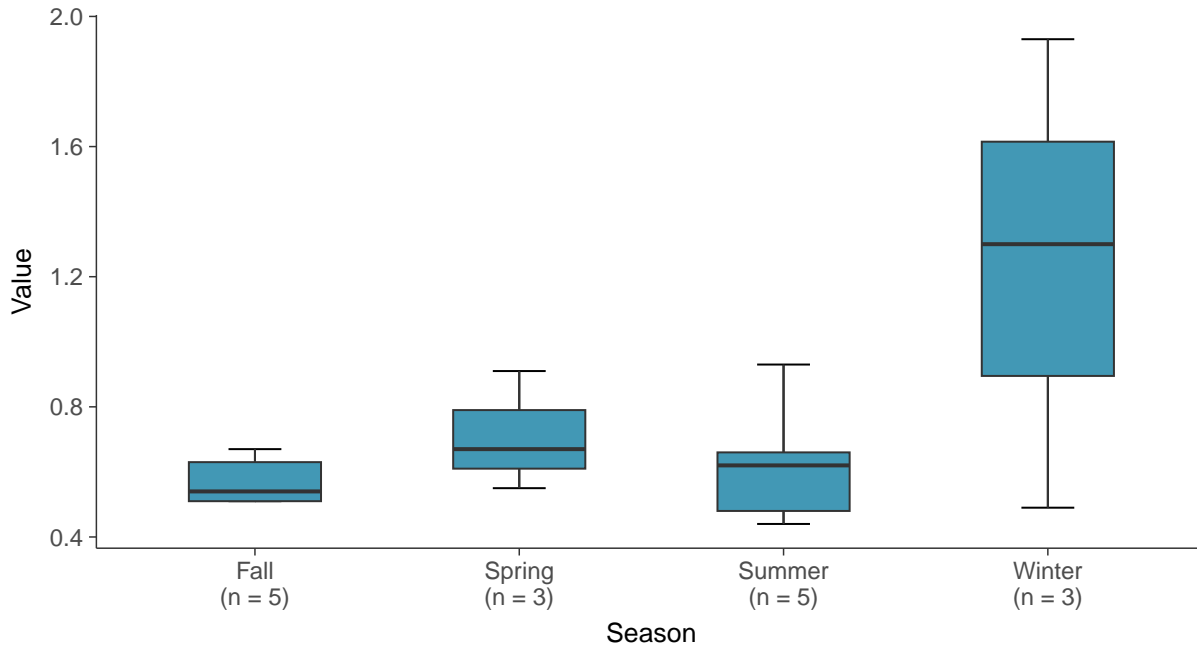
Boxplot

Iron, MW-2 (mg/L)



Boxplot by Season

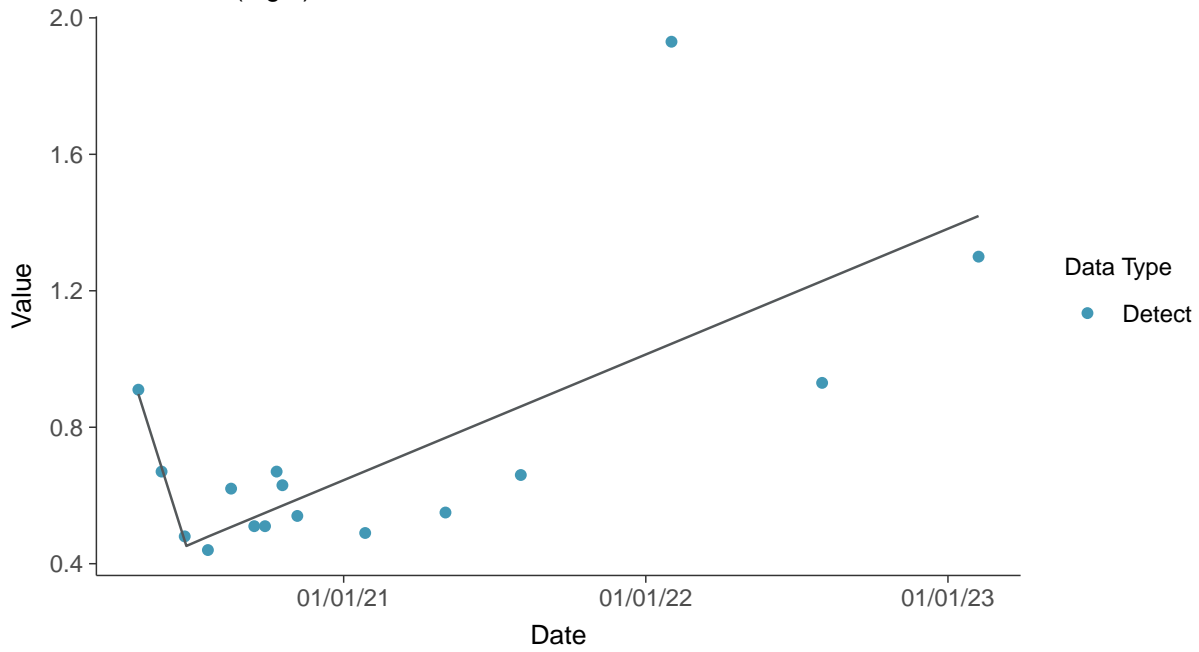
Iron, MW-2 (mg/L)





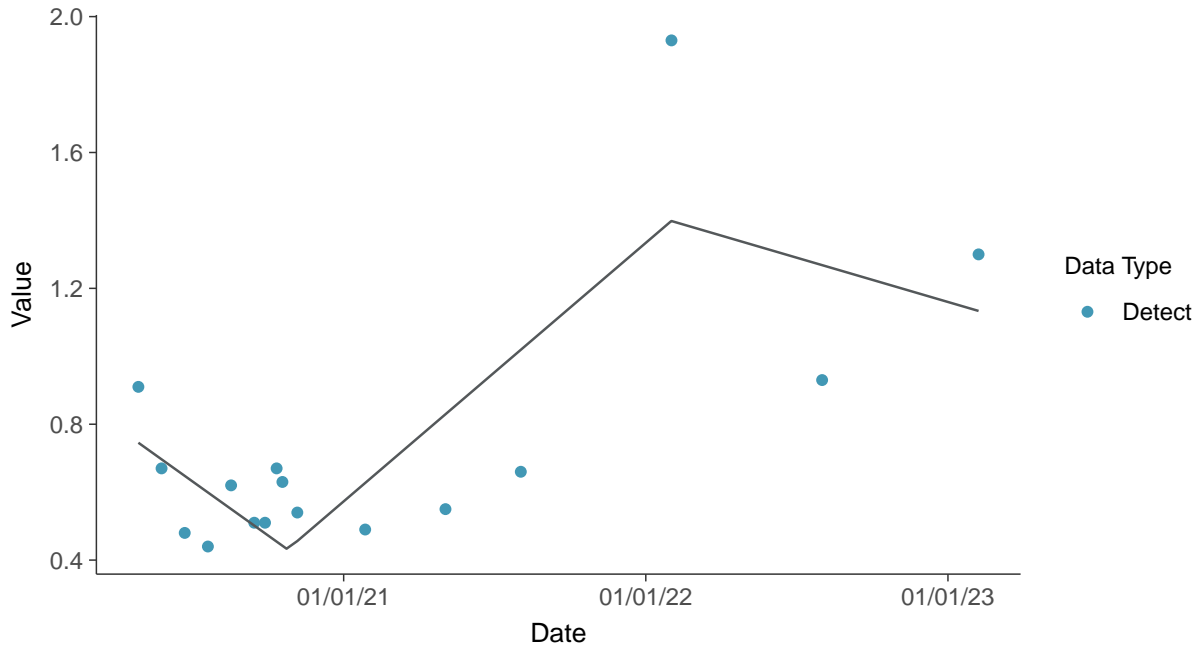
Trend Regression: Piecewise Linear-Linear

Iron, MW-2 (mg/L)



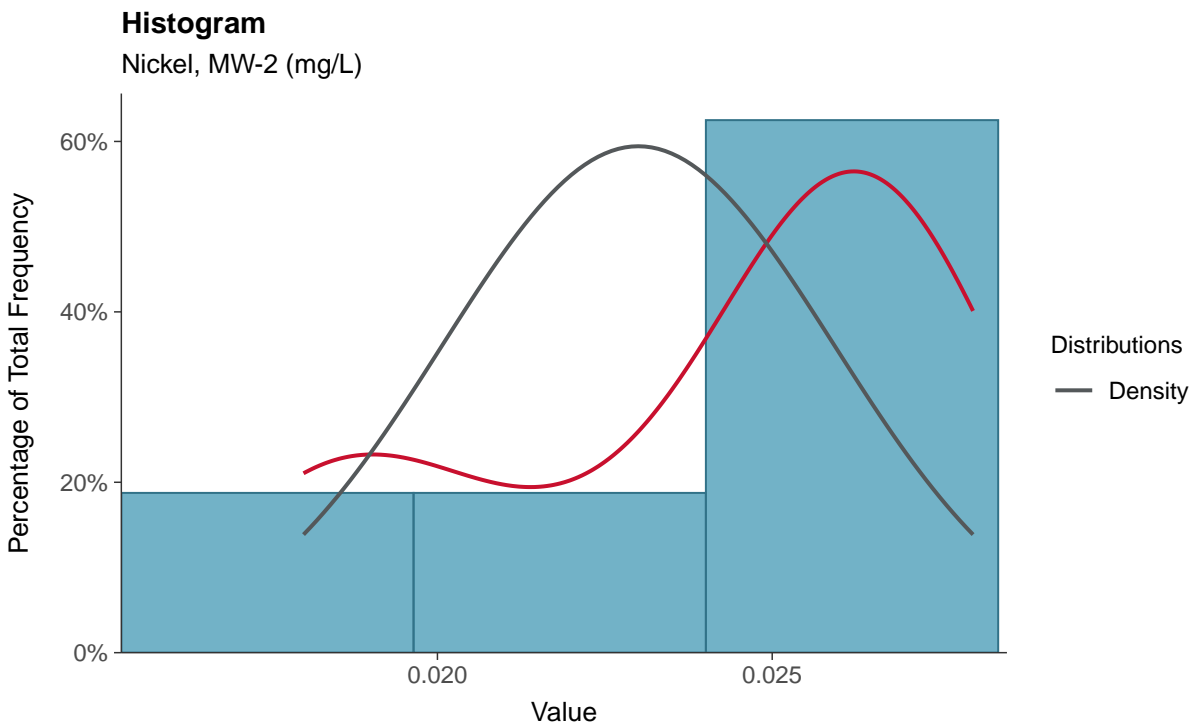
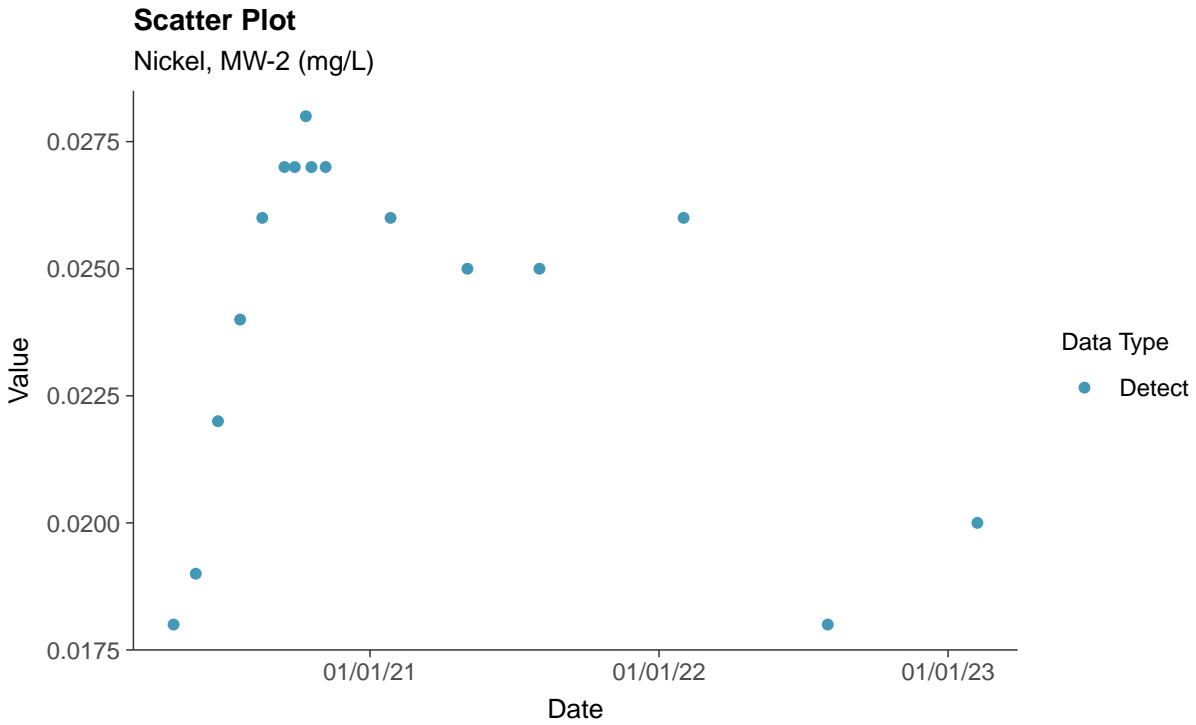
Trend Regression: Piecewise Linear-Linear-Linear

Iron, MW-2 (mg/L)



Part 115: Nickel, MW-2

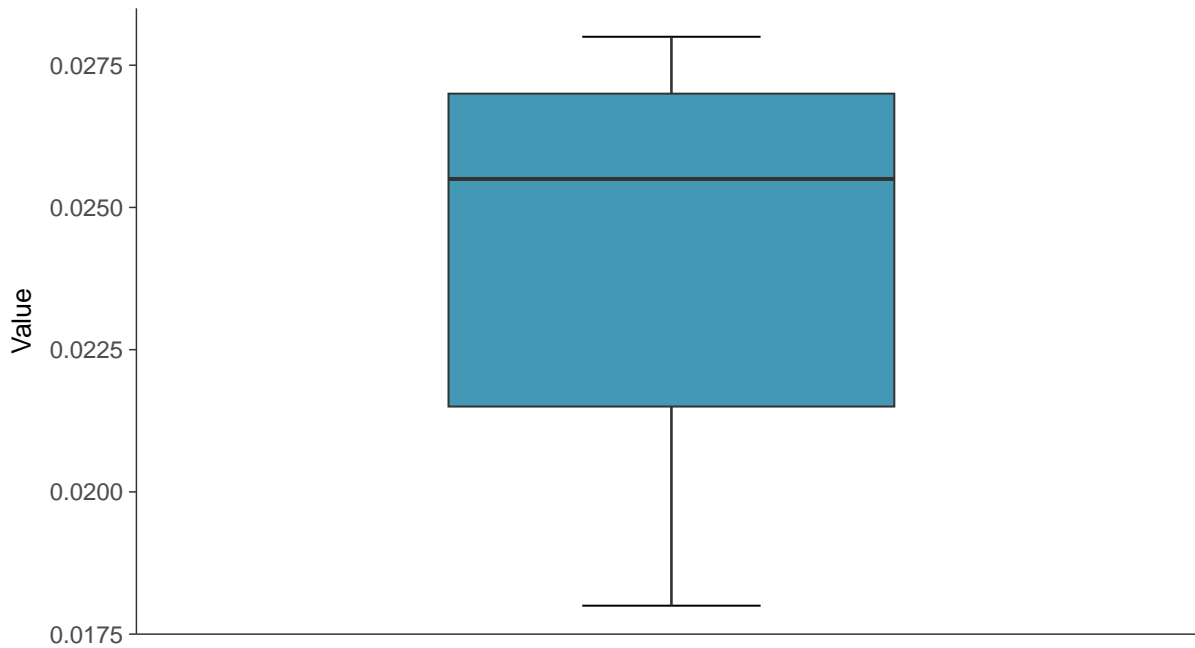
ID: 02_5_39





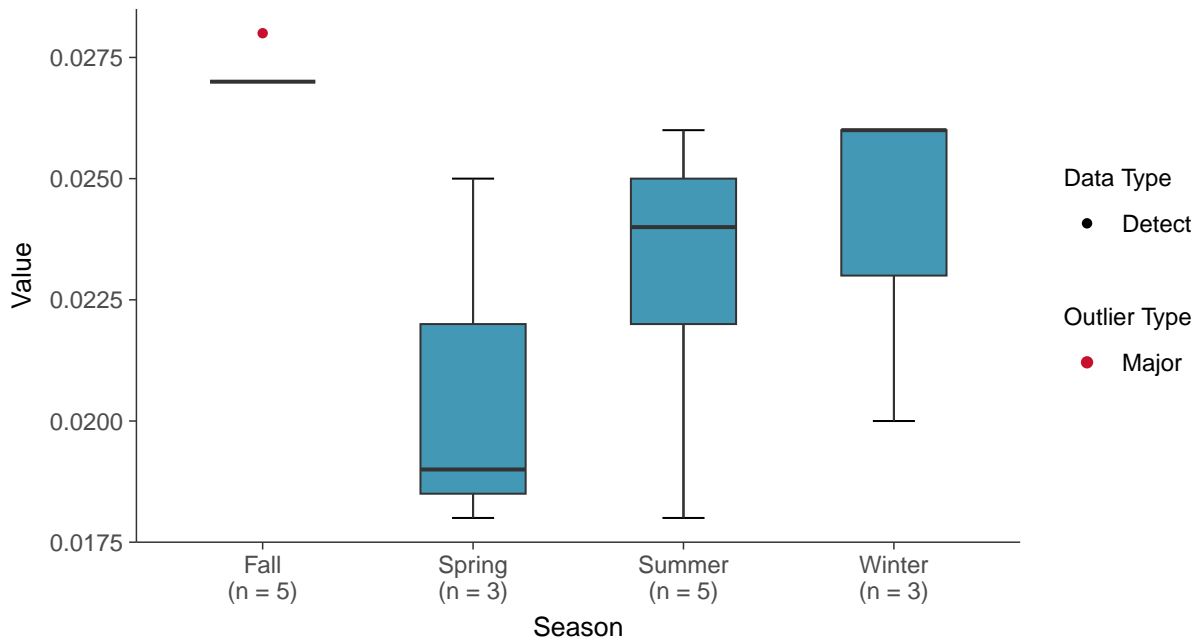
Boxplot

Nickel, MW-2 (mg/L)



Boxplot by Season

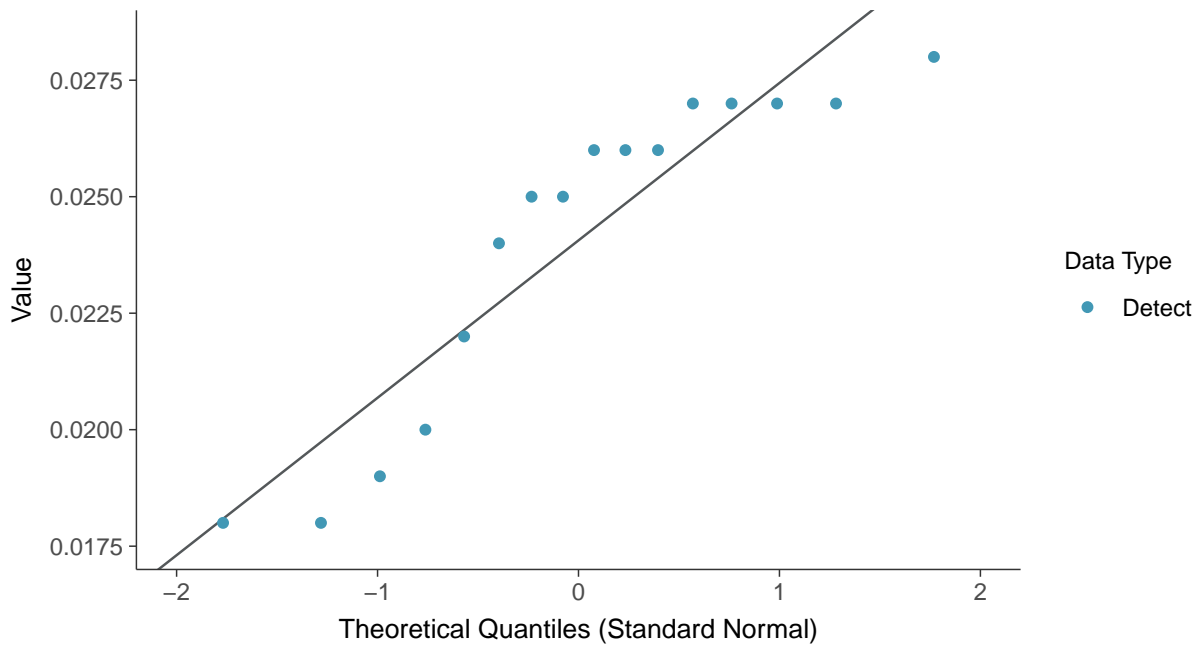
Nickel, MW-2 (mg/L)





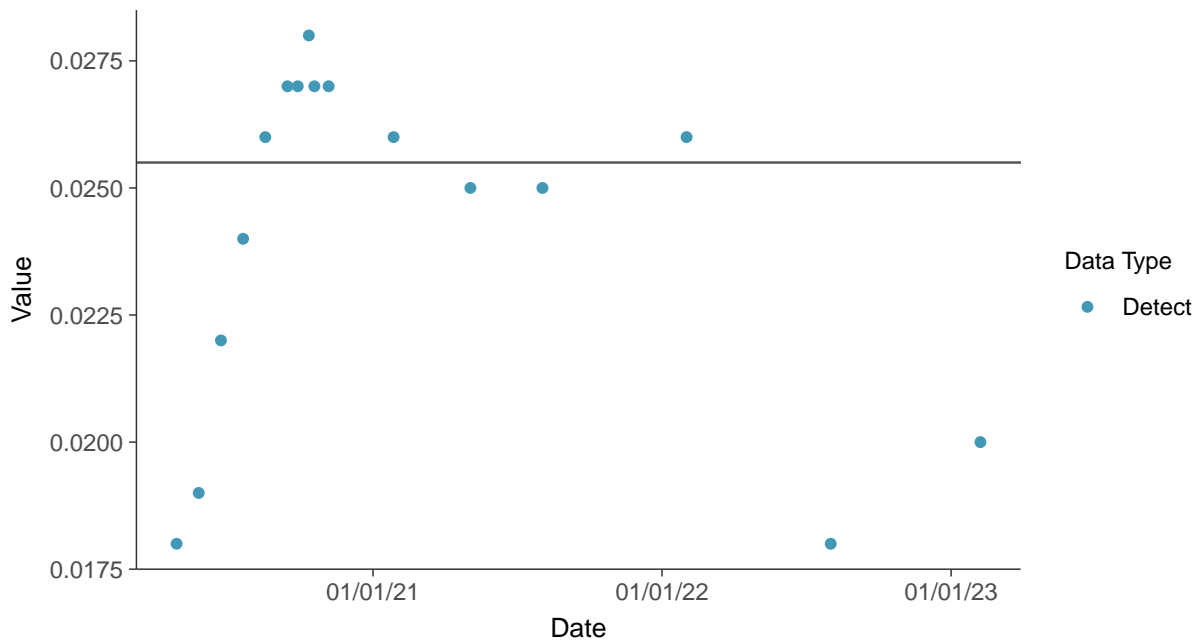
Normal Q-Q plot

Nickel, MW-2 (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

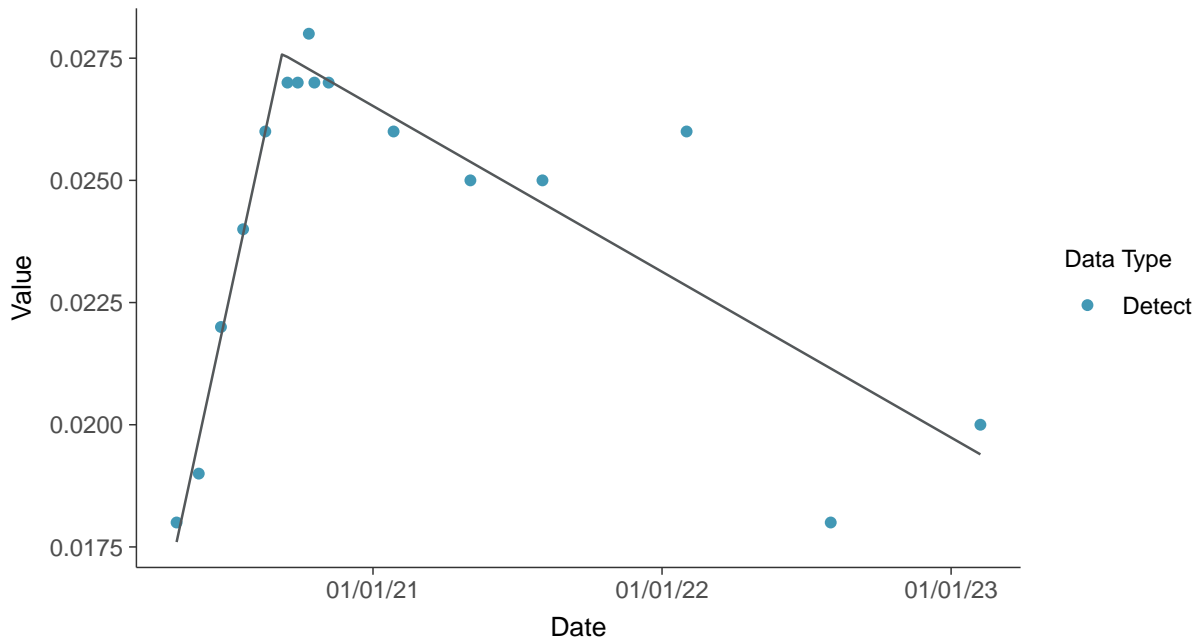
Nickel, MW-2 (mg/L)





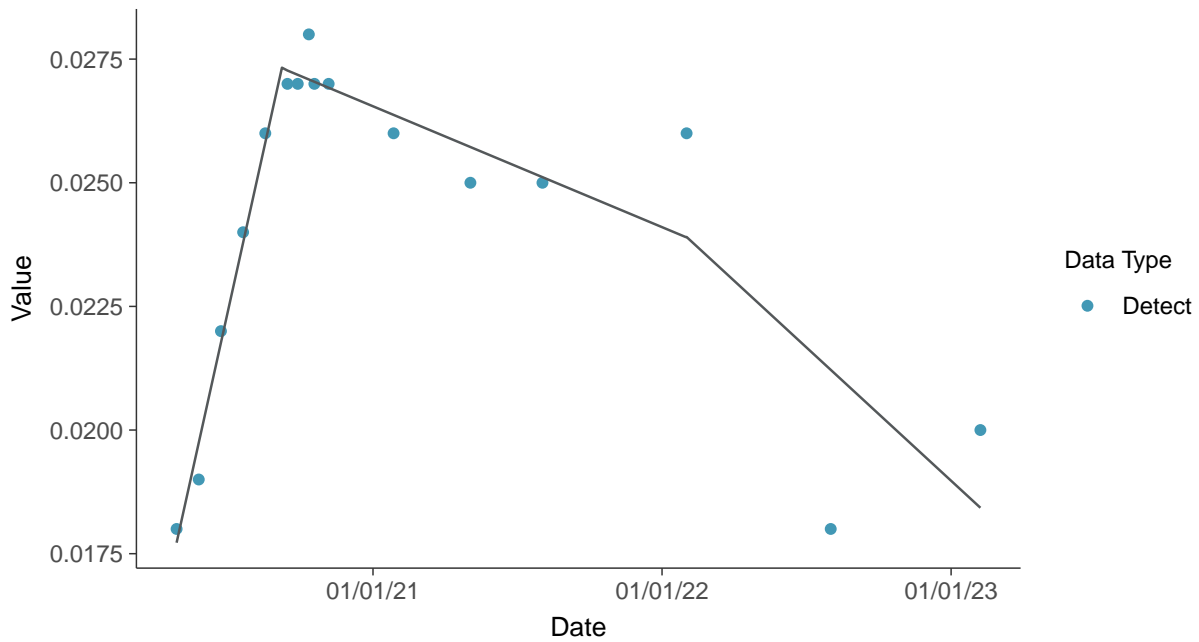
Trend Regression: Piecewise Linear-Linear

Nickel, MW-2 (mg/L)



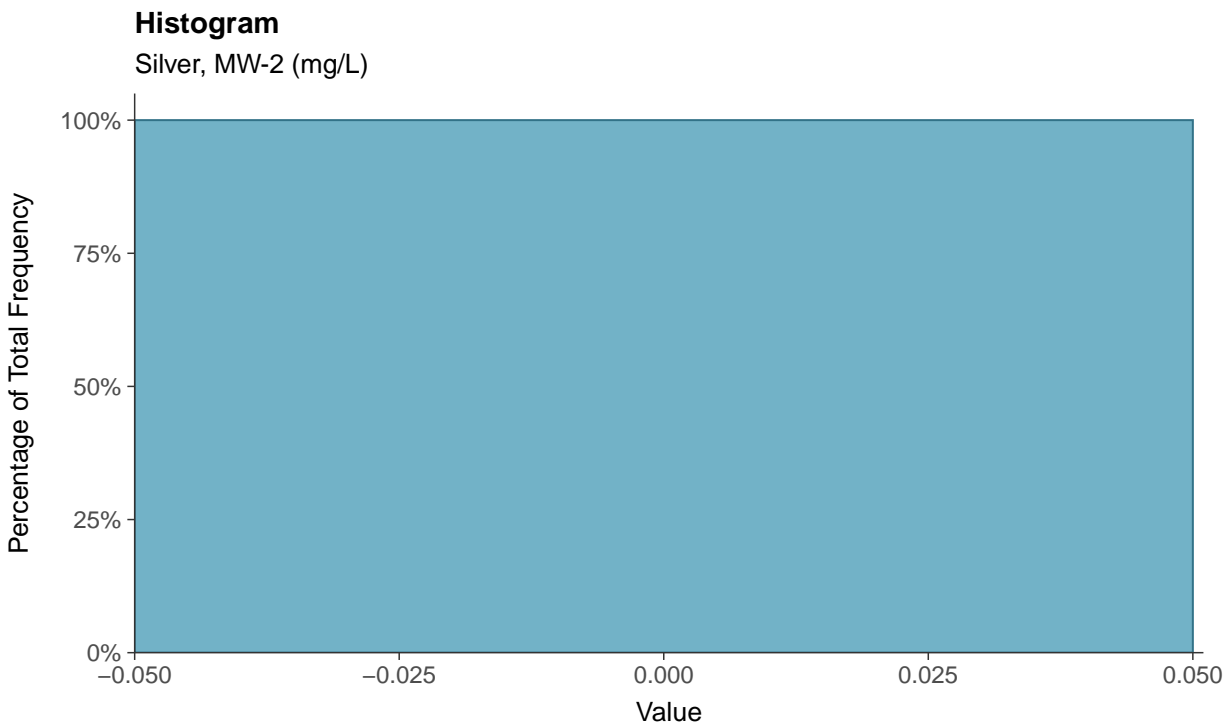
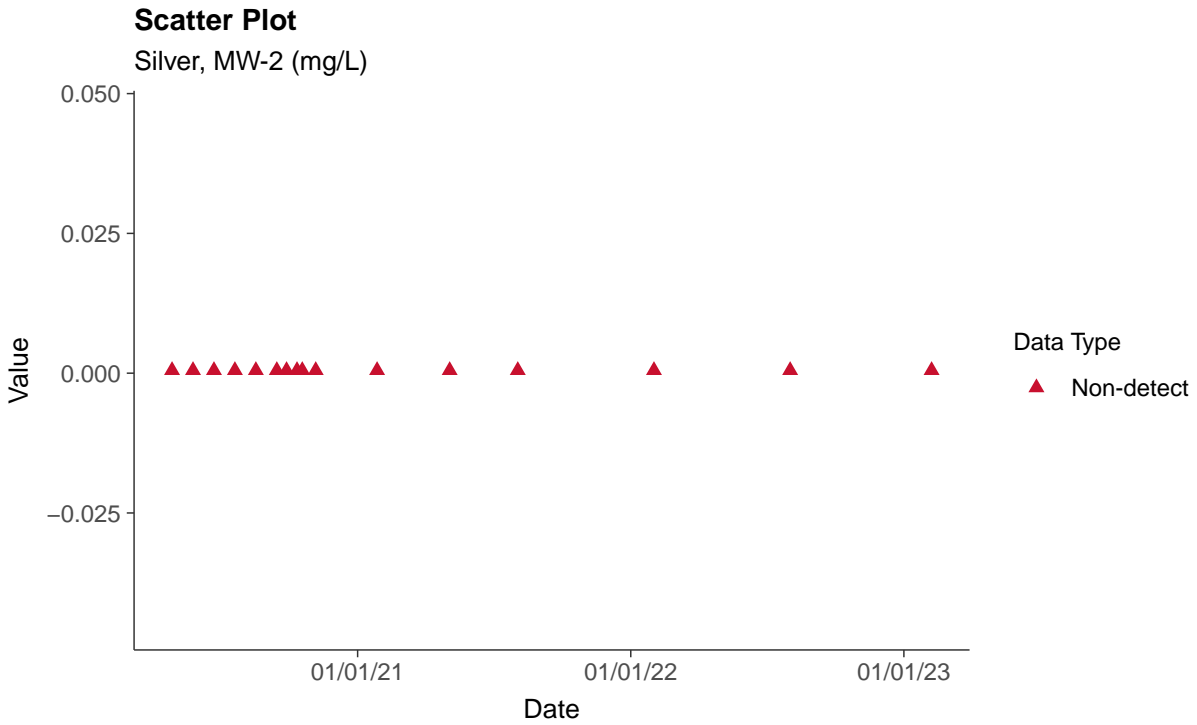
Trend Regression: Piecewise Linear-Linear-Linear

Nickel, MW-2 (mg/L)



Part 115: Silver, MW-2

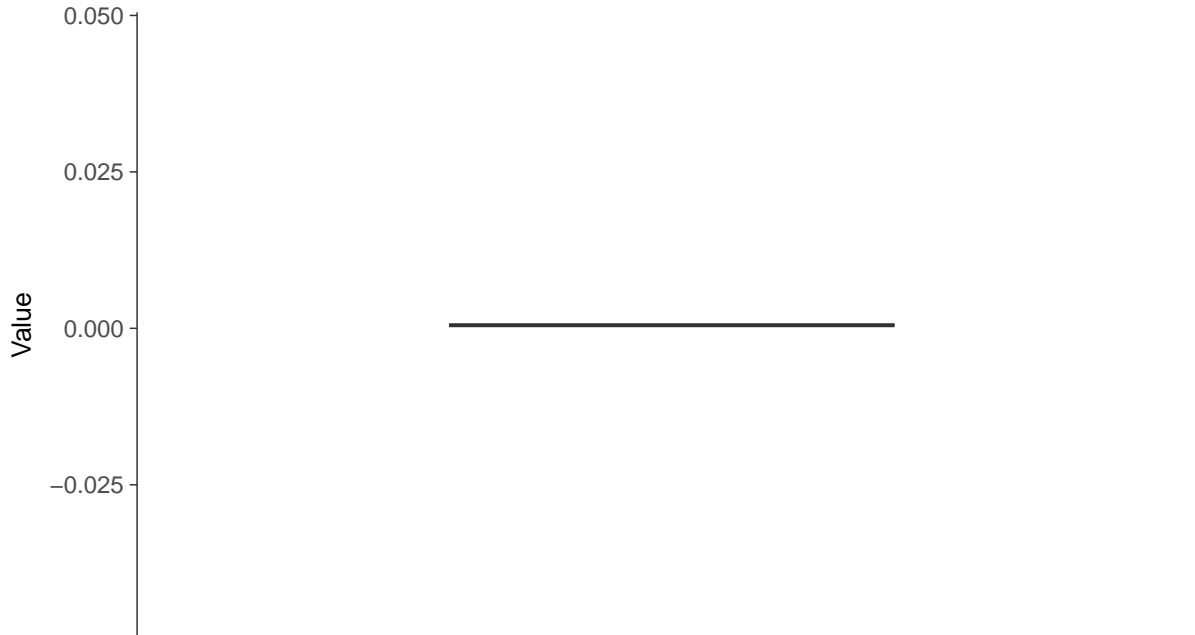
ID: 02_5_40





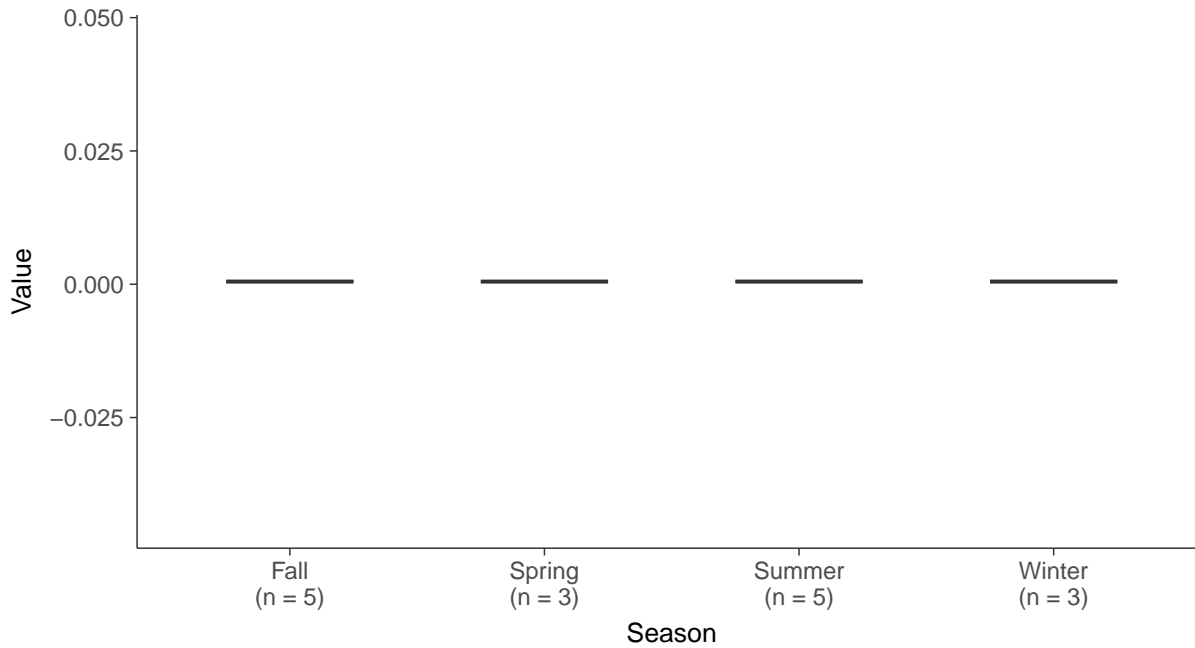
Boxplot

Silver, MW-2 (mg/L)



Boxplot by Season

Silver, MW-2 (mg/L)





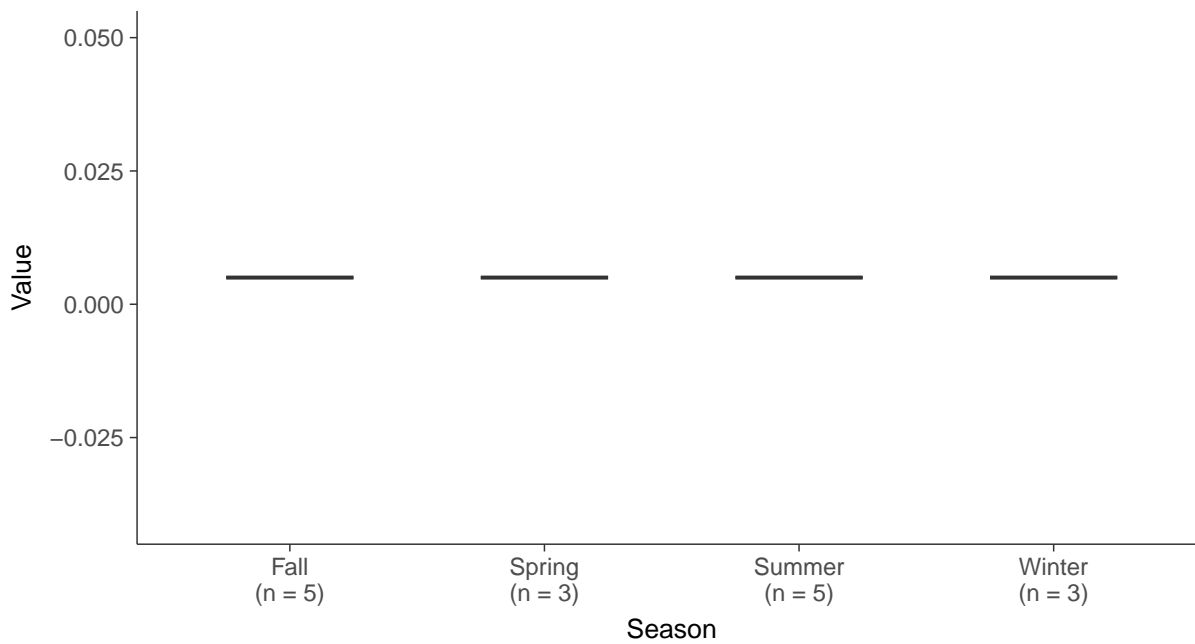
Boxplot

Vanadium, MW-2 (mg/L)



Boxplot by Season

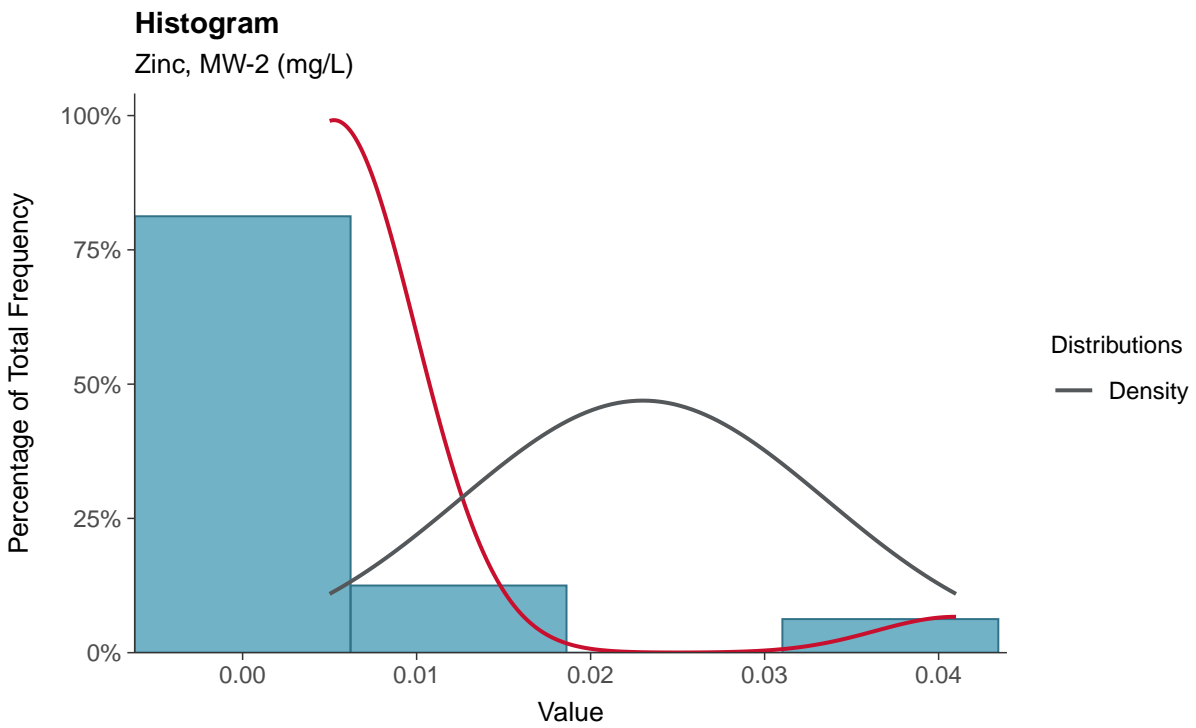
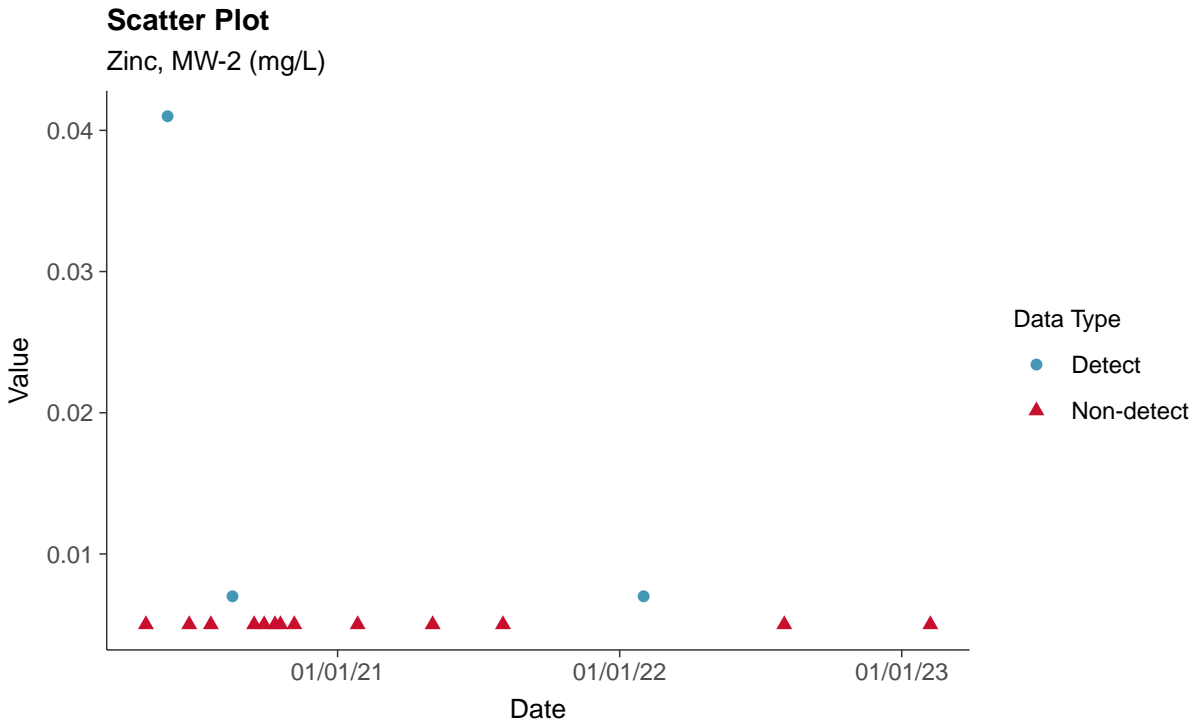
Vanadium, MW-2 (mg/L)





Part 115: Zinc, MW-2

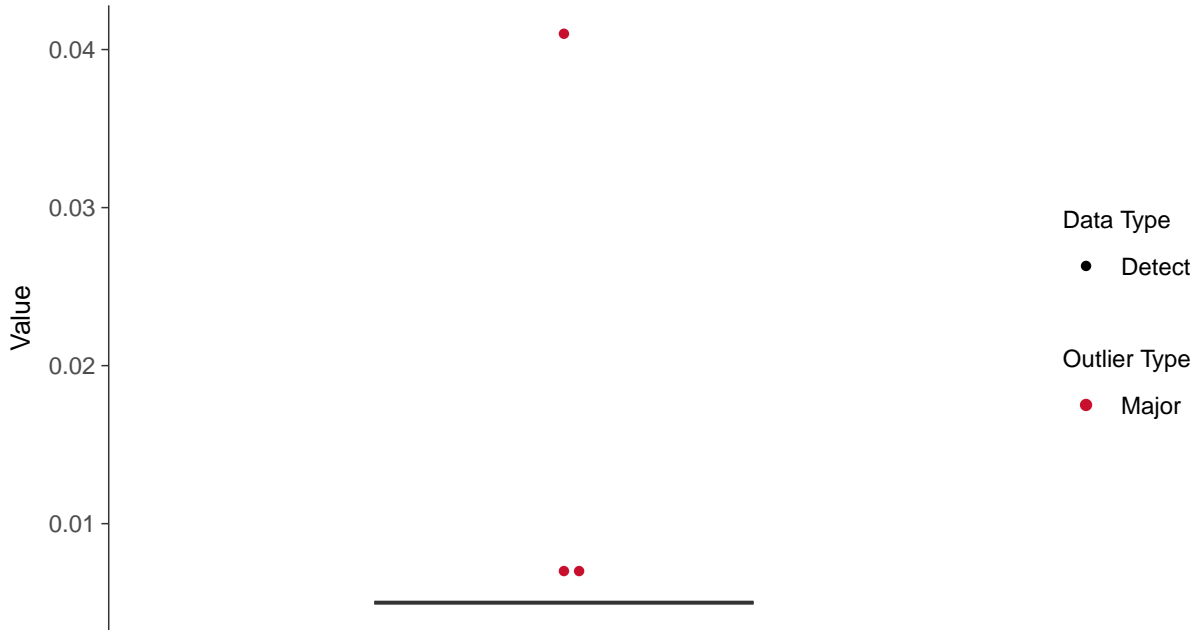
ID: 02_5_42





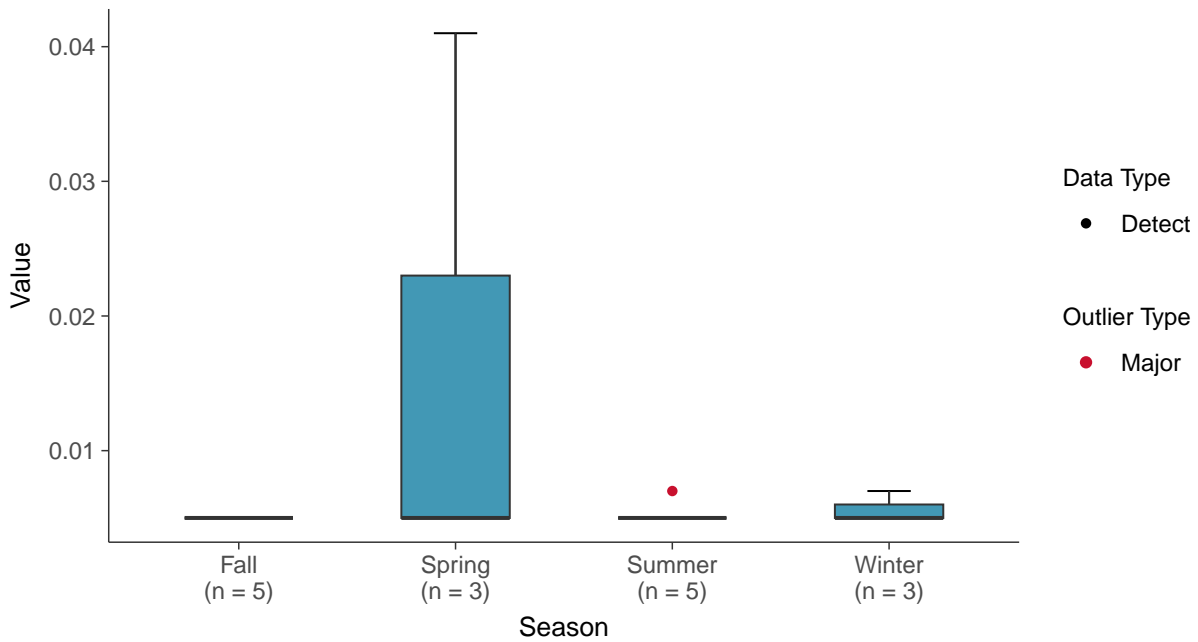
Boxplot

Zinc, MW-2 (mg/L)



Boxplot by Season

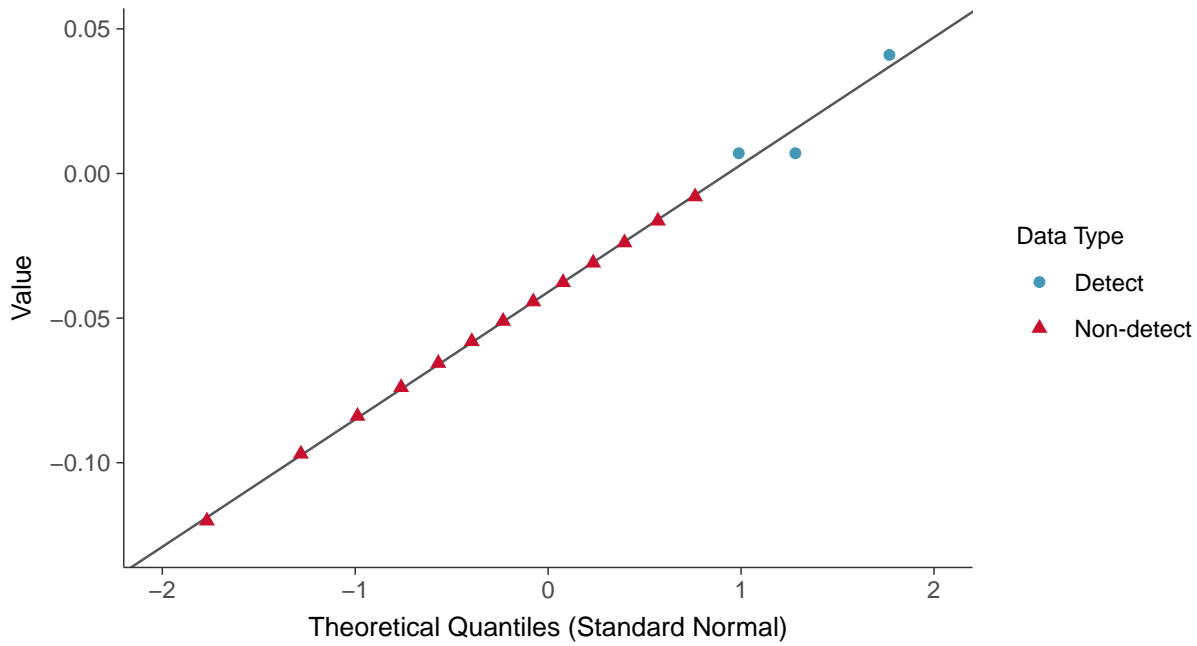
Zinc, MW-2 (mg/L)





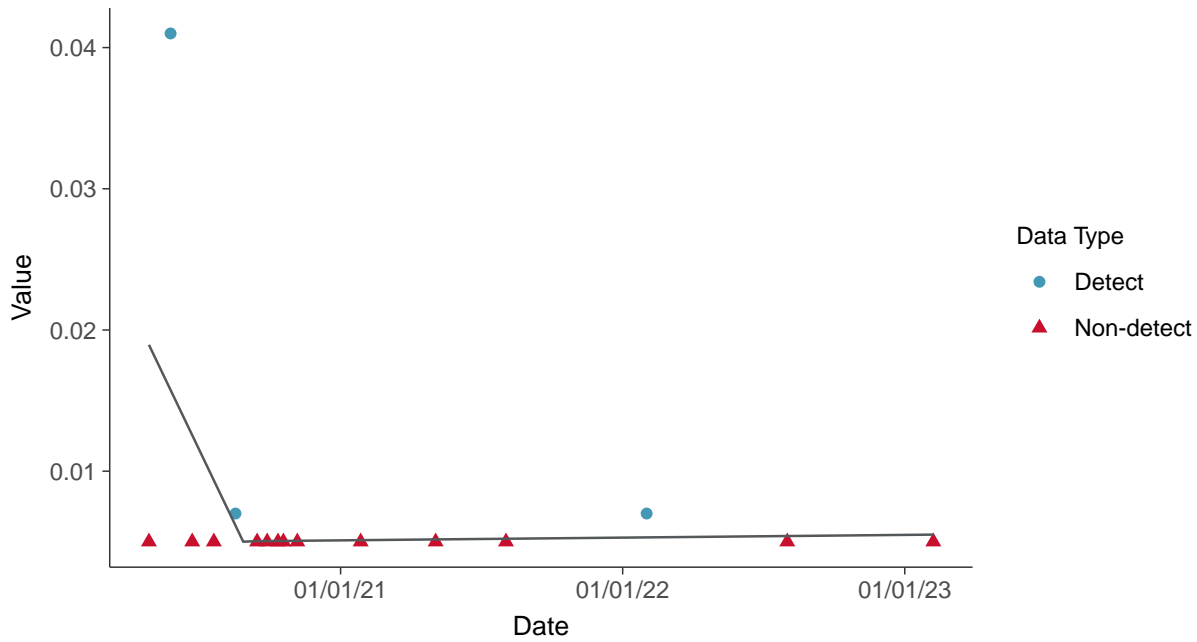
Normal Q-Q plot using ROS Imputed Estimates

Zinc, MW-2 (mg/L)



Trend Regression: Piecewise Linear-Linear

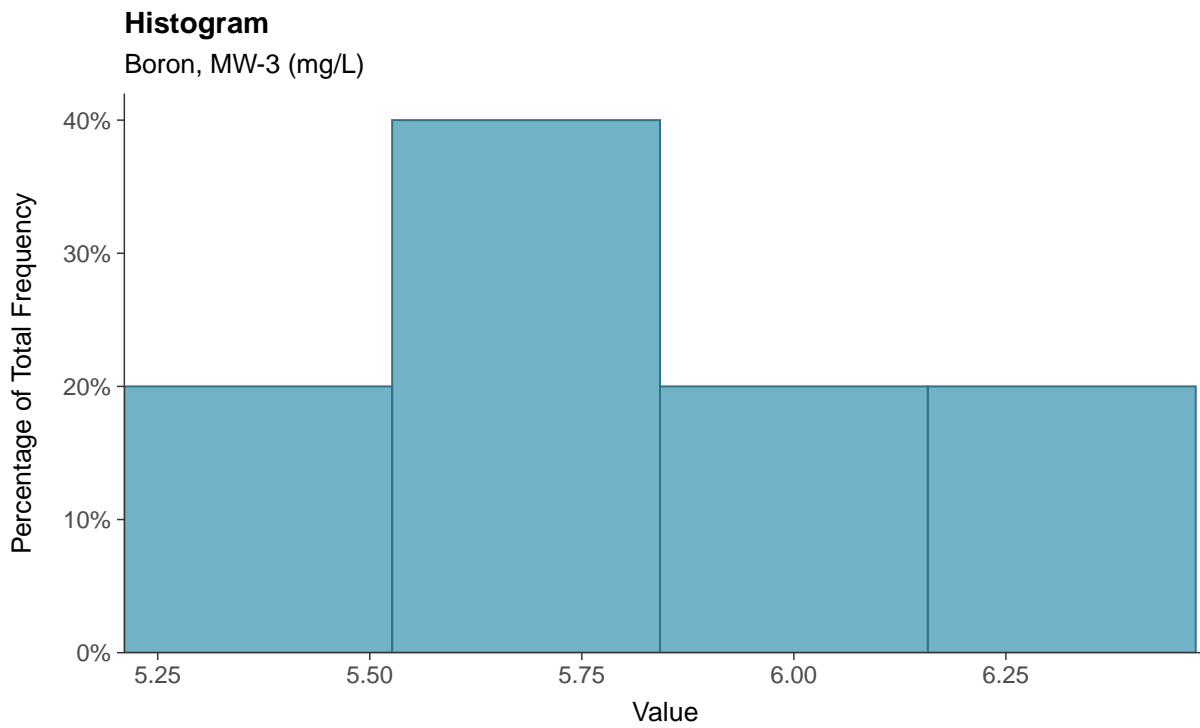
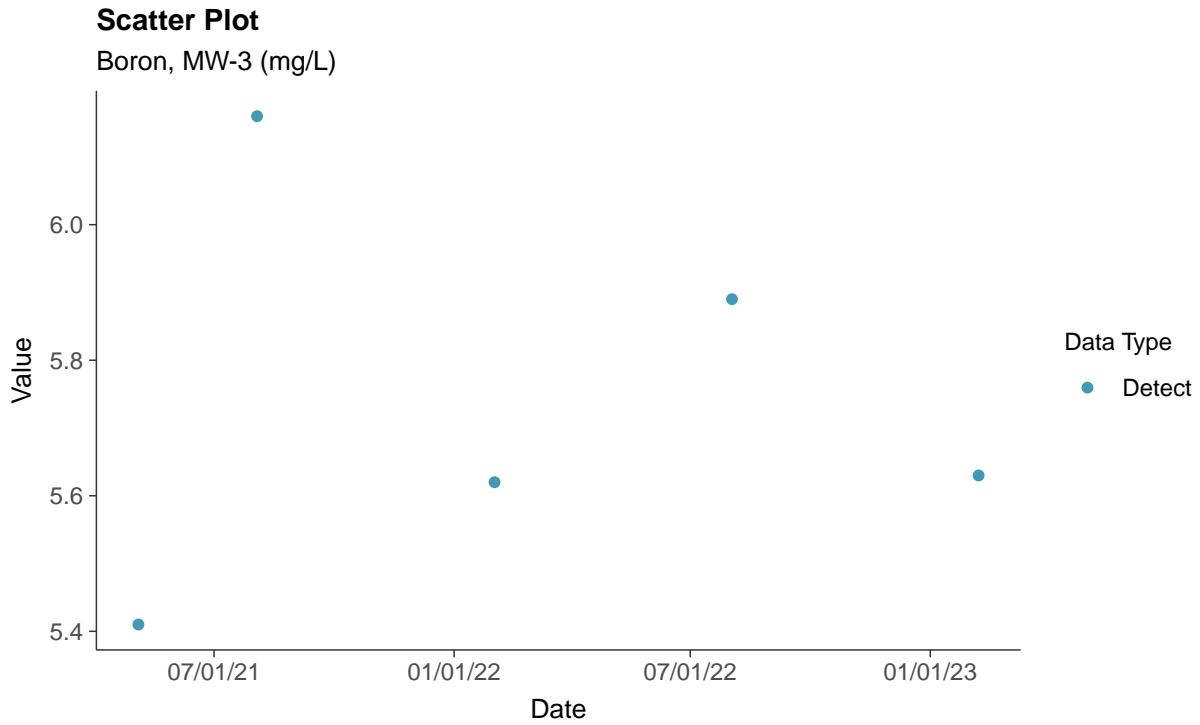
Zinc, MW-2 (mg/L)





Appendix III: Boron, MW-3

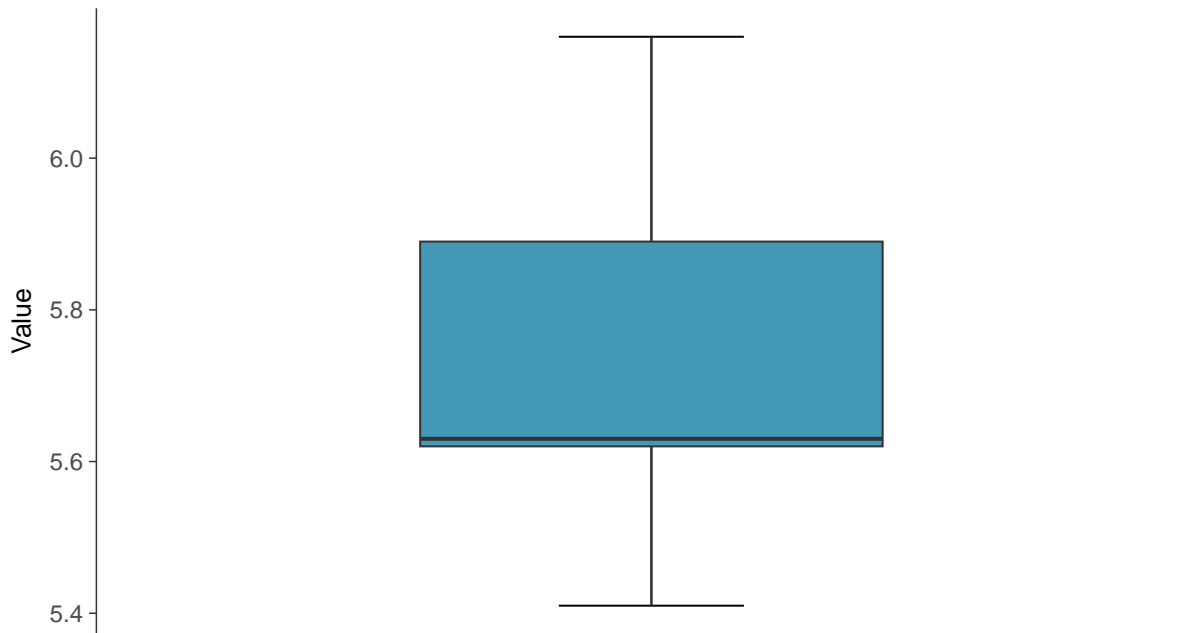
ID: 03_1_01





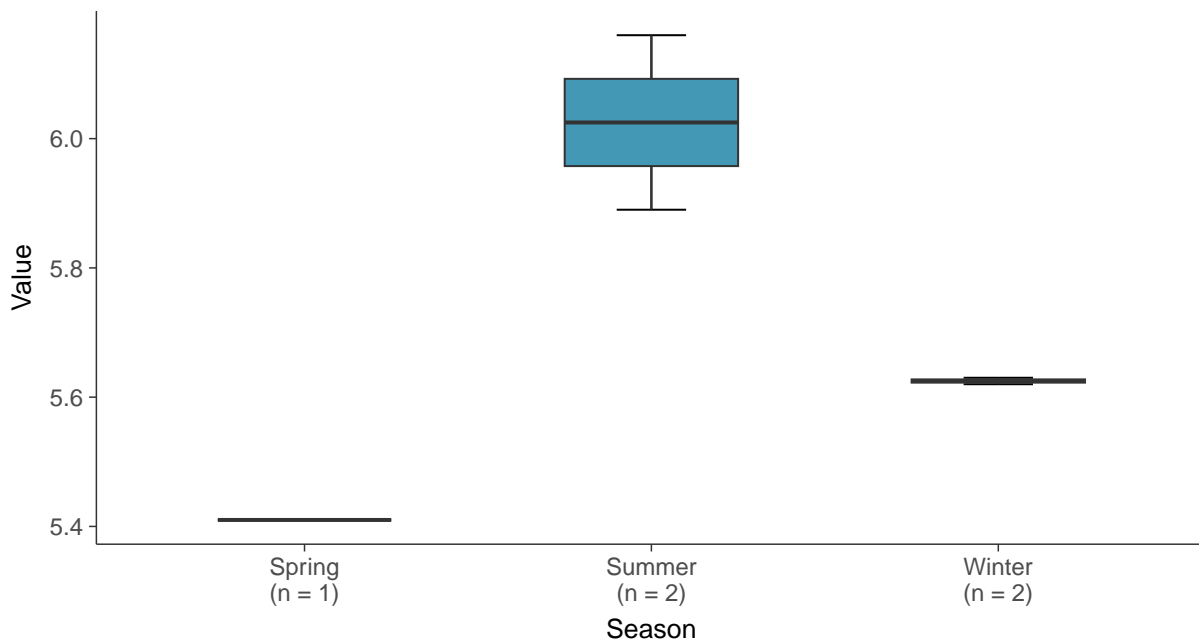
Boxplot

Boron, MW-3 (mg/L)



Boxplot by Season

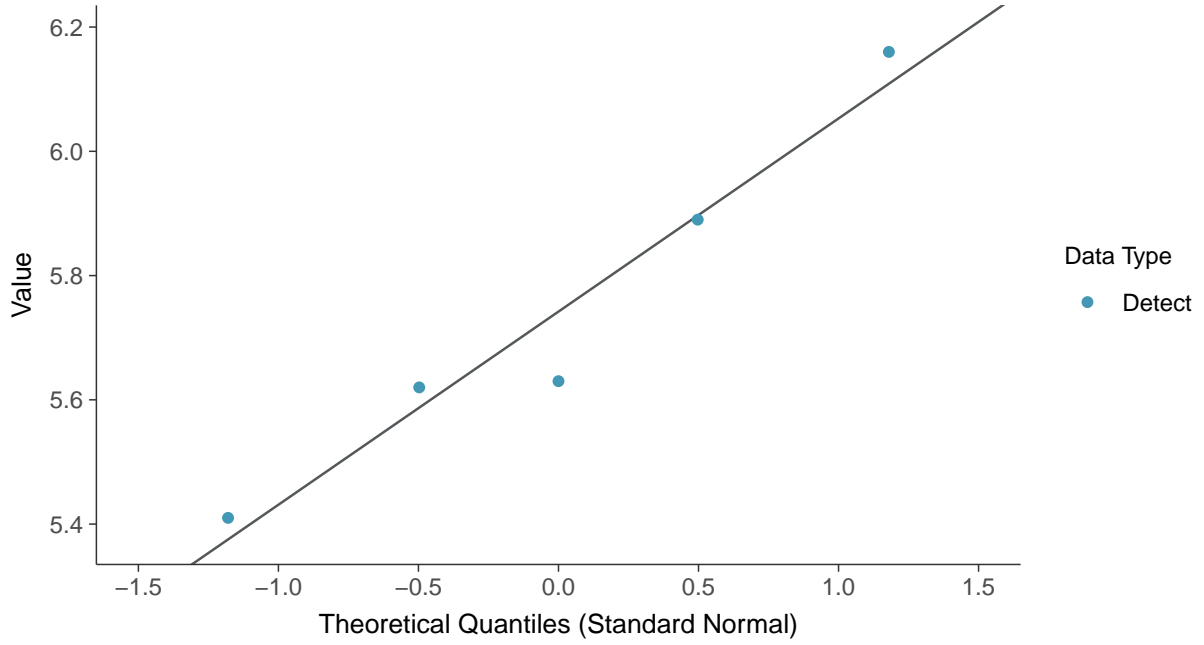
Boron, MW-3 (mg/L)





Normal Q-Q plot

Boron, MW-3 (mg/L)



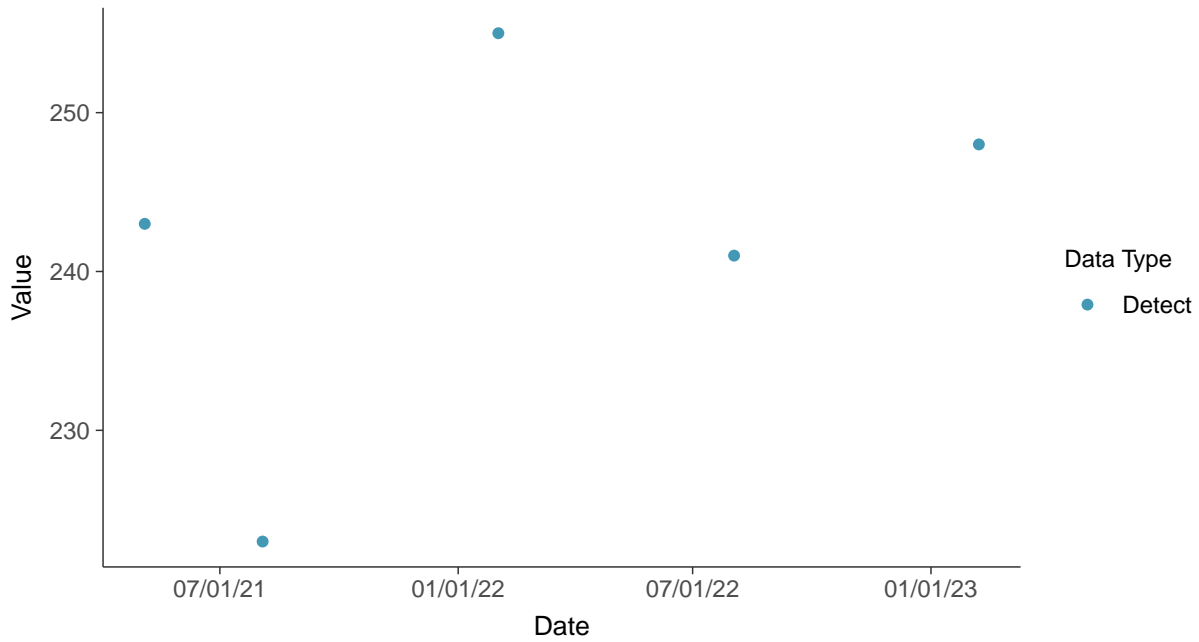


Appendix III: Calcium, MW-3

ID: 03_1_02

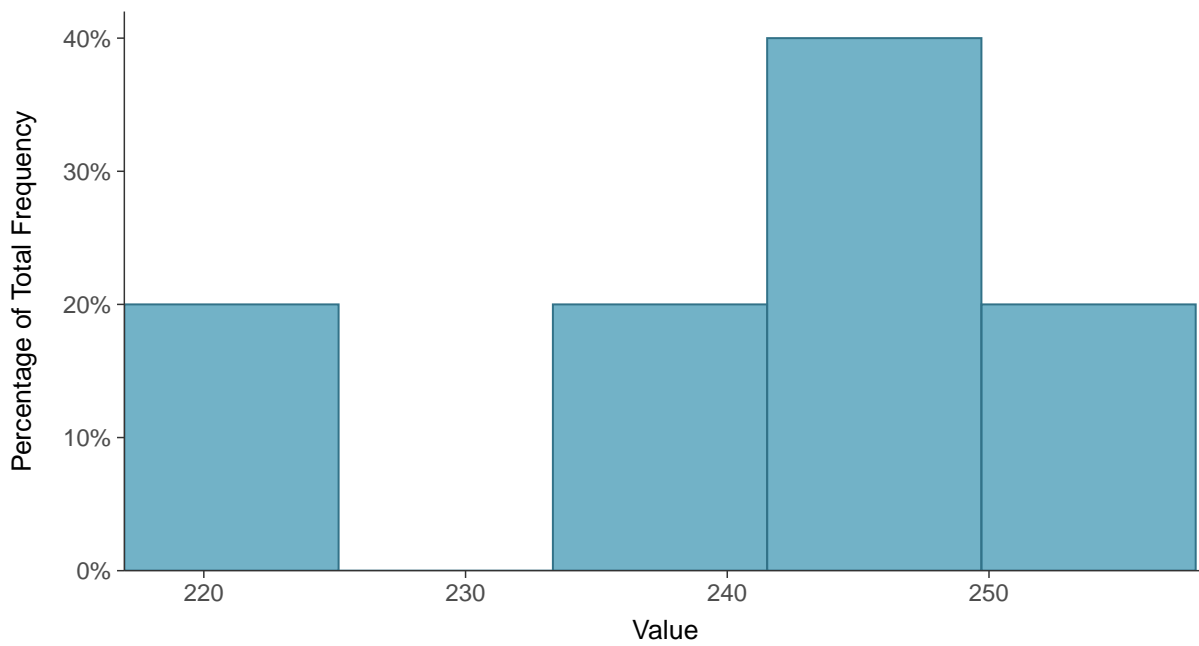
Scatter Plot

Calcium, MW-3 (mg/L)



Histogram

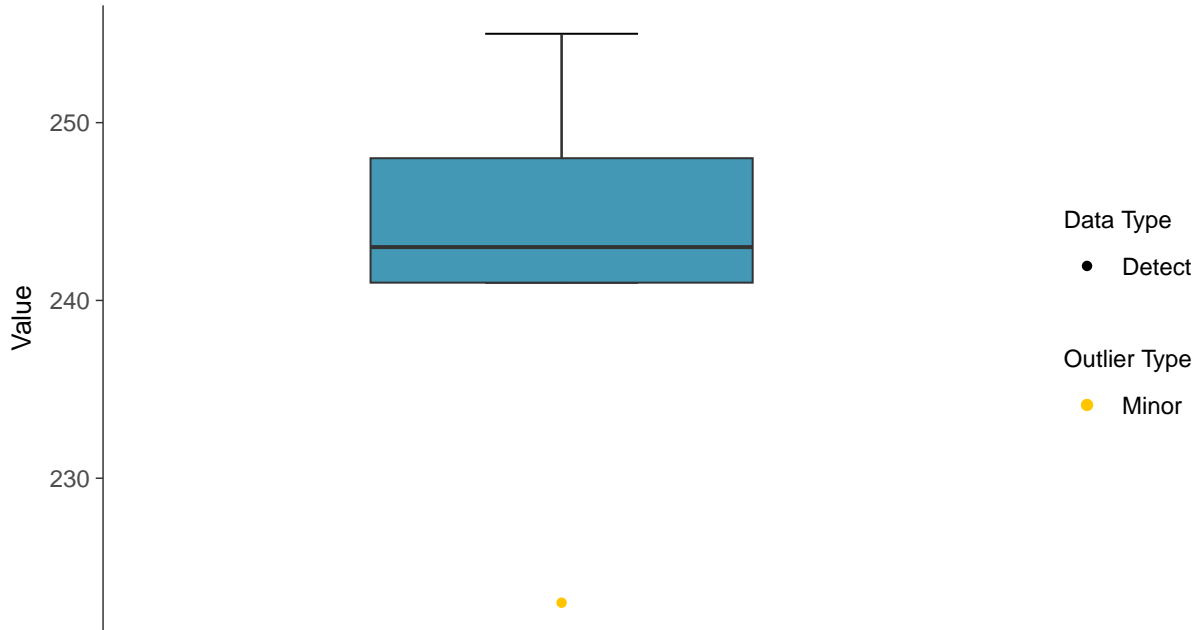
Calcium, MW-3 (mg/L)





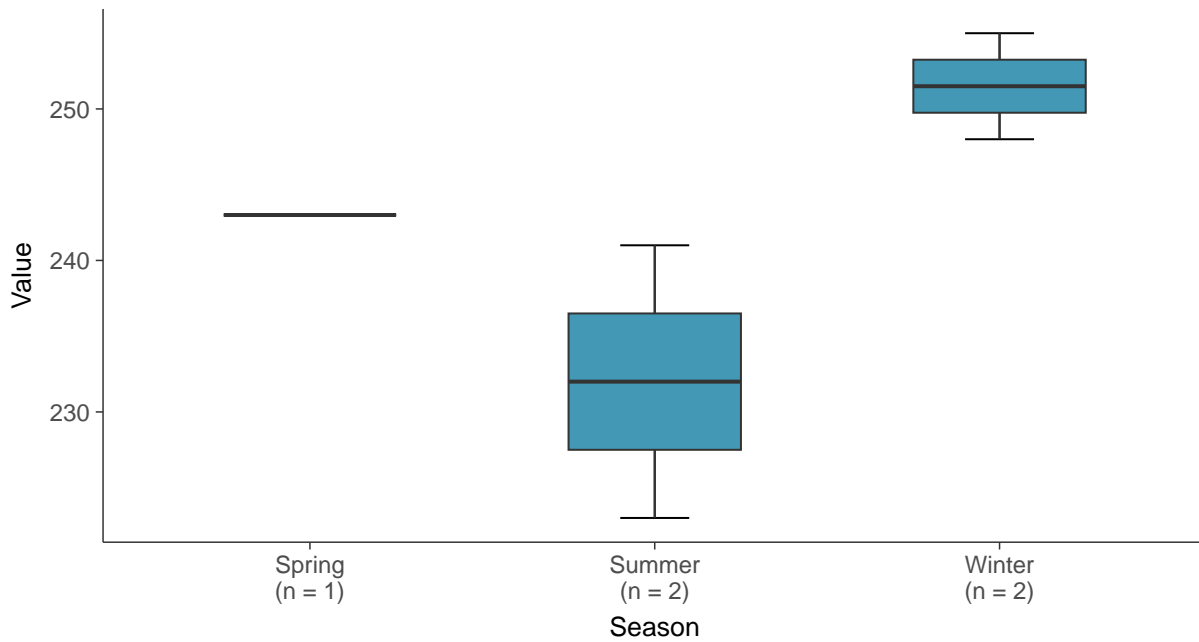
Boxplot

Calcium, MW-3 (mg/L)



Boxplot by Season

Calcium, MW-3 (mg/L)

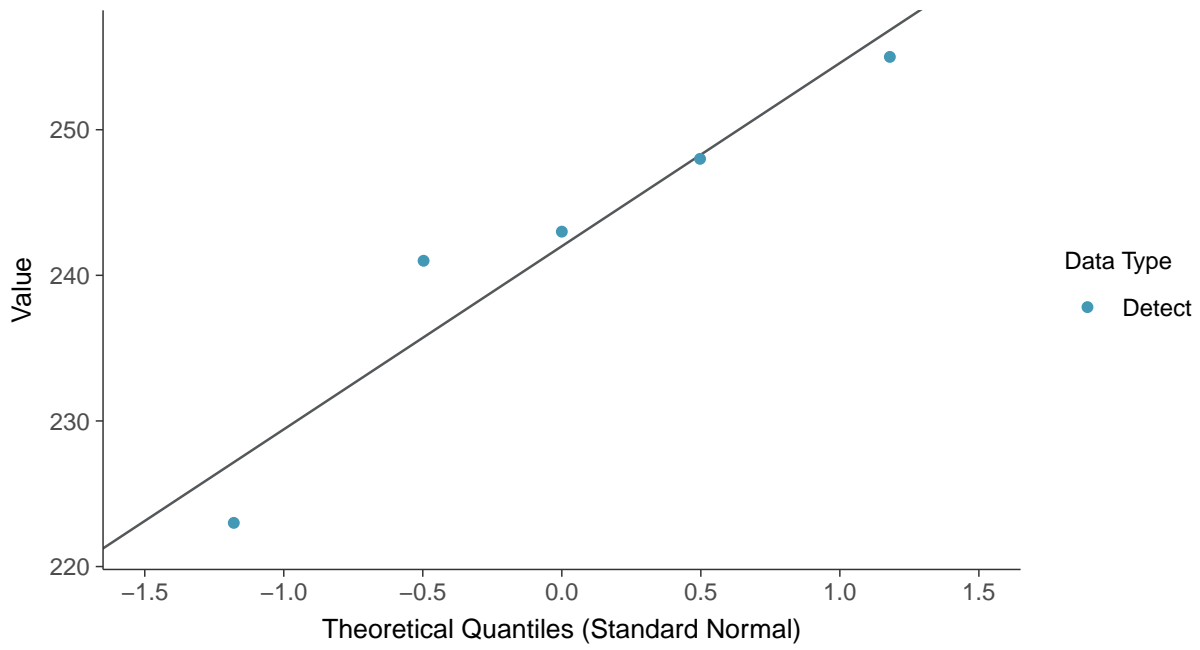




Downgradient Wells MW-2, MW-3, MW-5, MW-6, MW-7, MW-7B, MW-8, MW-9, MW-10, MW-13, MW-14, MW-15

Normal Q-Q plot

Calcium, MW-3 (mg/L)



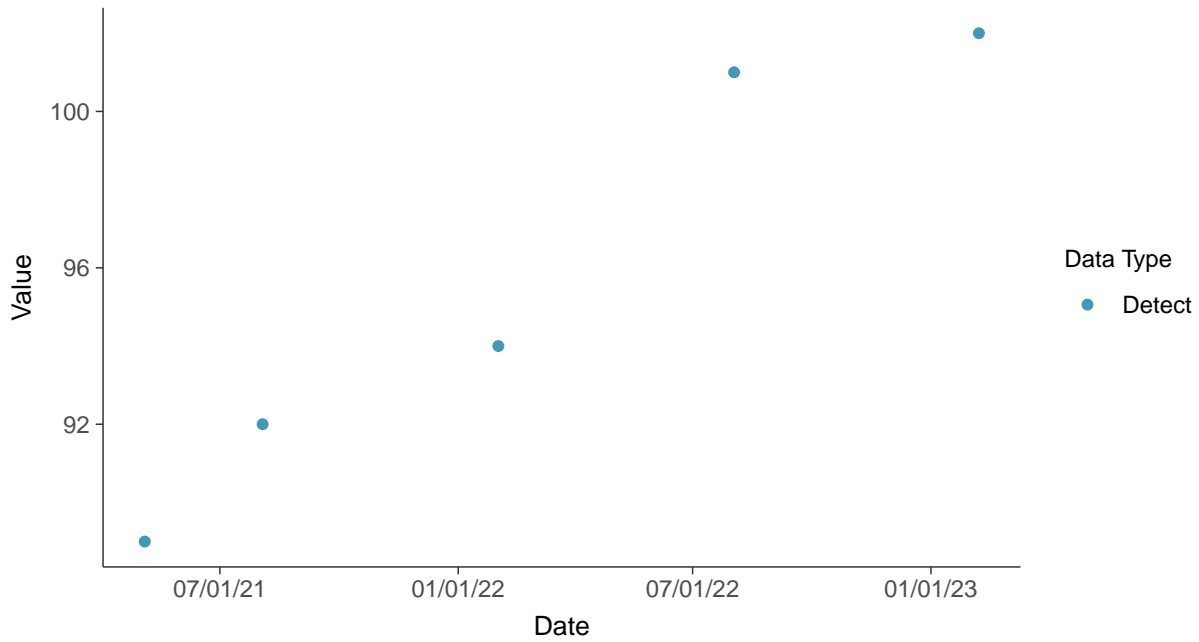


Appendix III: Chloride, MW-3

ID: 03_1_03

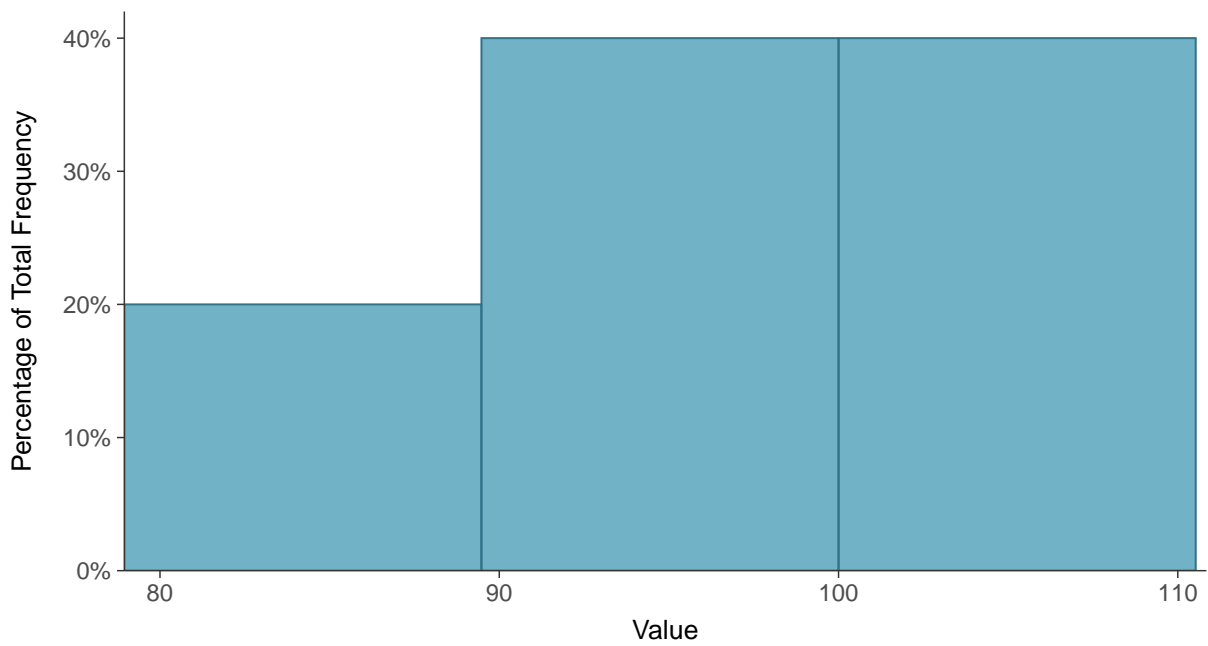
Scatter Plot

Chloride, MW-3 (mg/L)



Histogram

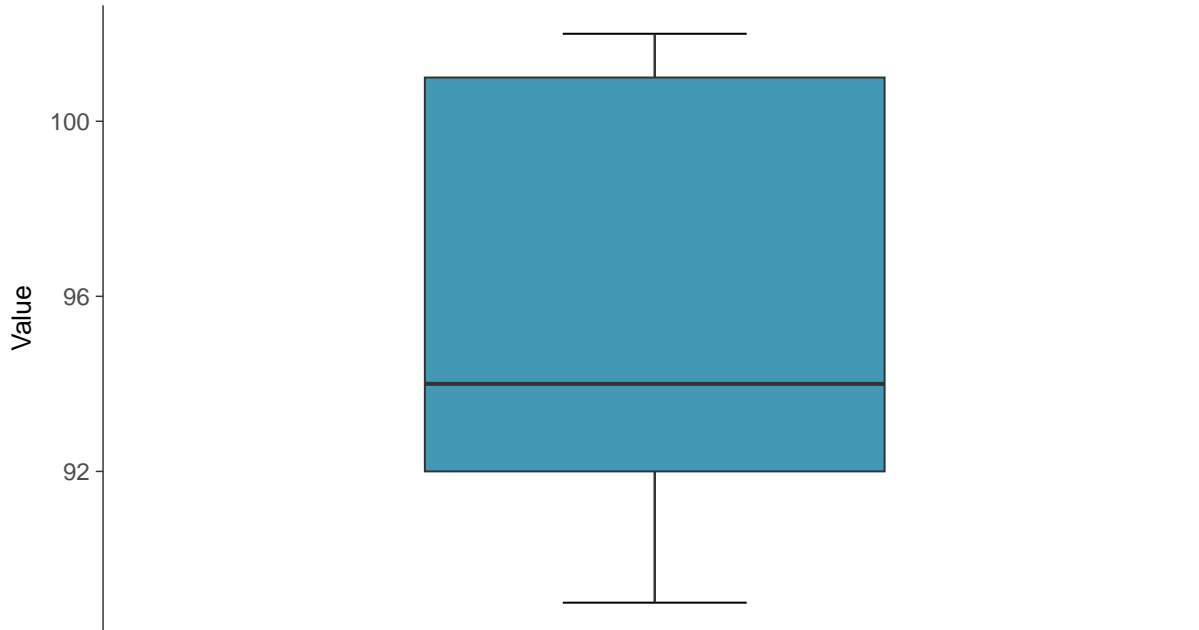
Chloride, MW-3 (mg/L)





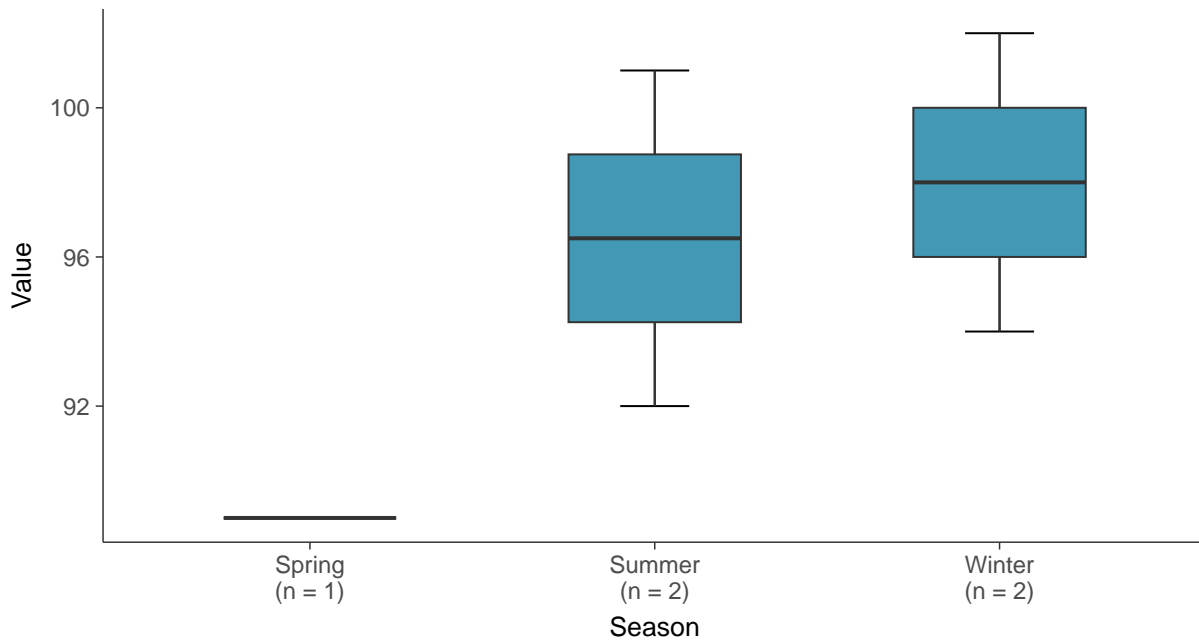
Boxplot

Chloride, MW-3 (mg/L)



Boxplot by Season

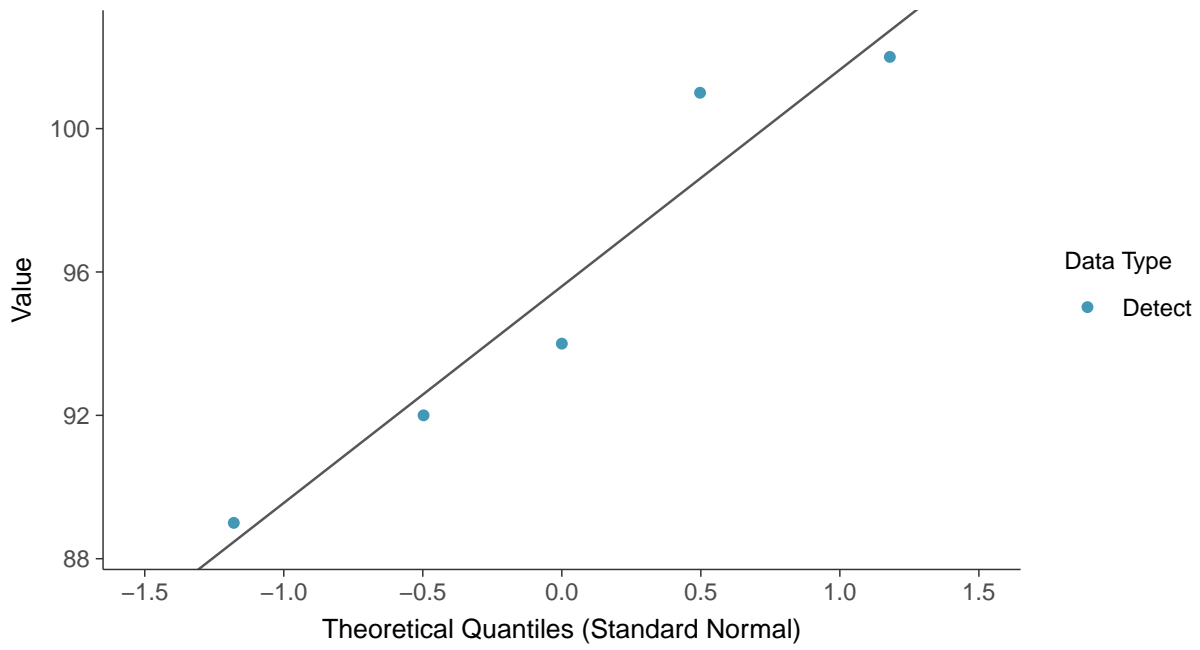
Chloride, MW-3 (mg/L)





Normal Q-Q plot

Chloride, MW-3 (mg/L)



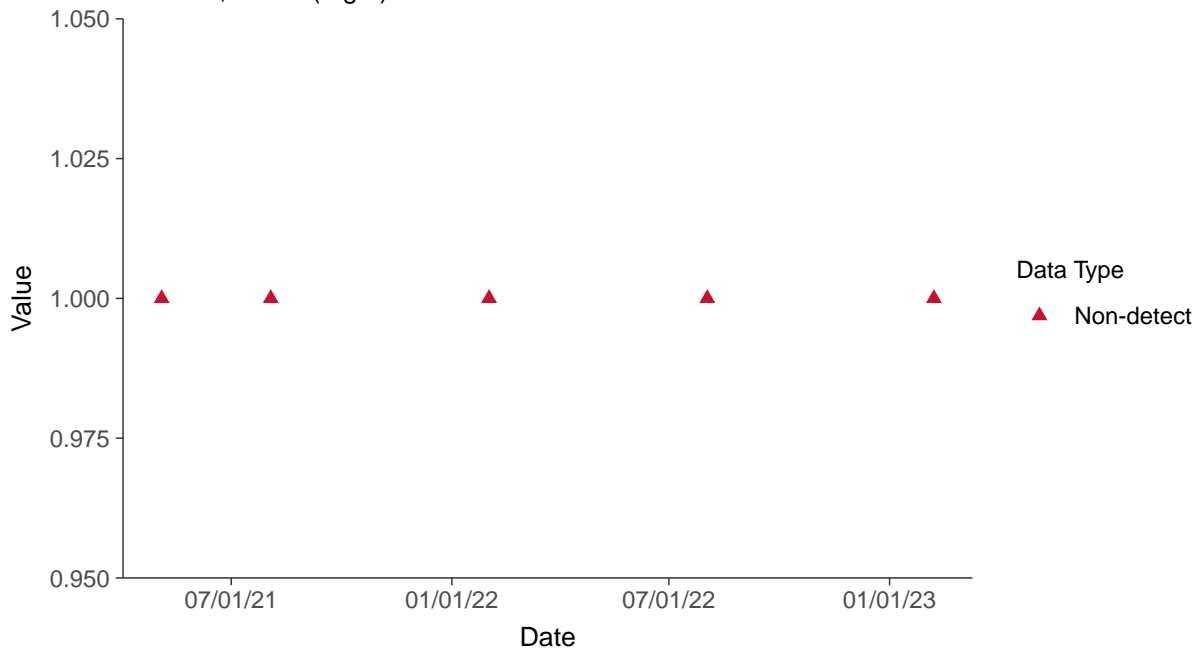


Appendix III: Fluoride, MW-3

ID: 03_1_04

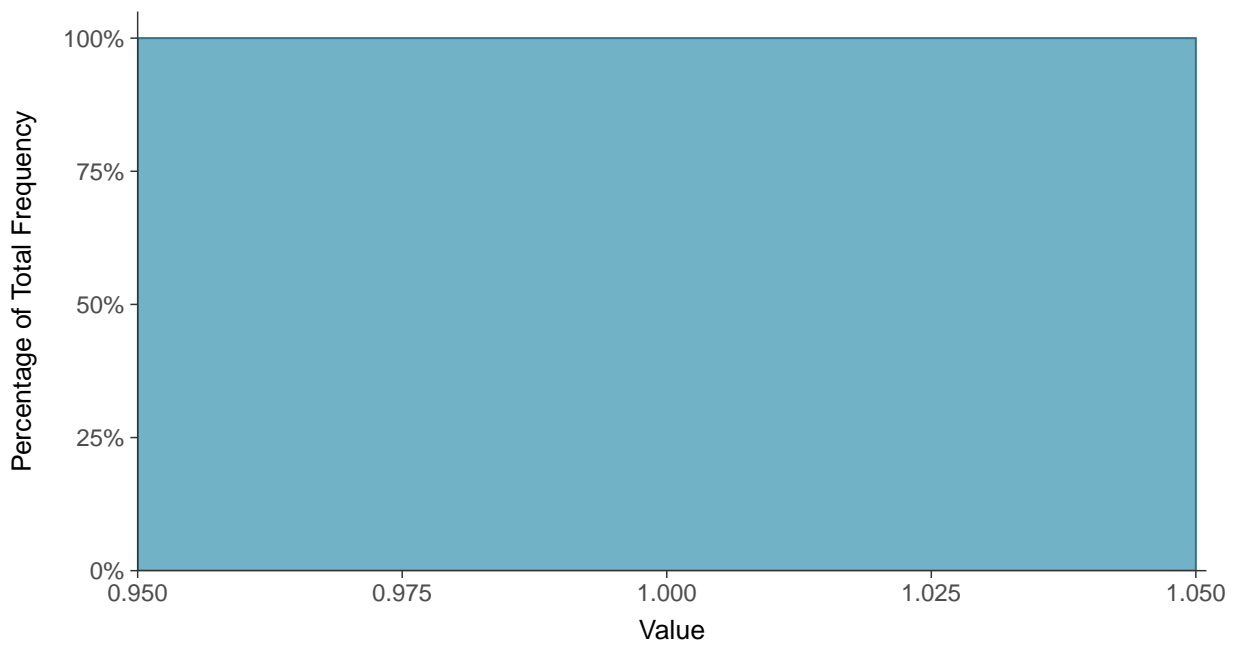
Scatter Plot

Fluoride, MW-3 (mg/L)



Histogram

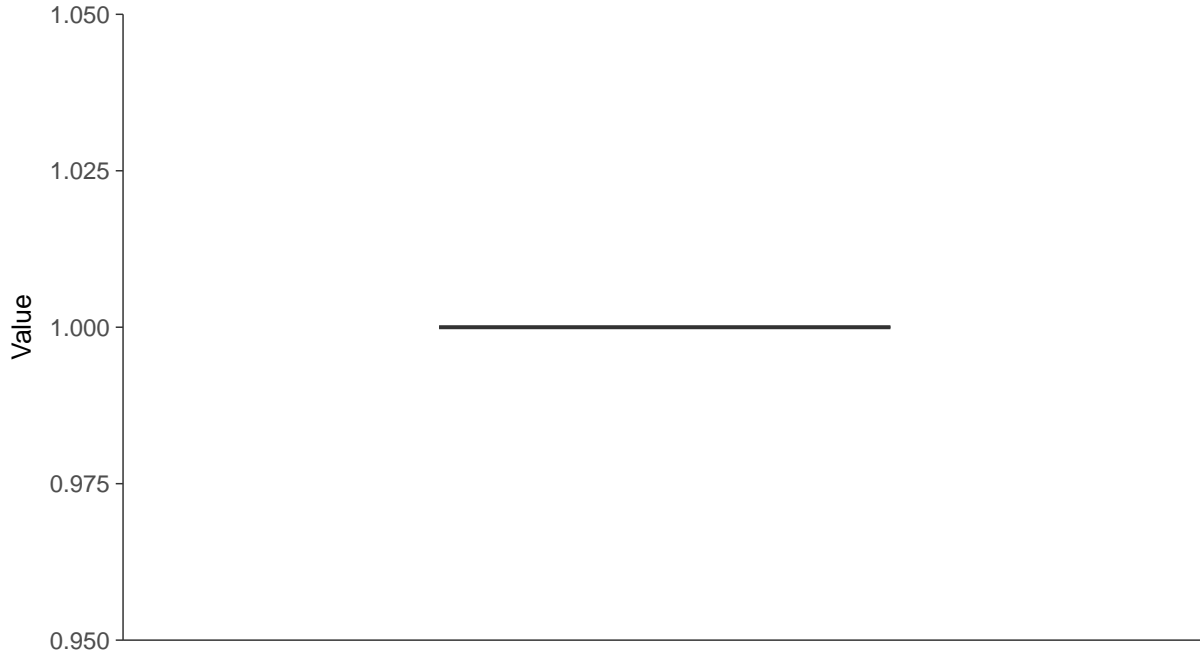
Fluoride, MW-3 (mg/L)





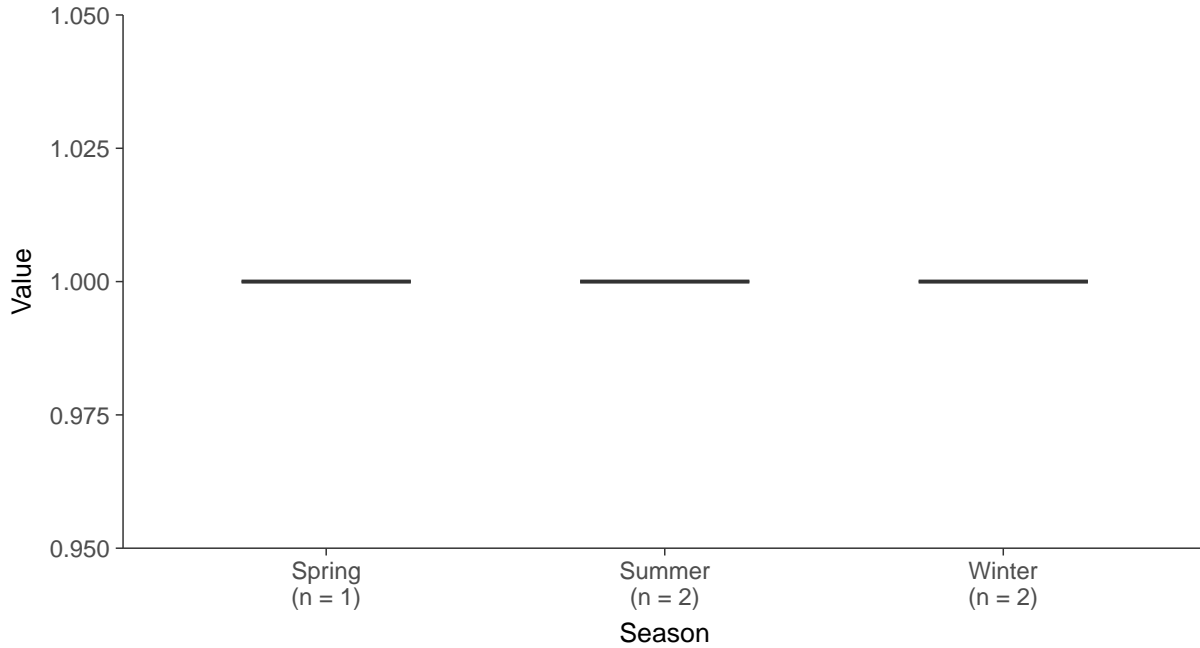
Boxplot

Fluoride, MW-3 (mg/L)



Boxplot by Season

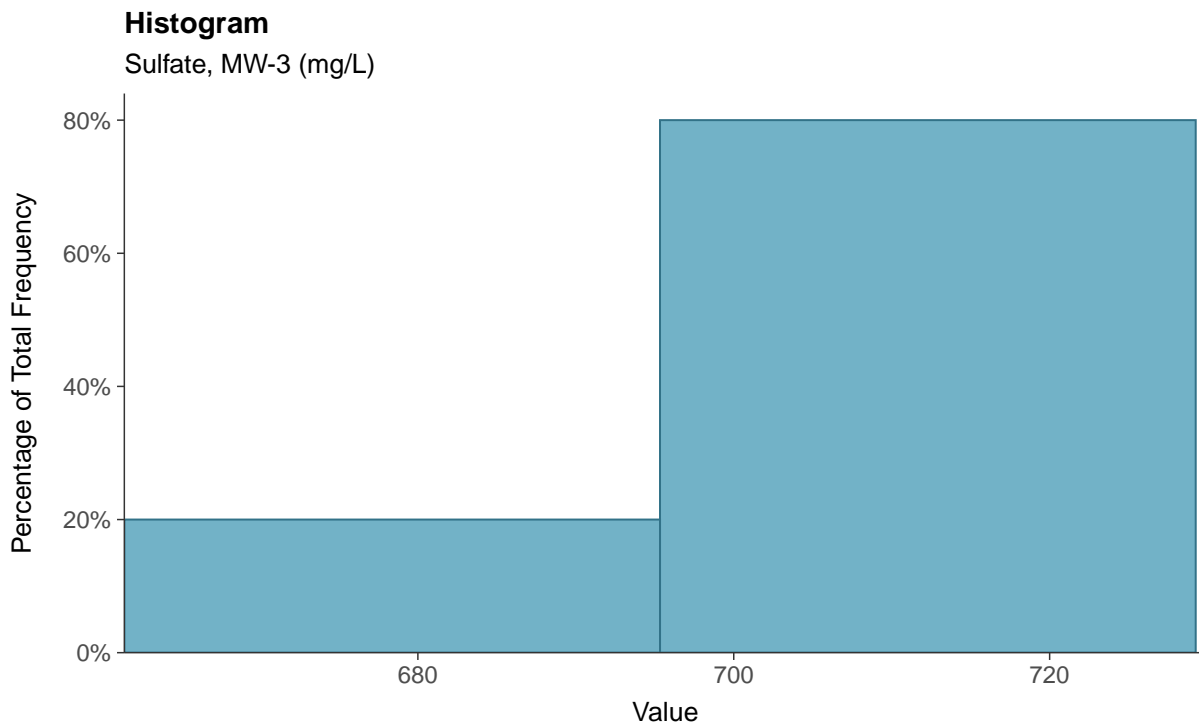
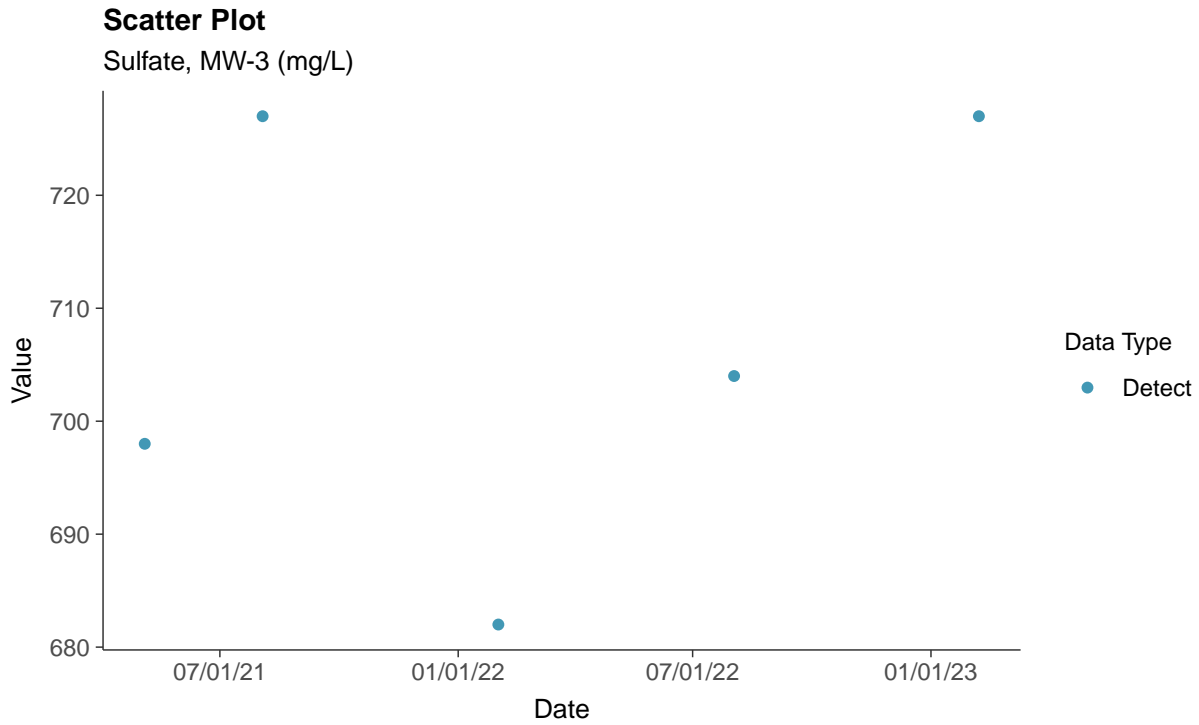
Fluoride, MW-3 (mg/L)





Appendix III: Sulfate, MW-3

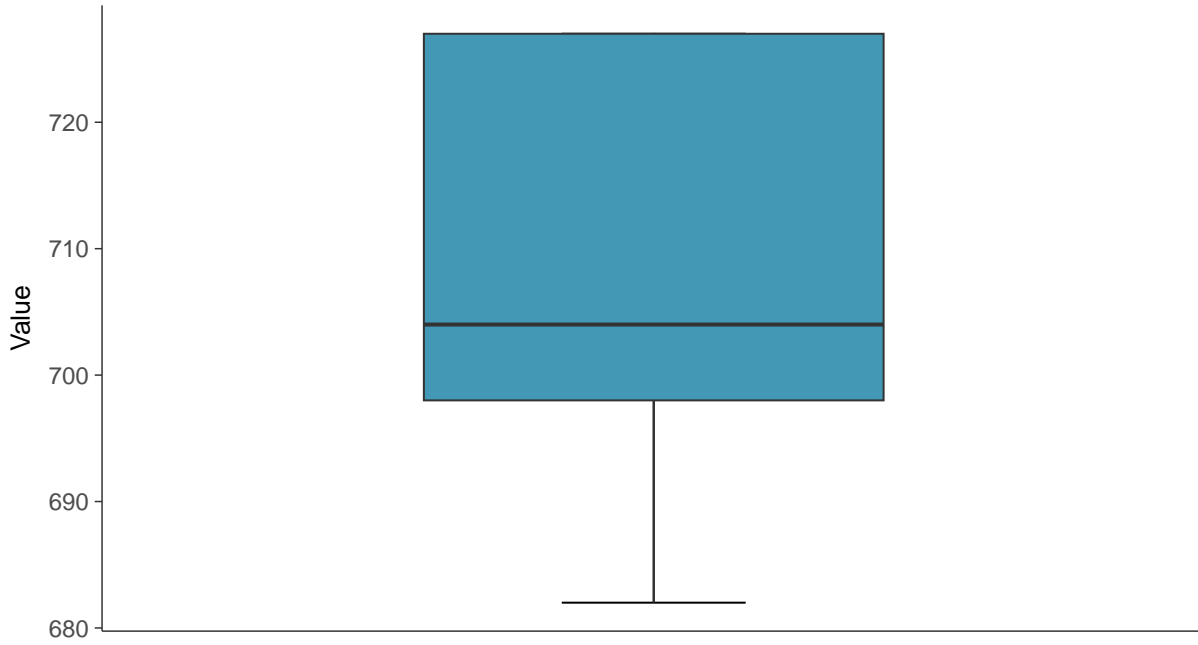
ID: 03_1_05





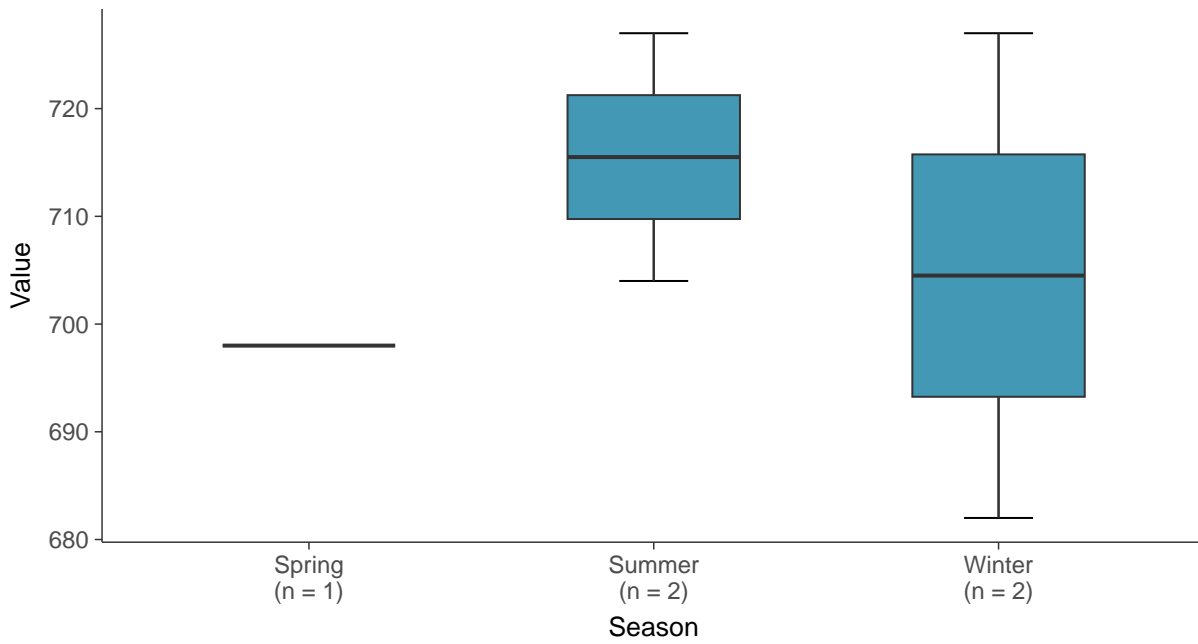
Boxplot

Sulfate, MW-3 (mg/L)



Boxplot by Season

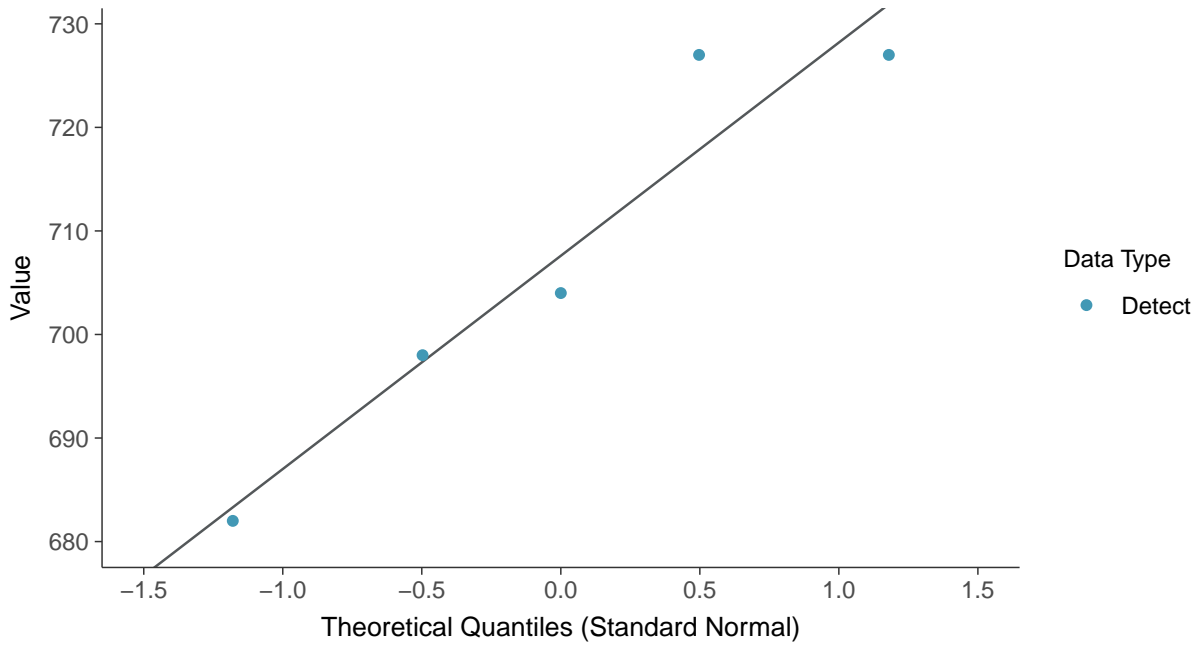
Sulfate, MW-3 (mg/L)





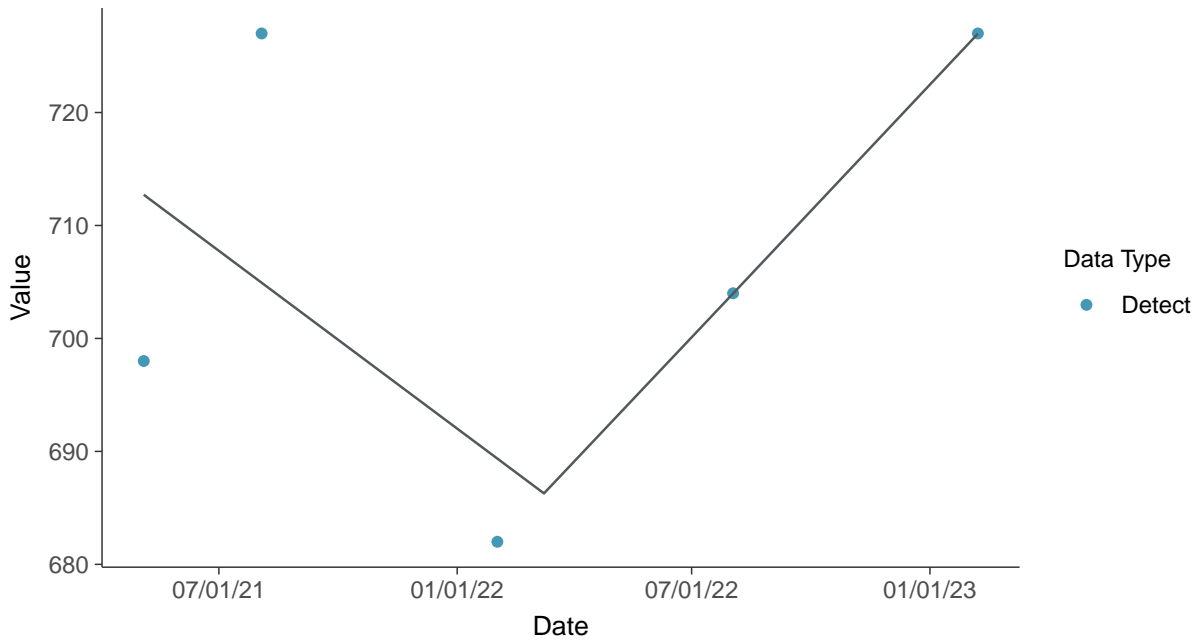
Normal Q-Q plot

Sulfate, MW-3 (mg/L)



Trend Regression: Piecewise Linear-Linear

Sulfate, MW-3 (mg/L)



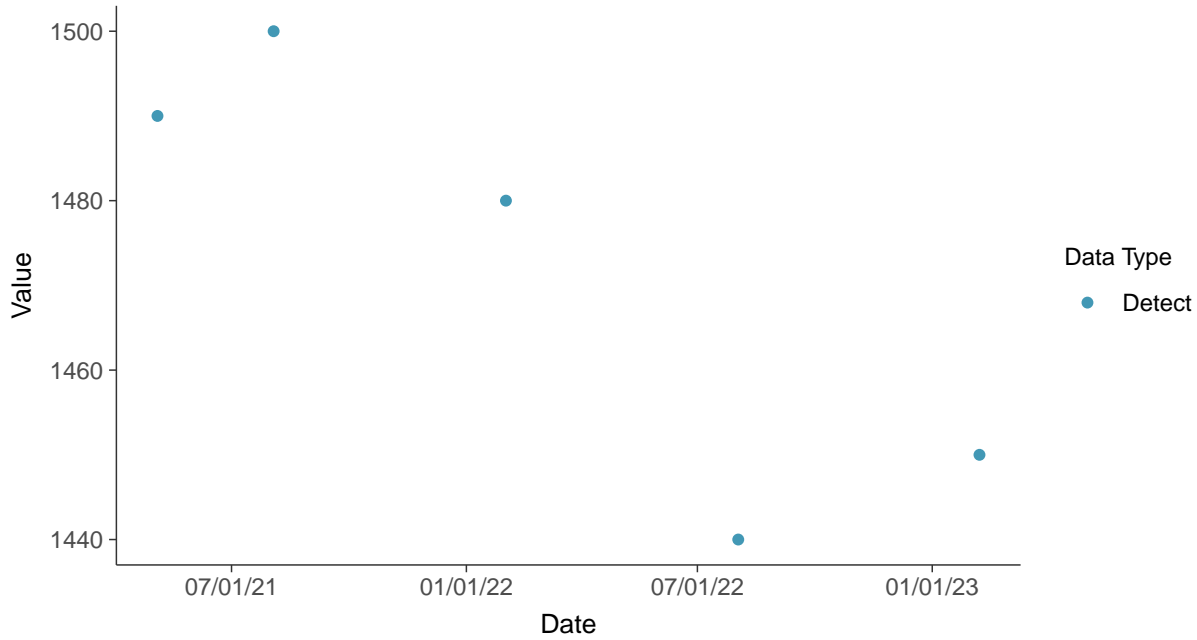


Appendix III: Total Dissolved Solids, MW-3

ID: 03_1_06

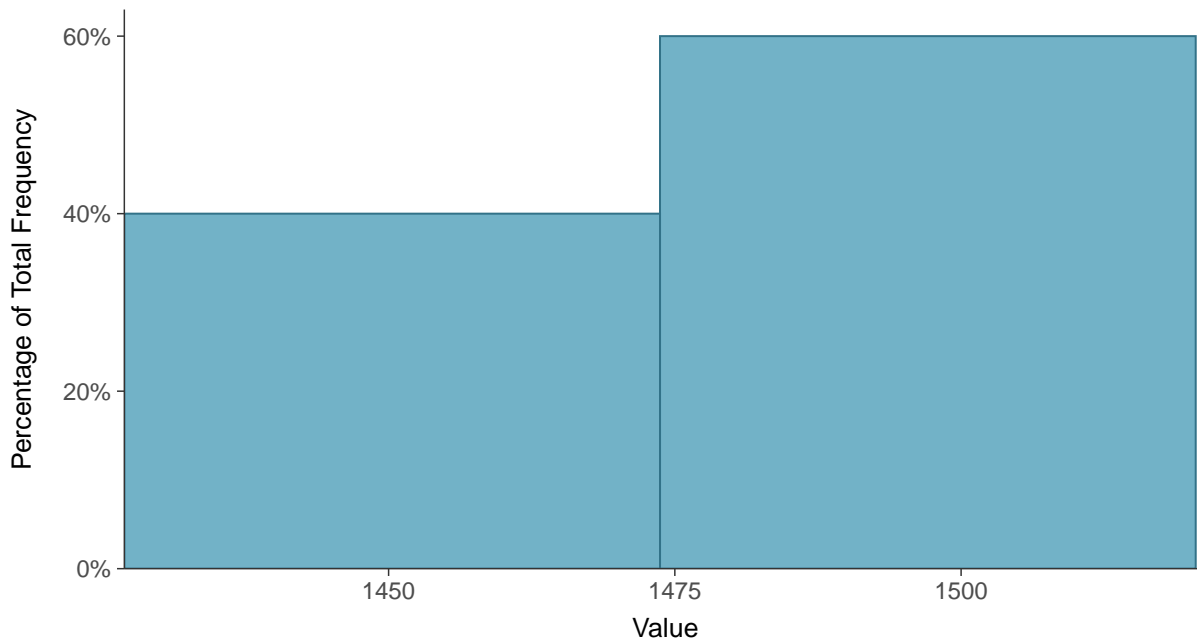
Scatter Plot

Total Dissolved Solids, MW-3 (mg/L)



Histogram

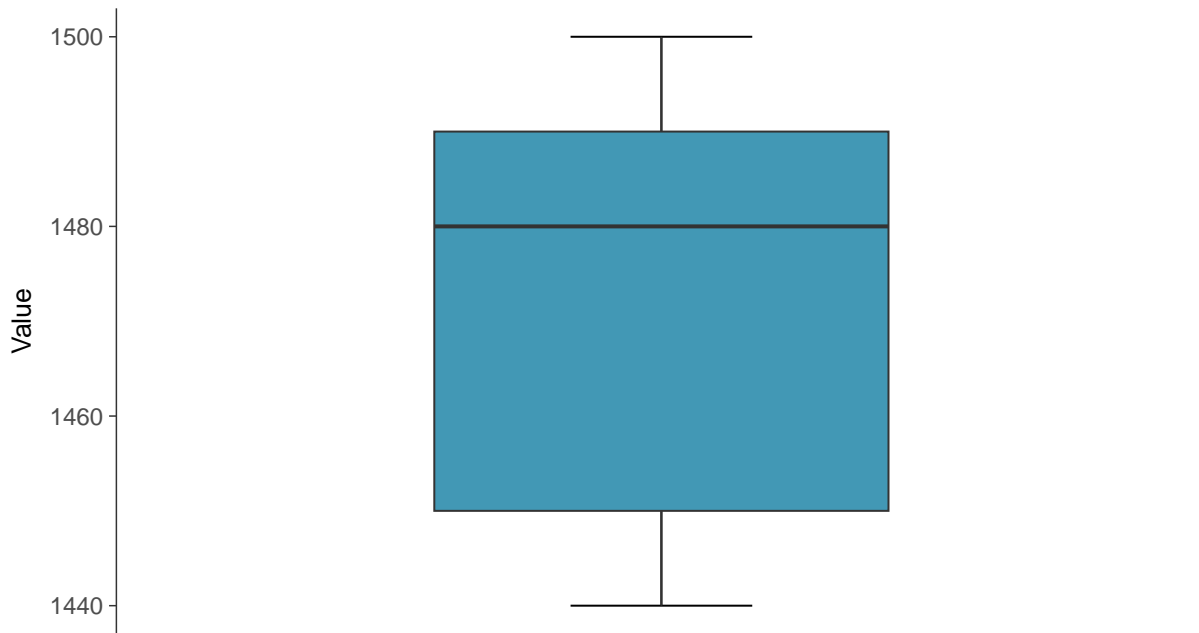
Total Dissolved Solids, MW-3 (mg/L)





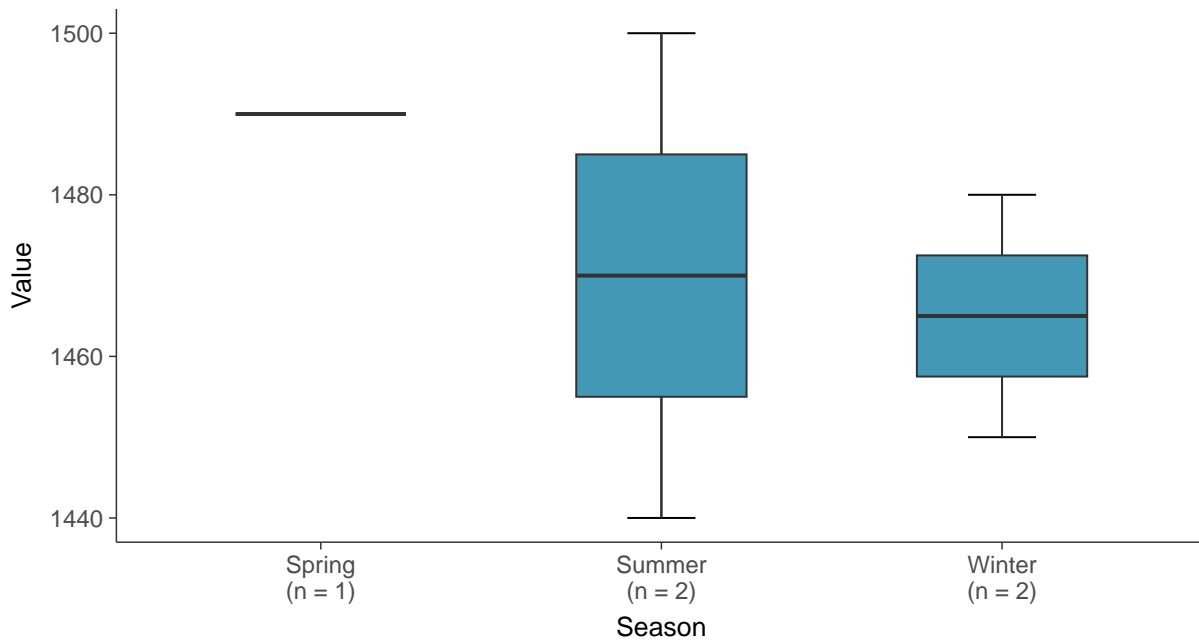
Boxplot

Total Dissolved Solids, MW-3 (mg/L)



Boxplot by Season

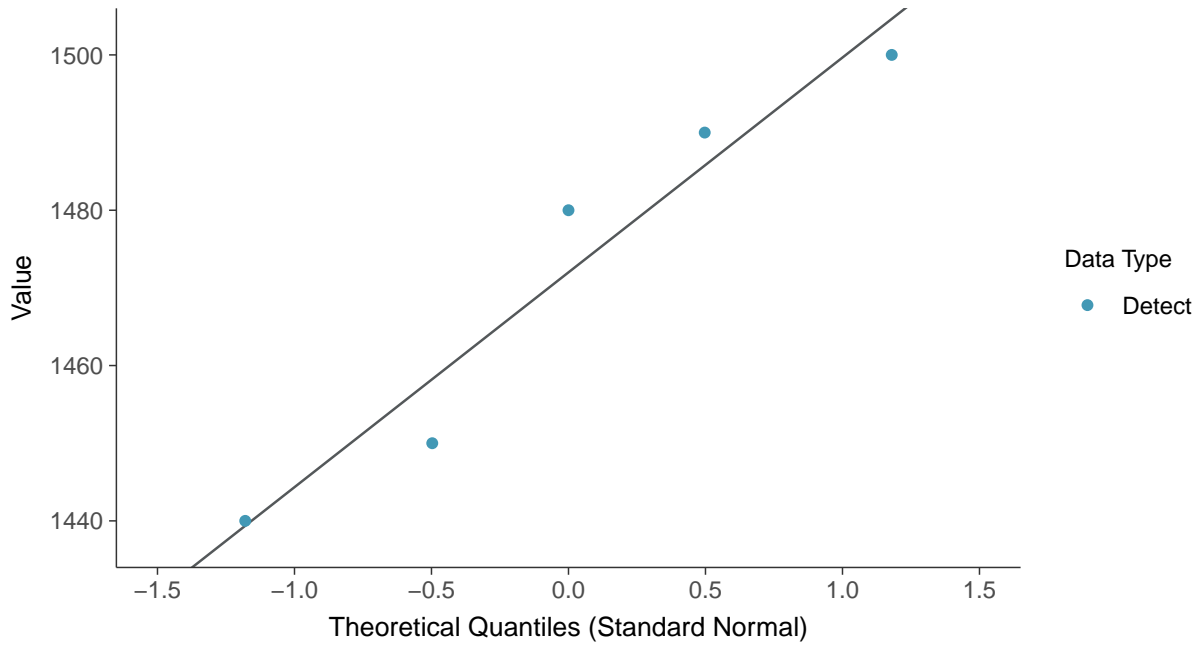
Total Dissolved Solids, MW-3 (mg/L)





Normal Q-Q plot

Total Dissolved Solids, MW-3 (mg/L)



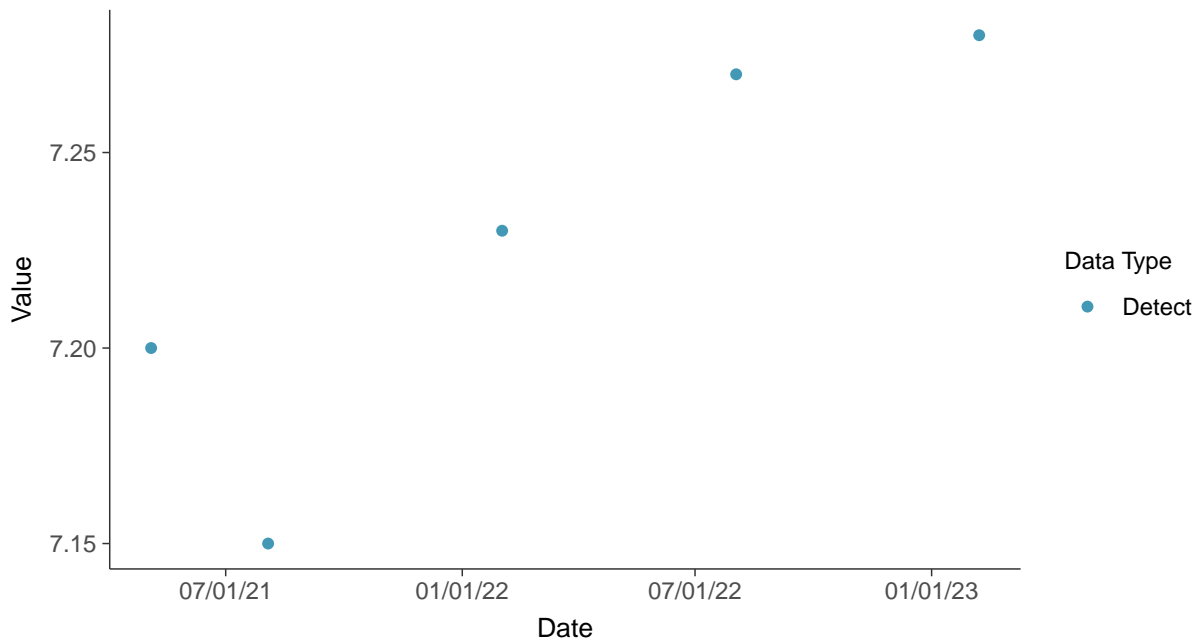


Appendix III: pH, Field, MW-3

ID: 03_1_07

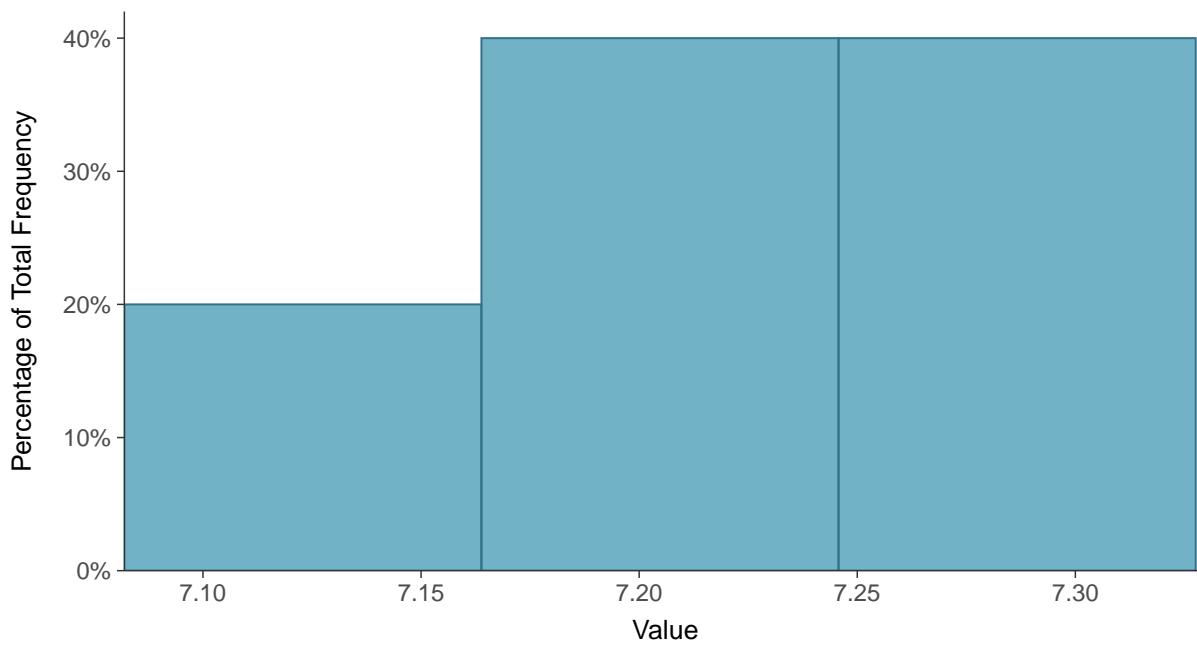
Scatter Plot

pH, Field, MW-3 (su)



Histogram

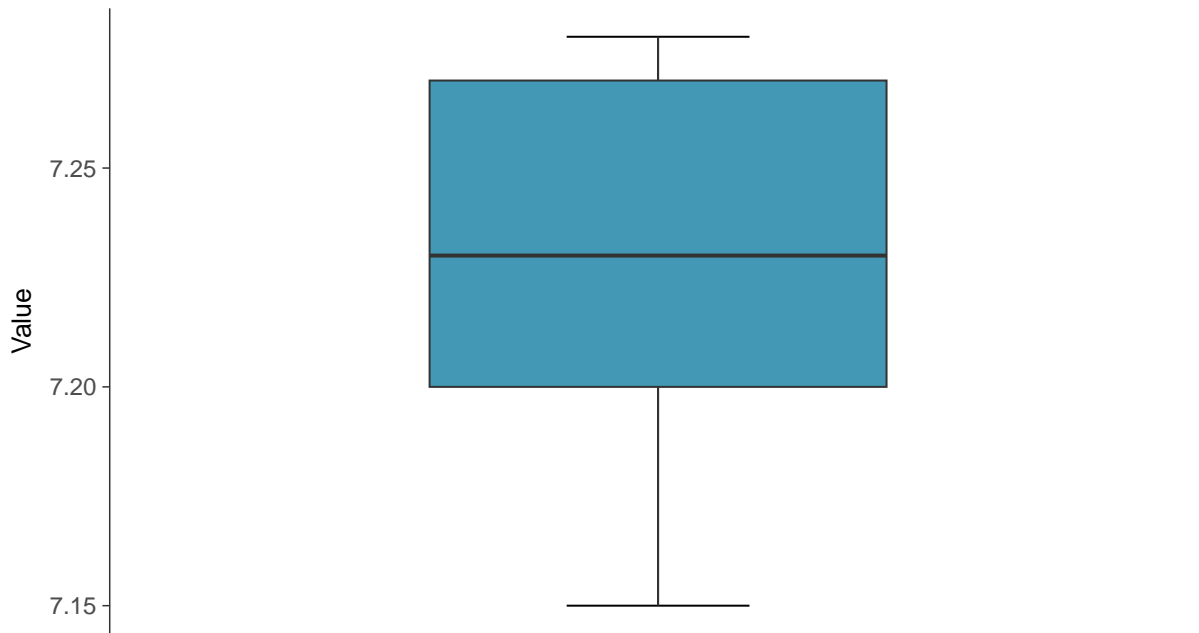
pH, Field, MW-3 (su)





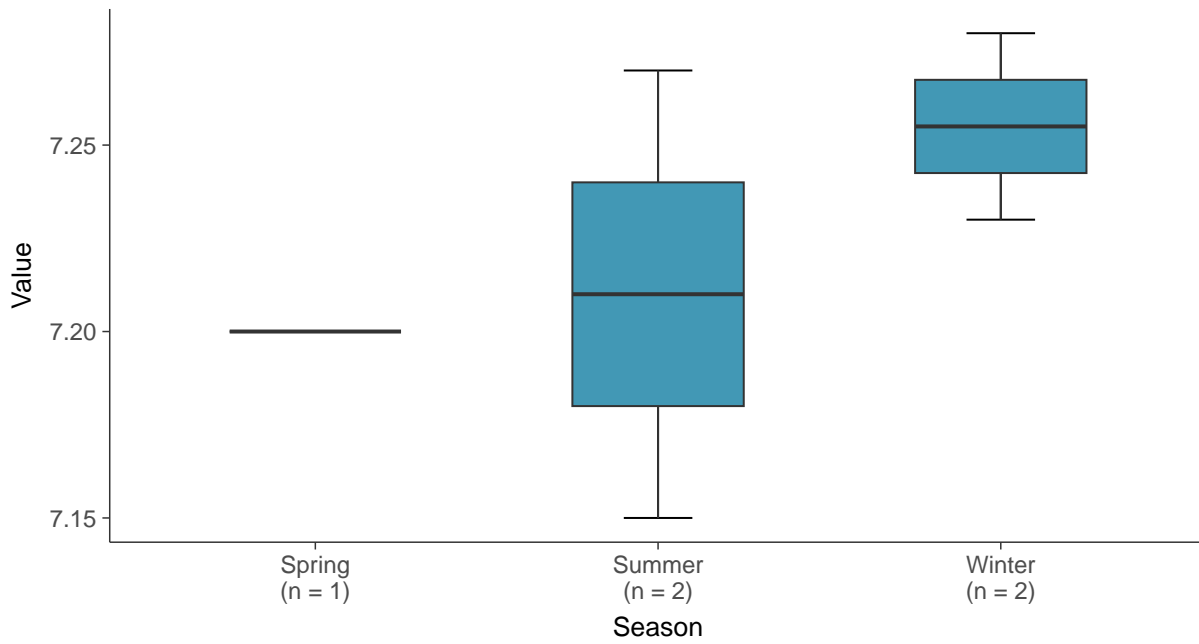
Boxplot

pH, Field, MW-3 (su)



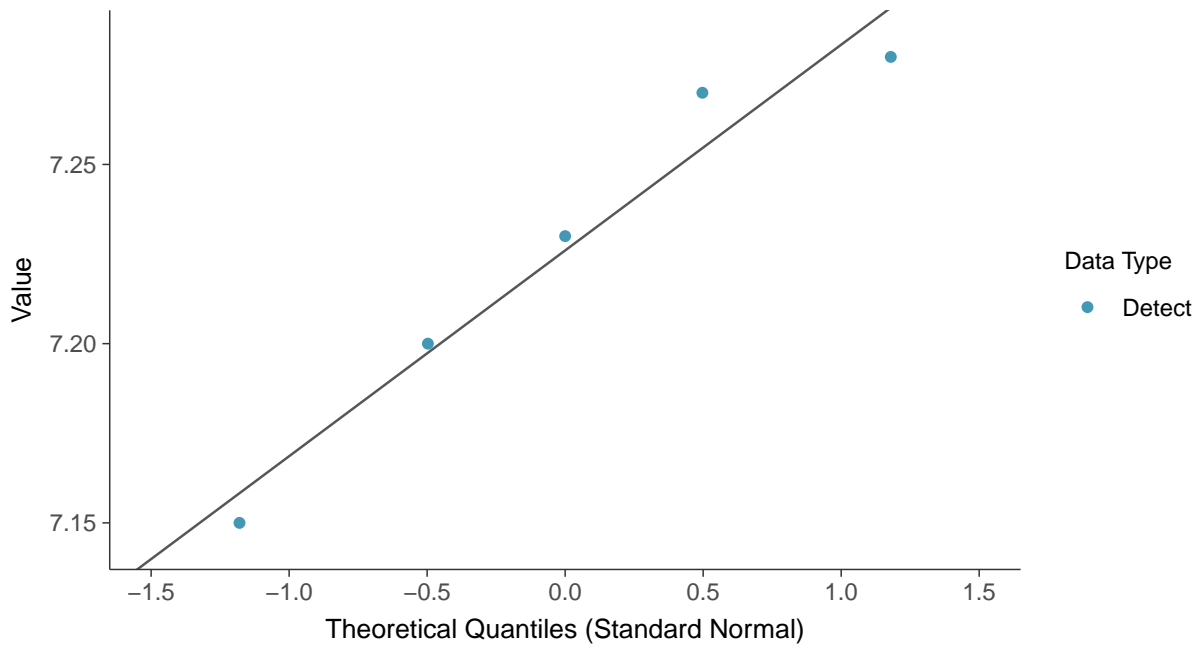
Boxplot by Season

pH, Field, MW-3 (su)





Normal Q-Q plot
pH, Field, MW-3 (su)



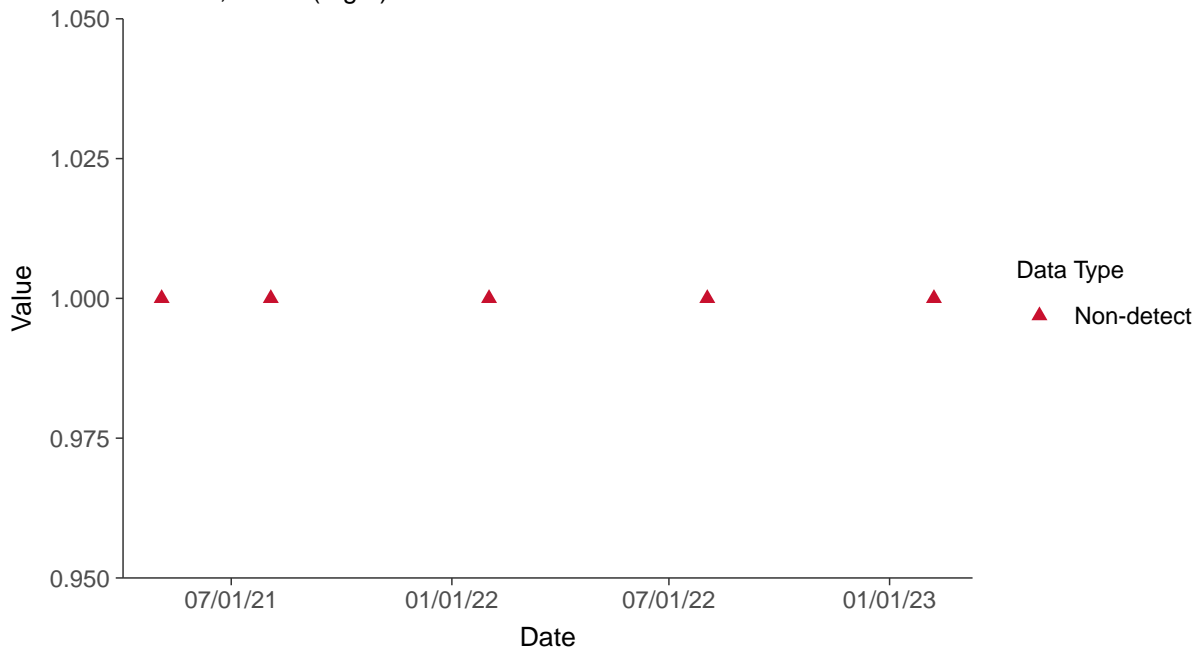


Appendix IV: Fluoride, MW-3

ID: 03_2_04

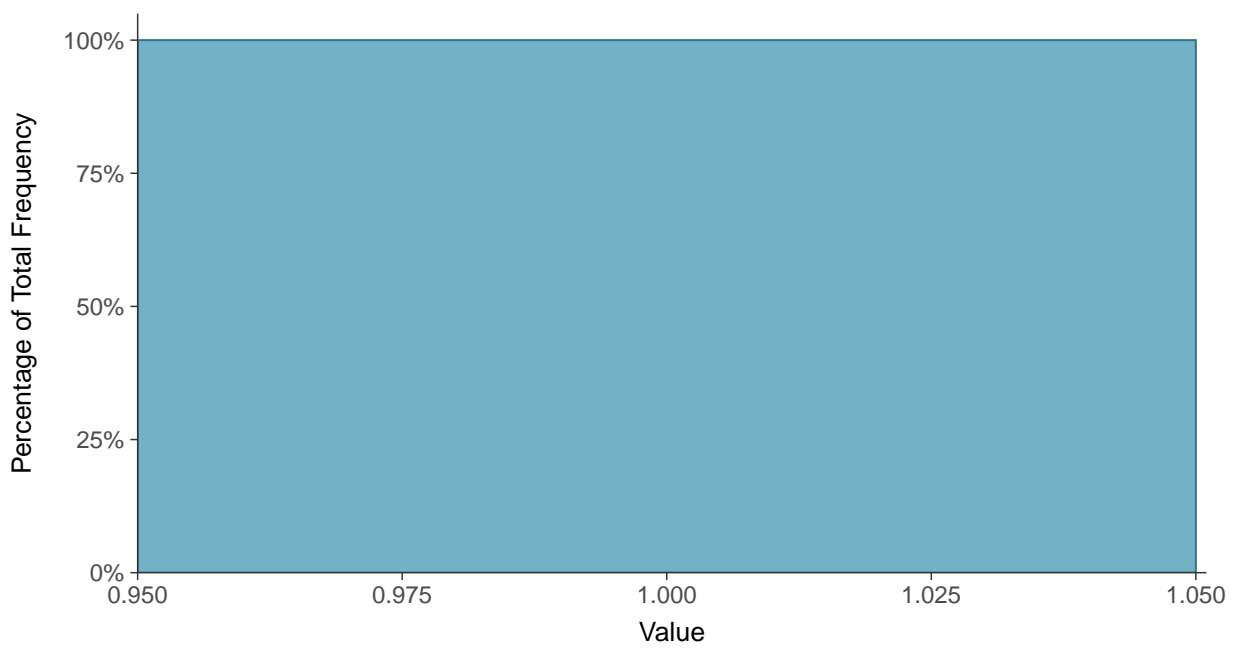
Scatter Plot

Fluoride, MW-3 (mg/L)



Histogram

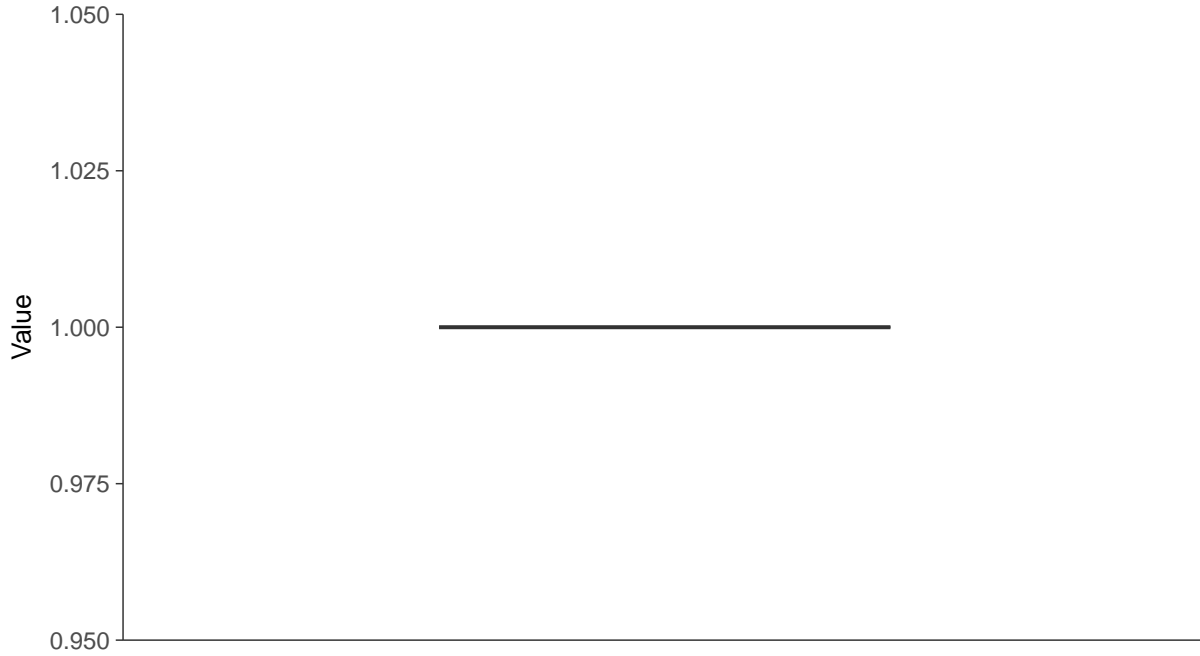
Fluoride, MW-3 (mg/L)





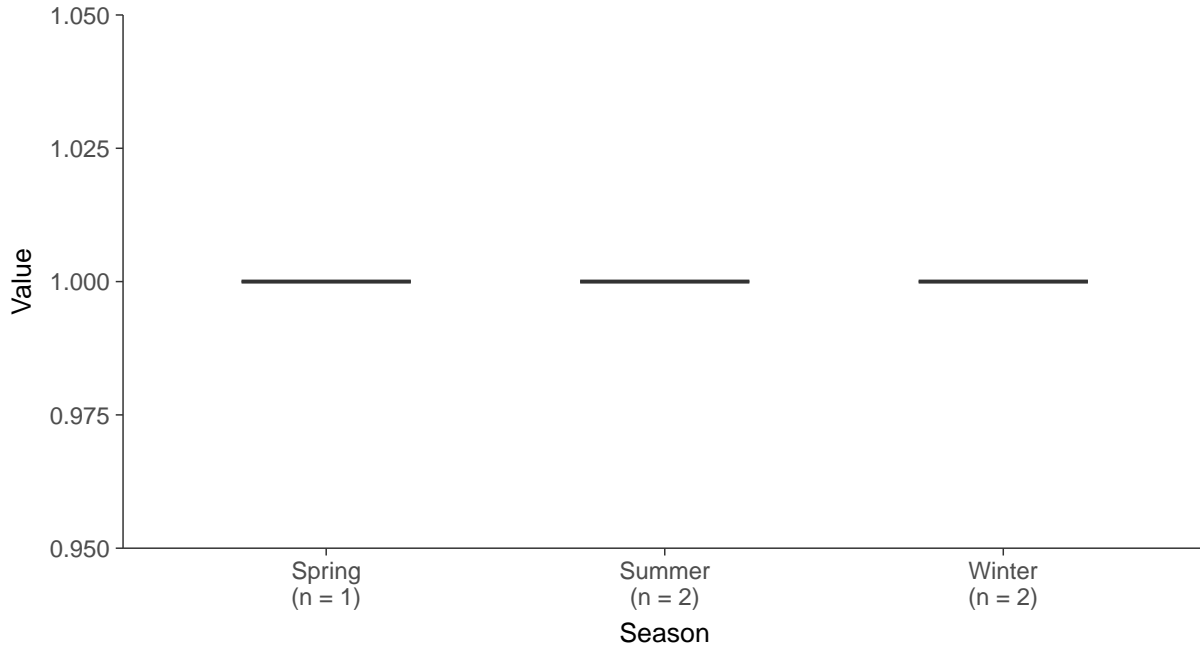
Boxplot

Fluoride, MW-3 (mg/L)



Boxplot by Season

Fluoride, MW-3 (mg/L)



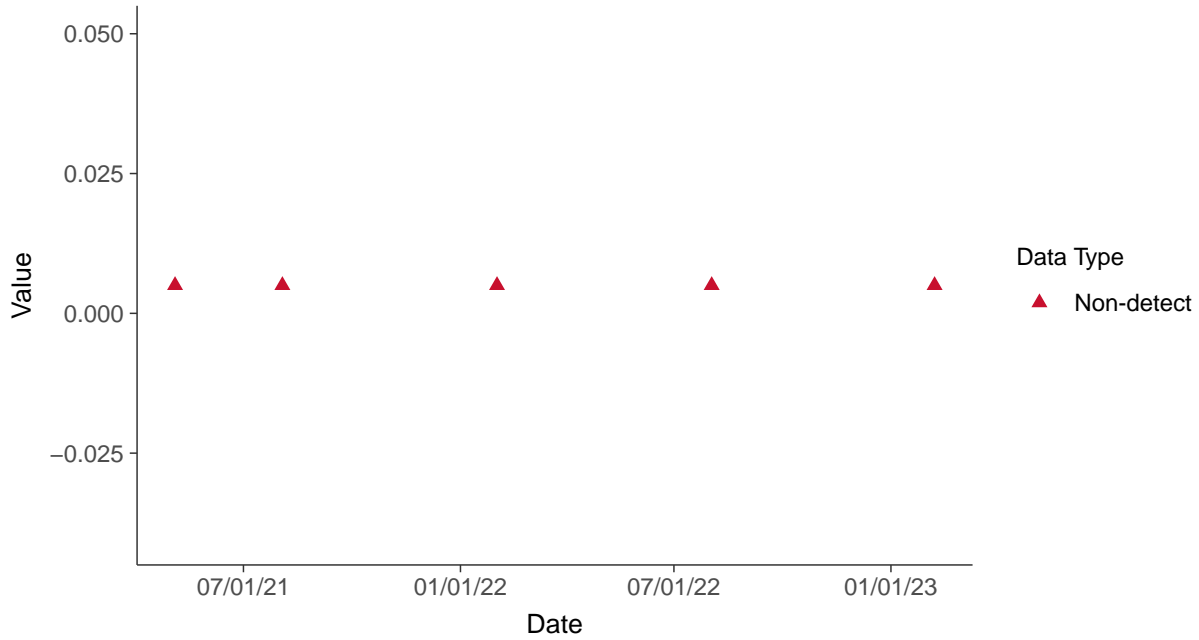


Appendix IV: Antimony, MW-3

ID: 03_2_08

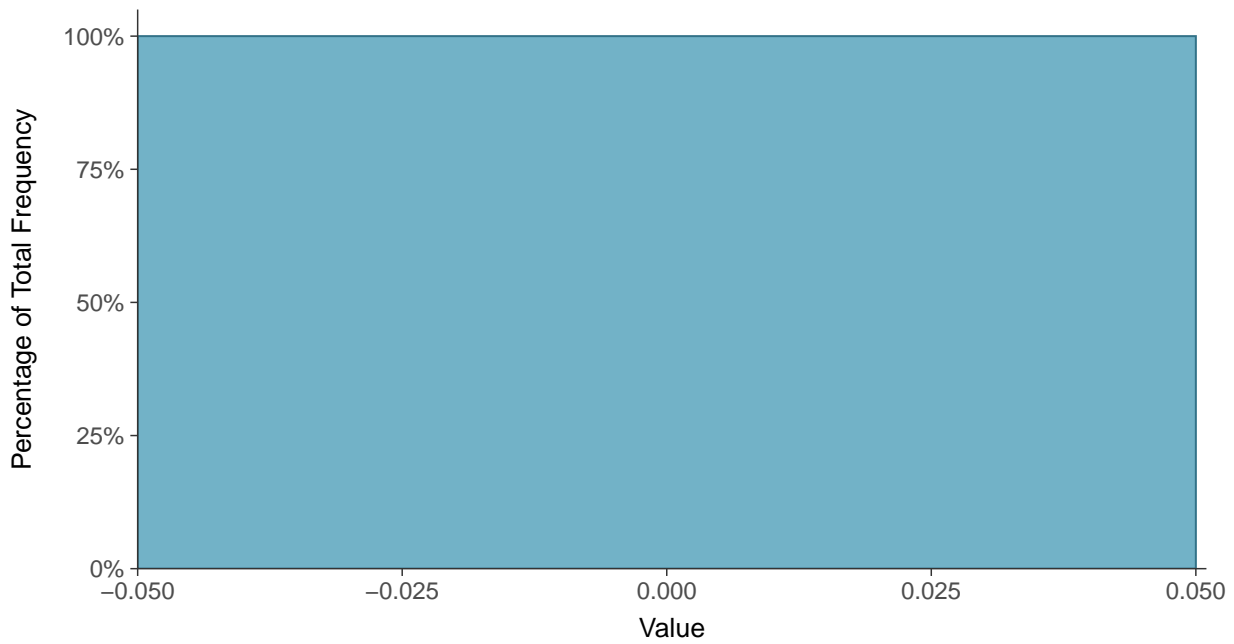
Scatter Plot

Antimony, MW-3 (mg/L)



Histogram

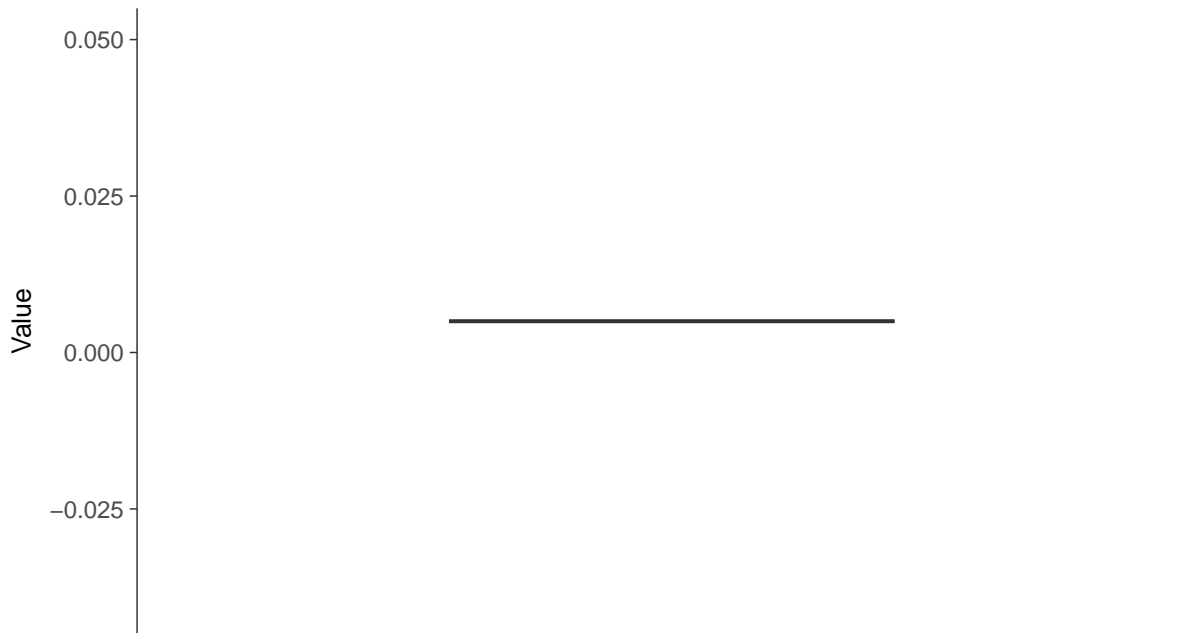
Antimony, MW-3 (mg/L)





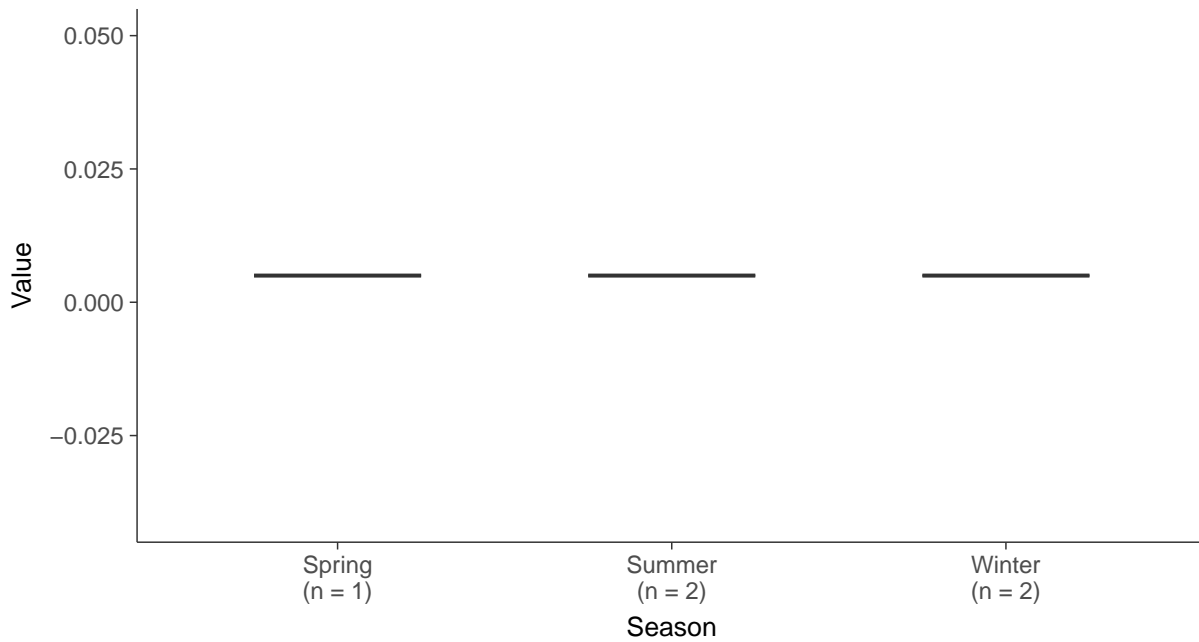
Boxplot

Antimony, MW-3 (mg/L)



Boxplot by Season

Antimony, MW-3 (mg/L)



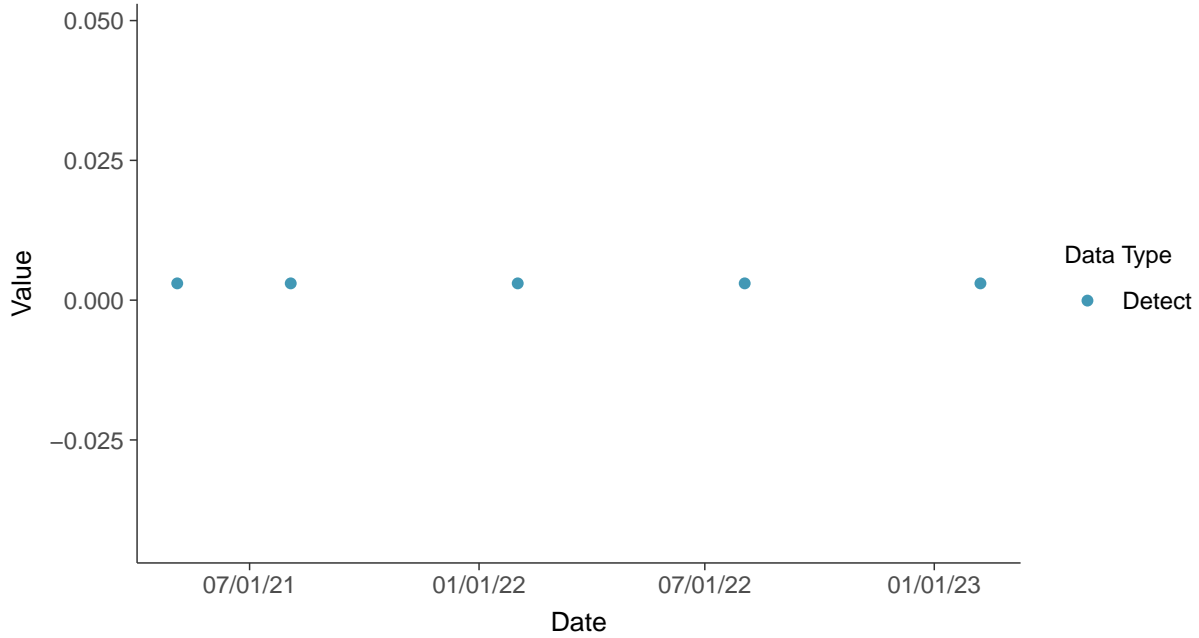


Appendix IV: Arsenic, MW-3

ID: 03_2_09

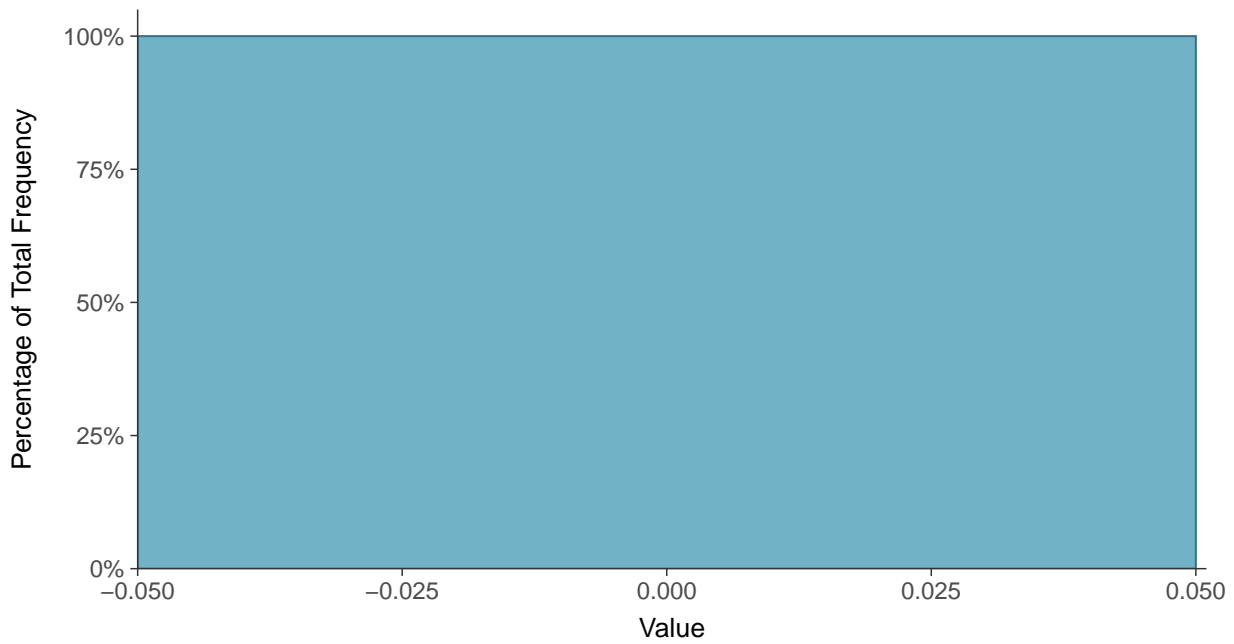
Scatter Plot

Arsenic, MW-3 (mg/L)



Histogram

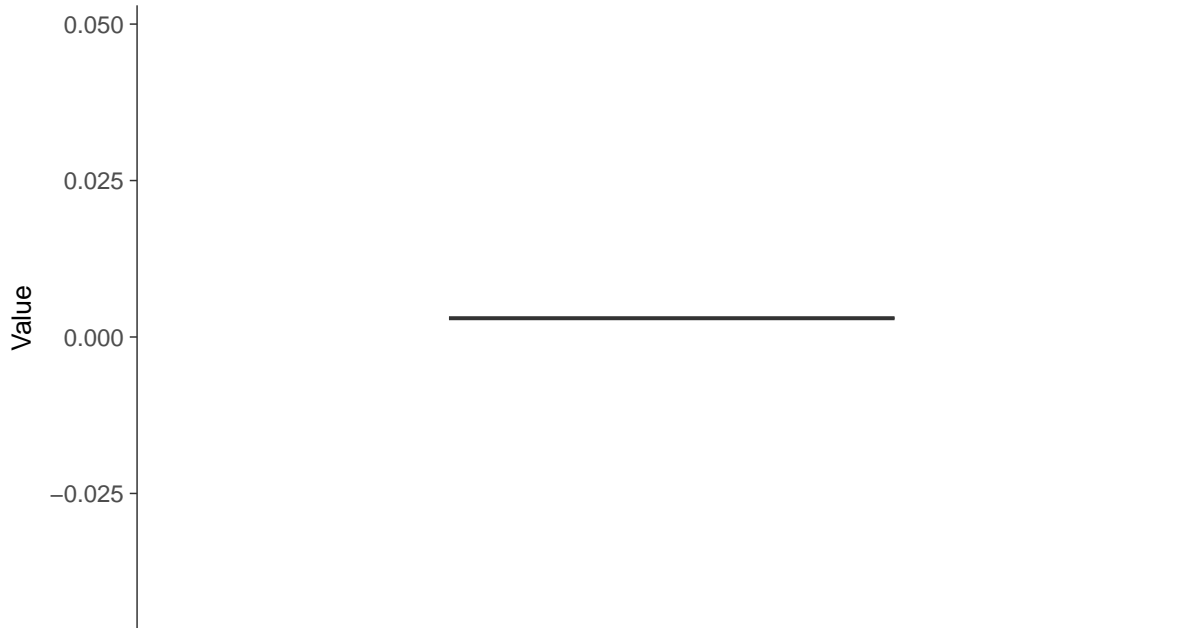
Arsenic, MW-3 (mg/L)





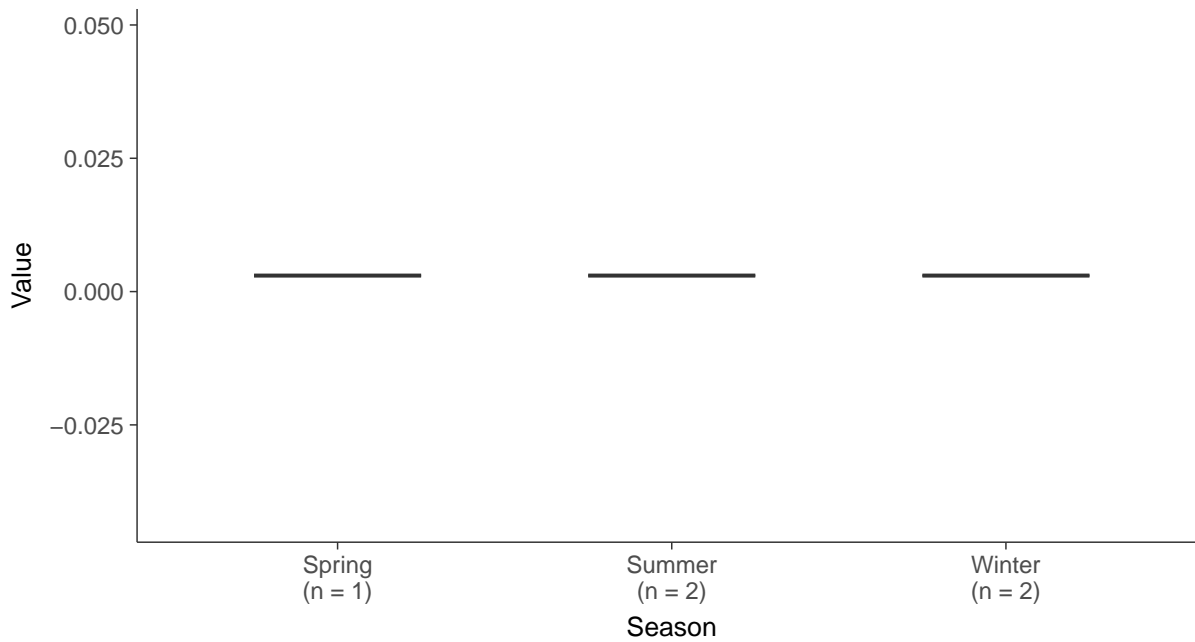
Boxplot

Arsenic, MW-3 (mg/L)



Boxplot by Season

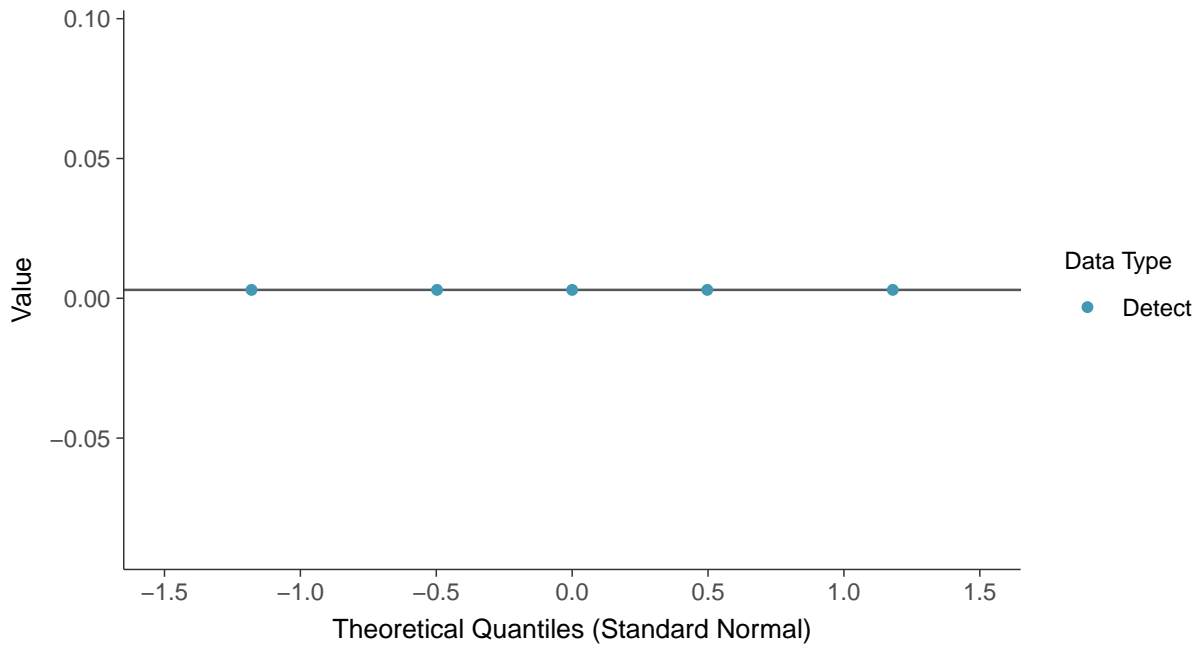
Arsenic, MW-3 (mg/L)





Normal Q-Q plot

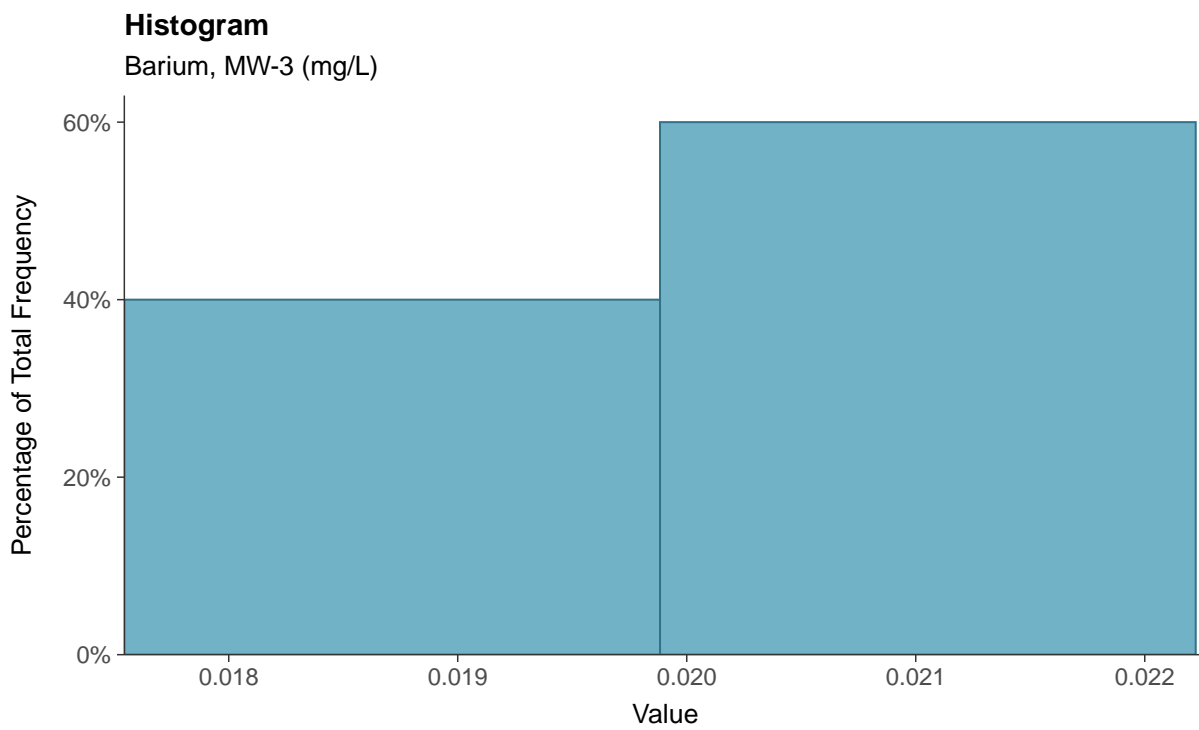
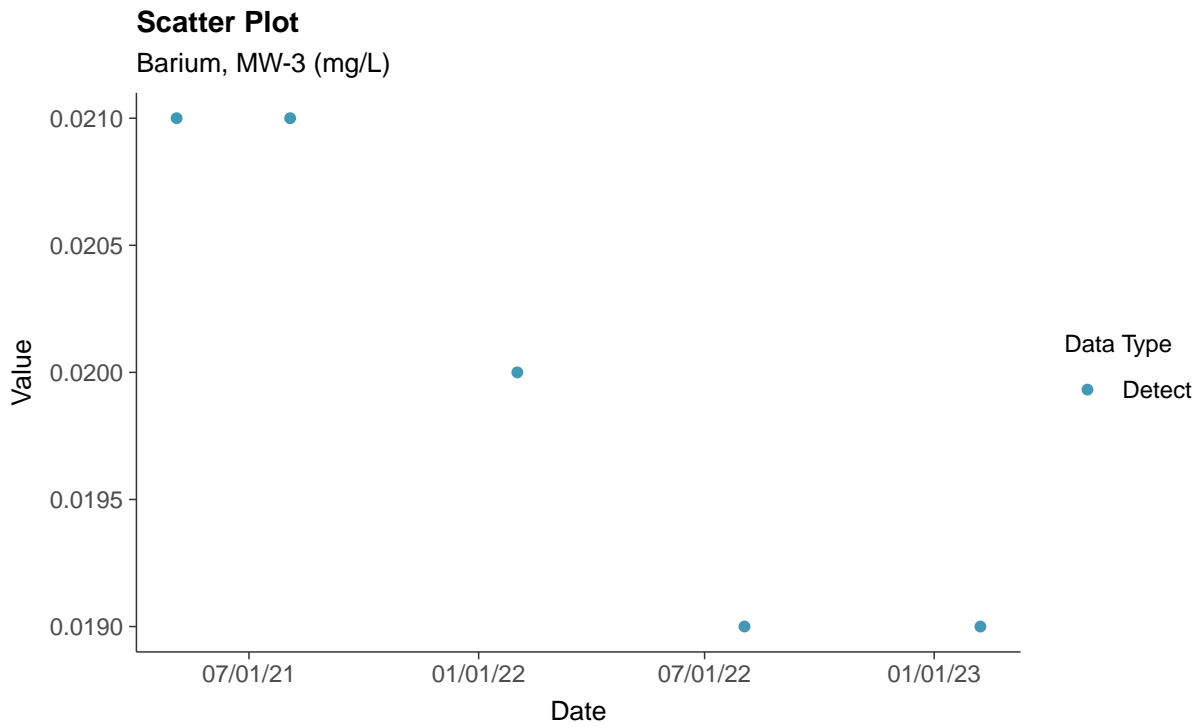
Arsenic, MW-3 (mg/L)





Appendix IV: Barium, MW-3

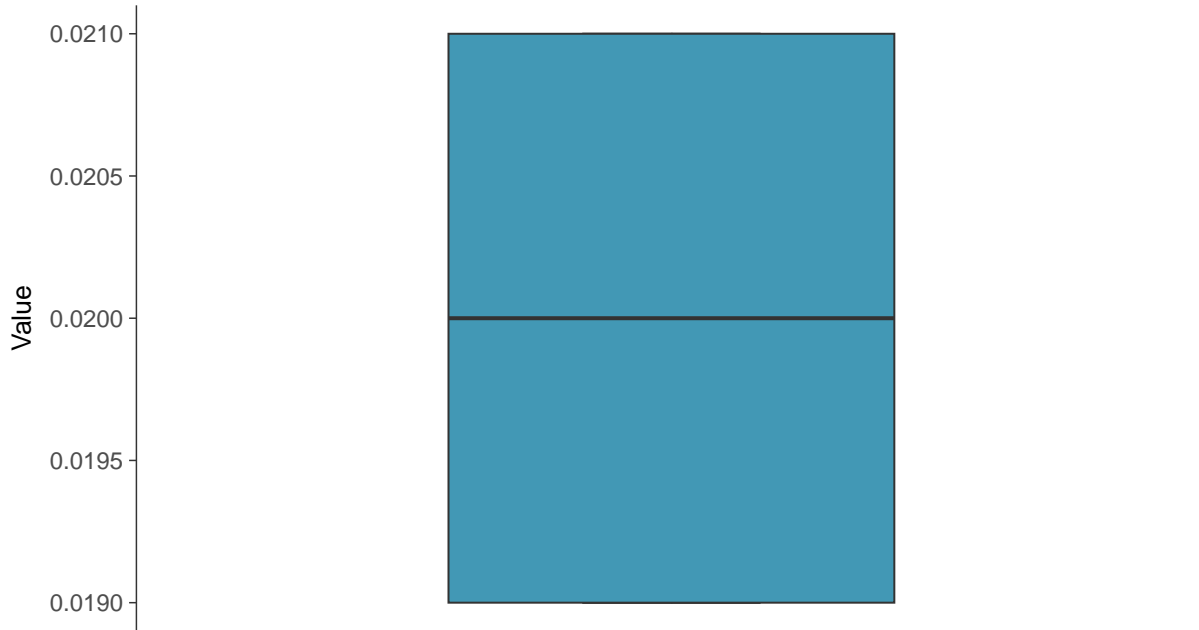
ID: 03_2_10





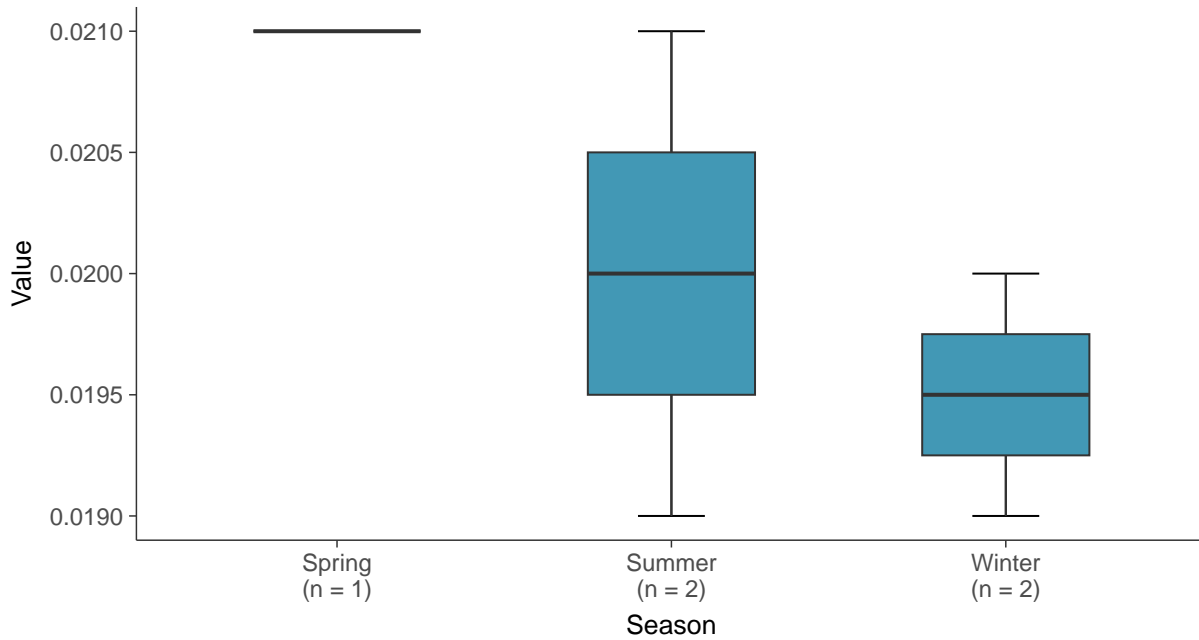
Boxplot

Barium, MW-3 (mg/L)



Boxplot by Season

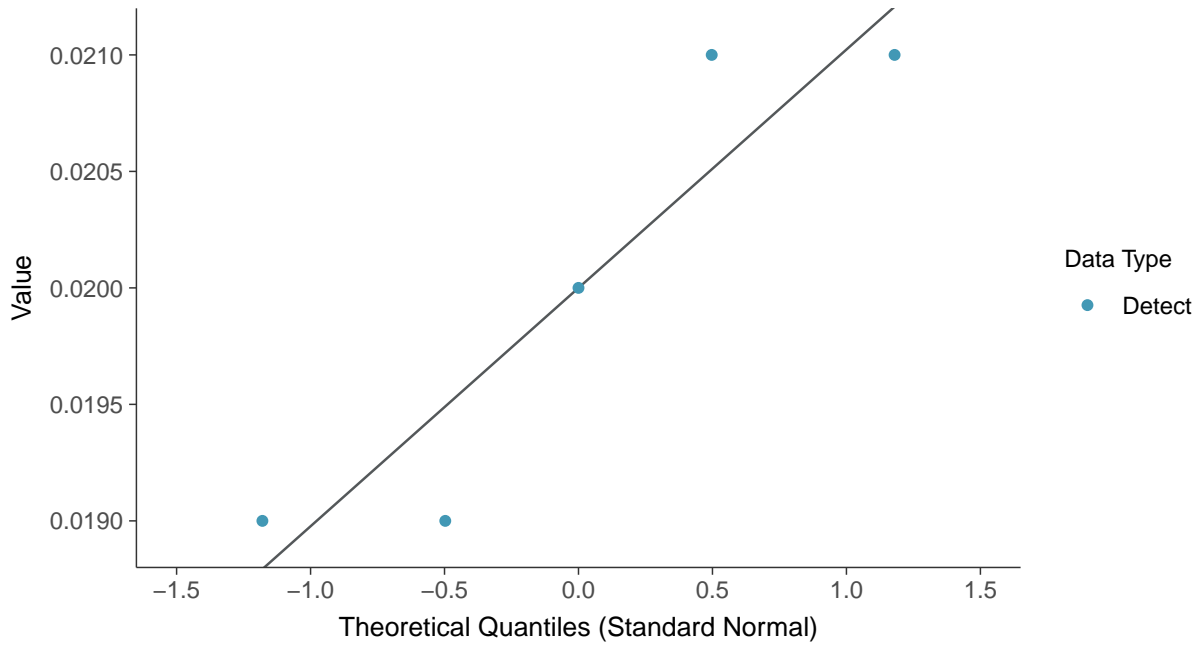
Barium, MW-3 (mg/L)





Normal Q-Q plot

Barium, MW-3 (mg/L)



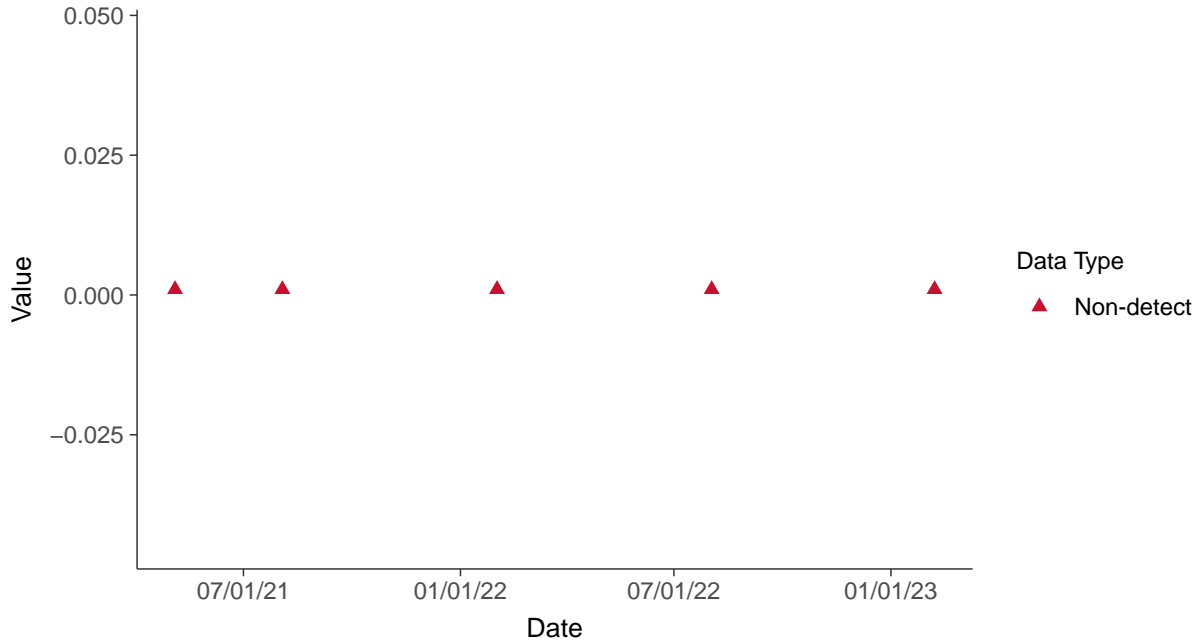


Appendix IV: Beryllium, MW-3

ID: 03_2_11

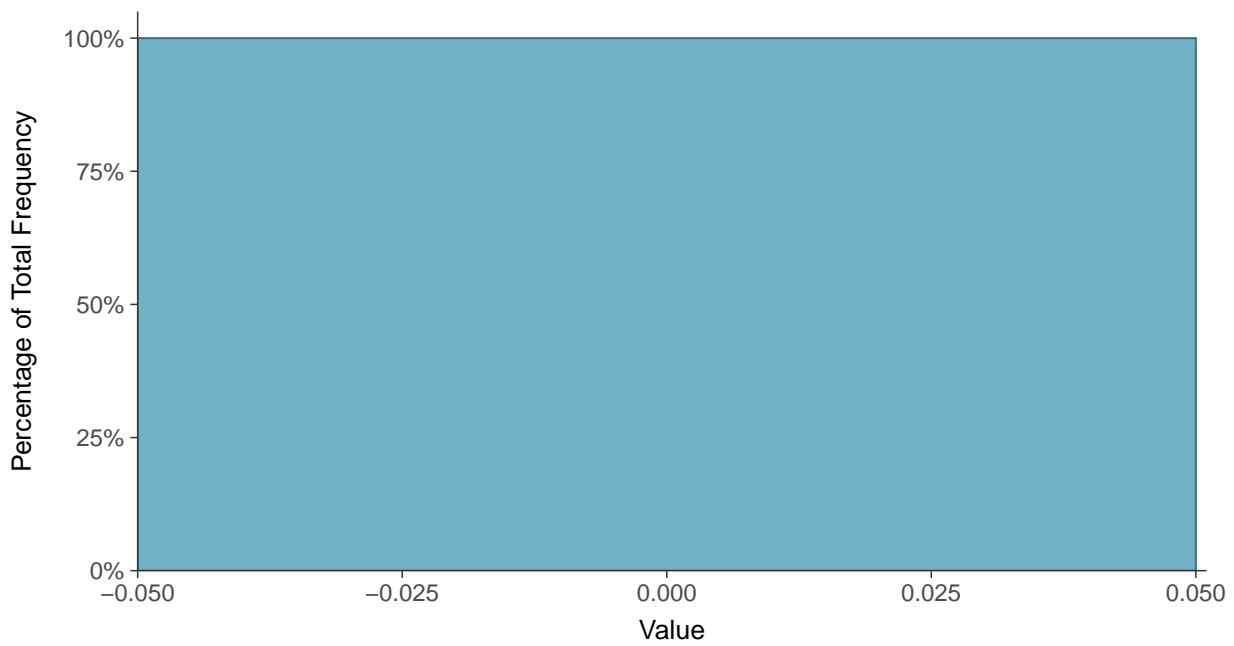
Scatter Plot

Beryllium, MW-3 (mg/L)



Histogram

Beryllium, MW-3 (mg/L)





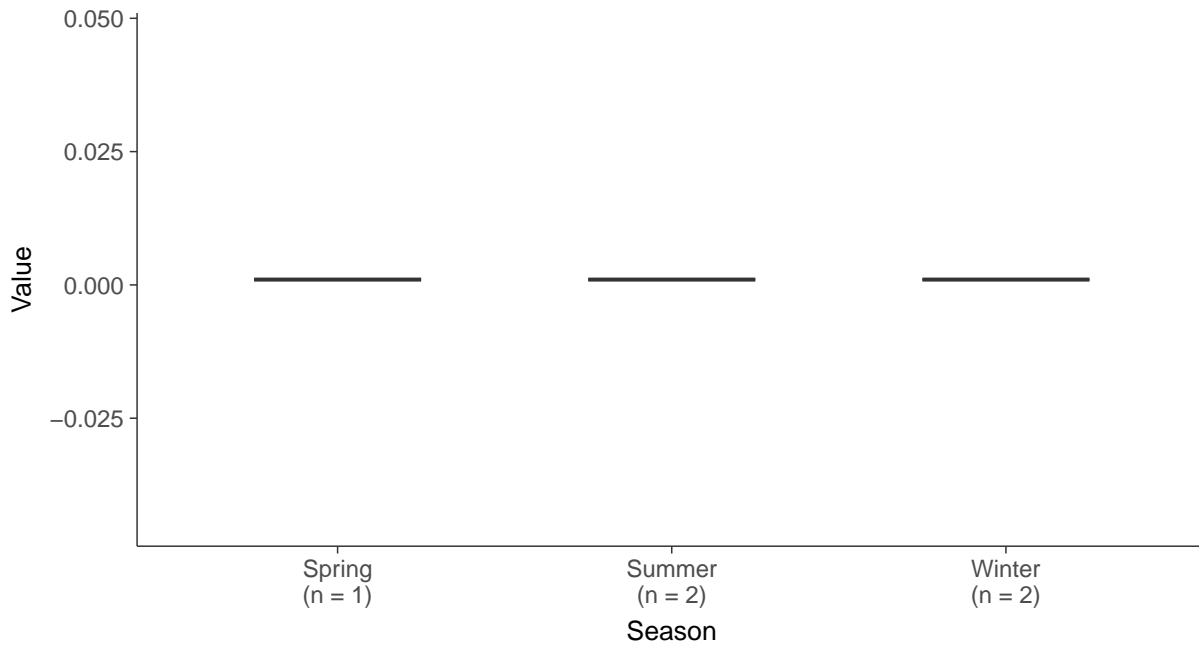
Boxplot

Beryllium, MW-3 (mg/L)



Boxplot by Season

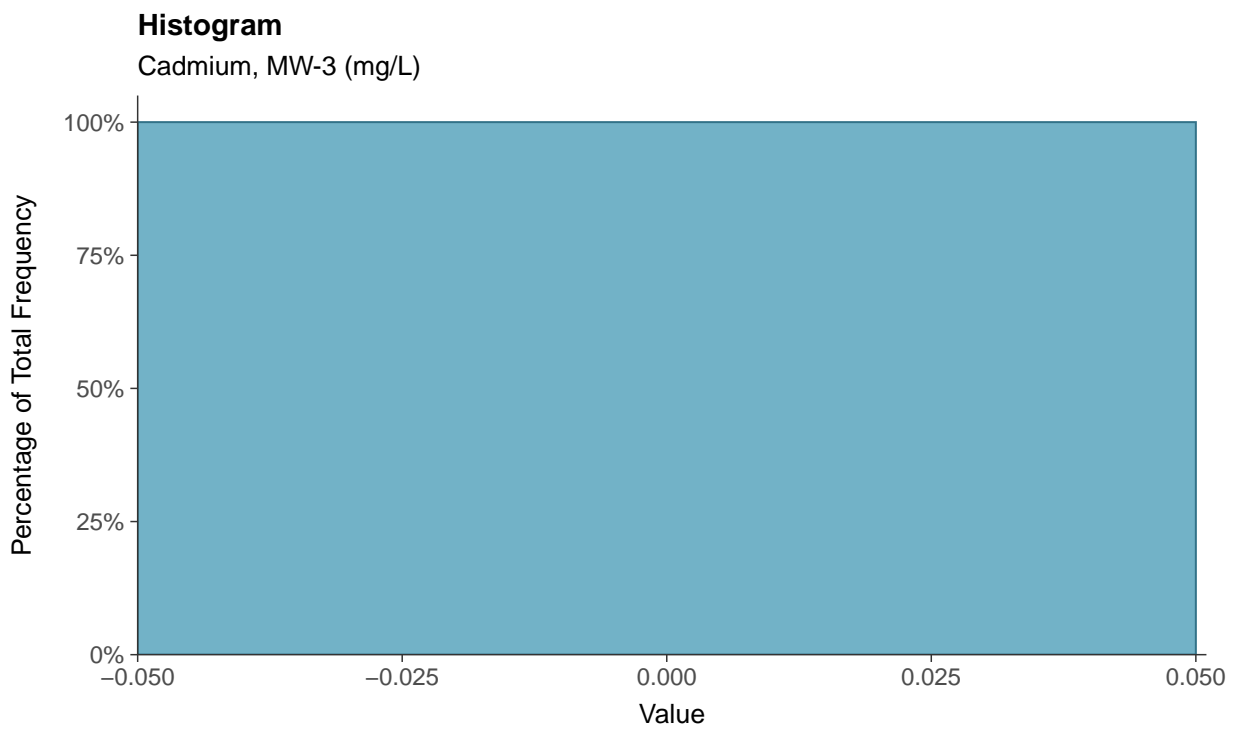
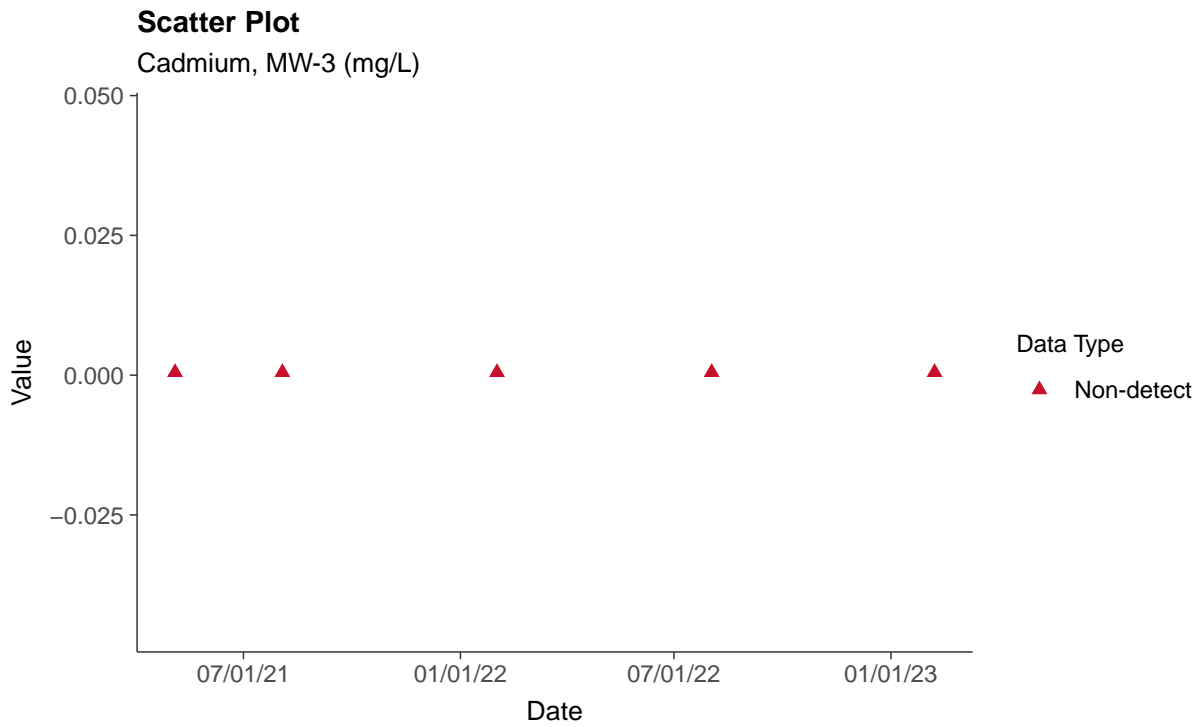
Beryllium, MW-3 (mg/L)





Appendix IV: Cadmium, MW-3

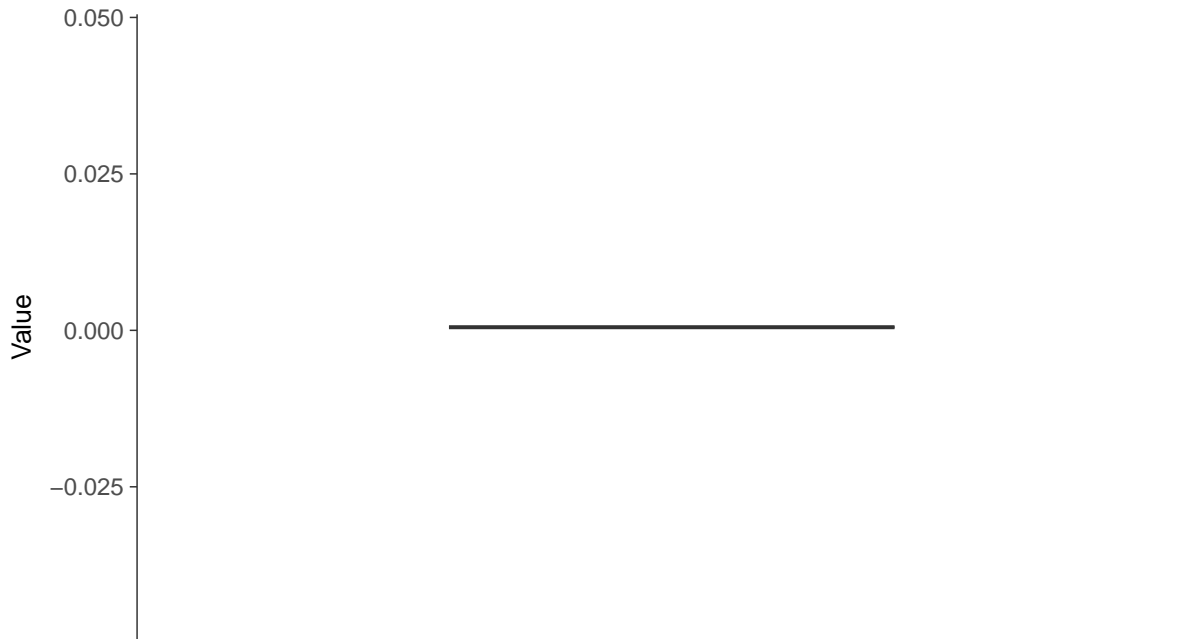
ID: 03_2_13





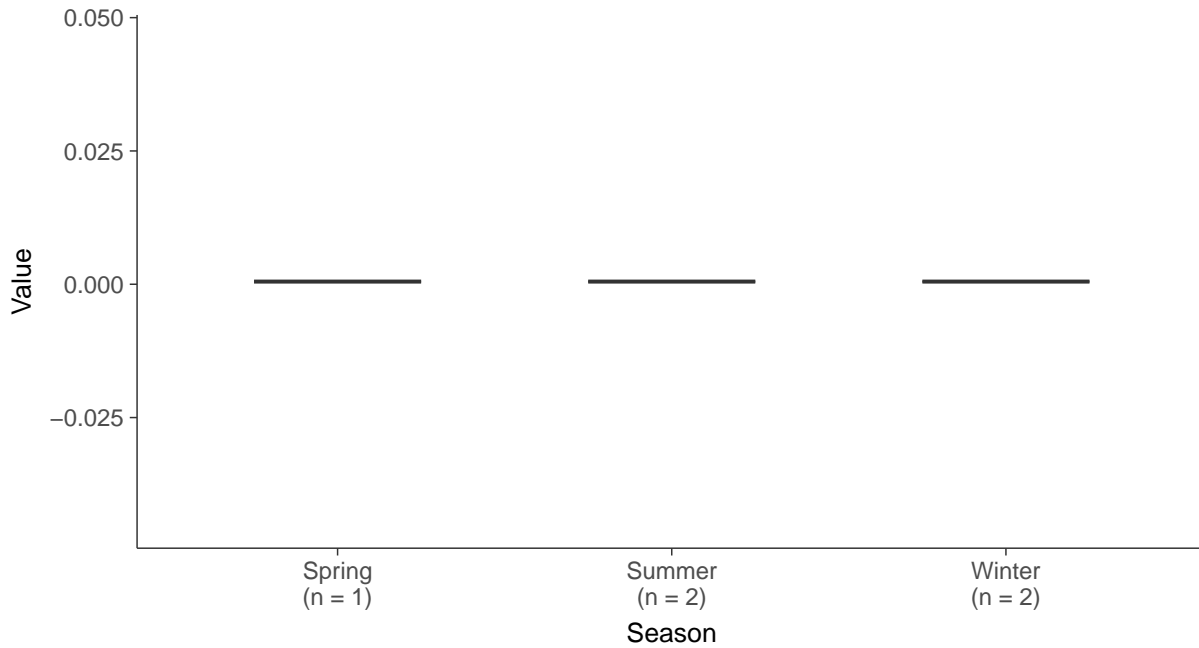
Boxplot

Cadmium, MW-3 (mg/L)



Boxplot by Season

Cadmium, MW-3 (mg/L)



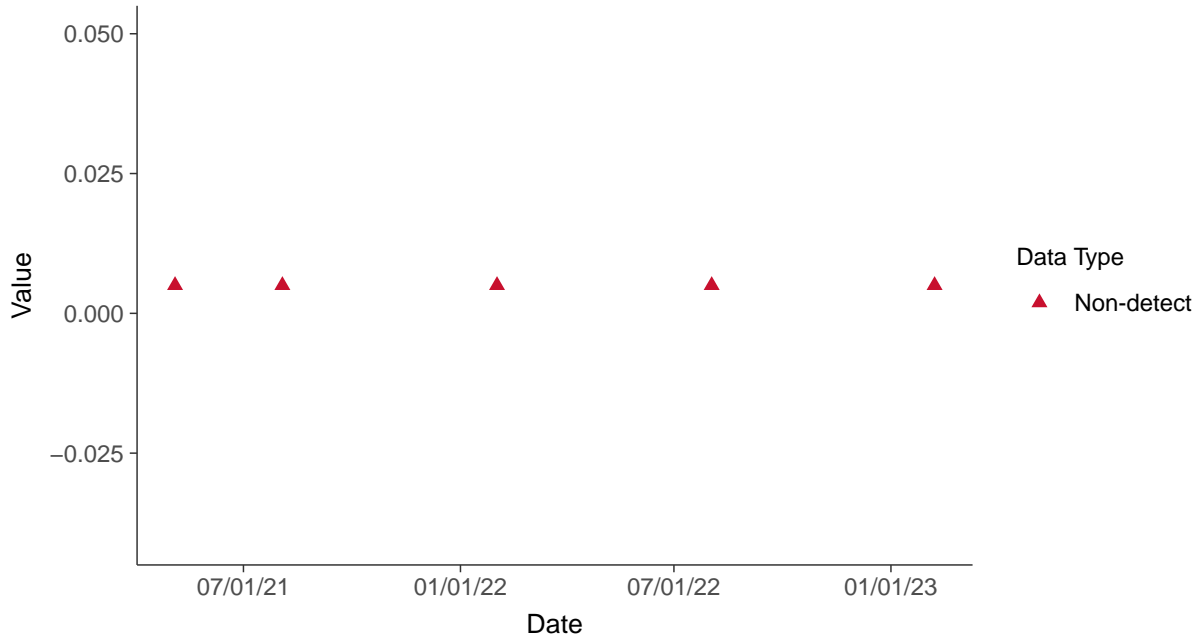


Appendix IV: Chromium, MW-3

ID: 03_2_15

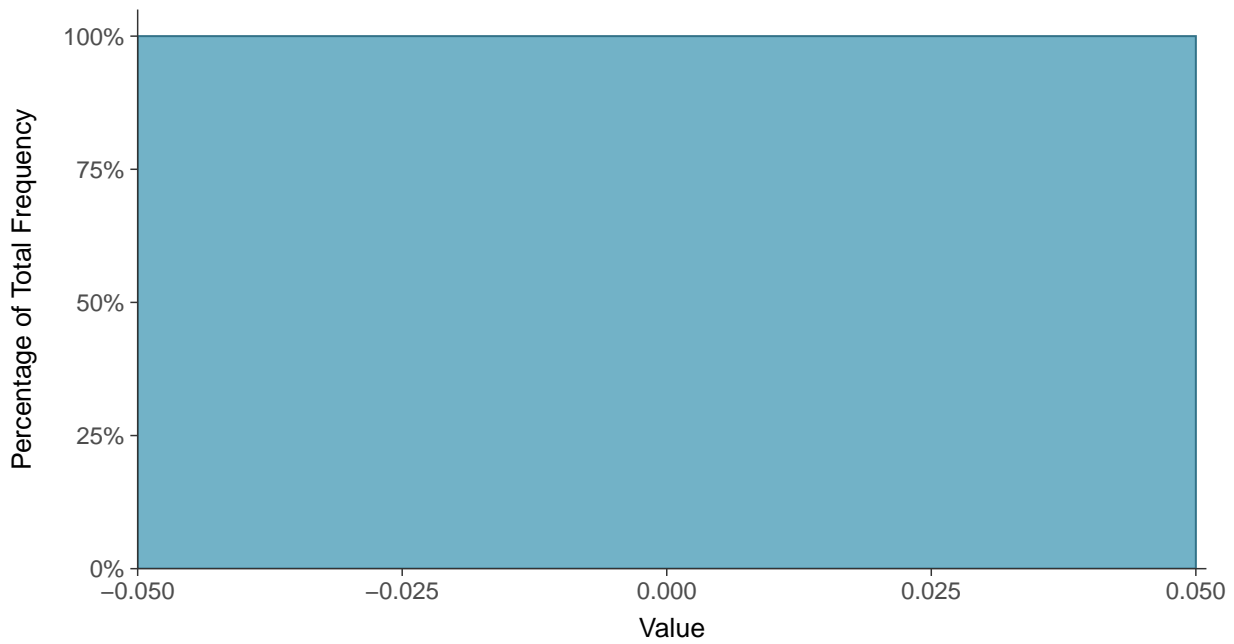
Scatter Plot

Chromium, MW-3 (mg/L)



Histogram

Chromium, MW-3 (mg/L)





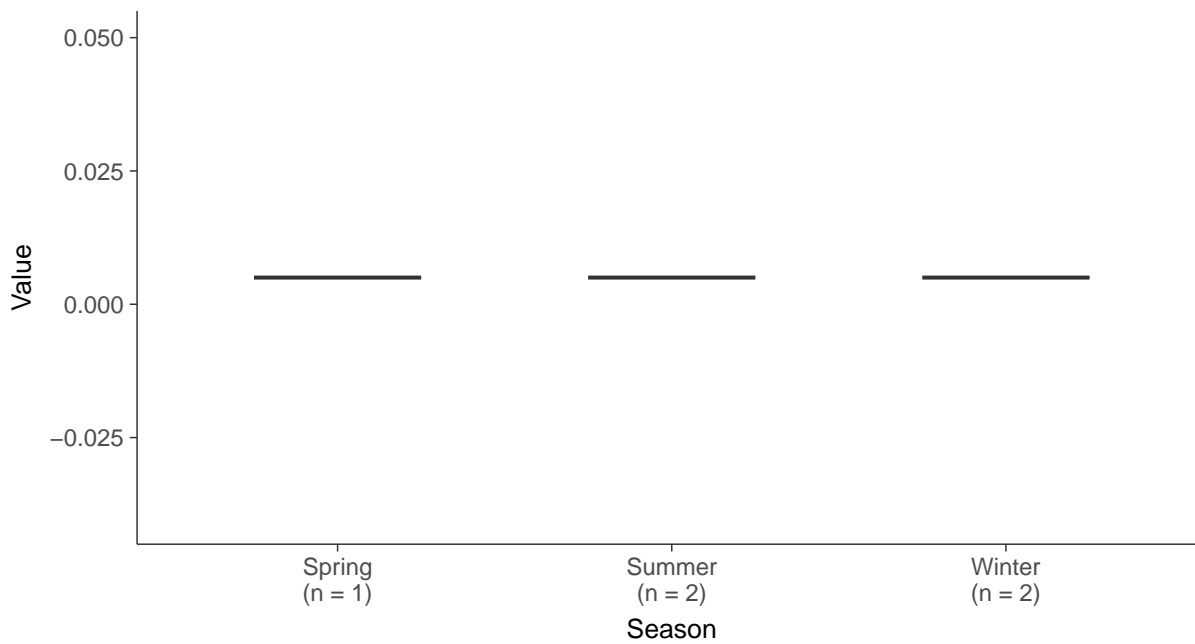
Boxplot

Chromium, MW-3 (mg/L)



Boxplot by Season

Chromium, MW-3 (mg/L)



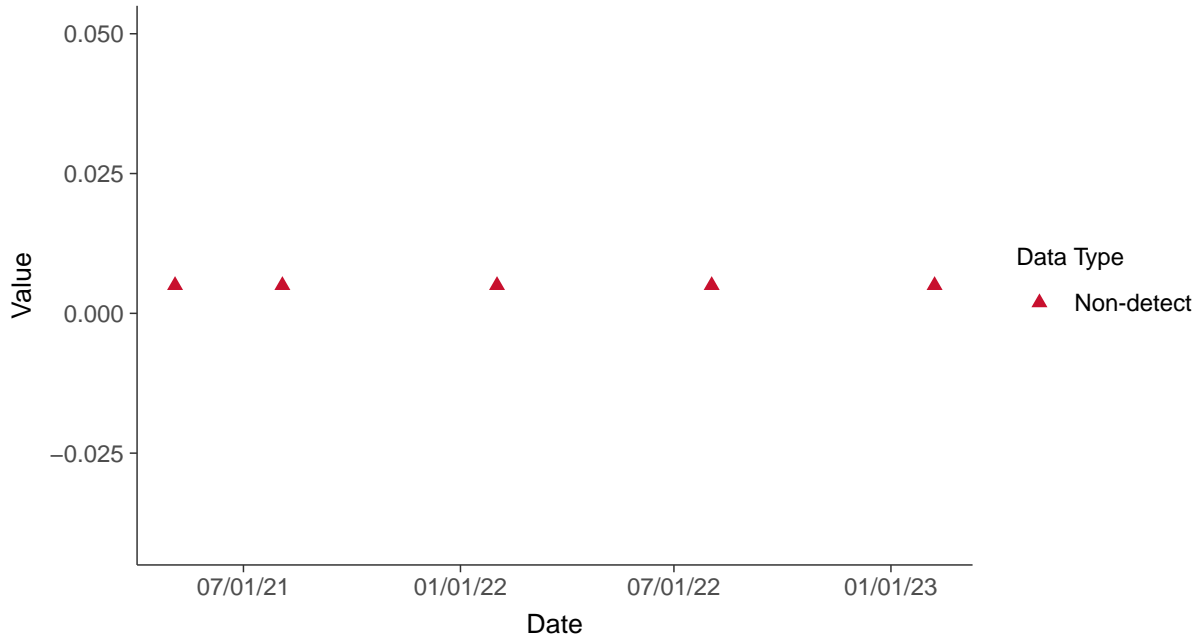


Appendix IV: Cobalt, MW-3

ID: 03_2_16

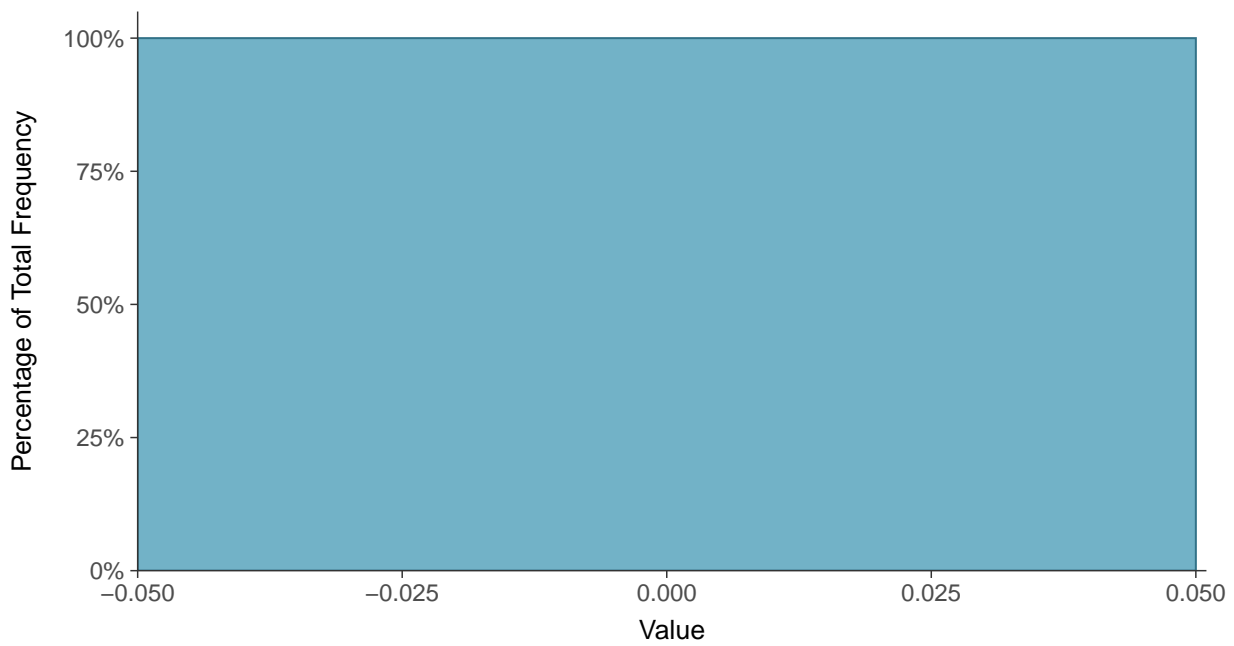
Scatter Plot

Cobalt, MW-3 (mg/L)



Histogram

Cobalt, MW-3 (mg/L)





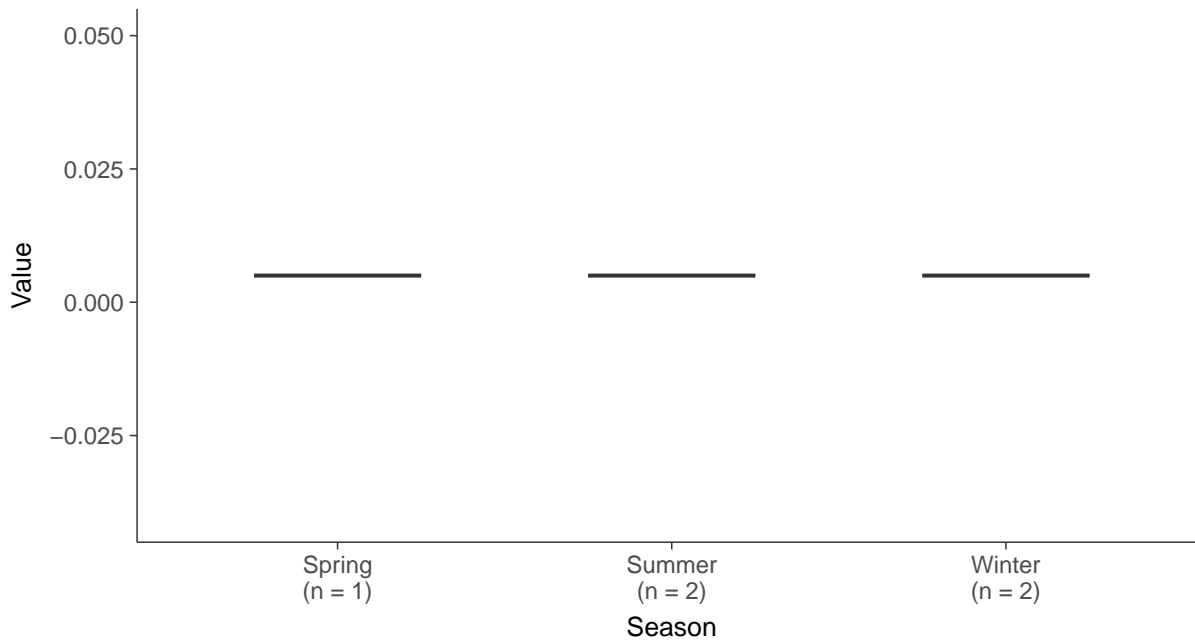
Boxplot

Cobalt, MW-3 (mg/L)



Boxplot by Season

Cobalt, MW-3 (mg/L)



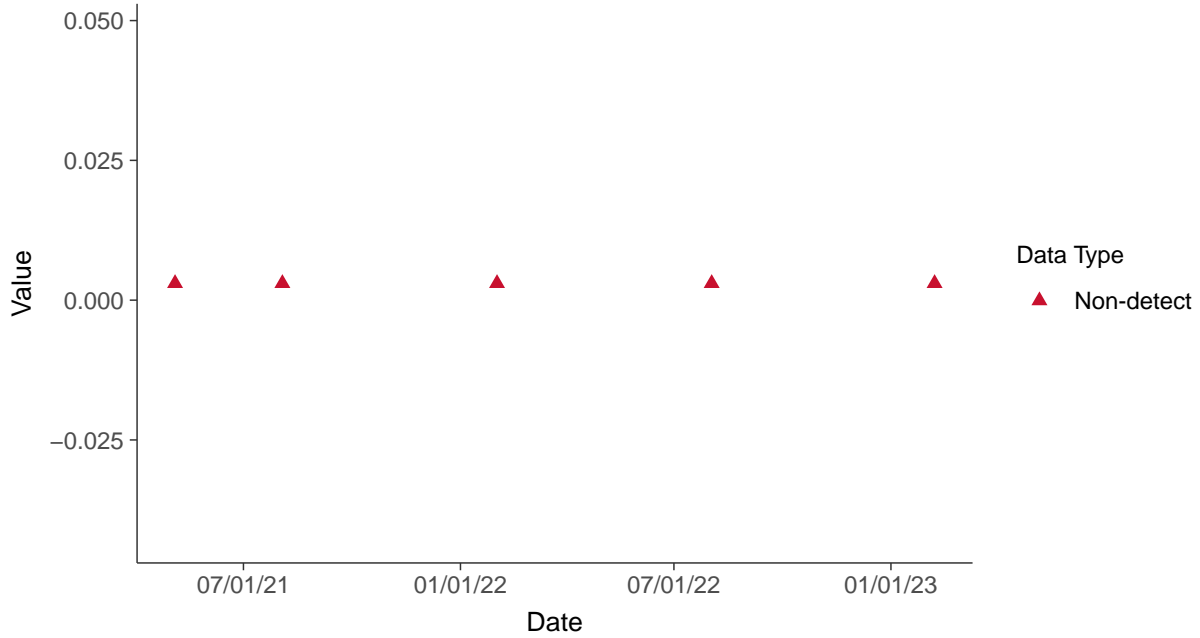


Appendix IV: Lead, MW-3

ID: 03_2_18

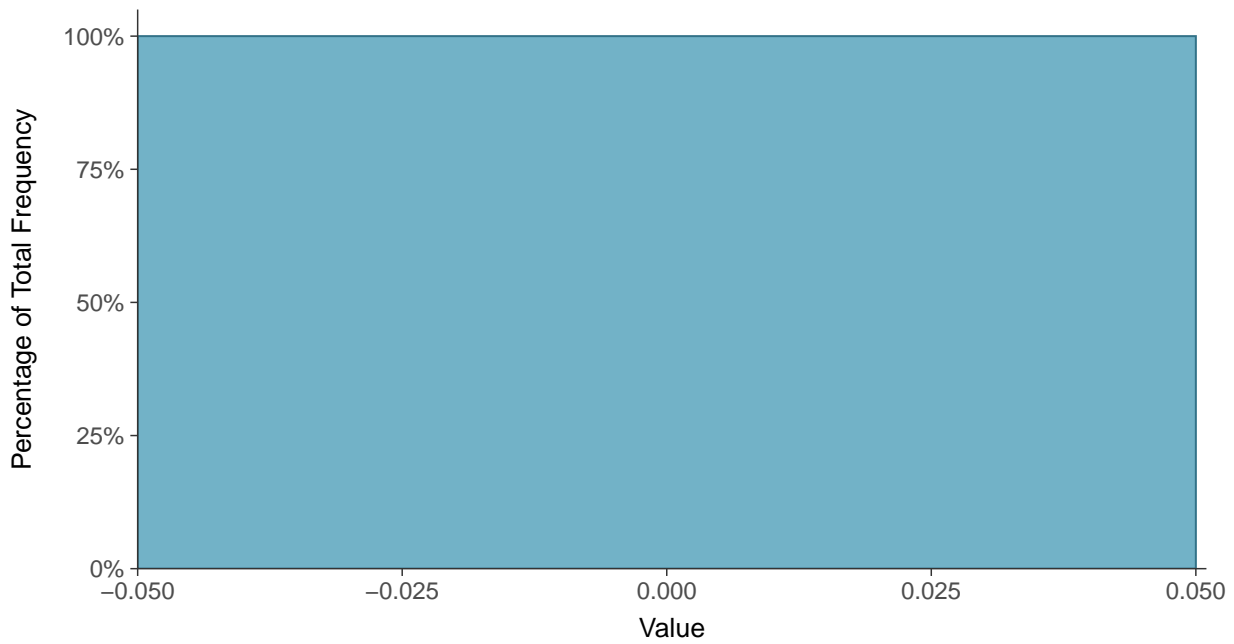
Scatter Plot

Lead, MW-3 (mg/L)



Histogram

Lead, MW-3 (mg/L)





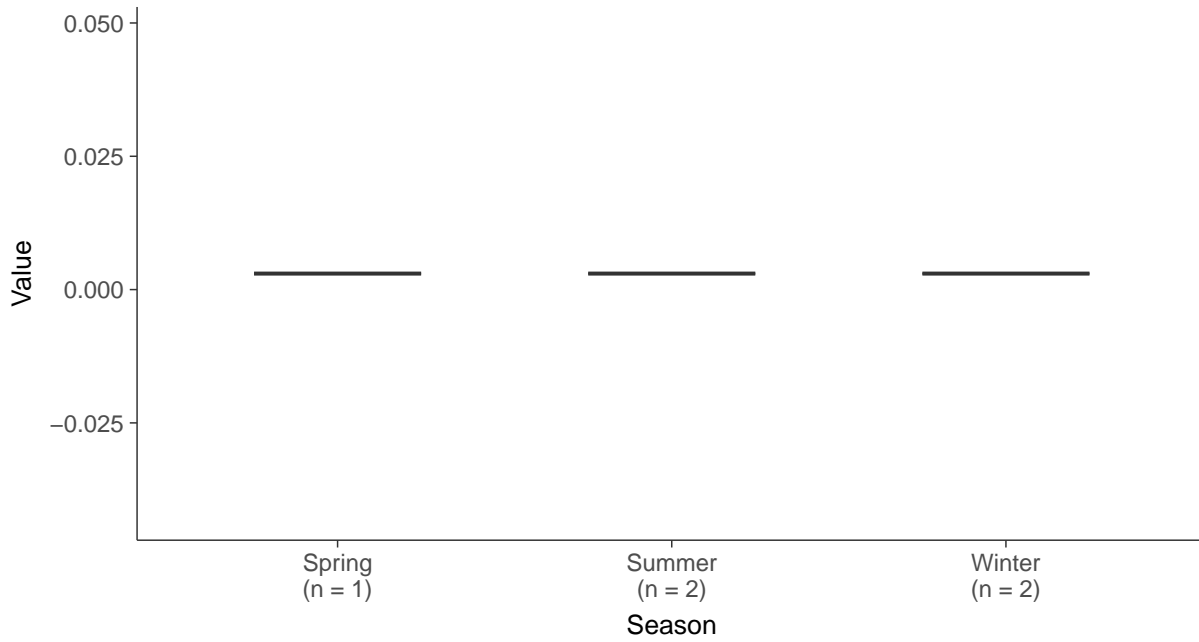
Boxplot

Lead, MW-3 (mg/L)



Boxplot by Season

Lead, MW-3 (mg/L)



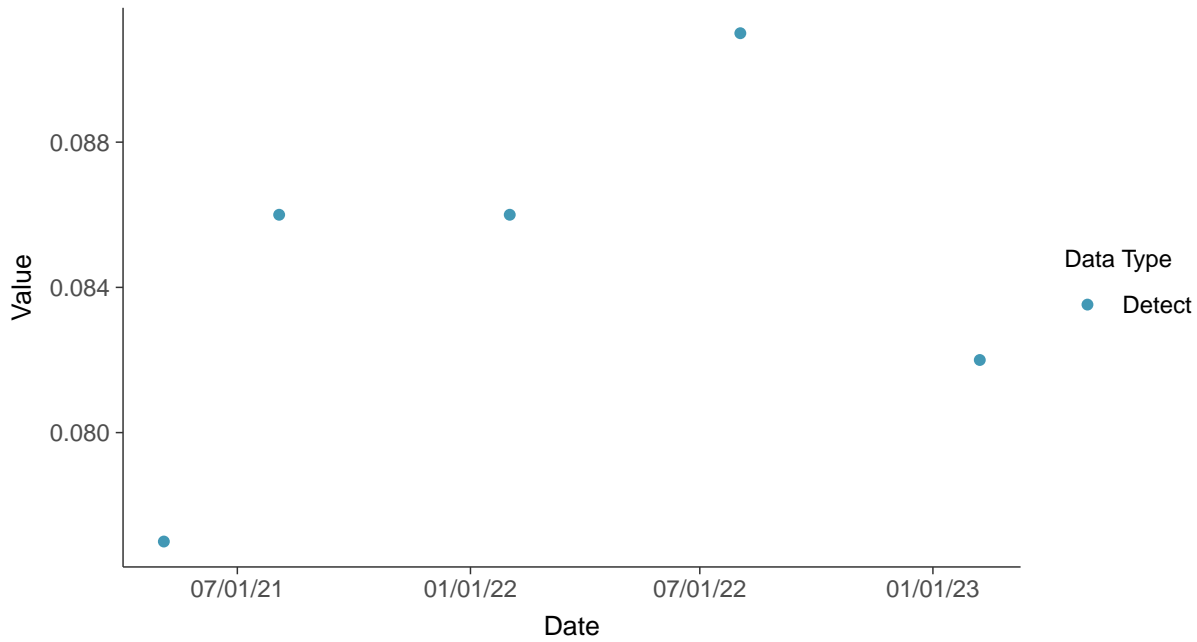


Appendix IV: Lithium, MW-3

ID: 03_2_19

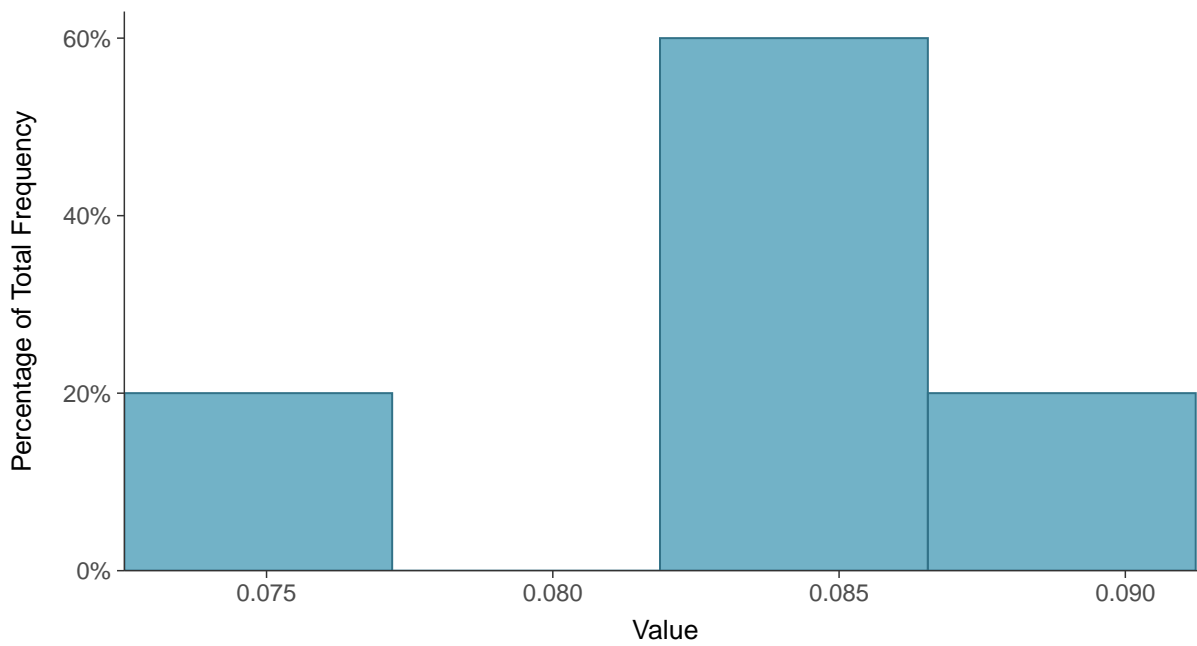
Scatter Plot

Lithium, MW-3 (mg/L)



Histogram

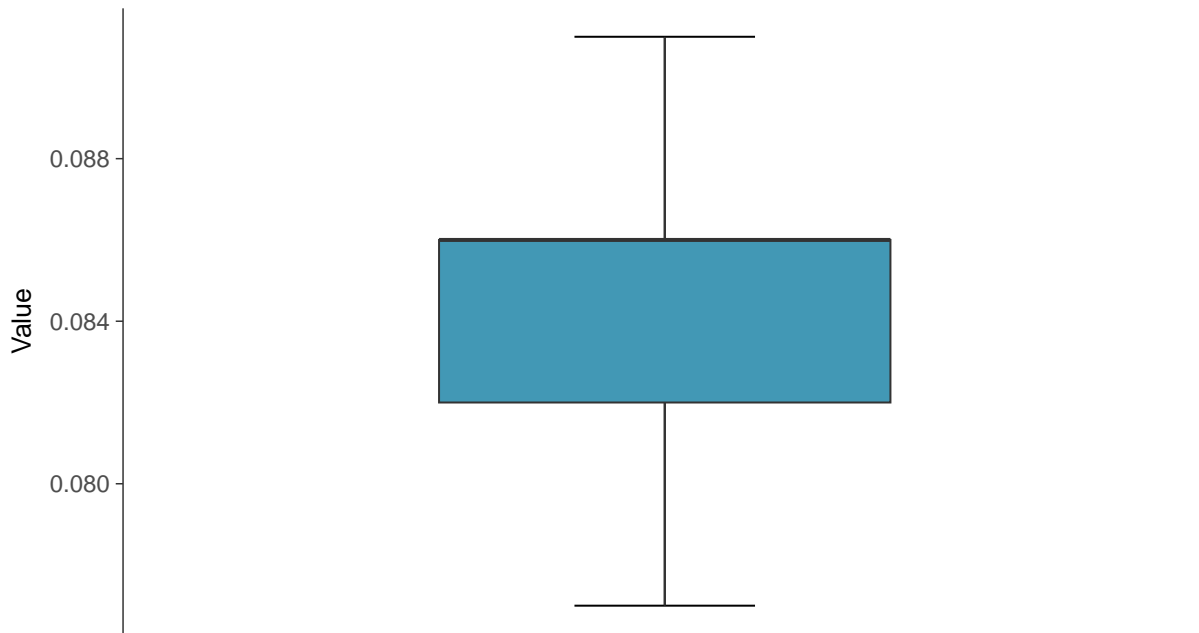
Lithium, MW-3 (mg/L)





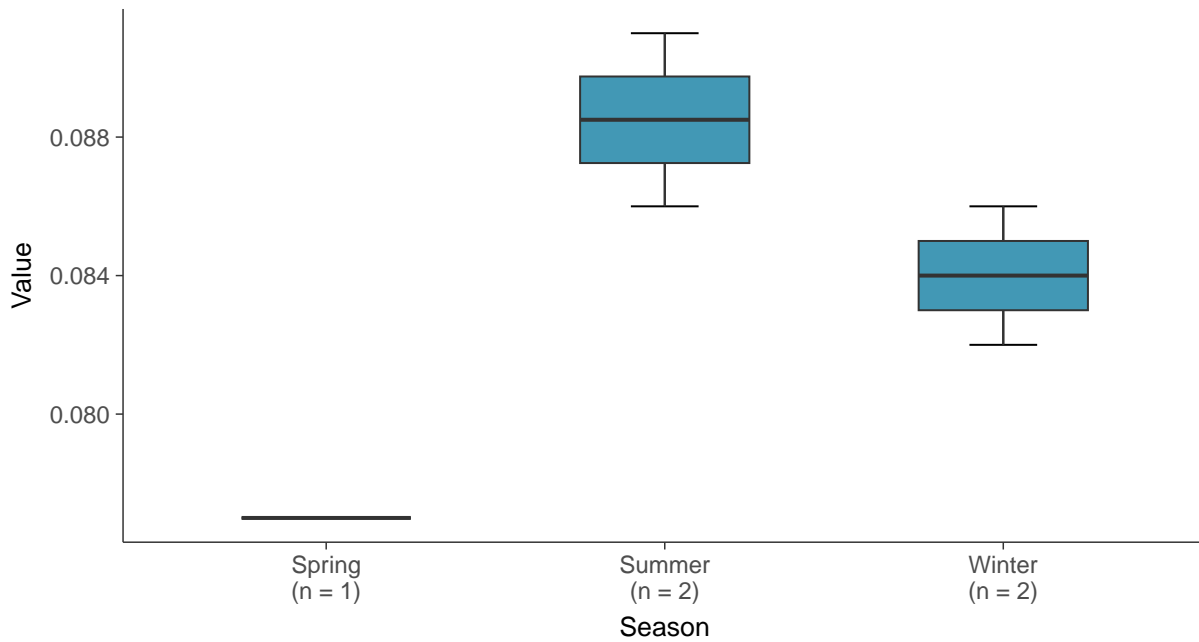
Boxplot

Lithium, MW-3 (mg/L)



Boxplot by Season

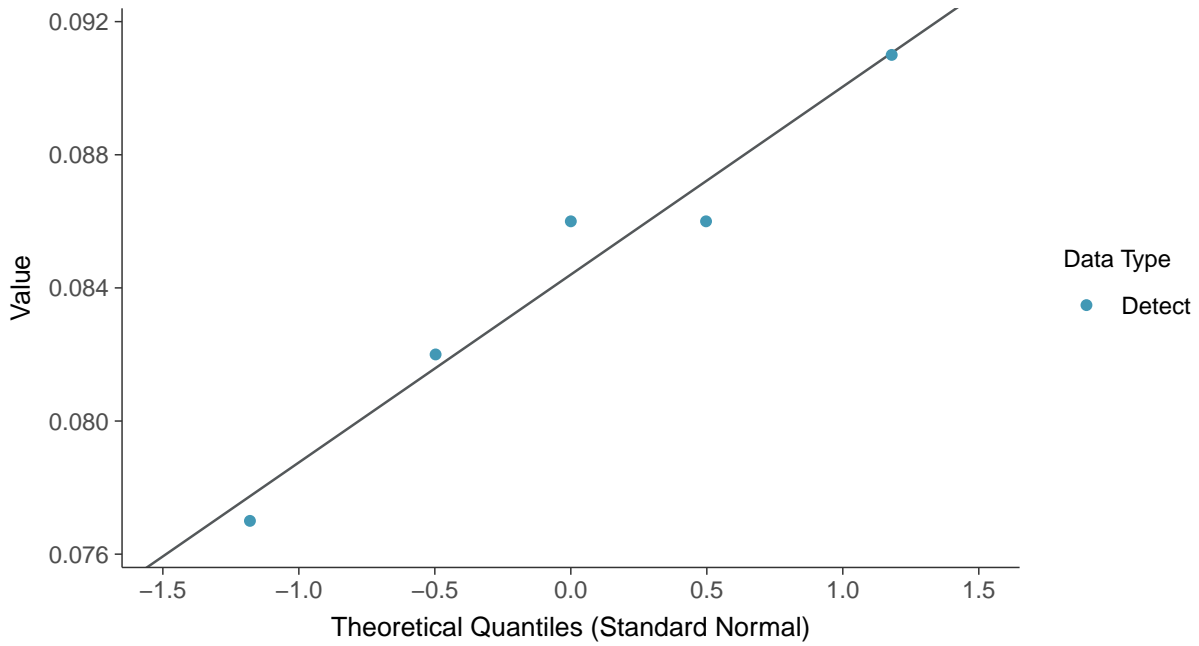
Lithium, MW-3 (mg/L)





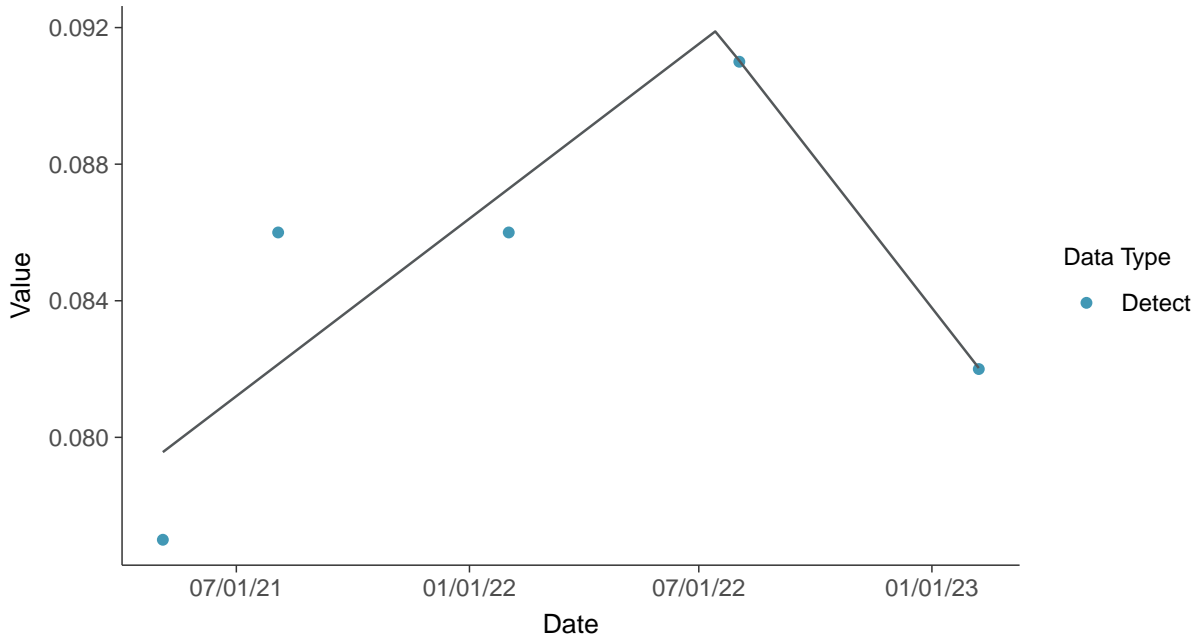
Normal Q-Q plot

Lithium, MW-3 (mg/L)



Trend Regression: Piecewise Linear-Linear

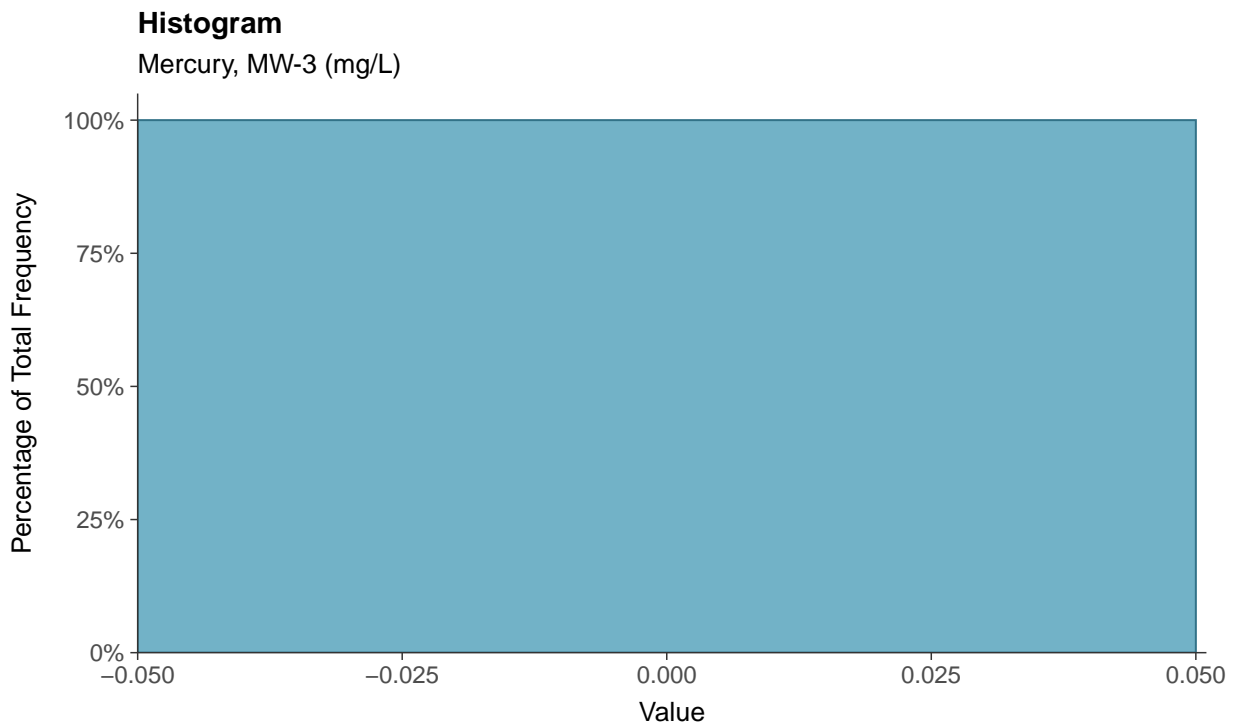
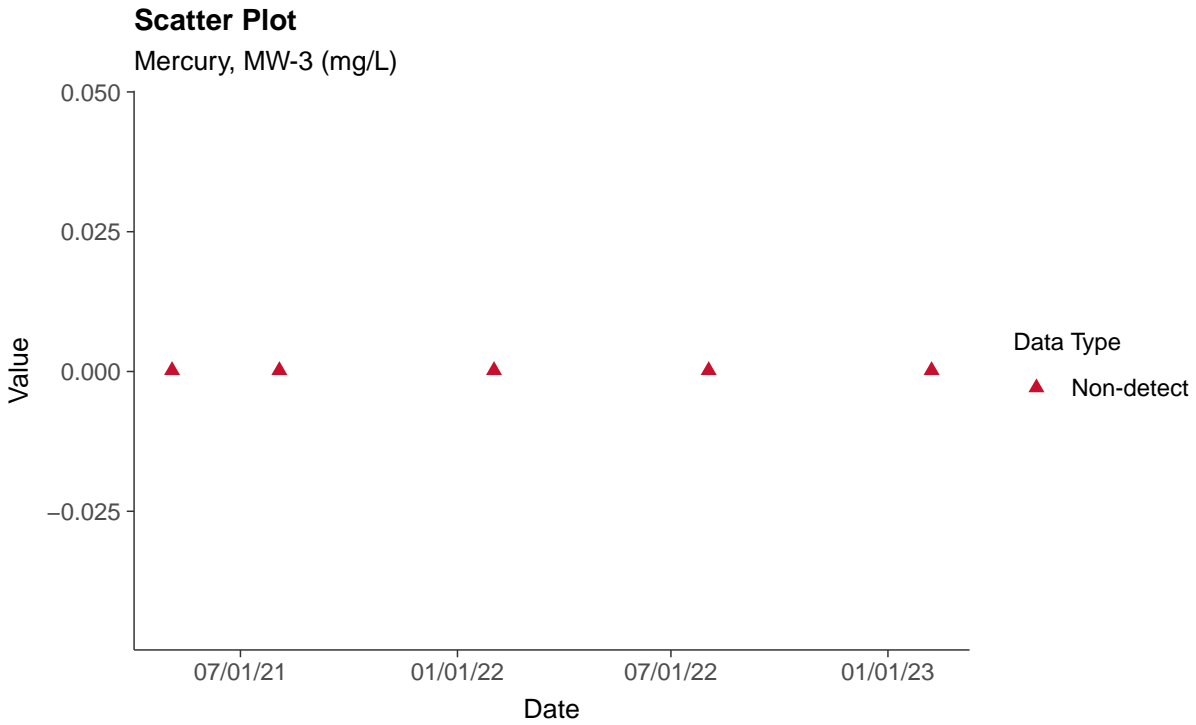
Lithium, MW-3 (mg/L)





Appendix IV: Mercury, MW-3

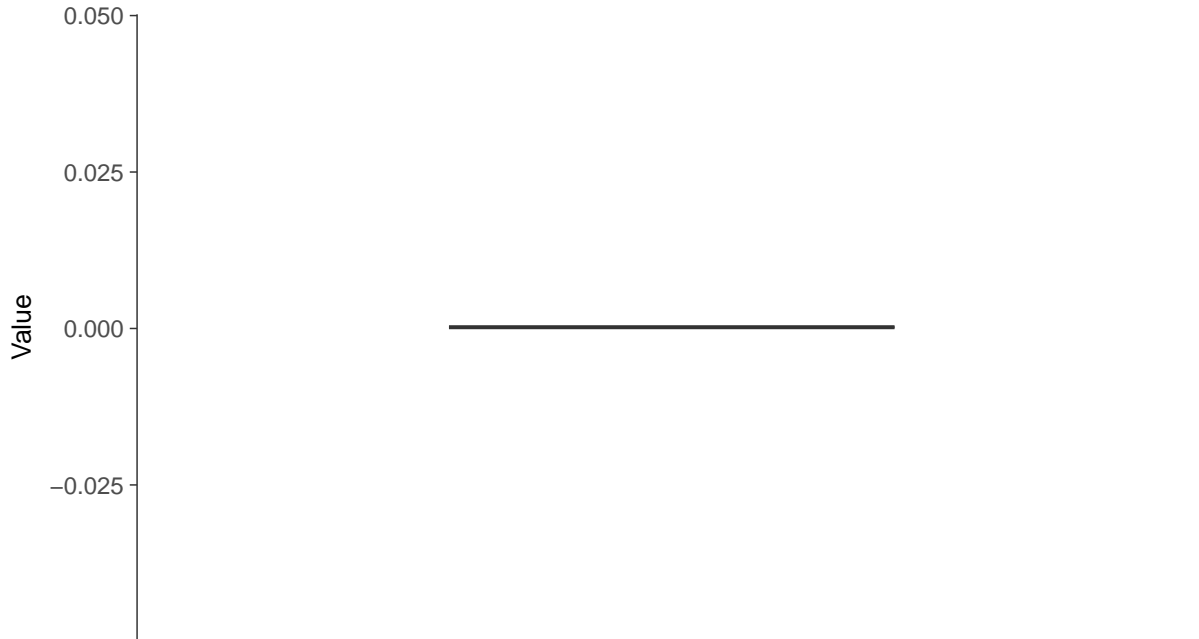
ID: 03_2_21





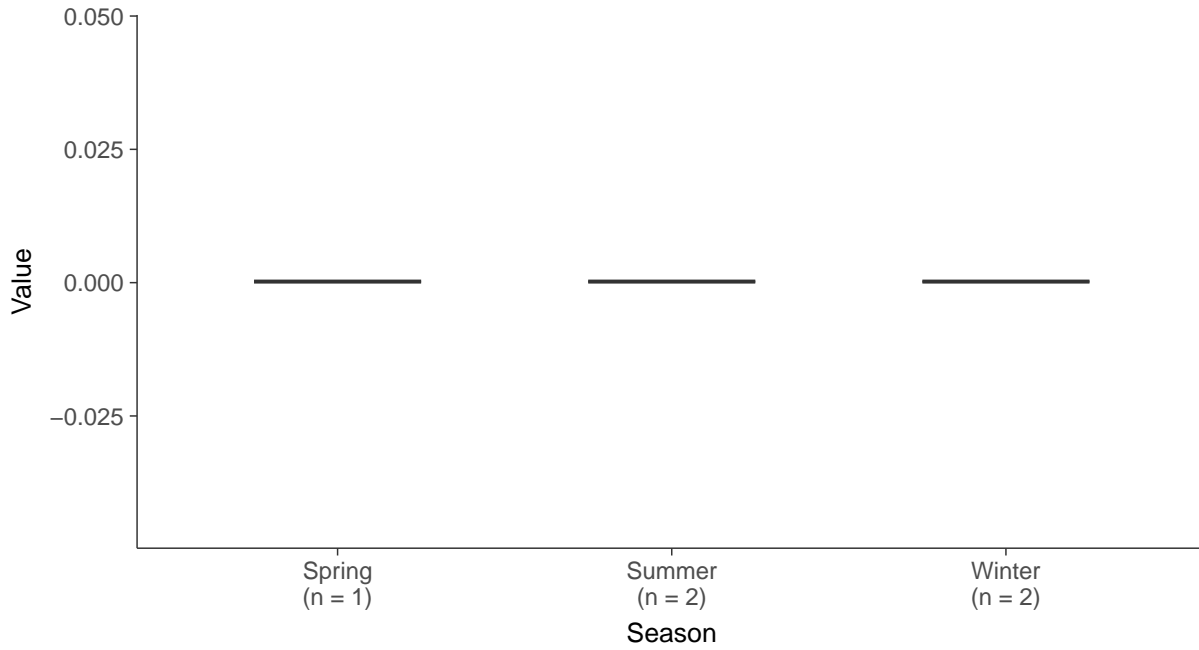
Boxplot

Mercury, MW-3 (mg/L)



Boxplot by Season

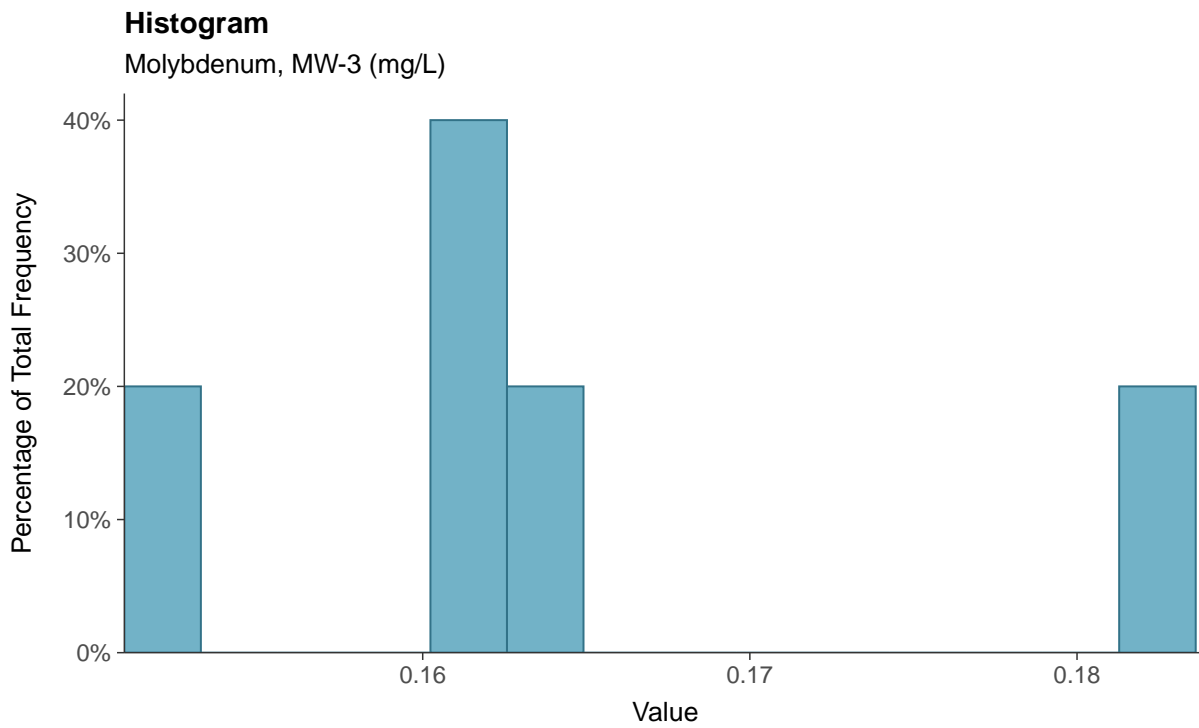
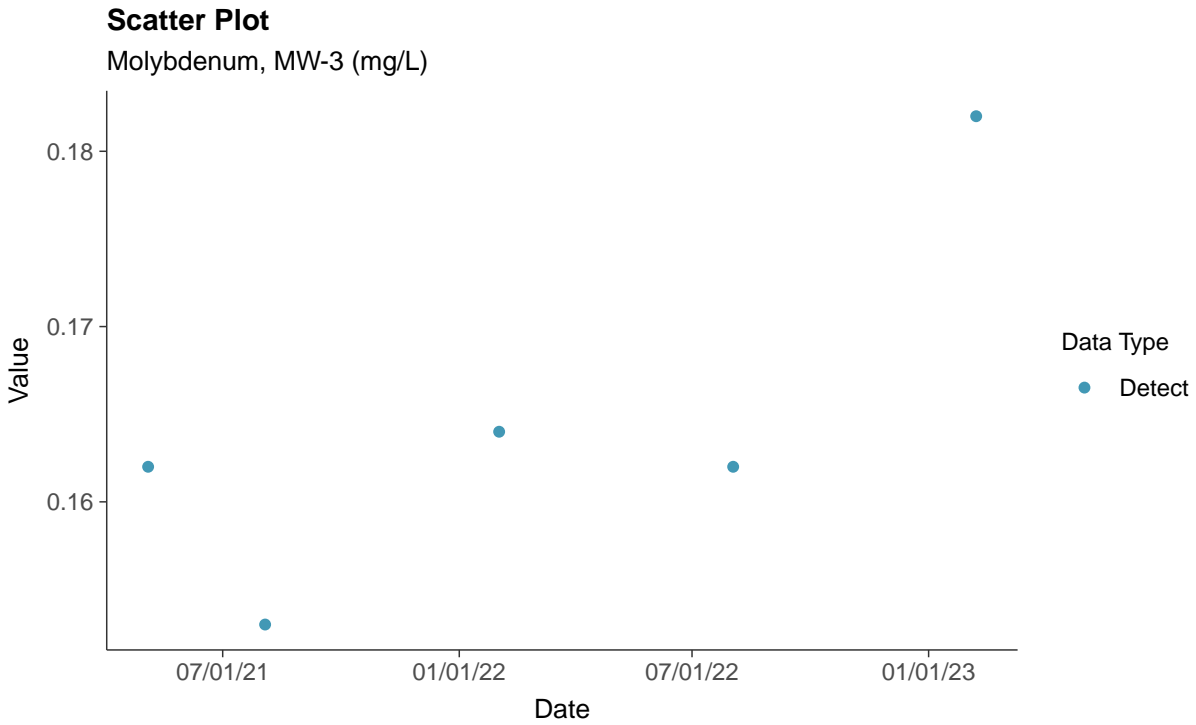
Mercury, MW-3 (mg/L)





Appendix IV: Molybdenum, MW-3

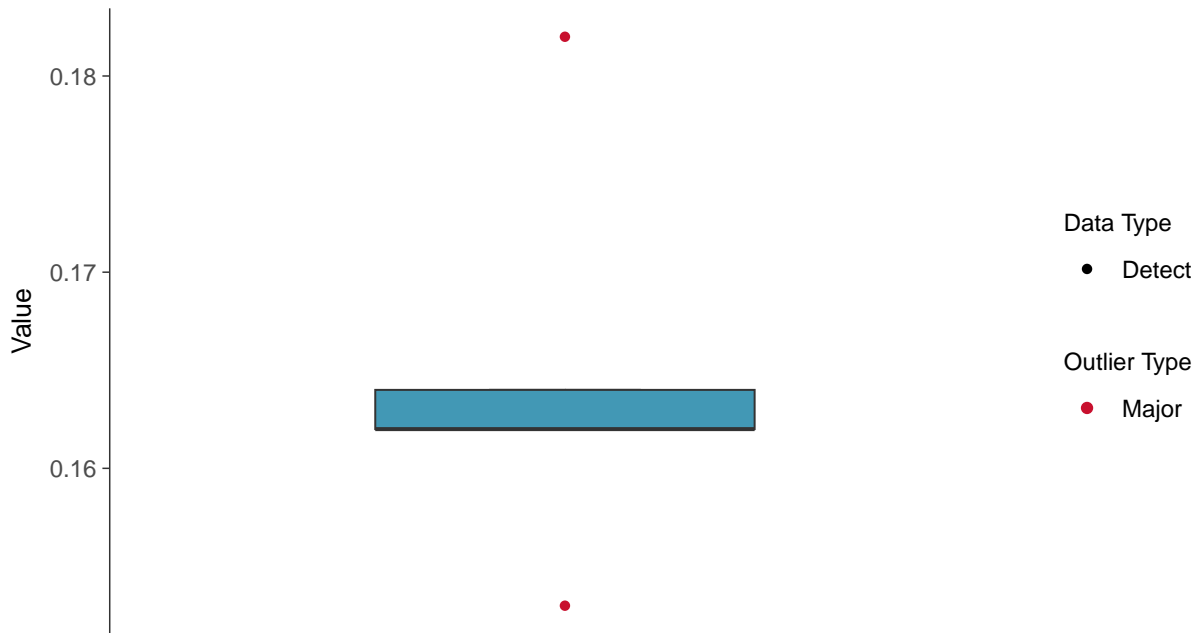
ID: 03_2_22





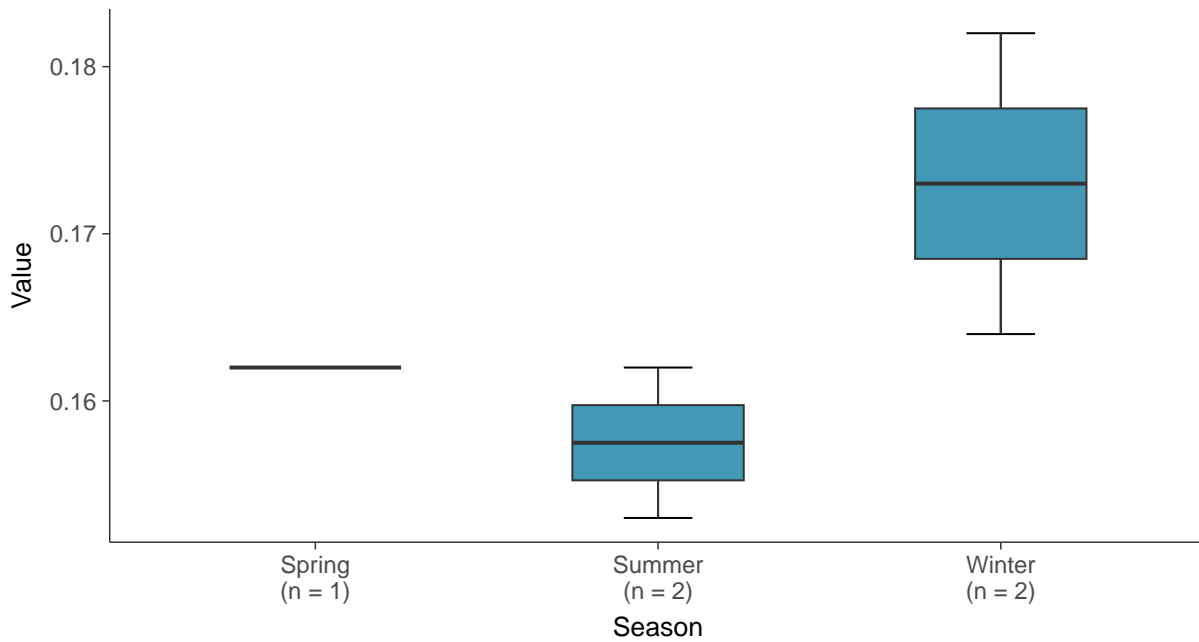
Boxplot

Molybdenum, MW-3 (mg/L)



Boxplot by Season

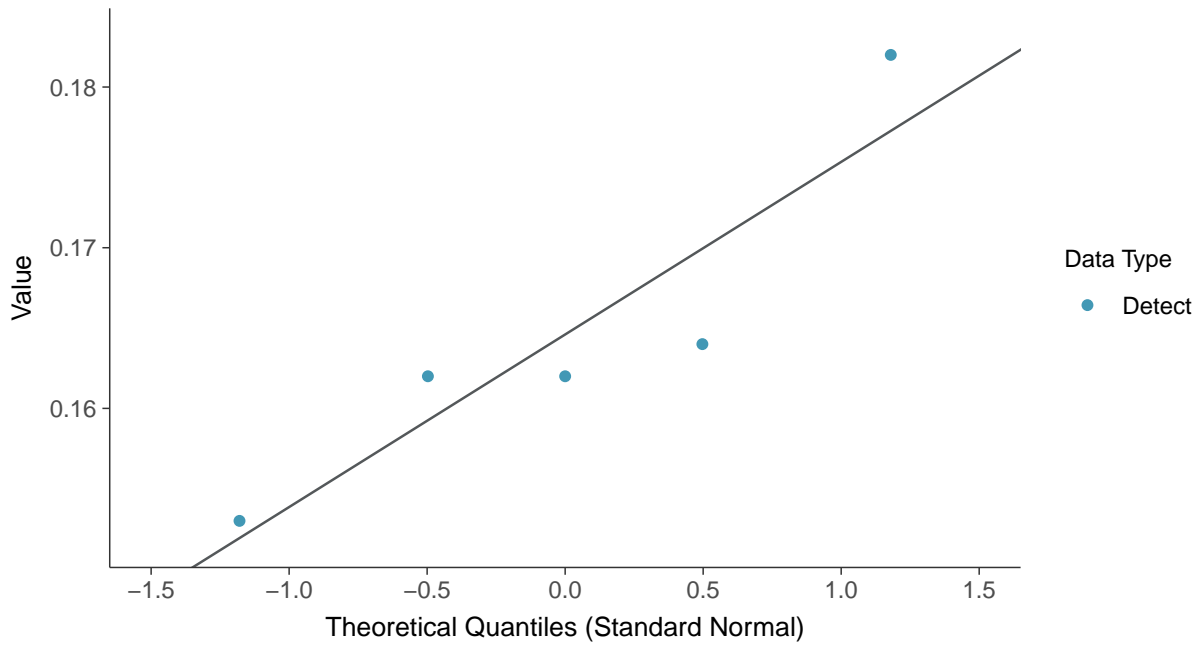
Molybdenum, MW-3 (mg/L)





Normal Q-Q plot

Molybdenum, MW-3 (mg/L)



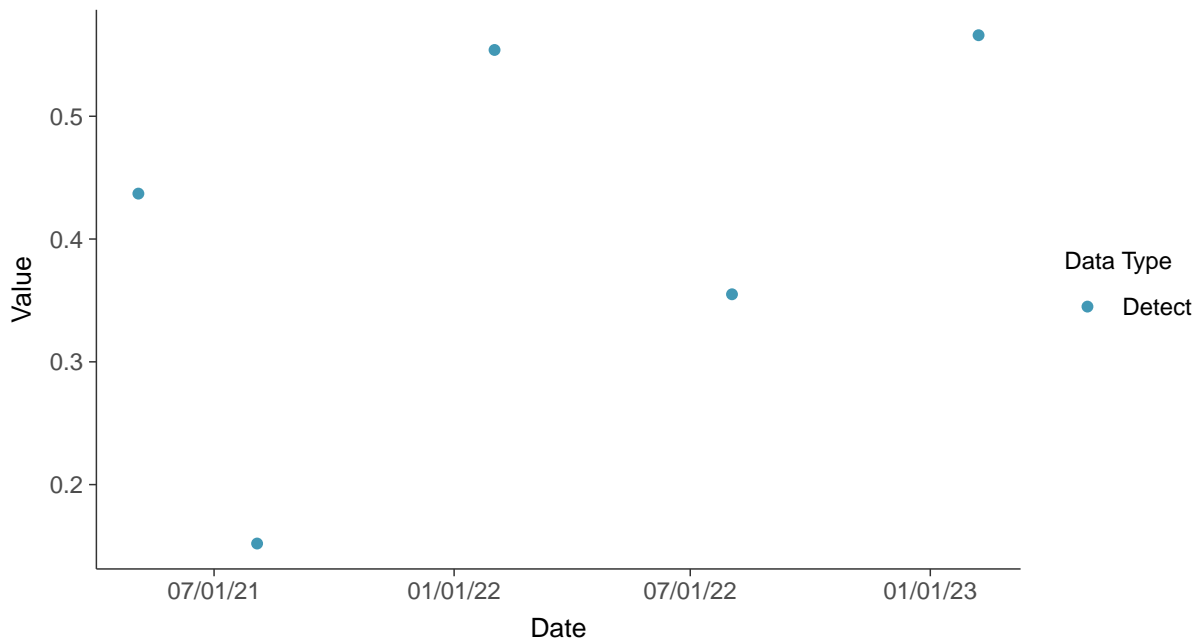


Appendix IV: Radium-226, MW-3

ID: 03_2_24

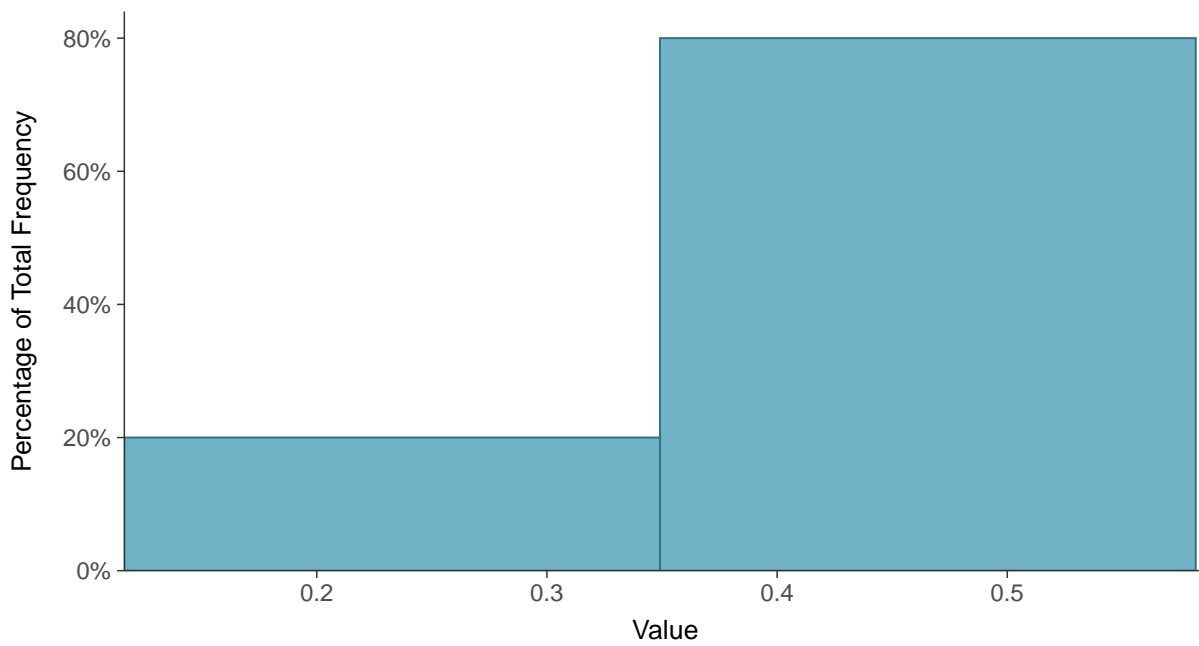
Scatter Plot

Radium-226, MW-3 (pCi/L)



Histogram

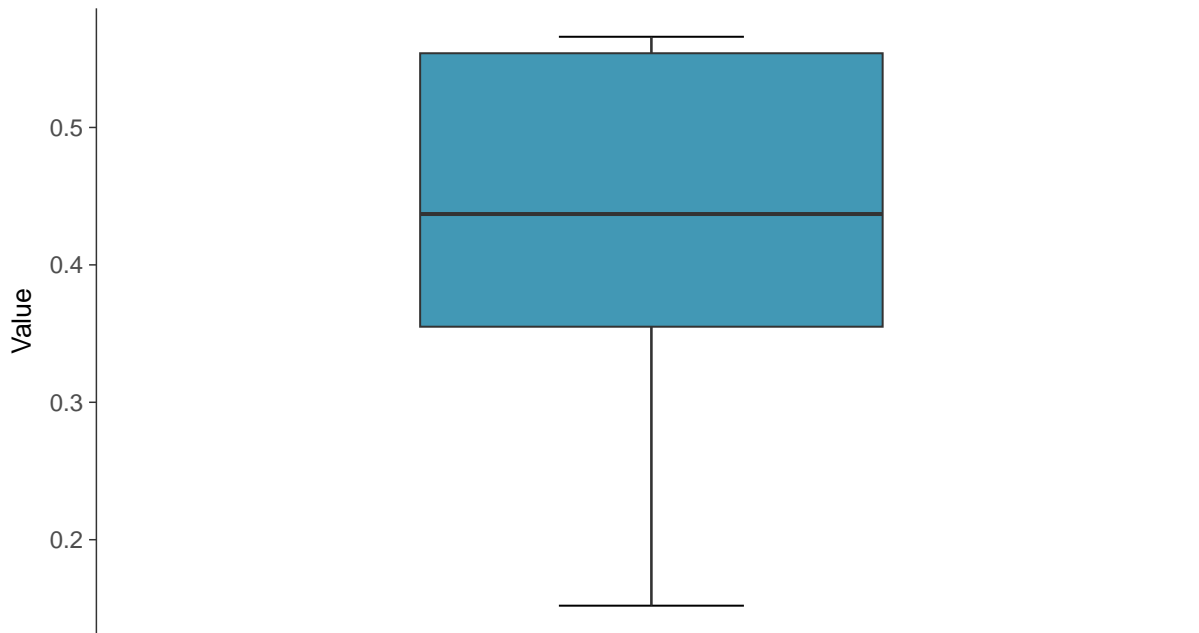
Radium-226, MW-3 (pCi/L)





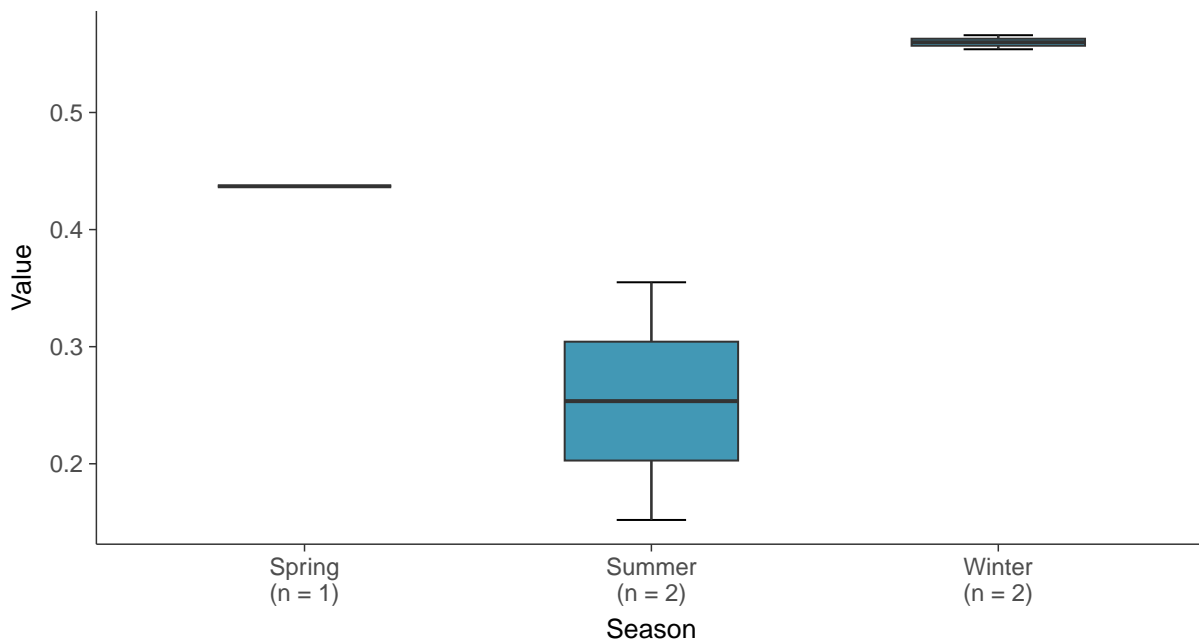
Boxplot

Radium-226, MW-3 (pCi/L)



Boxplot by Season

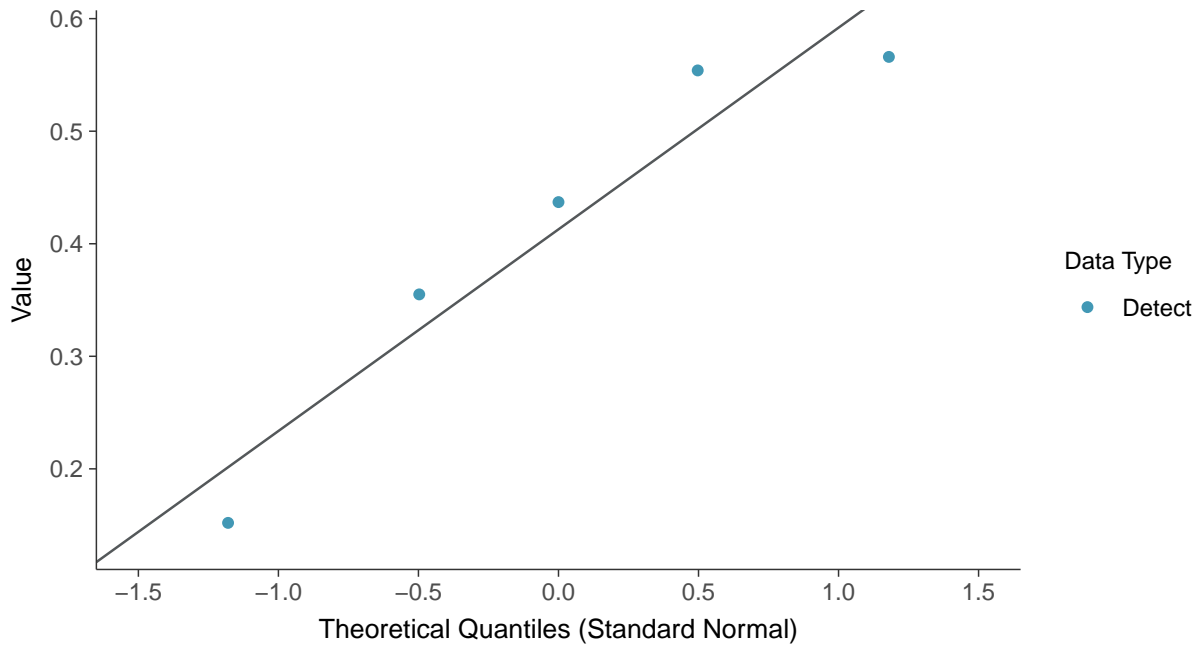
Radium-226, MW-3 (pCi/L)





Normal Q-Q plot

Radium-226, MW-3 (pCi/L)



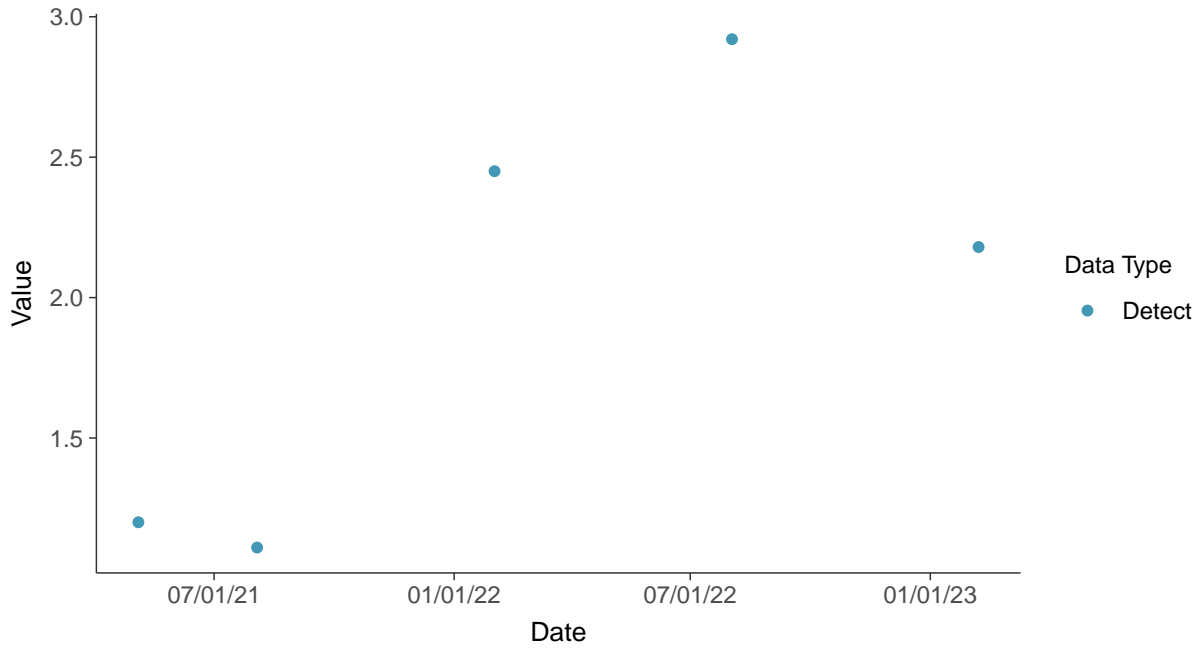


Appendix IV: Radium-226/228, MW-3

ID: 03_2_25

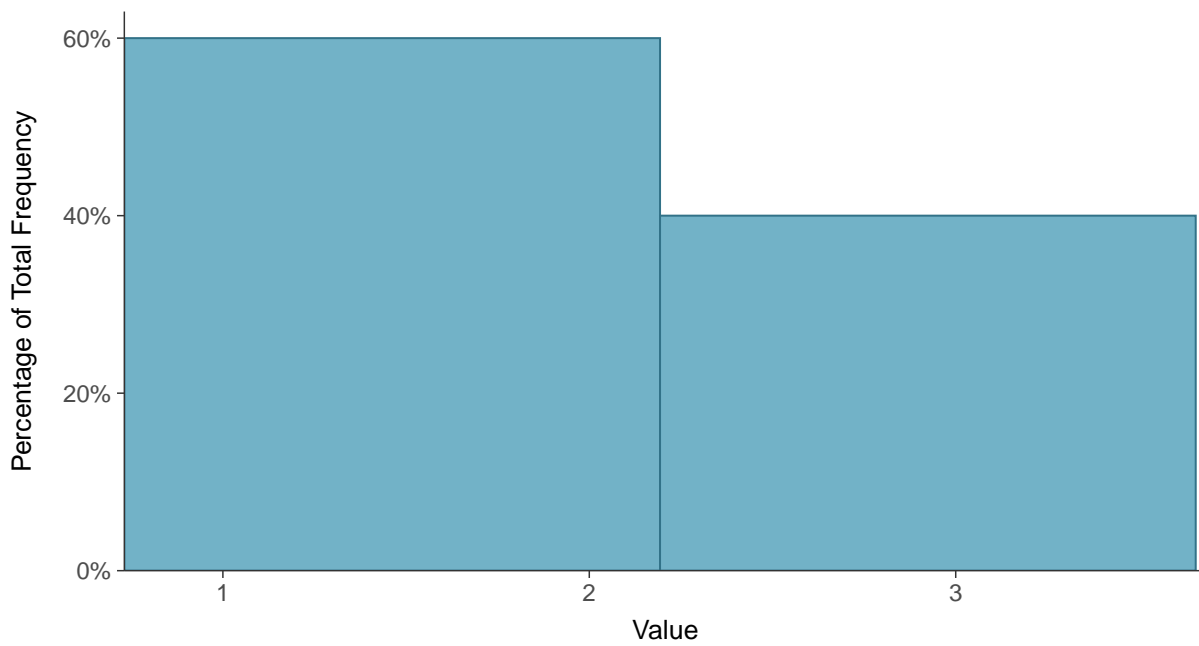
Scatter Plot

Radium-226/228, MW-3 (pCi/L)



Histogram

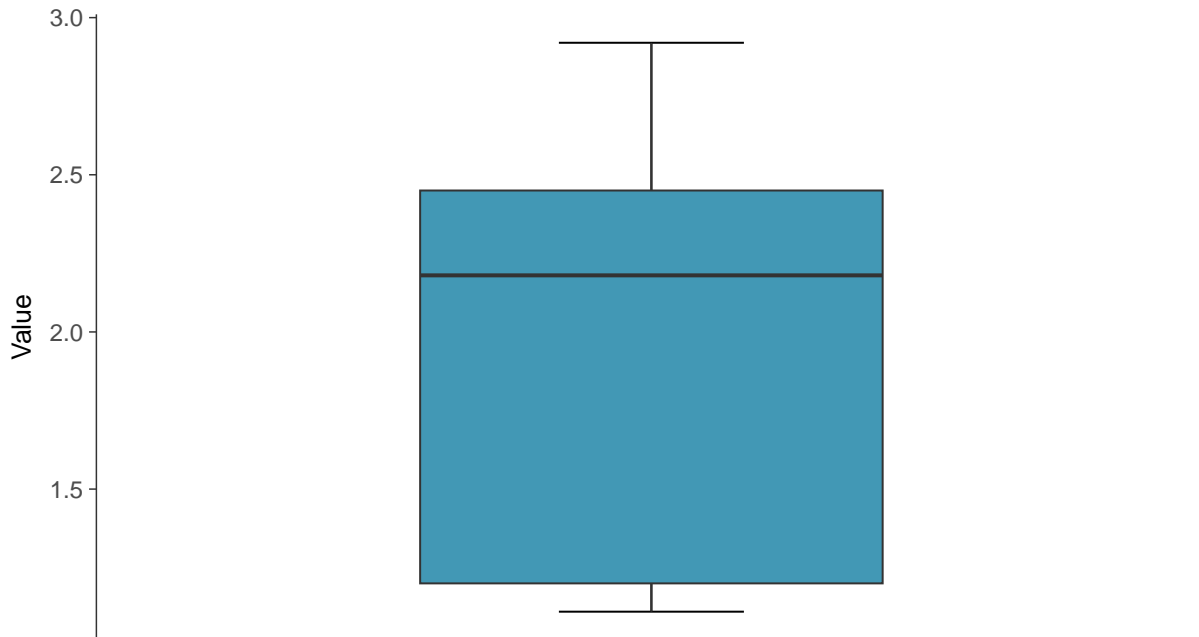
Radium-226/228, MW-3 (pCi/L)





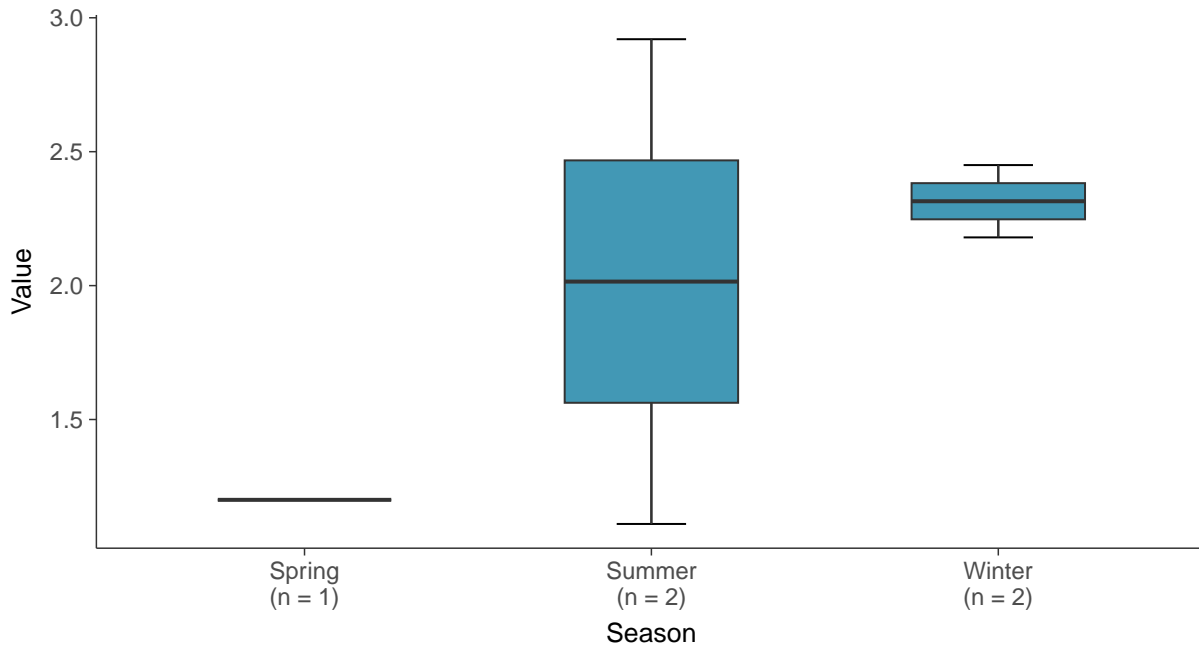
Boxplot

Radium-226/228, MW-3 (pCi/L)



Boxplot by Season

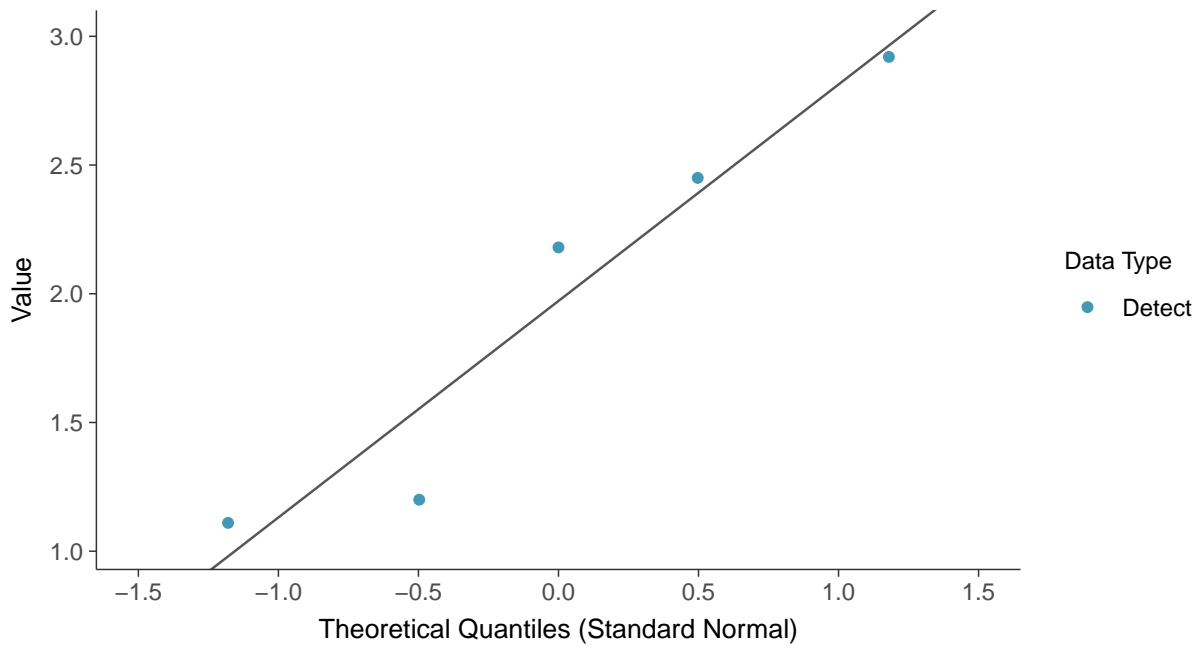
Radium-226/228, MW-3 (pCi/L)





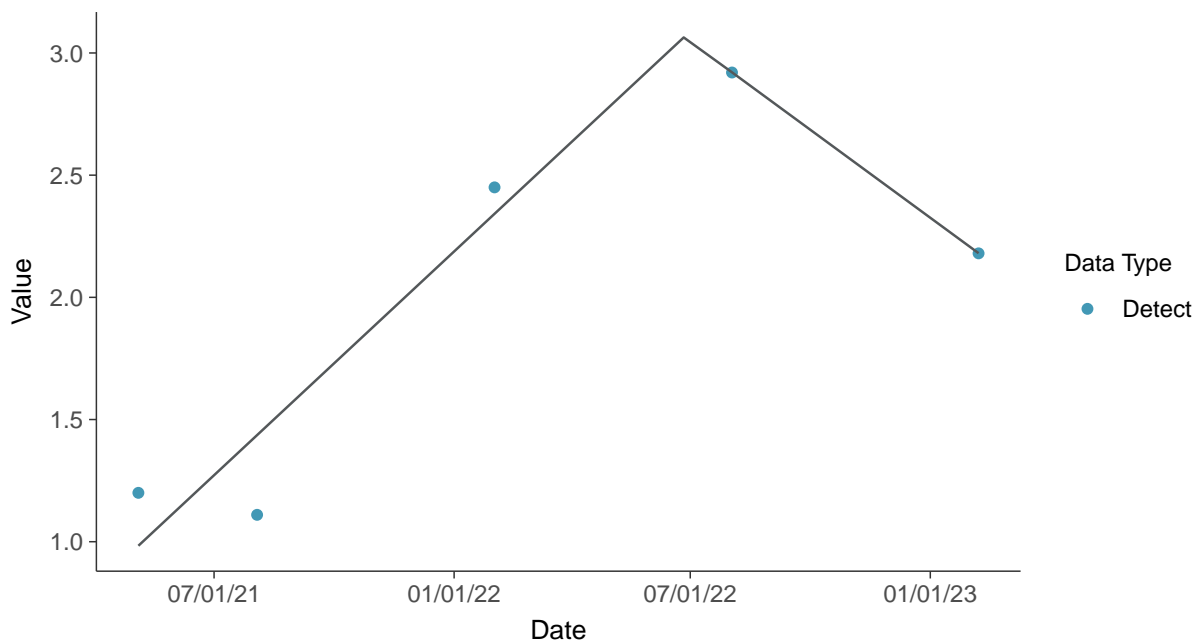
Normal Q-Q plot

Radium-226/228, MW-3 (pCi/L)



Trend Regression: Piecewise Linear-Linear

Radium-226/228, MW-3 (pCi/L)



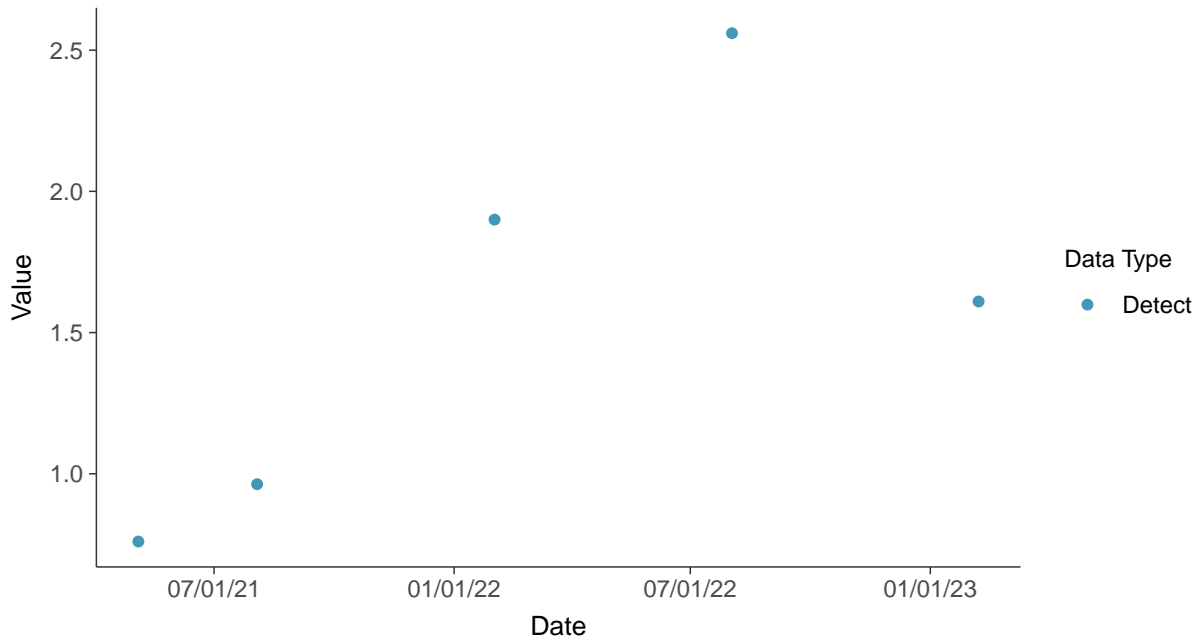


Appendix IV: Radium-228, MW-3

ID: 03_2_26

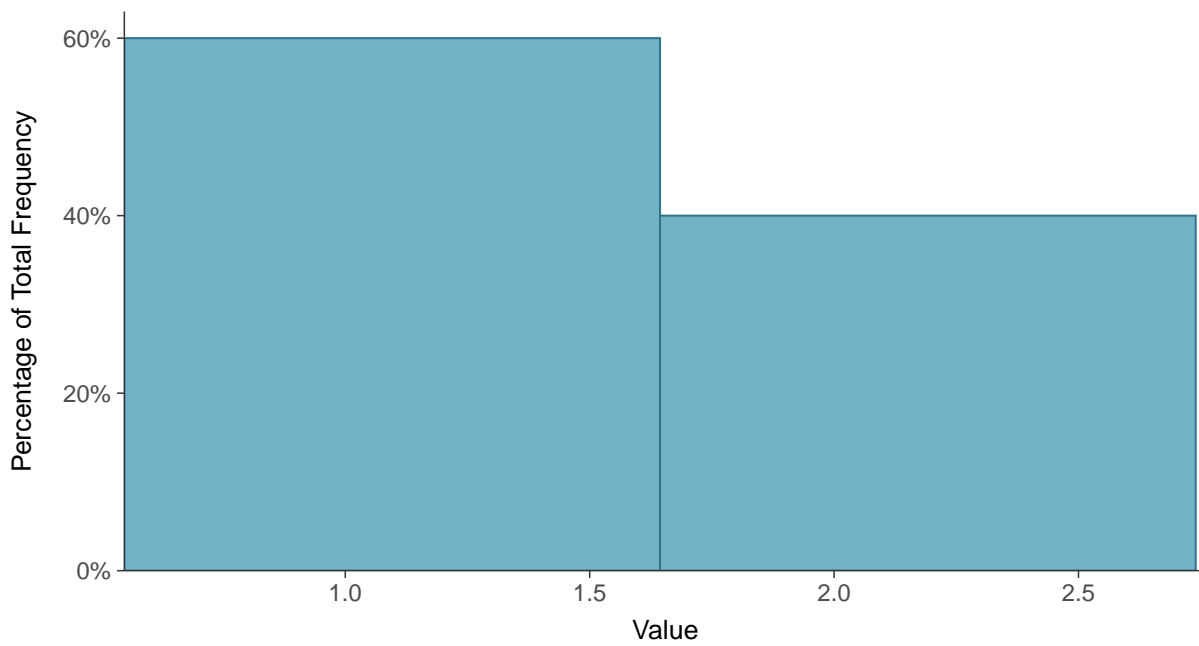
Scatter Plot

Radium-228, MW-3 (pCi/L)



Histogram

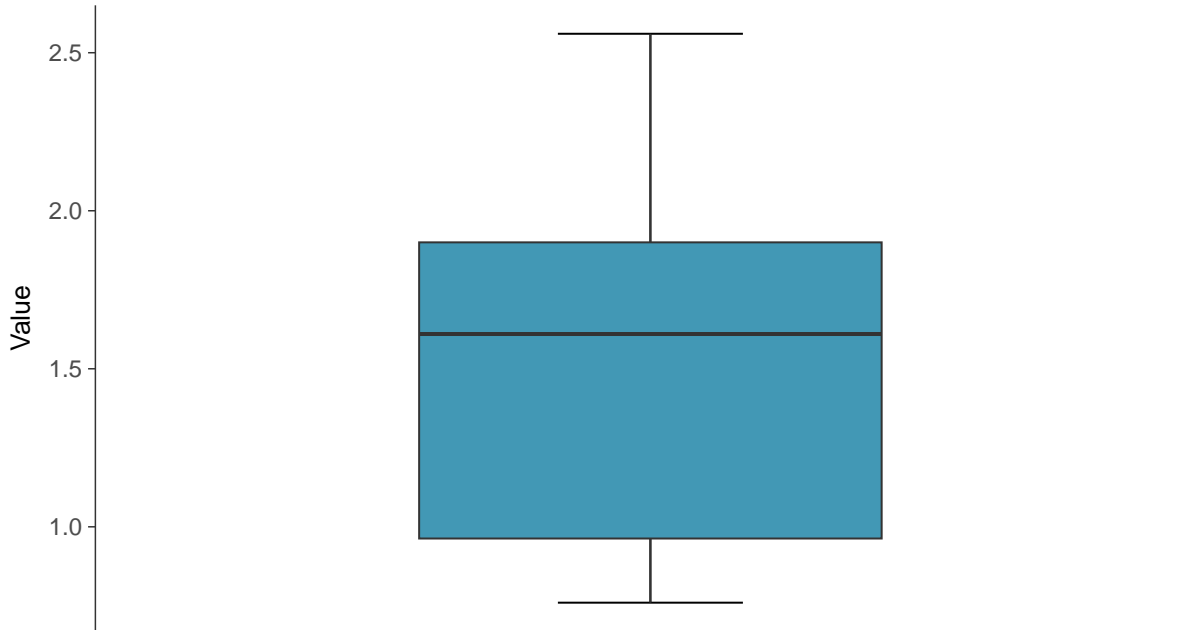
Radium-228, MW-3 (pCi/L)





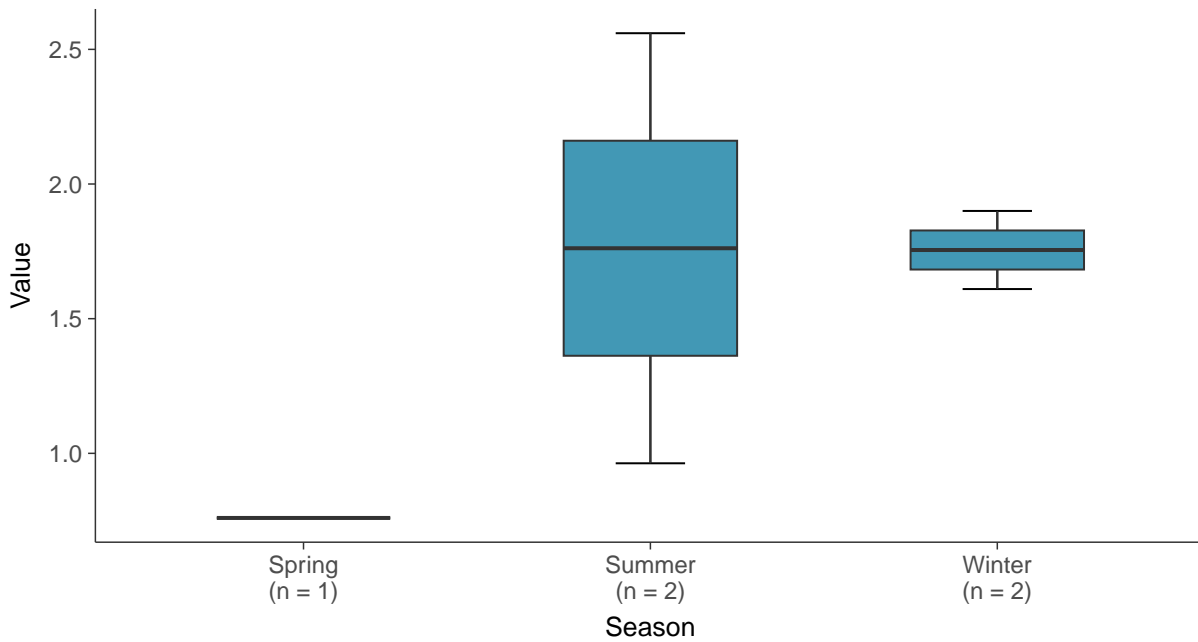
Boxplot

Radium-228, MW-3 (pCi/L)



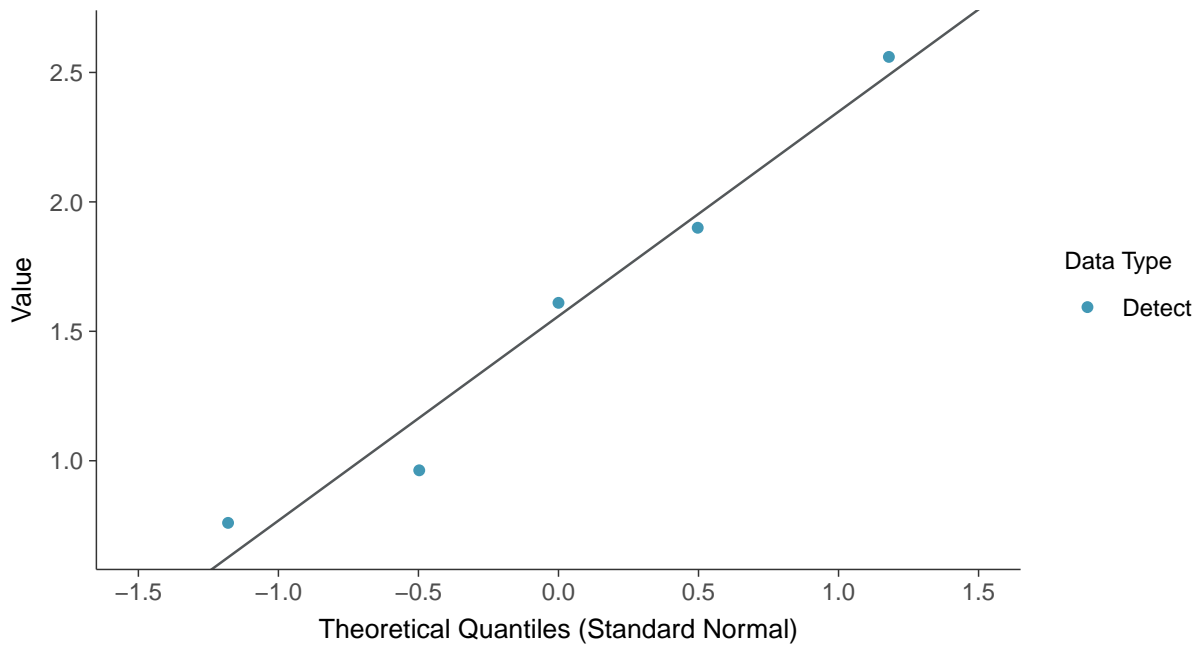
Boxplot by Season

Radium-228, MW-3 (pCi/L)

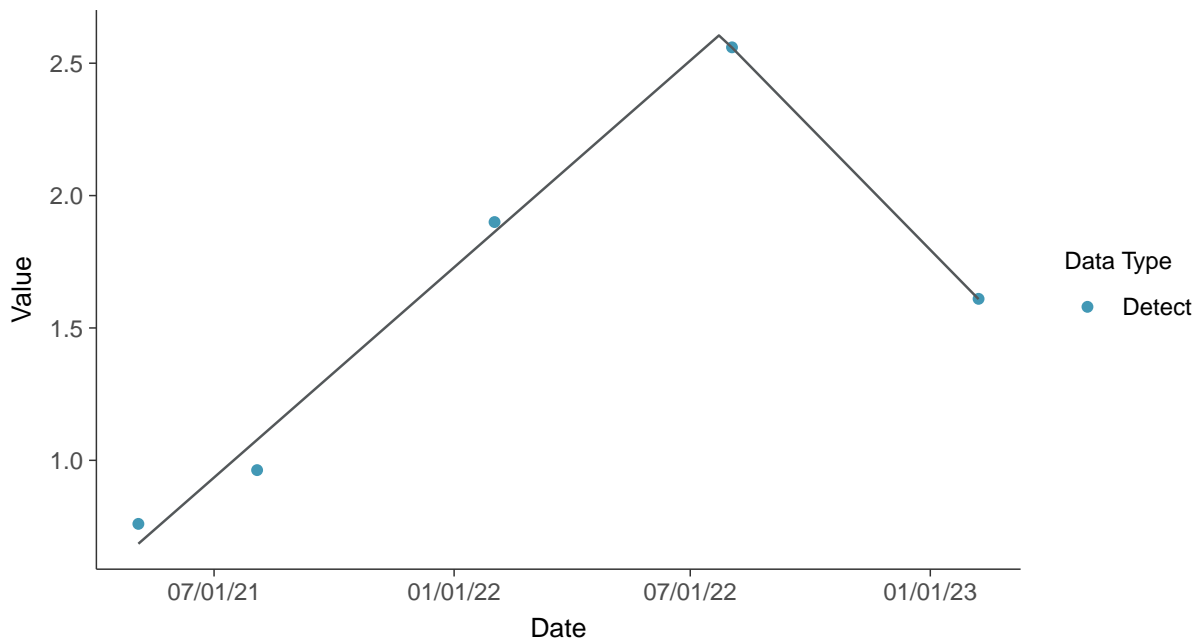




Normal Q-Q plot Radium-228, MW-3 (pCi/L)



Trend Regression: Piecewise Linear-Linear Radium-228, MW-3 (pCi/L)



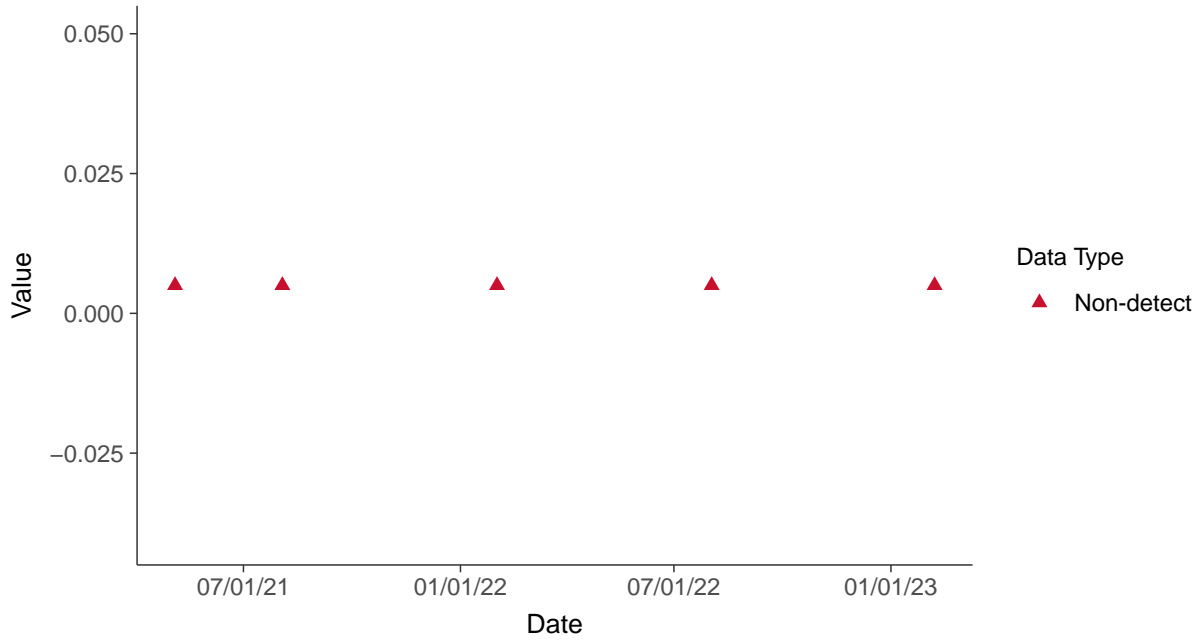


Appendix IV: Selenium, MW-3

ID: 03_2_27

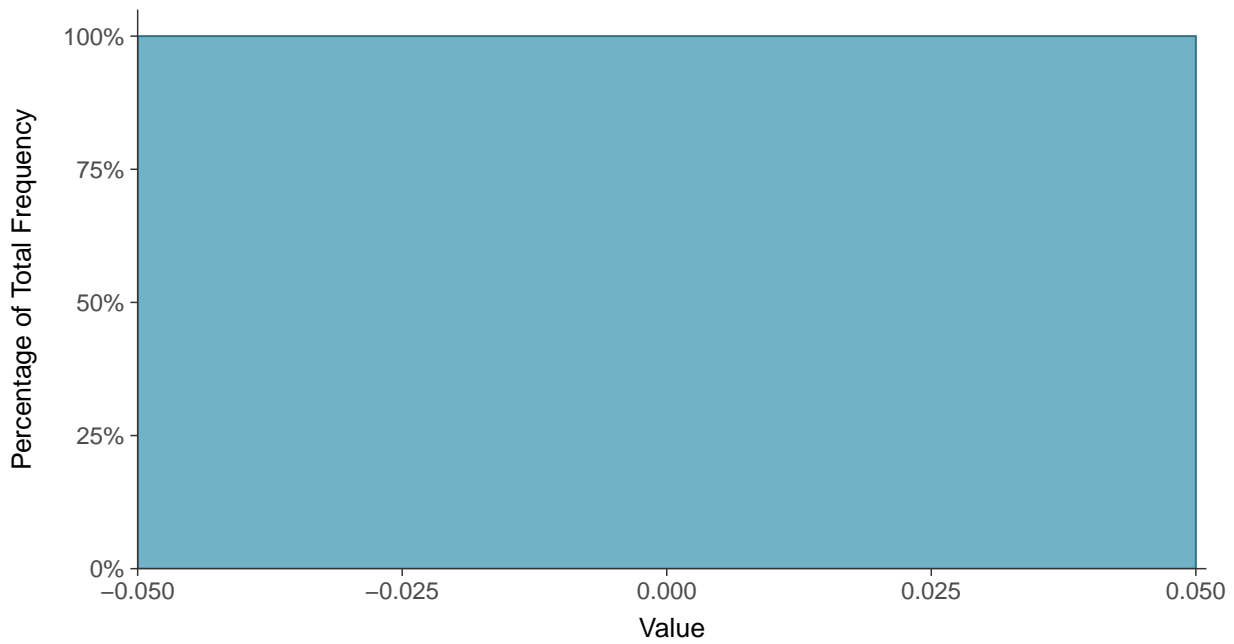
Scatter Plot

Selenium, MW-3 (mg/L)



Histogram

Selenium, MW-3 (mg/L)





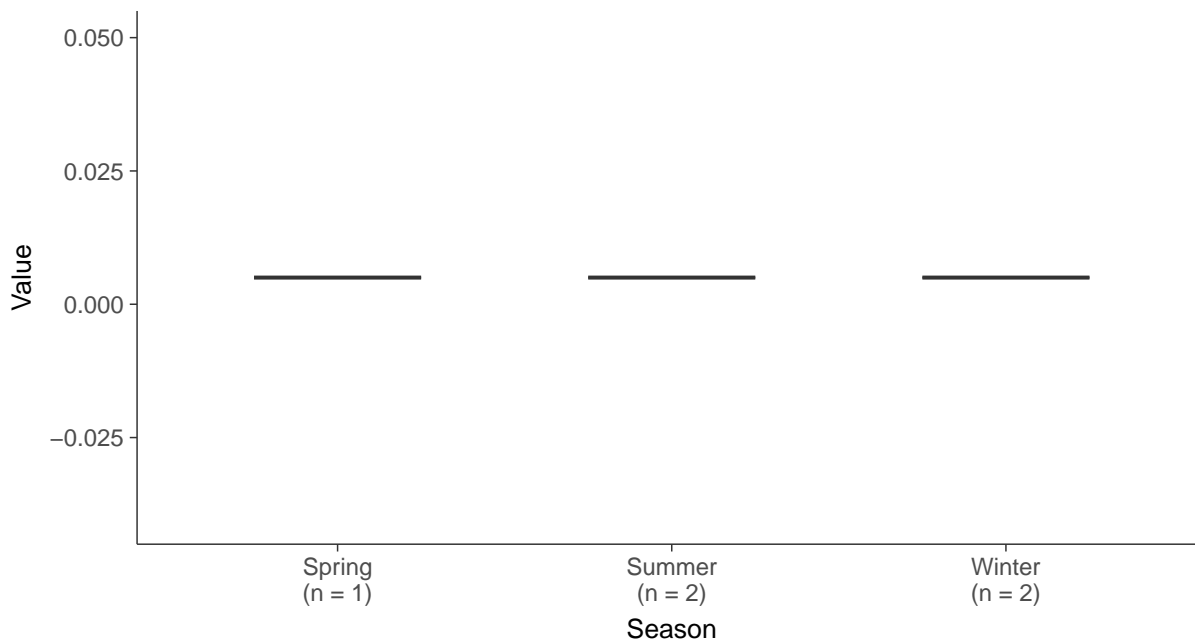
Boxplot

Selenium, MW-3 (mg/L)



Boxplot by Season

Selenium, MW-3 (mg/L)



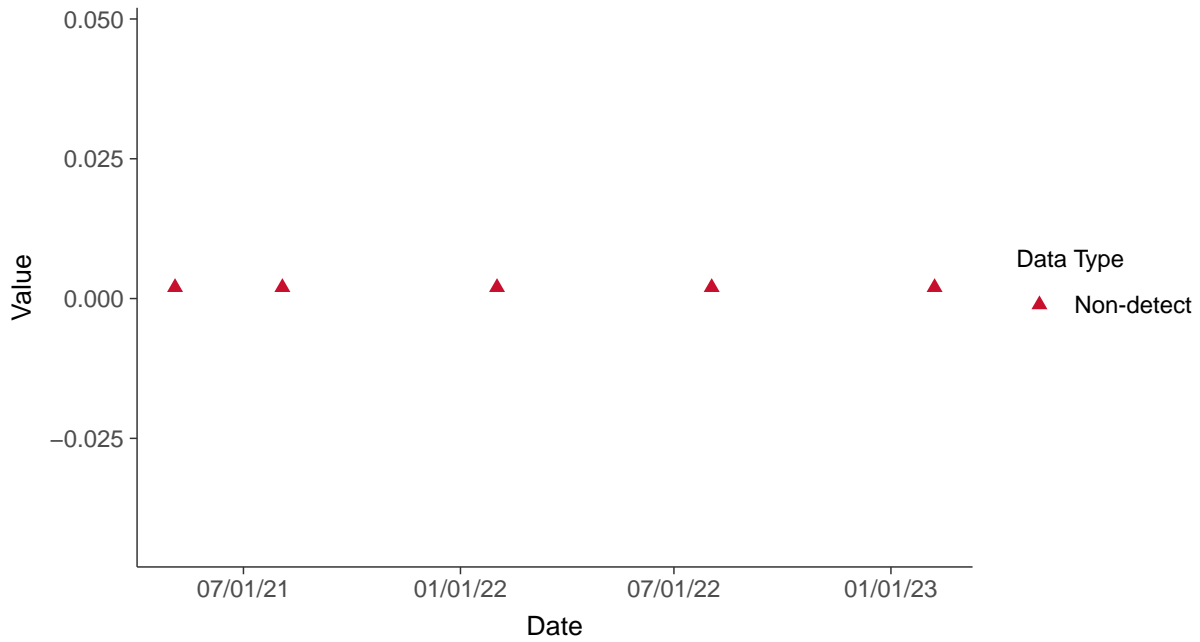


Appendix IV: Thallium, MW-3

ID: 03_2_29

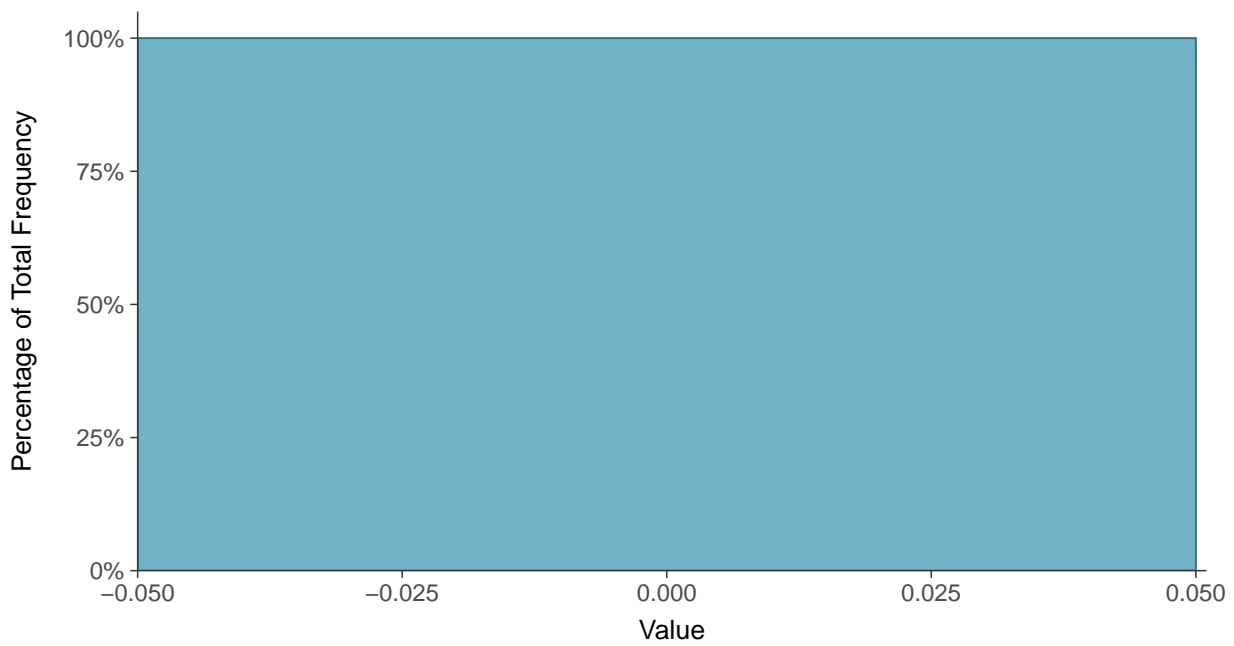
Scatter Plot

Thallium, MW-3 (mg/L)



Histogram

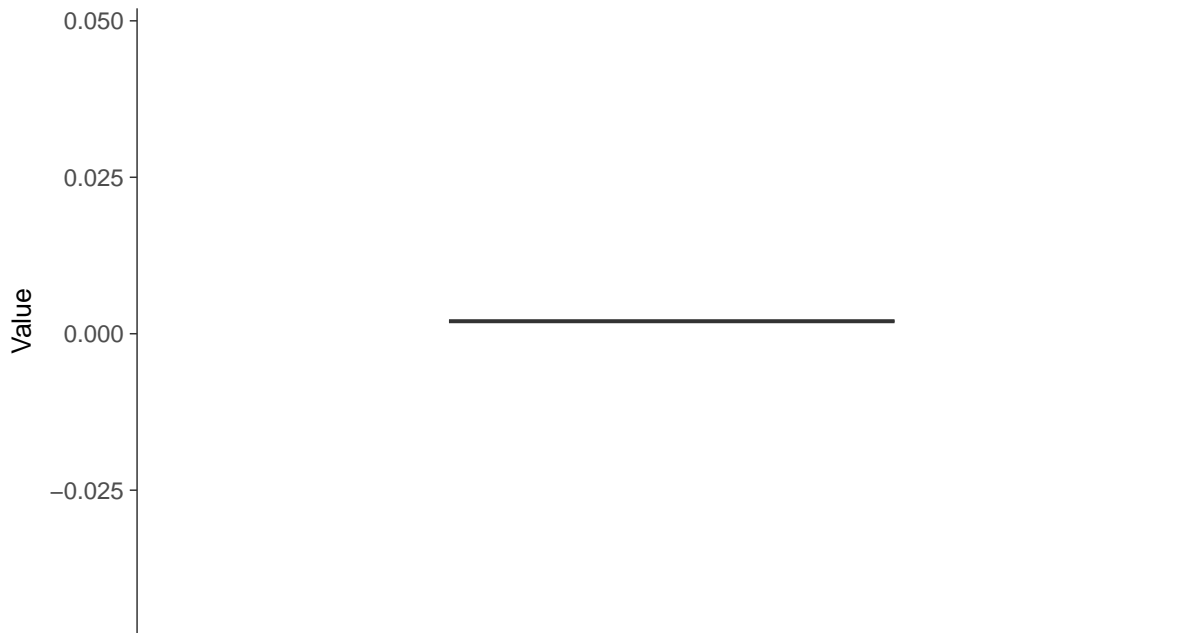
Thallium, MW-3 (mg/L)





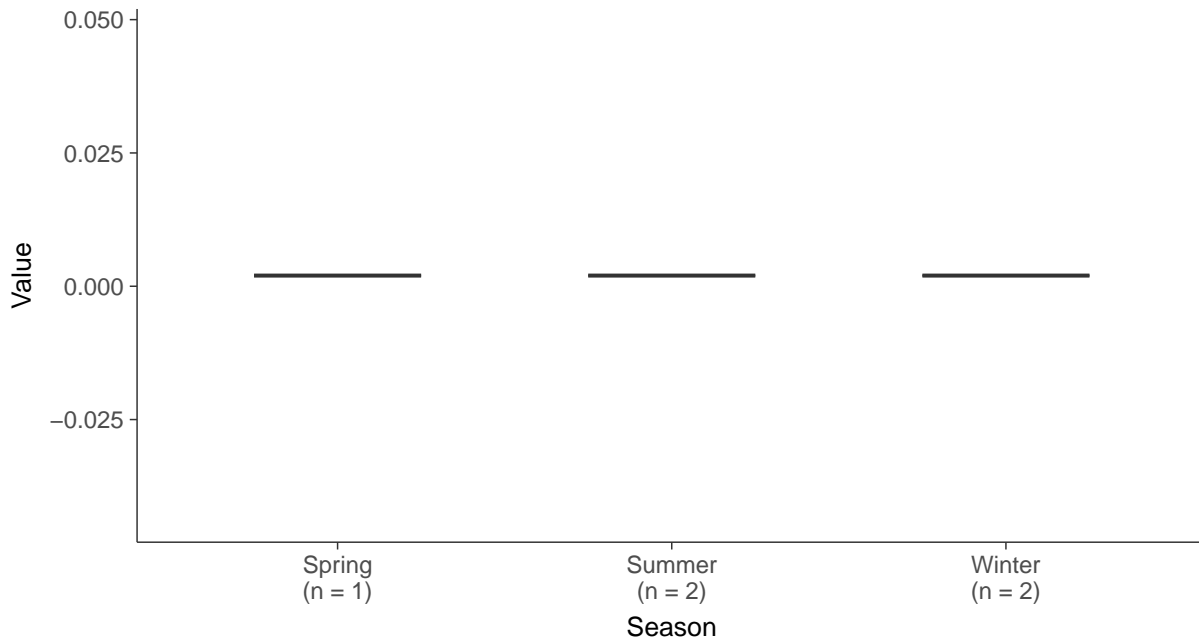
Boxplot

Thallium, MW-3 (mg/L)



Boxplot by Season

Thallium, MW-3 (mg/L)



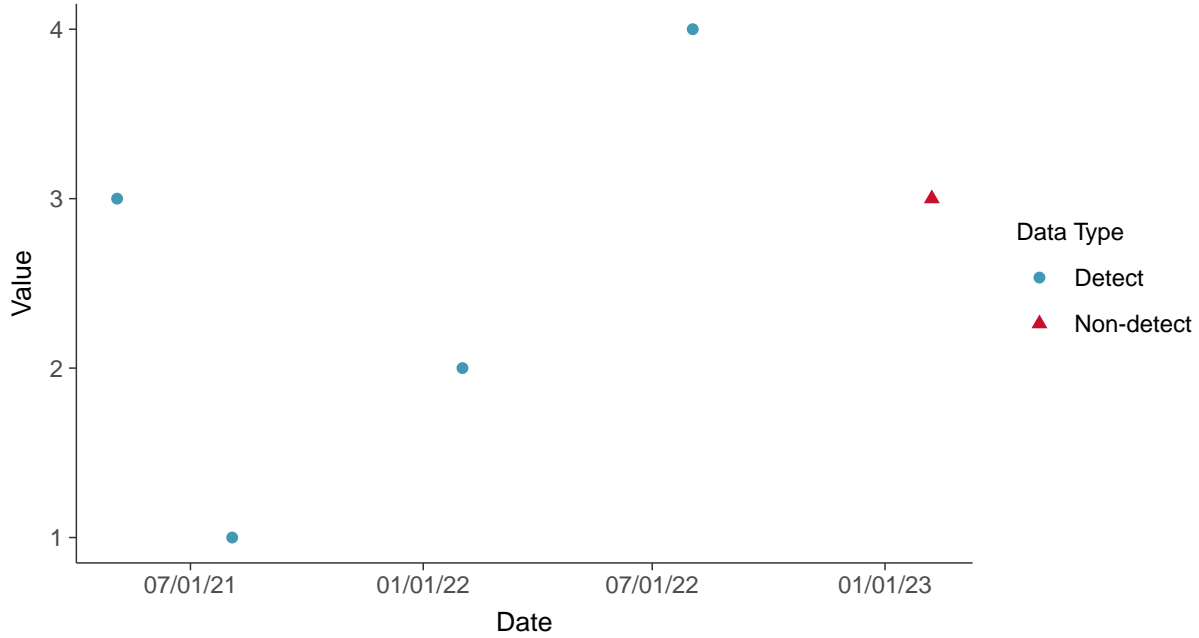


Appendix IV: Total Suspended Solids, MW-3

ID: 03_2_30

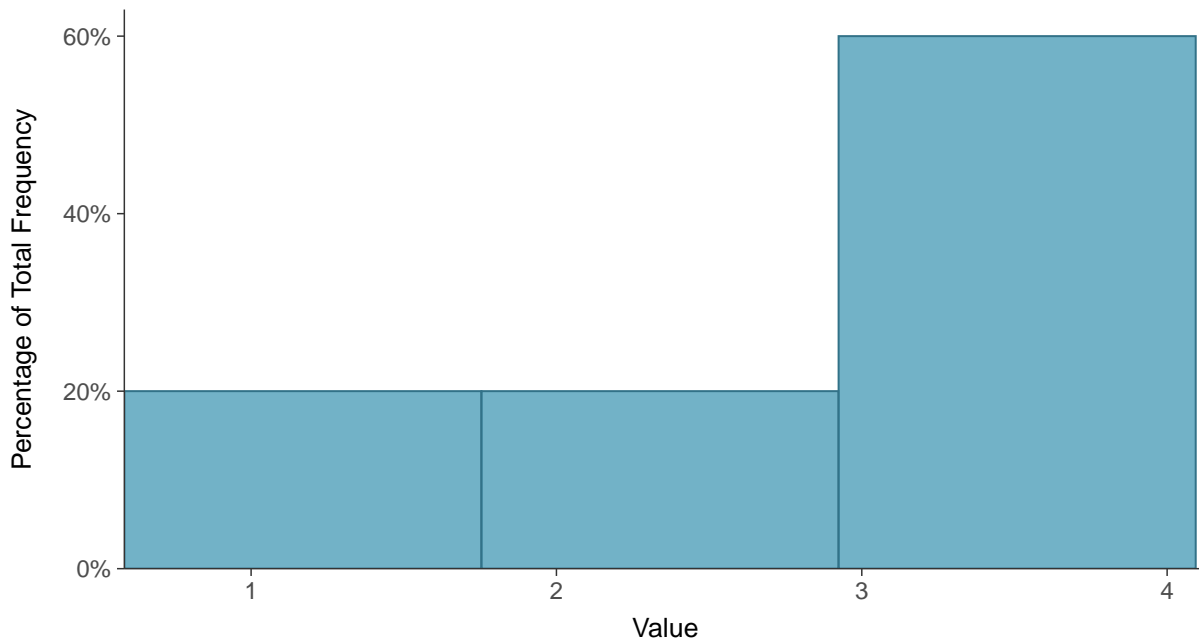
Scatter Plot

Total Suspended Solids, MW-3 (mg/L)



Histogram

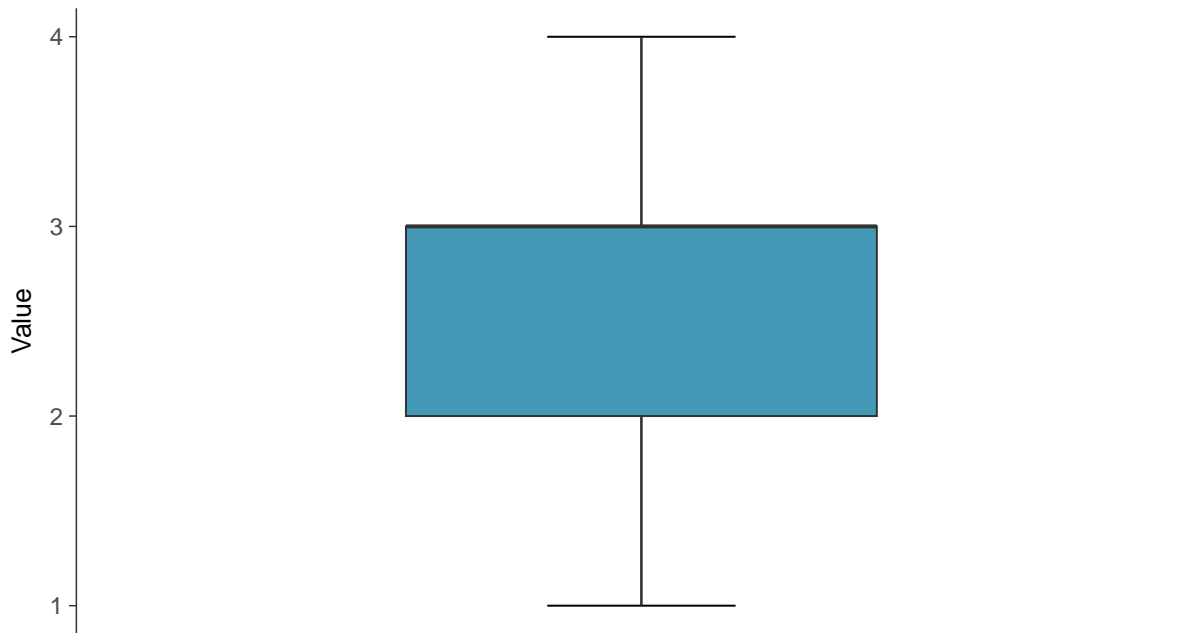
Total Suspended Solids, MW-3 (mg/L)





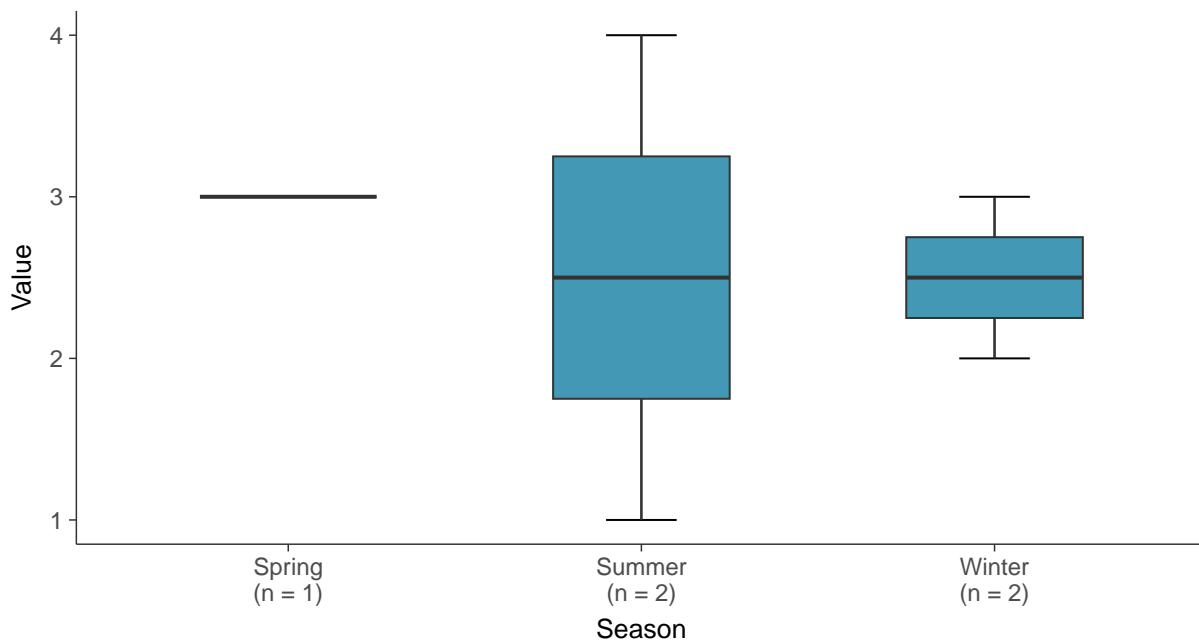
Boxplot

Total Suspended Solids, MW-3 (mg/L)



Boxplot by Season

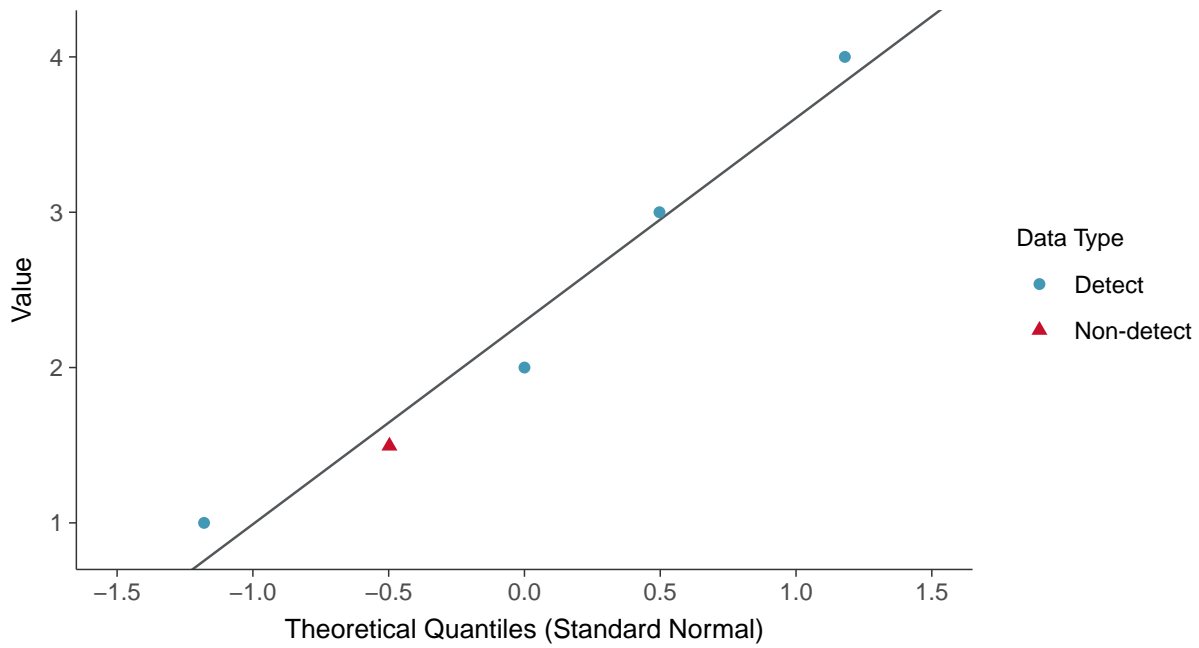
Total Suspended Solids, MW-3 (mg/L)





Normal Q-Q plot using ROS Imputed Estimates

Total Suspended Solids, MW-3 (mg/L)



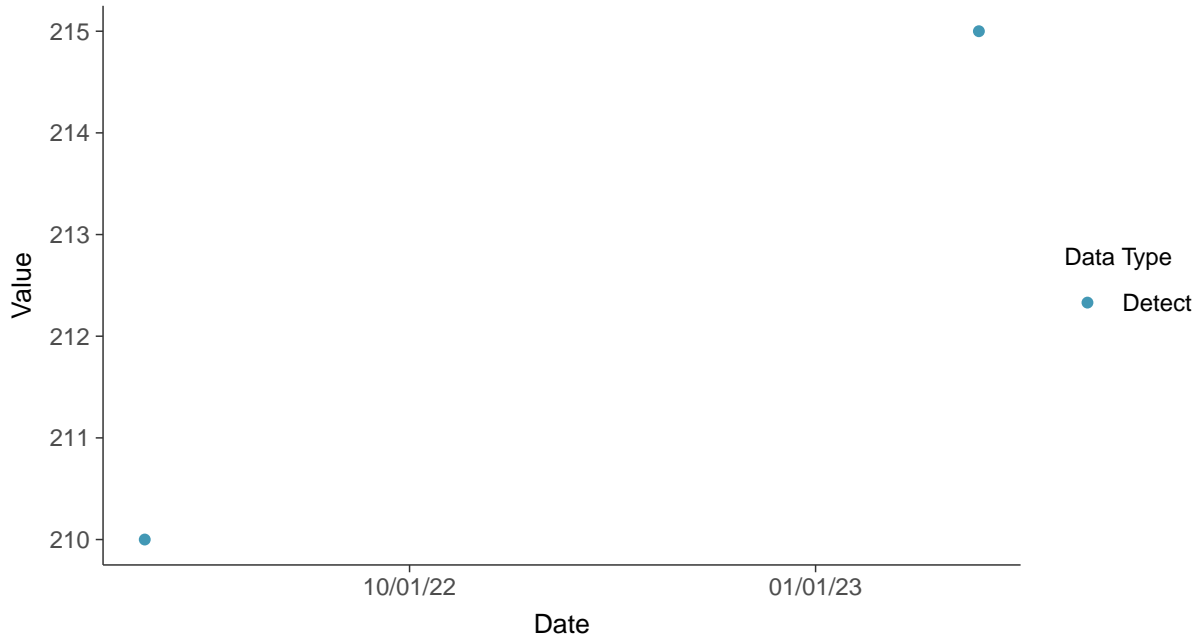


Other: Bicarbonate, MW-3

ID: 03_3_12

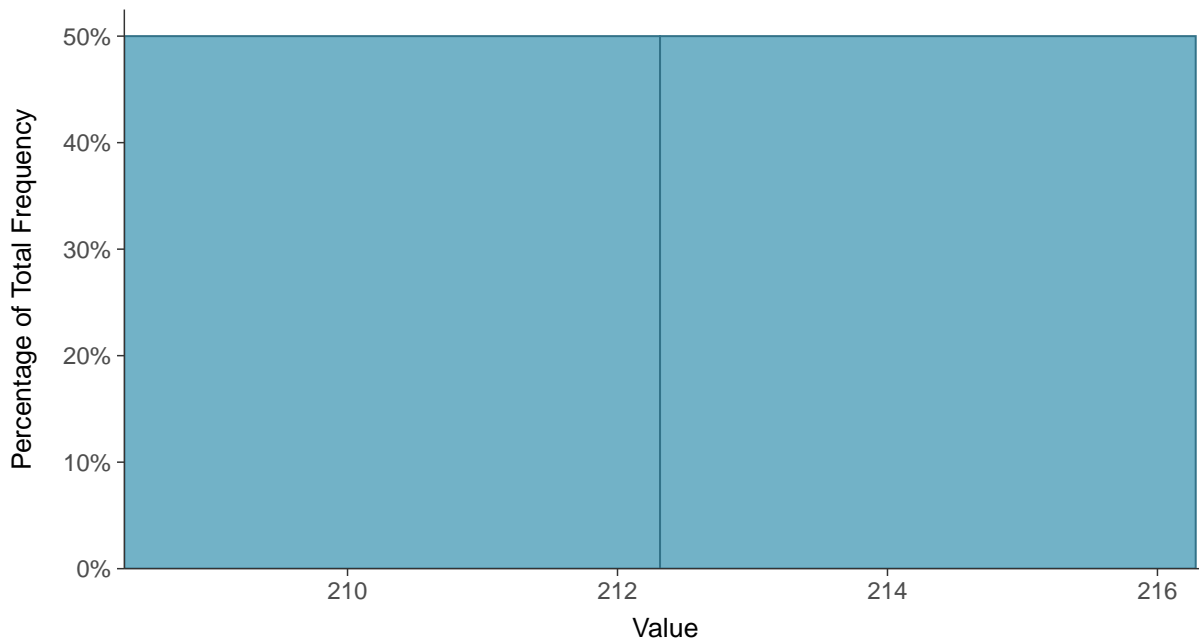
Scatter Plot

Bicarbonate, MW-3 (mg/L)



Histogram

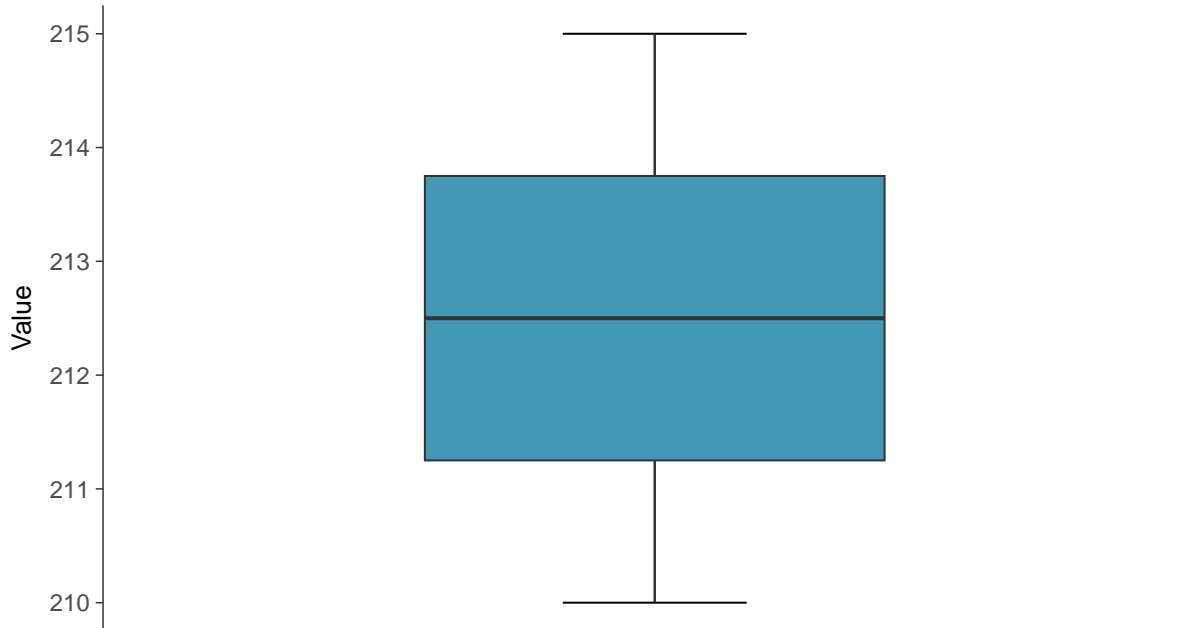
Bicarbonate, MW-3 (mg/L)





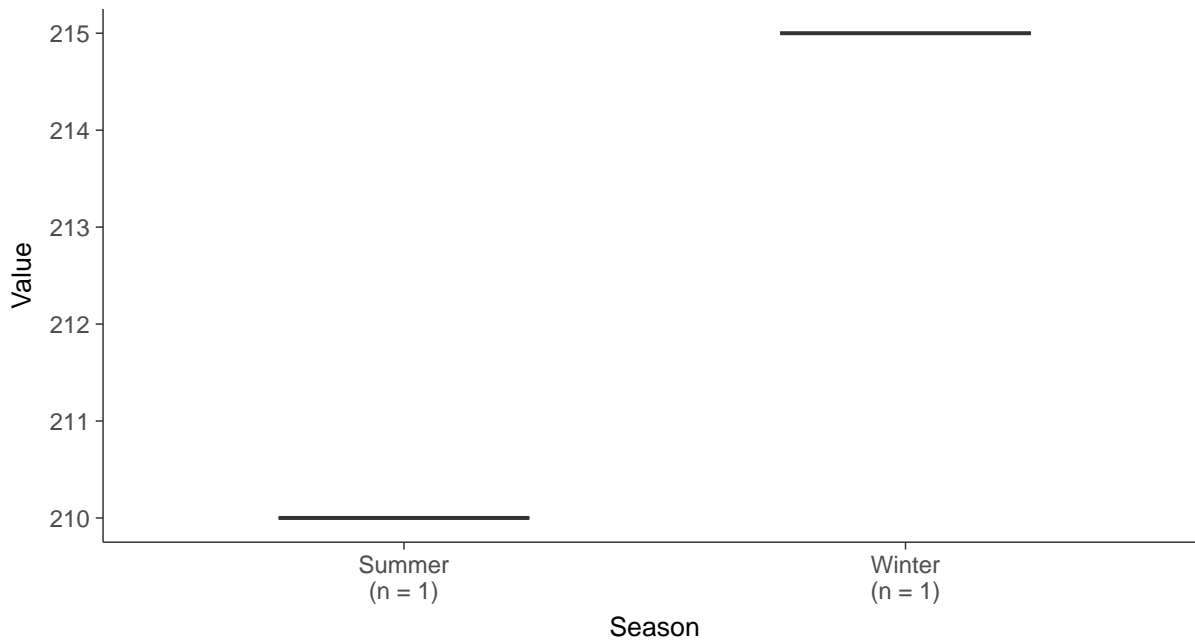
Boxplot

Bicarbonate, MW-3 (mg/L)



Boxplot by Season

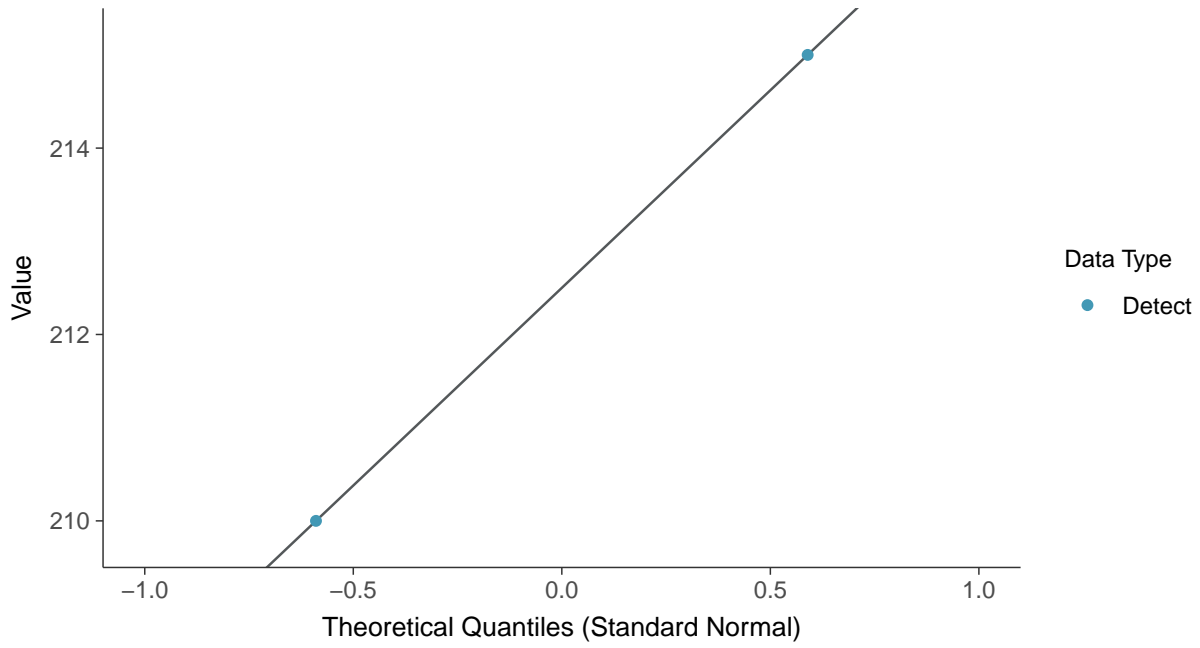
Bicarbonate, MW-3 (mg/L)





Normal Q-Q plot

Bicarbonate, MW-3 (mg/L)



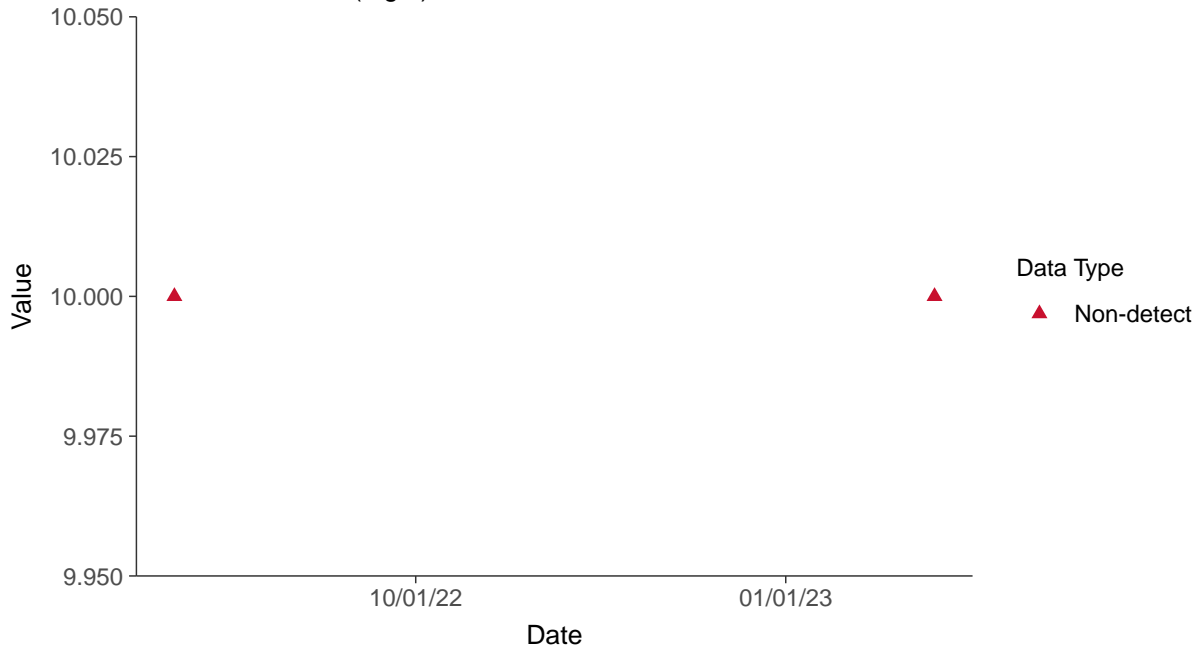


Other: Carbonate, MW-3

ID: 03_3_14

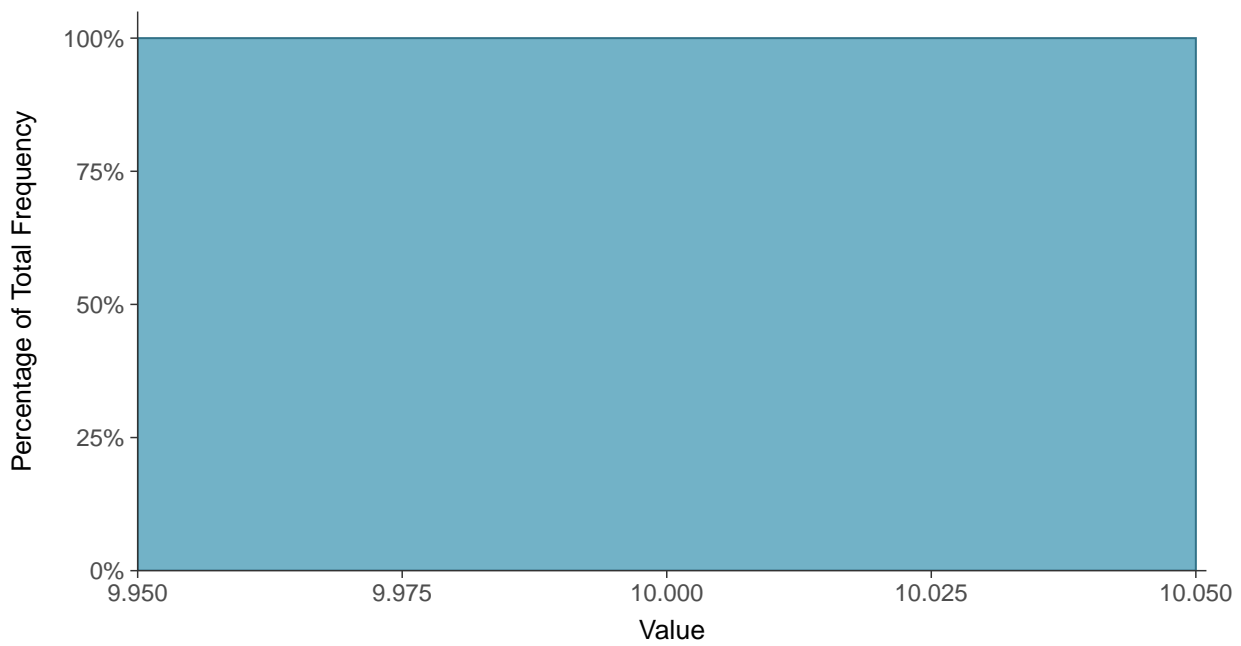
Scatter Plot

Carbonate, MW-3 (mg/L)



Histogram

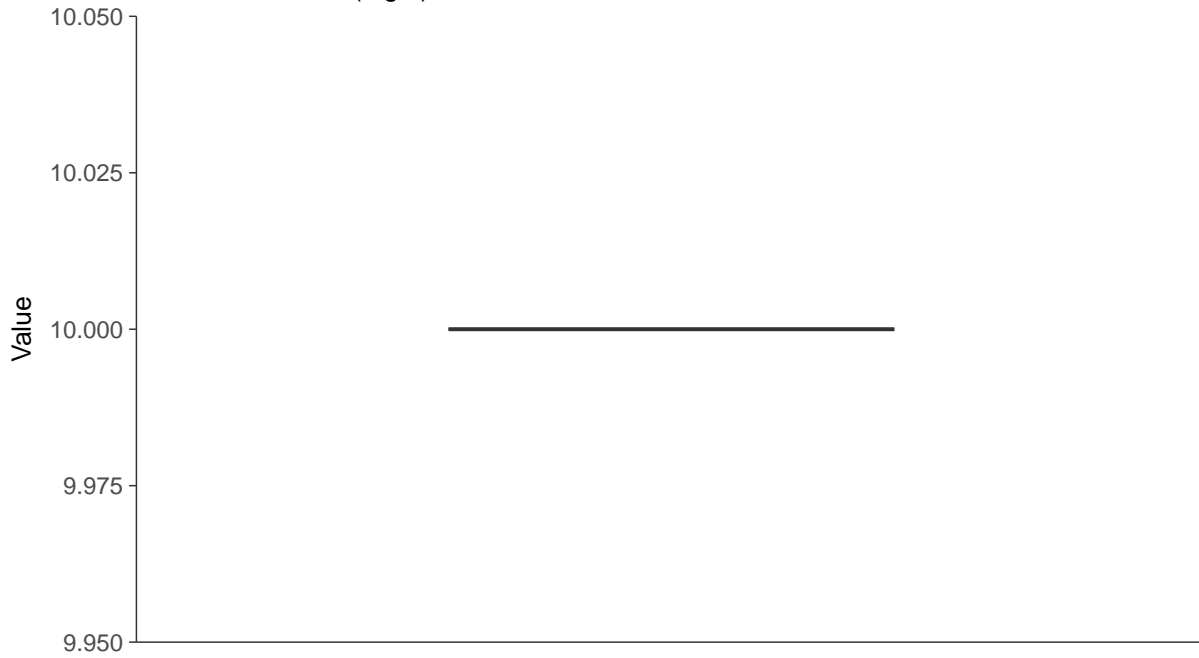
Carbonate, MW-3 (mg/L)





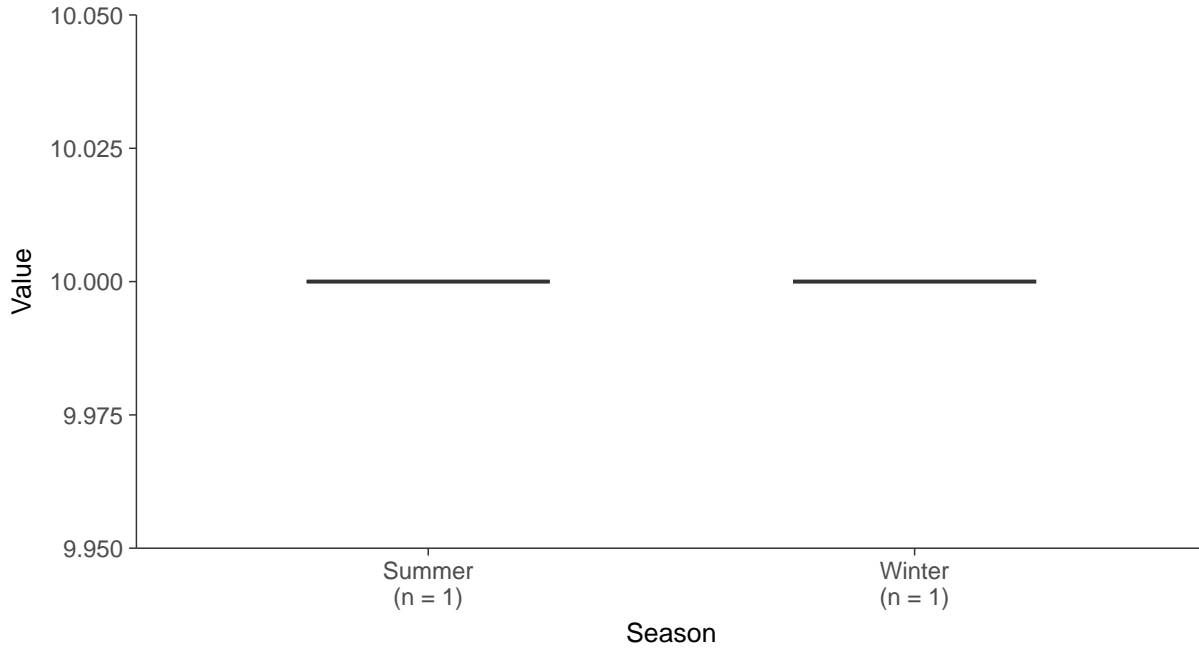
Boxplot

Carbonate, MW-3 (mg/L)



Boxplot by Season

Carbonate, MW-3 (mg/L)



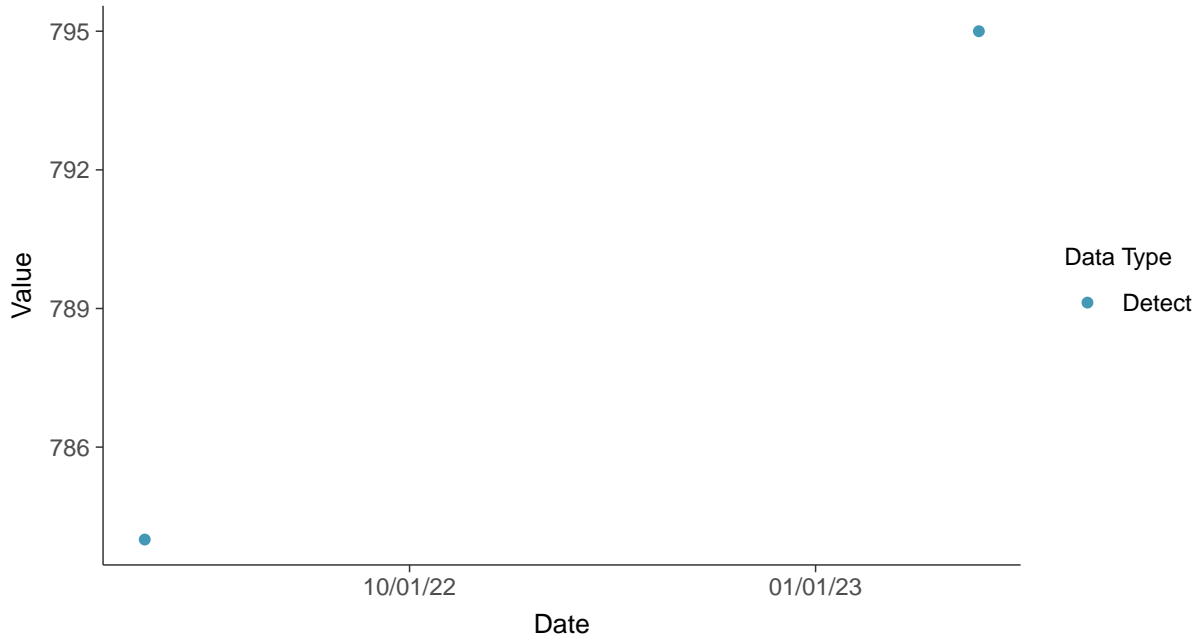


Other: Hardness, MW-3

ID: 03_3_17

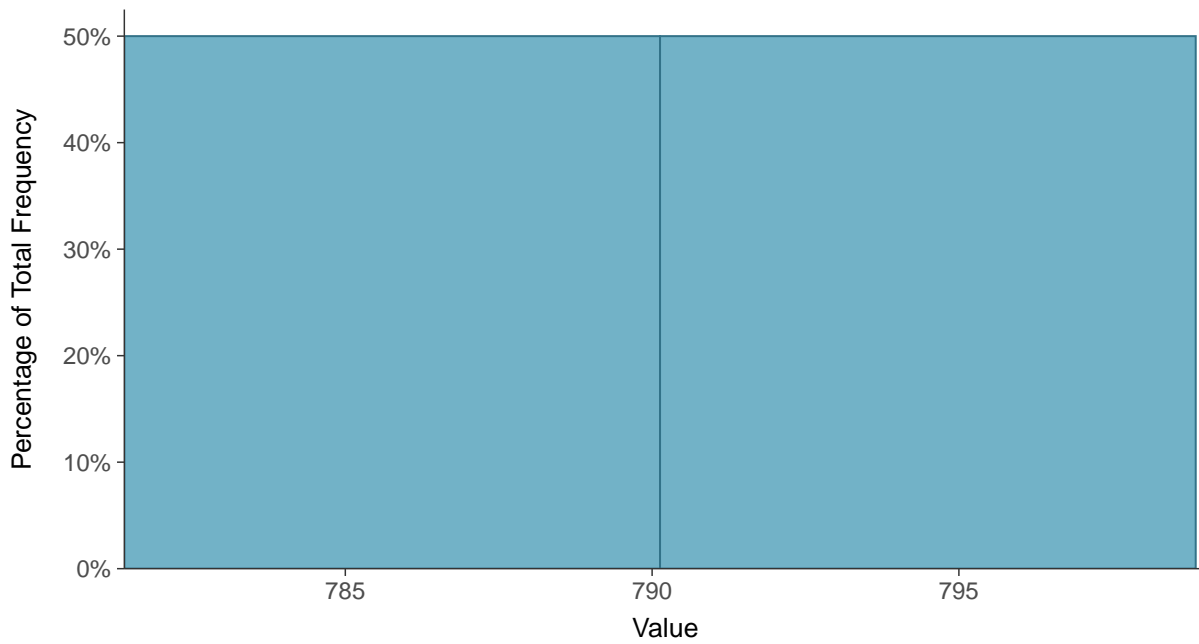
Scatter Plot

Hardness, MW-3 (mg/L)



Histogram

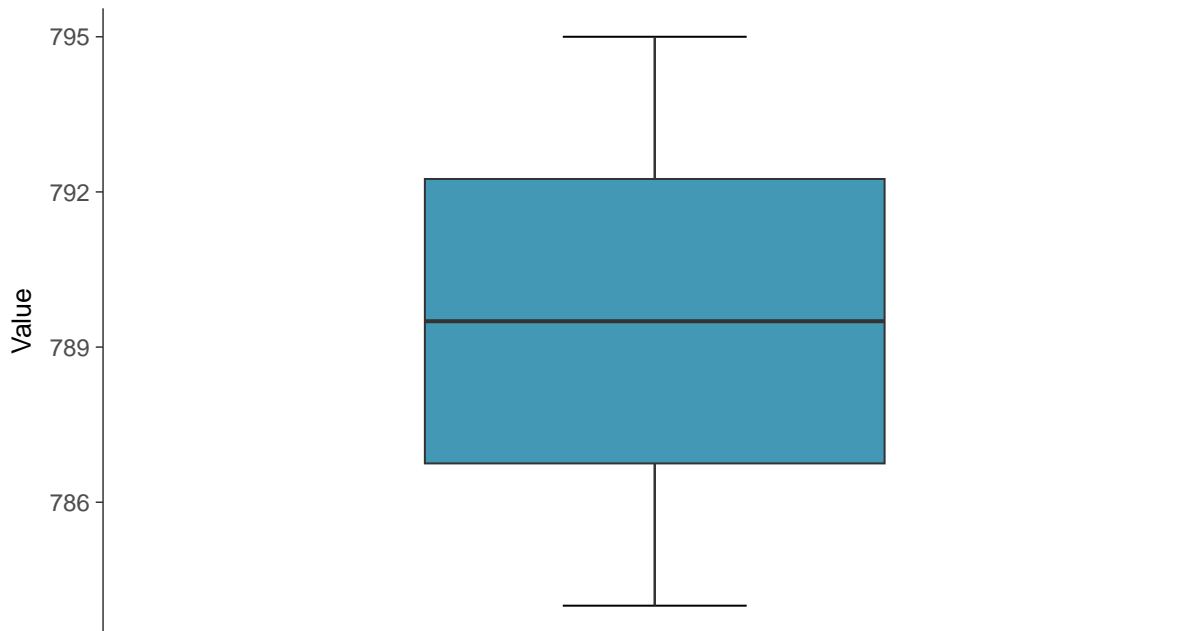
Hardness, MW-3 (mg/L)





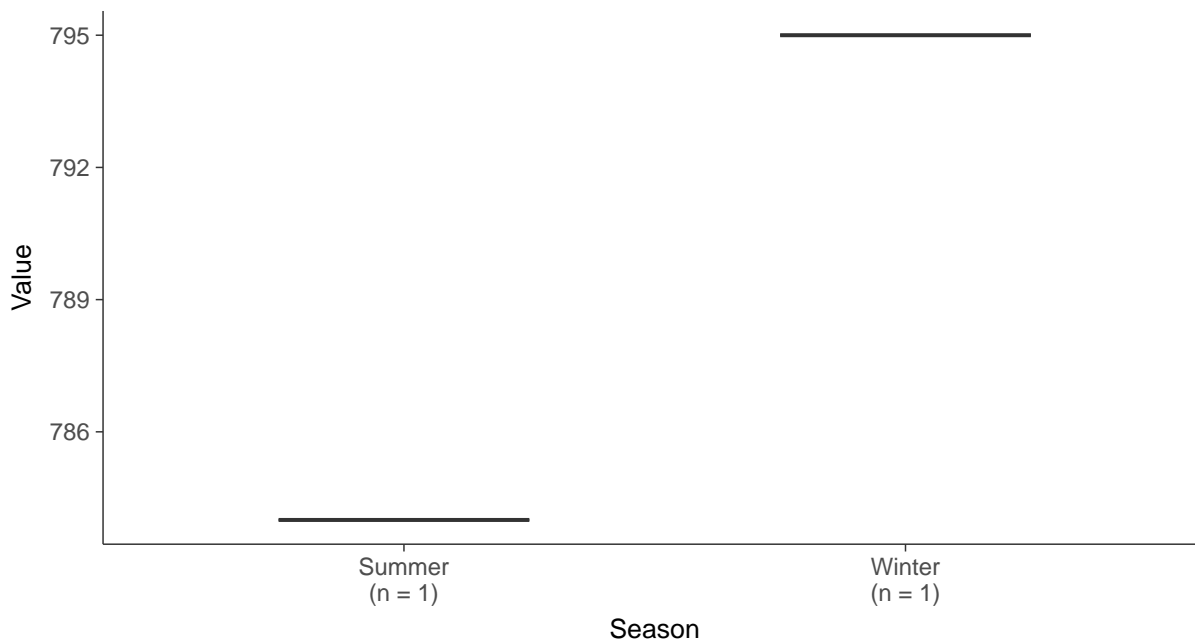
Boxplot

Hardness, MW-3 (mg/L)



Boxplot by Season

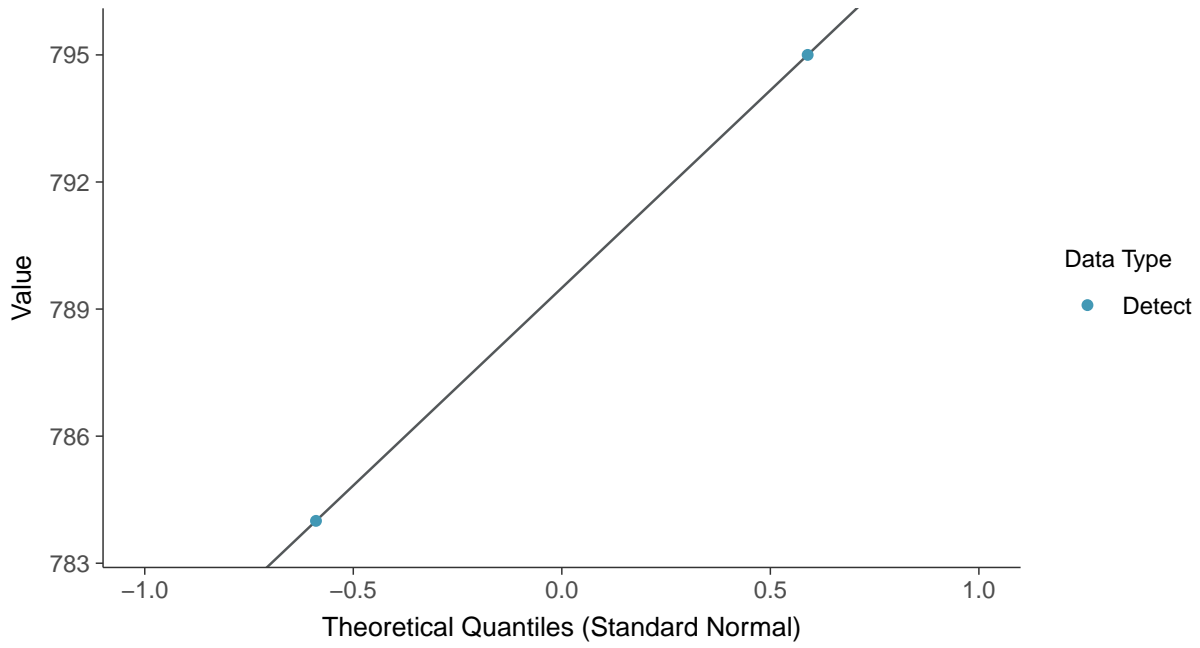
Hardness, MW-3 (mg/L)





Normal Q-Q plot

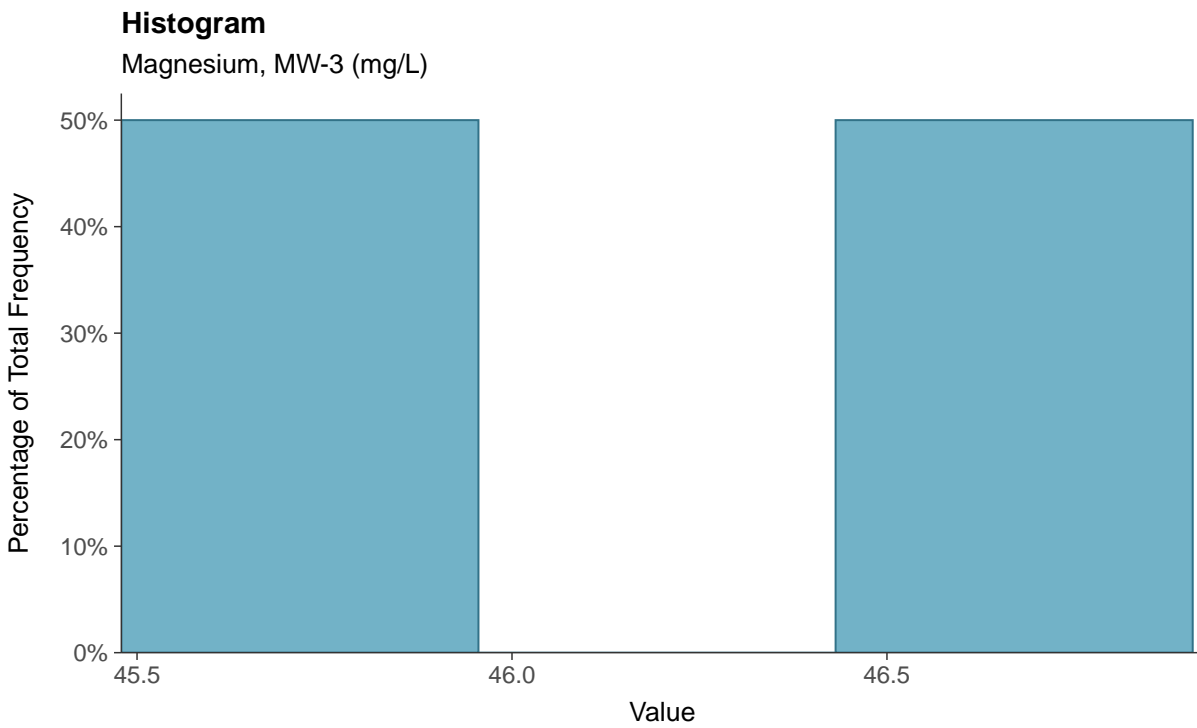
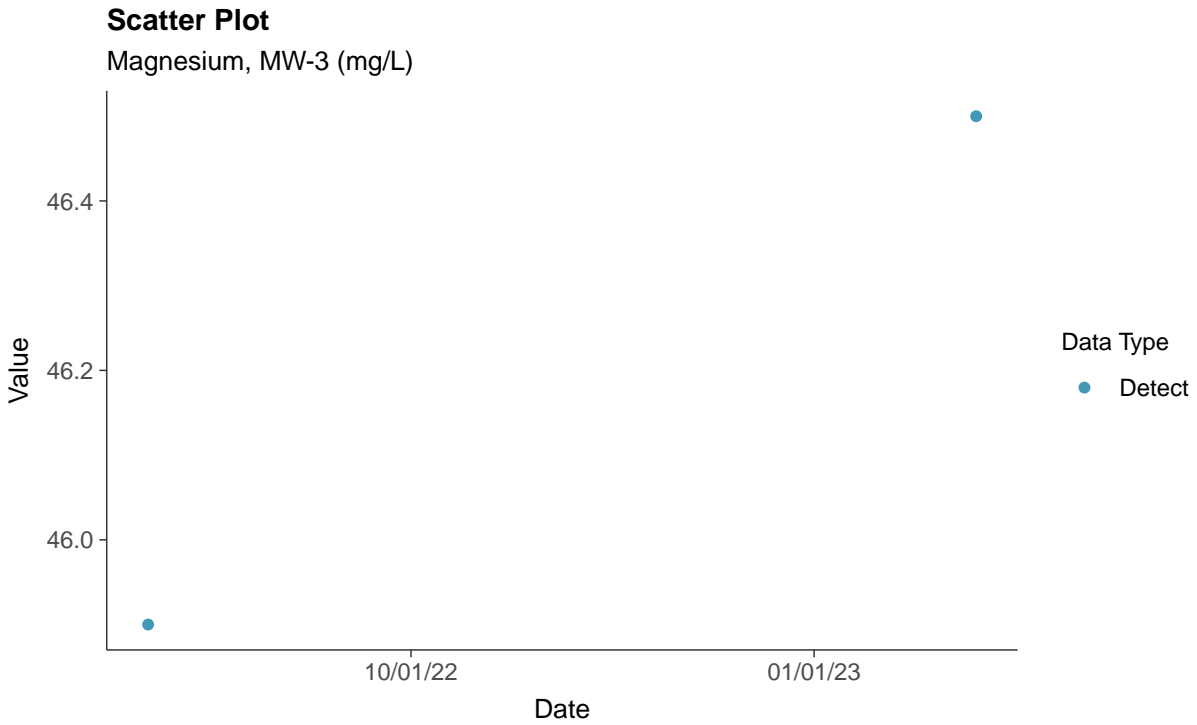
Hardness, MW-3 (mg/L)





Other: Magnesium, MW-3

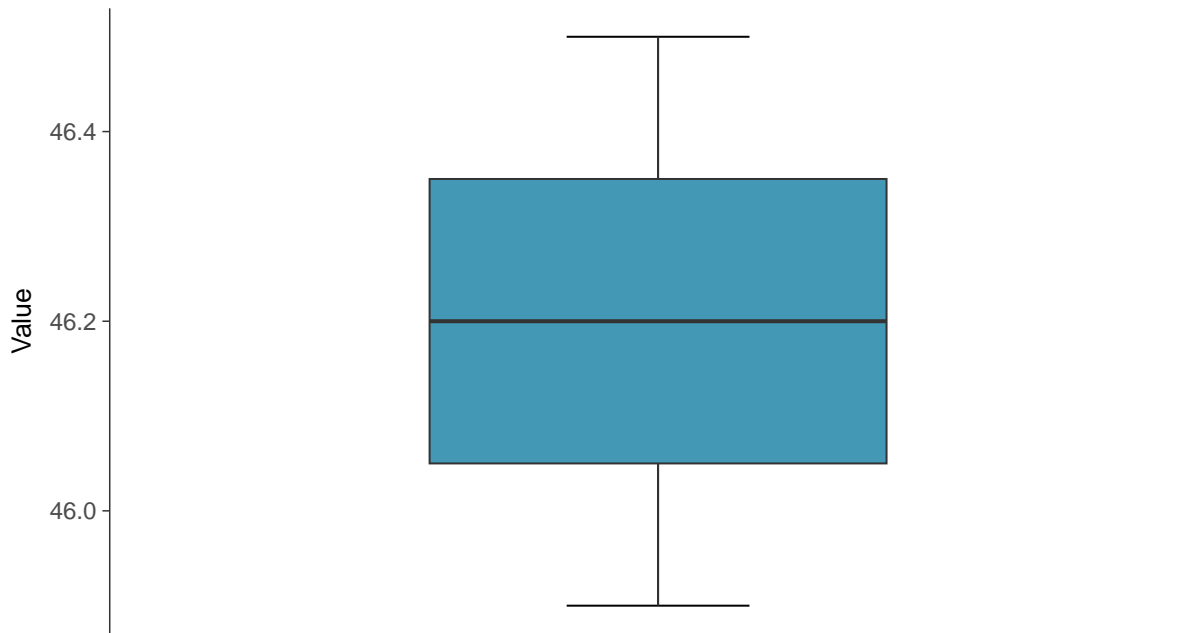
ID: 03_3_20





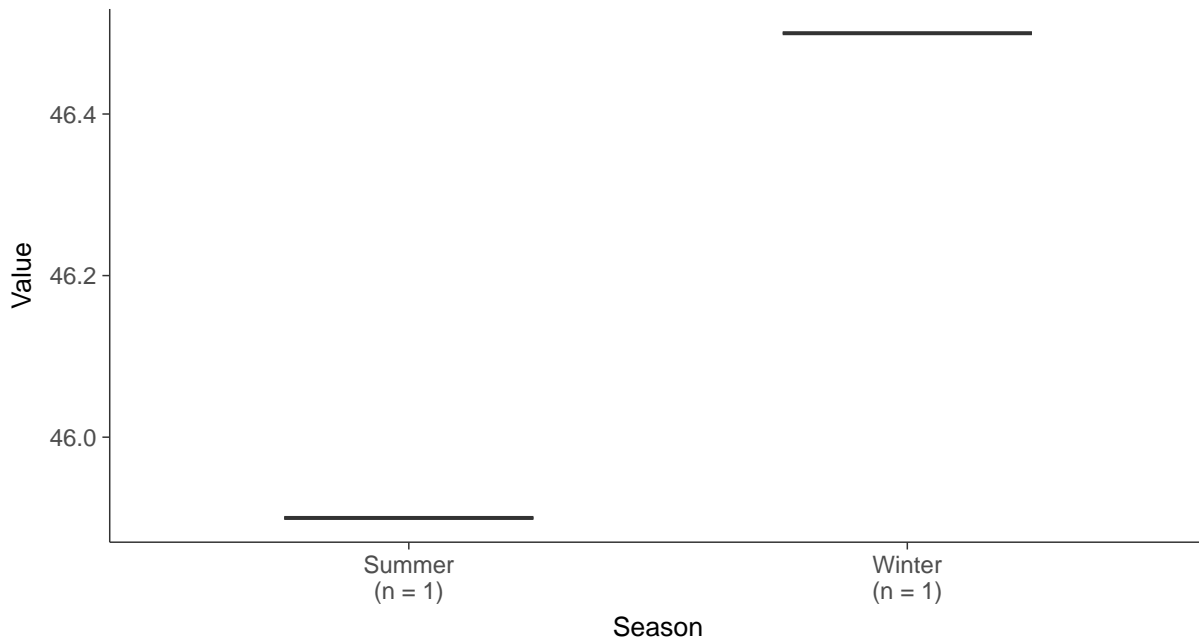
Boxplot

Magnesium, MW-3 (mg/L)



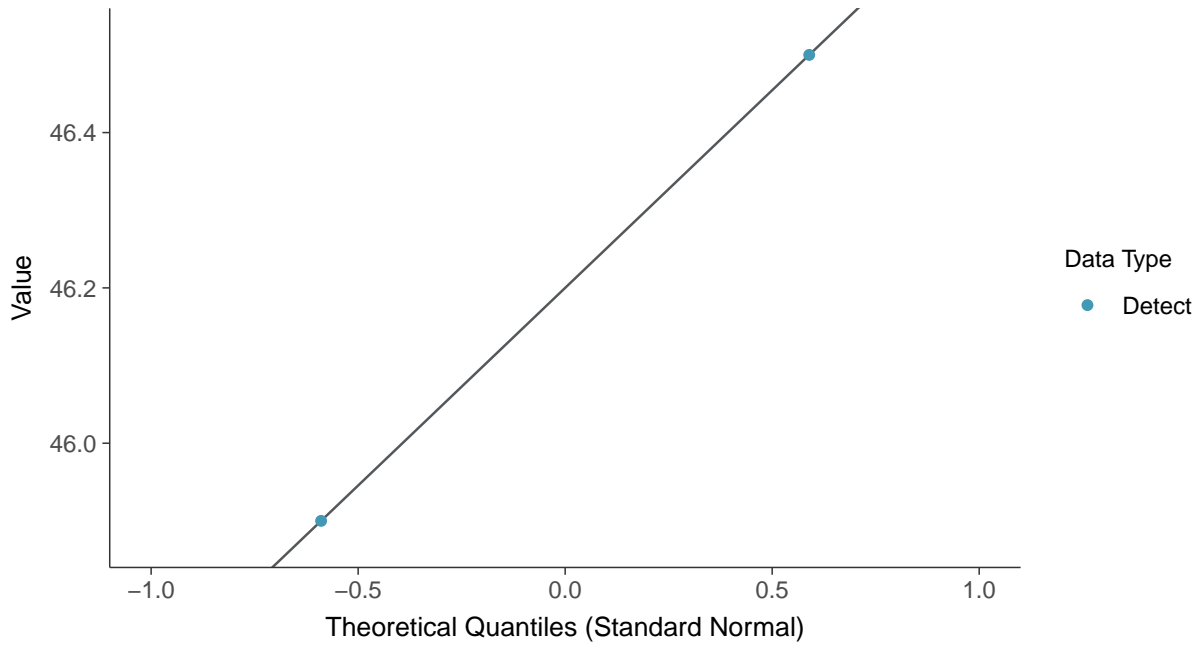
Boxplot by Season

Magnesium, MW-3 (mg/L)





Normal Q-Q plot
Magnesium, MW-3 (mg/L)



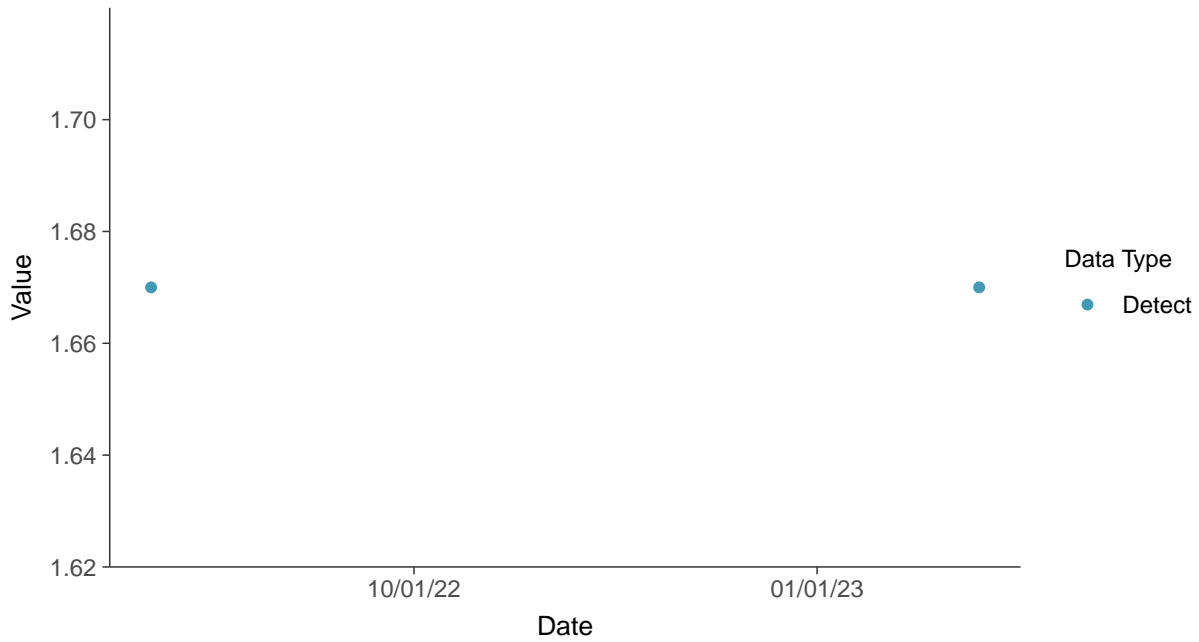


Other: Potassium, MW-3

ID: 03_3_23

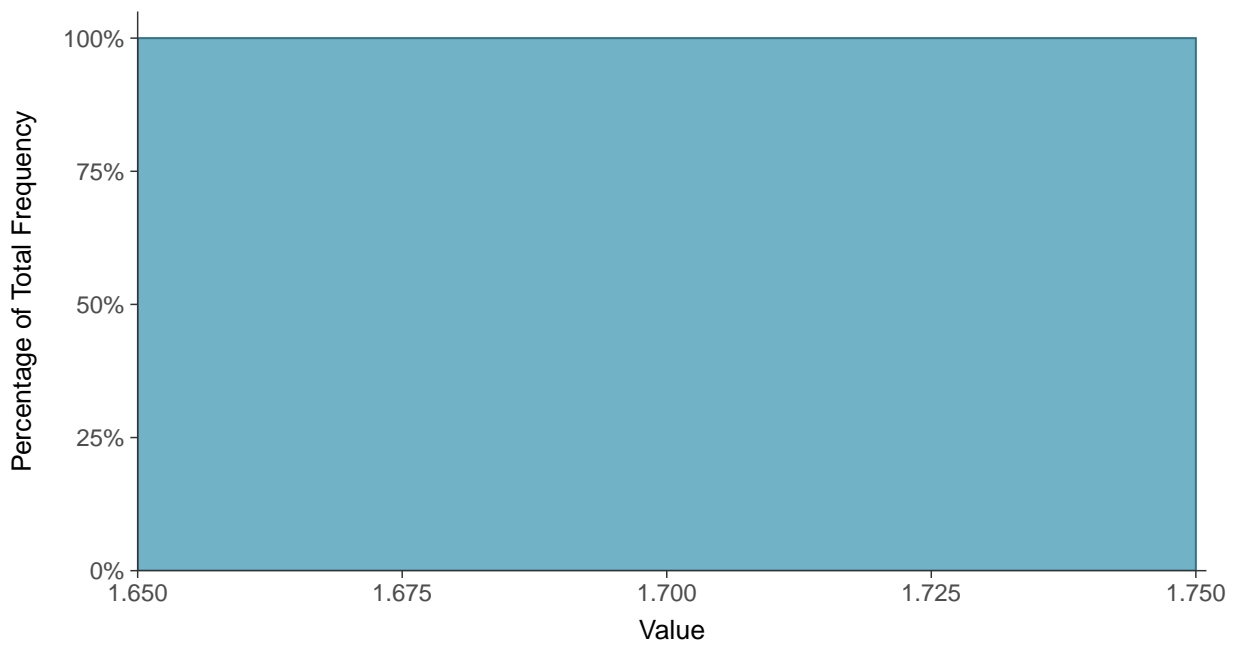
Scatter Plot

Potassium, MW-3 (mg/L)



Histogram

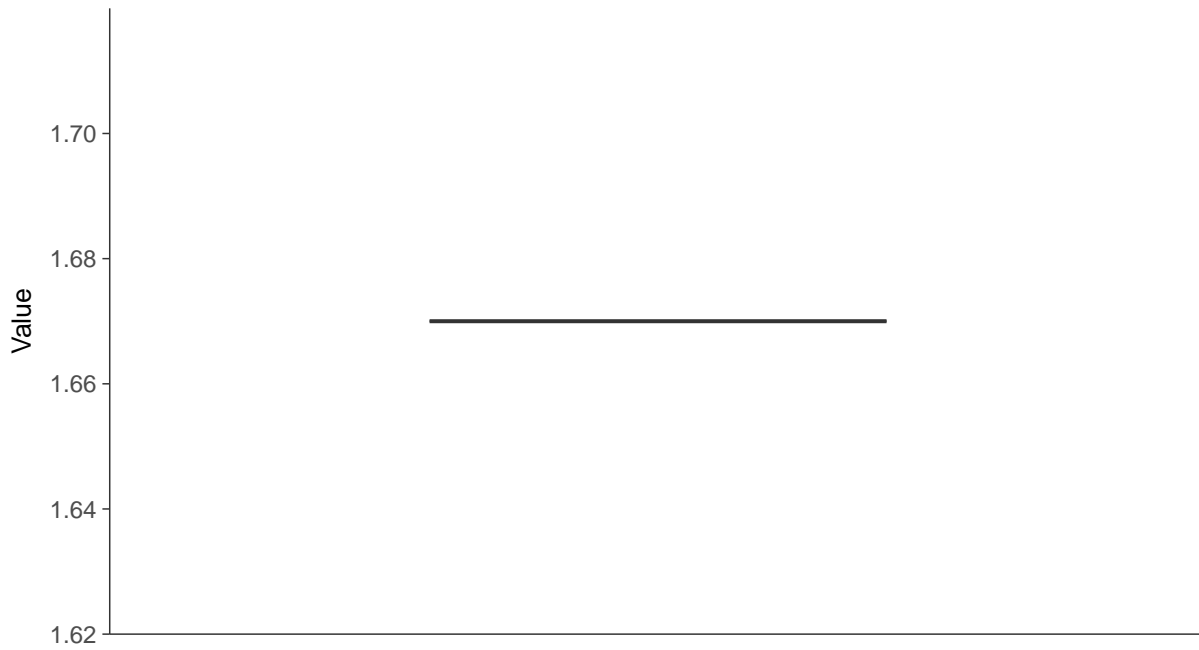
Potassium, MW-3 (mg/L)





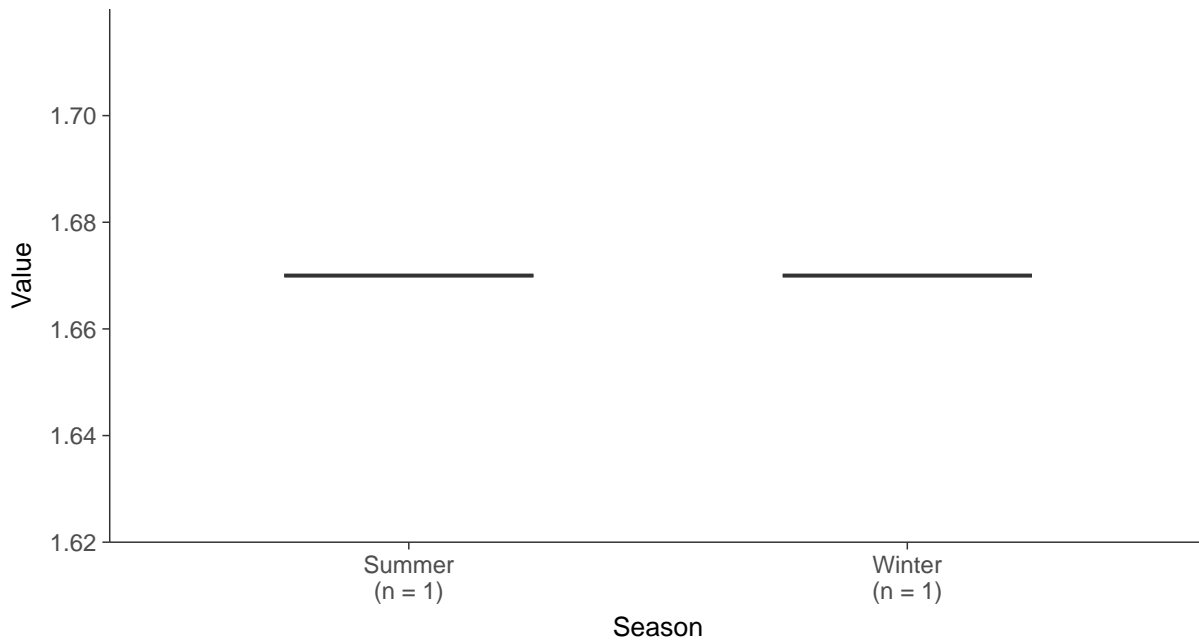
Boxplot

Potassium, MW-3 (mg/L)



Boxplot by Season

Potassium, MW-3 (mg/L)

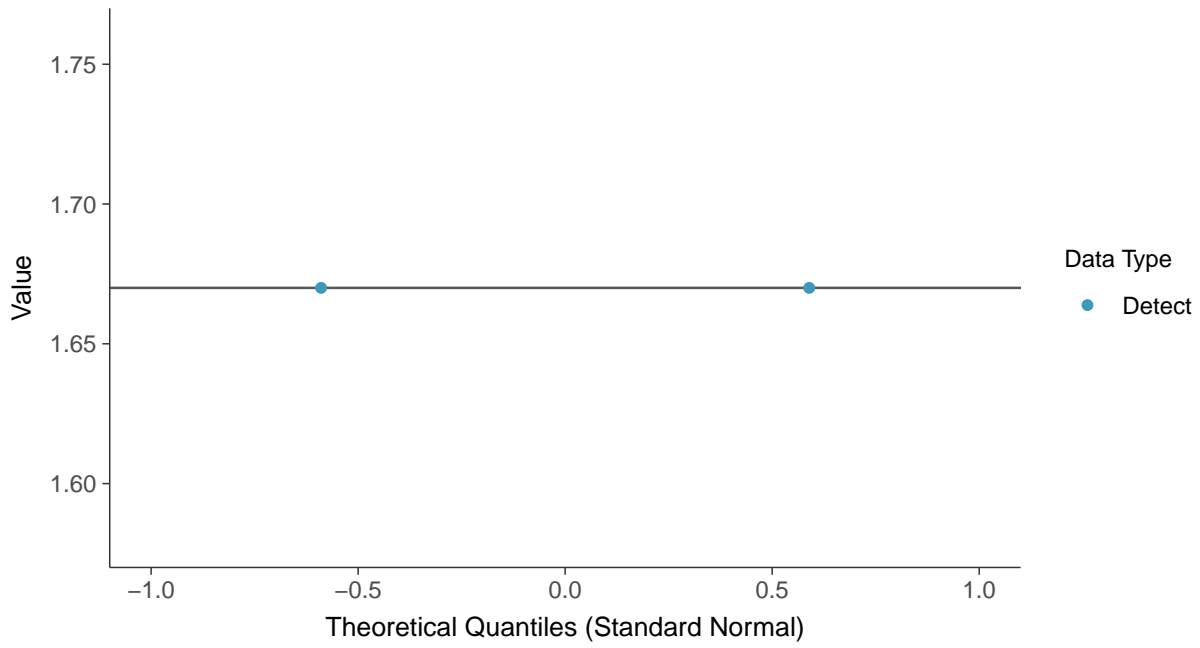




Downgradient Wells MW-2, MW-3, MW-5, MW-6, MW-7, MW-7B, MW-8, MW-9, MW-10, MW-13, MW-14, MW-15

Normal Q-Q plot

Potassium, MW-3 (mg/L)



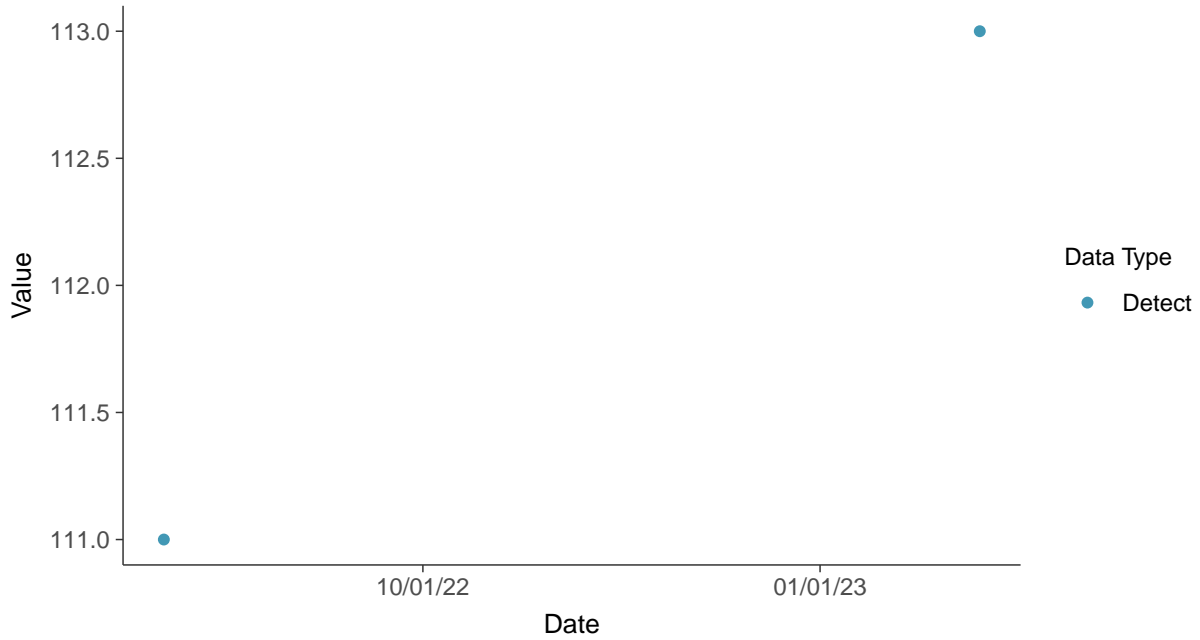


Other: Sodium, MW-3

ID: 03_3_28

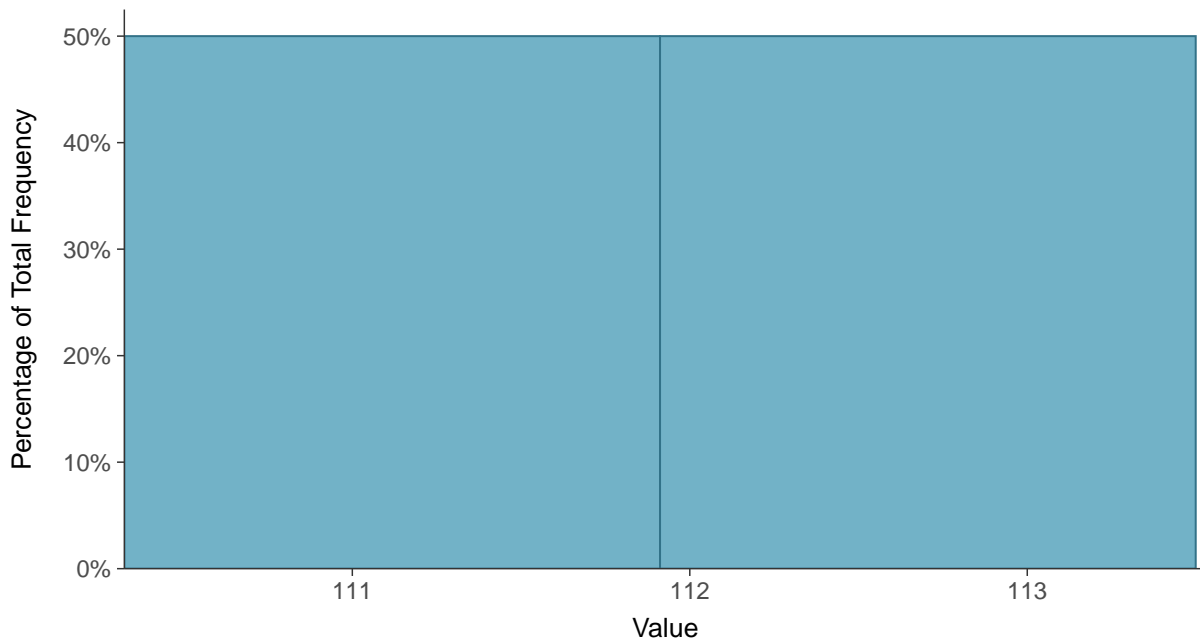
Scatter Plot

Sodium, MW-3 (mg/L)



Histogram

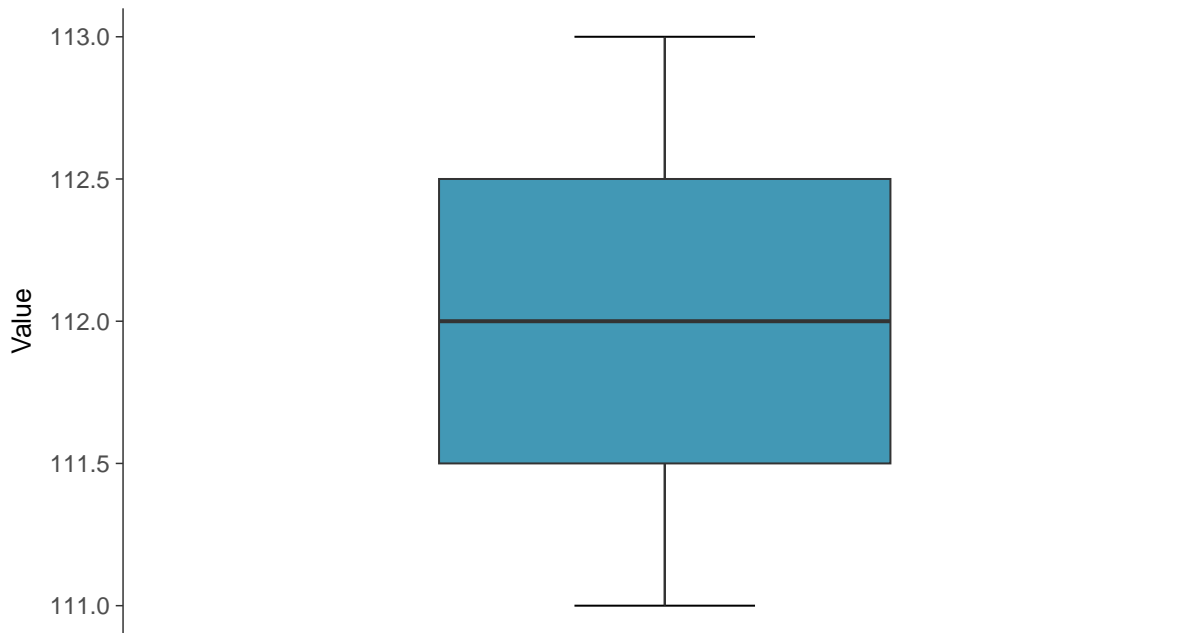
Sodium, MW-3 (mg/L)





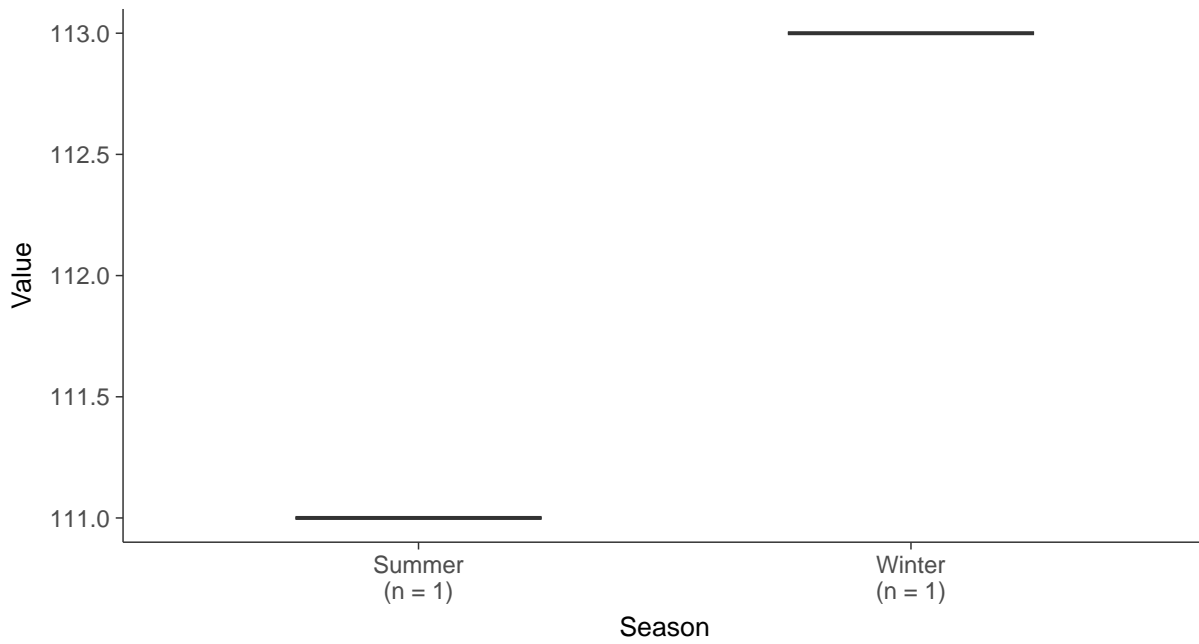
Boxplot

Sodium, MW-3 (mg/L)



Boxplot by Season

Sodium, MW-3 (mg/L)

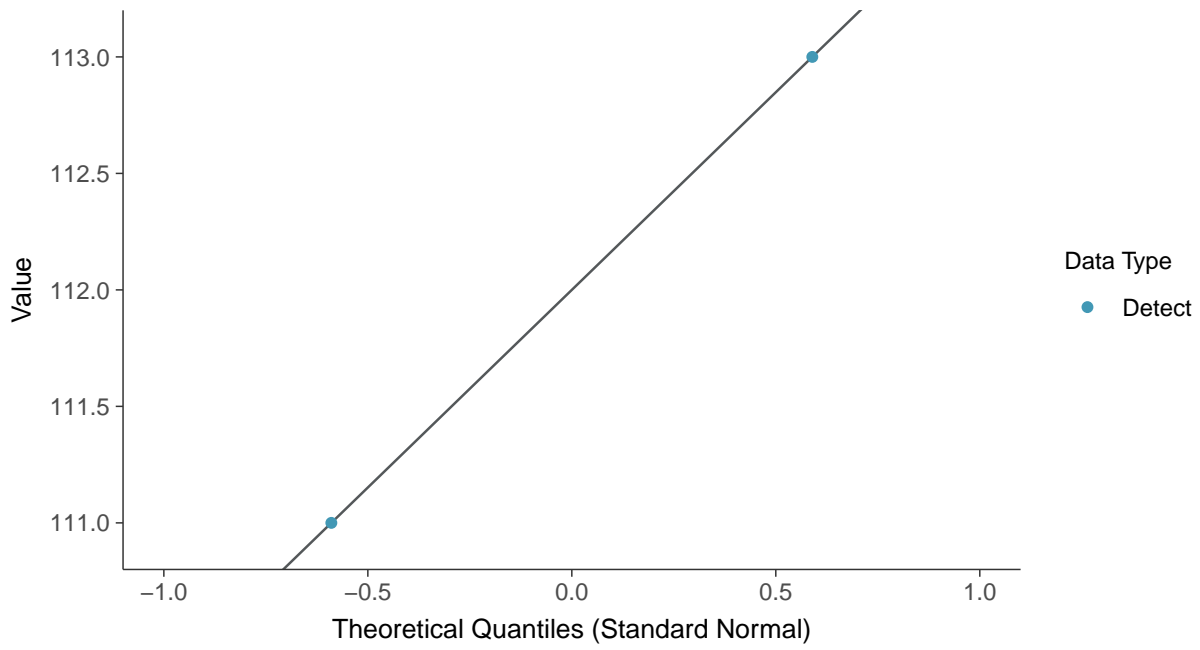




Downgradient Wells MW-2, MW-3, MW-5, MW-6, MW-7, MW-7B, MW-8, MW-9, MW-10, MW-13, MW-14, MW-15

Normal Q-Q plot

Sodium, MW-3 (mg/L)



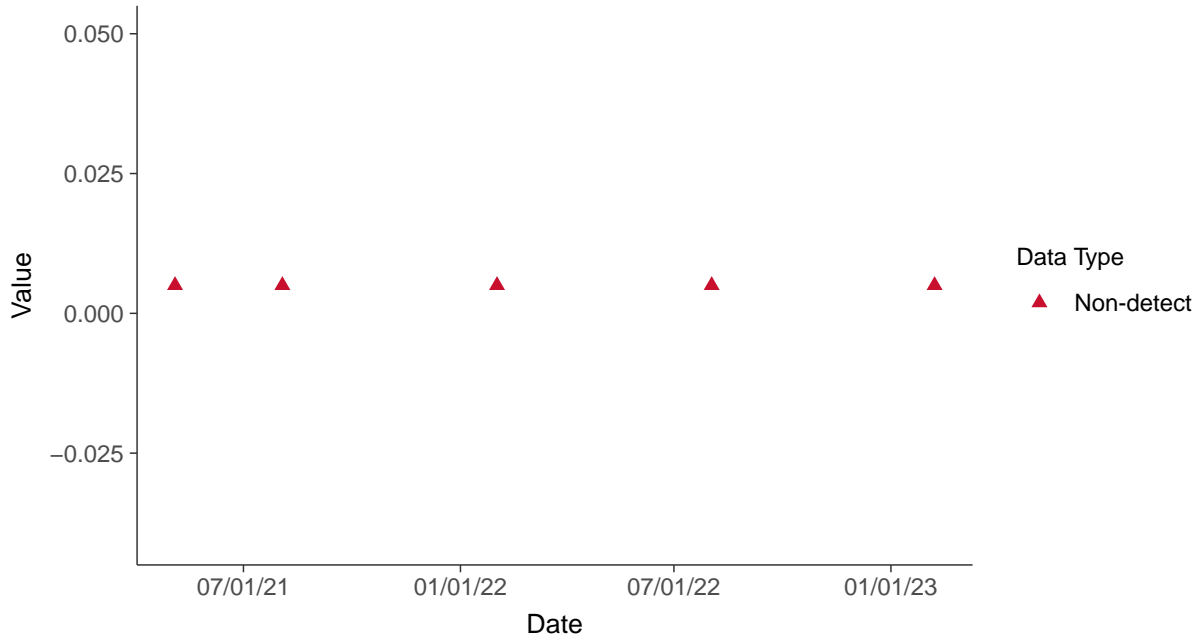


Part 115: Copper, MW-3

ID: 03_5_37

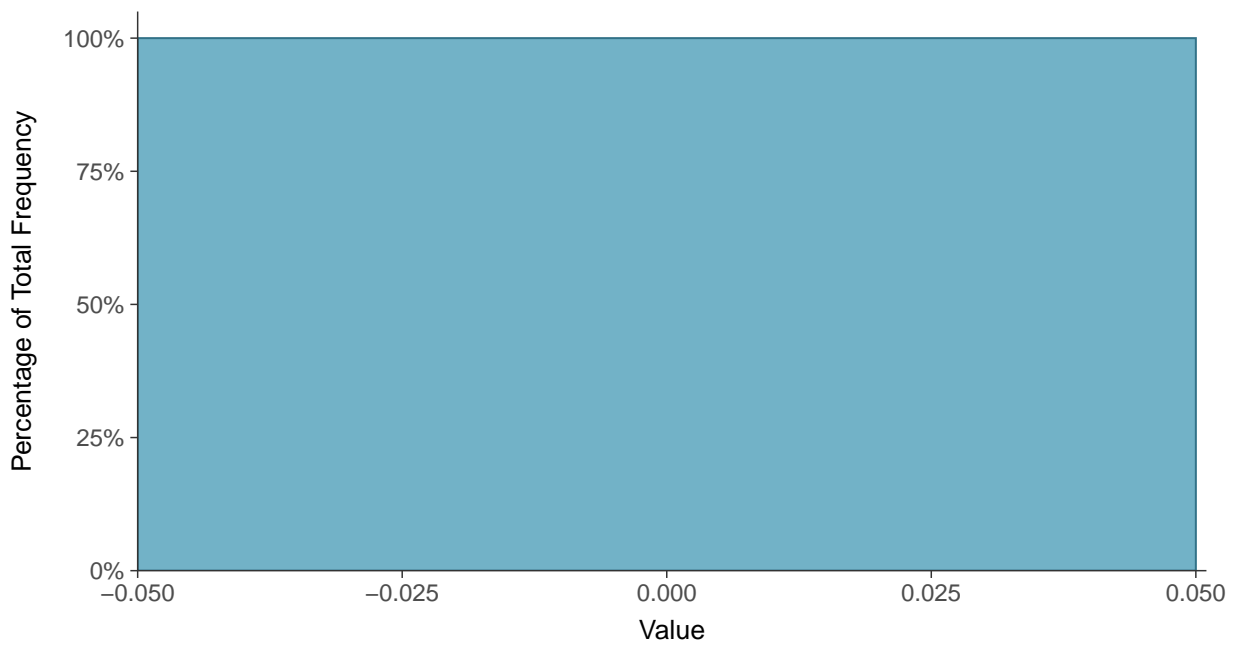
Scatter Plot

Copper, MW-3 (mg/L)



Histogram

Copper, MW-3 (mg/L)





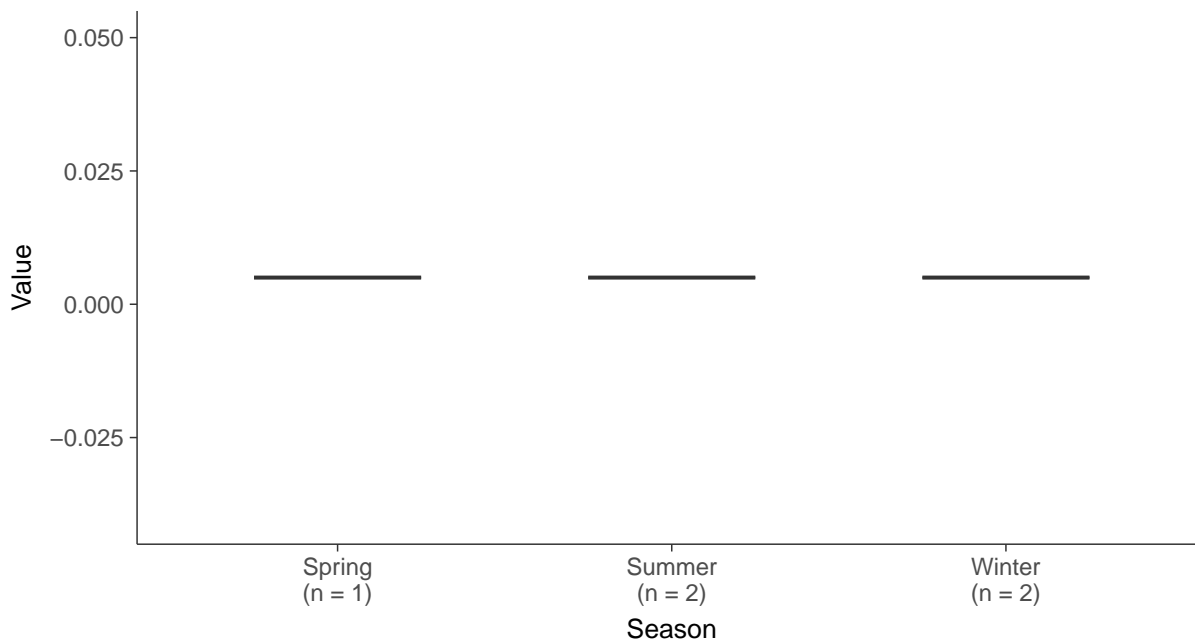
Boxplot

Copper, MW-3 (mg/L)



Boxplot by Season

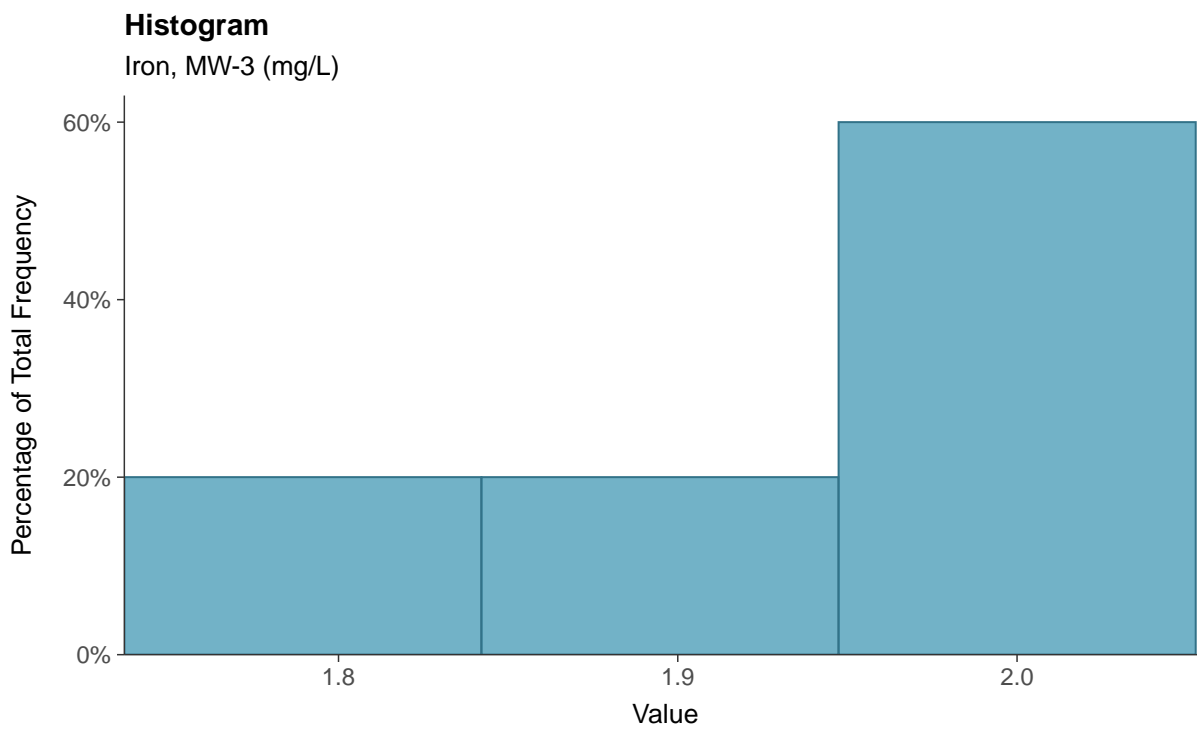
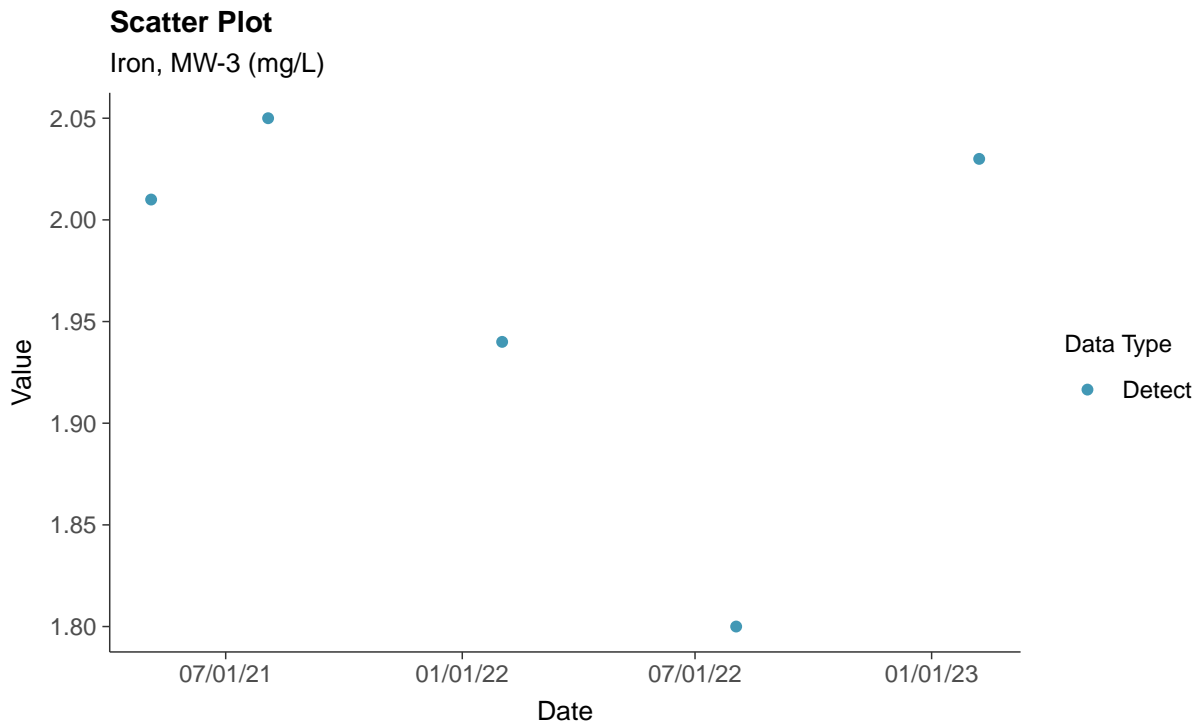
Copper, MW-3 (mg/L)





Part 115: Iron, MW-3

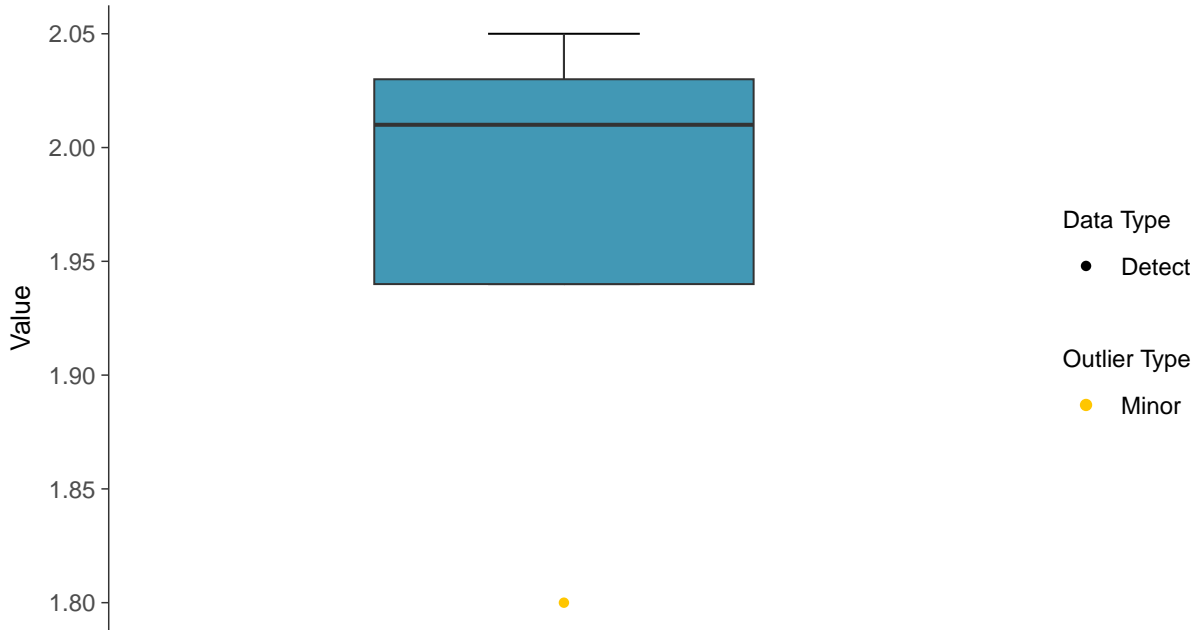
ID: 03_5_38





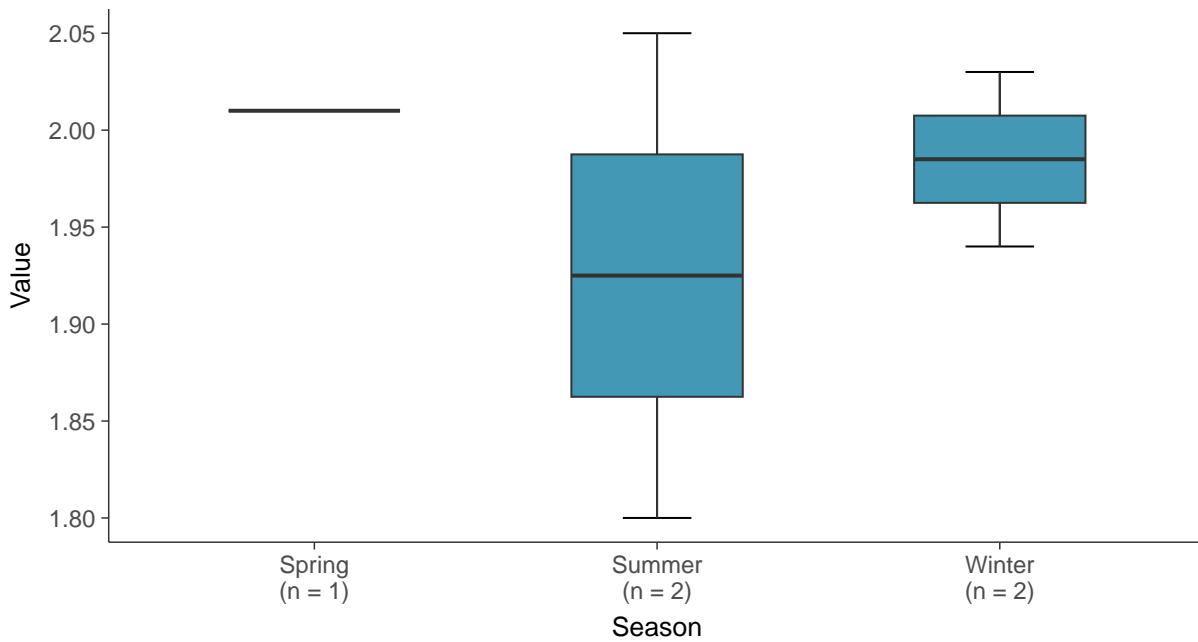
Boxplot

Iron, MW-3 (mg/L)



Boxplot by Season

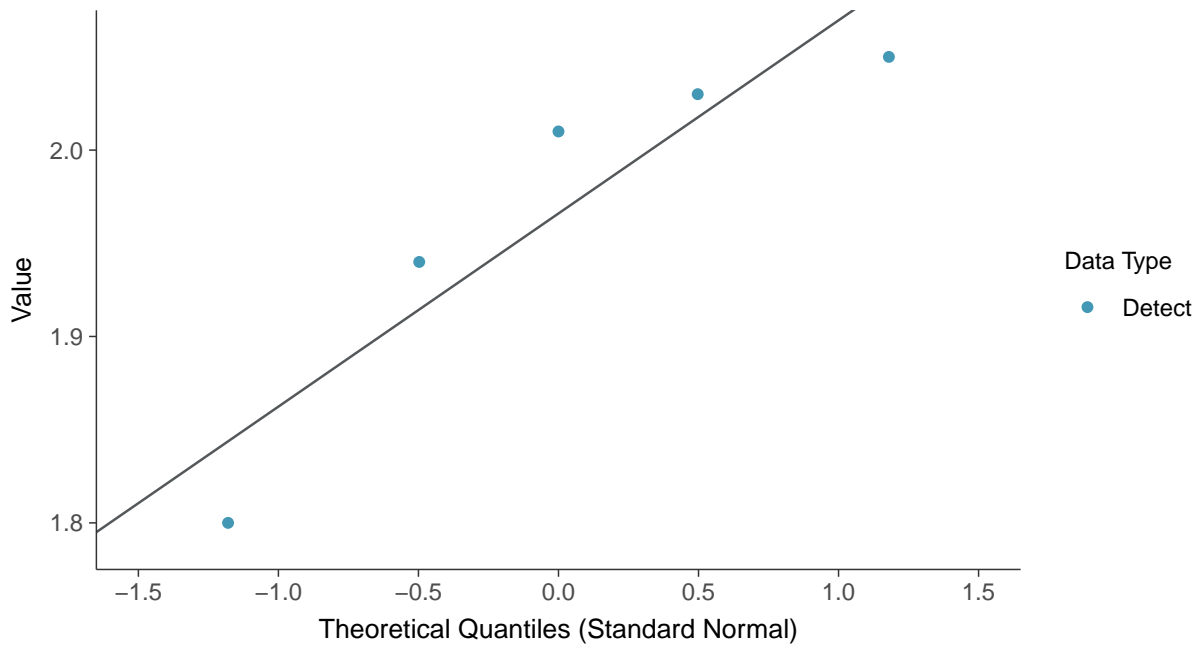
Iron, MW-3 (mg/L)





Normal Q-Q plot

Iron, MW-3 (mg/L)



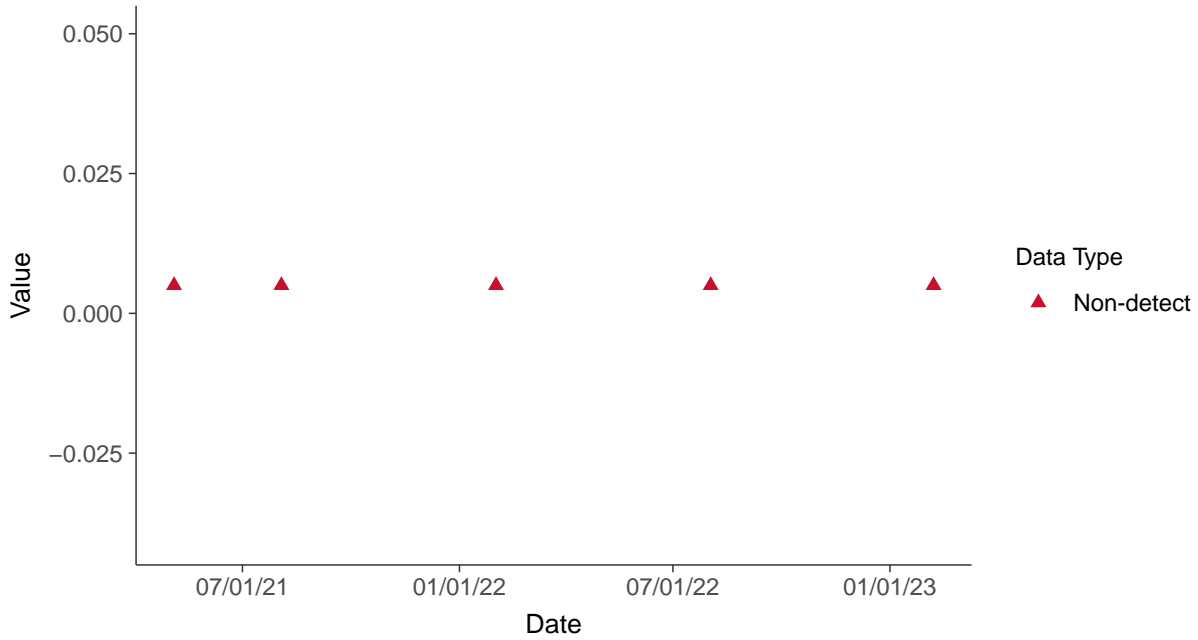


Part 115: Nickel, MW-3

ID: 03_5_39

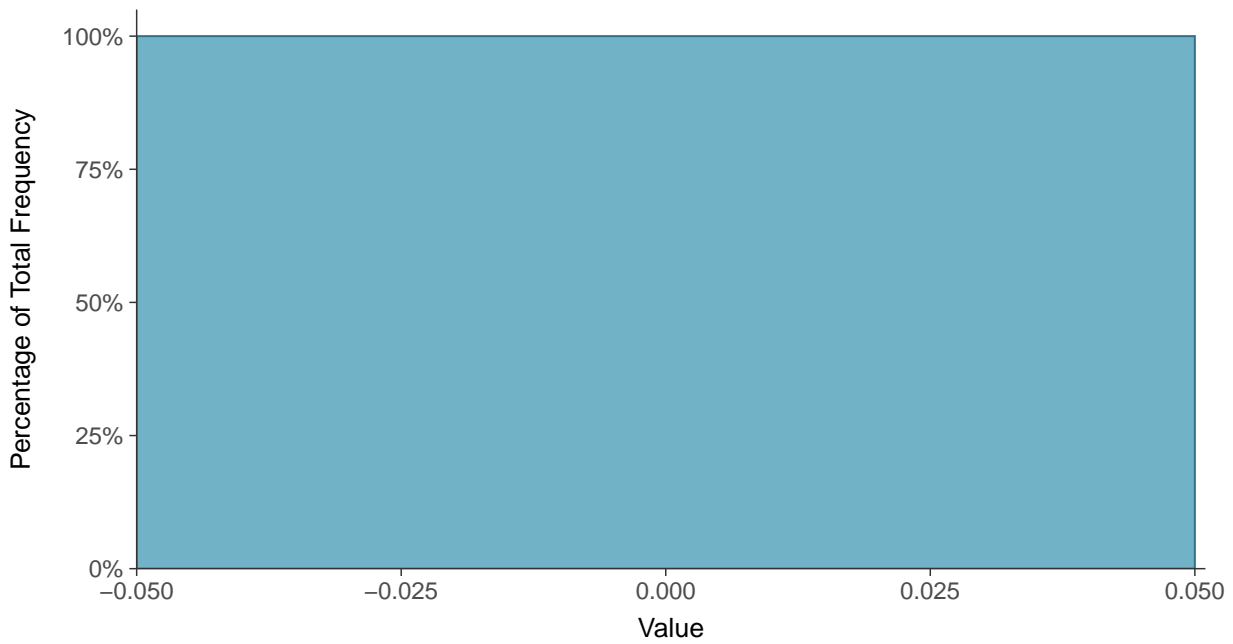
Scatter Plot

Nickel, MW-3 (mg/L)



Histogram

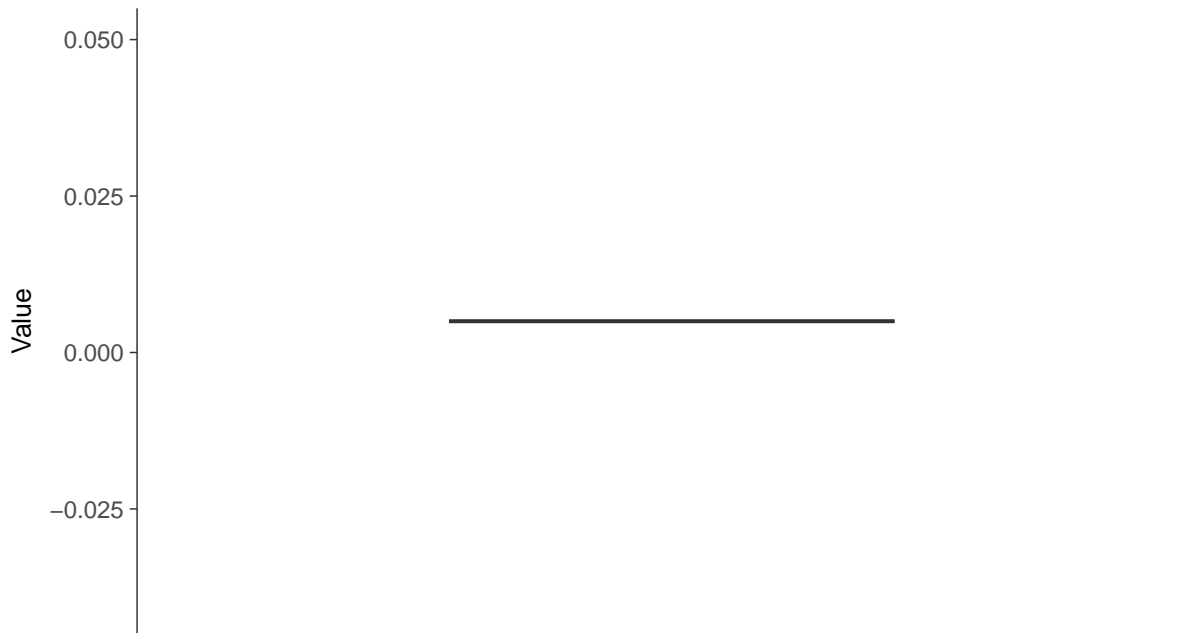
Nickel, MW-3 (mg/L)





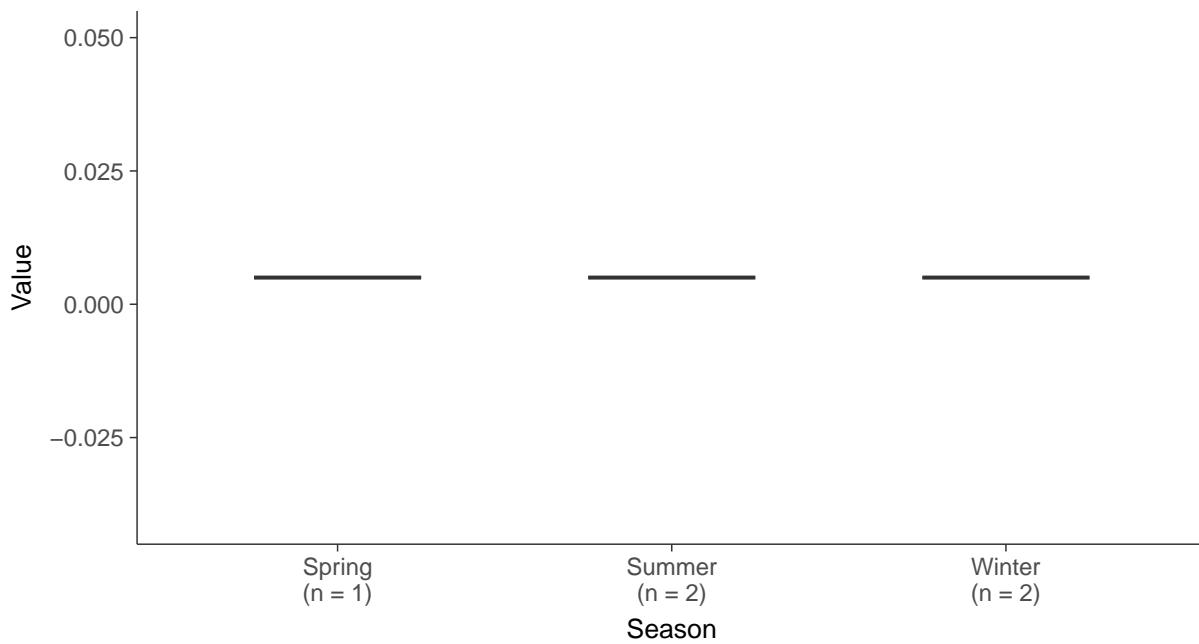
Boxplot

Nickel, MW-3 (mg/L)



Boxplot by Season

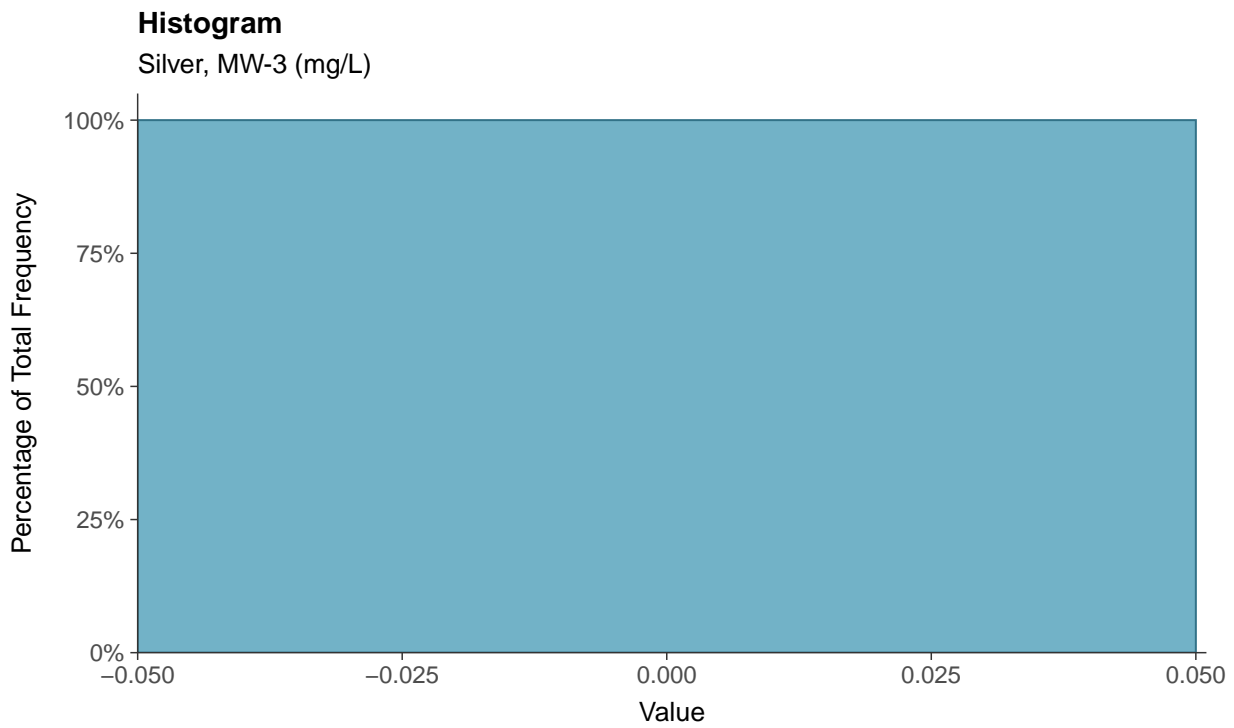
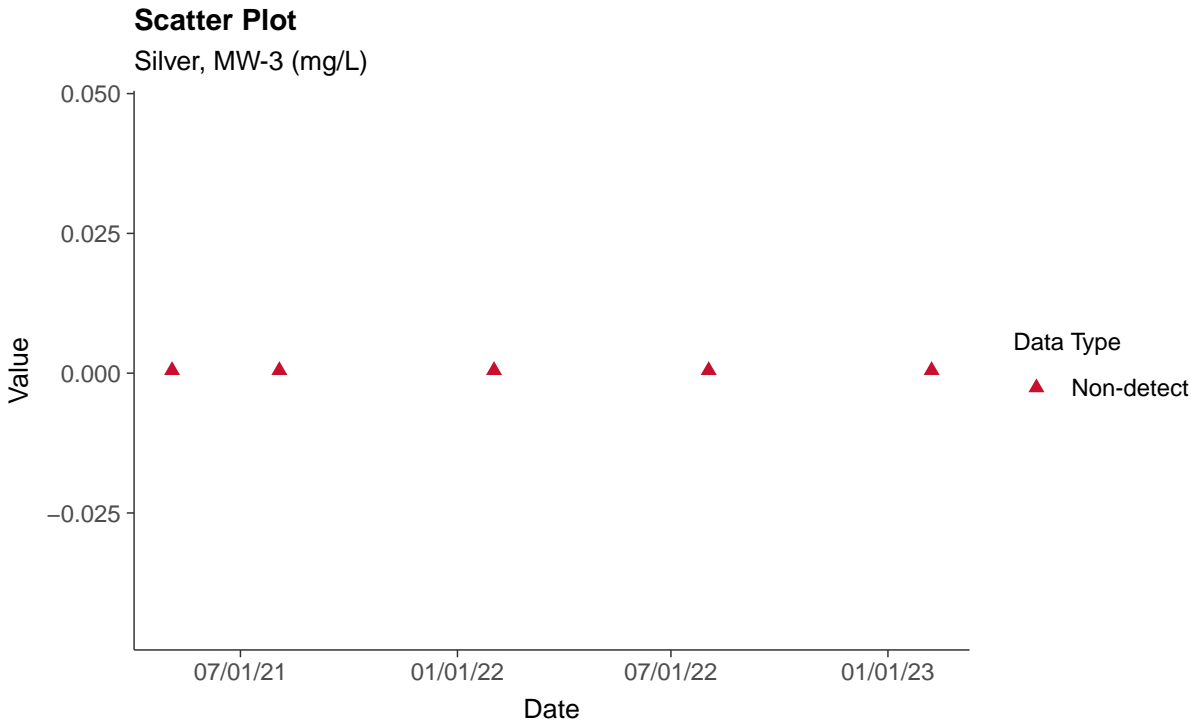
Nickel, MW-3 (mg/L)





Part 115: Silver, MW-3

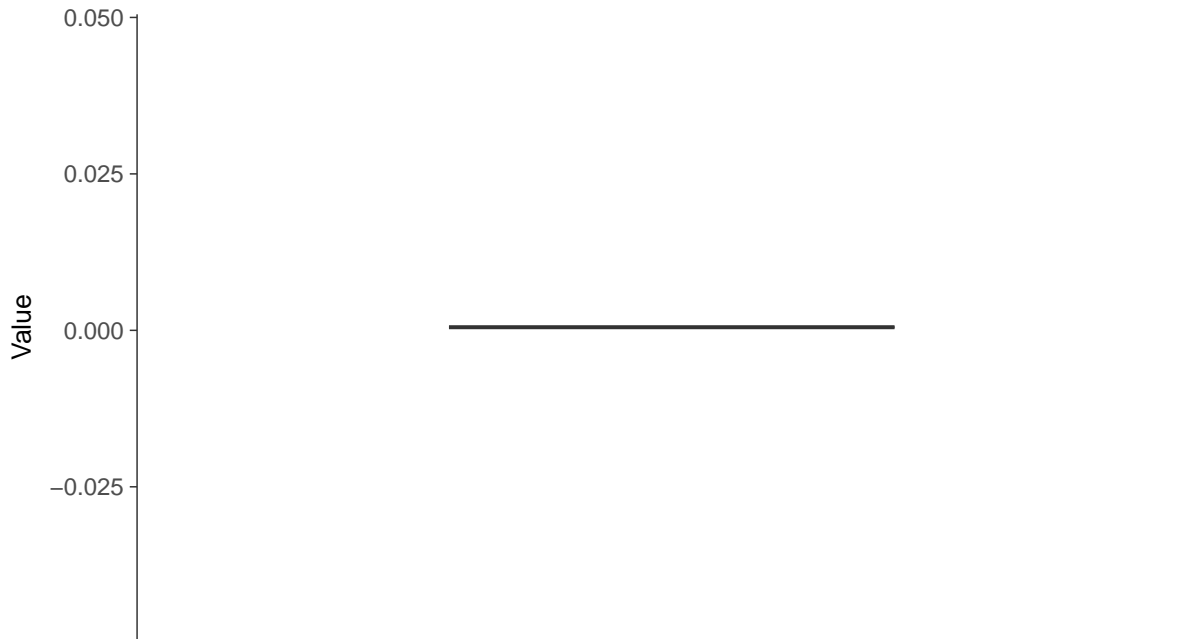
ID: 03_5_40





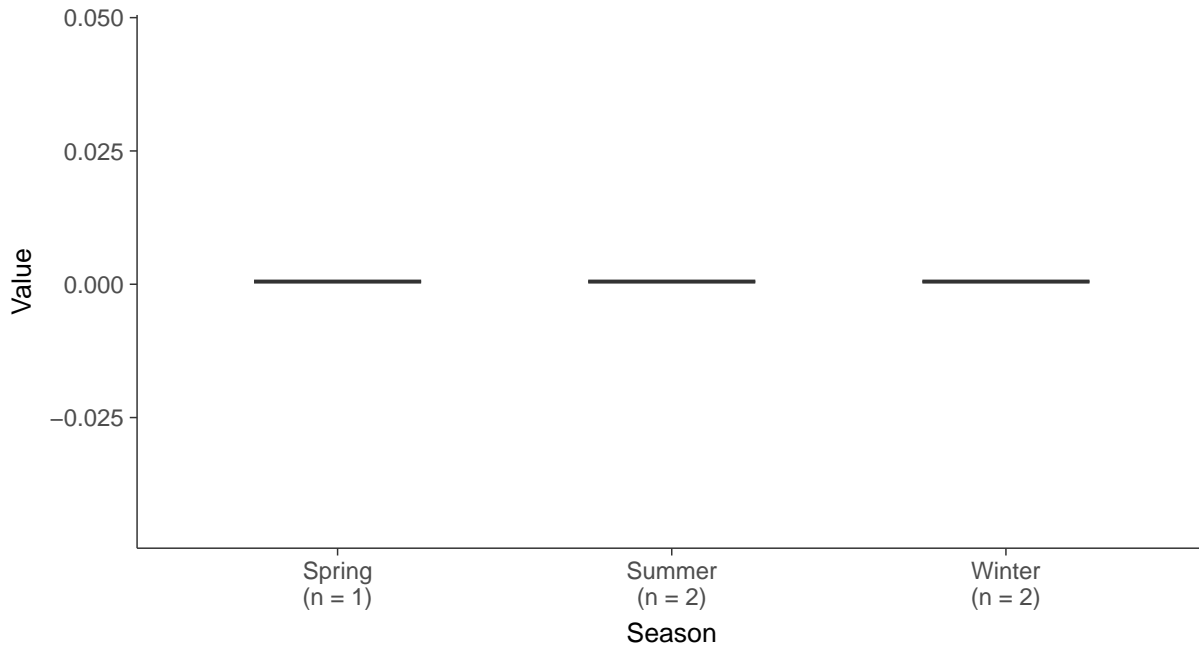
Boxplot

Silver, MW-3 (mg/L)



Boxplot by Season

Silver, MW-3 (mg/L)



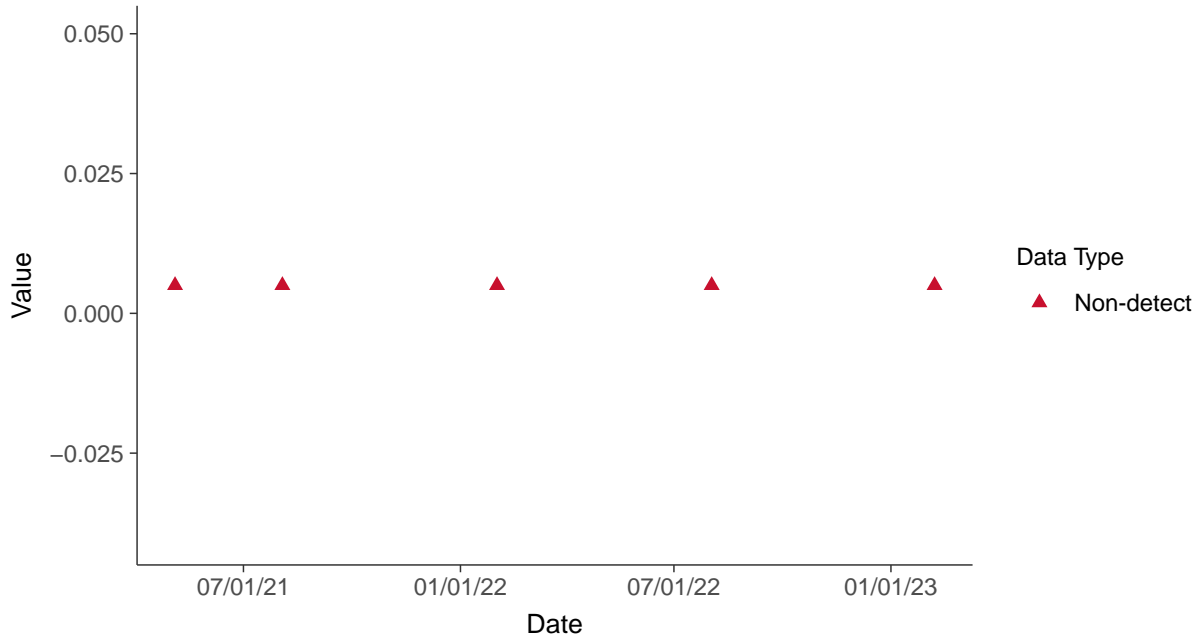


Part 115: Vanadium, MW-3

ID: 03_5_41

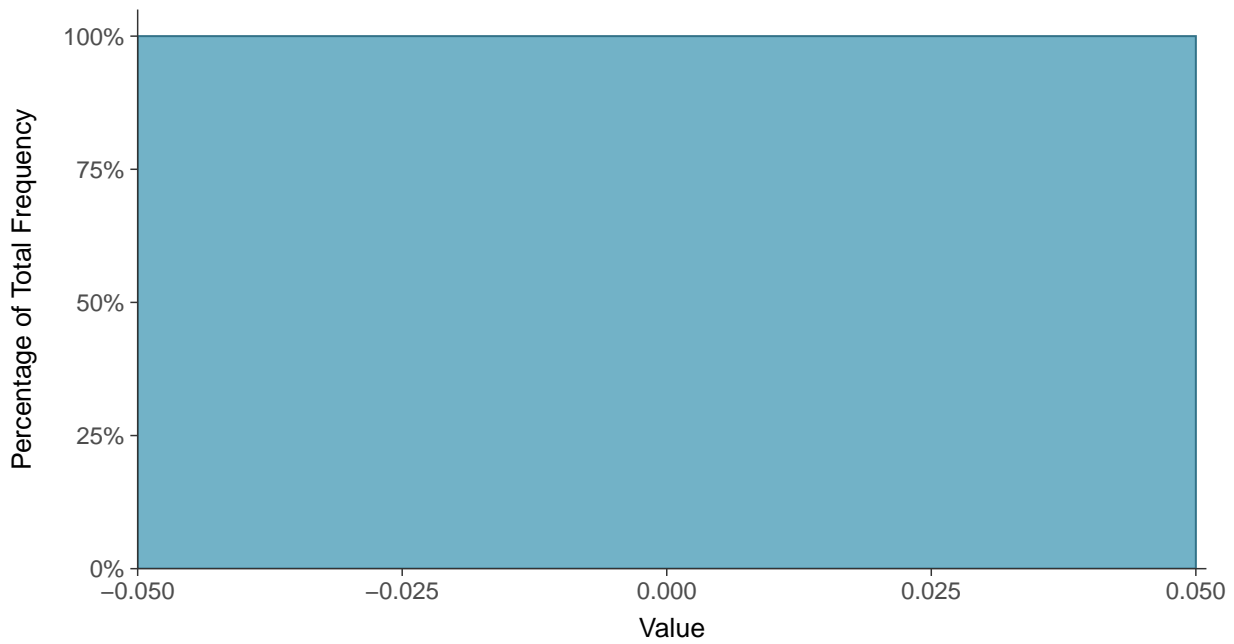
Scatter Plot

Vanadium, MW-3 (mg/L)



Histogram

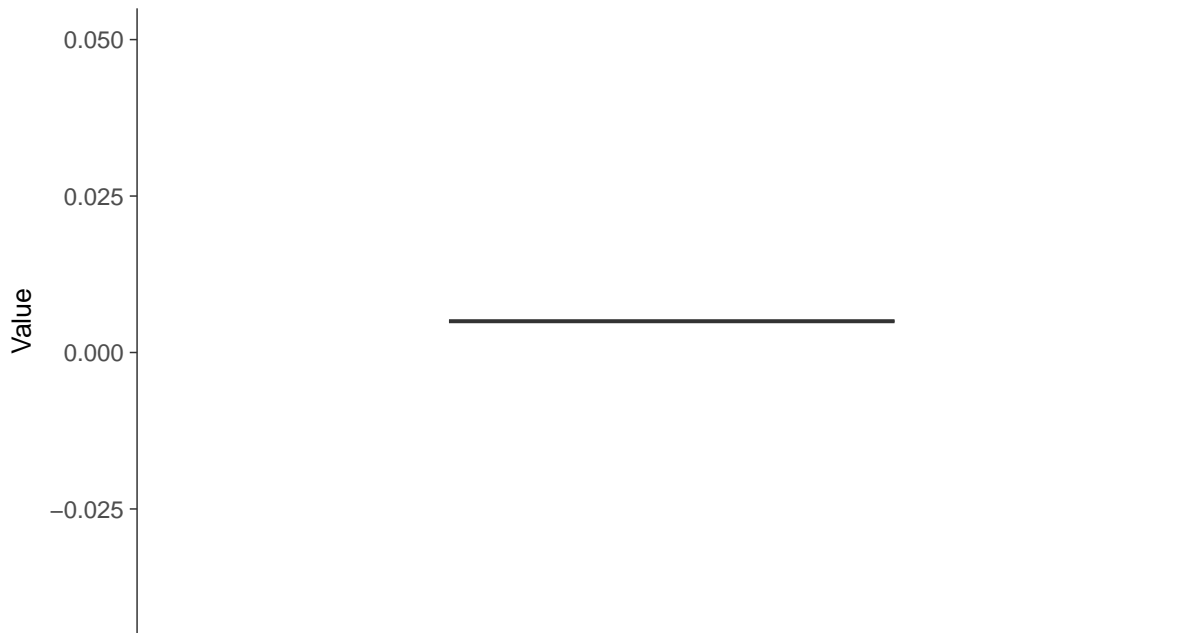
Vanadium, MW-3 (mg/L)





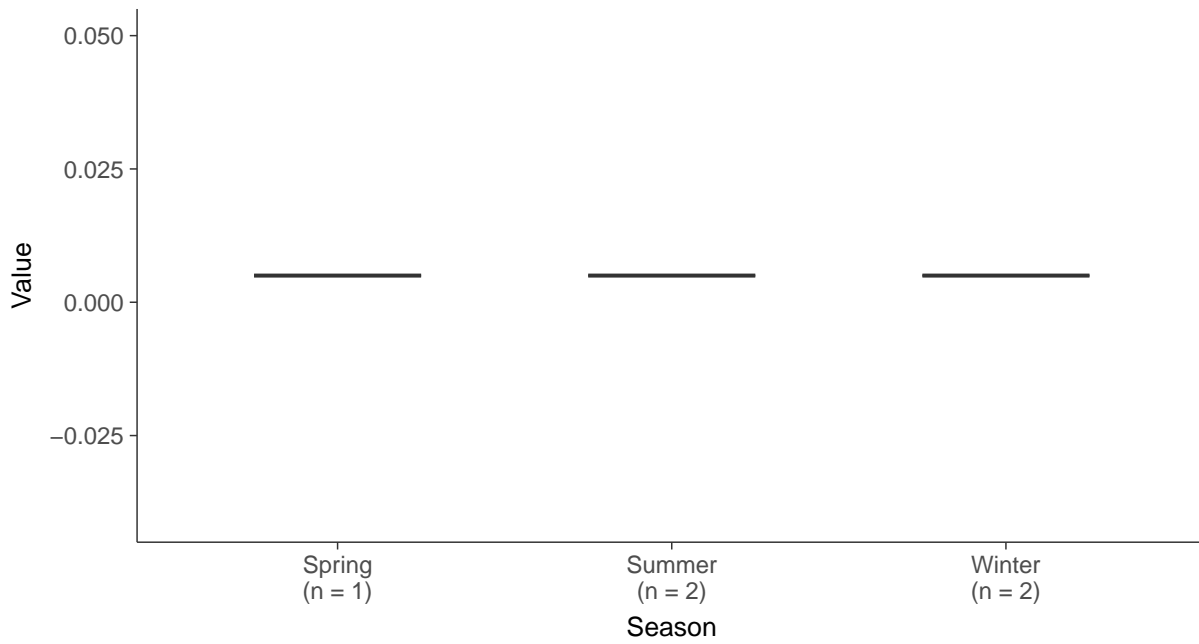
Boxplot

Vanadium, MW-3 (mg/L)



Boxplot by Season

Vanadium, MW-3 (mg/L)



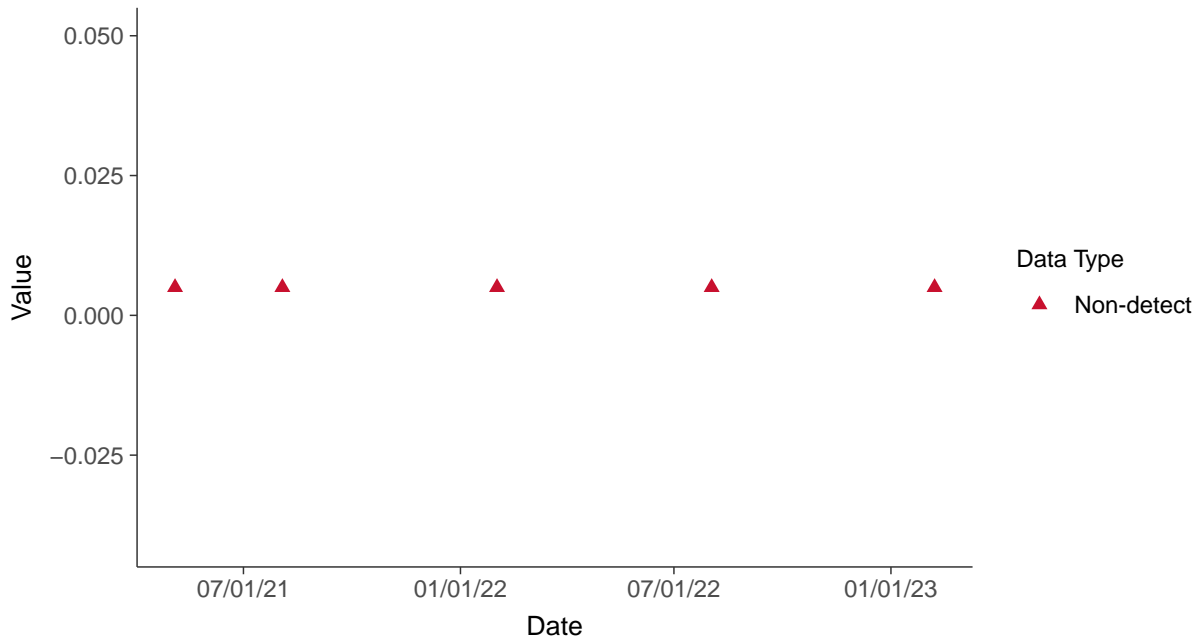


Part 115: Zinc, MW-3

ID: 03_5_42

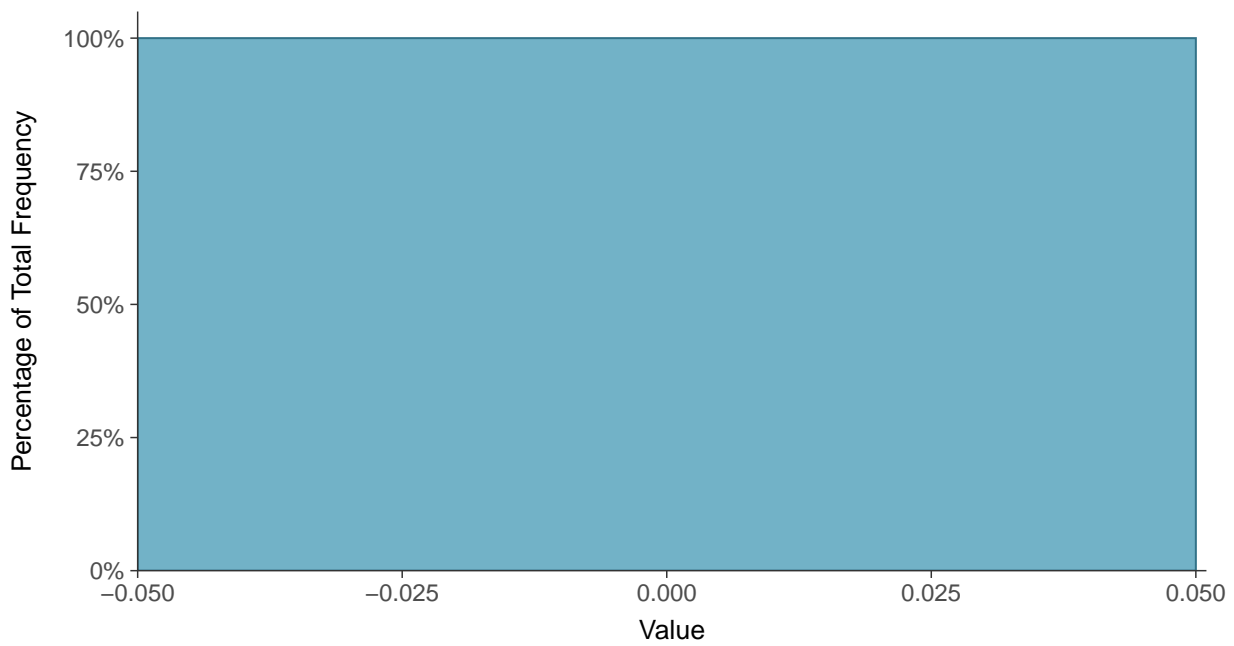
Scatter Plot

Zinc, MW-3 (mg/L)



Histogram

Zinc, MW-3 (mg/L)





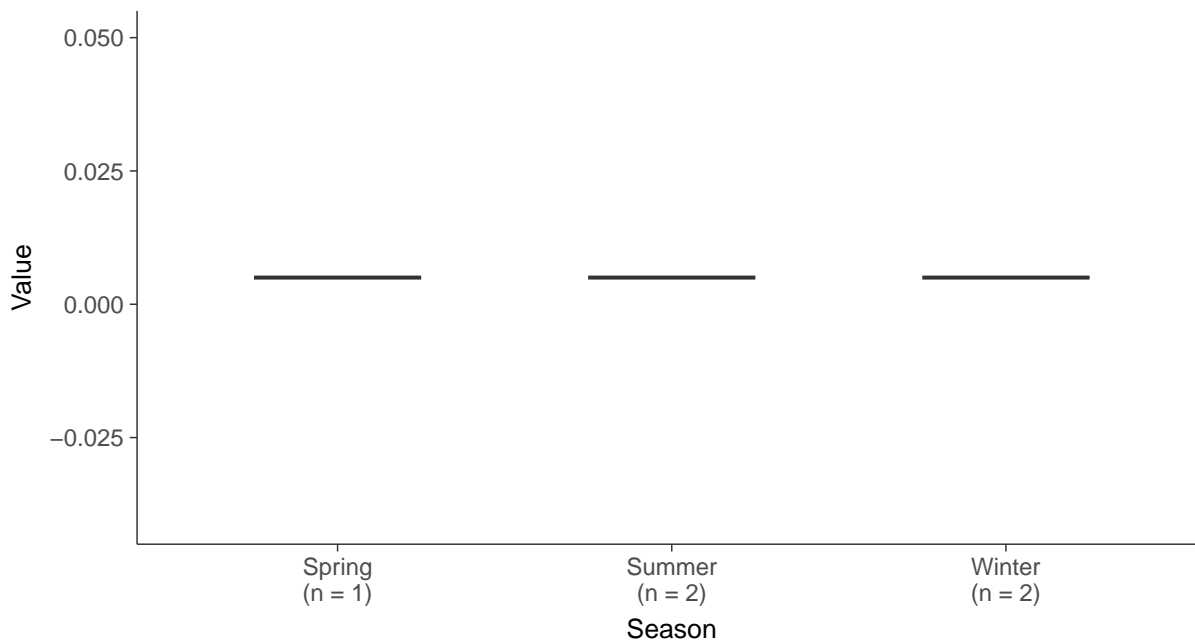
Boxplot

Zinc, MW-3 (mg/L)



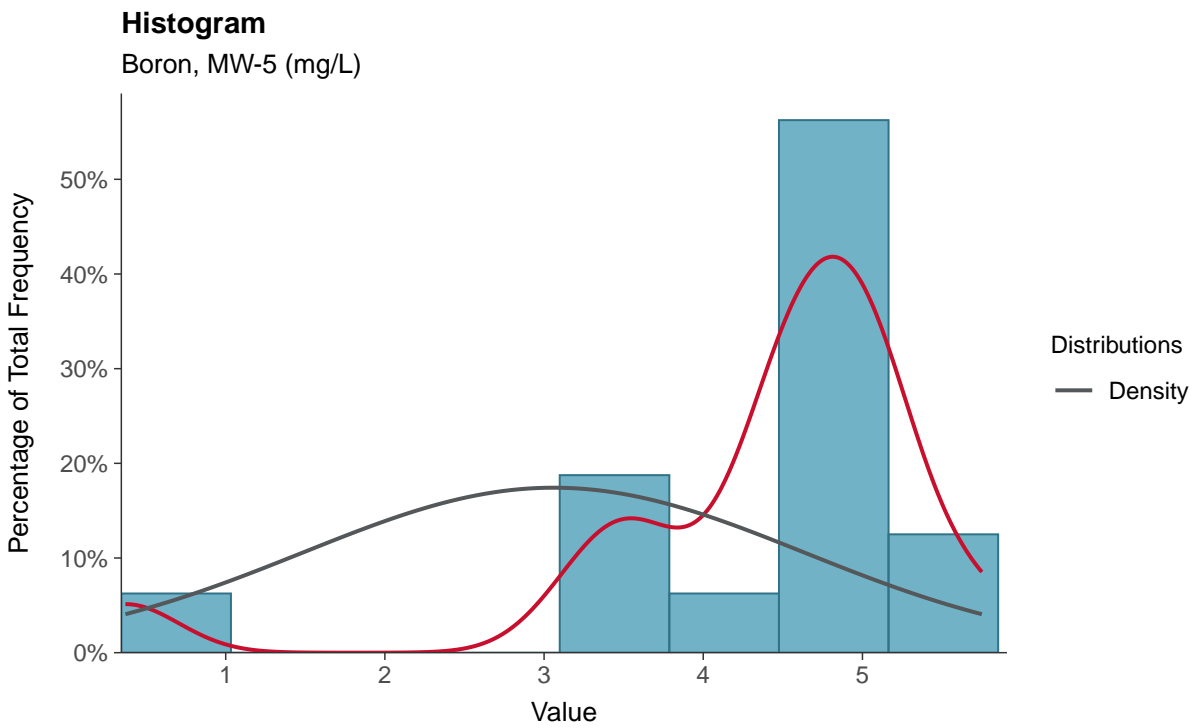
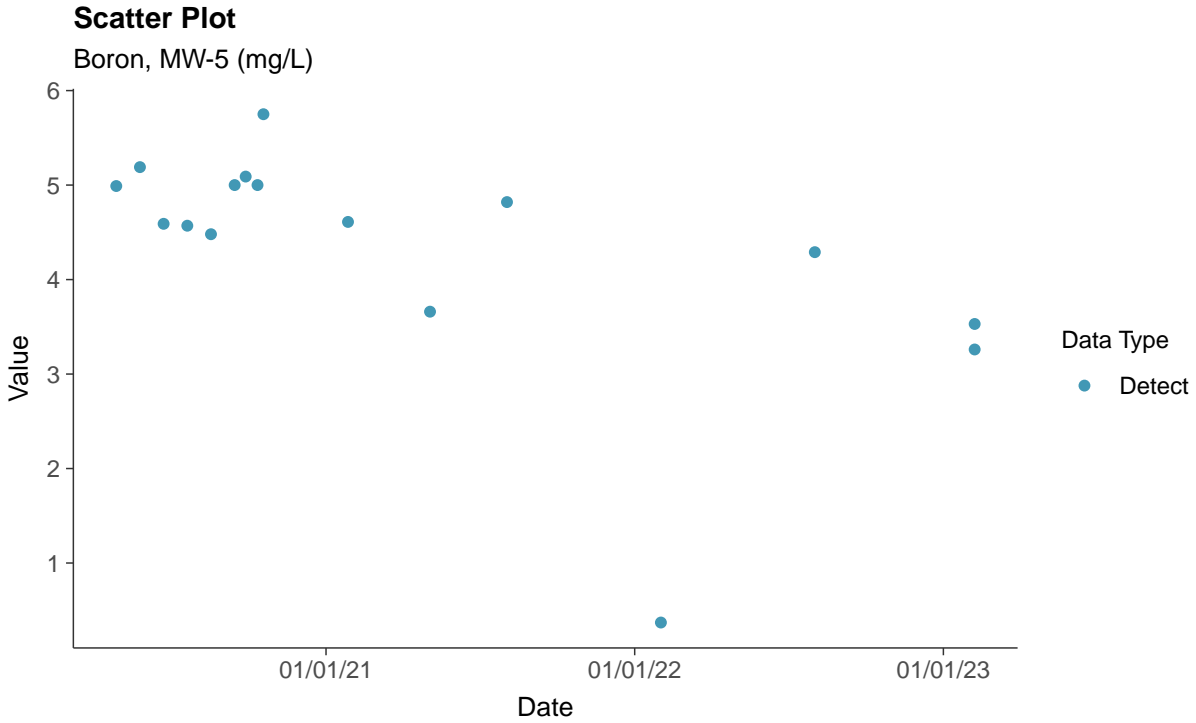
Boxplot by Season

Zinc, MW-3 (mg/L)



Appendix III: Boron, MW-5

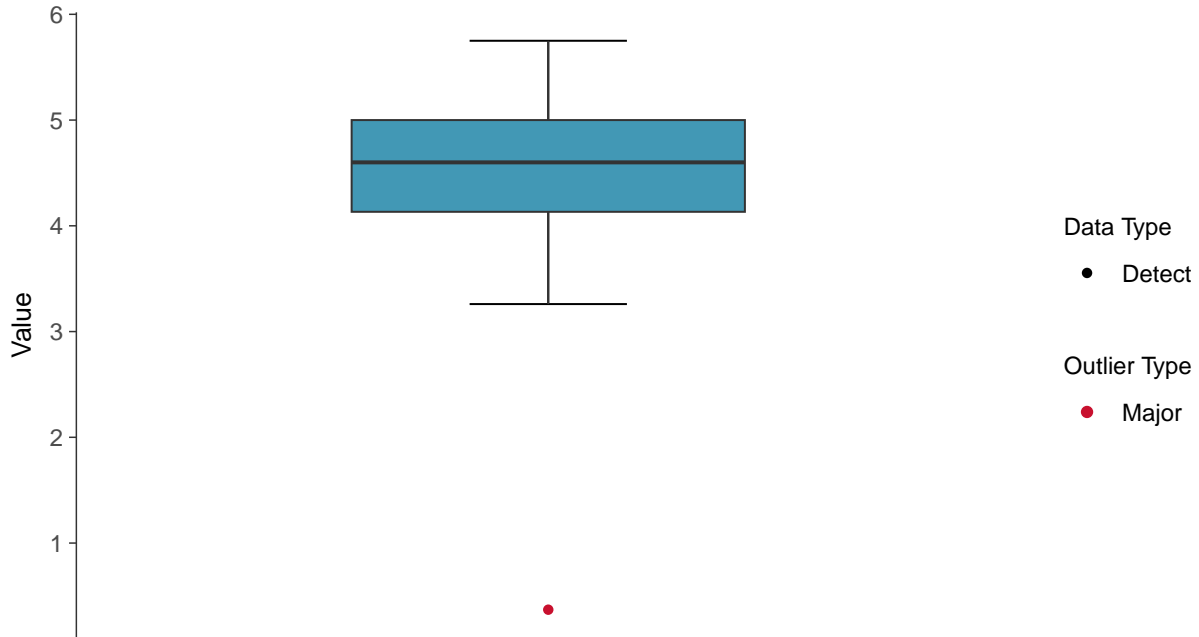
ID: 05_1_01





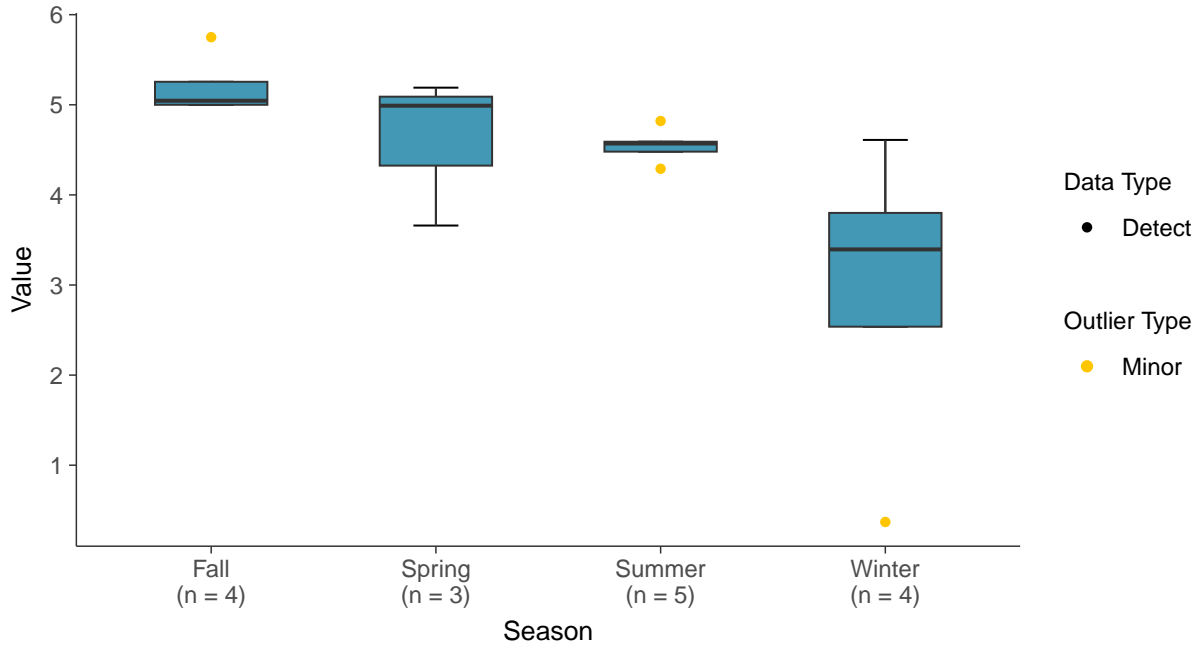
Boxplot

Boron, MW-5 (mg/L)



Boxplot by Season

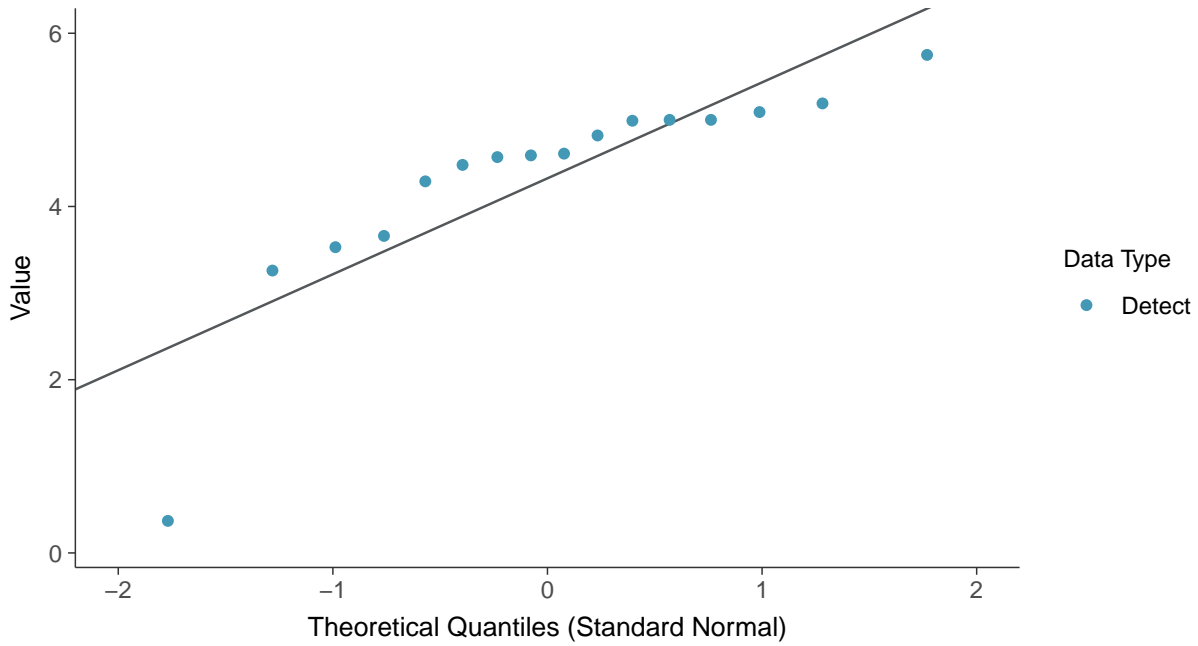
Boron, MW-5 (mg/L)





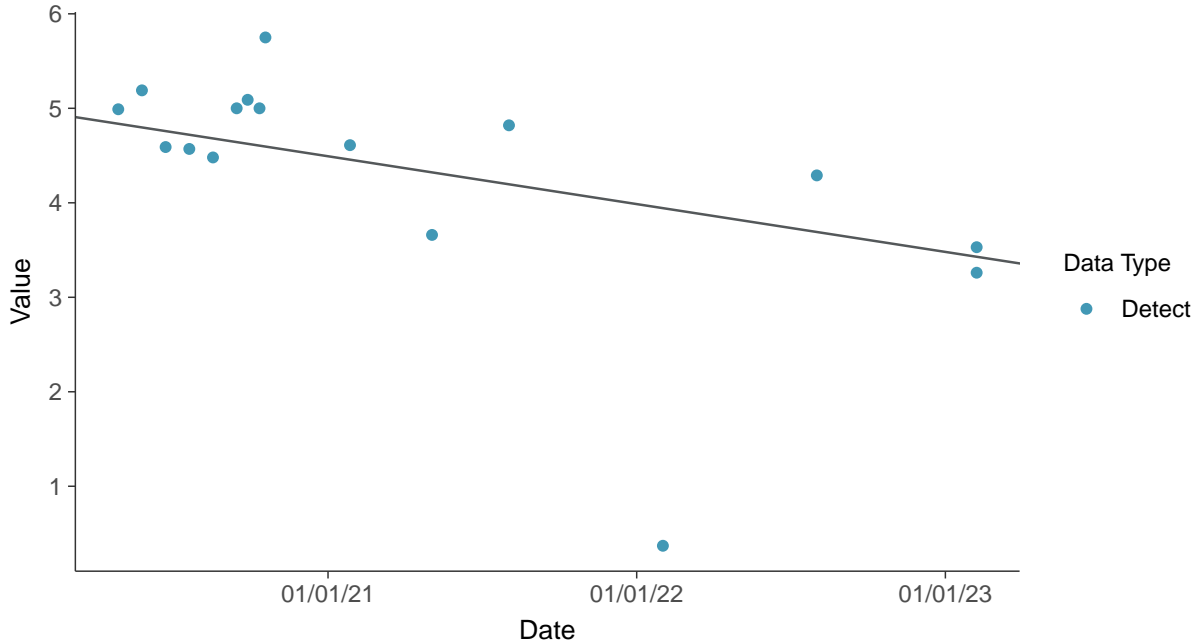
Normal Q-Q plot

Boron, MW-5 (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

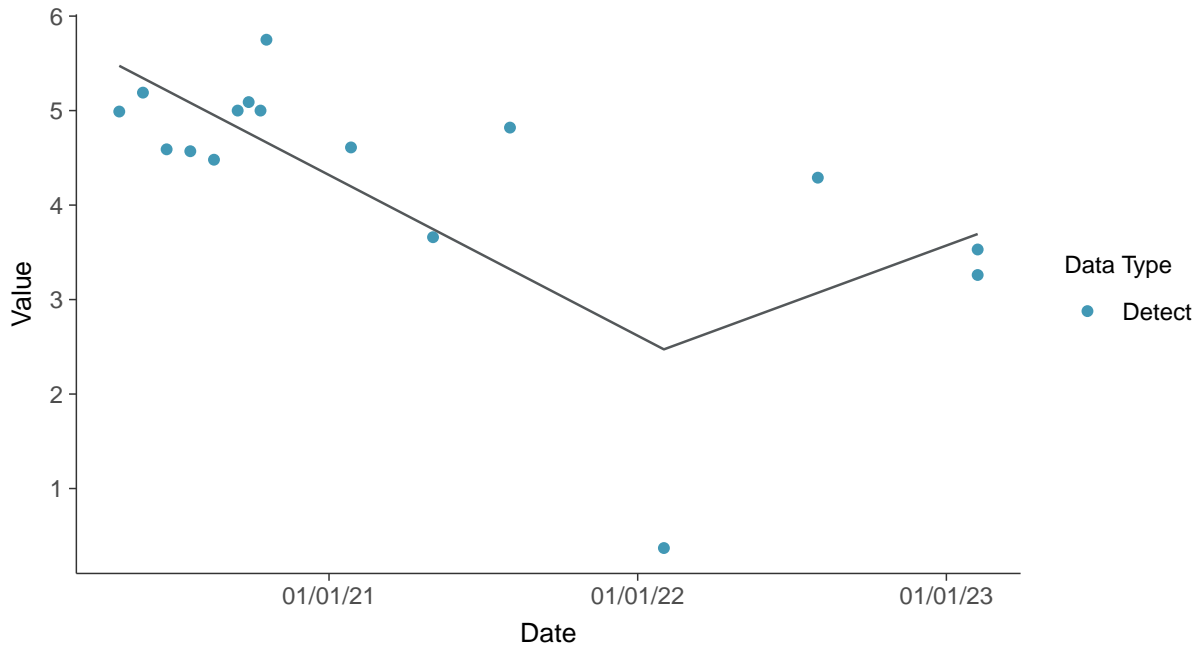
Boron, MW-5 (mg/L)





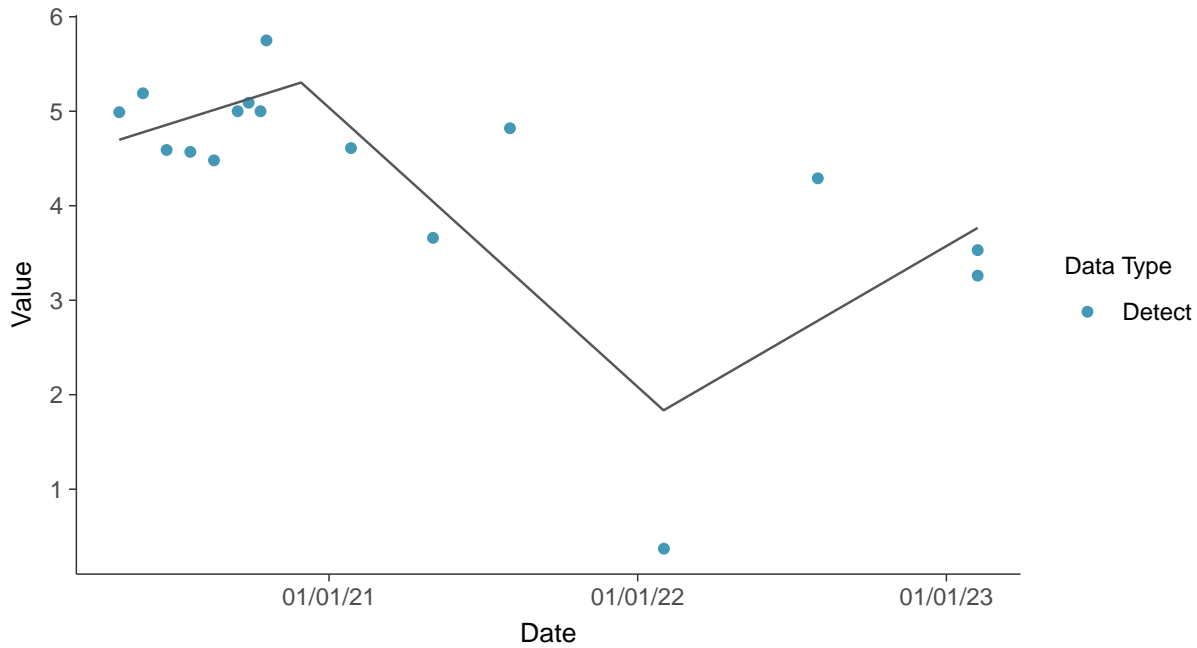
Trend Regression: Piecewise Linear-Linear

Boron, MW-5 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Boron, MW-5 (mg/L)



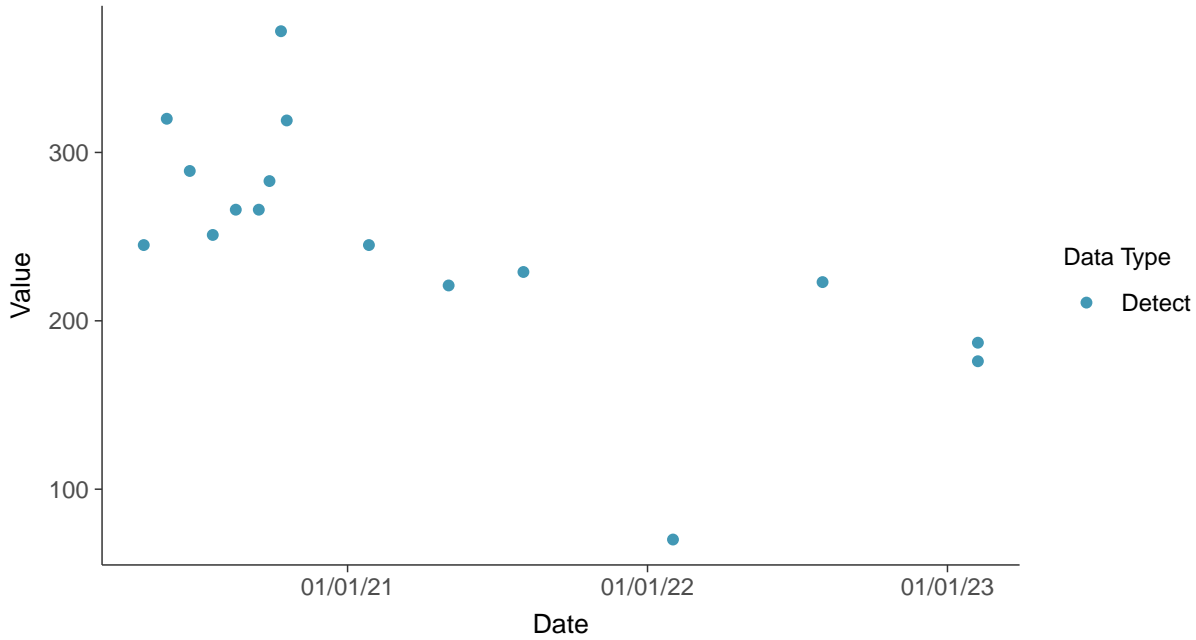


Appendix III: Calcium, MW-5

ID: 05_1_02

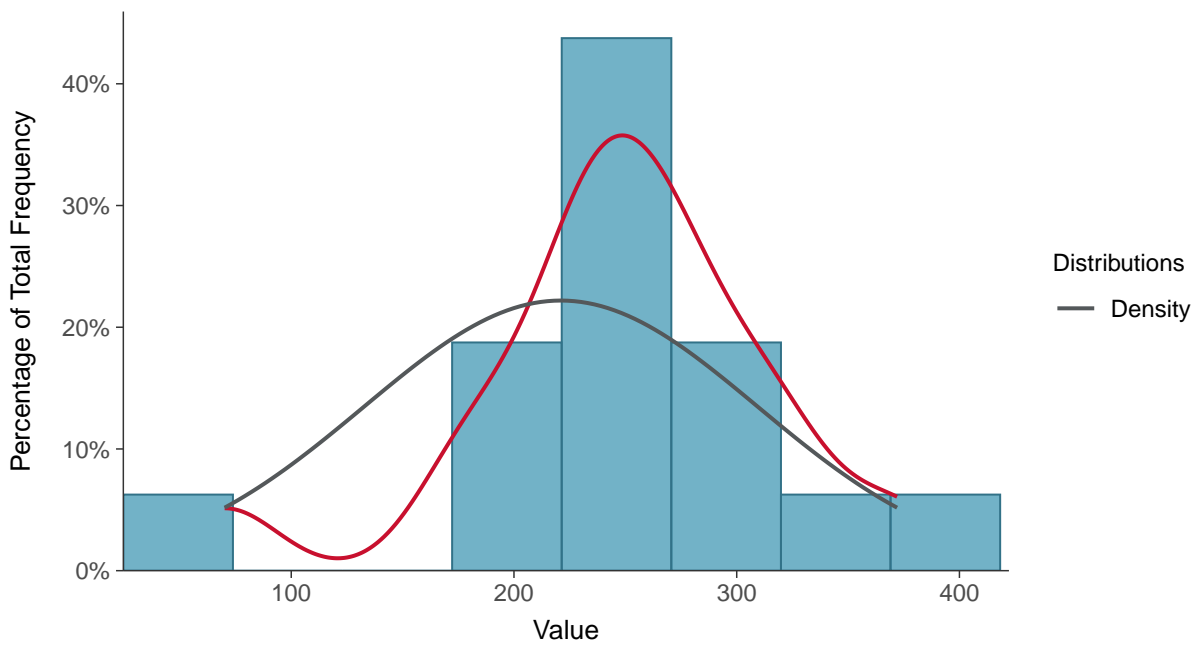
Scatter Plot

Calcium, MW-5 (mg/L)



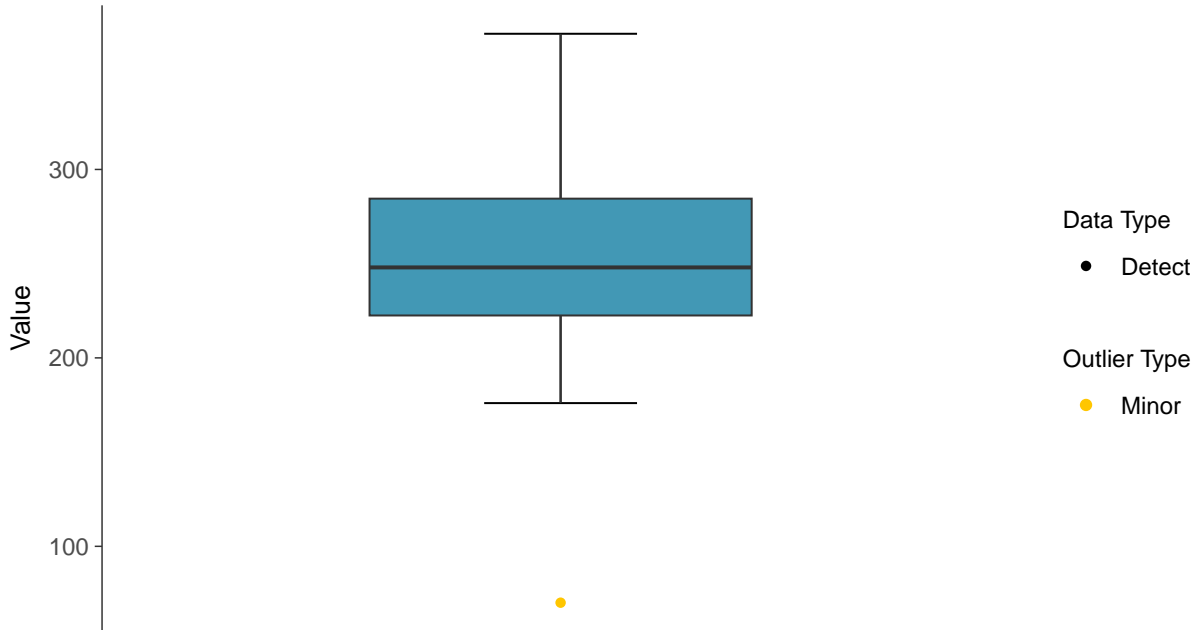
Histogram

Calcium, MW-5 (mg/L)



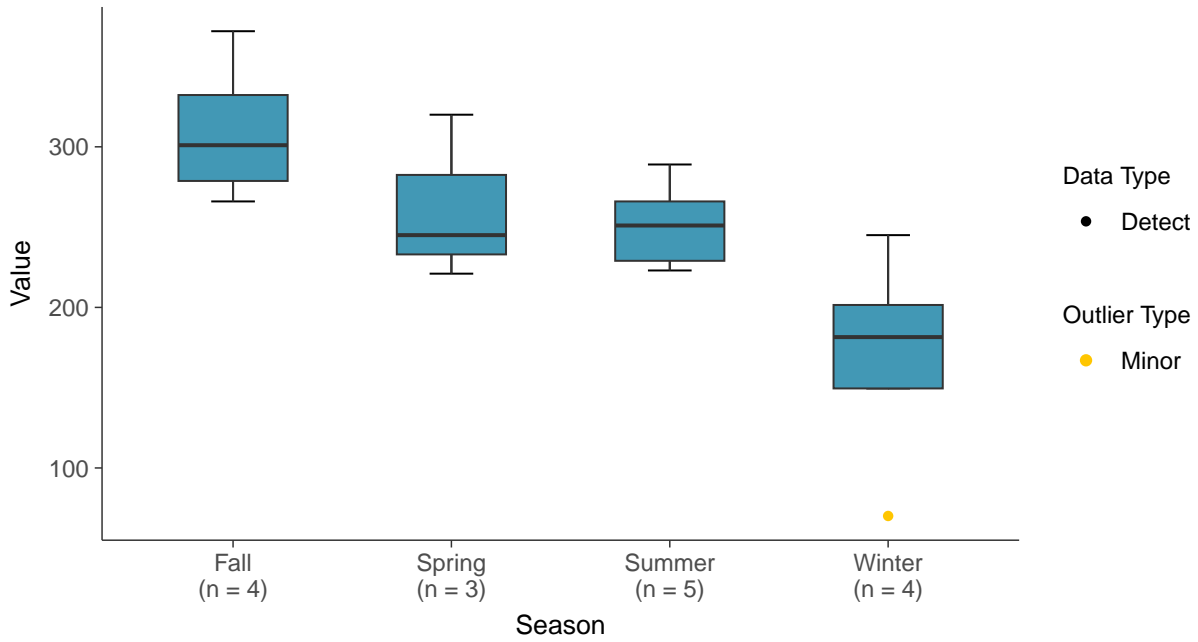
Boxplot

Calcium, MW-5 (mg/L)



Boxplot by Season

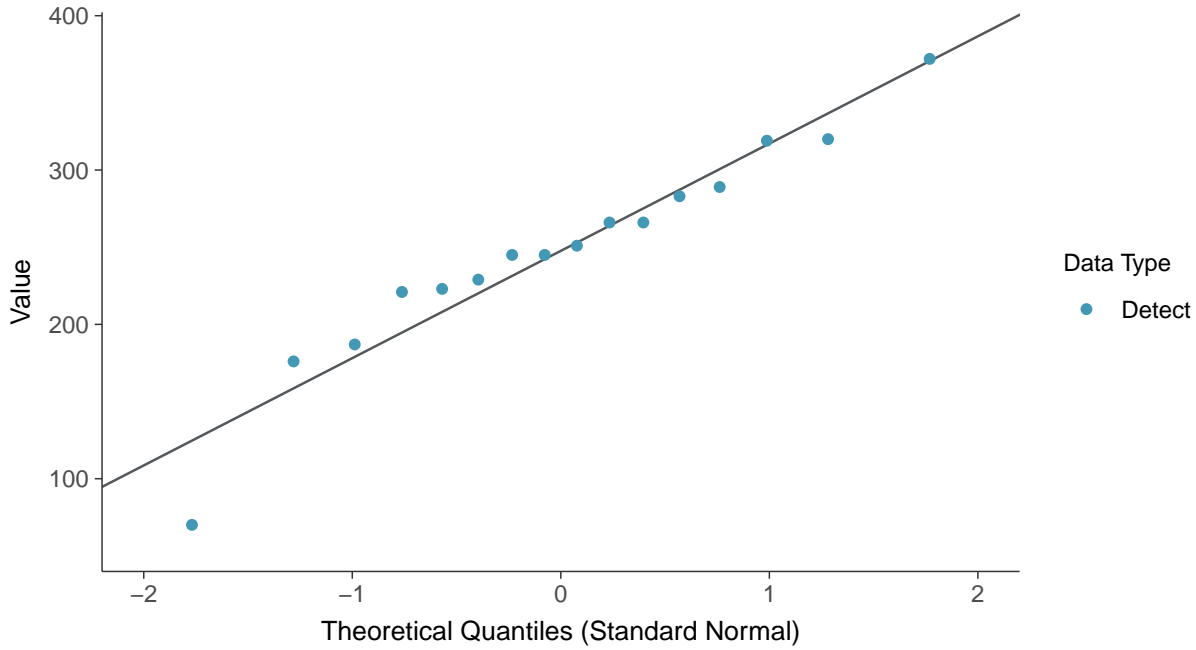
Calcium, MW-5 (mg/L)





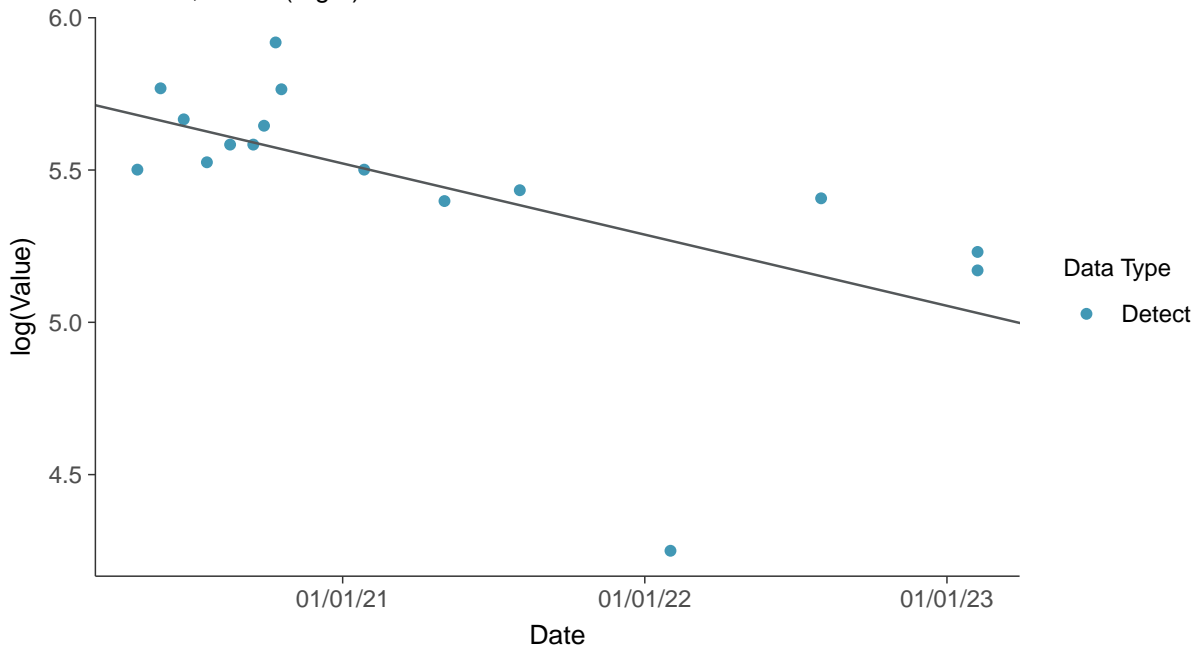
Normal Q-Q plot

Calcium, MW-5 (mg/L)



Trend Regression: Lognormal MLE

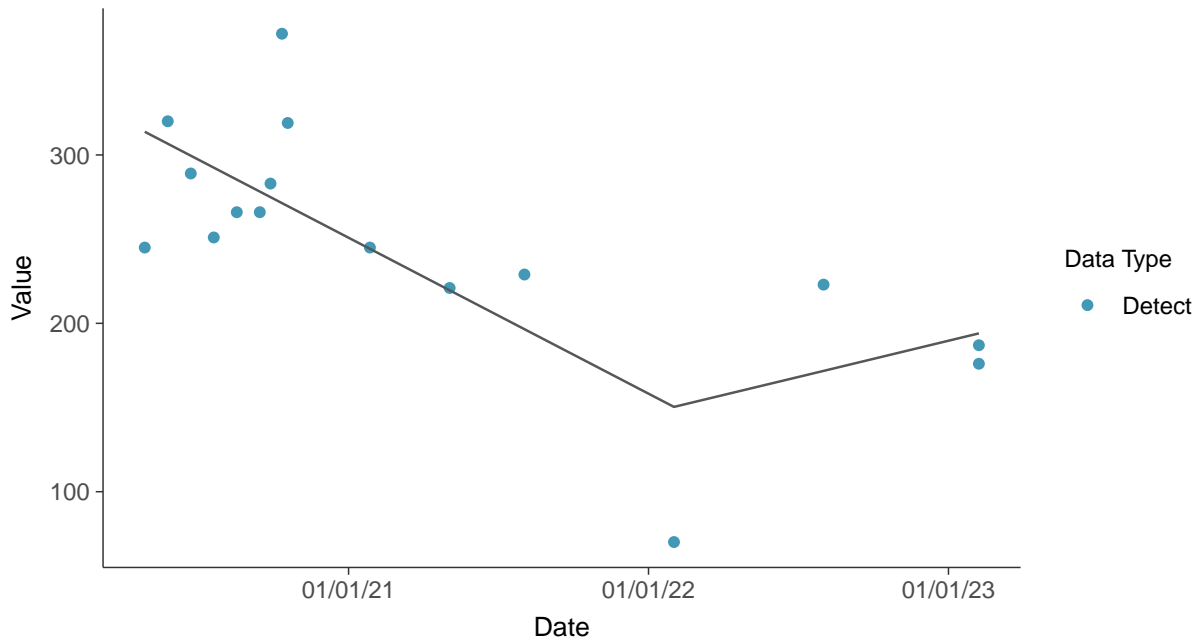
Calcium, MW-5 (mg/L)





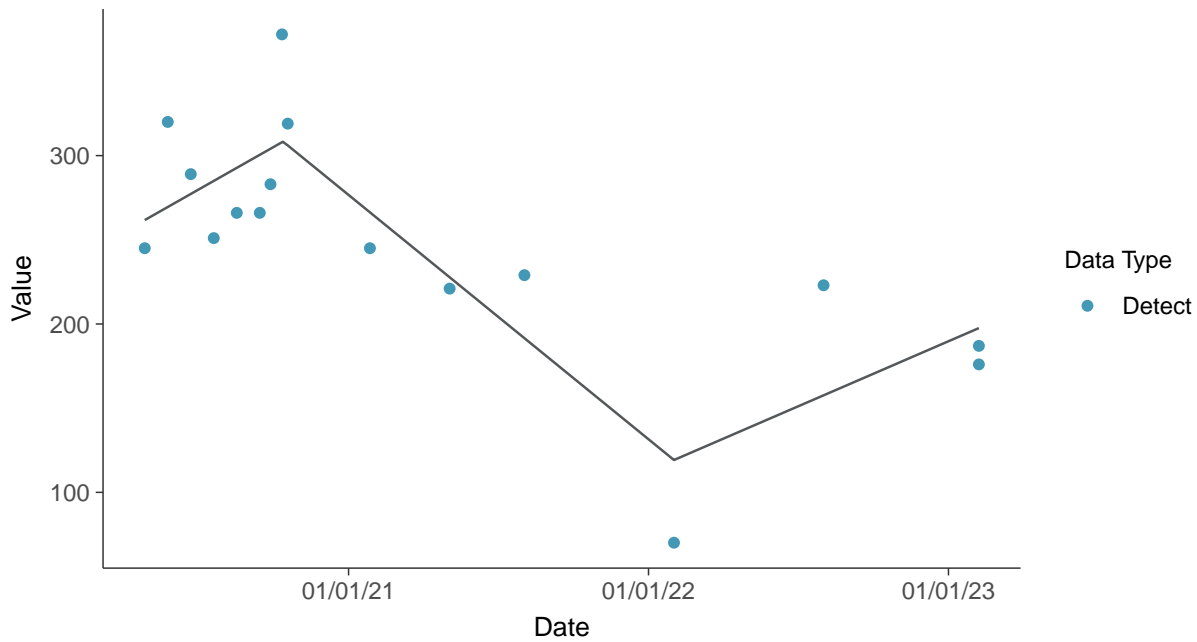
Trend Regression: Piecewise Linear-Linear

Calcium, MW-5 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Calcium, MW-5 (mg/L)

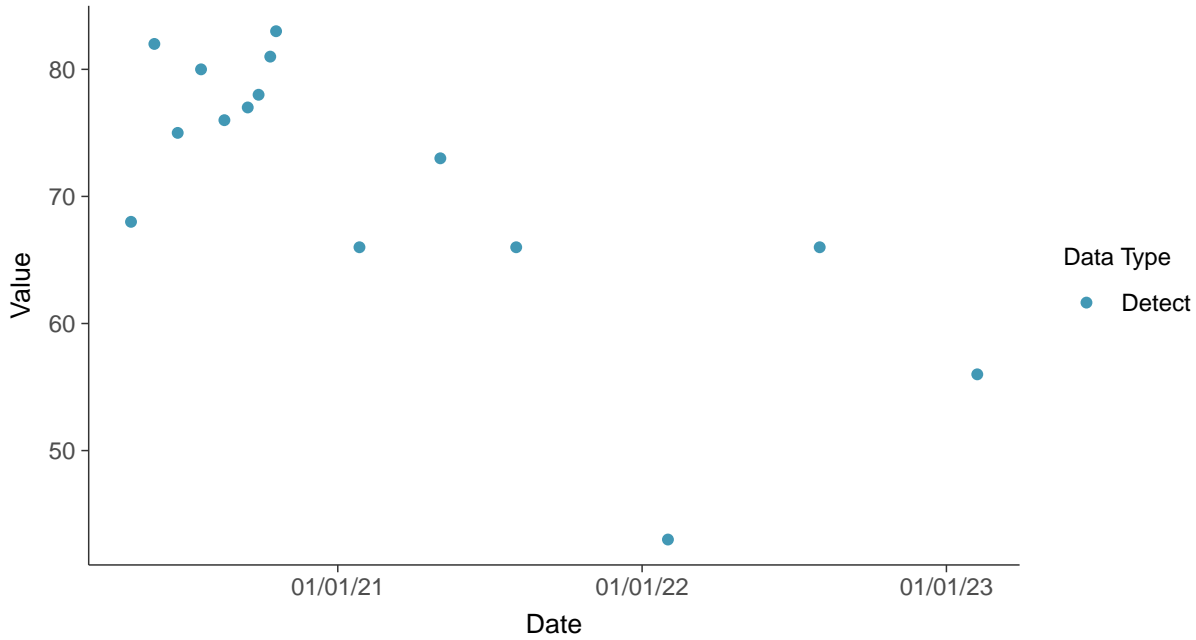


Appendix III: Chloride, MW-5

ID: 05_1_03

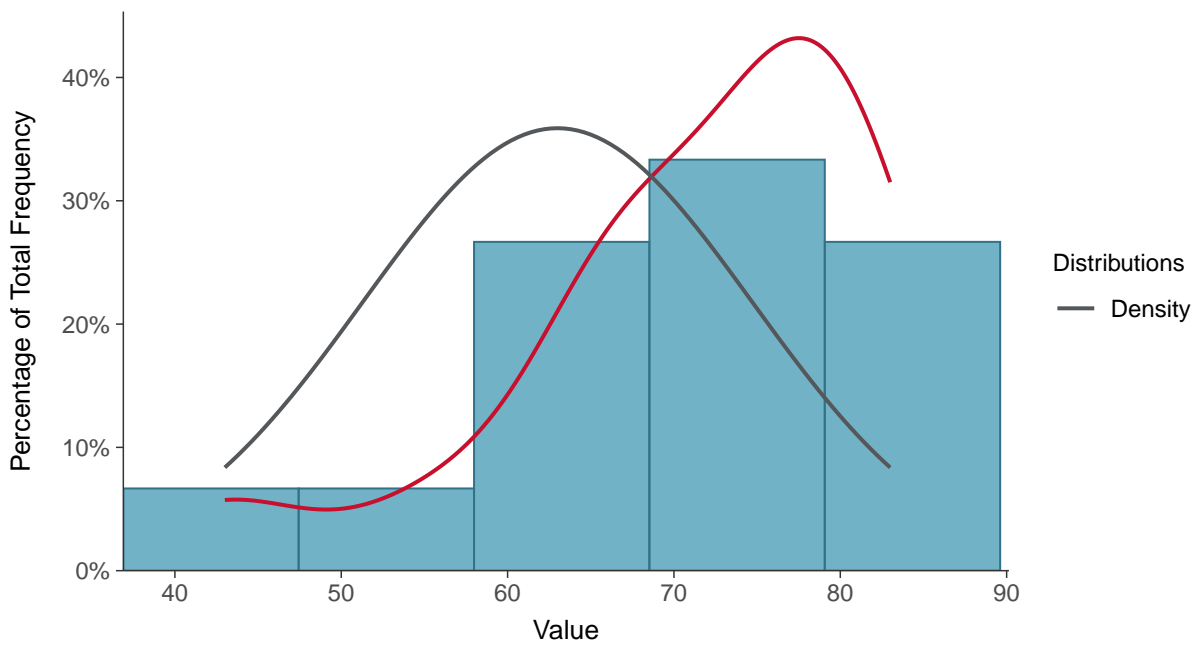
Scatter Plot

Chloride, MW-5 (mg/L)



Histogram

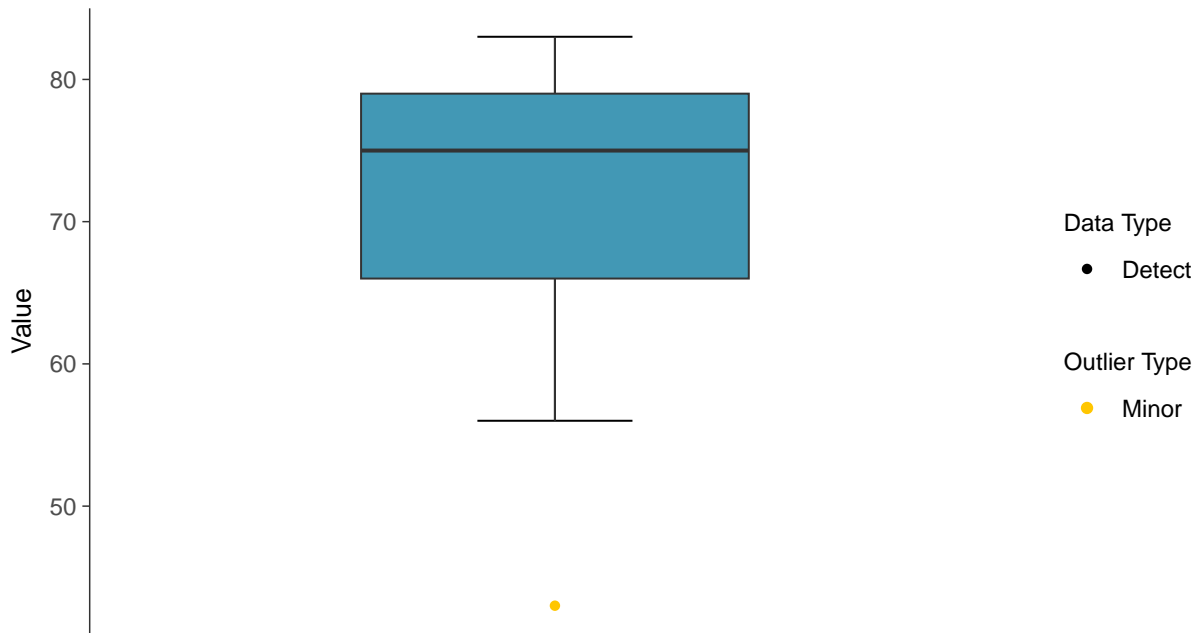
Chloride, MW-5 (mg/L)





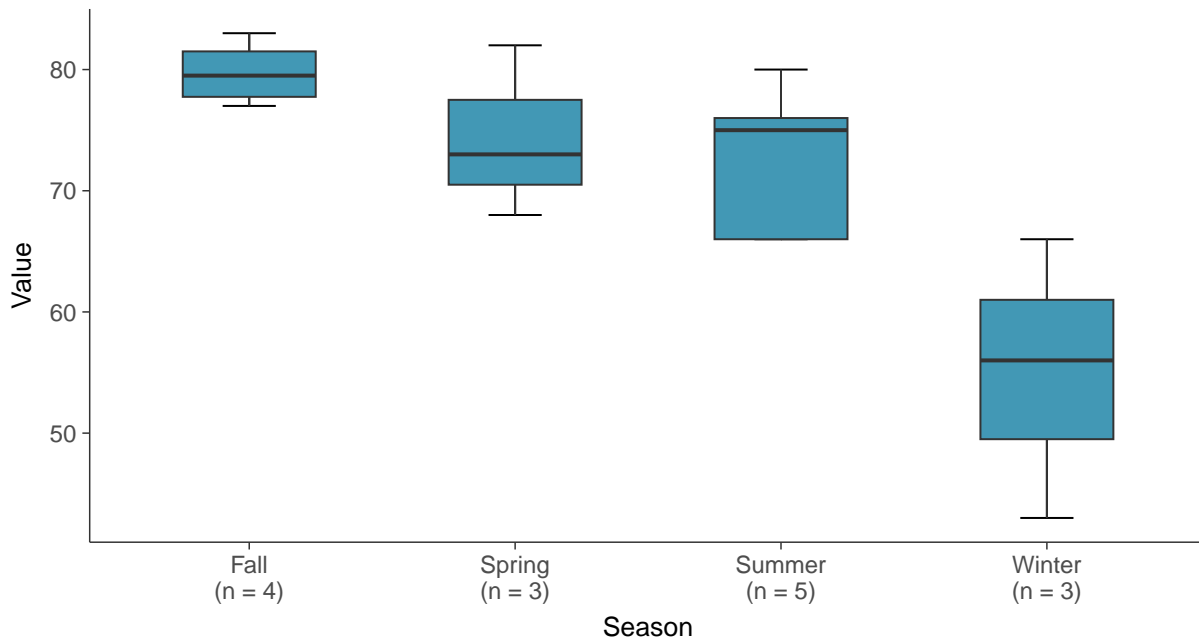
Boxplot

Chloride, MW-5 (mg/L)



Boxplot by Season

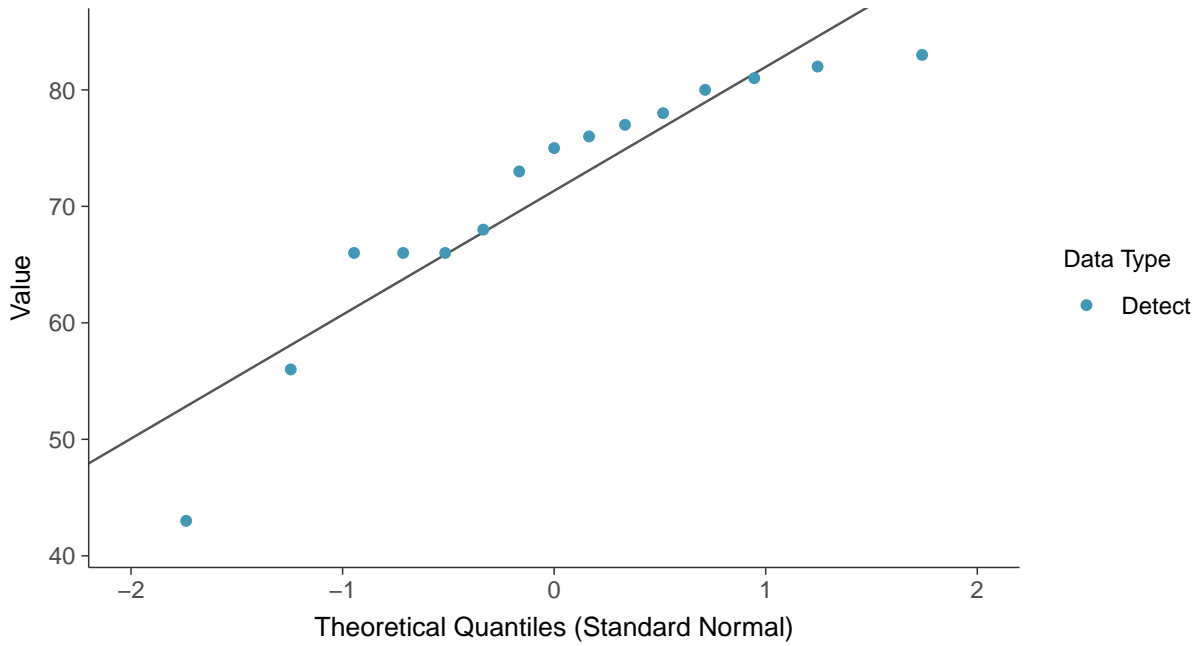
Chloride, MW-5 (mg/L)





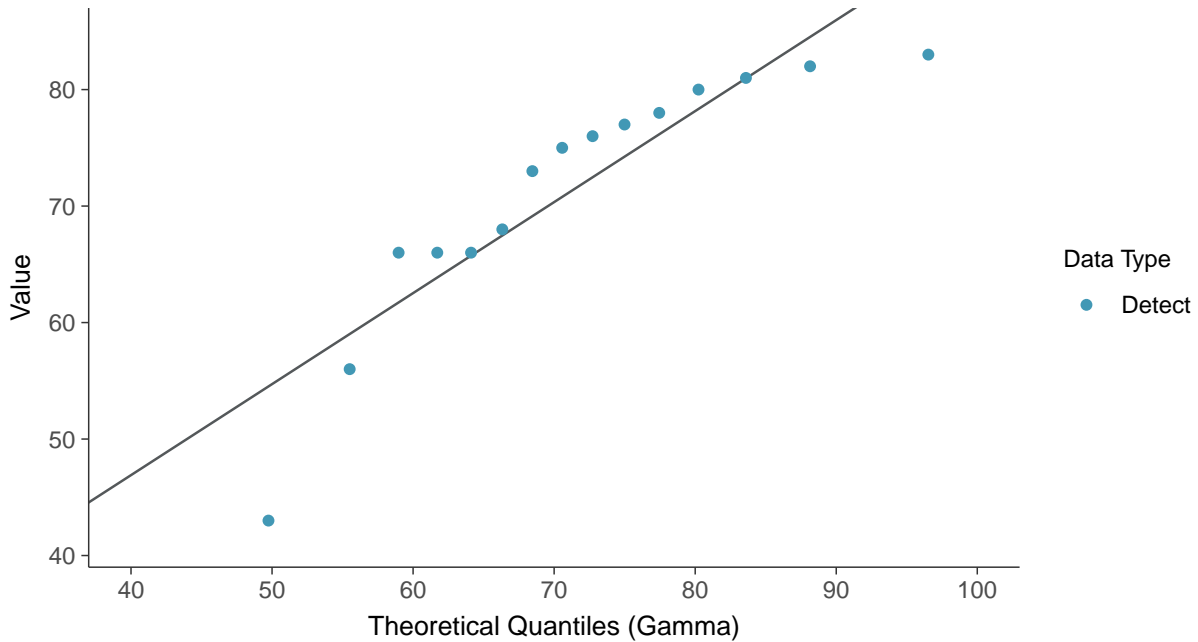
Normal Q-Q plot

Chloride, MW-5 (mg/L)



Gamma Q-Q plot

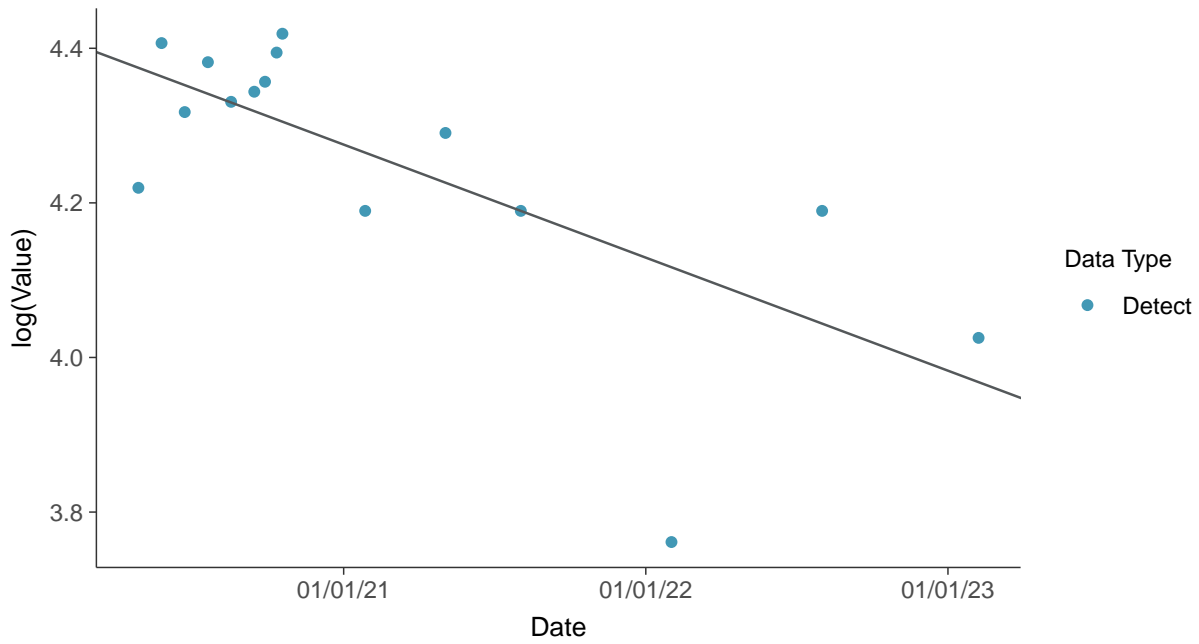
Chloride, MW-5 (mg/L)





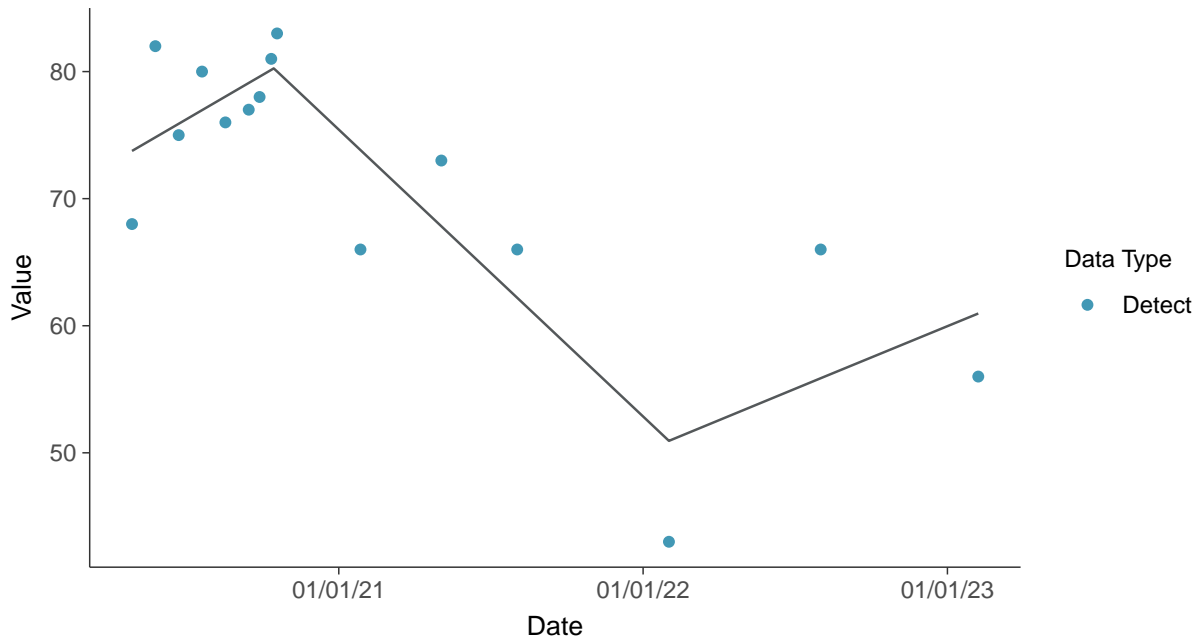
Trend Regression: Lognormal MLE

Chloride, MW-5 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Chloride, MW-5 (mg/L)





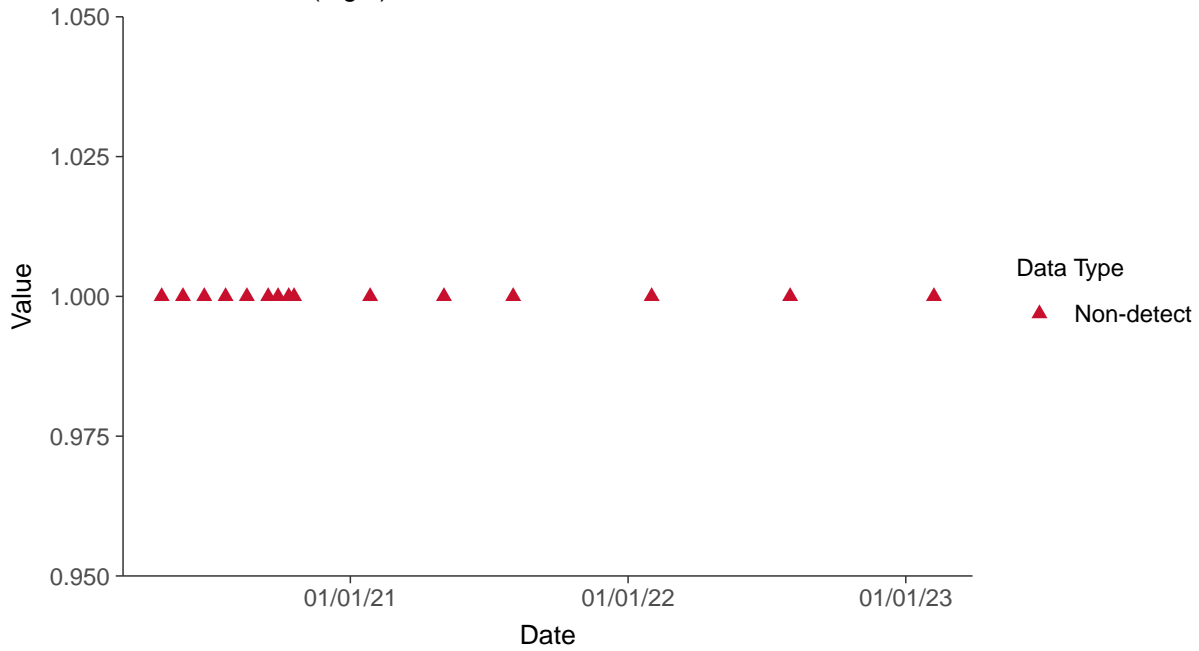
Downgradient Wells MW-2, MW-3, MW-5, MW-6, MW-7, MW-7B, MW-8, MW-9, MW-10, MW-13, MW-14, MW-15

Appendix III: Fluoride, MW-5

ID: 05_1_04

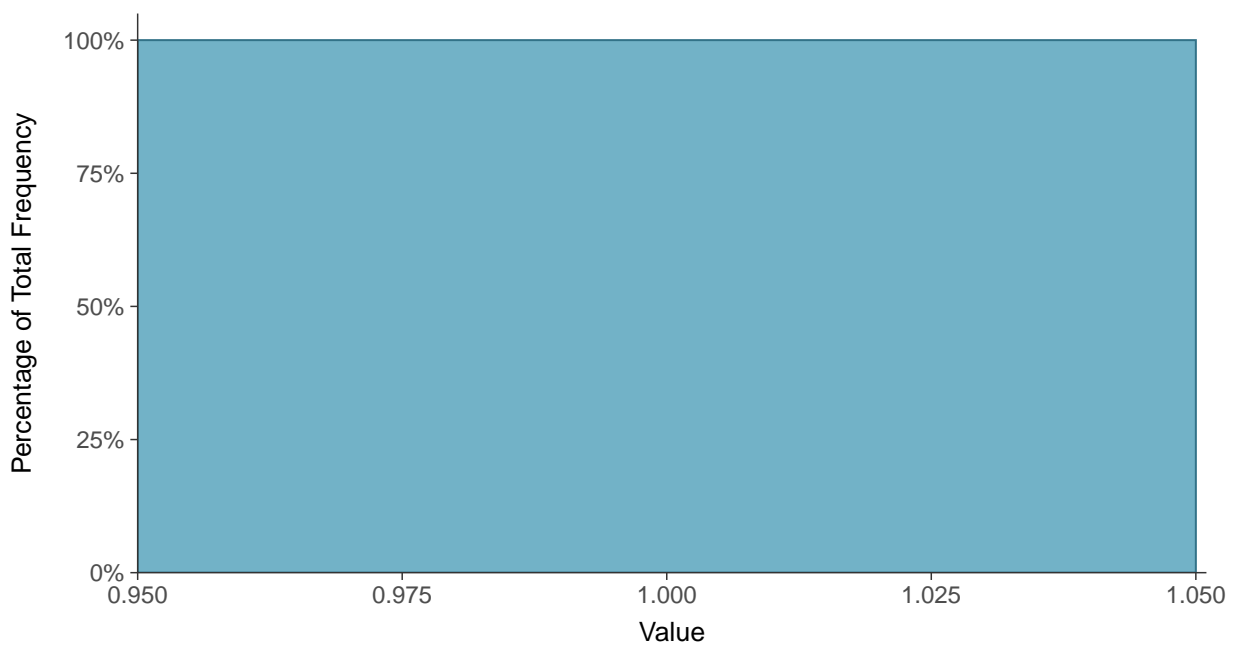
Scatter Plot

Fluoride, MW-5 (mg/L)



Histogram

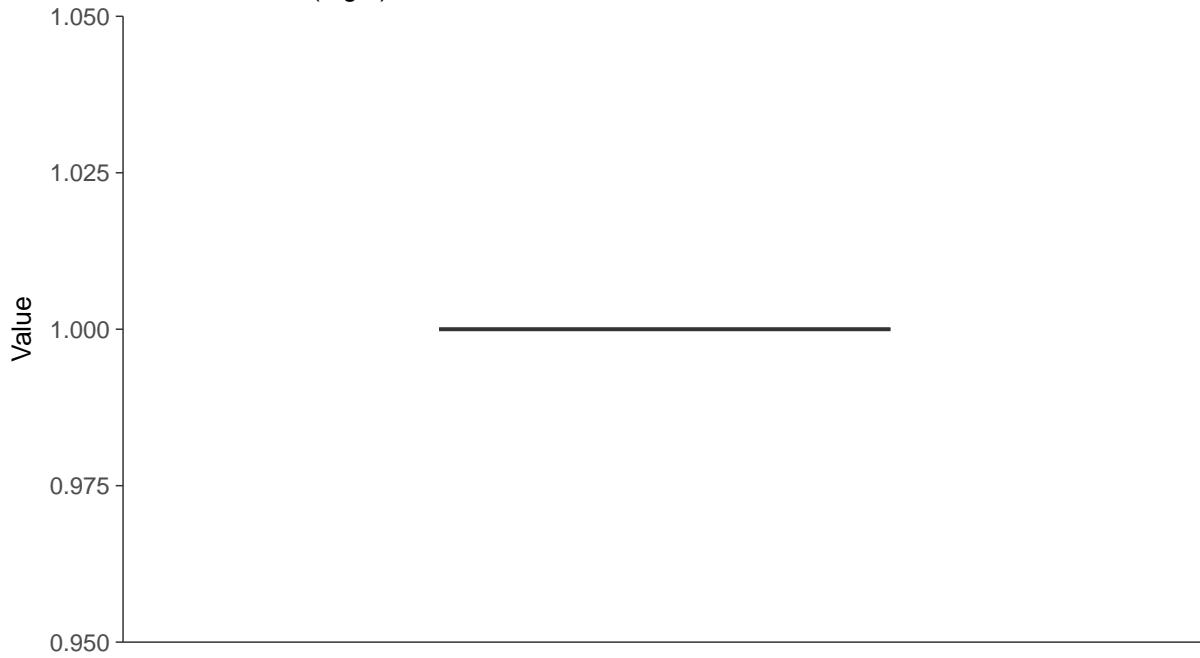
Fluoride, MW-5 (mg/L)





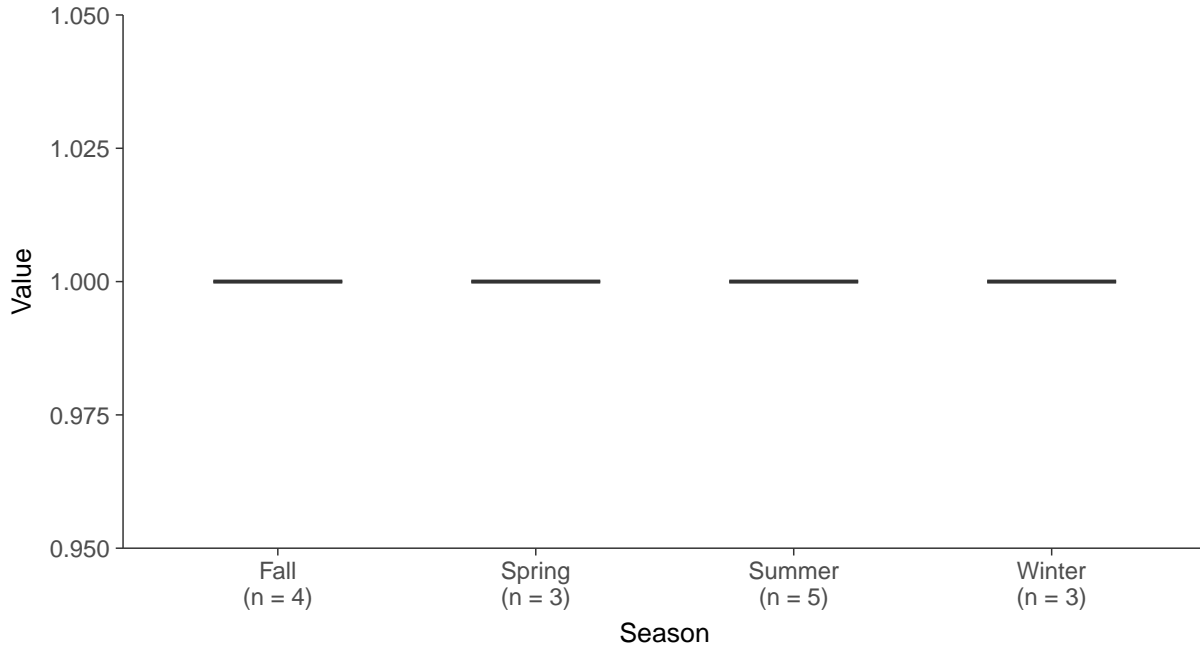
Boxplot

Fluoride, MW-5 (mg/L)



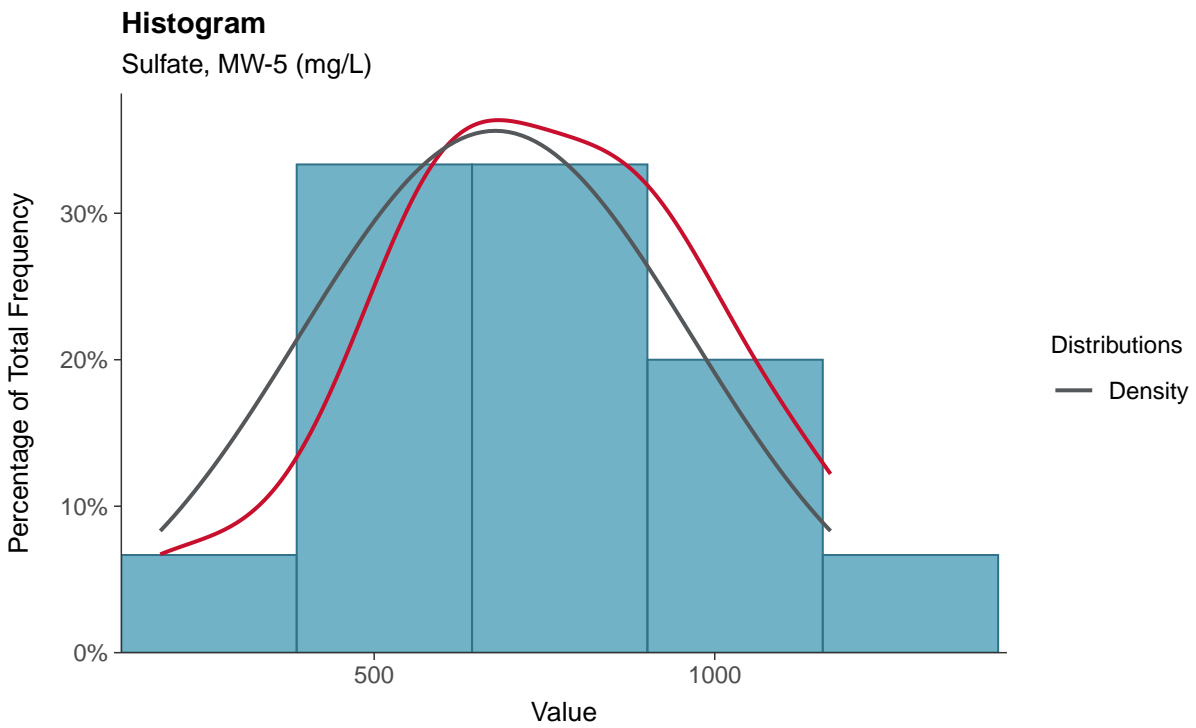
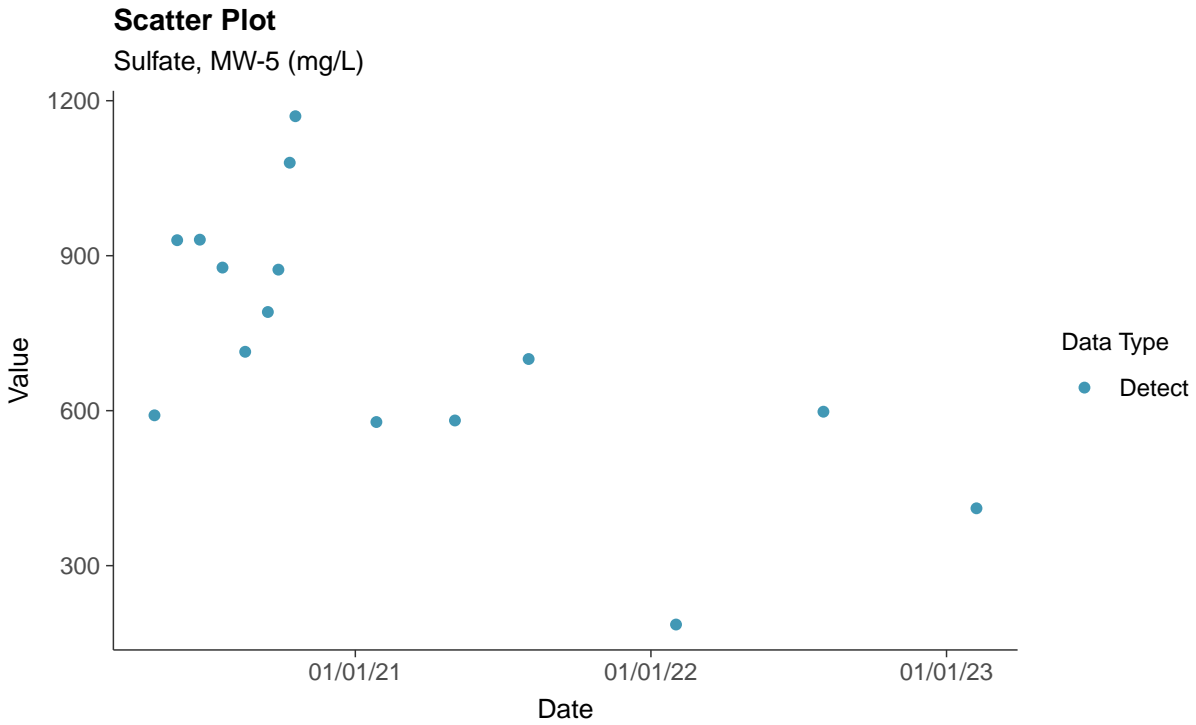
Boxplot by Season

Fluoride, MW-5 (mg/L)



Appendix III: Sulfate, MW-5

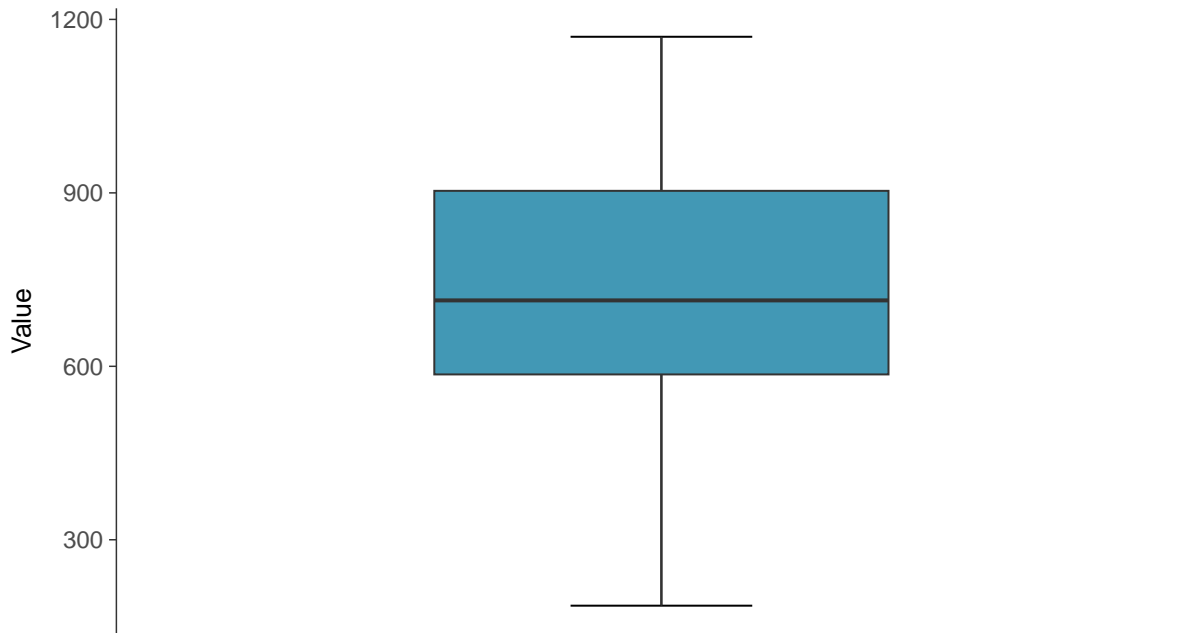
ID: 05_1_05





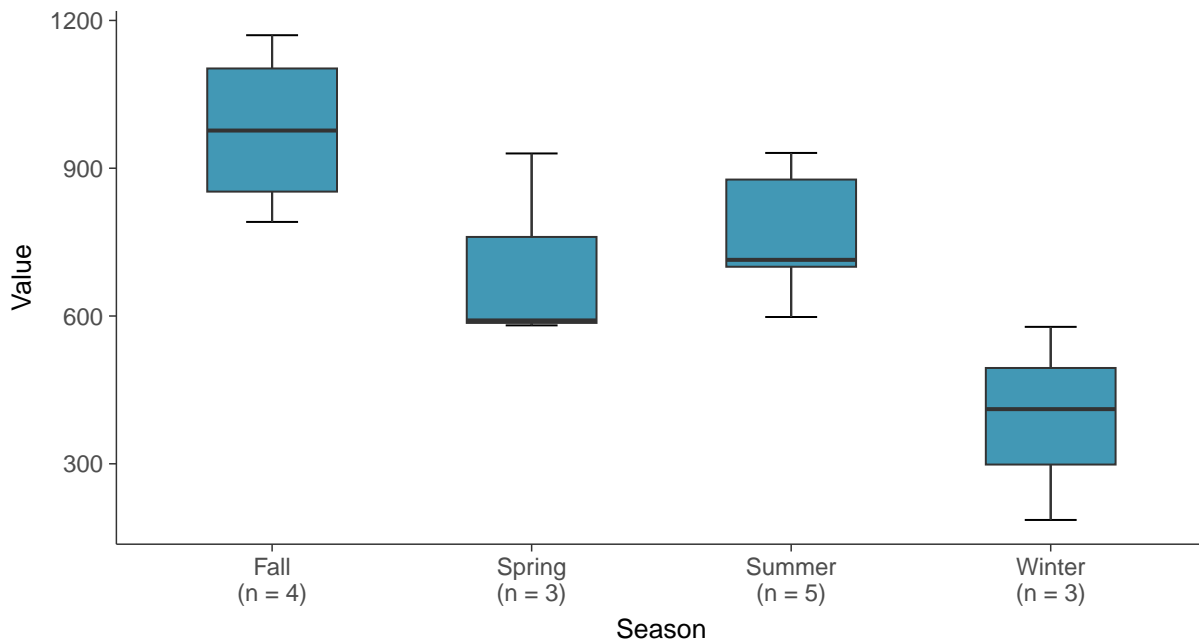
Boxplot

Sulfate, MW-5 (mg/L)



Boxplot by Season

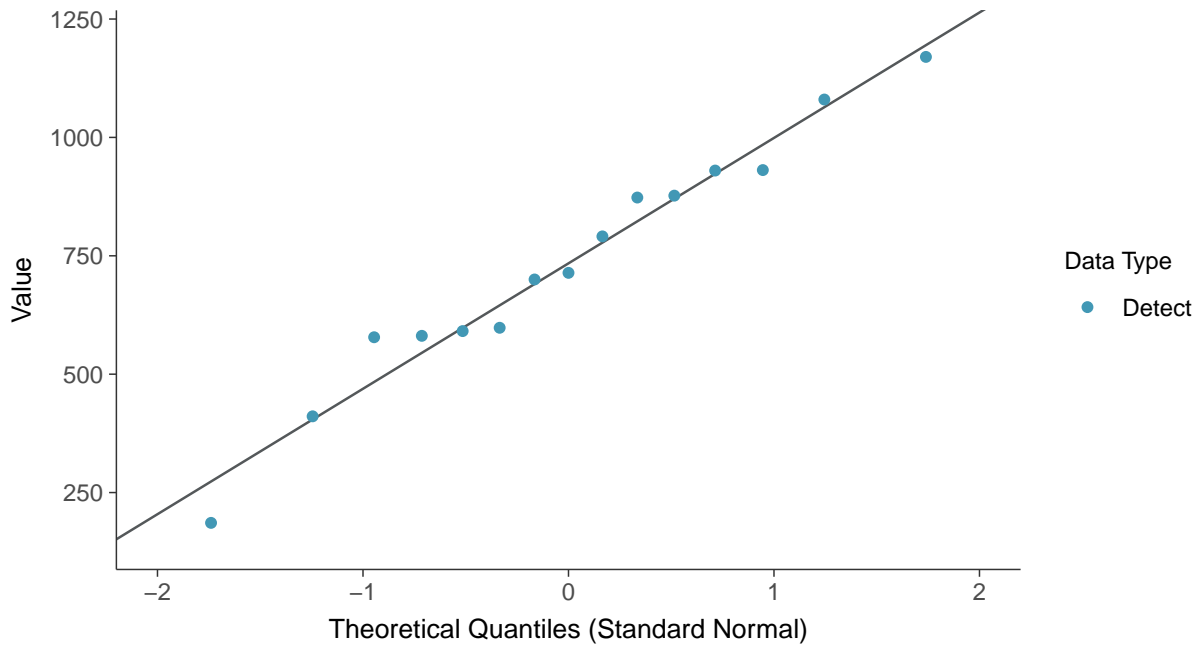
Sulfate, MW-5 (mg/L)





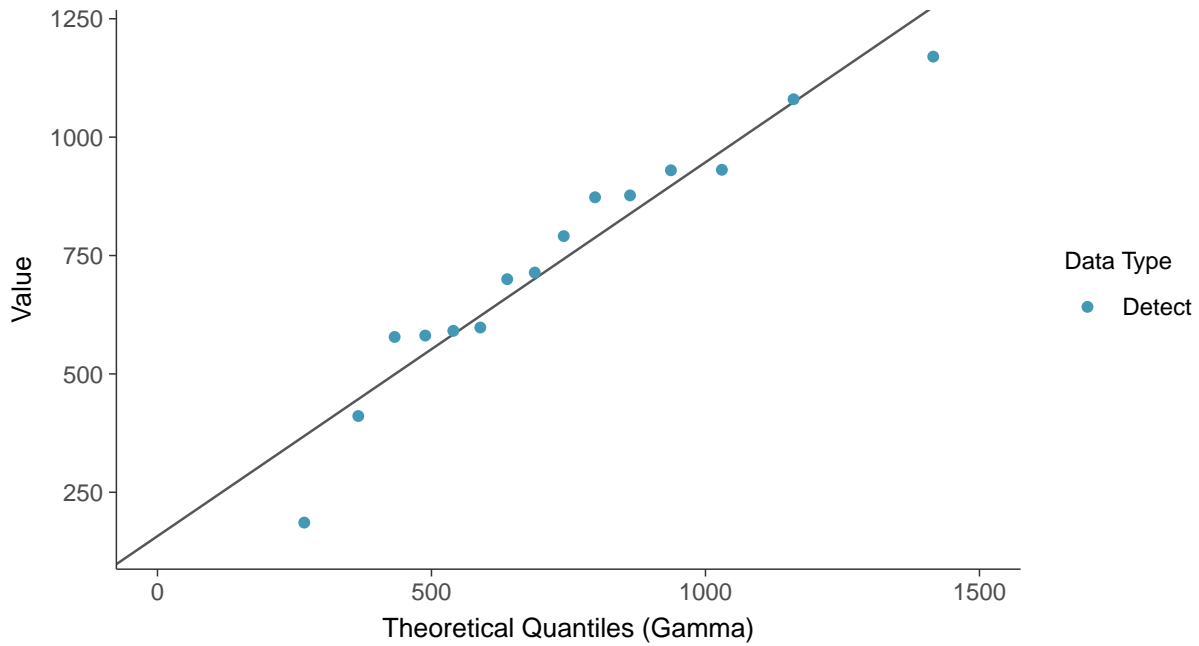
Normal Q-Q plot

Sulfate, MW-5 (mg/L)



Gamma Q-Q plot

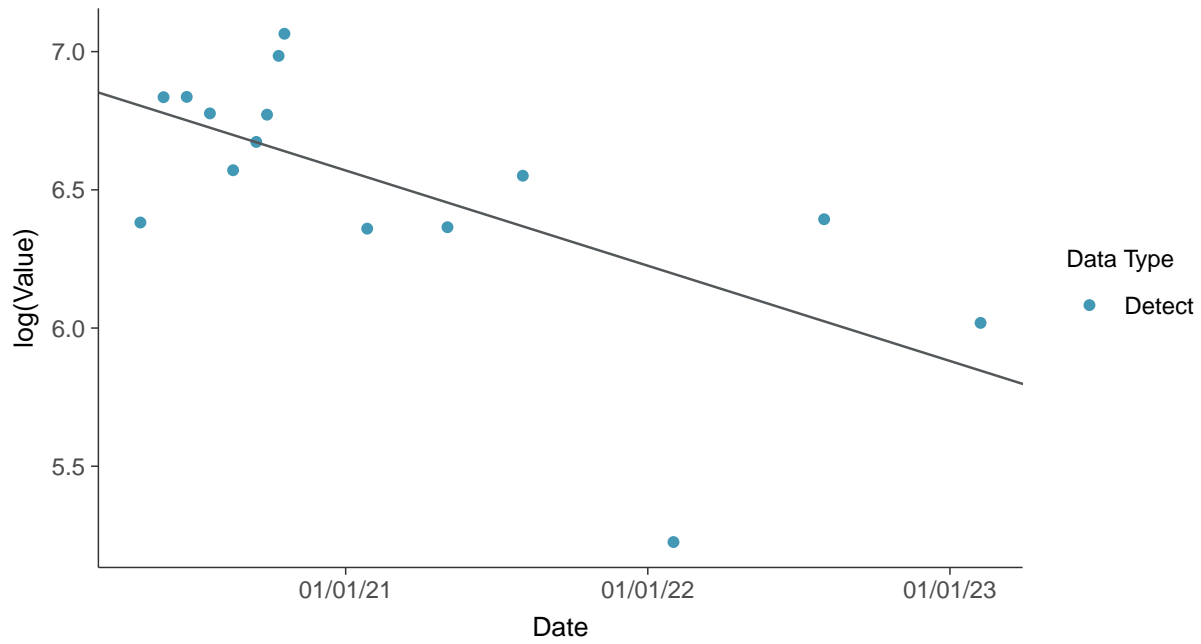
Sulfate, MW-5 (mg/L)





Trend Regression: Lognormal MLE

Sulfate, MW-5 (mg/L)



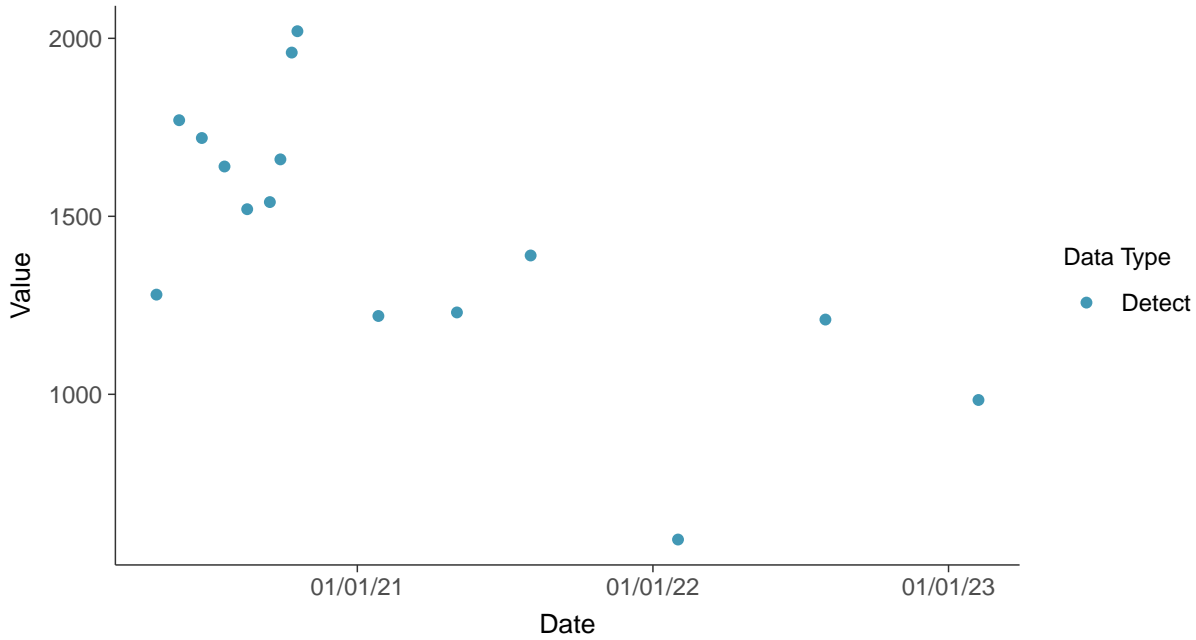


Appendix III: Total Dissolved Solids, MW-5

ID: 05_1_06

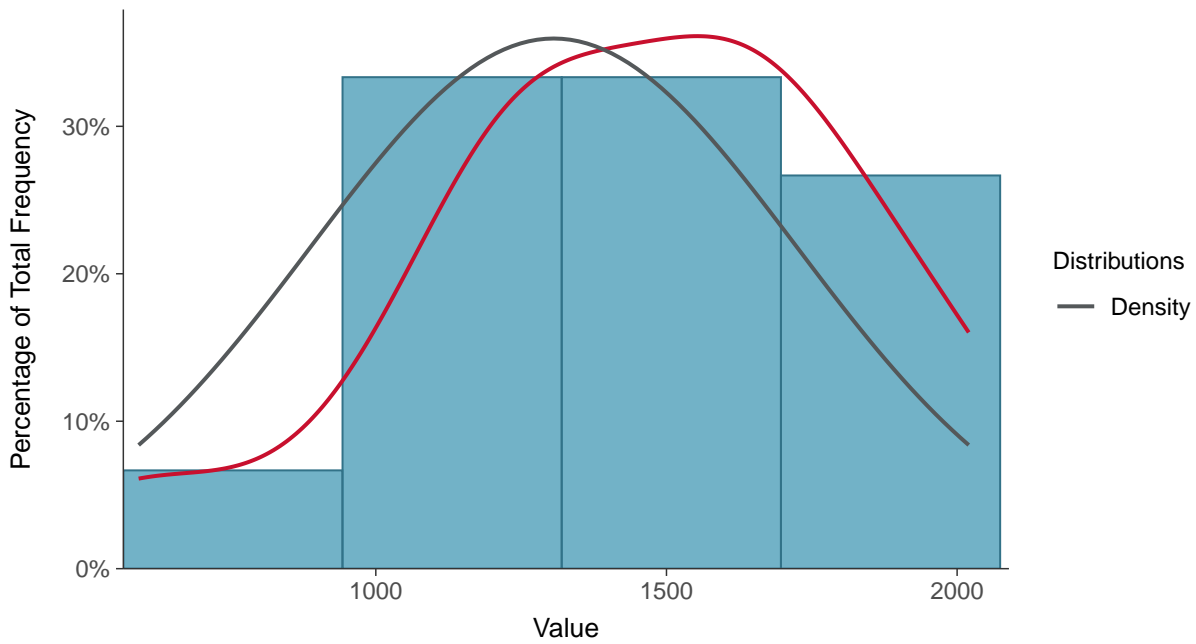
Scatter Plot

Total Dissolved Solids, MW-5 (mg/L)



Histogram

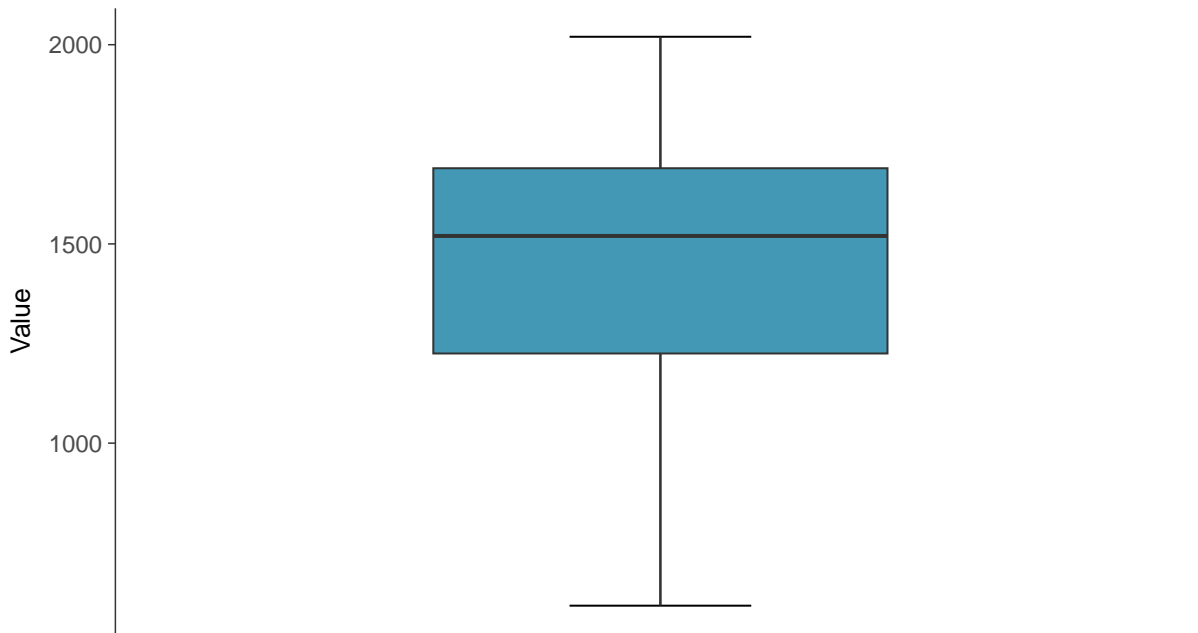
Total Dissolved Solids, MW-5 (mg/L)





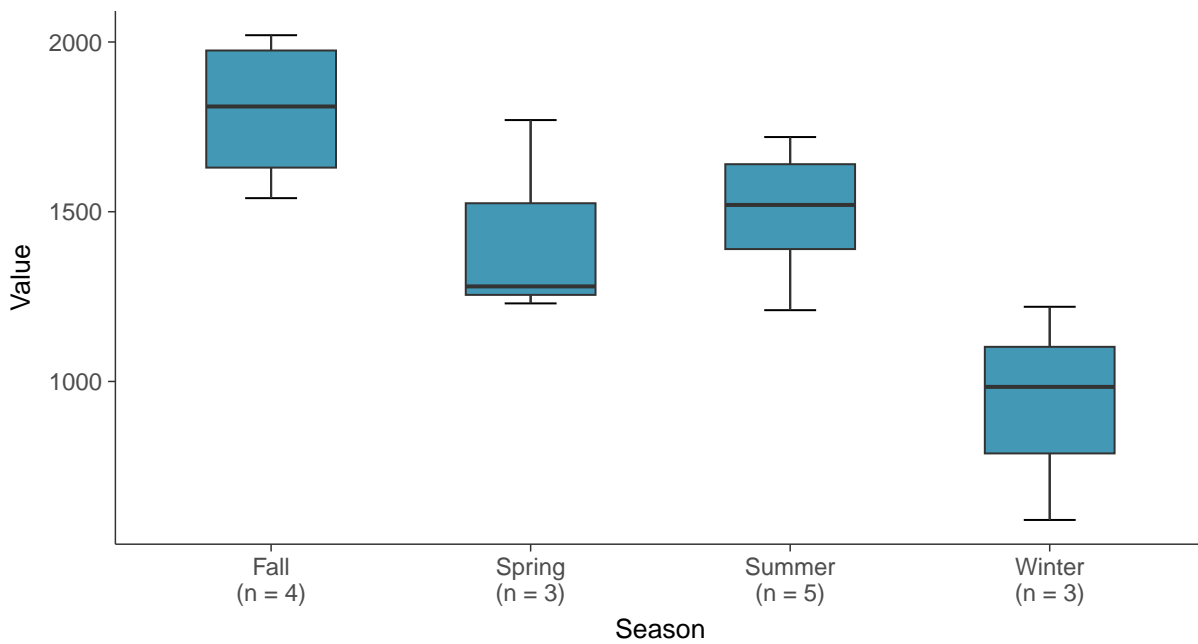
Boxplot

Total Dissolved Solids, MW-5 (mg/L)



Boxplot by Season

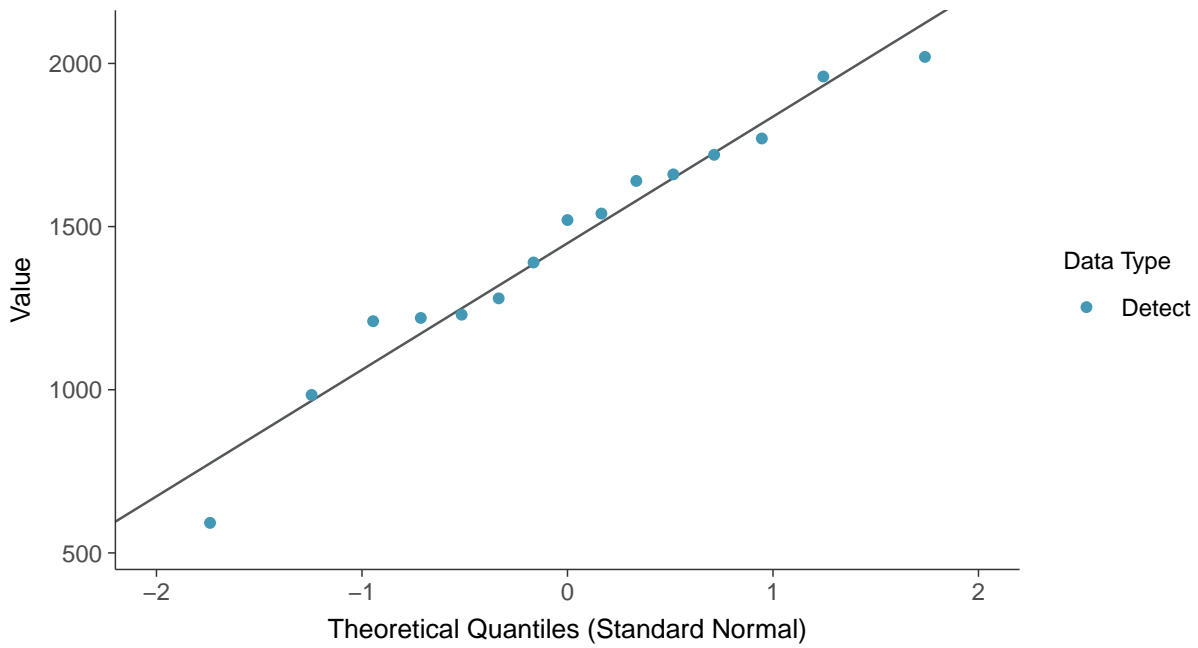
Total Dissolved Solids, MW-5 (mg/L)





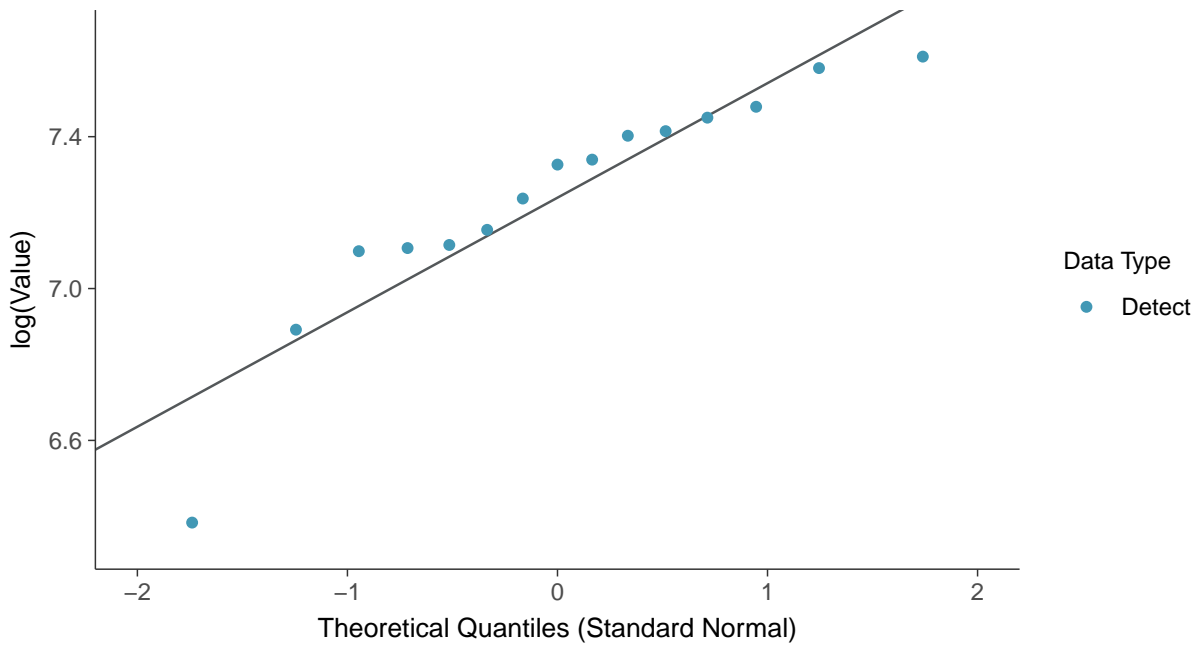
Normal Q-Q plot

Total Dissolved Solids, MW-5 (mg/L)



Lognormal Q-Q plot

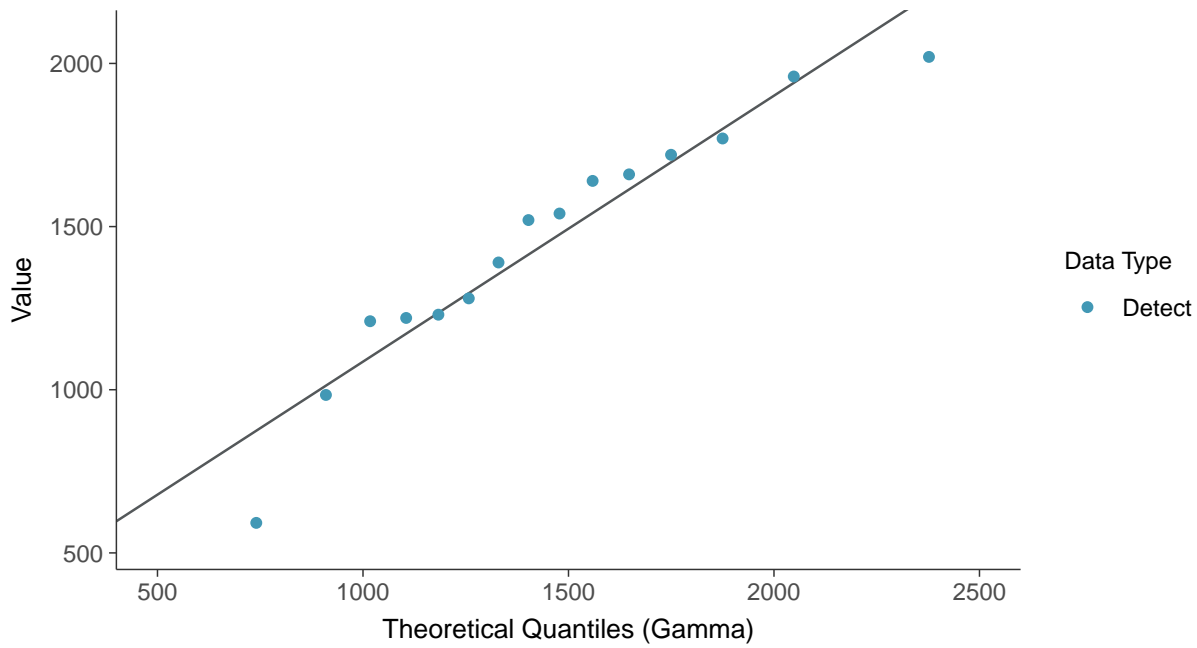
Total Dissolved Solids, MW-5 (mg/L)





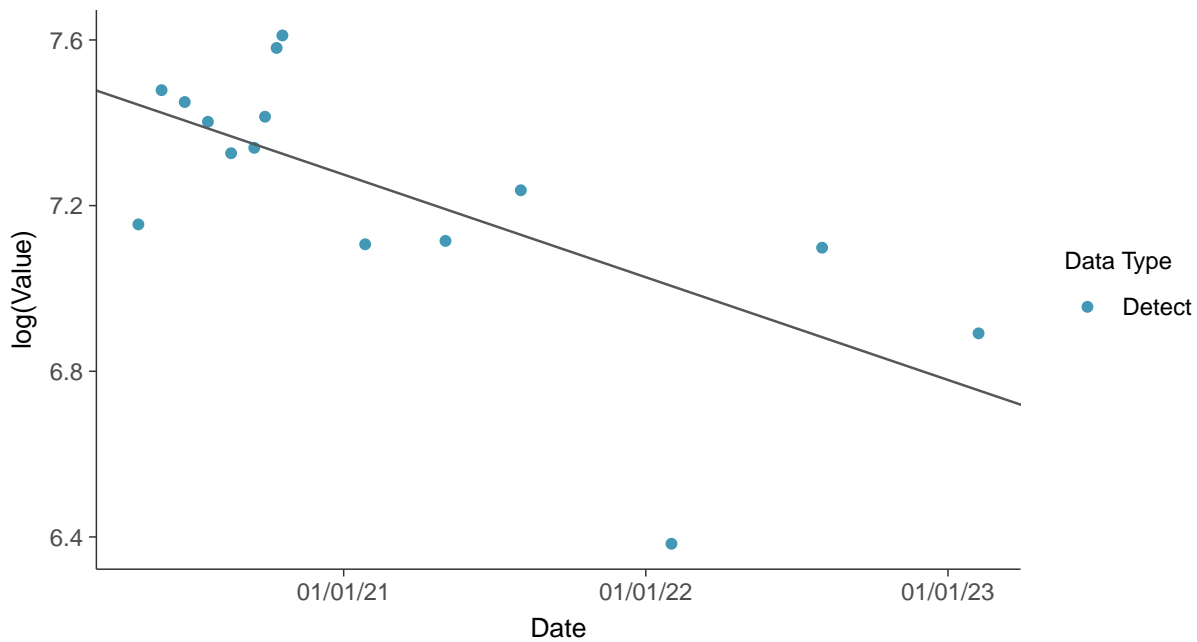
Gamma Q-Q plot

Total Dissolved Solids, MW-5 (mg/L)



Trend Regression: Lognormal MLE

Total Dissolved Solids, MW-5 (mg/L)



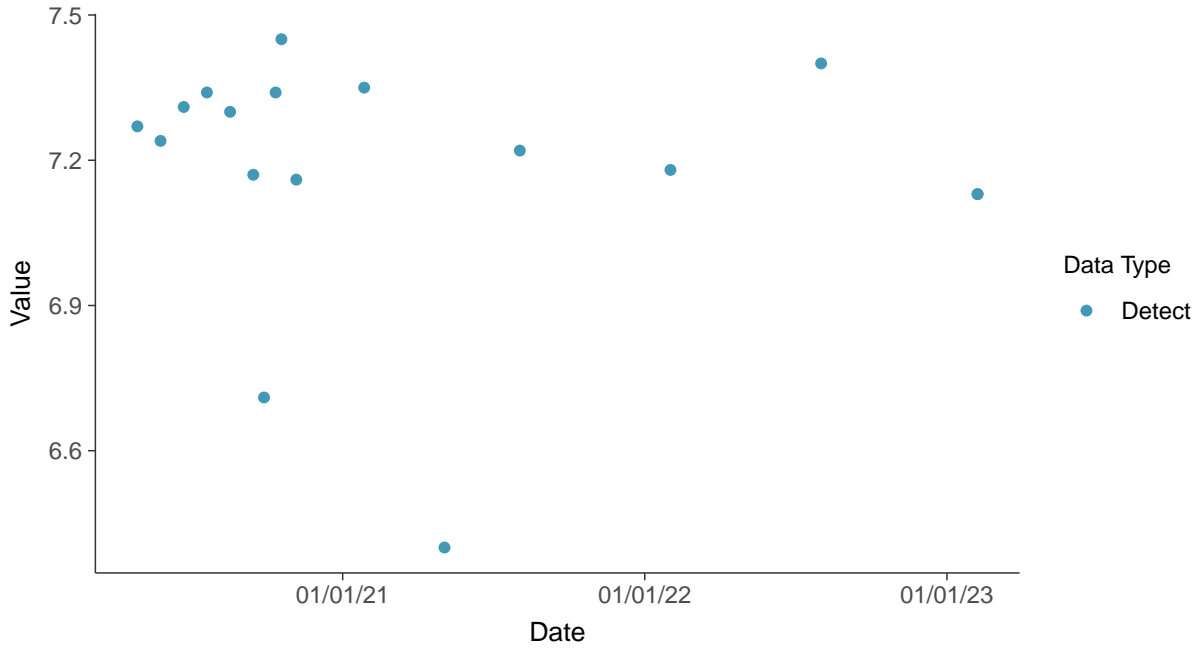


Appendix III: pH, Field, MW-5

ID: 05_1_07

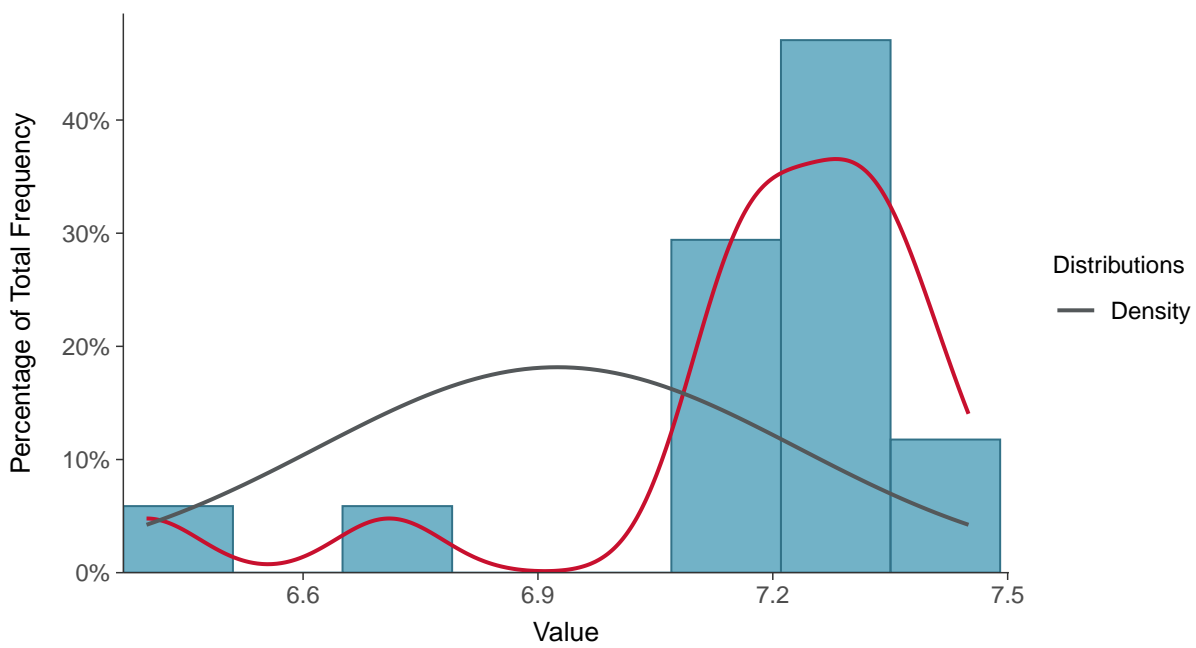
Scatter Plot

pH, Field, MW-5 (su)



Histogram

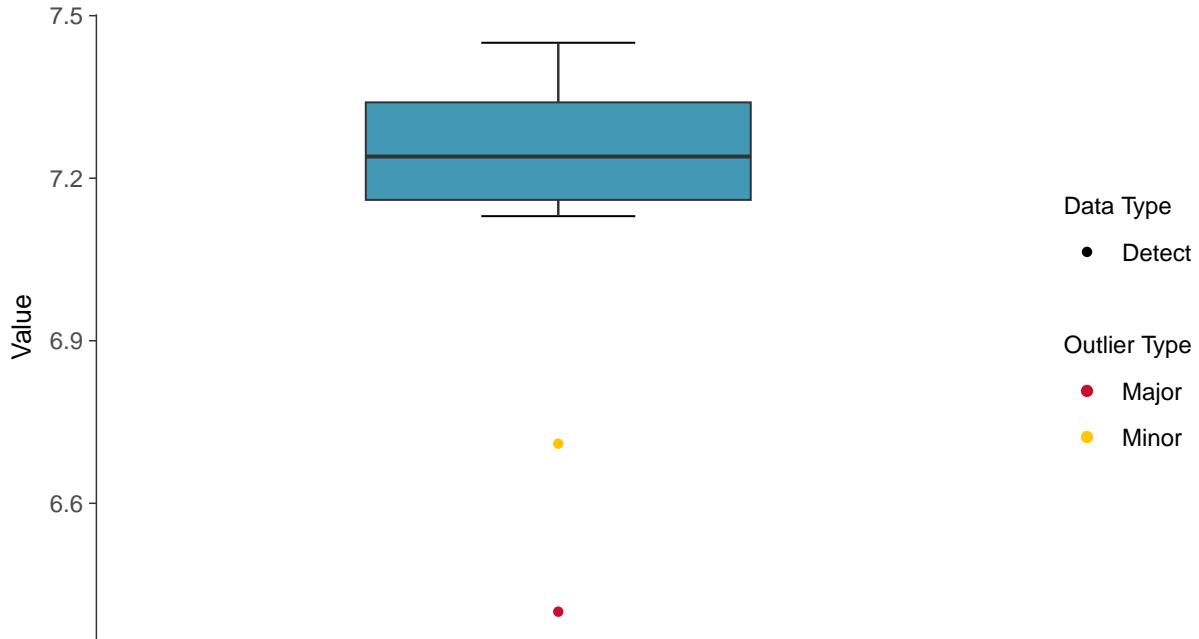
pH, Field, MW-5 (su)





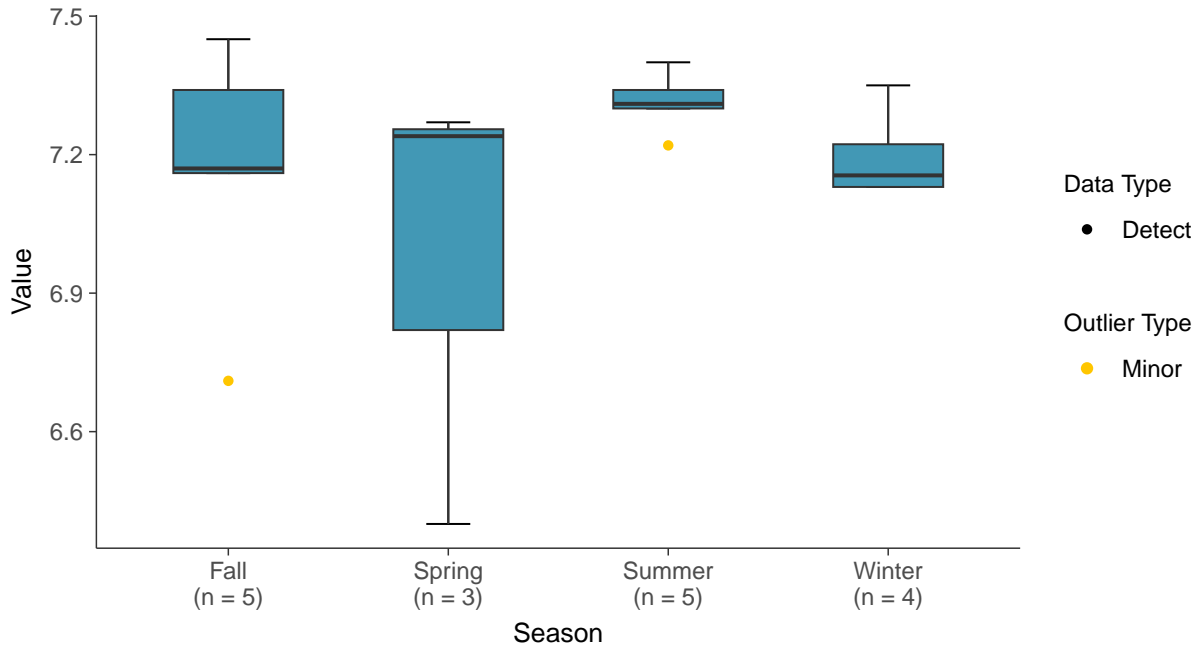
Boxplot

pH, Field, MW-5 (su)



Boxplot by Season

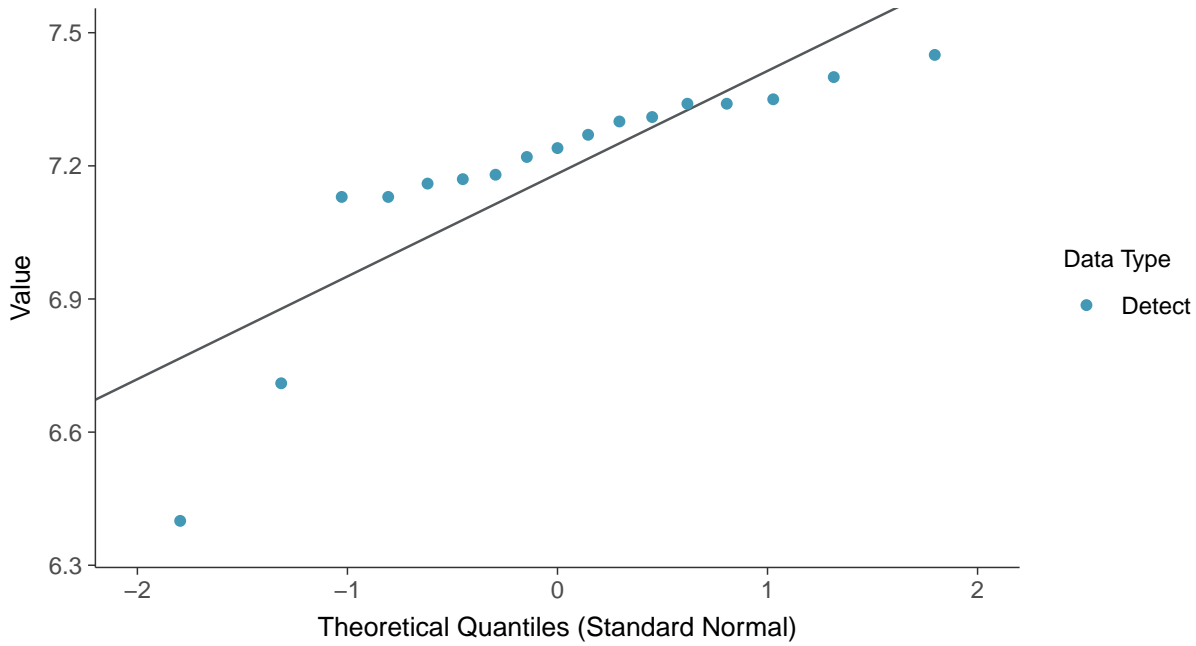
pH, Field, MW-5 (su)





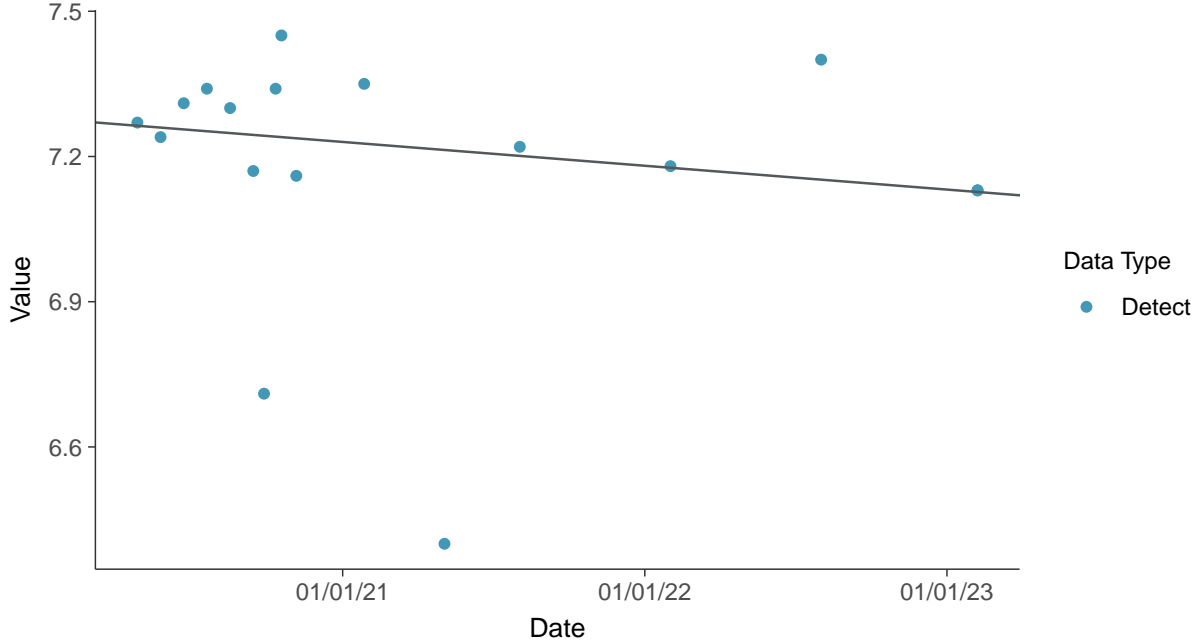
Normal Q-Q plot

pH, Field, MW-5 (su)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

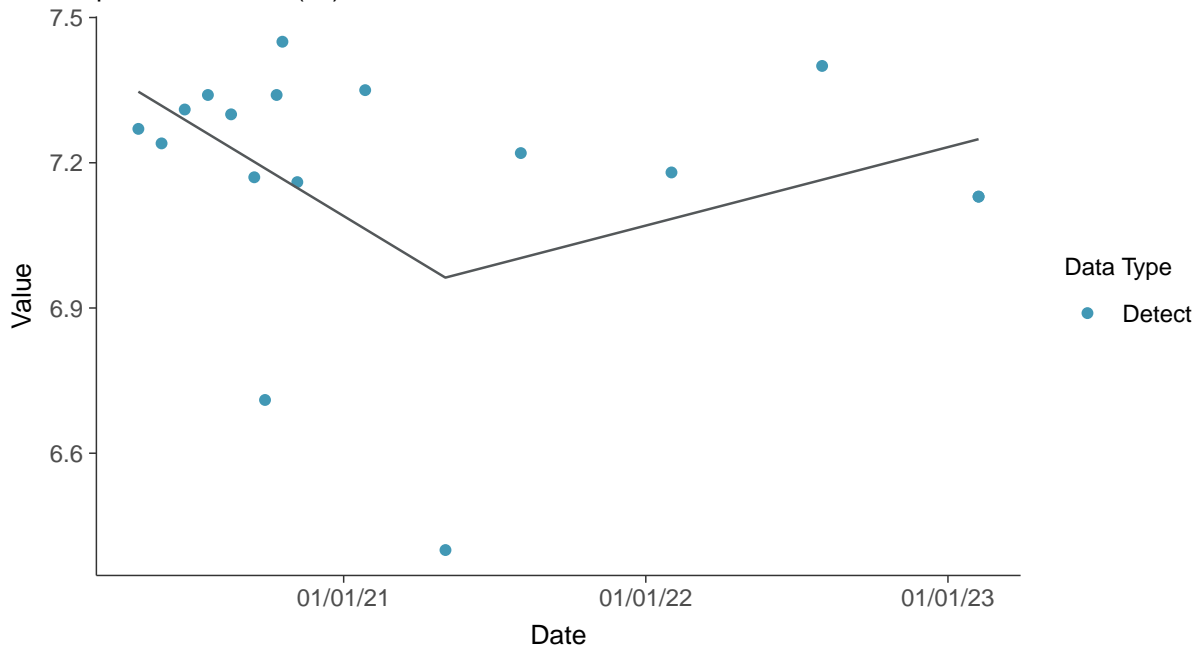
pH, Field, MW-5 (su)





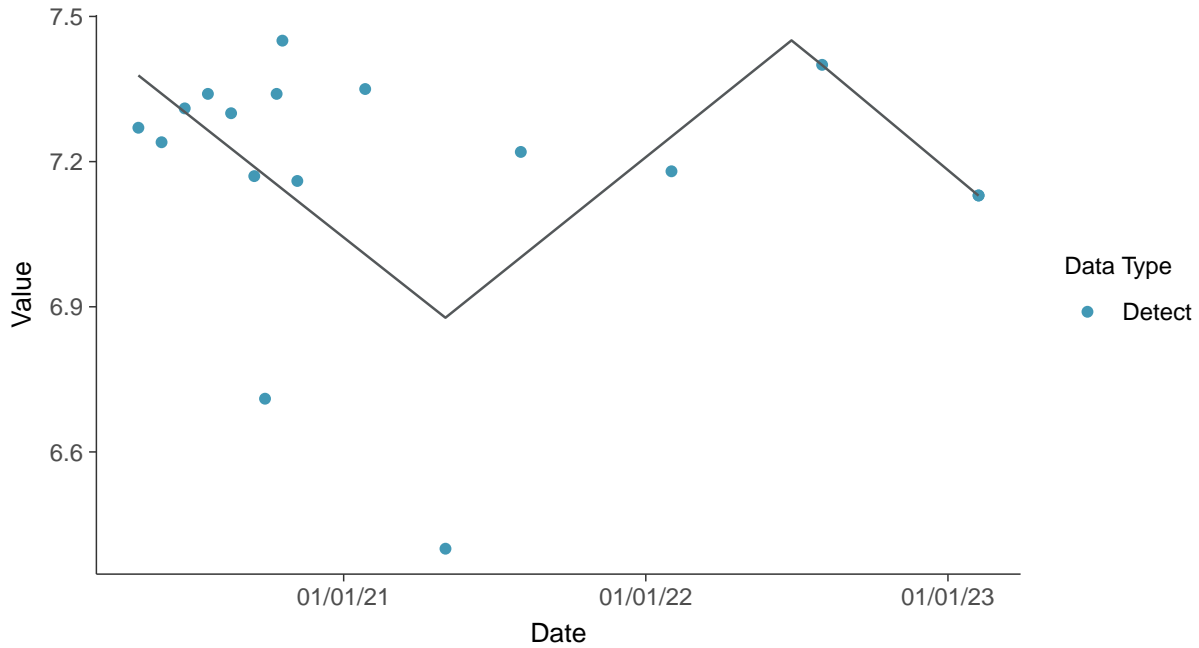
Trend Regression: Piecewise Linear-Linear

pH, Field, MW-5 (su)



Trend Regression: Piecewise Linear-Linear-Linear

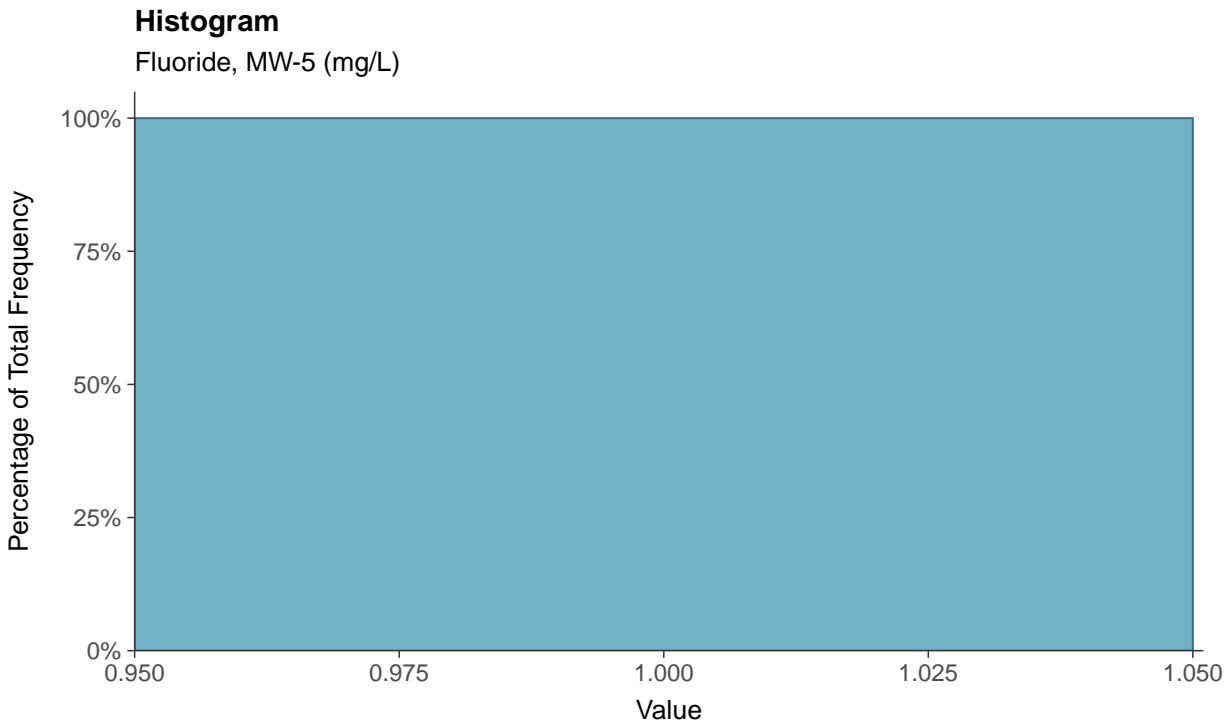
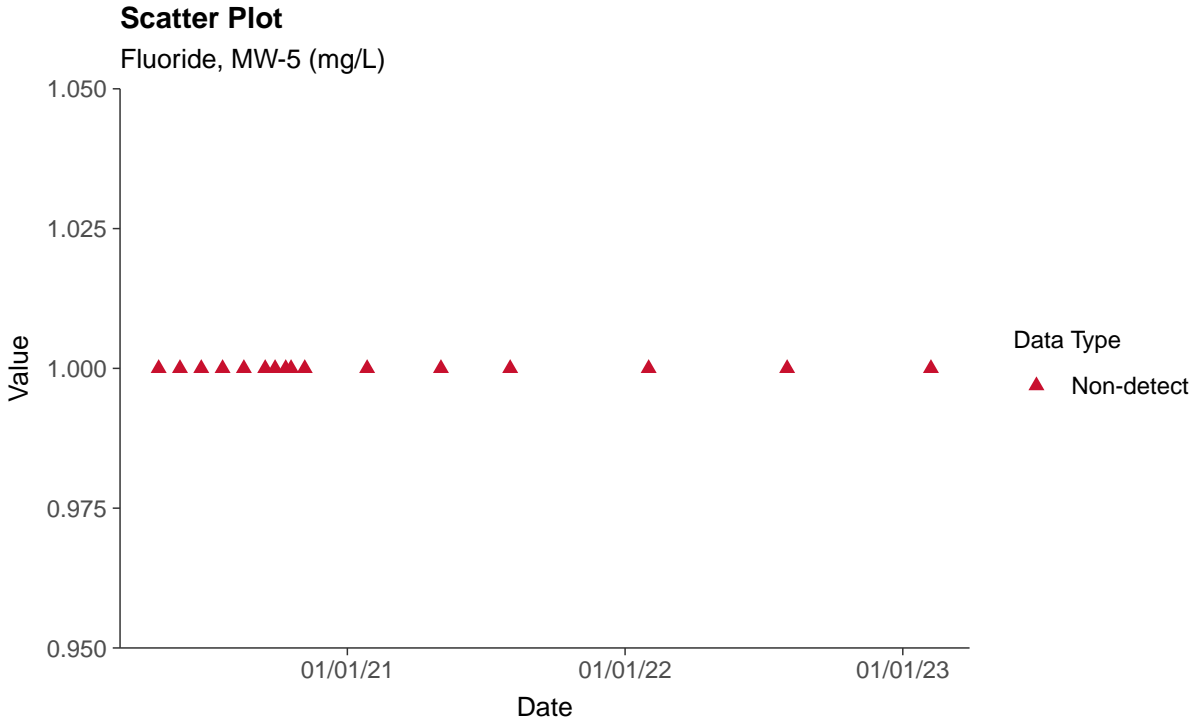
pH, Field, MW-5 (su)





Appendix IV: Fluoride, MW-5

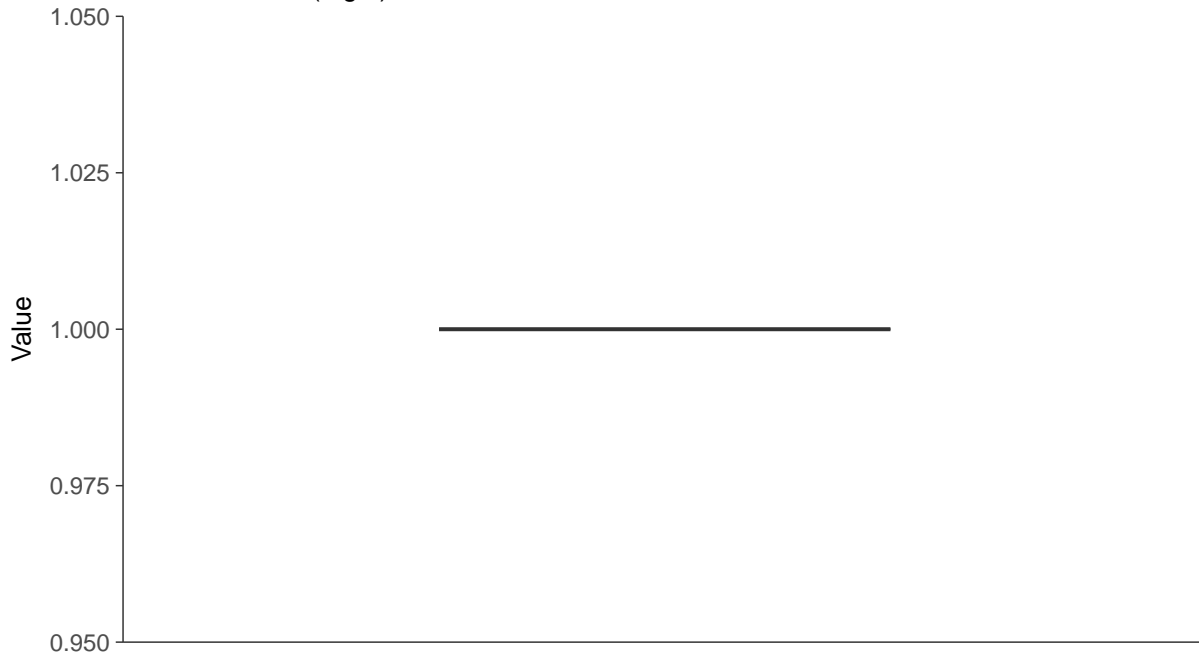
ID: 05_2_04





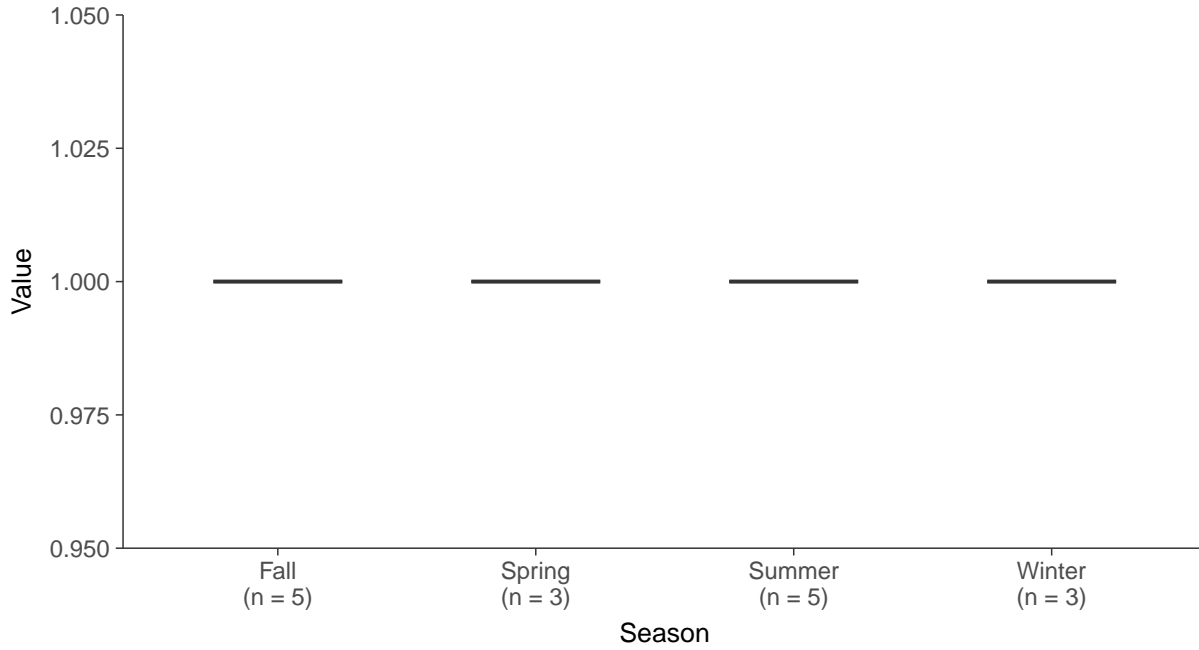
Boxplot

Fluoride, MW-5 (mg/L)



Boxplot by Season

Fluoride, MW-5 (mg/L)



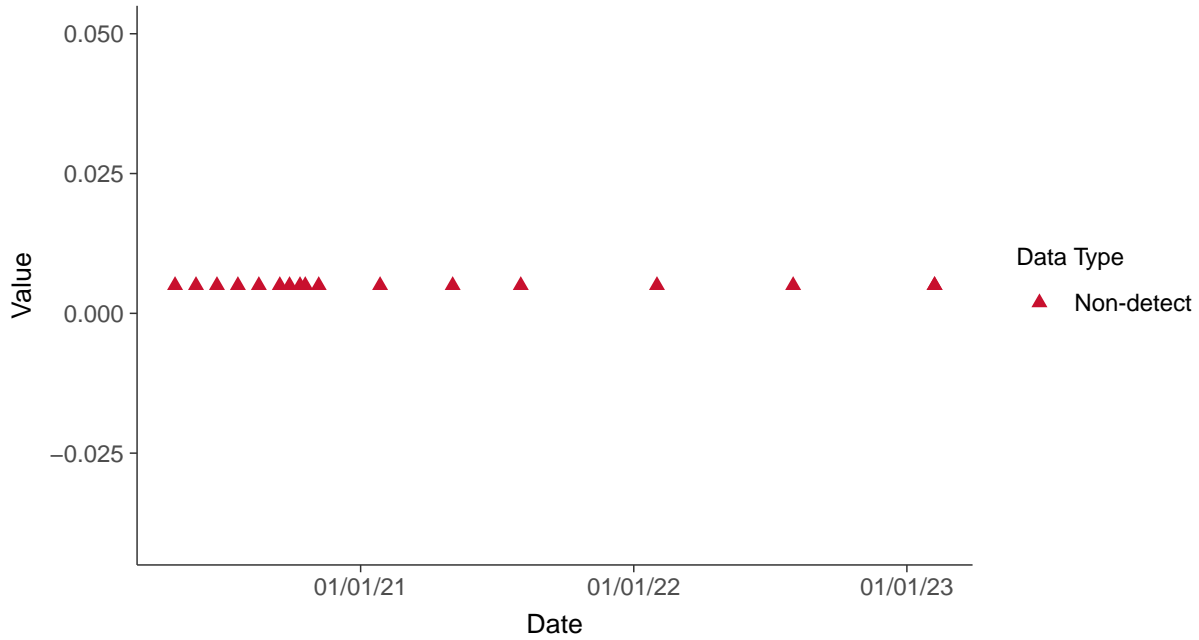


Appendix IV: Antimony, MW-5

ID: 05_2_08

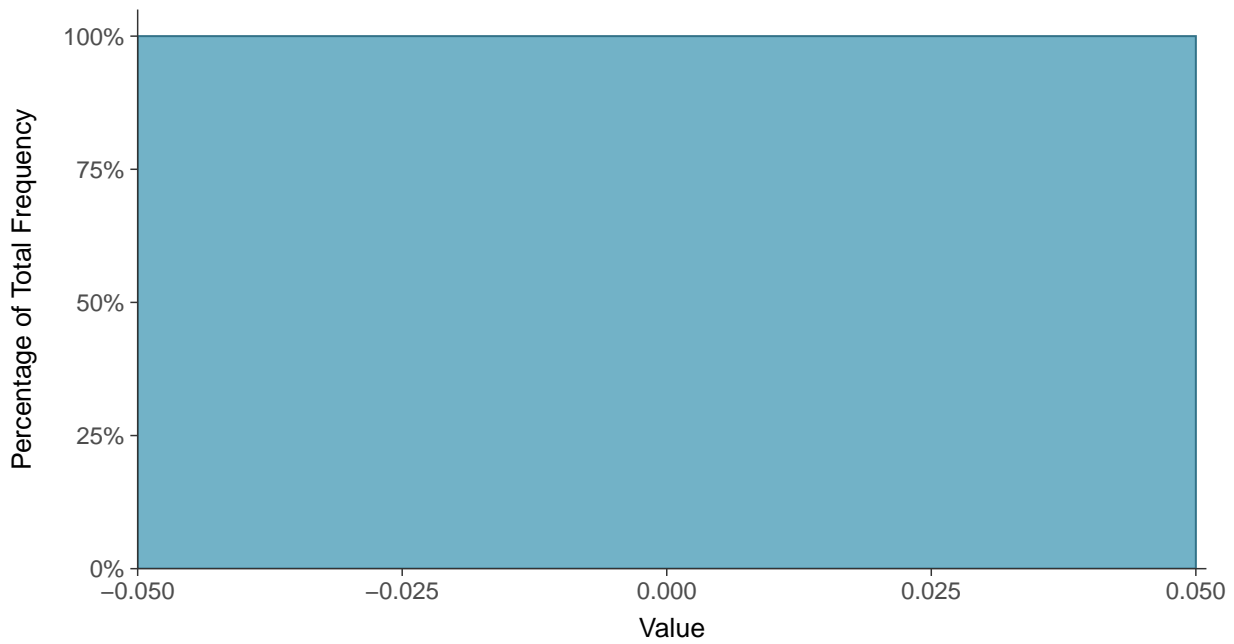
Scatter Plot

Antimony, MW-5 (mg/L)



Histogram

Antimony, MW-5 (mg/L)





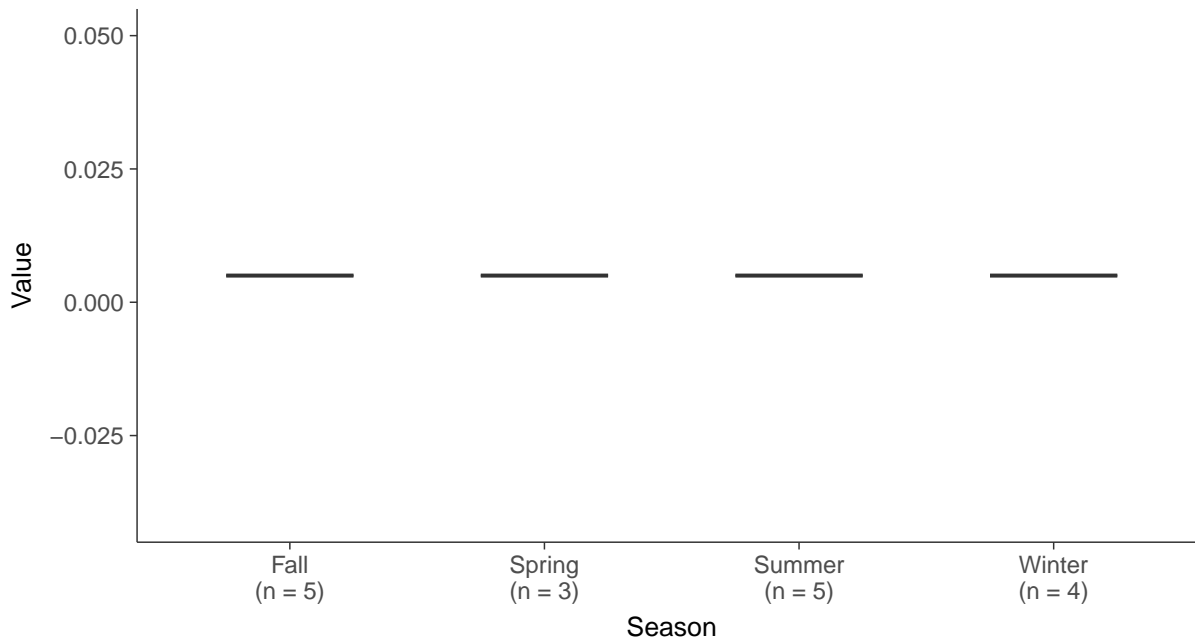
Boxplot

Antimony, MW-5 (mg/L)



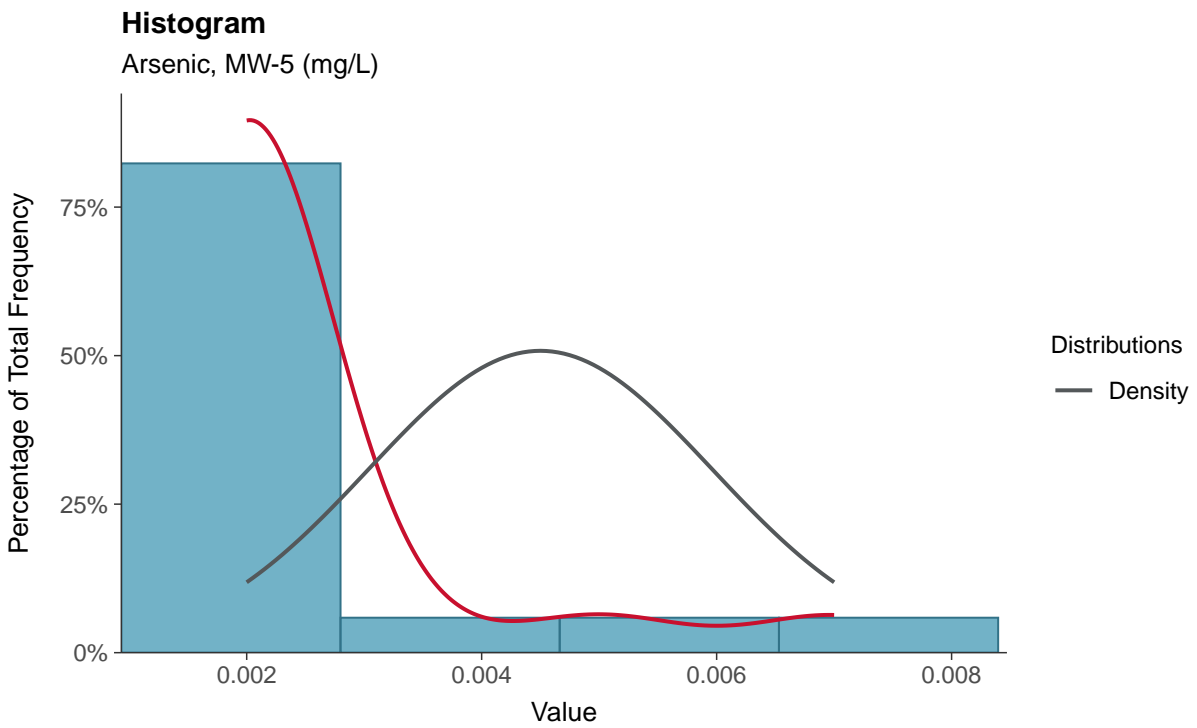
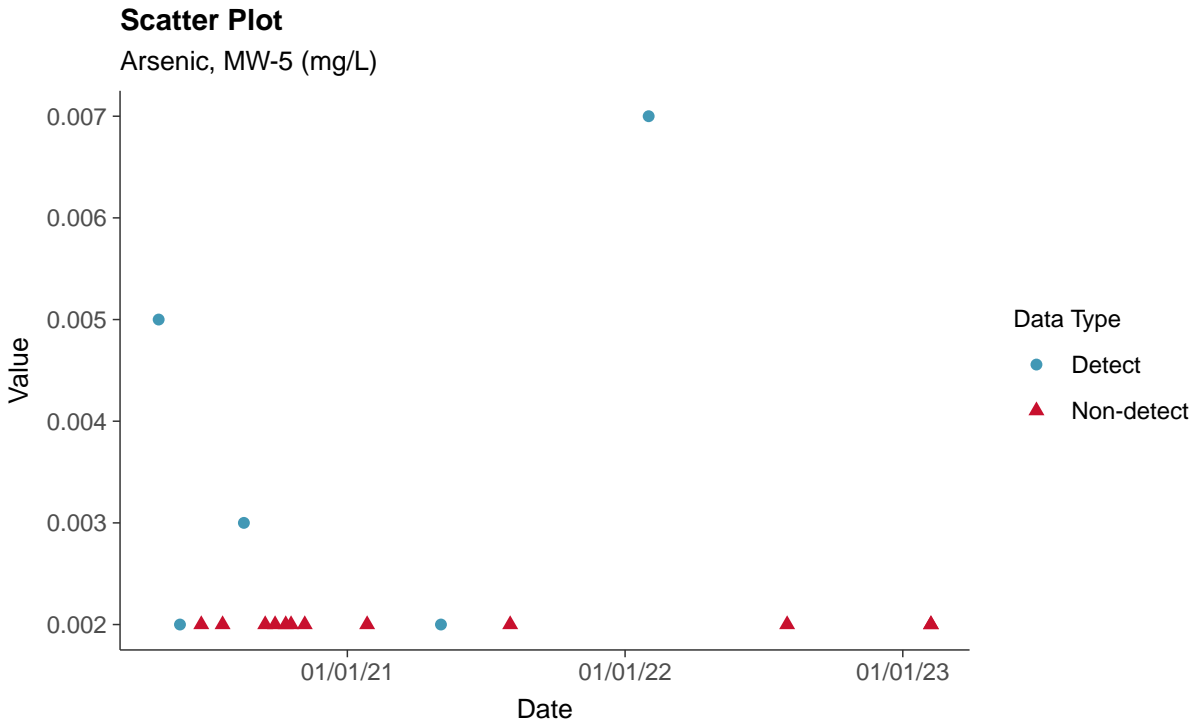
Boxplot by Season

Antimony, MW-5 (mg/L)



Appendix IV: Arsenic, MW-5

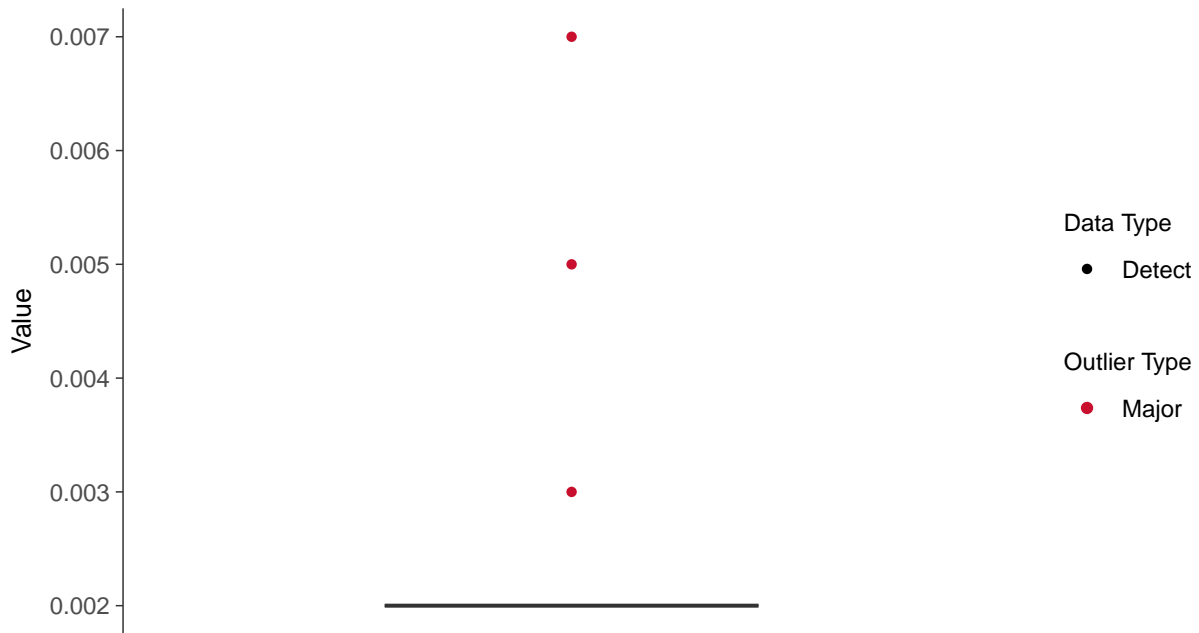
ID: 05_2_09





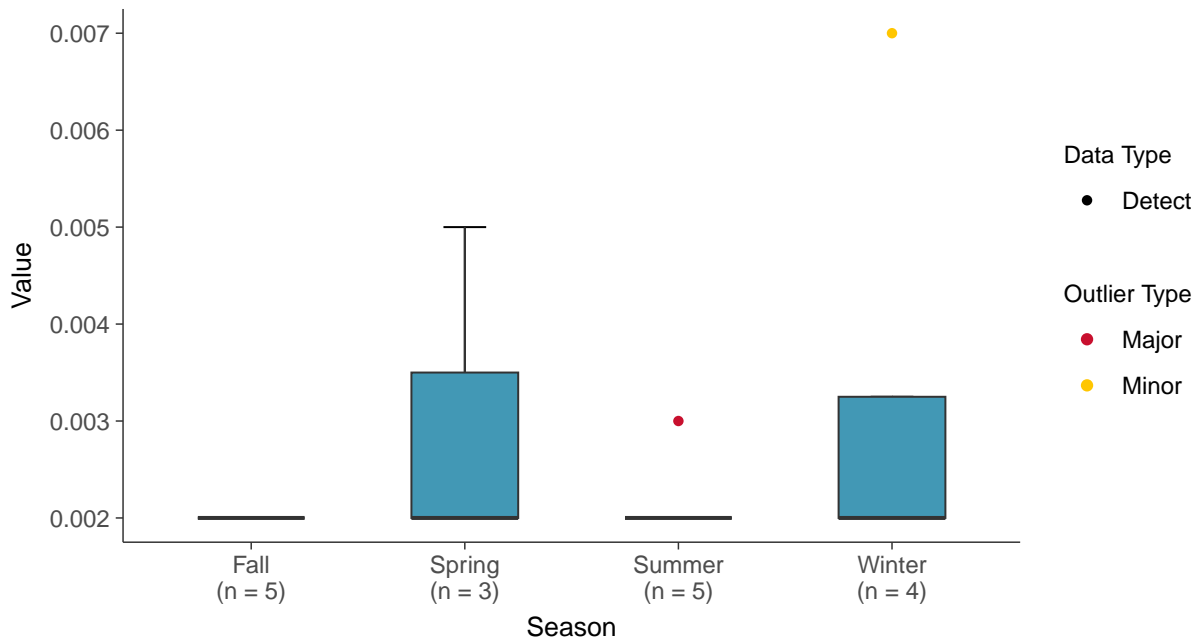
Boxplot

Arsenic, MW-5 (mg/L)



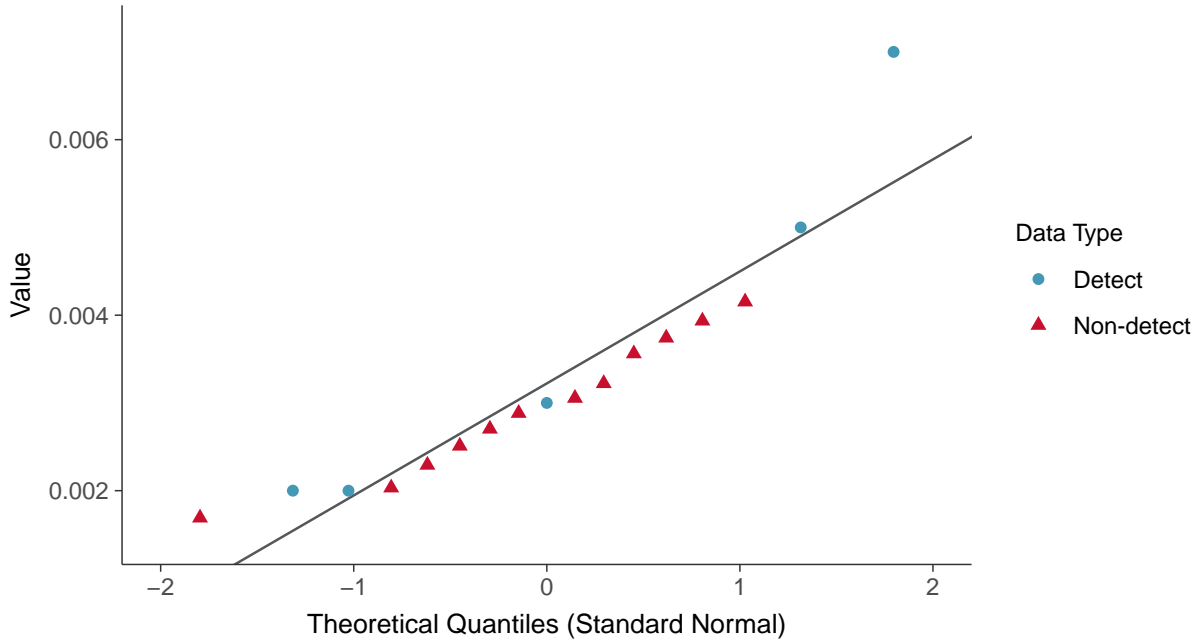
Boxplot by Season

Arsenic, MW-5 (mg/L)



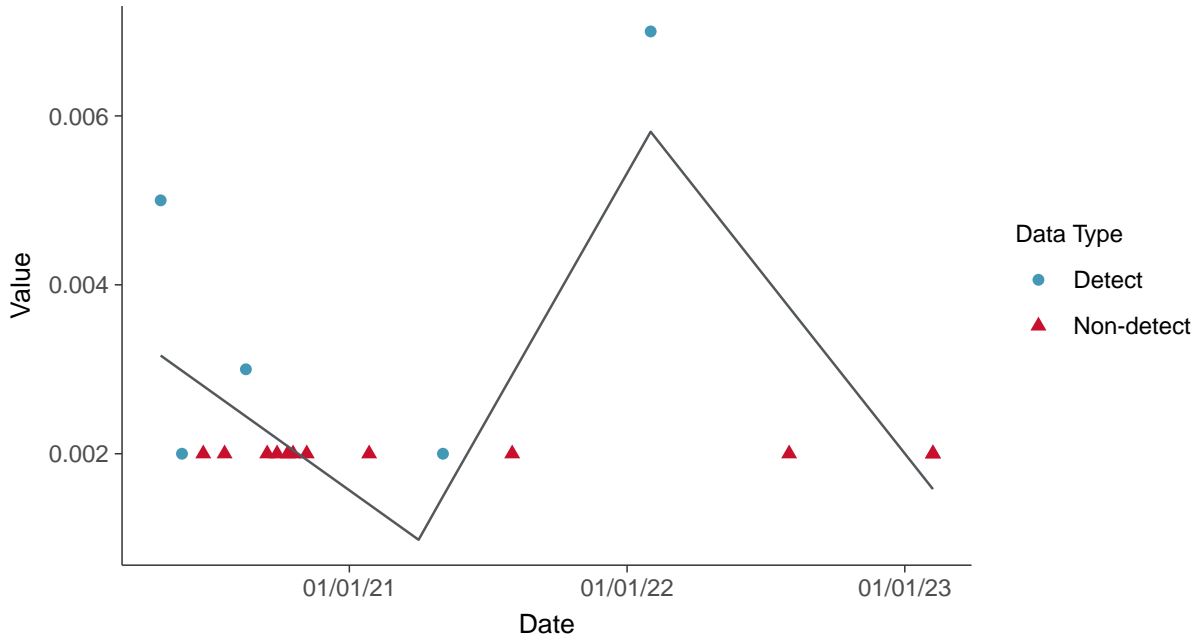
Normal Q-Q plot using ROS Imputed Estimates

Arsenic, MW-5 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

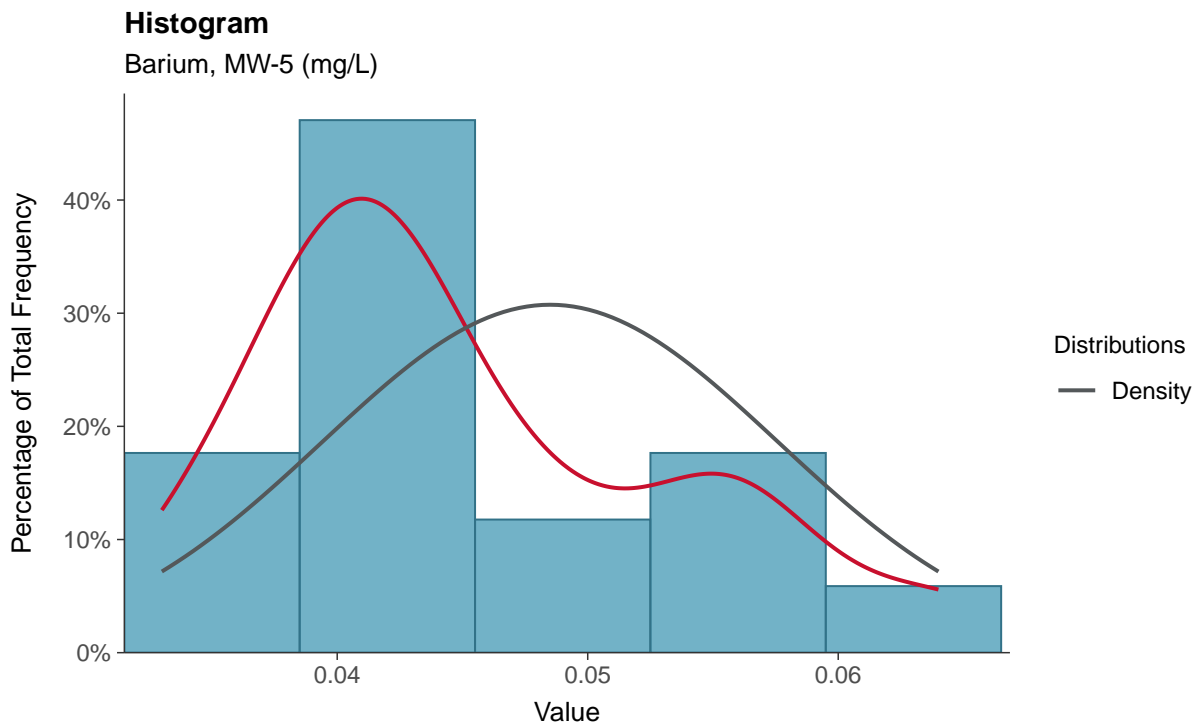
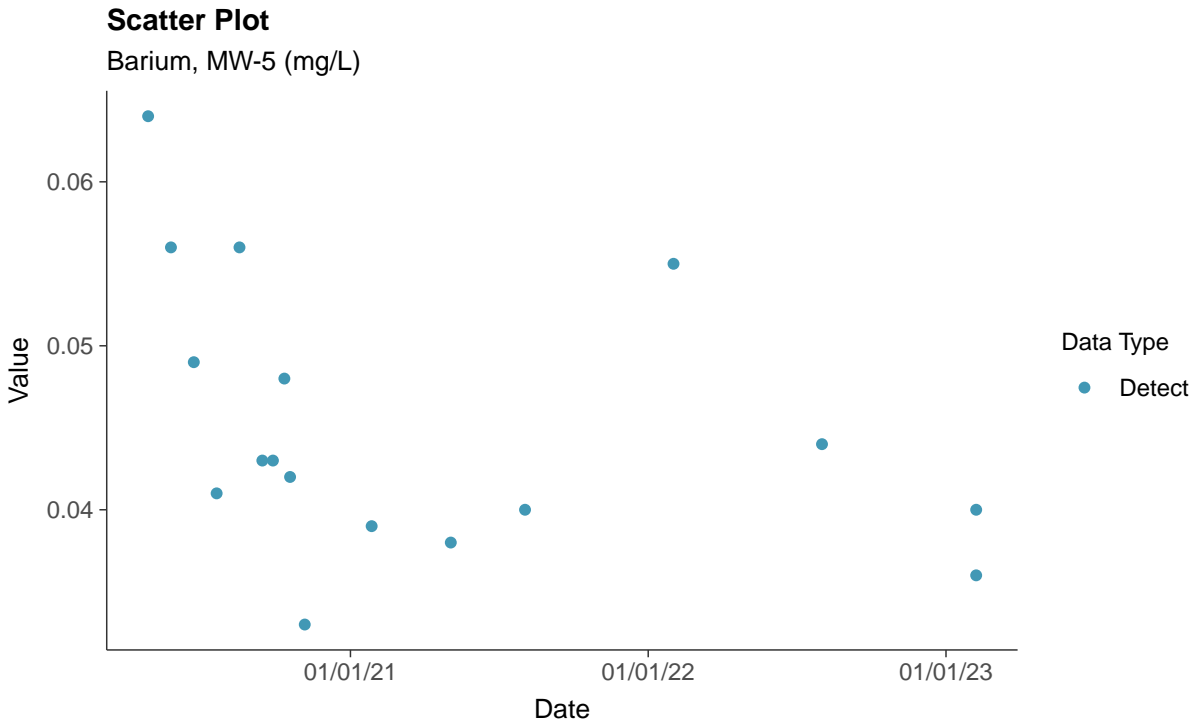
Arsenic, MW-5 (mg/L)





Appendix IV: Barium, MW-5

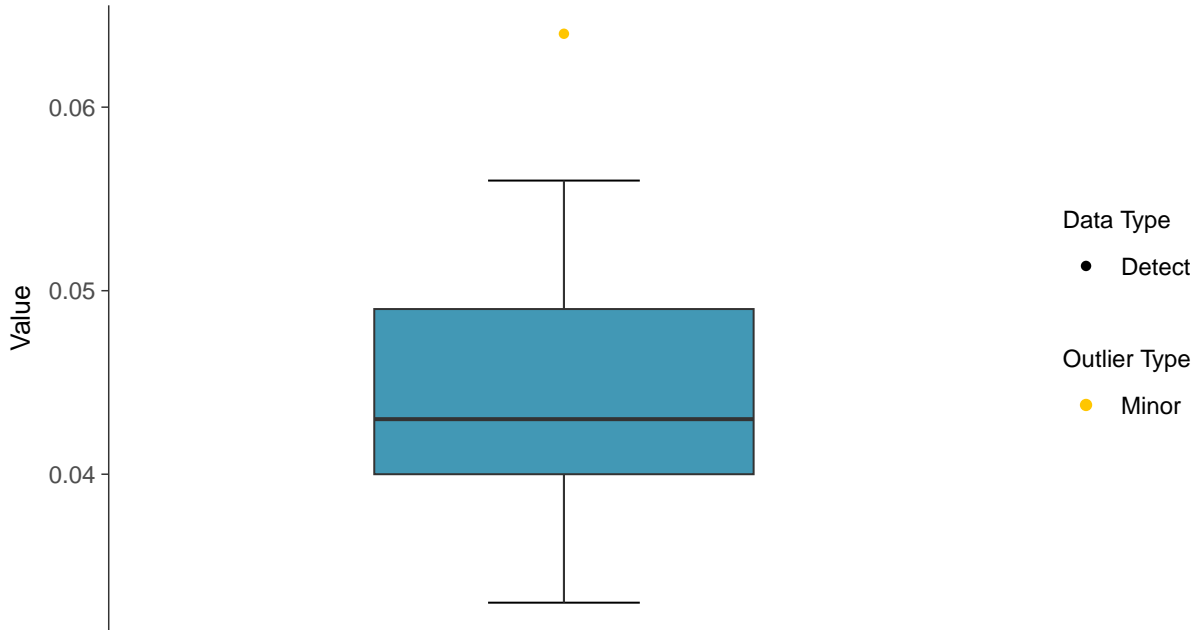
ID: 05_2_10





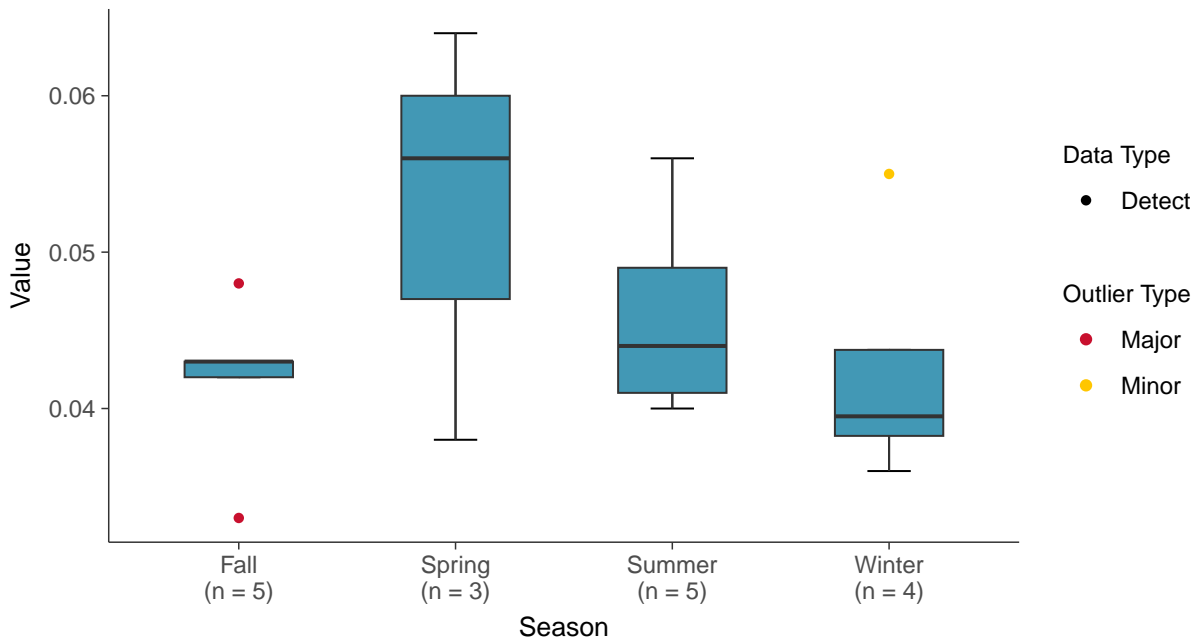
Boxplot

Barium, MW-5 (mg/L)



Boxplot by Season

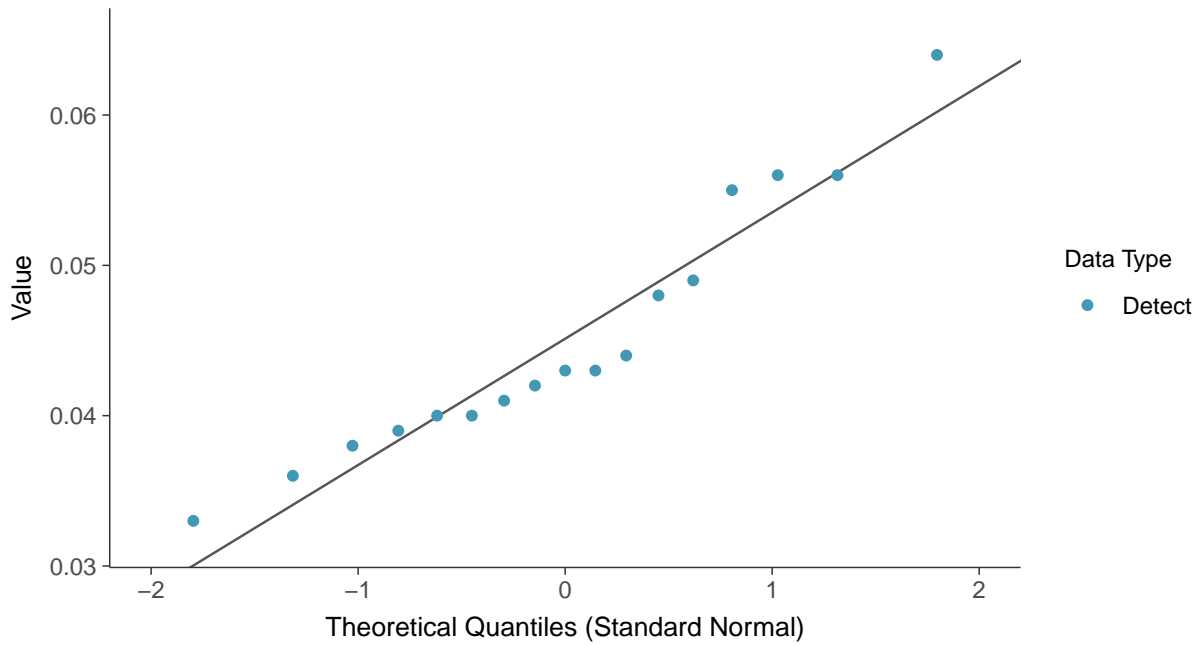
Barium, MW-5 (mg/L)





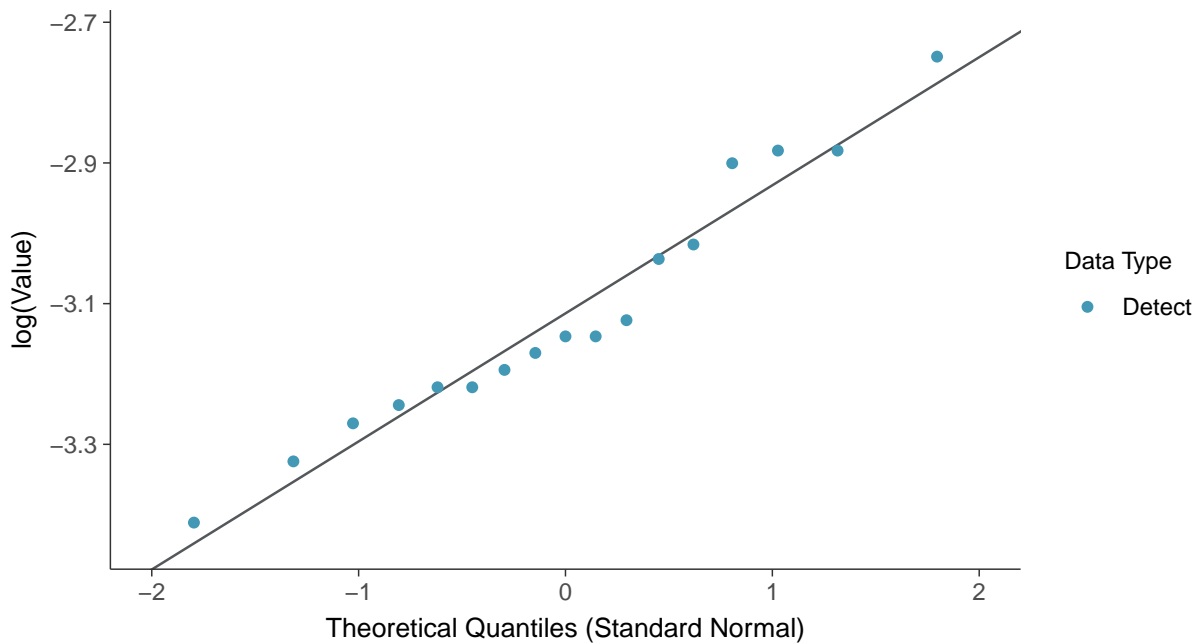
Normal Q-Q plot

Barium, MW-5 (mg/L)



Lognormal Q-Q plot

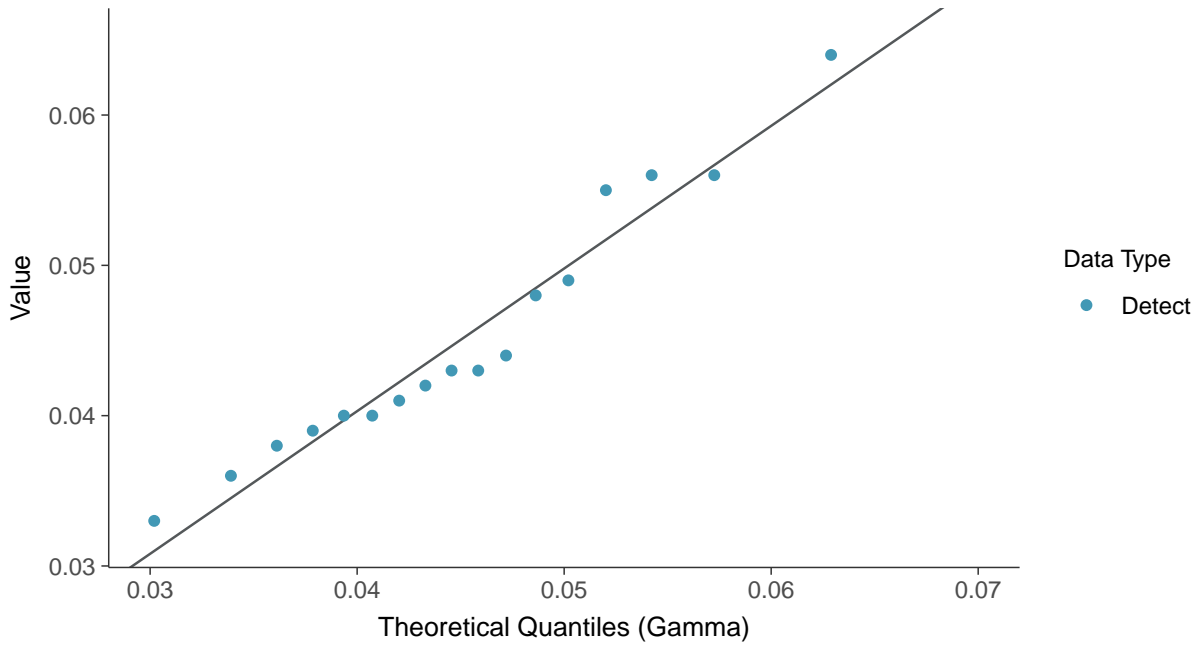
Barium, MW-5 (mg/L)





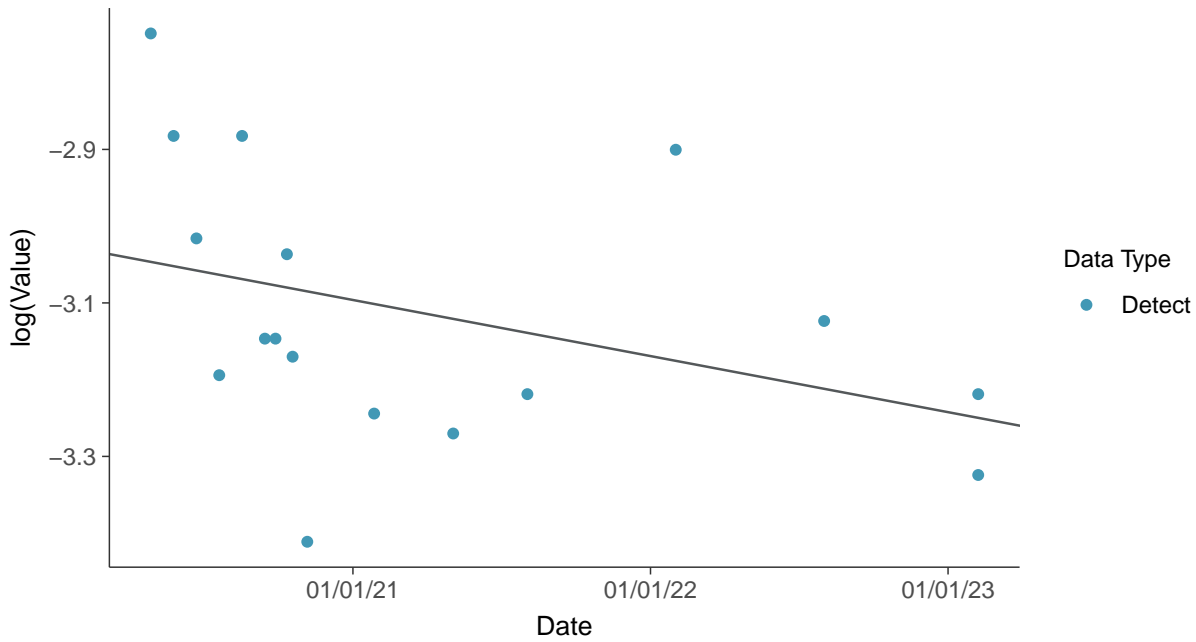
Gamma Q-Q plot

Barium, MW-5 (mg/L)



Trend Regression: Lognormal MLE

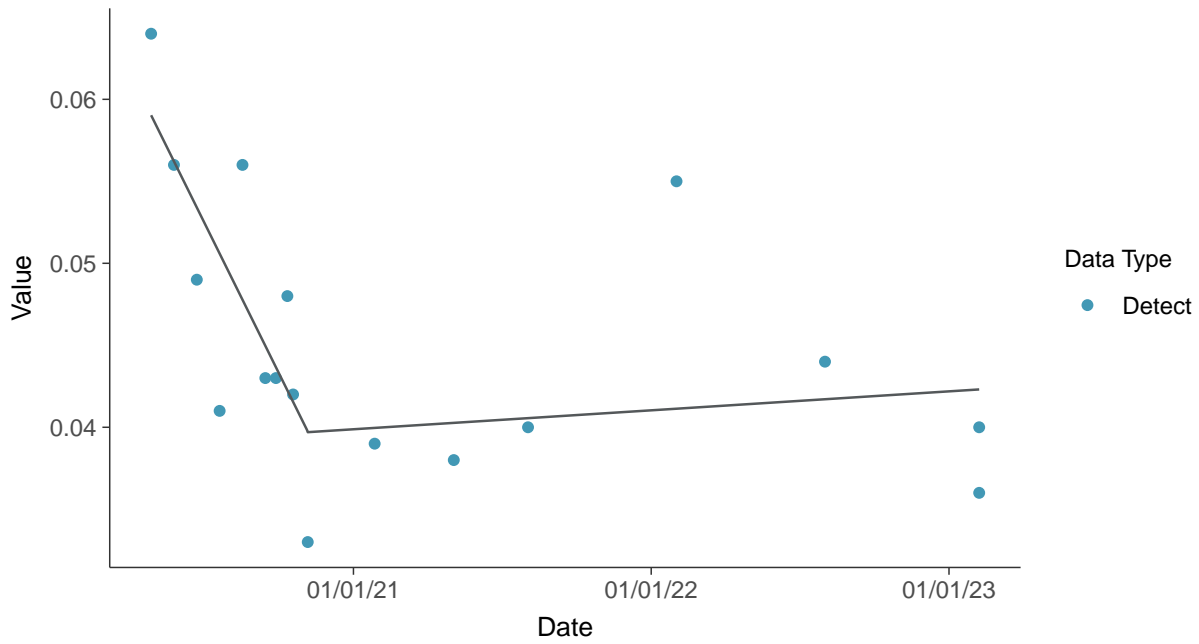
Barium, MW-5 (mg/L)





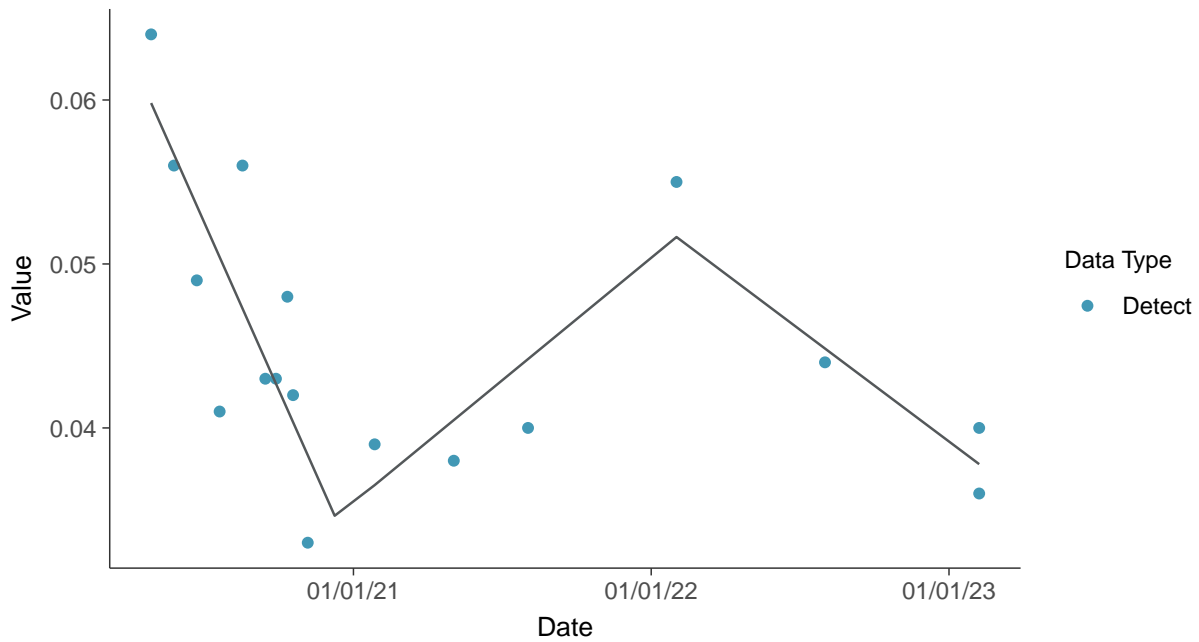
Trend Regression: Piecewise Linear-Linear

Barium, MW-5 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Barium, MW-5 (mg/L)





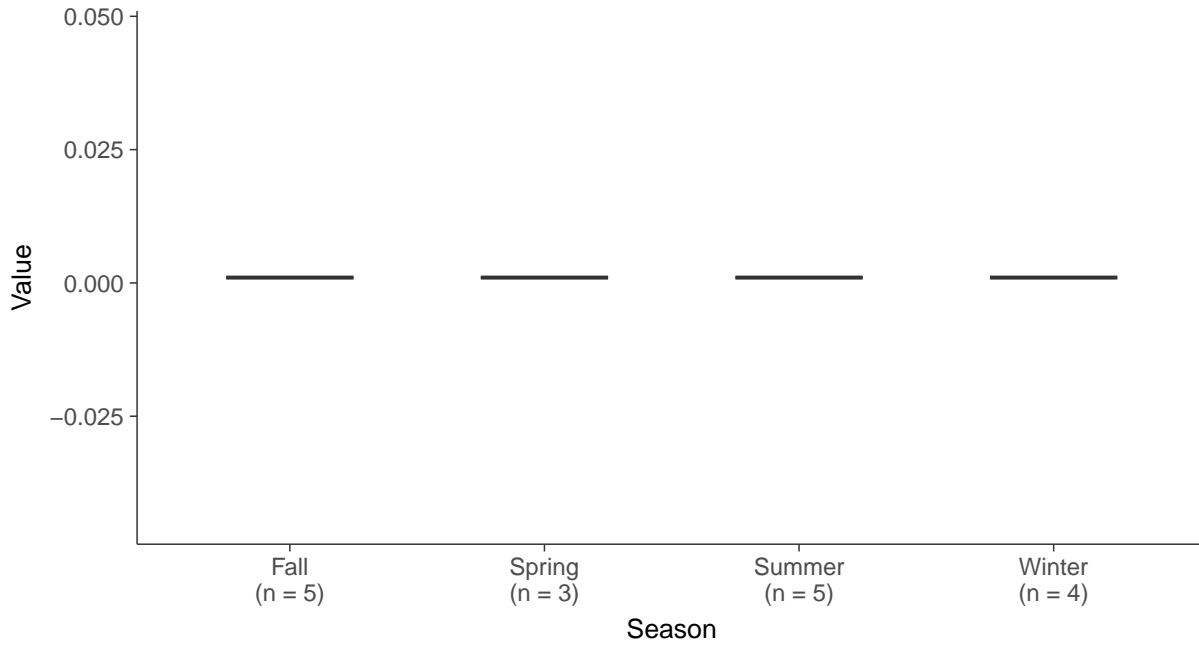
Boxplot

Beryllium, MW-5 (mg/L)



Boxplot by Season

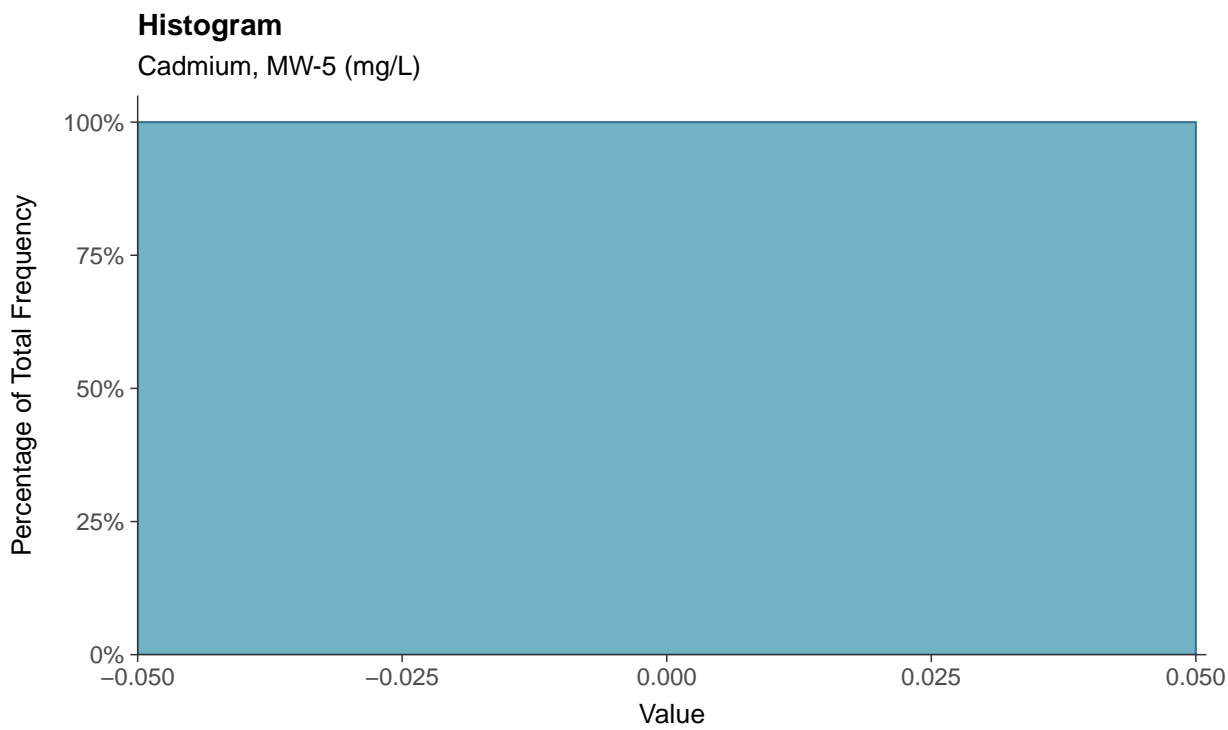
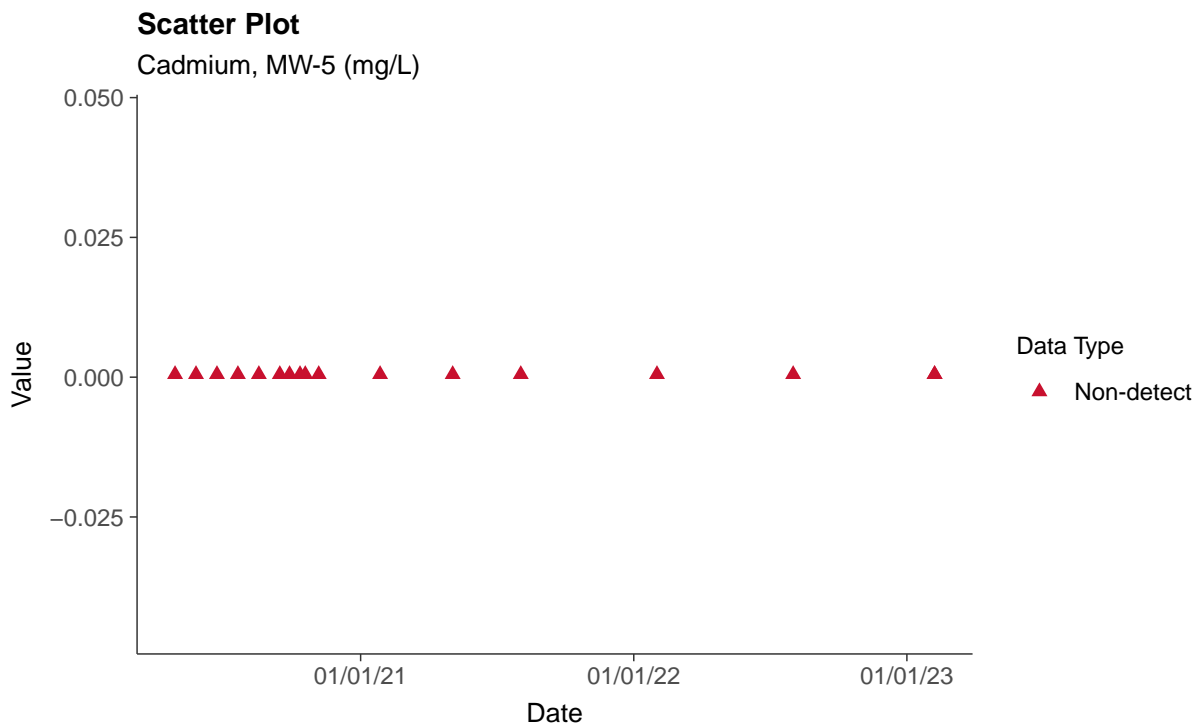
Beryllium, MW-5 (mg/L)





Appendix IV: Cadmium, MW-5

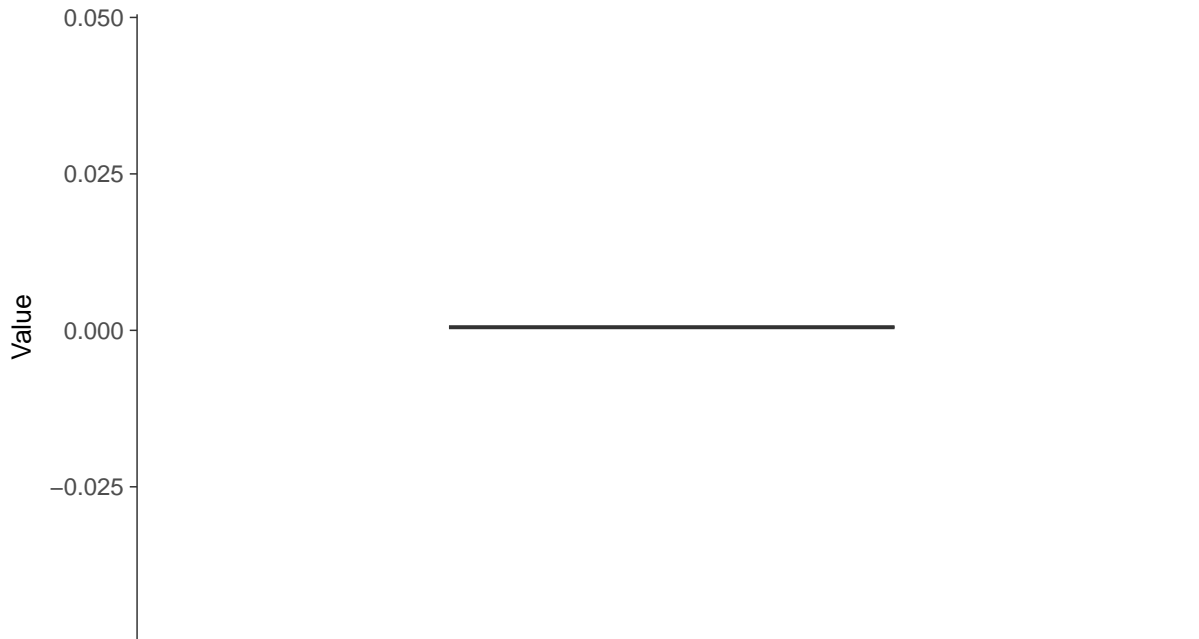
ID: 05_2_13





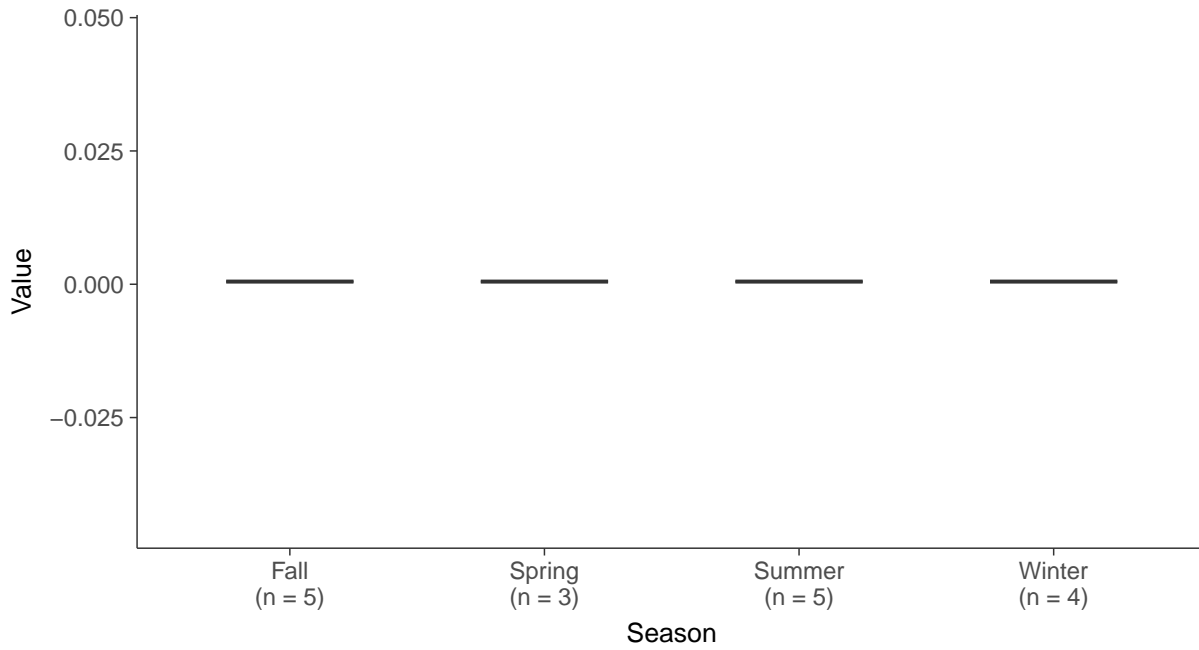
Boxplot

Cadmium, MW-5 (mg/L)



Boxplot by Season

Cadmium, MW-5 (mg/L)



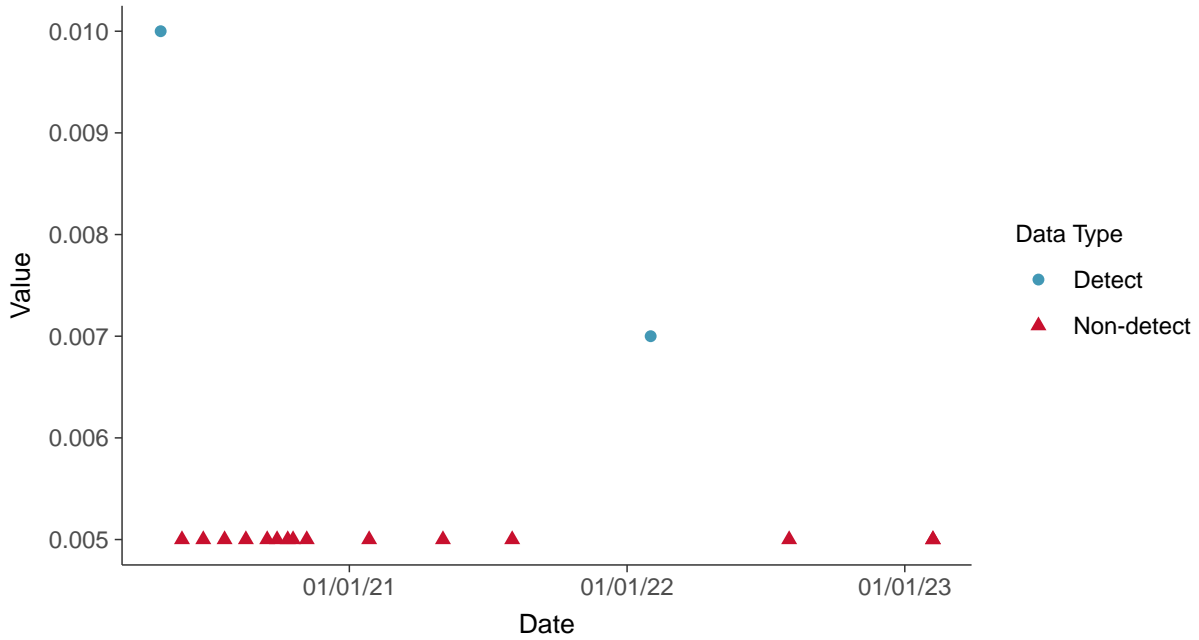


Appendix IV: Chromium, MW-5

ID: 05_2_15

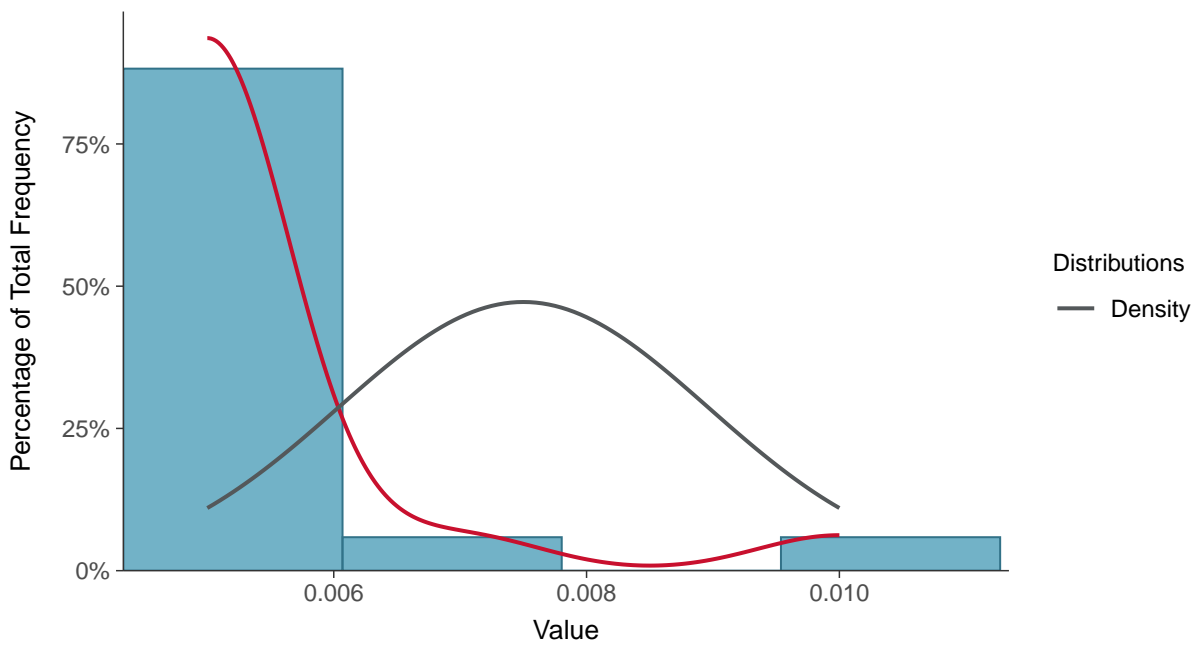
Scatter Plot

Chromium, MW-5 (mg/L)



Histogram

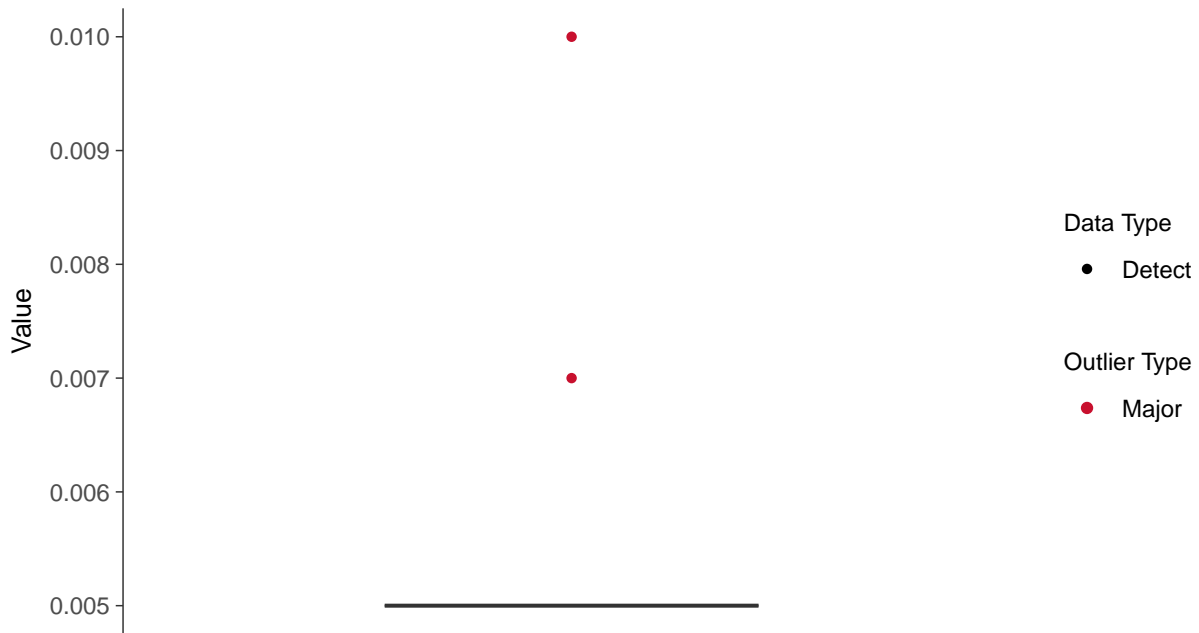
Chromium, MW-5 (mg/L)





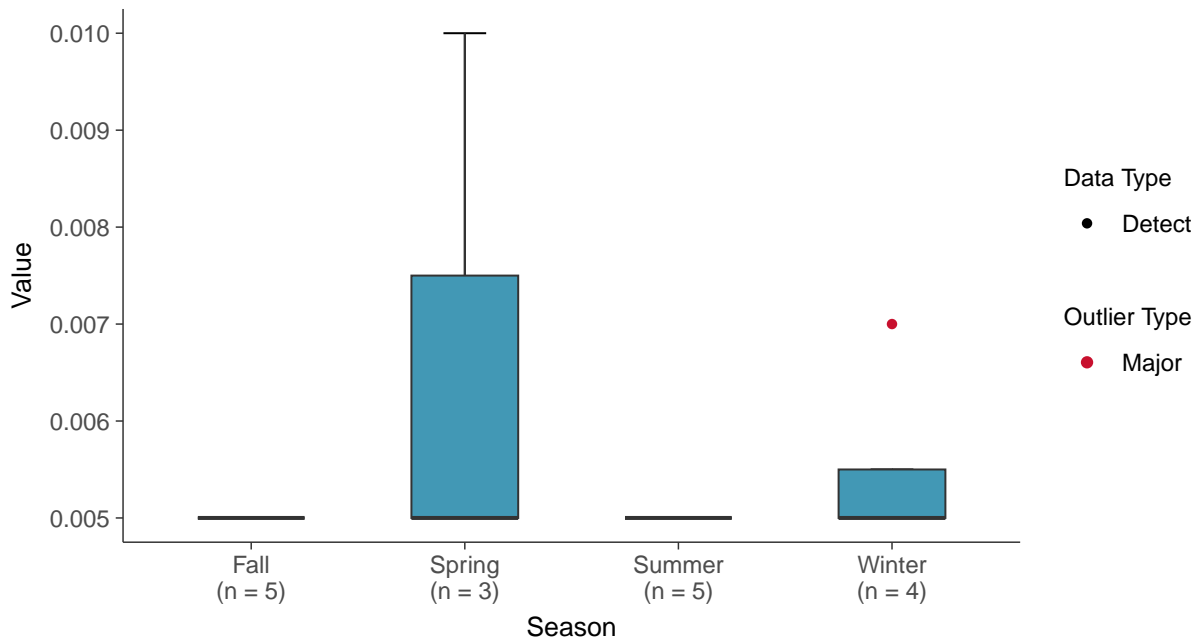
Boxplot

Chromium, MW-5 (mg/L)



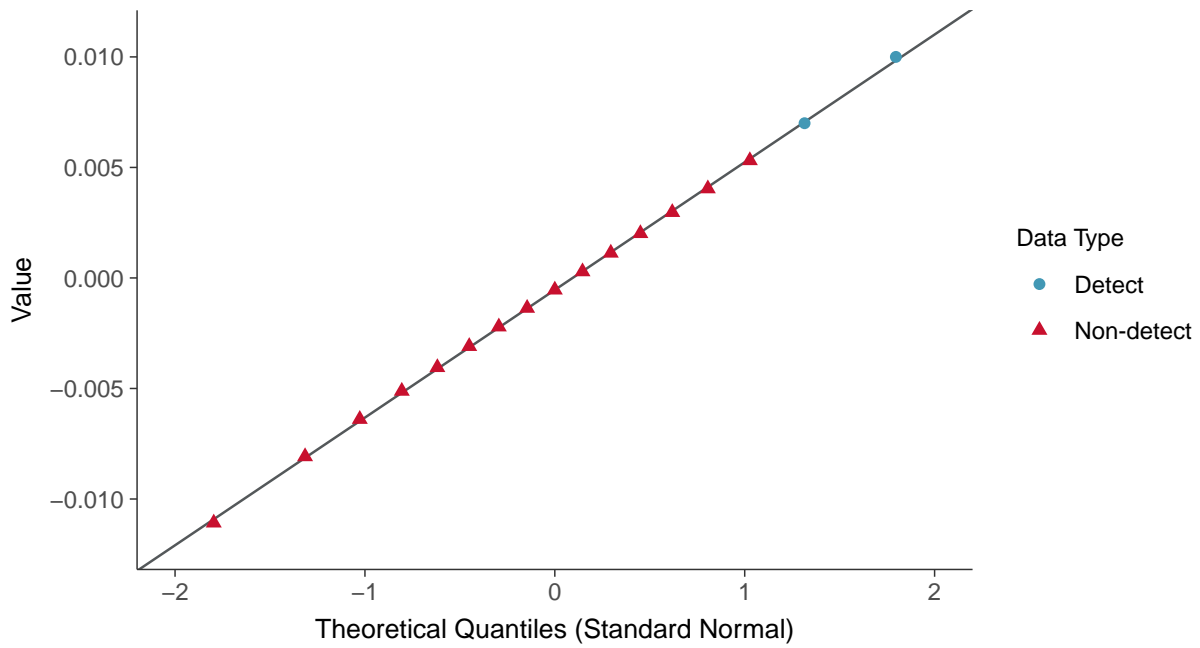
Boxplot by Season

Chromium, MW-5 (mg/L)



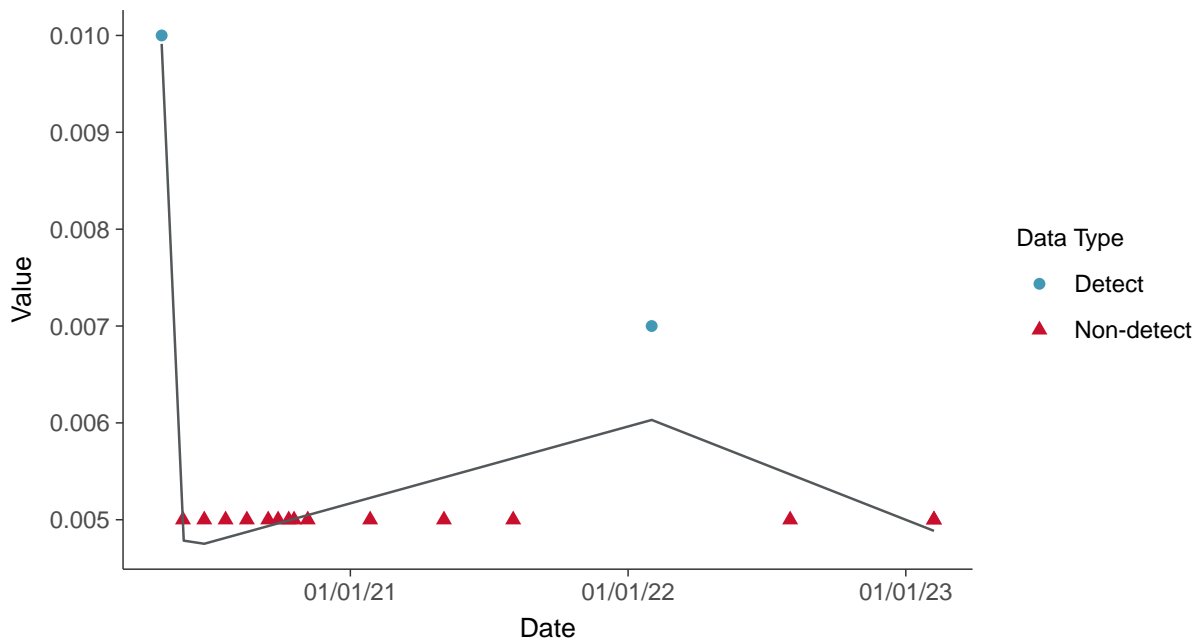
Normal Q-Q plot using ROS Imputed Estimates

Chromium, MW-5 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Chromium, MW-5 (mg/L)



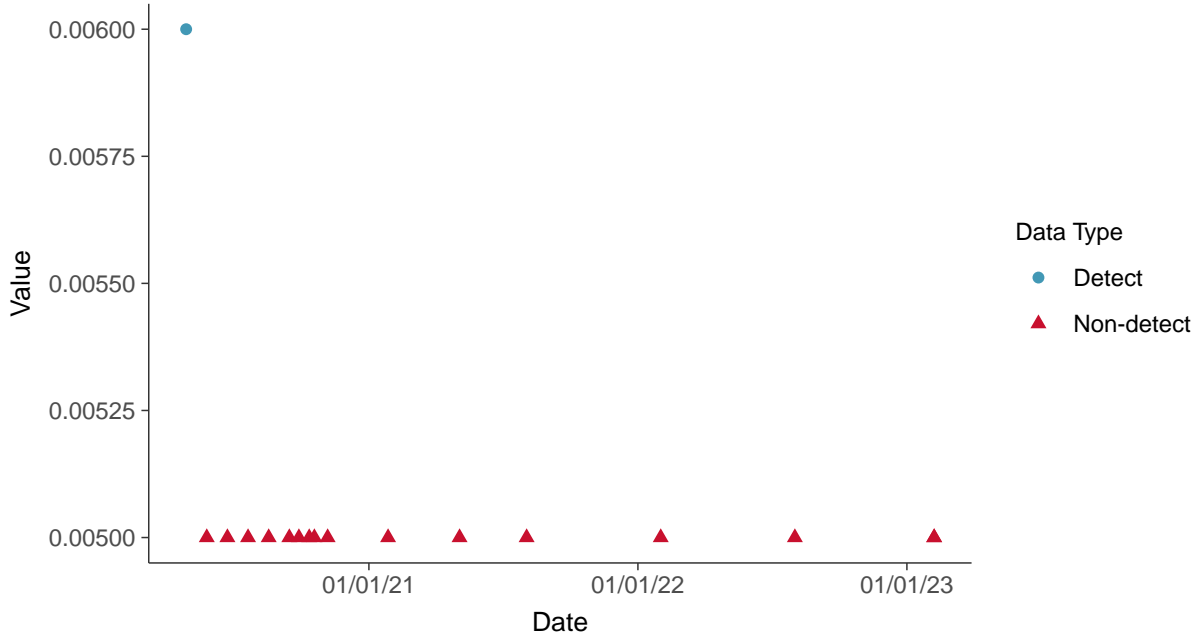


Appendix IV: Cobalt, MW-5

ID: 05_2_16

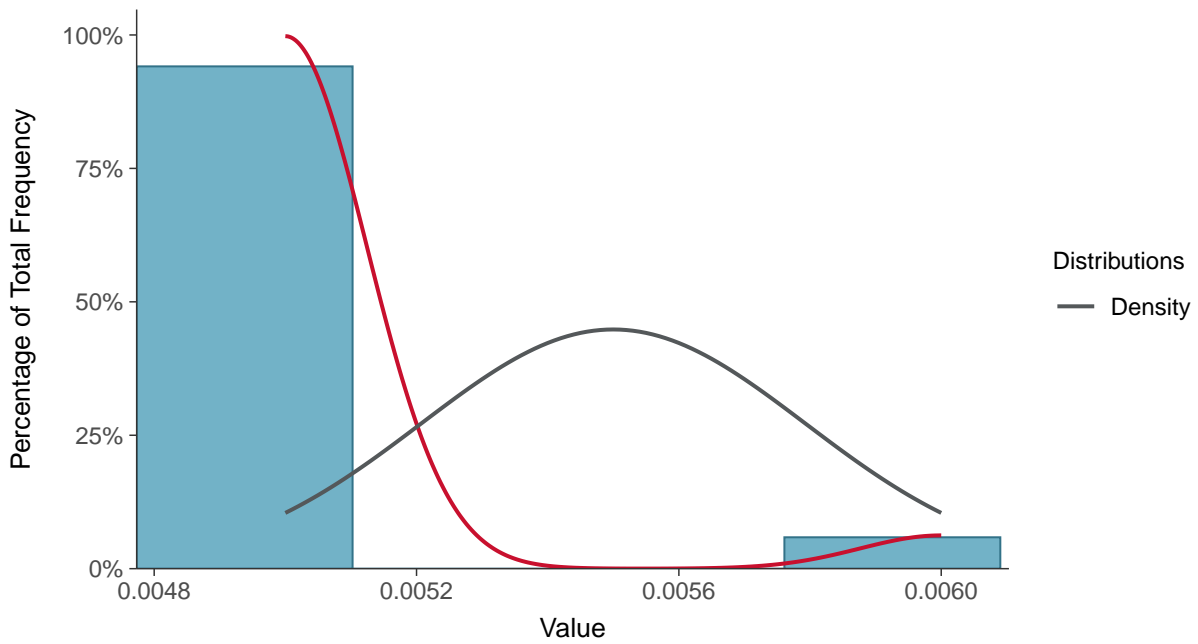
Scatter Plot

Cobalt, MW-5 (mg/L)



Histogram

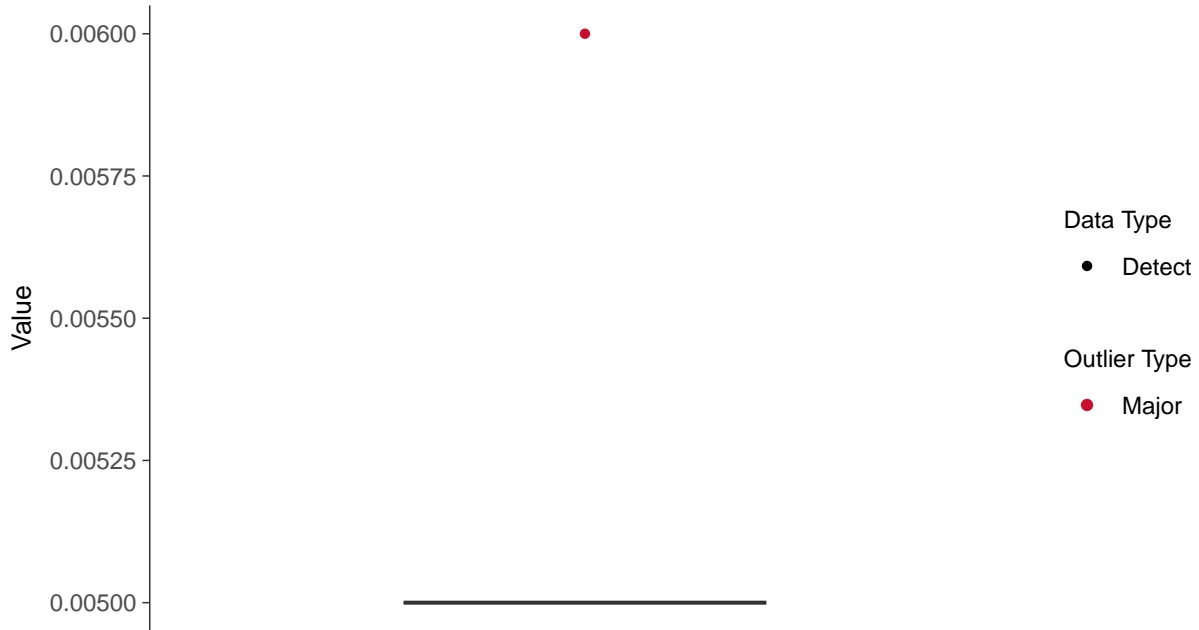
Cobalt, MW-5 (mg/L)





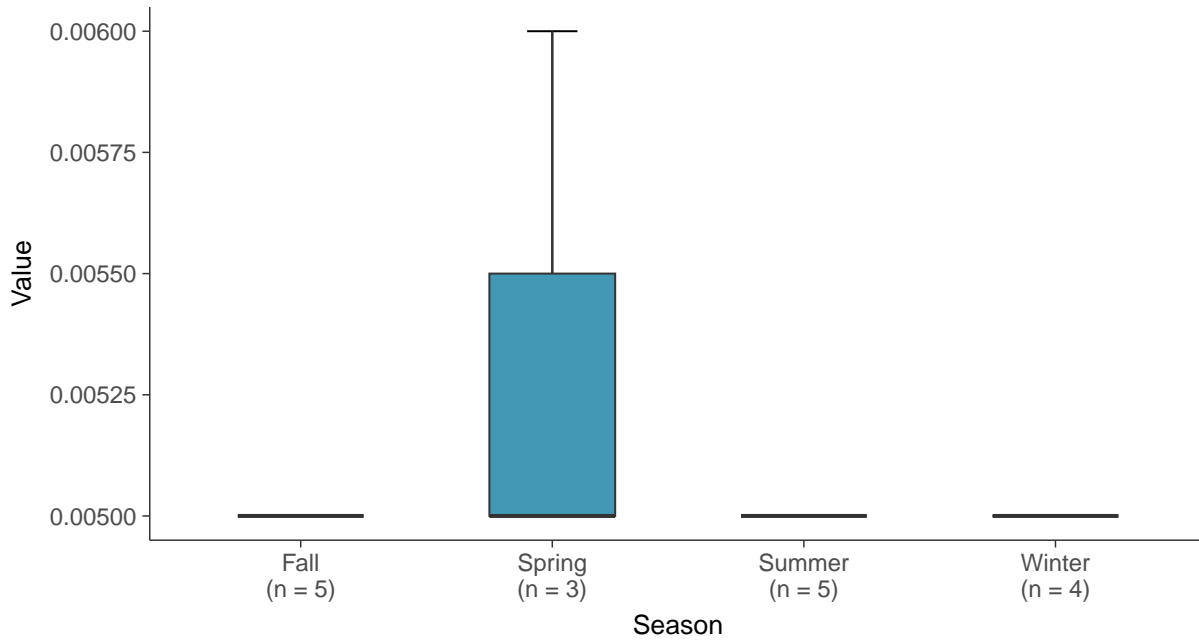
Boxplot

Cobalt, MW-5 (mg/L)



Boxplot by Season

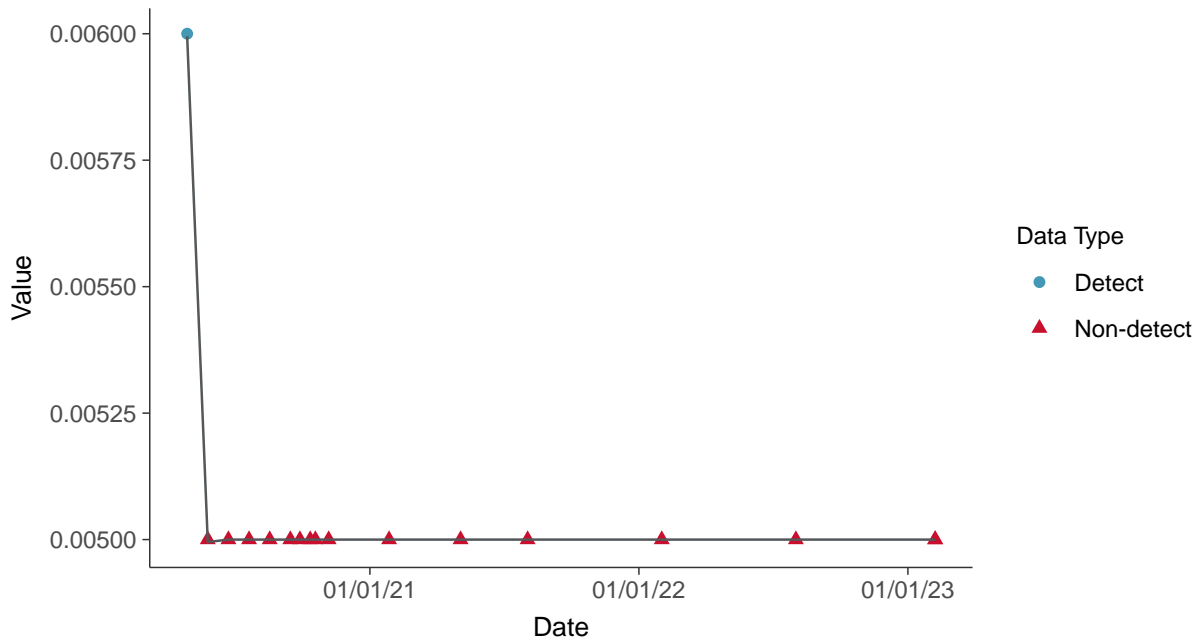
Cobalt, MW-5 (mg/L)





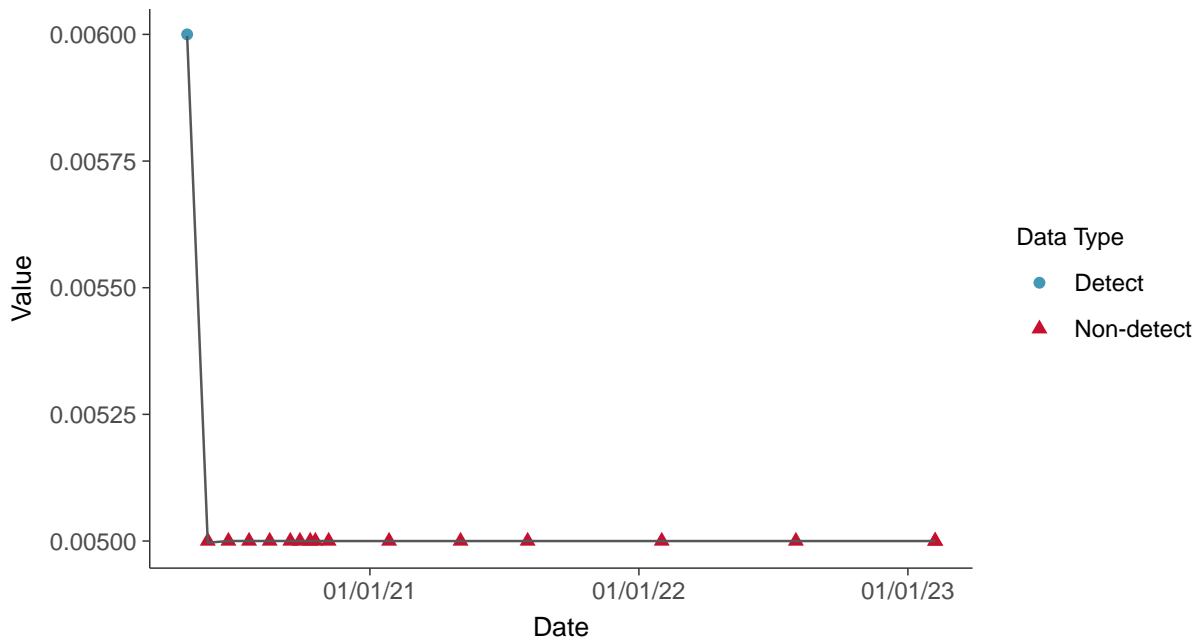
Trend Regression: Piecewise Linear-Linear

Cobalt, MW-5 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

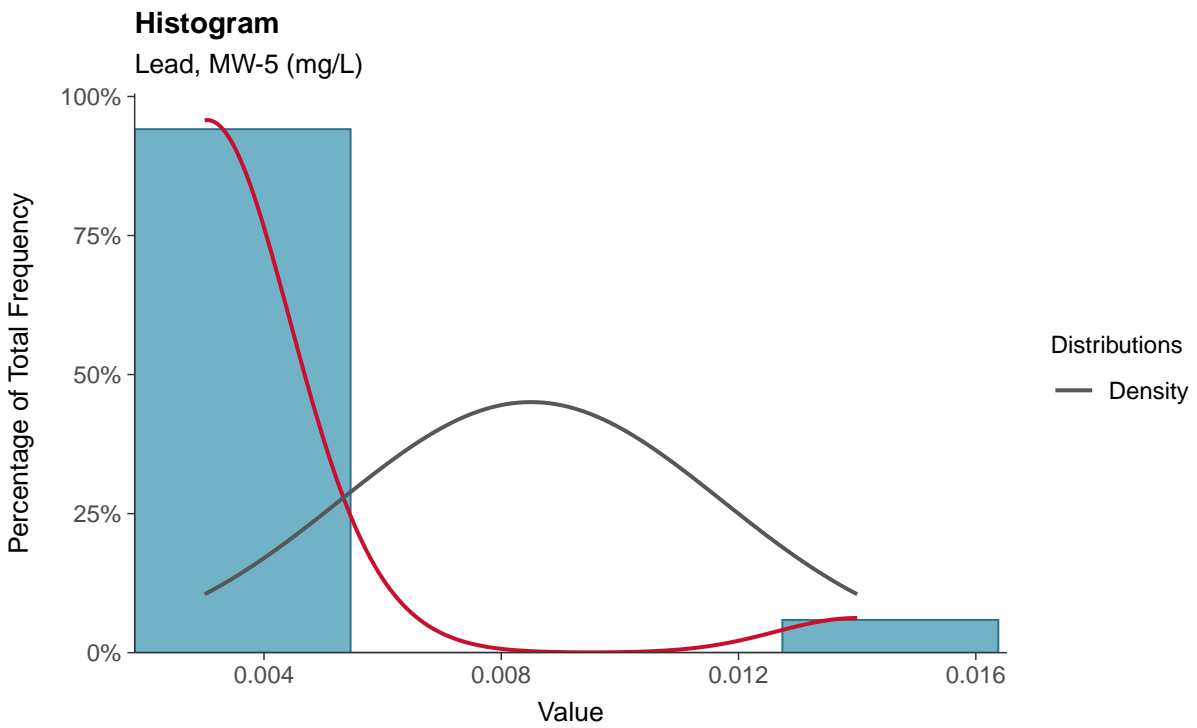
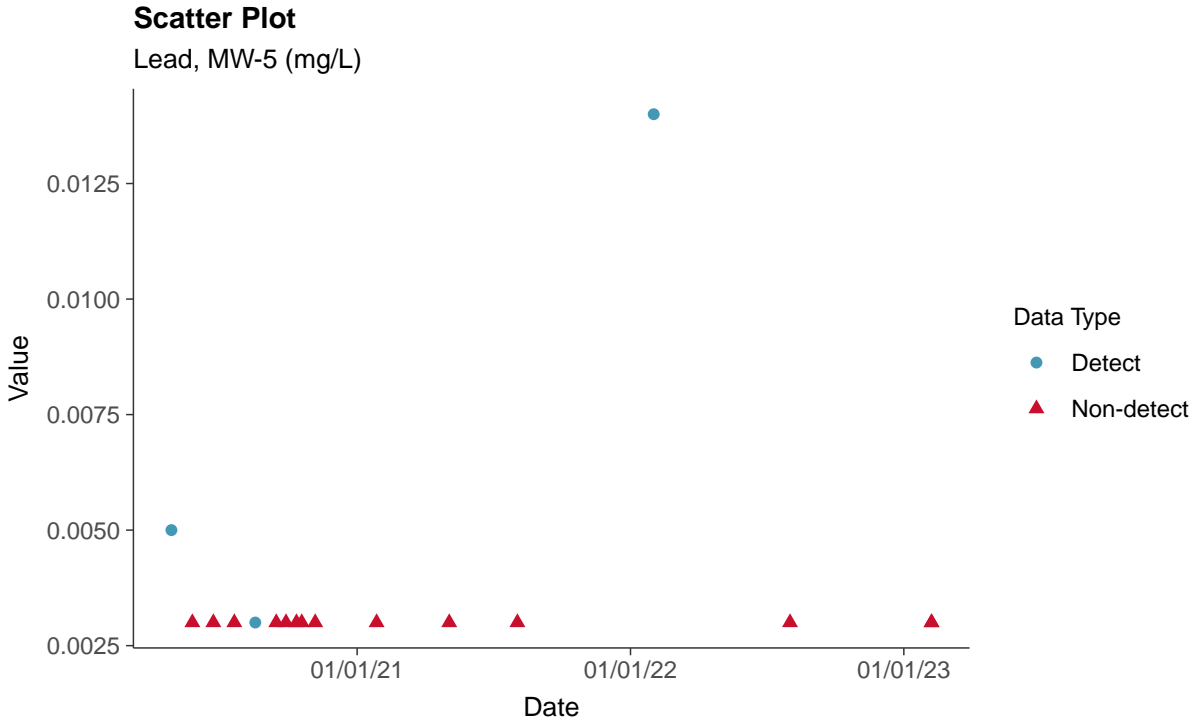
Cobalt, MW-5 (mg/L)





Appendix IV: Lead, MW-5

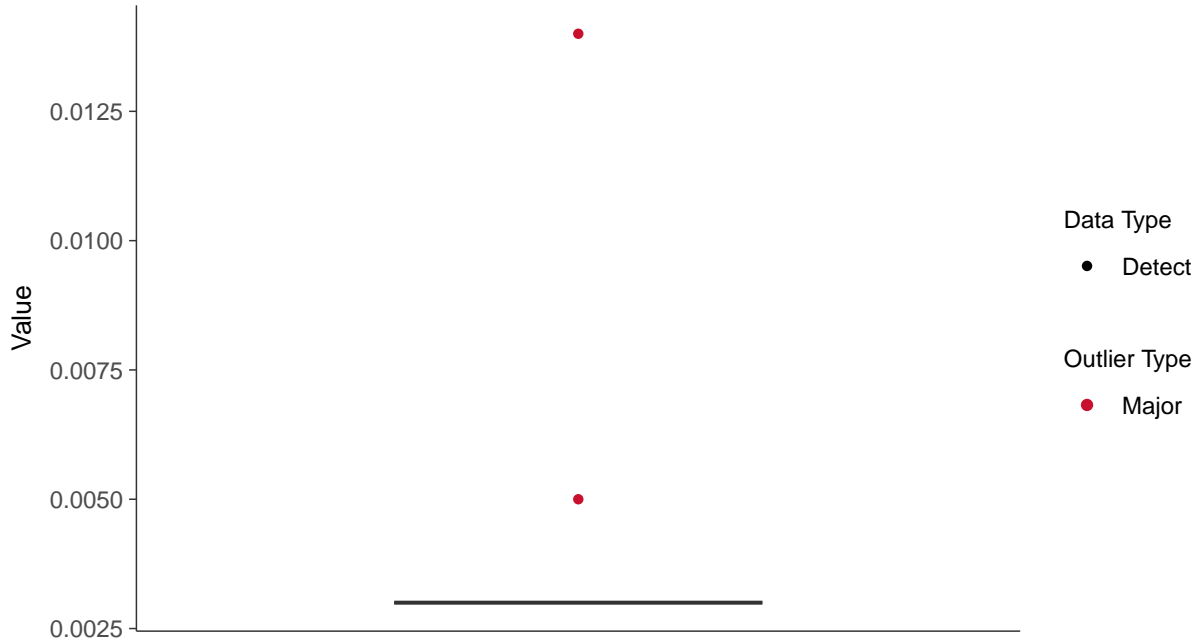
ID: 05_2_18





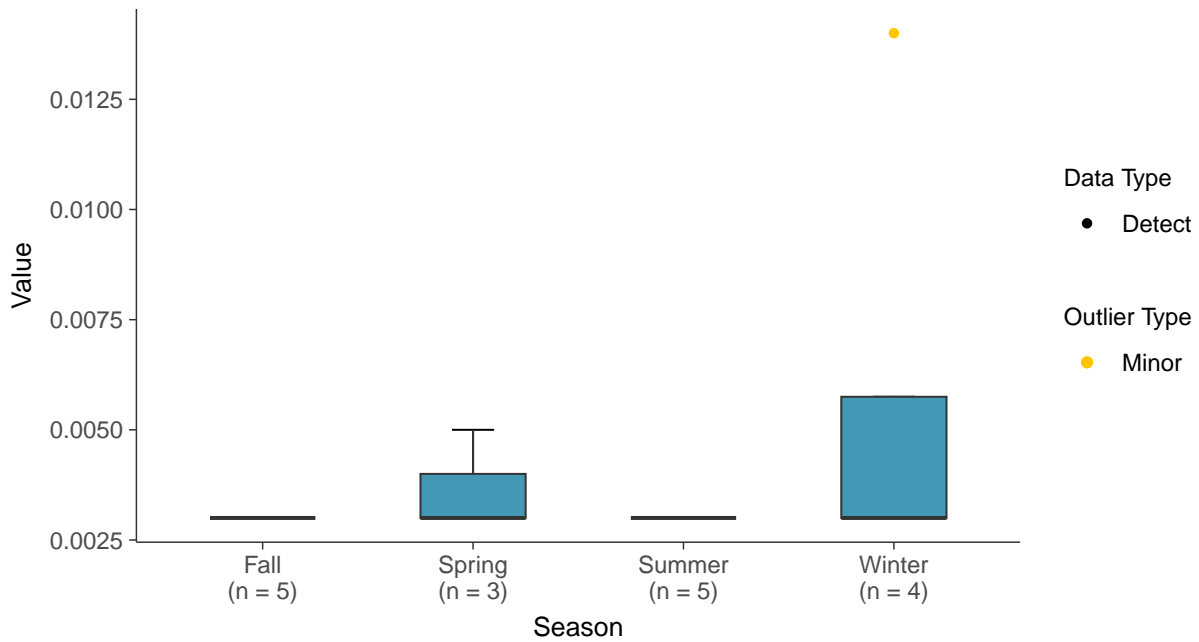
Boxplot

Lead, MW-5 (mg/L)



Boxplot by Season

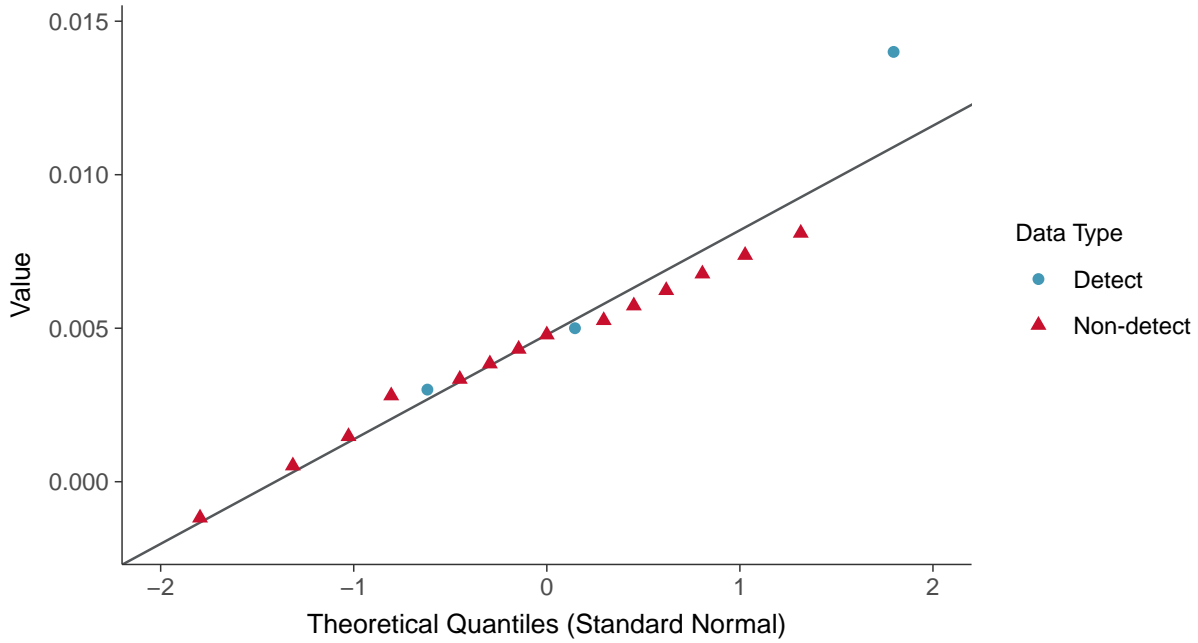
Lead, MW-5 (mg/L)





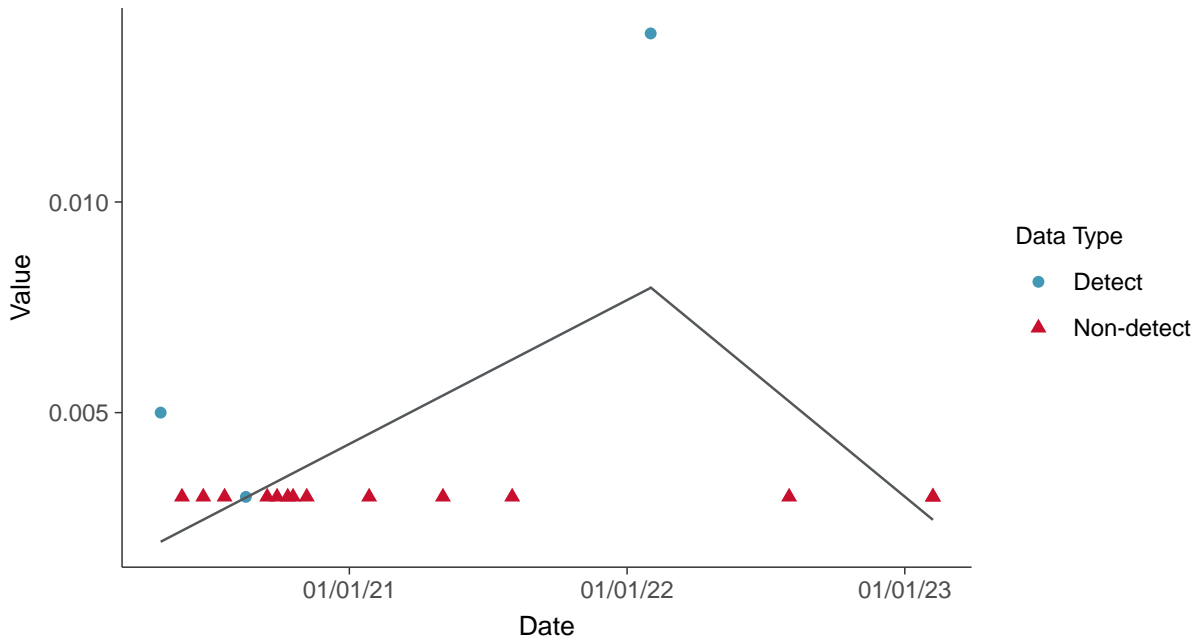
Normal Q-Q plot using ROS Imputed Estimates

Lead, MW-5 (mg/L)



Trend Regression: Piecewise Linear-Linear

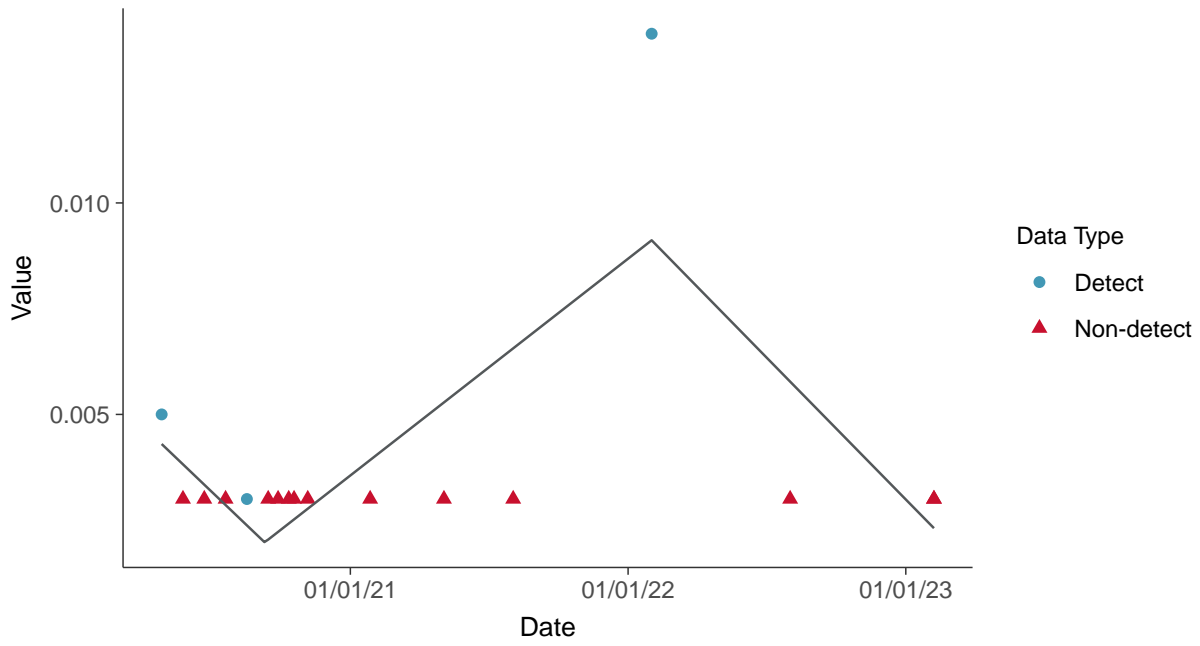
Lead, MW-5 (mg/L)





Trend Regression: Piecewise Linear-Linear-Linear

Lead, MW-5 (mg/L)



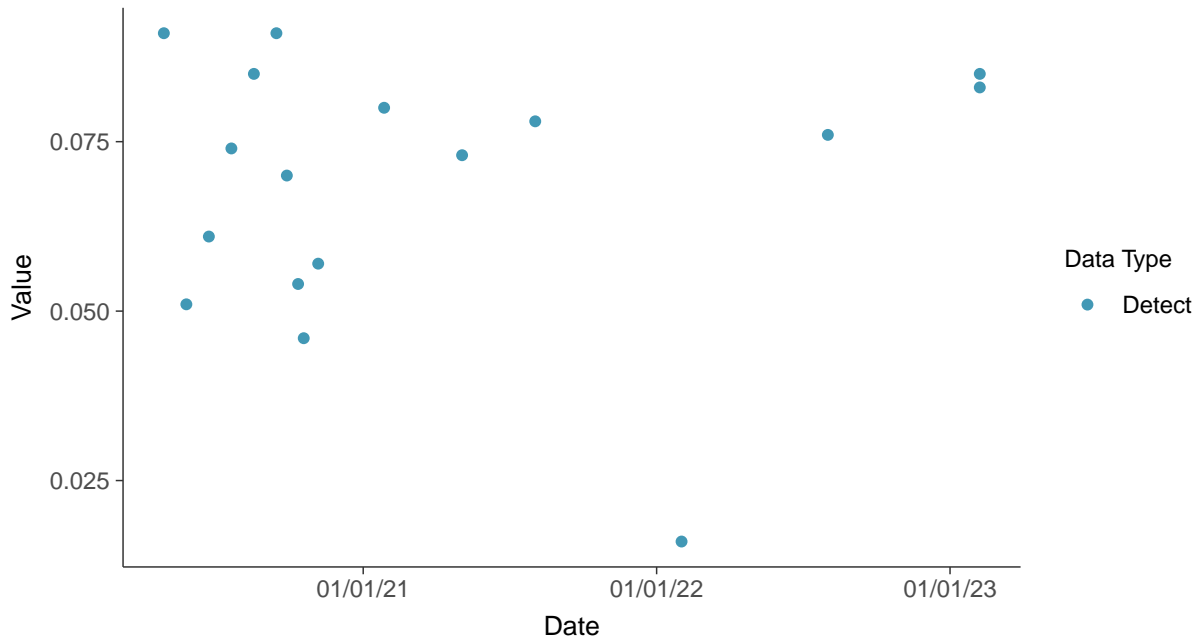


Appendix IV: Lithium, MW-5

ID: 05_2_19

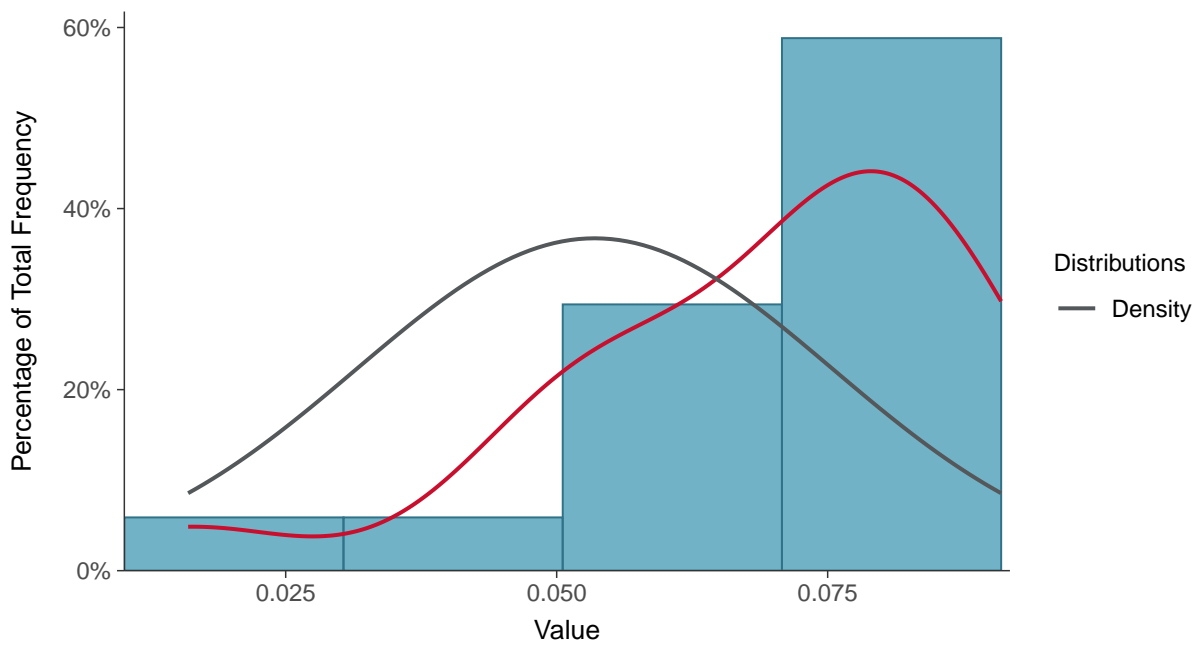
Scatter Plot

Lithium, MW-5 (mg/L)



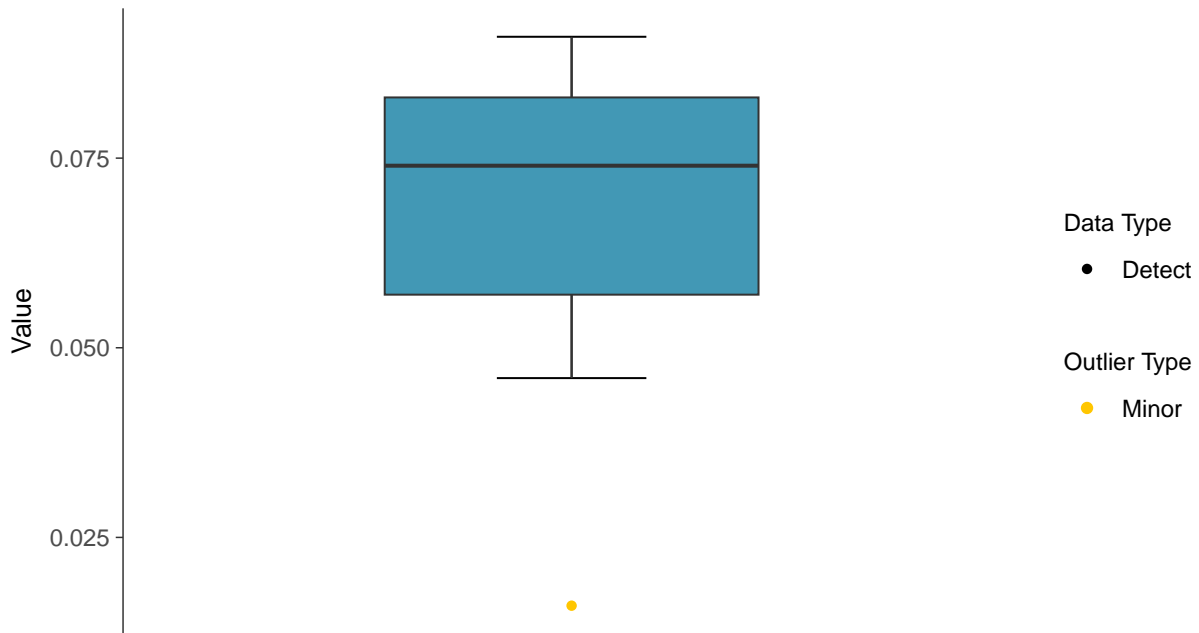
Histogram

Lithium, MW-5 (mg/L)



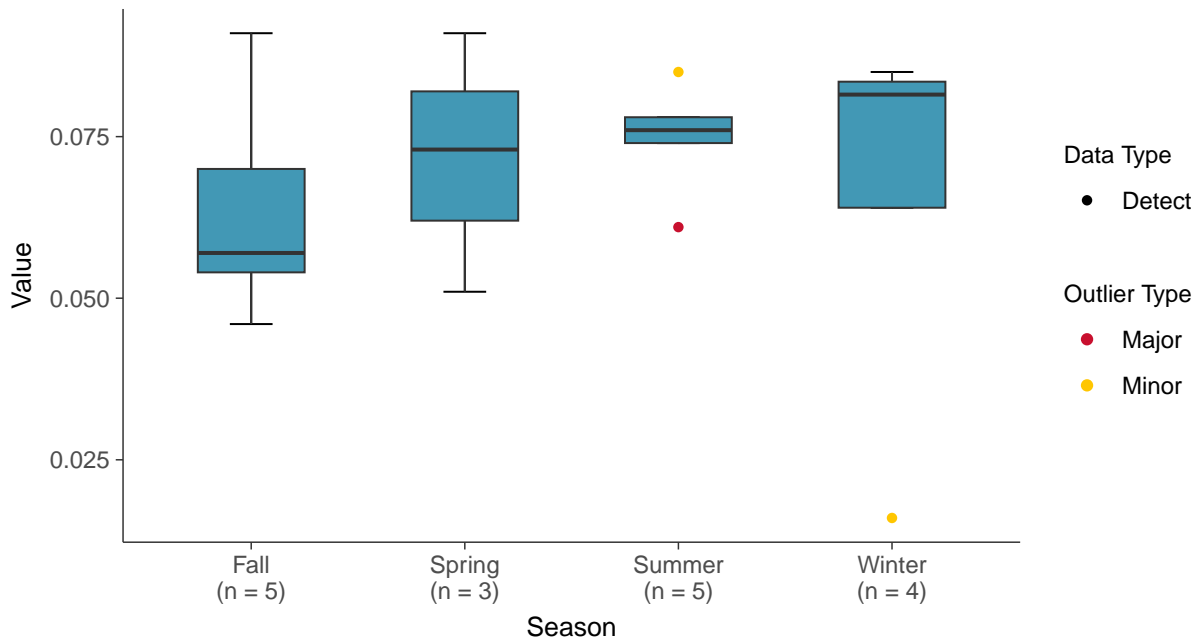
Boxplot

Lithium, MW-5 (mg/L)



Boxplot by Season

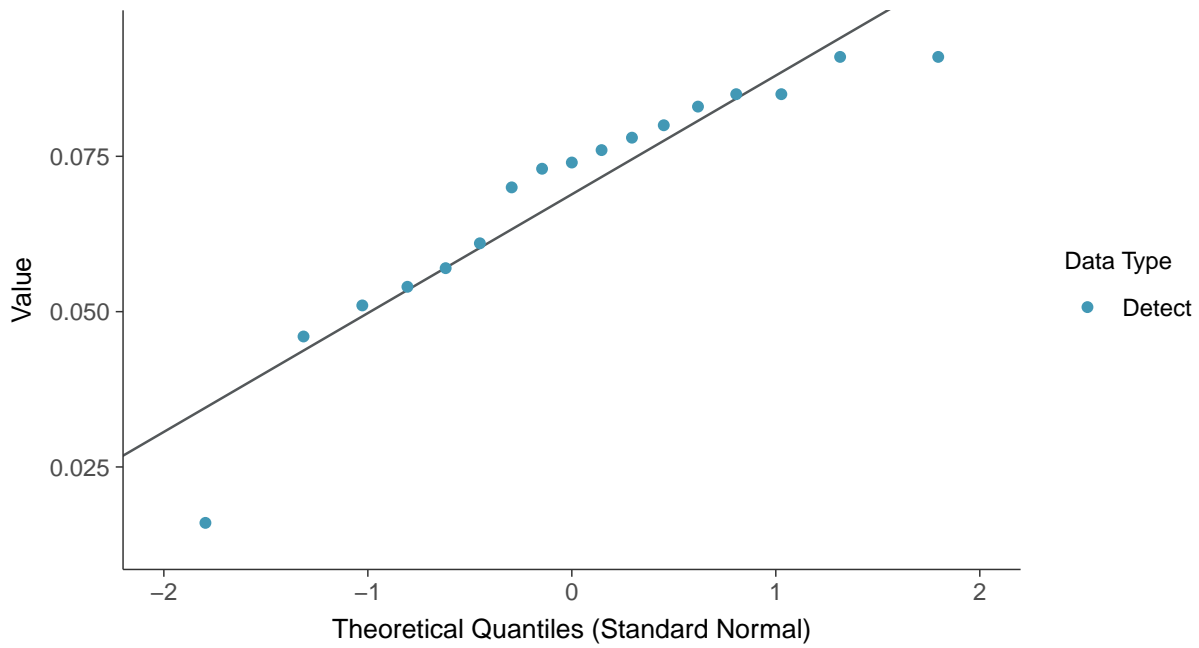
Lithium, MW-5 (mg/L)





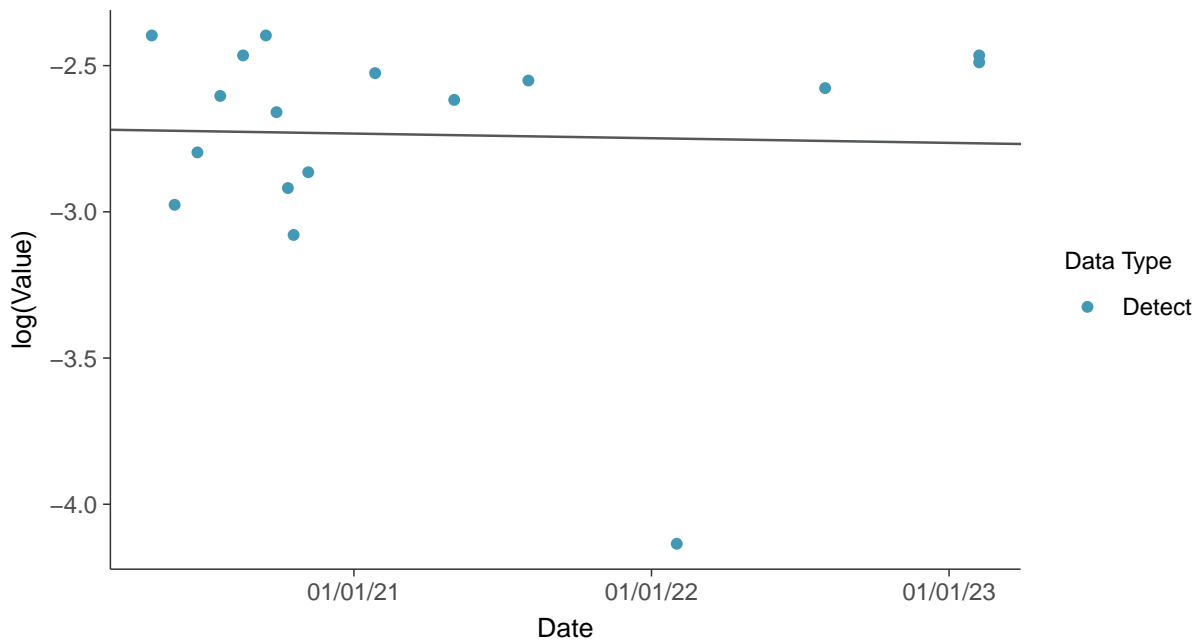
Normal Q-Q plot

Lithium, MW-5 (mg/L)



Trend Regression: Lognormal MLE

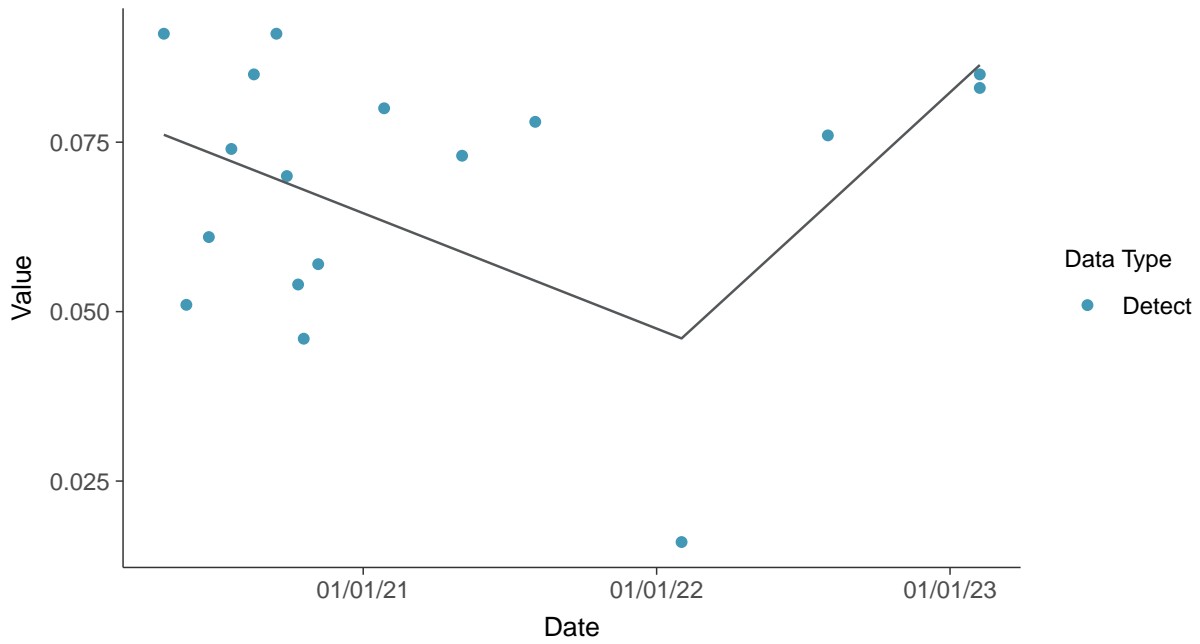
Lithium, MW-5 (mg/L)





Trend Regression: Piecewise Linear-Linear

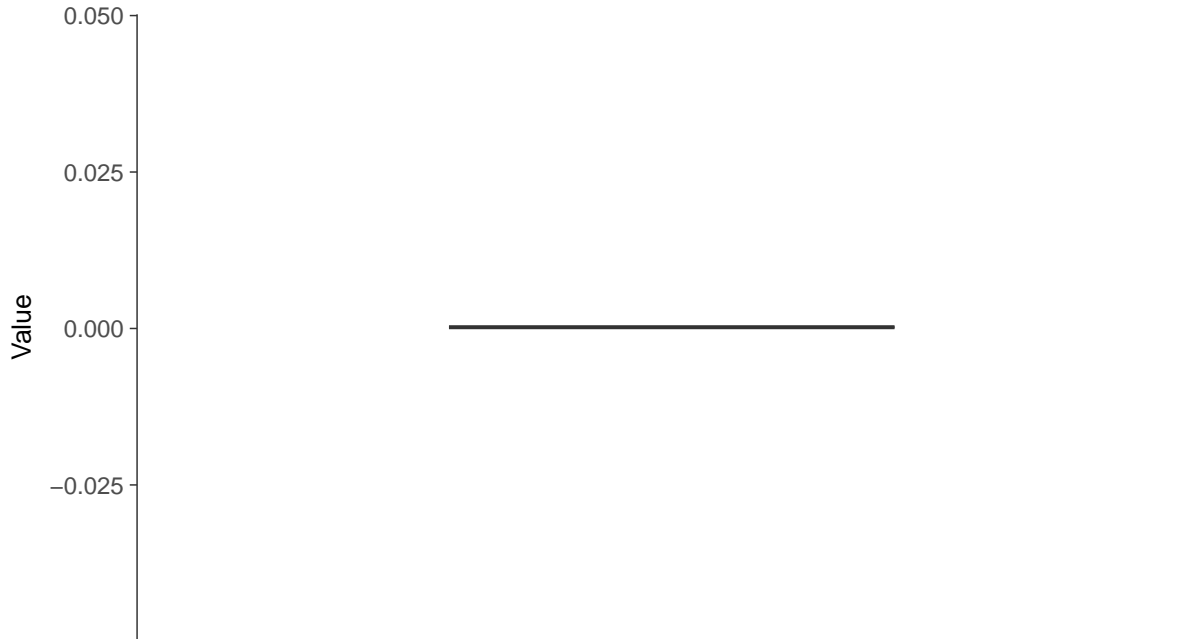
Lithium, MW-5 (mg/L)





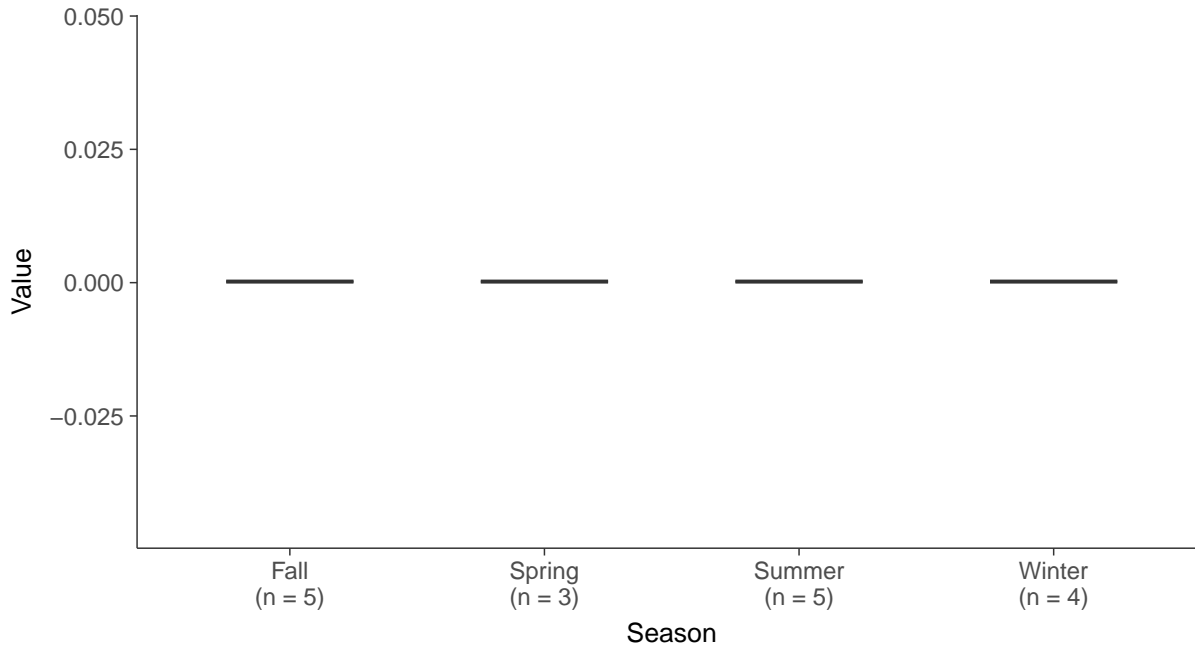
Boxplot

Mercury, MW-5 (mg/L)



Boxplot by Season

Mercury, MW-5 (mg/L)



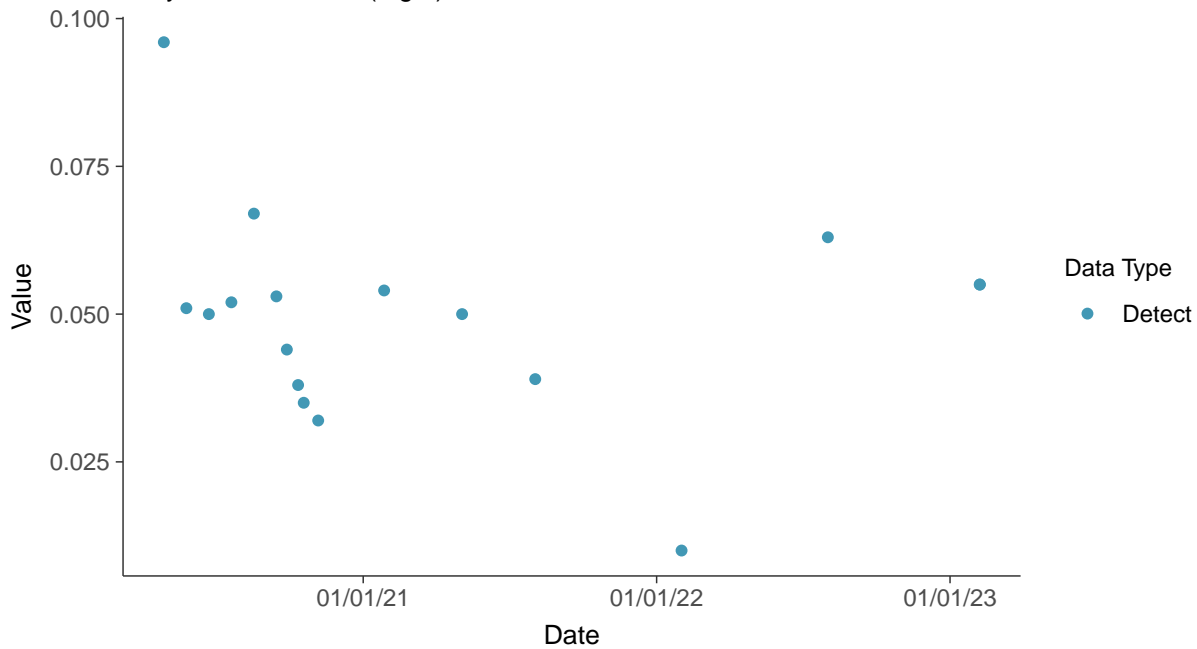


Appendix IV: Molybdenum, MW-5

ID: 05_2_22

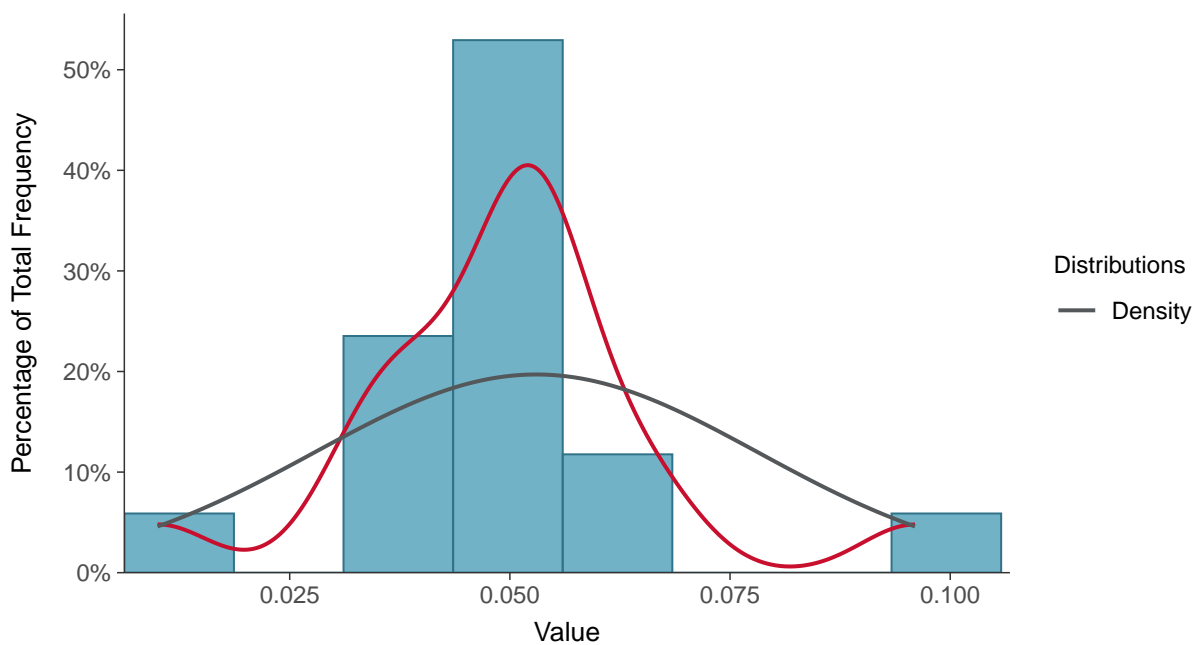
Scatter Plot

Molybdenum, MW-5 (mg/L)



Histogram

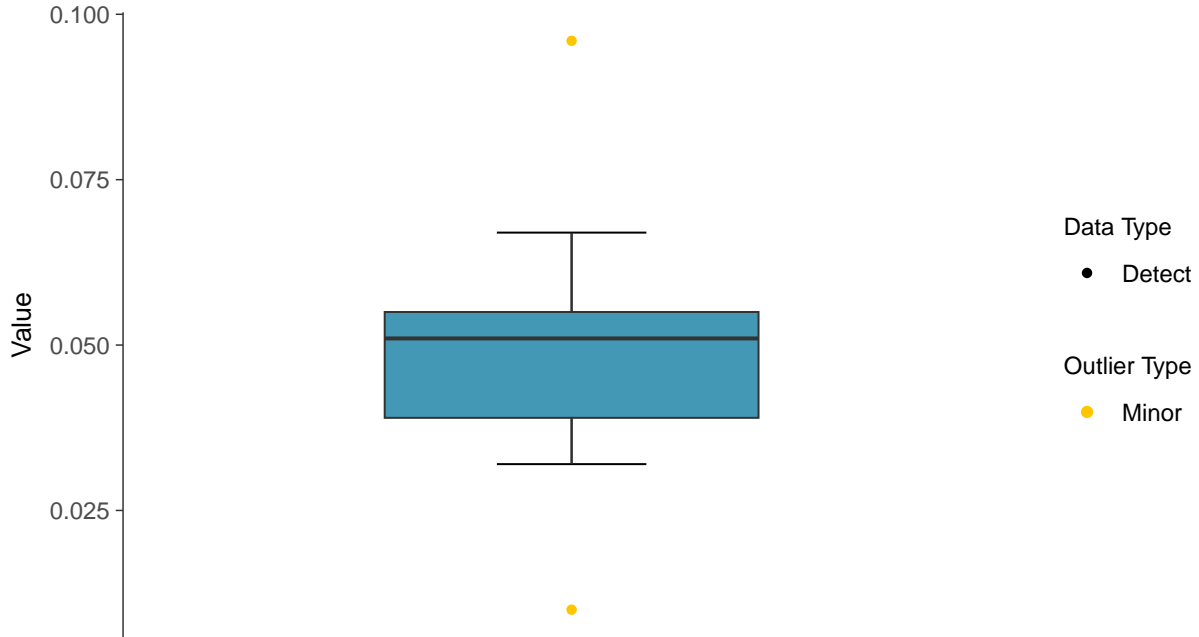
Molybdenum, MW-5 (mg/L)





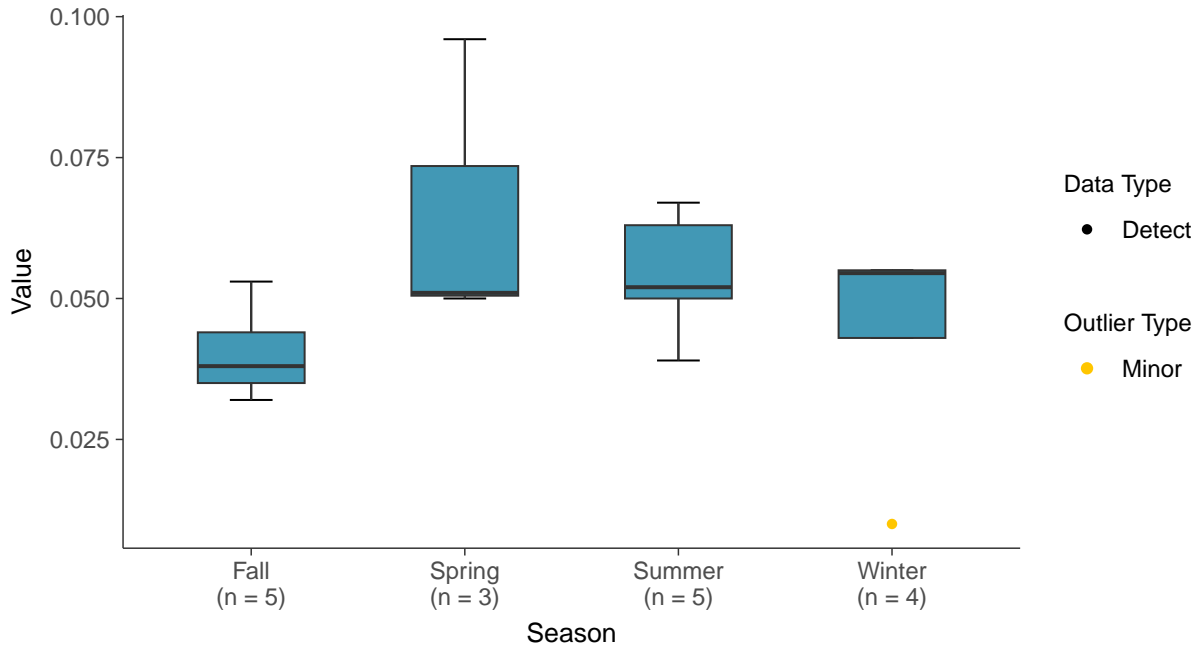
Boxplot

Molybdenum, MW-5 (mg/L)



Boxplot by Season

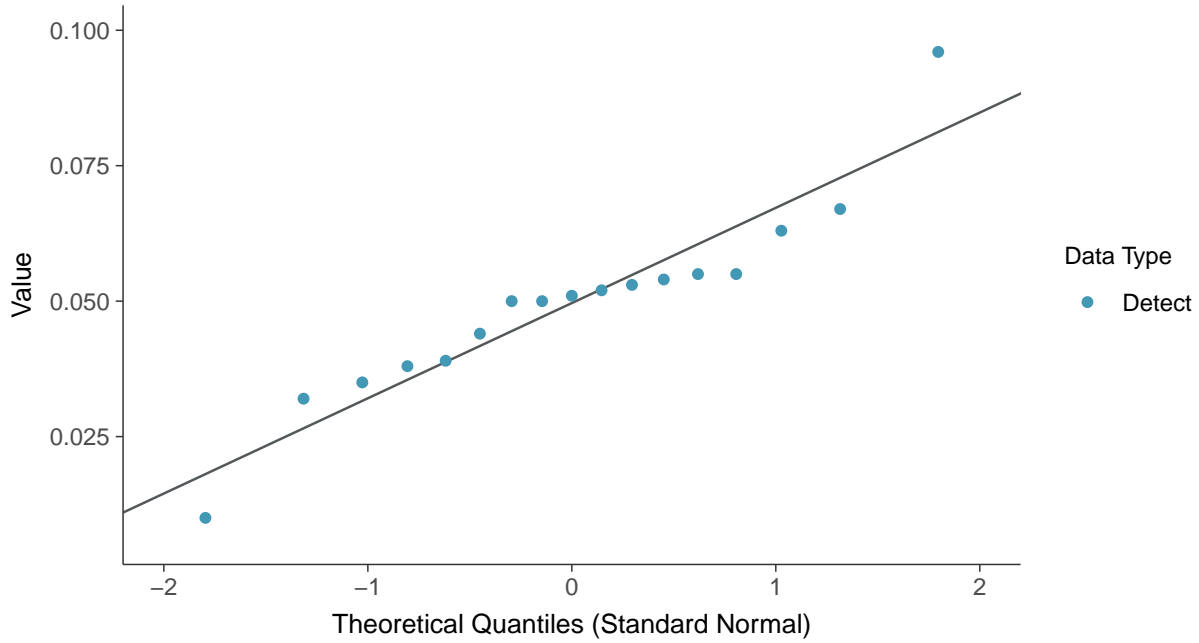
Molybdenum, MW-5 (mg/L)





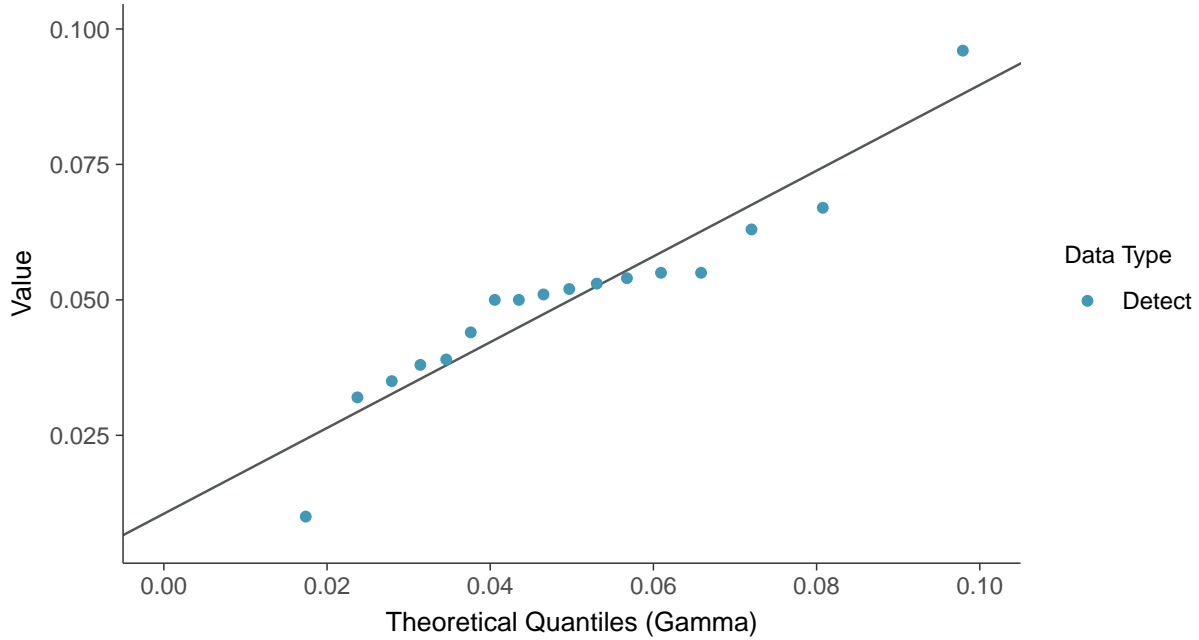
Normal Q-Q plot

Molybdenum, MW-5 (mg/L)



Gamma Q-Q plot

Molybdenum, MW-5 (mg/L)

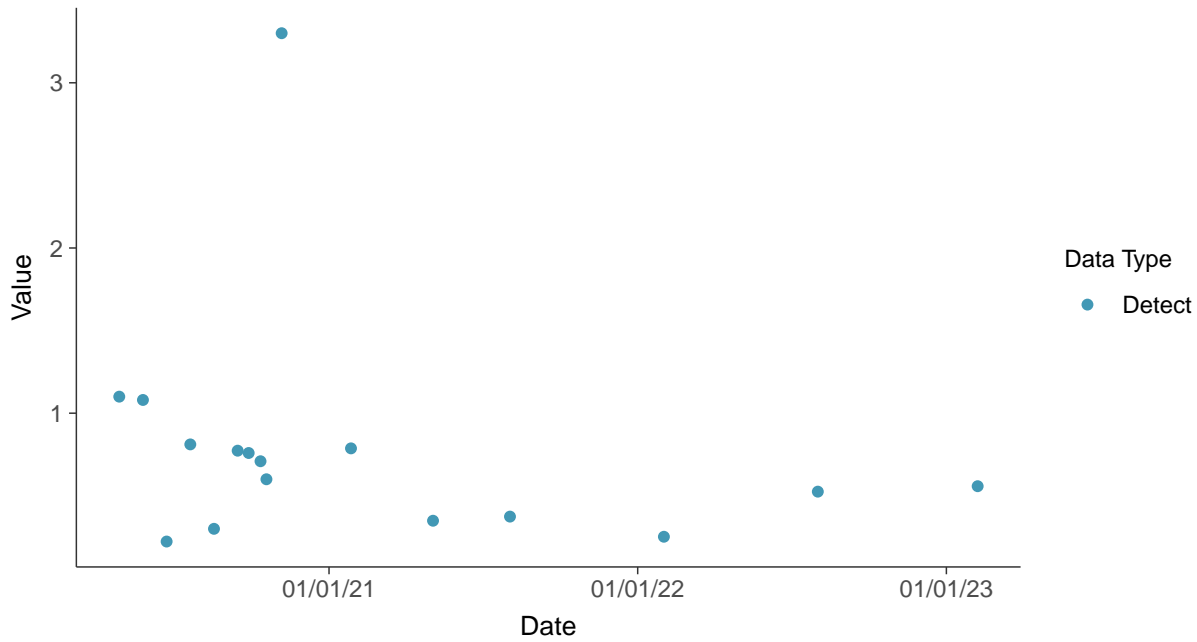


Appendix IV: Radium-226, MW-5

ID: 05_2_24

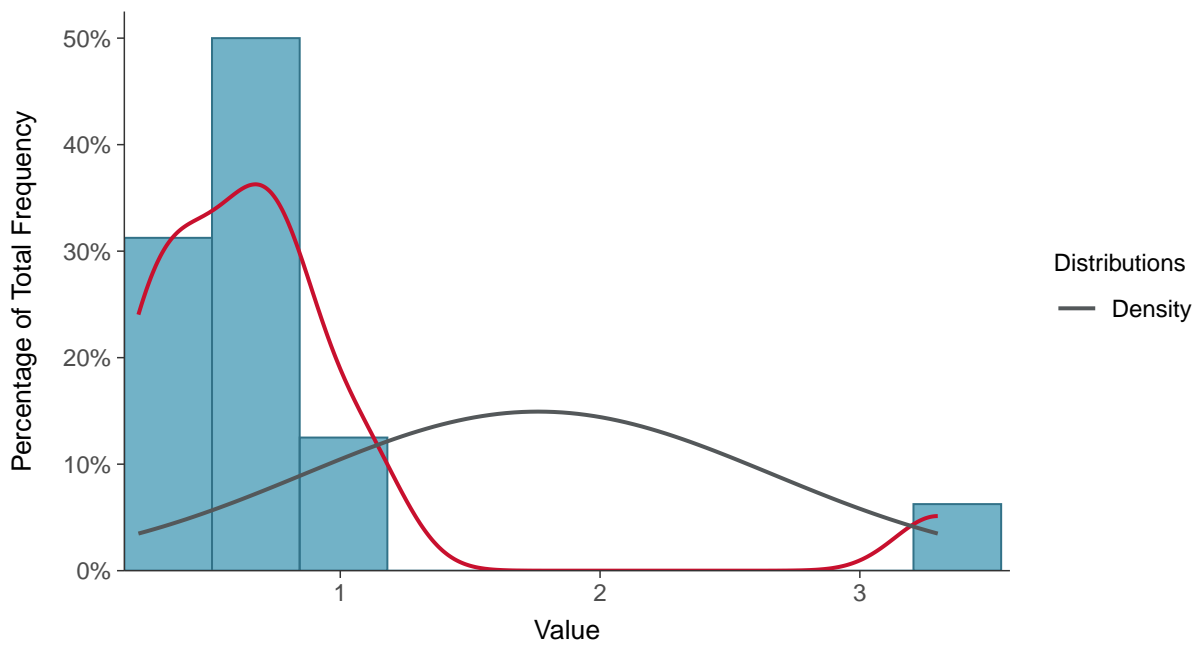
Scatter Plot

Radium-226, MW-5 (pCi/L)



Histogram

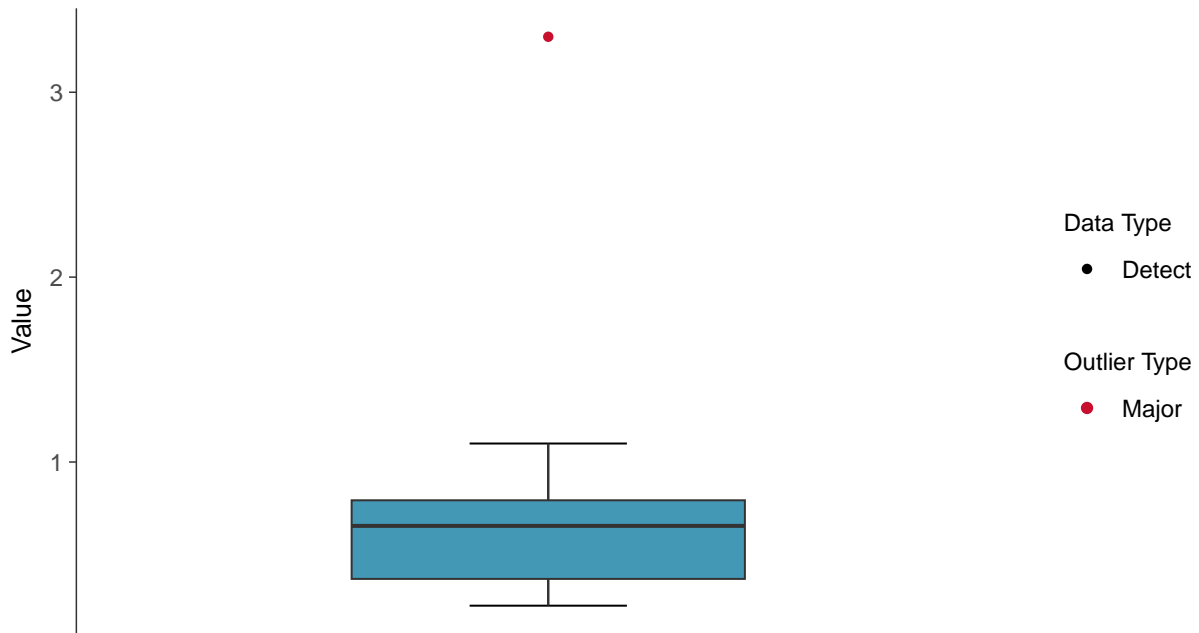
Radium-226, MW-5 (pCi/L)





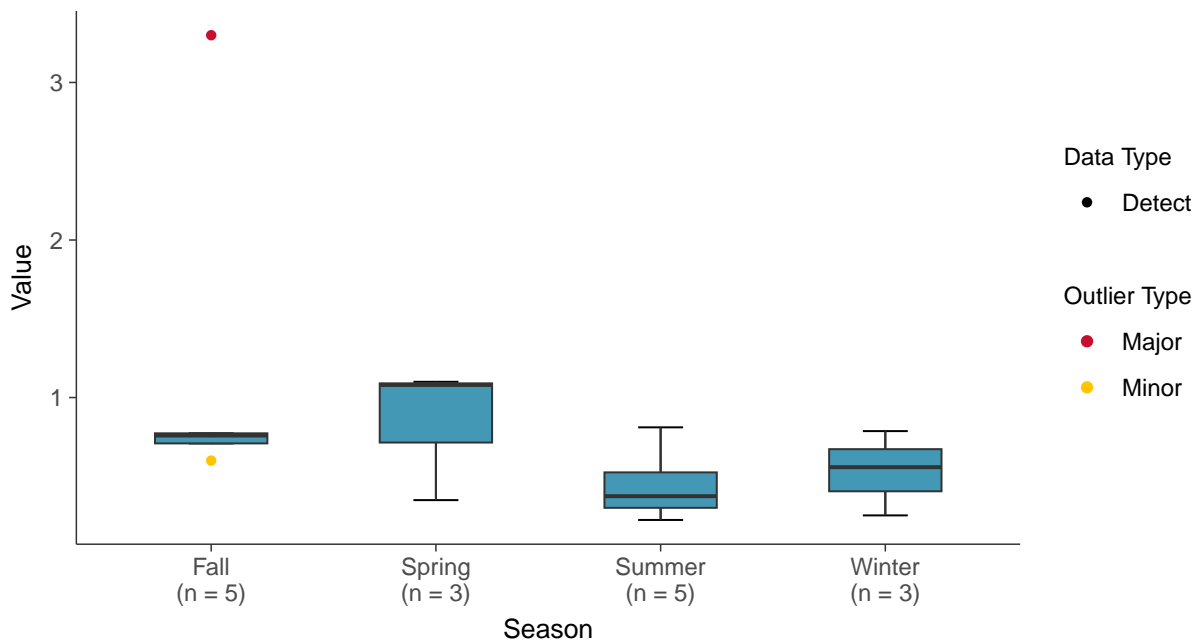
Boxplot

Radium-226, MW-5 (pCi/L)



Boxplot by Season

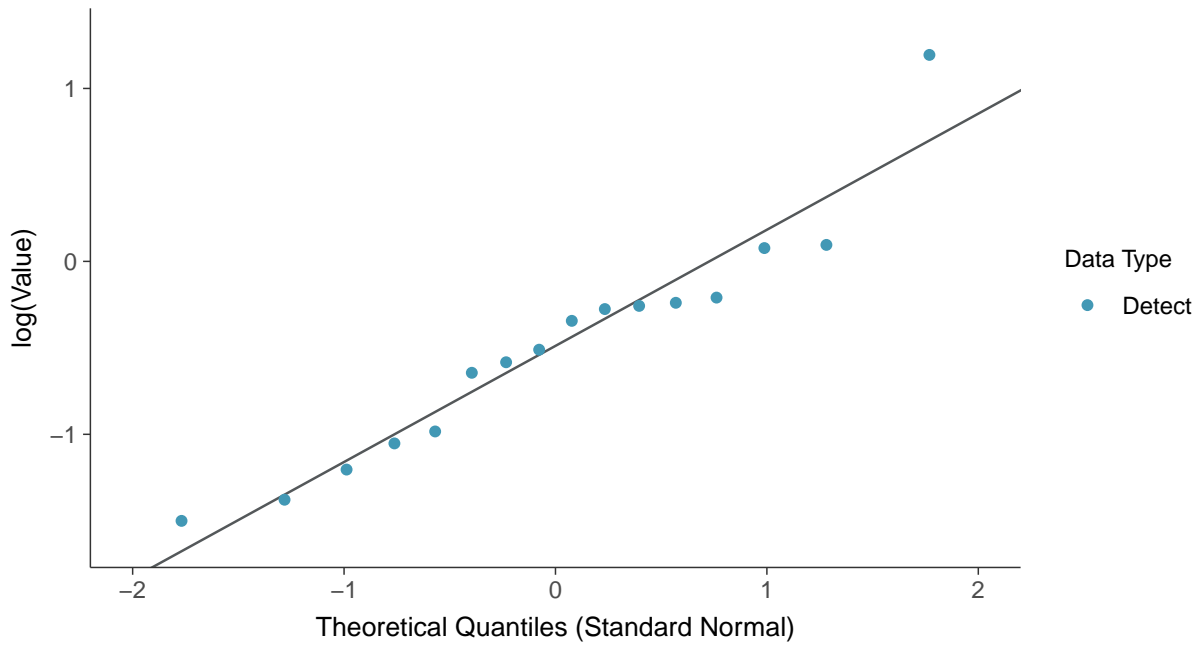
Radium-226, MW-5 (pCi/L)





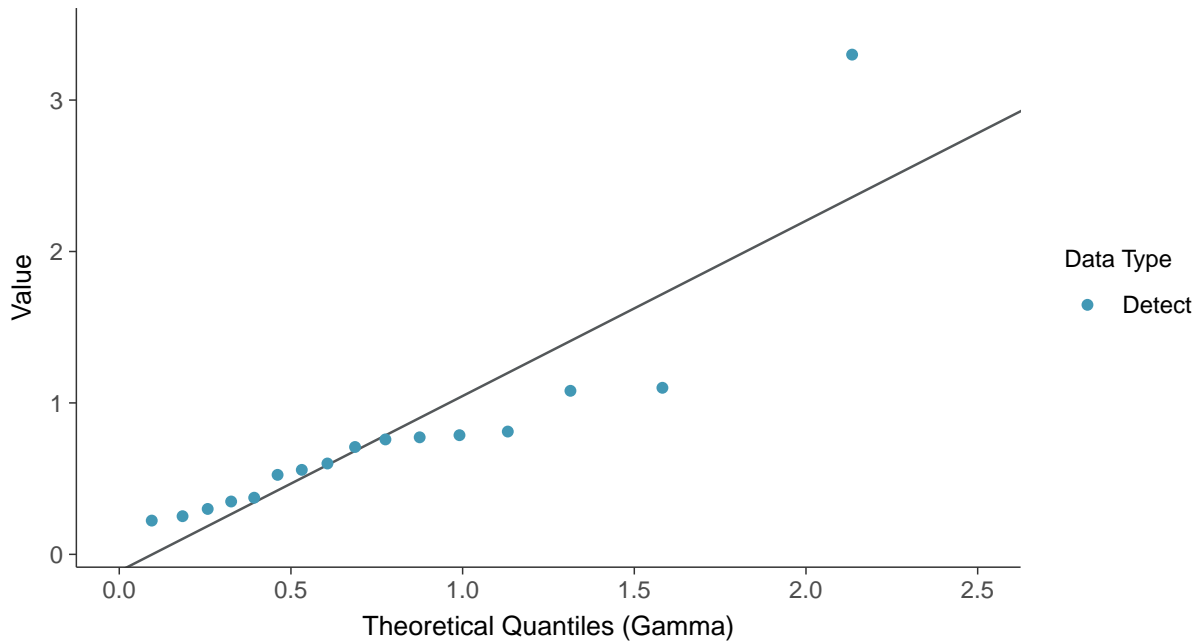
Lognormal Q-Q plot

Radium-226, MW-5 (pCi/L)



Gamma Q-Q plot

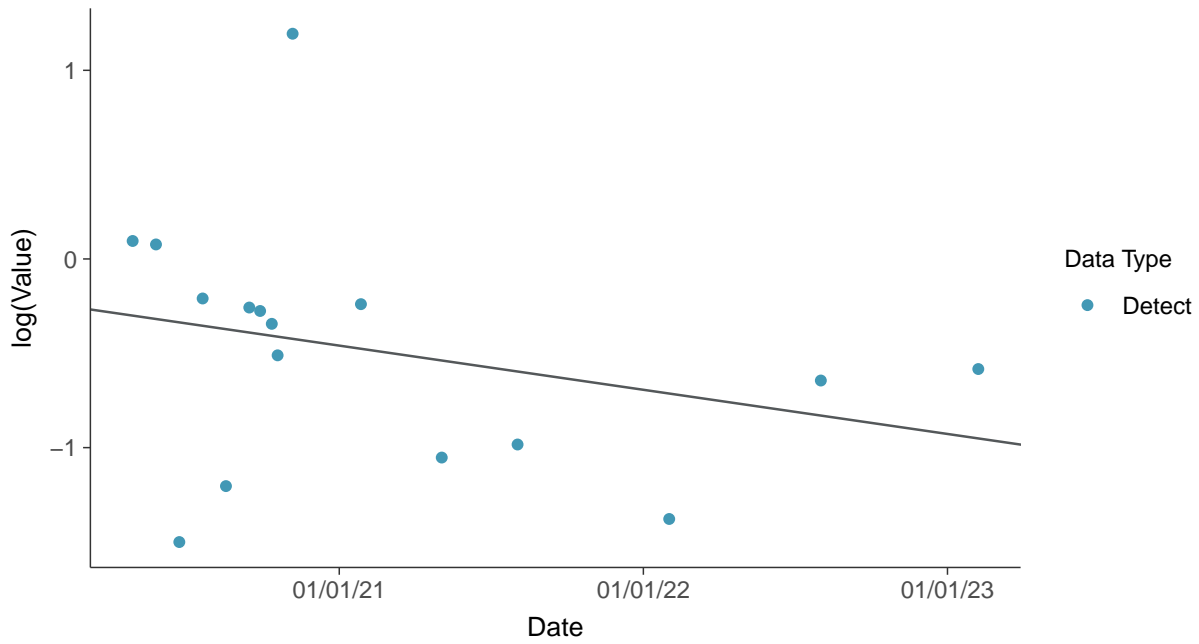
Radium-226, MW-5 (pCi/L)





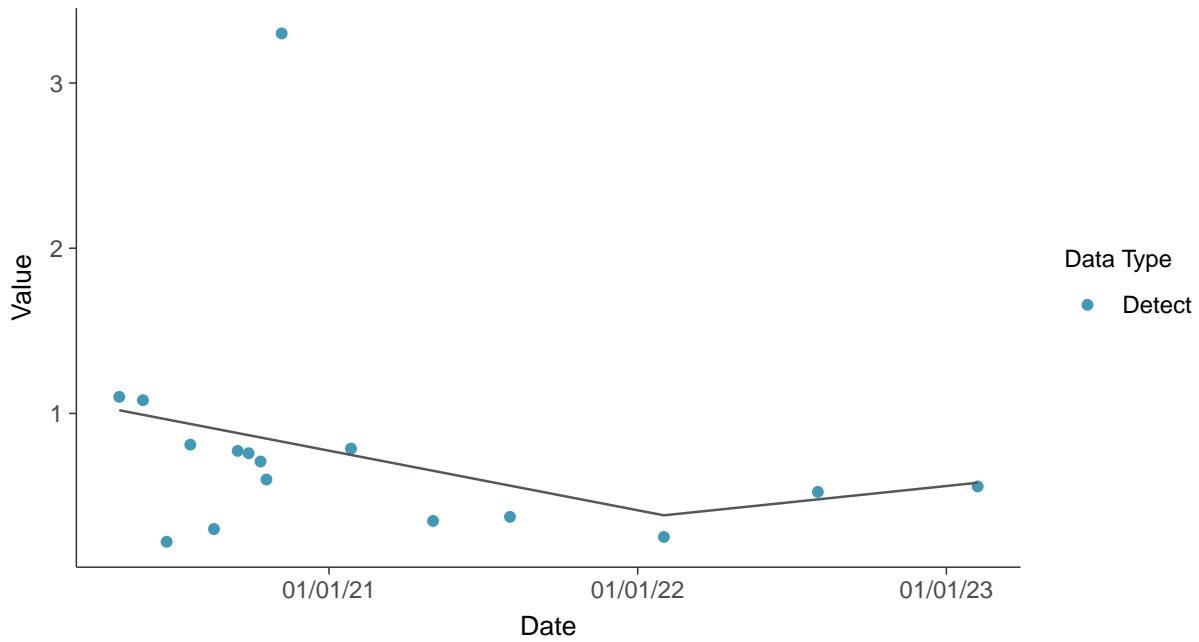
Trend Regression: Lognormal MLE

Radium-226, MW-5 (pCi/L)



Trend Regression: Piecewise Linear-Linear

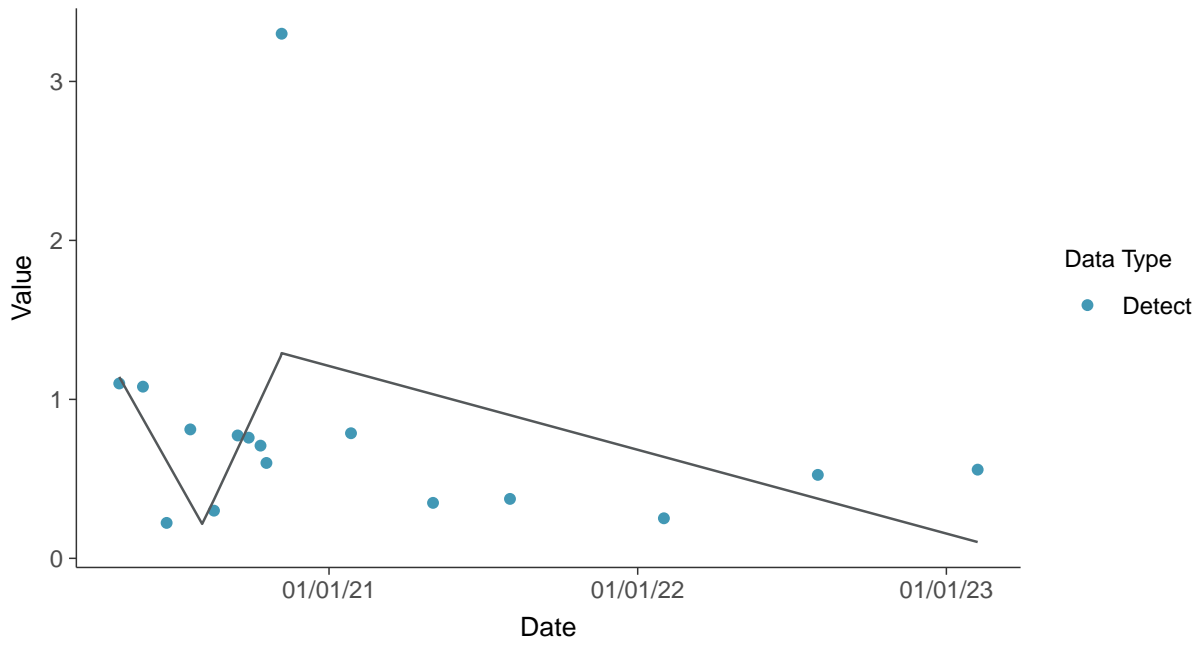
Radium-226, MW-5 (pCi/L)





Trend Regression: Piecewise Linear-Linear-Linear

Radium-226, MW-5 (pCi/L)



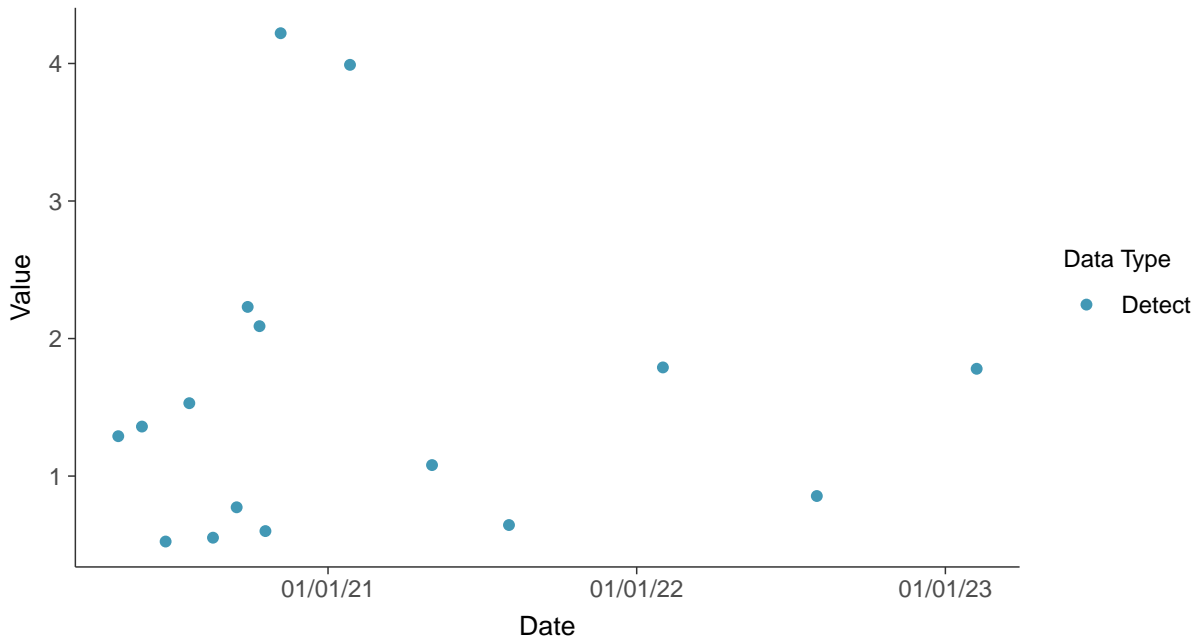


Appendix IV: Radium-226/228, MW-5

ID: 05_2_25

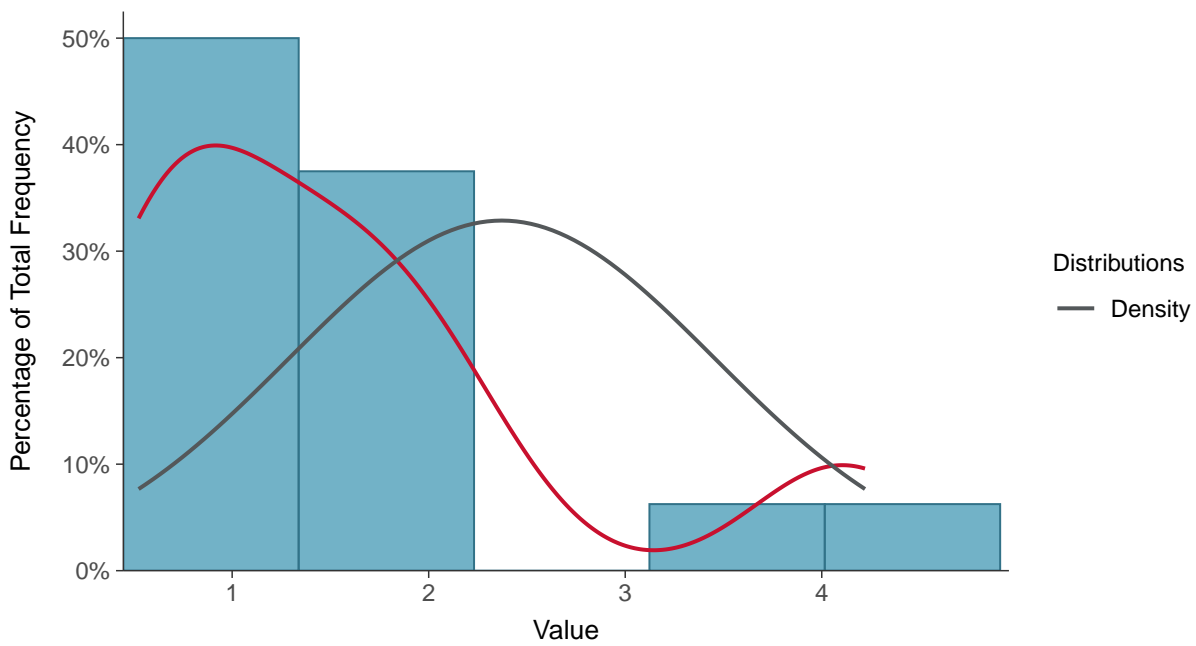
Scatter Plot

Radium-226/228, MW-5 (pCi/L)



Histogram

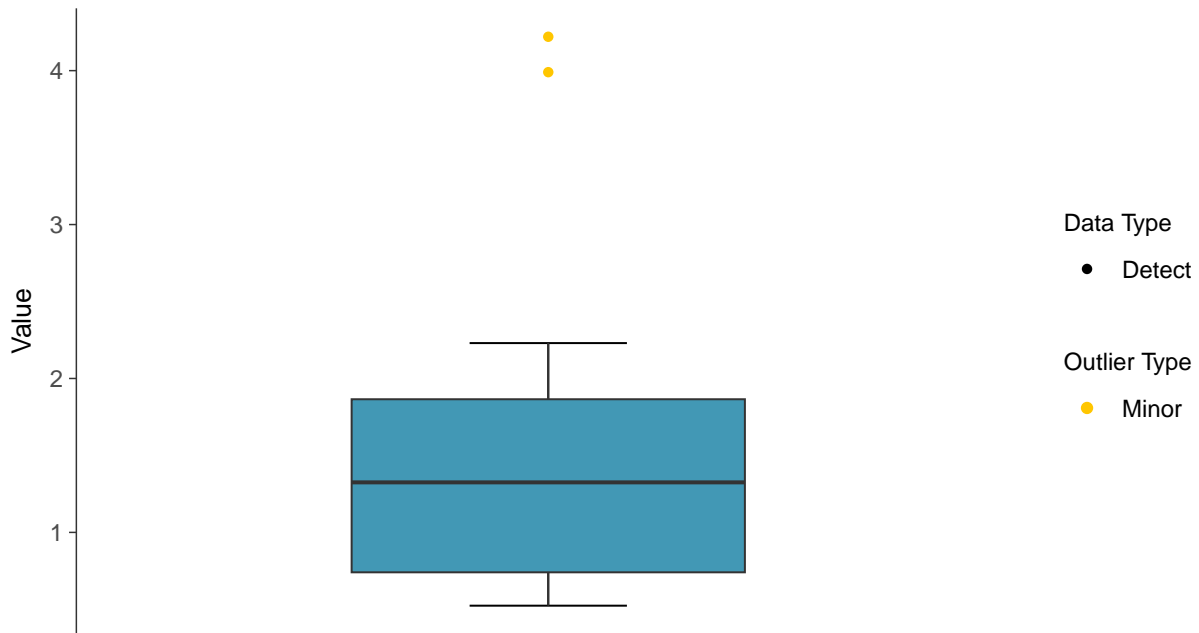
Radium-226/228, MW-5 (pCi/L)





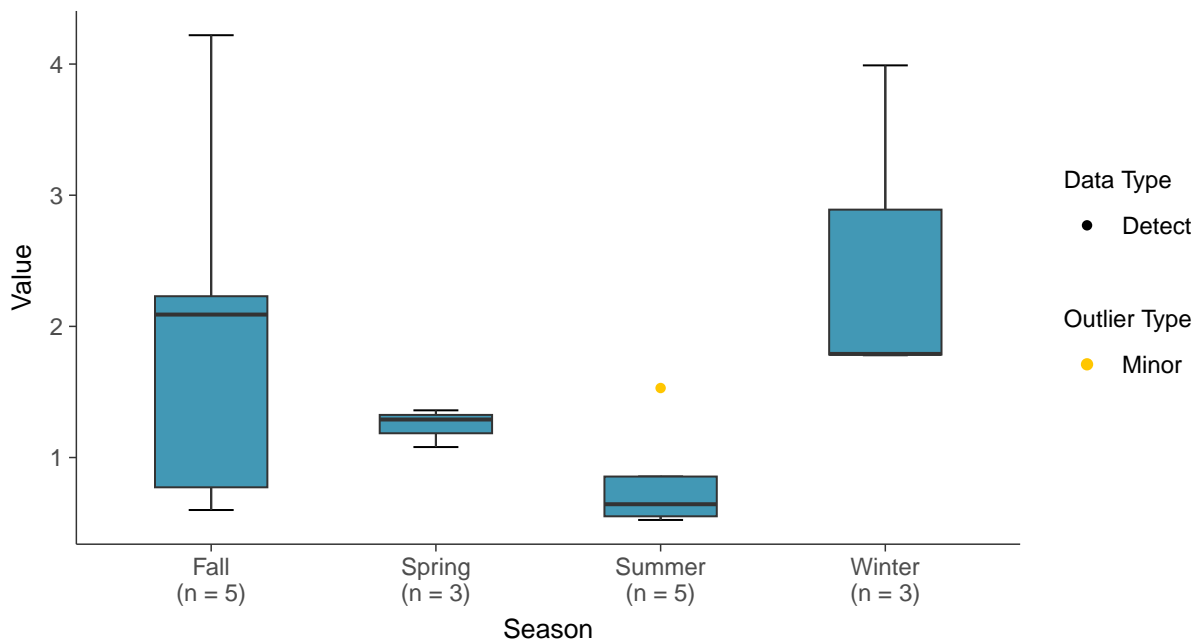
Boxplot

Radium-226/228, MW-5 (pCi/L)



Boxplot by Season

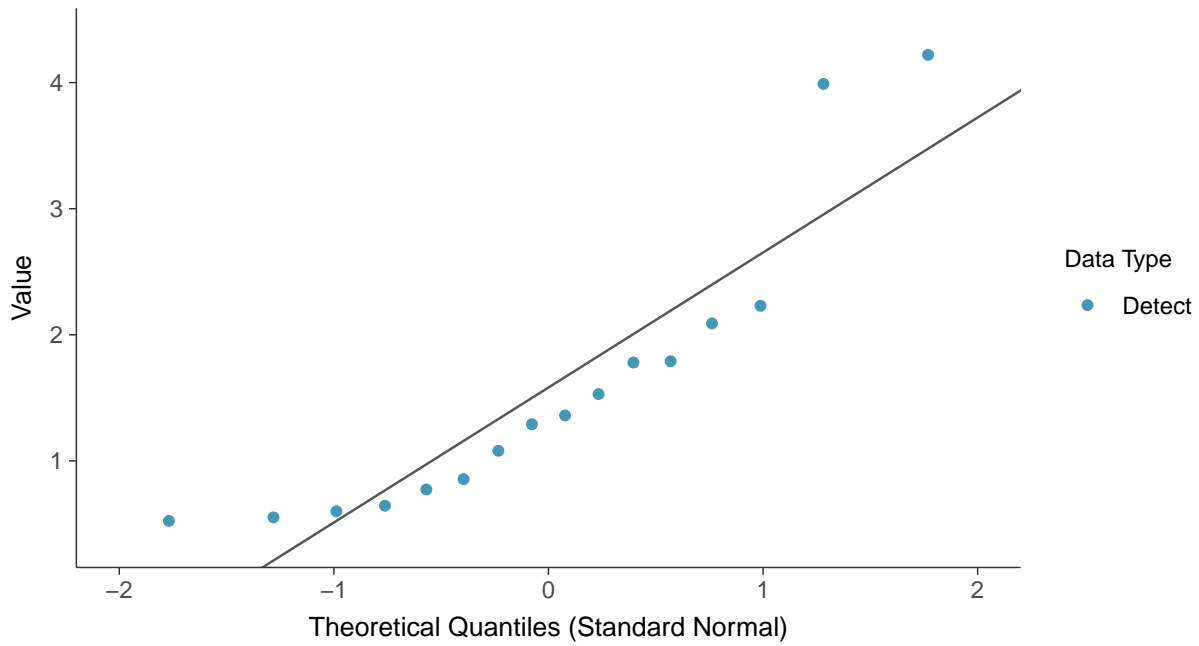
Radium-226/228, MW-5 (pCi/L)





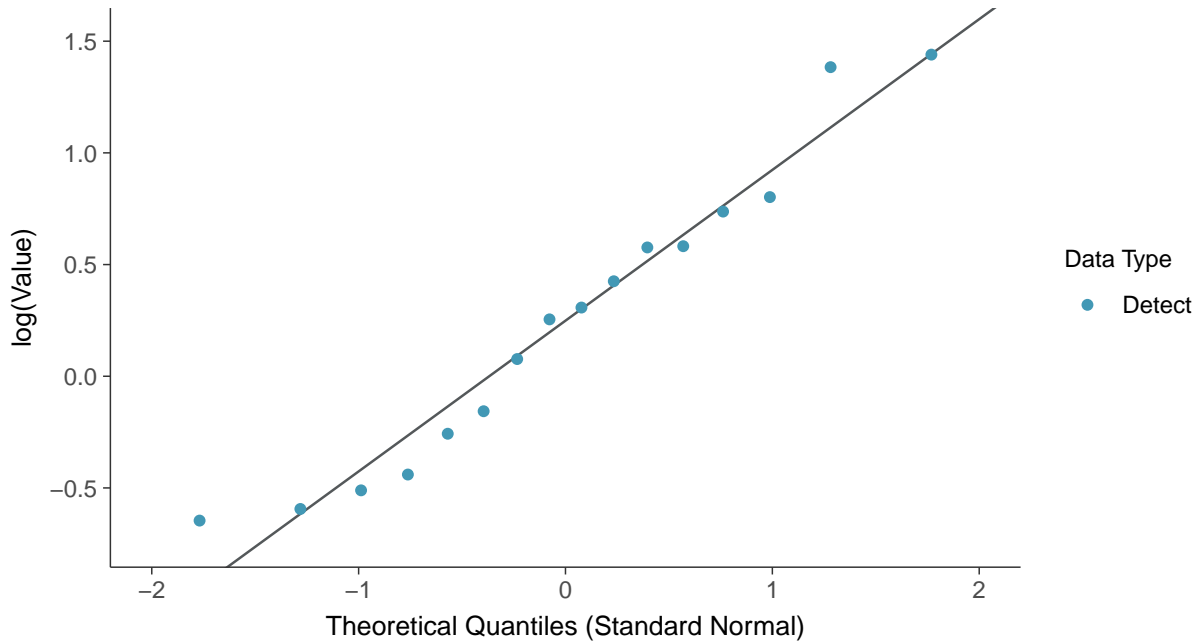
Normal Q-Q plot

Radium-226/228, MW-5 (pCi/L)



Lognormal Q-Q plot

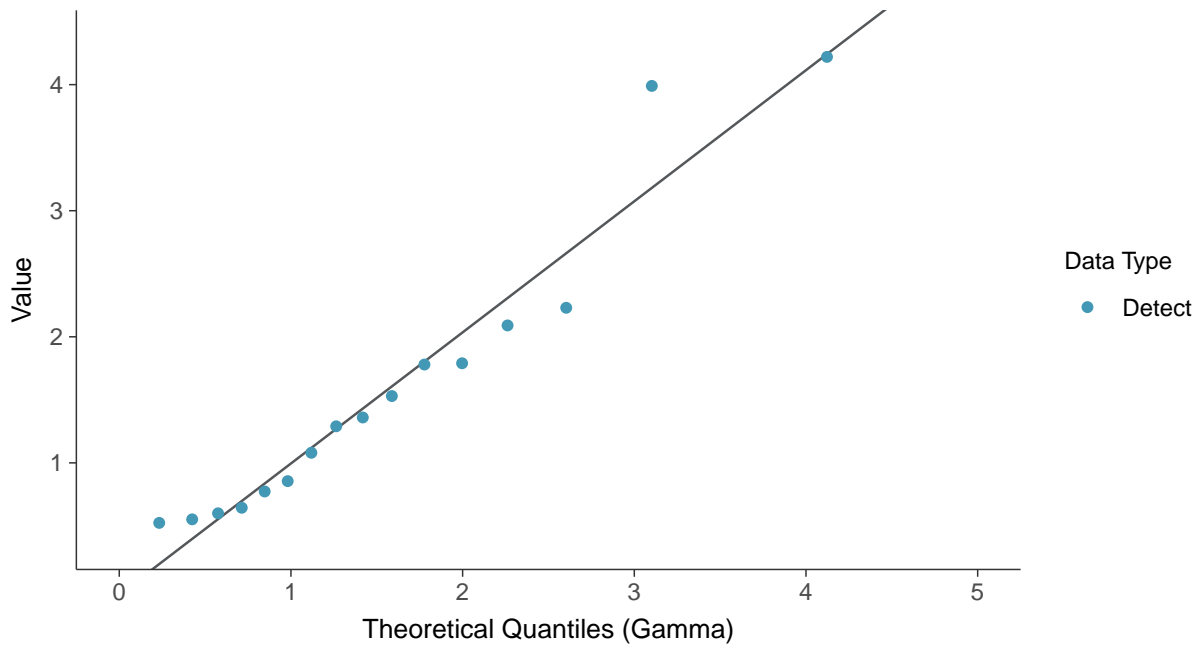
Radium-226/228, MW-5 (pCi/L)





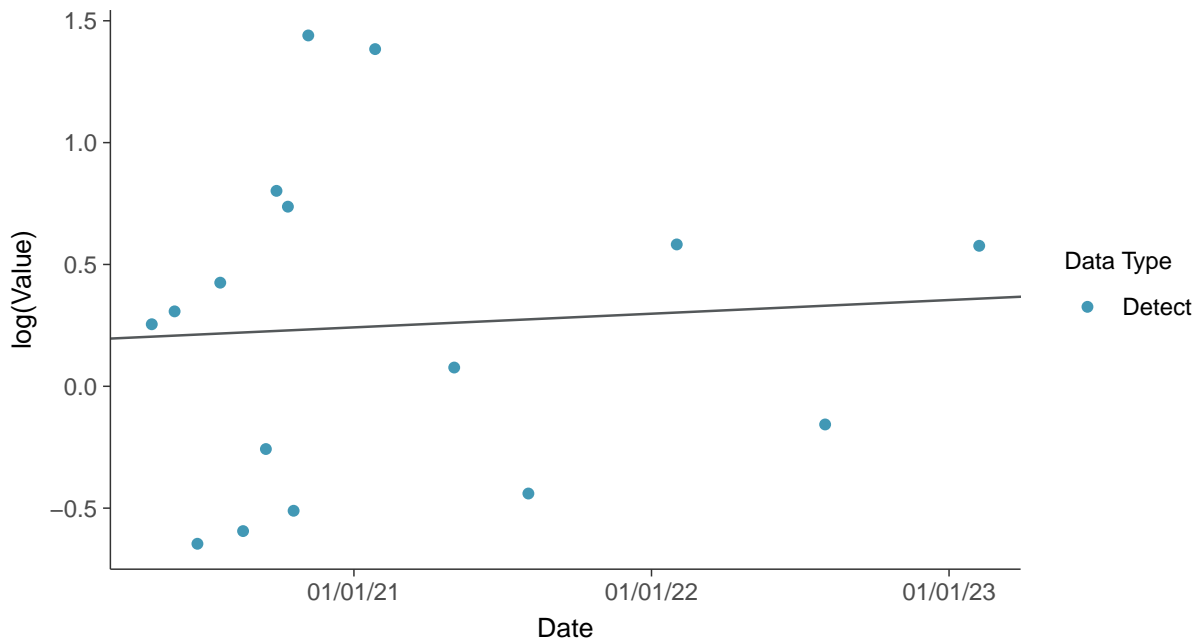
Gamma Q-Q plot

Radium-226/228, MW-5 (pCi/L)



Trend Regression: Lognormal MLE

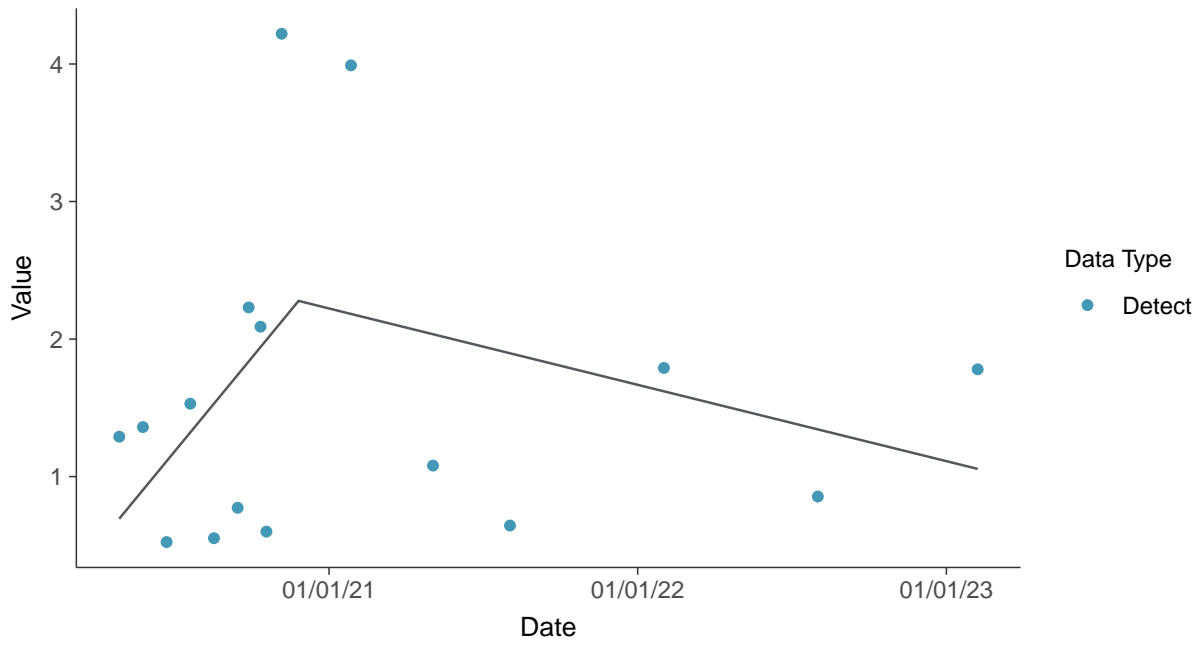
Radium-226/228, MW-5 (pCi/L)





Trend Regression: Piecewise Linear-Linear

Radium-226/228, MW-5 (pCi/L)

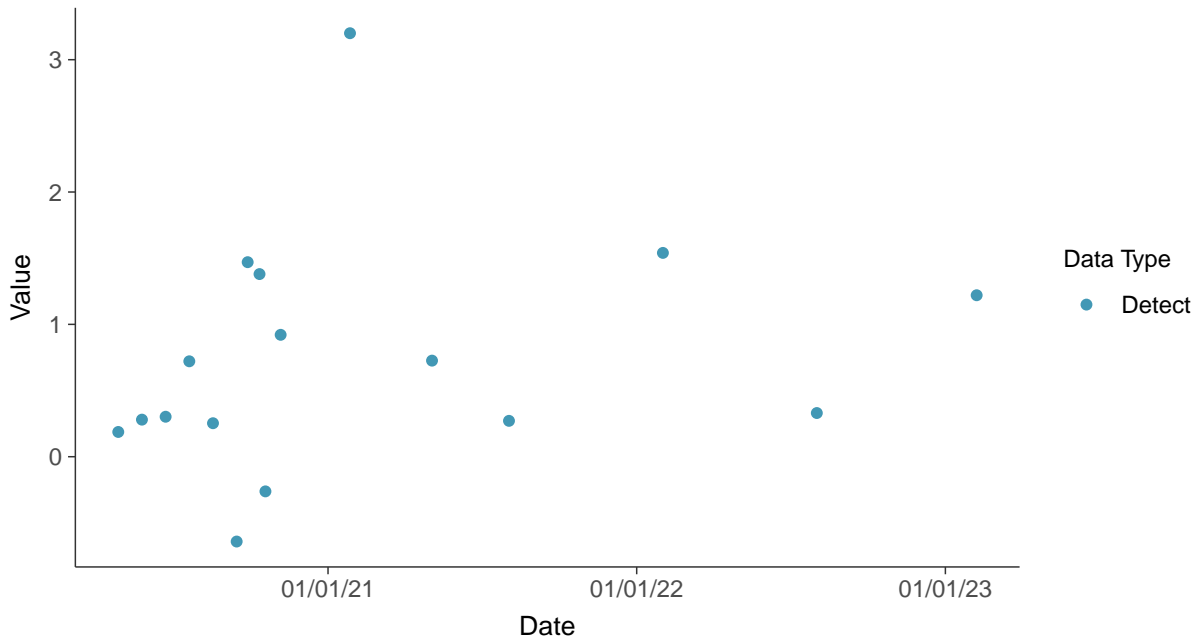


Appendix IV: Radium-228, MW-5

ID: 05_2_26

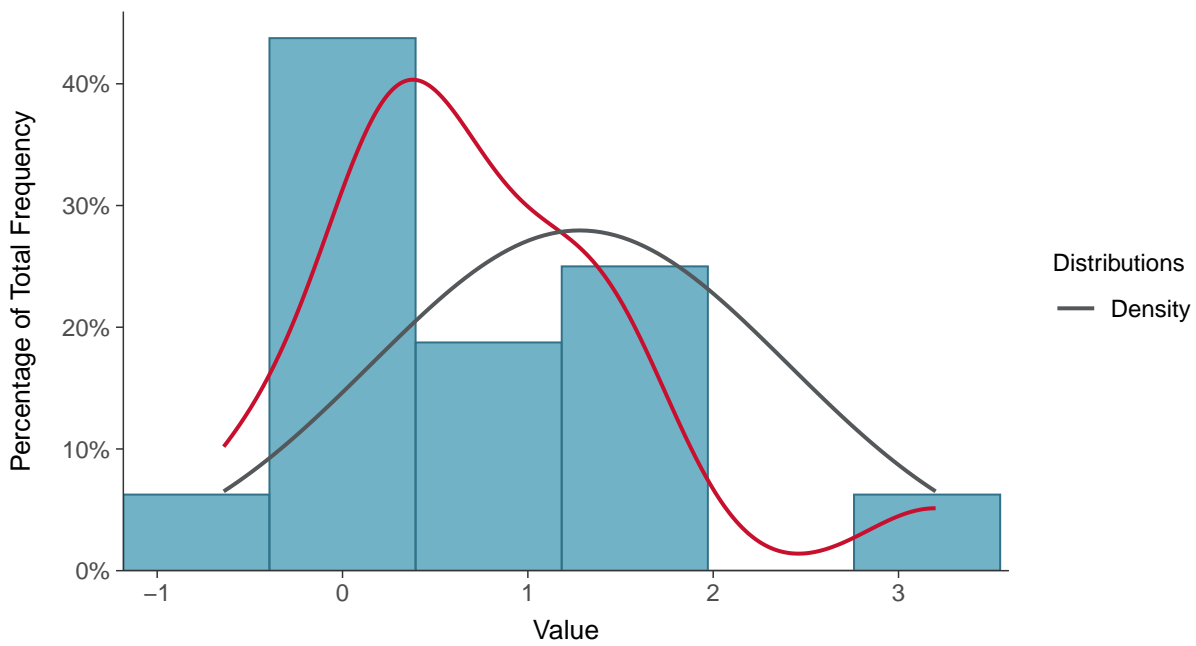
Scatter Plot

Radium-228, MW-5 (pCi/L)



Histogram

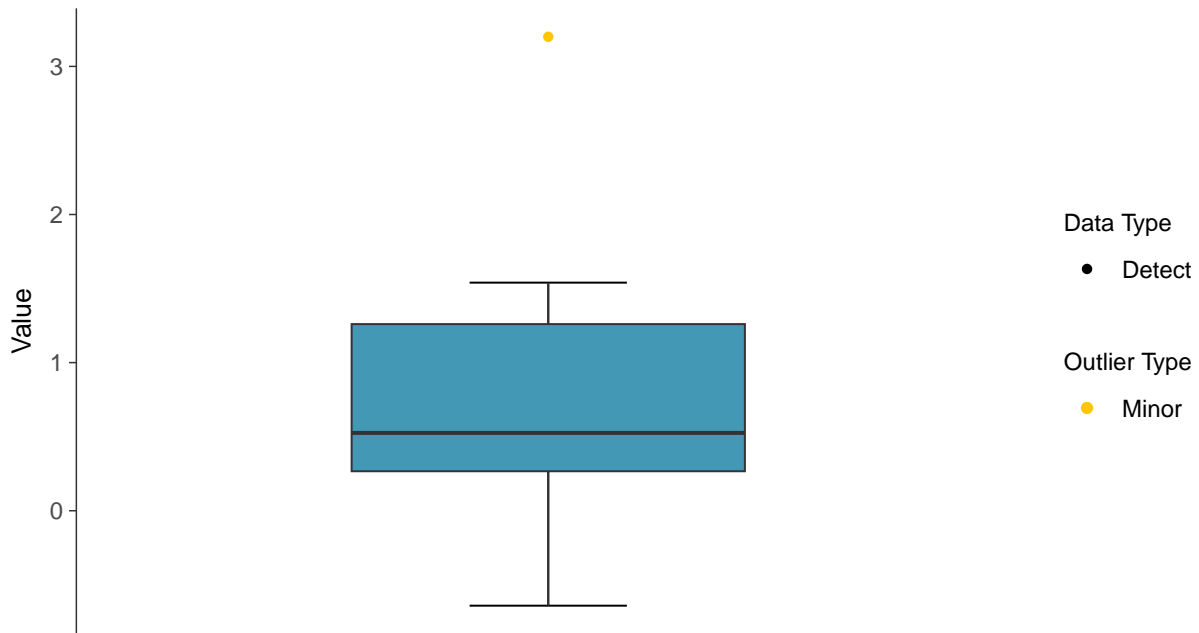
Radium-228, MW-5 (pCi/L)





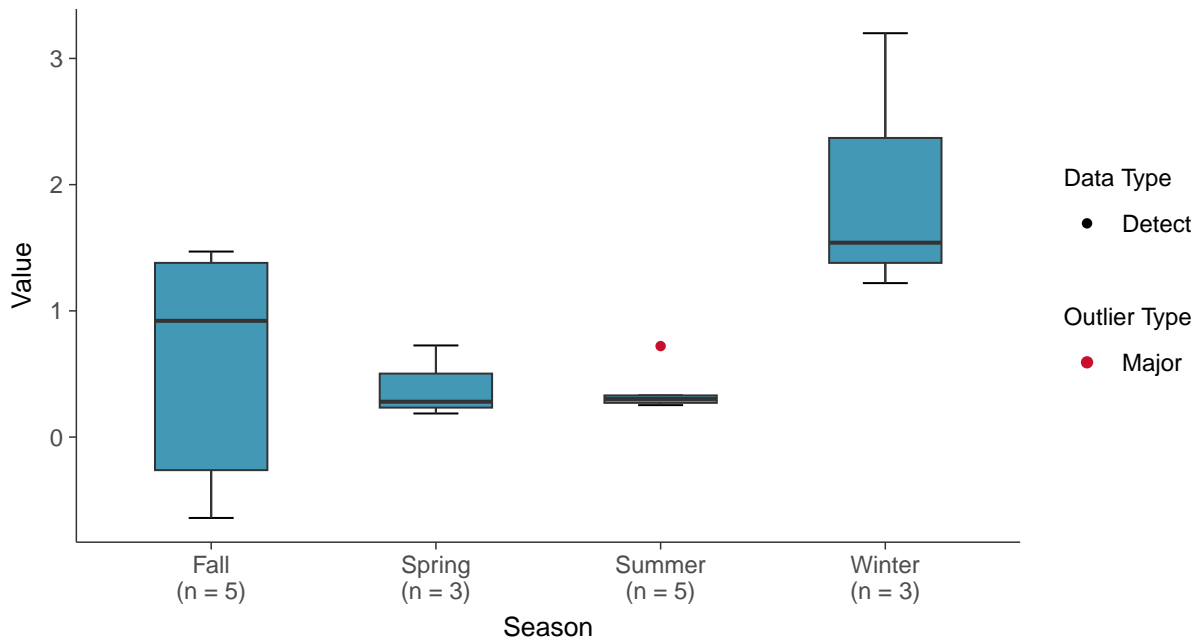
Boxplot

Radium-228, MW-5 (pCi/L)



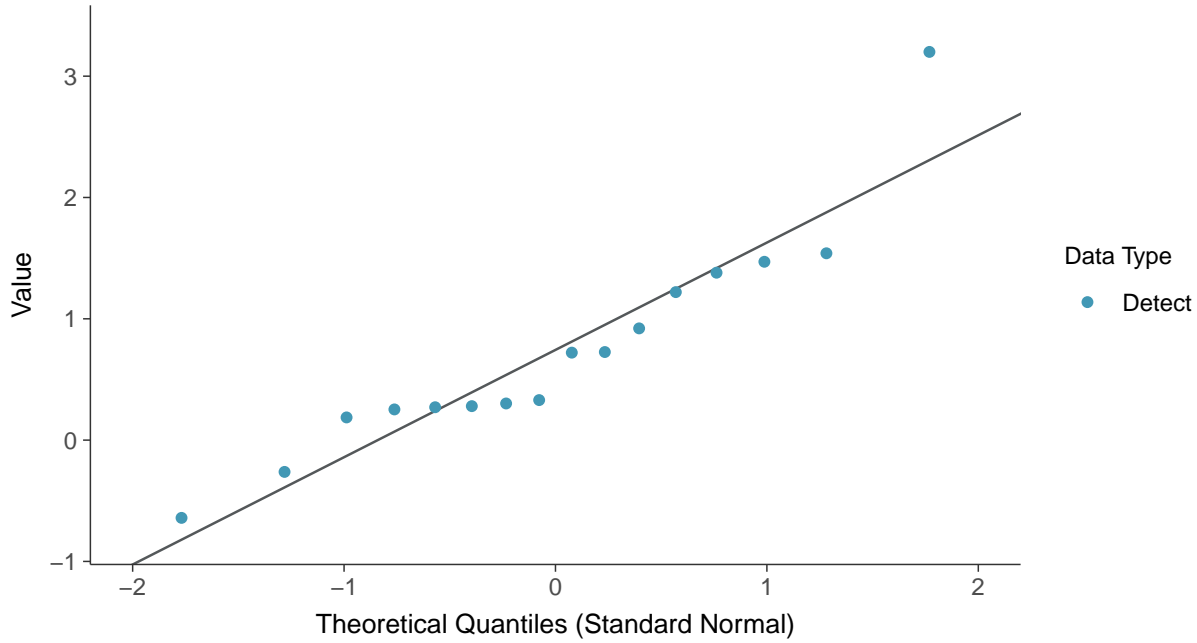
Boxplot by Season

Radium-228, MW-5 (pCi/L)



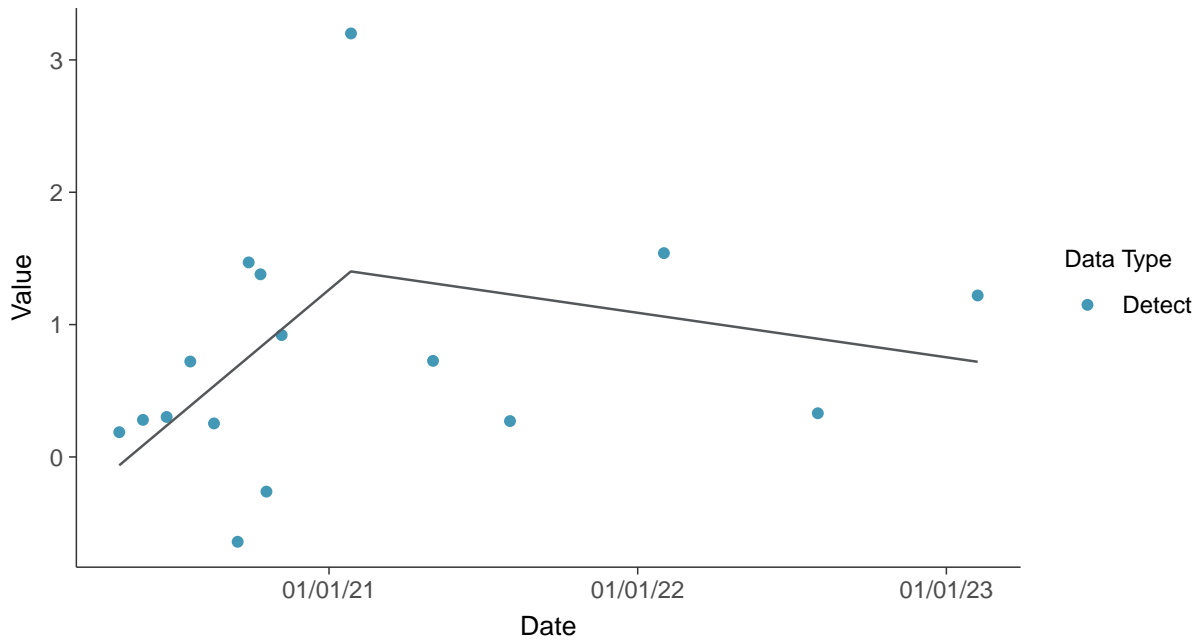
Normal Q-Q plot

Radium-228, MW-5 (pCi/L)



Trend Regression: Piecewise Linear-Linear

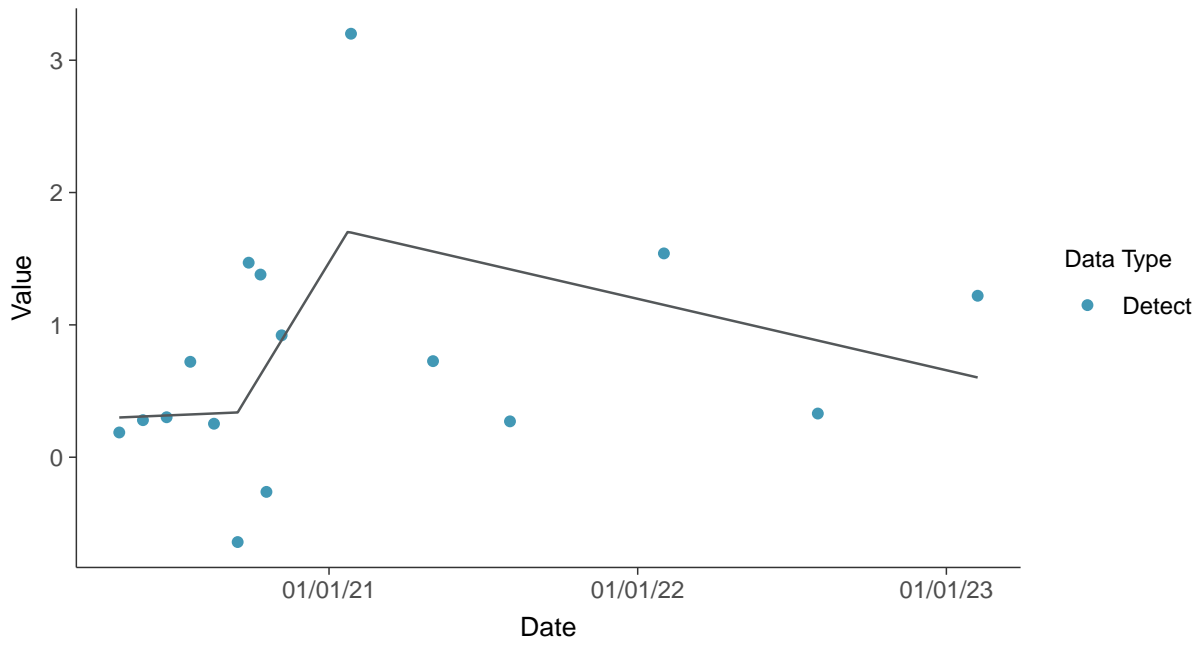
Radium-228, MW-5 (pCi/L)





Trend Regression: Piecewise Linear-Linear-Linear

Radium-228, MW-5 (pCi/L)



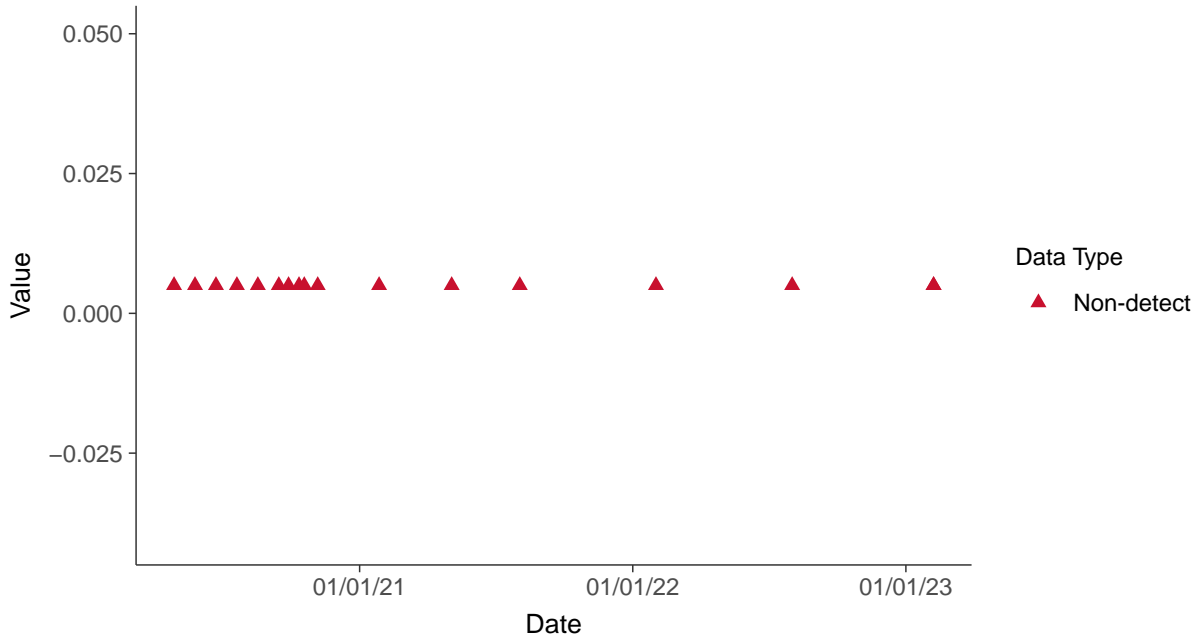


Appendix IV: Selenium, MW-5

ID: 05_2_27

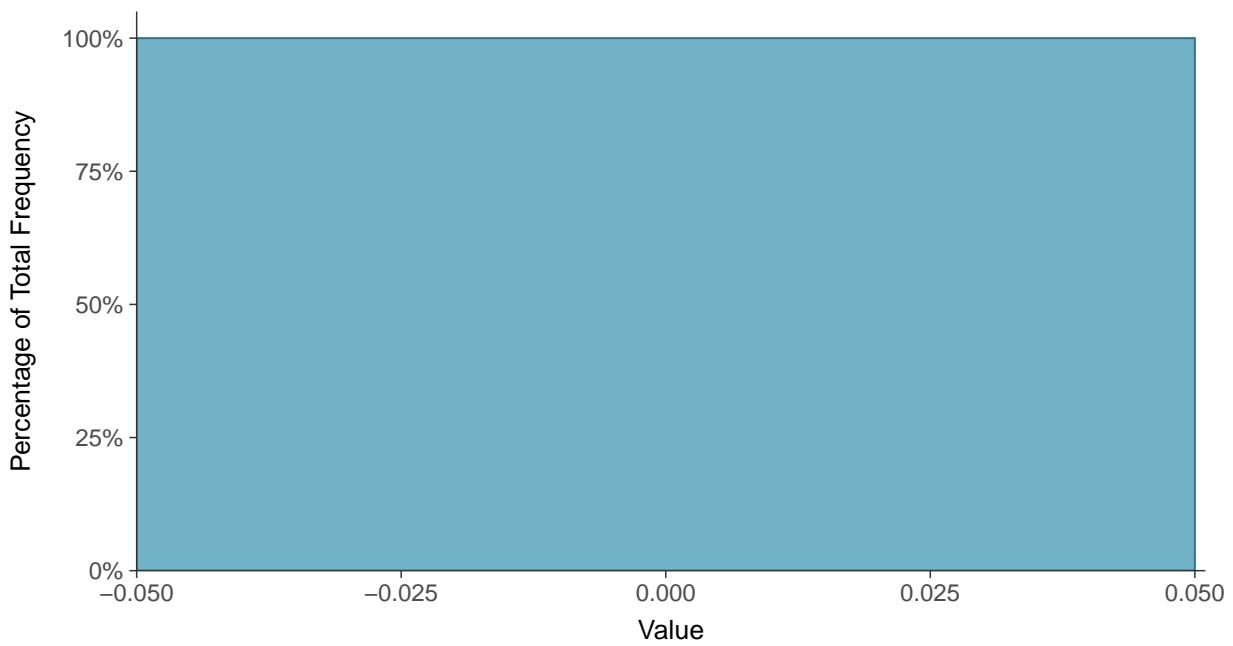
Scatter Plot

Selenium, MW-5 (mg/L)



Histogram

Selenium, MW-5 (mg/L)





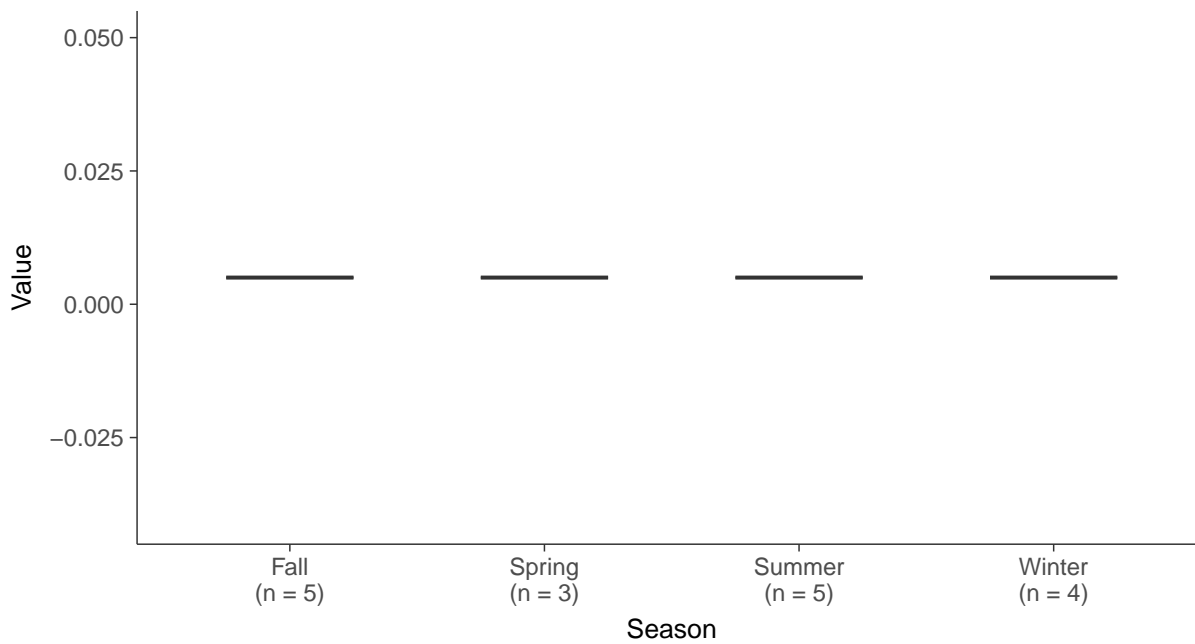
Boxplot

Selenium, MW-5 (mg/L)



Boxplot by Season

Selenium, MW-5 (mg/L)



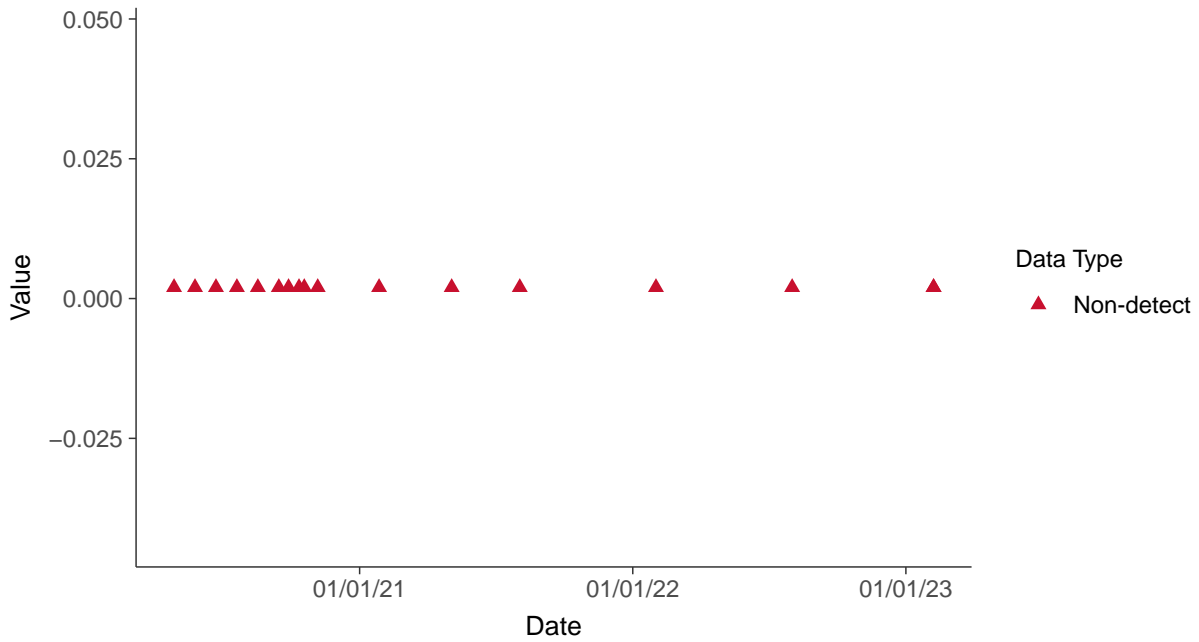


Appendix IV: Thallium, MW-5

ID: 05_2_29

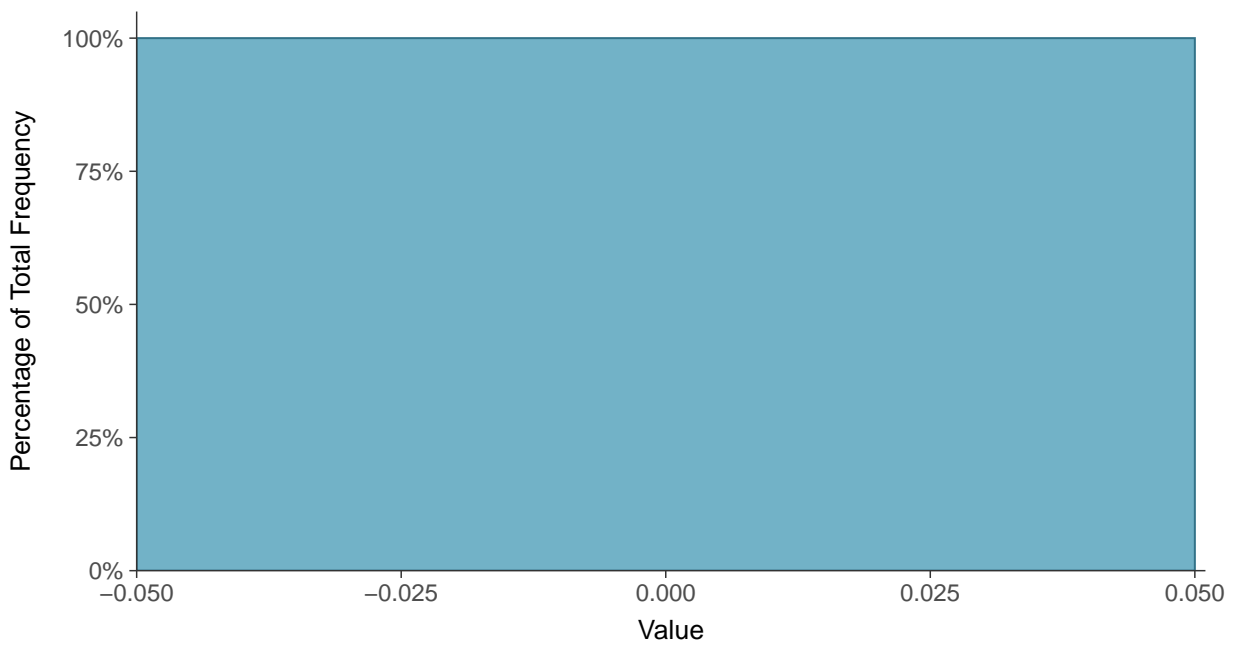
Scatter Plot

Thallium, MW-5 (mg/L)



Histogram

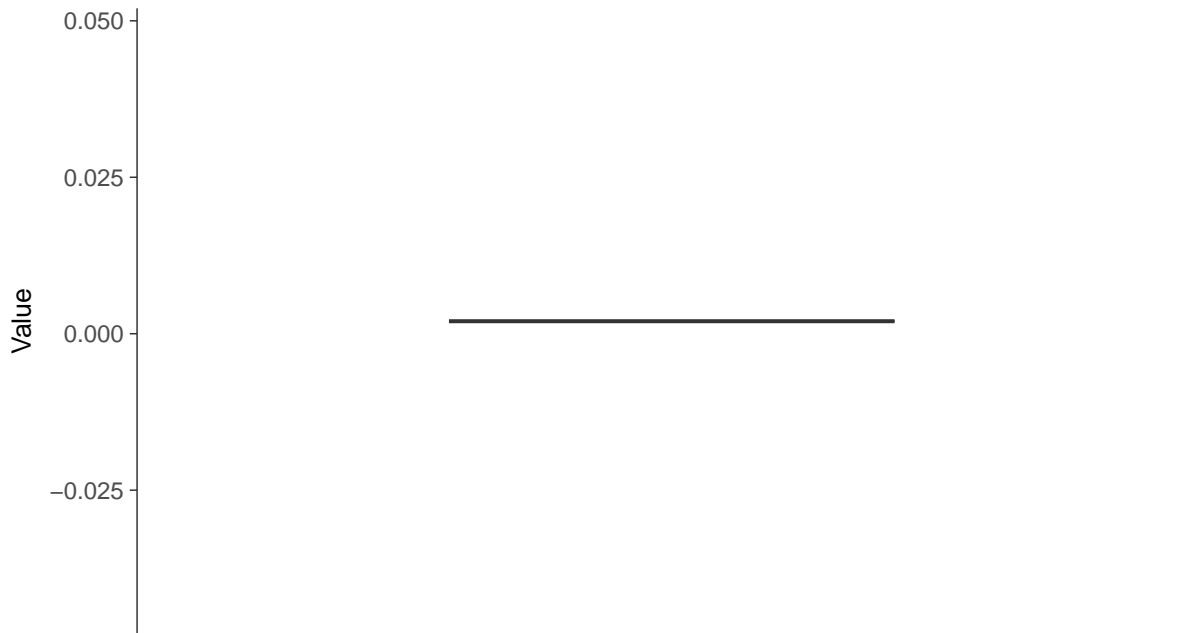
Thallium, MW-5 (mg/L)





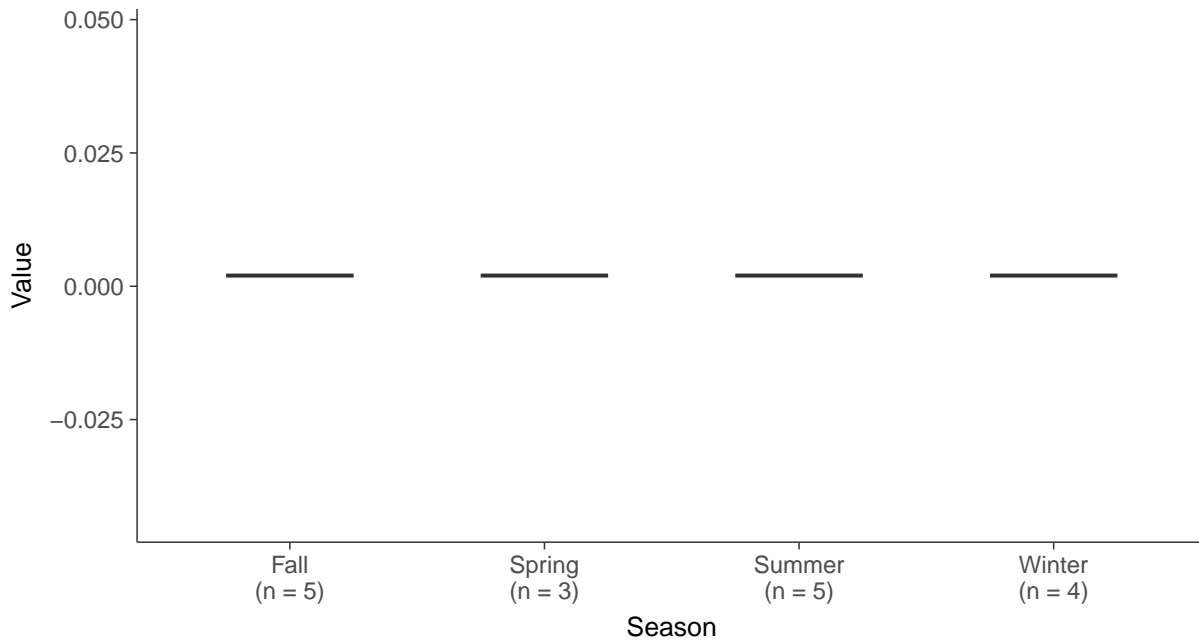
Boxplot

Thallium, MW-5 (mg/L)



Boxplot by Season

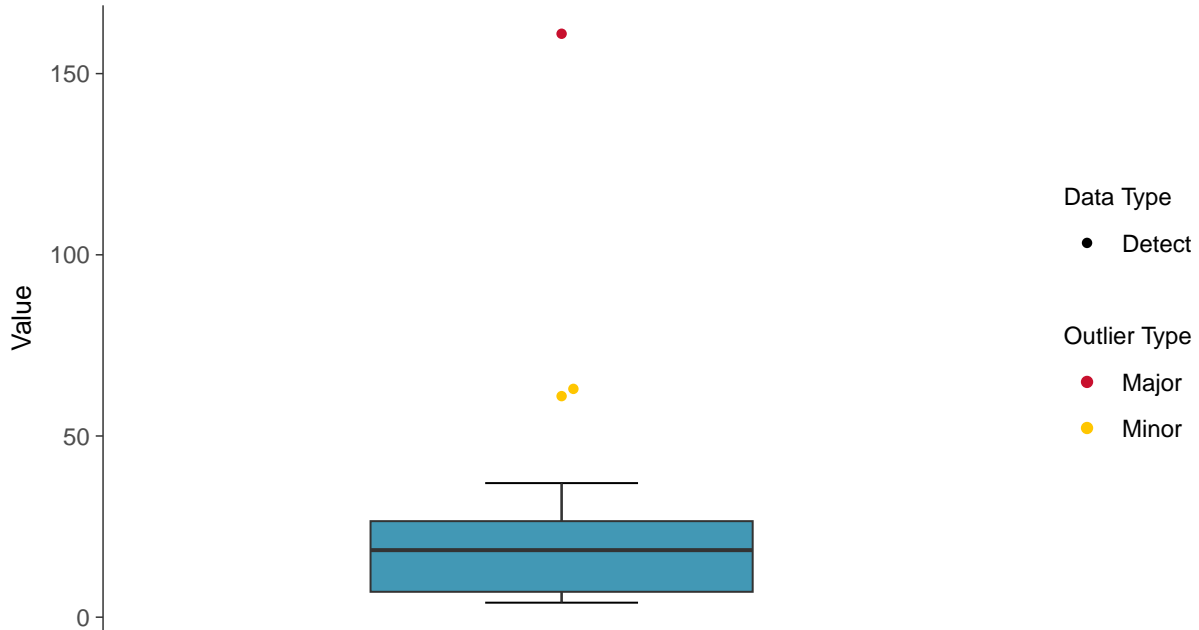
Thallium, MW-5 (mg/L)





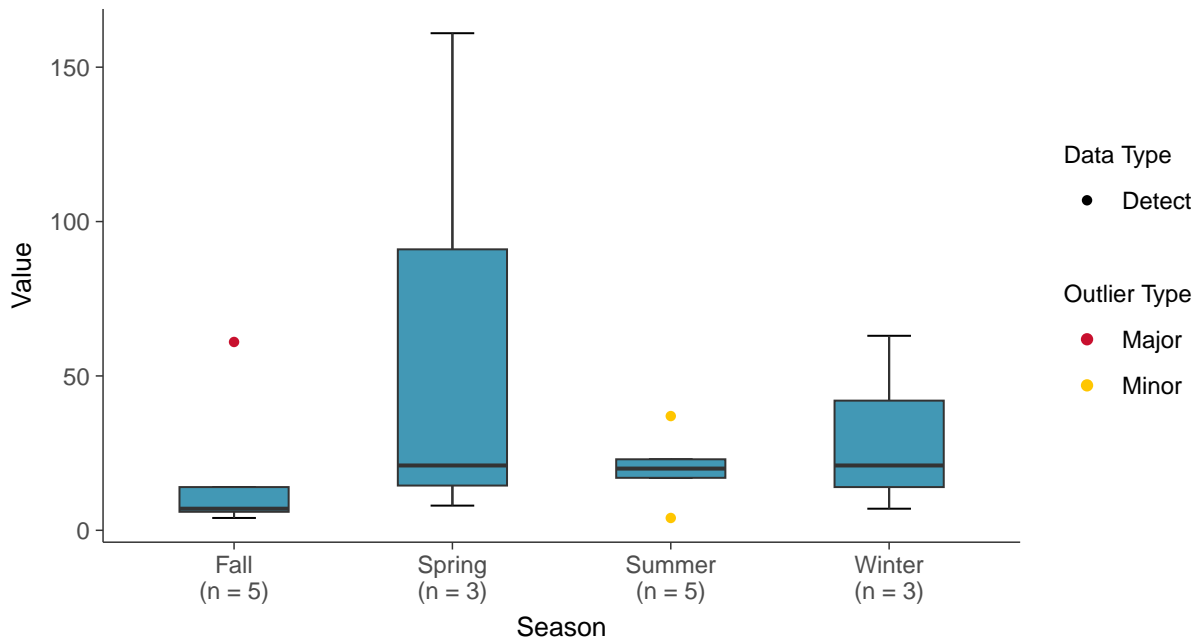
Boxplot

Total Suspended Solids, MW-5 (mg/L)



Boxplot by Season

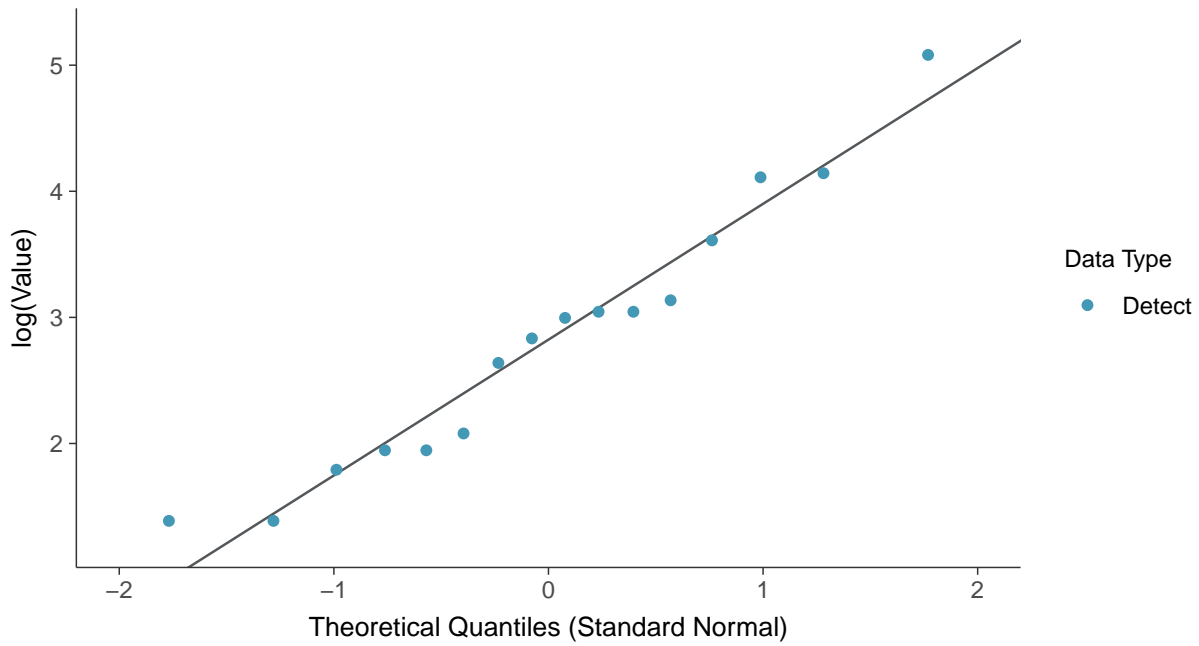
Total Suspended Solids, MW-5 (mg/L)





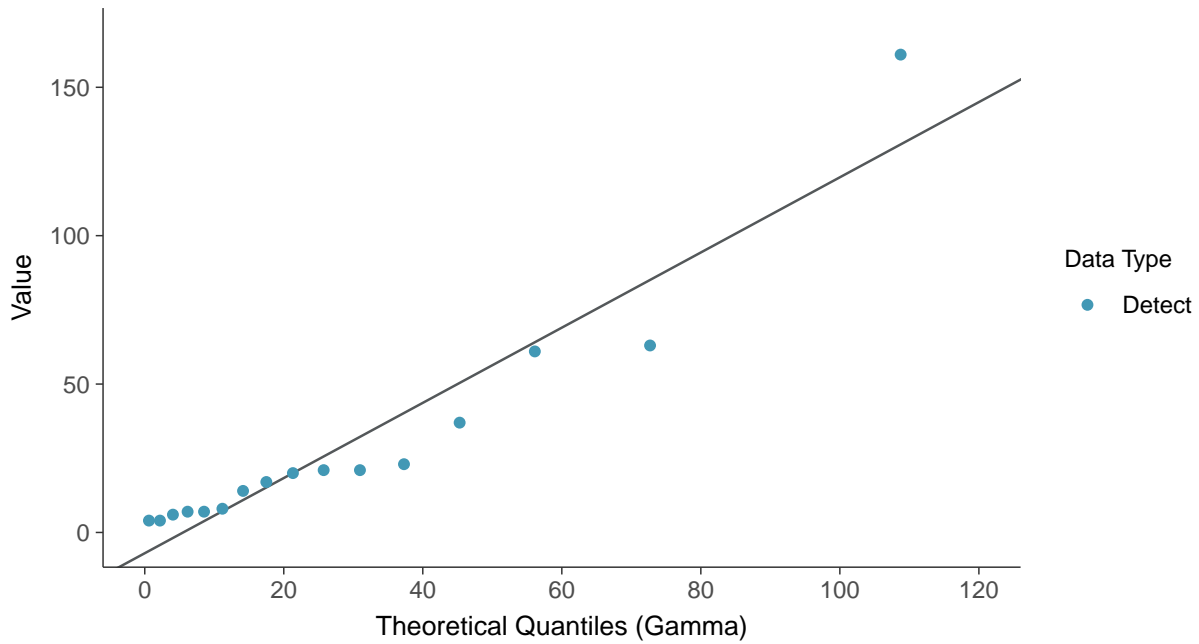
Lognormal Q-Q plot

Total Suspended Solids, MW-5 (mg/L)



Gamma Q-Q plot

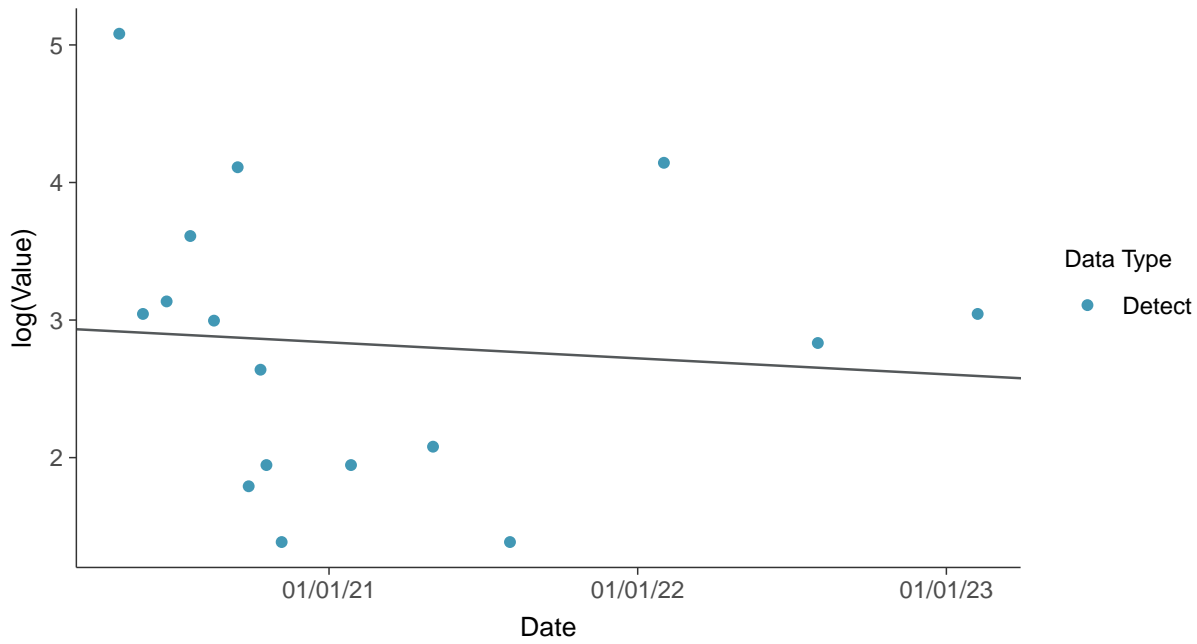
Total Suspended Solids, MW-5 (mg/L)





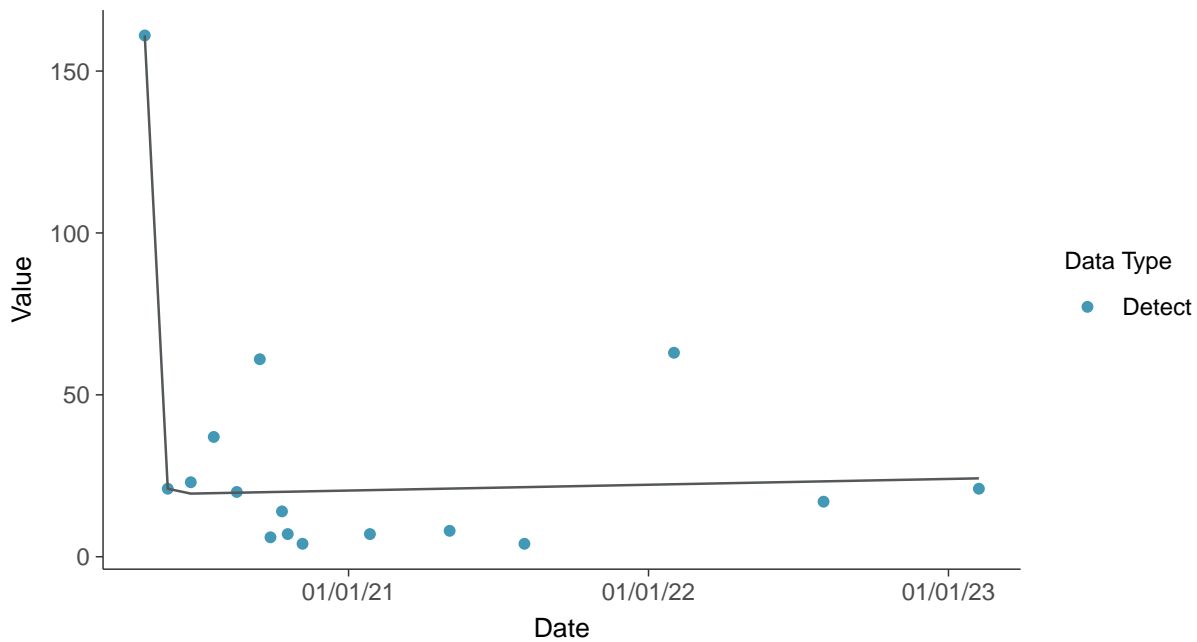
Trend Regression: Lognormal MLE

Total Suspended Solids, MW-5 (mg/L)



Trend Regression: Piecewise Linear-Linear

Total Suspended Solids, MW-5 (mg/L)



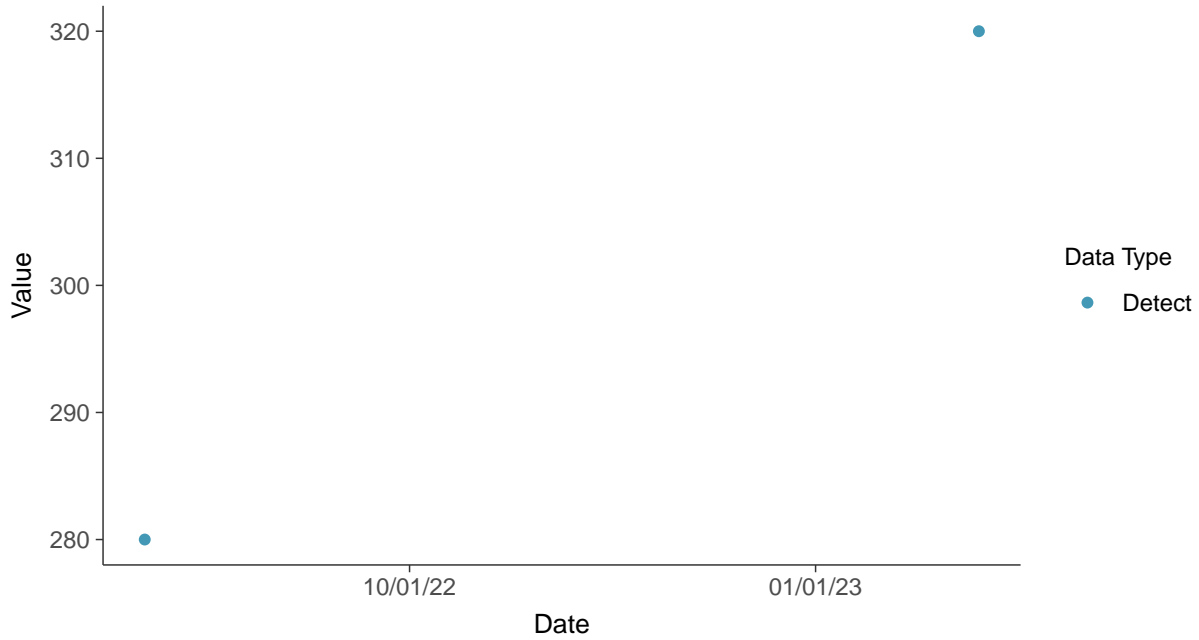


Other: Bicarbonate, MW-5

ID: 05_3_12

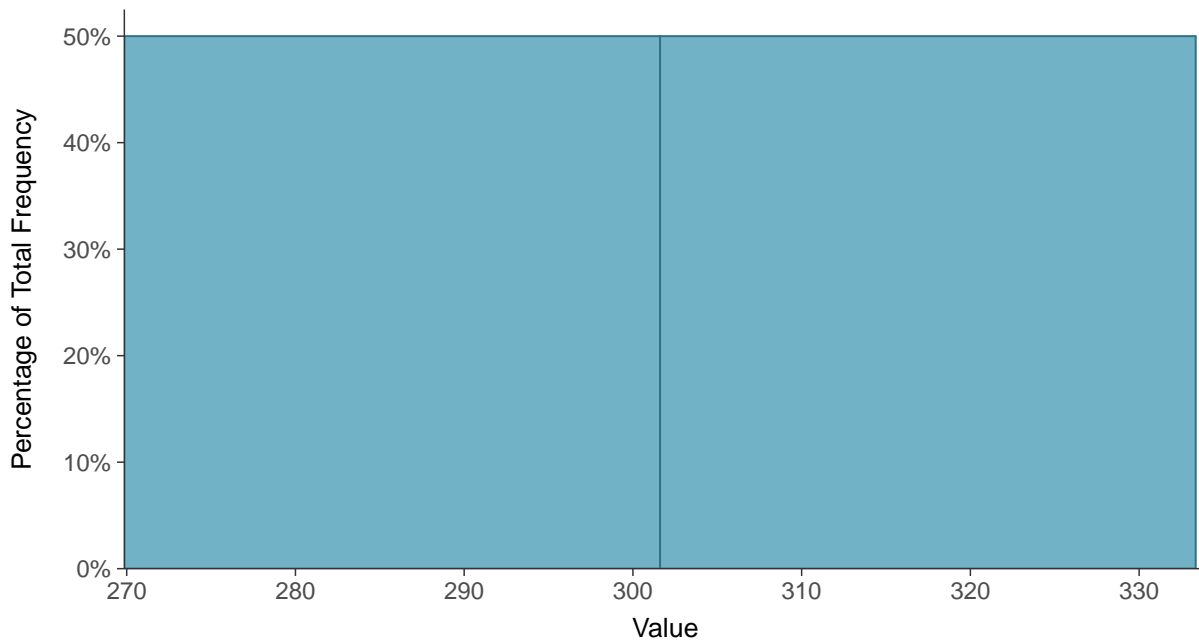
Scatter Plot

Bicarbonate, MW-5 (mg/L)



Histogram

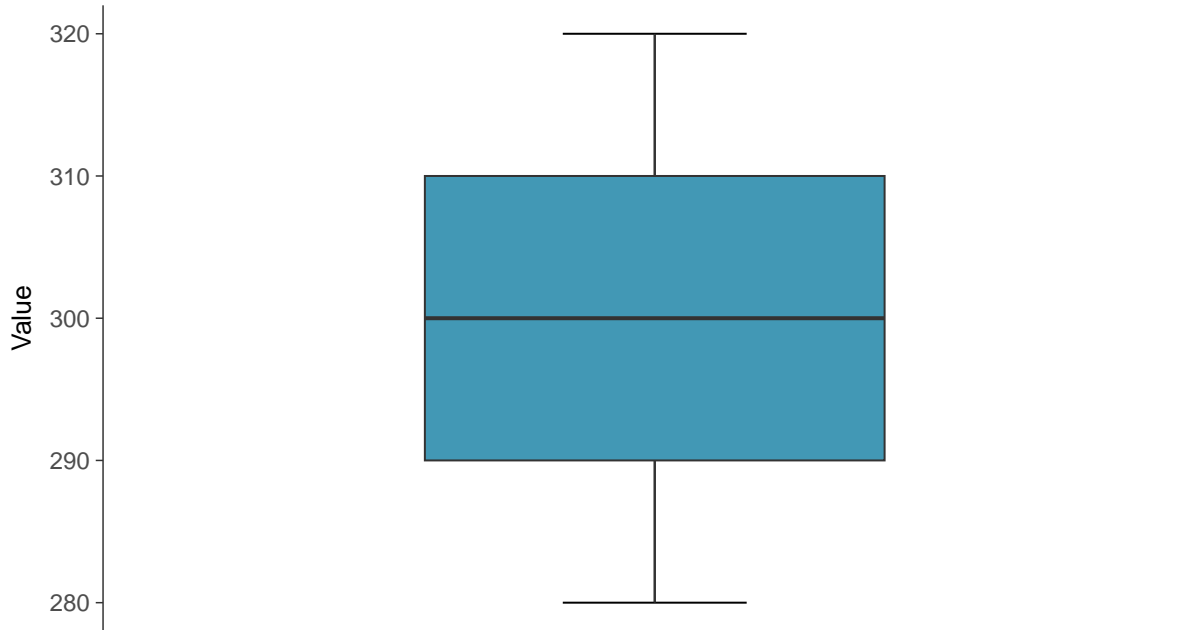
Bicarbonate, MW-5 (mg/L)





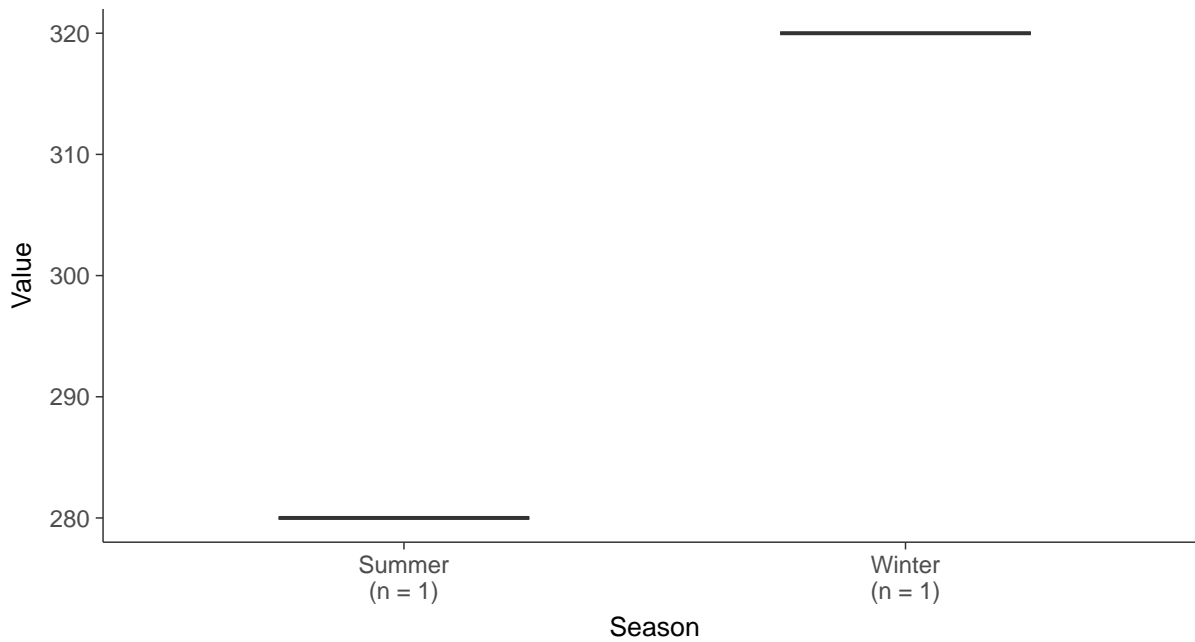
Boxplot

Bicarbonate, MW-5 (mg/L)



Boxplot by Season

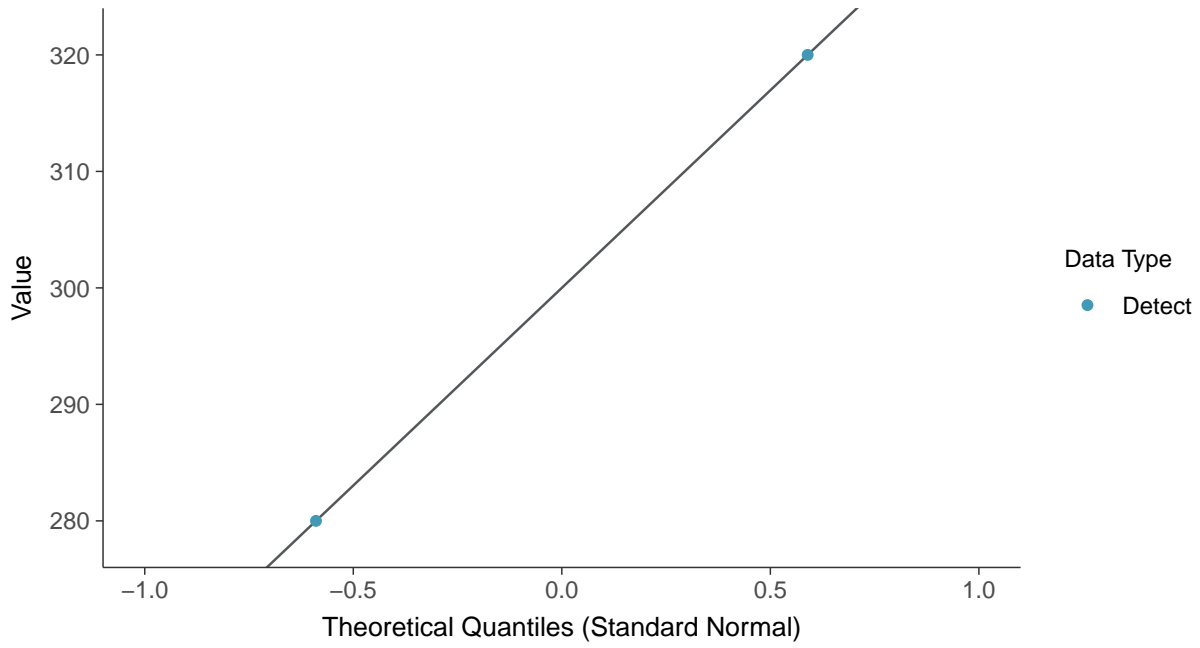
Bicarbonate, MW-5 (mg/L)





Normal Q-Q plot

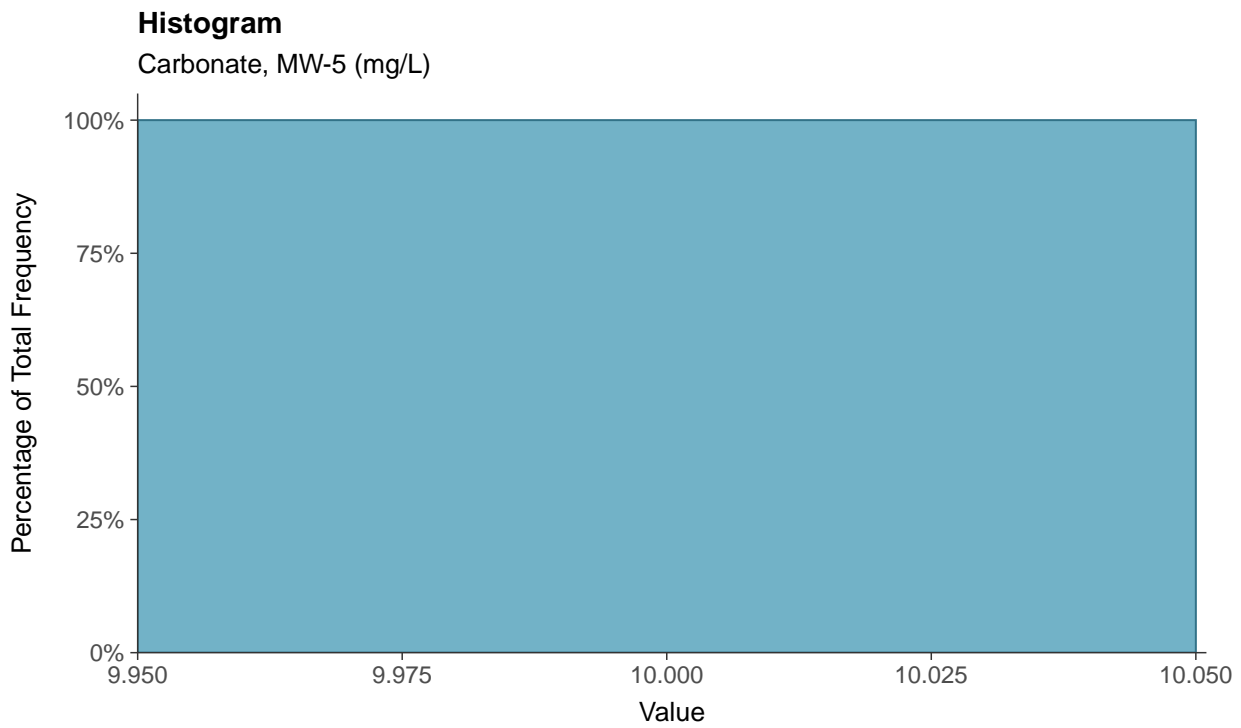
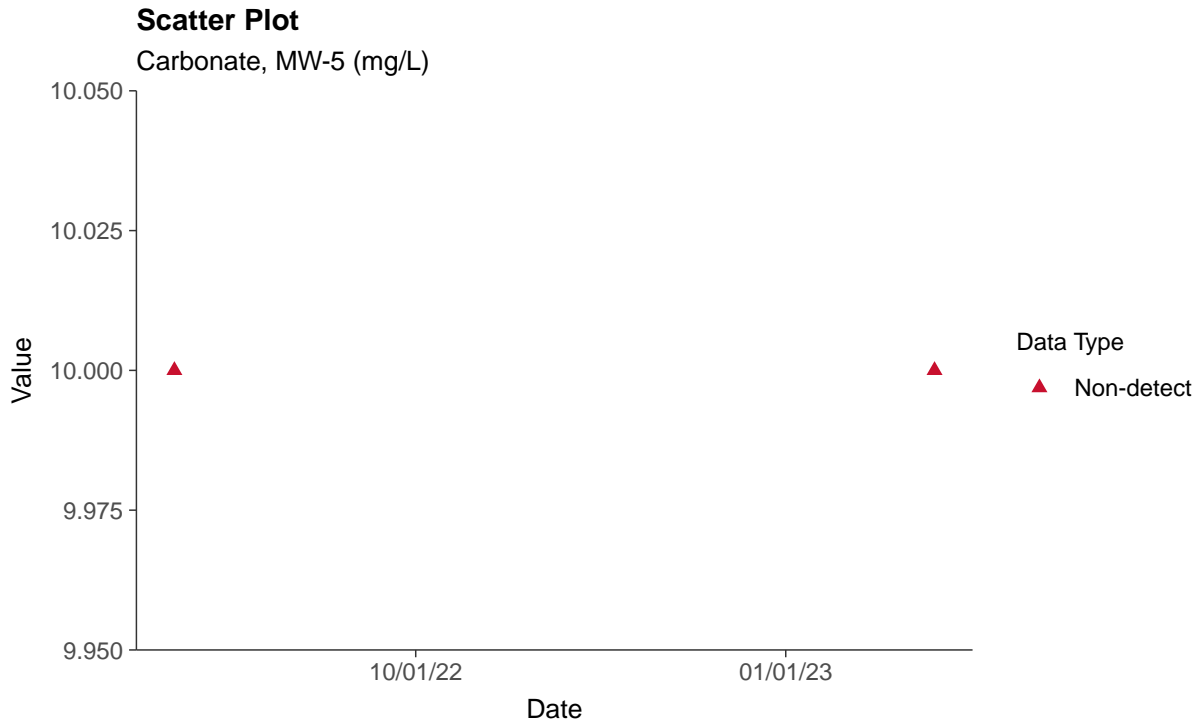
Bicarbonate, MW-5 (mg/L)





Other: Carbonate, MW-5

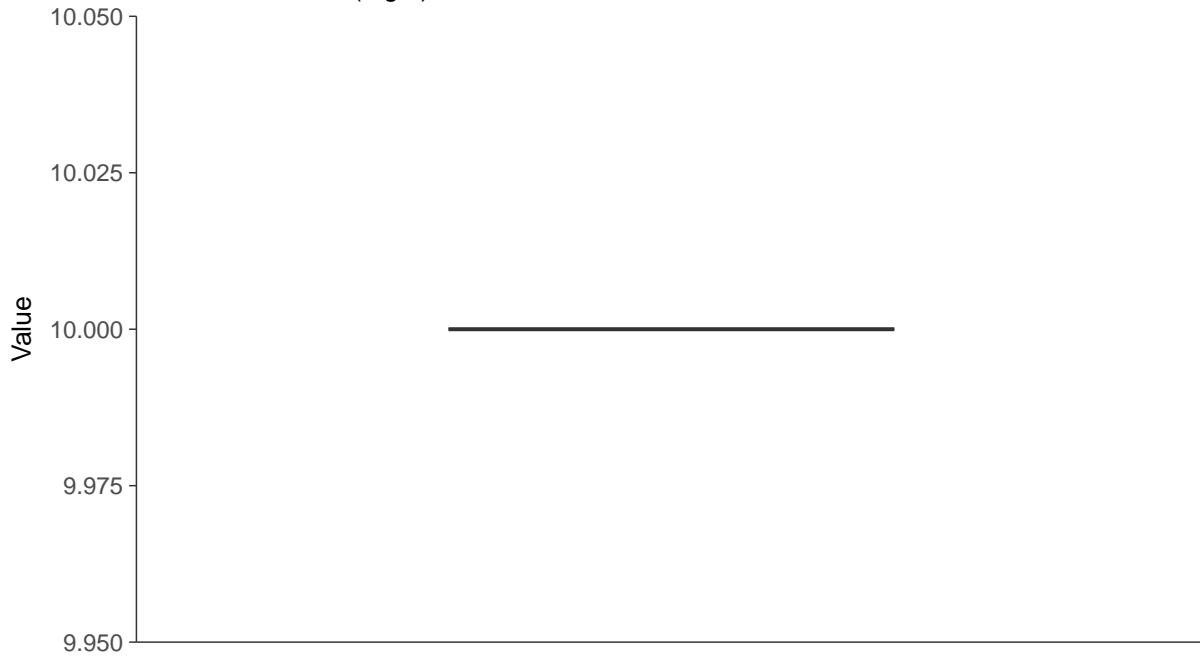
ID: 05_3_14





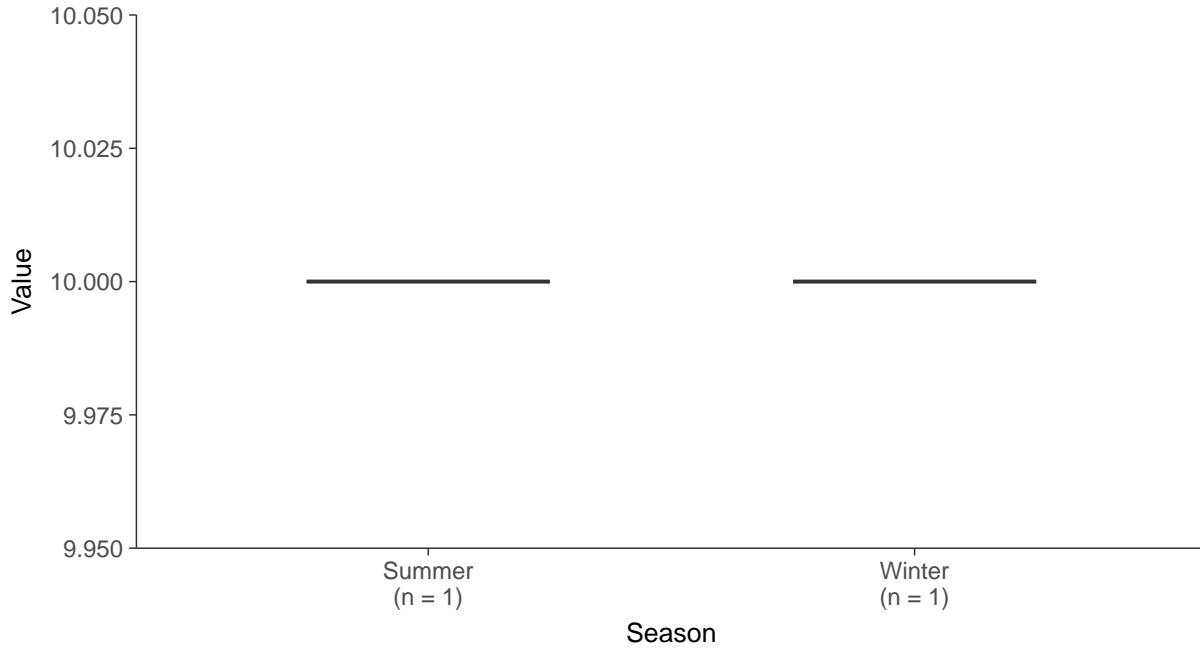
Boxplot

Carbonate, MW-5 (mg/L)



Boxplot by Season

Carbonate, MW-5 (mg/L)



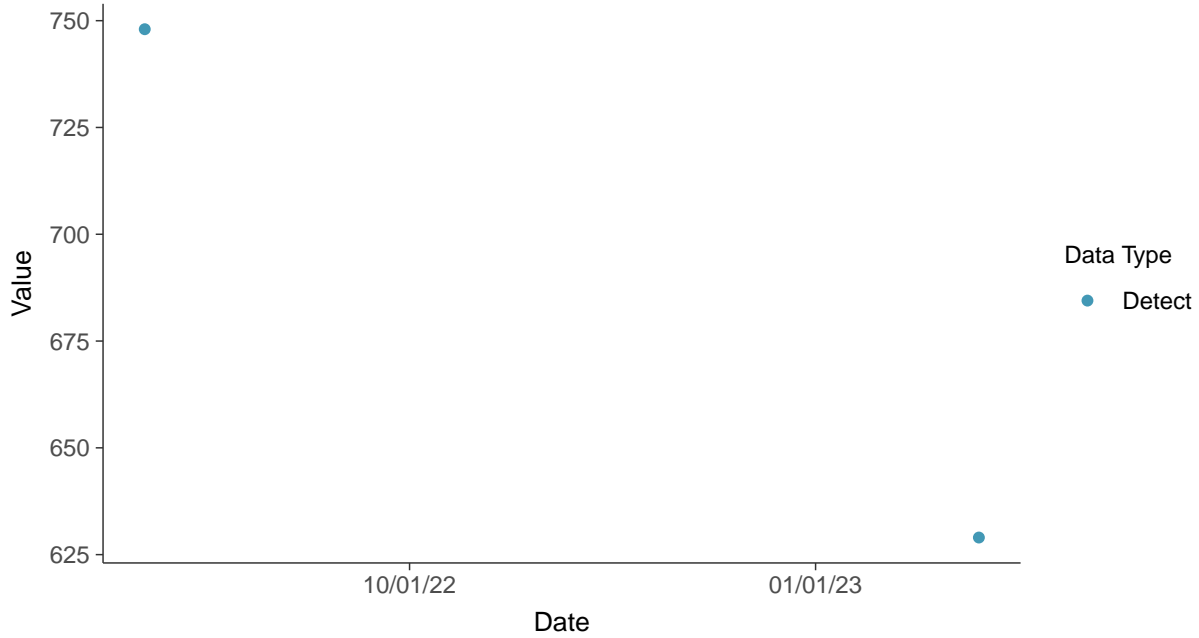


Other: Hardness, MW-5

ID: 05_3_17

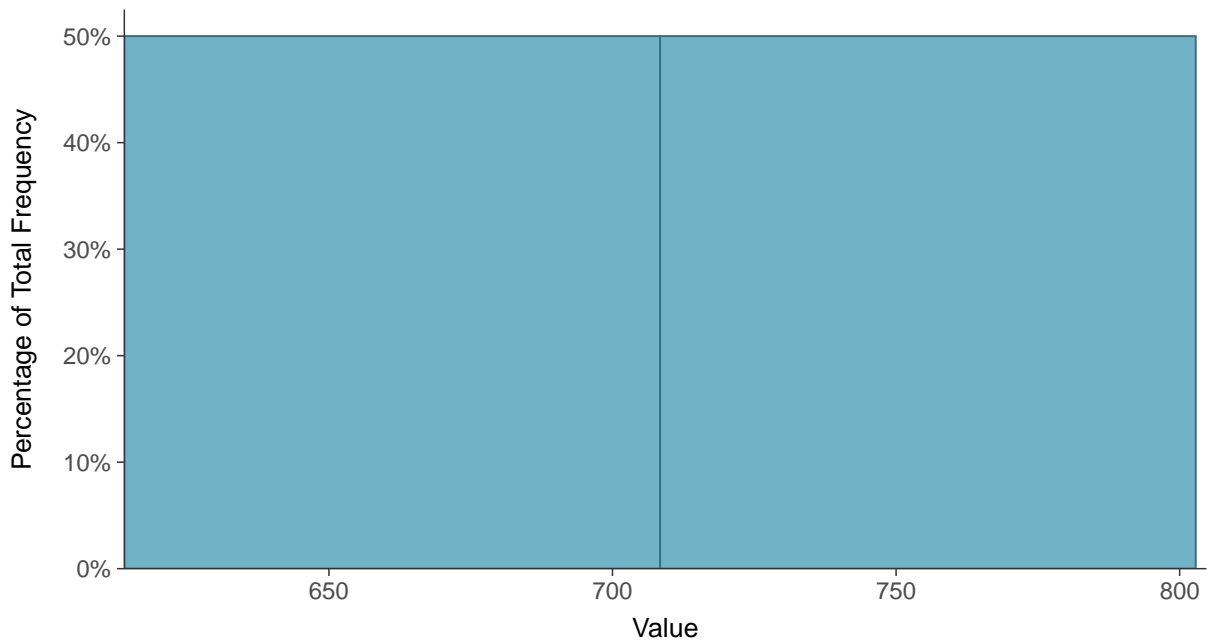
Scatter Plot

Hardness, MW-5 (mg/L)



Histogram

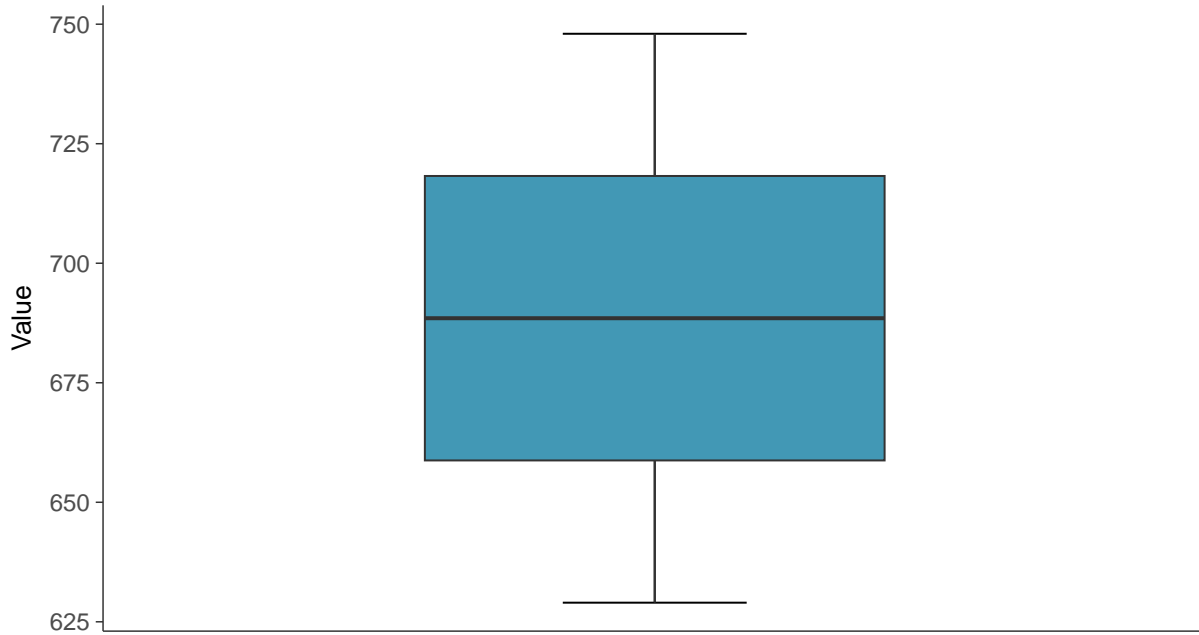
Hardness, MW-5 (mg/L)





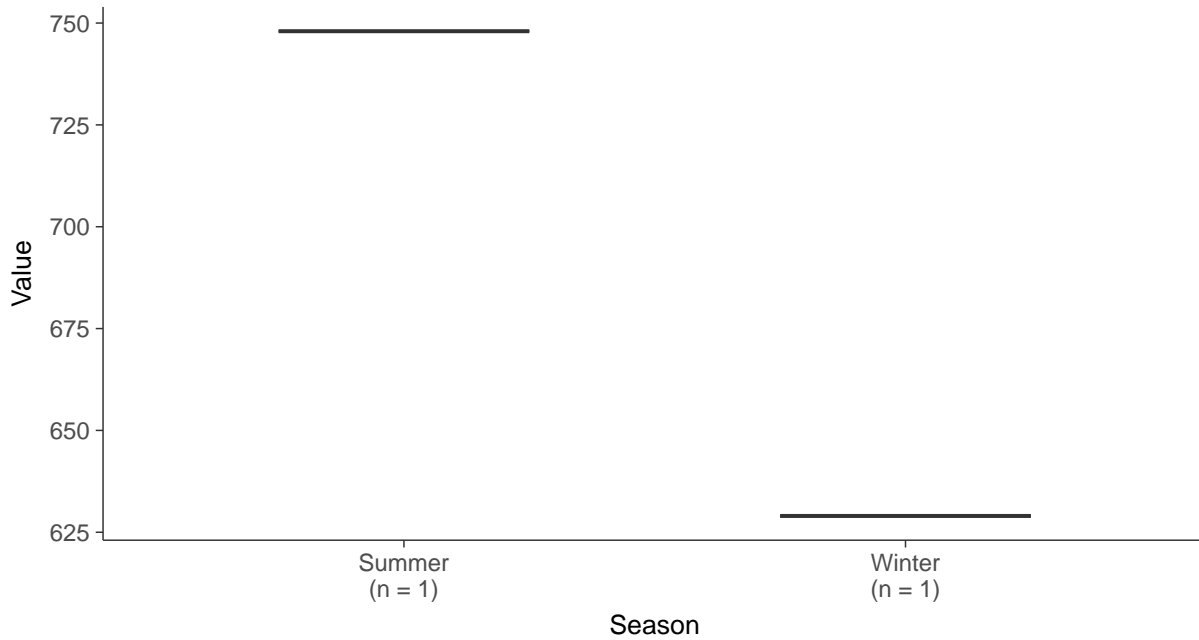
Boxplot

Hardness, MW-5 (mg/L)



Boxplot by Season

Hardness, MW-5 (mg/L)

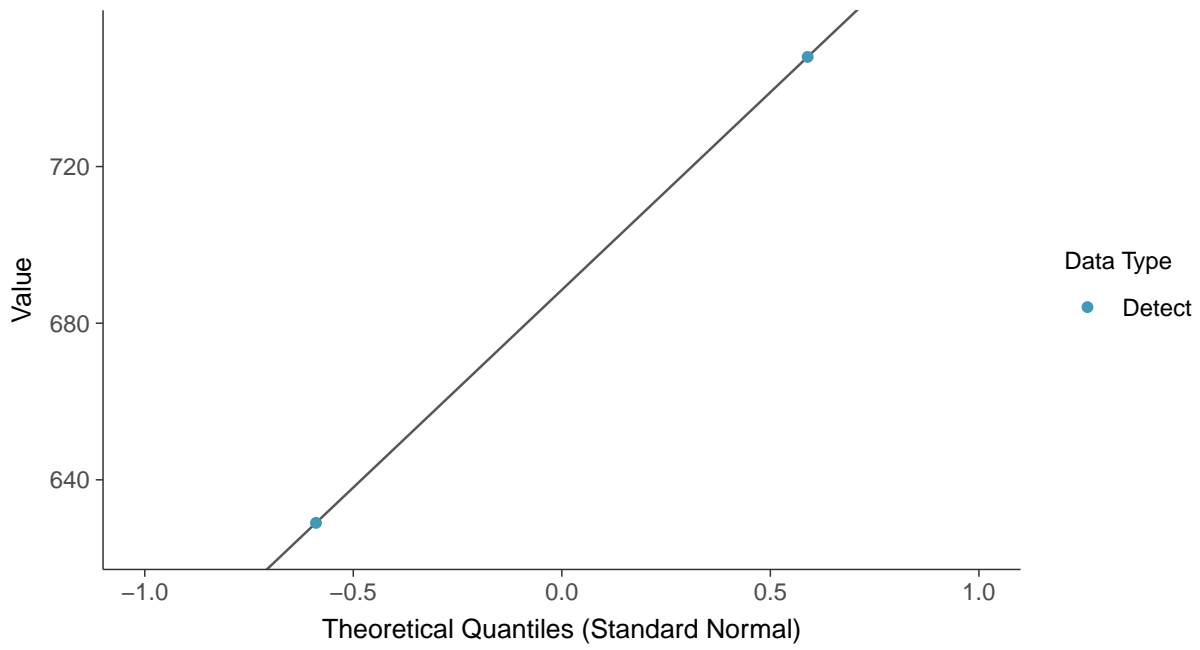




Downgradient Wells MW-2, MW-3, MW-5, MW-6, MW-7, MW-7B, MW-8, MW-9, MW-10, MW-13, MW-14, MW-15

Normal Q-Q plot

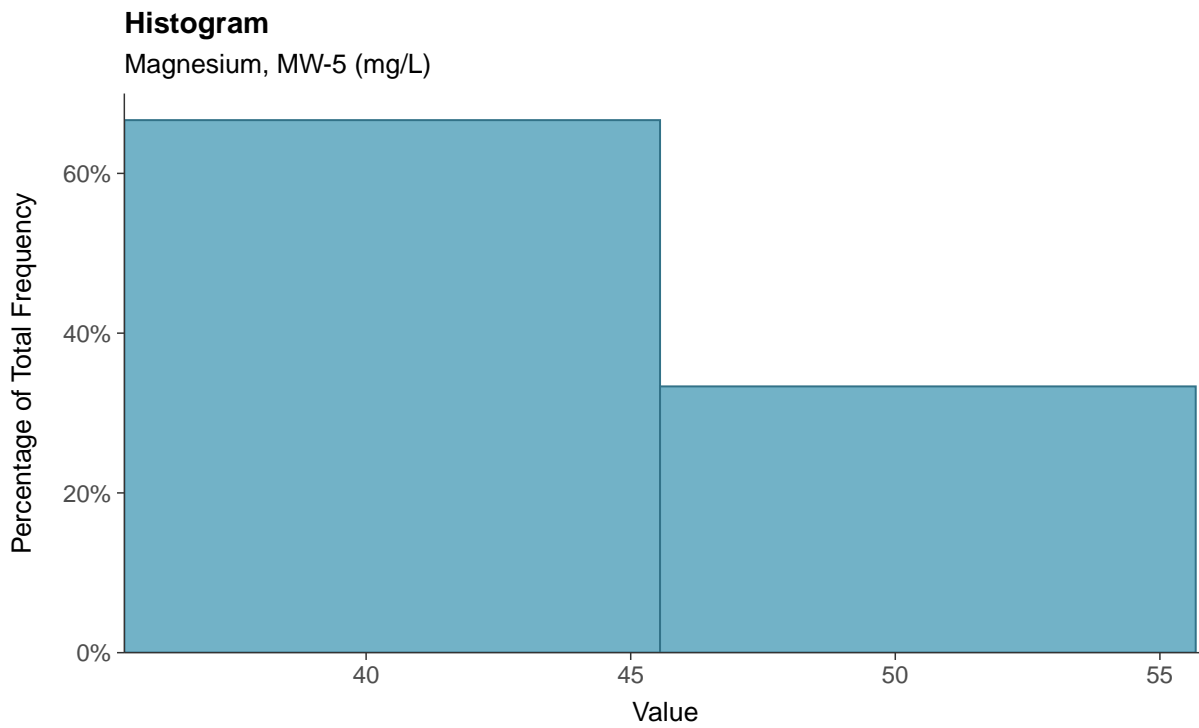
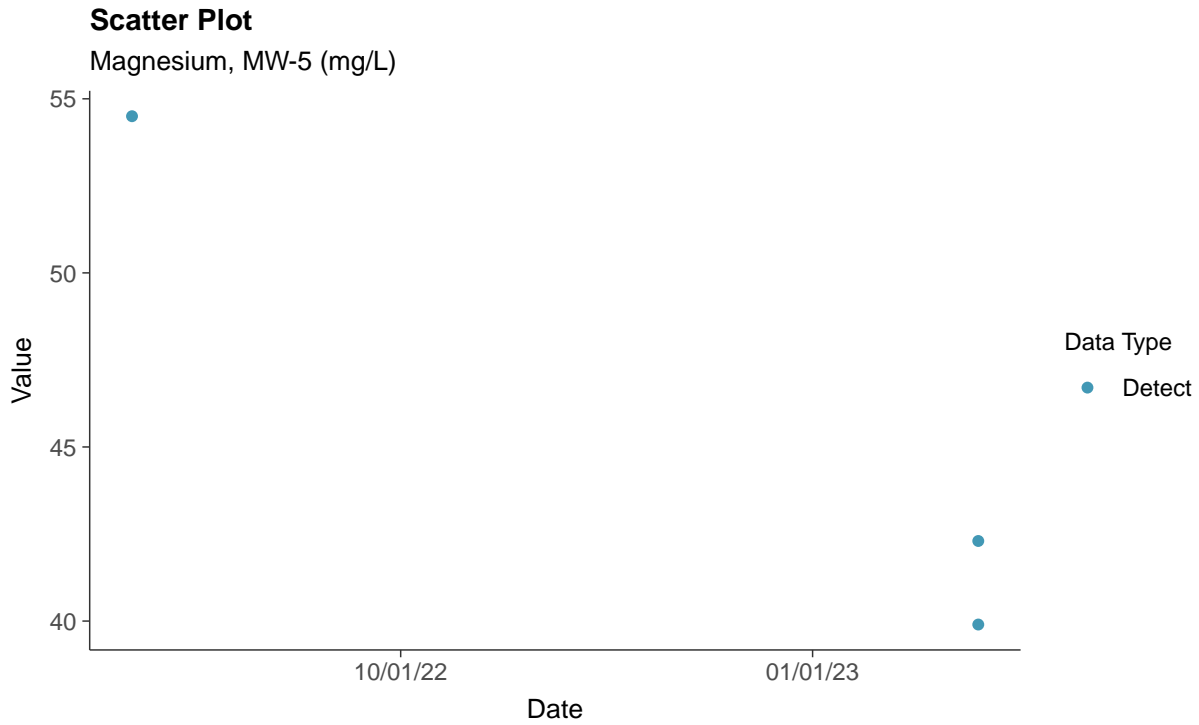
Hardness, MW-5 (mg/L)





Other: Magnesium, MW-5

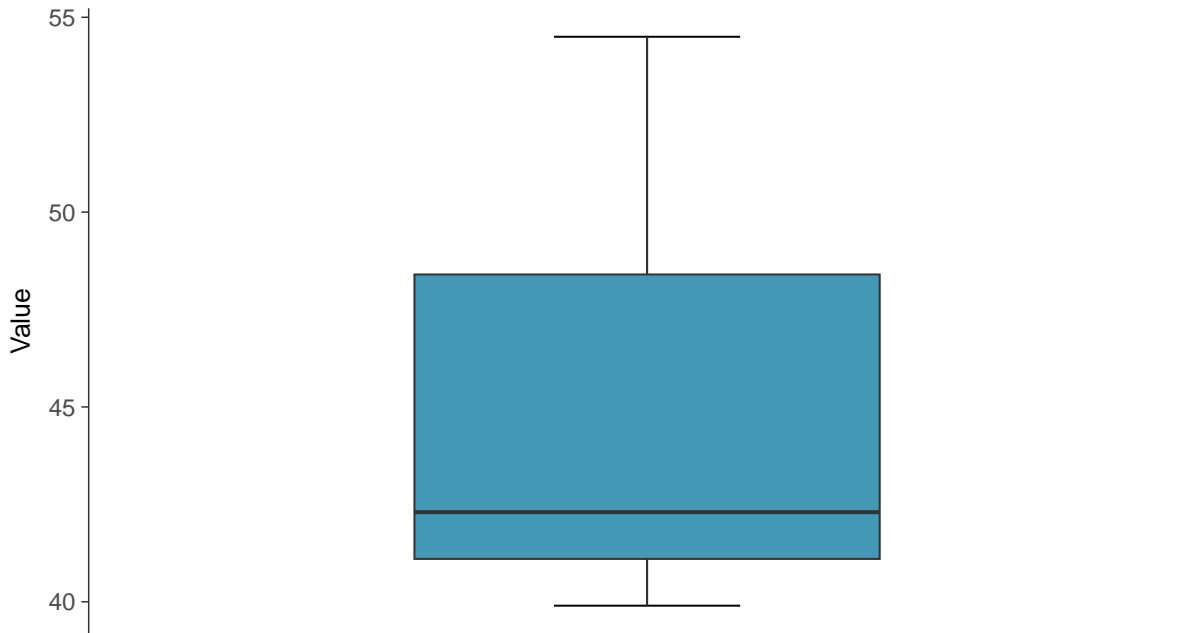
ID: 05_3_20





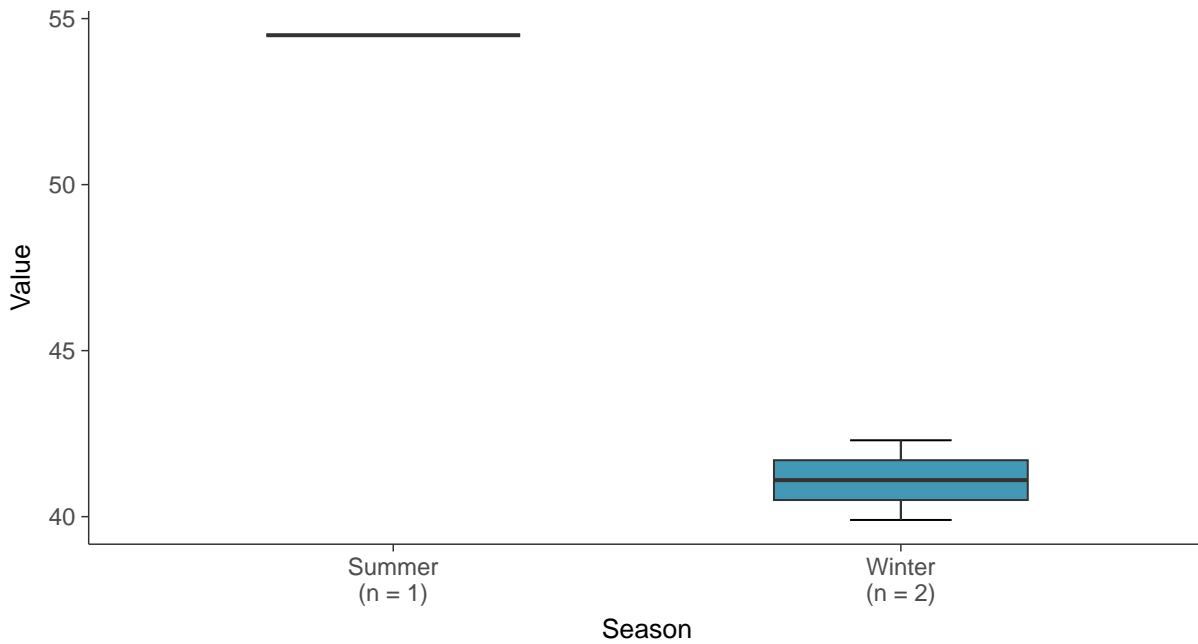
Boxplot

Magnesium, MW-5 (mg/L)



Boxplot by Season

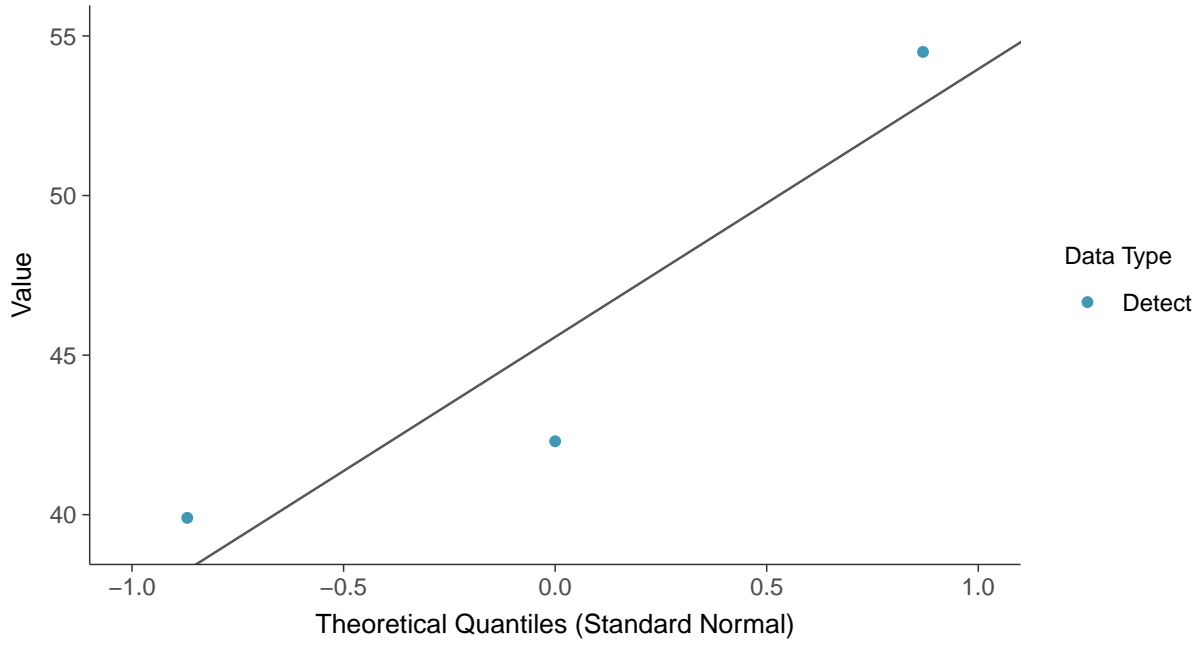
Magnesium, MW-5 (mg/L)





Normal Q-Q plot

Magnesium, MW-5 (mg/L)



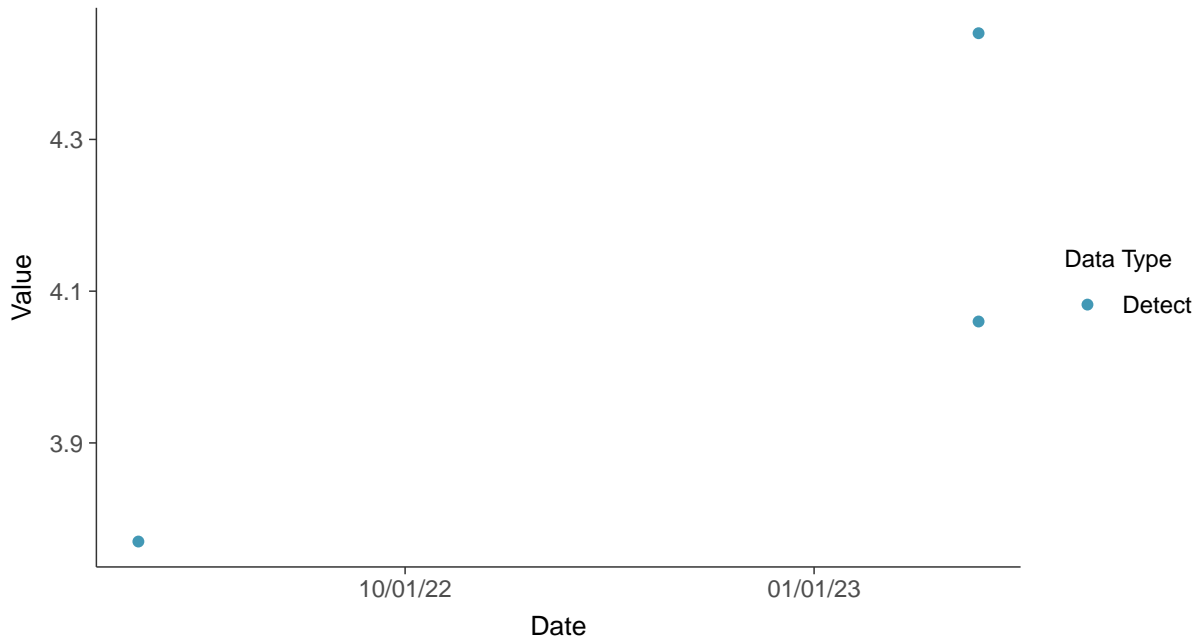


Other: Potassium, MW-5

ID: 05_3_23

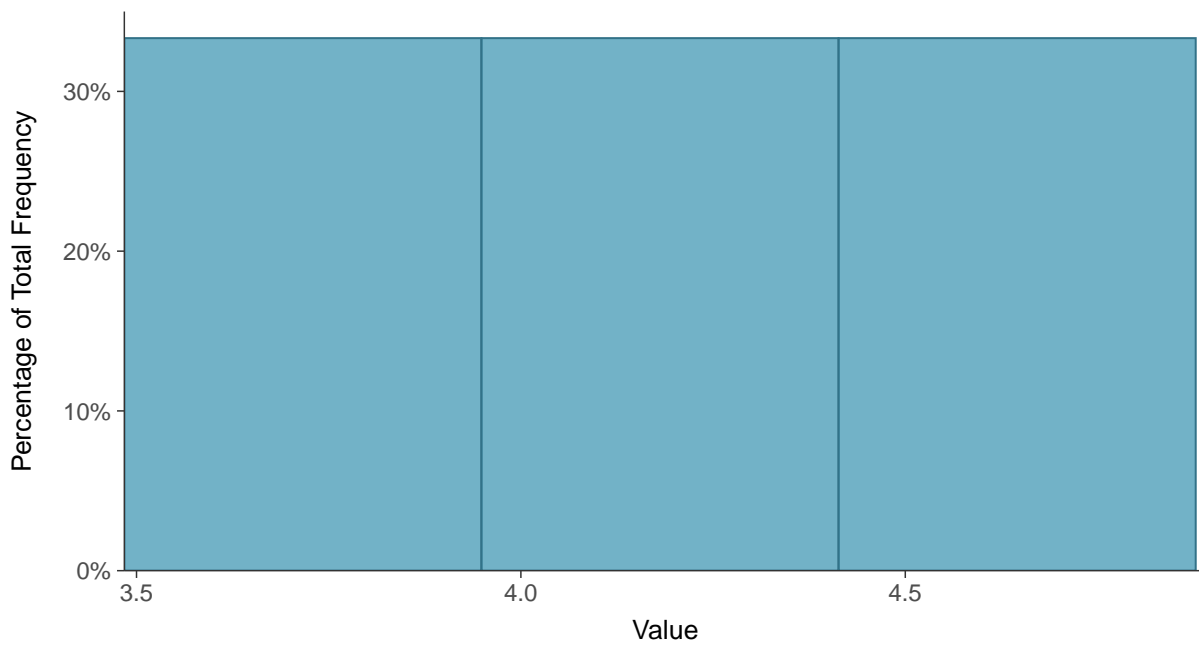
Scatter Plot

Potassium, MW-5 (mg/L)



Histogram

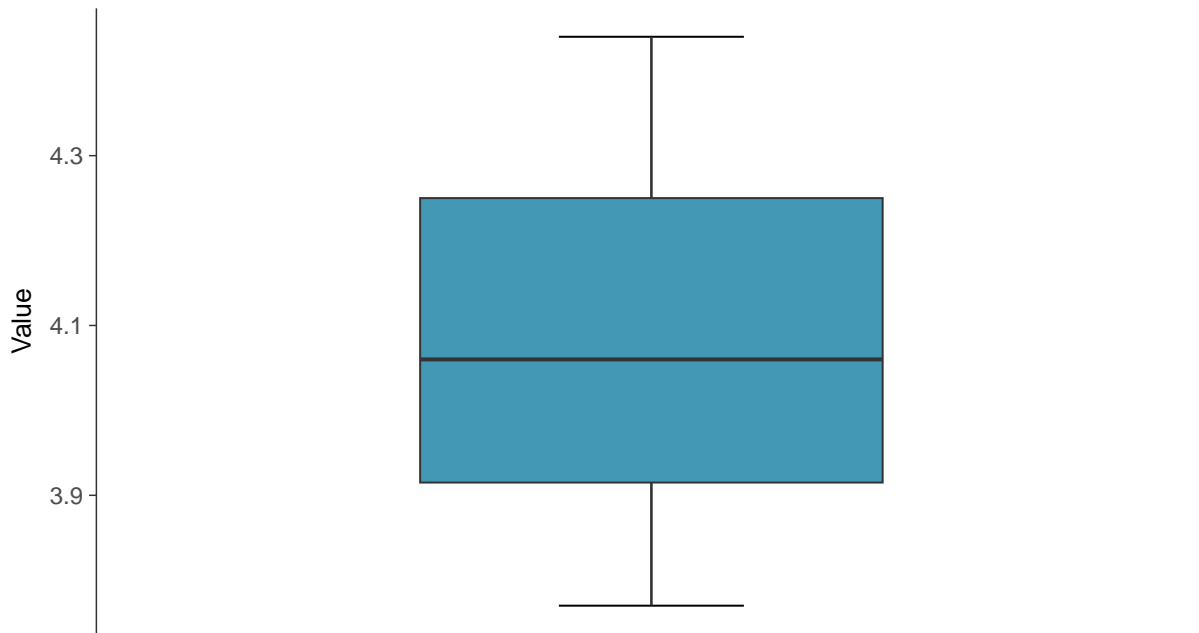
Potassium, MW-5 (mg/L)





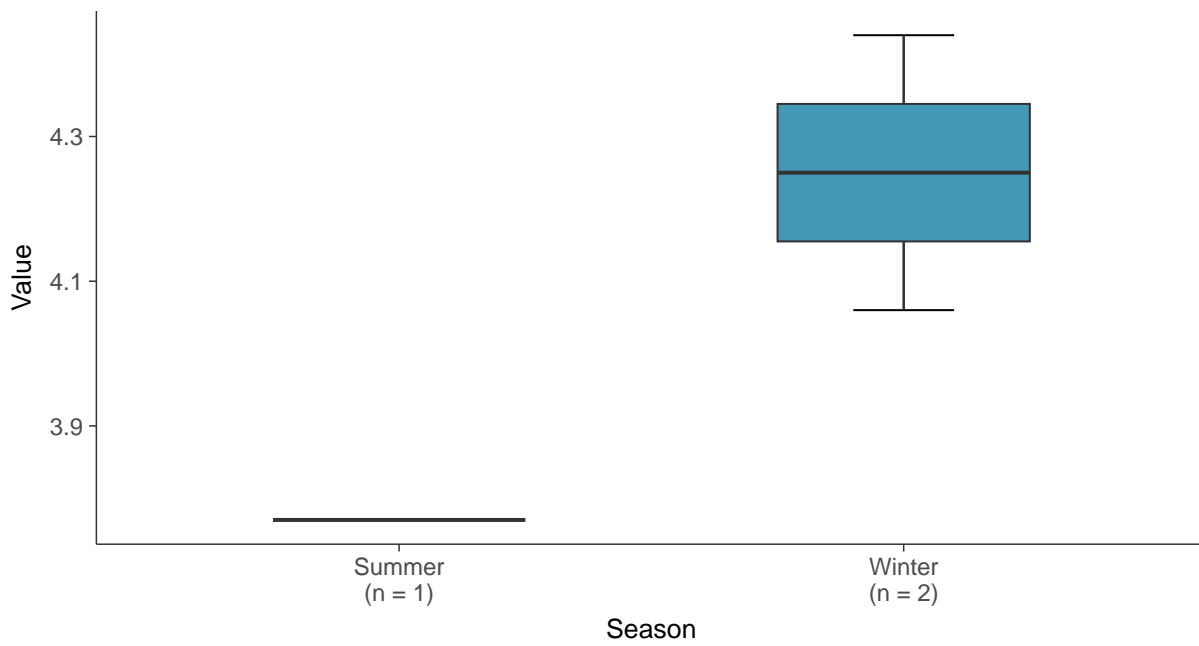
Boxplot

Potassium, MW-5 (mg/L)



Boxplot by Season

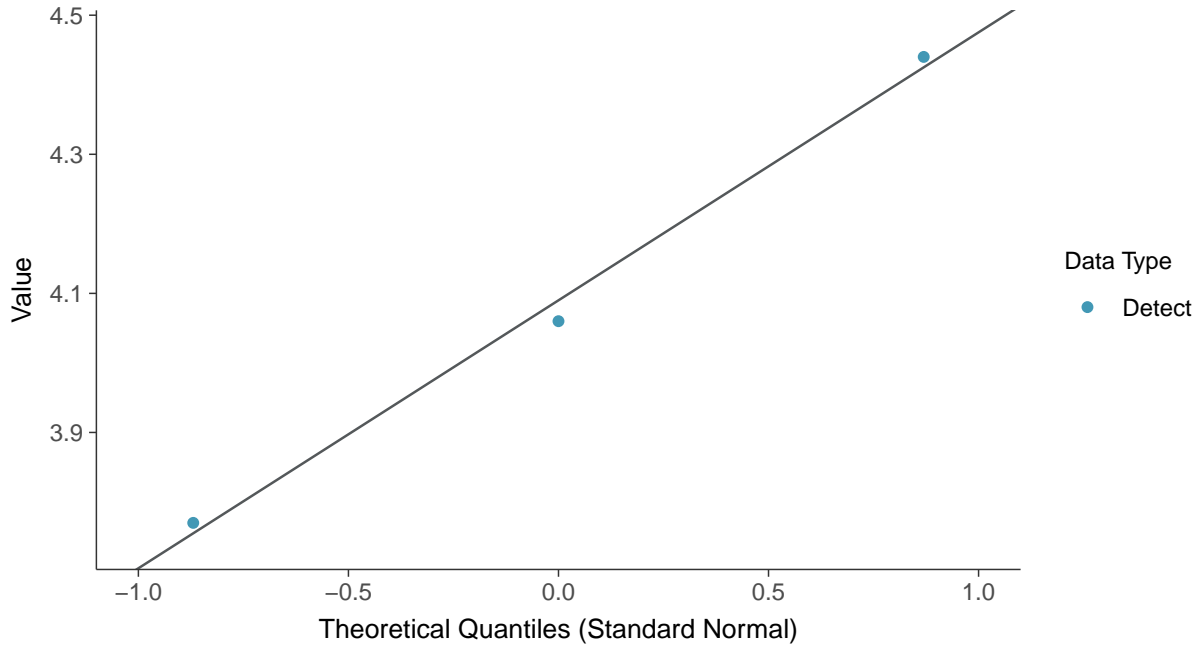
Potassium, MW-5 (mg/L)





Normal Q-Q plot

Potassium, MW-5 (mg/L)



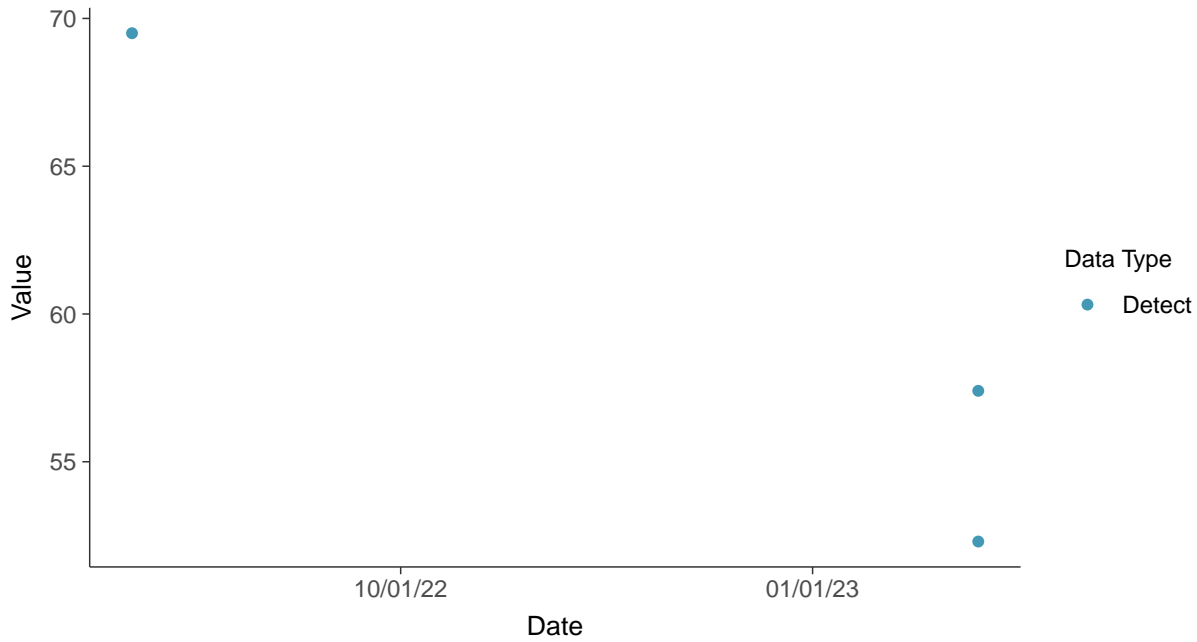


Other: Sodium, MW-5

ID: 05_3_28

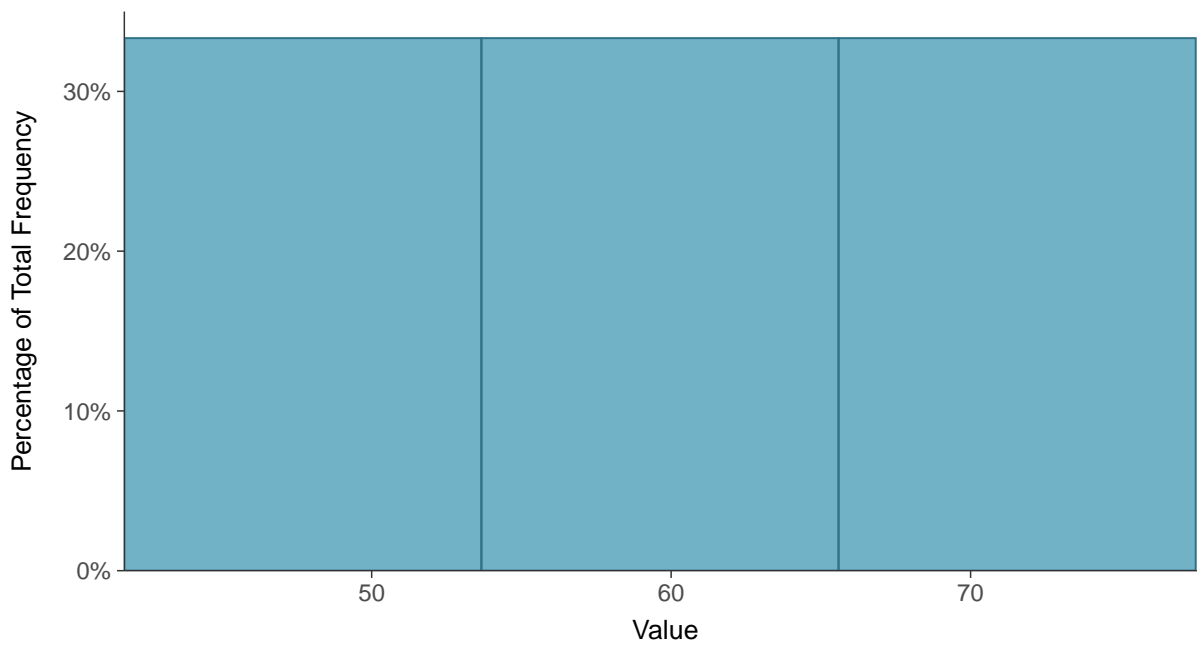
Scatter Plot

Sodium, MW-5 (mg/L)



Histogram

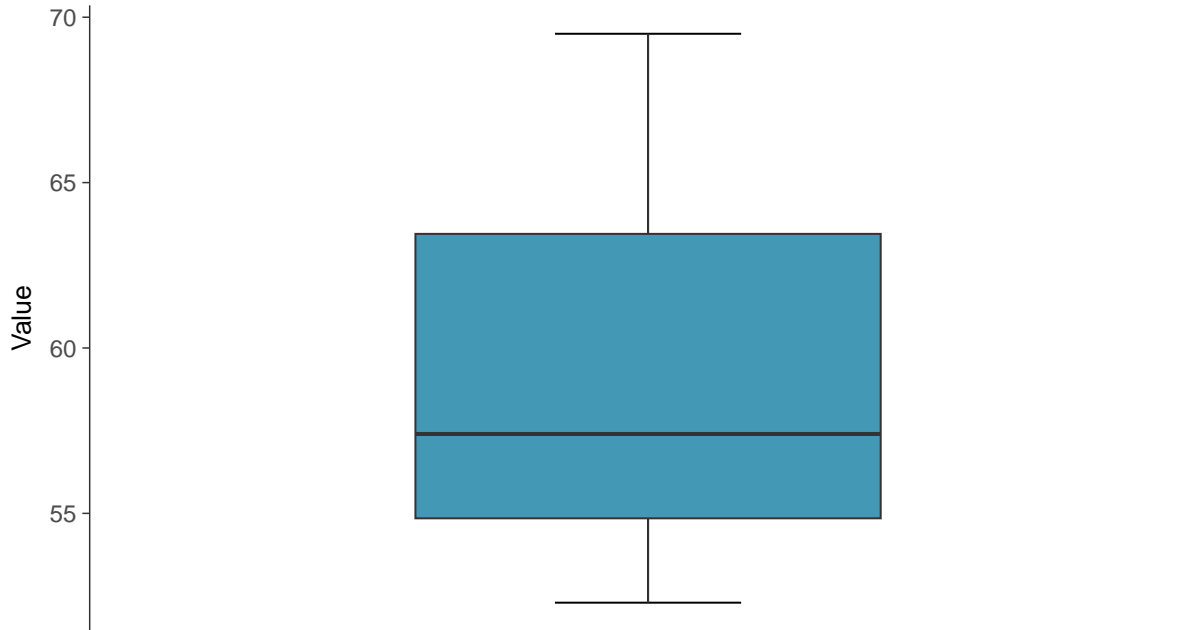
Sodium, MW-5 (mg/L)





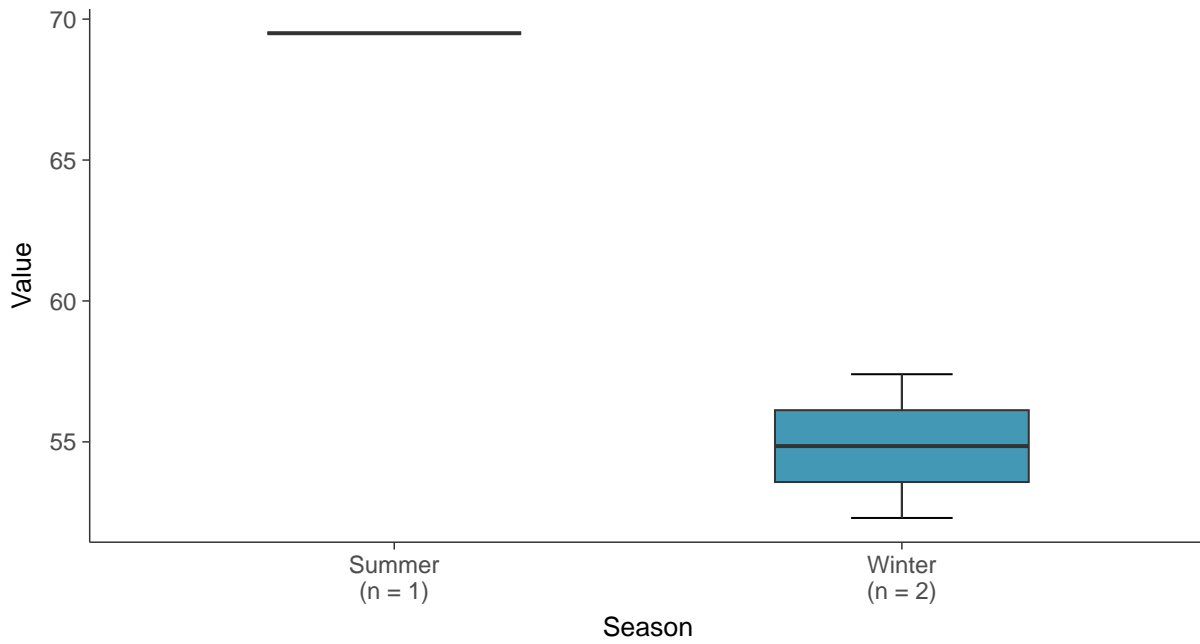
Boxplot

Sodium, MW-5 (mg/L)



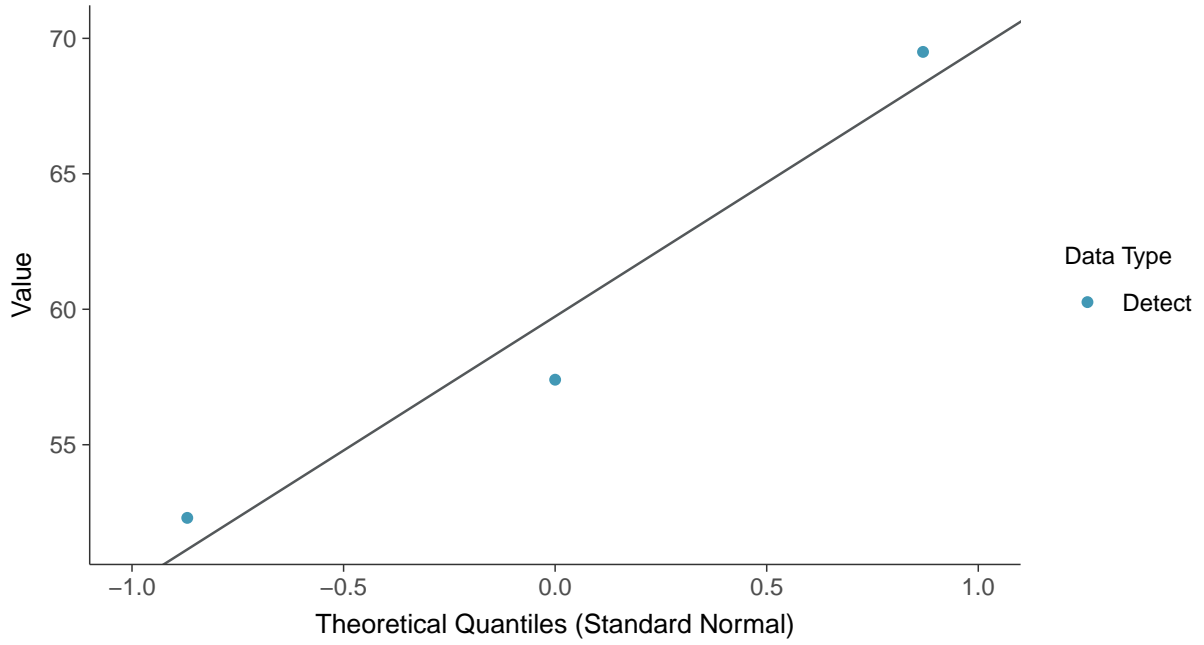
Boxplot by Season

Sodium, MW-5 (mg/L)





Normal Q-Q plot
Sodium, MW-5 (mg/L)

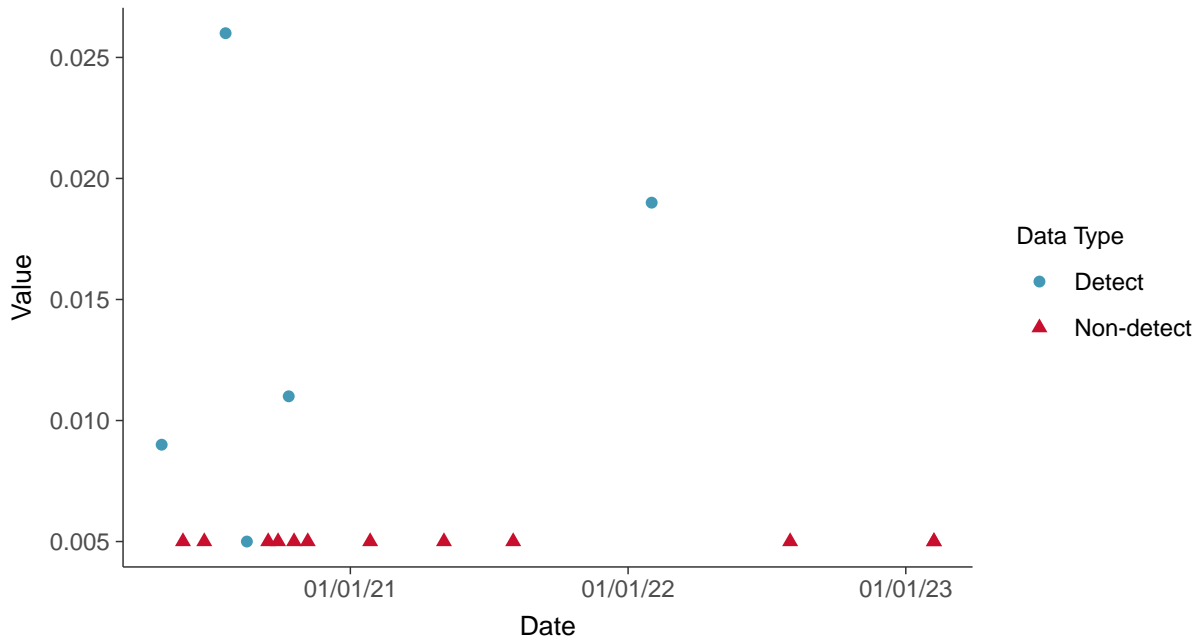


Part 115: Copper, MW-5

ID: 05_5_37

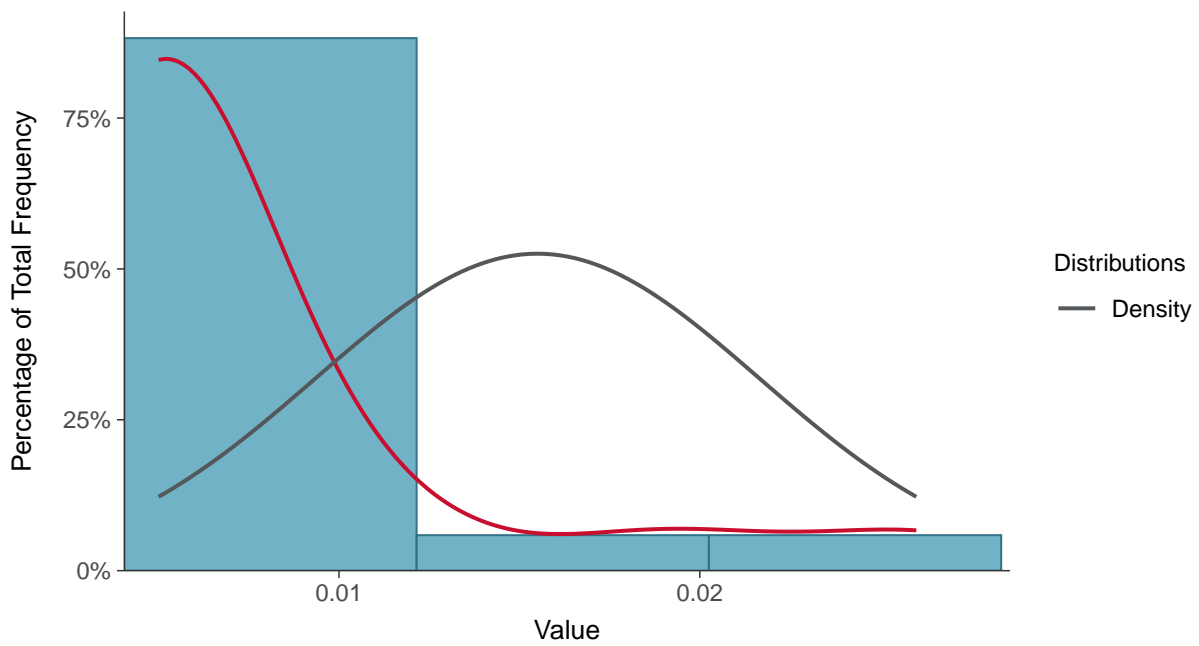
Scatter Plot

Copper, MW-5 (mg/L)



Histogram

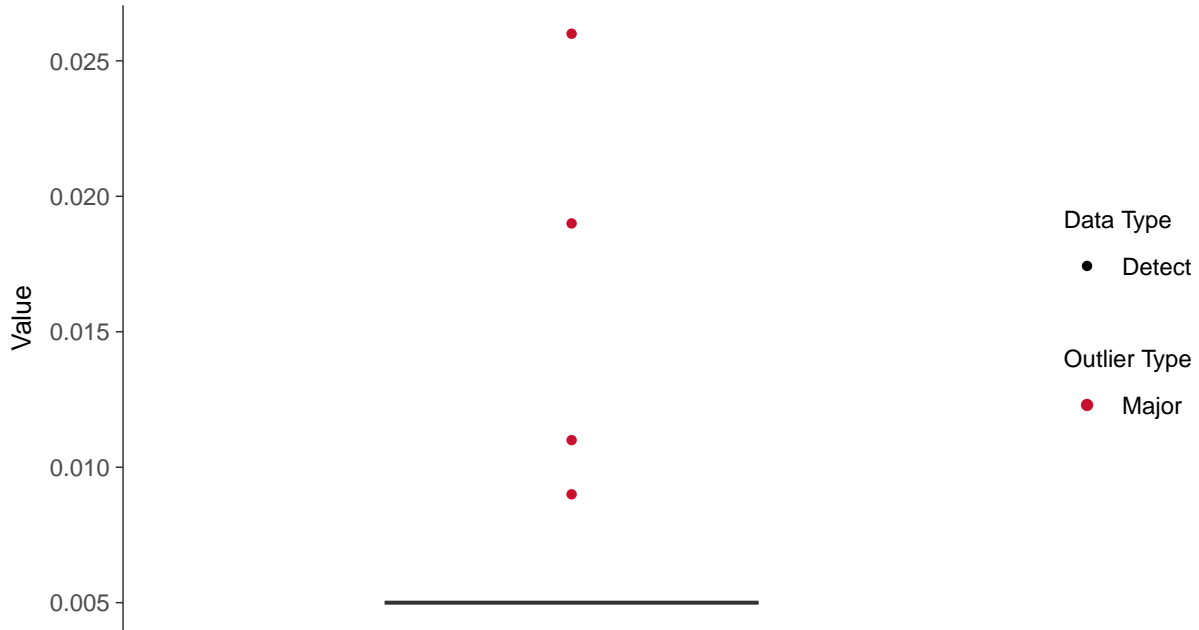
Copper, MW-5 (mg/L)





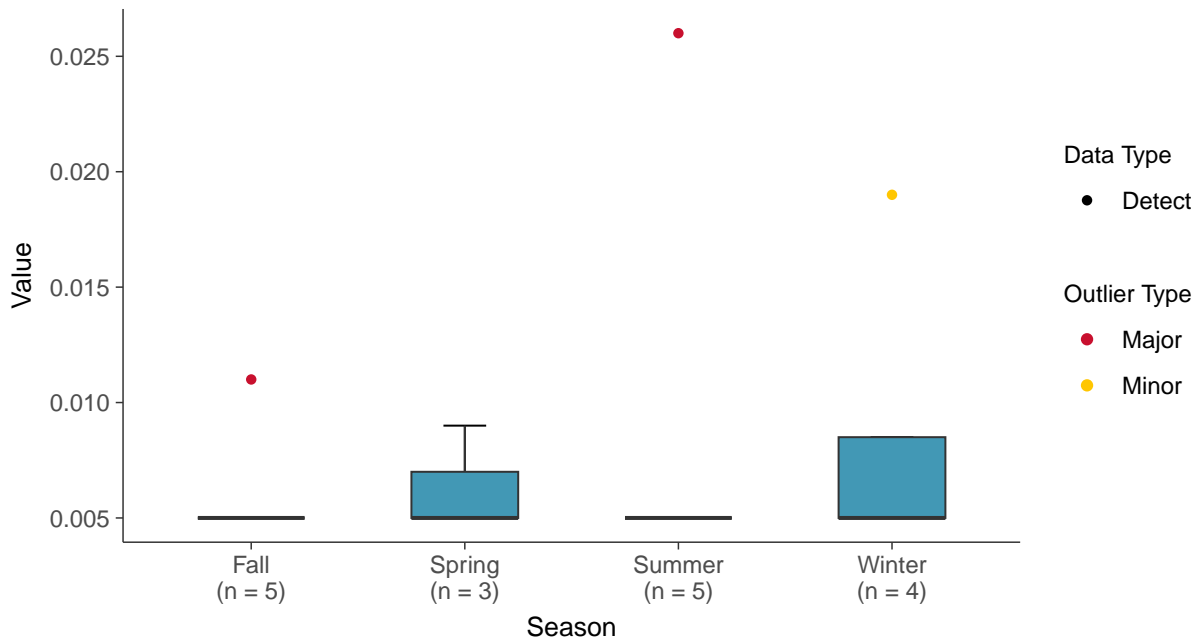
Boxplot

Copper, MW-5 (mg/L)



Boxplot by Season

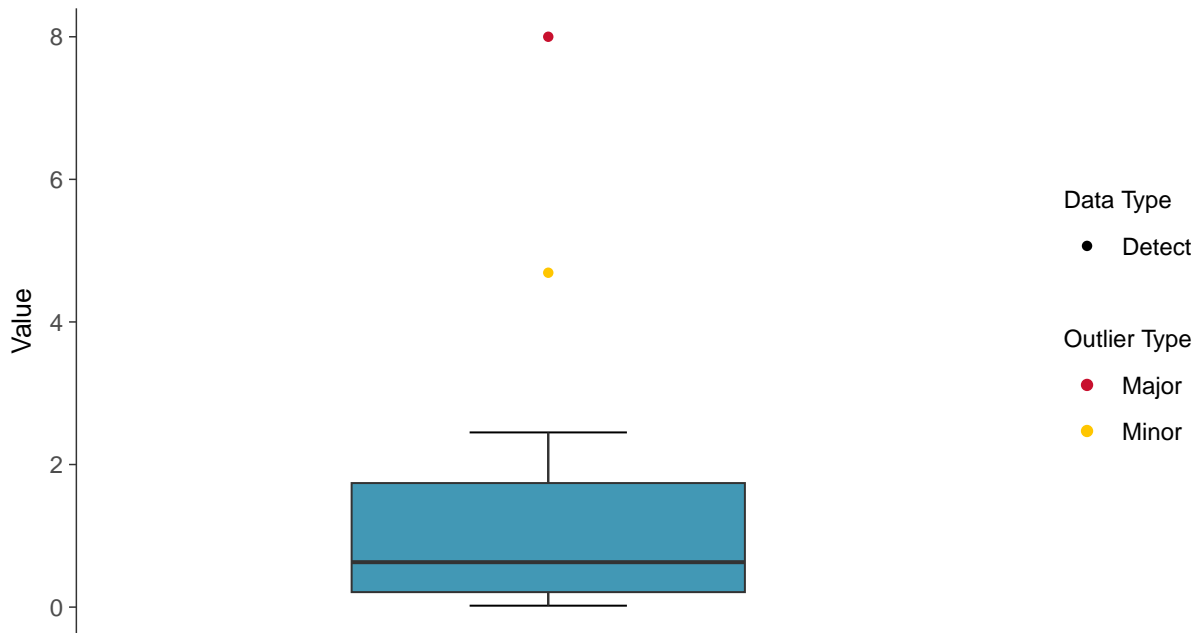
Copper, MW-5 (mg/L)





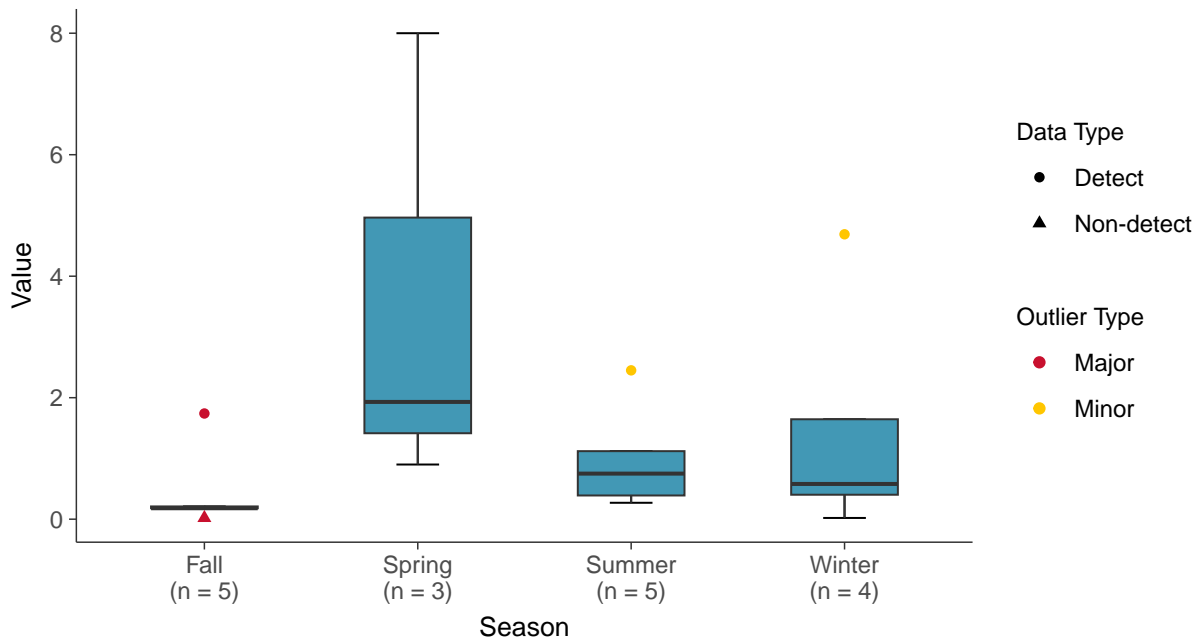
Boxplot

Iron, MW-5 (mg/L)



Boxplot by Season

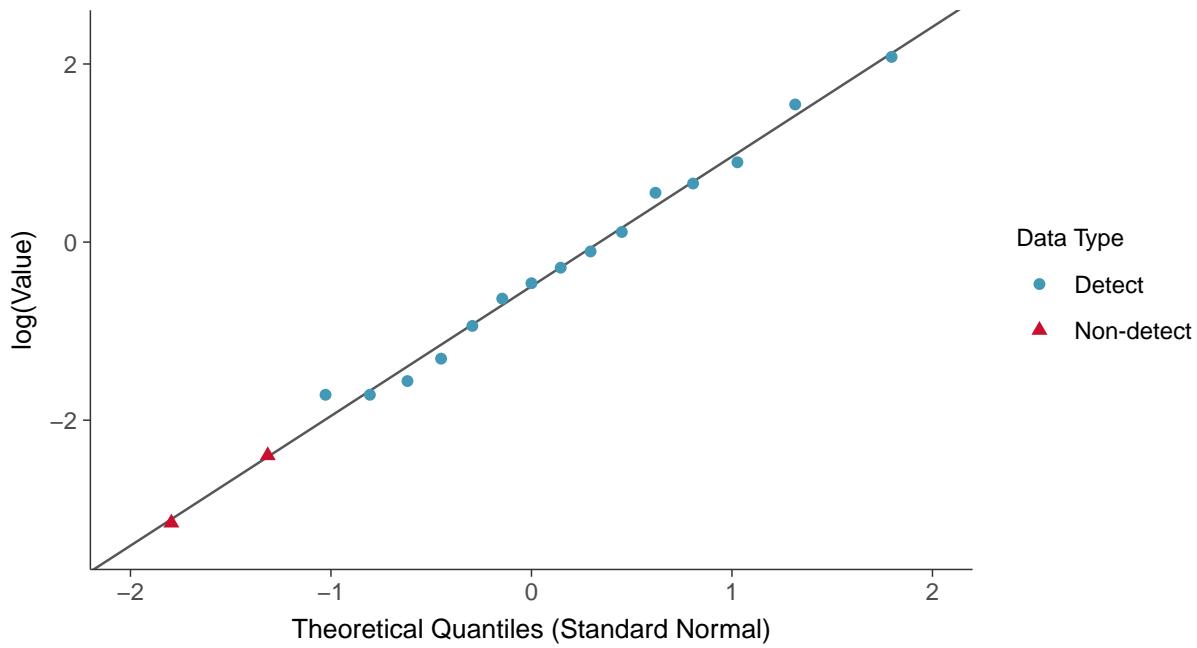
Iron, MW-5 (mg/L)





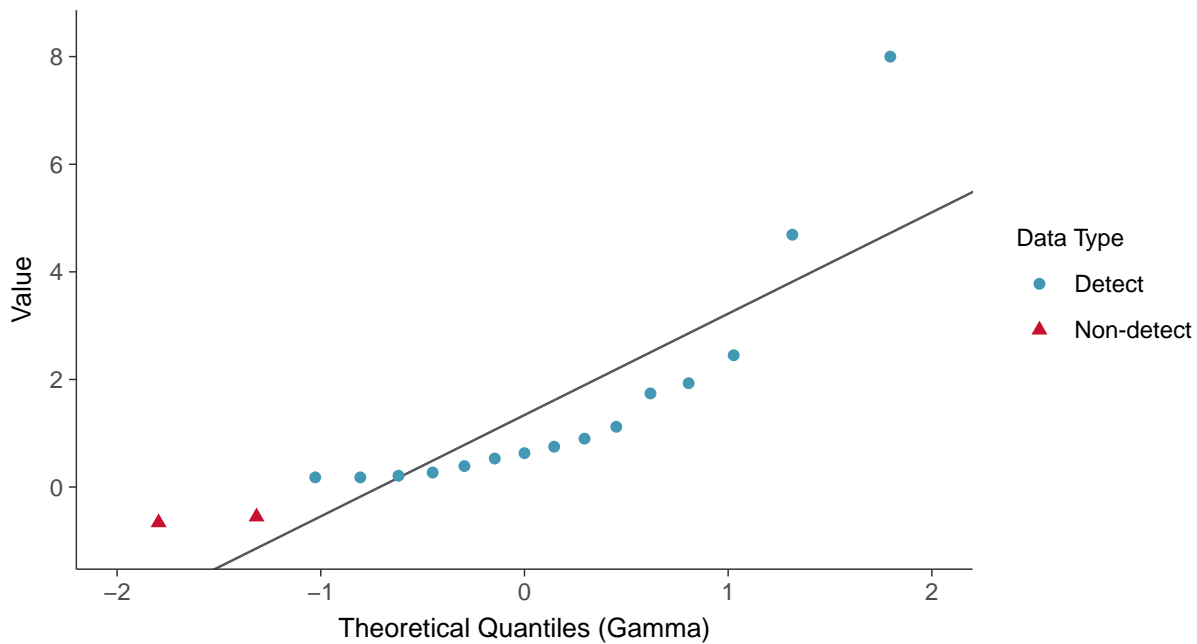
Lognormal Q-Q plot using ROS Imputed Estimates

Iron, MW-5 (mg/L)



Gamma Q-Q plot using ROS Imputed Estimates

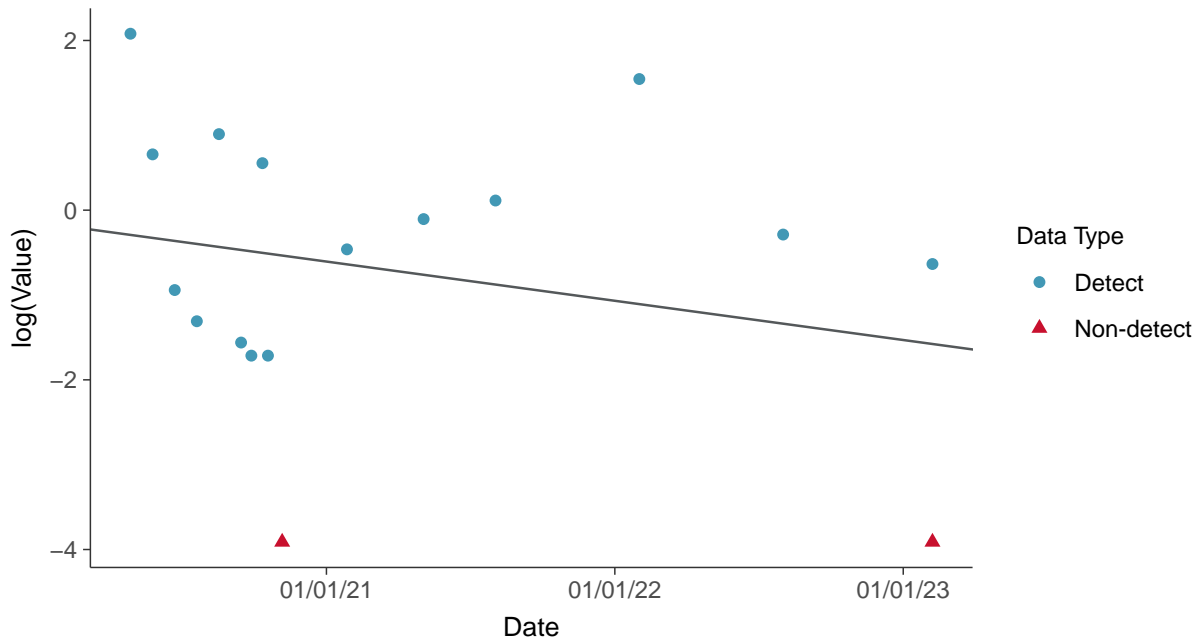
Iron, MW-5 (mg/L)





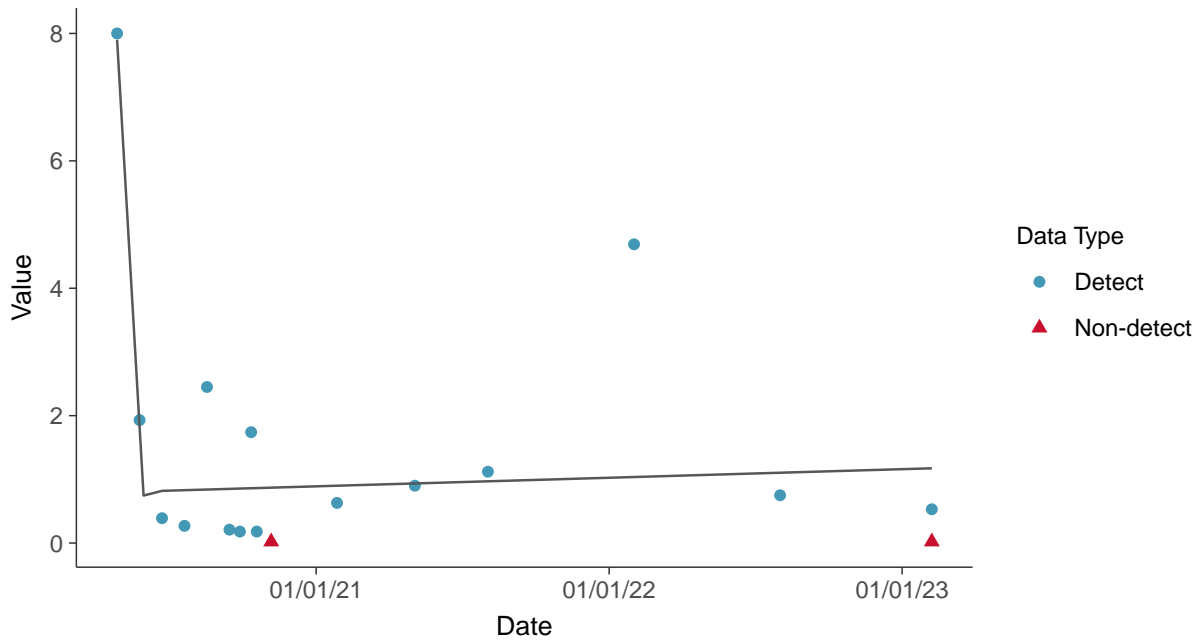
Trend Regression: Lognormal MLE

Iron, MW-5 (mg/L)



Trend Regression: Piecewise Linear-Linear

Iron, MW-5 (mg/L)



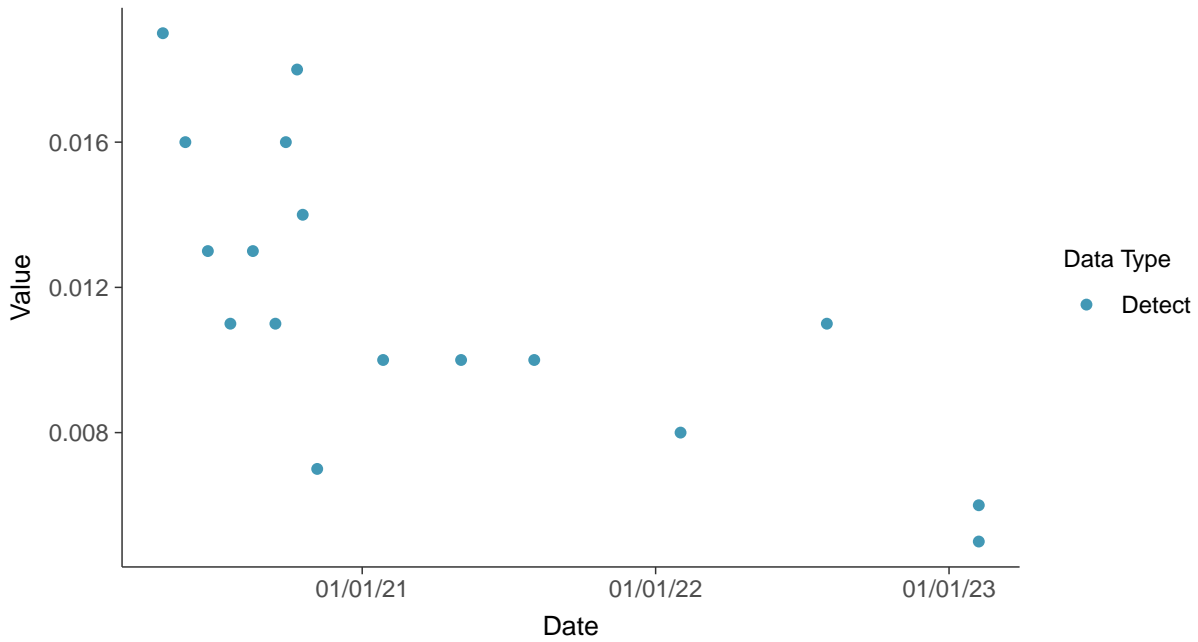


Part 115: Nickel, MW-5

ID: 05_5_39

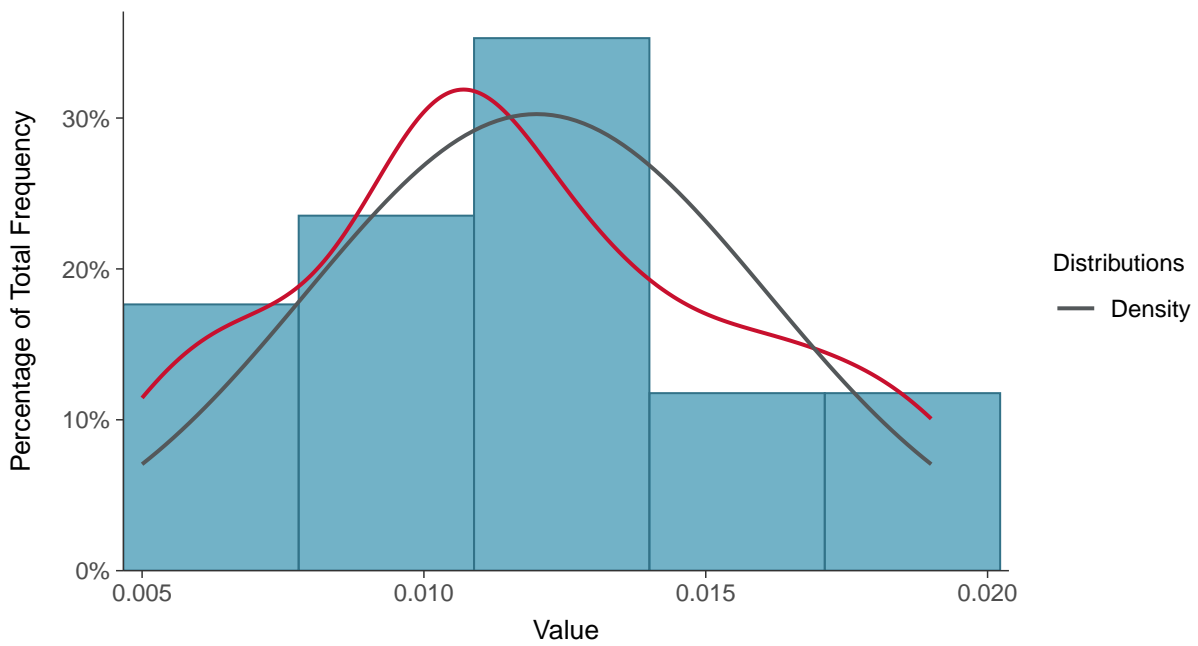
Scatter Plot

Nickel, MW-5 (mg/L)



Histogram

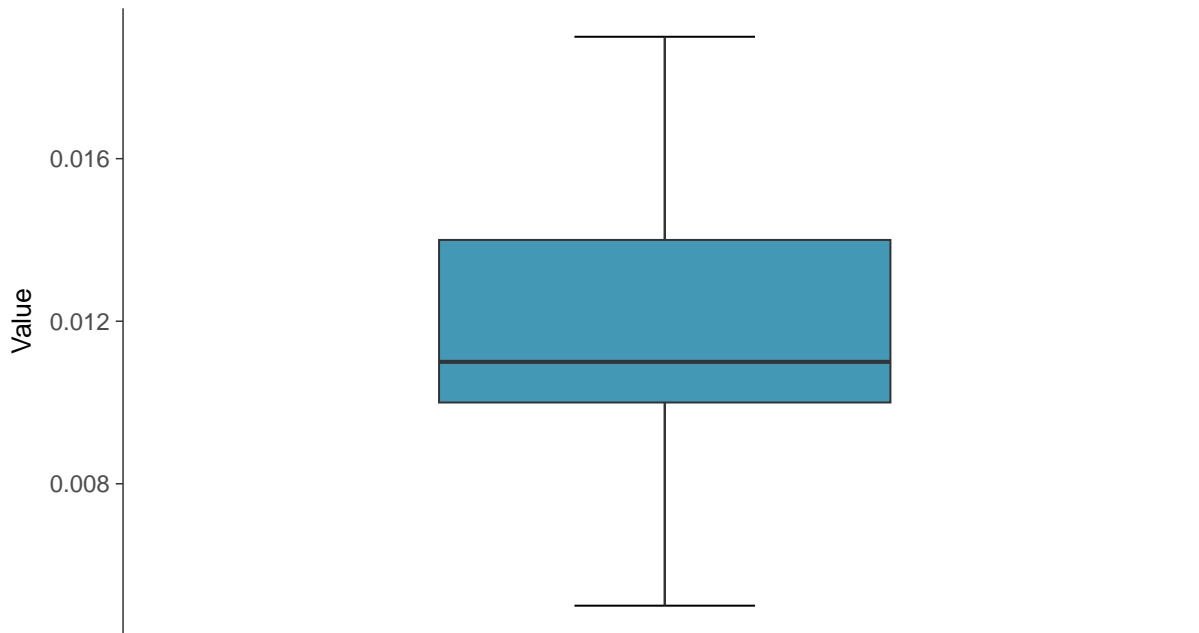
Nickel, MW-5 (mg/L)





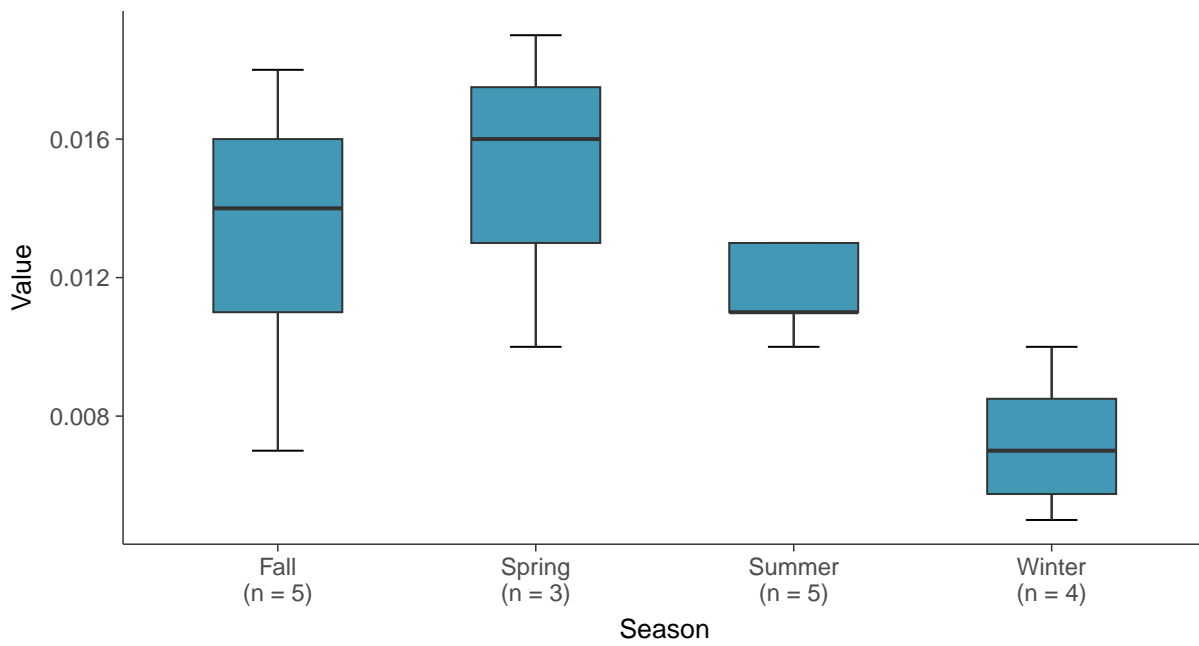
Boxplot

Nickel, MW-5 (mg/L)



Boxplot by Season

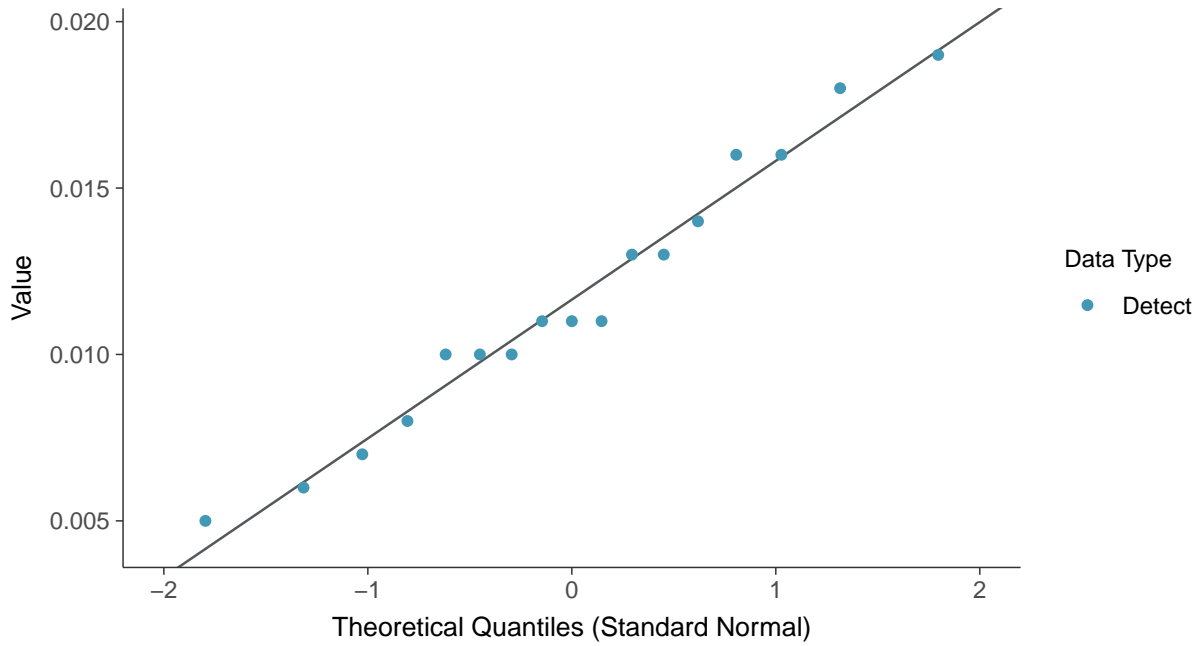
Nickel, MW-5 (mg/L)





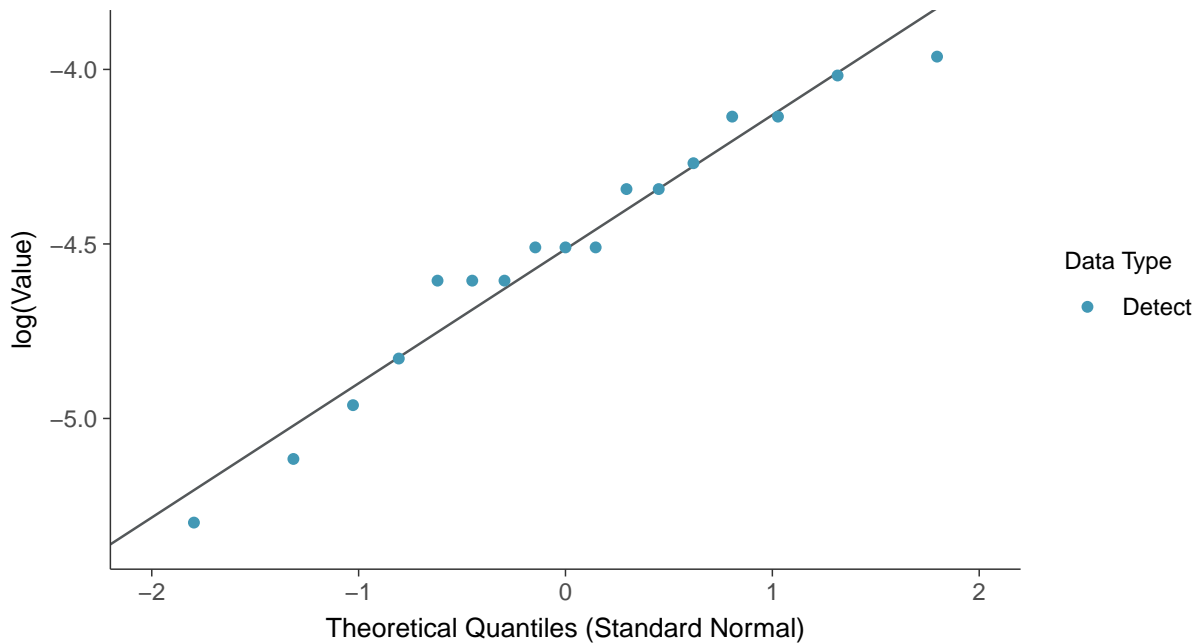
Normal Q-Q plot

Nickel, MW-5 (mg/L)



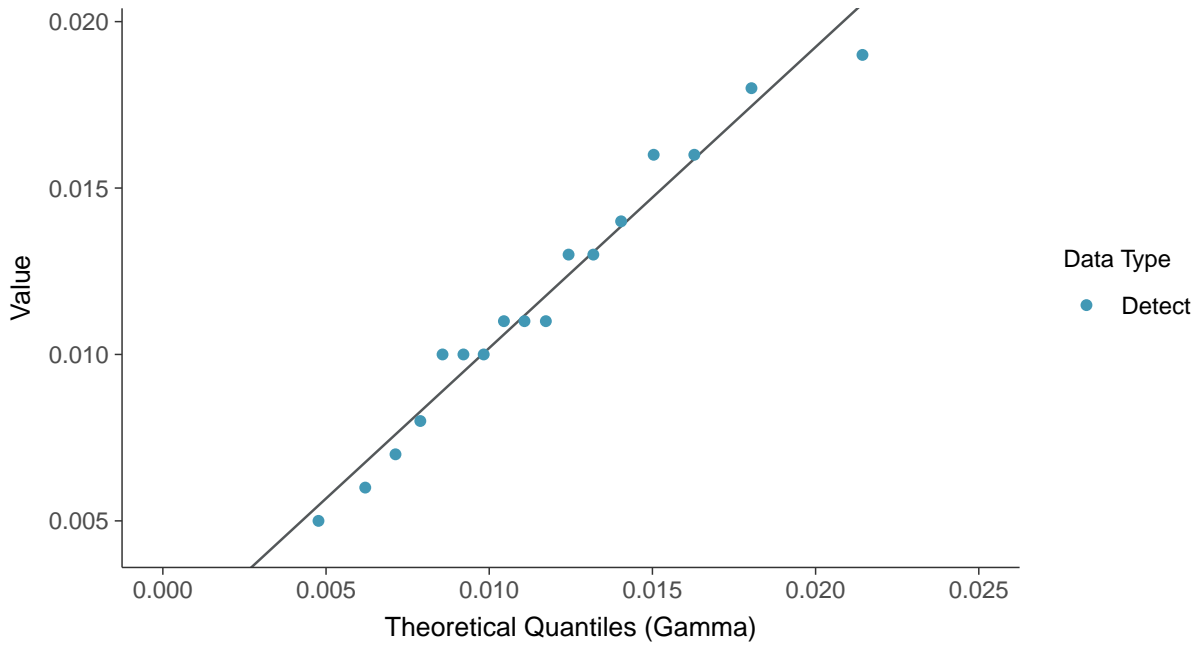
Lognormal Q-Q plot

Nickel, MW-5 (mg/L)

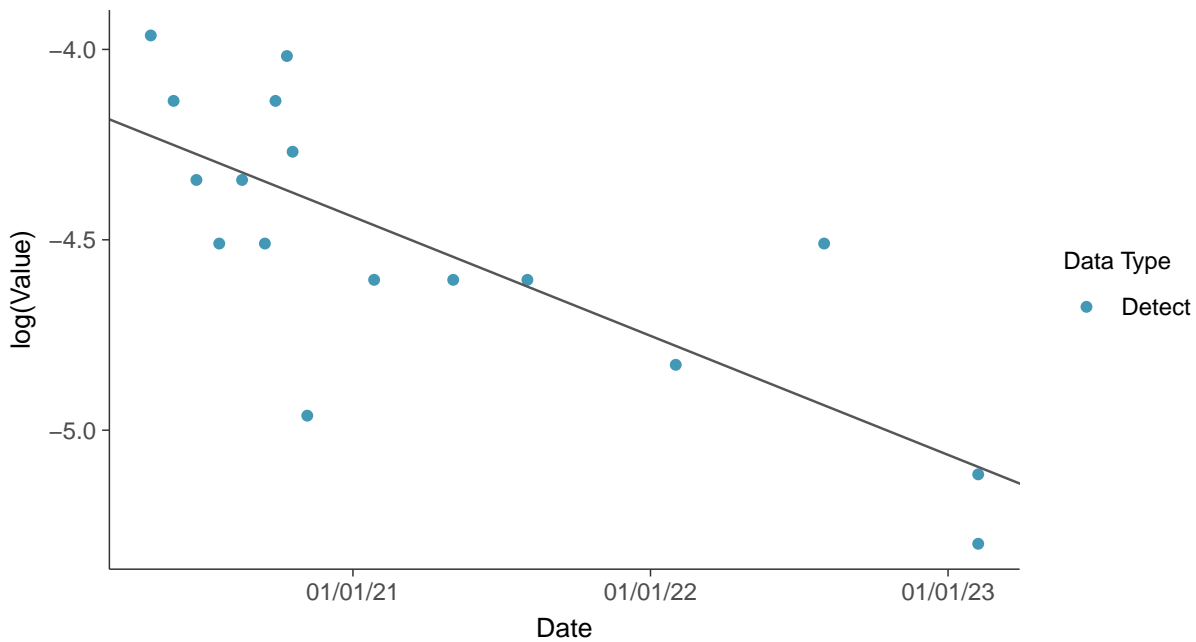




Gamma Q-Q plot
Nickel, MW-5 (mg/L)



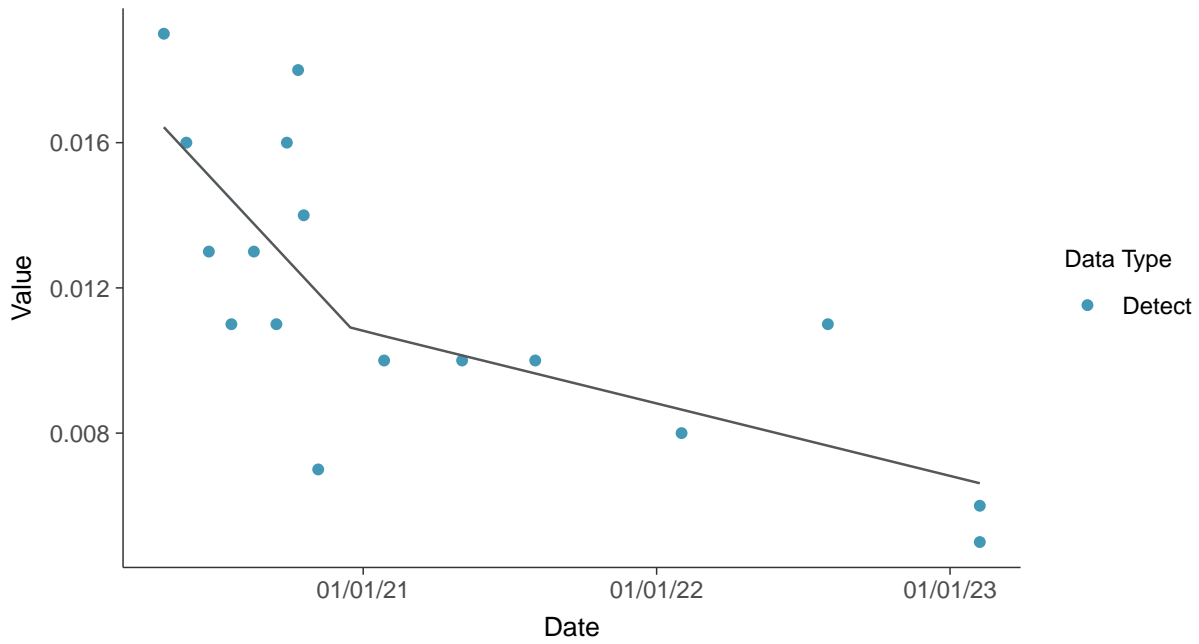
Trend Regression: Lognormal MLE
Nickel, MW-5 (mg/L)





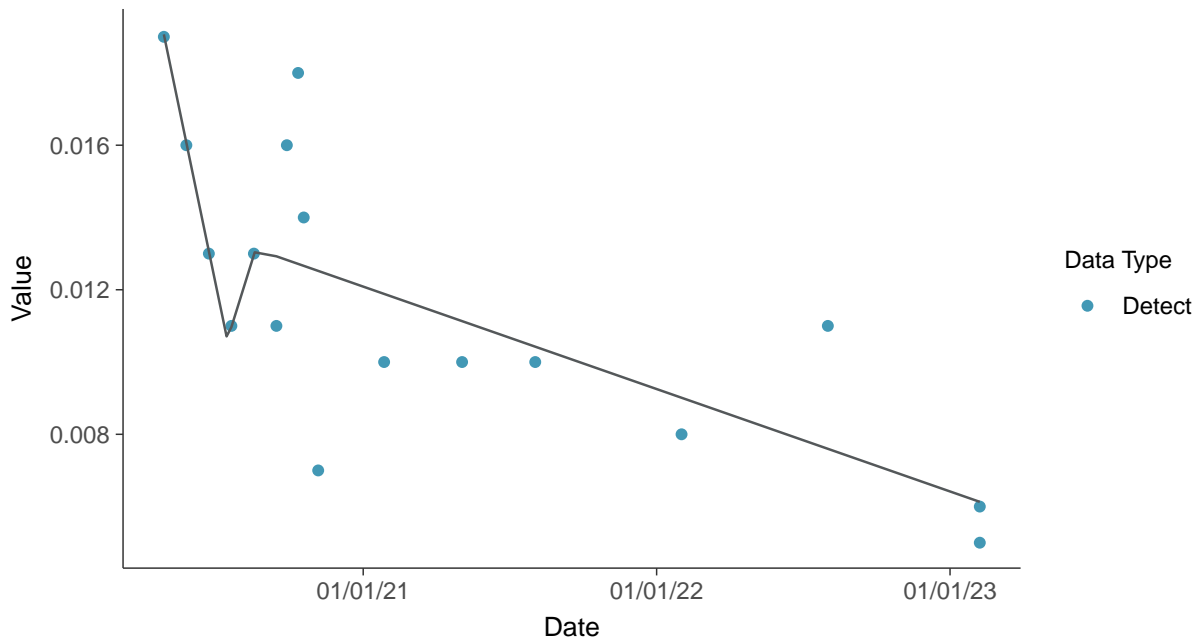
Trend Regression: Piecewise Linear-Linear

Nickel, MW-5 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

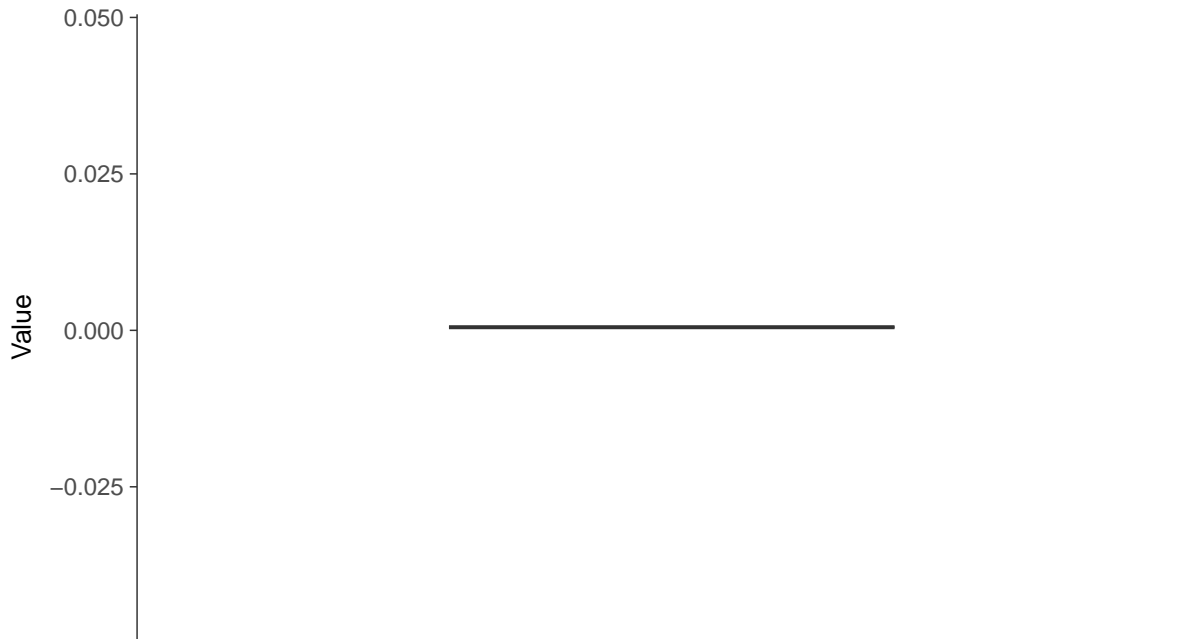
Nickel, MW-5 (mg/L)





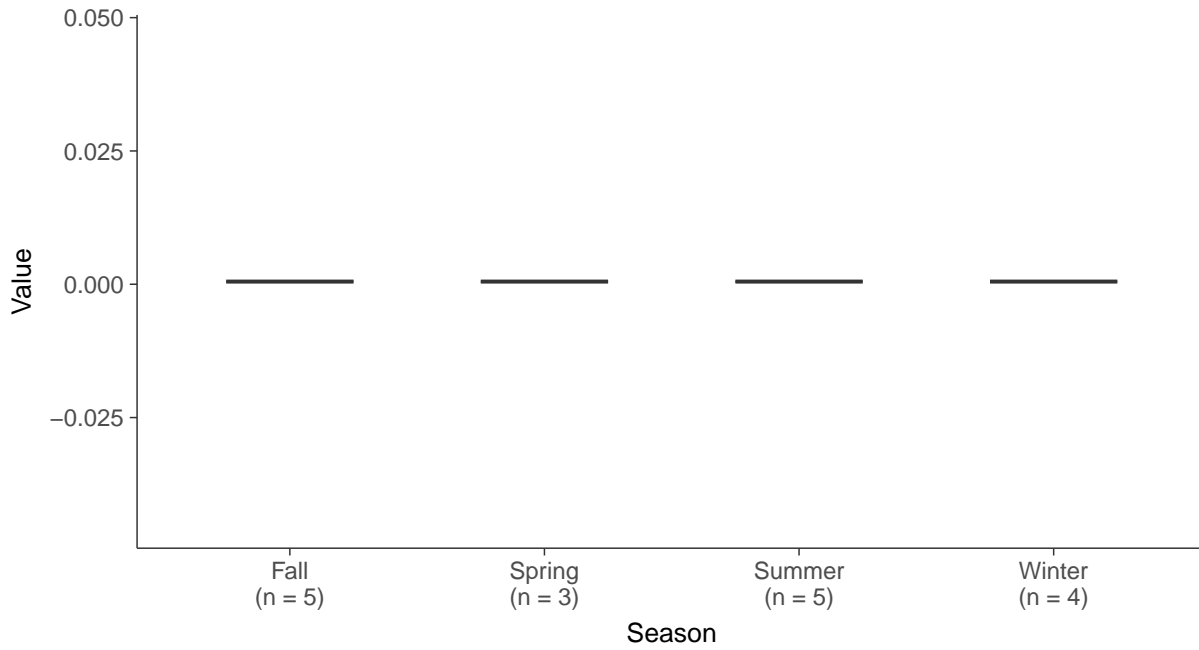
Boxplot

Silver, MW-5 (mg/L)



Boxplot by Season

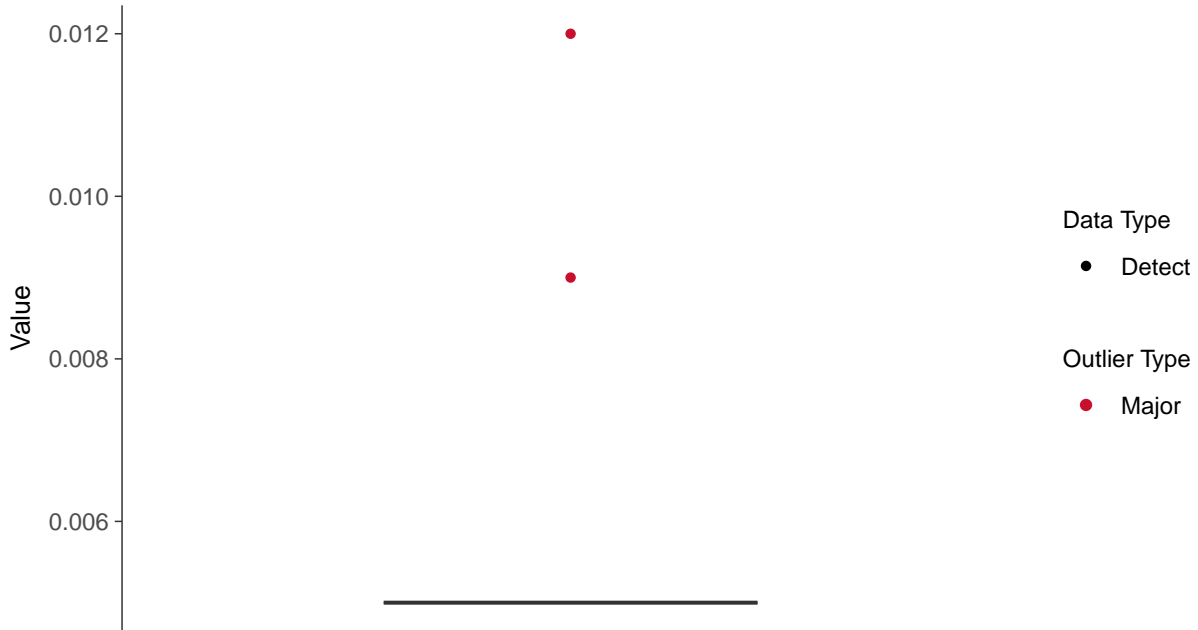
Silver, MW-5 (mg/L)





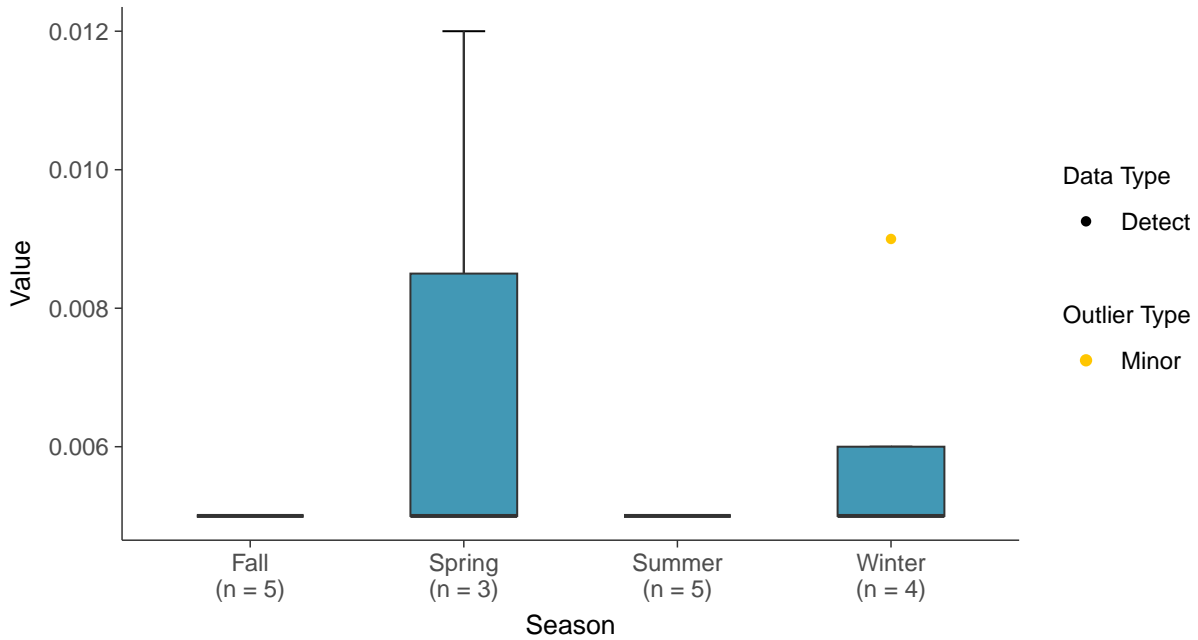
Boxplot

Vanadium, MW-5 (mg/L)



Boxplot by Season

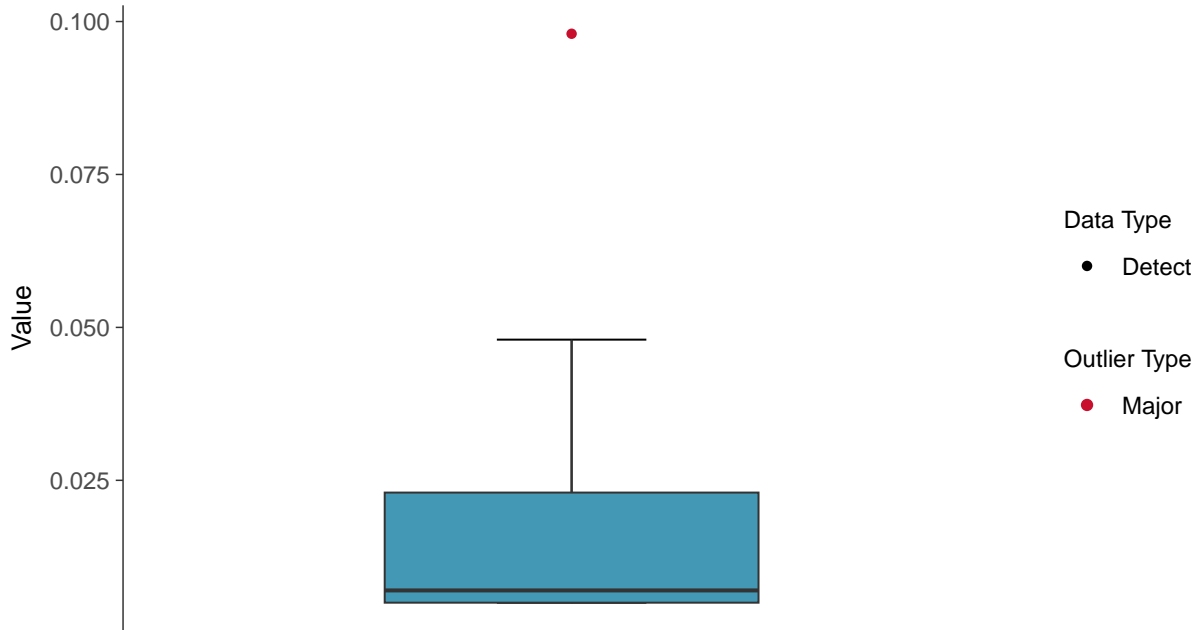
Vanadium, MW-5 (mg/L)





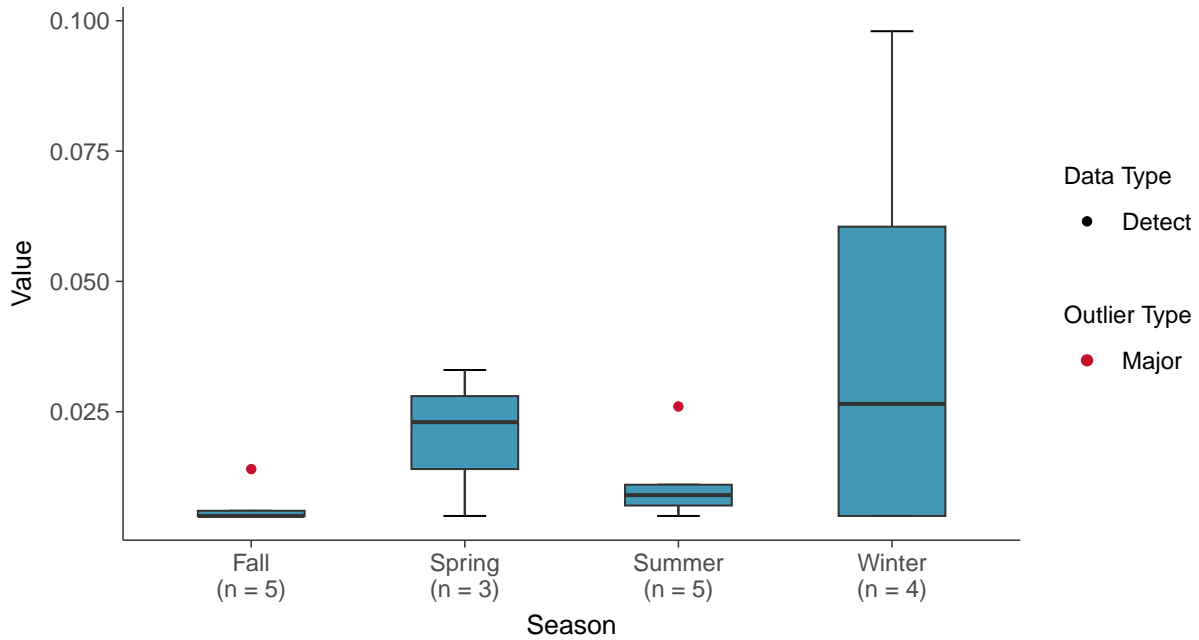
Boxplot

Zinc, MW-5 (mg/L)



Boxplot by Season

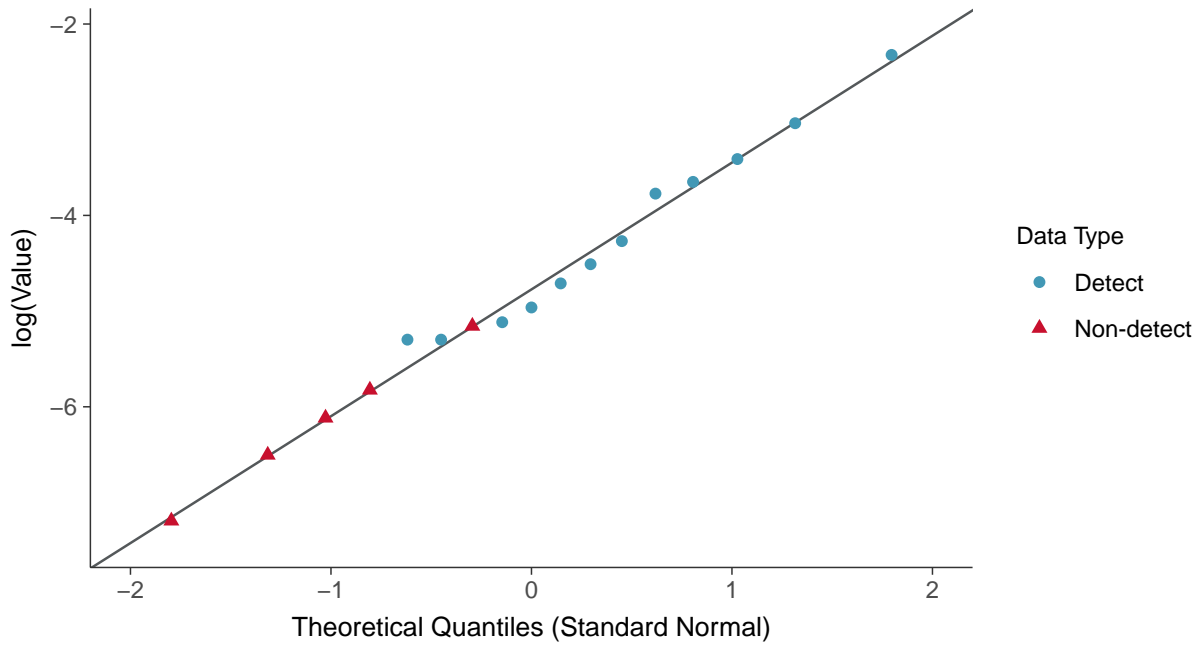
Zinc, MW-5 (mg/L)





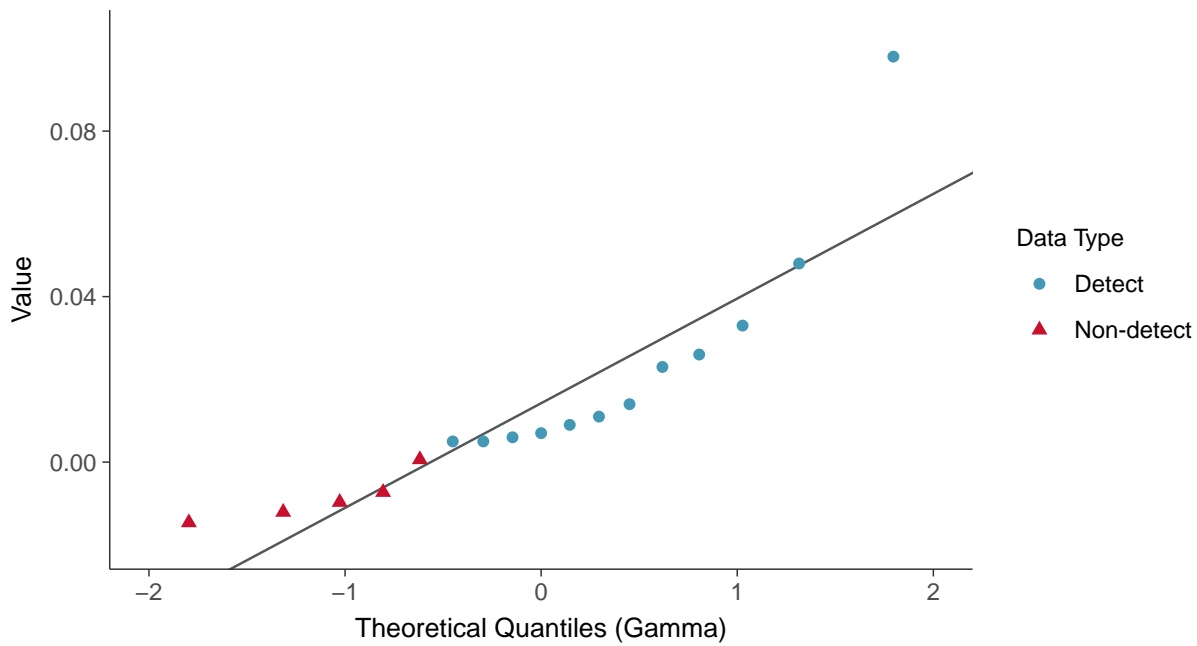
Lognormal Q-Q plot using ROS Imputed Estimates

Zinc, MW-5 (mg/L)



Gamma Q-Q plot using ROS Imputed Estimates

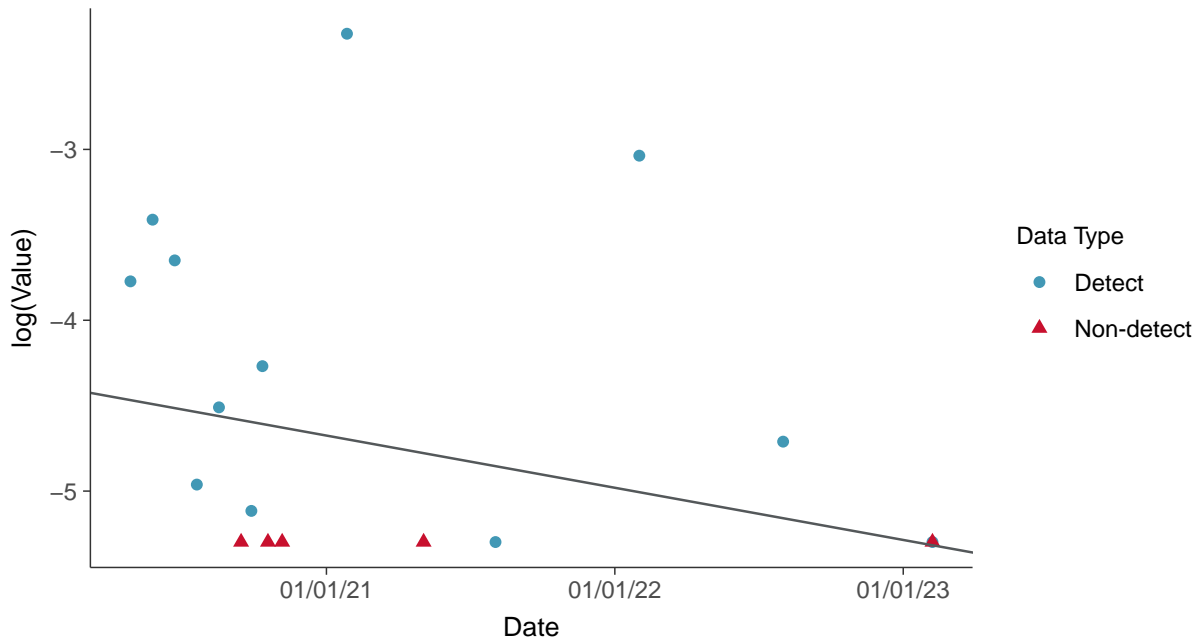
Zinc, MW-5 (mg/L)





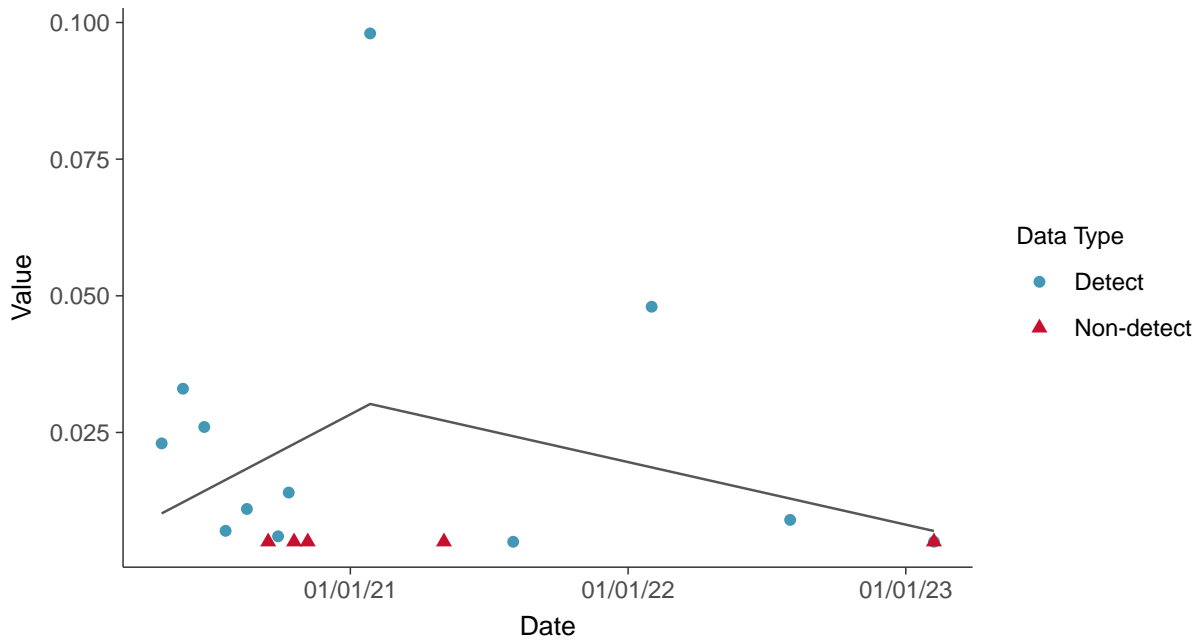
Trend Regression: Lognormal MLE

Zinc, MW-5 (mg/L)



Trend Regression: Piecewise Linear-Linear

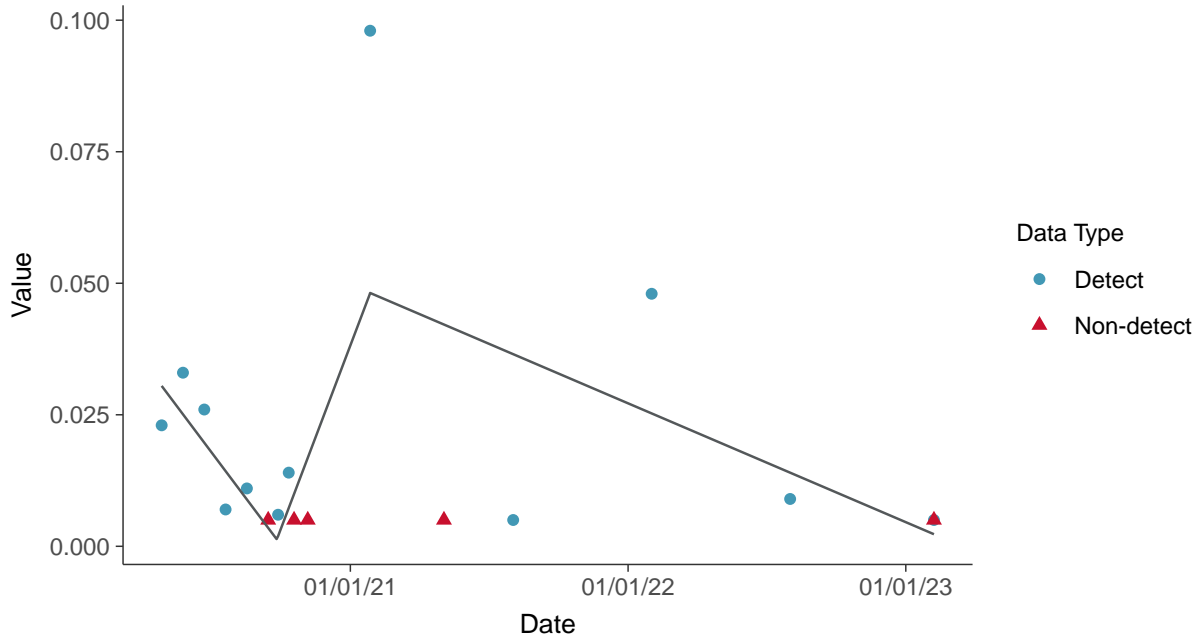
Zinc, MW-5 (mg/L)





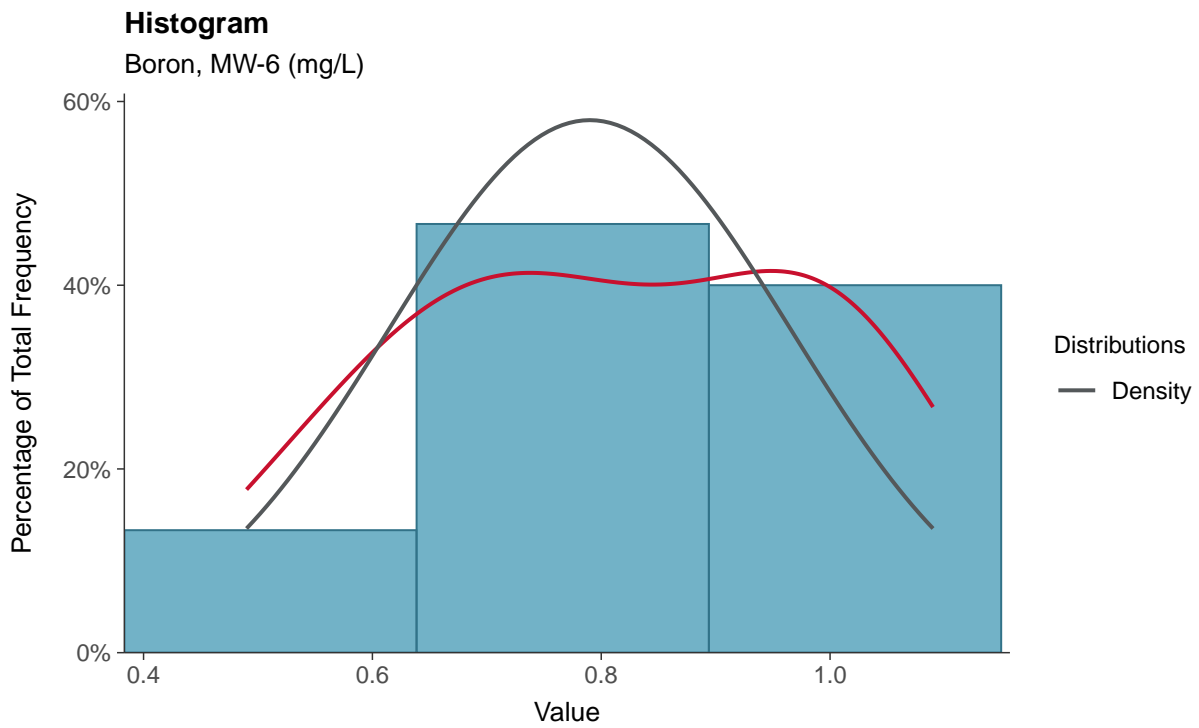
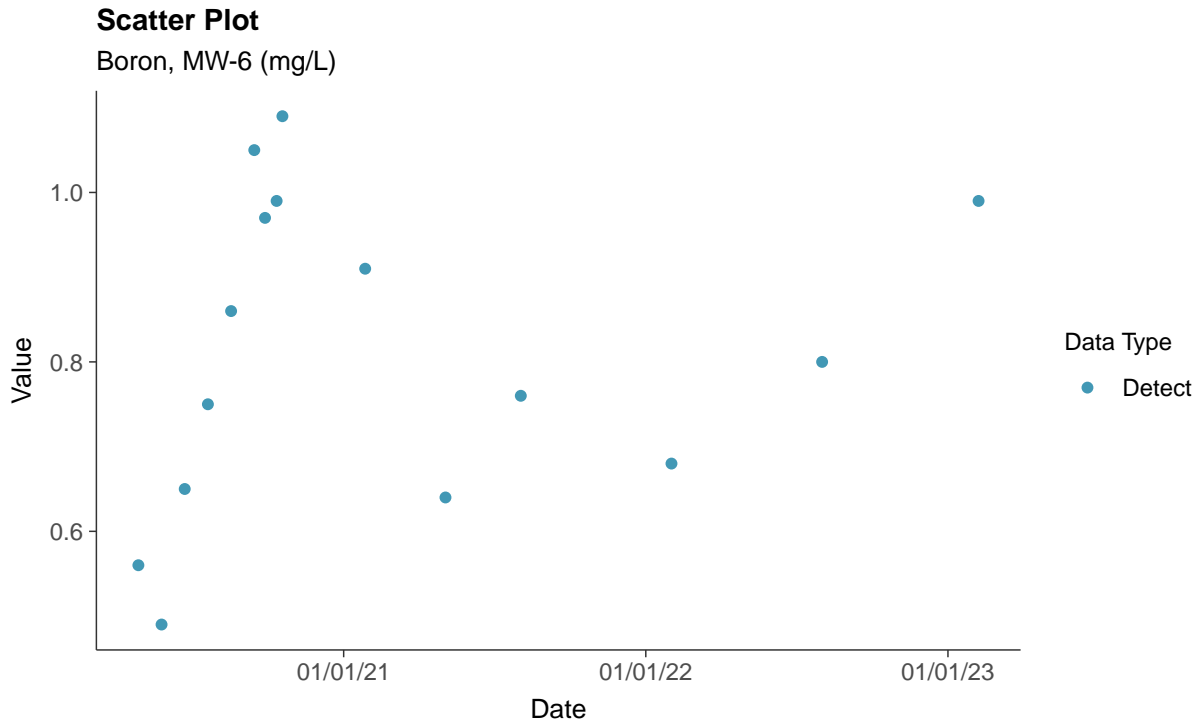
Trend Regression: Piecewise Linear-Linear-Linear

Zinc, MW-5 (mg/L)



Appendix III: Boron, MW-6

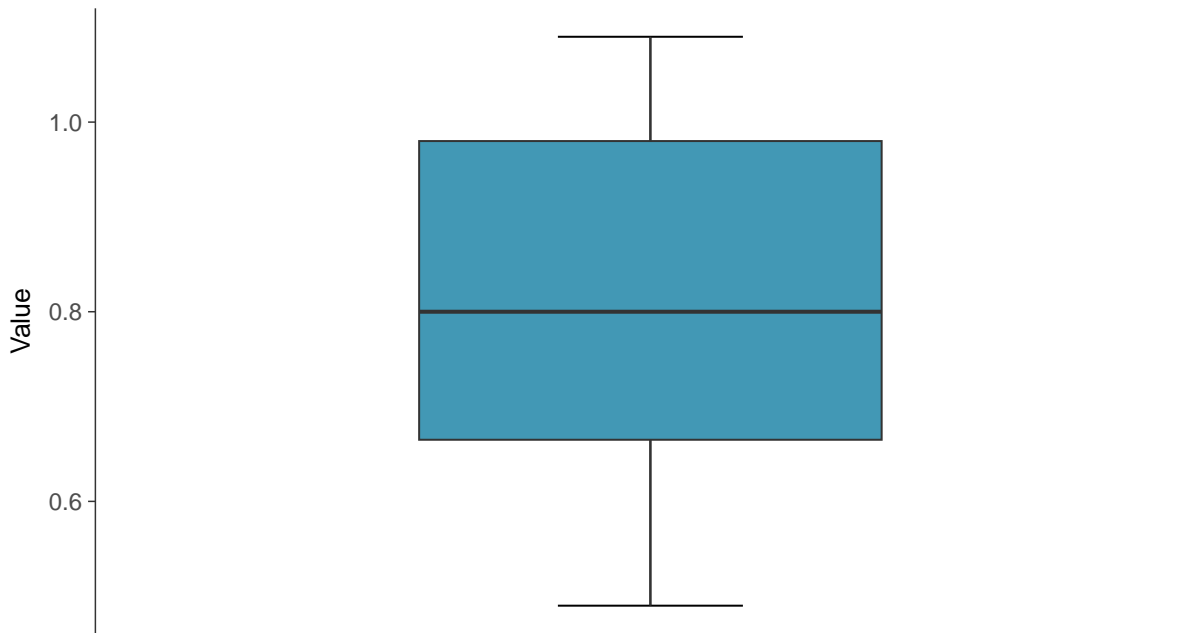
ID: 06_1_01





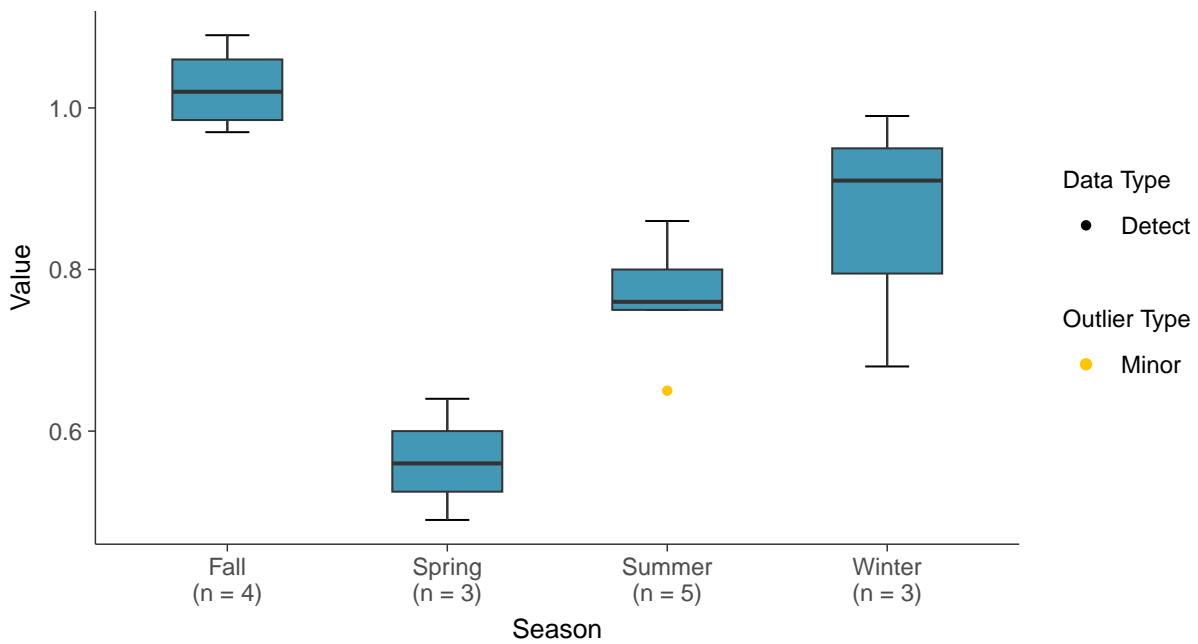
Boxplot

Boron, MW-6 (mg/L)



Boxplot by Season

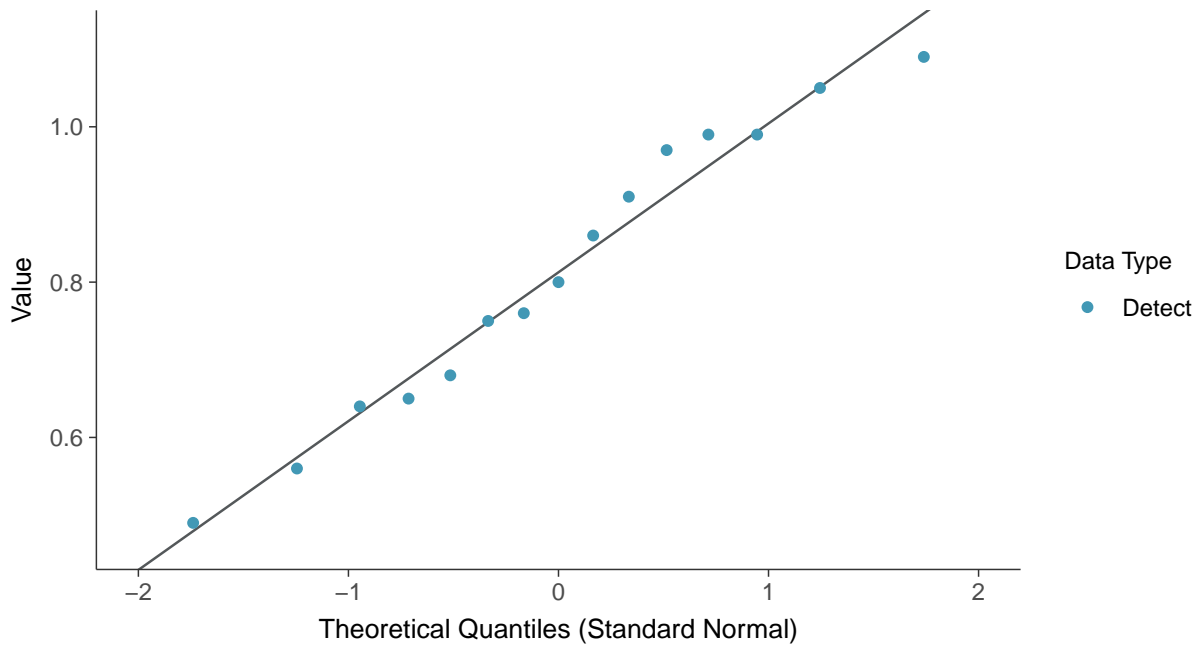
Boron, MW-6 (mg/L)





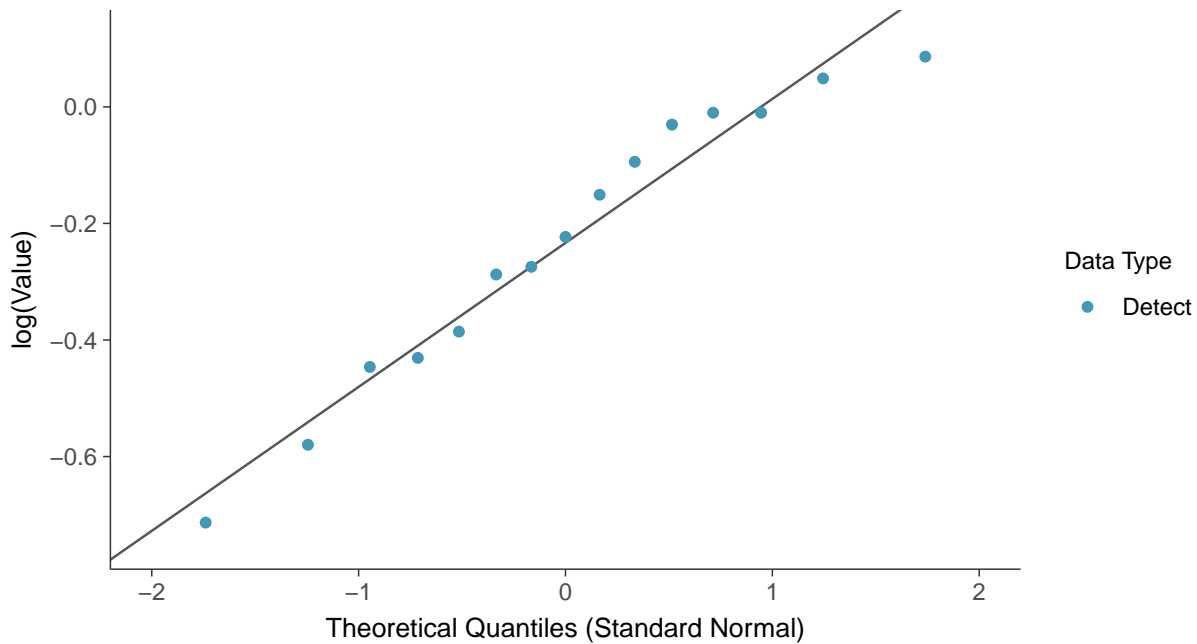
Normal Q-Q plot

Boron, MW-6 (mg/L)



Lognormal Q-Q plot

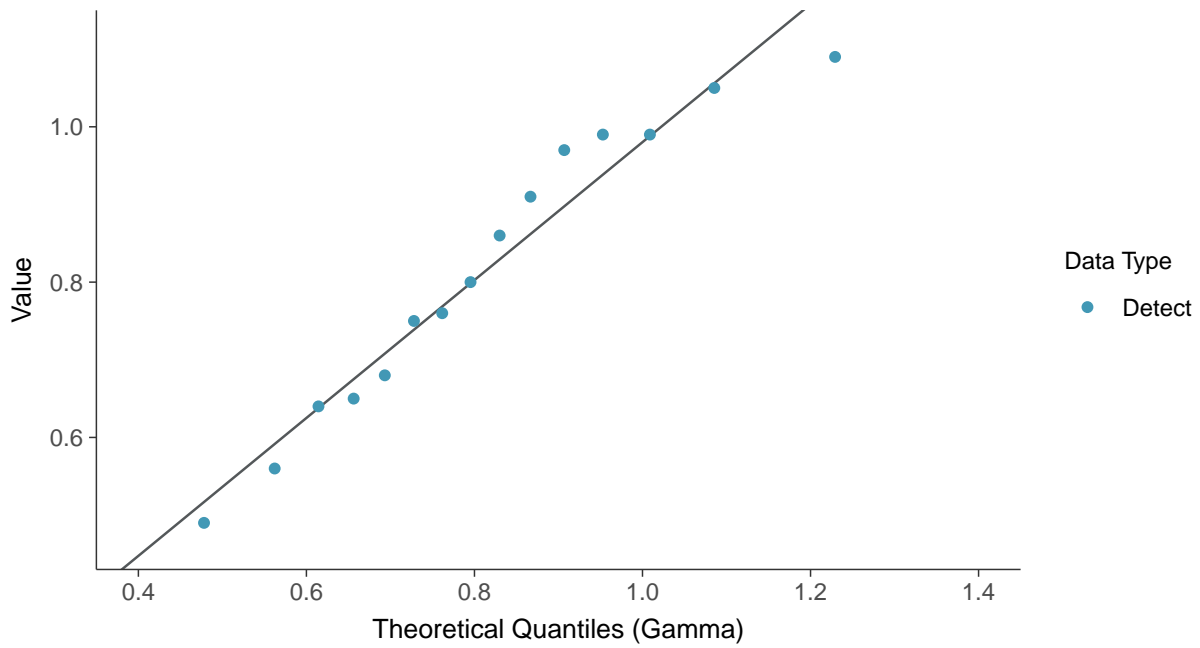
Boron, MW-6 (mg/L)





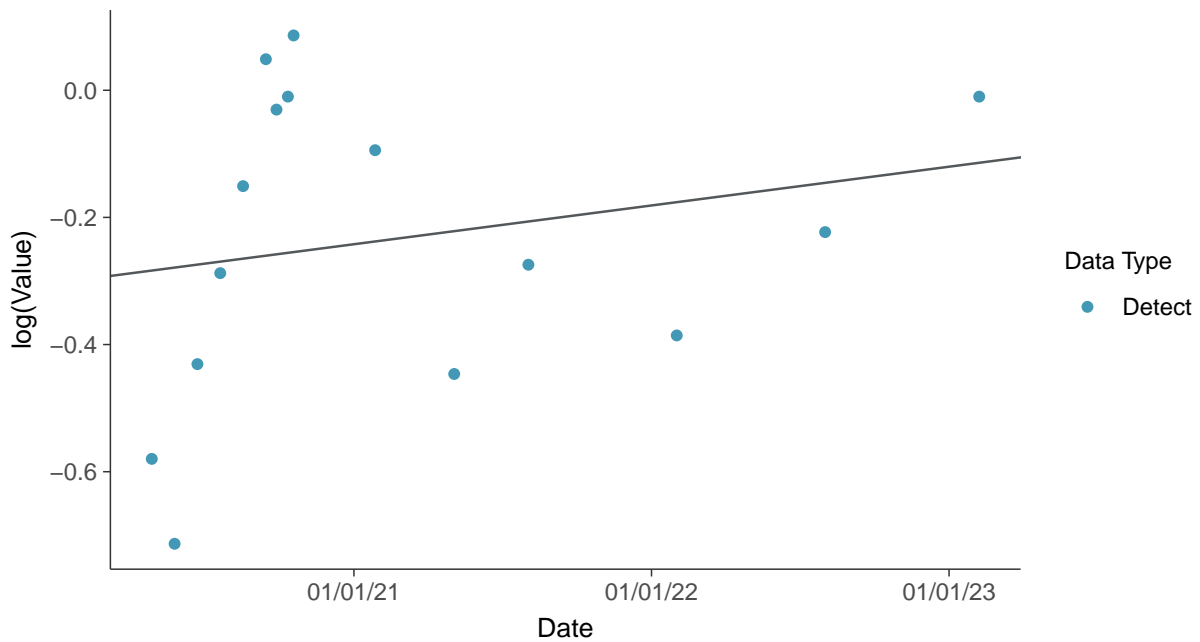
Gamma Q-Q plot

Boron, MW-6 (mg/L)



Trend Regression: Lognormal MLE

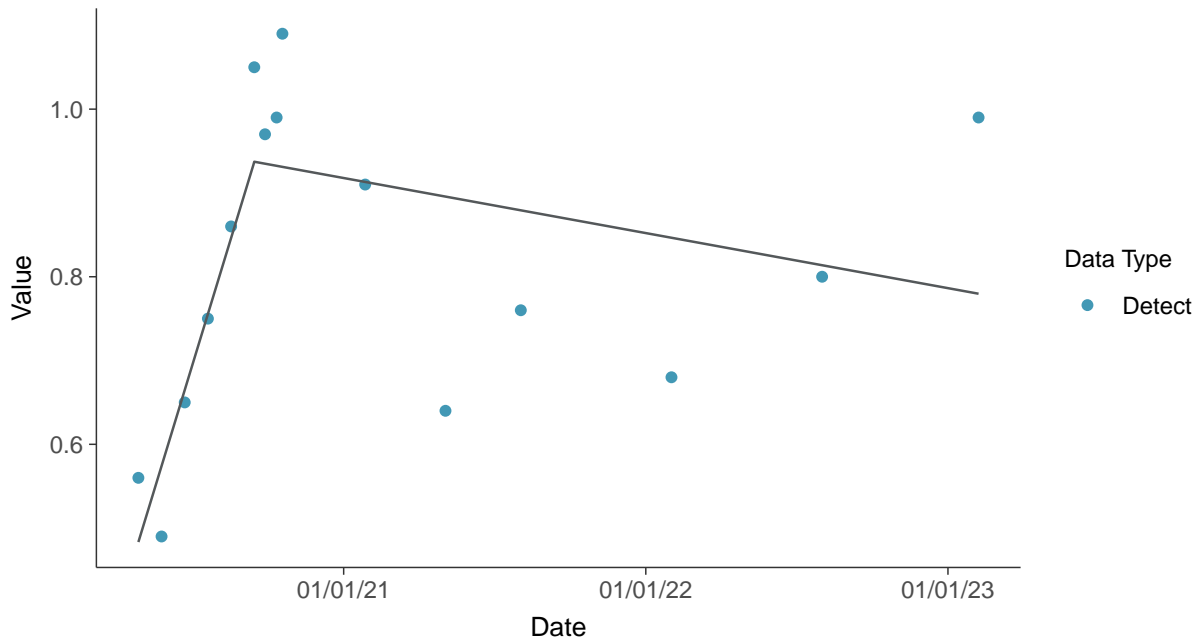
Boron, MW-6 (mg/L)





Trend Regression: Piecewise Linear-Linear

Boron, MW-6 (mg/L)



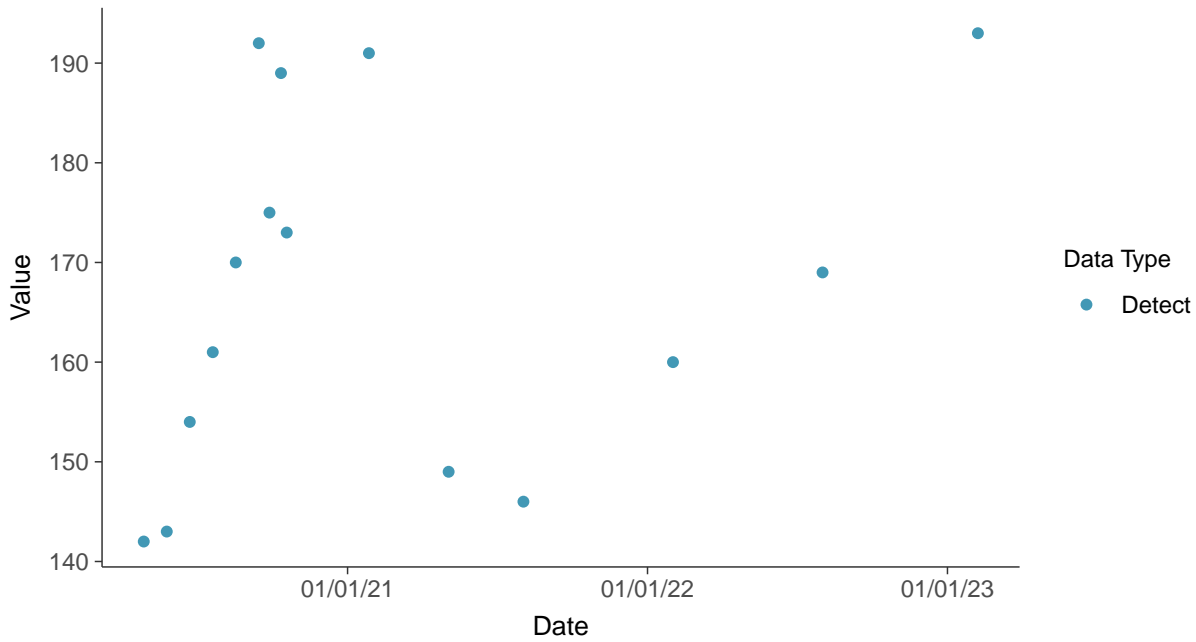


Appendix III: Calcium, MW-6

ID: 06_1_02

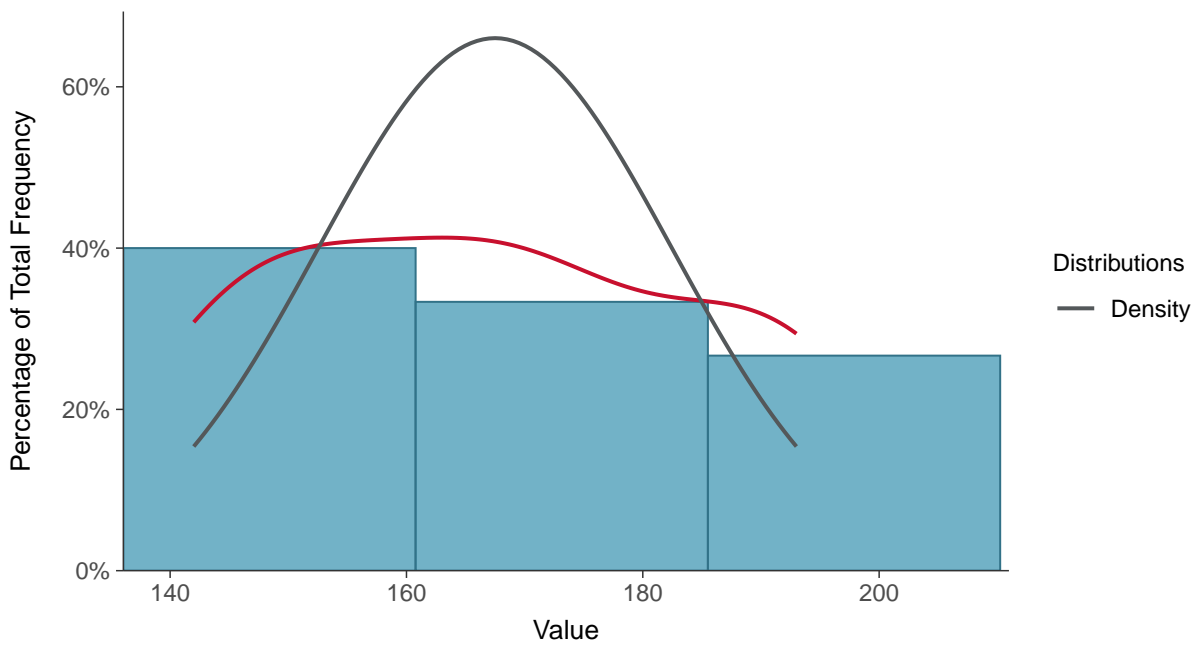
Scatter Plot

Calcium, MW-6 (mg/L)



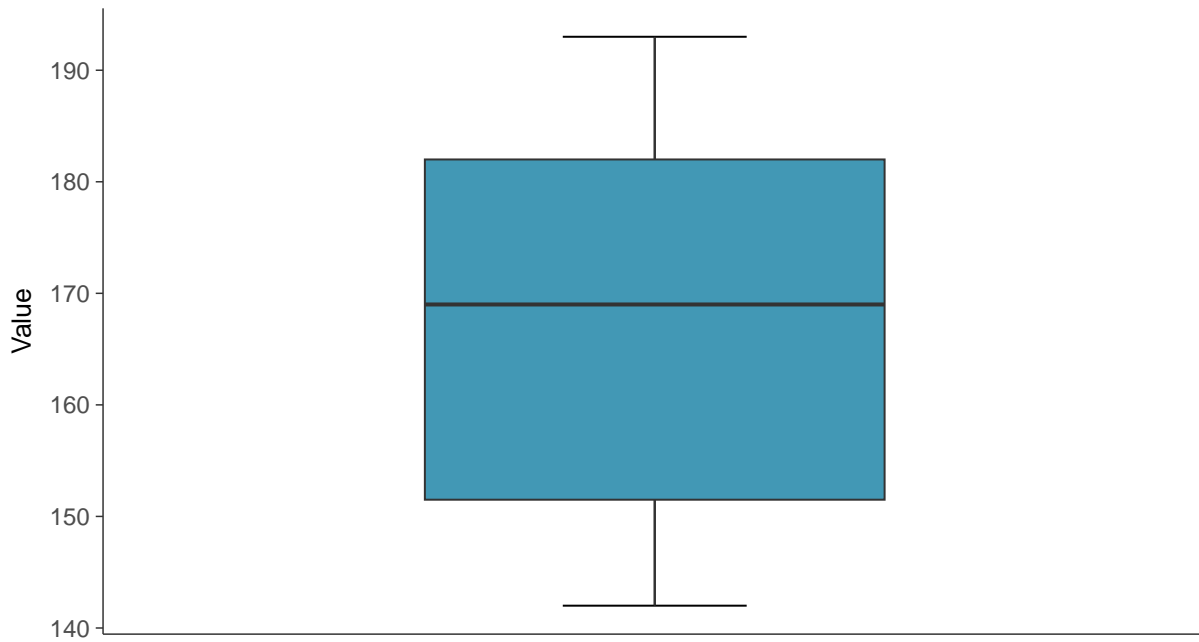
Histogram

Calcium, MW-6 (mg/L)



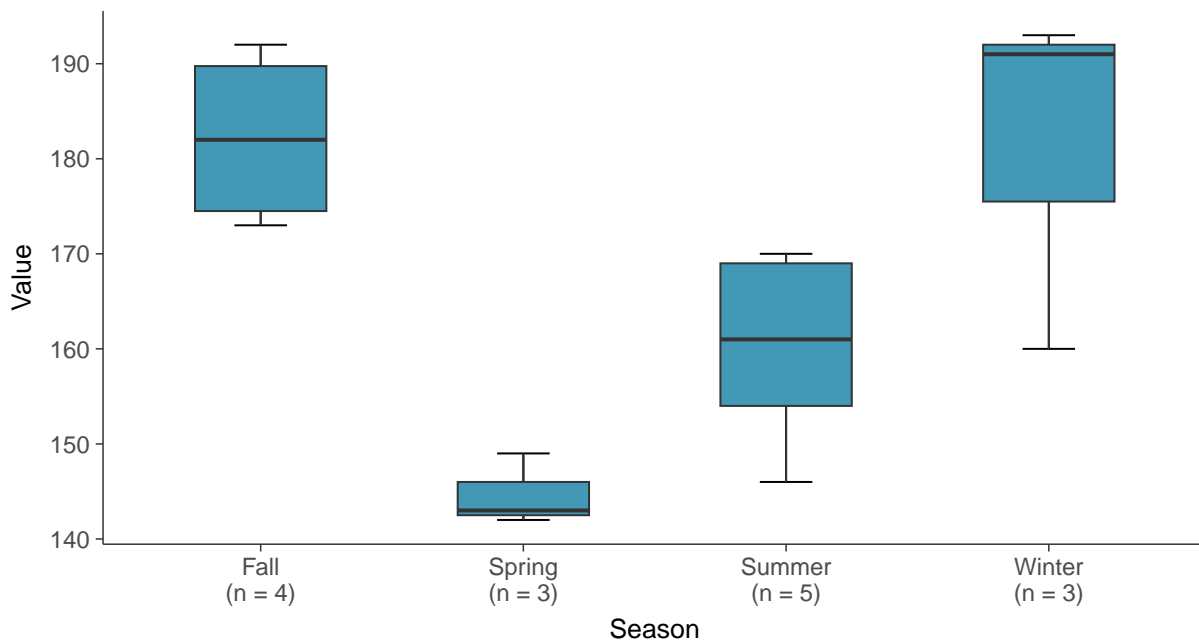
Boxplot

Calcium, MW-6 (mg/L)



Boxplot by Season

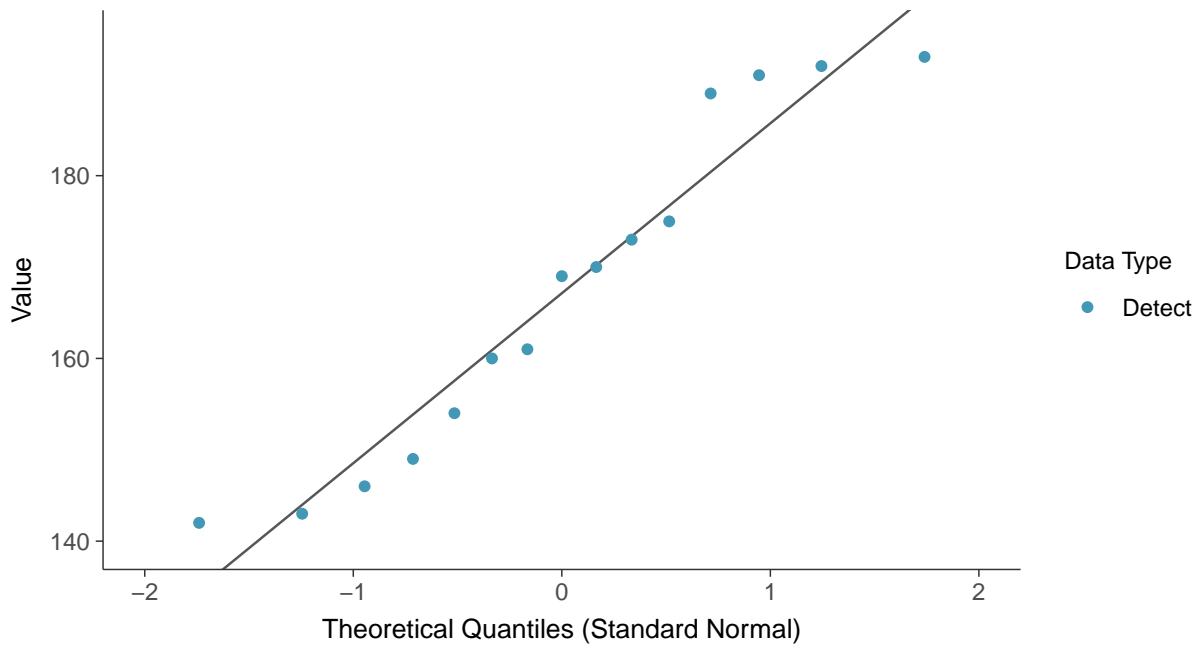
Calcium, MW-6 (mg/L)





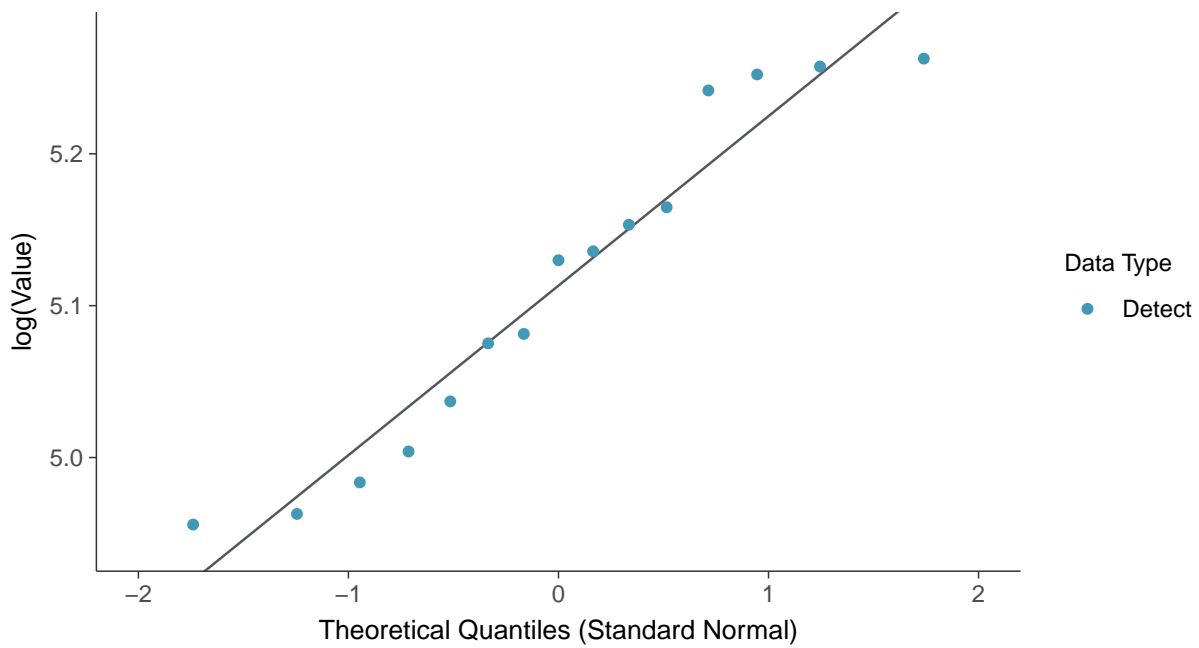
Normal Q-Q plot

Calcium, MW-6 (mg/L)



Lognormal Q-Q plot

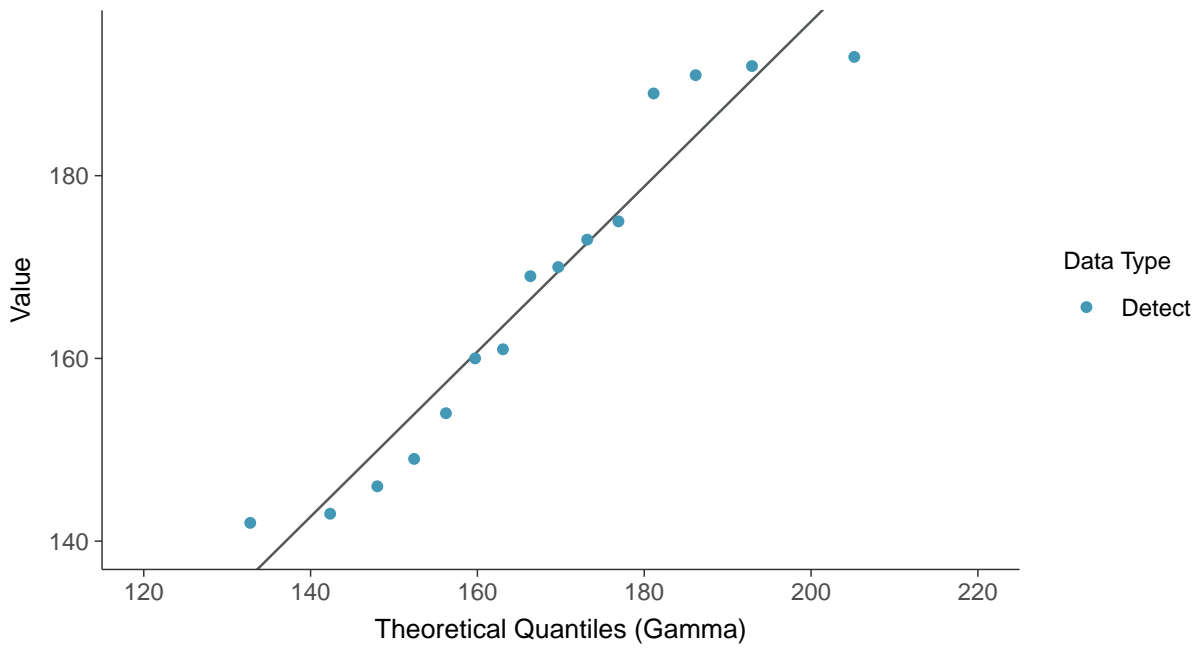
Calcium, MW-6 (mg/L)





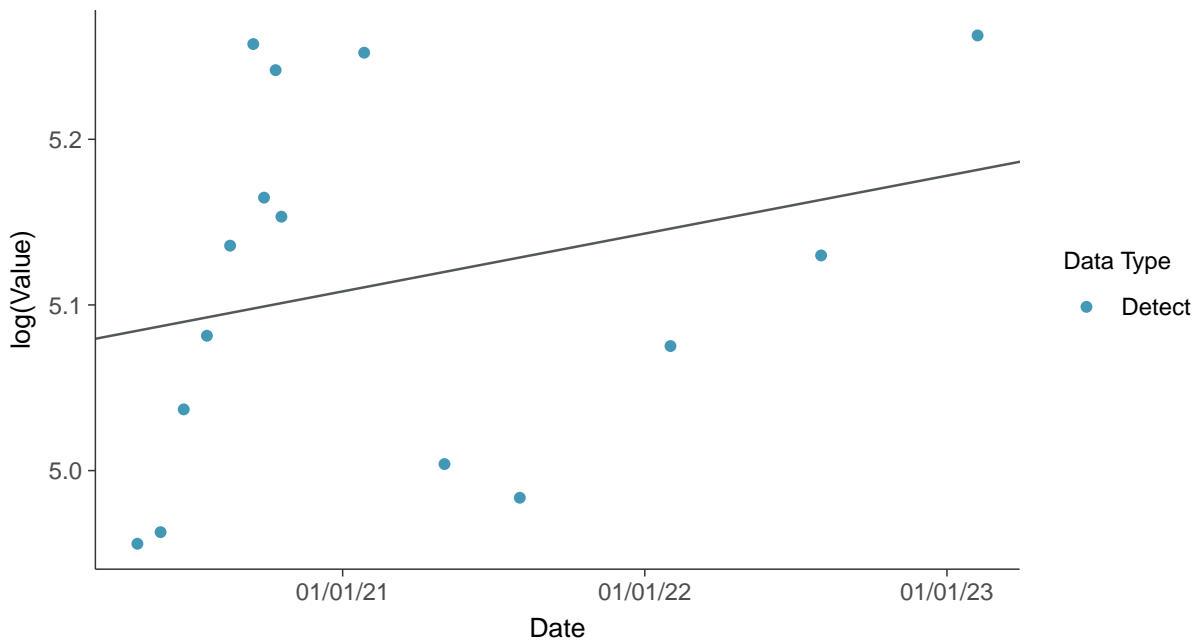
Gamma Q-Q plot

Calcium, MW-6 (mg/L)



Trend Regression: Lognormal MLE

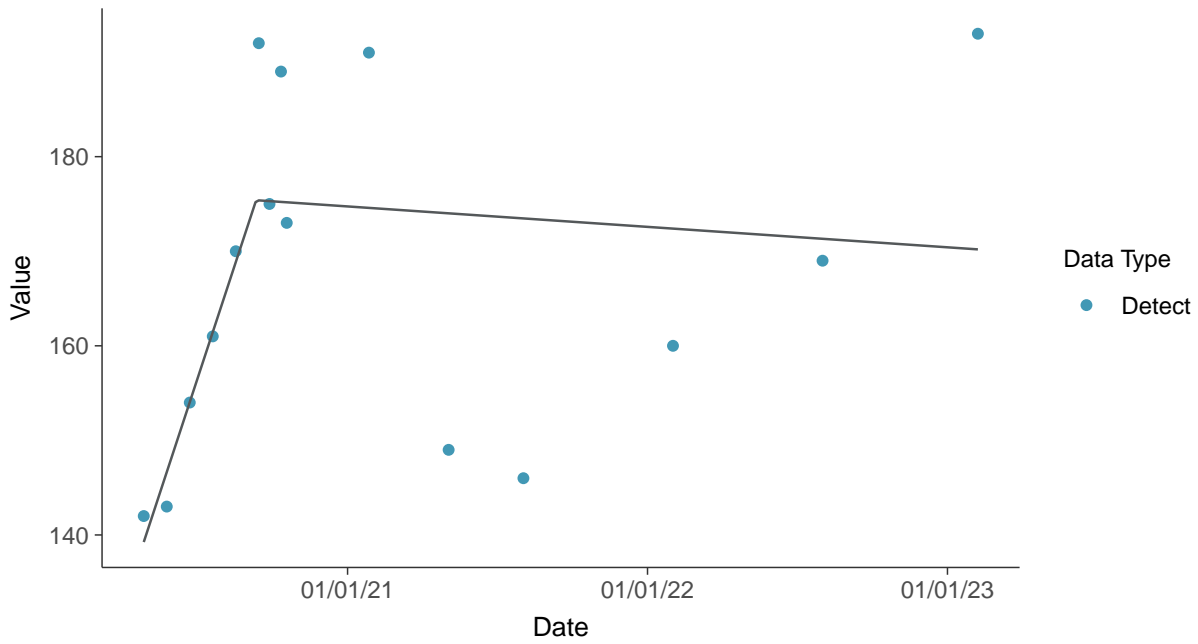
Calcium, MW-6 (mg/L)





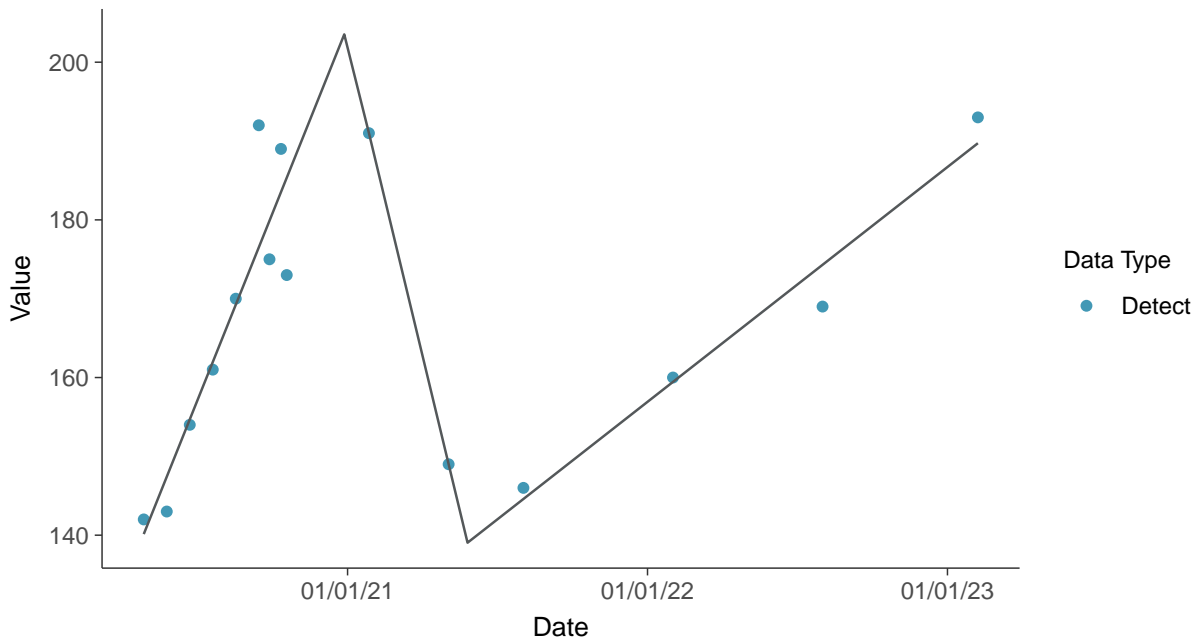
Trend Regression: Piecewise Linear-Linear

Calcium, MW-6 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Calcium, MW-6 (mg/L)



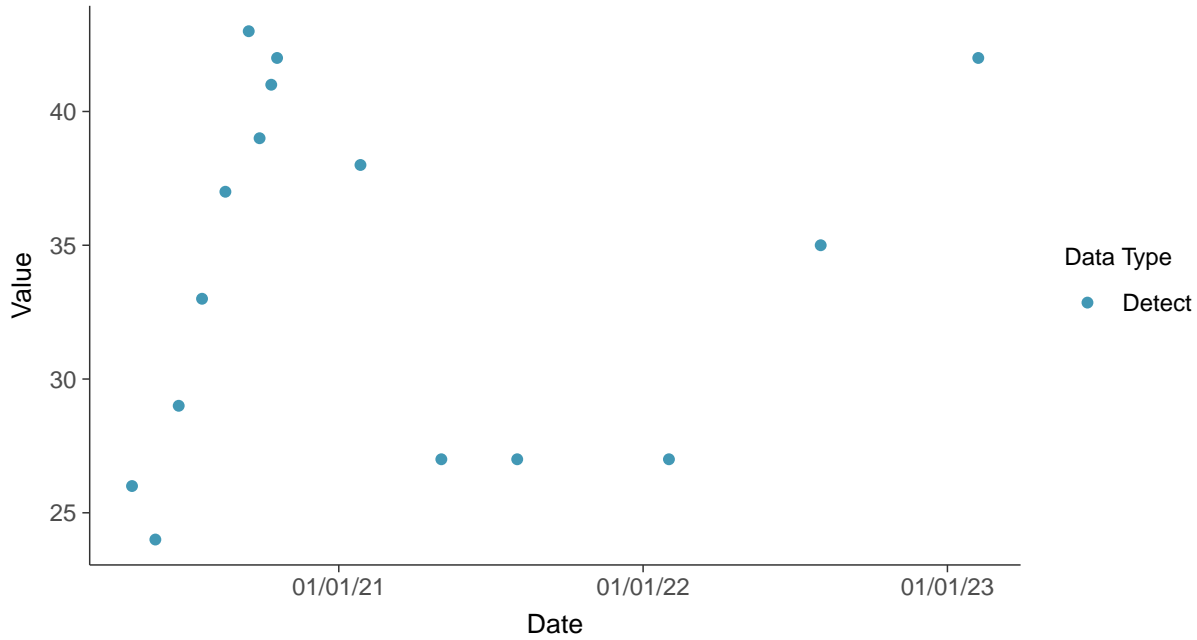


Appendix III: Chloride, MW-6

ID: 06_1_03

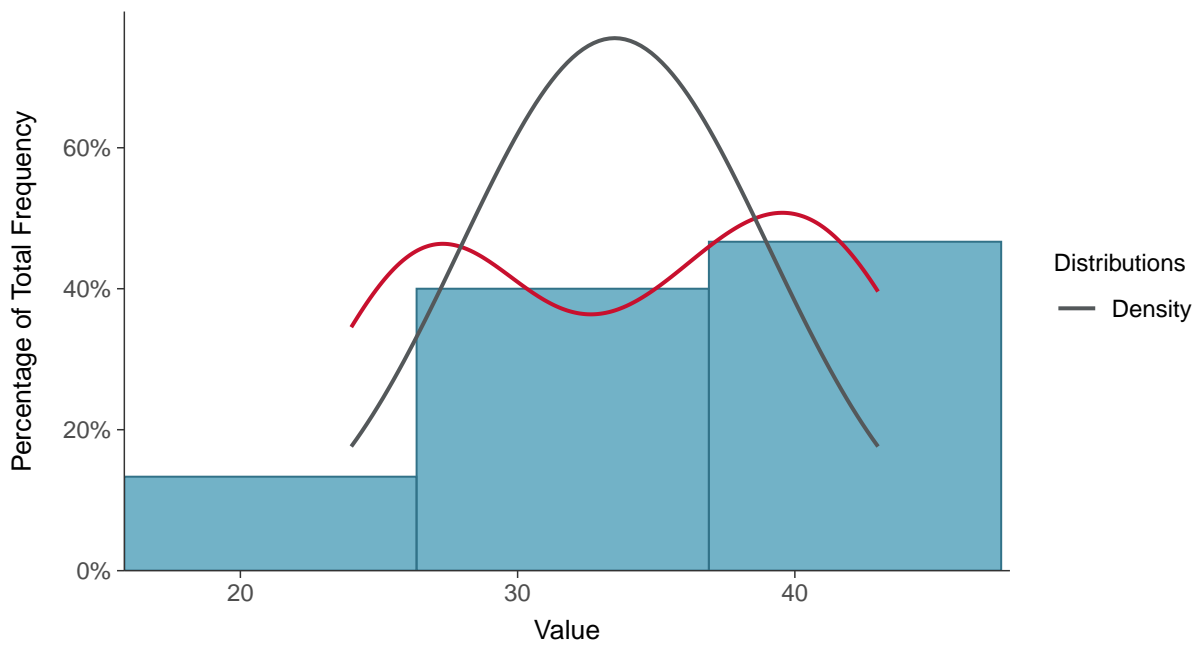
Scatter Plot

Chloride, MW-6 (mg/L)



Histogram

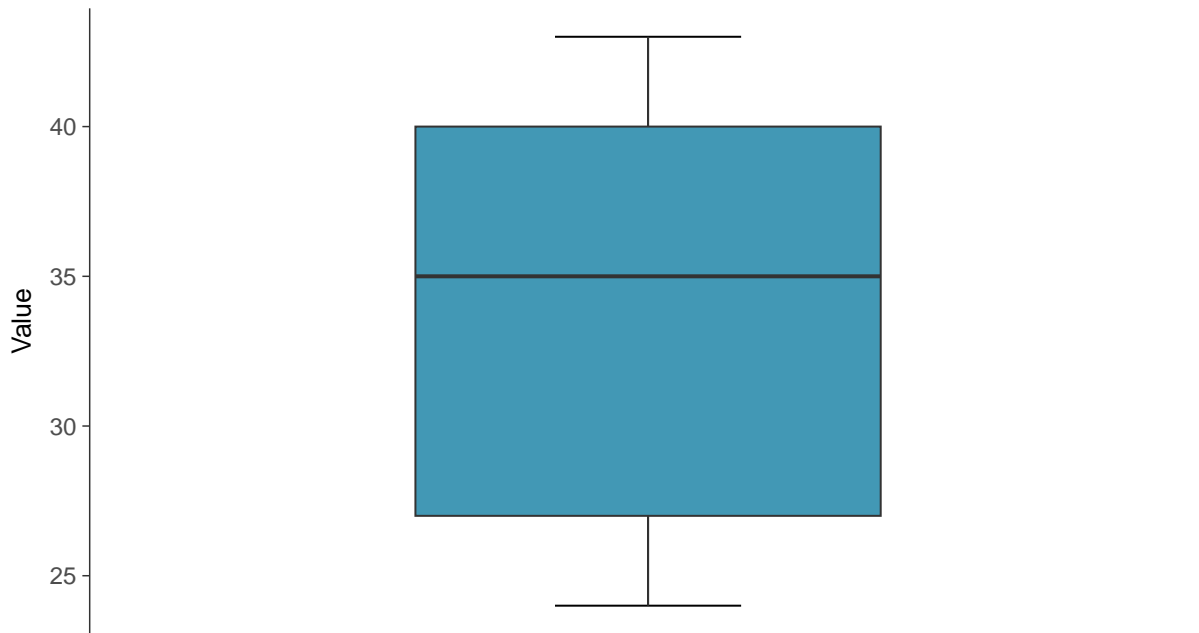
Chloride, MW-6 (mg/L)





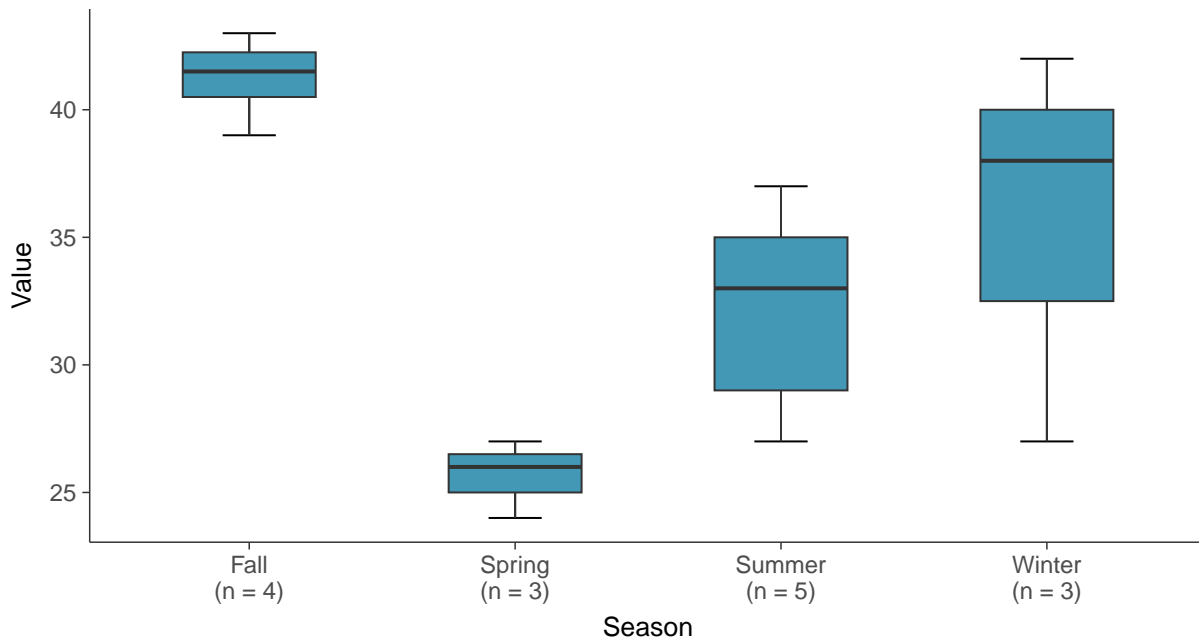
Boxplot

Chloride, MW-6 (mg/L)



Boxplot by Season

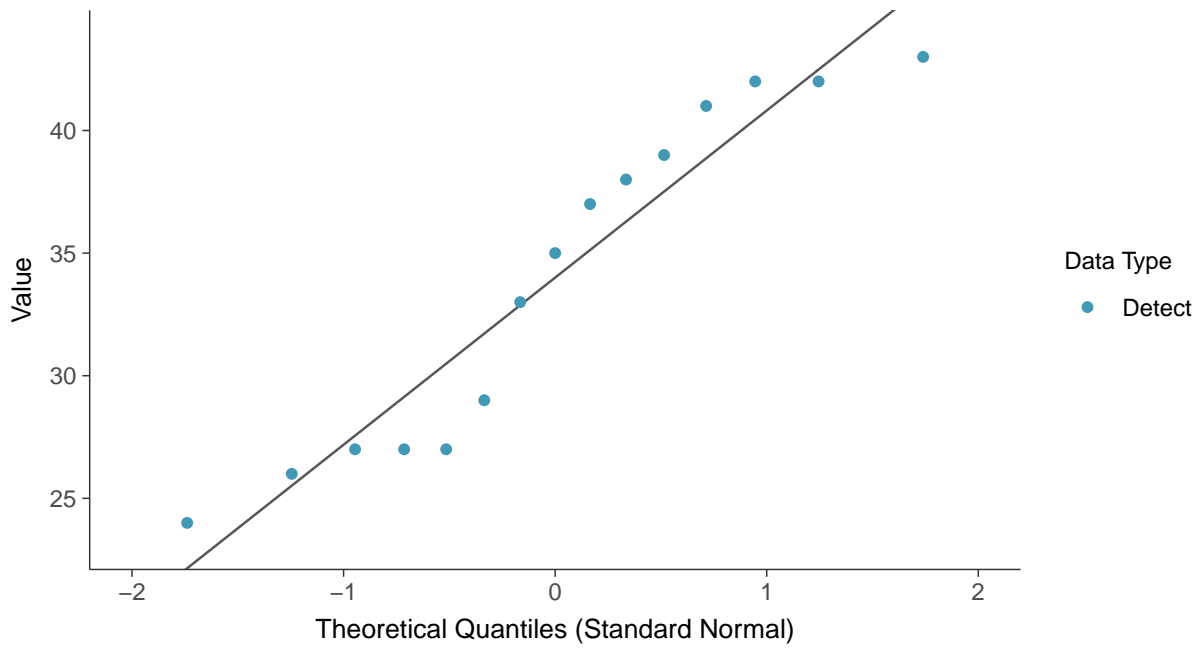
Chloride, MW-6 (mg/L)





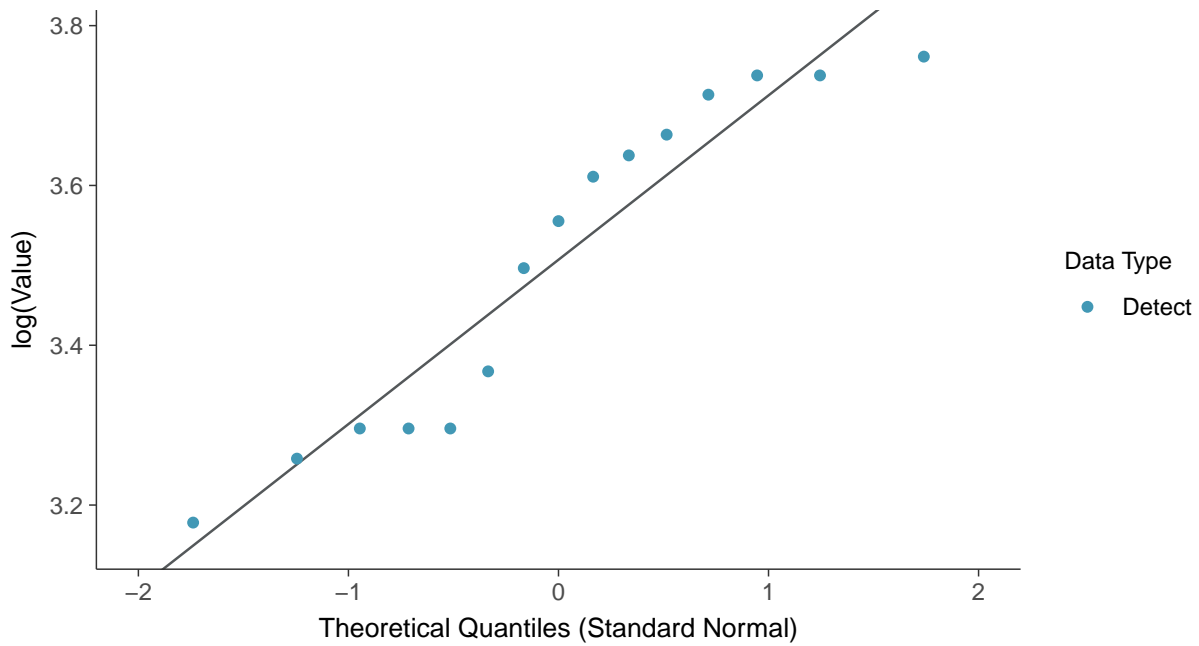
Normal Q-Q plot

Chloride, MW-6 (mg/L)



Lognormal Q-Q plot

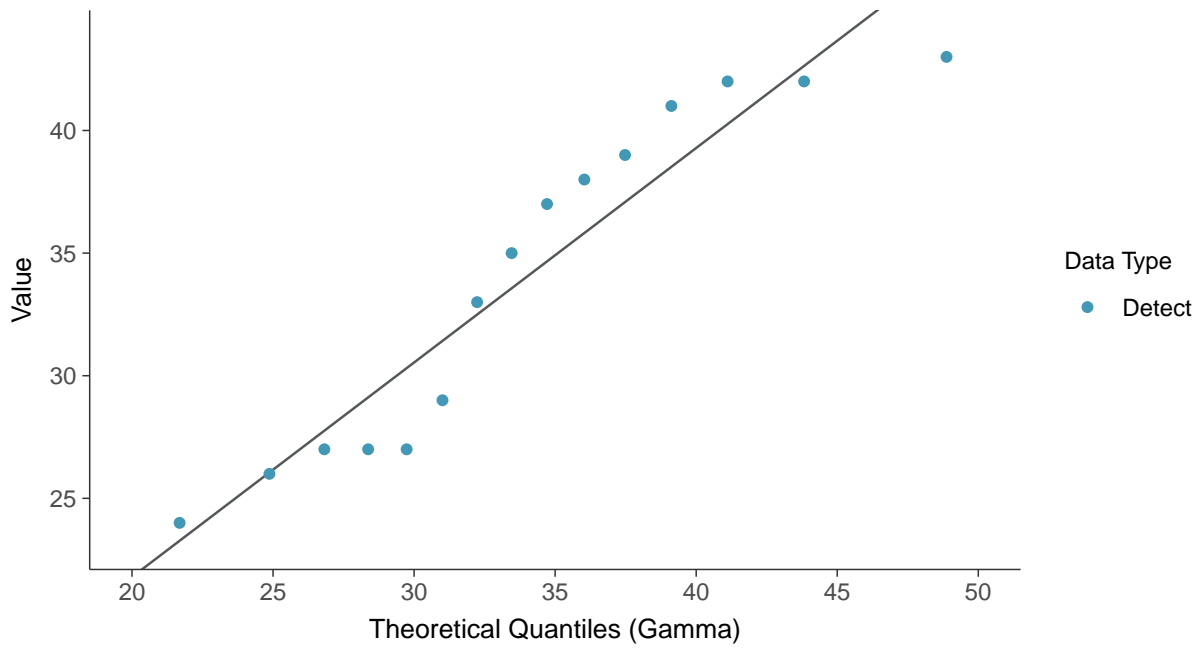
Chloride, MW-6 (mg/L)





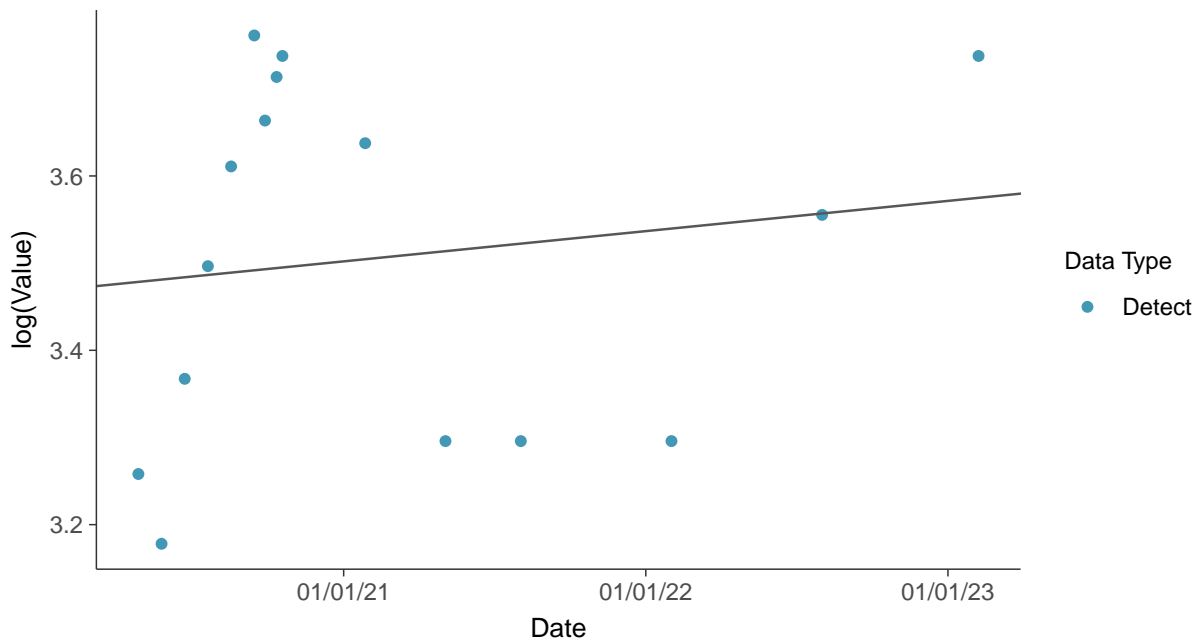
Gamma Q-Q plot

Chloride, MW-6 (mg/L)



Trend Regression: Lognormal MLE

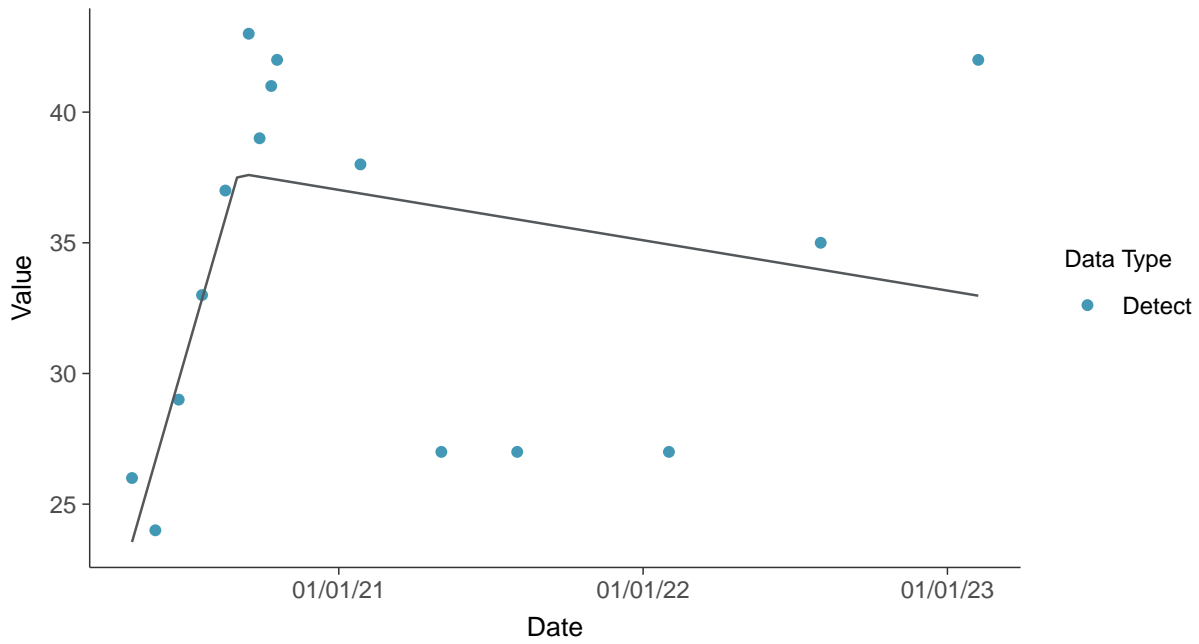
Chloride, MW-6 (mg/L)





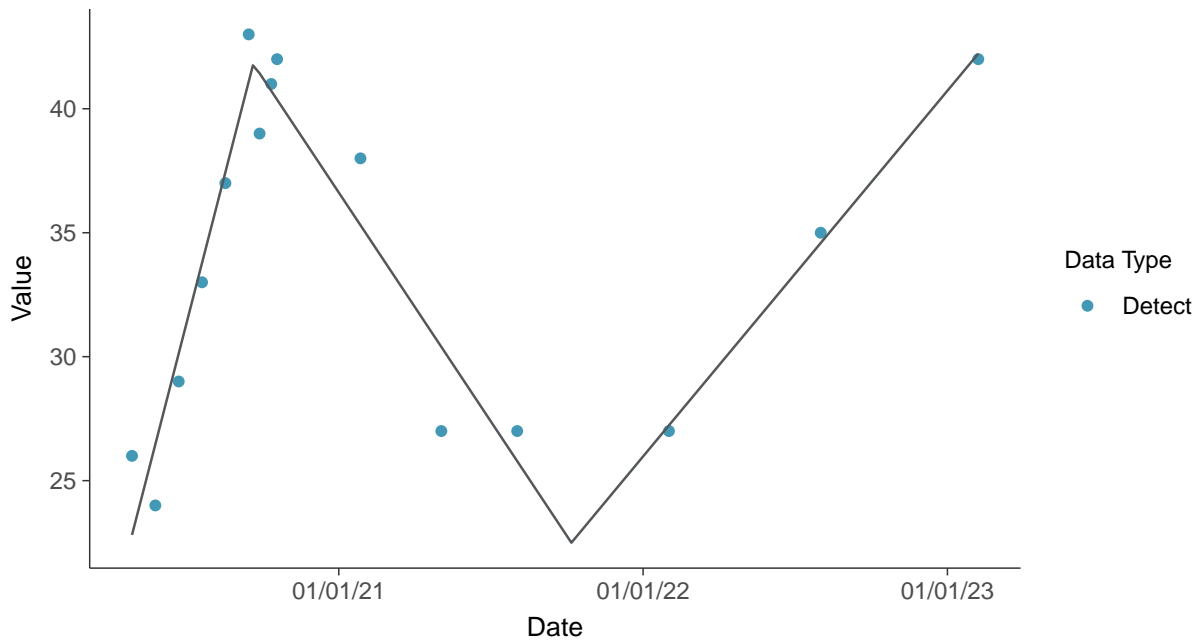
Trend Regression: Piecewise Linear-Linear

Chloride, MW-6 (mg/L)



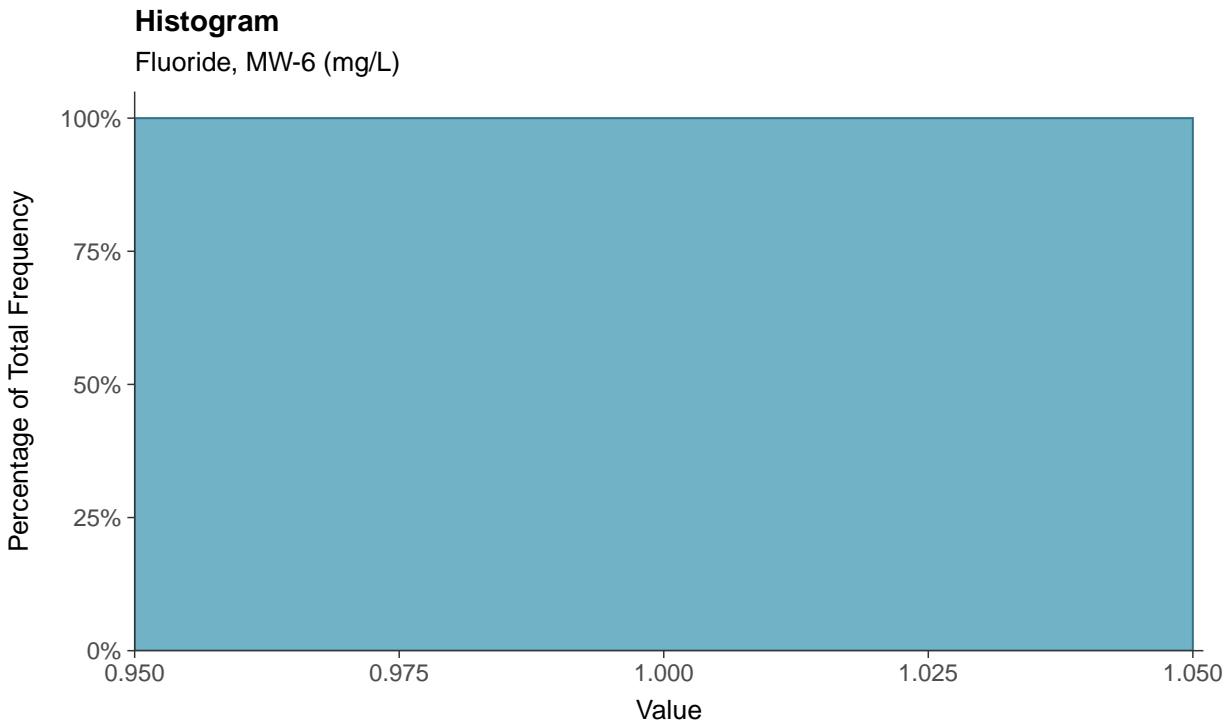
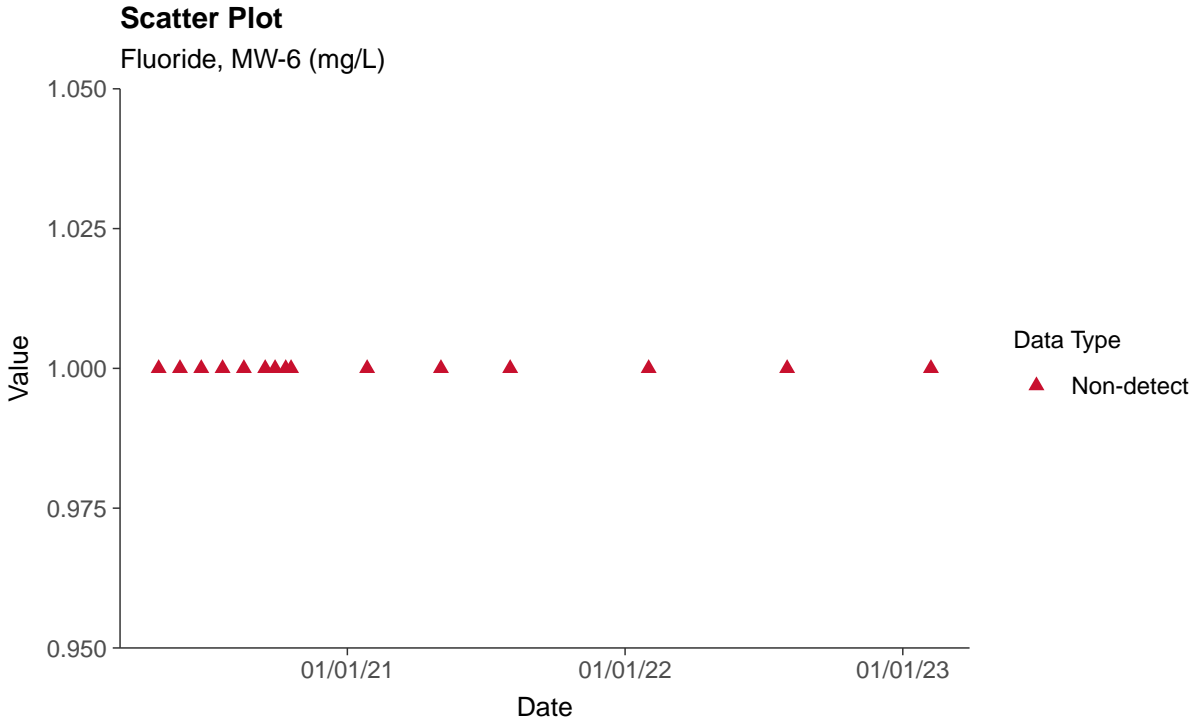
Trend Regression: Piecewise Linear-Linear-Linear

Chloride, MW-6 (mg/L)



Appendix III: Fluoride, MW-6

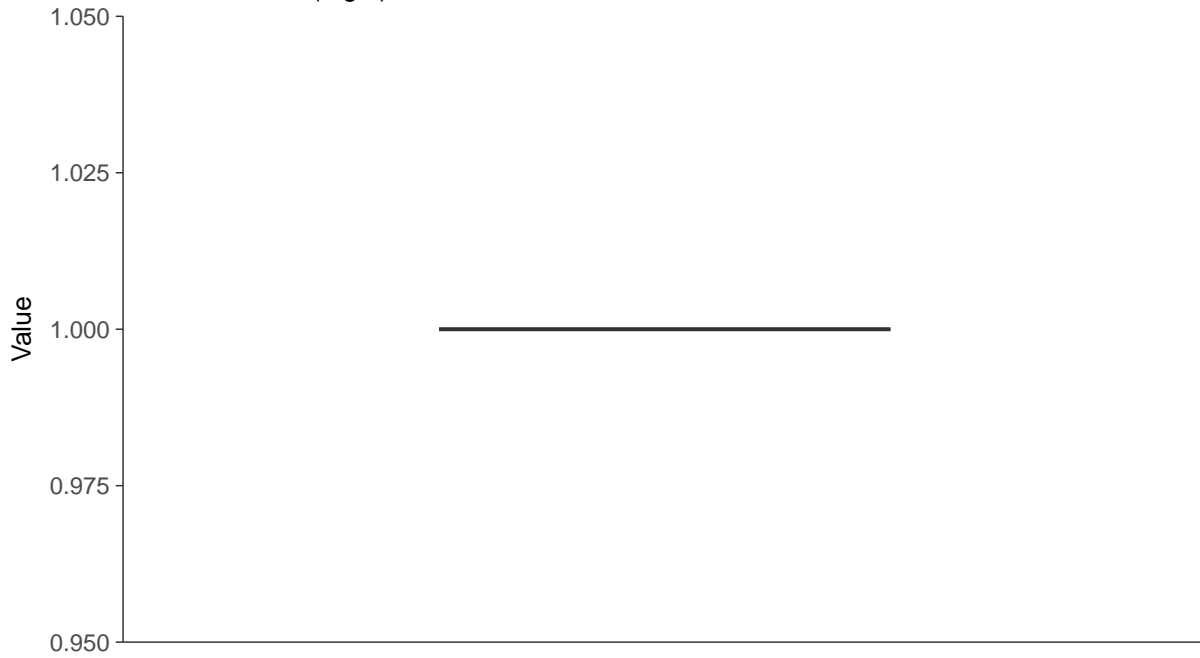
ID: 06_1_04





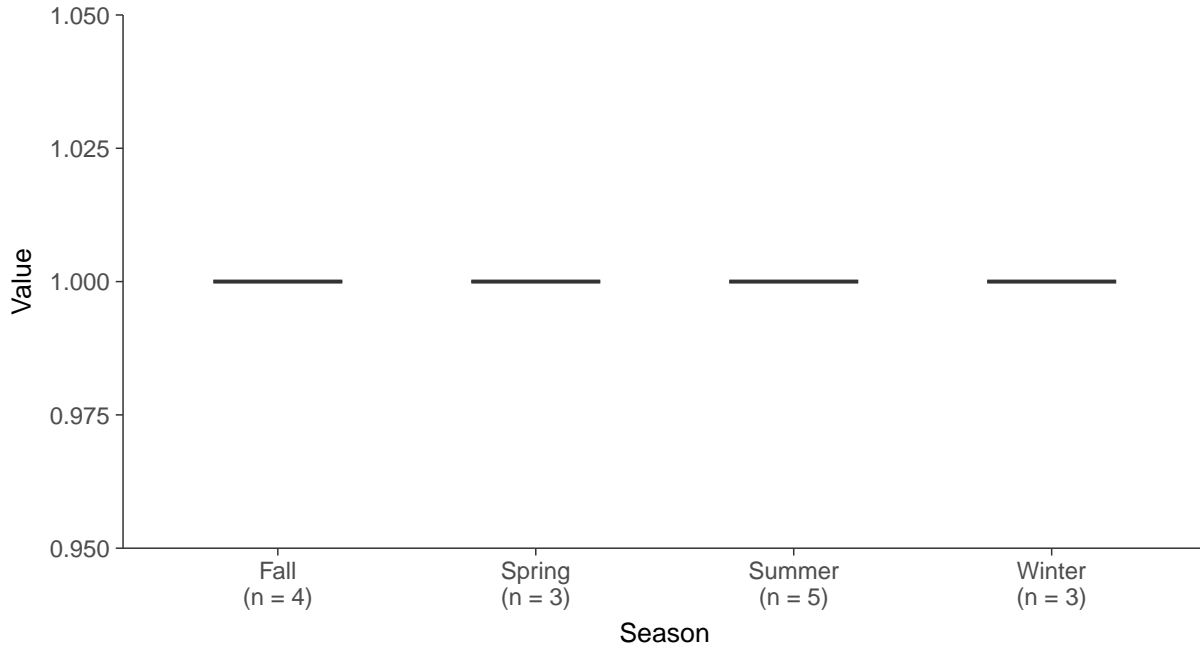
Boxplot

Fluoride, MW-6 (mg/L)



Boxplot by Season

Fluoride, MW-6 (mg/L)



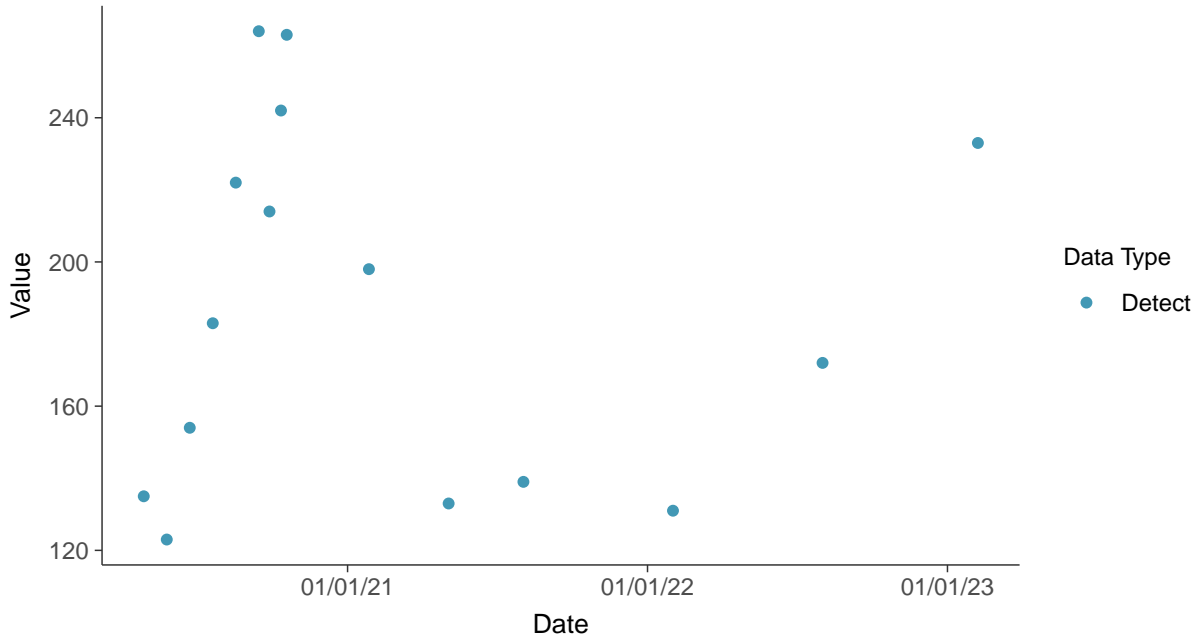


Appendix III: Sulfate, MW-6

ID: 06_1_05

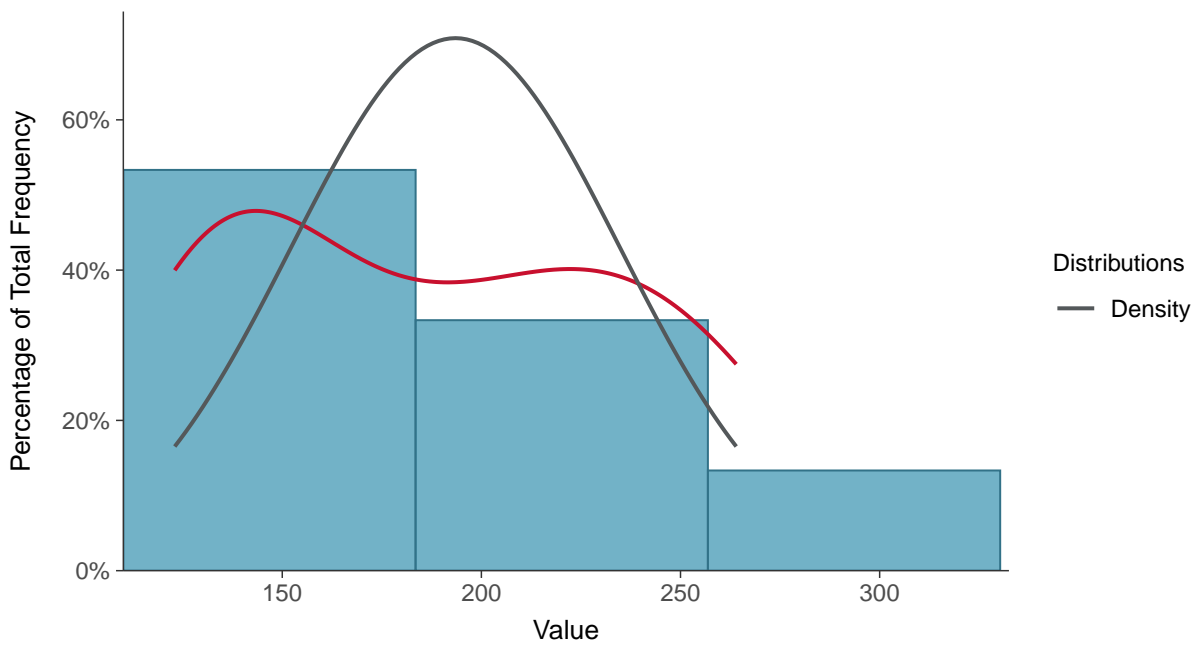
Scatter Plot

Sulfate, MW-6 (mg/L)



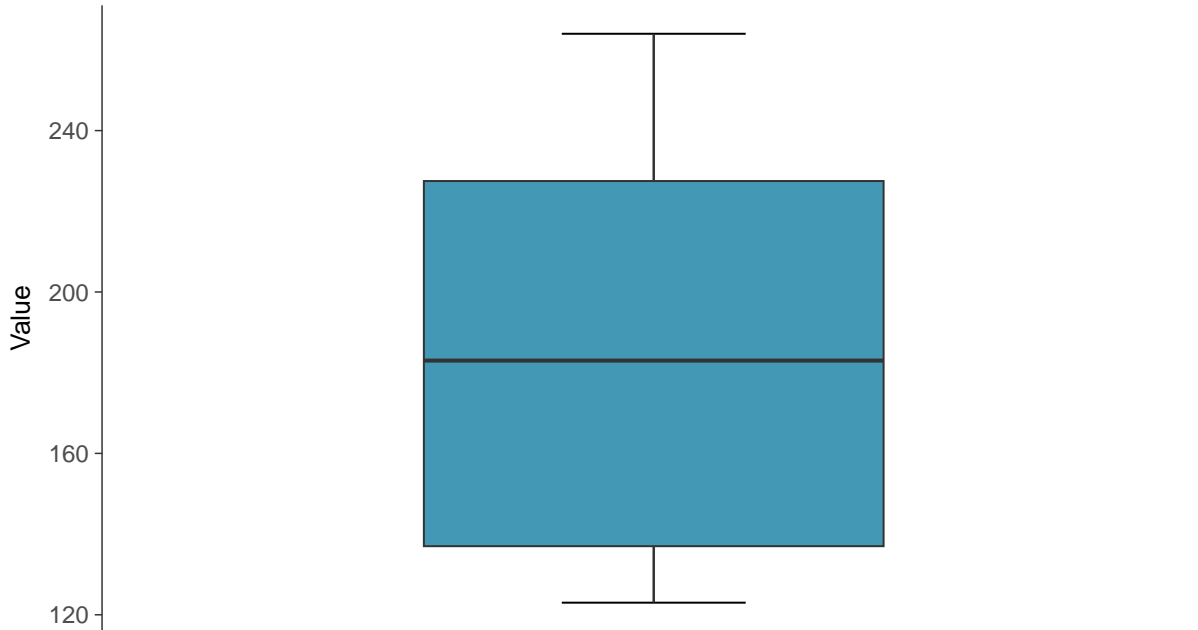
Histogram

Sulfate, MW-6 (mg/L)



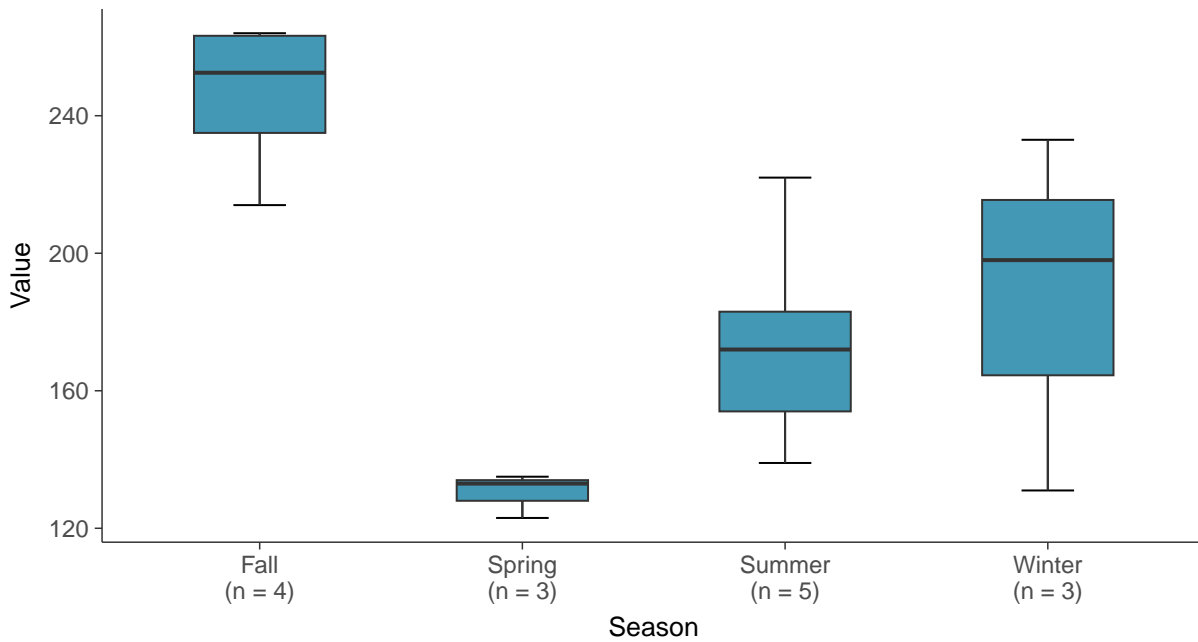
Boxplot

Sulfate, MW-6 (mg/L)



Boxplot by Season

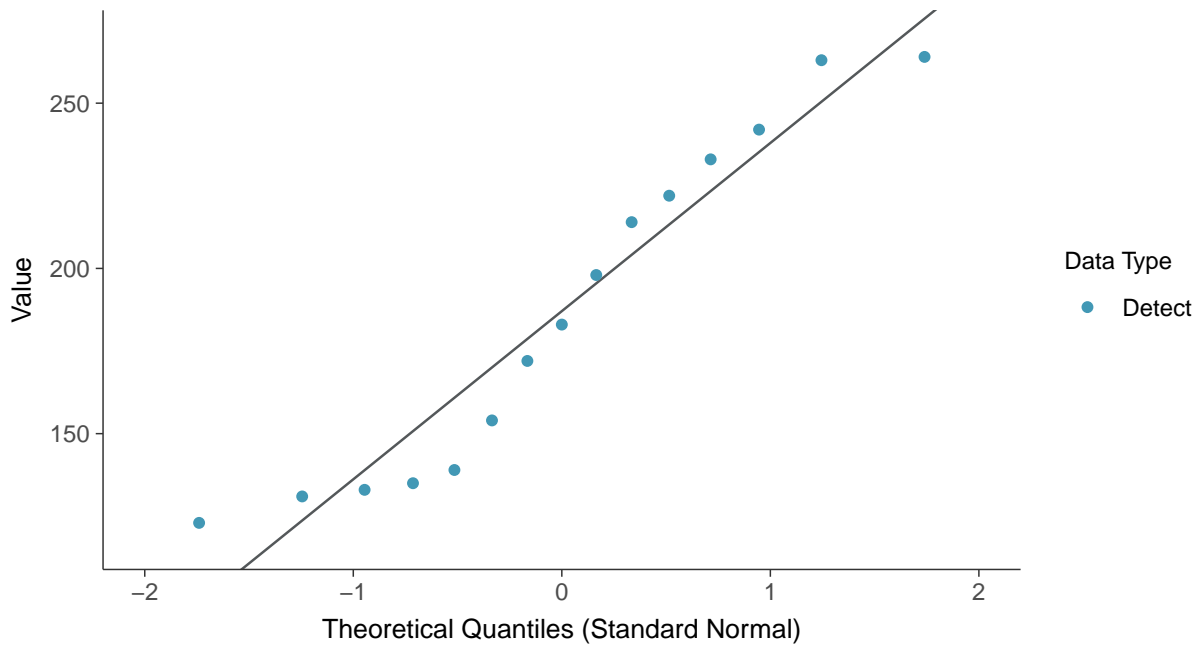
Sulfate, MW-6 (mg/L)





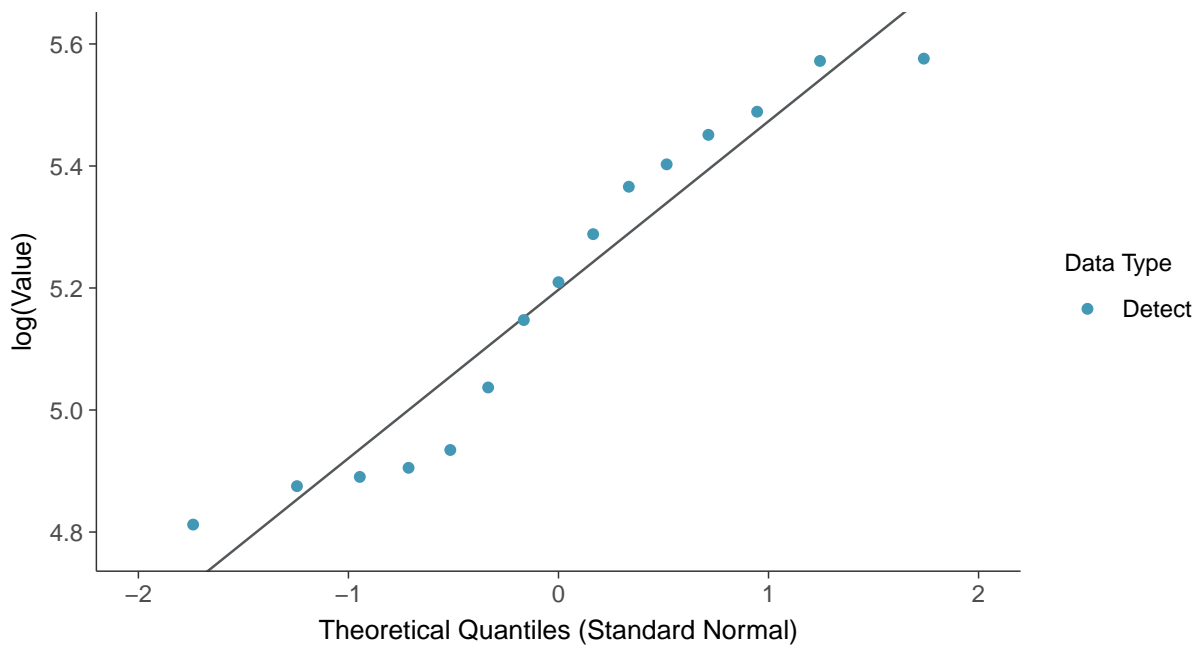
Normal Q-Q plot

Sulfate, MW-6 (mg/L)



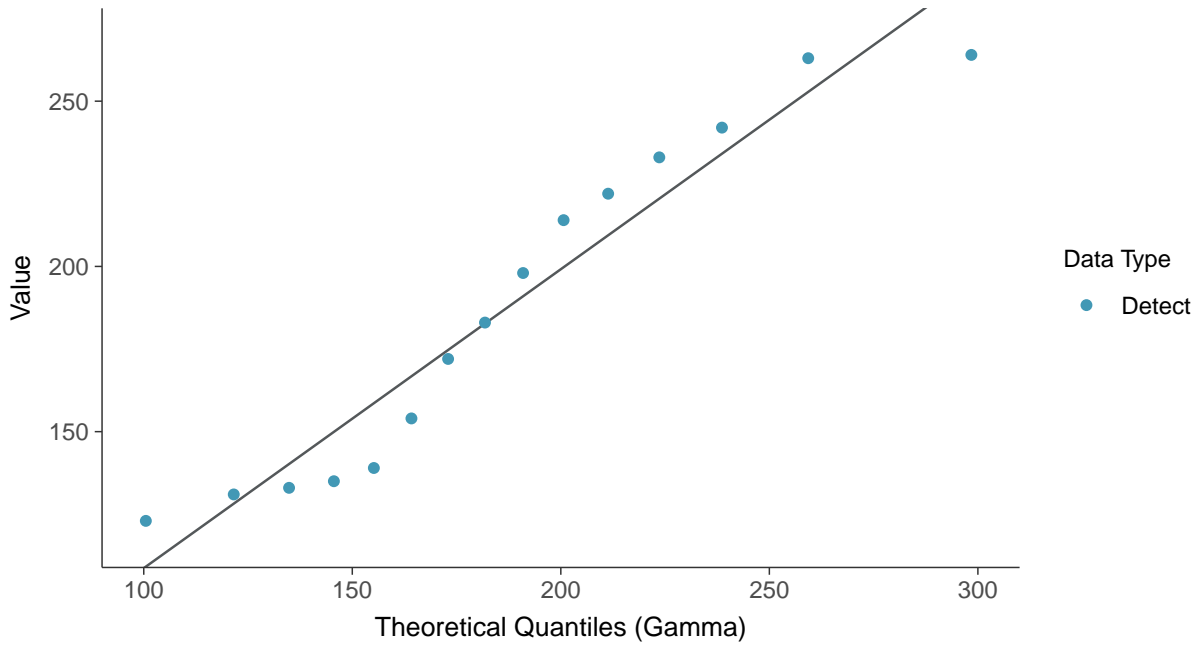
Lognormal Q-Q plot

Sulfate, MW-6 (mg/L)

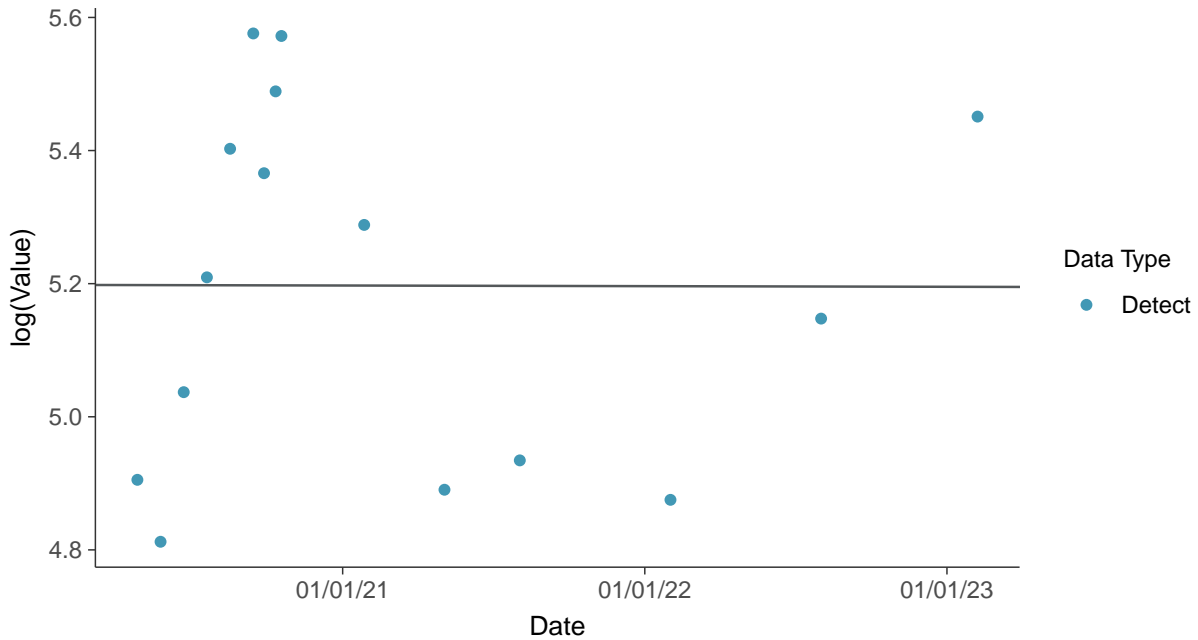




Gamma Q-Q plot
Sulfate, MW-6 (mg/L)



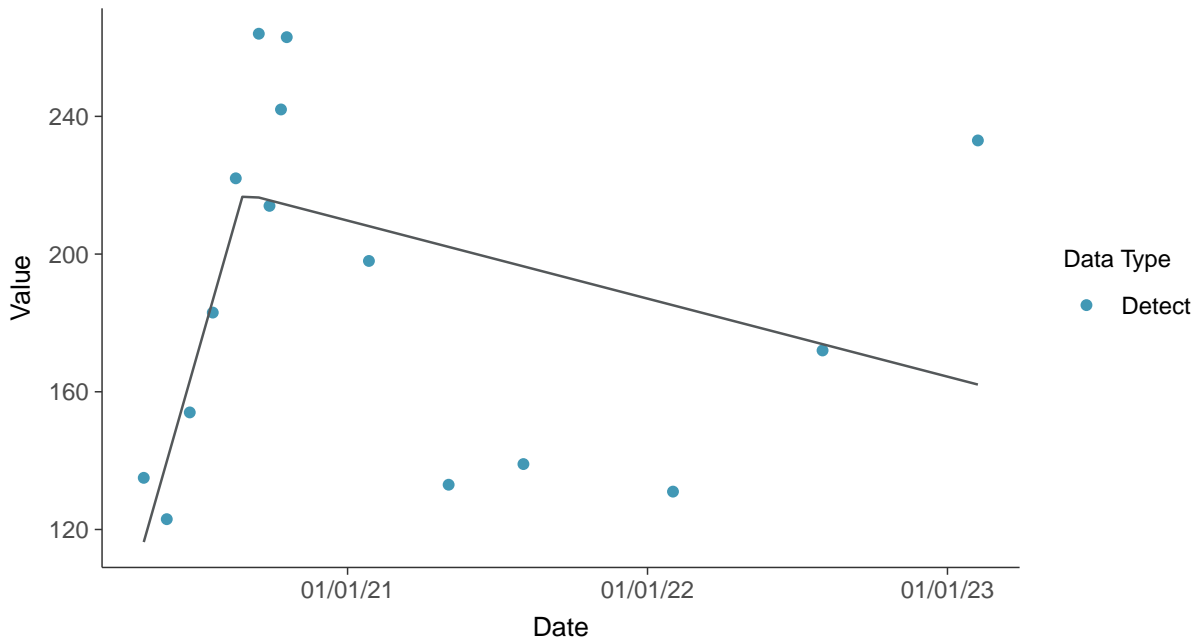
Trend Regression: Lognormal MLE
Sulfate, MW-6 (mg/L)





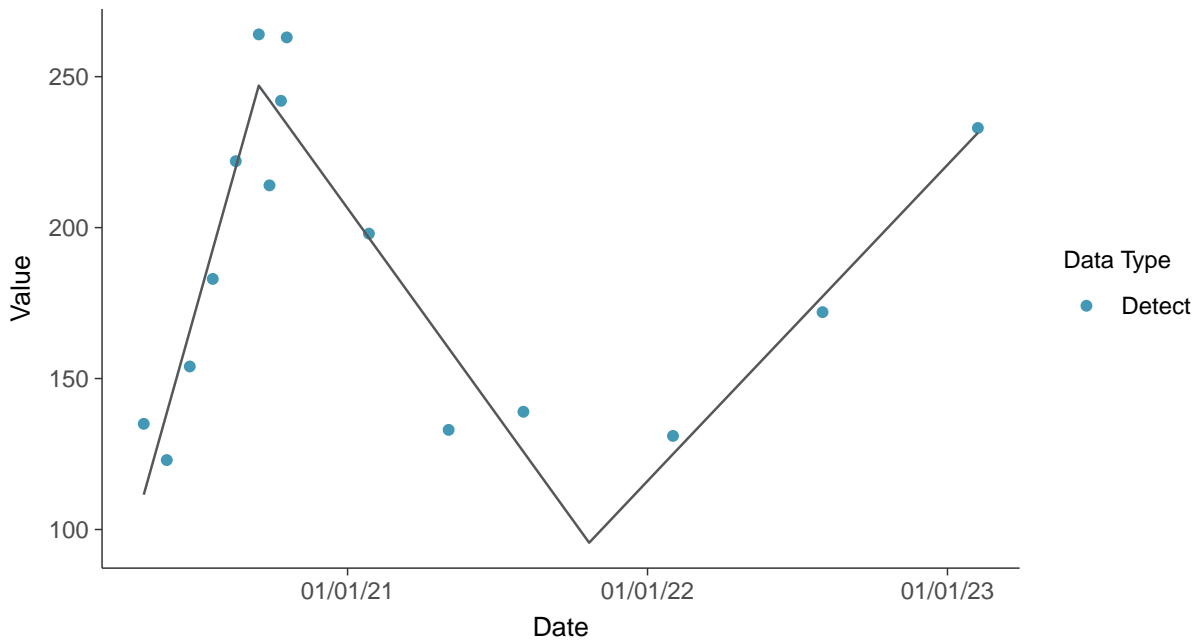
Trend Regression: Piecewise Linear-Linear

Sulfate, MW-6 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Sulfate, MW-6 (mg/L)



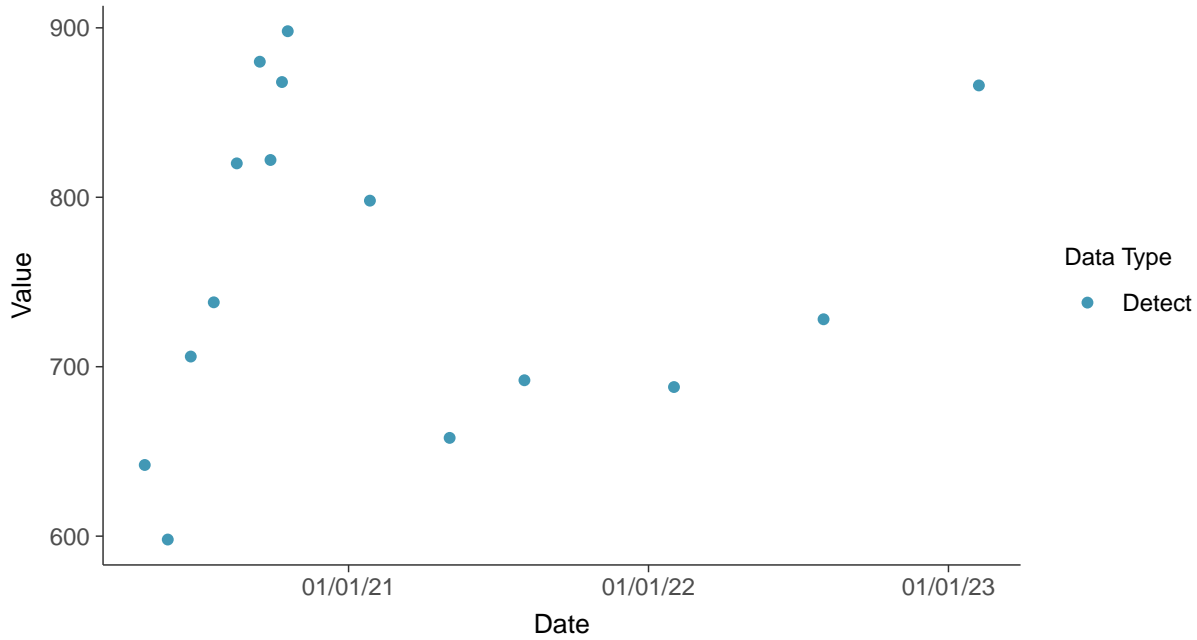


Appendix III: Total Dissolved Solids, MW-6

ID: 06_1_06

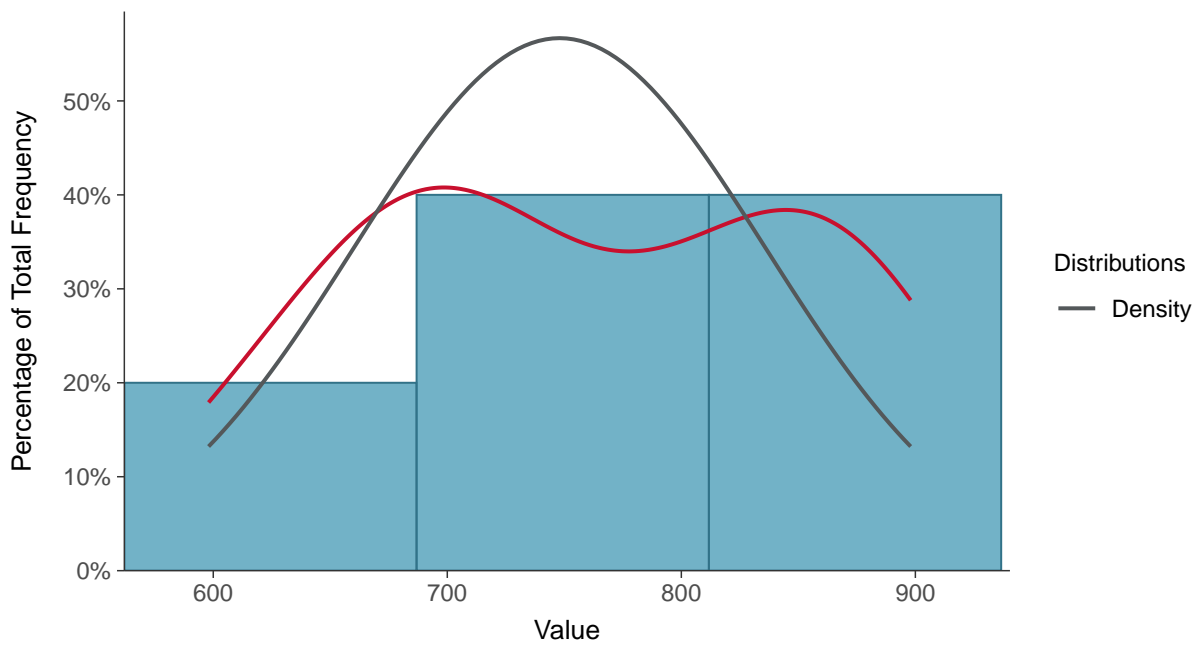
Scatter Plot

Total Dissolved Solids, MW-6 (mg/L)



Histogram

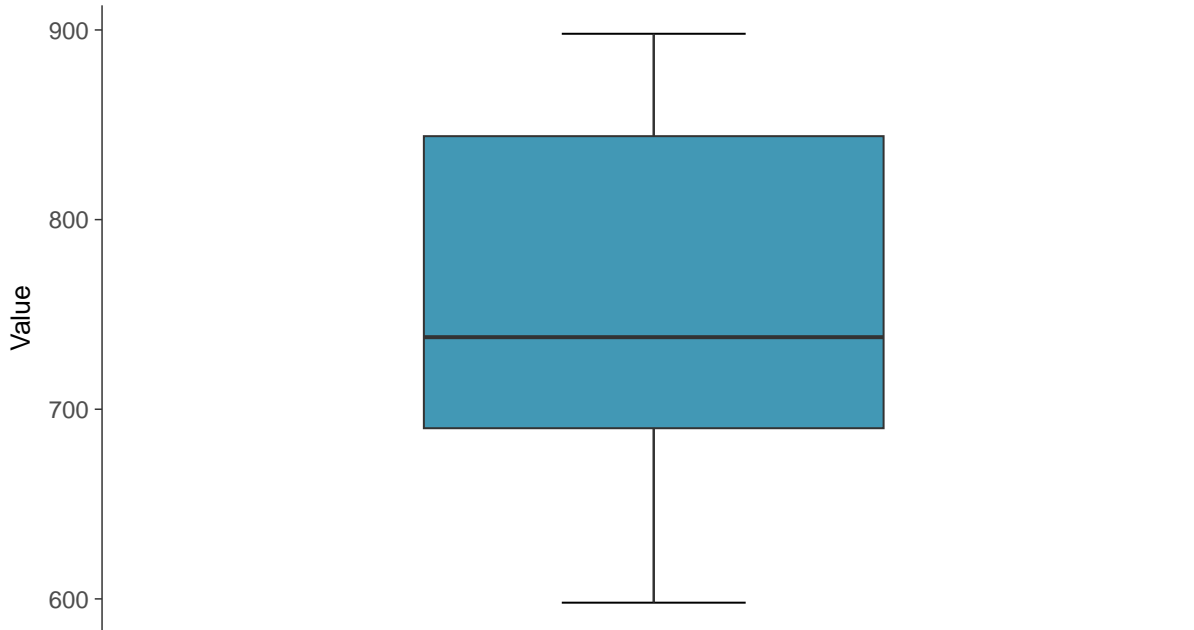
Total Dissolved Solids, MW-6 (mg/L)





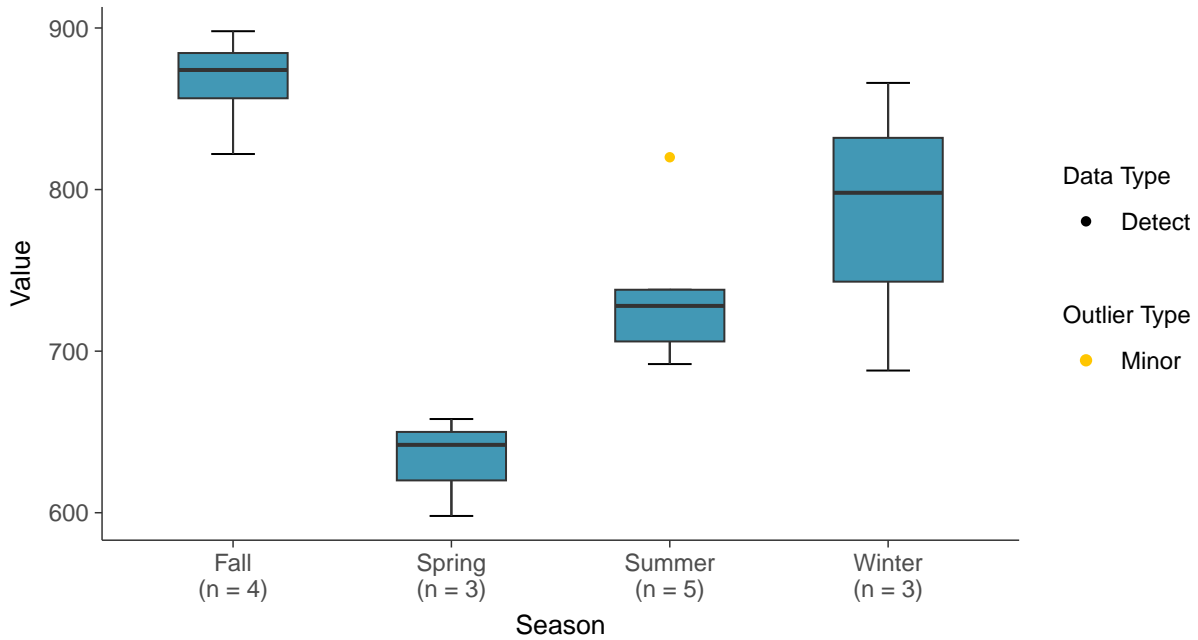
Boxplot

Total Dissolved Solids, MW-6 (mg/L)



Boxplot by Season

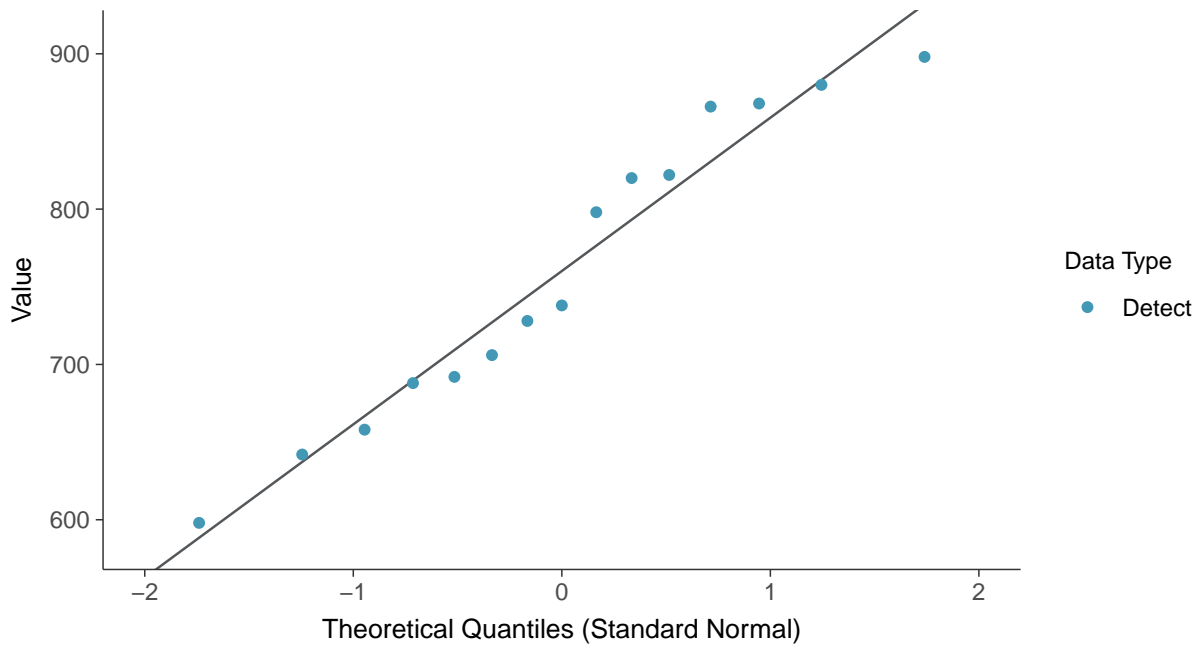
Total Dissolved Solids, MW-6 (mg/L)





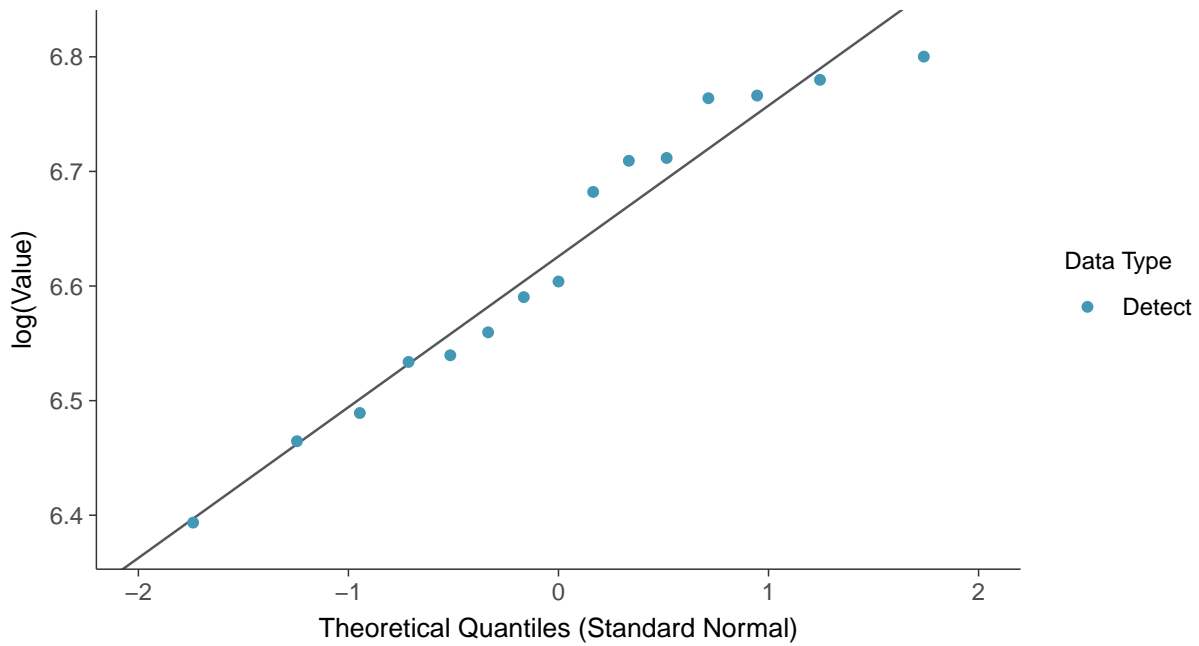
Normal Q-Q plot

Total Dissolved Solids, MW-6 (mg/L)



Lognormal Q-Q plot

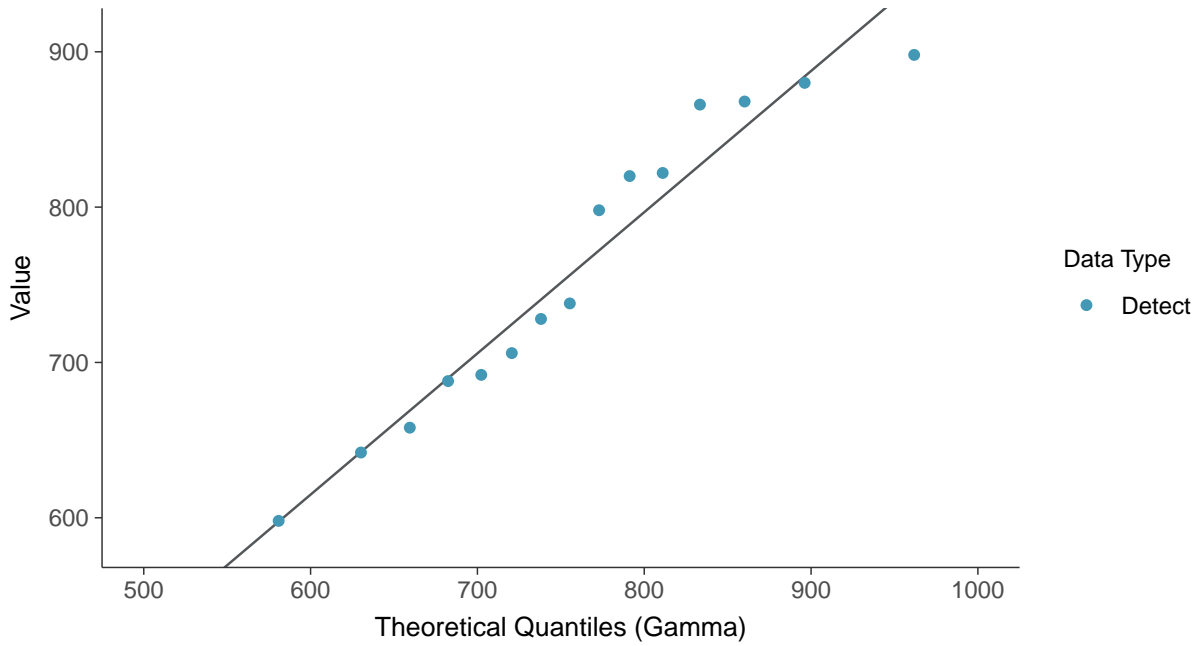
Total Dissolved Solids, MW-6 (mg/L)





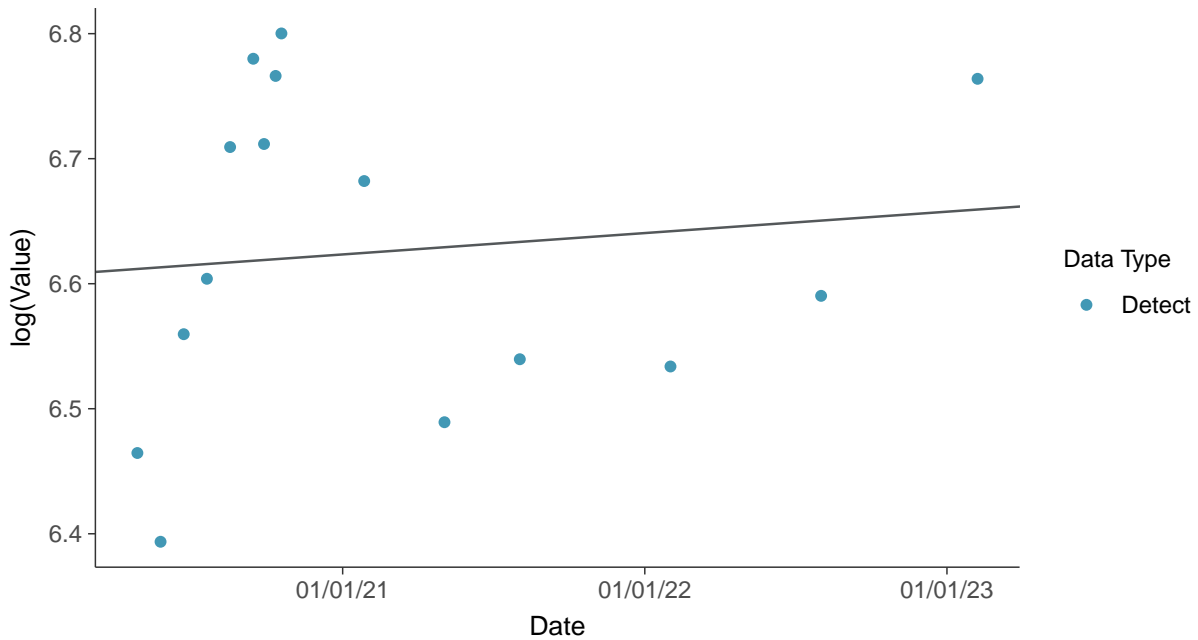
Gamma Q-Q plot

Total Dissolved Solids, MW-6 (mg/L)



Trend Regression: Lognormal MLE

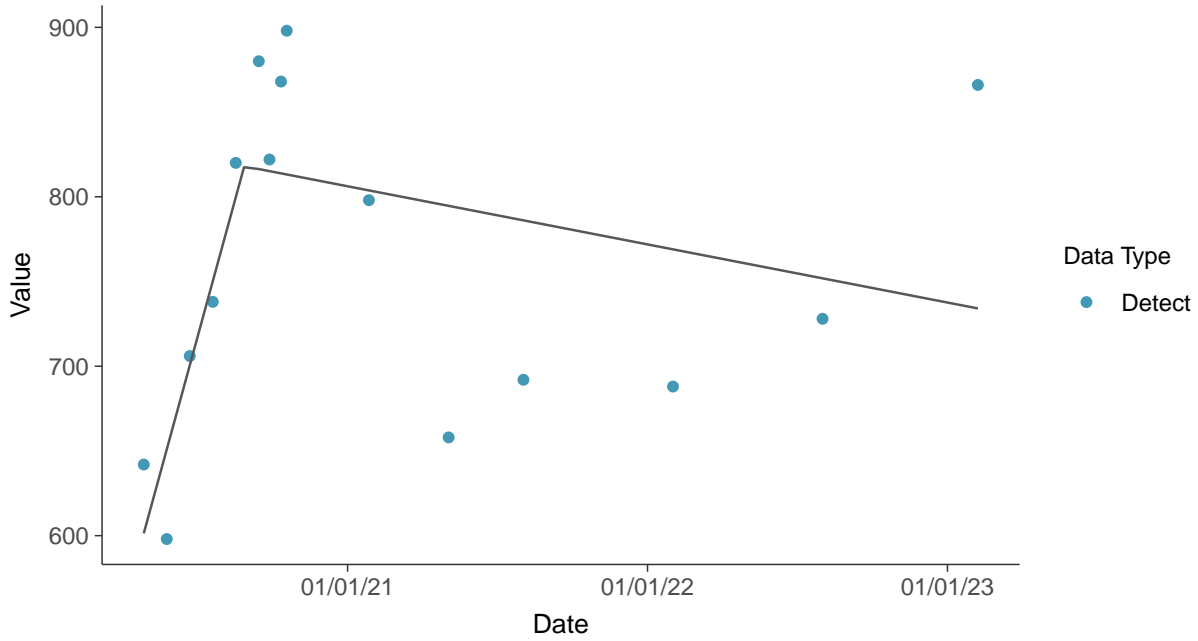
Total Dissolved Solids, MW-6 (mg/L)





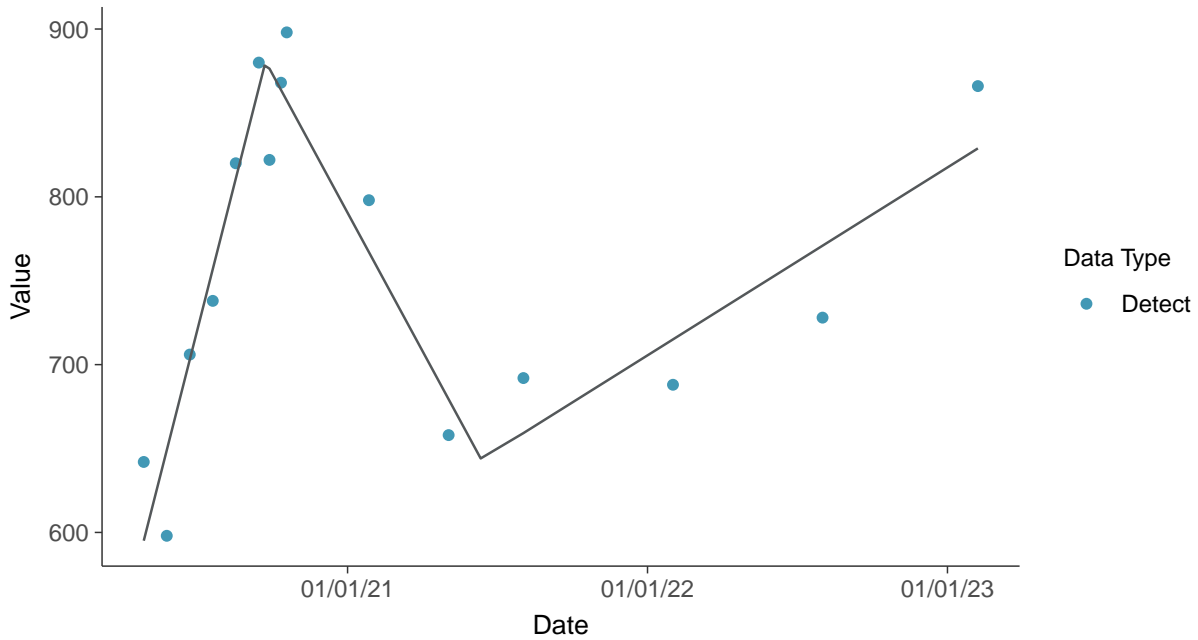
Trend Regression: Piecewise Linear-Linear

Total Dissolved Solids, MW-6 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Total Dissolved Solids, MW-6 (mg/L)



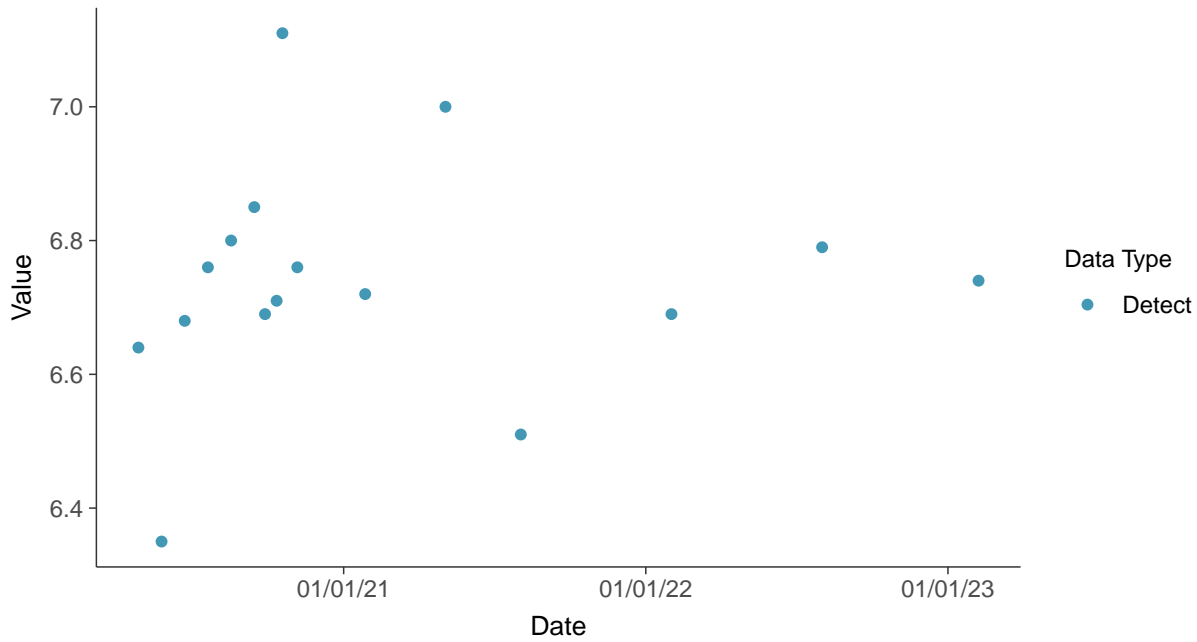


Appendix III: pH, Field, MW-6

ID: 06_1_07

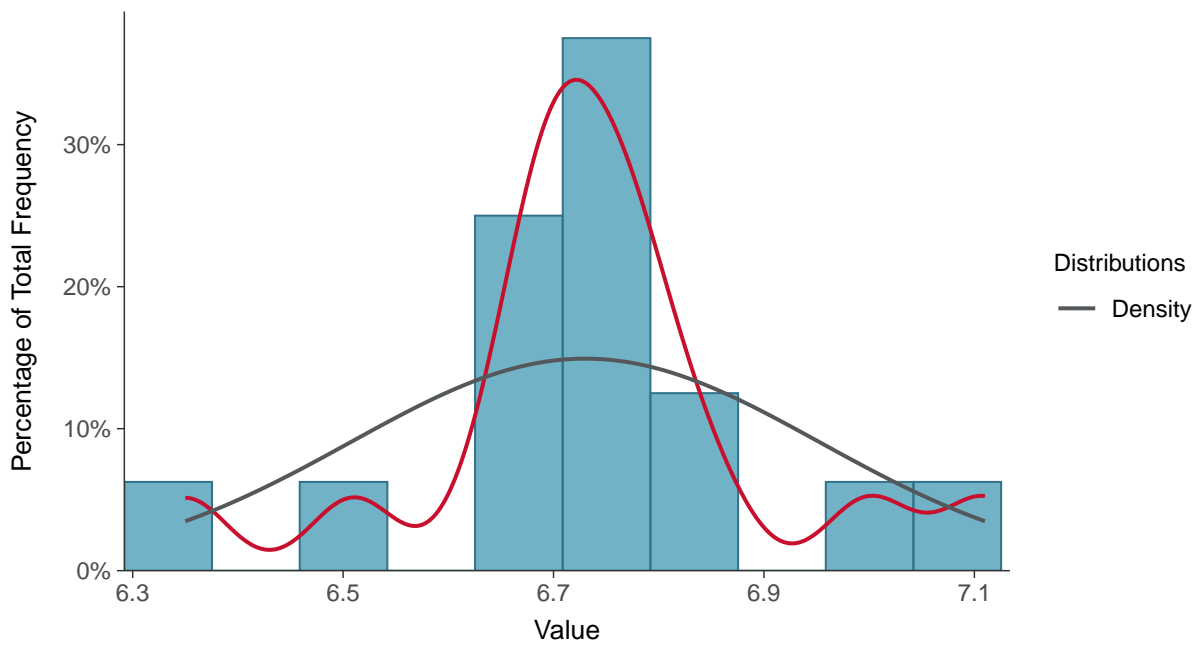
Scatter Plot

pH, Field, MW-6 (su)



Histogram

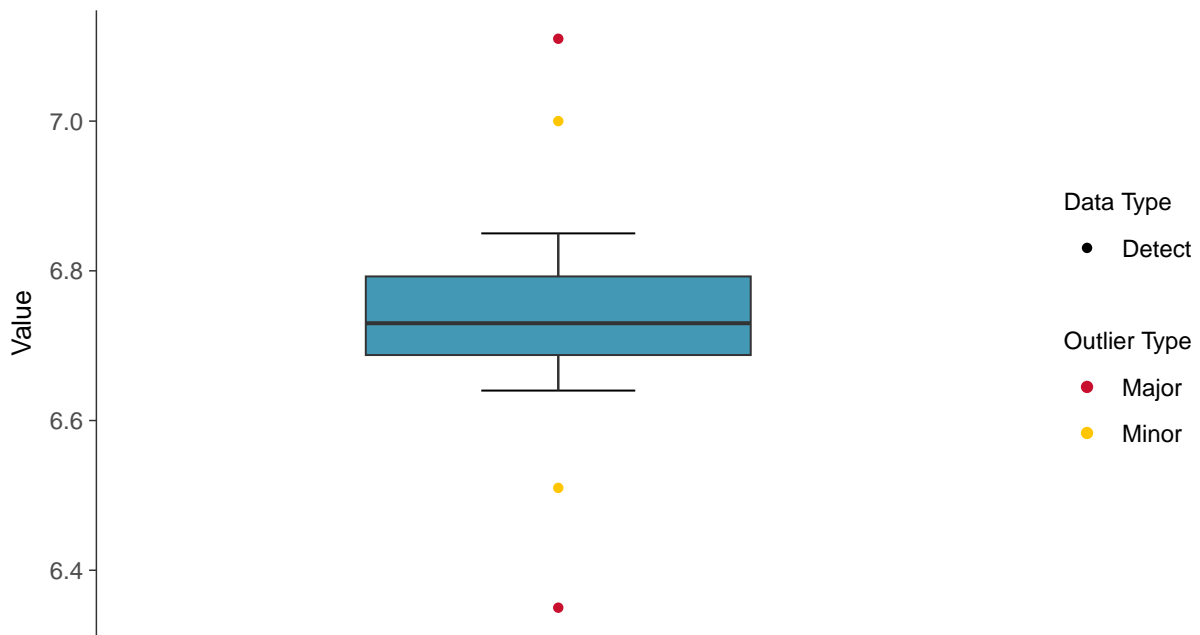
pH, Field, MW-6 (su)





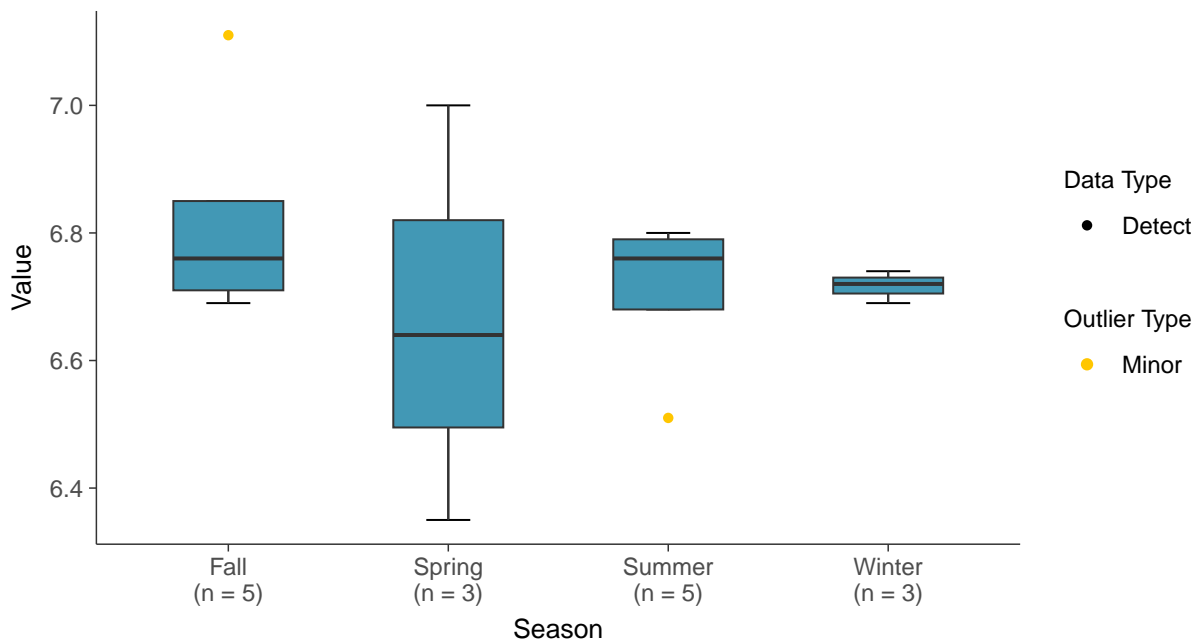
Boxplot

pH, Field, MW-6 (su)



Boxplot by Season

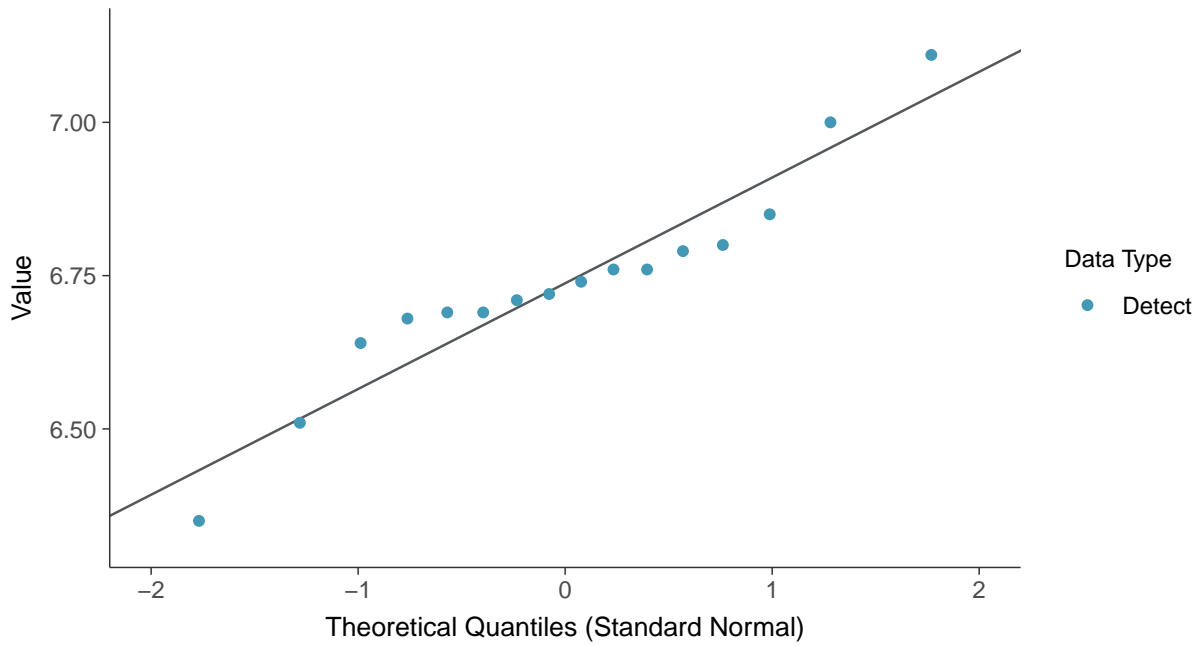
pH, Field, MW-6 (su)





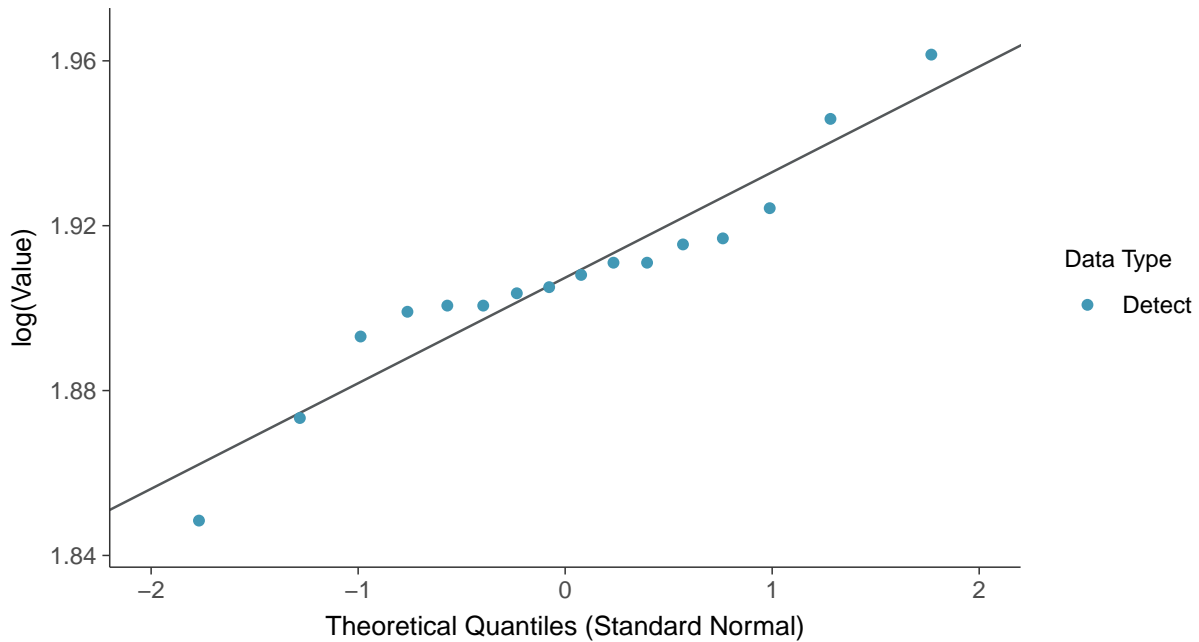
Normal Q-Q plot

pH, Field, MW-6 (su)



Lognormal Q-Q plot

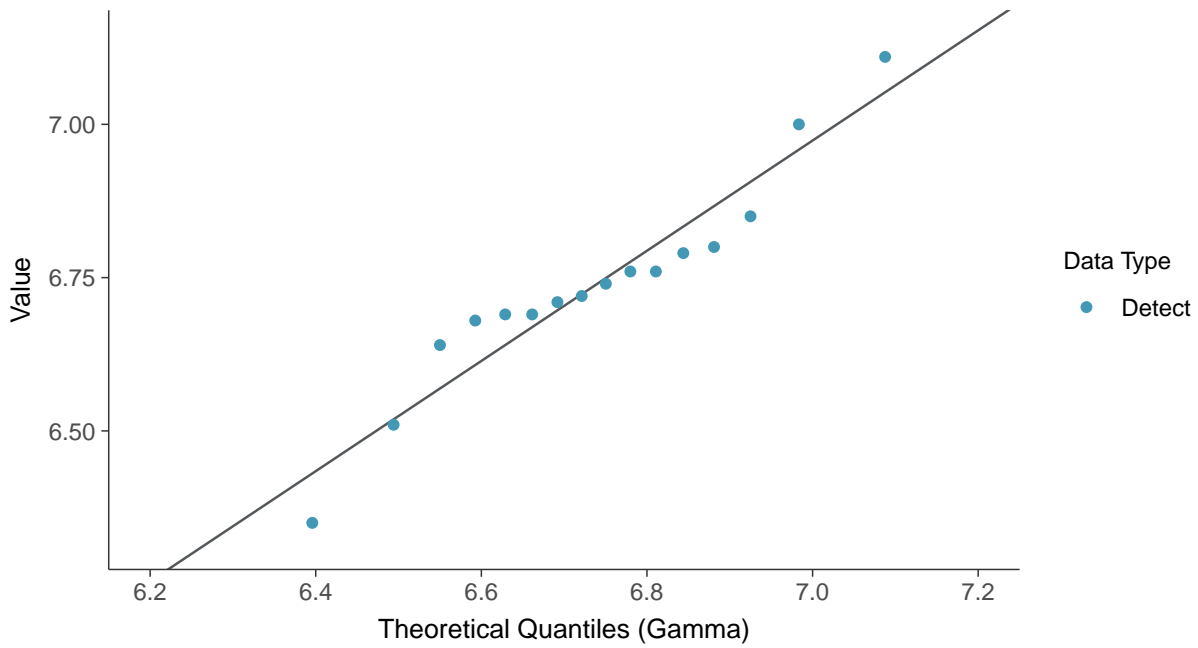
pH, Field, MW-6 (su)





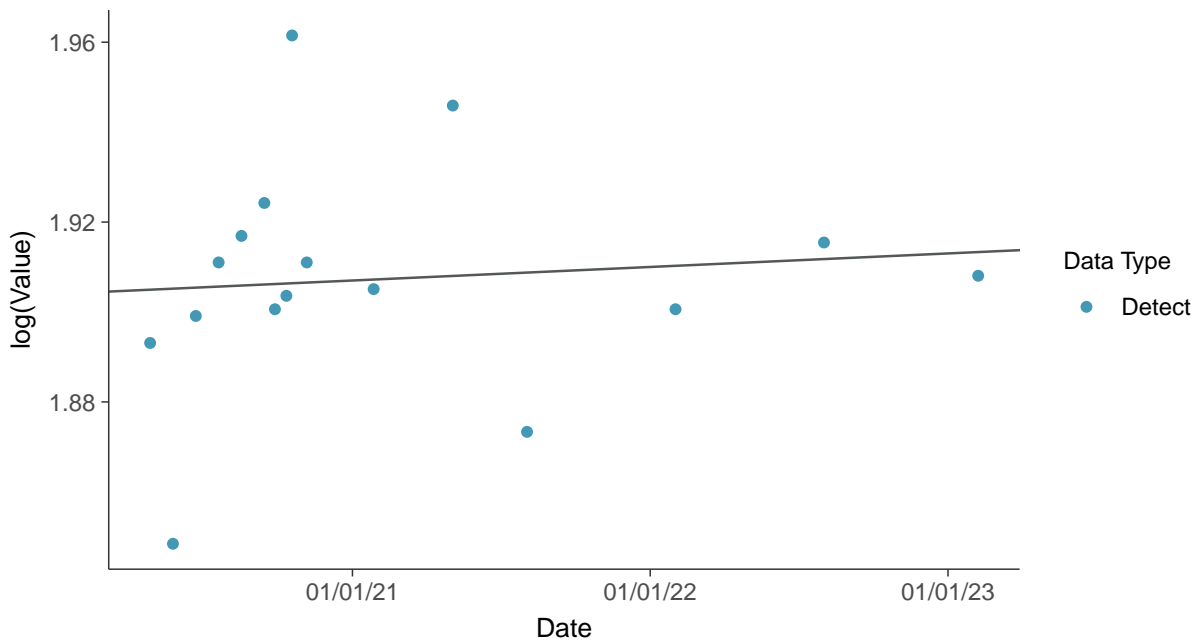
Gamma Q-Q plot

pH, Field, MW-6 (su)



Trend Regression: Lognormal MLE

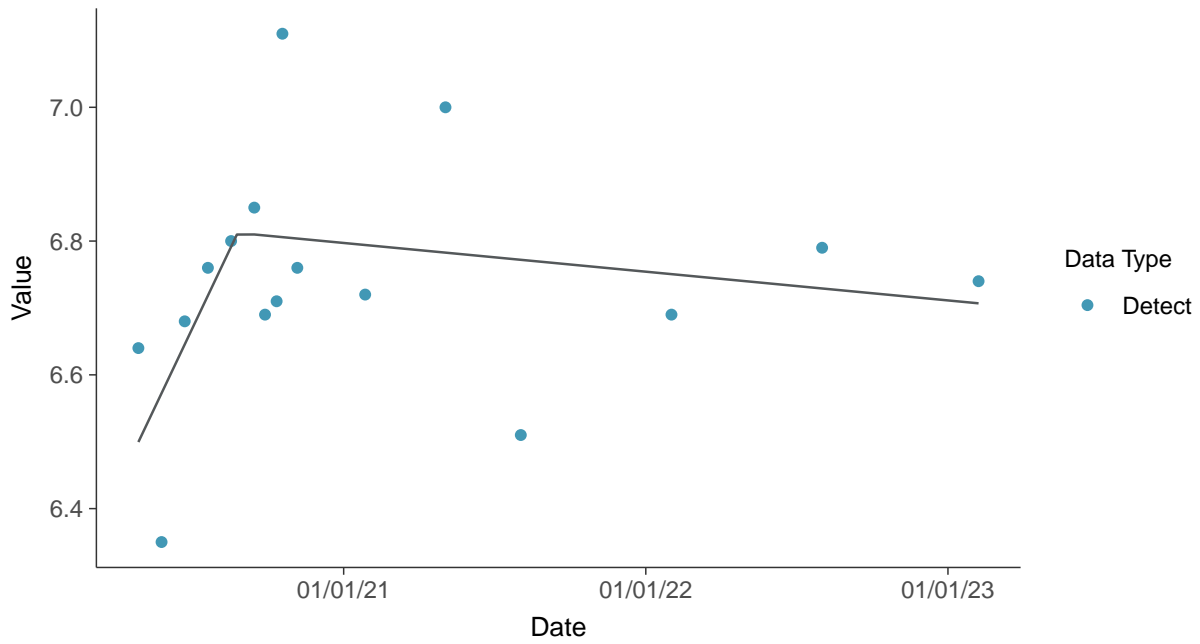
pH, Field, MW-6 (su)





Trend Regression: Piecewise Linear-Linear

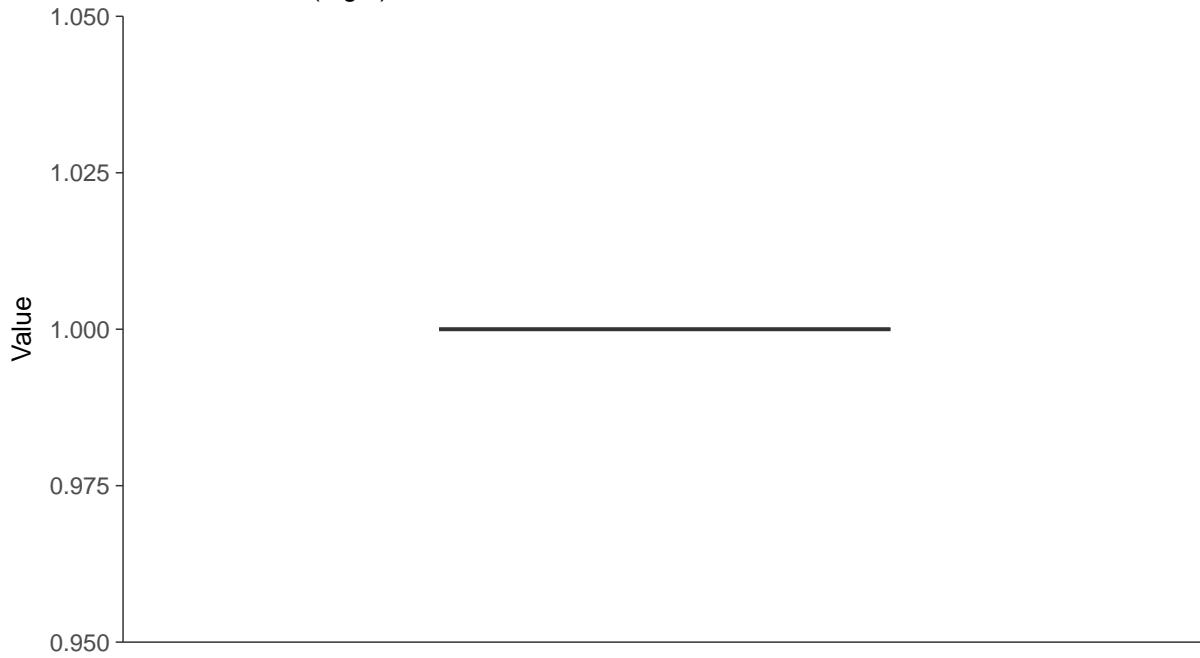
pH, Field, MW-6 (su)





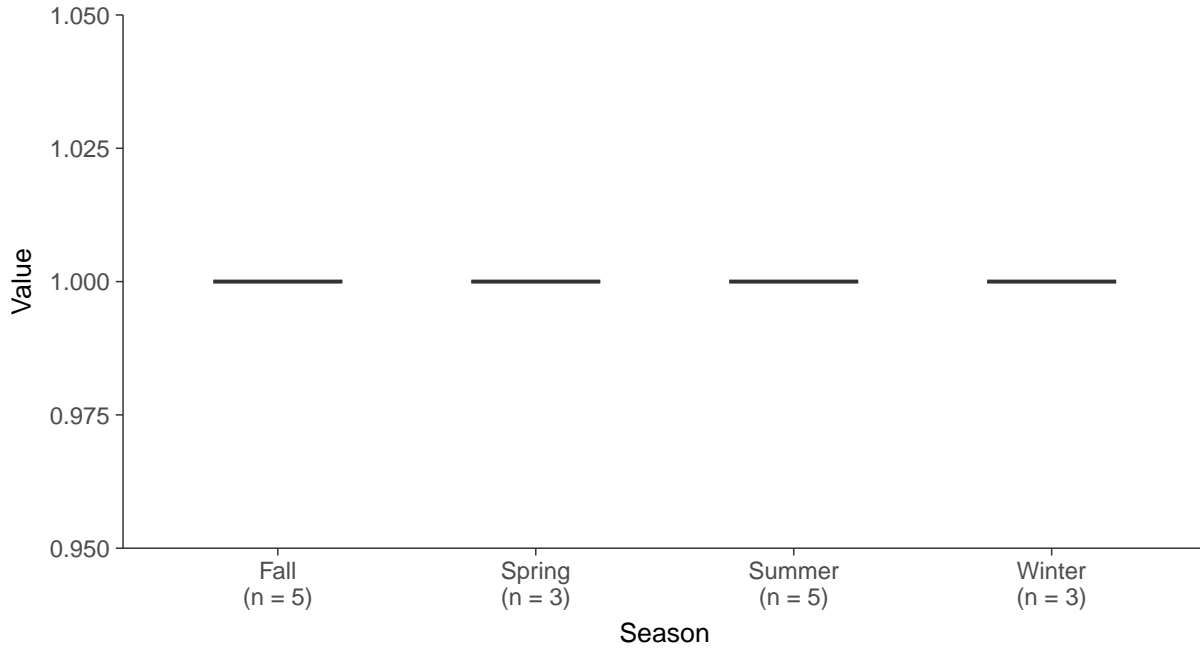
Boxplot

Fluoride, MW-6 (mg/L)



Boxplot by Season

Fluoride, MW-6 (mg/L)



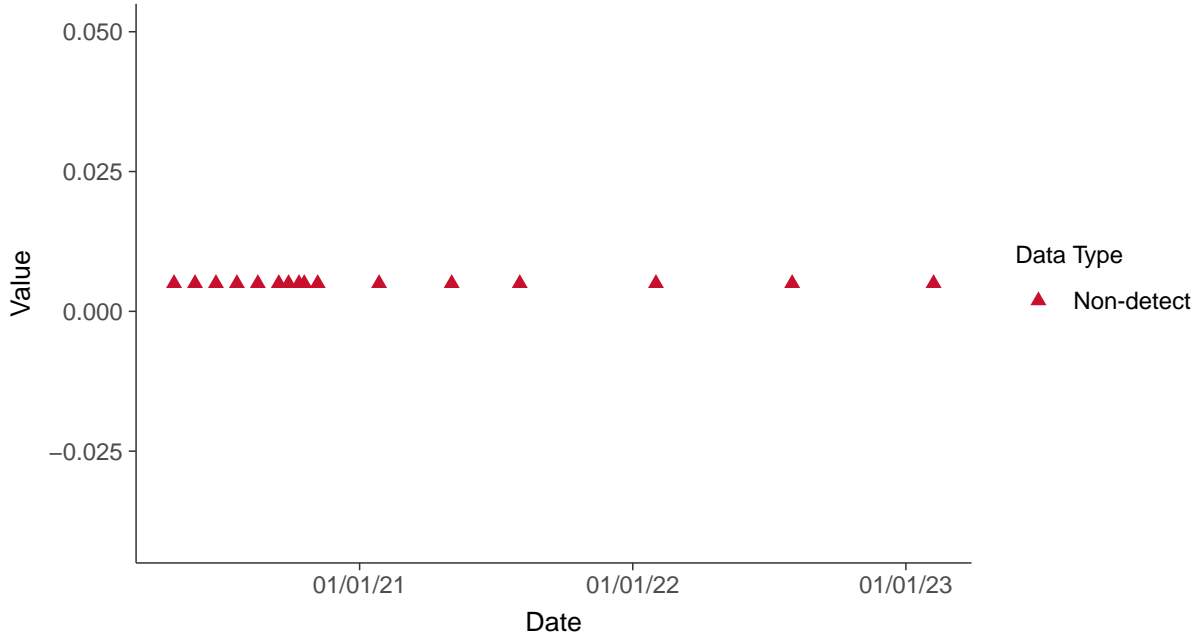


Appendix IV: Antimony, MW-6

ID: 06_2_08

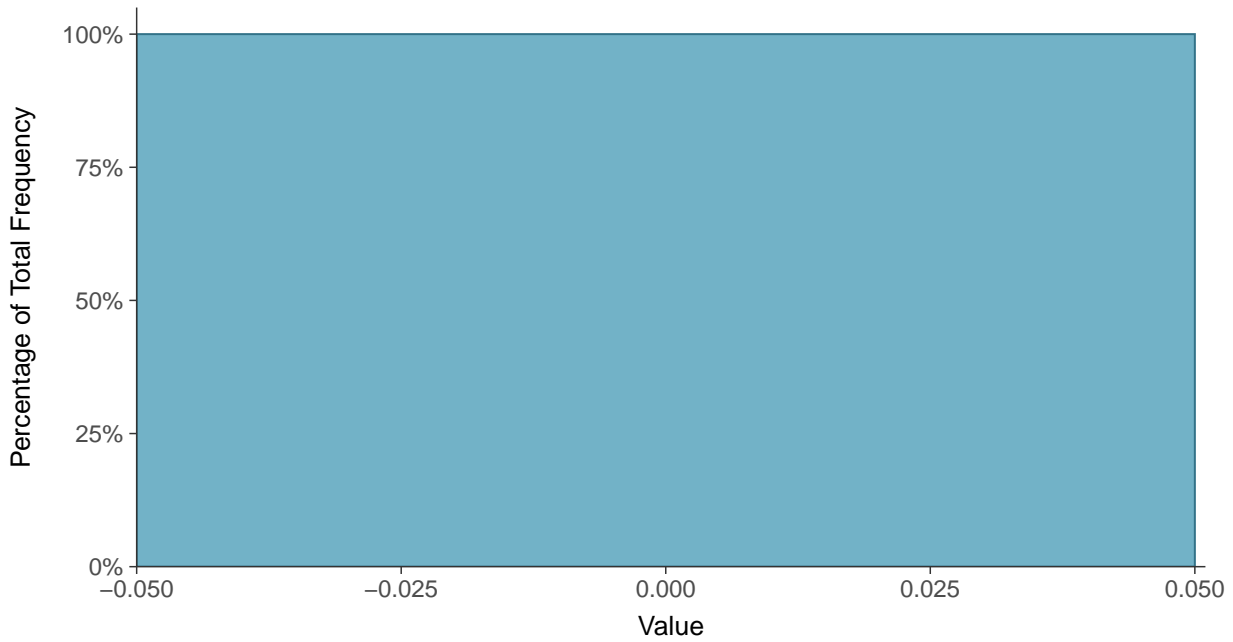
Scatter Plot

Antimony, MW-6 (mg/L)



Histogram

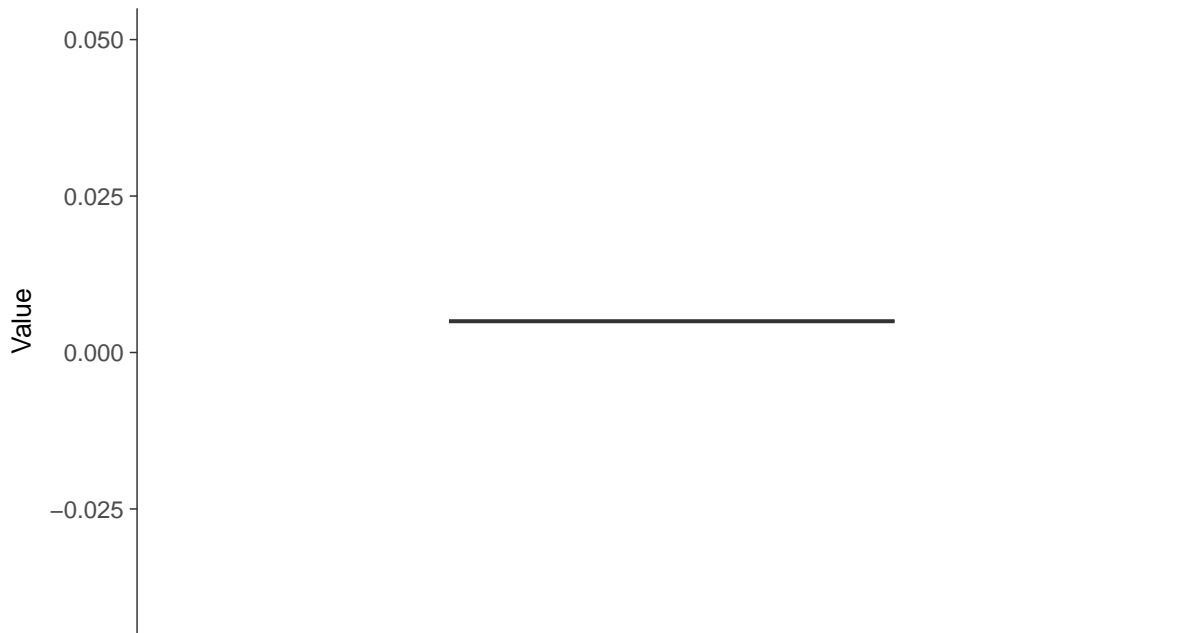
Antimony, MW-6 (mg/L)





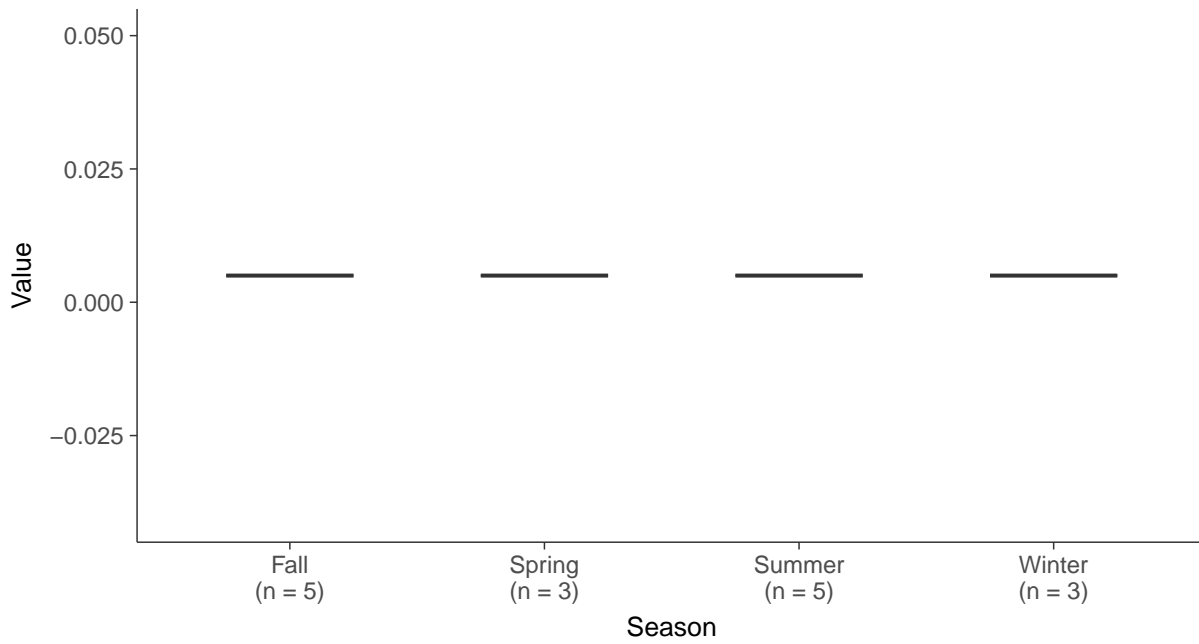
Boxplot

Antimony, MW-6 (mg/L)



Boxplot by Season

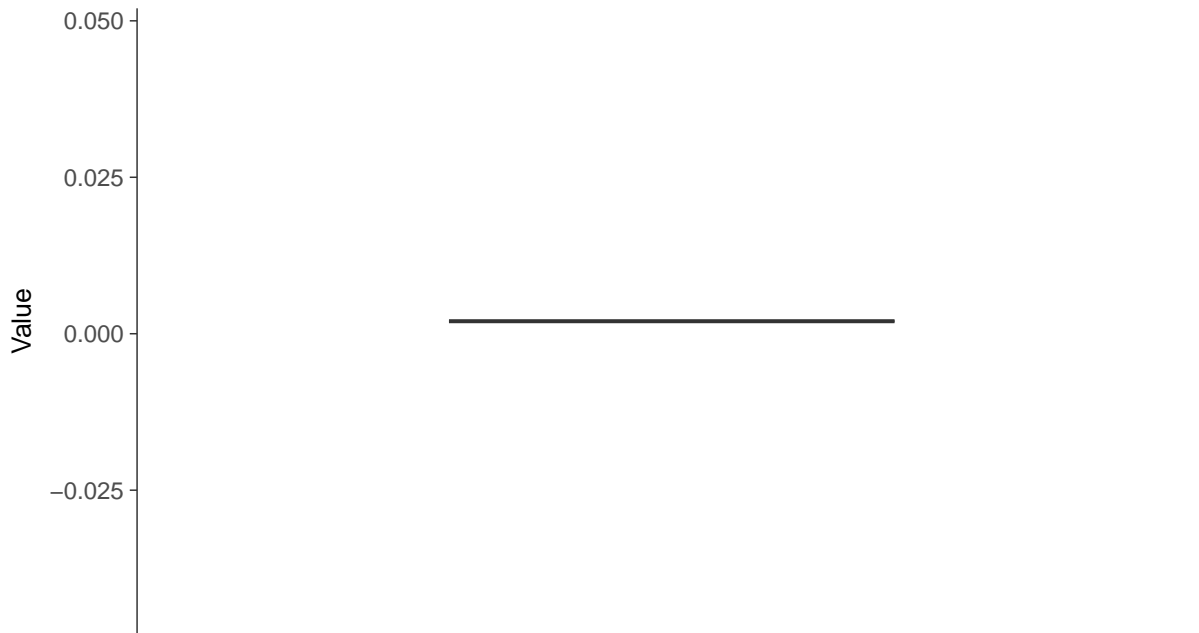
Antimony, MW-6 (mg/L)





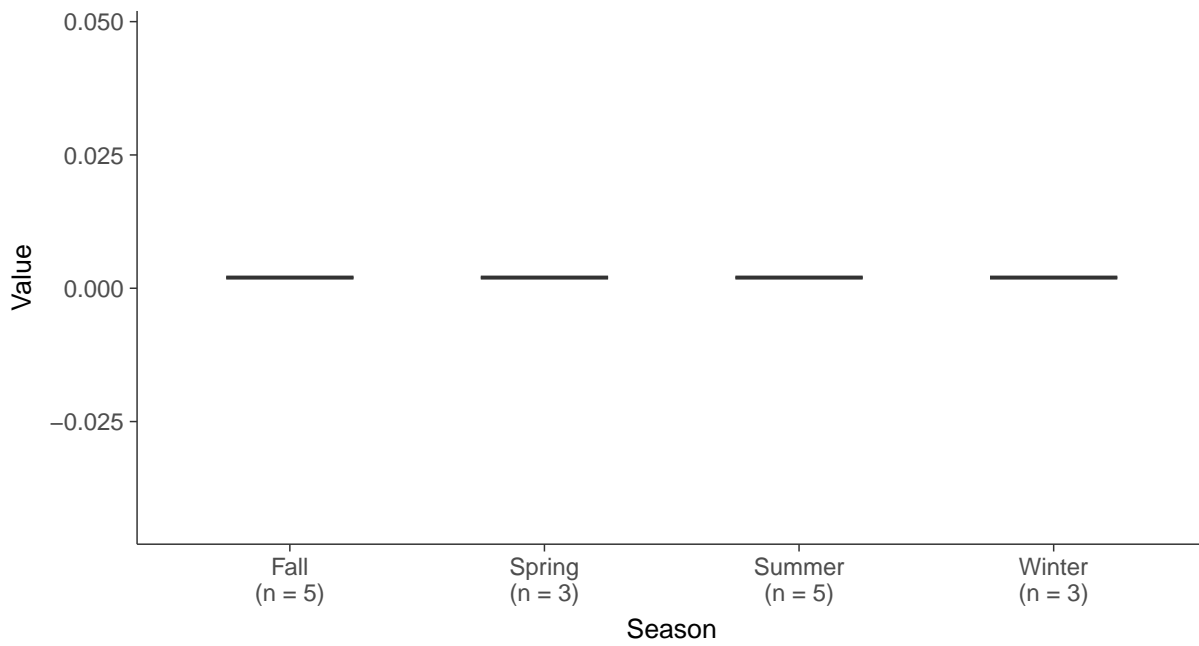
Boxplot

Arsenic, MW-6 (mg/L)



Boxplot by Season

Arsenic, MW-6 (mg/L)

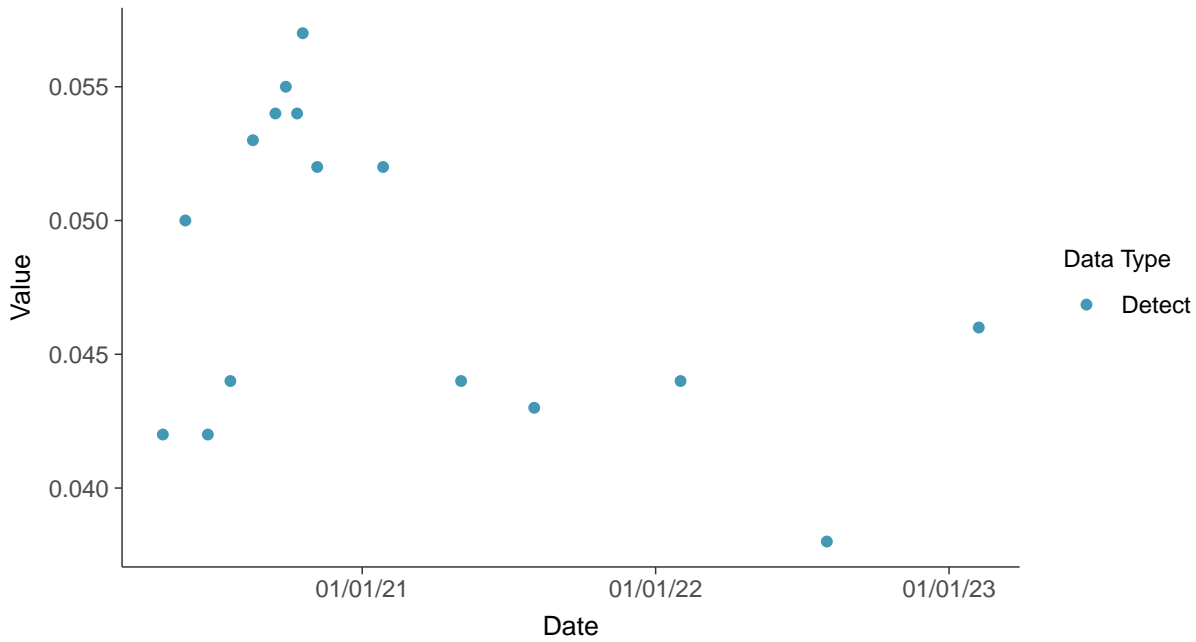


Appendix IV: Barium, MW-6

ID: 06_2_10

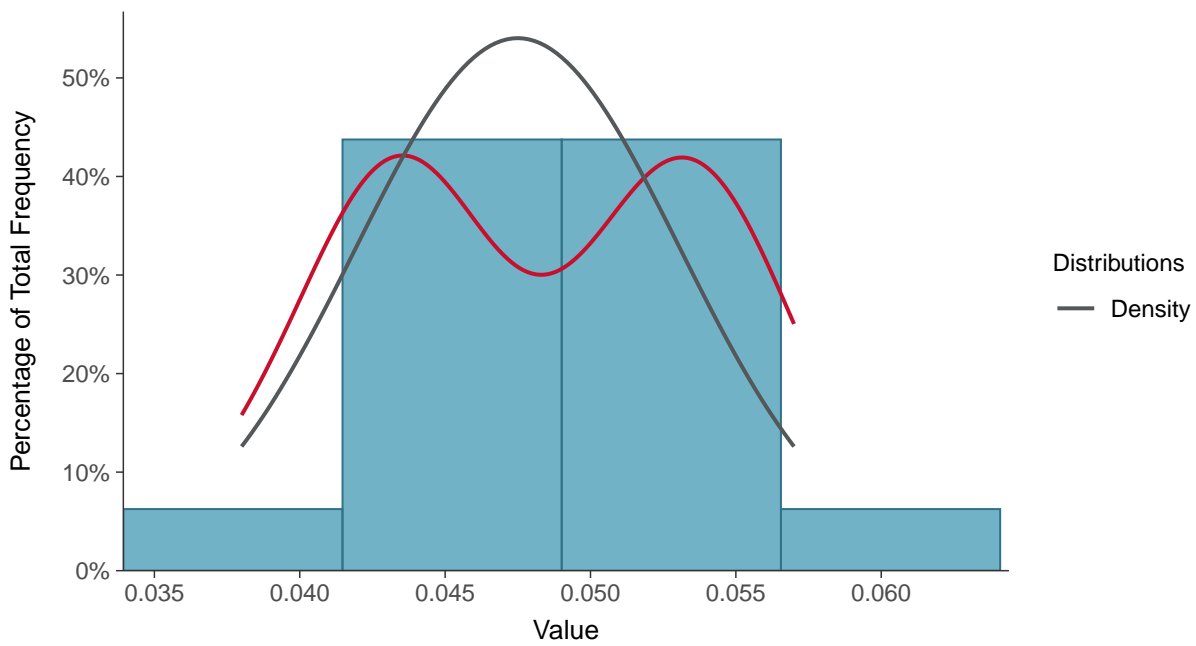
Scatter Plot

Barium, MW-6 (mg/L)



Histogram

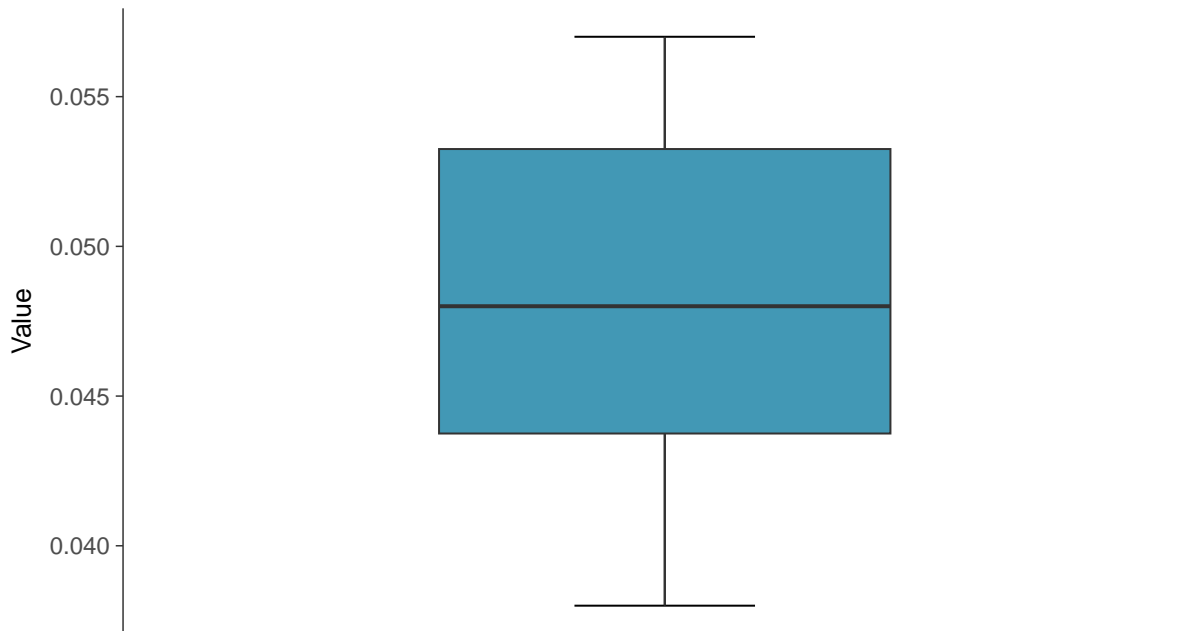
Barium, MW-6 (mg/L)





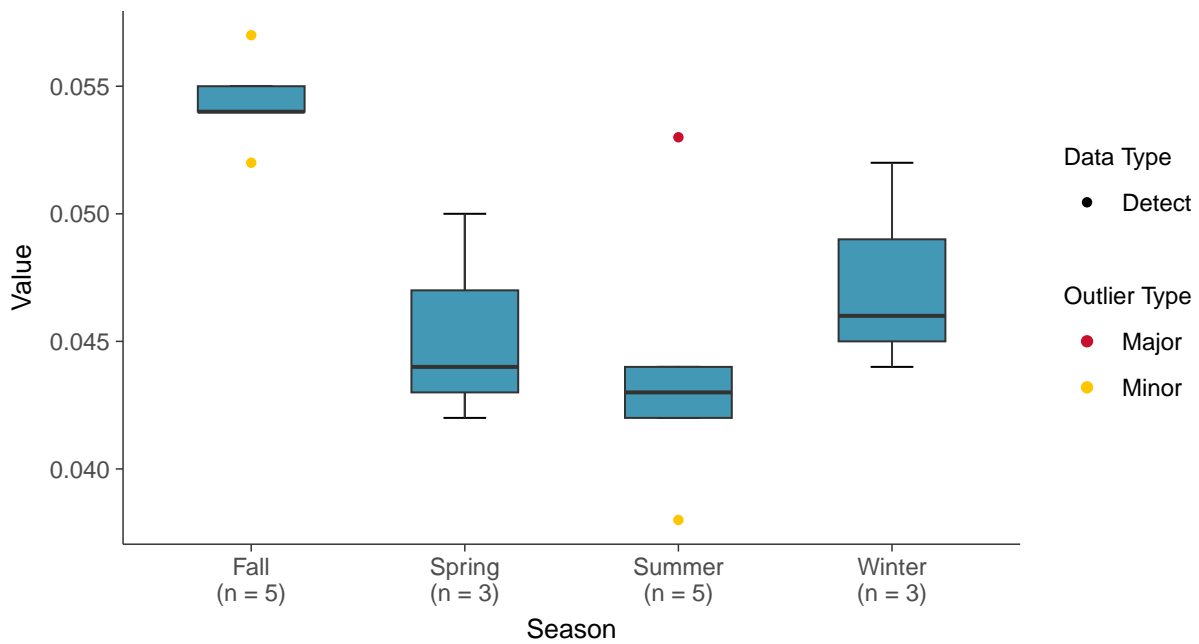
Boxplot

Barium, MW-6 (mg/L)



Boxplot by Season

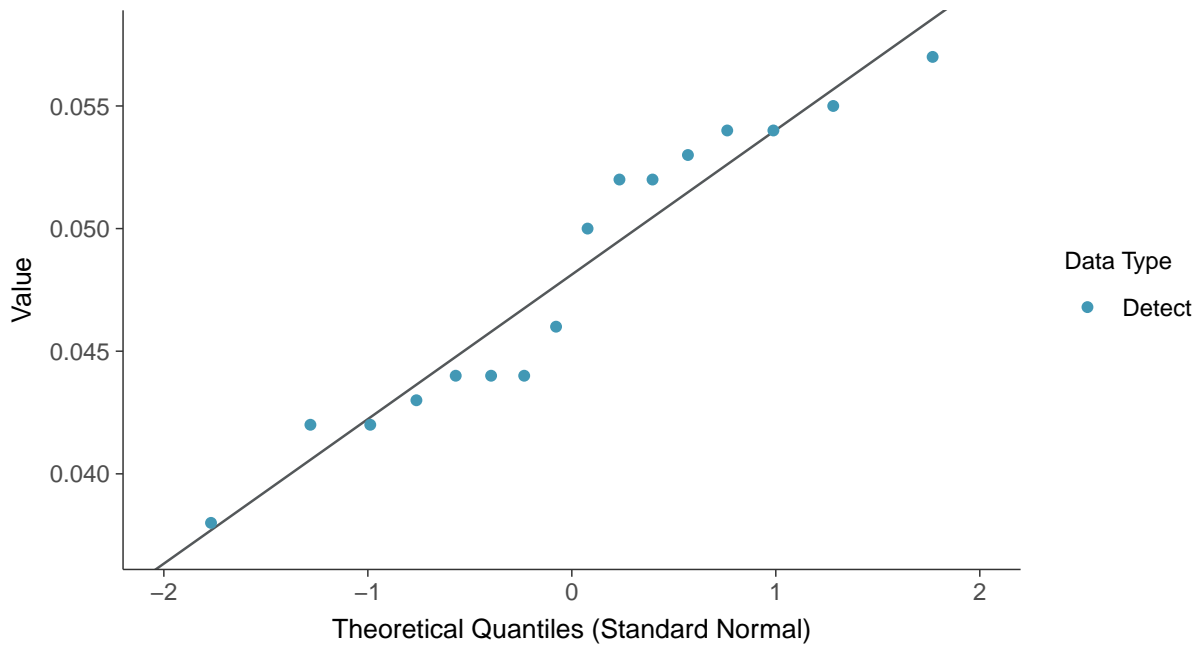
Barium, MW-6 (mg/L)





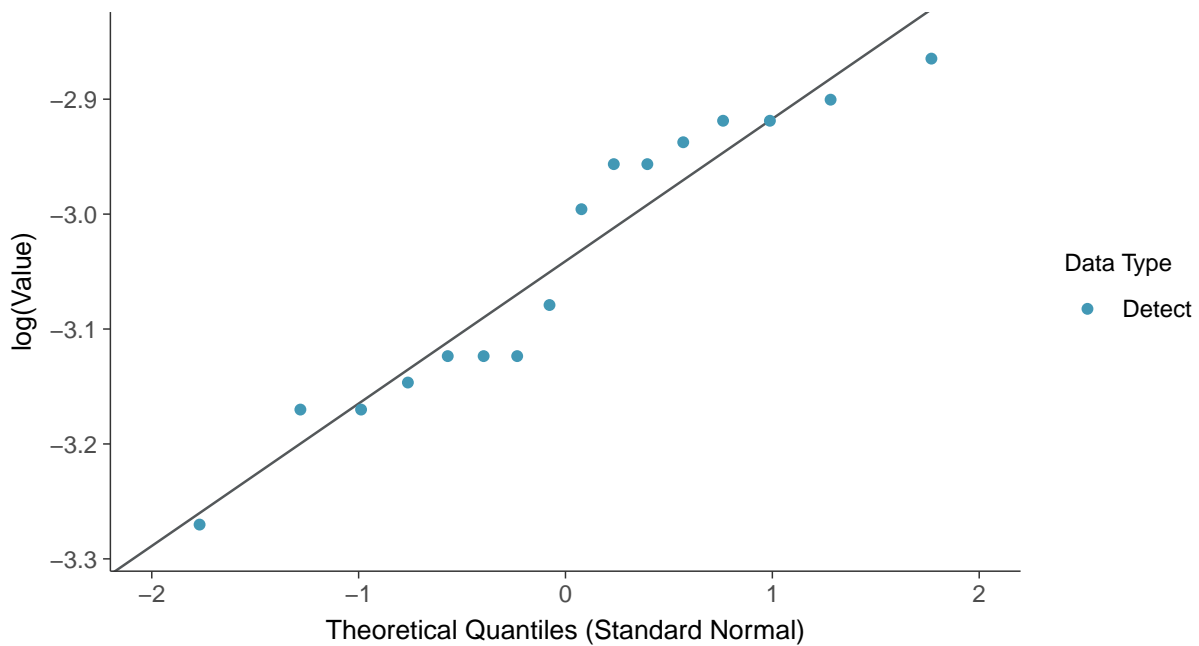
Normal Q-Q plot

Barium, MW-6 (mg/L)



Lognormal Q-Q plot

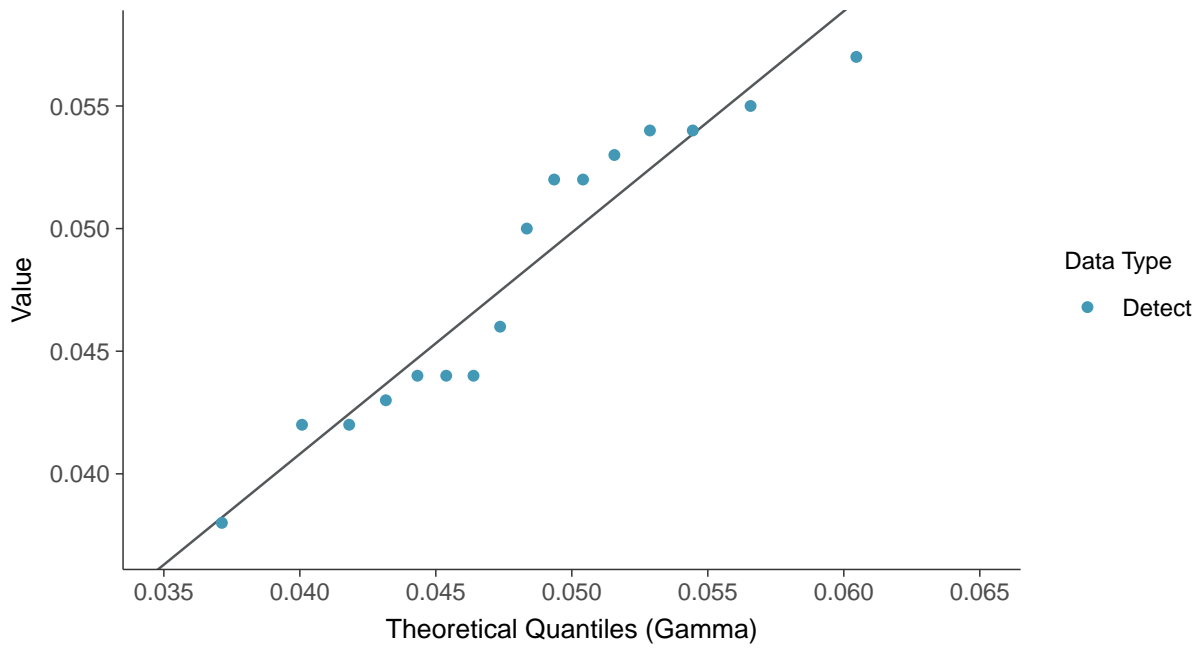
Barium, MW-6 (mg/L)





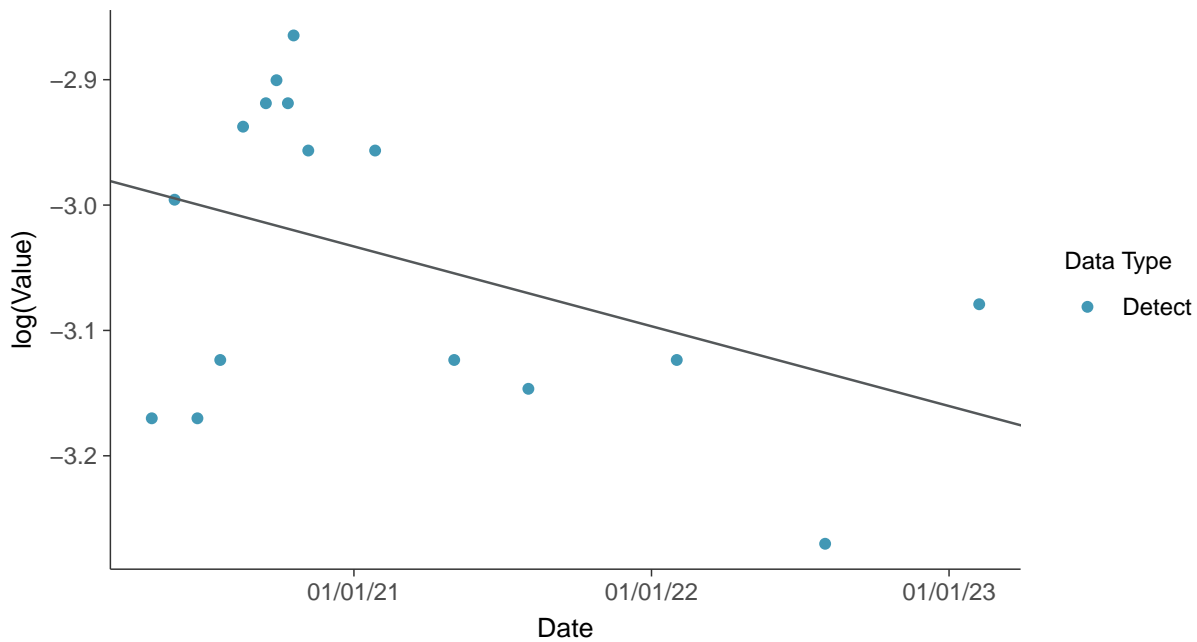
Gamma Q-Q plot

Barium, MW-6 (mg/L)



Trend Regression: Lognormal MLE

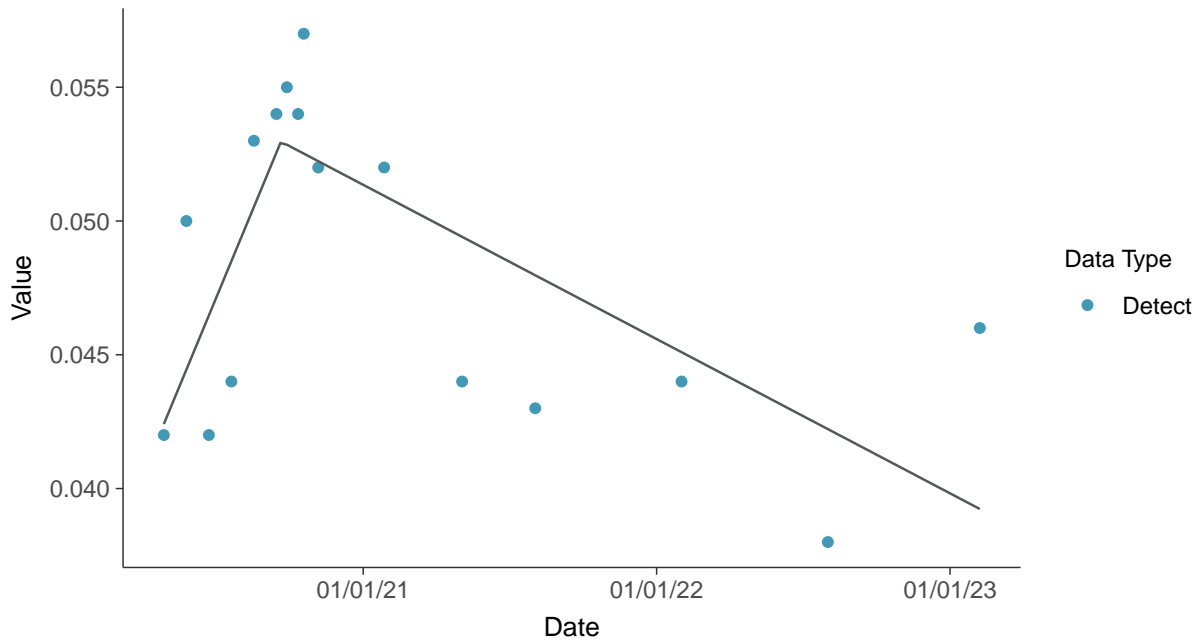
Barium, MW-6 (mg/L)





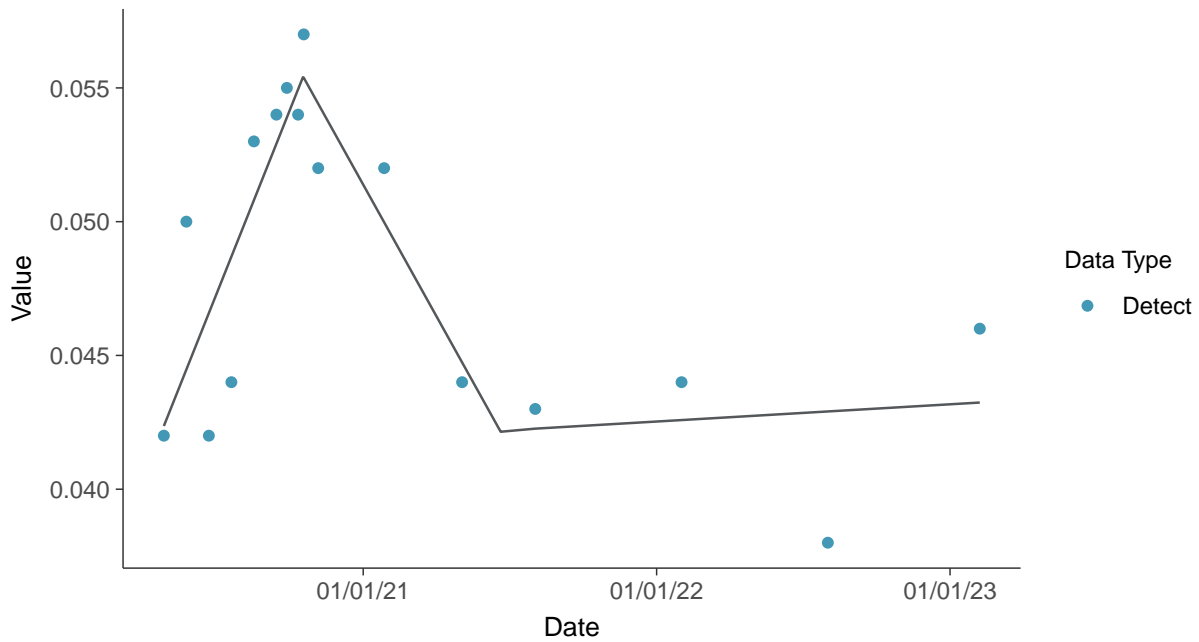
Trend Regression: Piecewise Linear-Linear

Barium, MW-6 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

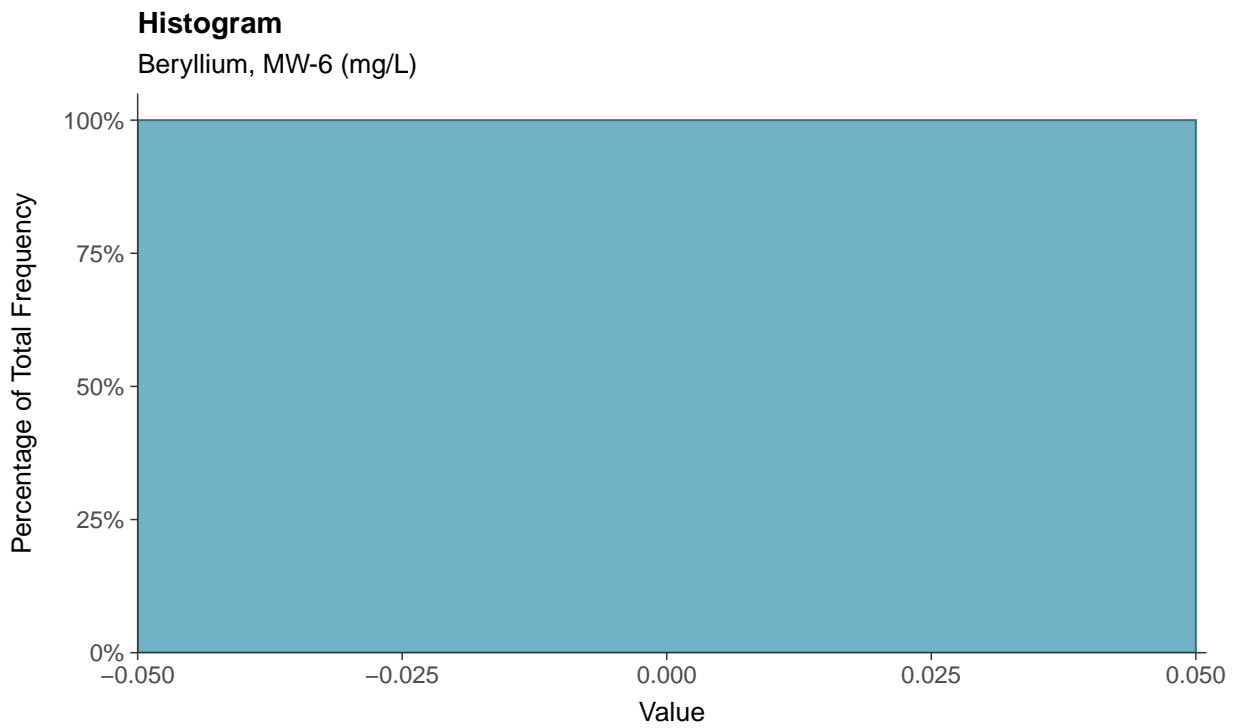
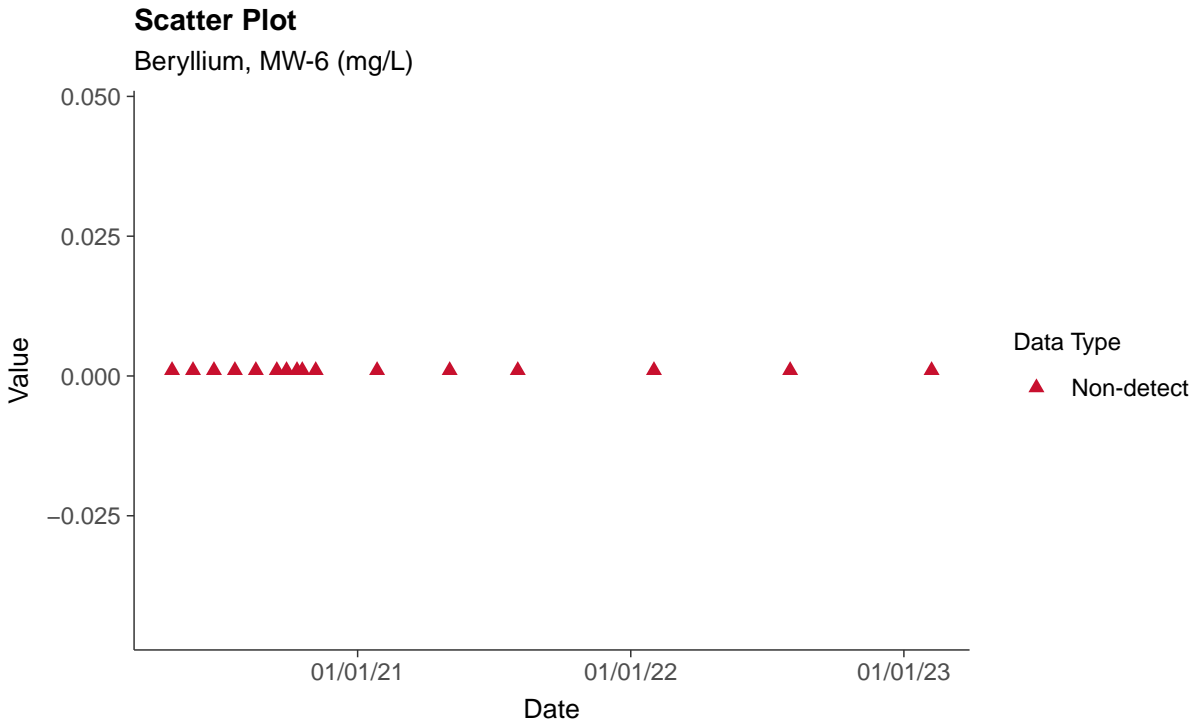
Barium, MW-6 (mg/L)





Appendix IV: Beryllium, MW-6

ID: 06_2_11





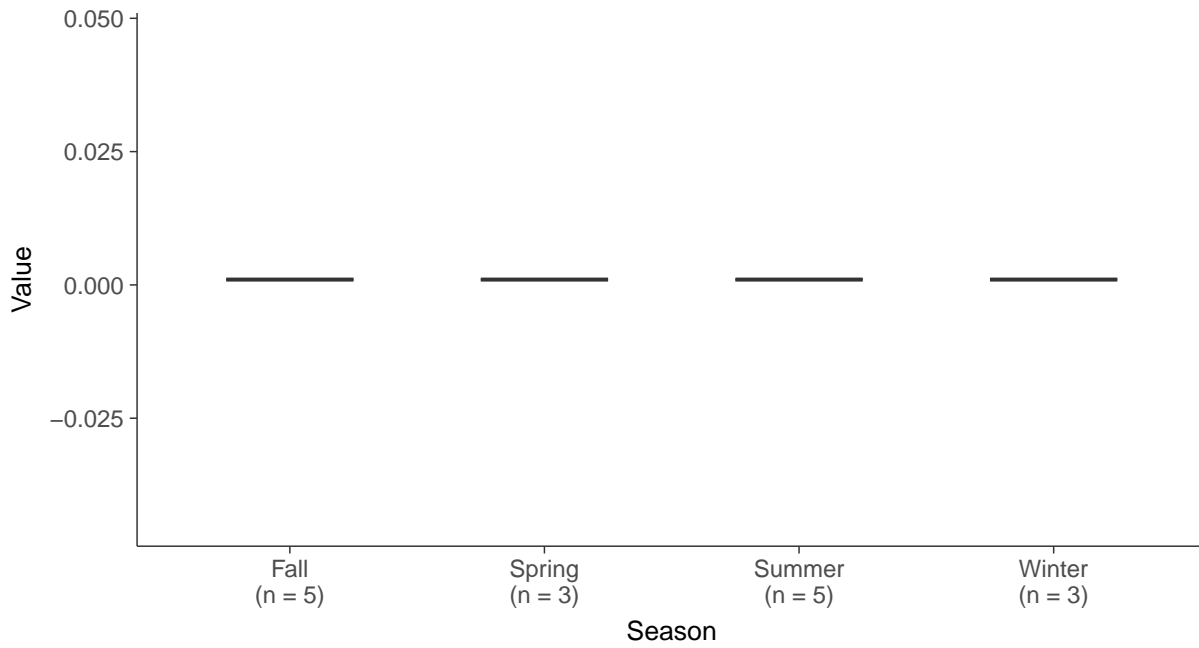
Boxplot

Beryllium, MW-6 (mg/L)



Boxplot by Season

Beryllium, MW-6 (mg/L)

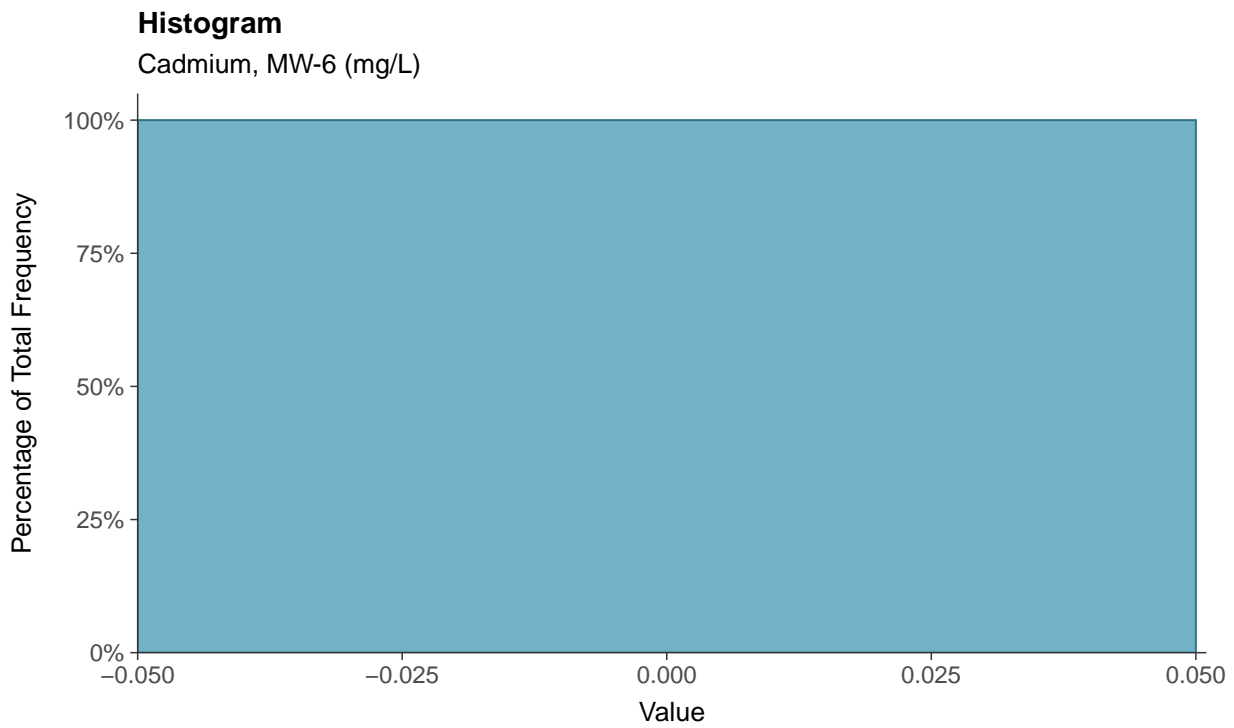
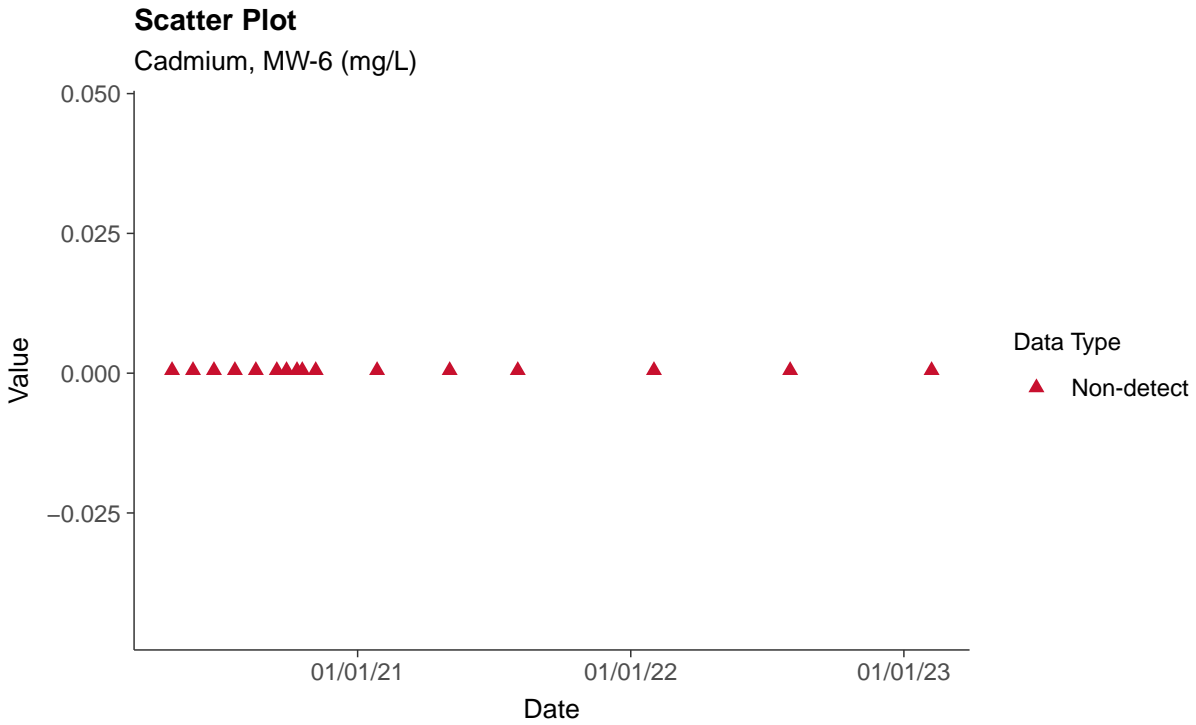




Downgradient Wells MW-2, MW-3, MW-5, MW-6, MW-7, MW-7B, MW-8, MW-9, MW-10, MW-13, MW-14, MW-15

Appendix IV: Cadmium, MW-6

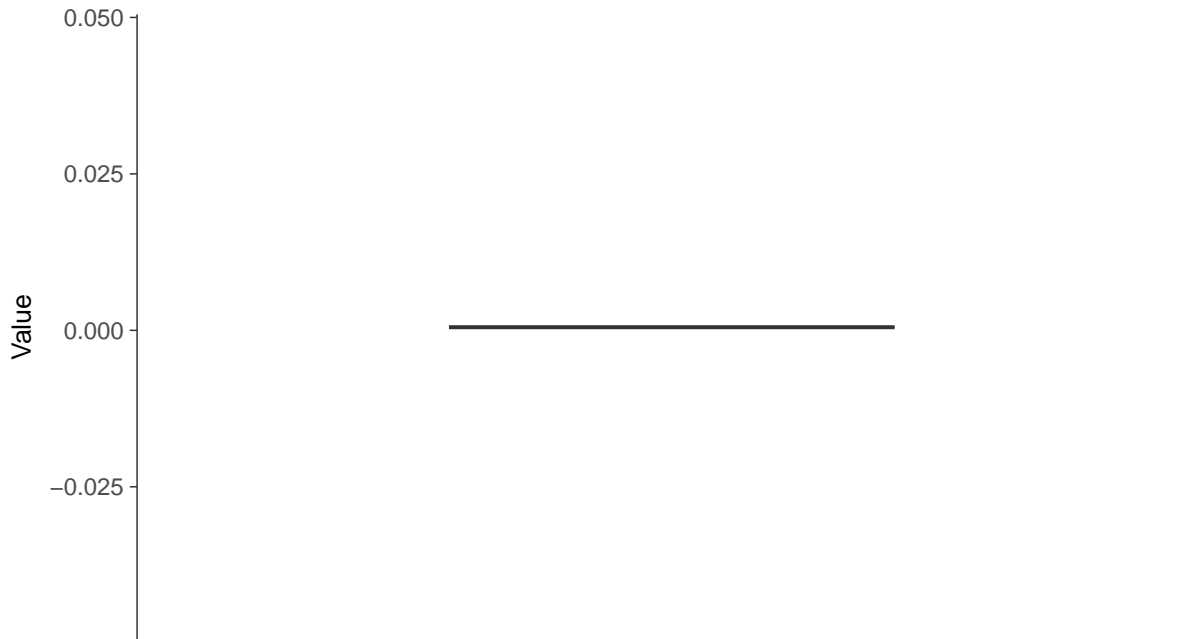
ID: 06_2_13





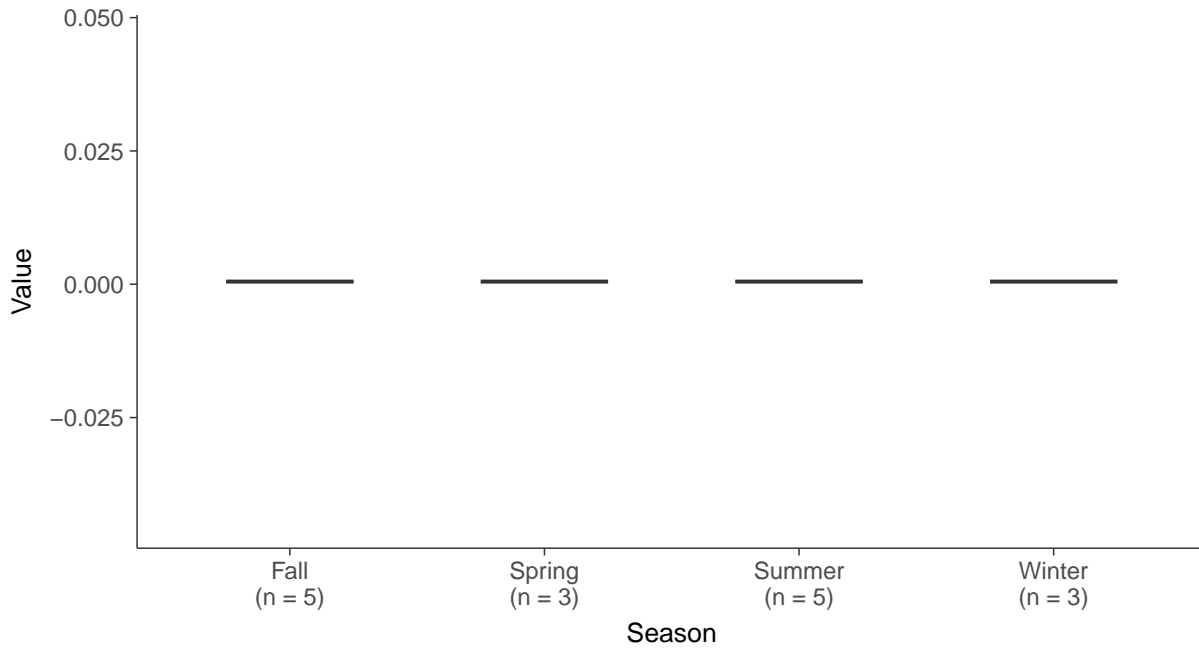
Boxplot

Cadmium, MW-6 (mg/L)



Boxplot by Season

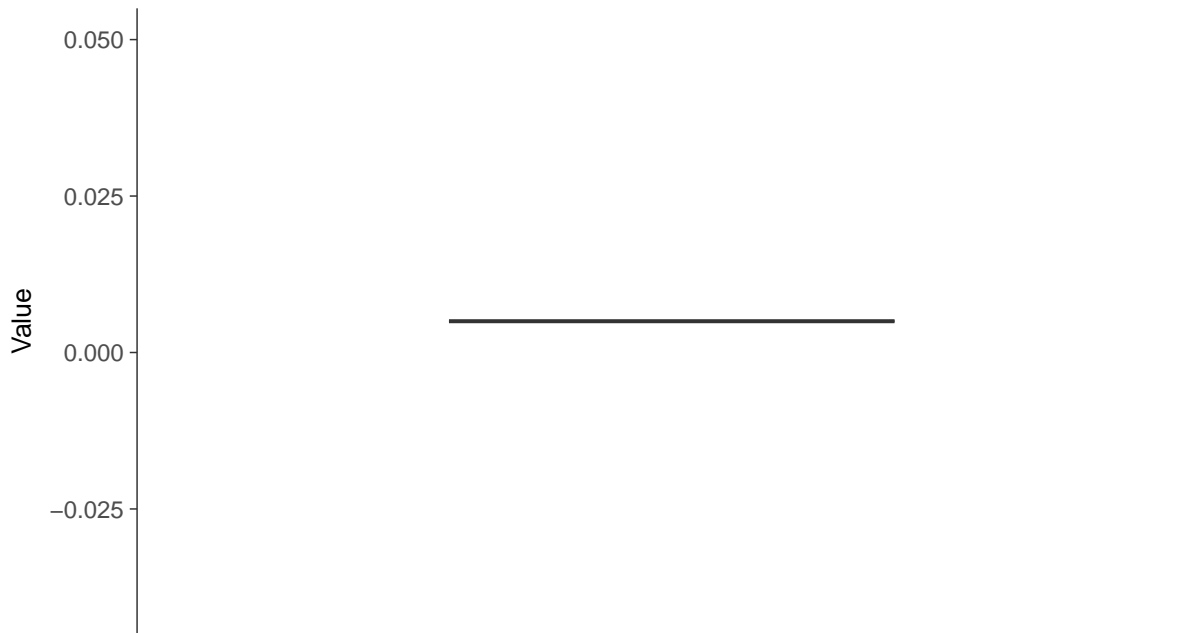
Cadmium, MW-6 (mg/L)





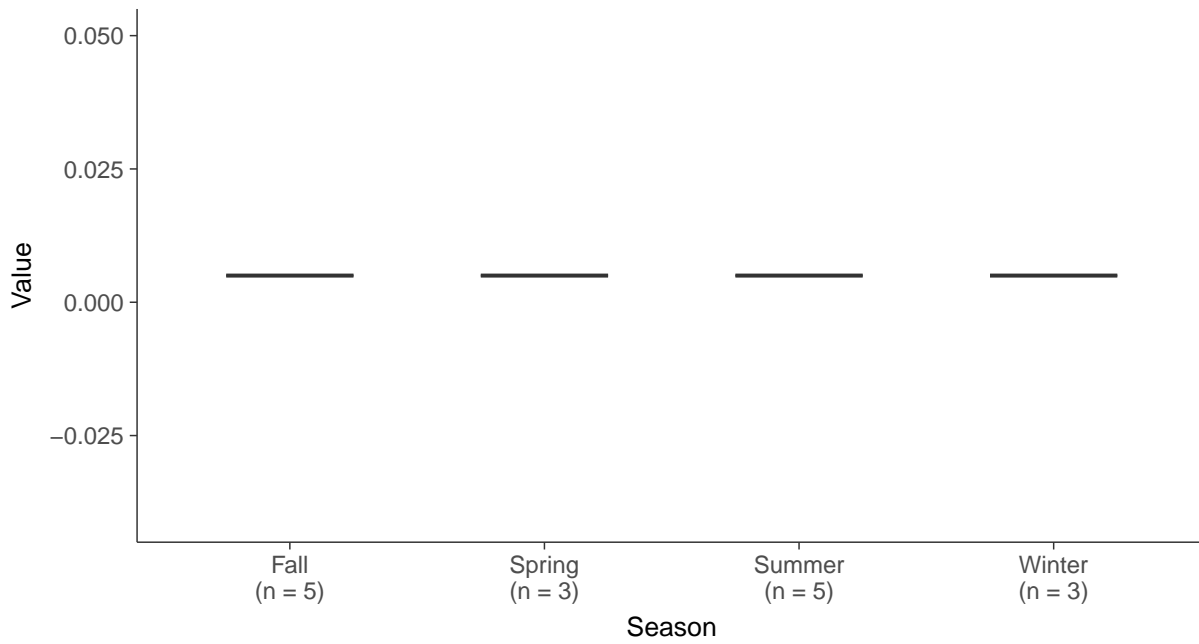
Boxplot

Chromium, MW-6 (mg/L)



Boxplot by Season

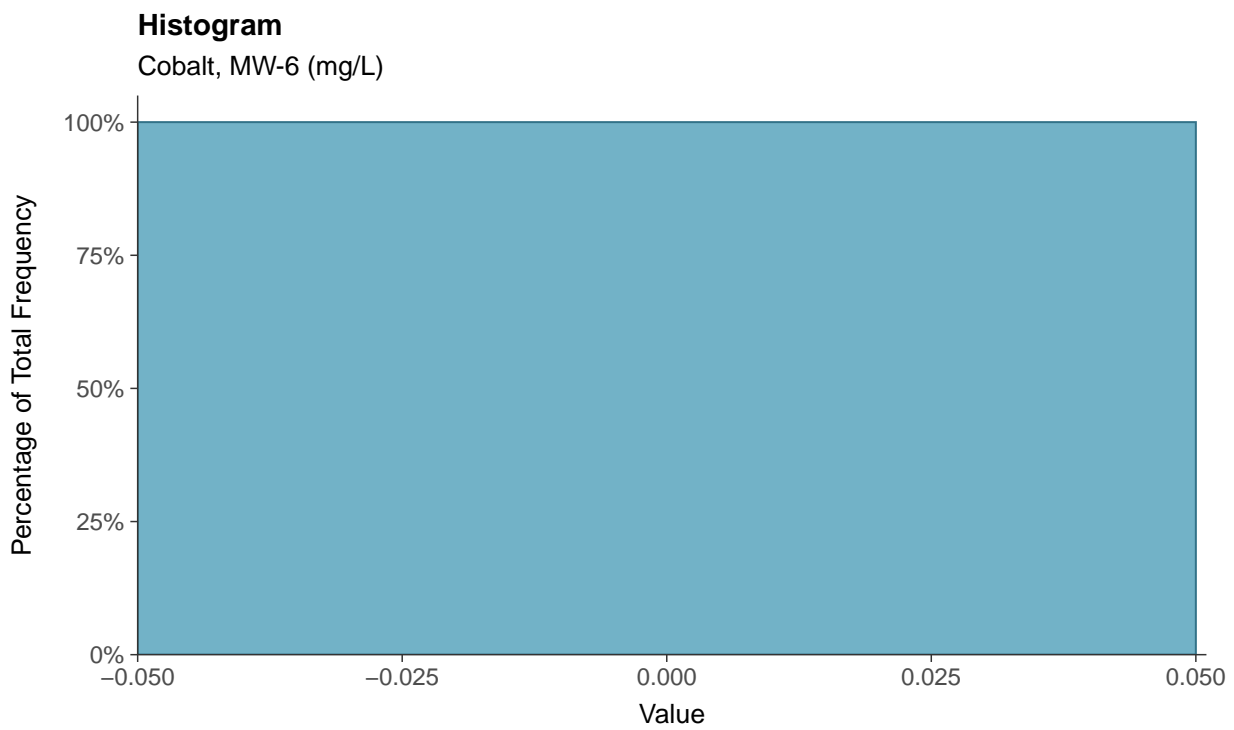
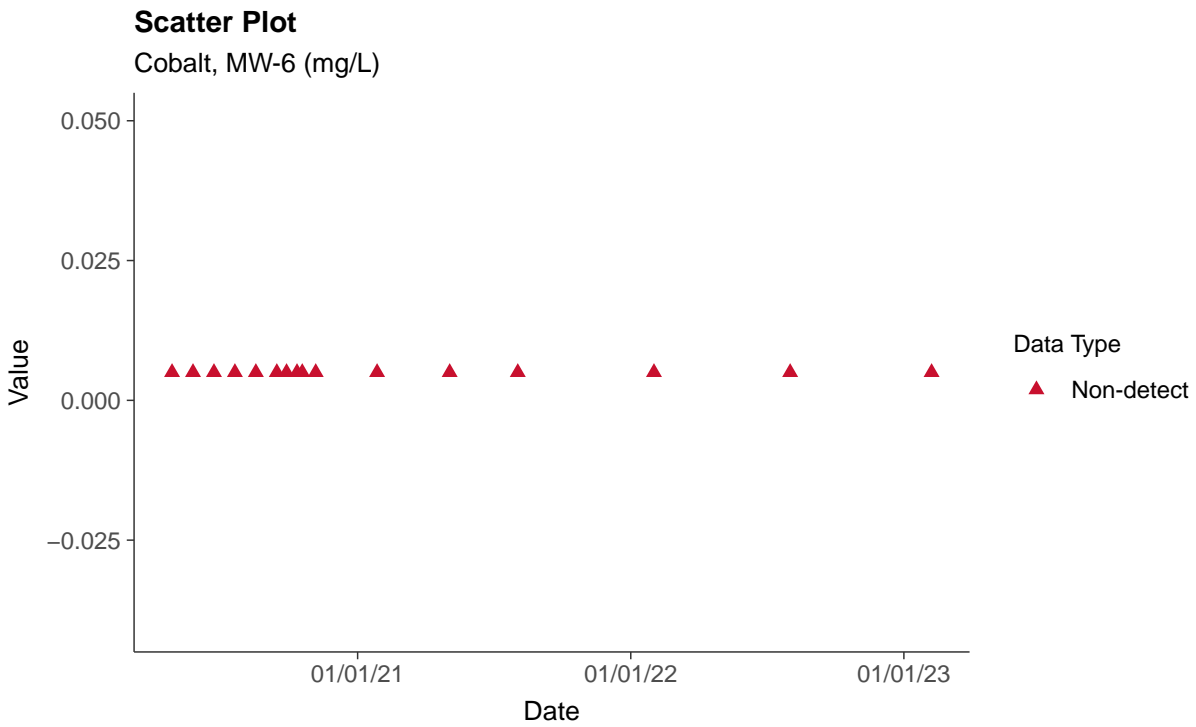
Chromium, MW-6 (mg/L)





Appendix IV: Cobalt, MW-6

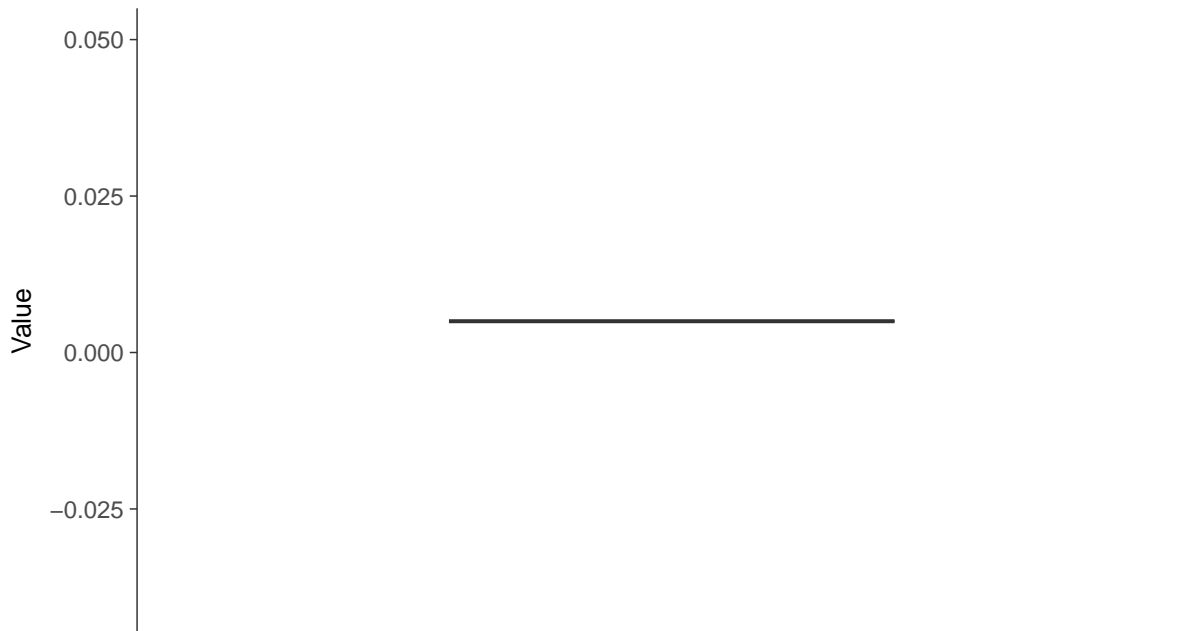
ID: 06_2_16





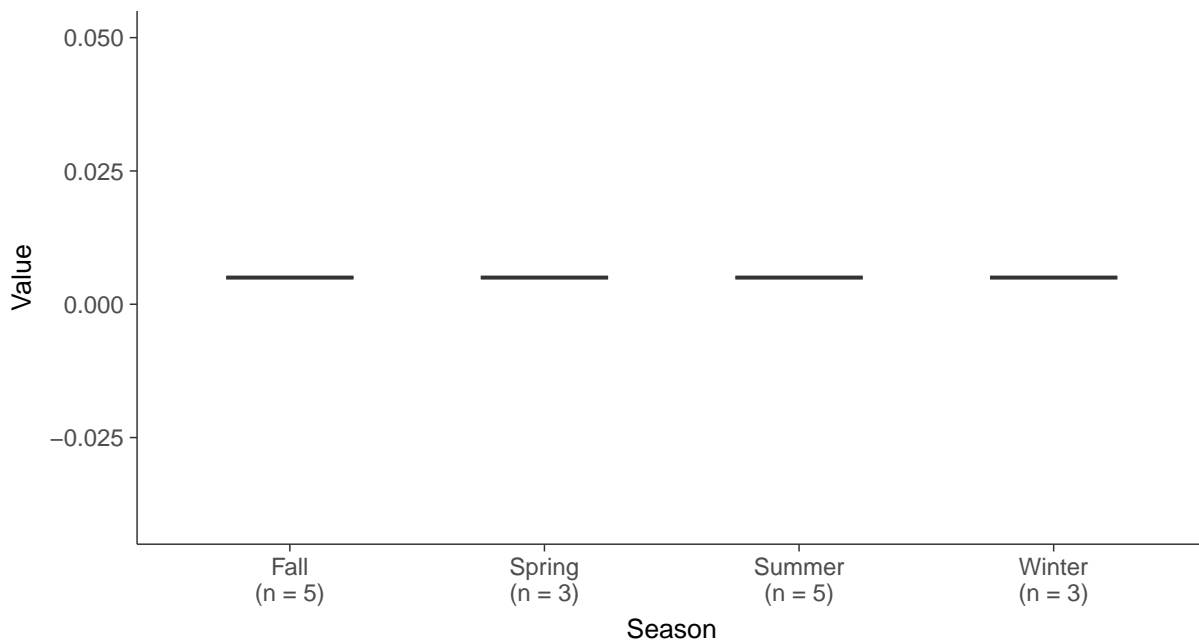
Boxplot

Cobalt, MW-6 (mg/L)



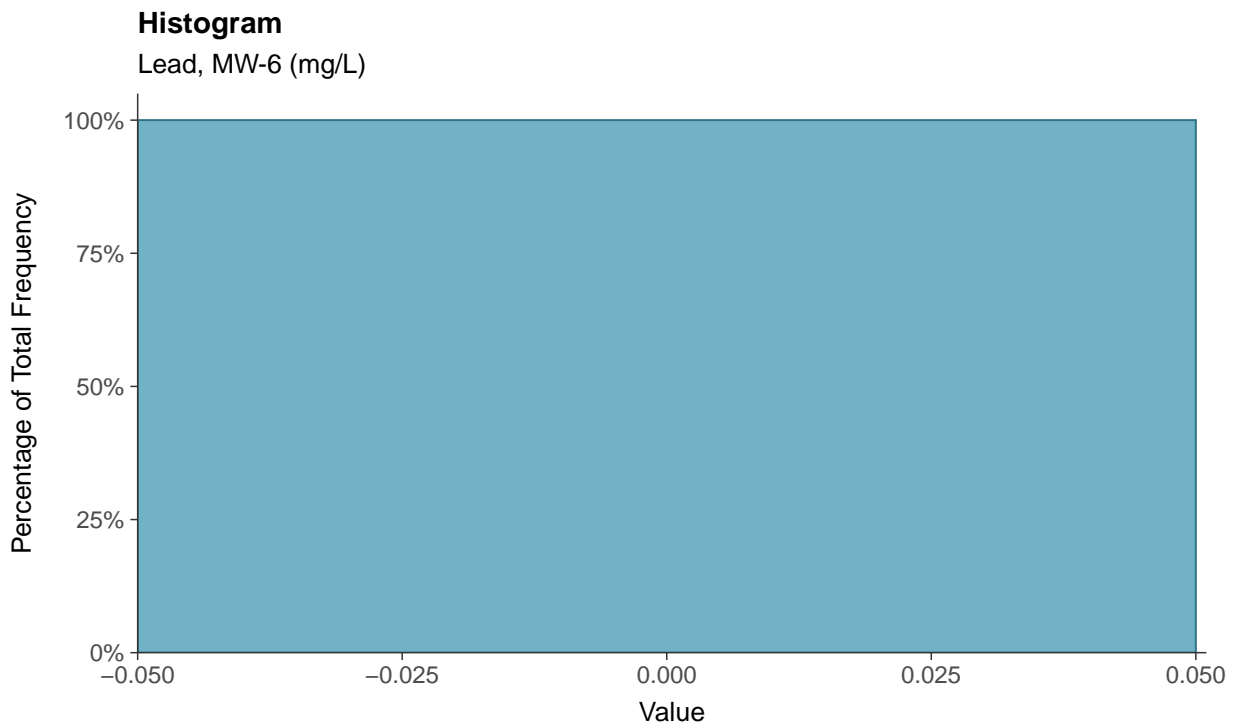
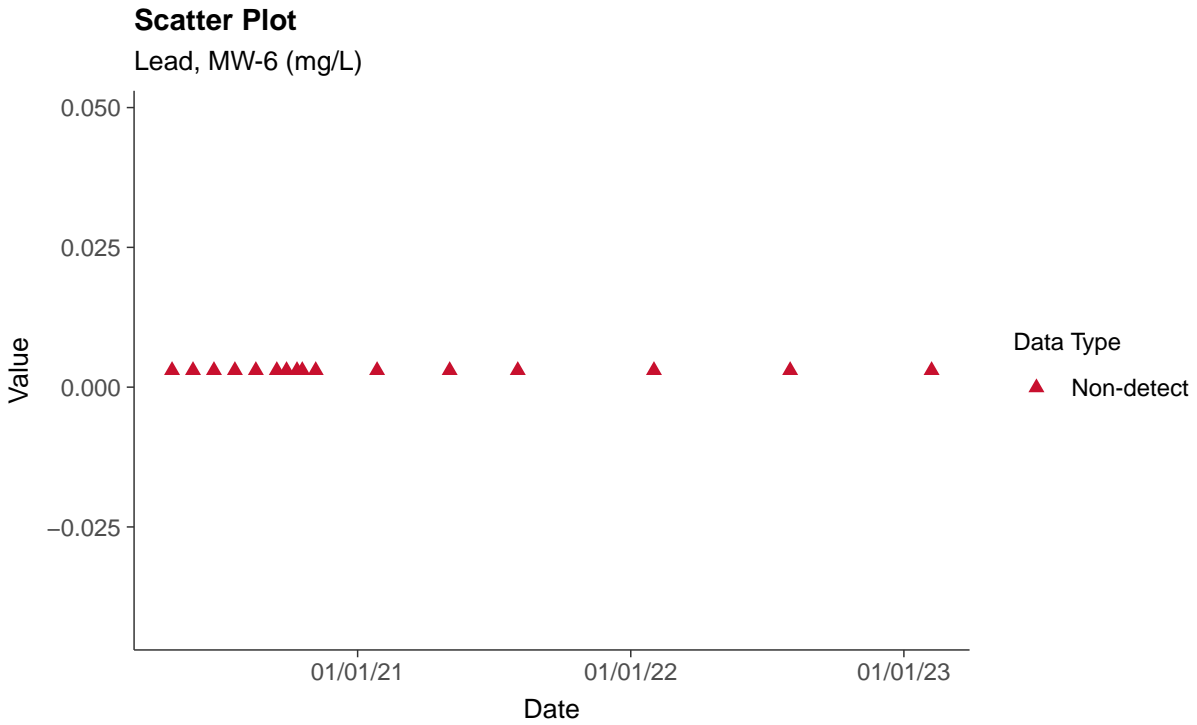
Boxplot by Season

Cobalt, MW-6 (mg/L)



Appendix IV: Lead, MW-6

ID: 06_2_18





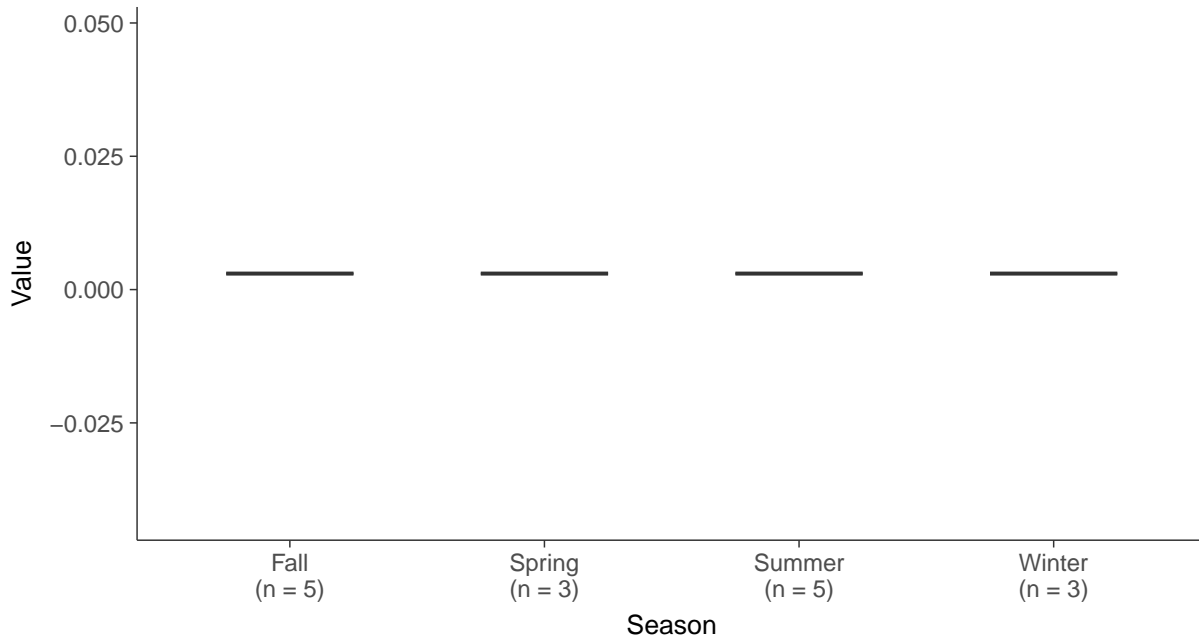
Boxplot

Lead, MW-6 (mg/L)



Boxplot by Season

Lead, MW-6 (mg/L)



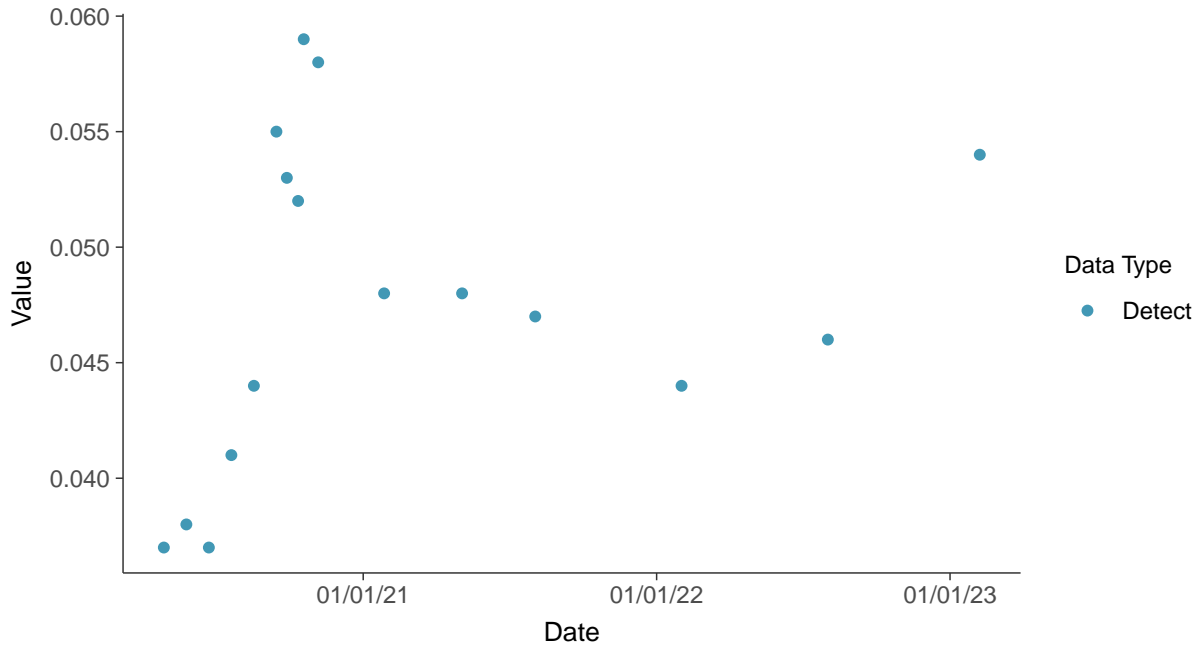


Appendix IV: Lithium, MW-6

ID: 06_2_19

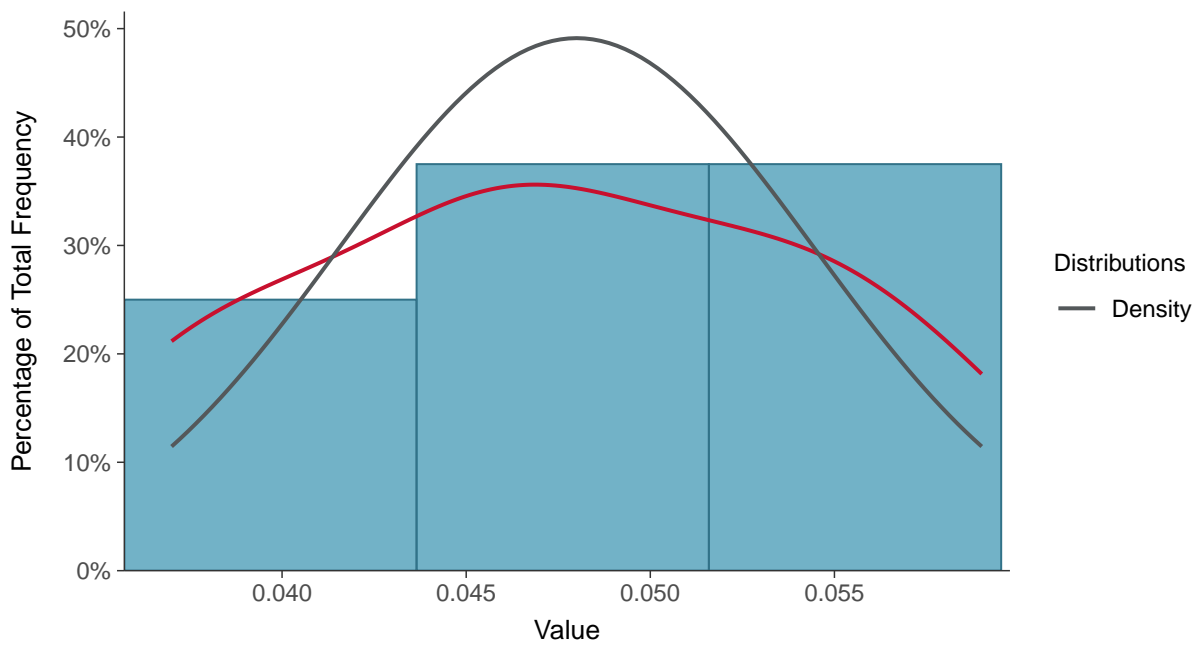
Scatter Plot

Lithium, MW-6 (mg/L)



Histogram

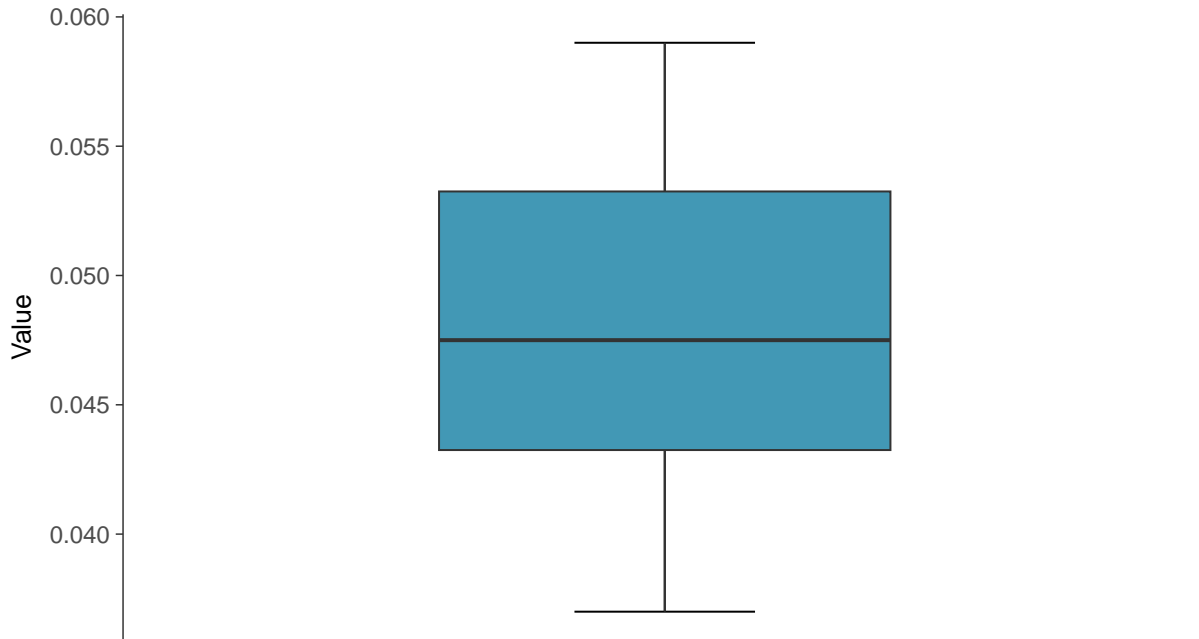
Lithium, MW-6 (mg/L)





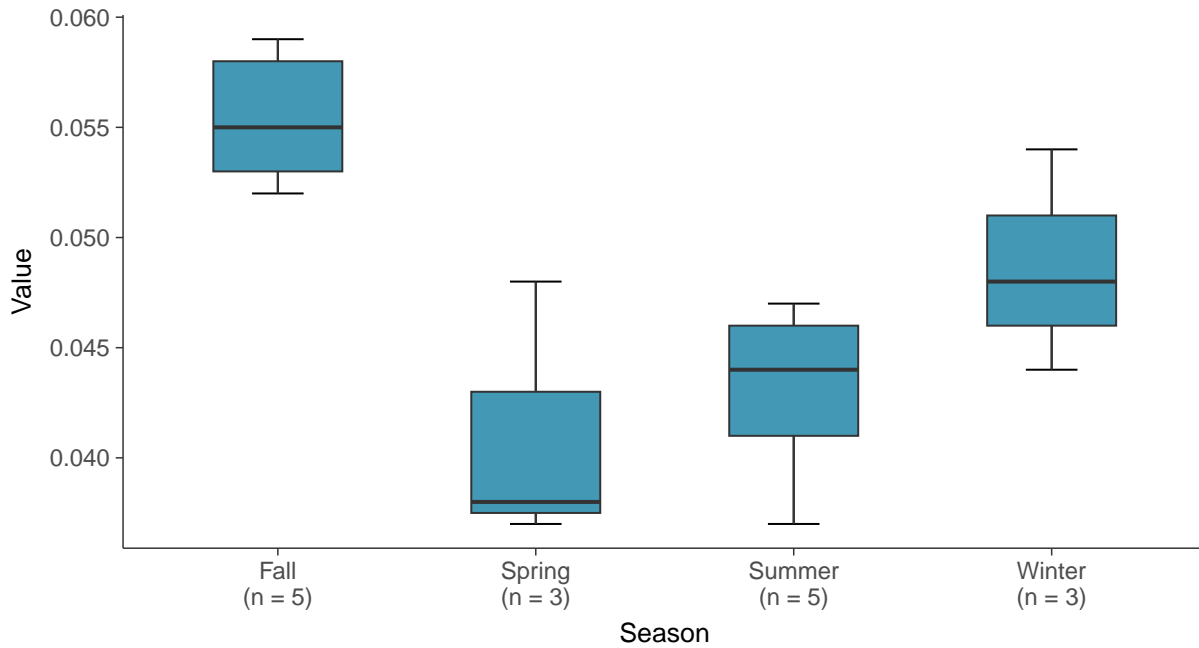
Boxplot

Lithium, MW-6 (mg/L)



Boxplot by Season

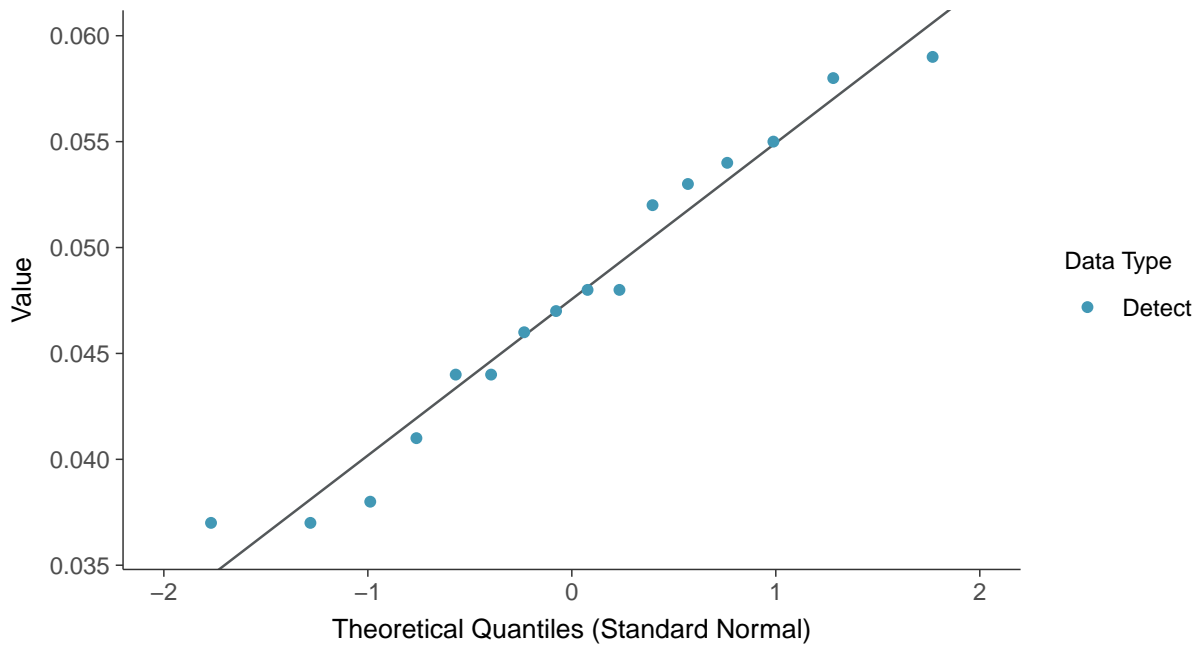
Lithium, MW-6 (mg/L)





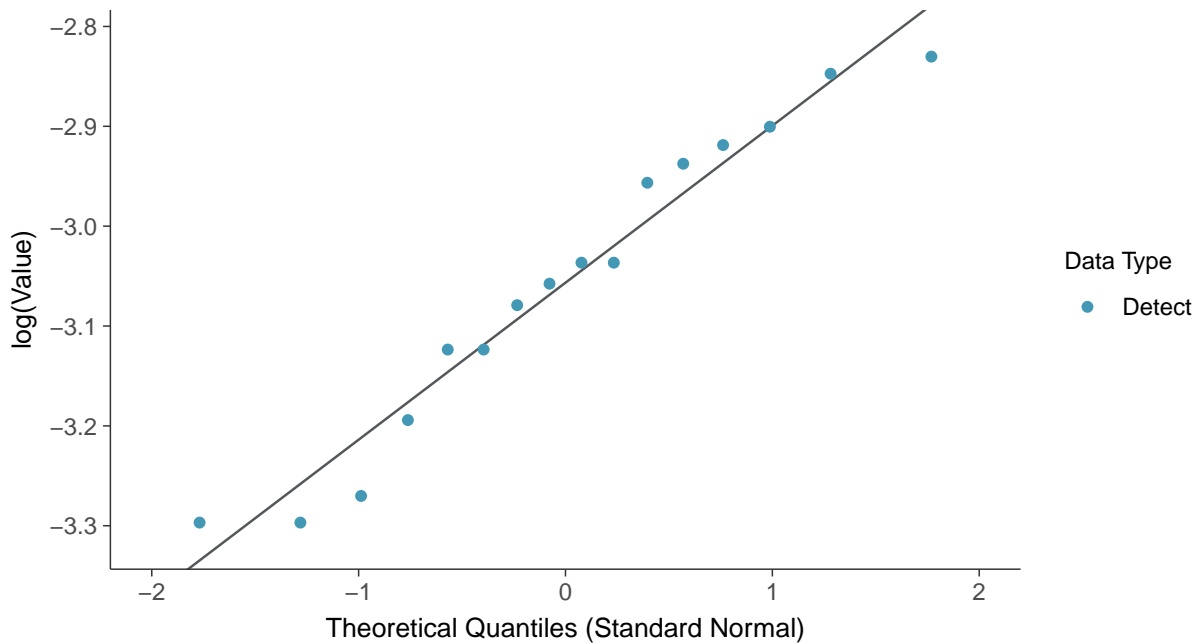
Normal Q-Q plot

Lithium, MW-6 (mg/L)



Lognormal Q-Q plot

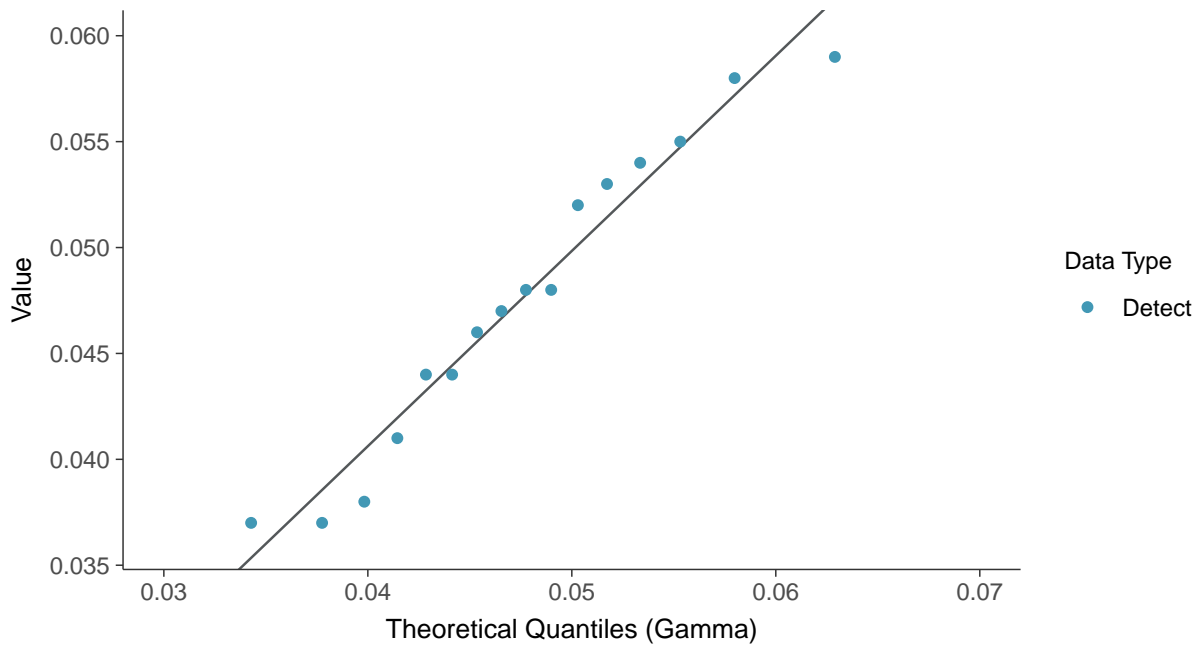
Lithium, MW-6 (mg/L)





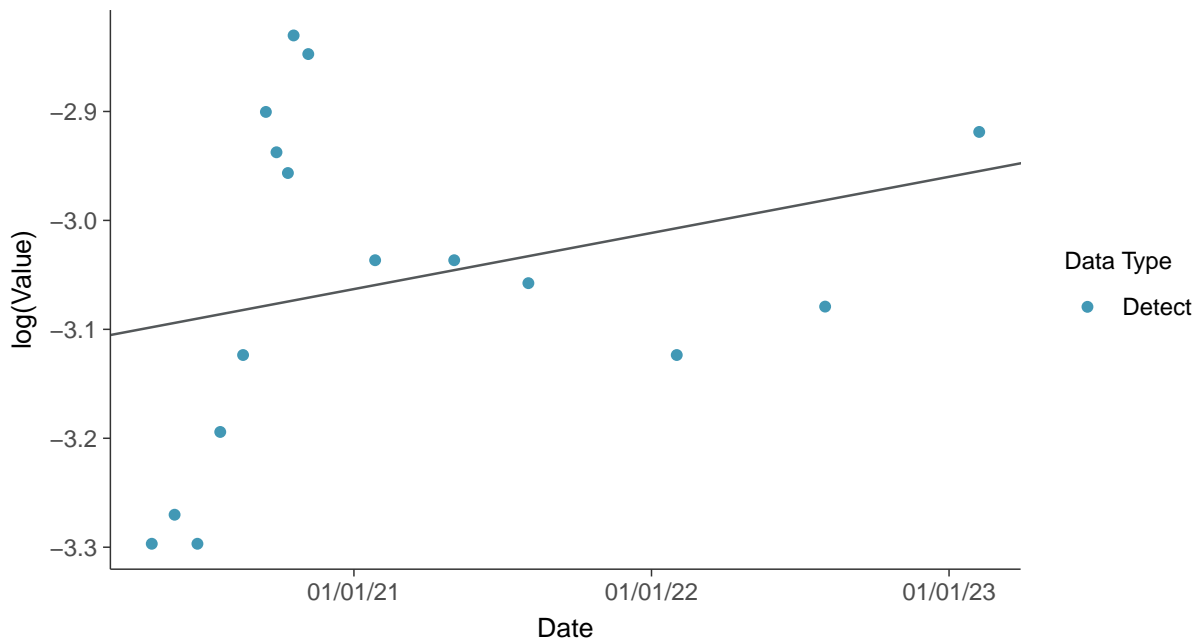
Gamma Q-Q plot

Lithium, MW-6 (mg/L)



Trend Regression: Lognormal MLE

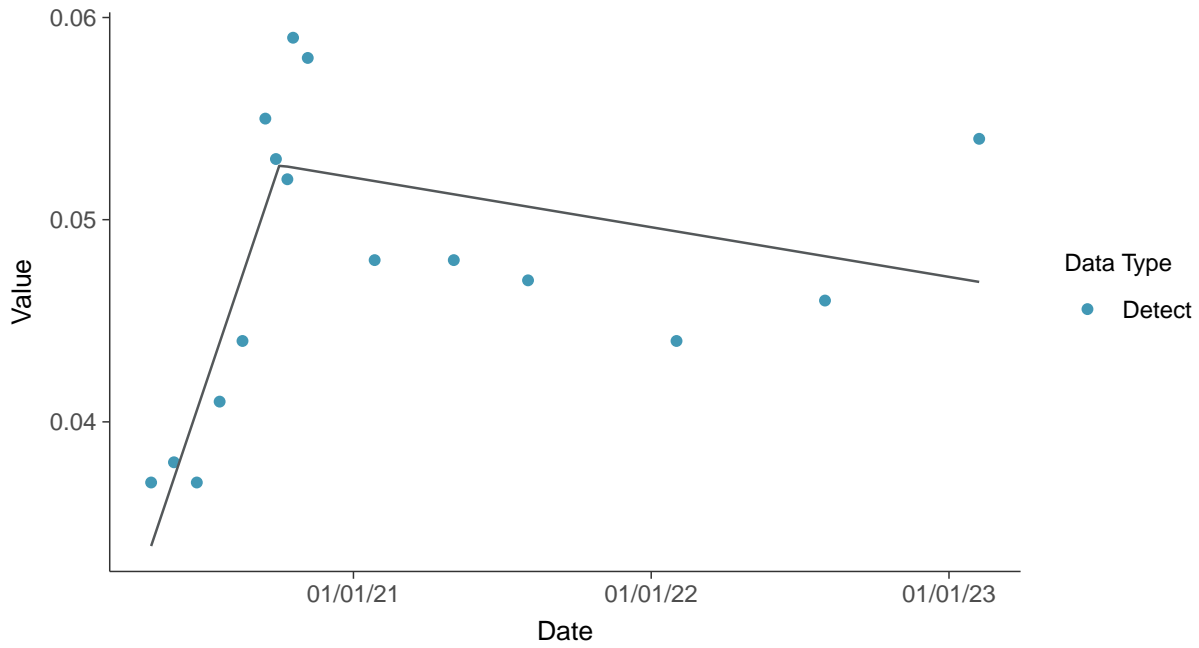
Lithium, MW-6 (mg/L)





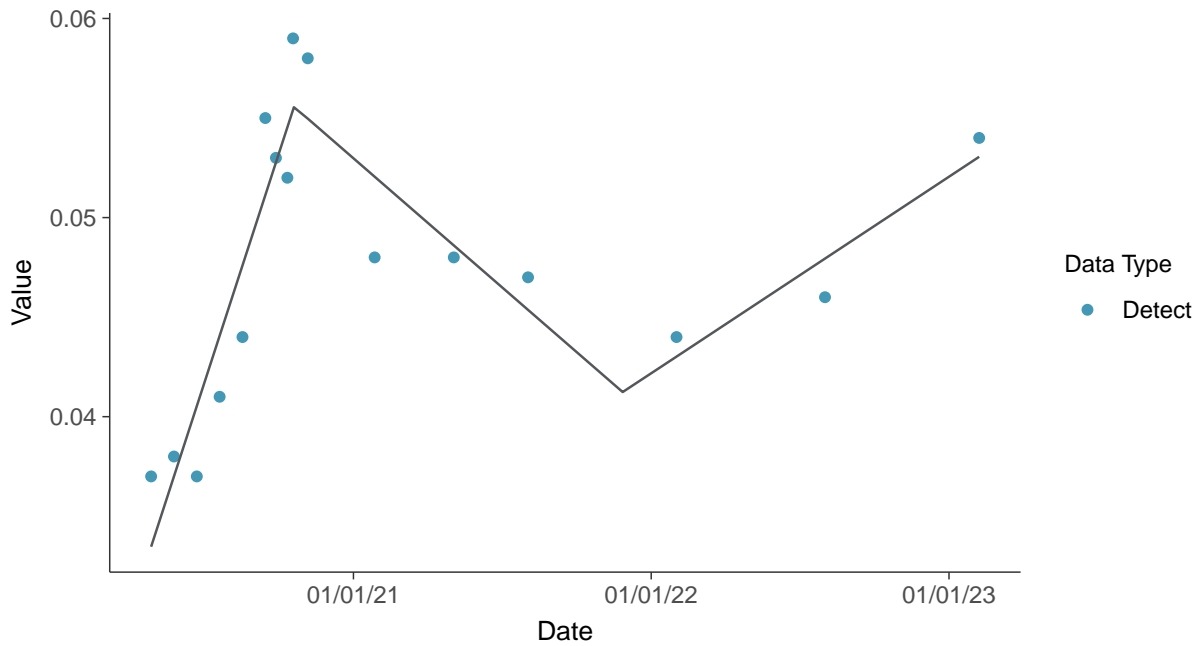
Trend Regression: Piecewise Linear-Linear

Lithium, MW-6 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Lithium, MW-6 (mg/L)

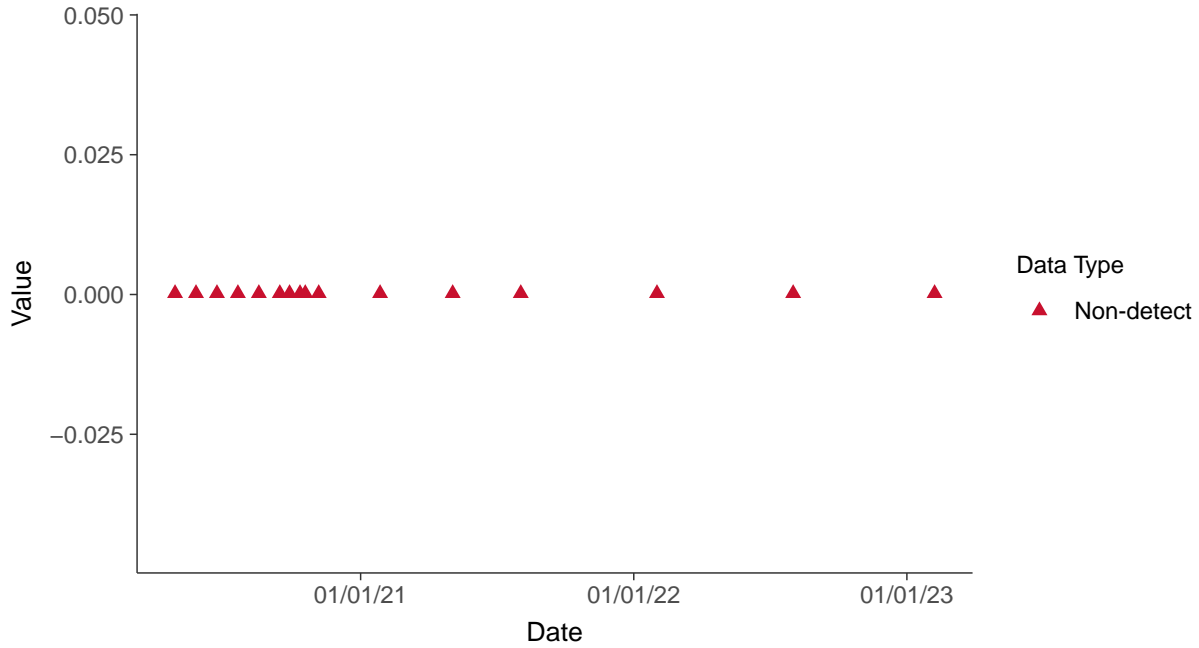


Appendix IV: Mercury, MW-6

ID: 06_2_21

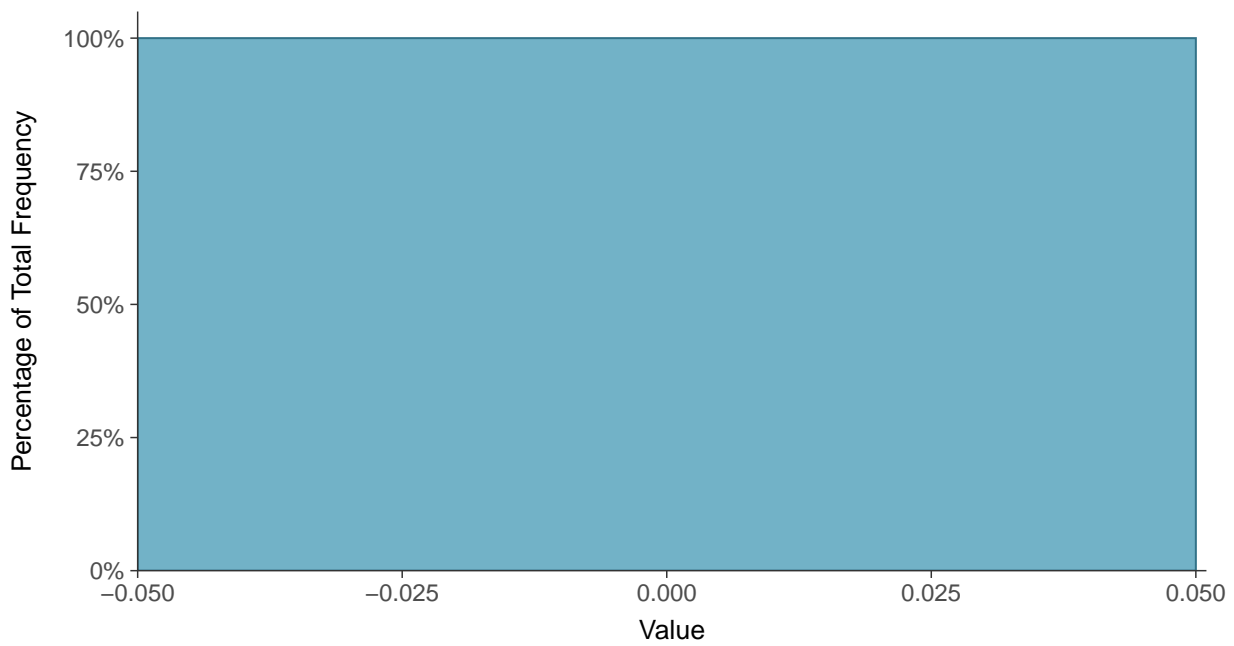
Scatter Plot

Mercury, MW-6 (mg/L)



Histogram

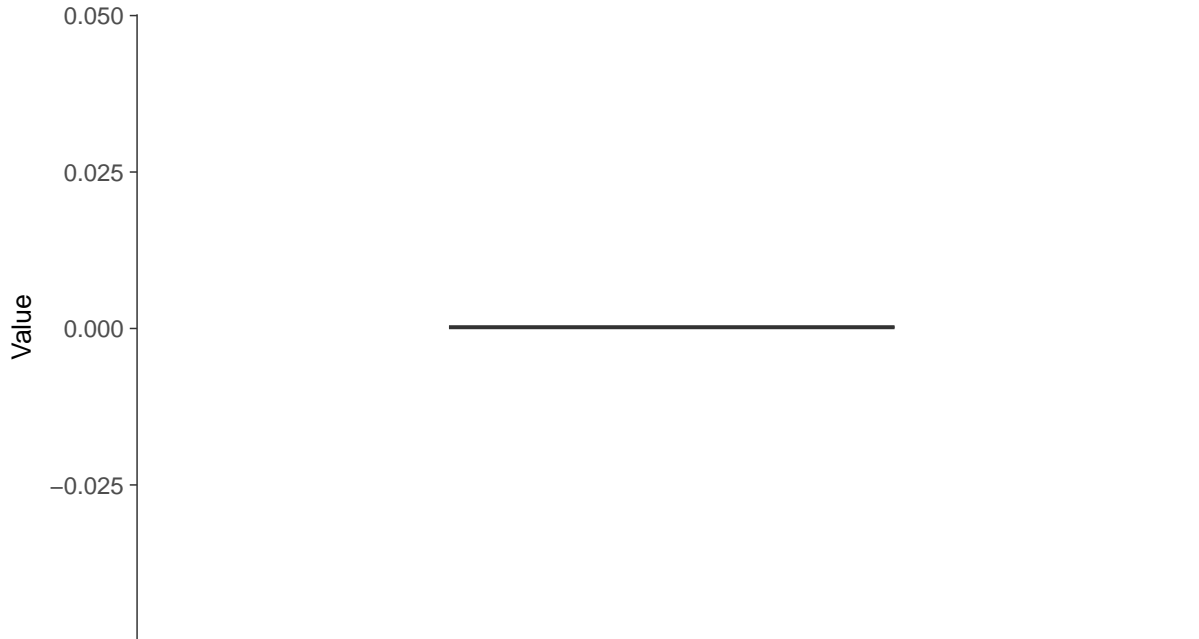
Mercury, MW-6 (mg/L)





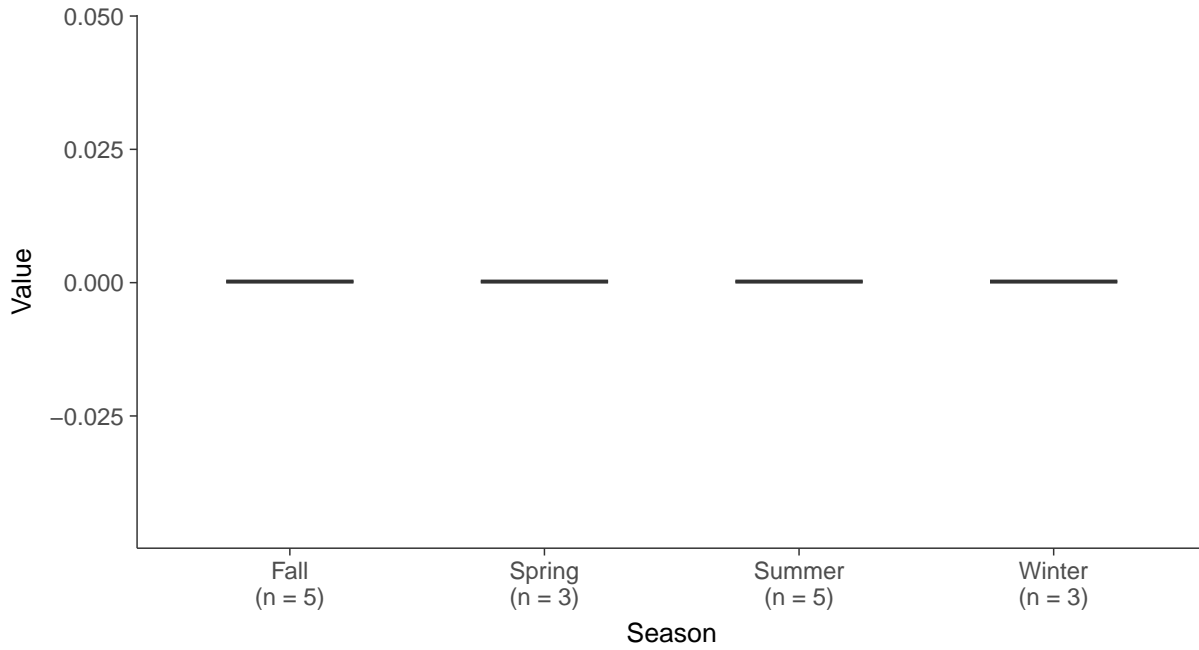
Boxplot

Mercury, MW-6 (mg/L)



Boxplot by Season

Mercury, MW-6 (mg/L)



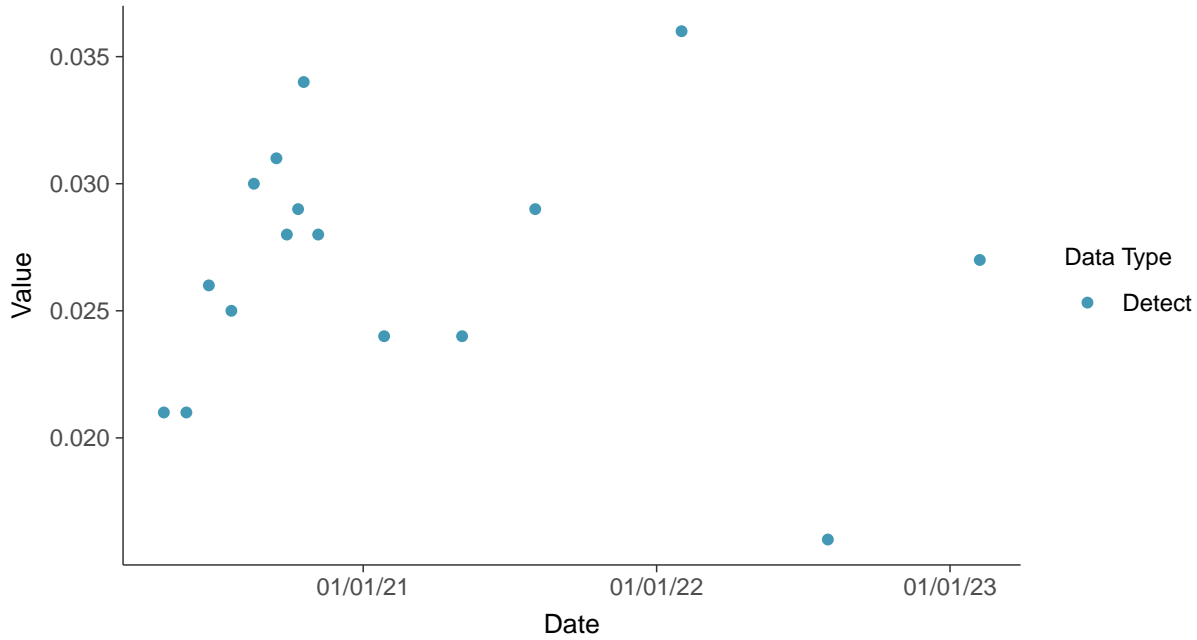


Appendix IV: Molybdenum, MW-6

ID: 06_2_22

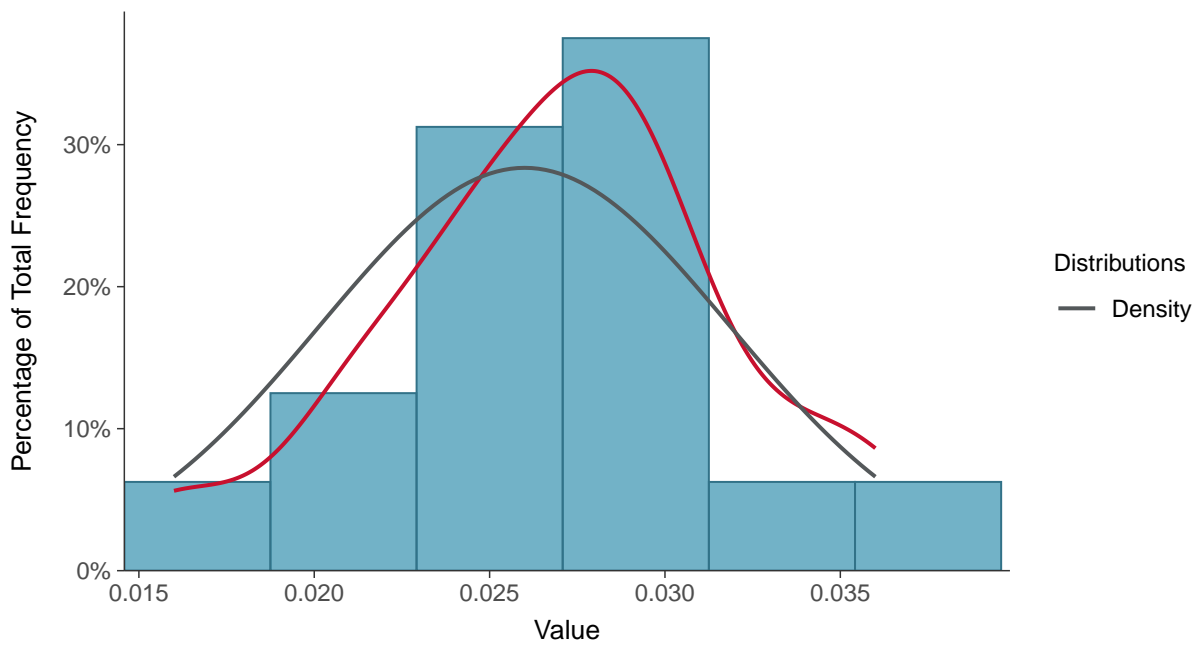
Scatter Plot

Molybdenum, MW-6 (mg/L)



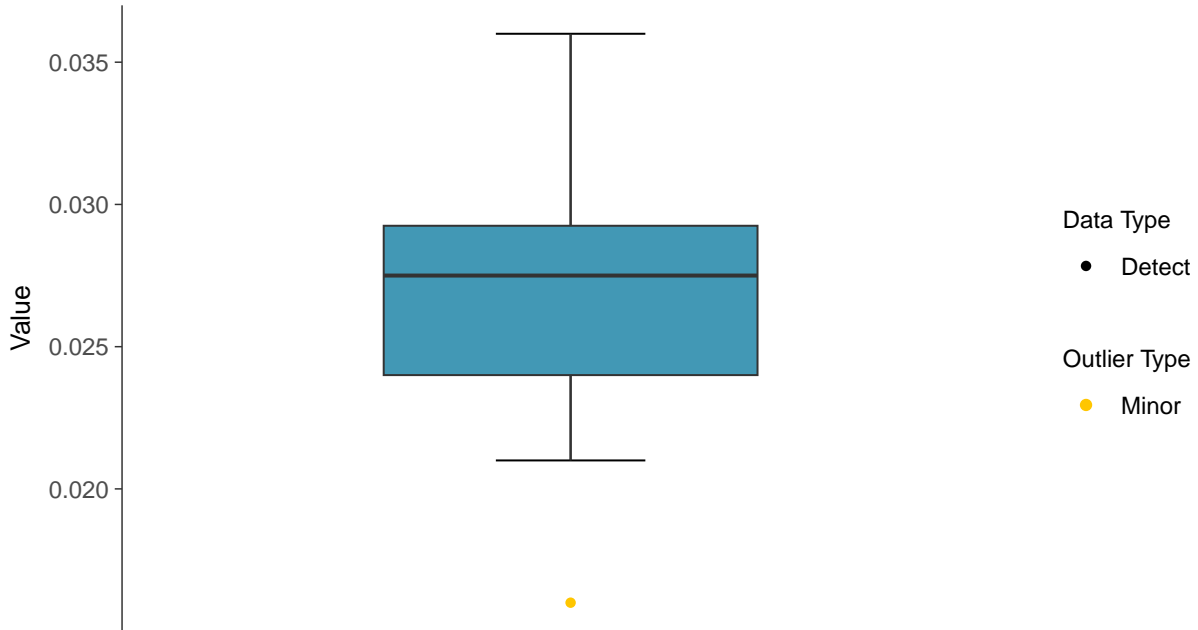
Histogram

Molybdenum, MW-6 (mg/L)



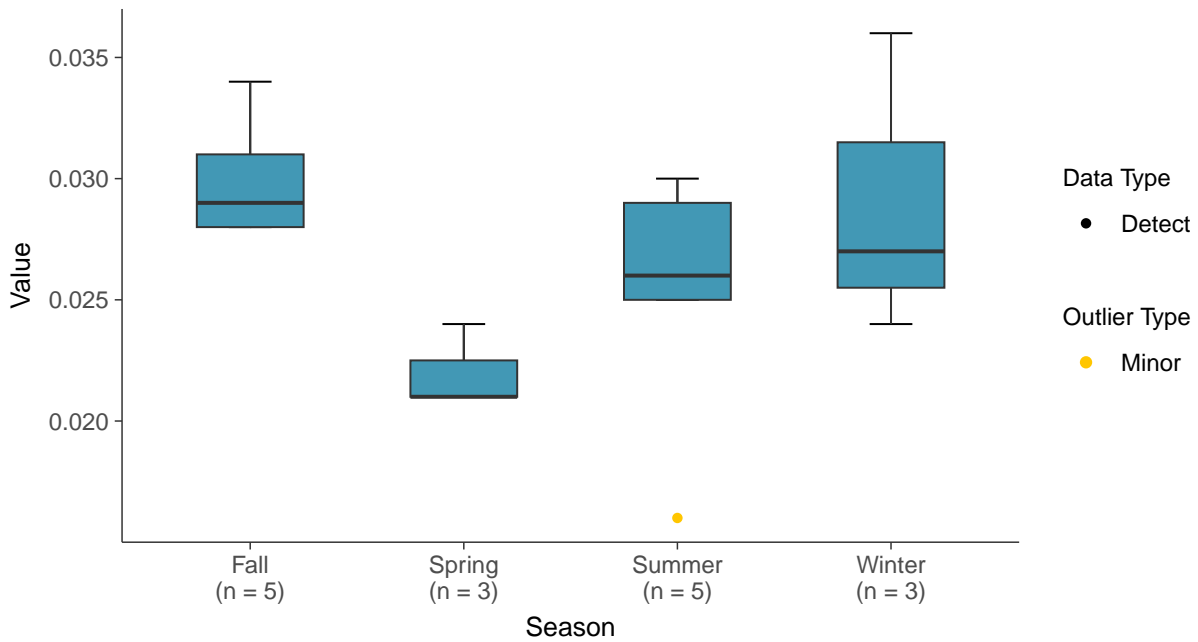
Boxplot

Molybdenum, MW-6 (mg/L)



Boxplot by Season

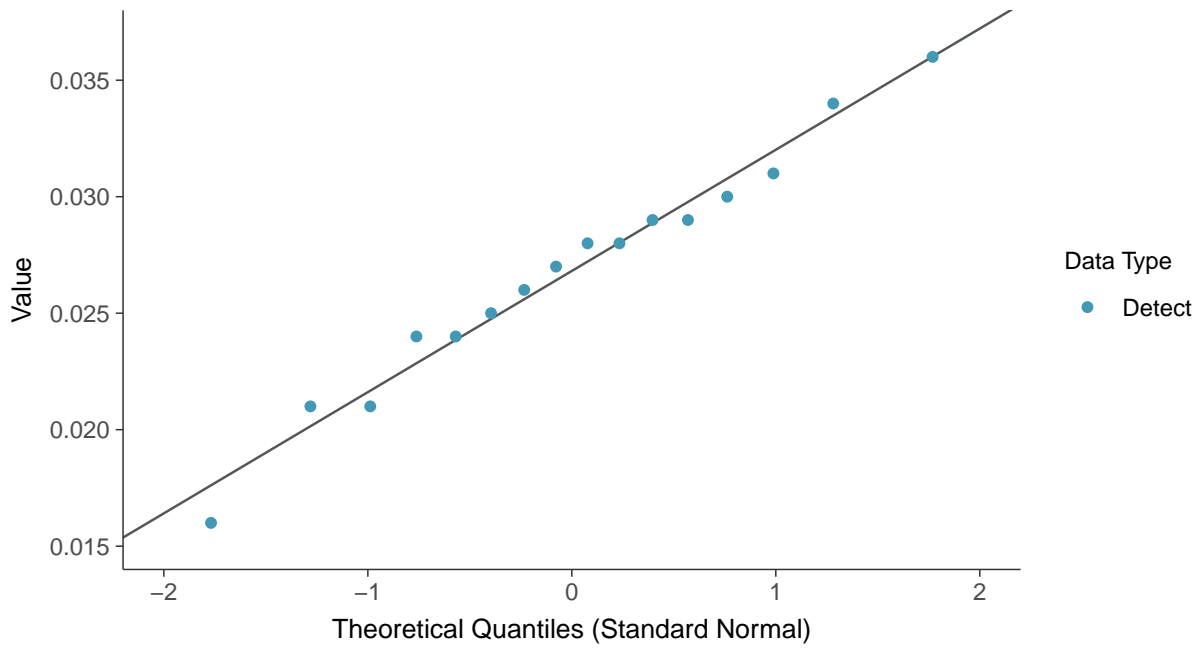
Molybdenum, MW-6 (mg/L)





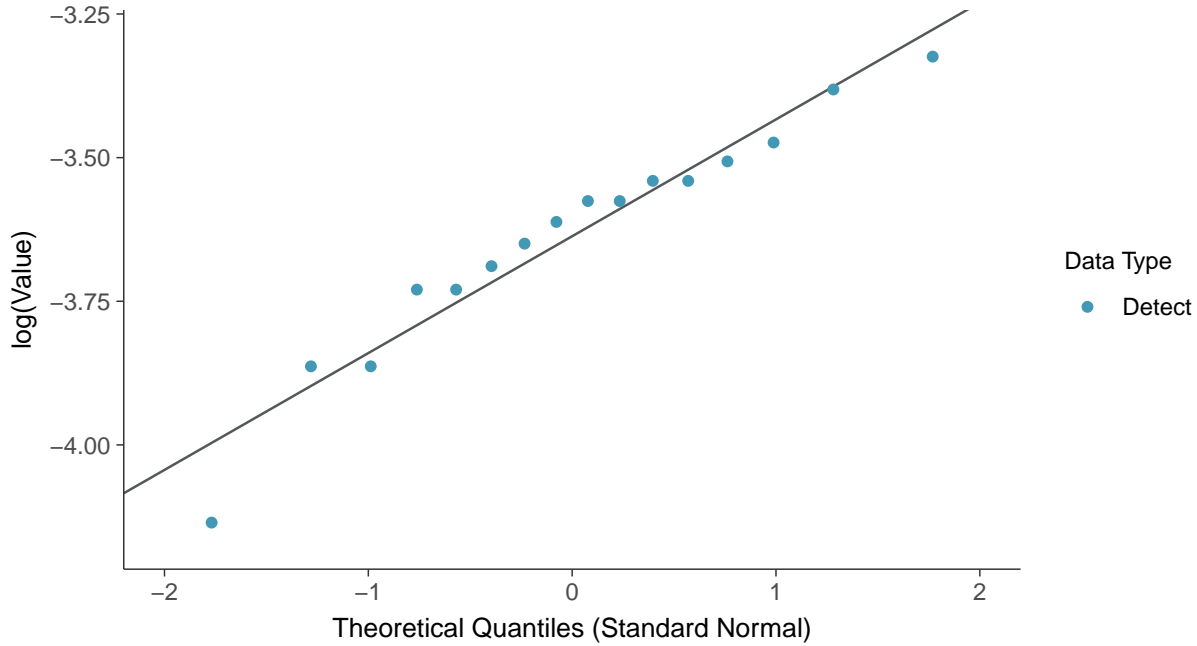
Normal Q-Q plot

Molybdenum, MW-6 (mg/L)



Lognormal Q-Q plot

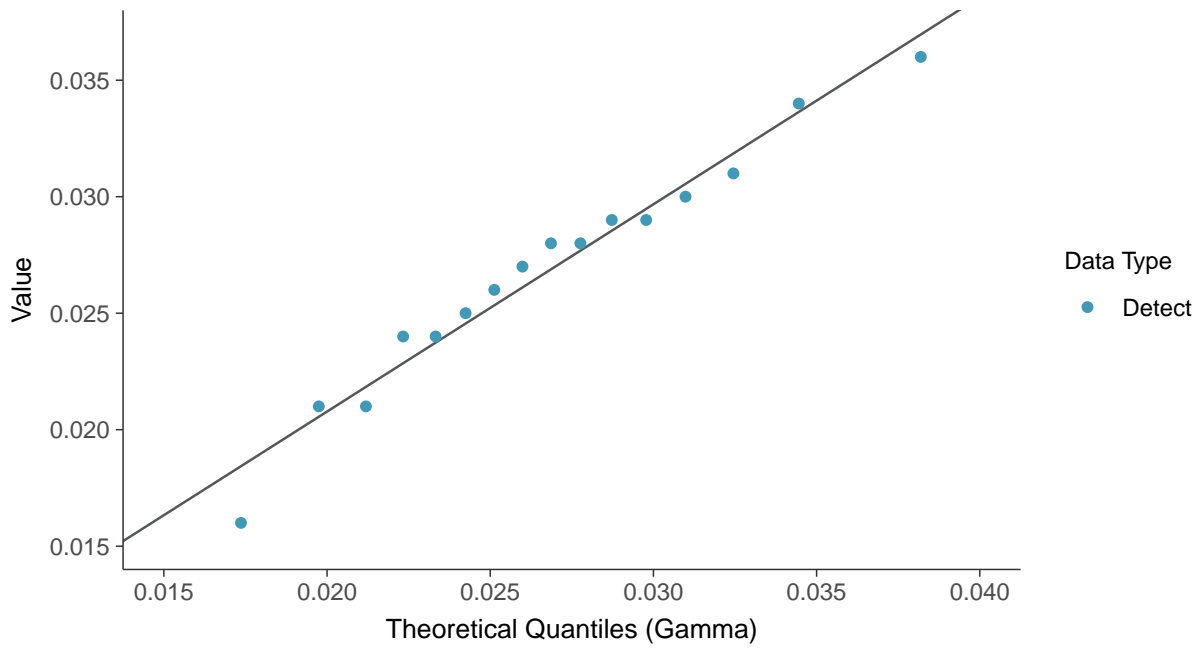
Molybdenum, MW-6 (mg/L)





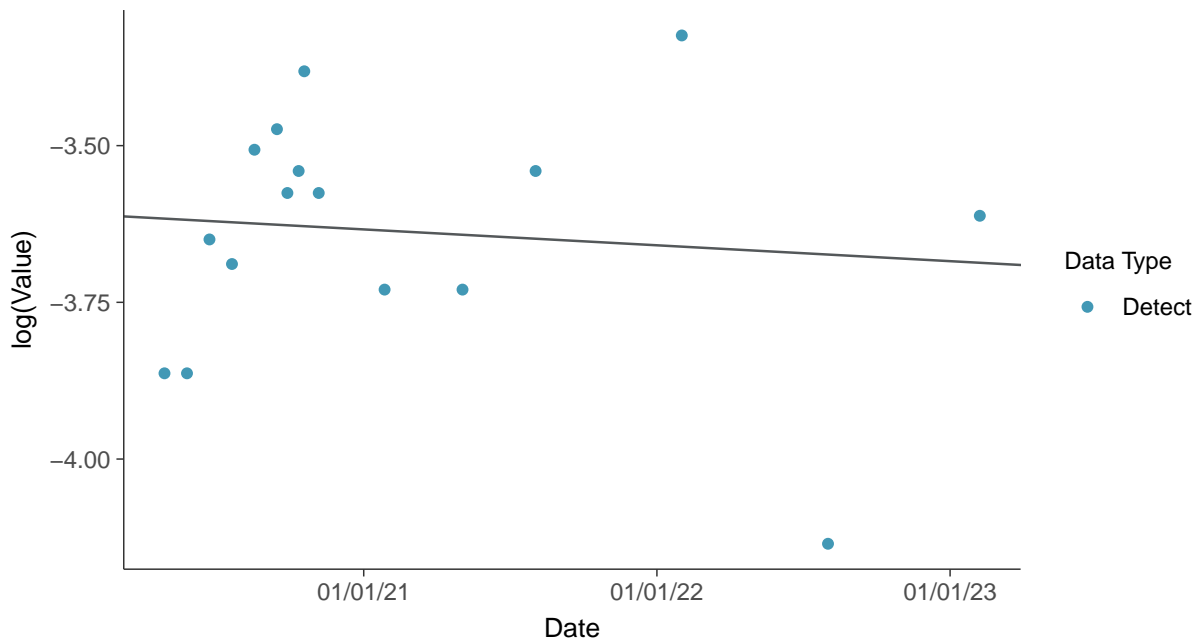
Gamma Q-Q plot

Molybdenum, MW-6 (mg/L)



Trend Regression: Lognormal MLE

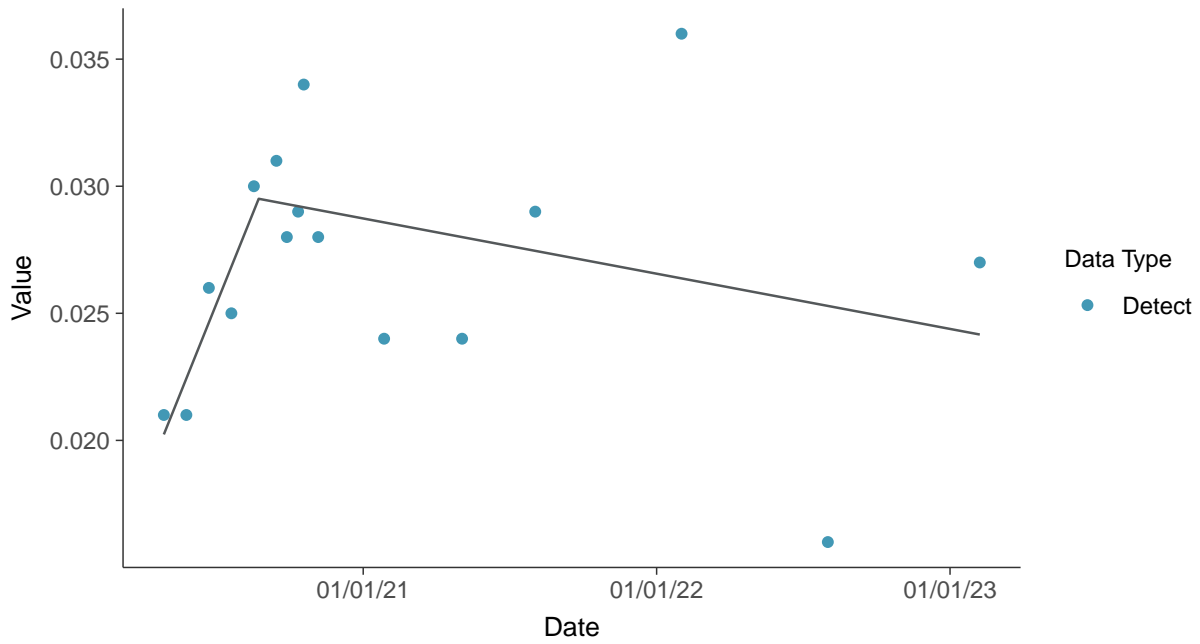
Molybdenum, MW-6 (mg/L)





Trend Regression: Piecewise Linear-Linear

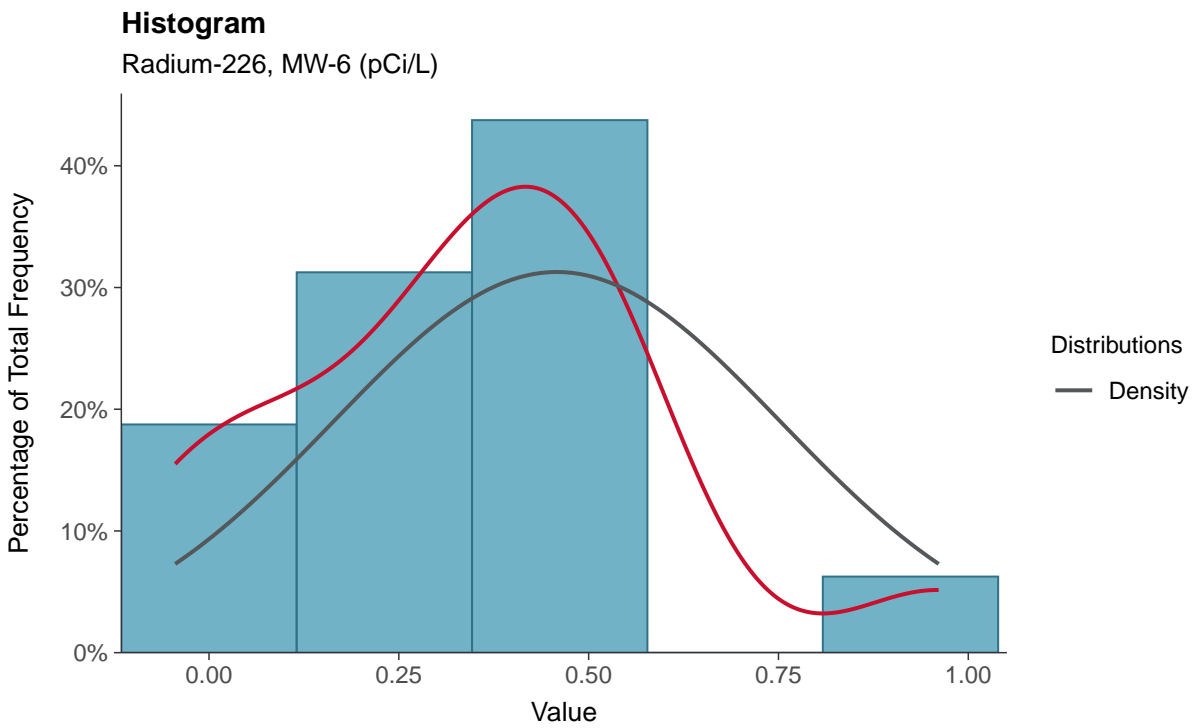
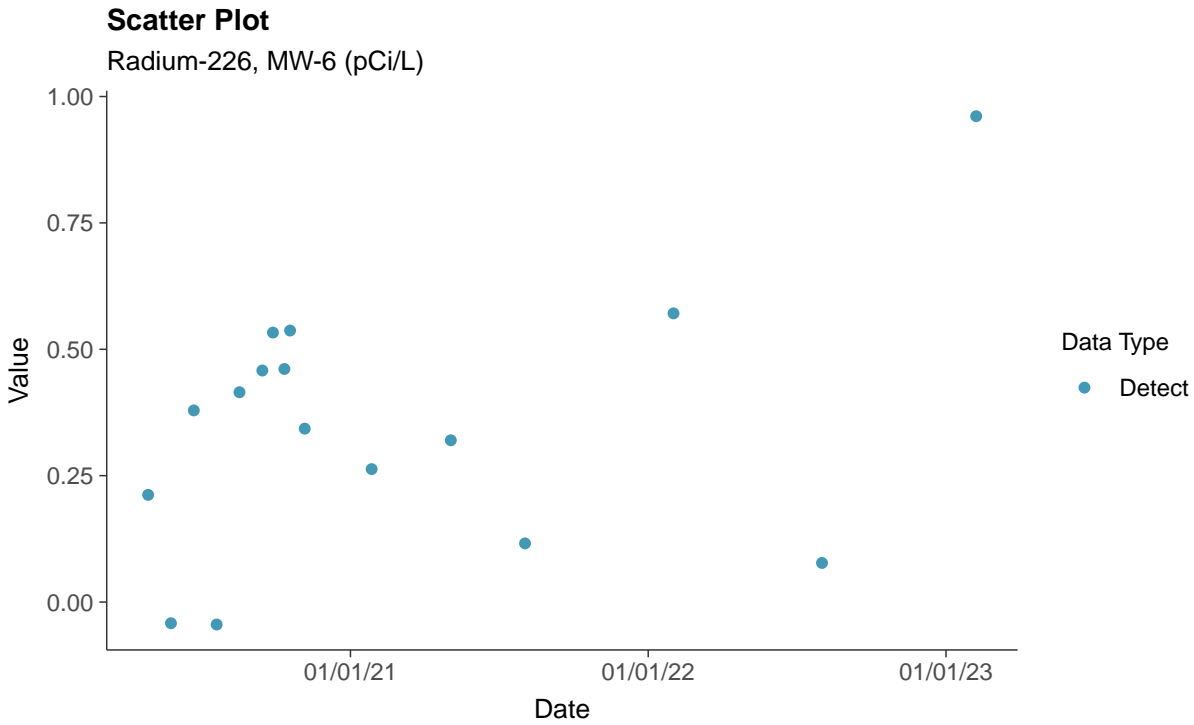
Molybdenum, MW-6 (mg/L)





Appendix IV: Radium-226, MW-6

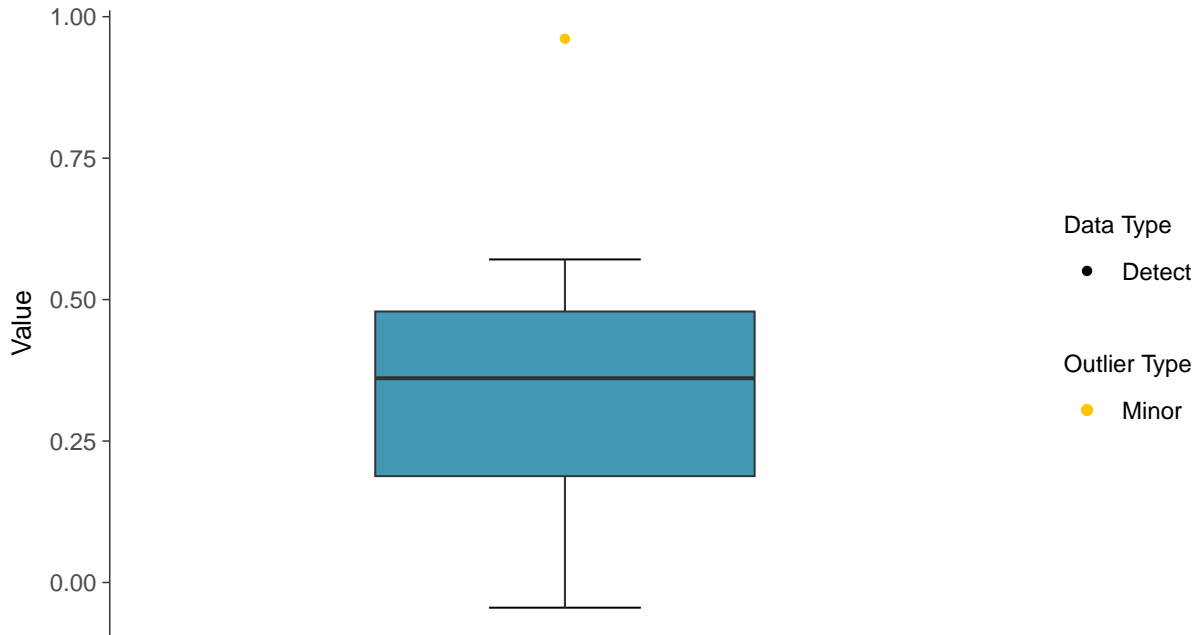
ID: 06_2_24





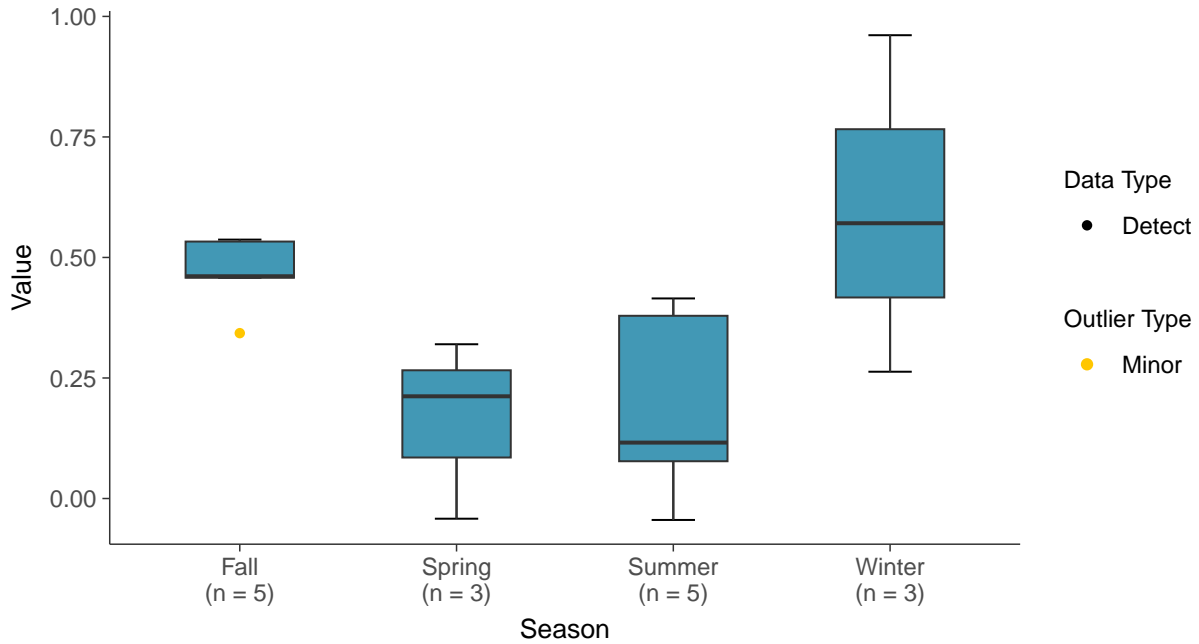
Boxplot

Radium-226, MW-6 (pCi/L)



Boxplot by Season

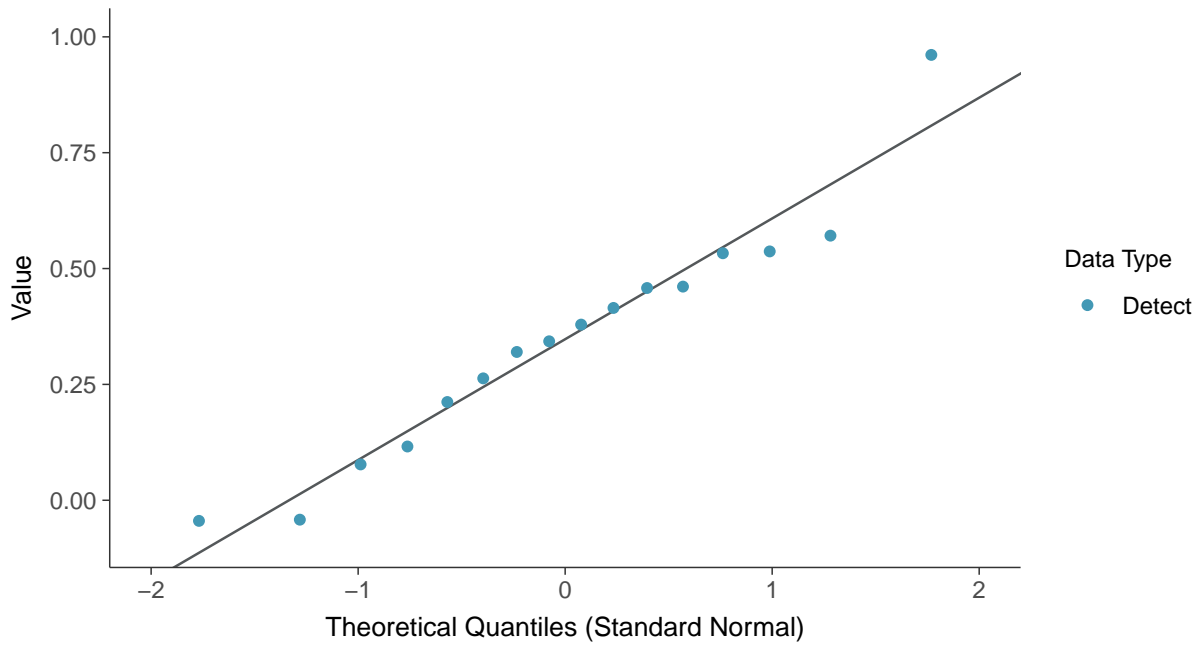
Radium-226, MW-6 (pCi/L)





Normal Q-Q plot

Radium-226, MW-6 (pCi/L)



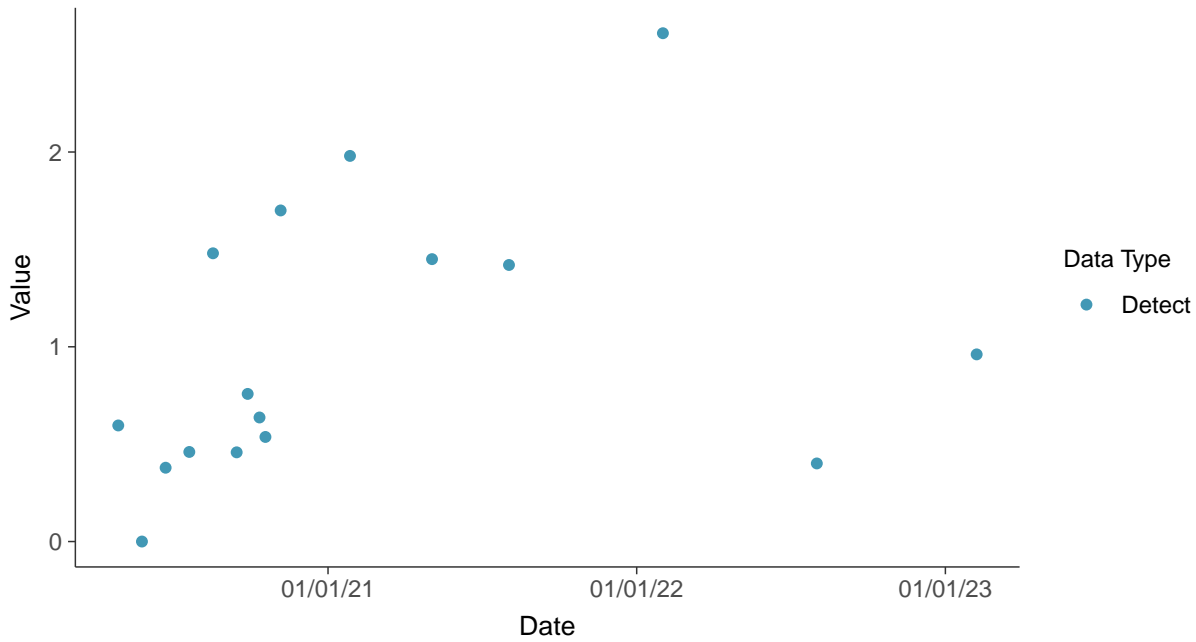


Appendix IV: Radium-226/228, MW-6

ID: 06_2_25

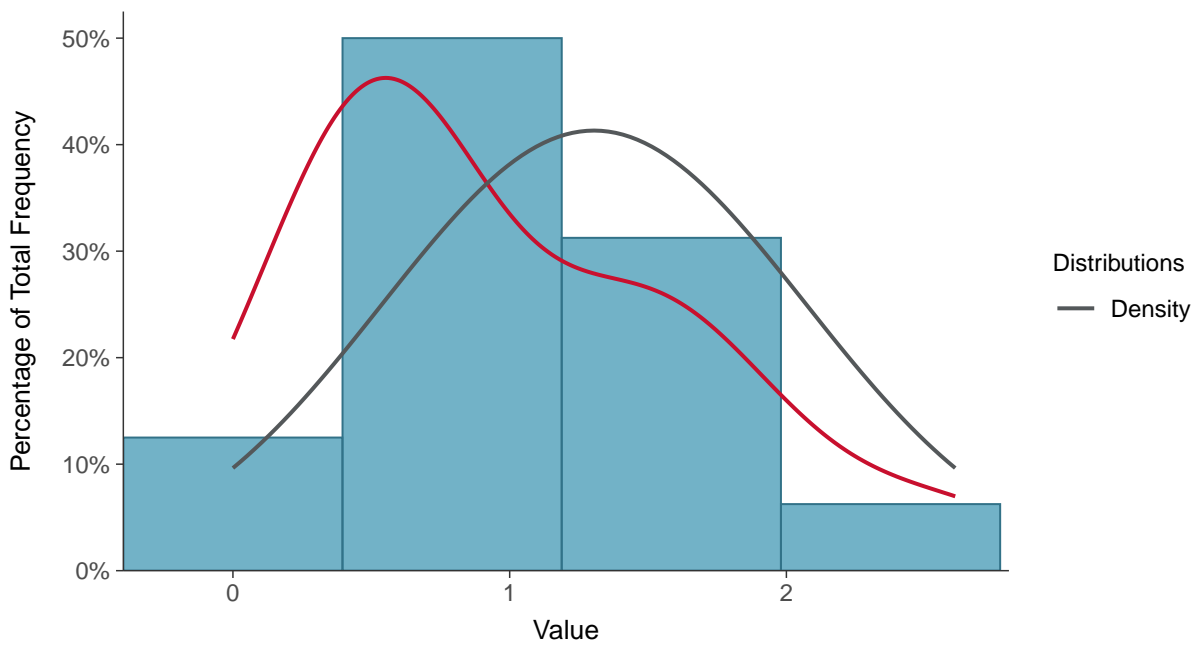
Scatter Plot

Radium-226/228, MW-6 (pCi/L)



Histogram

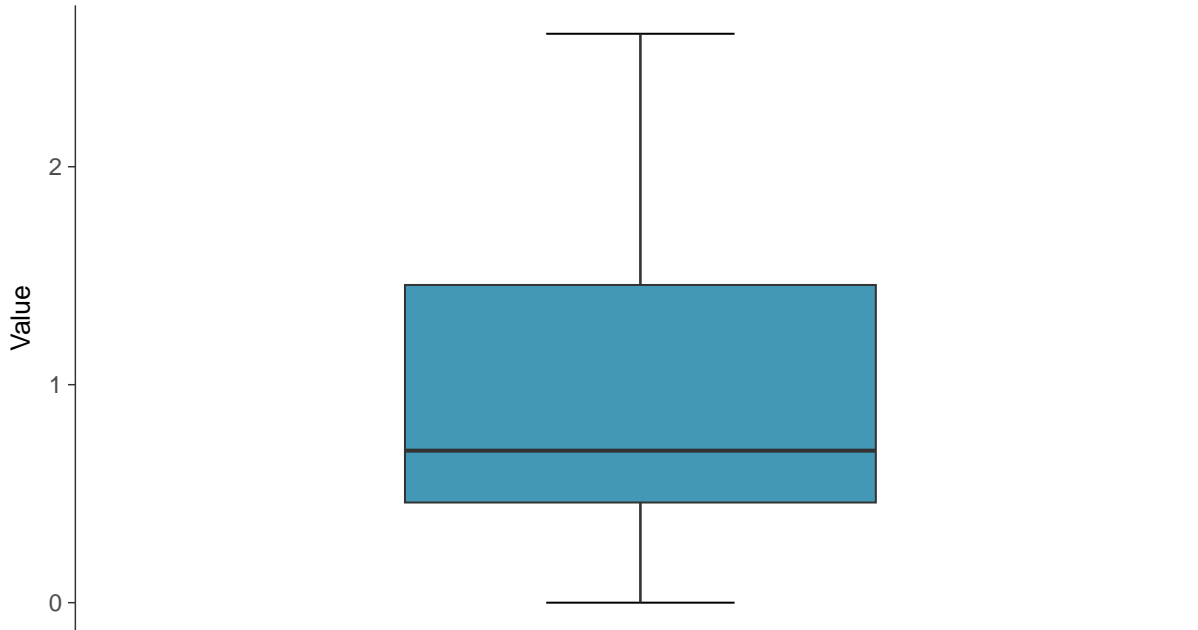
Radium-226/228, MW-6 (pCi/L)





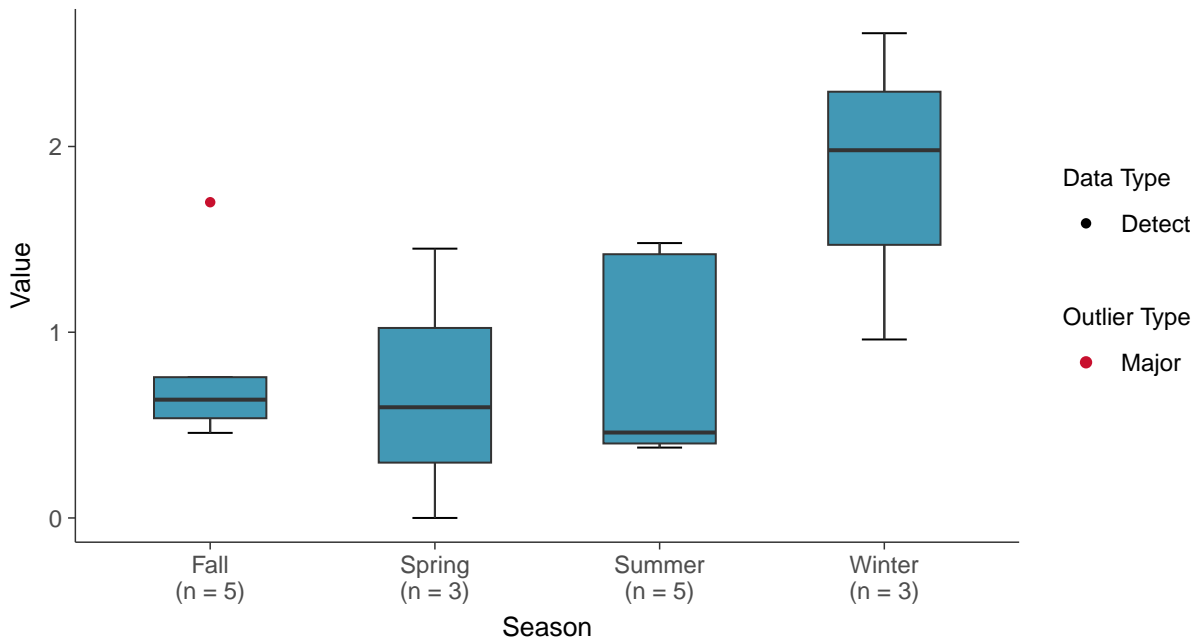
Boxplot

Radium-226/228, MW-6 (pCi/L)



Boxplot by Season

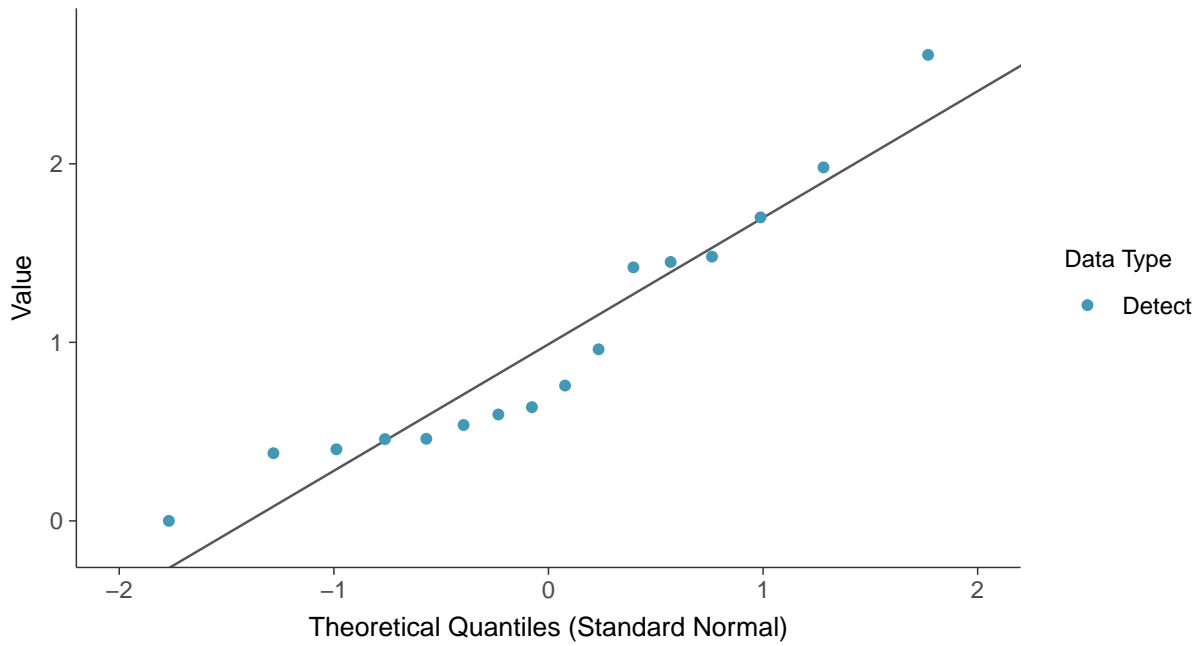
Radium-226/228, MW-6 (pCi/L)





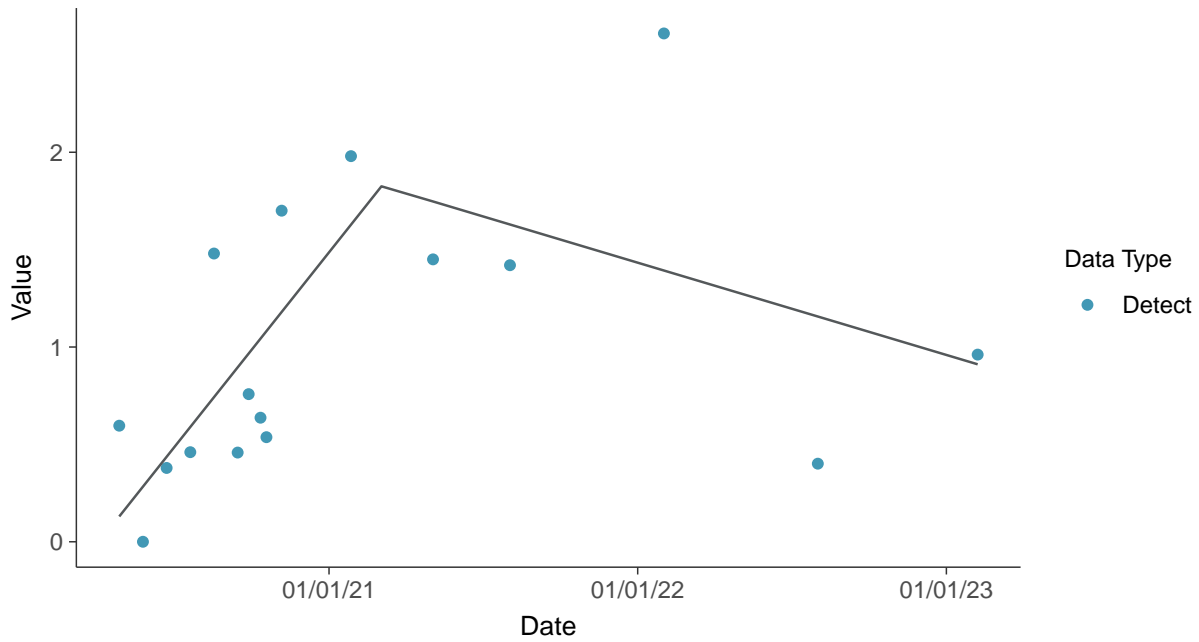
Normal Q-Q plot

Radium-226/228, MW-6 (pCi/L)



Trend Regression: Piecewise Linear-Linear

Radium-226/228, MW-6 (pCi/L)



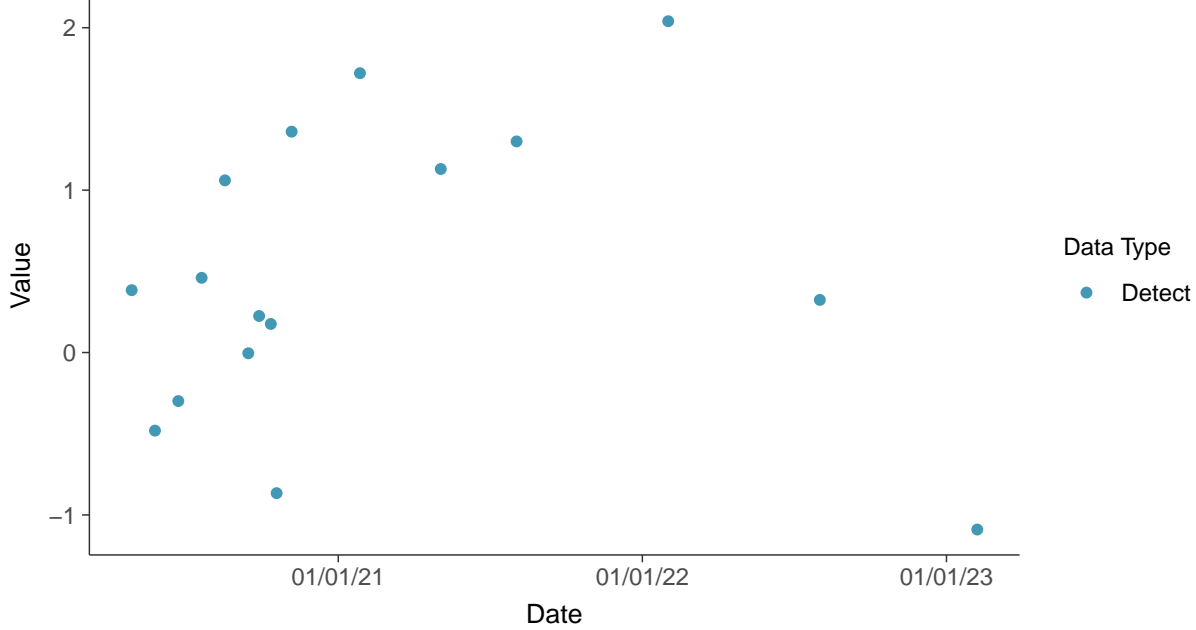


Appendix IV: Radium-228, MW-6

ID: 06_2_26

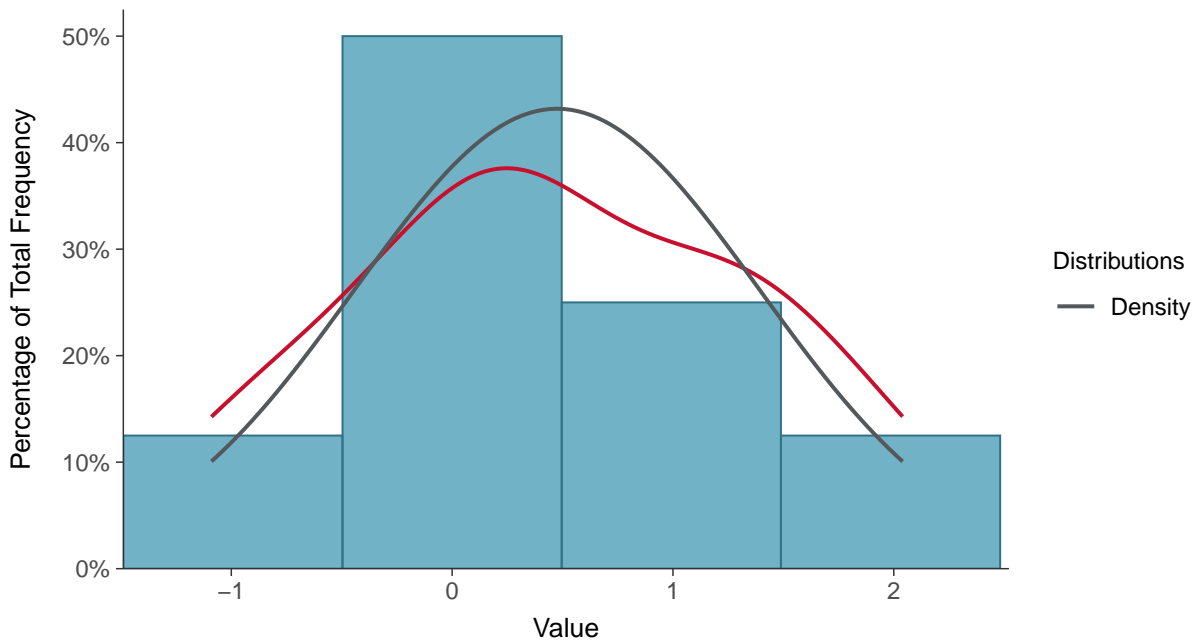
Scatter Plot

Radium-228, MW-6 (pCi/L)



Histogram

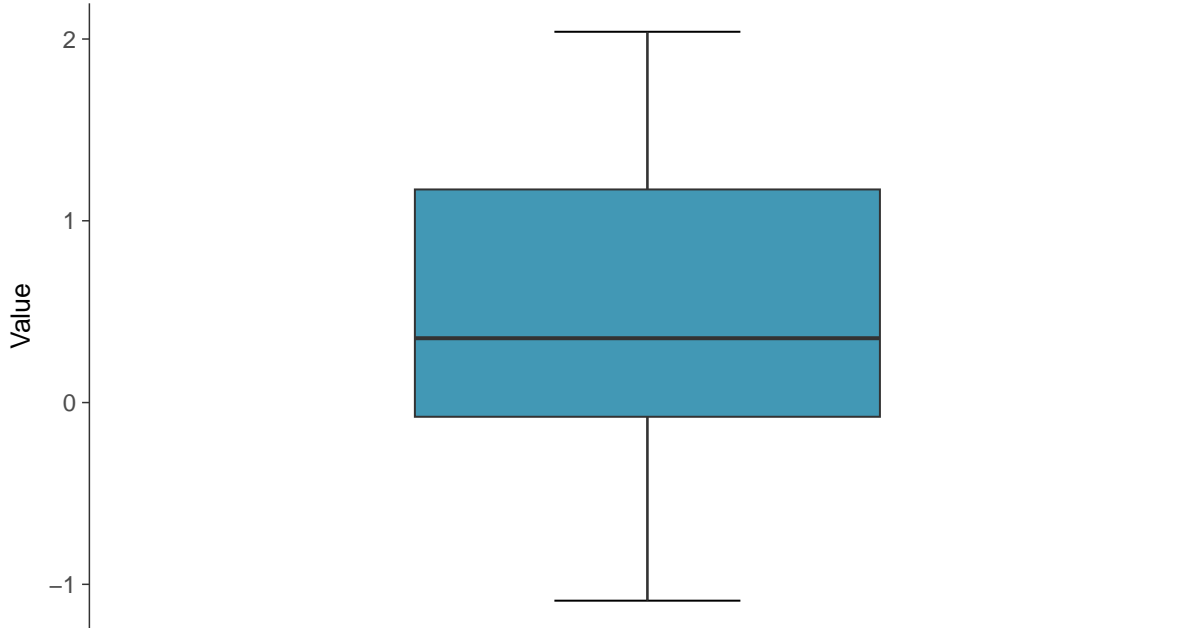
Radium-228, MW-6 (pCi/L)





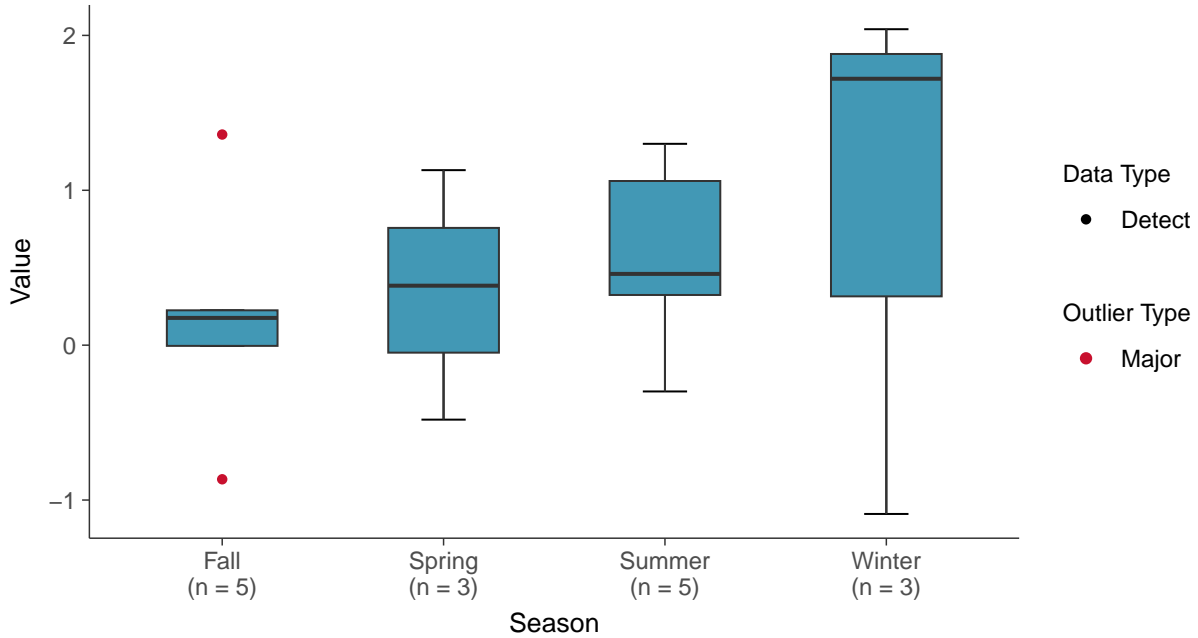
Boxplot

Radium-228, MW-6 (pCi/L)



Boxplot by Season

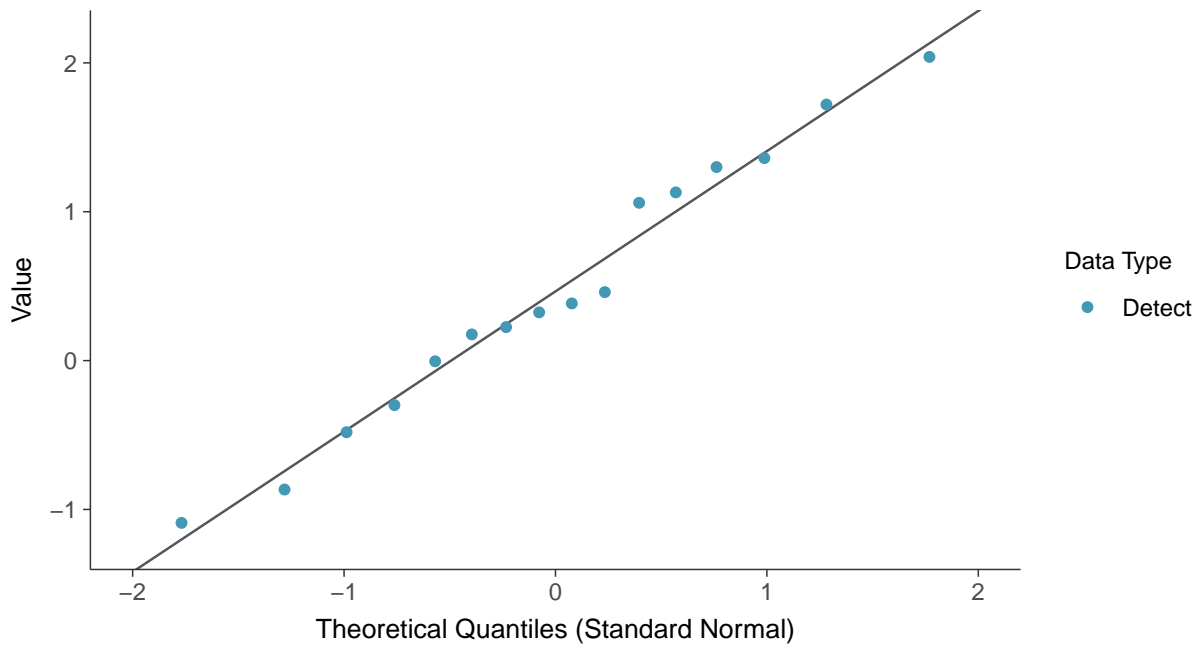
Radium-228, MW-6 (pCi/L)





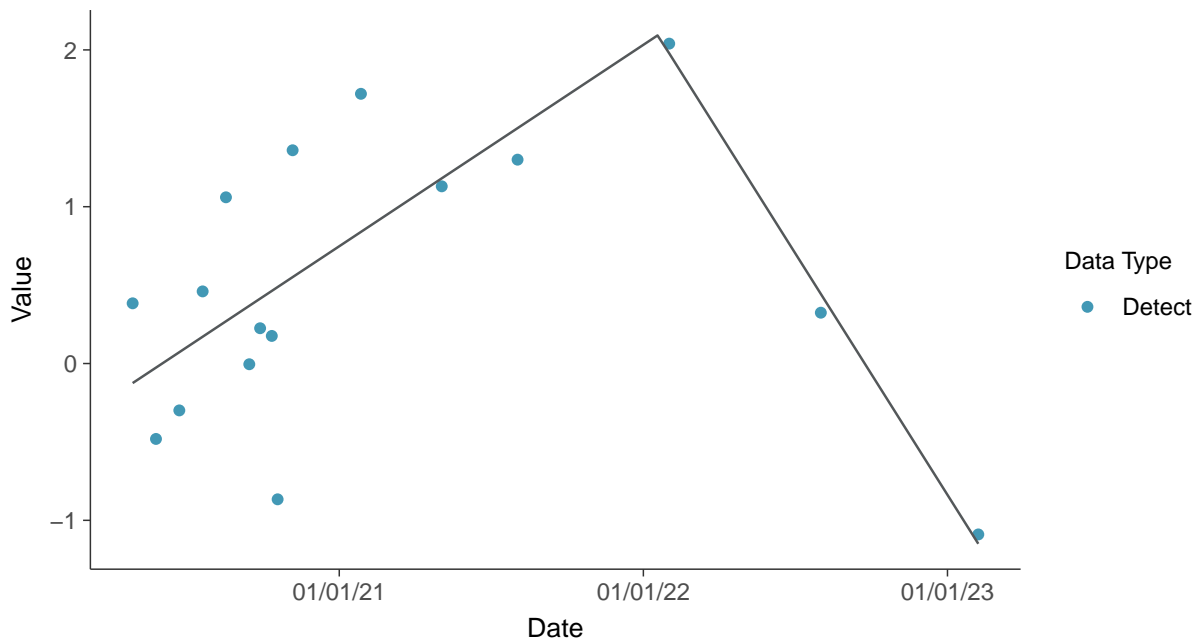
Normal Q-Q plot

Radium-228, MW-6 (pCi/L)



Trend Regression: Piecewise Linear-Linear

Radium-228, MW-6 (pCi/L)



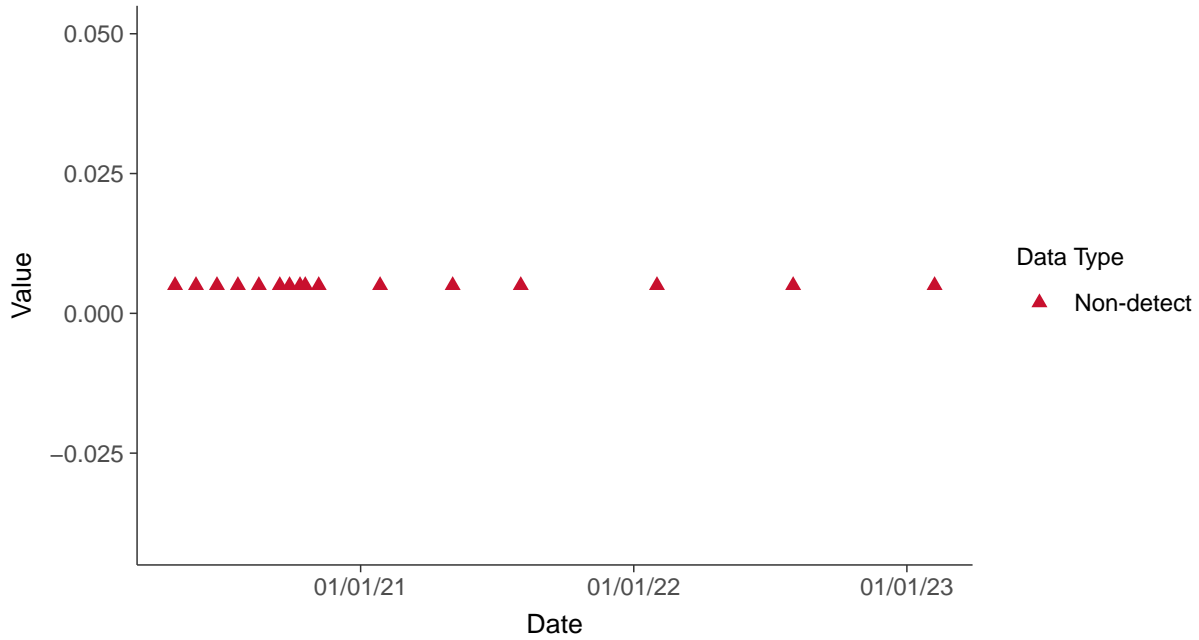


Appendix IV: Selenium, MW-6

ID: 06_2_27

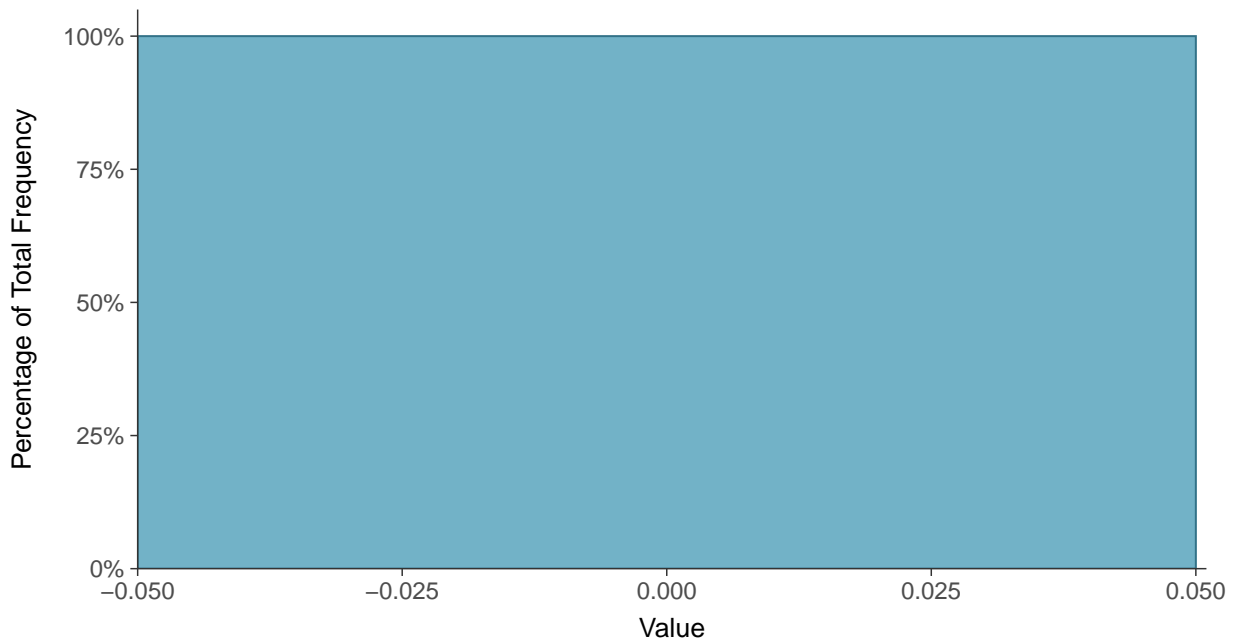
Scatter Plot

Selenium, MW-6 (mg/L)



Histogram

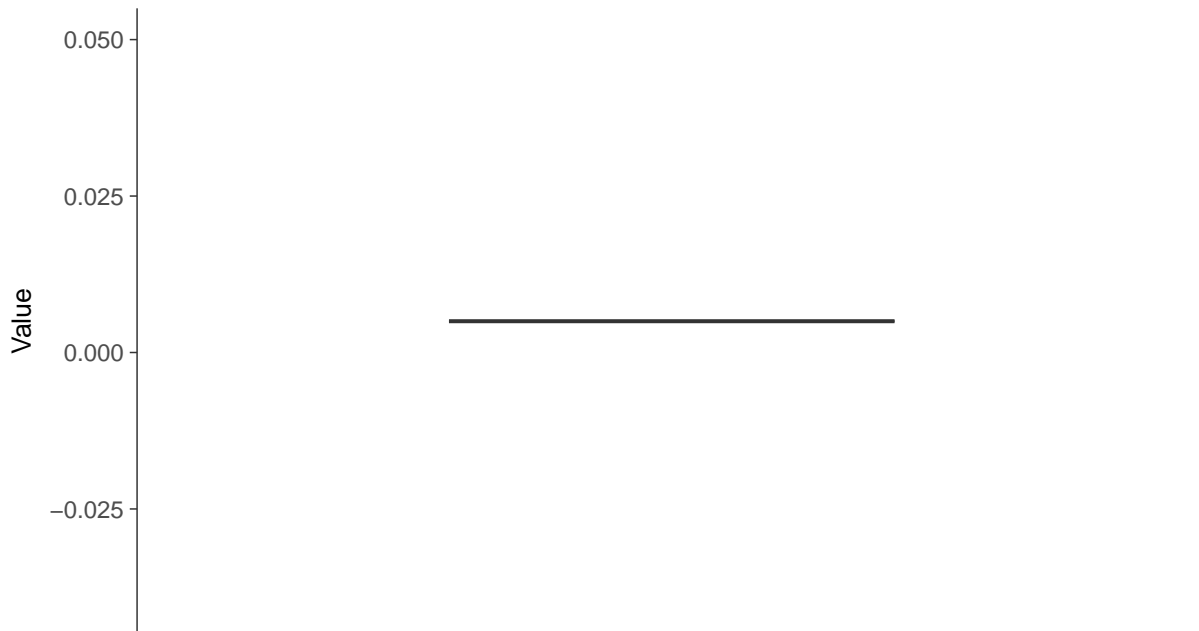
Selenium, MW-6 (mg/L)





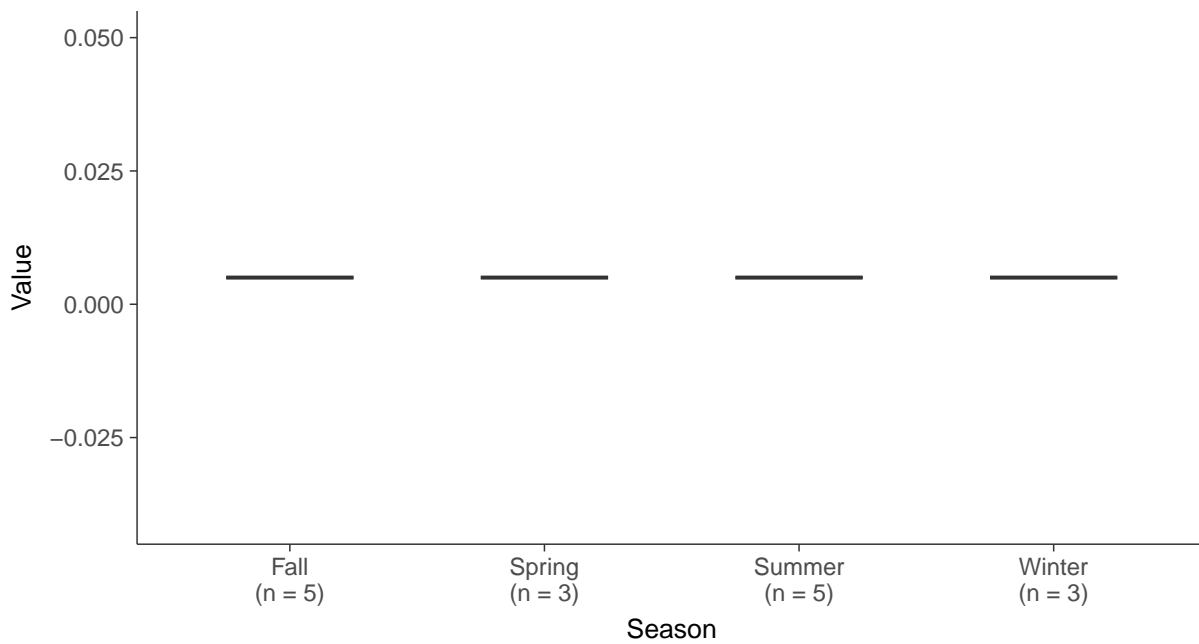
Boxplot

Selenium, MW-6 (mg/L)



Boxplot by Season

Selenium, MW-6 (mg/L)



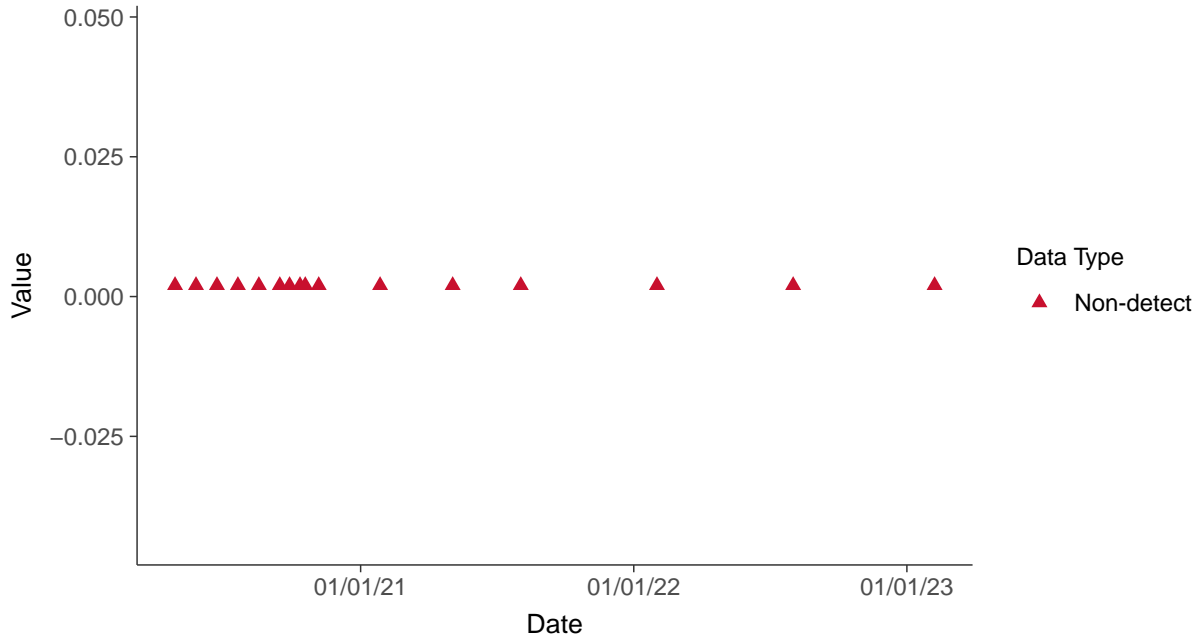


Appendix IV: Thallium, MW-6

ID: 06_2_29

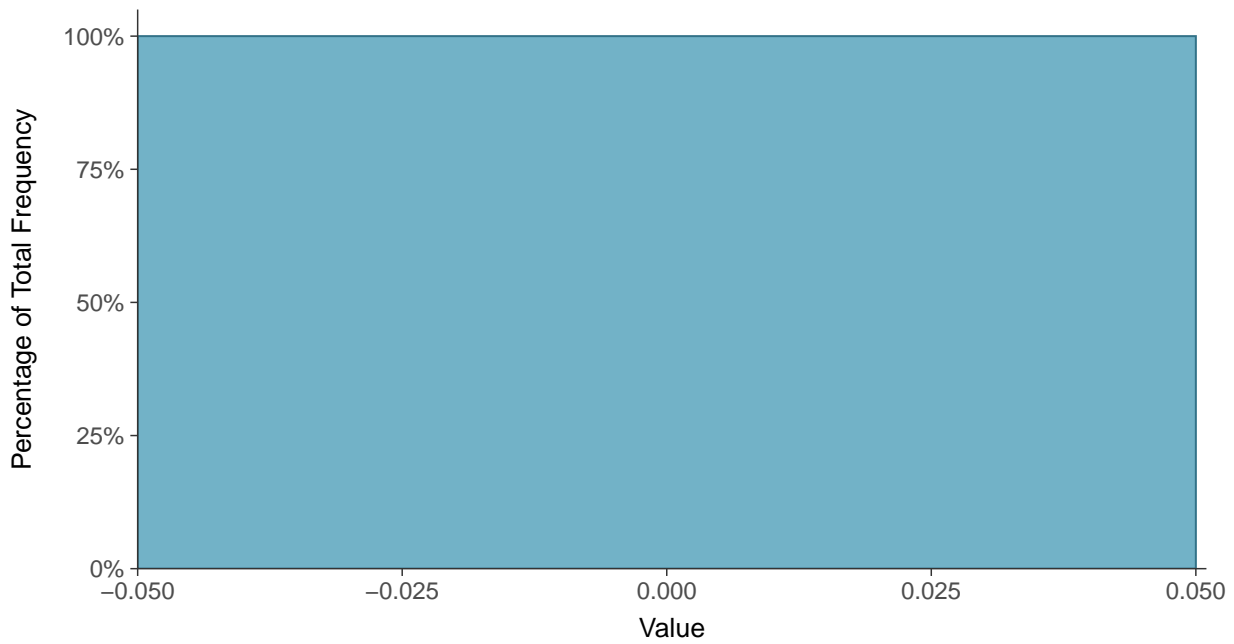
Scatter Plot

Thallium, MW-6 (mg/L)



Histogram

Thallium, MW-6 (mg/L)





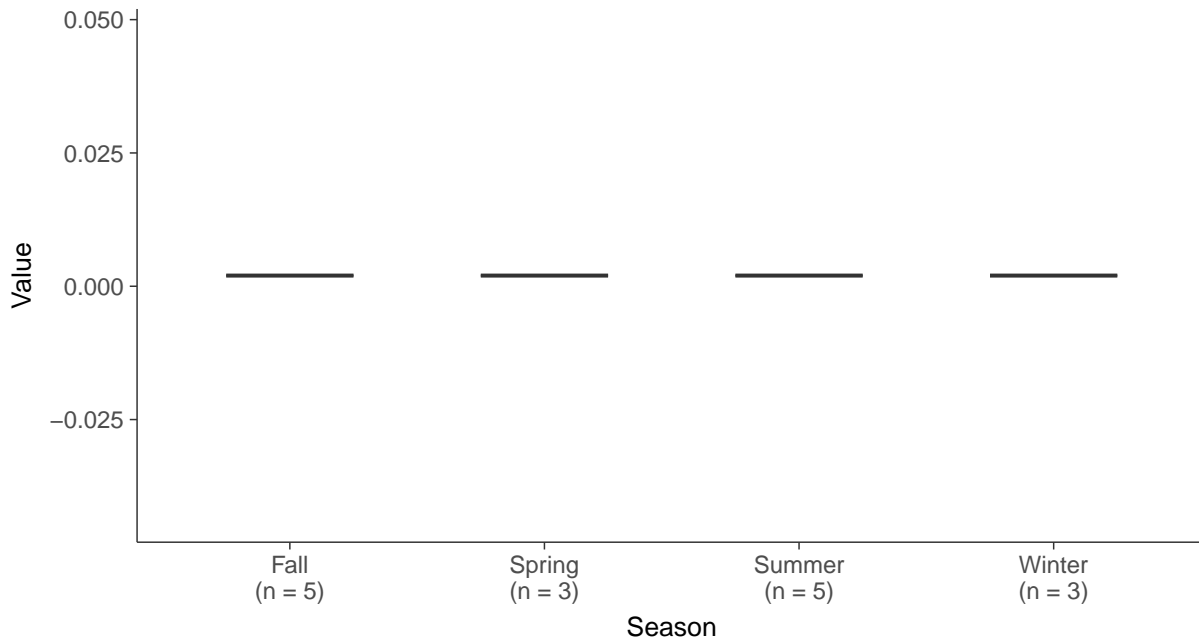
Boxplot

Thallium, MW-6 (mg/L)



Boxplot by Season

Thallium, MW-6 (mg/L)

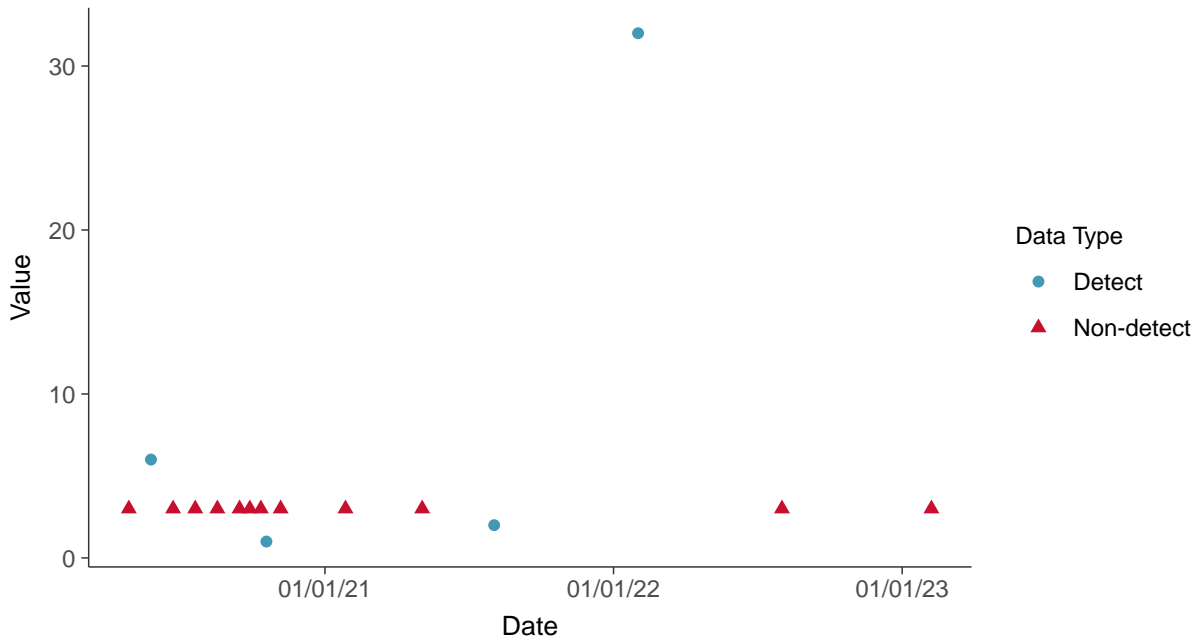


Appendix IV: Total Suspended Solids, MW-6

ID: 06_2_30

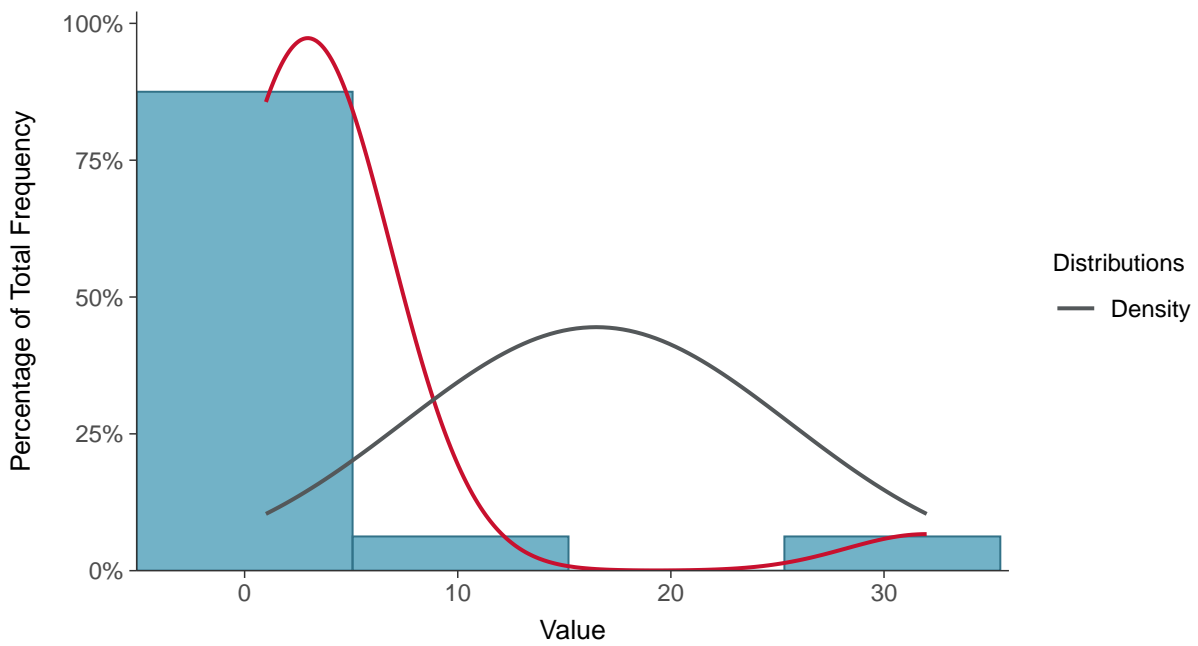
Scatter Plot

Total Suspended Solids, MW-6 (mg/L)



Histogram

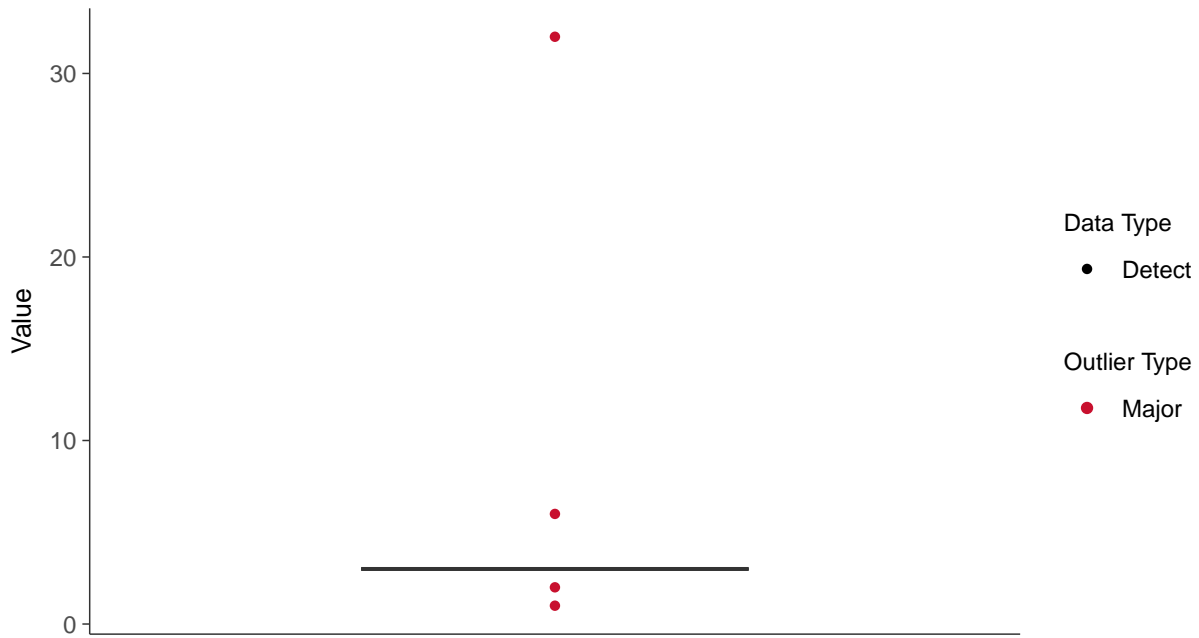
Total Suspended Solids, MW-6 (mg/L)





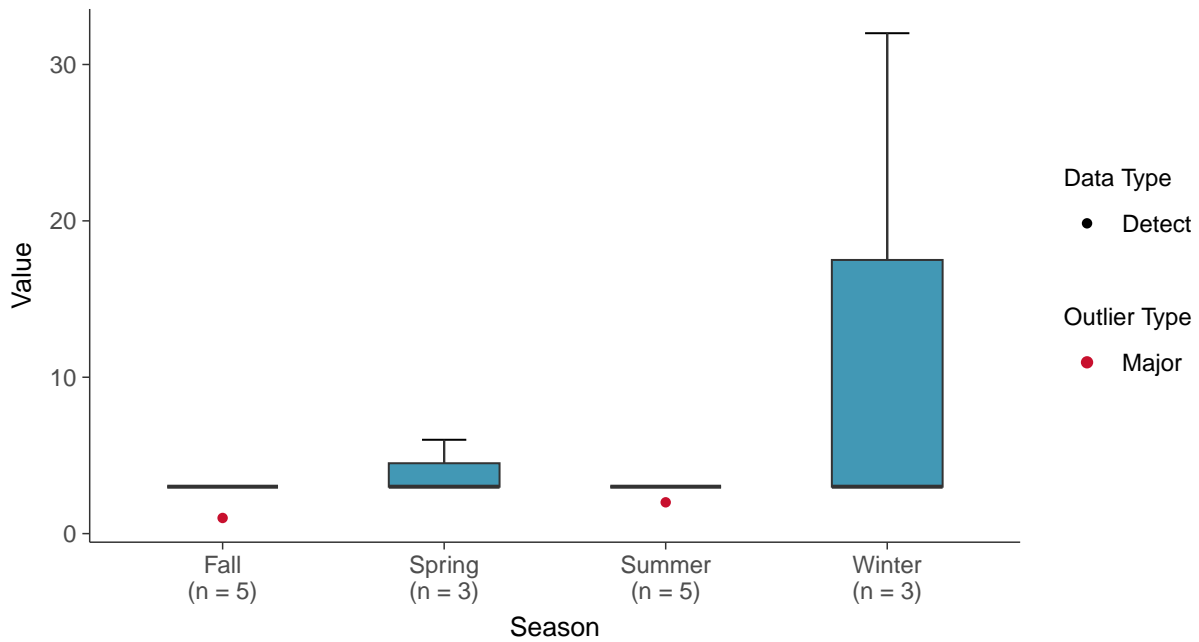
Boxplot

Total Suspended Solids, MW-6 (mg/L)



Boxplot by Season

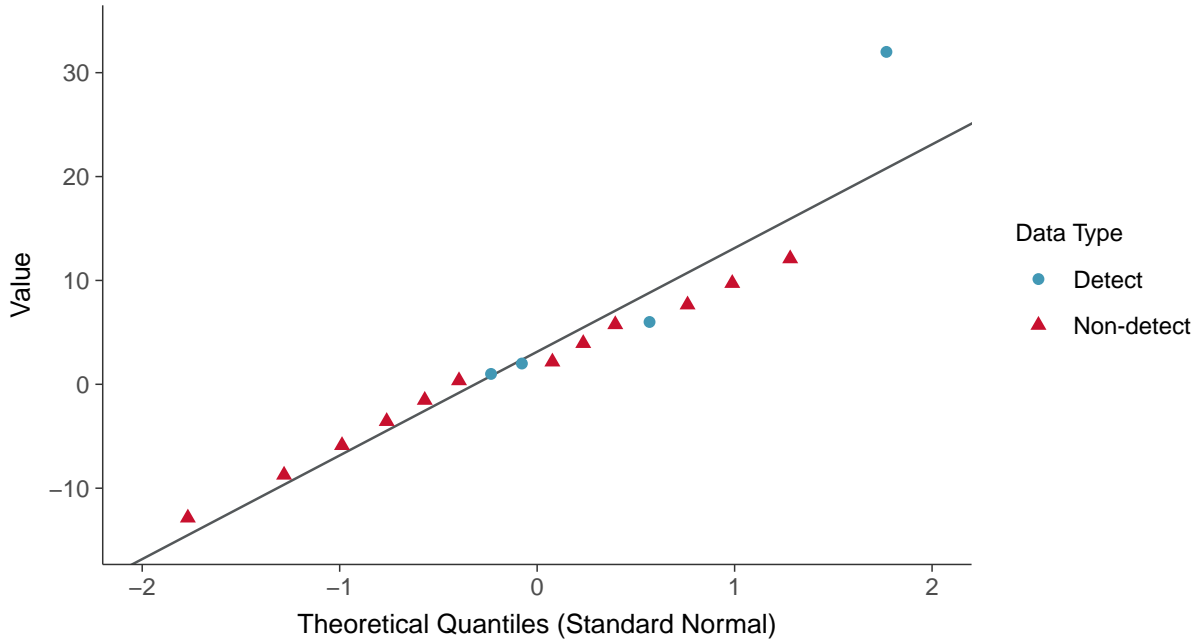
Total Suspended Solids, MW-6 (mg/L)





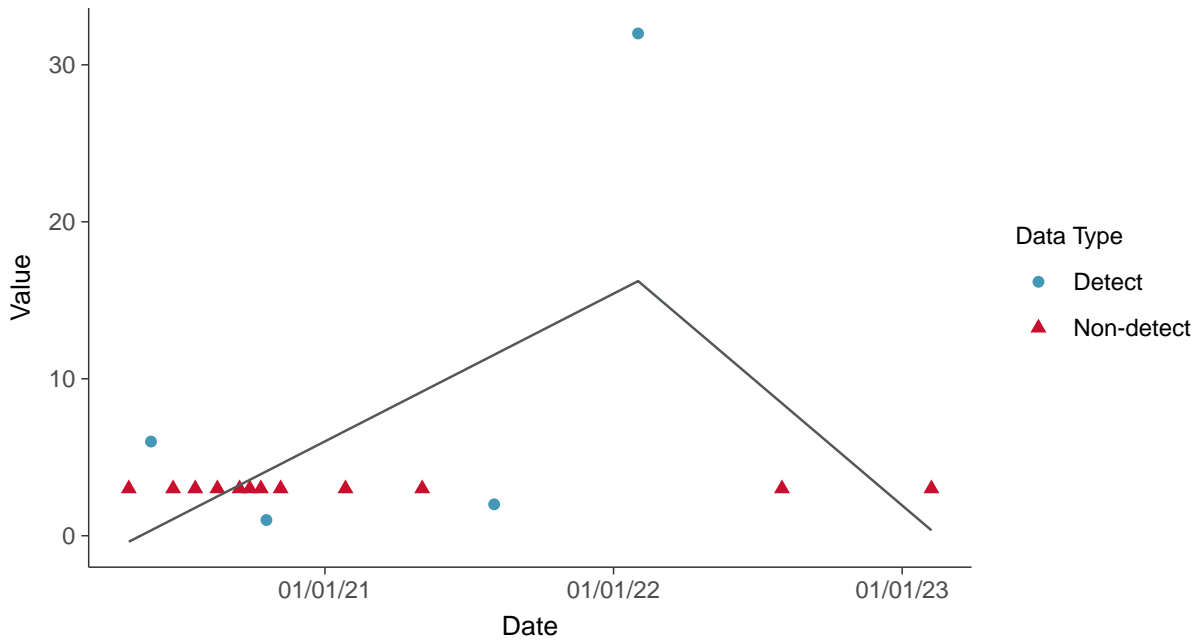
Normal Q-Q plot using ROS Imputed Estimates

Total Suspended Solids, MW-6 (mg/L)



Trend Regression: Piecewise Linear-Linear

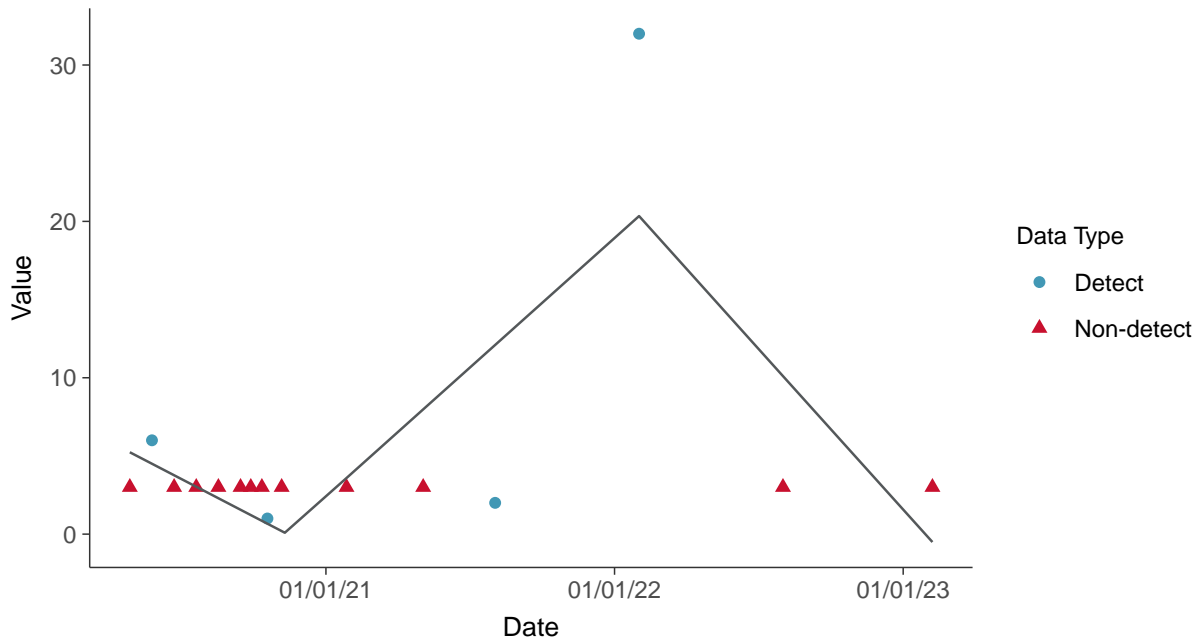
Total Suspended Solids, MW-6 (mg/L)





Trend Regression: Piecewise Linear-Linear-Linear

Total Suspended Solids, MW-6 (mg/L)



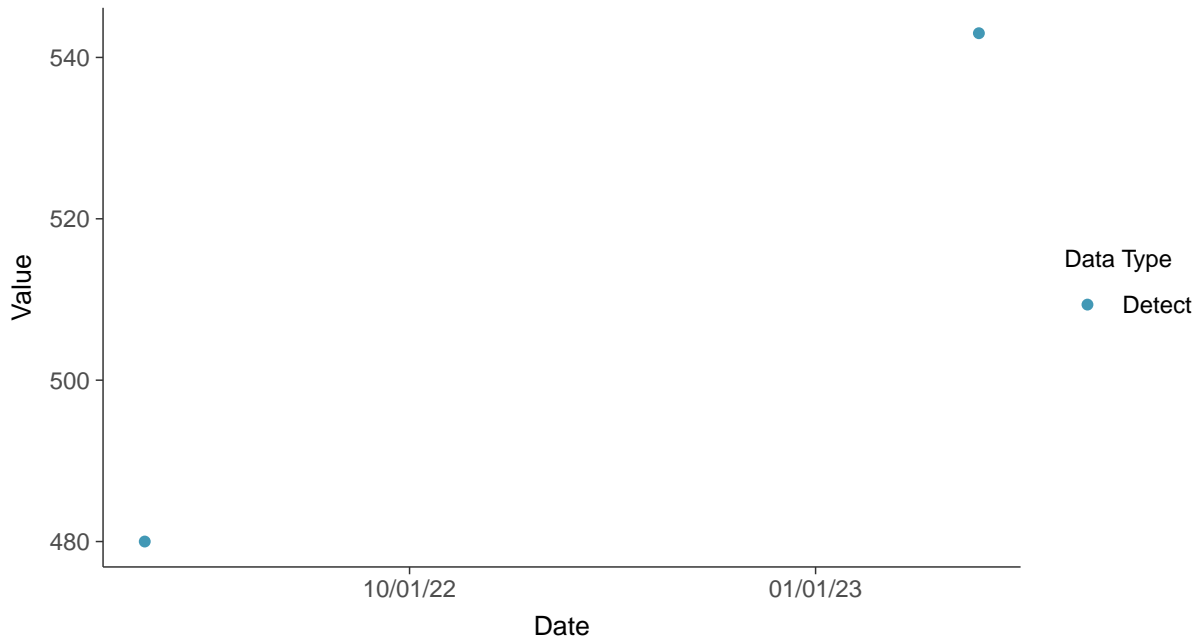


Other: Bicarbonate, MW-6

ID: 06_3_12

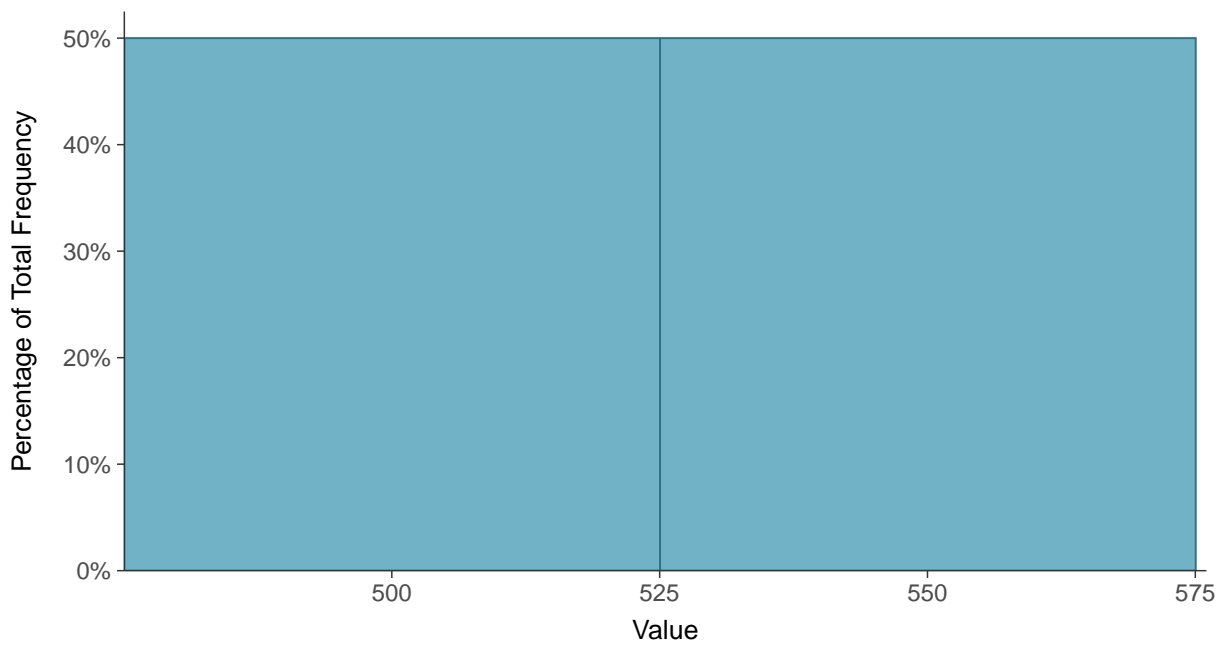
Scatter Plot

Bicarbonate, MW-6 (mg/L)



Histogram

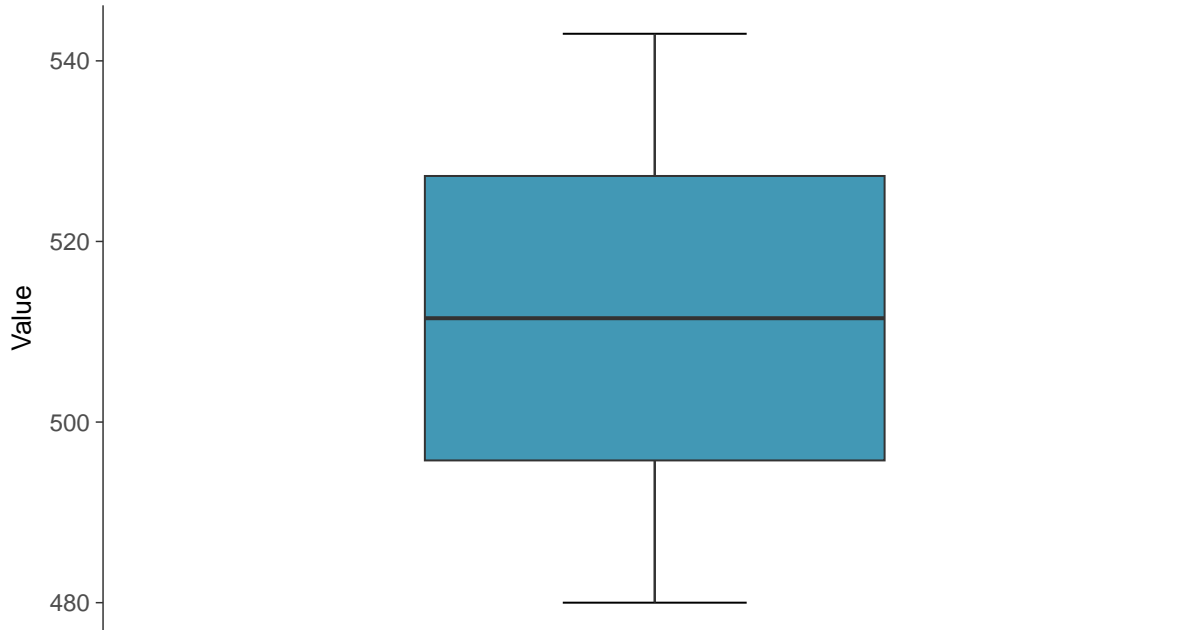
Bicarbonate, MW-6 (mg/L)





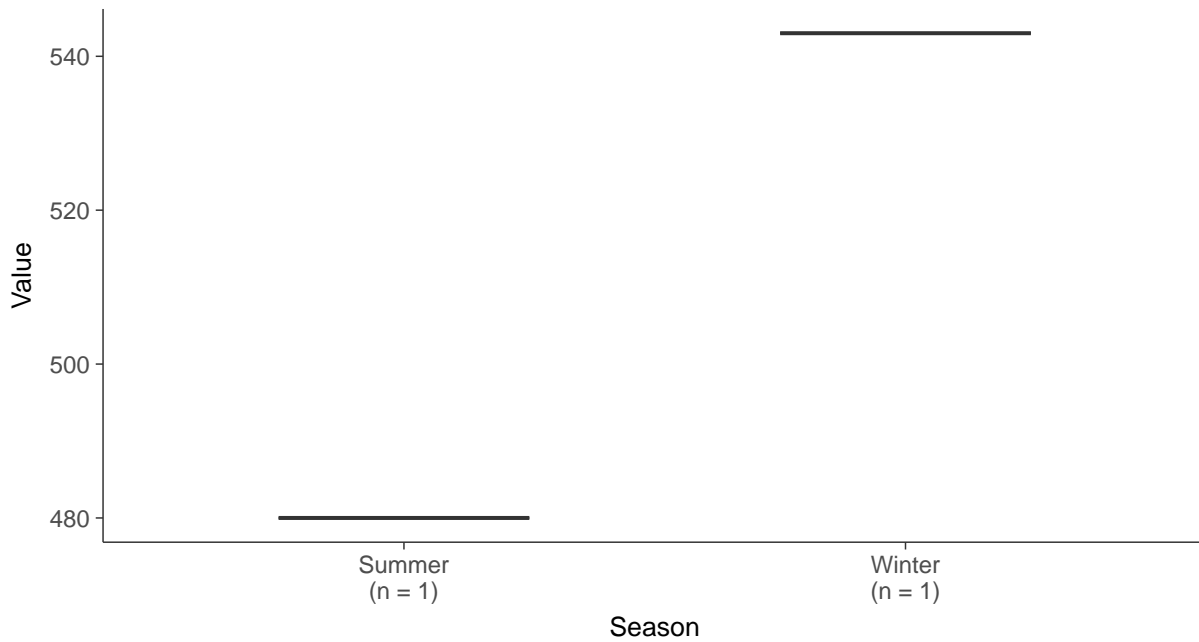
Boxplot

Bicarbonate, MW-6 (mg/L)



Boxplot by Season

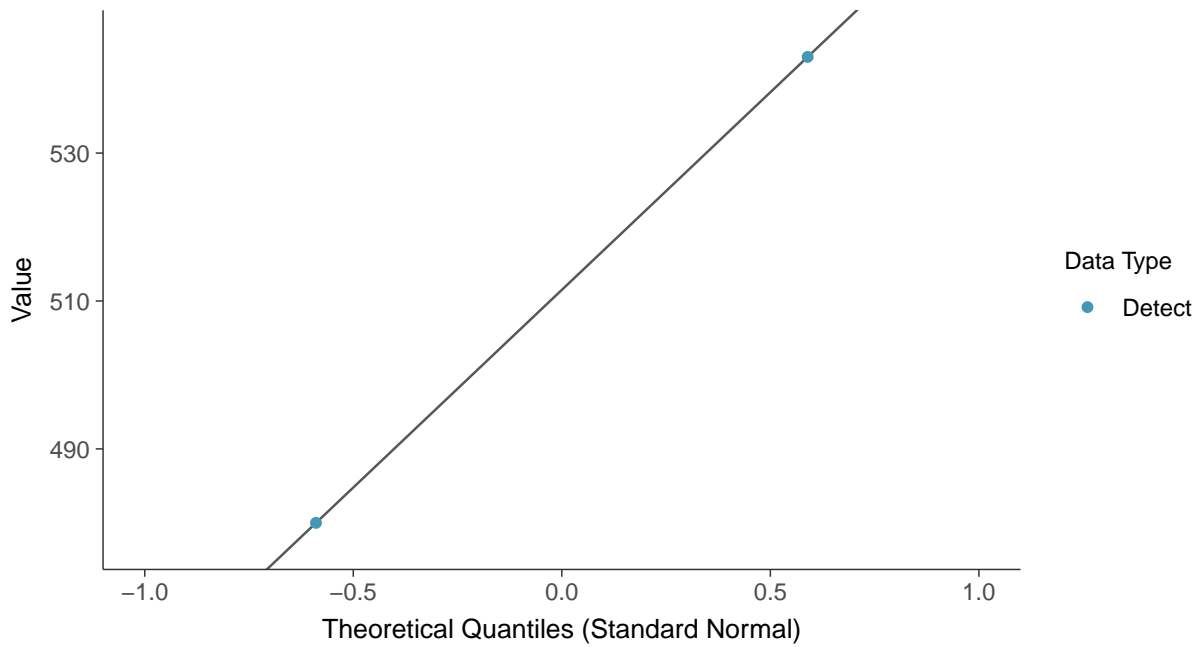
Bicarbonate, MW-6 (mg/L)





Normal Q-Q plot

Bicarbonate, MW-6 (mg/L)



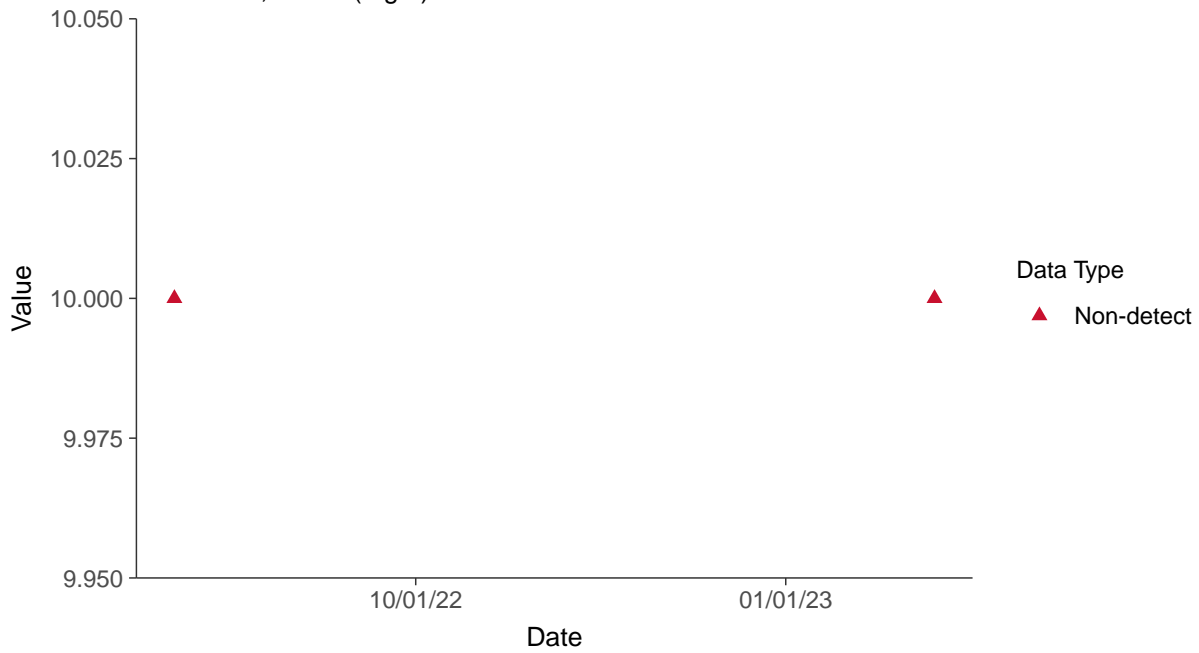


Other: Carbonate, MW-6

ID: 06_3_14

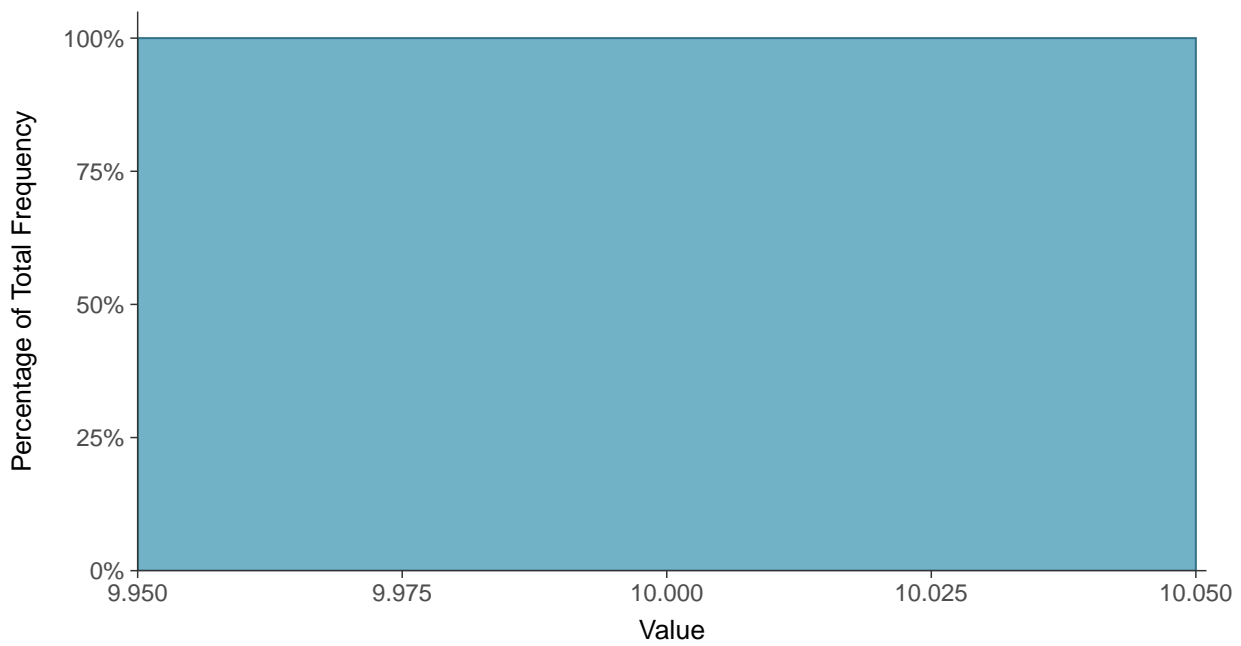
Scatter Plot

Carbonate, MW-6 (mg/L)



Histogram

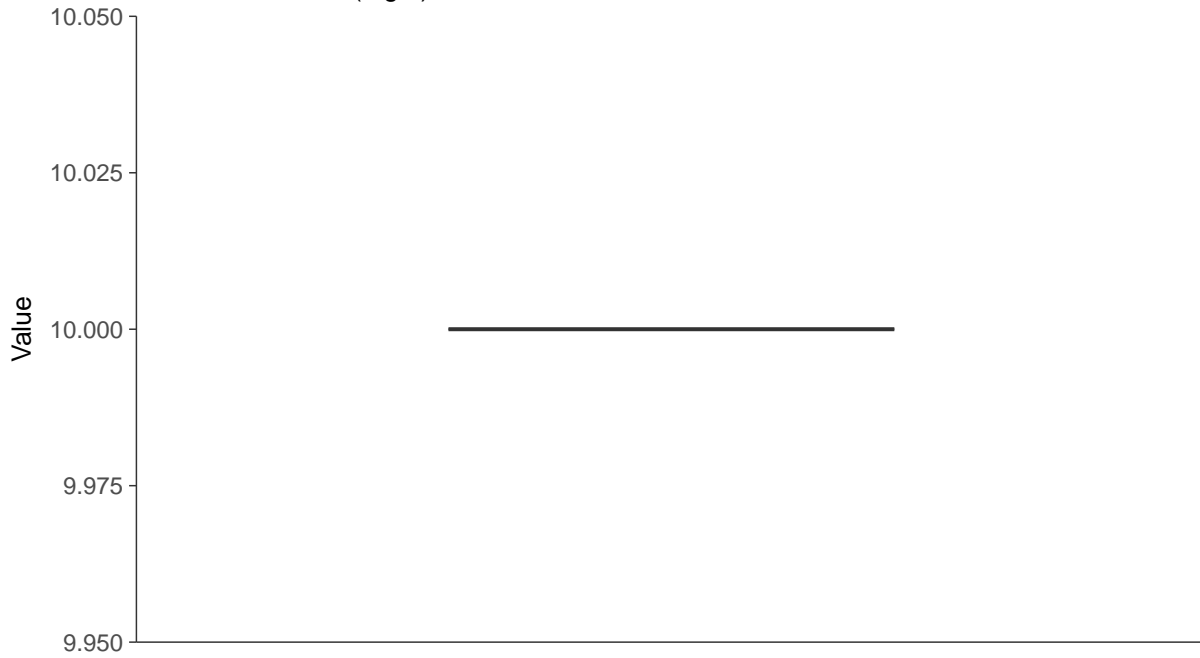
Carbonate, MW-6 (mg/L)





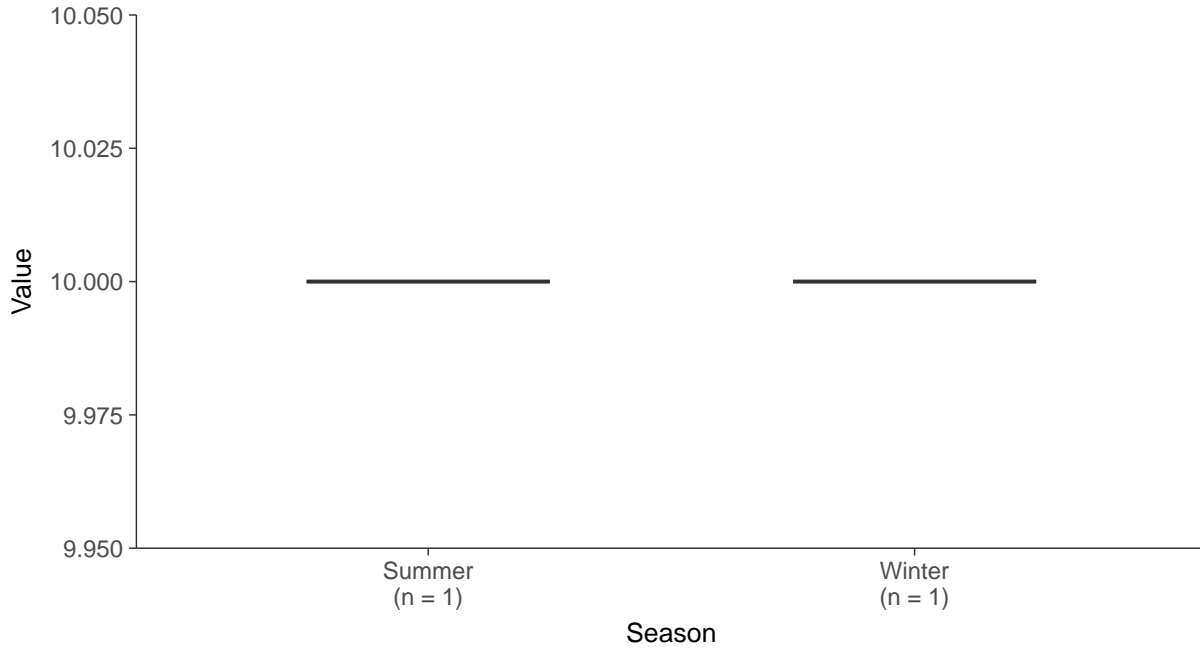
Boxplot

Carbonate, MW-6 (mg/L)



Boxplot by Season

Carbonate, MW-6 (mg/L)



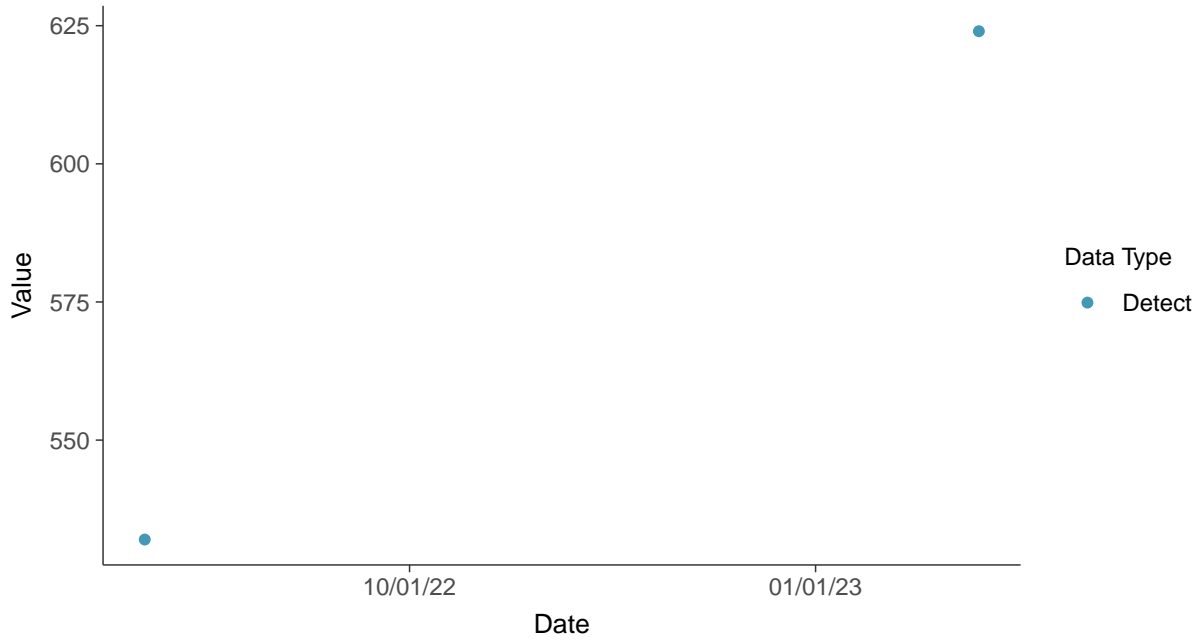


Other: Hardness, MW-6

ID: 06_3_17

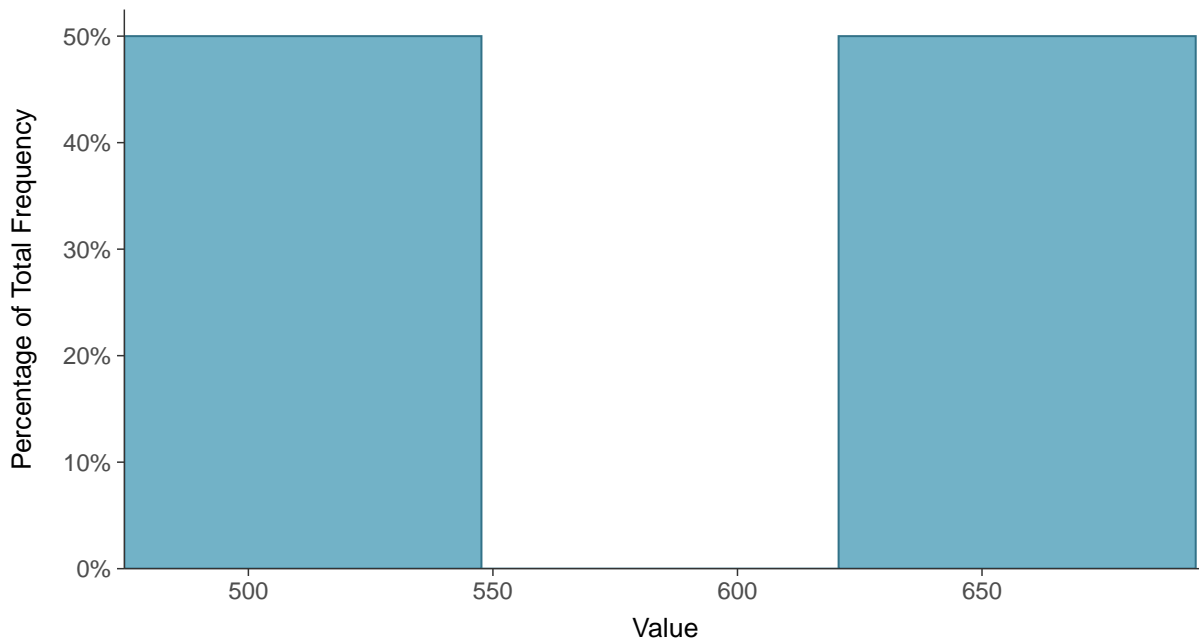
Scatter Plot

Hardness, MW-6 (mg/L)



Histogram

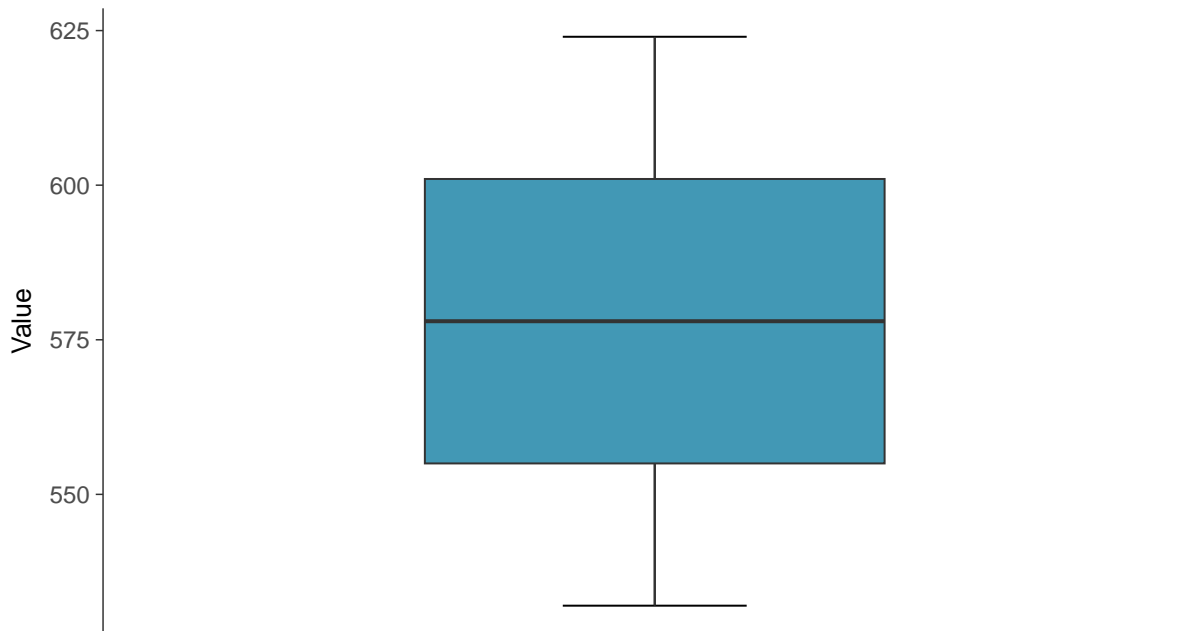
Hardness, MW-6 (mg/L)





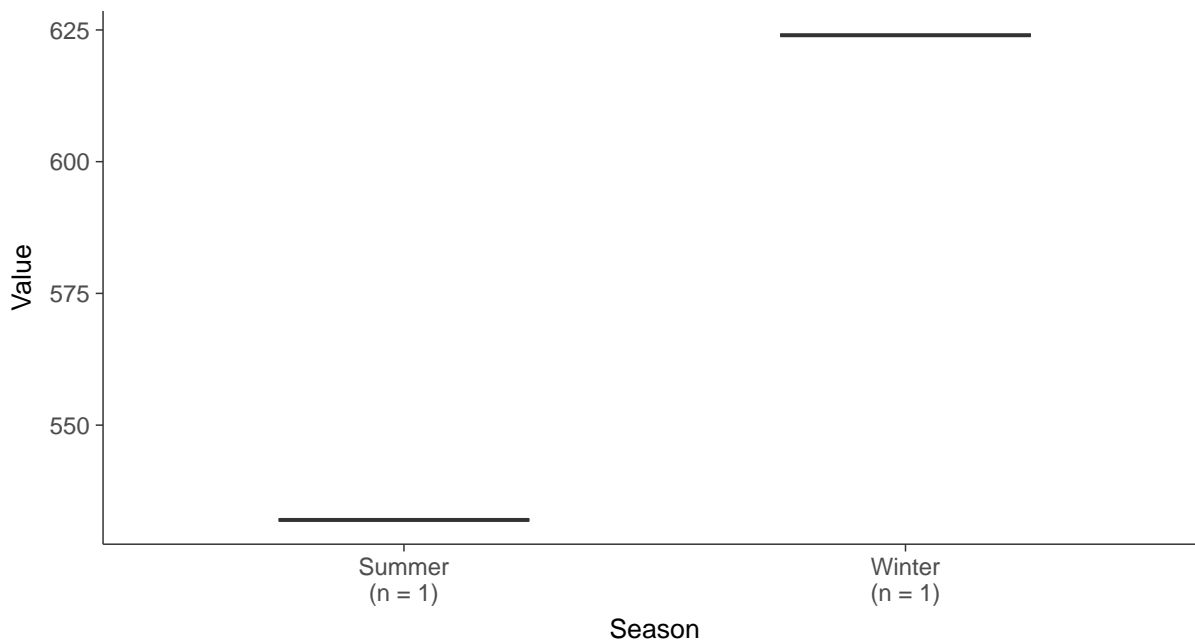
Boxplot

Hardness, MW-6 (mg/L)



Boxplot by Season

Hardness, MW-6 (mg/L)

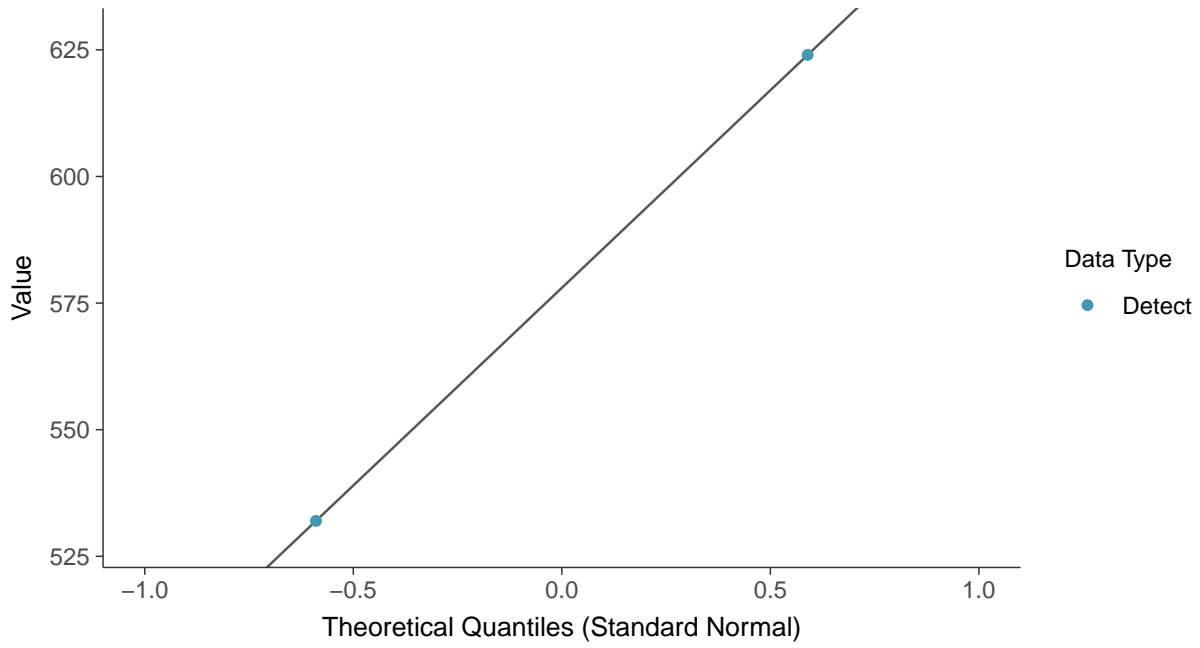




Downgradient Wells MW-2, MW-3, MW-5, MW-6, MW-7, MW-7B, MW-8, MW-9, MW-10, MW-13, MW-14, MW-15

Normal Q-Q plot

Hardness, MW-6 (mg/L)



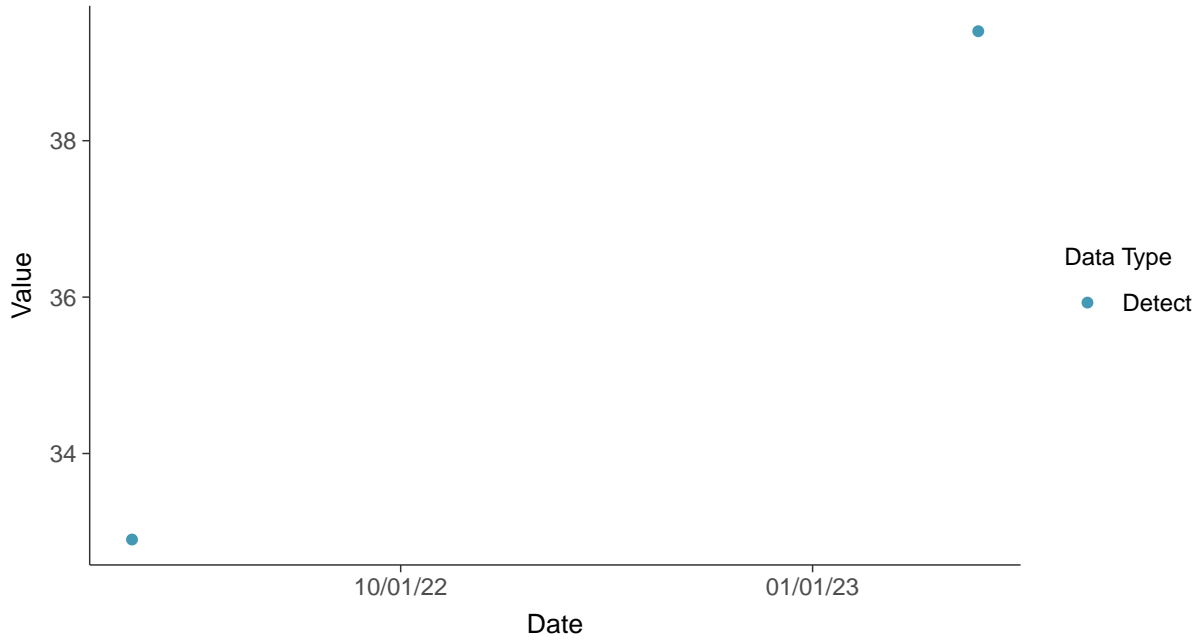


Other: Magnesium, MW-6

ID: 06_3_20

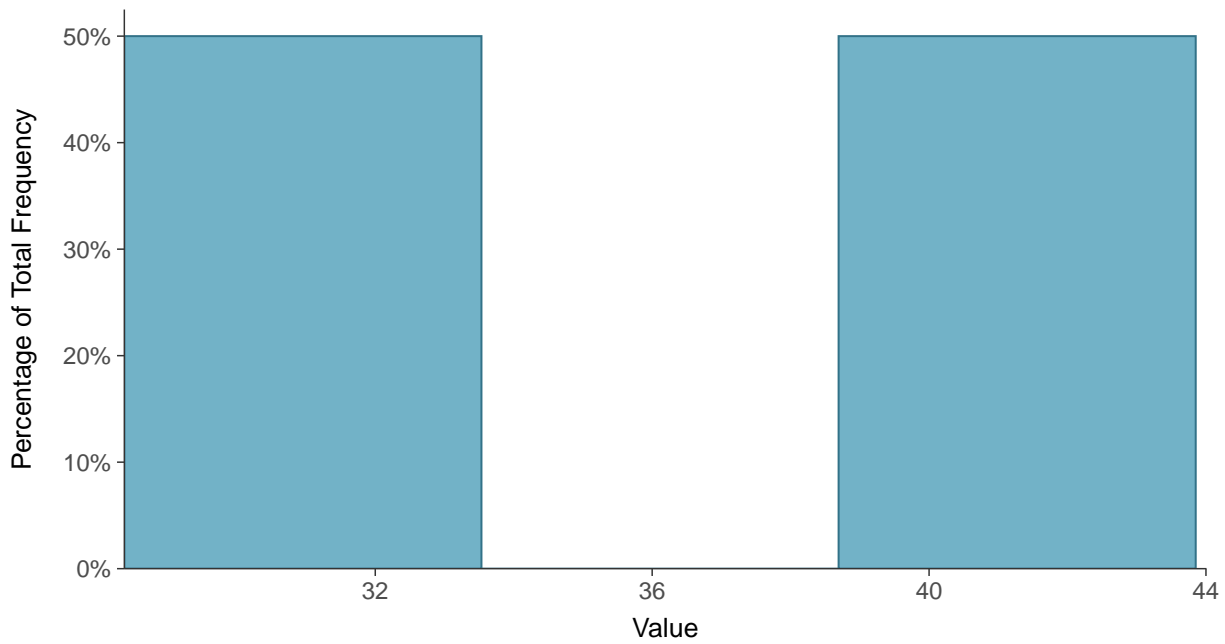
Scatter Plot

Magnesium, MW-6 (mg/L)



Histogram

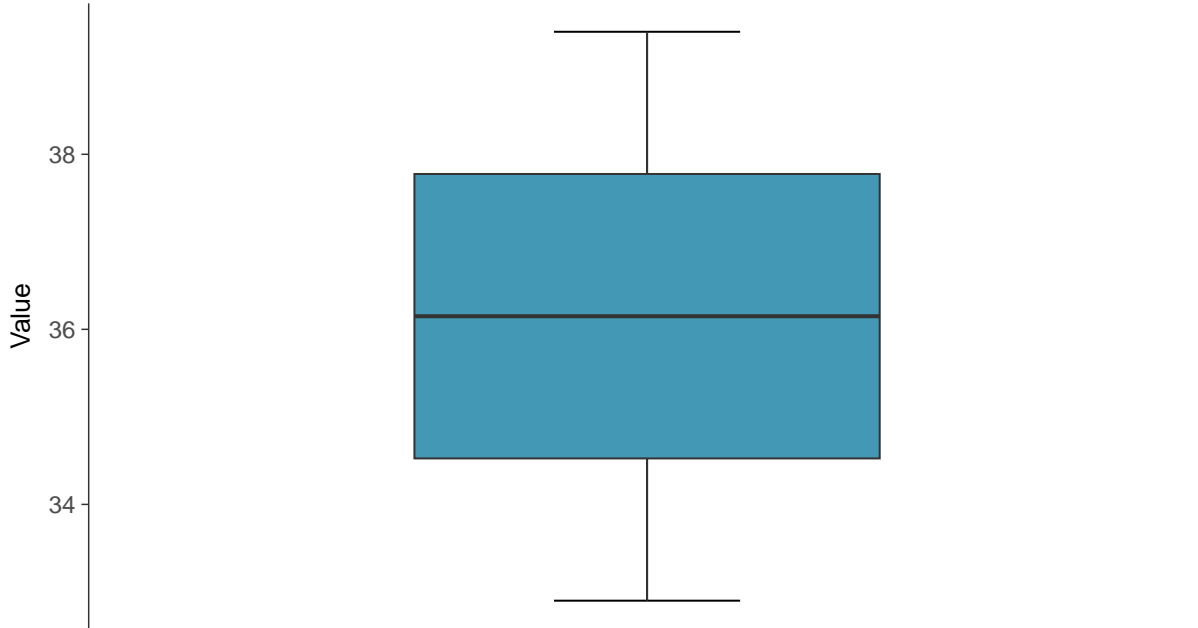
Magnesium, MW-6 (mg/L)





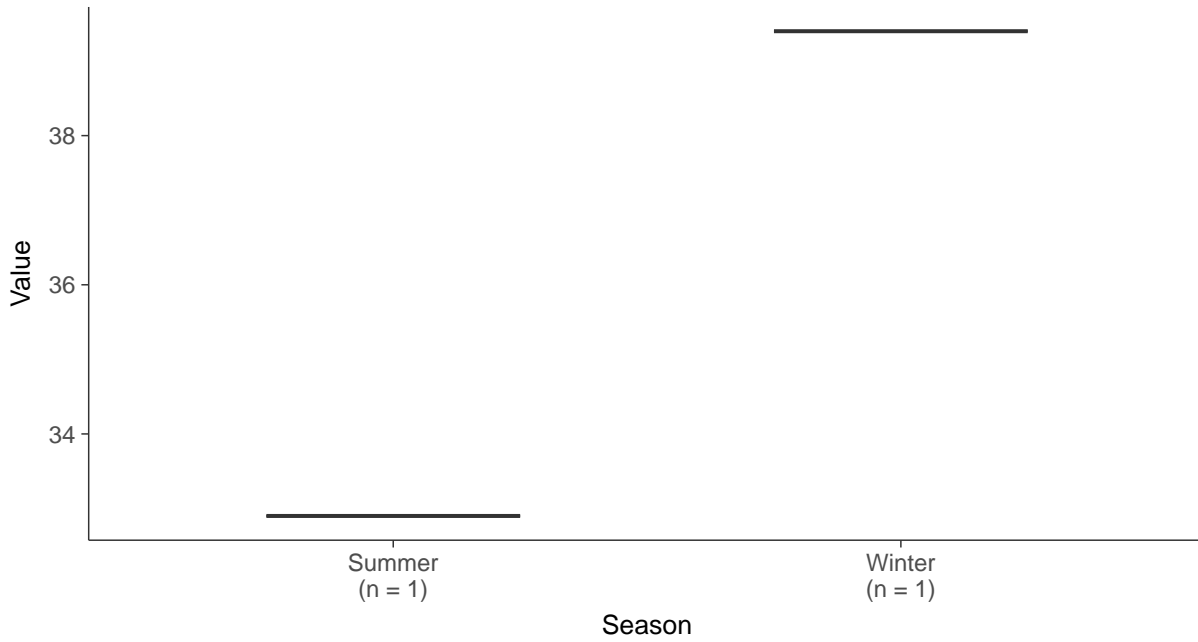
Boxplot

Magnesium, MW-6 (mg/L)



Boxplot by Season

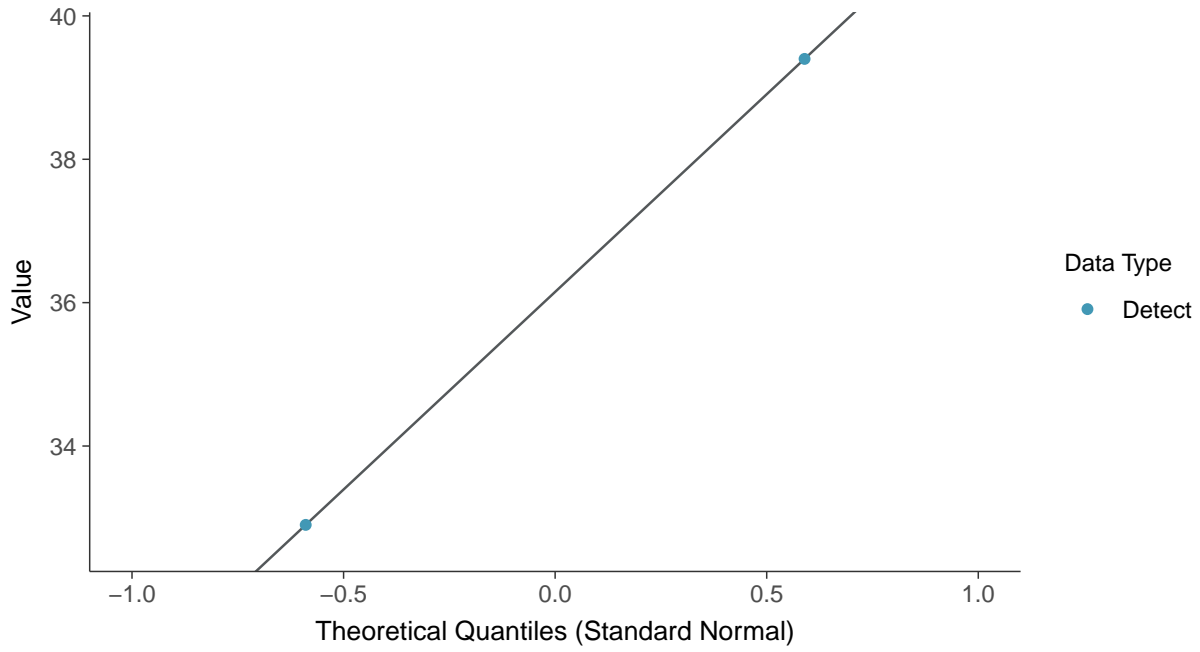
Magnesium, MW-6 (mg/L)





Normal Q-Q plot

Magnesium, MW-6 (mg/L)



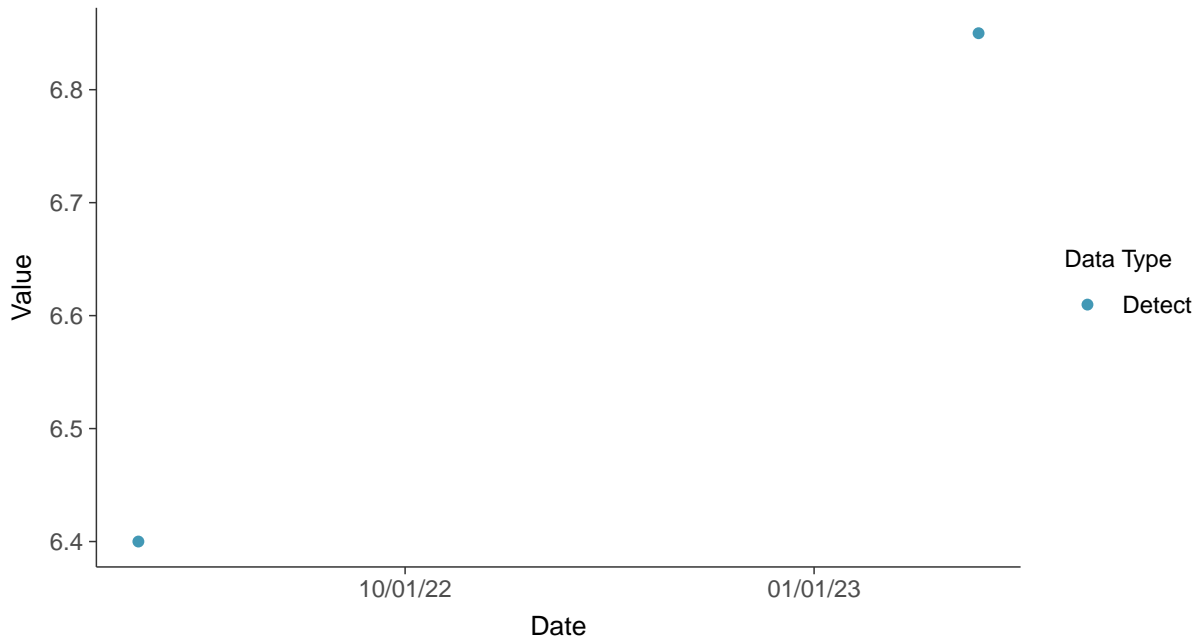


Other: Potassium, MW-6

ID: 06_3_23

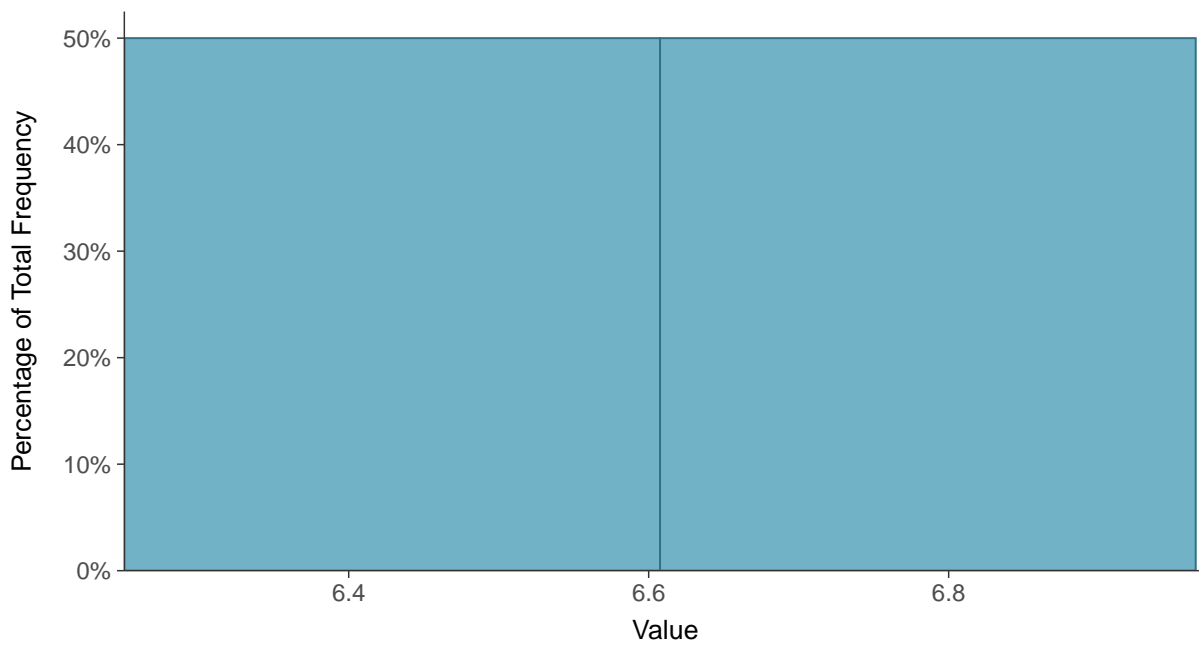
Scatter Plot

Potassium, MW-6 (mg/L)



Histogram

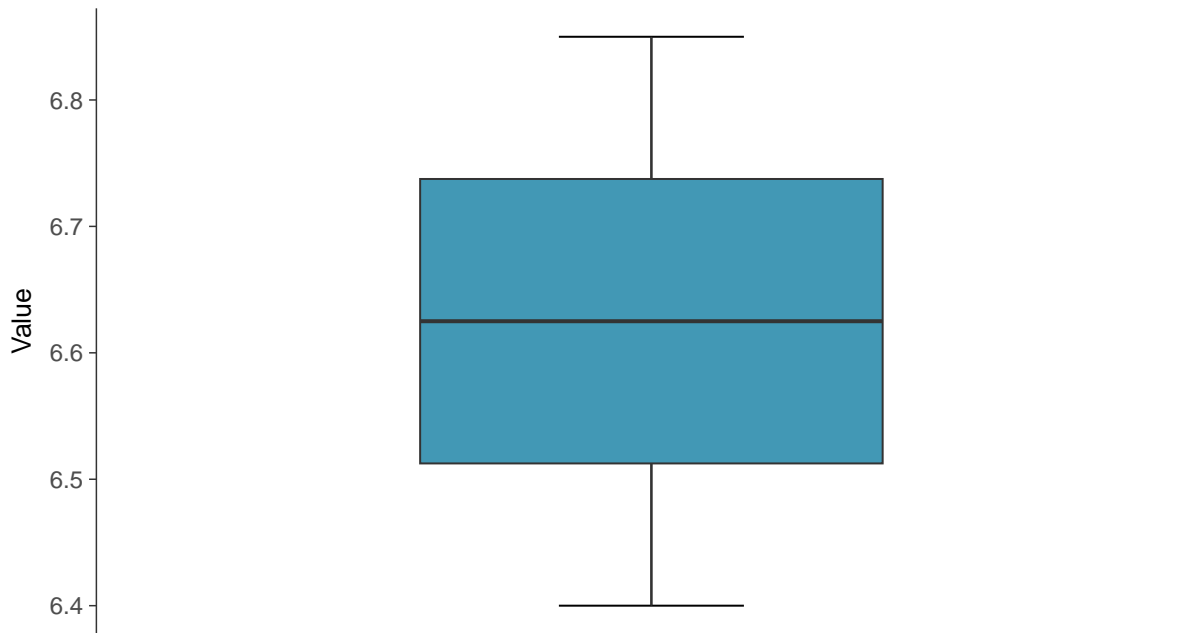
Potassium, MW-6 (mg/L)





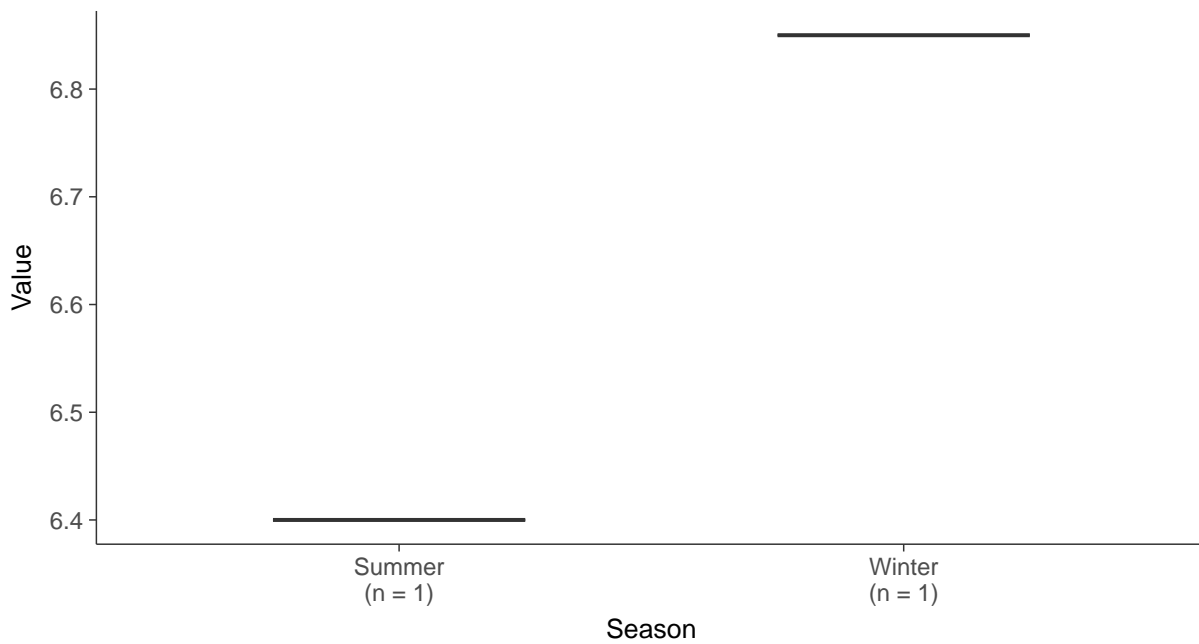
Boxplot

Potassium, MW-6 (mg/L)



Boxplot by Season

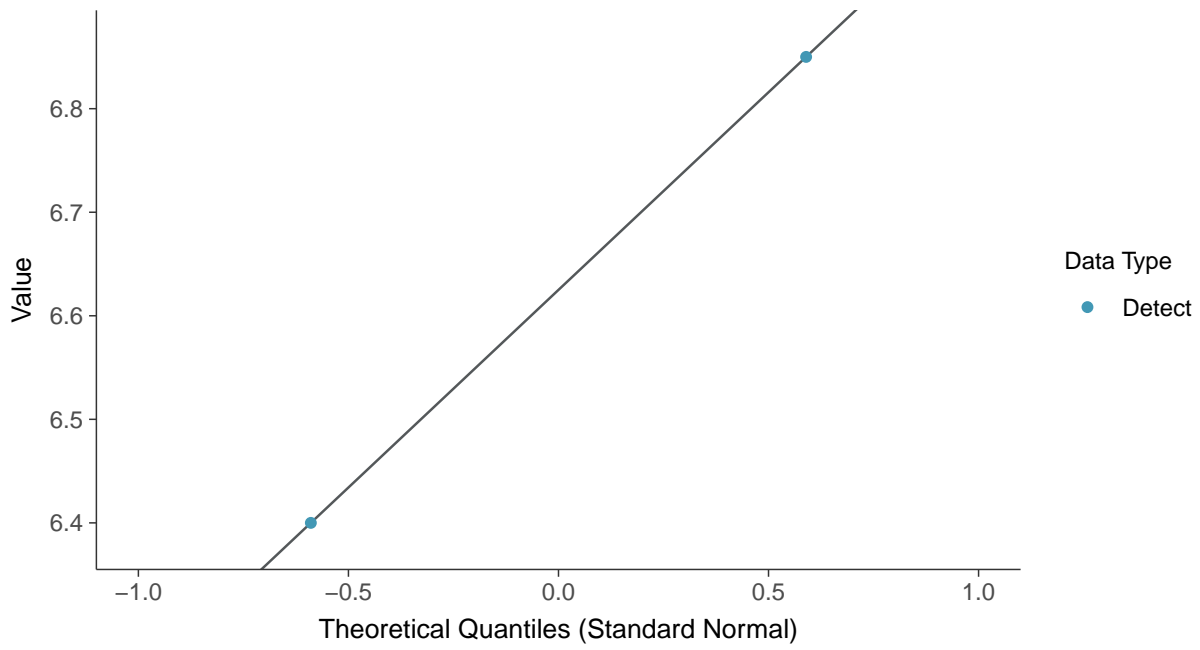
Potassium, MW-6 (mg/L)





Normal Q-Q plot

Potassium, MW-6 (mg/L)



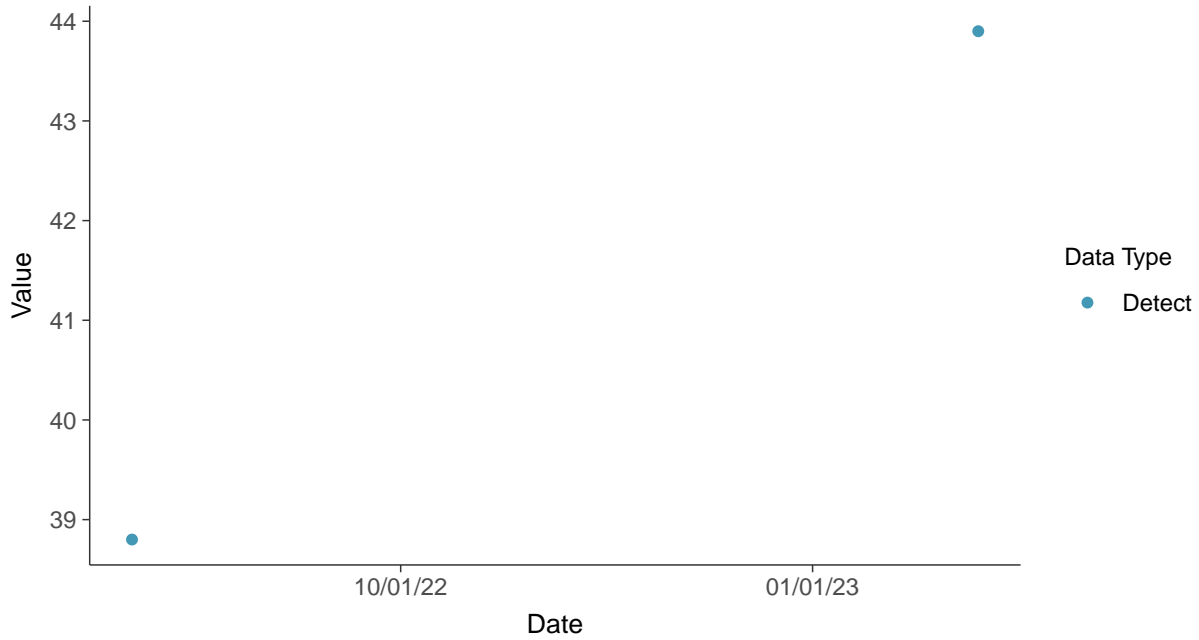


Other: Sodium, MW-6

ID: 06_3_28

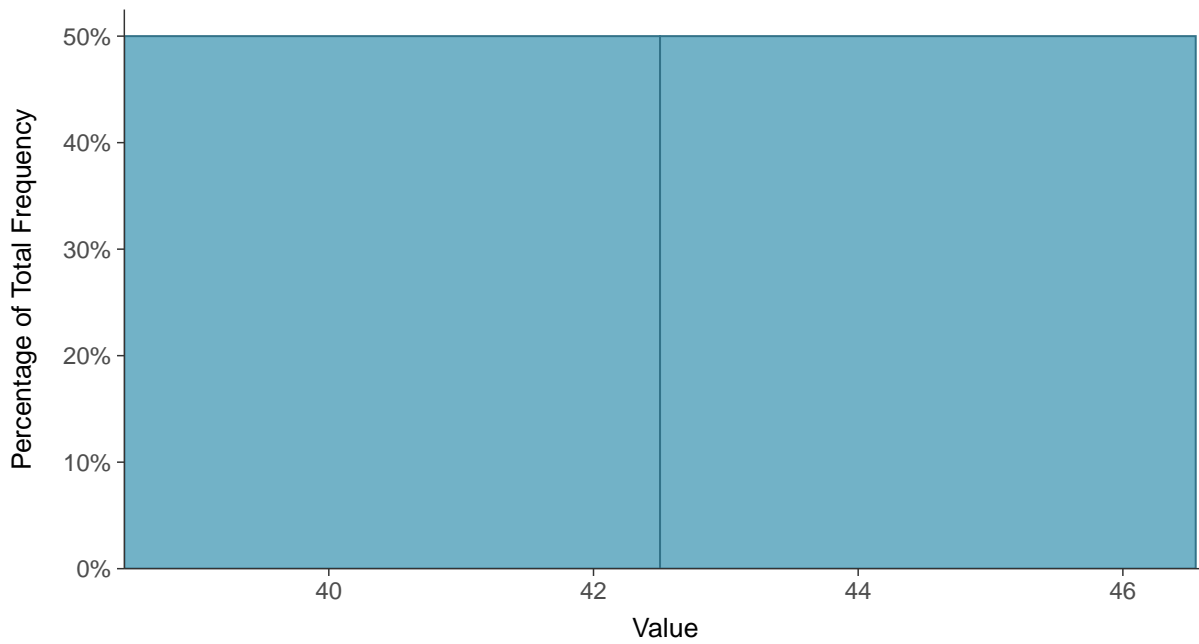
Scatter Plot

Sodium, MW-6 (mg/L)



Histogram

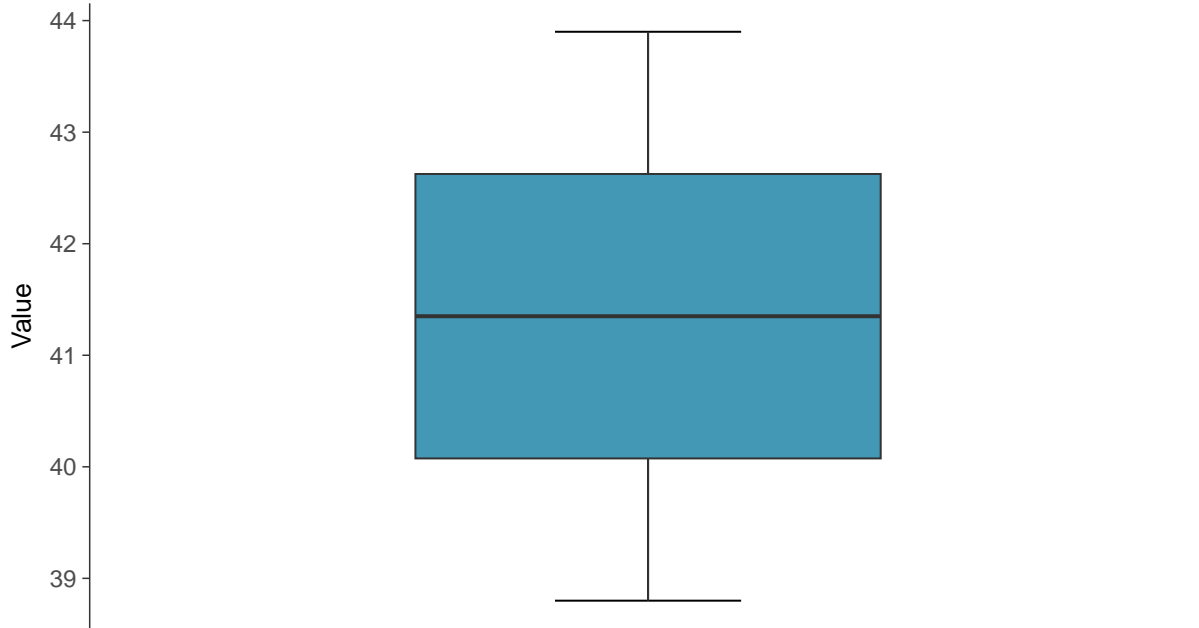
Sodium, MW-6 (mg/L)





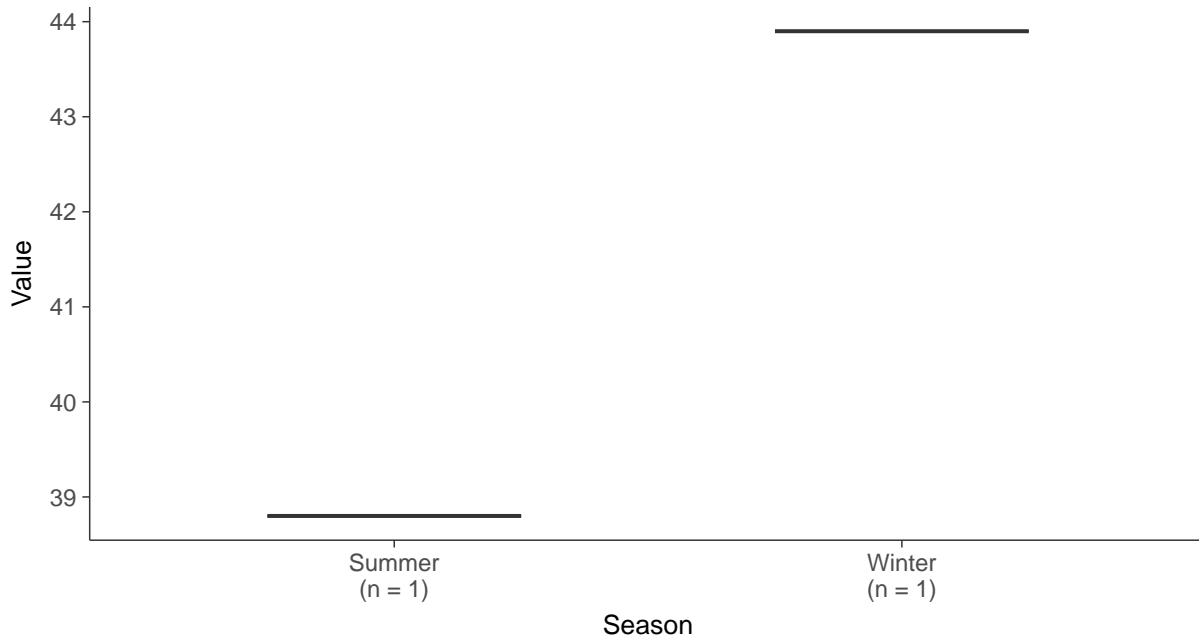
Boxplot

Sodium, MW-6 (mg/L)



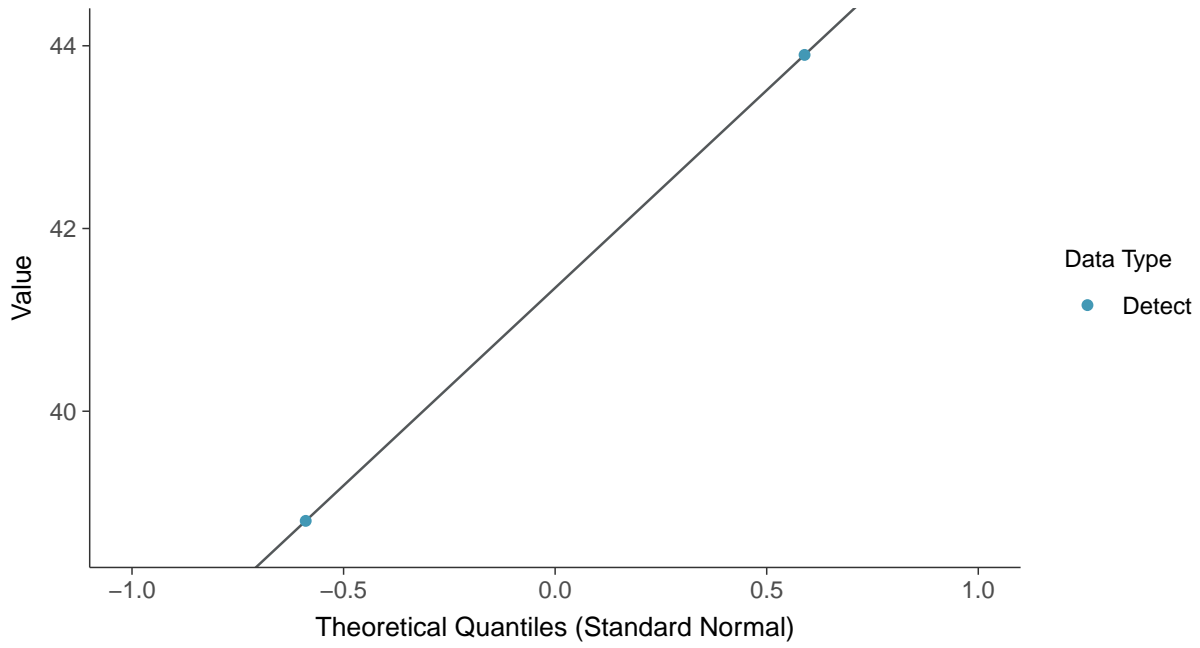
Boxplot by Season

Sodium, MW-6 (mg/L)





Normal Q-Q plot
Sodium, MW-6 (mg/L)



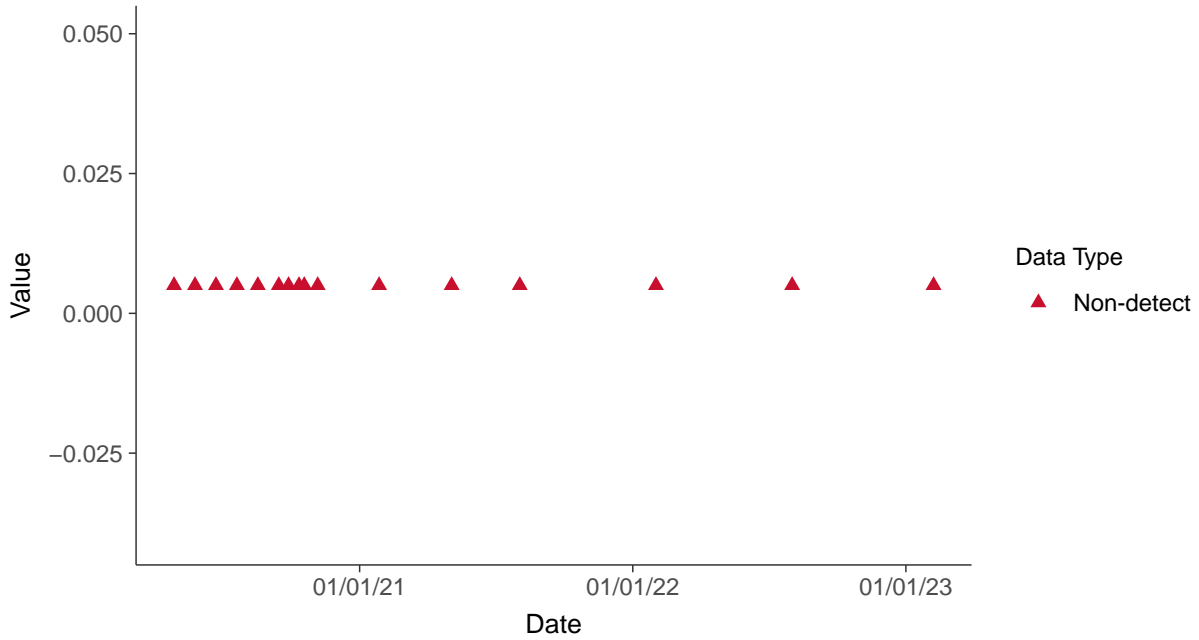


Part 115: Copper, MW-6

ID: 06_5_37

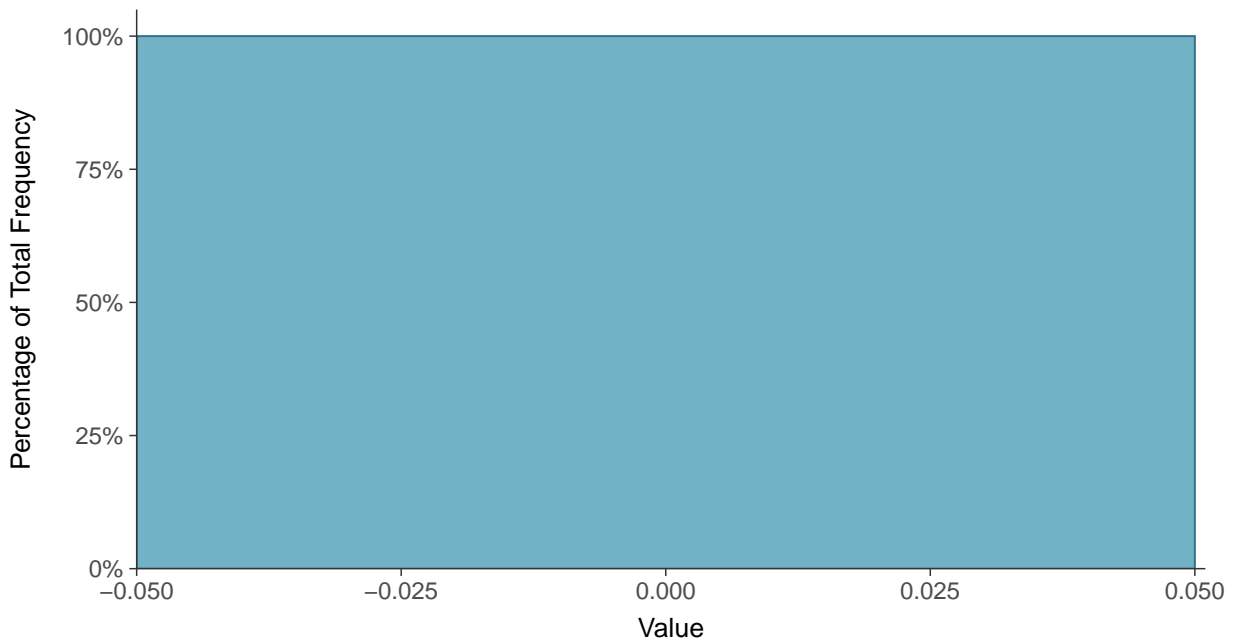
Scatter Plot

Copper, MW-6 (mg/L)



Histogram

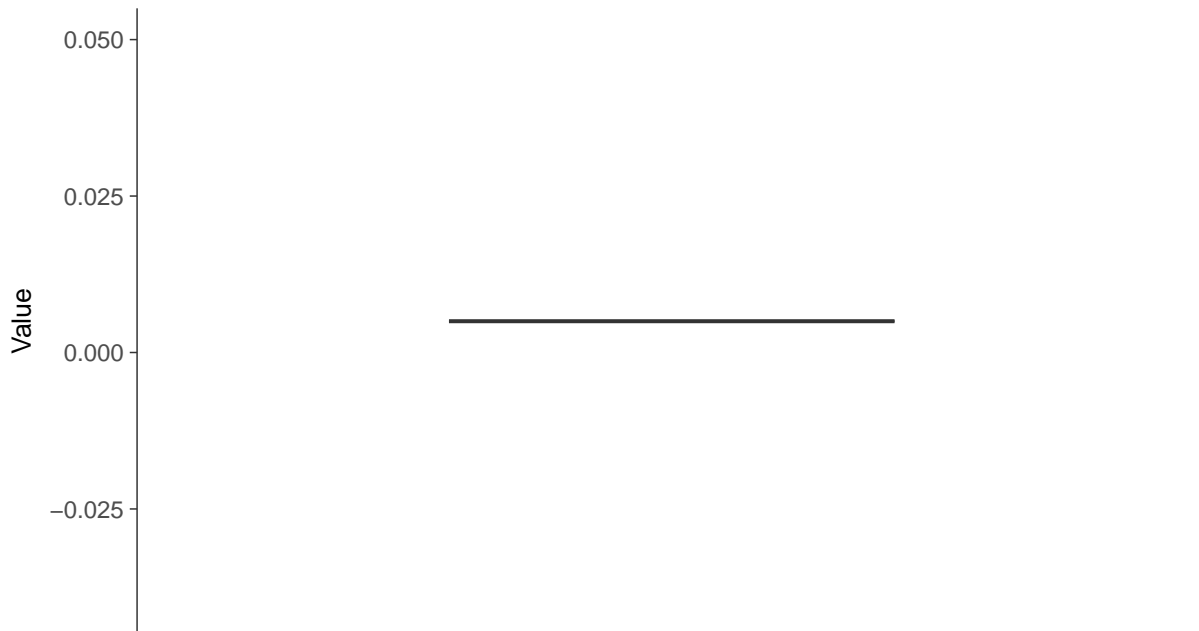
Copper, MW-6 (mg/L)





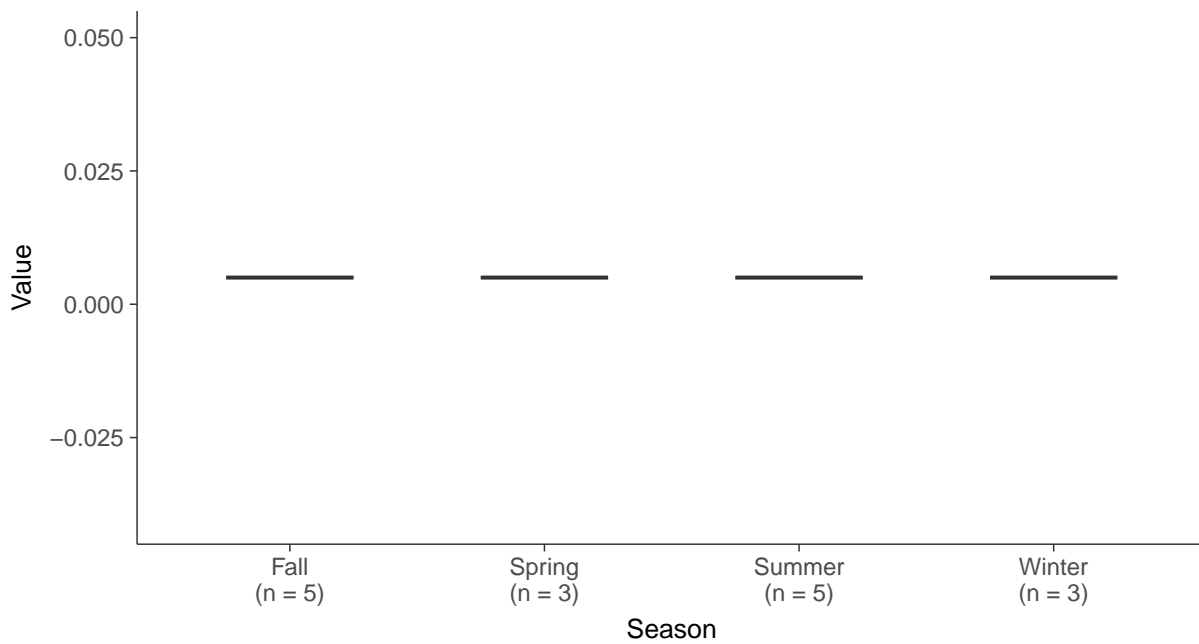
Boxplot

Copper, MW-6 (mg/L)



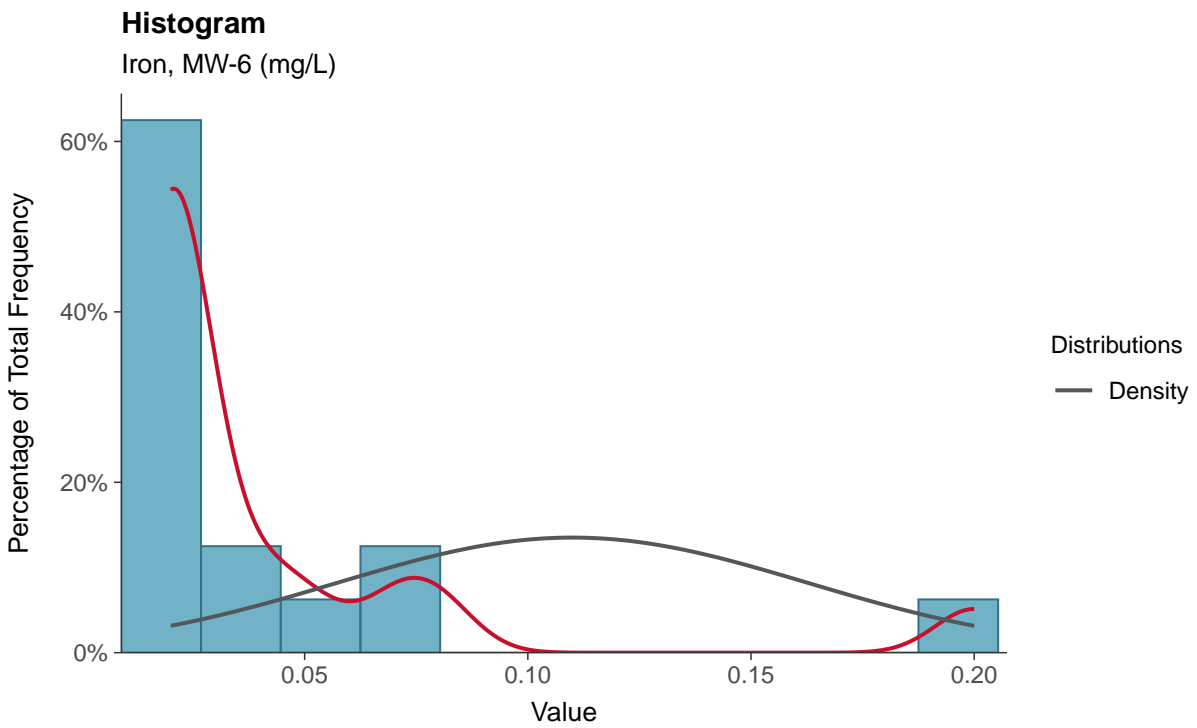
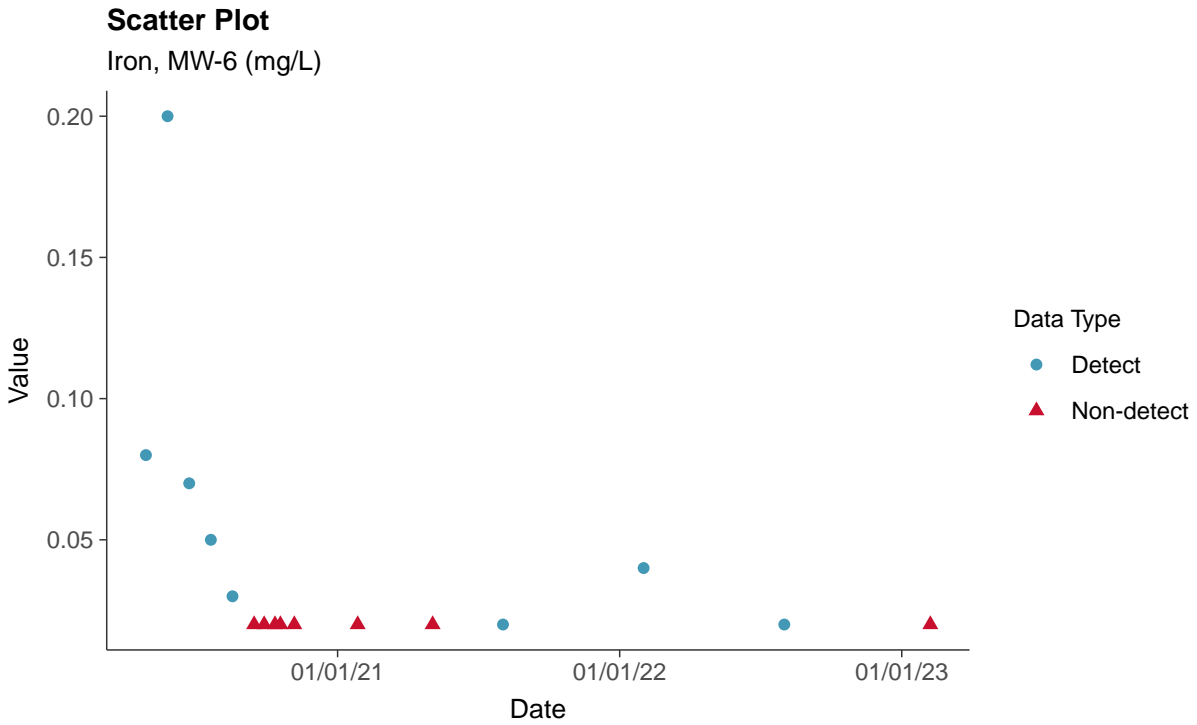
Boxplot by Season

Copper, MW-6 (mg/L)



Part 115: Iron, MW-6

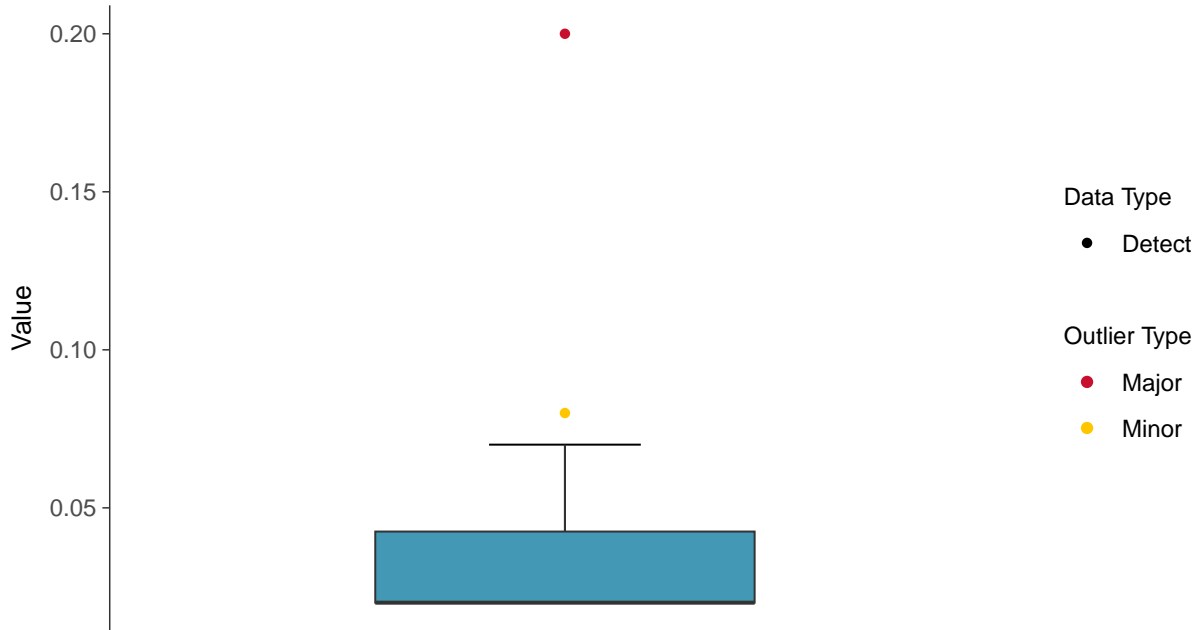
ID: 06_5_38





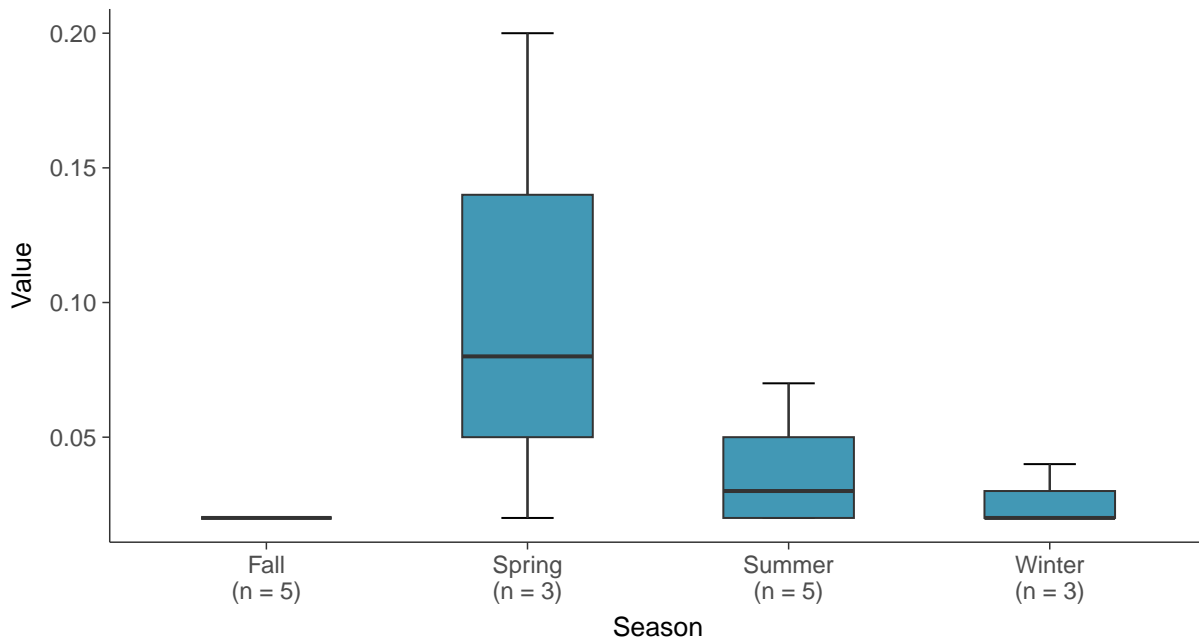
Boxplot

Iron, MW-6 (mg/L)



Boxplot by Season

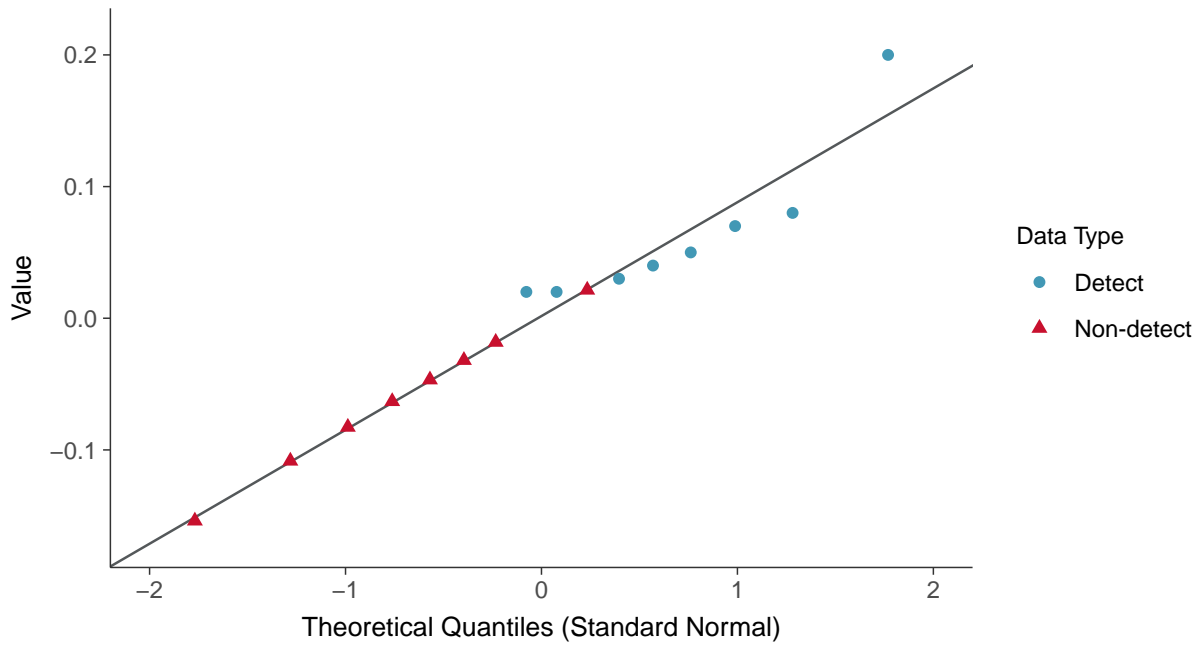
Iron, MW-6 (mg/L)





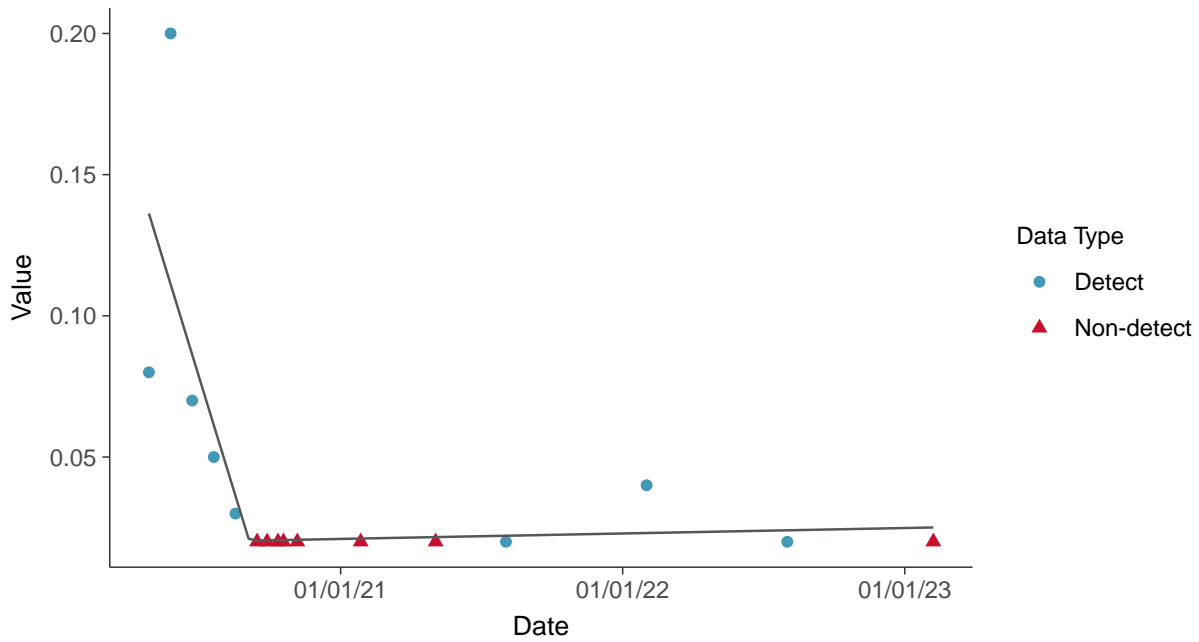
Normal Q-Q plot using ROS Imputed Estimates

Iron, MW-6 (mg/L)



Trend Regression: Piecewise Linear-Linear

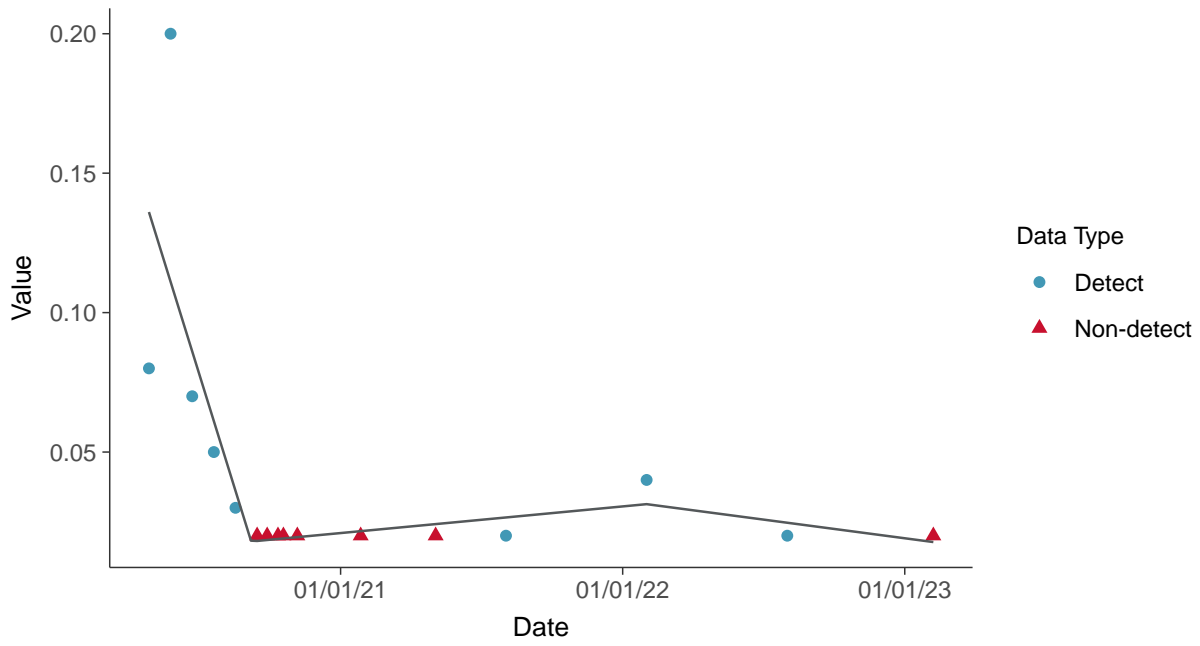
Iron, MW-6 (mg/L)





Trend Regression: Piecewise Linear-Linear-Linear

Iron, MW-6 (mg/L)



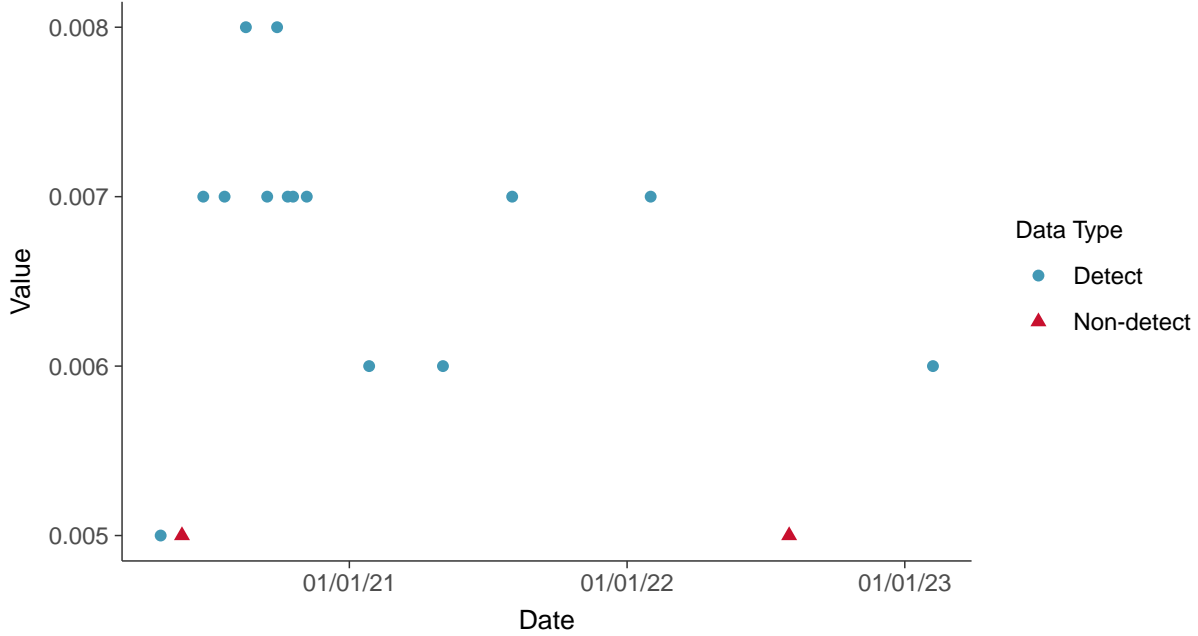


Part 115: Nickel, MW-6

ID: 06_5_39

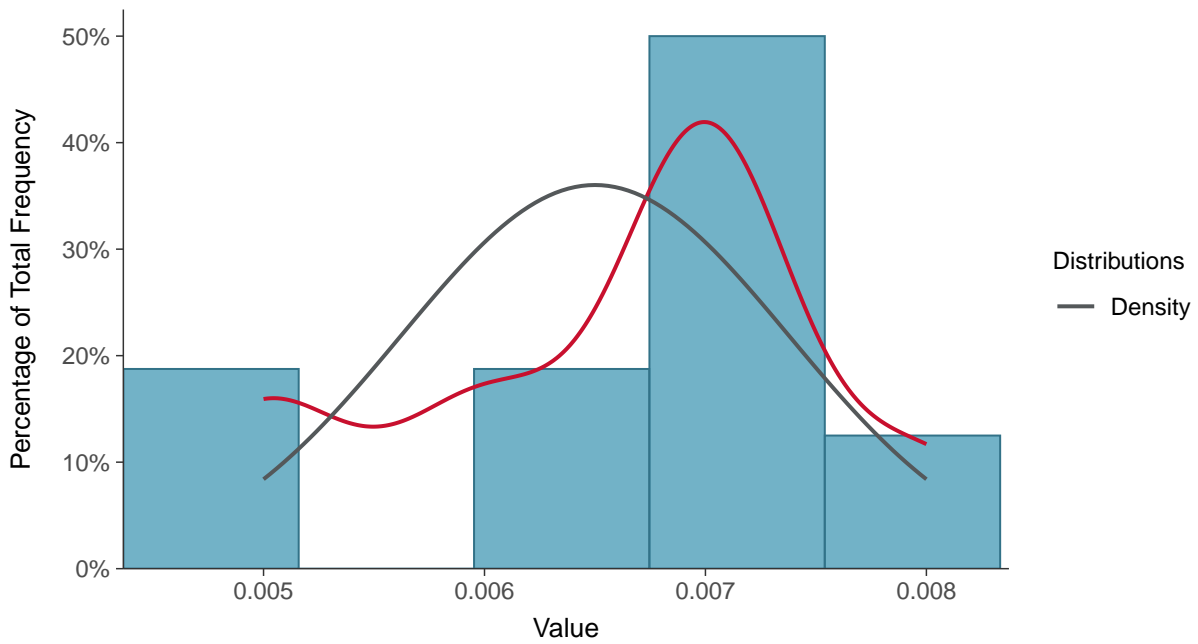
Scatter Plot

Nickel, MW-6 (mg/L)



Histogram

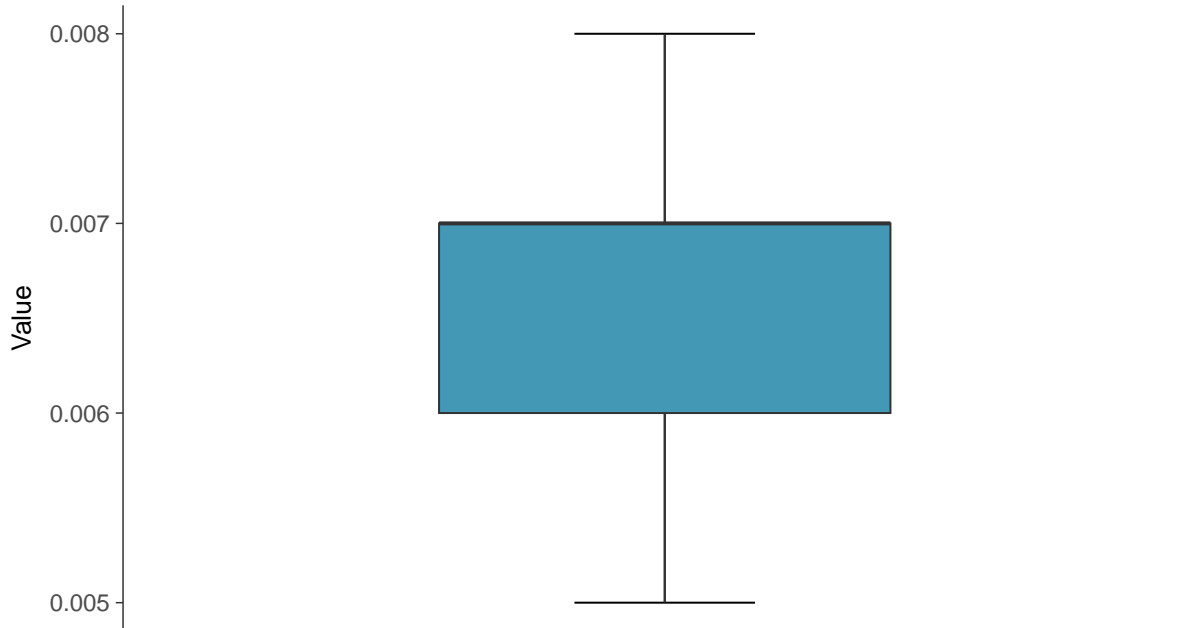
Nickel, MW-6 (mg/L)





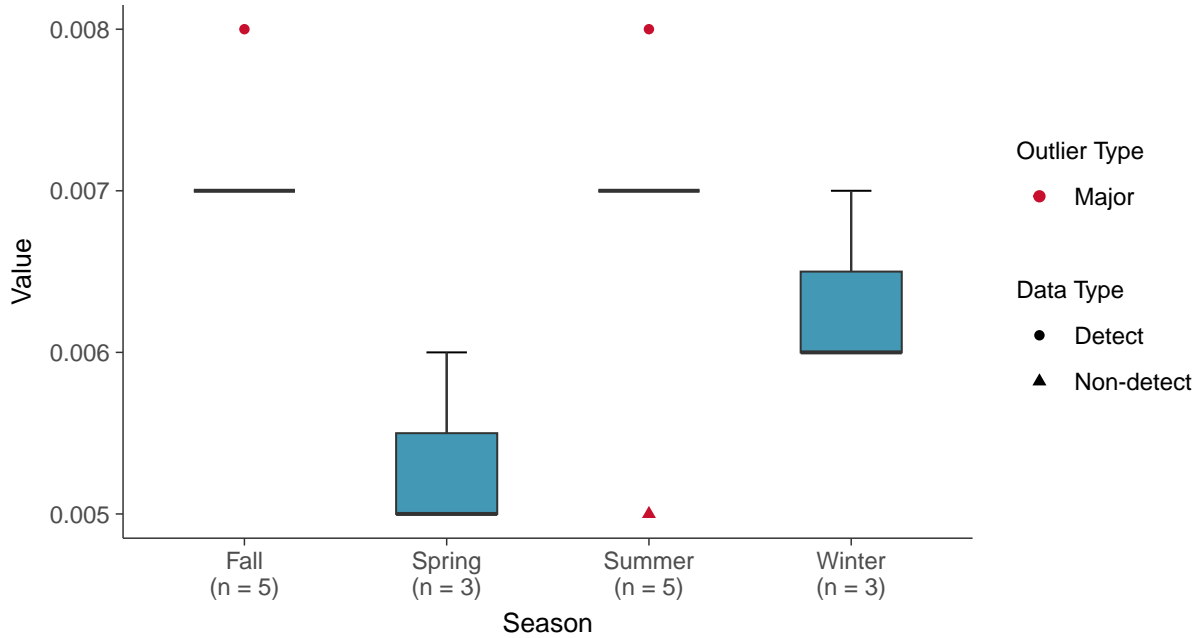
Boxplot

Nickel, MW-6 (mg/L)



Boxplot by Season

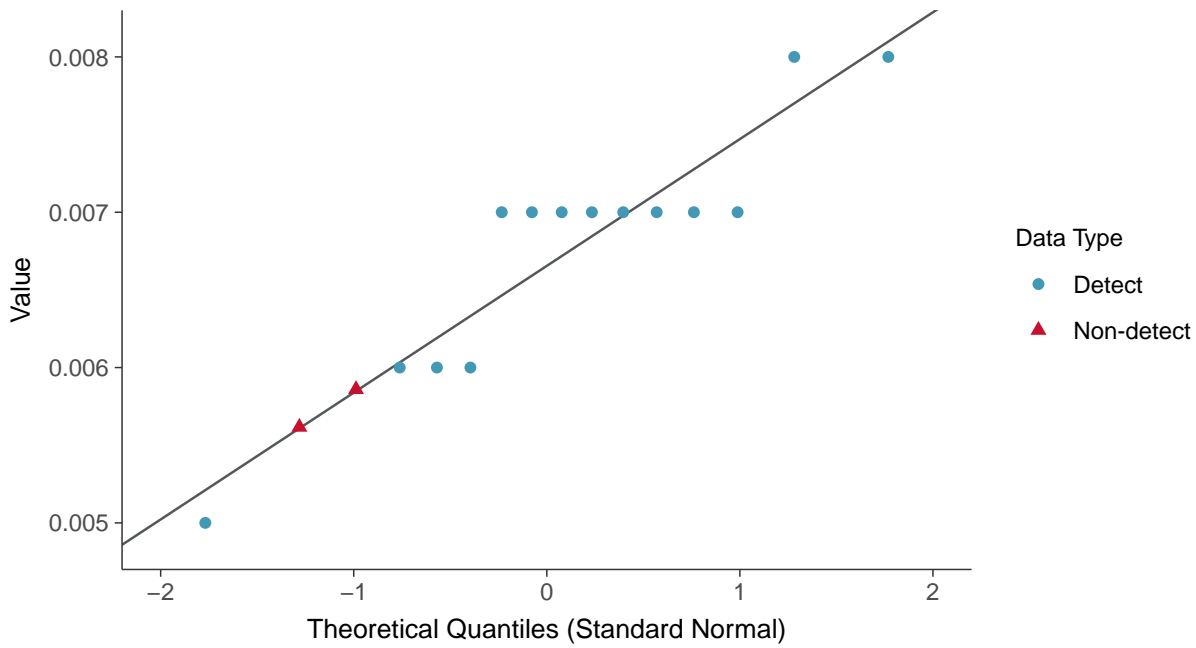
Nickel, MW-6 (mg/L)





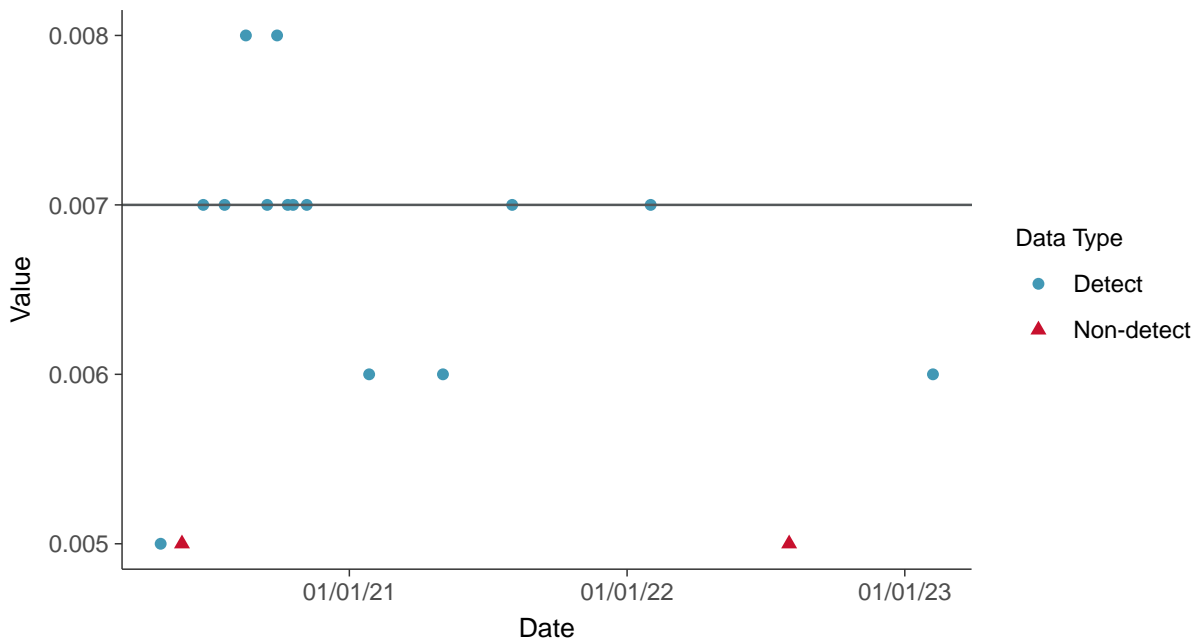
Normal Q-Q plot using ROS Imputed Estimates

Nickel, MW-6 (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

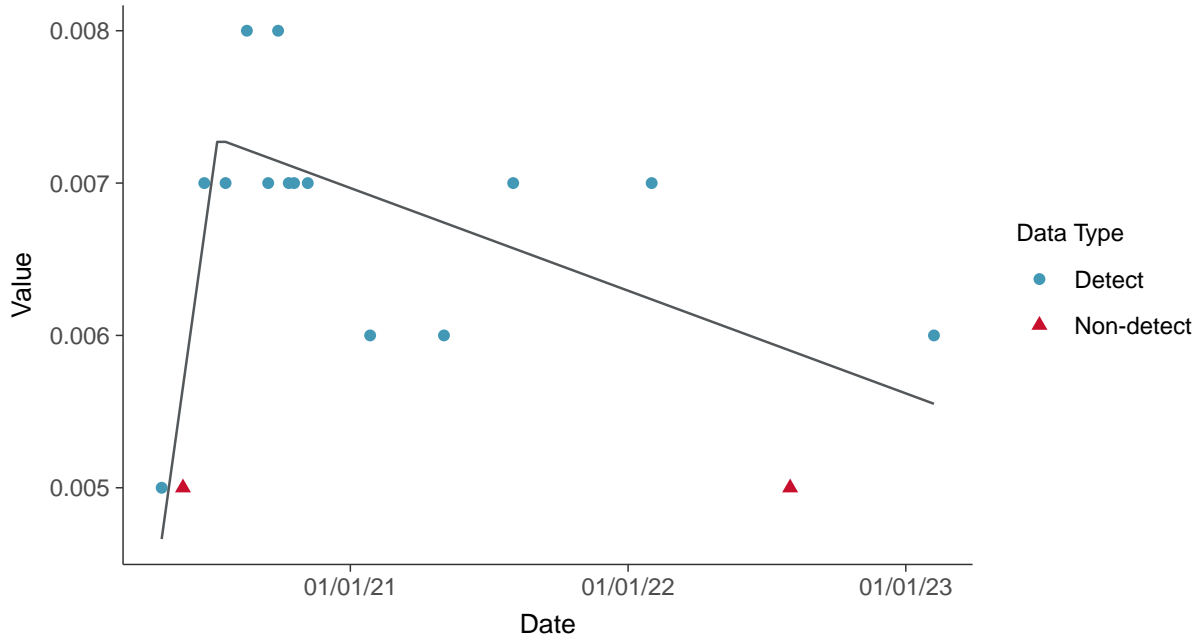
Nickel, MW-6 (mg/L)





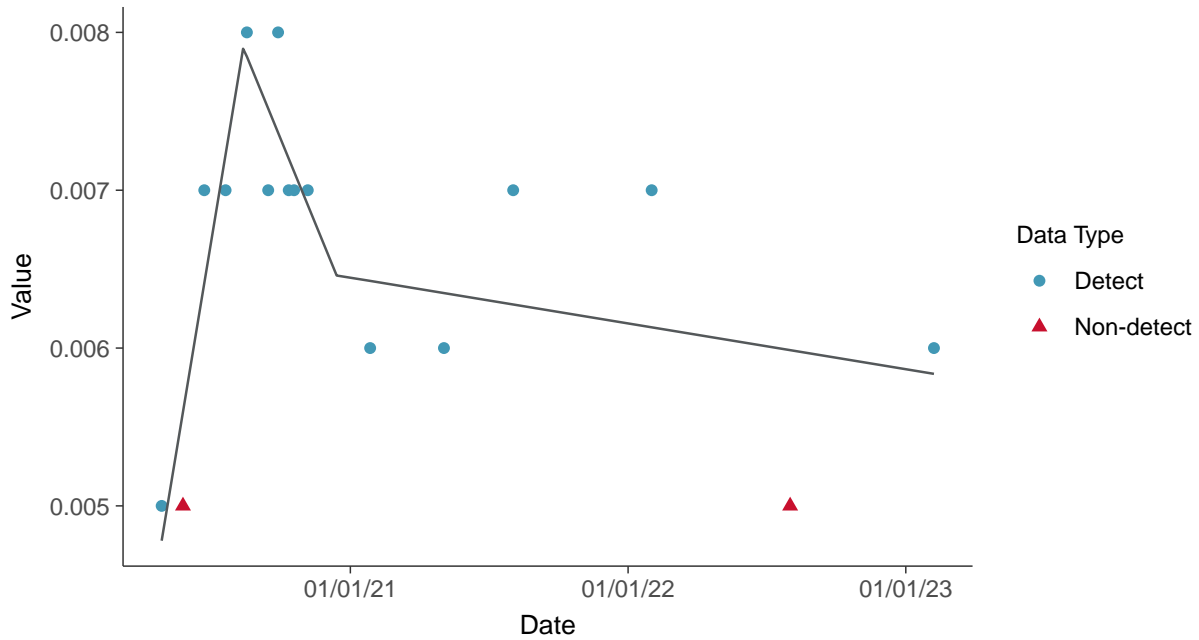
Trend Regression: Piecewise Linear-Linear

Nickel, MW-6 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

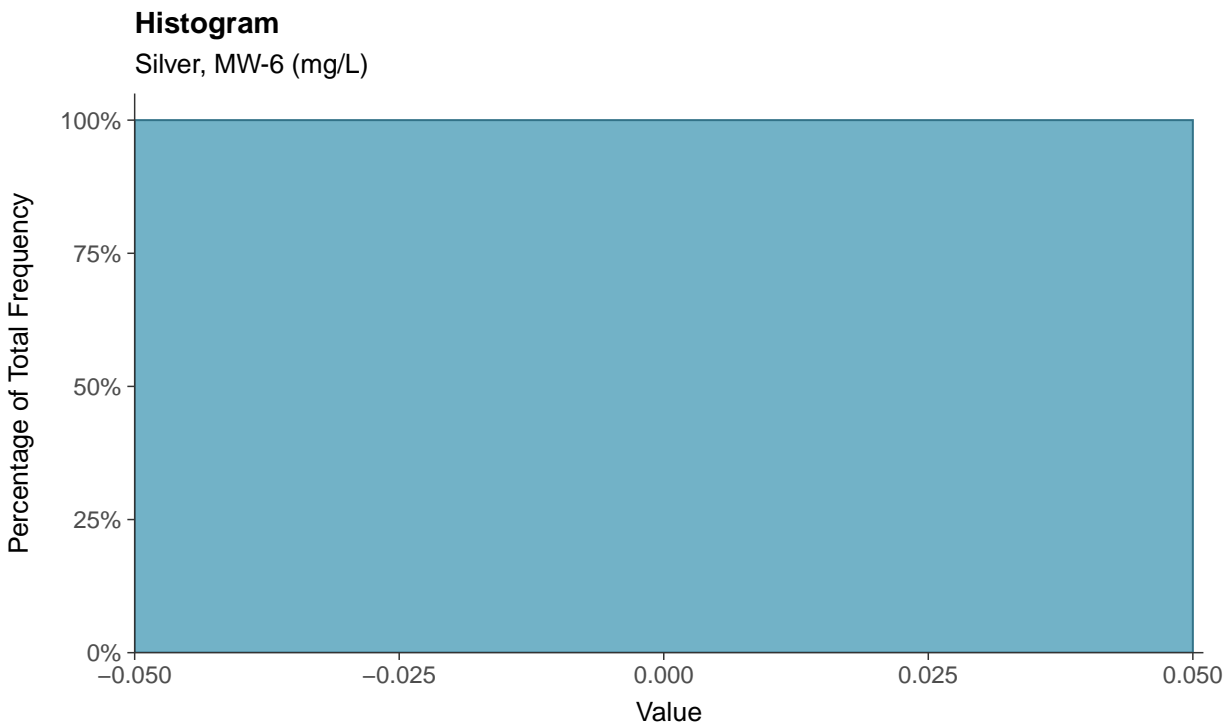
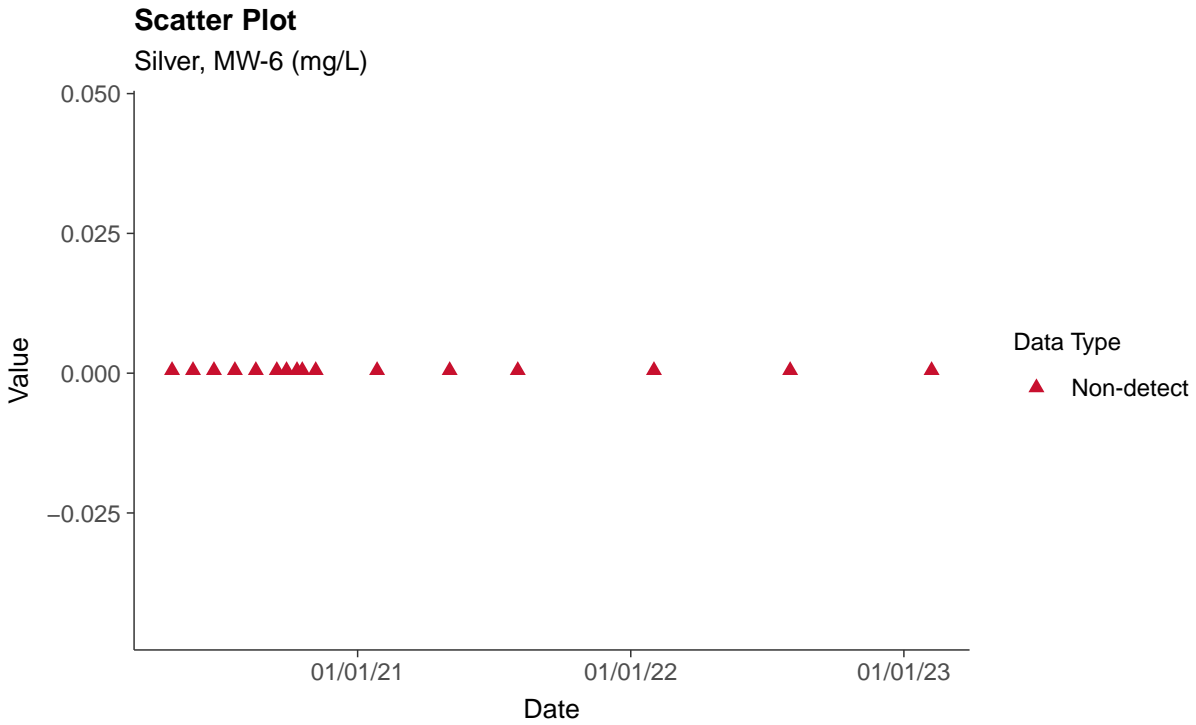
Nickel, MW-6 (mg/L)





Part 115: Silver, MW-6

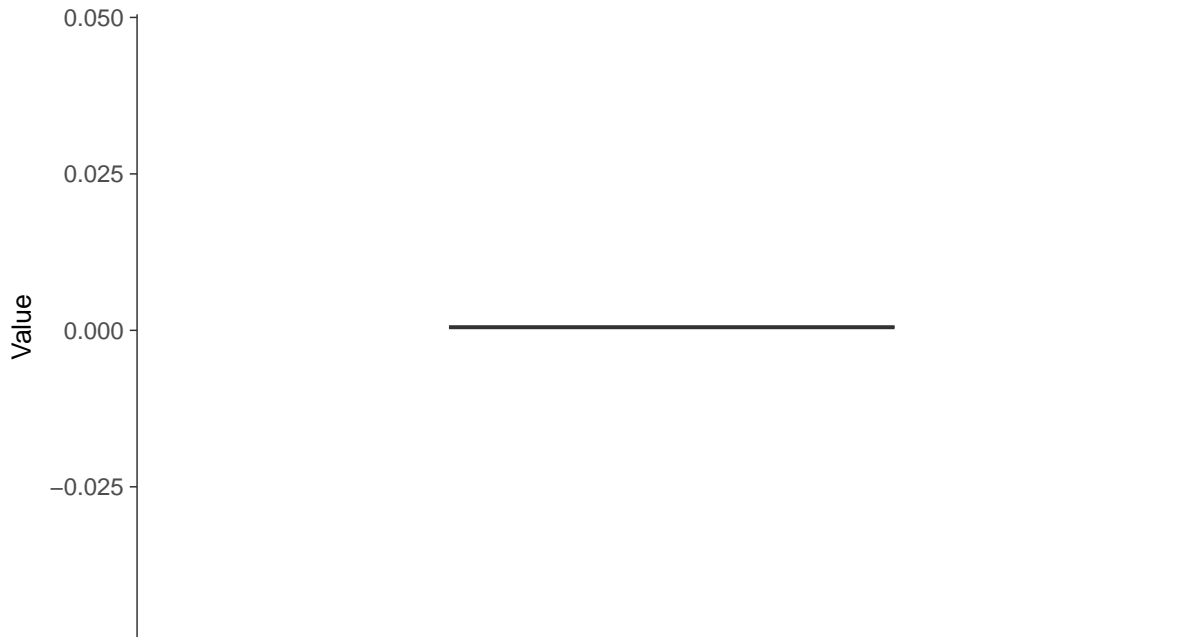
ID: 06_5_40





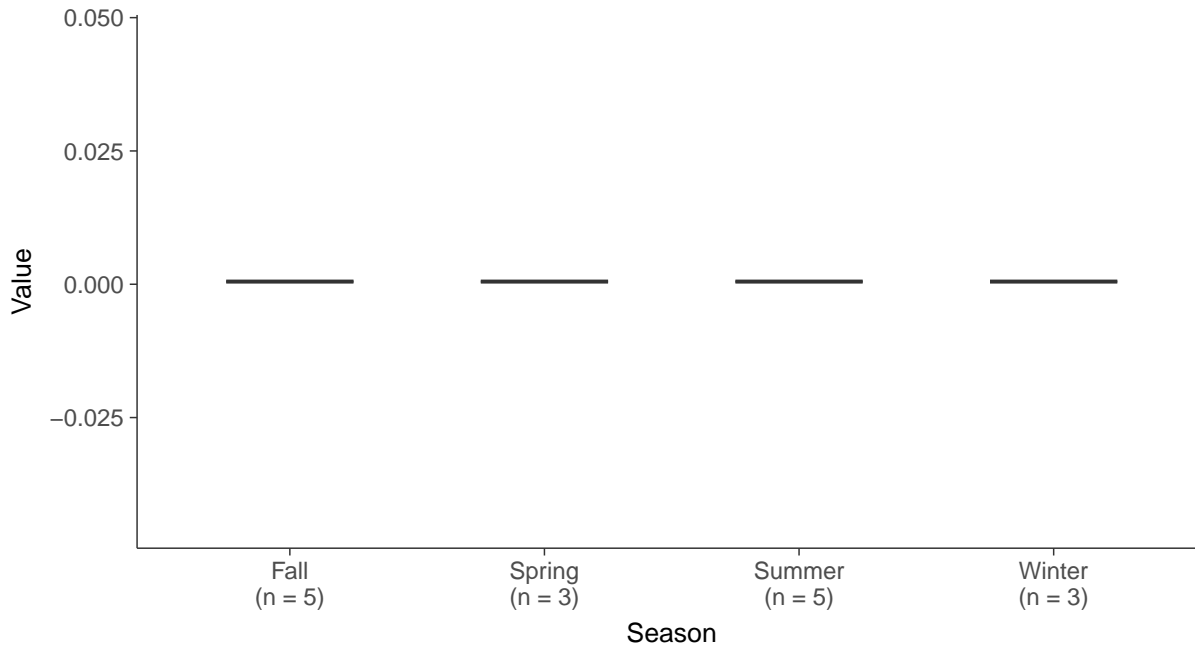
Boxplot

Silver, MW-6 (mg/L)



Boxplot by Season

Silver, MW-6 (mg/L)



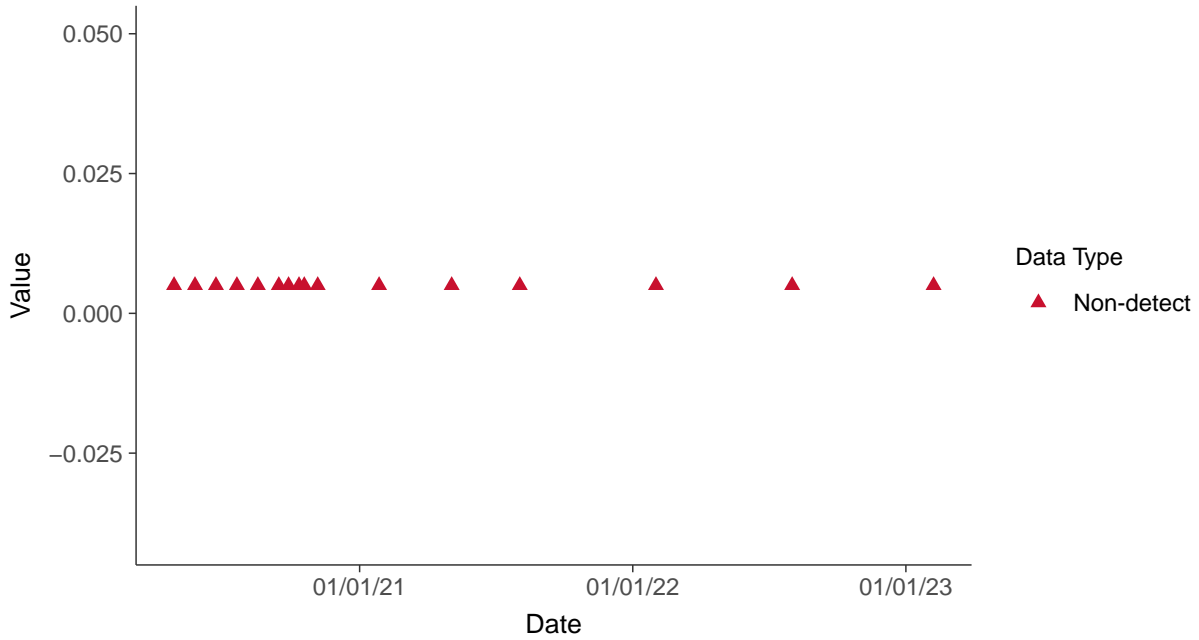


Part 115: Vanadium, MW-6

ID: 06_5_41

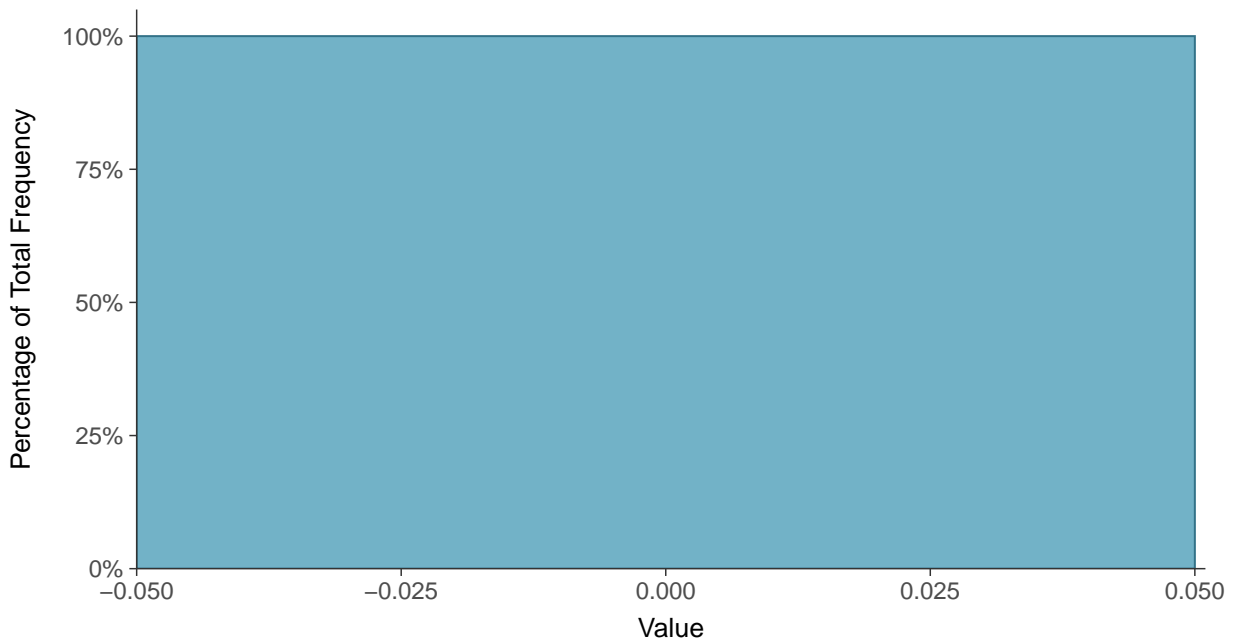
Scatter Plot

Vanadium, MW-6 (mg/L)



Histogram

Vanadium, MW-6 (mg/L)





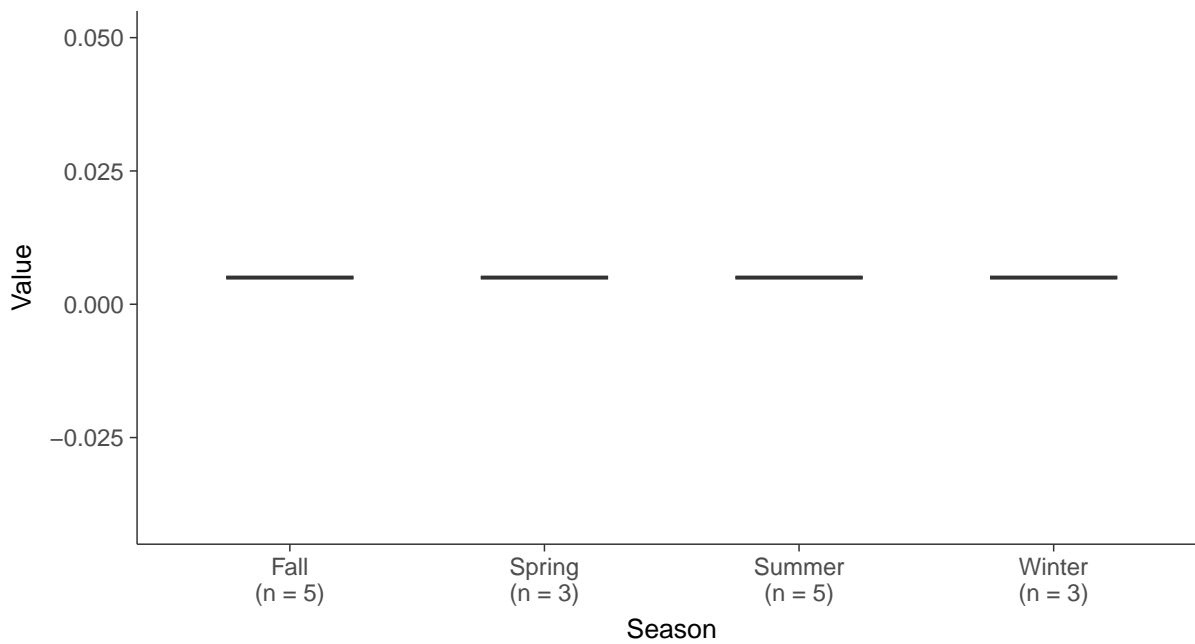
Boxplot

Vanadium, MW-6 (mg/L)



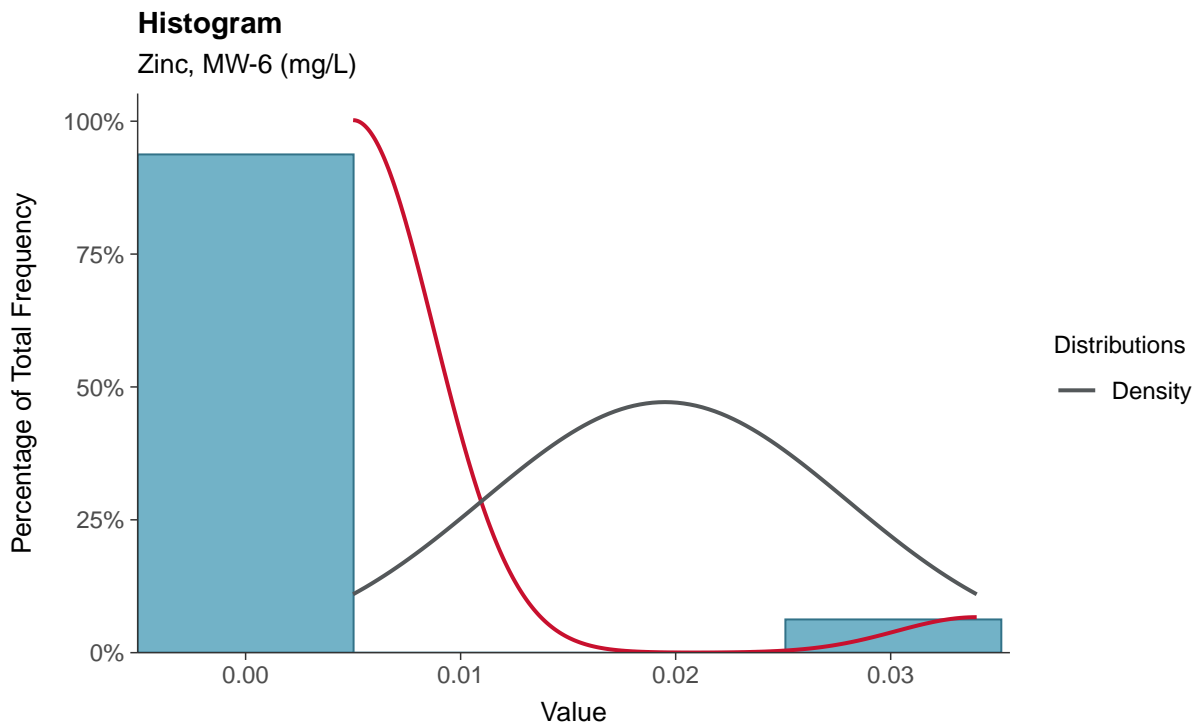
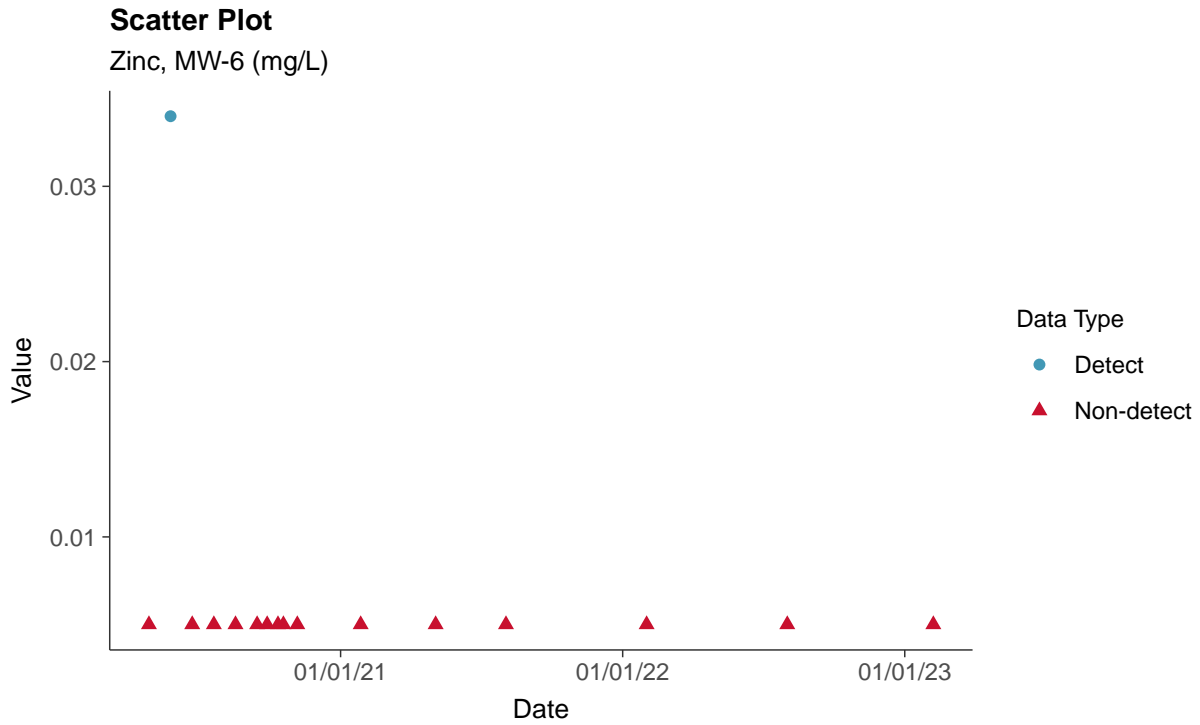
Boxplot by Season

Vanadium, MW-6 (mg/L)



Part 115: Zinc, MW-6

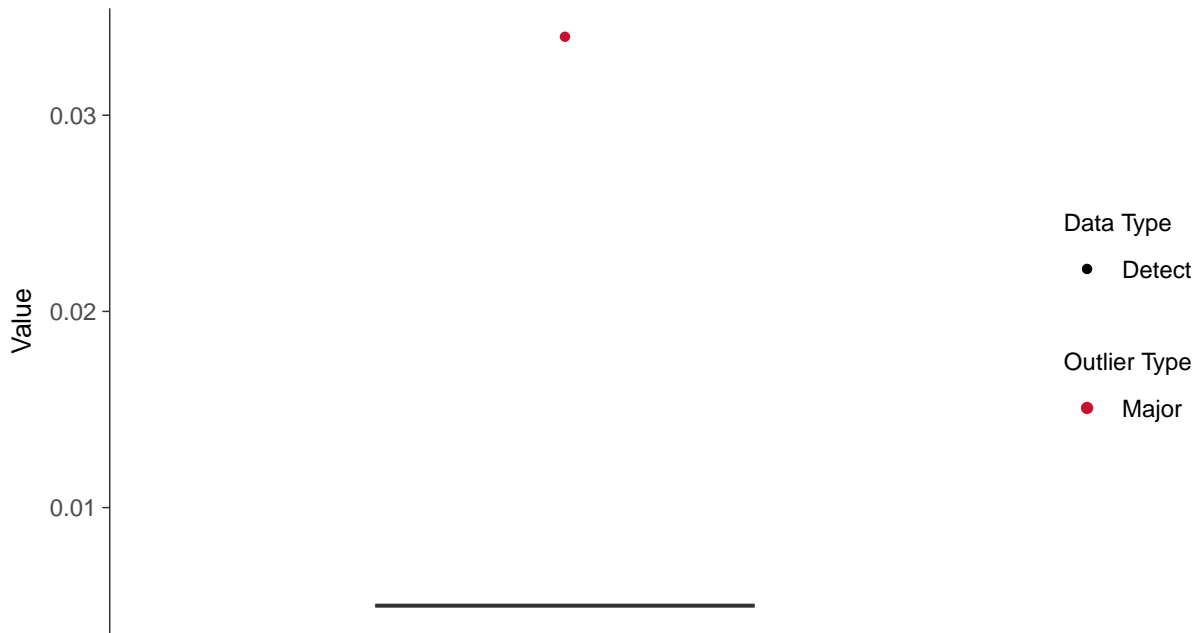
ID: 06_5_42





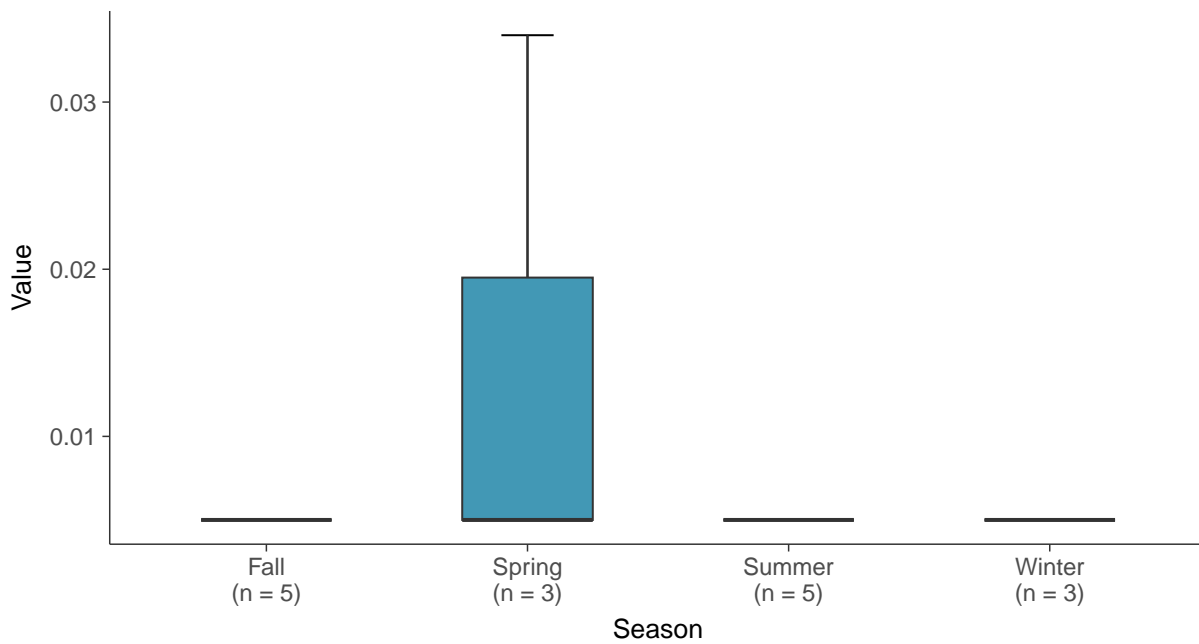
Boxplot

Zinc, MW-6 (mg/L)



Boxplot by Season

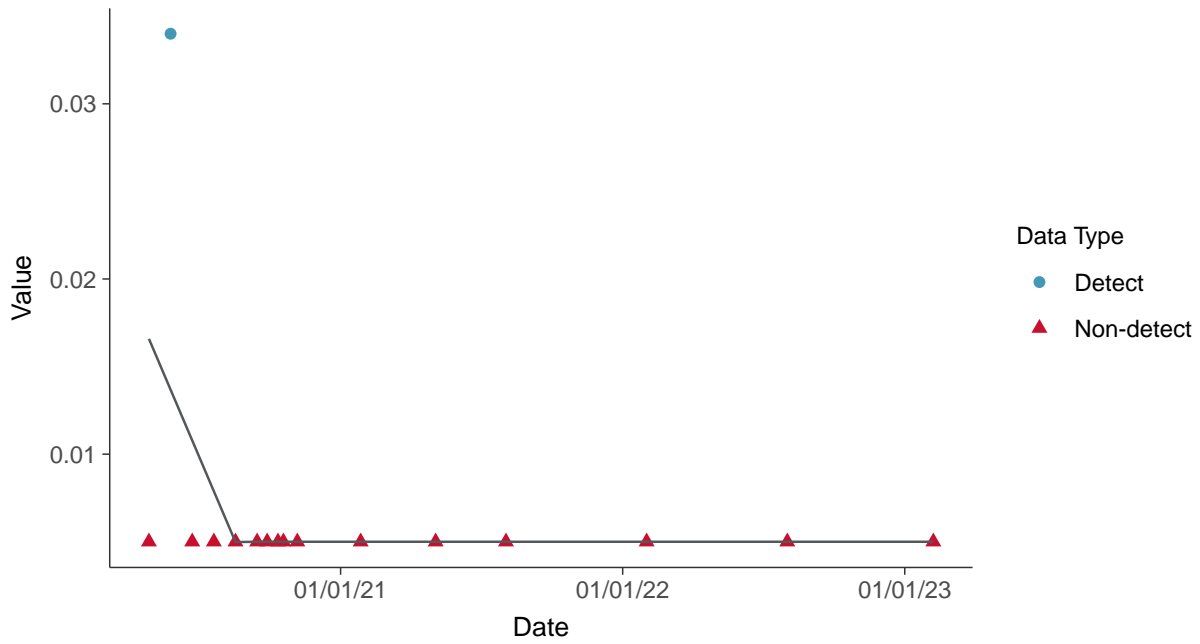
Zinc, MW-6 (mg/L)





Trend Regression: Piecewise Linear-Linear

Zinc, MW-6 (mg/L)



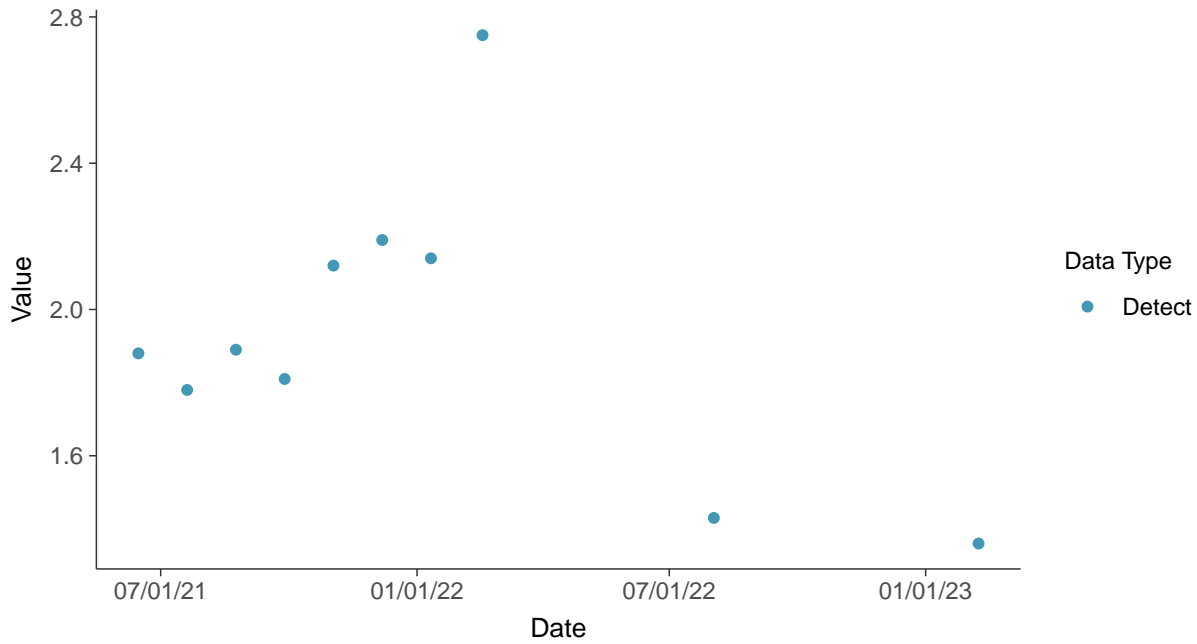


Appendix III: Boron, MW-7

ID: 07_1_01

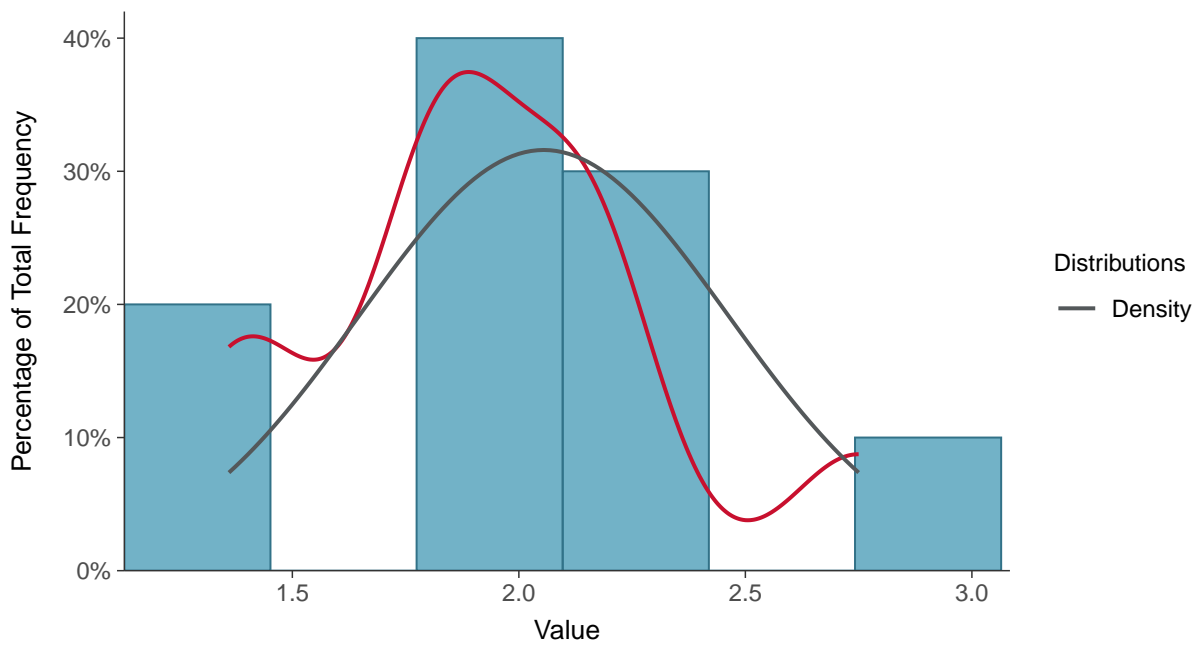
Scatter Plot

Boron, MW-7 (mg/L)



Histogram

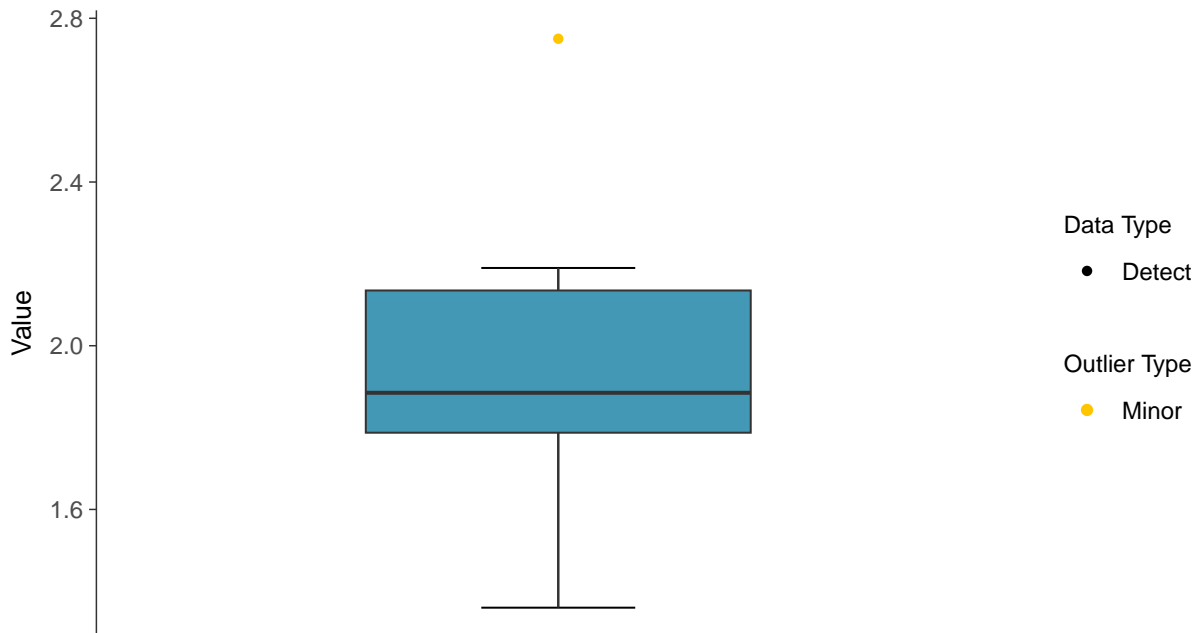
Boron, MW-7 (mg/L)





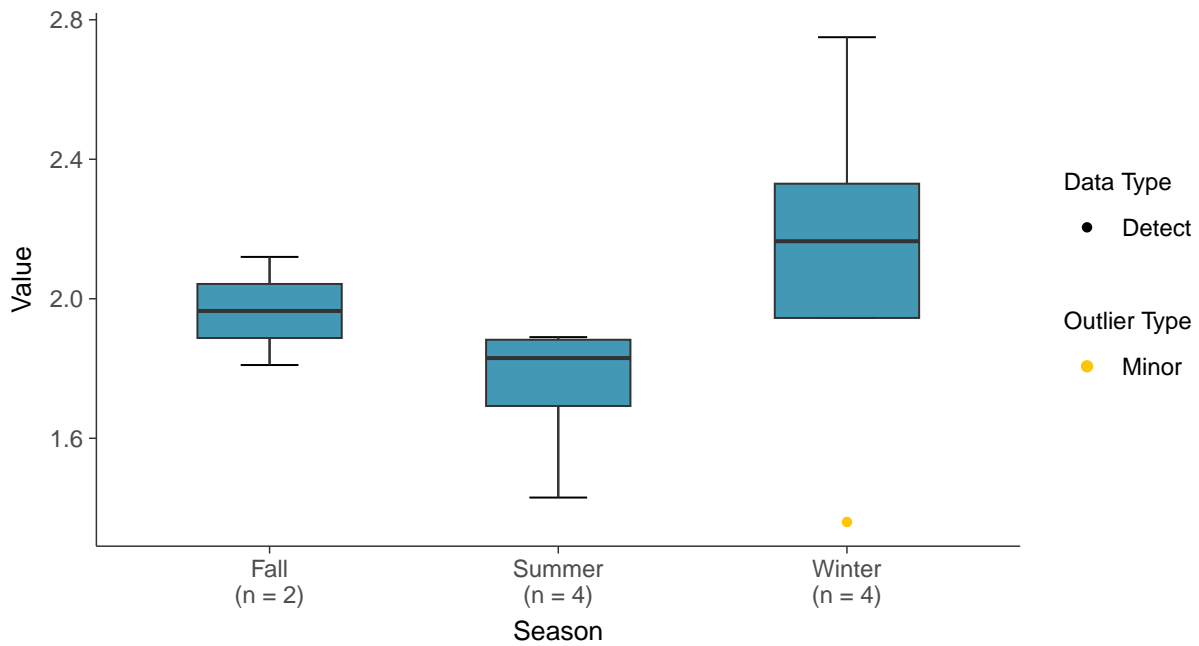
Boxplot

Boron, MW-7 (mg/L)



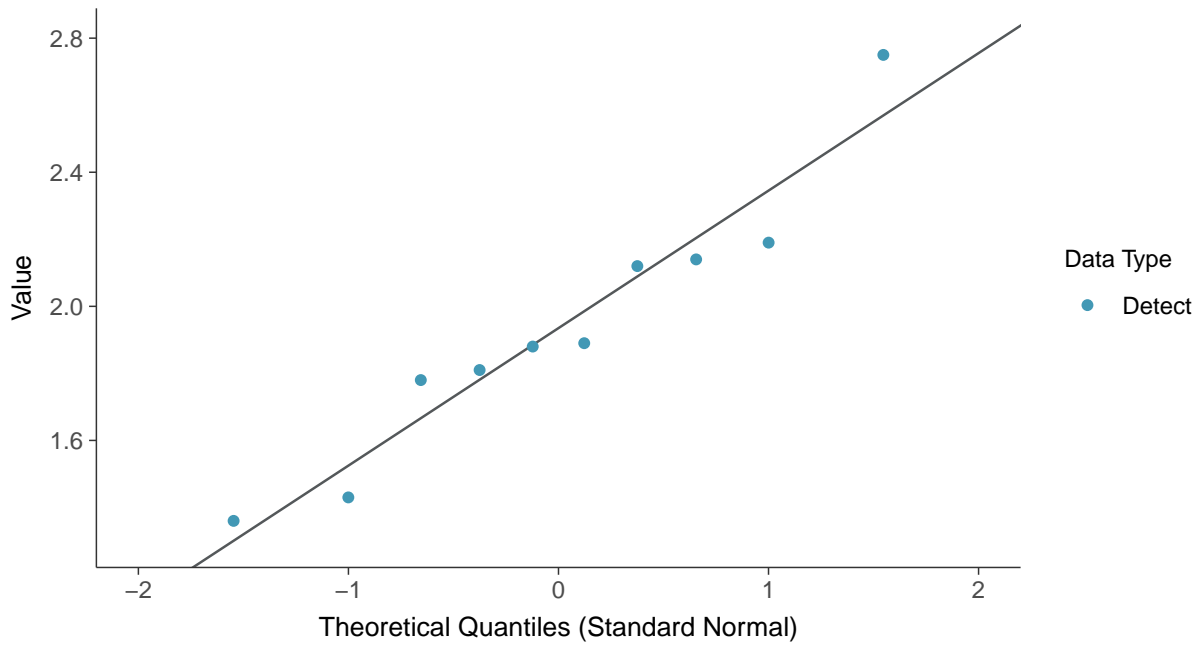
Boxplot by Season

Boron, MW-7 (mg/L)

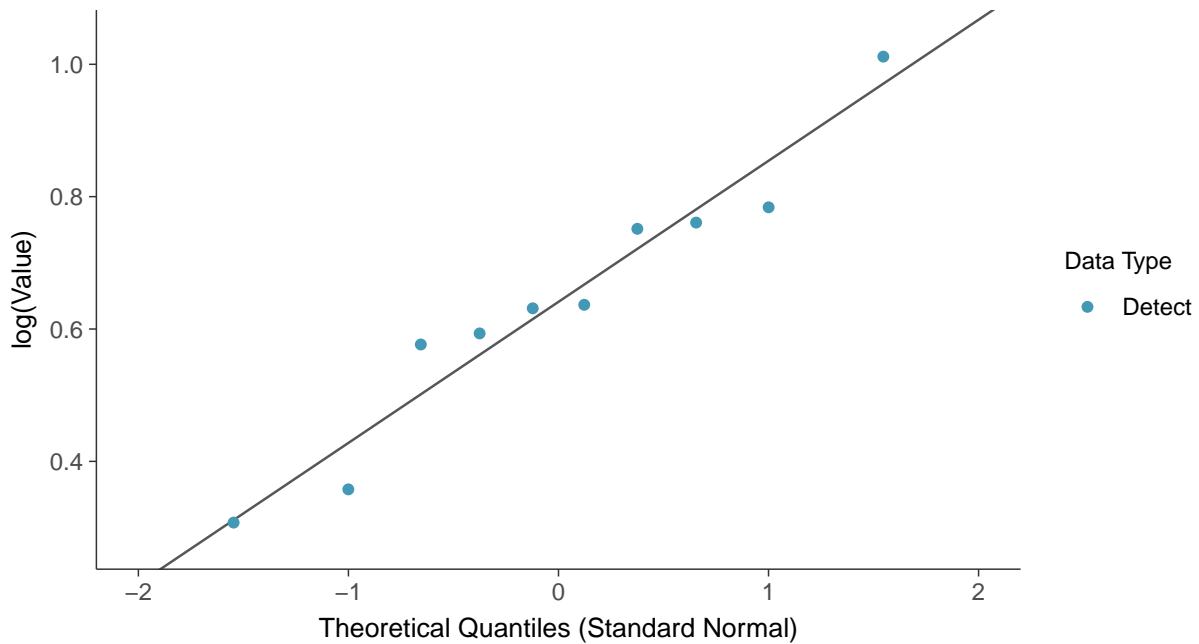




Normal Q-Q plot Boron, MW-7 (mg/L)



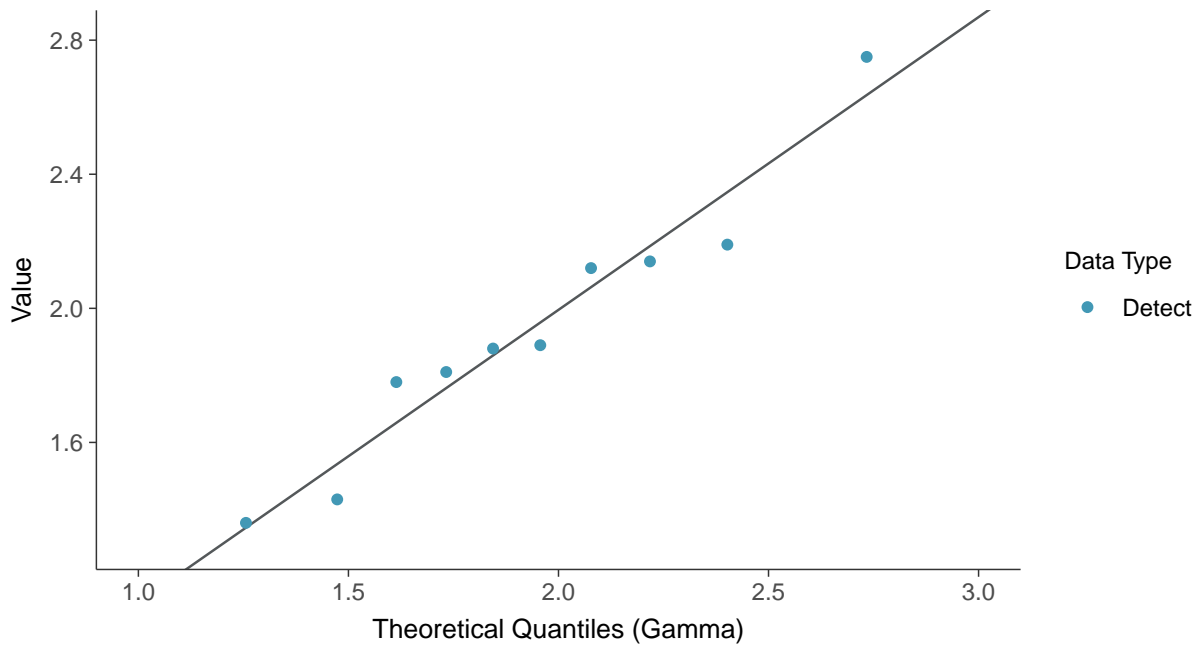
Lognormal Q-Q plot Boron, MW-7 (mg/L)





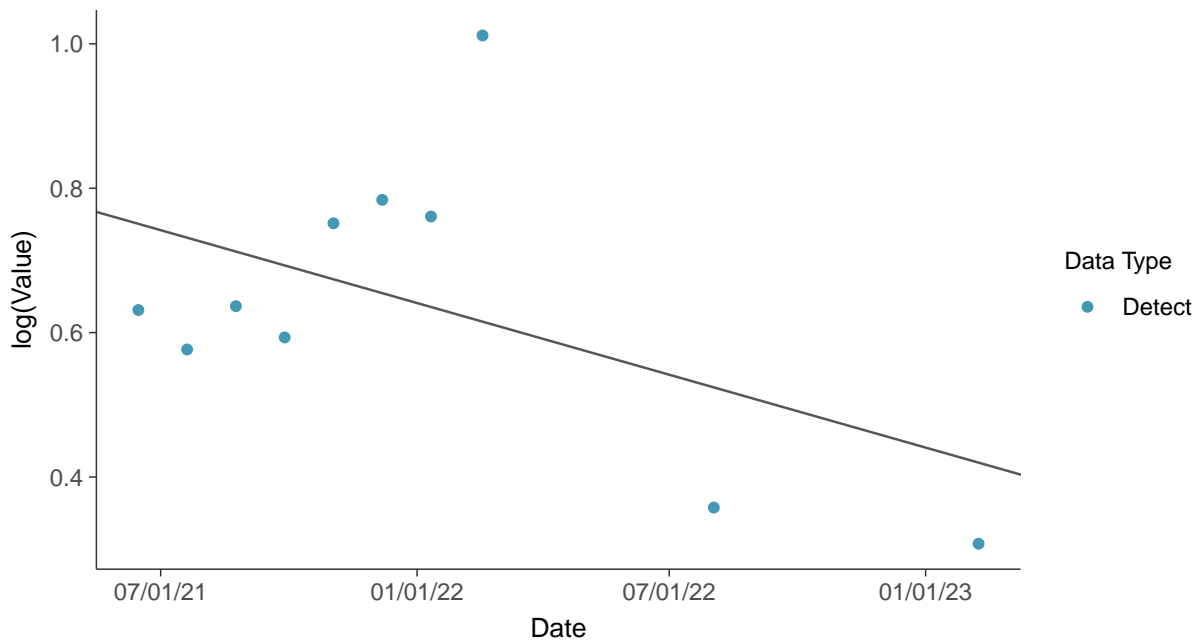
Gamma Q-Q plot

Boron, MW-7 (mg/L)



Trend Regression: Lognormal MLE

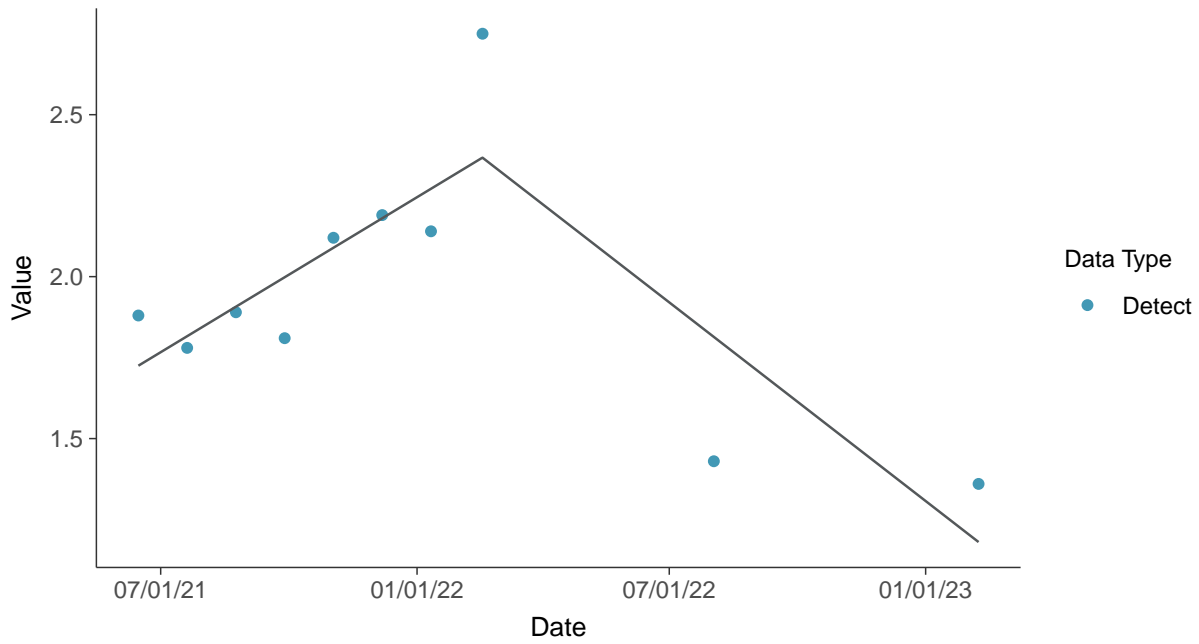
Boron, MW-7 (mg/L)





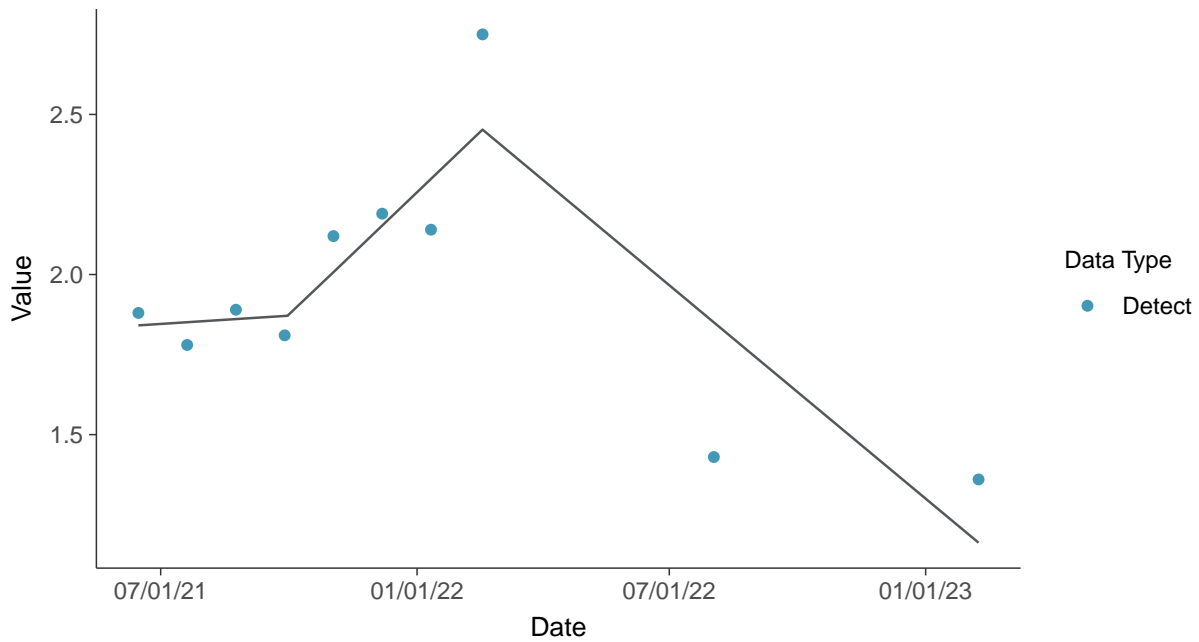
Trend Regression: Piecewise Linear-Linear

Boron, MW-7 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Boron, MW-7 (mg/L)

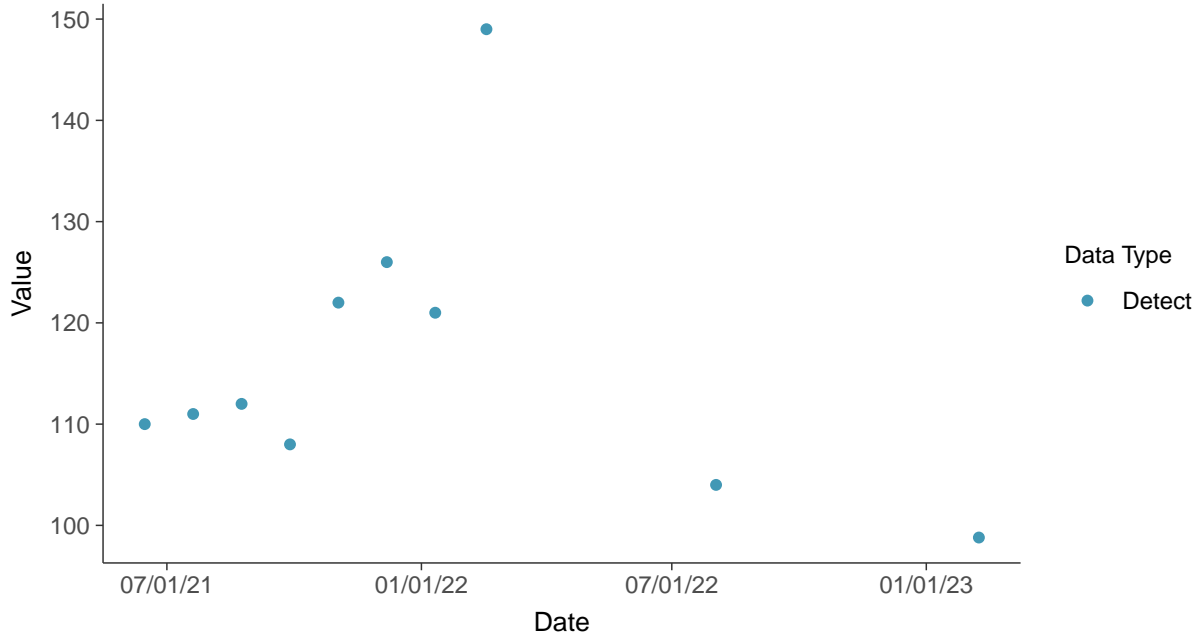


Appendix III: Calcium, MW-7

ID: 07_1_02

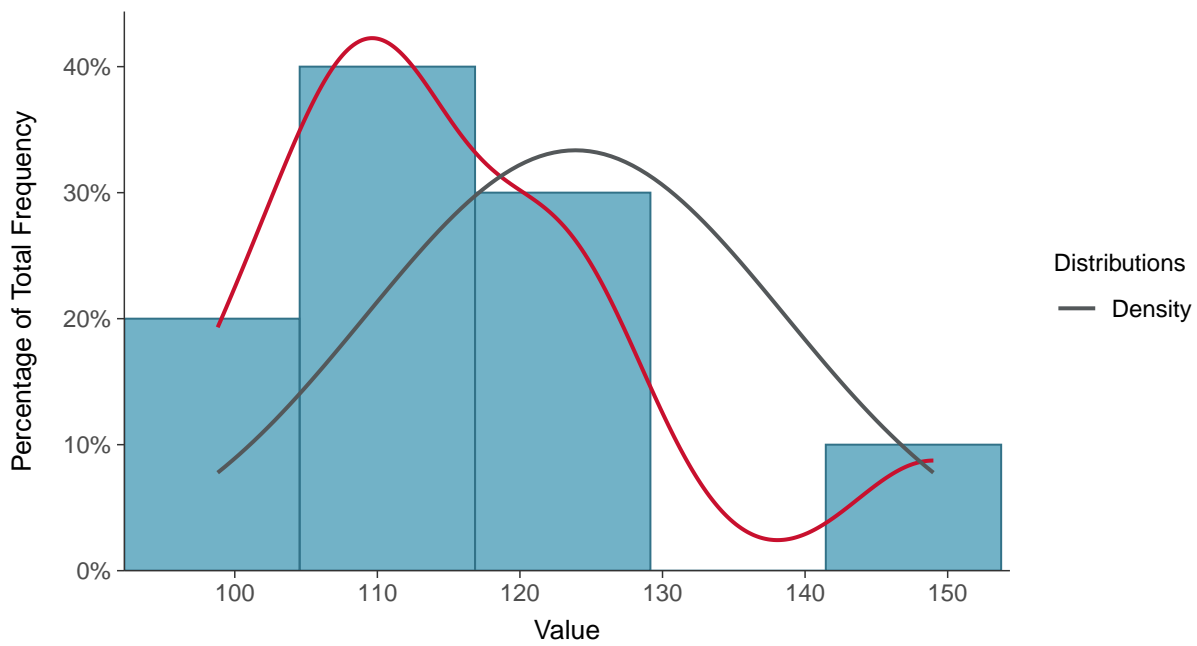
Scatter Plot

Calcium, MW-7 (mg/L)



Histogram

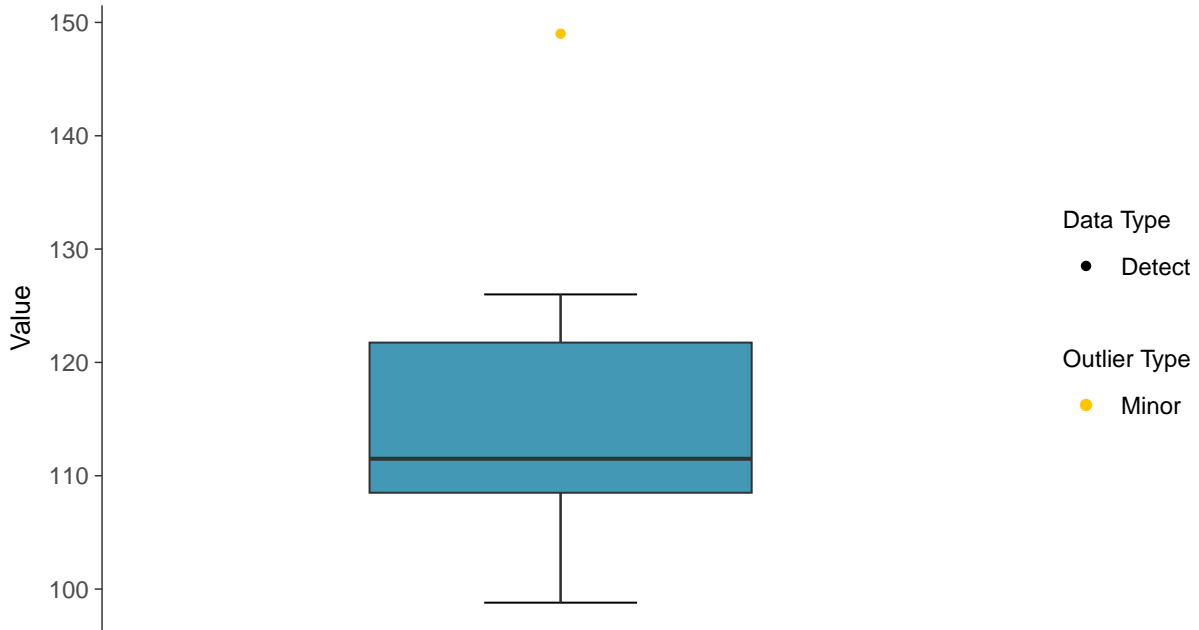
Calcium, MW-7 (mg/L)





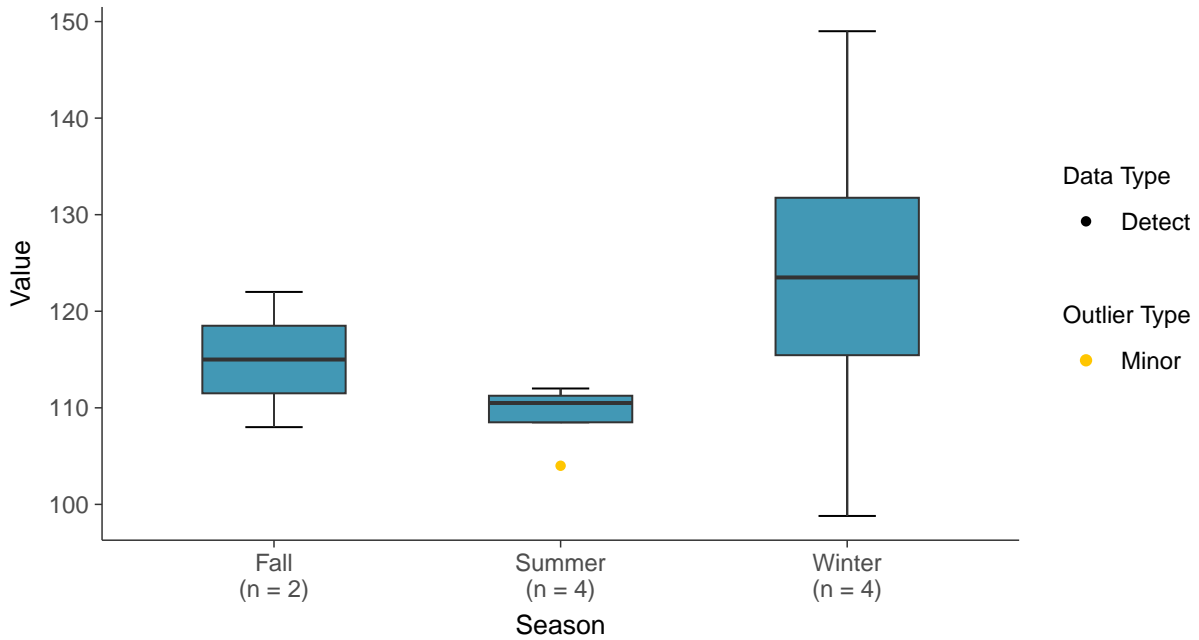
Boxplot

Calcium, MW-7 (mg/L)



Boxplot by Season

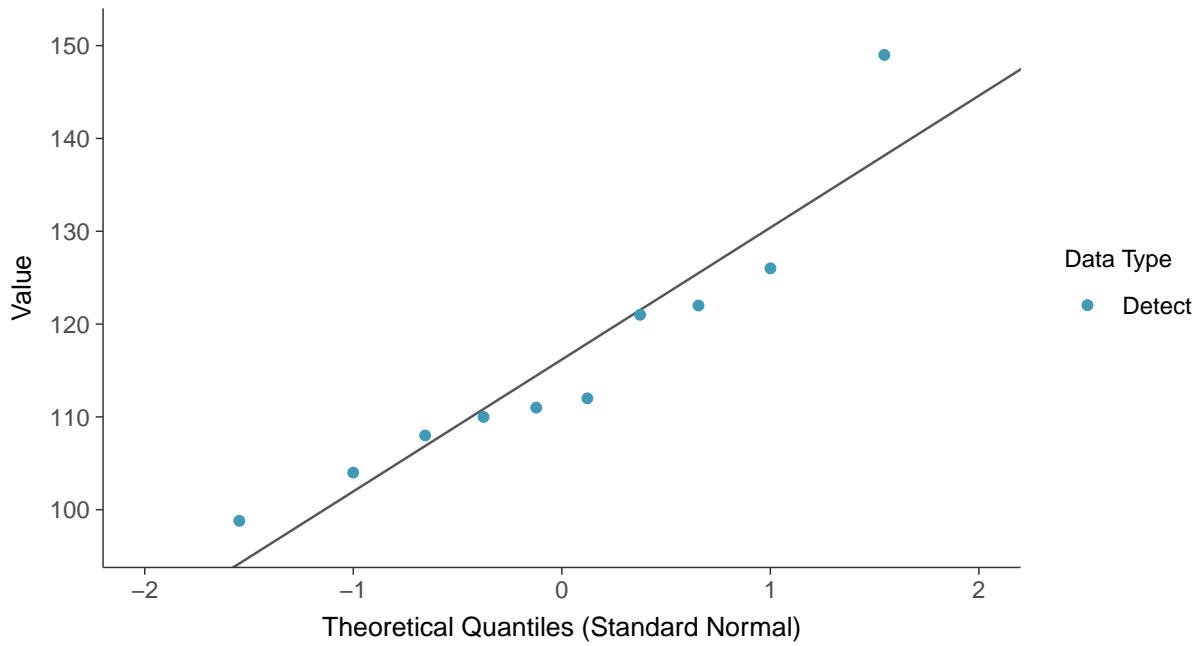
Calcium, MW-7 (mg/L)





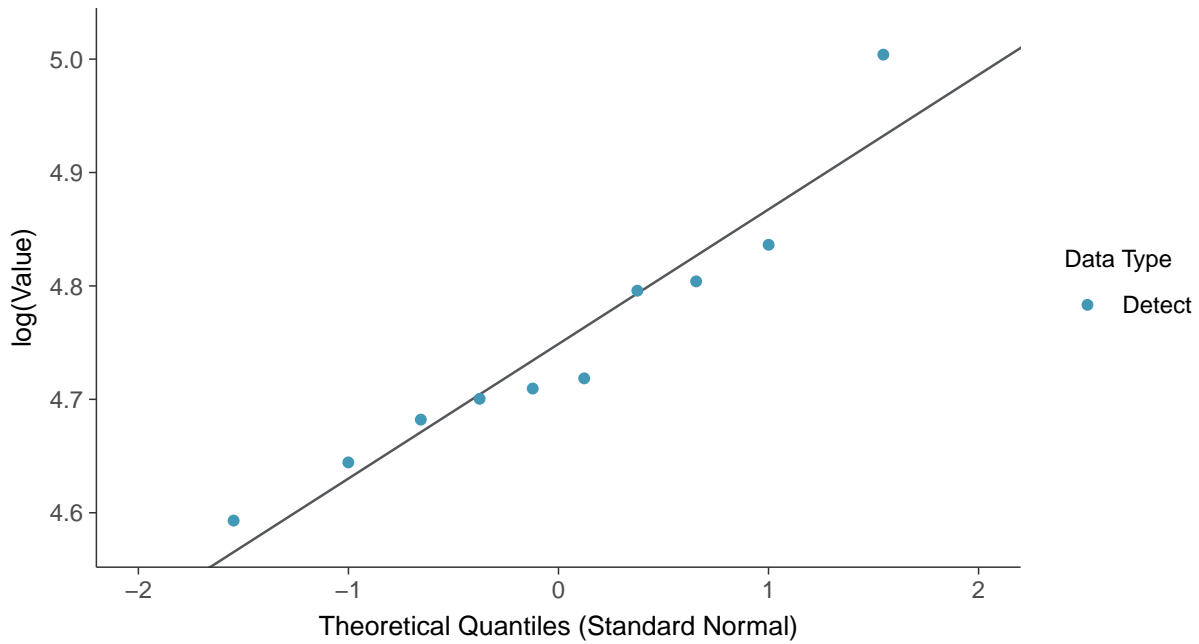
Normal Q-Q plot

Calcium, MW-7 (mg/L)



Lognormal Q-Q plot

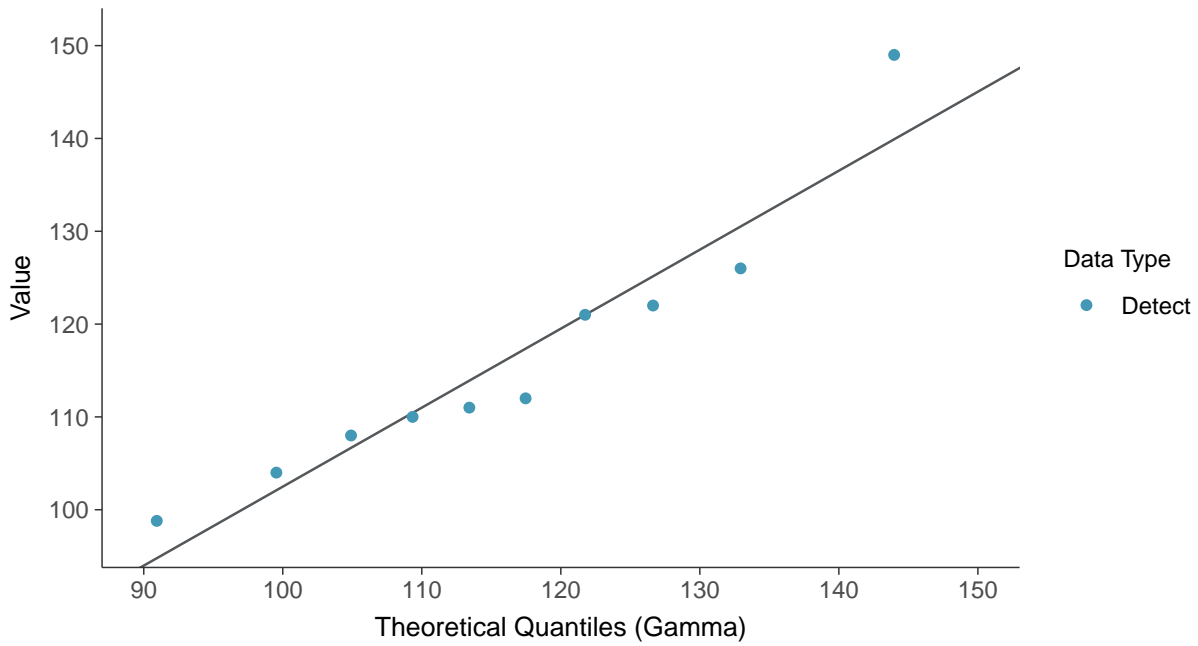
Calcium, MW-7 (mg/L)





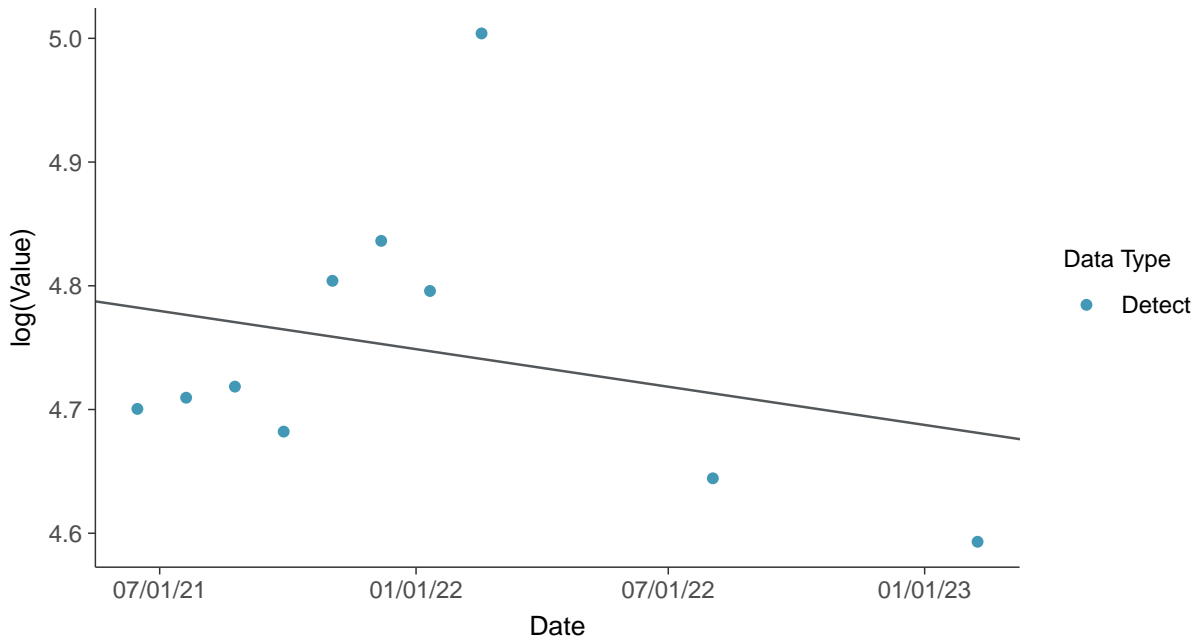
Gamma Q-Q plot

Calcium, MW-7 (mg/L)



Trend Regression: Lognormal MLE

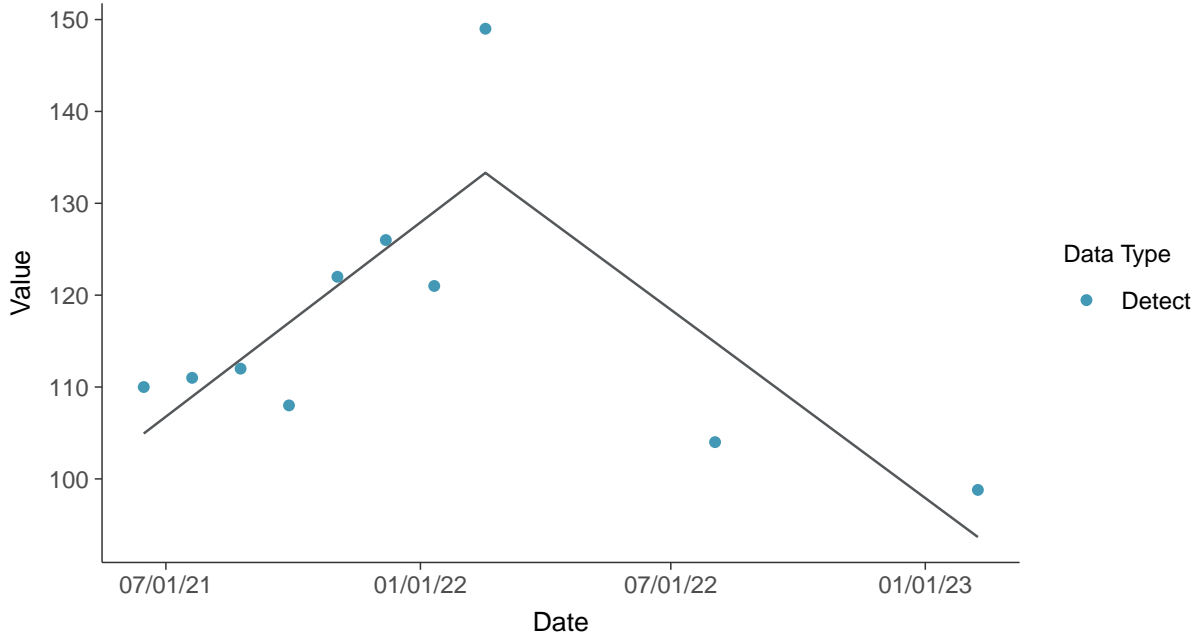
Calcium, MW-7 (mg/L)





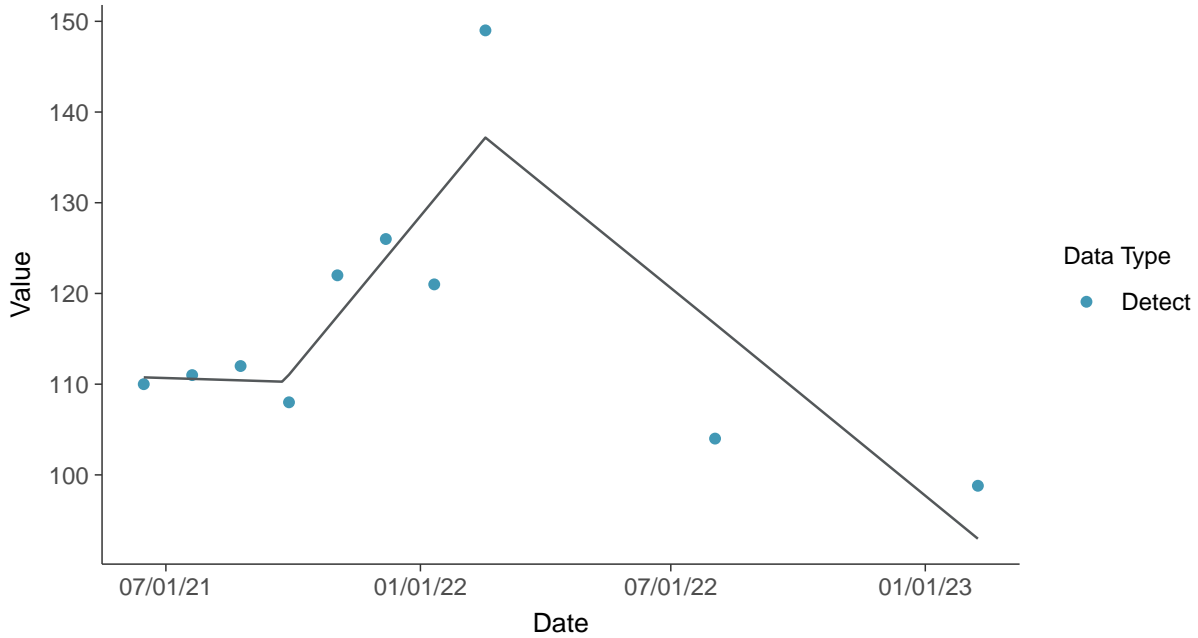
Trend Regression: Piecewise Linear-Linear

Calcium, MW-7 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Calcium, MW-7 (mg/L)



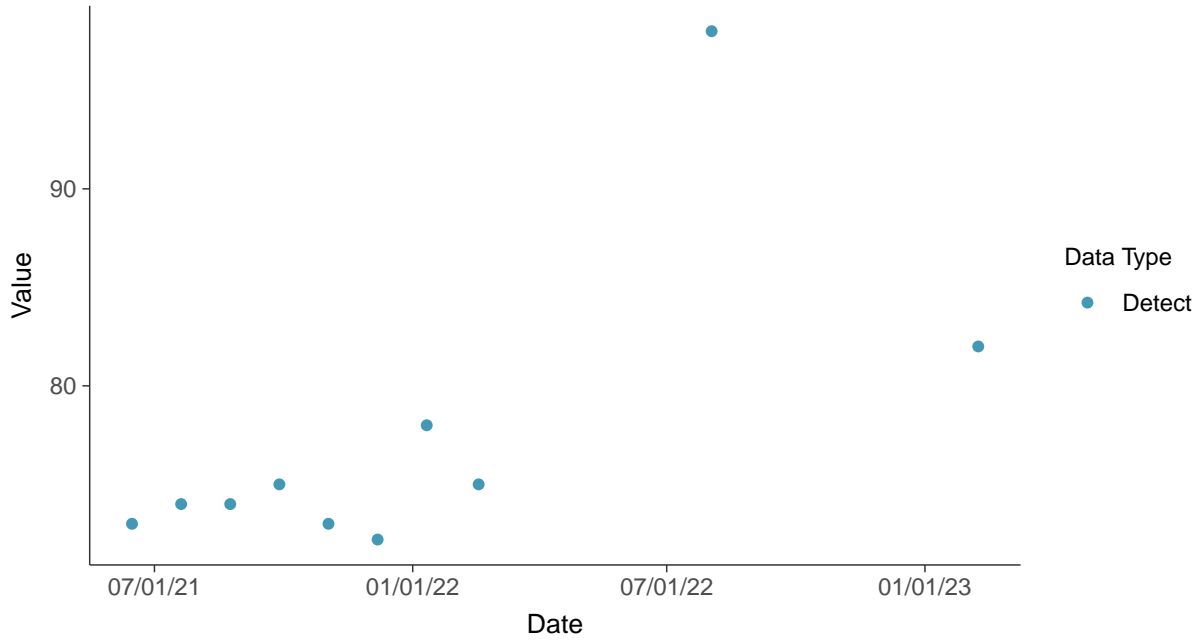


Appendix III: Chloride, MW-7

ID: 07_1_03

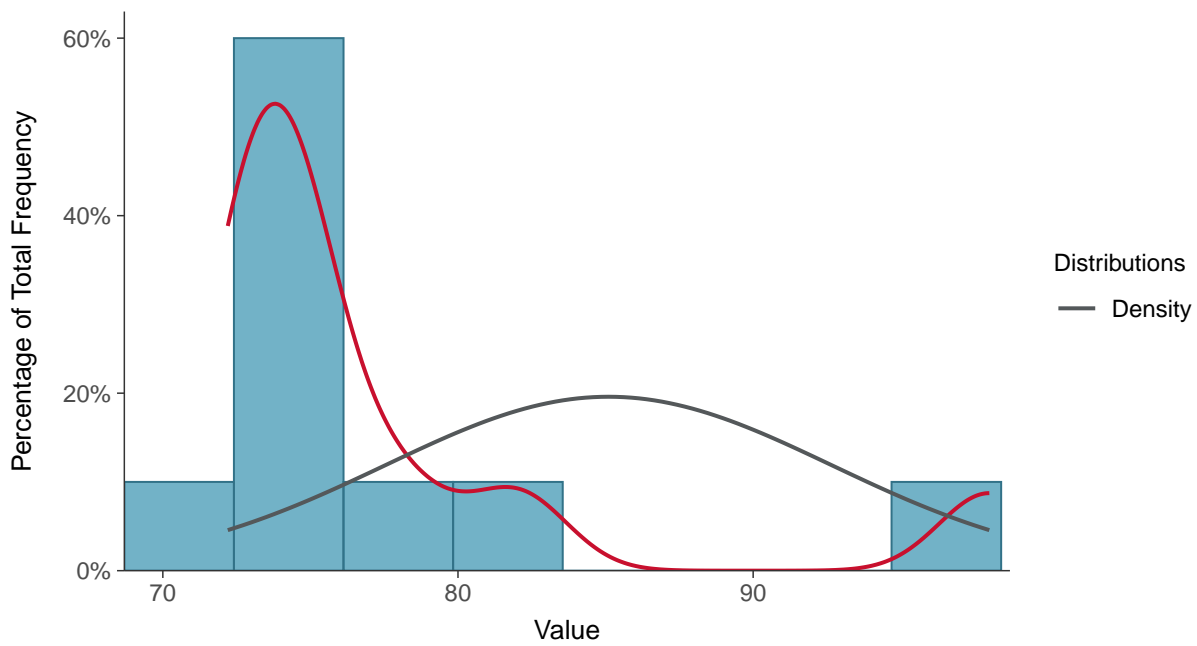
Scatter Plot

Chloride, MW-7 (mg/L)



Histogram

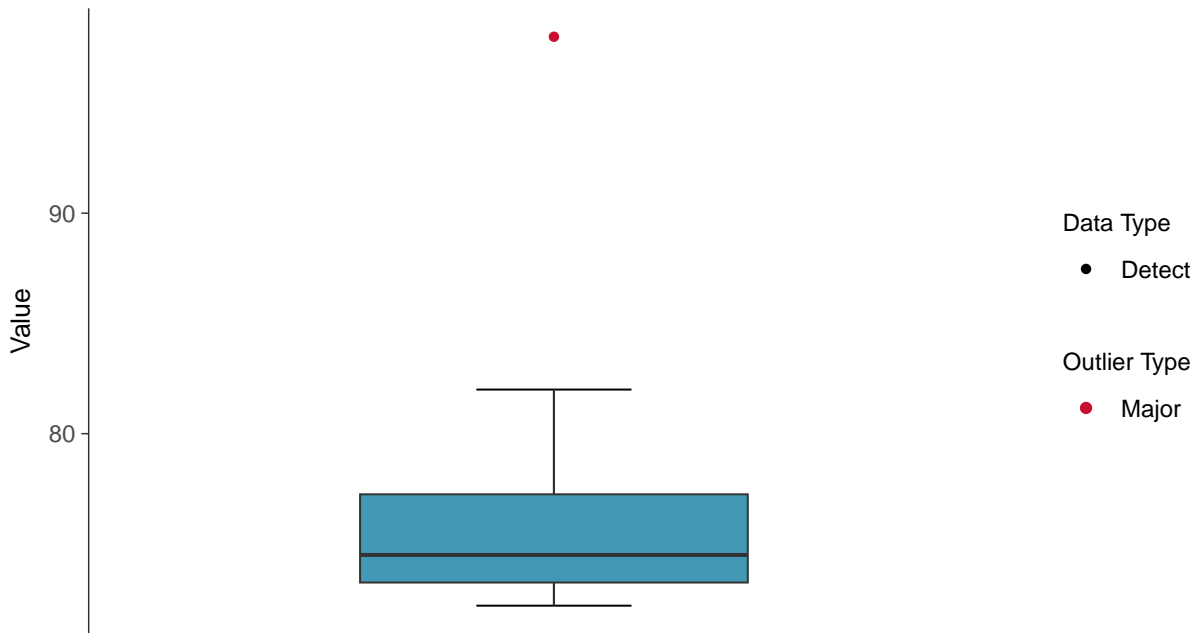
Chloride, MW-7 (mg/L)





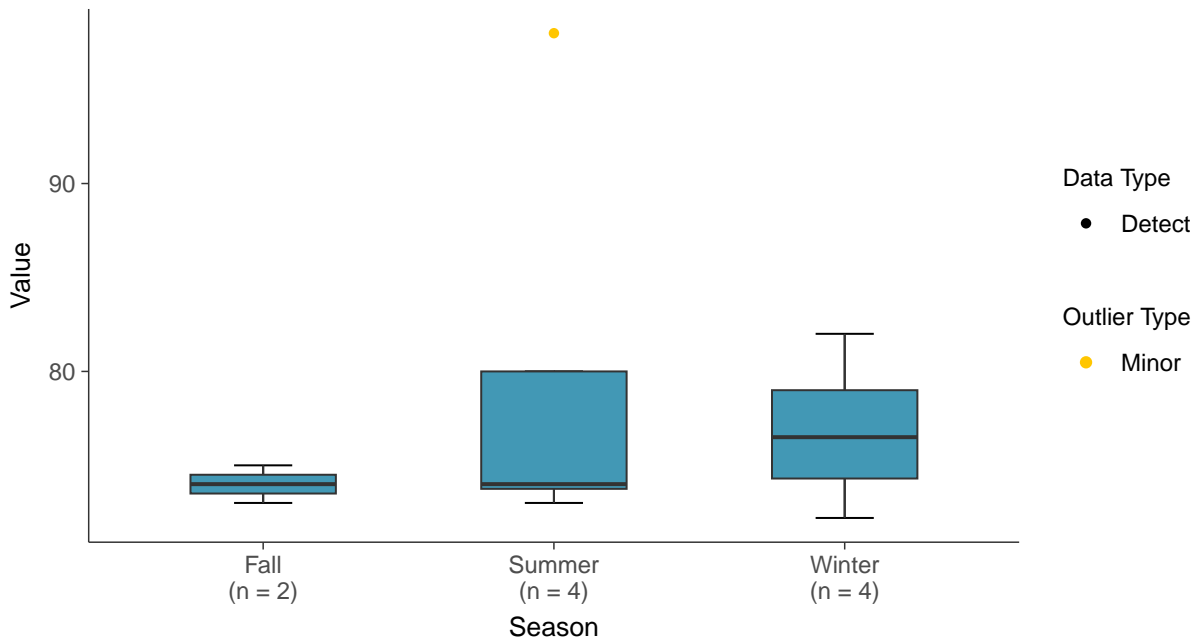
Boxplot

Chloride, MW-7 (mg/L)



Boxplot by Season

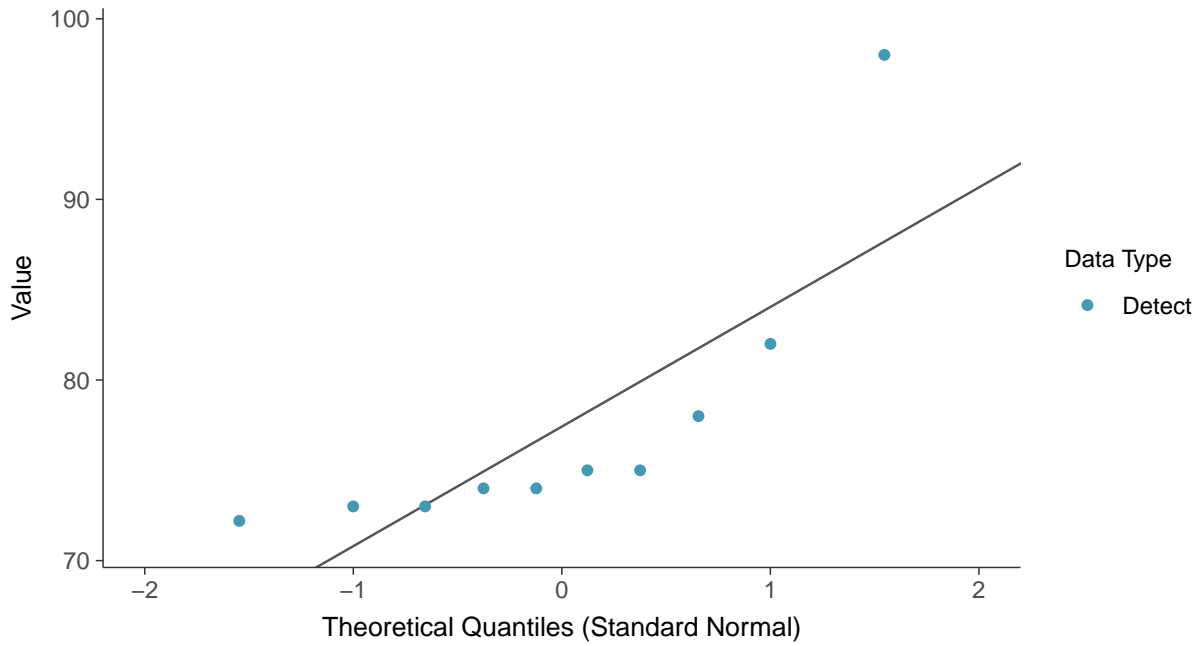
Chloride, MW-7 (mg/L)





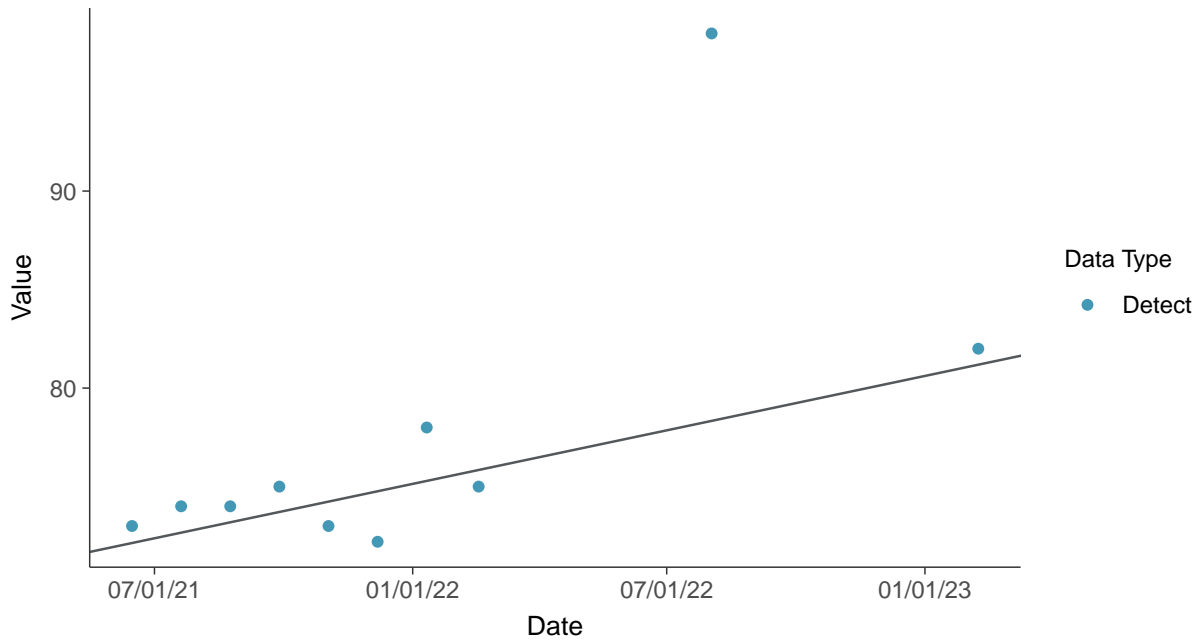
Normal Q-Q plot

Chloride, MW-7 (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

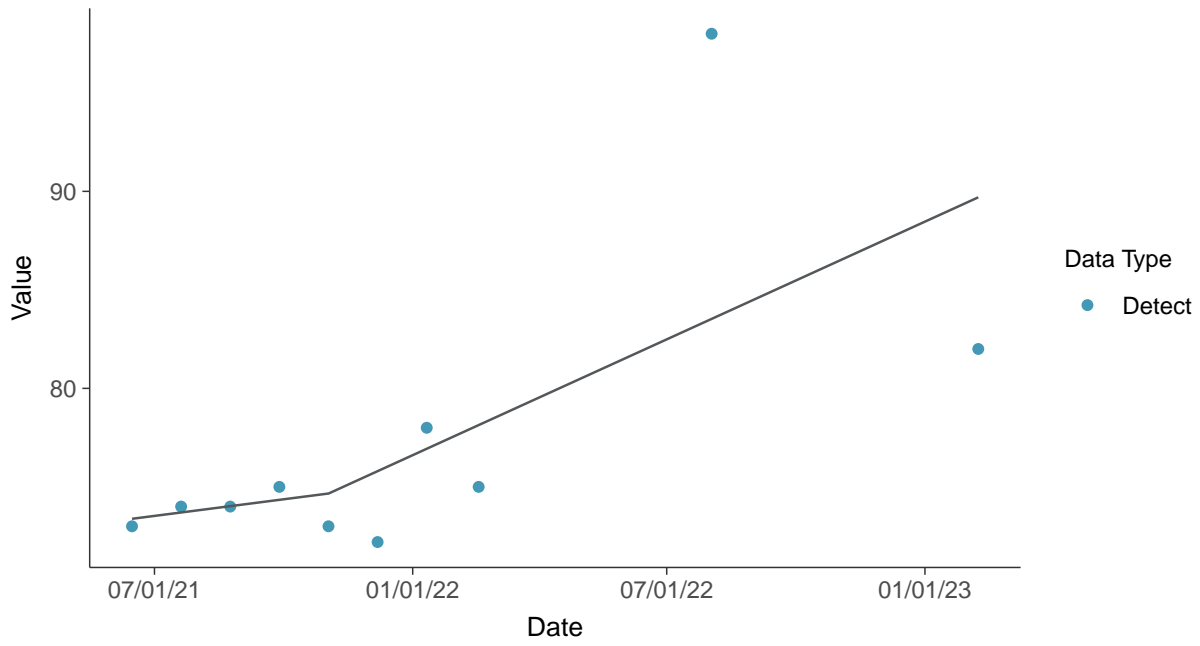
Chloride, MW-7 (mg/L)





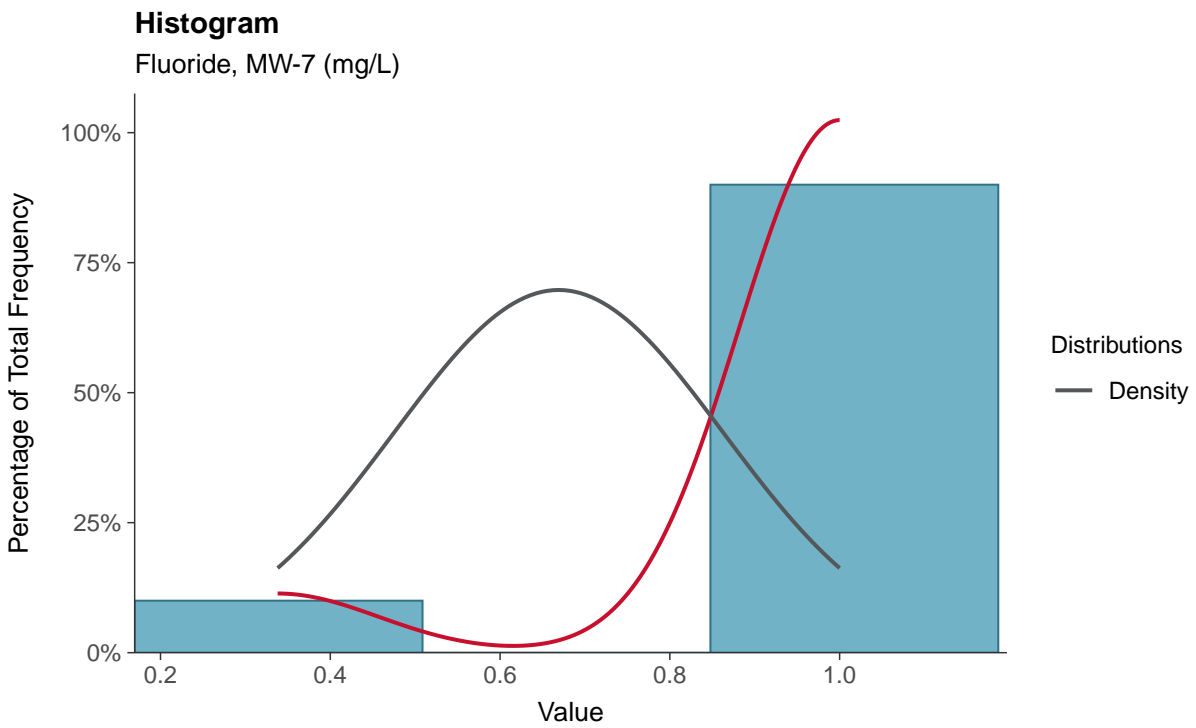
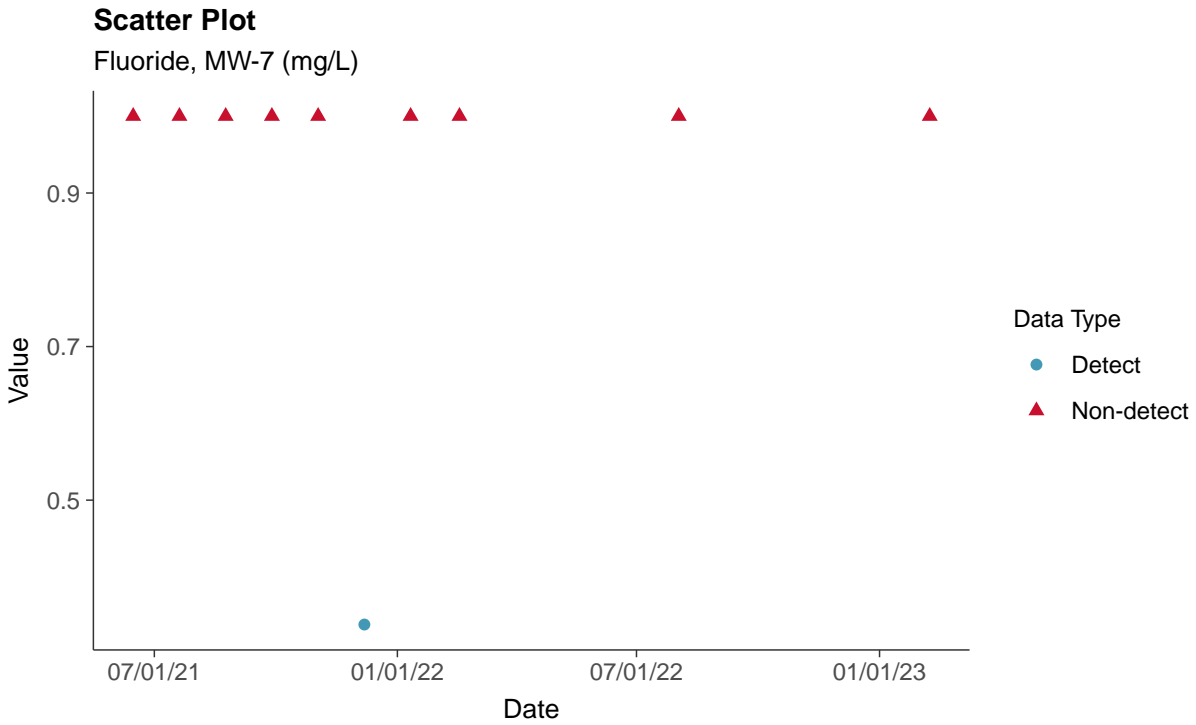
Trend Regression: Piecewise Linear-Linear

Chloride, MW-7 (mg/L)



Appendix III: Fluoride, MW-7

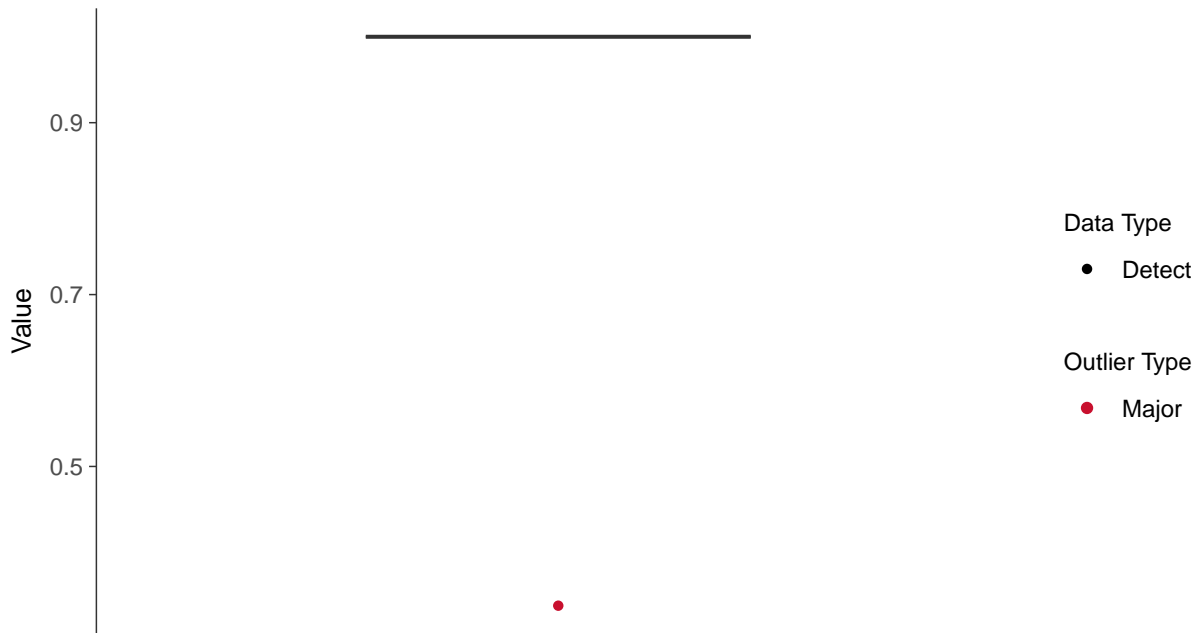
ID: 07_1_04





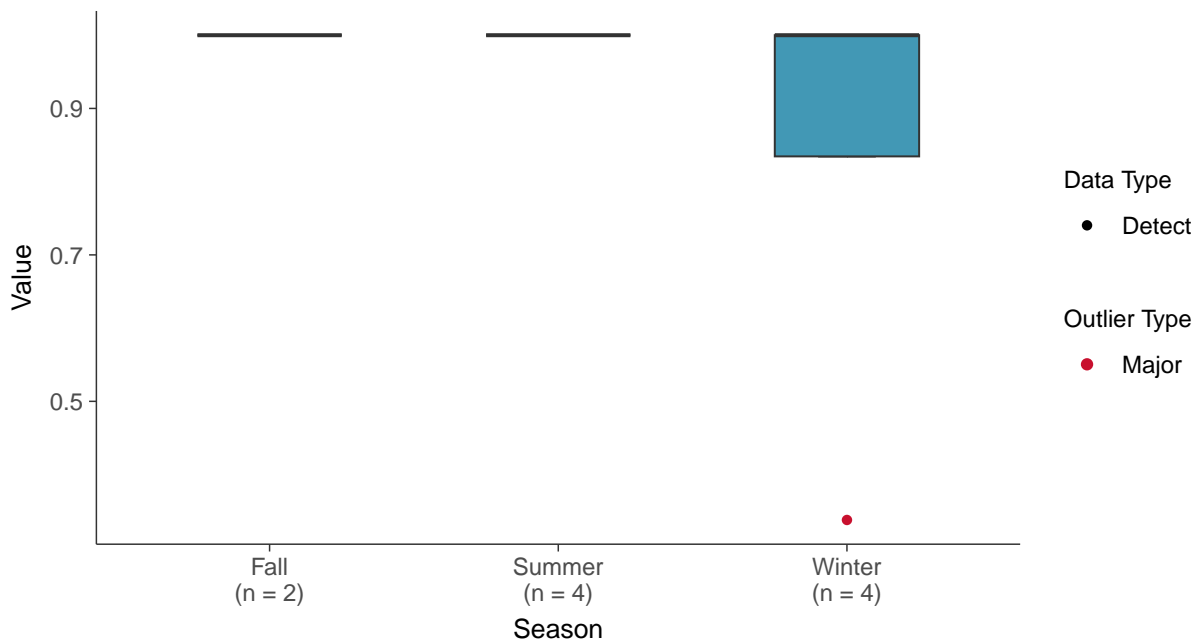
Boxplot

Fluoride, MW-7 (mg/L)



Boxplot by Season

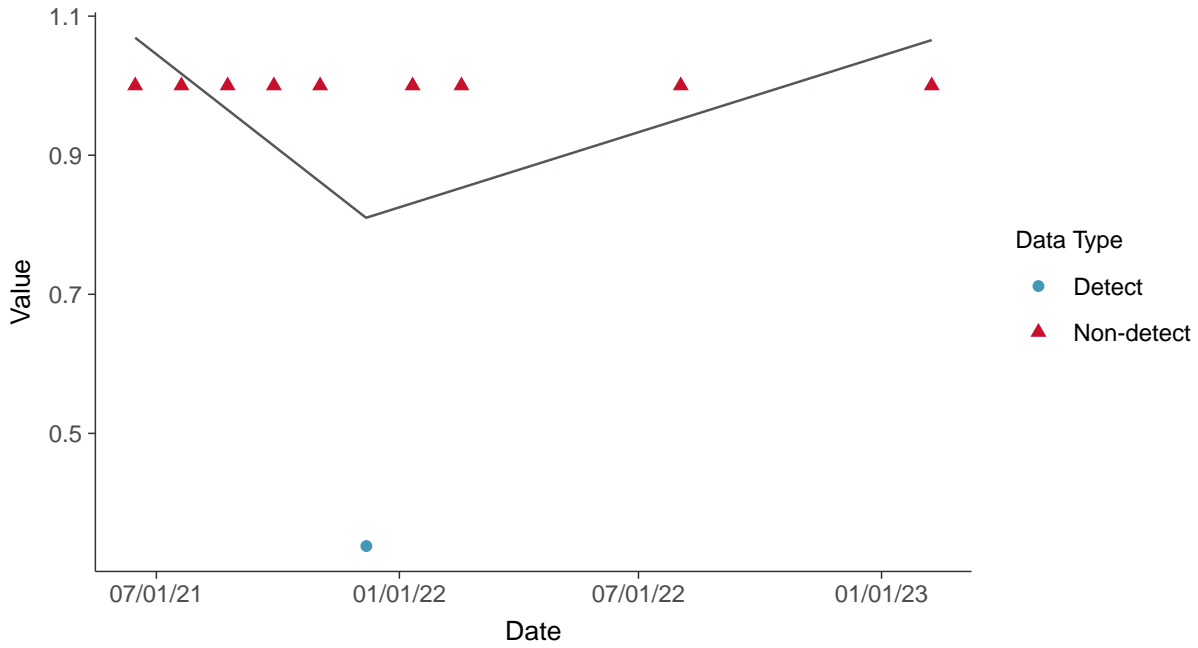
Fluoride, MW-7 (mg/L)





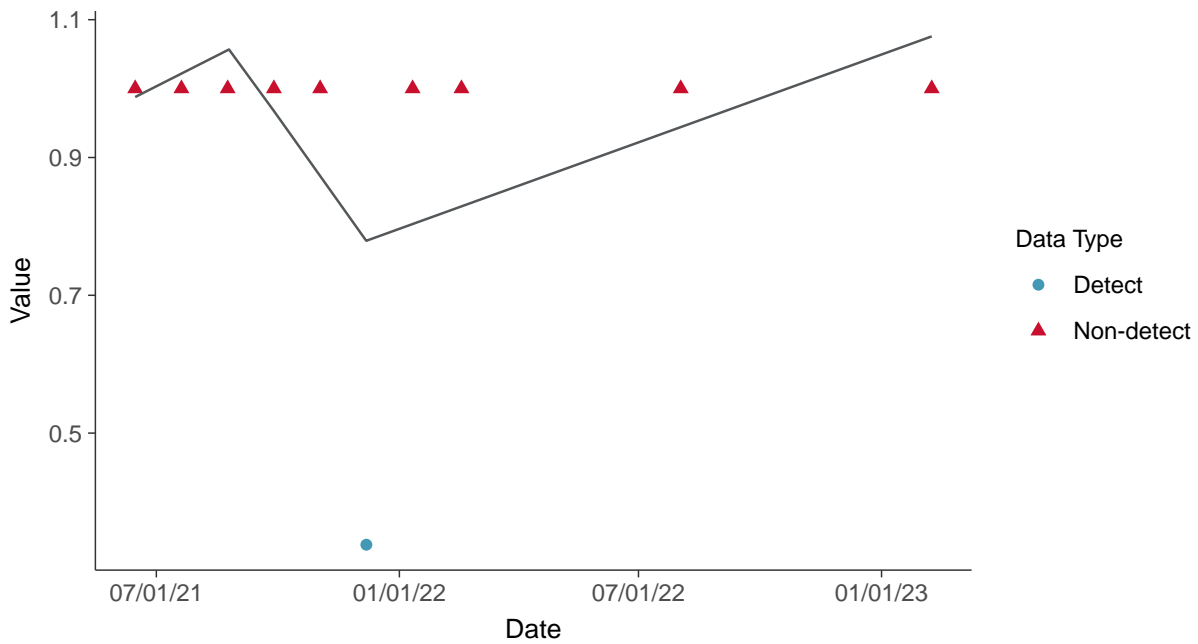
Trend Regression: Piecewise Linear-Linear

Fluoride, MW-7 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Fluoride, MW-7 (mg/L)



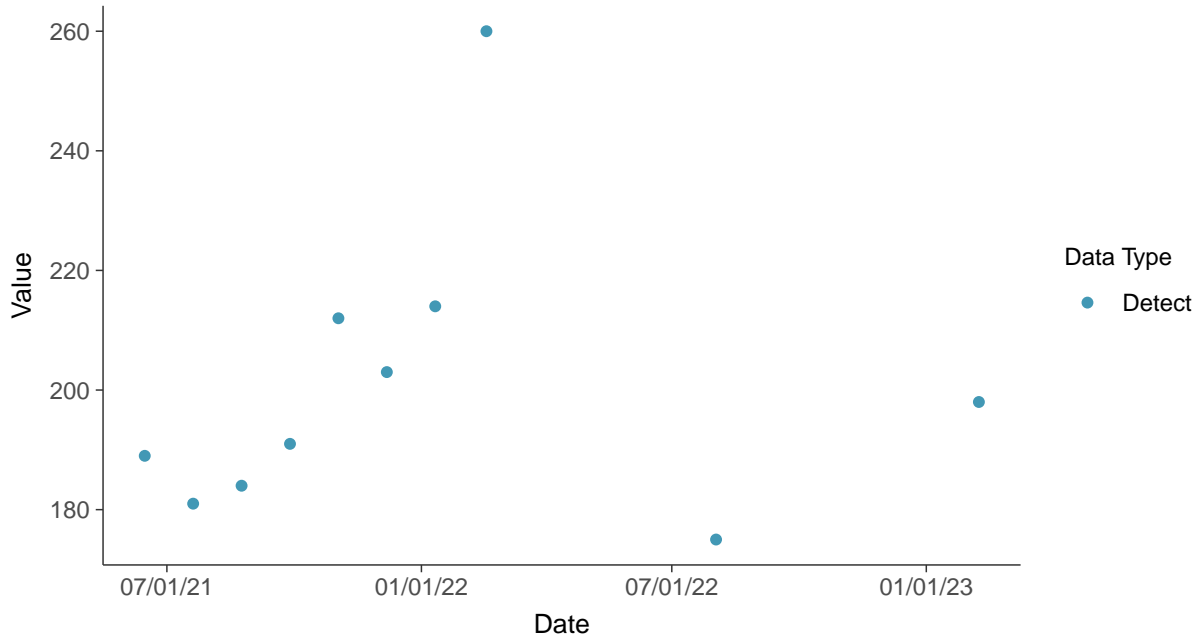


Appendix III: Sulfate, MW-7

ID: 07_1_05

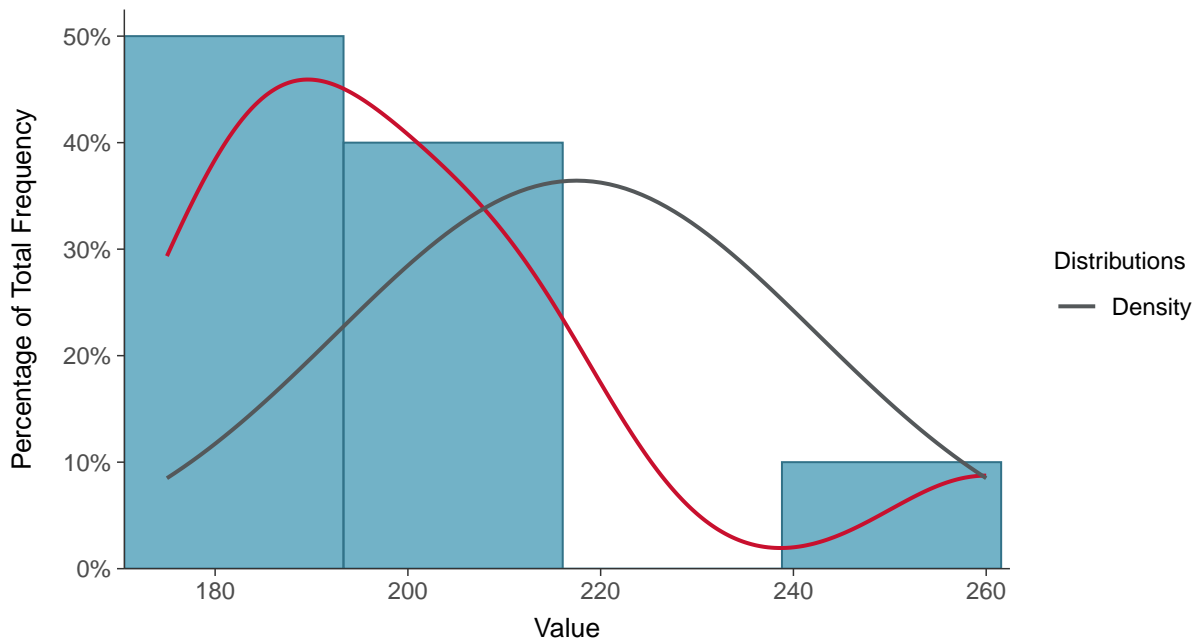
Scatter Plot

Sulfate, MW-7 (mg/L)



Histogram

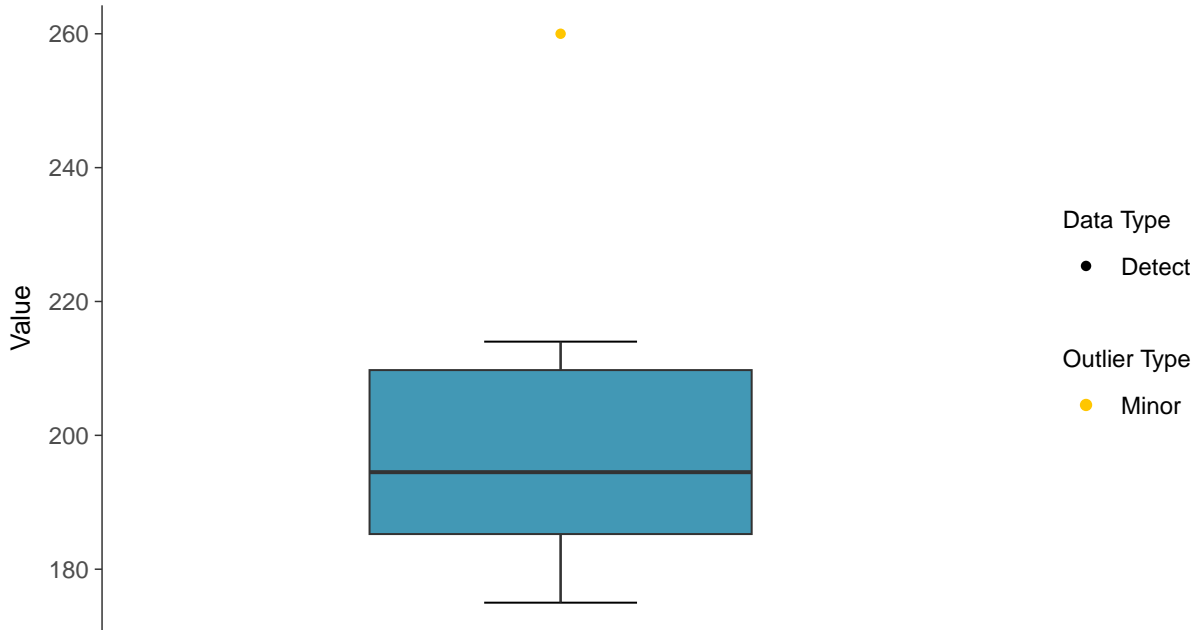
Sulfate, MW-7 (mg/L)





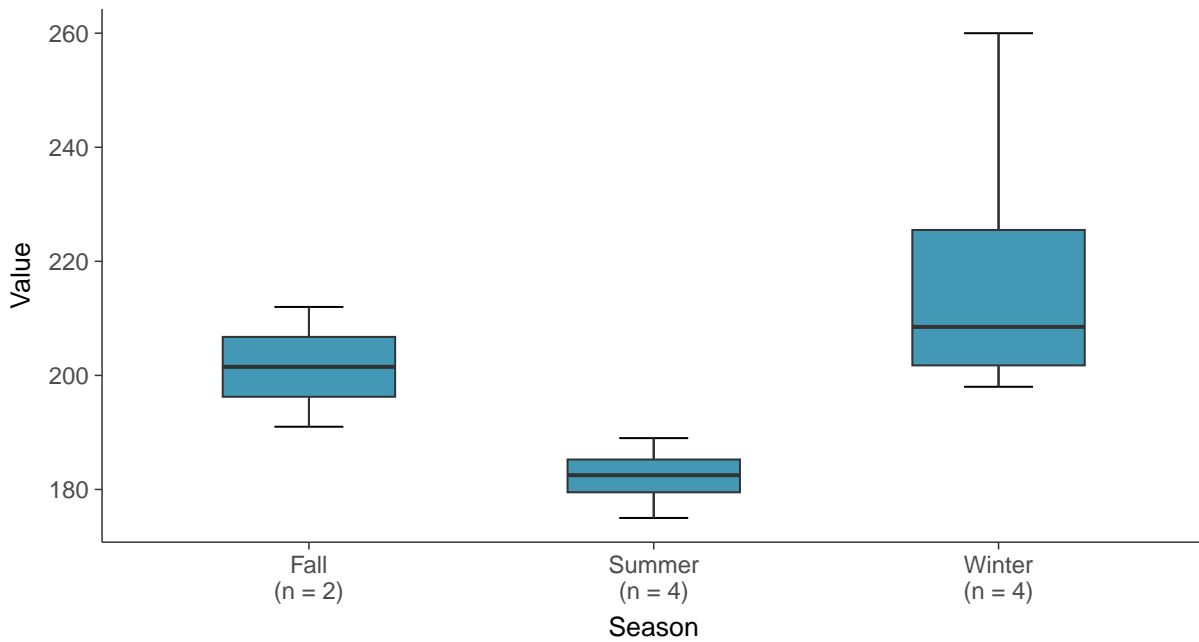
Boxplot

Sulfate, MW-7 (mg/L)



Boxplot by Season

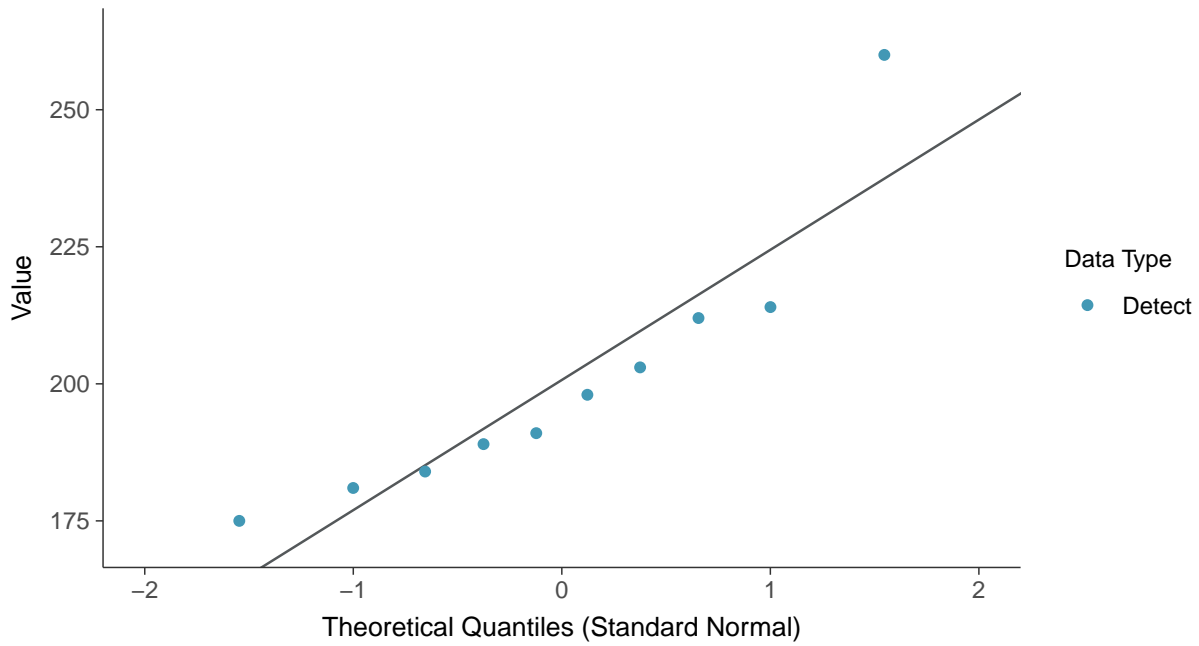
Sulfate, MW-7 (mg/L)





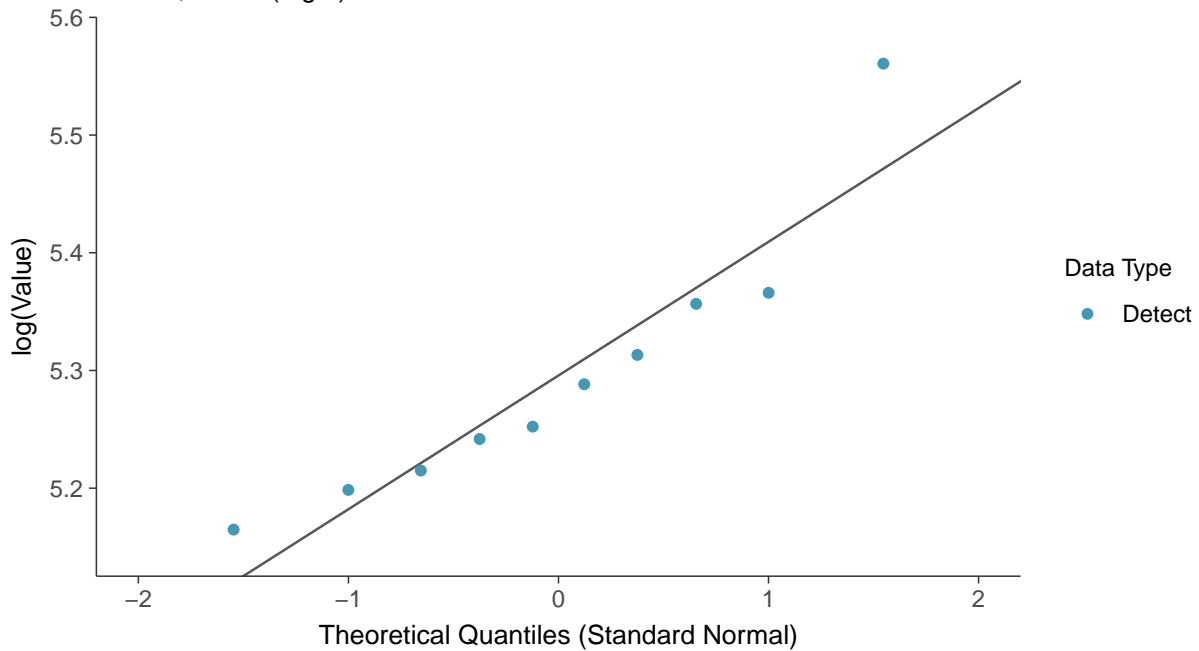
Normal Q-Q plot

Sulfate, MW-7 (mg/L)



Lognormal Q-Q plot

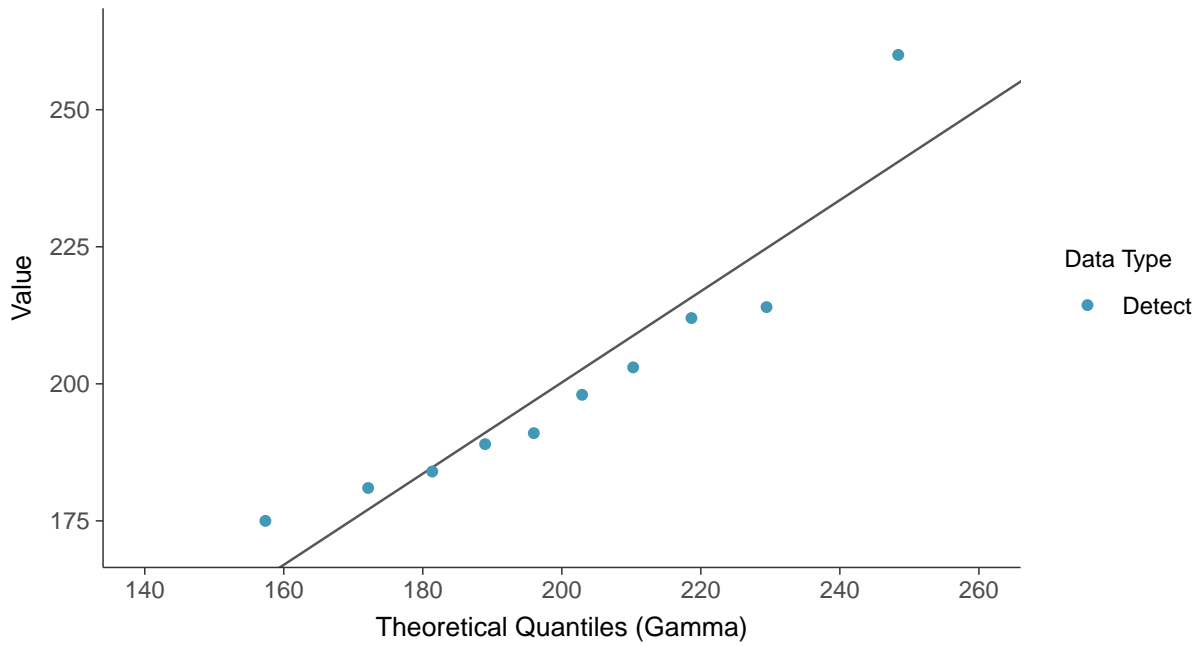
Sulfate, MW-7 (mg/L)





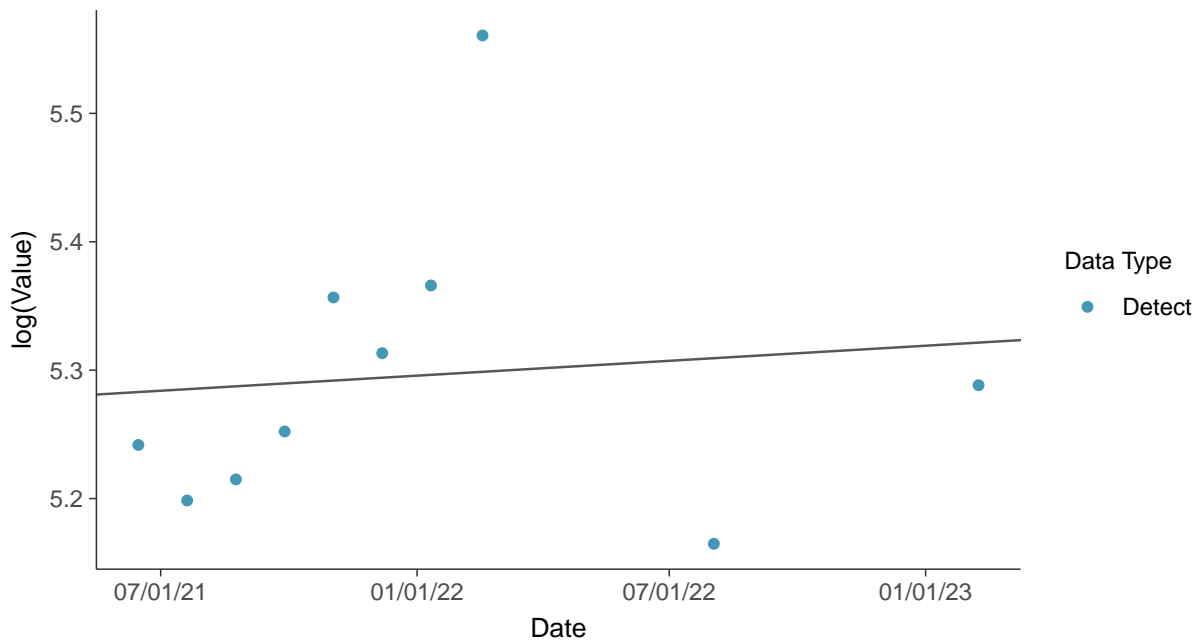
Gamma Q-Q plot

Sulfate, MW-7 (mg/L)



Trend Regression: Lognormal MLE

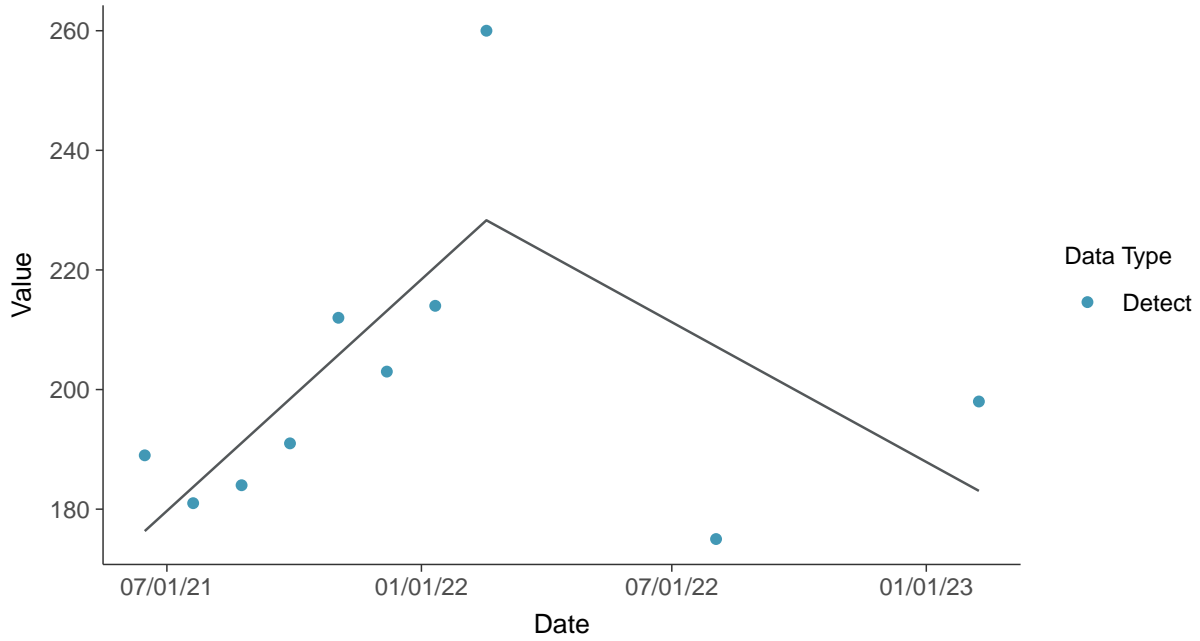
Sulfate, MW-7 (mg/L)





Trend Regression: Piecewise Linear-Linear

Sulfate, MW-7 (mg/L)

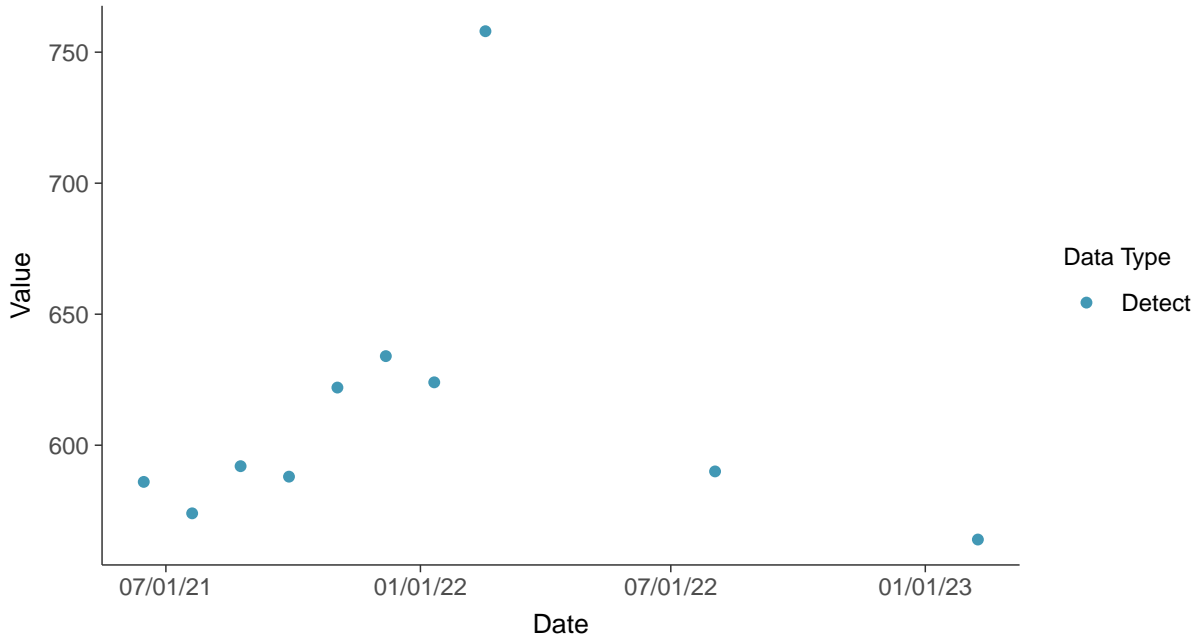


Appendix III: Total Dissolved Solids, MW-7

ID: 07_1_06

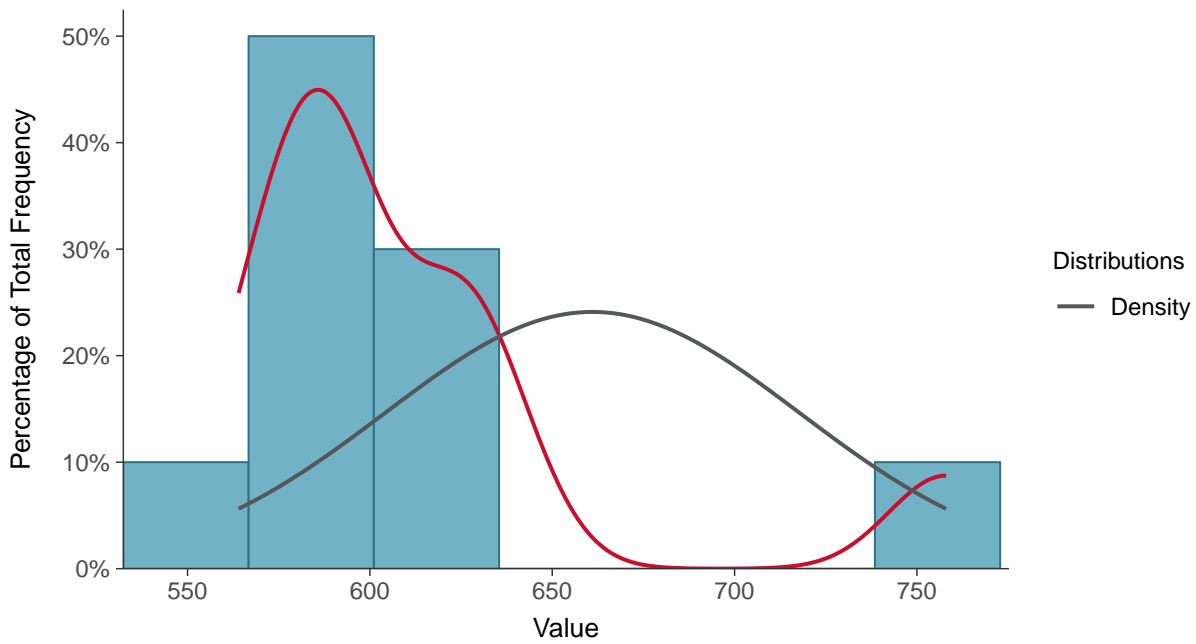
Scatter Plot

Total Dissolved Solids, MW-7 (mg/L)



Histogram

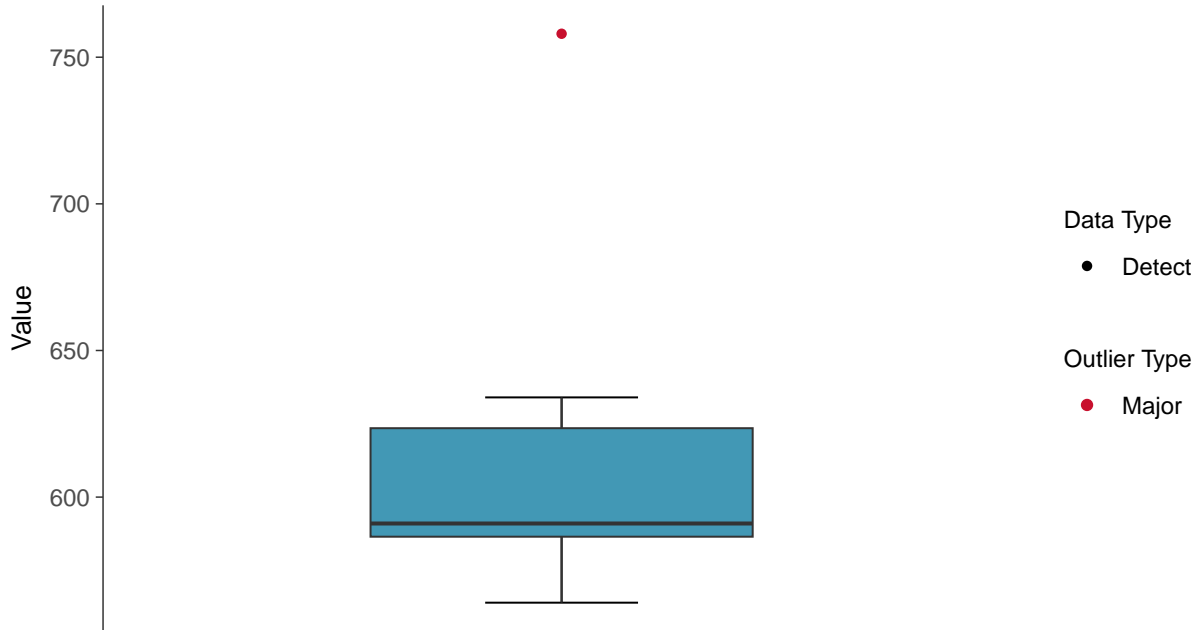
Total Dissolved Solids, MW-7 (mg/L)





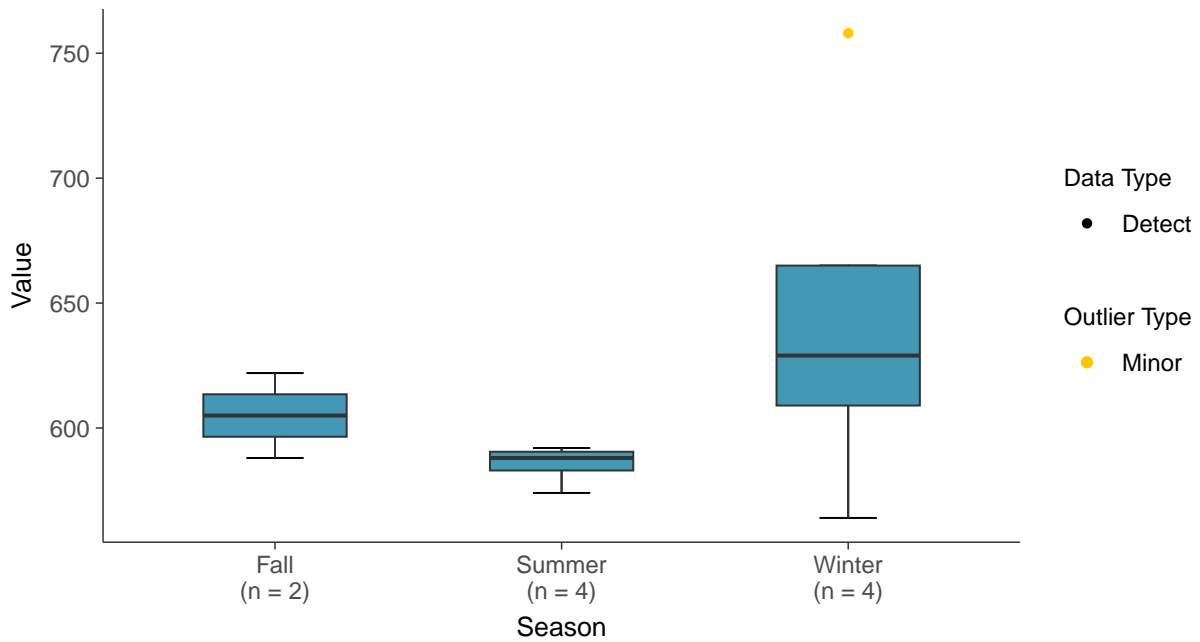
Boxplot

Total Dissolved Solids, MW-7 (mg/L)



Boxplot by Season

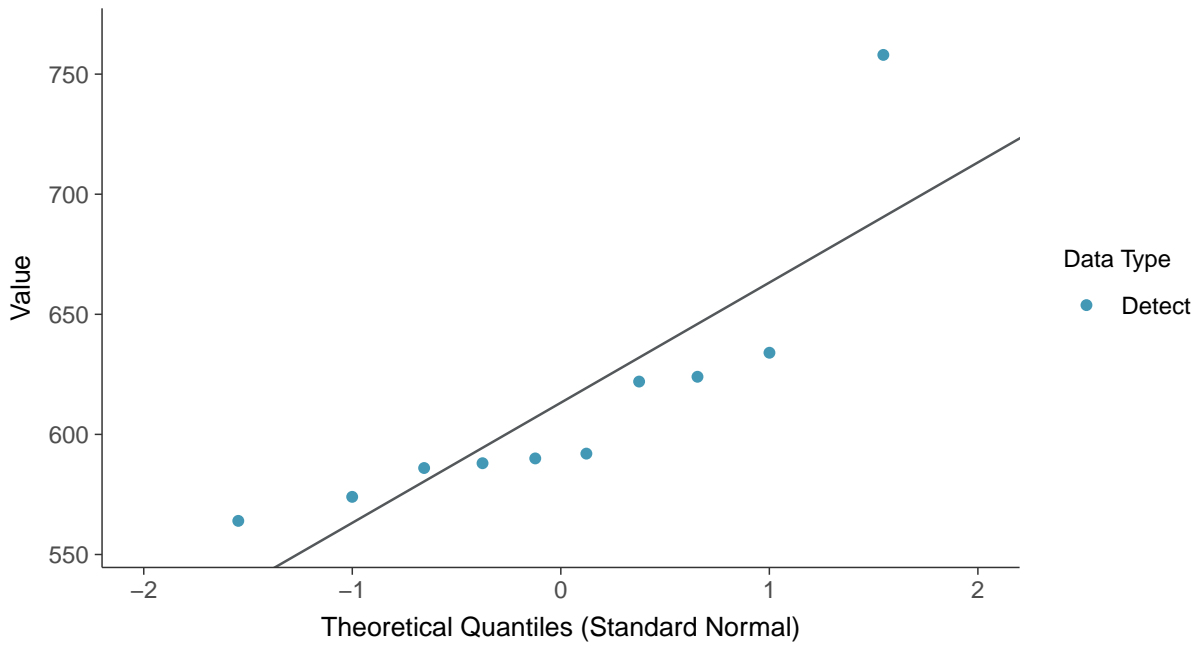
Total Dissolved Solids, MW-7 (mg/L)





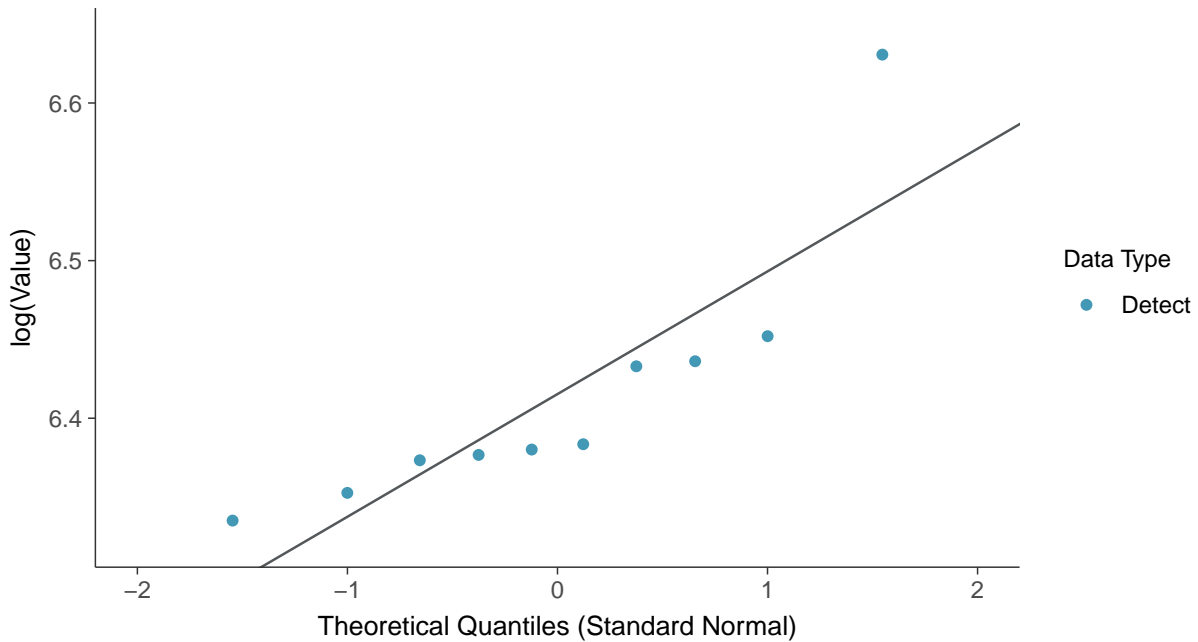
Normal Q-Q plot

Total Dissolved Solids, MW-7 (mg/L)



Lognormal Q-Q plot

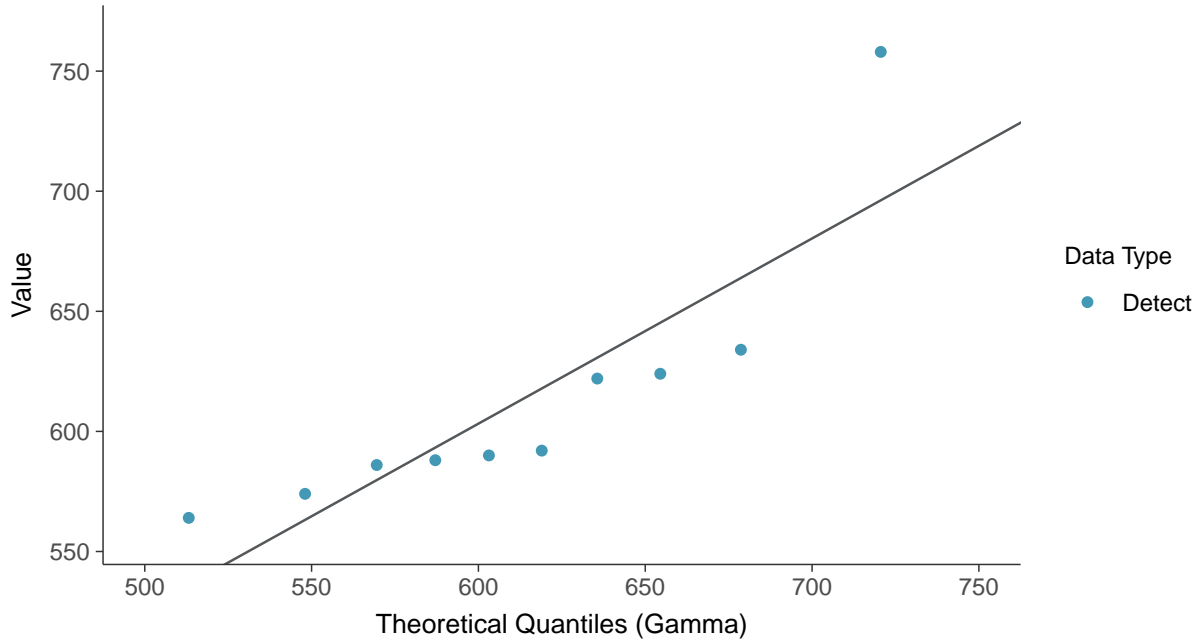
Total Dissolved Solids, MW-7 (mg/L)





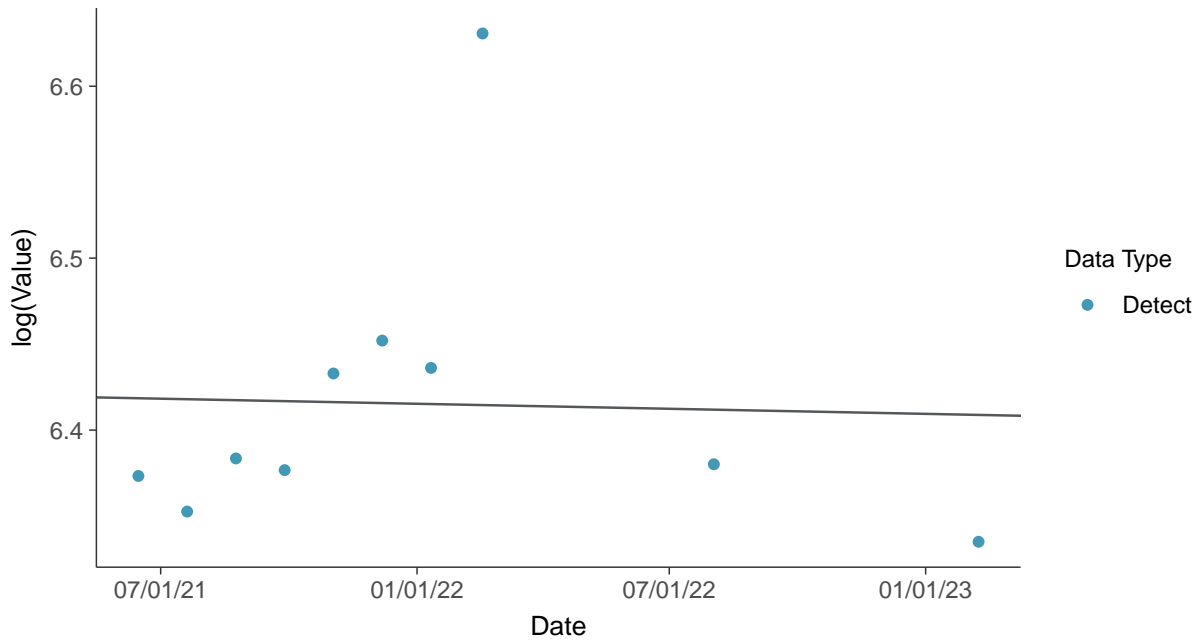
Gamma Q-Q plot

Total Dissolved Solids, MW-7 (mg/L)



Trend Regression: Lognormal MLE

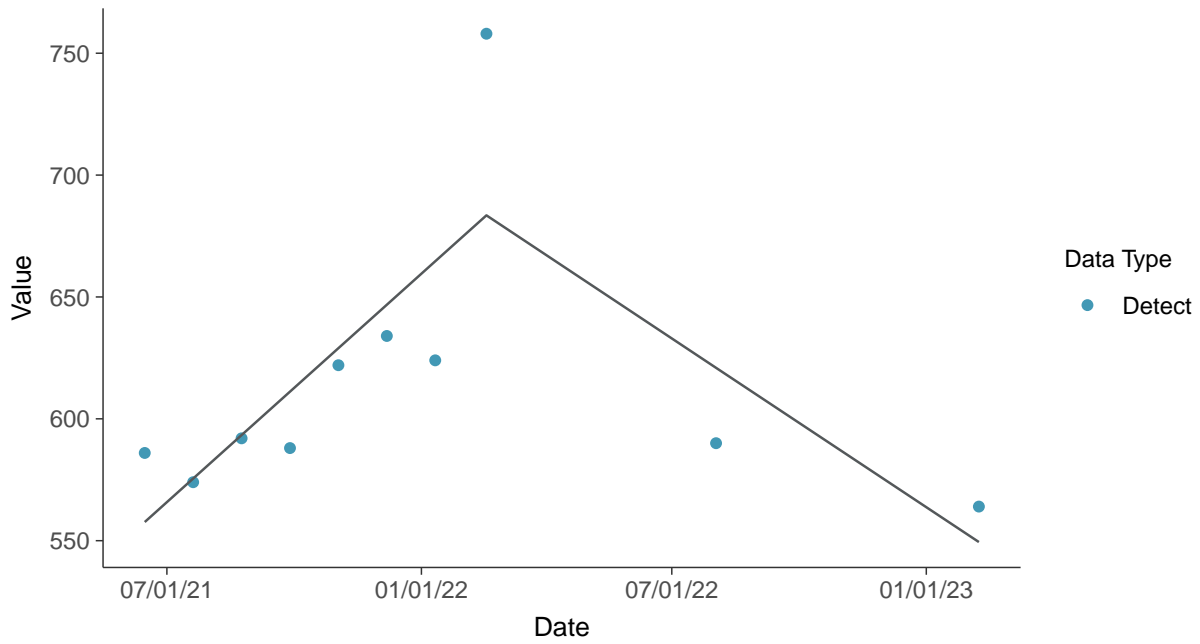
Total Dissolved Solids, MW-7 (mg/L)





Trend Regression: Piecewise Linear-Linear

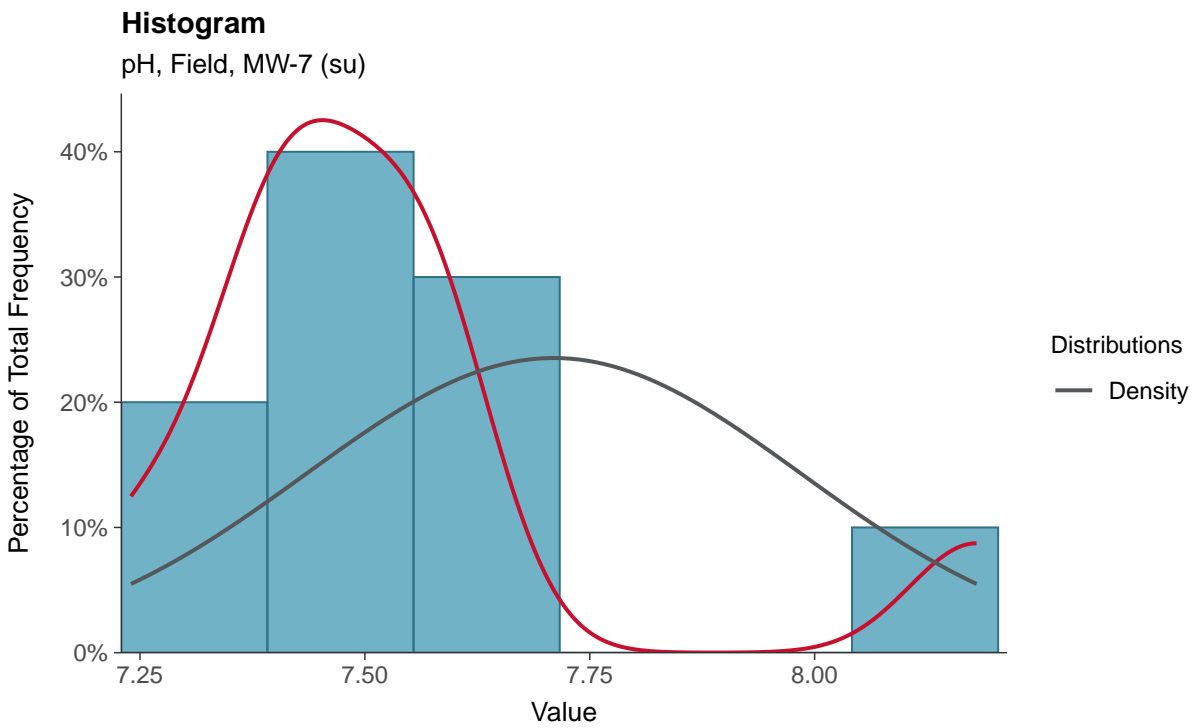
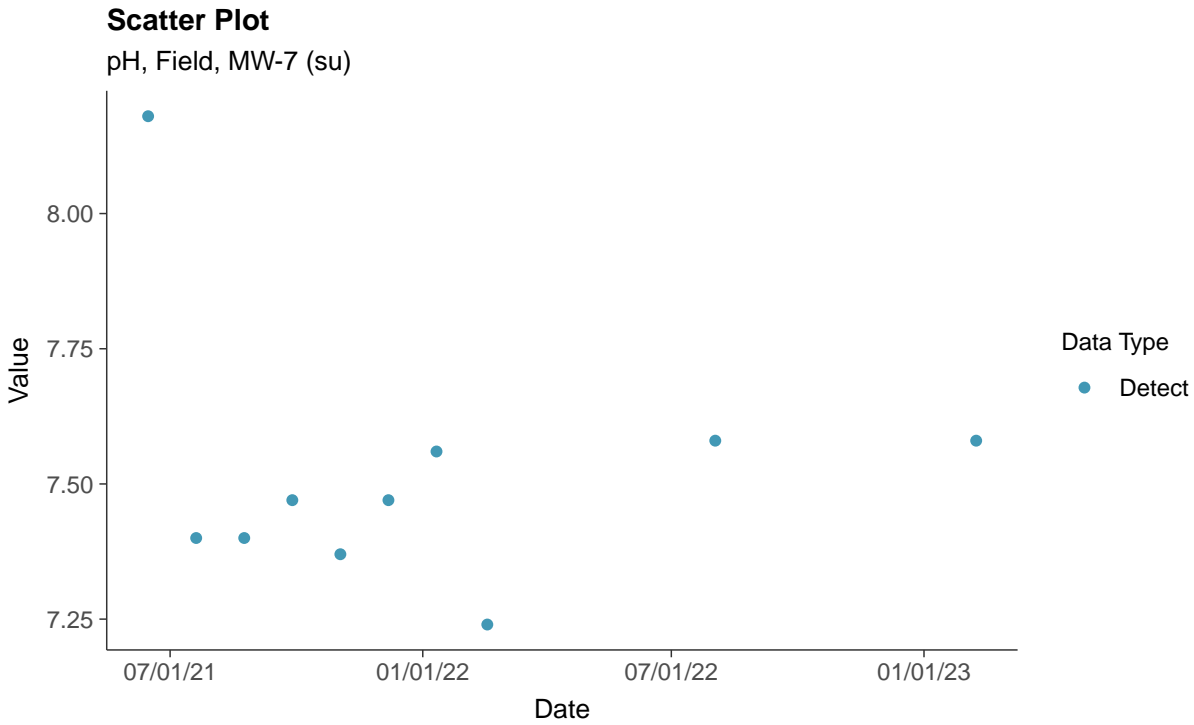
Total Dissolved Solids, MW-7 (mg/L)





Appendix III: pH, Field, MW-7

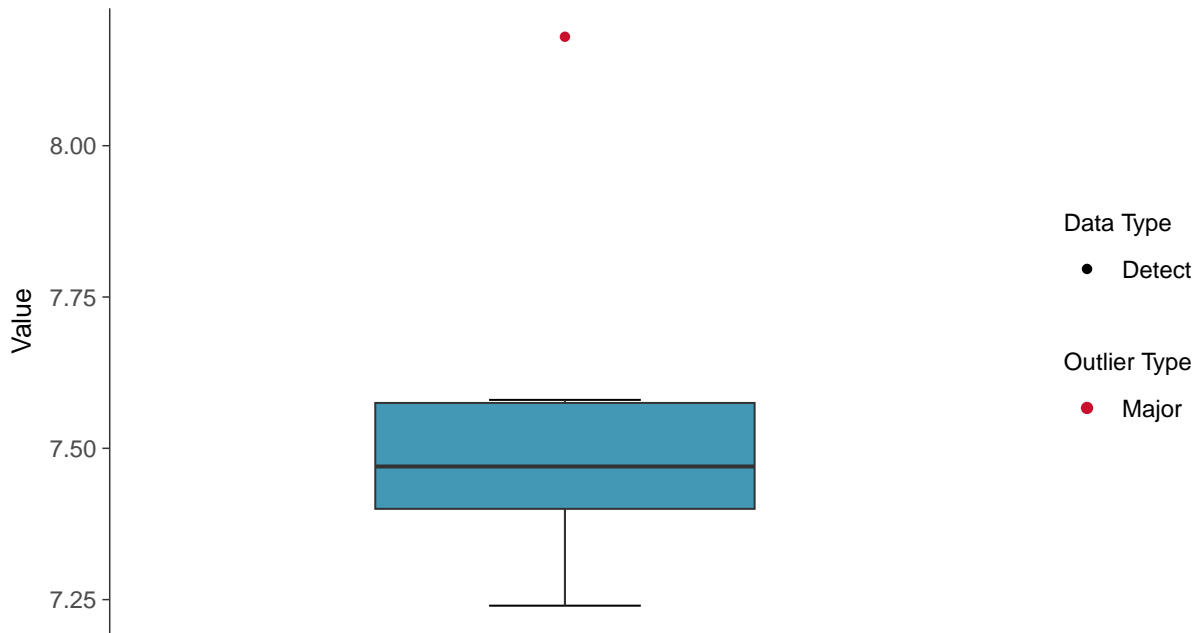
ID: 07_1_07





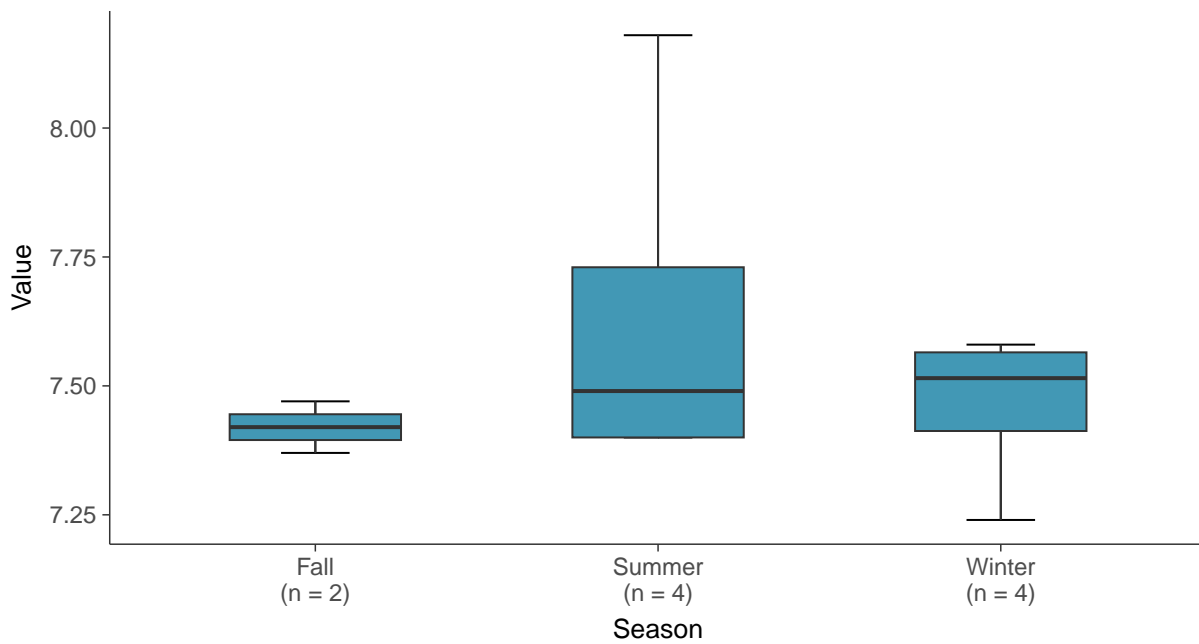
Boxplot

pH, Field, MW-7 (su)



Boxplot by Season

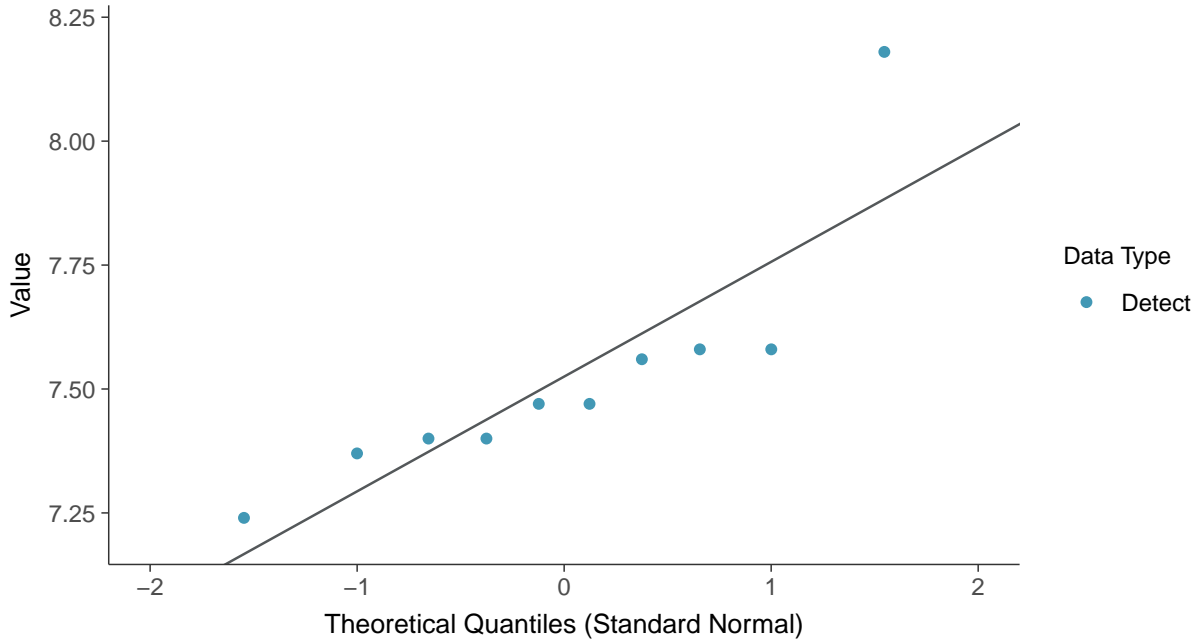
pH, Field, MW-7 (su)





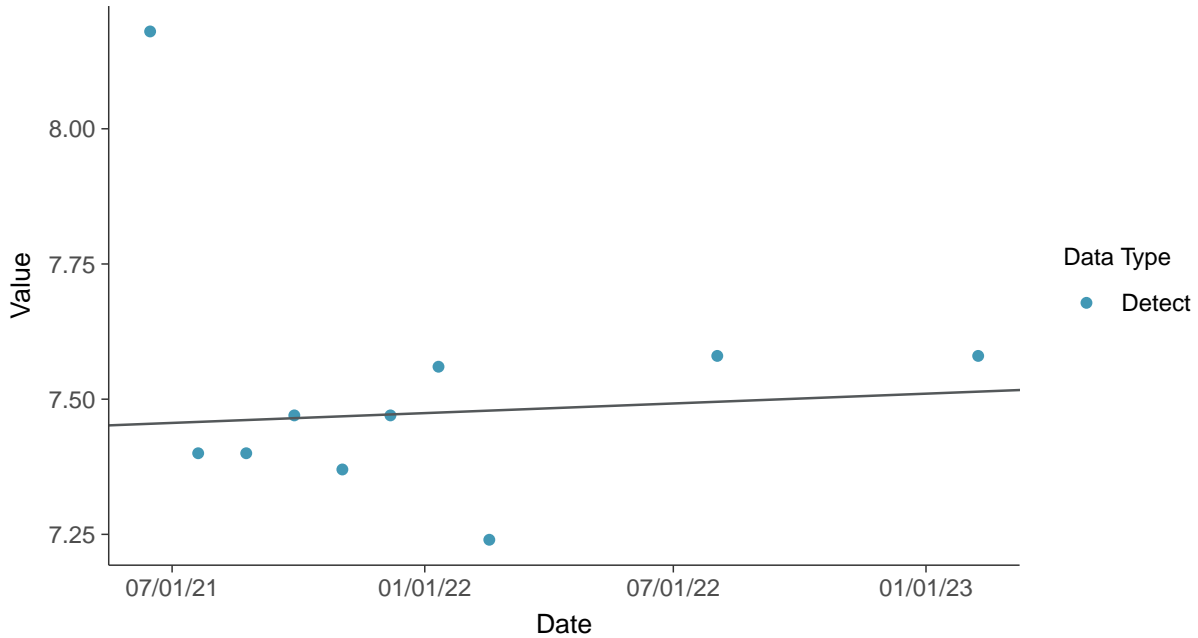
Normal Q-Q plot

pH, Field, MW-7 (su)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

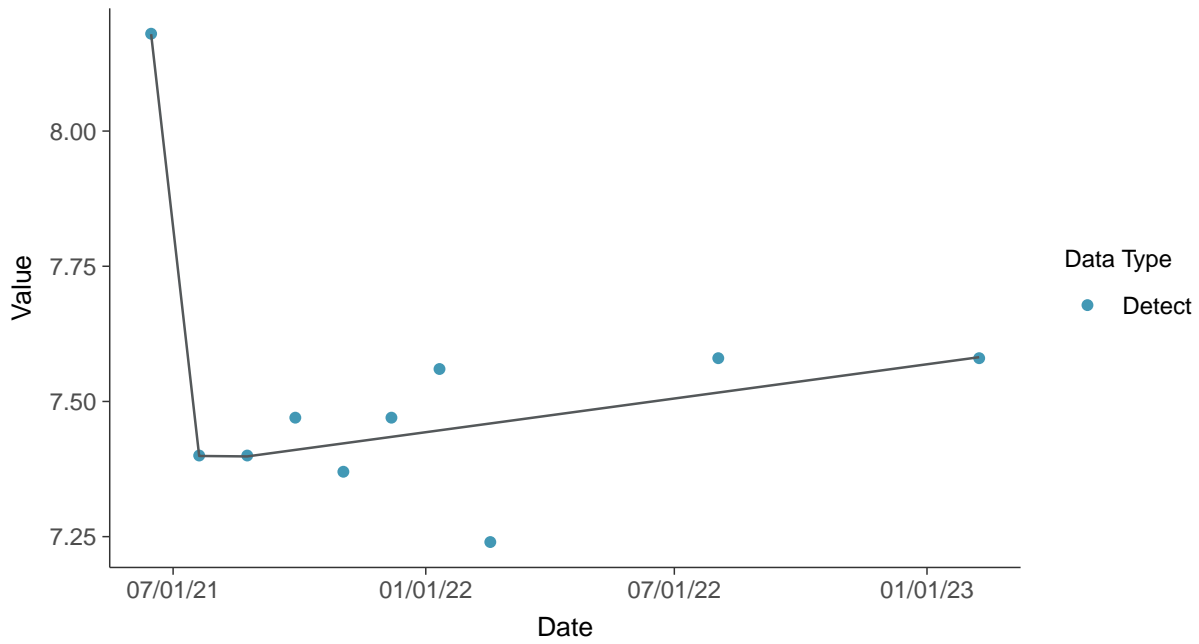
pH, Field, MW-7 (su)





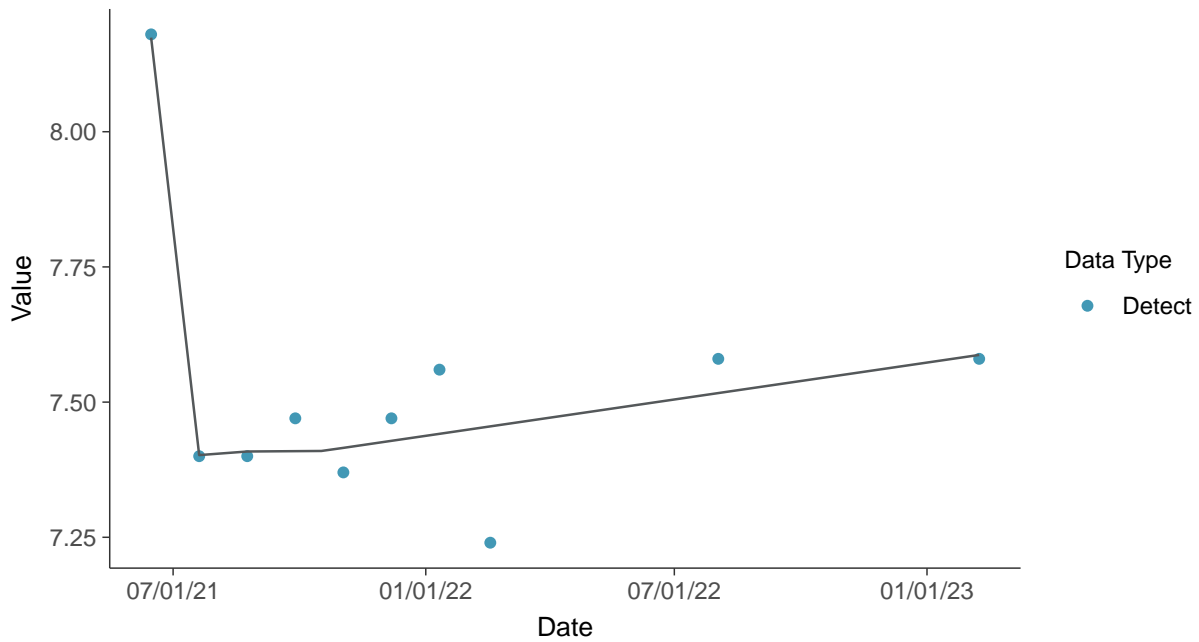
Trend Regression: Piecewise Linear-Linear

pH, Field, MW-7 (su)



Trend Regression: Piecewise Linear-Linear-Linear

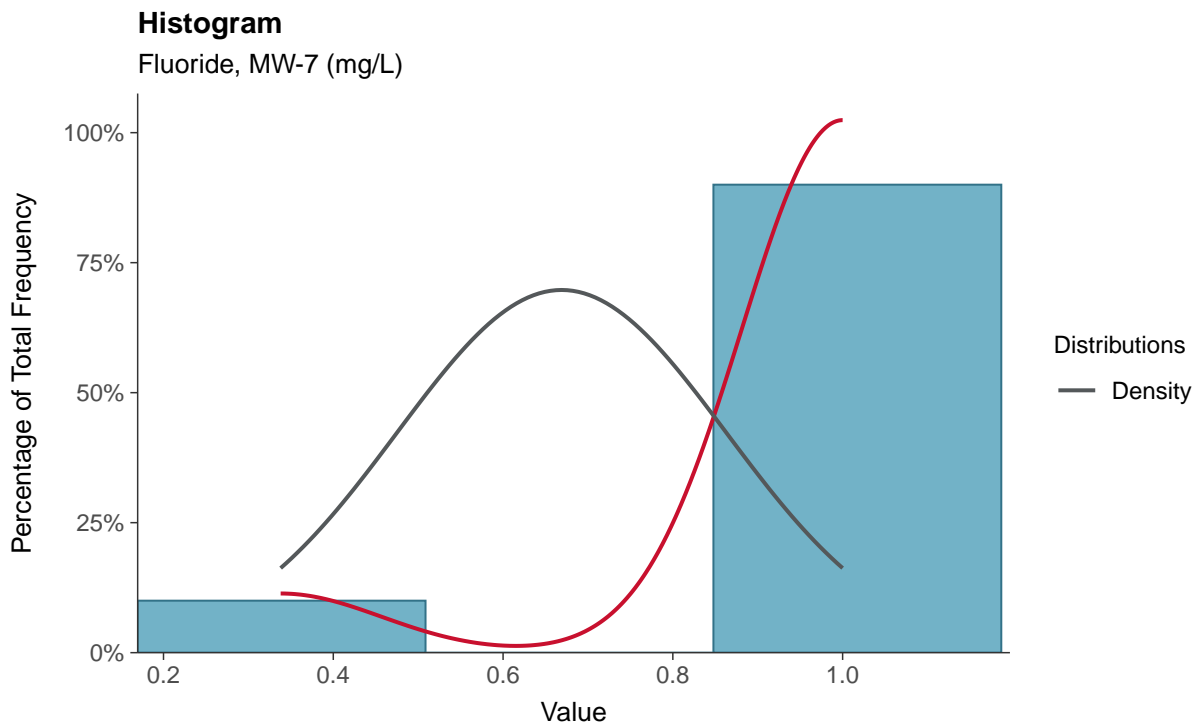
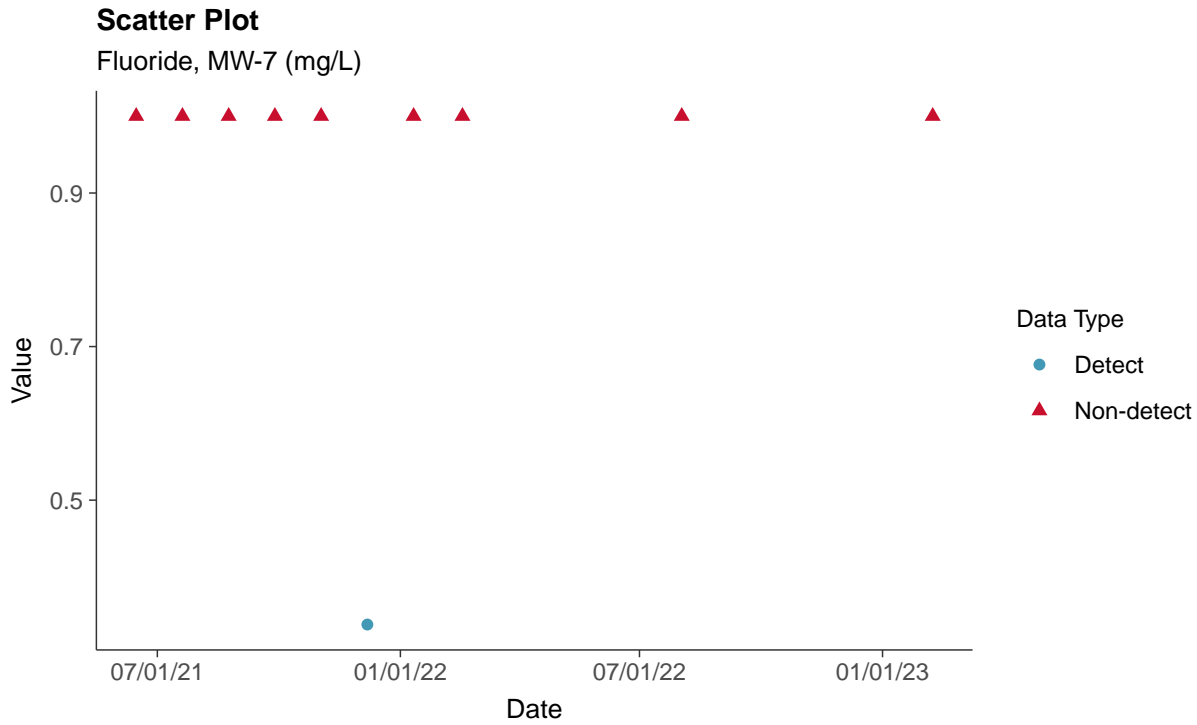
pH, Field, MW-7 (su)





Appendix IV: Fluoride, MW-7

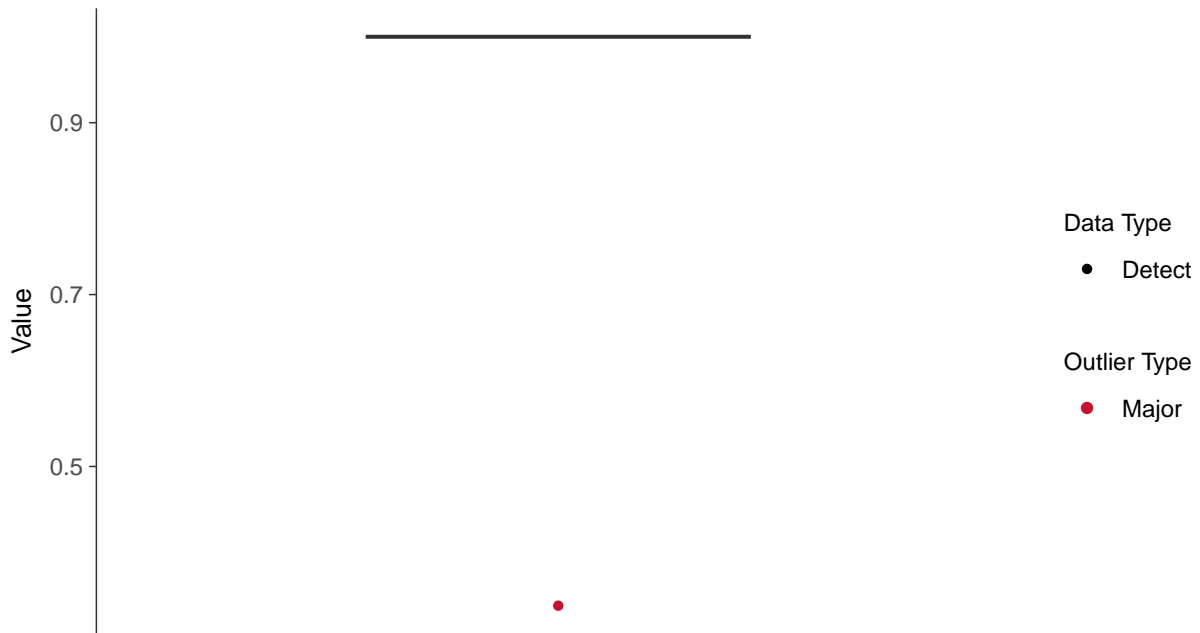
ID: 07_2_04





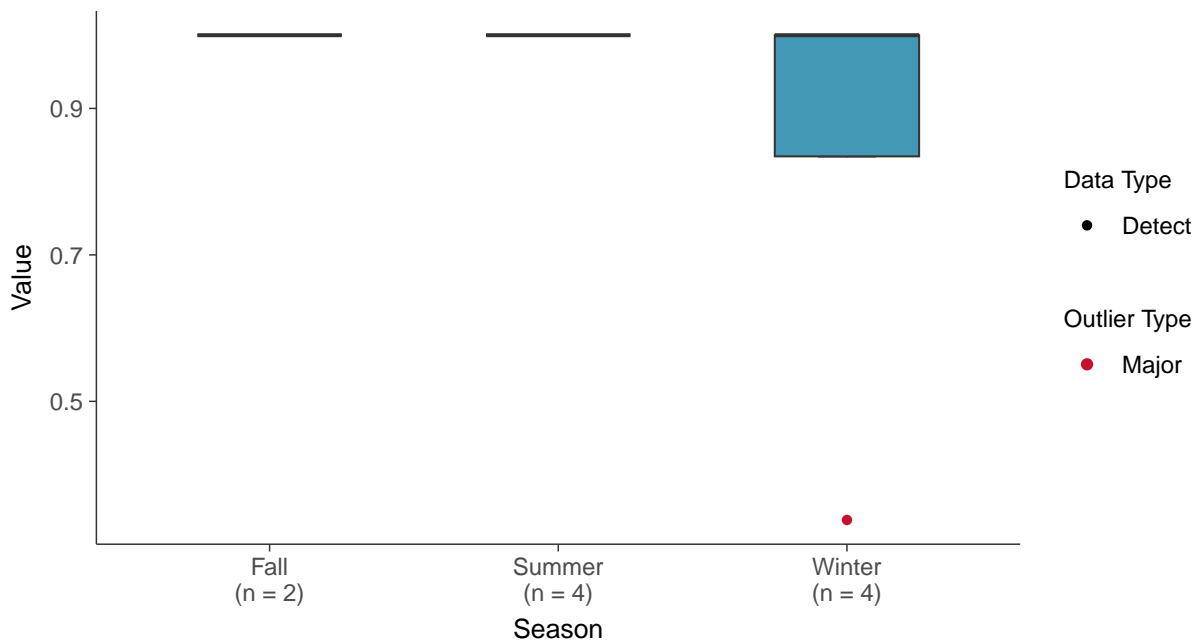
Boxplot

Fluoride, MW-7 (mg/L)



Boxplot by Season

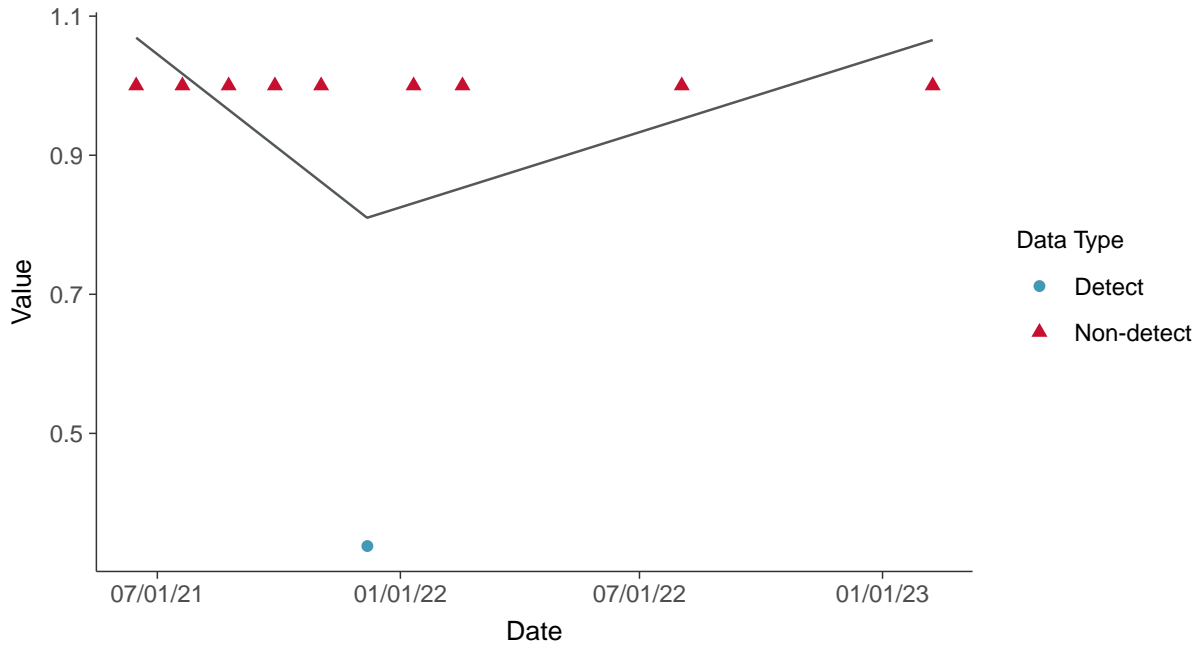
Fluoride, MW-7 (mg/L)





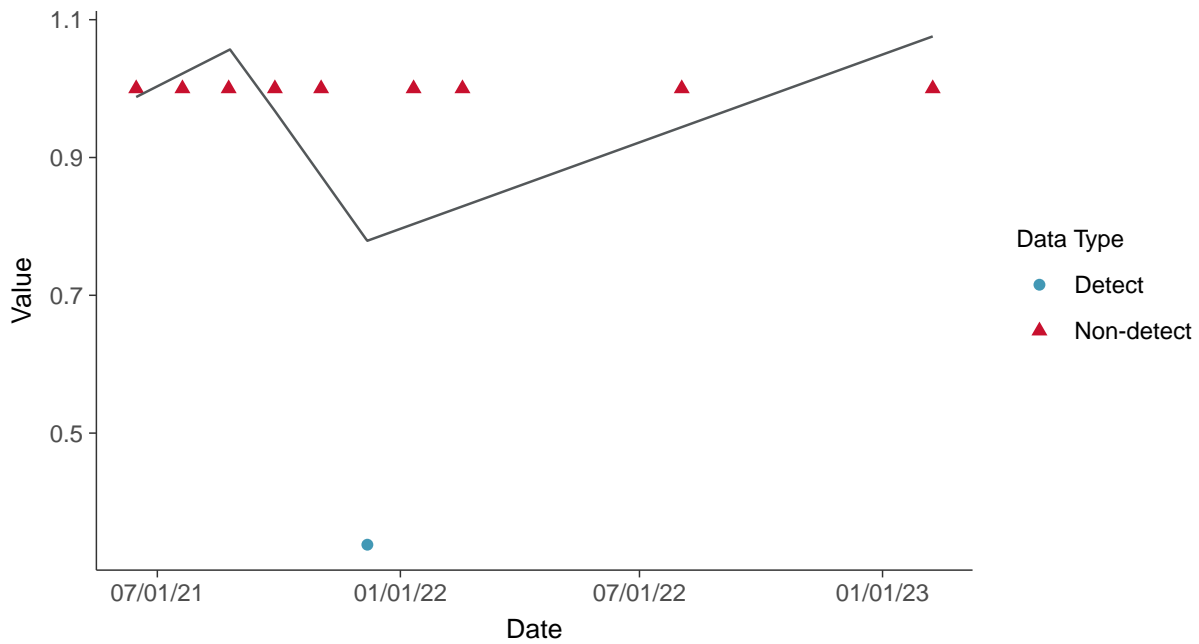
Trend Regression: Piecewise Linear-Linear

Fluoride, MW-7 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Fluoride, MW-7 (mg/L)



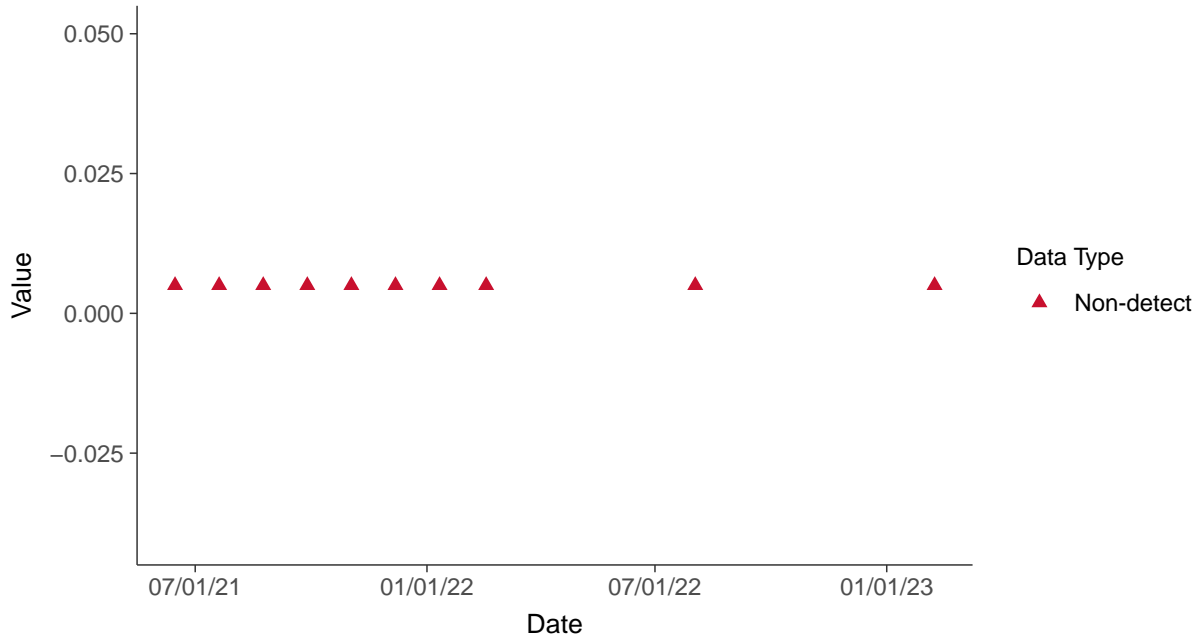


Appendix IV: Antimony, MW-7

ID: 07_2_08

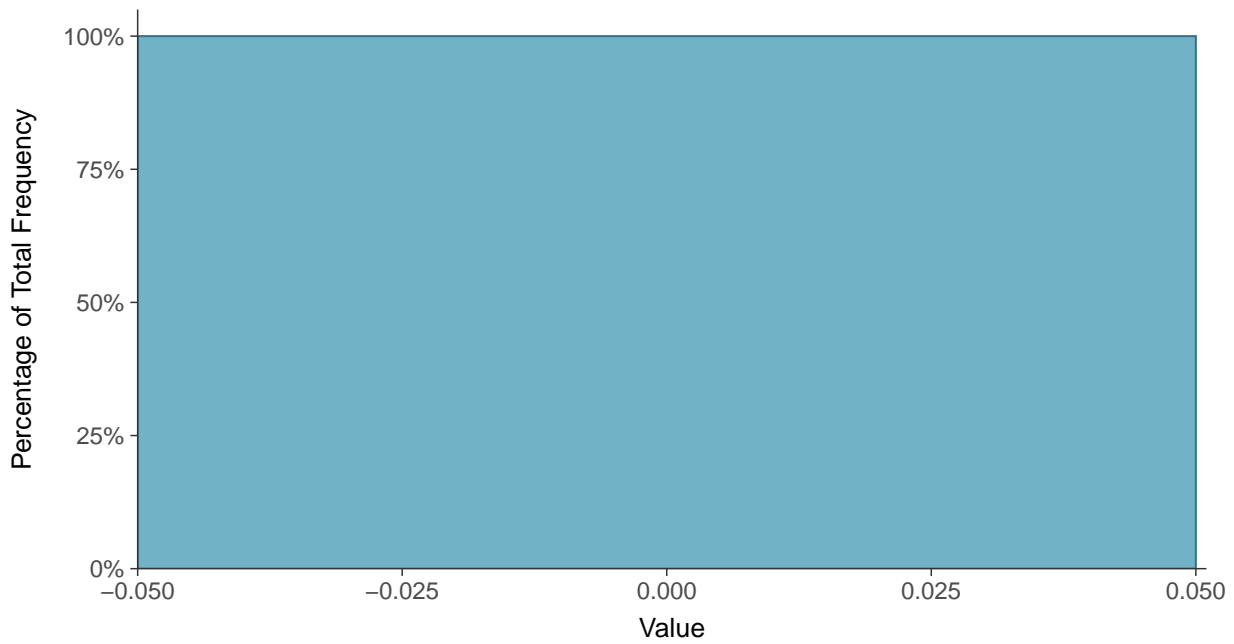
Scatter Plot

Antimony, MW-7 (mg/L)



Histogram

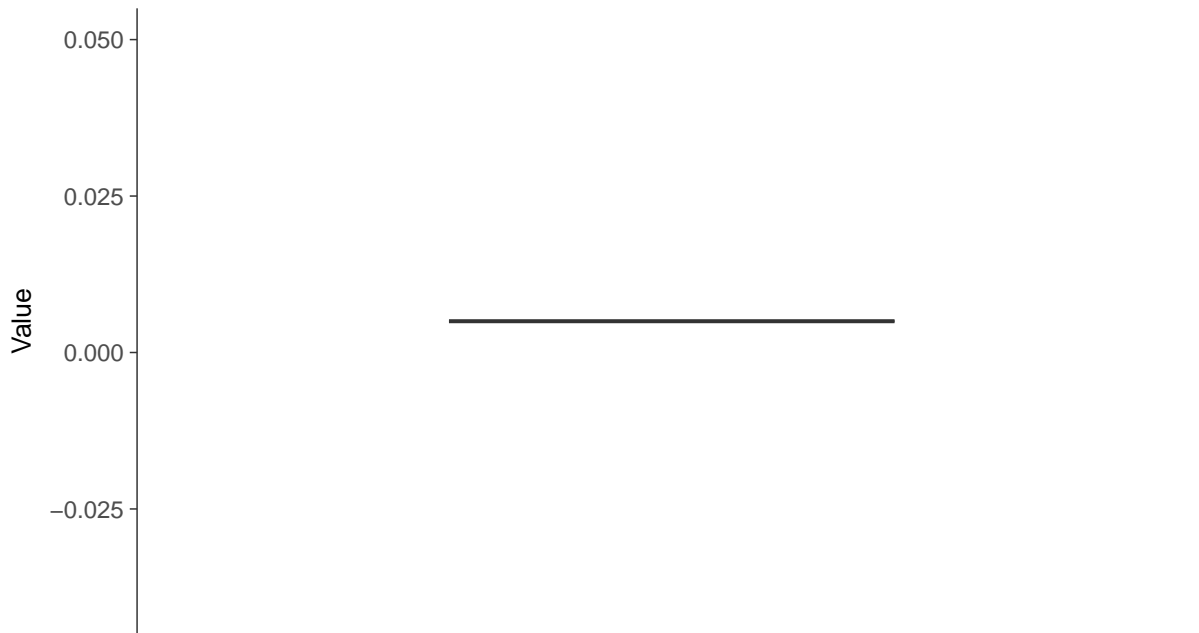
Antimony, MW-7 (mg/L)





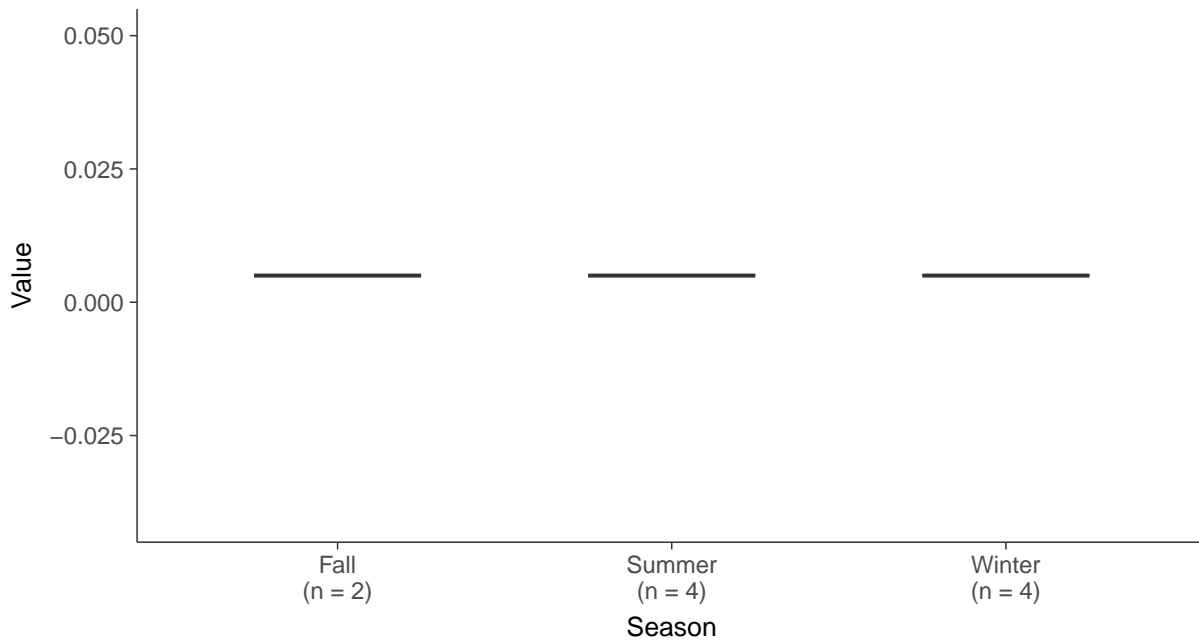
Boxplot

Antimony, MW-7 (mg/L)



Boxplot by Season

Antimony, MW-7 (mg/L)

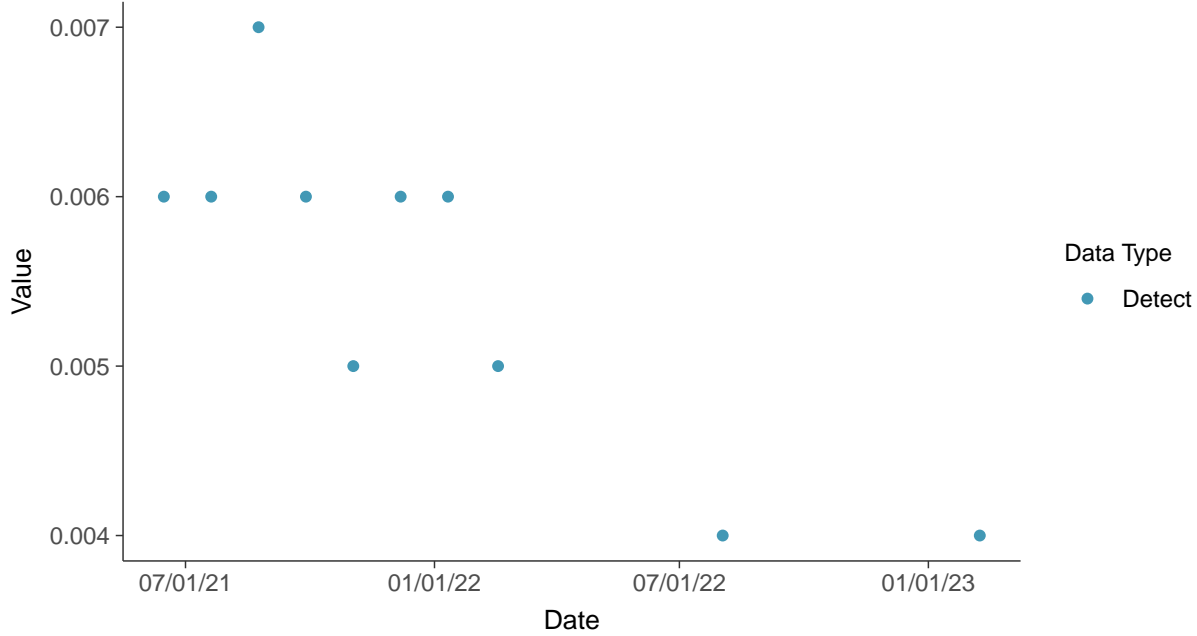


Appendix IV: Arsenic, MW-7

ID: 07_2_09

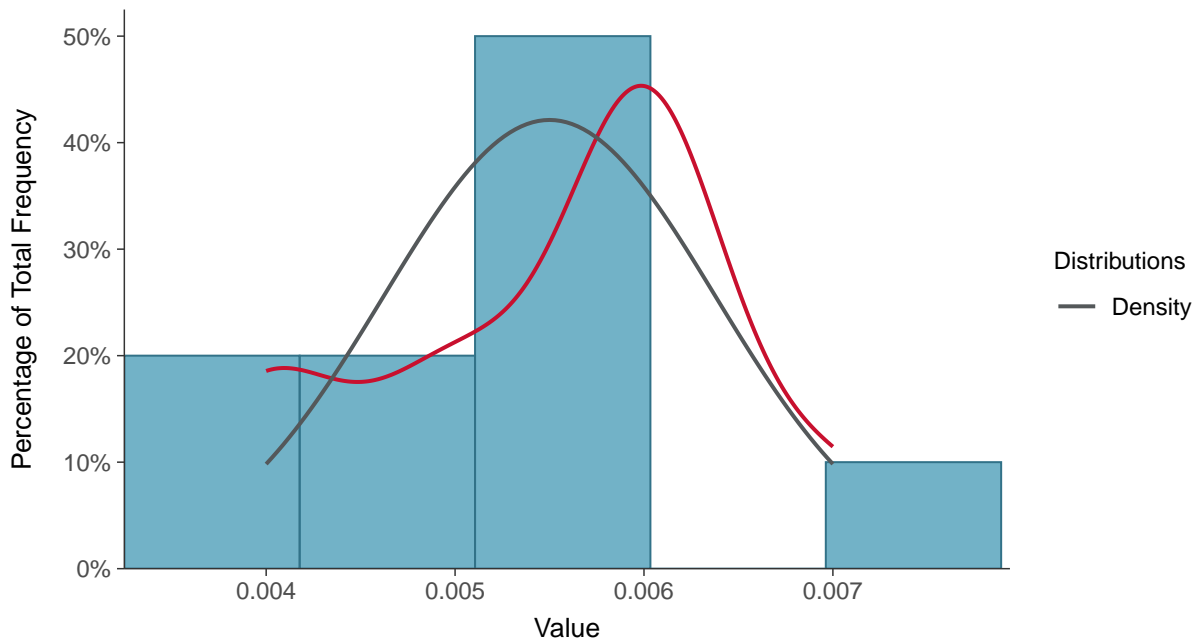
Scatter Plot

Arsenic, MW-7 (mg/L)



Histogram

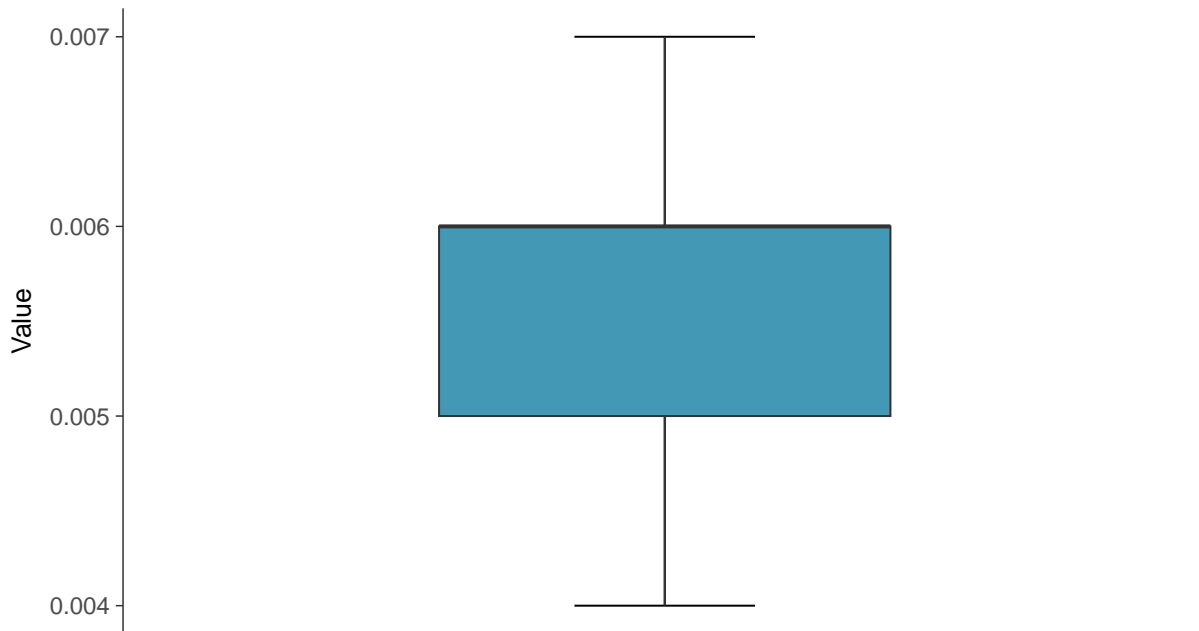
Arsenic, MW-7 (mg/L)





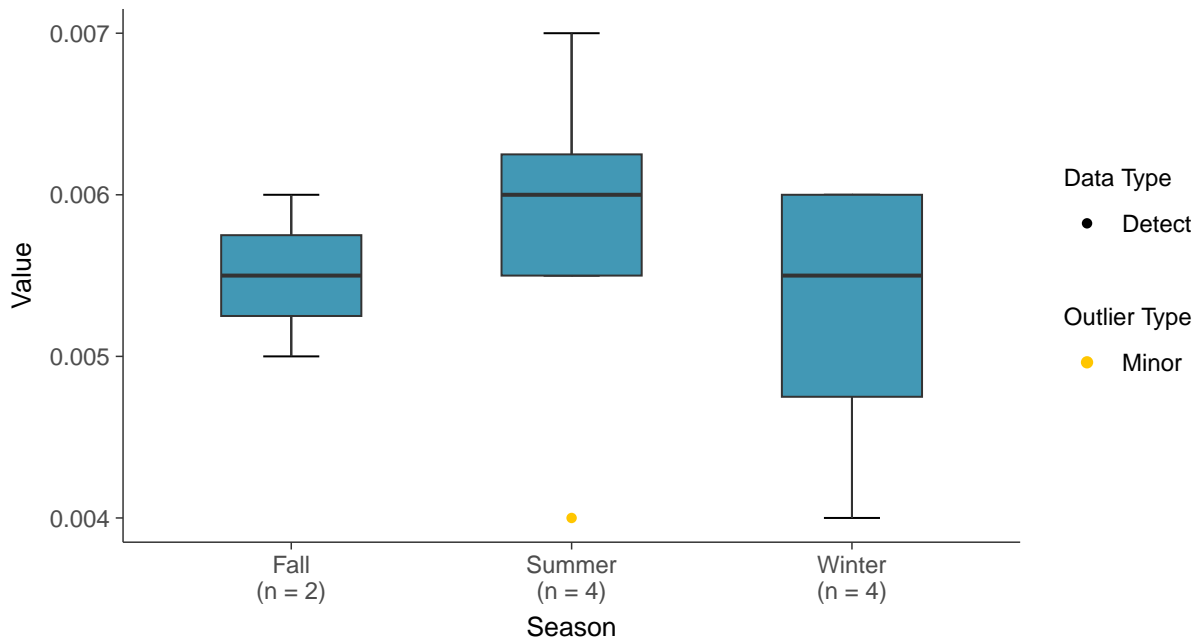
Boxplot

Arsenic, MW-7 (mg/L)



Boxplot by Season

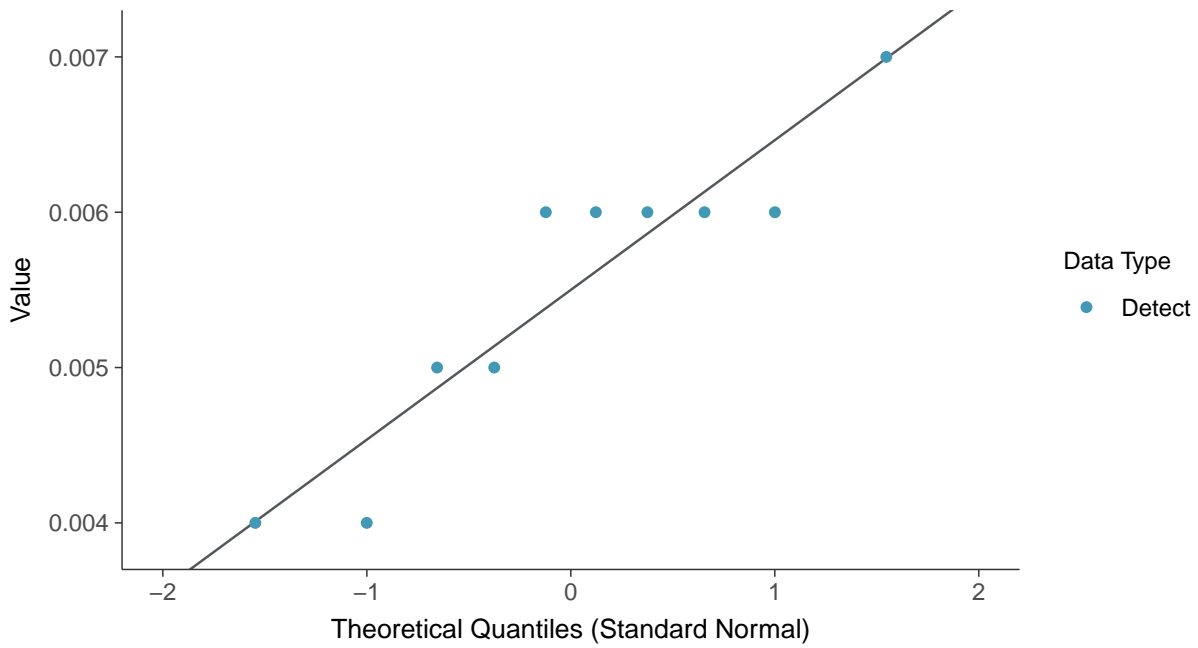
Arsenic, MW-7 (mg/L)





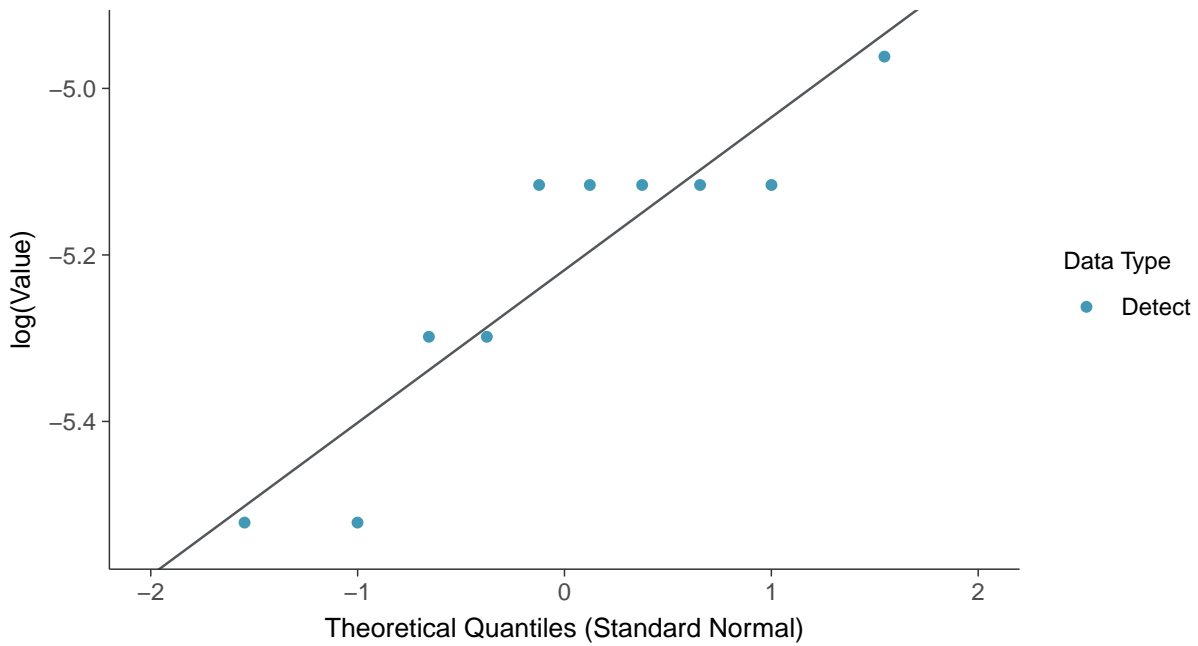
Normal Q-Q plot

Arsenic, MW-7 (mg/L)



Lognormal Q-Q plot

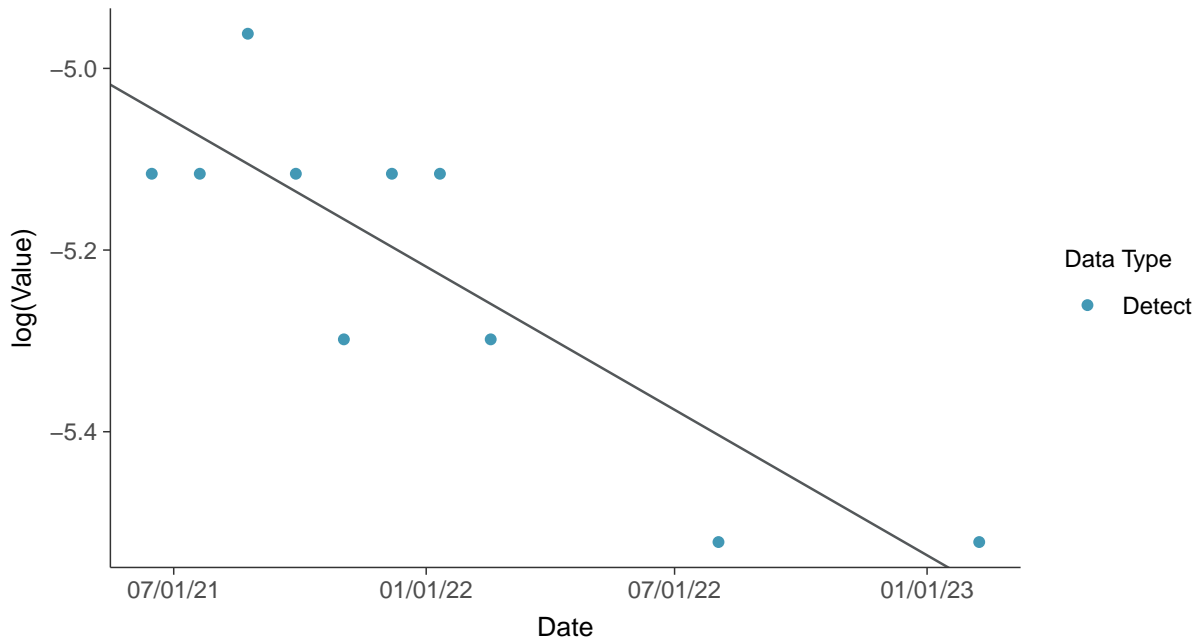
Arsenic, MW-7 (mg/L)





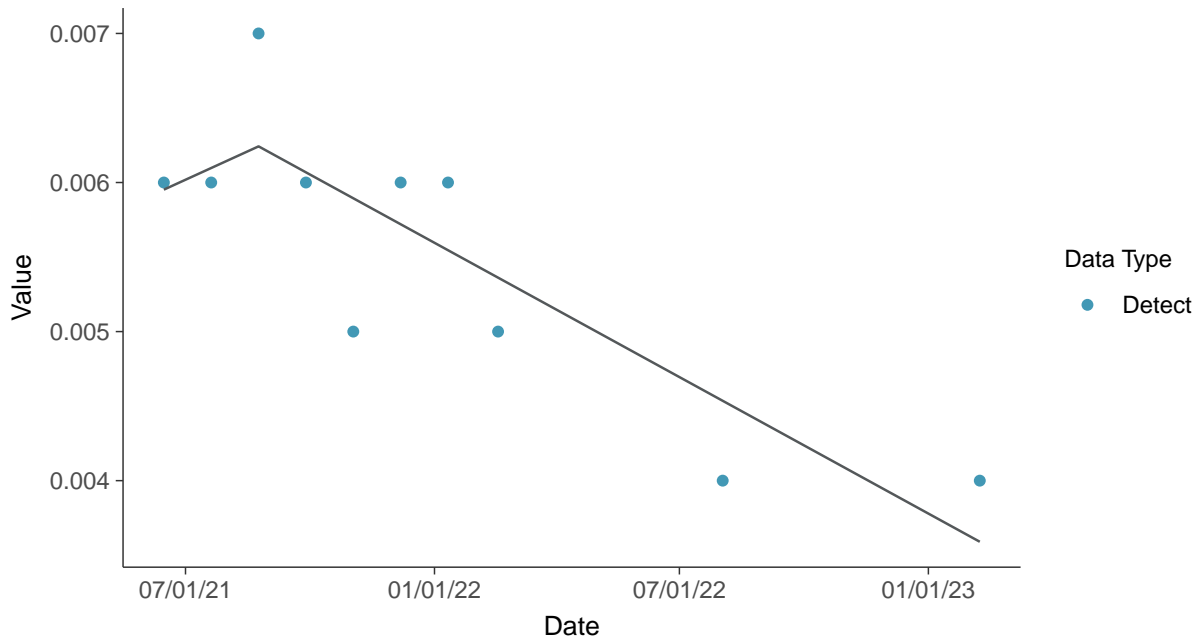
Trend Regression: Lognormal MLE

Arsenic, MW-7 (mg/L)



Trend Regression: Piecewise Linear-Linear

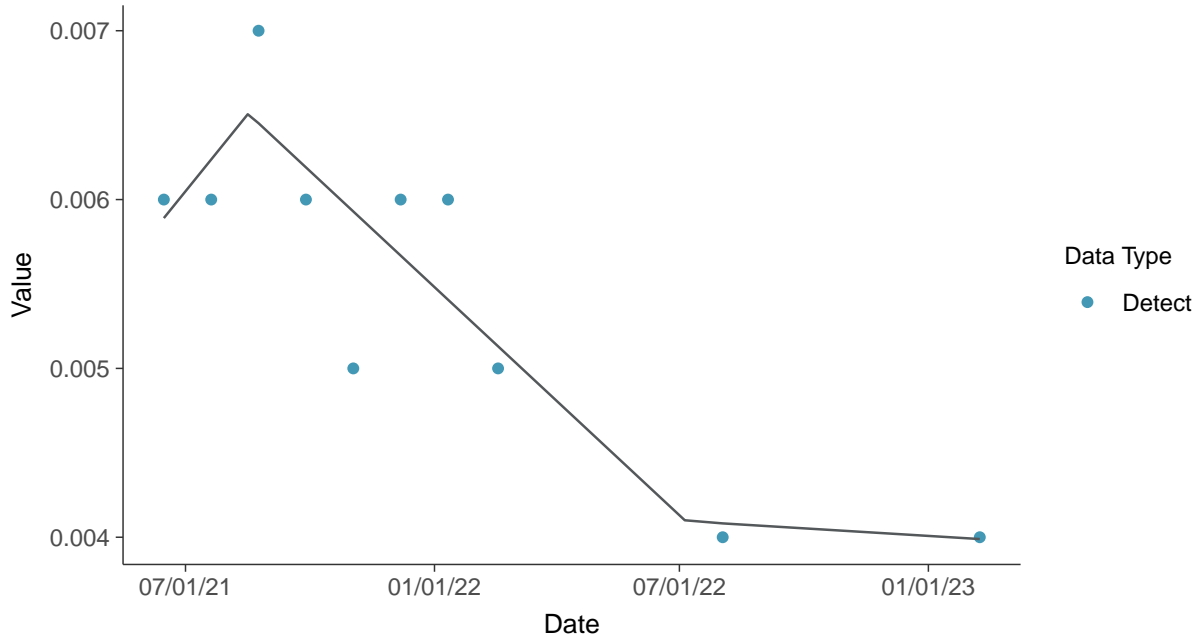
Arsenic, MW-7 (mg/L)





Trend Regression: Piecewise Linear-Linear-Linear

Arsenic, MW-7 (mg/L)



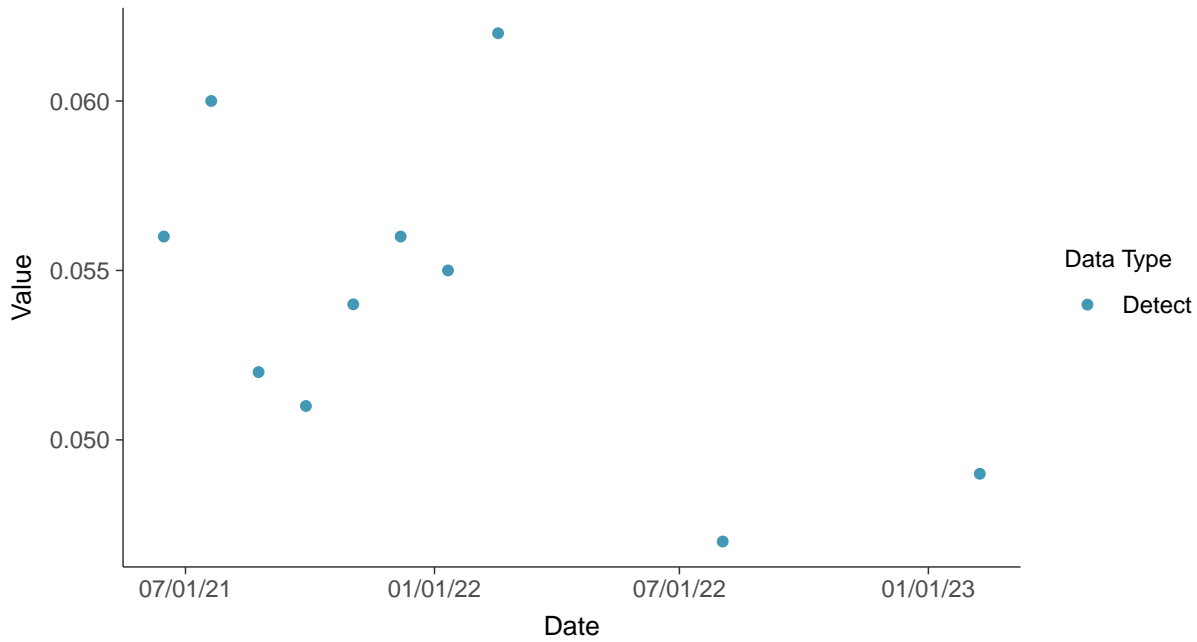


Appendix IV: Barium, MW-7

ID: 07_2_10

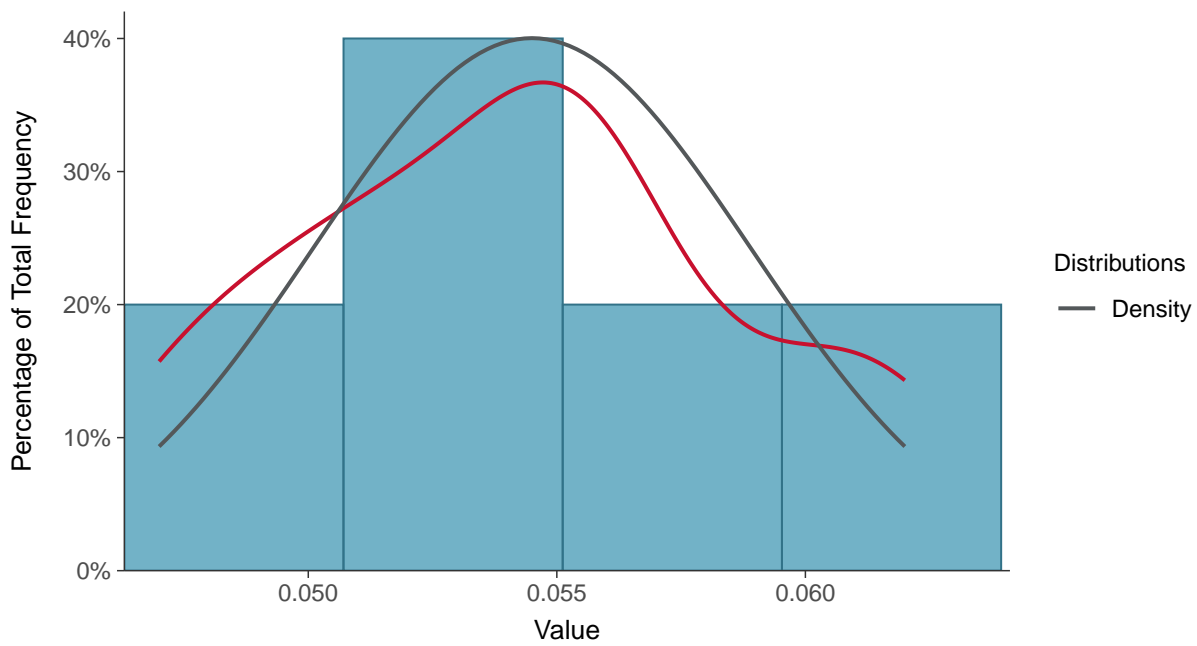
Scatter Plot

Barium, MW-7 (mg/L)



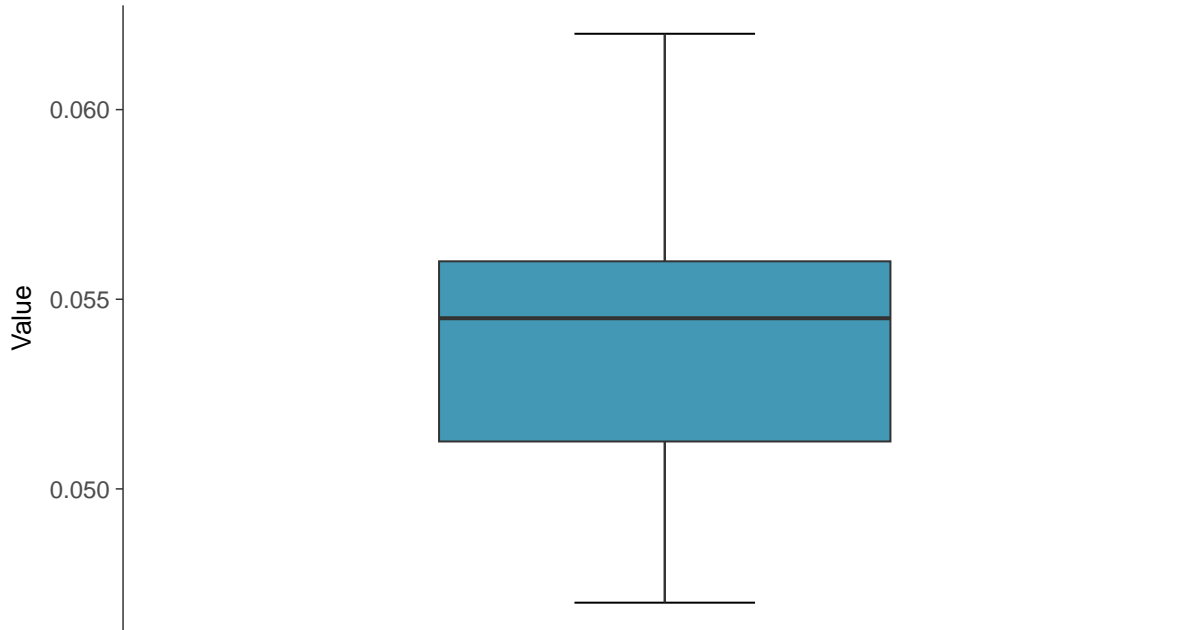
Histogram

Barium, MW-7 (mg/L)



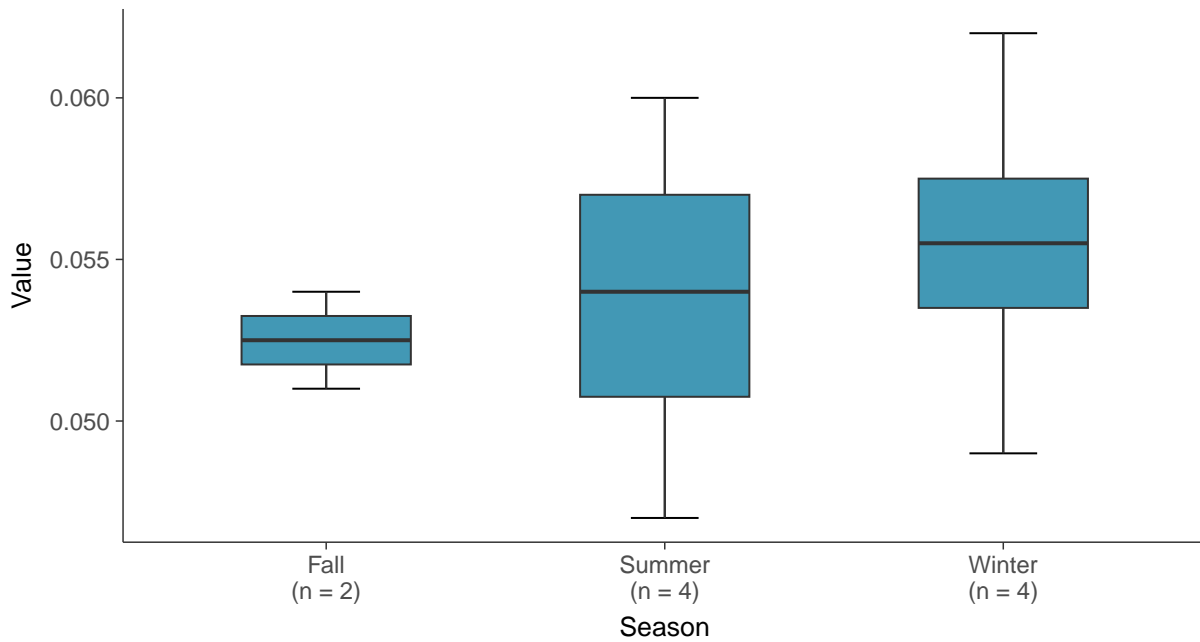
Boxplot

Barium, MW-7 (mg/L)



Boxplot by Season

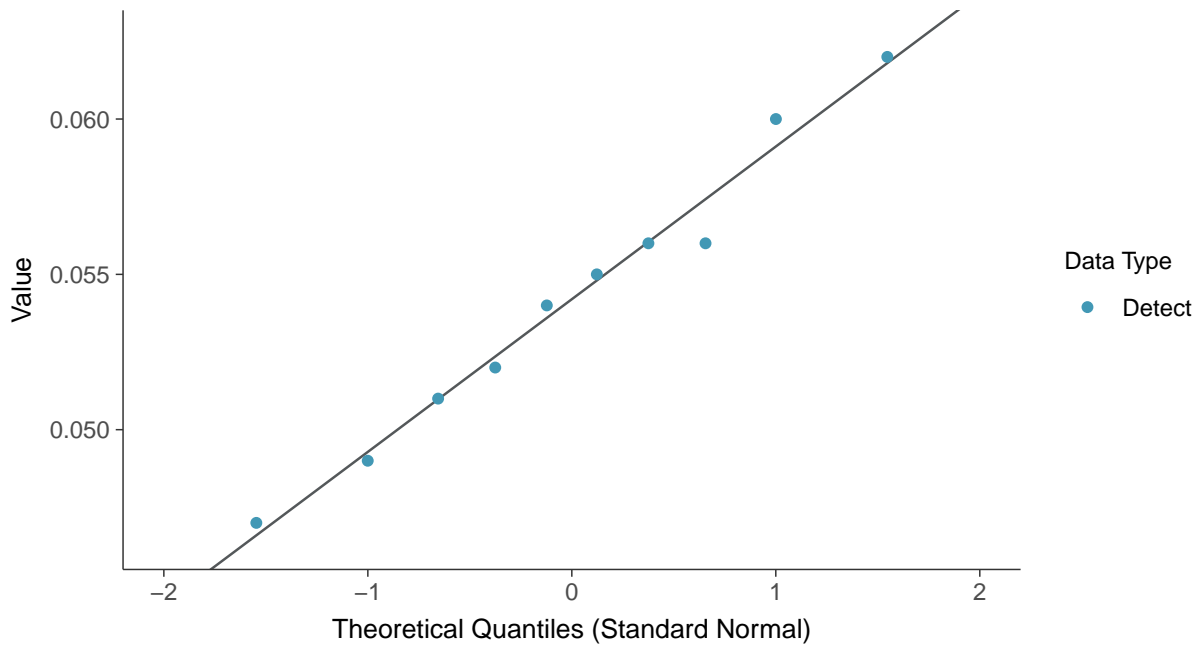
Barium, MW-7 (mg/L)





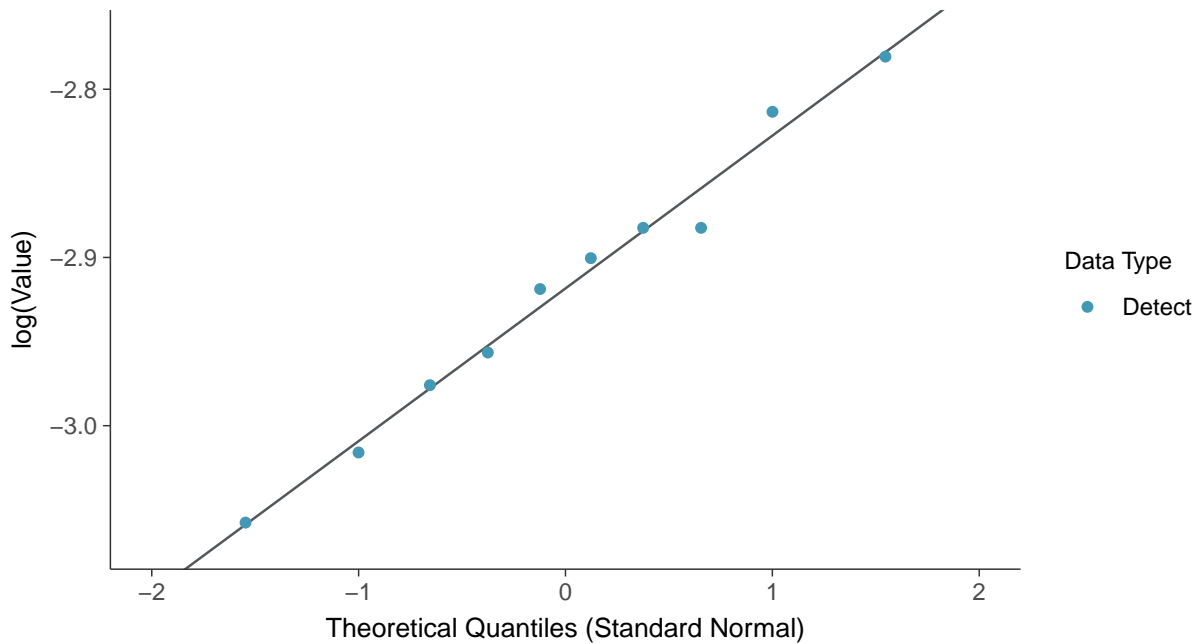
Normal Q-Q plot

Barium, MW-7 (mg/L)



Lognormal Q-Q plot

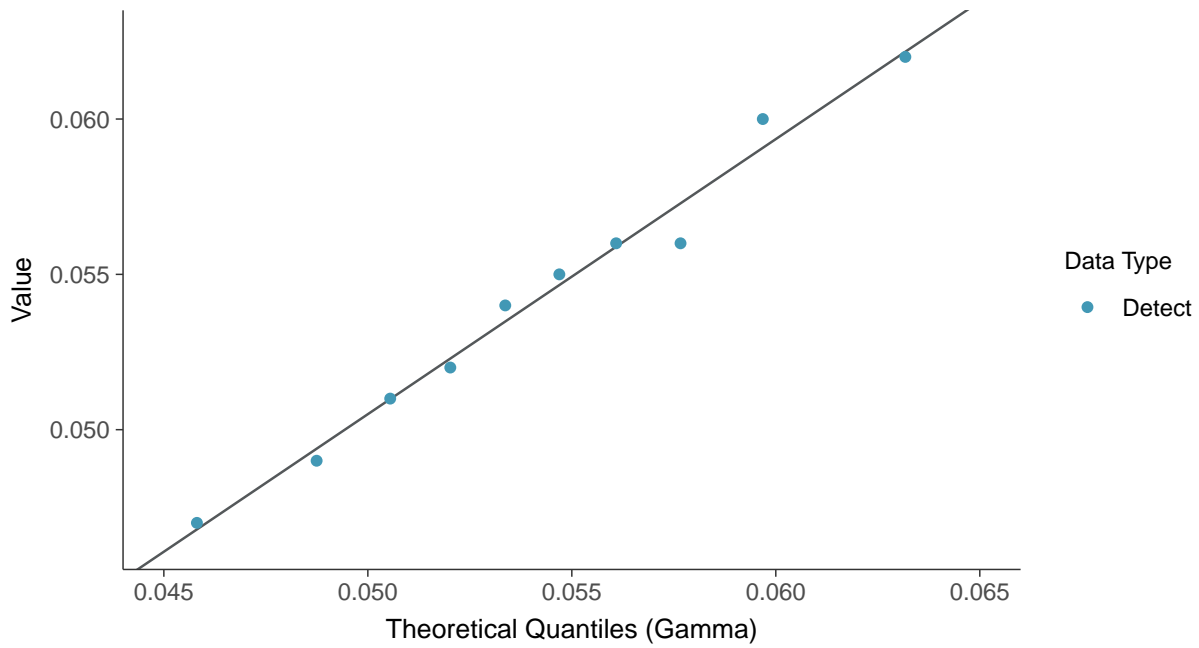
Barium, MW-7 (mg/L)





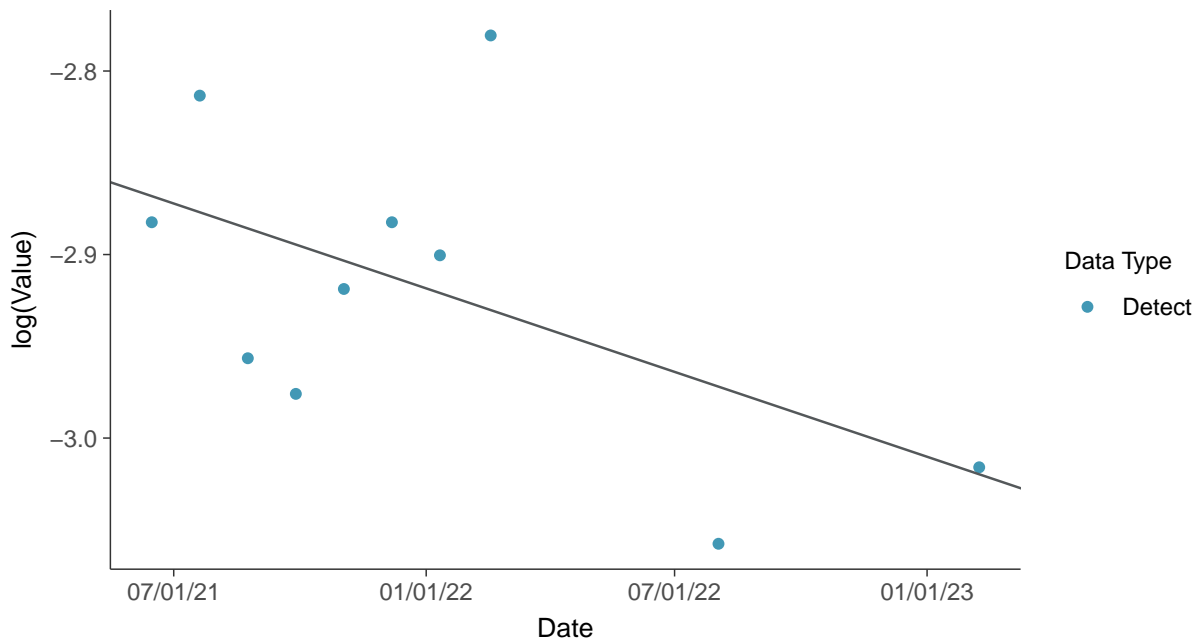
Gamma Q-Q plot

Barium, MW-7 (mg/L)



Trend Regression: Lognormal MLE

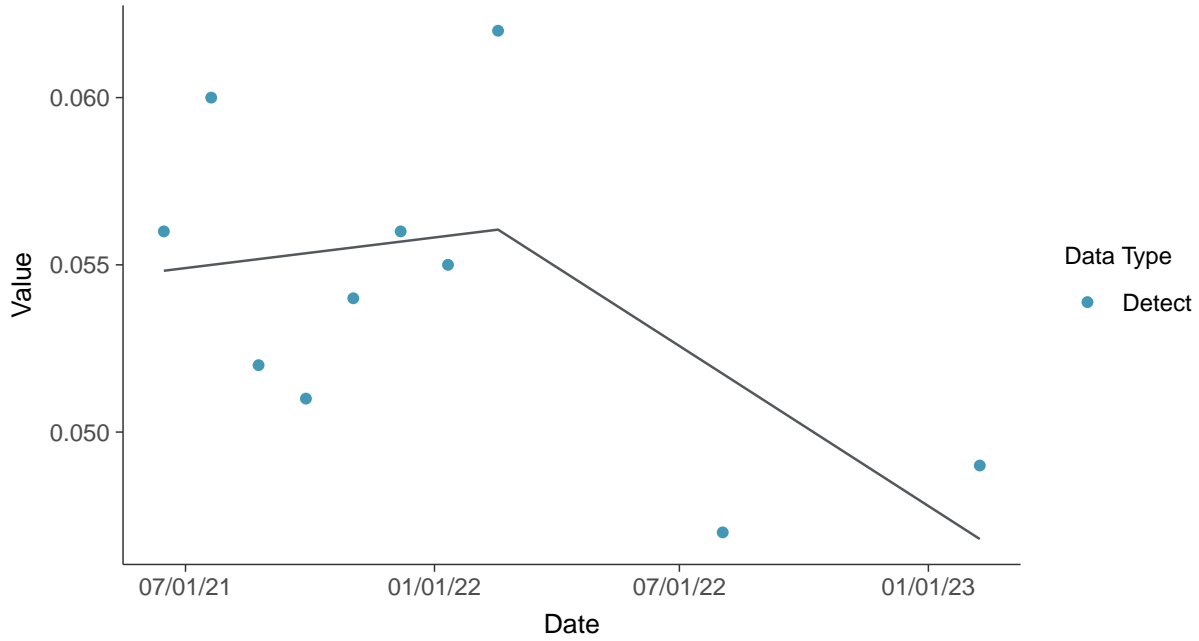
Barium, MW-7 (mg/L)





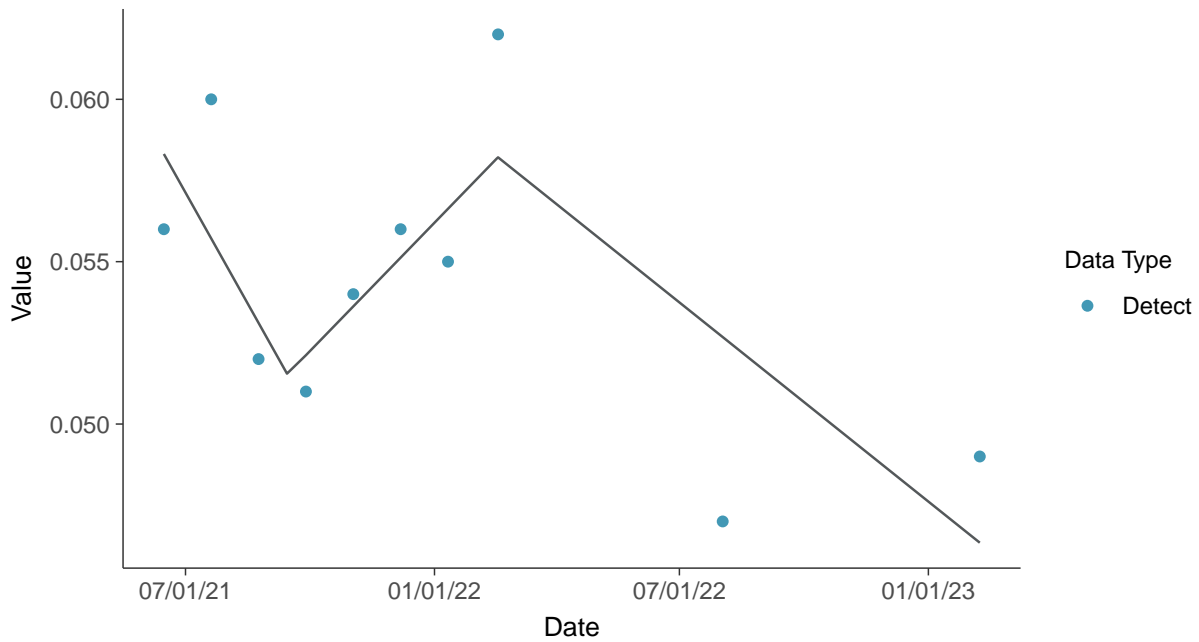
Trend Regression: Piecewise Linear-Linear

Barium, MW-7 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Barium, MW-7 (mg/L)



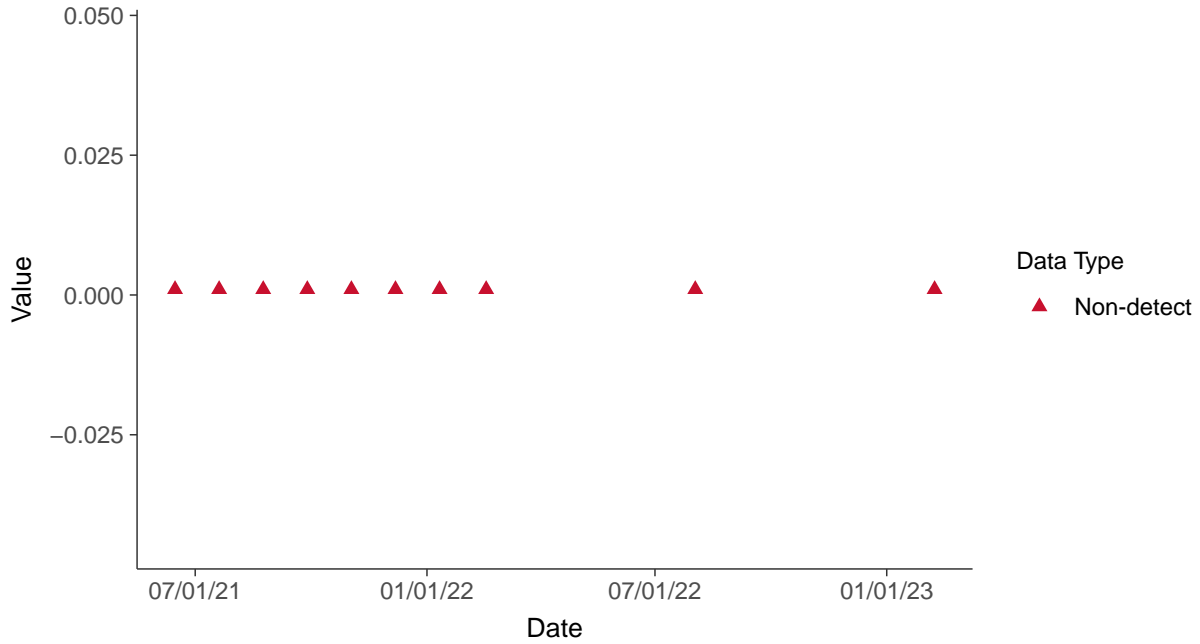


Appendix IV: Beryllium, MW-7

ID: 07_2_11

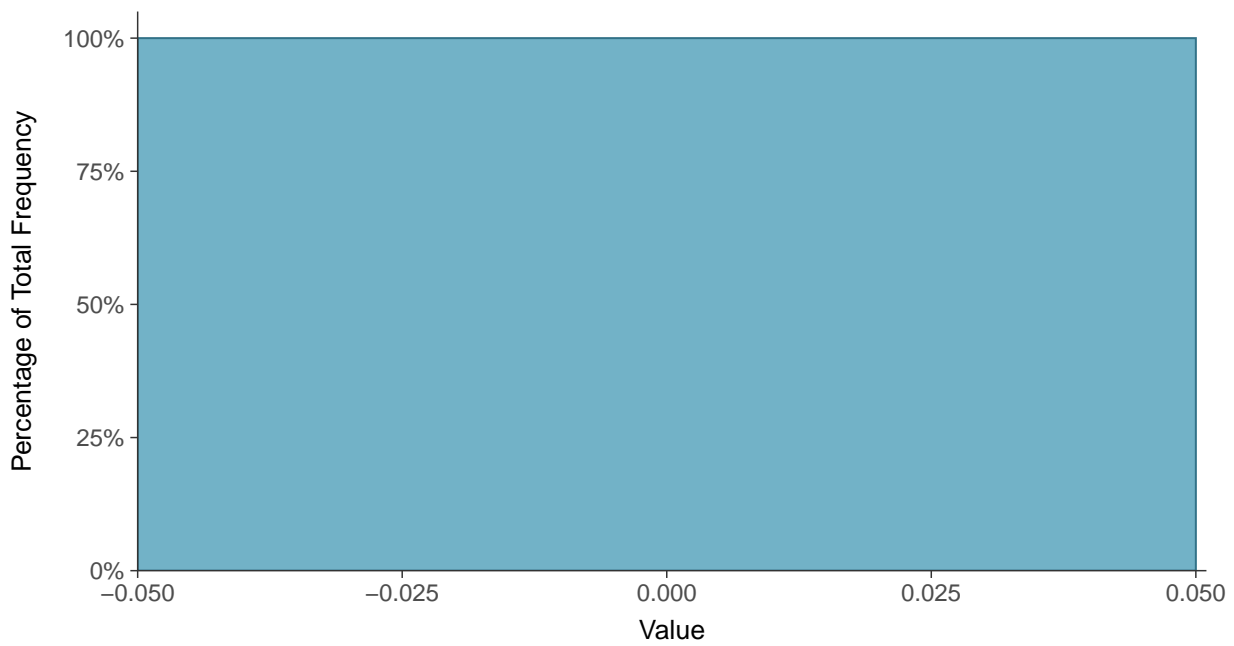
Scatter Plot

Beryllium, MW-7 (mg/L)



Histogram

Beryllium, MW-7 (mg/L)





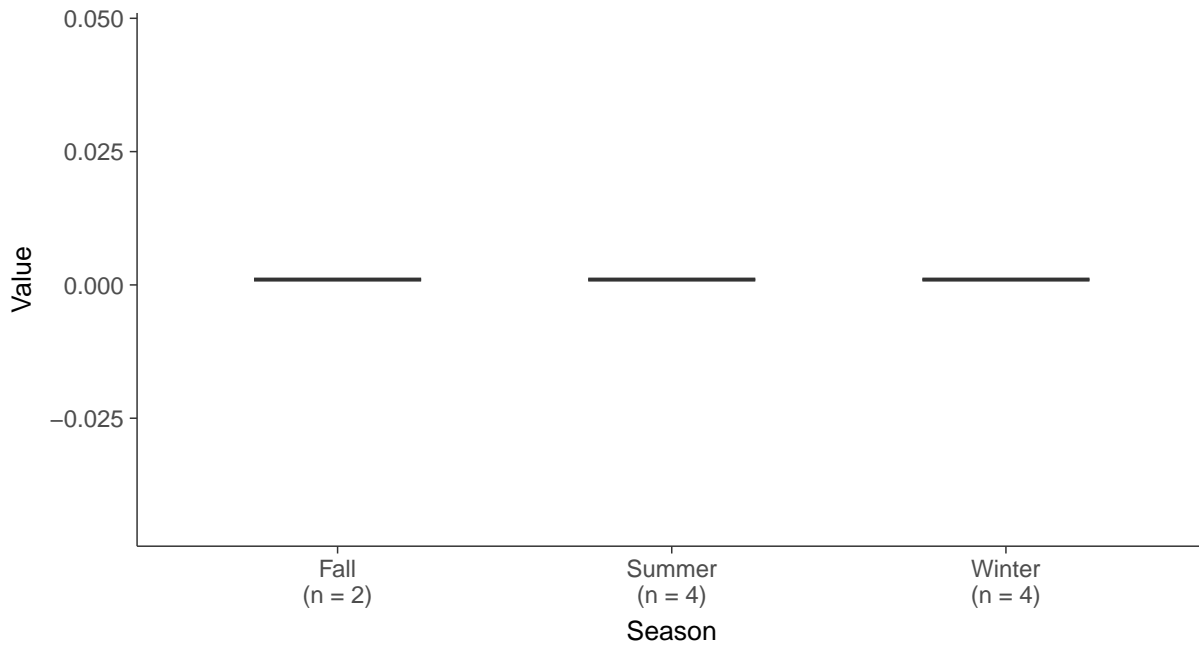
Boxplot

Beryllium, MW-7 (mg/L)



Boxplot by Season

Beryllium, MW-7 (mg/L)



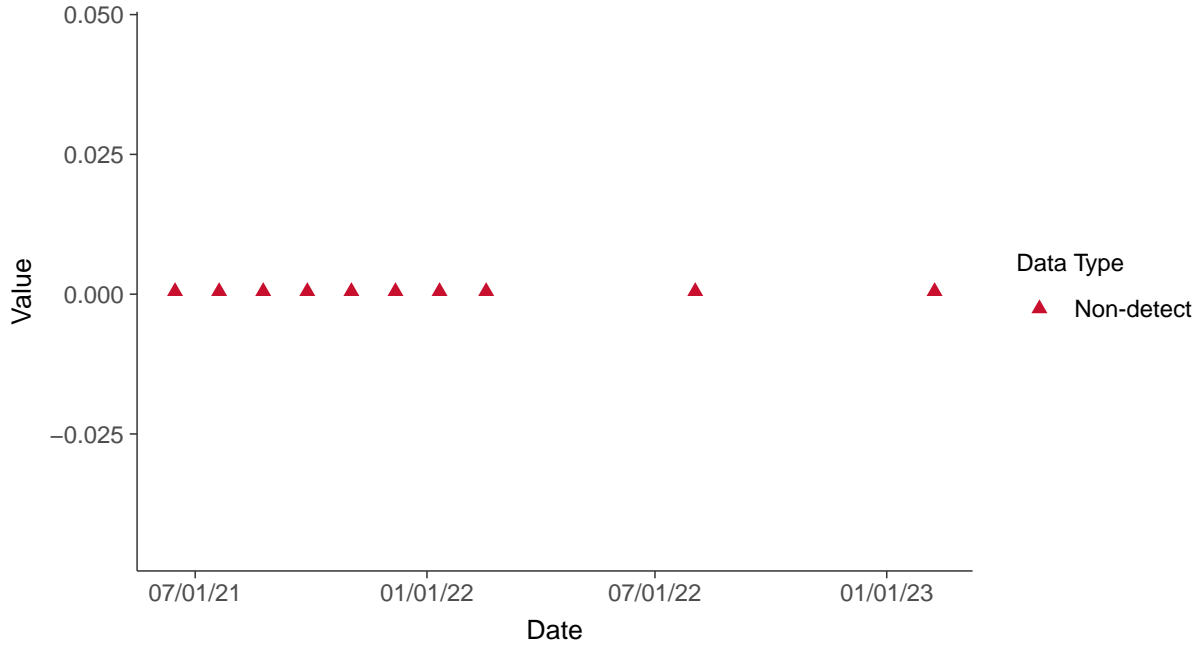


Appendix IV: Cadmium, MW-7

ID: 07_2_13

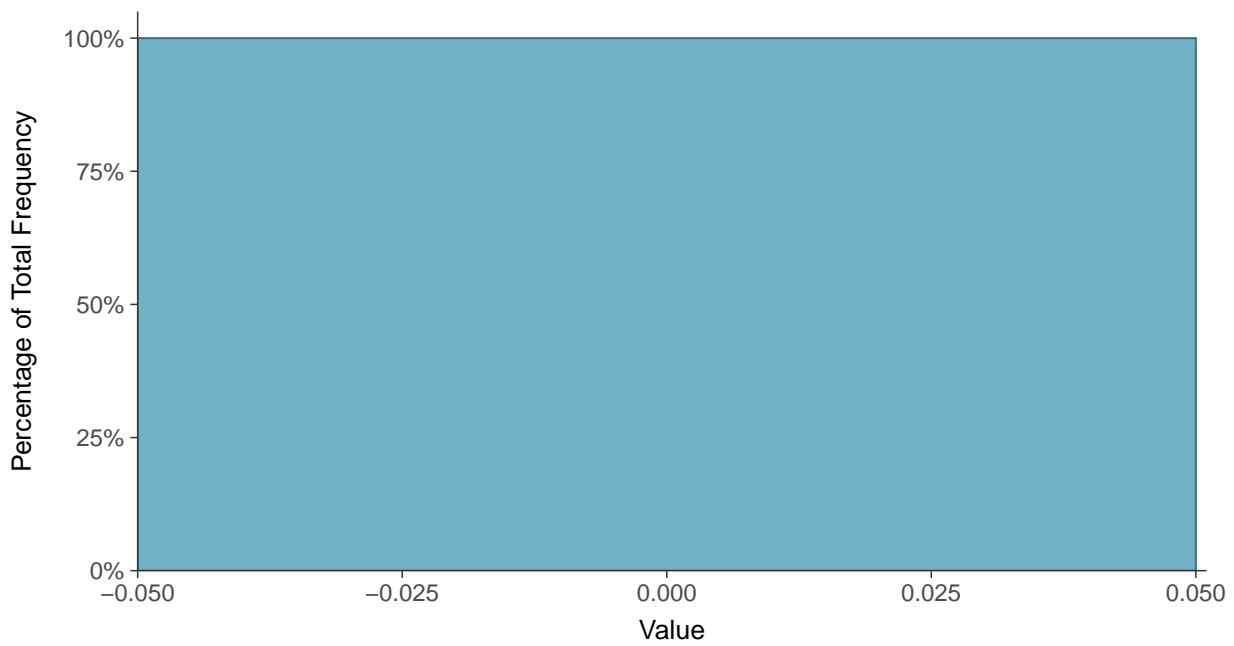
Scatter Plot

Cadmium, MW-7 (mg/L)



Histogram

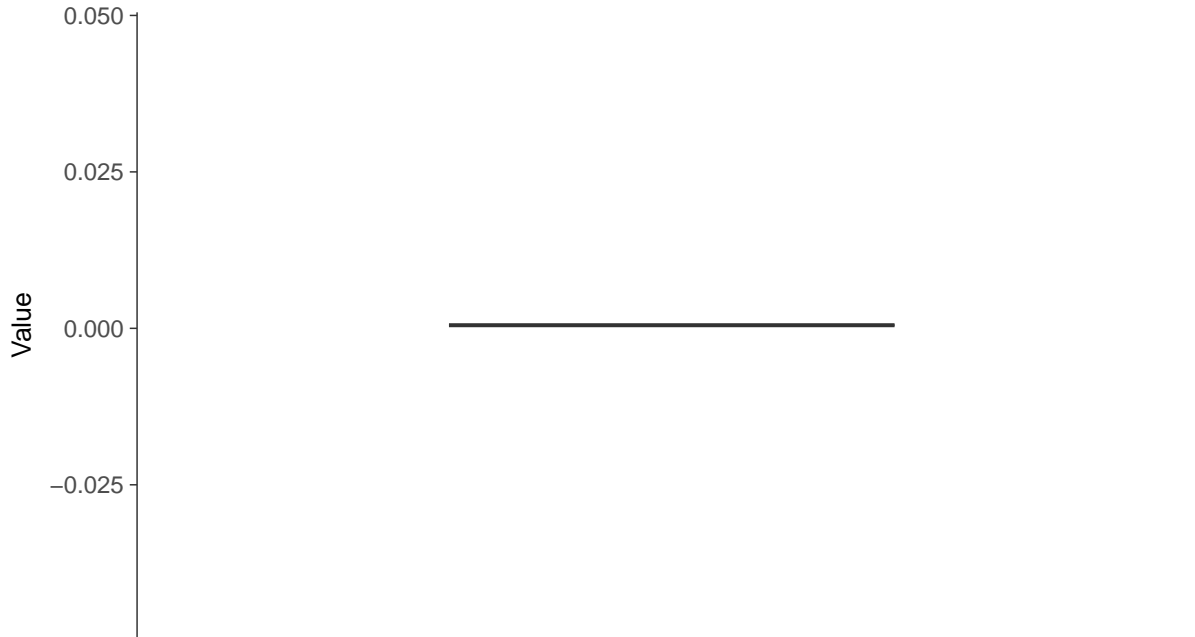
Cadmium, MW-7 (mg/L)





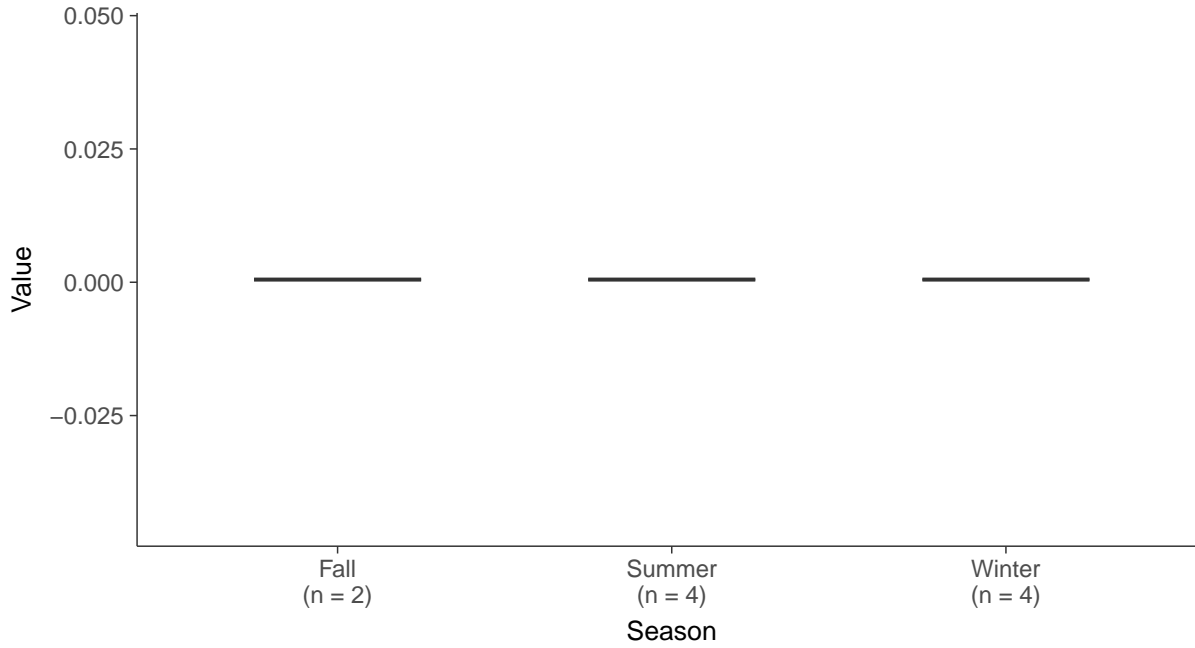
Boxplot

Cadmium, MW-7 (mg/L)



Boxplot by Season

Cadmium, MW-7 (mg/L)



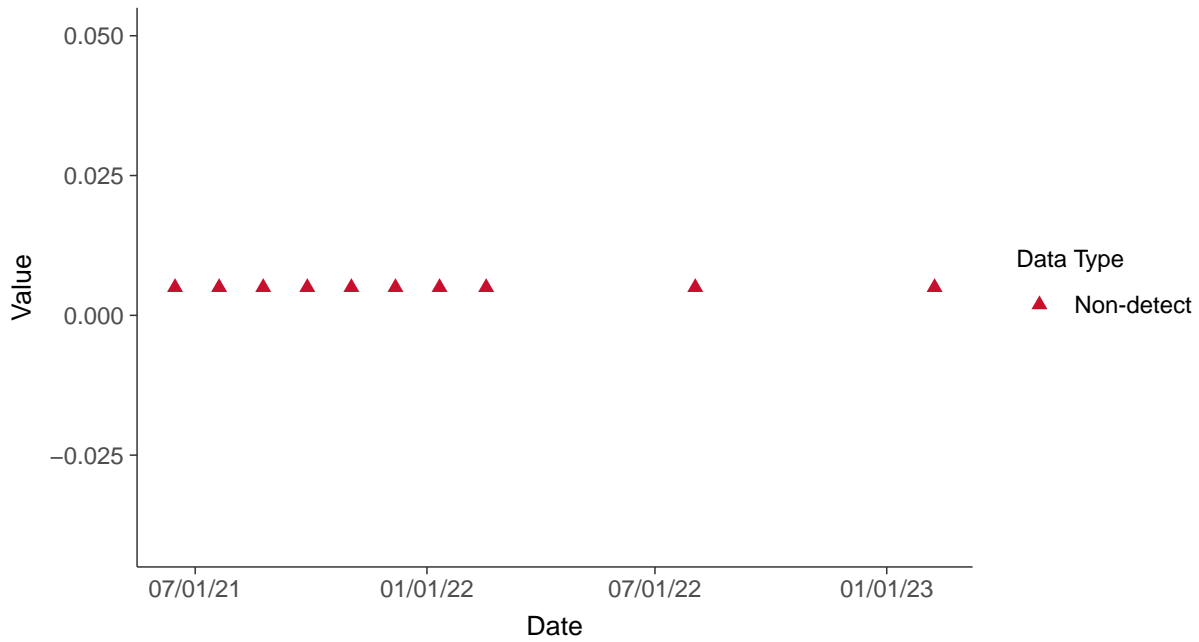


Appendix IV: Chromium, MW-7

ID: 07_2_15

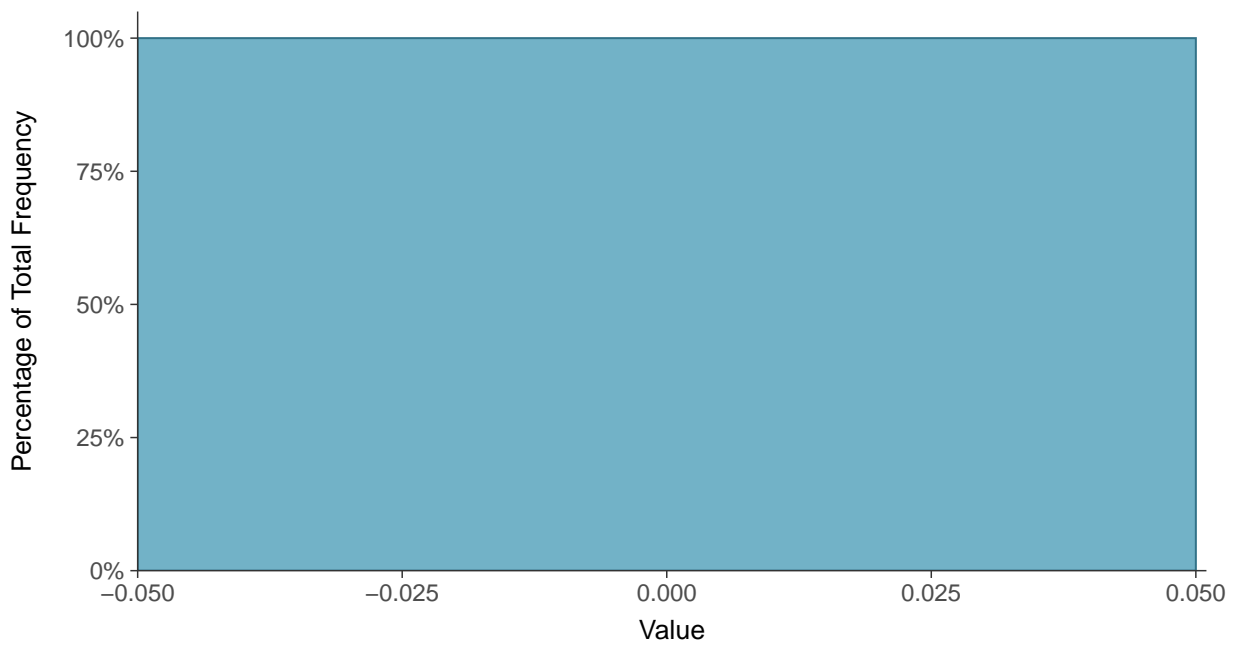
Scatter Plot

Chromium, MW-7 (mg/L)



Histogram

Chromium, MW-7 (mg/L)





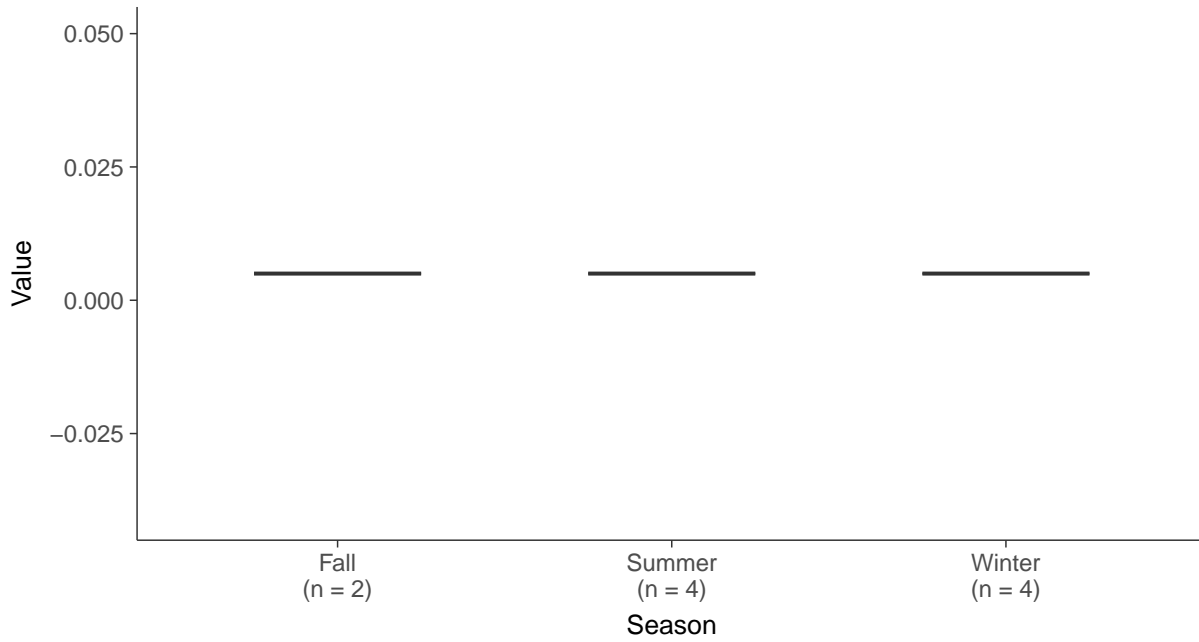
Boxplot

Chromium, MW-7 (mg/L)



Boxplot by Season

Chromium, MW-7 (mg/L)



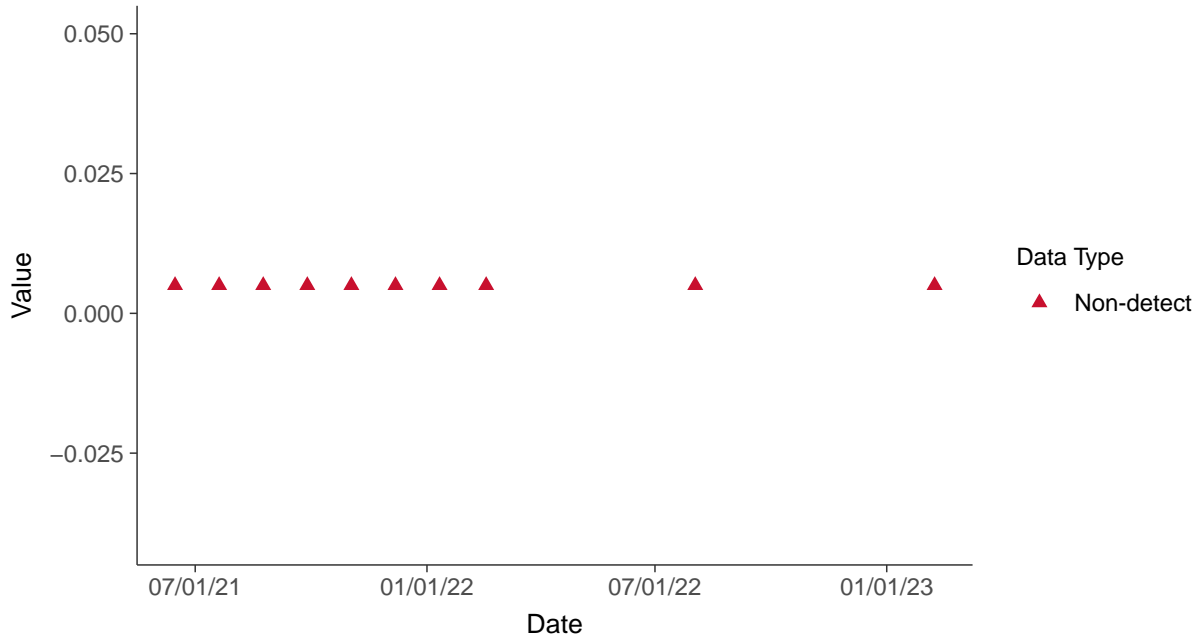


Appendix IV: Cobalt, MW-7

ID: 07_2_16

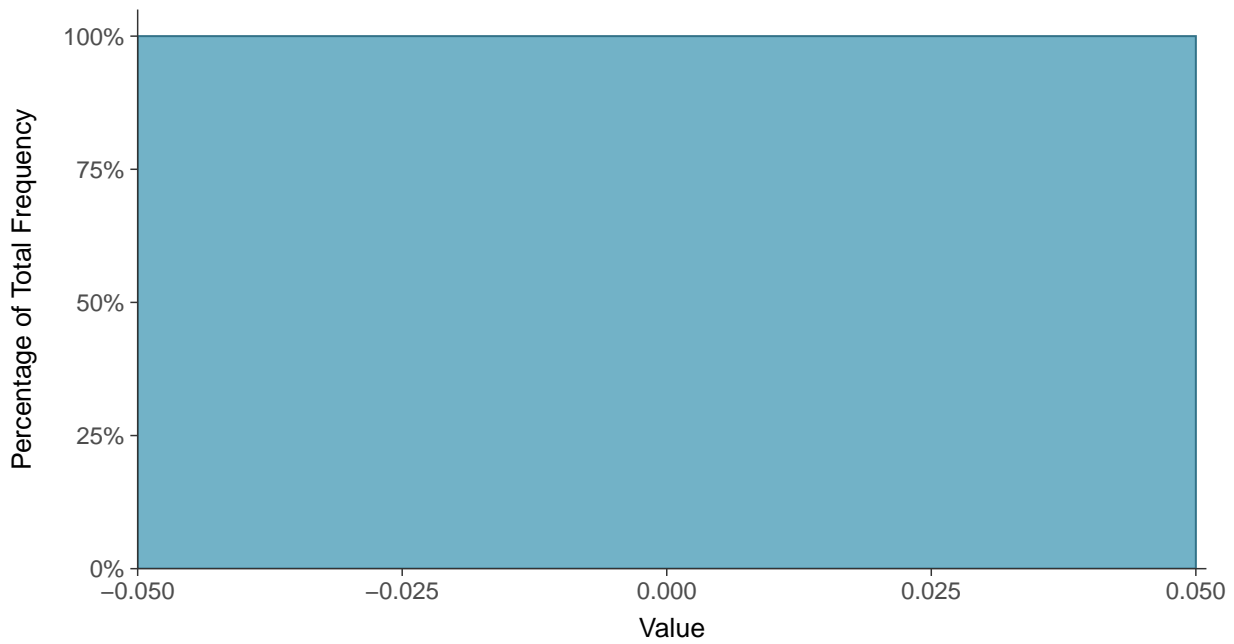
Scatter Plot

Cobalt, MW-7 (mg/L)



Histogram

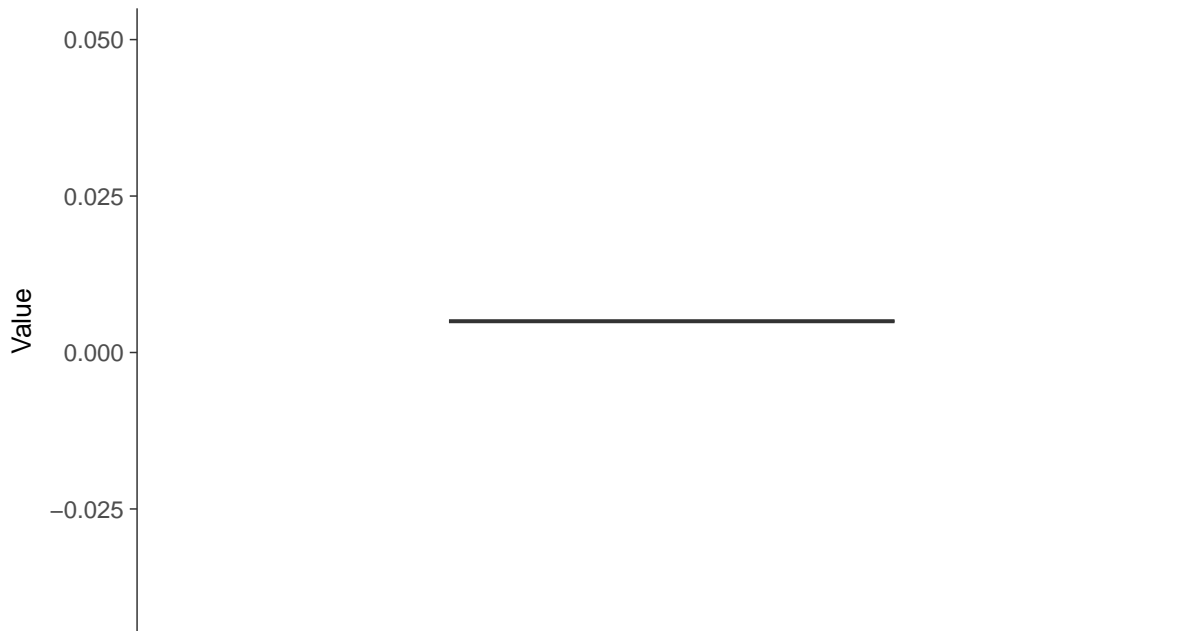
Cobalt, MW-7 (mg/L)





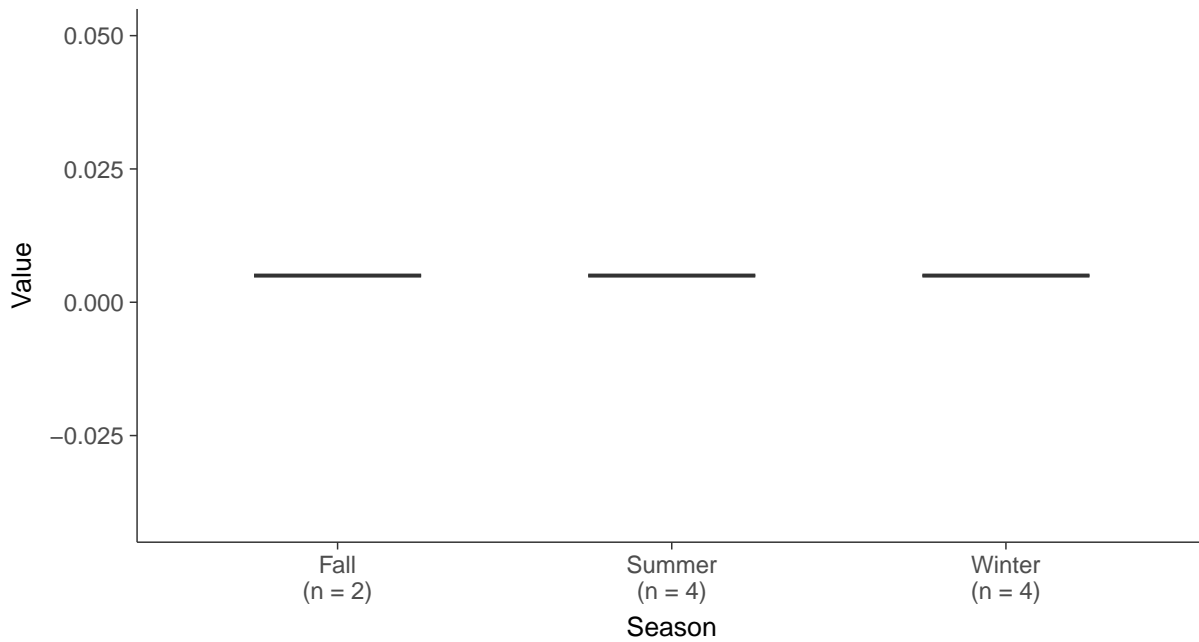
Boxplot

Cobalt, MW-7 (mg/L)



Boxplot by Season

Cobalt, MW-7 (mg/L)



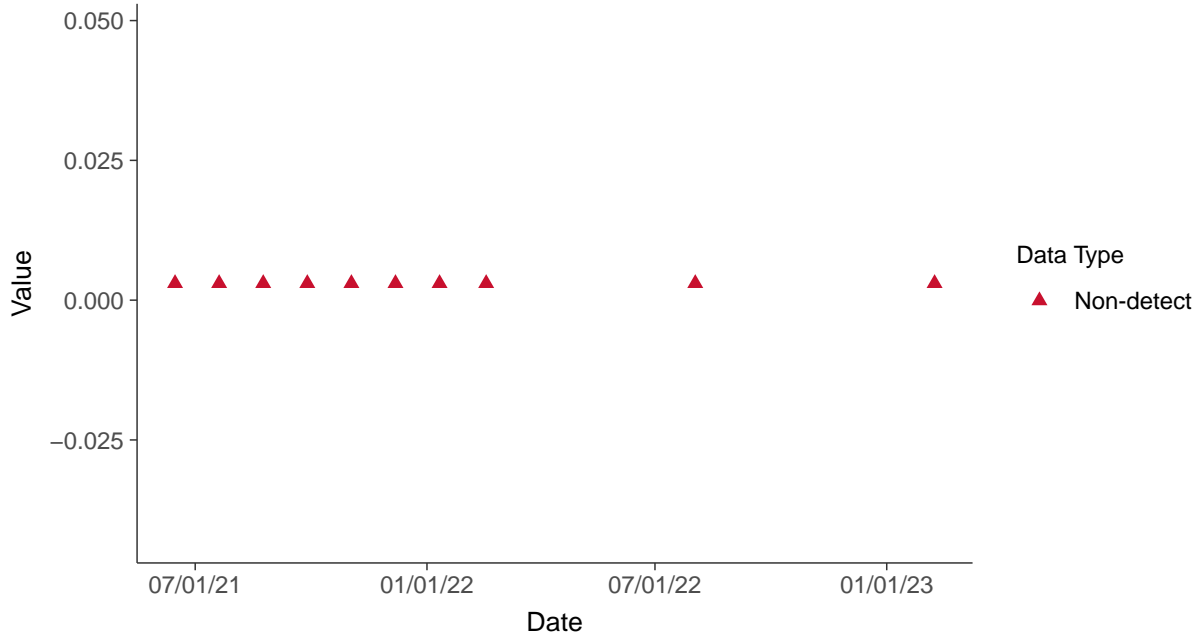


Appendix IV: Lead, MW-7

ID: 07_2_18

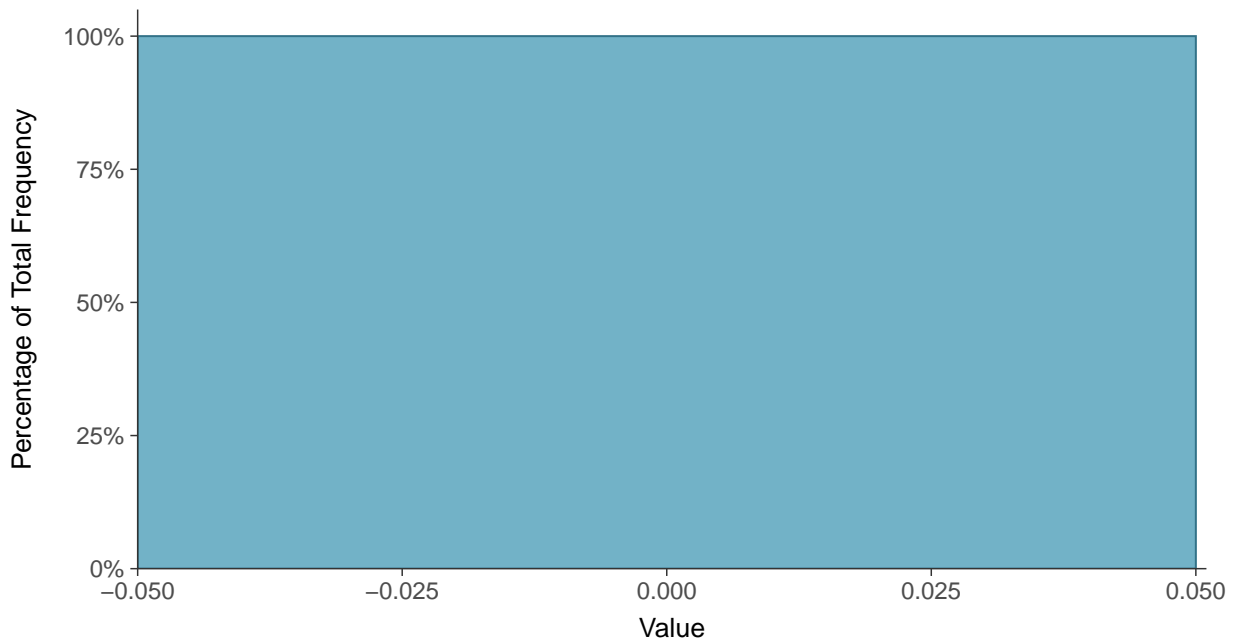
Scatter Plot

Lead, MW-7 (mg/L)



Histogram

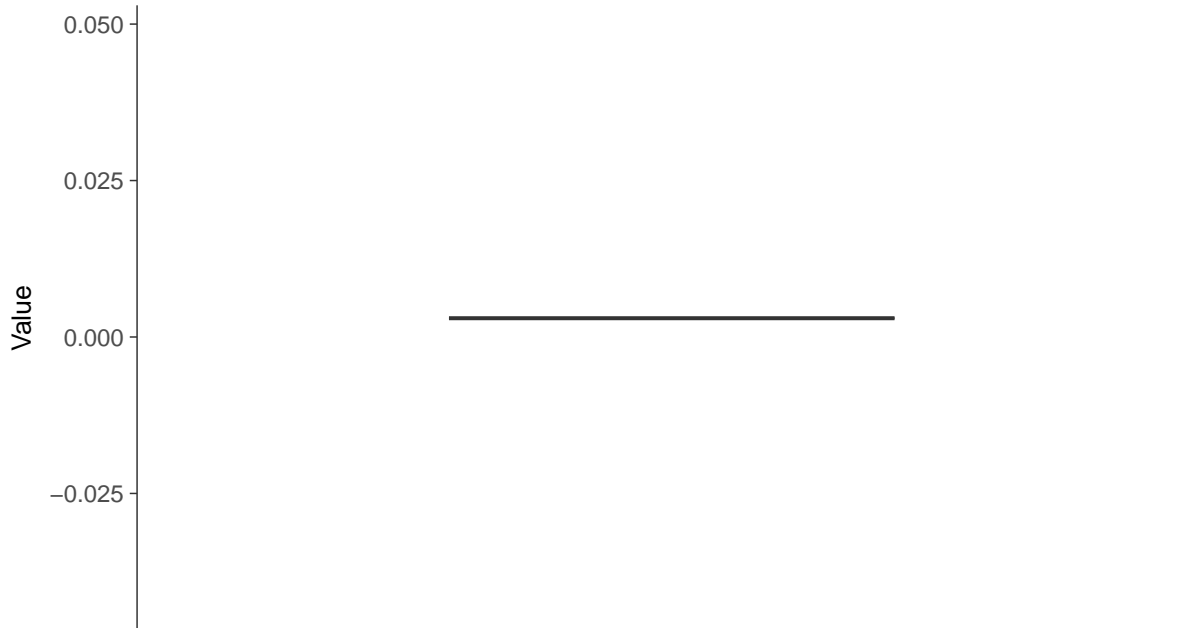
Lead, MW-7 (mg/L)





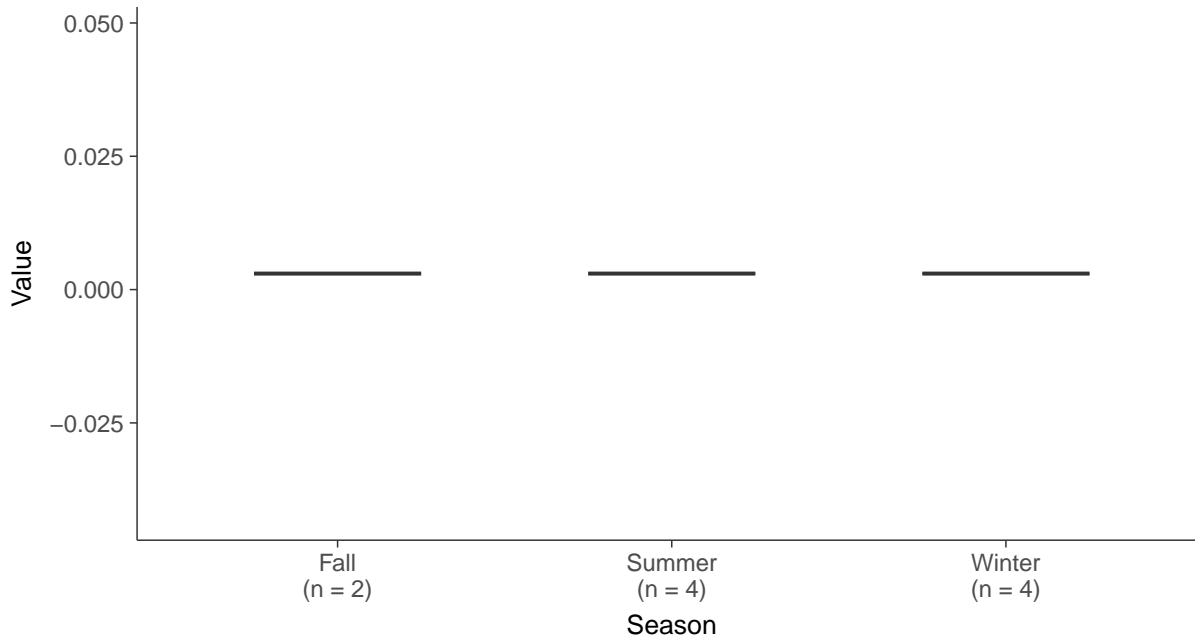
Boxplot

Lead, MW-7 (mg/L)



Boxplot by Season

Lead, MW-7 (mg/L)



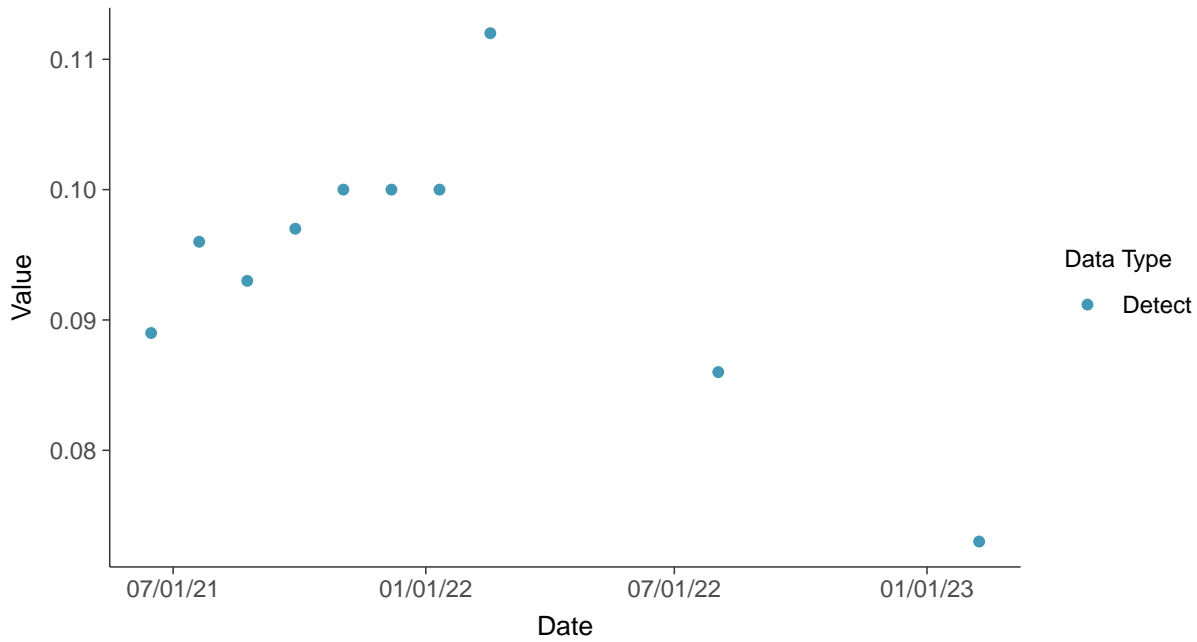


Appendix IV: Lithium, MW-7

ID: 07_2_19

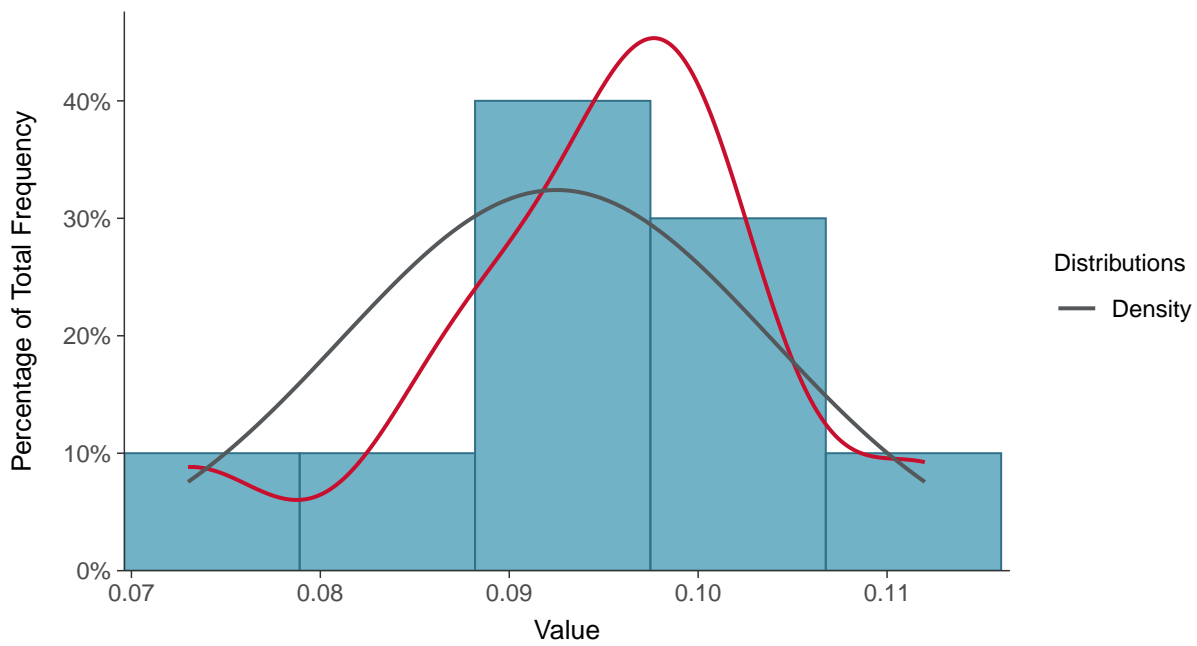
Scatter Plot

Lithium, MW-7 (mg/L)



Histogram

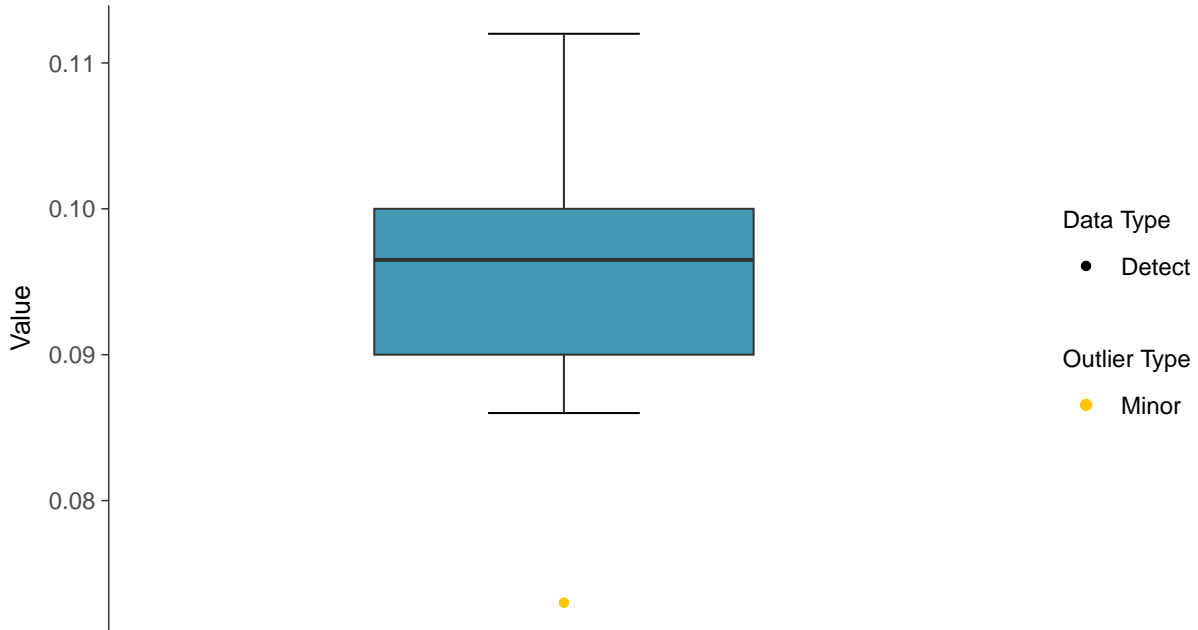
Lithium, MW-7 (mg/L)





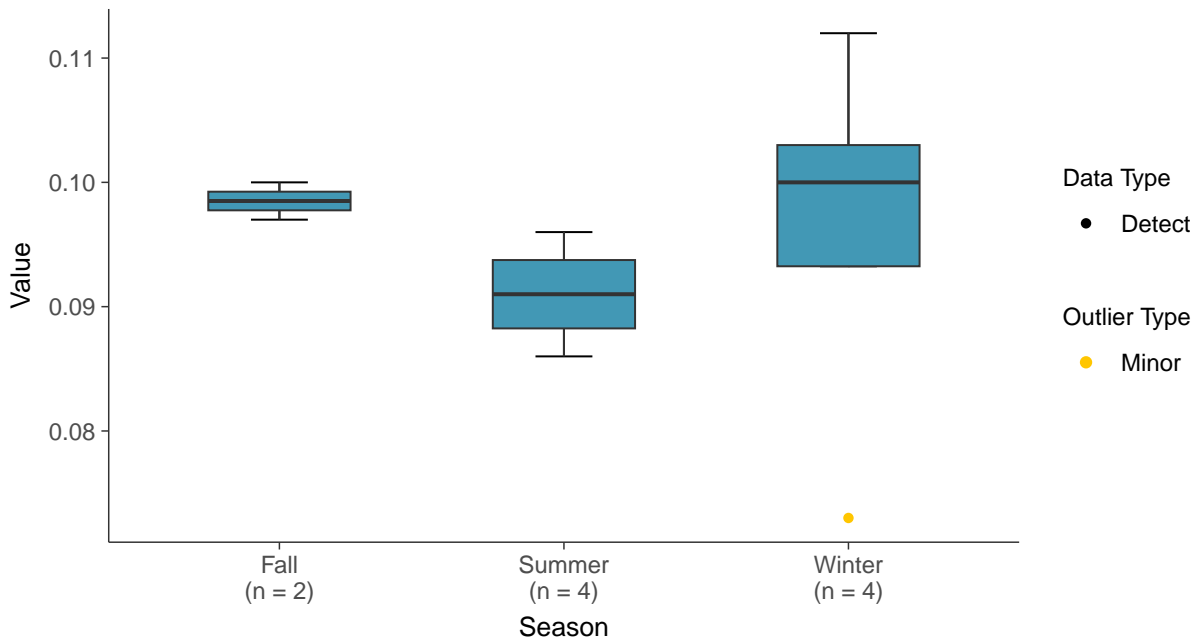
Boxplot

Lithium, MW-7 (mg/L)



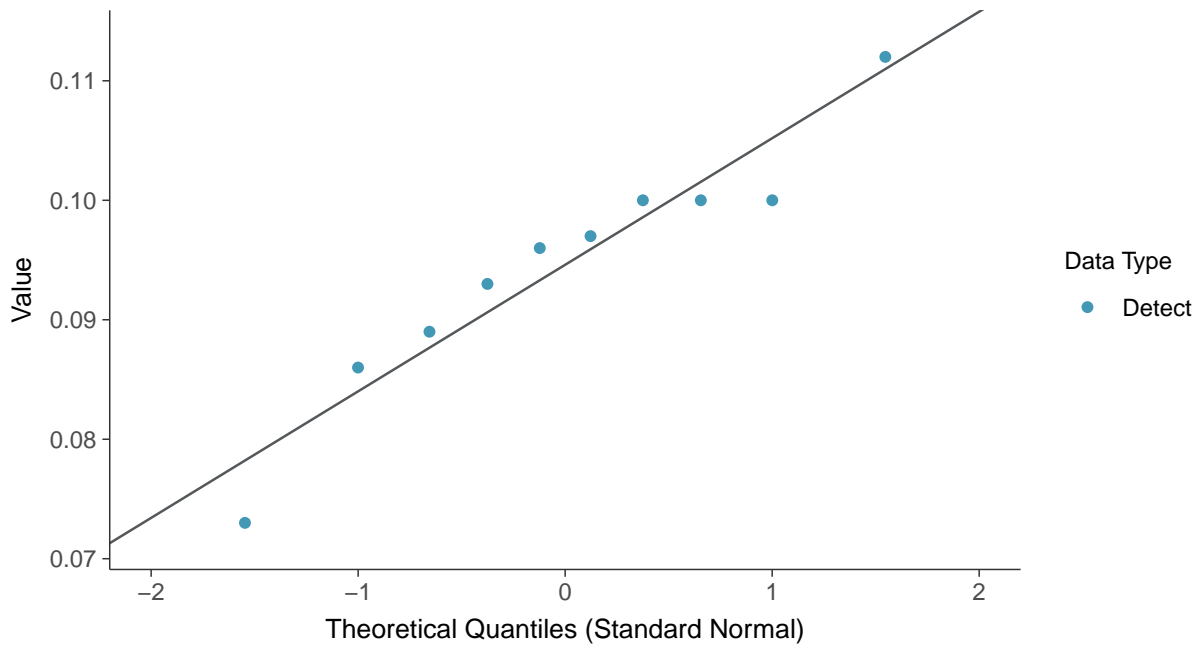
Boxplot by Season

Lithium, MW-7 (mg/L)

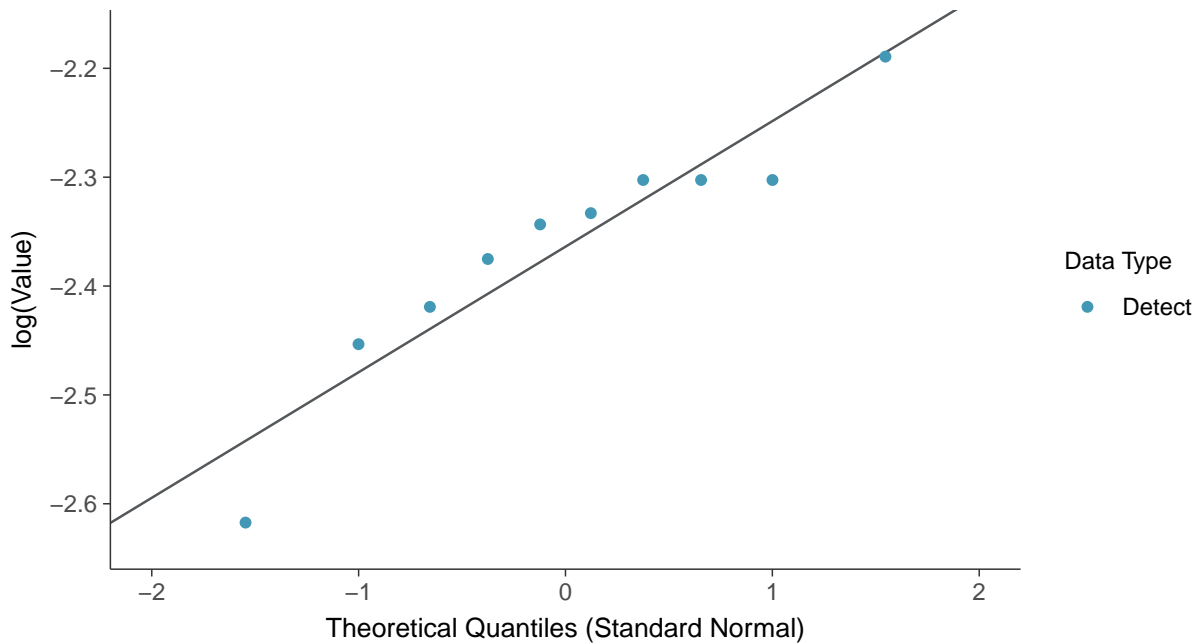




Normal Q-Q plot
Lithium, MW-7 (mg/L)



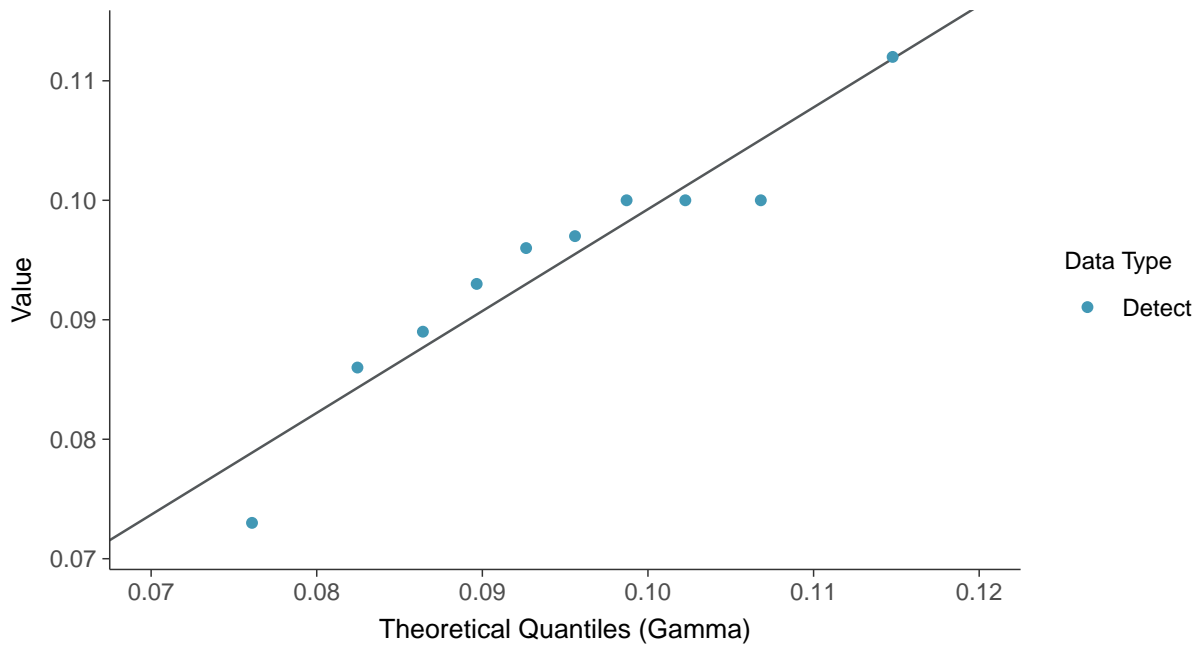
Lognormal Q-Q plot
Lithium, MW-7 (mg/L)





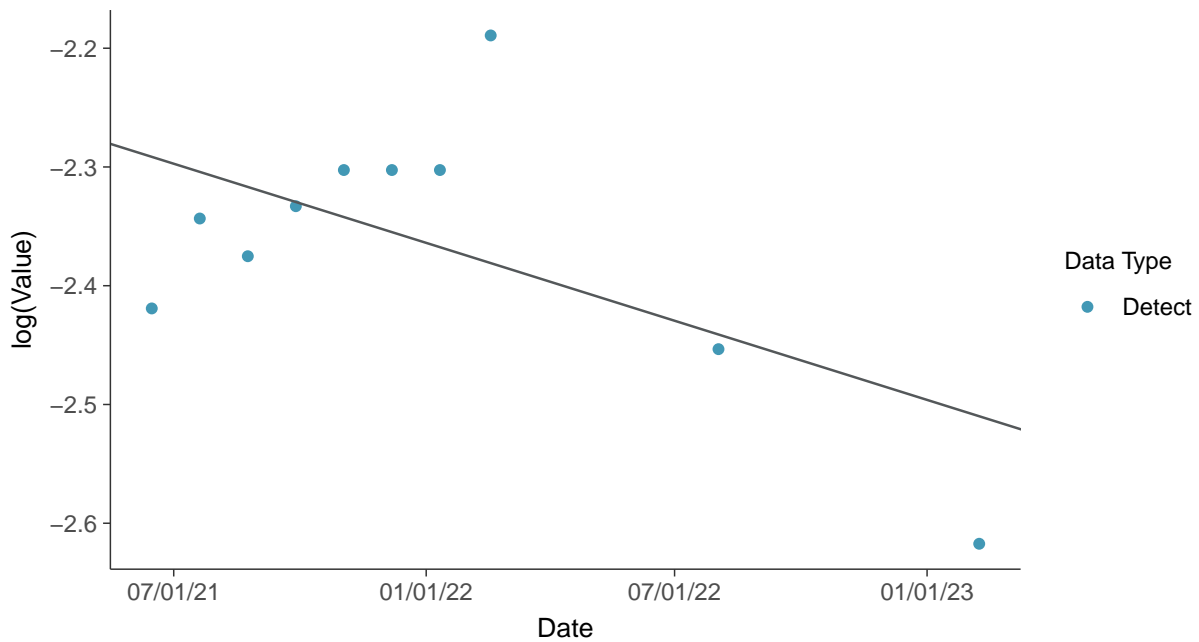
Gamma Q-Q plot

Lithium, MW-7 (mg/L)



Trend Regression: Lognormal MLE

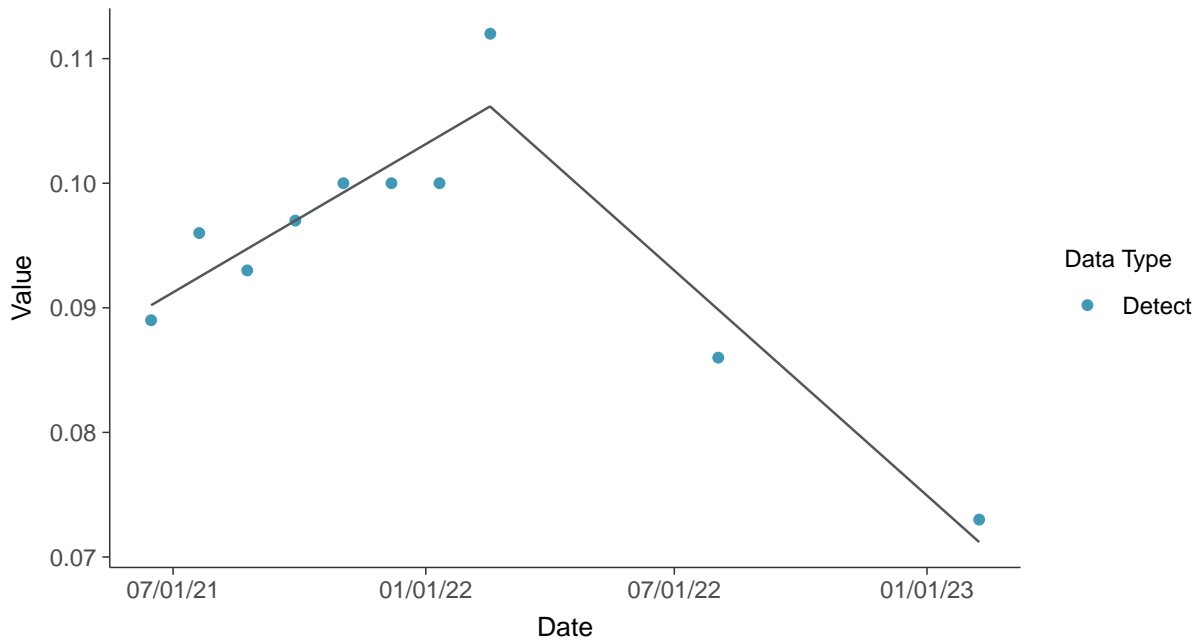
Lithium, MW-7 (mg/L)





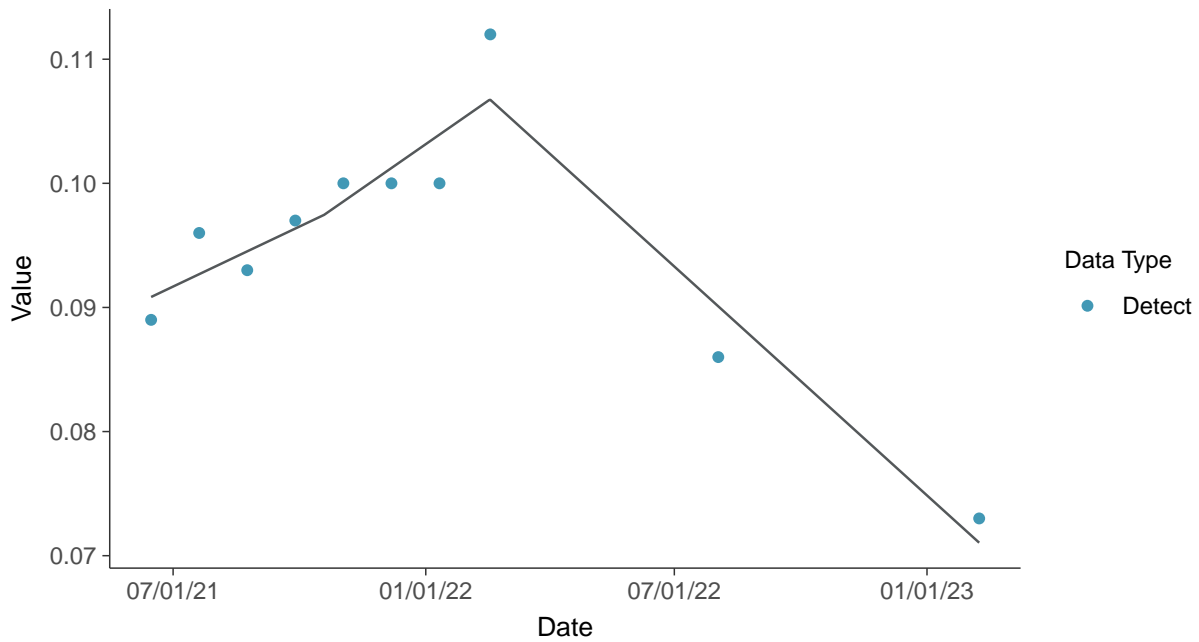
Trend Regression: Piecewise Linear-Linear

Lithium, MW-7 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

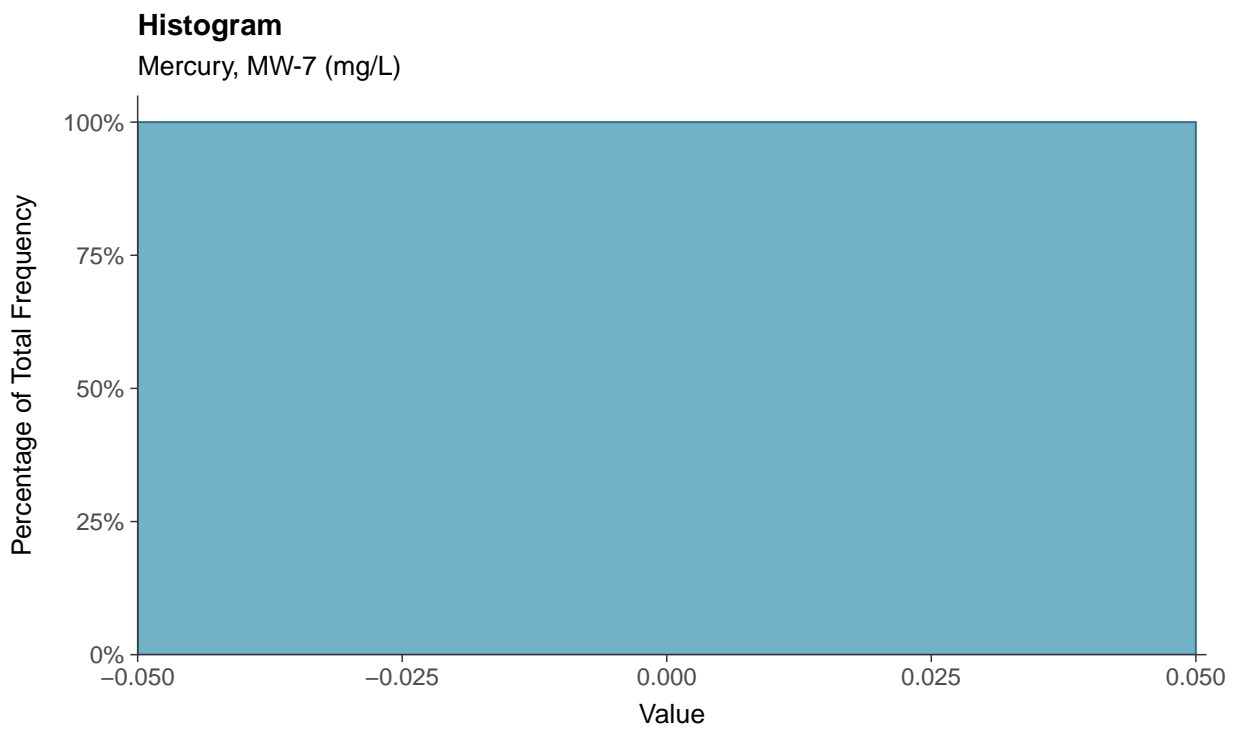
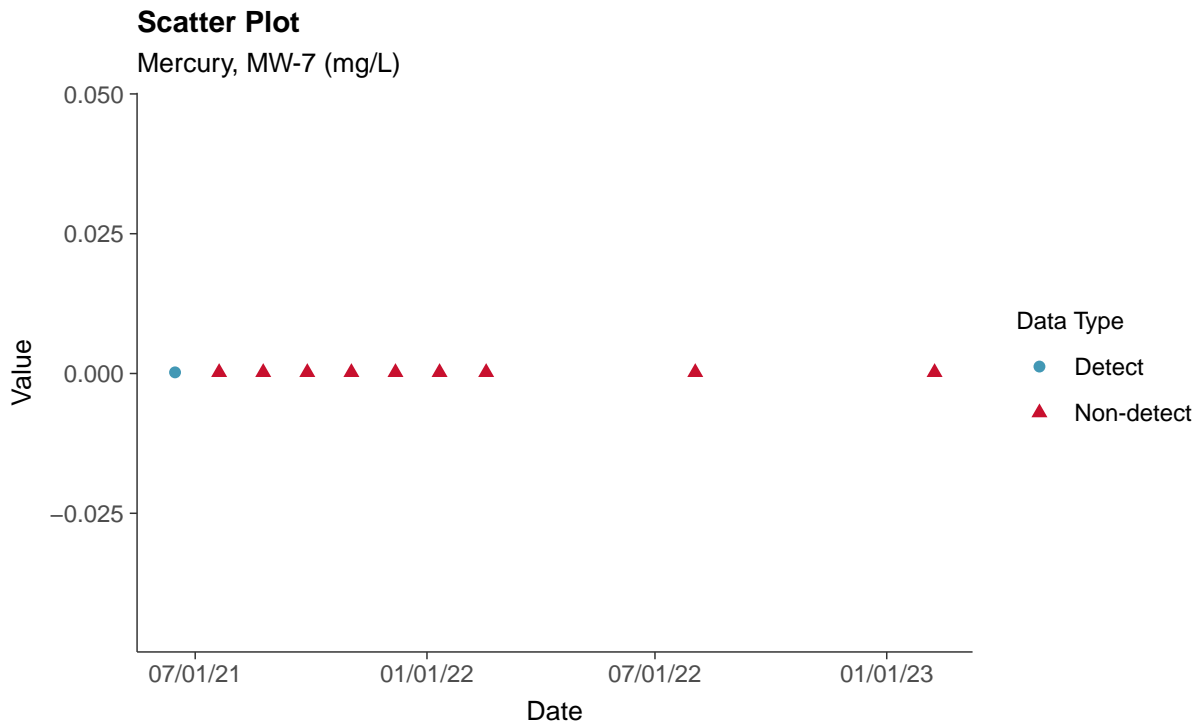
Lithium, MW-7 (mg/L)





Appendix IV: Mercury, MW-7

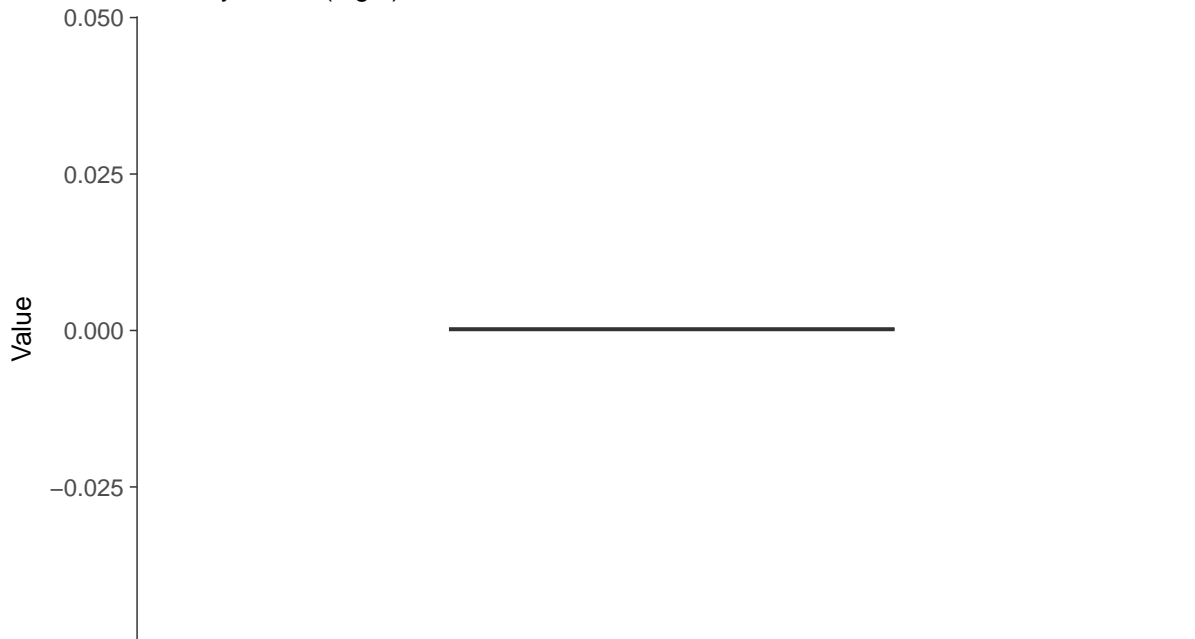
ID: 07_2_21





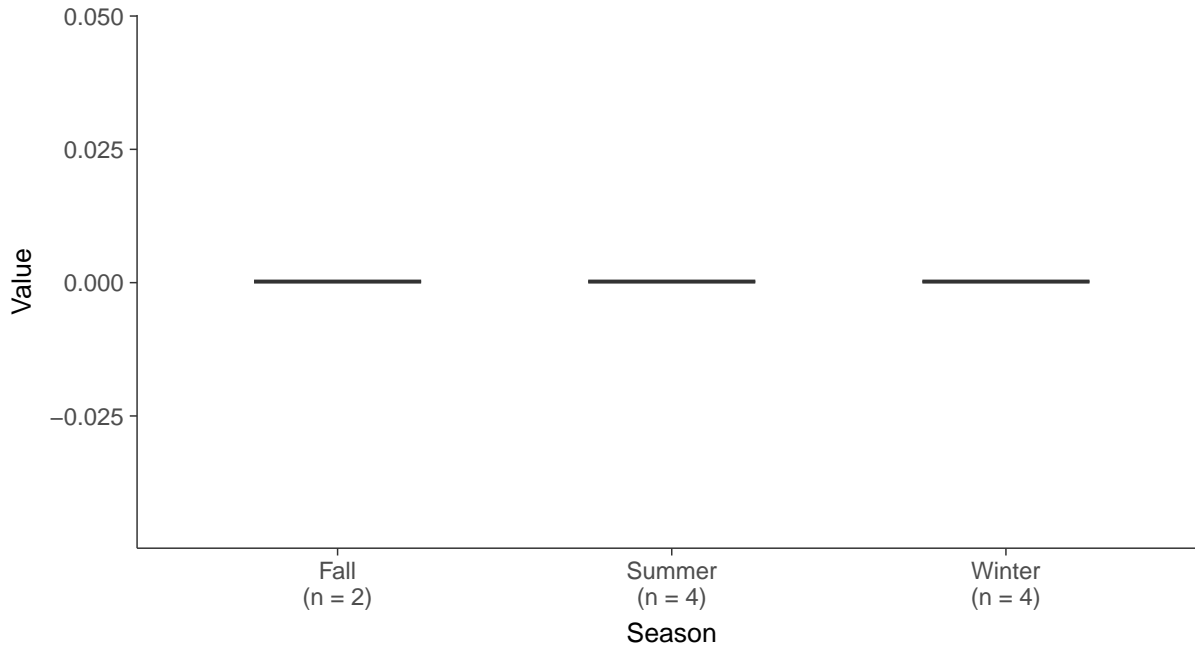
Boxplot

Mercury, MW-7 (mg/L)



Boxplot by Season

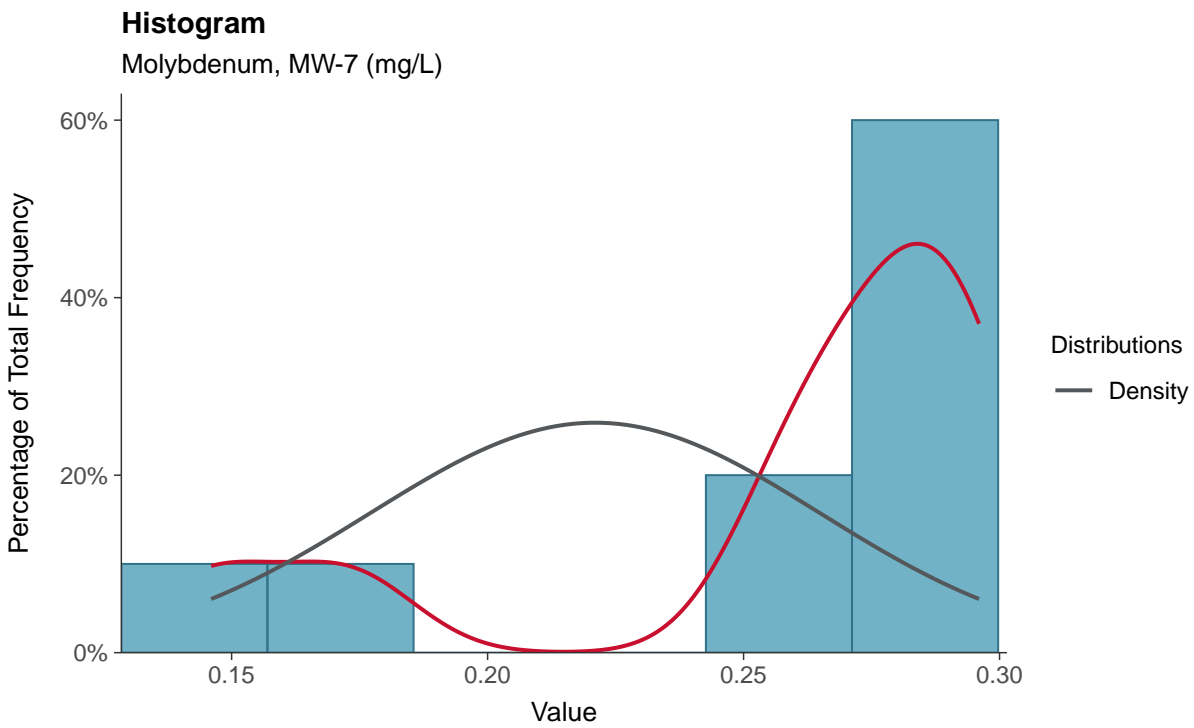
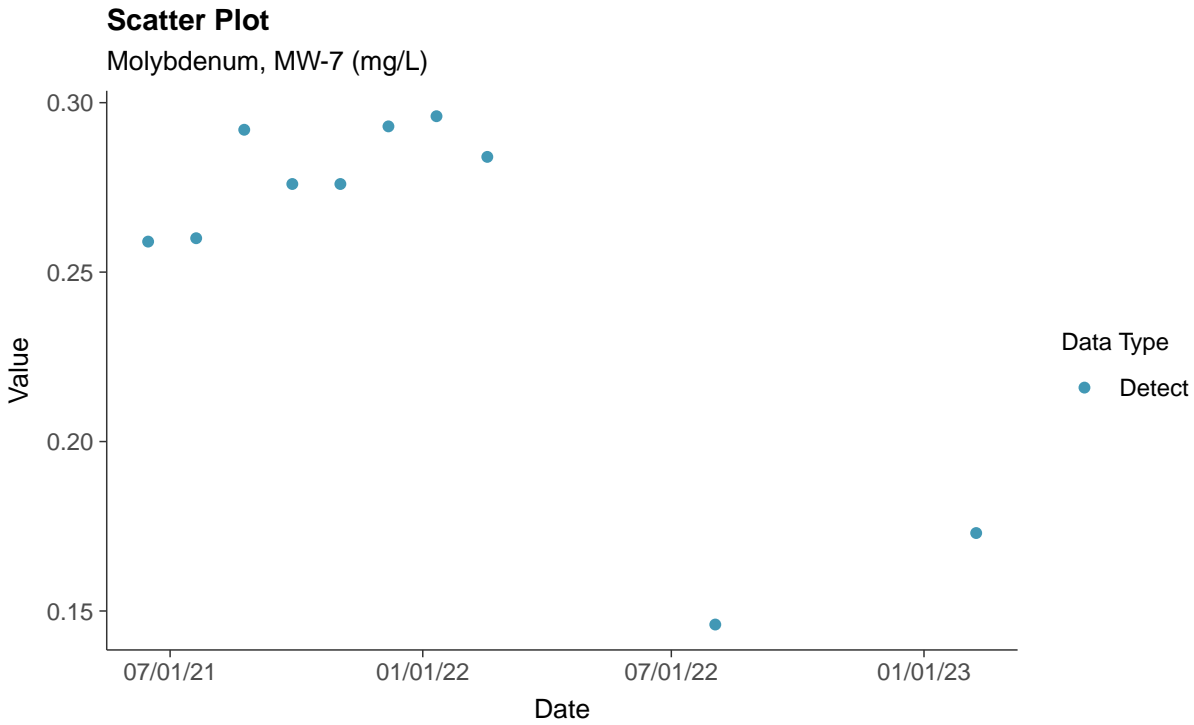
Mercury, MW-7 (mg/L)





Appendix IV: Molybdenum, MW-7

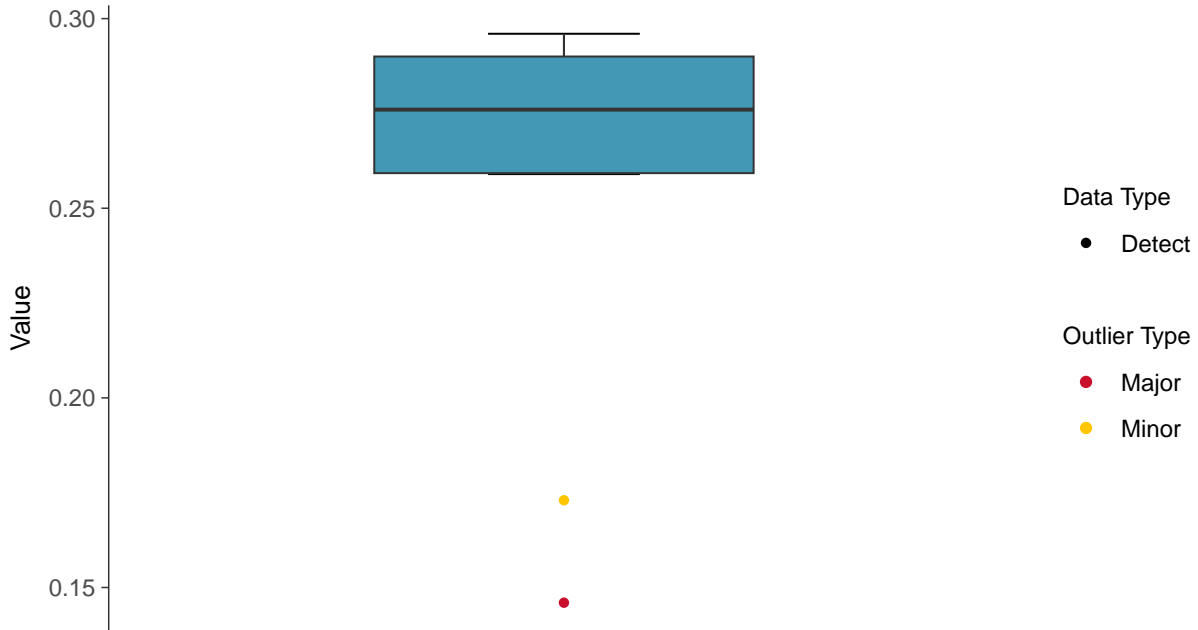
ID: 07_2_22





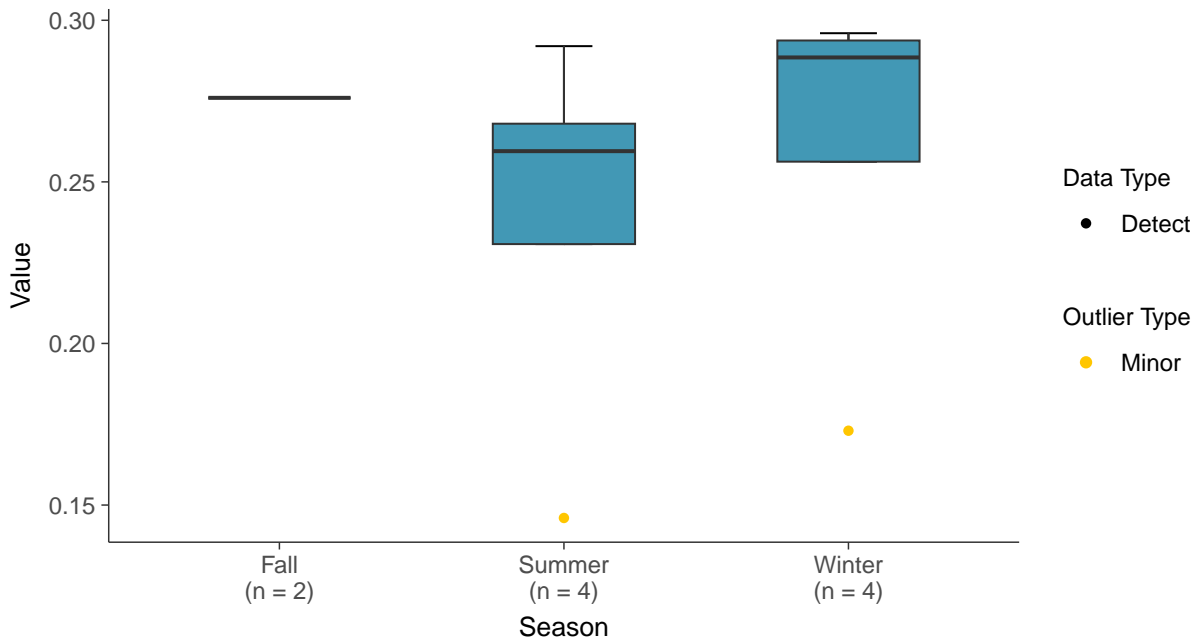
Boxplot

Molybdenum, MW-7 (mg/L)



Boxplot by Season

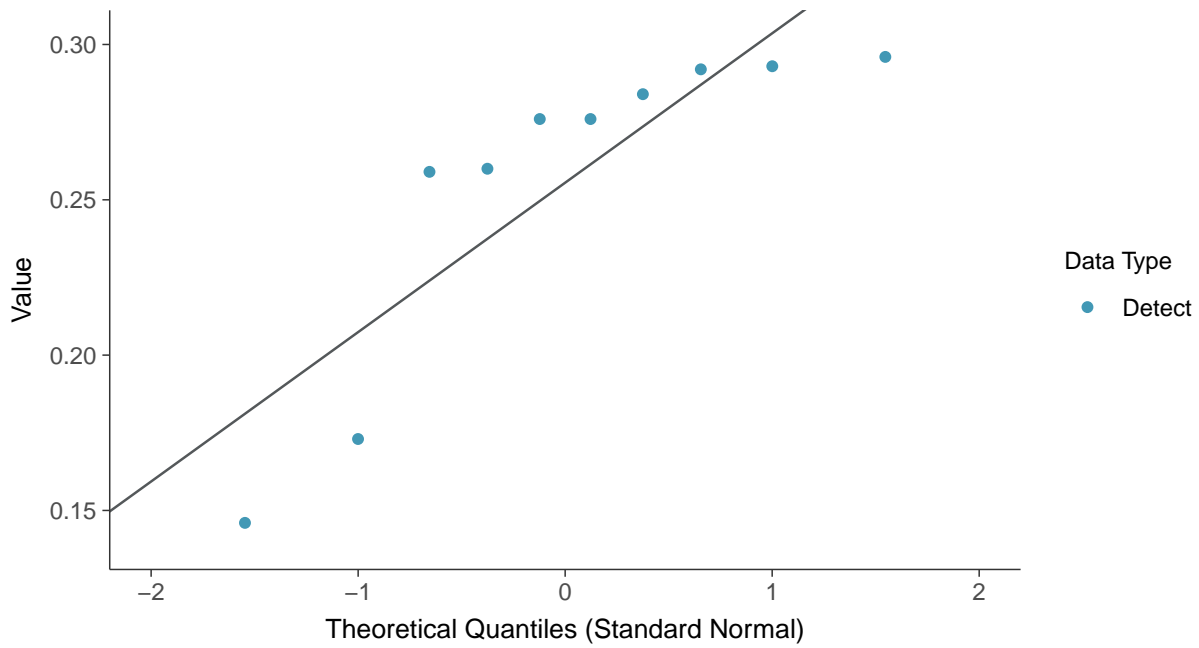
Molybdenum, MW-7 (mg/L)





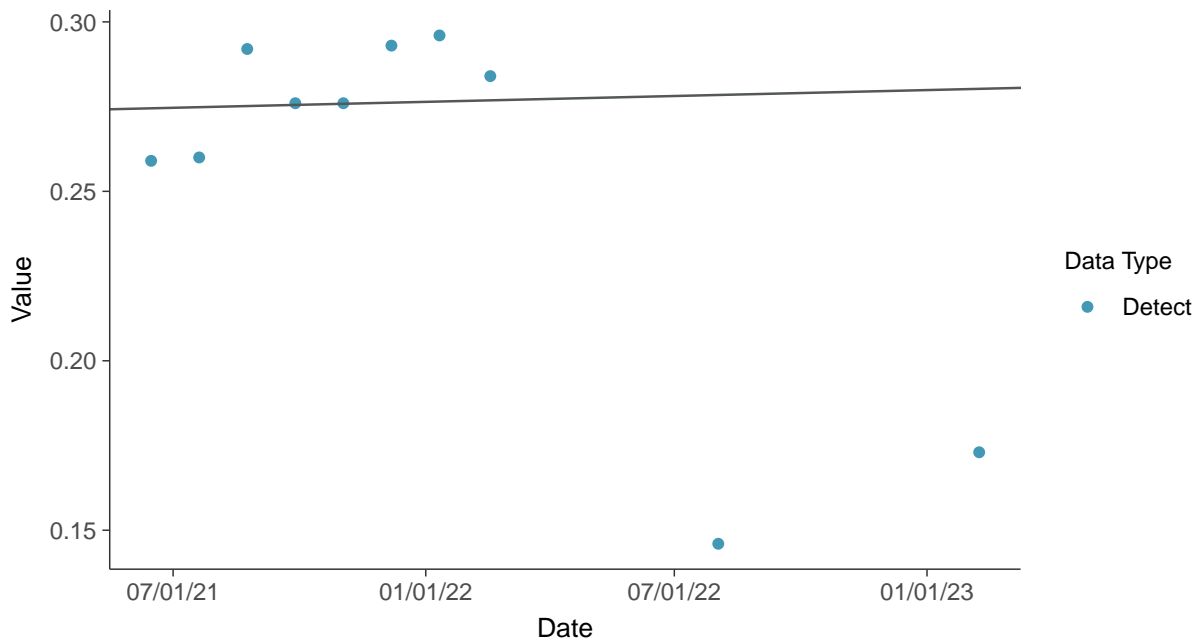
Normal Q-Q plot

Molybdenum, MW-7 (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

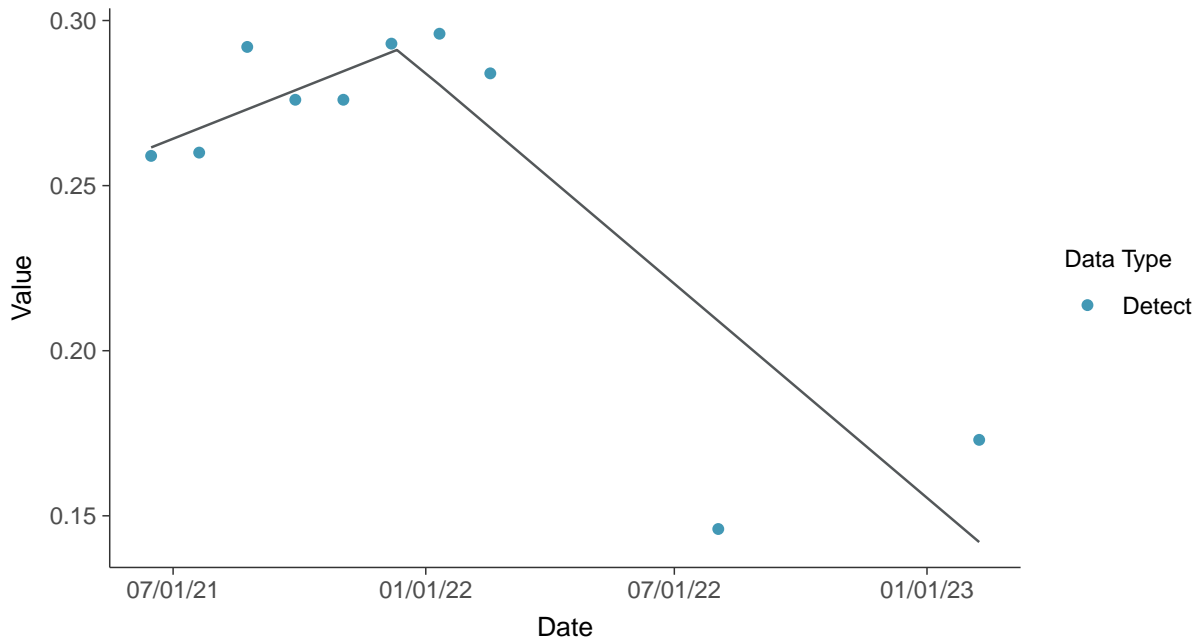
Molybdenum, MW-7 (mg/L)





Trend Regression: Piecewise Linear-Linear

Molybdenum, MW-7 (mg/L)



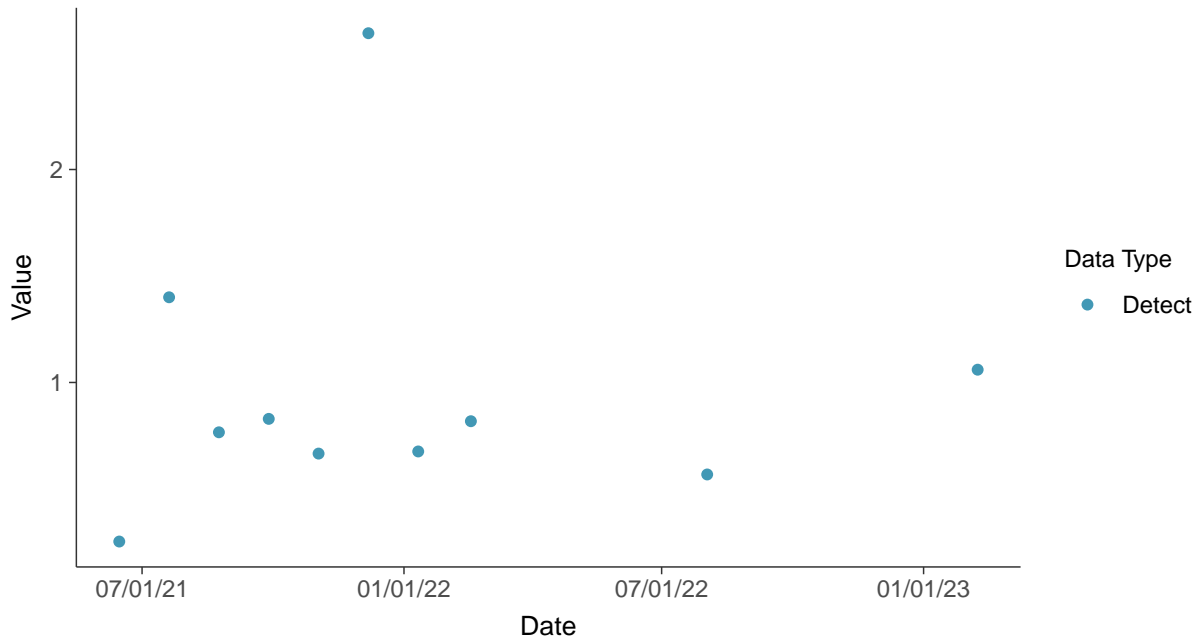


Appendix IV: Radium-226, MW-7

ID: 07_2_24

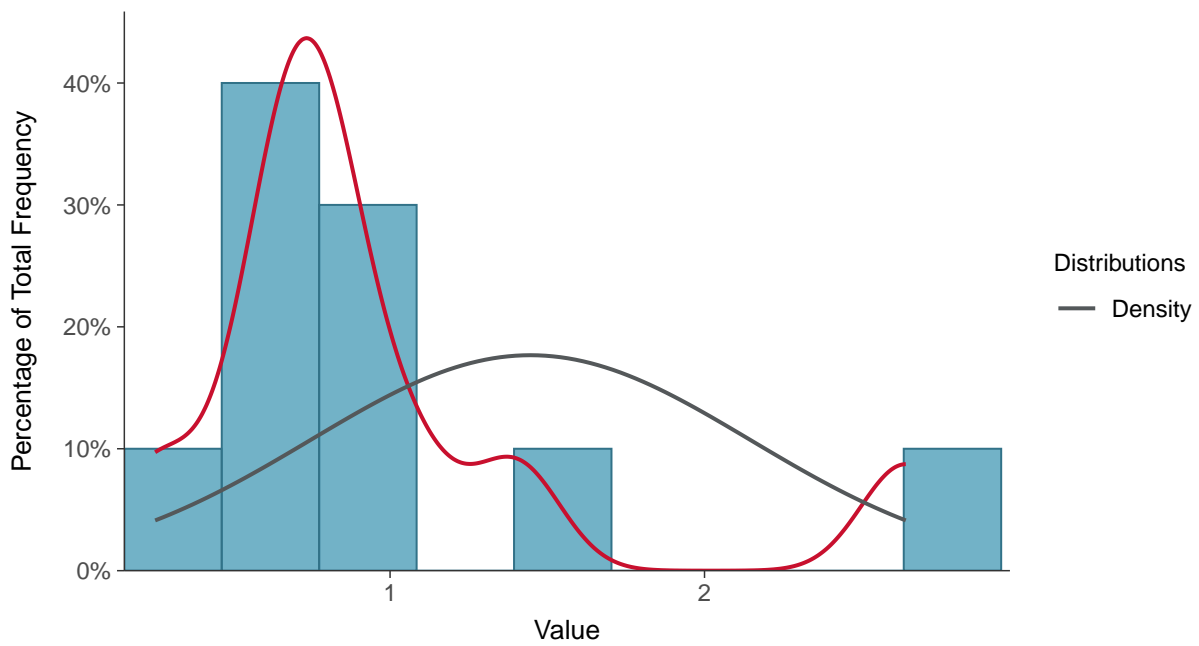
Scatter Plot

Radium-226, MW-7 (pCi/L)



Histogram

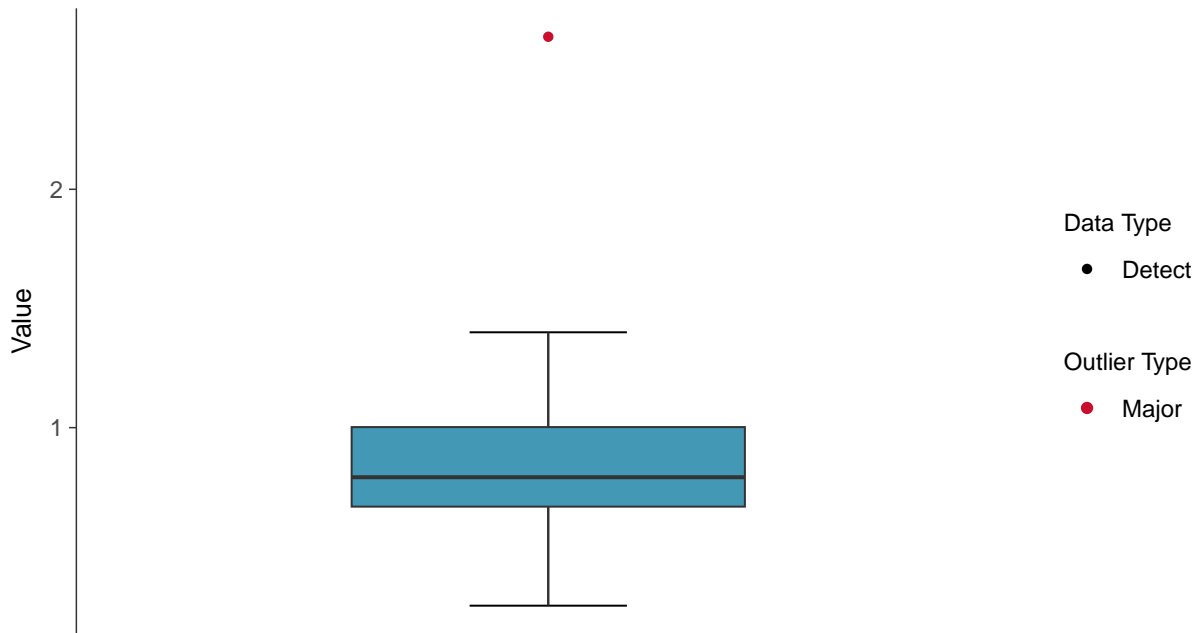
Radium-226, MW-7 (pCi/L)





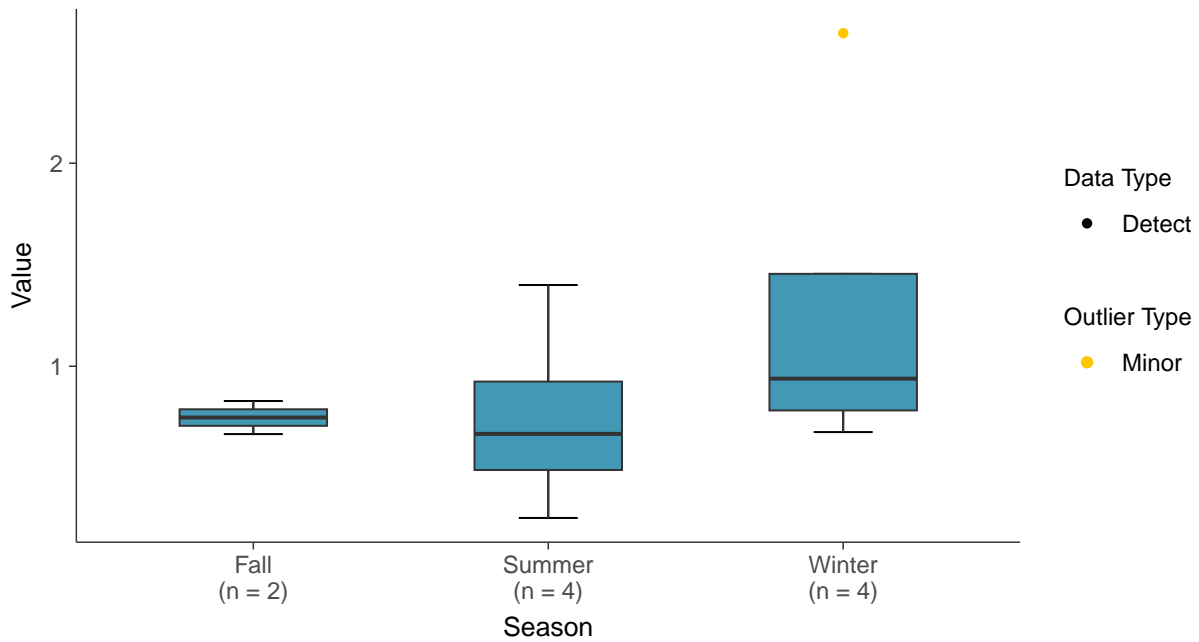
Boxplot

Radium-226, MW-7 (pCi/L)



Boxplot by Season

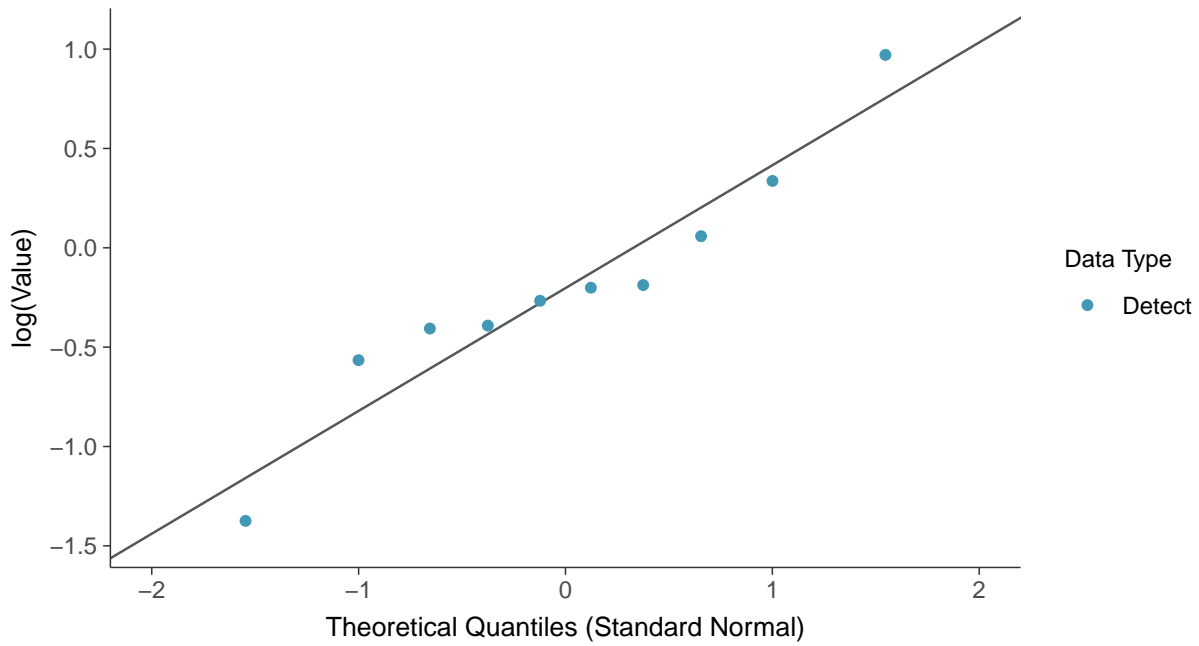
Radium-226, MW-7 (pCi/L)





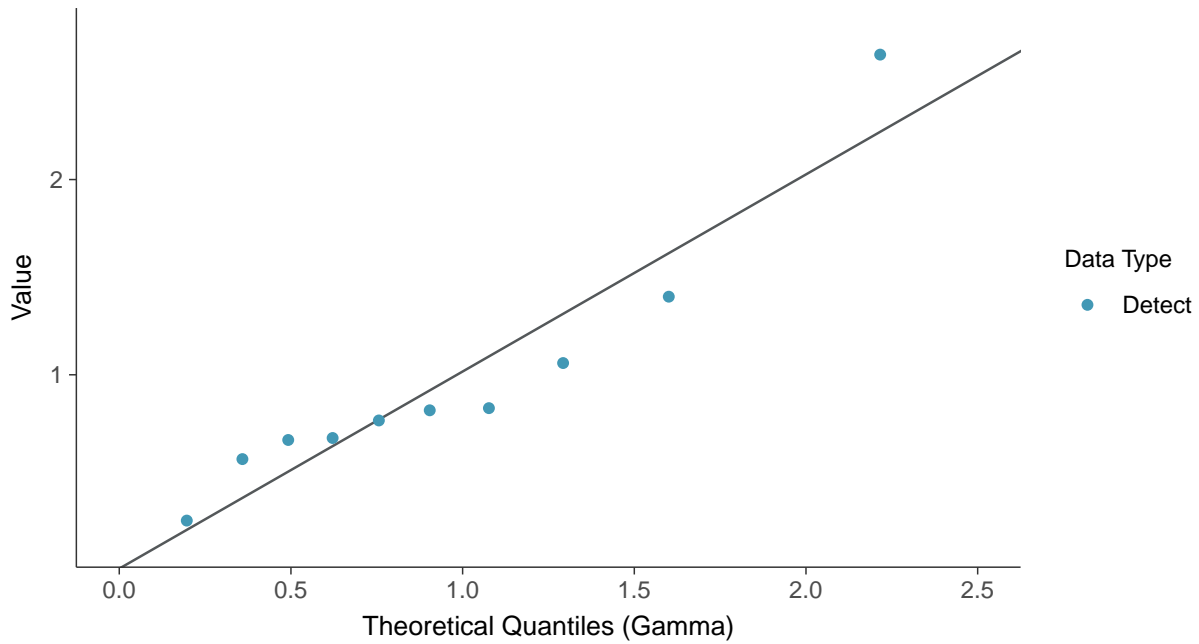
Lognormal Q-Q plot

Radium-226, MW-7 (pCi/L)



Gamma Q-Q plot

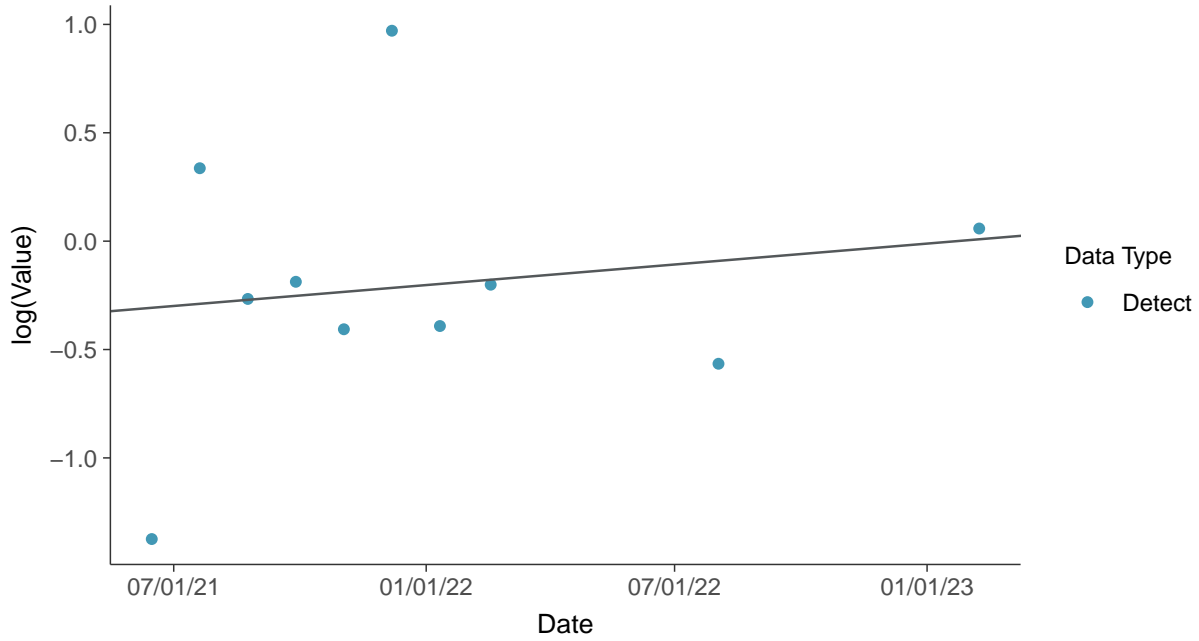
Radium-226, MW-7 (pCi/L)





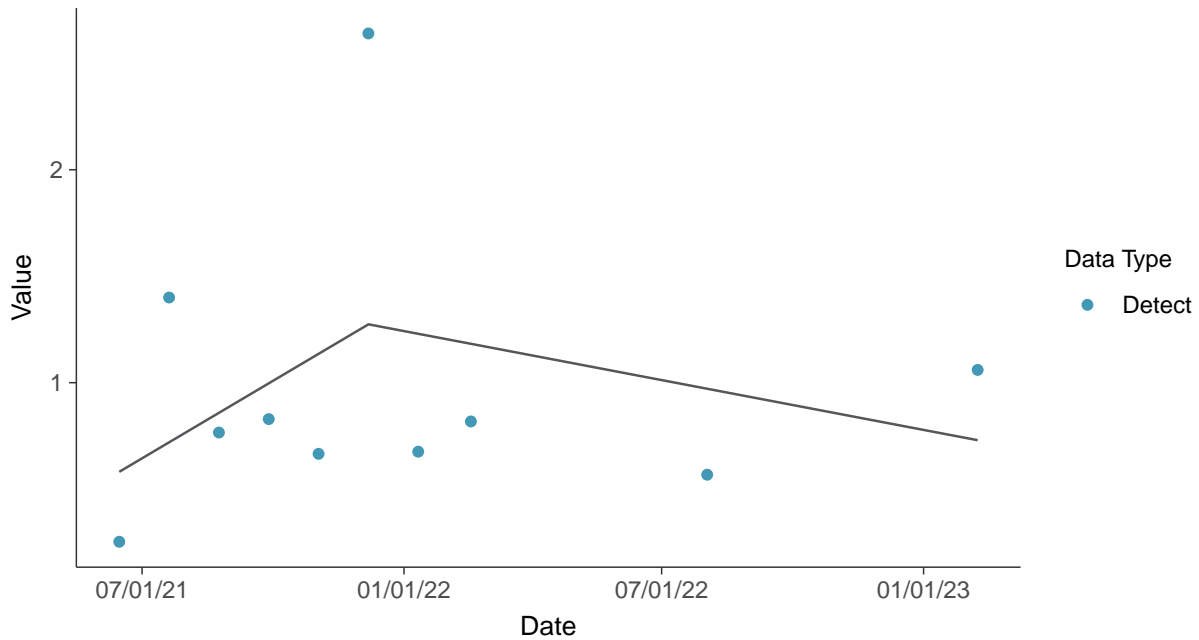
Trend Regression: Lognormal MLE

Radium-226, MW-7 (pCi/L)



Trend Regression: Piecewise Linear-Linear

Radium-226, MW-7 (pCi/L)



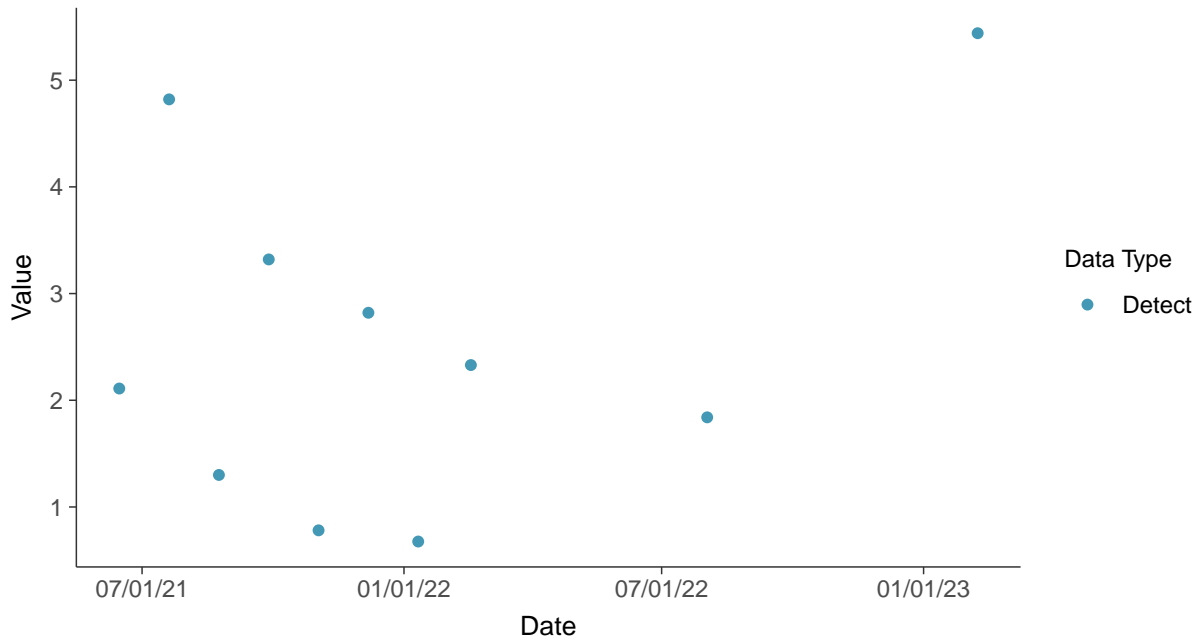


Appendix IV: Radium-226/228, MW-7

ID: 07_2_25

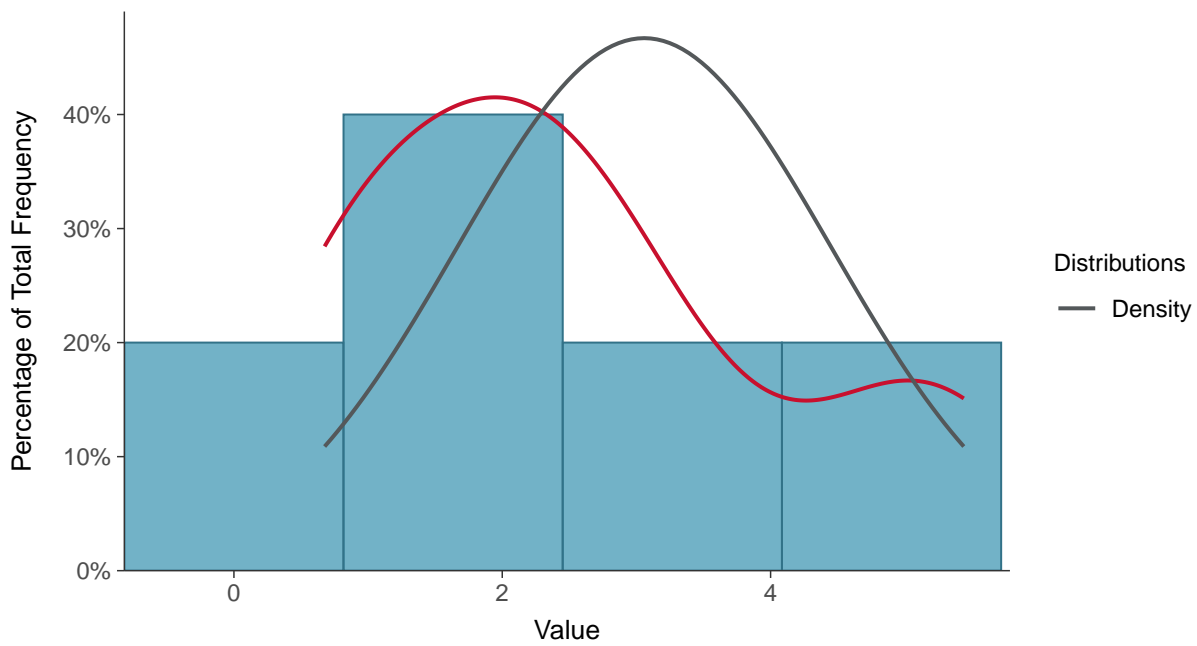
Scatter Plot

Radium-226/228, MW-7 (pCi/L)



Histogram

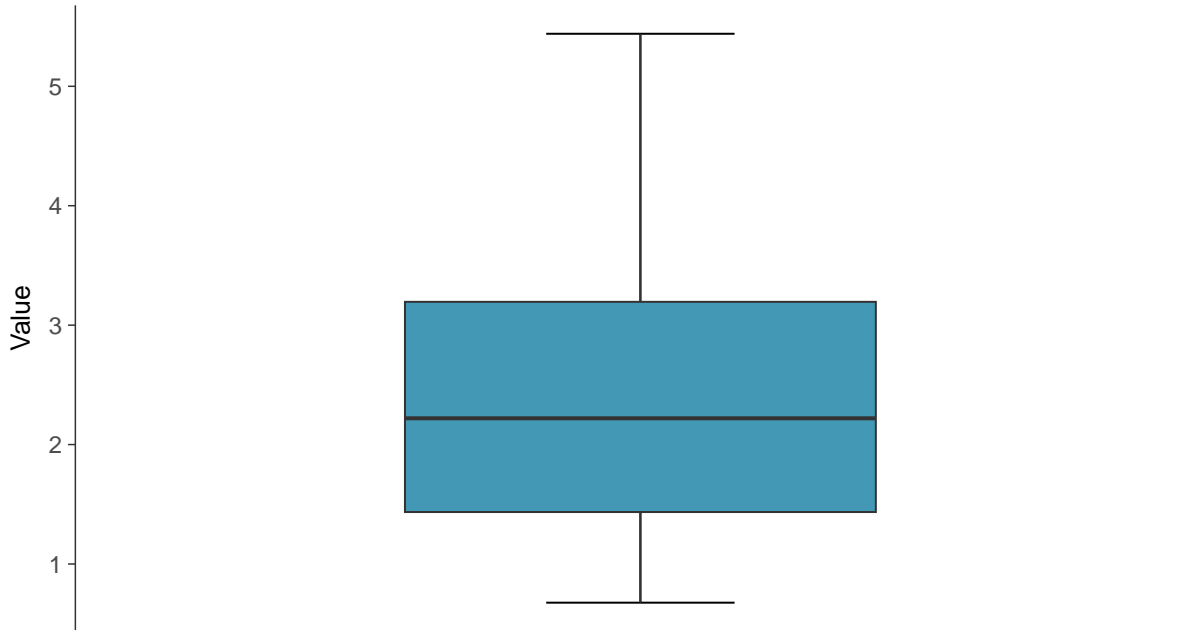
Radium-226/228, MW-7 (pCi/L)





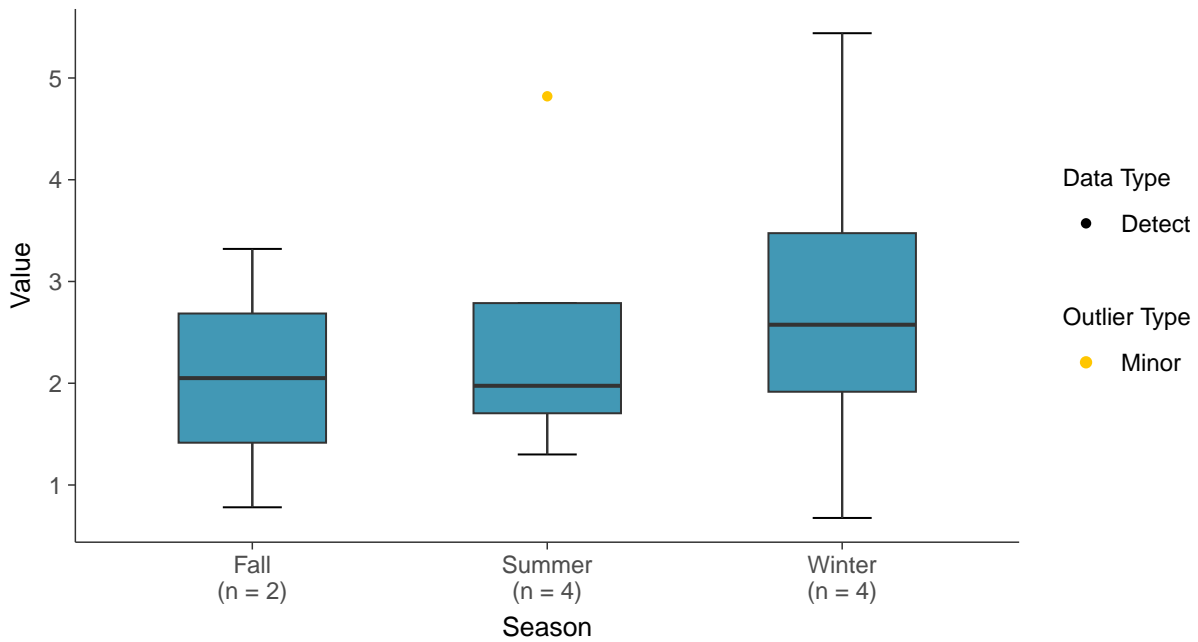
Boxplot

Radium-226/228, MW-7 (pCi/L)



Boxplot by Season

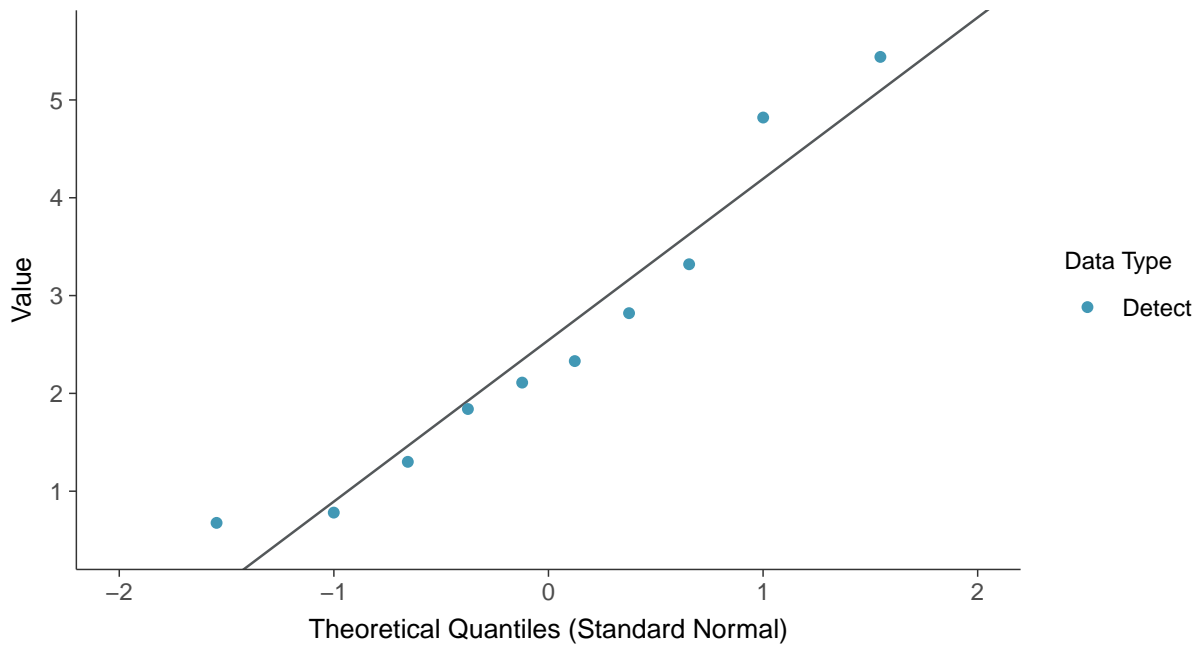
Radium-226/228, MW-7 (pCi/L)





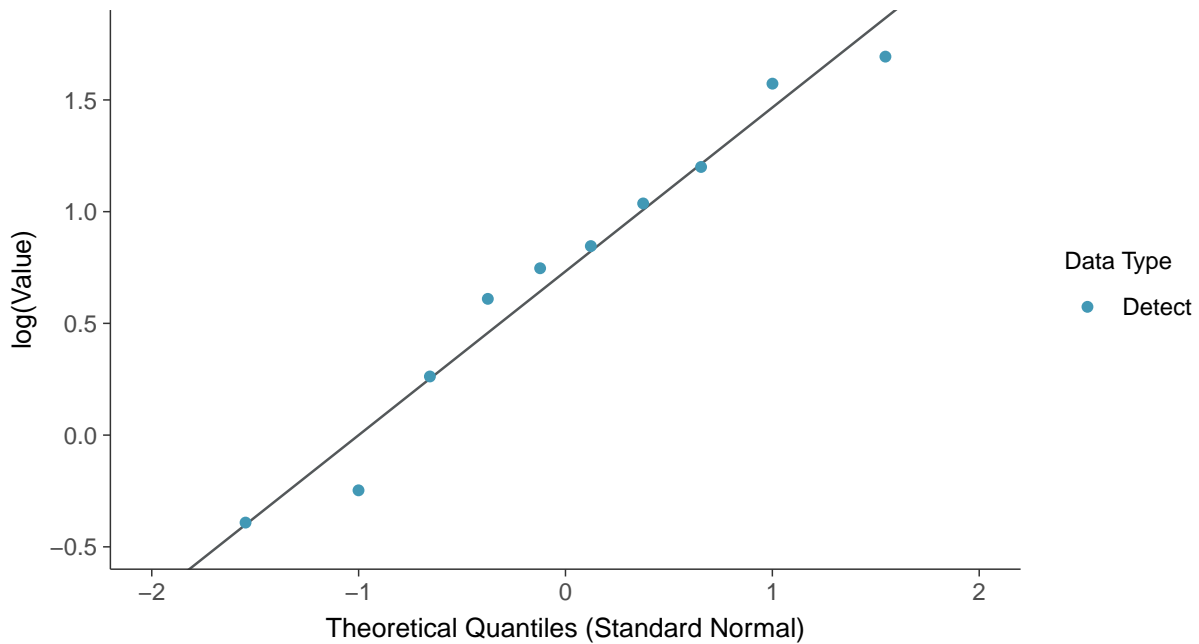
Normal Q-Q plot

Radium-226/228, MW-7 (pCi/L)



Lognormal Q-Q plot

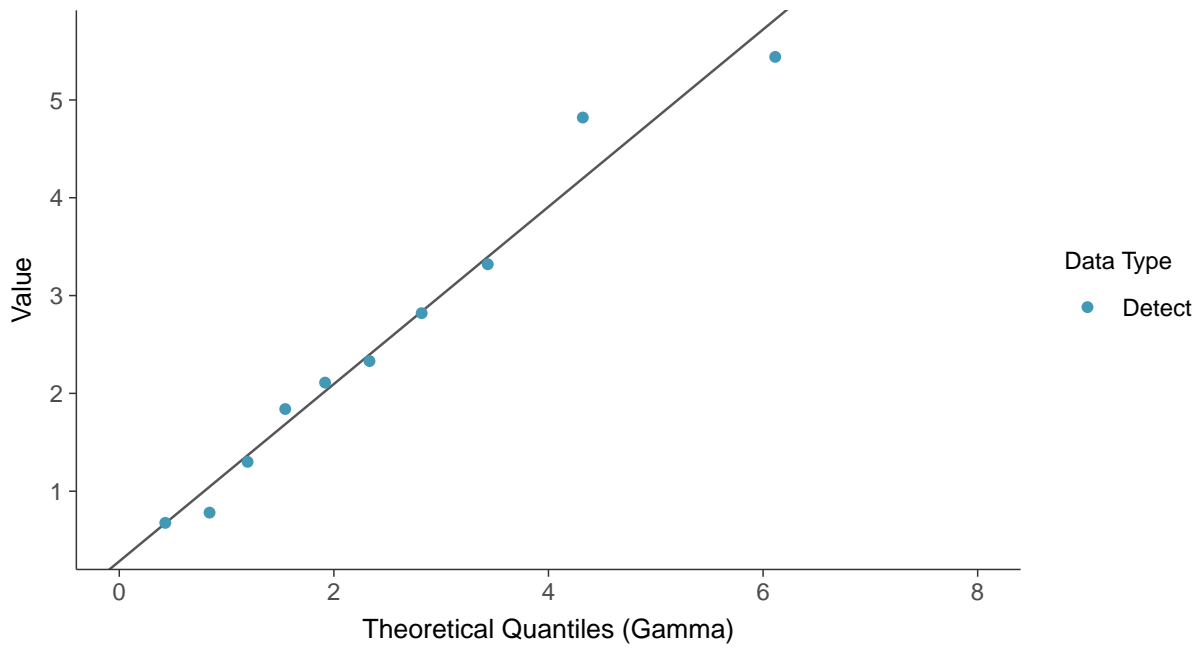
Radium-226/228, MW-7 (pCi/L)





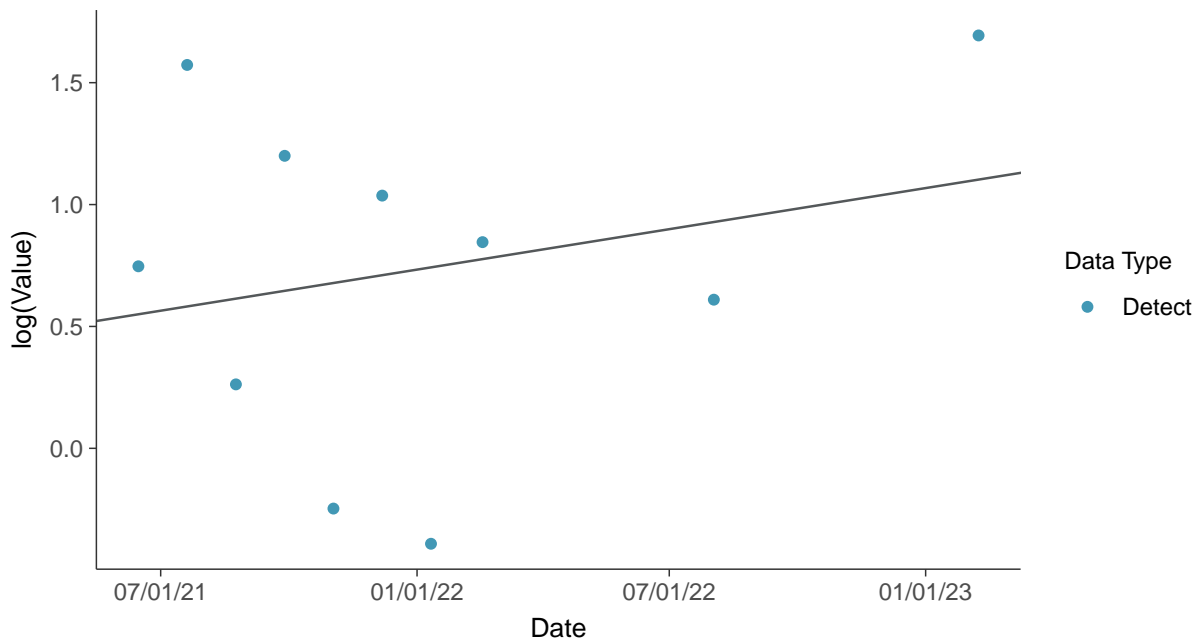
Gamma Q-Q plot

Radium-226/228, MW-7 (pCi/L)



Trend Regression: Lognormal MLE

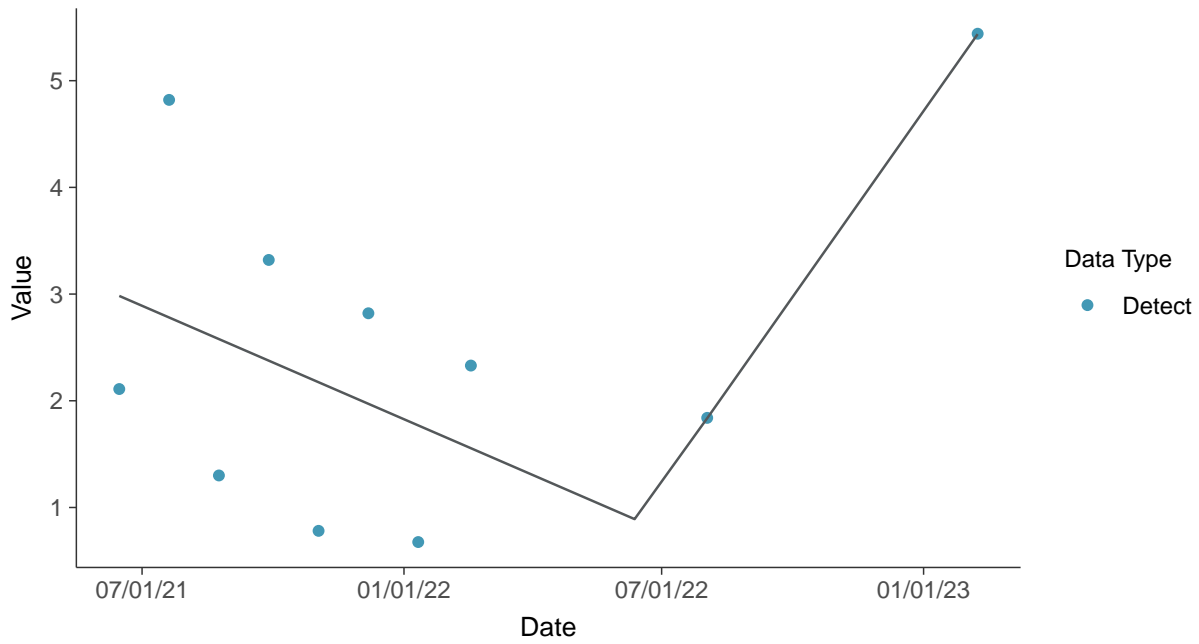
Radium-226/228, MW-7 (pCi/L)





Trend Regression: Piecewise Linear-Linear

Radium-226/228, MW-7 (pCi/L)



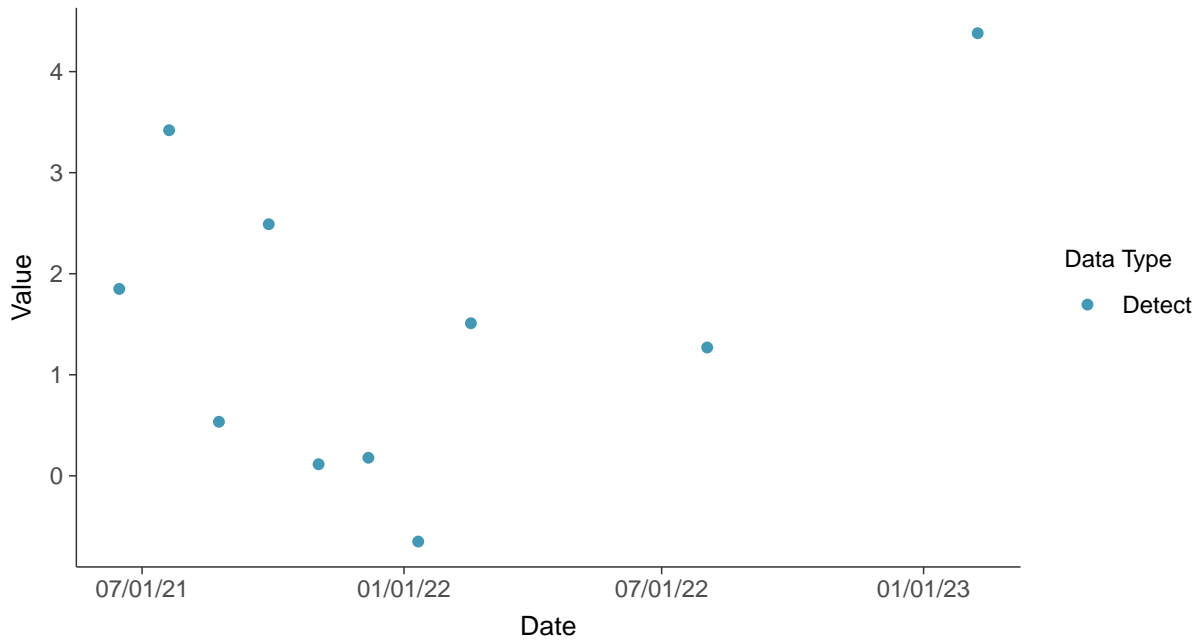


Appendix IV: Radium-228, MW-7

ID: 07_2_26

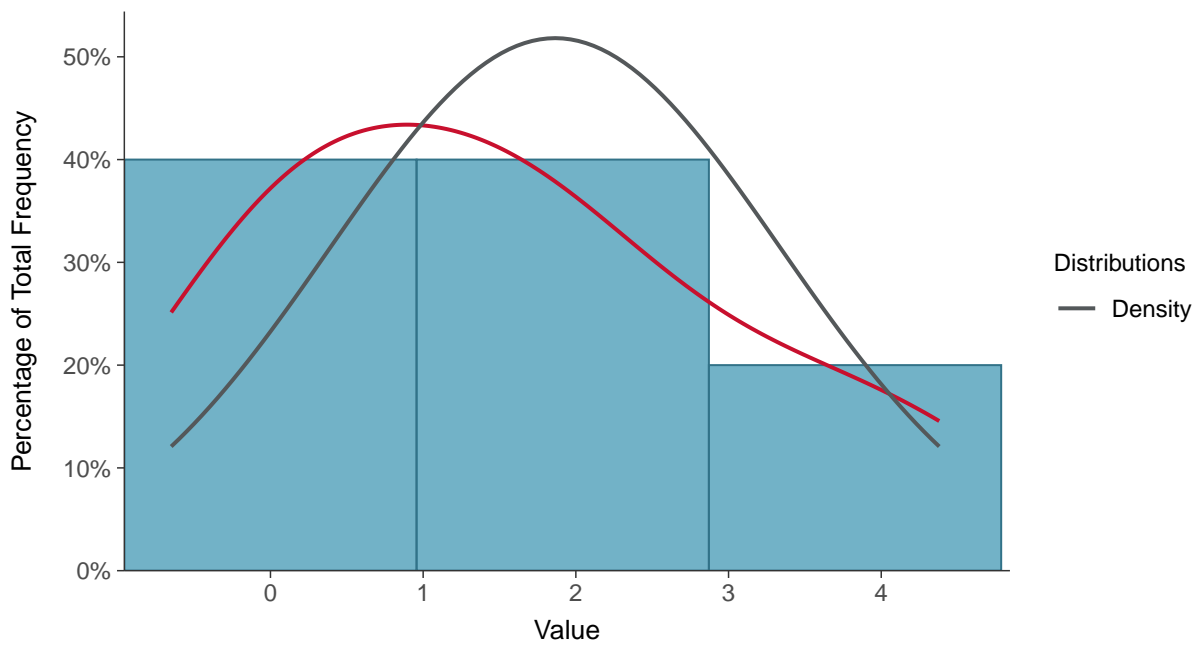
Scatter Plot

Radium-228, MW-7 (pCi/L)



Histogram

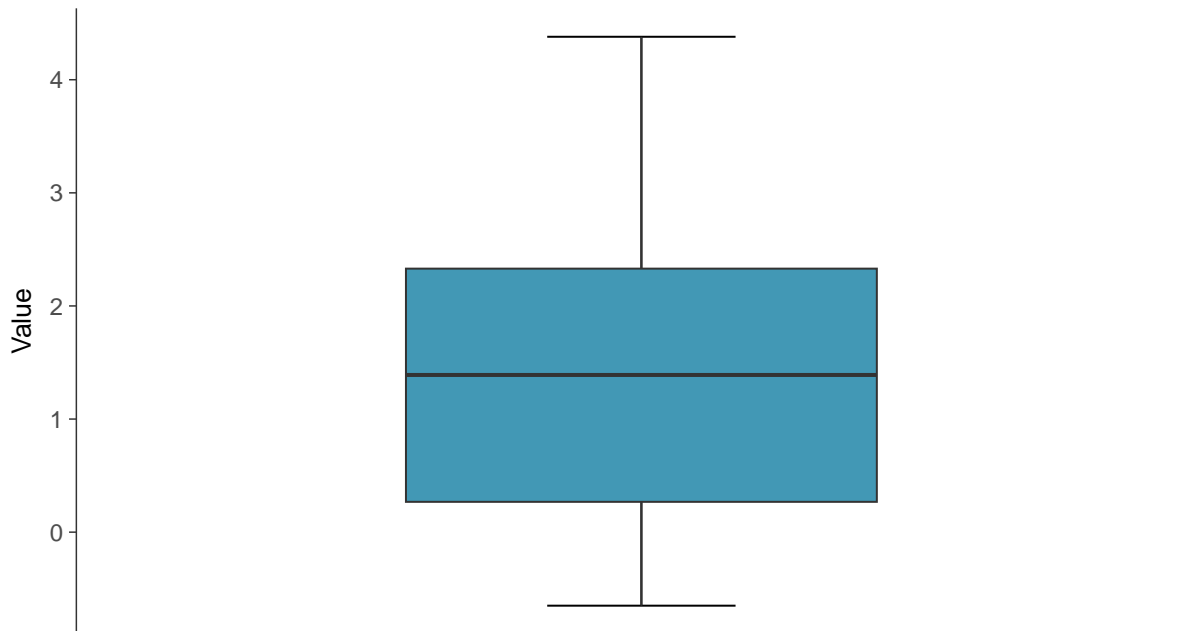
Radium-228, MW-7 (pCi/L)





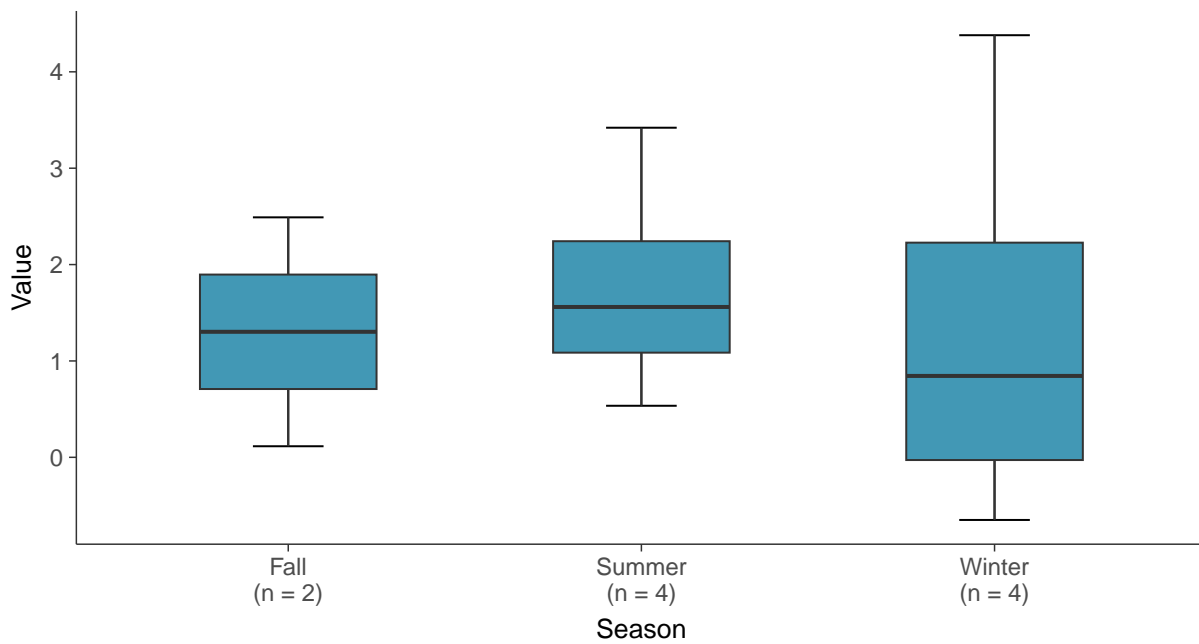
Boxplot

Radium-228, MW-7 (pCi/L)



Boxplot by Season

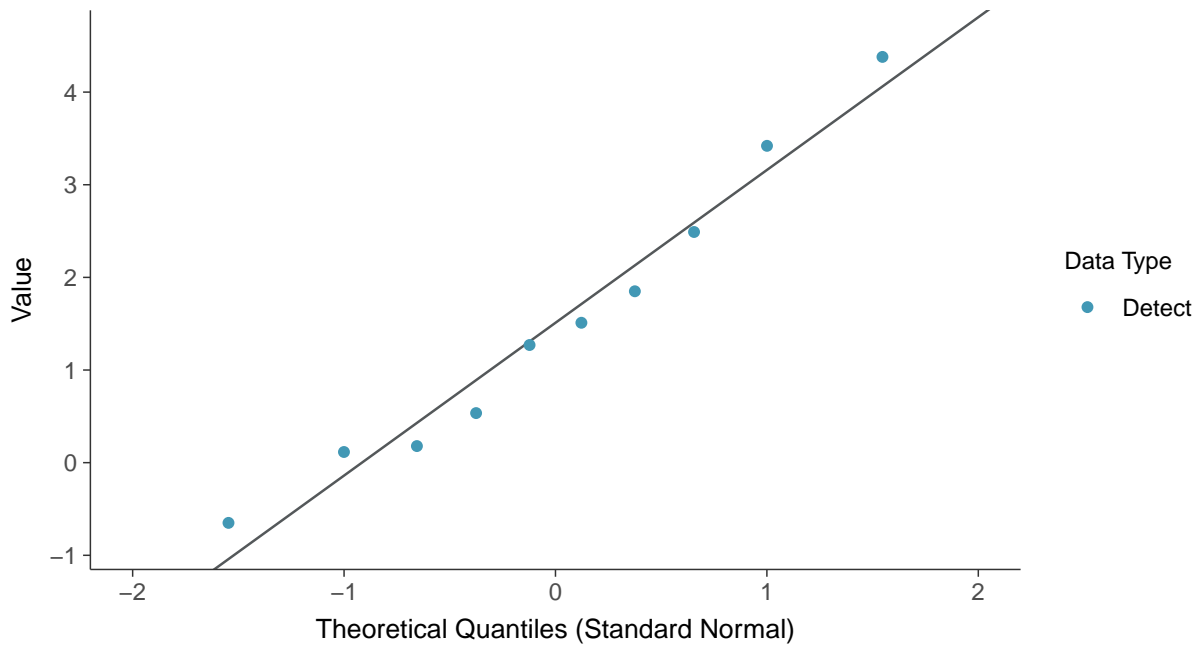
Radium-228, MW-7 (pCi/L)





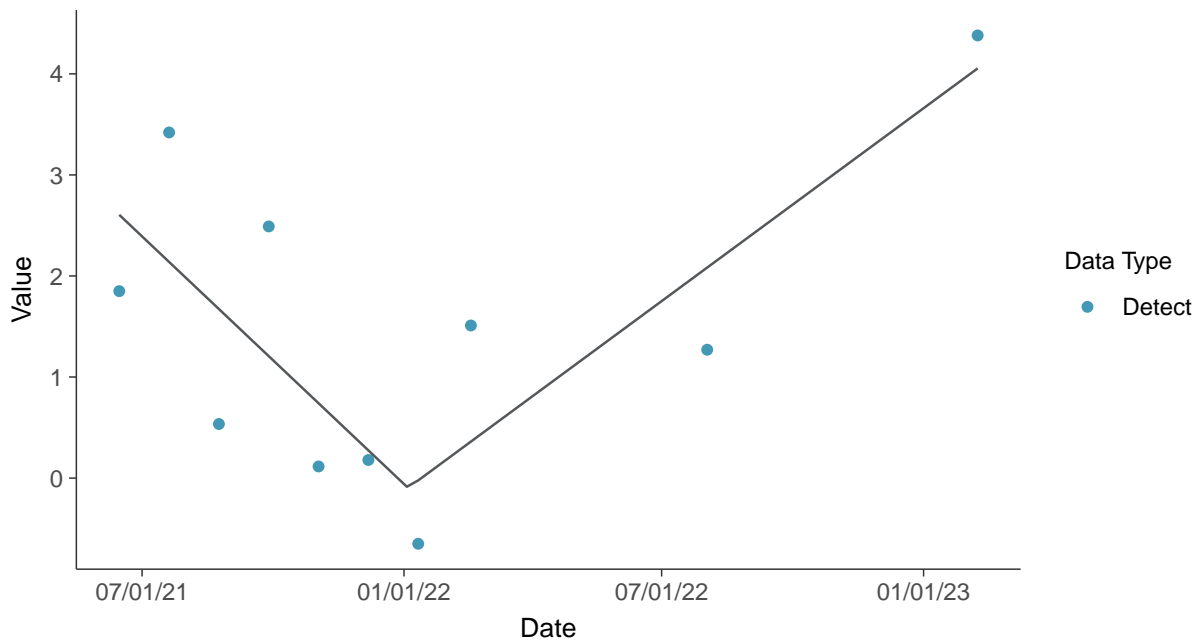
Normal Q-Q plot

Radium-228, MW-7 (pCi/L)



Trend Regression: Piecewise Linear-Linear

Radium-228, MW-7 (pCi/L)



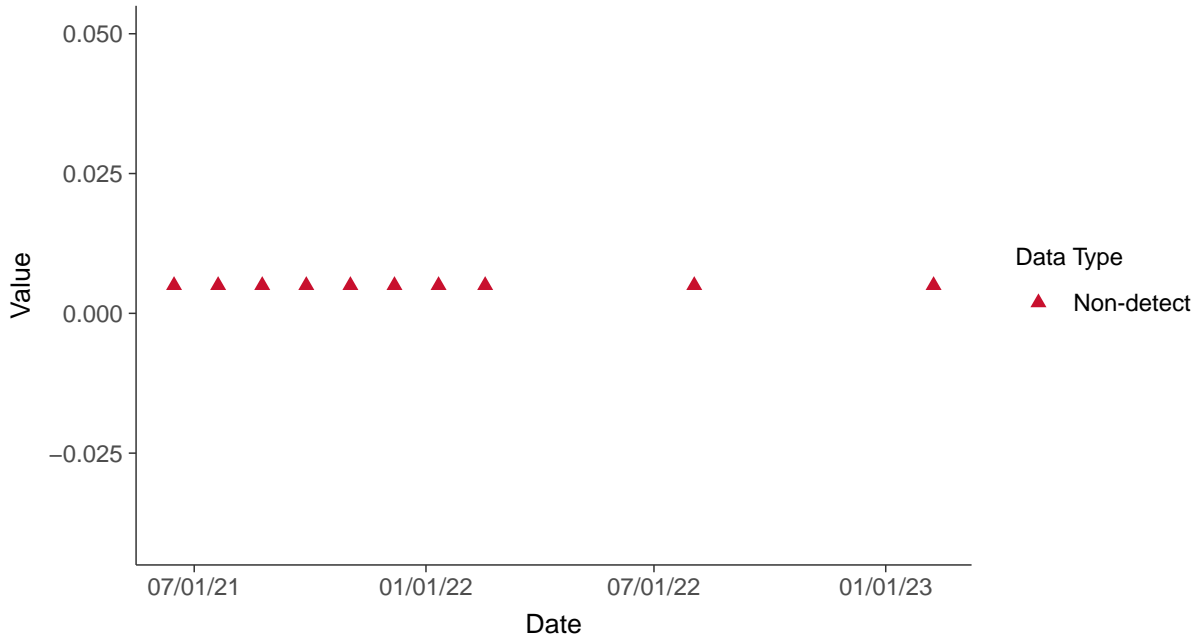


Appendix IV: Selenium, MW-7

ID: 07_2_27

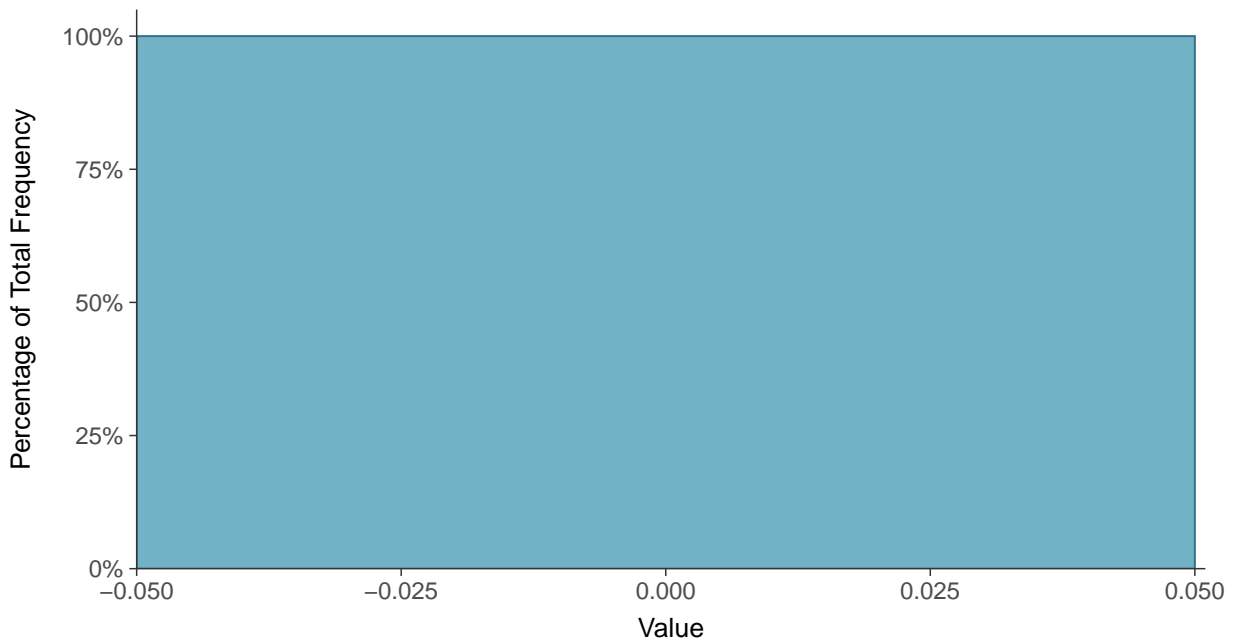
Scatter Plot

Selenium, MW-7 (mg/L)



Histogram

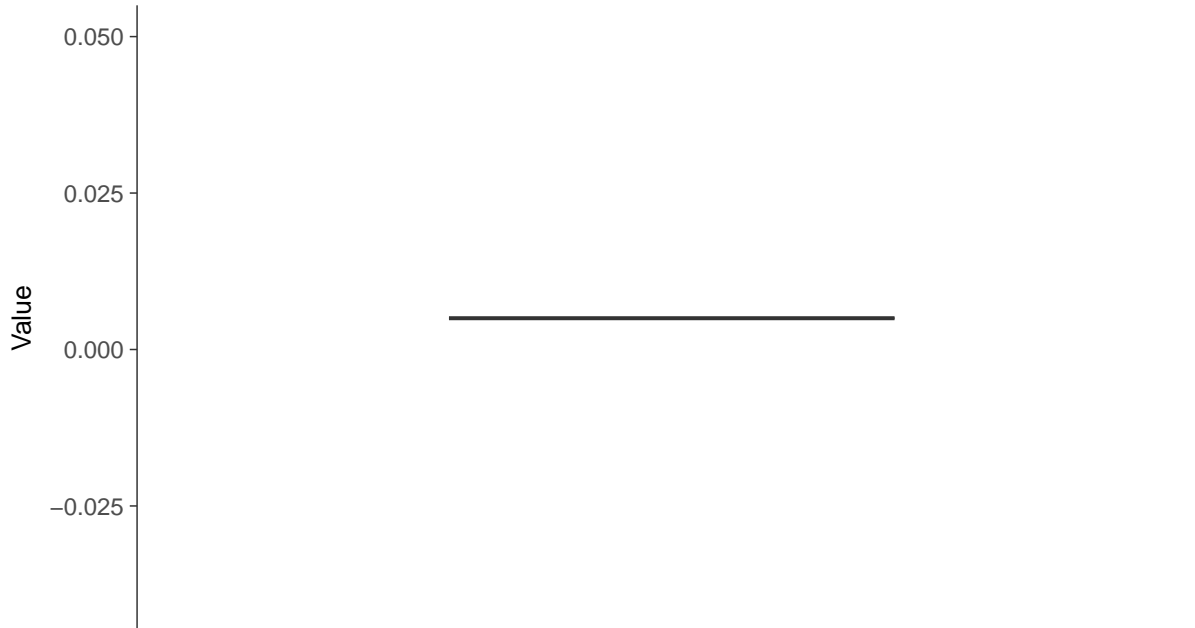
Selenium, MW-7 (mg/L)





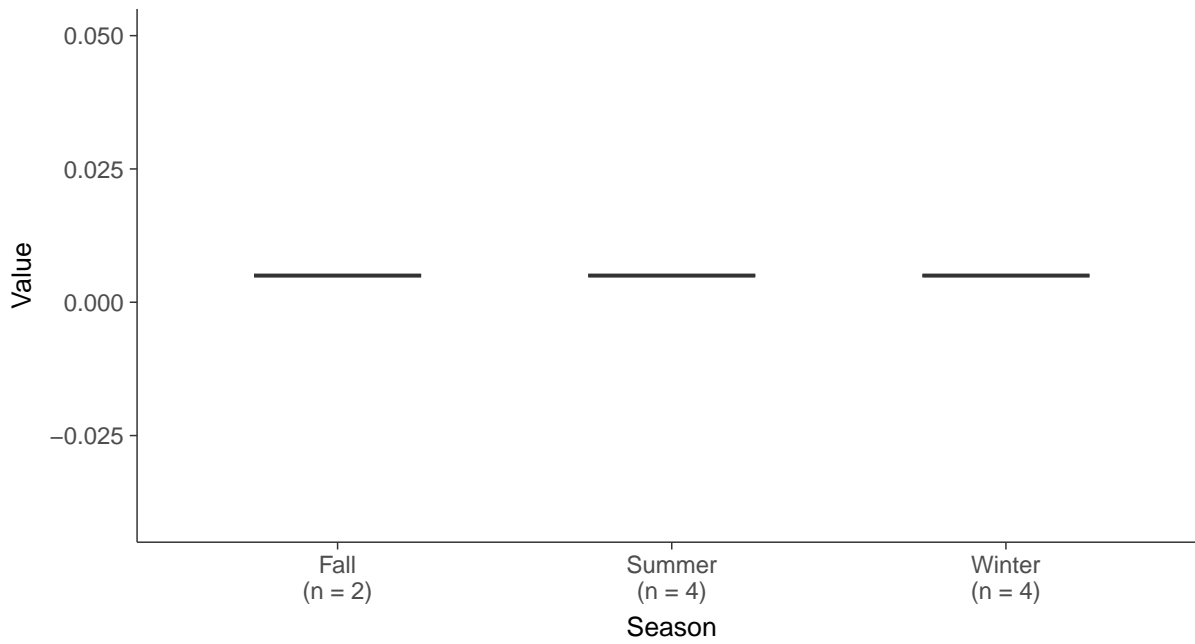
Boxplot

Selenium, MW-7 (mg/L)



Boxplot by Season

Selenium, MW-7 (mg/L)



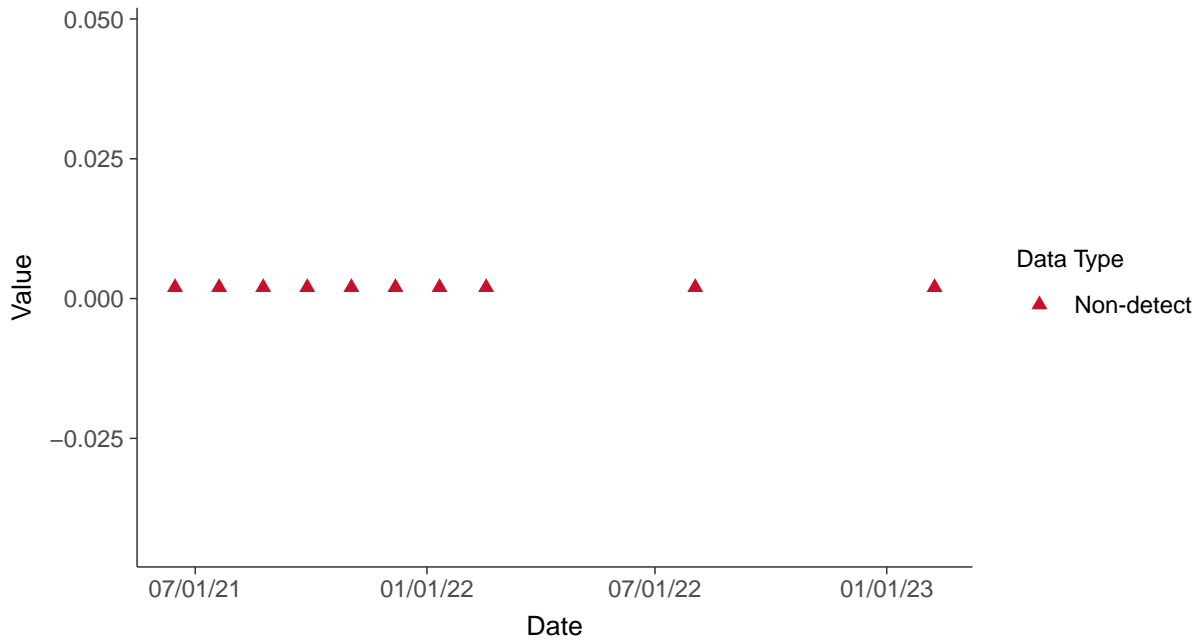


Appendix IV: Thallium, MW-7

ID: 07_2_29

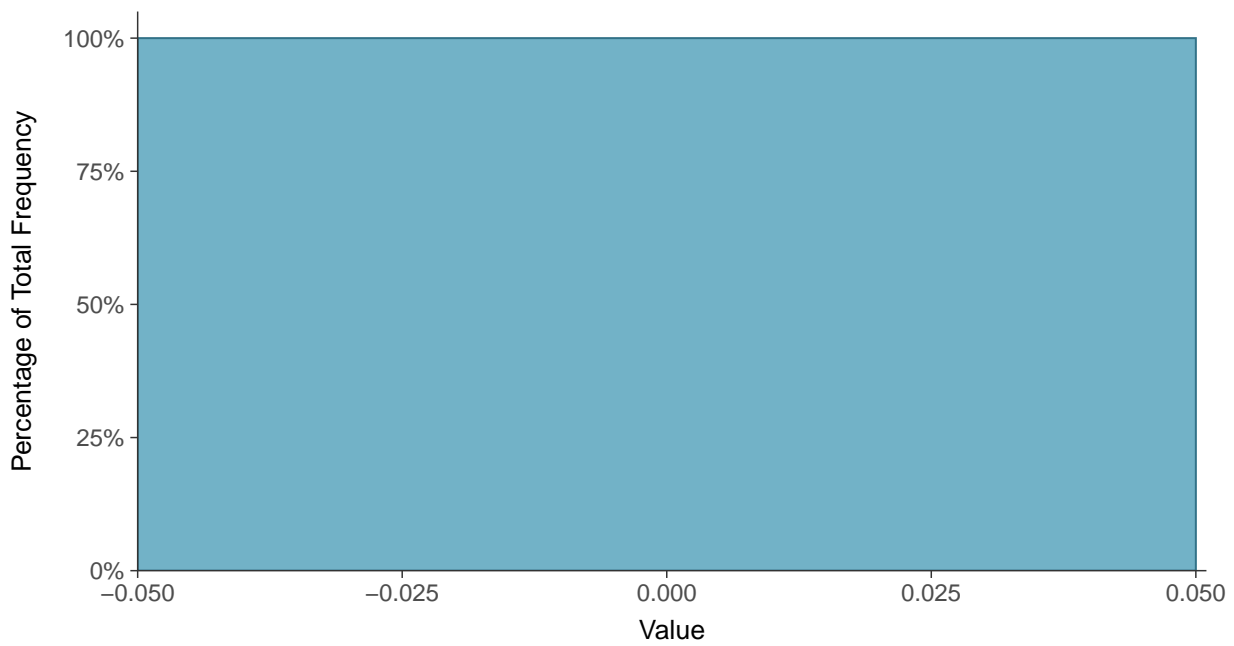
Scatter Plot

Thallium, MW-7 (mg/L)



Histogram

Thallium, MW-7 (mg/L)





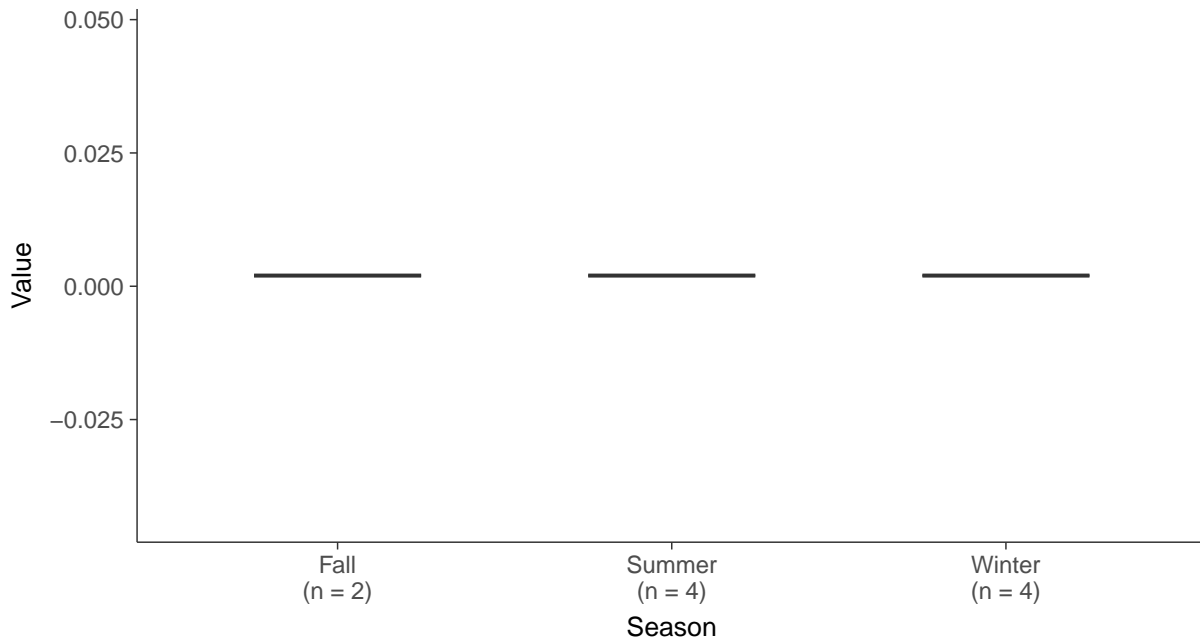
Boxplot

Thallium, MW-7 (mg/L)



Boxplot by Season

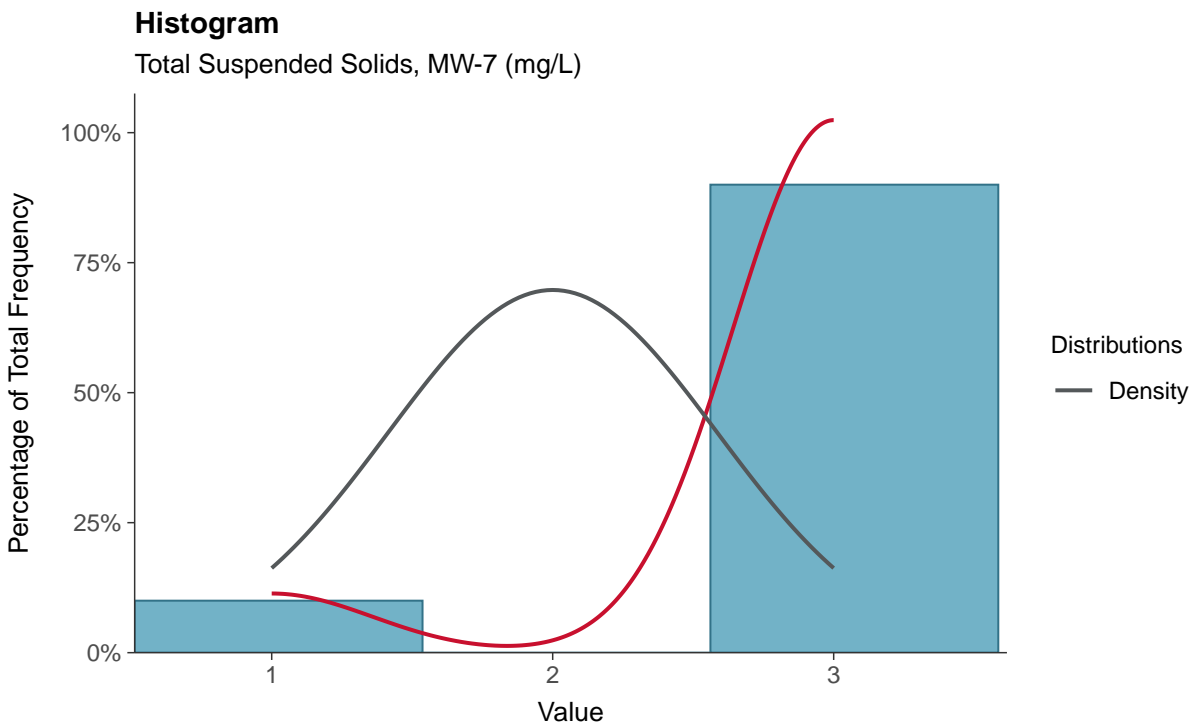
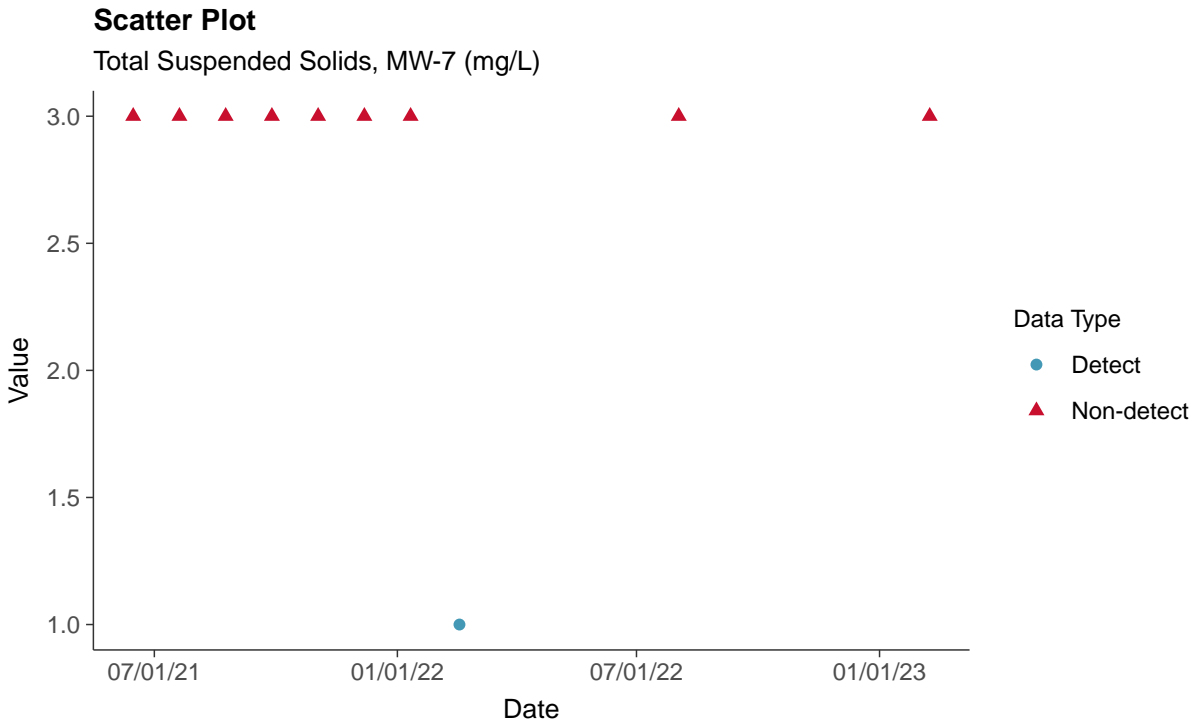
Thallium, MW-7 (mg/L)





Appendix IV: Total Suspended Solids, MW-7

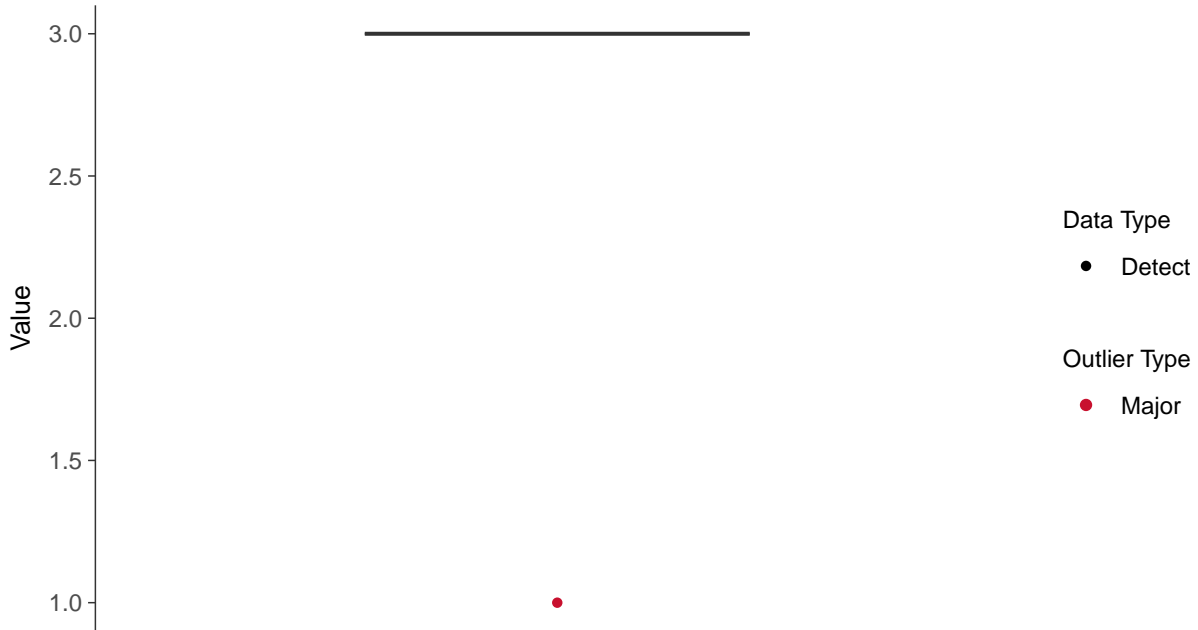
ID: 07_2_30





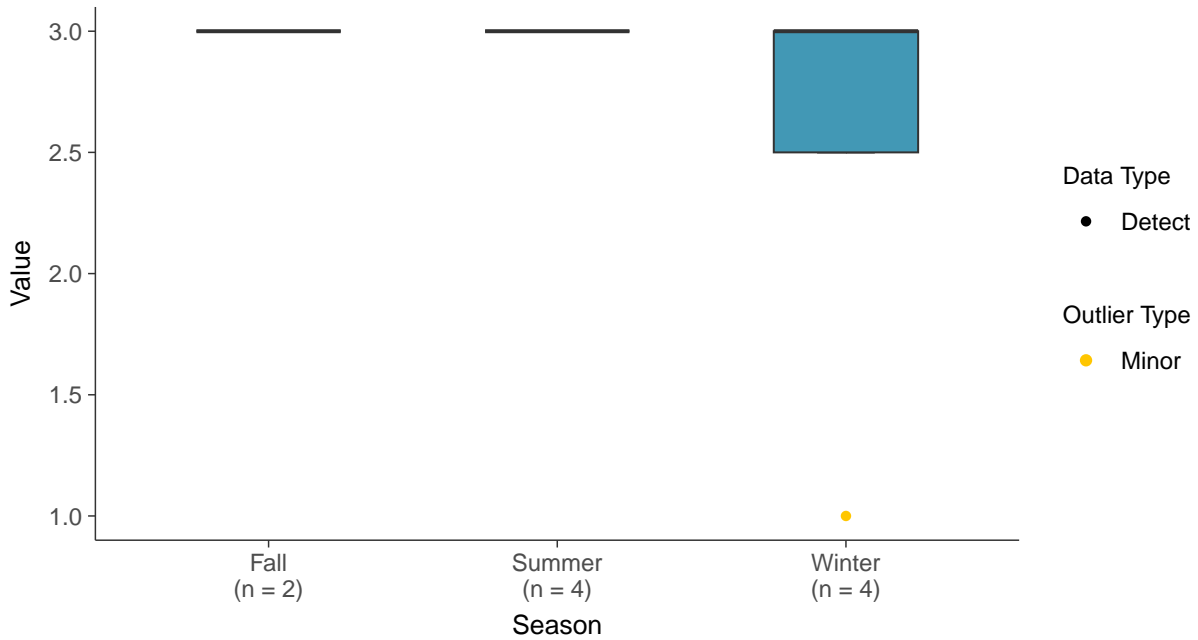
Boxplot

Total Suspended Solids, MW-7 (mg/L)



Boxplot by Season

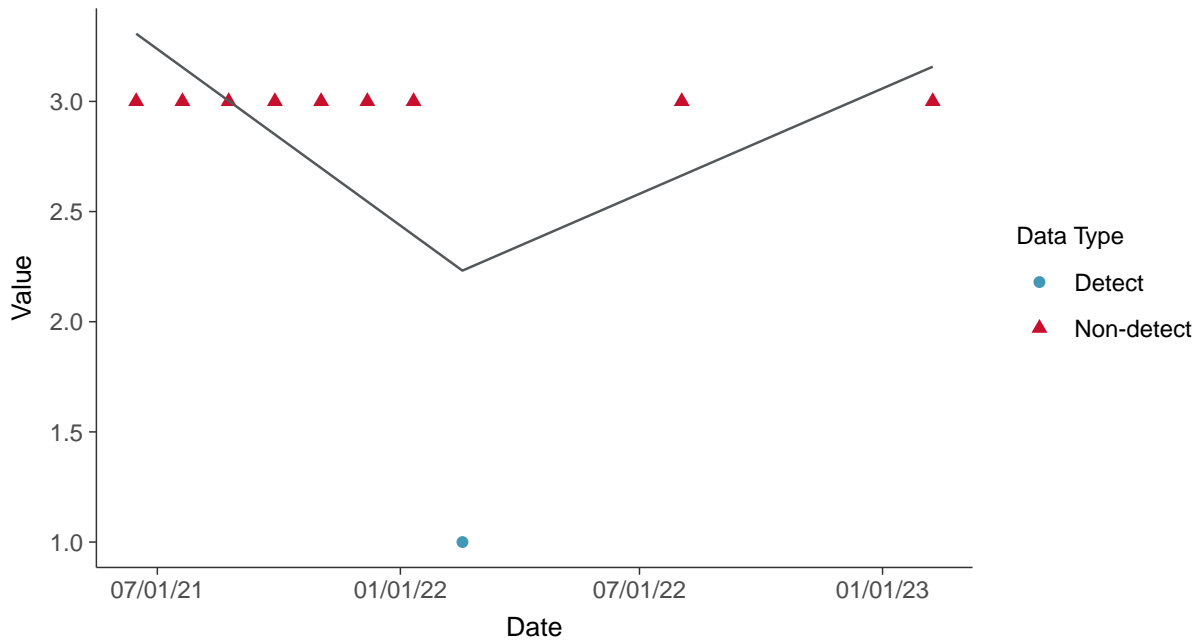
Total Suspended Solids, MW-7 (mg/L)





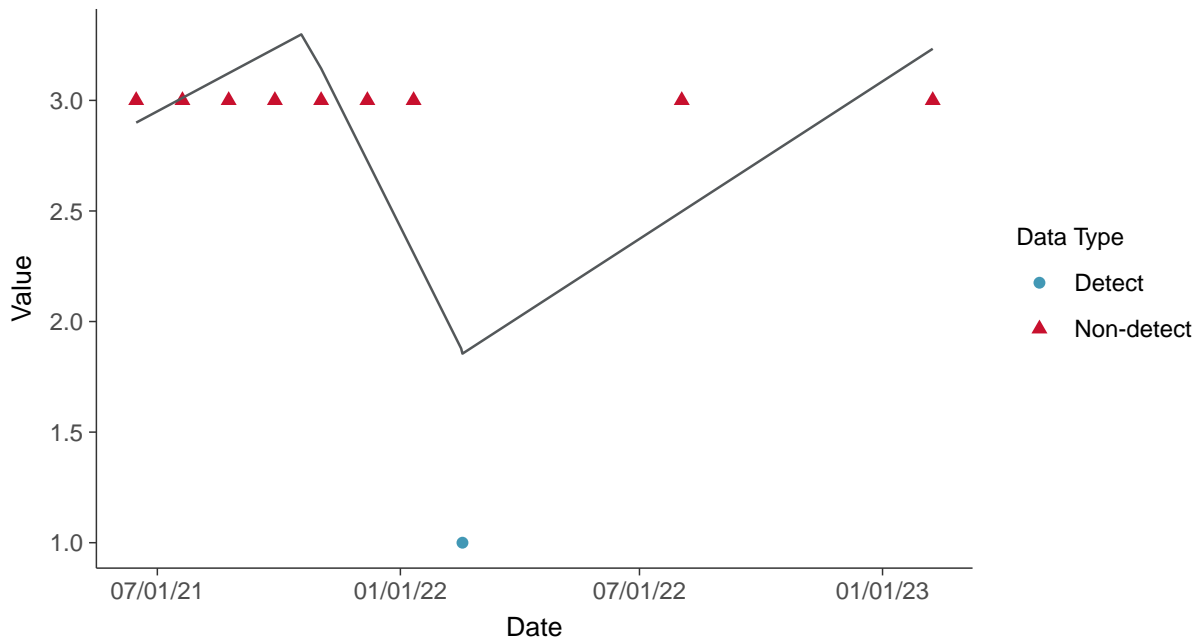
Trend Regression: Piecewise Linear-Linear

Total Suspended Solids, MW-7 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Total Suspended Solids, MW-7 (mg/L)



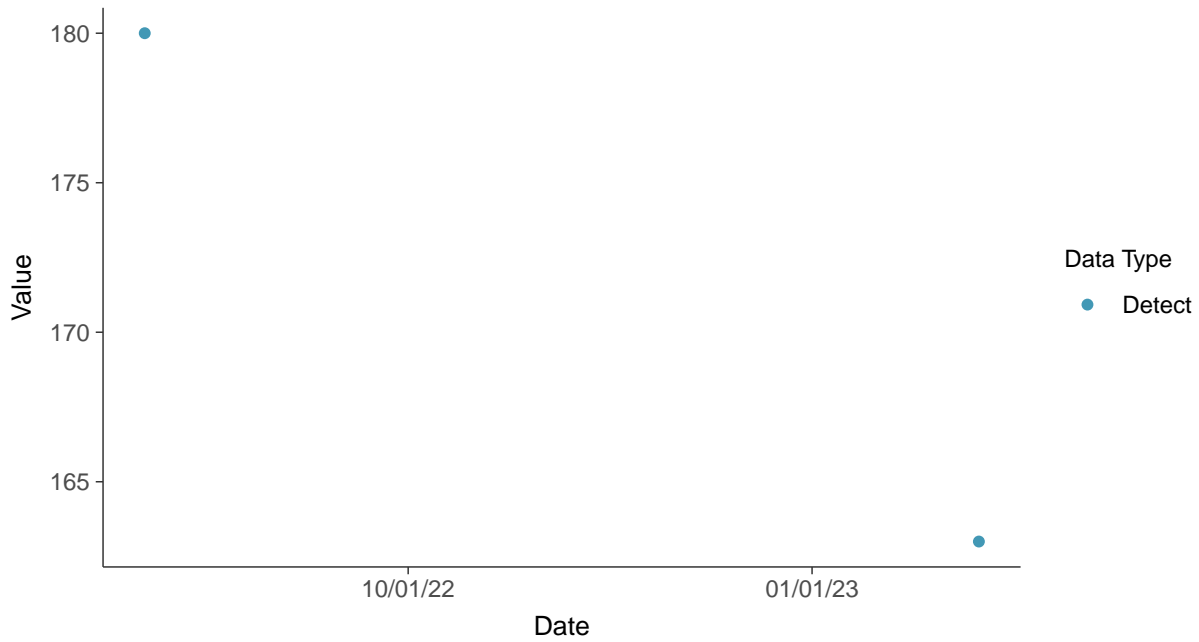


Other: Bicarbonate, MW-7

ID: 07_3_12

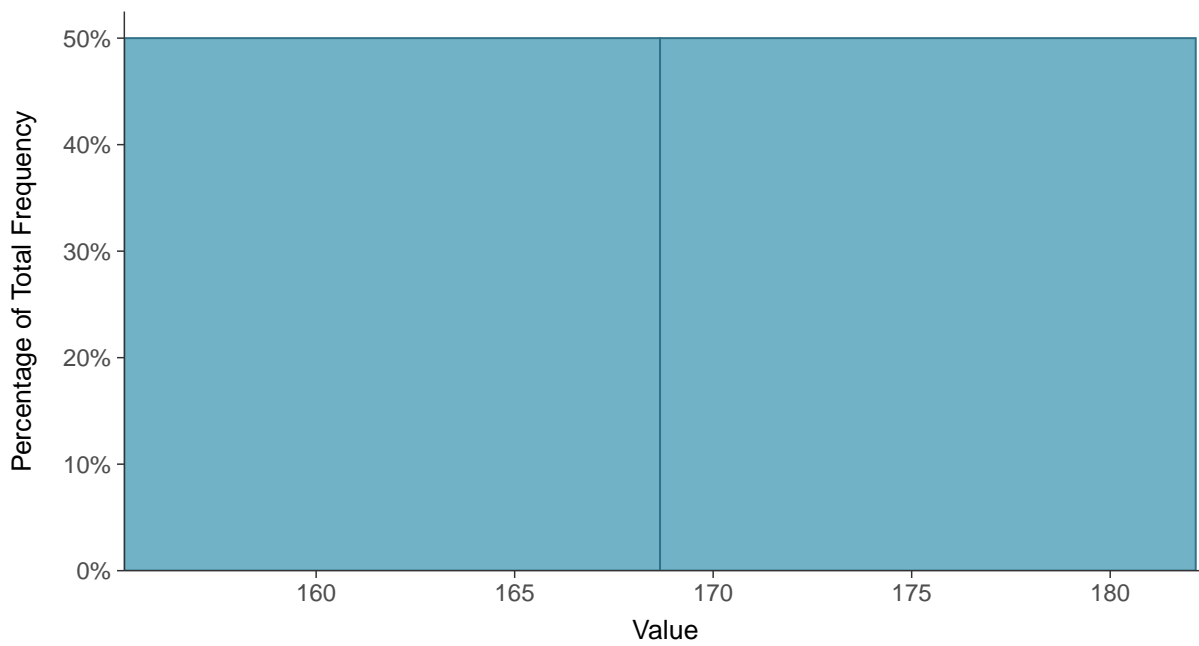
Scatter Plot

Bicarbonate, MW-7 (mg/L)



Histogram

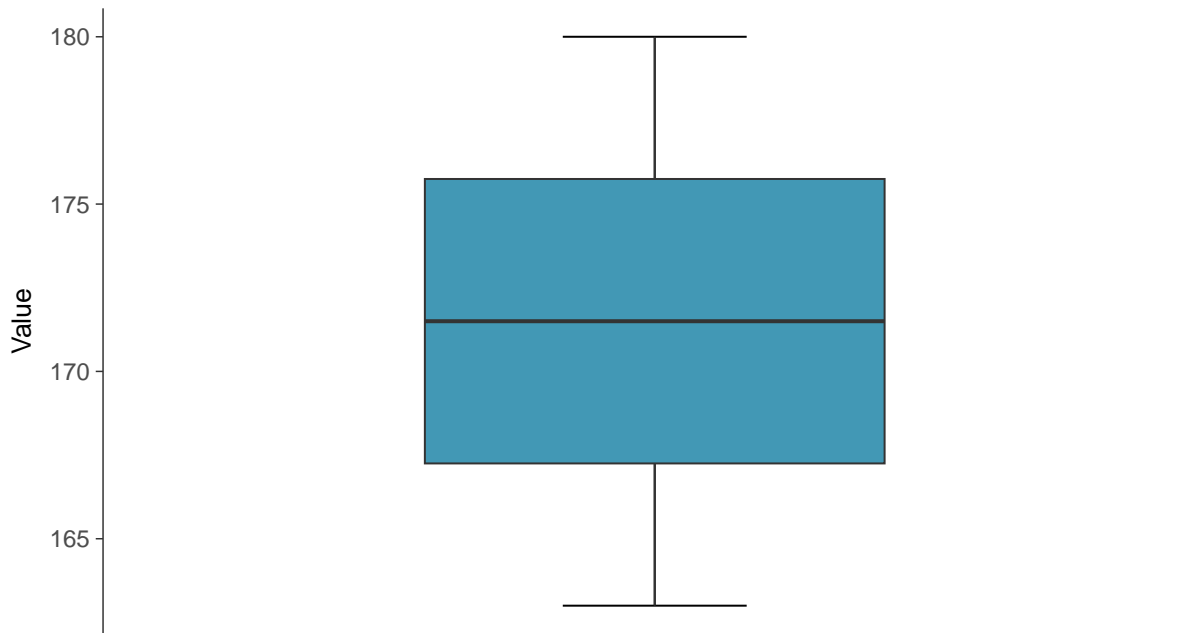
Bicarbonate, MW-7 (mg/L)





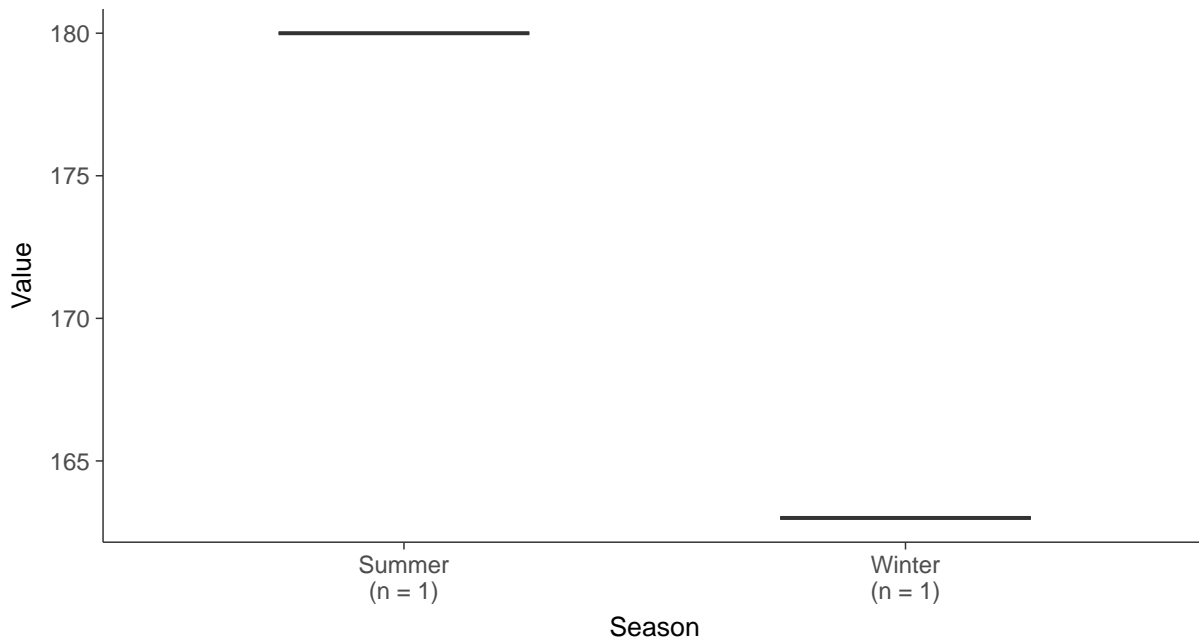
Boxplot

Bicarbonate, MW-7 (mg/L)



Boxplot by Season

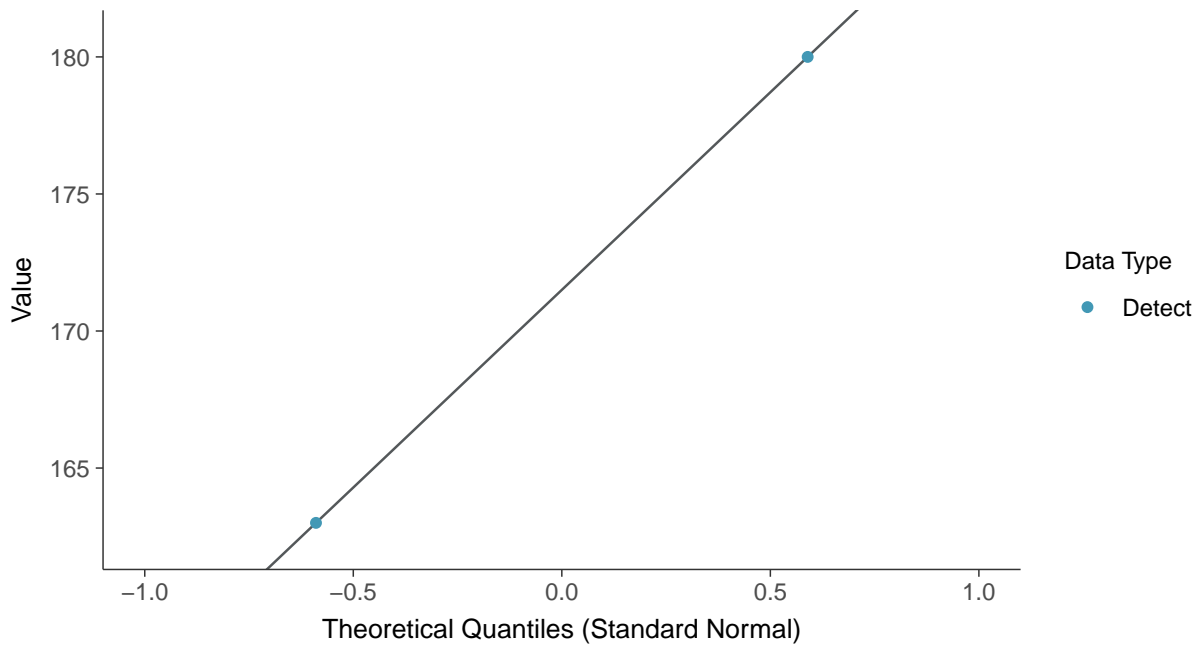
Bicarbonate, MW-7 (mg/L)





Normal Q-Q plot

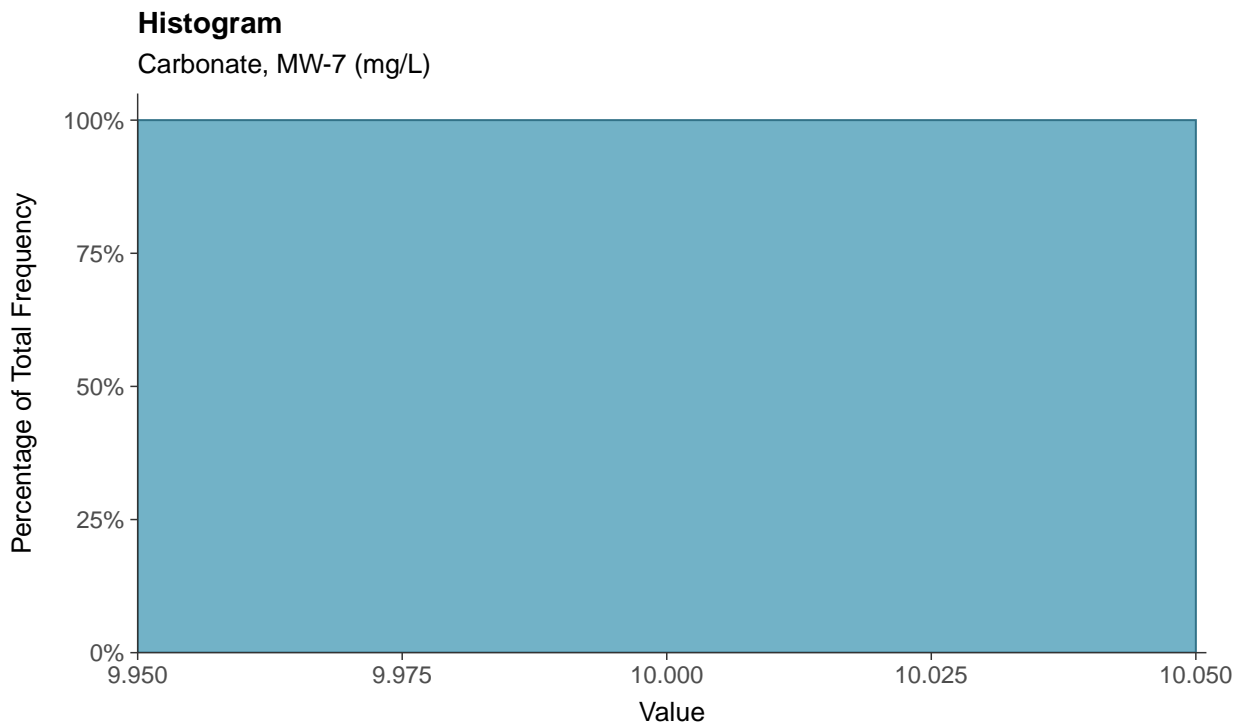
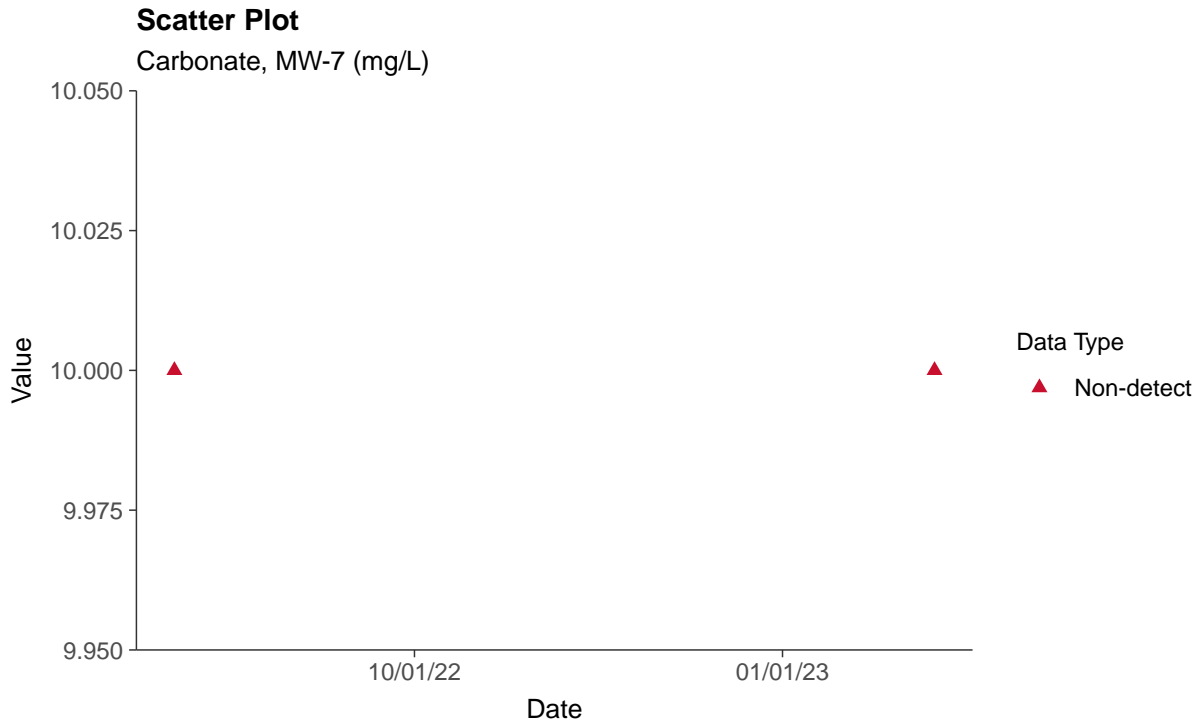
Bicarbonate, MW-7 (mg/L)





Other: Carbonate, MW-7

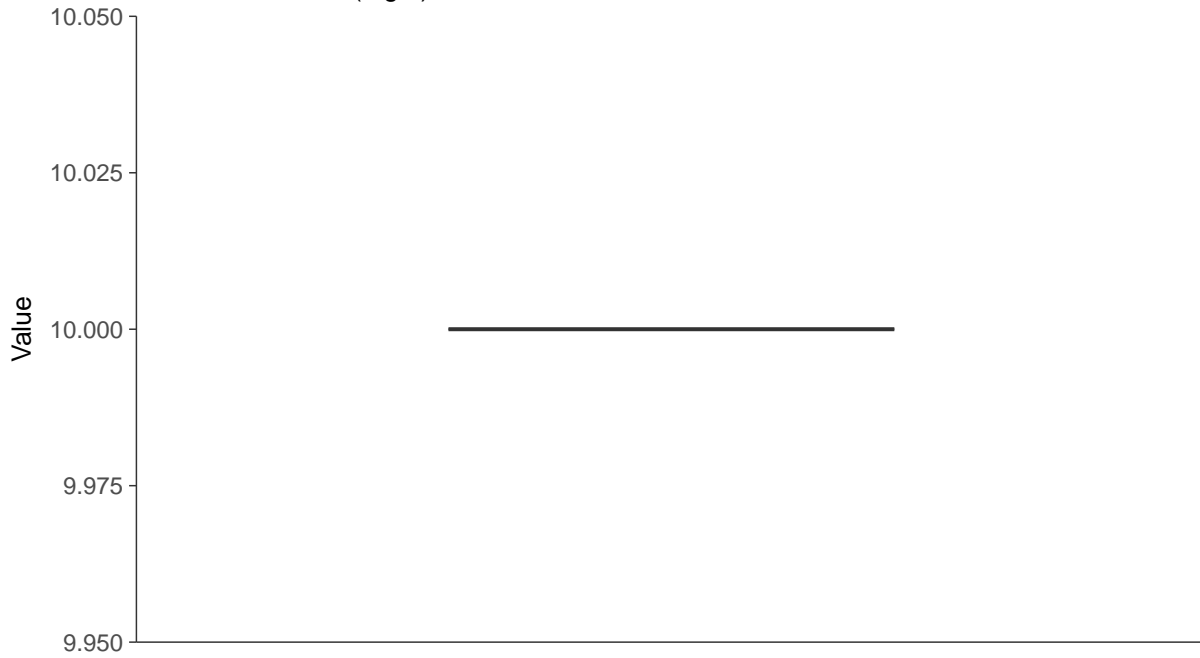
ID: 07_3_14





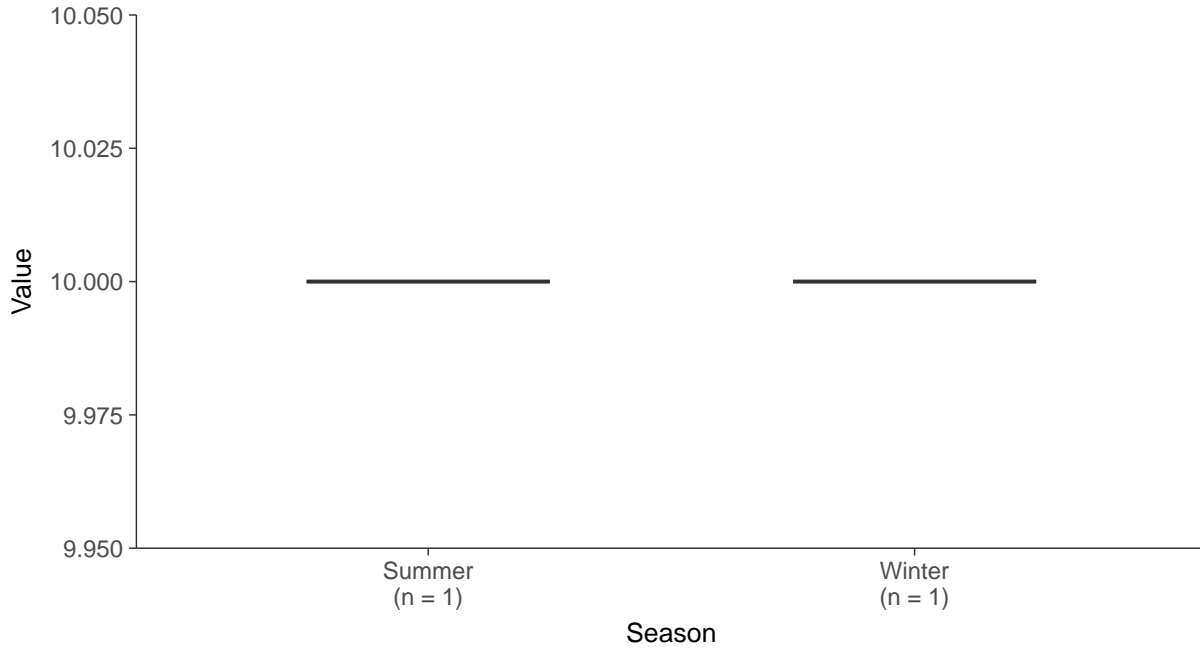
Boxplot

Carbonate, MW-7 (mg/L)



Boxplot by Season

Carbonate, MW-7 (mg/L)



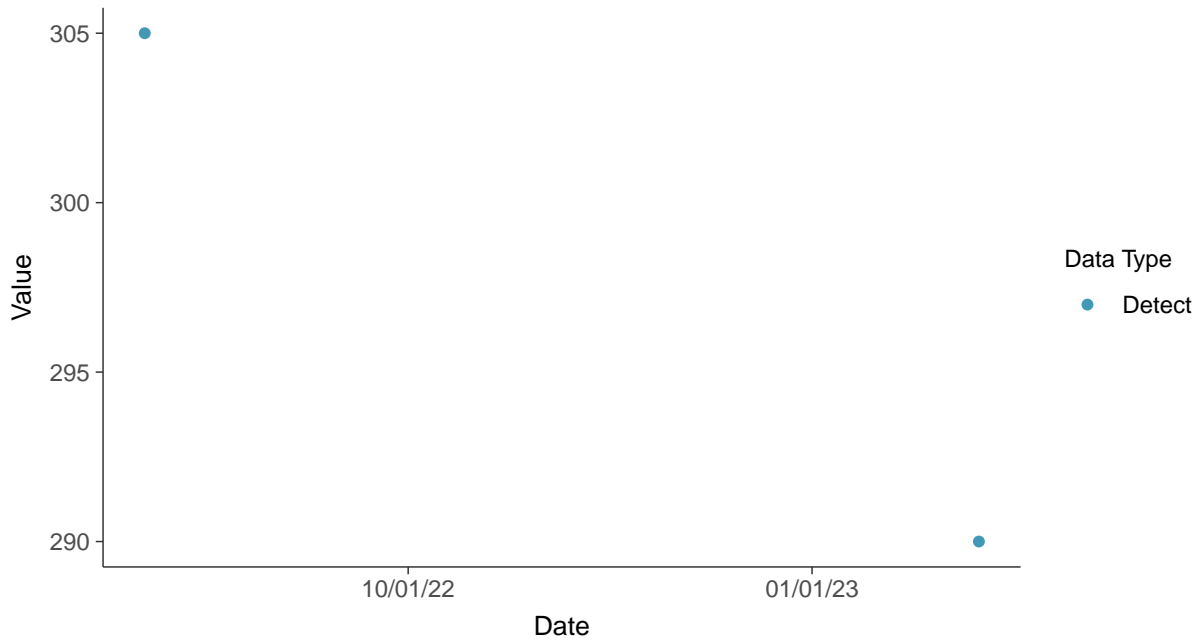


Other: Hardness, MW-7

ID: 07_3_17

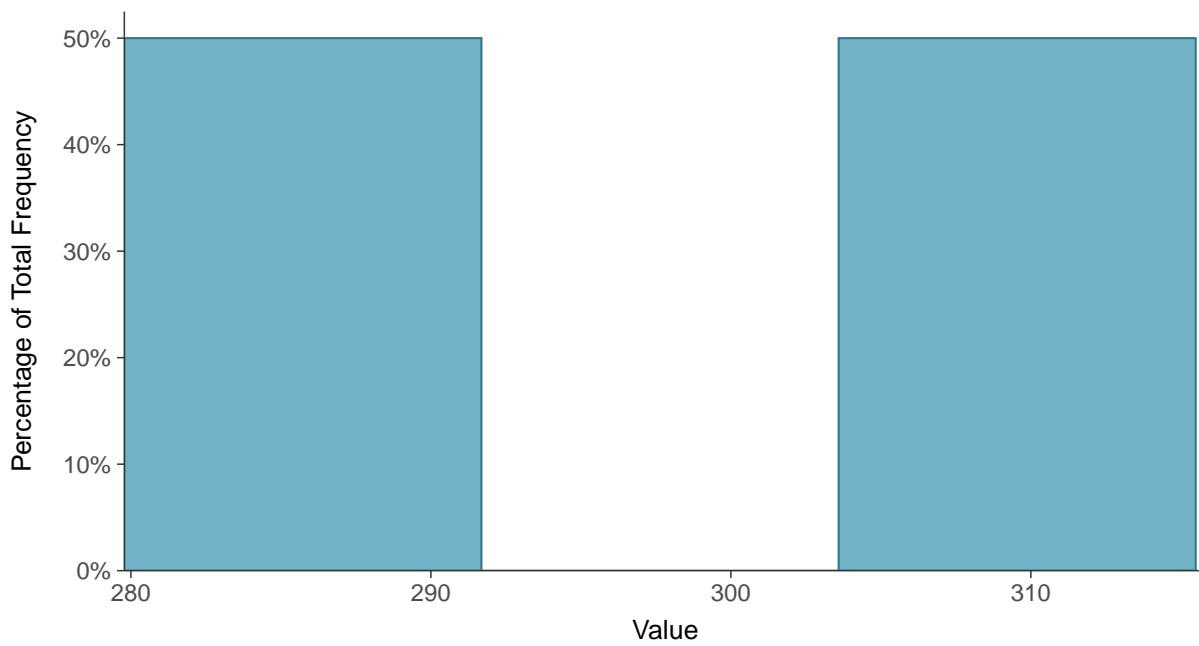
Scatter Plot

Hardness, MW-7 (mg/L)



Histogram

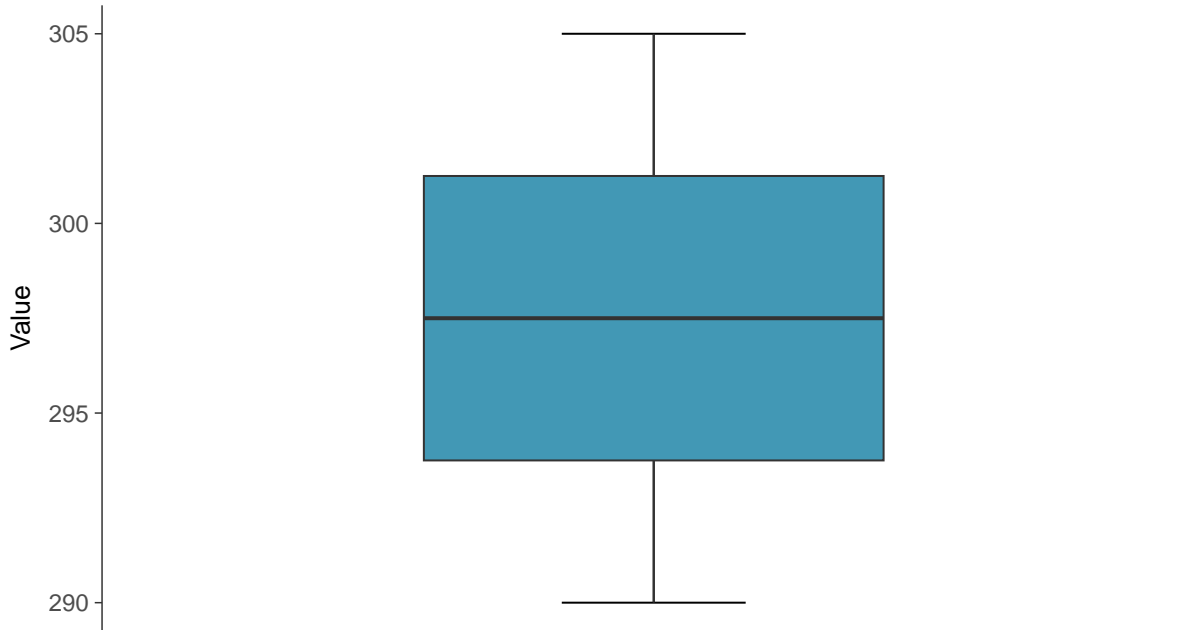
Hardness, MW-7 (mg/L)





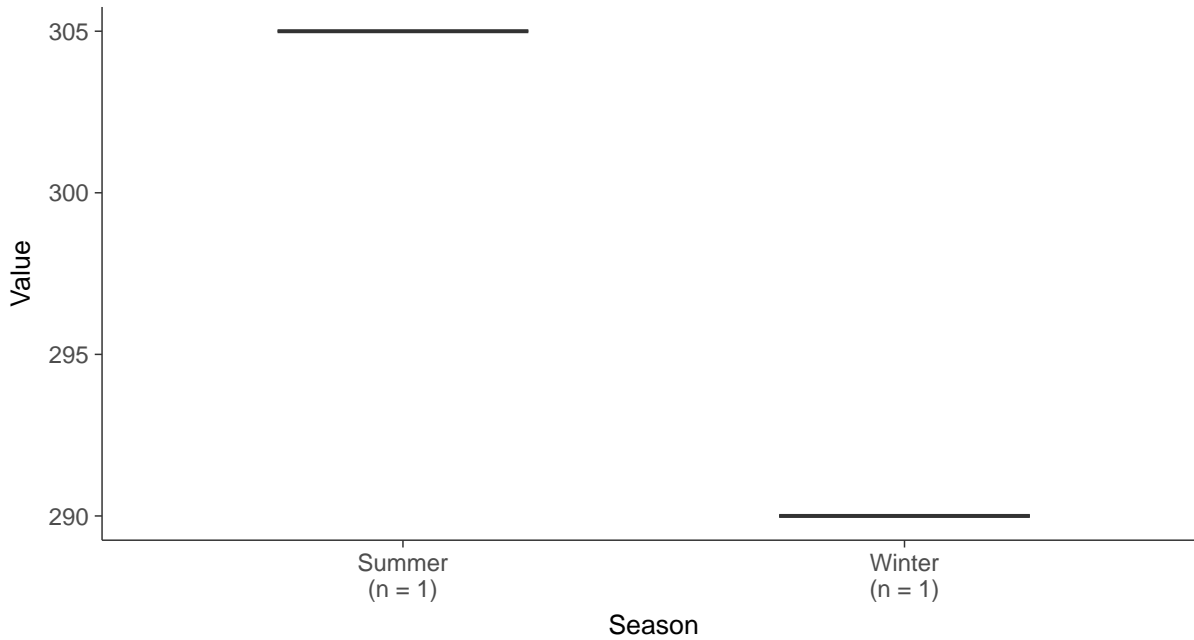
Boxplot

Hardness, MW-7 (mg/L)



Boxplot by Season

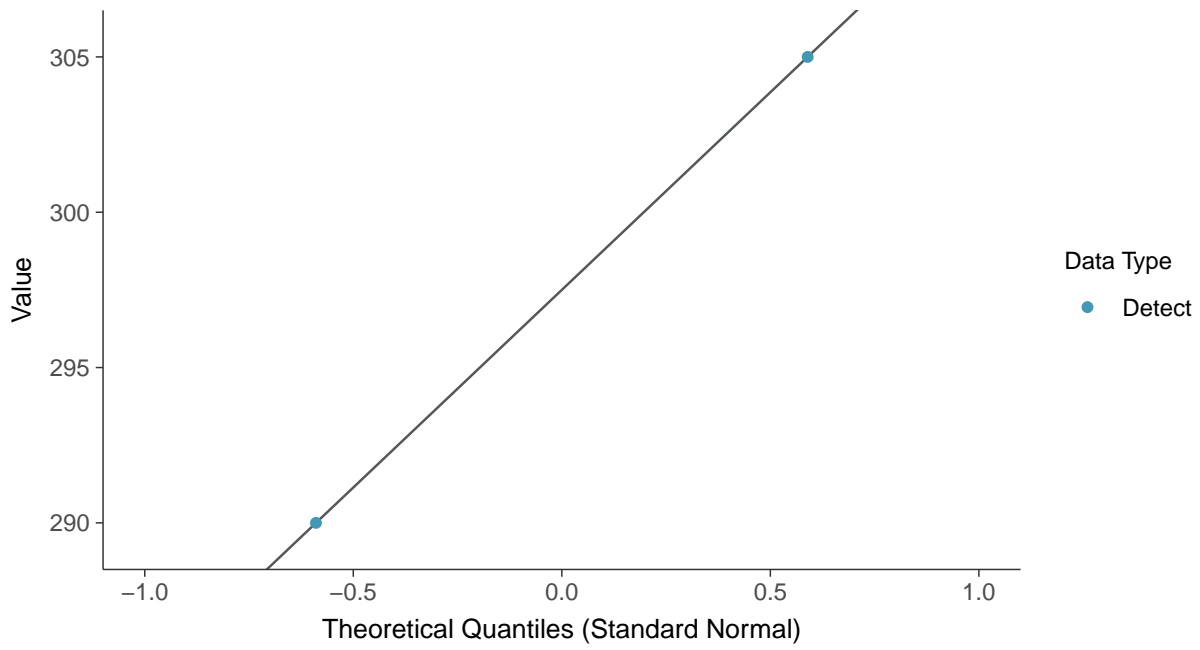
Hardness, MW-7 (mg/L)





Normal Q-Q plot

Hardness, MW-7 (mg/L)





Other: Magnesium, MW-7

ID: 07_3_20

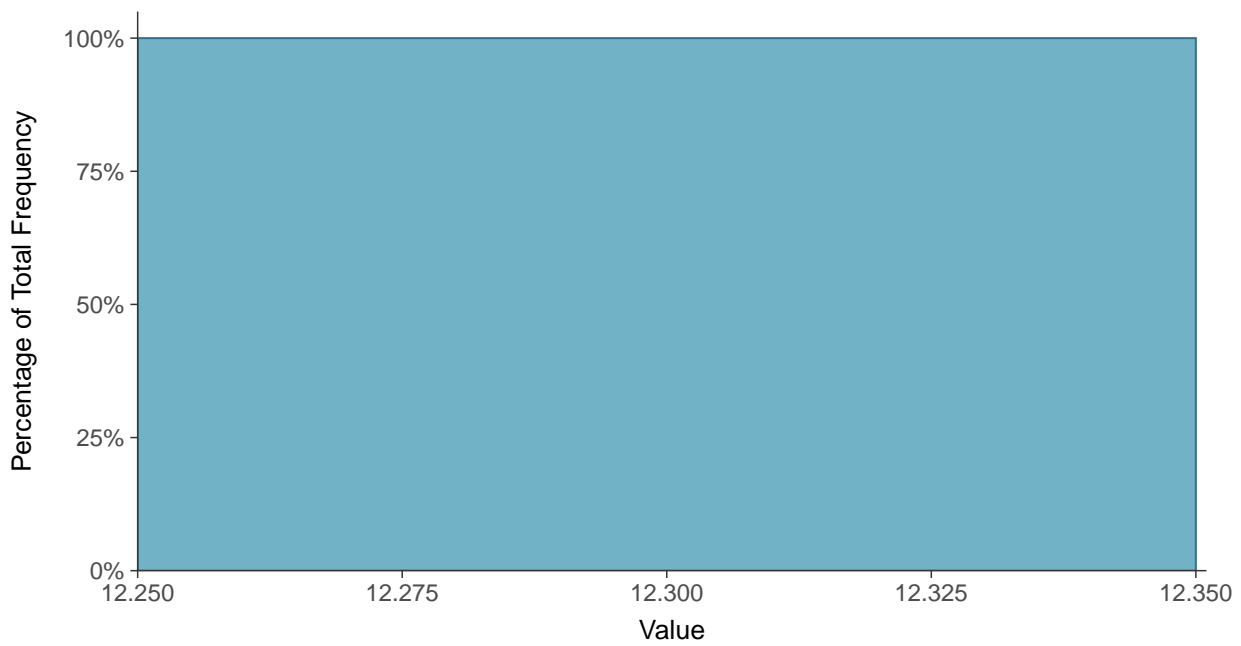
Scatter Plot

Magnesium, MW-7 (mg/L)



Histogram

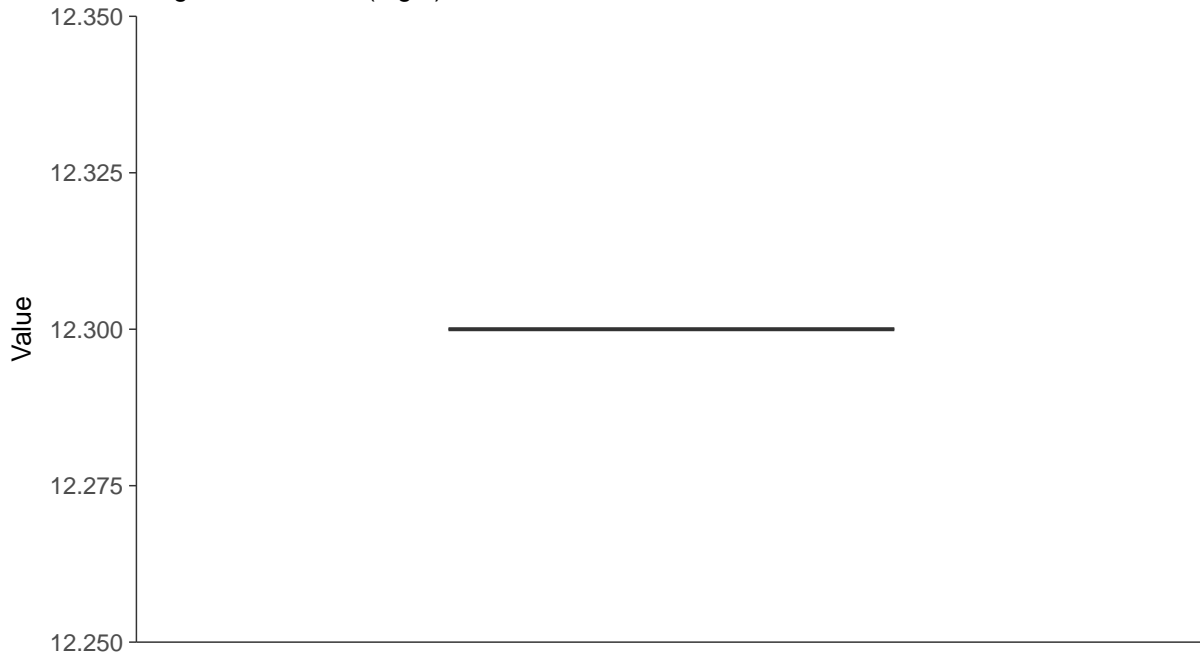
Magnesium, MW-7 (mg/L)





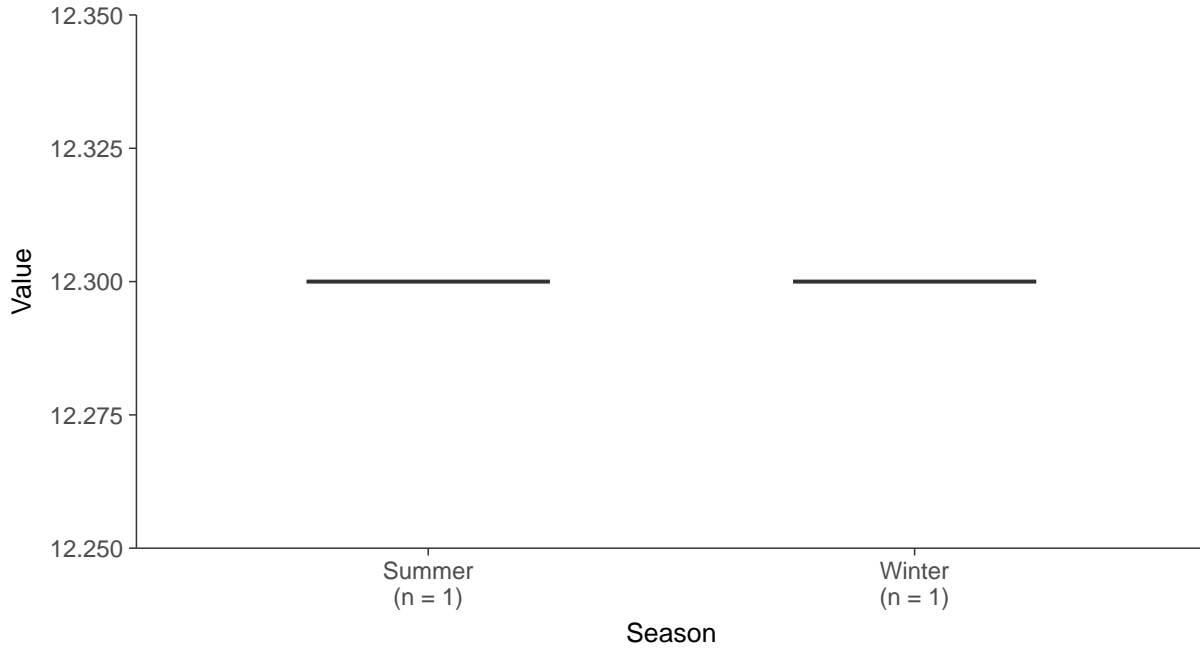
Boxplot

Magnesium, MW-7 (mg/L)



Boxplot by Season

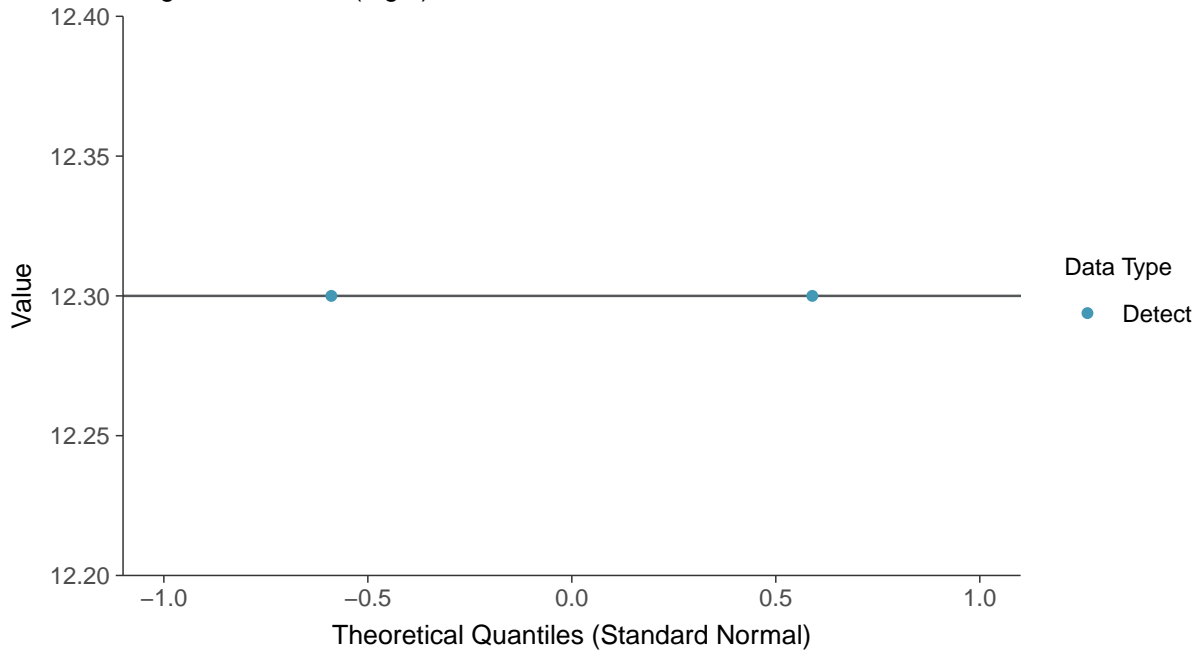
Magnesium, MW-7 (mg/L)





Normal Q-Q plot

Magnesium, MW-7 (mg/L)



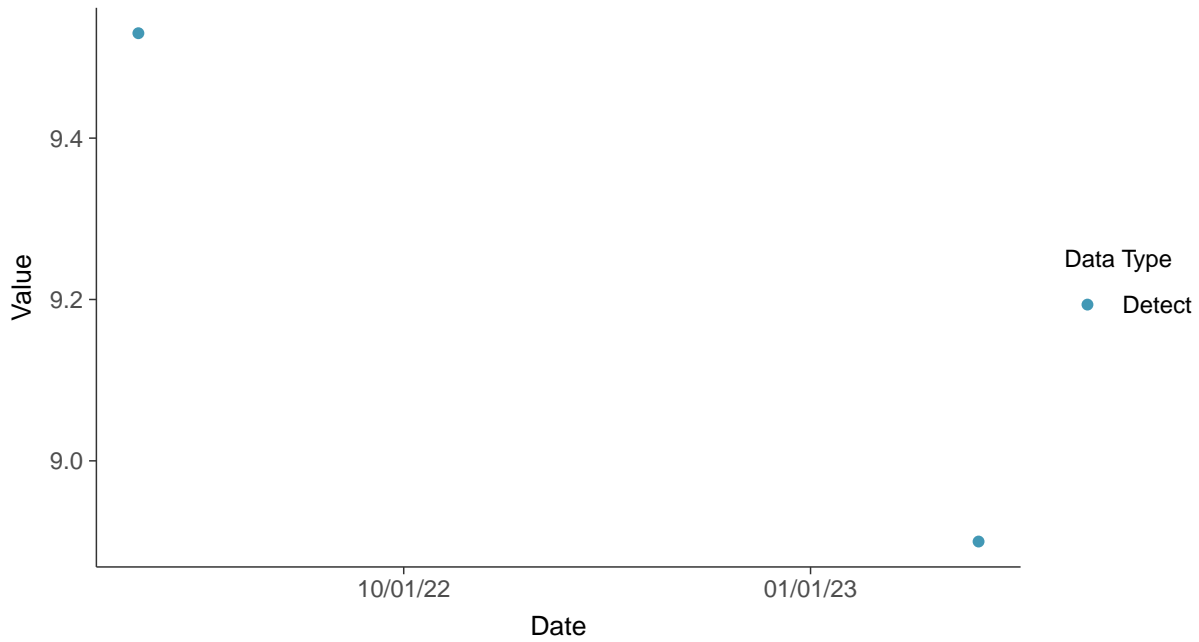


Other: Potassium, MW-7

ID: 07_3_23

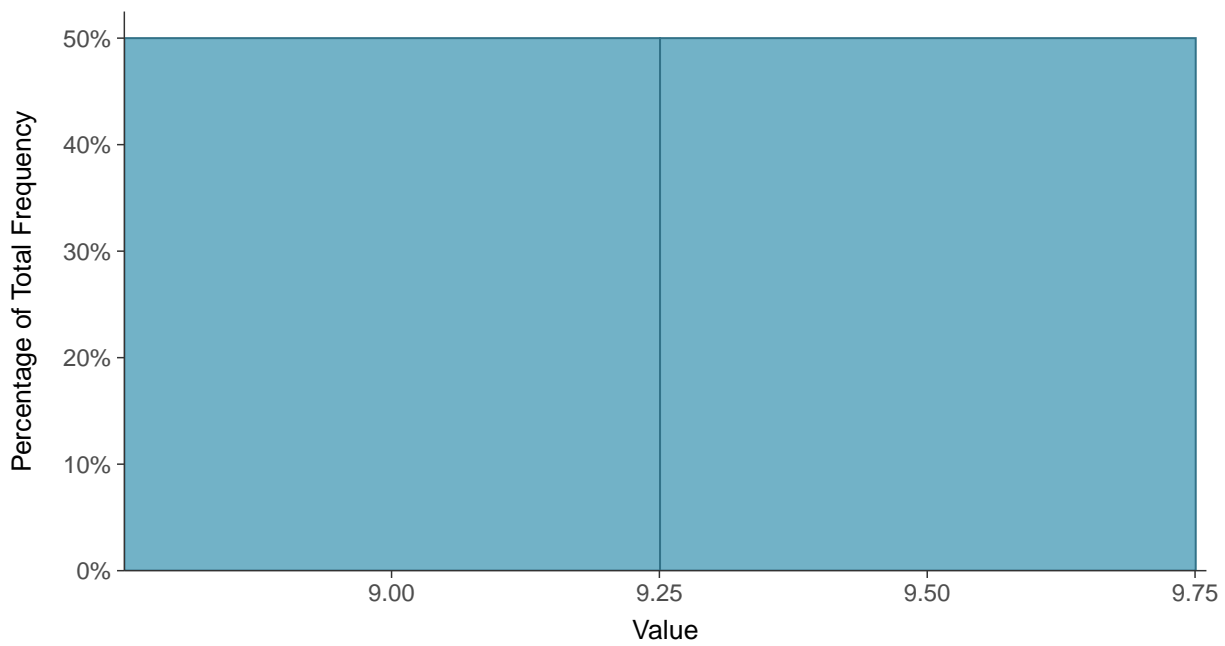
Scatter Plot

Potassium, MW-7 (mg/L)



Histogram

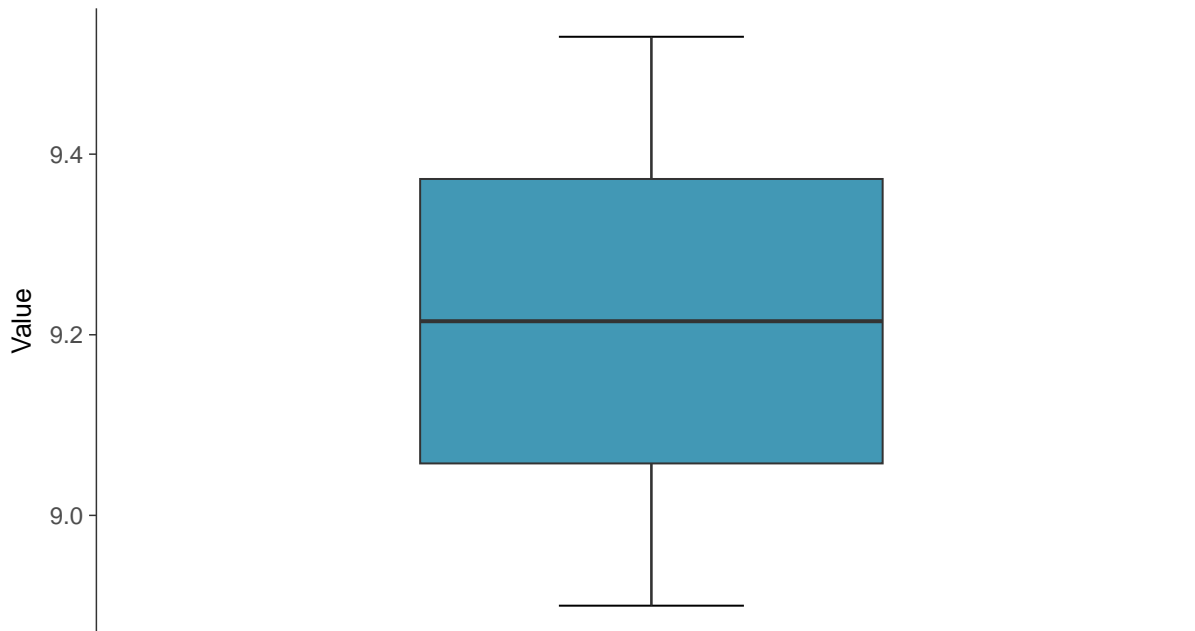
Potassium, MW-7 (mg/L)





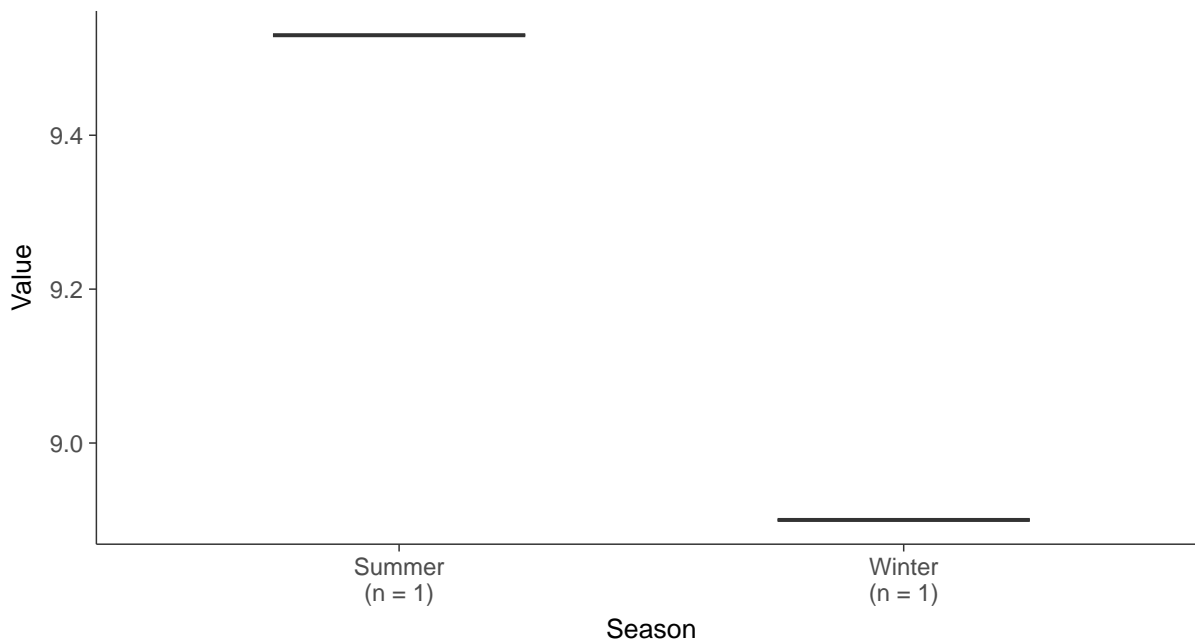
Boxplot

Potassium, MW-7 (mg/L)



Boxplot by Season

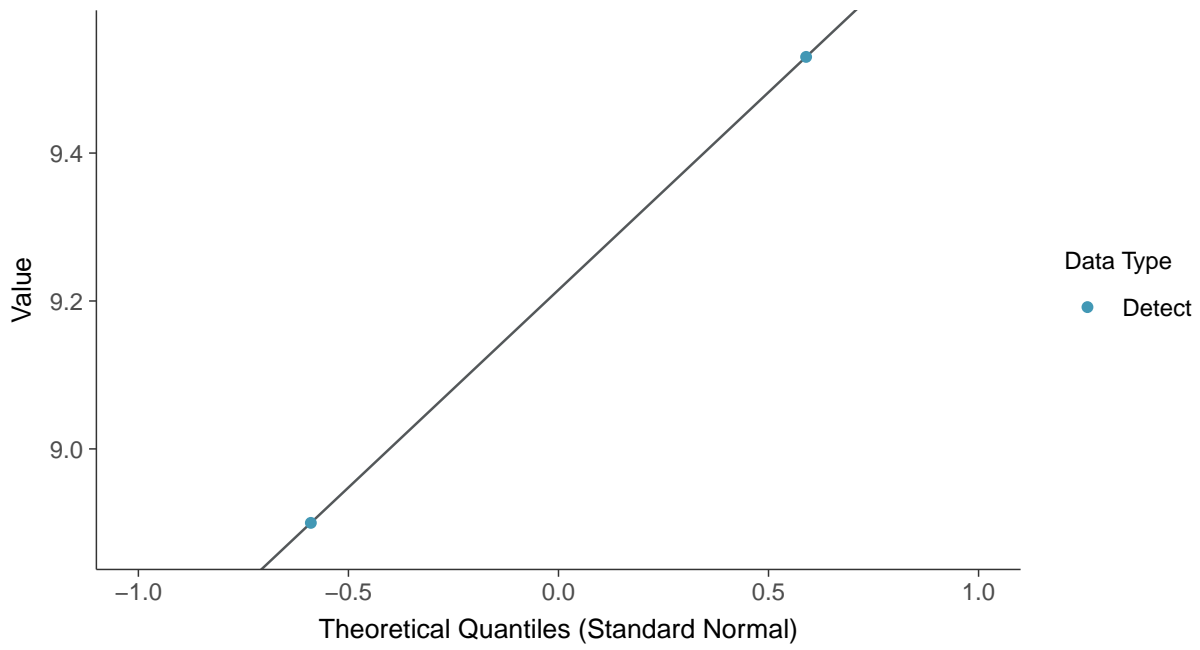
Potassium, MW-7 (mg/L)





Normal Q-Q plot

Potassium, MW-7 (mg/L)



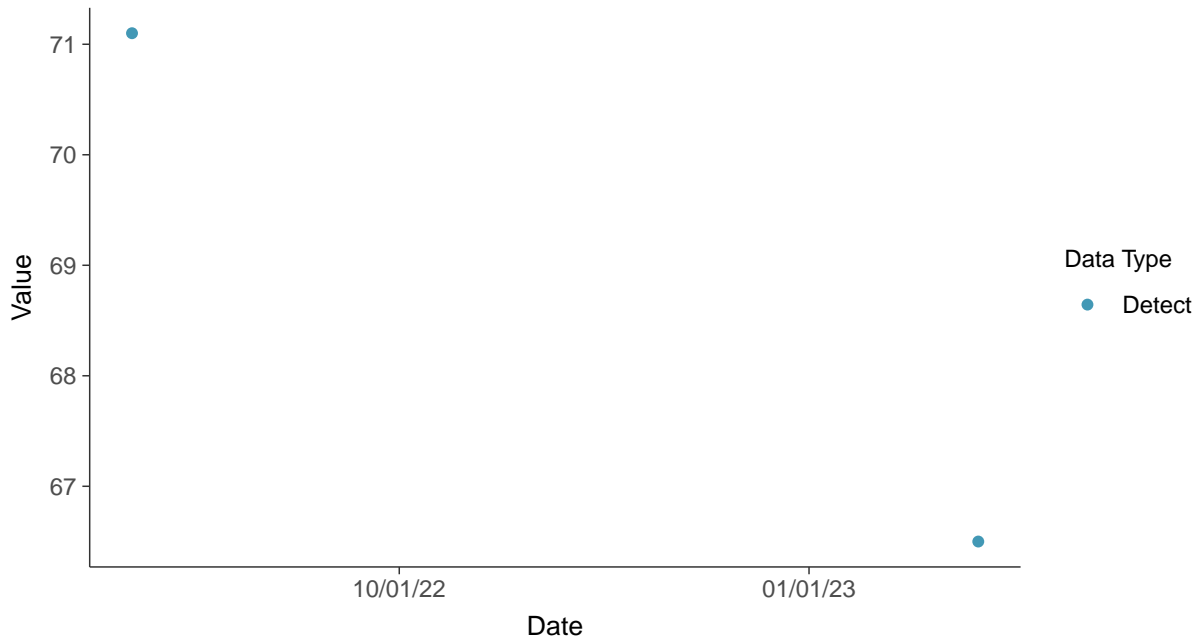


Other: Sodium, MW-7

ID: 07_3_28

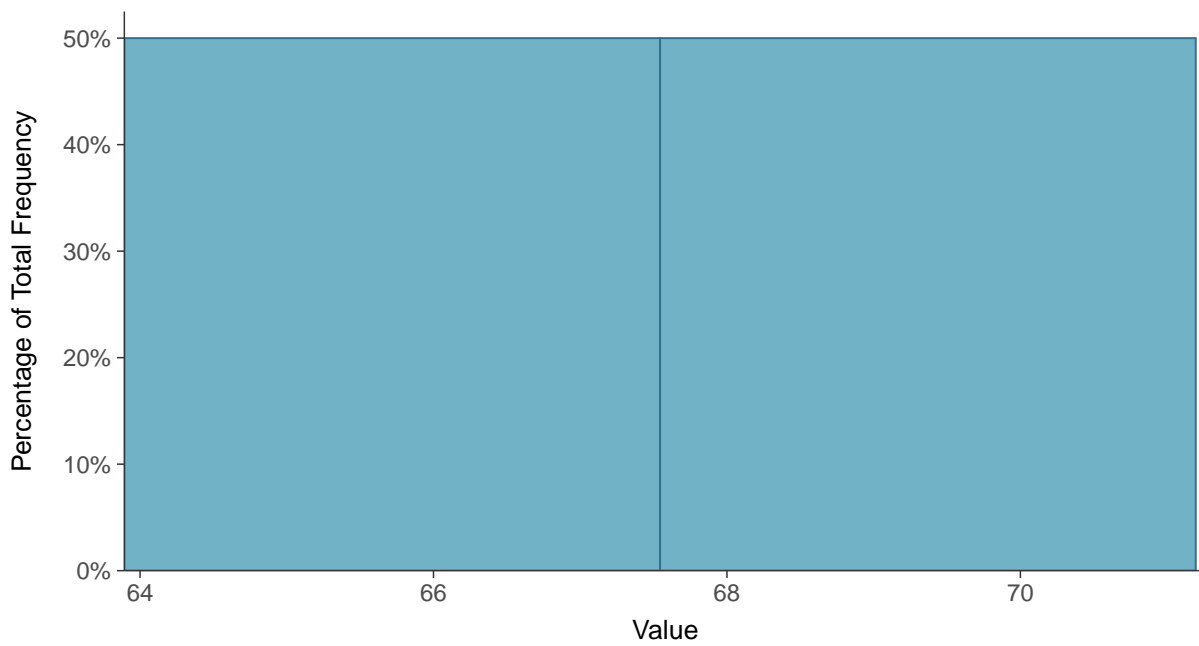
Scatter Plot

Sodium, MW-7 (mg/L)



Histogram

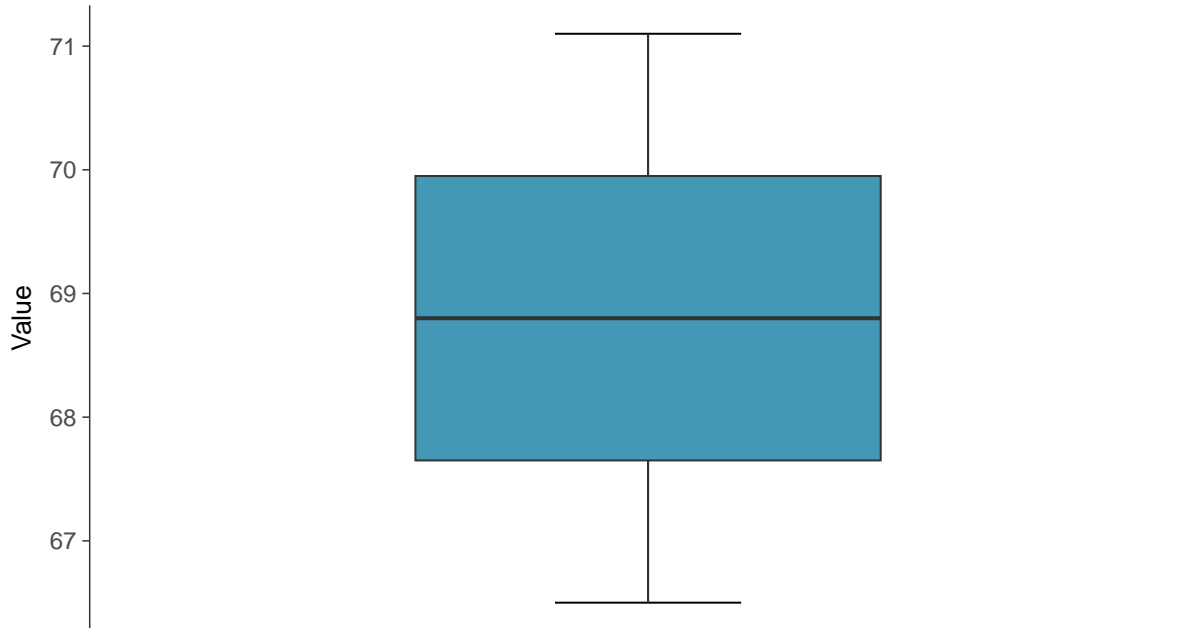
Sodium, MW-7 (mg/L)





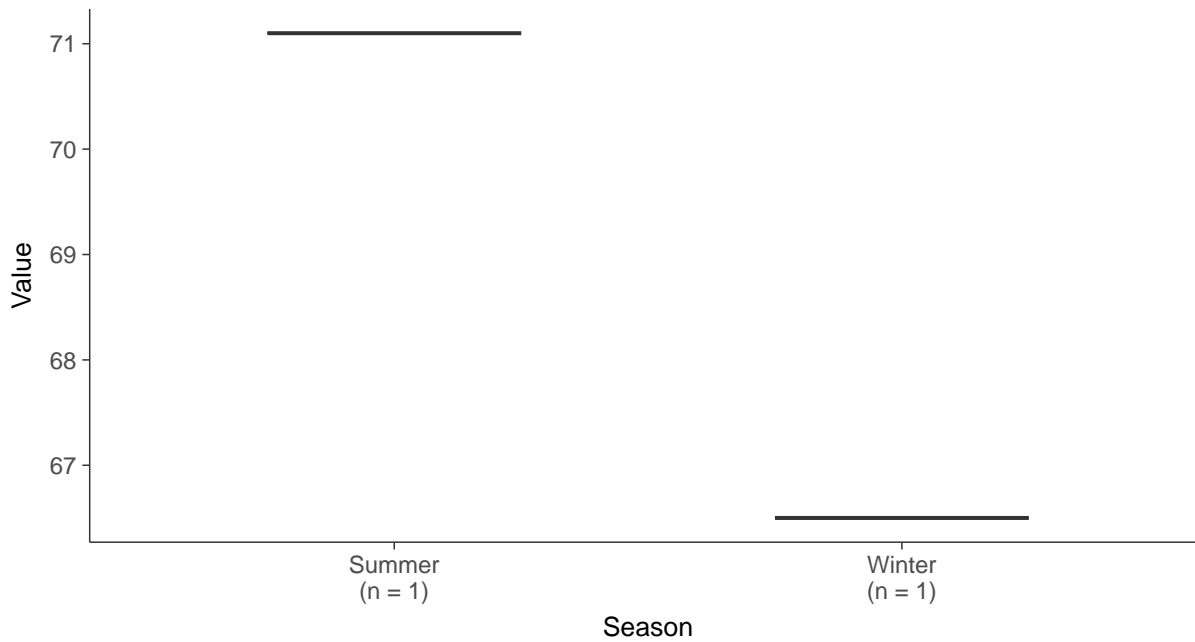
Boxplot

Sodium, MW-7 (mg/L)



Boxplot by Season

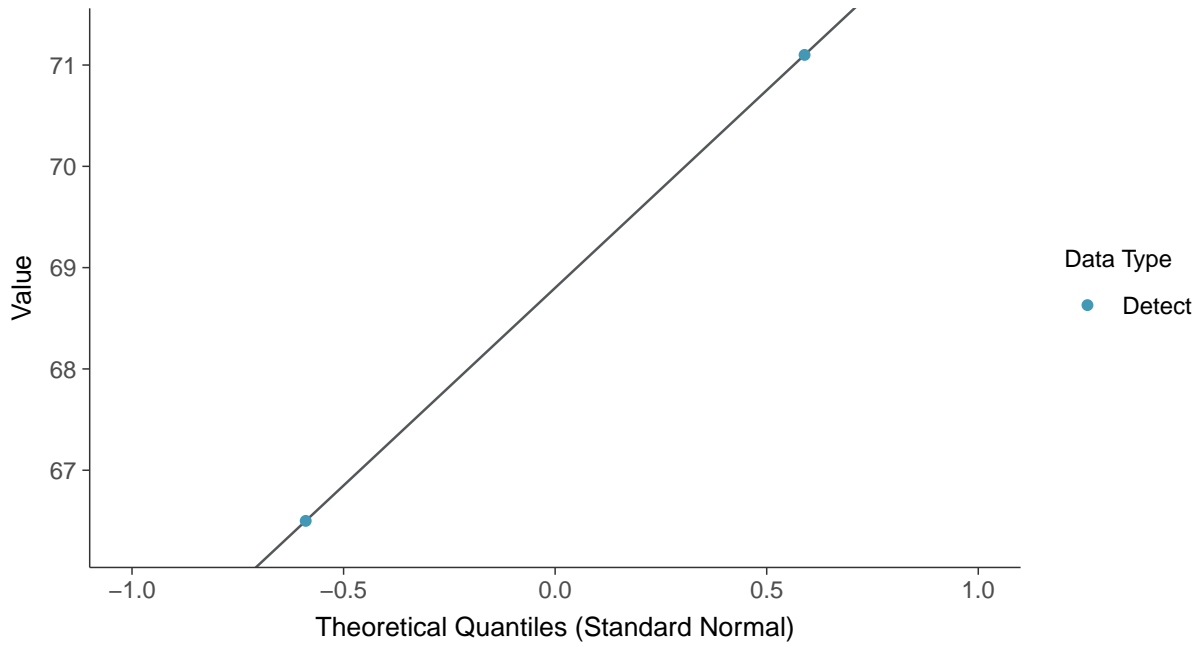
Sodium, MW-7 (mg/L)





Normal Q-Q plot

Sodium, MW-7 (mg/L)



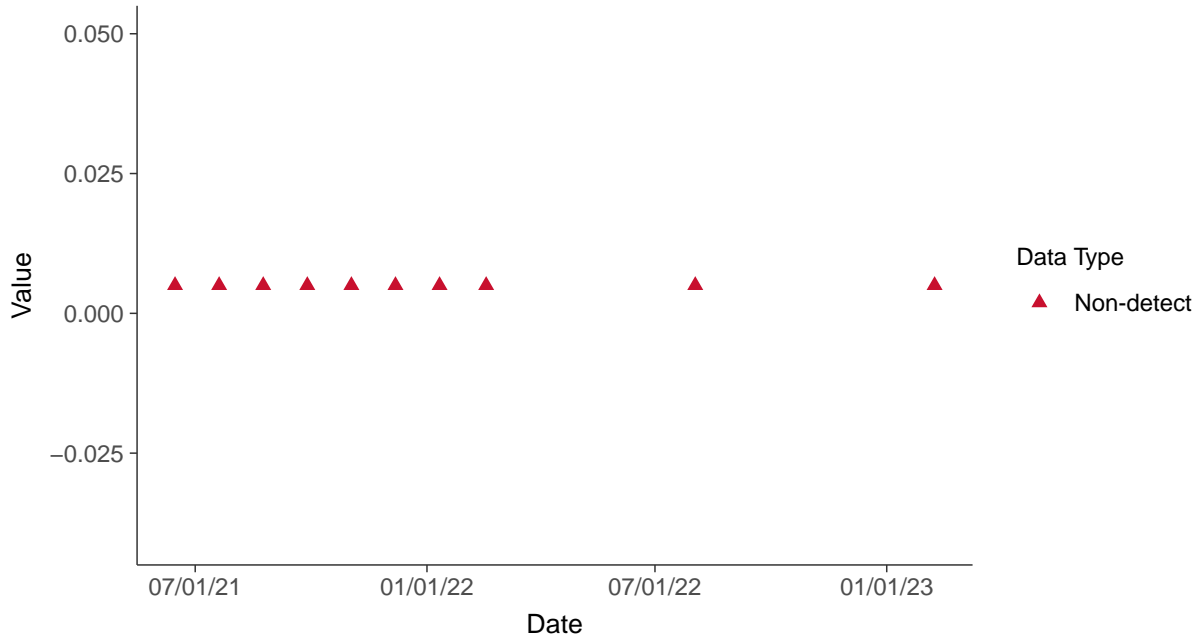


Part 115: Copper, MW-7

ID: 07_5_37

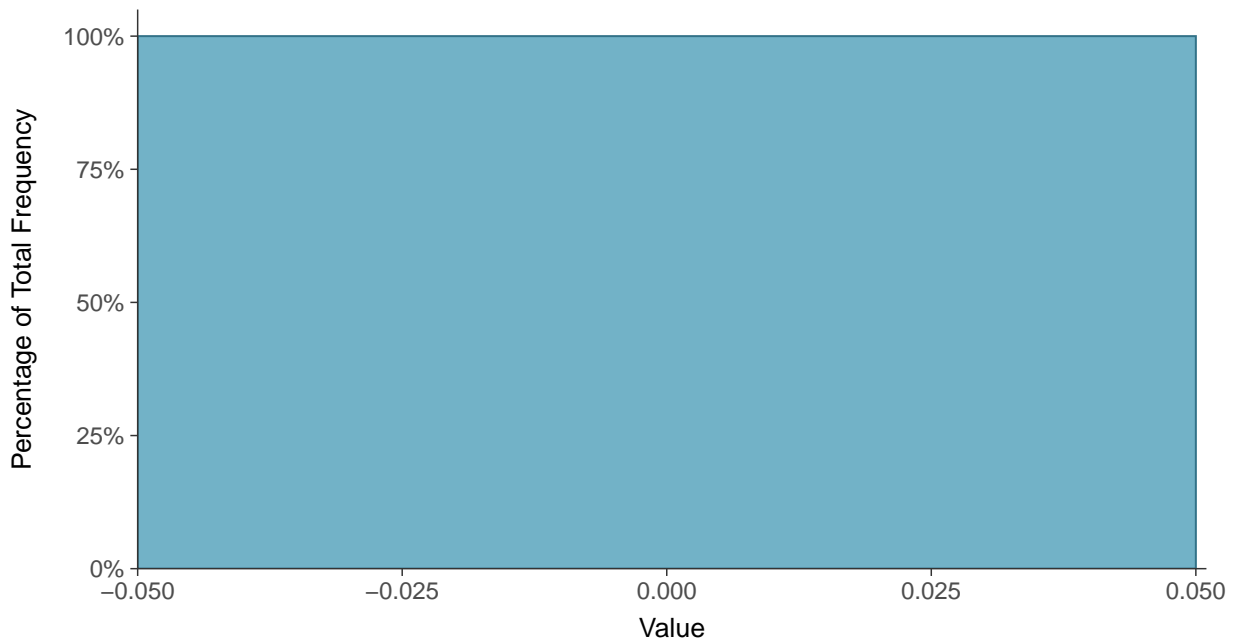
Scatter Plot

Copper, MW-7 (mg/L)



Histogram

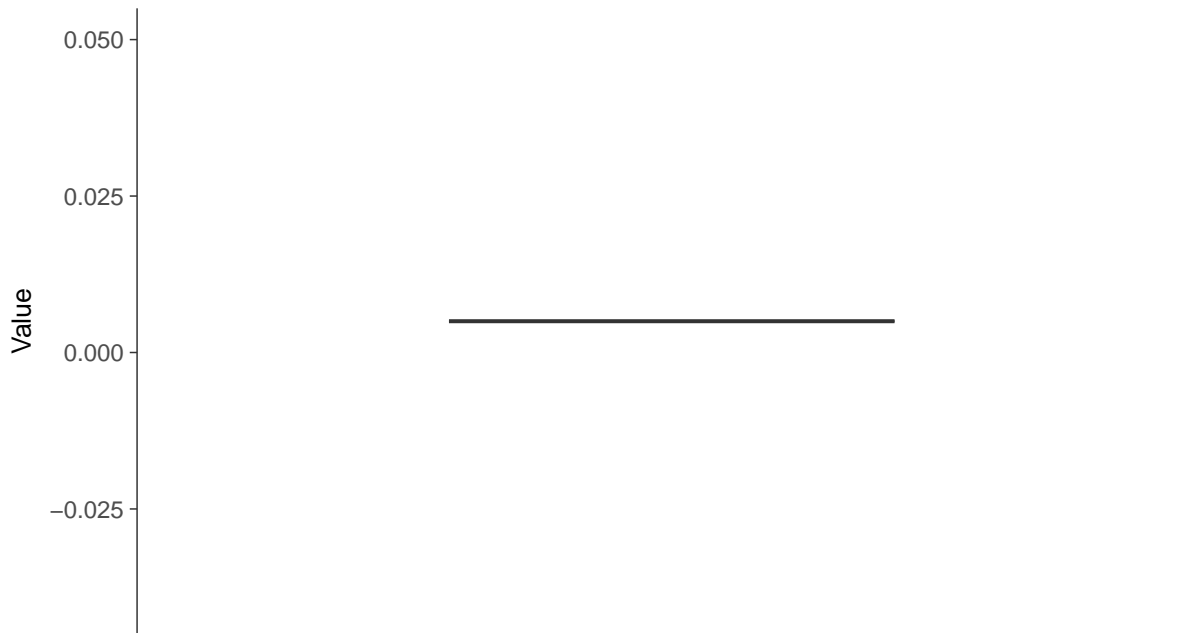
Copper, MW-7 (mg/L)





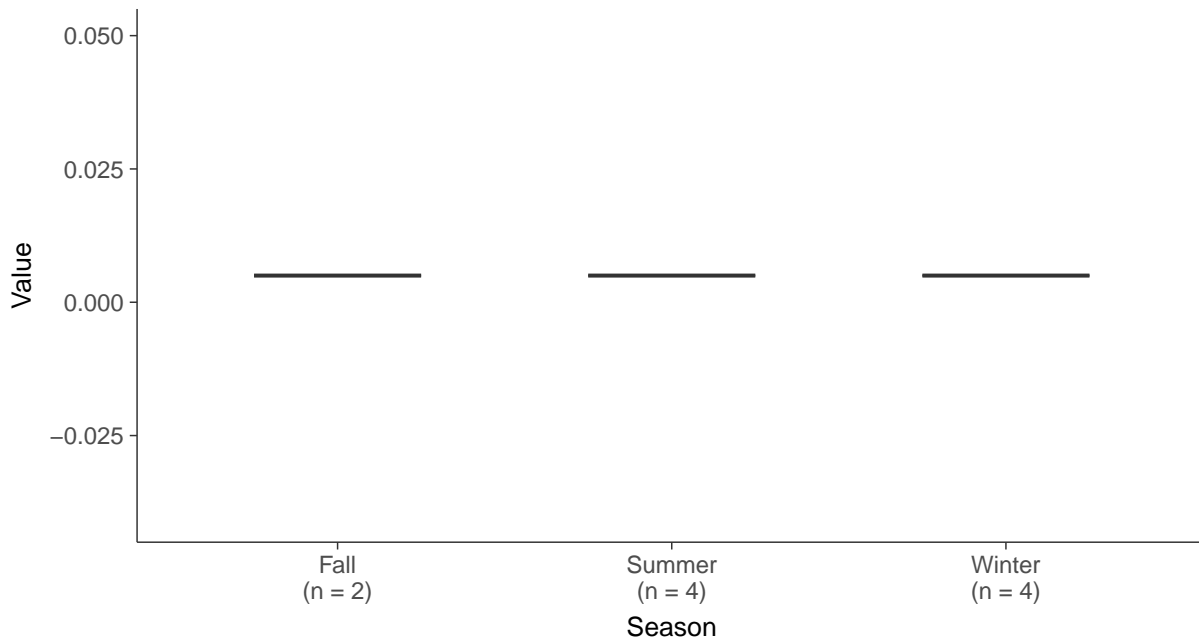
Boxplot

Copper, MW-7 (mg/L)



Boxplot by Season

Copper, MW-7 (mg/L)

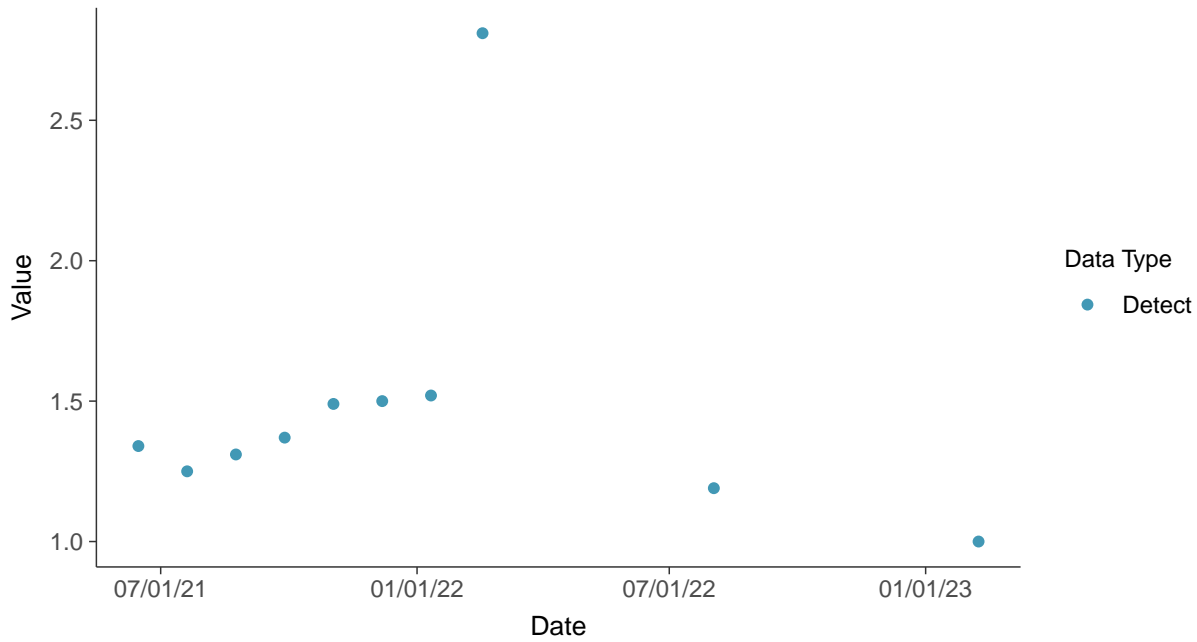


Part 115: Iron, MW-7

ID: 07_5_38

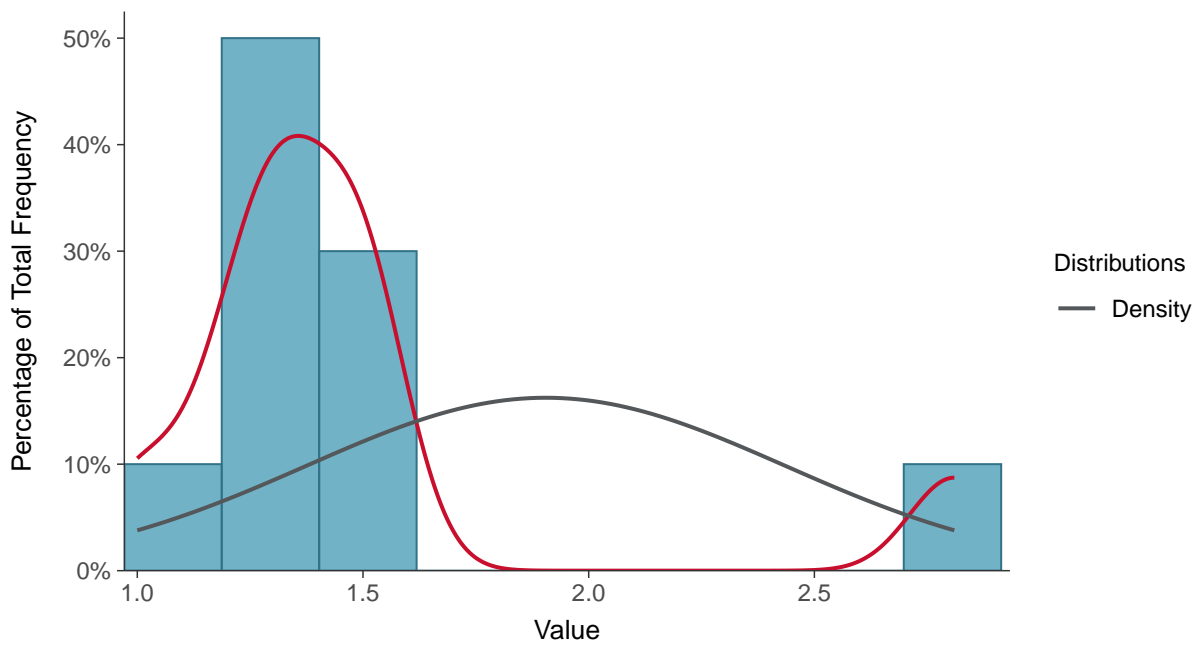
Scatter Plot

Iron, MW-7 (mg/L)



Histogram

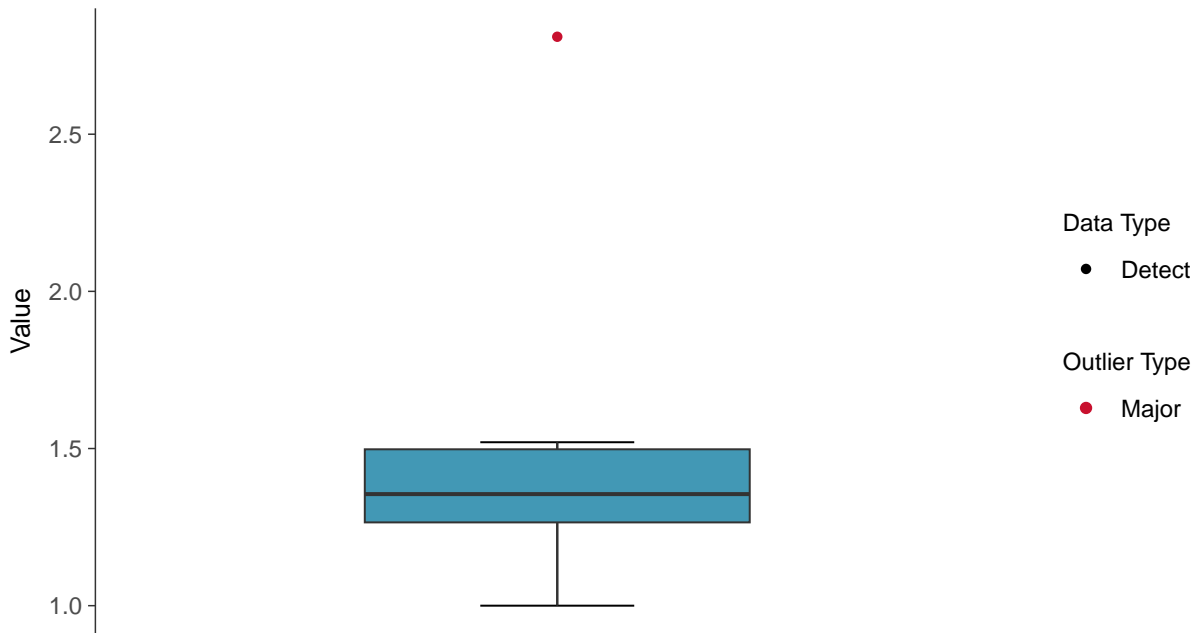
Iron, MW-7 (mg/L)





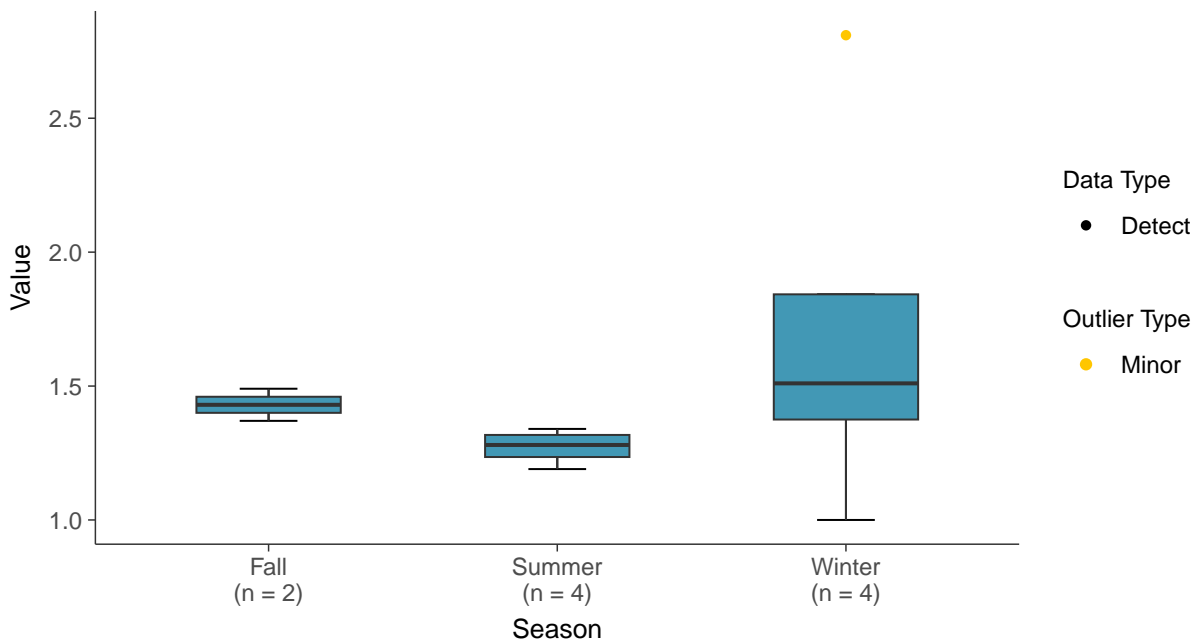
Boxplot

Iron, MW-7 (mg/L)



Boxplot by Season

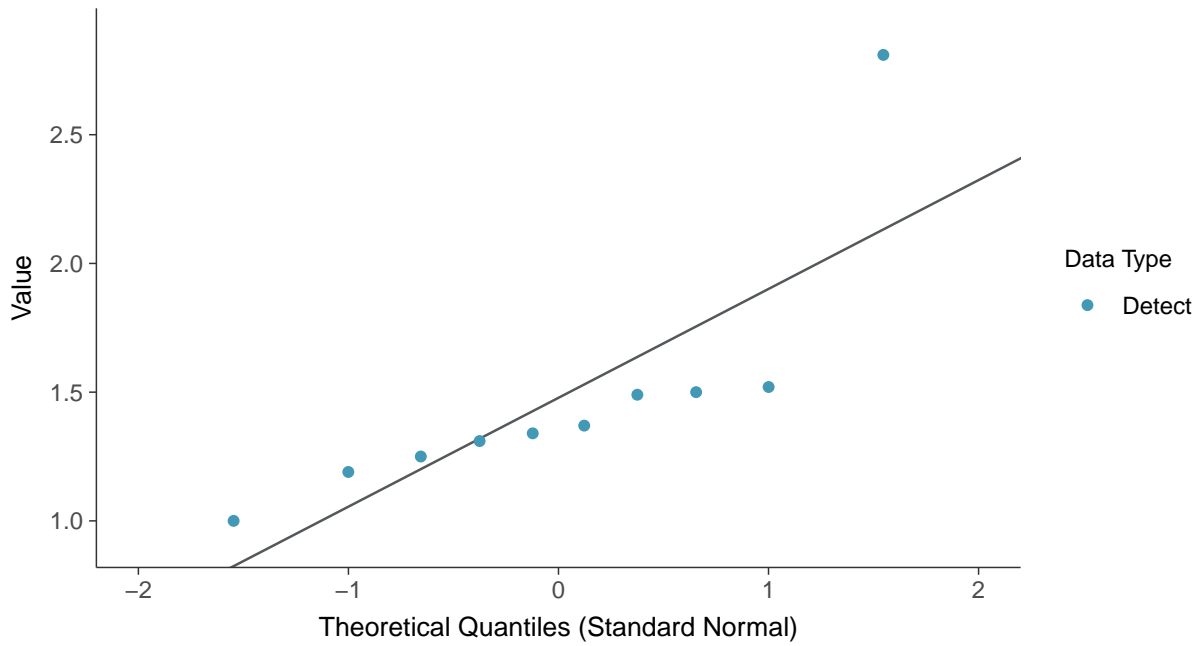
Iron, MW-7 (mg/L)





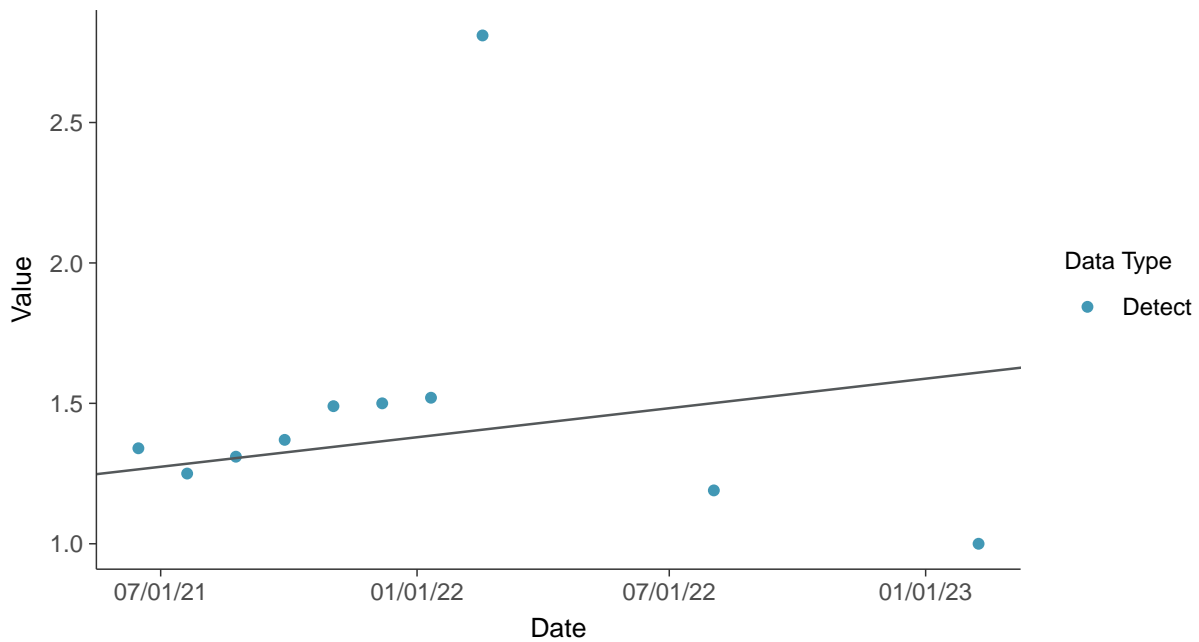
Normal Q-Q plot

Iron, MW-7 (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

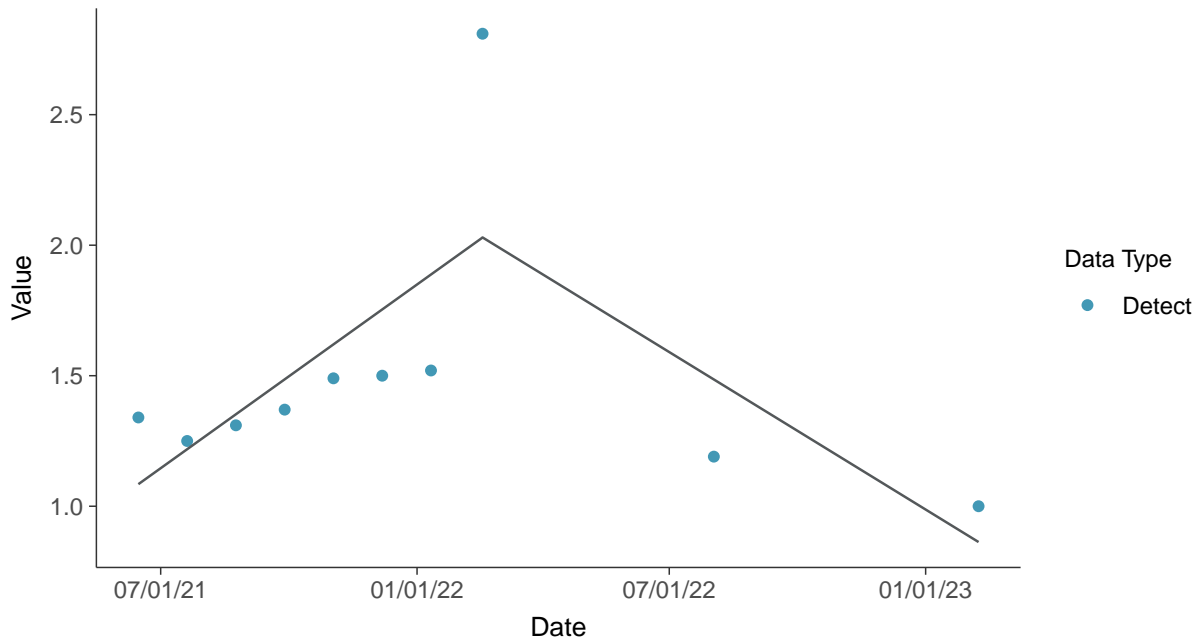
Iron, MW-7 (mg/L)





Trend Regression: Piecewise Linear-Linear

Iron, MW-7 (mg/L)



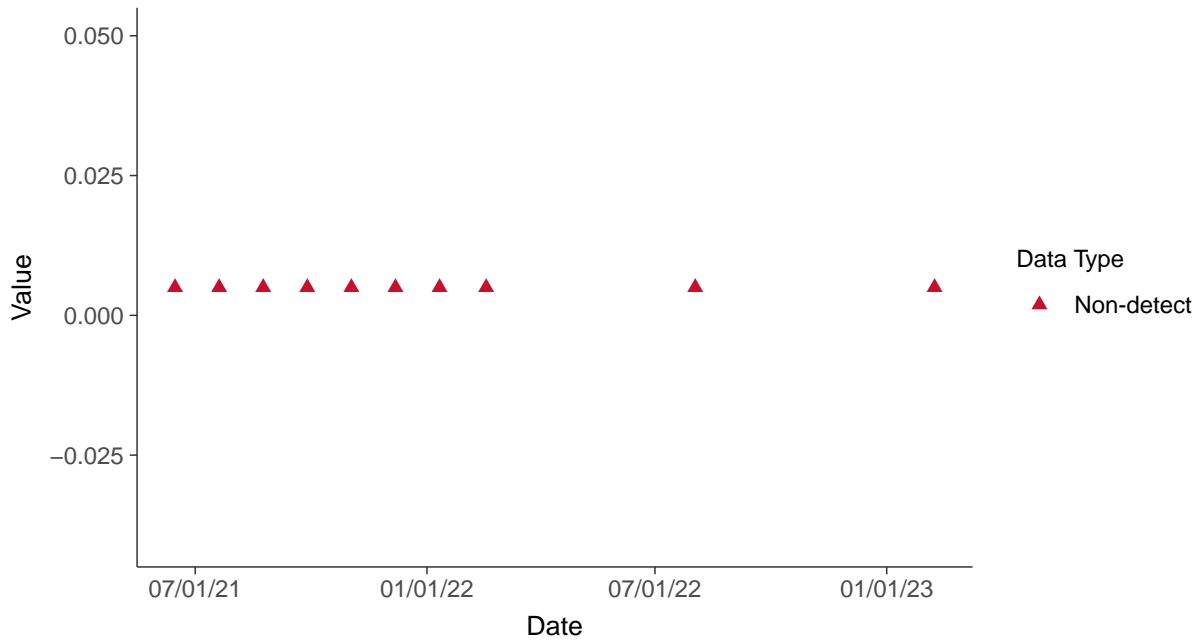


Part 115: Nickel, MW-7

ID: 07_5_39

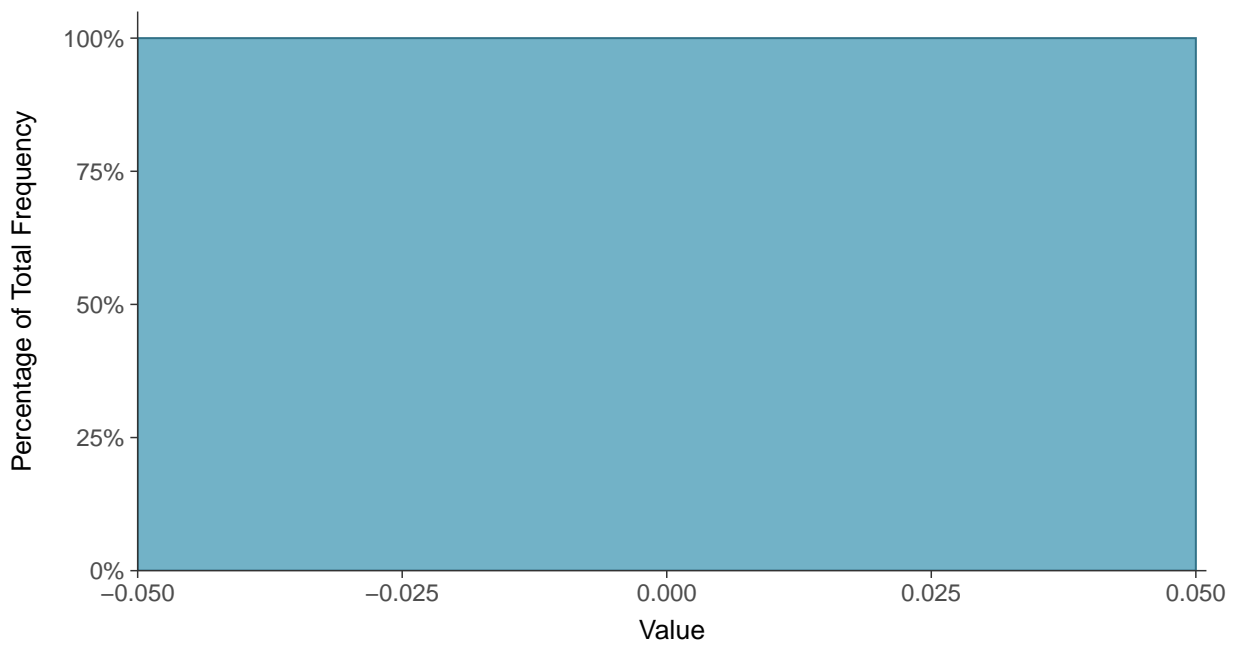
Scatter Plot

Nickel, MW-7 (mg/L)



Histogram

Nickel, MW-7 (mg/L)





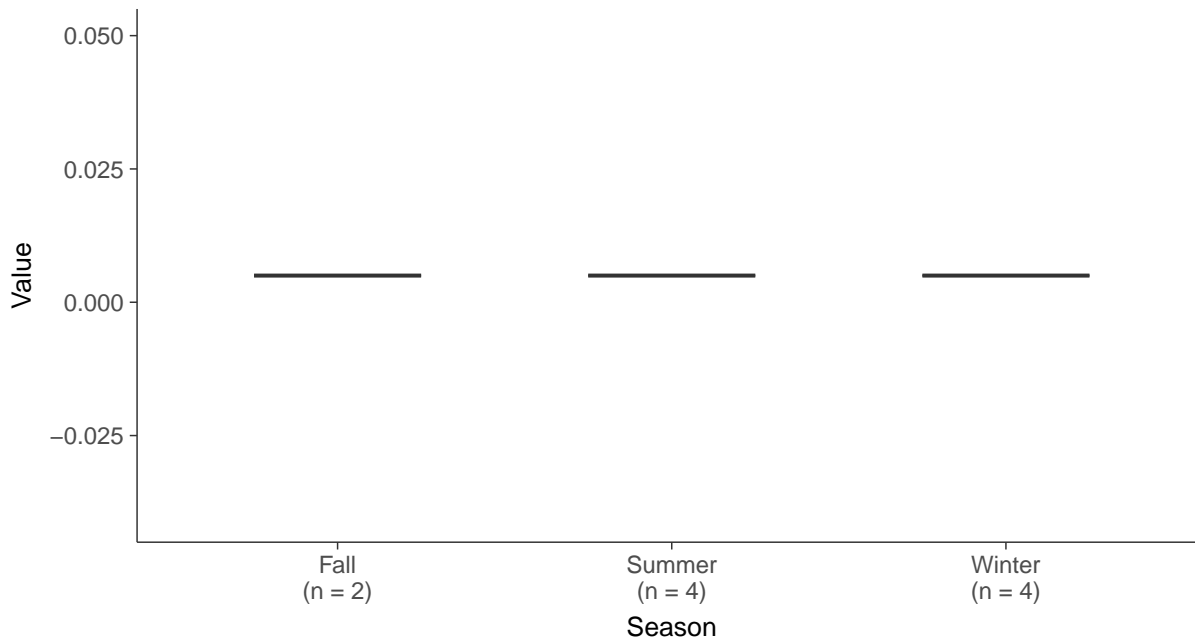
Boxplot

Nickel, MW-7 (mg/L)



Boxplot by Season

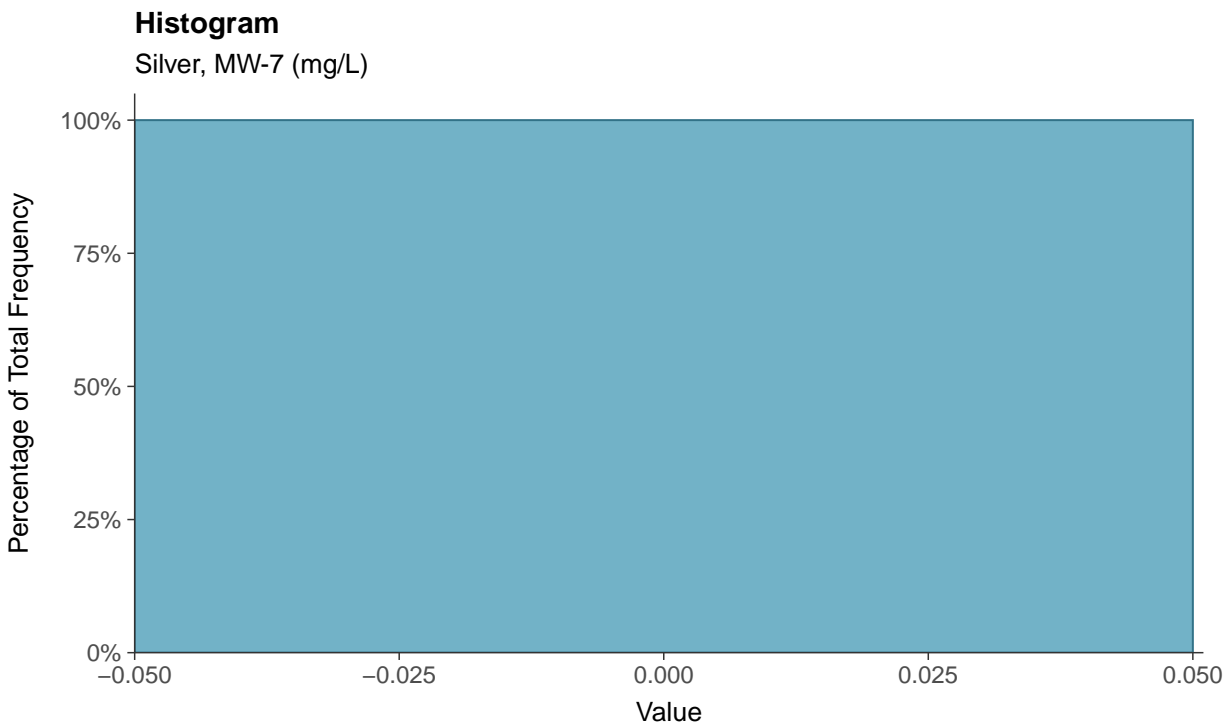
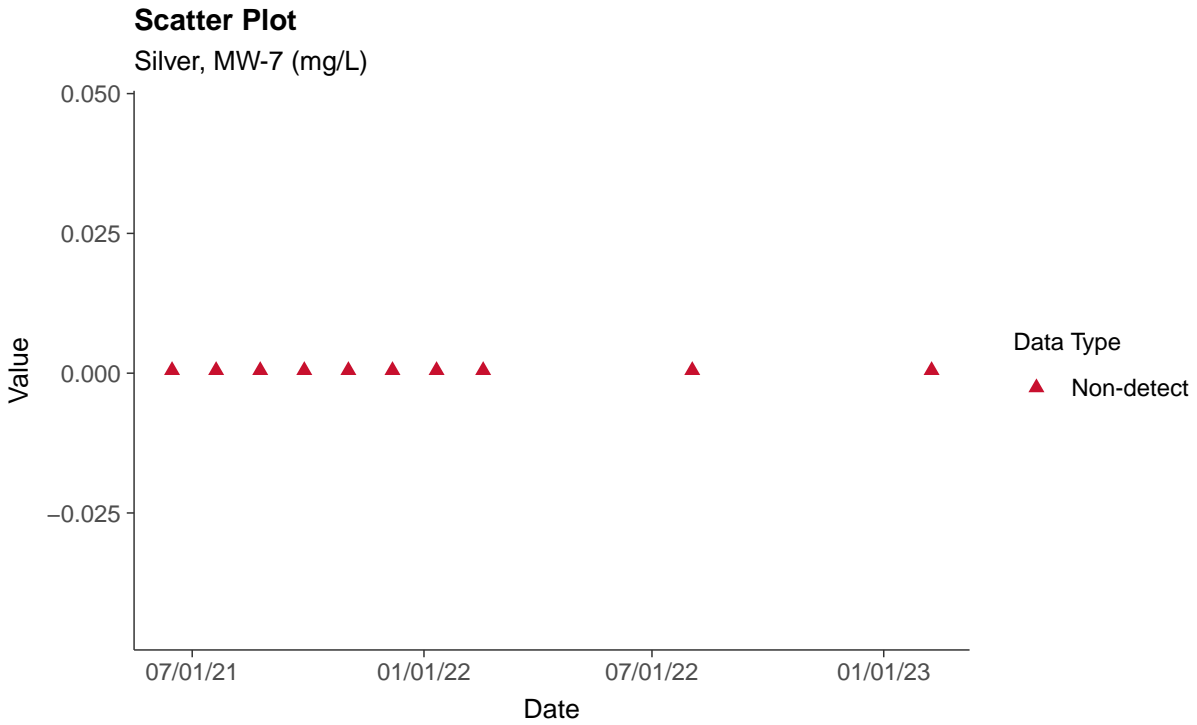
Nickel, MW-7 (mg/L)





Part 115: Silver, MW-7

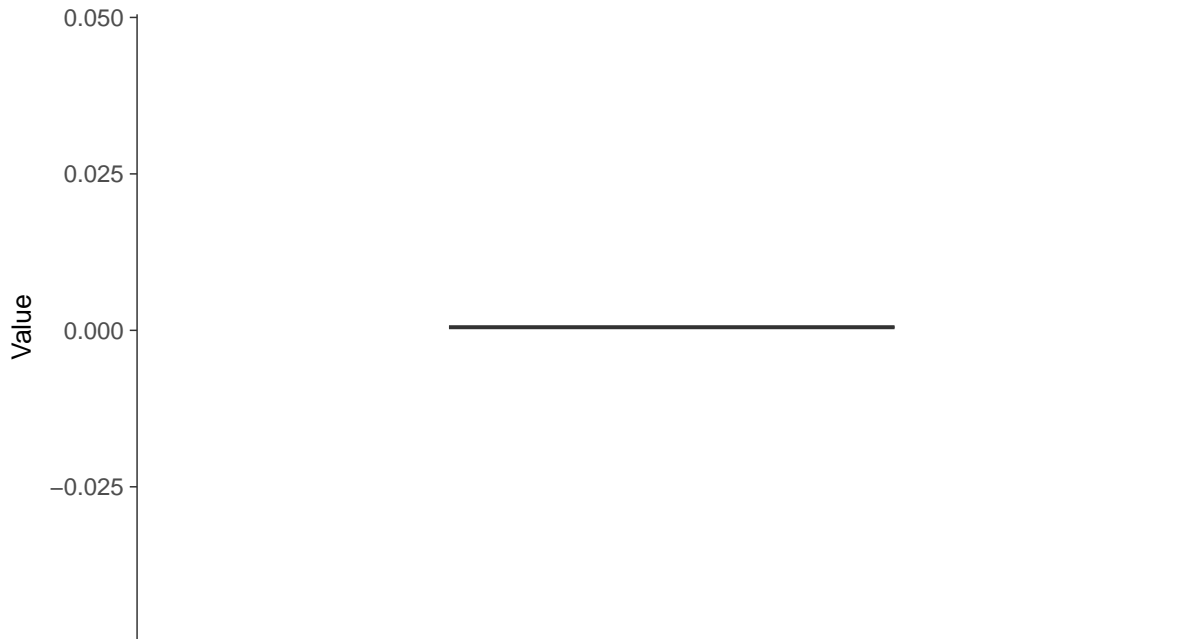
ID: 07_5_40





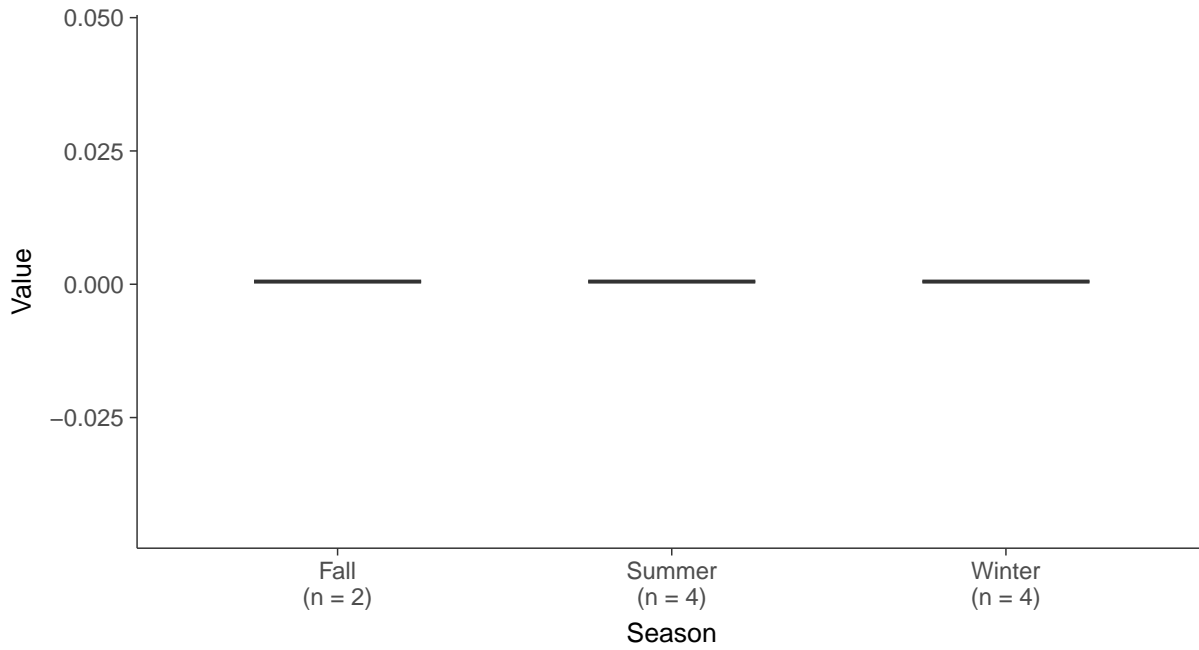
Boxplot

Silver, MW-7 (mg/L)



Boxplot by Season

Silver, MW-7 (mg/L)



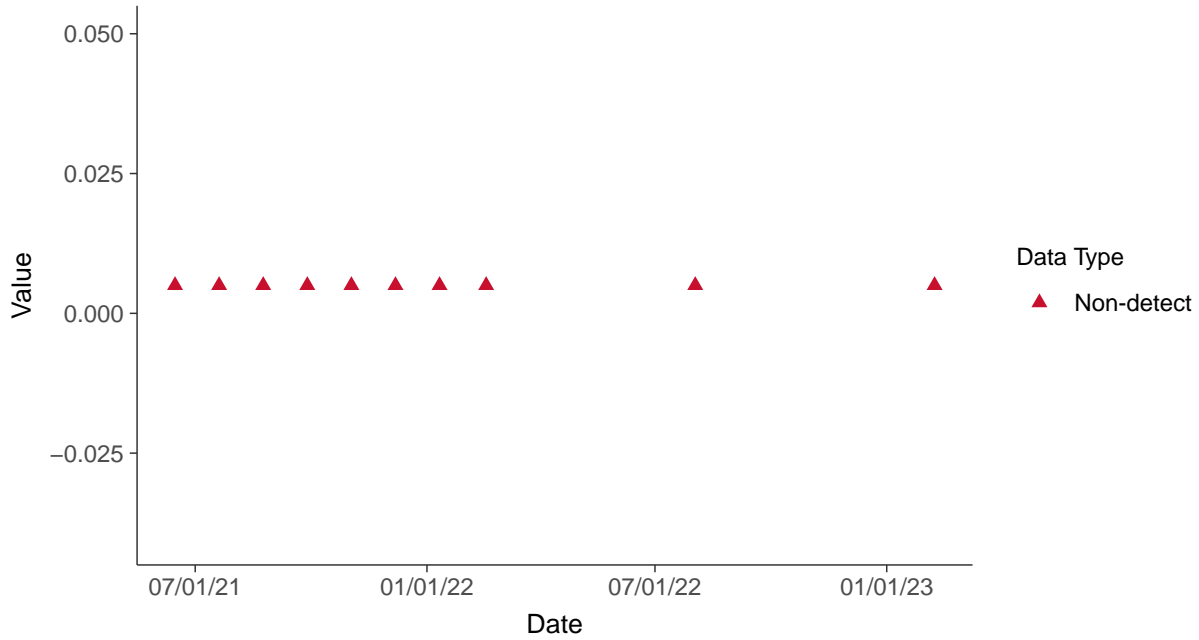


Part 115: Vanadium, MW-7

ID: 07_5_41

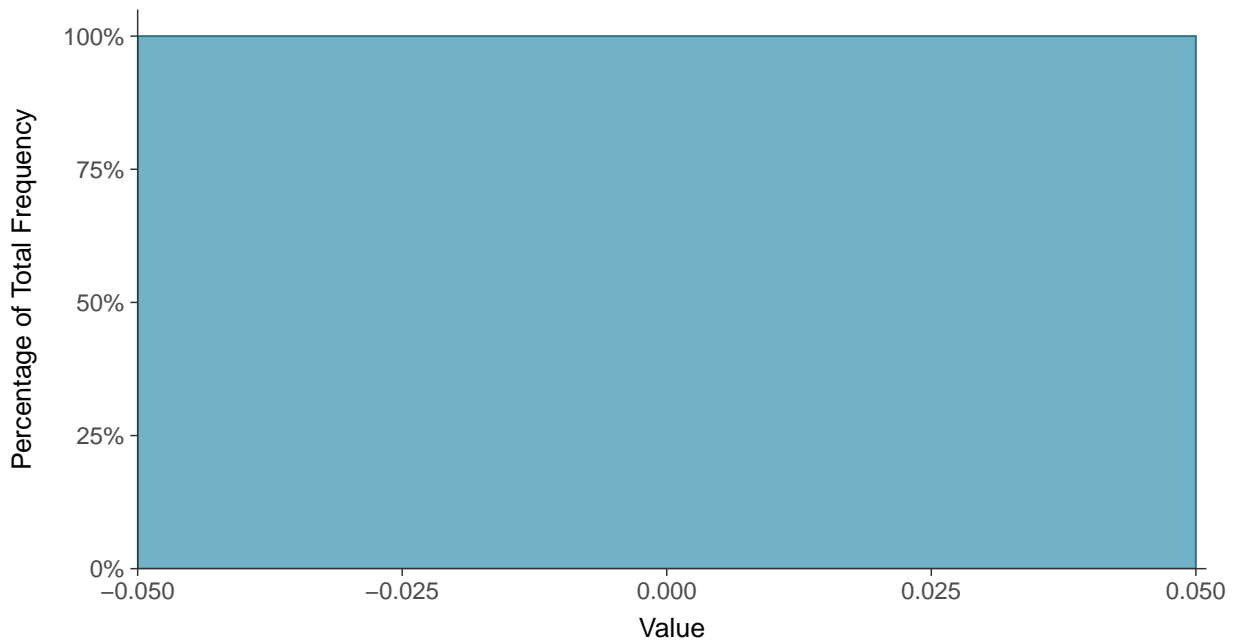
Scatter Plot

Vanadium, MW-7 (mg/L)



Histogram

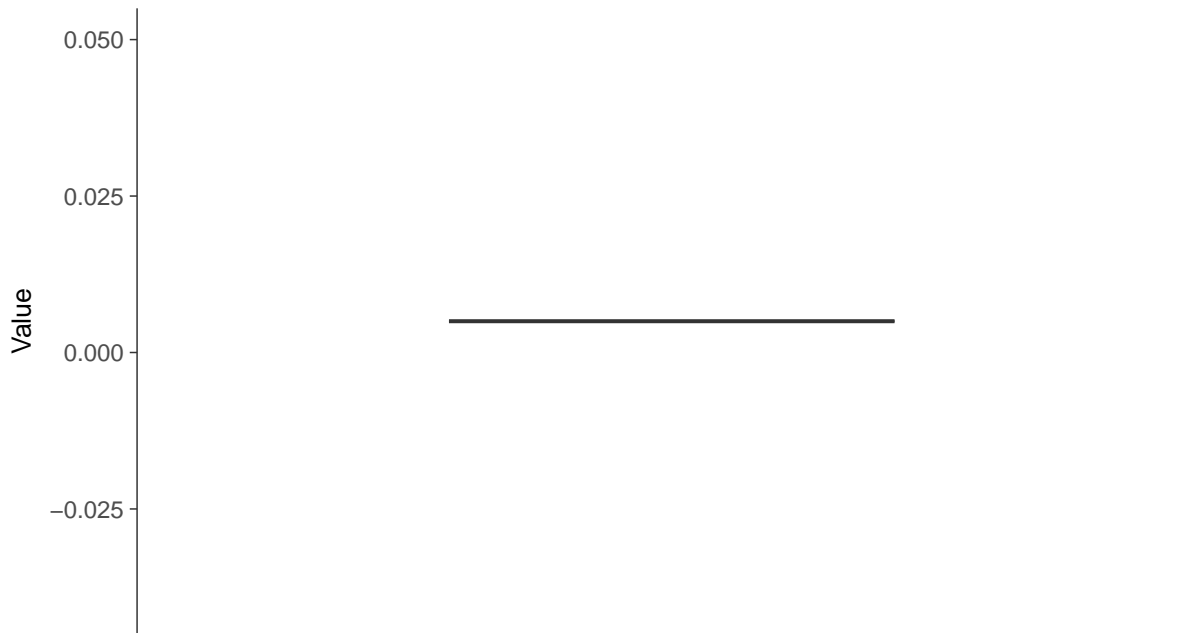
Vanadium, MW-7 (mg/L)





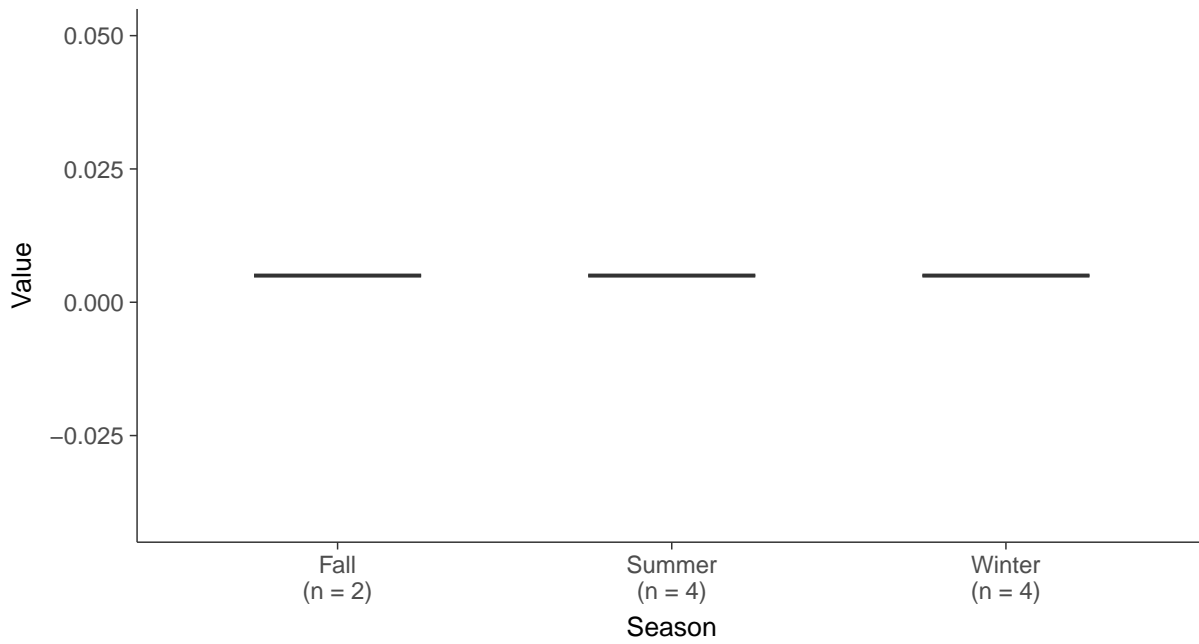
Boxplot

Vanadium, MW-7 (mg/L)



Boxplot by Season

Vanadium, MW-7 (mg/L)



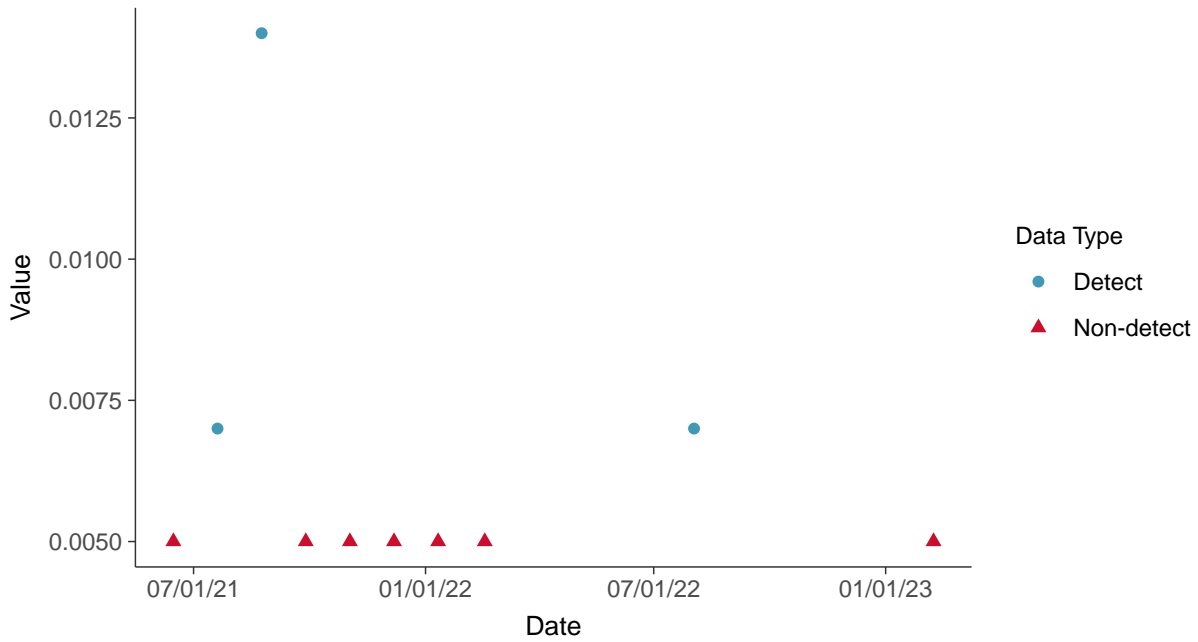


Part 115: Zinc, MW-7

ID: 07_5_42

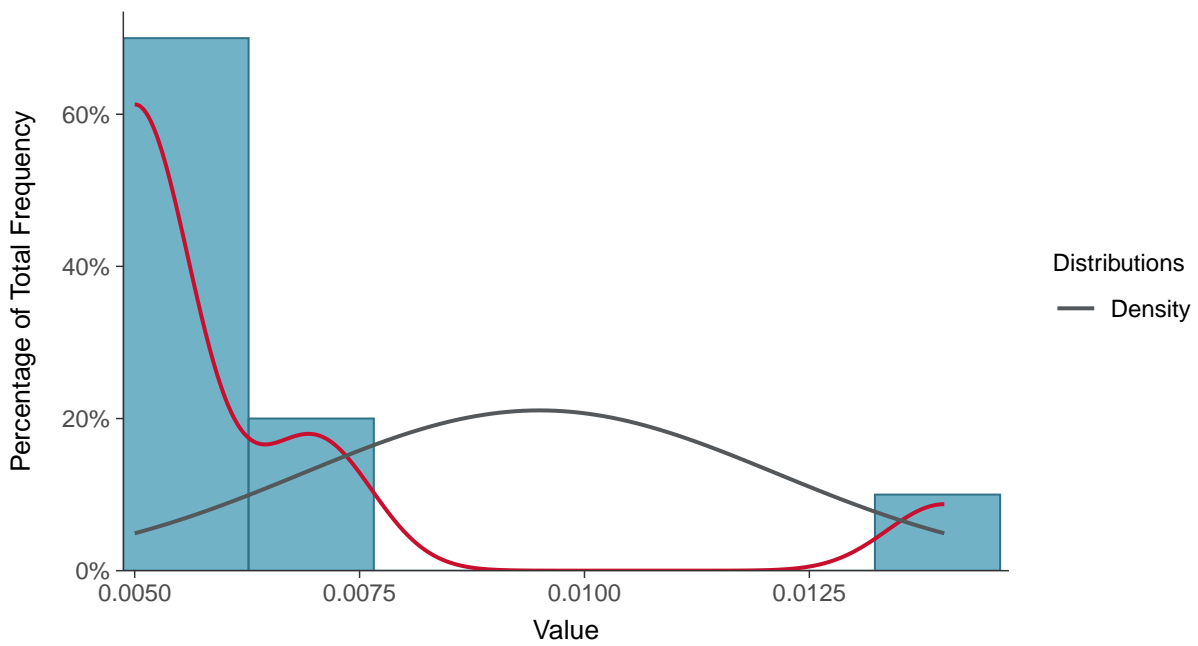
Scatter Plot

Zinc, MW-7 (mg/L)



Histogram

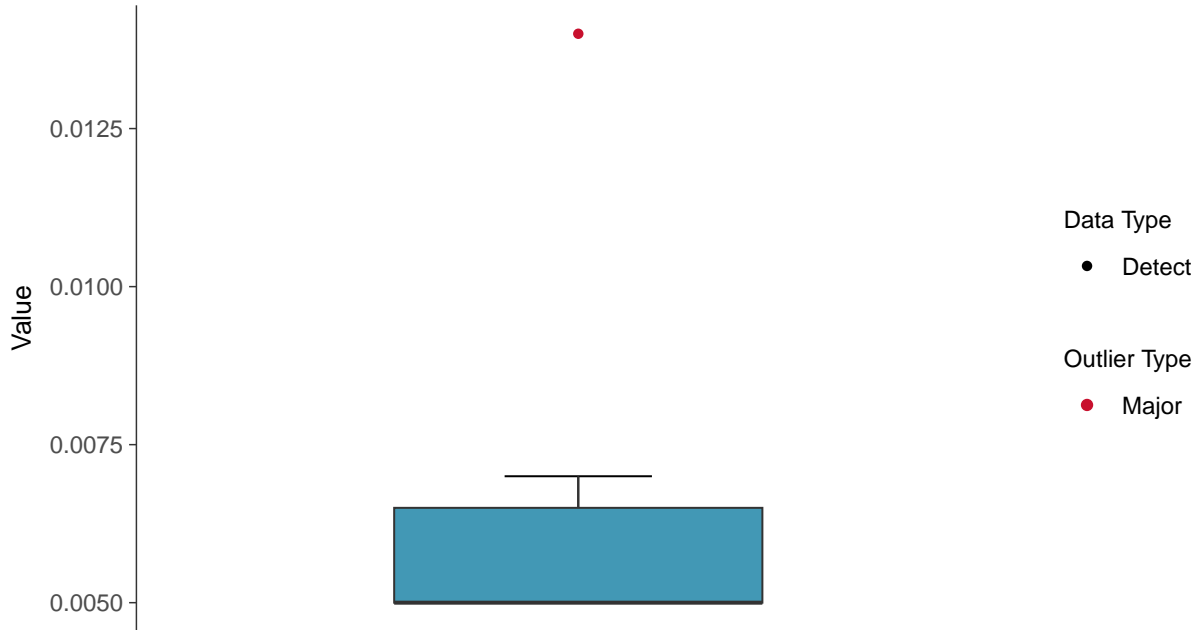
Zinc, MW-7 (mg/L)





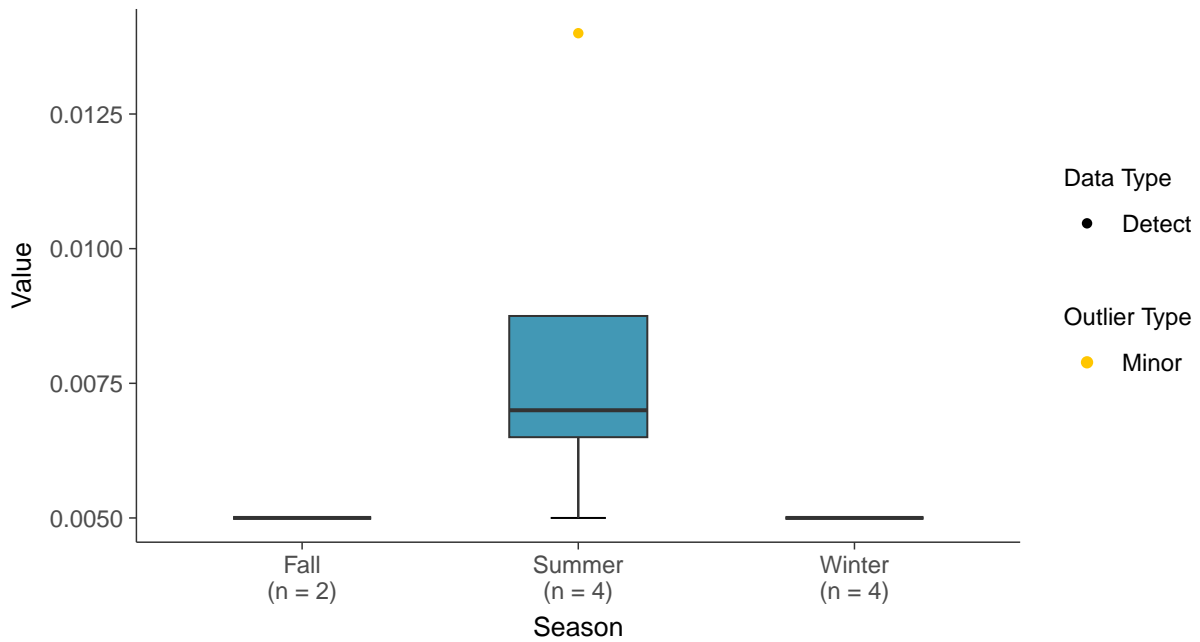
Boxplot

Zinc, MW-7 (mg/L)



Boxplot by Season

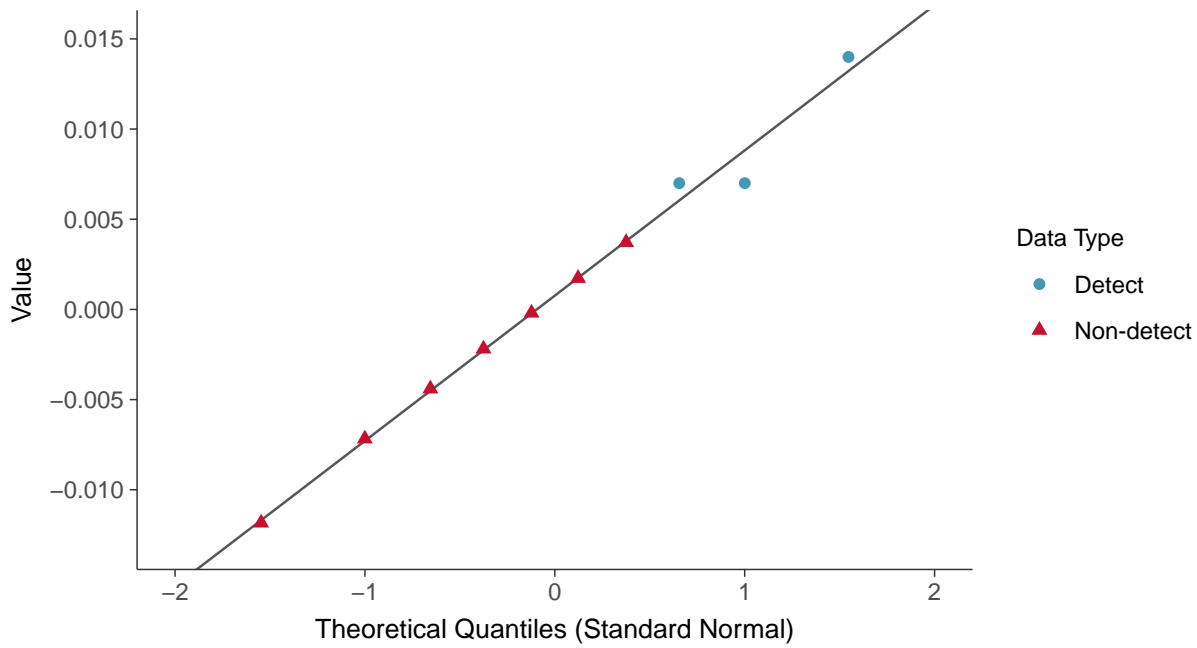
Zinc, MW-7 (mg/L)





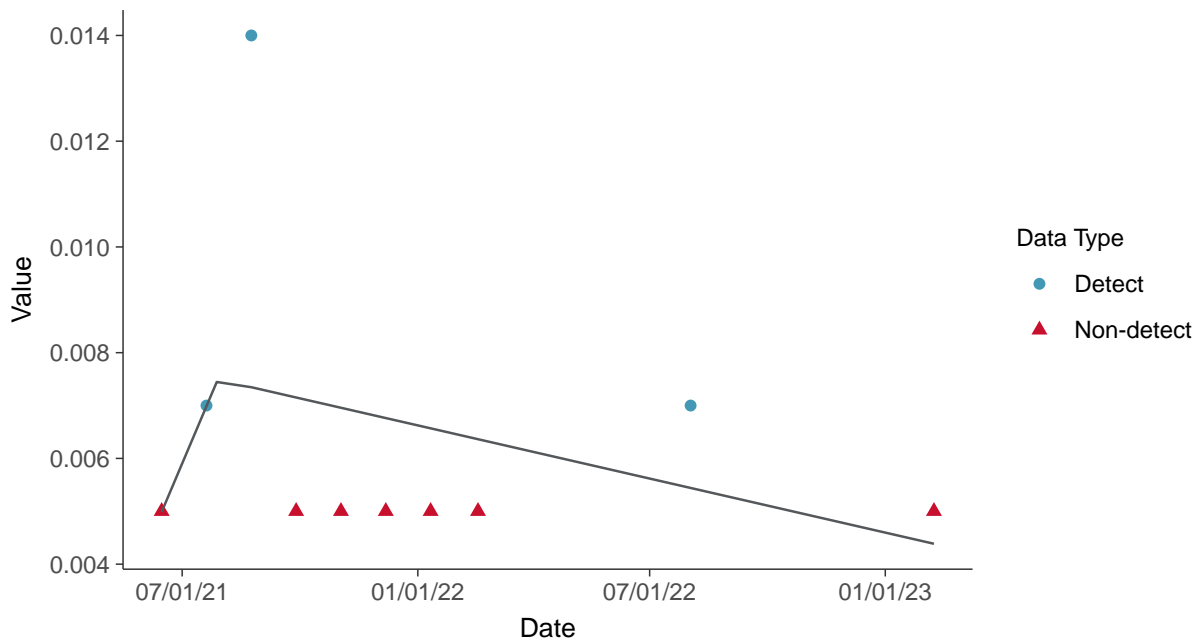
Normal Q-Q plot using ROS Imputed Estimates

Zinc, MW-7 (mg/L)



Trend Regression: Piecewise Linear-Linear

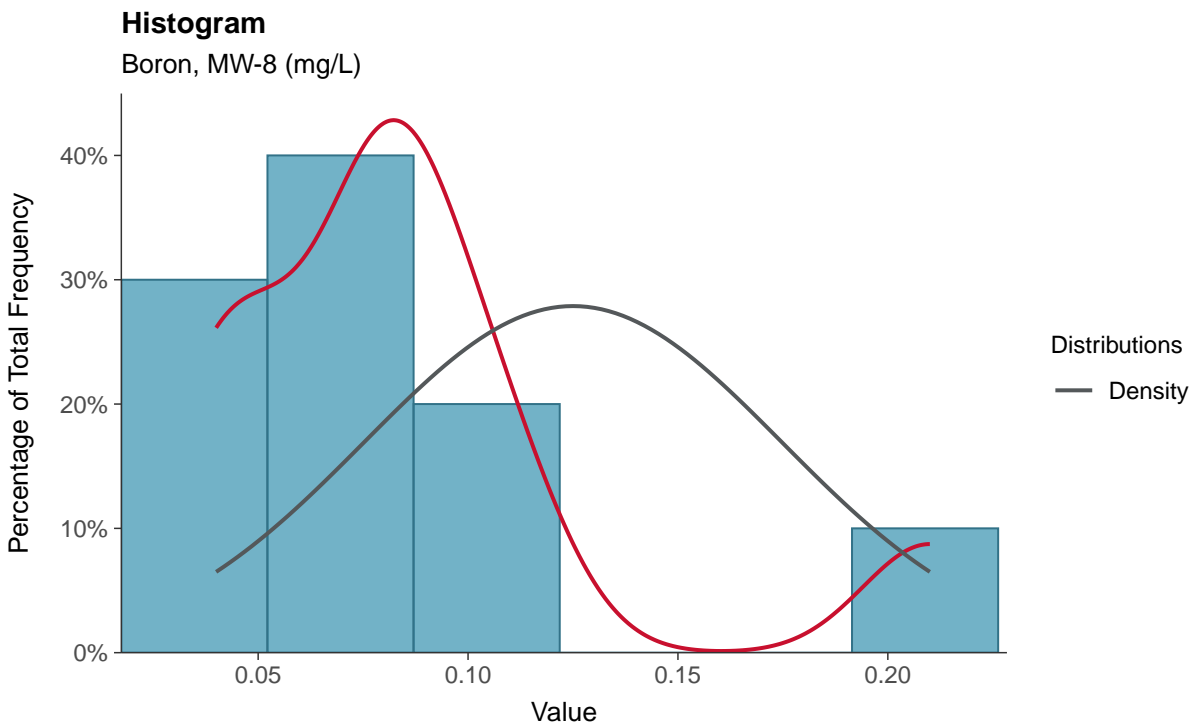
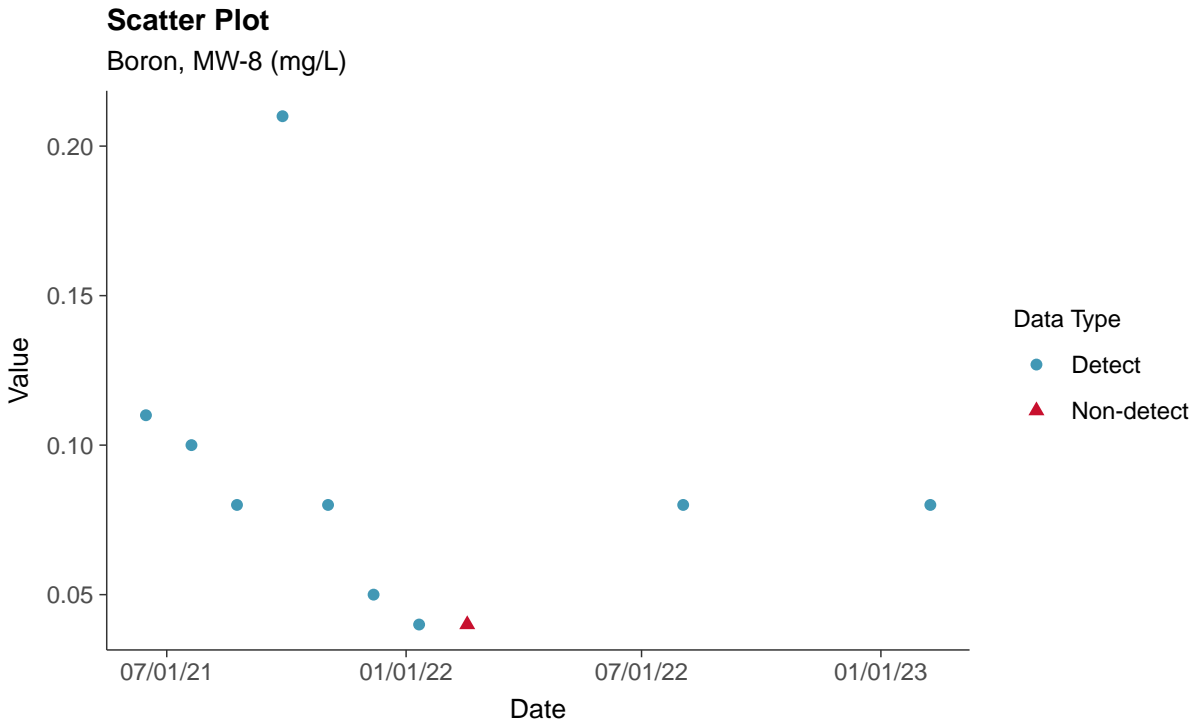
Zinc, MW-7 (mg/L)





Appendix III: Boron, MW-8

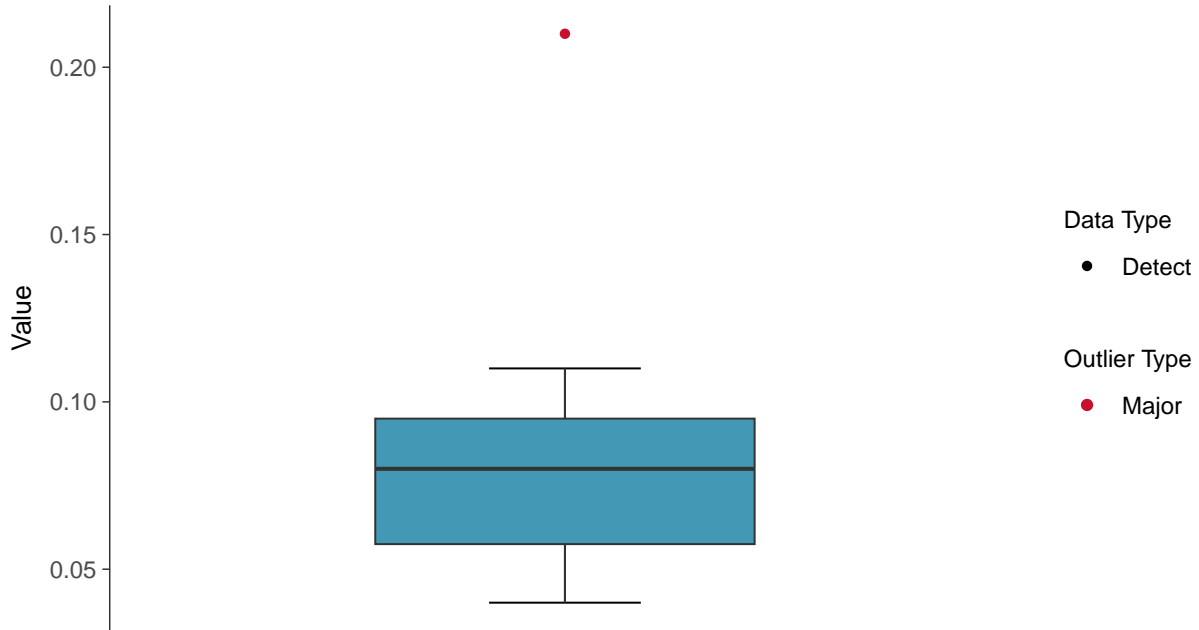
ID: 08_1_01





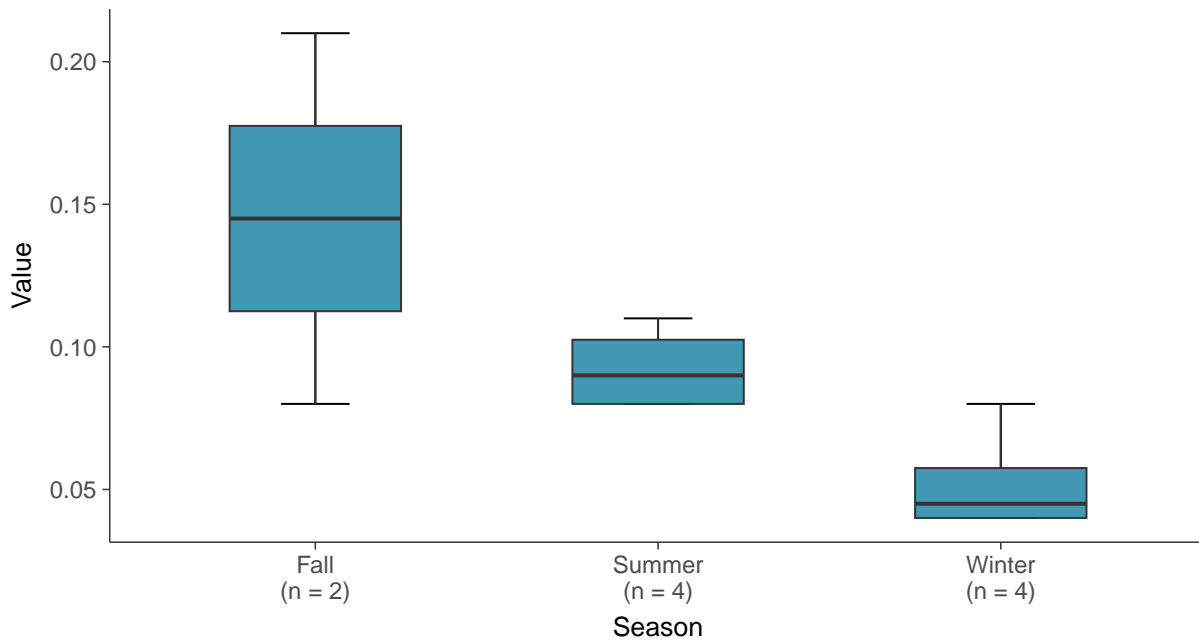
Boxplot

Boron, MW-8 (mg/L)



Boxplot by Season

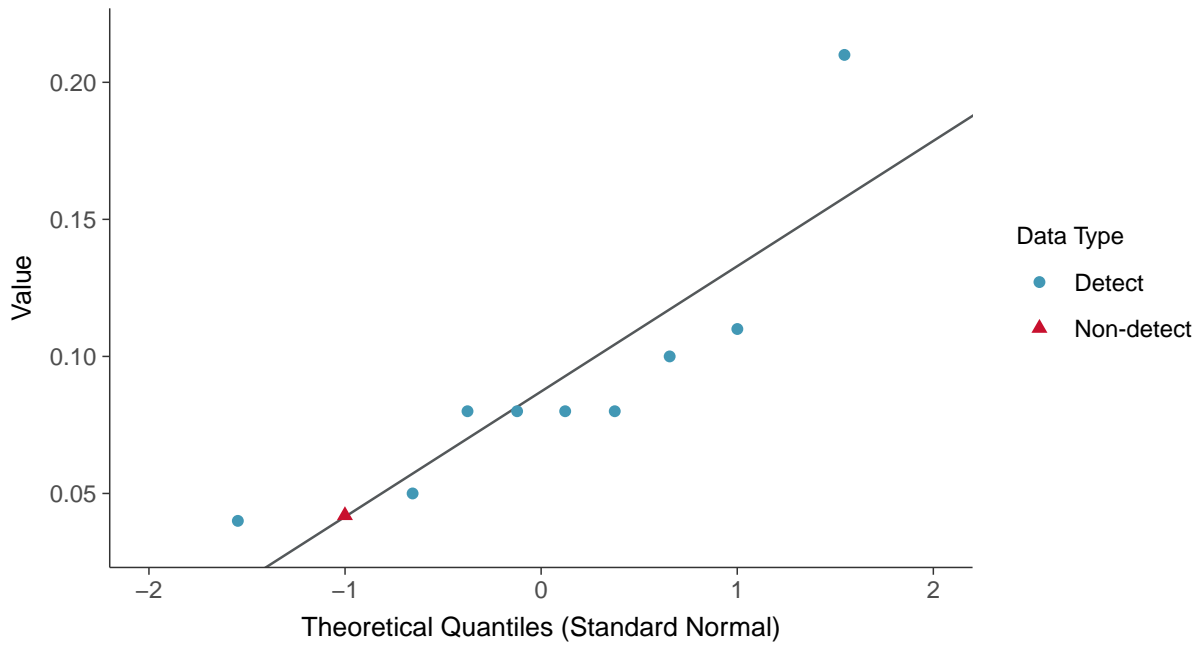
Boron, MW-8 (mg/L)





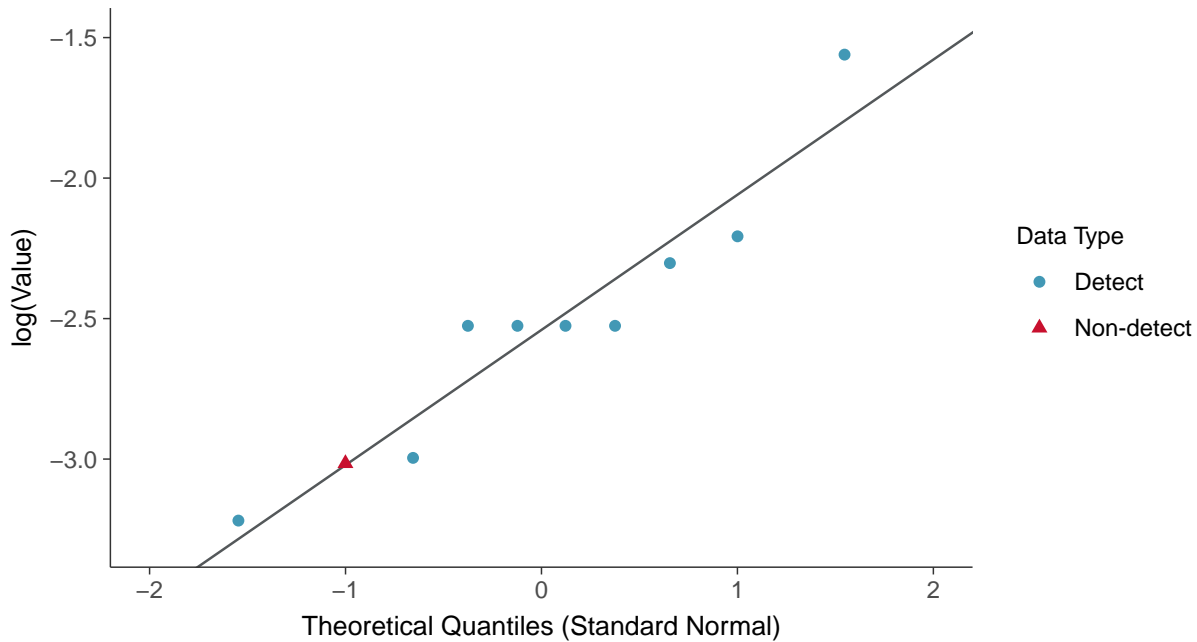
Normal Q-Q plot using ROS Imputed Estimates

Boron, MW-8 (mg/L)



Lognormal Q-Q plot using ROS Imputed Estimates

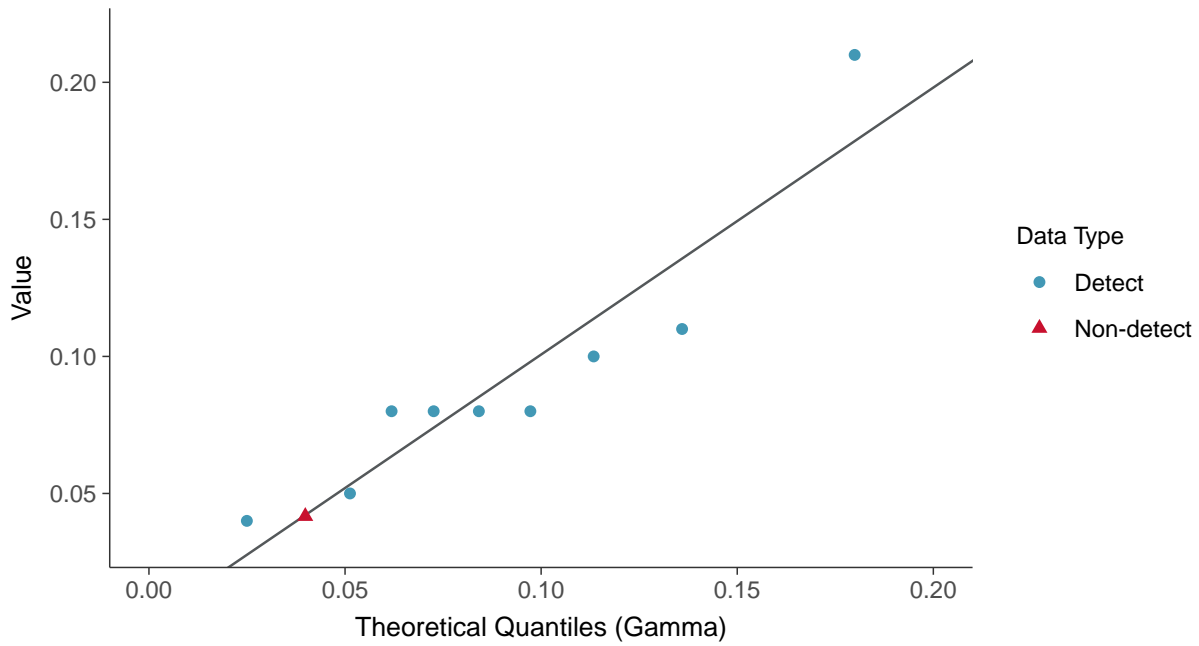
Boron, MW-8 (mg/L)





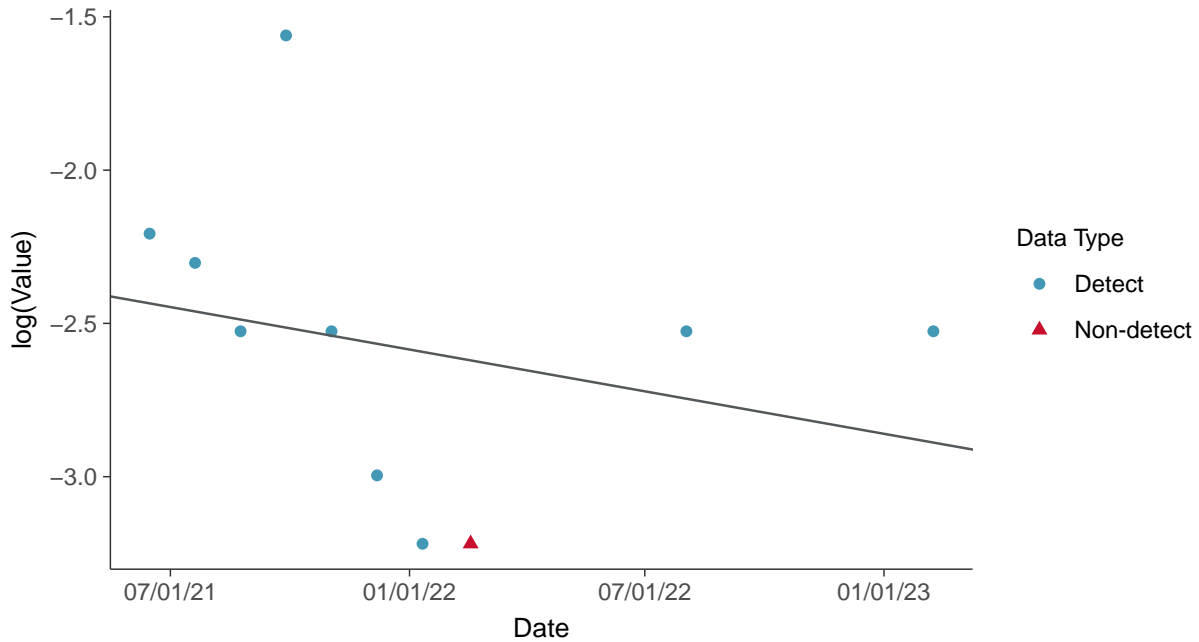
Gamma Q-Q plot using ROS Imputed Estimates

Boron, MW-8 (mg/L)



Trend Regression: Lognormal MLE

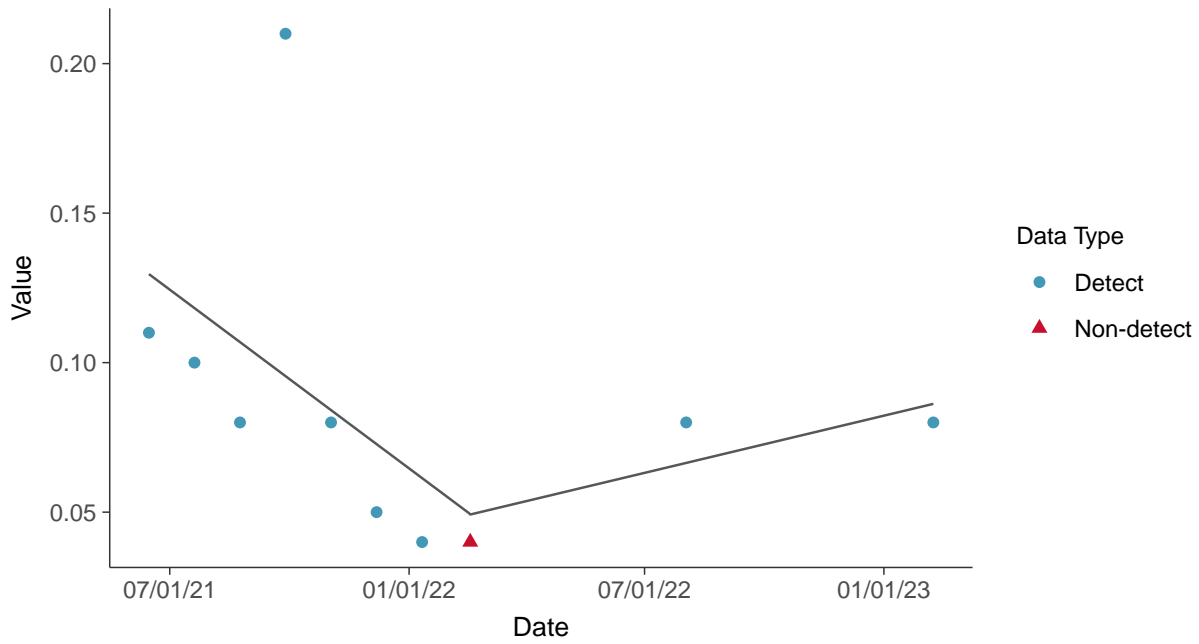
Boron, MW-8 (mg/L)





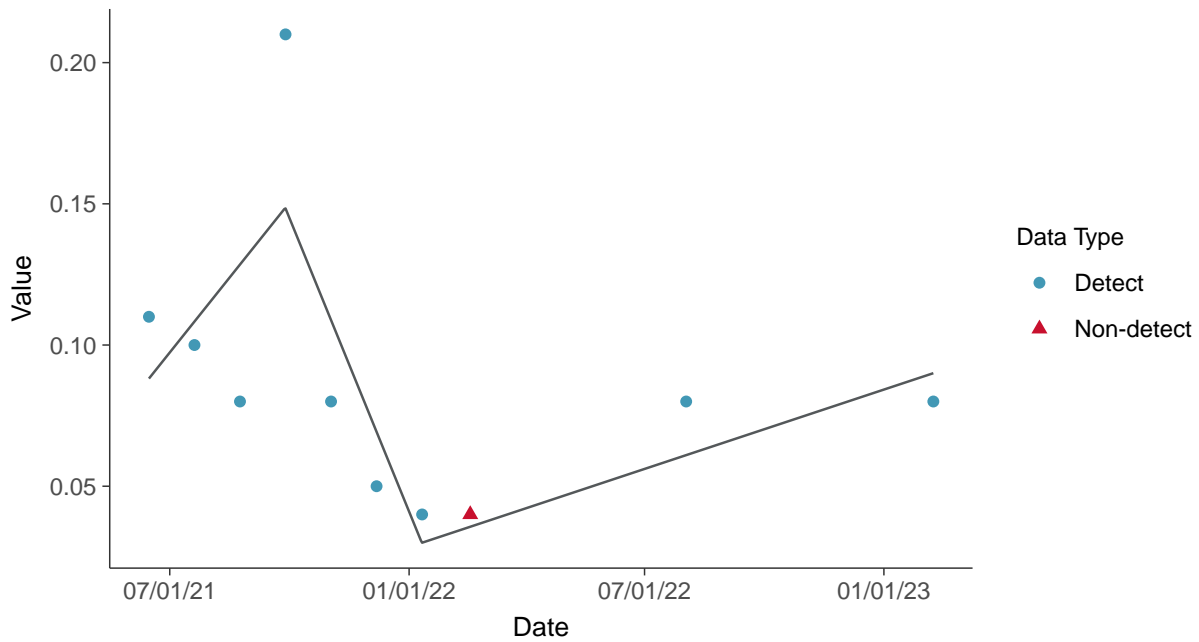
Trend Regression: Piecewise Linear-Linear

Boron, MW-8 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Boron, MW-8 (mg/L)



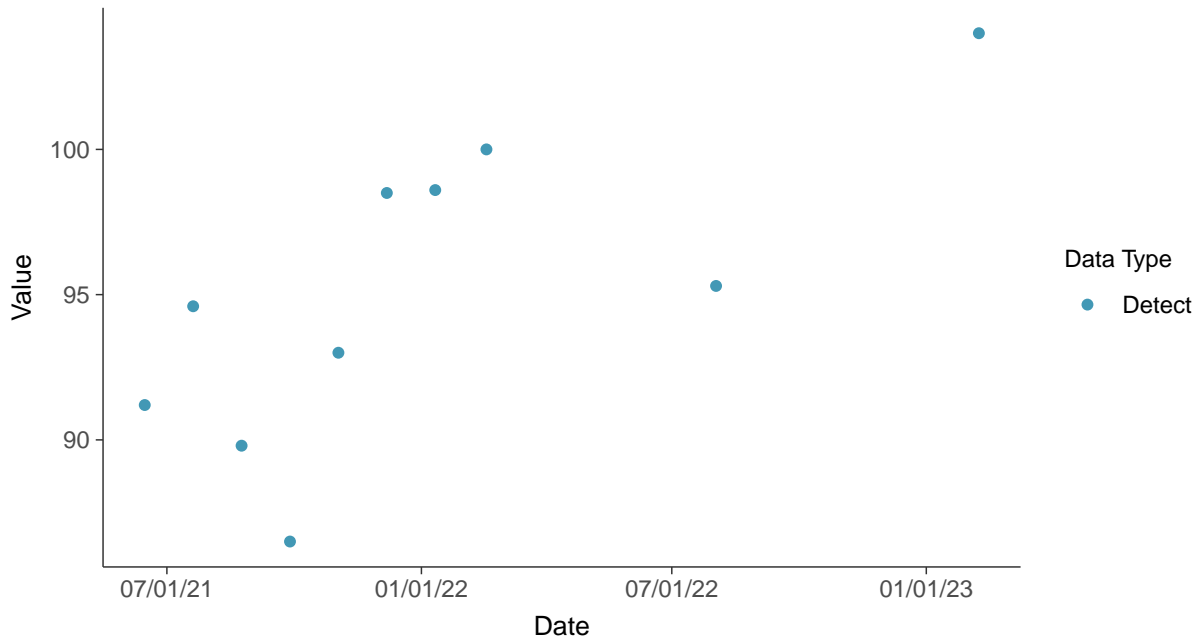


Appendix III: Calcium, MW-8

ID: 08_1_02

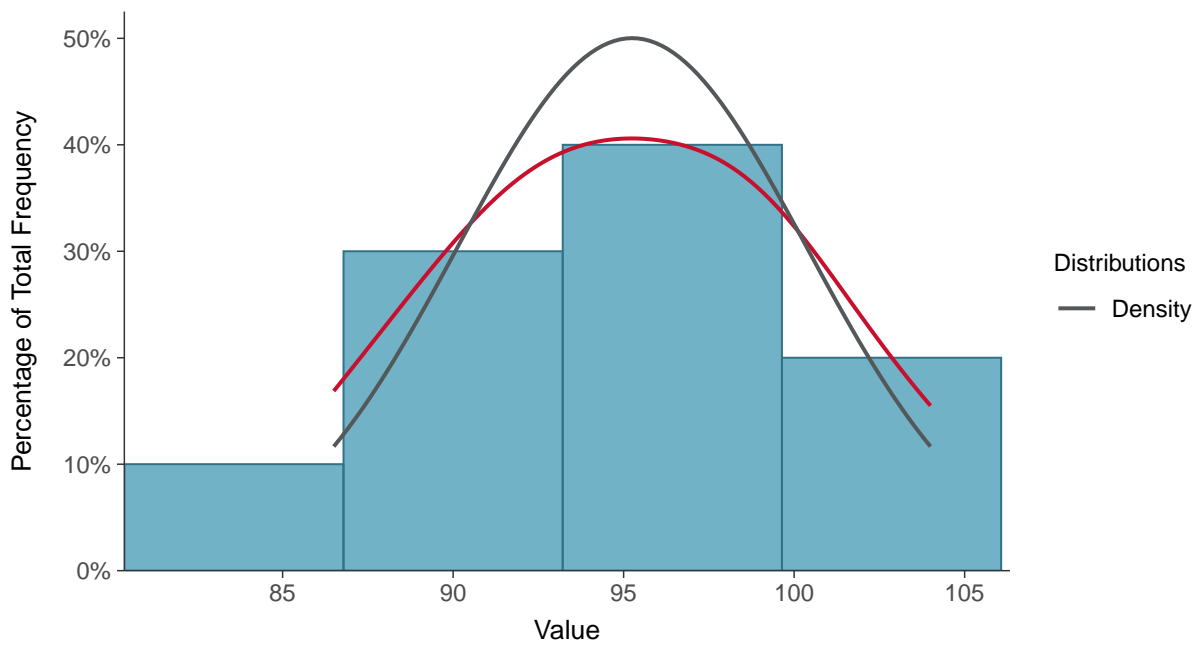
Scatter Plot

Calcium, MW-8 (mg/L)



Histogram

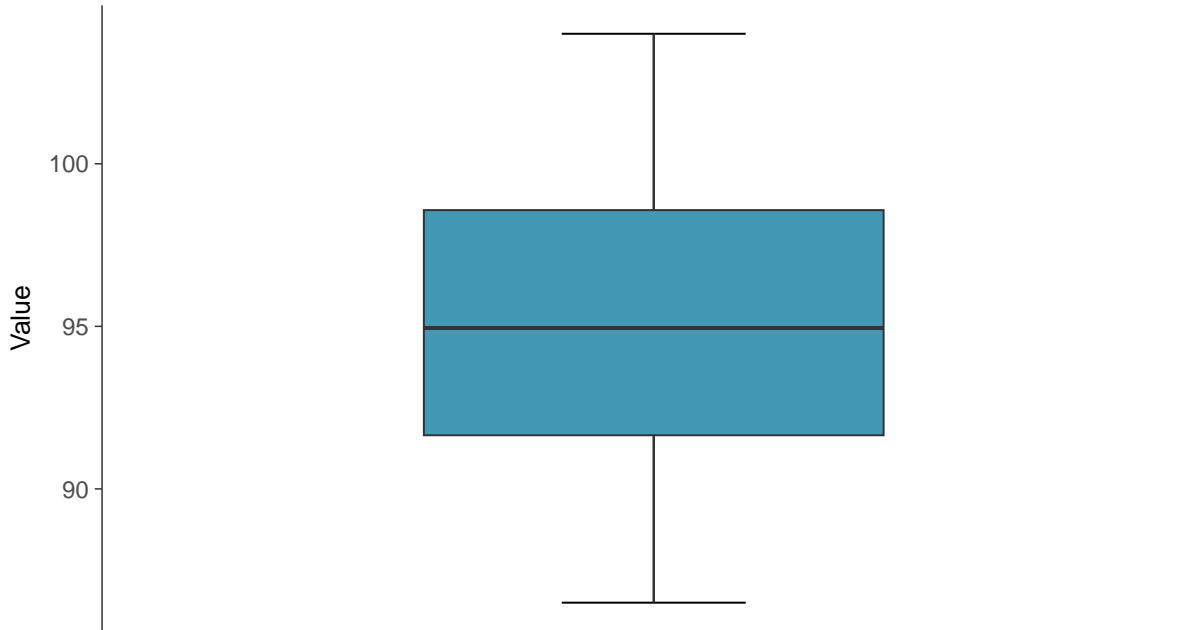
Calcium, MW-8 (mg/L)





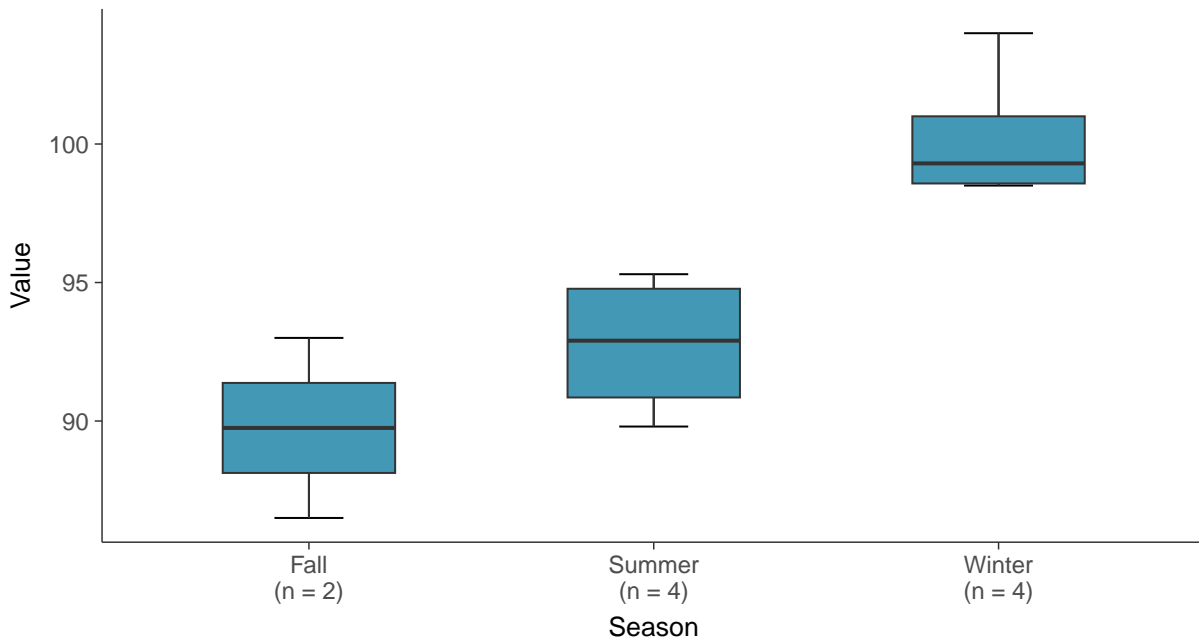
Boxplot

Calcium, MW-8 (mg/L)



Boxplot by Season

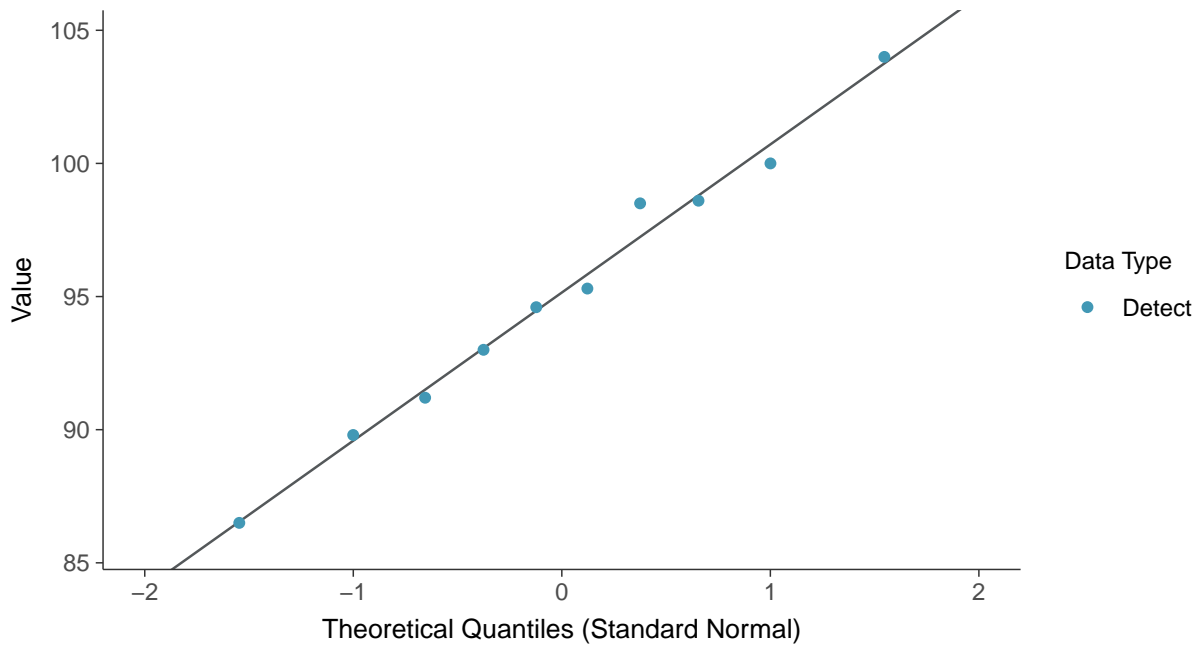
Calcium, MW-8 (mg/L)





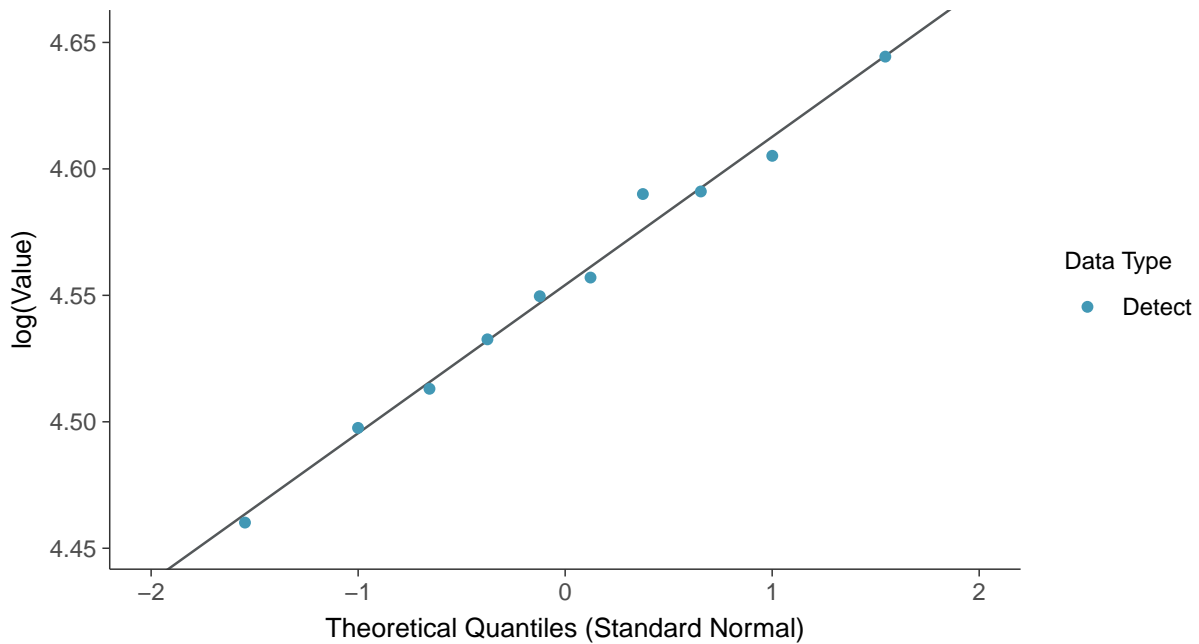
Normal Q-Q plot

Calcium, MW-8 (mg/L)



Lognormal Q-Q plot

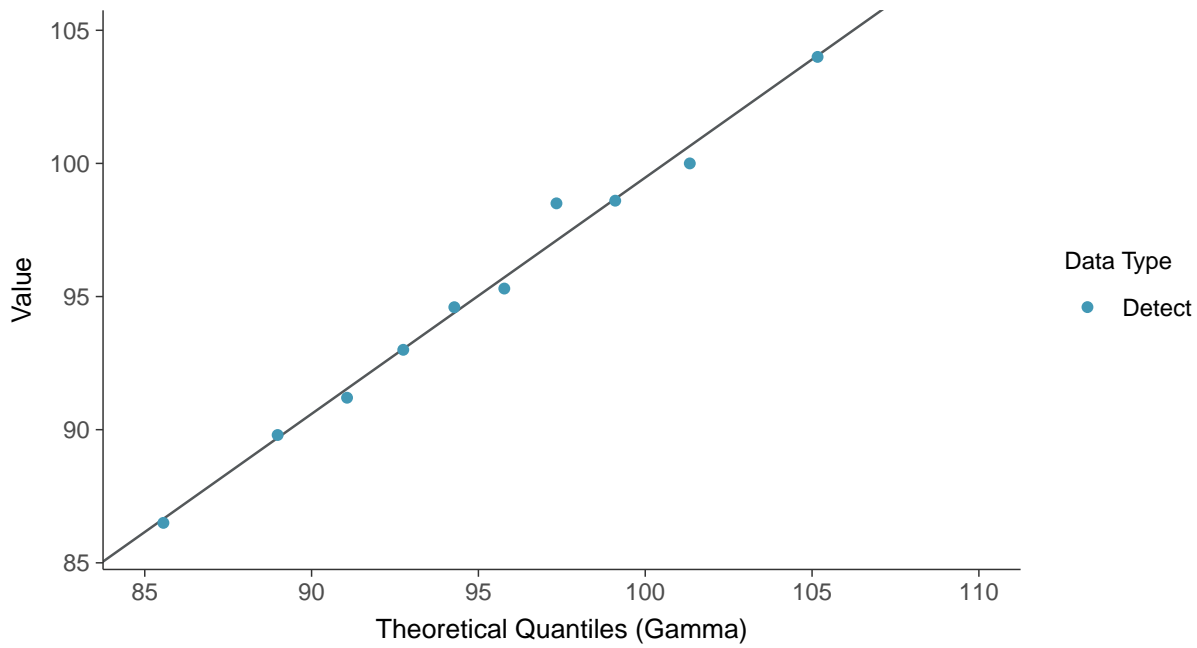
Calcium, MW-8 (mg/L)





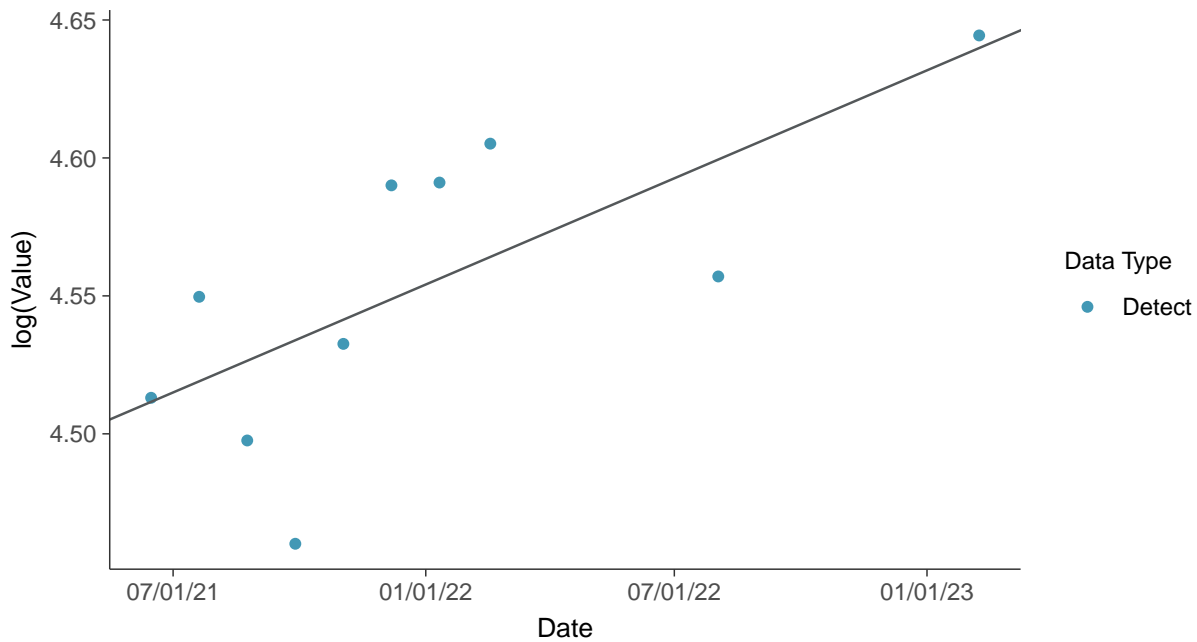
Gamma Q-Q plot

Calcium, MW-8 (mg/L)



Trend Regression: Lognormal MLE

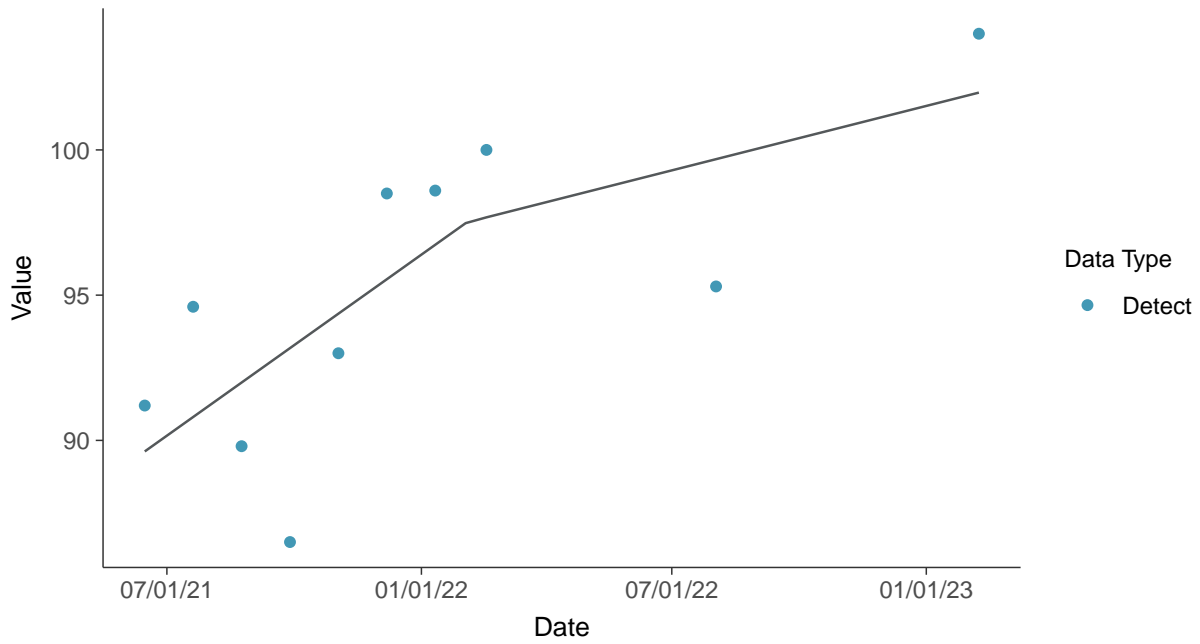
Calcium, MW-8 (mg/L)





Trend Regression: Piecewise Linear-Linear

Calcium, MW-8 (mg/L)



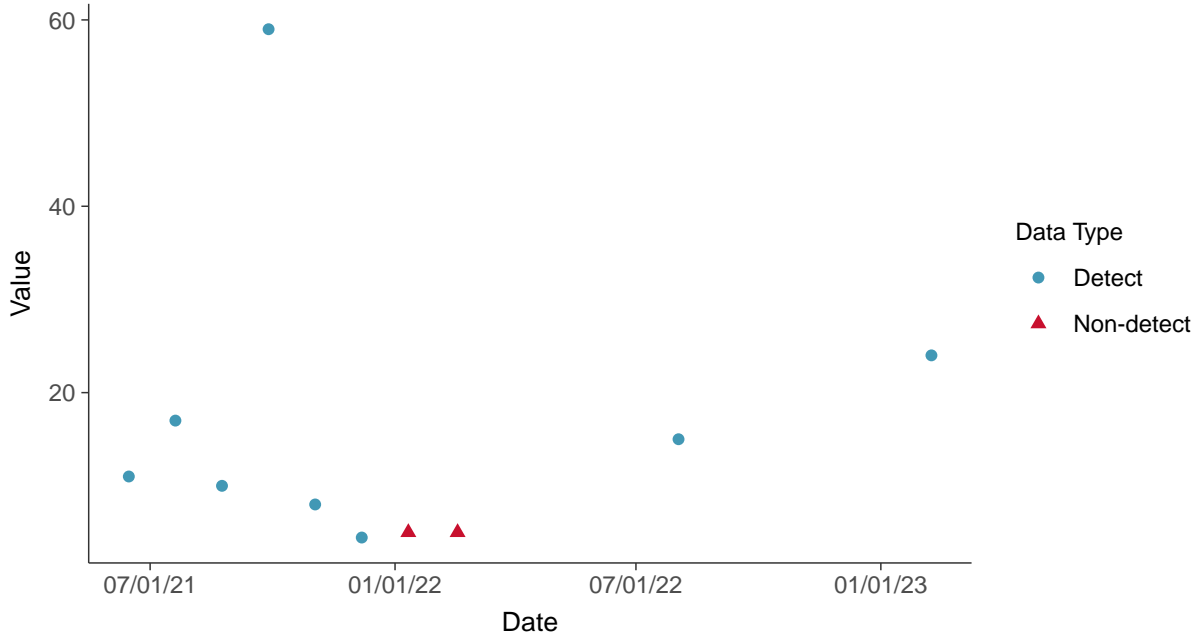


Appendix III: Chloride, MW-8

ID: 08_1_03

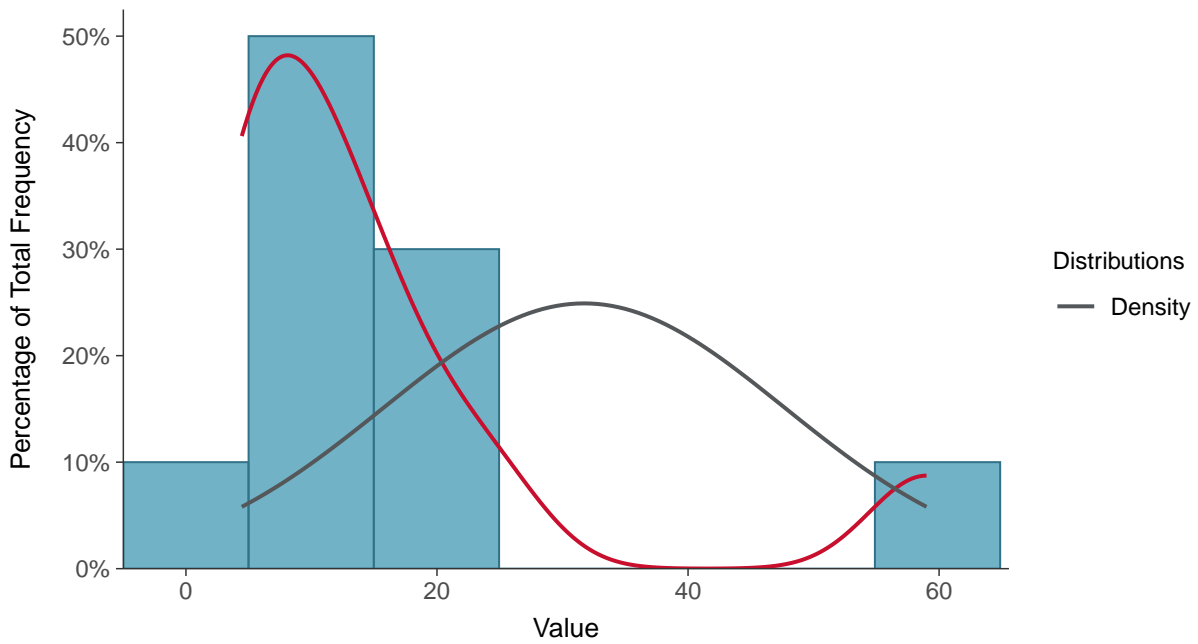
Scatter Plot

Chloride, MW-8 (mg/L)



Histogram

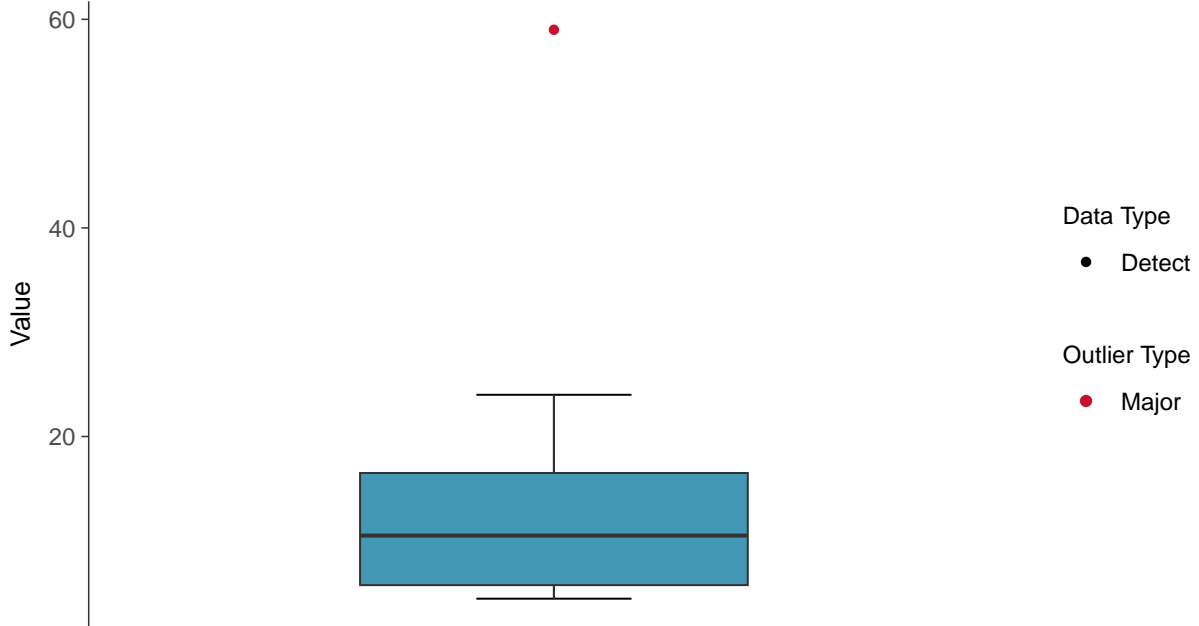
Chloride, MW-8 (mg/L)





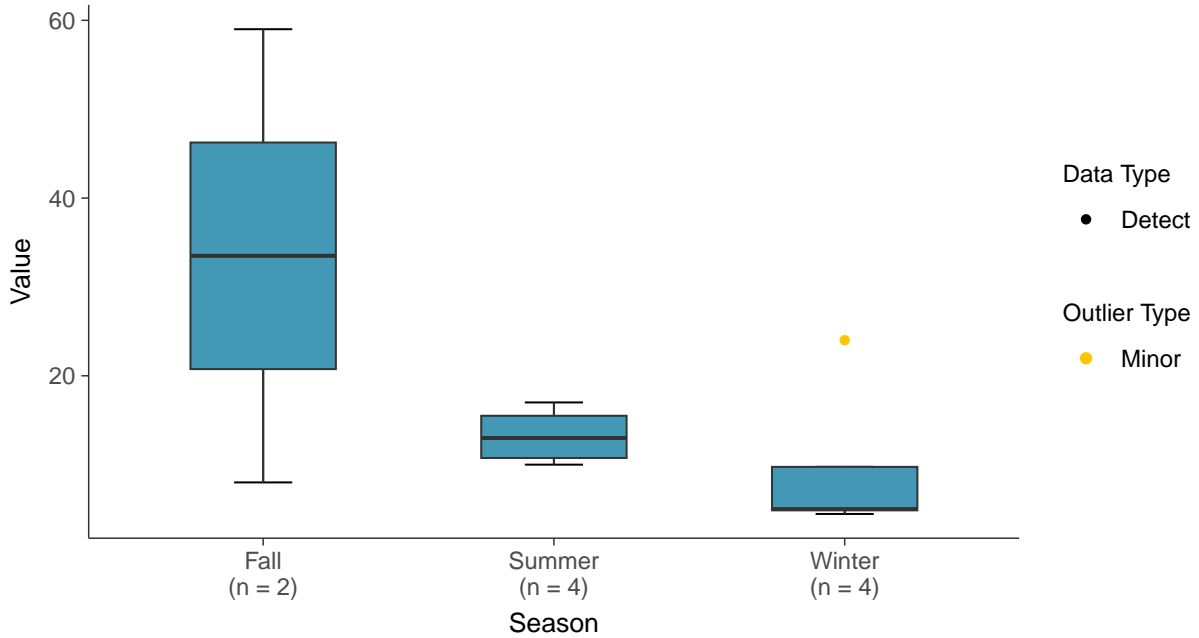
Boxplot

Chloride, MW-8 (mg/L)



Boxplot by Season

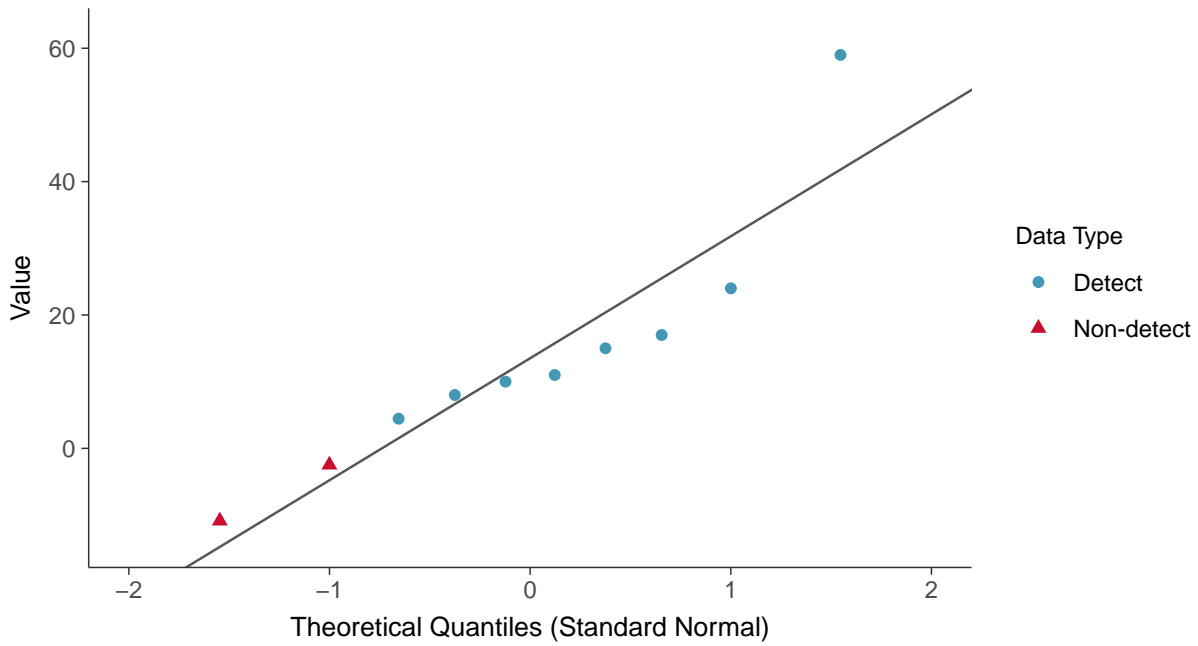
Chloride, MW-8 (mg/L)





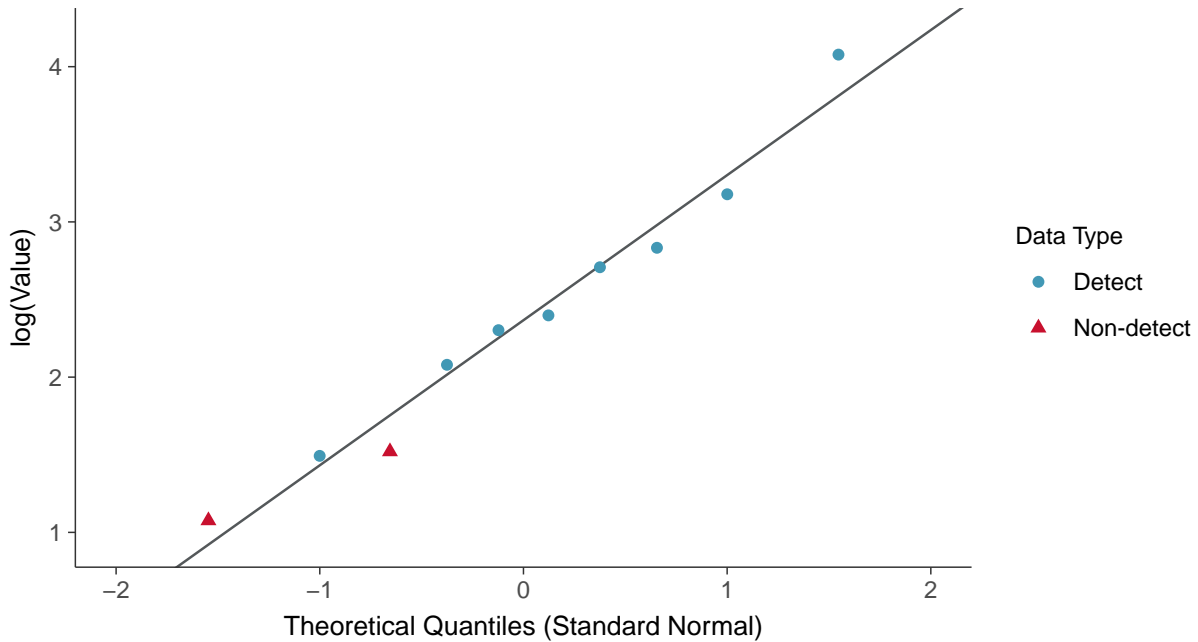
Normal Q-Q plot using ROS Imputed Estimates

Chloride, MW-8 (mg/L)



Lognormal Q-Q plot using ROS Imputed Estimates

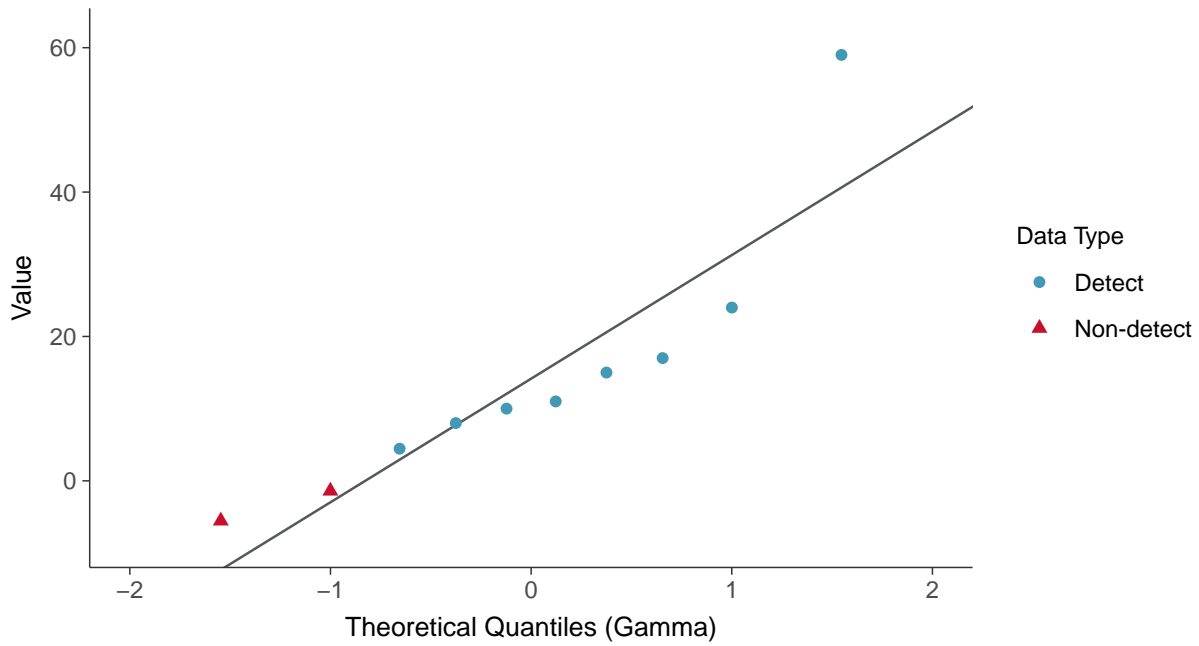
Chloride, MW-8 (mg/L)





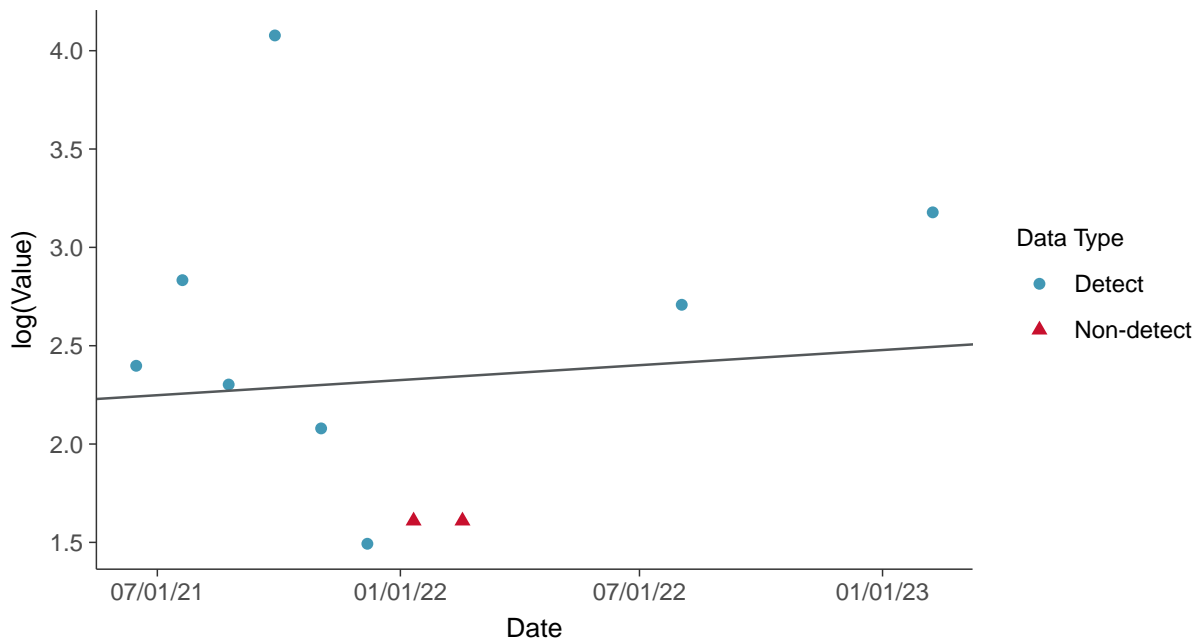
Gamma Q-Q plot using ROS Imputed Estimates

Chloride, MW-8 (mg/L)



Trend Regression: Lognormal MLE

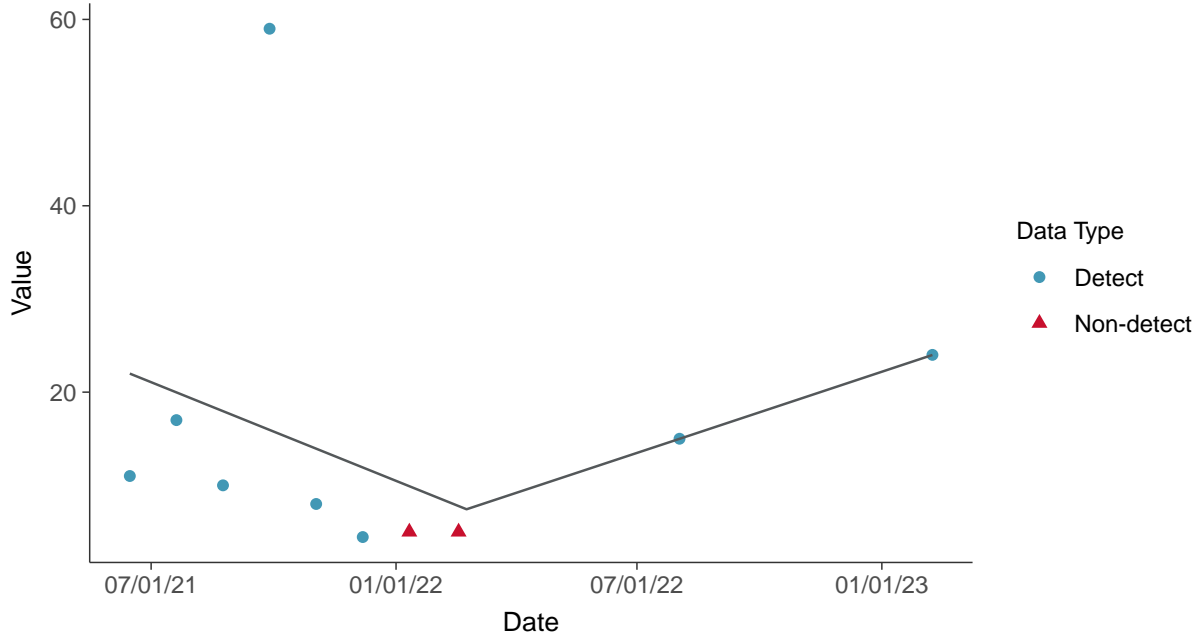
Chloride, MW-8 (mg/L)





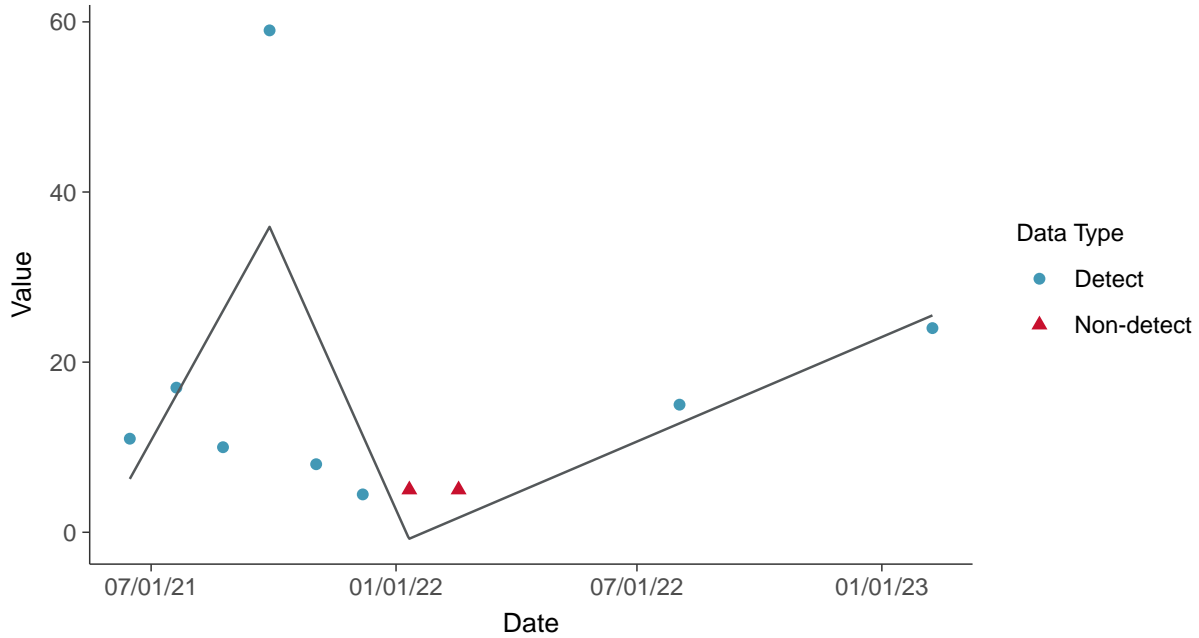
Trend Regression: Piecewise Linear-Linear

Chloride, MW-8 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

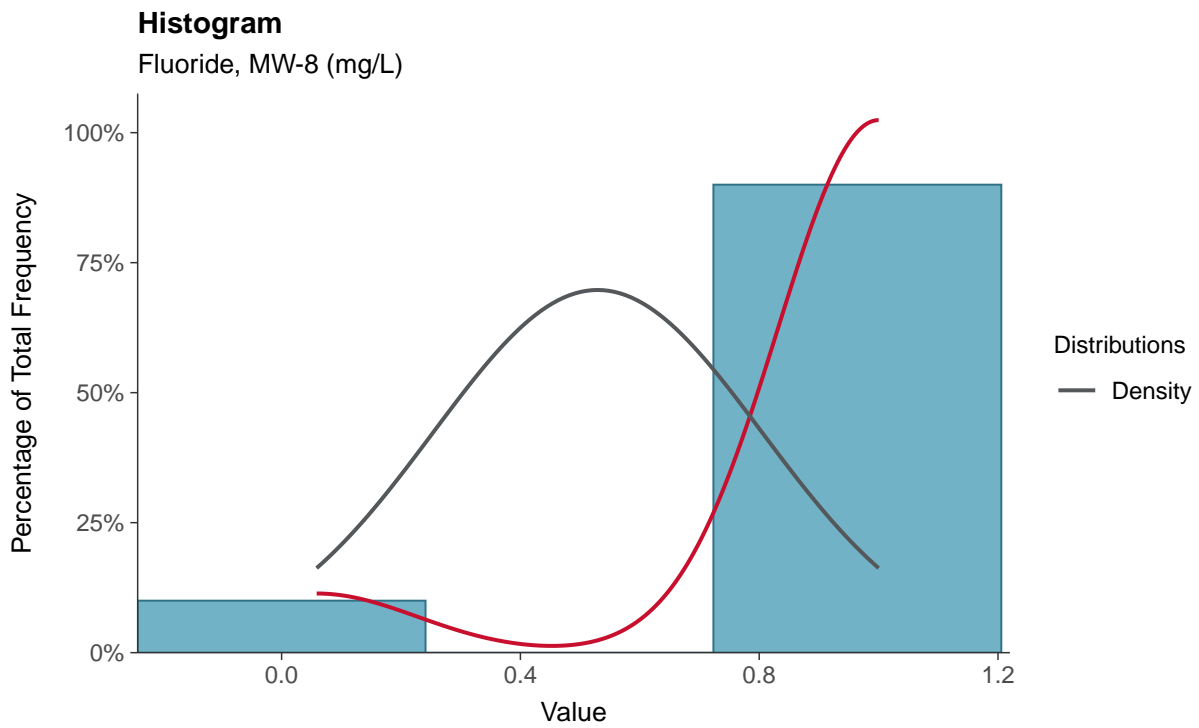
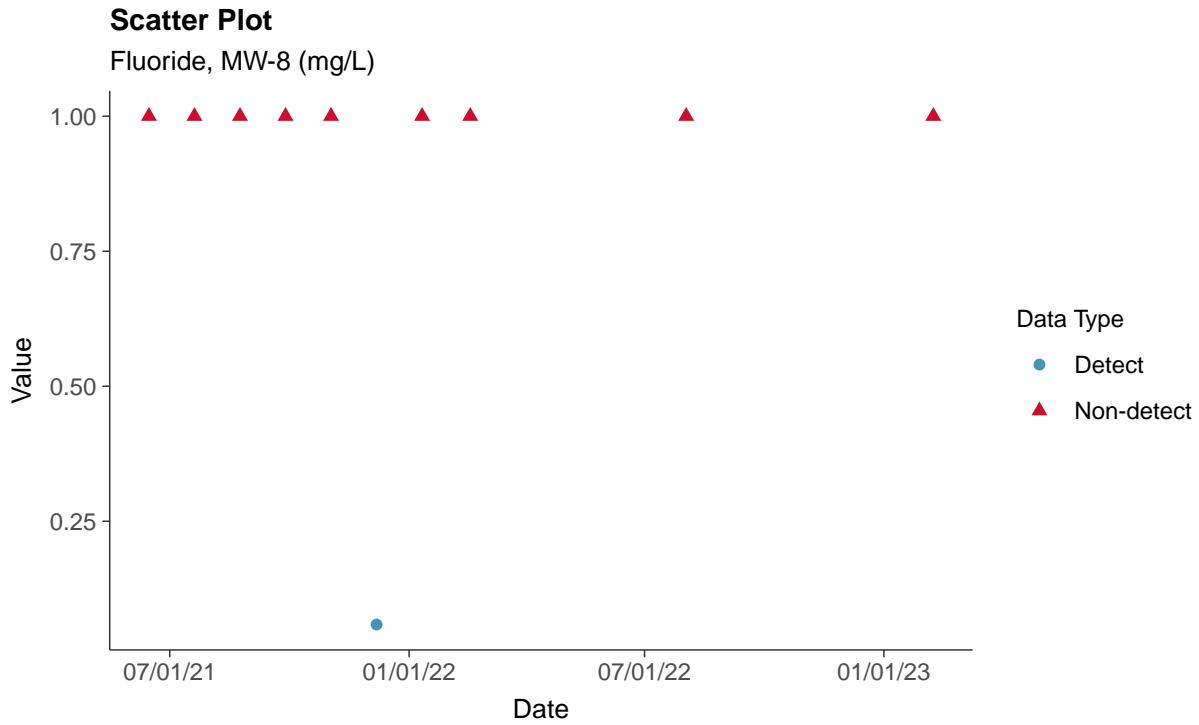
Chloride, MW-8 (mg/L)





Appendix III: Fluoride, MW-8

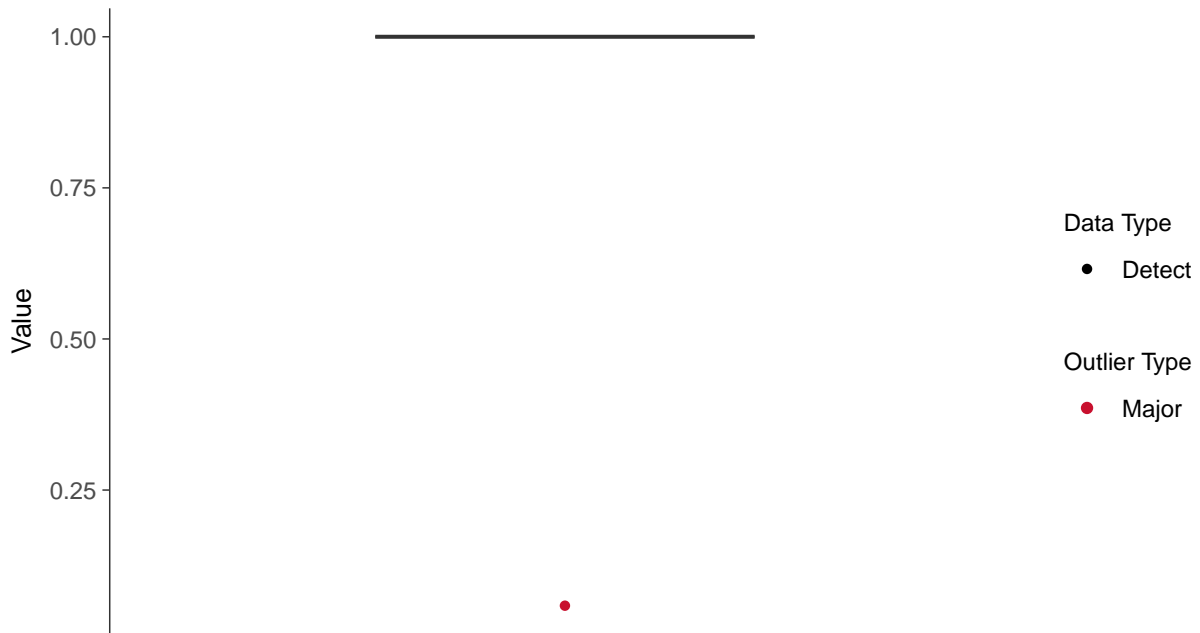
ID: 08_1_04





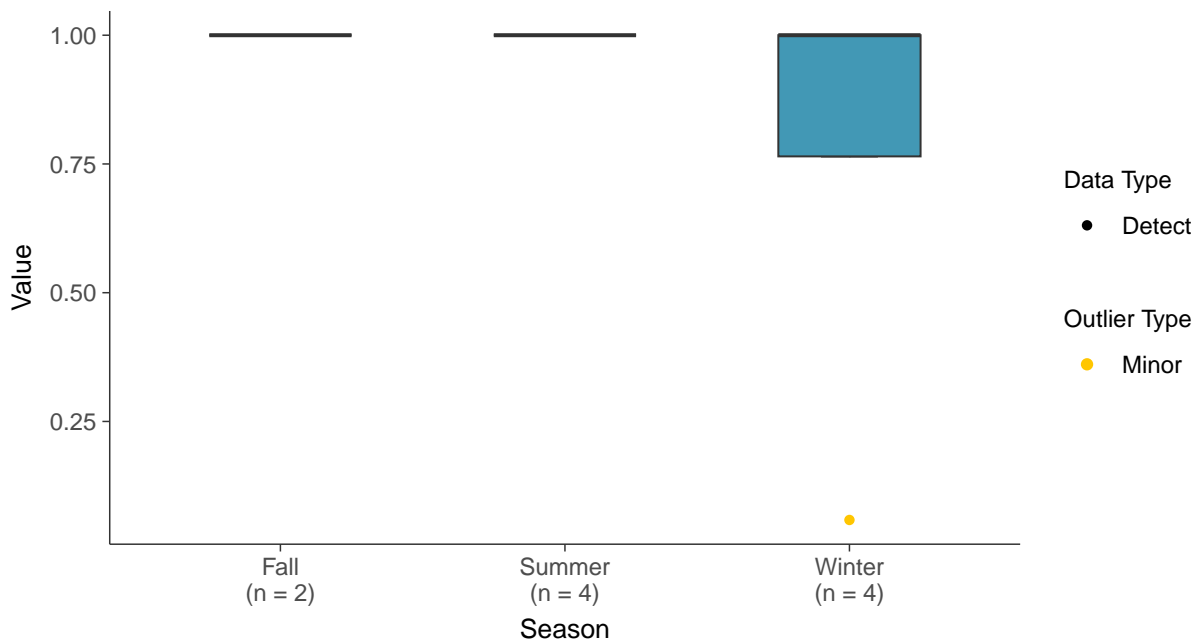
Boxplot

Fluoride, MW-8 (mg/L)



Boxplot by Season

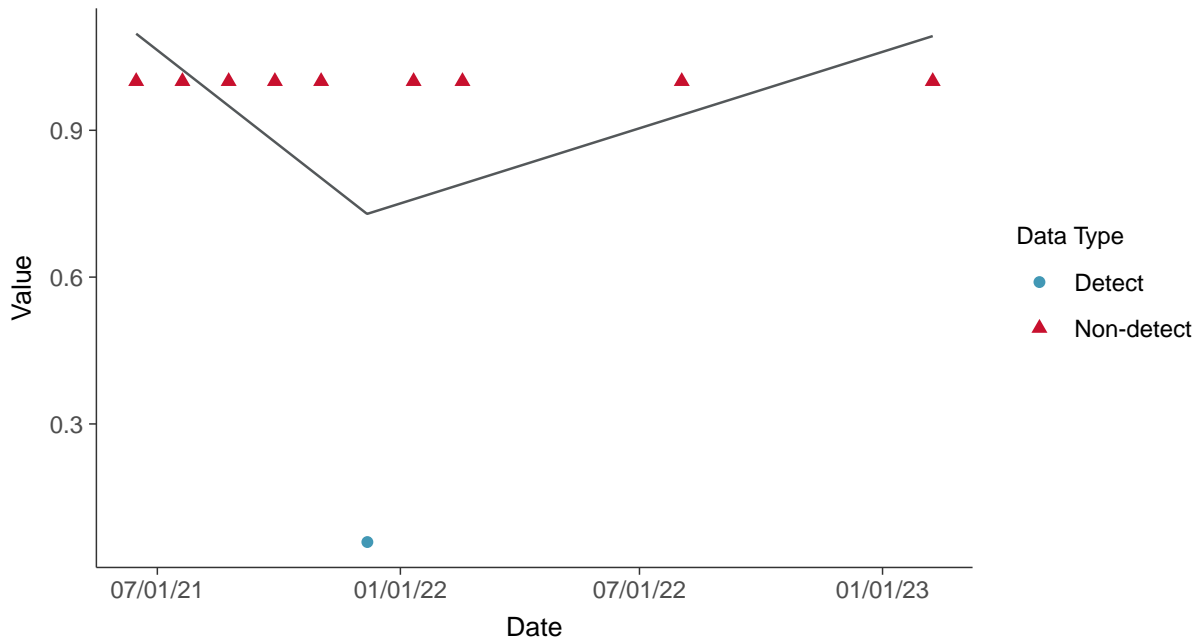
Fluoride, MW-8 (mg/L)





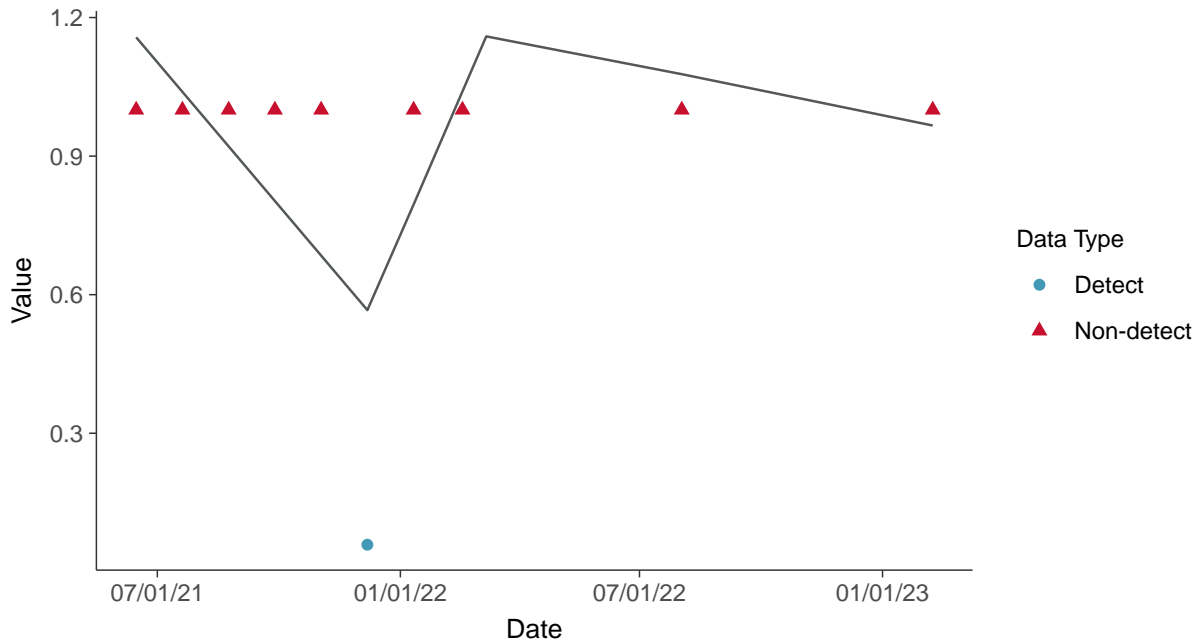
Trend Regression: Piecewise Linear-Linear

Fluoride, MW-8 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Fluoride, MW-8 (mg/L)

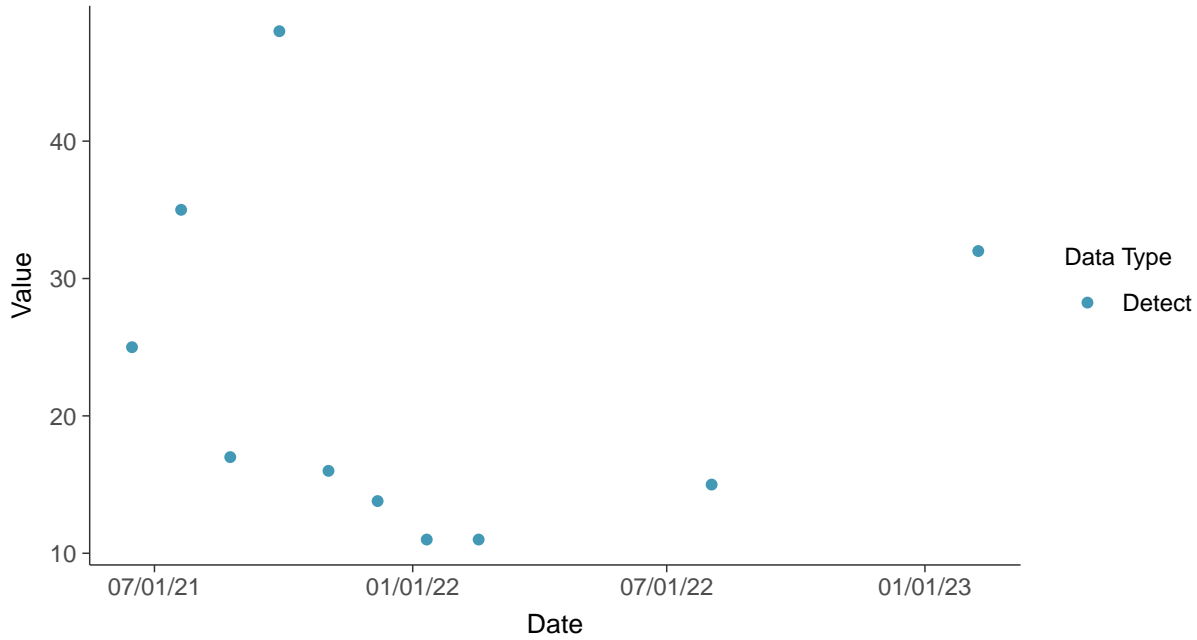


Appendix III: Sulfate, MW-8

ID: 08_1_05

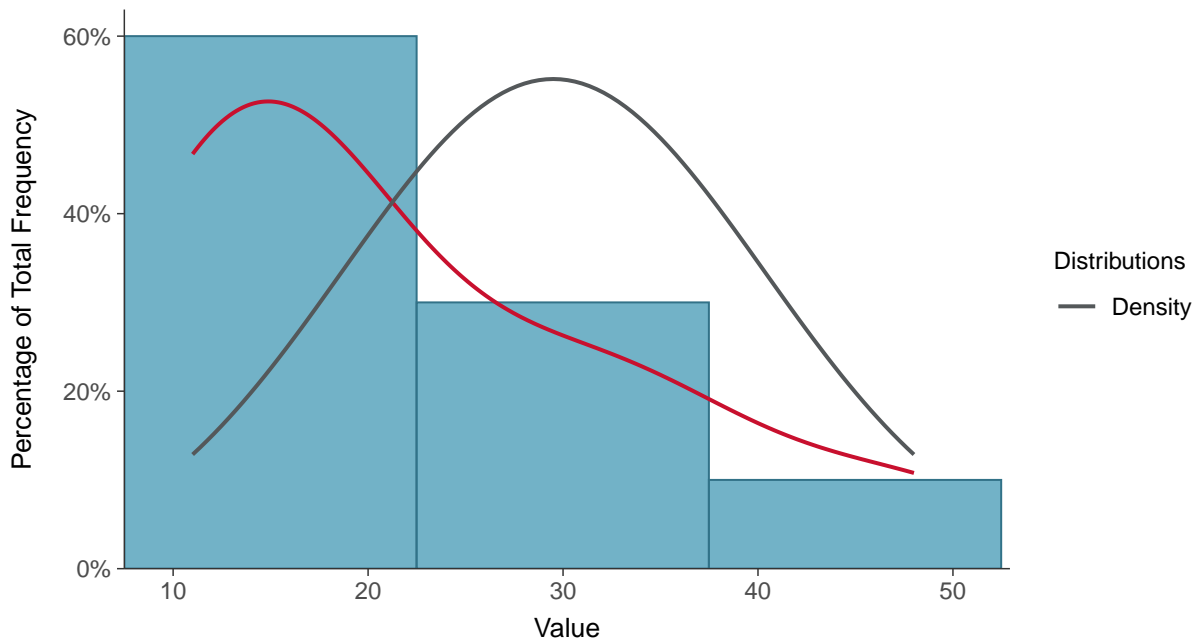
Scatter Plot

Sulfate, MW-8 (mg/L)



Histogram

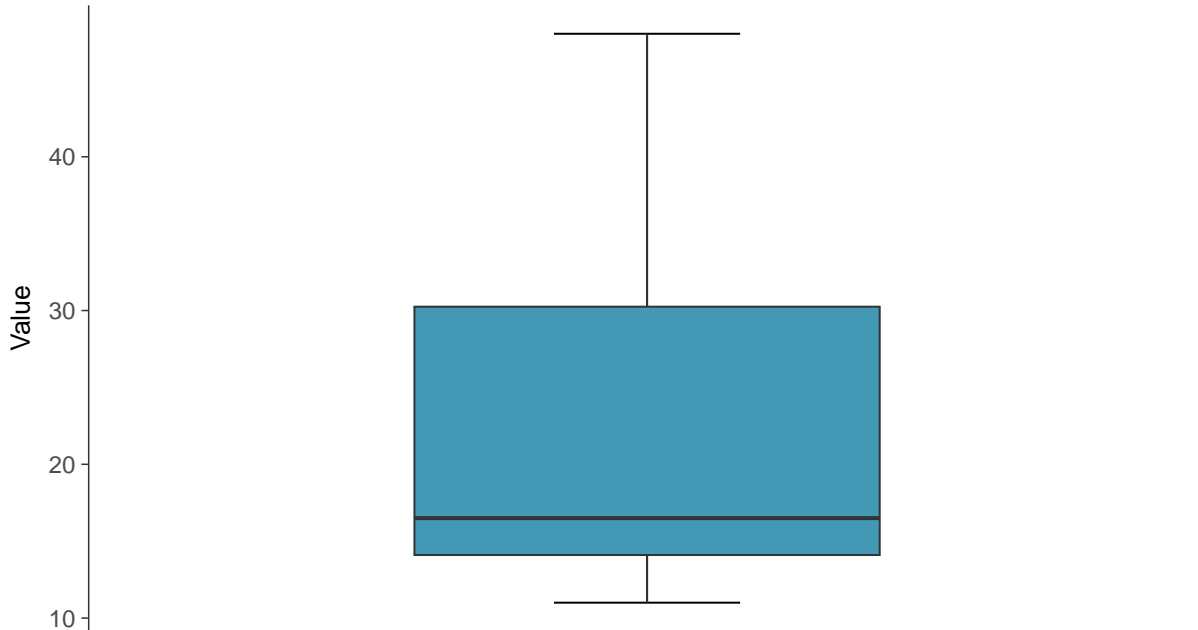
Sulfate, MW-8 (mg/L)





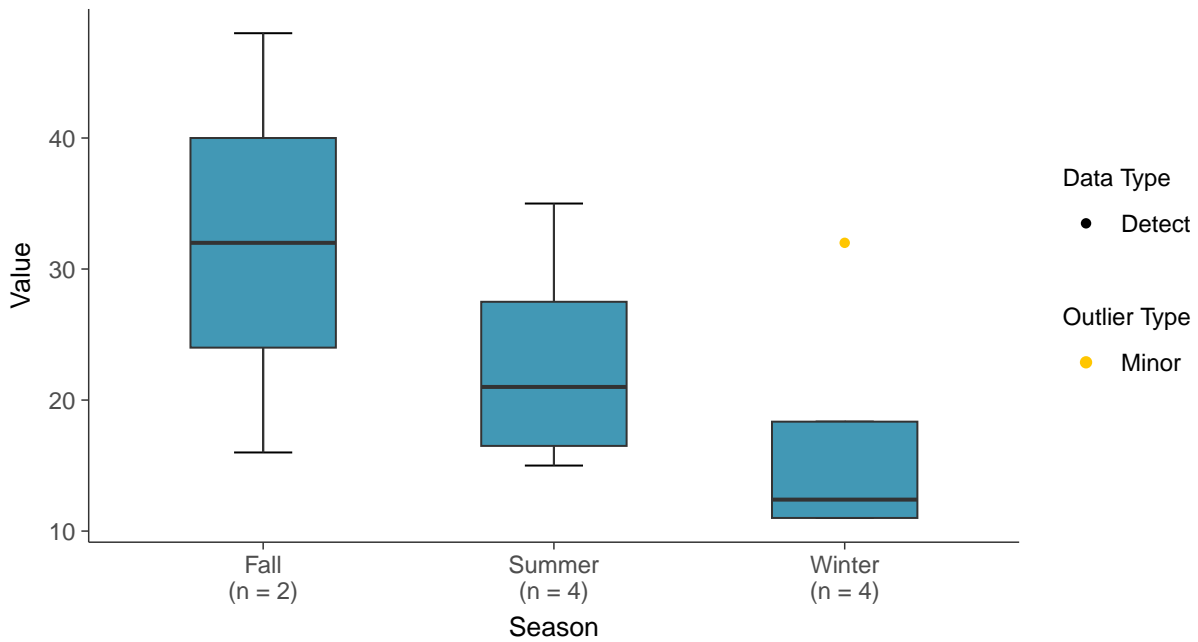
Boxplot

Sulfate, MW-8 (mg/L)



Boxplot by Season

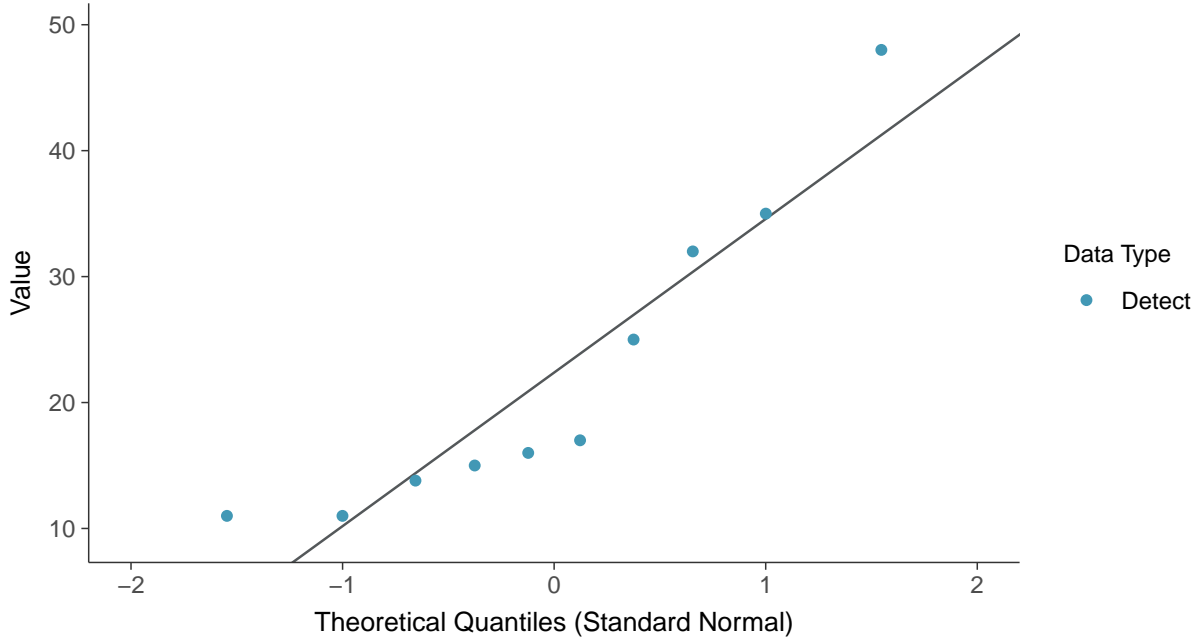
Sulfate, MW-8 (mg/L)





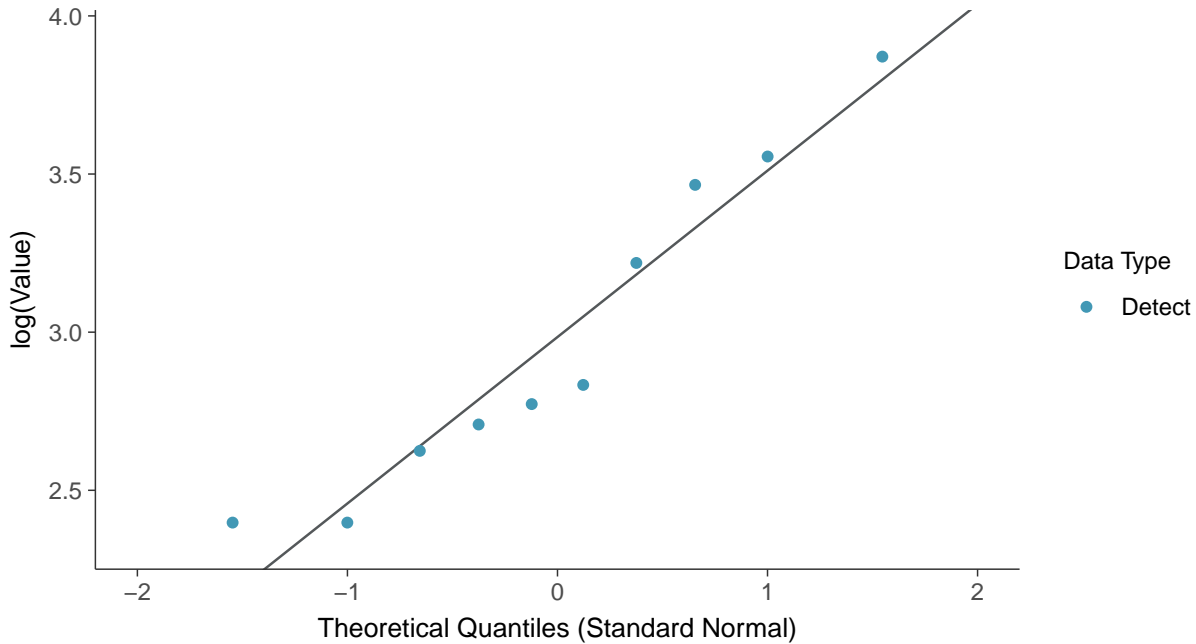
Normal Q-Q plot

Sulfate, MW-8 (mg/L)



Lognormal Q-Q plot

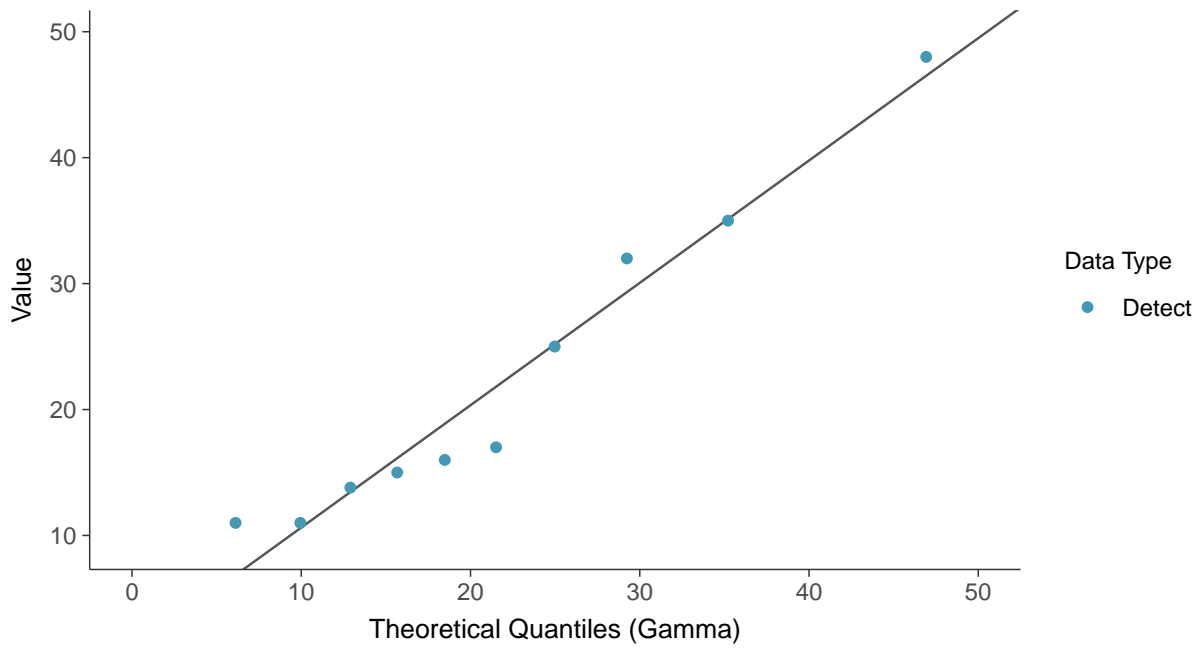
Sulfate, MW-8 (mg/L)





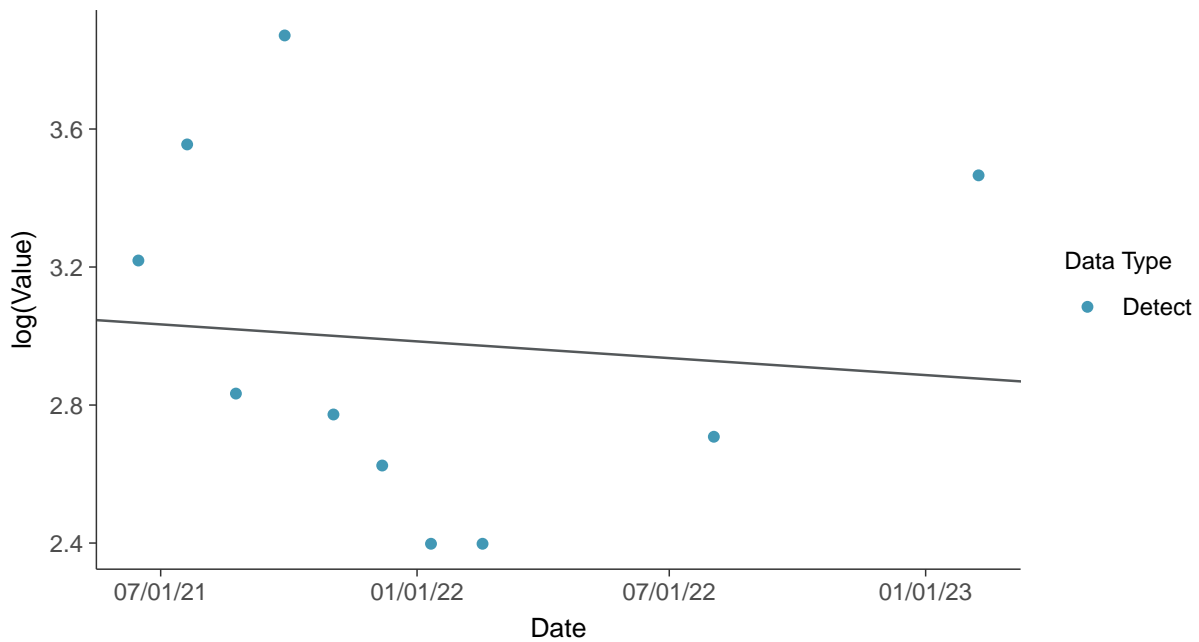
Gamma Q-Q plot

Sulfate, MW-8 (mg/L)



Trend Regression: Lognormal MLE

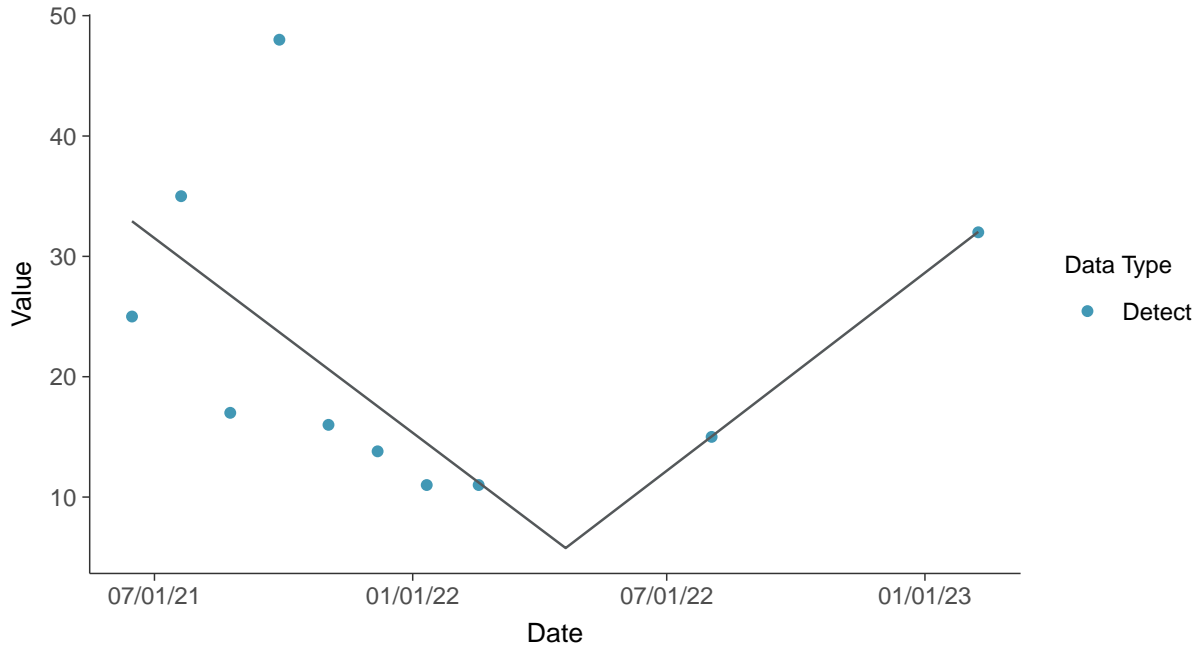
Sulfate, MW-8 (mg/L)





Trend Regression: Piecewise Linear-Linear

Sulfate, MW-8 (mg/L)



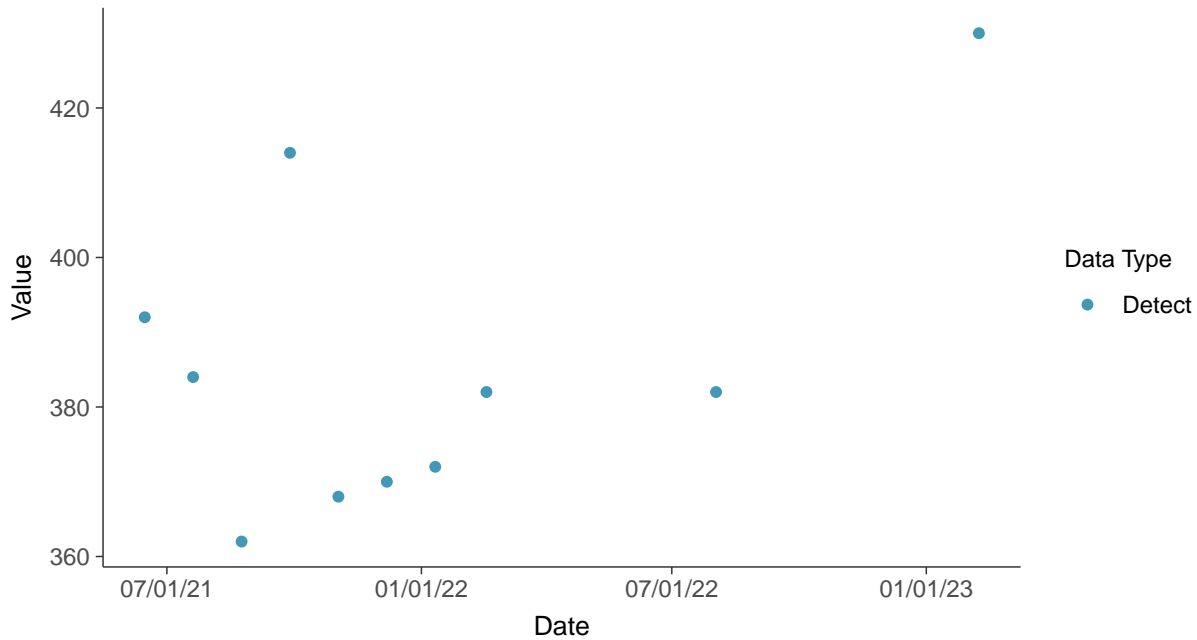


Appendix III: Total Dissolved Solids, MW-8

ID: 08_1_06

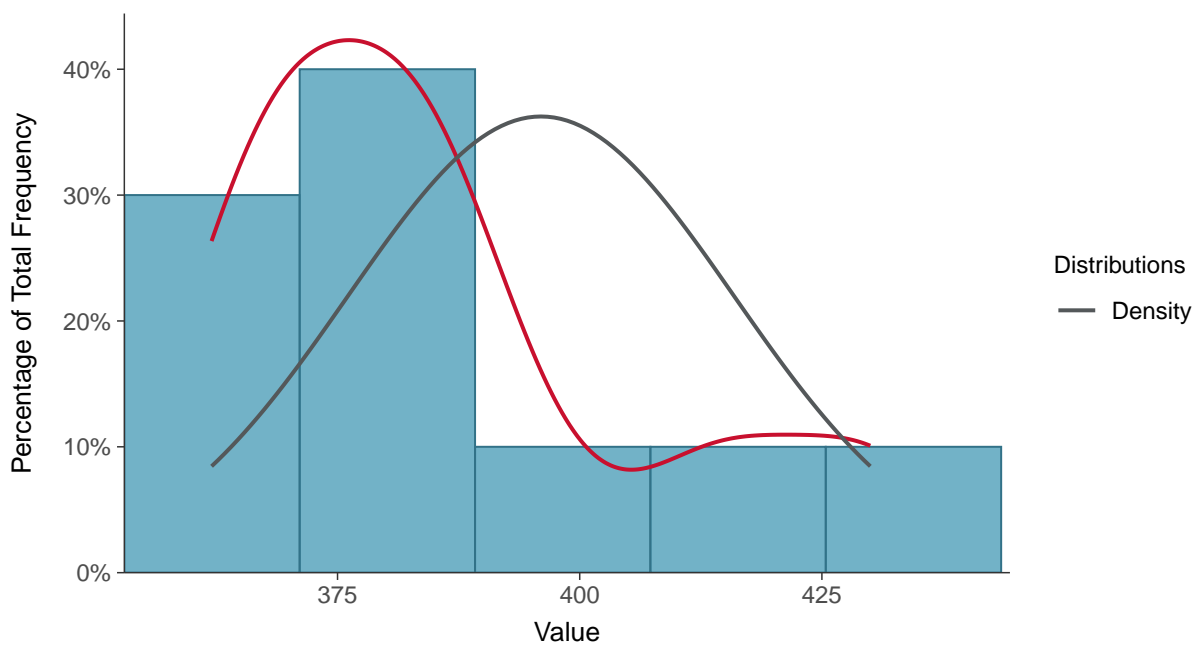
Scatter Plot

Total Dissolved Solids, MW-8 (mg/L)



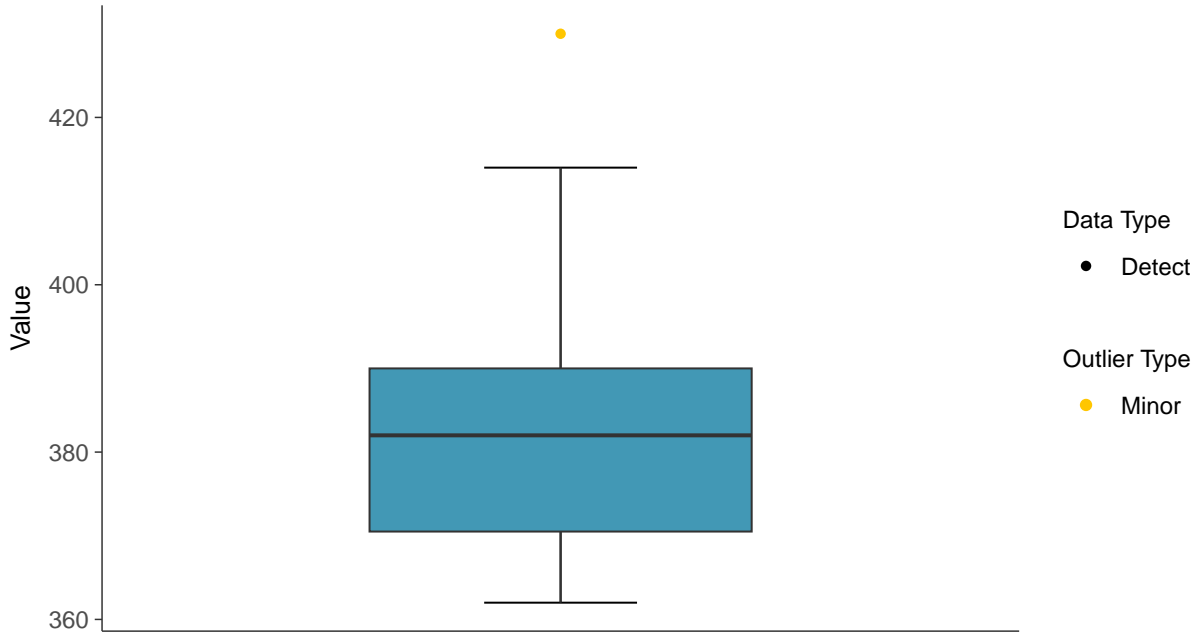
Histogram

Total Dissolved Solids, MW-8 (mg/L)



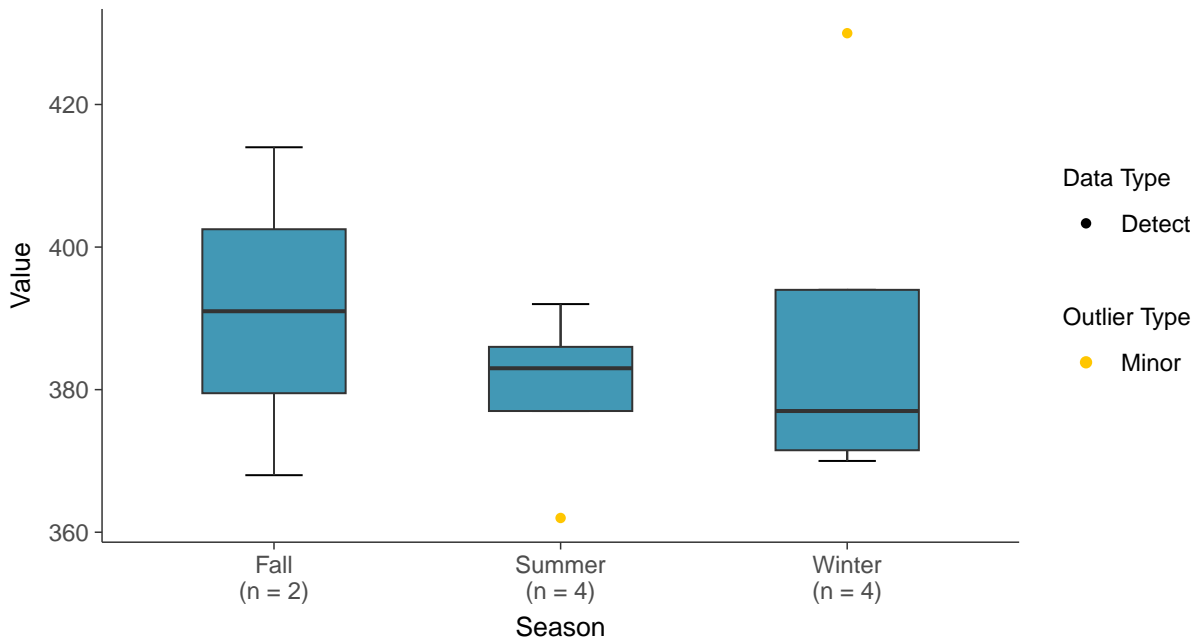
Boxplot

Total Dissolved Solids, MW-8 (mg/L)



Boxplot by Season

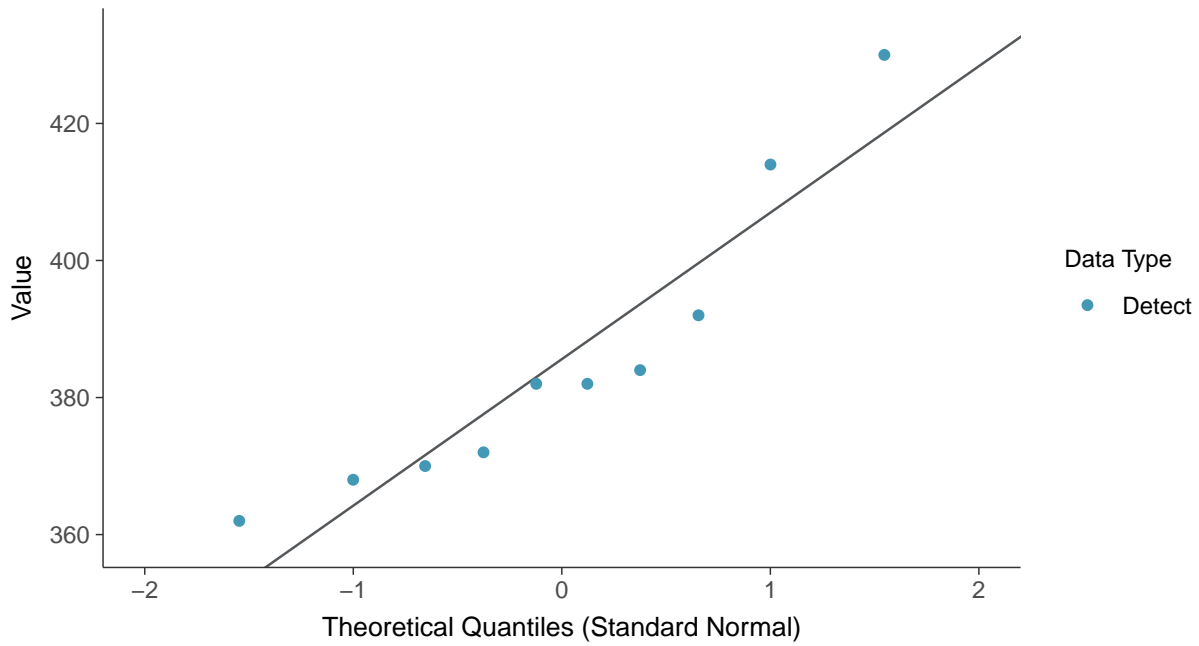
Total Dissolved Solids, MW-8 (mg/L)





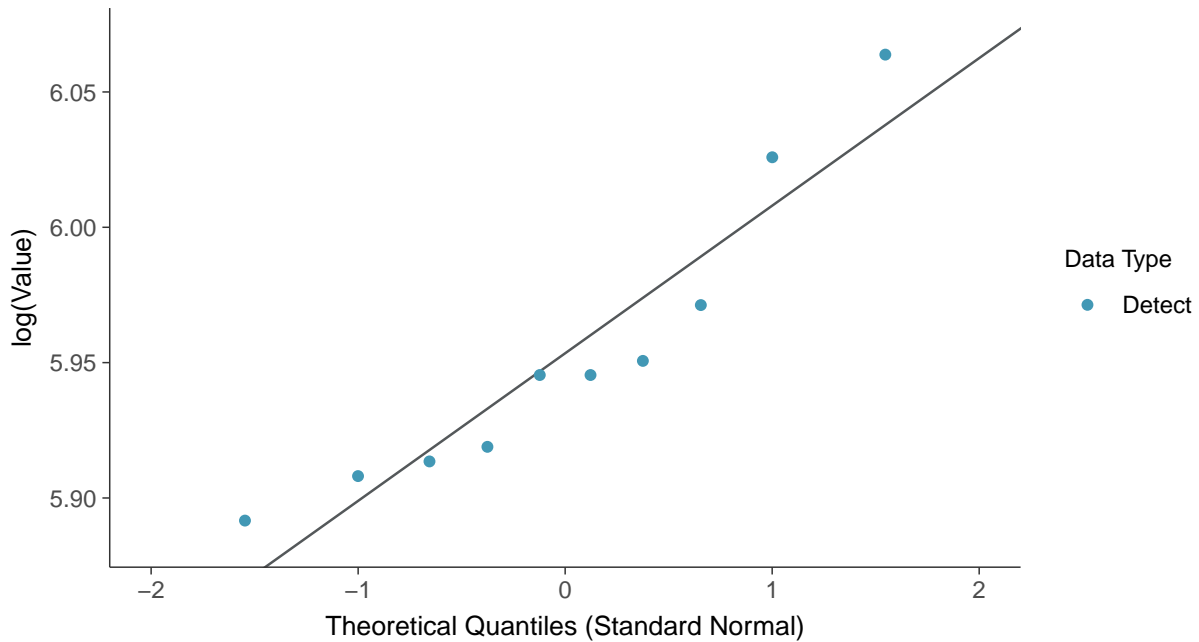
Normal Q-Q plot

Total Dissolved Solids, MW-8 (mg/L)



Lognormal Q-Q plot

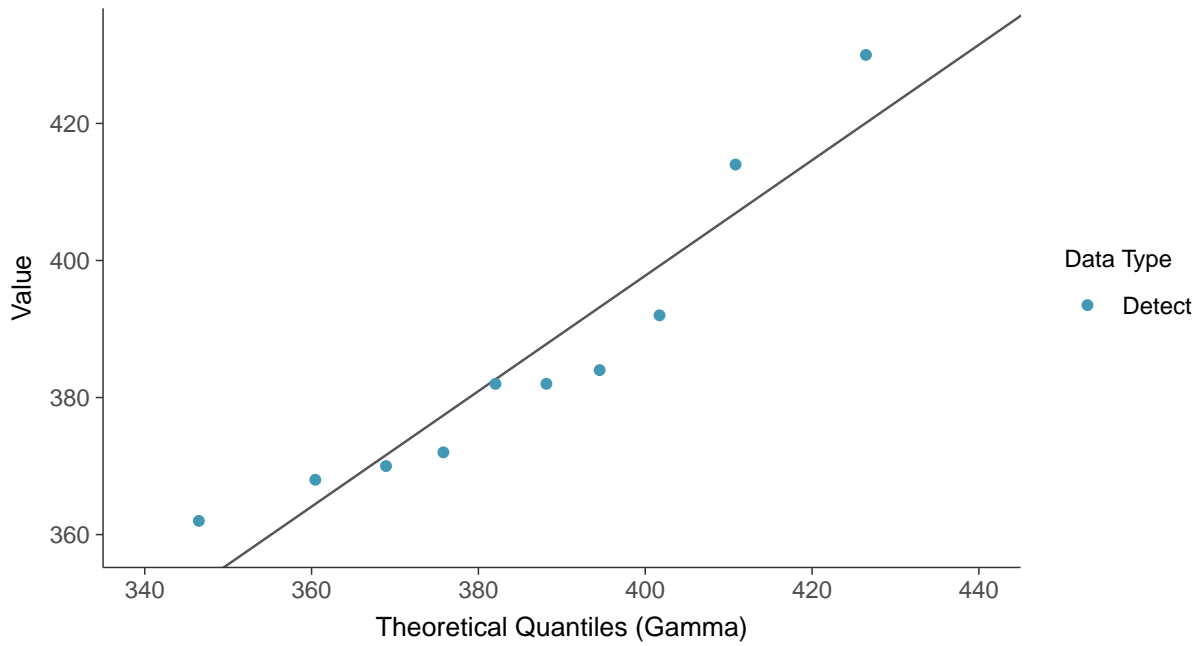
Total Dissolved Solids, MW-8 (mg/L)





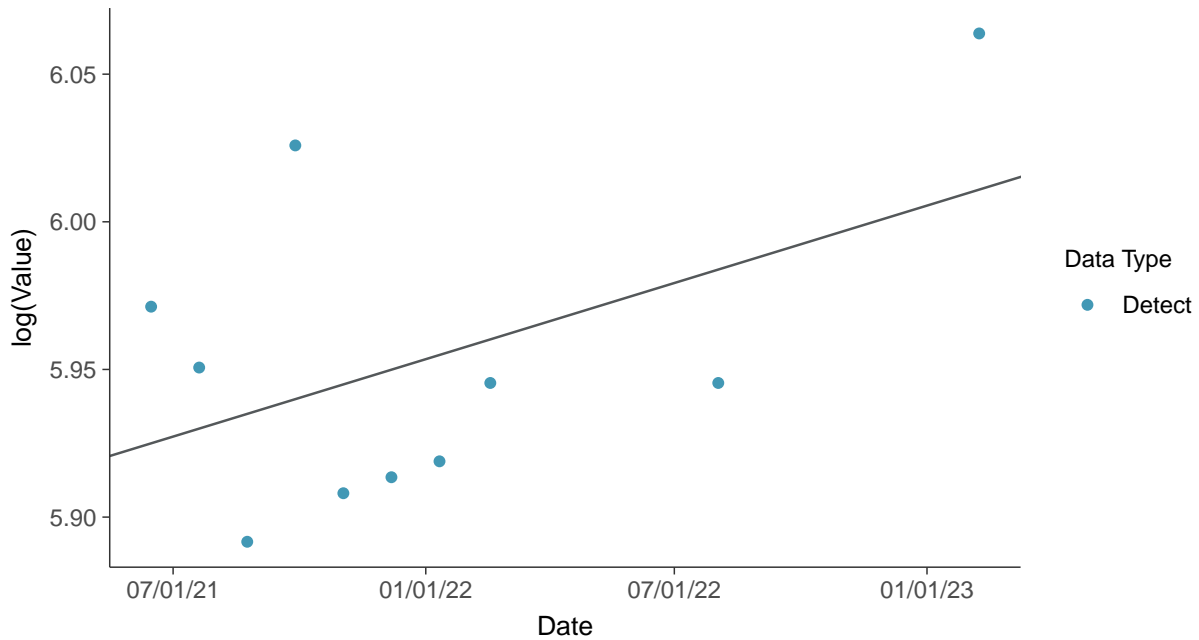
Gamma Q-Q plot

Total Dissolved Solids, MW-8 (mg/L)



Trend Regression: Lognormal MLE

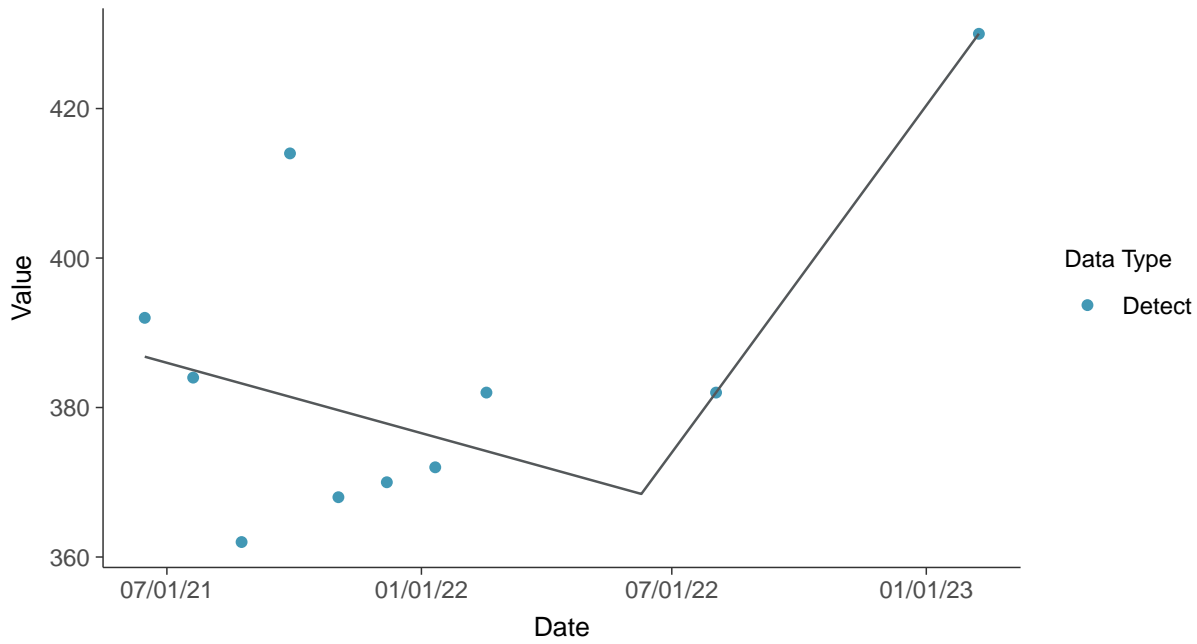
Total Dissolved Solids, MW-8 (mg/L)





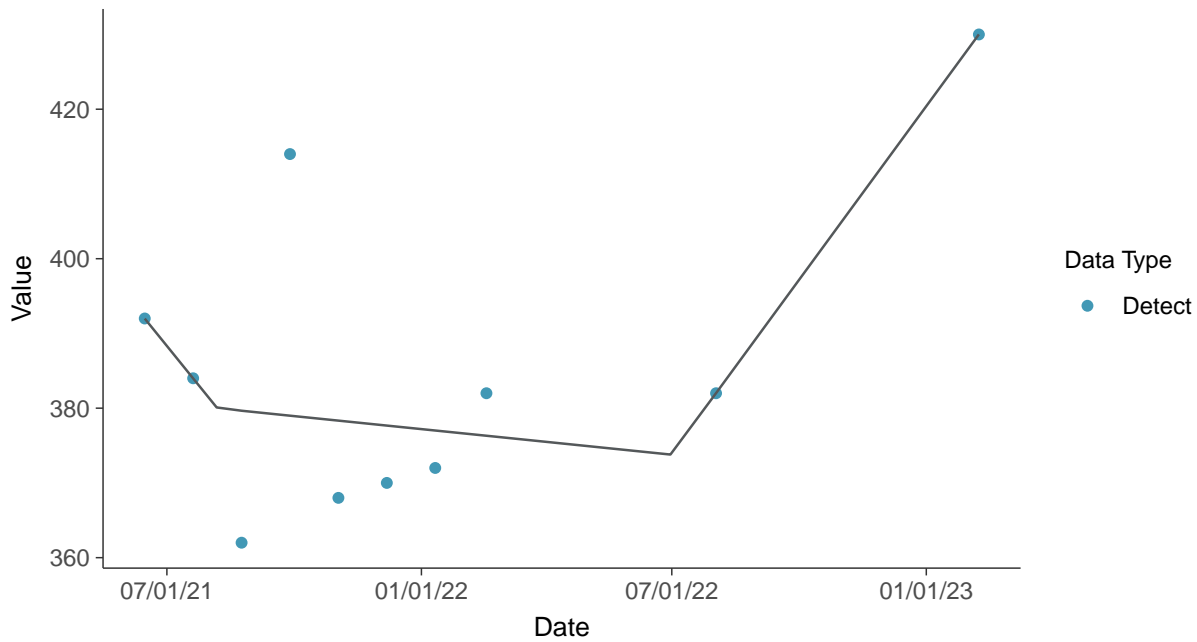
Trend Regression: Piecewise Linear-Linear

Total Dissolved Solids, MW-8 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Total Dissolved Solids, MW-8 (mg/L)



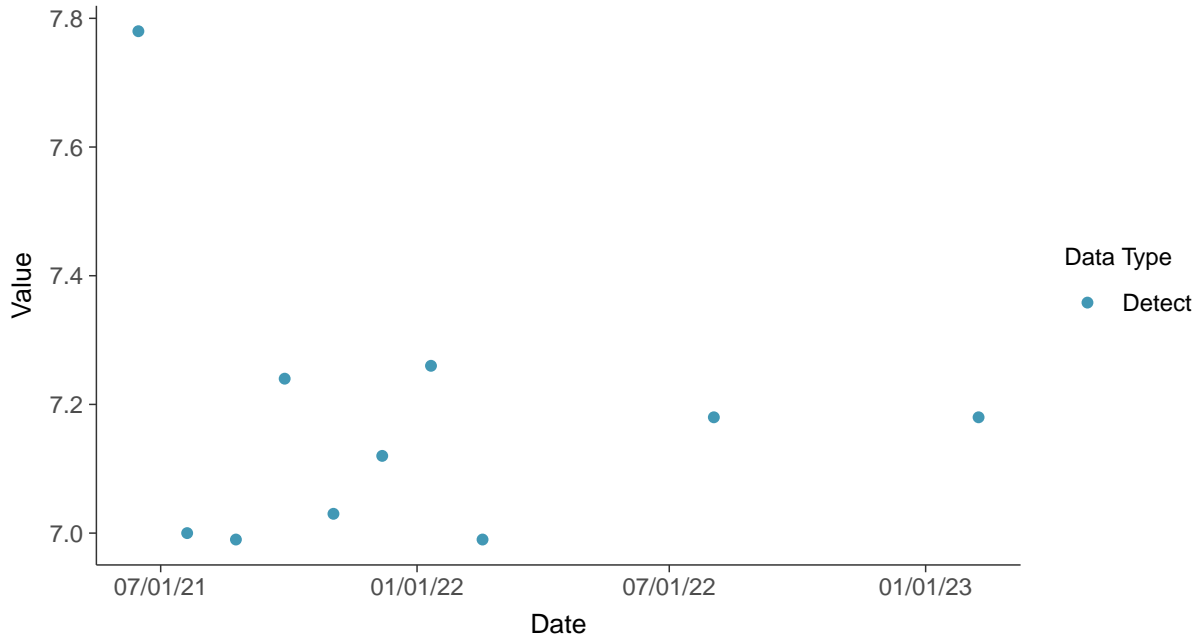


Appendix III: pH, Field, MW-8

ID: 08_1_07

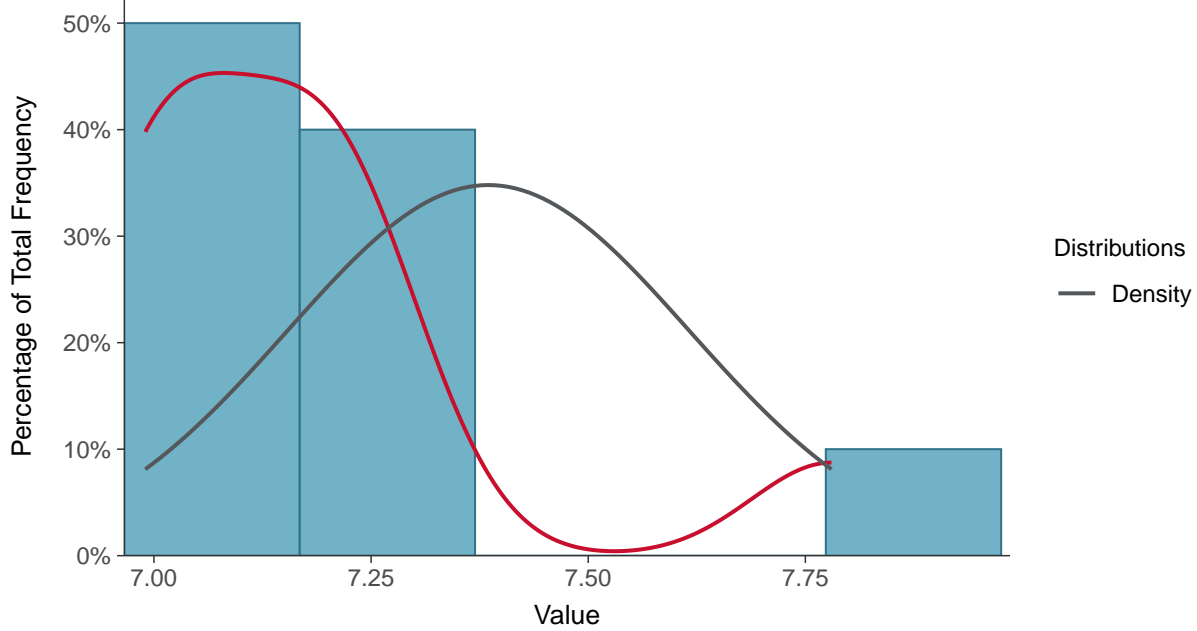
Scatter Plot

pH, Field, MW-8 (su)



Histogram

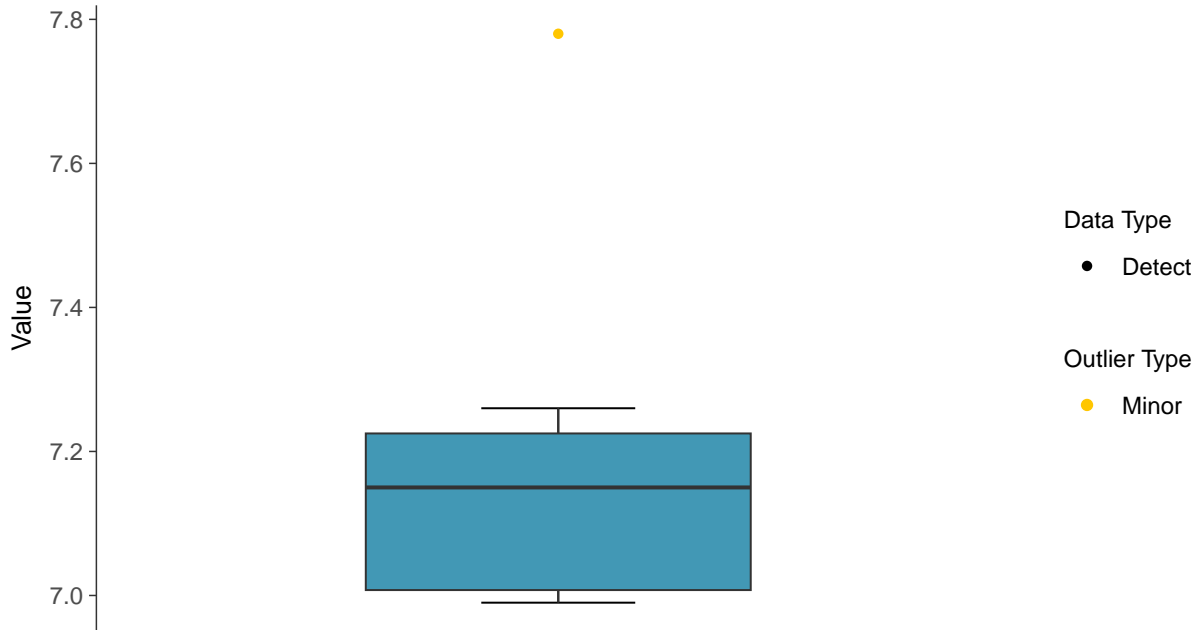
pH, Field, MW-8 (su)





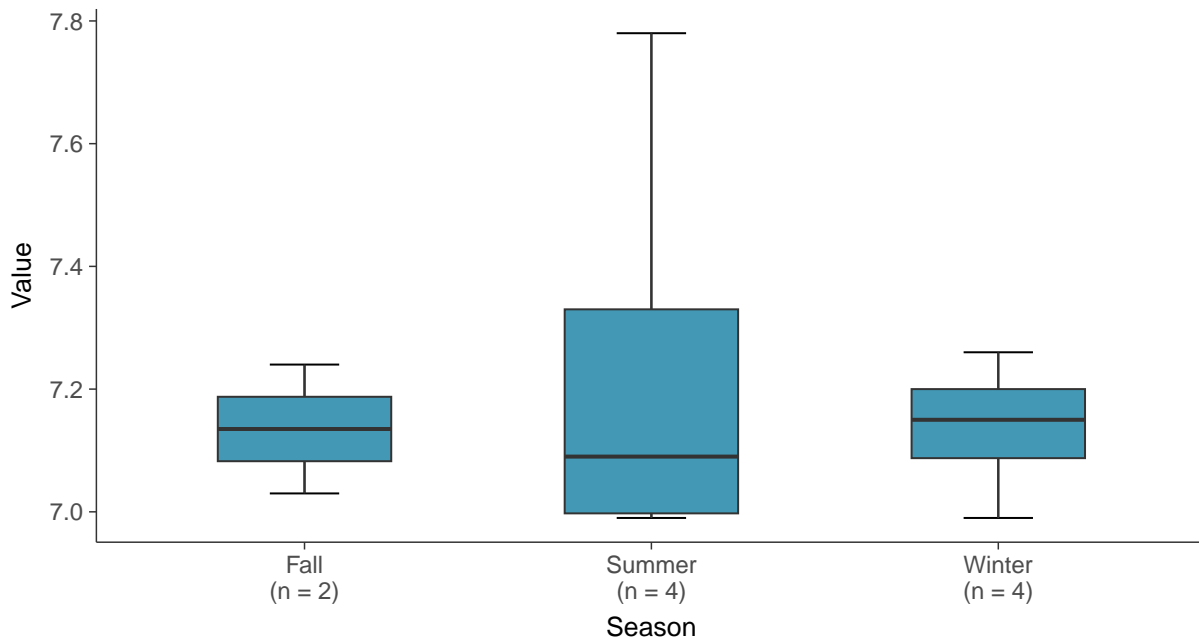
Boxplot

pH, Field, MW-8 (su)



Boxplot by Season

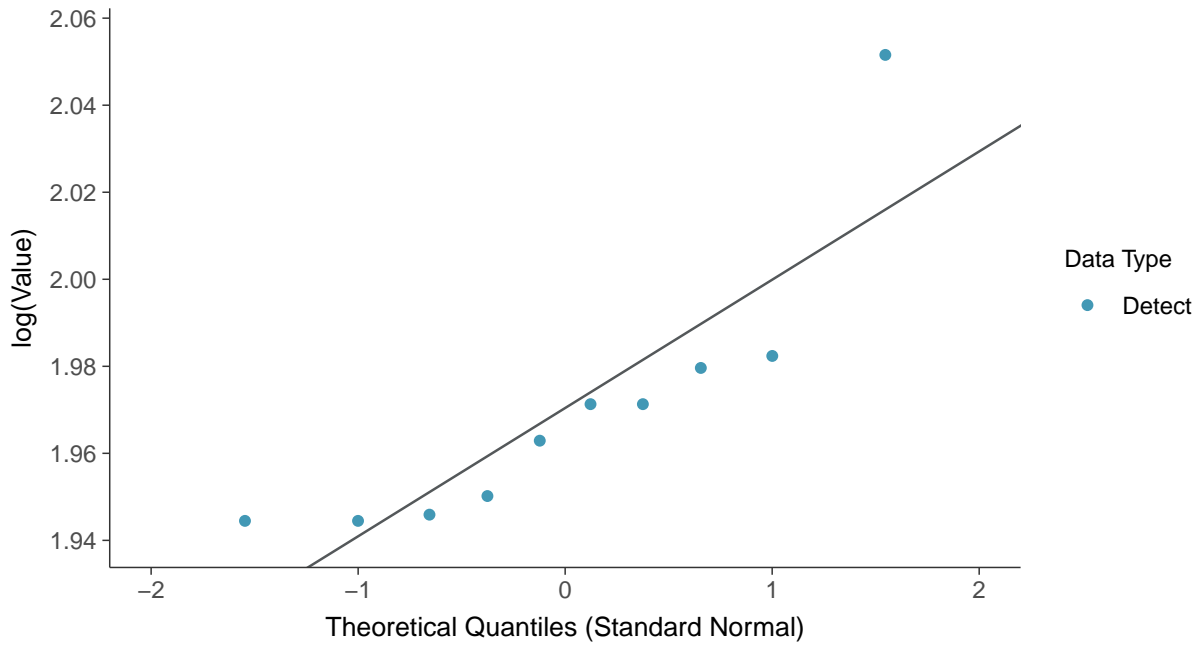
pH, Field, MW-8 (su)





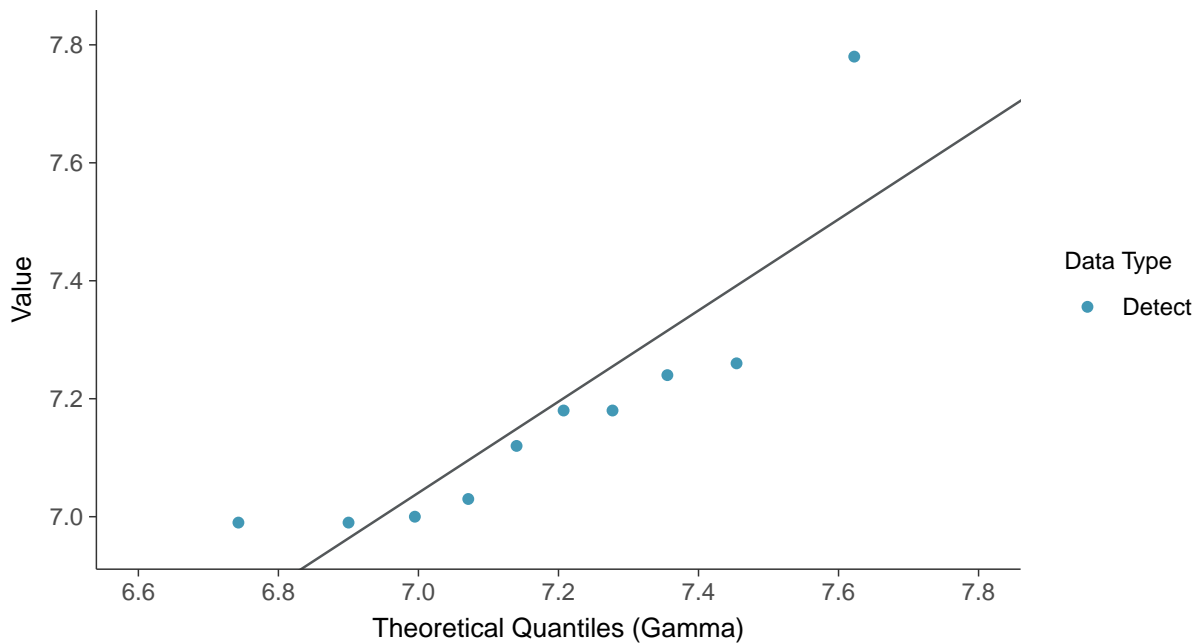
Lognormal Q-Q plot

pH, Field, MW-8 (su)



Gamma Q-Q plot

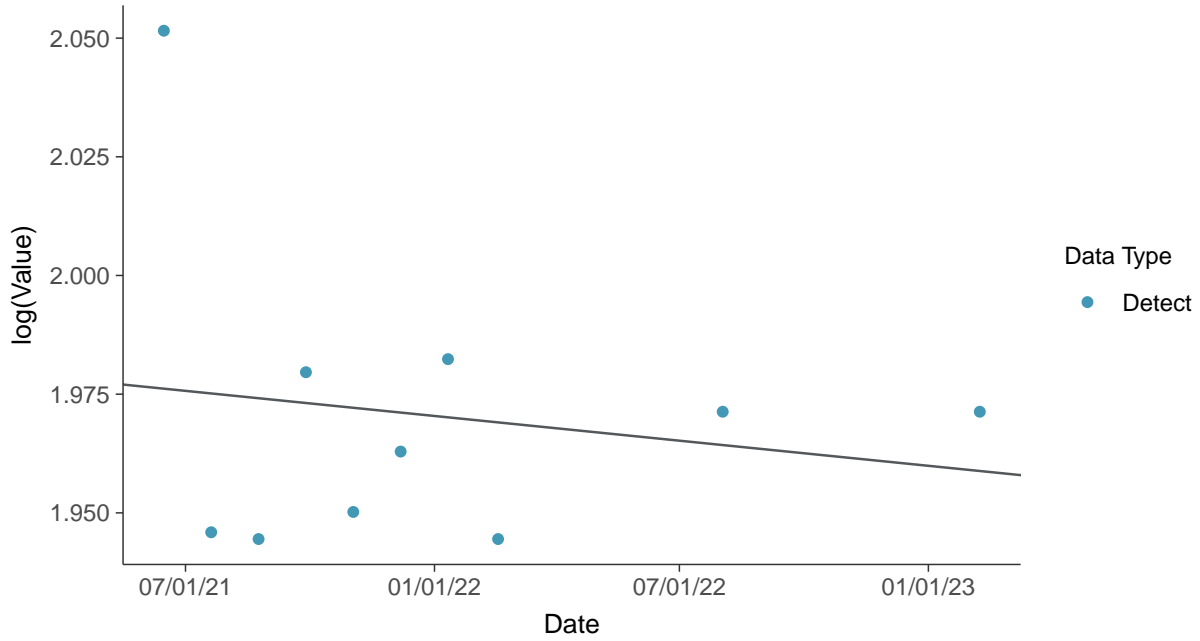
pH, Field, MW-8 (su)





Trend Regression: Lognormal MLE

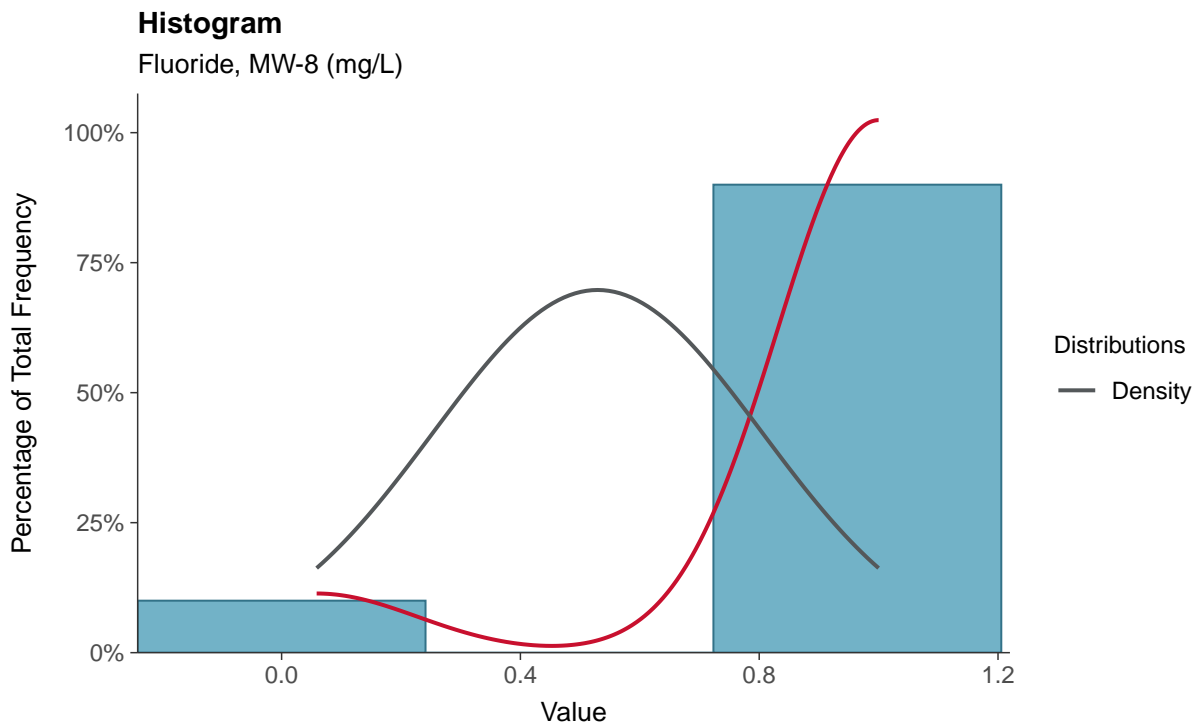
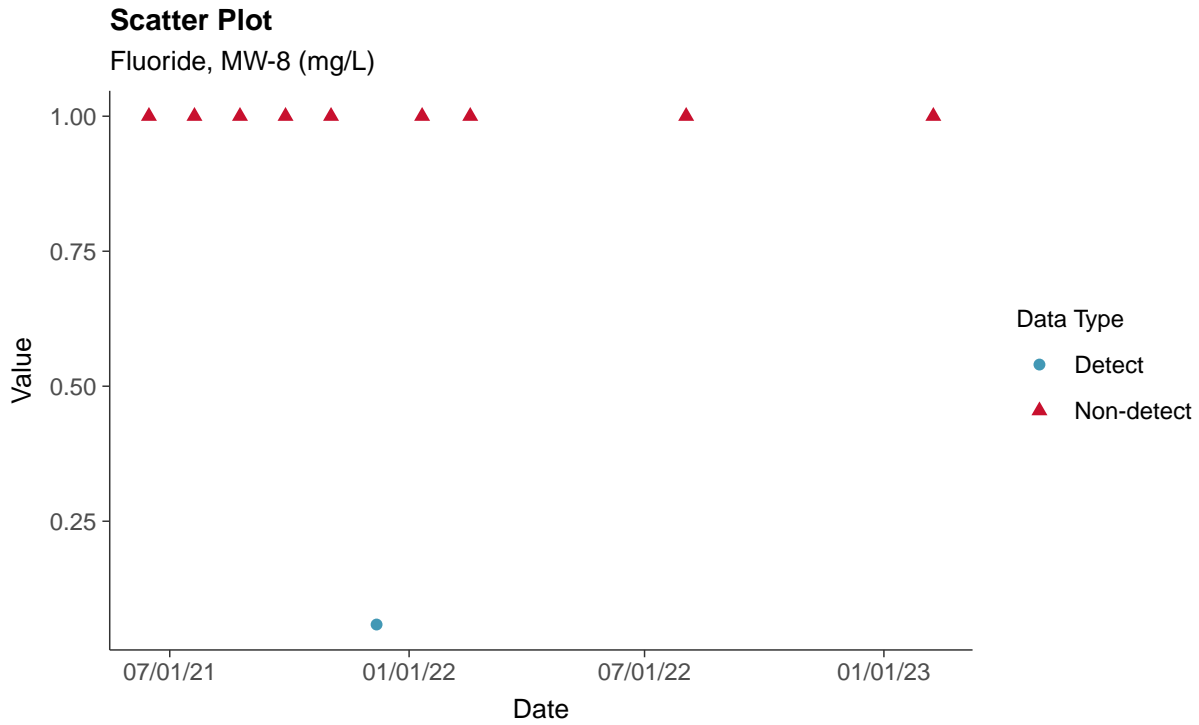
pH, Field, MW-8 (su)





Appendix IV: Fluoride, MW-8

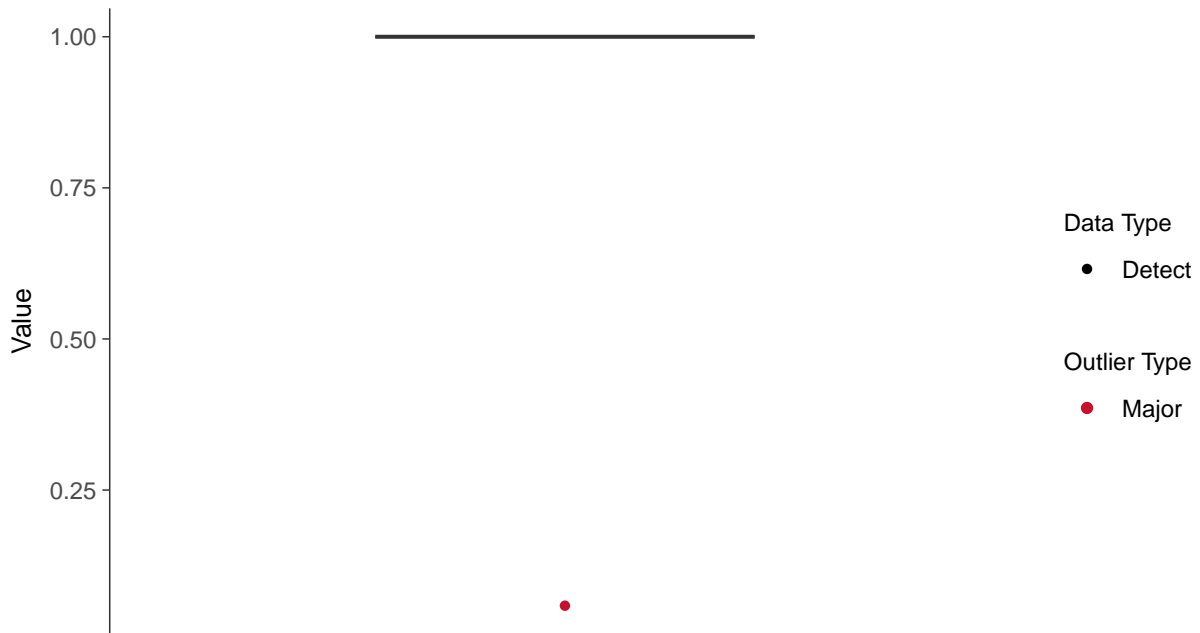
ID: 08_2_04





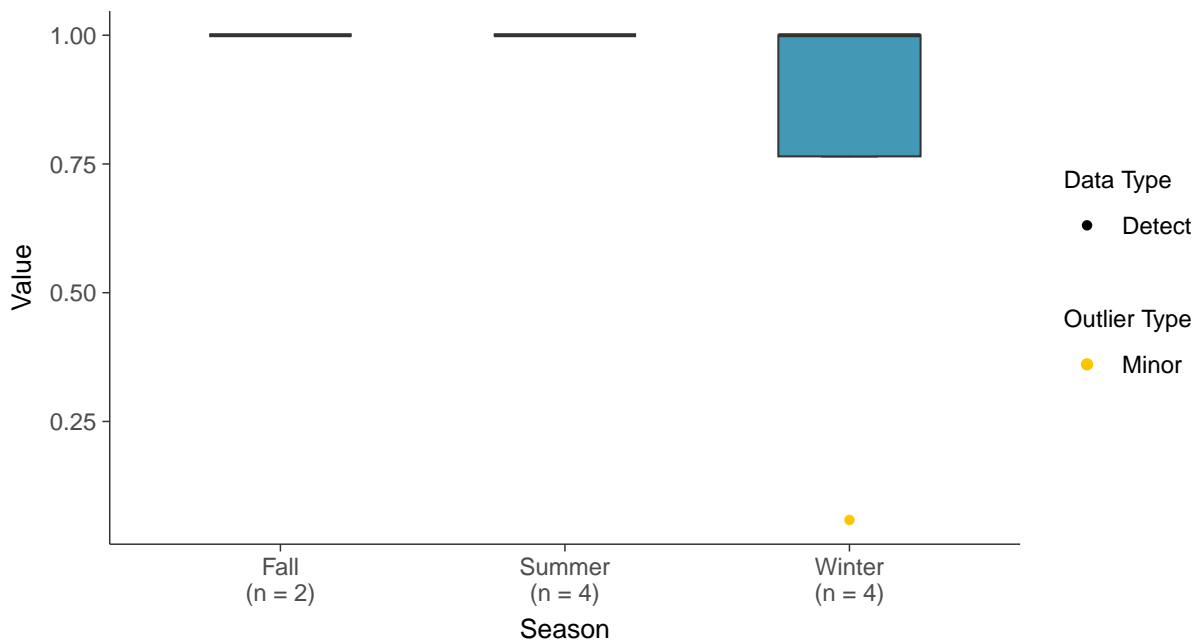
Boxplot

Fluoride, MW-8 (mg/L)



Boxplot by Season

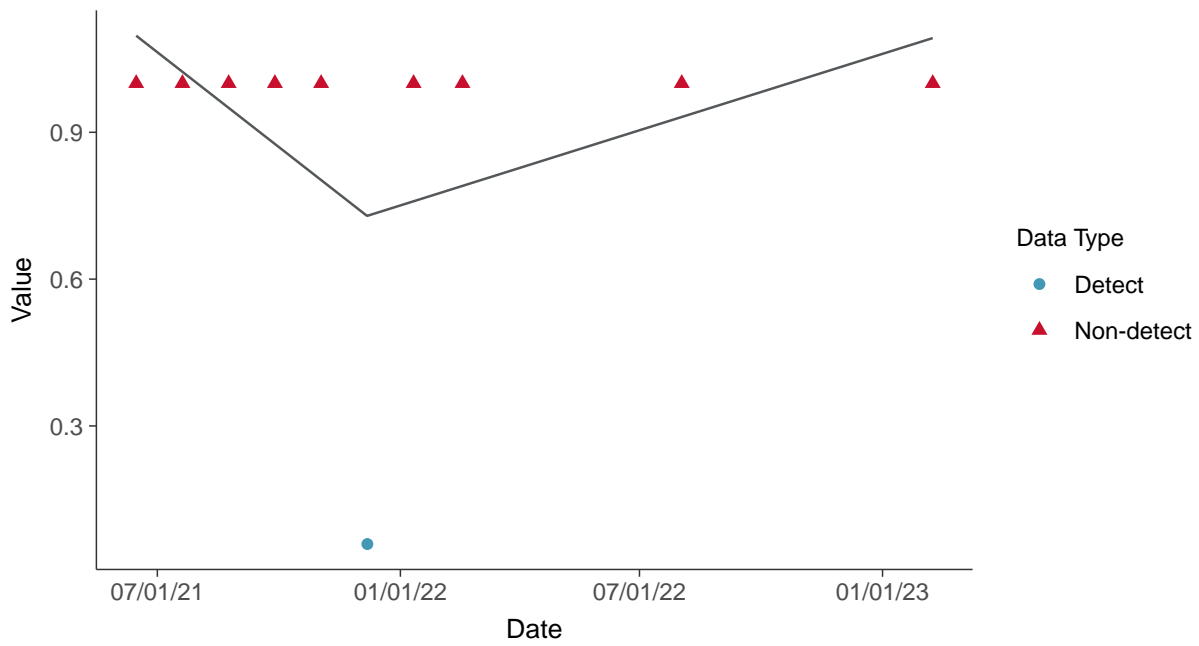
Fluoride, MW-8 (mg/L)





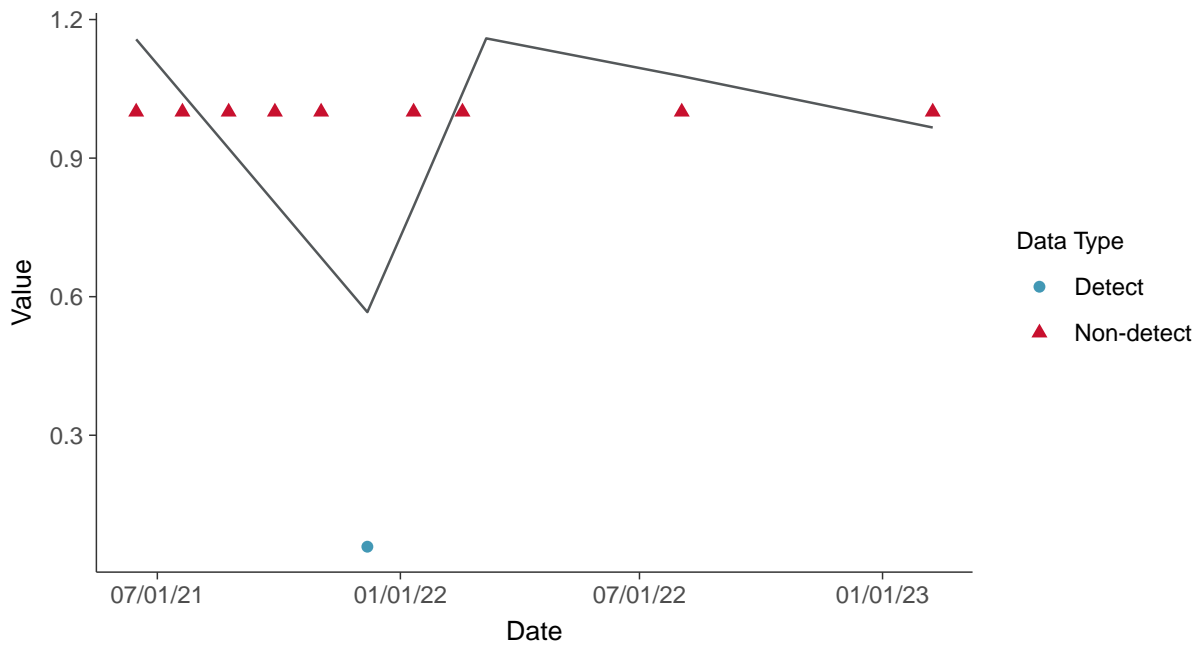
Trend Regression: Piecewise Linear-Linear

Fluoride, MW-8 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Fluoride, MW-8 (mg/L)



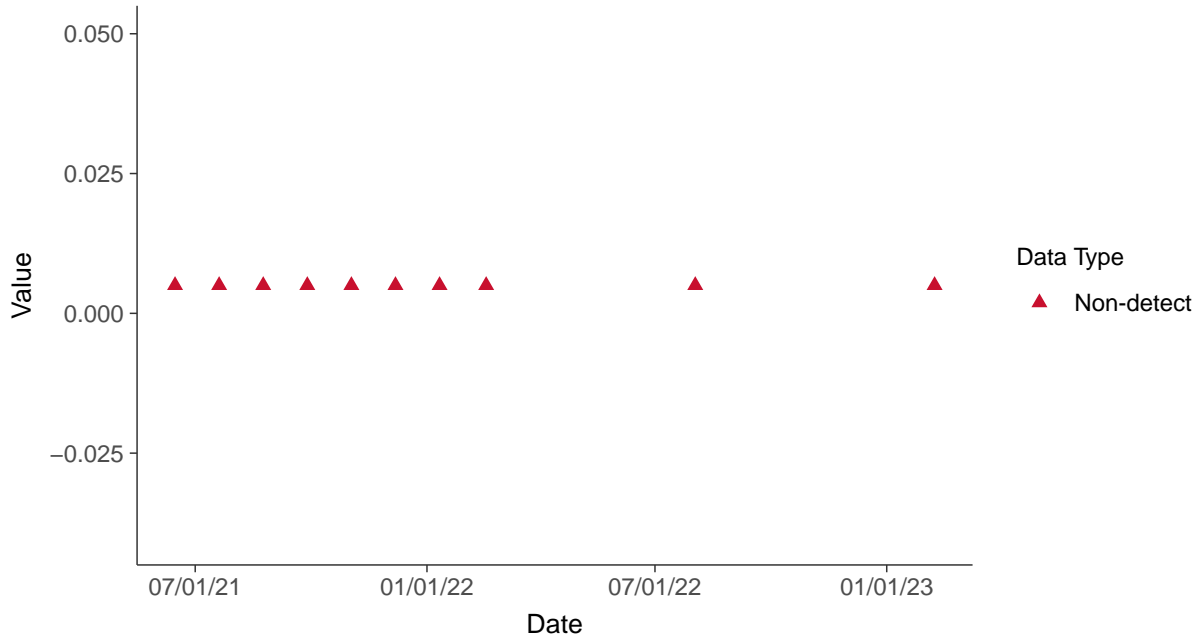


Appendix IV: Antimony, MW-8

ID: 08_2_08

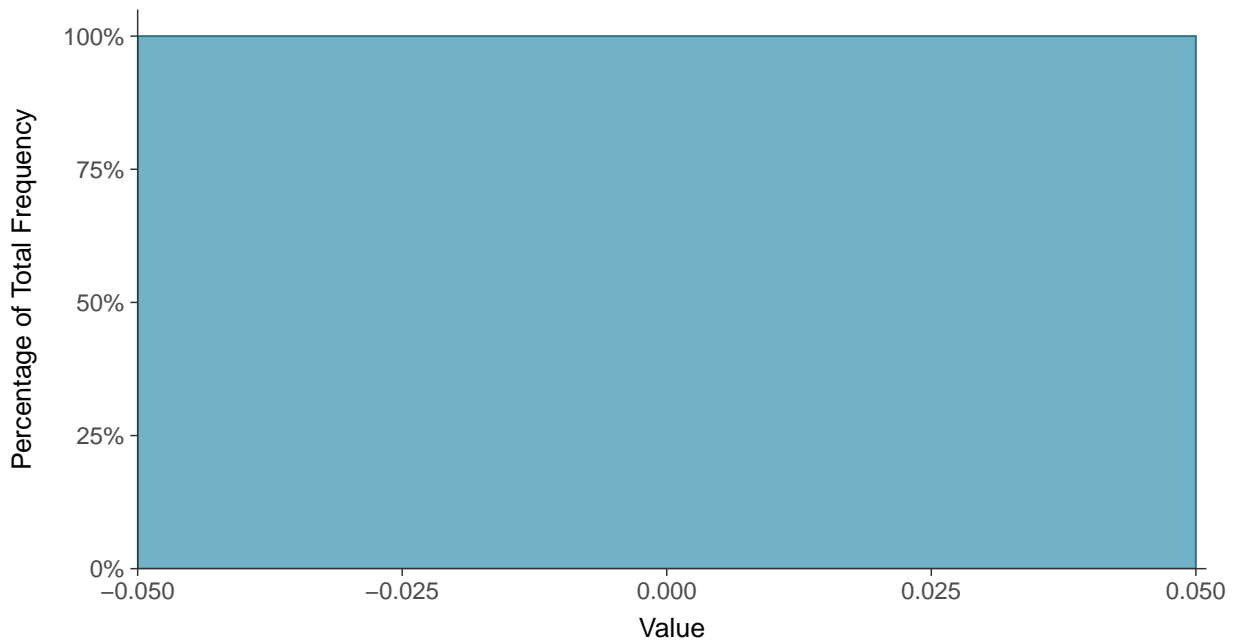
Scatter Plot

Antimony, MW-8 (mg/L)



Histogram

Antimony, MW-8 (mg/L)





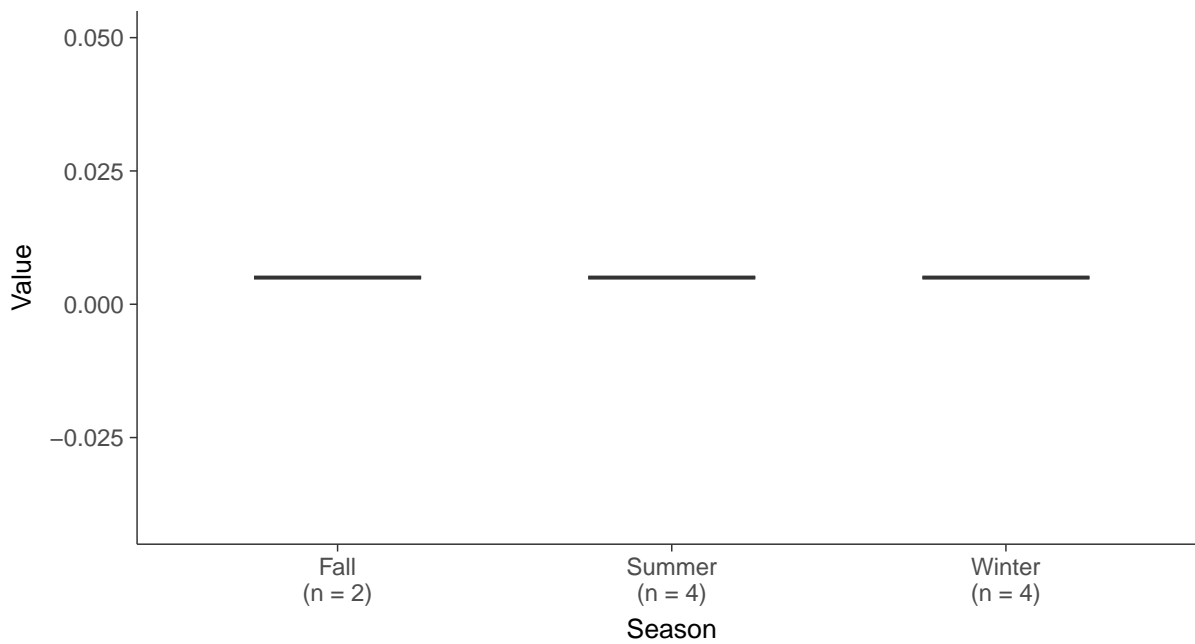
Boxplot

Antimony, MW-8 (mg/L)



Boxplot by Season

Antimony, MW-8 (mg/L)



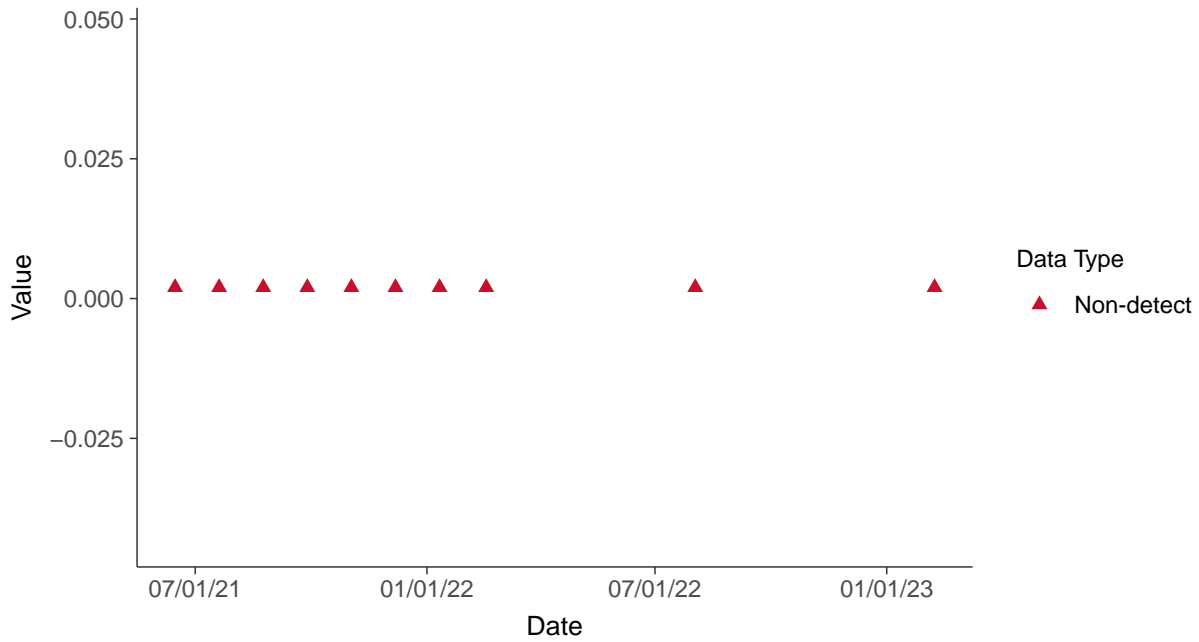


Appendix IV: Arsenic, MW-8

ID: 08_2_09

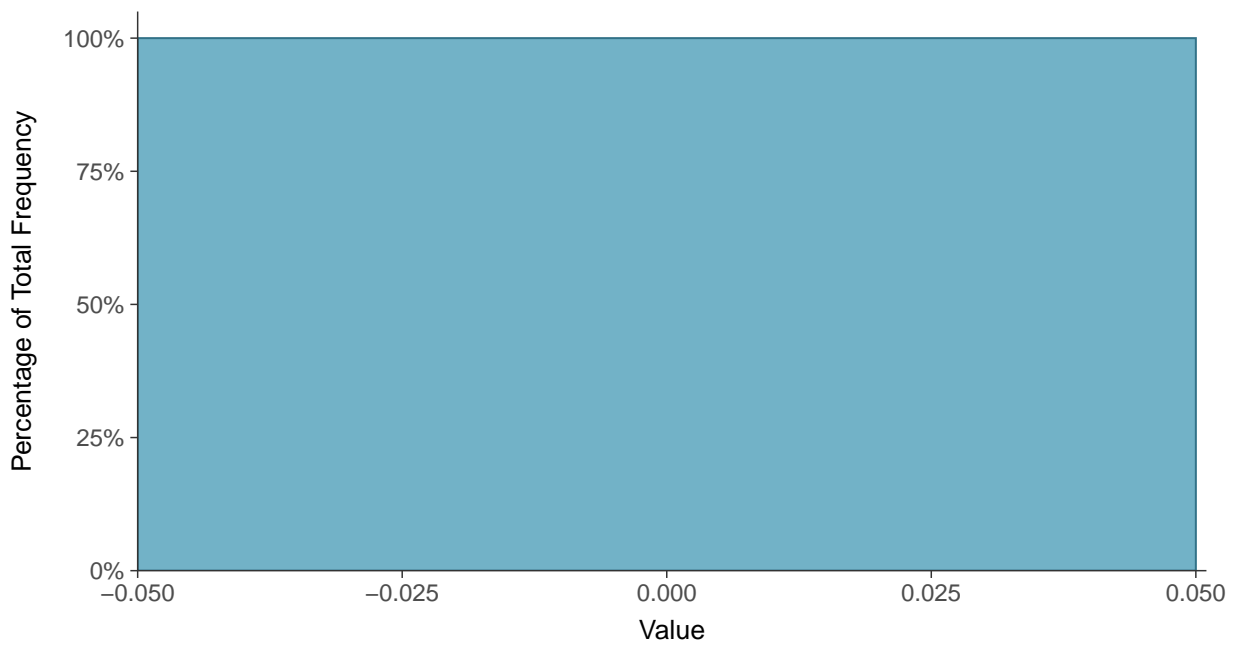
Scatter Plot

Arsenic, MW-8 (mg/L)



Histogram

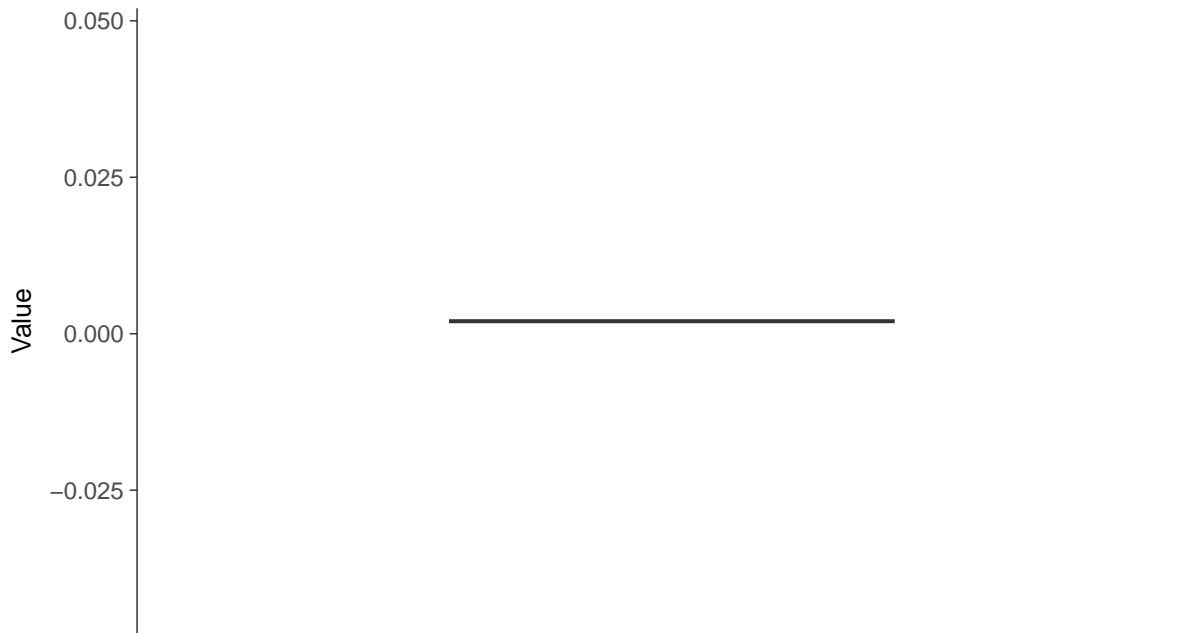
Arsenic, MW-8 (mg/L)





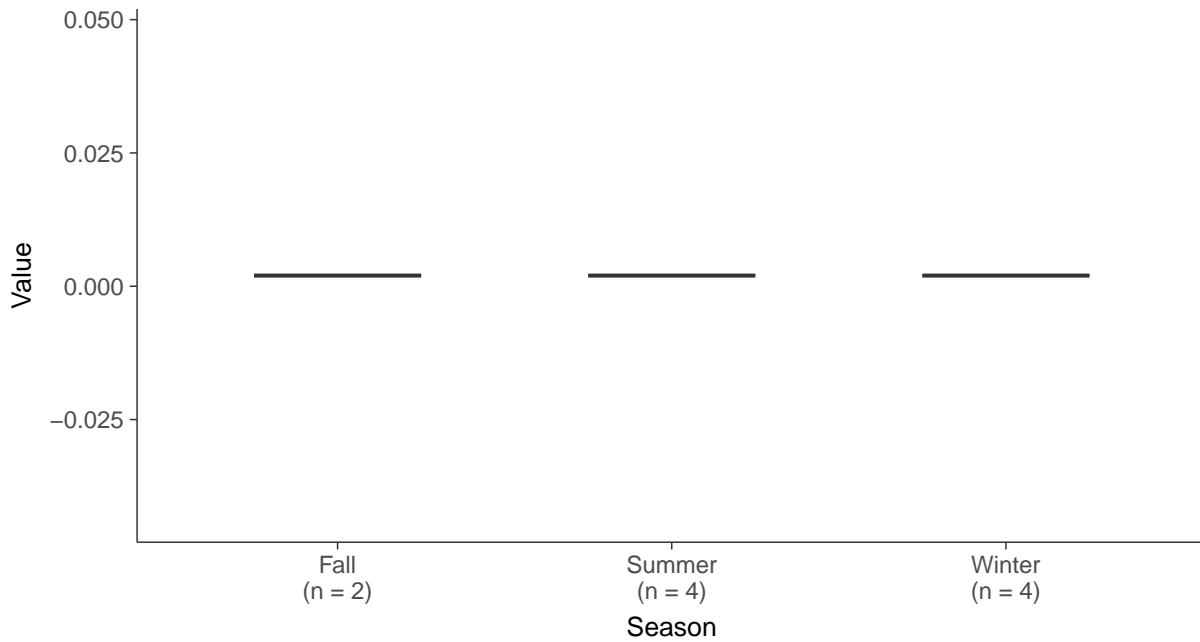
Boxplot

Arsenic, MW-8 (mg/L)



Boxplot by Season

Arsenic, MW-8 (mg/L)



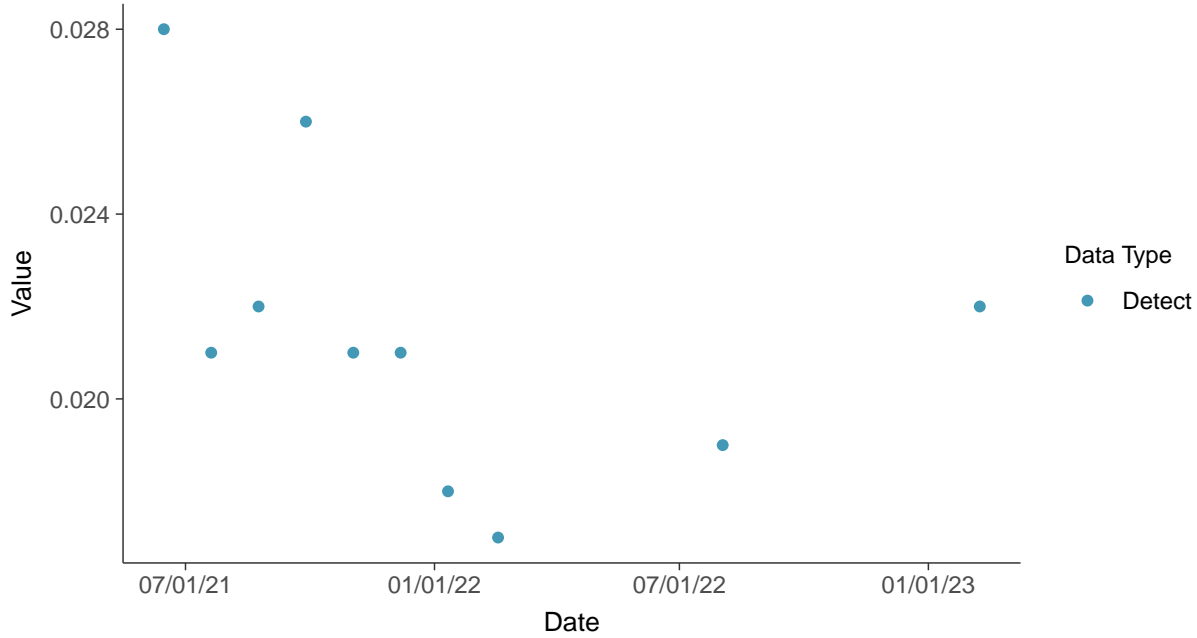


Appendix IV: Barium, MW-8

ID: 08_2_10

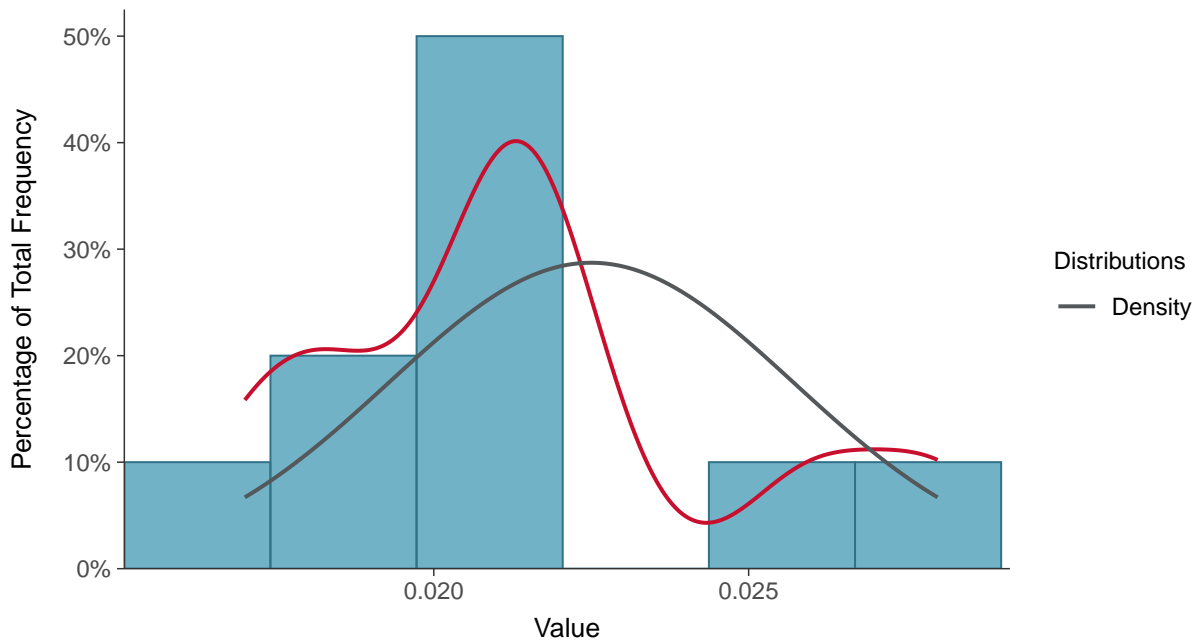
Scatter Plot

Barium, MW-8 (mg/L)



Histogram

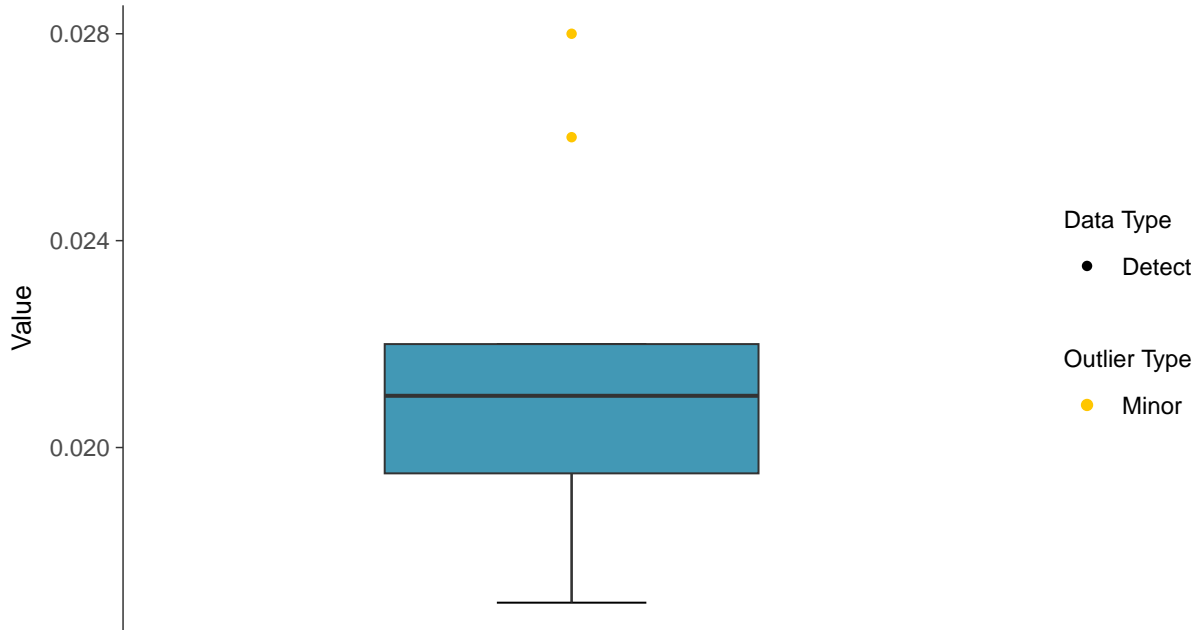
Barium, MW-8 (mg/L)





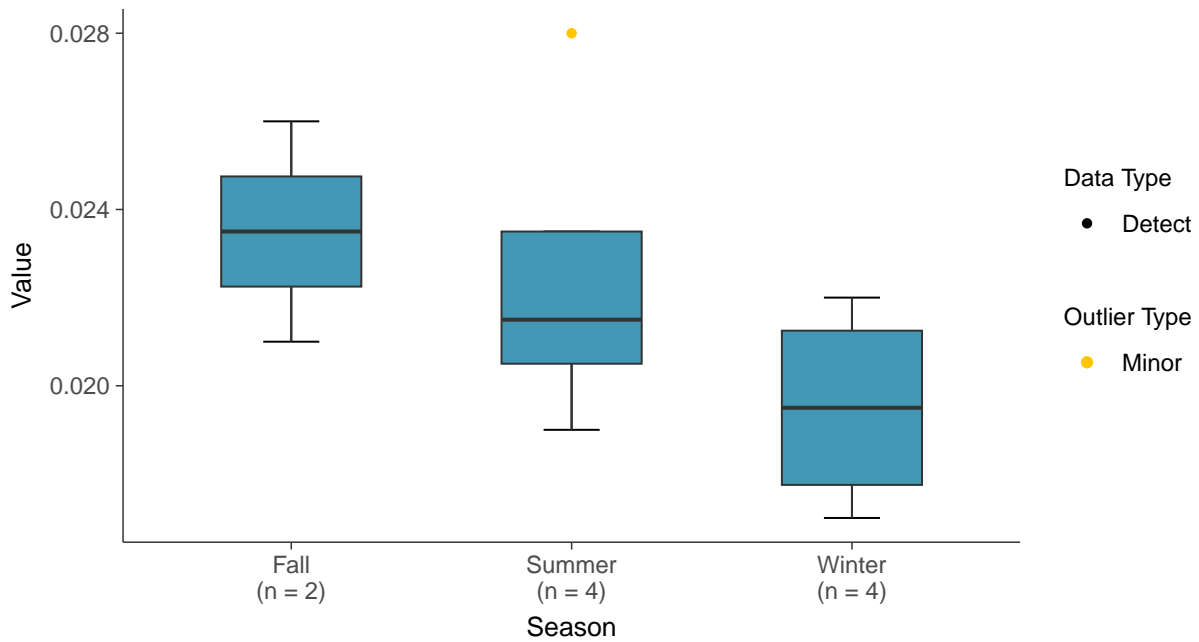
Boxplot

Barium, MW-8 (mg/L)



Boxplot by Season

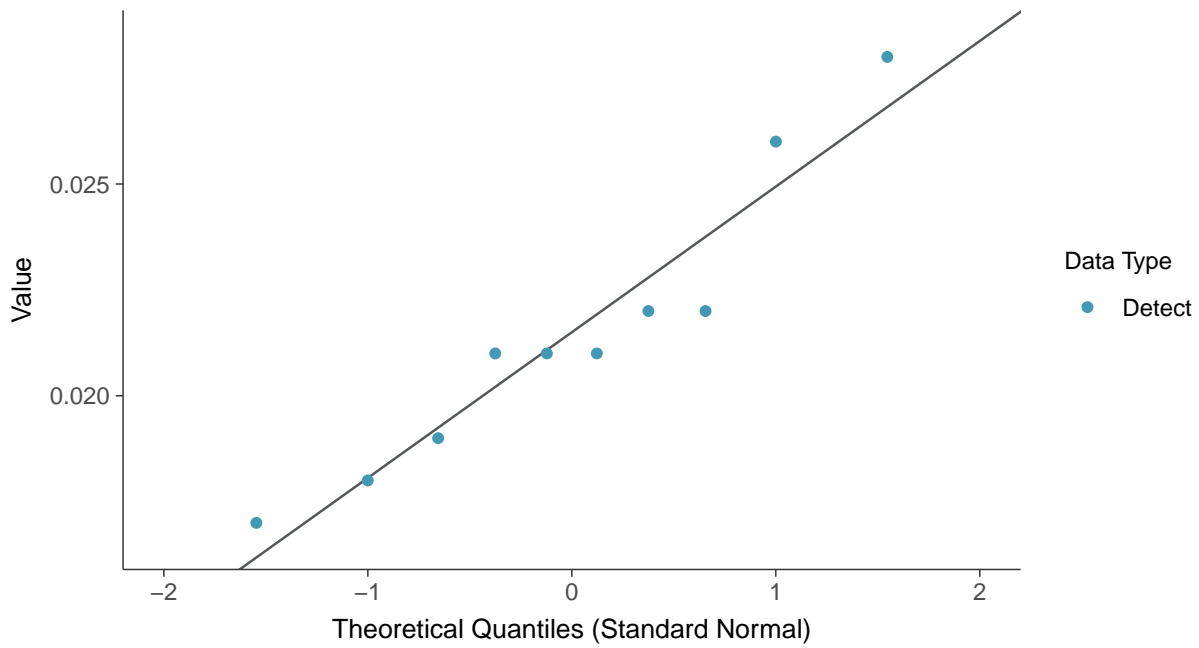
Barium, MW-8 (mg/L)





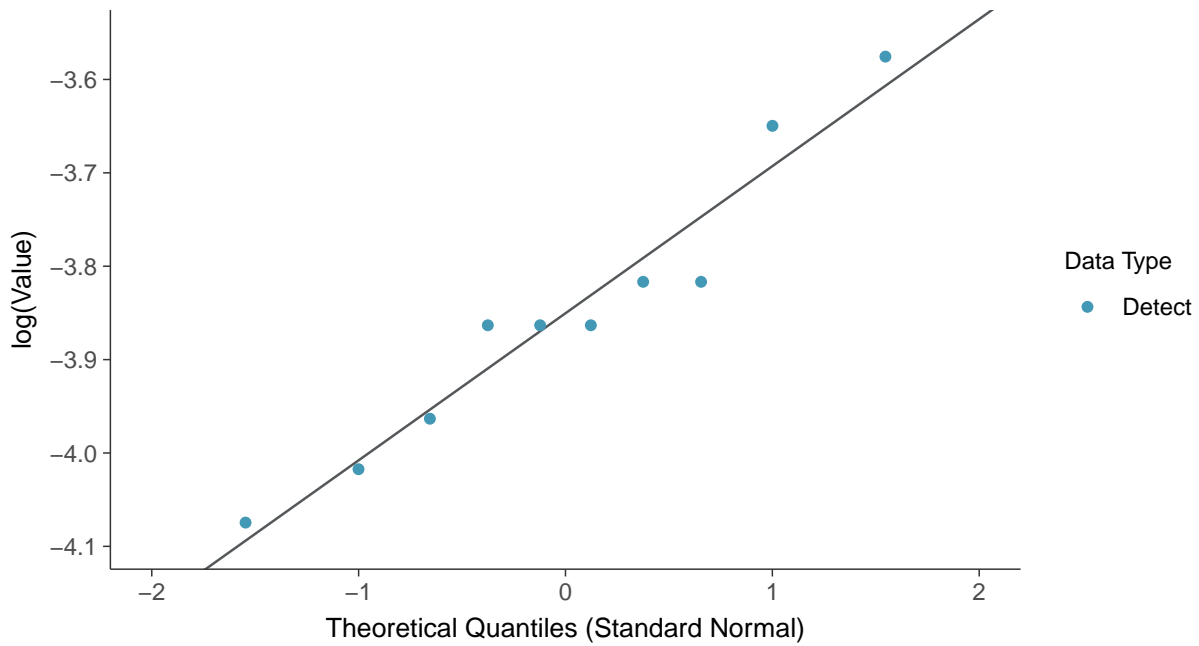
Normal Q-Q plot

Barium, MW-8 (mg/L)



Lognormal Q-Q plot

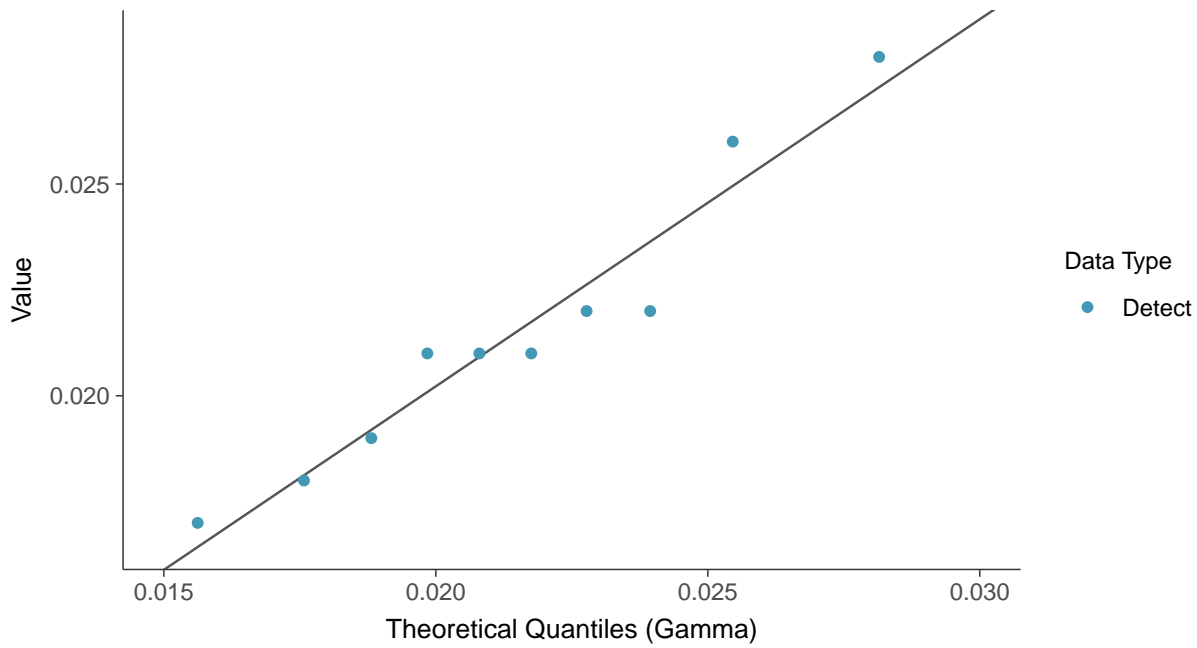
Barium, MW-8 (mg/L)





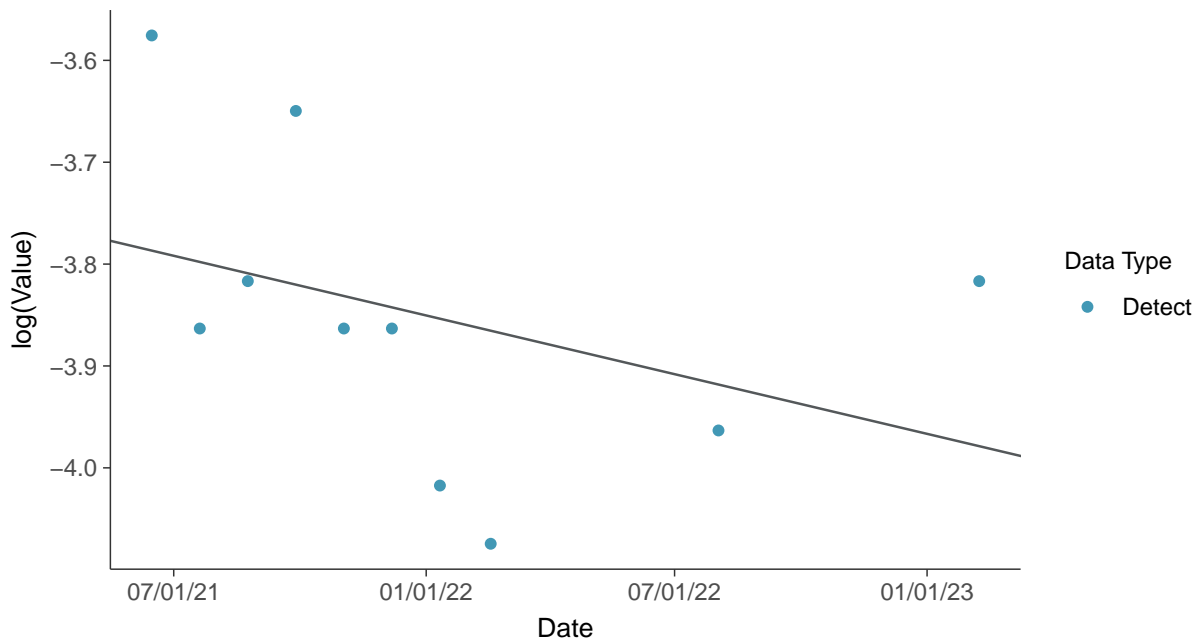
Gamma Q-Q plot

Barium, MW-8 (mg/L)



Trend Regression: Lognormal MLE

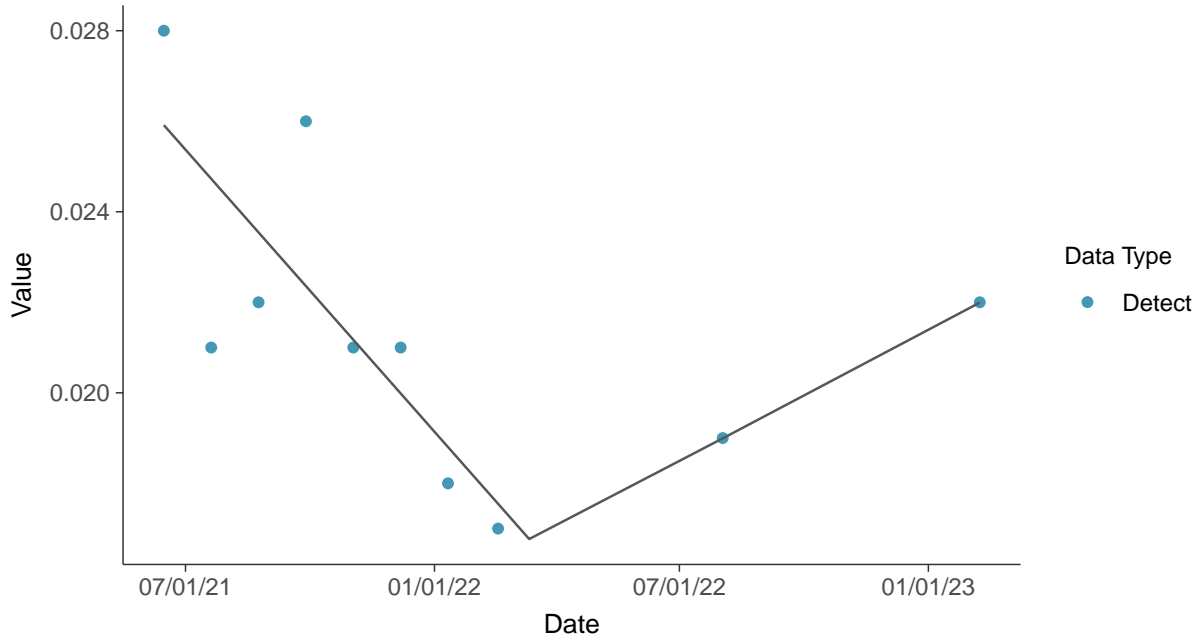
Barium, MW-8 (mg/L)





Trend Regression: Piecewise Linear-Linear

Barium, MW-8 (mg/L)



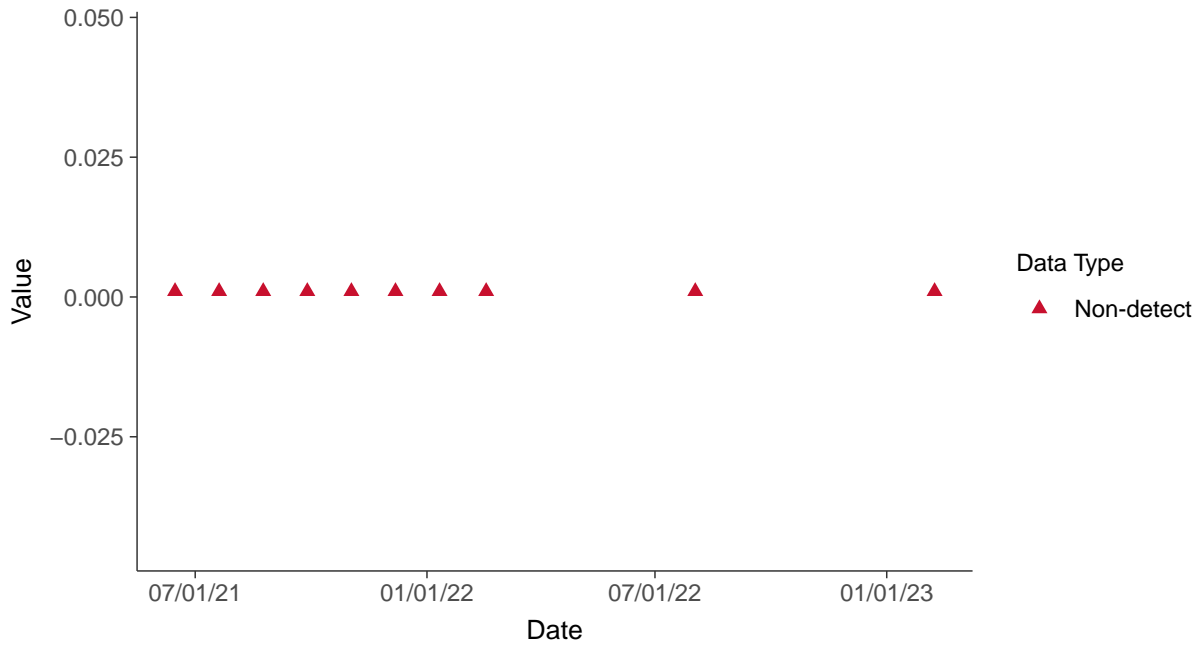


Appendix IV: Beryllium, MW-8

ID: 08_2_11

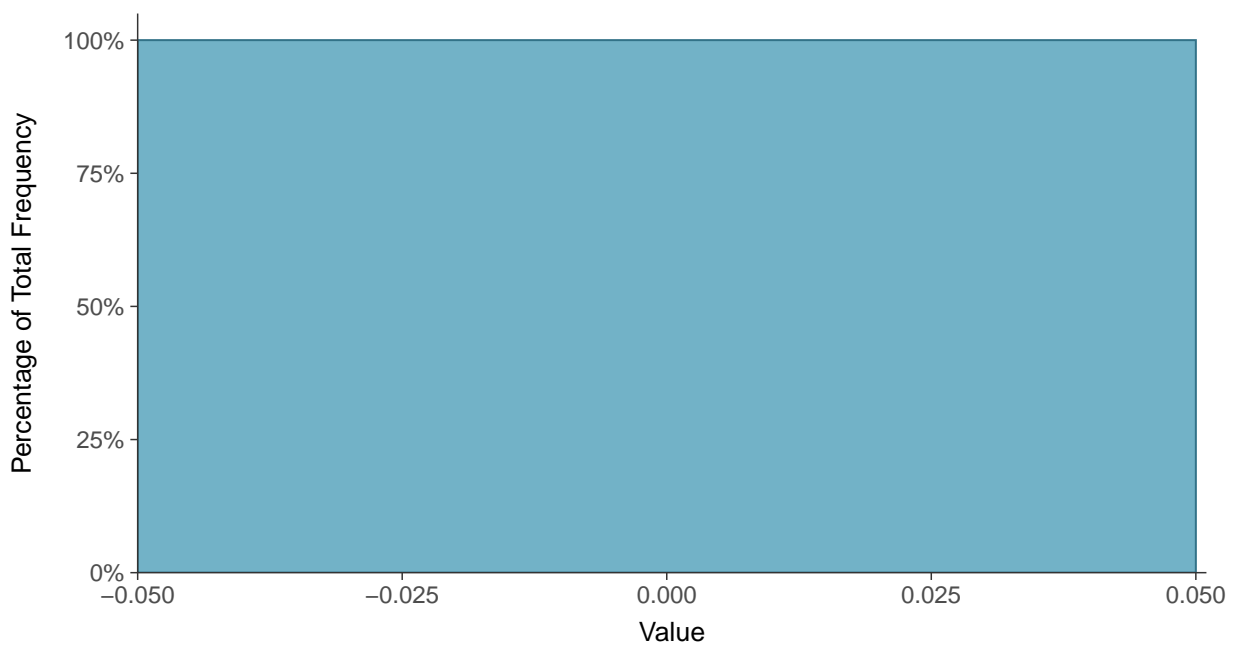
Scatter Plot

Beryllium, MW-8 (mg/L)



Histogram

Beryllium, MW-8 (mg/L)





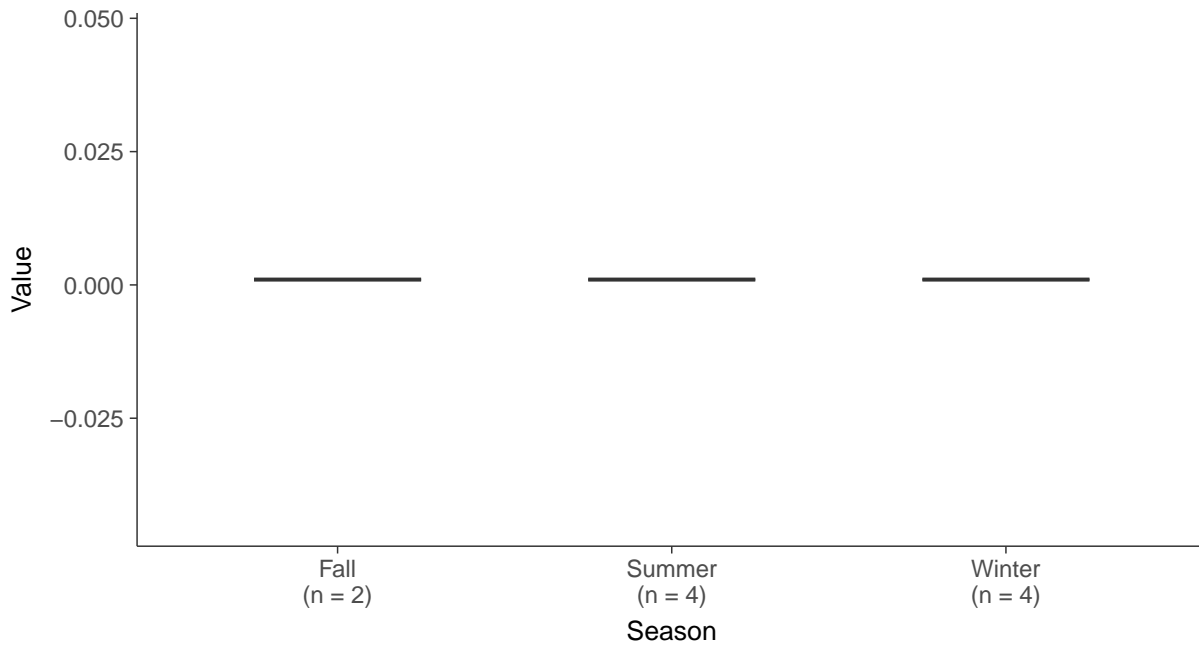
Boxplot

Beryllium, MW-8 (mg/L)



Boxplot by Season

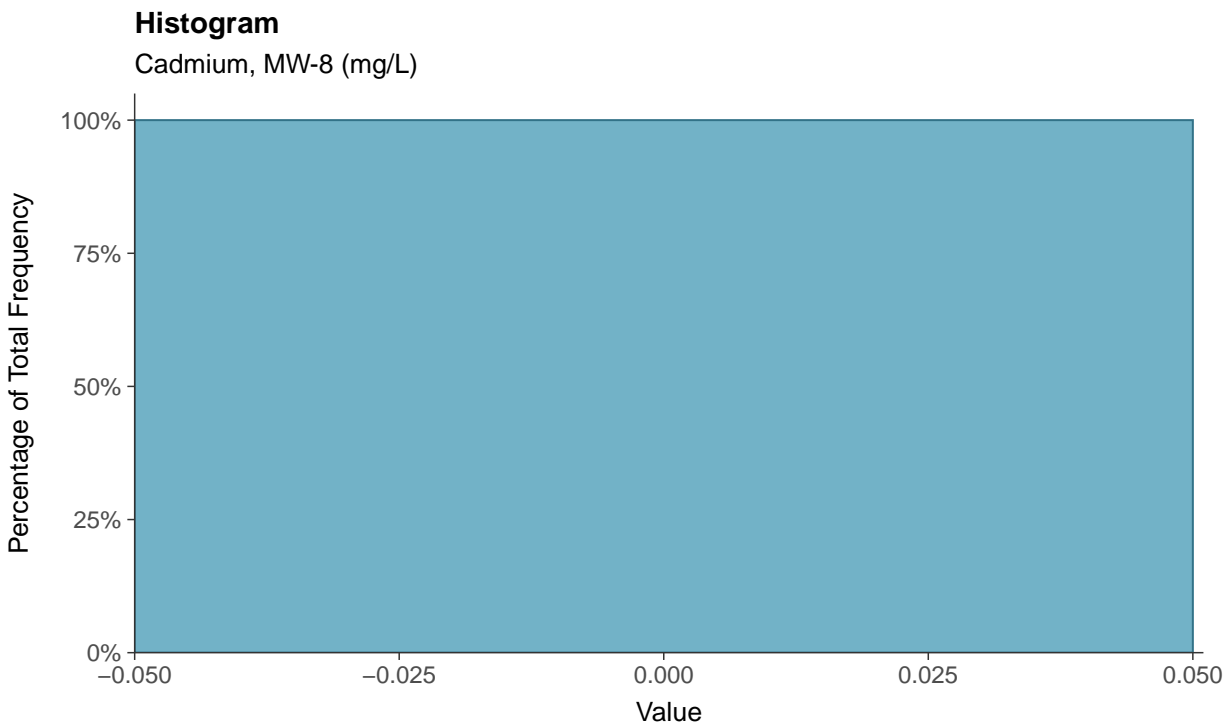
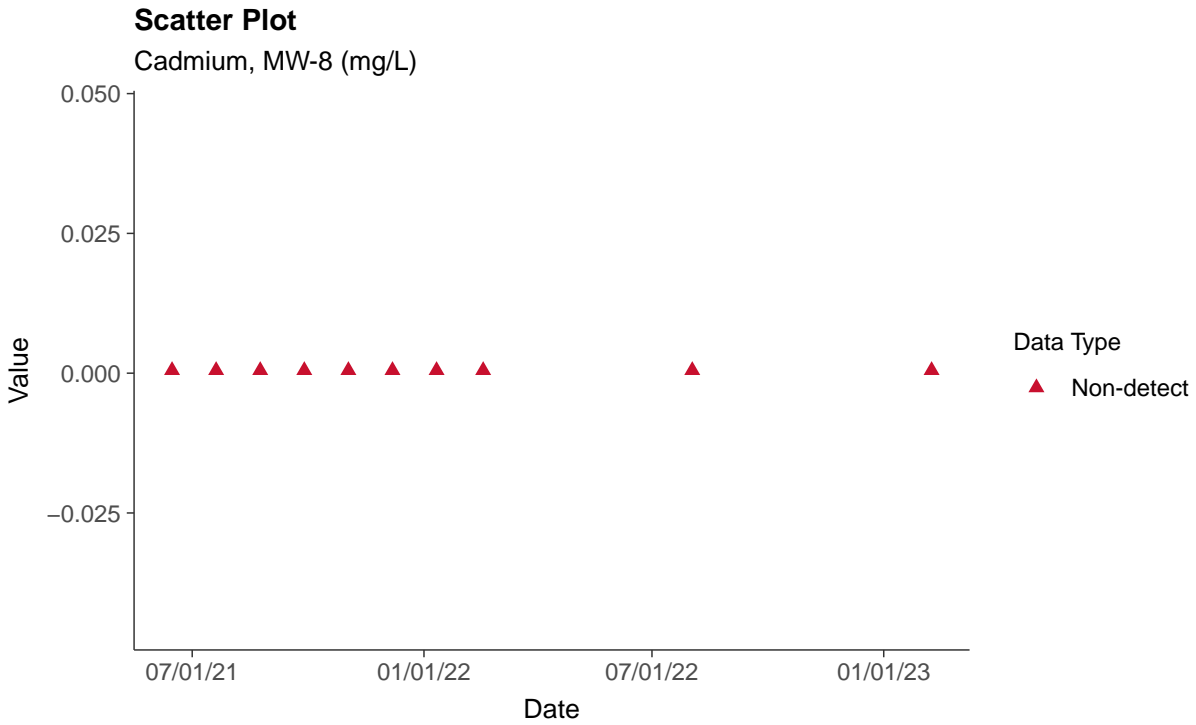
Beryllium, MW-8 (mg/L)





Appendix IV: Cadmium, MW-8

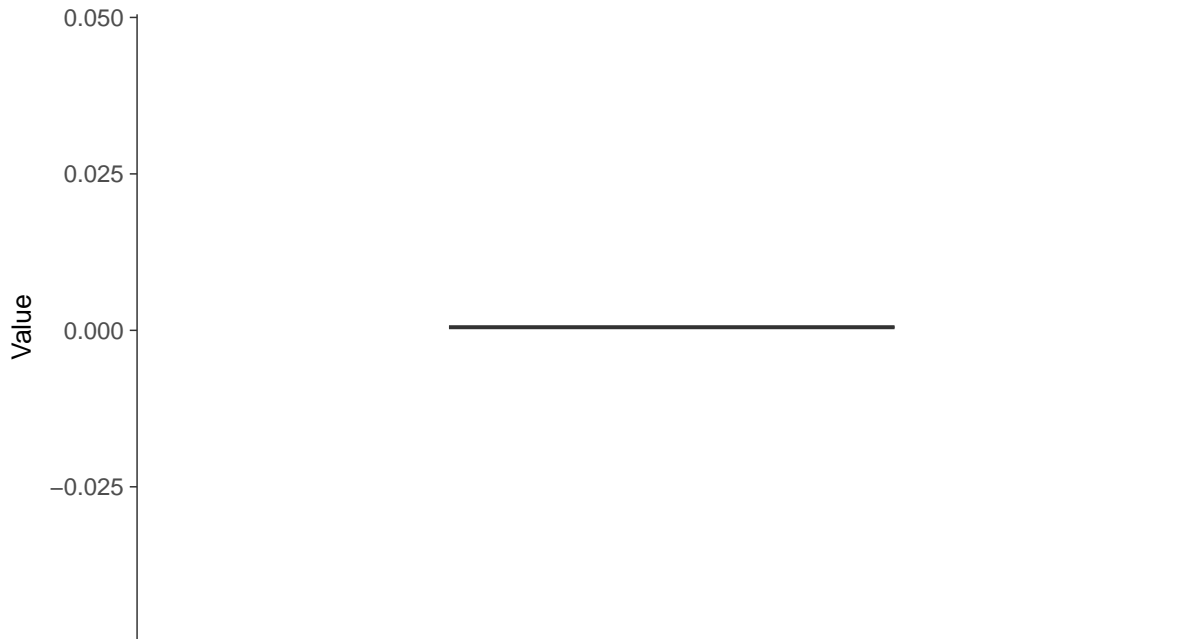
ID: 08_2_13





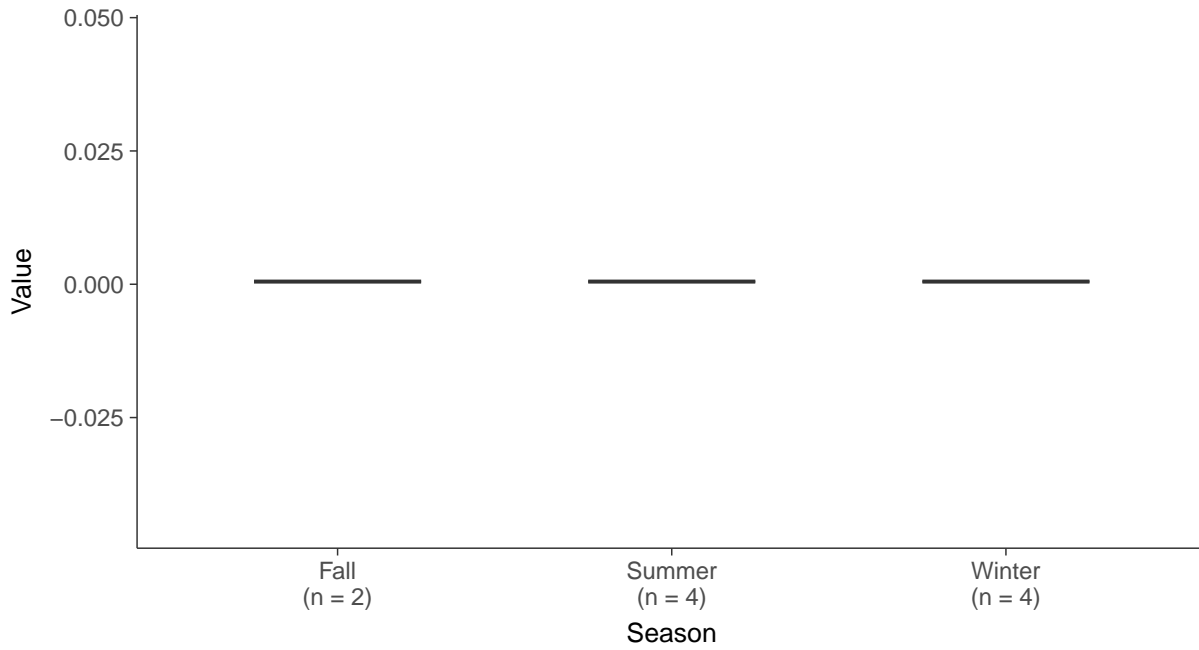
Boxplot

Cadmium, MW-8 (mg/L)



Boxplot by Season

Cadmium, MW-8 (mg/L)



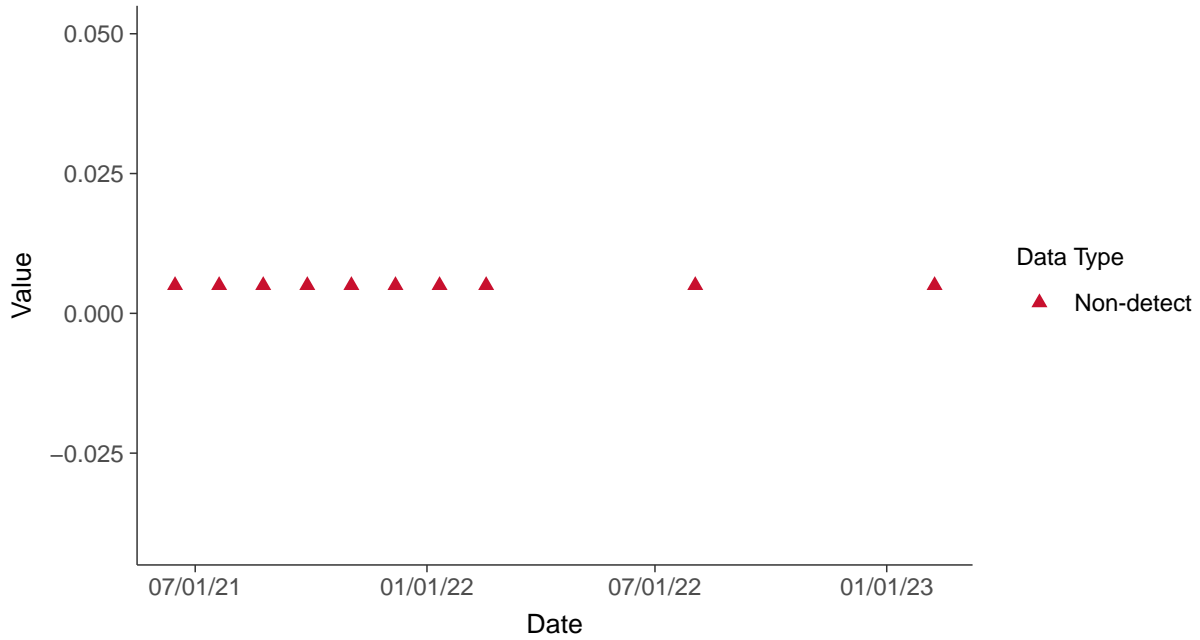


Appendix IV: Chromium, MW-8

ID: 08_2_15

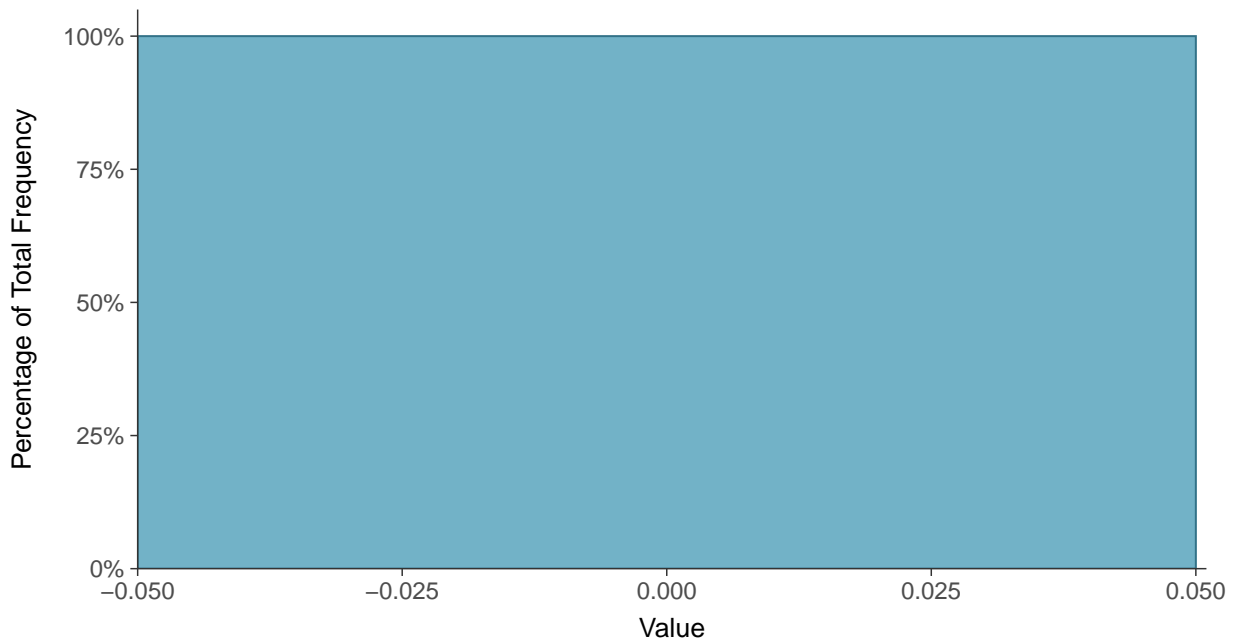
Scatter Plot

Chromium, MW-8 (mg/L)



Histogram

Chromium, MW-8 (mg/L)





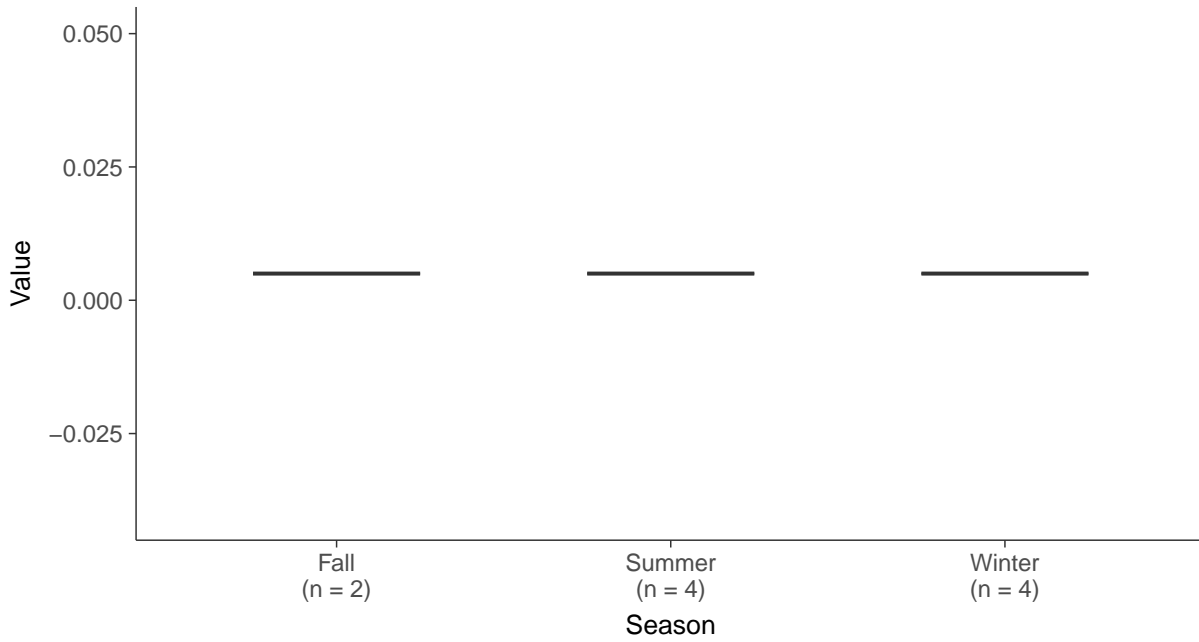
Boxplot

Chromium, MW-8 (mg/L)



Boxplot by Season

Chromium, MW-8 (mg/L)



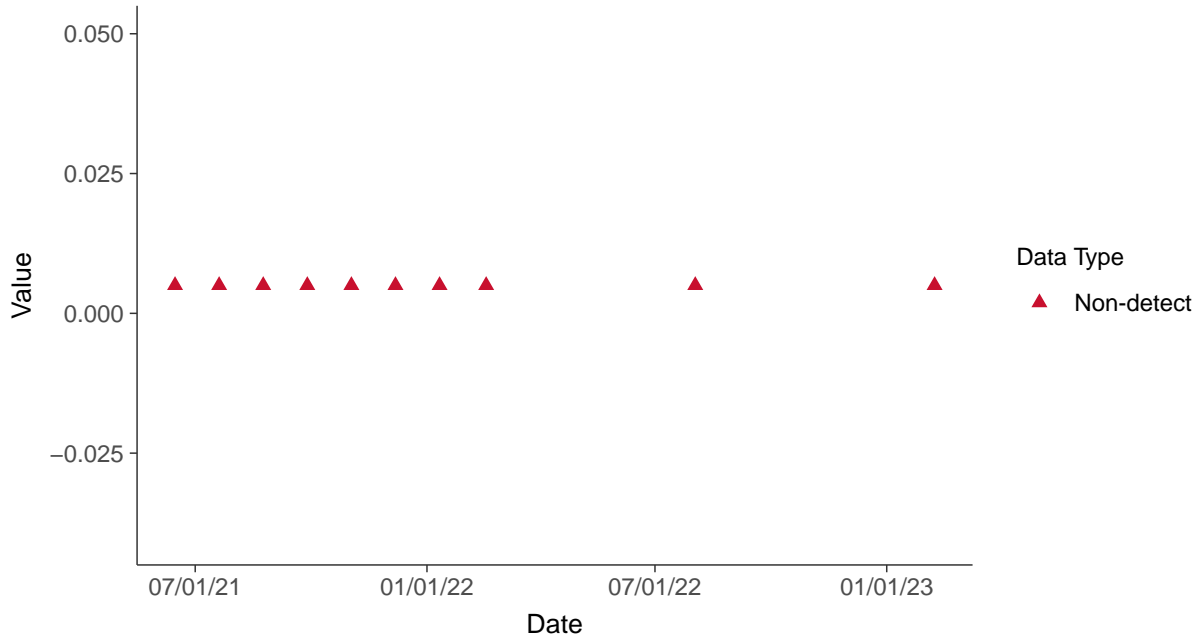


Appendix IV: Cobalt, MW-8

ID: 08_2_16

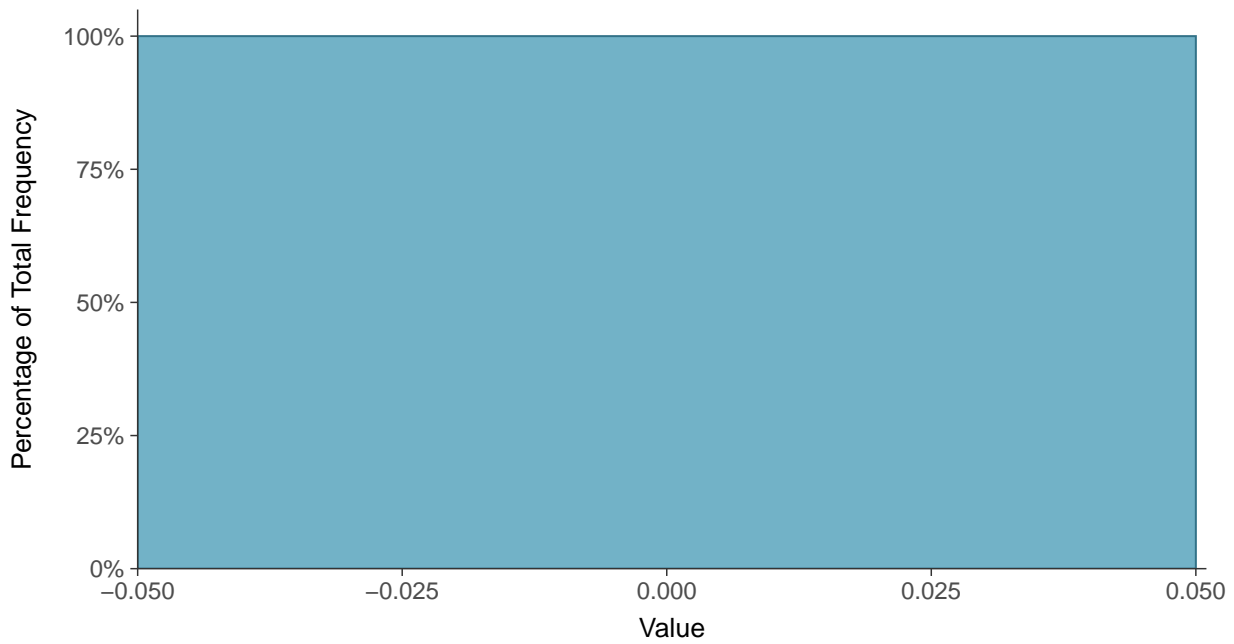
Scatter Plot

Cobalt, MW-8 (mg/L)



Histogram

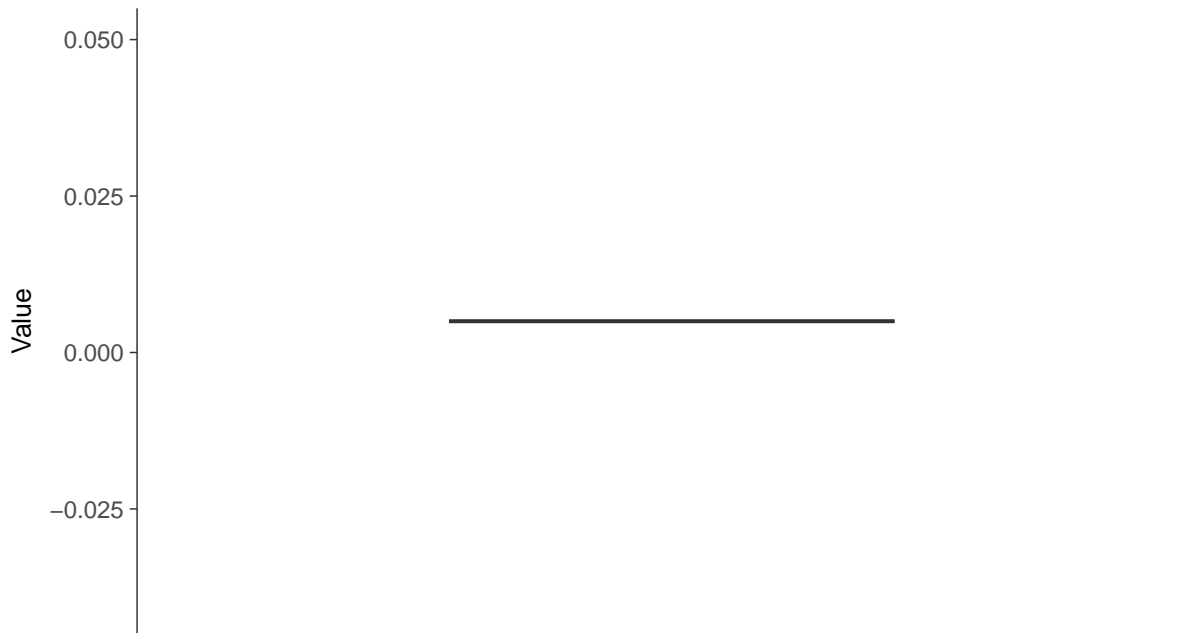
Cobalt, MW-8 (mg/L)





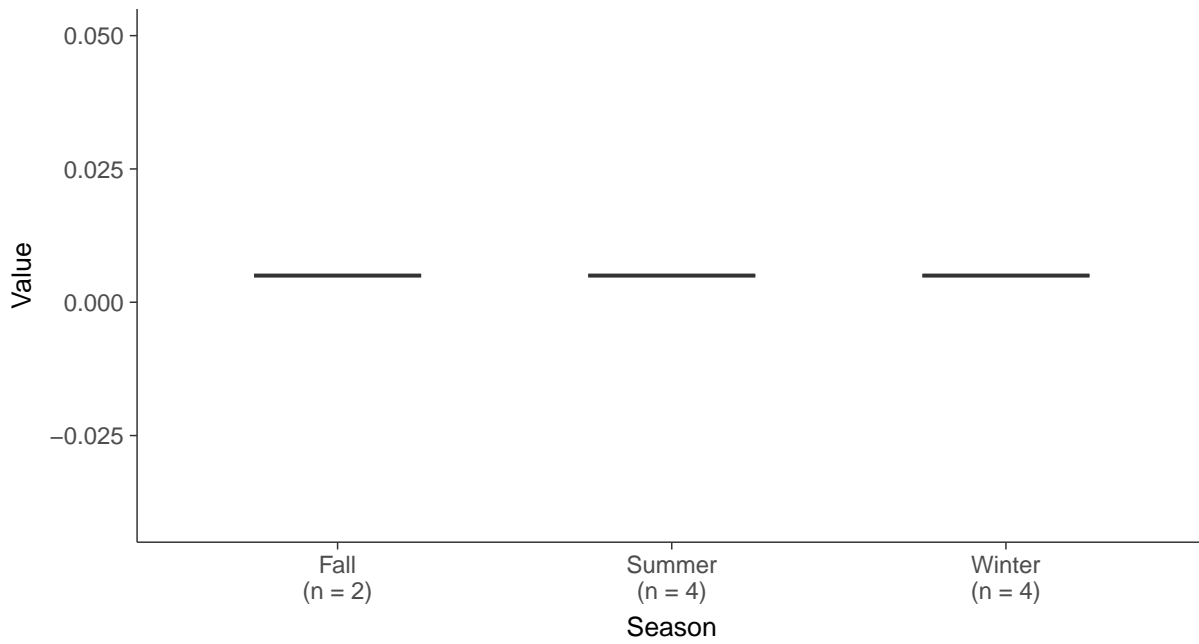
Boxplot

Cobalt, MW-8 (mg/L)



Boxplot by Season

Cobalt, MW-8 (mg/L)



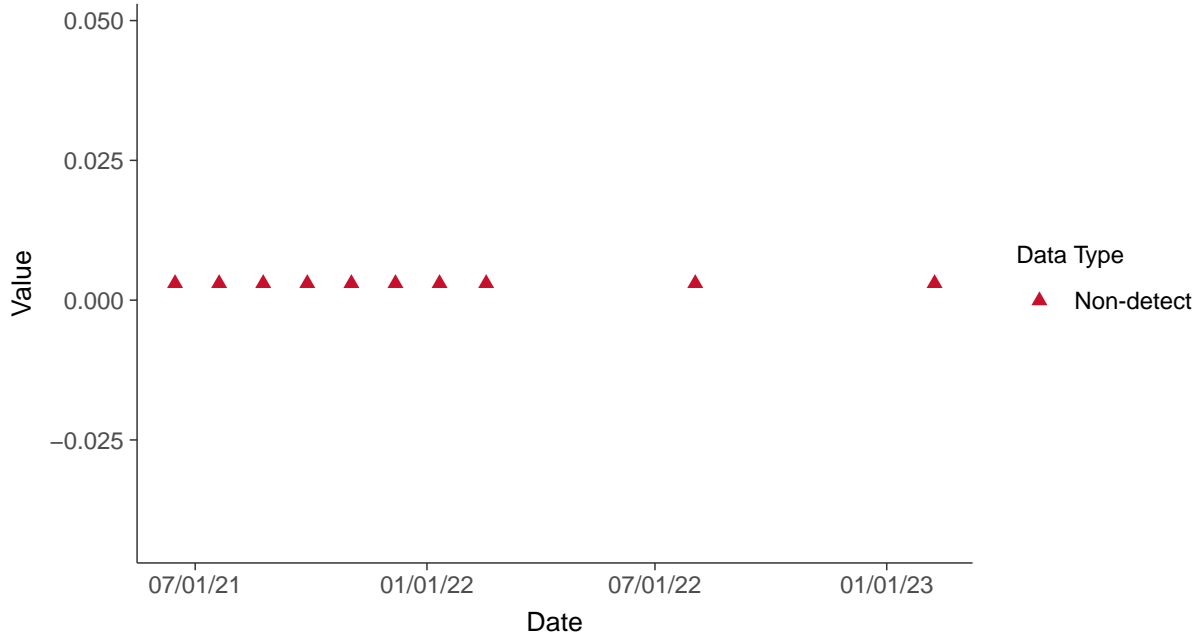


Appendix IV: Lead, MW-8

ID: 08_2_18

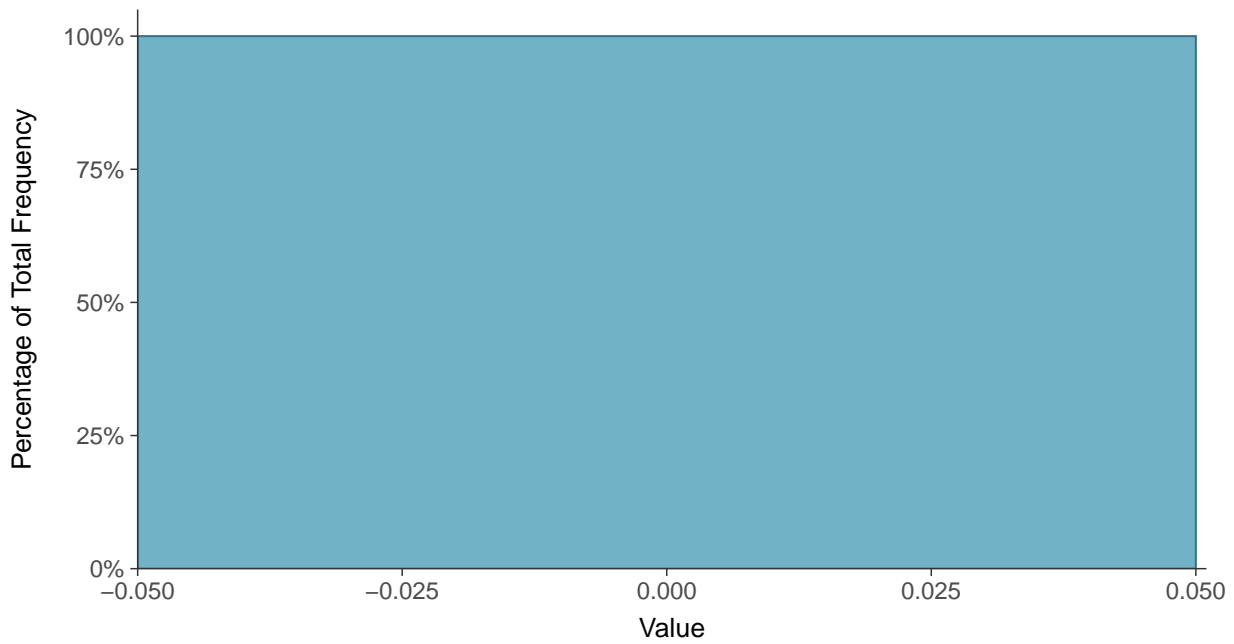
Scatter Plot

Lead, MW-8 (mg/L)



Histogram

Lead, MW-8 (mg/L)





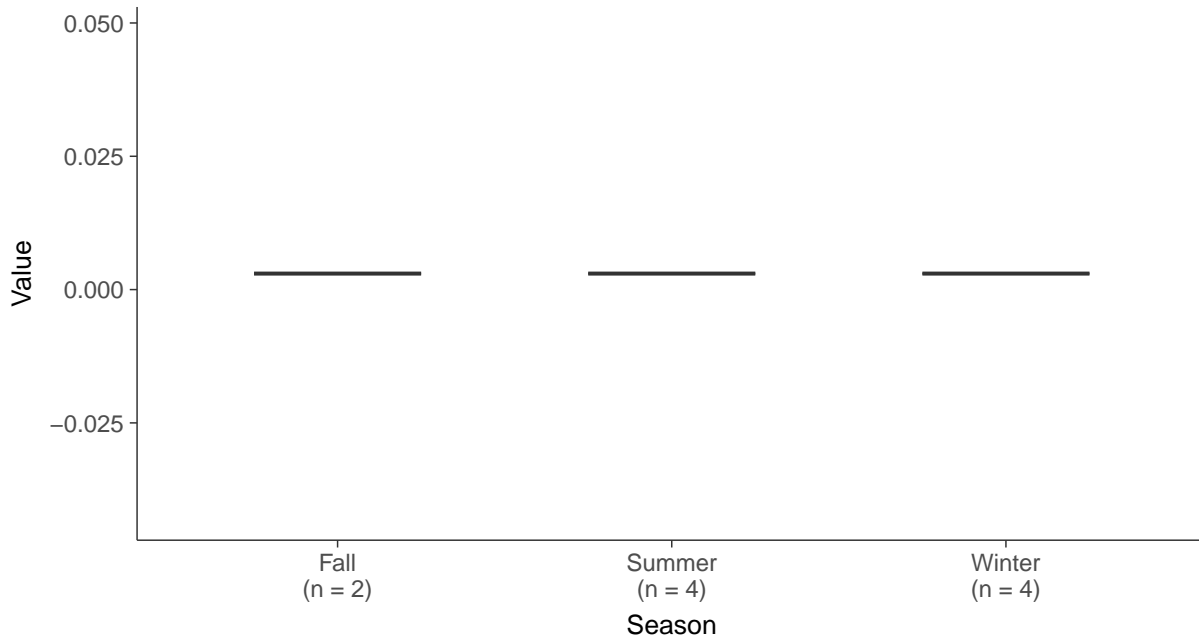
Boxplot

Lead, MW-8 (mg/L)



Boxplot by Season

Lead, MW-8 (mg/L)



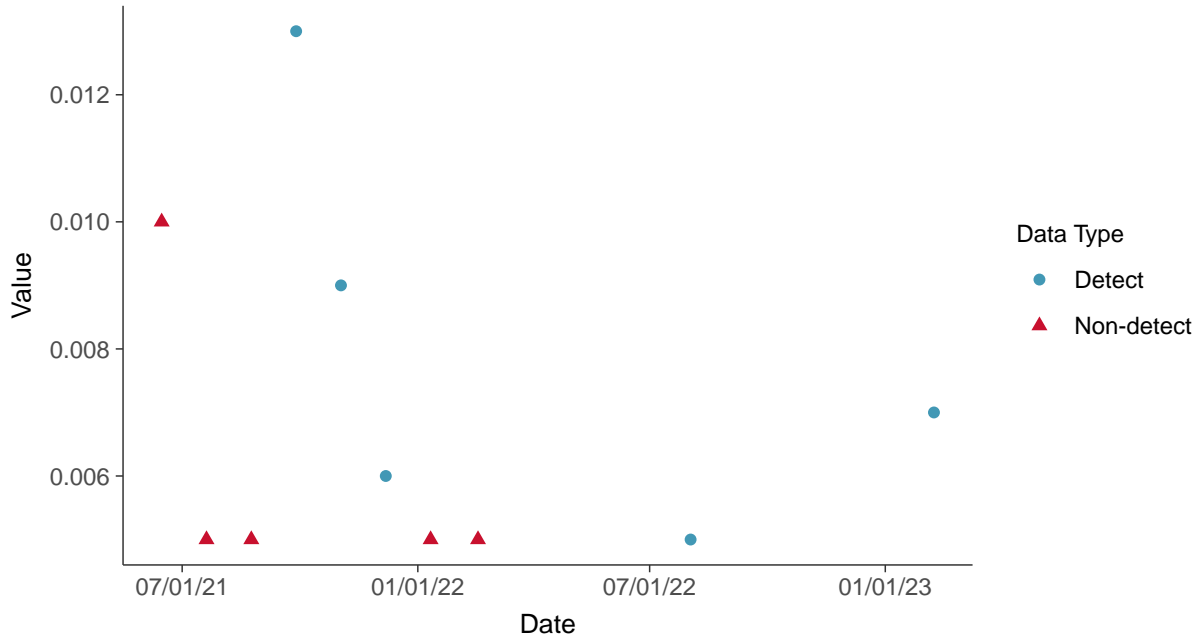


Appendix IV: Lithium, MW-8

ID: 08_2_19

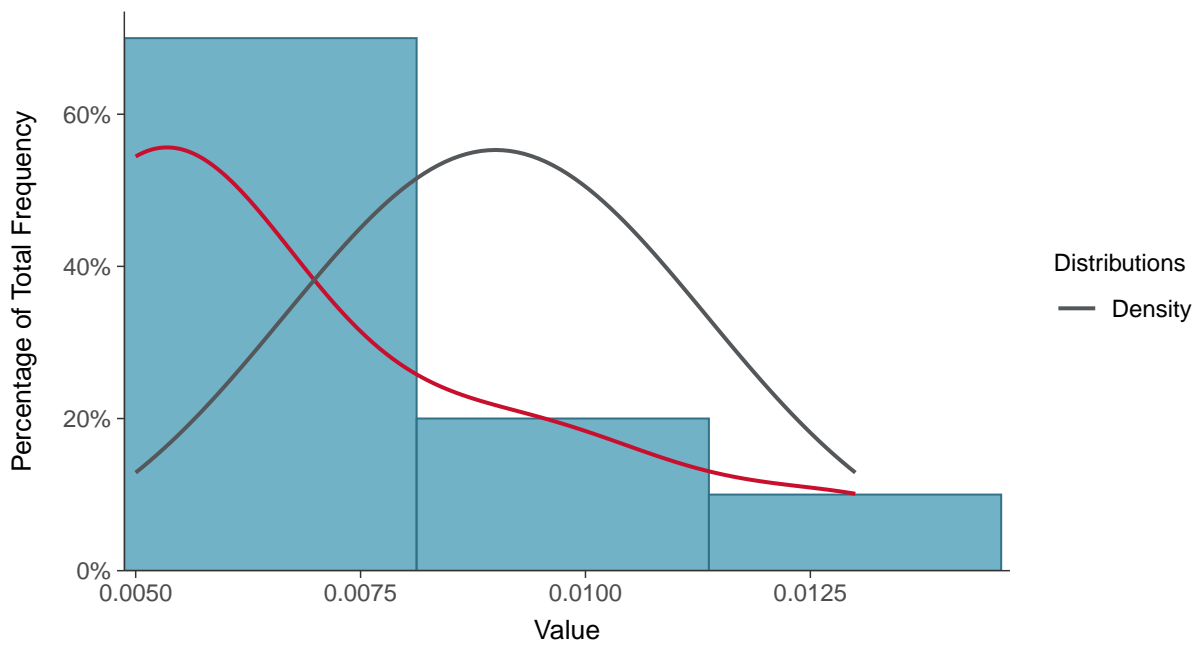
Scatter Plot

Lithium, MW-8 (mg/L)



Histogram

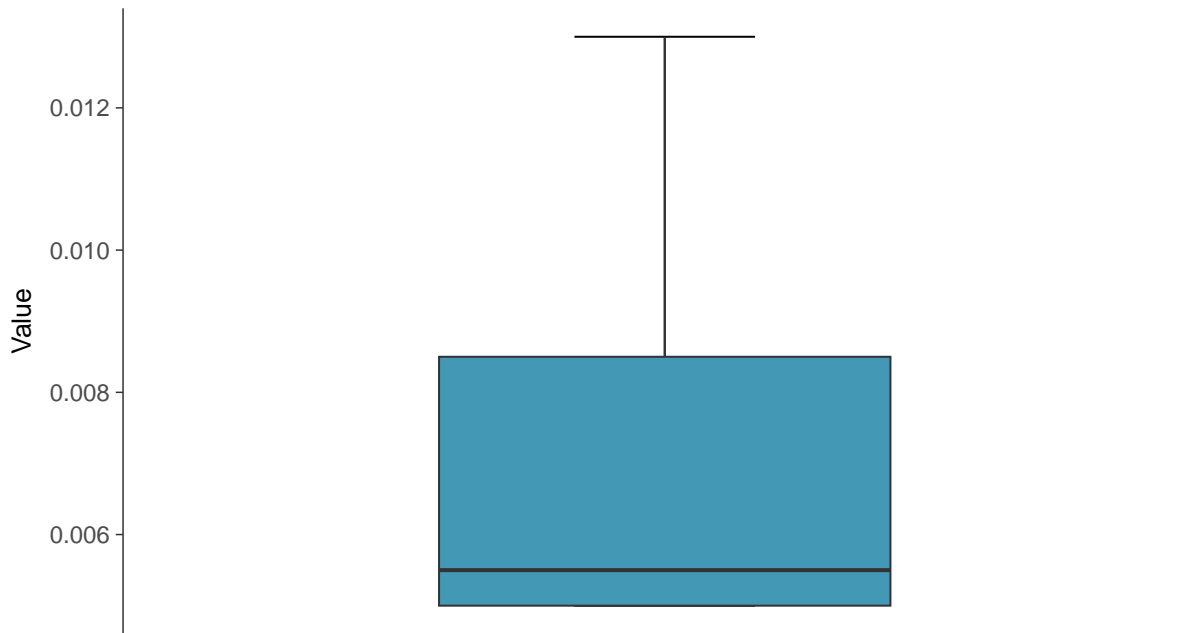
Lithium, MW-8 (mg/L)





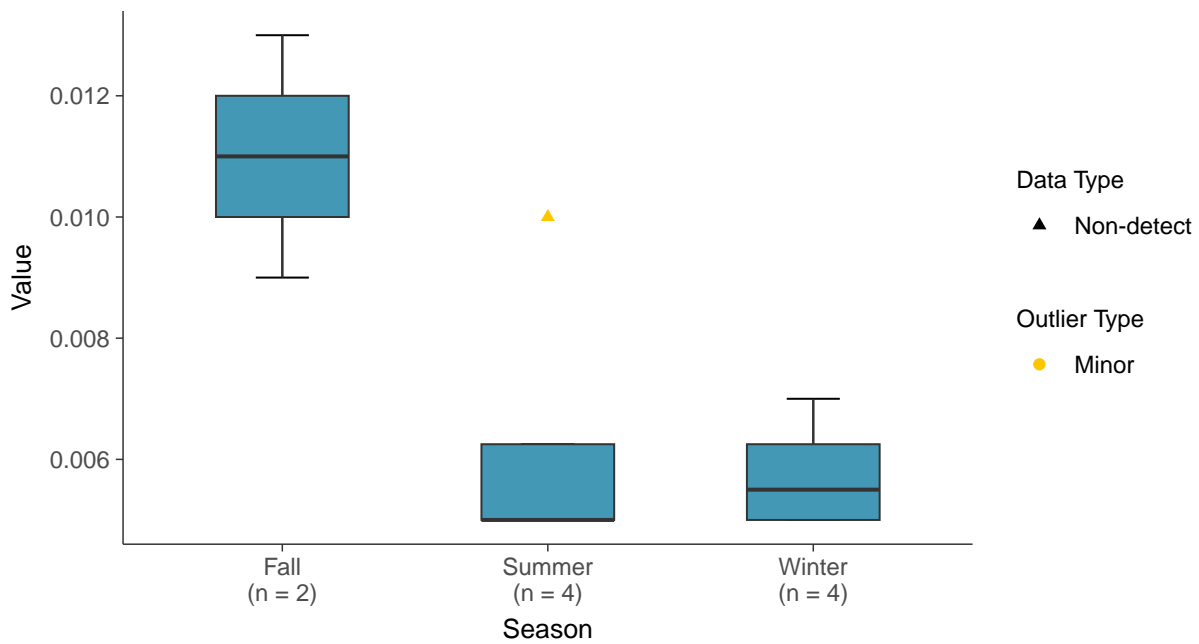
Boxplot

Lithium, MW-8 (mg/L)



Boxplot by Season

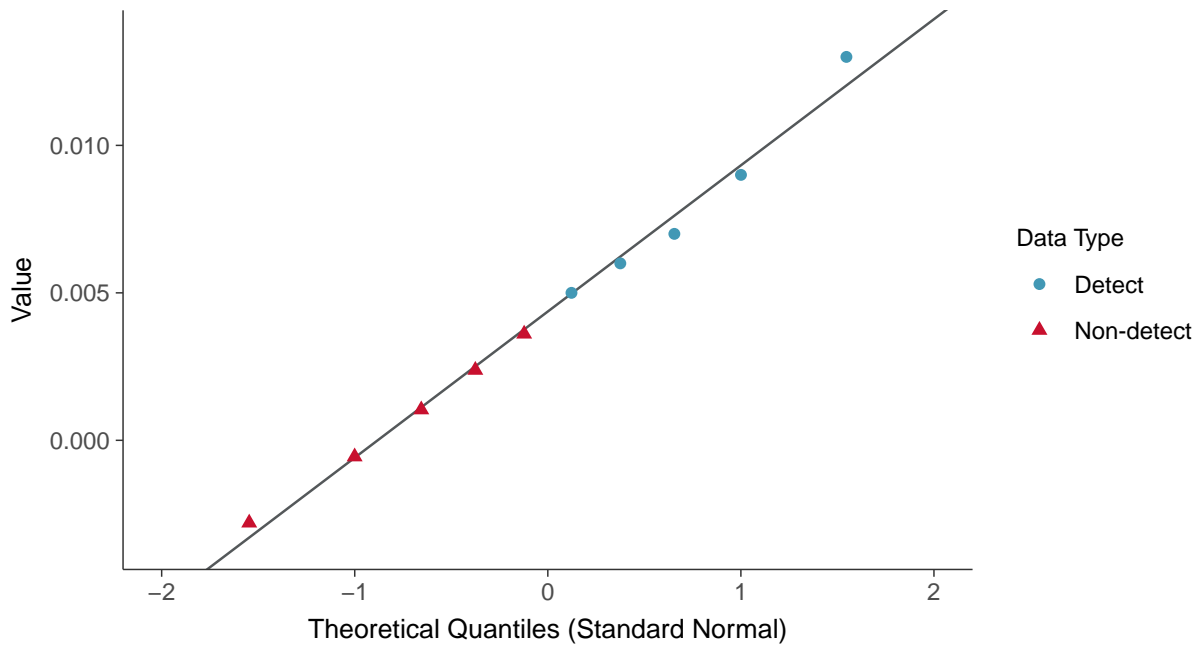
Lithium, MW-8 (mg/L)





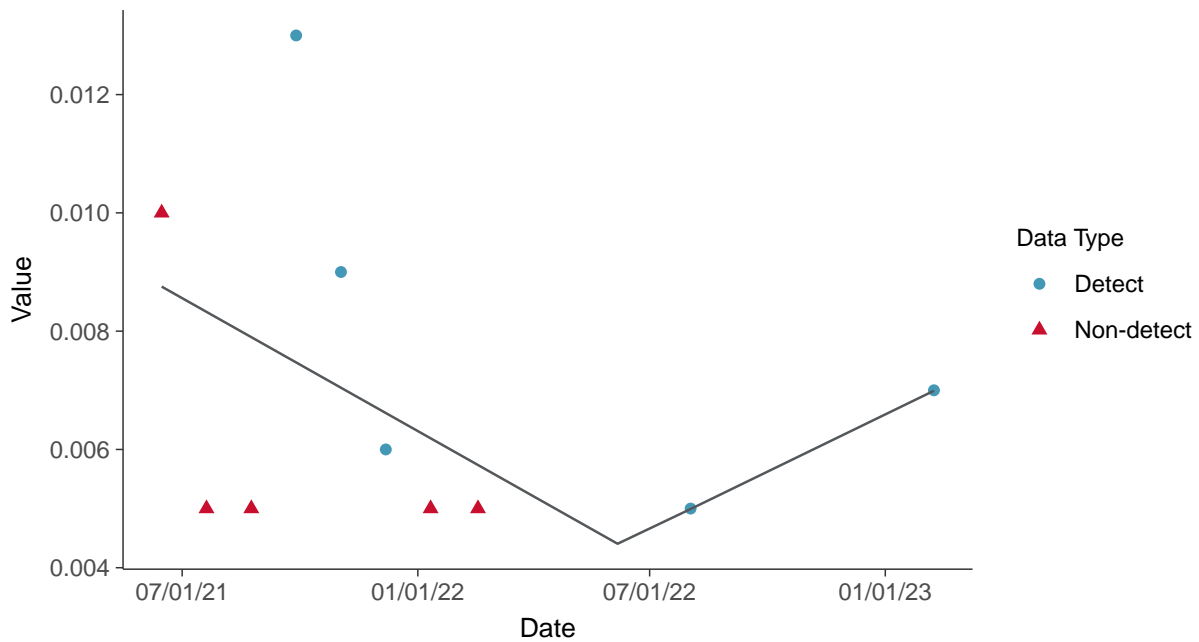
Normal Q-Q plot using ROS Imputed Estimates

Lithium, MW-8 (mg/L)



Trend Regression: Piecewise Linear-Linear

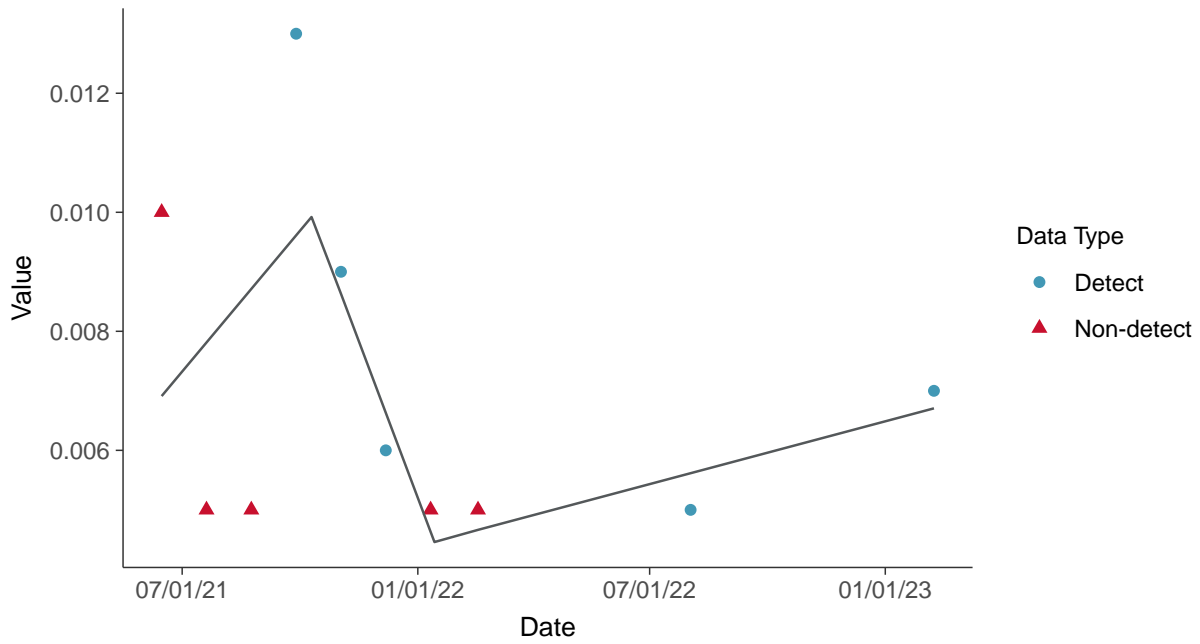
Lithium, MW-8 (mg/L)





Trend Regression: Piecewise Linear-Linear-Linear

Lithium, MW-8 (mg/L)



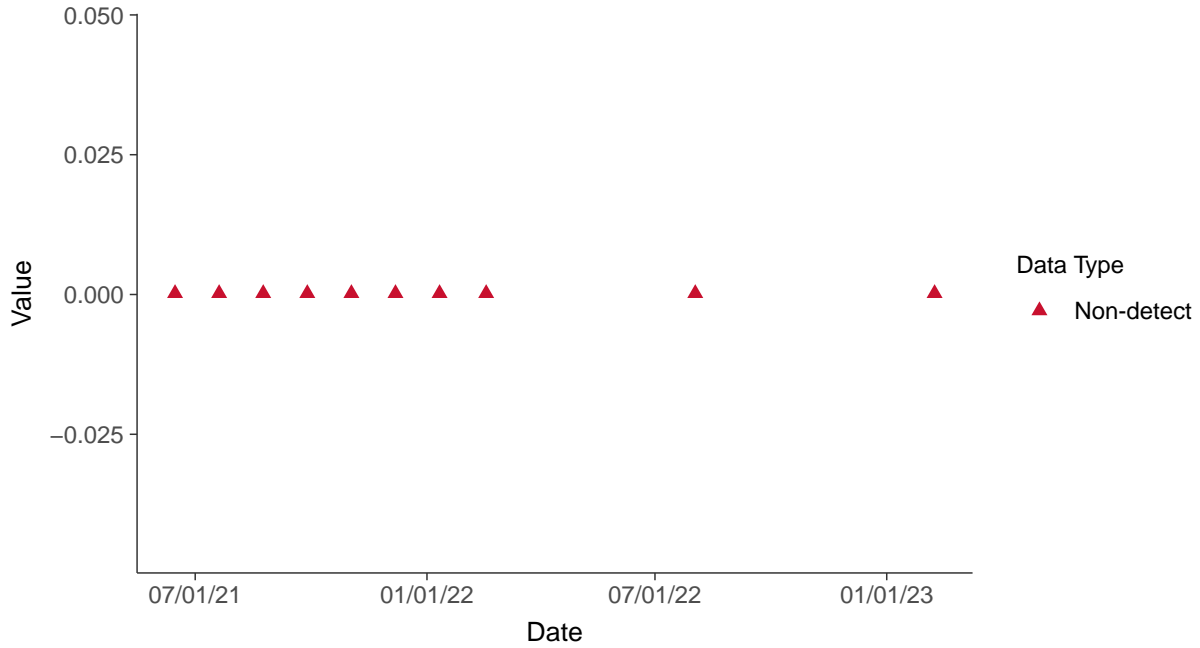


Appendix IV: Mercury, MW-8

ID: 08_2_21

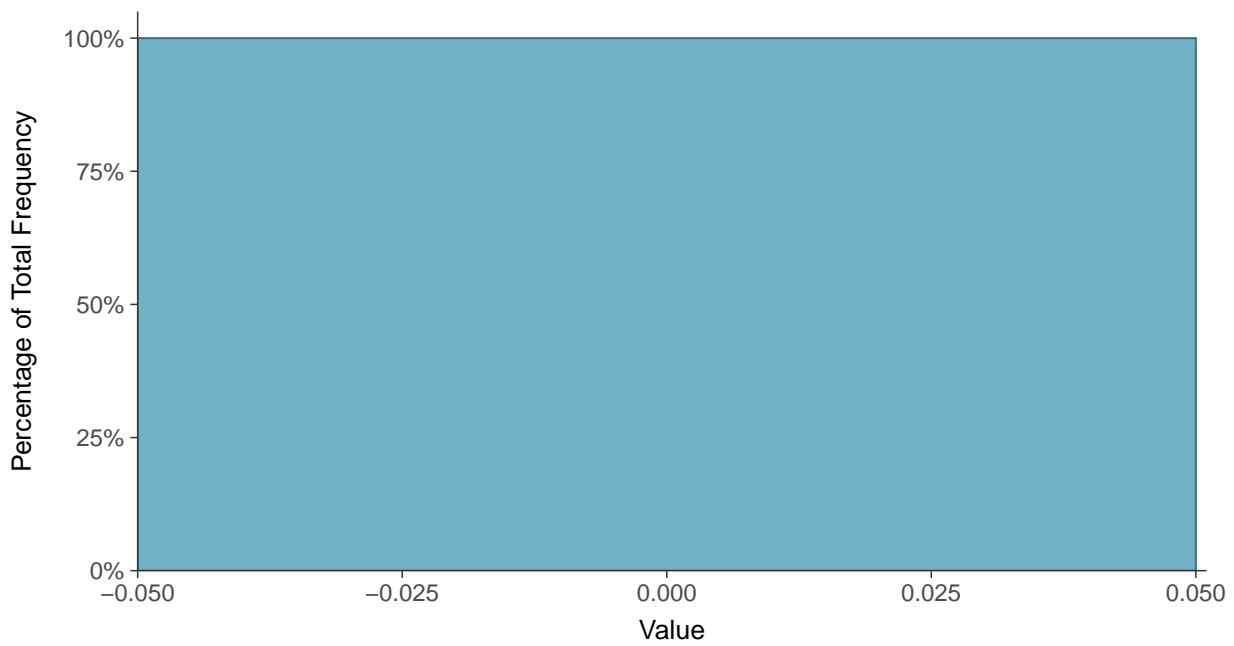
Scatter Plot

Mercury, MW-8 (mg/L)



Histogram

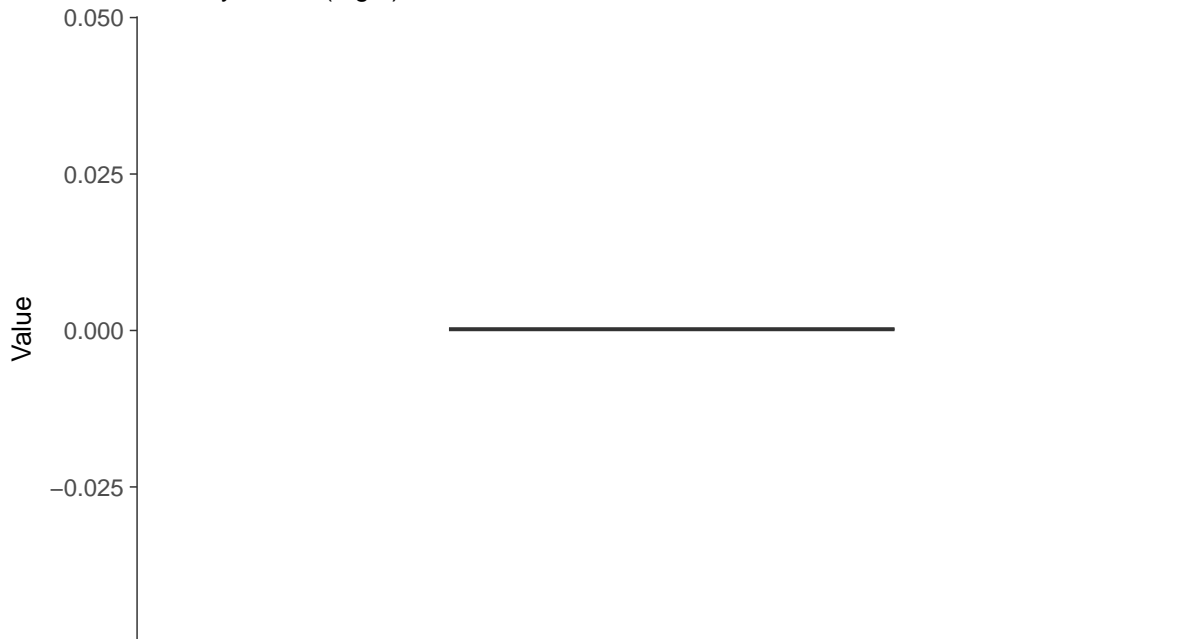
Mercury, MW-8 (mg/L)





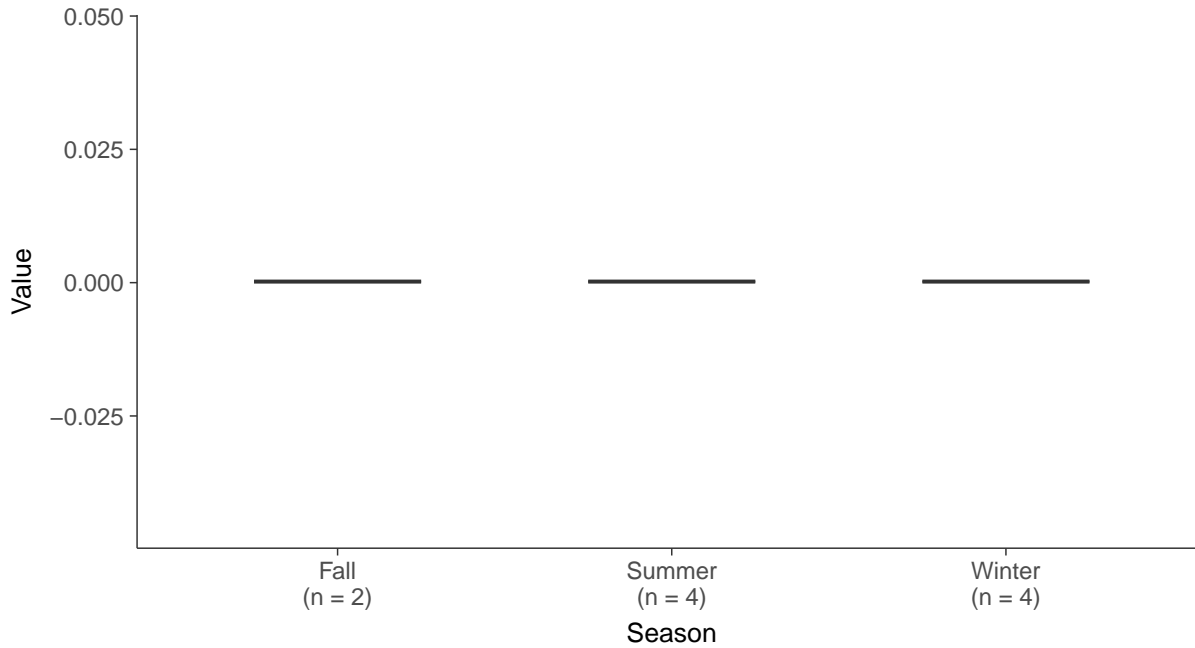
Boxplot

Mercury, MW-8 (mg/L)



Boxplot by Season

Mercury, MW-8 (mg/L)



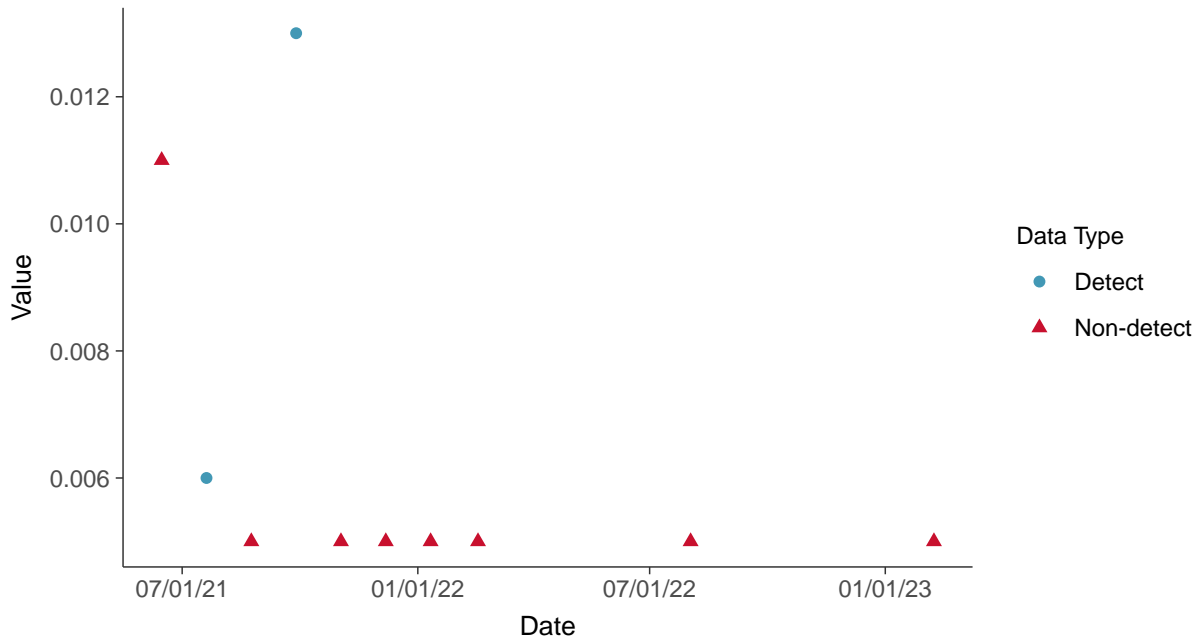


Appendix IV: Molybdenum, MW-8

ID: 08_2_22

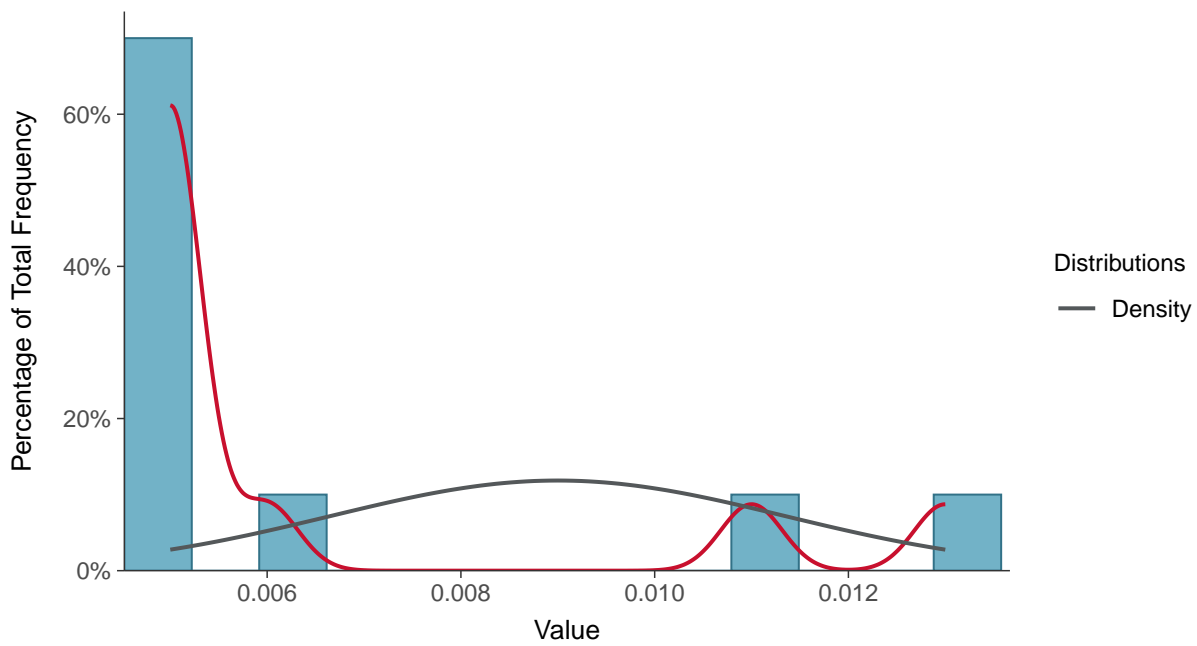
Scatter Plot

Molybdenum, MW-8 (mg/L)



Histogram

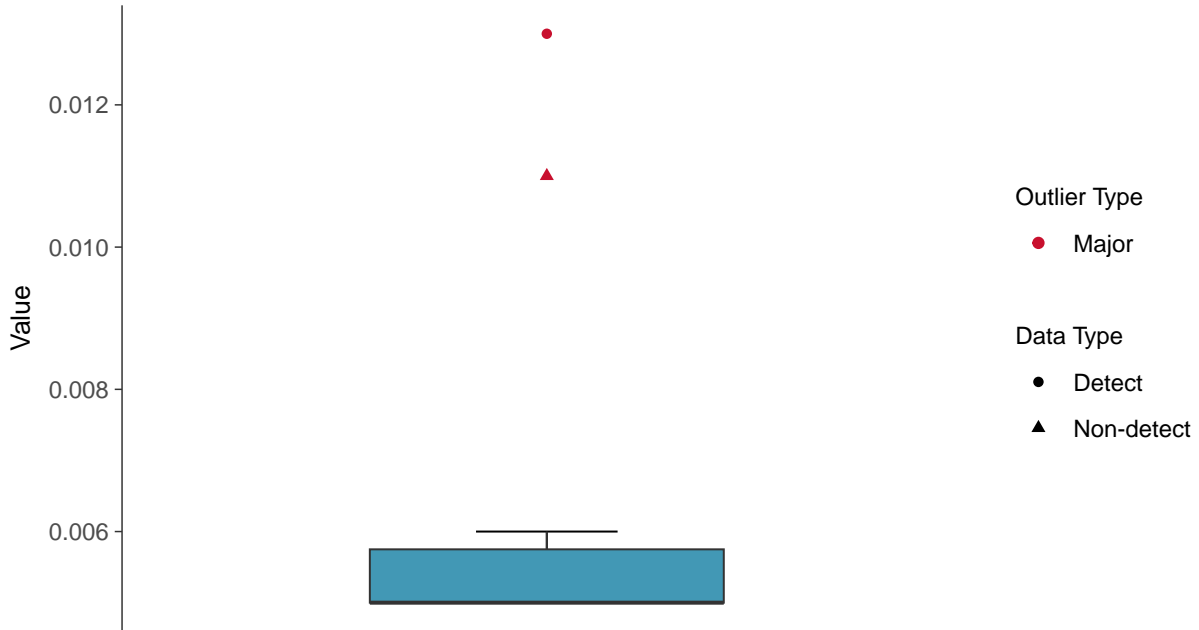
Molybdenum, MW-8 (mg/L)





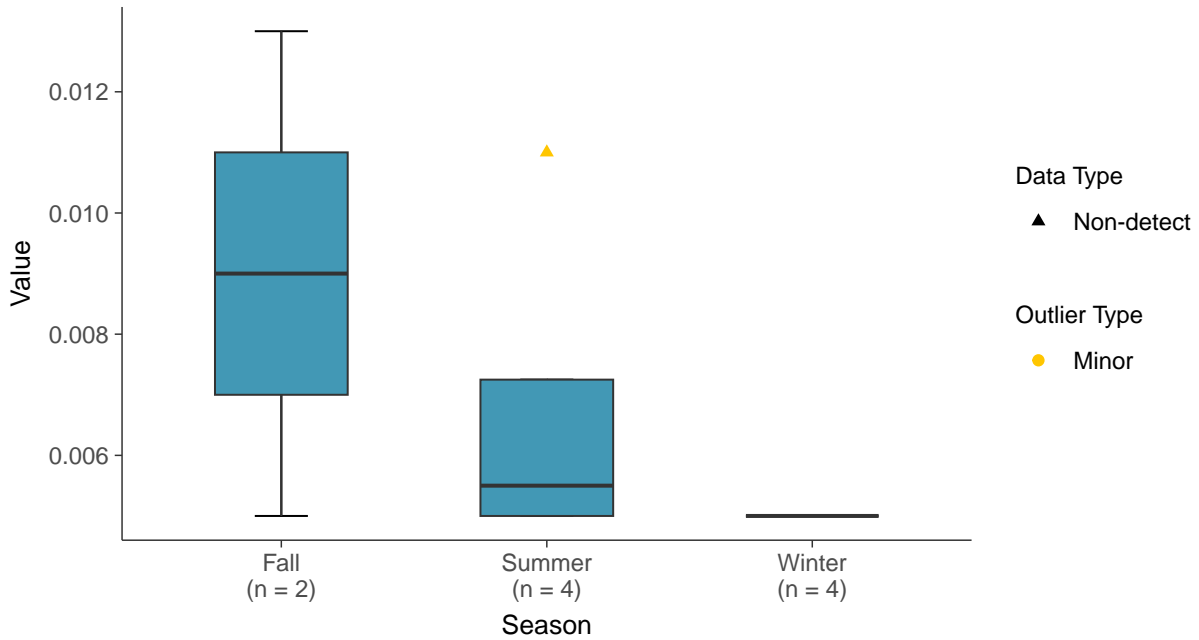
Boxplot

Molybdenum, MW-8 (mg/L)



Boxplot by Season

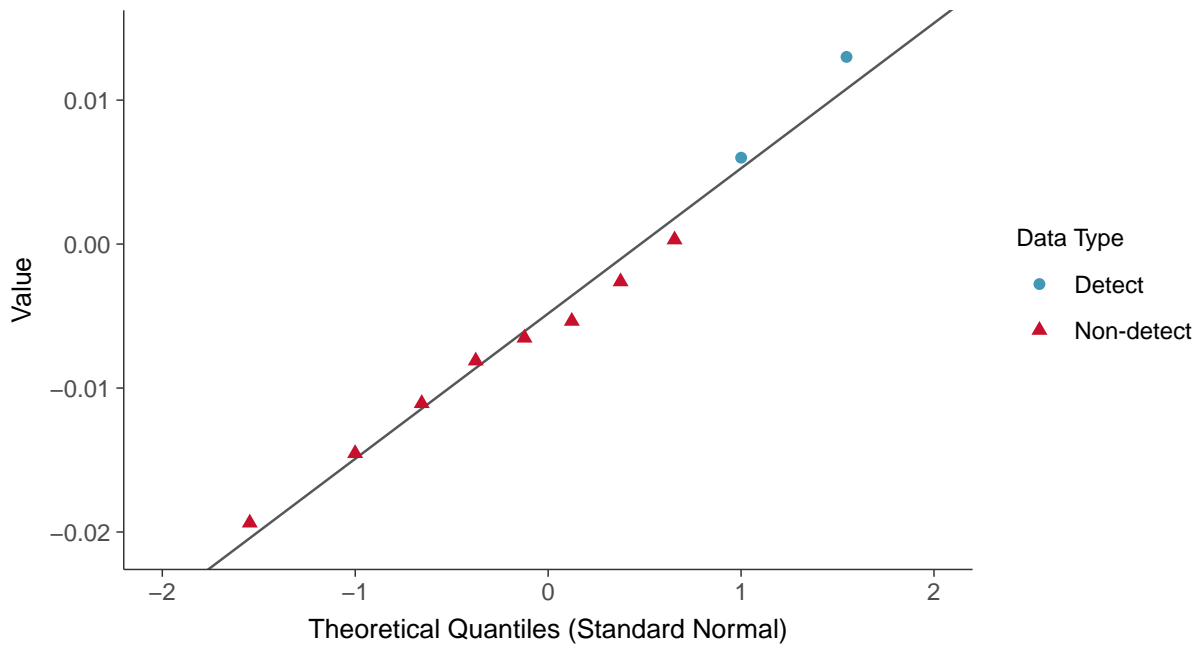
Molybdenum, MW-8 (mg/L)





Normal Q-Q plot using ROS Imputed Estimates

Molybdenum, MW-8 (mg/L)



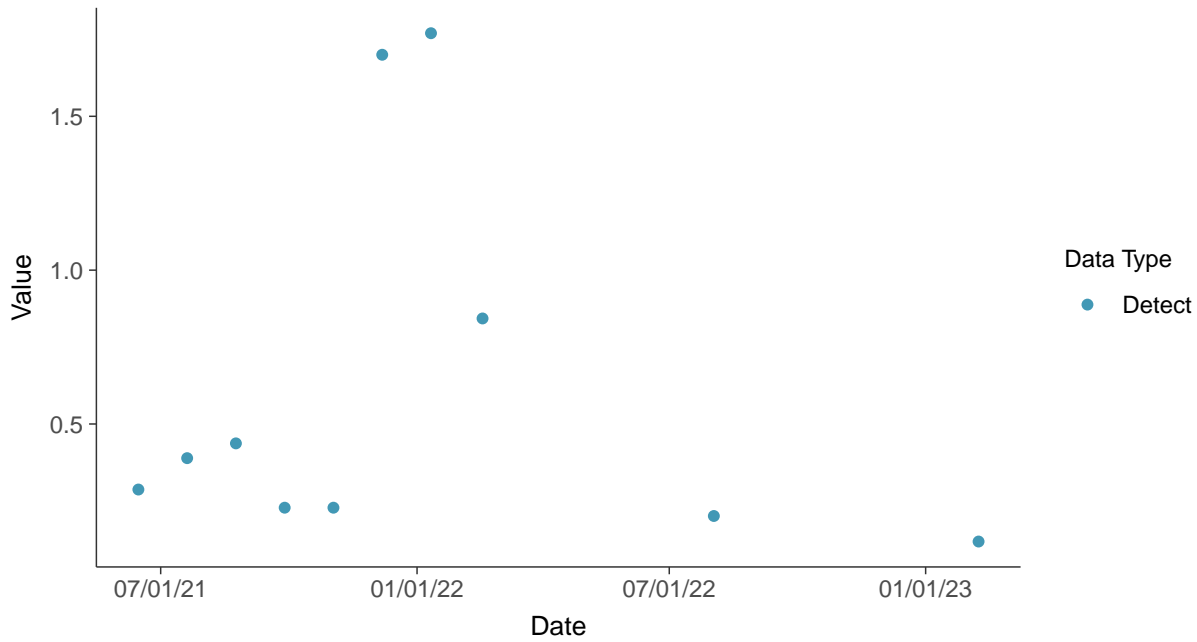


Appendix IV: Radium-226, MW-8

ID: 08_2_24

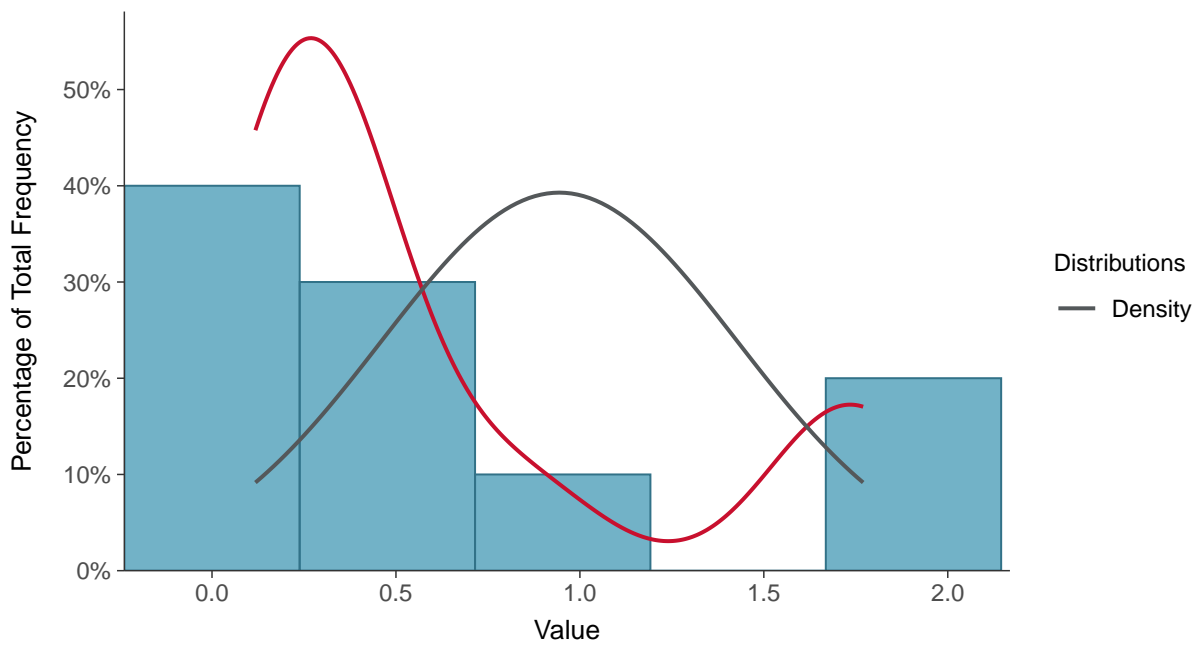
Scatter Plot

Radium-226, MW-8 (pCi/L)



Histogram

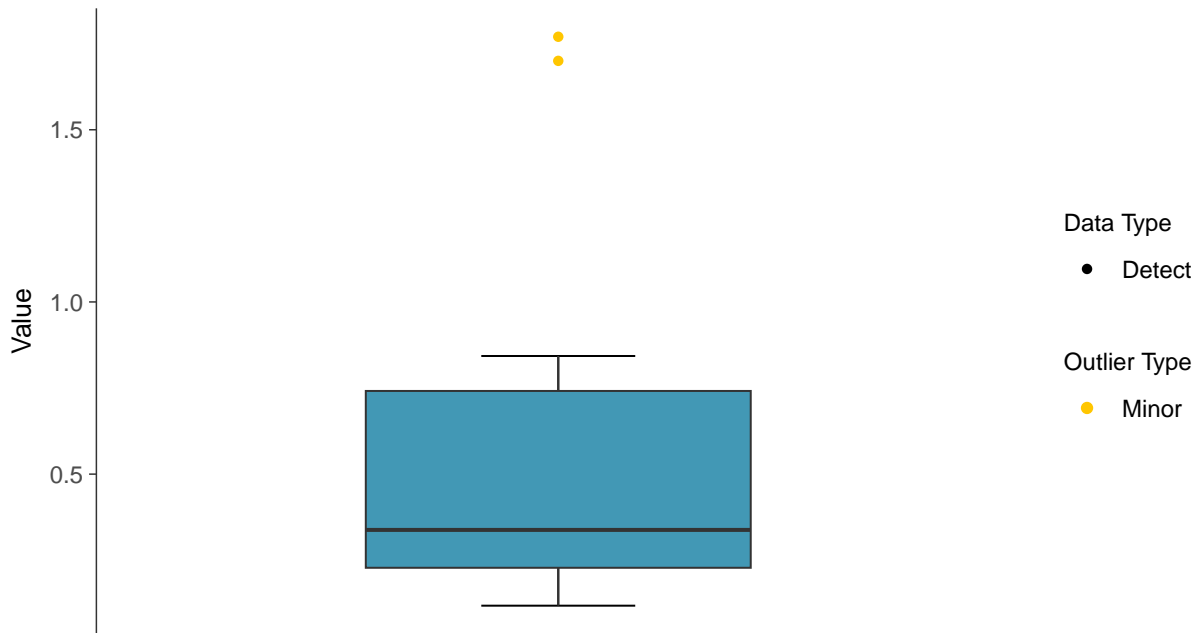
Radium-226, MW-8 (pCi/L)





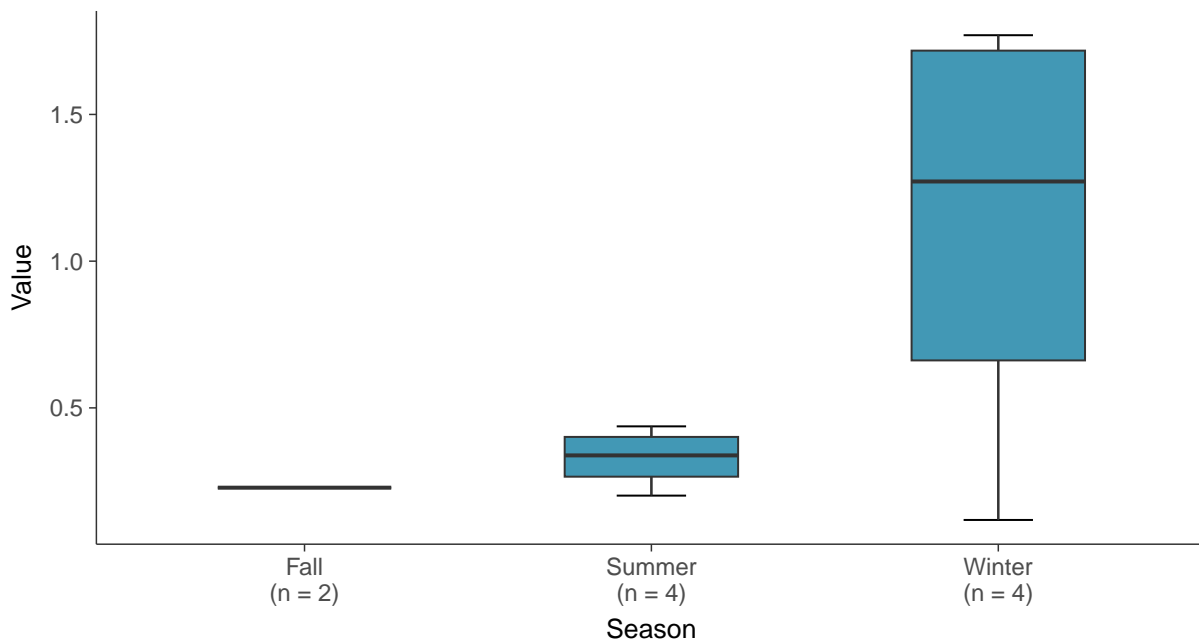
Boxplot

Radium-226, MW-8 (pCi/L)



Boxplot by Season

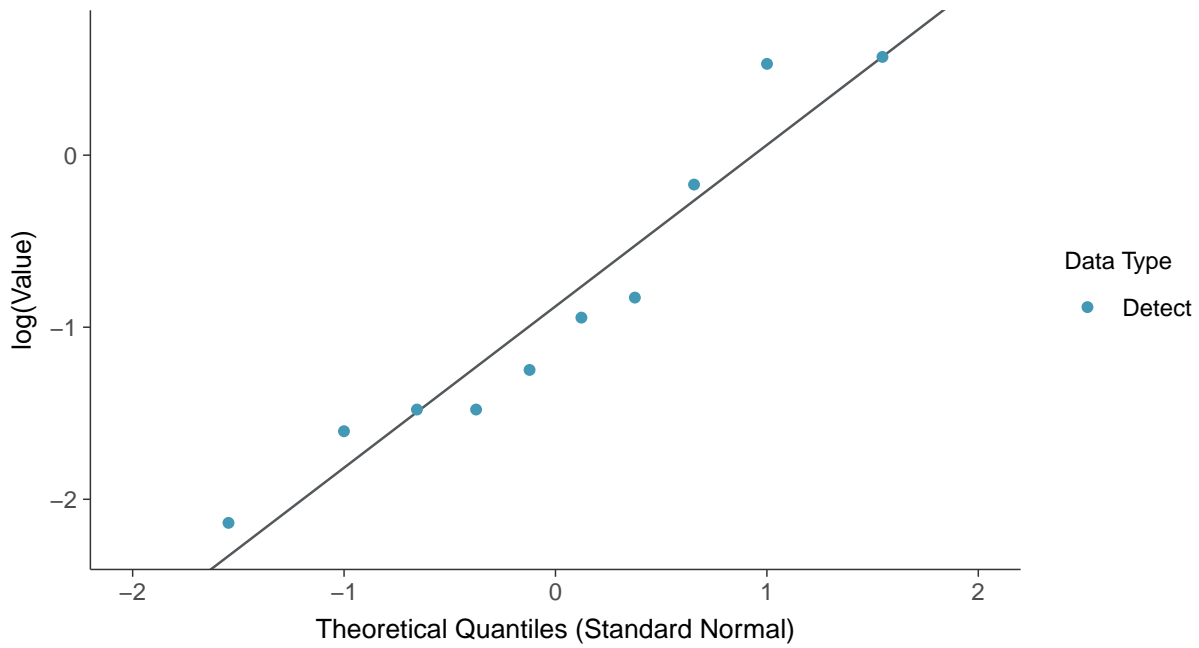
Radium-226, MW-8 (pCi/L)





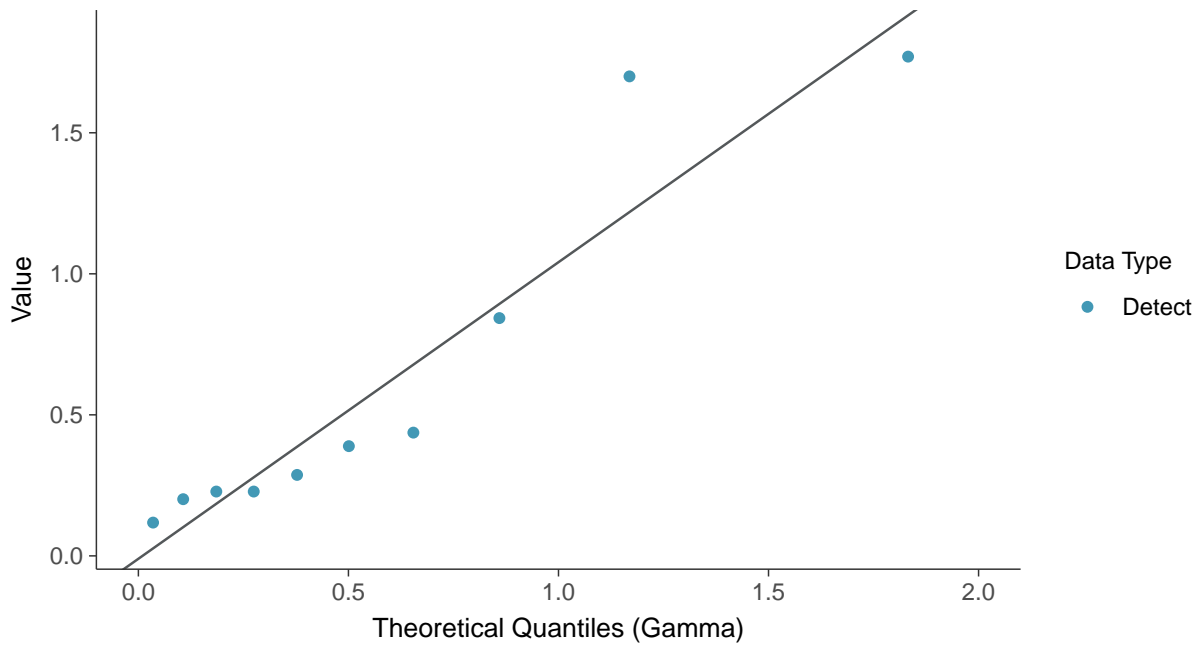
Lognormal Q-Q plot

Radium-226, MW-8 (pCi/L)



Gamma Q-Q plot

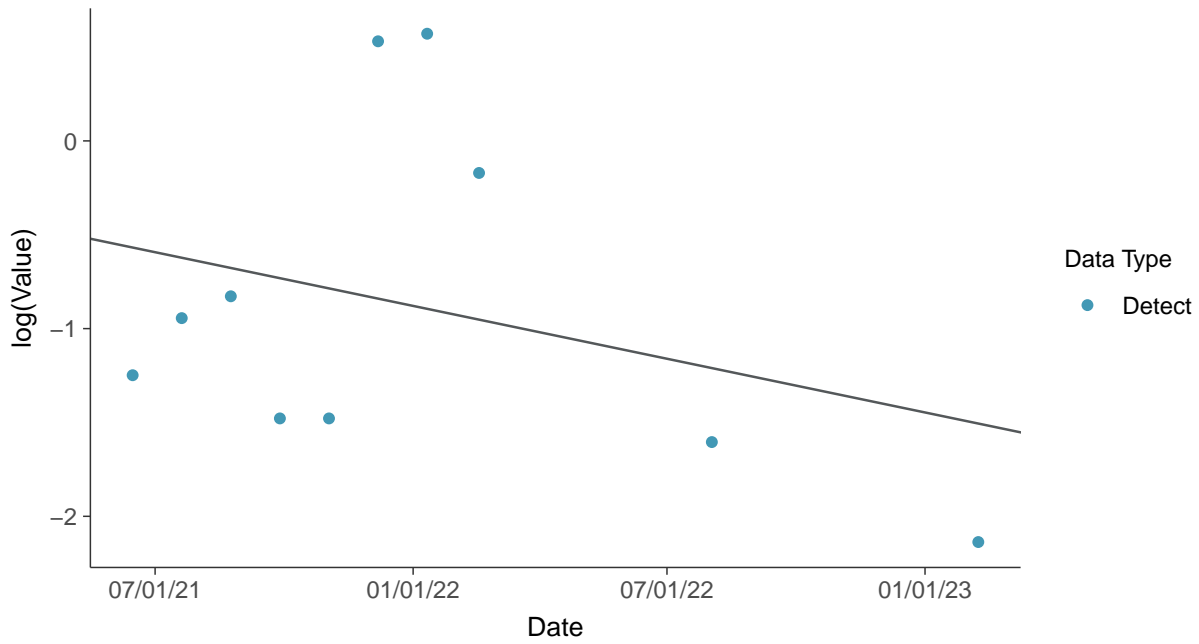
Radium-226, MW-8 (pCi/L)





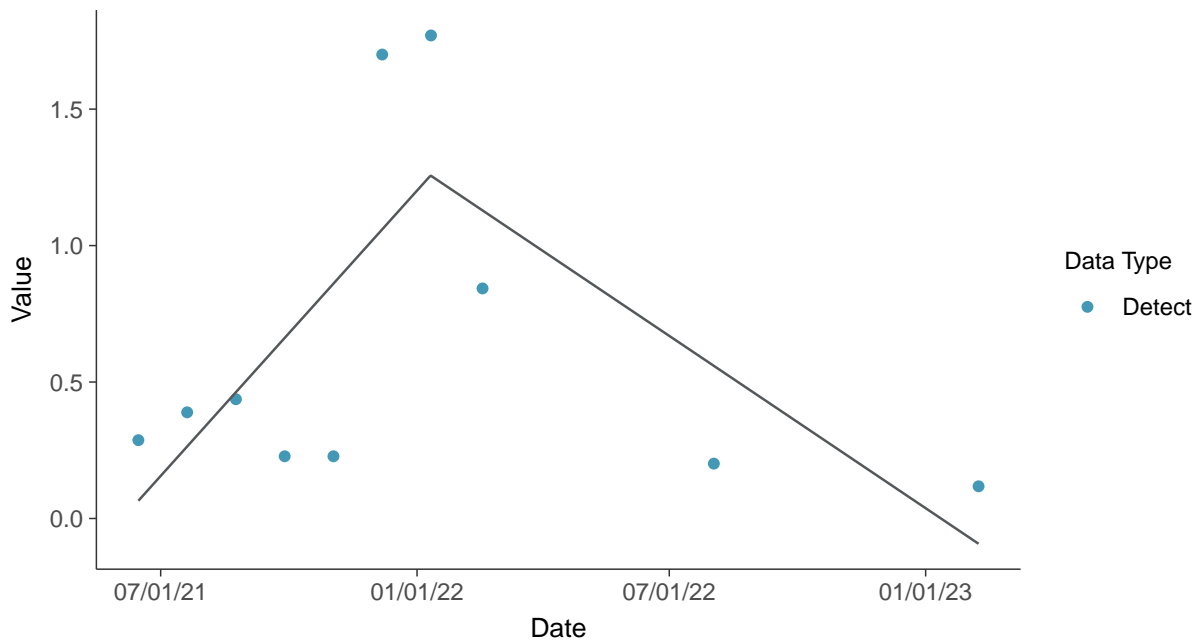
Trend Regression: Lognormal MLE

Radium-226, MW-8 (pCi/L)



Trend Regression: Piecewise Linear-Linear

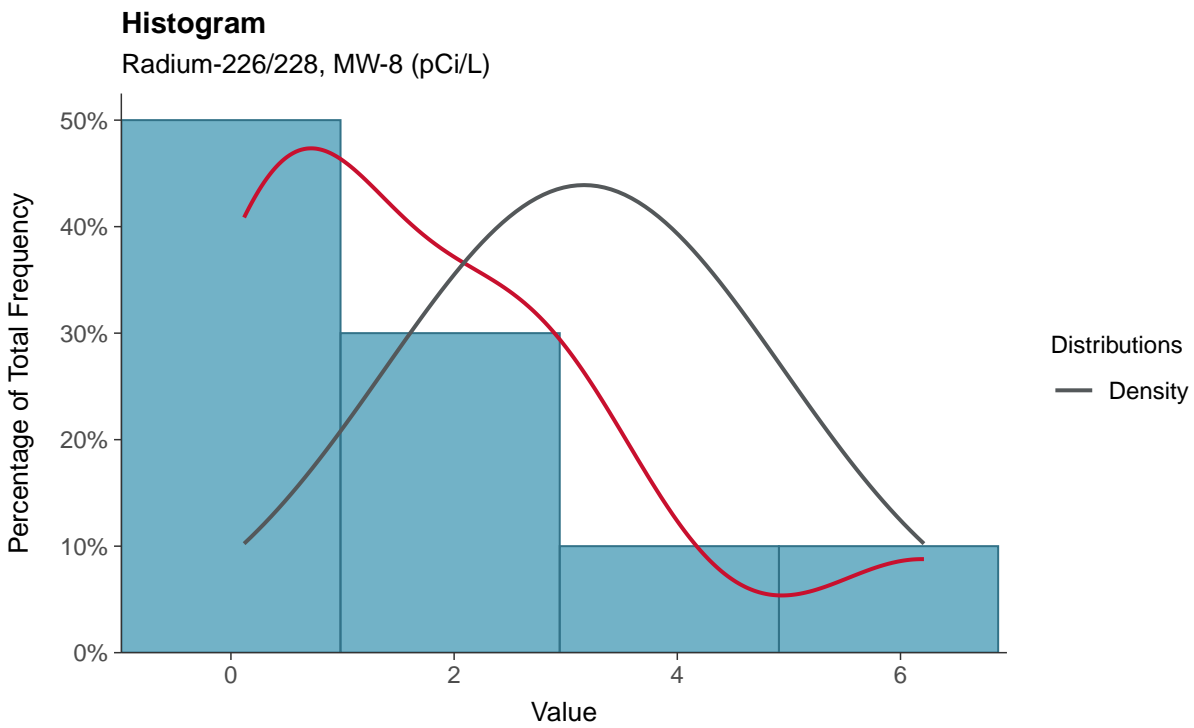
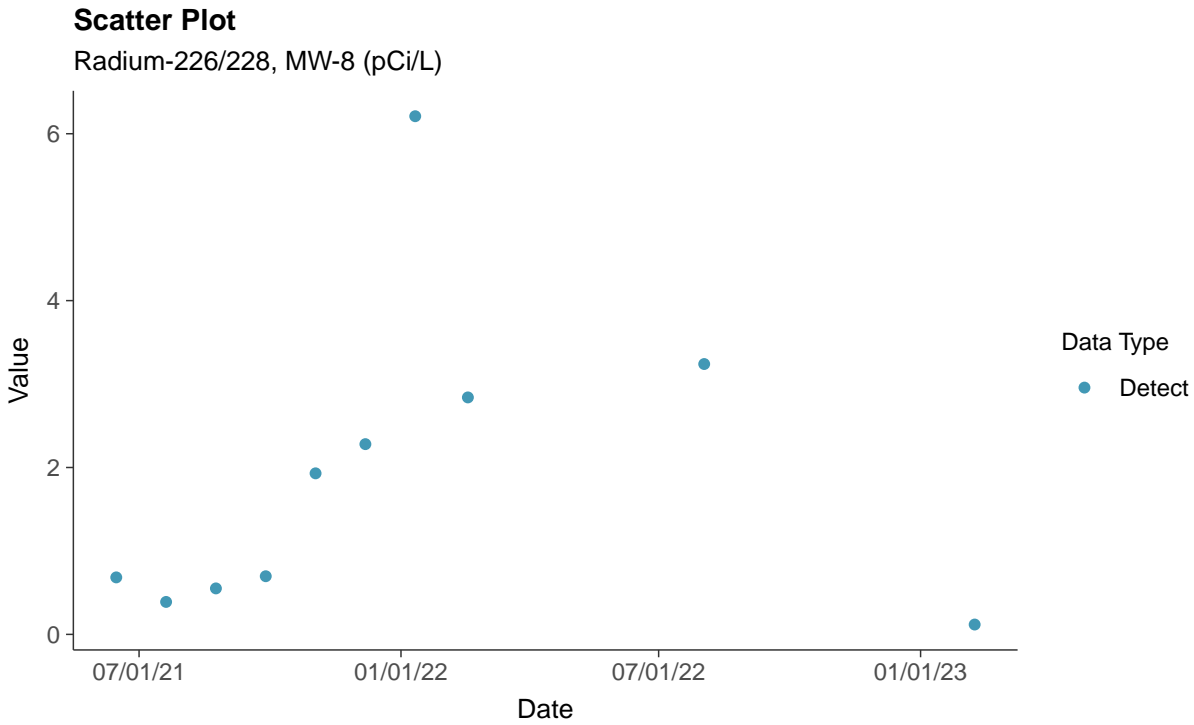
Radium-226, MW-8 (pCi/L)





Appendix IV: Radium-226/228, MW-8

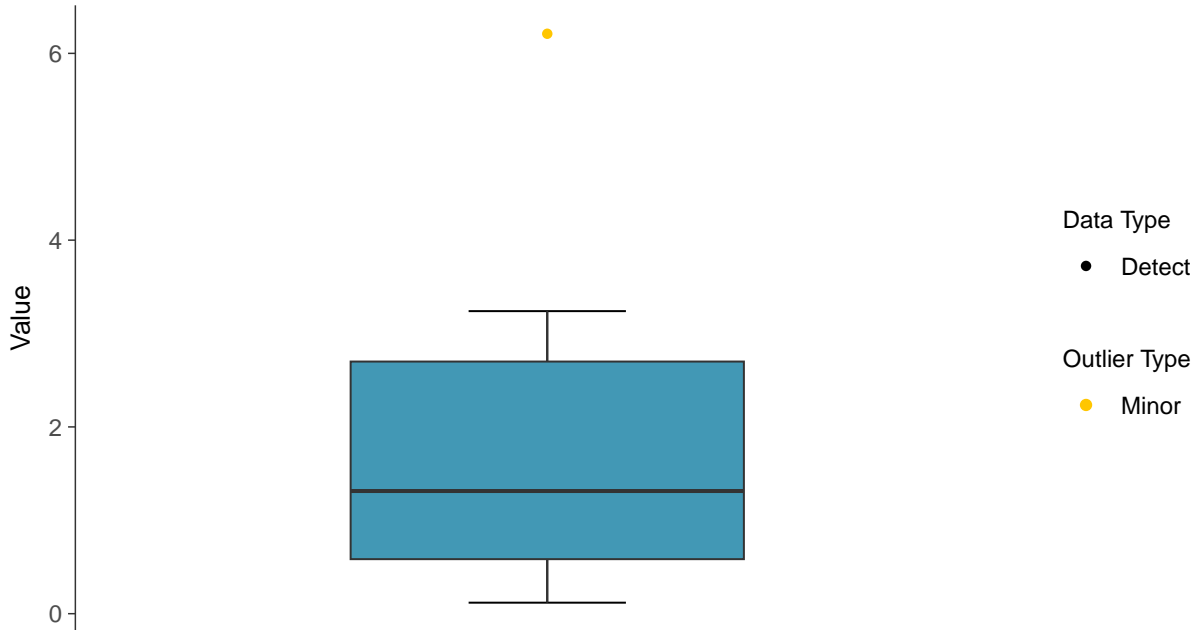
ID: 08_2_25





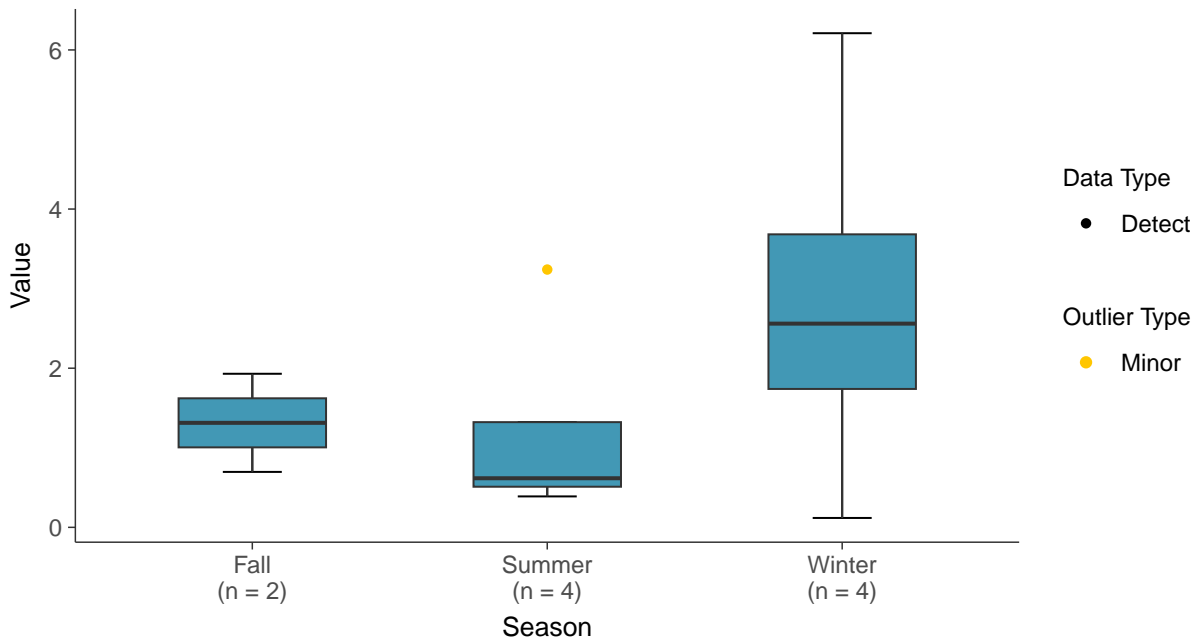
Boxplot

Radium-226/228, MW-8 (pCi/L)



Boxplot by Season

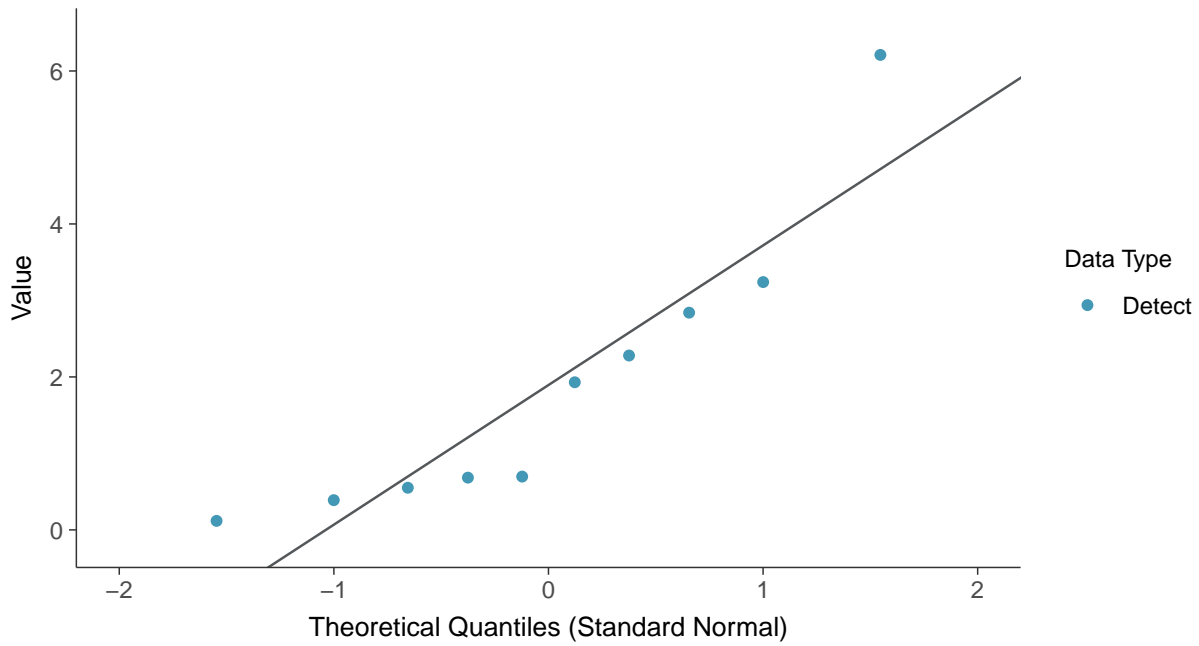
Radium-226/228, MW-8 (pCi/L)





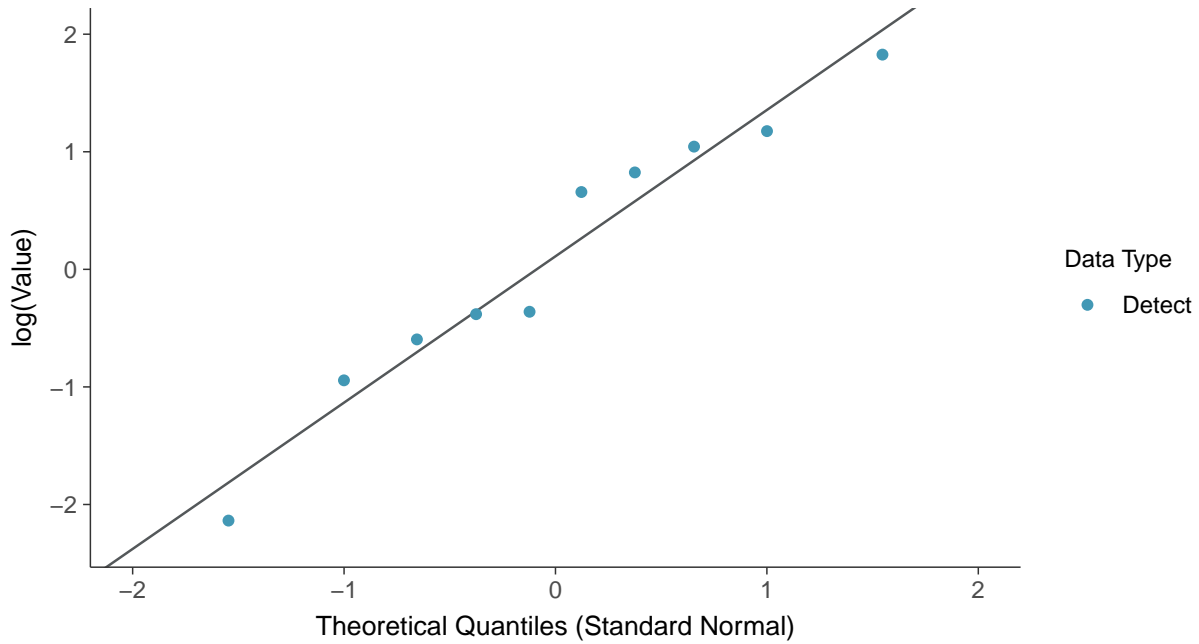
Normal Q-Q plot

Radium-226/228, MW-8 (pCi/L)



Lognormal Q-Q plot

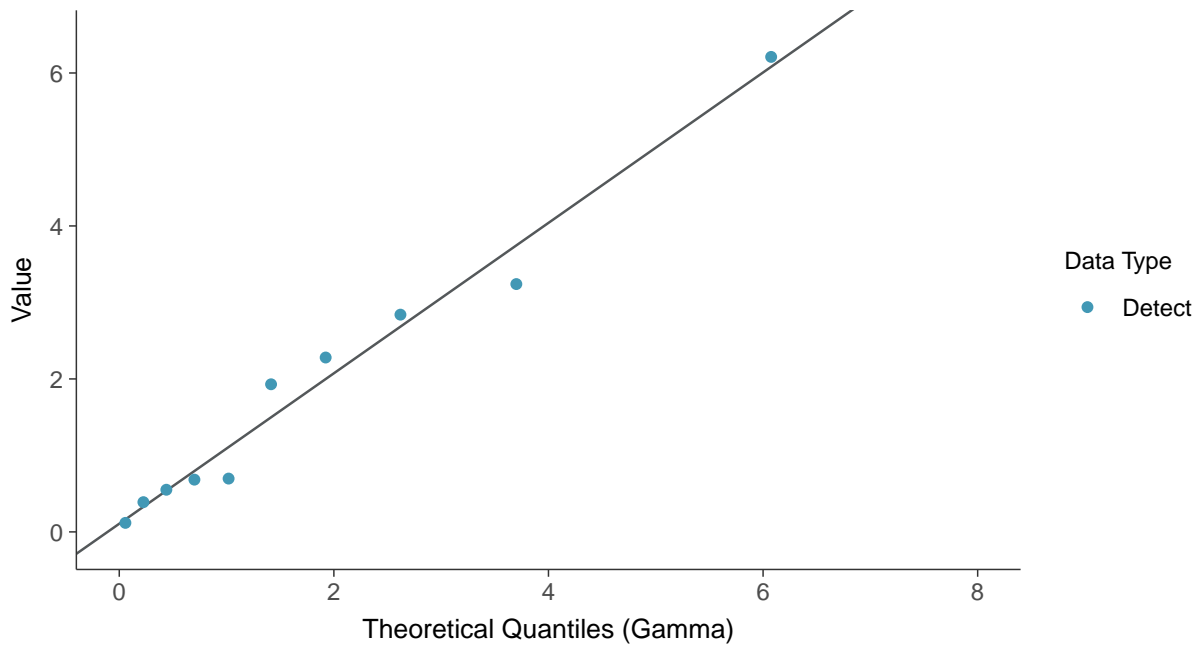
Radium-226/228, MW-8 (pCi/L)





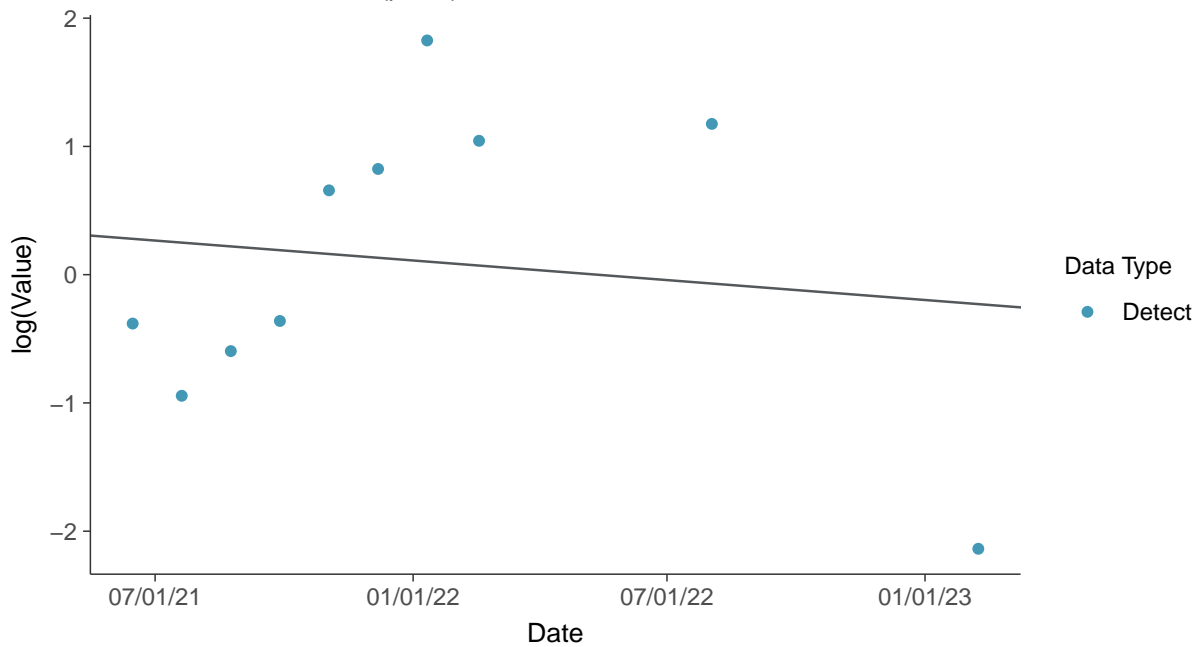
Gamma Q-Q plot

Radium-226/228, MW-8 (pCi/L)



Trend Regression: Lognormal MLE

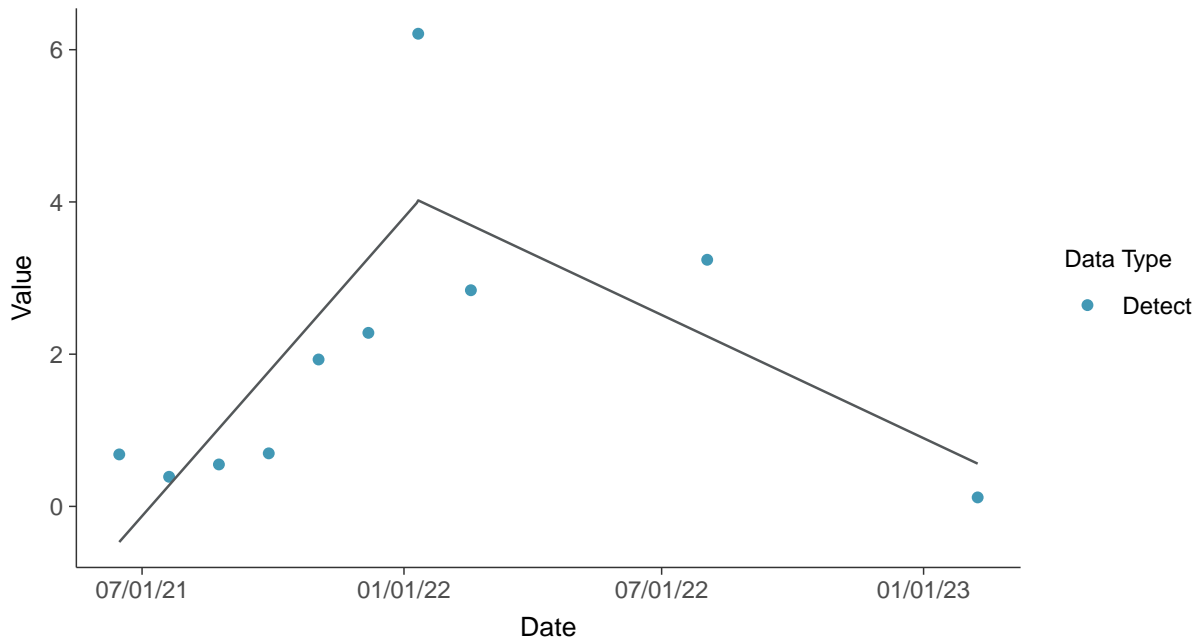
Radium-226/228, MW-8 (pCi/L)





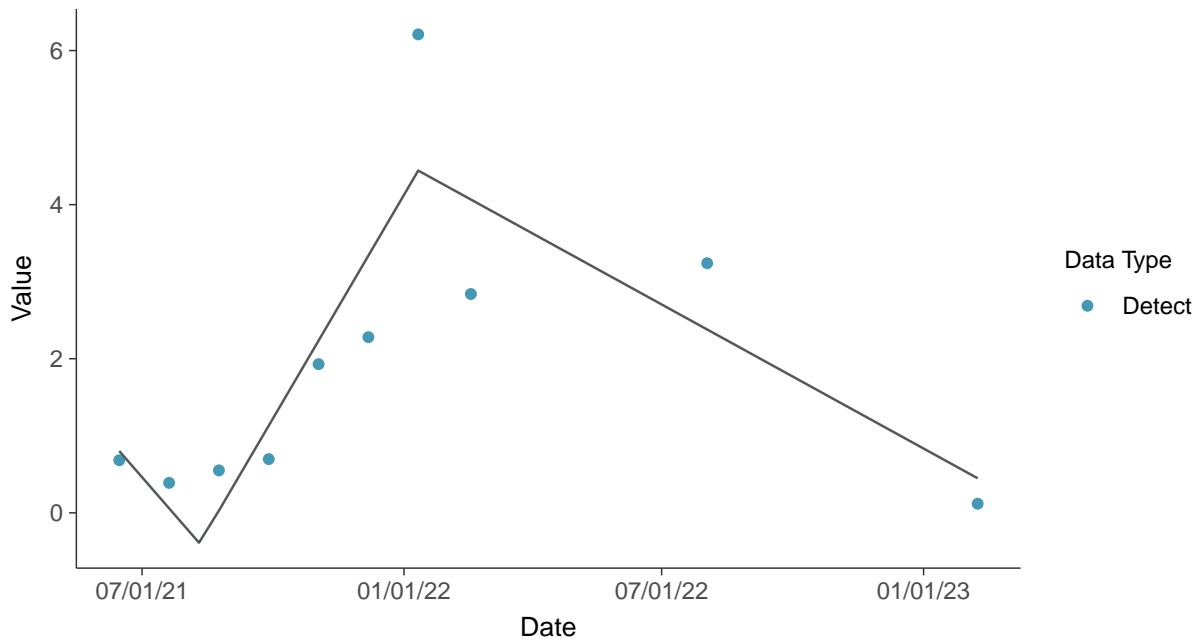
Trend Regression: Piecewise Linear-Linear

Radium-226/228, MW-8 (pCi/L)



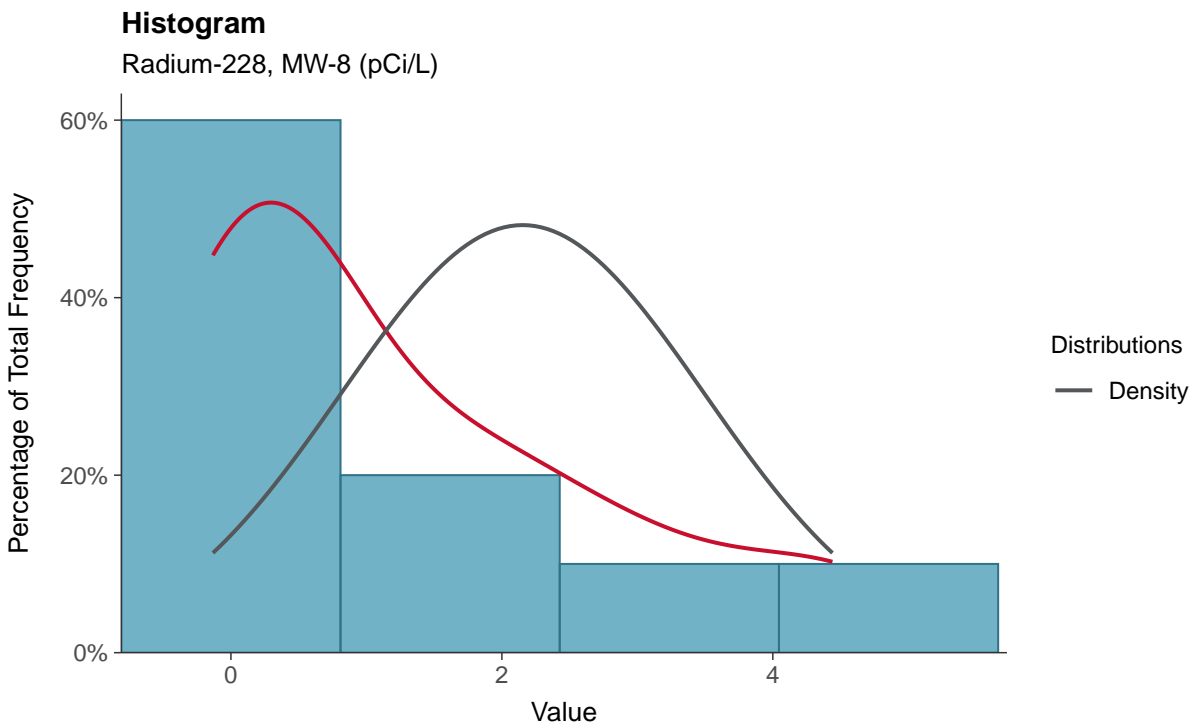
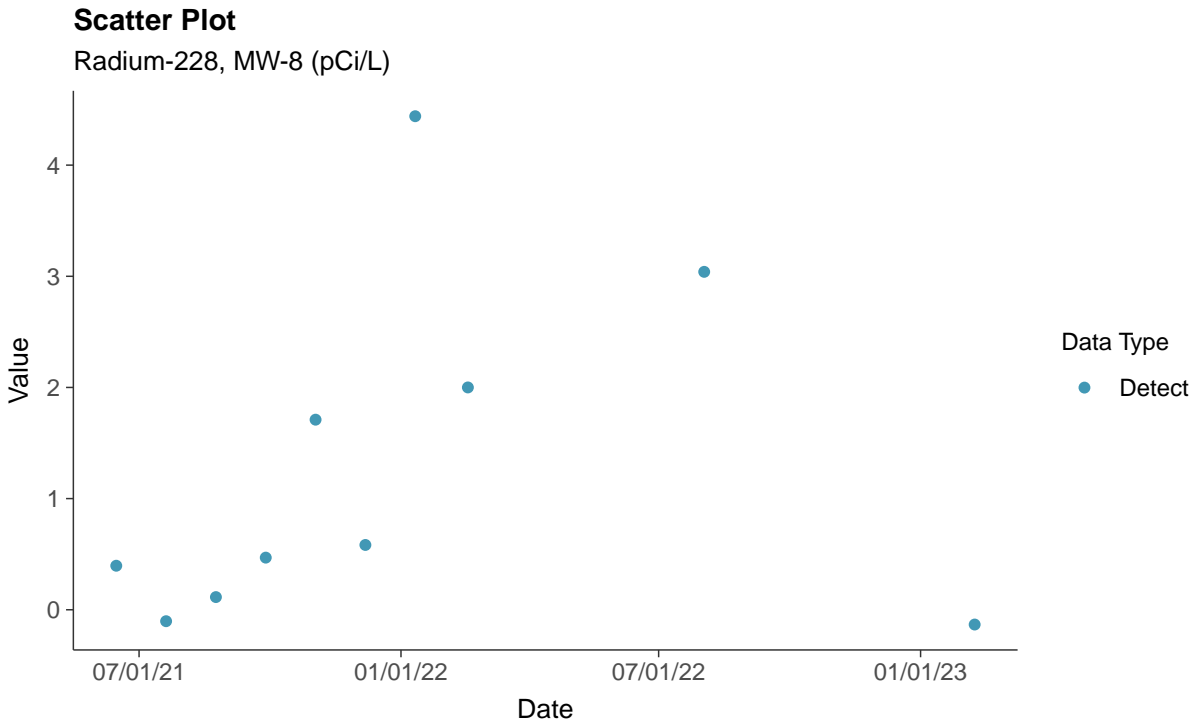
Trend Regression: Piecewise Linear-Linear-Linear

Radium-226/228, MW-8 (pCi/L)



Appendix IV: Radium-228, MW-8

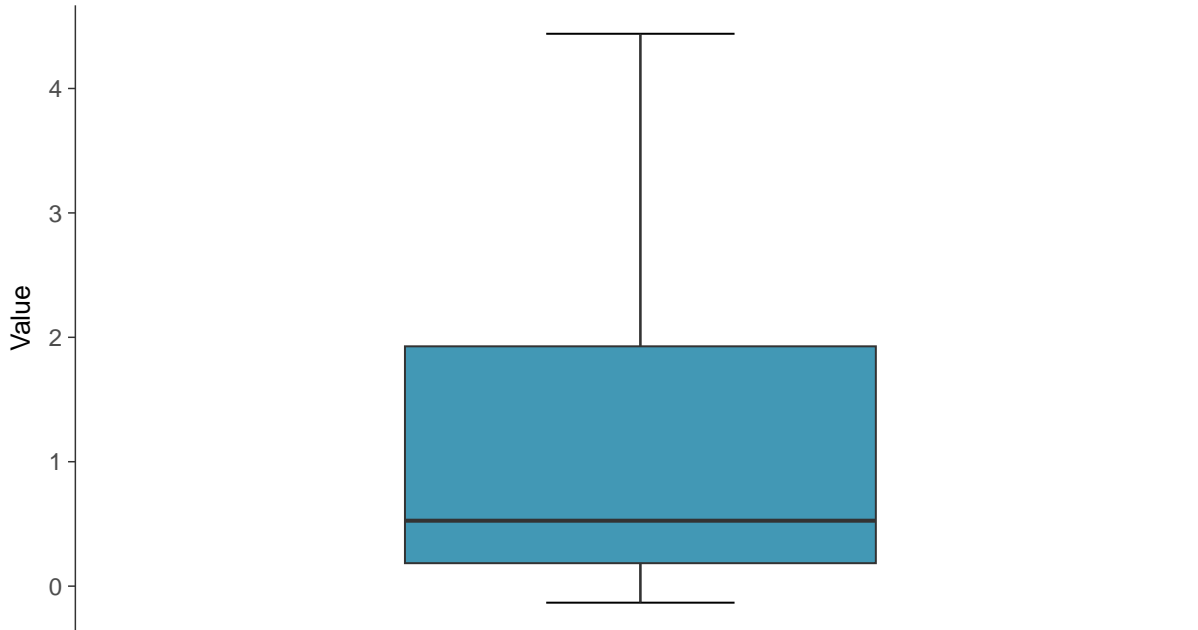
ID: 08_2_26





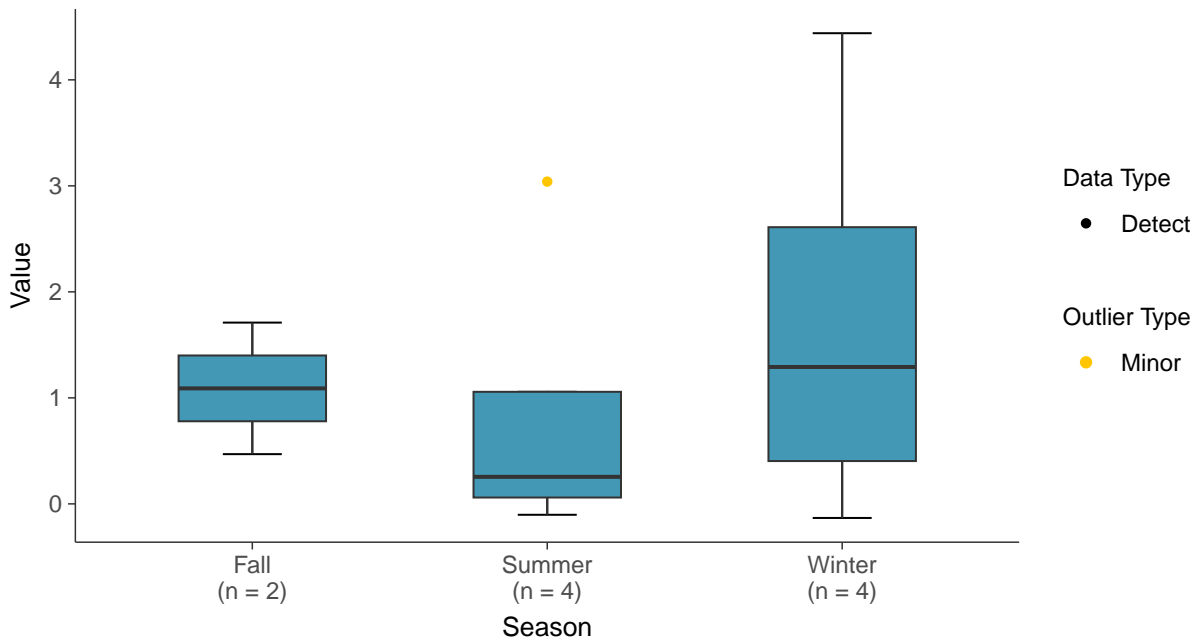
Boxplot

Radium-228, MW-8 (pCi/L)



Boxplot by Season

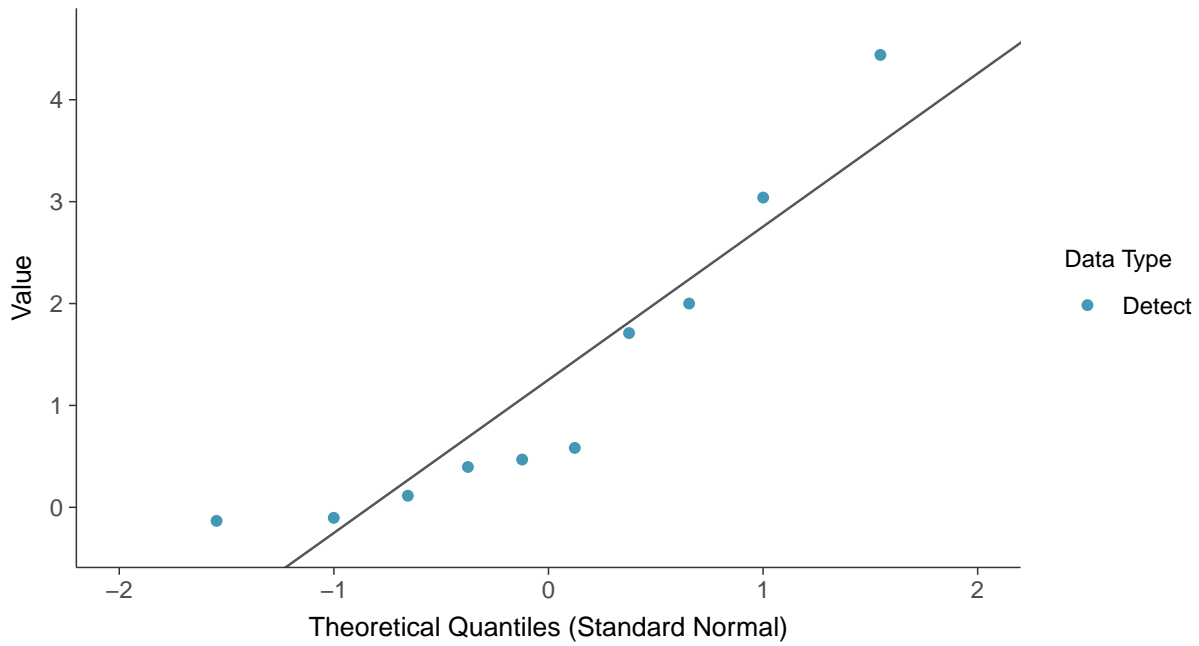
Radium-228, MW-8 (pCi/L)





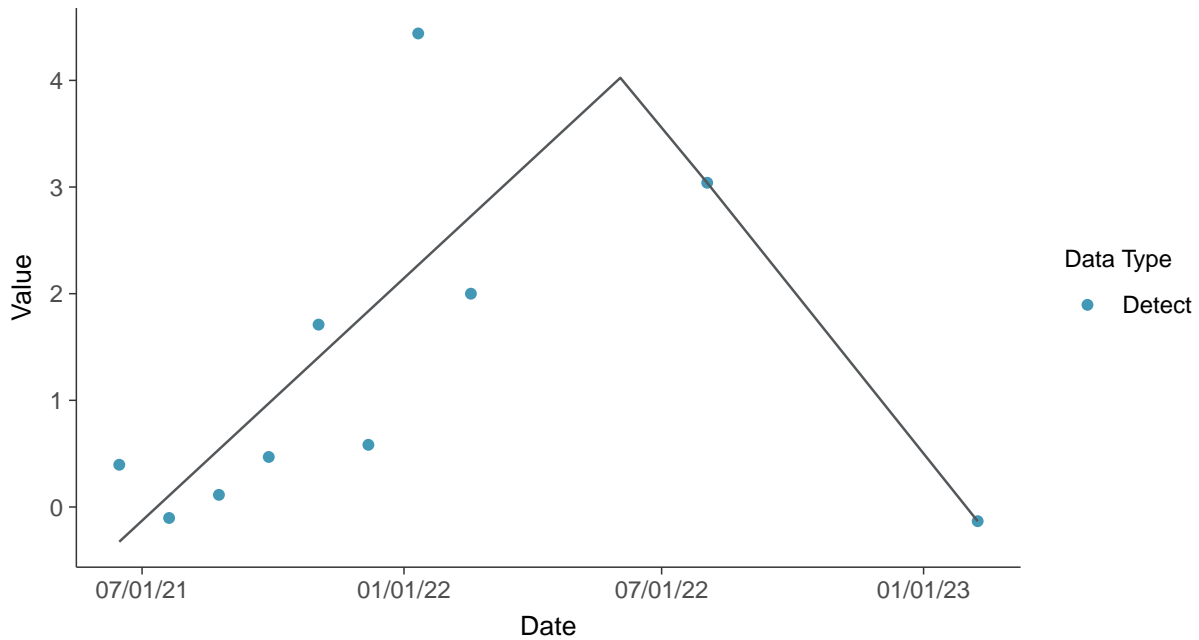
Normal Q-Q plot

Radium-228, MW-8 (pCi/L)



Trend Regression: Piecewise Linear-Linear

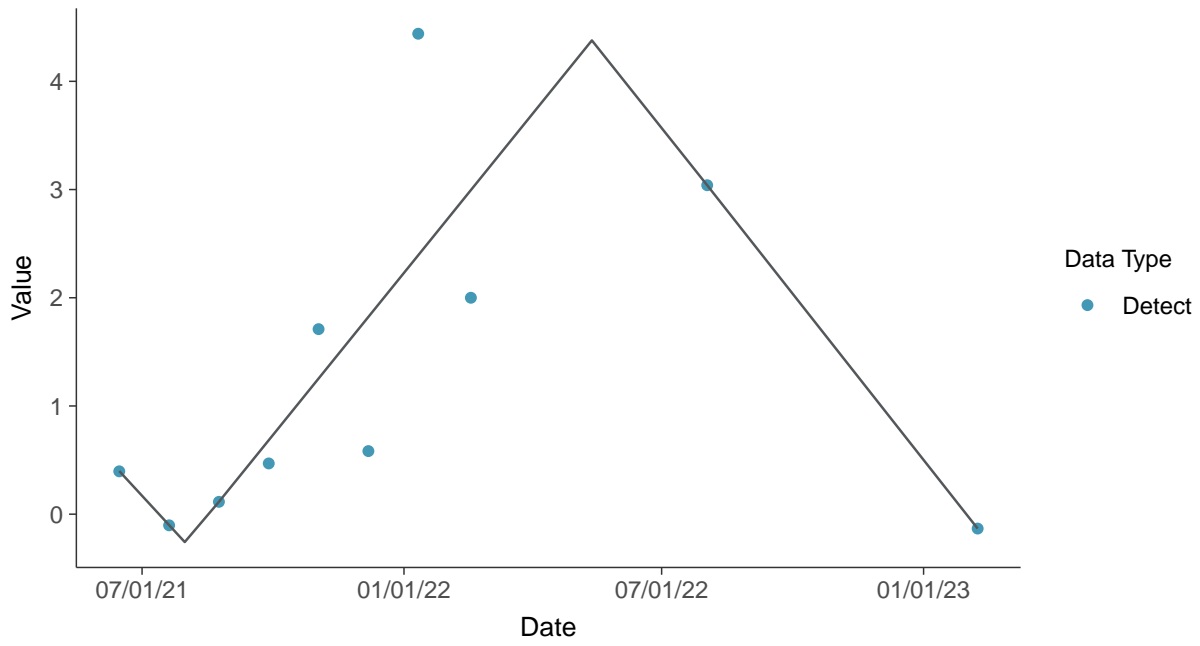
Radium-228, MW-8 (pCi/L)





Trend Regression: Piecewise Linear-Linear-Linear

Radium-228, MW-8 (pCi/L)



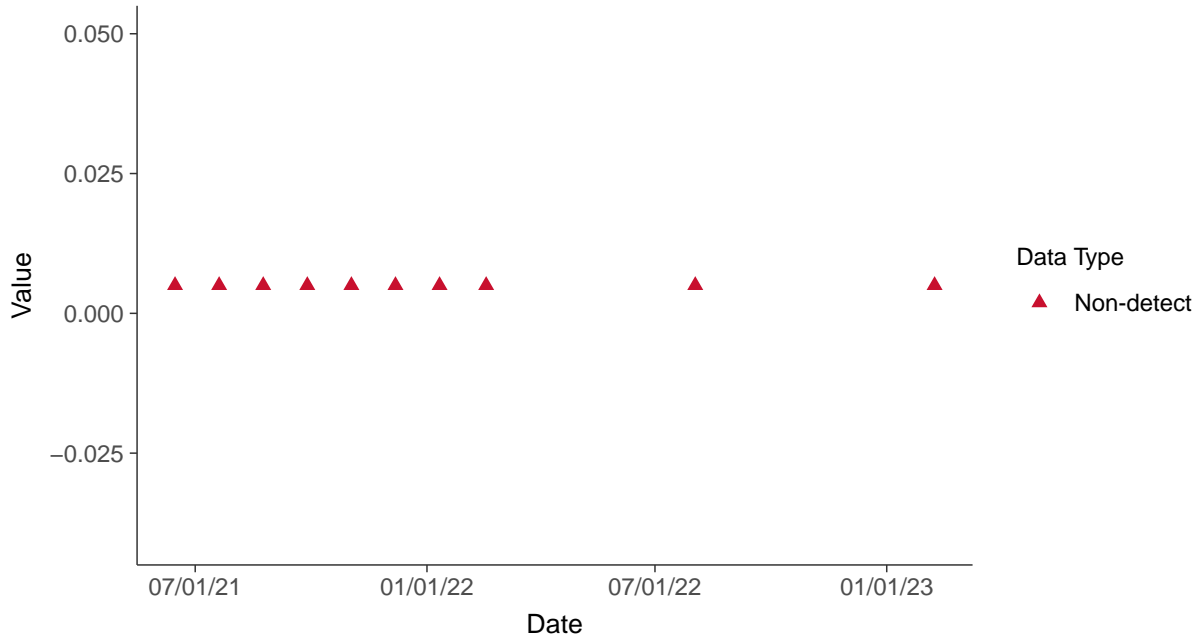


Appendix IV: Selenium, MW-8

ID: 08_2_27

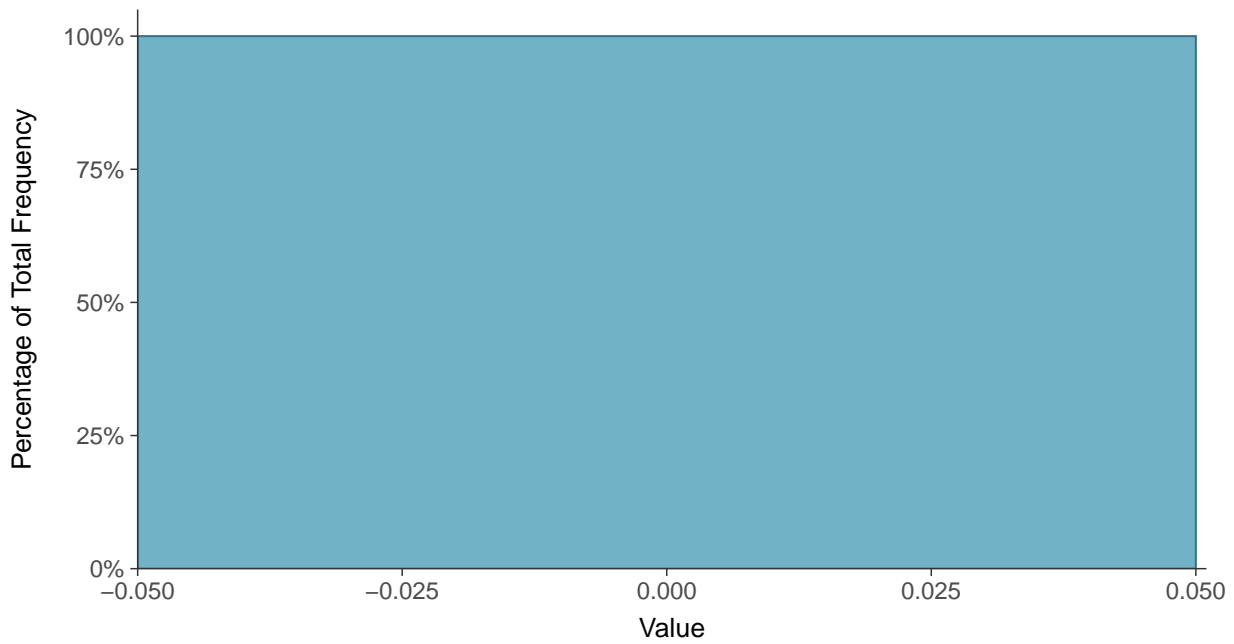
Scatter Plot

Selenium, MW-8 (mg/L)



Histogram

Selenium, MW-8 (mg/L)





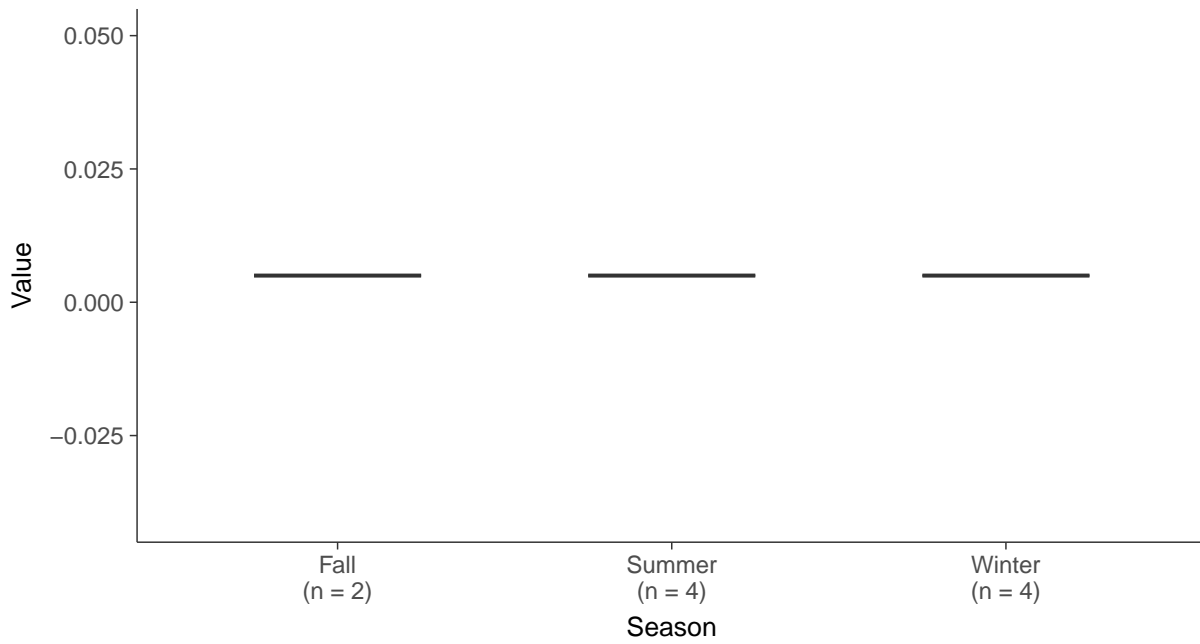
Boxplot

Selenium, MW-8 (mg/L)



Boxplot by Season

Selenium, MW-8 (mg/L)



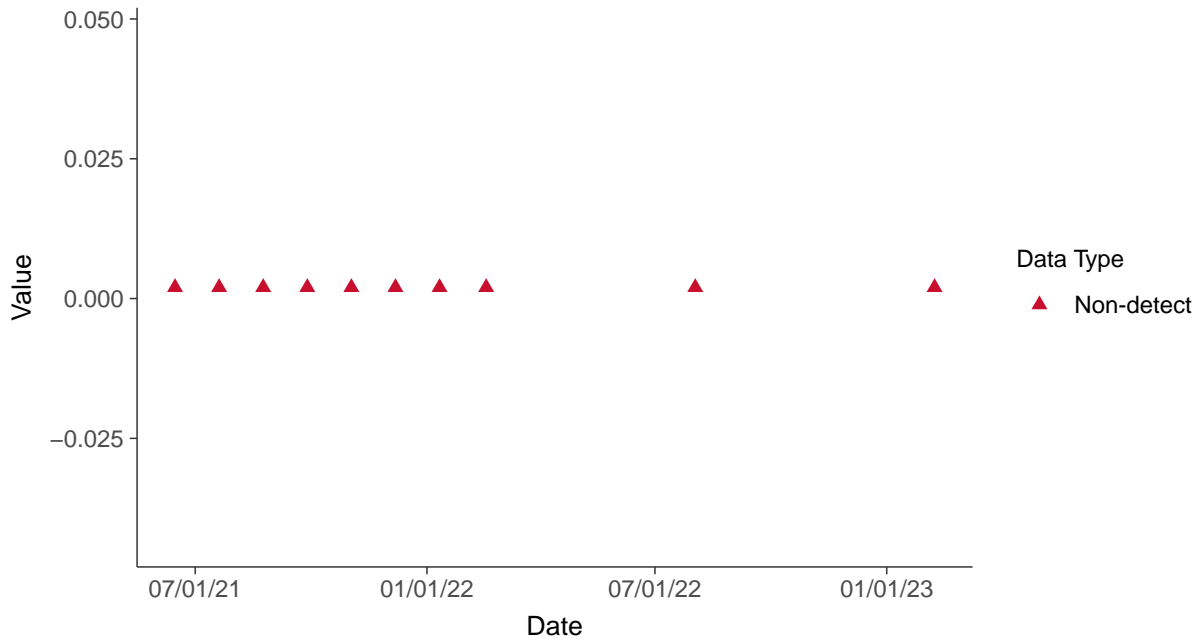


Appendix IV: Thallium, MW-8

ID: 08_2_29

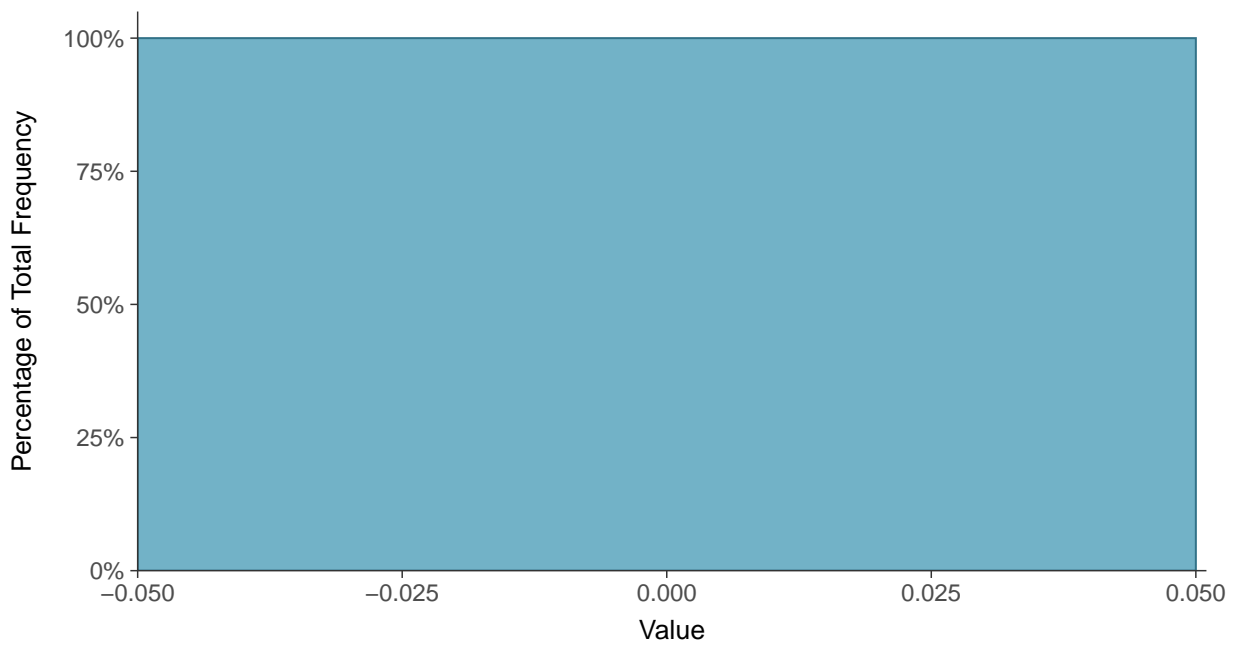
Scatter Plot

Thallium, MW-8 (mg/L)



Histogram

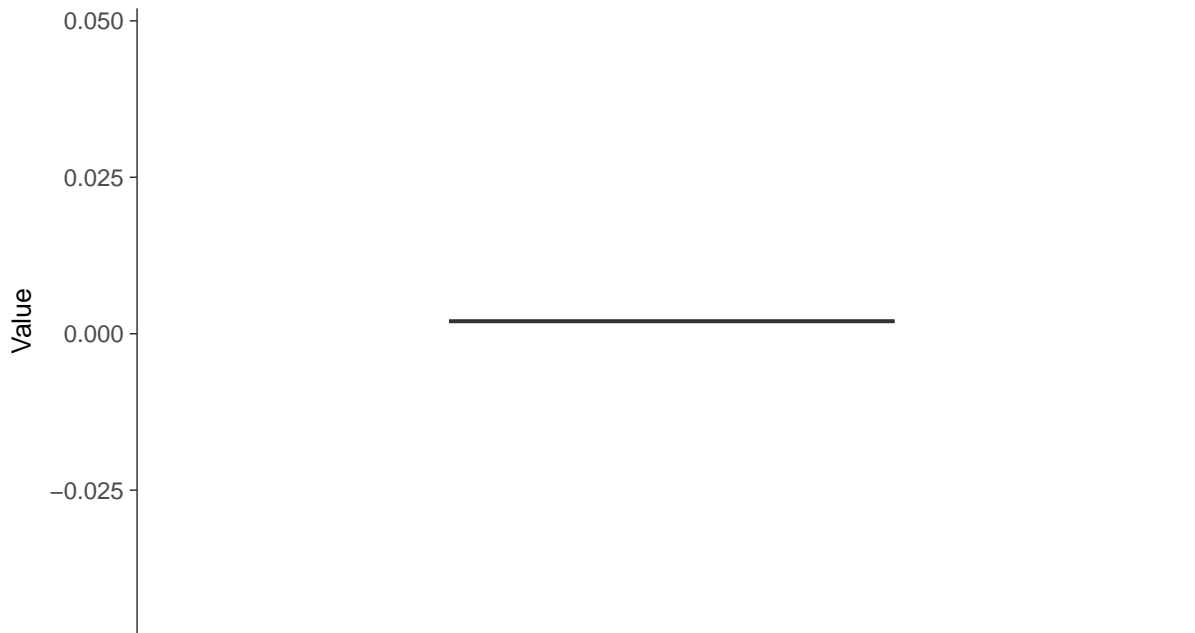
Thallium, MW-8 (mg/L)





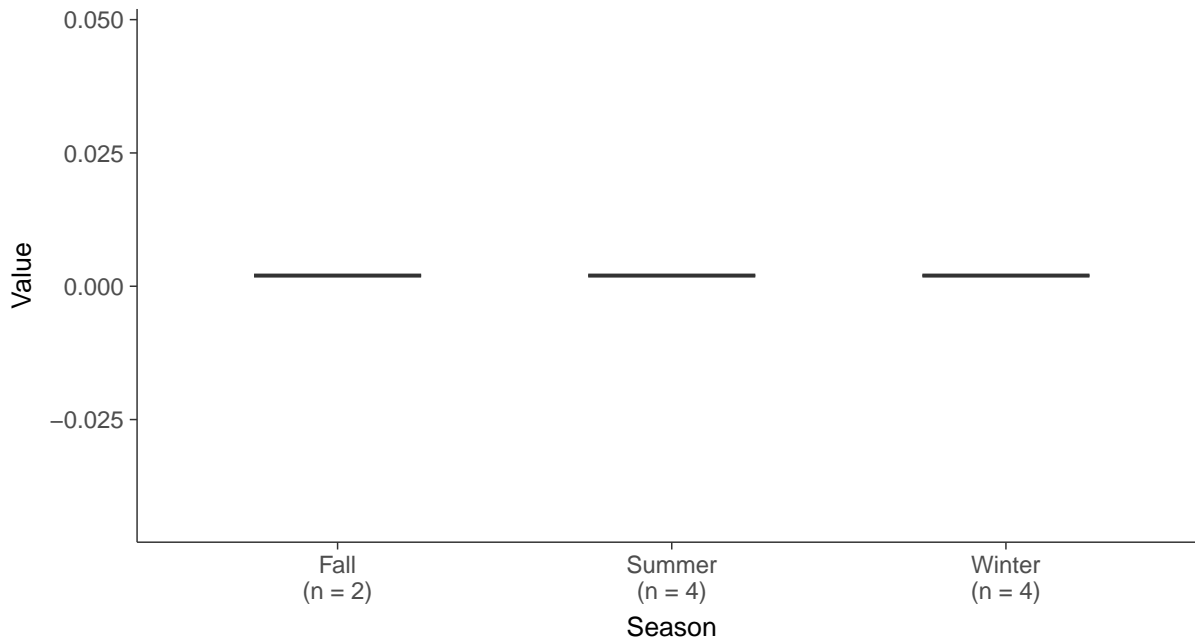
Boxplot

Thallium, MW-8 (mg/L)



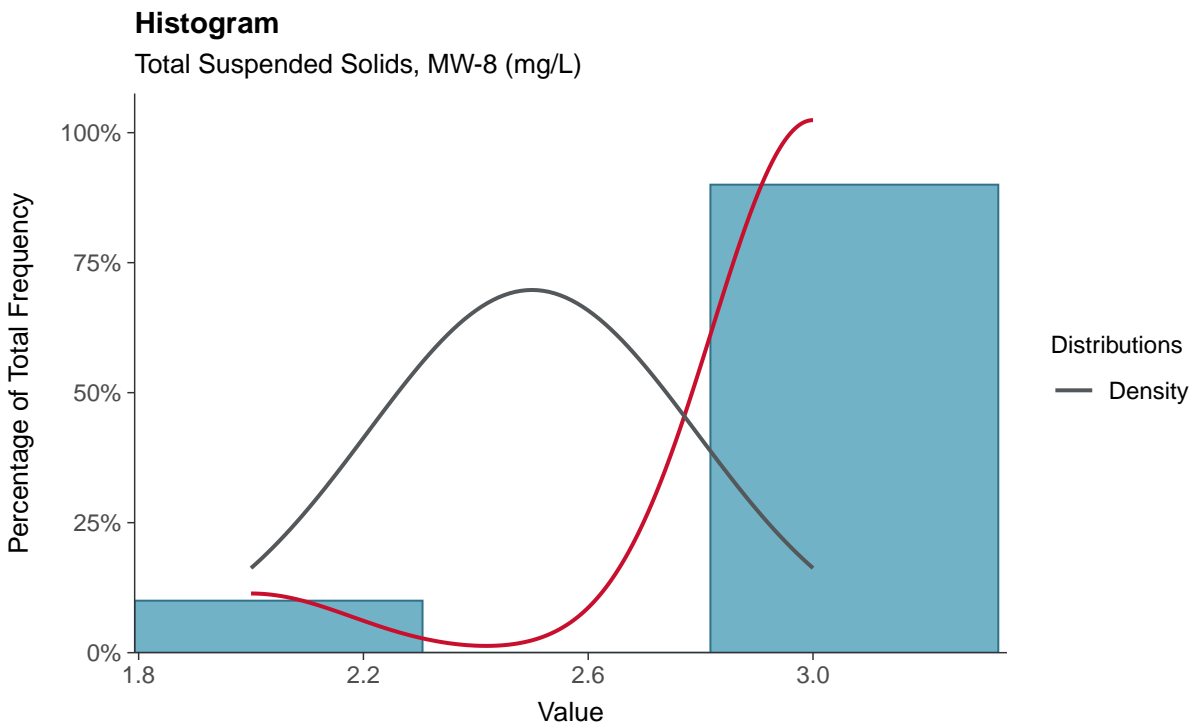
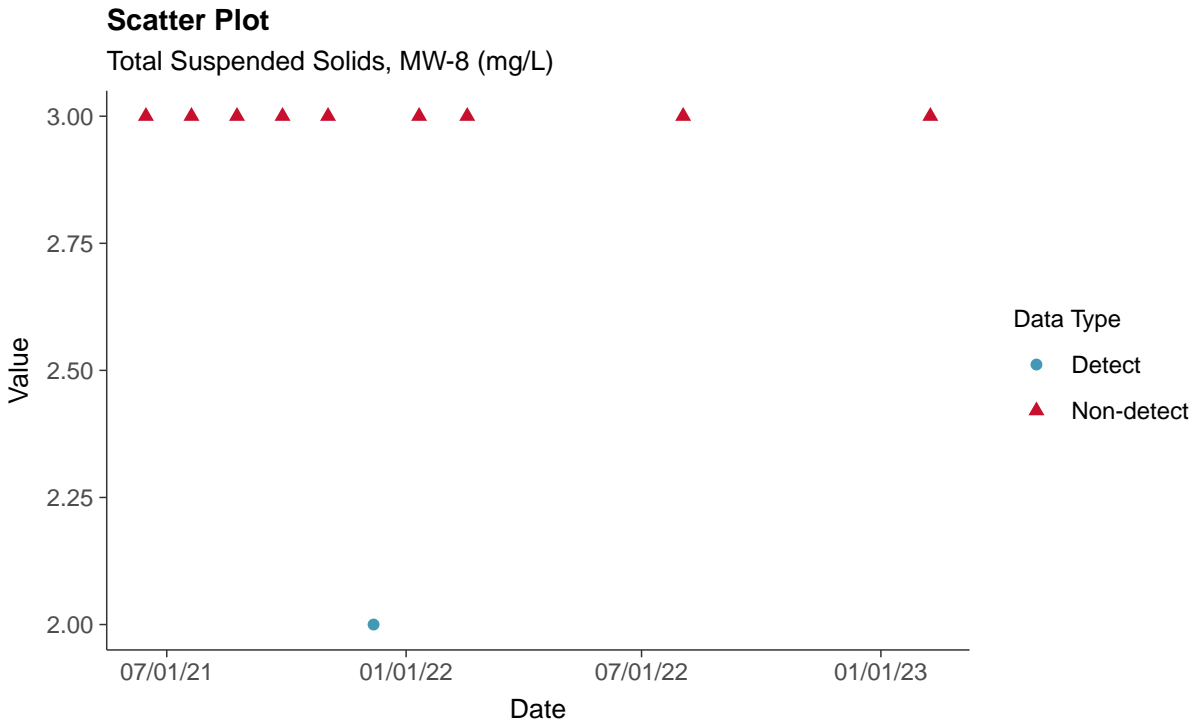
Boxplot by Season

Thallium, MW-8 (mg/L)



Appendix IV: Total Suspended Solids, MW-8

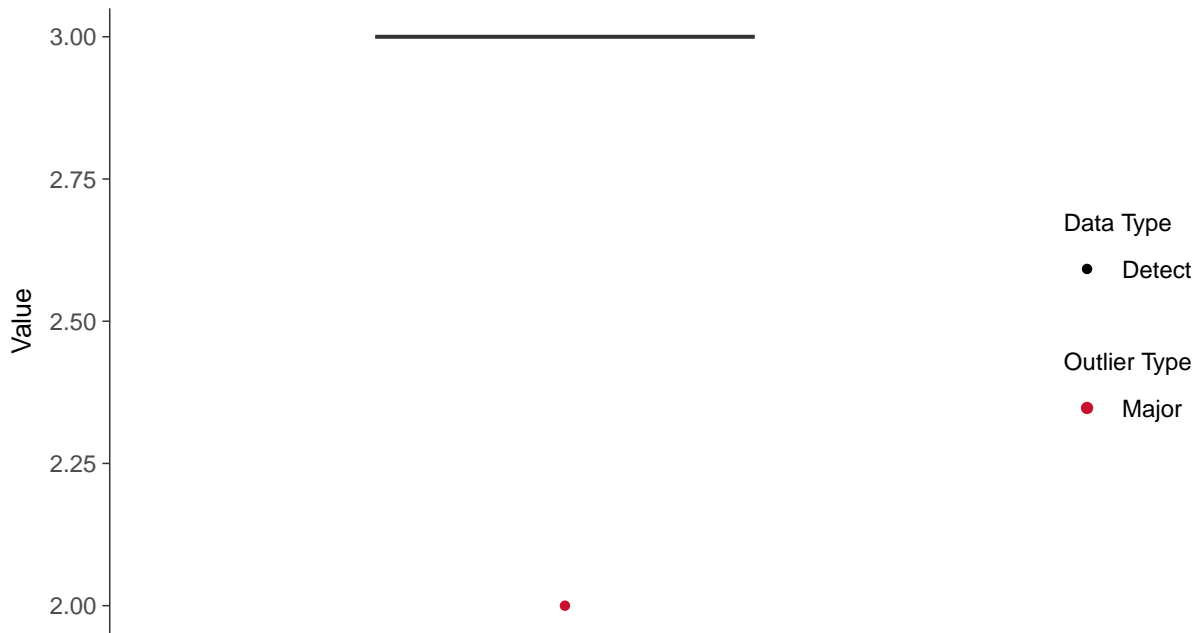
ID: 08_2_30





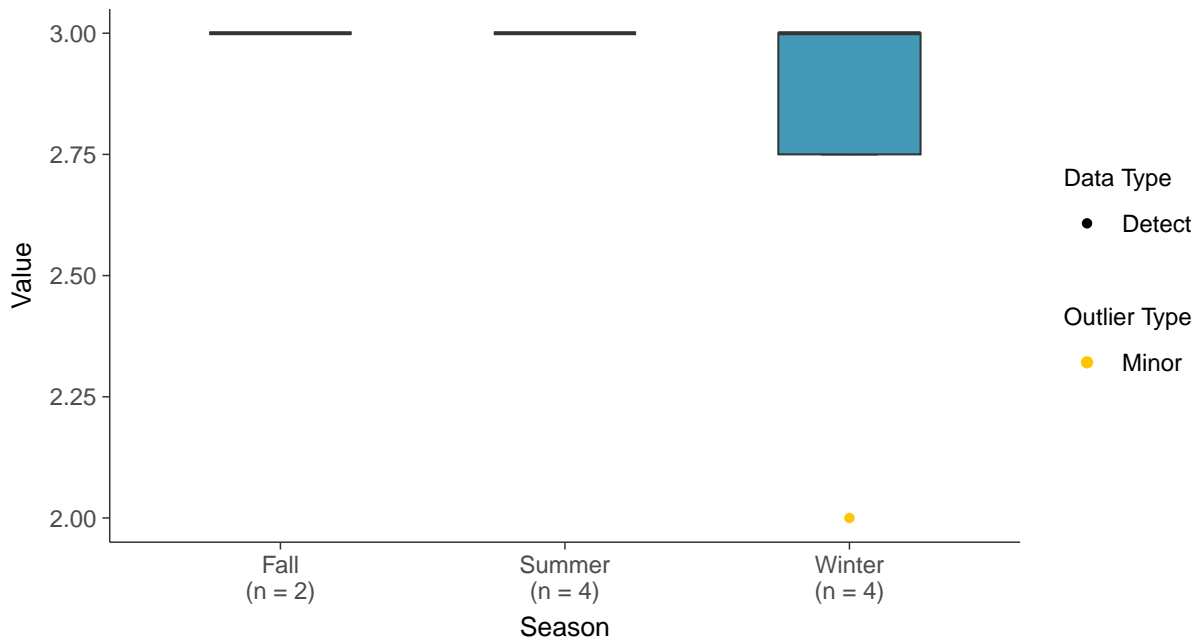
Boxplot

Total Suspended Solids, MW-8 (mg/L)



Boxplot by Season

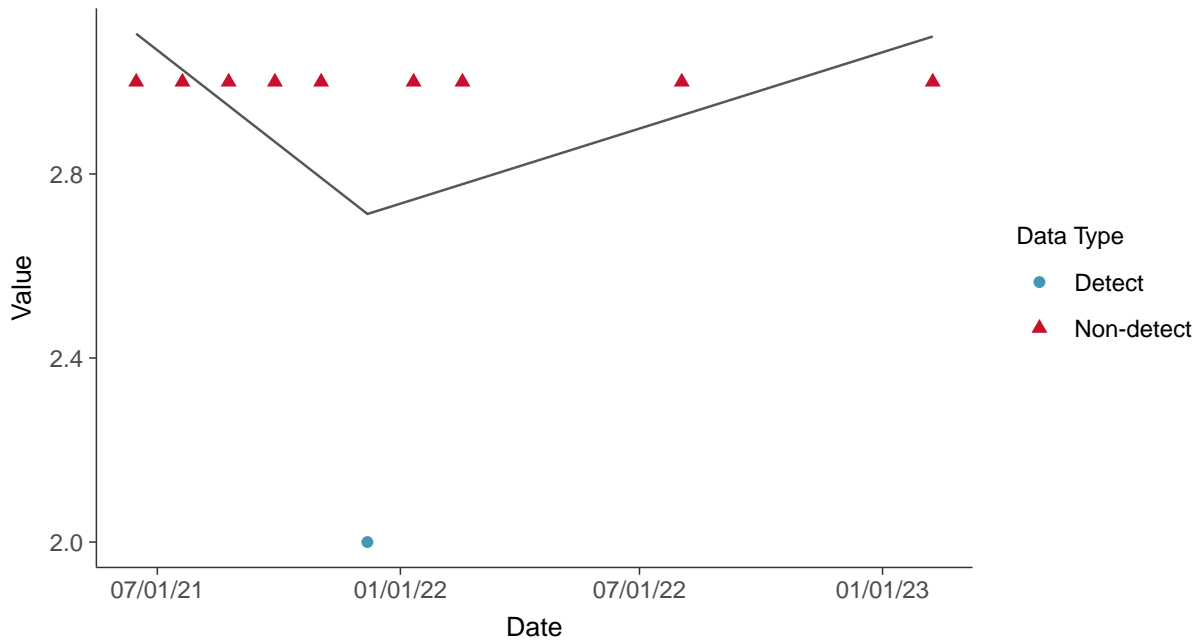
Total Suspended Solids, MW-8 (mg/L)





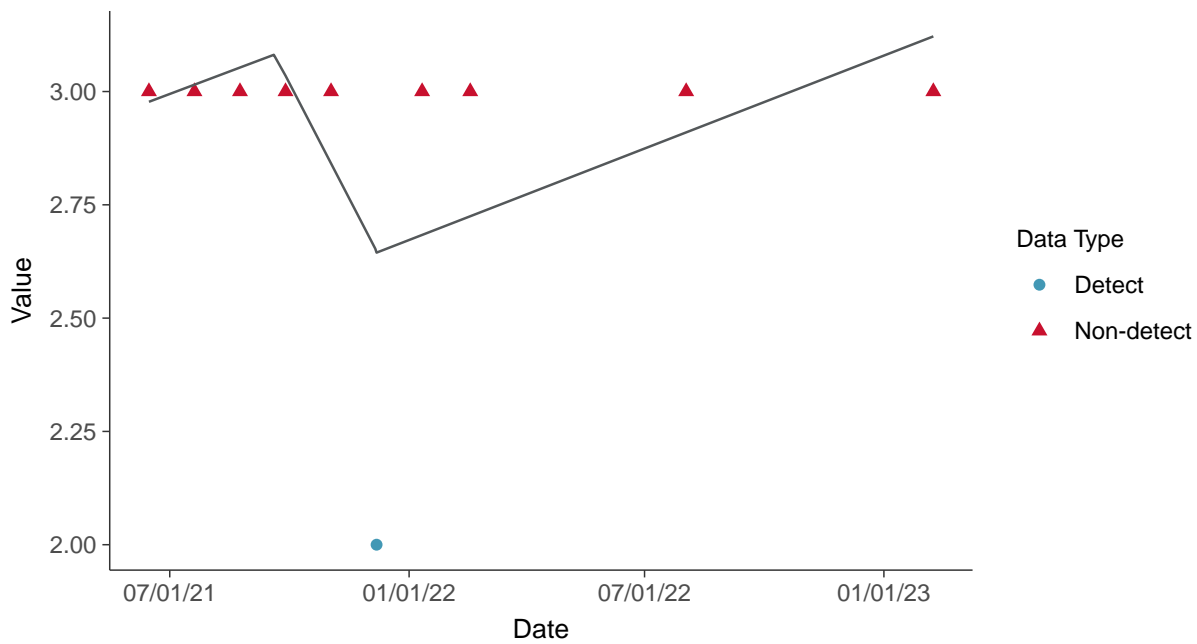
Trend Regression: Piecewise Linear-Linear

Total Suspended Solids, MW-8 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Total Suspended Solids, MW-8 (mg/L)



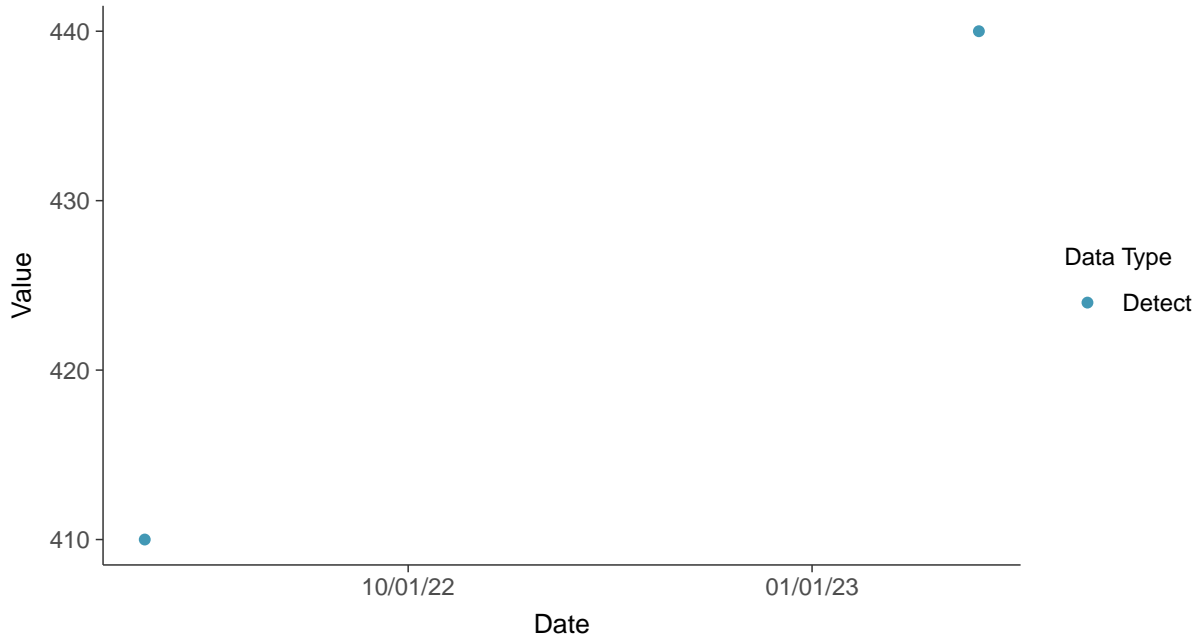


Other: Bicarbonate, MW-8

ID: 08_3_12

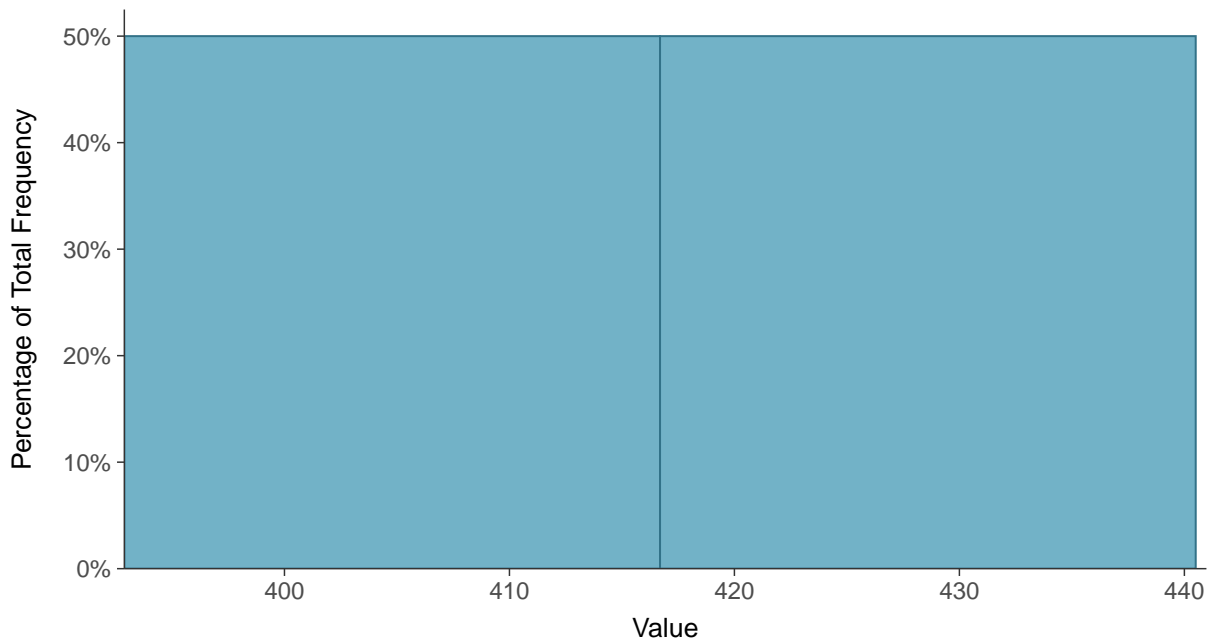
Scatter Plot

Bicarbonate, MW-8 (mg/L)



Histogram

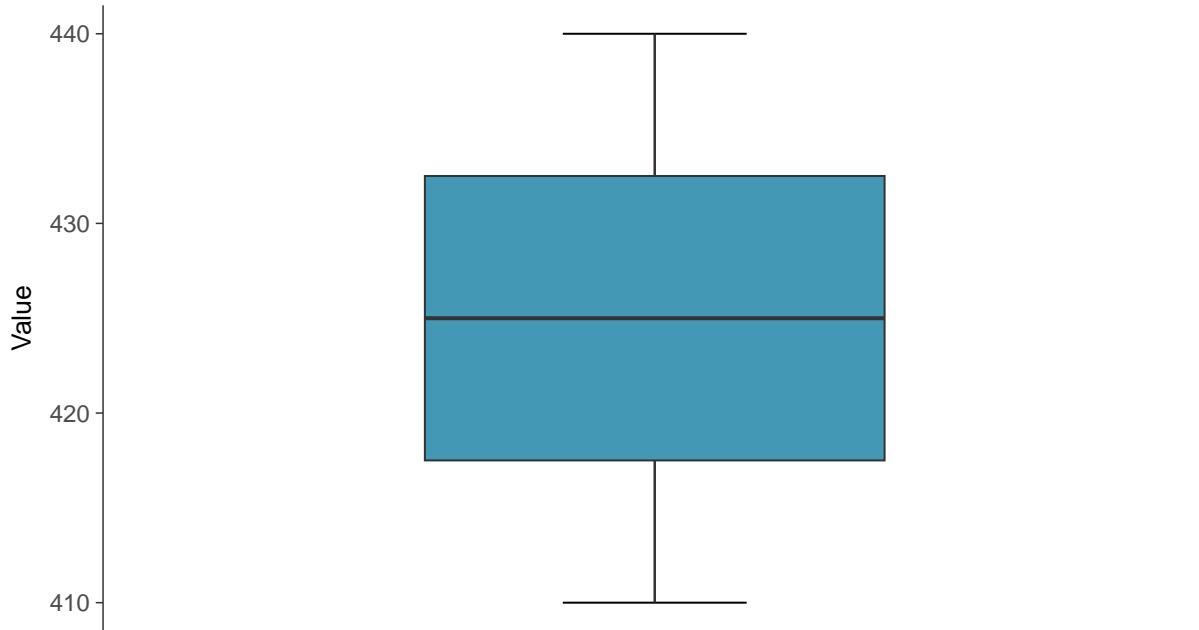
Bicarbonate, MW-8 (mg/L)





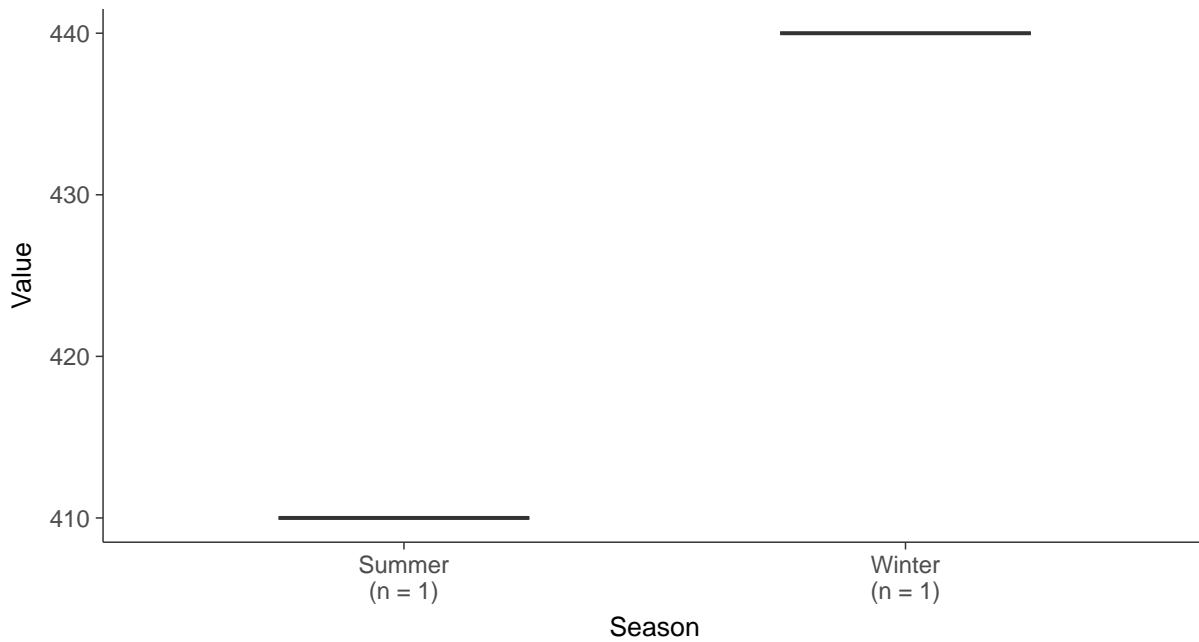
Boxplot

Bicarbonate, MW-8 (mg/L)



Boxplot by Season

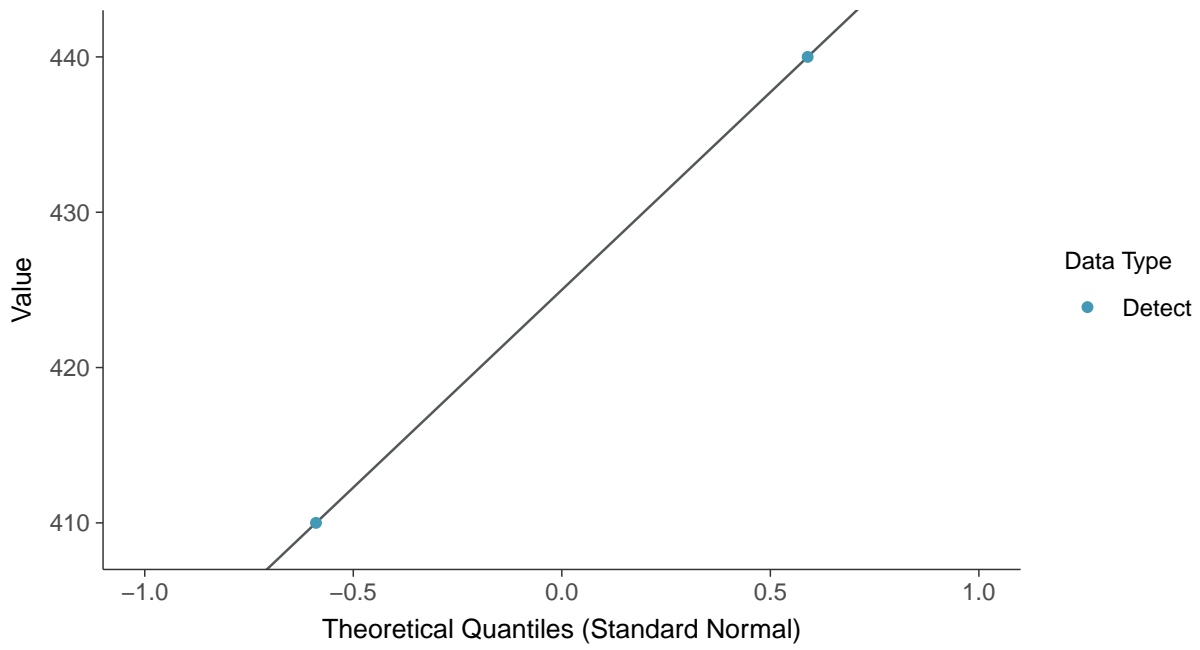
Bicarbonate, MW-8 (mg/L)





Normal Q-Q plot

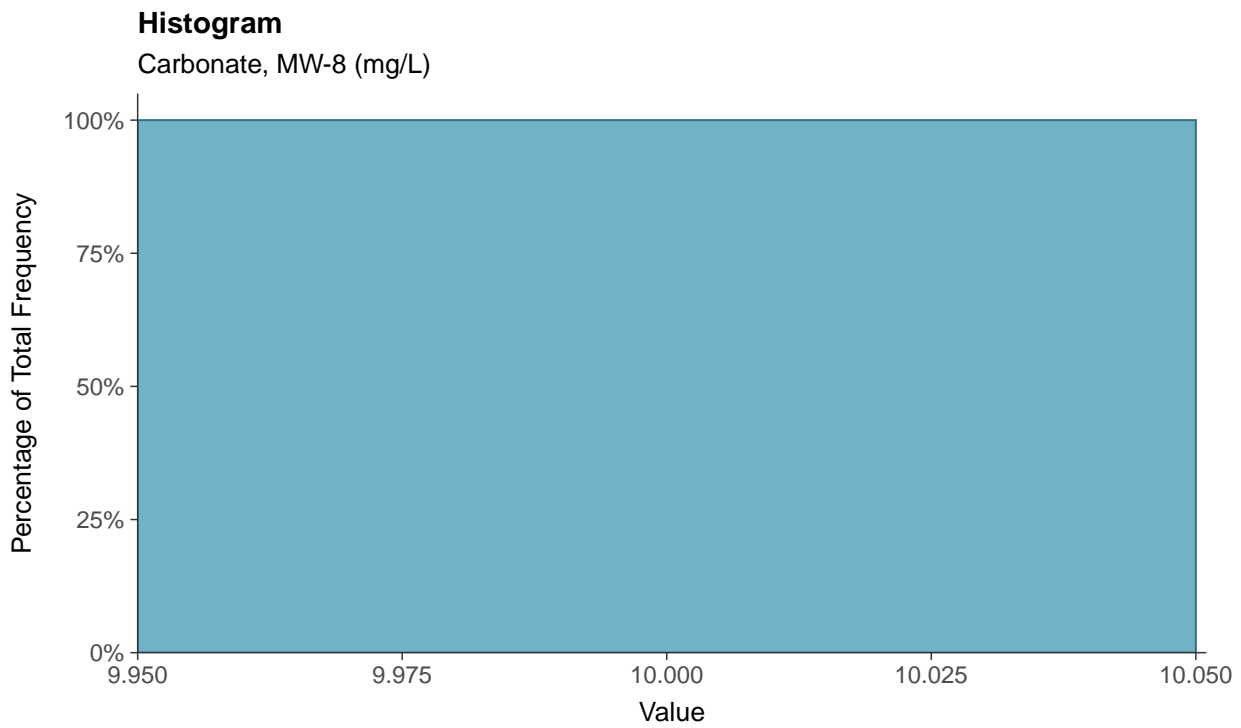
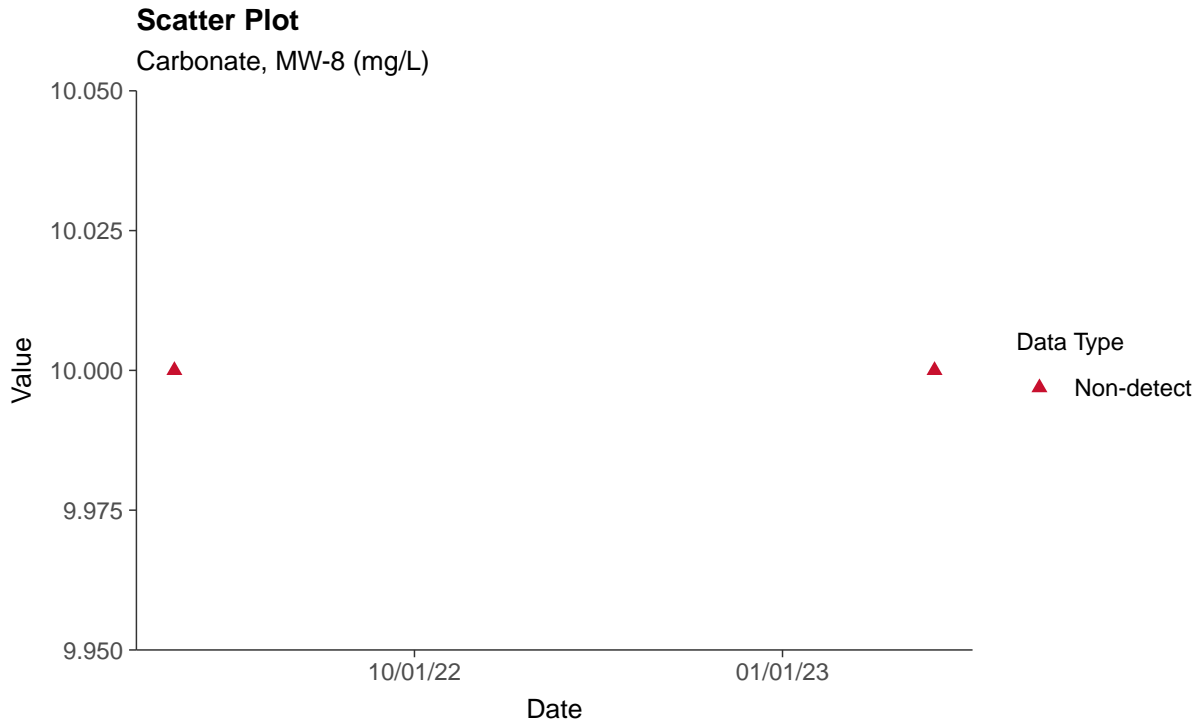
Bicarbonate, MW-8 (mg/L)





Other: Carbonate, MW-8

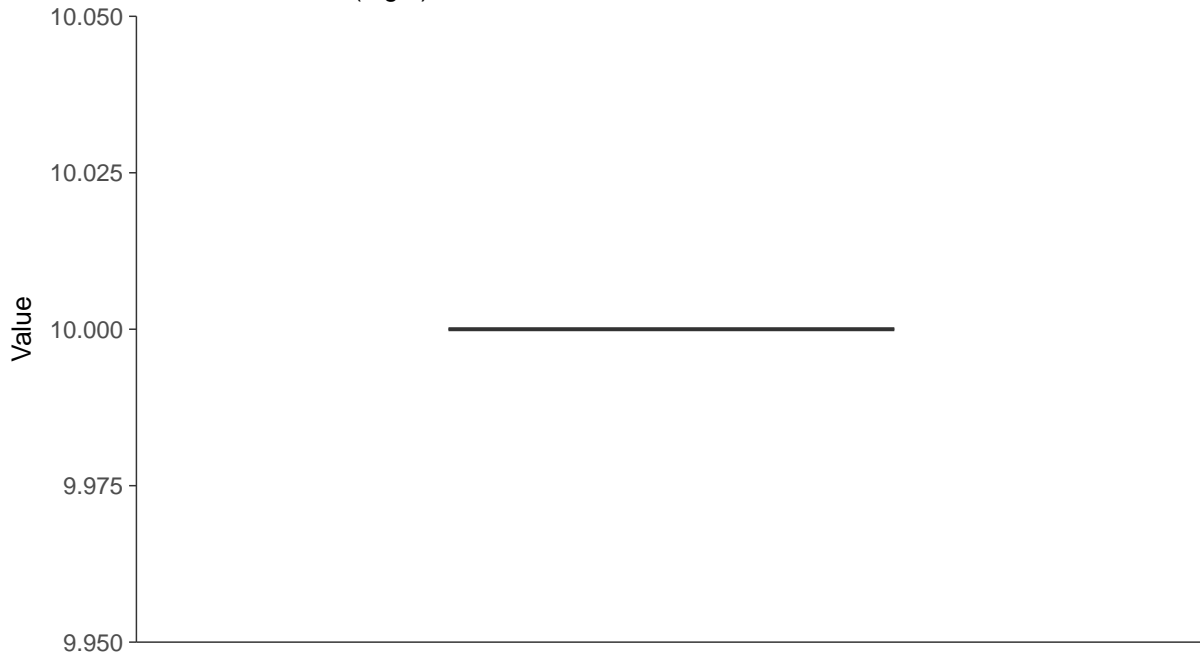
ID: 08_3_14





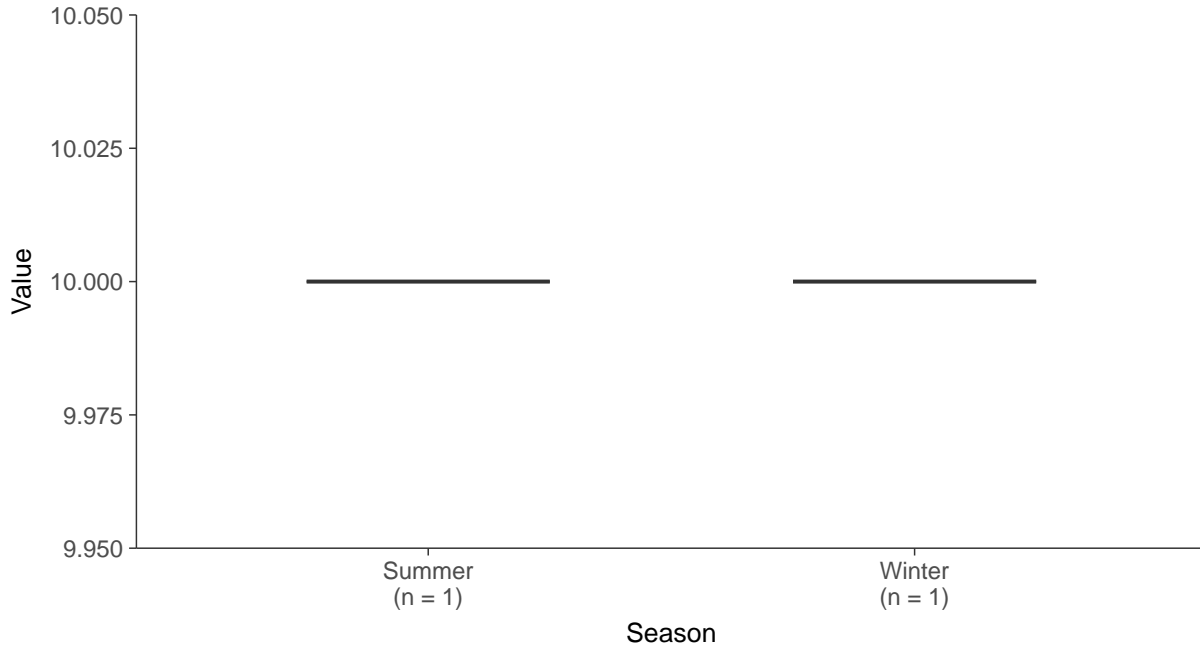
Boxplot

Carbonate, MW-8 (mg/L)



Boxplot by Season

Carbonate, MW-8 (mg/L)



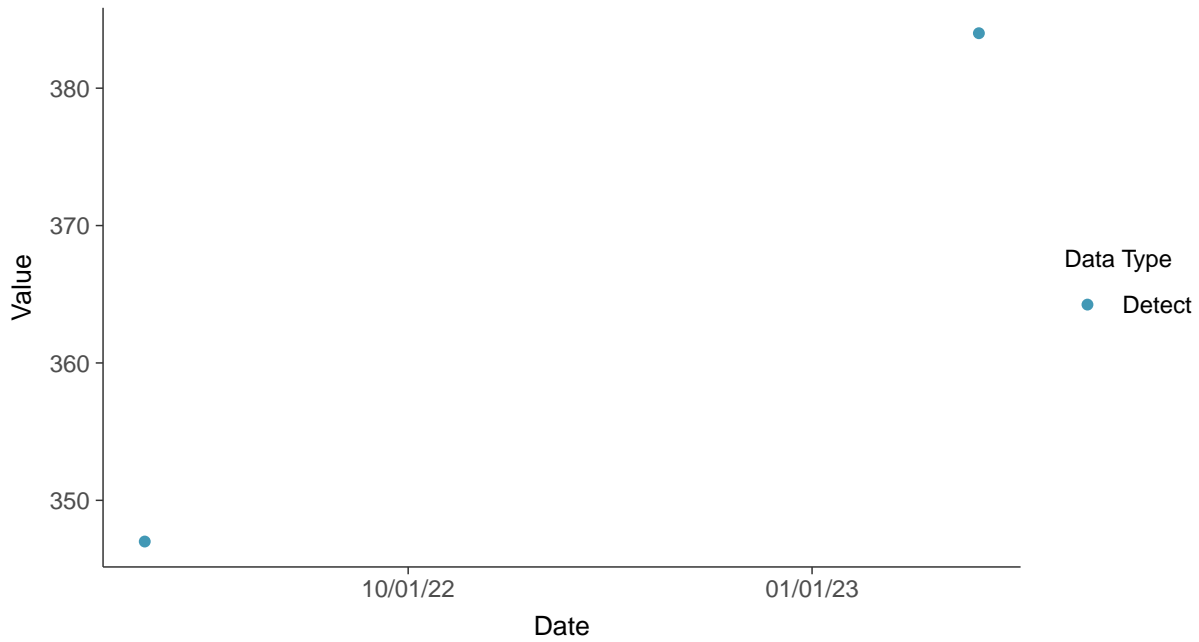


Other: Hardness, MW-8

ID: 08_3_17

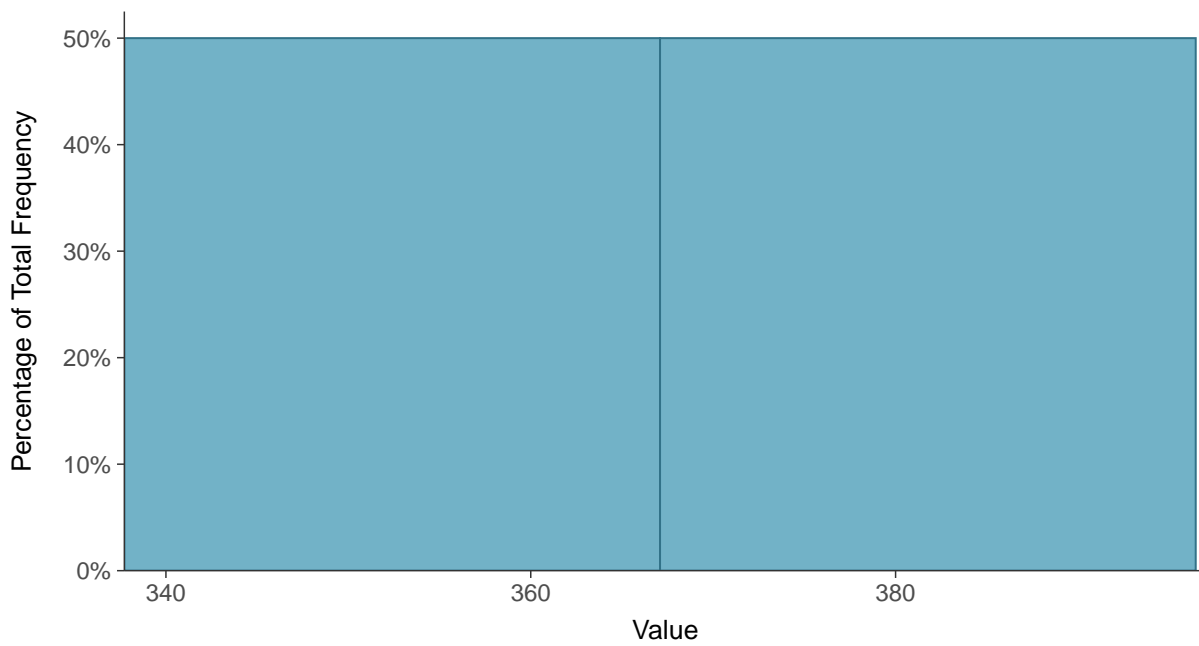
Scatter Plot

Hardness, MW-8 (mg/L)



Histogram

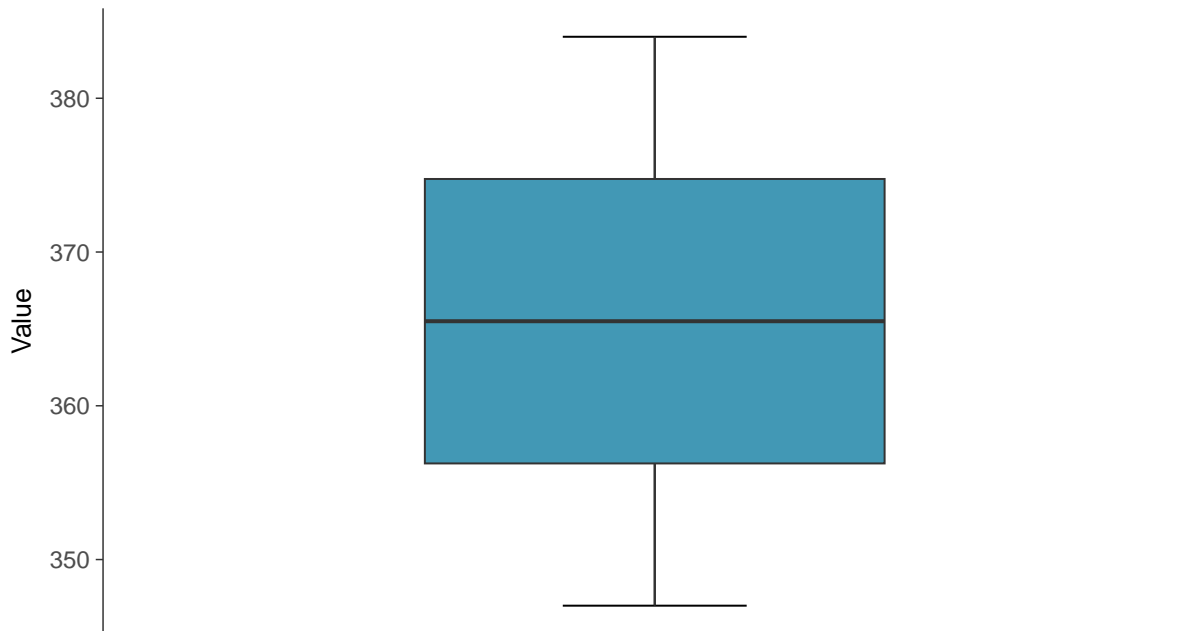
Hardness, MW-8 (mg/L)





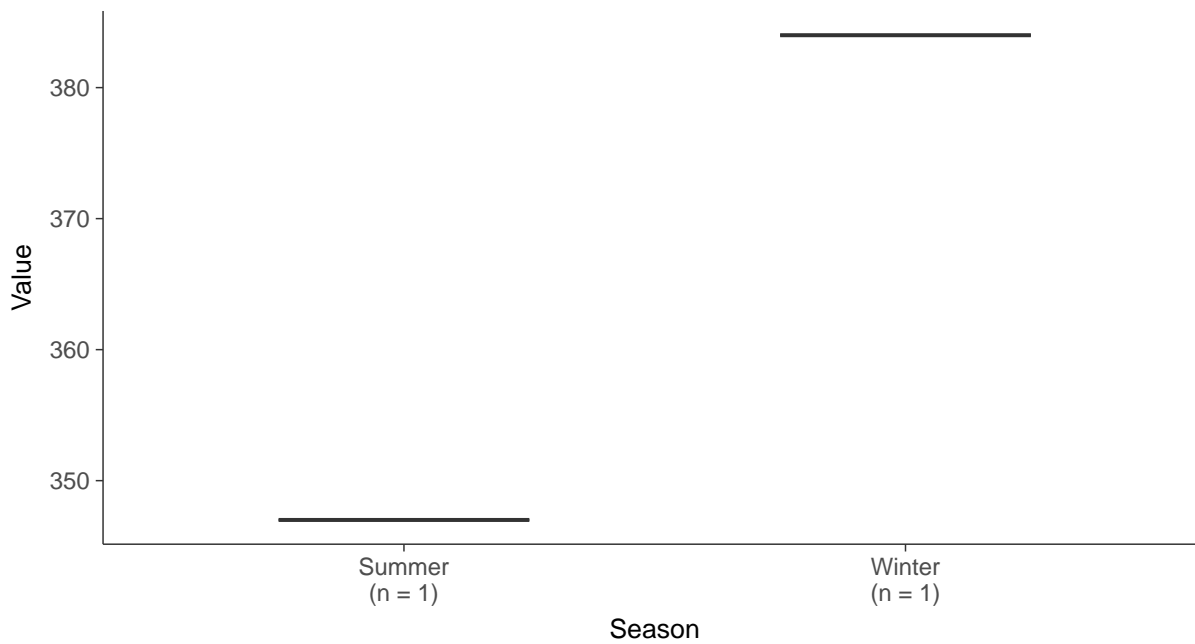
Boxplot

Hardness, MW-8 (mg/L)



Boxplot by Season

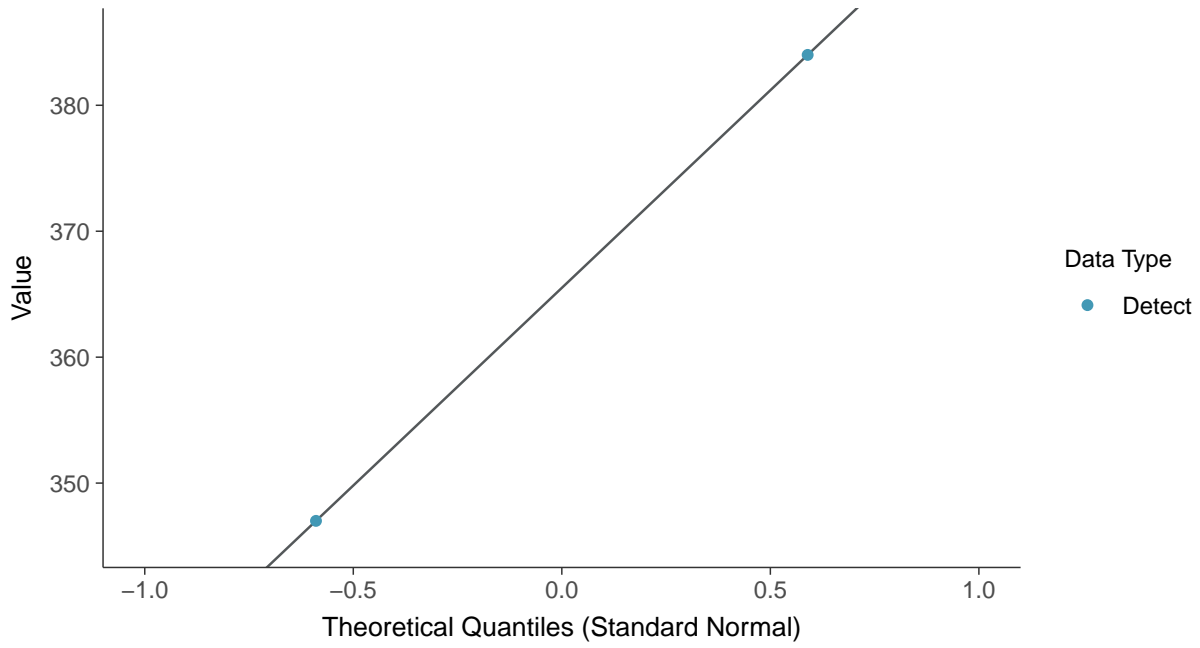
Hardness, MW-8 (mg/L)





Normal Q-Q plot

Hardness, MW-8 (mg/L)



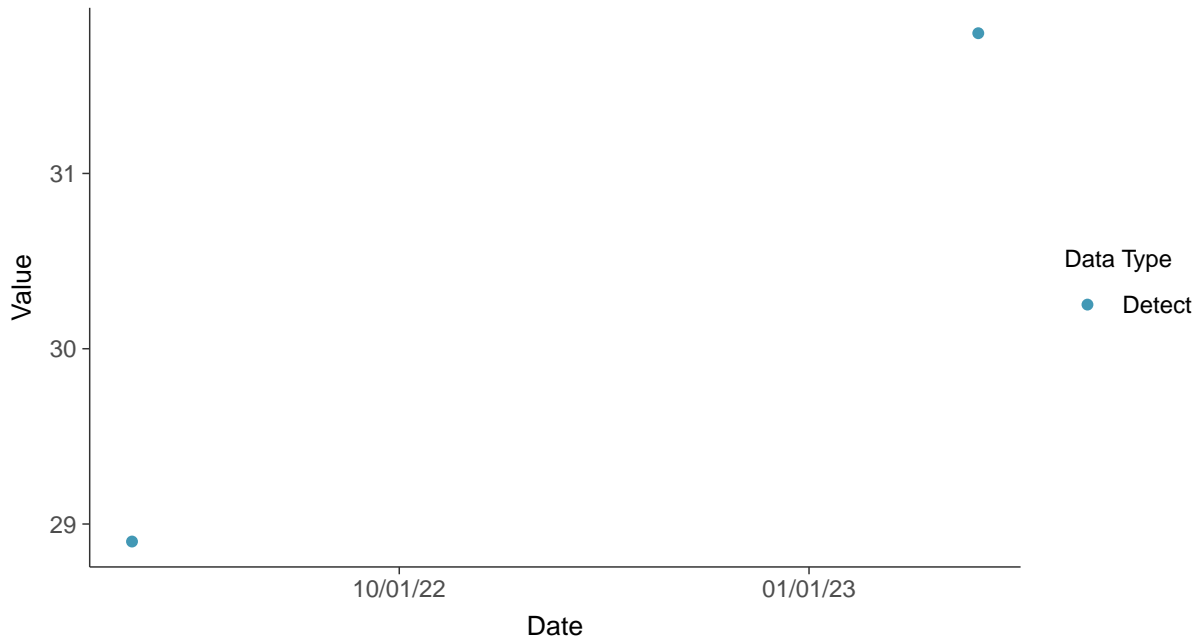


Other: Magnesium, MW-8

ID: 08_3_20

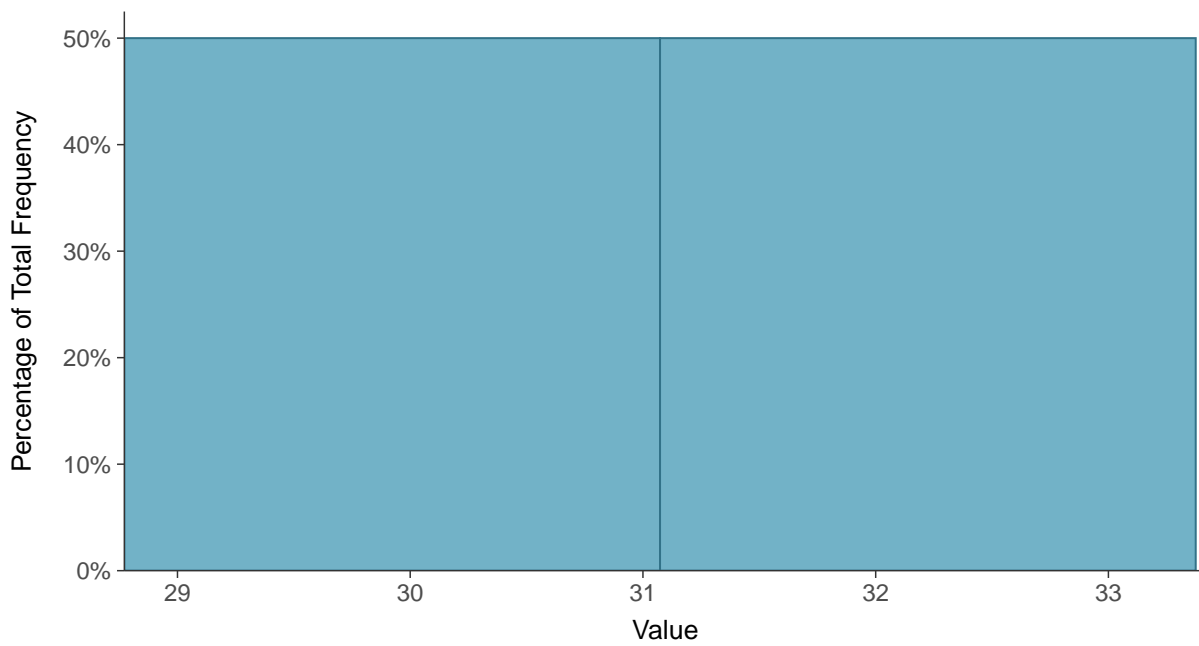
Scatter Plot

Magnesium, MW-8 (mg/L)



Histogram

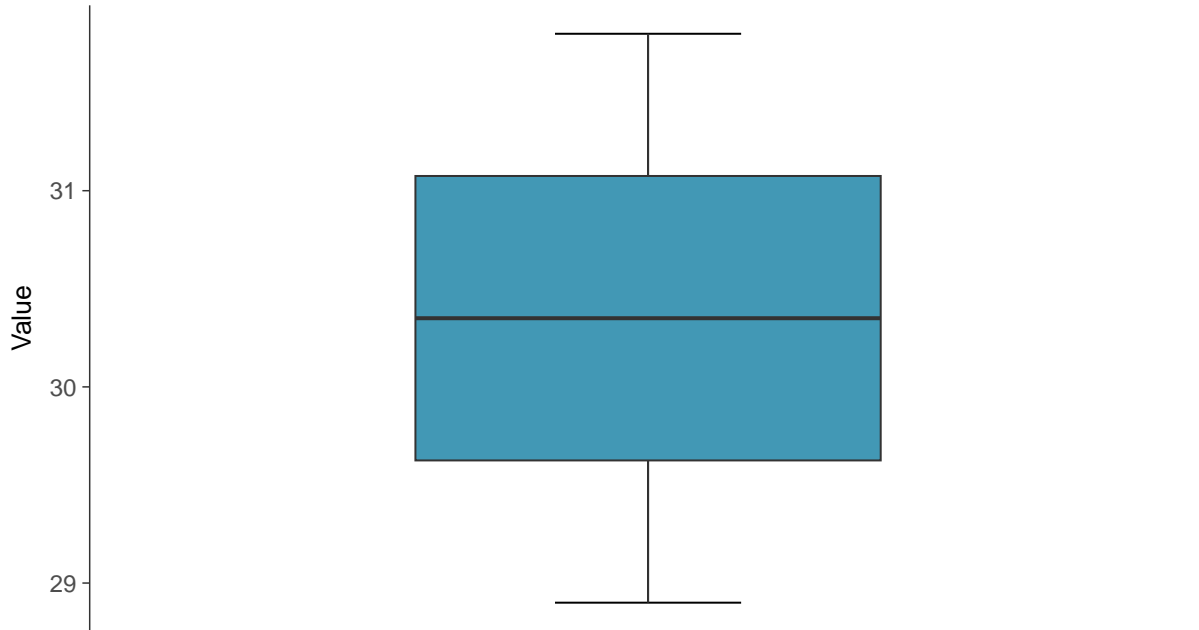
Magnesium, MW-8 (mg/L)





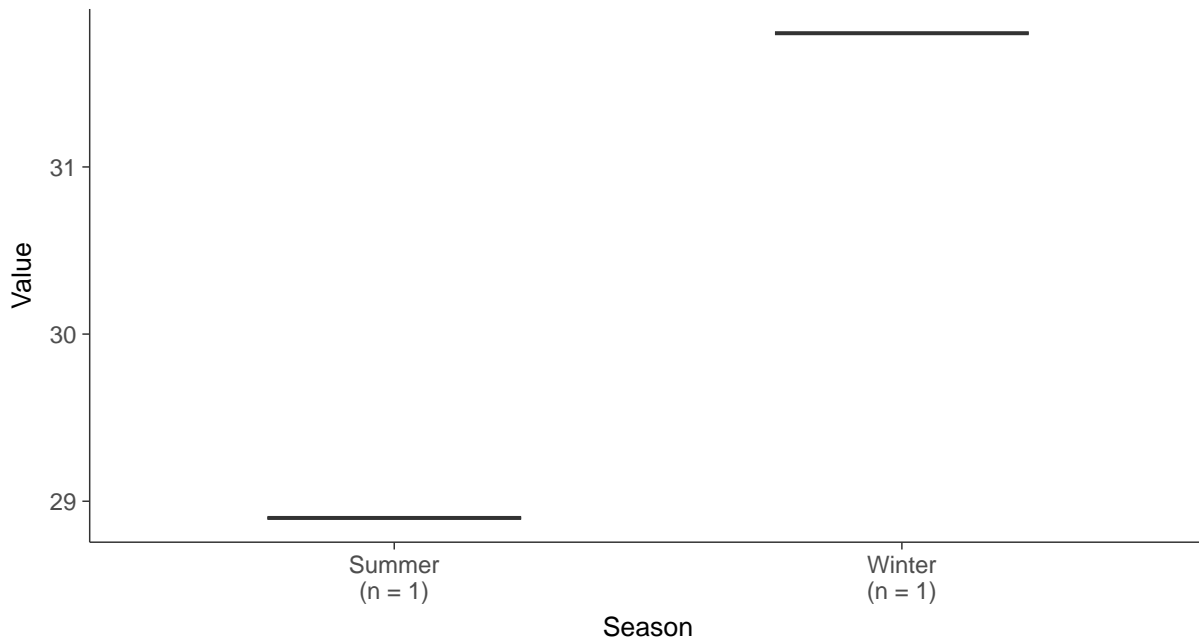
Boxplot

Magnesium, MW-8 (mg/L)



Boxplot by Season

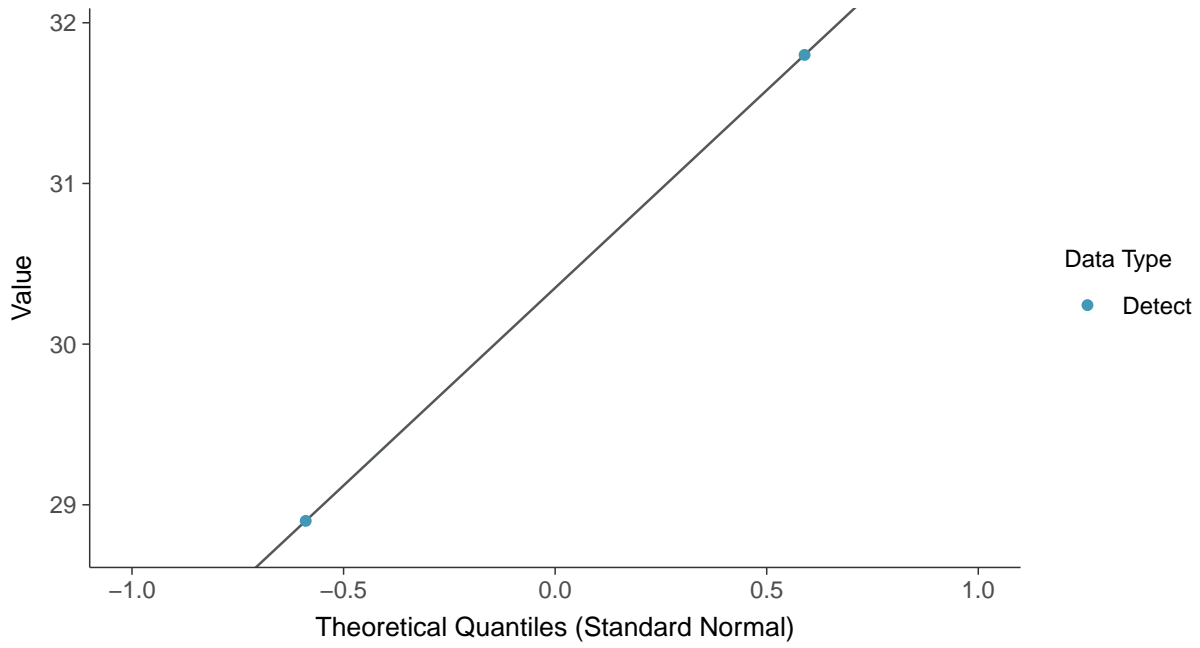
Magnesium, MW-8 (mg/L)





Normal Q-Q plot

Magnesium, MW-8 (mg/L)



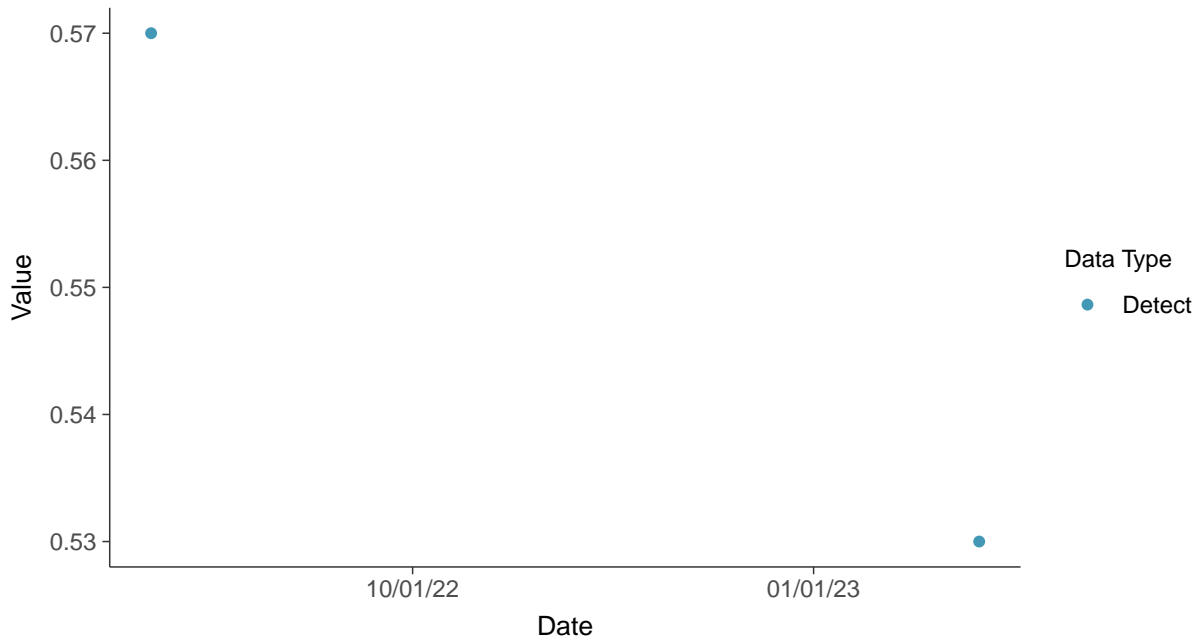


Other: Potassium, MW-8

ID: 08_3_23

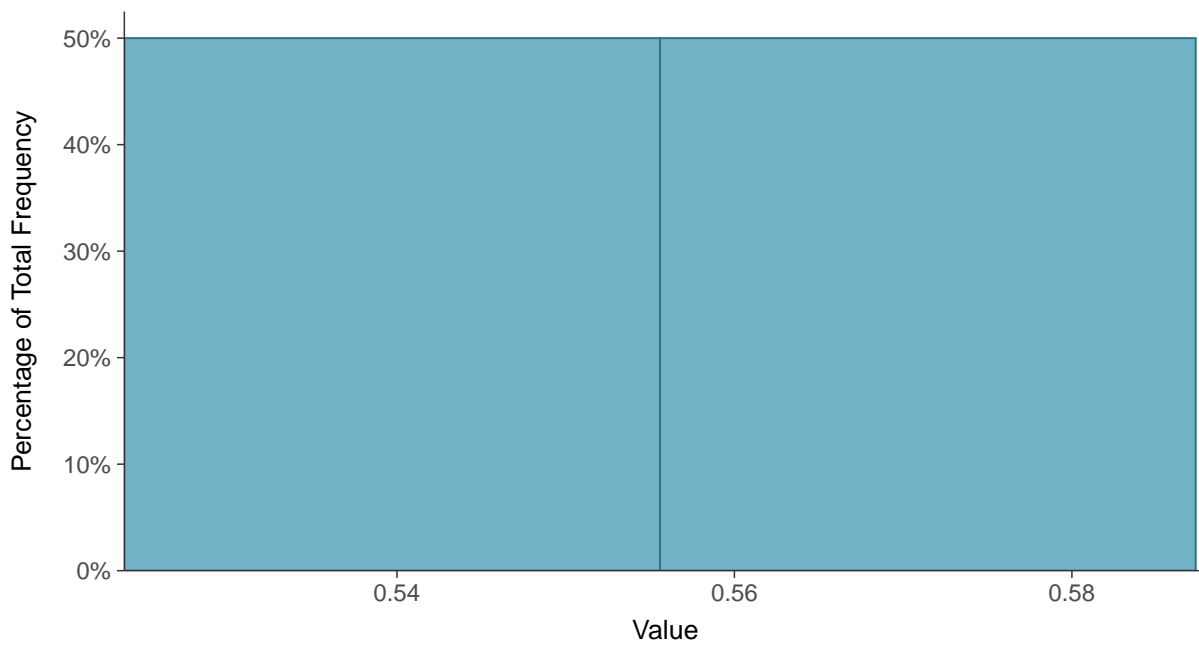
Scatter Plot

Potassium, MW-8 (mg/L)



Histogram

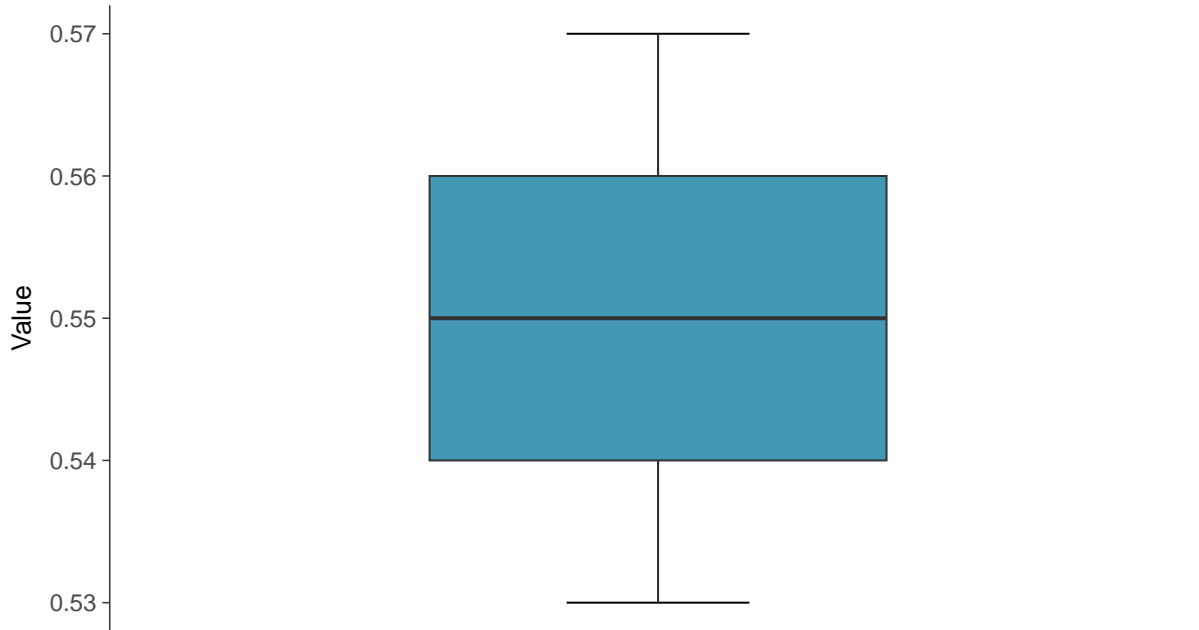
Potassium, MW-8 (mg/L)





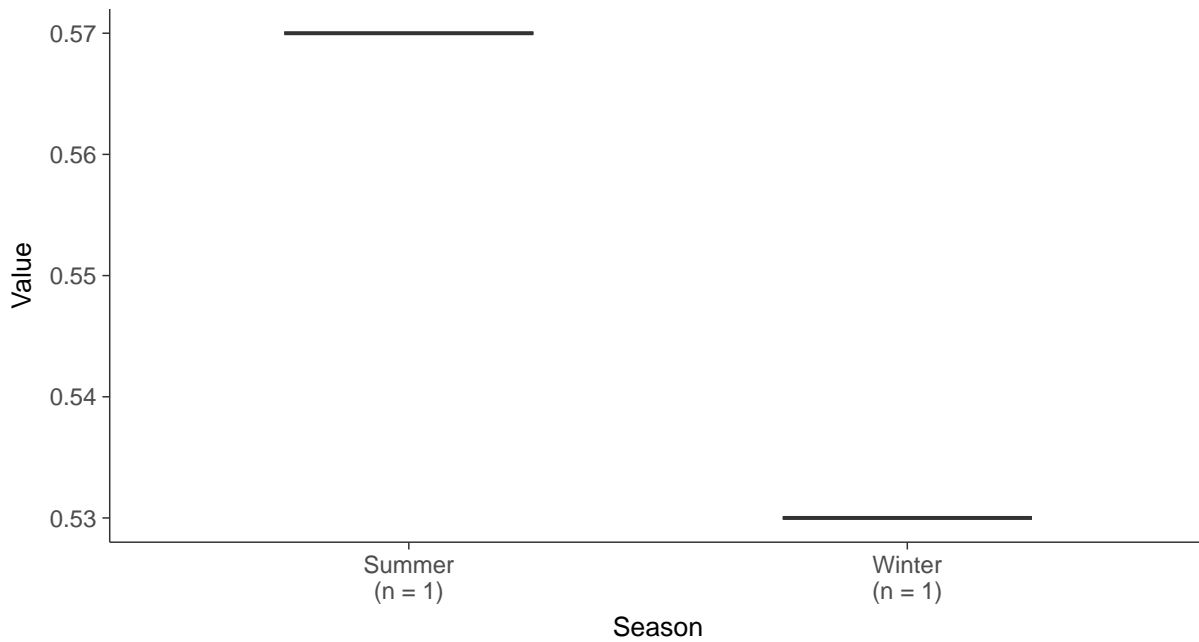
Boxplot

Potassium, MW-8 (mg/L)



Boxplot by Season

Potassium, MW-8 (mg/L)

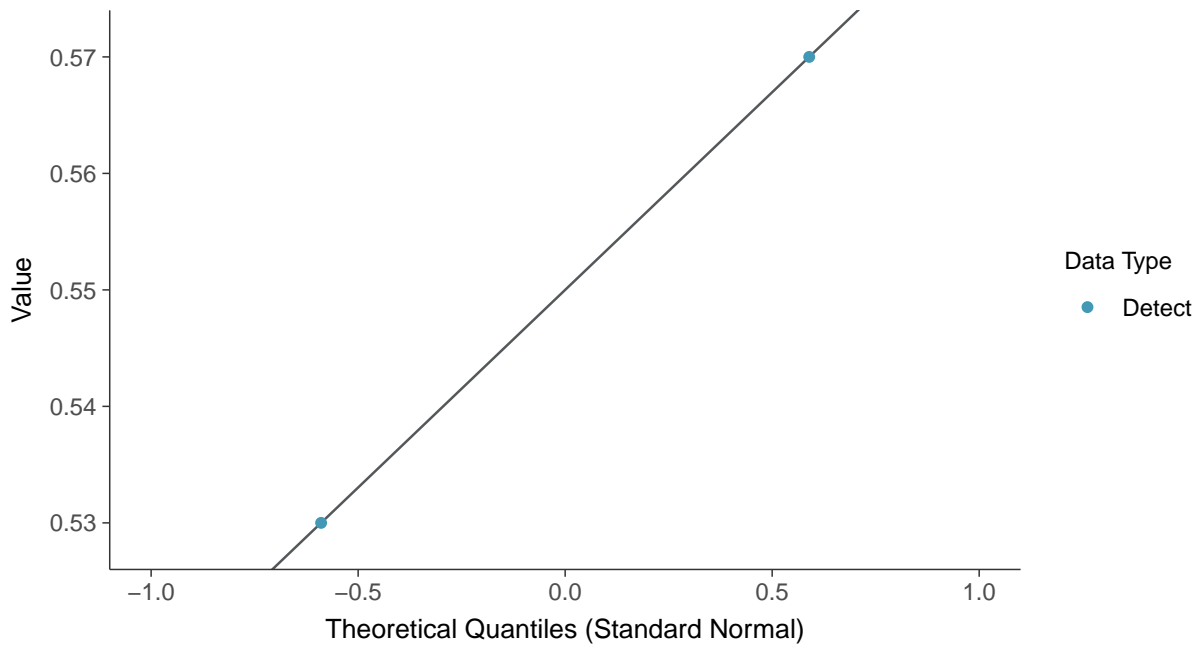




Downgradient Wells MW-2, MW-3, MW-5, MW-6, MW-7, MW-7B, MW-8, MW-9, MW-10, MW-13, MW-14, MW-15

Normal Q-Q plot

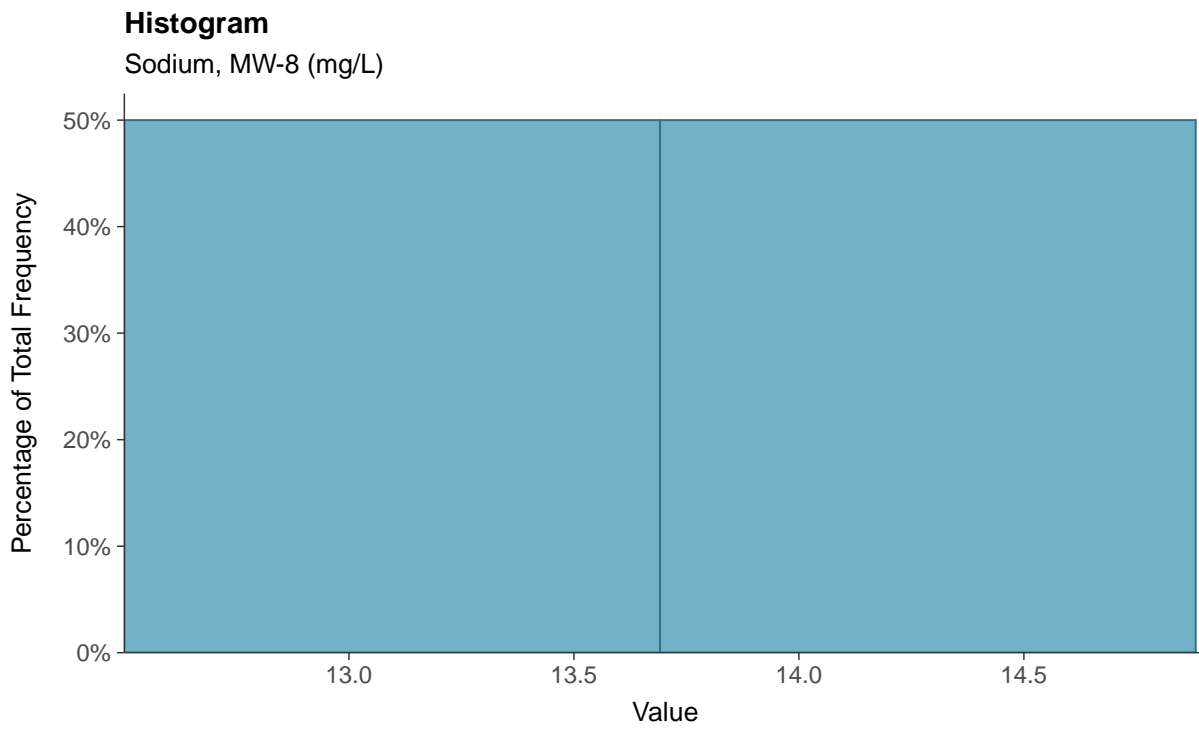
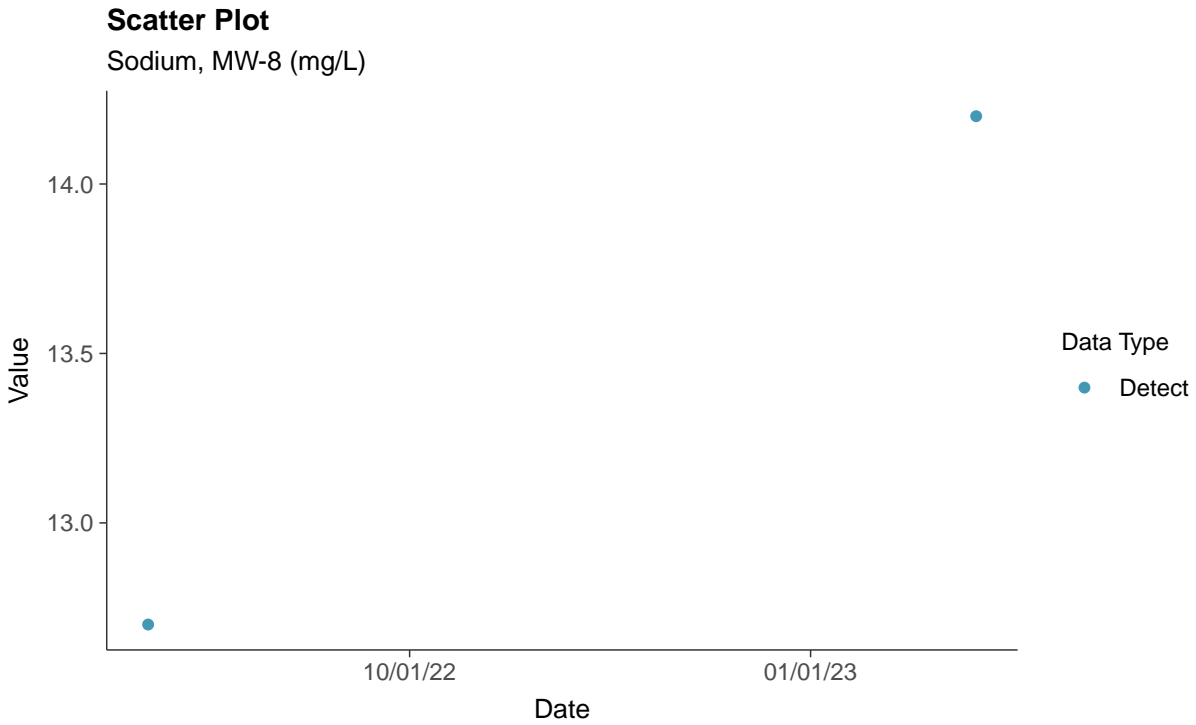
Potassium, MW-8 (mg/L)





Other: Sodium, MW-8

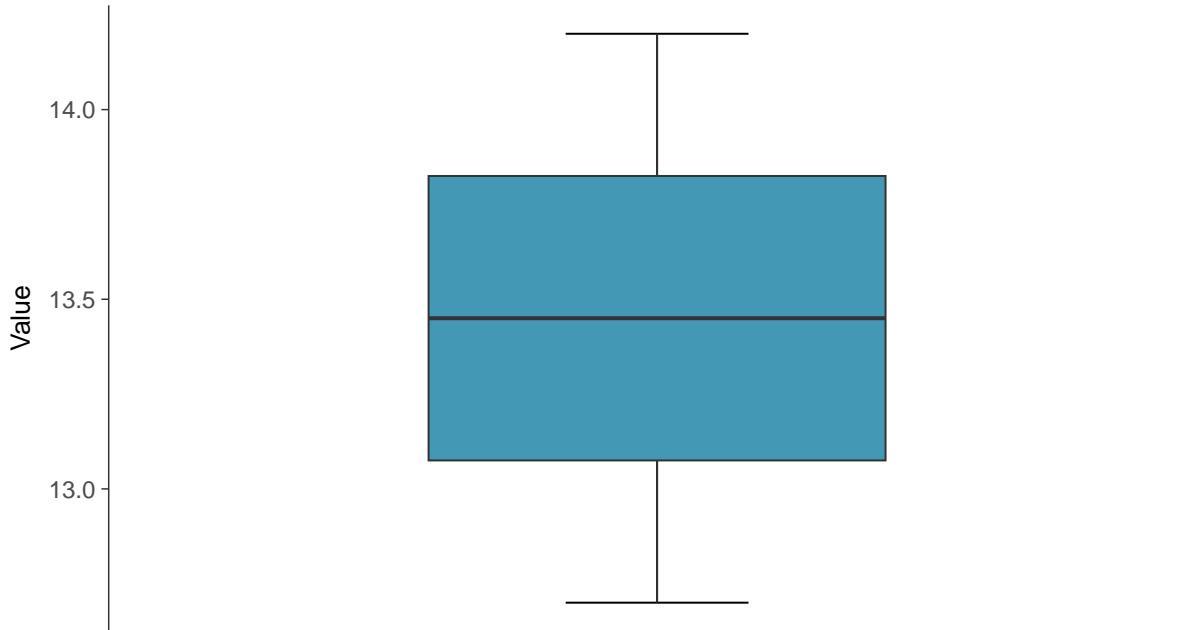
ID: 08_3_28





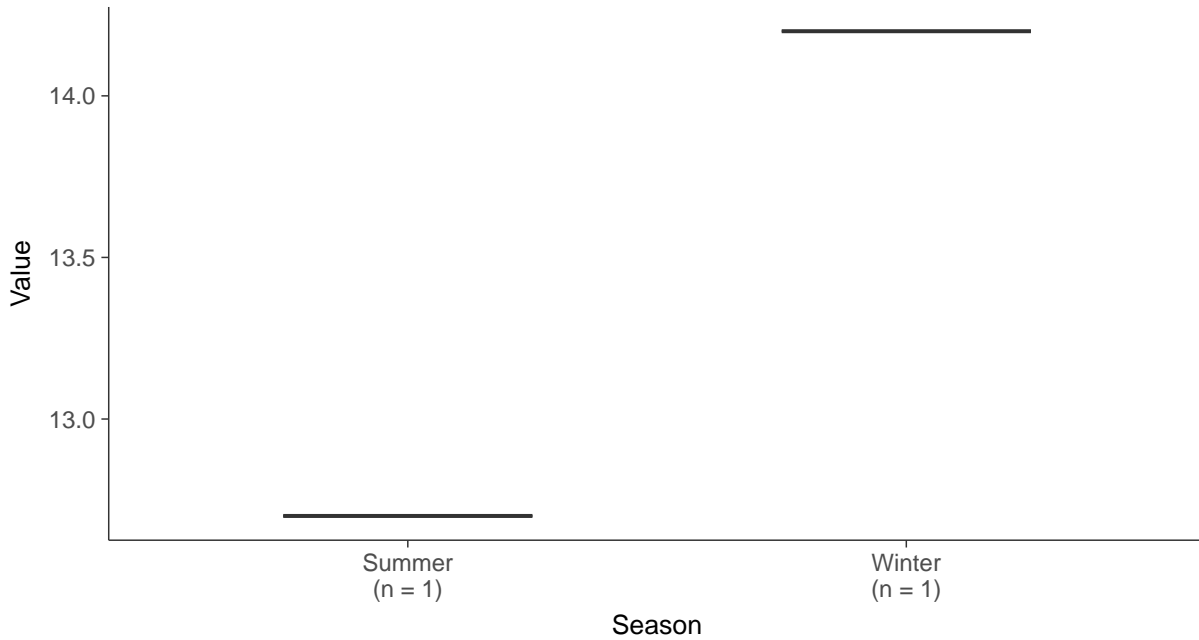
Boxplot

Sodium, MW-8 (mg/L)



Boxplot by Season

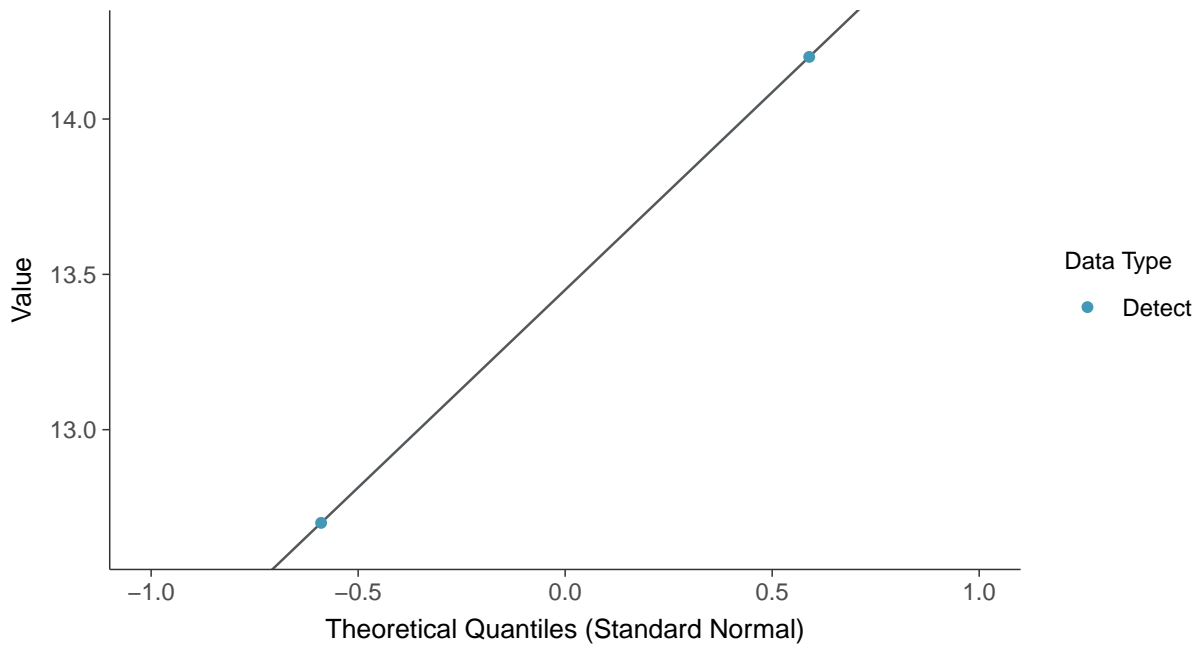
Sodium, MW-8 (mg/L)





Normal Q-Q plot

Sodium, MW-8 (mg/L)



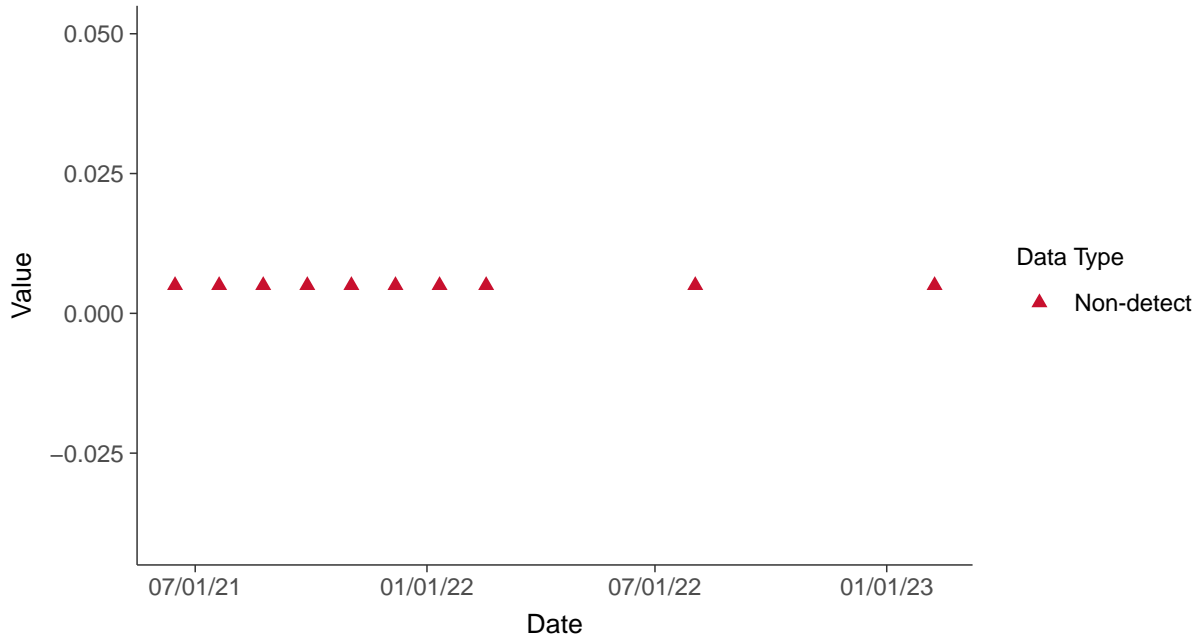


Part 115: Copper, MW-8

ID: 08_5_37

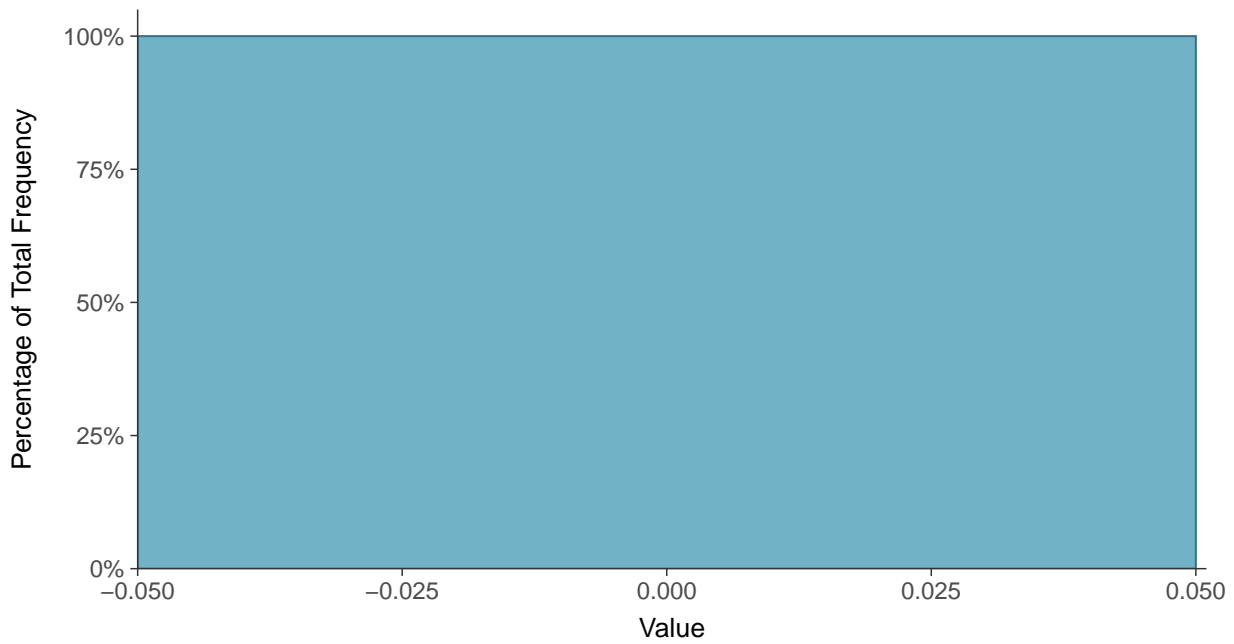
Scatter Plot

Copper, MW-8 (mg/L)



Histogram

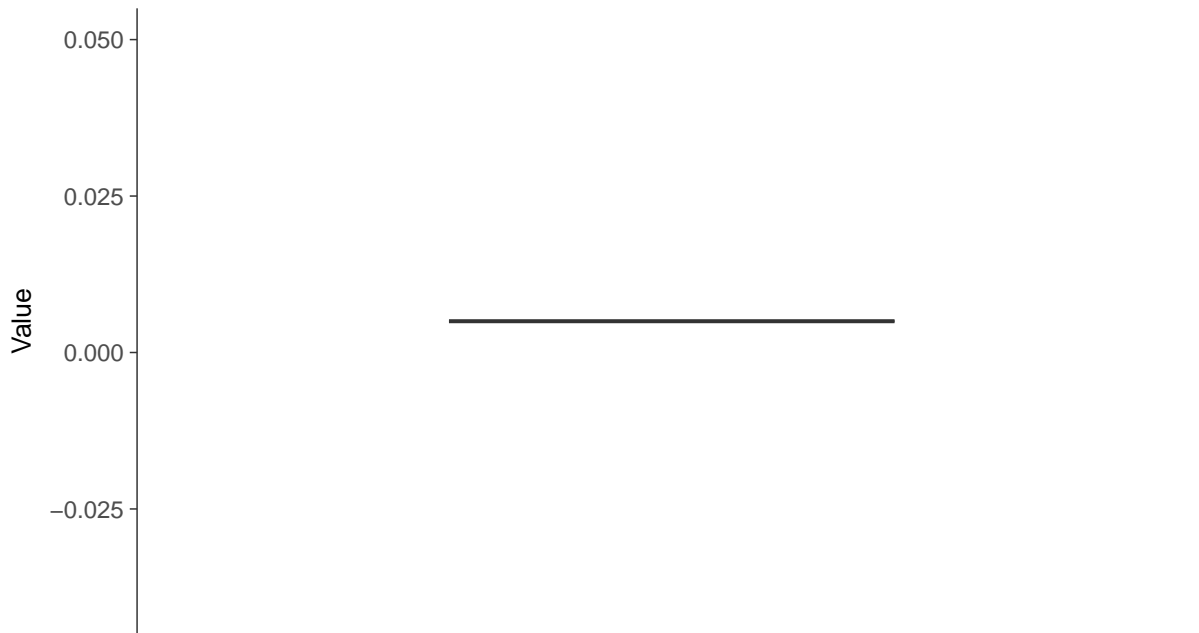
Copper, MW-8 (mg/L)





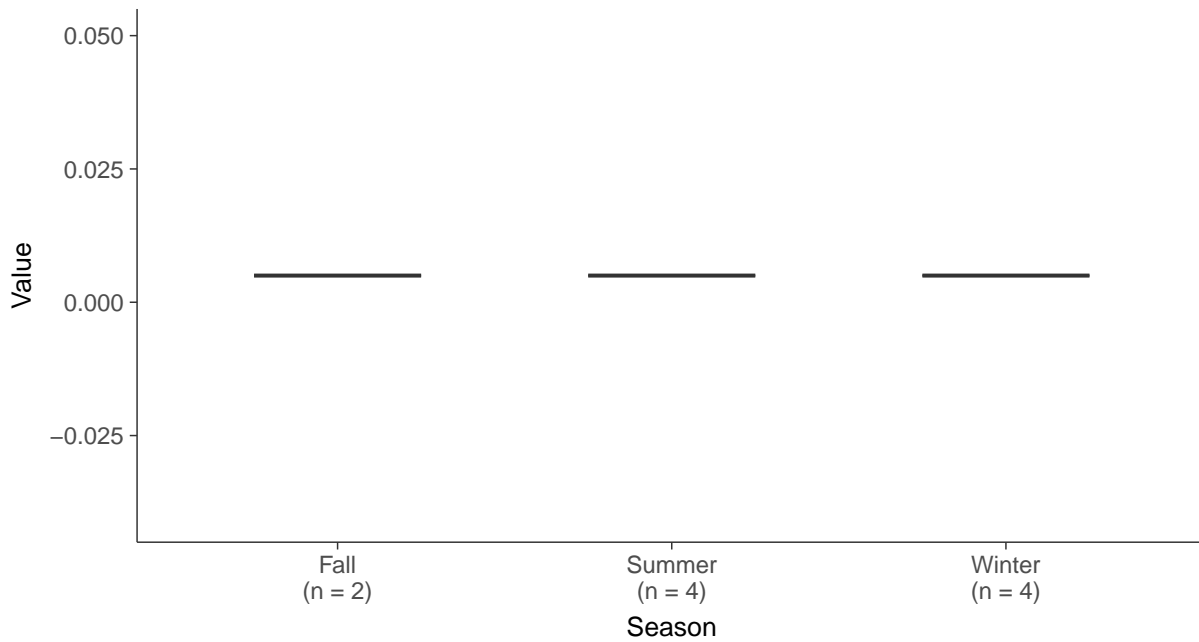
Boxplot

Copper, MW-8 (mg/L)



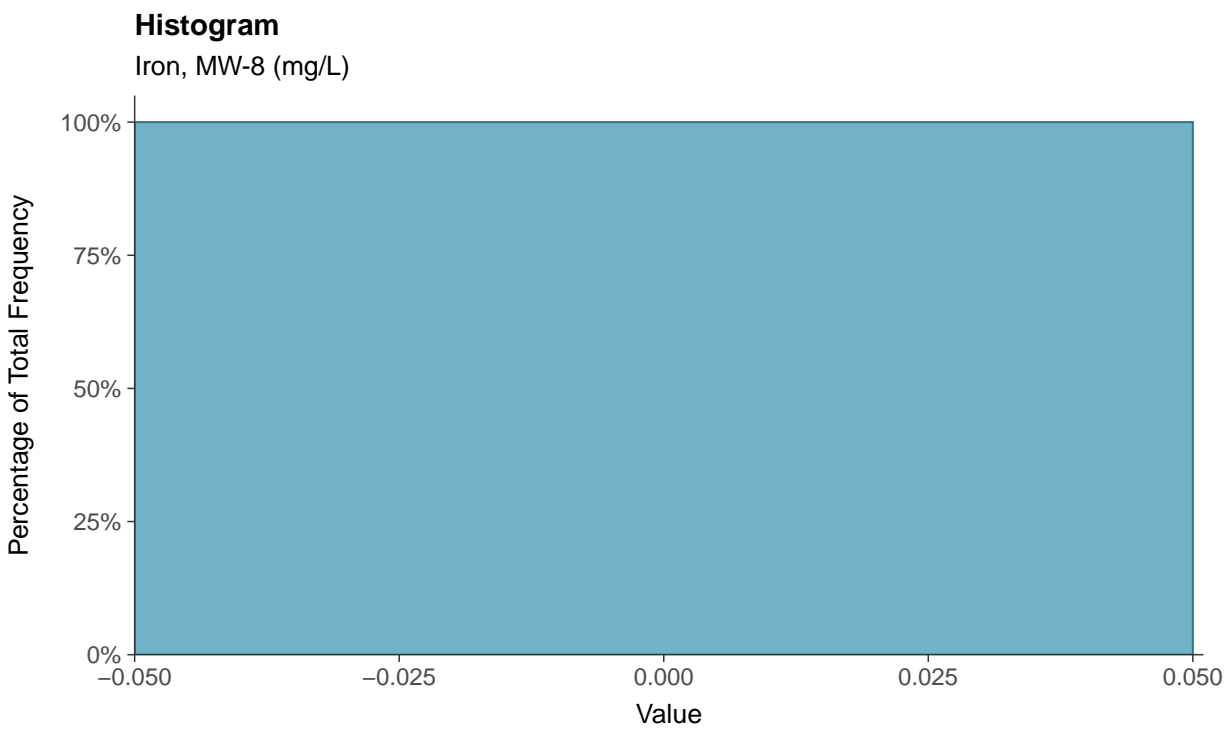
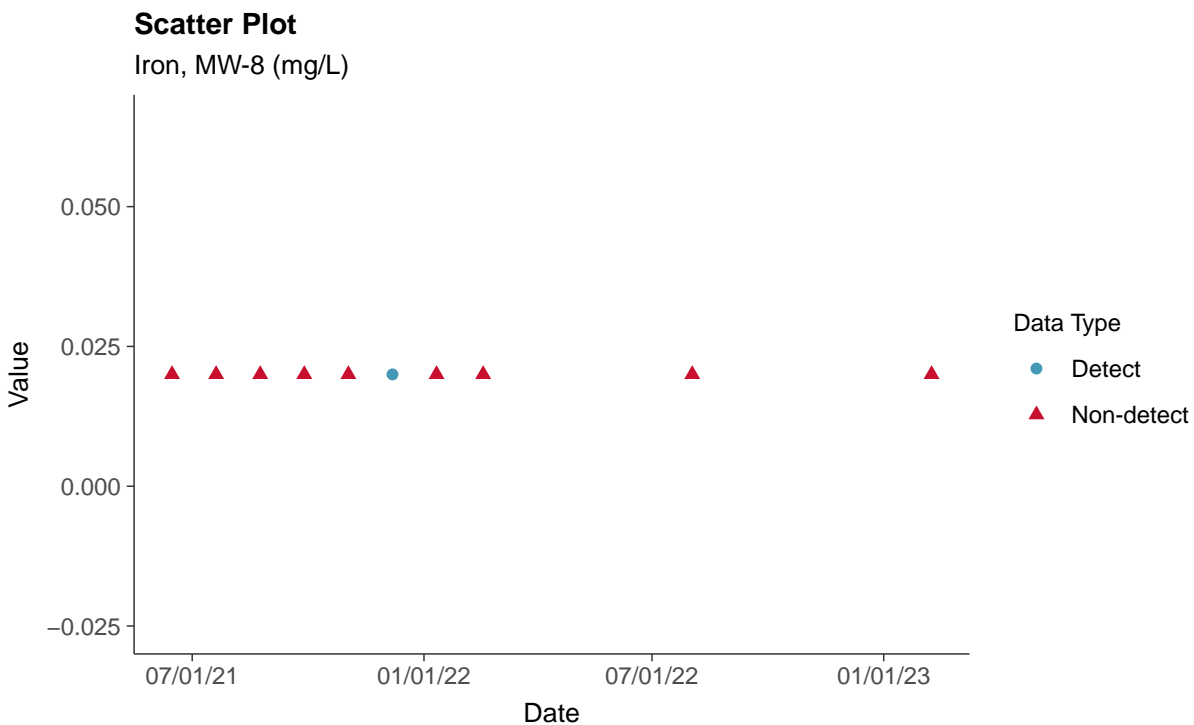
Boxplot by Season

Copper, MW-8 (mg/L)



Part 115: Iron, MW-8

ID: 08_5_38





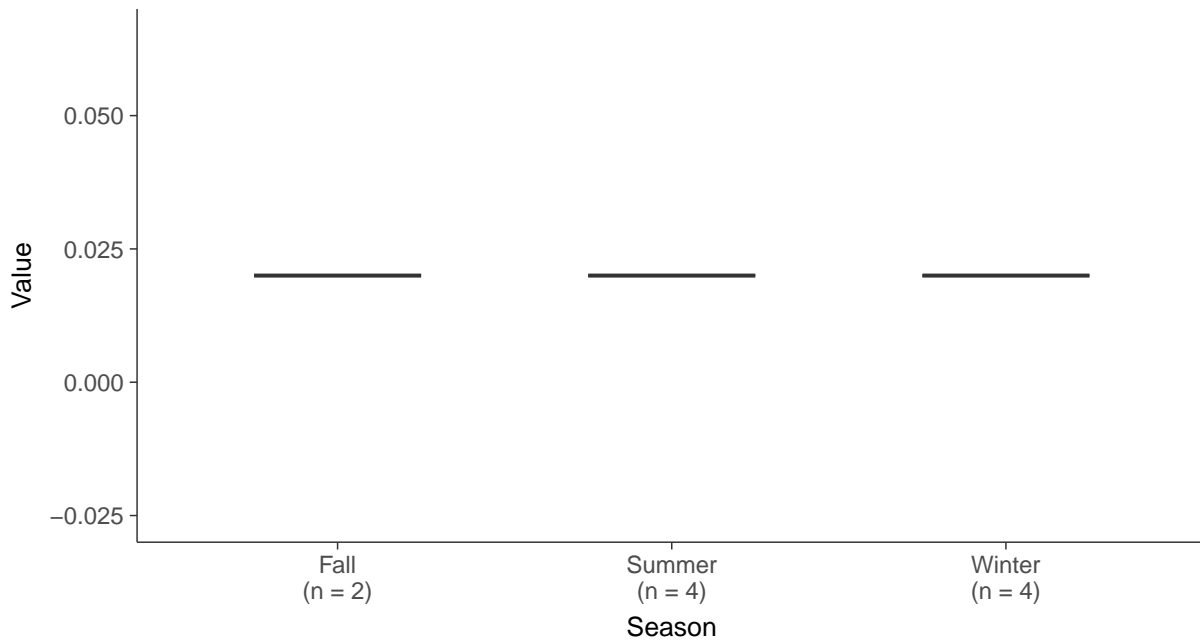
Boxplot

Iron, MW-8 (mg/L)



Boxplot by Season

Iron, MW-8 (mg/L)



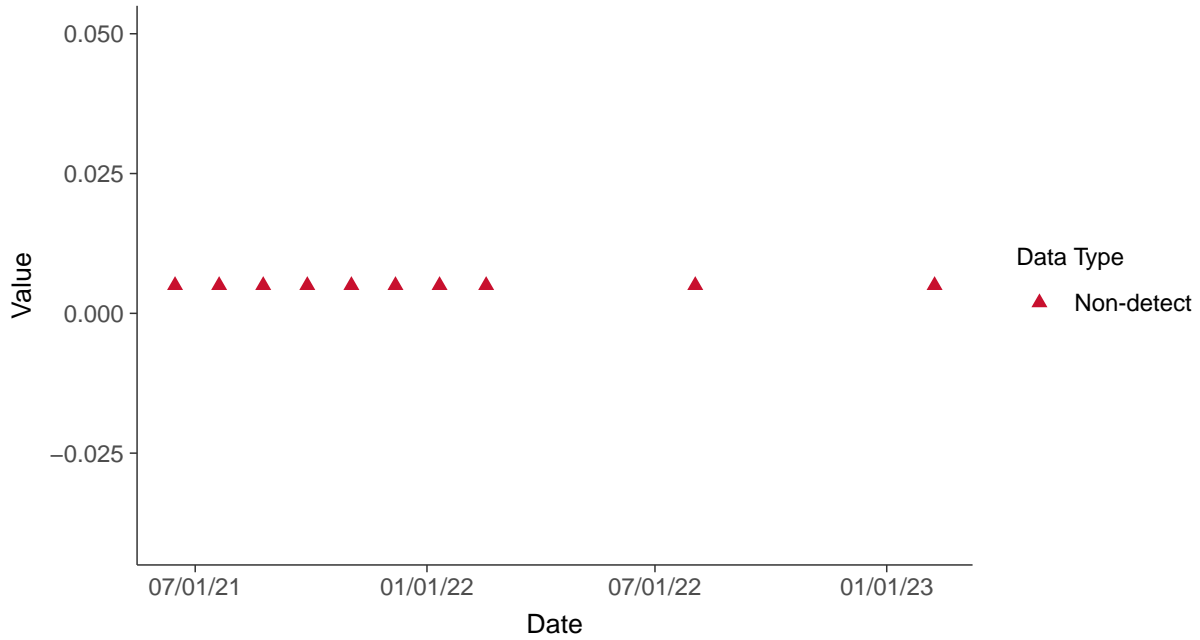


Part 115: Nickel, MW-8

ID: 08_5_39

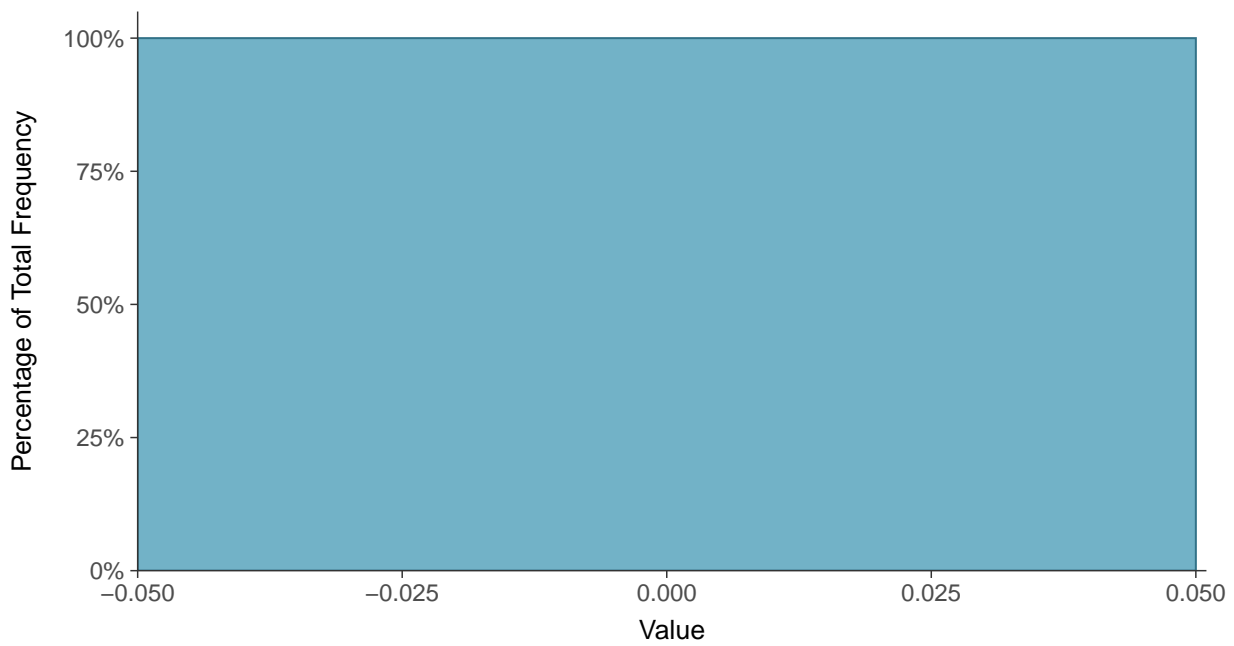
Scatter Plot

Nickel, MW-8 (mg/L)



Histogram

Nickel, MW-8 (mg/L)





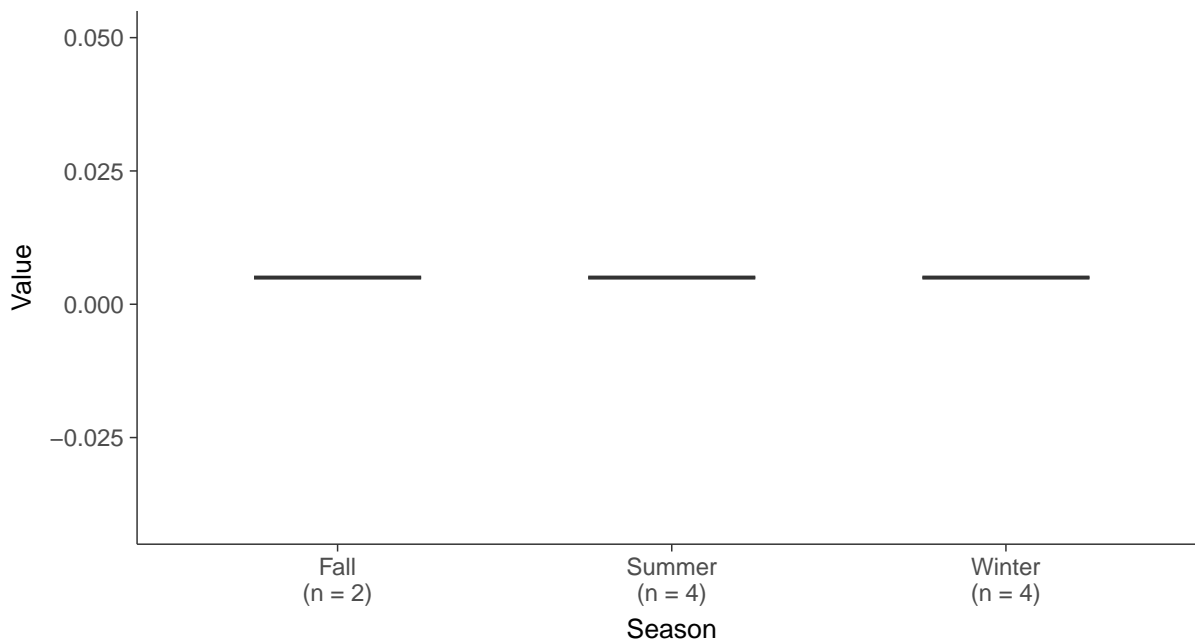
Boxplot

Nickel, MW-8 (mg/L)



Boxplot by Season

Nickel, MW-8 (mg/L)



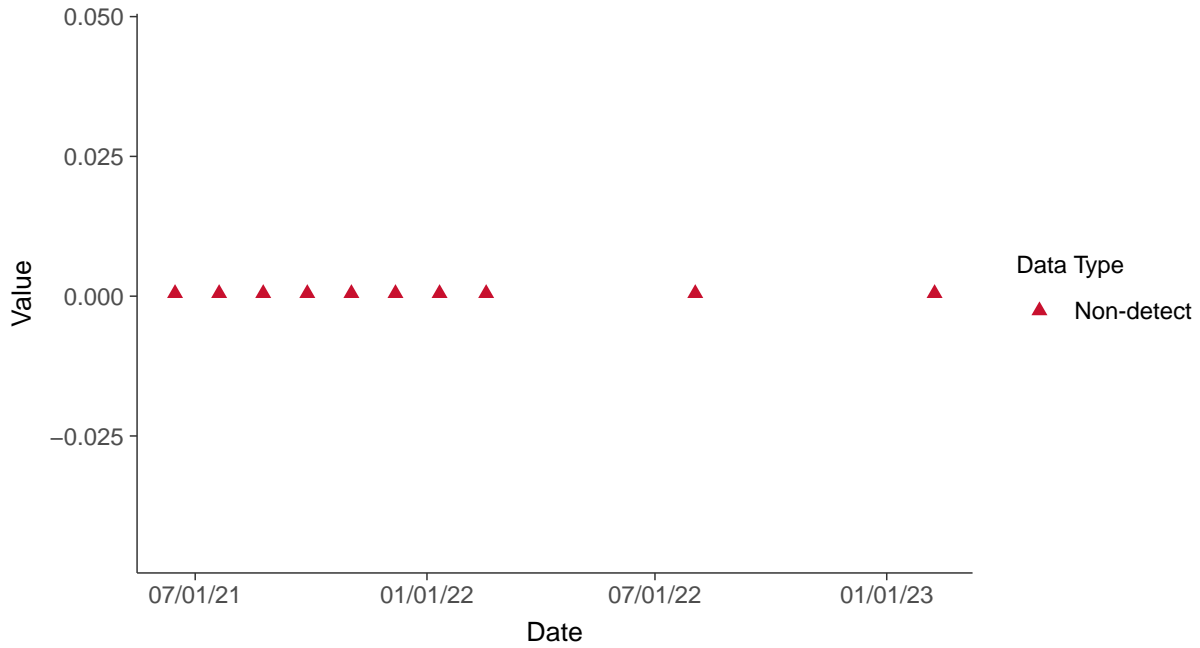


Part 115: Silver, MW-8

ID: 08_5_40

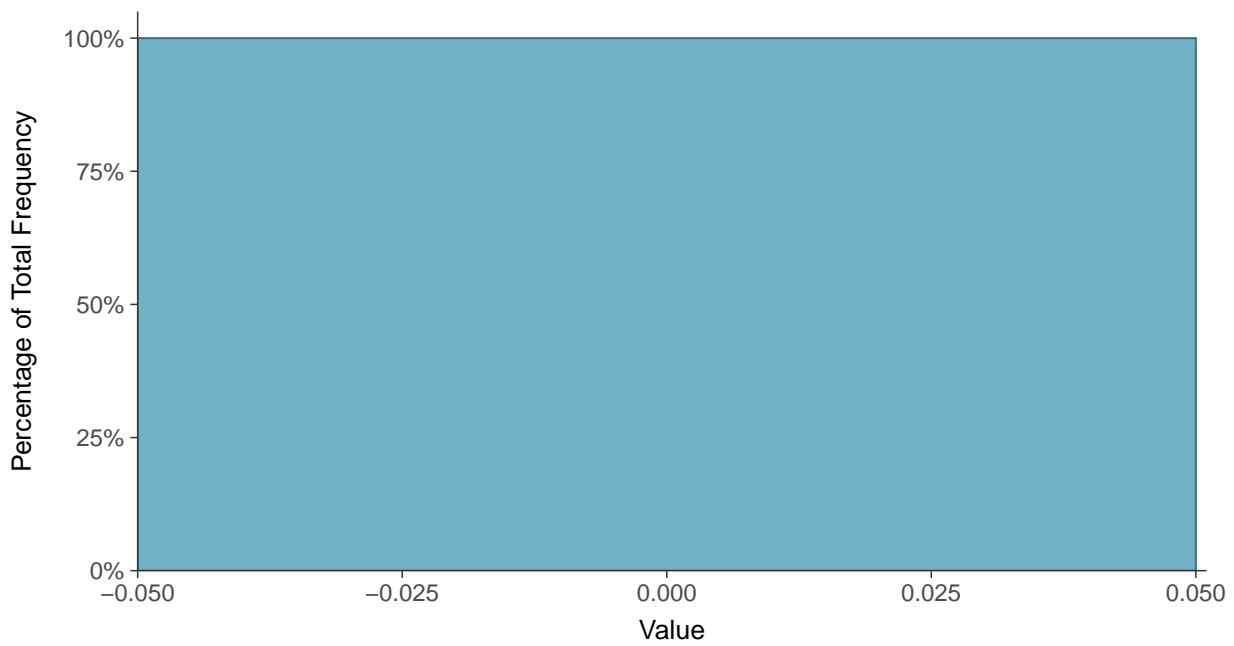
Scatter Plot

Silver, MW-8 (mg/L)



Histogram

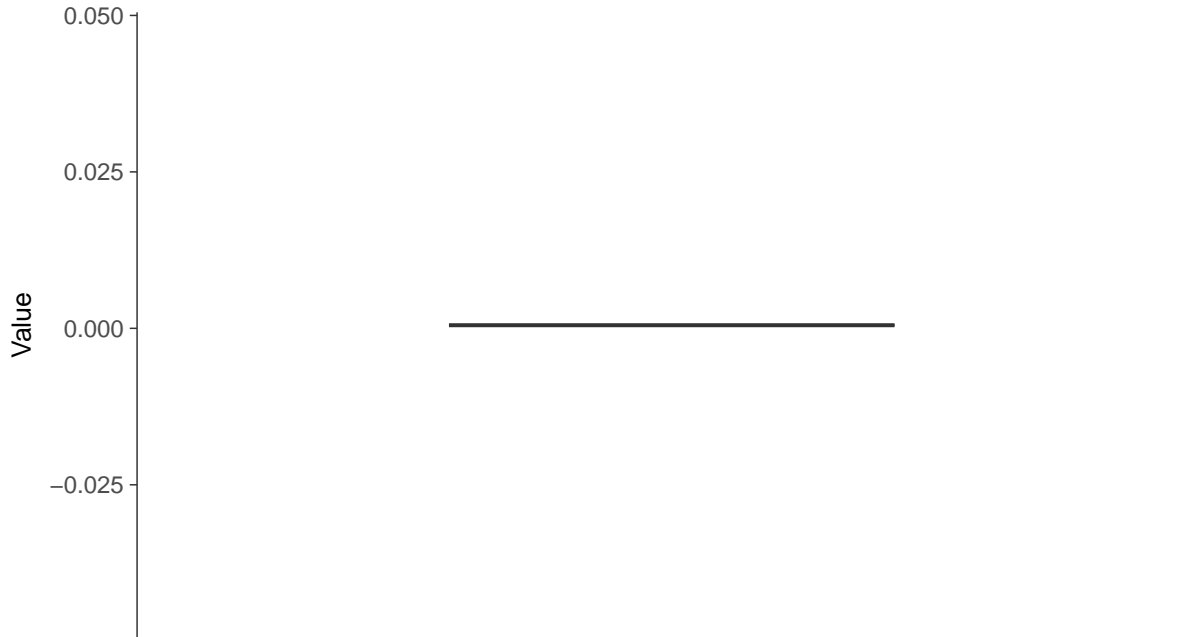
Silver, MW-8 (mg/L)





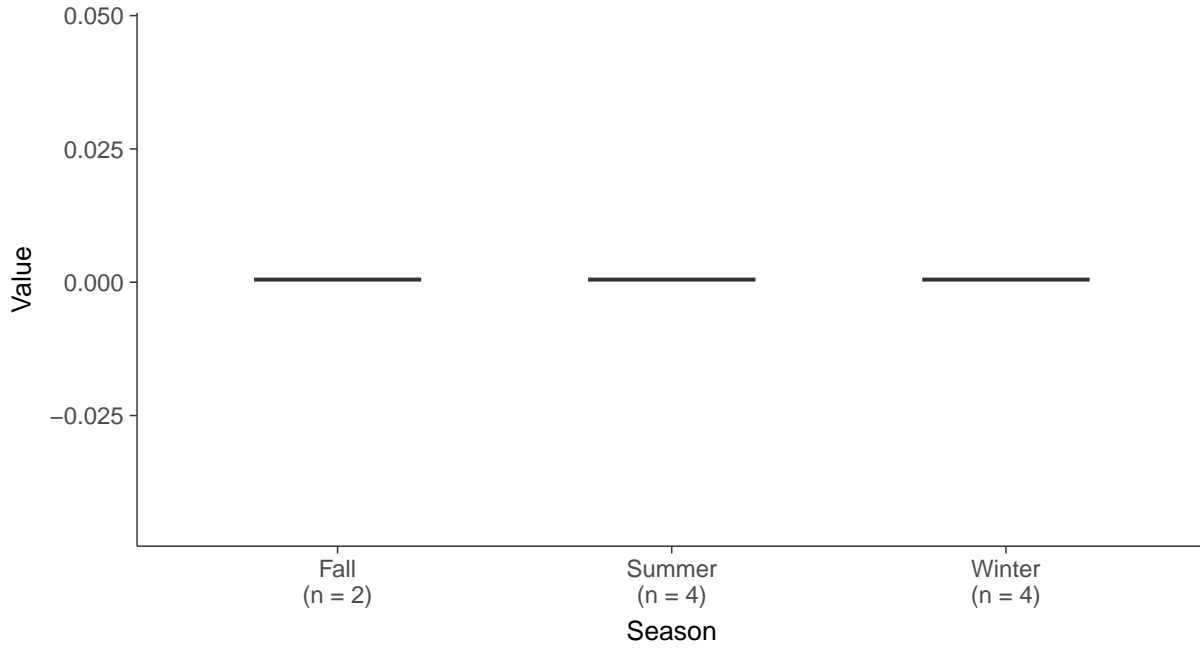
Boxplot

Silver, MW-8 (mg/L)



Boxplot by Season

Silver, MW-8 (mg/L)



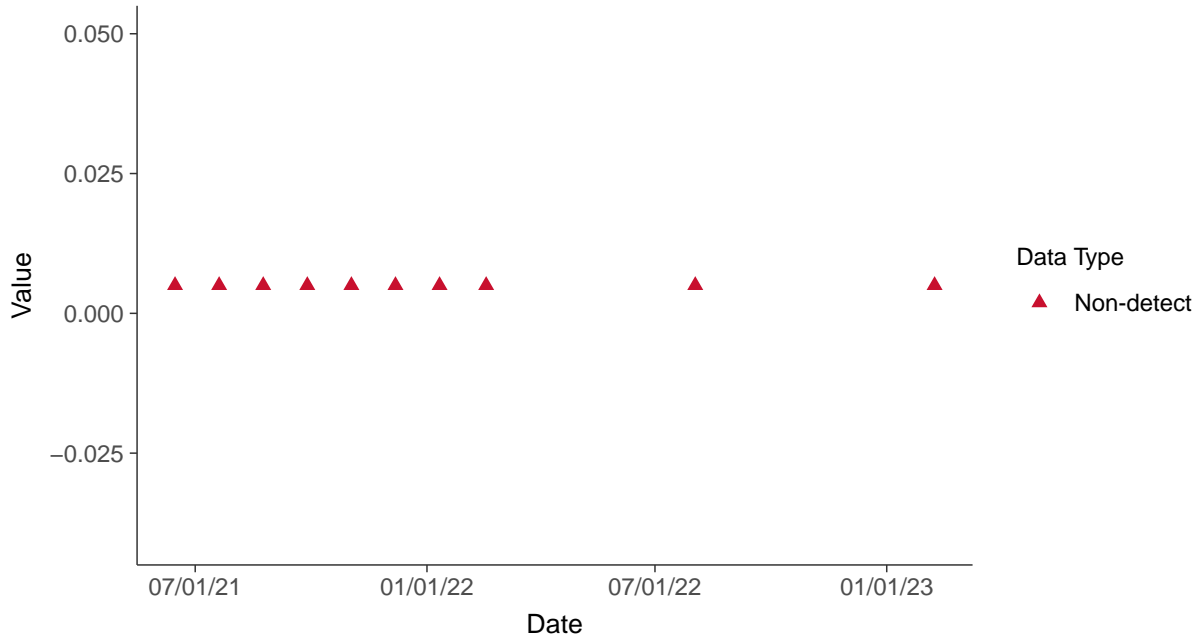


Part 115: Vanadium, MW-8

ID: 08_5_41

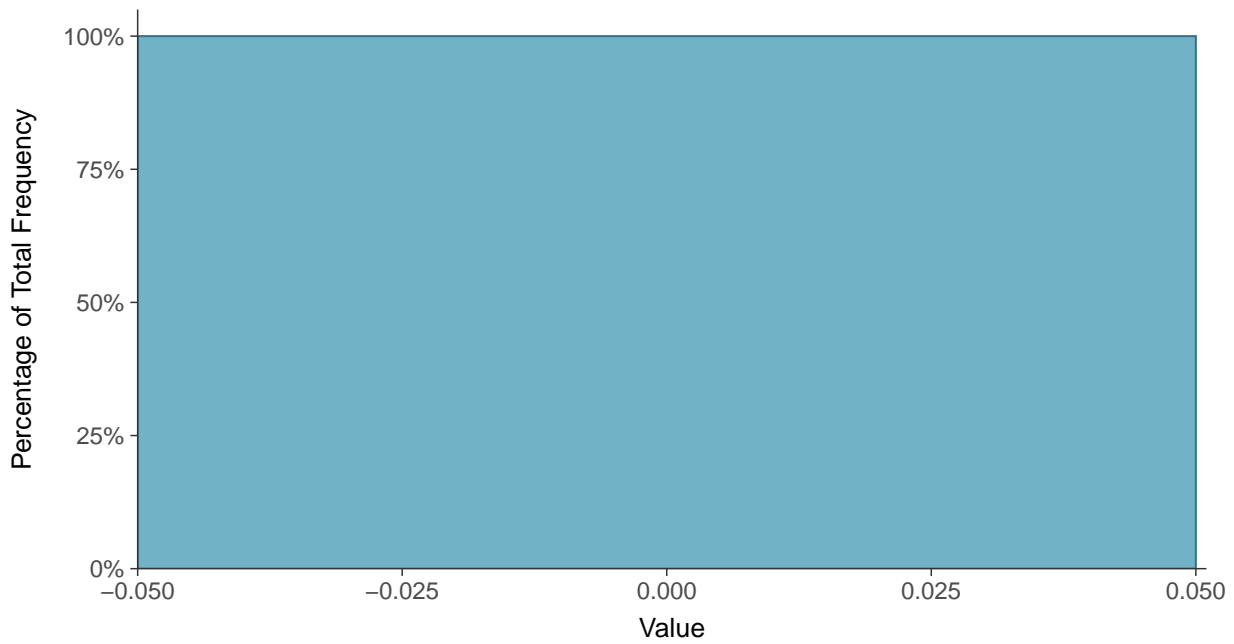
Scatter Plot

Vanadium, MW-8 (mg/L)



Histogram

Vanadium, MW-8 (mg/L)





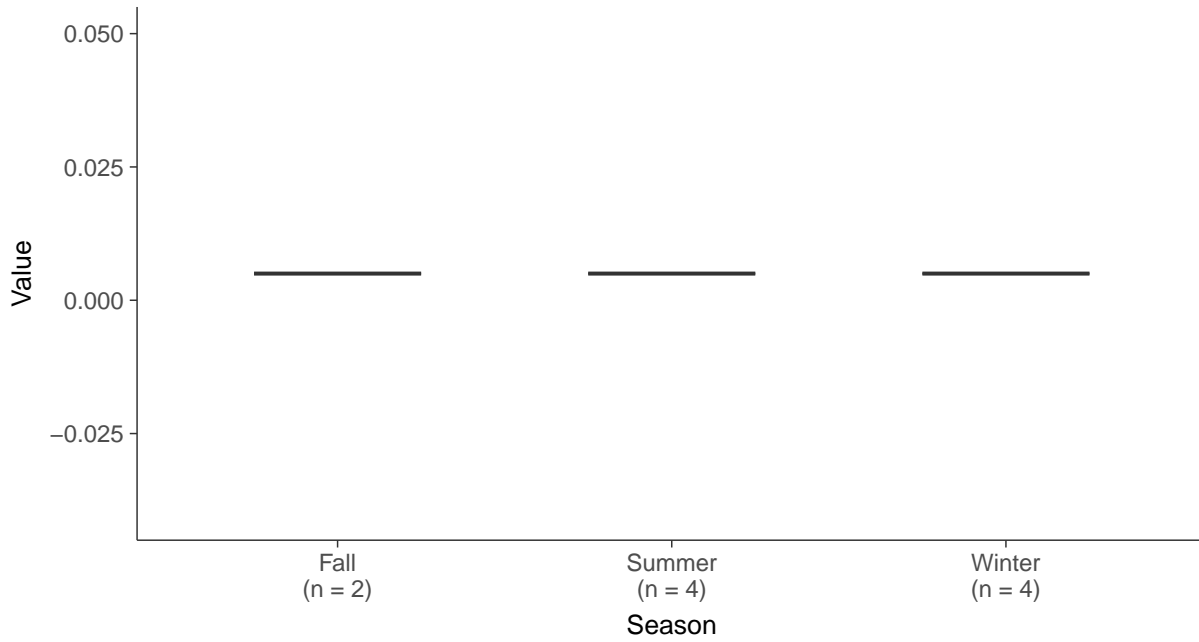
Boxplot

Vanadium, MW-8 (mg/L)



Boxplot by Season

Vanadium, MW-8 (mg/L)



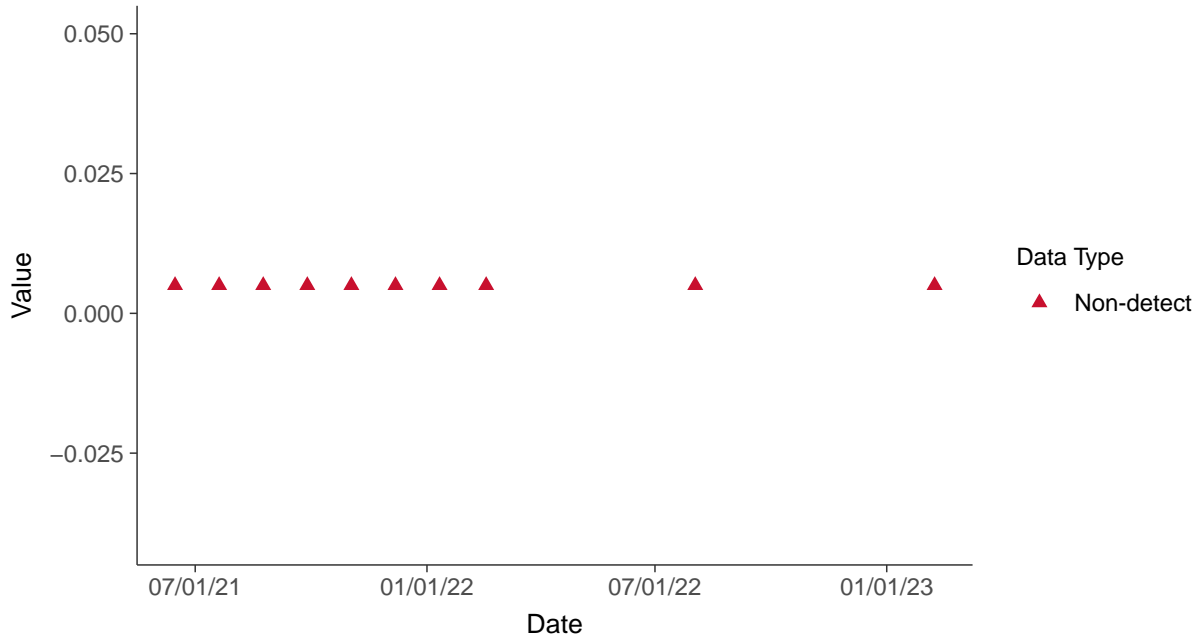


Part 115: Zinc, MW-8

ID: 08_5_42

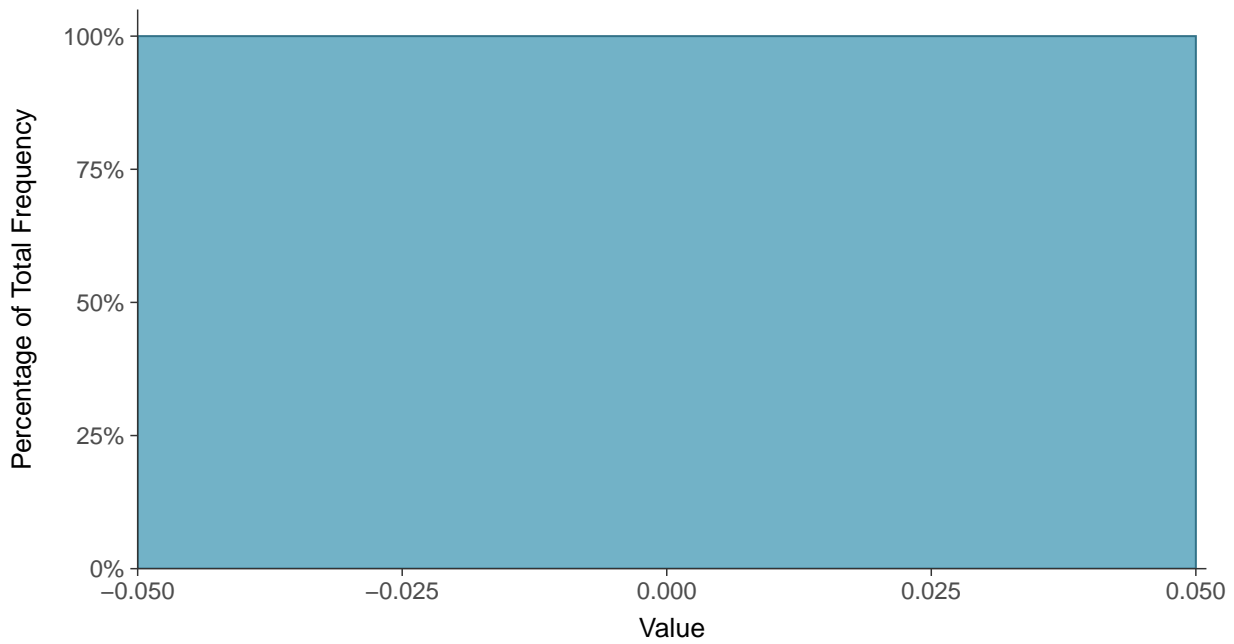
Scatter Plot

Zinc, MW-8 (mg/L)



Histogram

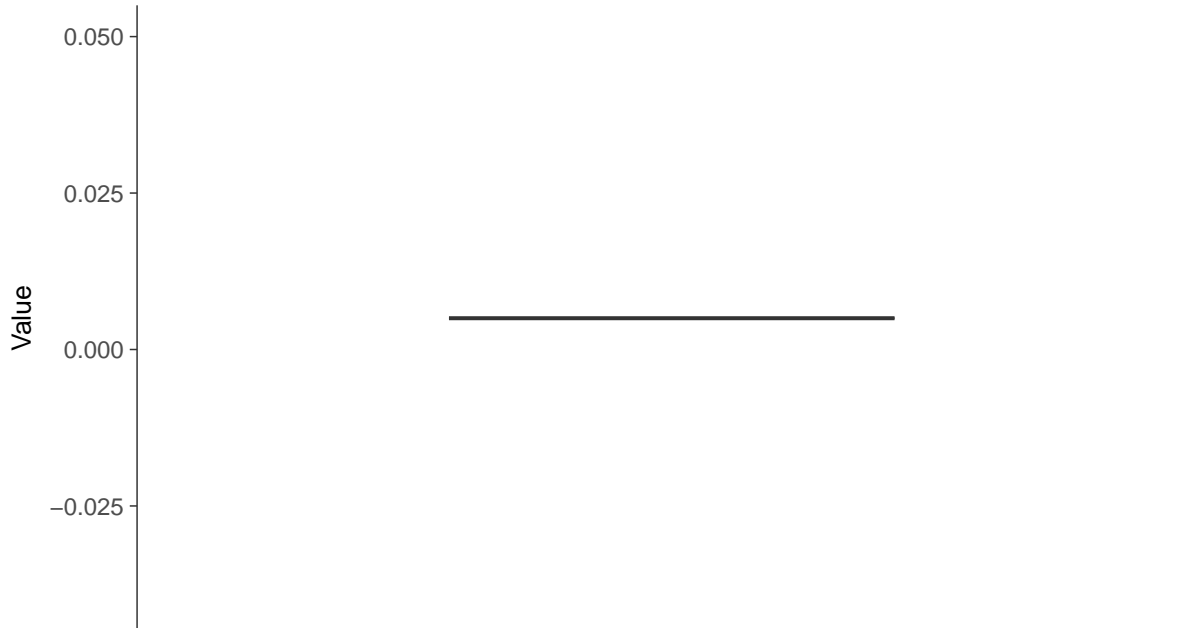
Zinc, MW-8 (mg/L)





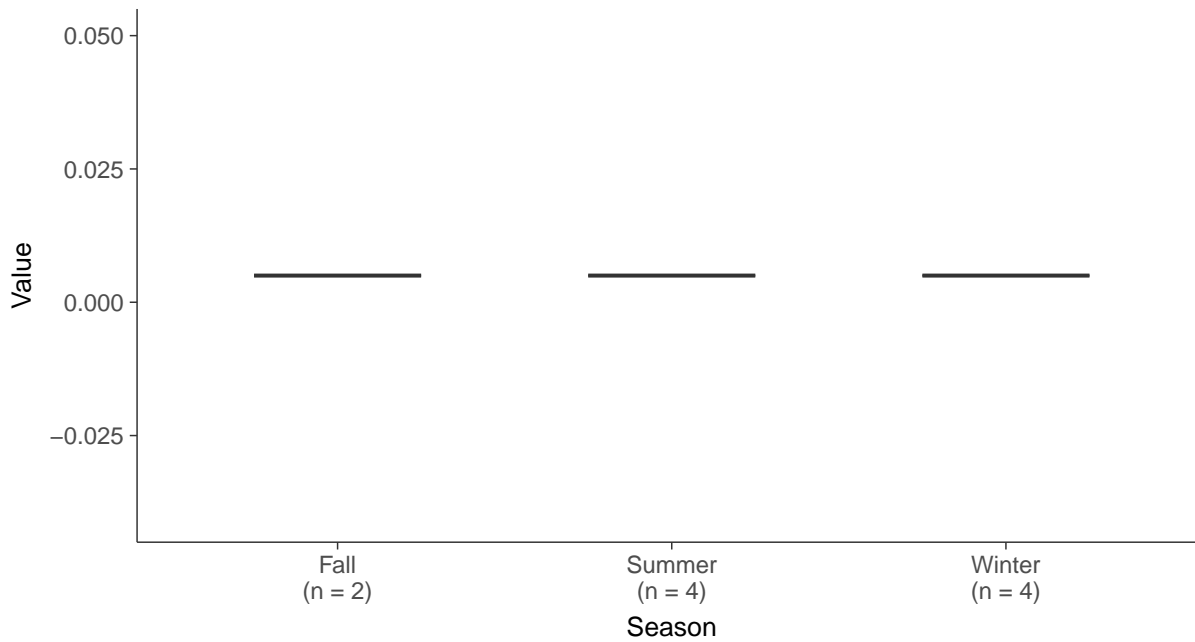
Boxplot

Zinc, MW-8 (mg/L)



Boxplot by Season

Zinc, MW-8 (mg/L)



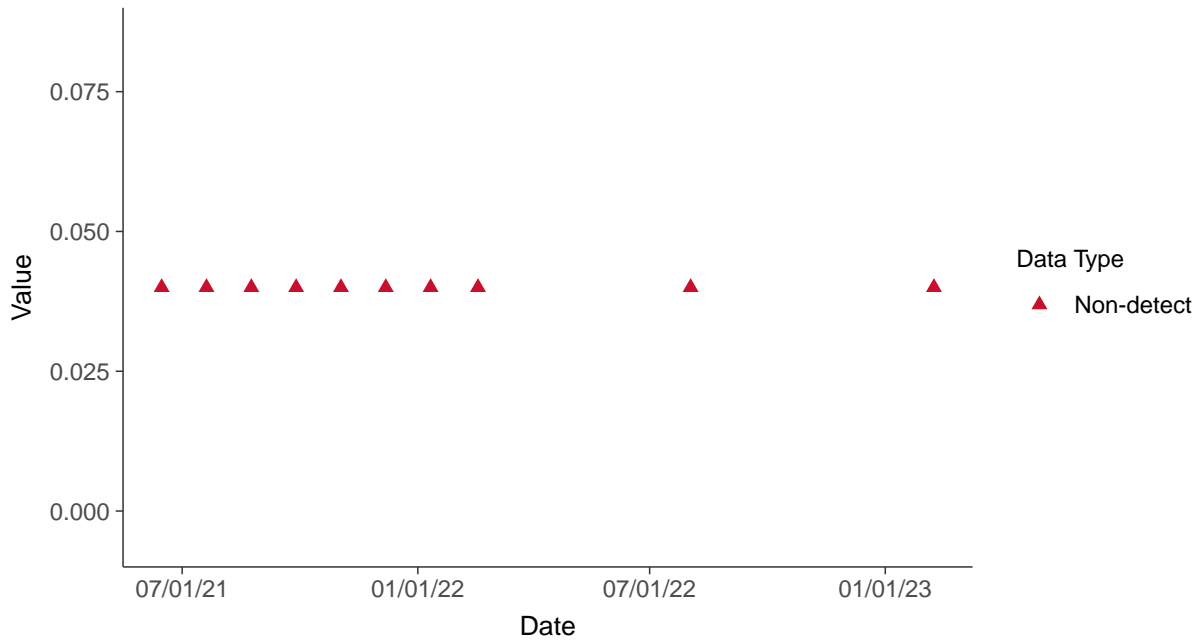


Appendix III: Boron, MW-9

ID: 09_1_01

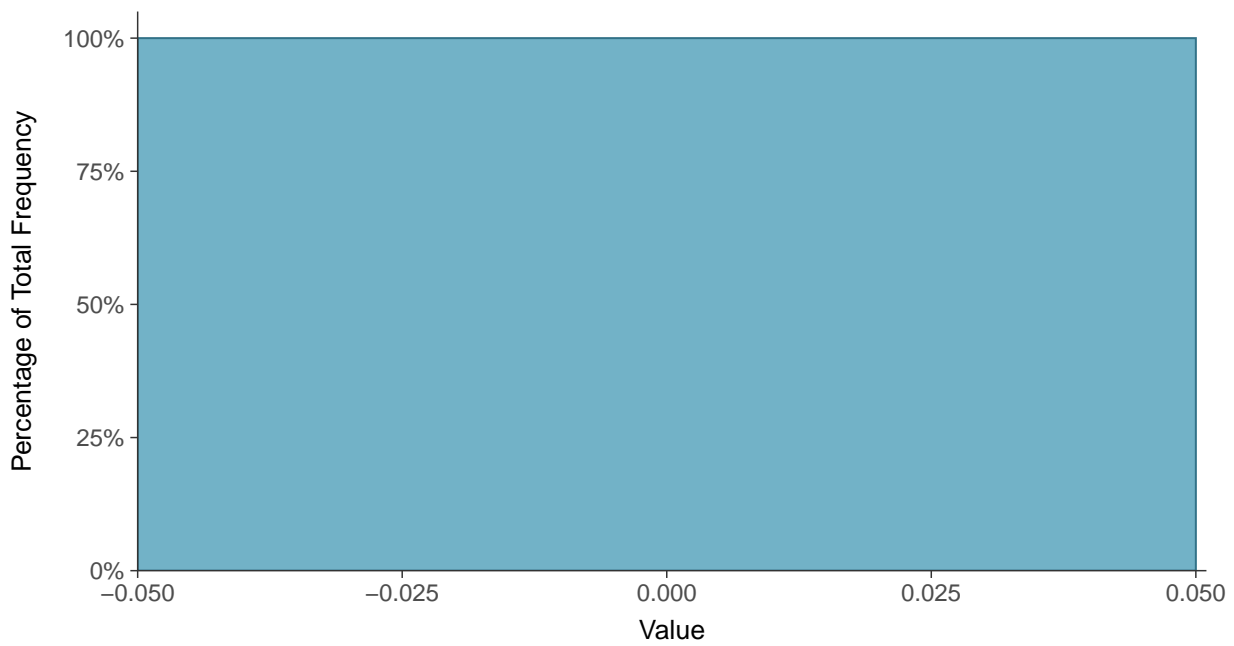
Scatter Plot

Boron, MW-9 (mg/L)



Histogram

Boron, MW-9 (mg/L)





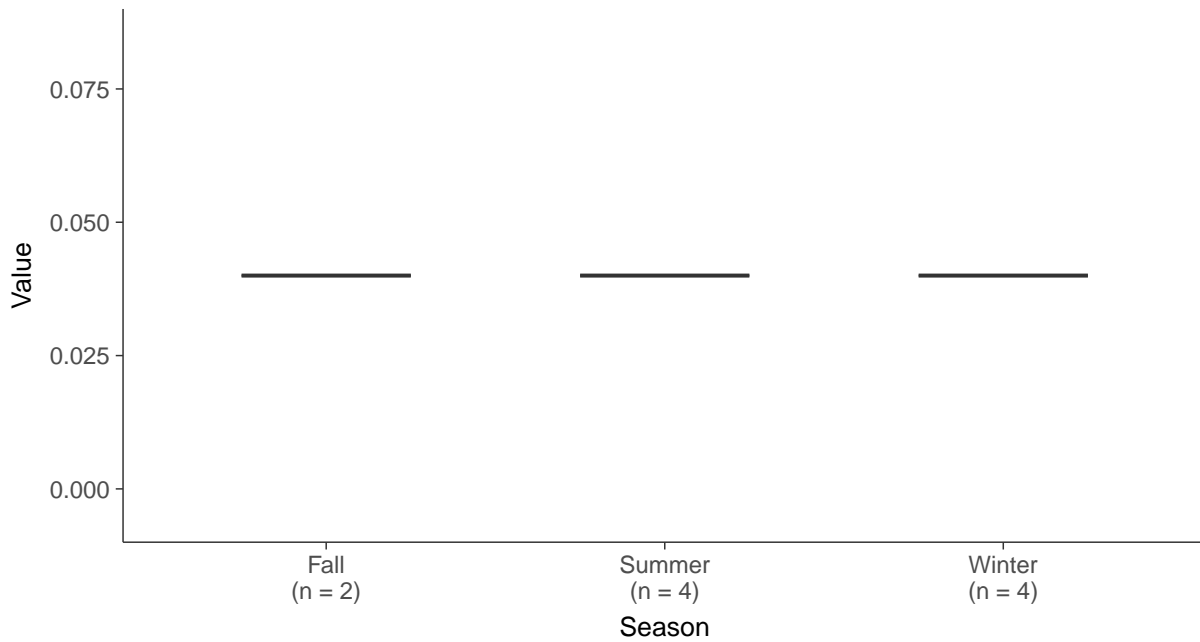
Boxplot

Boron, MW-9 (mg/L)



Boxplot by Season

Boron, MW-9 (mg/L)



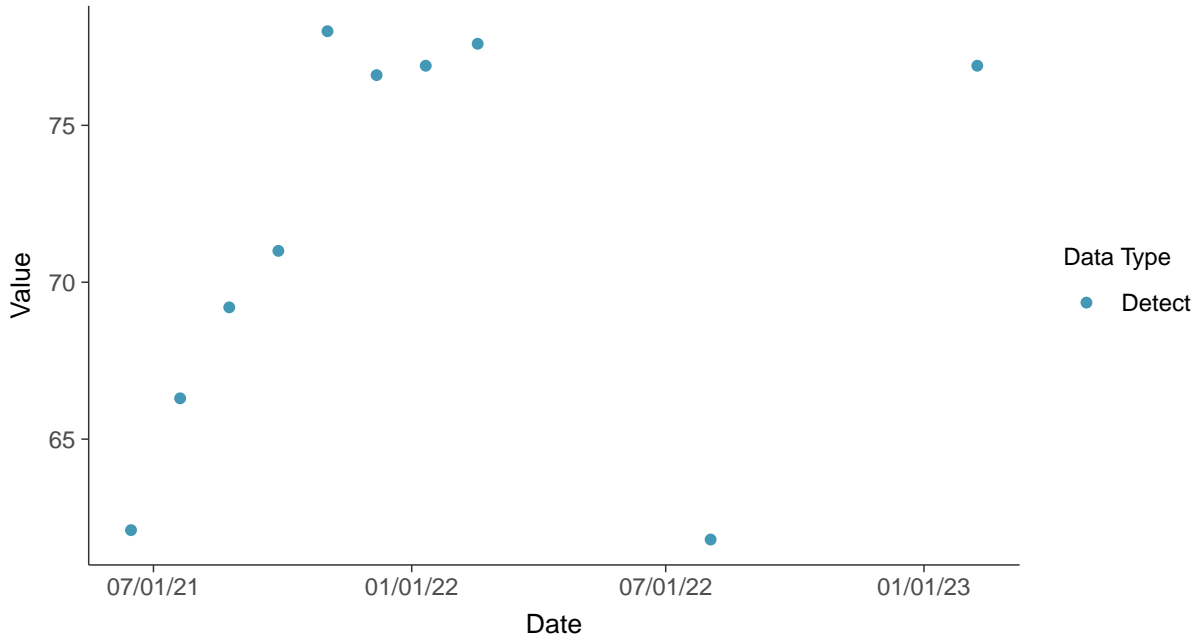


Appendix III: Calcium, MW-9

ID: 09_1_02

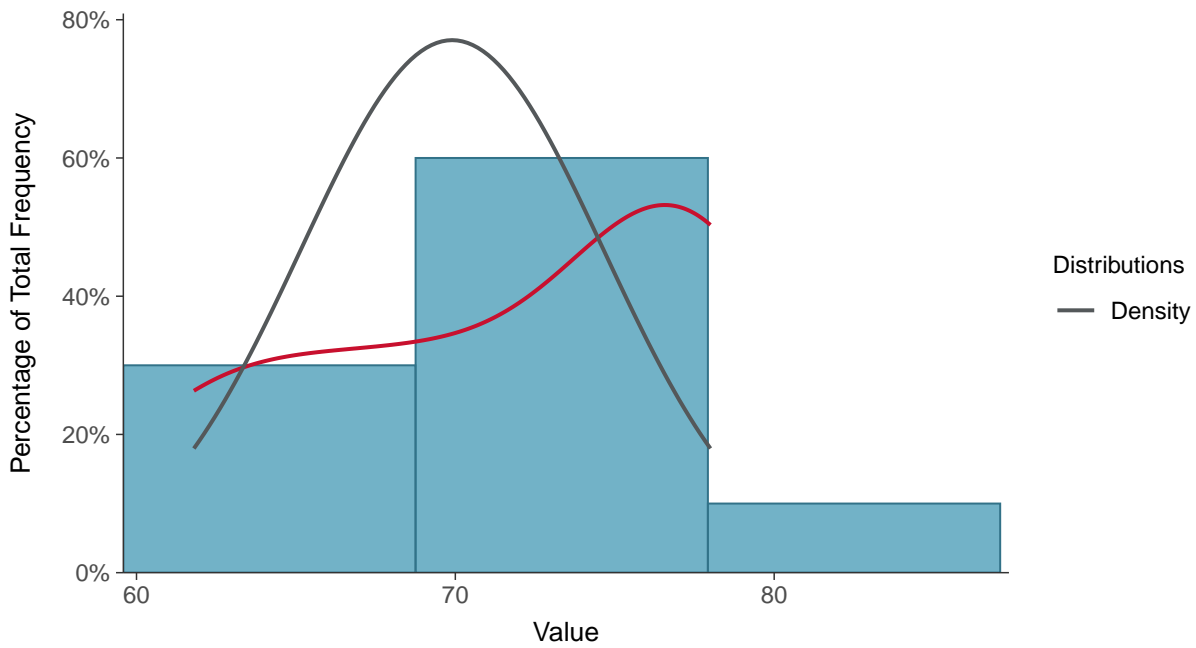
Scatter Plot

Calcium, MW-9 (mg/L)



Histogram

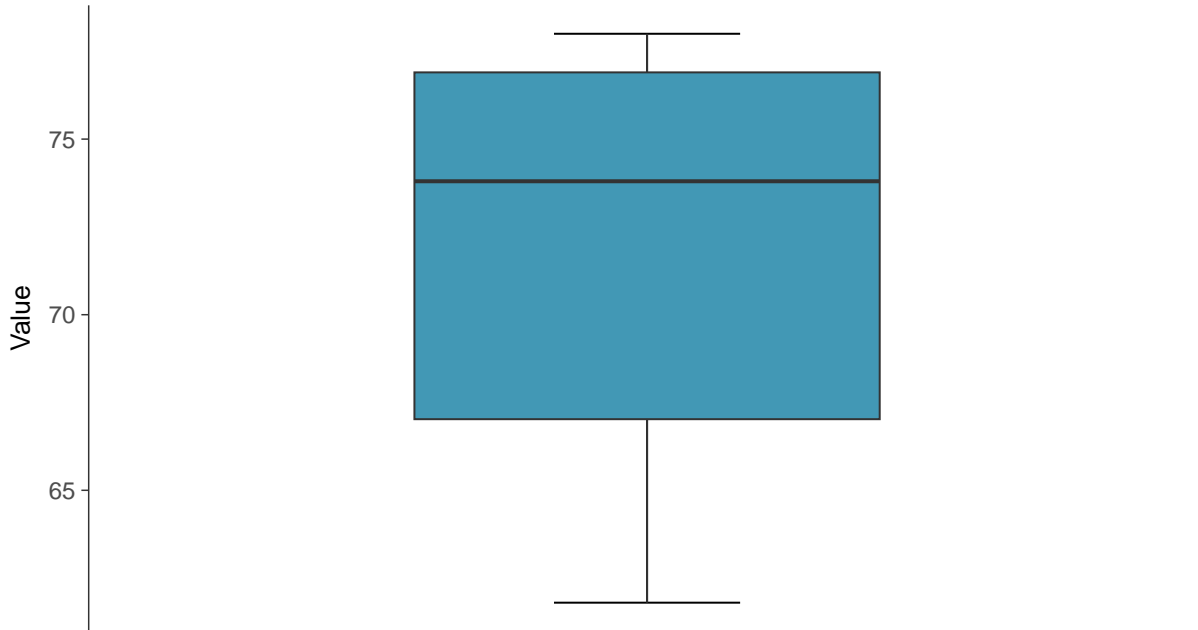
Calcium, MW-9 (mg/L)





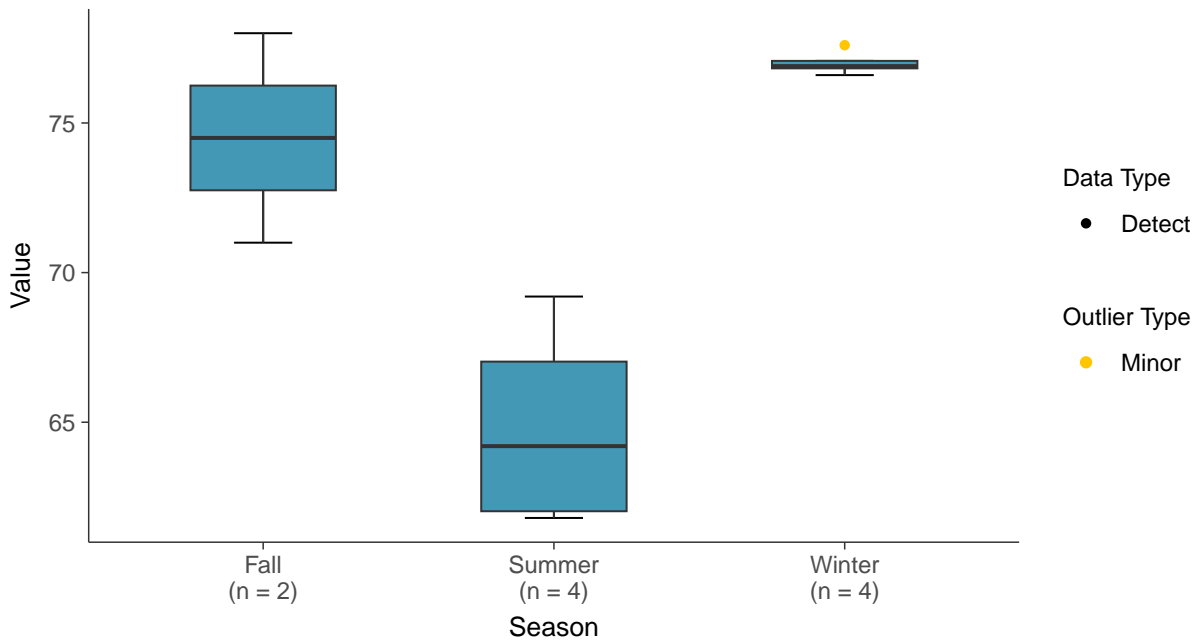
Boxplot

Calcium, MW-9 (mg/L)



Boxplot by Season

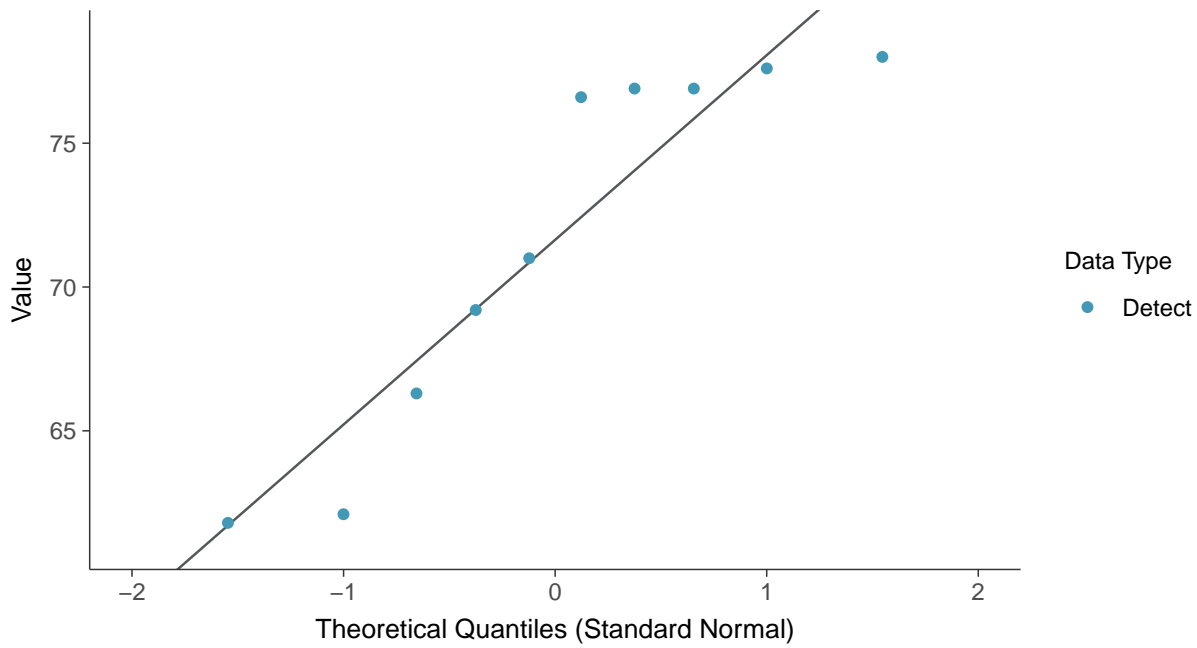
Calcium, MW-9 (mg/L)





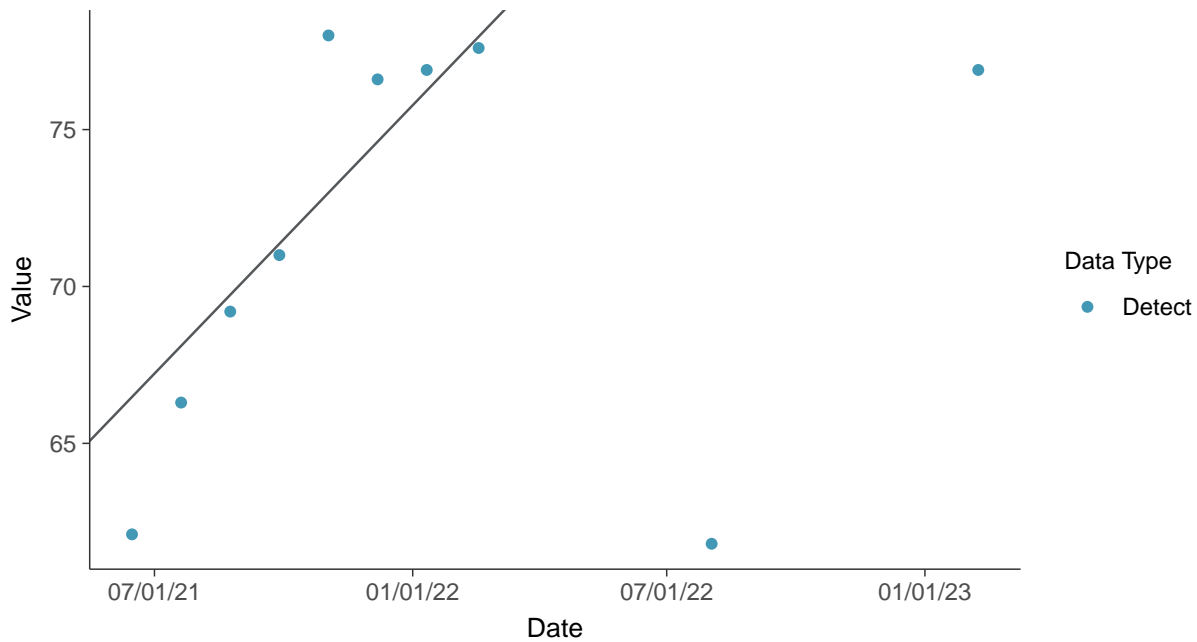
Normal Q-Q plot

Calcium, MW-9 (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

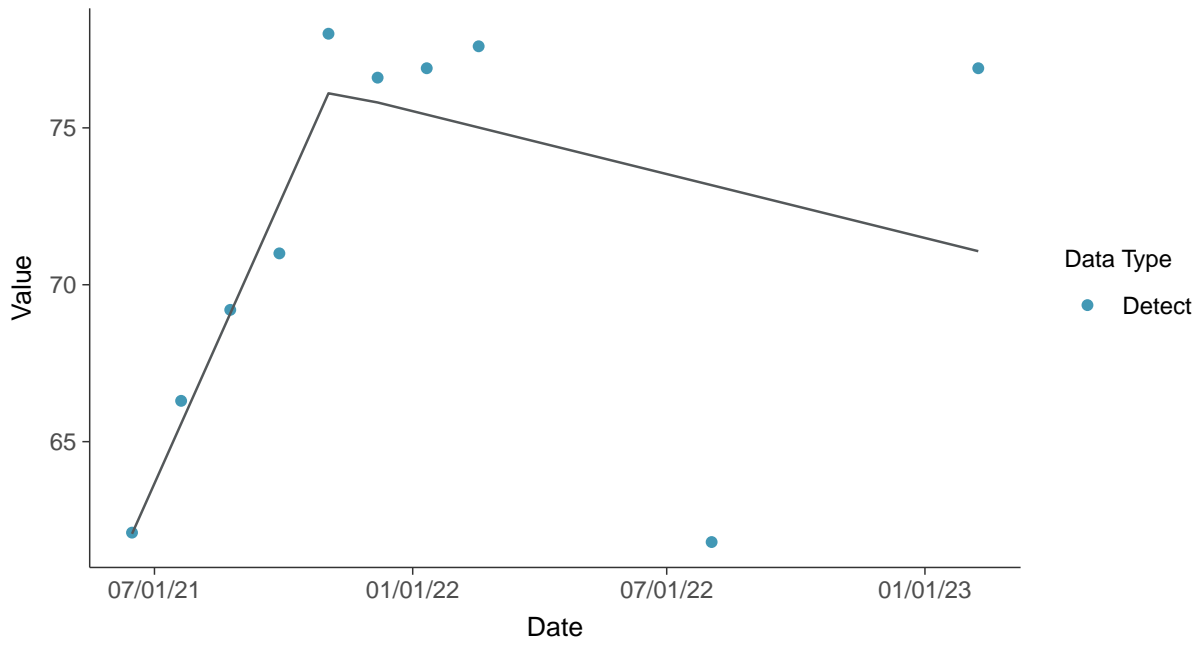
Calcium, MW-9 (mg/L)





Trend Regression: Piecewise Linear-Linear

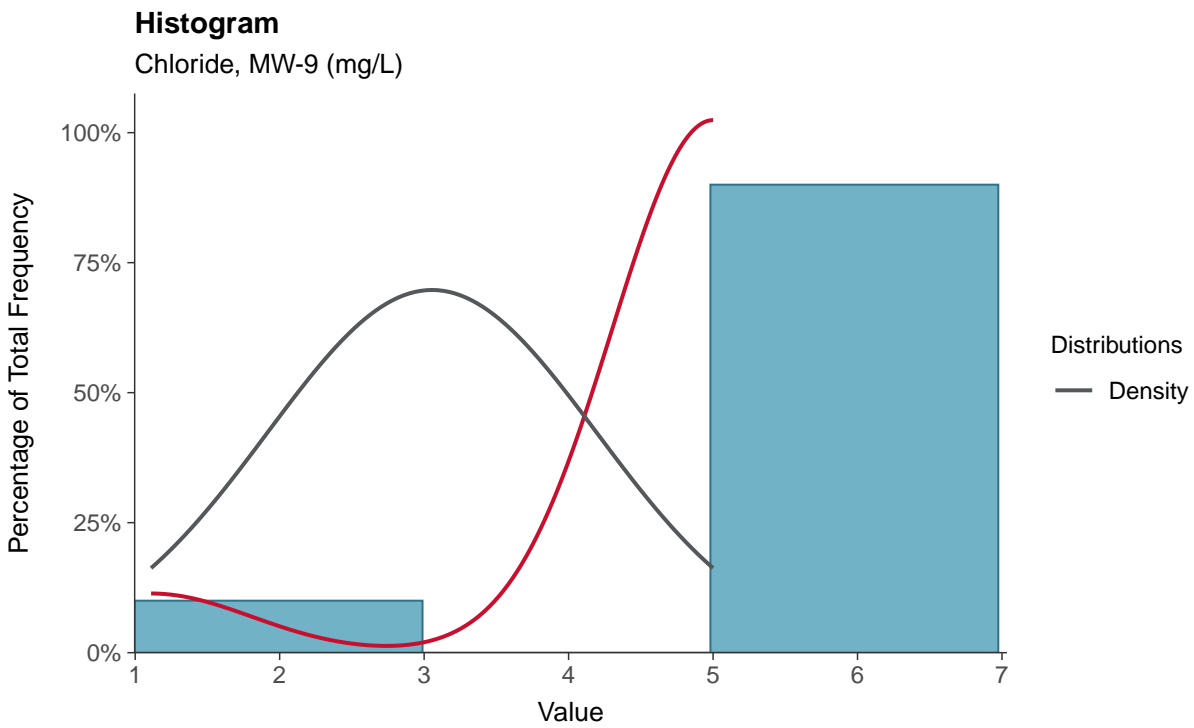
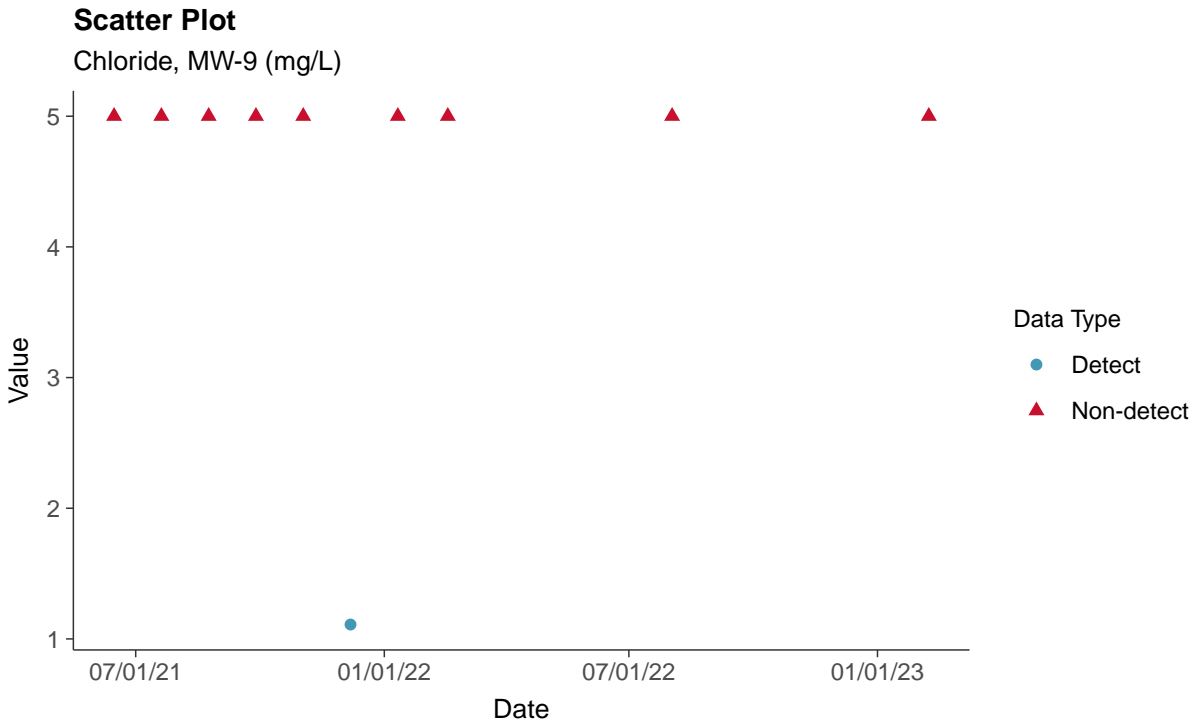
Calcium, MW-9 (mg/L)





Appendix III: Chloride, MW-9

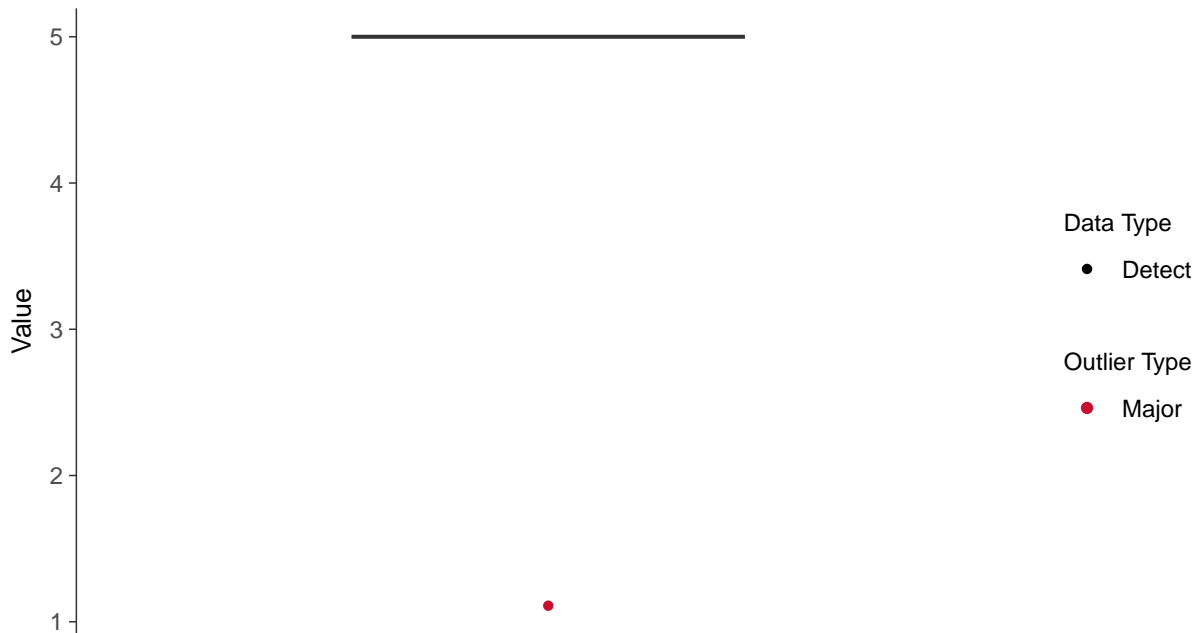
ID: 09_1_03





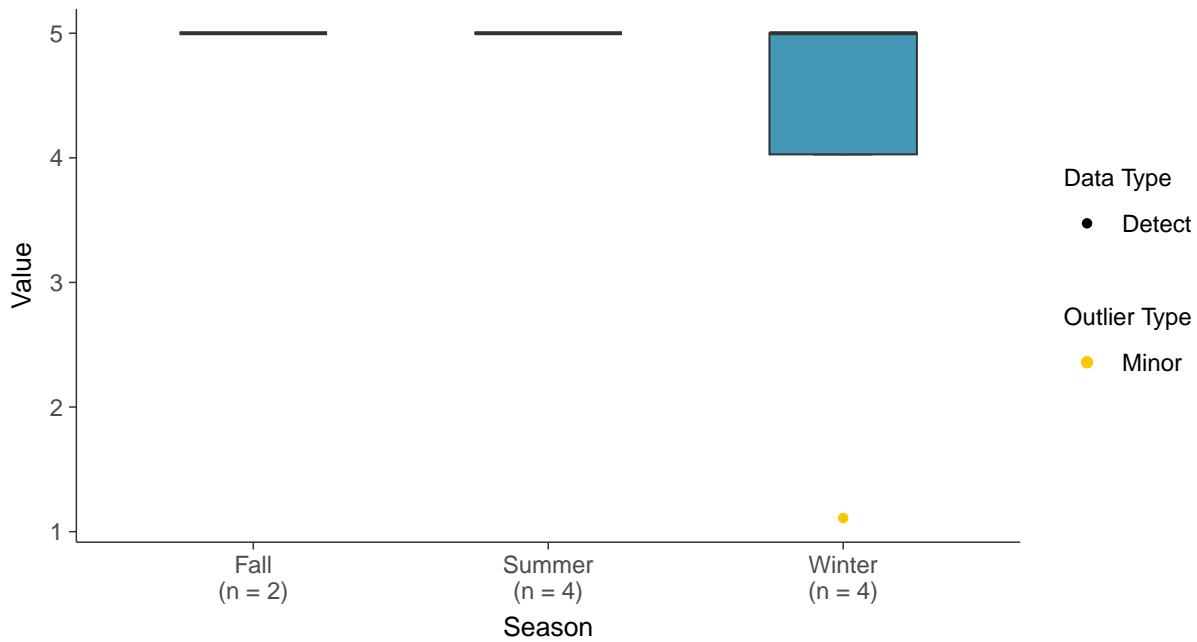
Boxplot

Chloride, MW-9 (mg/L)



Boxplot by Season

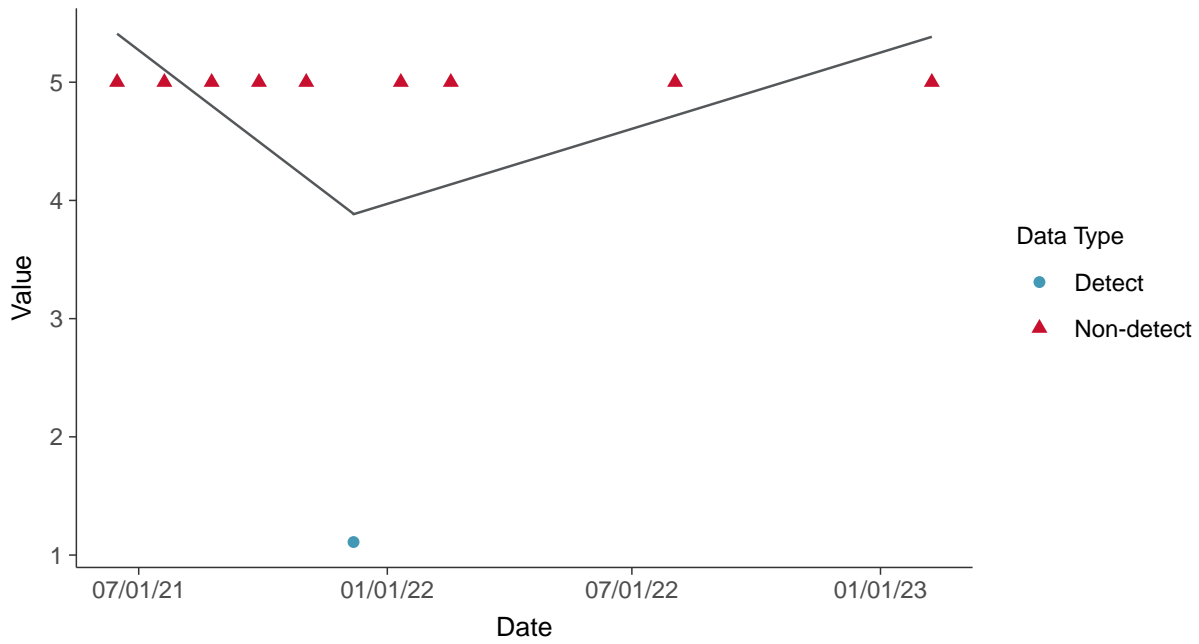
Chloride, MW-9 (mg/L)





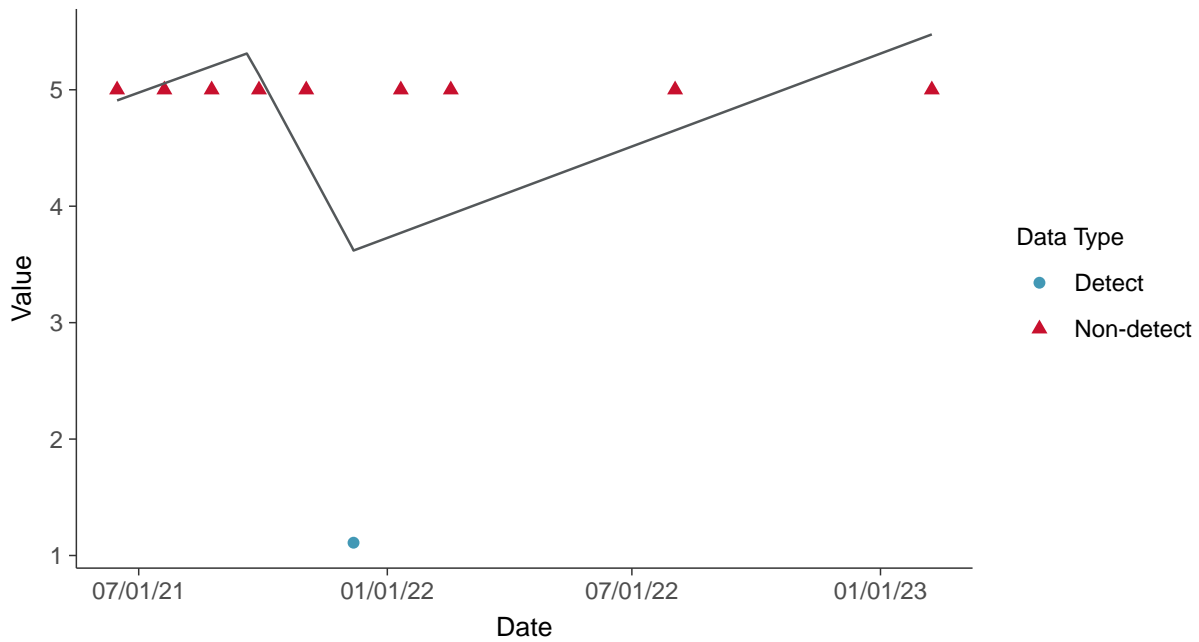
Trend Regression: Piecewise Linear-Linear

Chloride, MW-9 (mg/L)



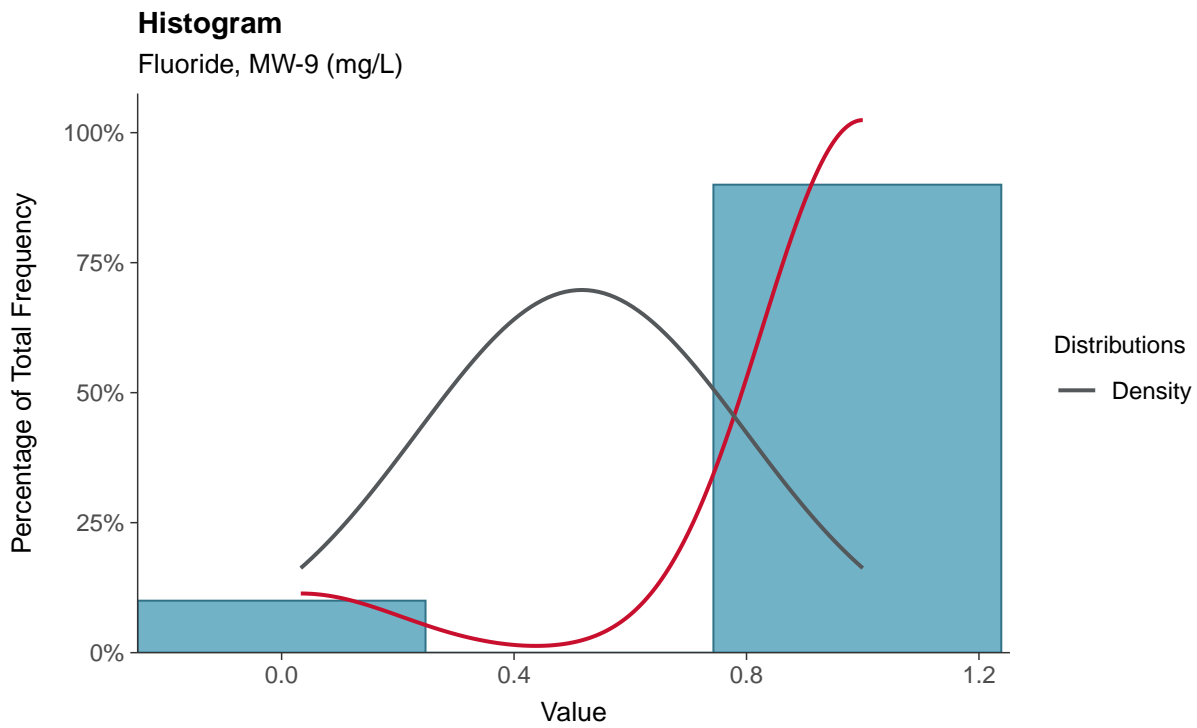
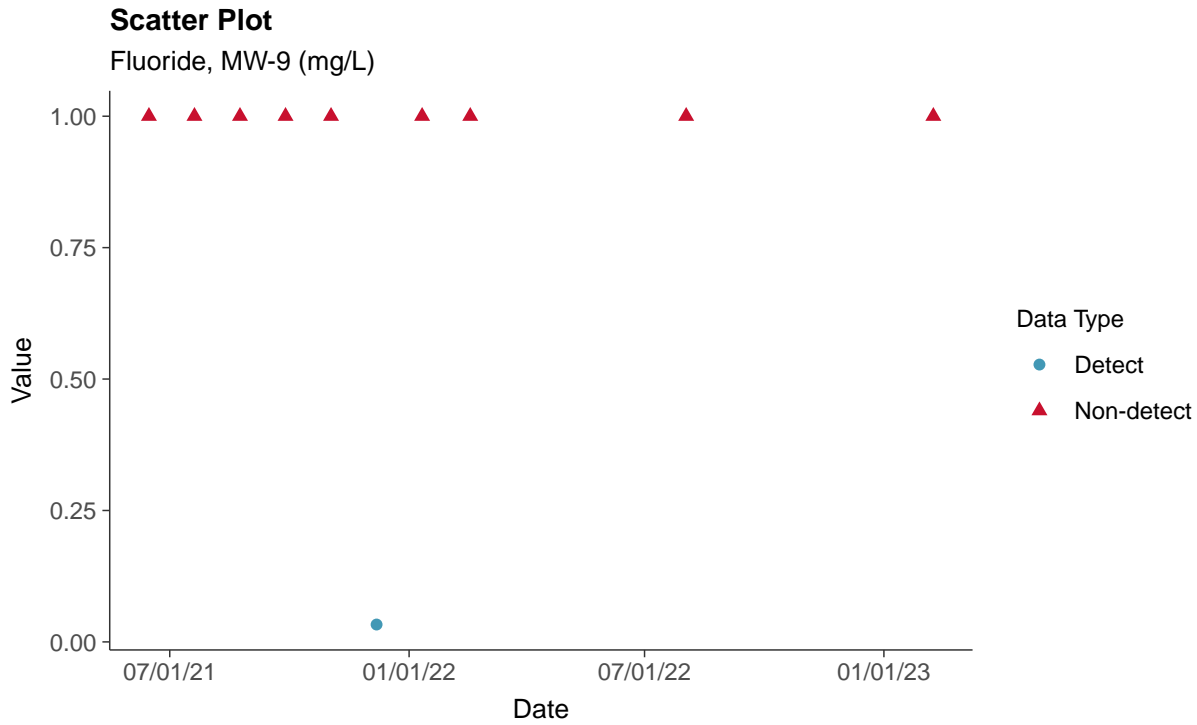
Trend Regression: Piecewise Linear-Linear-Linear

Chloride, MW-9 (mg/L)



Appendix III: Fluoride, MW-9

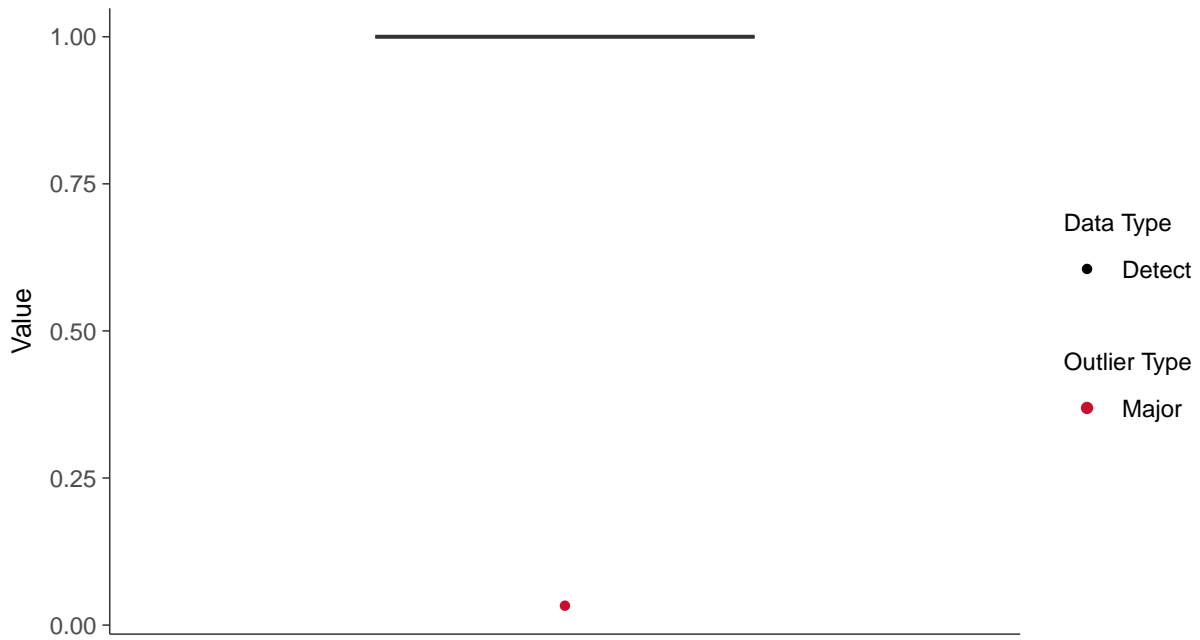
ID: 09_1_04





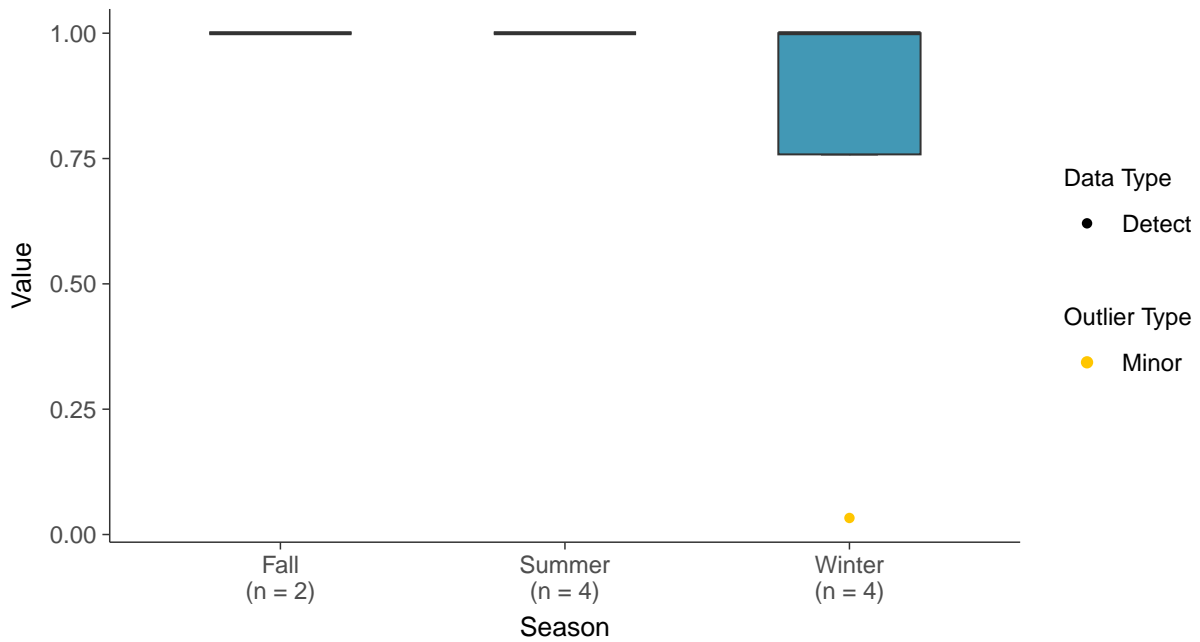
Boxplot

Fluoride, MW-9 (mg/L)



Boxplot by Season

Fluoride, MW-9 (mg/L)

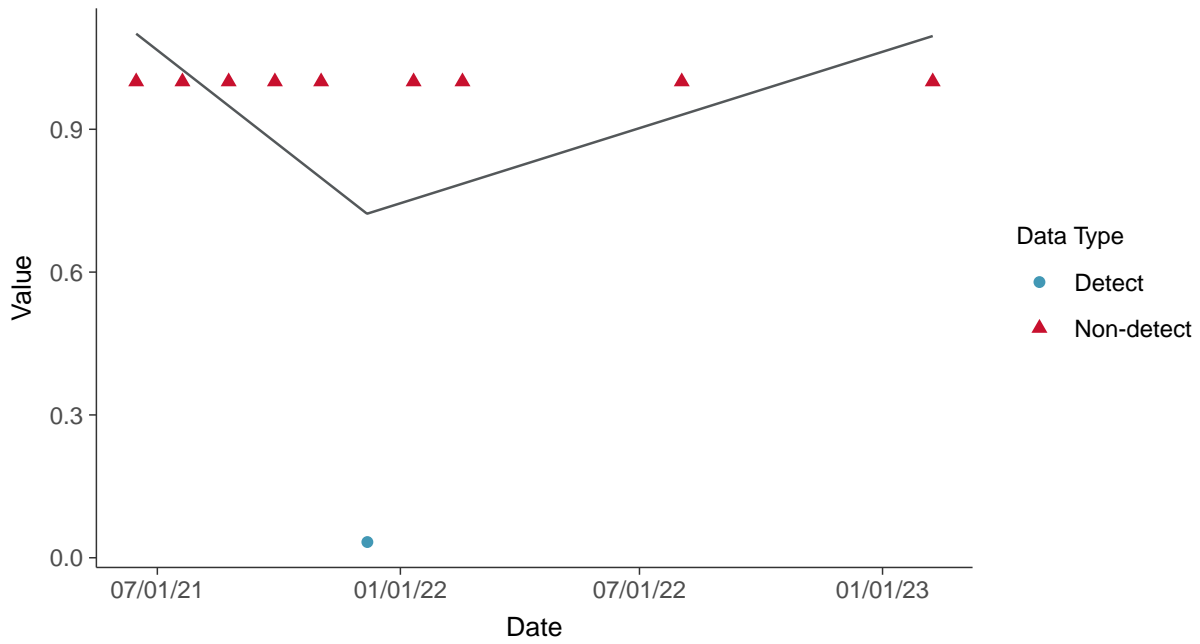




Downgradient Wells MW-2, MW-3, MW-5, MW-6, MW-7, MW-7B, MW-8, MW-9, MW-10, MW-13, MW-14, MW-15

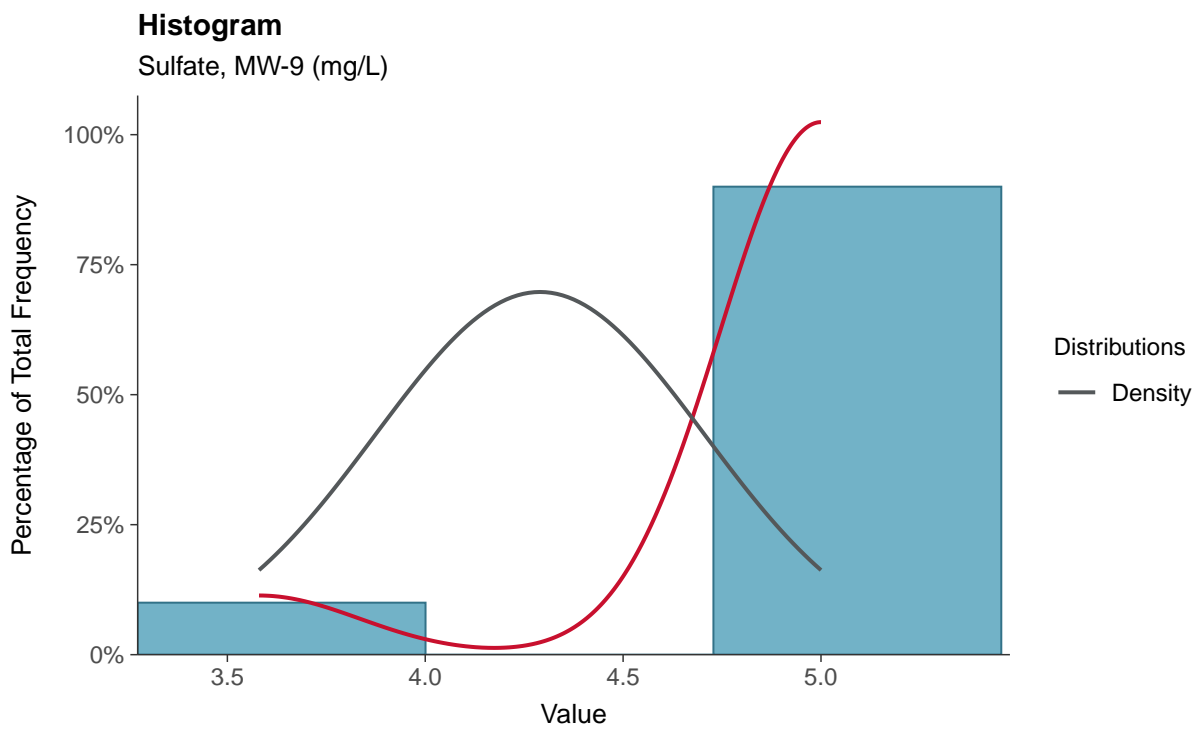
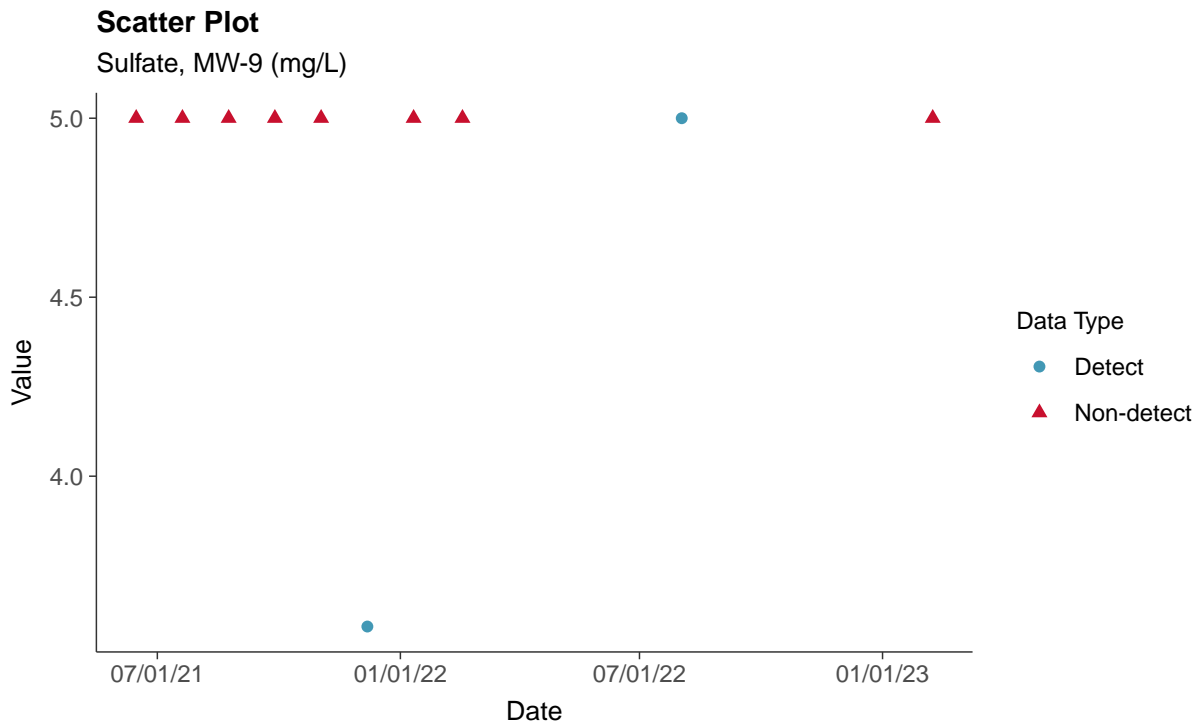
Trend Regression: Piecewise Linear-Linear

Fluoride, MW-9 (mg/L)



Appendix III: Sulfate, MW-9

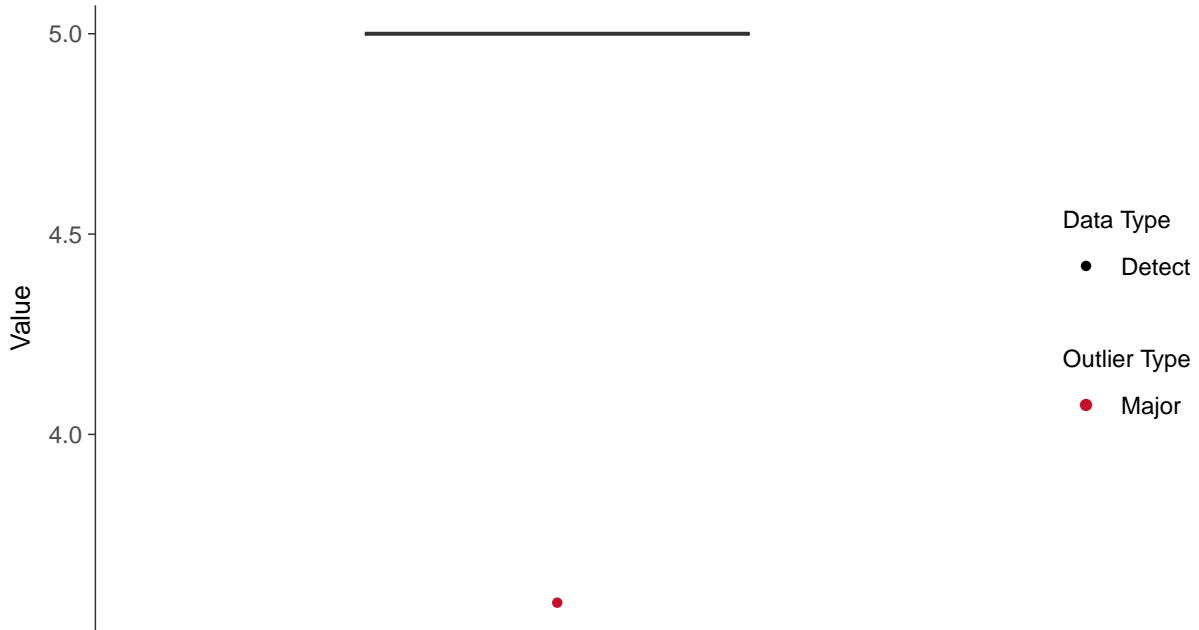
ID: 09_1_05





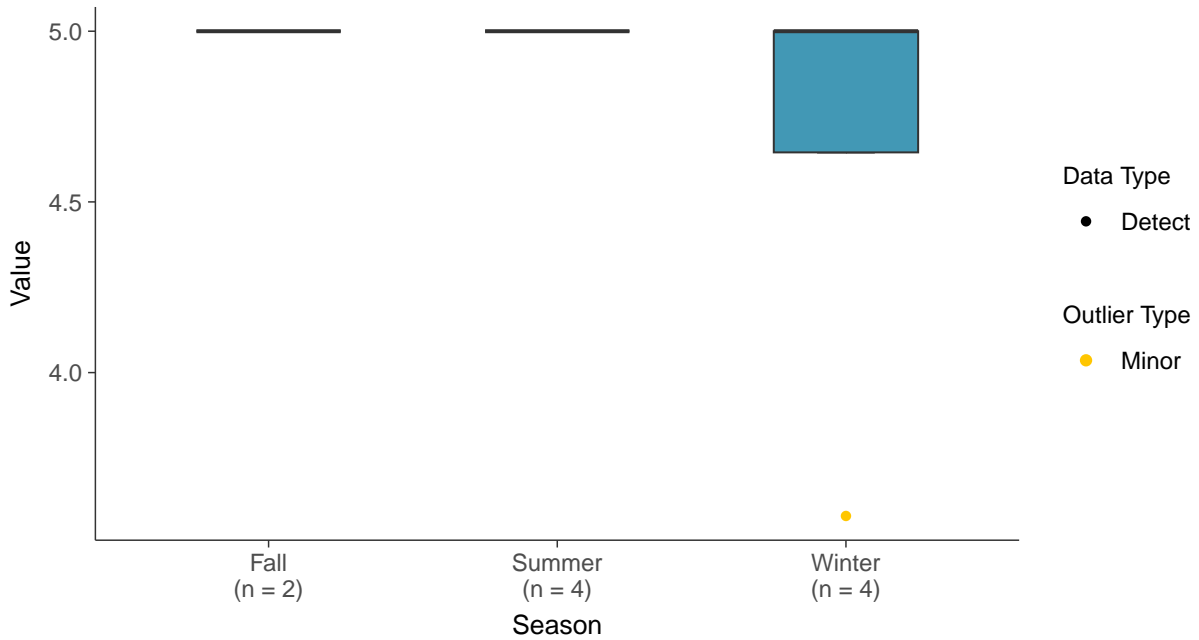
Boxplot

Sulfate, MW-9 (mg/L)



Boxplot by Season

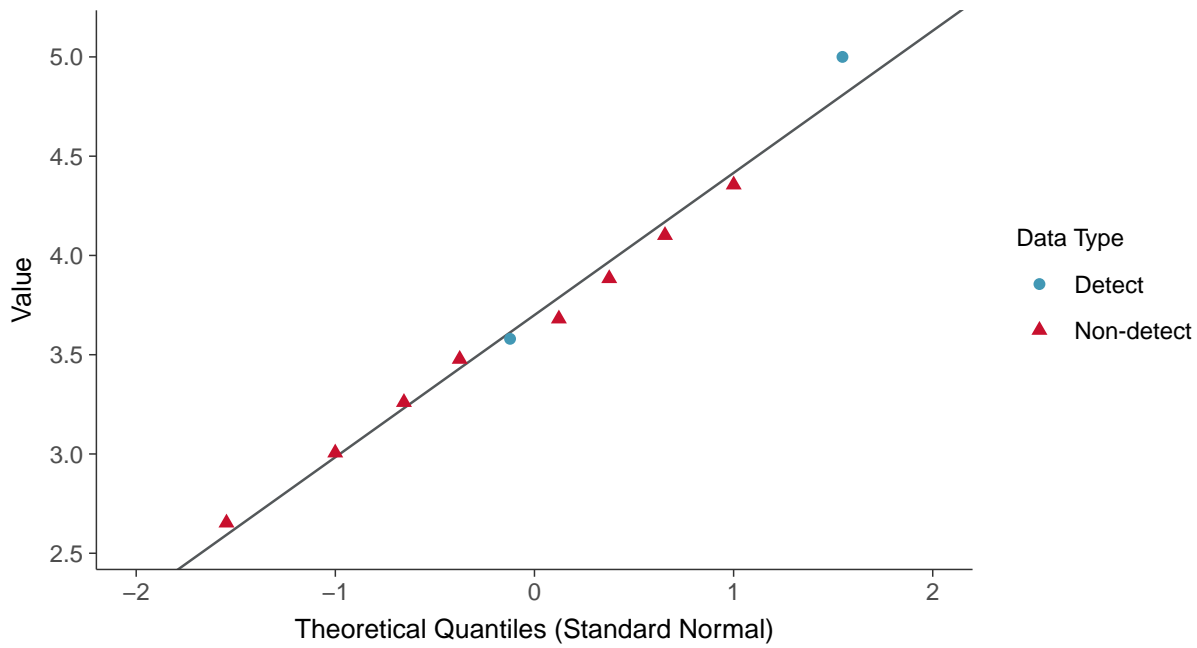
Sulfate, MW-9 (mg/L)





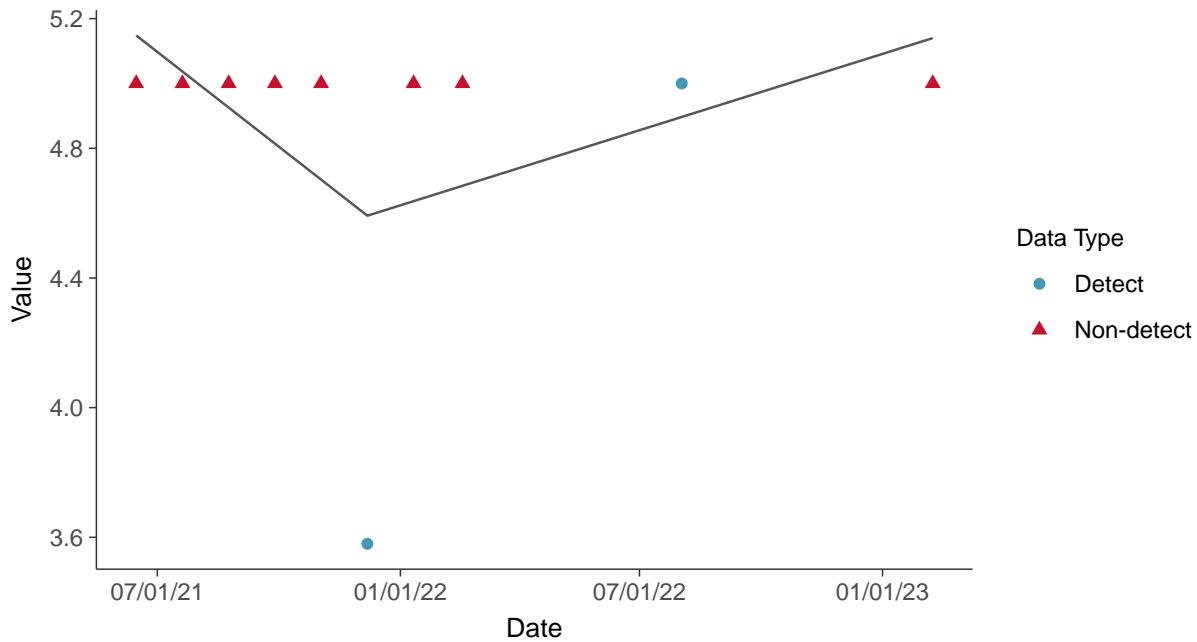
Normal Q-Q plot using ROS Imputed Estimates

Sulfate, MW-9 (mg/L)



Trend Regression: Piecewise Linear-Linear

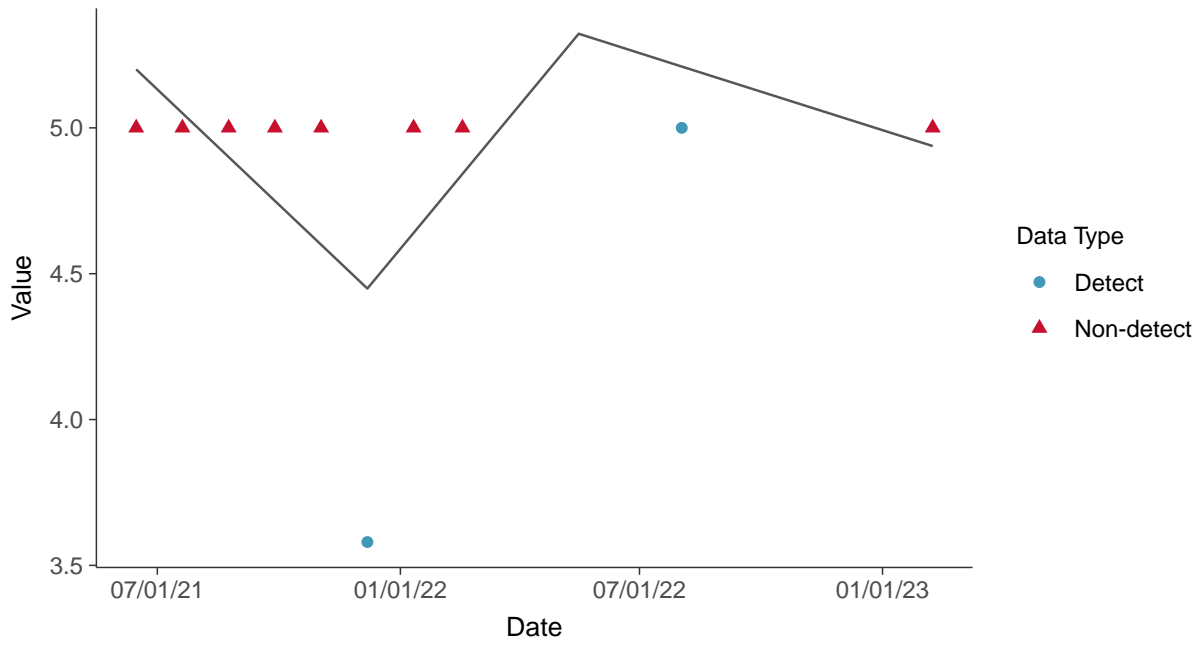
Sulfate, MW-9 (mg/L)





Trend Regression: Piecewise Linear-Linear-Linear

Sulfate, MW-9 (mg/L)



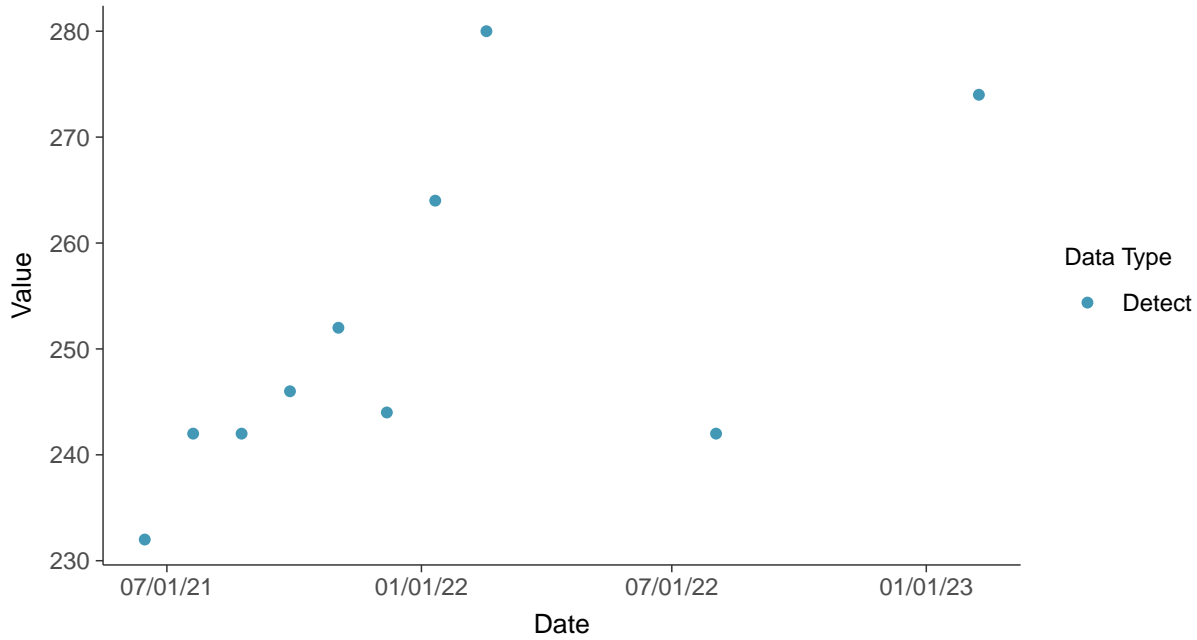


Appendix III: Total Dissolved Solids, MW-9

ID: 09_1_06

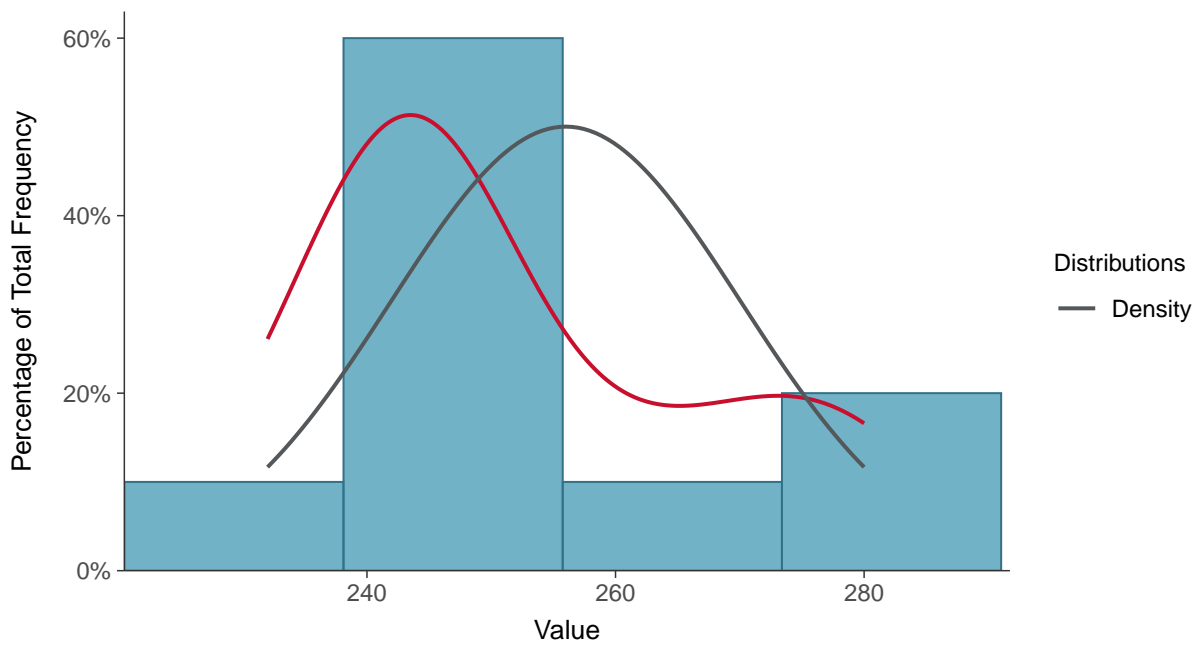
Scatter Plot

Total Dissolved Solids, MW-9 (mg/L)



Histogram

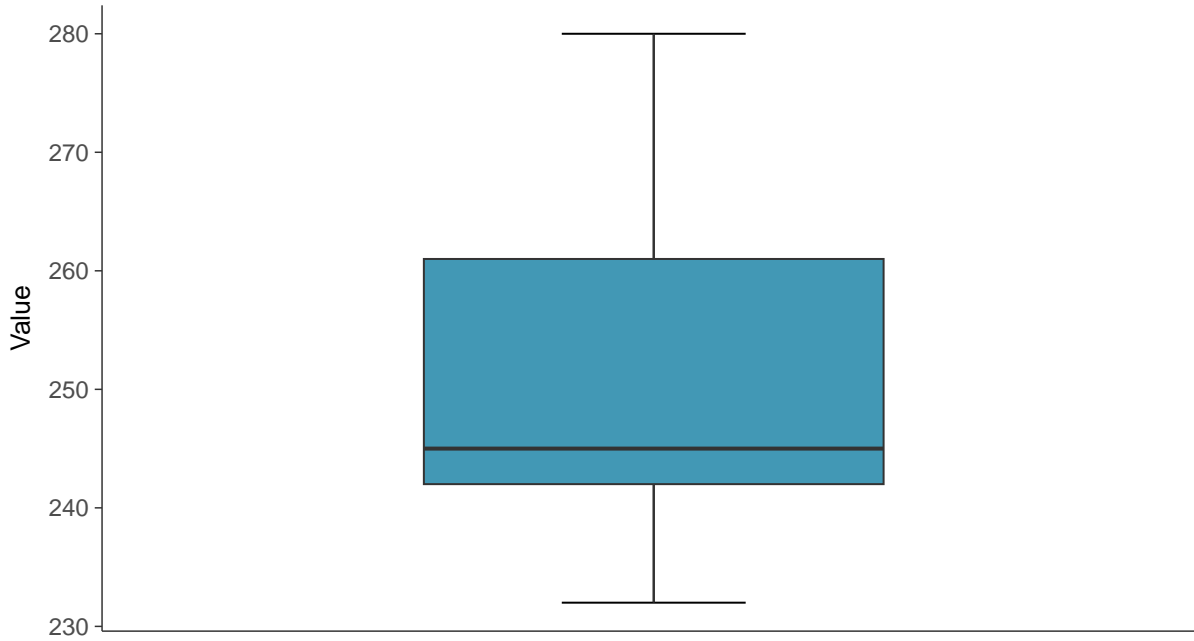
Total Dissolved Solids, MW-9 (mg/L)





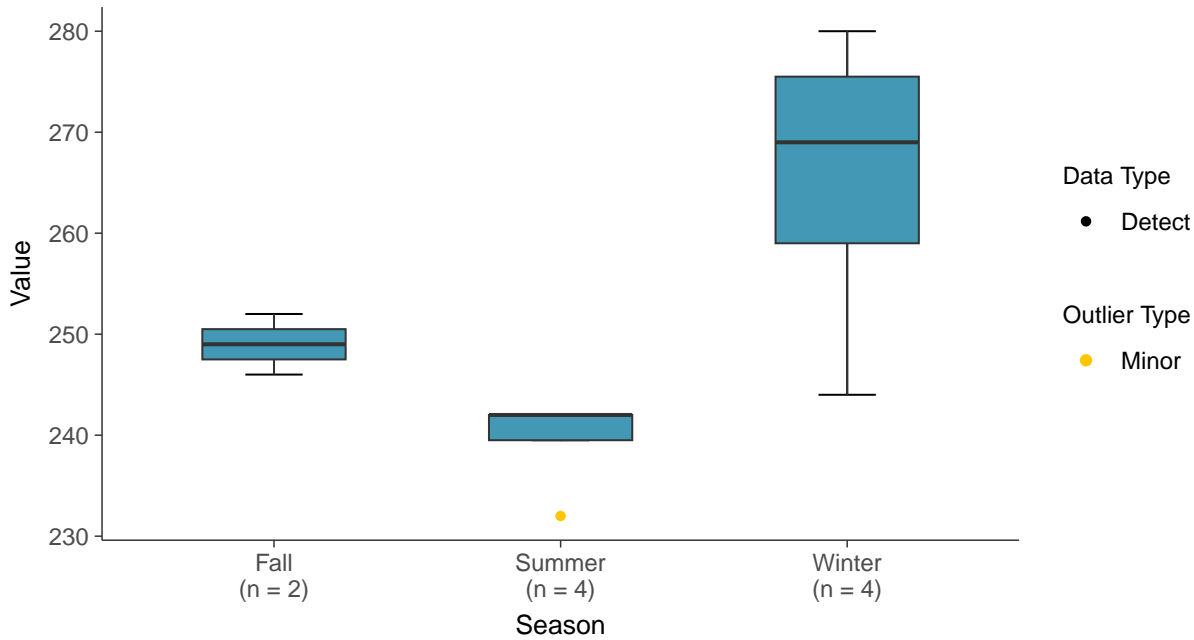
Boxplot

Total Dissolved Solids, MW-9 (mg/L)



Boxplot by Season

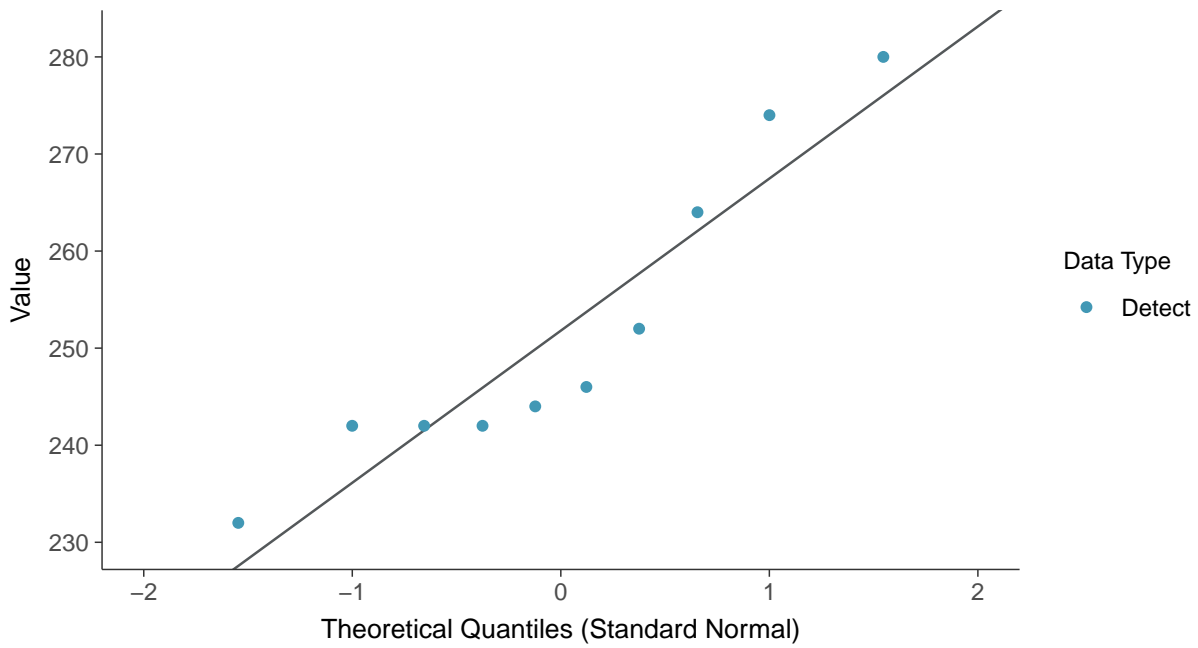
Total Dissolved Solids, MW-9 (mg/L)





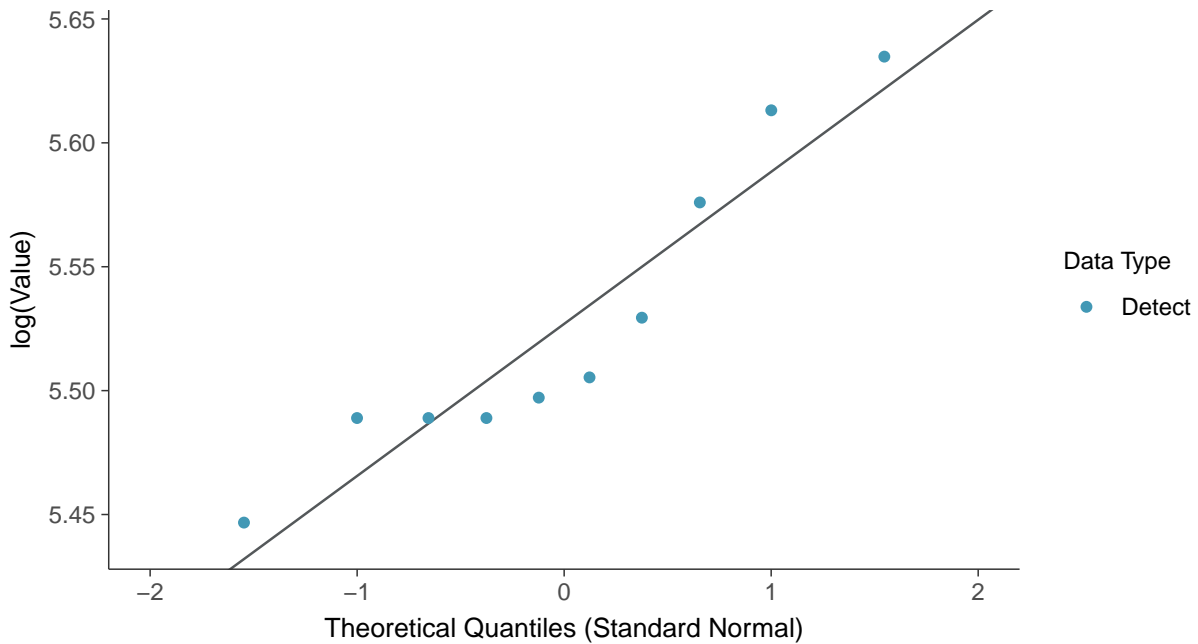
Normal Q-Q plot

Total Dissolved Solids, MW-9 (mg/L)



Lognormal Q-Q plot

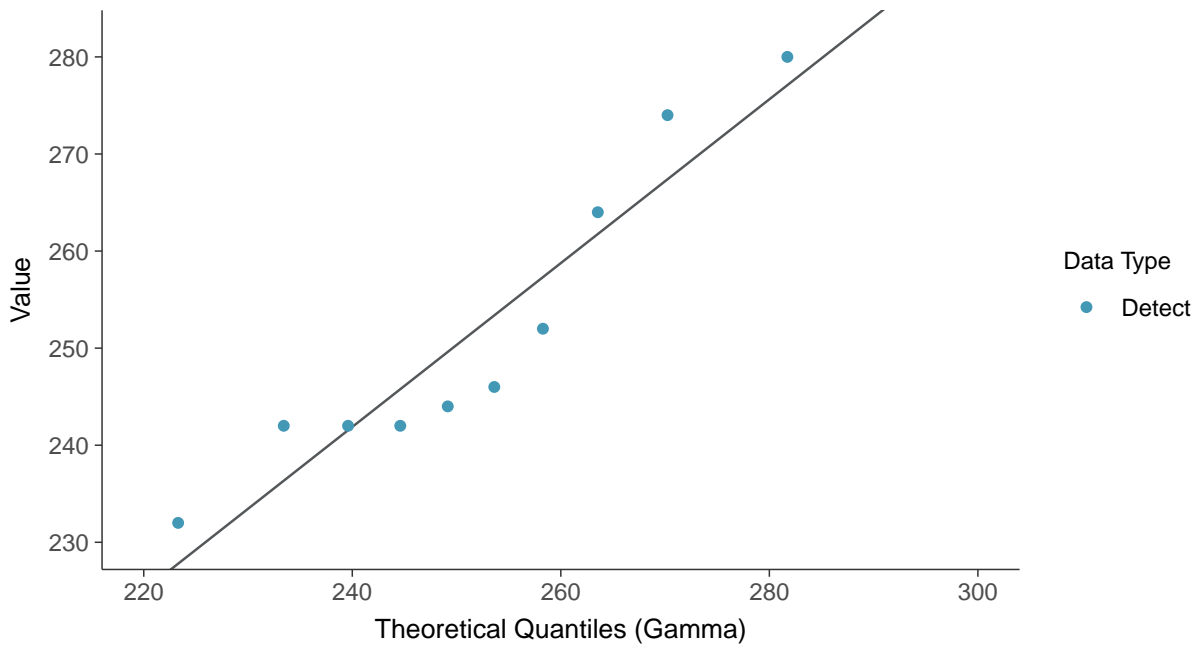
Total Dissolved Solids, MW-9 (mg/L)





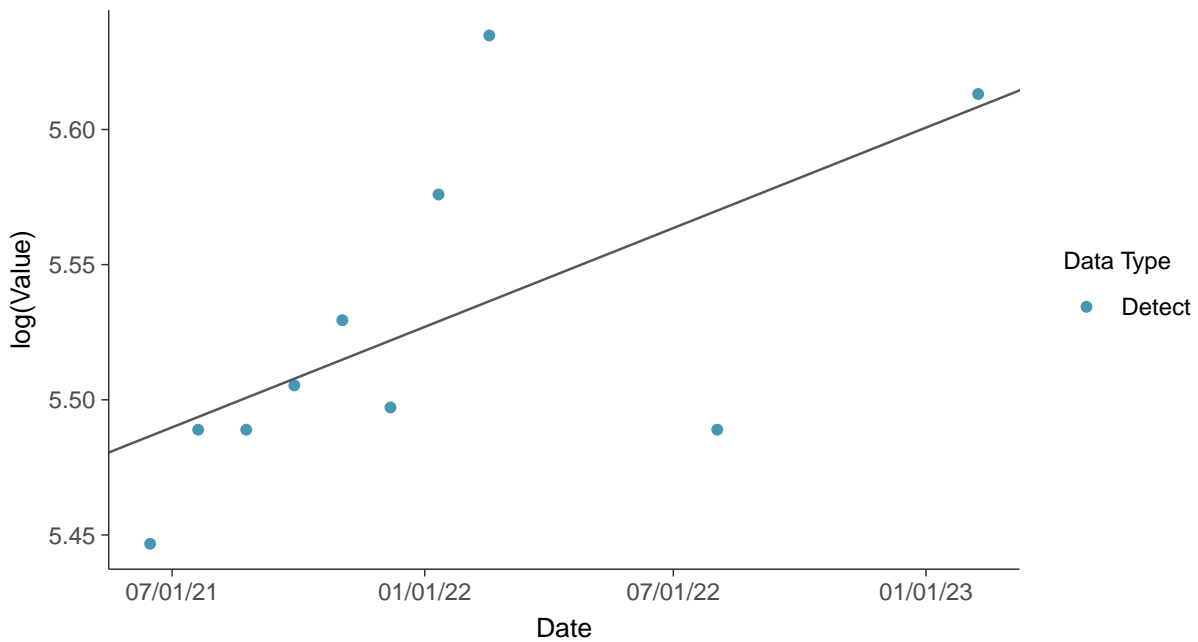
Gamma Q-Q plot

Total Dissolved Solids, MW-9 (mg/L)



Trend Regression: Lognormal MLE

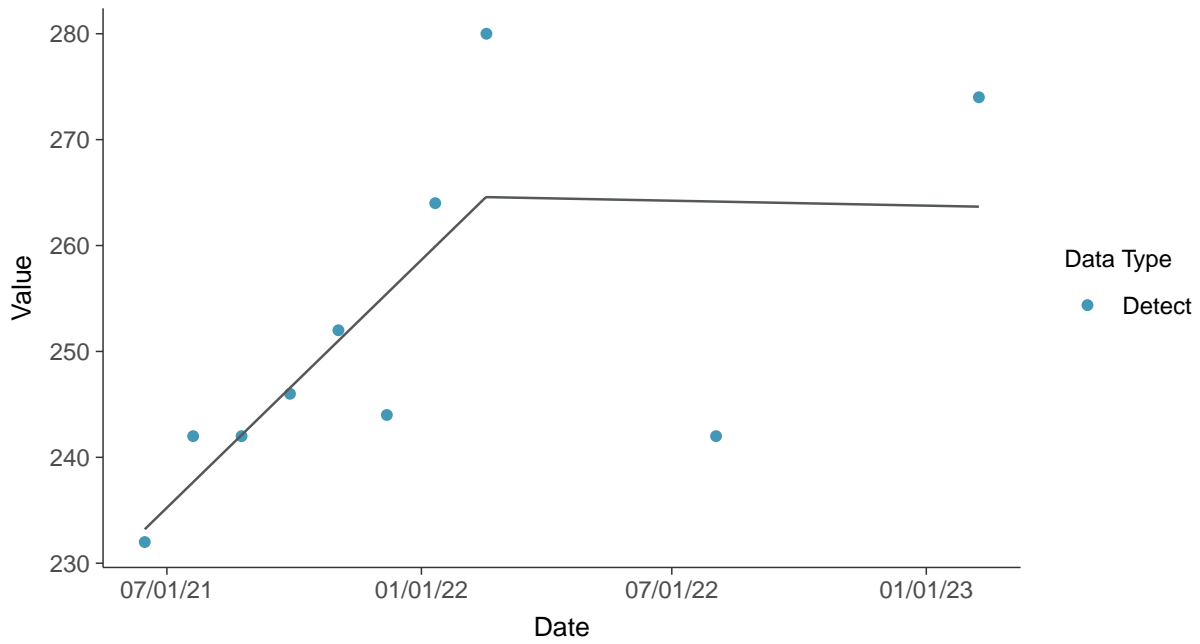
Total Dissolved Solids, MW-9 (mg/L)





Trend Regression: Piecewise Linear-Linear

Total Dissolved Solids, MW-9 (mg/L)



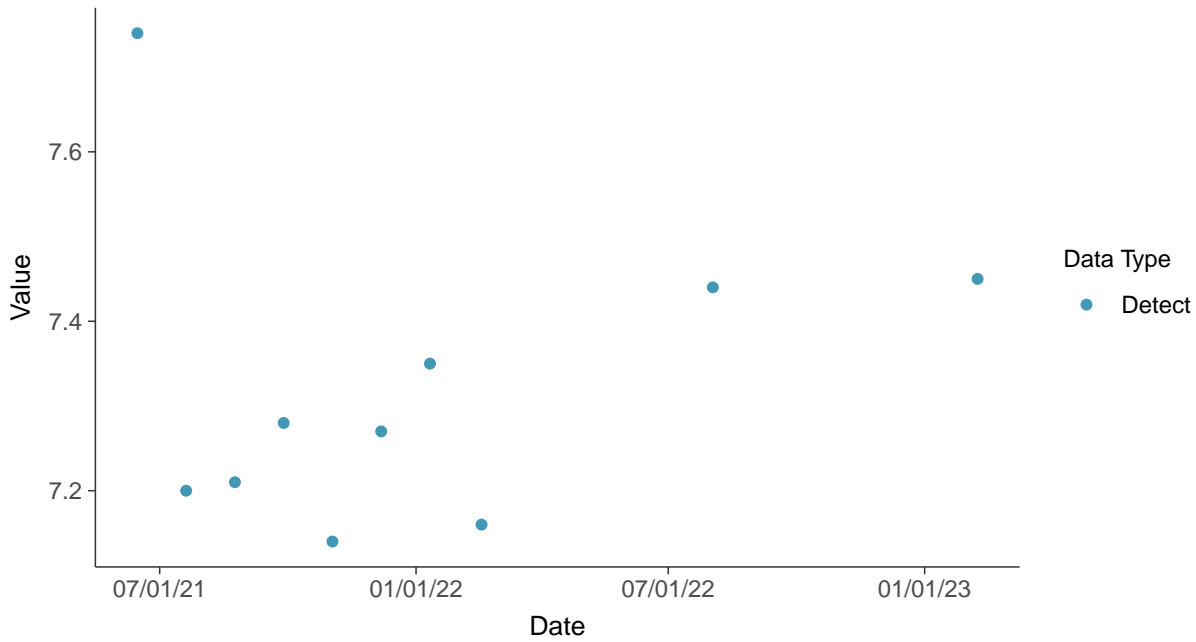


Appendix III: pH, Field, MW-9

ID: 09_1_07

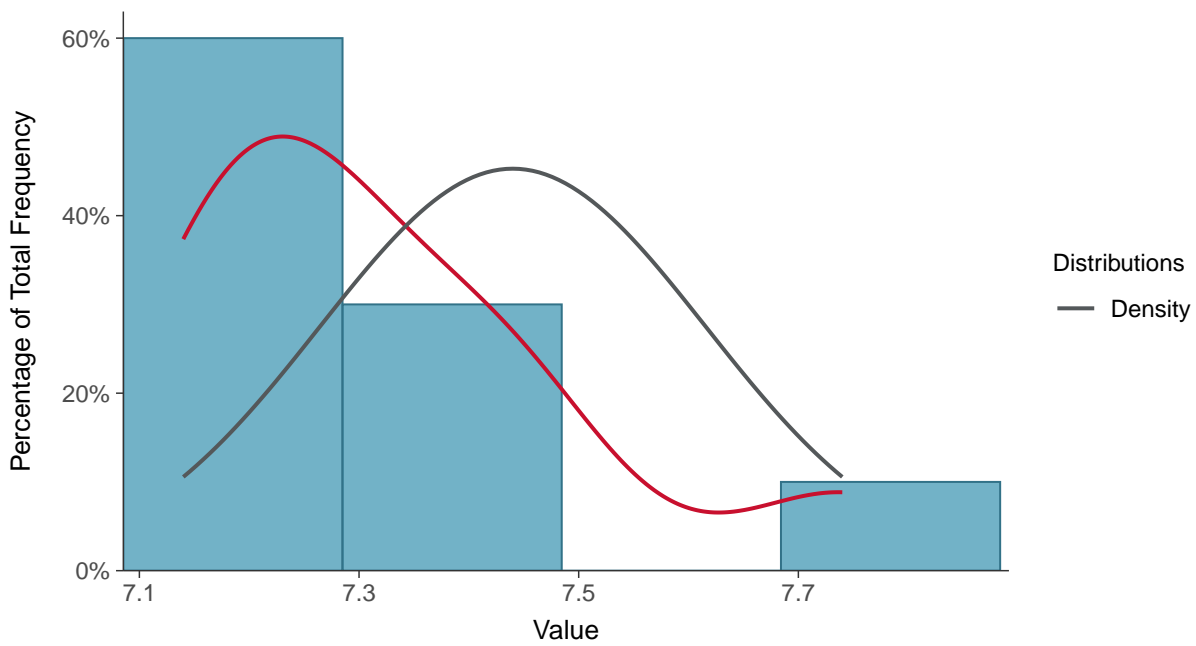
Scatter Plot

pH, Field, MW-9 (su)



Histogram

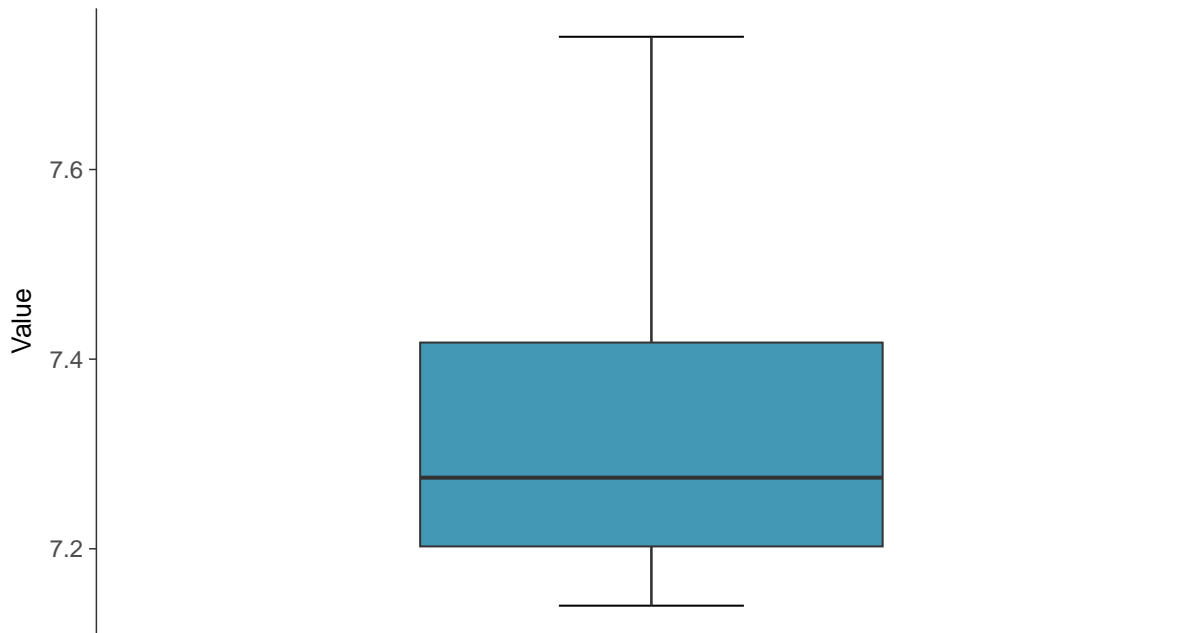
pH, Field, MW-9 (su)





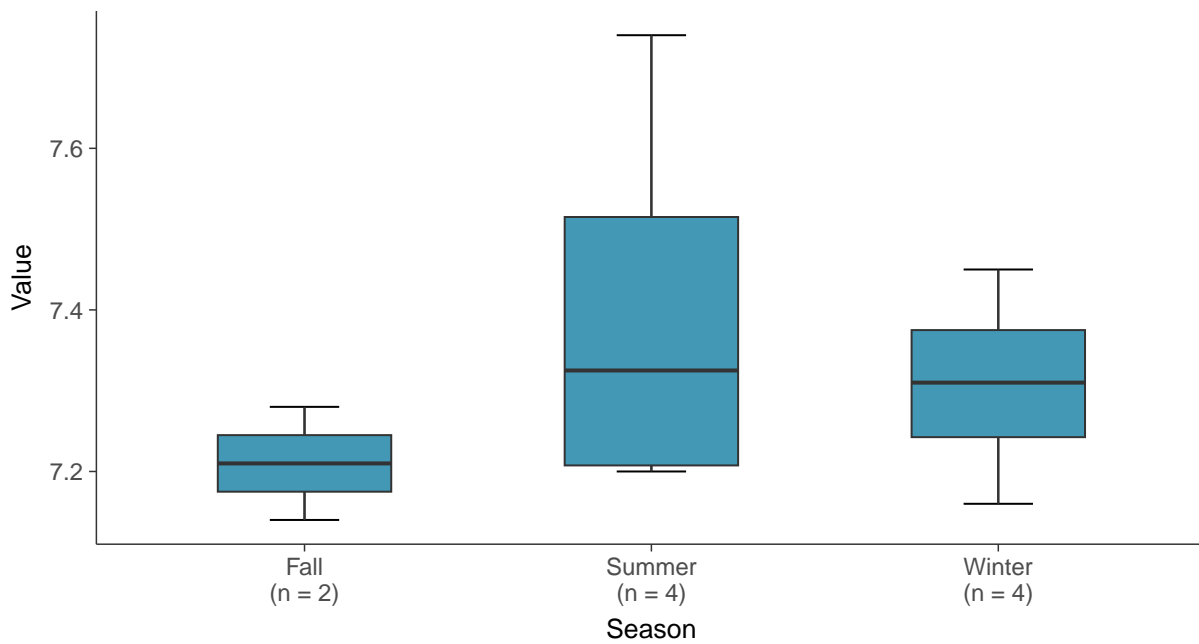
Boxplot

pH, Field, MW-9 (su)



Boxplot by Season

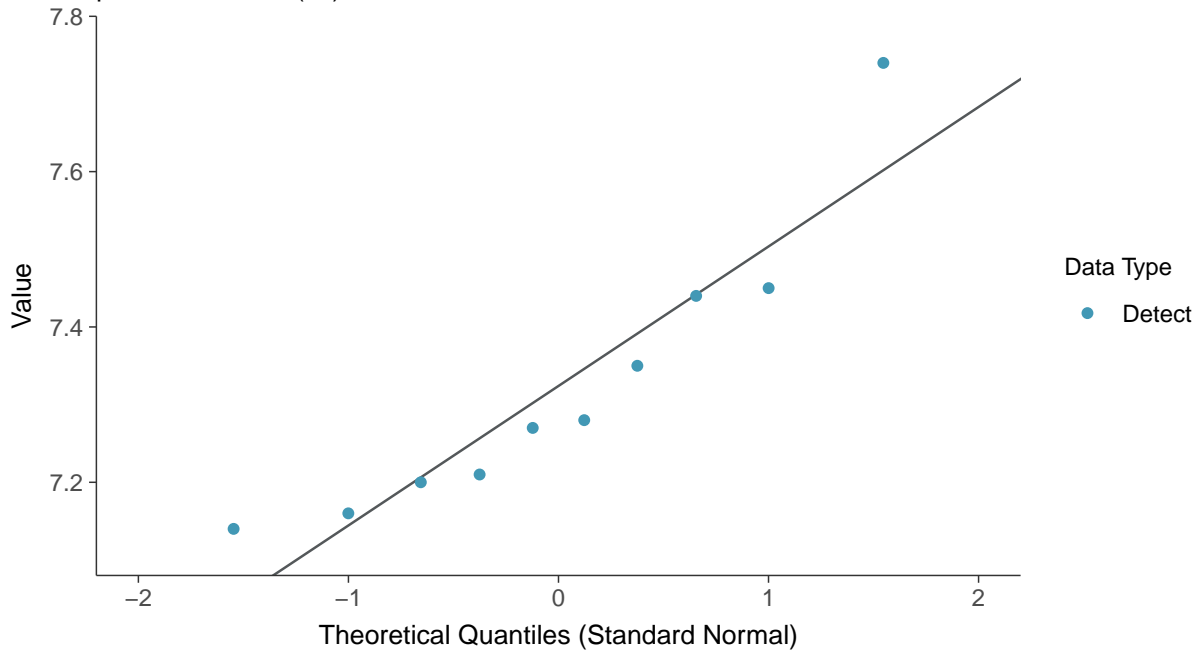
pH, Field, MW-9 (su)





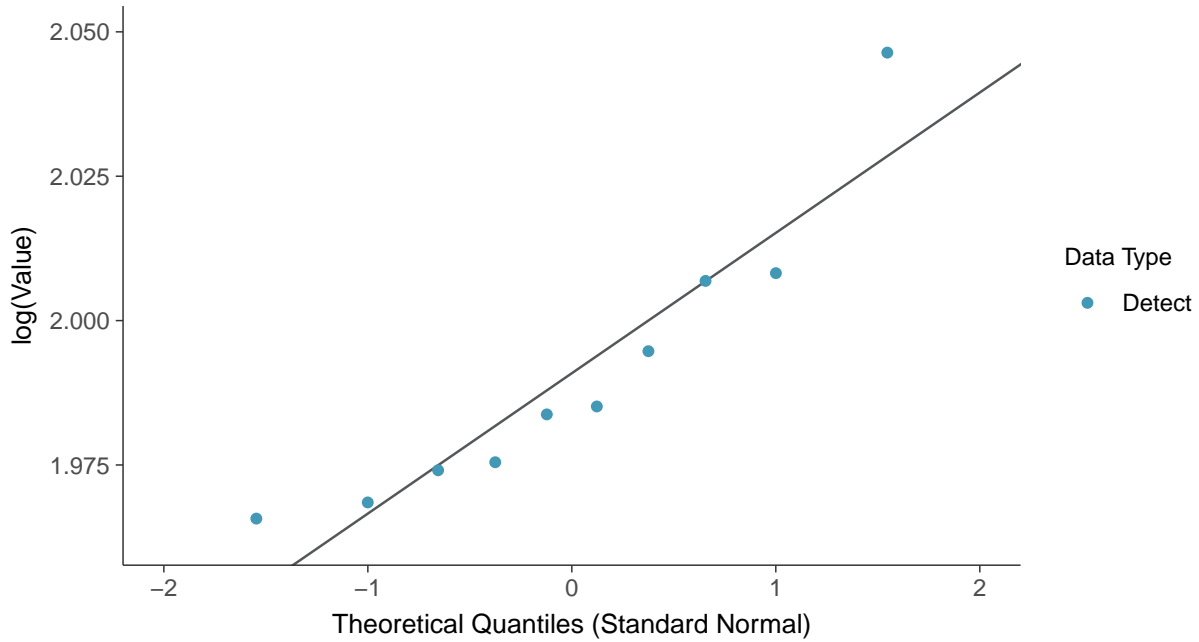
Normal Q-Q plot

pH, Field, MW-9 (su)



Lognormal Q-Q plot

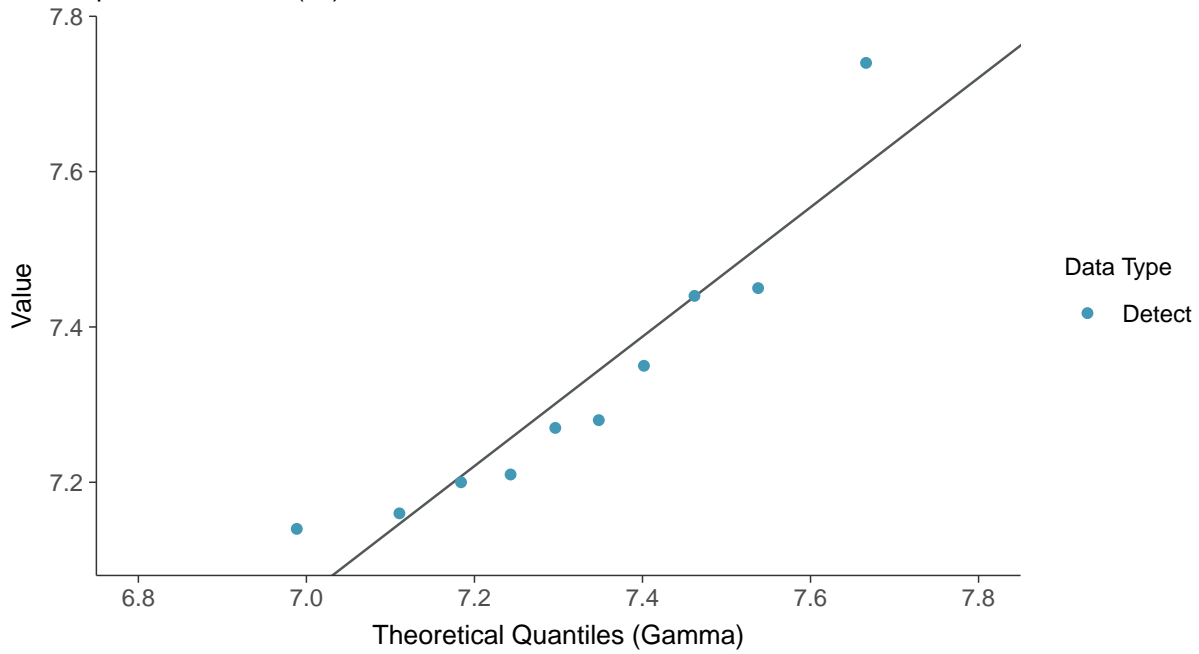
pH, Field, MW-9 (su)





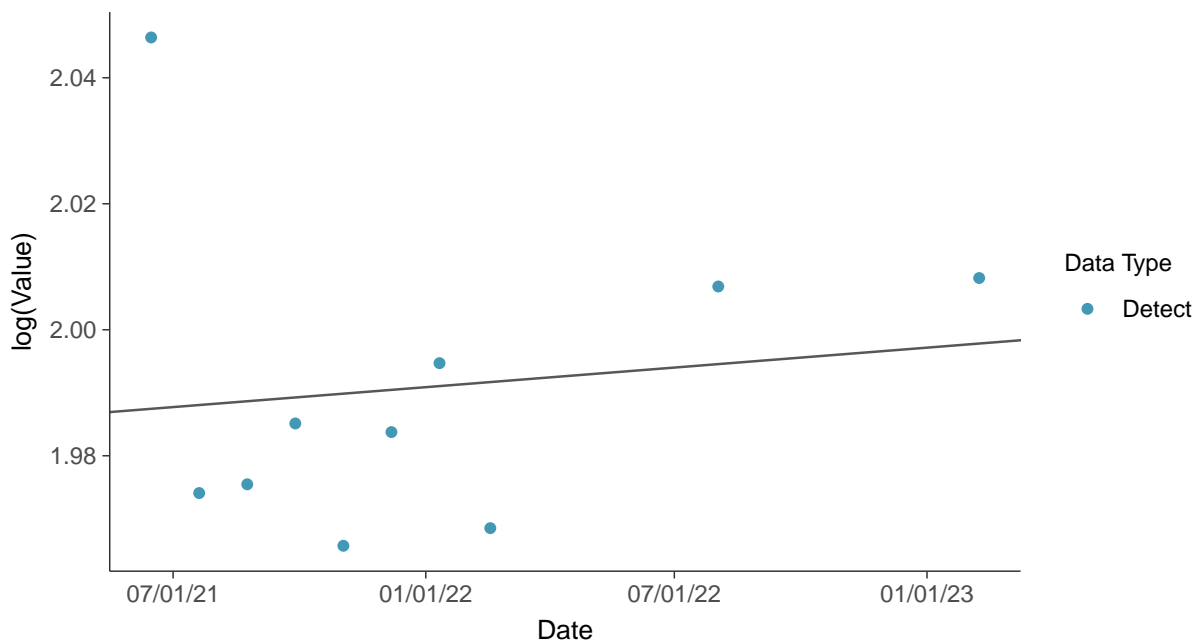
Gamma Q-Q plot

pH, Field, MW-9 (su)



Trend Regression: Lognormal MLE

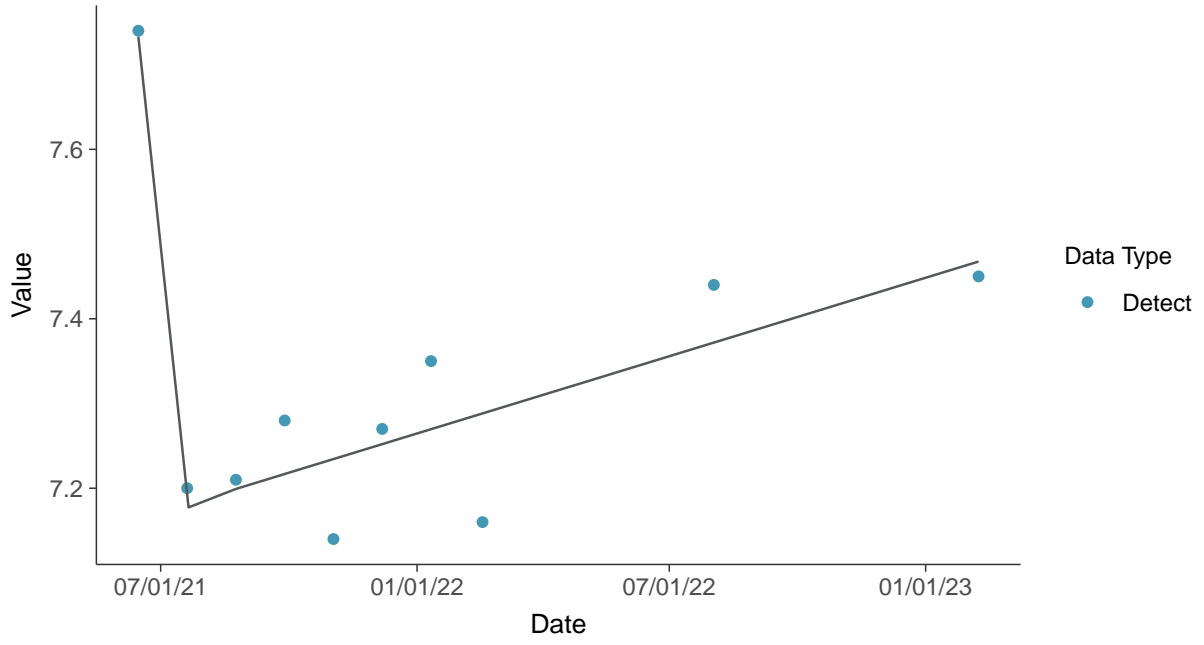
pH, Field, MW-9 (su)





Trend Regression: Piecewise Linear-Linear

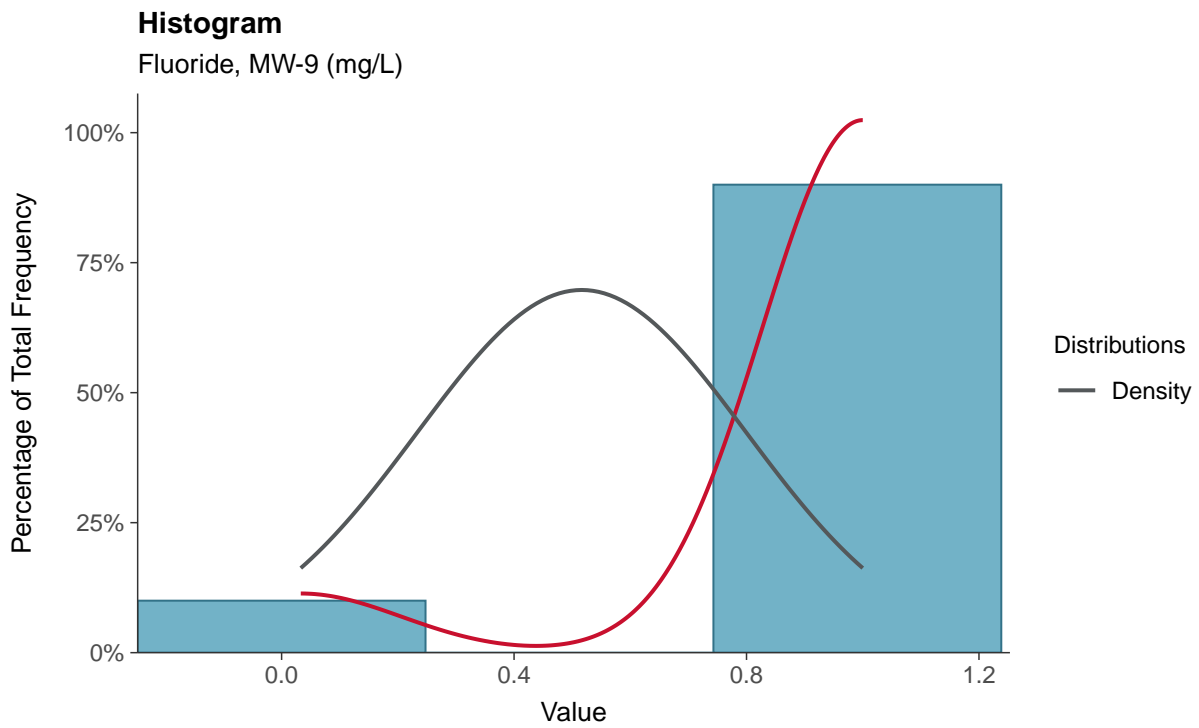
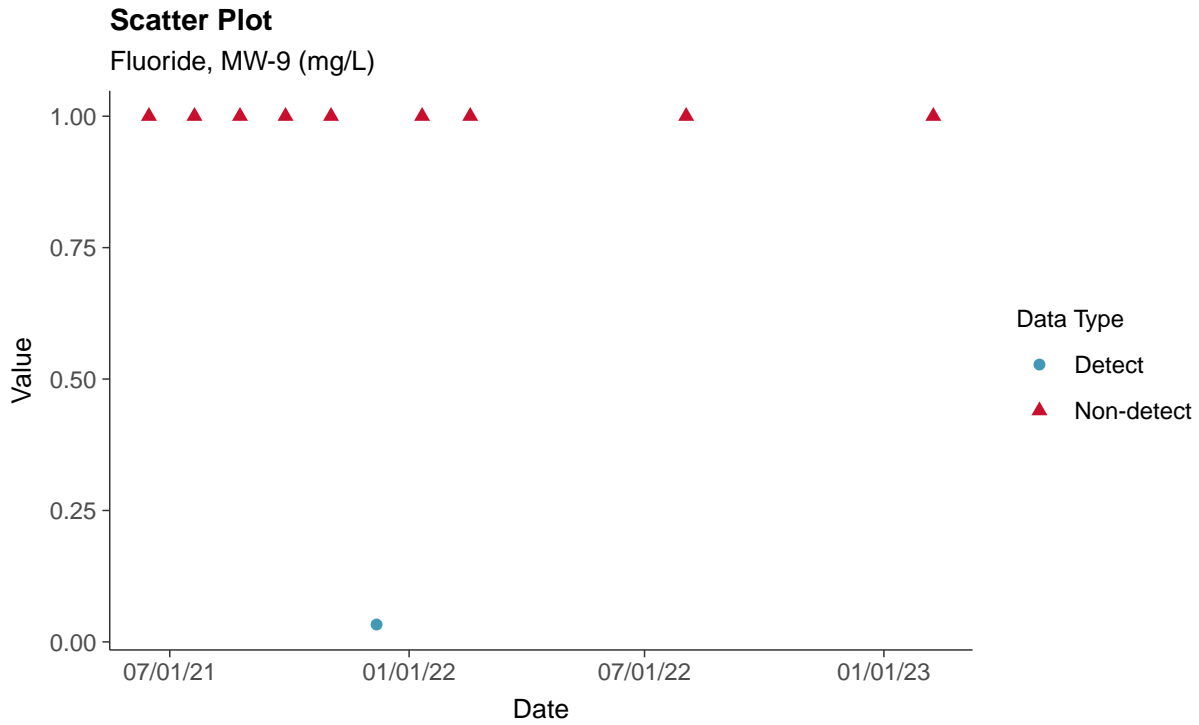
pH, Field, MW-9 (su)





Appendix IV: Fluoride, MW-9

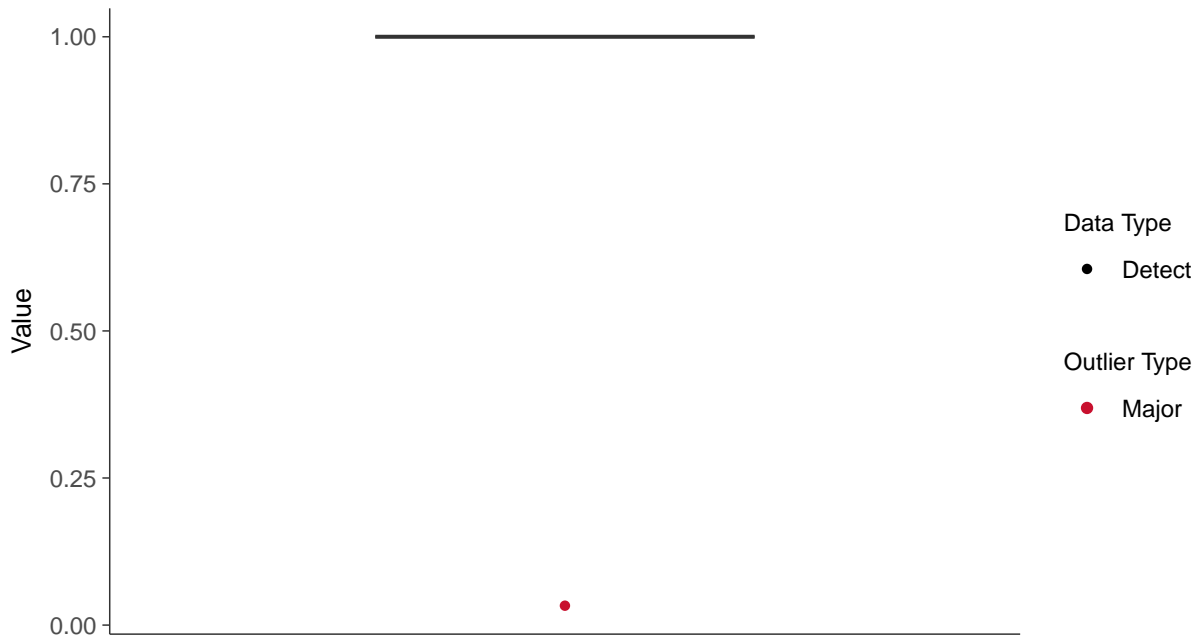
ID: 09_2_04





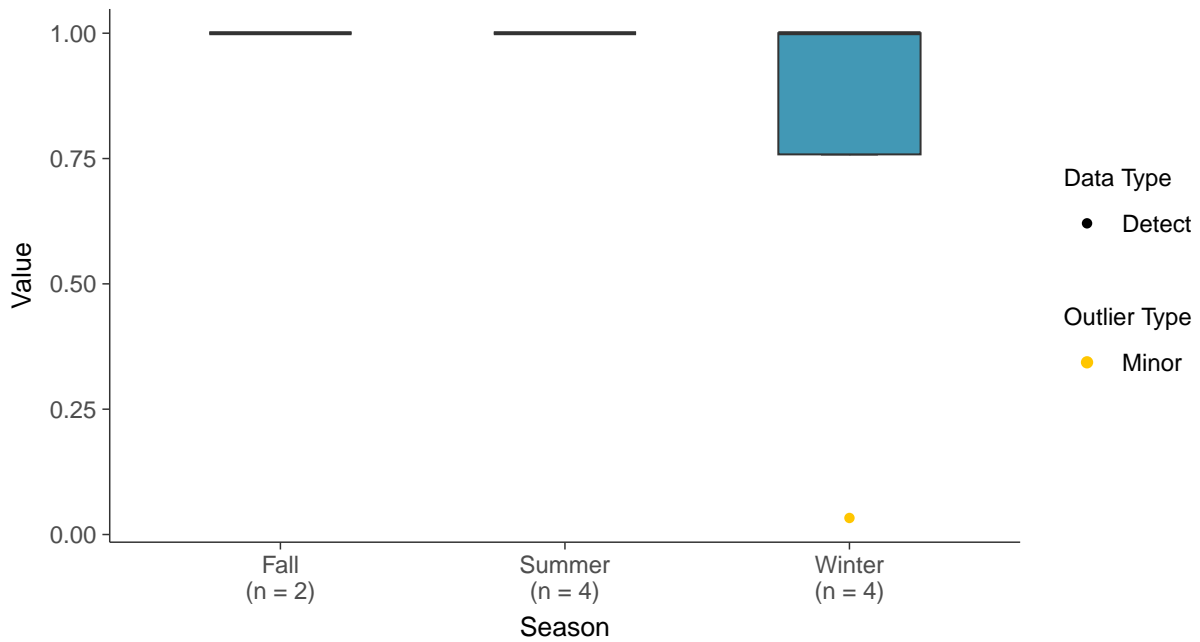
Boxplot

Fluoride, MW-9 (mg/L)



Boxplot by Season

Fluoride, MW-9 (mg/L)

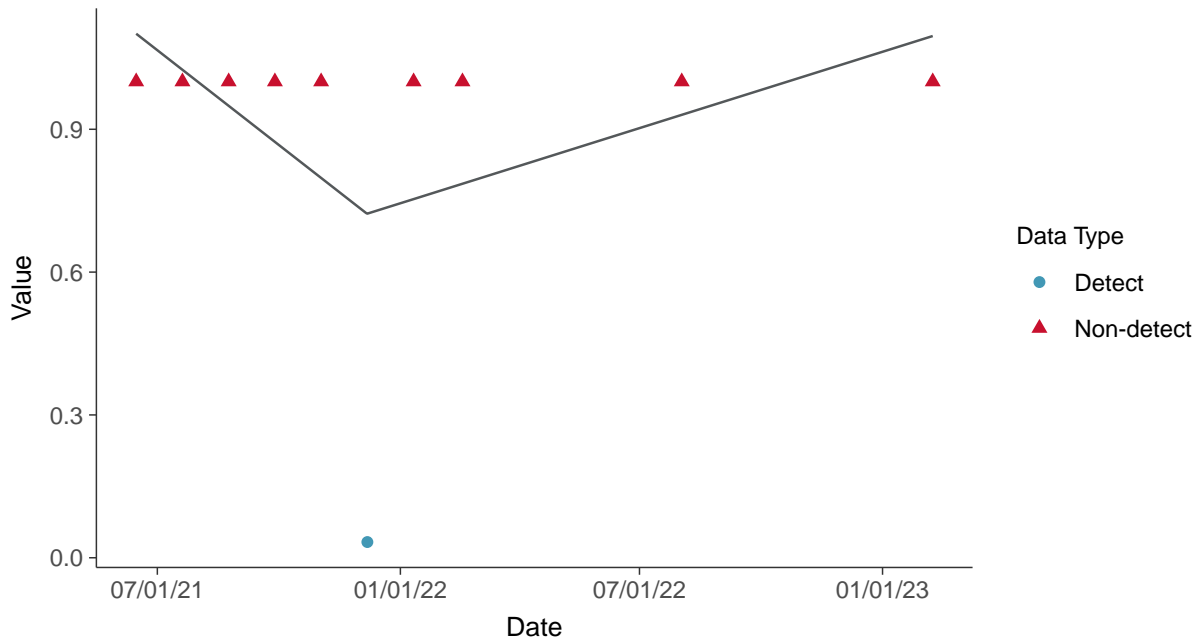




Downgradient Wells MW-2, MW-3, MW-5, MW-6, MW-7, MW-7B, MW-8, MW-9, MW-10, MW-13, MW-14, MW-15

Trend Regression: Piecewise Linear-Linear

Fluoride, MW-9 (mg/L)



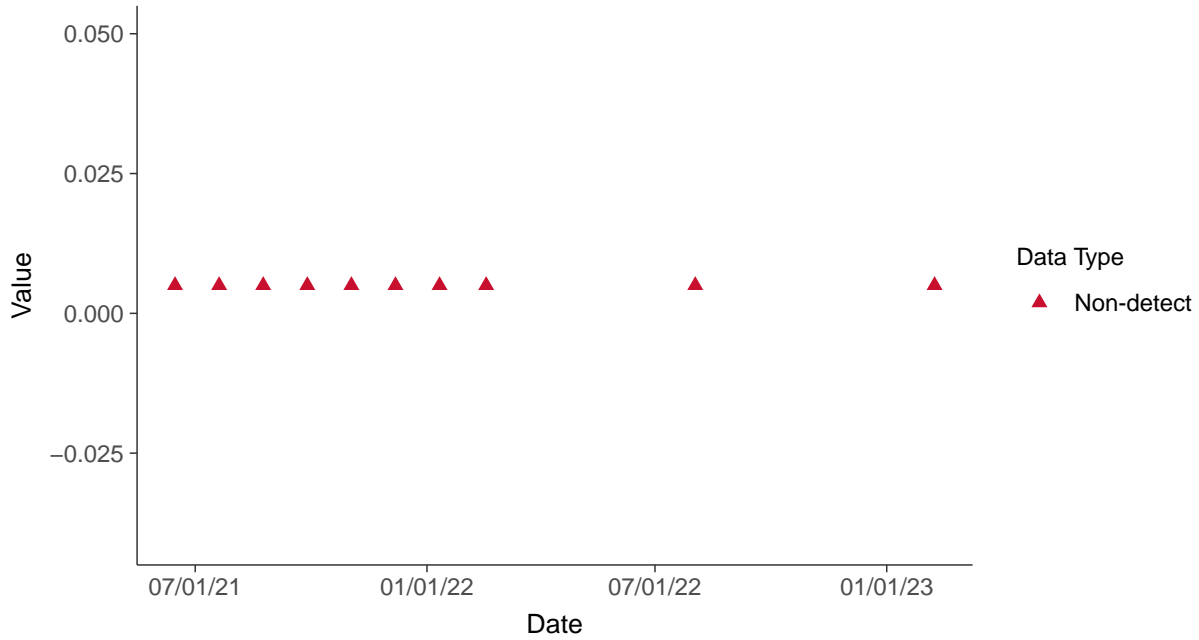


Appendix IV: Antimony, MW-9

ID: 09_2_08

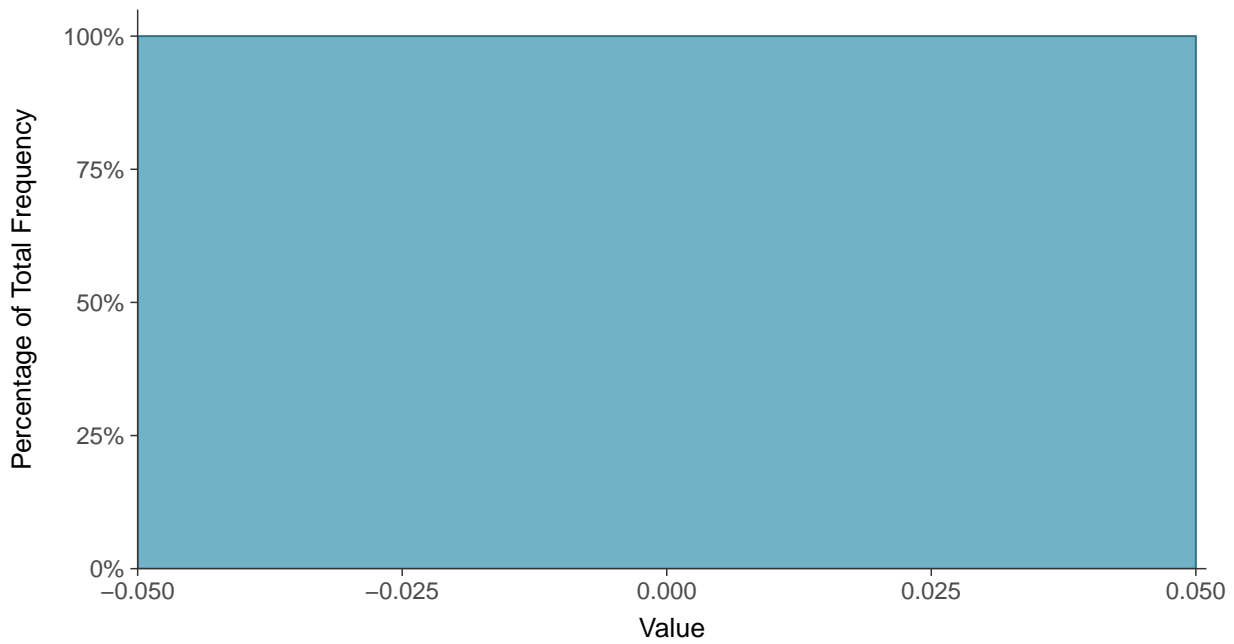
Scatter Plot

Antimony, MW-9 (mg/L)



Histogram

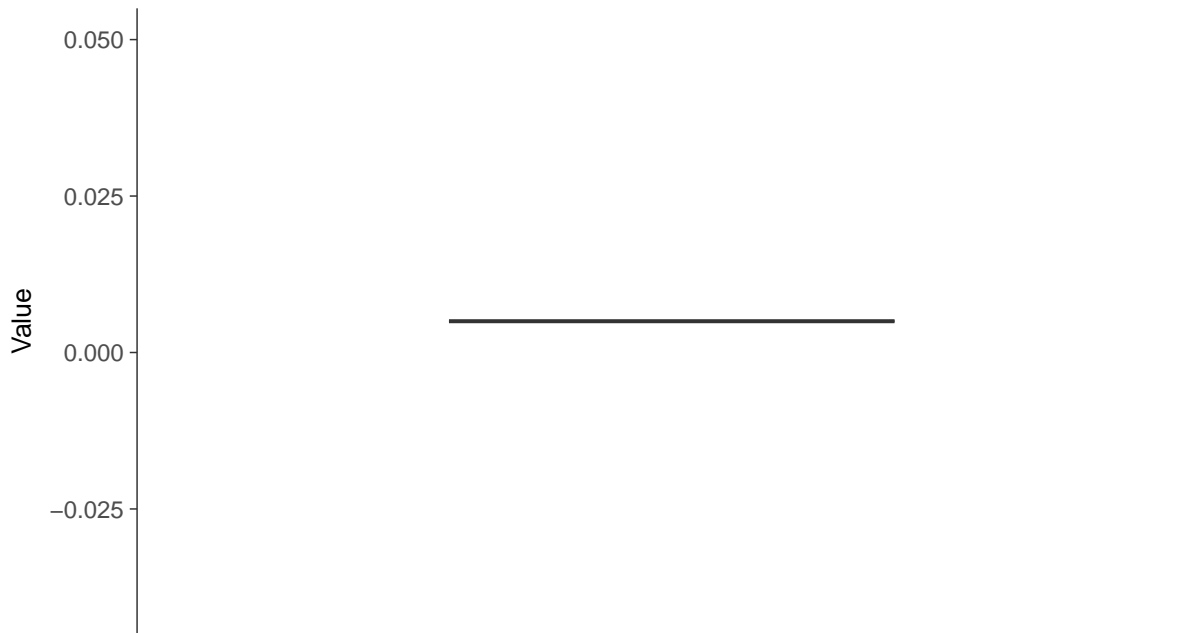
Antimony, MW-9 (mg/L)





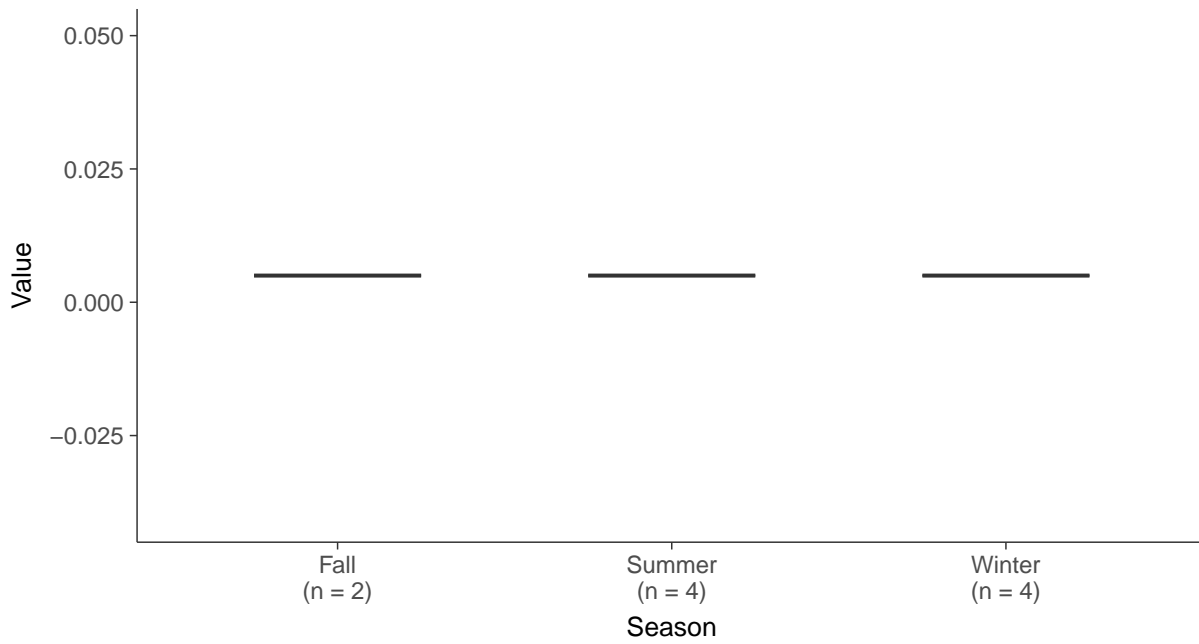
Boxplot

Antimony, MW-9 (mg/L)



Boxplot by Season

Antimony, MW-9 (mg/L)



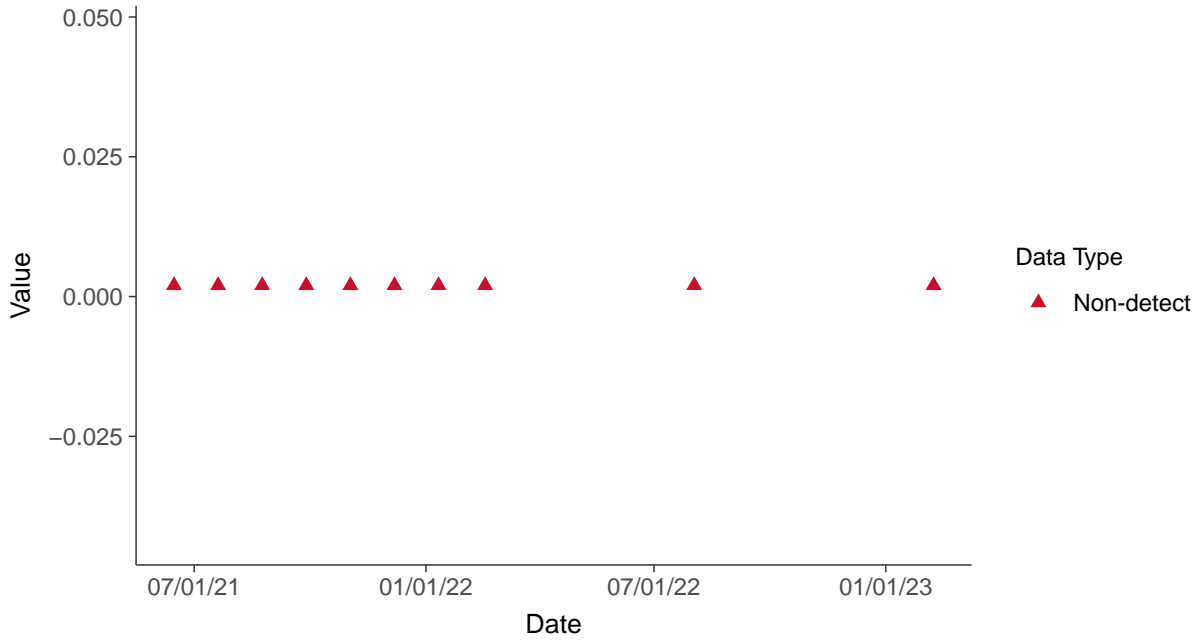


Appendix IV: Arsenic, MW-9

ID: 09_2_09

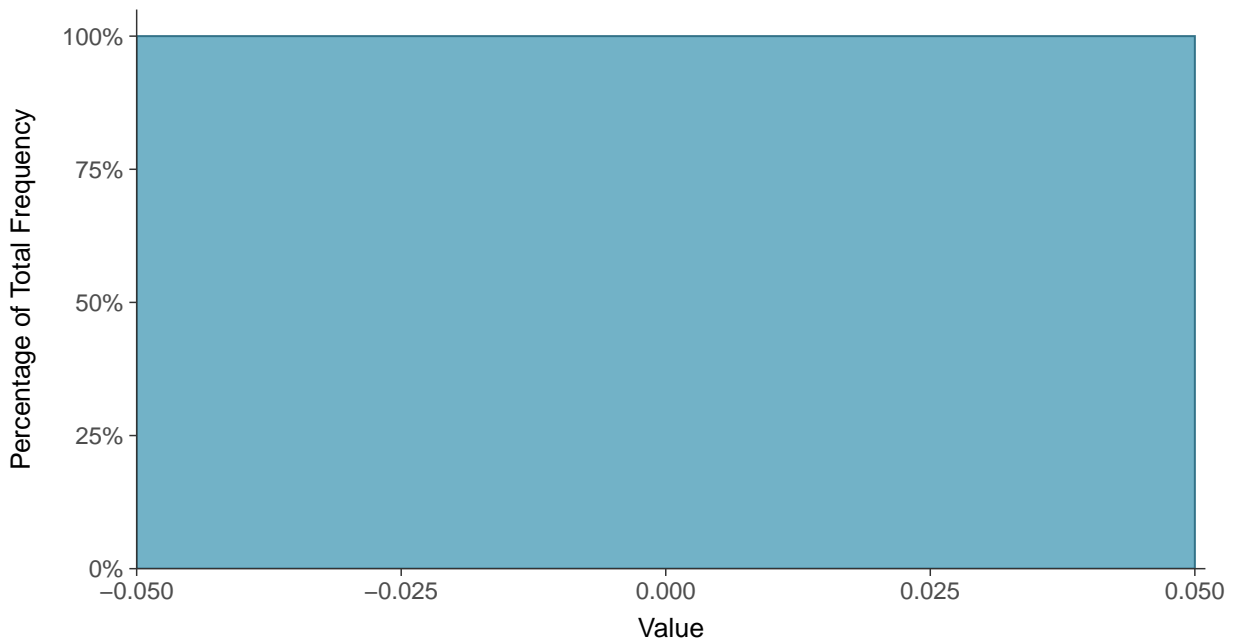
Scatter Plot

Arsenic, MW-9 (mg/L)



Histogram

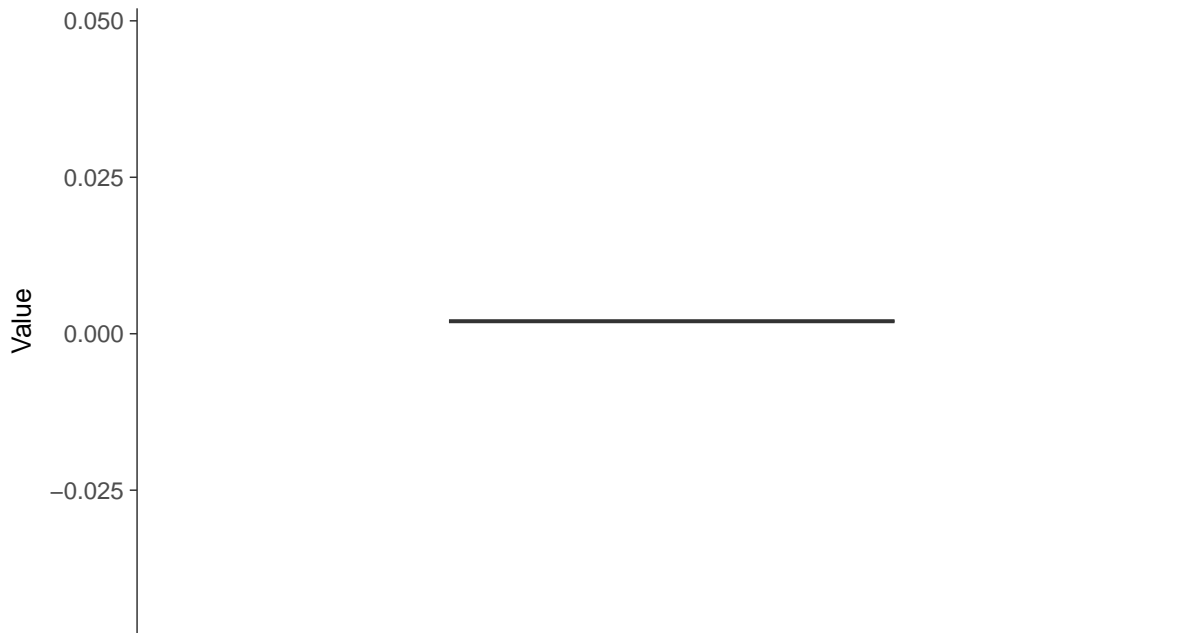
Arsenic, MW-9 (mg/L)





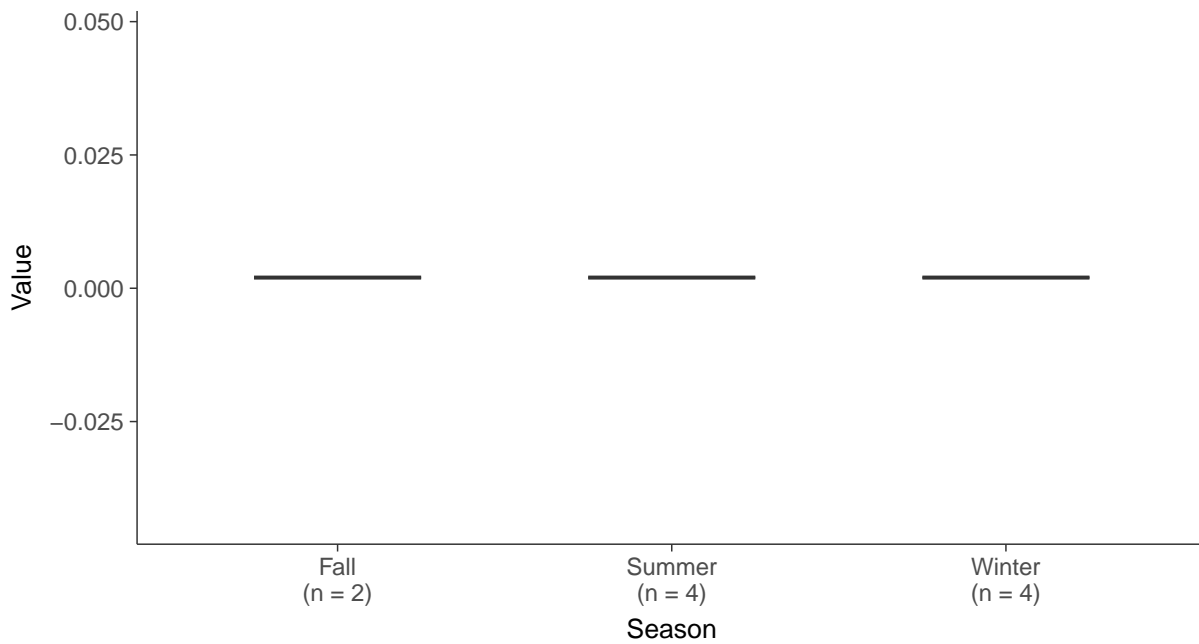
Boxplot

Arsenic, MW-9 (mg/L)



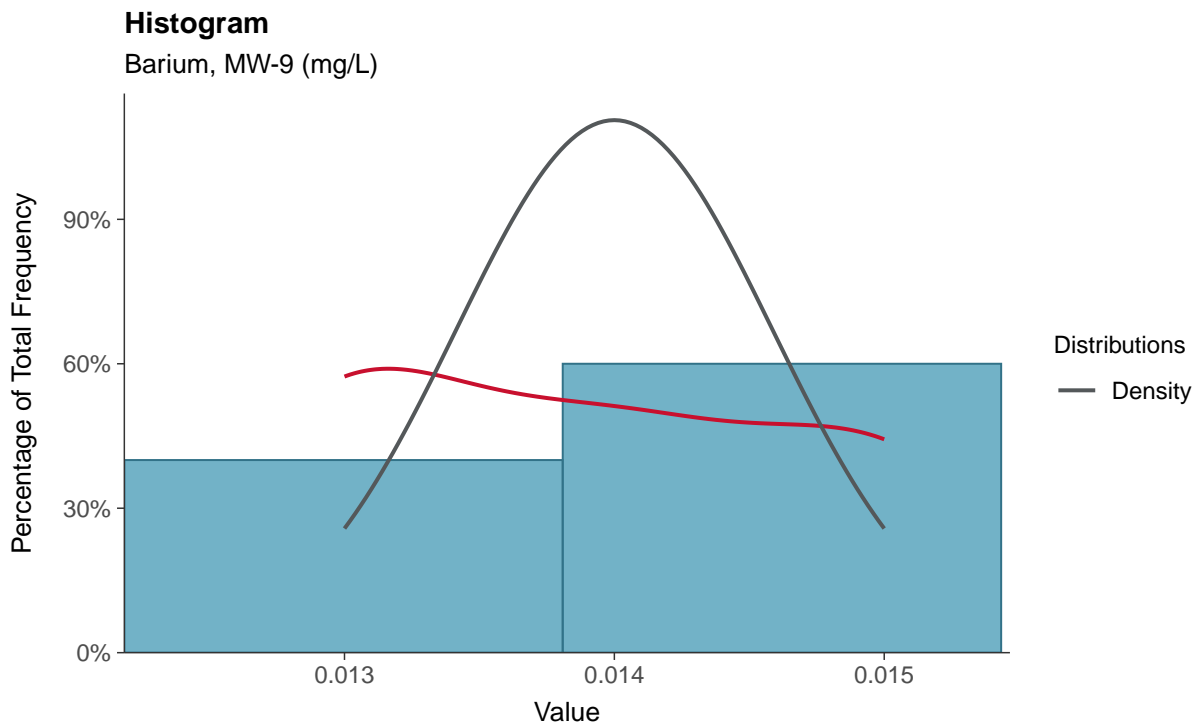
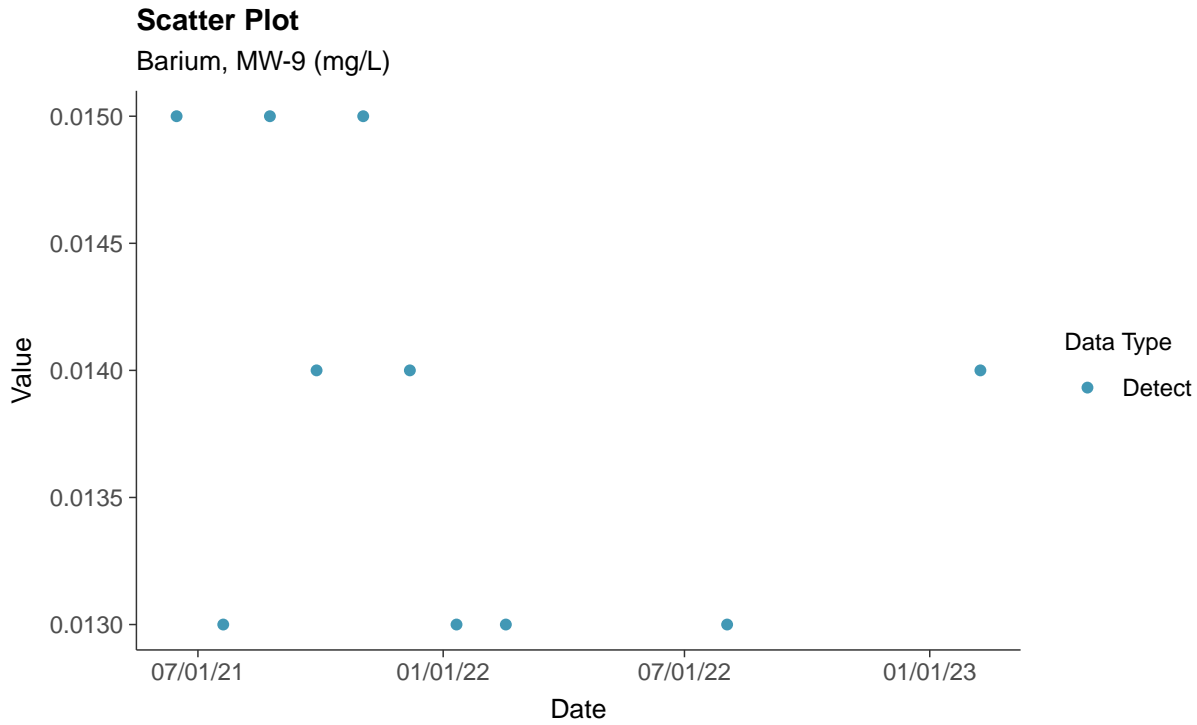
Boxplot by Season

Arsenic, MW-9 (mg/L)



Appendix IV: Barium, MW-9

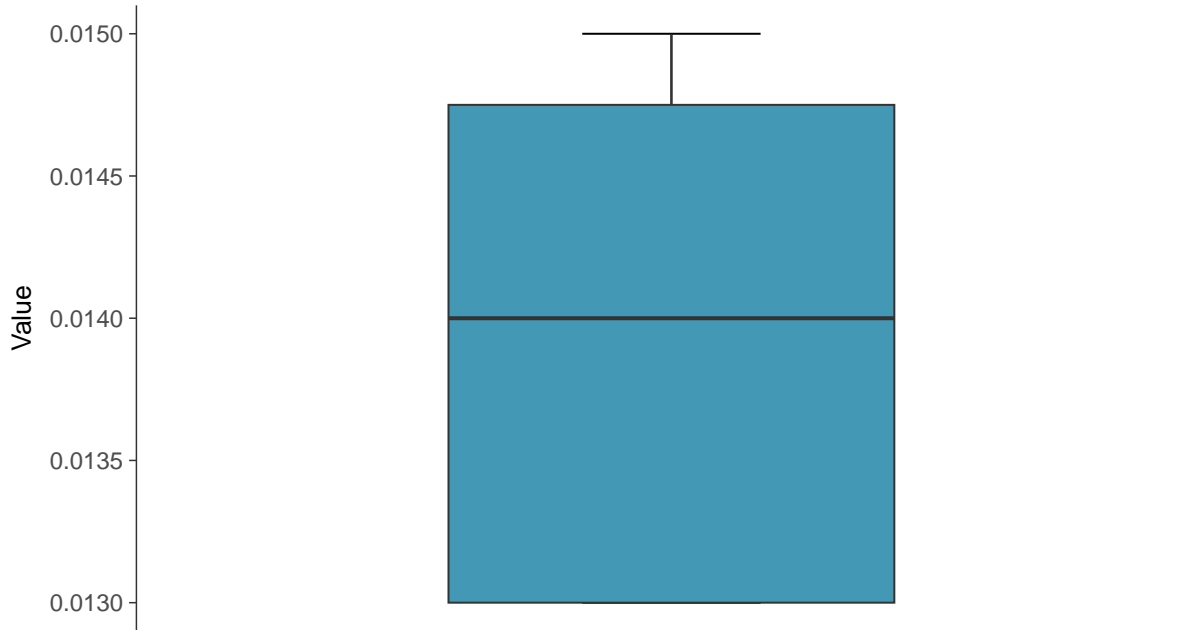
ID: 09_2_10





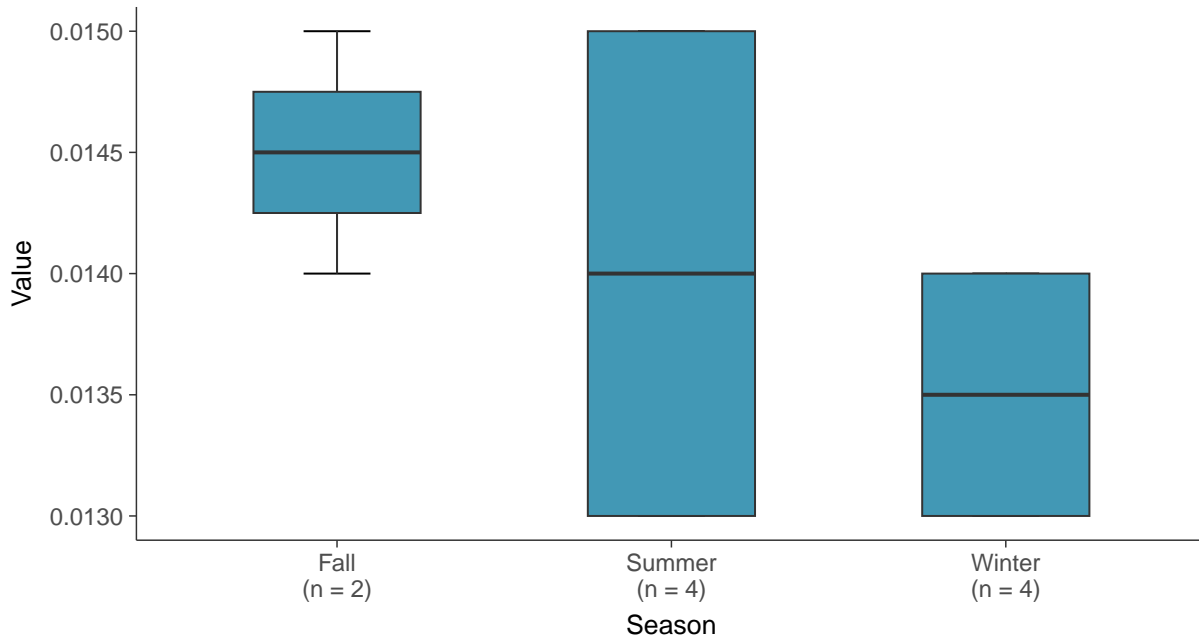
Boxplot

Barium, MW-9 (mg/L)



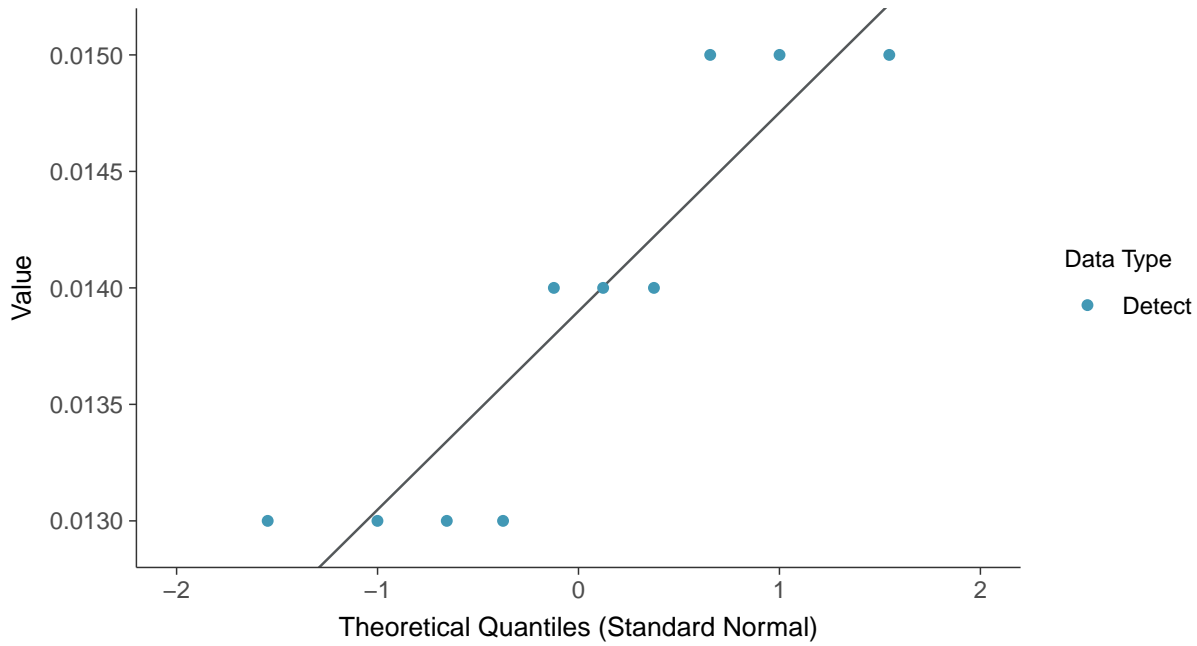
Boxplot by Season

Barium, MW-9 (mg/L)

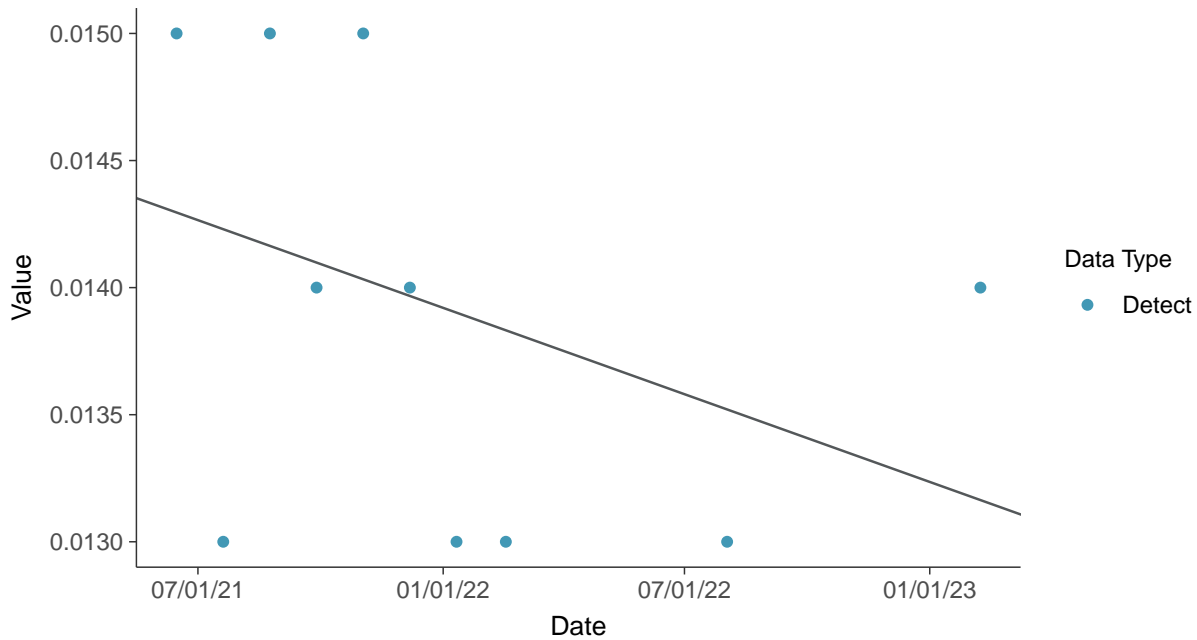




Normal Q-Q plot
Barium, MW-9 (mg/L)



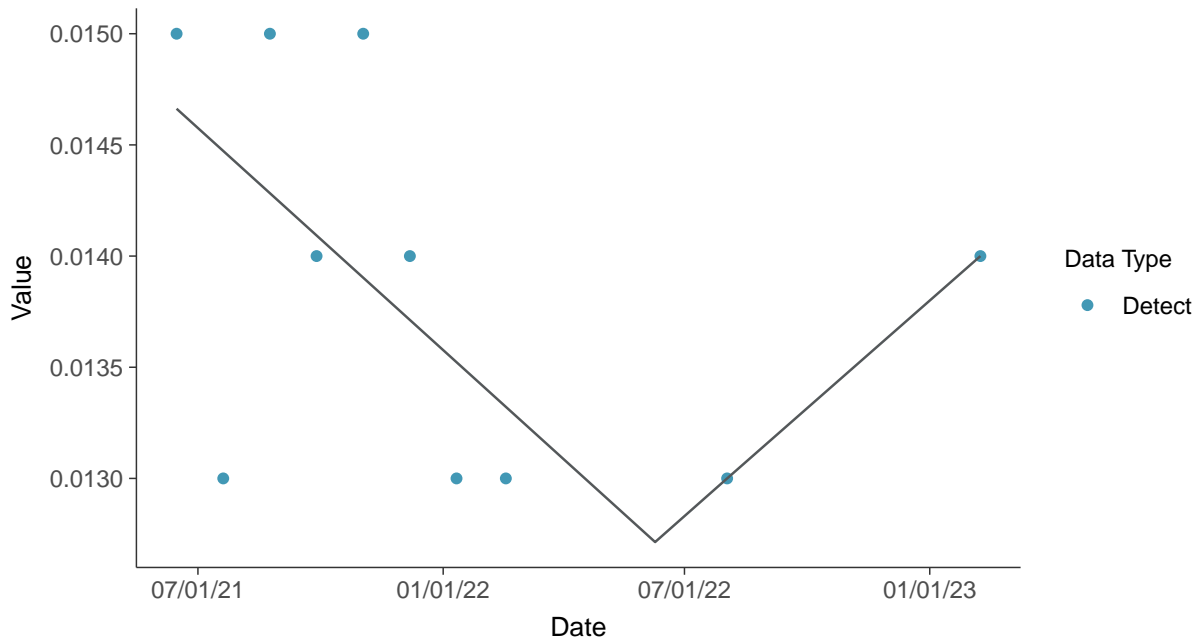
Trend Regression: Mann-Kendall/Theil-Sen Estimate
Barium, MW-9 (mg/L)





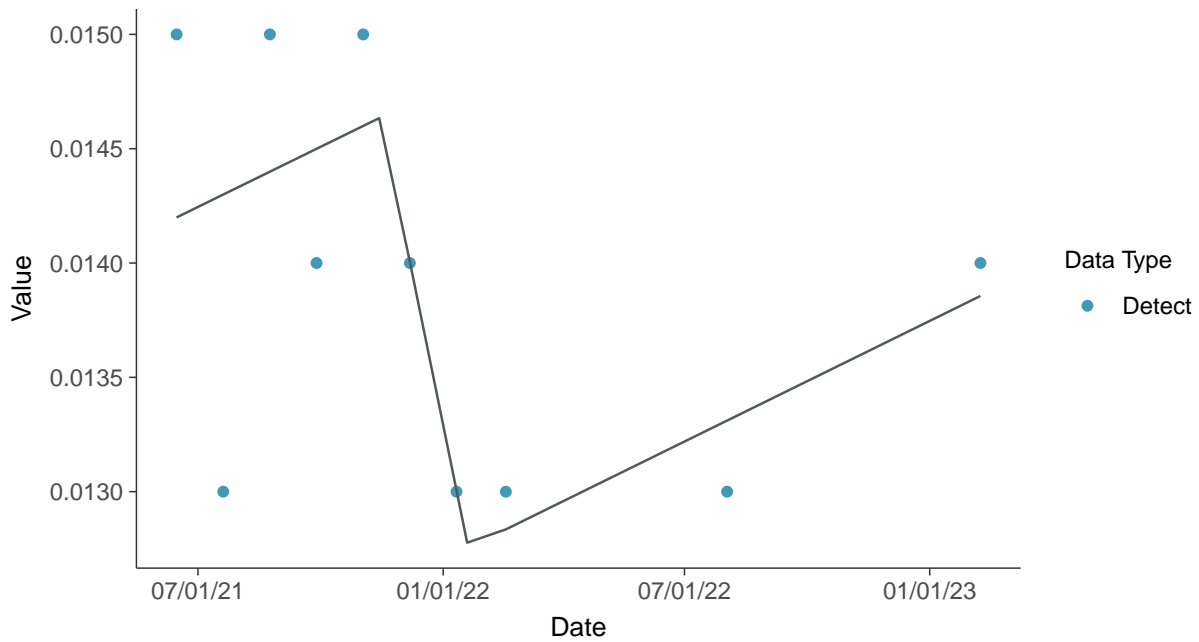
Trend Regression: Piecewise Linear-Linear

Barium, MW-9 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Barium, MW-9 (mg/L)



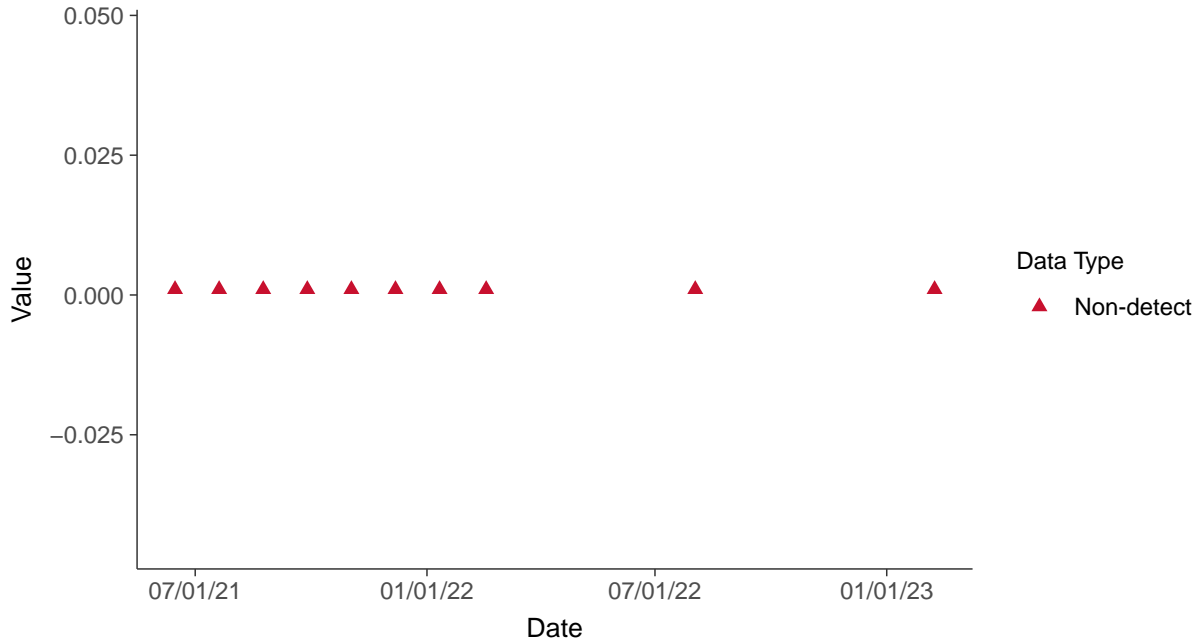


Appendix IV: Beryllium, MW-9

ID: 09_2_11

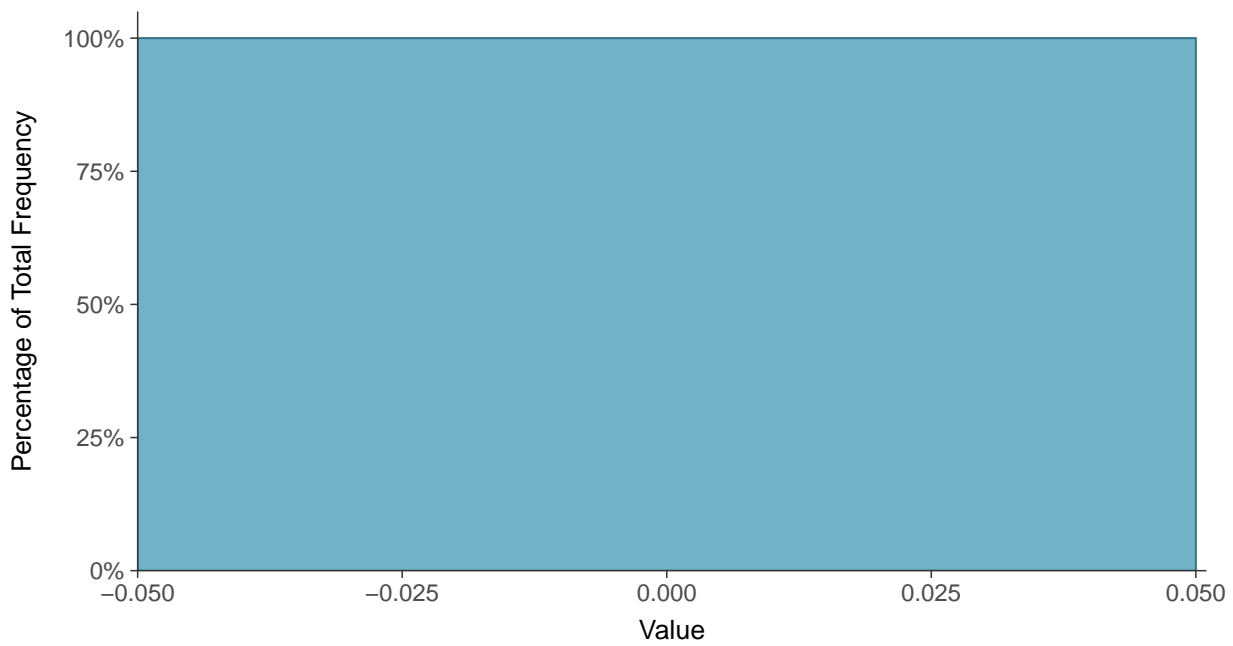
Scatter Plot

Beryllium, MW-9 (mg/L)



Histogram

Beryllium, MW-9 (mg/L)





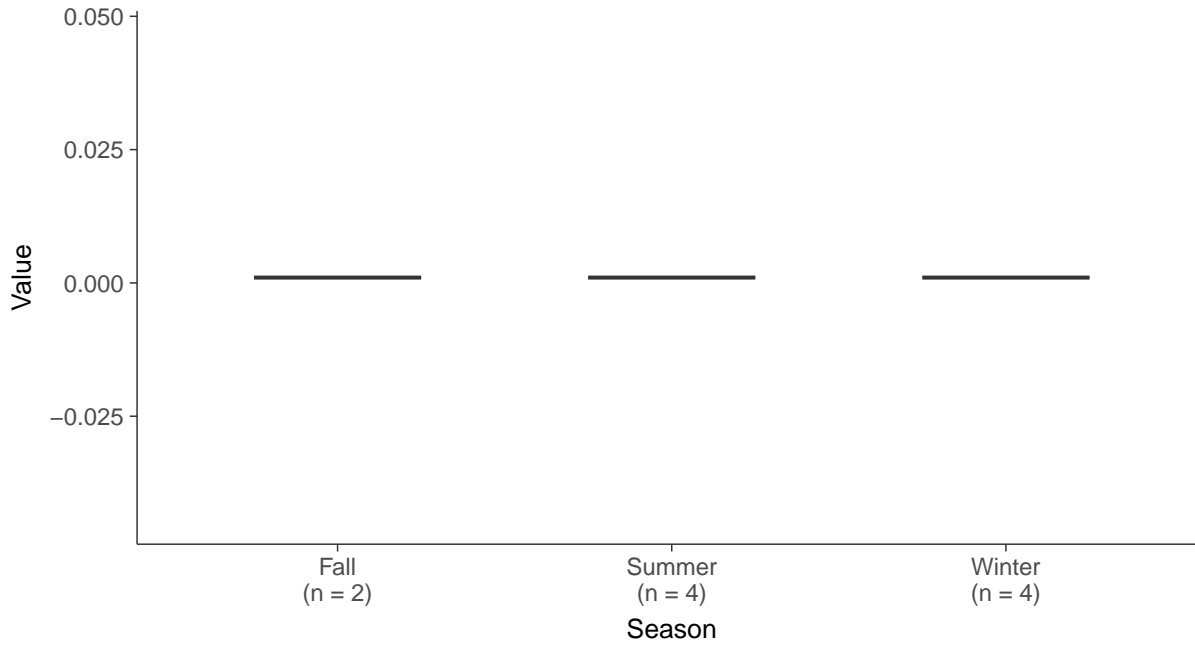
Boxplot

Beryllium, MW-9 (mg/L)



Boxplot by Season

Beryllium, MW-9 (mg/L)



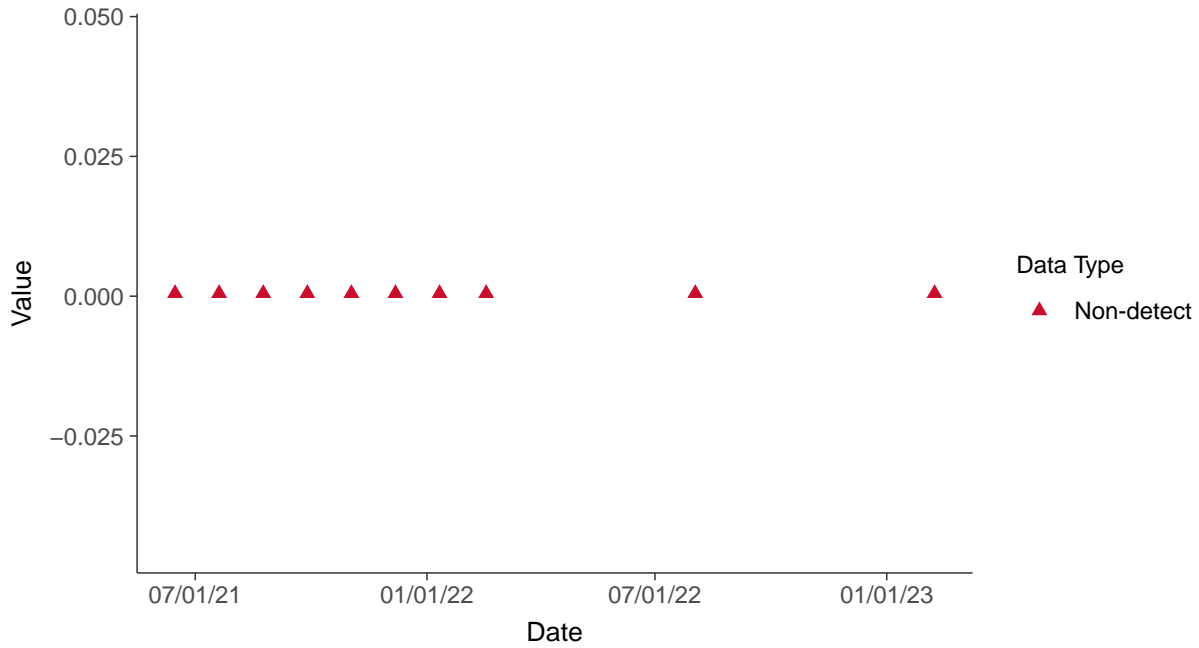


Appendix IV: Cadmium, MW-9

ID: 09_2_13

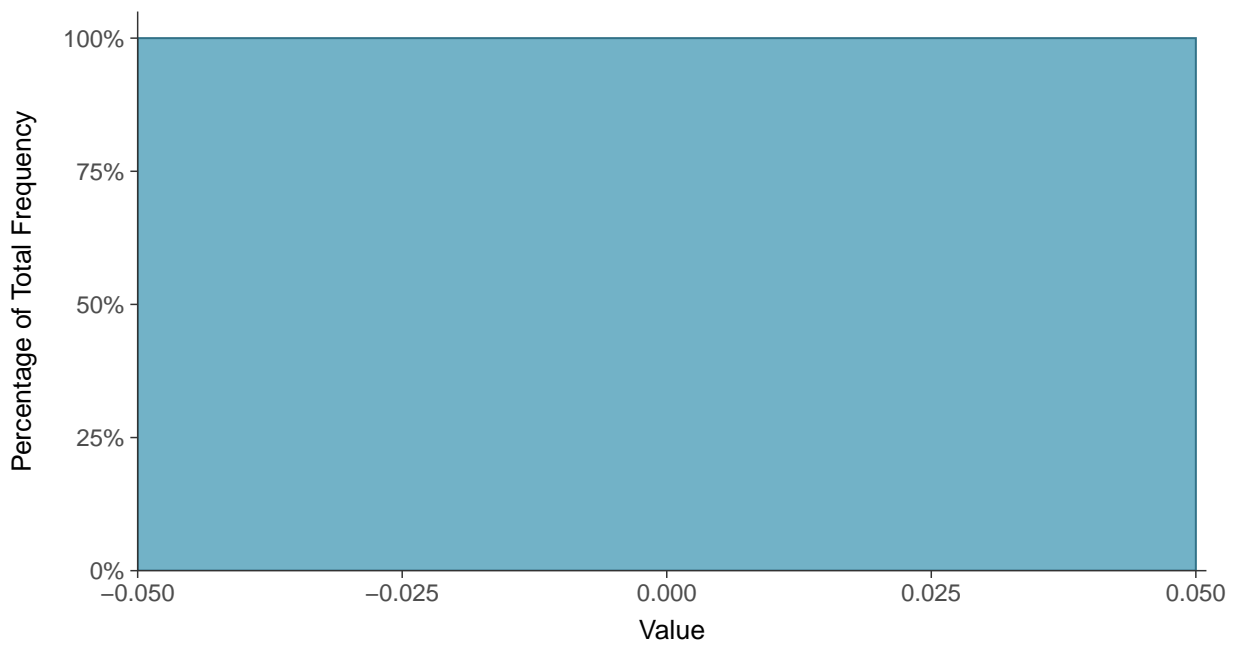
Scatter Plot

Cadmium, MW-9 (mg/L)



Histogram

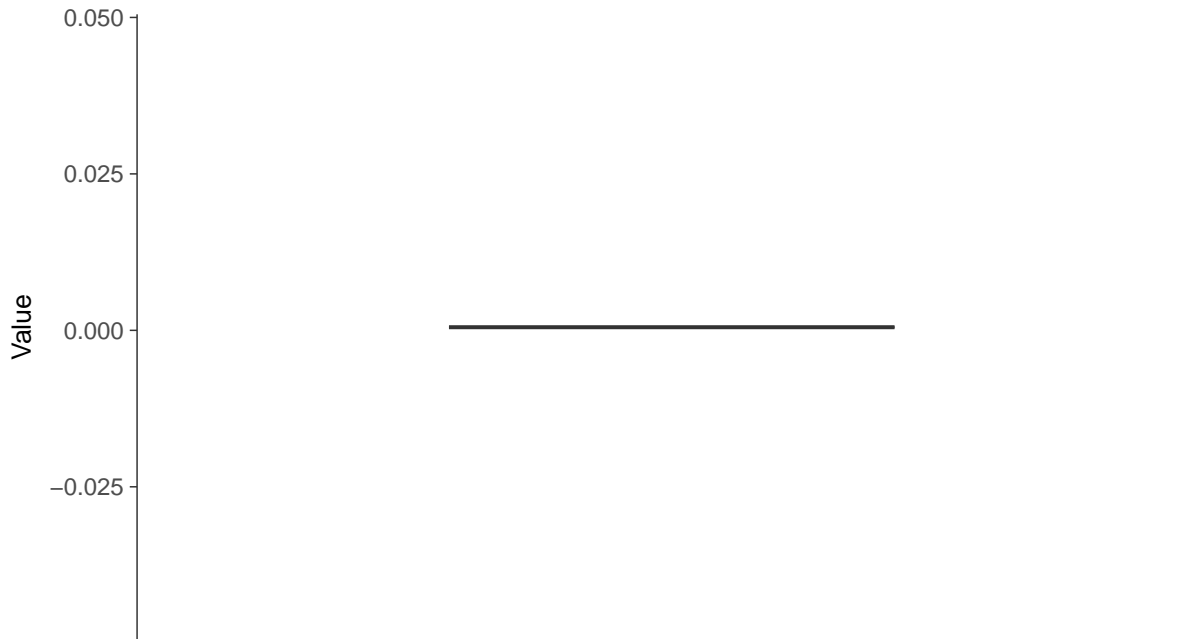
Cadmium, MW-9 (mg/L)





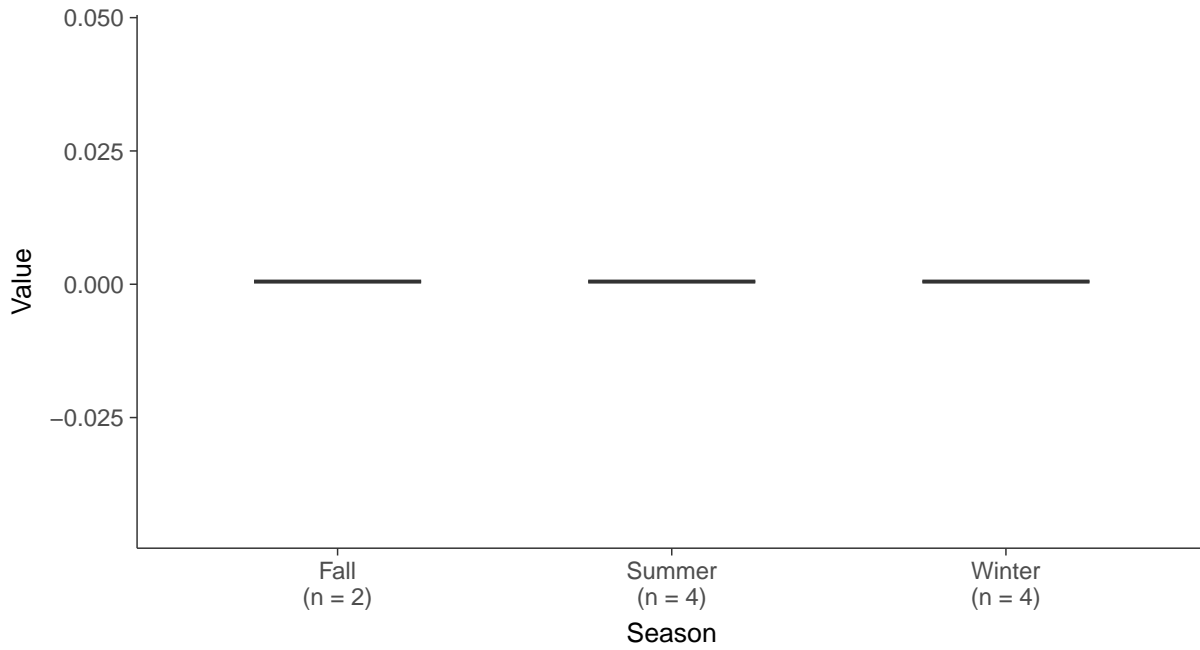
Boxplot

Cadmium, MW-9 (mg/L)



Boxplot by Season

Cadmium, MW-9 (mg/L)



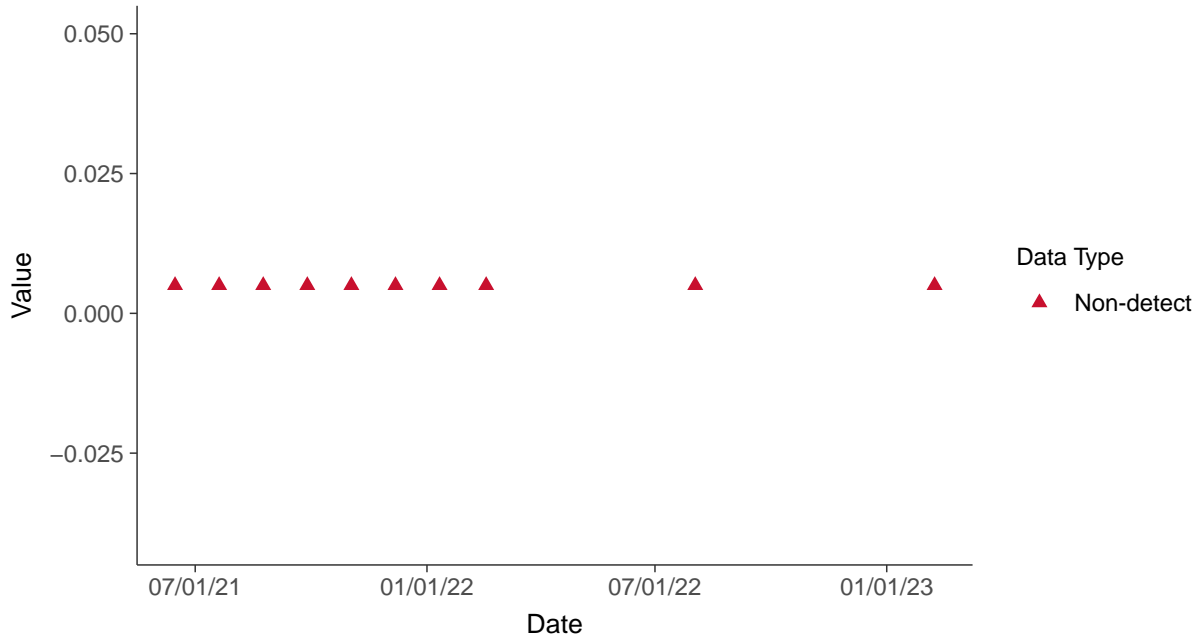


Appendix IV: Chromium, MW-9

ID: 09_2_15

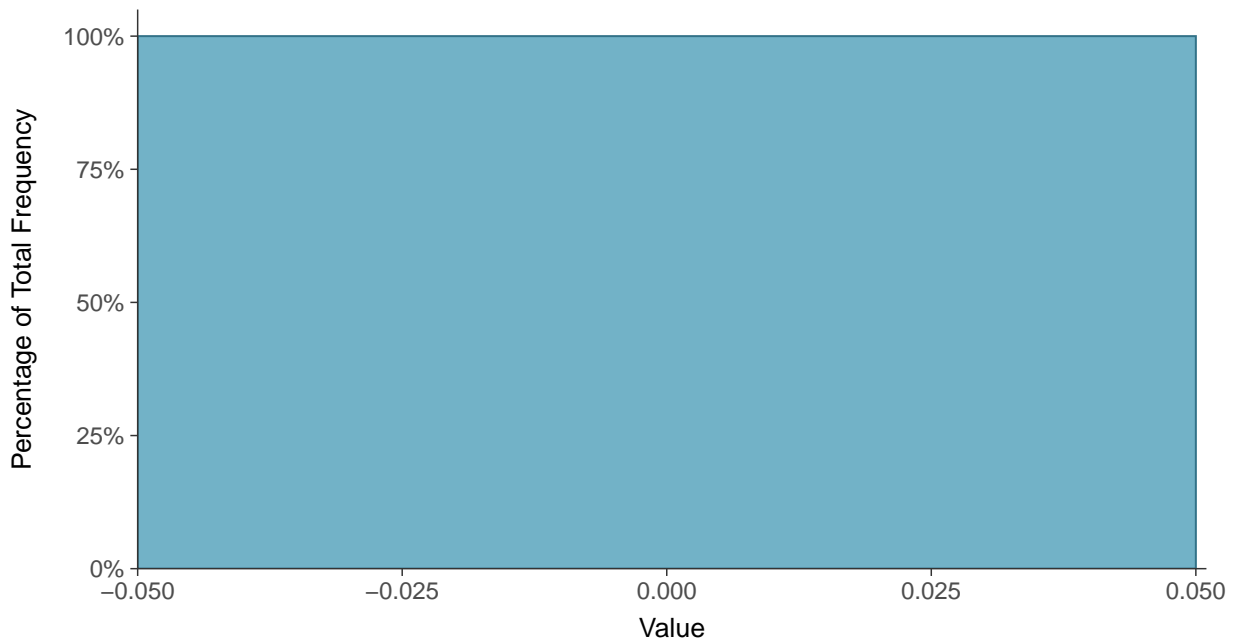
Scatter Plot

Chromium, MW-9 (mg/L)



Histogram

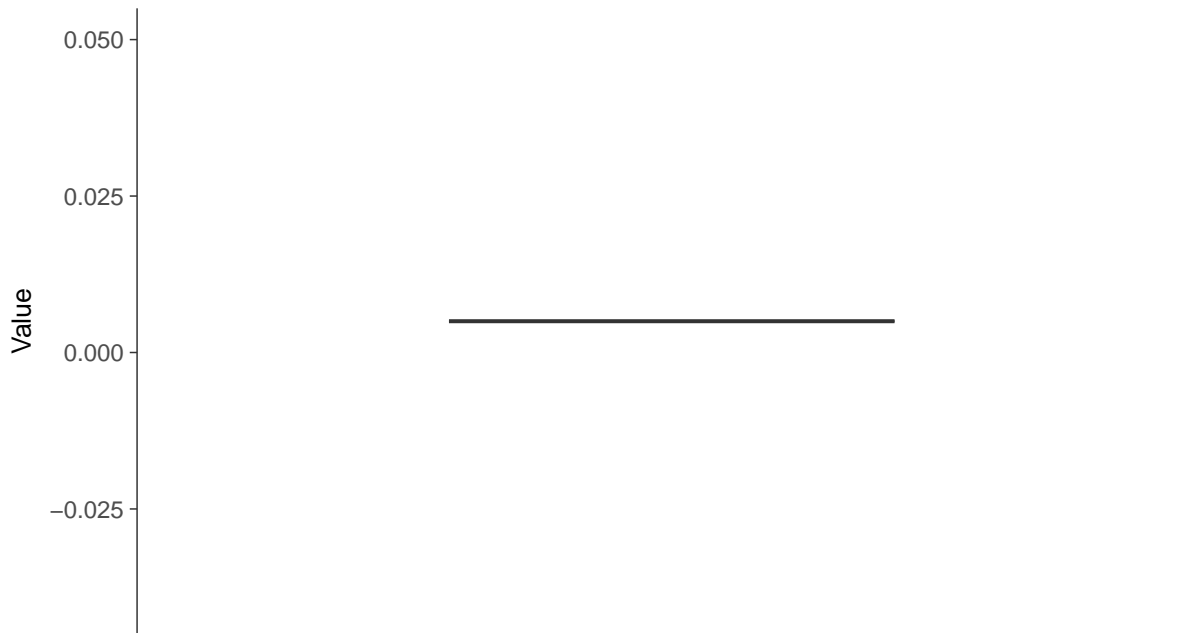
Chromium, MW-9 (mg/L)





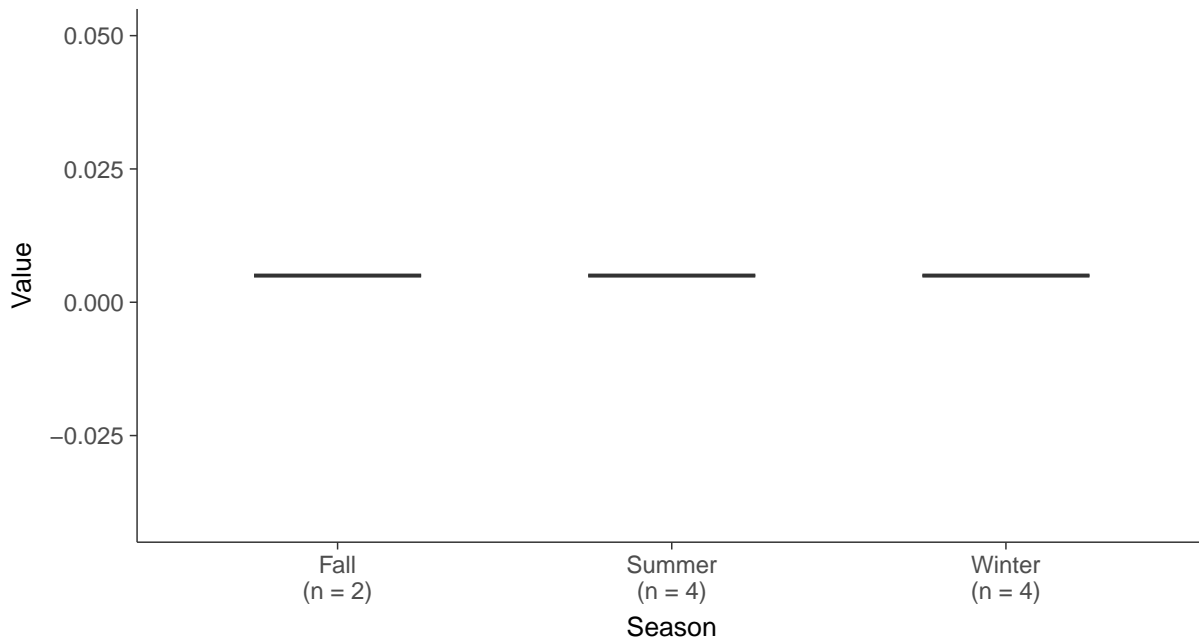
Boxplot

Chromium, MW-9 (mg/L)



Boxplot by Season

Chromium, MW-9 (mg/L)



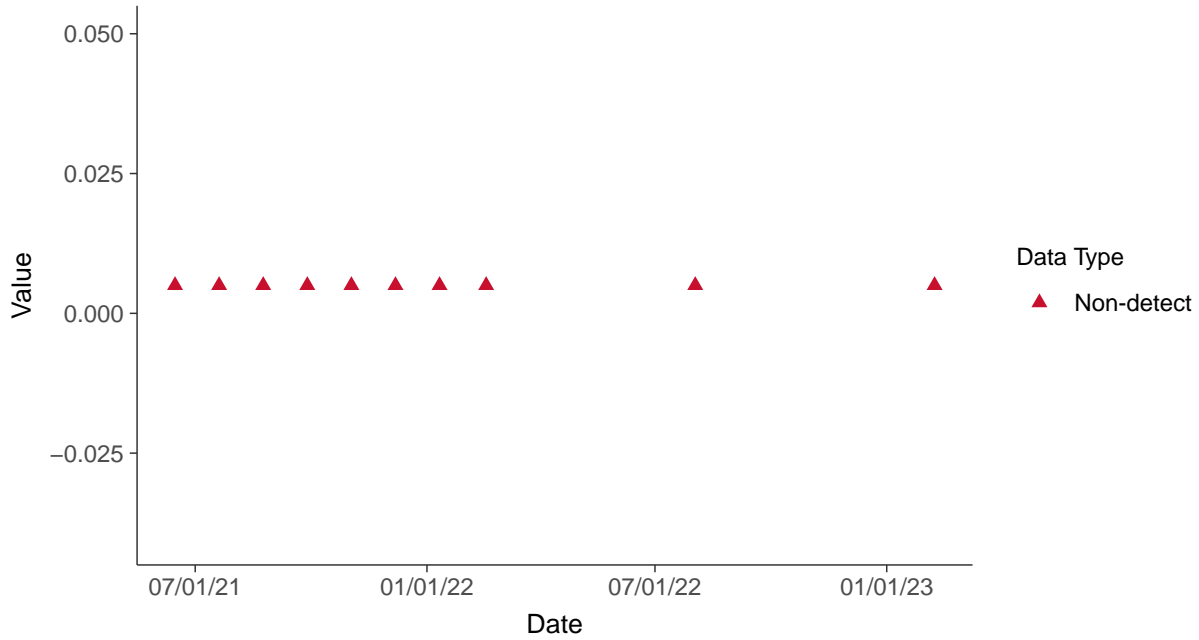


Appendix IV: Cobalt, MW-9

ID: 09_2_16

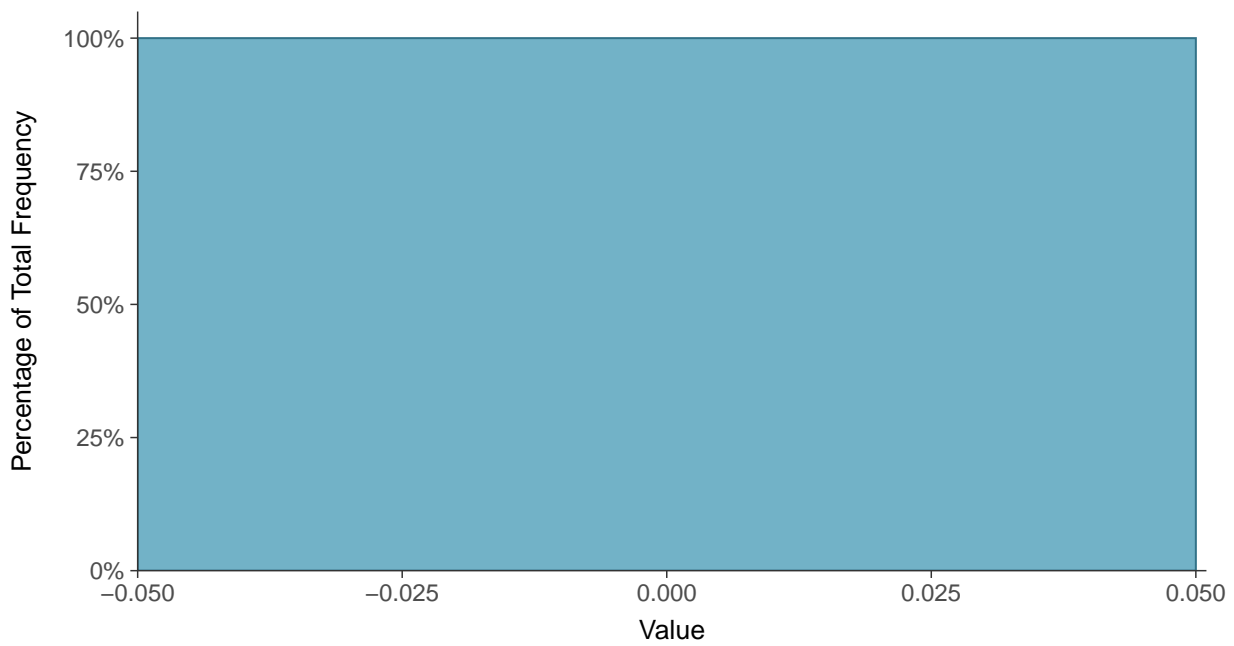
Scatter Plot

Cobalt, MW-9 (mg/L)



Histogram

Cobalt, MW-9 (mg/L)





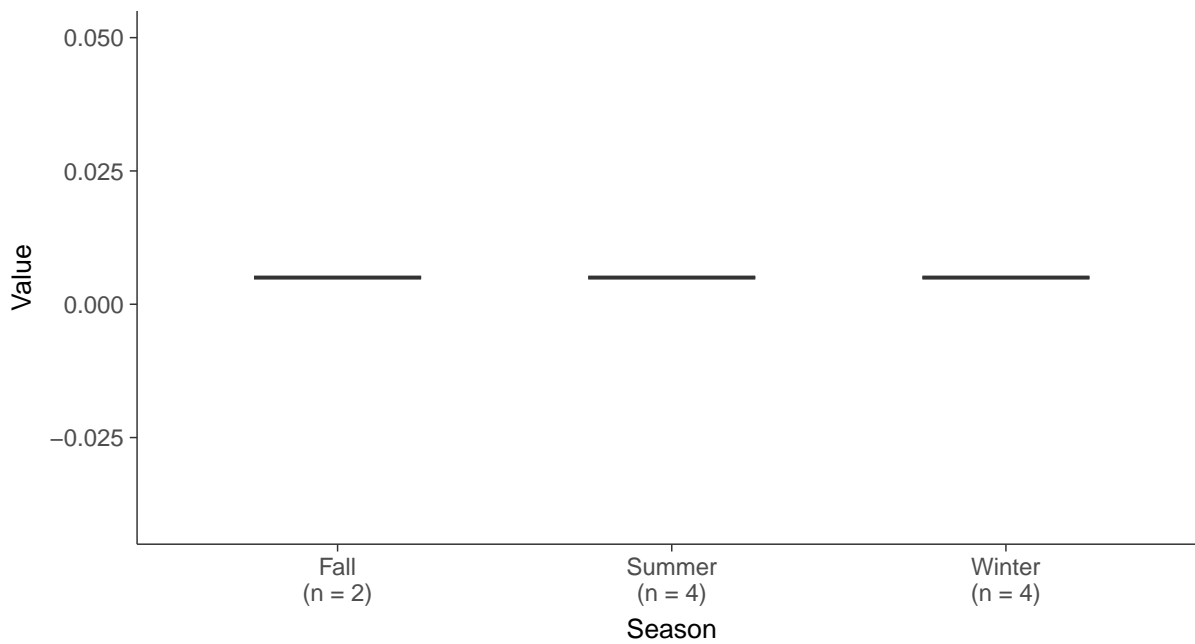
Boxplot

Cobalt, MW-9 (mg/L)



Boxplot by Season

Cobalt, MW-9 (mg/L)



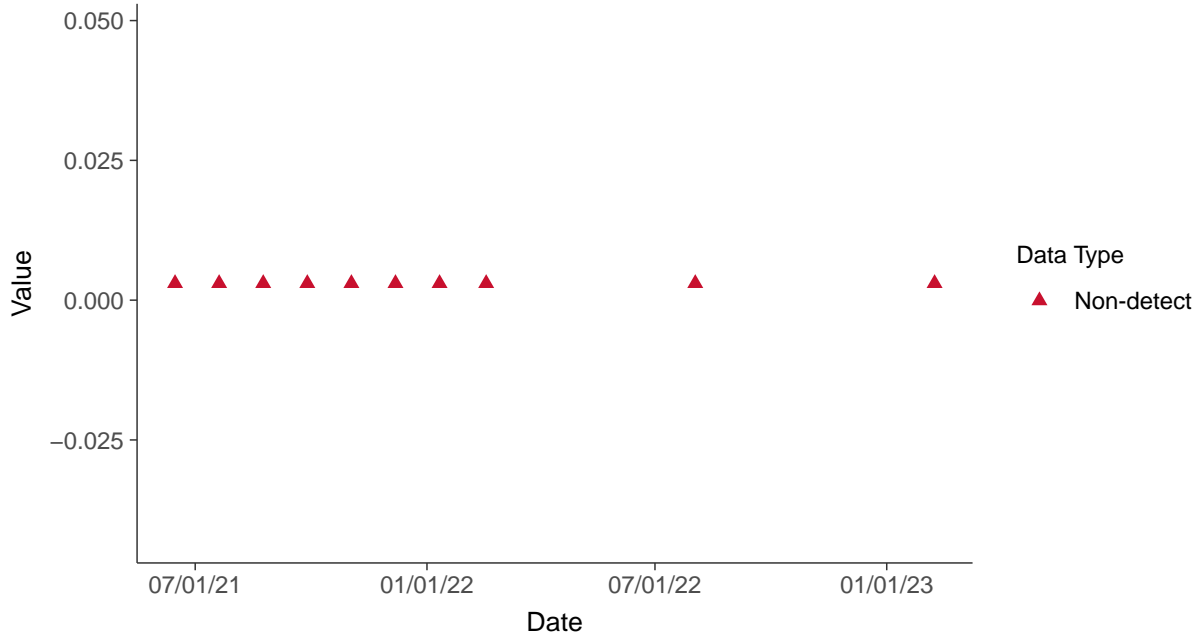


Appendix IV: Lead, MW-9

ID: 09_2_18

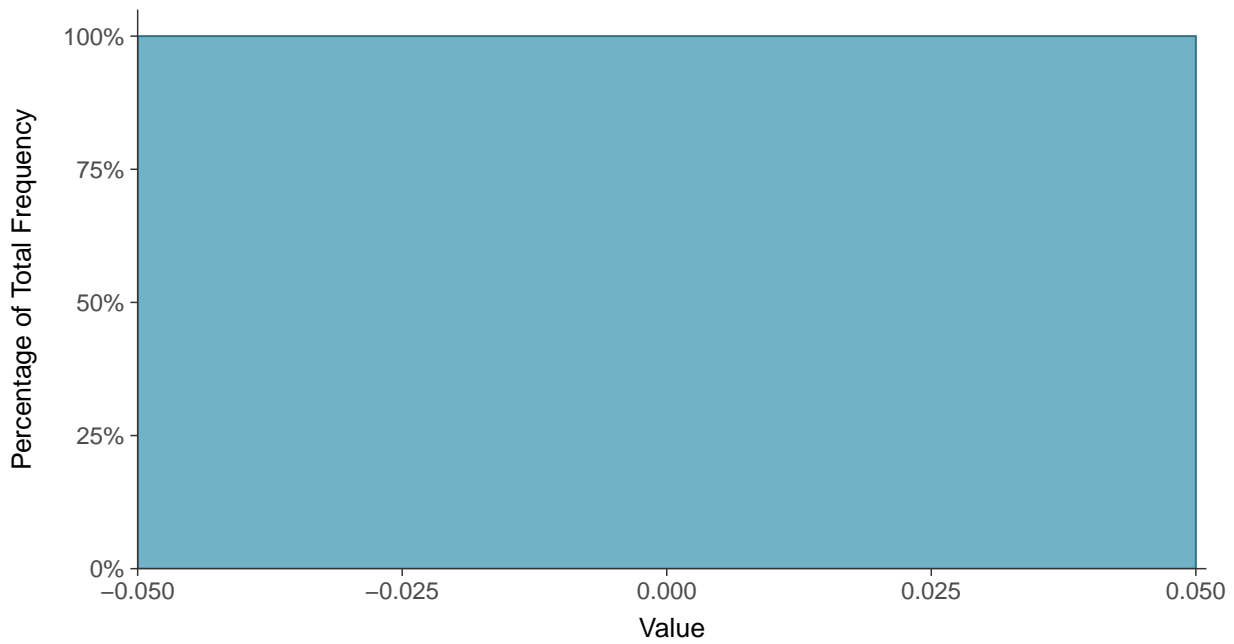
Scatter Plot

Lead, MW-9 (mg/L)



Histogram

Lead, MW-9 (mg/L)





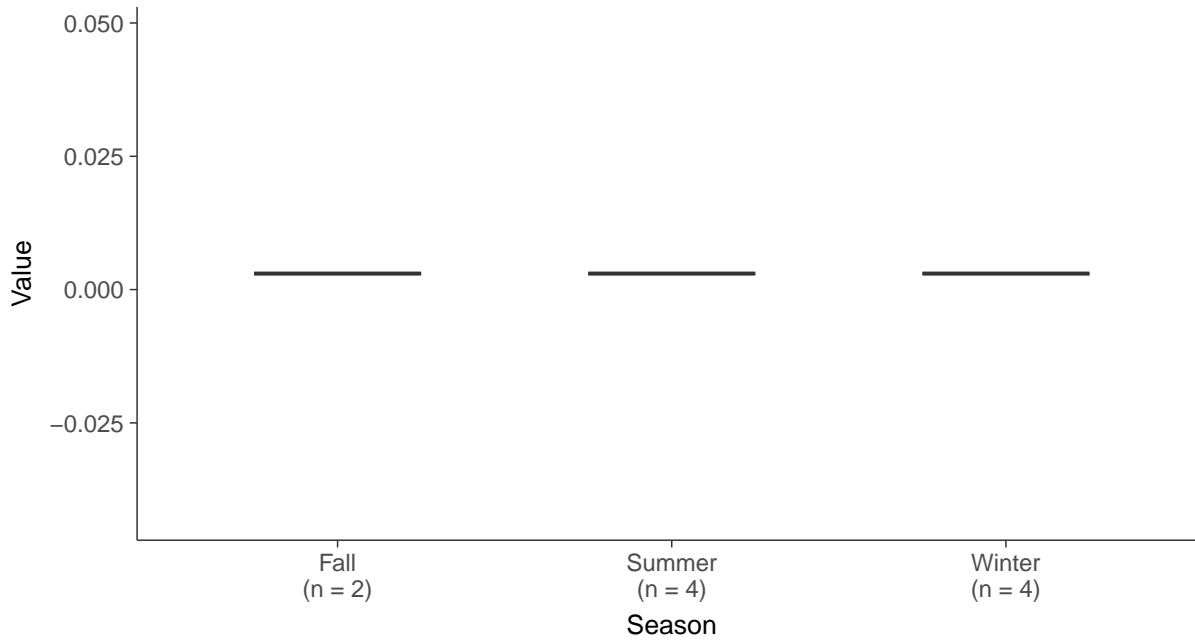
Boxplot

Lead, MW-9 (mg/L)



Boxplot by Season

Lead, MW-9 (mg/L)



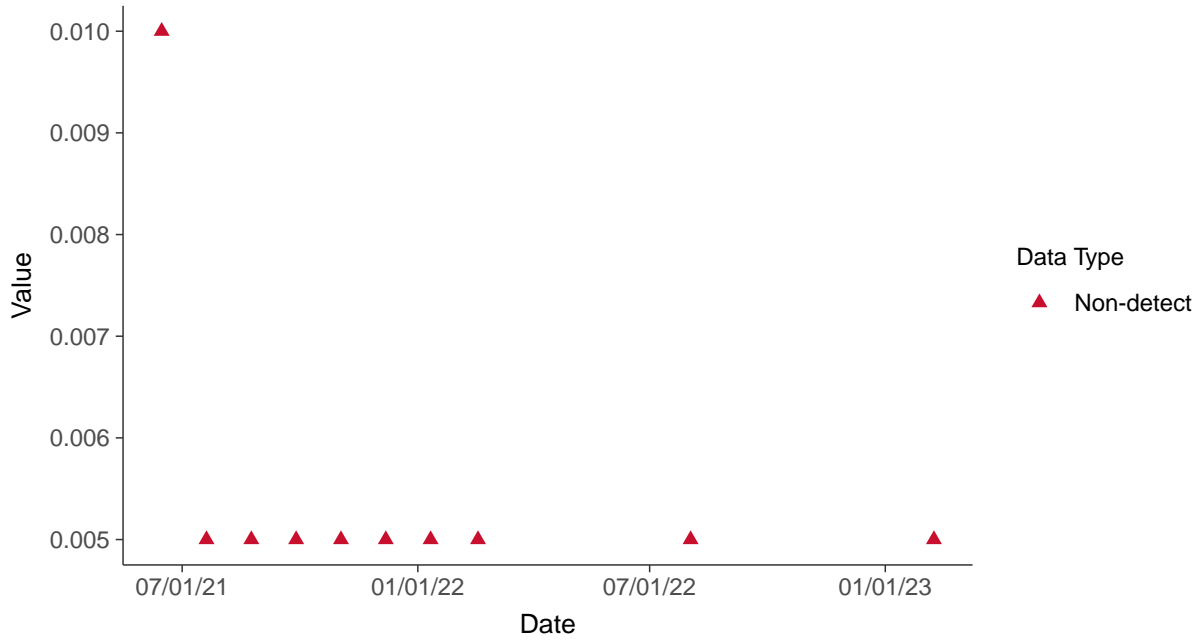


Appendix IV: Lithium, MW-9

ID: 09_2_19

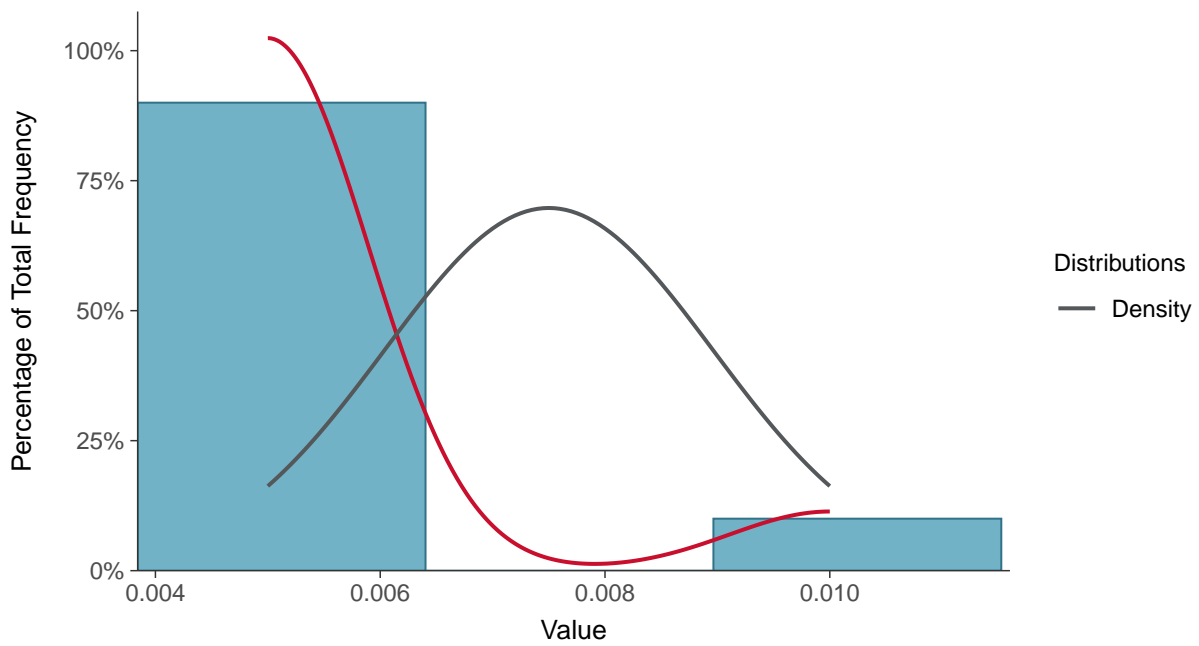
Scatter Plot

Lithium, MW-9 (mg/L)



Histogram

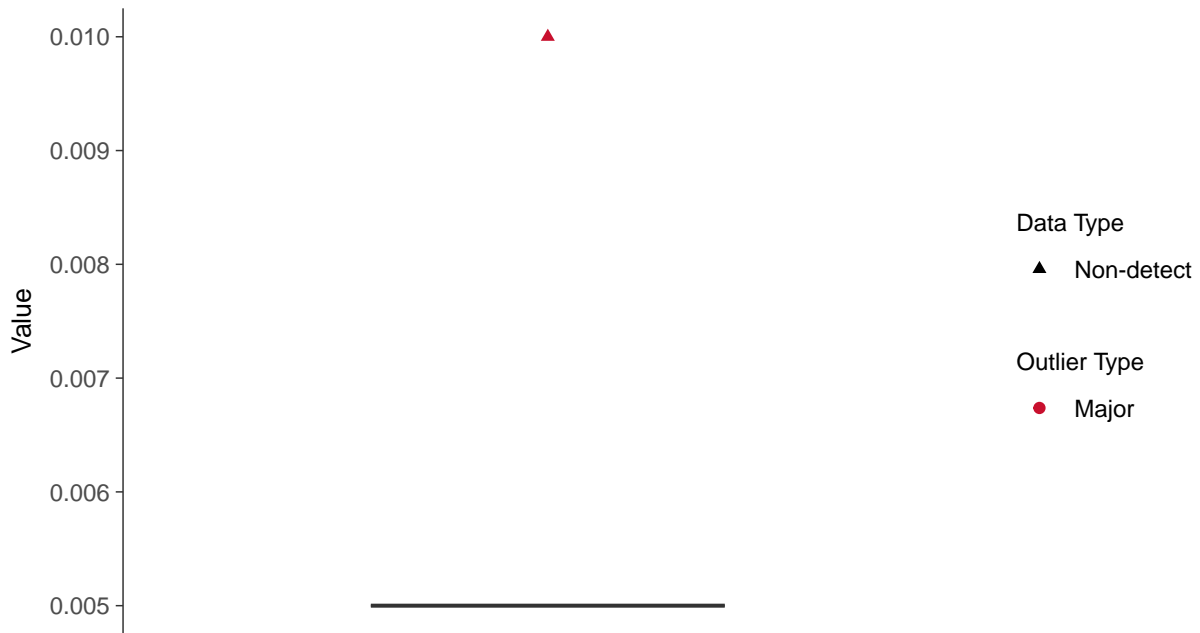
Lithium, MW-9 (mg/L)





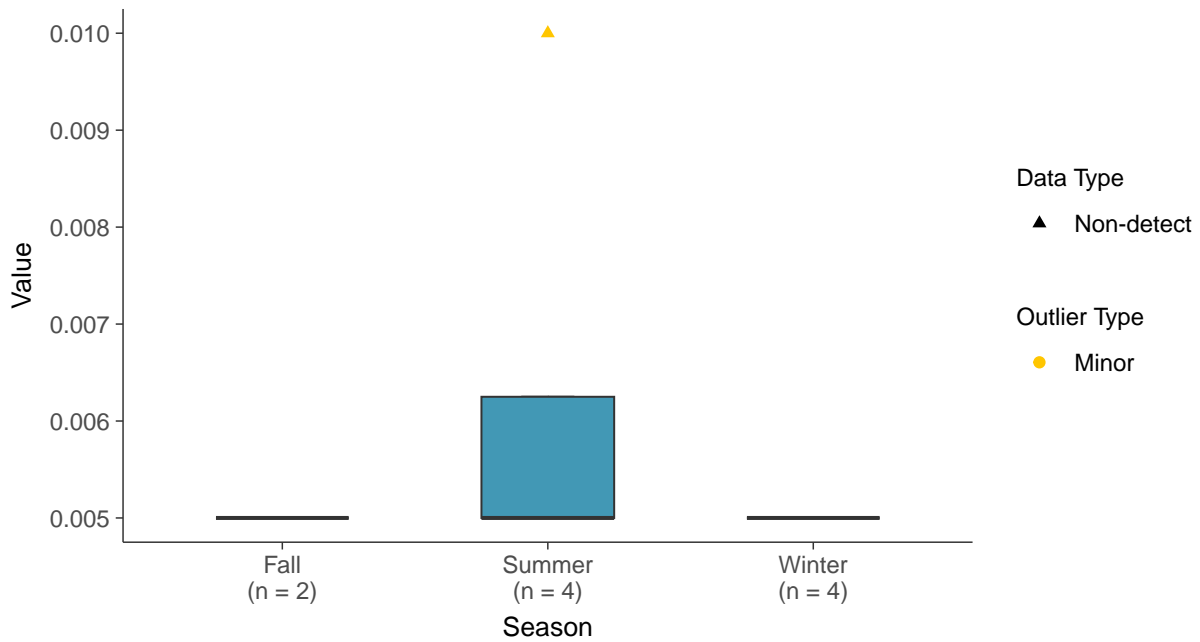
Boxplot

Lithium, MW-9 (mg/L)



Boxplot by Season

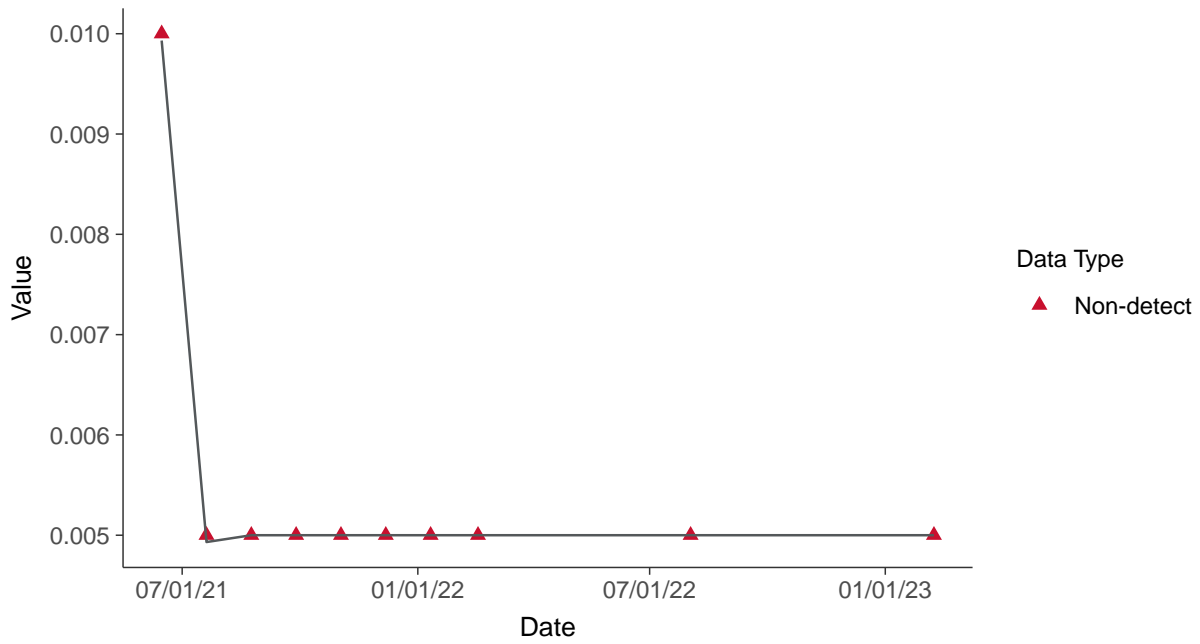
Lithium, MW-9 (mg/L)





Trend Regression: Piecewise Linear-Linear

Lithium, MW-9 (mg/L)



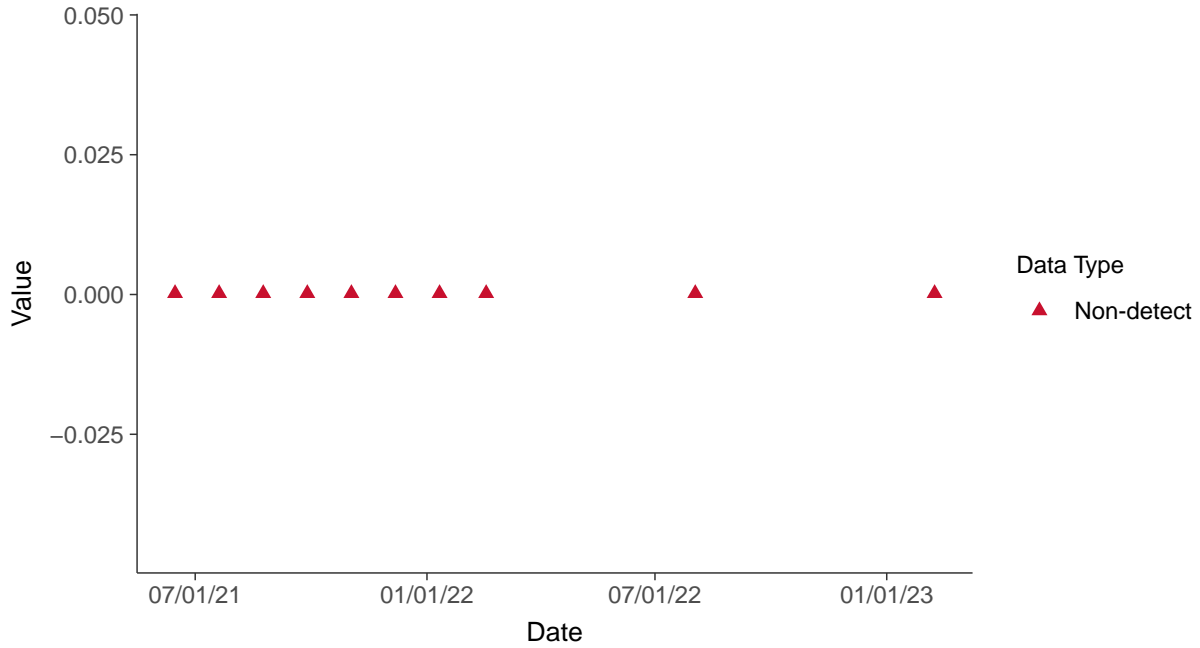


Appendix IV: Mercury, MW-9

ID: 09_2_21

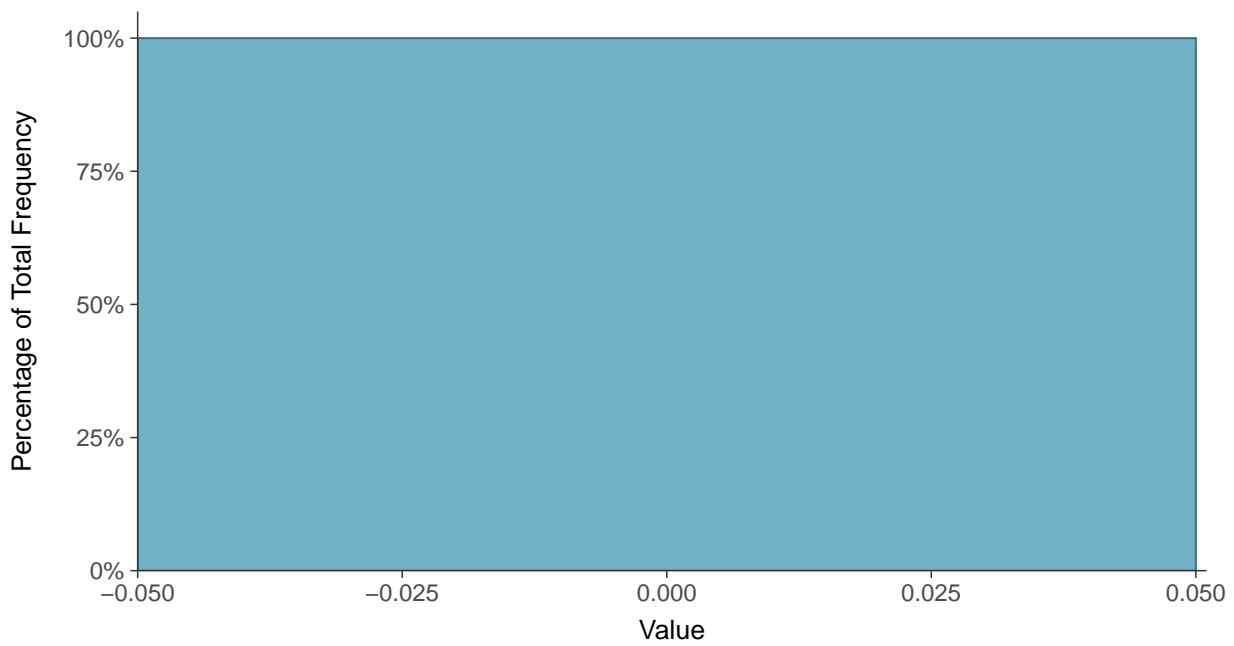
Scatter Plot

Mercury, MW-9 (mg/L)



Histogram

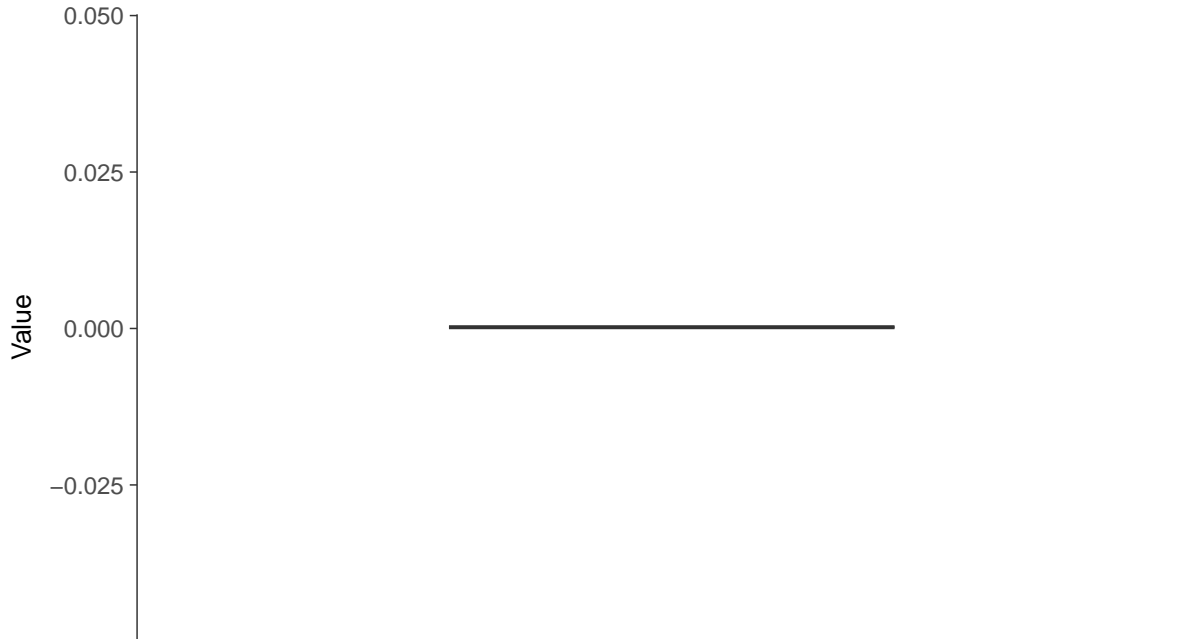
Mercury, MW-9 (mg/L)





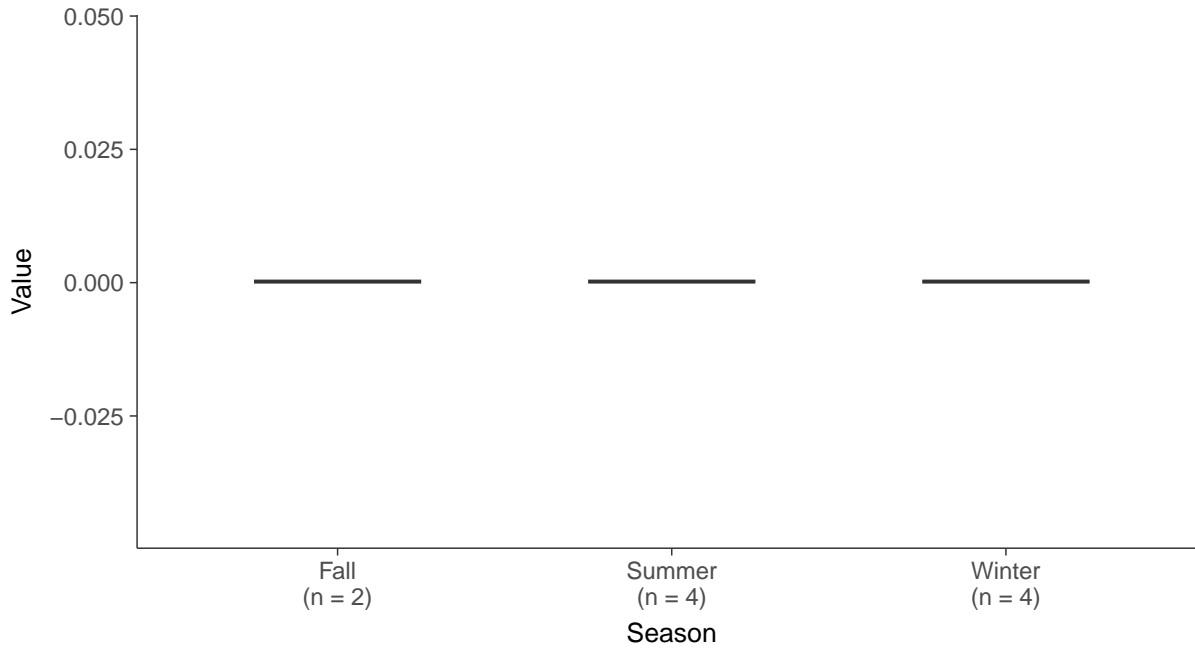
Boxplot

Mercury, MW-9 (mg/L)



Boxplot by Season

Mercury, MW-9 (mg/L)



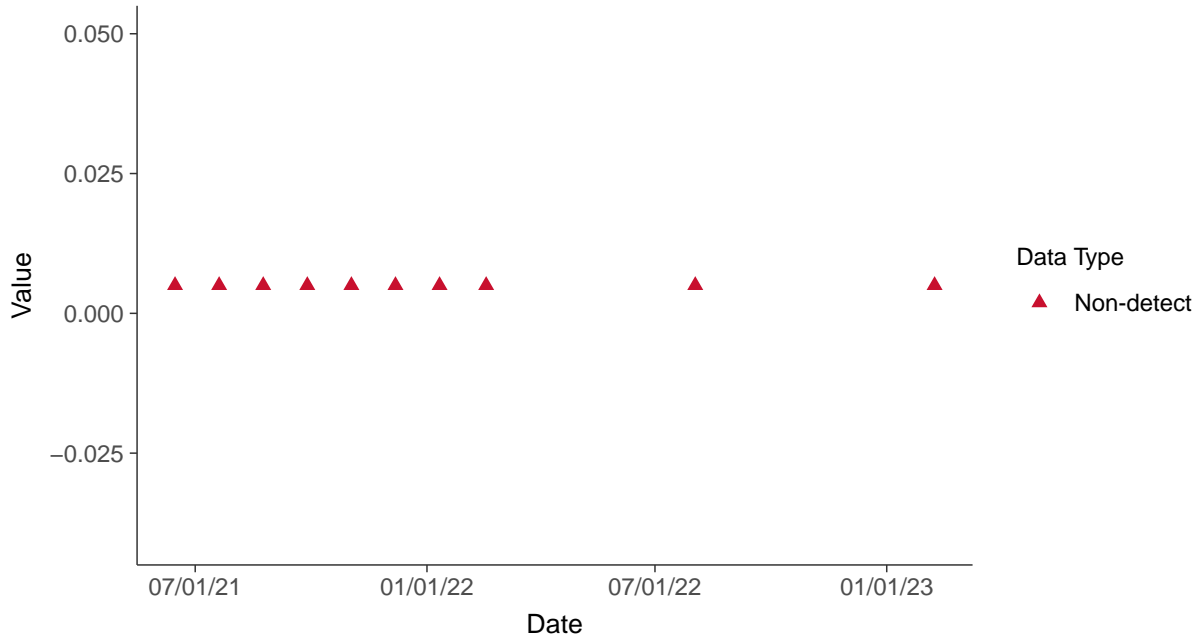


Appendix IV: Molybdenum, MW-9

ID: 09_2_22

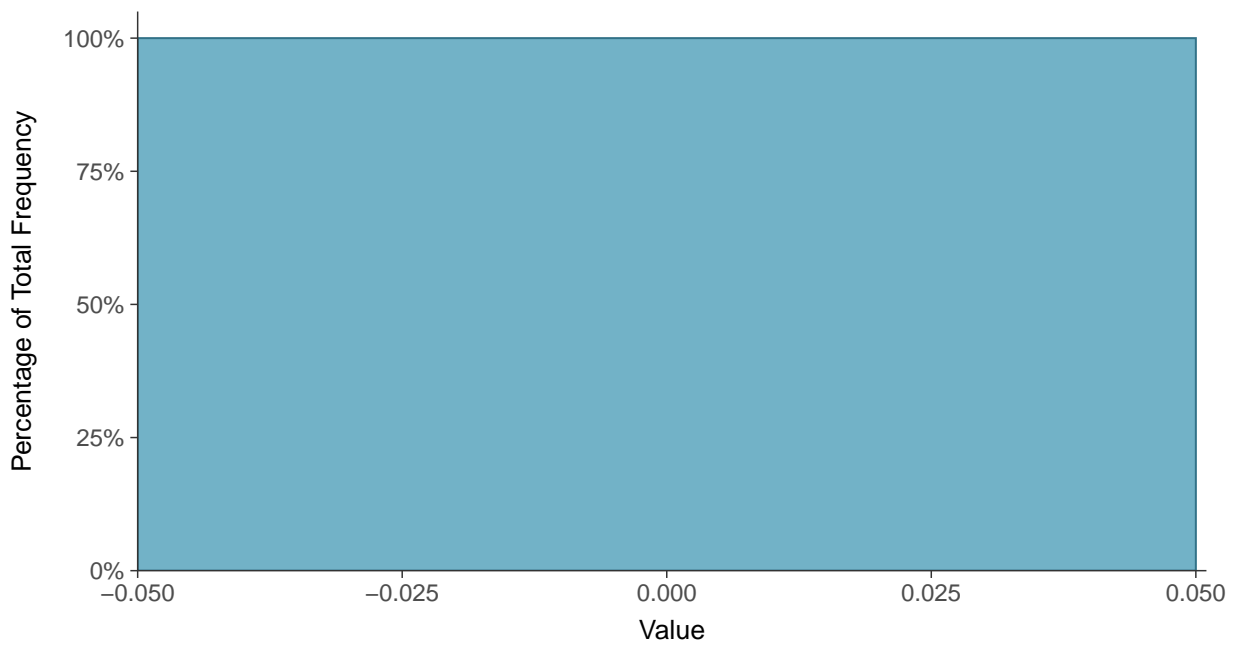
Scatter Plot

Molybdenum, MW-9 (mg/L)



Histogram

Molybdenum, MW-9 (mg/L)





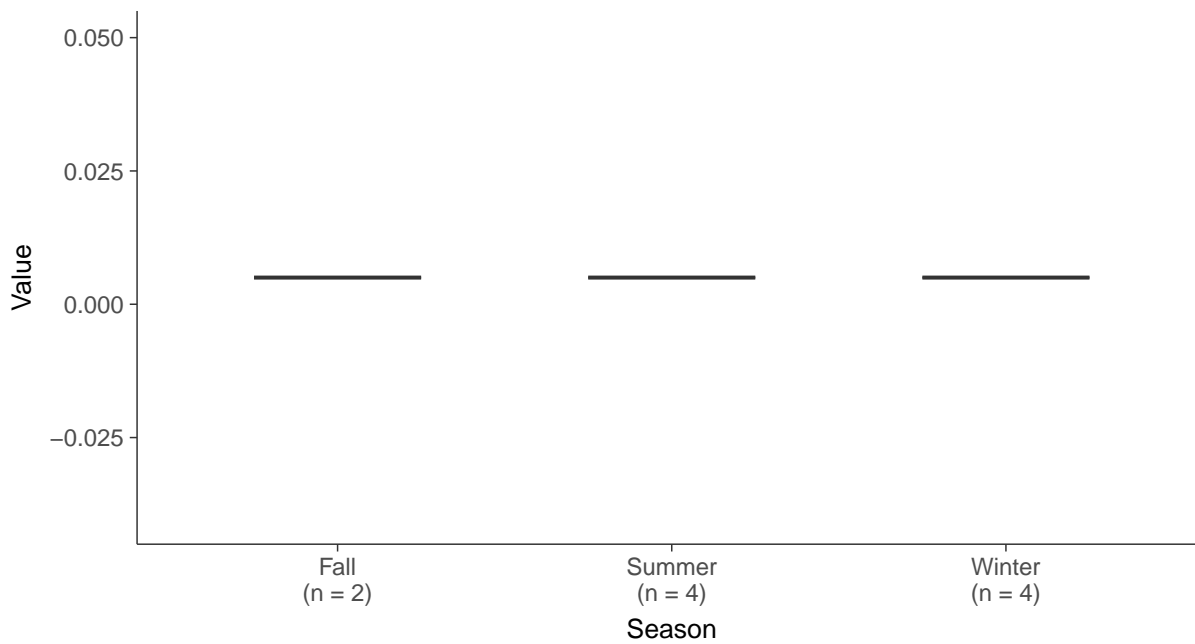
Boxplot

Molybdenum, MW-9 (mg/L)



Boxplot by Season

Molybdenum, MW-9 (mg/L)



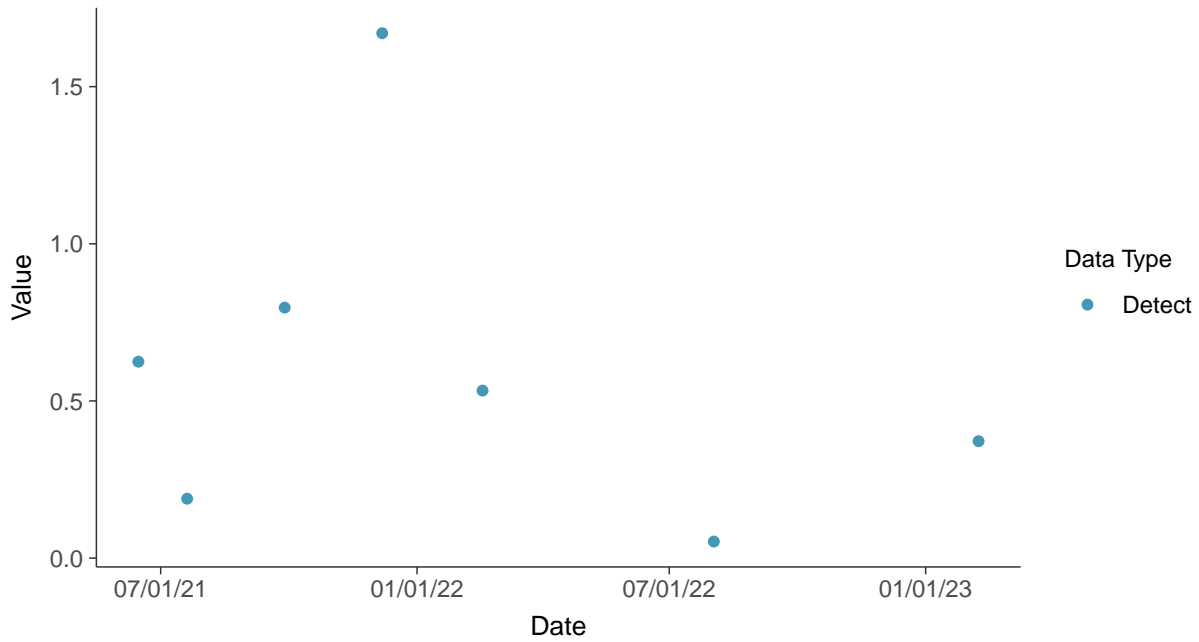


Appendix IV: Radium-226, MW-9

ID: 09_2_24

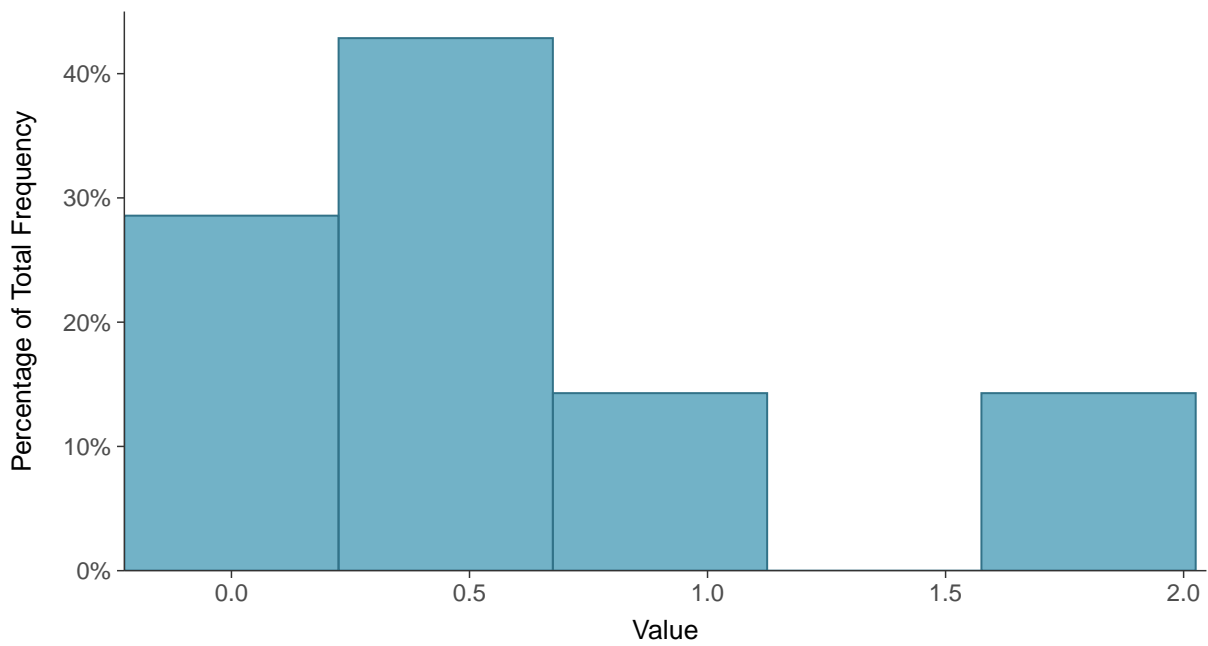
Scatter Plot

Radium-226, MW-9 (pCi/L)



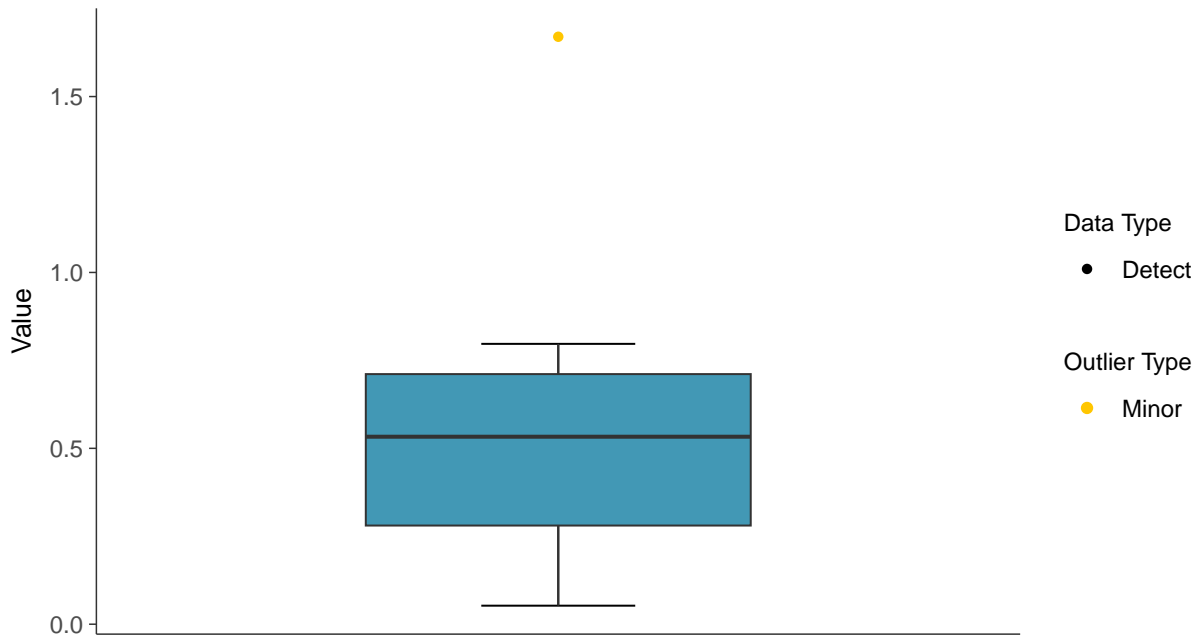
Histogram

Radium-226, MW-9 (pCi/L)



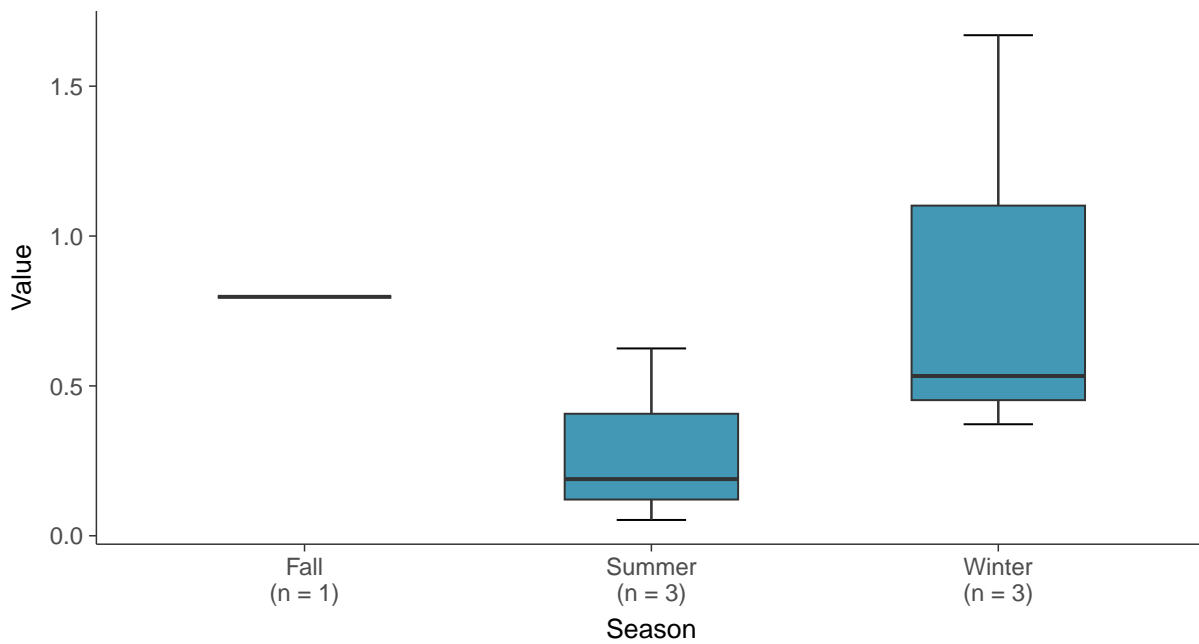
Boxplot

Radium-226, MW-9 (pCi/L)



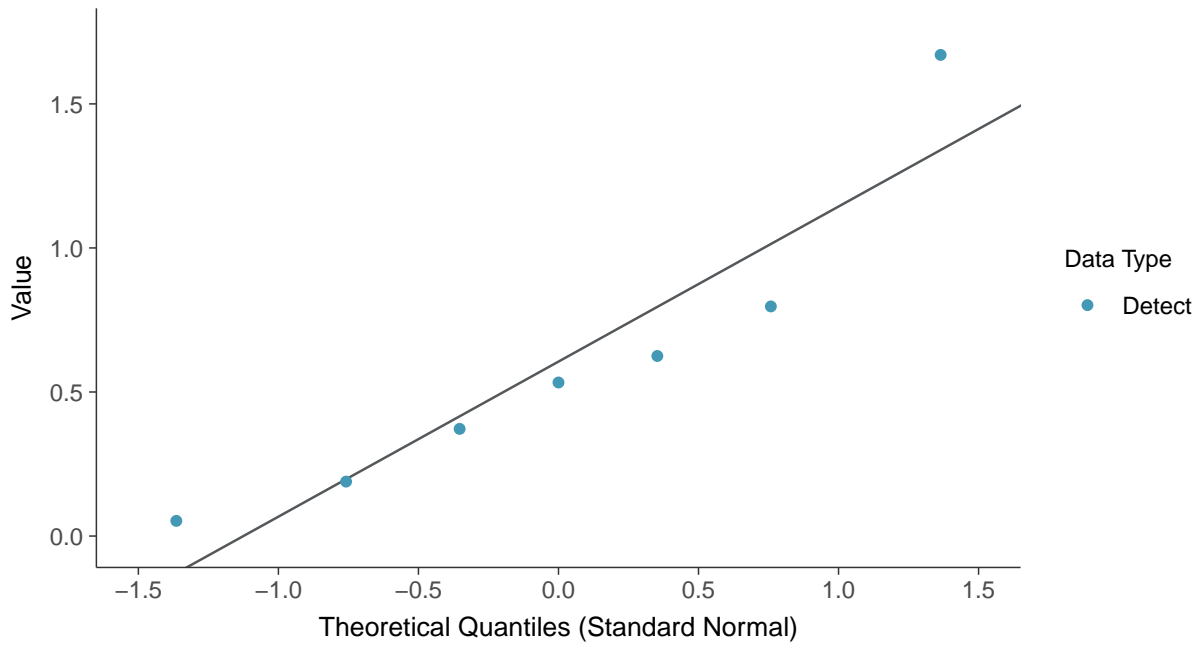
Boxplot by Season

Radium-226, MW-9 (pCi/L)

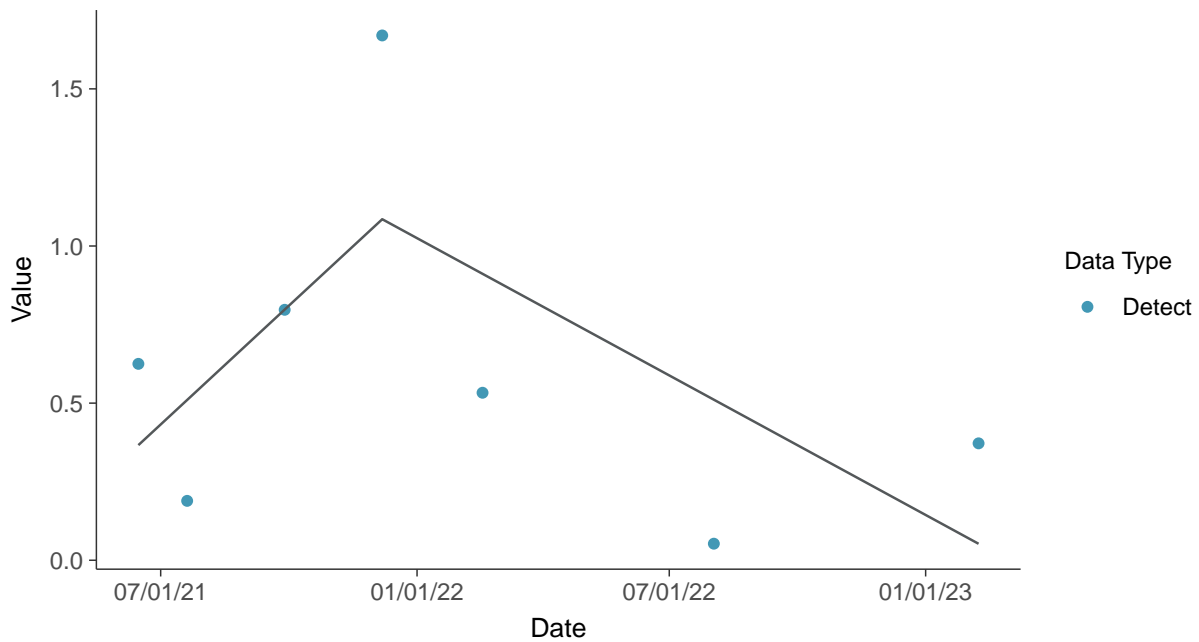




Normal Q-Q plot
Radium-226, MW-9 (pCi/L)



Trend Regression: Piecewise Linear-Linear
Radium-226, MW-9 (pCi/L)

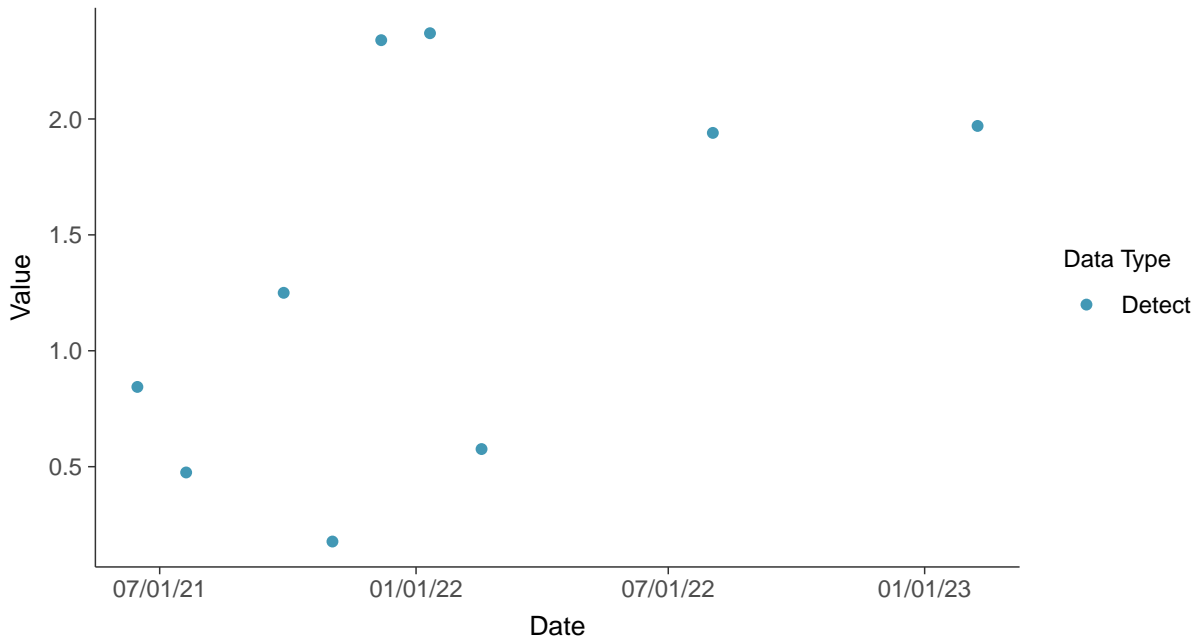


Appendix IV: Radium-226/228, MW-9

ID: 09_2_25

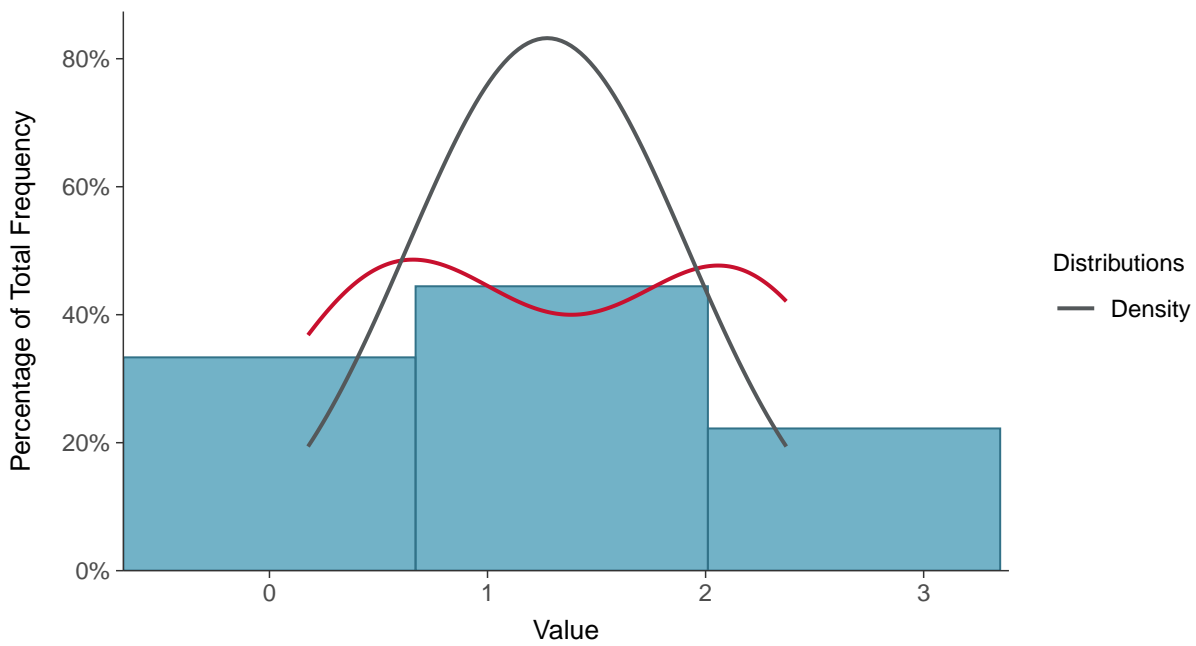
Scatter Plot

Radium-226/228, MW-9 (pCi/L)



Histogram

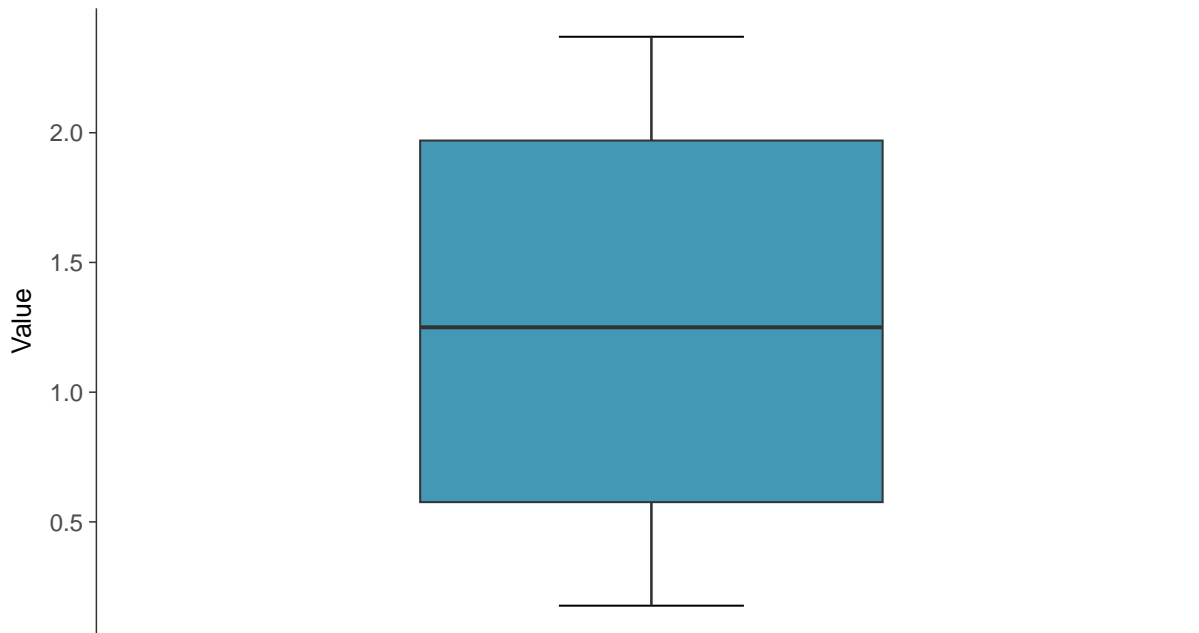
Radium-226/228, MW-9 (pCi/L)





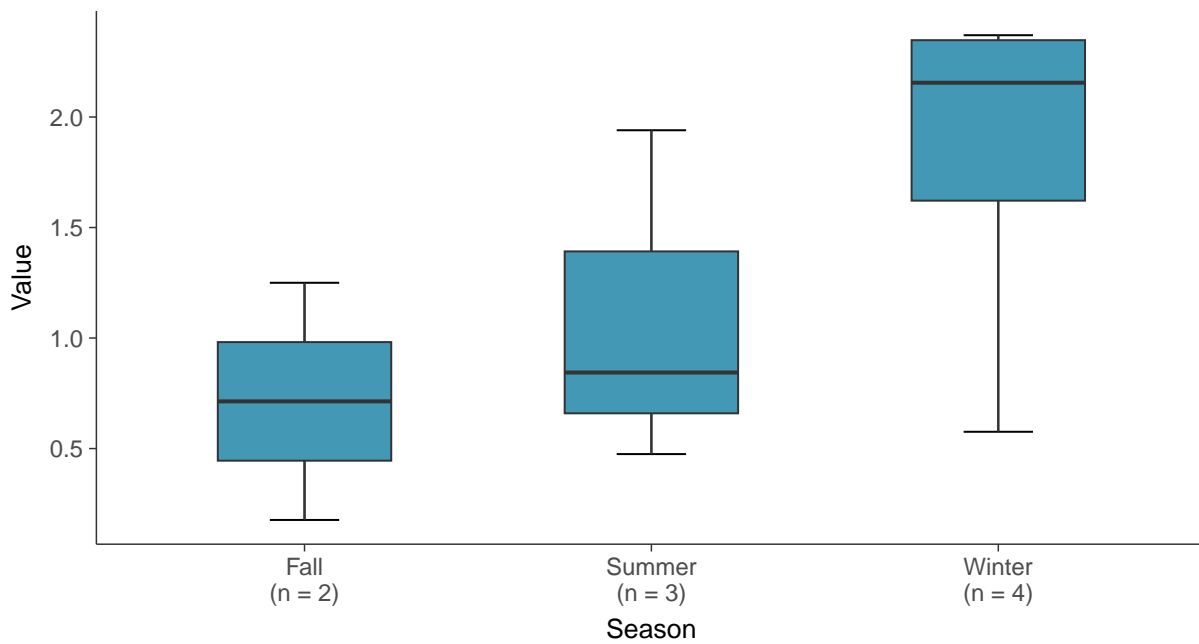
Boxplot

Radium-226/228, MW-9 (pCi/L)



Boxplot by Season

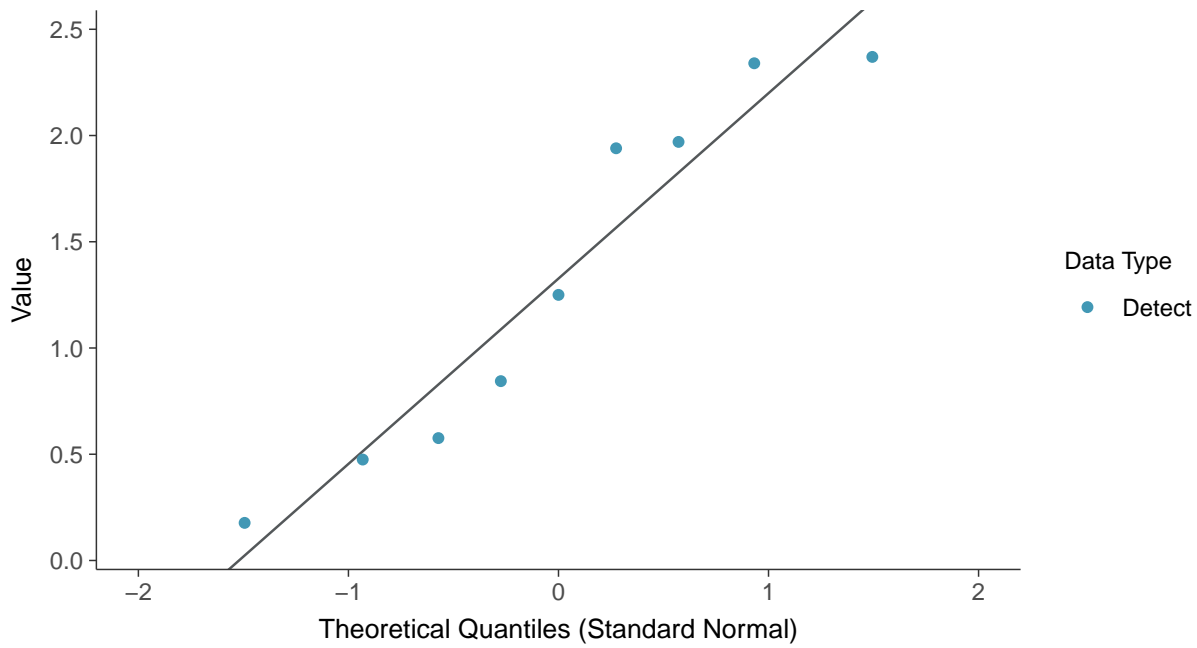
Radium-226/228, MW-9 (pCi/L)





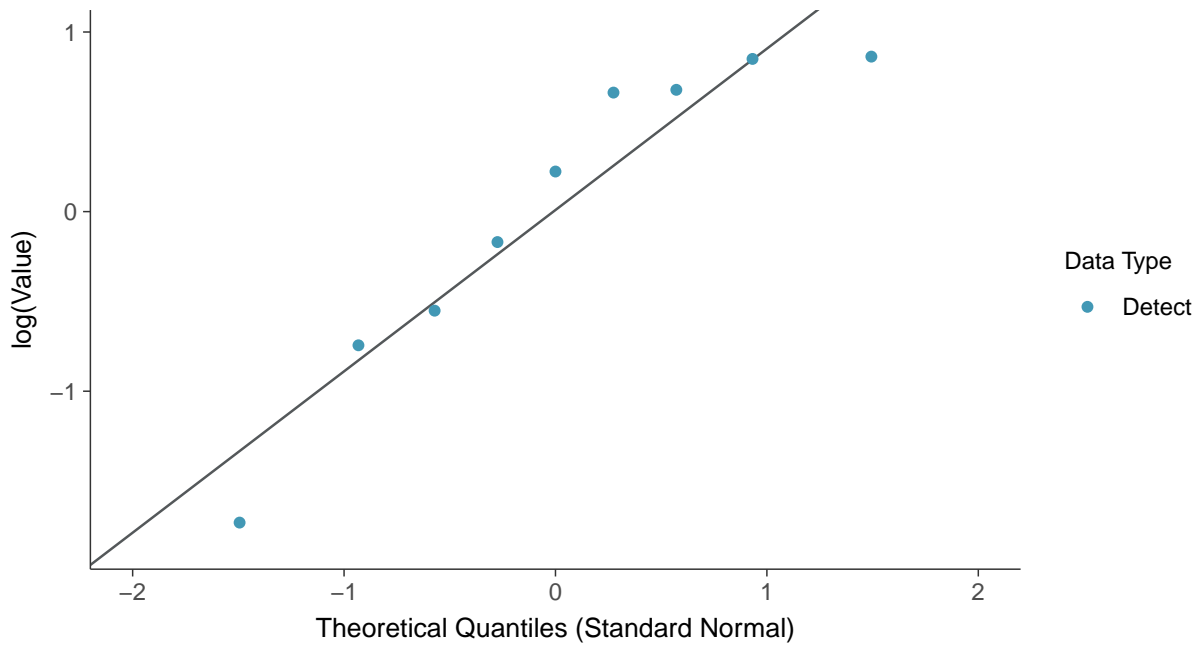
Normal Q-Q plot

Radium-226/228, MW-9 (pCi/L)



Lognormal Q-Q plot

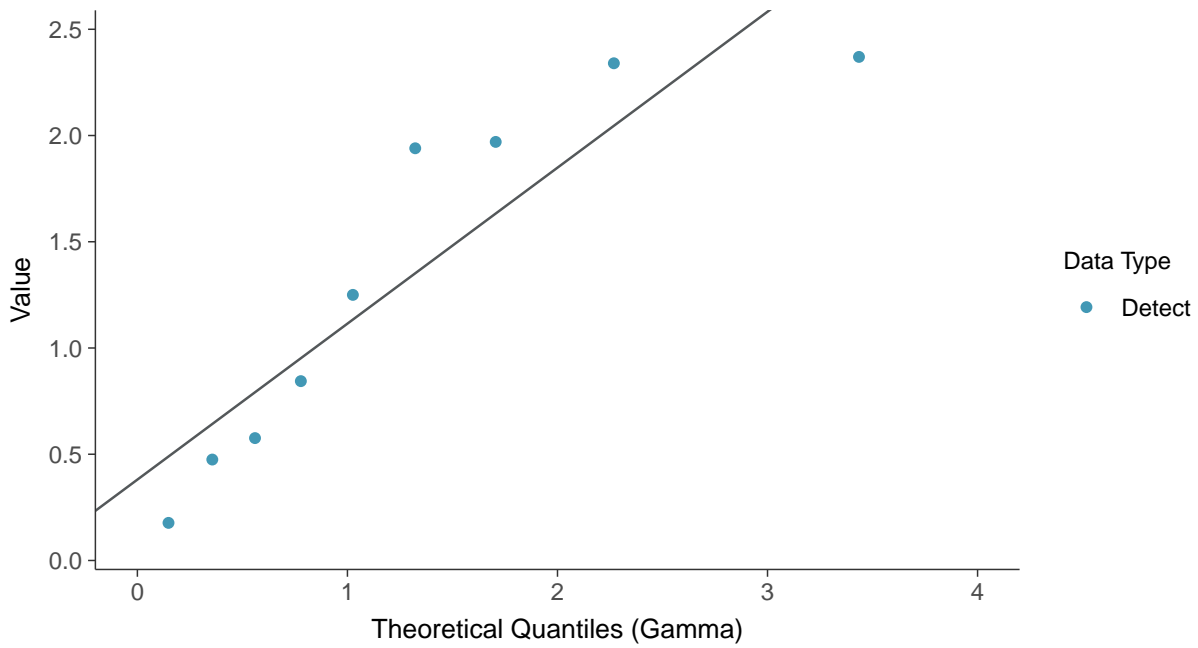
Radium-226/228, MW-9 (pCi/L)





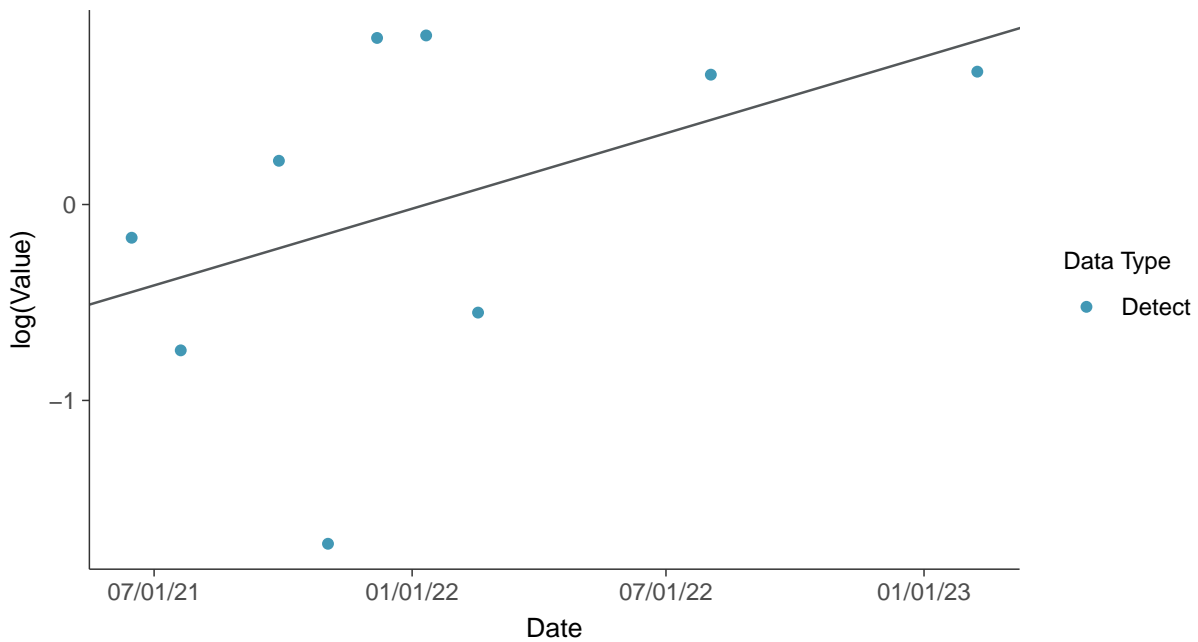
Gamma Q-Q plot

Radium-226/228, MW-9 (pCi/L)



Trend Regression: Lognormal MLE

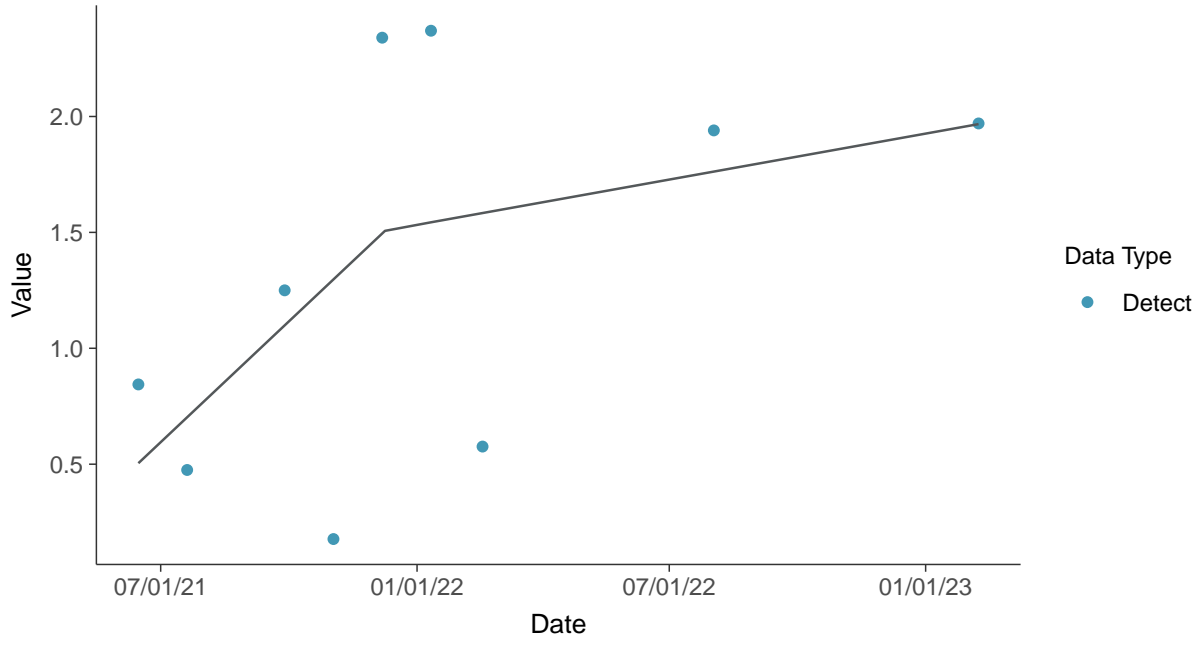
Radium-226/228, MW-9 (pCi/L)





Trend Regression: Piecewise Linear-Linear

Radium-226/228, MW-9 (pCi/L)



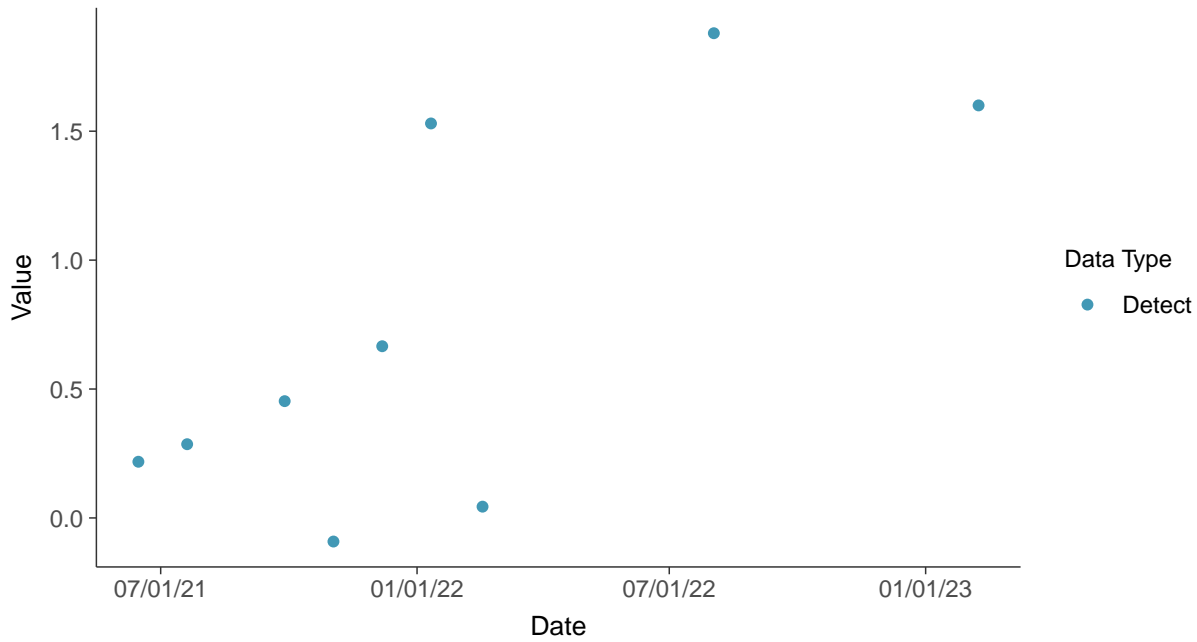


Appendix IV: Radium-228, MW-9

ID: 09_2_26

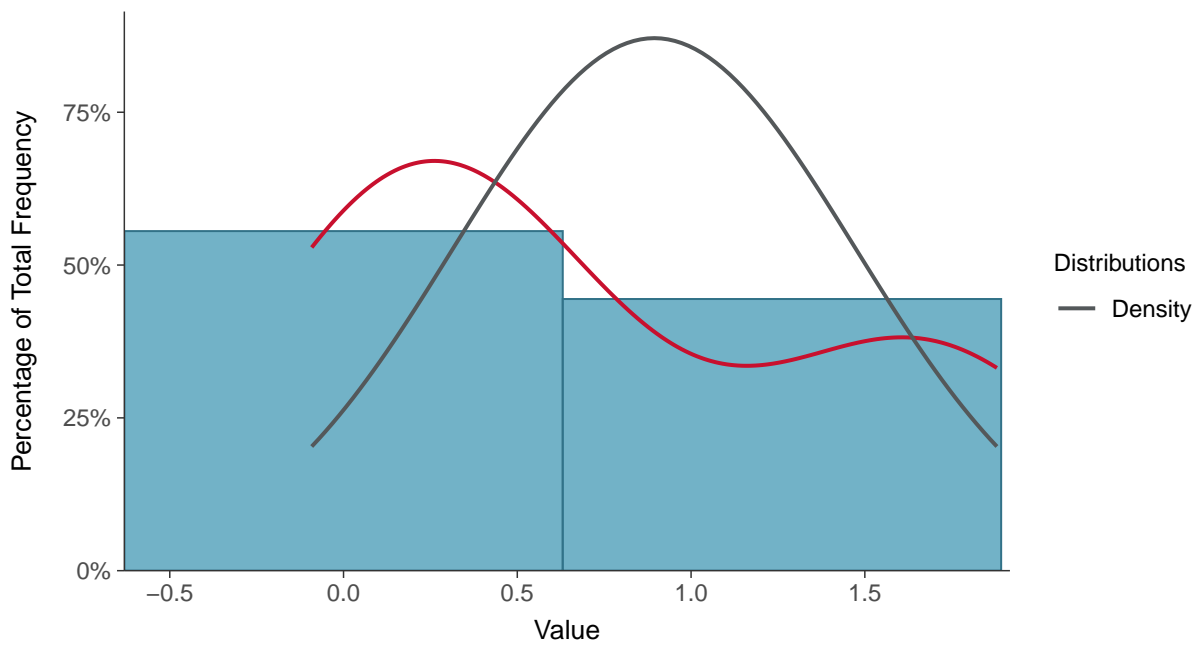
Scatter Plot

Radium-228, MW-9 (pCi/L)



Histogram

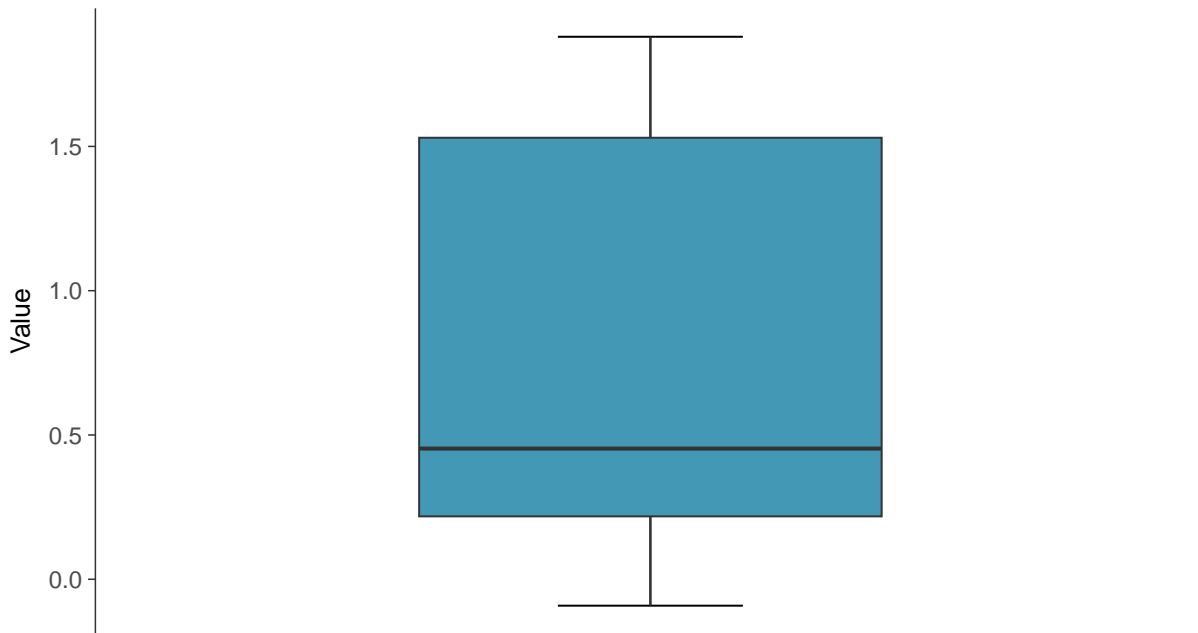
Radium-228, MW-9 (pCi/L)





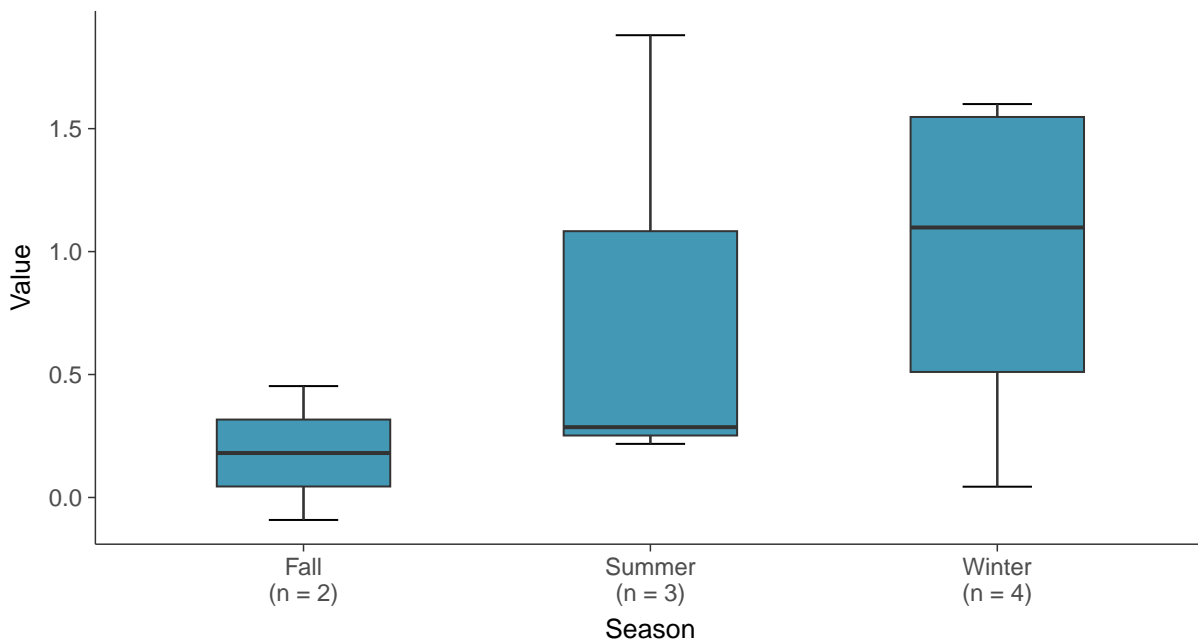
Boxplot

Radium-228, MW-9 (pCi/L)



Boxplot by Season

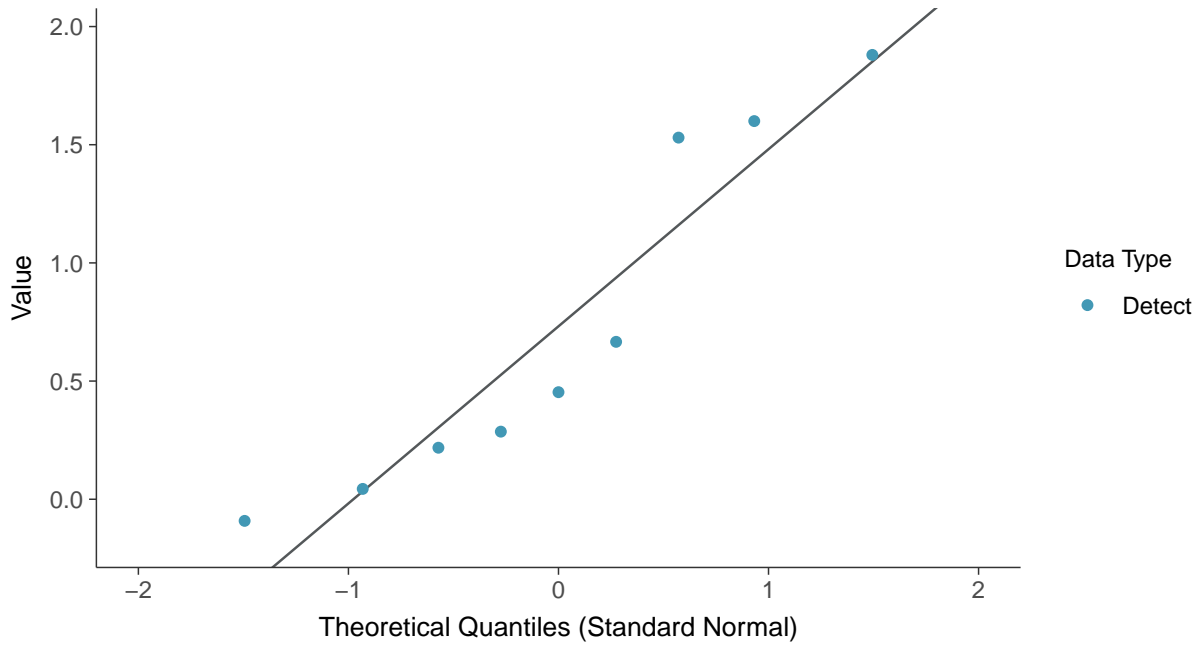
Radium-228, MW-9 (pCi/L)





Normal Q-Q plot

Radium-228, MW-9 (pCi/L)



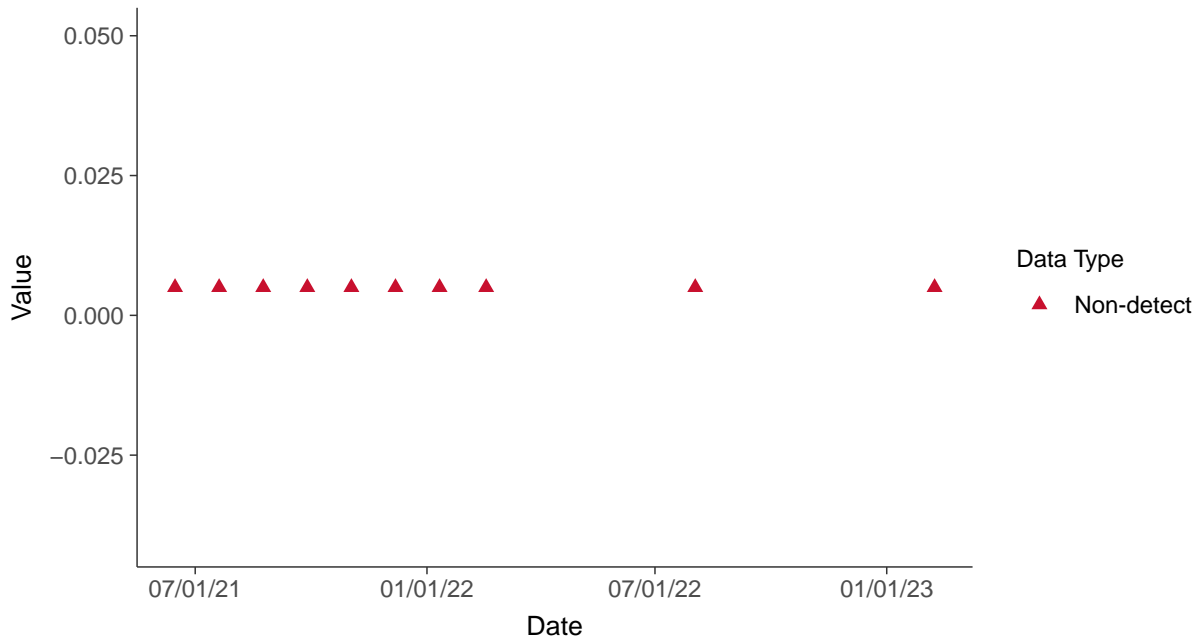


Appendix IV: Selenium, MW-9

ID: 09_2_27

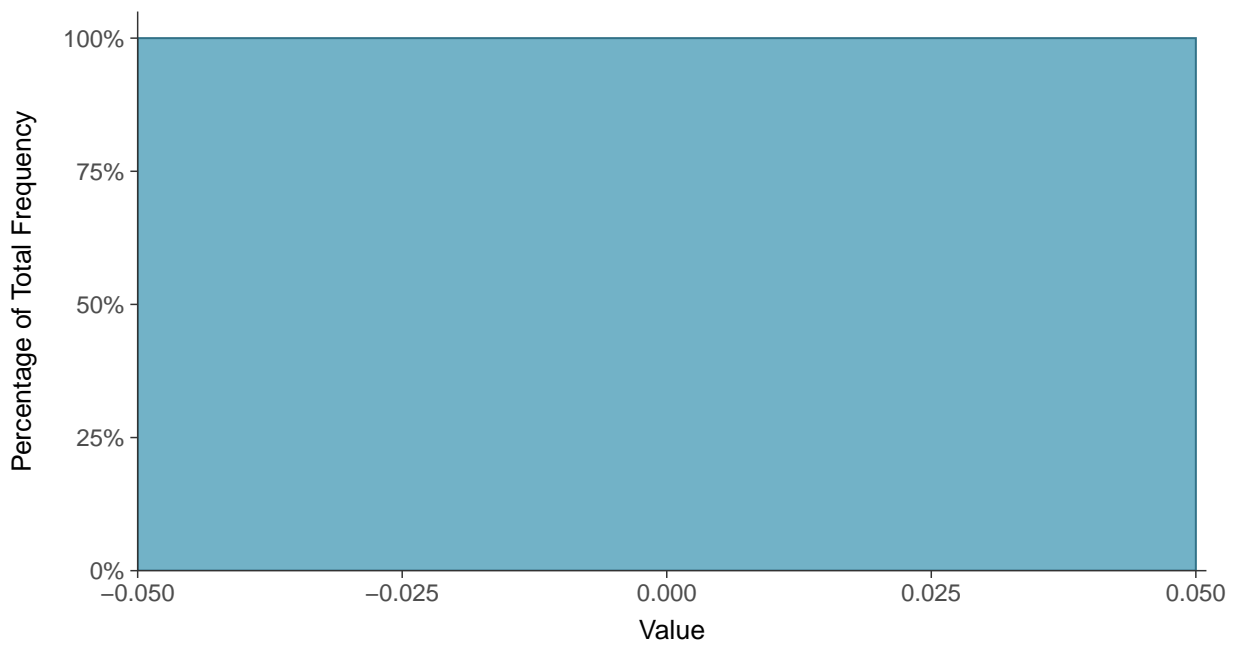
Scatter Plot

Selenium, MW-9 (mg/L)



Histogram

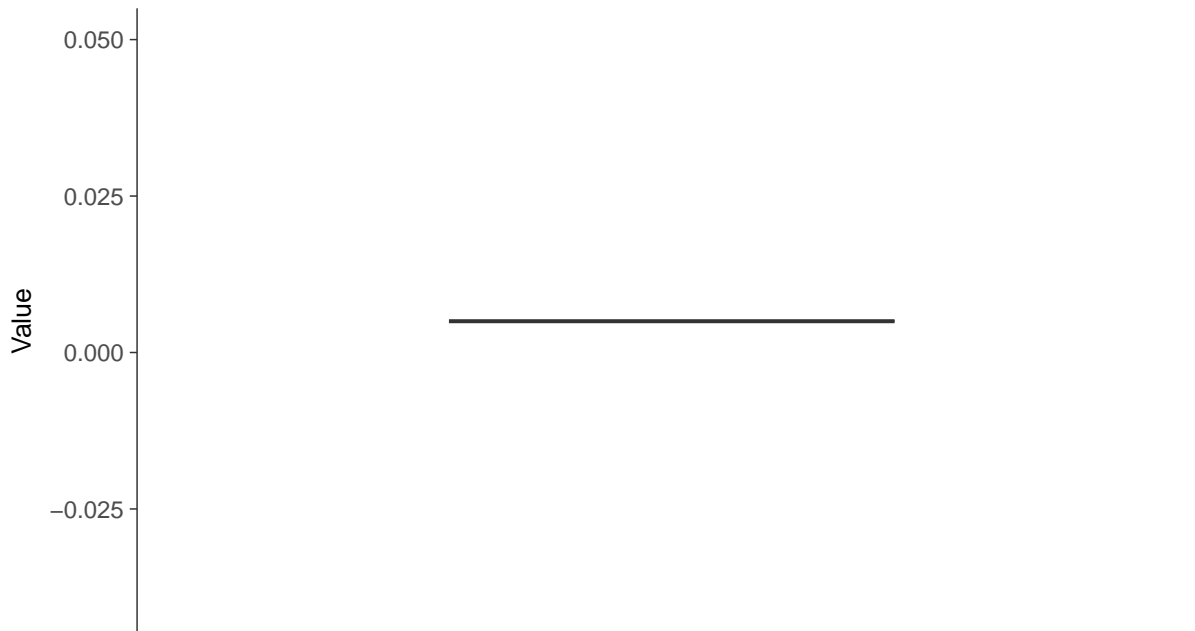
Selenium, MW-9 (mg/L)





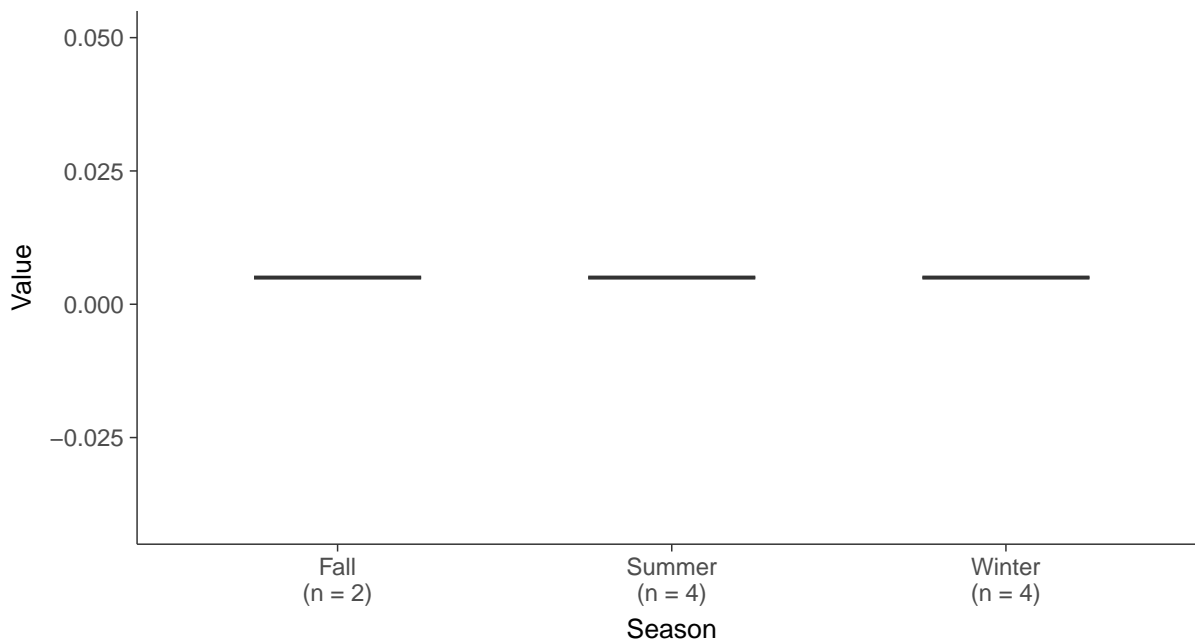
Boxplot

Selenium, MW-9 (mg/L)



Boxplot by Season

Selenium, MW-9 (mg/L)



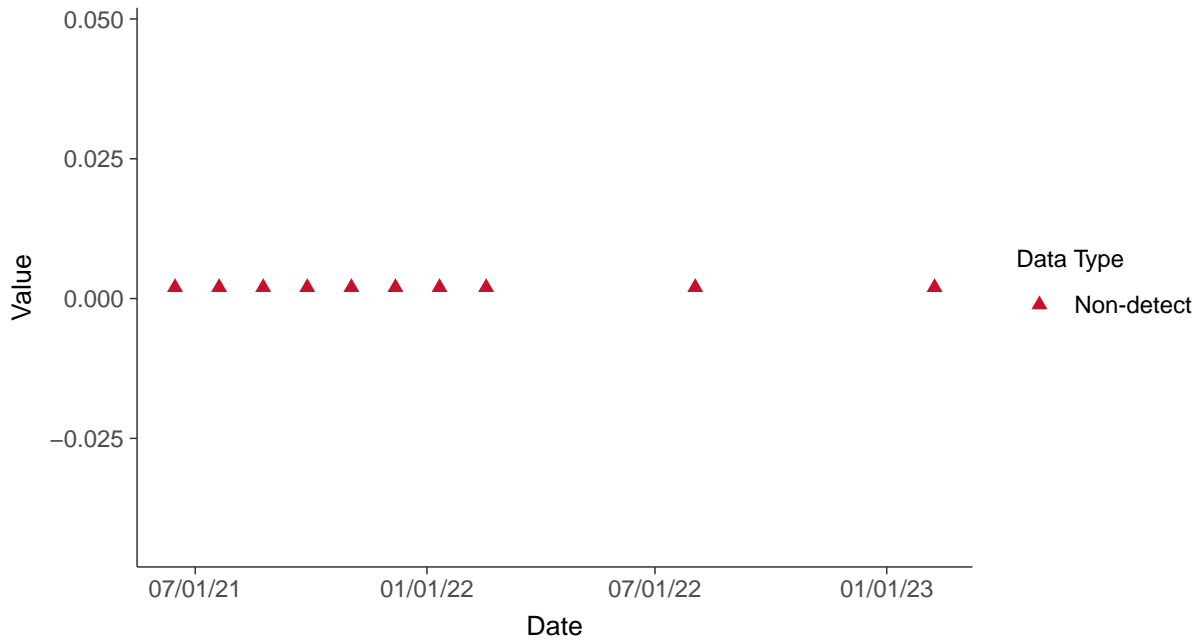


Appendix IV: Thallium, MW-9

ID: 09_2_29

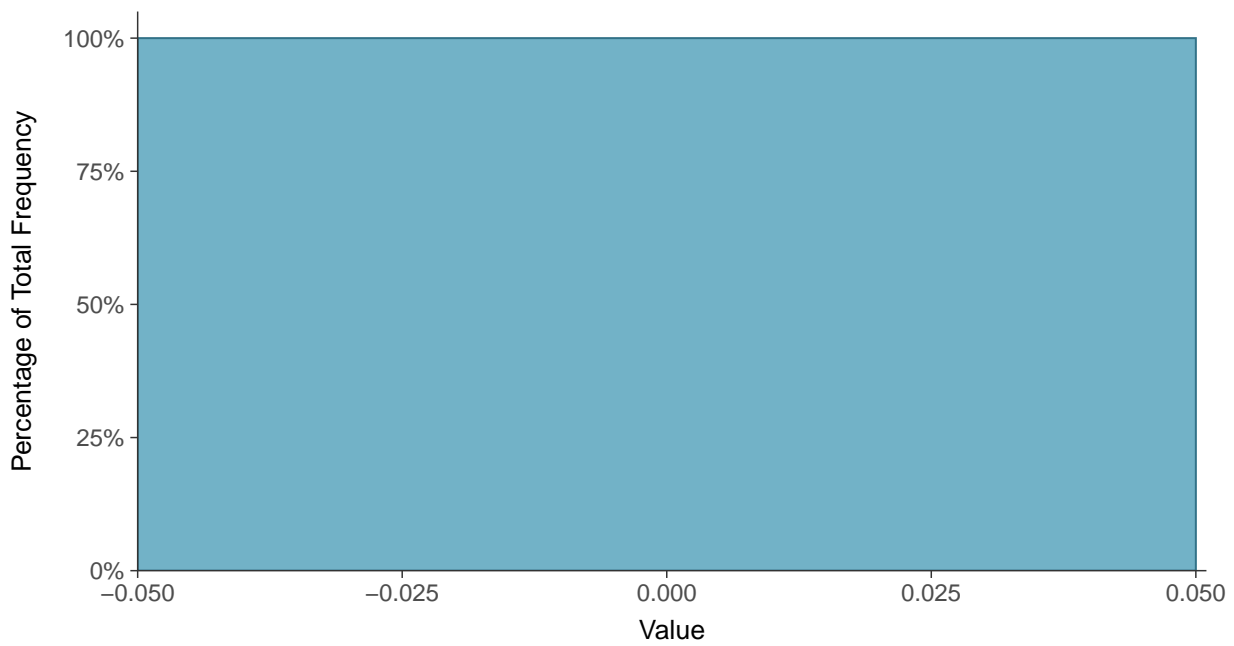
Scatter Plot

Thallium, MW-9 (mg/L)



Histogram

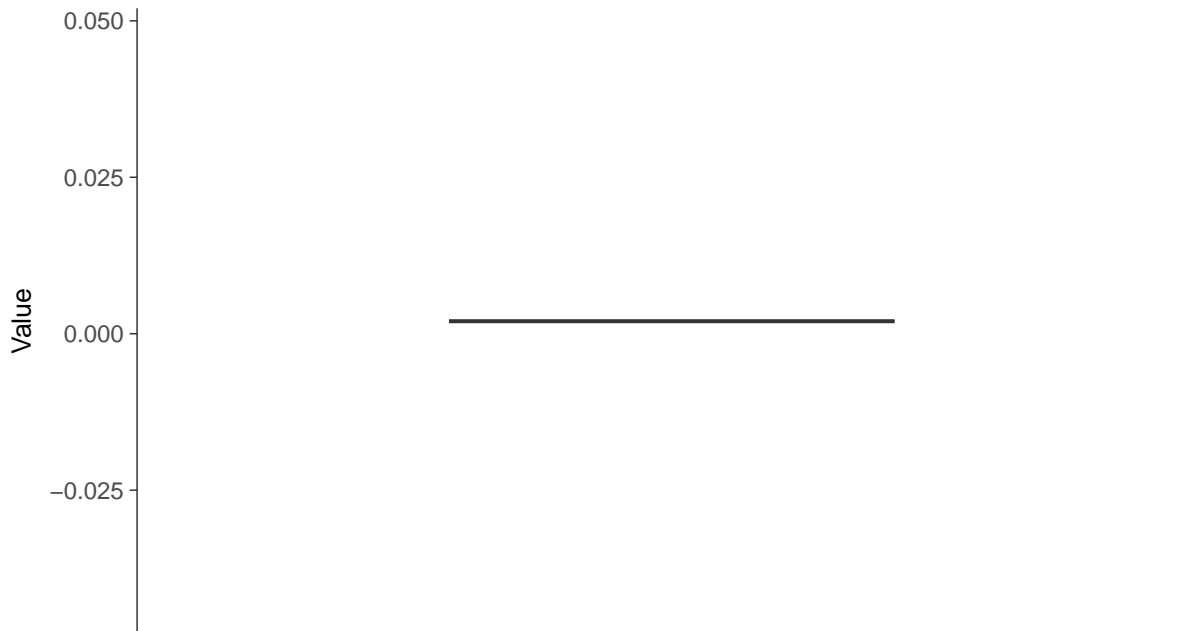
Thallium, MW-9 (mg/L)





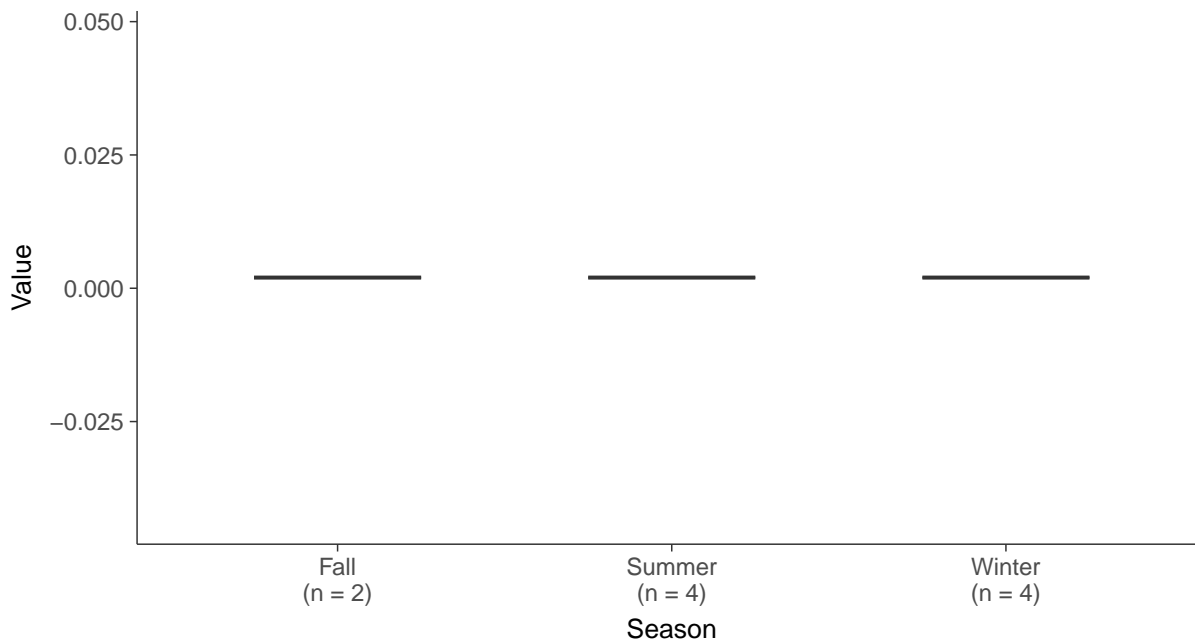
Boxplot

Thallium, MW-9 (mg/L)



Boxplot by Season

Thallium, MW-9 (mg/L)



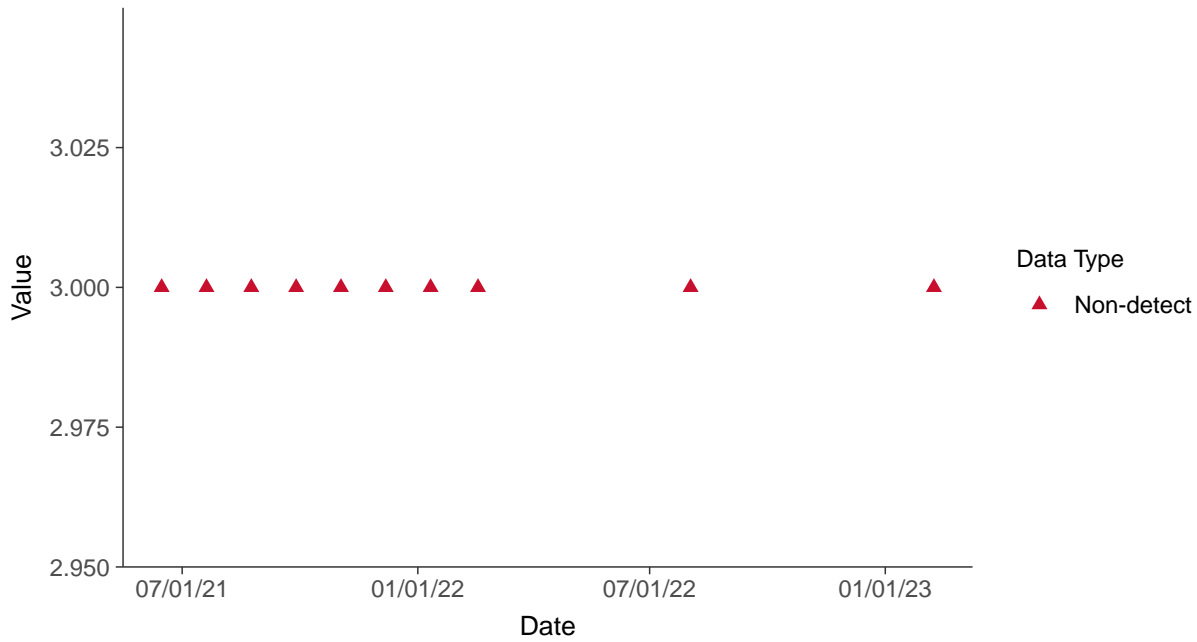


Appendix IV: Total Suspended Solids, MW-9

ID: 09_2_30

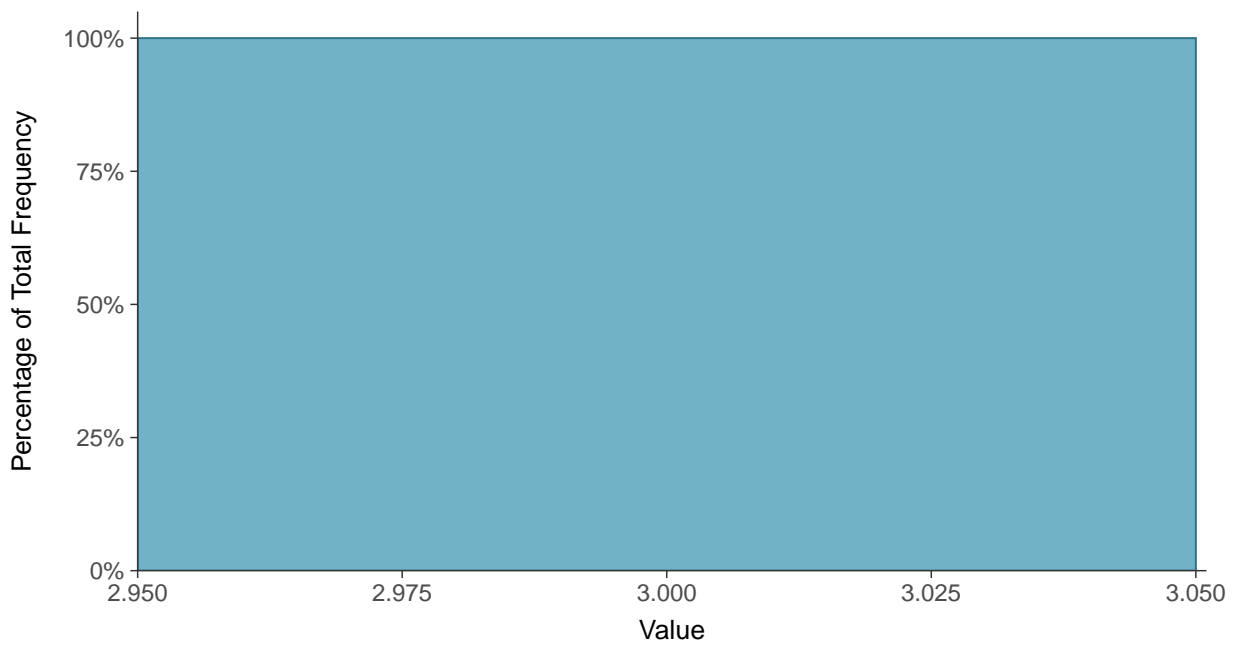
Scatter Plot

Total Suspended Solids, MW-9 (mg/L)



Histogram

Total Suspended Solids, MW-9 (mg/L)





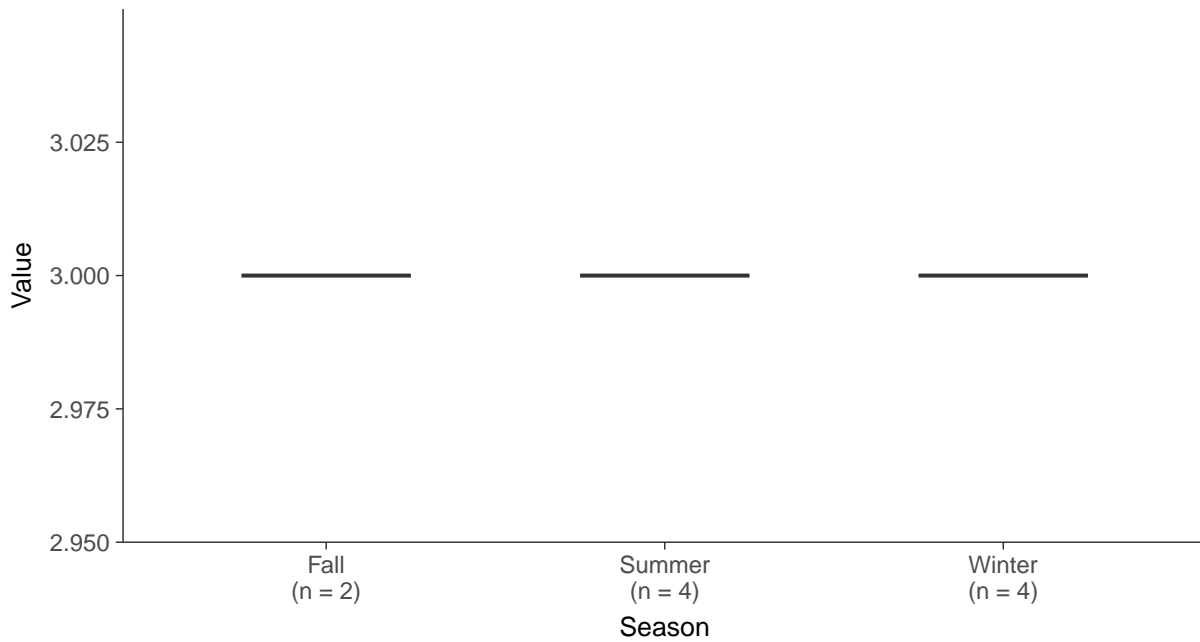
Boxplot

Total Suspended Solids, MW-9 (mg/L)



Boxplot by Season

Total Suspended Solids, MW-9 (mg/L)



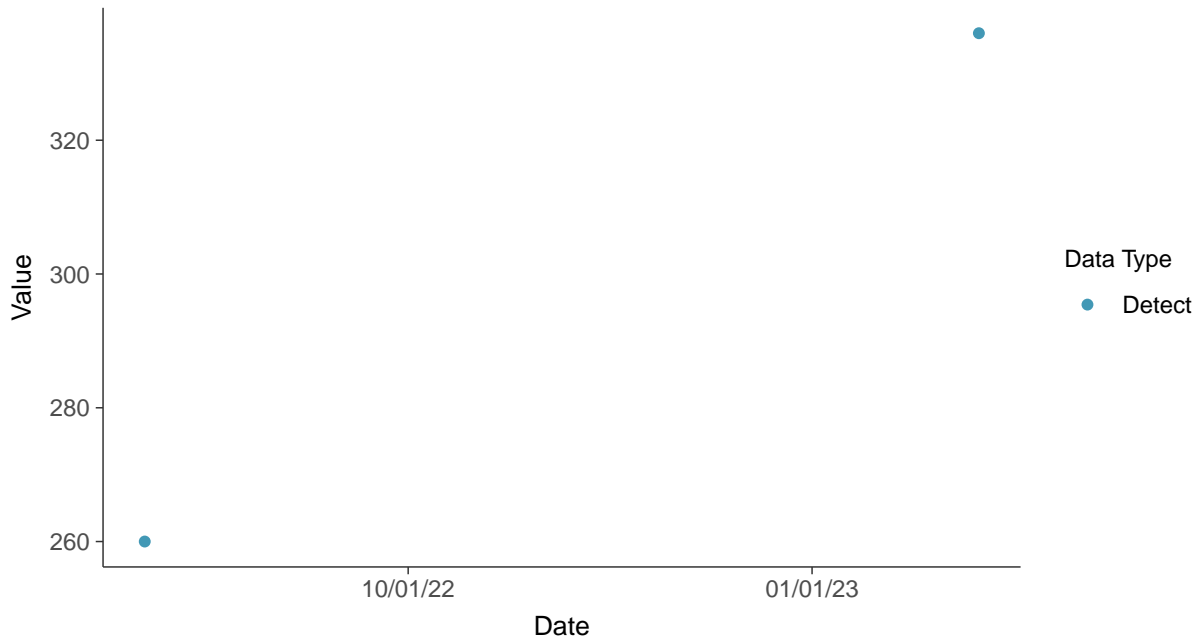


Other: Bicarbonate, MW-9

ID: 09_3_12

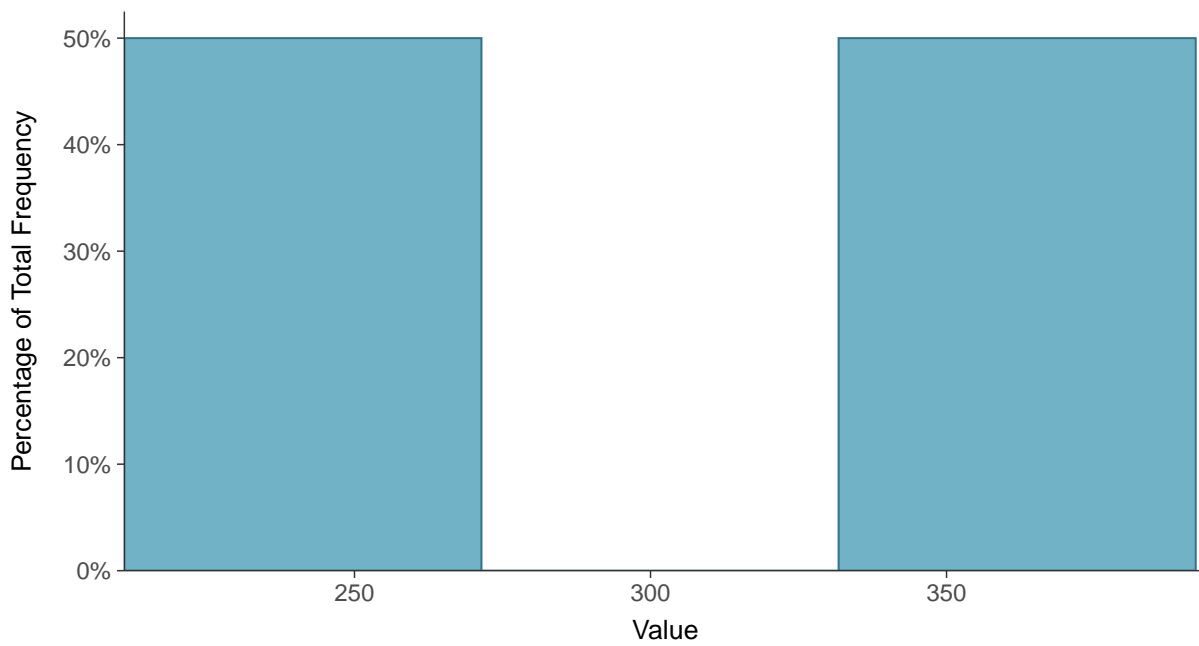
Scatter Plot

Bicarbonate, MW-9 (mg/L)



Histogram

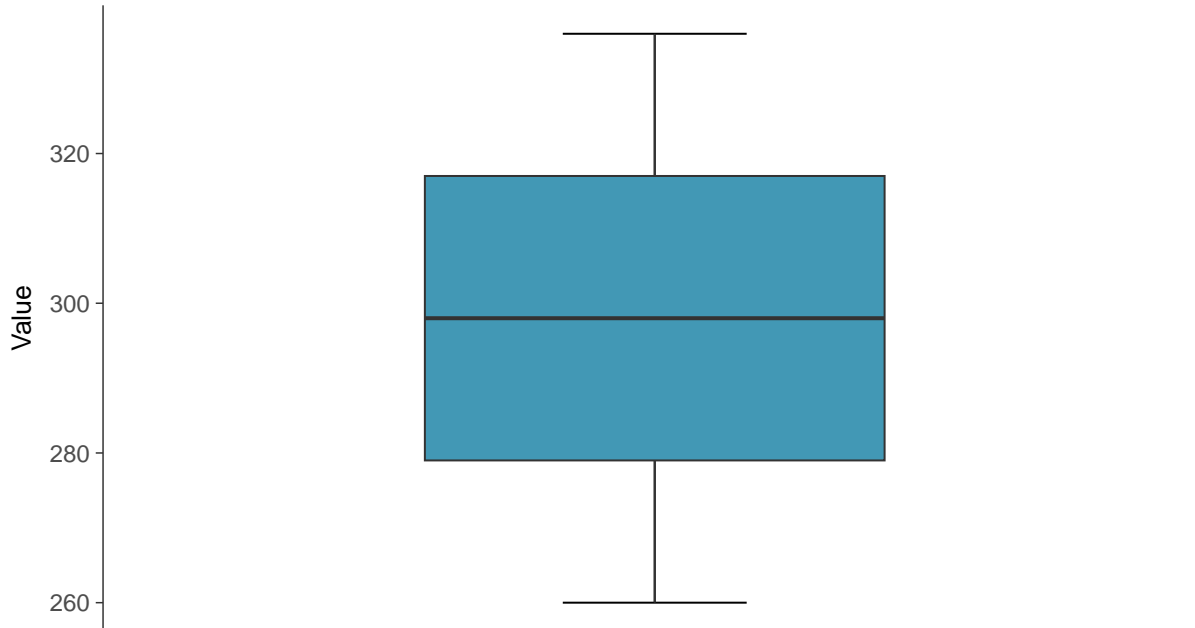
Bicarbonate, MW-9 (mg/L)





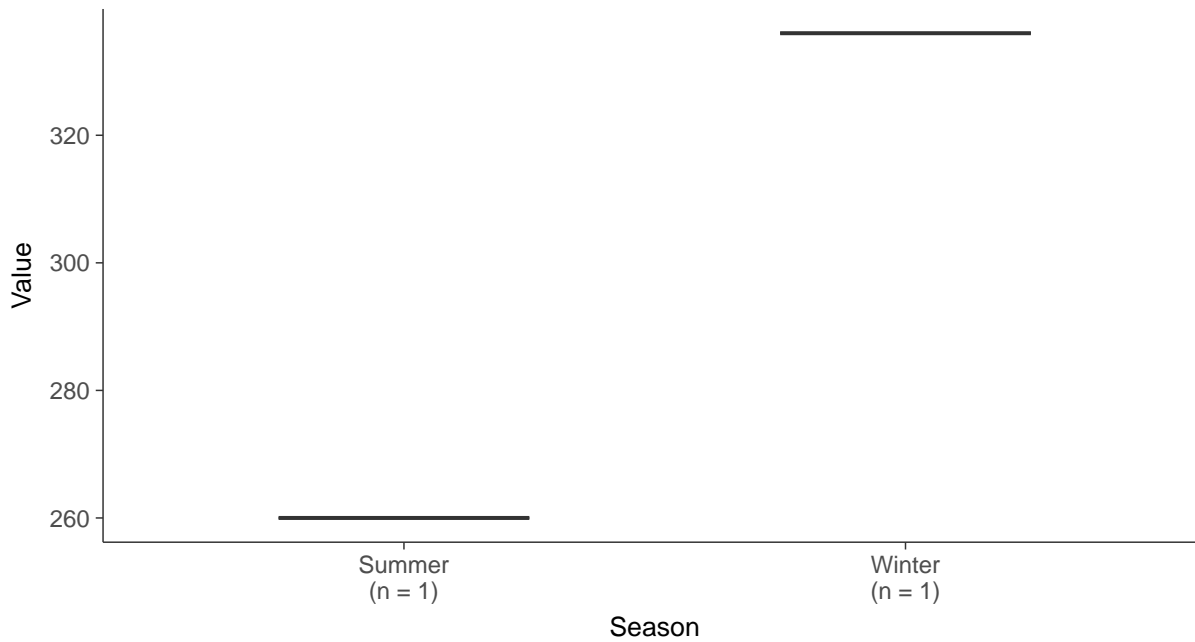
Boxplot

Bicarbonate, MW-9 (mg/L)



Boxplot by Season

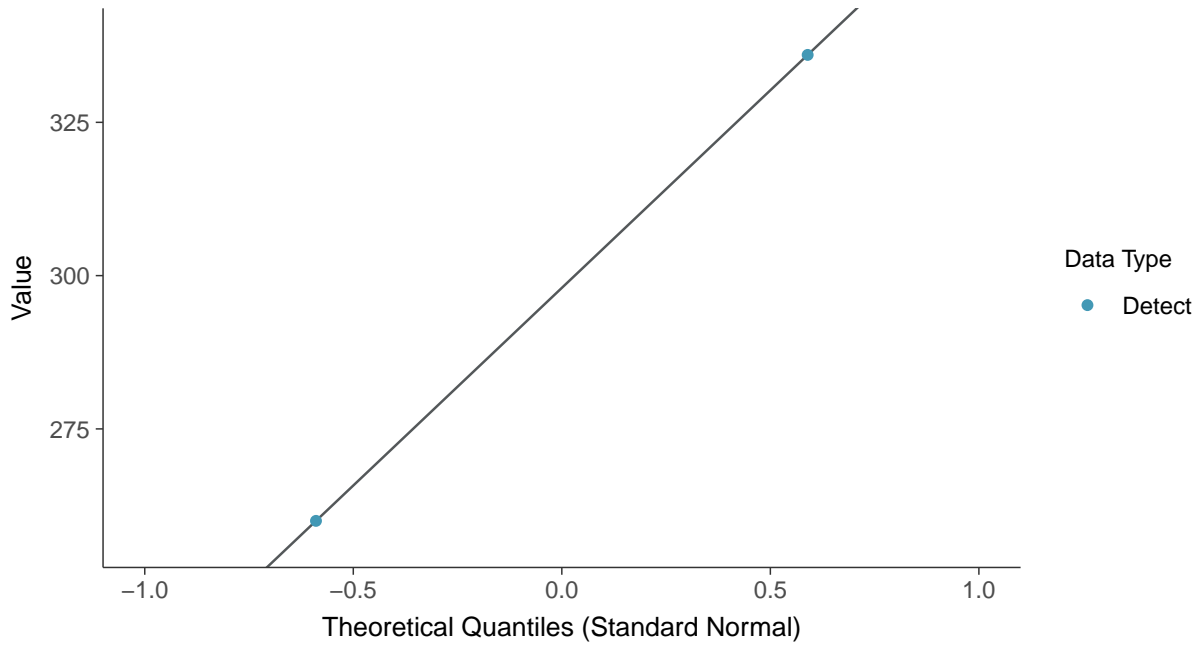
Bicarbonate, MW-9 (mg/L)





Normal Q-Q plot

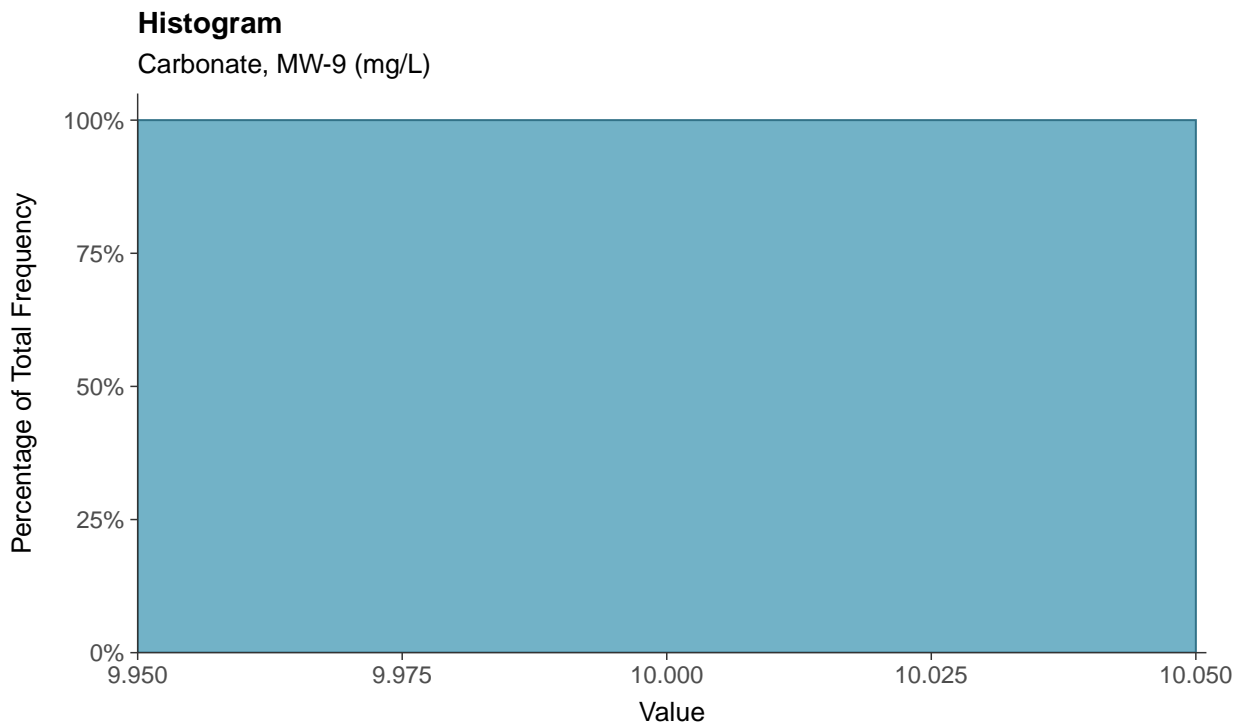
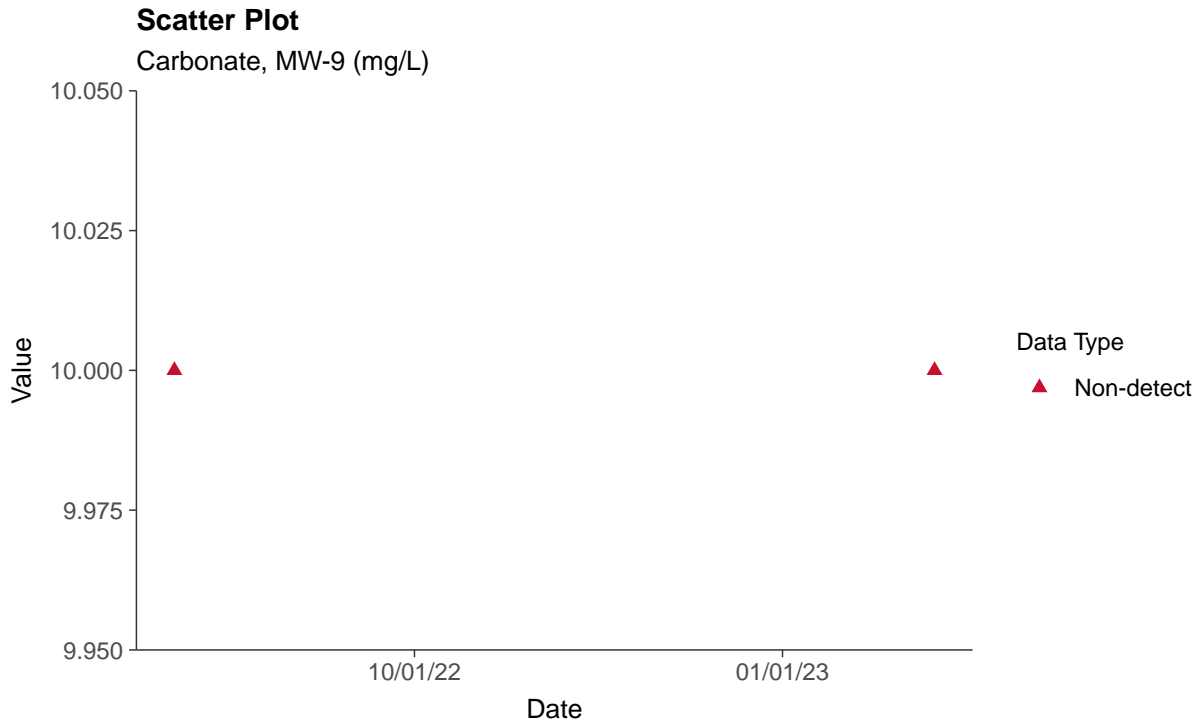
Bicarbonate, MW-9 (mg/L)





Other: Carbonate, MW-9

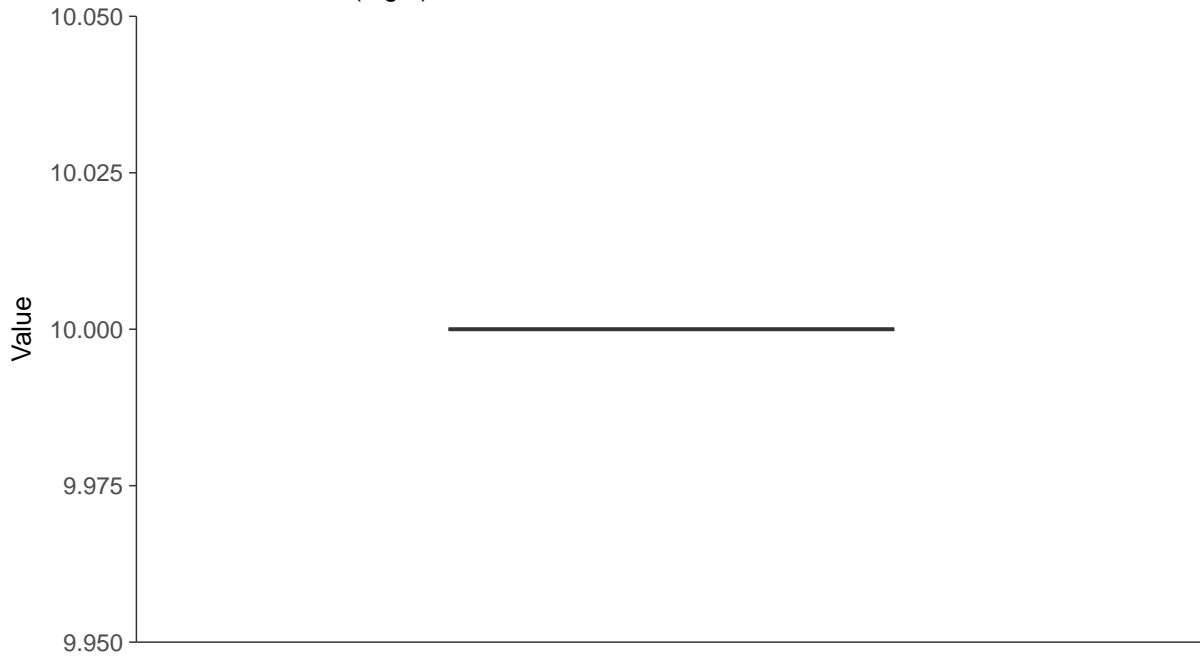
ID: 09_3_14





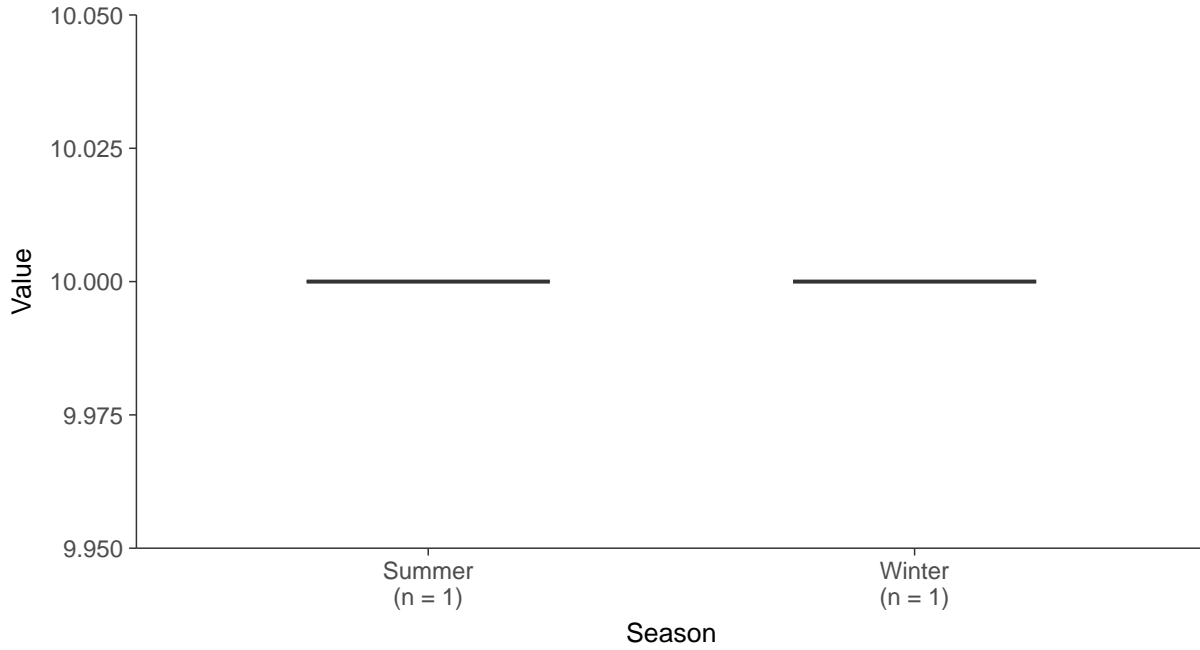
Boxplot

Carbonate, MW-9 (mg/L)



Boxplot by Season

Carbonate, MW-9 (mg/L)



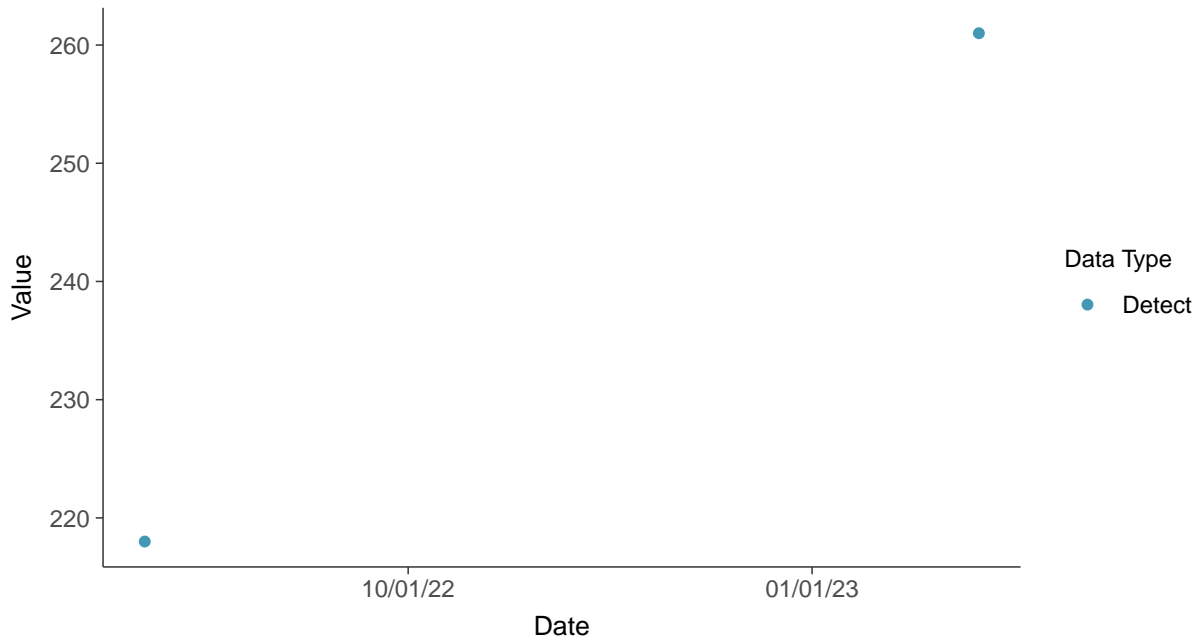


Other: Hardness, MW-9

ID: 09_3_17

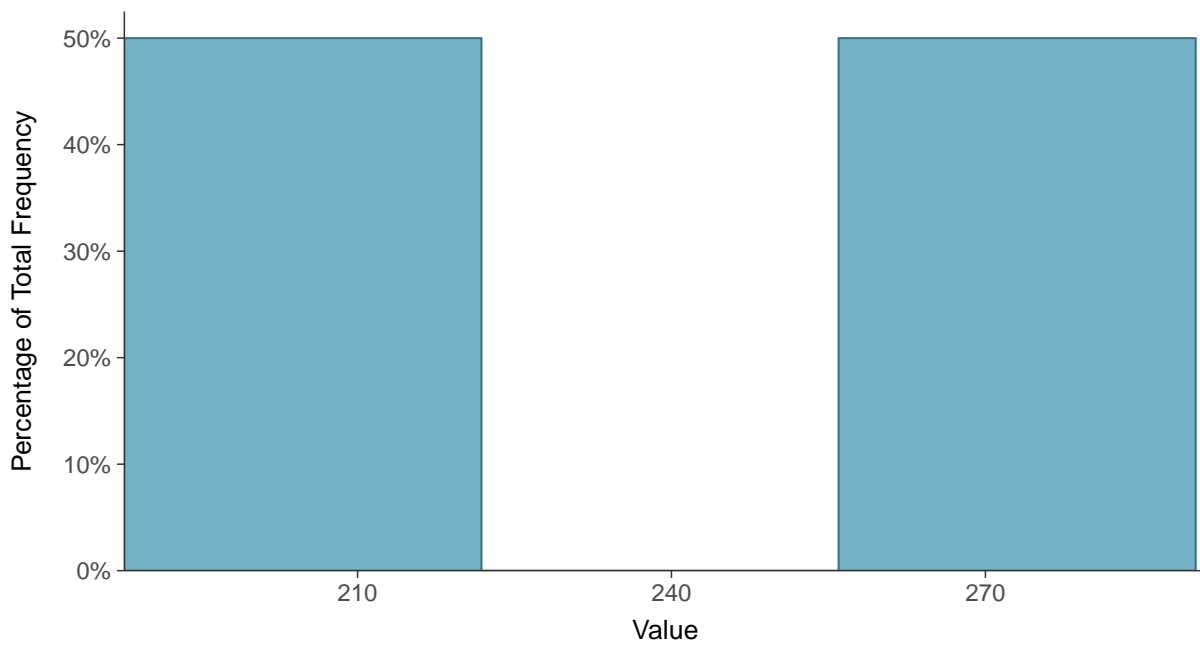
Scatter Plot

Hardness, MW-9 (mg/L)



Histogram

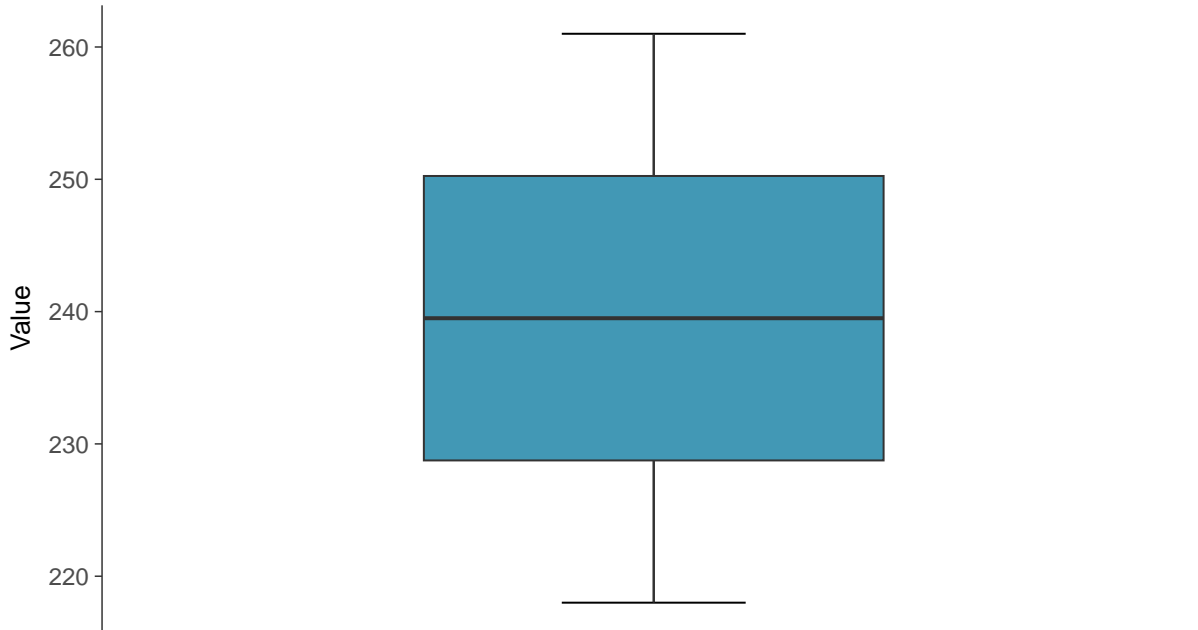
Hardness, MW-9 (mg/L)





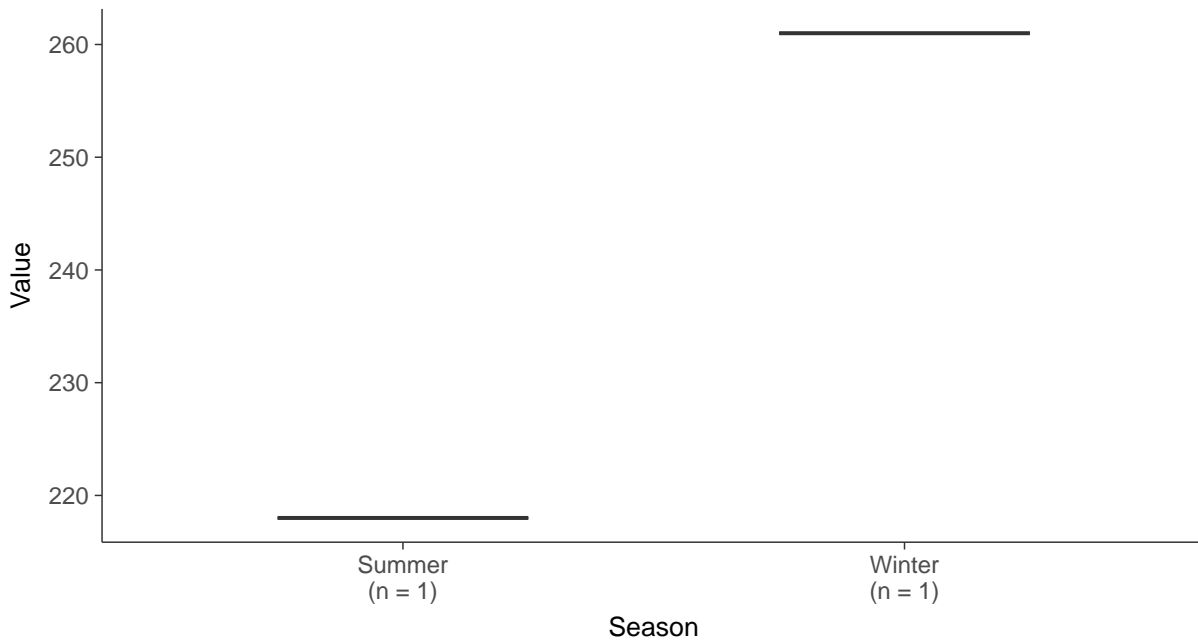
Boxplot

Hardness, MW-9 (mg/L)



Boxplot by Season

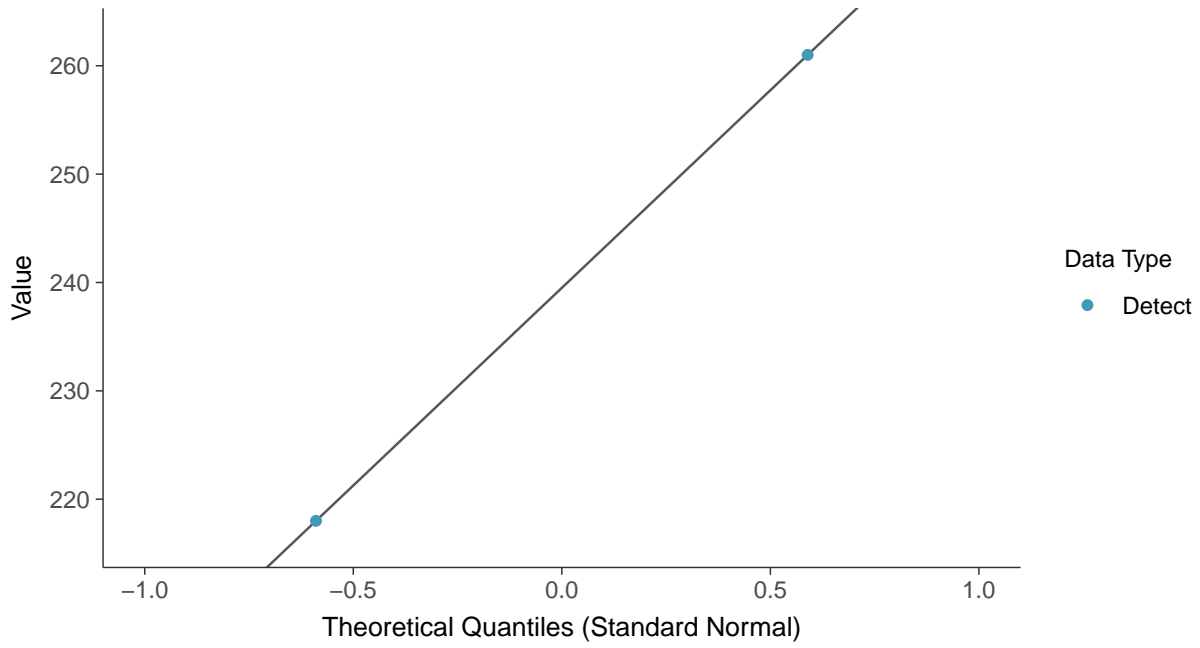
Hardness, MW-9 (mg/L)





Normal Q-Q plot

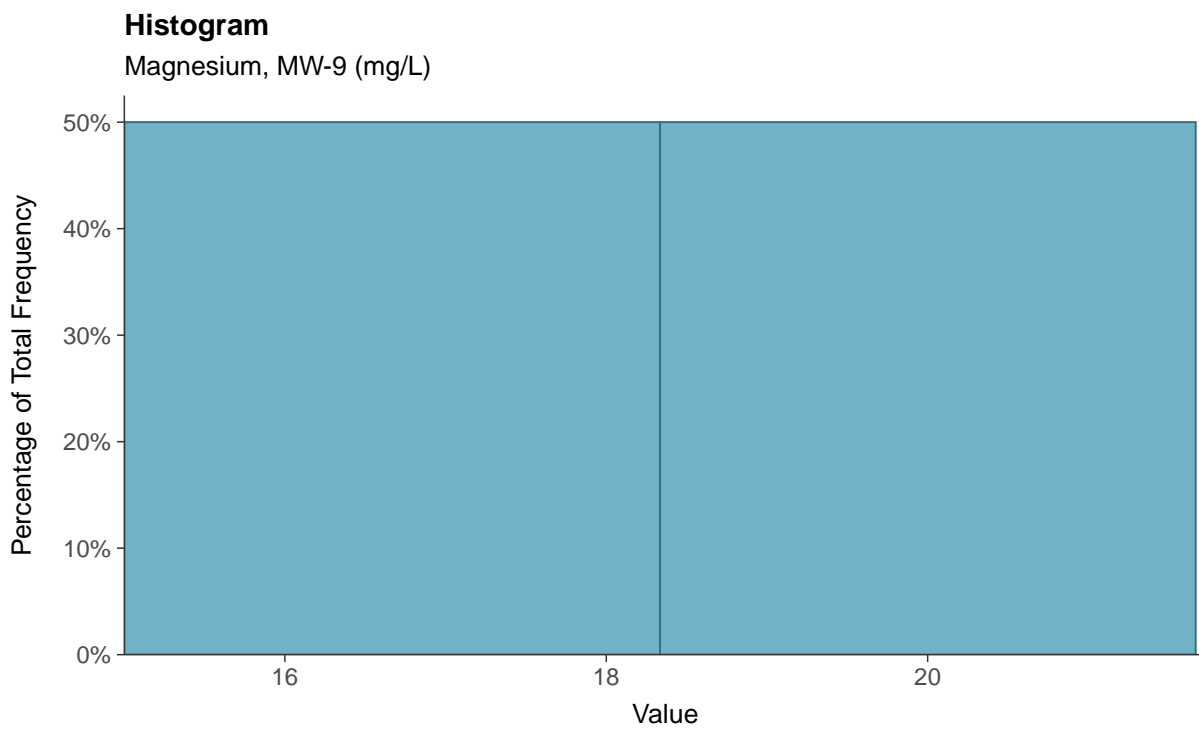
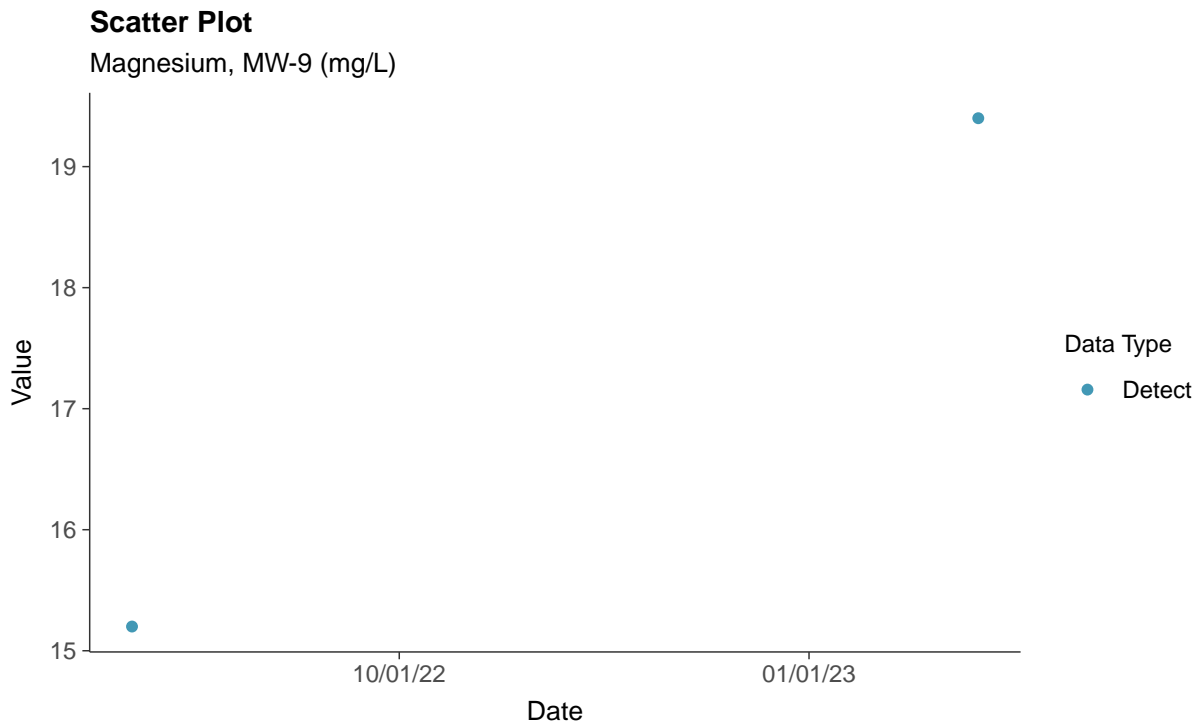
Hardness, MW-9 (mg/L)





Other: Magnesium, MW-9

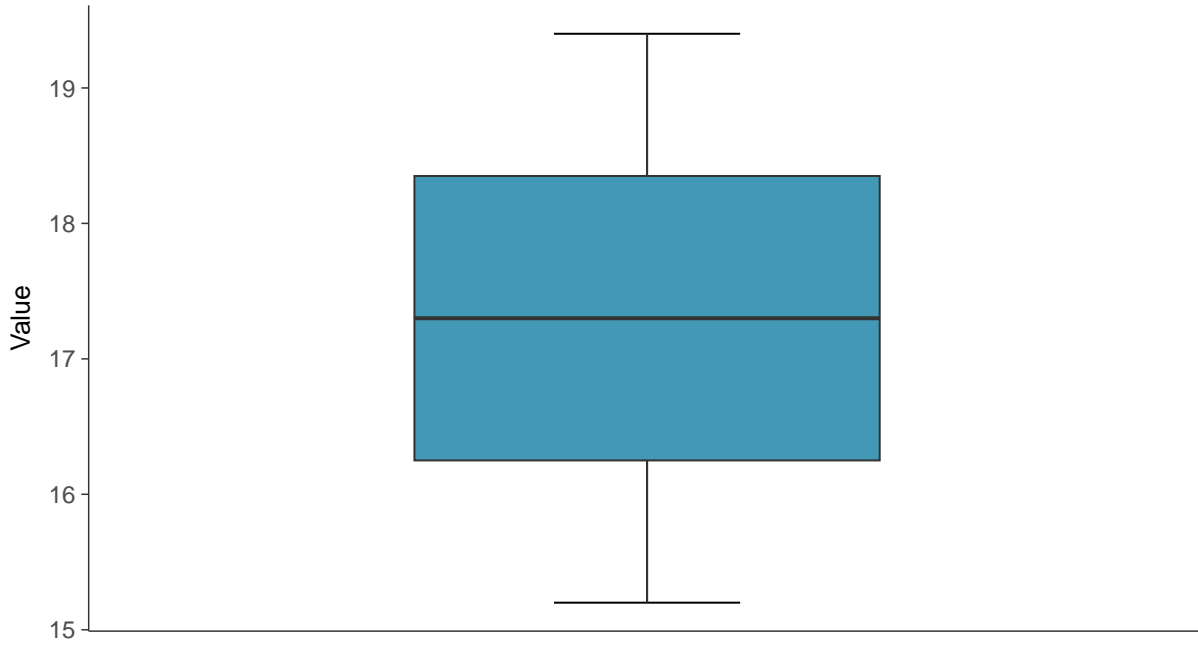
ID: 09_3_20





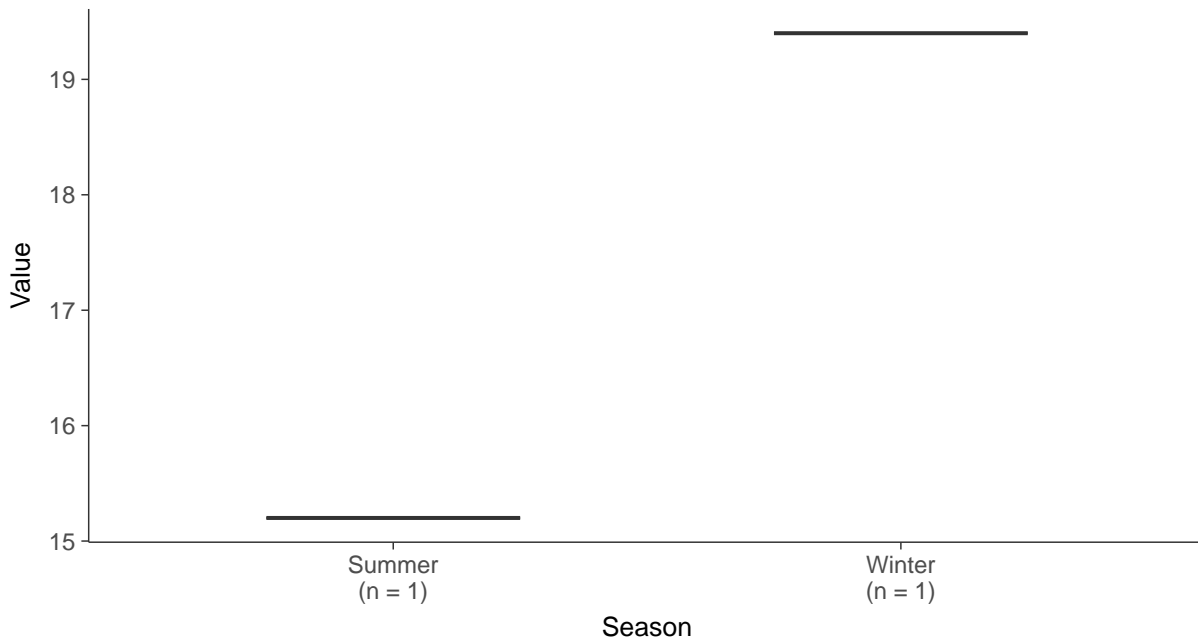
Boxplot

Magnesium, MW-9 (mg/L)



Boxplot by Season

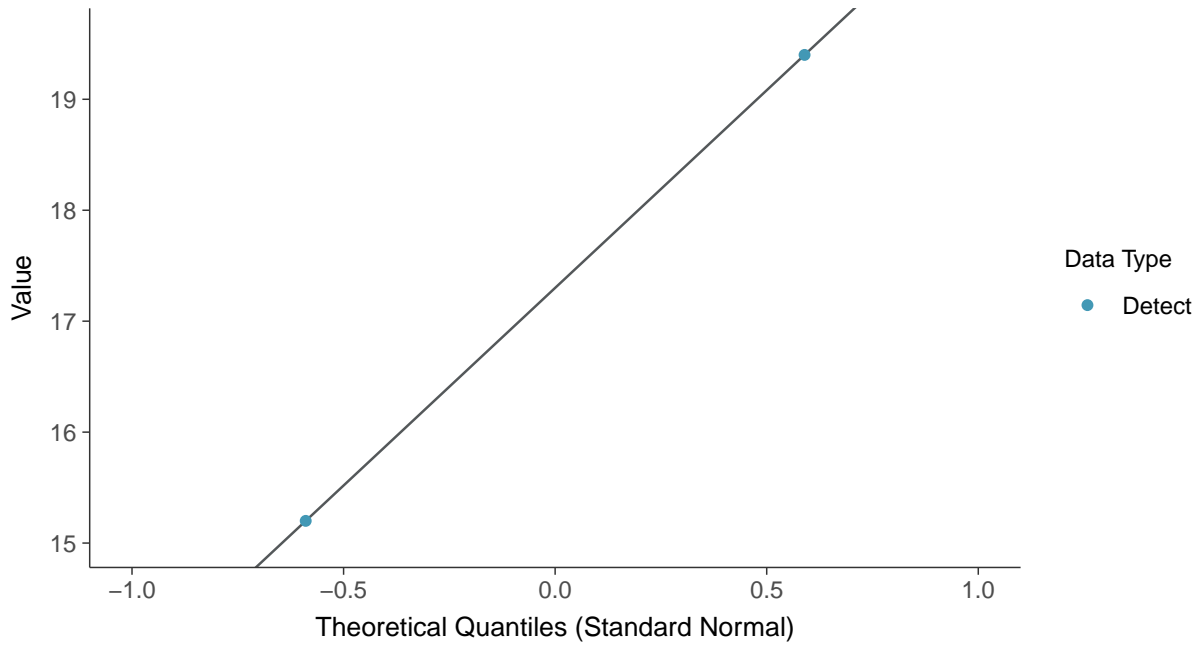
Magnesium, MW-9 (mg/L)





Normal Q-Q plot

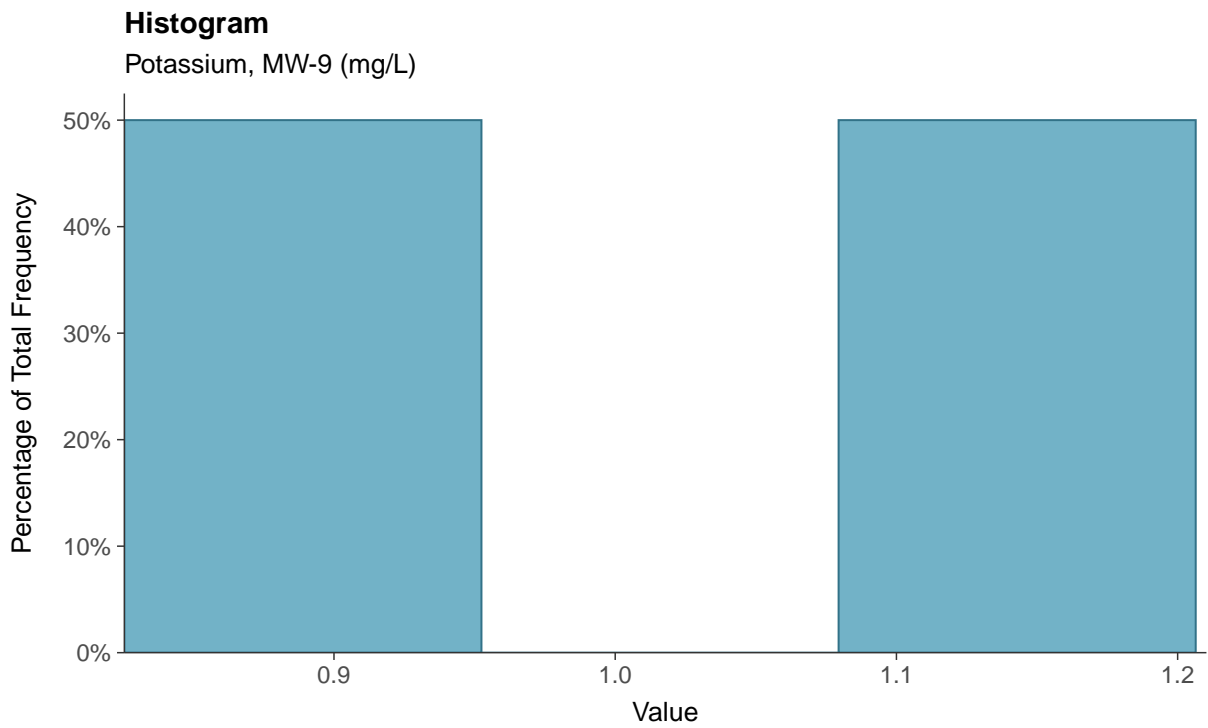
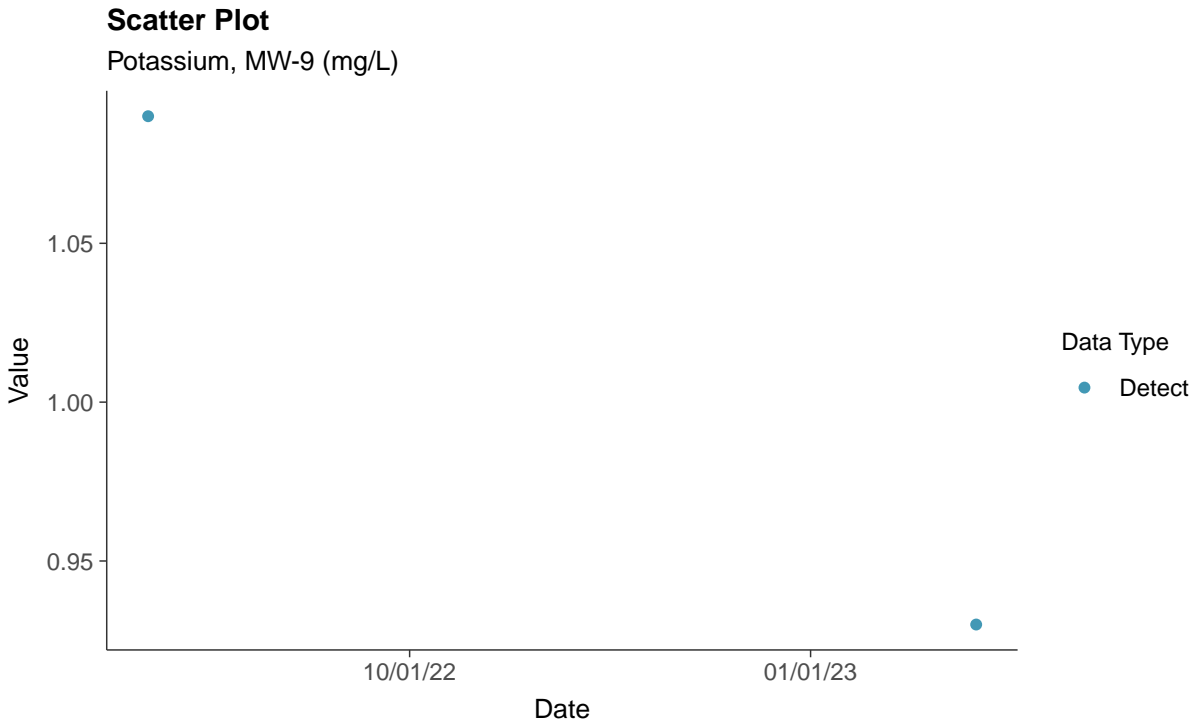
Magnesium, MW-9 (mg/L)





Other: Potassium, MW-9

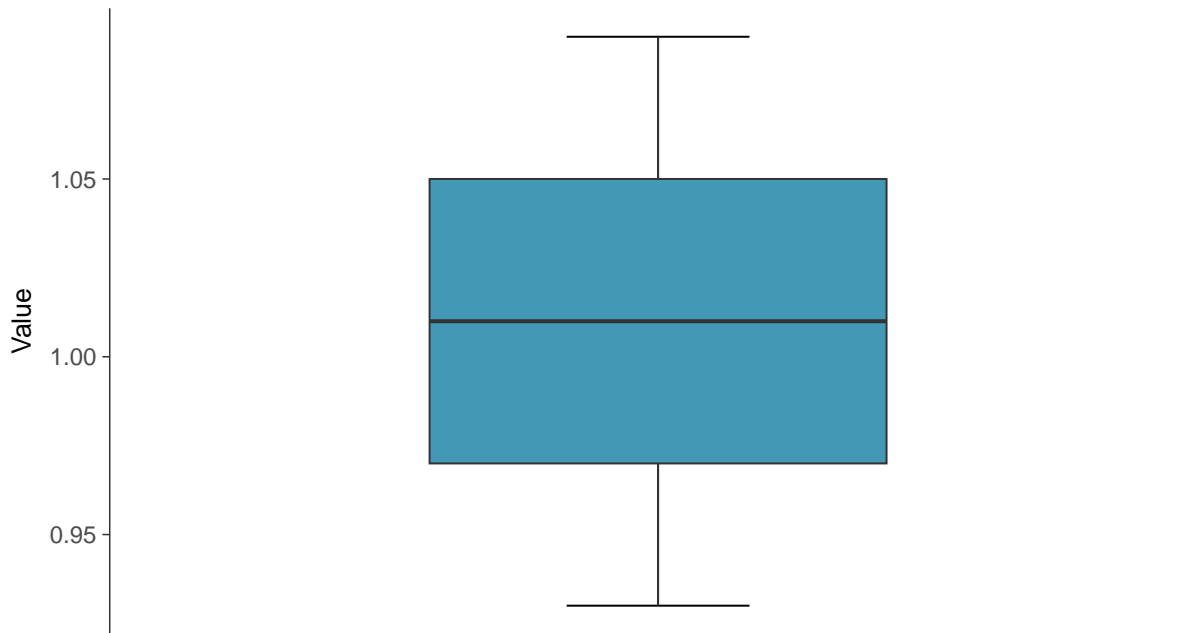
ID: 09_3_23





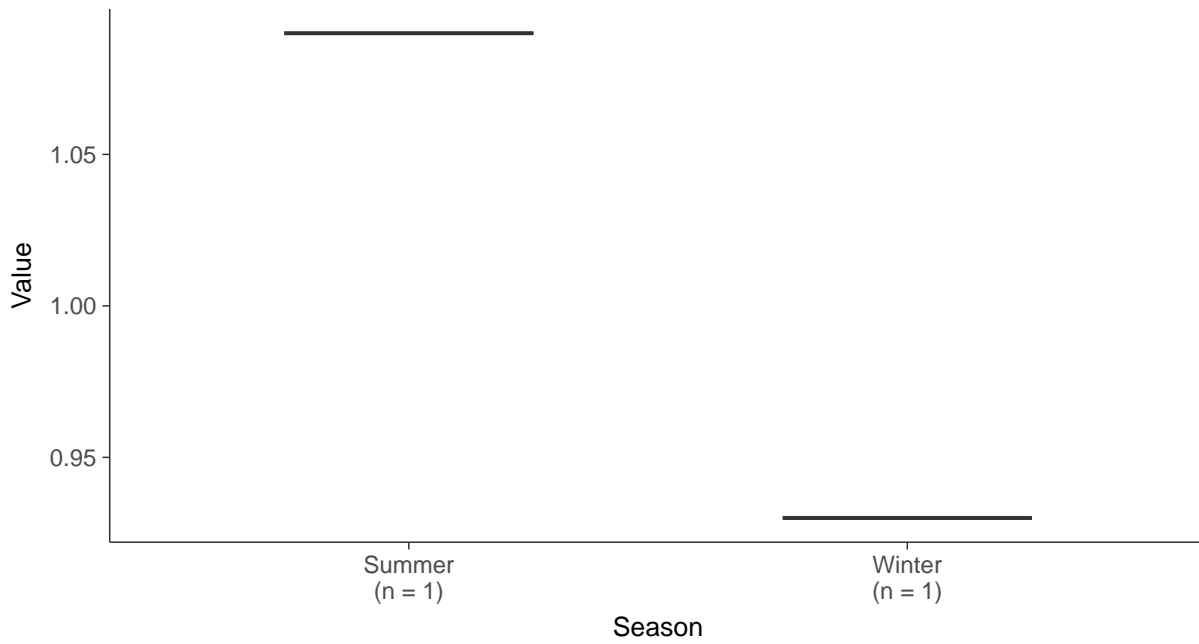
Boxplot

Potassium, MW-9 (mg/L)



Boxplot by Season

Potassium, MW-9 (mg/L)

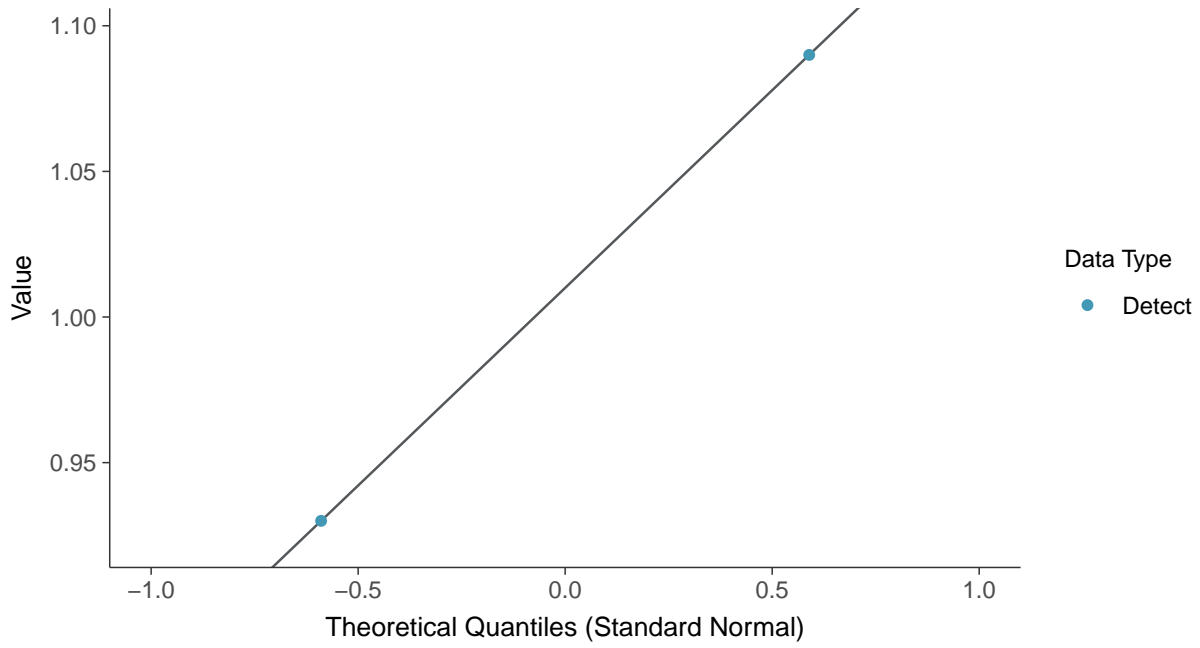




Downgradient Wells MW-2, MW-3, MW-5, MW-6, MW-7, MW-7B, MW-8, MW-9, MW-10, MW-13, MW-14, MW-15

Normal Q-Q plot

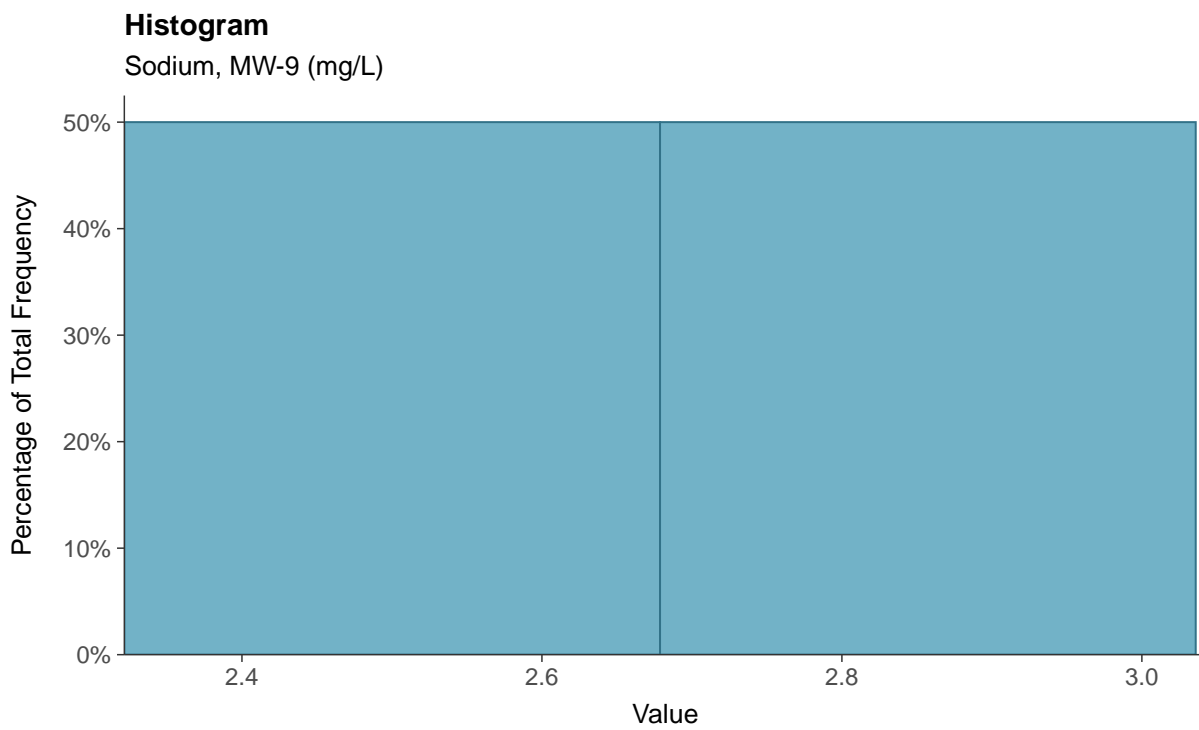
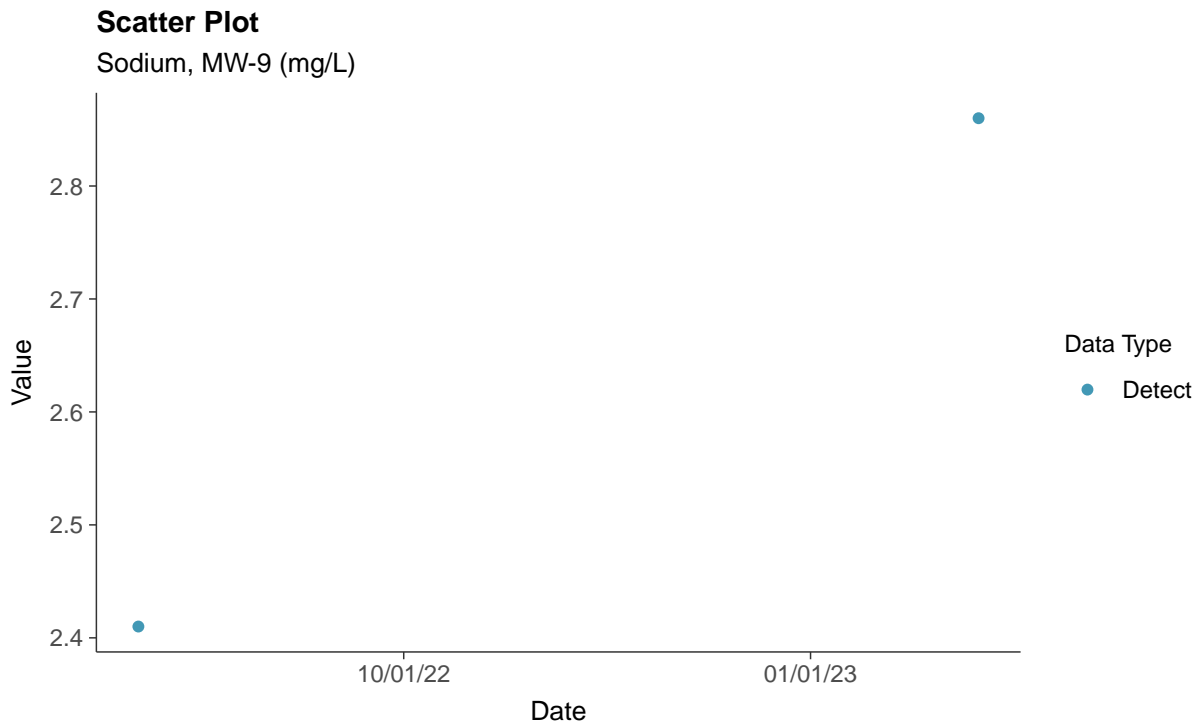
Potassium, MW-9 (mg/L)





Other: Sodium, MW-9

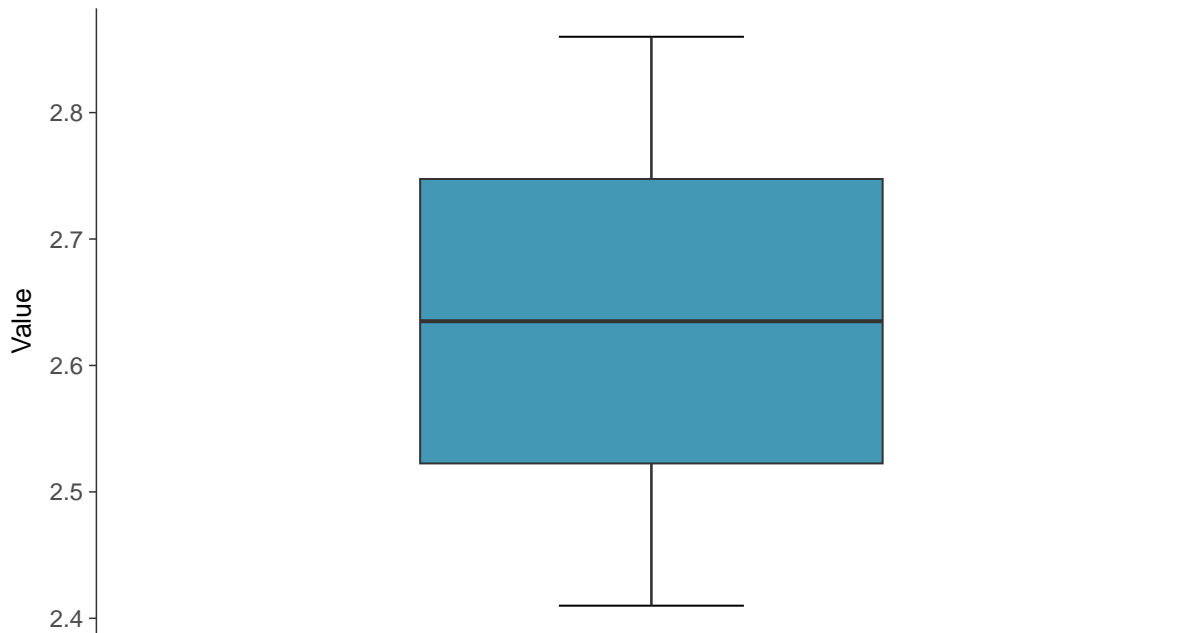
ID: 09_3_28





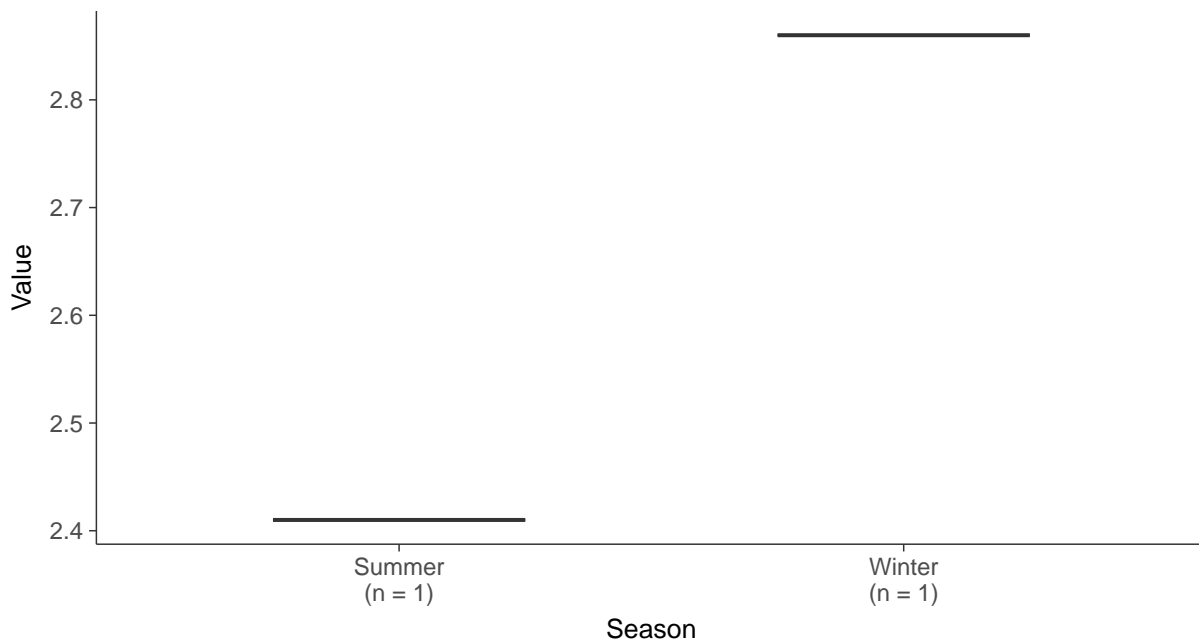
Boxplot

Sodium, MW-9 (mg/L)



Boxplot by Season

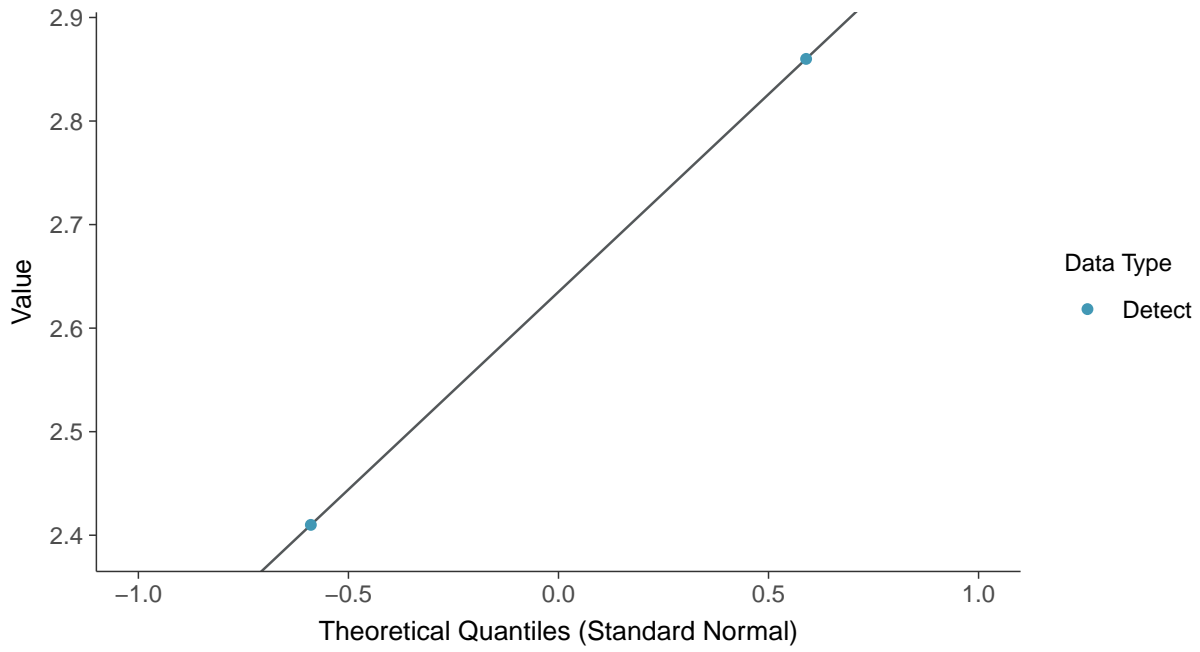
Sodium, MW-9 (mg/L)





Normal Q-Q plot

Sodium, MW-9 (mg/L)



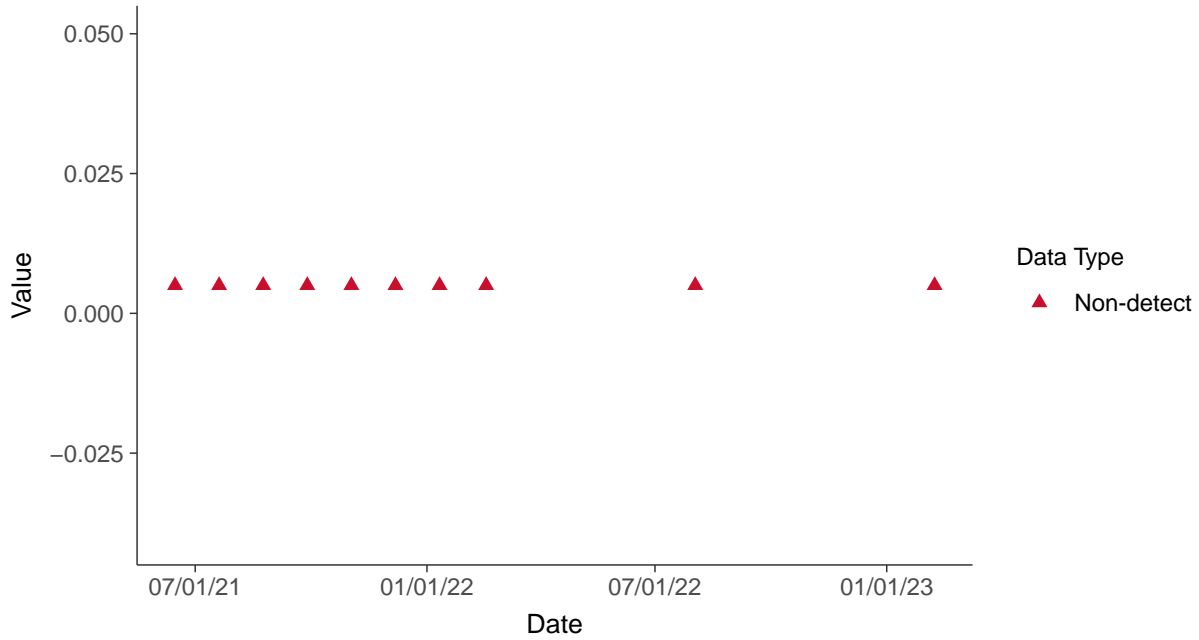


Part 115: Copper, MW-9

ID: 09_5_37

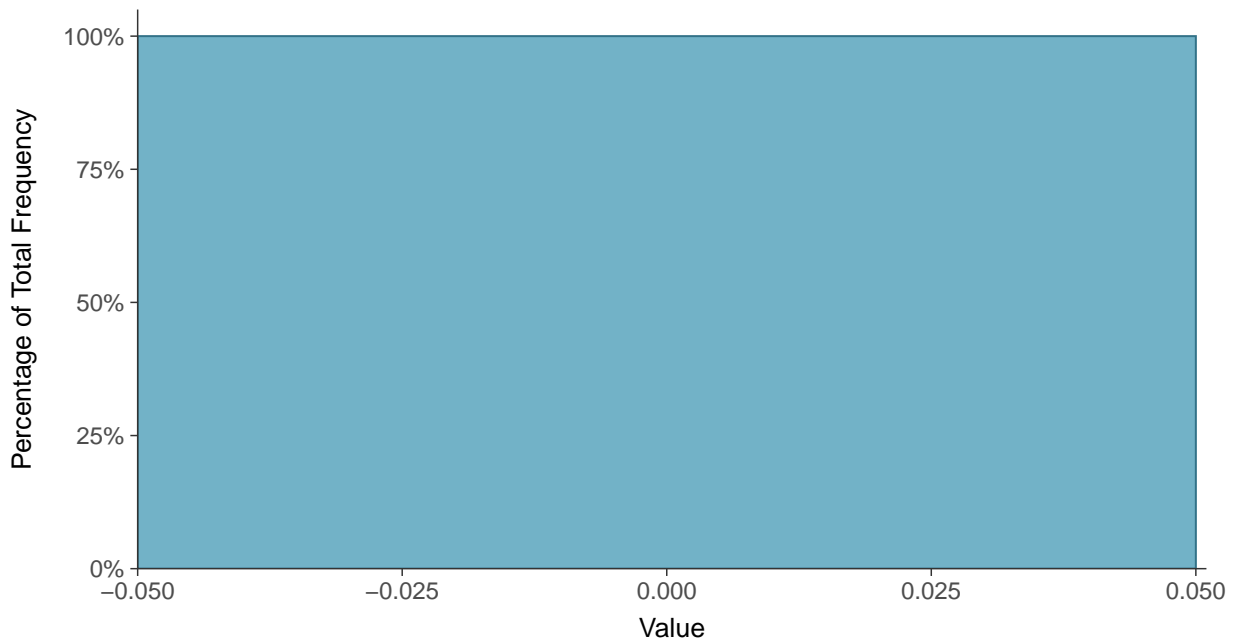
Scatter Plot

Copper, MW-9 (mg/L)



Histogram

Copper, MW-9 (mg/L)





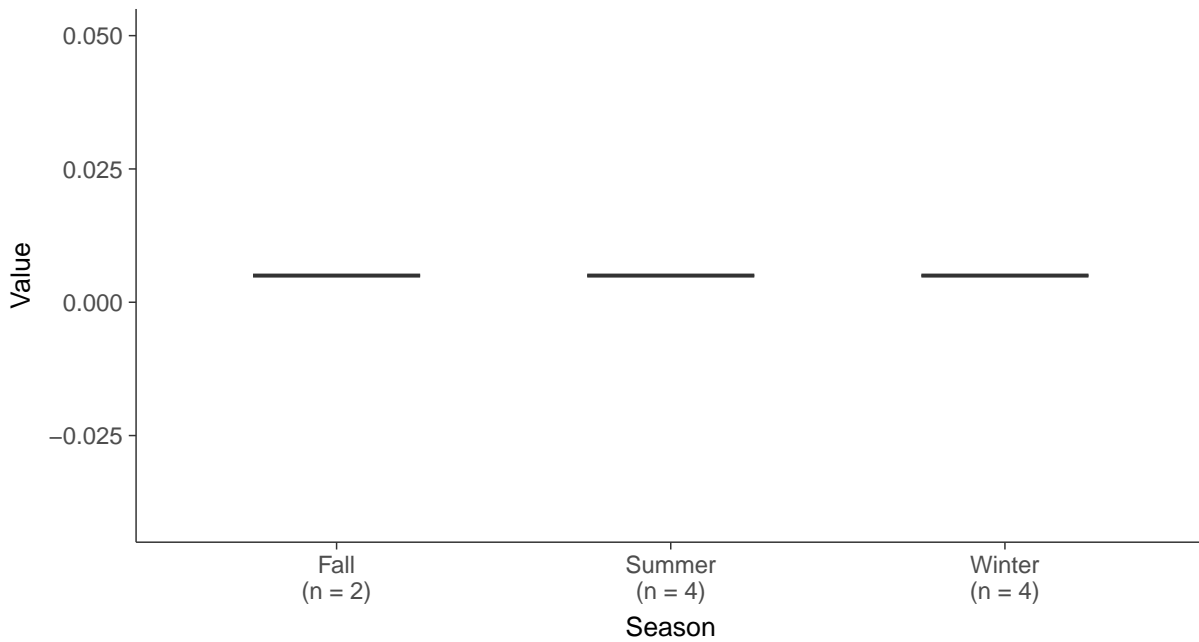
Boxplot

Copper, MW-9 (mg/L)



Boxplot by Season

Copper, MW-9 (mg/L)



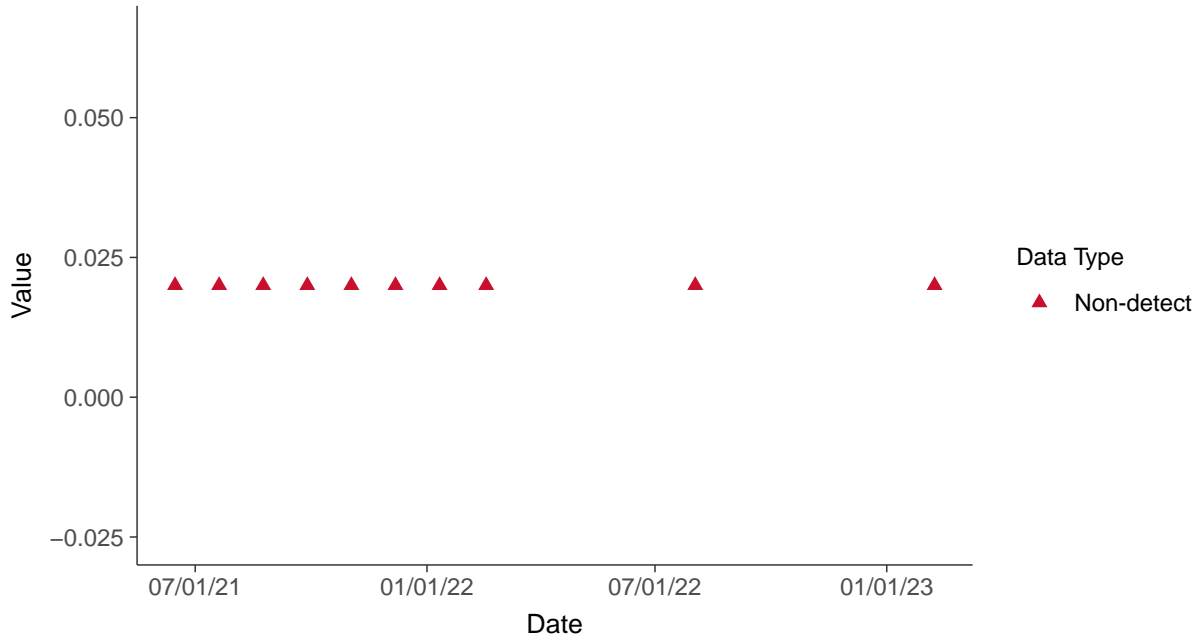


Part 115: Iron, MW-9

ID: 09_5_38

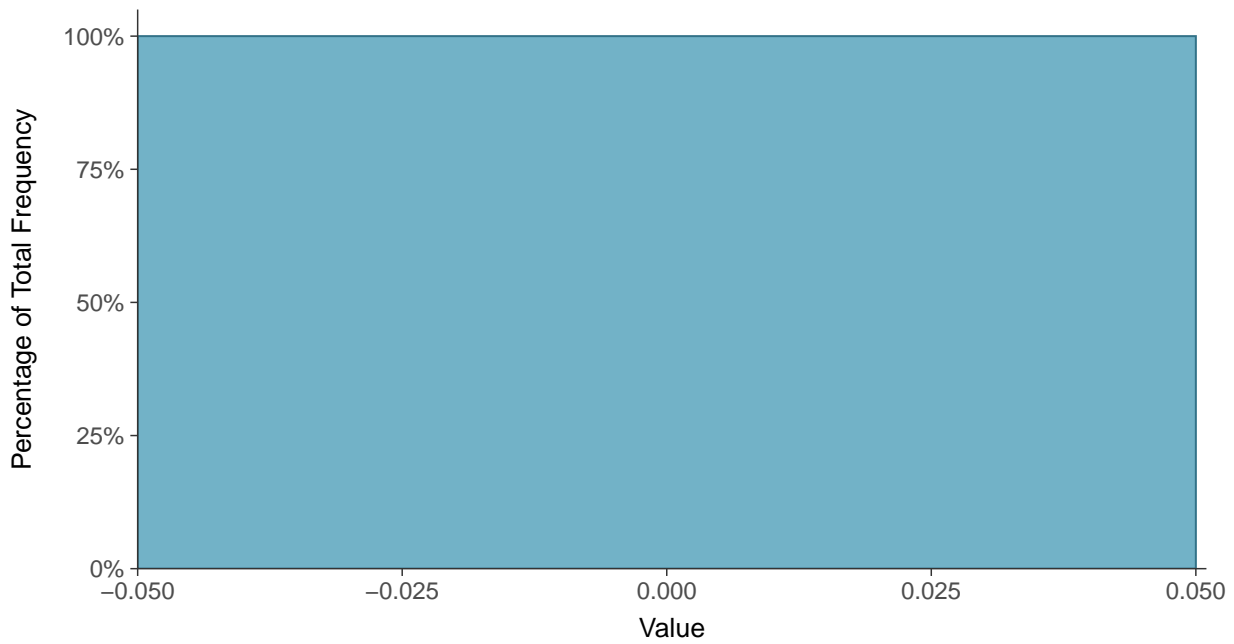
Scatter Plot

Iron, MW-9 (mg/L)



Histogram

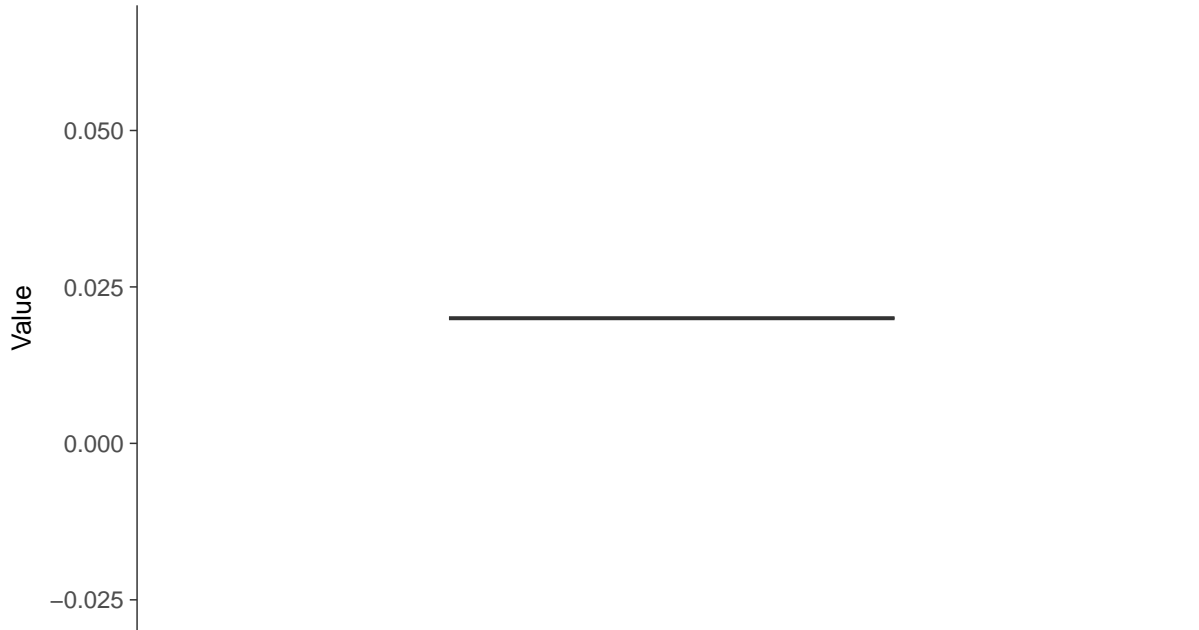
Iron, MW-9 (mg/L)





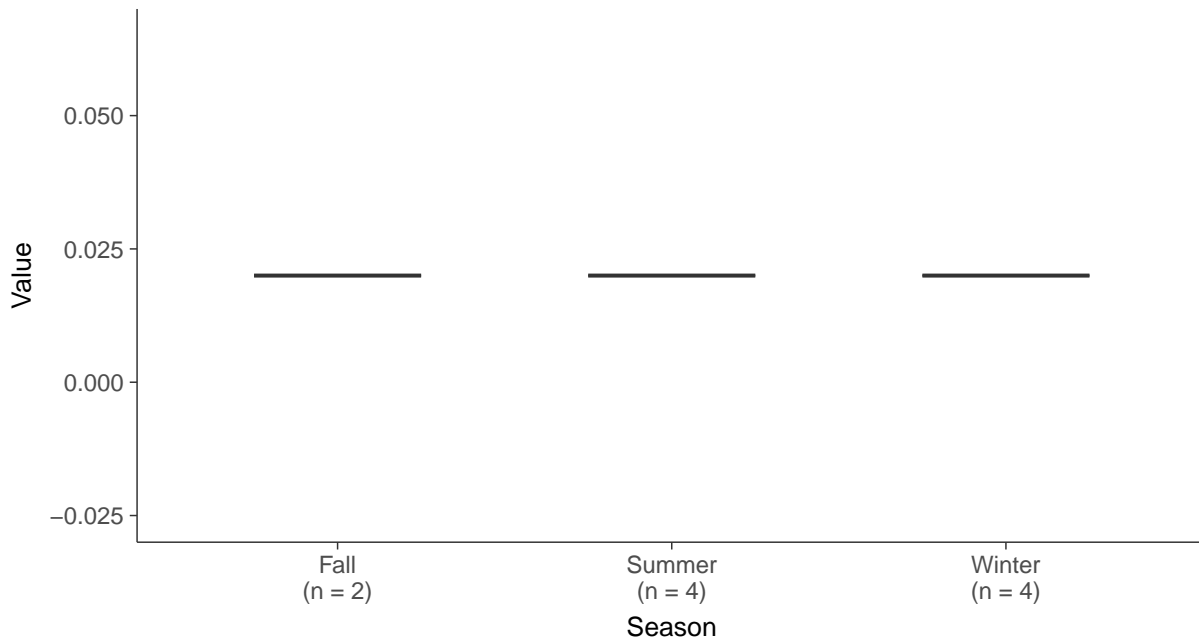
Boxplot

Iron, MW-9 (mg/L)



Boxplot by Season

Iron, MW-9 (mg/L)



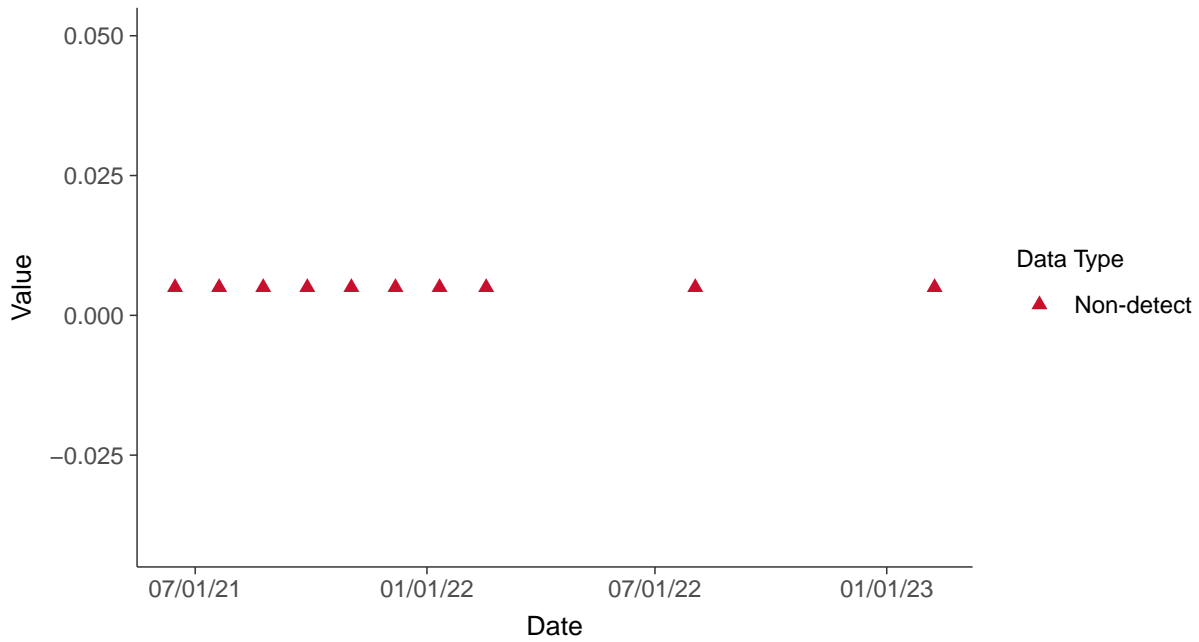


Part 115: Nickel, MW-9

ID: 09_5_39

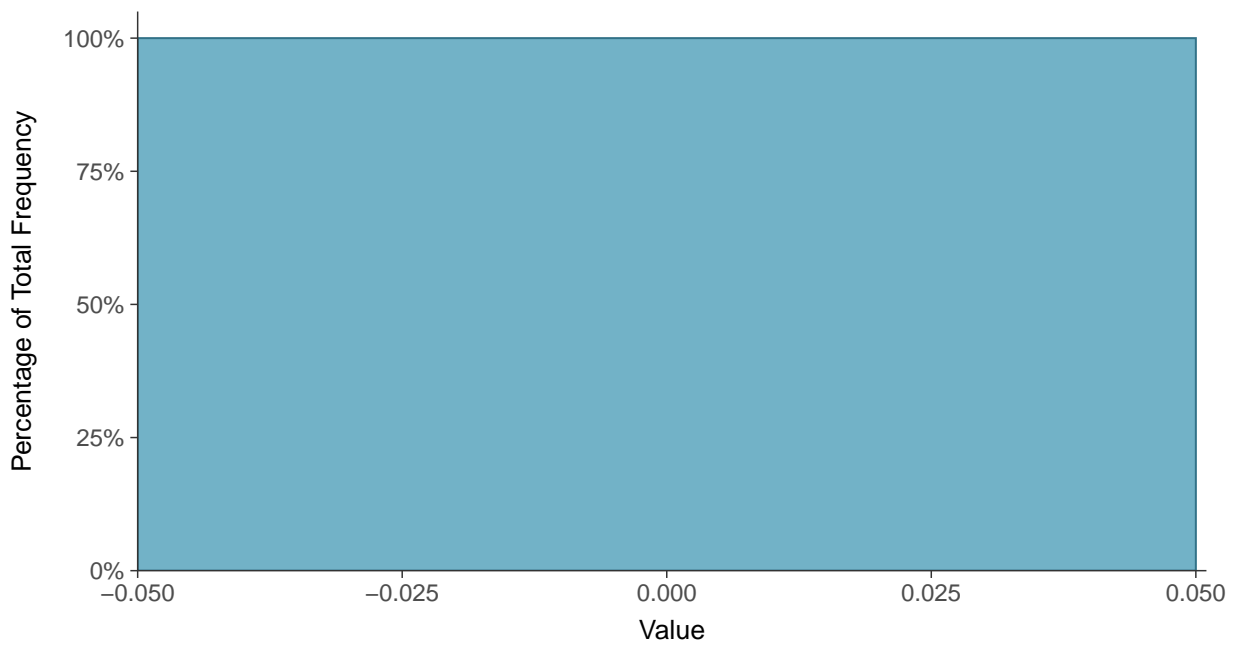
Scatter Plot

Nickel, MW-9 (mg/L)



Histogram

Nickel, MW-9 (mg/L)





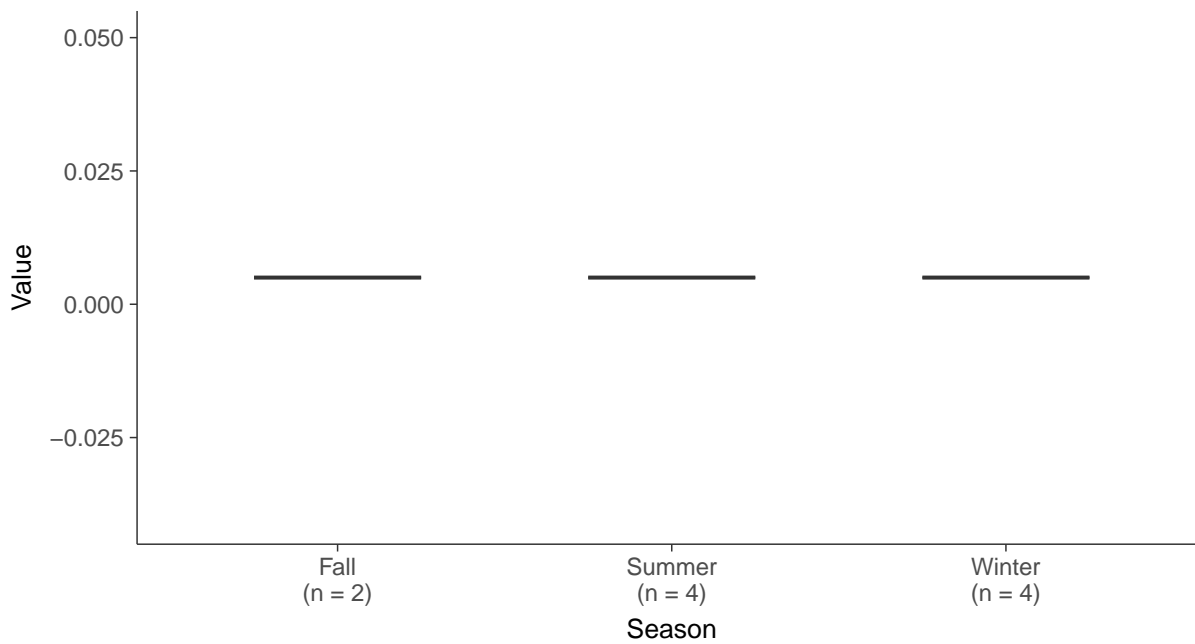
Boxplot

Nickel, MW-9 (mg/L)



Boxplot by Season

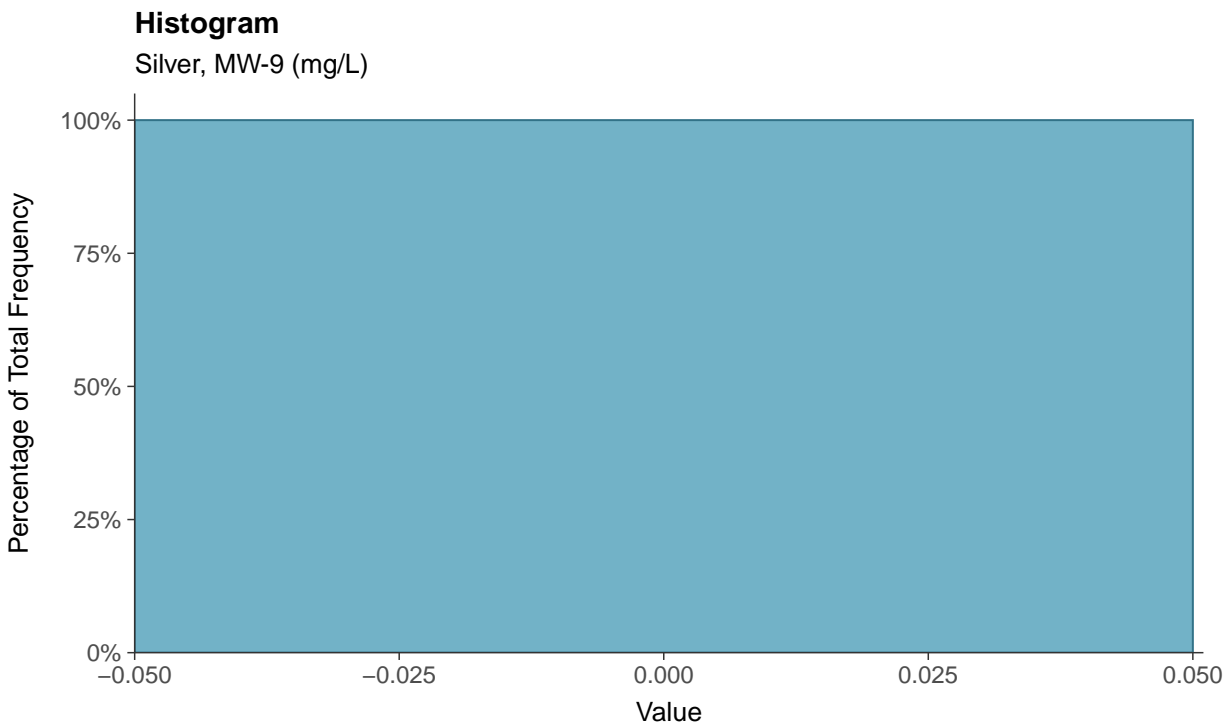
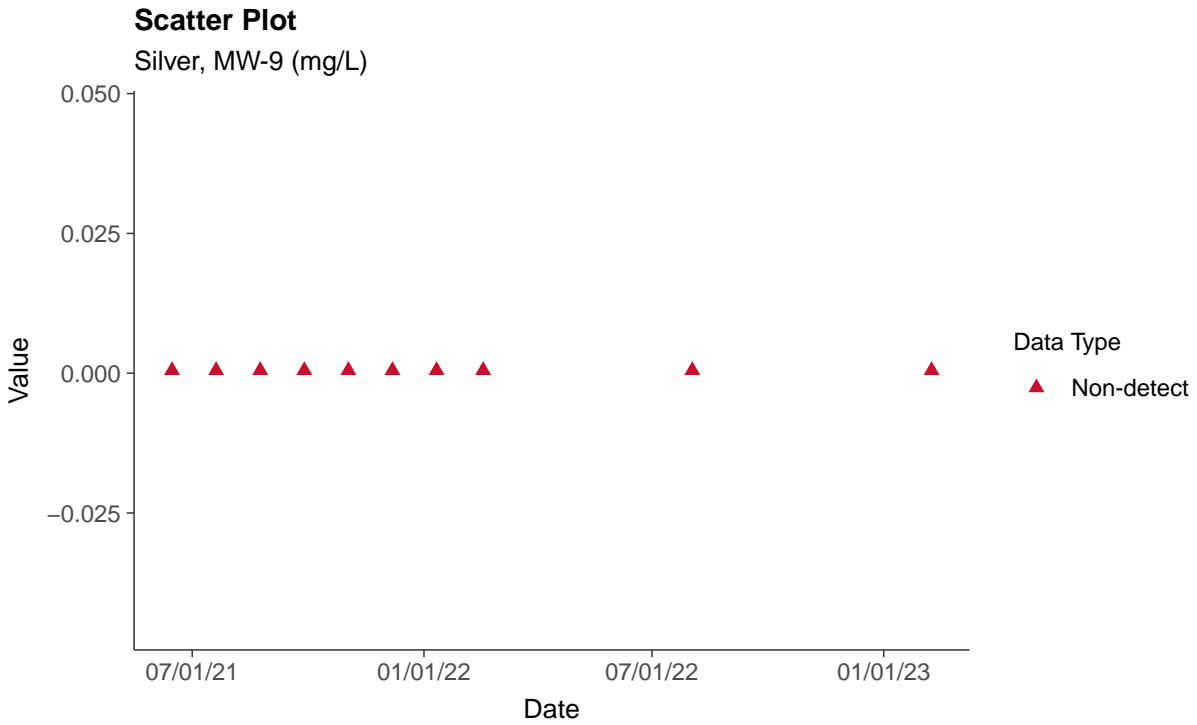
Nickel, MW-9 (mg/L)





Part 115: Silver, MW-9

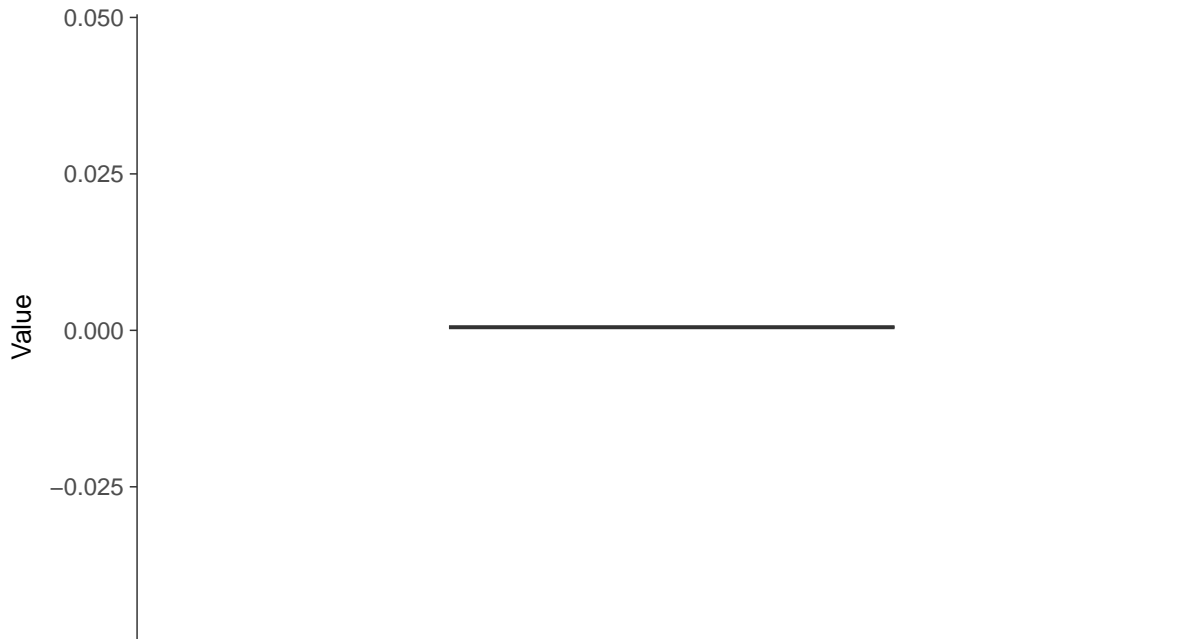
ID: 09_5_40





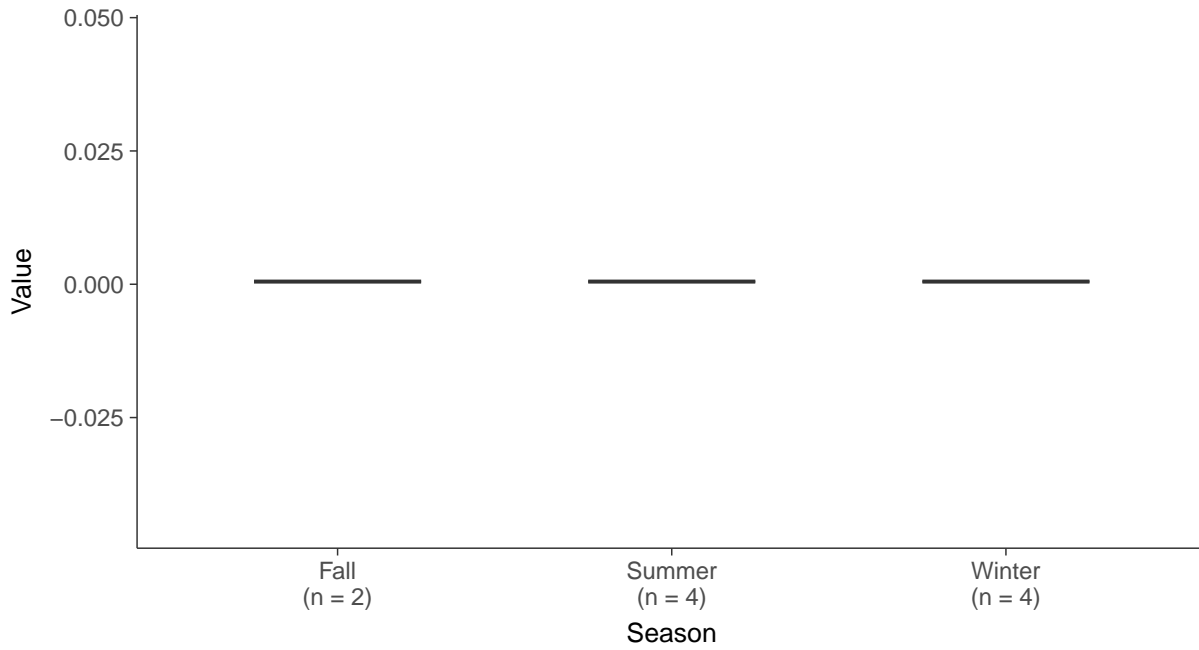
Boxplot

Silver, MW-9 (mg/L)



Boxplot by Season

Silver, MW-9 (mg/L)



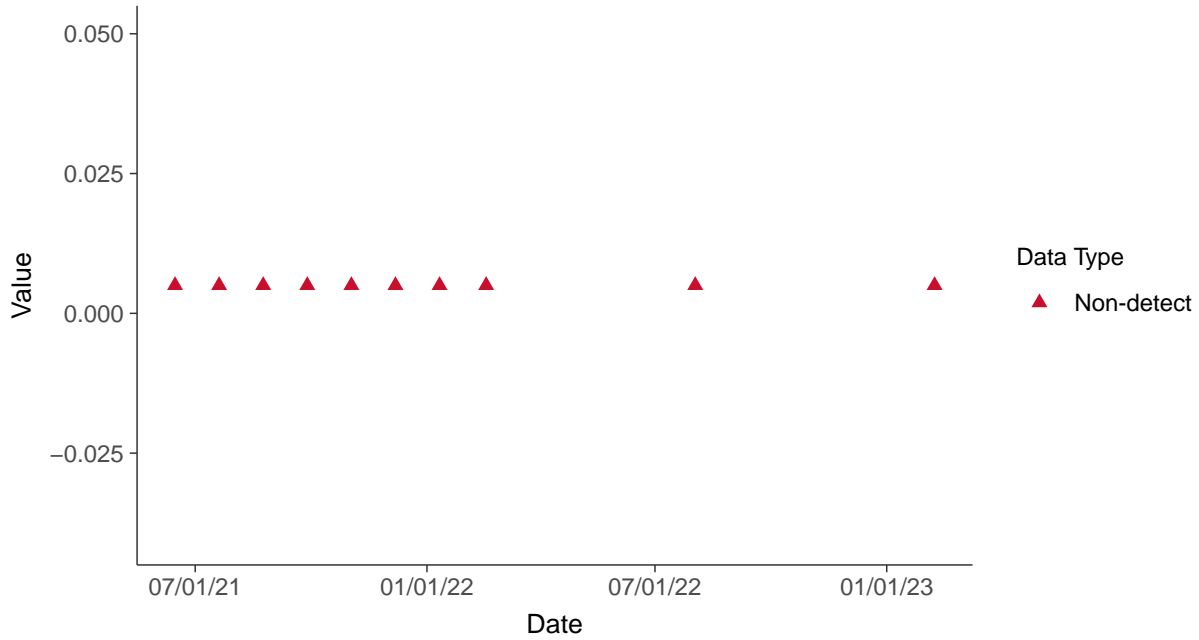


Part 115: Vanadium, MW-9

ID: 09_5_41

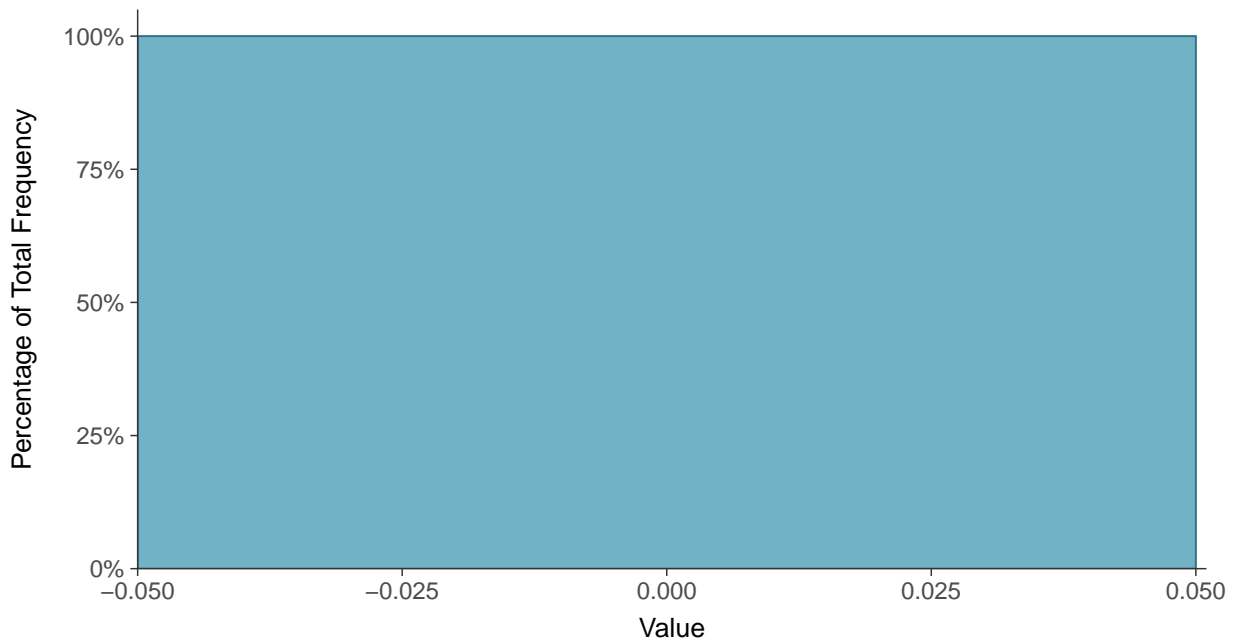
Scatter Plot

Vanadium, MW-9 (mg/L)



Histogram

Vanadium, MW-9 (mg/L)





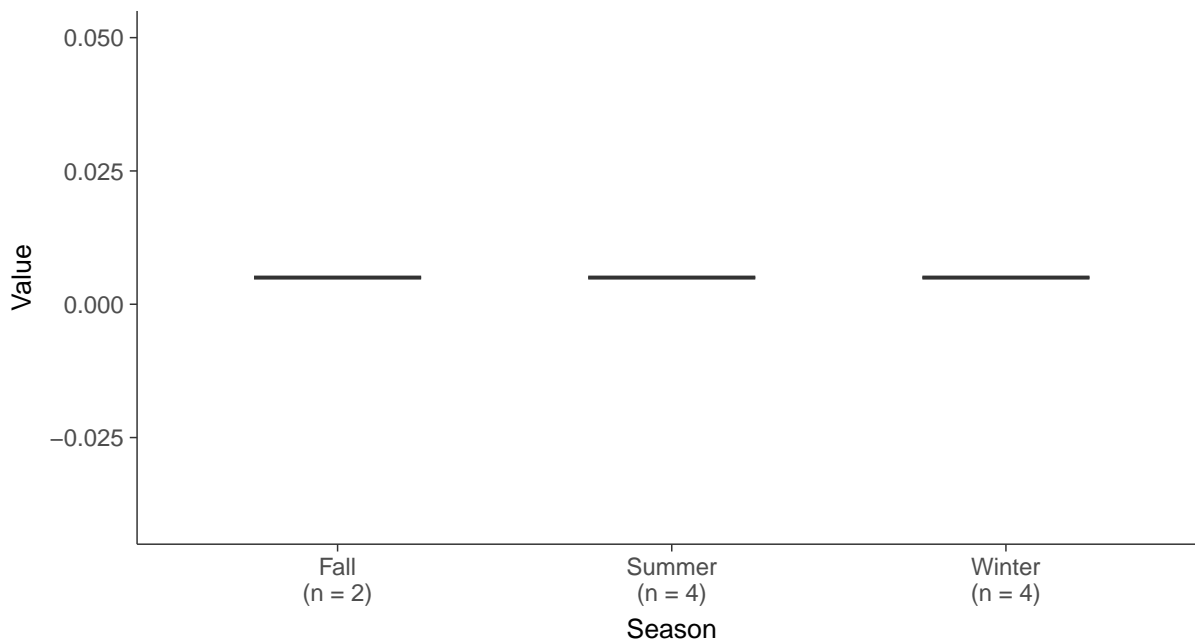
Boxplot

Vanadium, MW-9 (mg/L)



Boxplot by Season

Vanadium, MW-9 (mg/L)



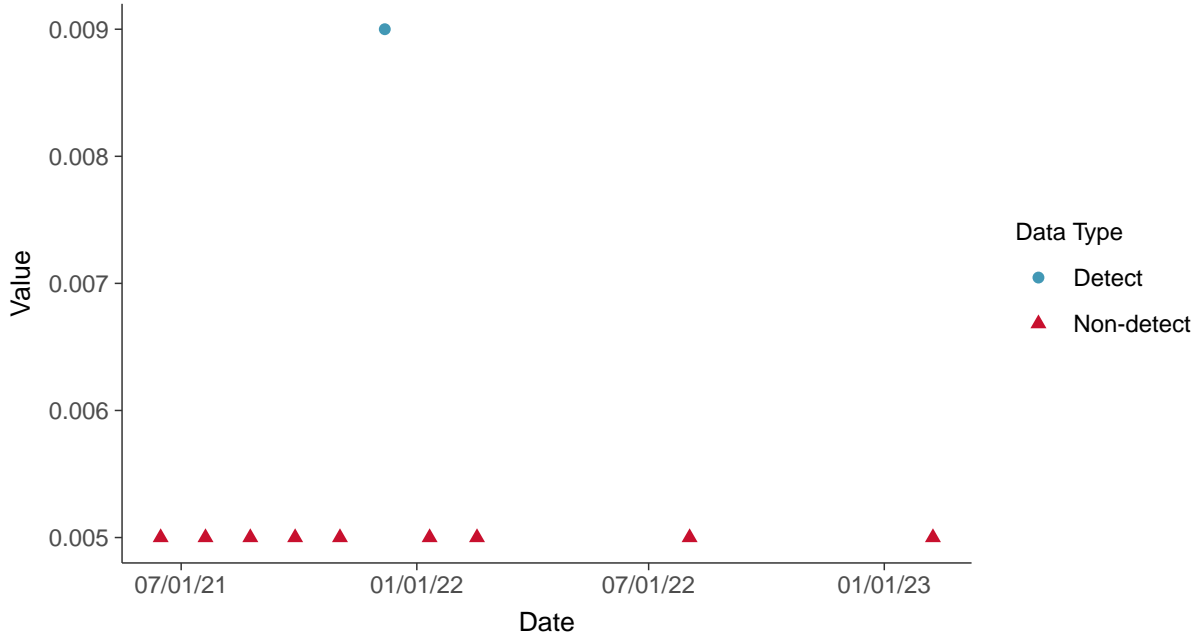


Part 115: Zinc, MW-9

ID: 09_5_42

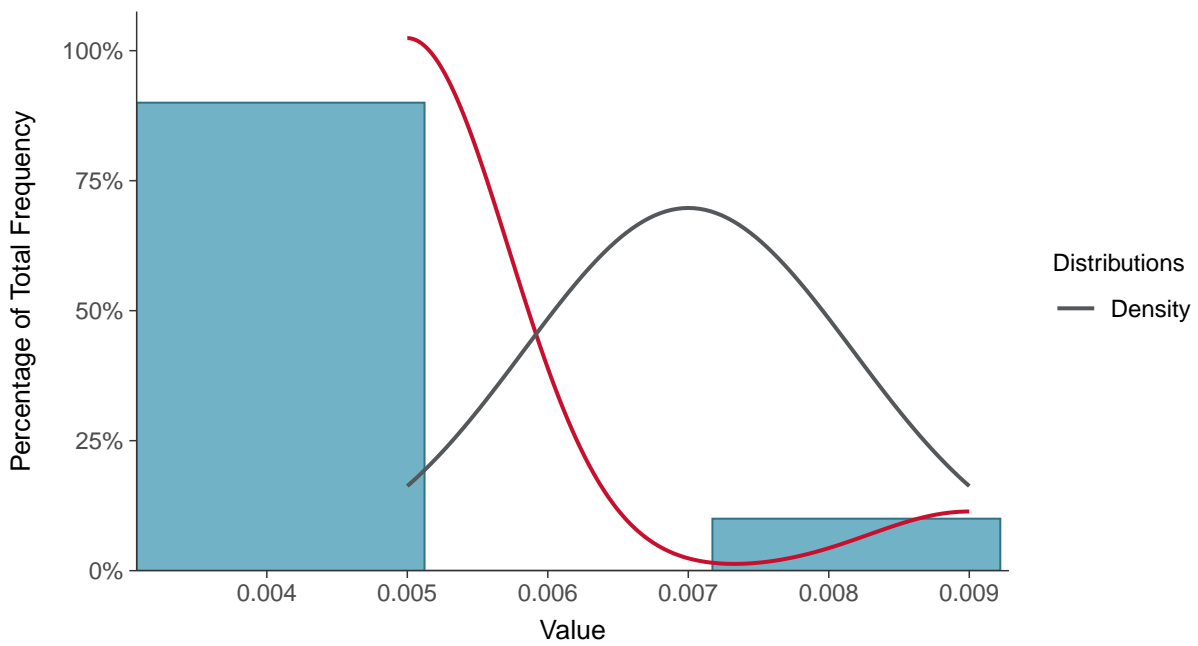
Scatter Plot

Zinc, MW-9 (mg/L)



Histogram

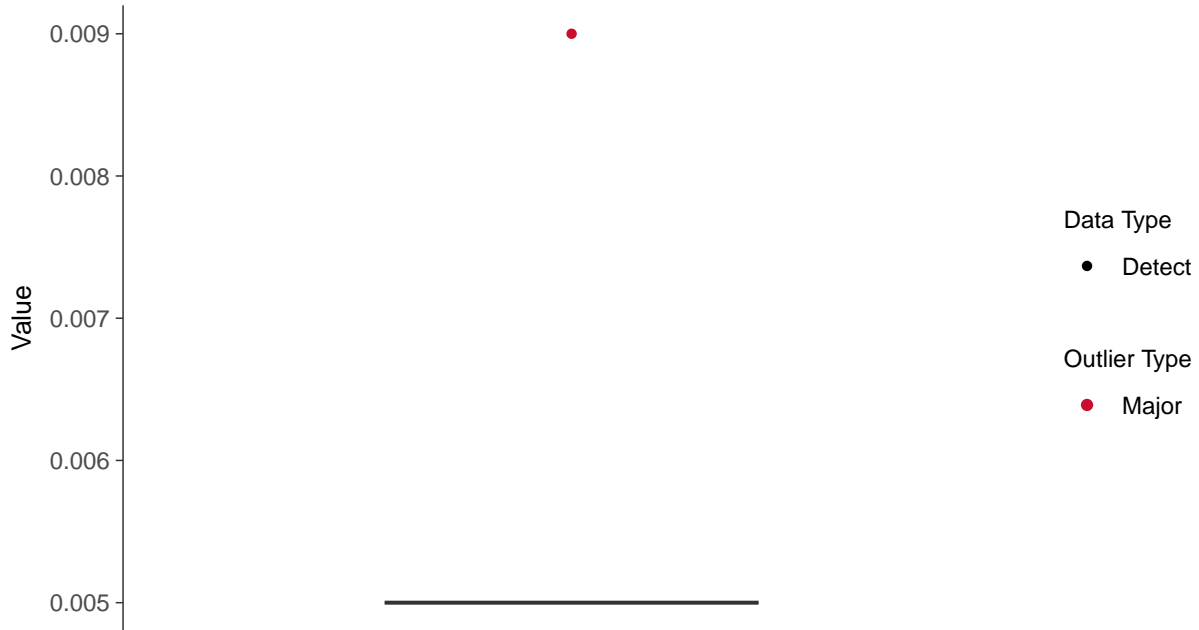
Zinc, MW-9 (mg/L)





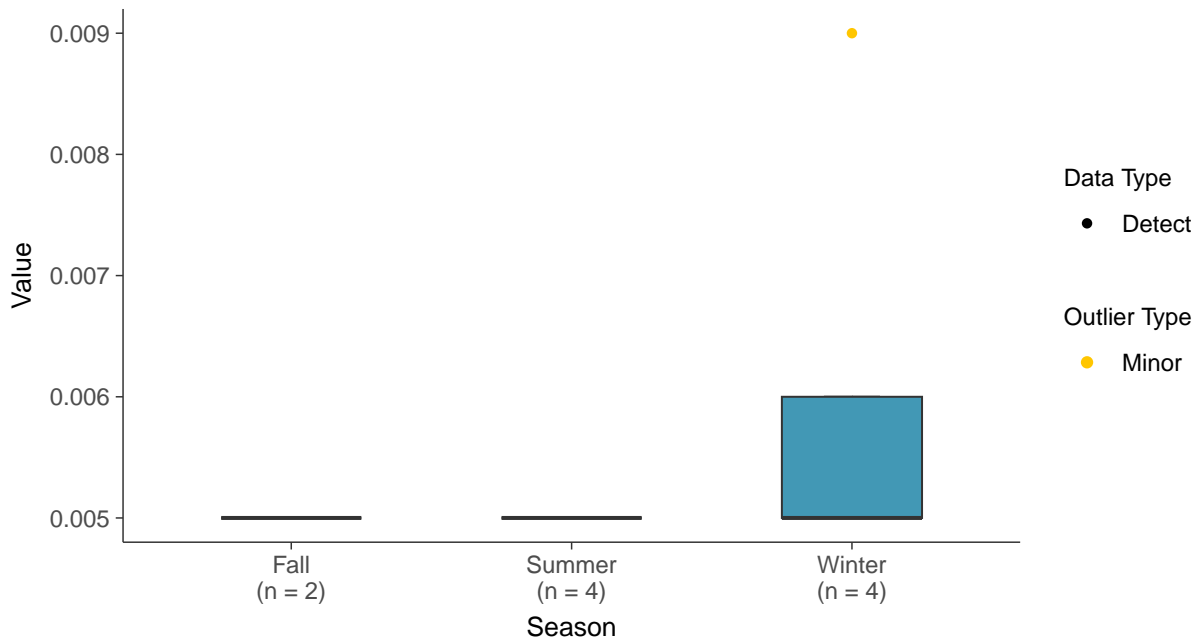
Boxplot

Zinc, MW-9 (mg/L)



Boxplot by Season

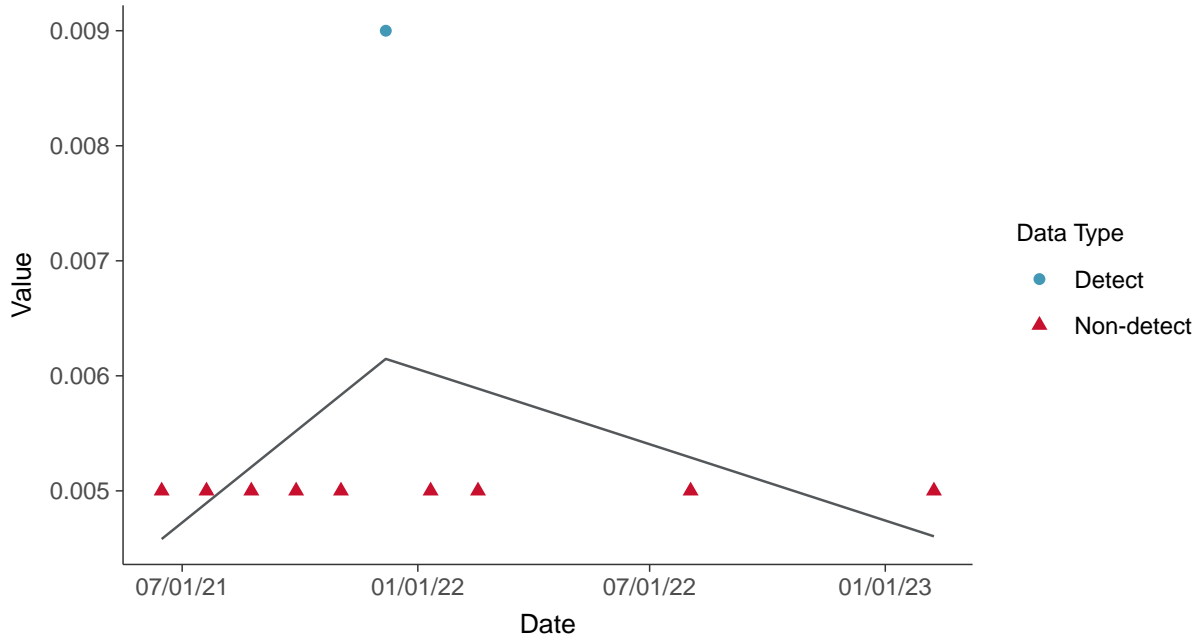
Zinc, MW-9 (mg/L)





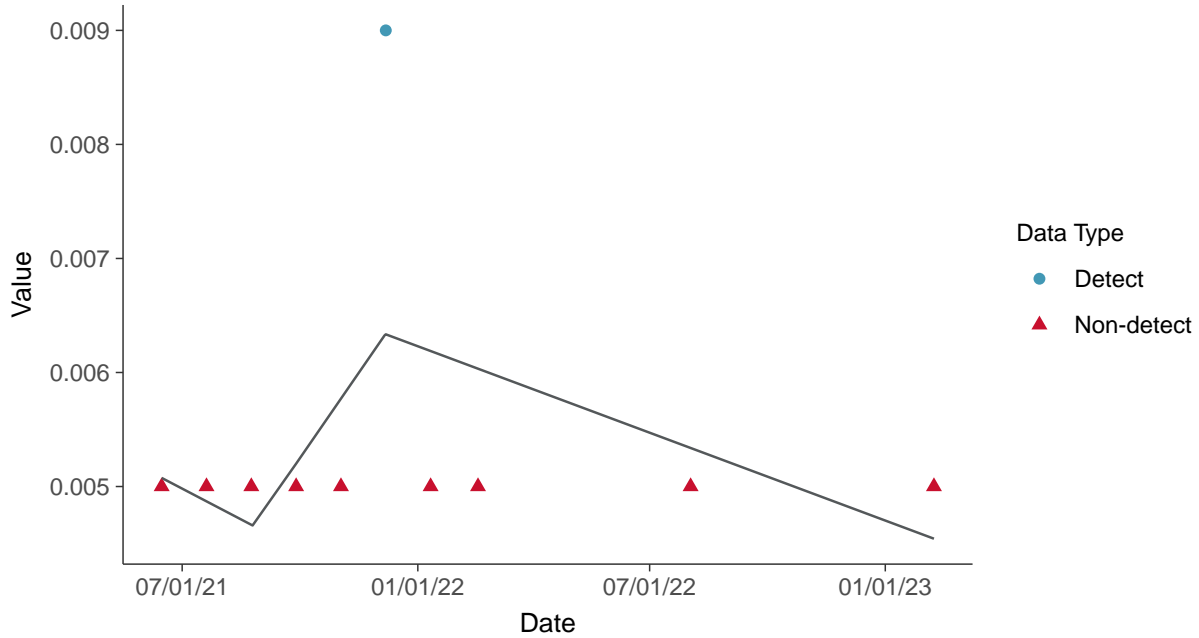
Trend Regression: Piecewise Linear-Linear

Zinc, MW-9 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

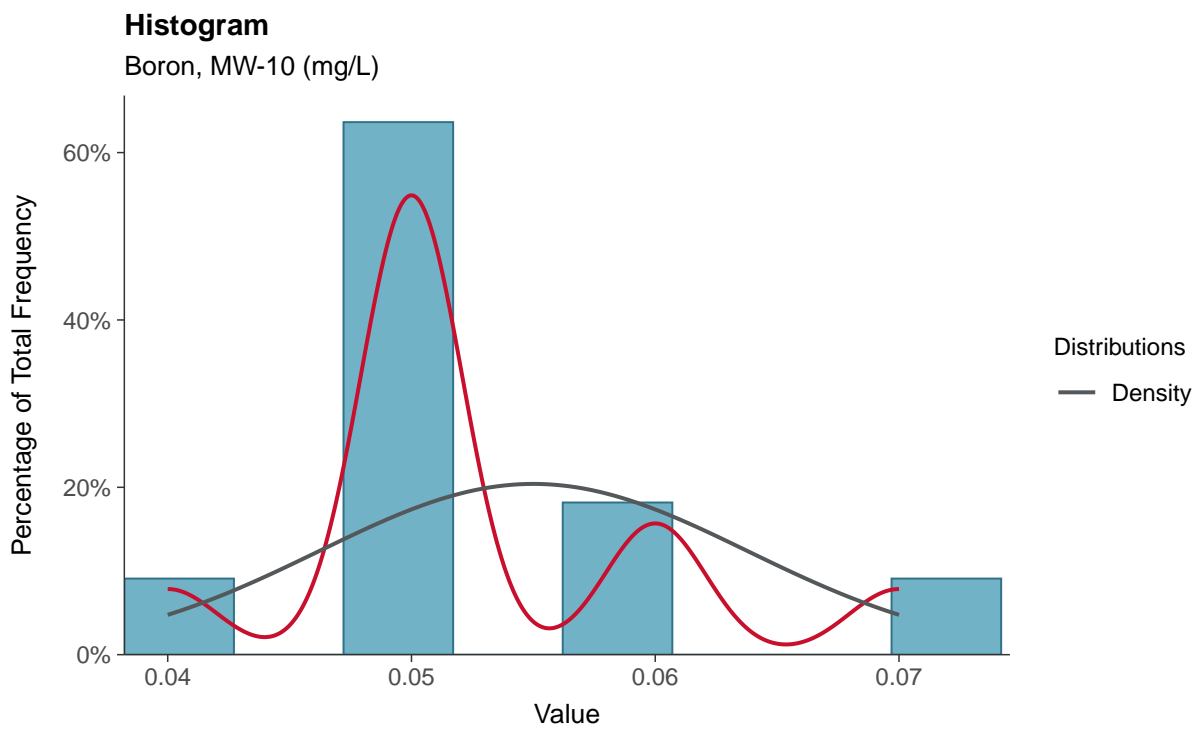
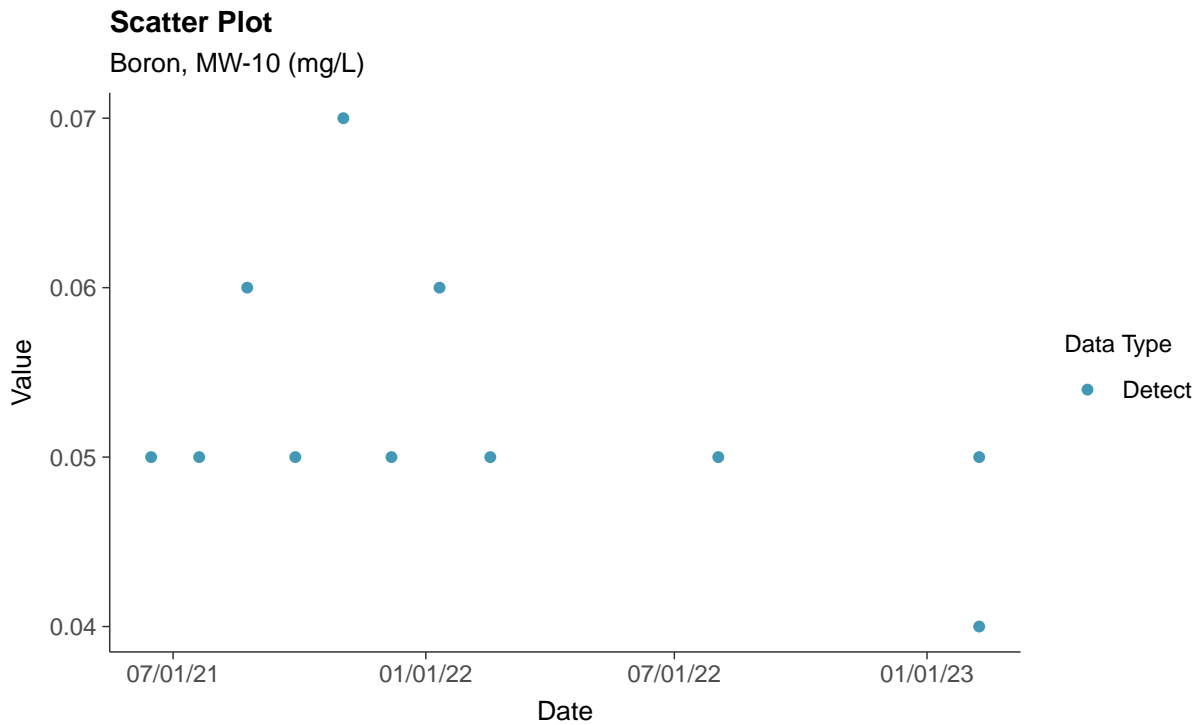
Zinc, MW-9 (mg/L)





Appendix III: Boron, MW-10

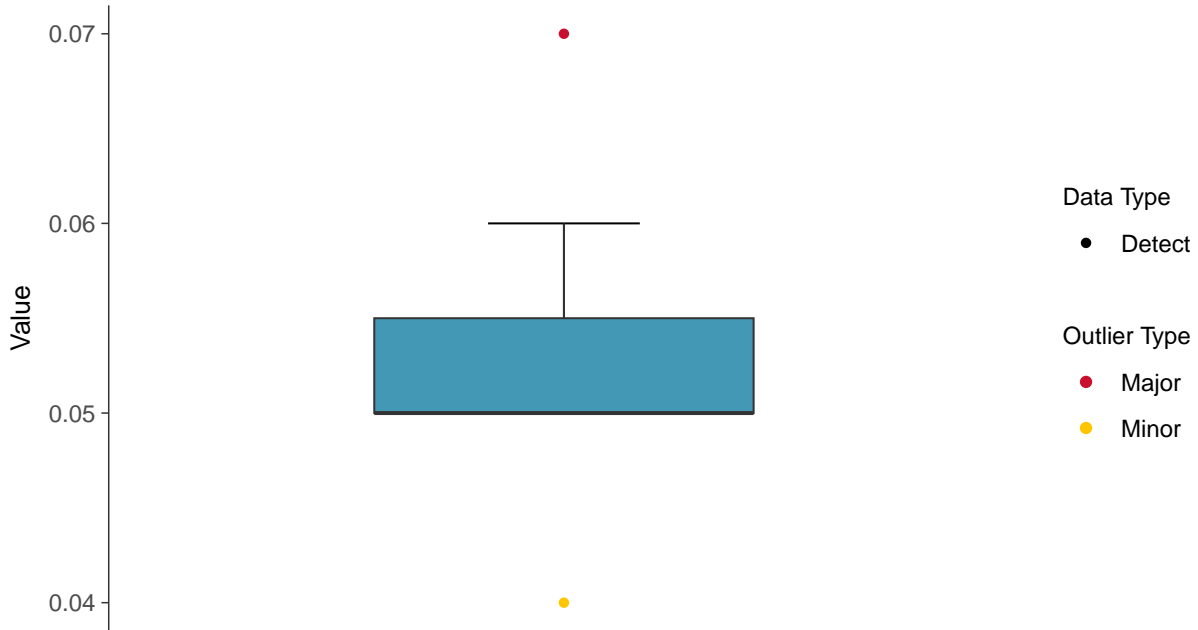
ID: 10_1_01





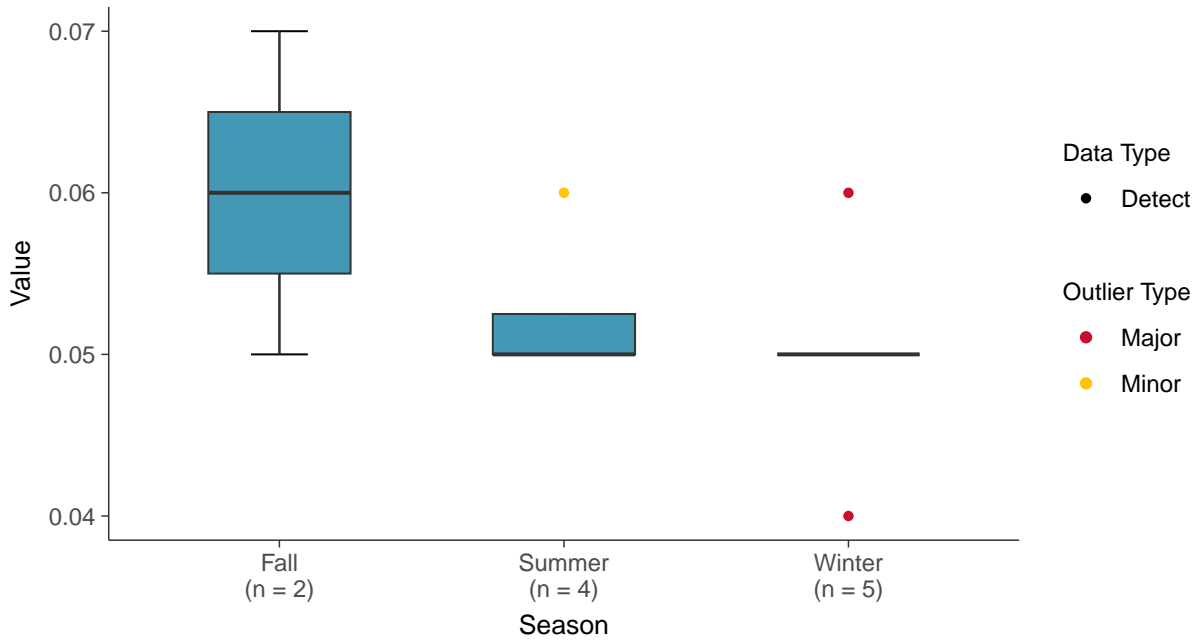
Boxplot

Boron, MW-10 (mg/L)



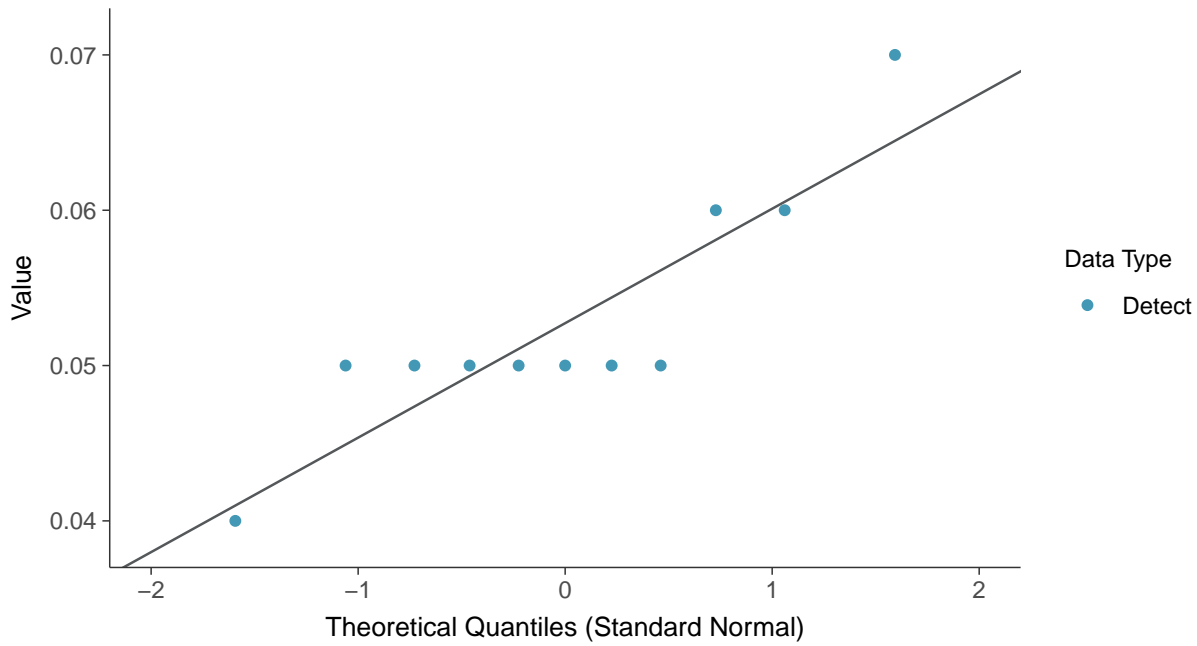
Boxplot by Season

Boron, MW-10 (mg/L)

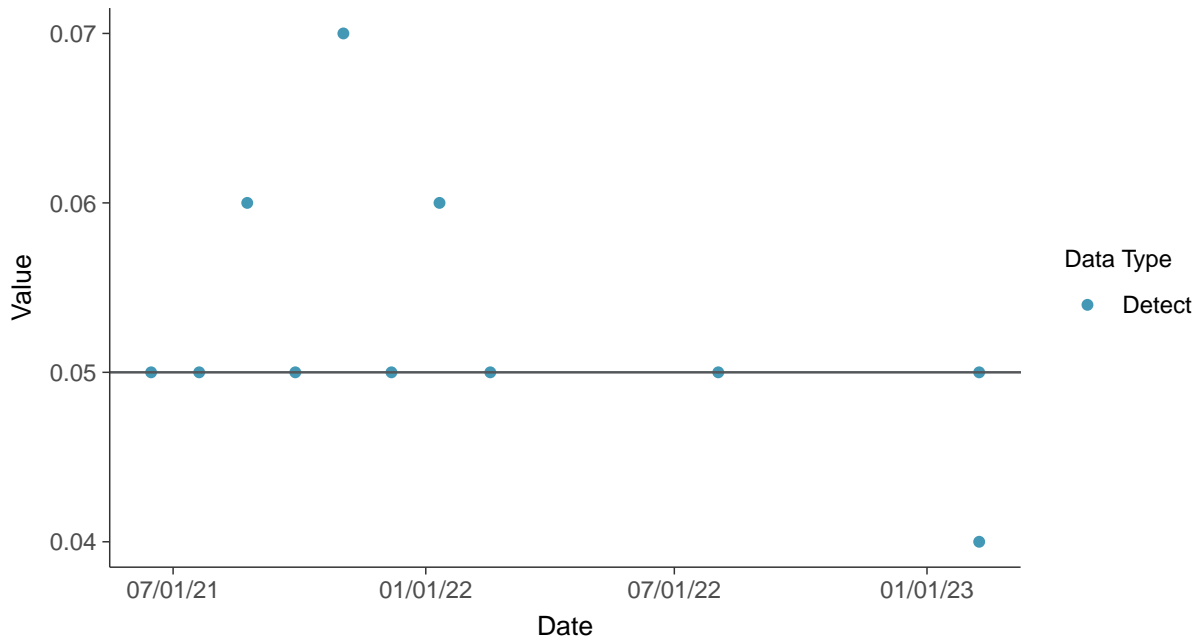




Normal Q-Q plot Boron, MW-10 (mg/L)



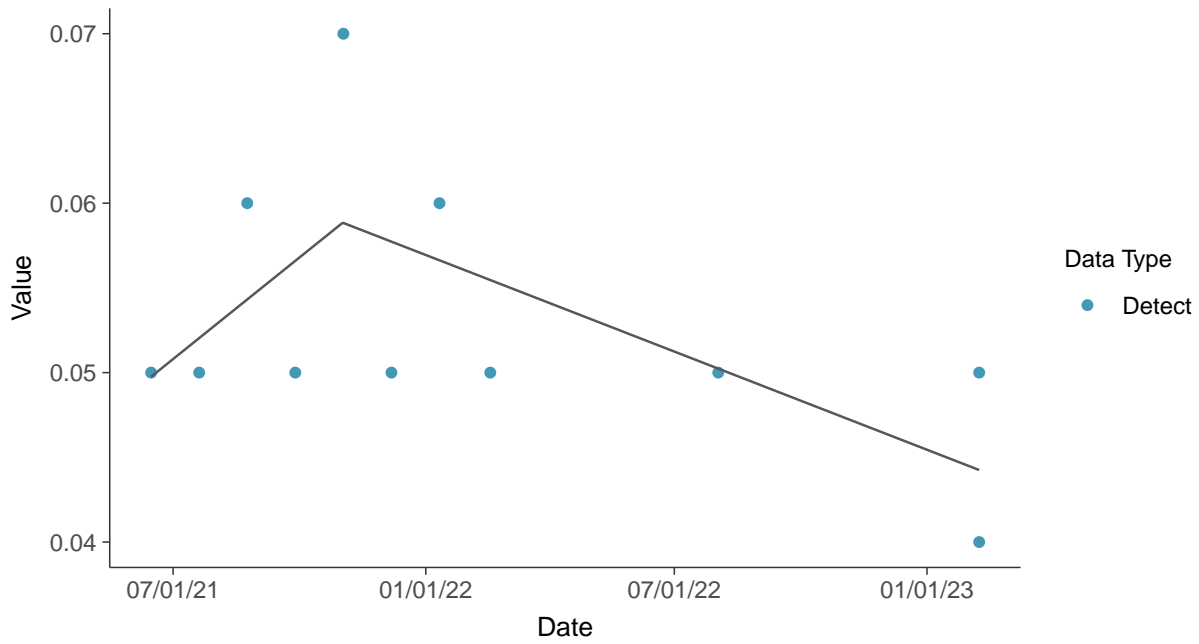
Trend Regression: Mann-Kendall/Theil-Sen Estimate Boron, MW-10 (mg/L)





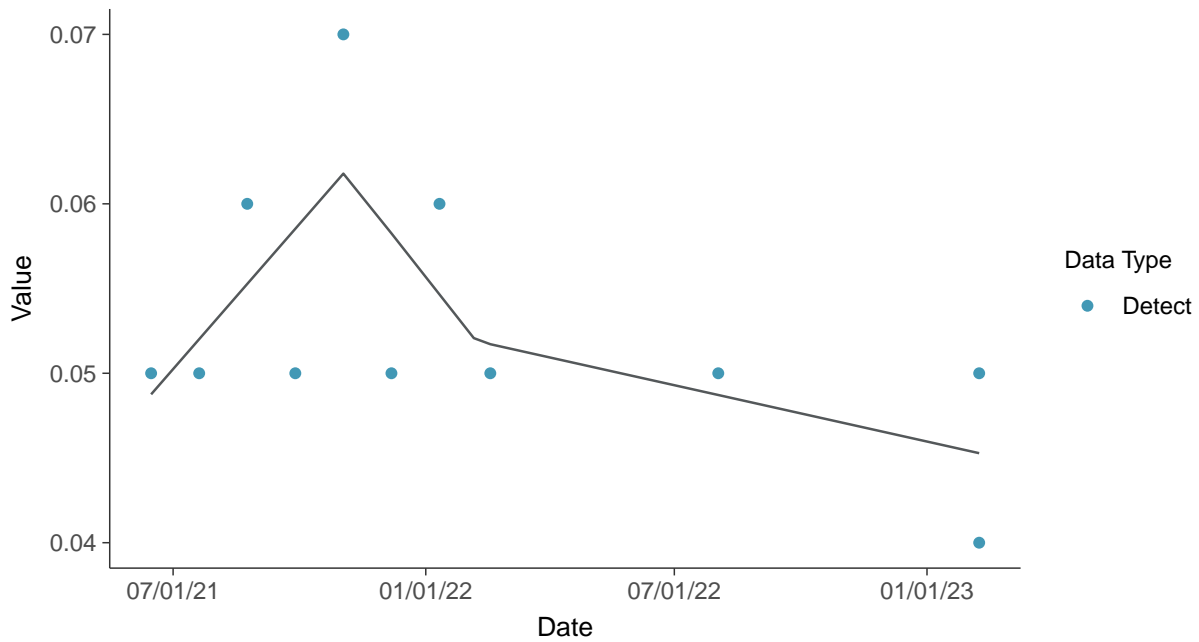
Trend Regression: Piecewise Linear-Linear

Boron, MW-10 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Boron, MW-10 (mg/L)

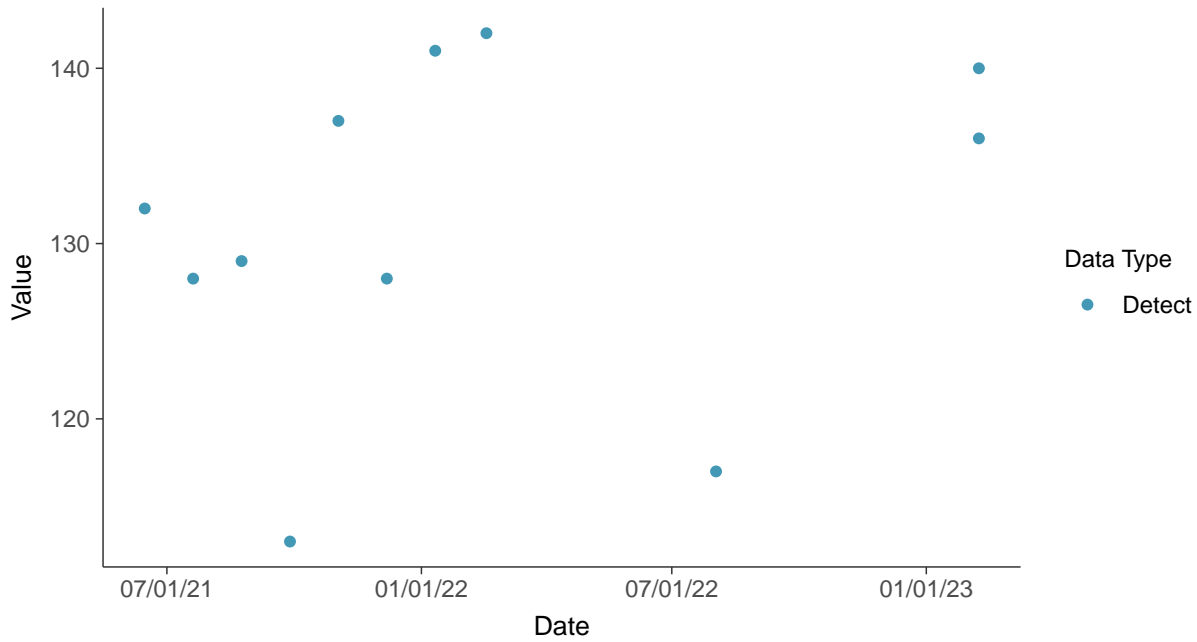


Appendix III: Calcium, MW-10

ID: 10_1_02

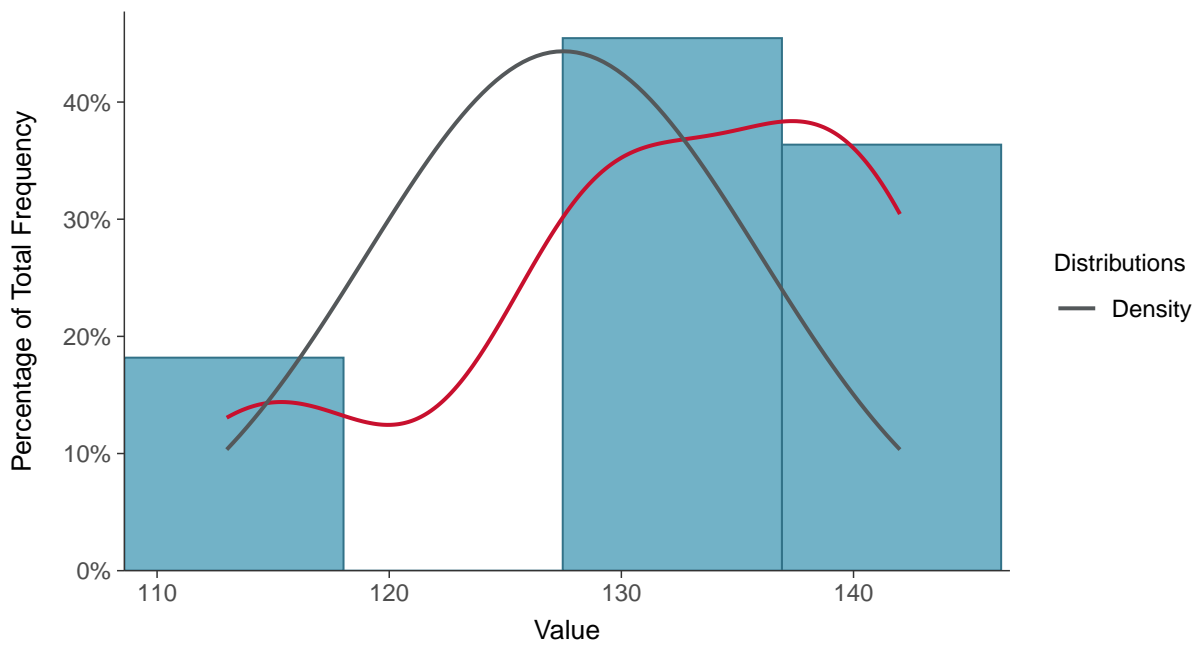
Scatter Plot

Calcium, MW-10 (mg/L)



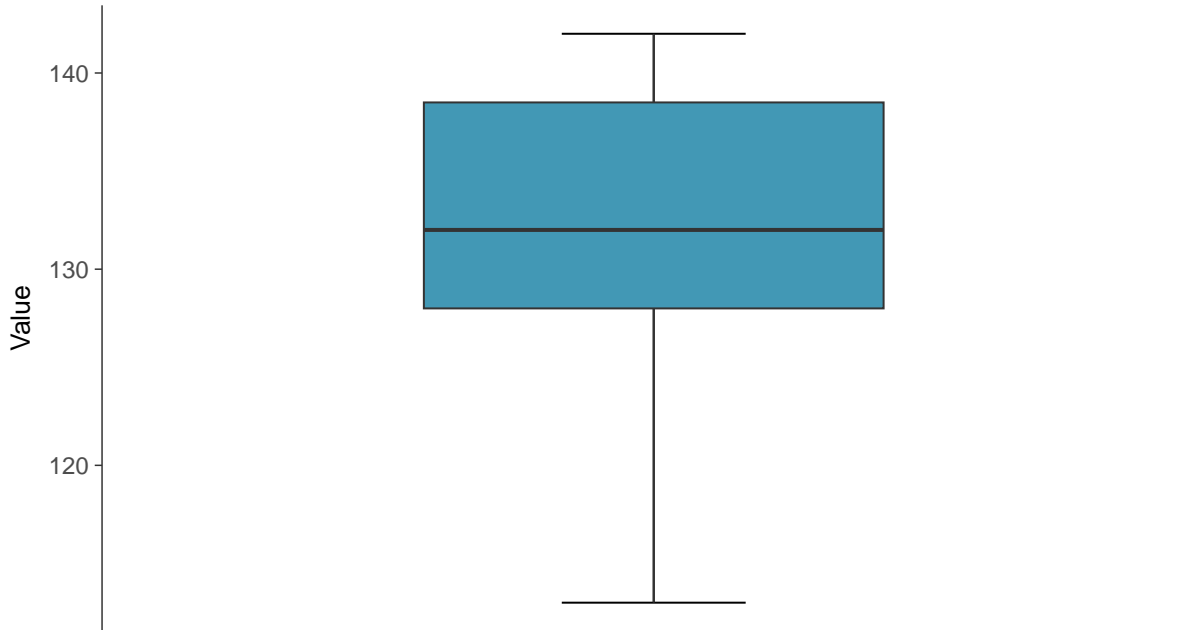
Histogram

Calcium, MW-10 (mg/L)



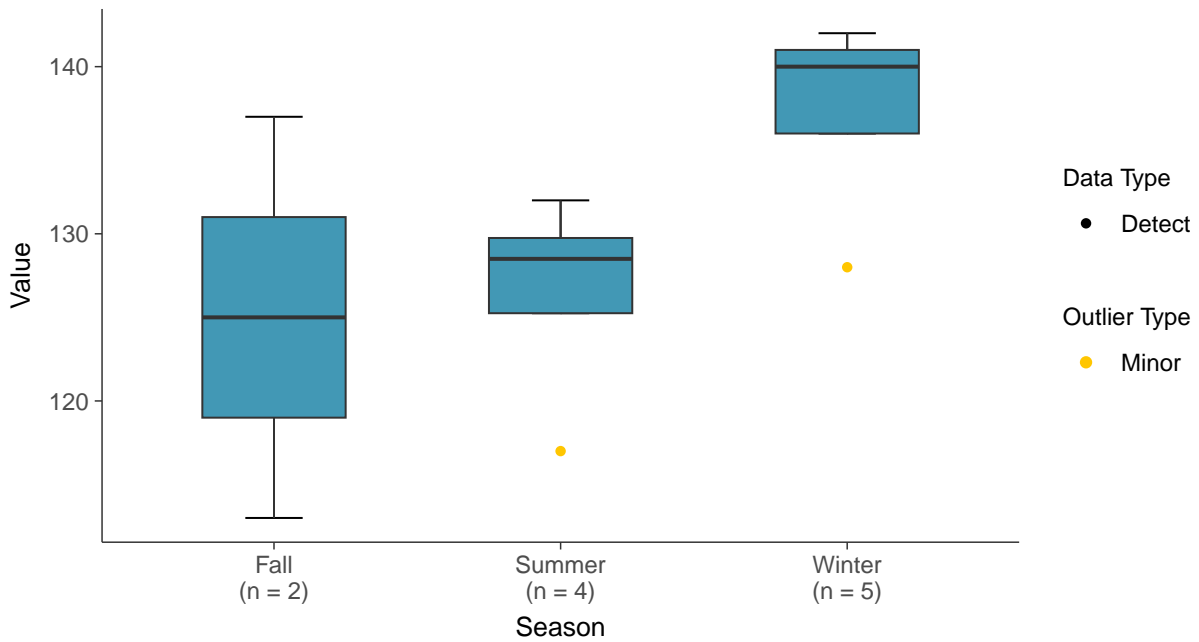
Boxplot

Calcium, MW-10 (mg/L)



Boxplot by Season

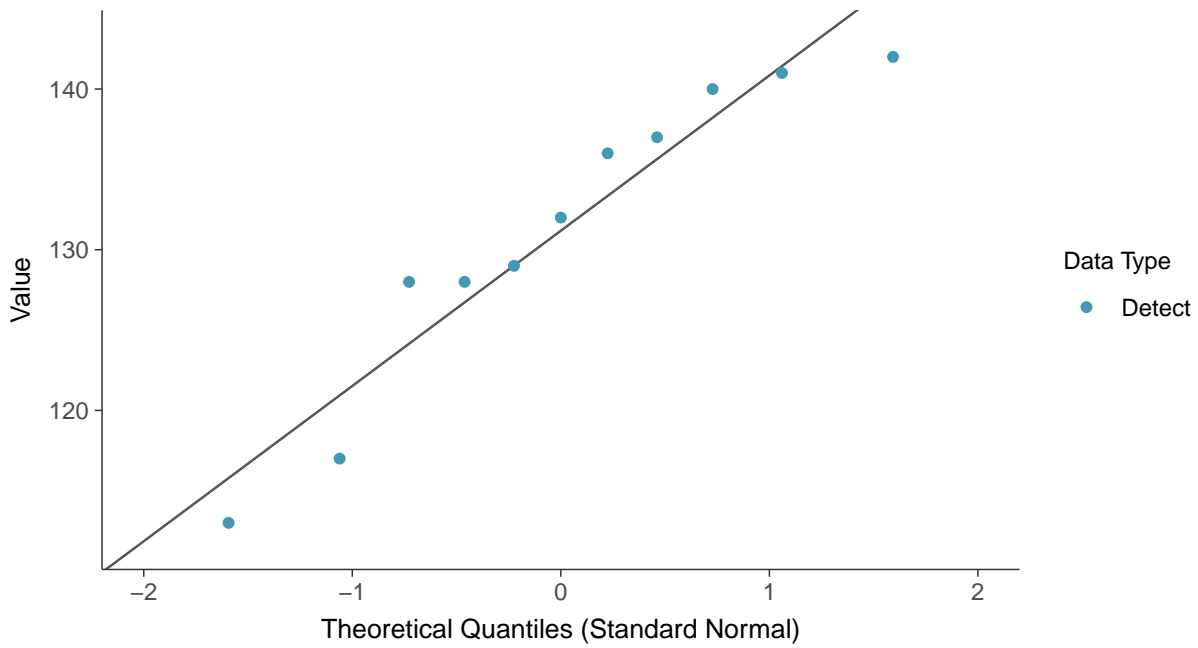
Calcium, MW-10 (mg/L)





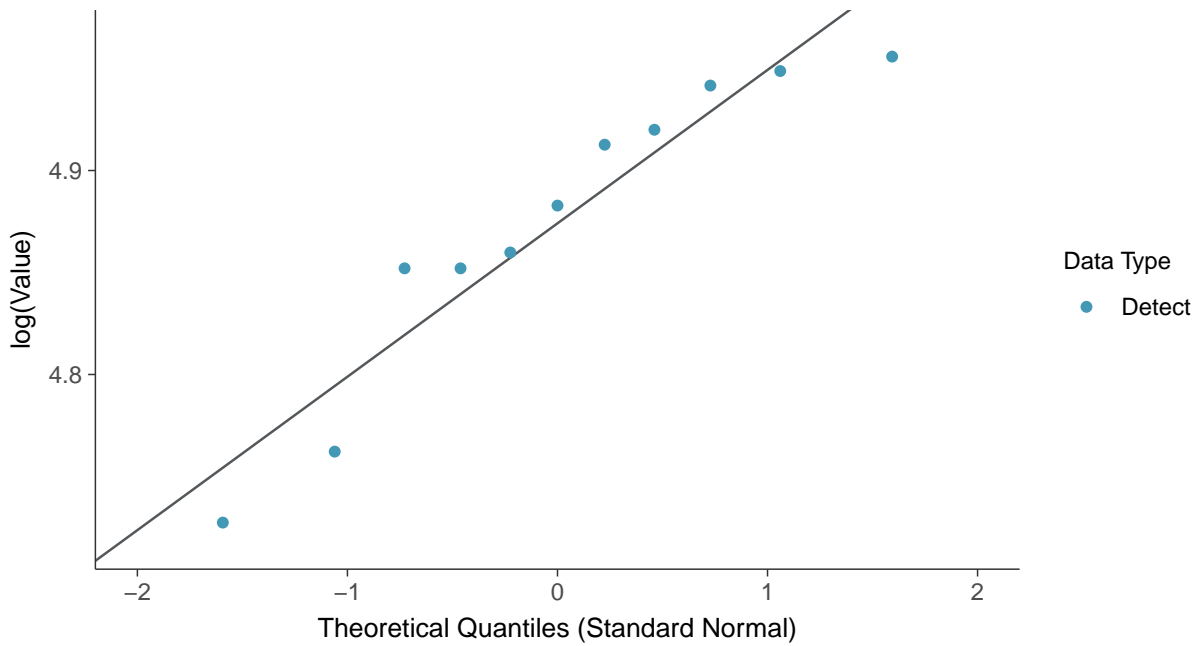
Normal Q-Q plot

Calcium, MW-10 (mg/L)



Lognormal Q-Q plot

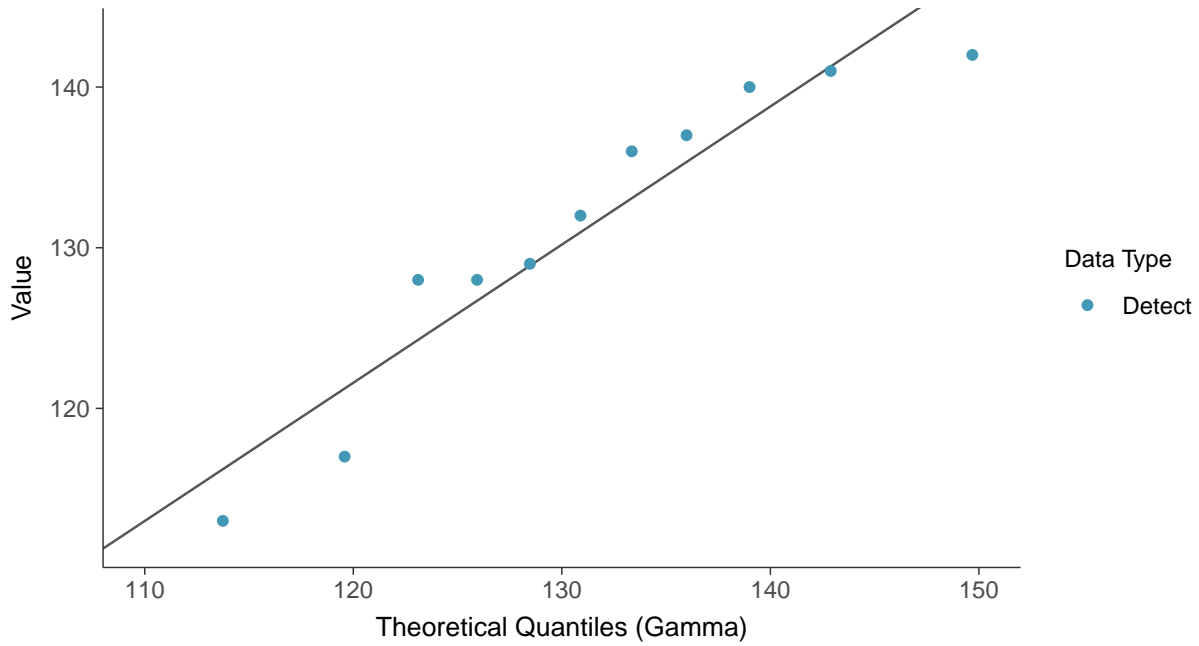
Calcium, MW-10 (mg/L)





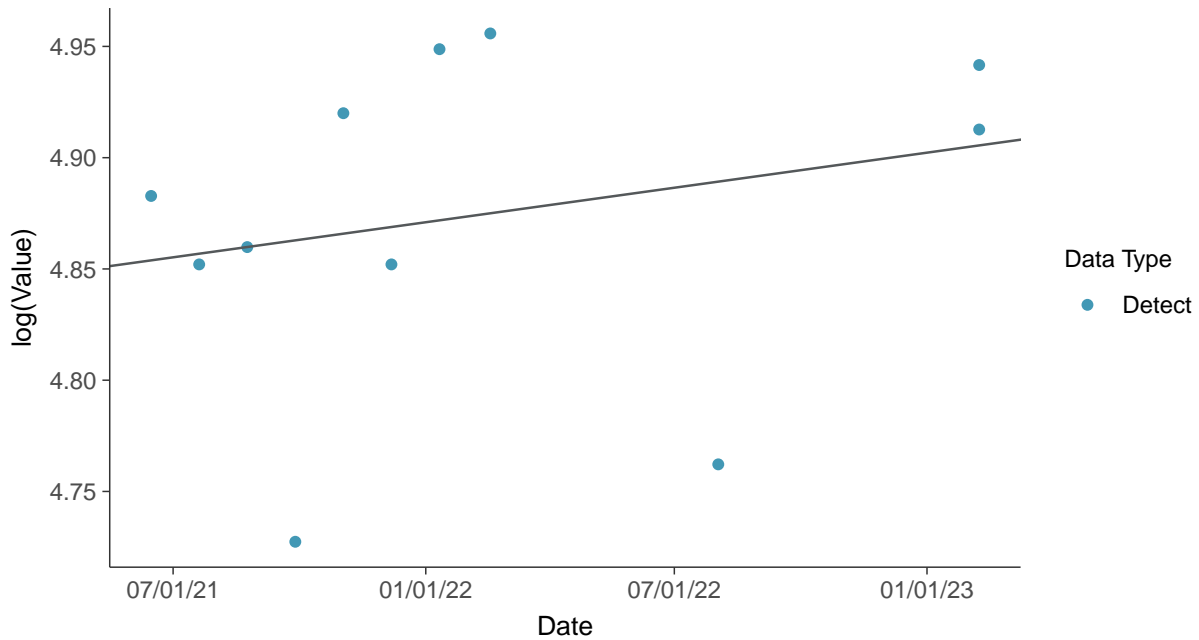
Gamma Q-Q plot

Calcium, MW-10 (mg/L)



Trend Regression: Lognormal MLE

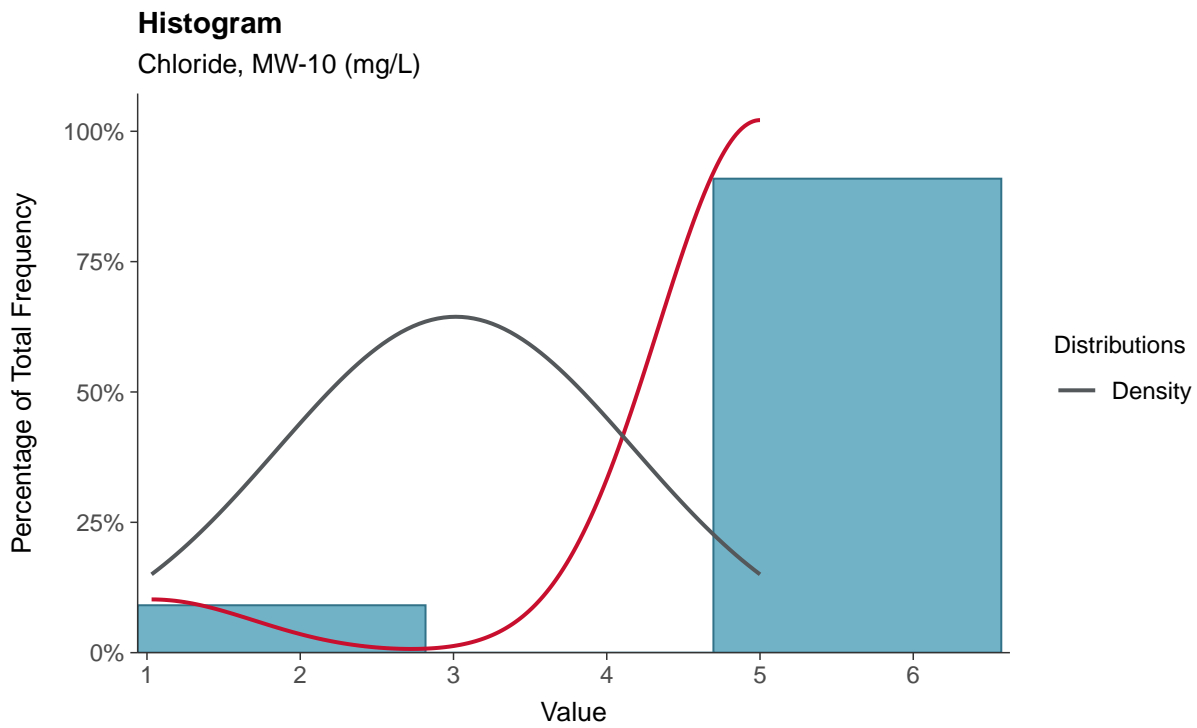
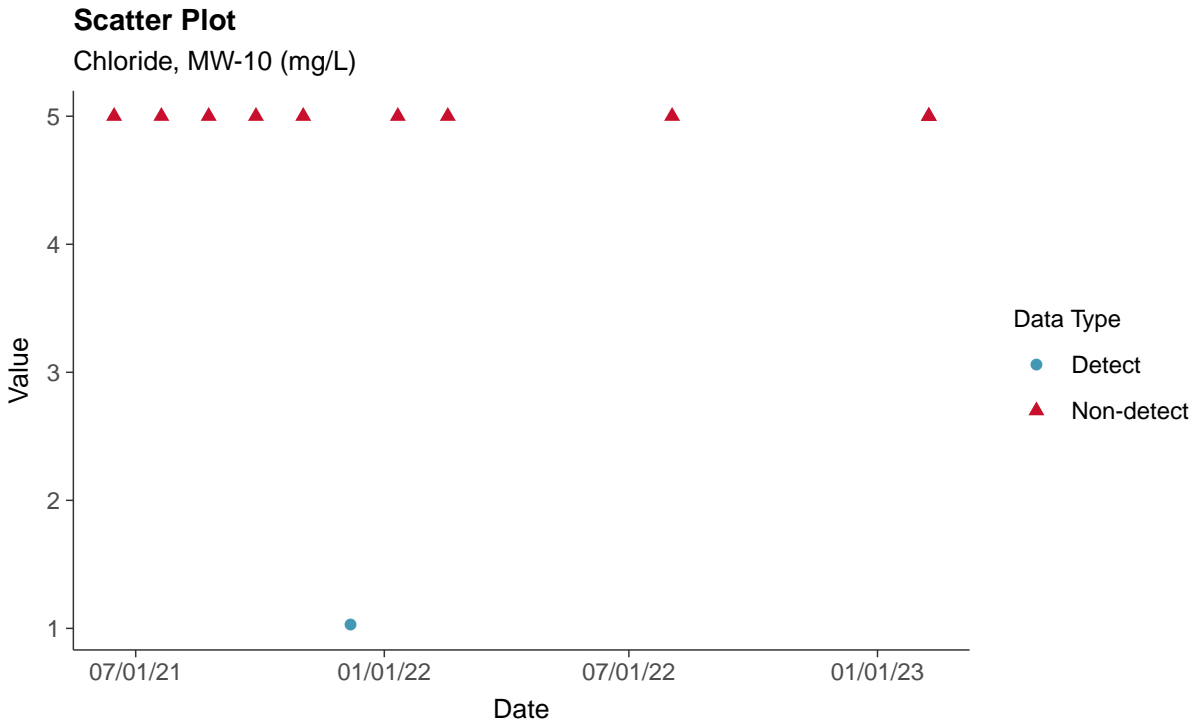
Calcium, MW-10 (mg/L)





Appendix III: Chloride, MW-10

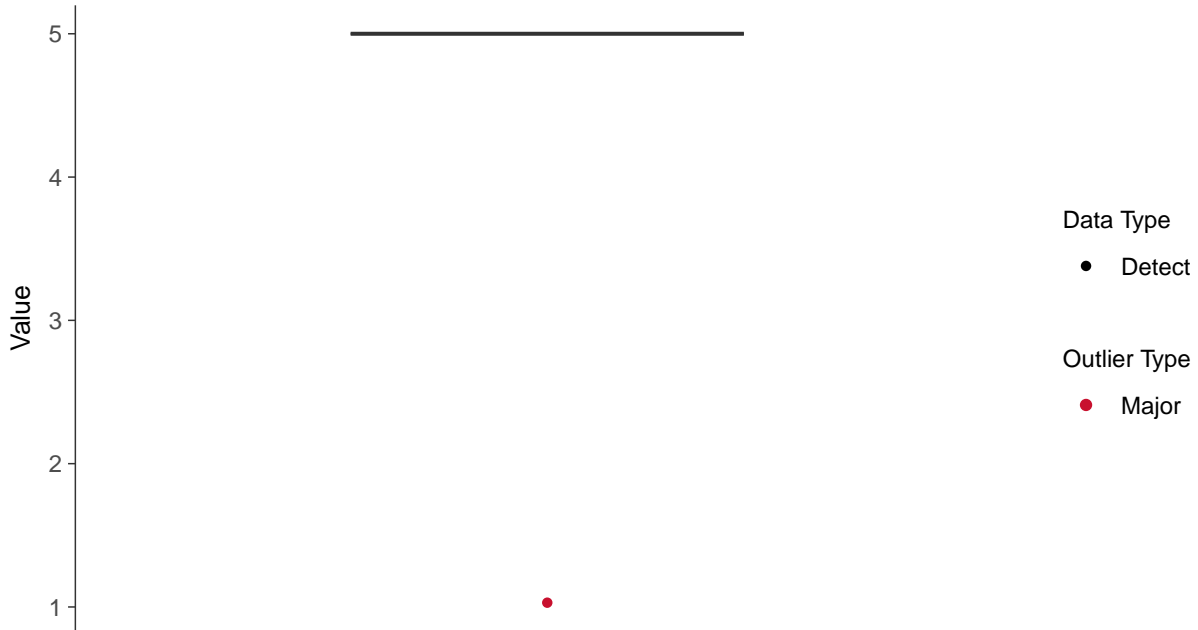
ID: 10_1_03





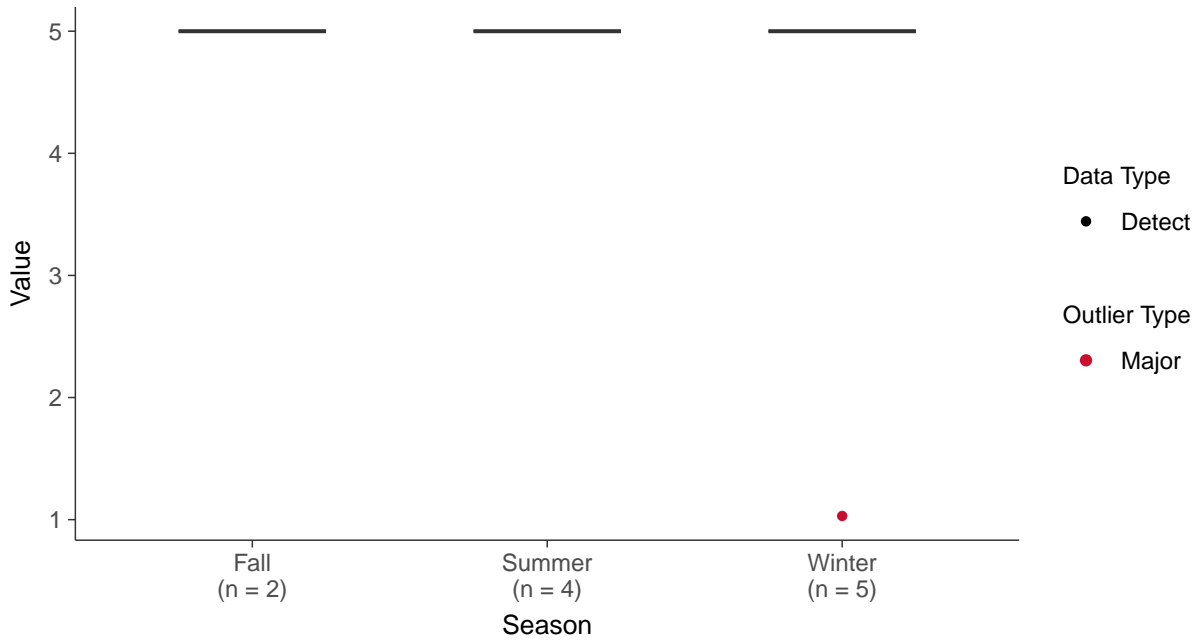
Boxplot

Chloride, MW-10 (mg/L)



Boxplot by Season

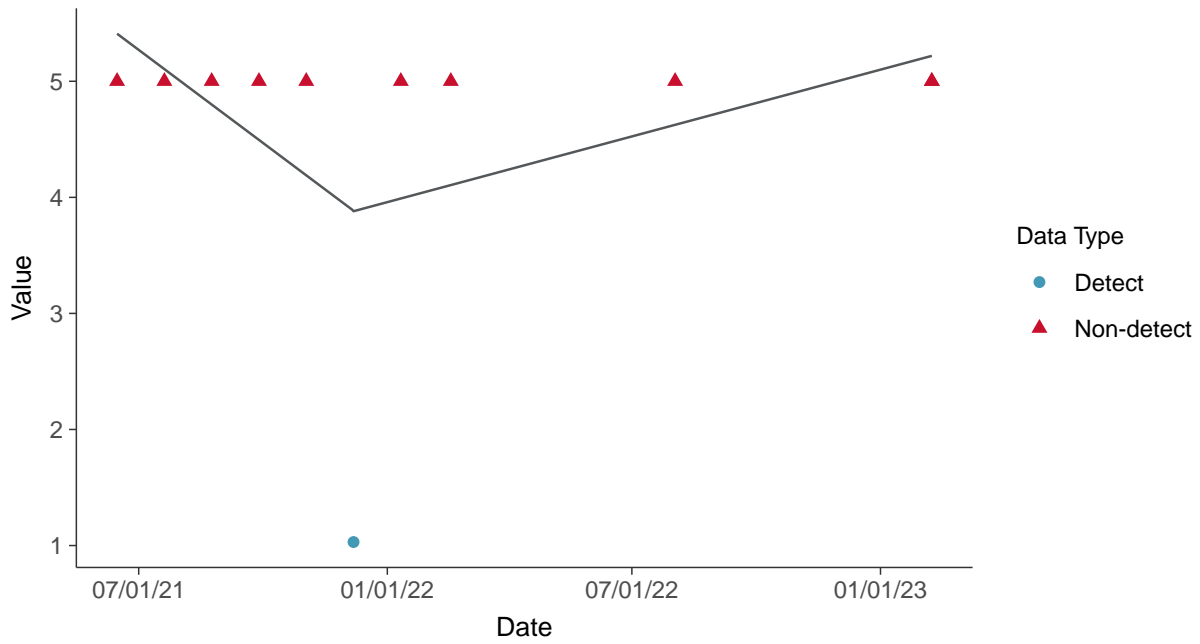
Chloride, MW-10 (mg/L)





Trend Regression: Piecewise Linear-Linear

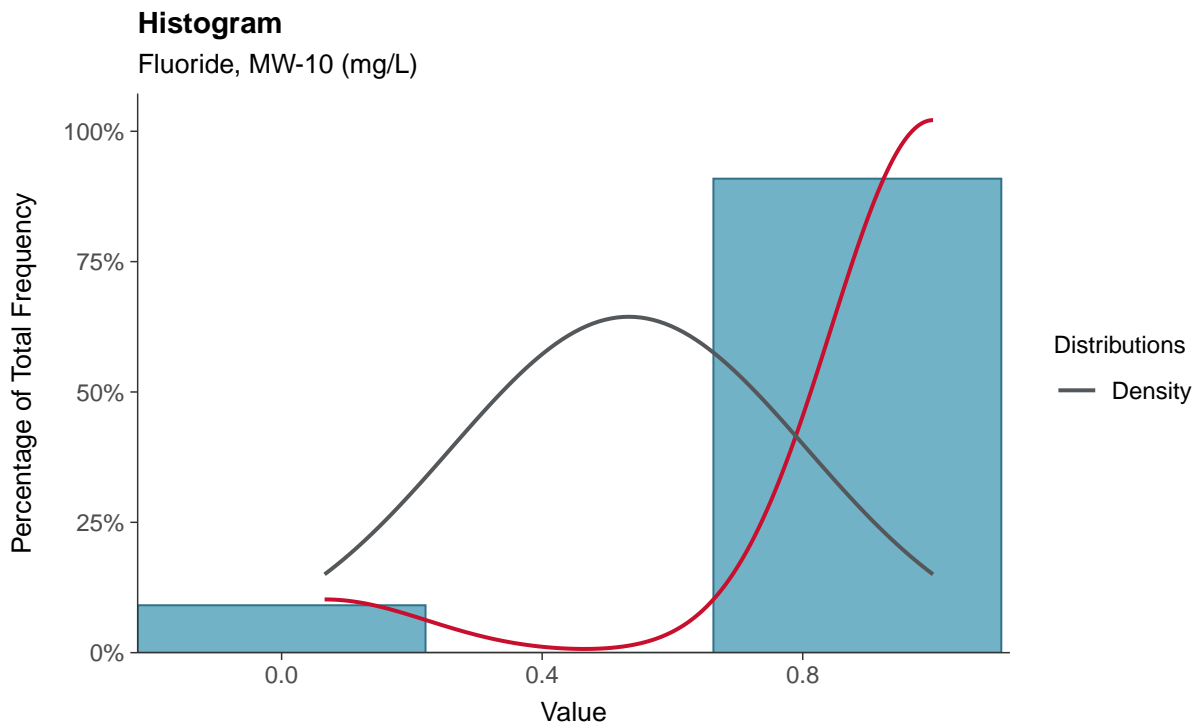
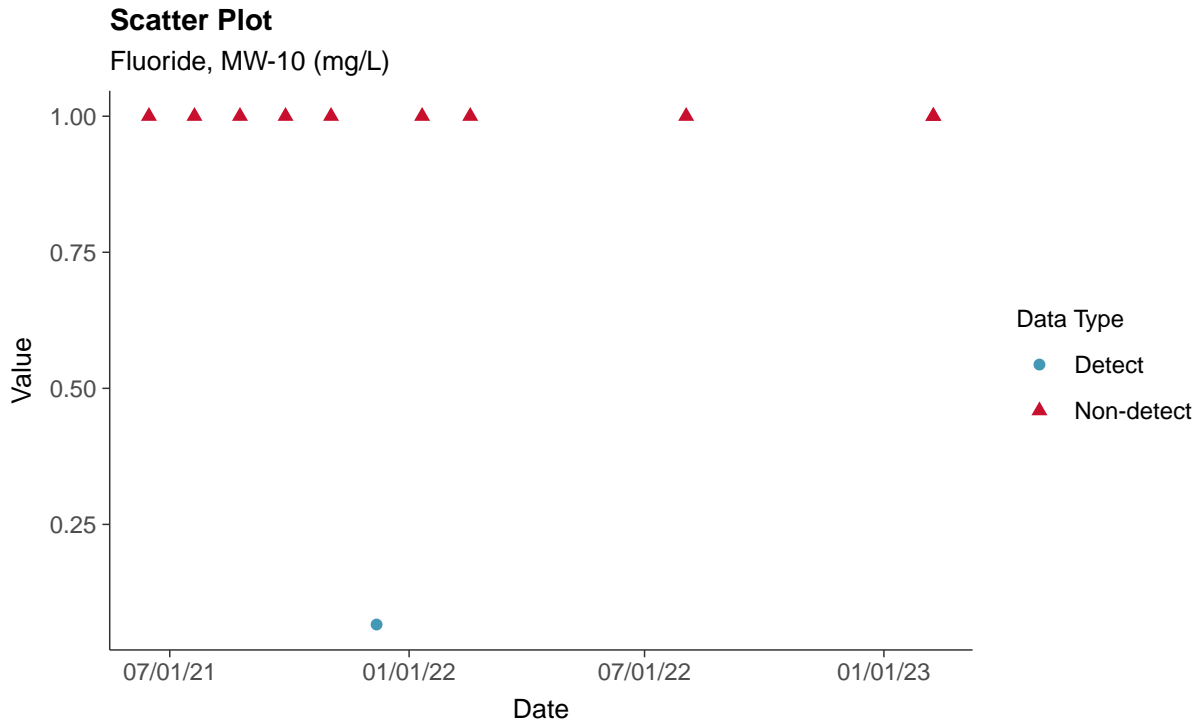
Chloride, MW-10 (mg/L)





Appendix III: Fluoride, MW-10

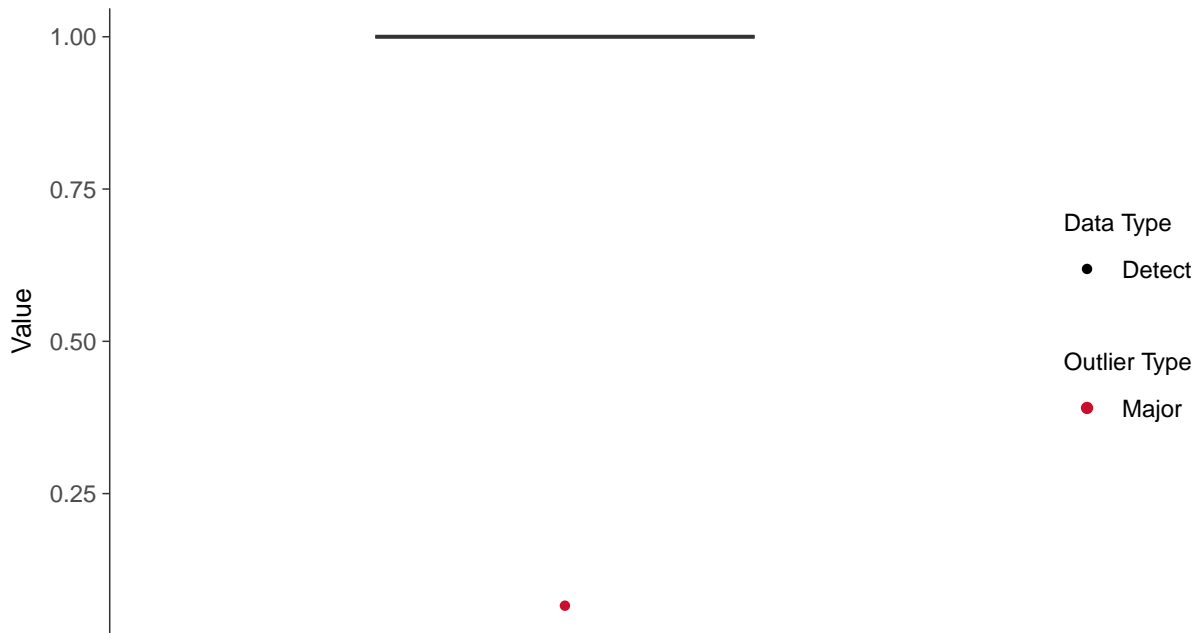
ID: 10_1_04





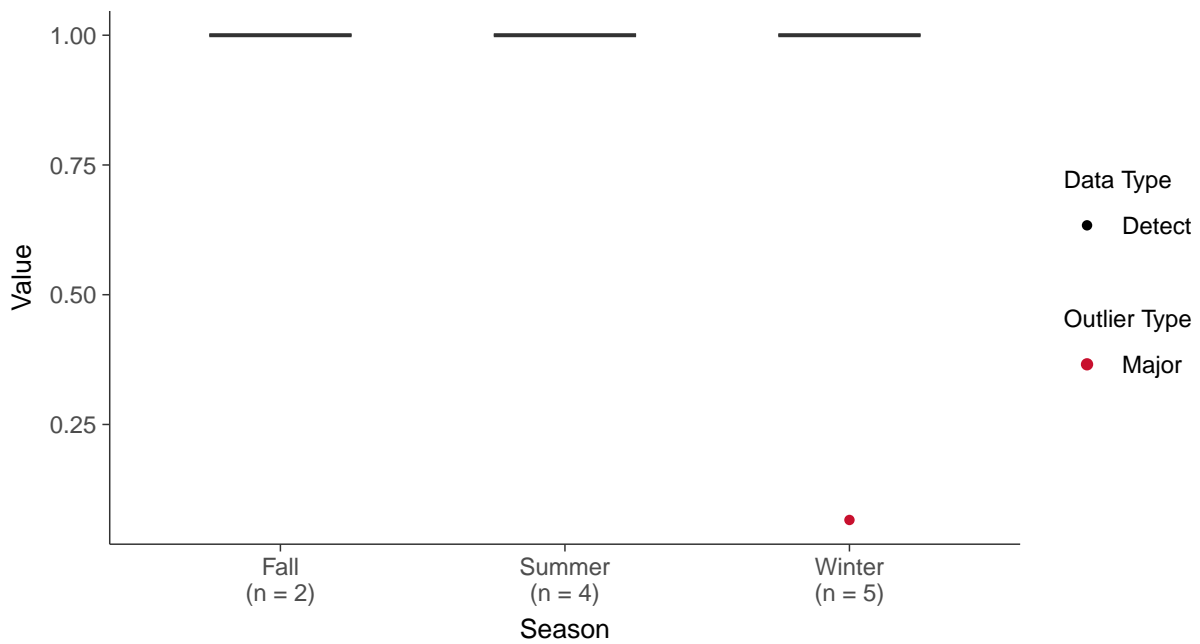
Boxplot

Fluoride, MW-10 (mg/L)



Boxplot by Season

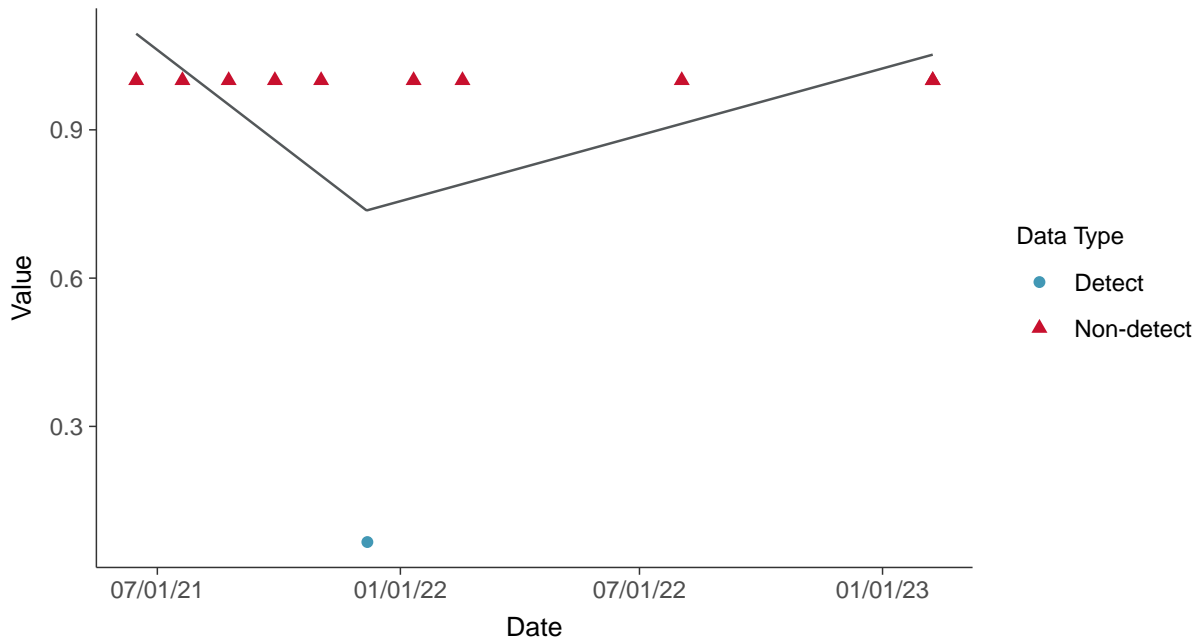
Fluoride, MW-10 (mg/L)





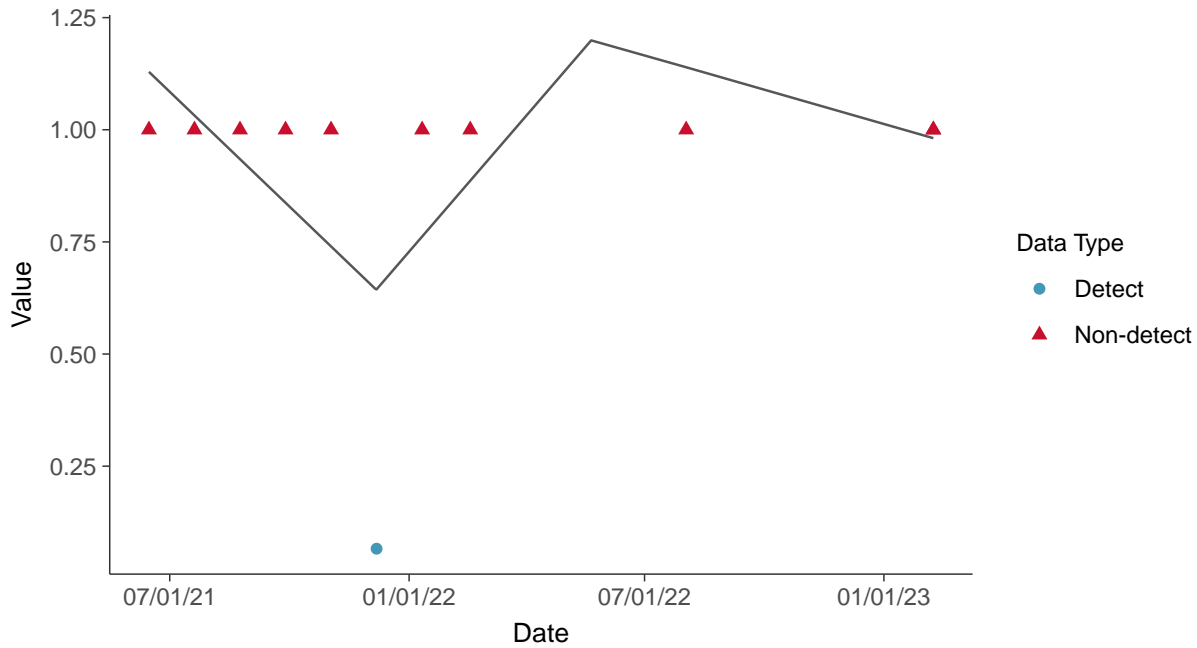
Trend Regression: Piecewise Linear-Linear

Fluoride, MW-10 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Fluoride, MW-10 (mg/L)

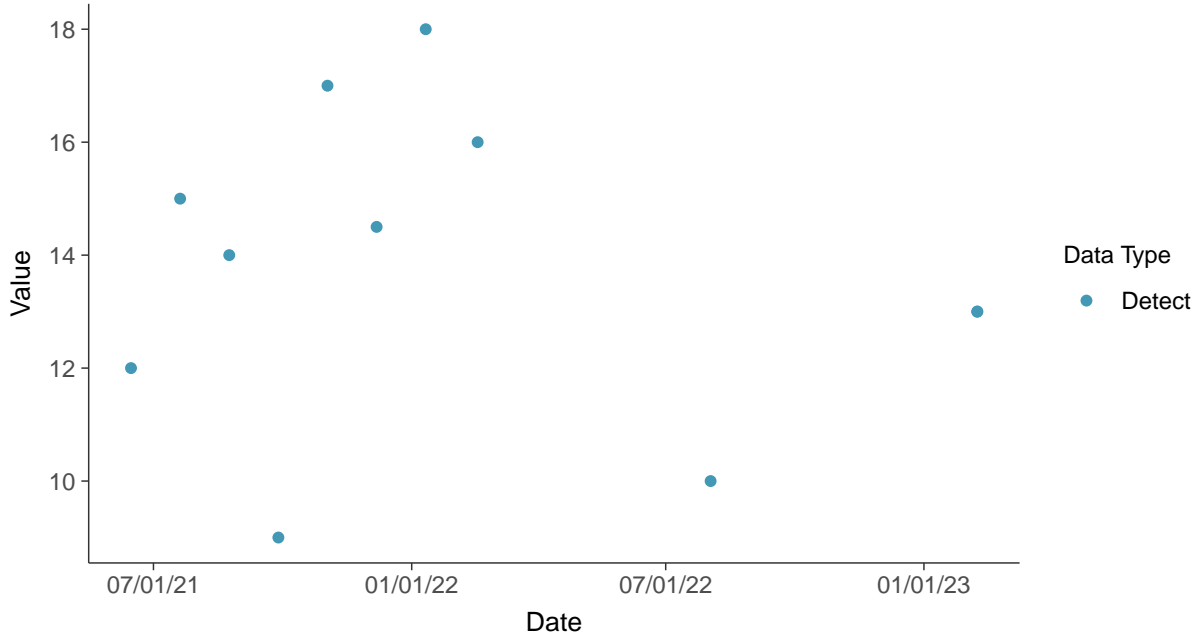


Appendix III: Sulfate, MW-10

ID: 10_1_05

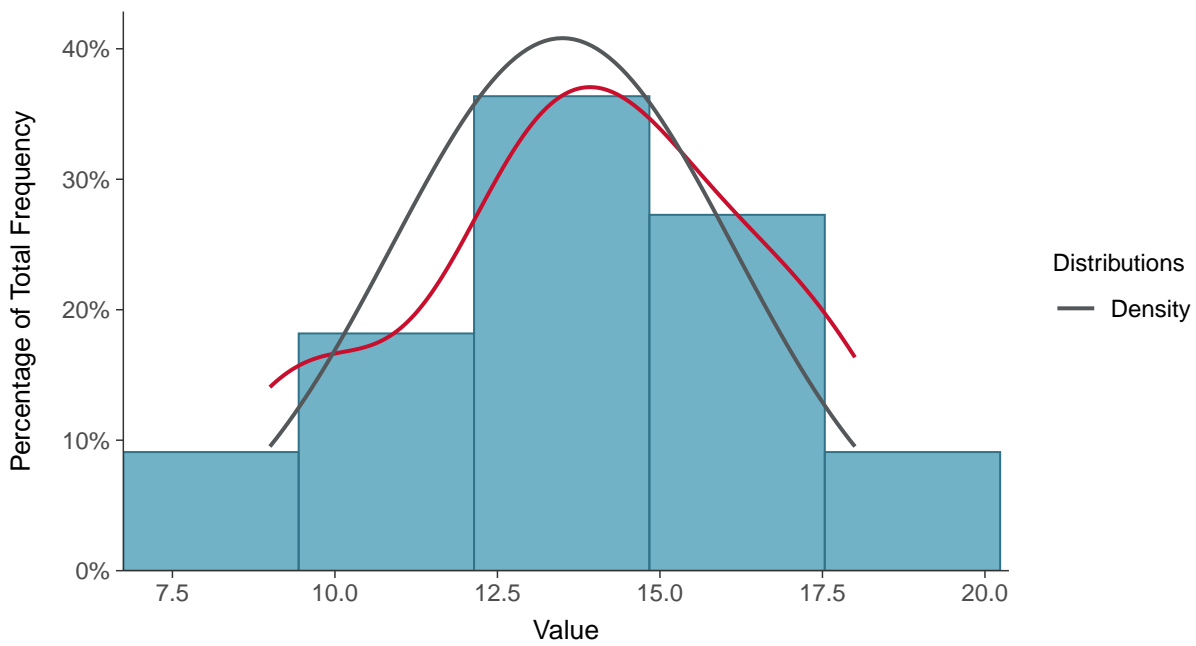
Scatter Plot

Sulfate, MW-10 (mg/L)



Histogram

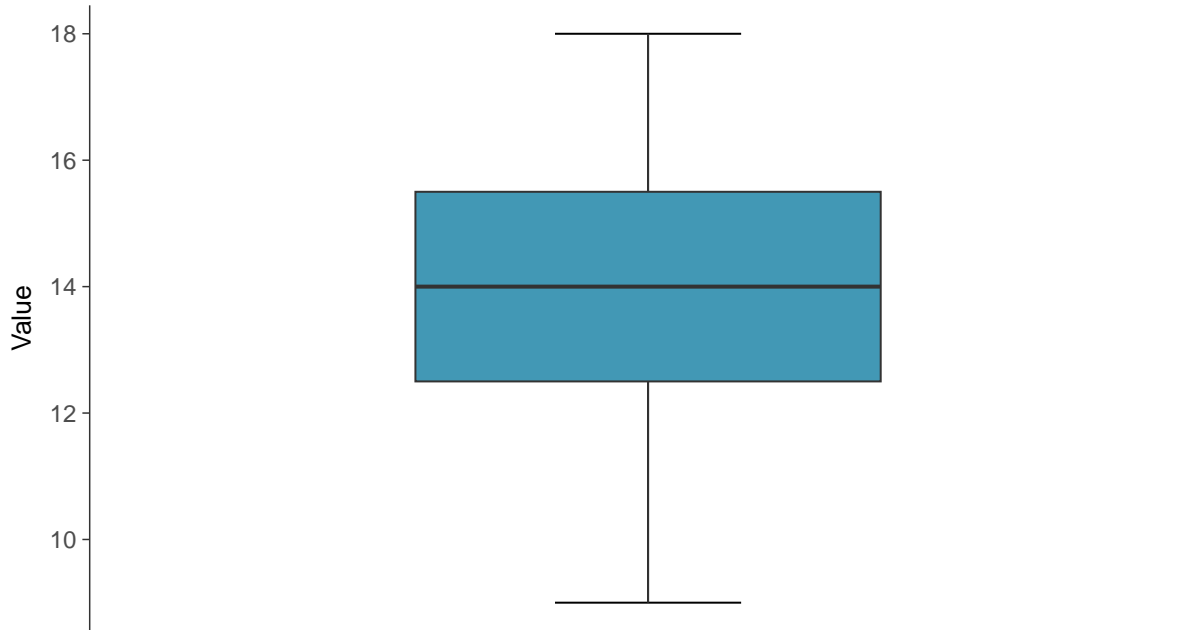
Sulfate, MW-10 (mg/L)





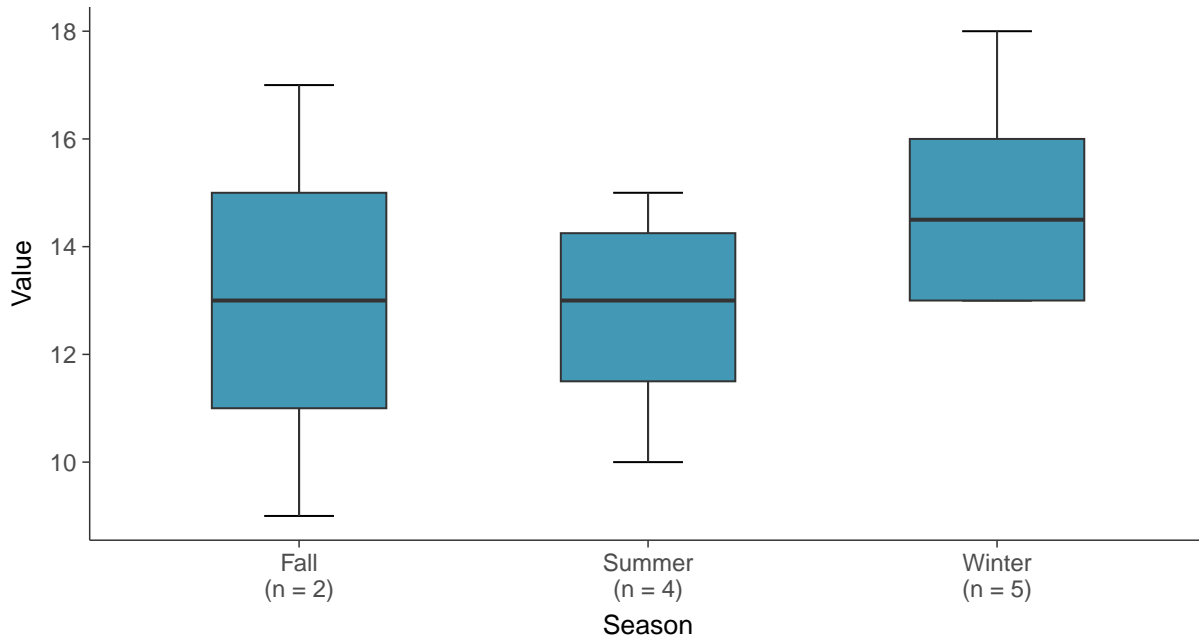
Boxplot

Sulfate, MW-10 (mg/L)



Boxplot by Season

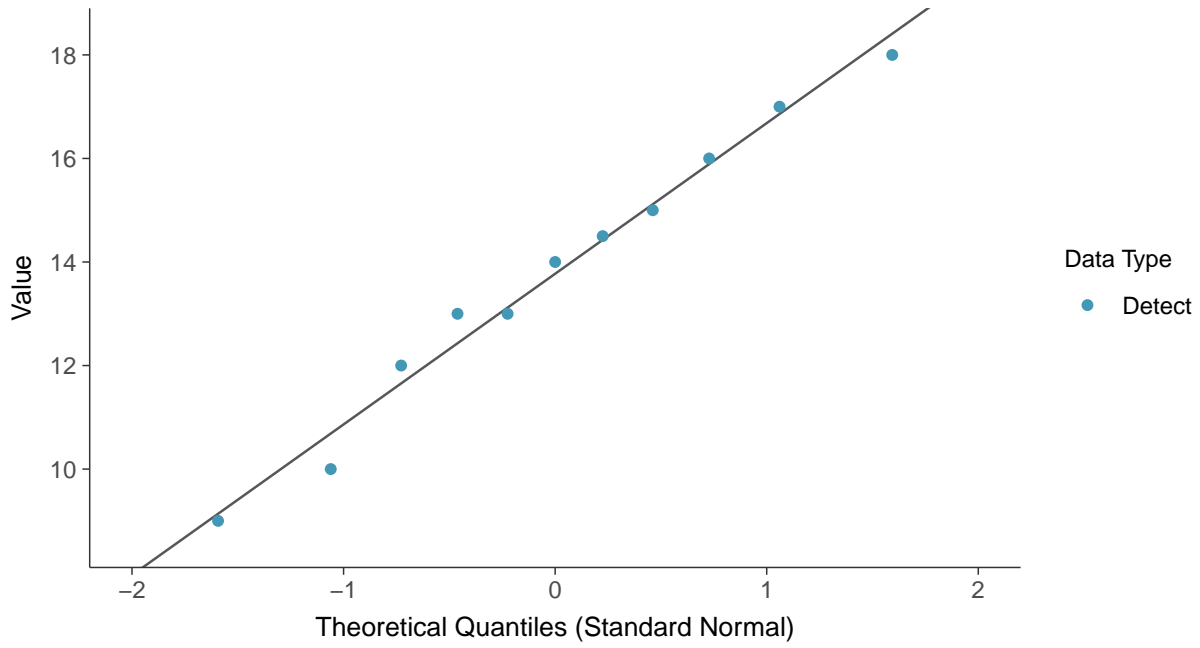
Sulfate, MW-10 (mg/L)





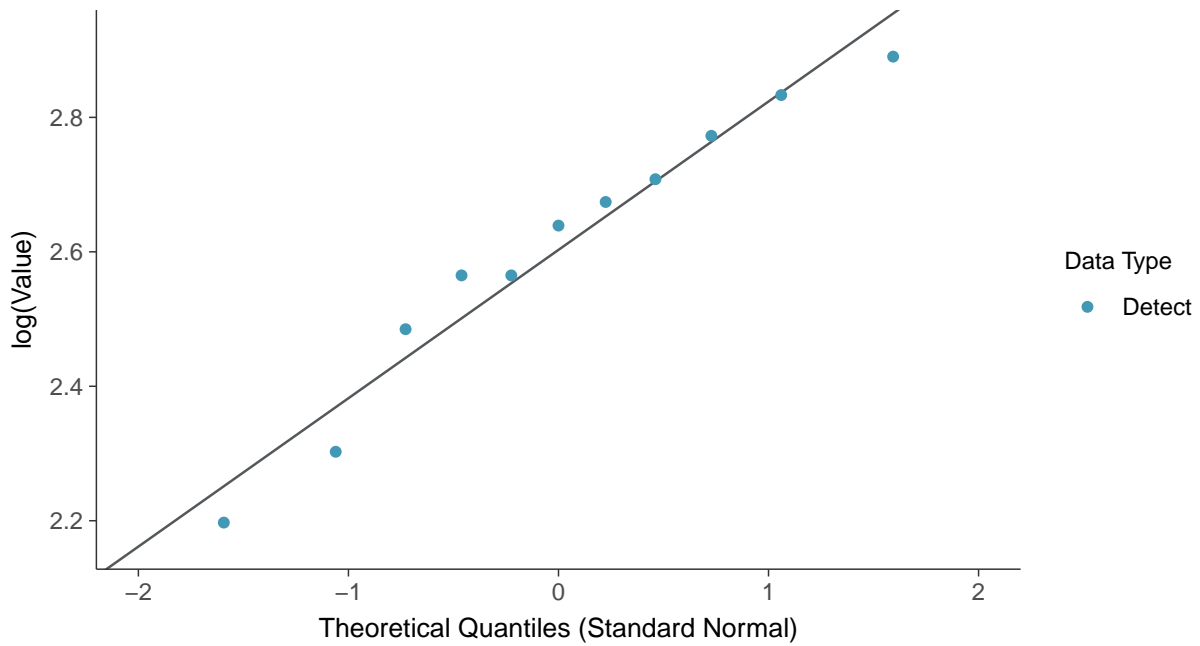
Normal Q-Q plot

Sulfate, MW-10 (mg/L)



Lognormal Q-Q plot

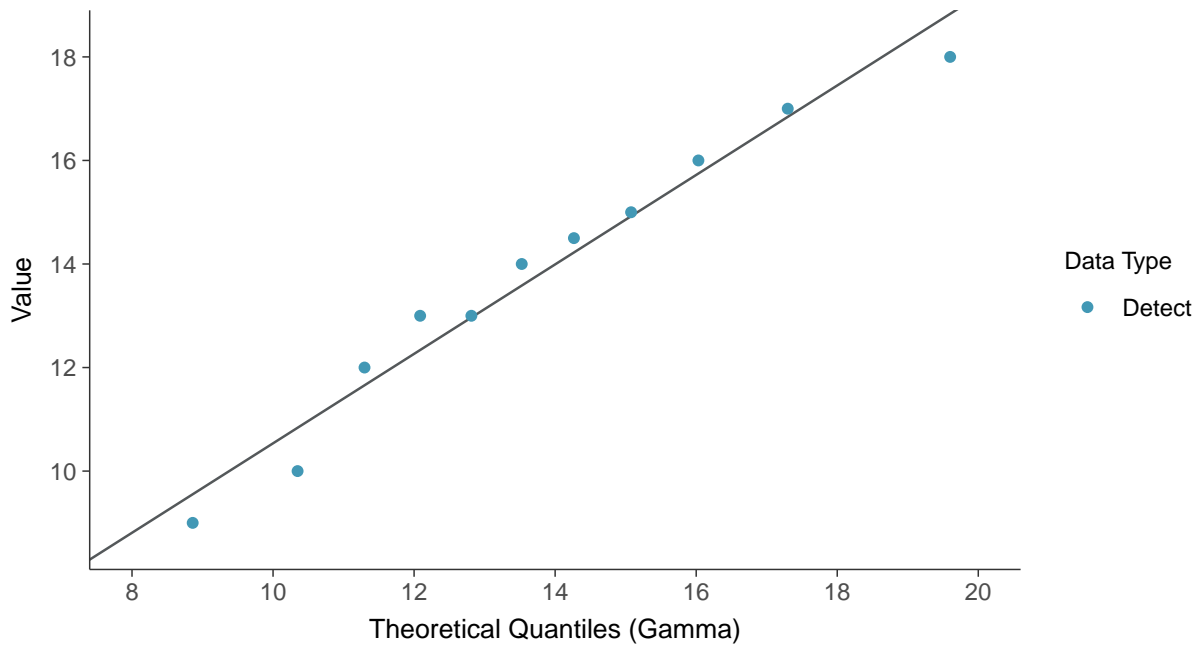
Sulfate, MW-10 (mg/L)





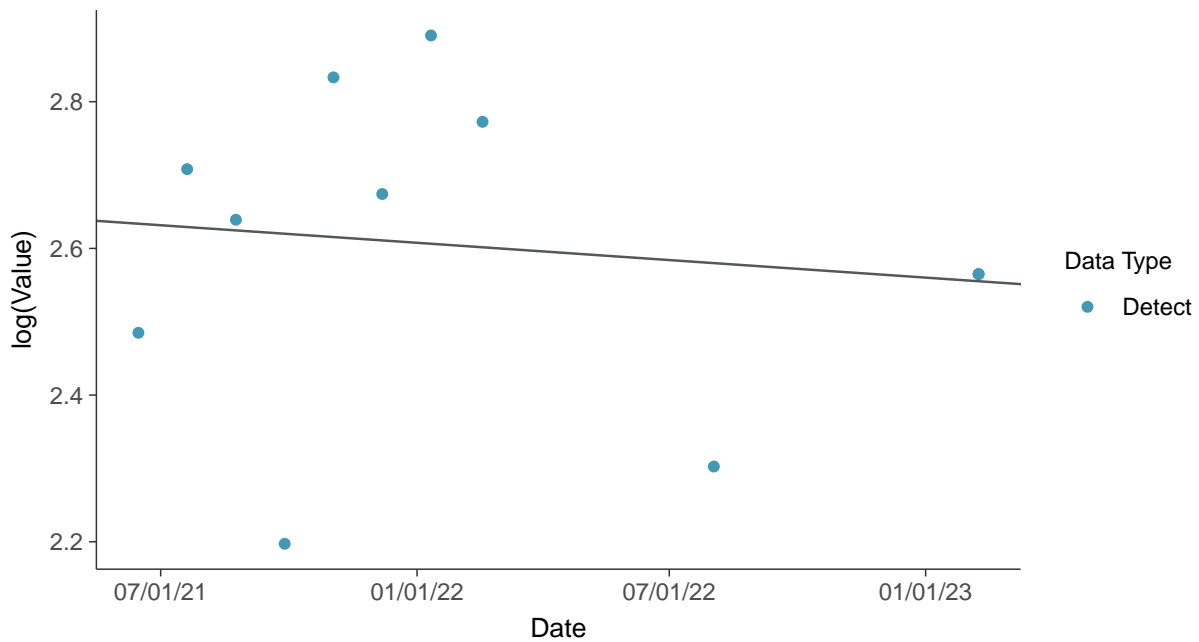
Gamma Q-Q plot

Sulfate, MW-10 (mg/L)



Trend Regression: Lognormal MLE

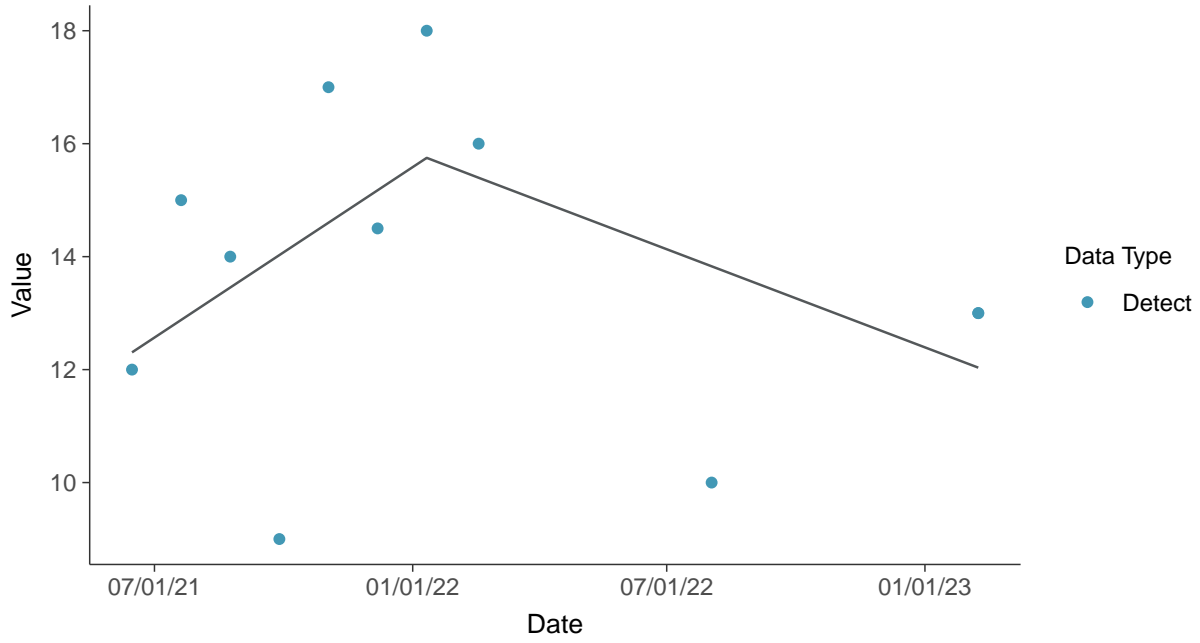
Sulfate, MW-10 (mg/L)





Trend Regression: Piecewise Linear-Linear

Sulfate, MW-10 (mg/L)



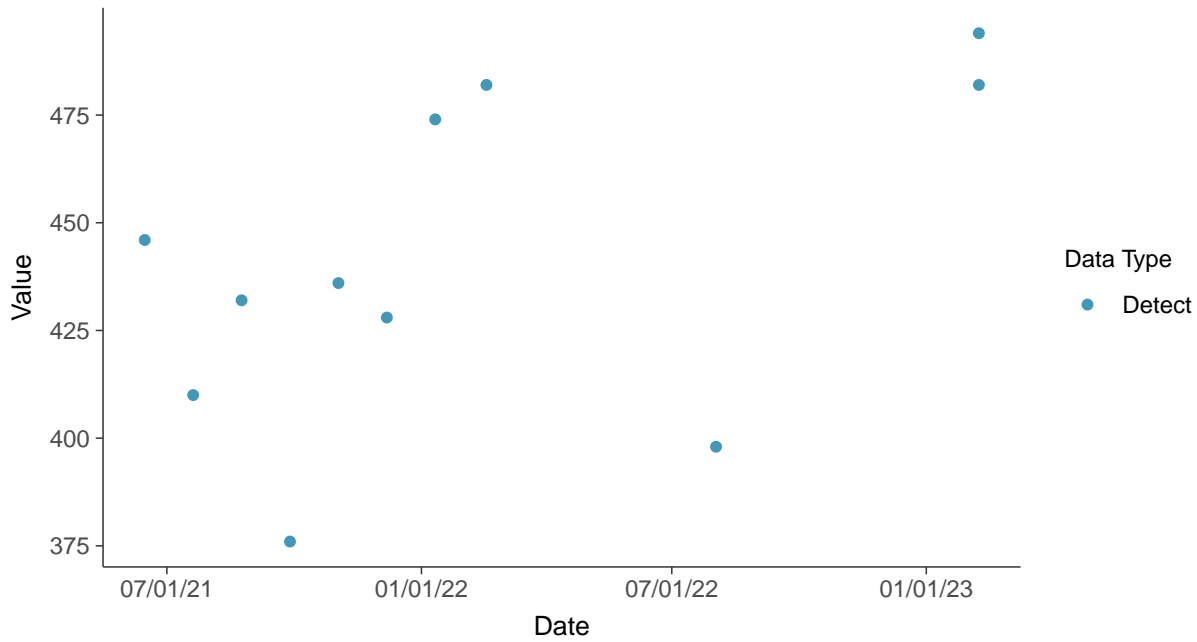


Appendix III: Total Dissolved Solids, MW-10

ID: 10_1_06

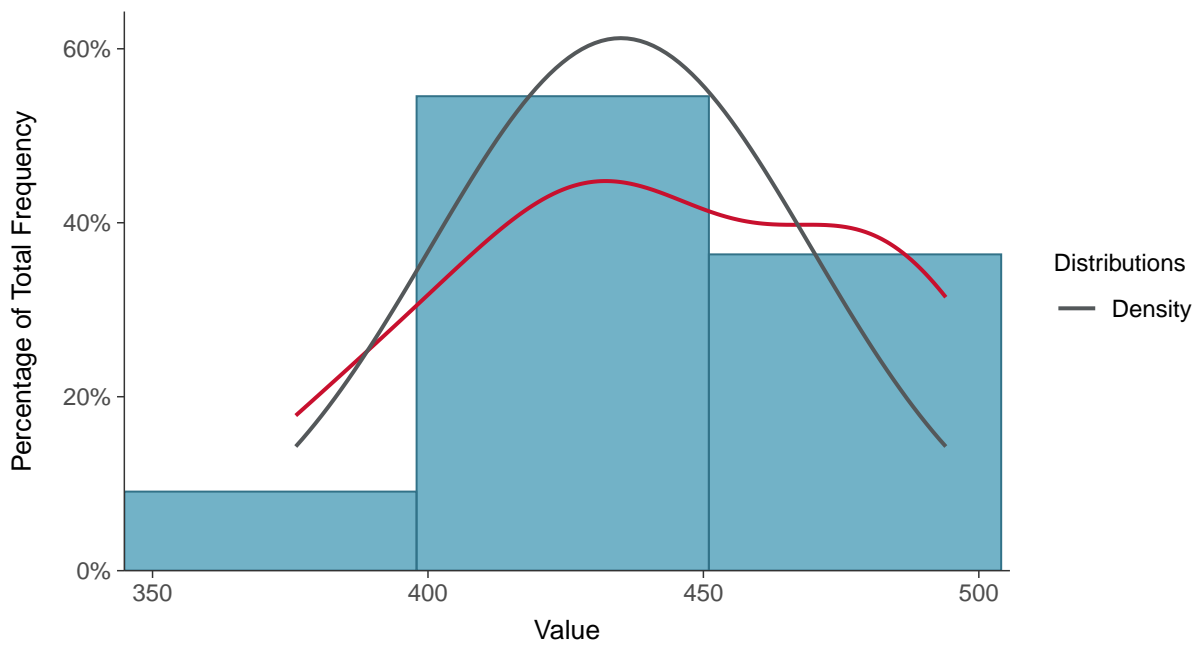
Scatter Plot

Total Dissolved Solids, MW-10 (mg/L)



Histogram

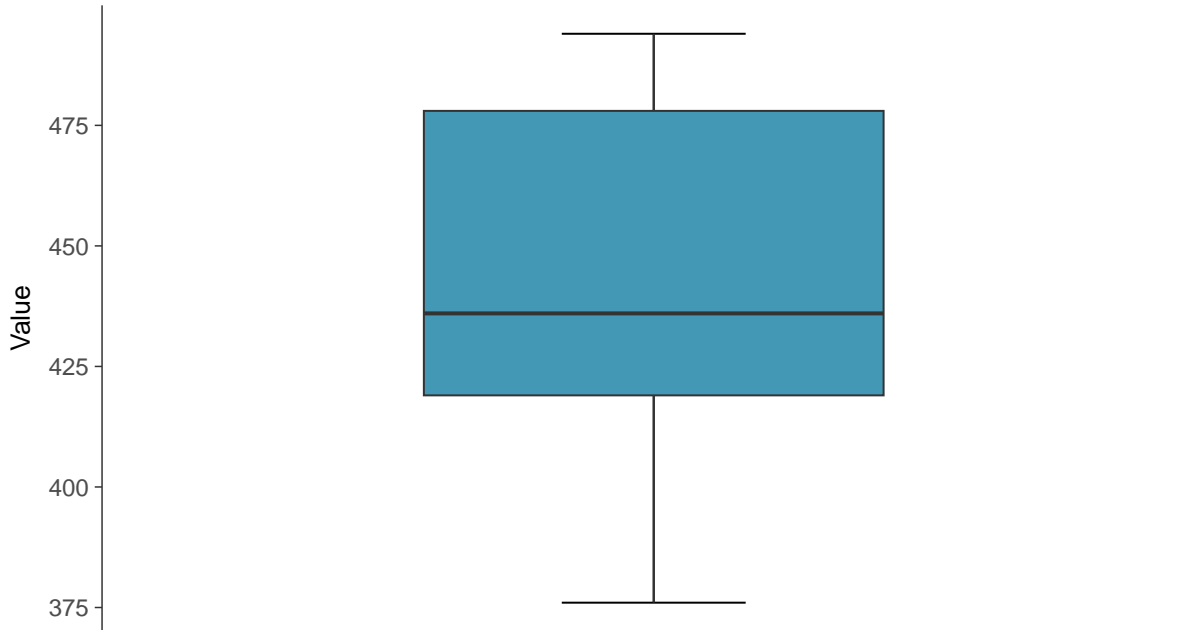
Total Dissolved Solids, MW-10 (mg/L)





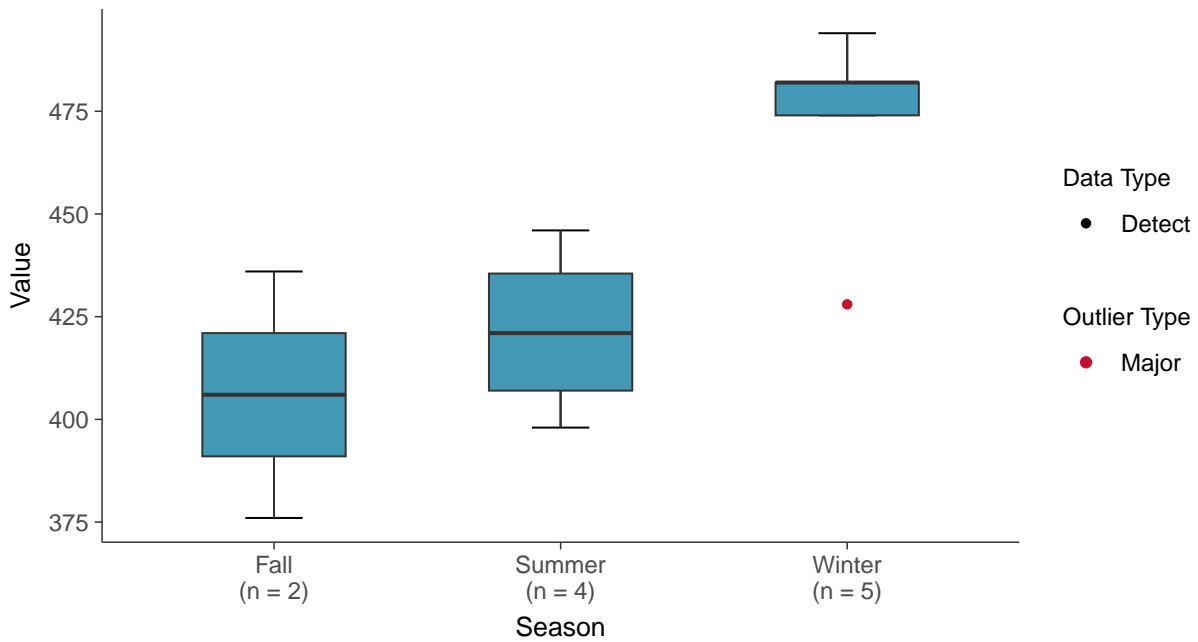
Boxplot

Total Dissolved Solids, MW-10 (mg/L)



Boxplot by Season

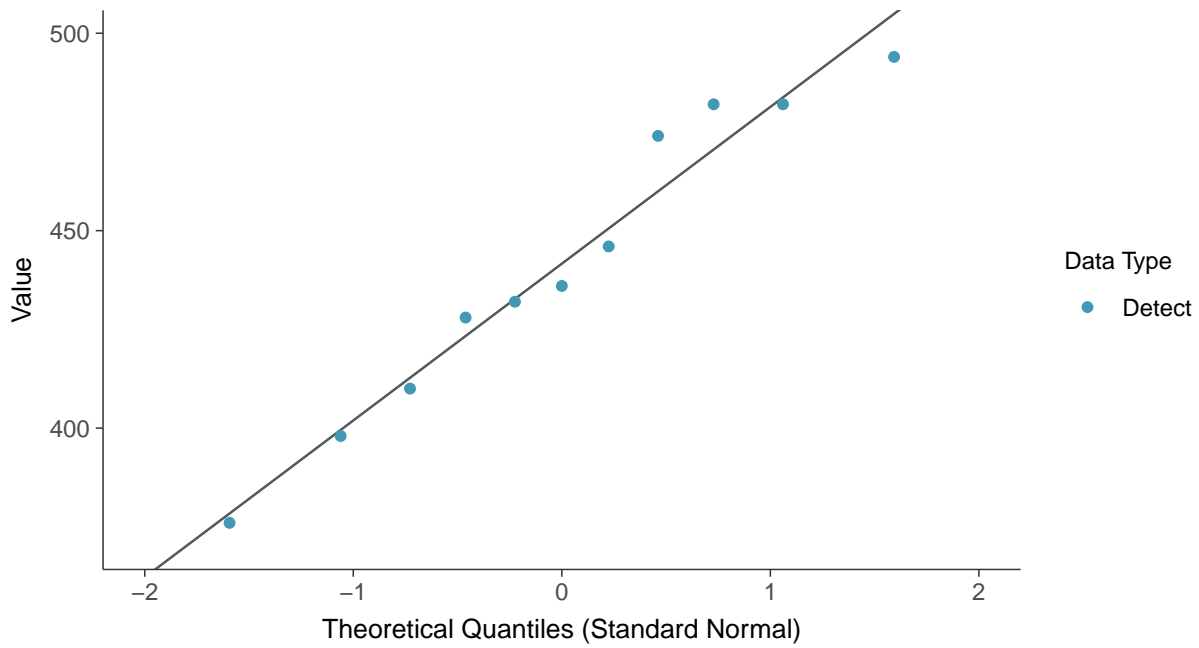
Total Dissolved Solids, MW-10 (mg/L)





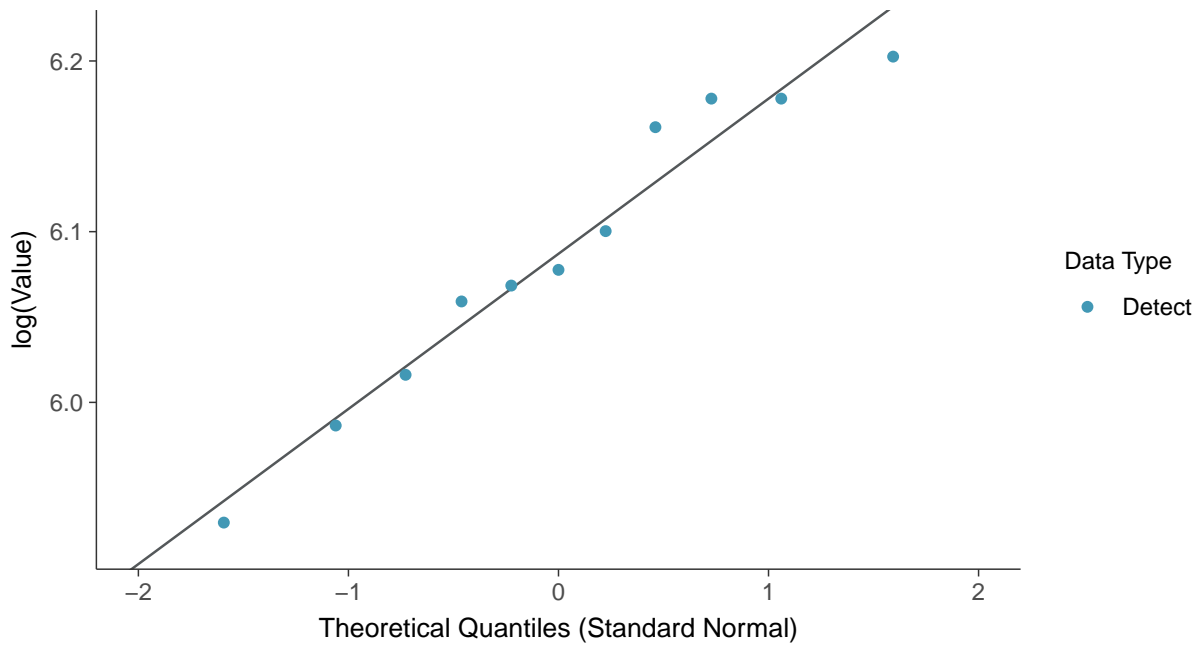
Normal Q-Q plot

Total Dissolved Solids, MW-10 (mg/L)



Lognormal Q-Q plot

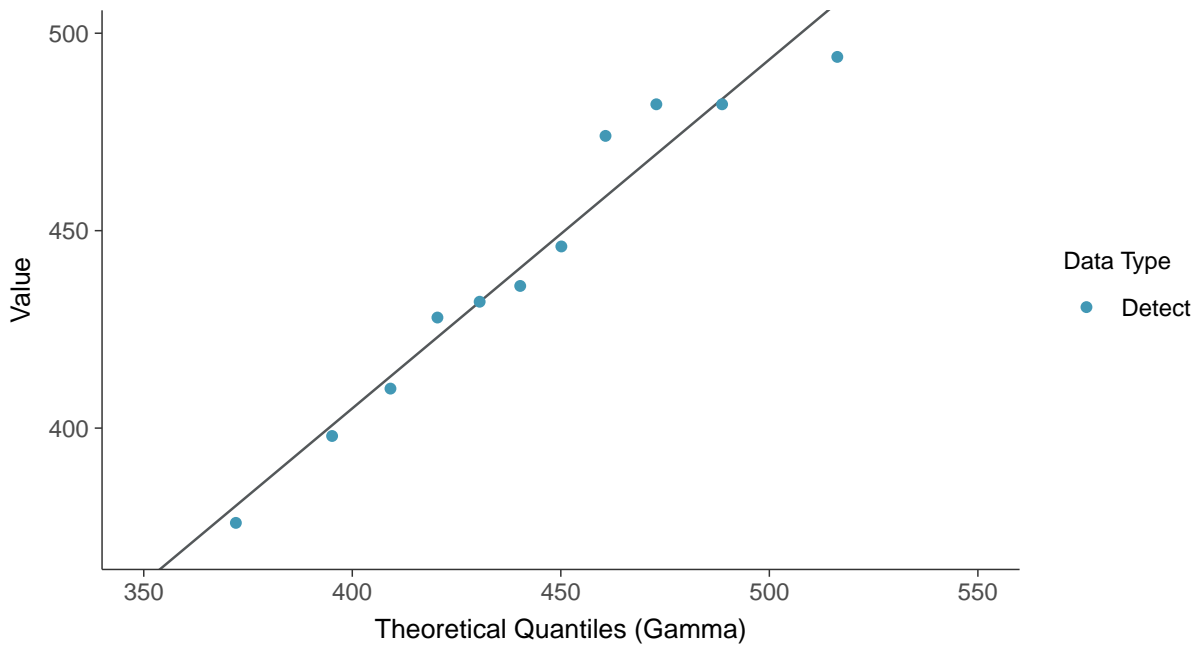
Total Dissolved Solids, MW-10 (mg/L)





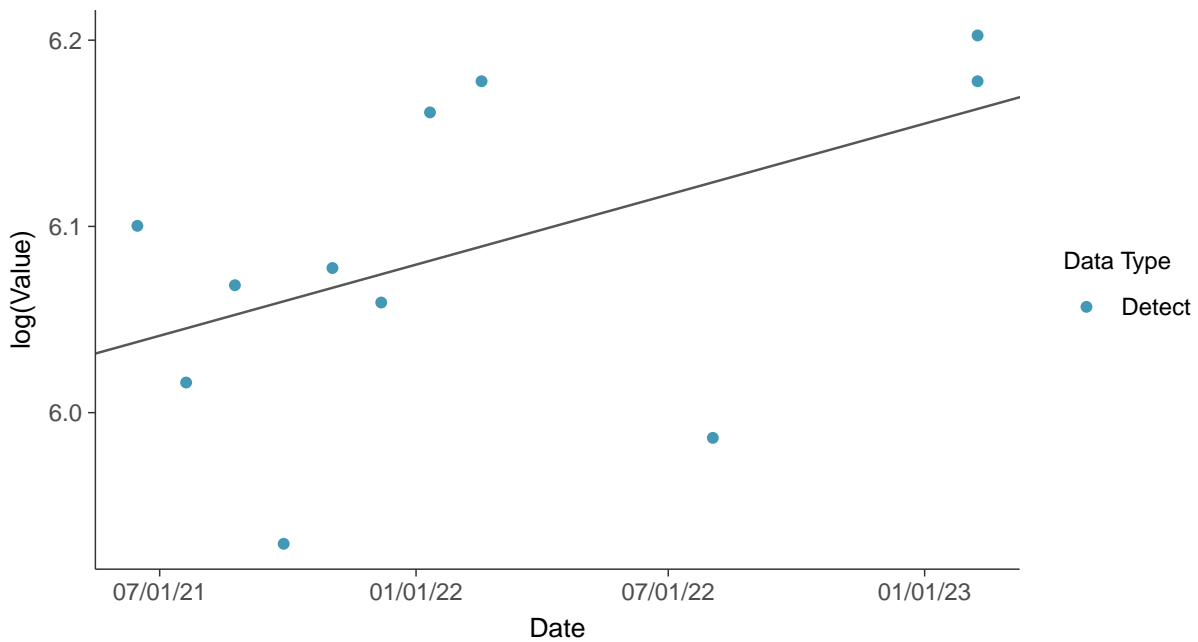
Gamma Q-Q plot

Total Dissolved Solids, MW-10 (mg/L)



Trend Regression: Lognormal MLE

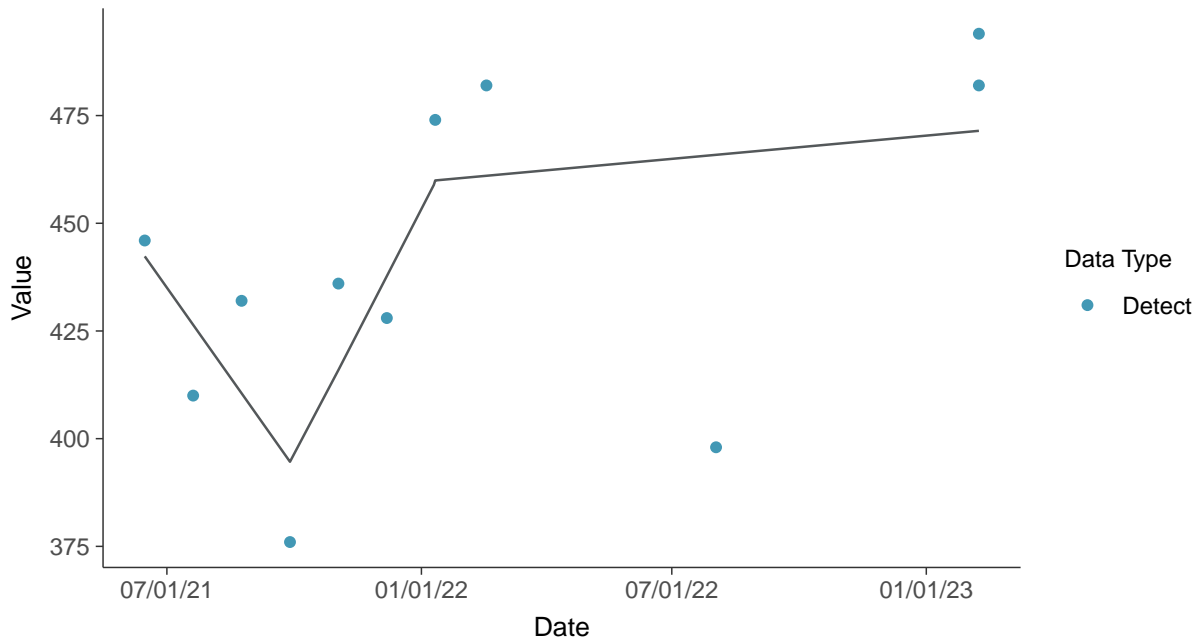
Total Dissolved Solids, MW-10 (mg/L)





Trend Regression: Piecewise Linear-Linear-Linear

Total Dissolved Solids, MW-10 (mg/L)



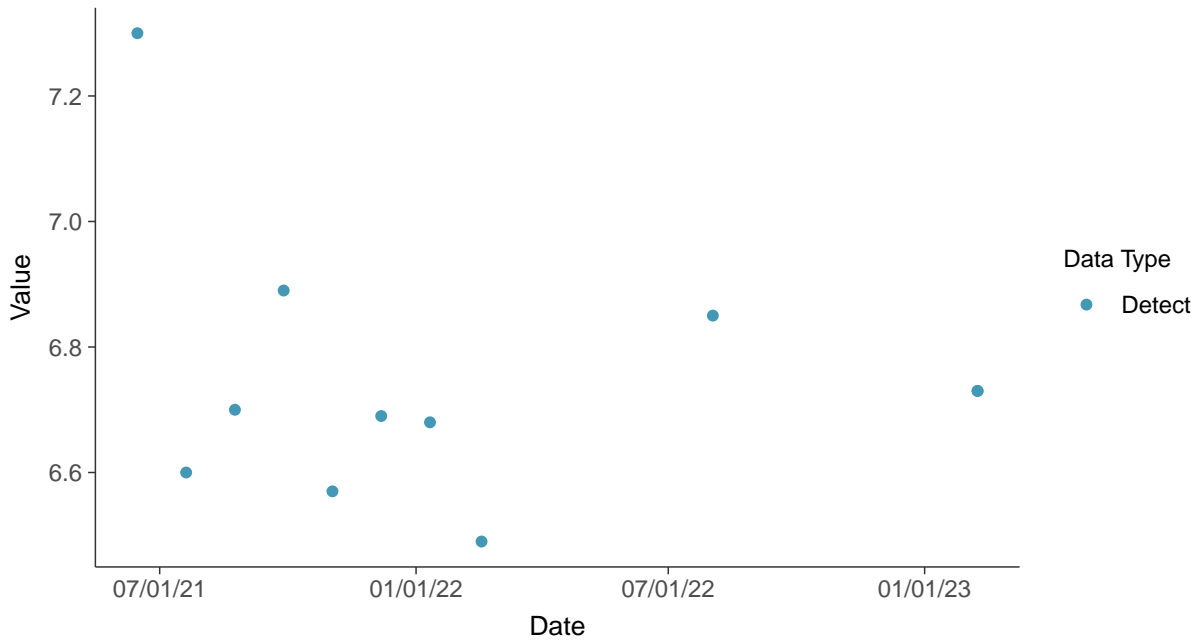


Appendix III: pH, Field, MW-10

ID: 10_1_07

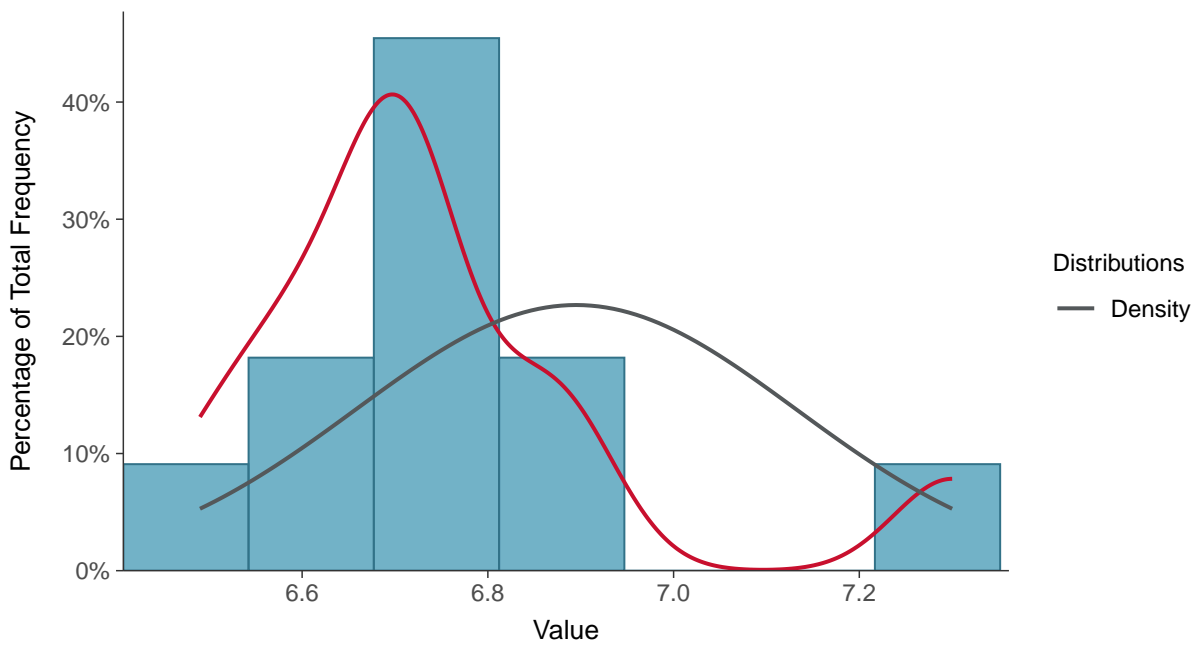
Scatter Plot

pH, Field, MW-10 (su)



Histogram

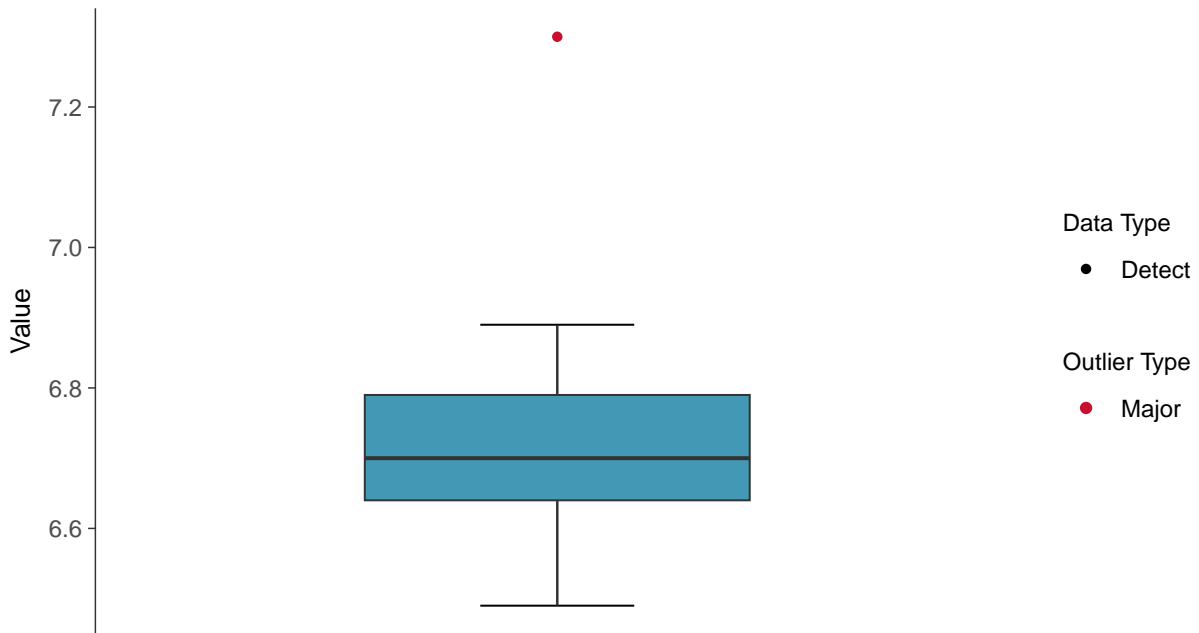
pH, Field, MW-10 (su)





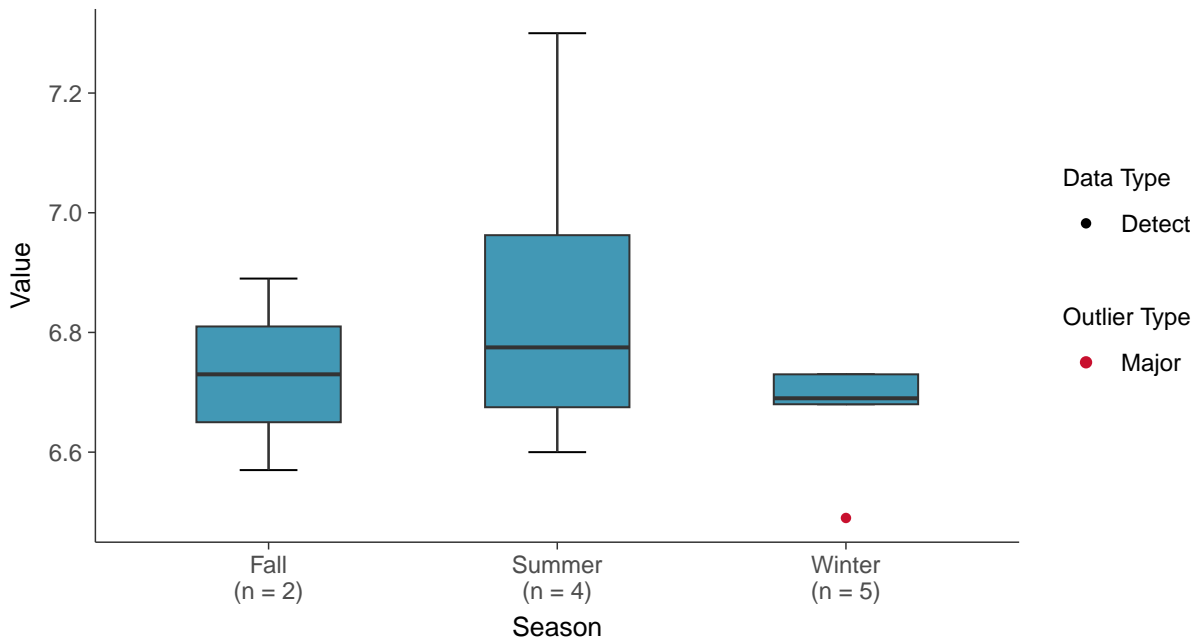
Boxplot

pH, Field, MW-10 (su)



Boxplot by Season

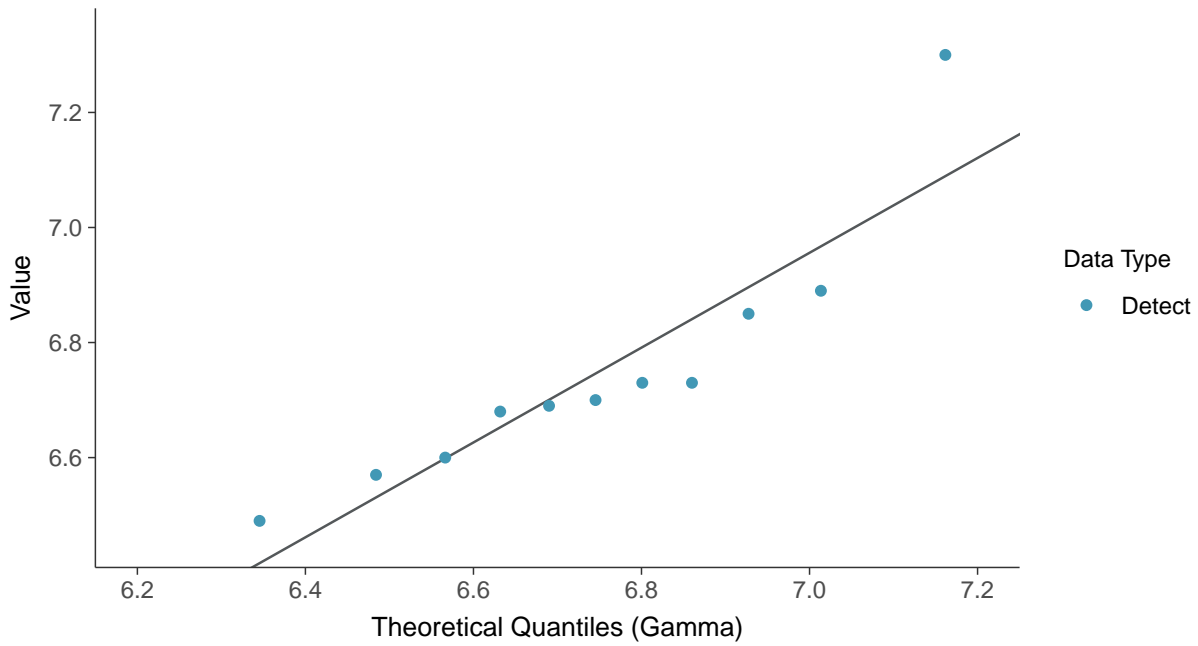
pH, Field, MW-10 (su)





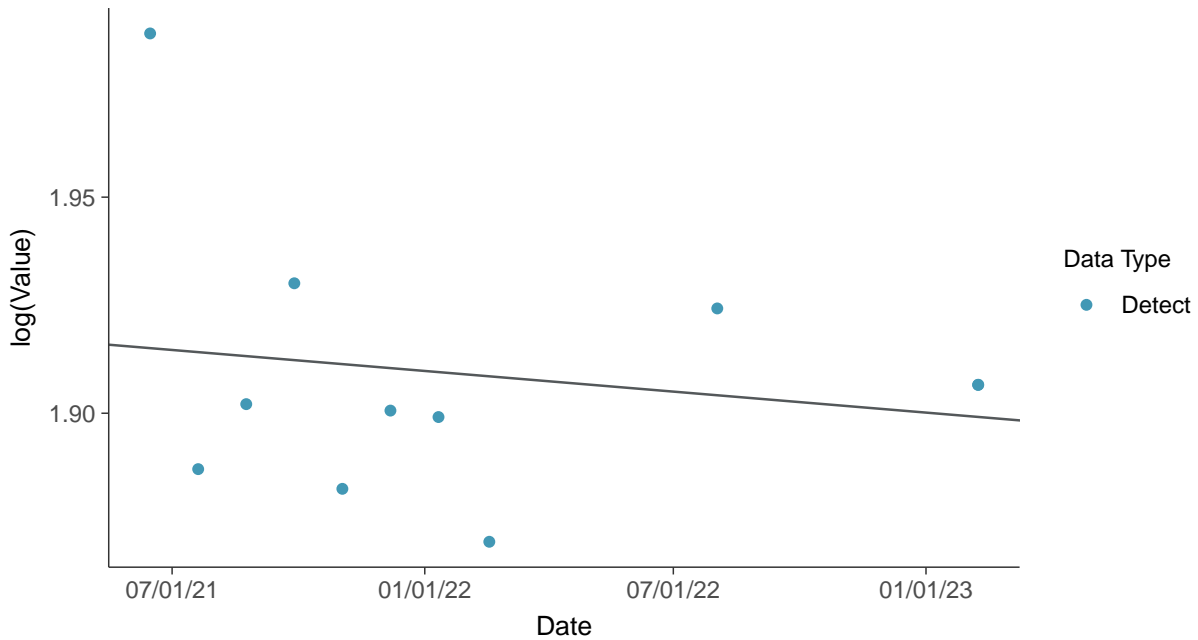
Gamma Q-Q plot

pH, Field, MW-10 (su)



Trend Regression: Lognormal MLE

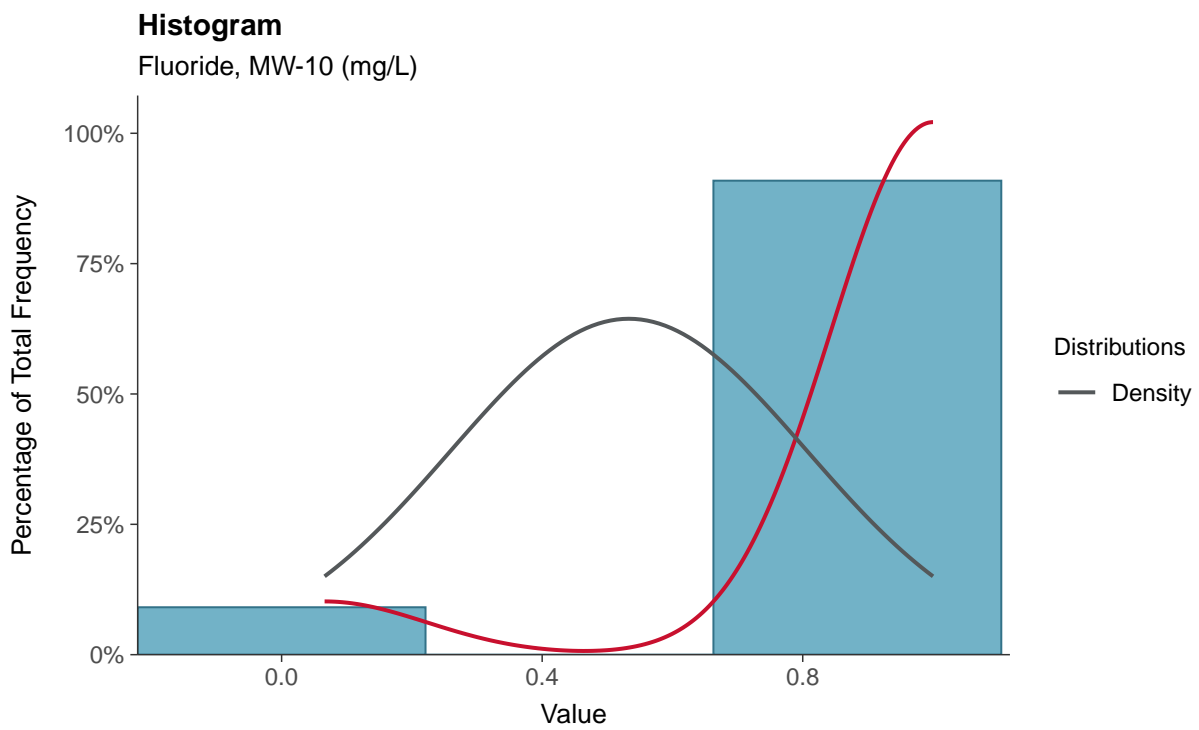
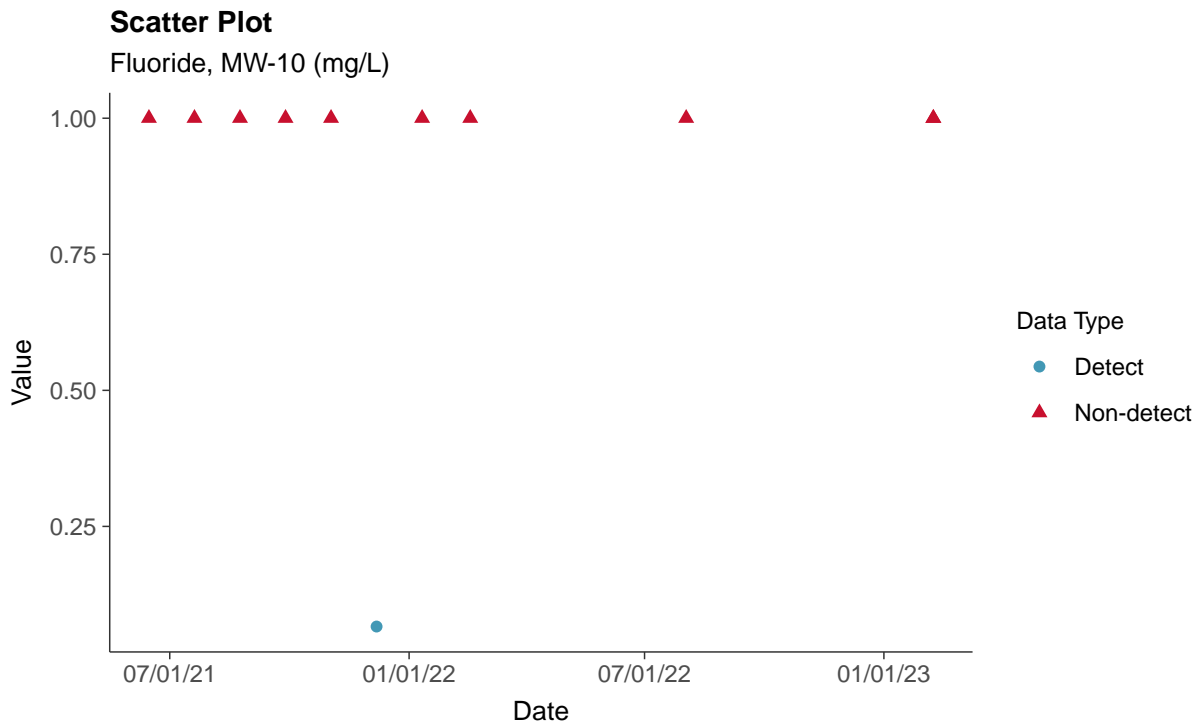
pH, Field, MW-10 (su)





Appendix IV: Fluoride, MW-10

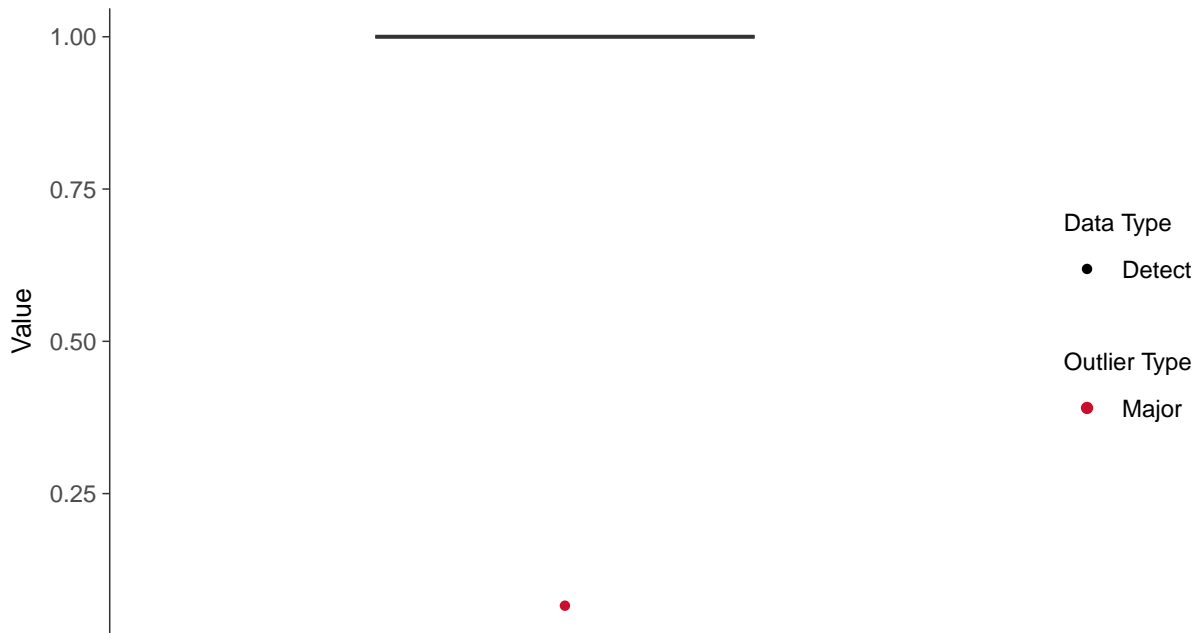
ID: 10_2_04





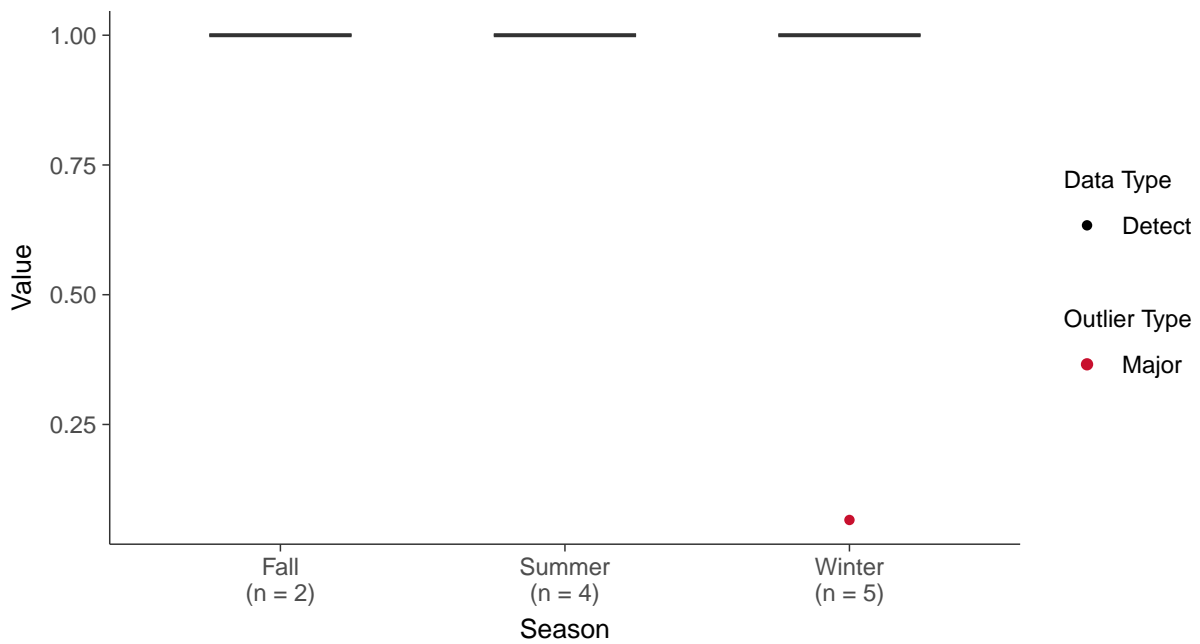
Boxplot

Fluoride, MW-10 (mg/L)



Boxplot by Season

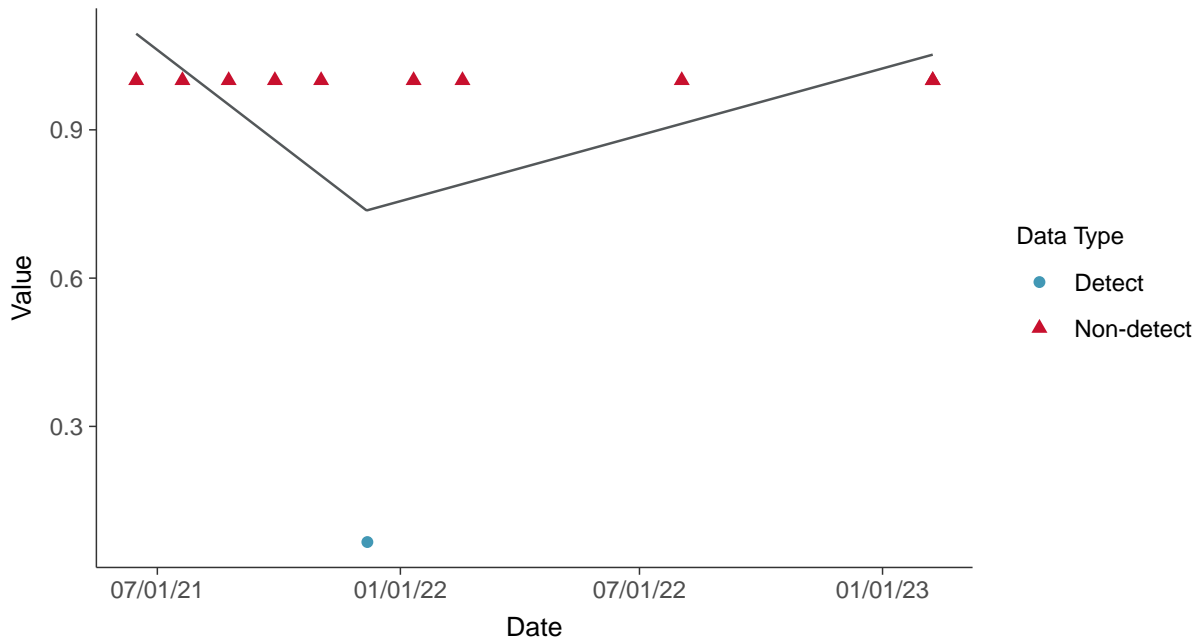
Fluoride, MW-10 (mg/L)





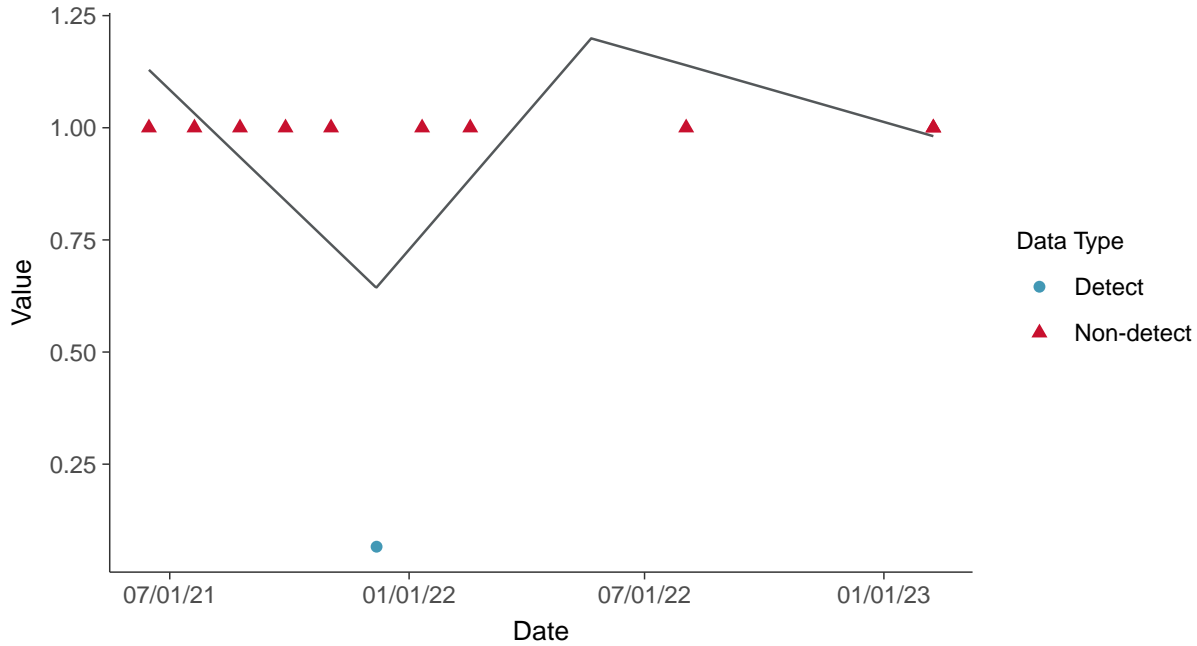
Trend Regression: Piecewise Linear-Linear

Fluoride, MW-10 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Fluoride, MW-10 (mg/L)



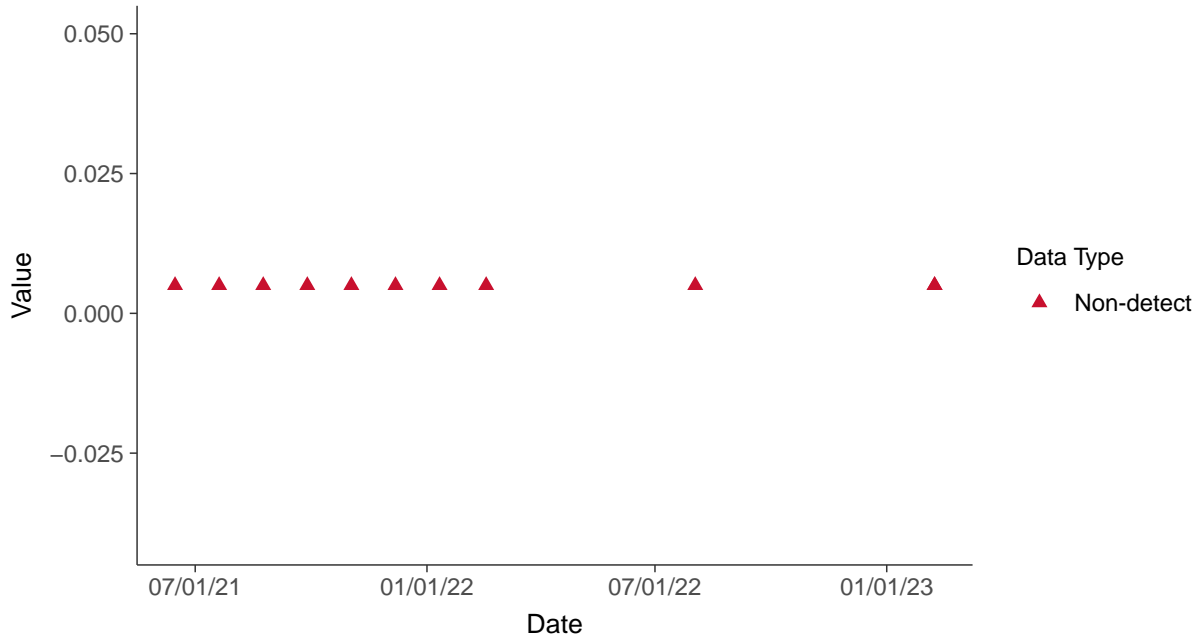


Appendix IV: Antimony, MW-10

ID: 10_2_08

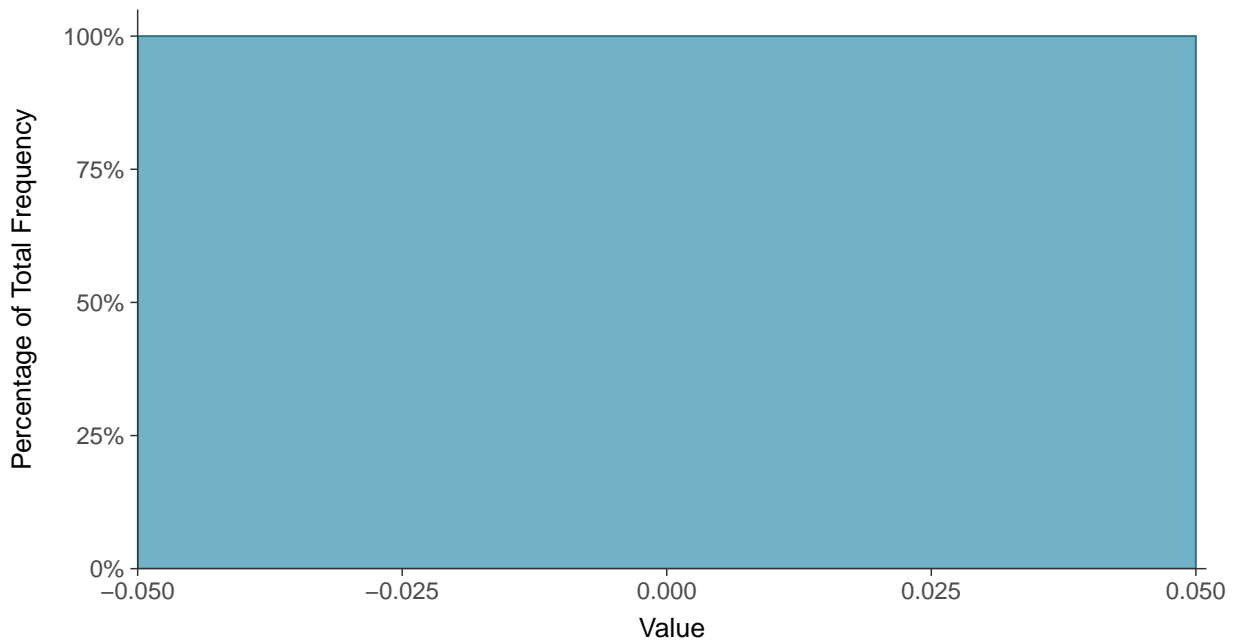
Scatter Plot

Antimony, MW-10 (mg/L)



Histogram

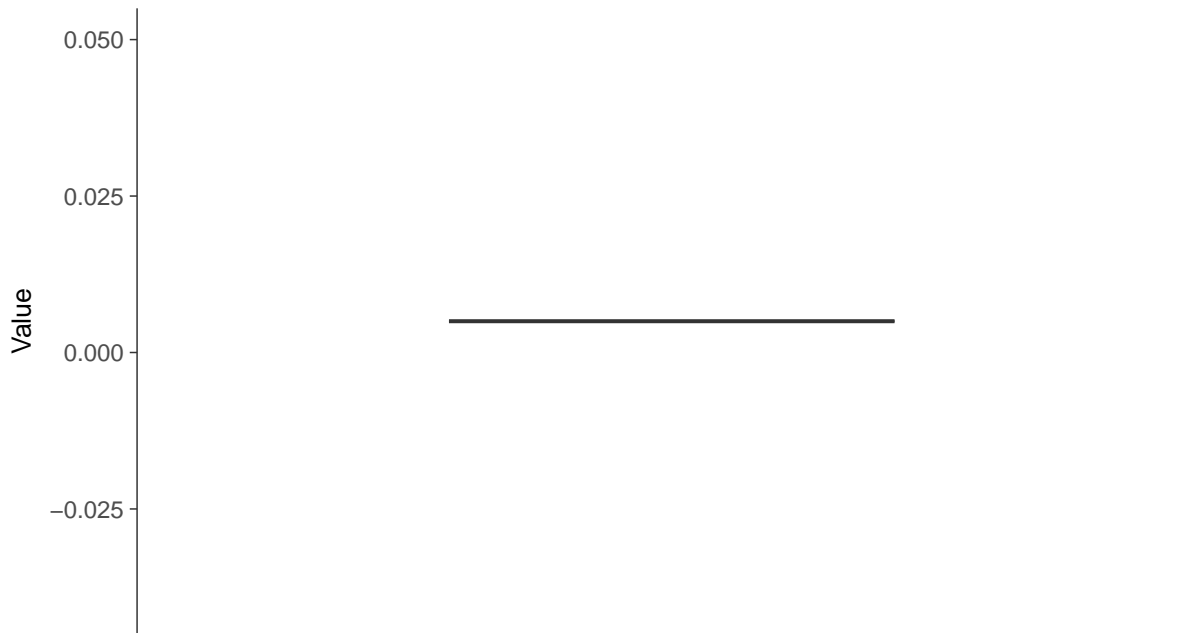
Antimony, MW-10 (mg/L)





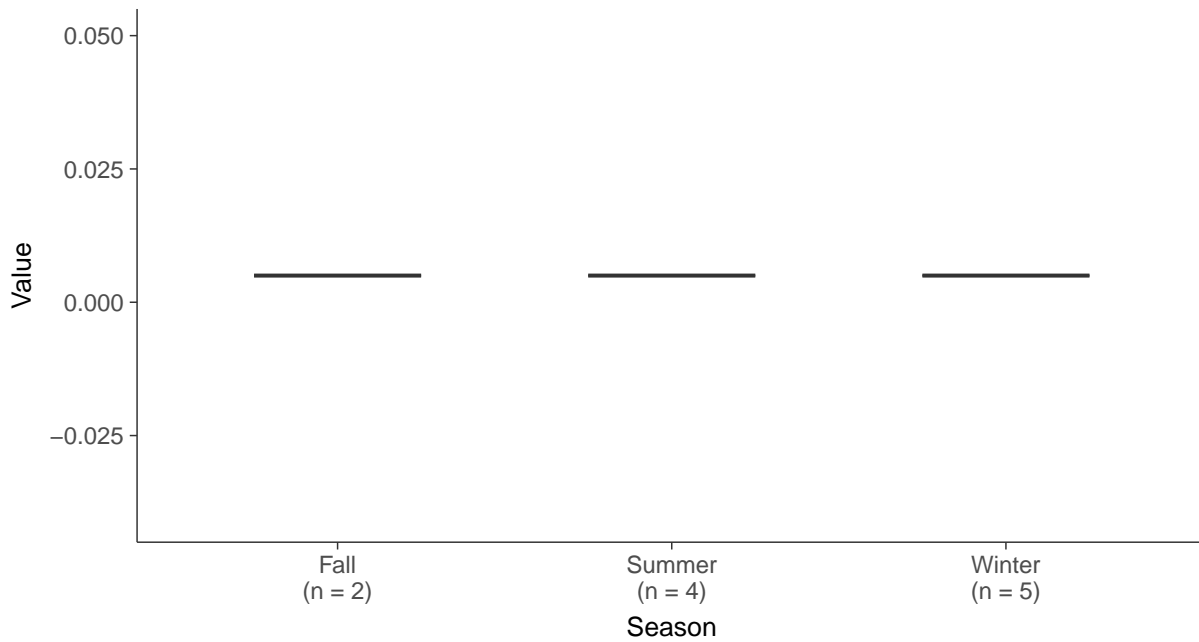
Boxplot

Antimony, MW-10 (mg/L)



Boxplot by Season

Antimony, MW-10 (mg/L)



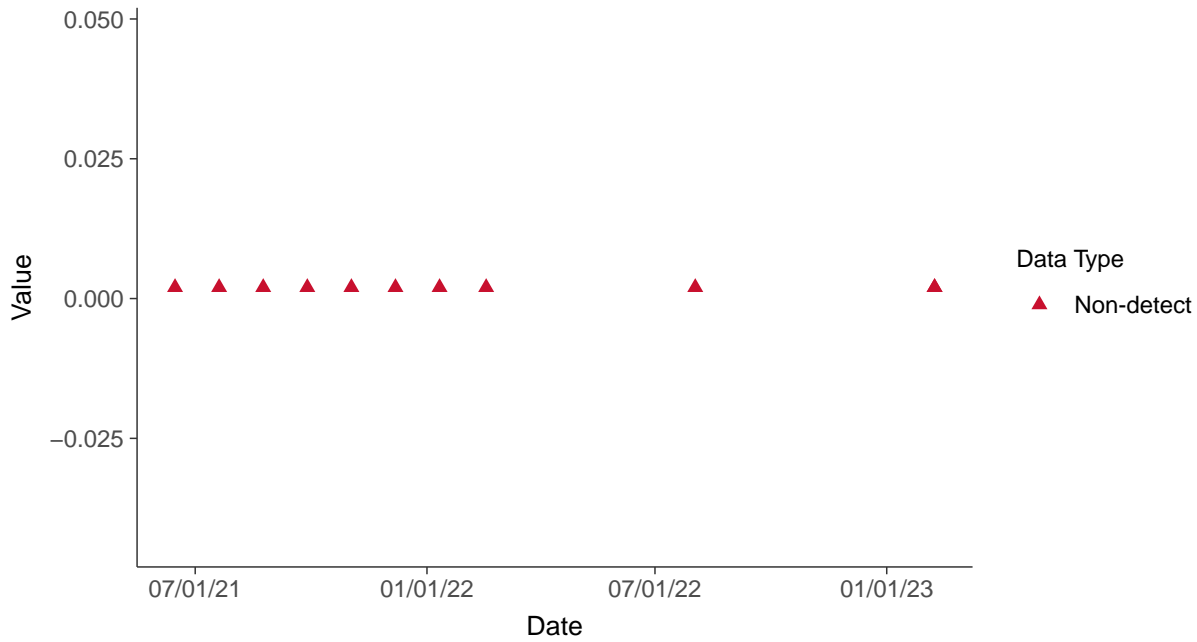


Appendix IV: Arsenic, MW-10

ID: 10_2_09

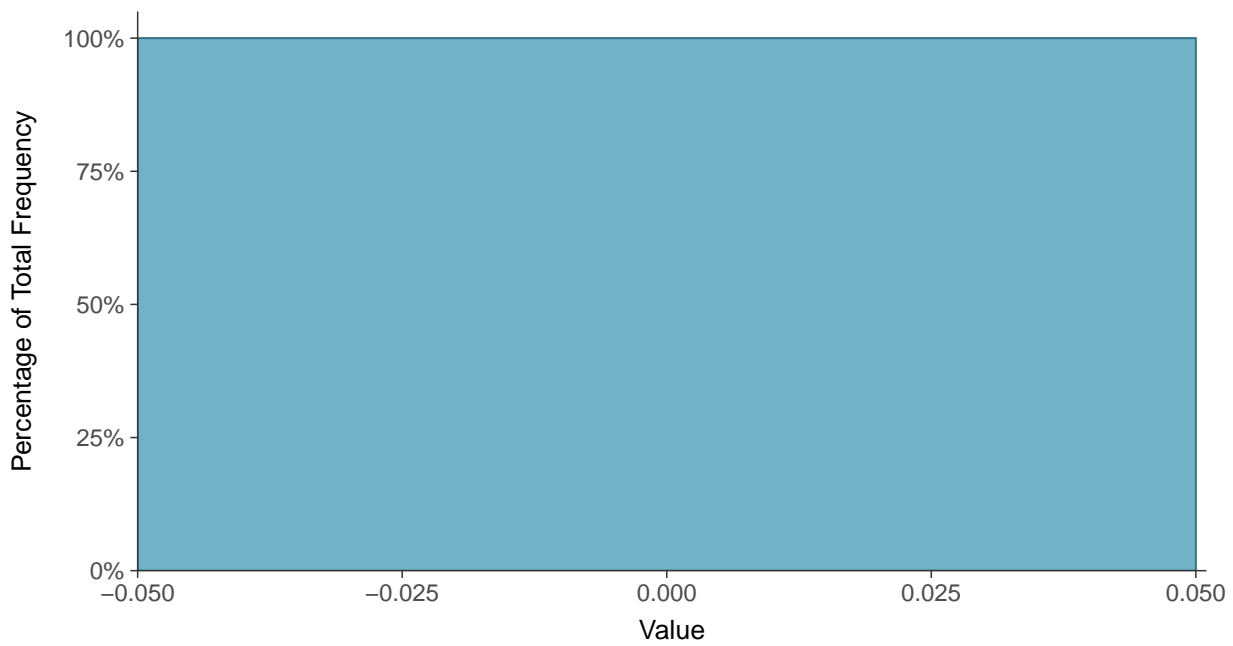
Scatter Plot

Arsenic, MW-10 (mg/L)



Histogram

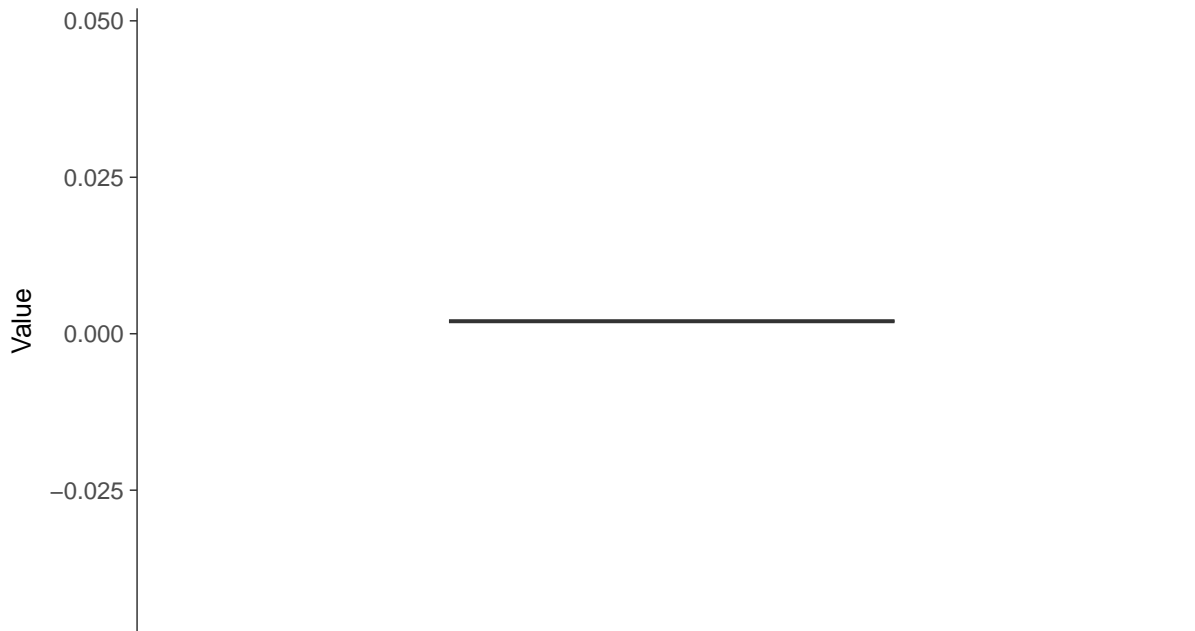
Arsenic, MW-10 (mg/L)





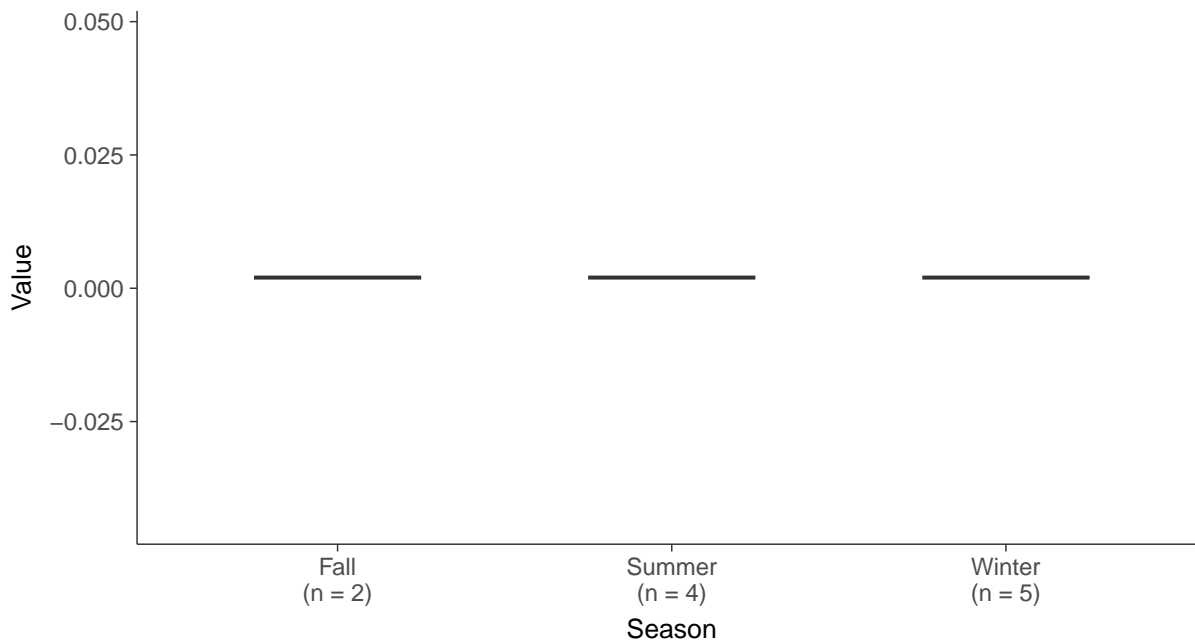
Boxplot

Arsenic, MW-10 (mg/L)



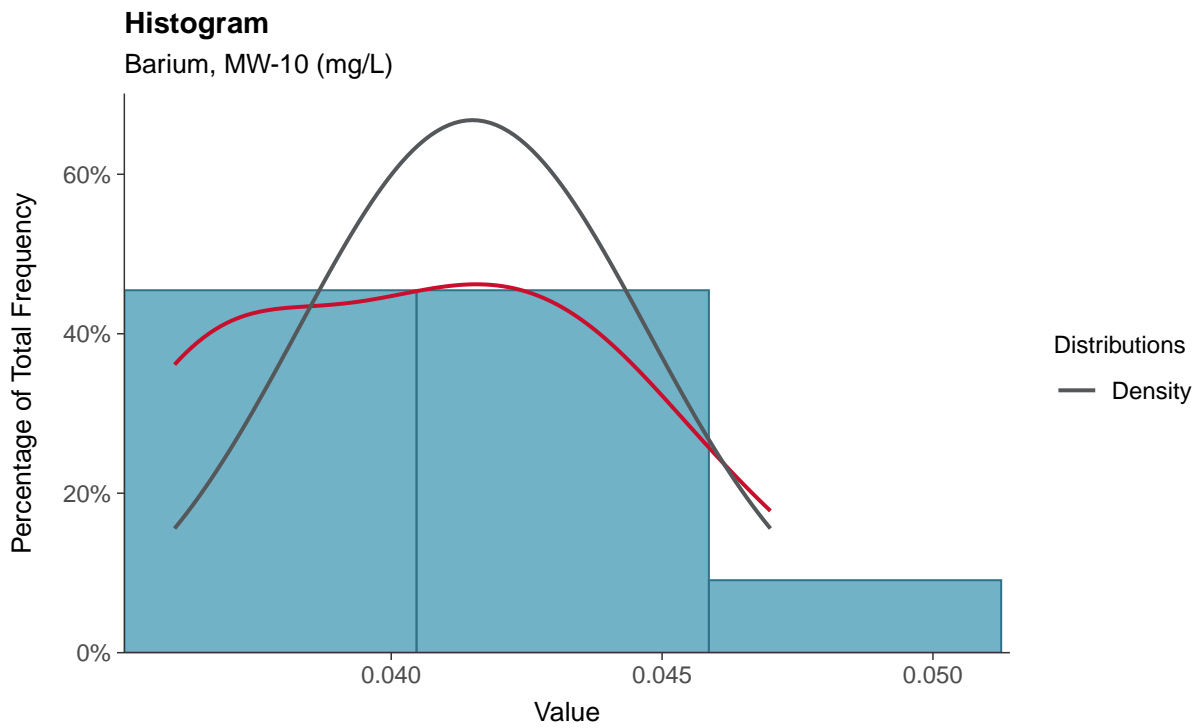
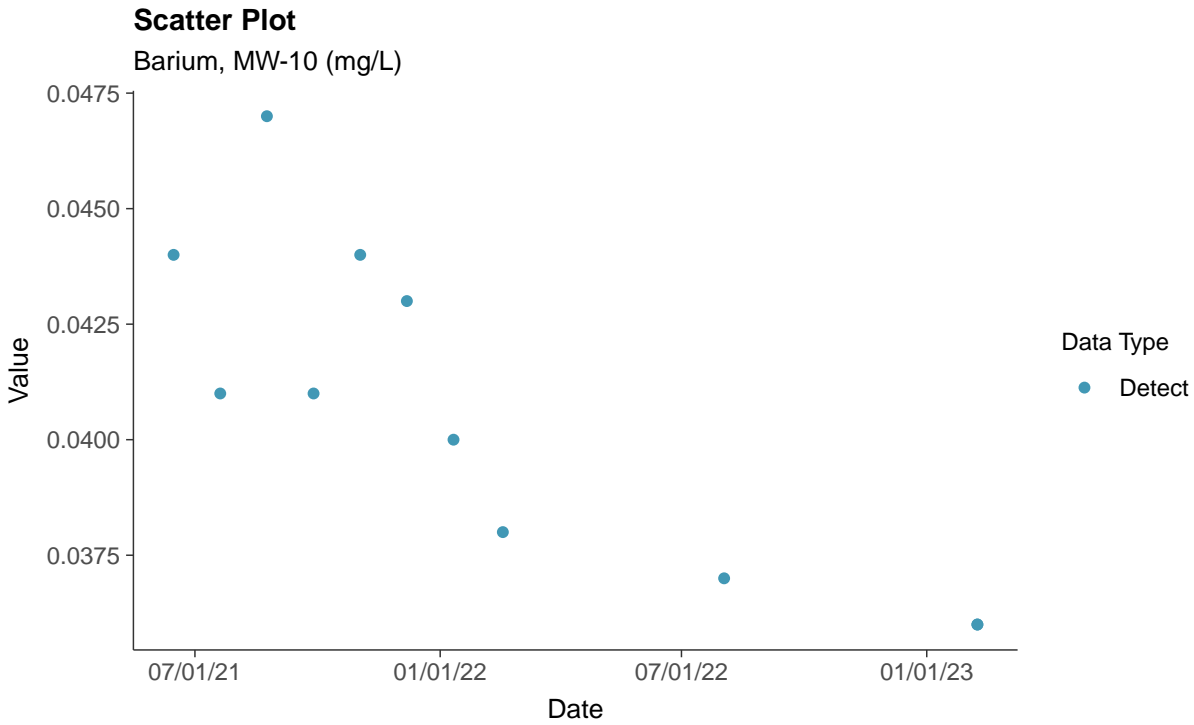
Boxplot by Season

Arsenic, MW-10 (mg/L)



Appendix IV: Barium, MW-10

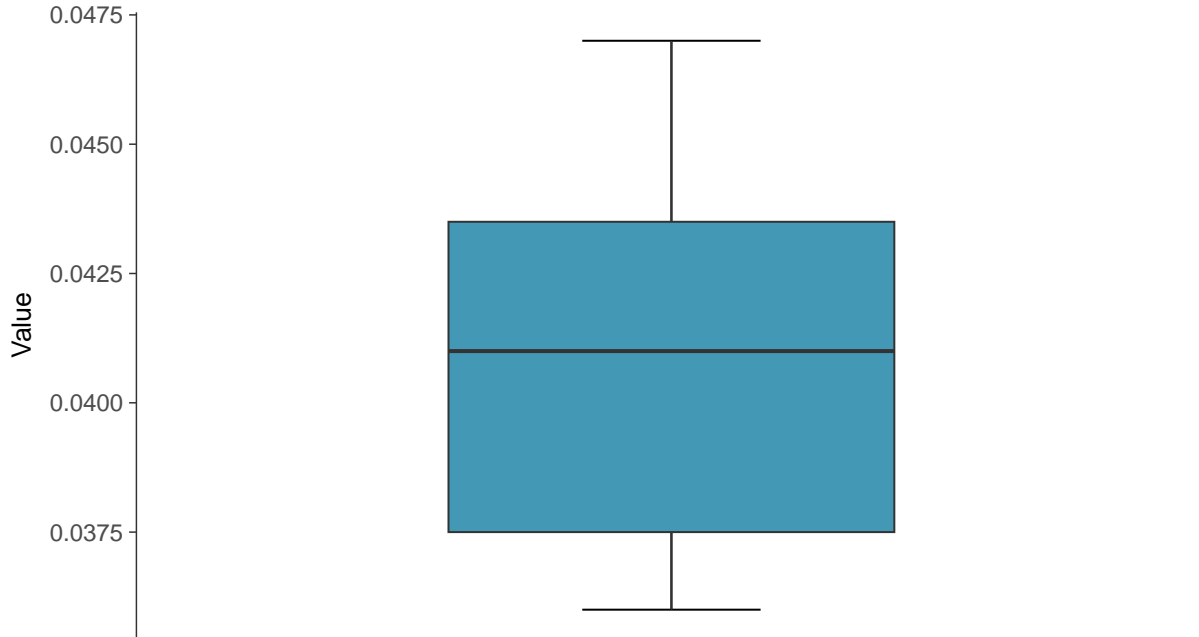
ID: 10_2_10





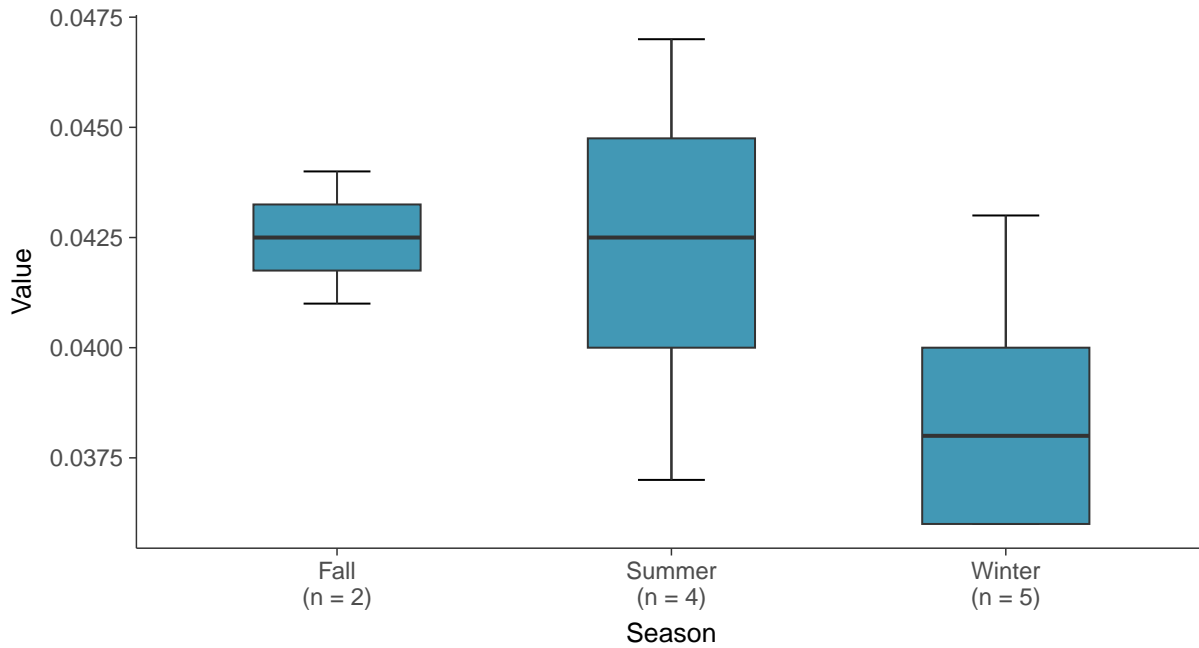
Boxplot

Barium, MW-10 (mg/L)



Boxplot by Season

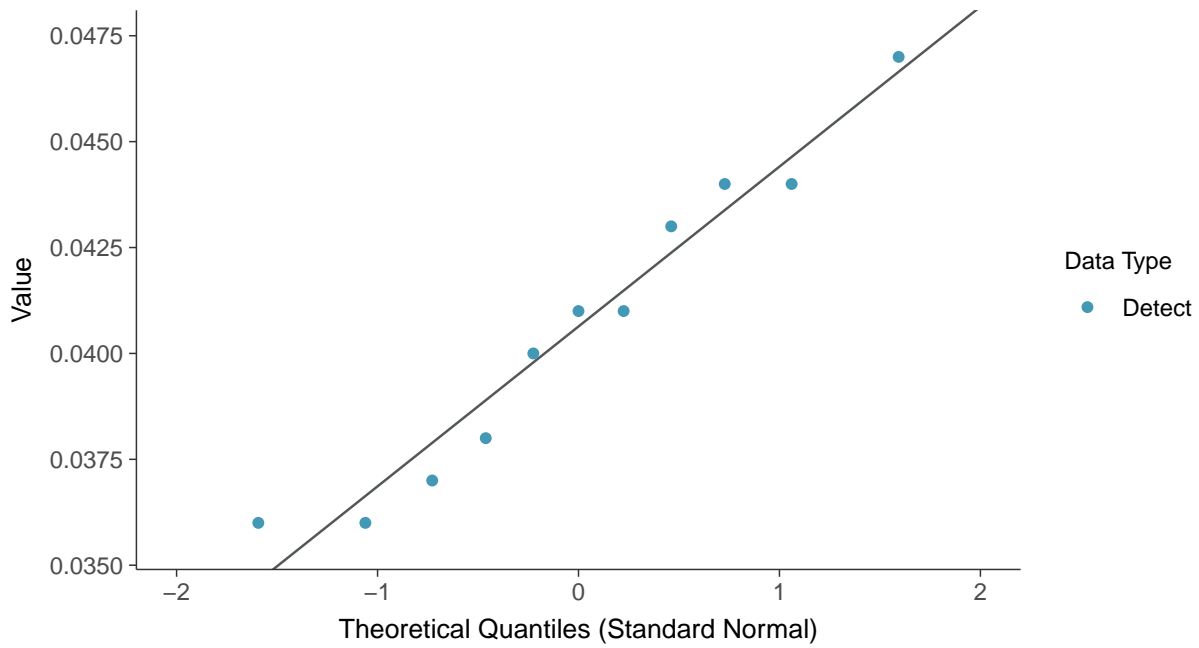
Barium, MW-10 (mg/L)





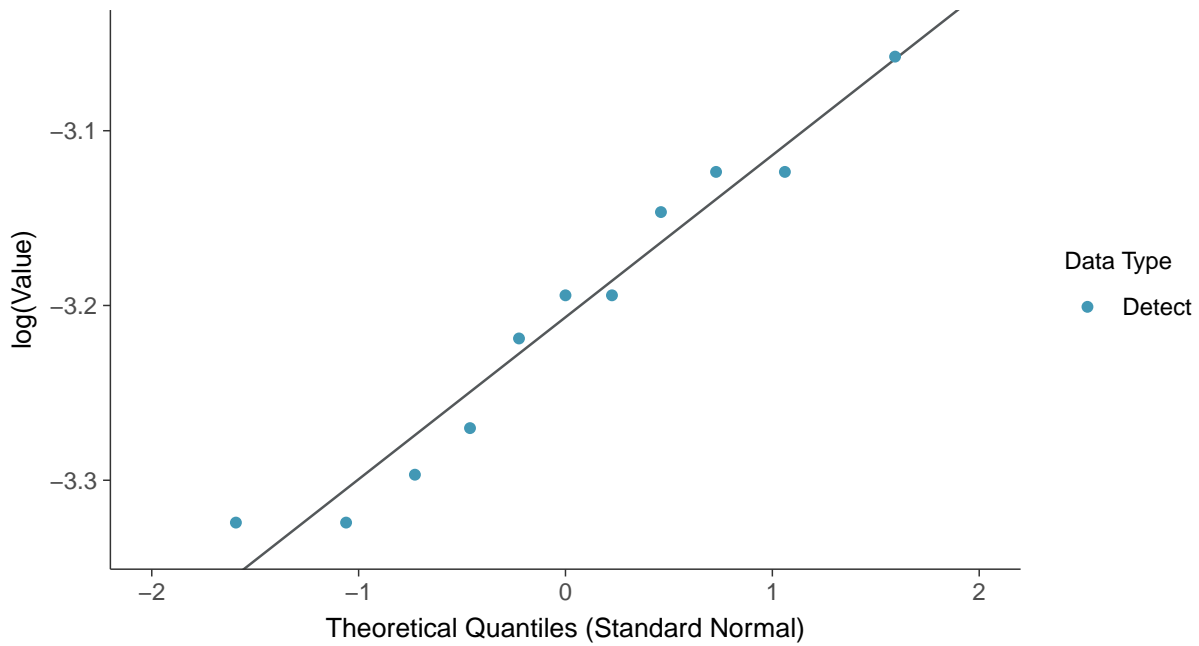
Normal Q-Q plot

Barium, MW-10 (mg/L)



Lognormal Q-Q plot

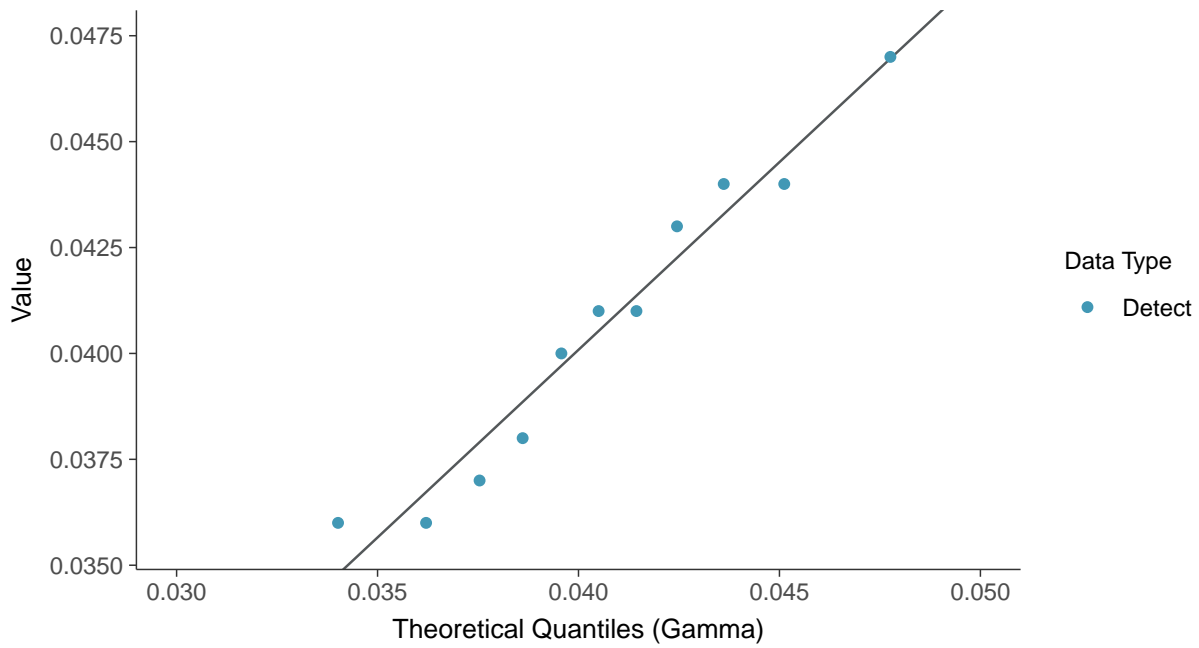
Barium, MW-10 (mg/L)





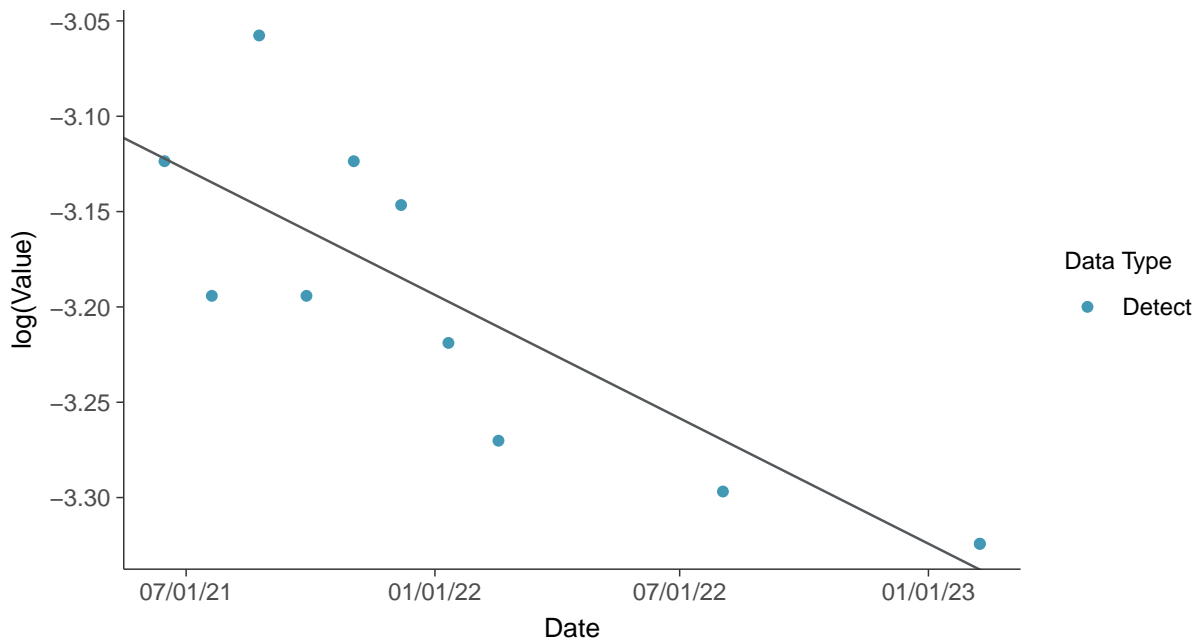
Gamma Q-Q plot

Barium, MW-10 (mg/L)



Trend Regression: Lognormal MLE

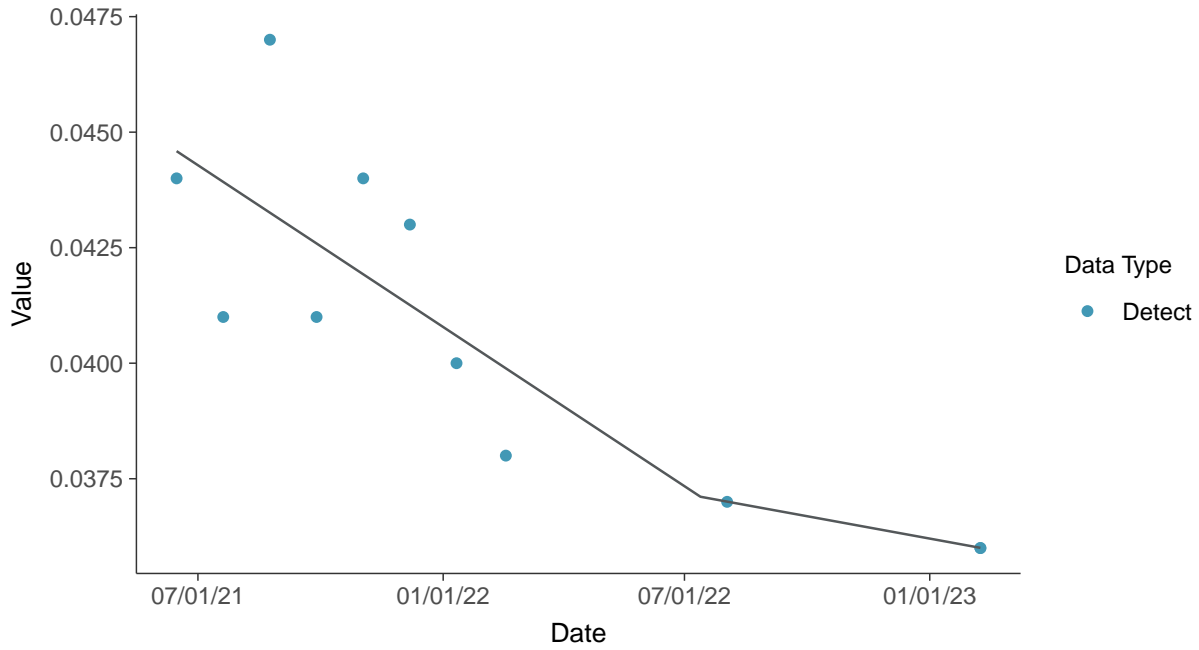
Barium, MW-10 (mg/L)





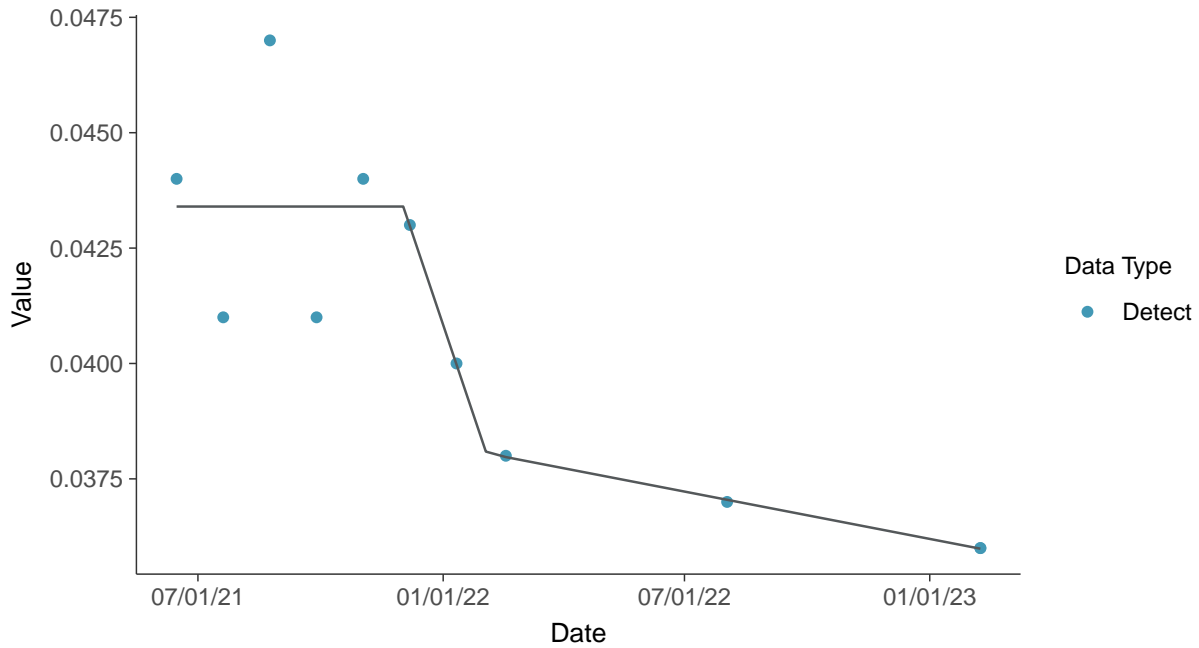
Trend Regression: Piecewise Linear-Linear

Barium, MW-10 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Barium, MW-10 (mg/L)



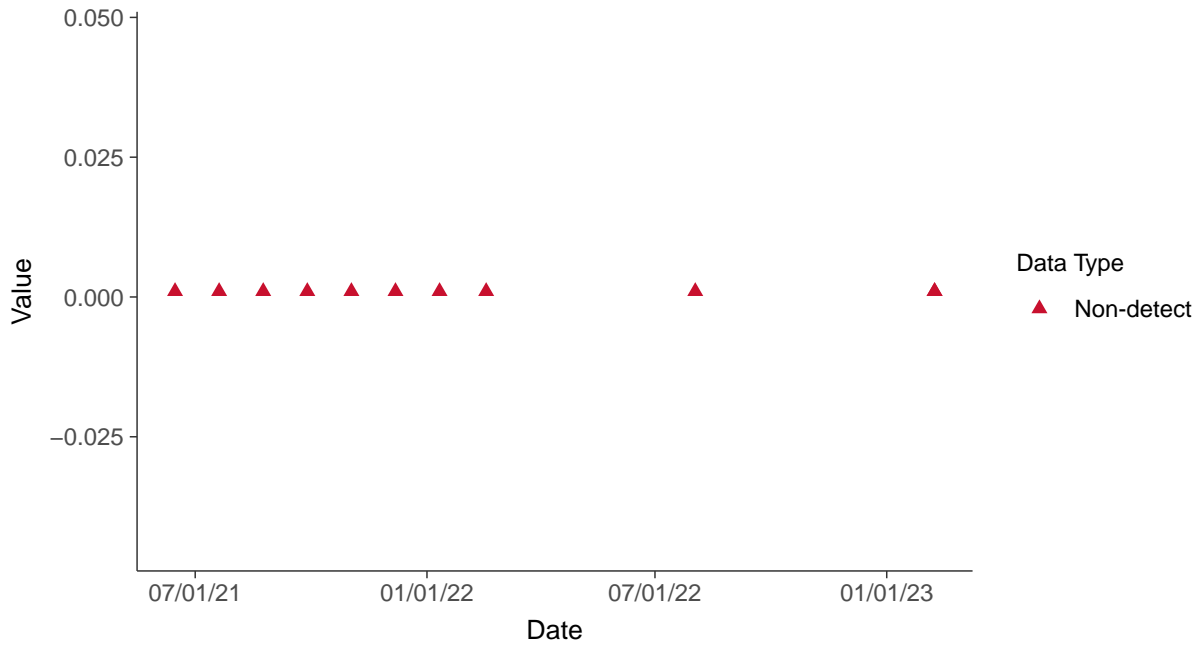


Appendix IV: Beryllium, MW-10

ID: 10_2_11

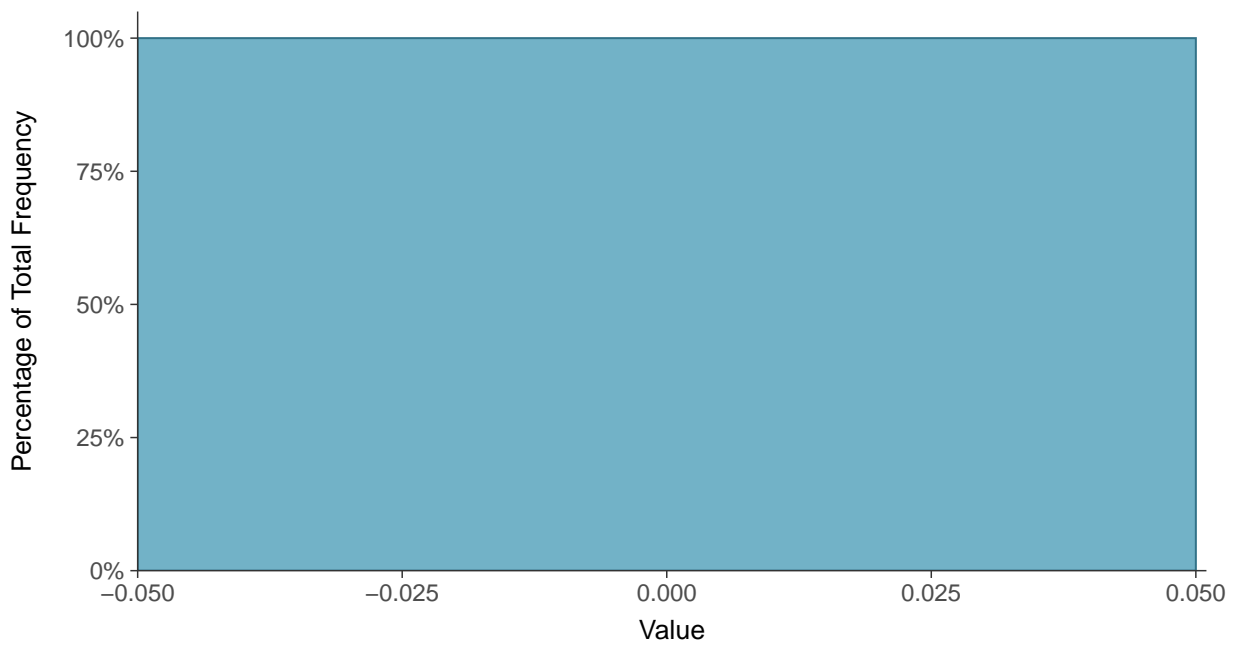
Scatter Plot

Beryllium, MW-10 (mg/L)



Histogram

Beryllium, MW-10 (mg/L)





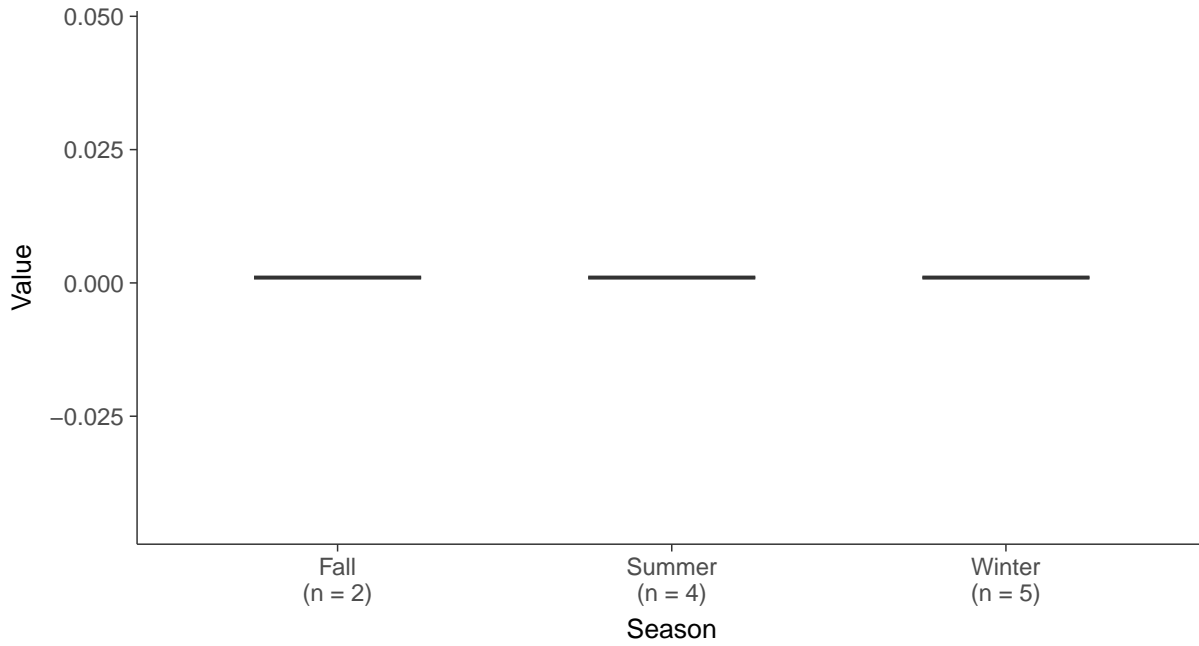
Boxplot

Beryllium, MW-10 (mg/L)



Boxplot by Season

Beryllium, MW-10 (mg/L)



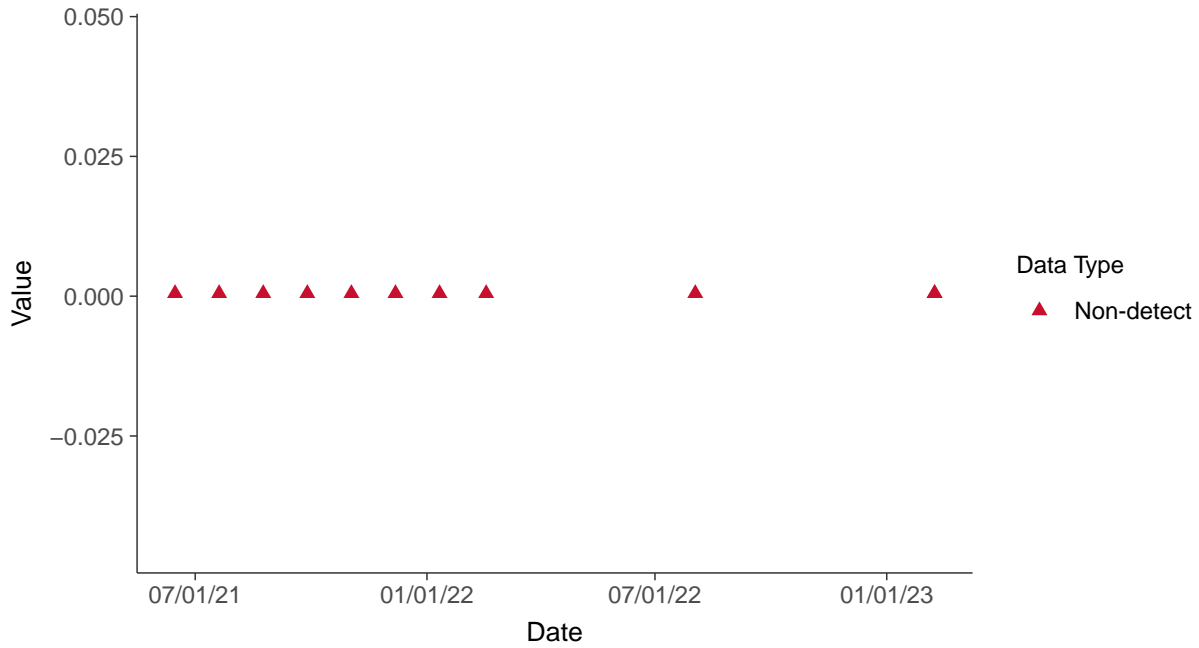


Appendix IV: Cadmium, MW-10

ID: 10_2_13

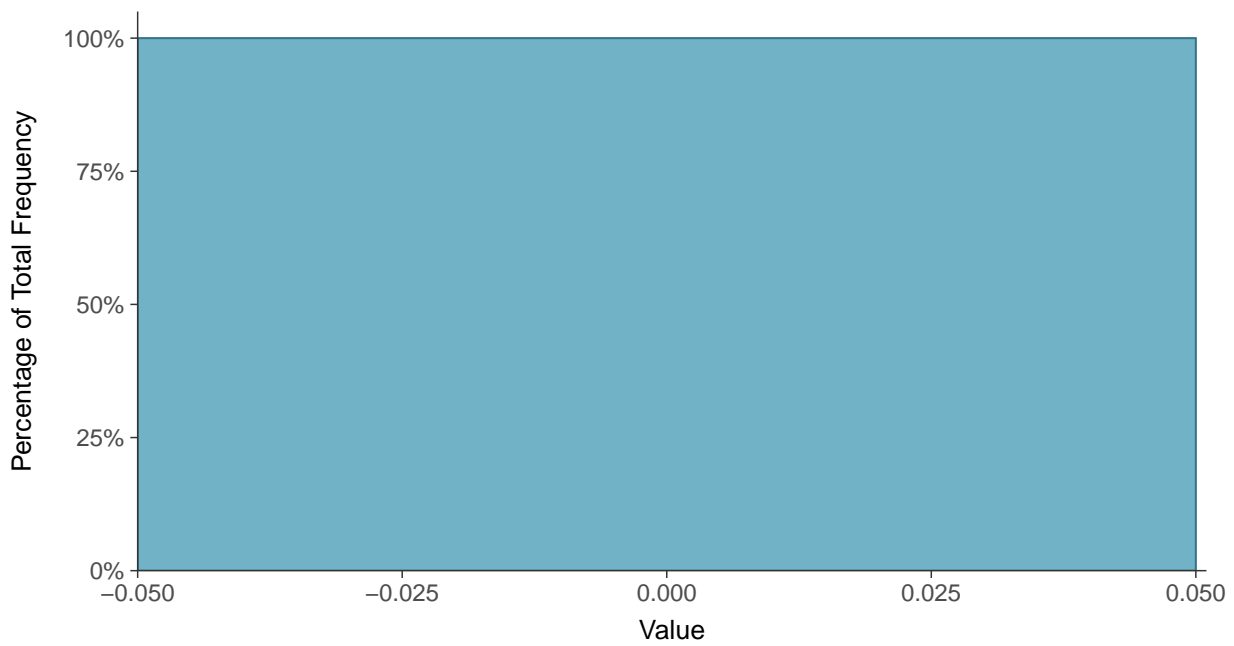
Scatter Plot

Cadmium, MW-10 (mg/L)



Histogram

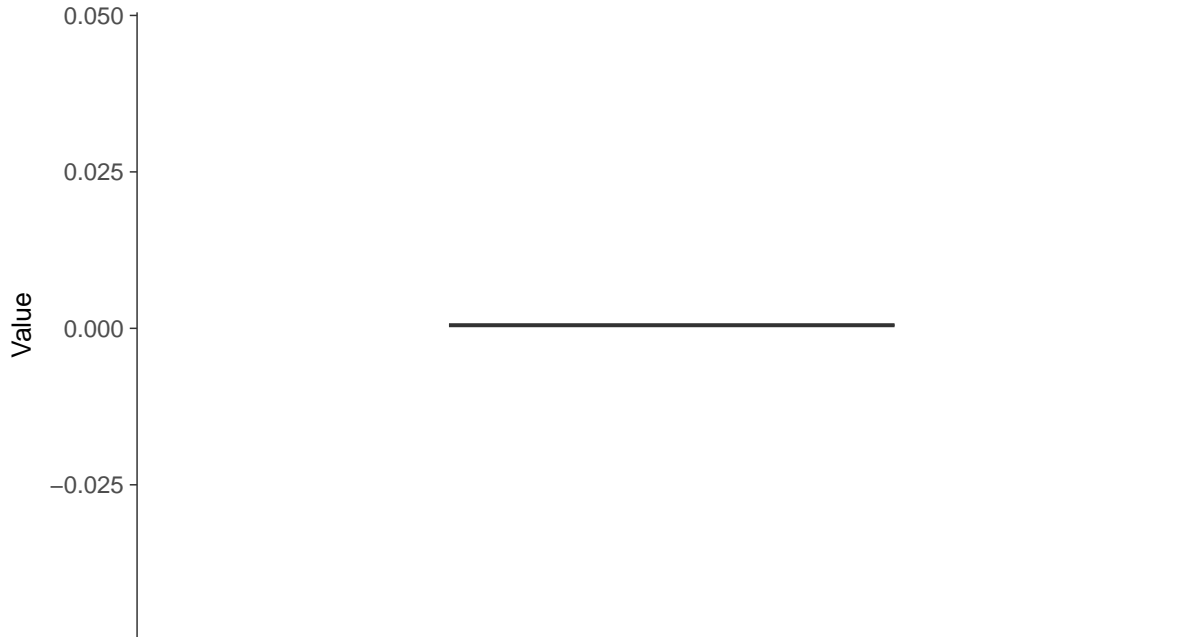
Cadmium, MW-10 (mg/L)





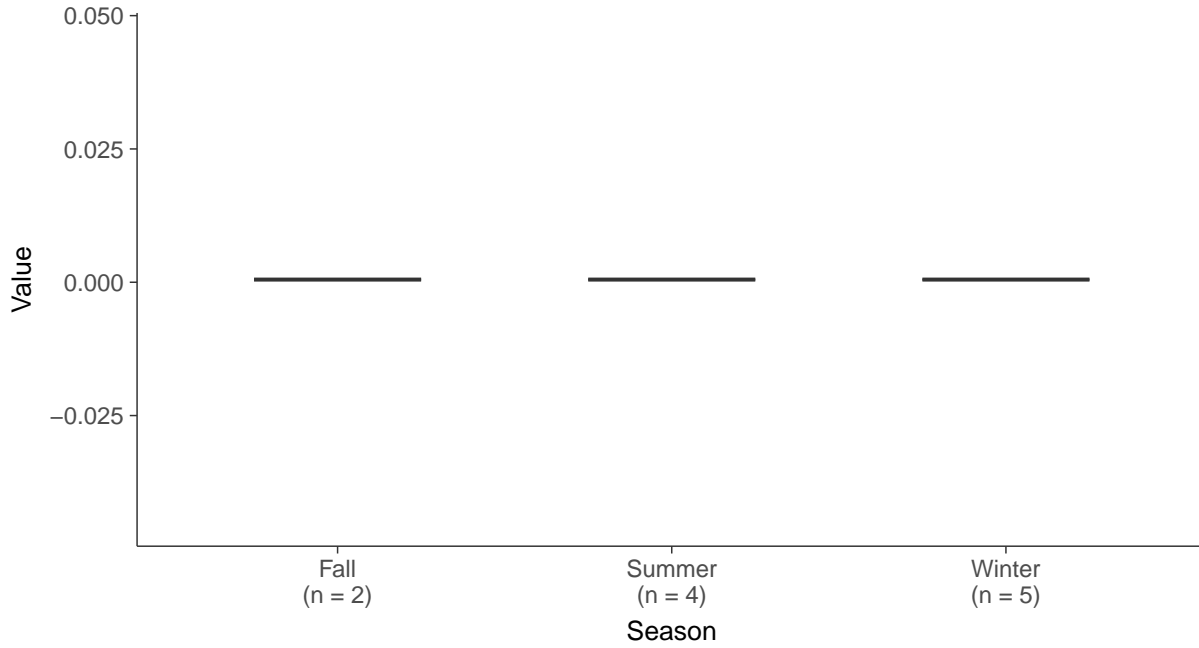
Boxplot

Cadmium, MW-10 (mg/L)



Boxplot by Season

Cadmium, MW-10 (mg/L)



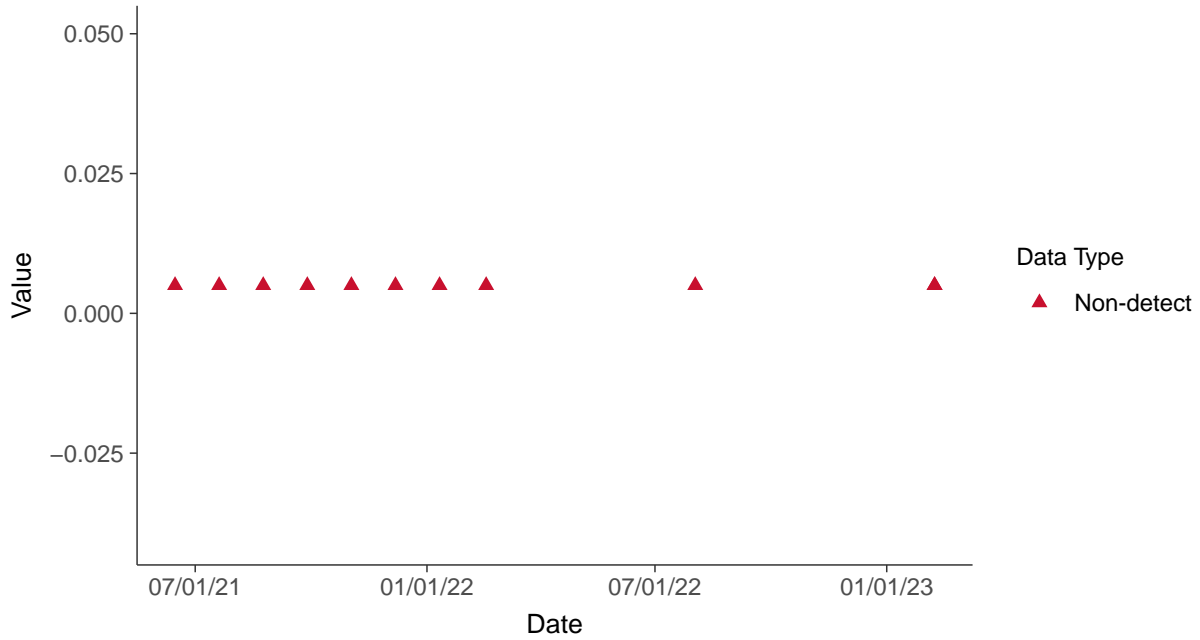


Appendix IV: Chromium, MW-10

ID: 10_2_15

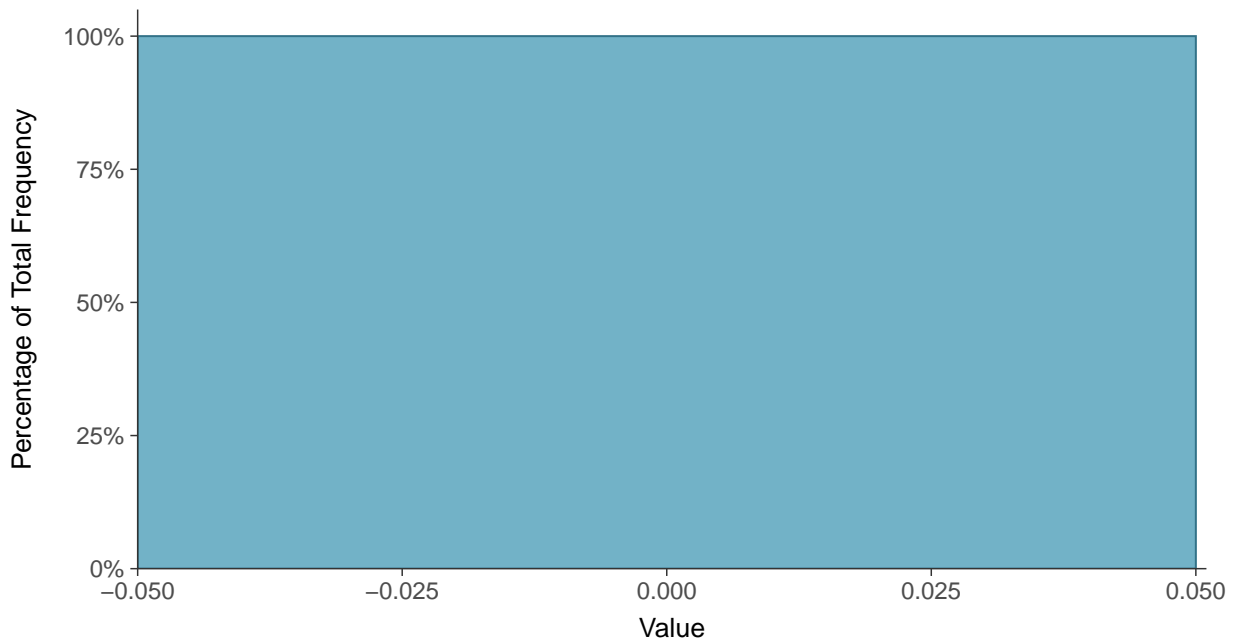
Scatter Plot

Chromium, MW-10 (mg/L)



Histogram

Chromium, MW-10 (mg/L)





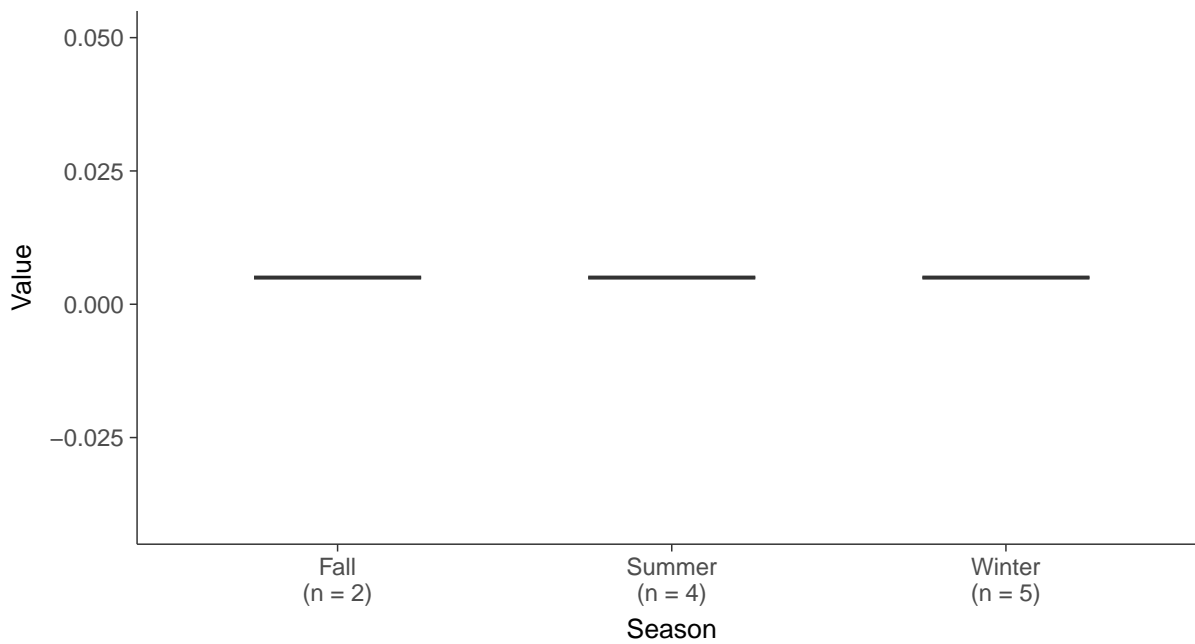
Boxplot

Chromium, MW-10 (mg/L)



Boxplot by Season

Chromium, MW-10 (mg/L)



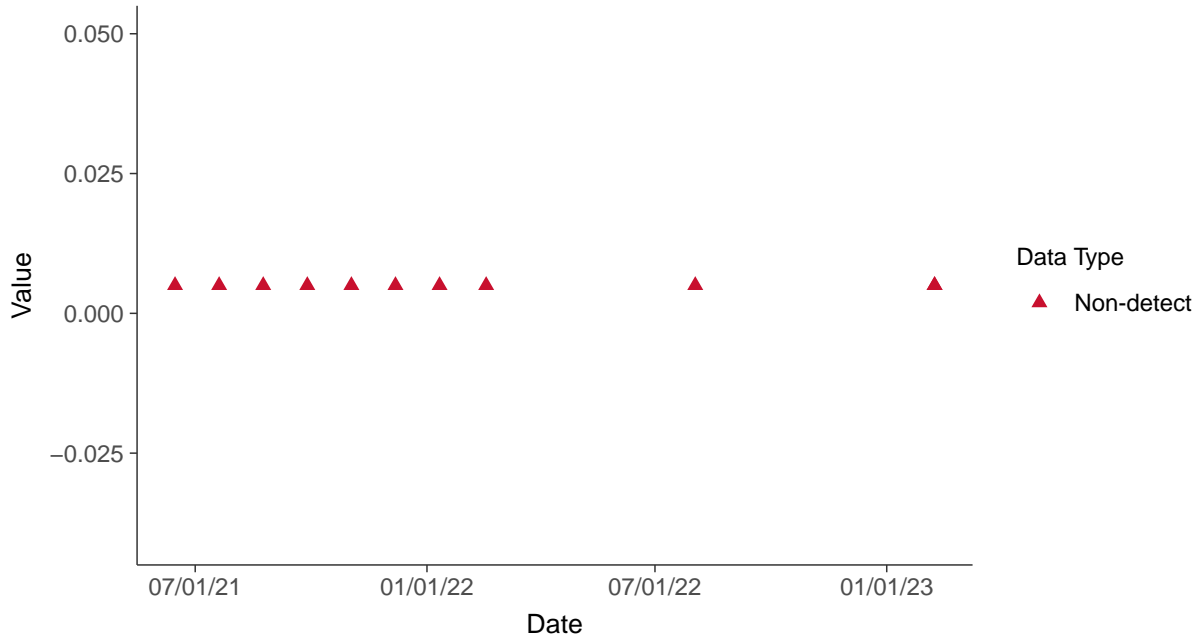


Appendix IV: Cobalt, MW-10

ID: 10_2_16

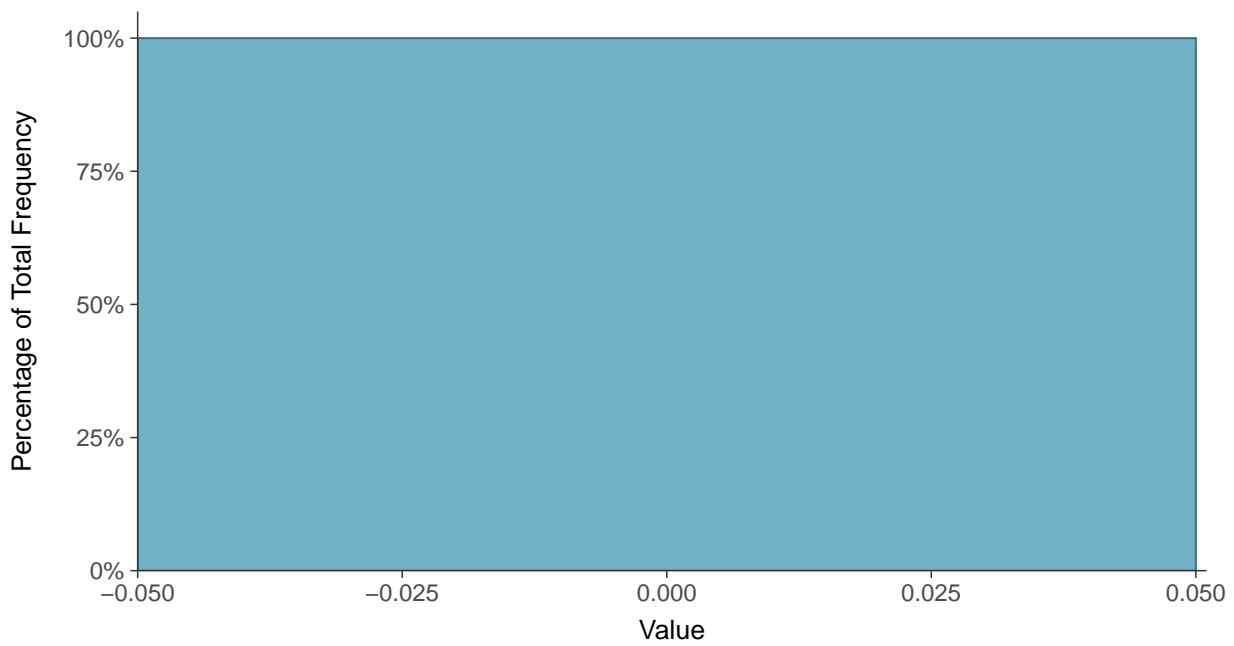
Scatter Plot

Cobalt, MW-10 (mg/L)



Histogram

Cobalt, MW-10 (mg/L)





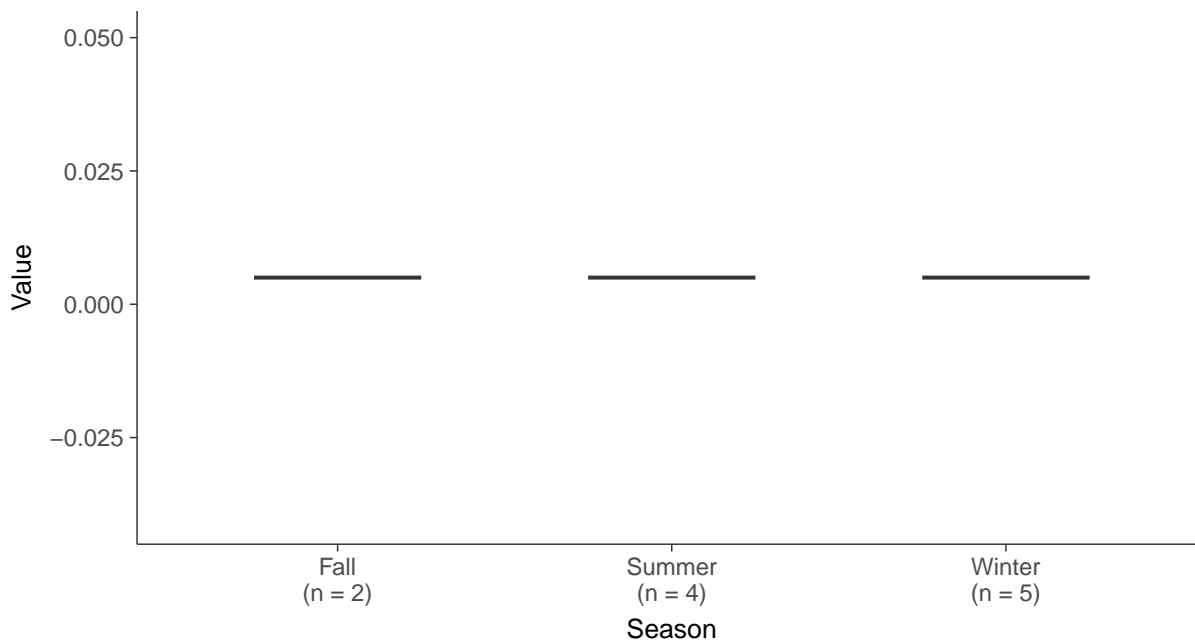
Boxplot

Cobalt, MW-10 (mg/L)



Boxplot by Season

Cobalt, MW-10 (mg/L)



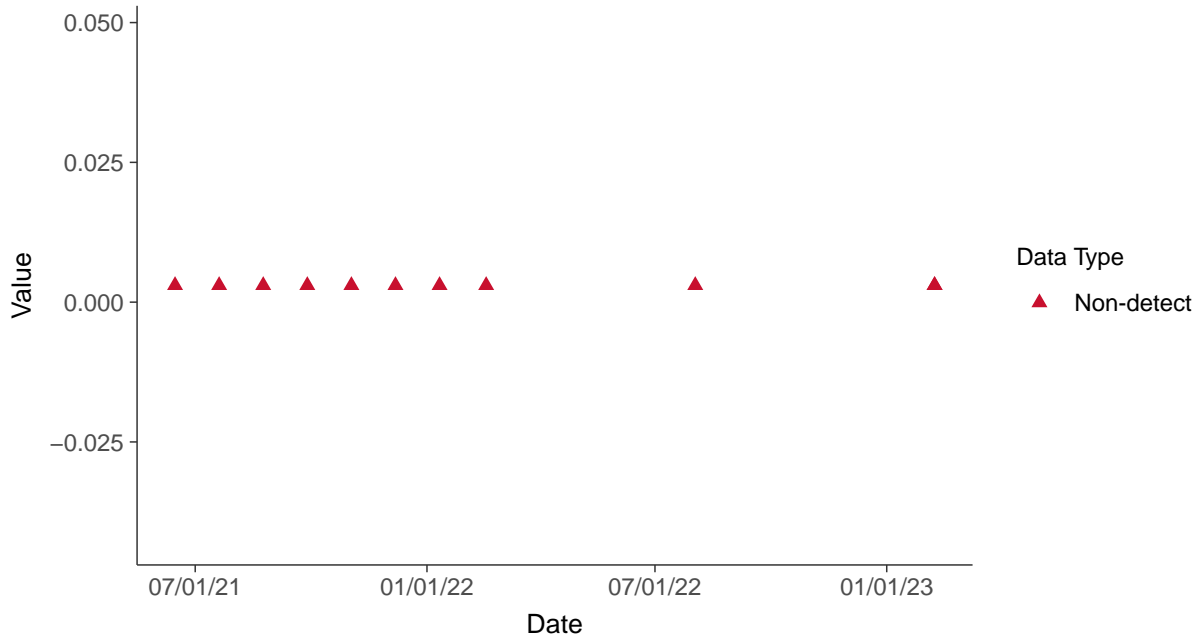


Appendix IV: Lead, MW-10

ID: 10_2_18

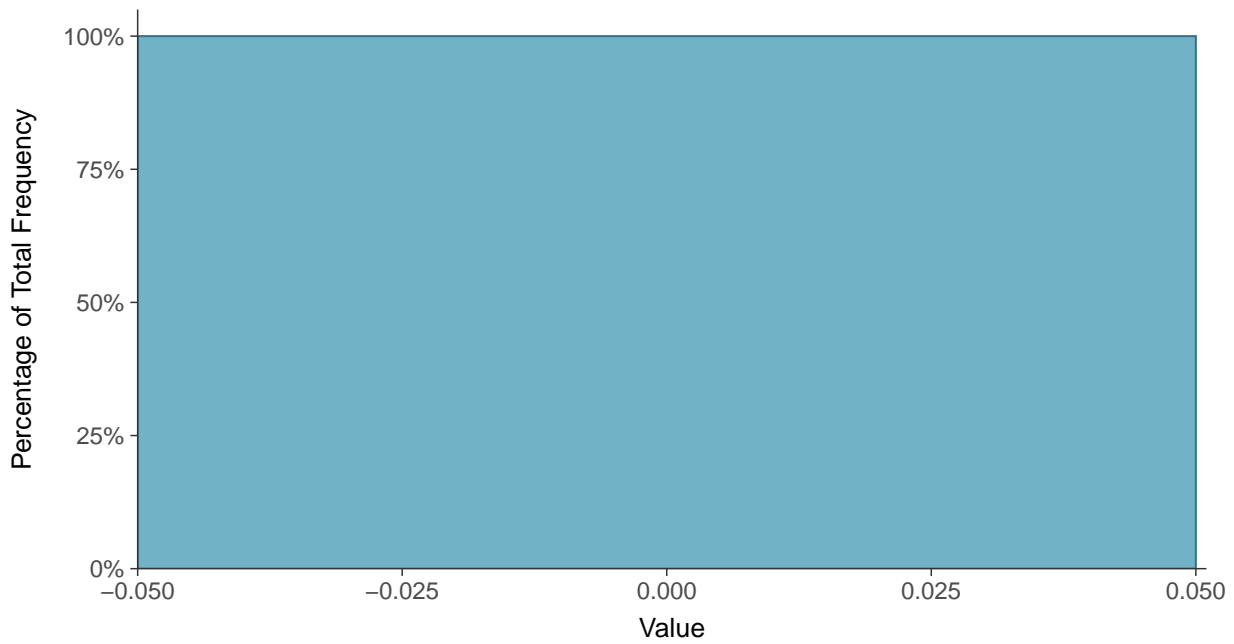
Scatter Plot

Lead, MW-10 (mg/L)



Histogram

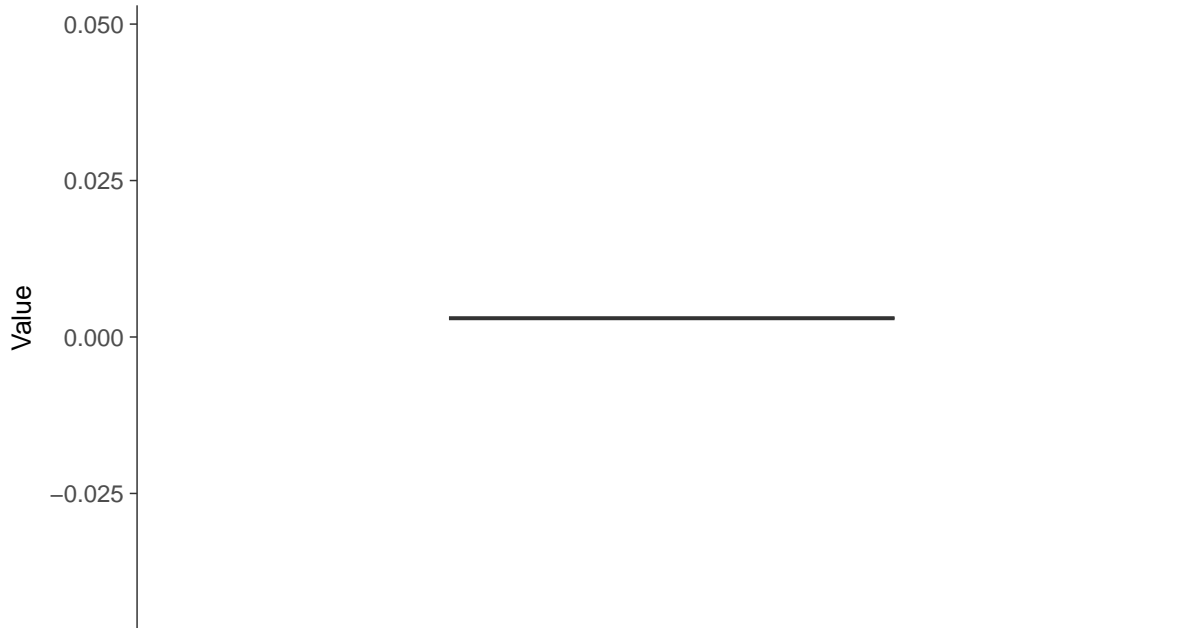
Lead, MW-10 (mg/L)





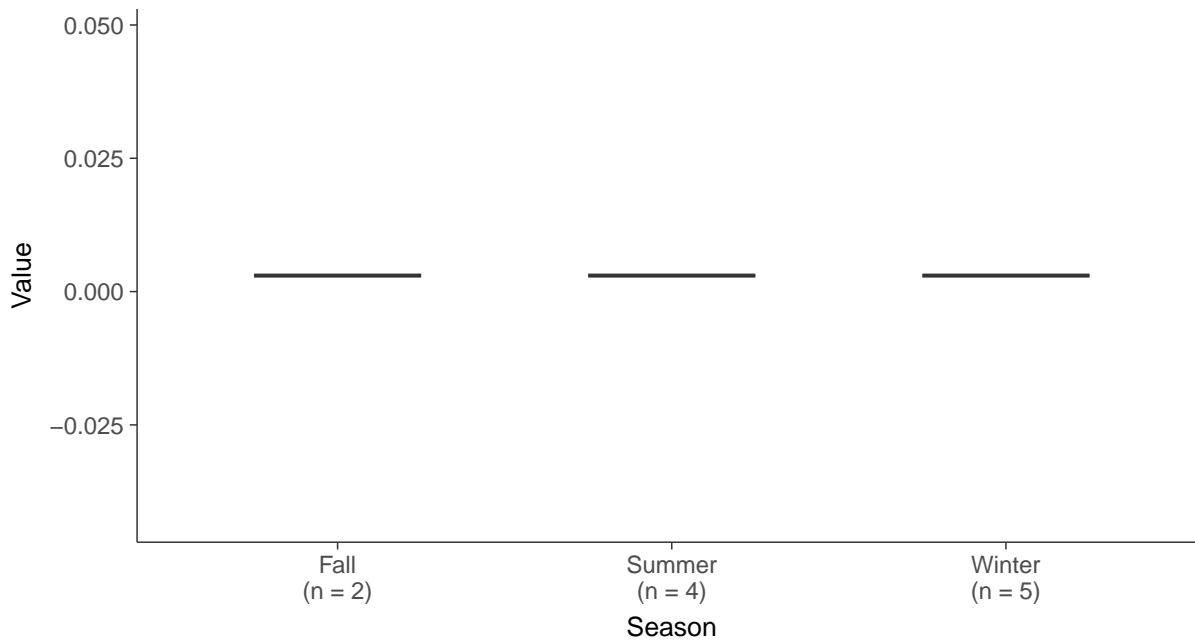
Boxplot

Lead, MW-10 (mg/L)



Boxplot by Season

Lead, MW-10 (mg/L)



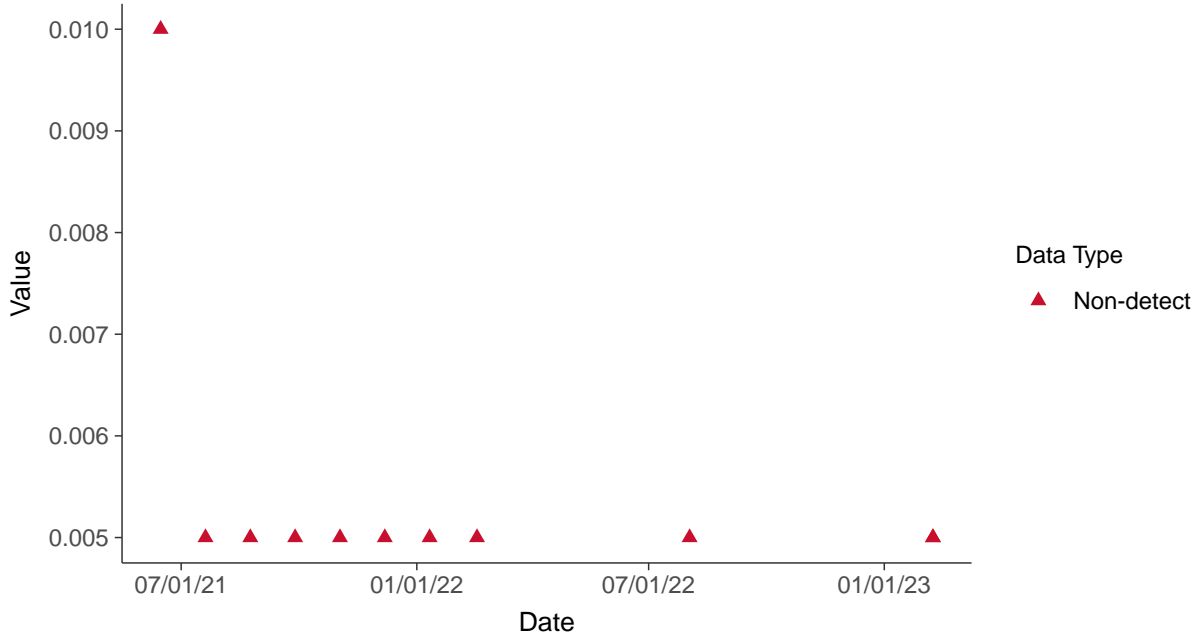


Appendix IV: Lithium, MW-10

ID: 10_2_19

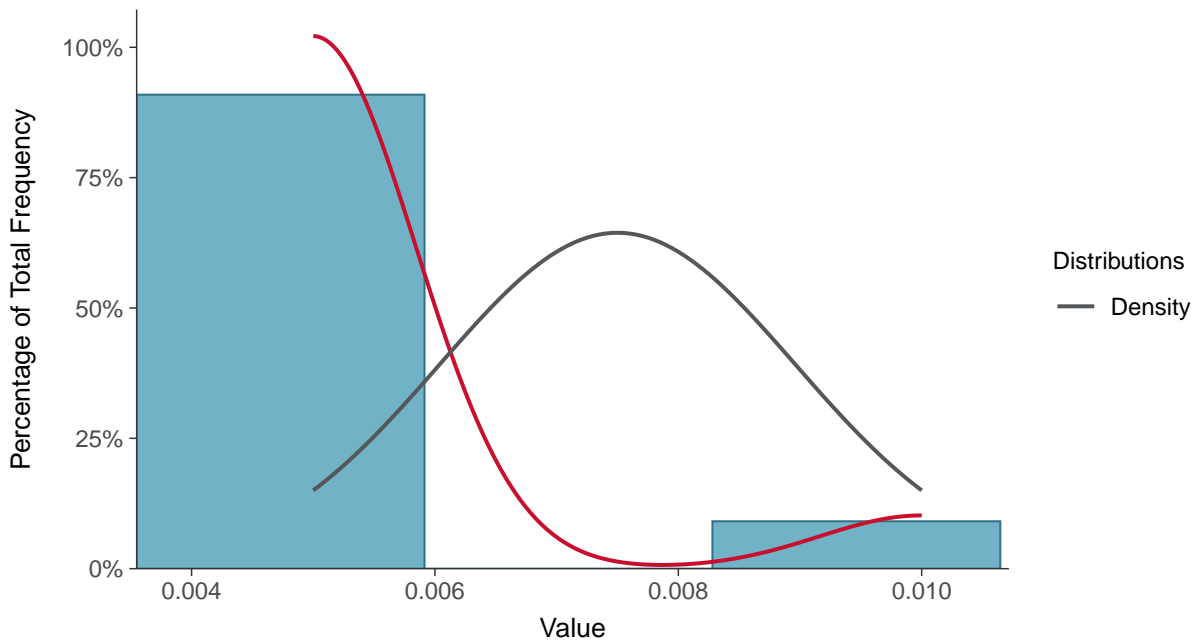
Scatter Plot

Lithium, MW-10 (mg/L)



Histogram

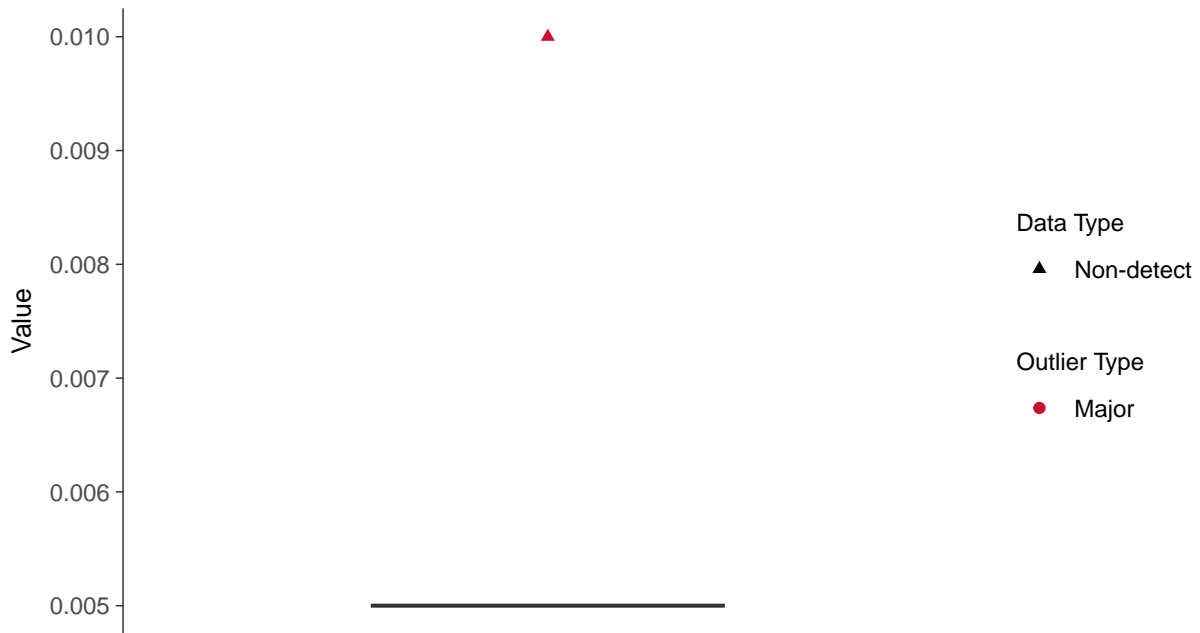
Lithium, MW-10 (mg/L)





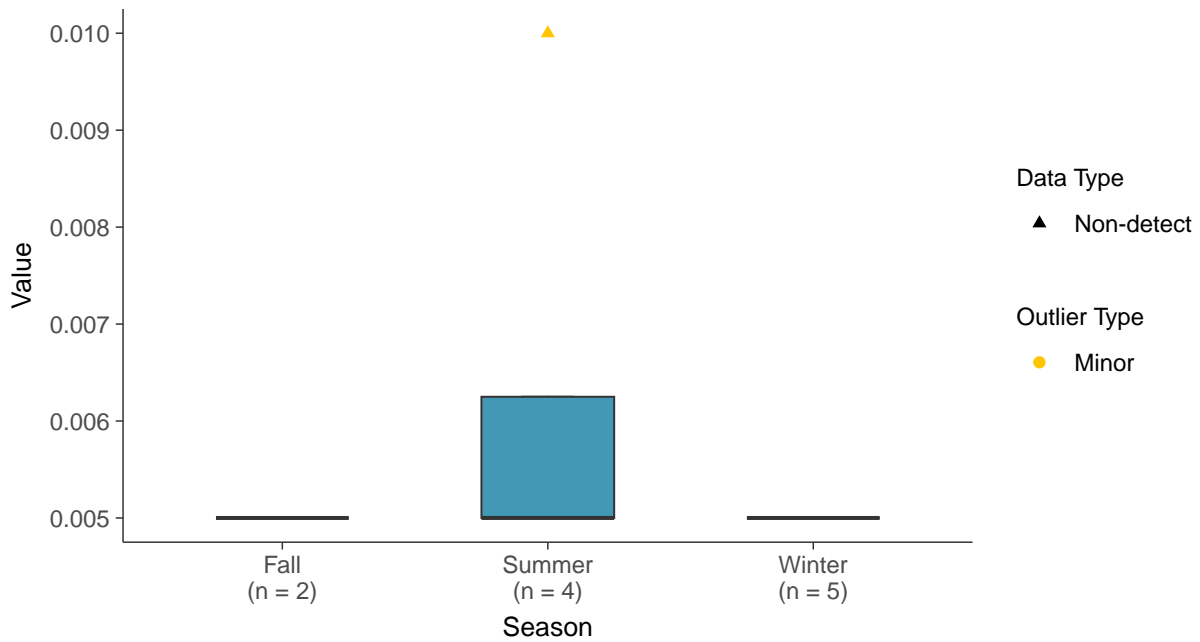
Boxplot

Lithium, MW-10 (mg/L)



Boxplot by Season

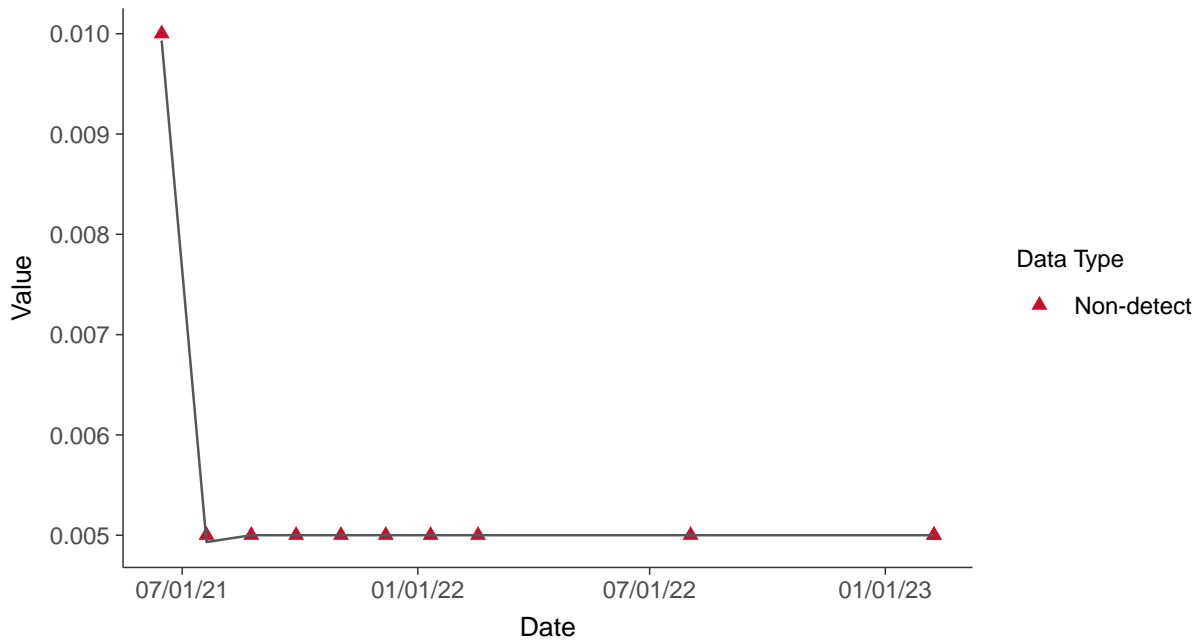
Lithium, MW-10 (mg/L)





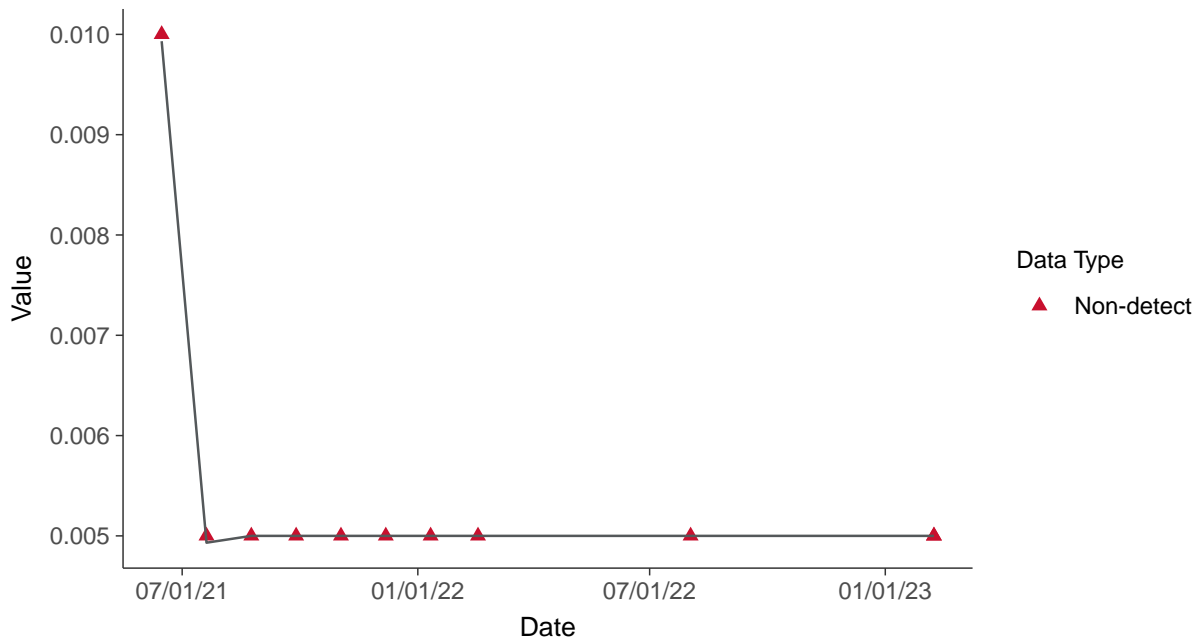
Trend Regression: Piecewise Linear-Linear

Lithium, MW-10 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Lithium, MW-10 (mg/L)



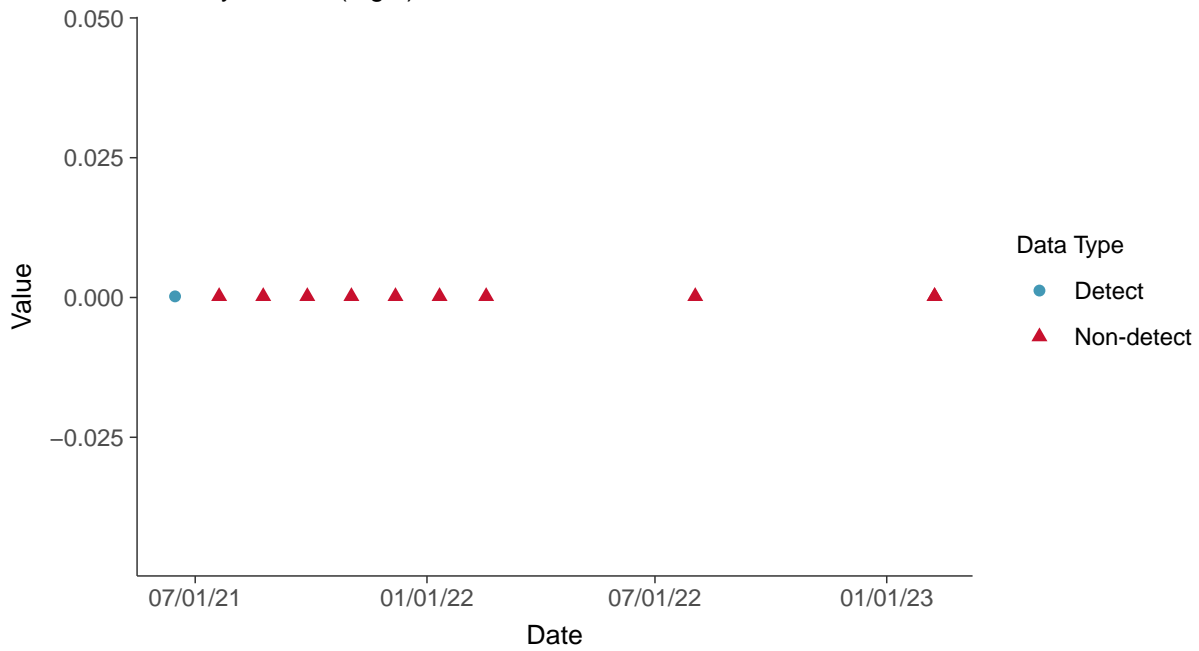


Appendix IV: Mercury, MW-10

ID: 10_2_21

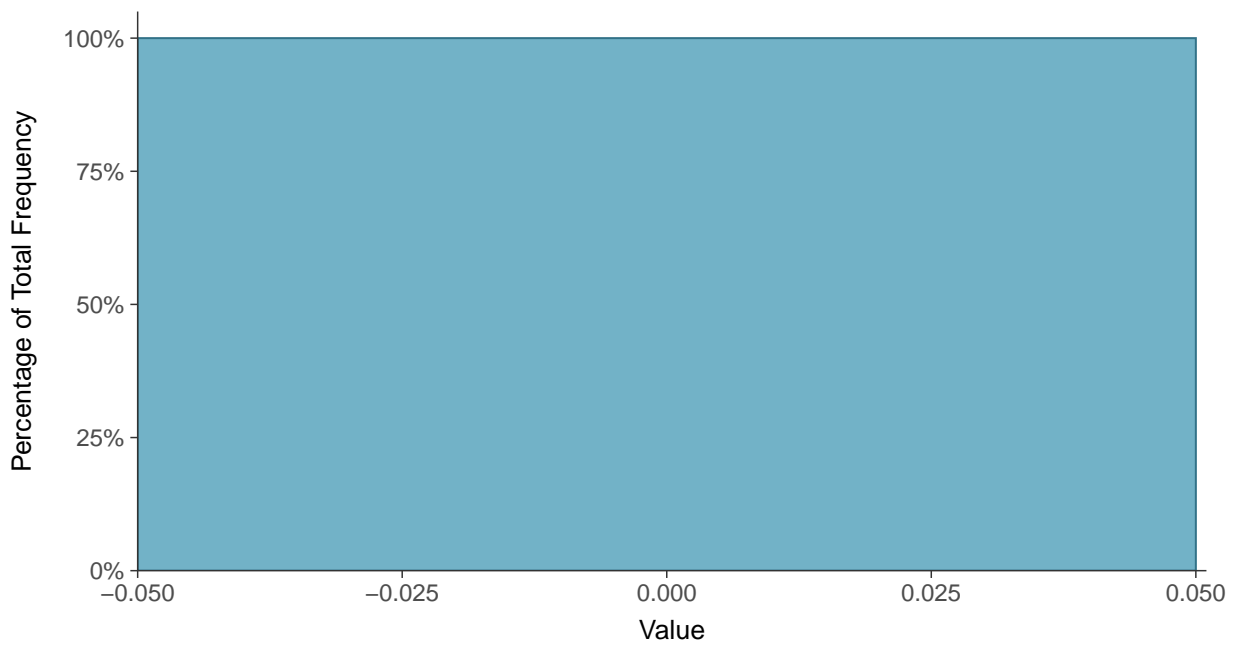
Scatter Plot

Mercury, MW-10 (mg/L)



Histogram

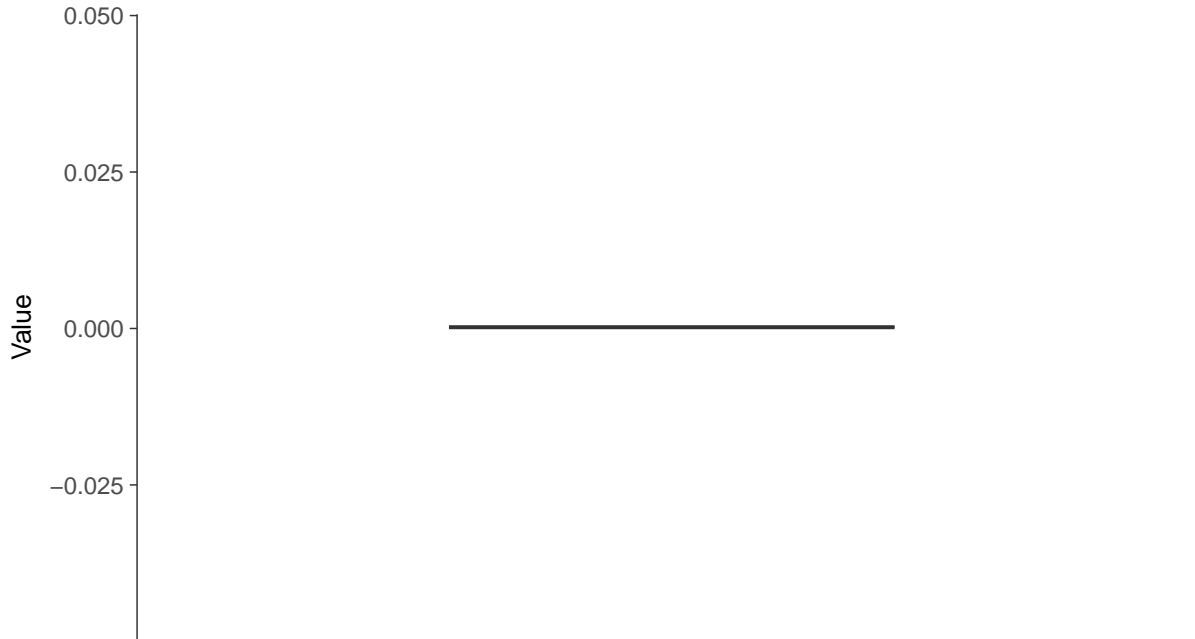
Mercury, MW-10 (mg/L)





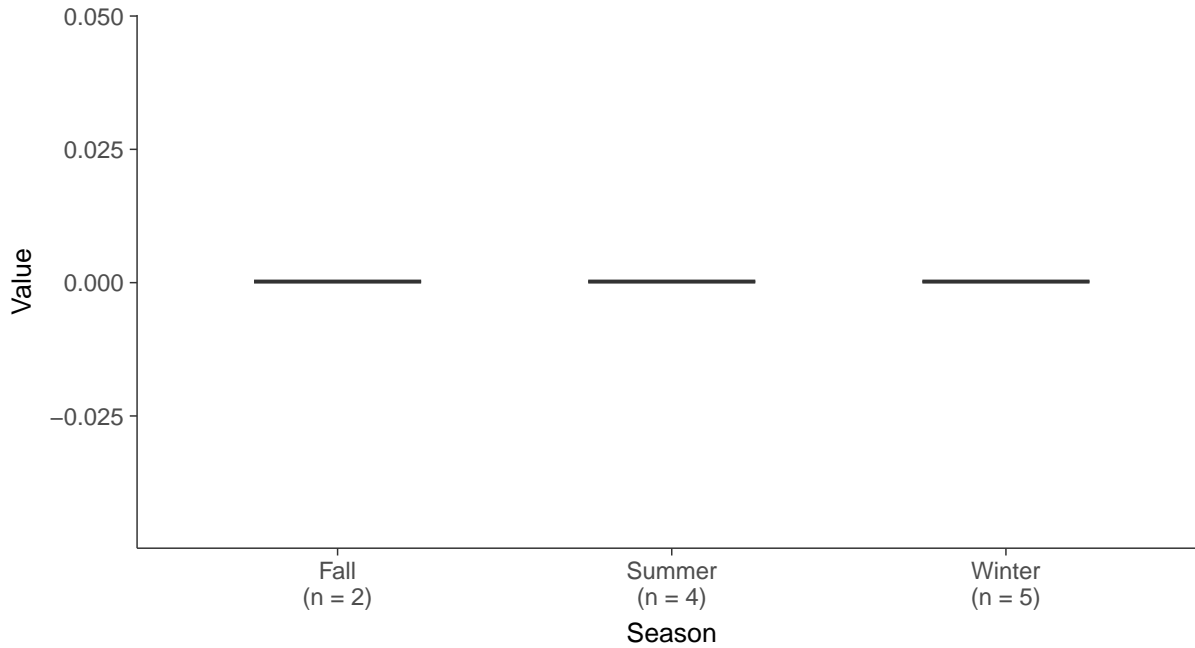
Boxplot

Mercury, MW-10 (mg/L)



Boxplot by Season

Mercury, MW-10 (mg/L)



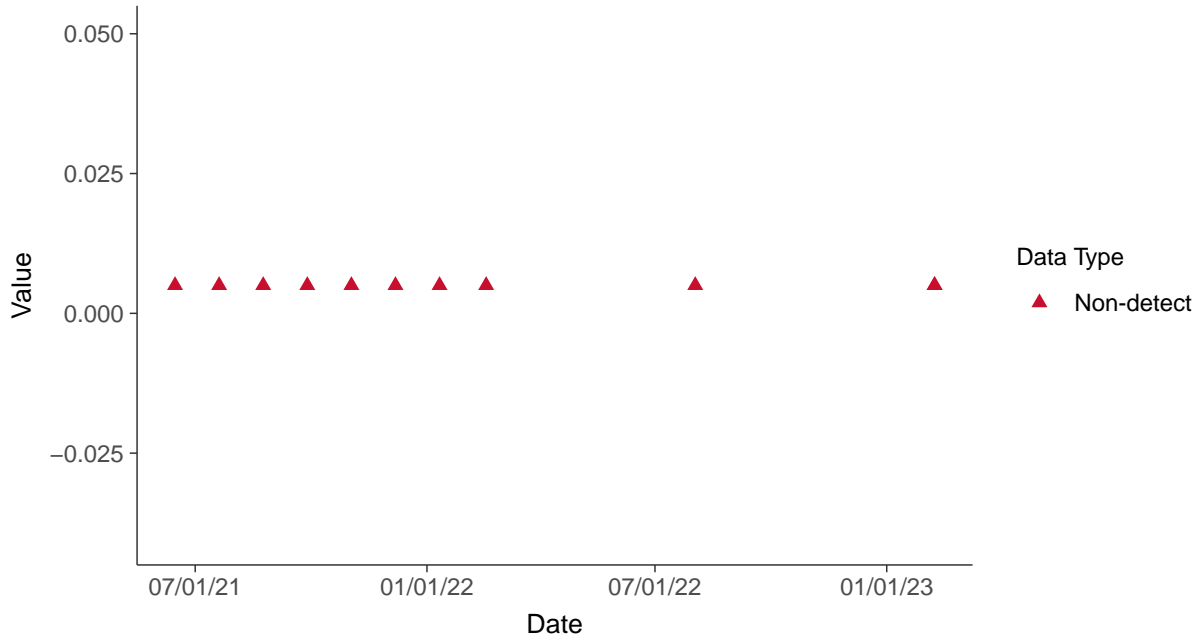


Appendix IV: Molybdenum, MW-10

ID: 10_2_22

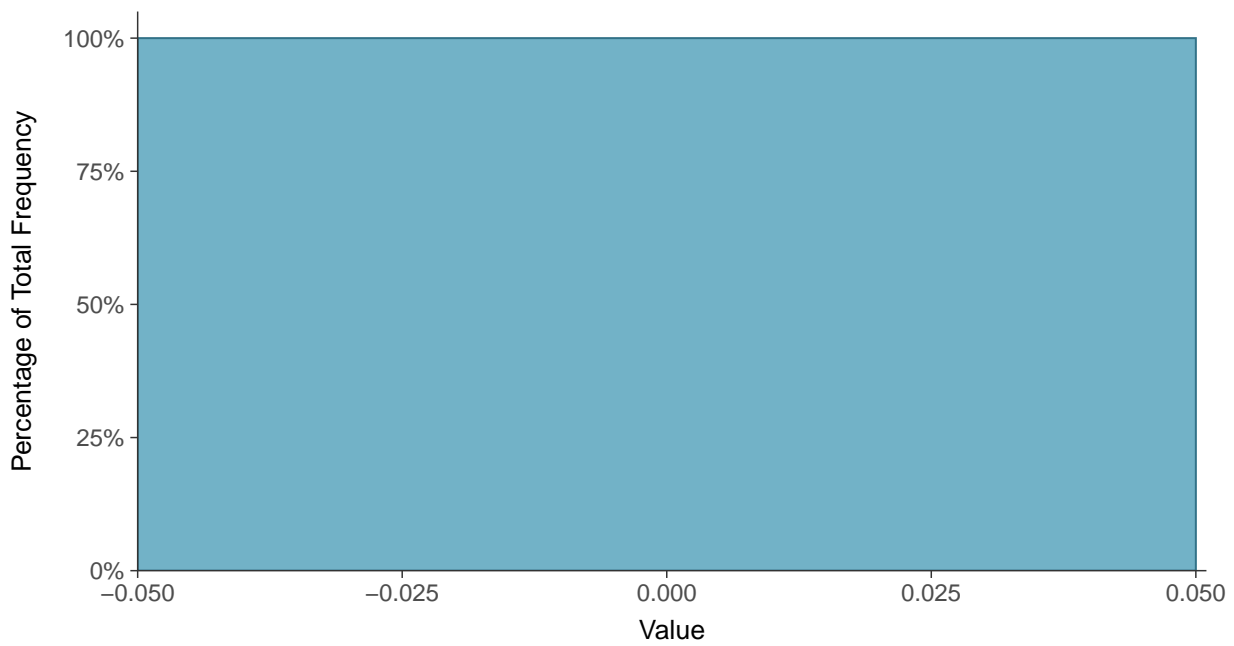
Scatter Plot

Molybdenum, MW-10 (mg/L)



Histogram

Molybdenum, MW-10 (mg/L)





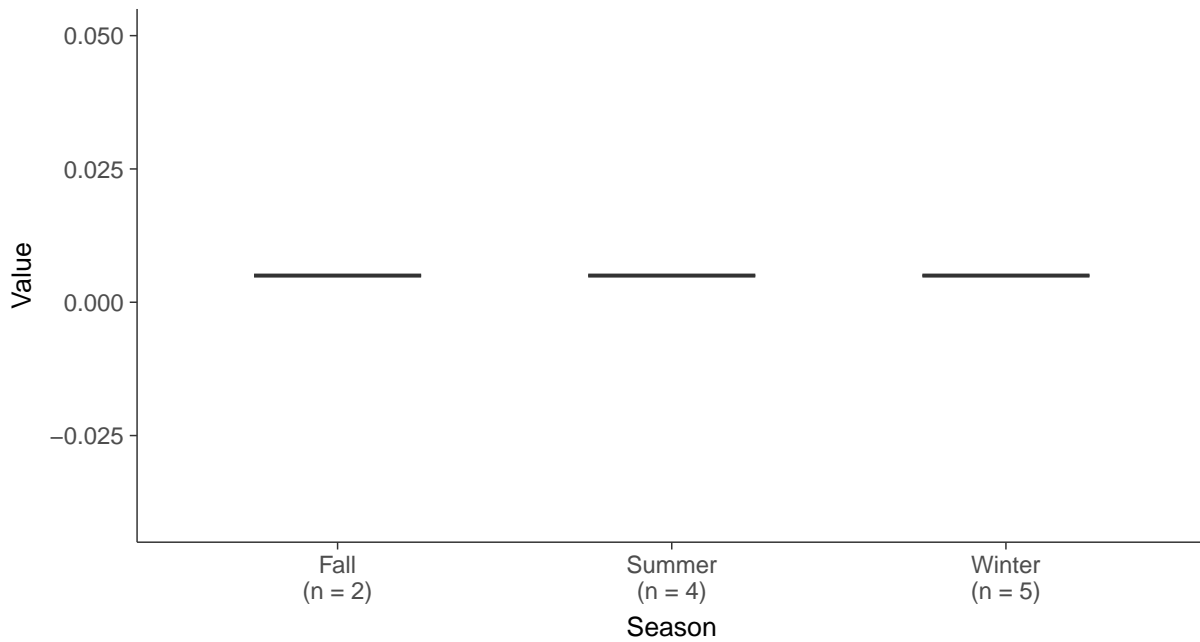
Boxplot

Molybdenum, MW-10 (mg/L)



Boxplot by Season

Molybdenum, MW-10 (mg/L)



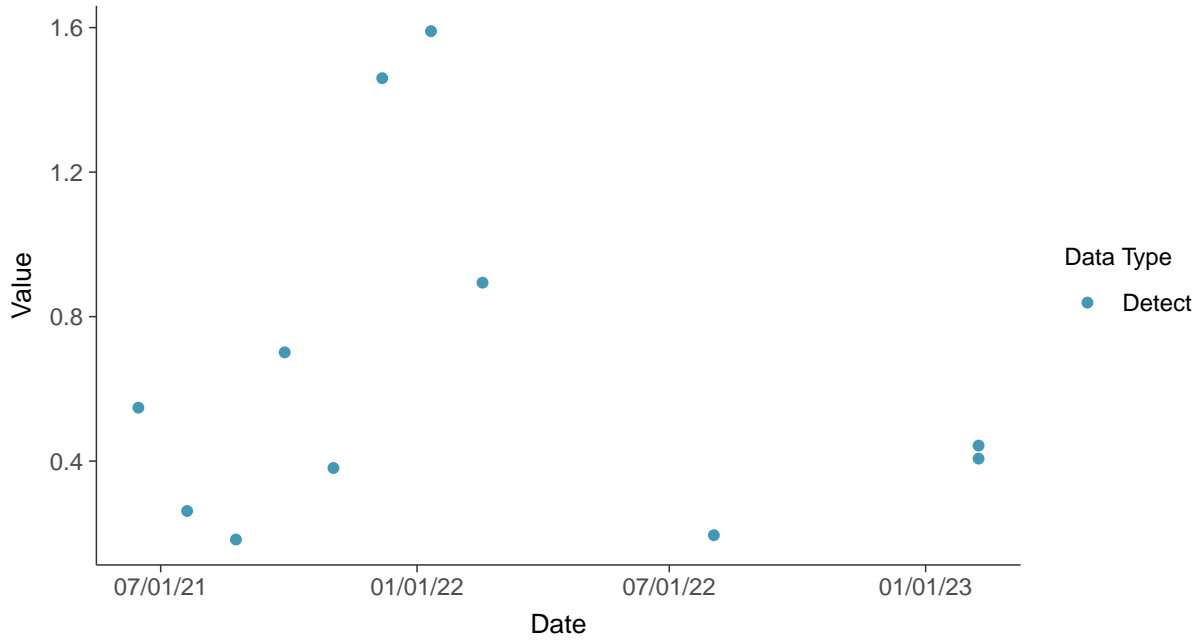


Appendix IV: Radium-226, MW-10

ID: 10_2_24

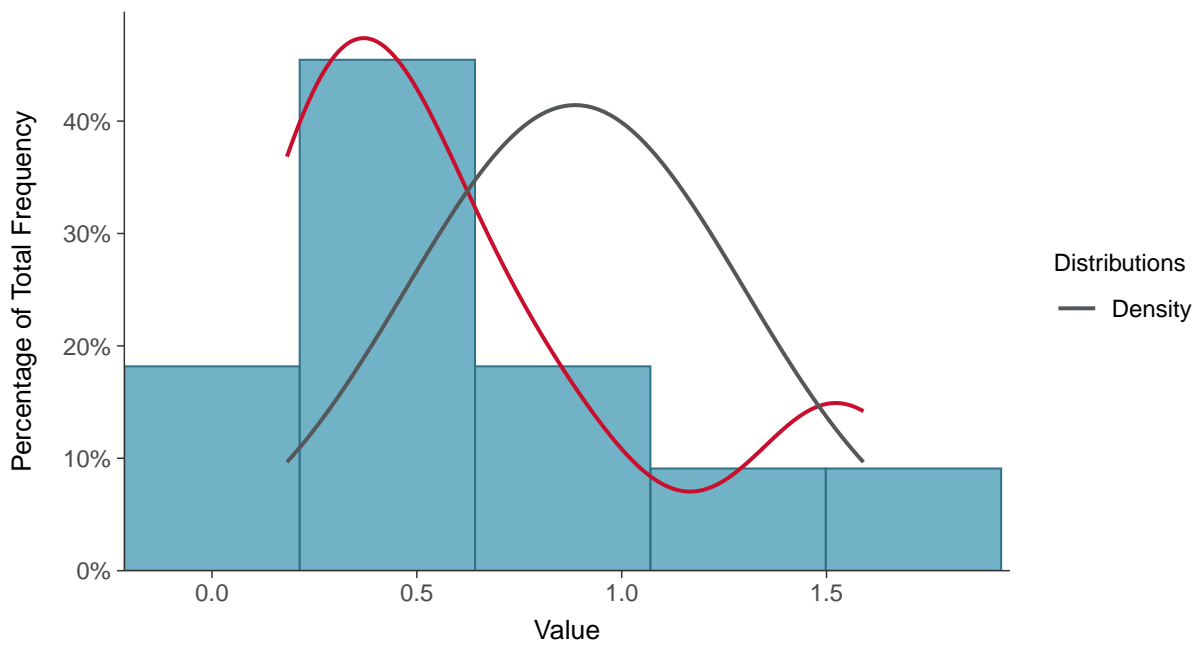
Scatter Plot

Radium-226, MW-10 (pCi/L)



Histogram

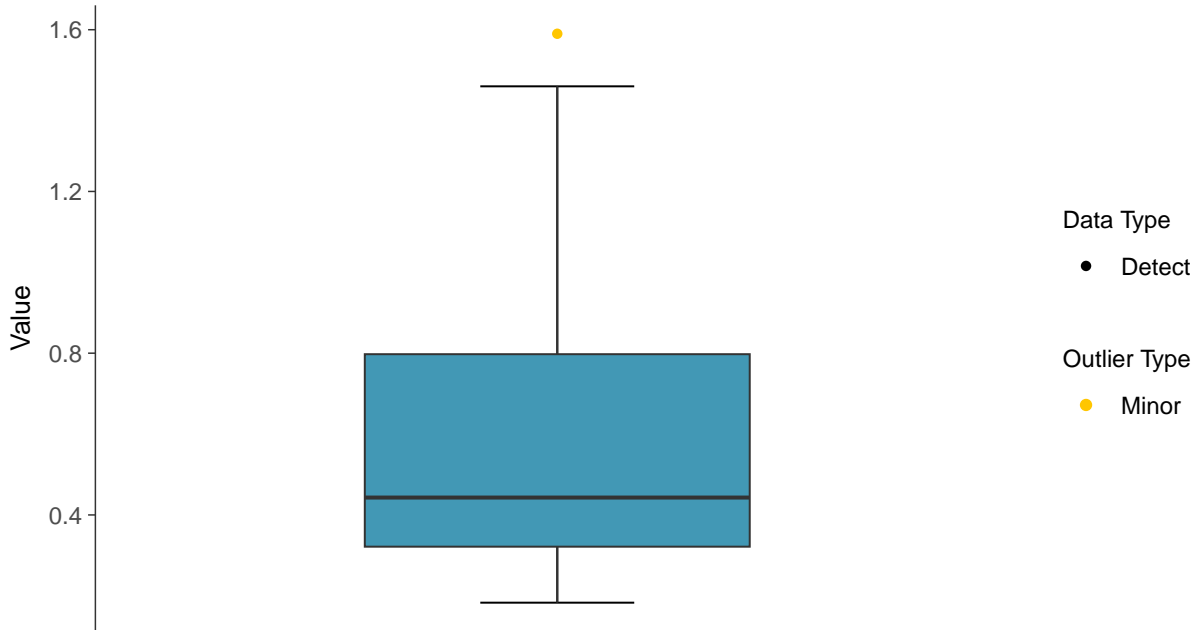
Radium-226, MW-10 (pCi/L)





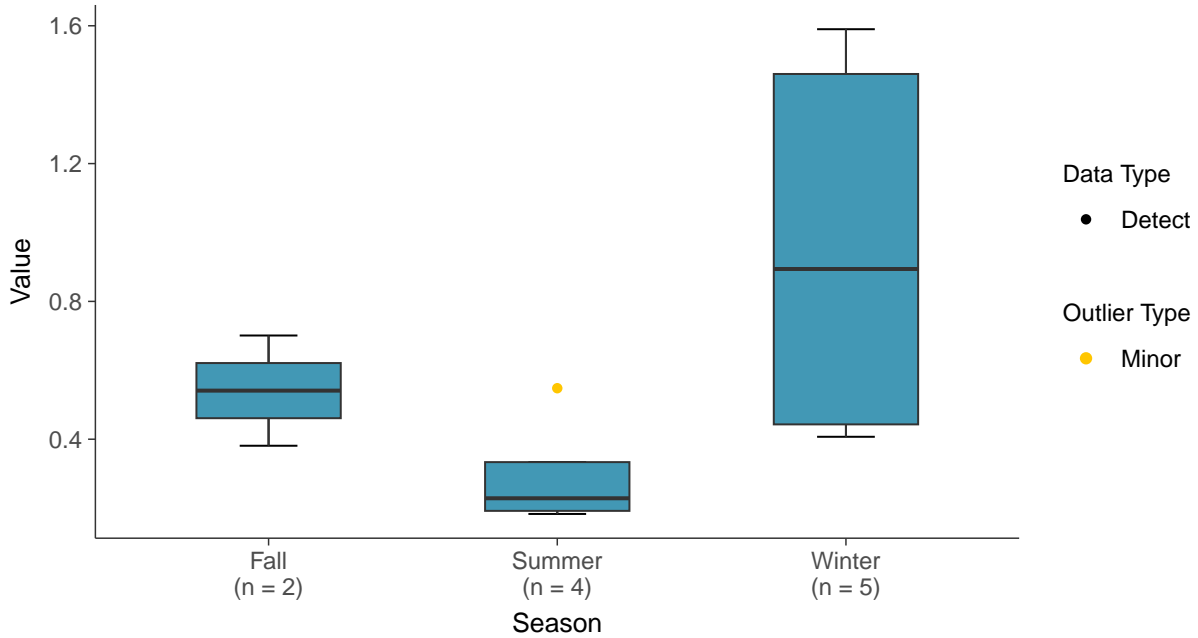
Boxplot

Radium-226, MW-10 (pCi/L)



Boxplot by Season

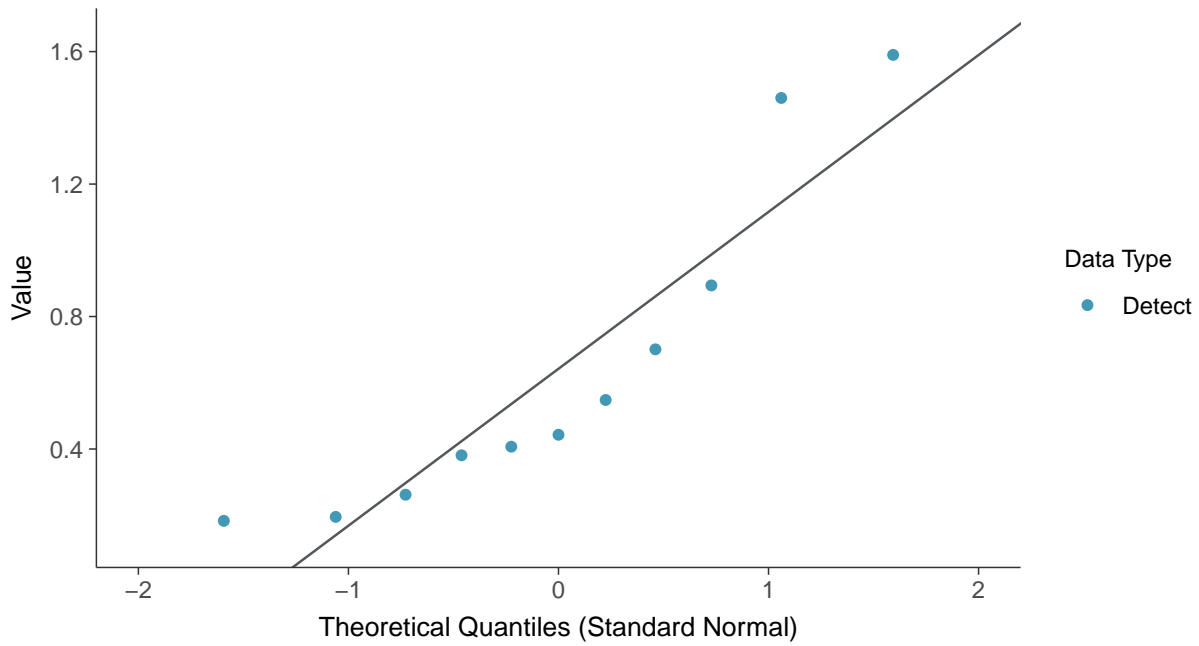
Radium-226, MW-10 (pCi/L)





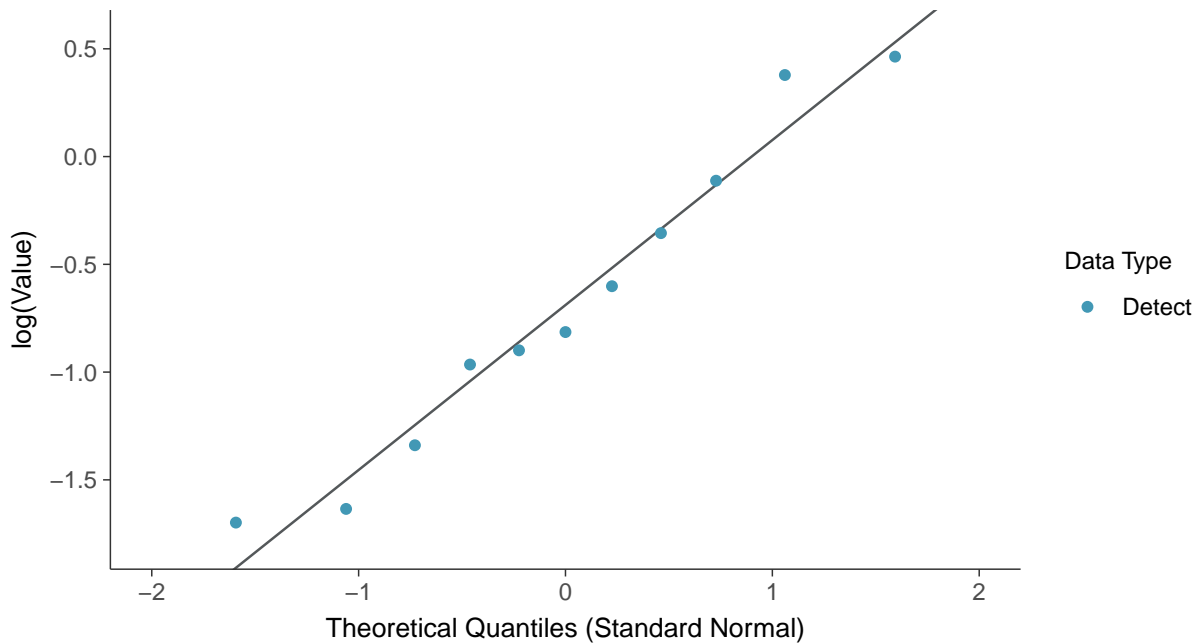
Normal Q-Q plot

Radium-226, MW-10 (pCi/L)



Lognormal Q-Q plot

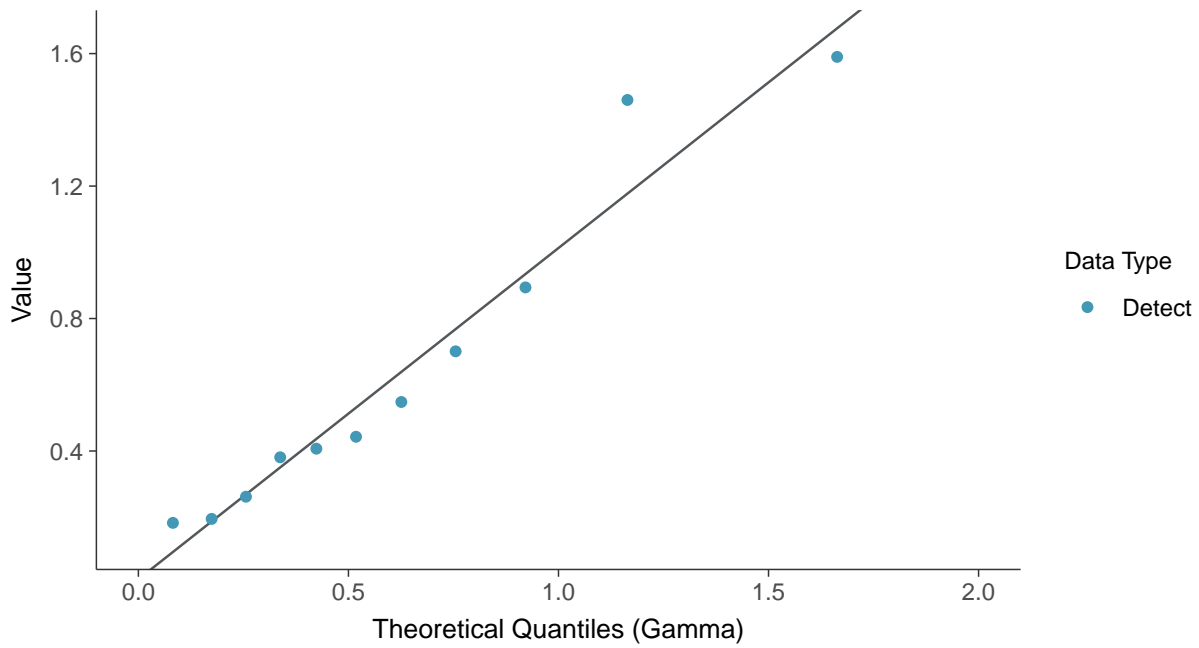
Radium-226, MW-10 (pCi/L)





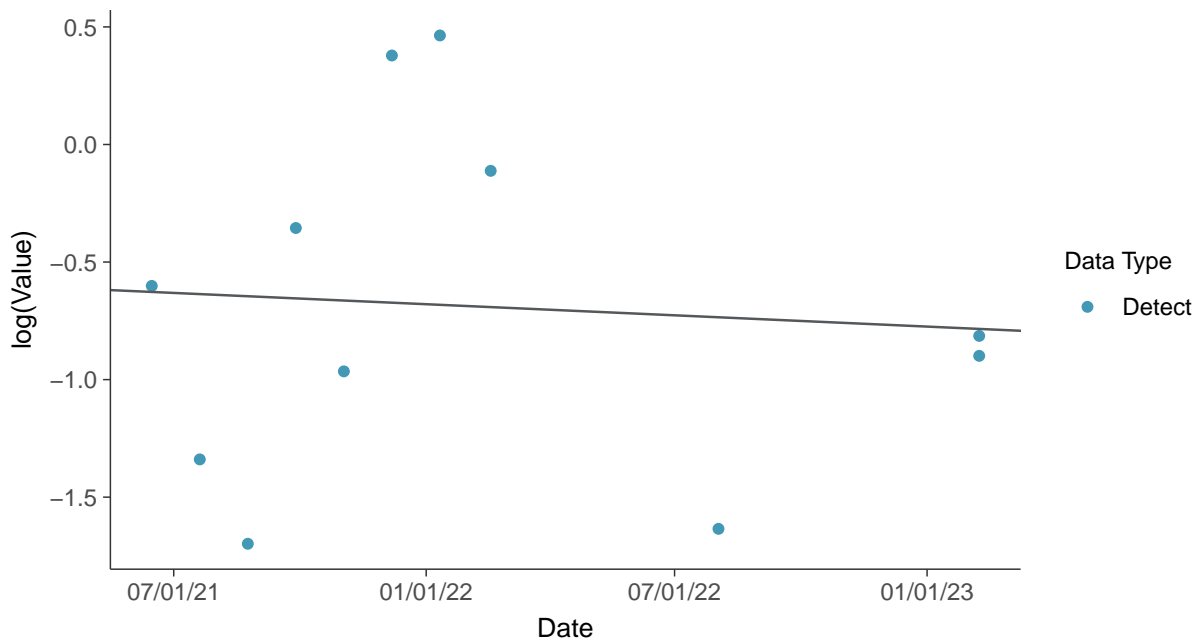
Gamma Q-Q plot

Radium-226, MW-10 (pCi/L)



Trend Regression: Lognormal MLE

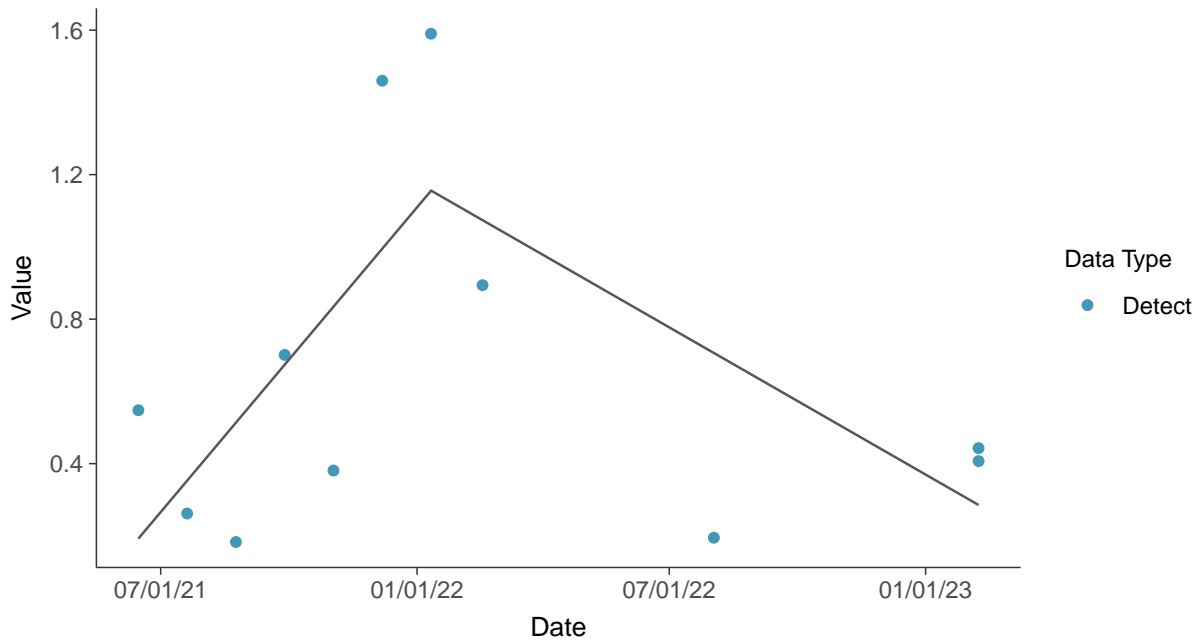
Radium-226, MW-10 (pCi/L)





Trend Regression: Piecewise Linear-Linear

Radium-226, MW-10 (pCi/L)



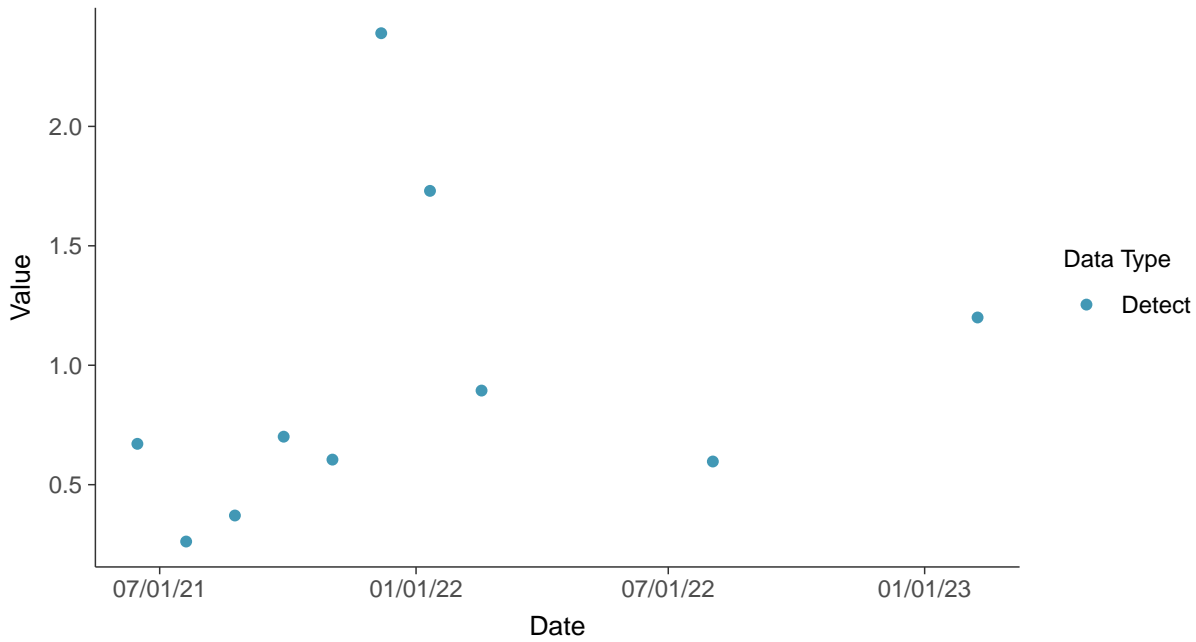


Appendix IV: Radium-226/228, MW-10

ID: 10_2_25

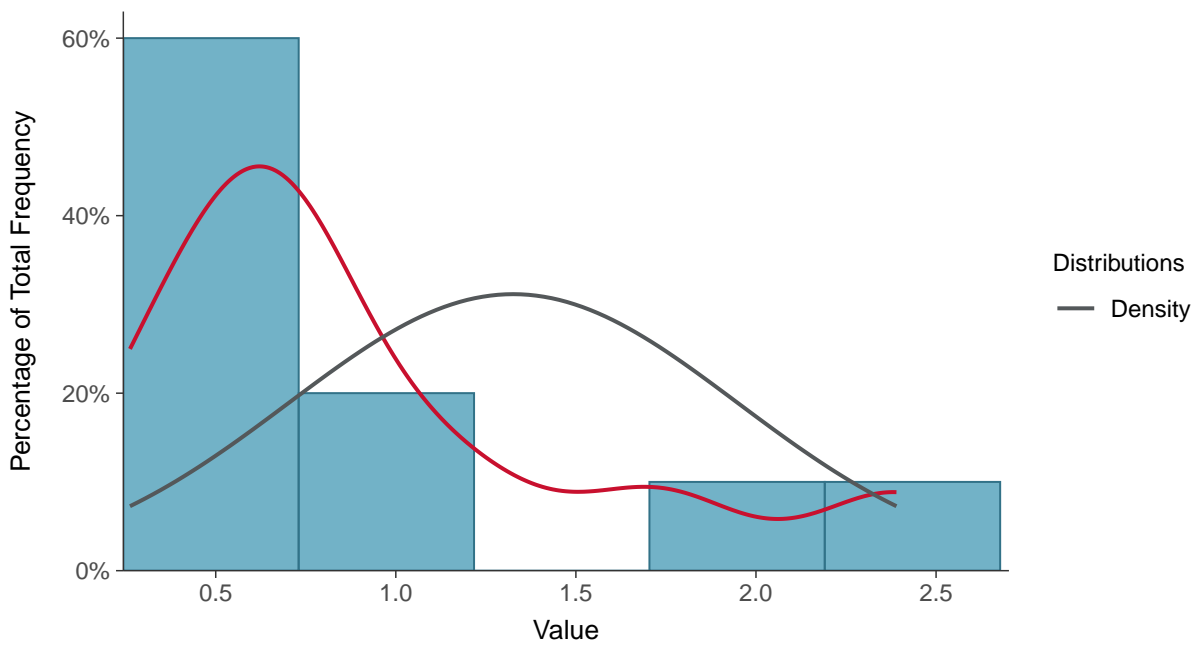
Scatter Plot

Radium-226/228, MW-10 (pCi/L)



Histogram

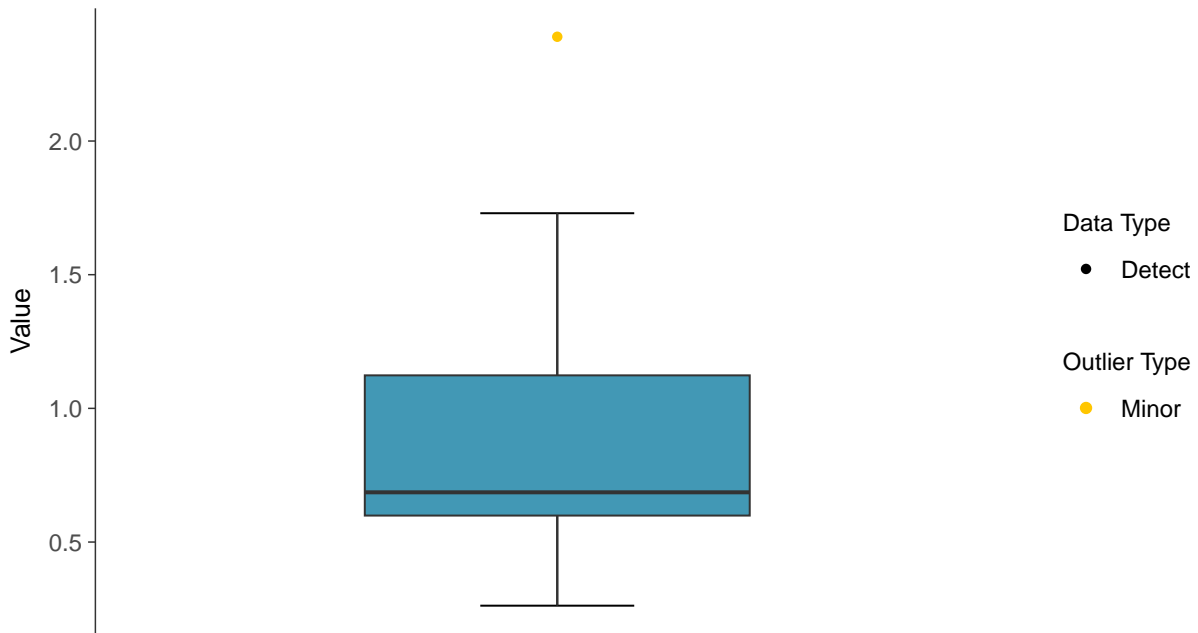
Radium-226/228, MW-10 (pCi/L)





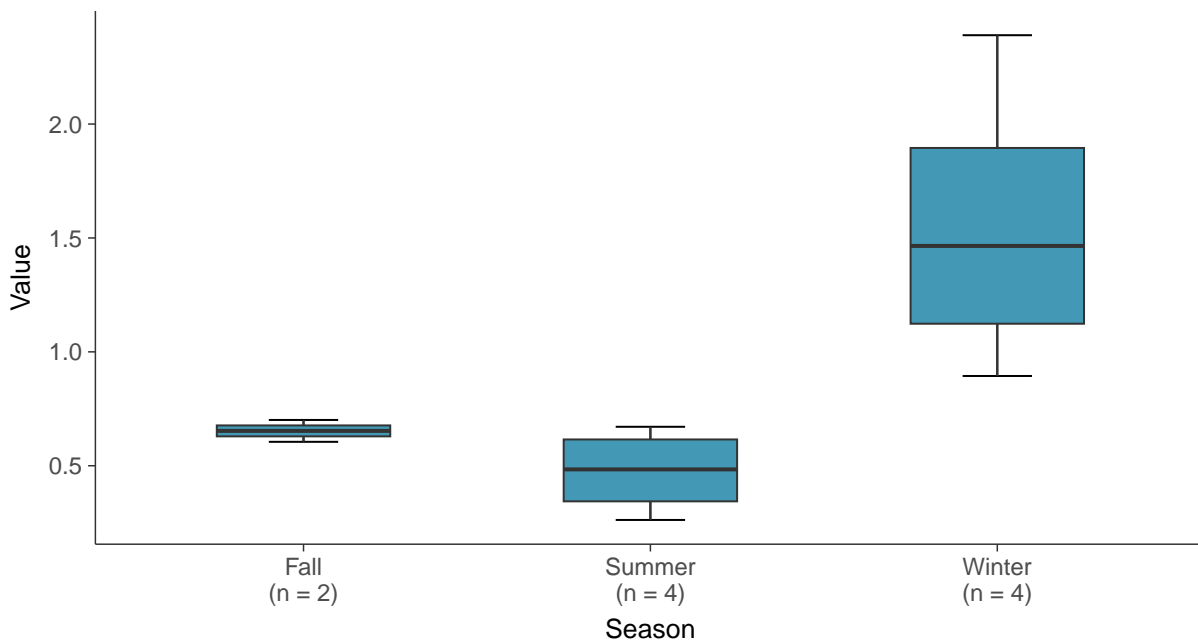
Boxplot

Radium-226/228, MW-10 (pCi/L)



Boxplot by Season

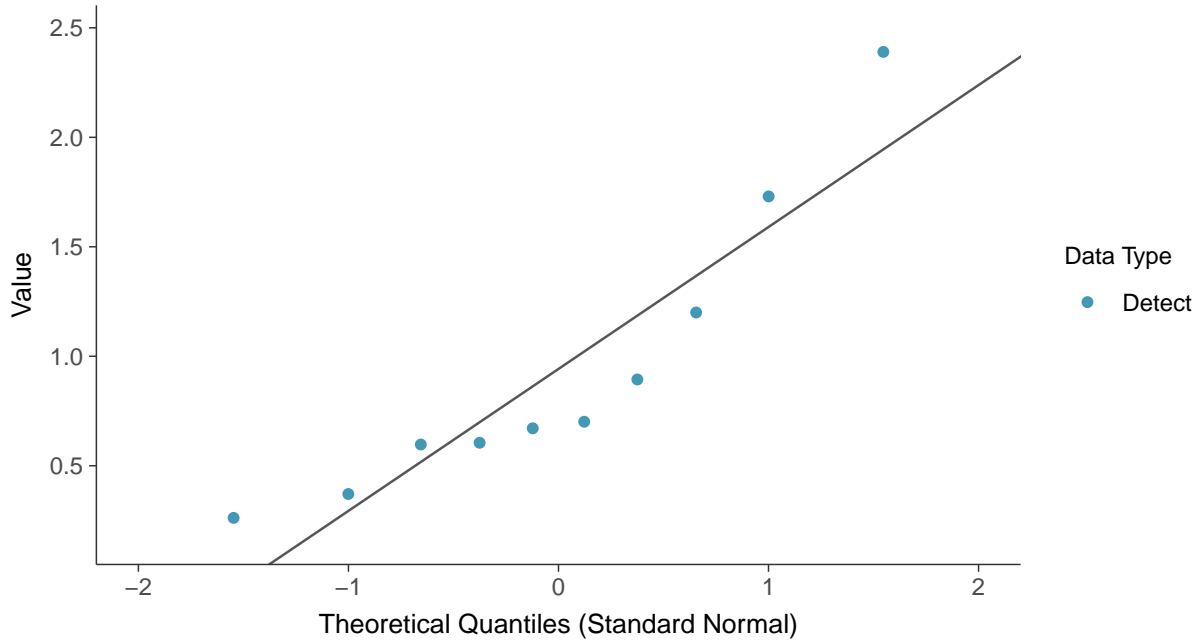
Radium-226/228, MW-10 (pCi/L)





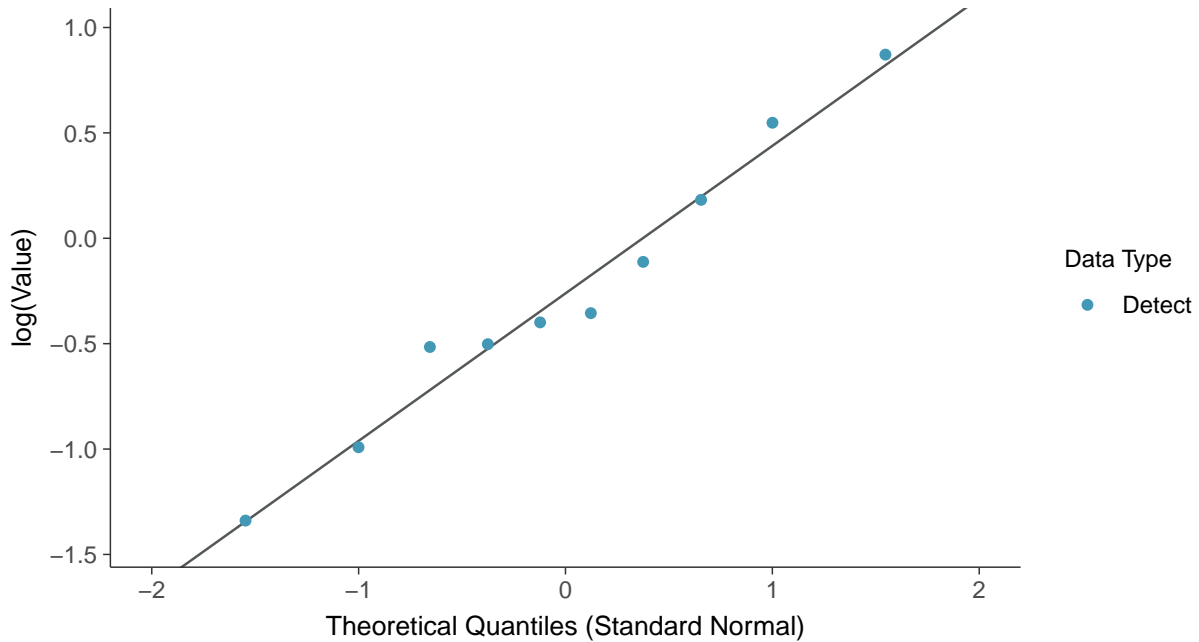
Normal Q-Q plot

Radium-226/228, MW-10 (pCi/L)



Lognormal Q-Q plot

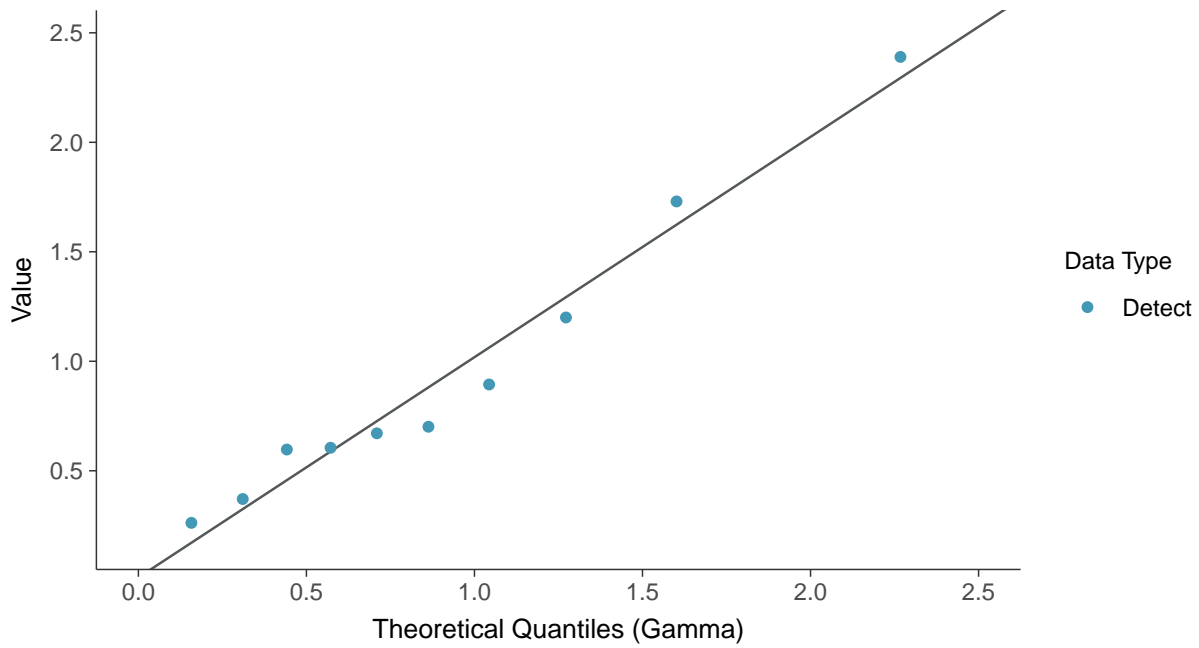
Radium-226/228, MW-10 (pCi/L)





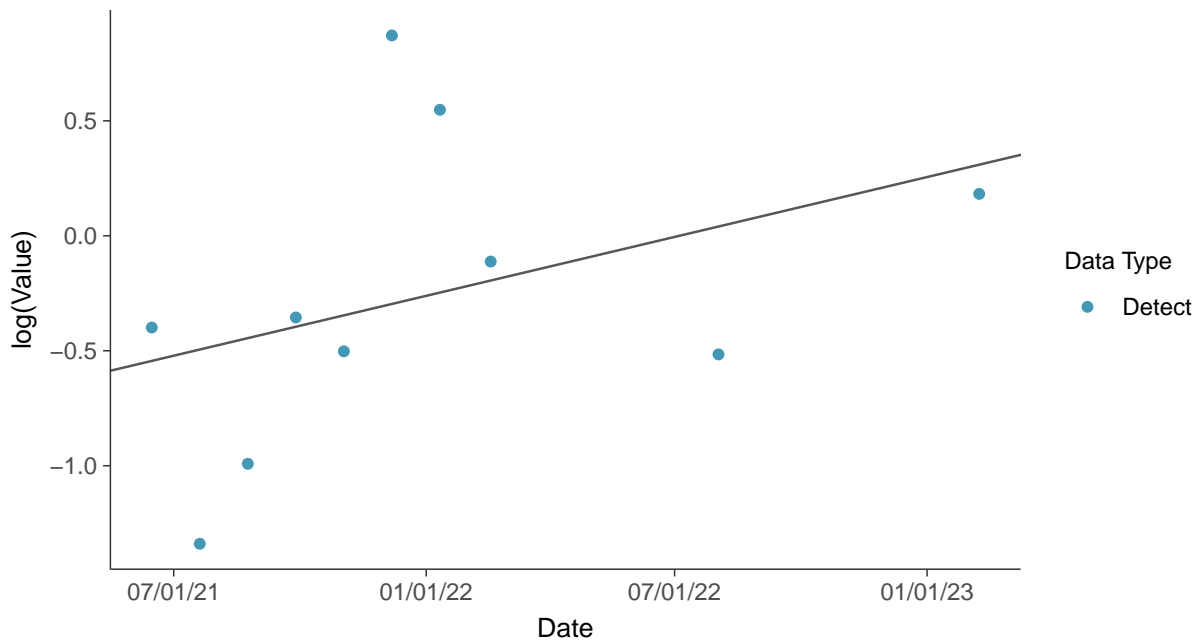
Gamma Q-Q plot

Radium-226/228, MW-10 (pCi/L)



Trend Regression: Lognormal MLE

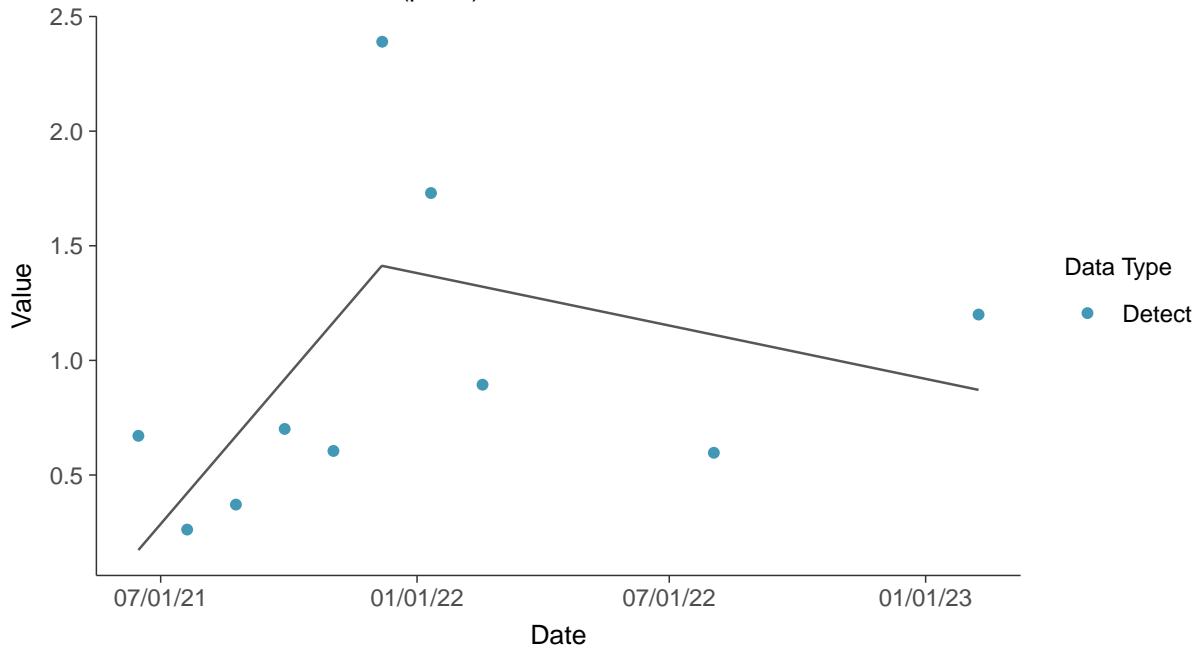
Radium-226/228, MW-10 (pCi/L)





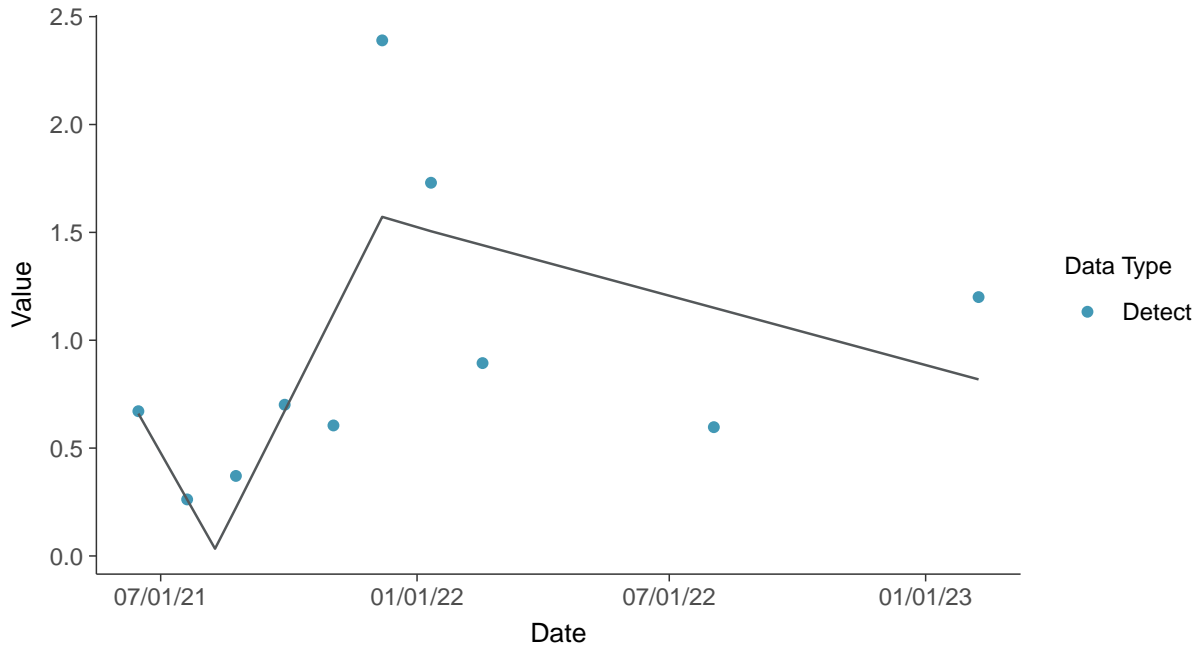
Trend Regression: Piecewise Linear-Linear

Radium-226/228, MW-10 (pCi/L)



Trend Regression: Piecewise Linear-Linear-Linear

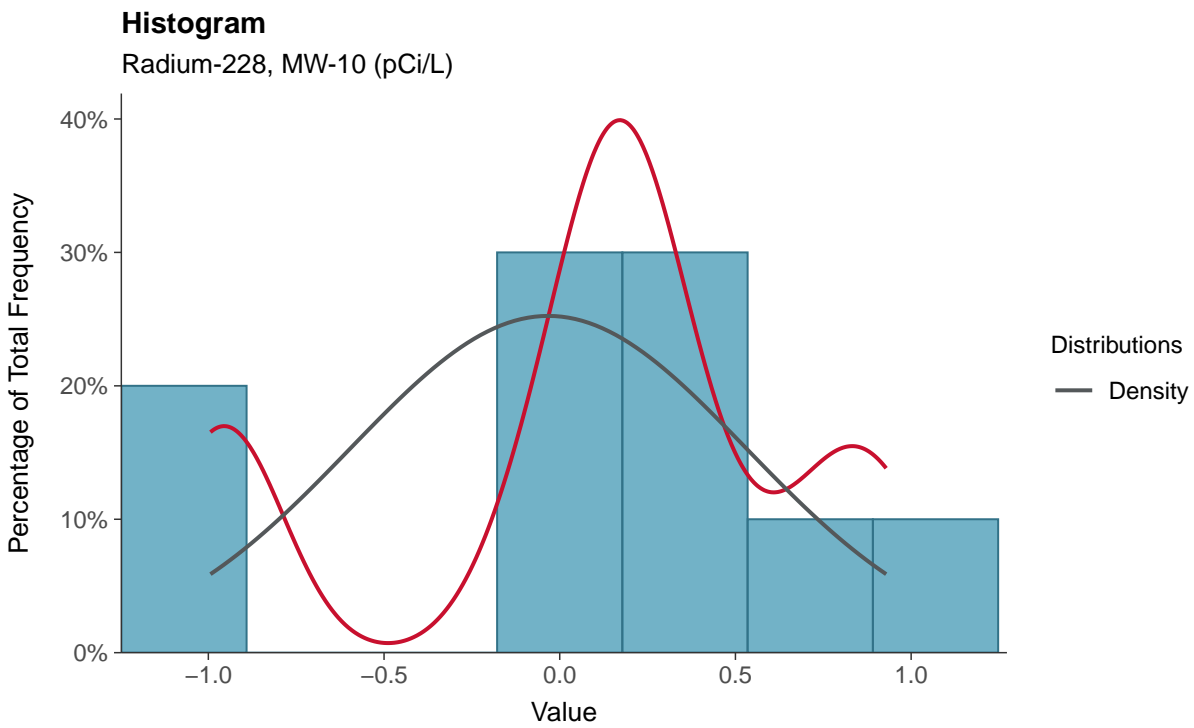
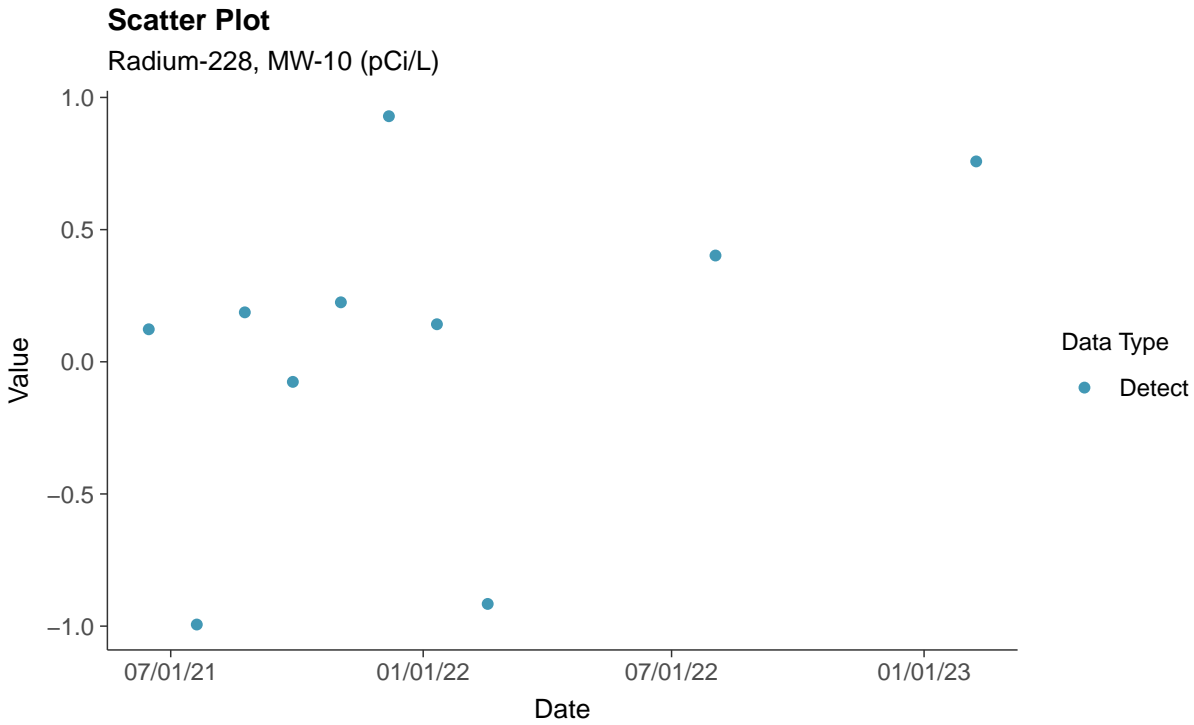
Radium-226/228, MW-10 (pCi/L)





Appendix IV: Radium-228, MW-10

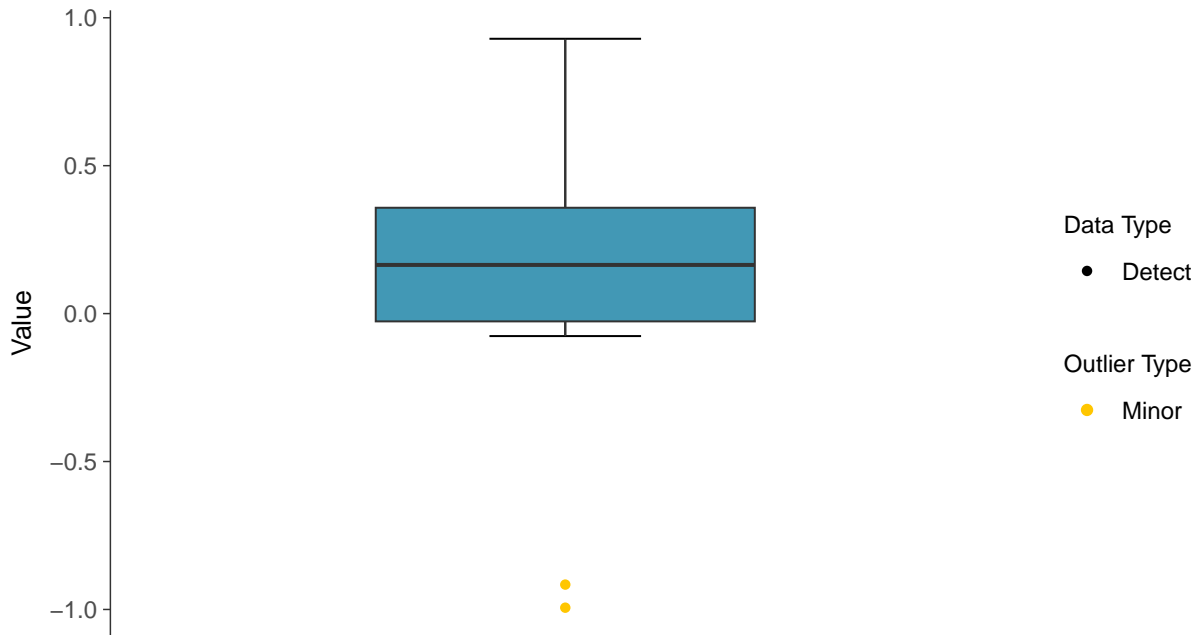
ID: 10_2_26





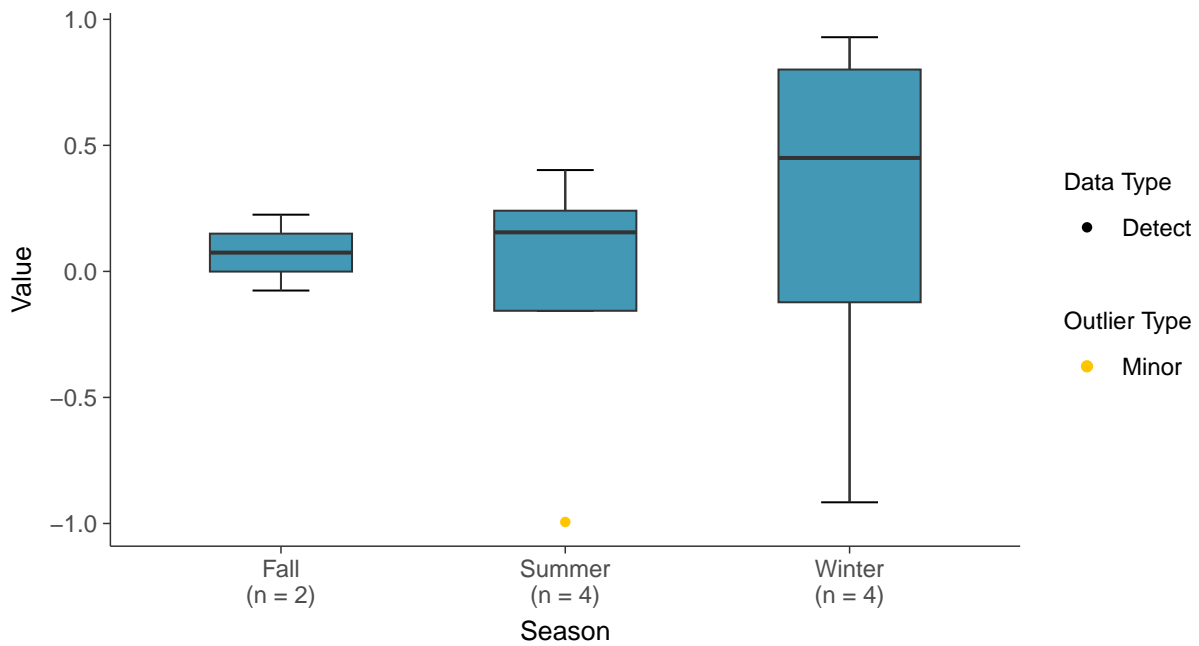
Boxplot

Radium-228, MW-10 (pCi/L)



Boxplot by Season

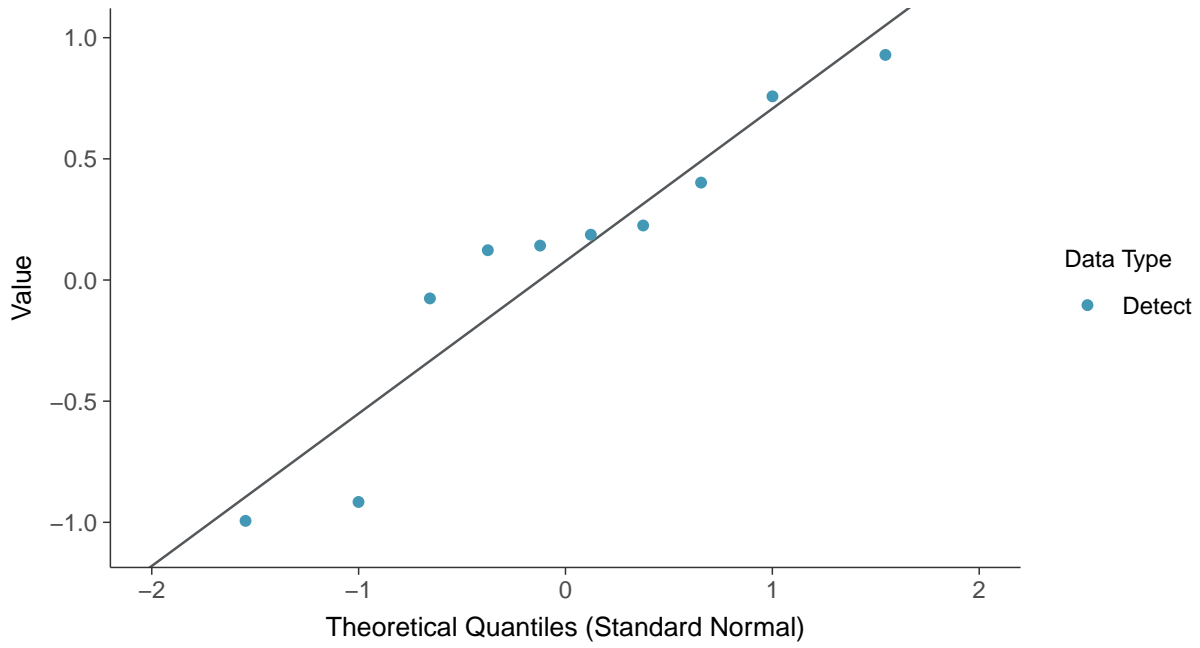
Radium-228, MW-10 (pCi/L)





Normal Q-Q plot

Radium-228, MW-10 (pCi/L)



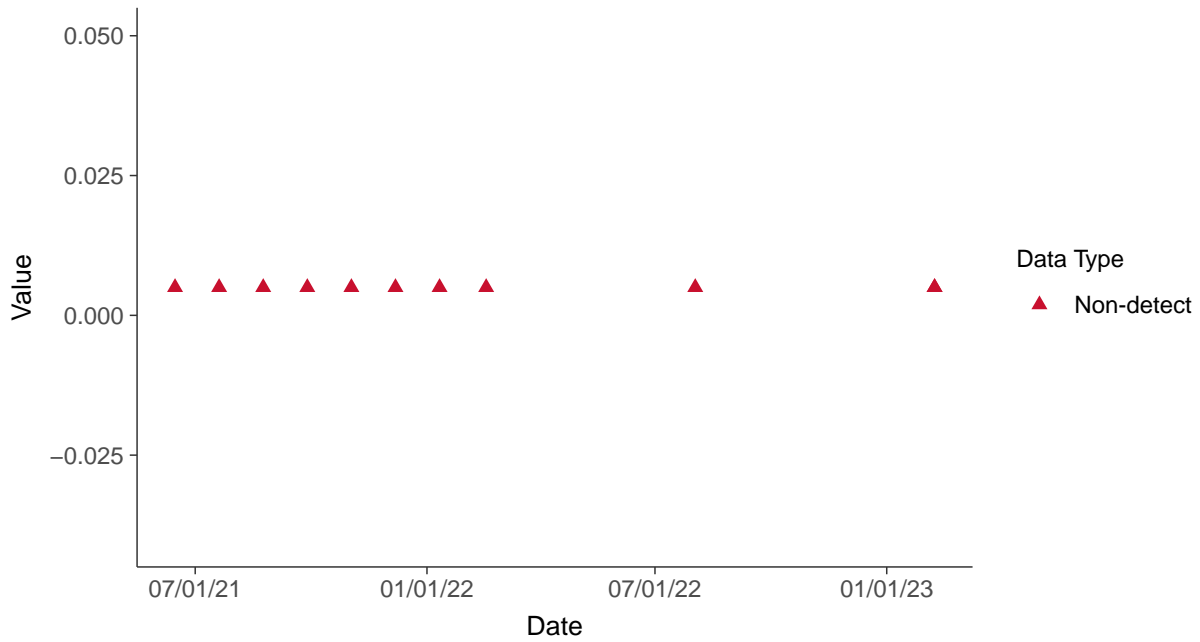


Appendix IV: Selenium, MW-10

ID: 10_2_27

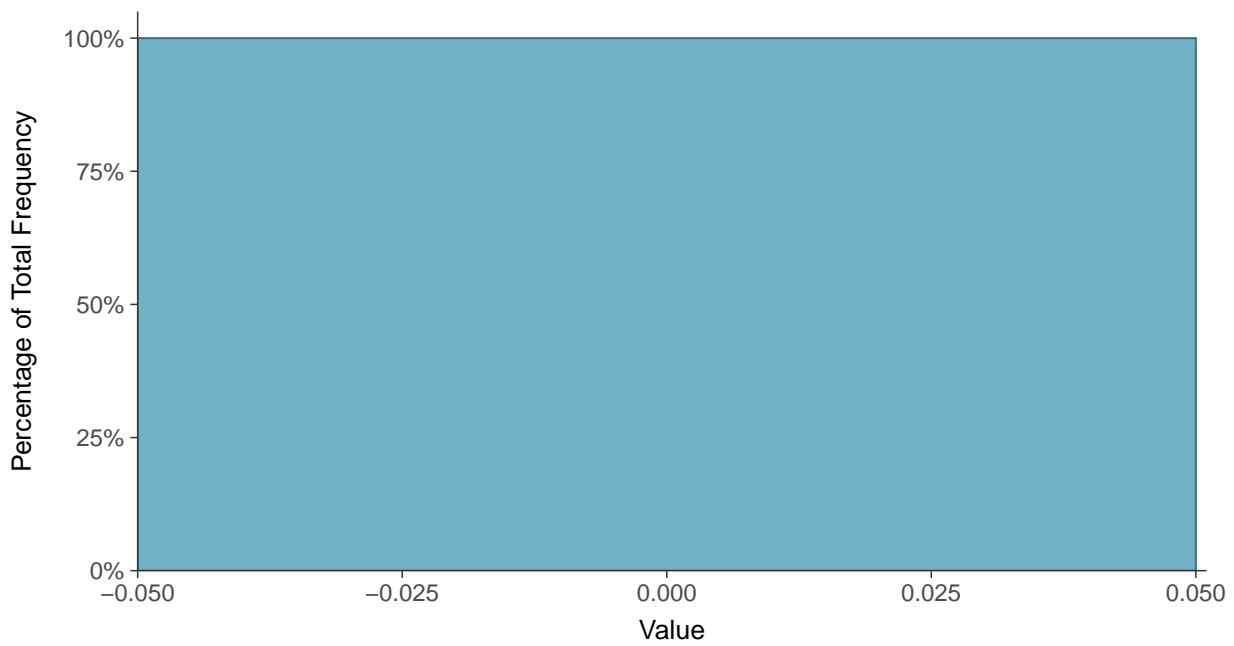
Scatter Plot

Selenium, MW-10 (mg/L)



Histogram

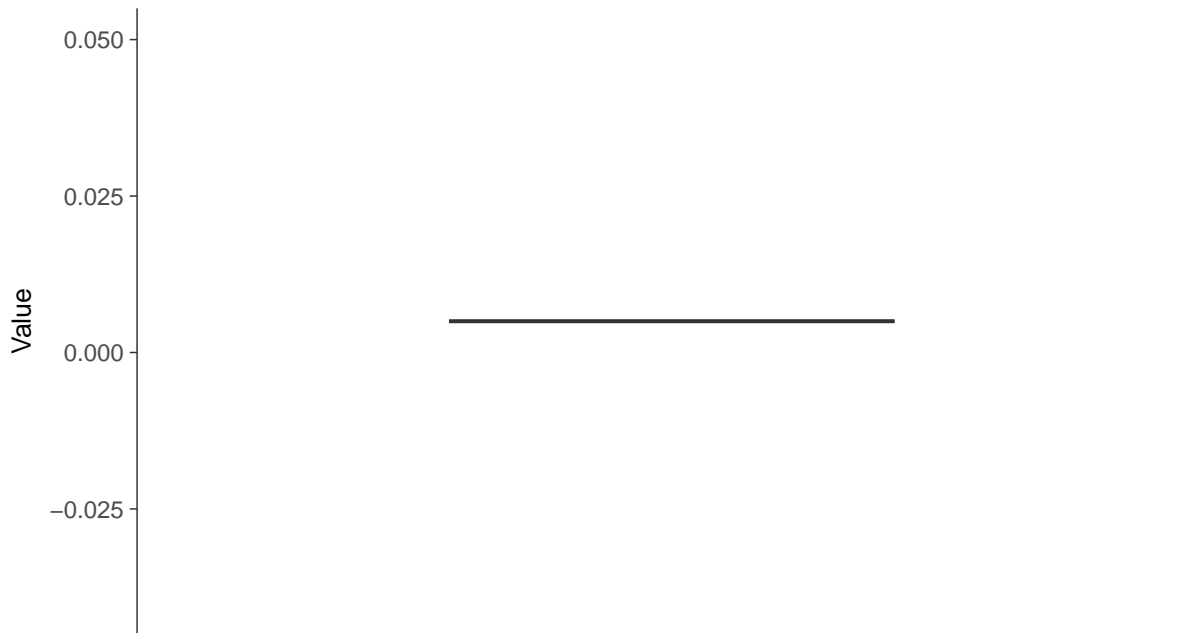
Selenium, MW-10 (mg/L)





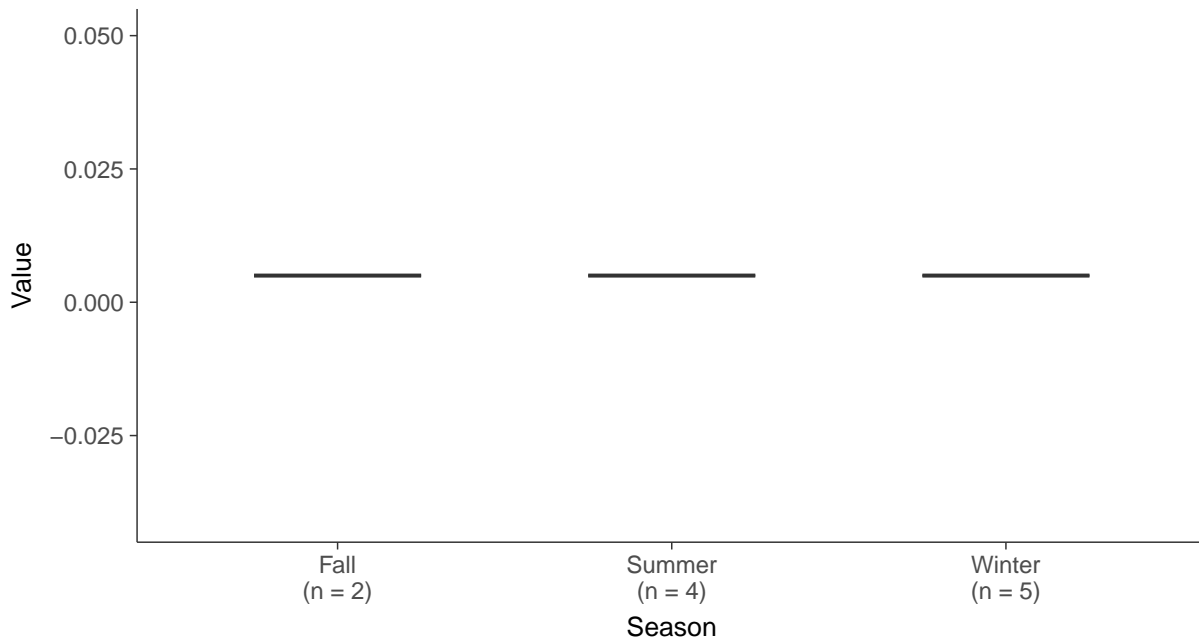
Boxplot

Selenium, MW-10 (mg/L)



Boxplot by Season

Selenium, MW-10 (mg/L)



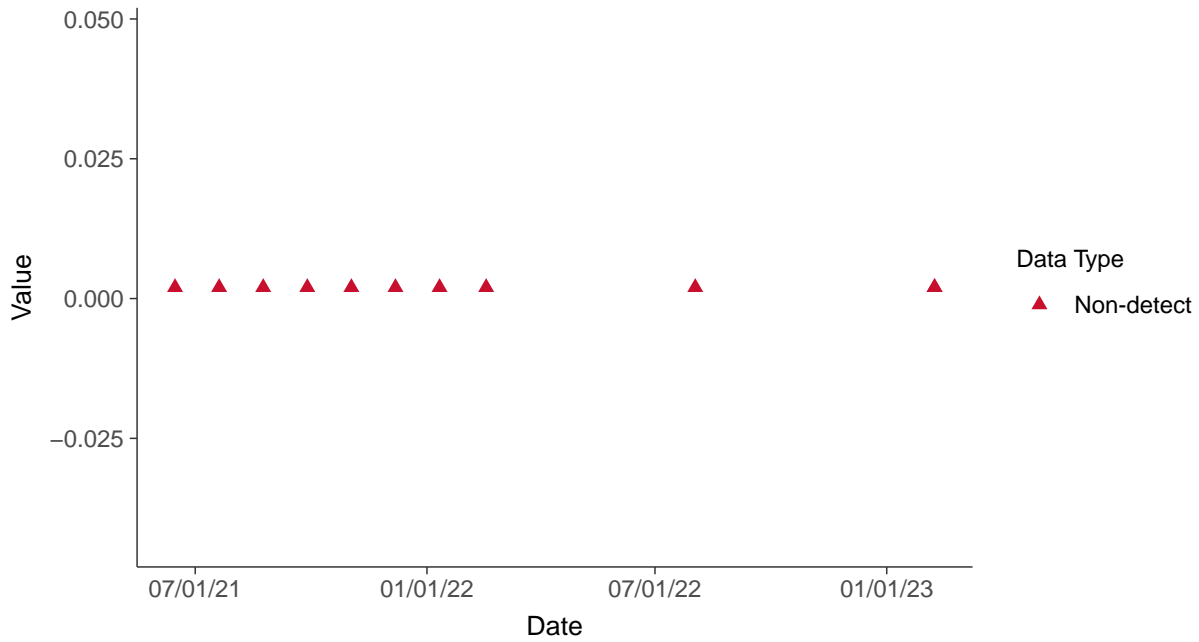


Appendix IV: Thallium, MW-10

ID: 10_2_29

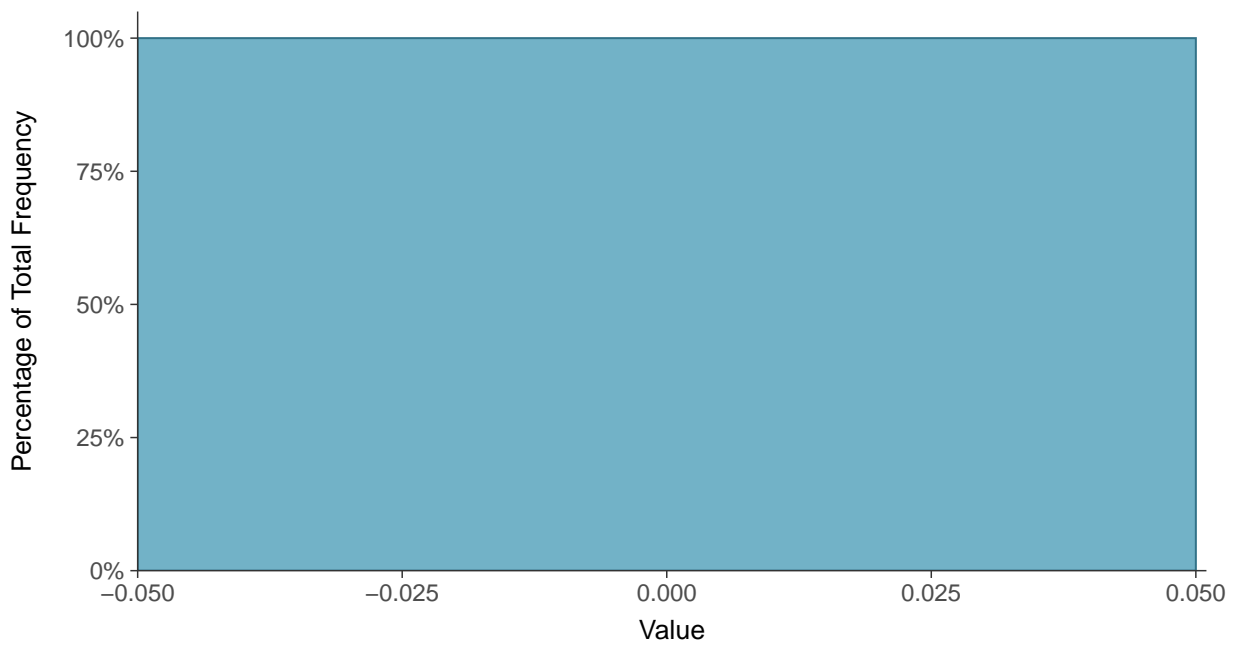
Scatter Plot

Thallium, MW-10 (mg/L)



Histogram

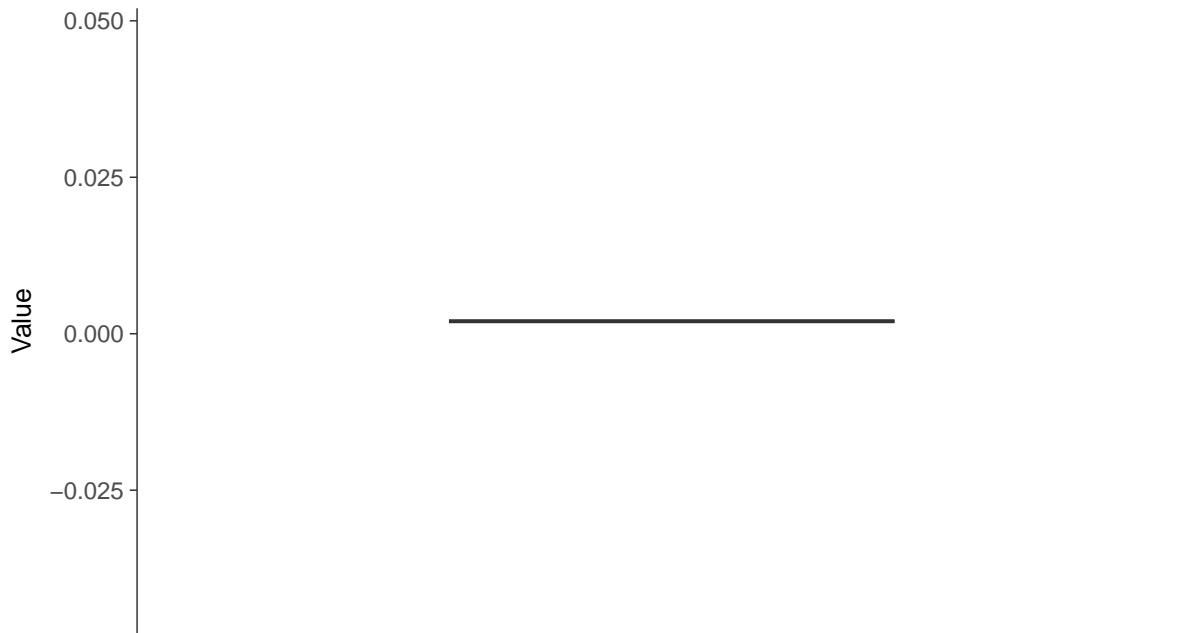
Thallium, MW-10 (mg/L)





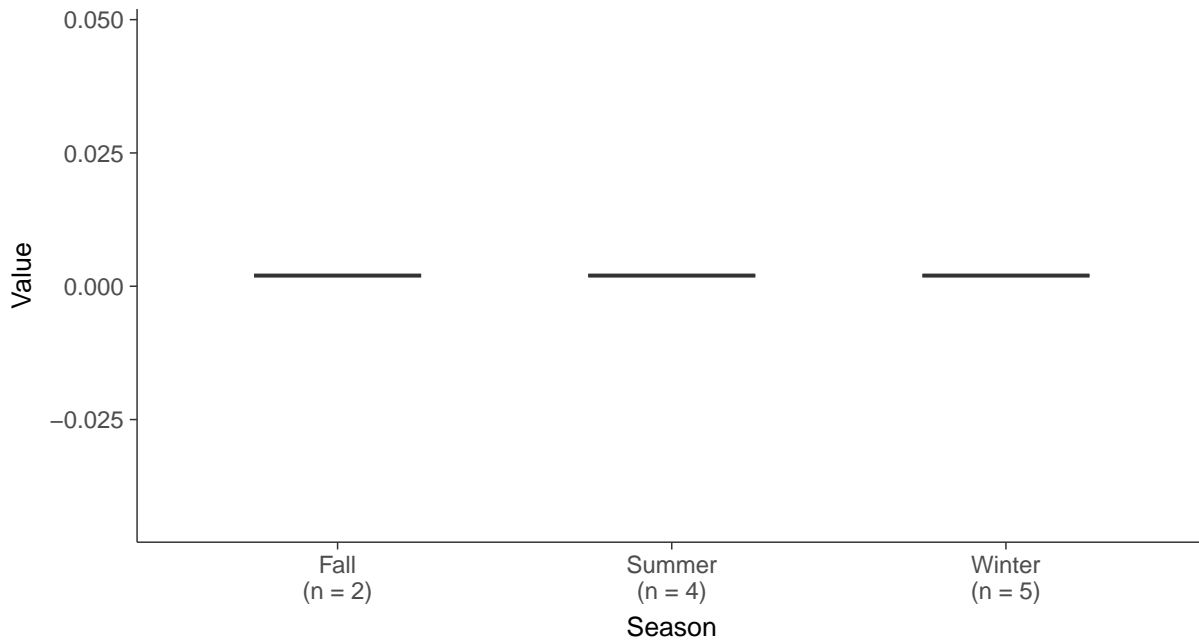
Boxplot

Thallium, MW-10 (mg/L)



Boxplot by Season

Thallium, MW-10 (mg/L)



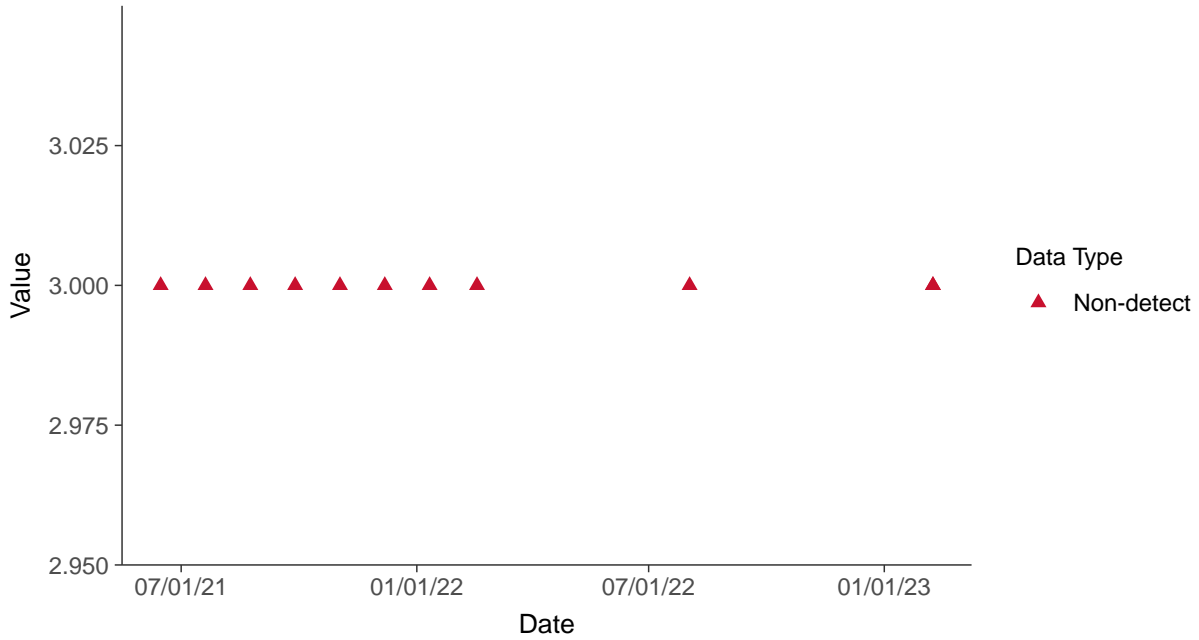


Appendix IV: Total Suspended Solids, MW-10

ID: 10_2_30

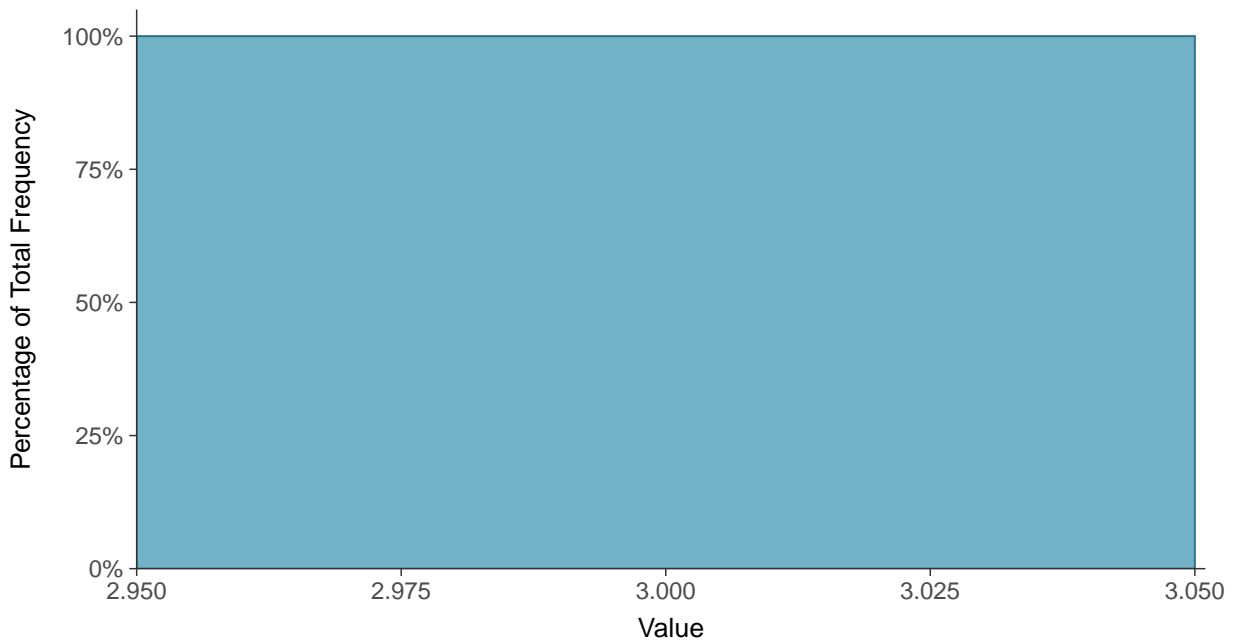
Scatter Plot

Total Suspended Solids, MW-10 (mg/L)



Histogram

Total Suspended Solids, MW-10 (mg/L)





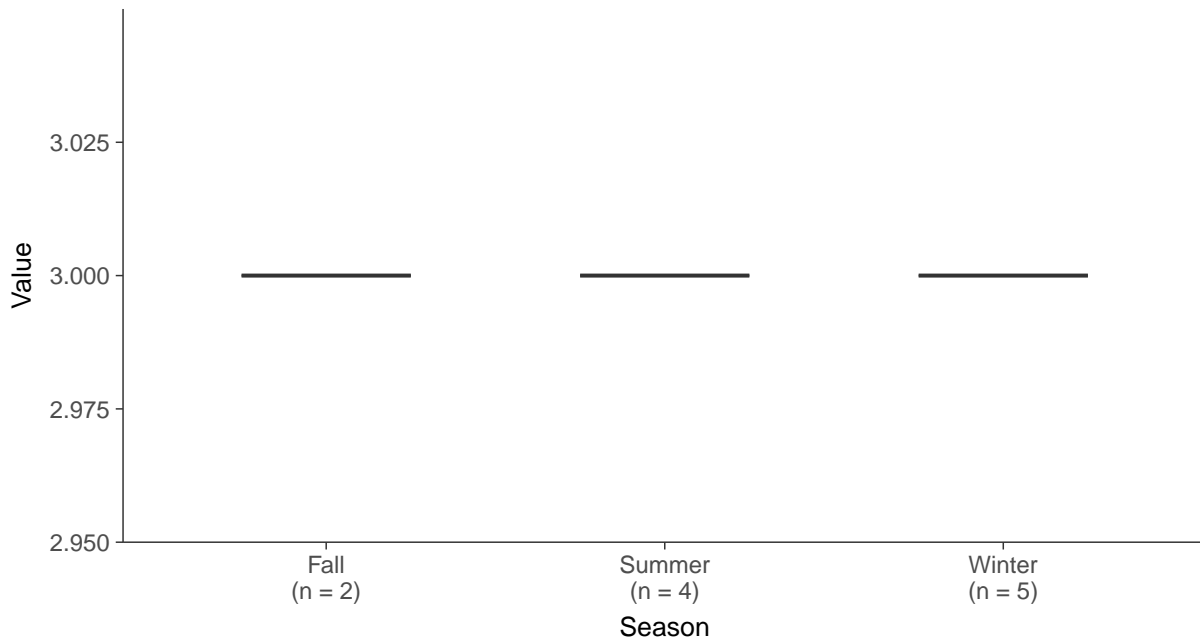
Boxplot

Total Suspended Solids, MW-10 (mg/L)



Boxplot by Season

Total Suspended Solids, MW-10 (mg/L)



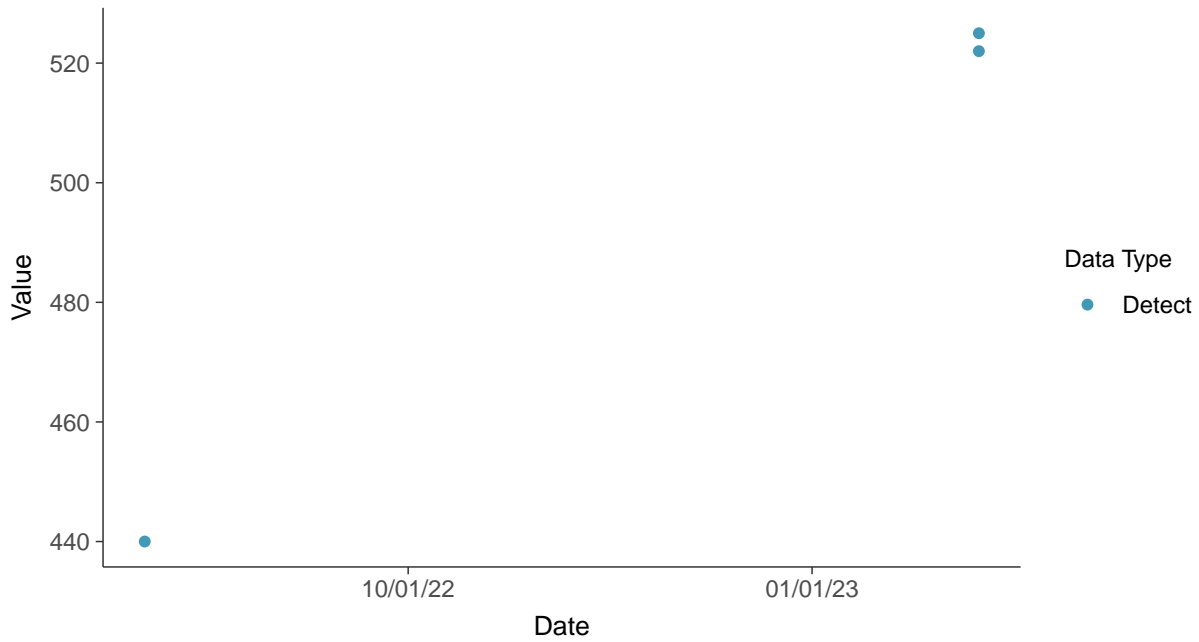


Other: Bicarbonate, MW-10

ID: 10_3_12

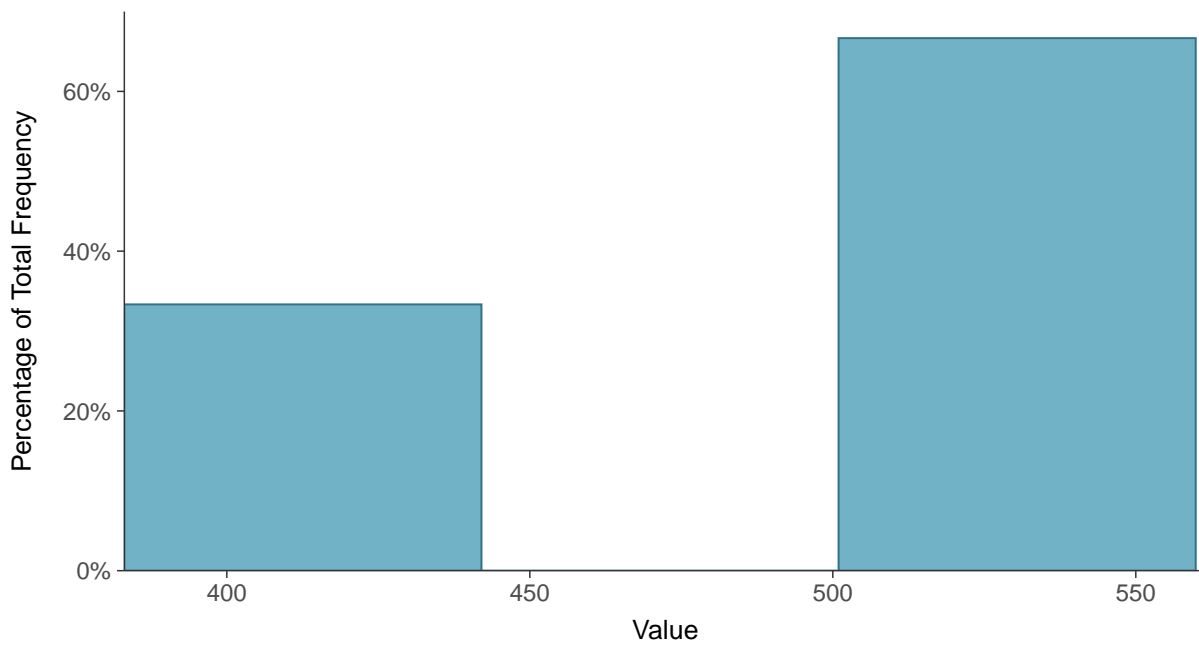
Scatter Plot

Bicarbonate, MW-10 (mg/L)



Histogram

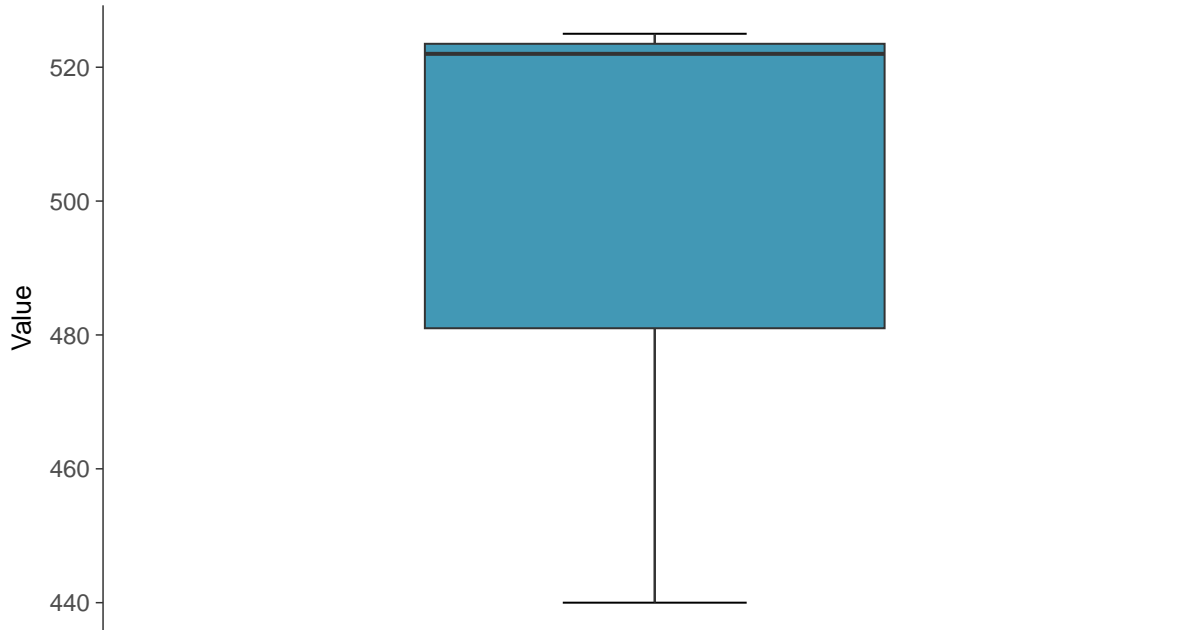
Bicarbonate, MW-10 (mg/L)





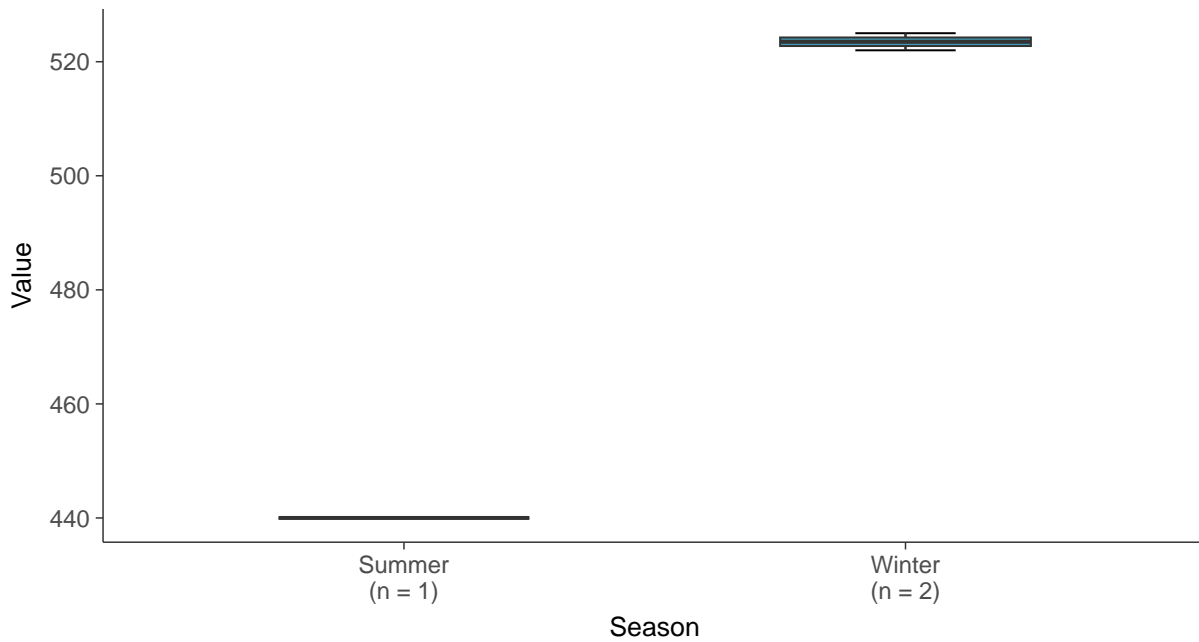
Boxplot

Bicarbonate, MW-10 (mg/L)



Boxplot by Season

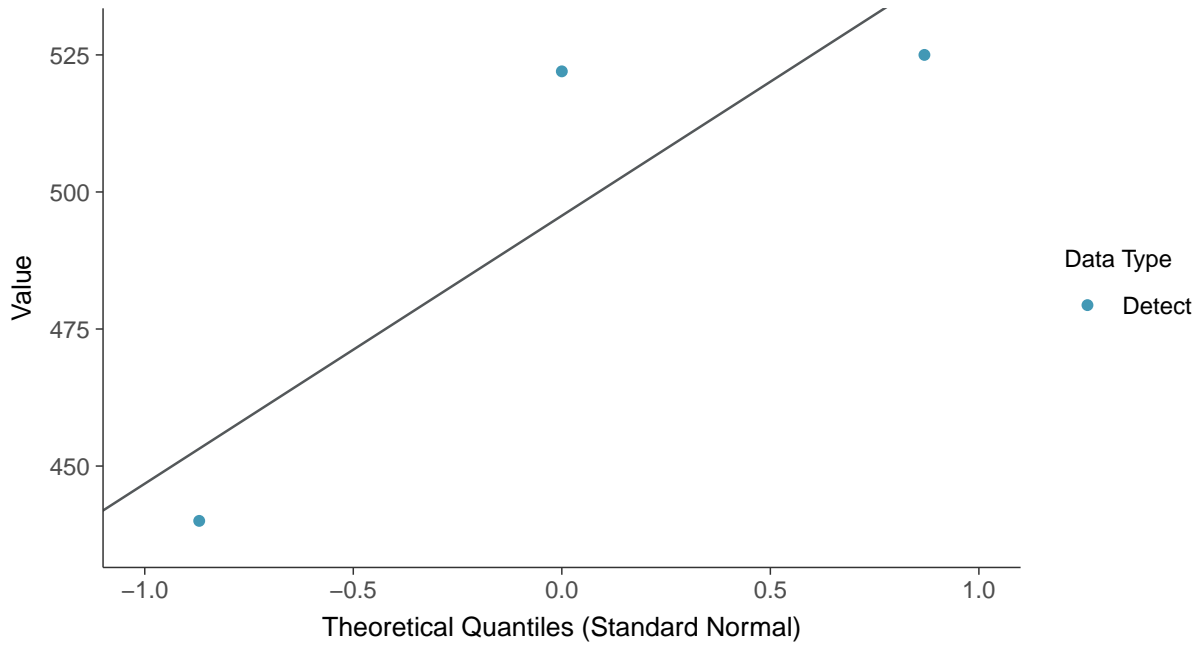
Bicarbonate, MW-10 (mg/L)





Normal Q-Q plot

Bicarbonate, MW-10 (mg/L)



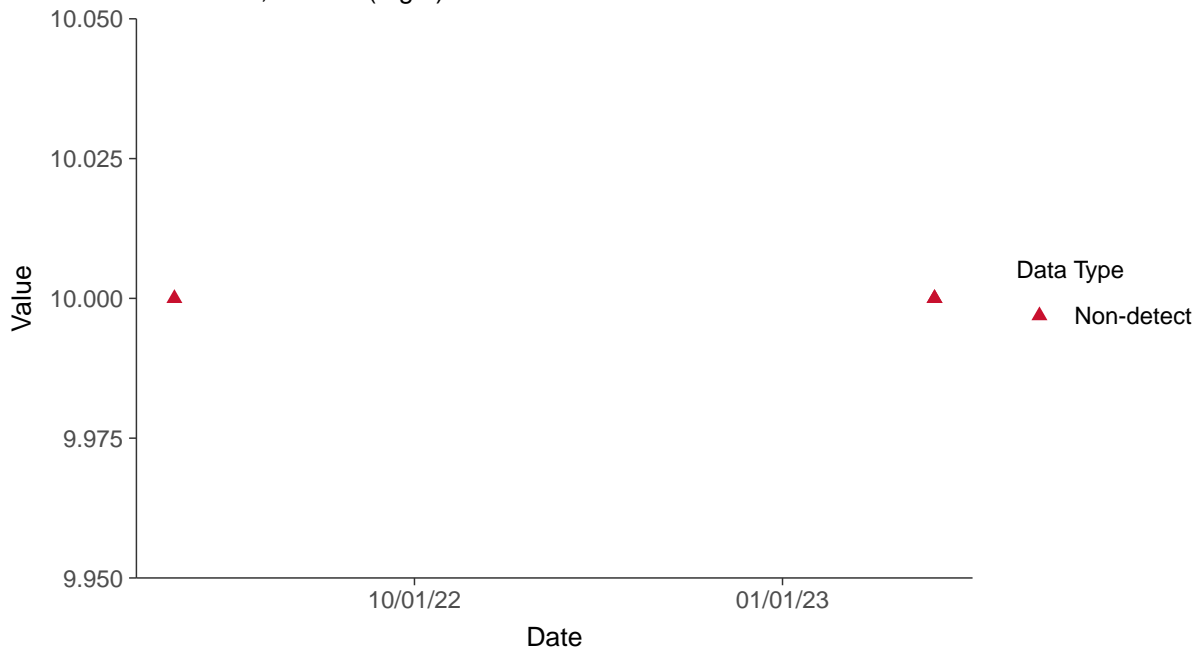


Other: Carbonate, MW-10

ID: 10_3_14

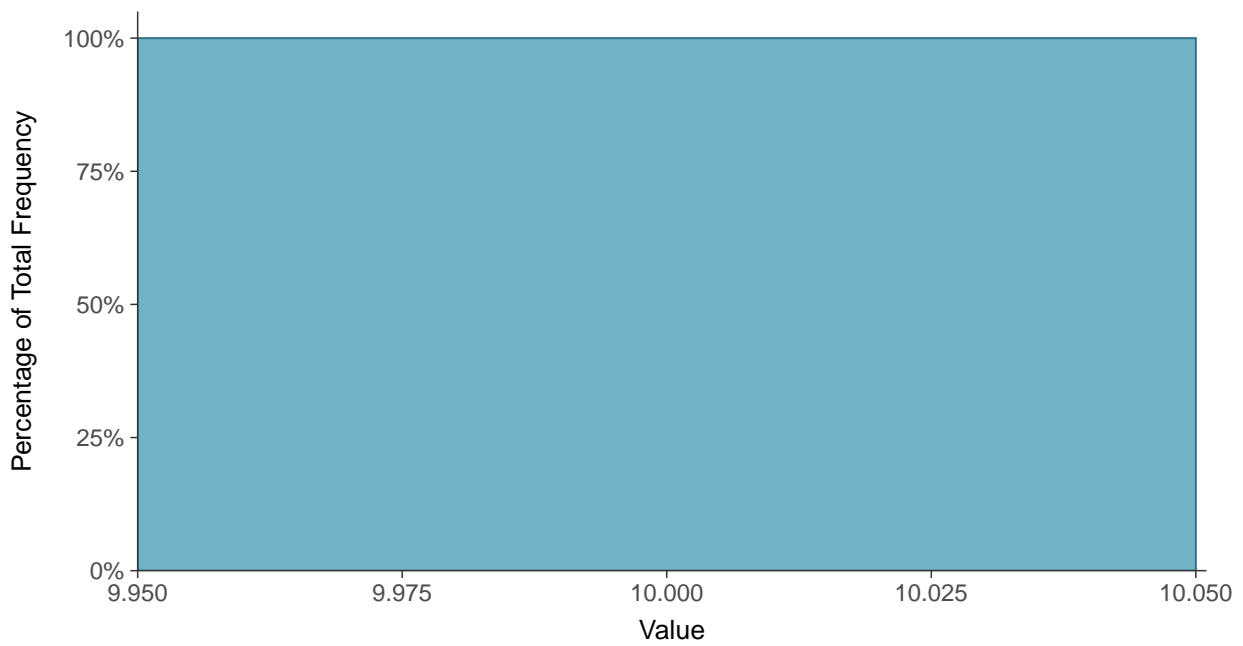
Scatter Plot

Carbonate, MW-10 (mg/L)



Histogram

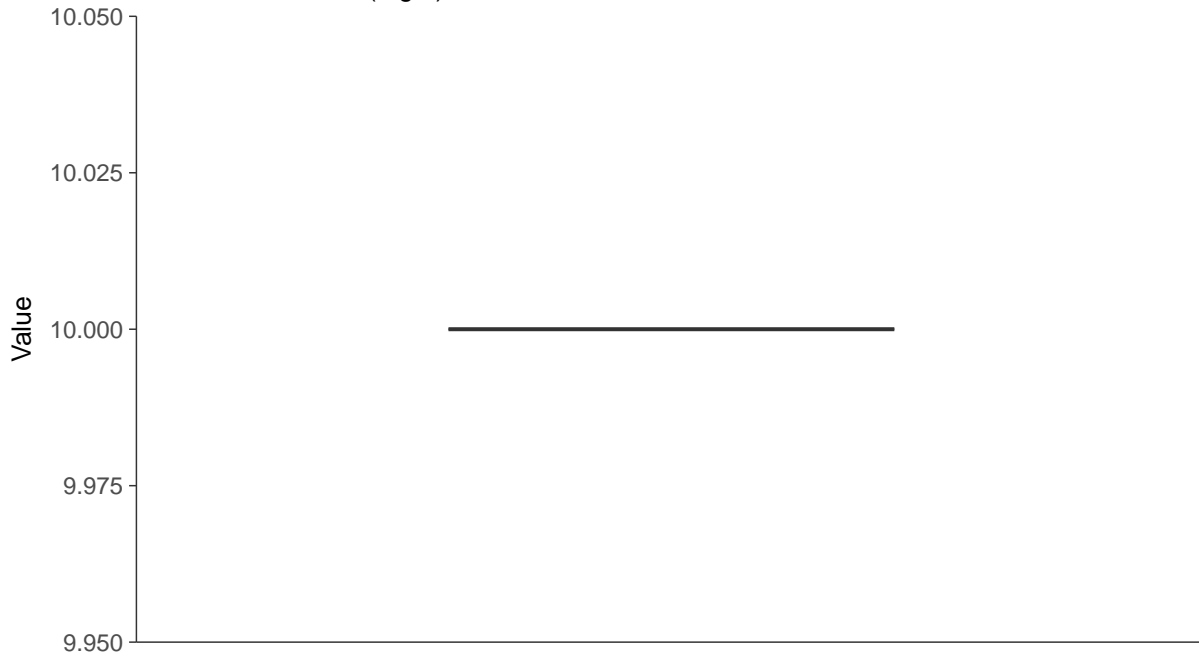
Carbonate, MW-10 (mg/L)





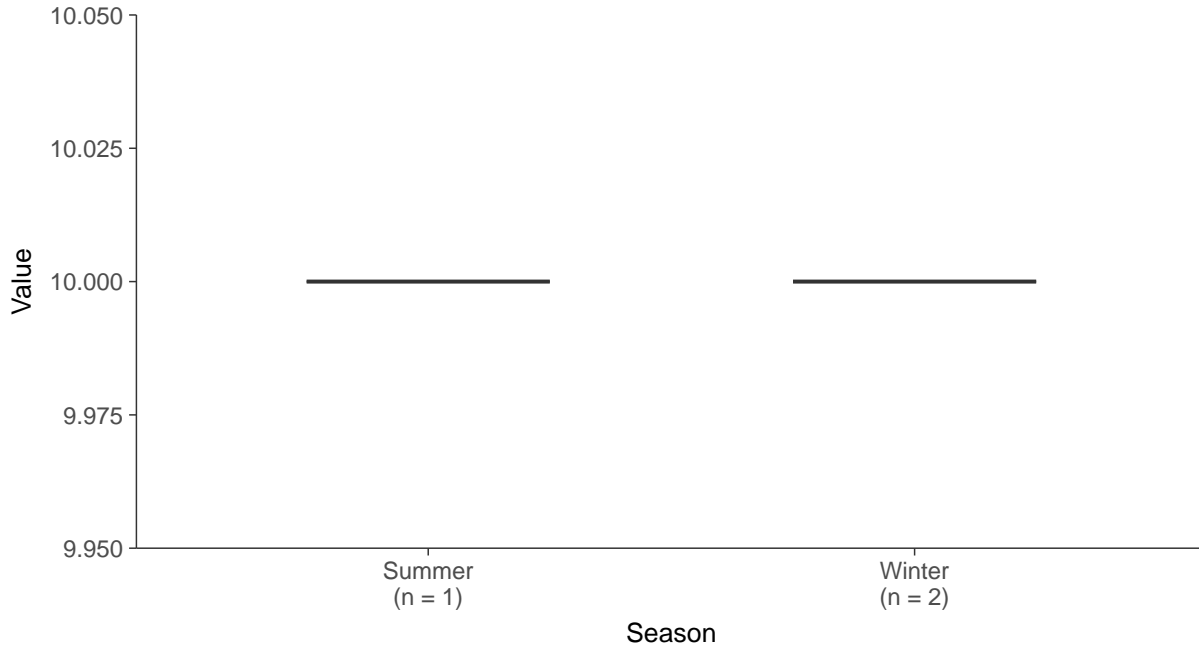
Boxplot

Carbonate, MW-10 (mg/L)



Boxplot by Season

Carbonate, MW-10 (mg/L)



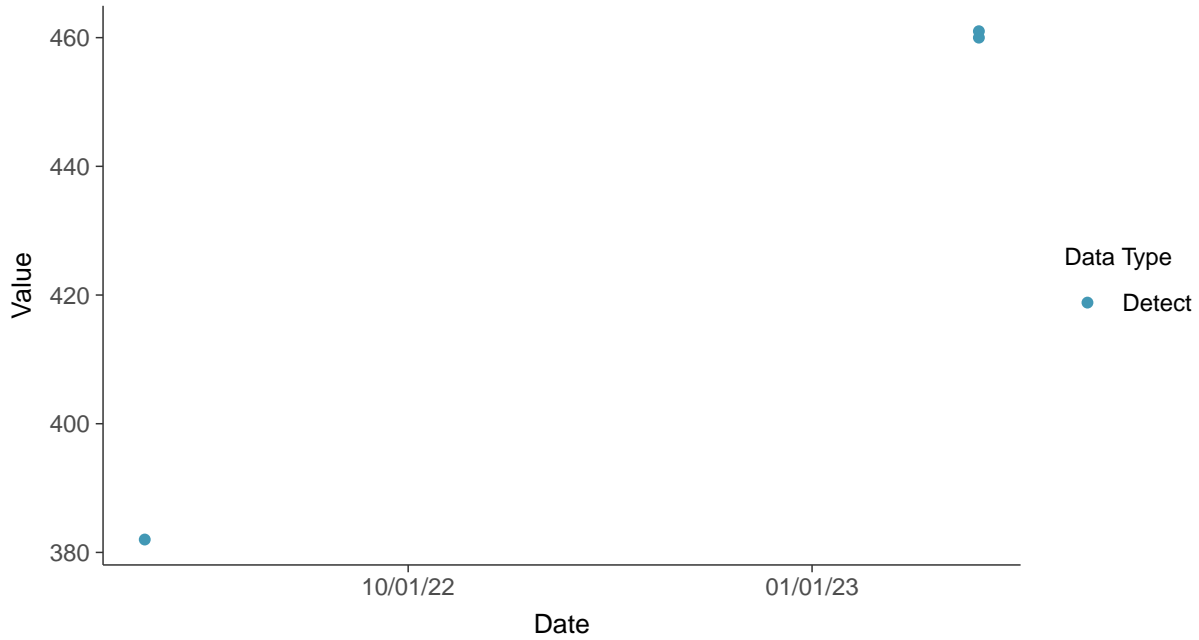


Other: Hardness, MW-10

ID: 10_3_17

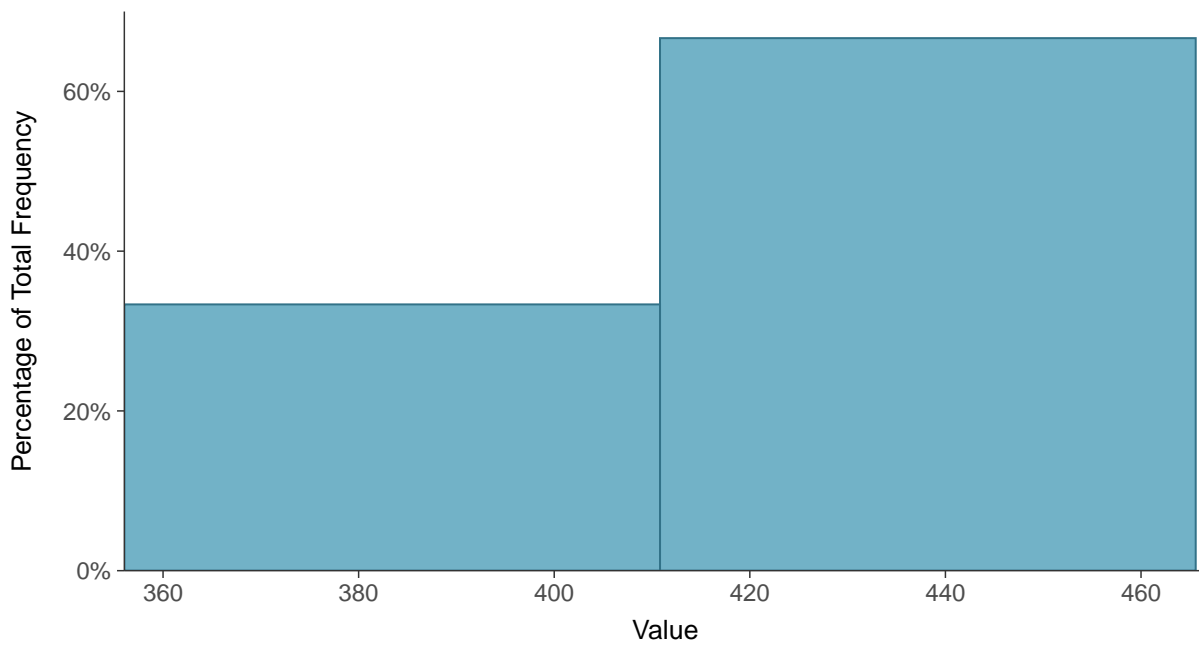
Scatter Plot

Hardness, MW-10 (mg/L)



Histogram

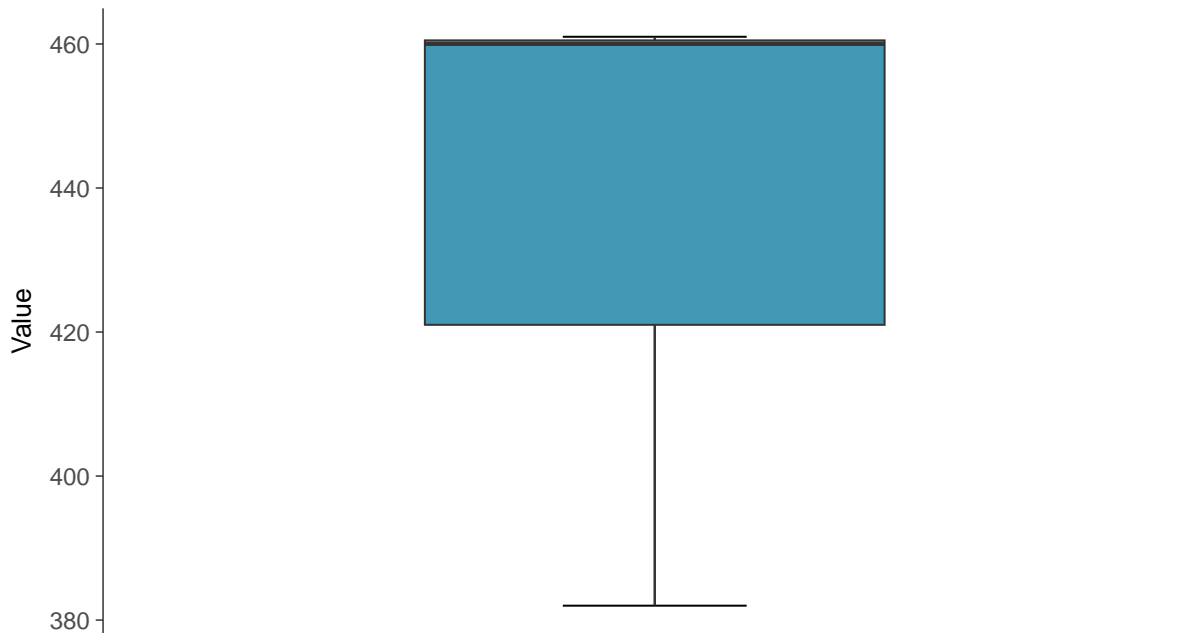
Hardness, MW-10 (mg/L)





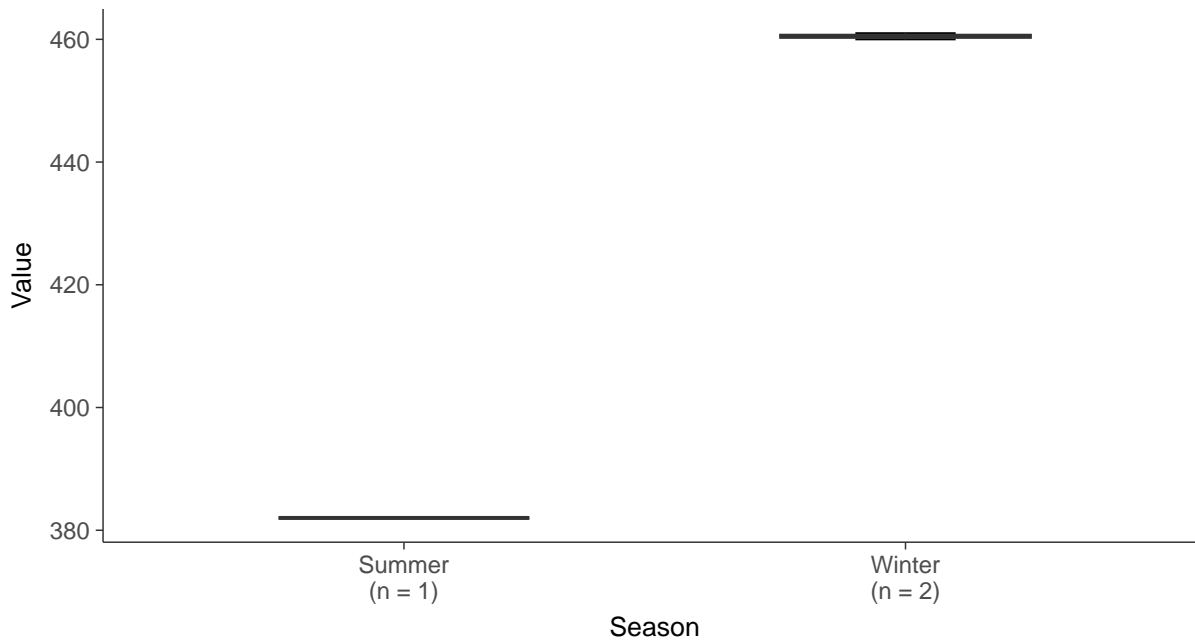
Boxplot

Hardness, MW-10 (mg/L)



Boxplot by Season

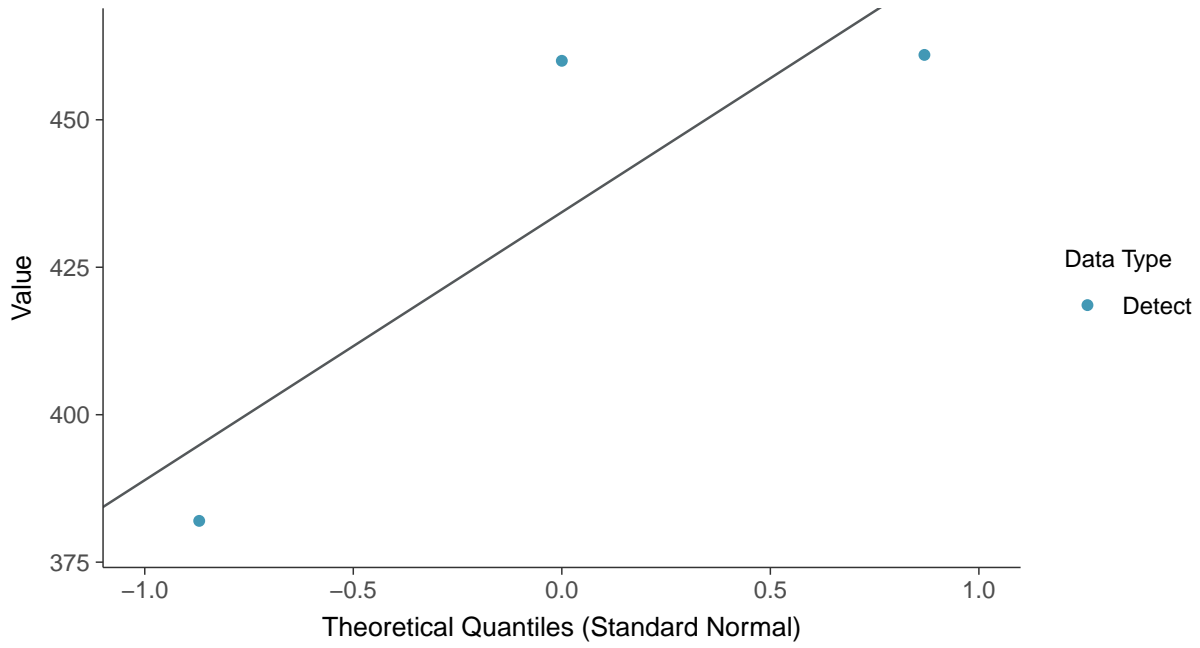
Hardness, MW-10 (mg/L)





Normal Q-Q plot

Hardness, MW-10 (mg/L)



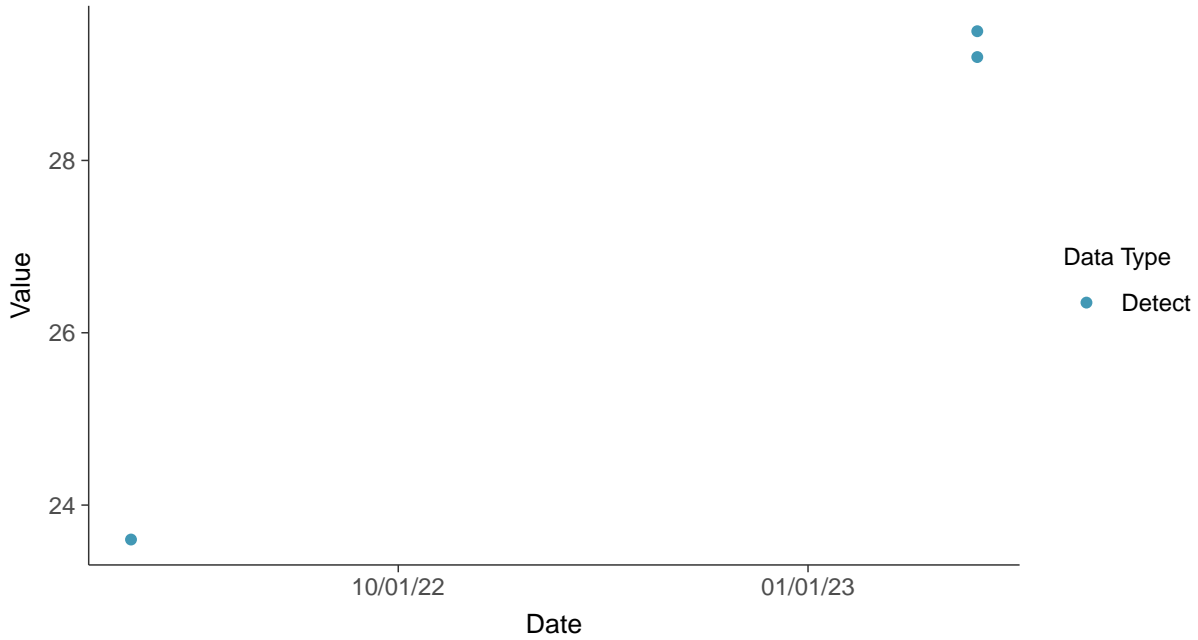


Other: Magnesium, MW-10

ID: 10_3_20

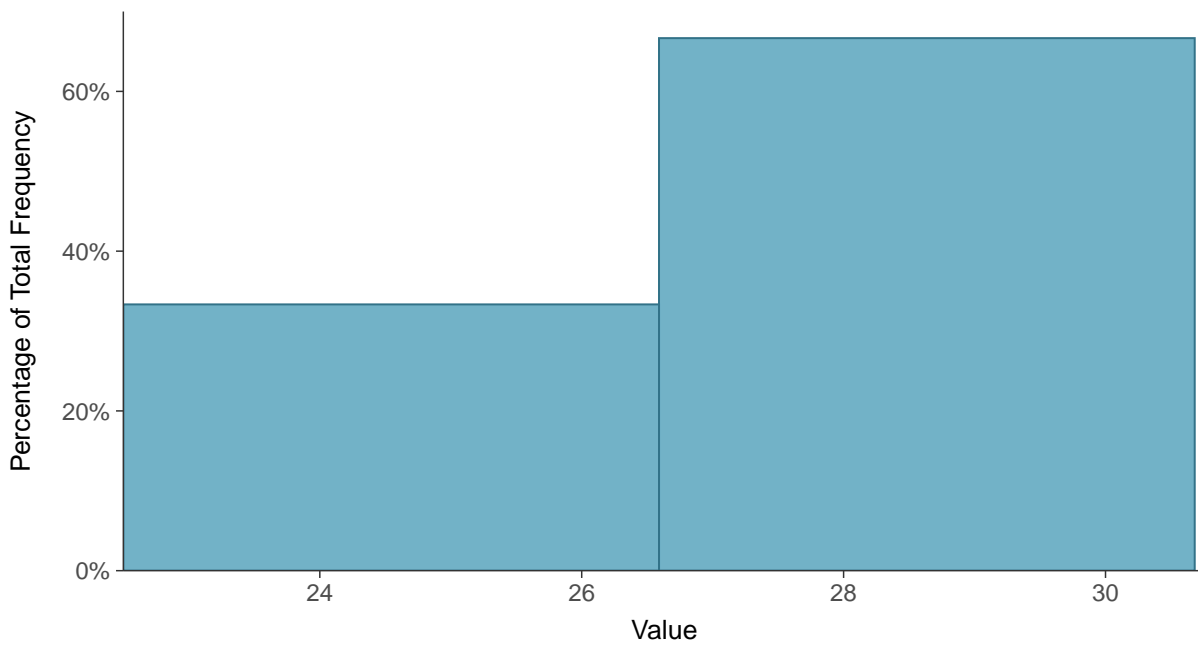
Scatter Plot

Magnesium, MW-10 (mg/L)



Histogram

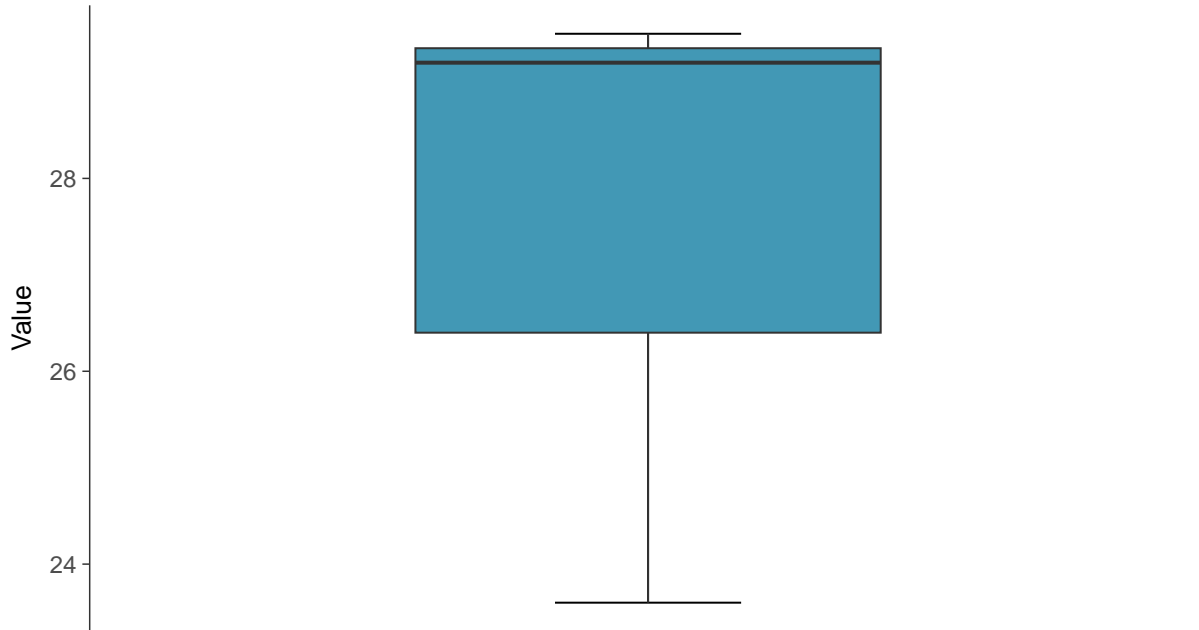
Magnesium, MW-10 (mg/L)





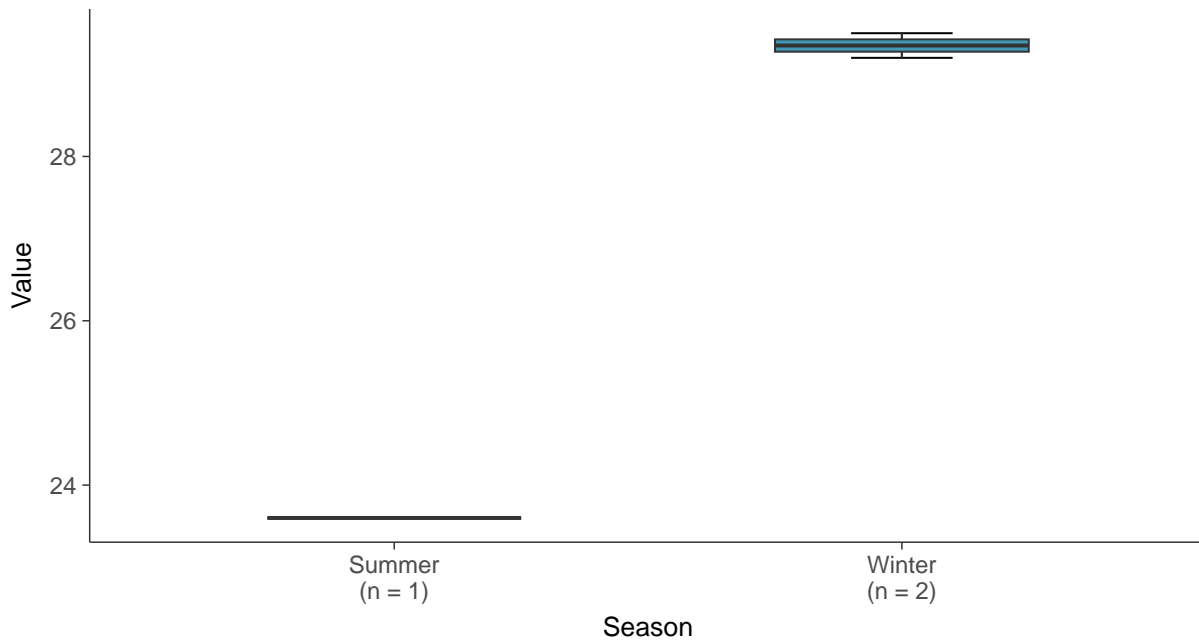
Boxplot

Magnesium, MW-10 (mg/L)



Boxplot by Season

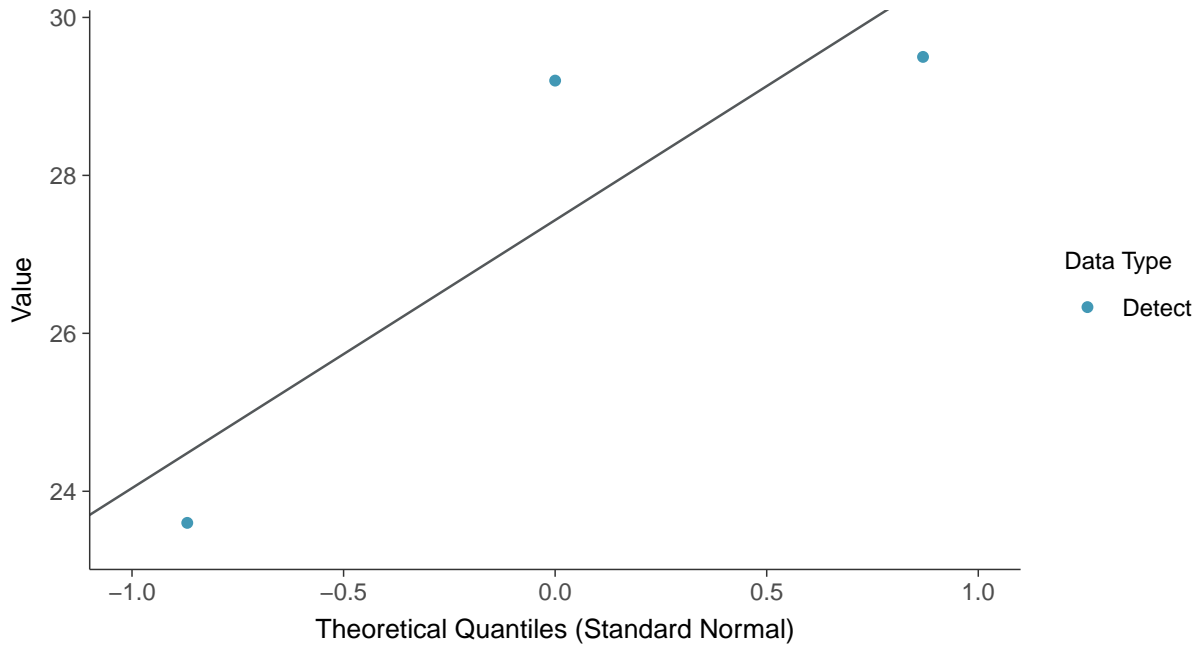
Magnesium, MW-10 (mg/L)





Normal Q-Q plot

Magnesium, MW-10 (mg/L)



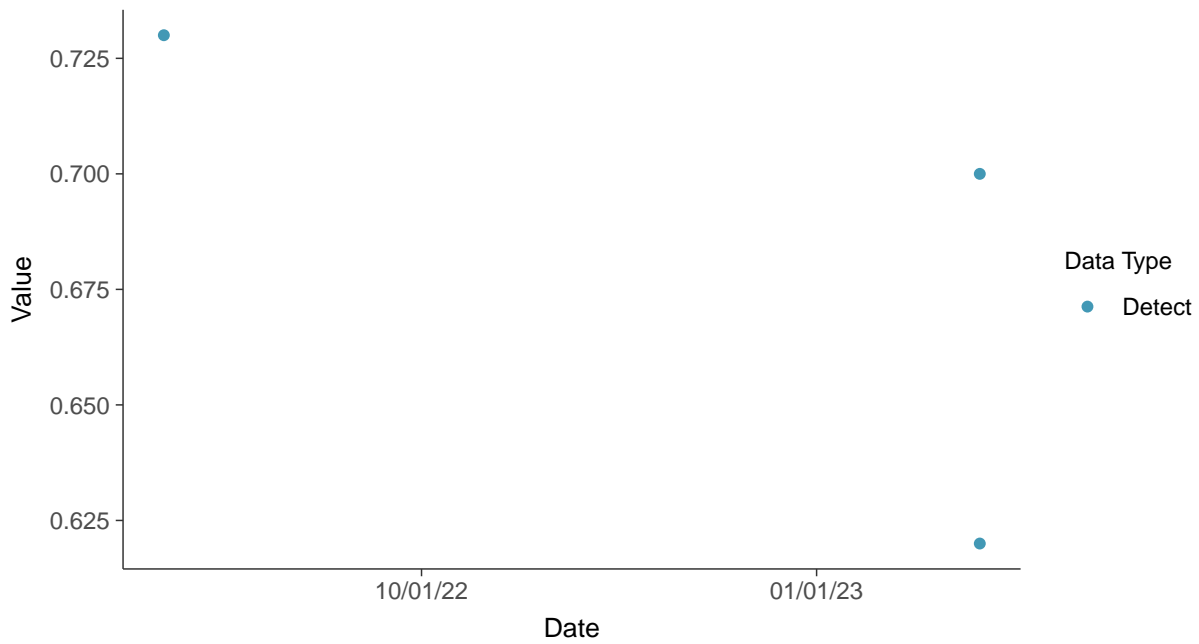


Other: Potassium, MW-10

ID: 10_3_23

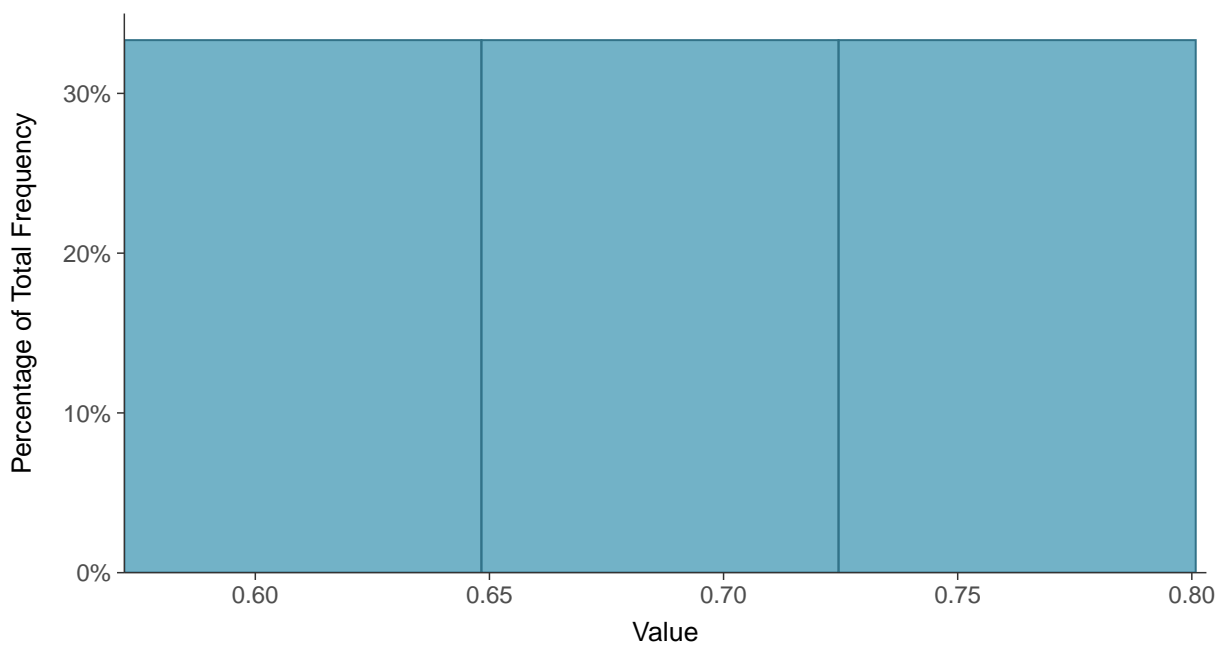
Scatter Plot

Potassium, MW-10 (mg/L)



Histogram

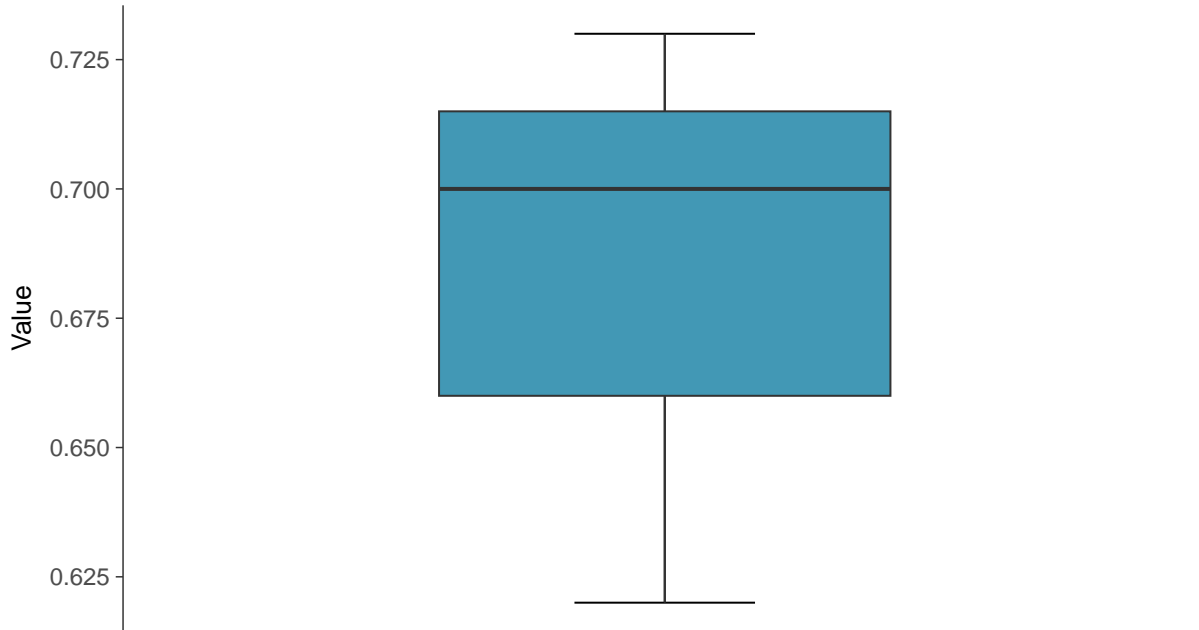
Potassium, MW-10 (mg/L)





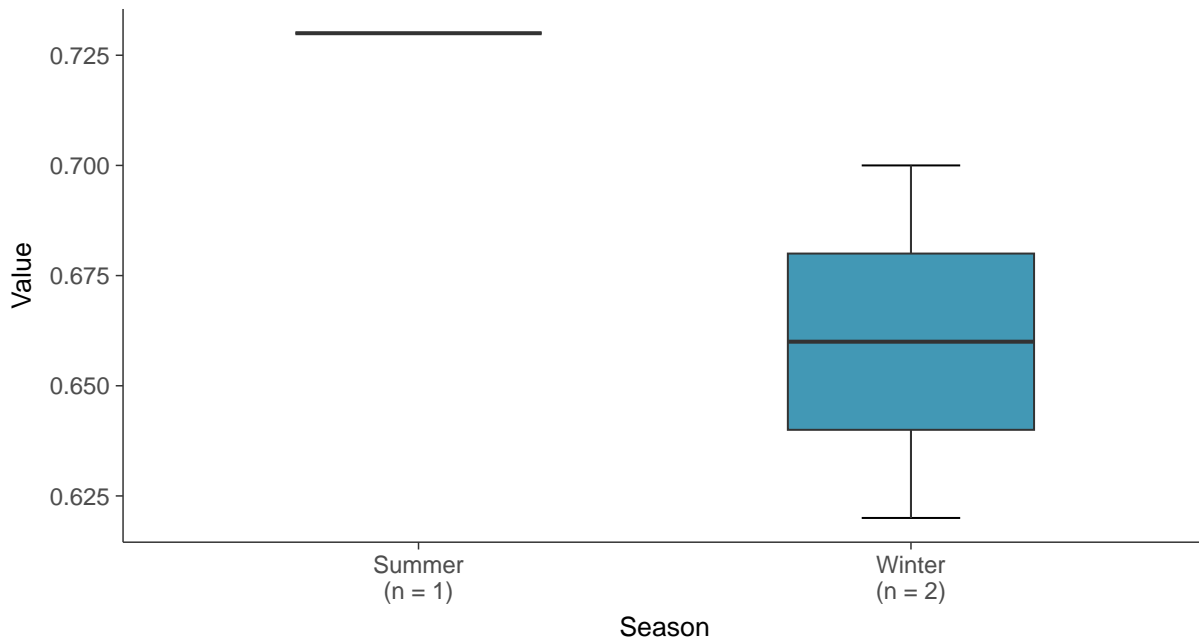
Boxplot

Potassium, MW-10 (mg/L)



Boxplot by Season

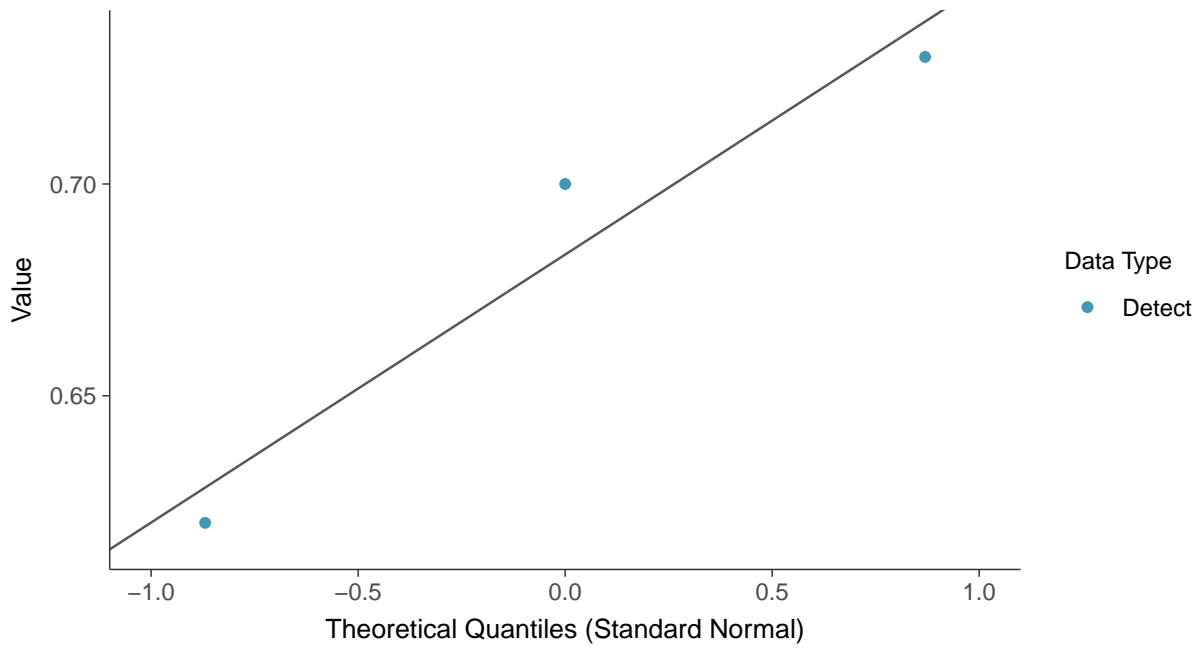
Potassium, MW-10 (mg/L)





Normal Q-Q plot

Potassium, MW-10 (mg/L)



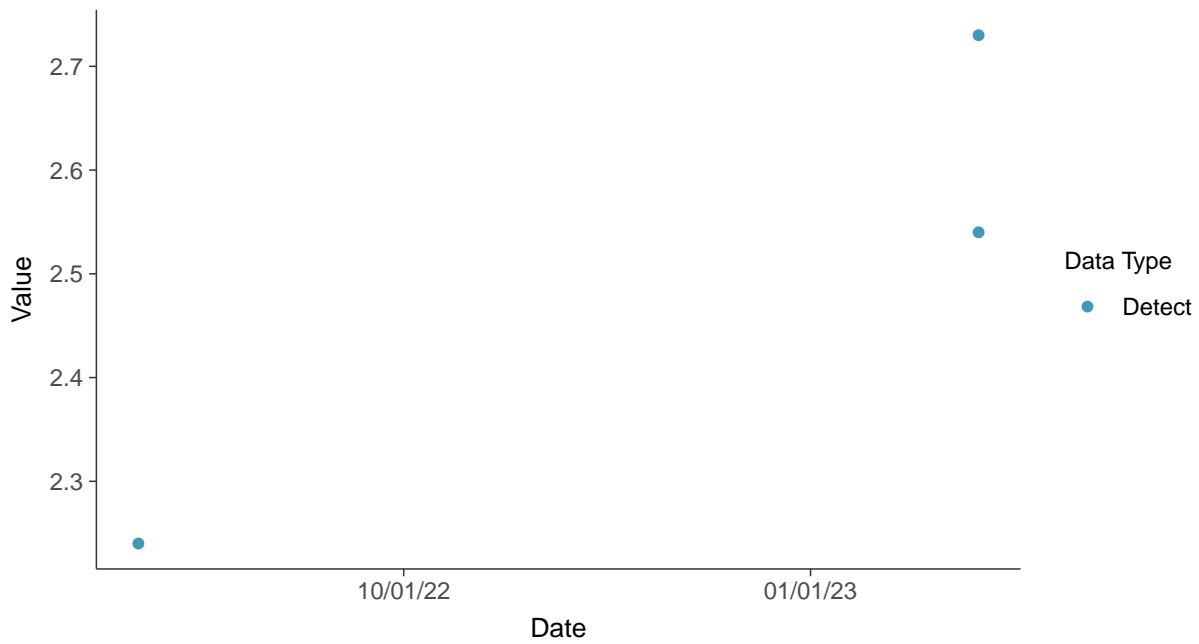


Other: Sodium, MW-10

ID: 10_3_28

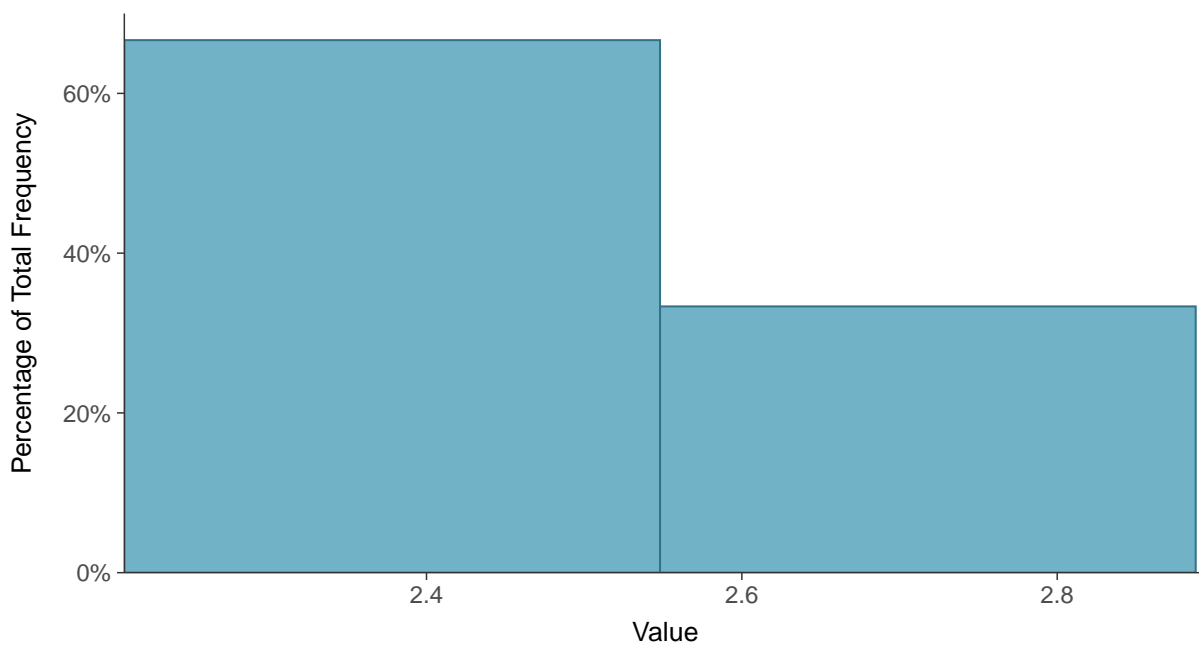
Scatter Plot

Sodium, MW-10 (mg/L)



Histogram

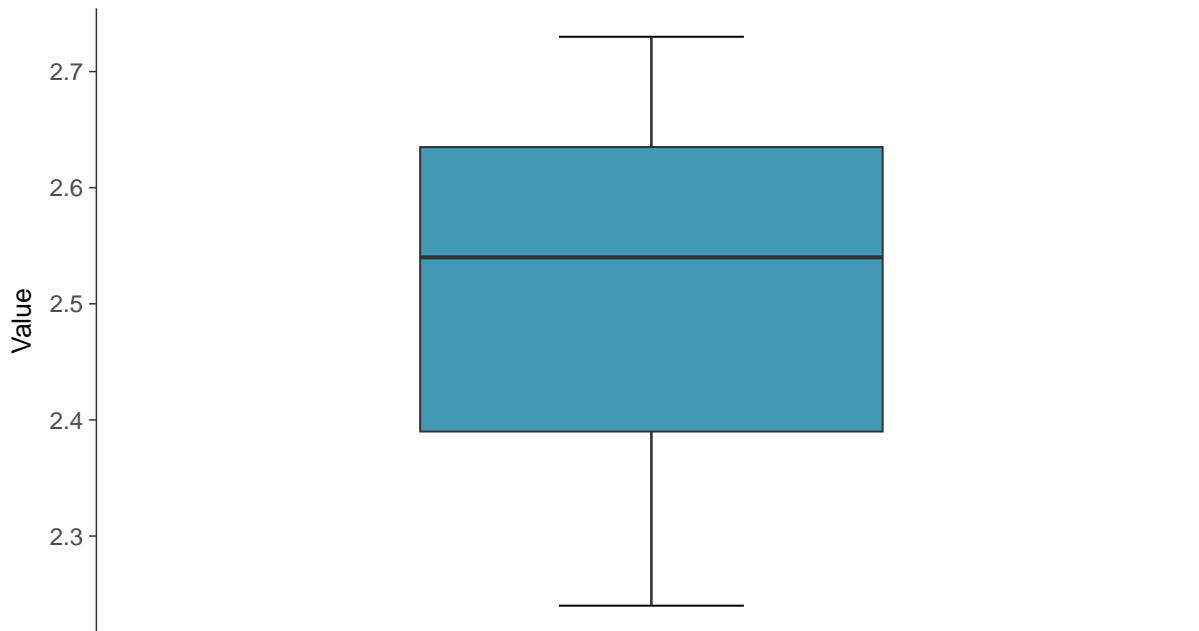
Sodium, MW-10 (mg/L)





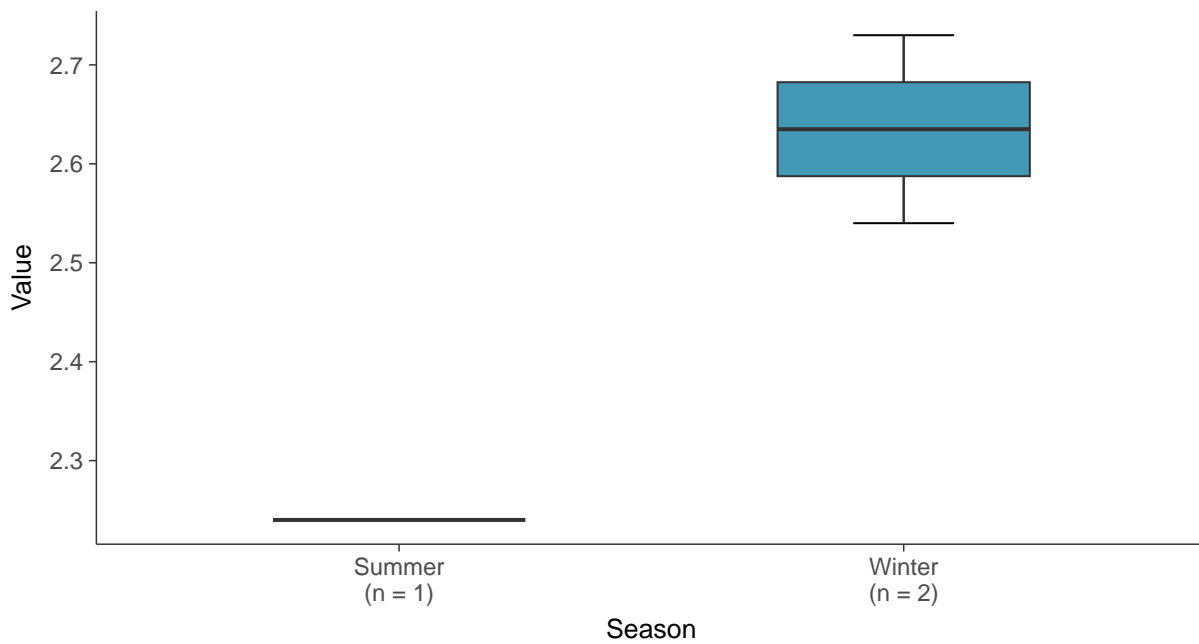
Boxplot

Sodium, MW-10 (mg/L)



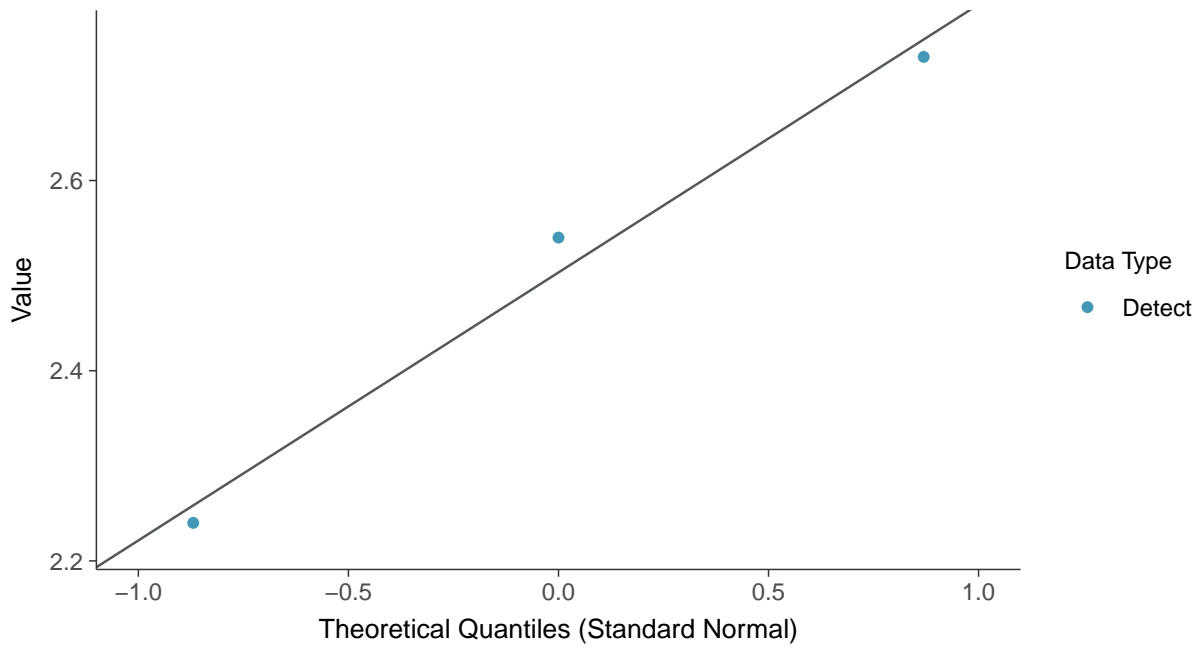
Boxplot by Season

Sodium, MW-10 (mg/L)





Normal Q-Q plot
Sodium, MW-10 (mg/L)



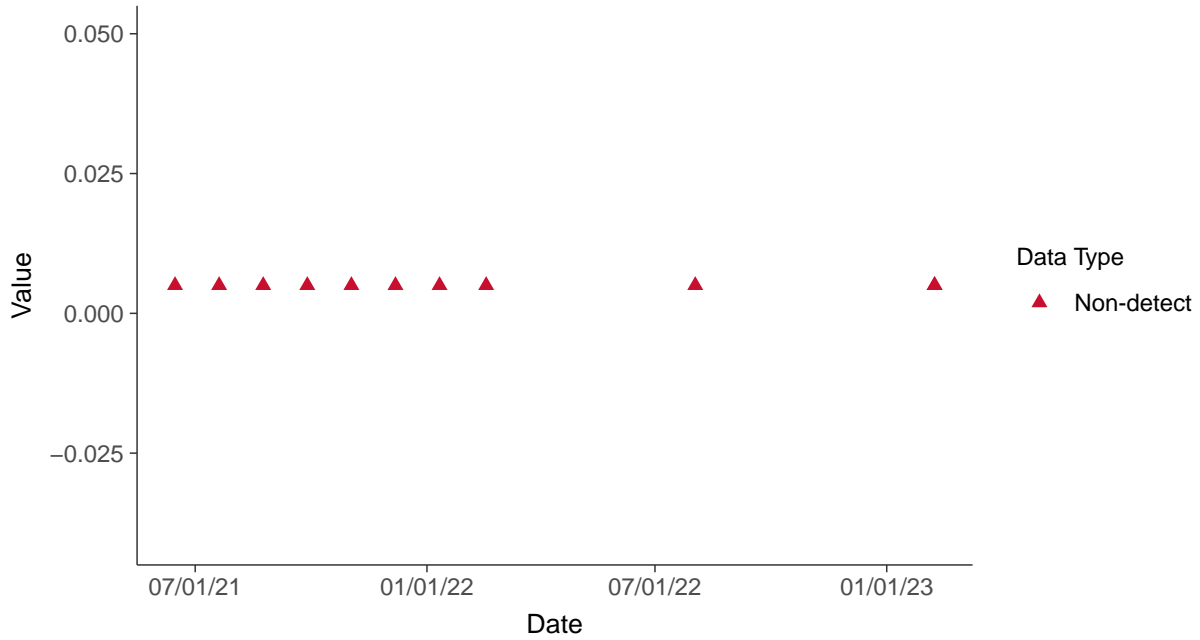


Part 115: Copper, MW-10

ID: 10_5_37

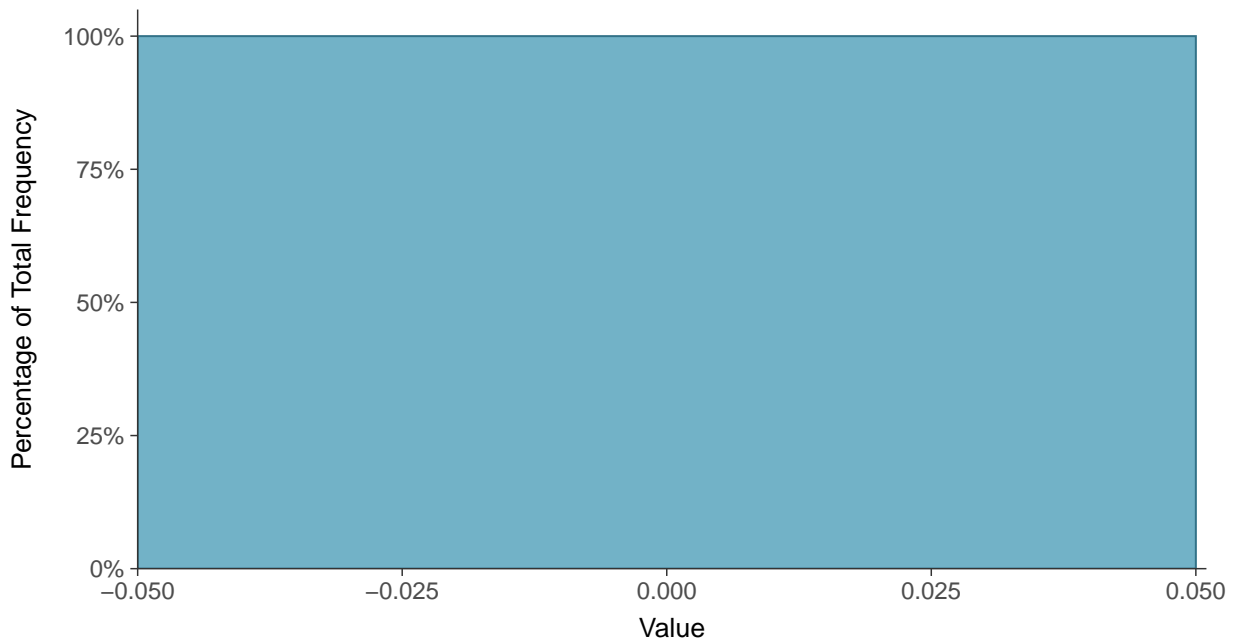
Scatter Plot

Copper, MW-10 (mg/L)



Histogram

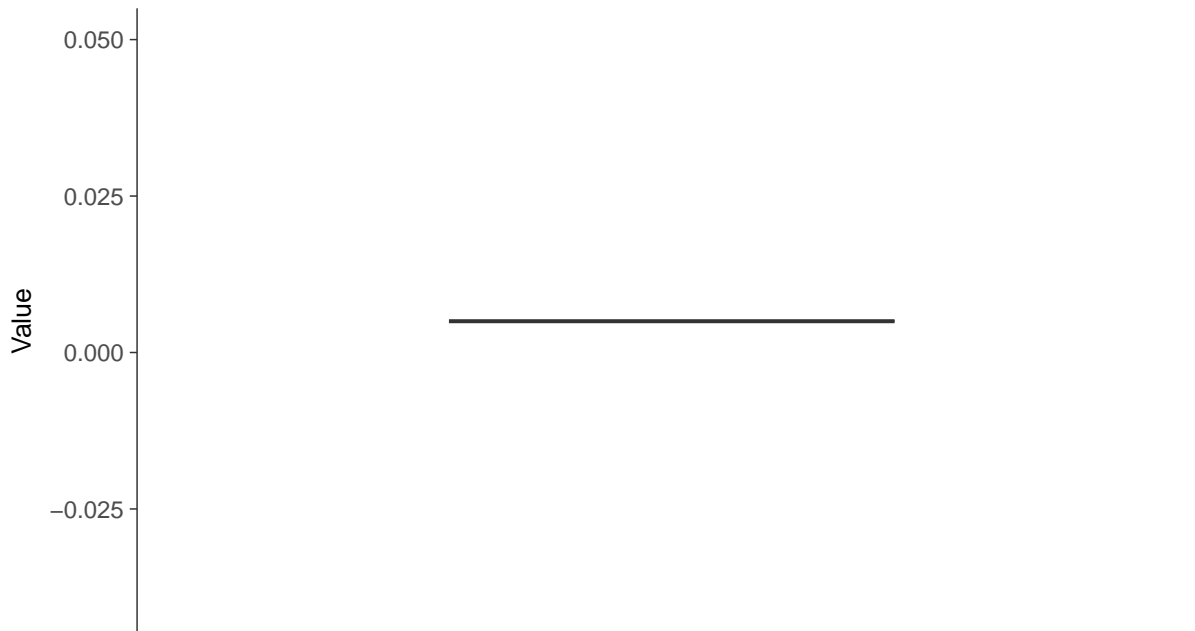
Copper, MW-10 (mg/L)





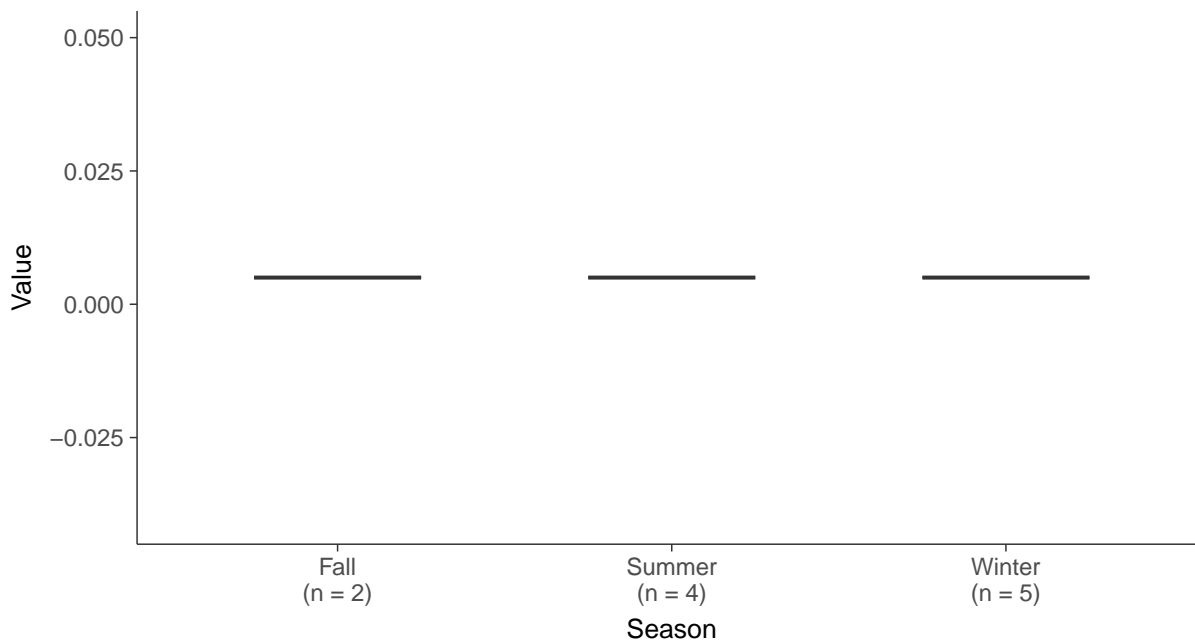
Boxplot

Copper, MW-10 (mg/L)



Boxplot by Season

Copper, MW-10 (mg/L)



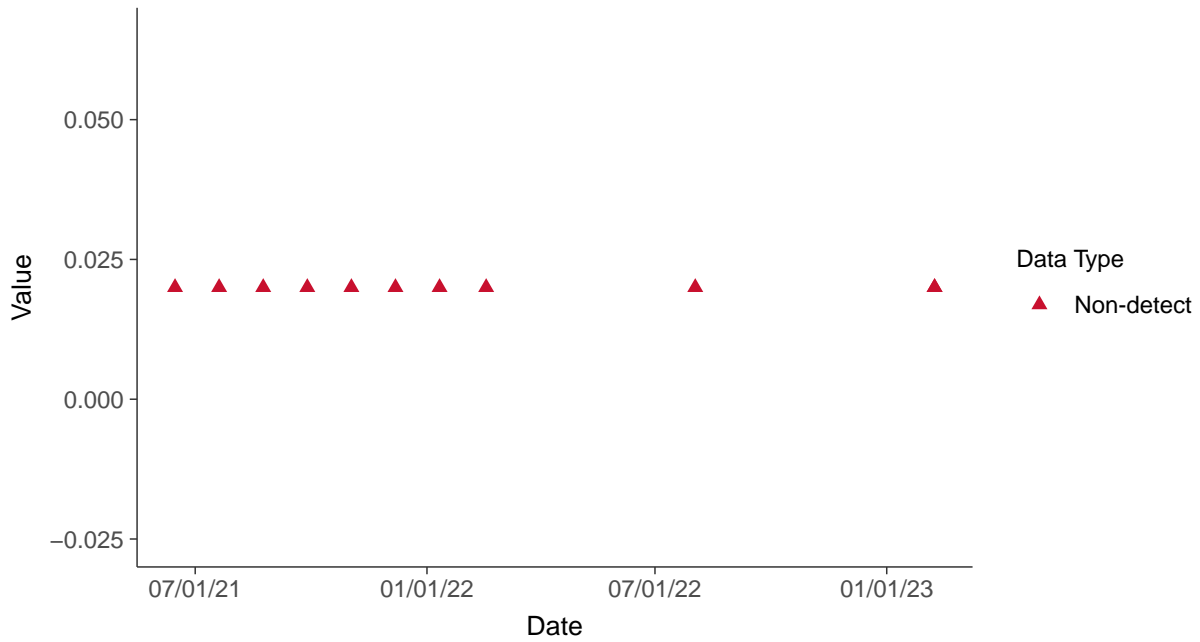


Part 115: Iron, MW-10

ID: 10_5_38

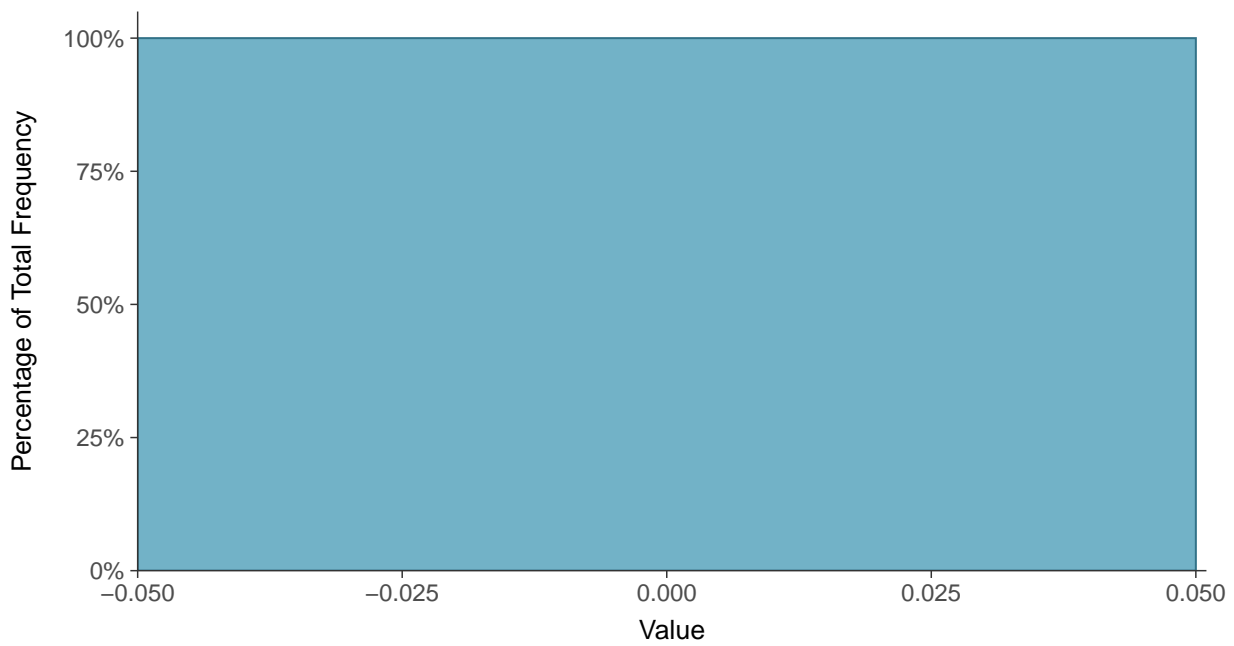
Scatter Plot

Iron, MW-10 (mg/L)



Histogram

Iron, MW-10 (mg/L)





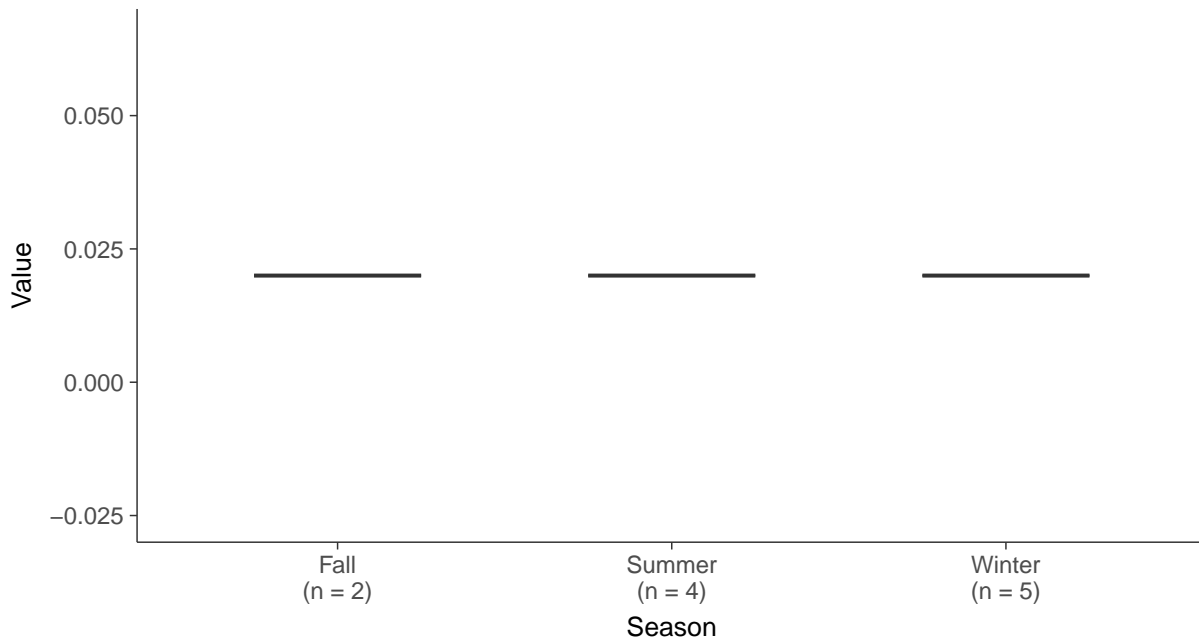
Boxplot

Iron, MW-10 (mg/L)



Boxplot by Season

Iron, MW-10 (mg/L)



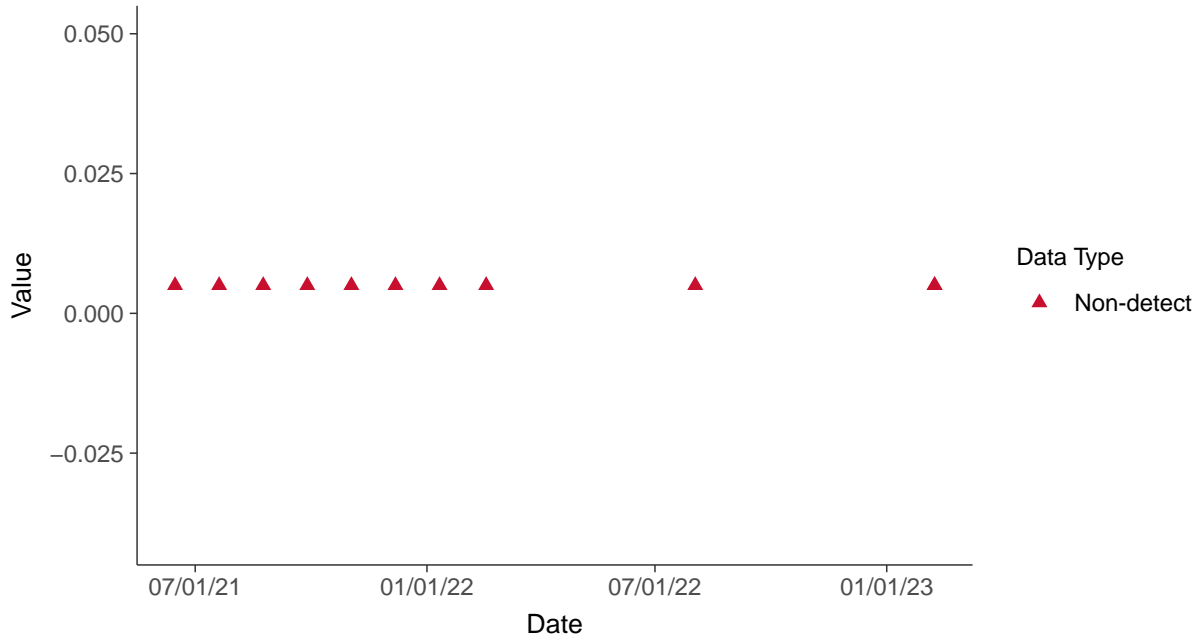


Part 115: Nickel, MW-10

ID: 10_5_39

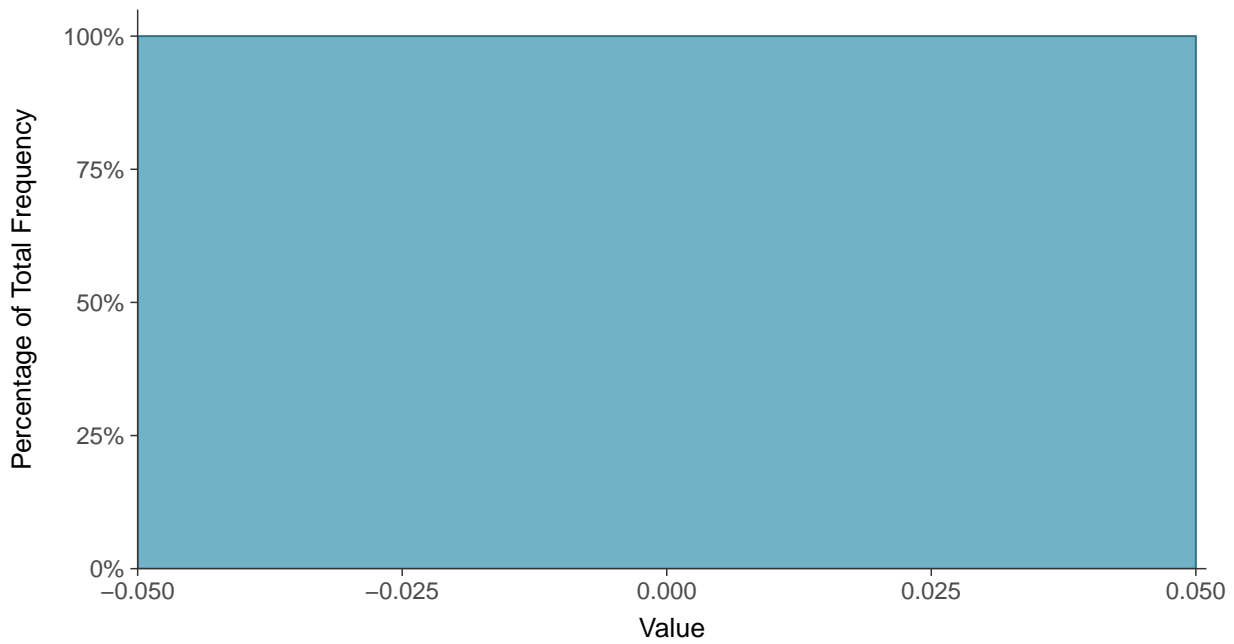
Scatter Plot

Nickel, MW-10 (mg/L)



Histogram

Nickel, MW-10 (mg/L)





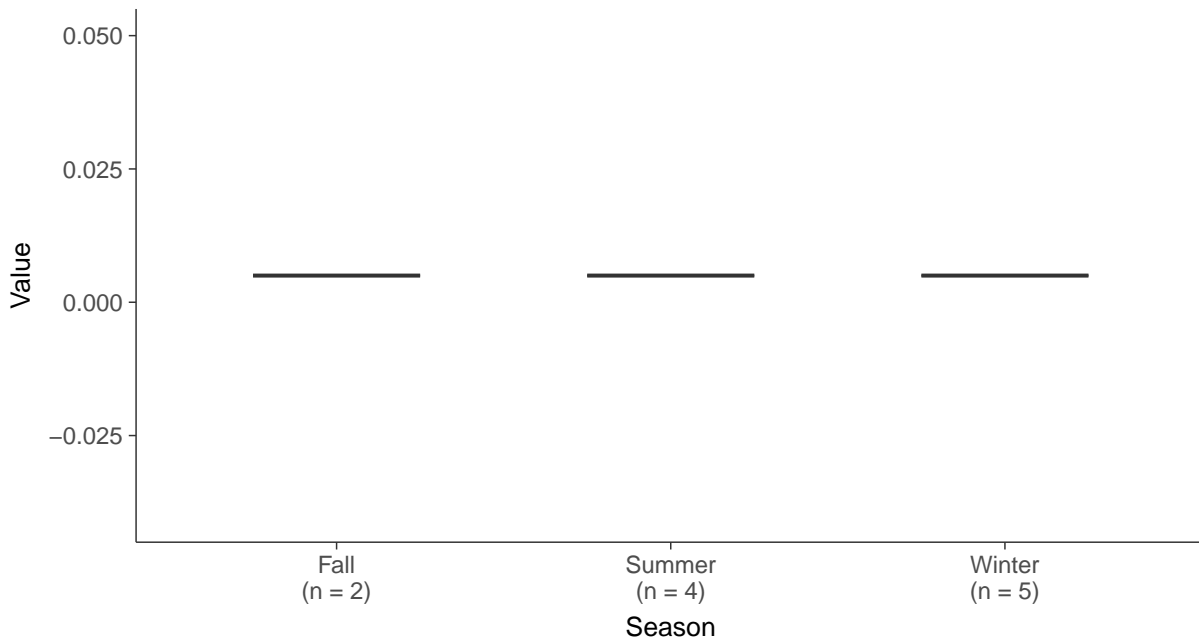
Boxplot

Nickel, MW-10 (mg/L)



Boxplot by Season

Nickel, MW-10 (mg/L)



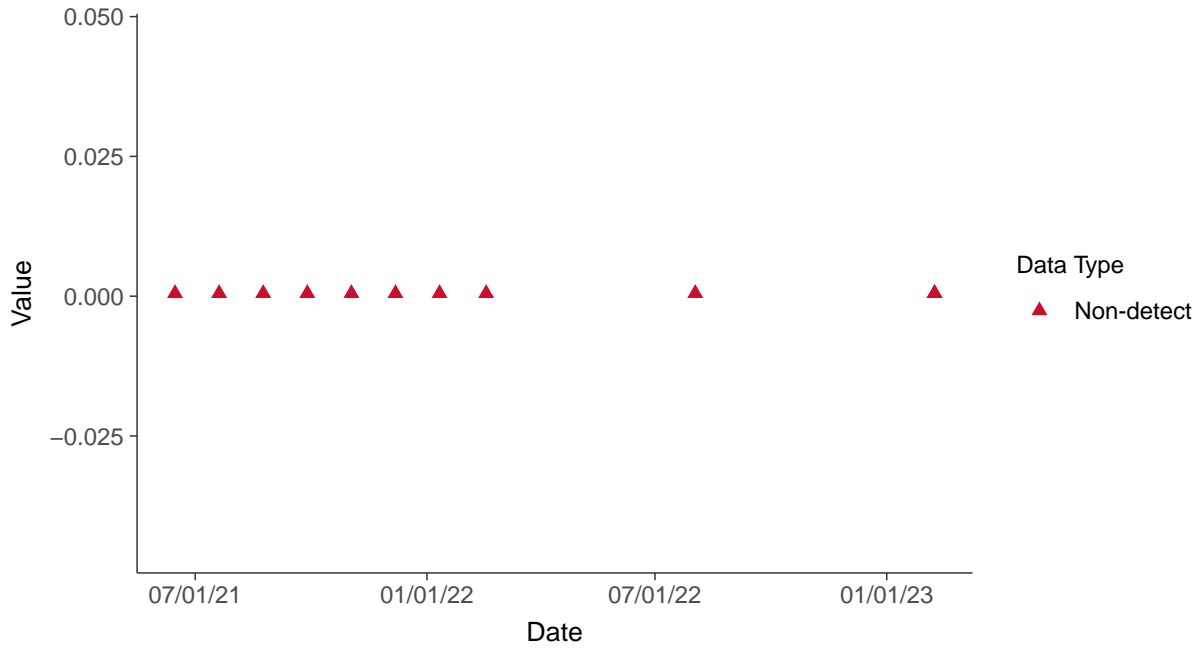


Part 115: Silver, MW-10

ID: 10_5_40

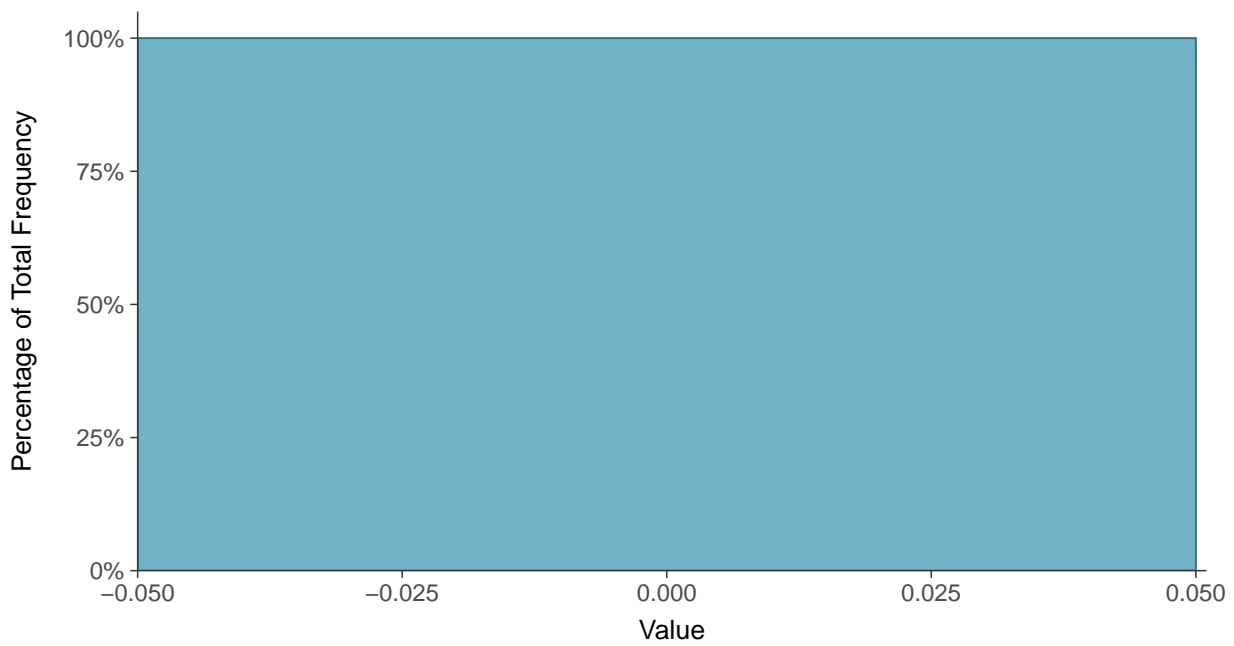
Scatter Plot

Silver, MW-10 (mg/L)



Histogram

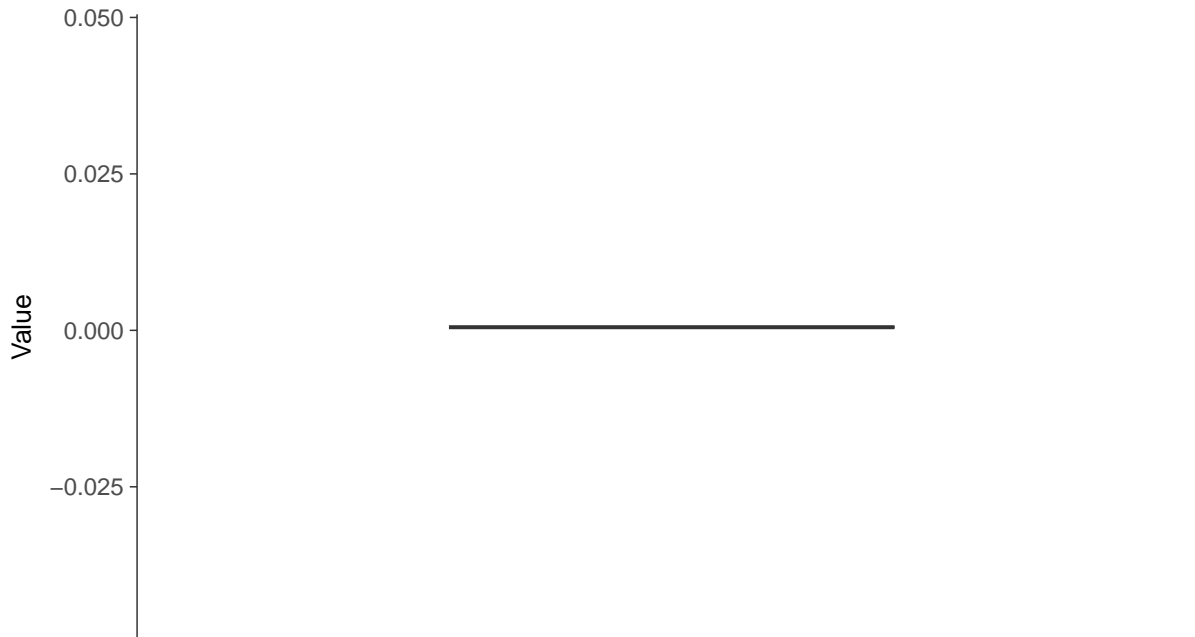
Silver, MW-10 (mg/L)





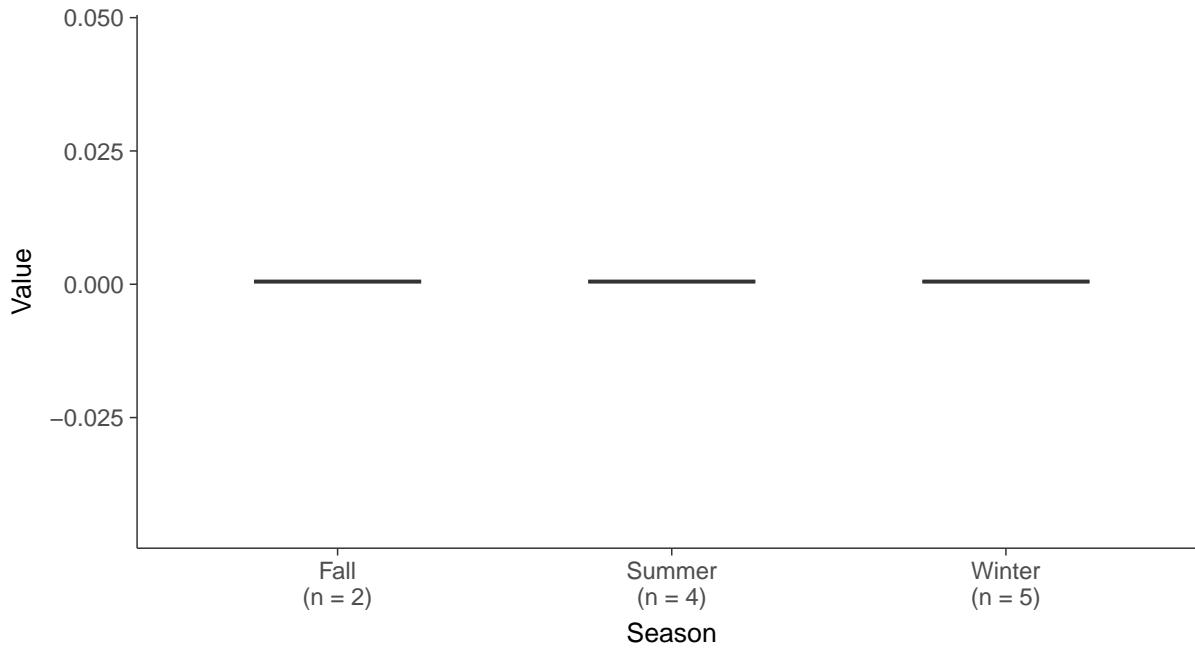
Boxplot

Silver, MW-10 (mg/L)



Boxplot by Season

Silver, MW-10 (mg/L)



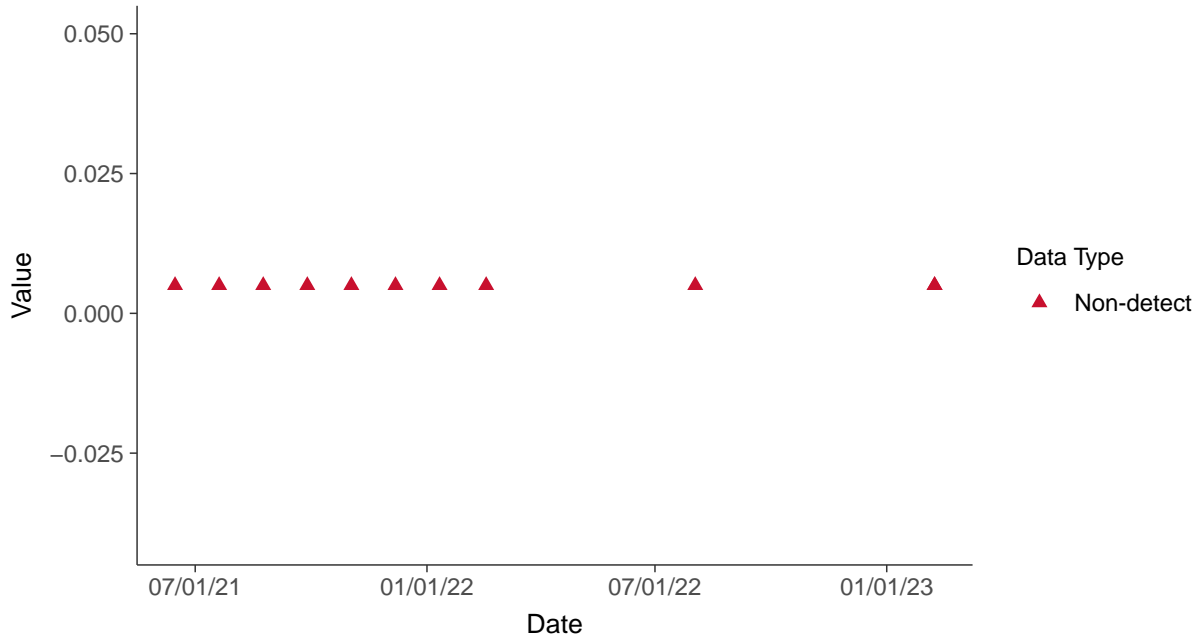


Part 115: Vanadium, MW-10

ID: 10_5_41

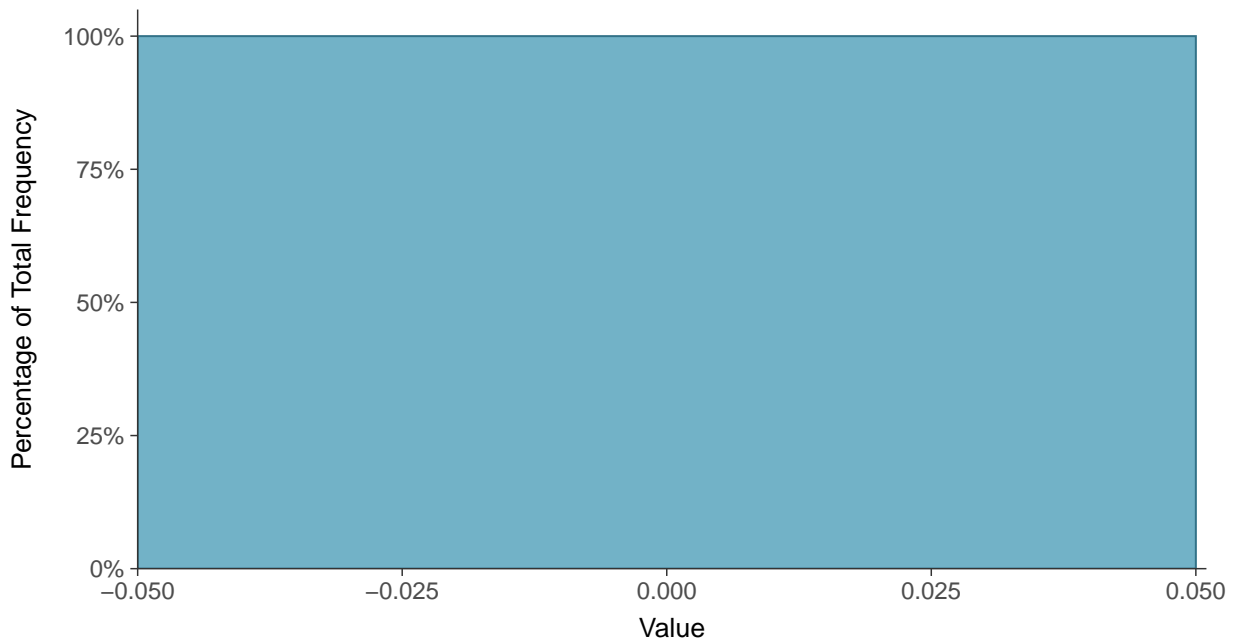
Scatter Plot

Vanadium, MW-10 (mg/L)



Histogram

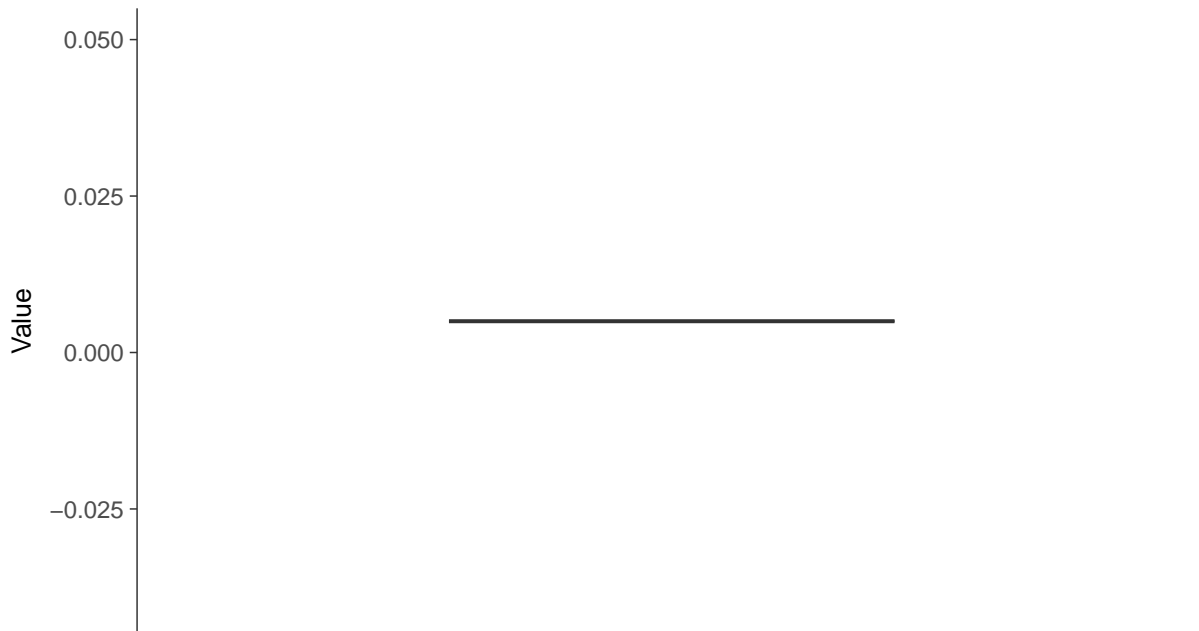
Vanadium, MW-10 (mg/L)





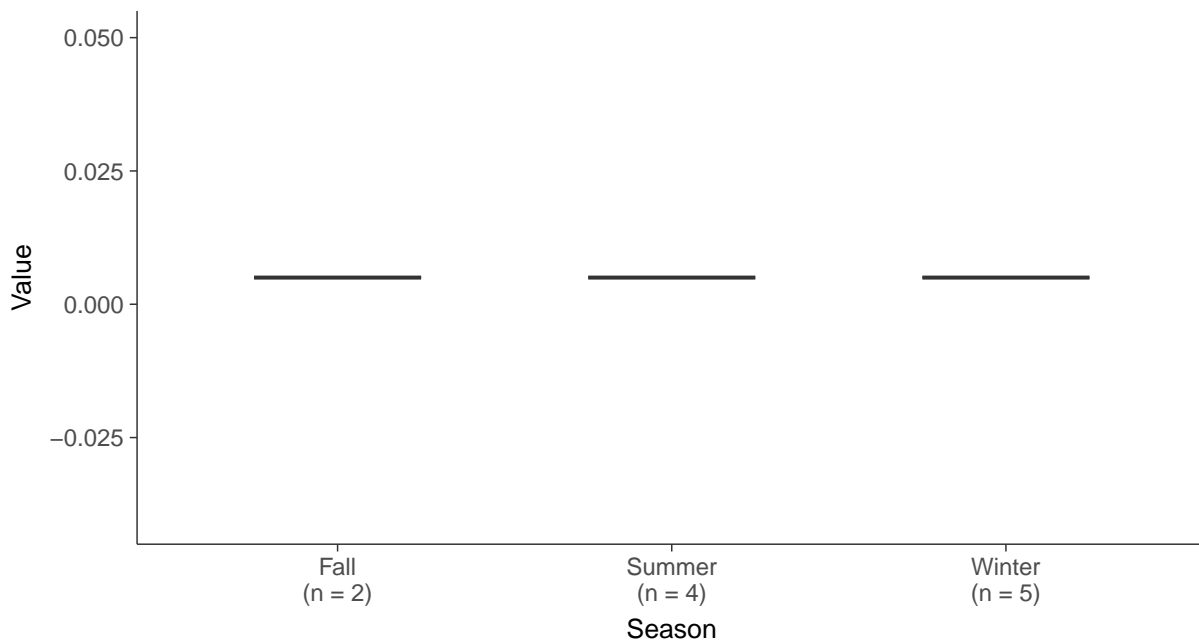
Boxplot

Vanadium, MW-10 (mg/L)



Boxplot by Season

Vanadium, MW-10 (mg/L)



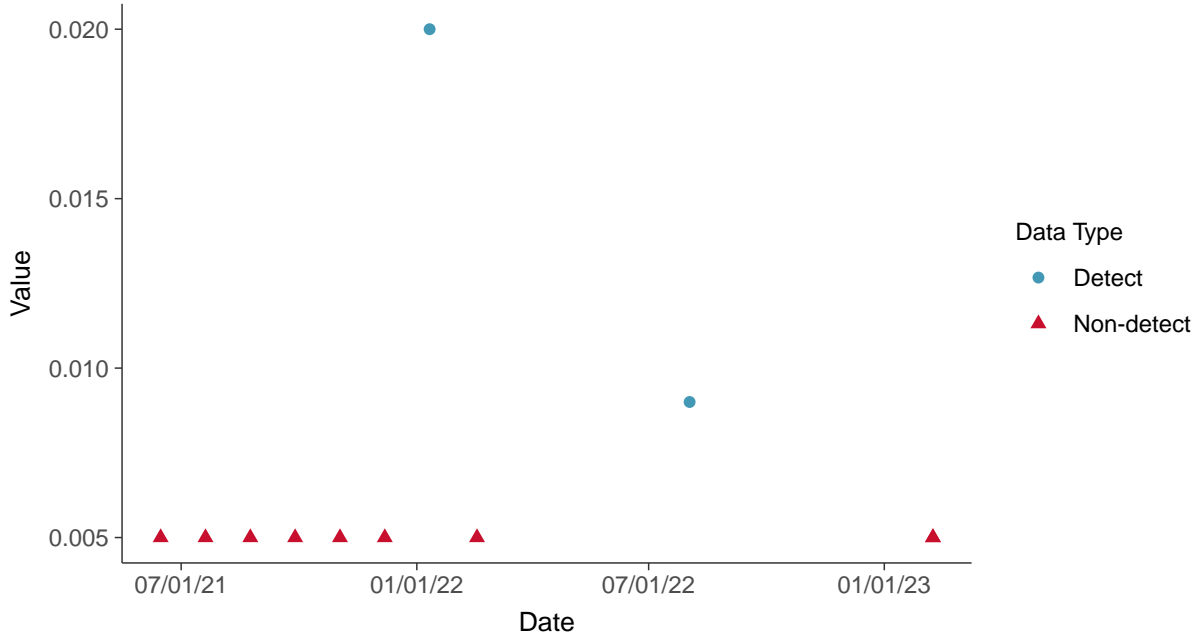


Part 115: Zinc, MW-10

ID: 10_5_42

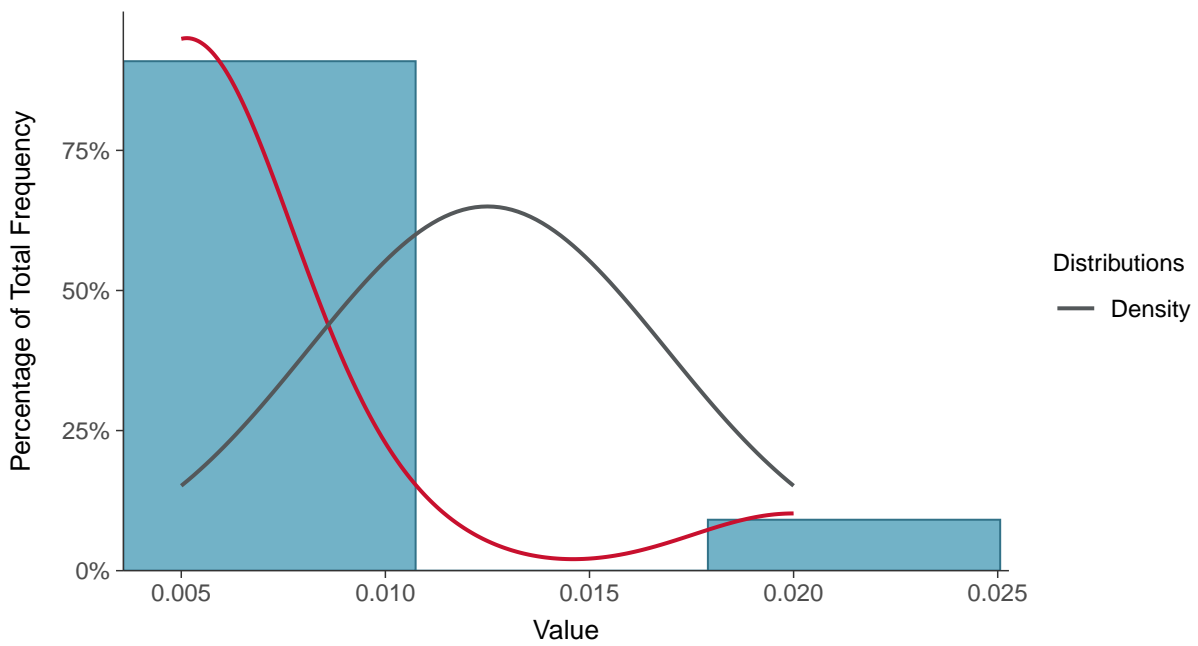
Scatter Plot

Zinc, MW-10 (mg/L)



Histogram

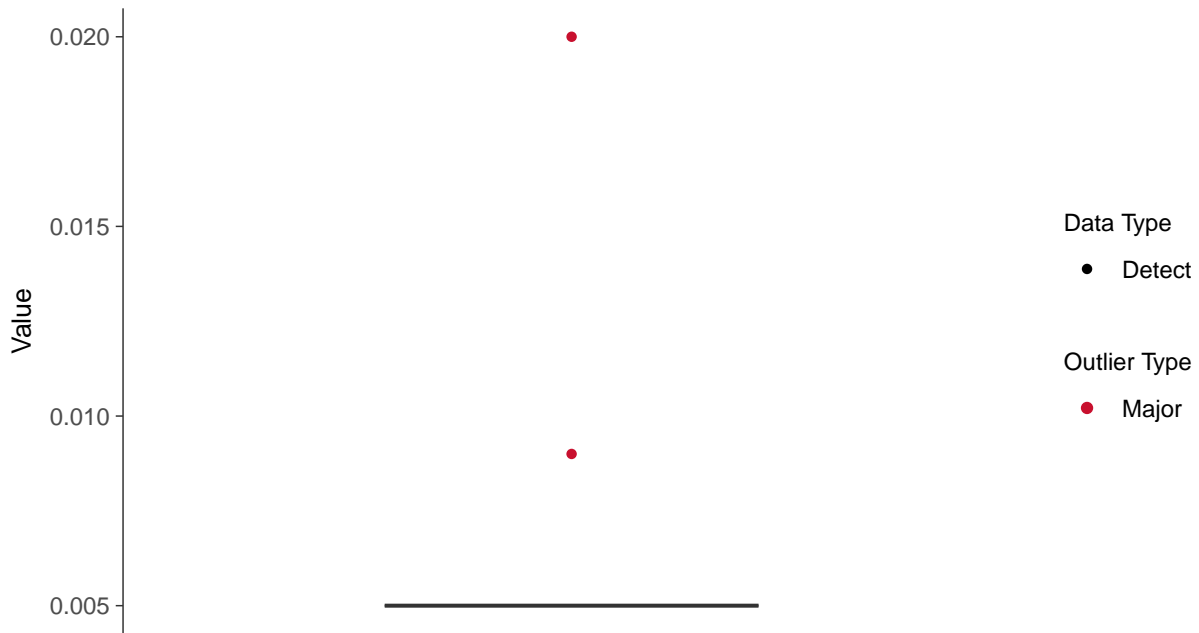
Zinc, MW-10 (mg/L)





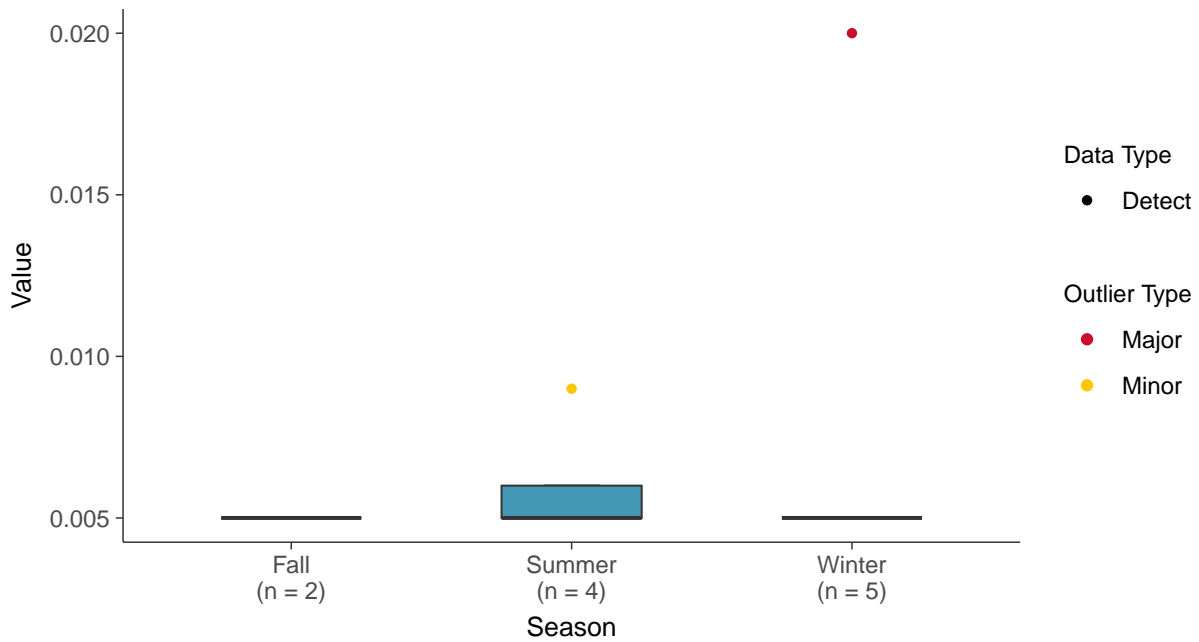
Boxplot

Zinc, MW-10 (mg/L)



Boxplot by Season

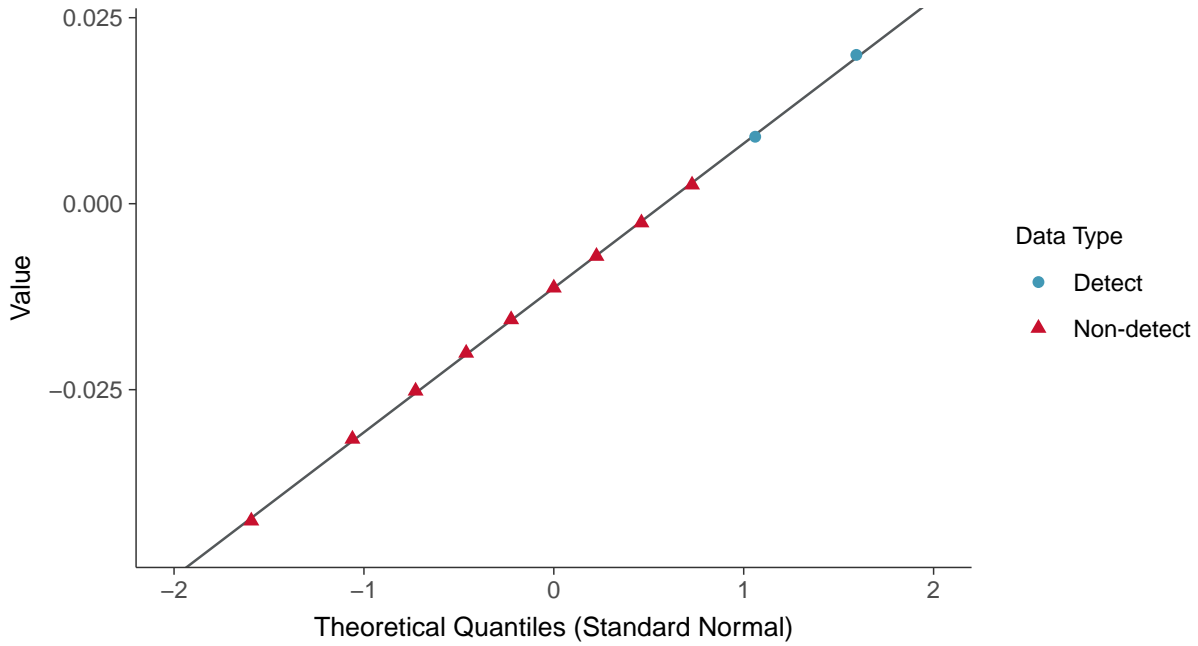
Zinc, MW-10 (mg/L)





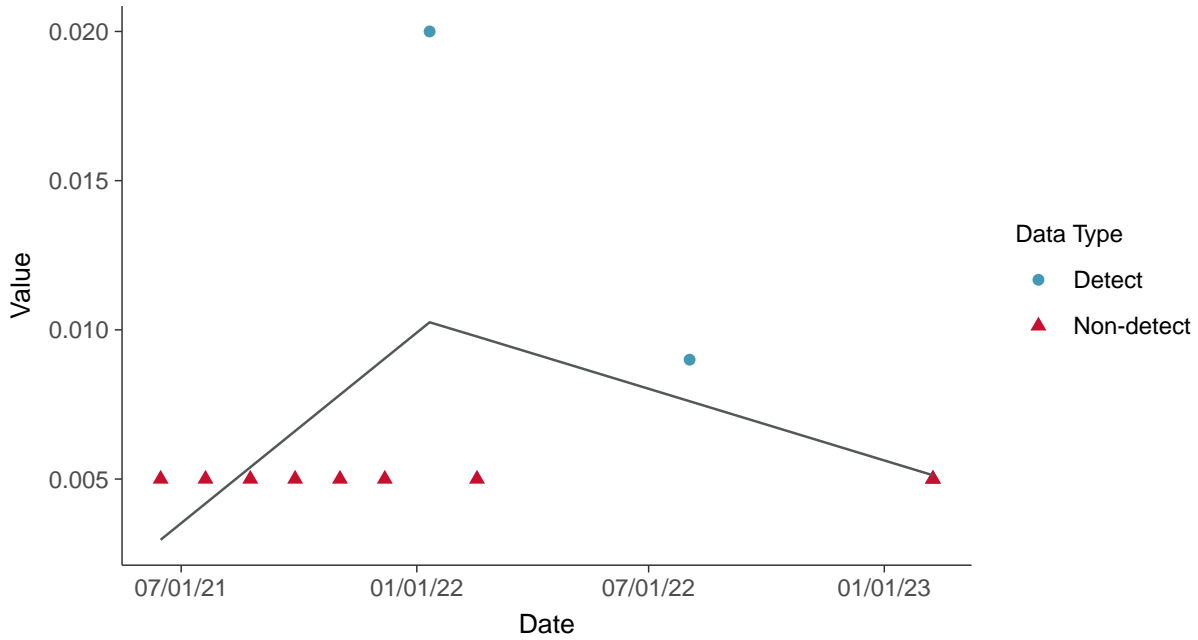
Normal Q-Q plot using ROS Imputed Estimates

Zinc, MW-10 (mg/L)



Trend Regression: Piecewise Linear-Linear

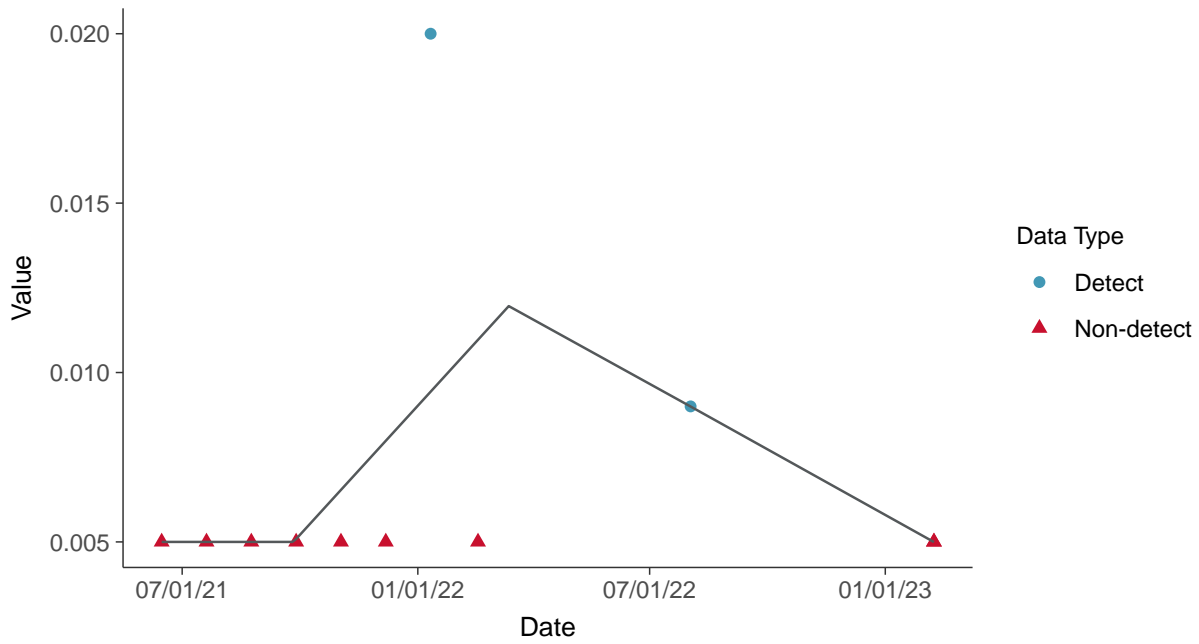
Zinc, MW-10 (mg/L)





Trend Regression: Piecewise Linear-Linear-Linear

Zinc, MW-10 (mg/L)



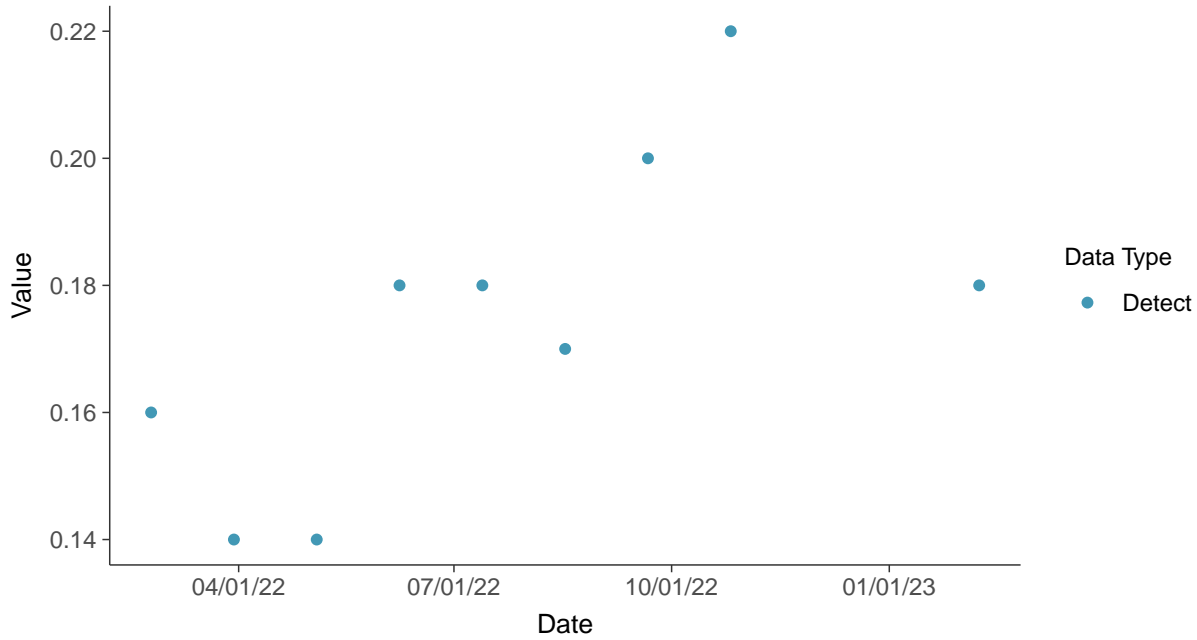


Appendix III: Boron, MW-13

ID: 13_1_01

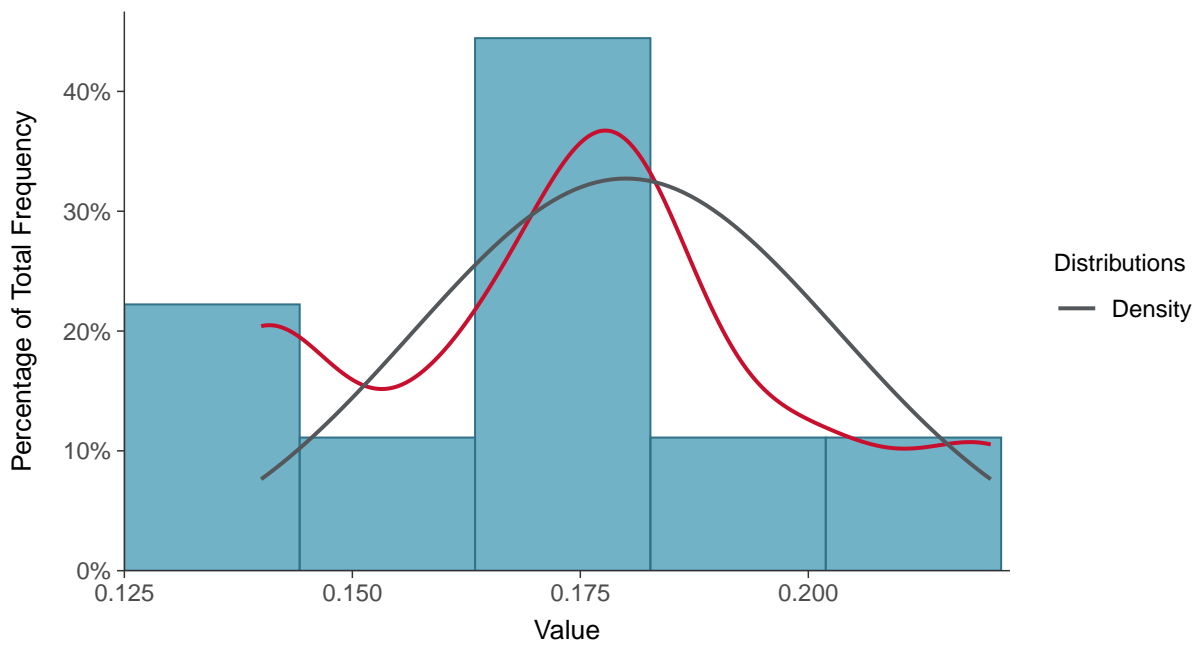
Scatter Plot

Boron, MW-13 (mg/L)



Histogram

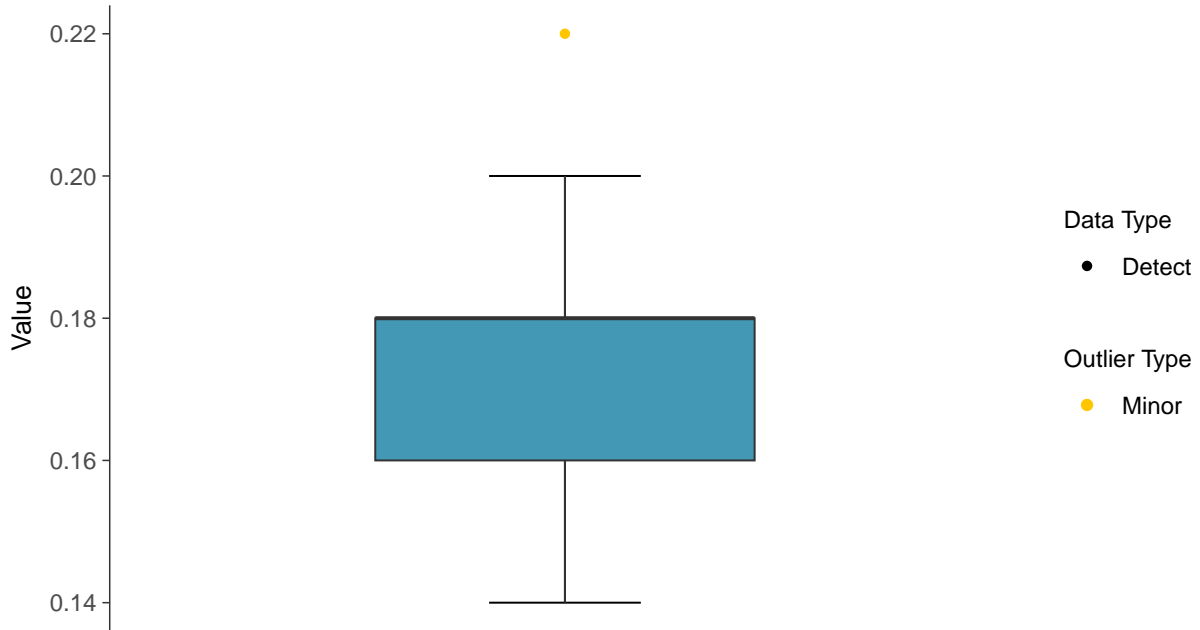
Boron, MW-13 (mg/L)





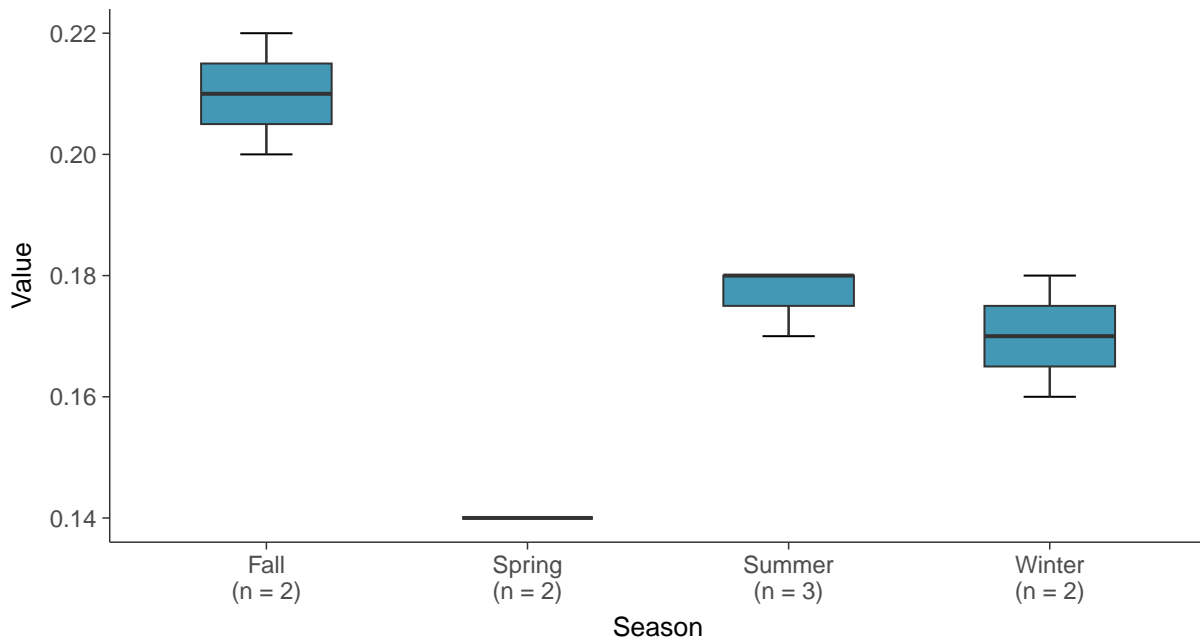
Boxplot

Boron, MW-13 (mg/L)



Boxplot by Season

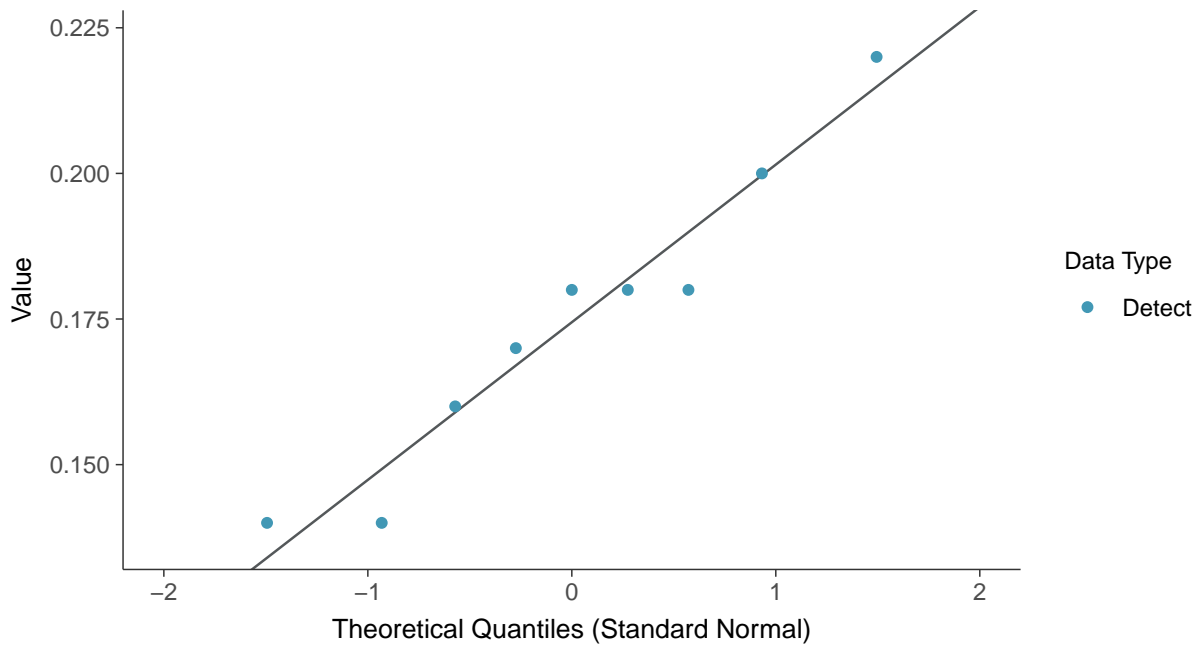
Boron, MW-13 (mg/L)





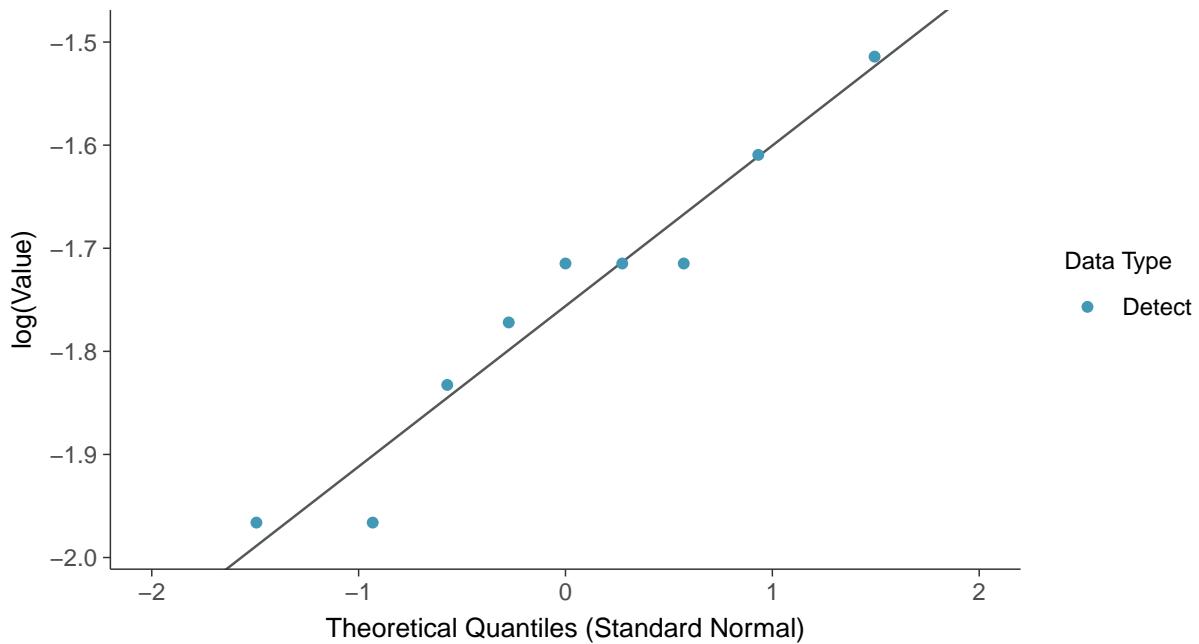
Normal Q-Q plot

Boron, MW-13 (mg/L)



Lognormal Q-Q plot

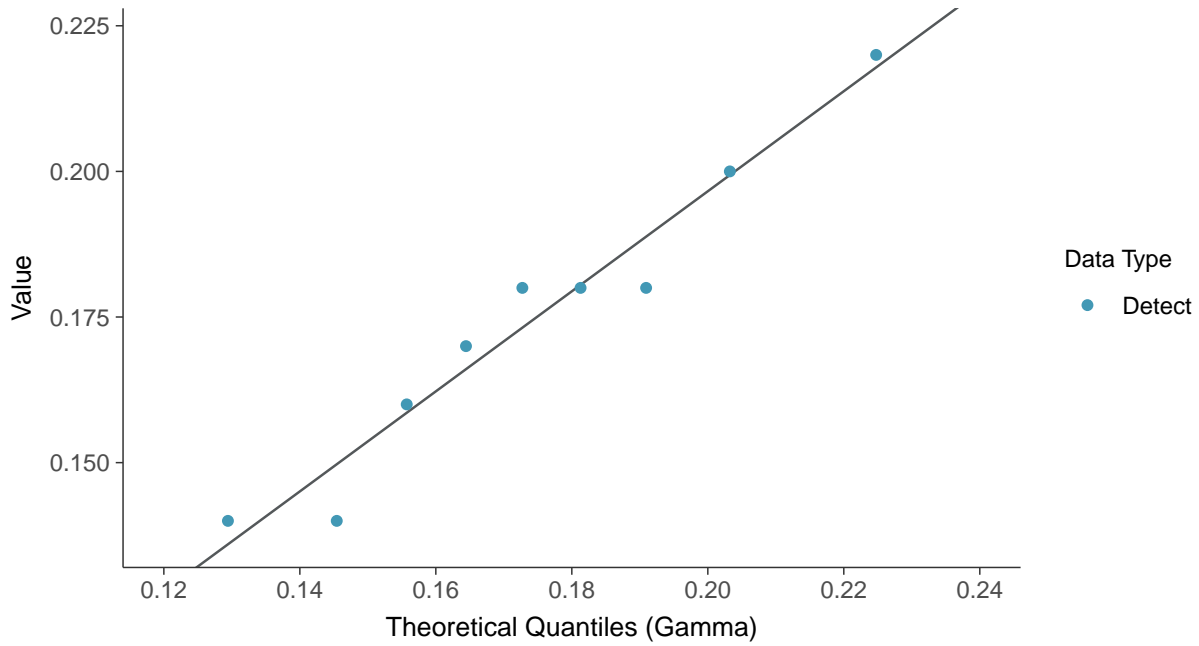
Boron, MW-13 (mg/L)





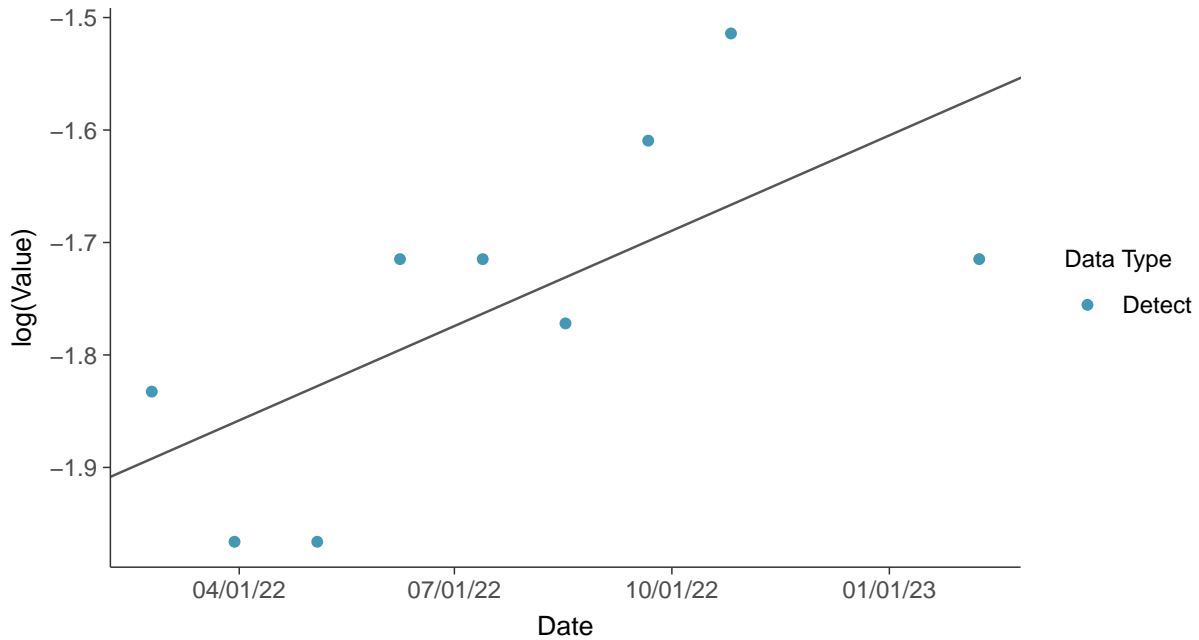
Gamma Q-Q plot

Boron, MW-13 (mg/L)



Trend Regression: Lognormal MLE

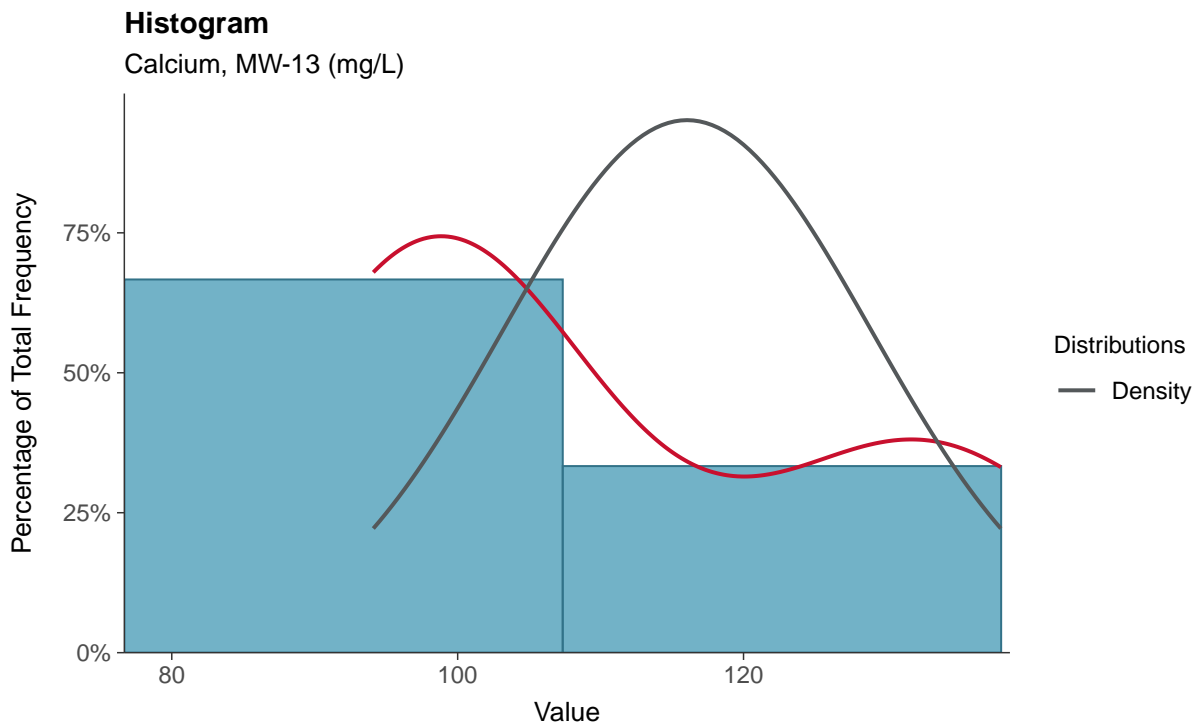
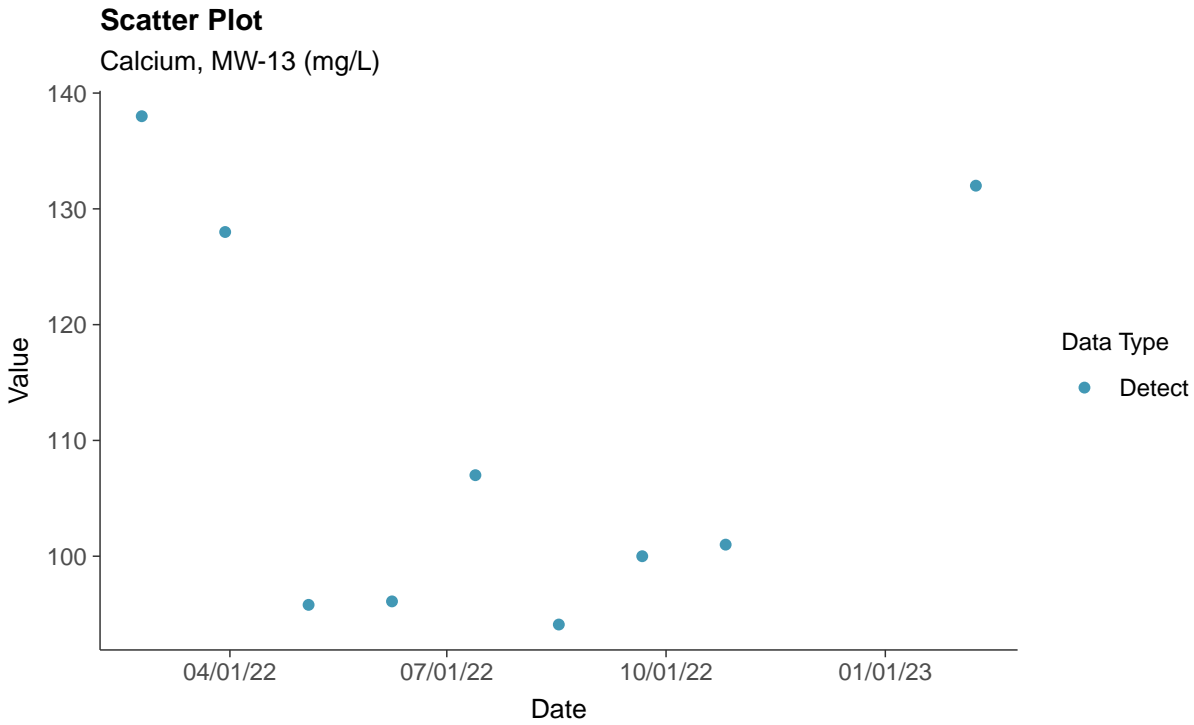
Boron, MW-13 (mg/L)





Appendix III: Calcium, MW-13

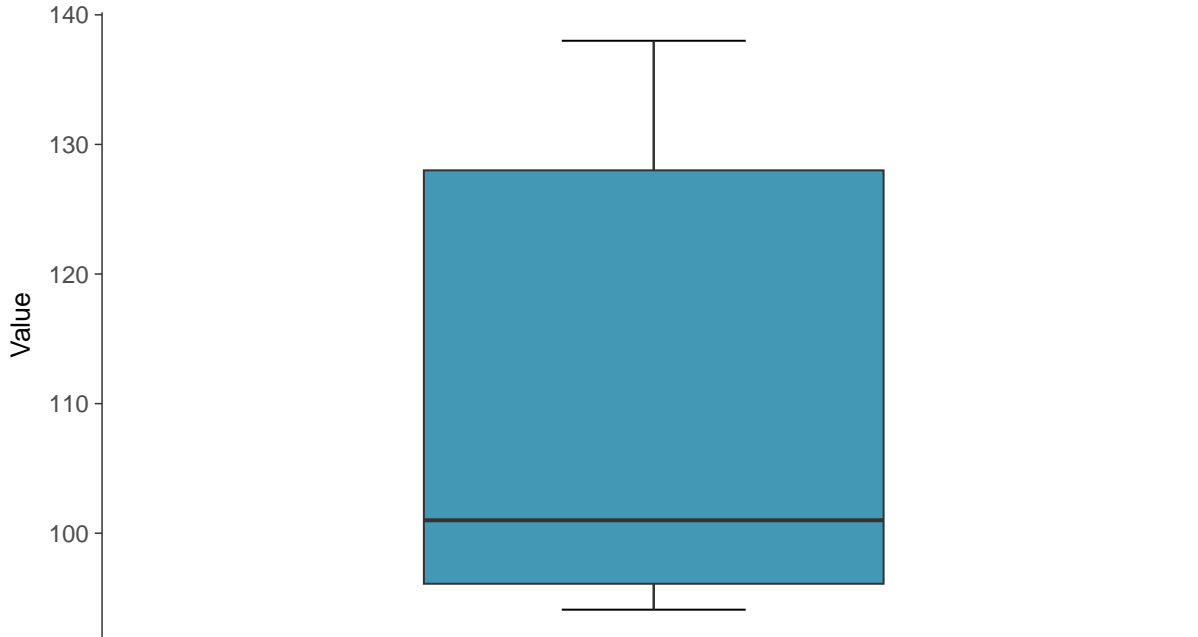
ID: 13_1_02





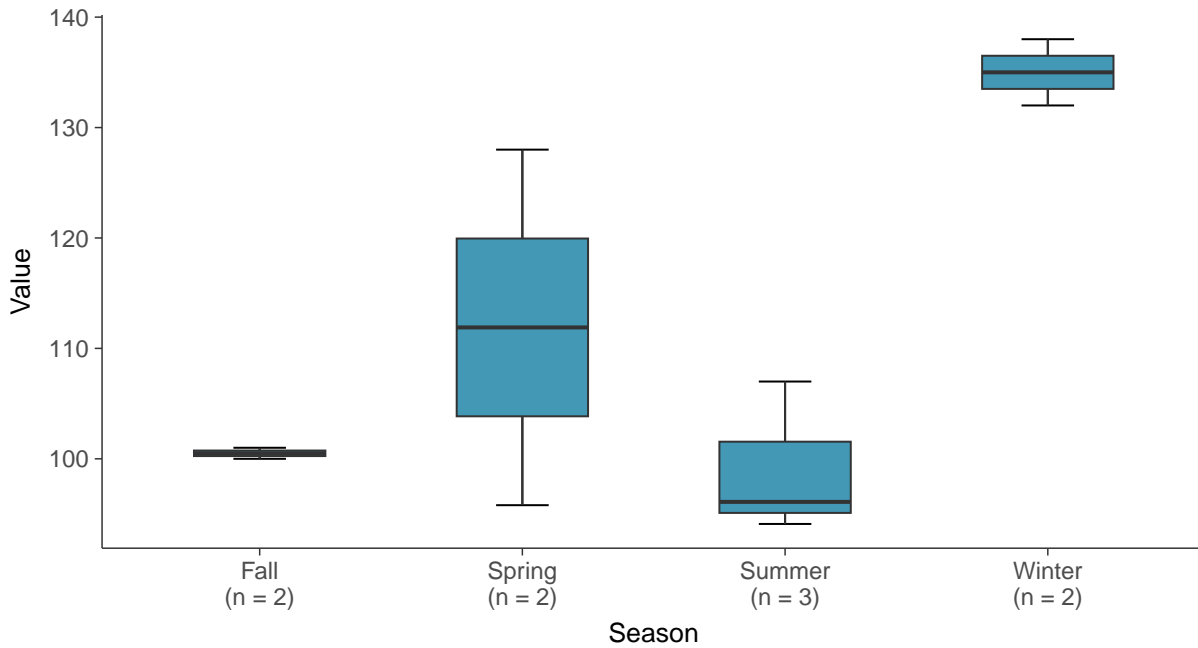
Boxplot

Calcium, MW-13 (mg/L)



Boxplot by Season

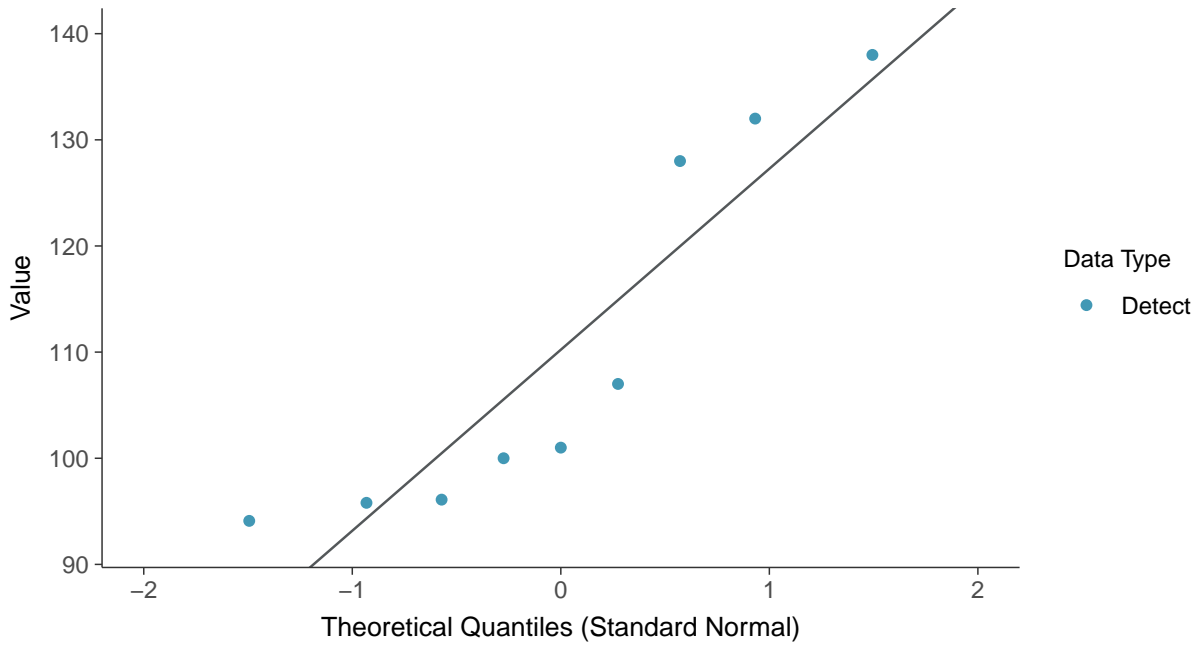
Calcium, MW-13 (mg/L)





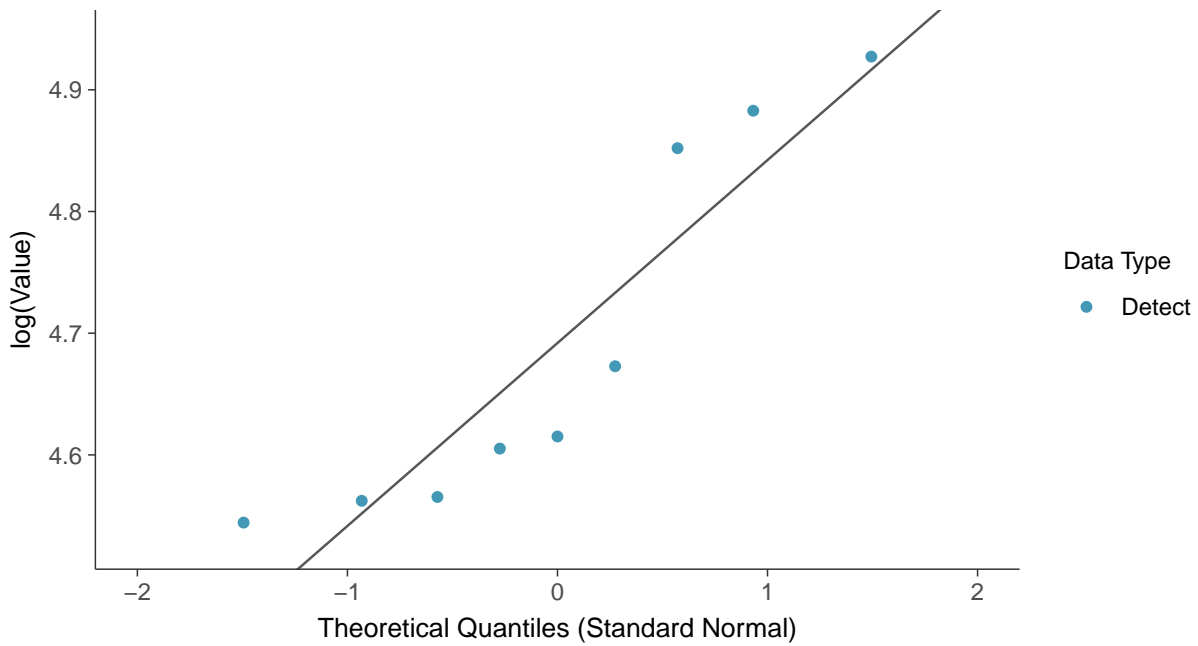
Normal Q-Q plot

Calcium, MW-13 (mg/L)



Lognormal Q-Q plot

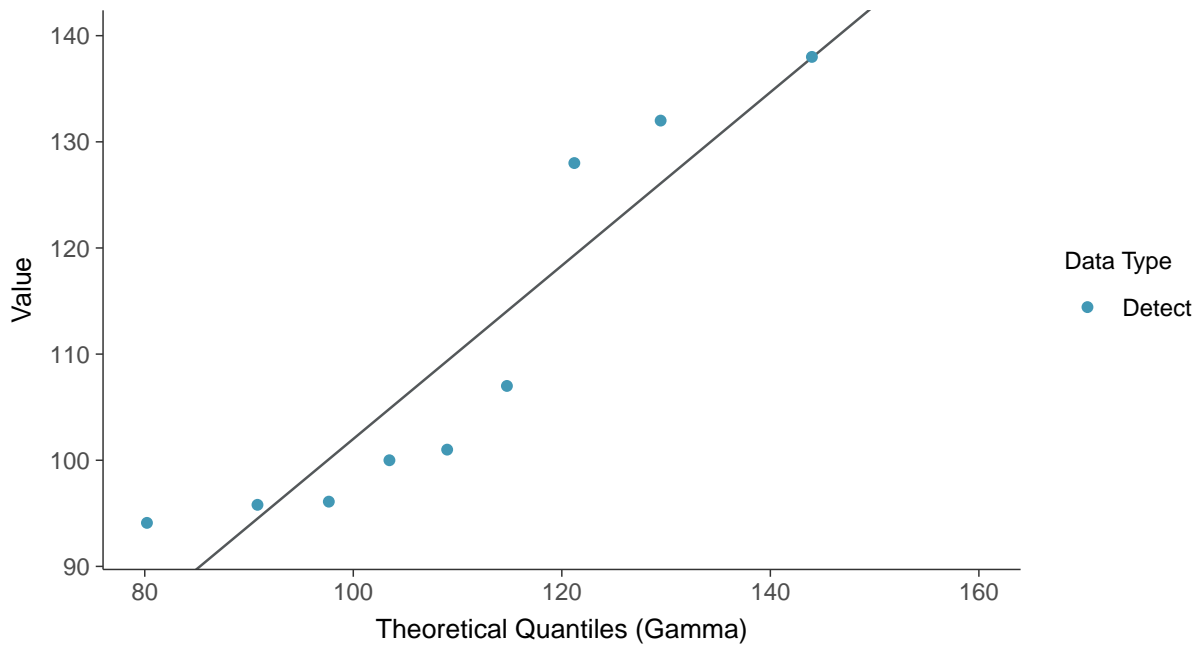
Calcium, MW-13 (mg/L)





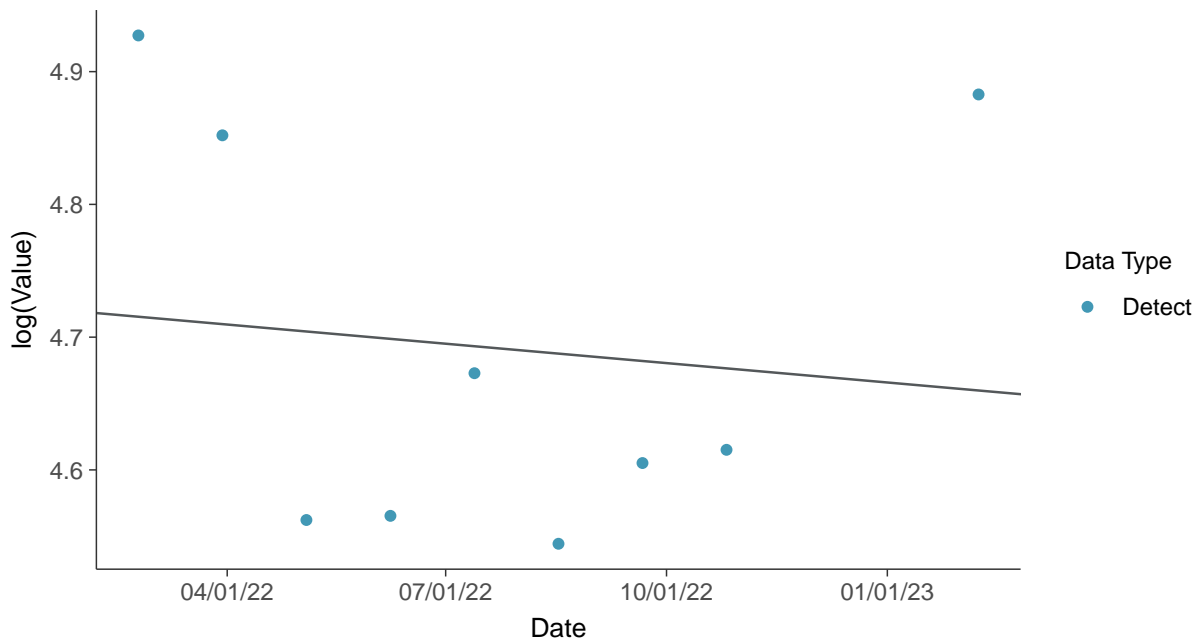
Gamma Q-Q plot

Calcium, MW-13 (mg/L)



Trend Regression: Lognormal MLE

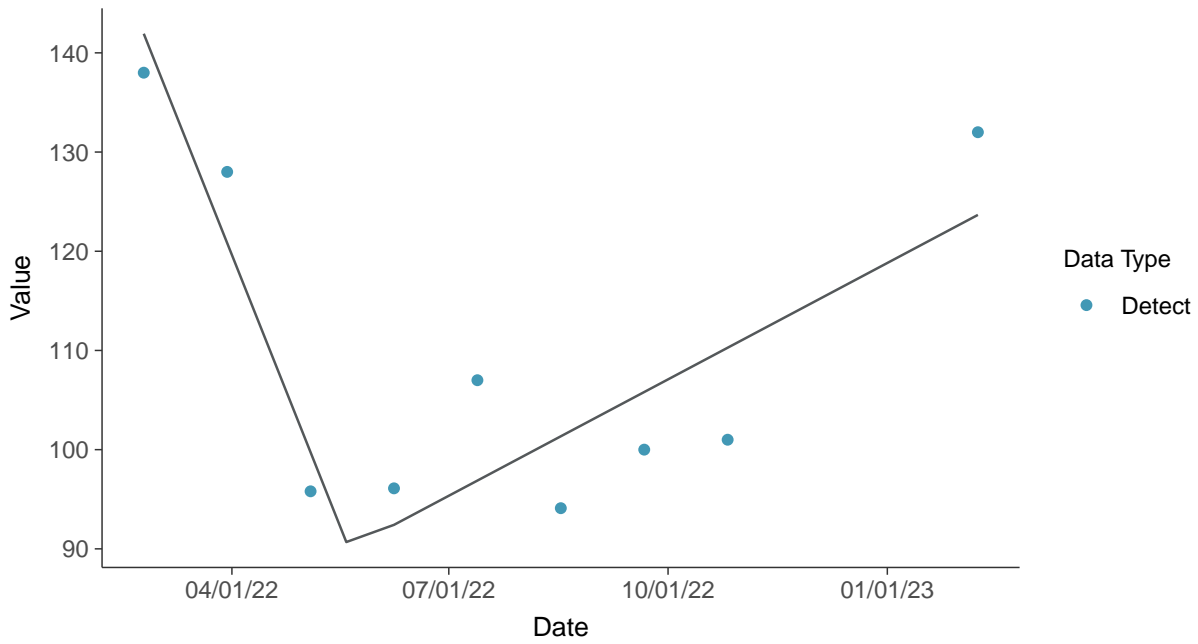
Calcium, MW-13 (mg/L)





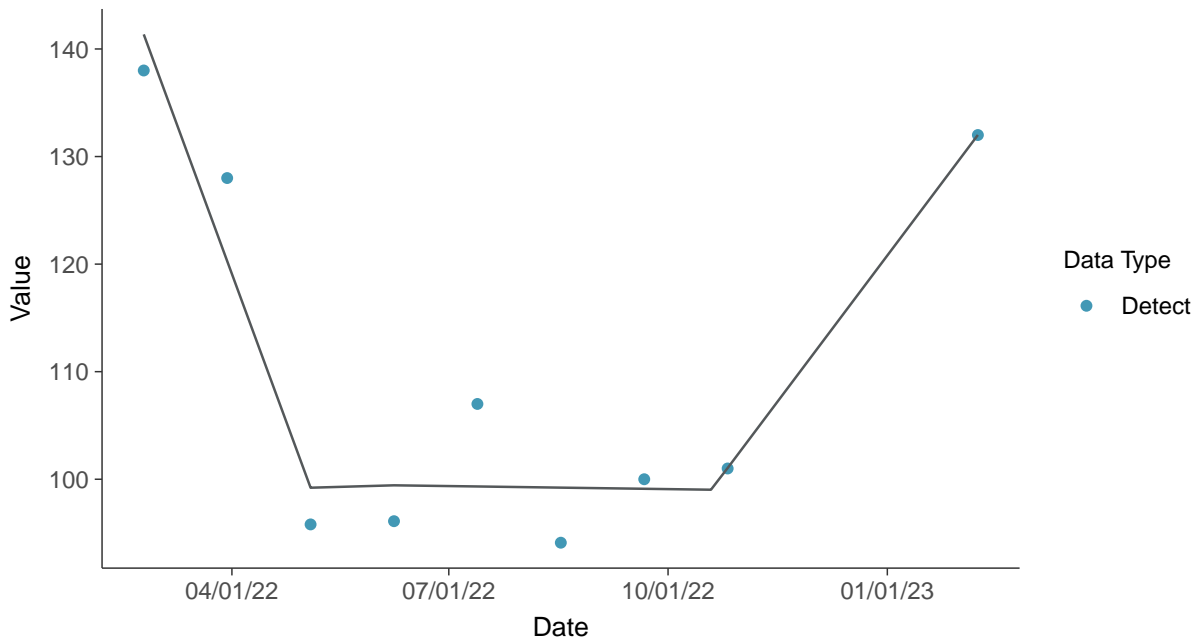
Trend Regression: Piecewise Linear-Linear

Calcium, MW-13 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Calcium, MW-13 (mg/L)

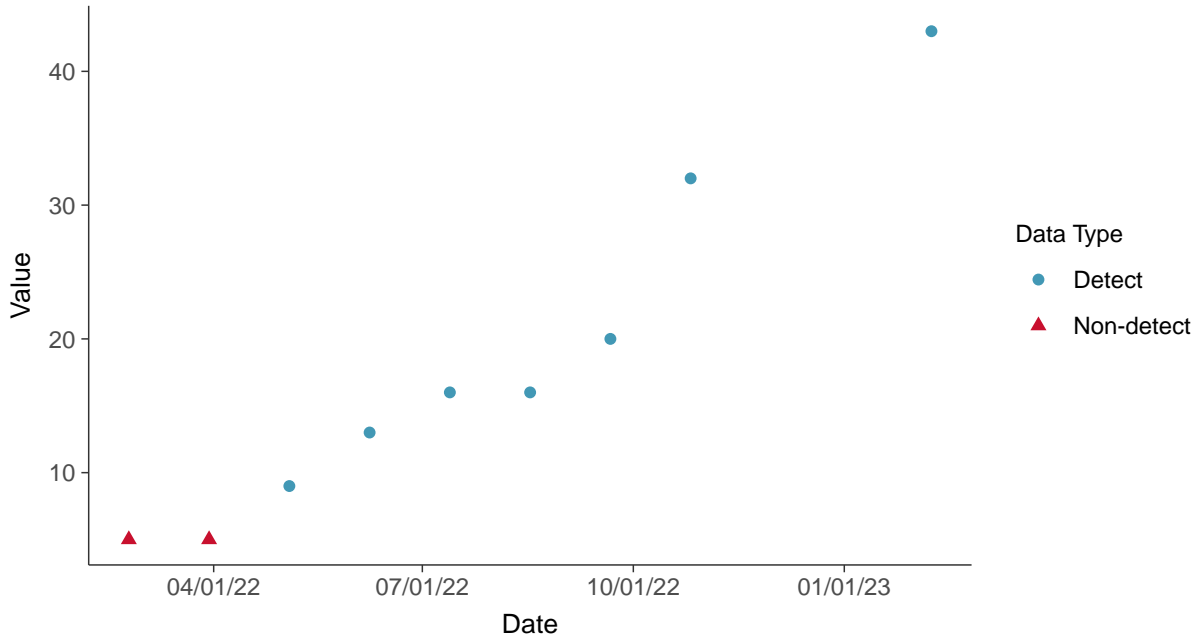


Appendix III: Chloride, MW-13

ID: 13_1_03

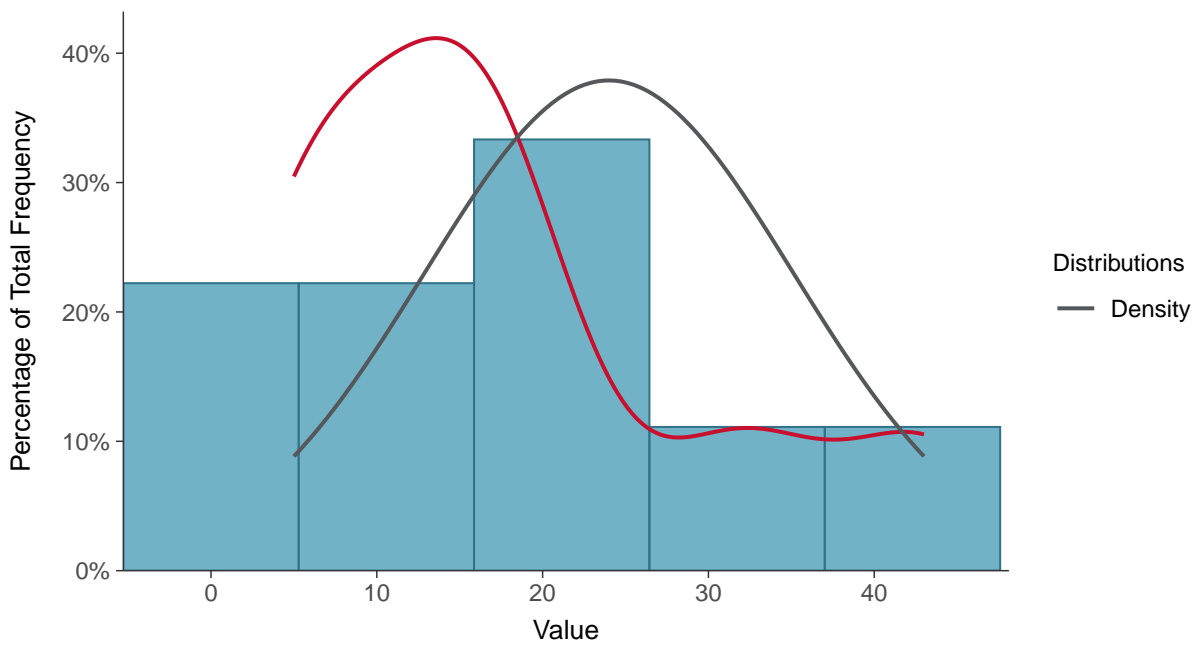
Scatter Plot

Chloride, MW-13 (mg/L)



Histogram

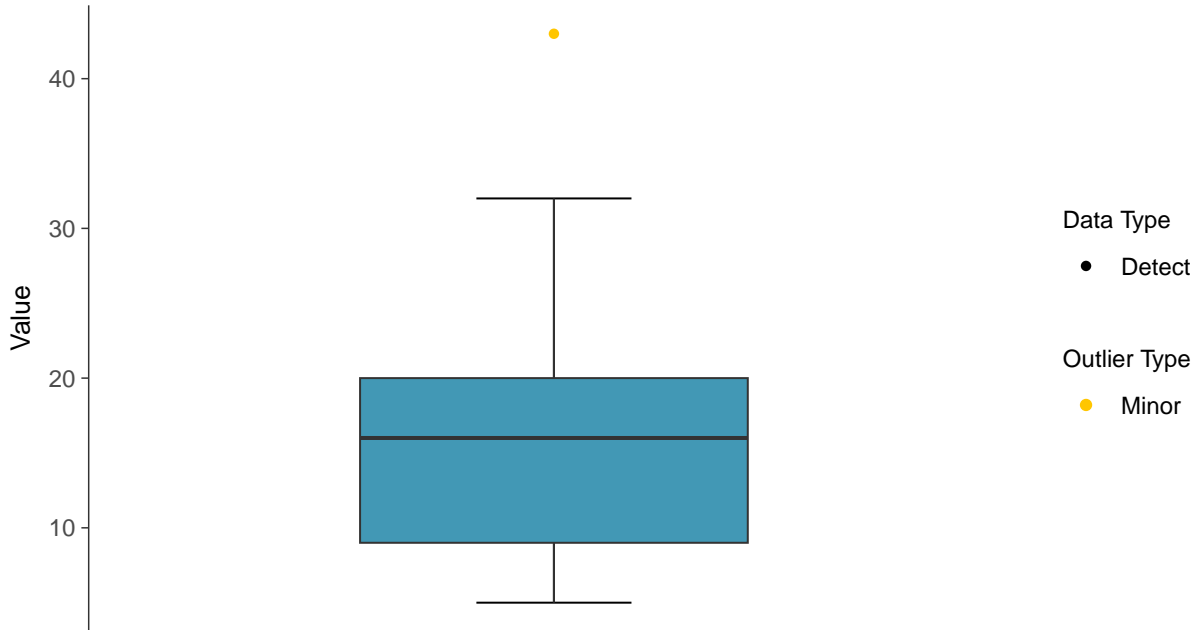
Chloride, MW-13 (mg/L)





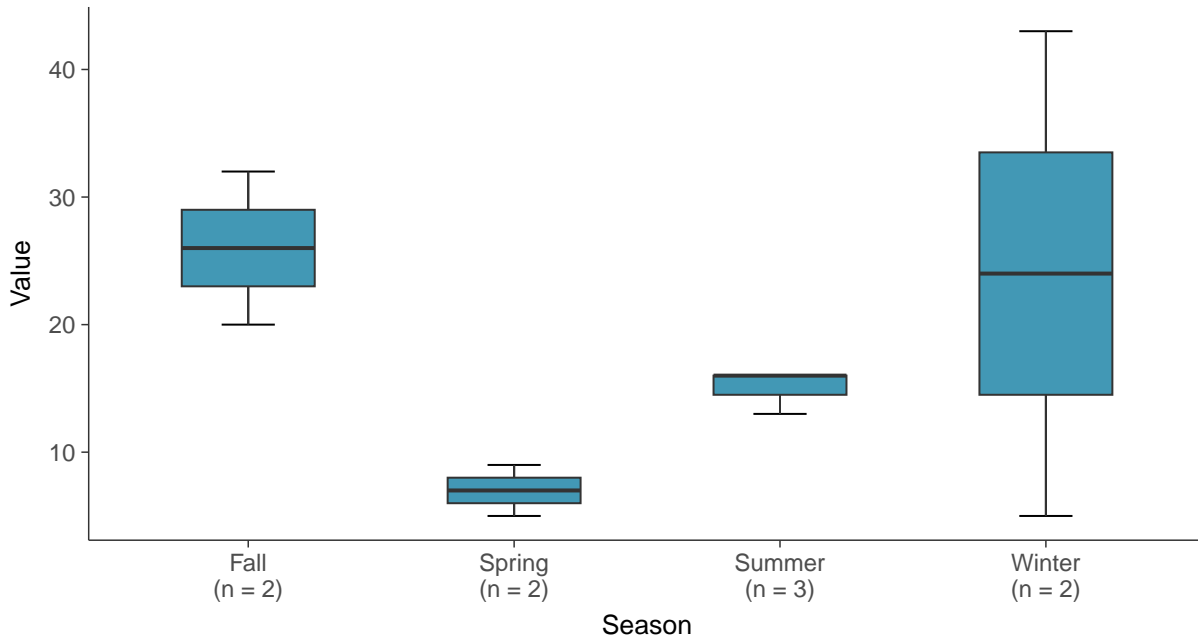
Boxplot

Chloride, MW-13 (mg/L)



Boxplot by Season

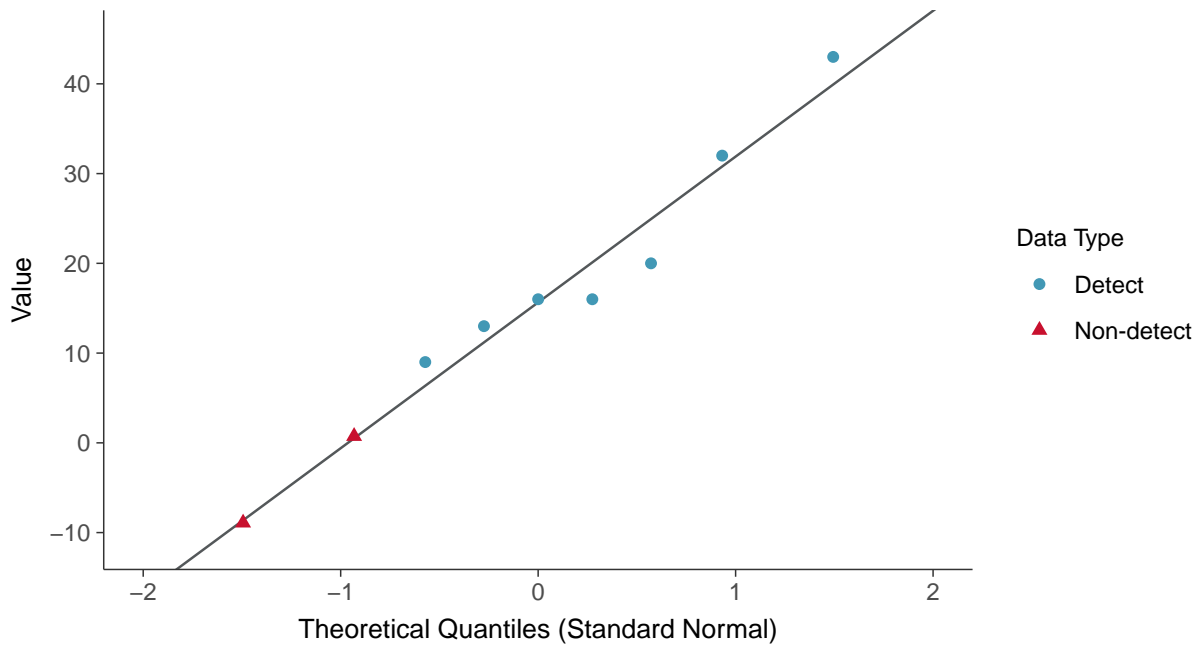
Chloride, MW-13 (mg/L)





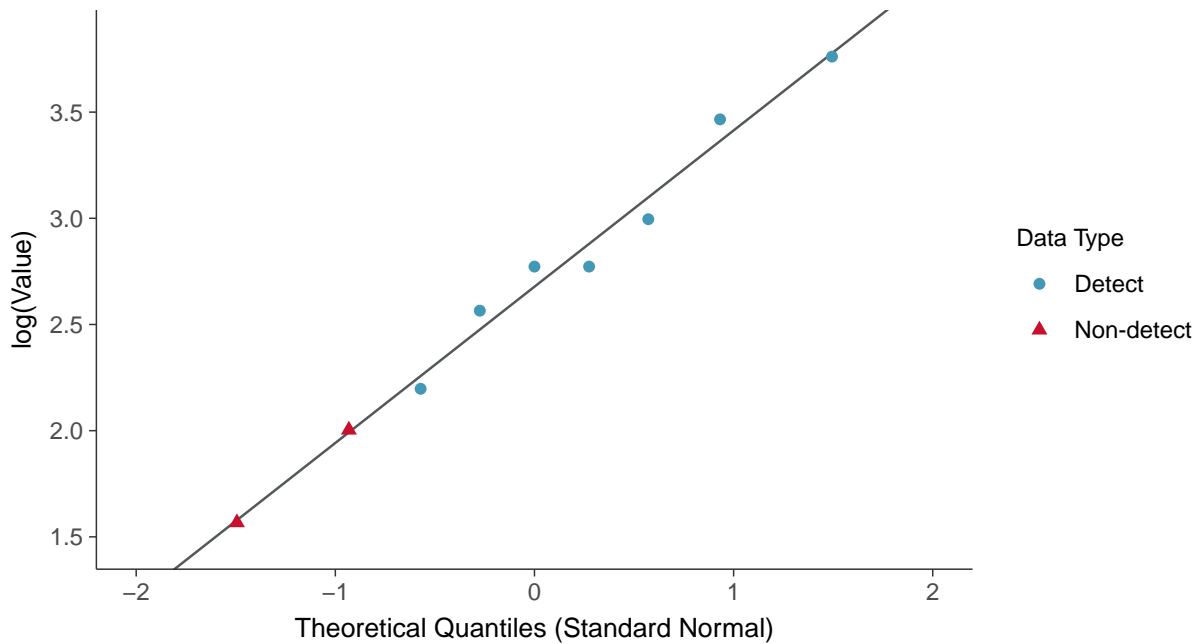
Normal Q-Q plot using ROS Imputed Estimates

Chloride, MW-13 (mg/L)



Lognormal Q-Q plot using ROS Imputed Estimates

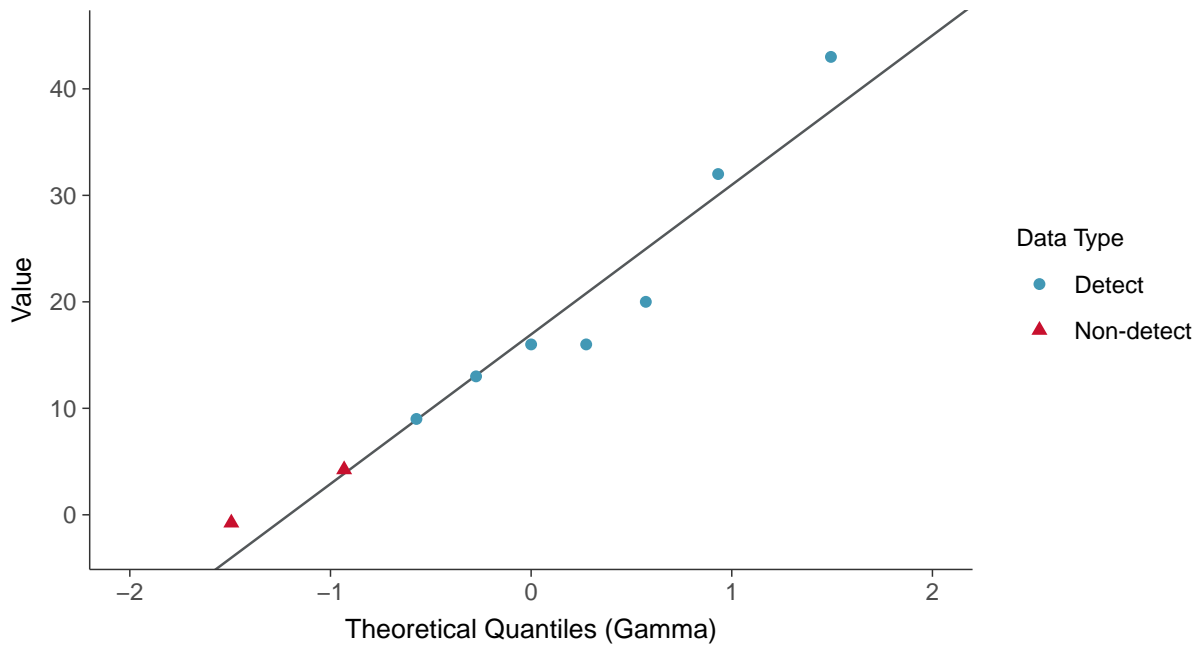
Chloride, MW-13 (mg/L)





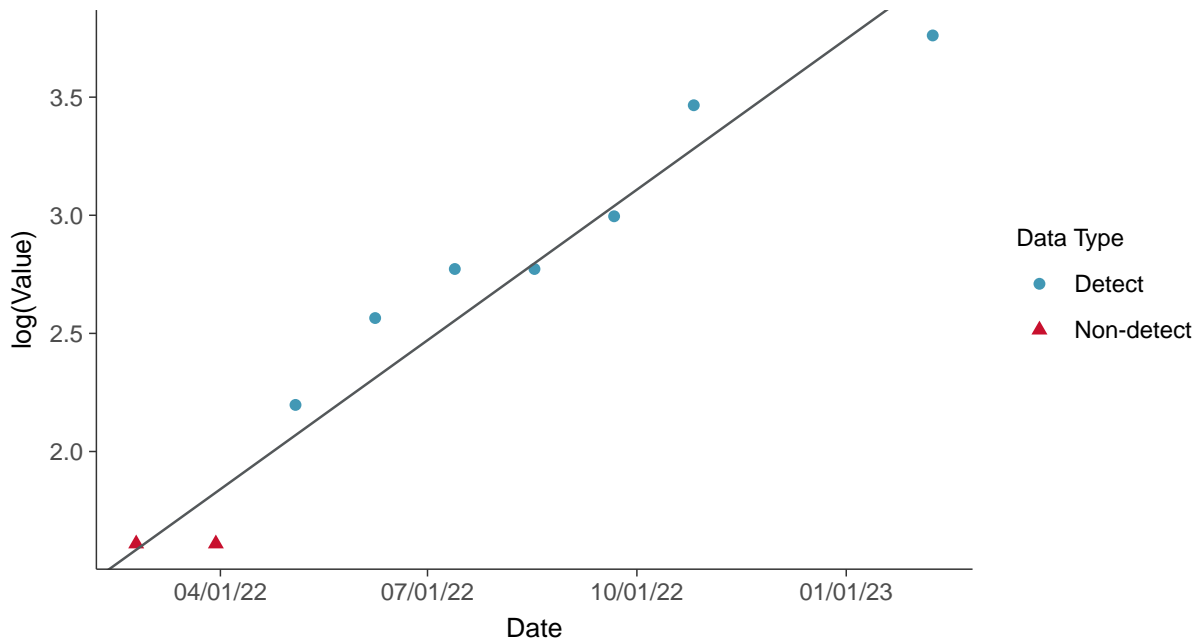
Gamma Q-Q plot using ROS Imputed Estimates

Chloride, MW-13 (mg/L)



Trend Regression: Lognormal MLE

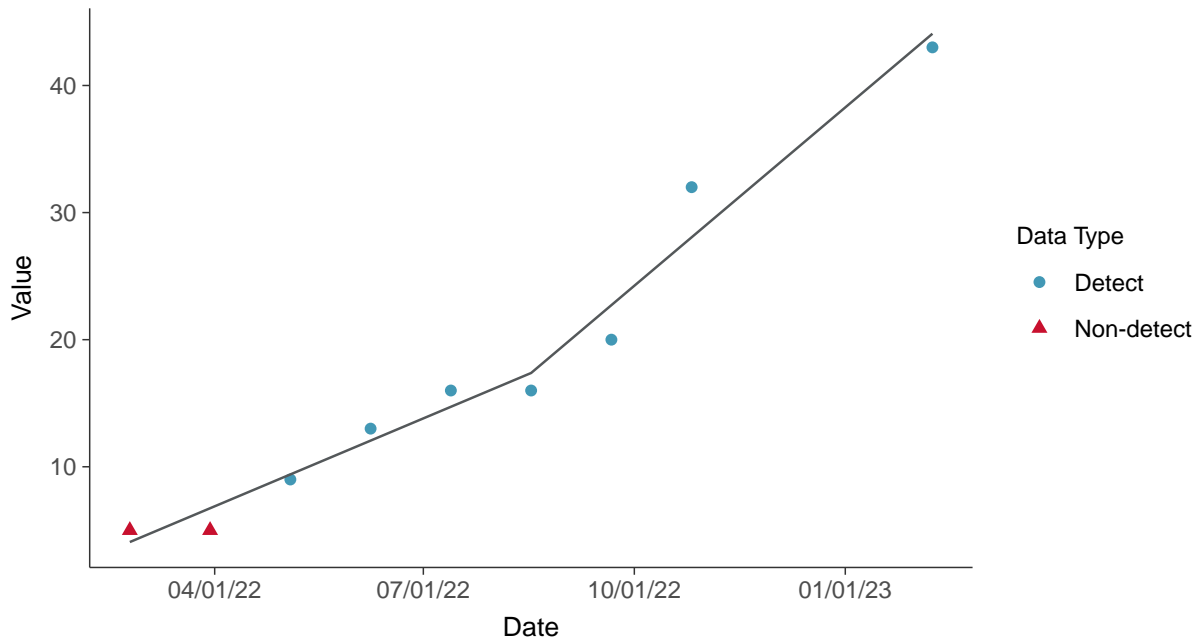
Chloride, MW-13 (mg/L)





Trend Regression: Piecewise Linear-Linear

Chloride, MW-13 (mg/L)



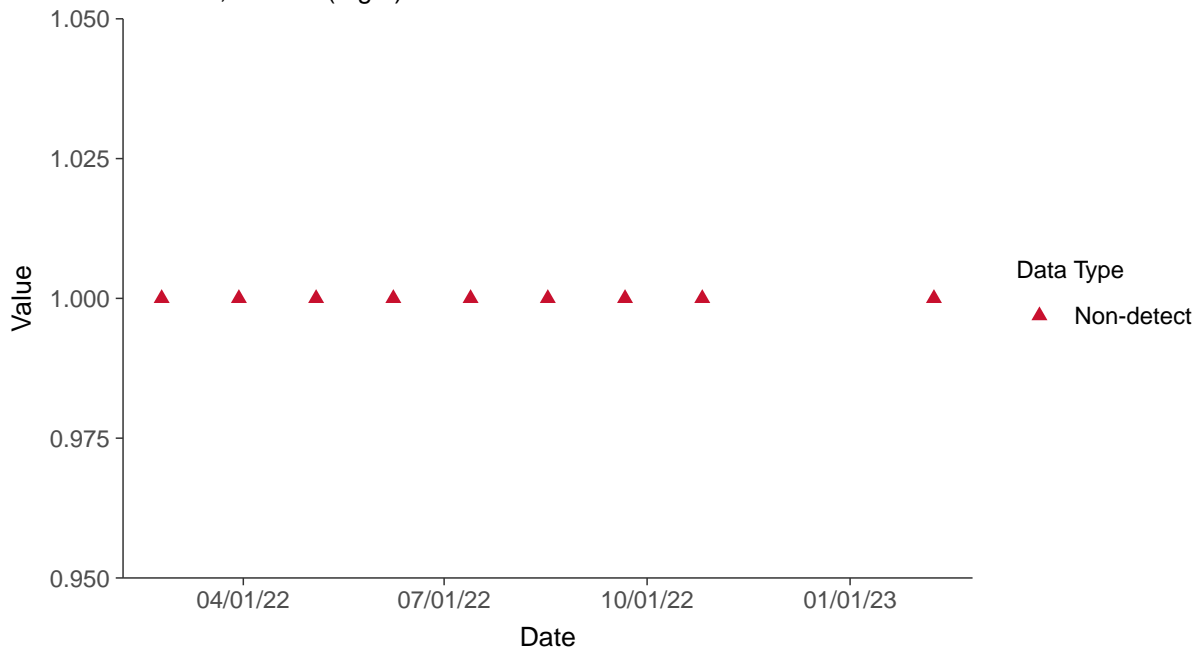


Appendix III: Fluoride, MW-13

ID: 13_1_04

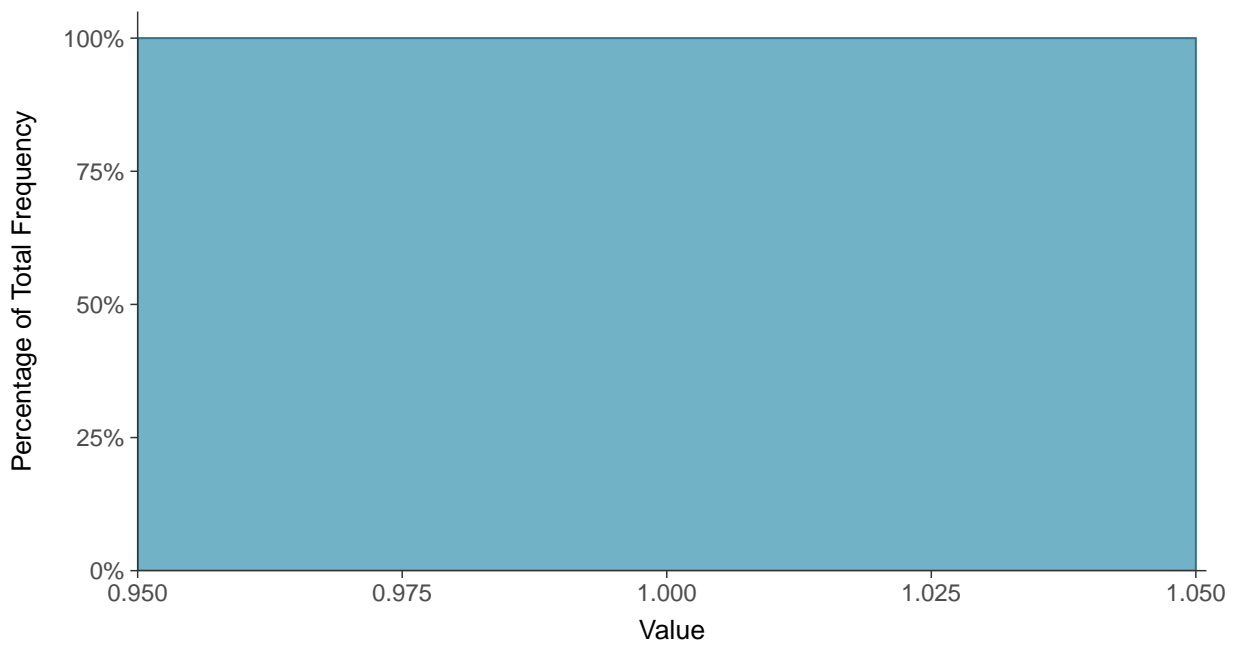
Scatter Plot

Fluoride, MW-13 (mg/L)



Histogram

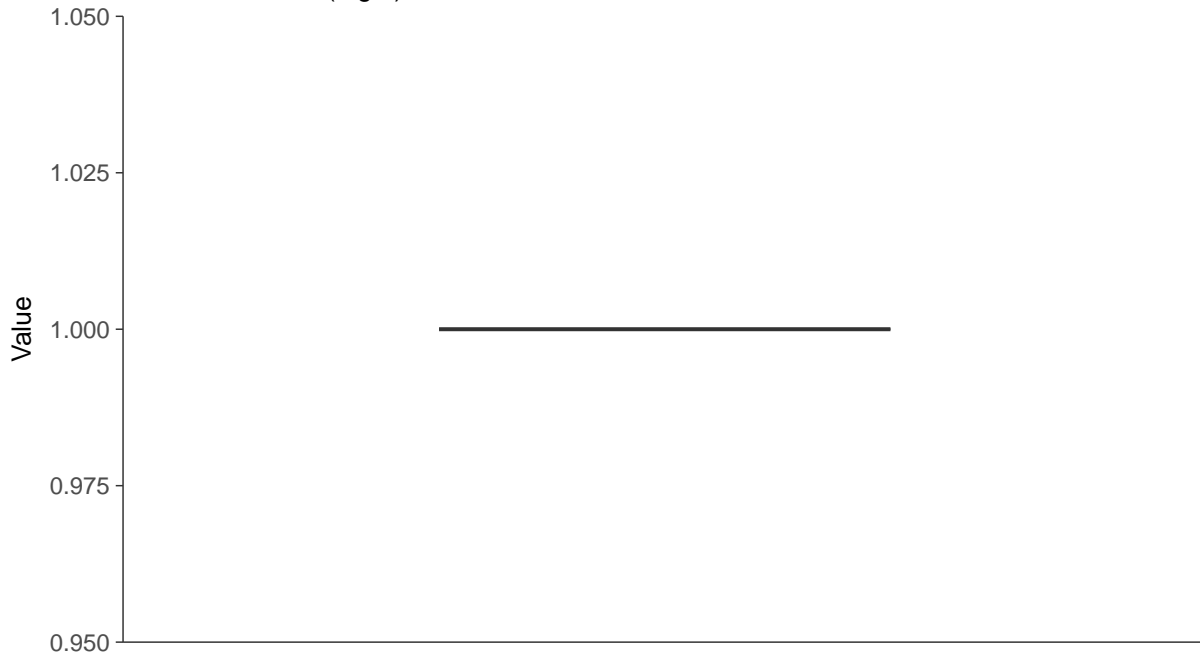
Fluoride, MW-13 (mg/L)





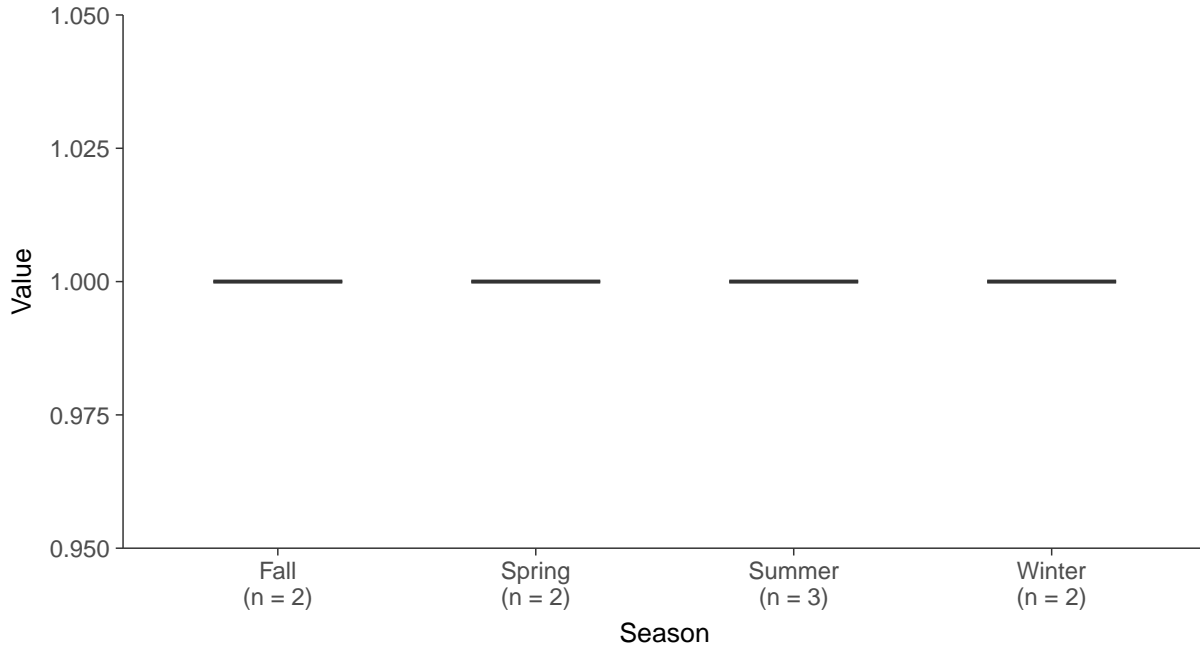
Boxplot

Fluoride, MW-13 (mg/L)



Boxplot by Season

Fluoride, MW-13 (mg/L)



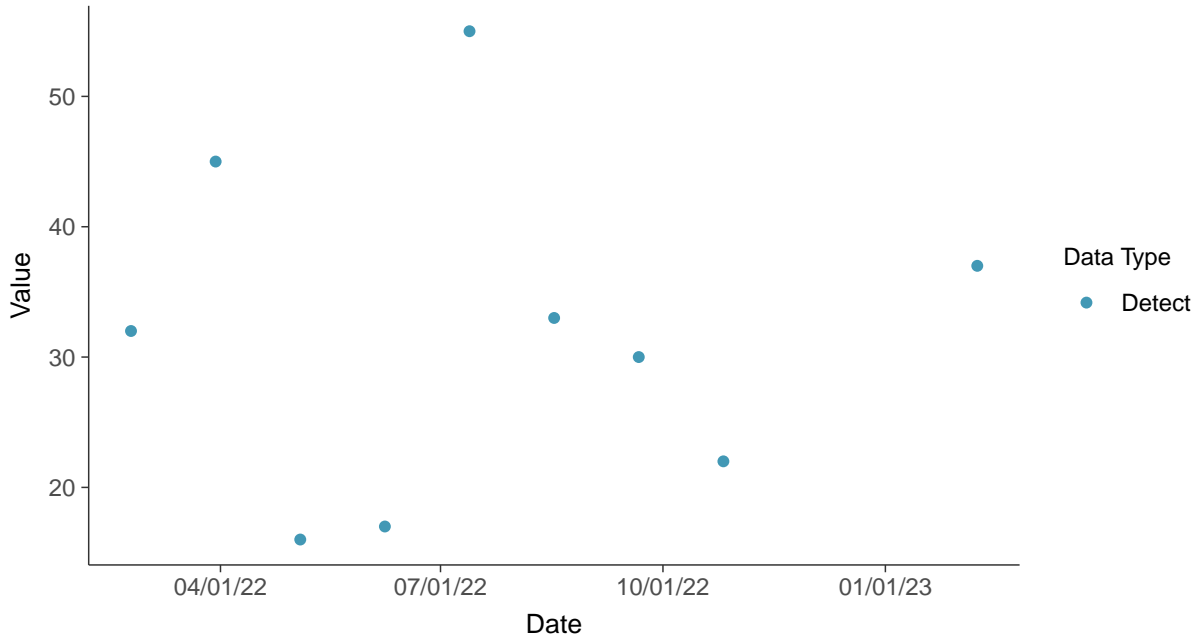


Appendix III: Sulfate, MW-13

ID: 13_1_05

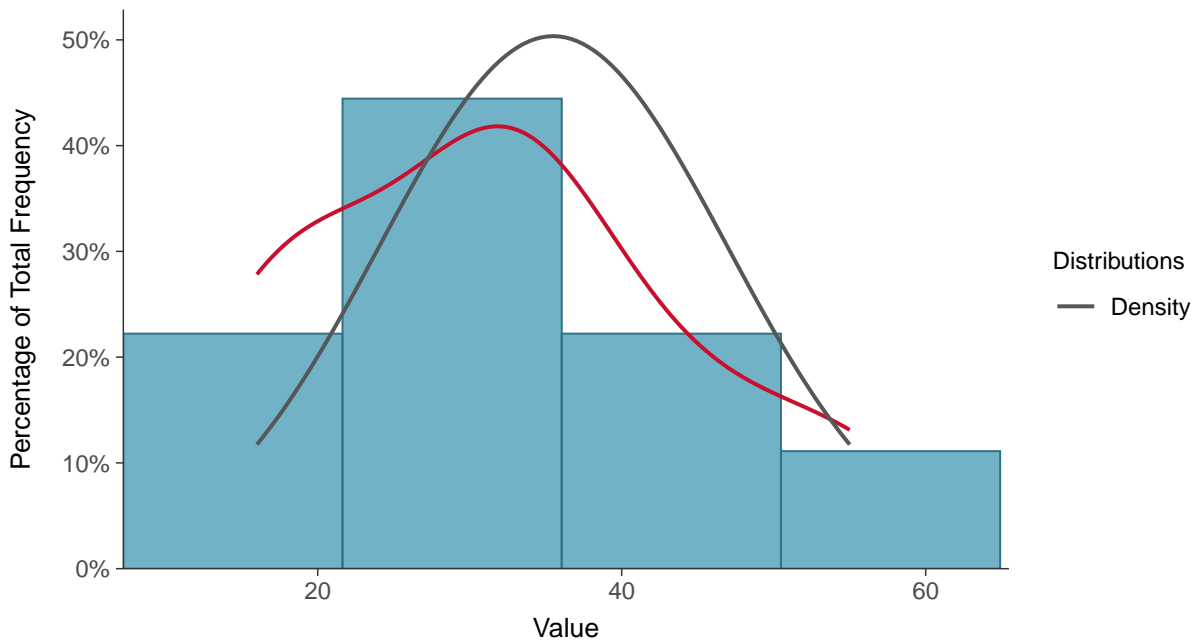
Scatter Plot

Sulfate, MW-13 (mg/L)



Histogram

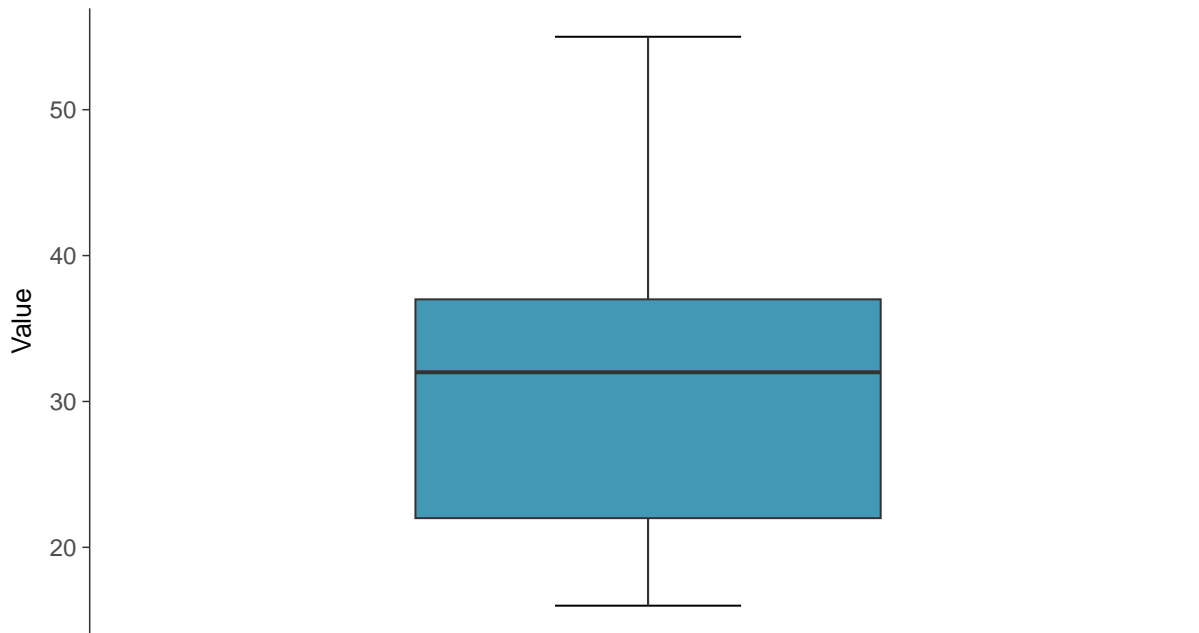
Sulfate, MW-13 (mg/L)





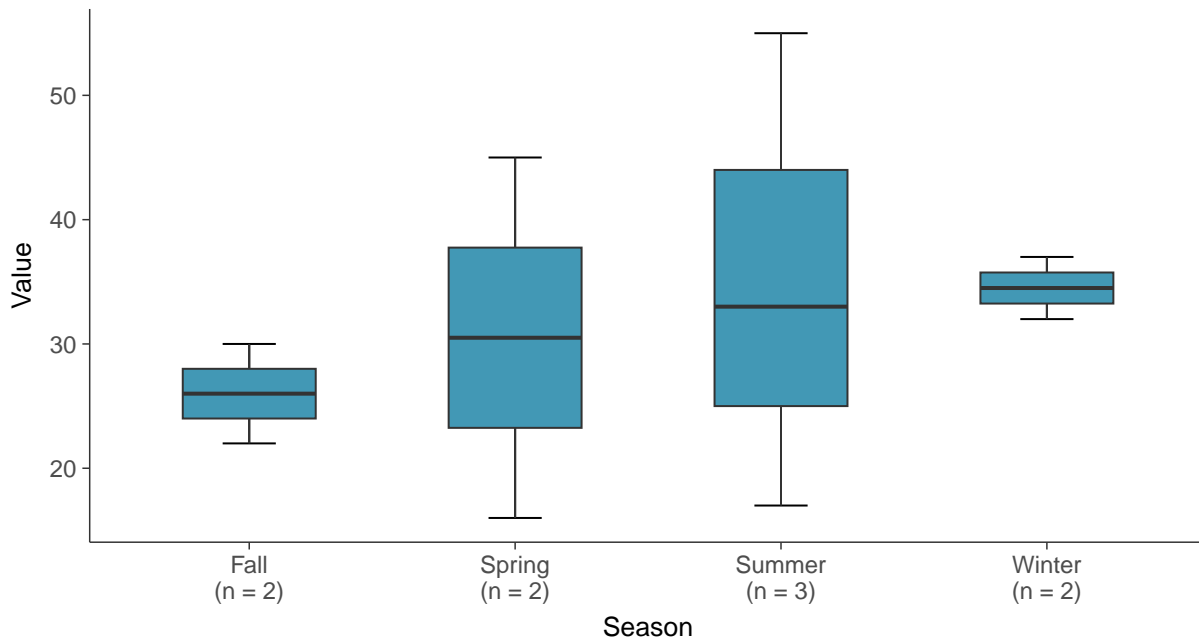
Boxplot

Sulfate, MW-13 (mg/L)



Boxplot by Season

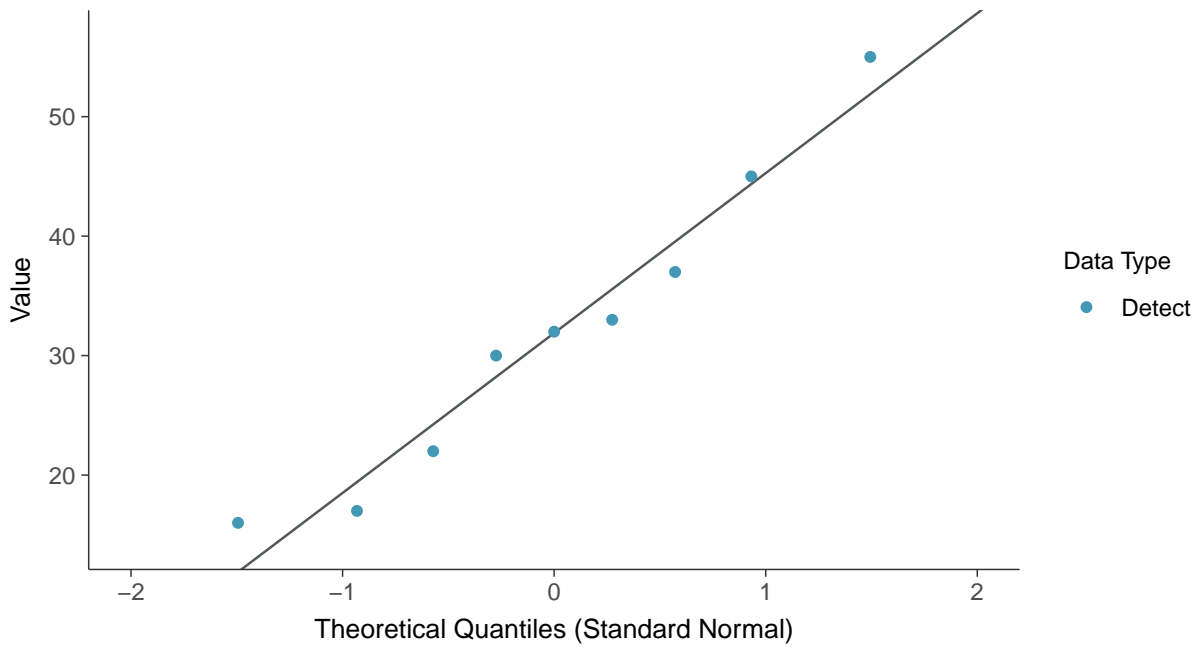
Sulfate, MW-13 (mg/L)





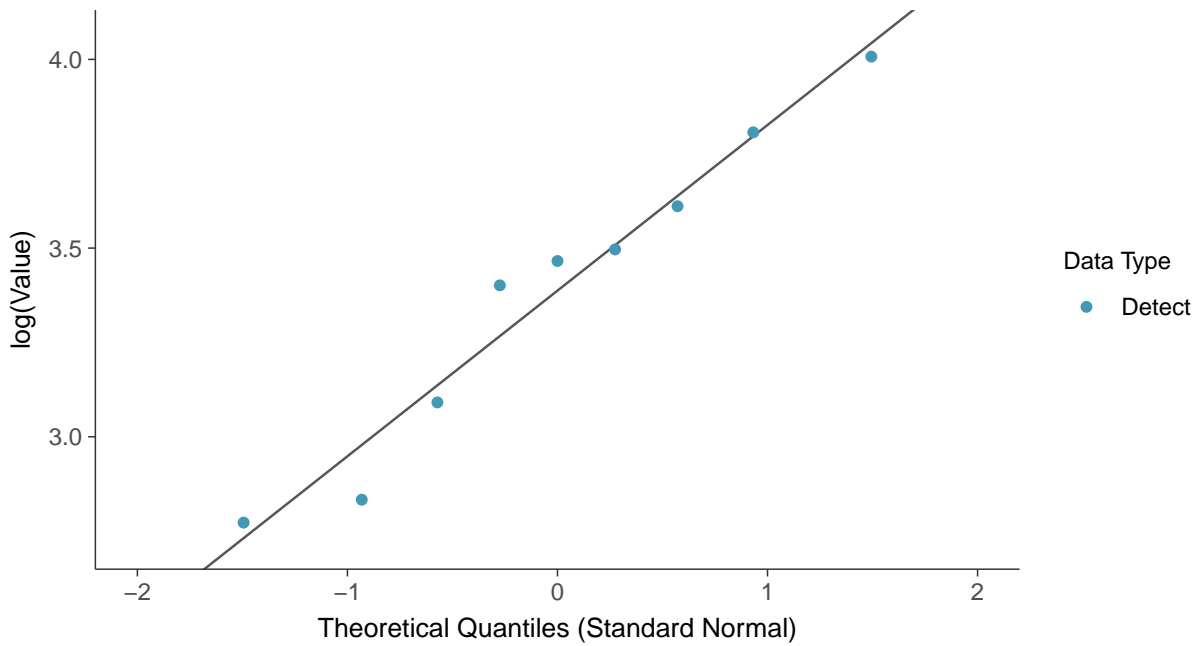
Normal Q-Q plot

Sulfate, MW-13 (mg/L)



Lognormal Q-Q plot

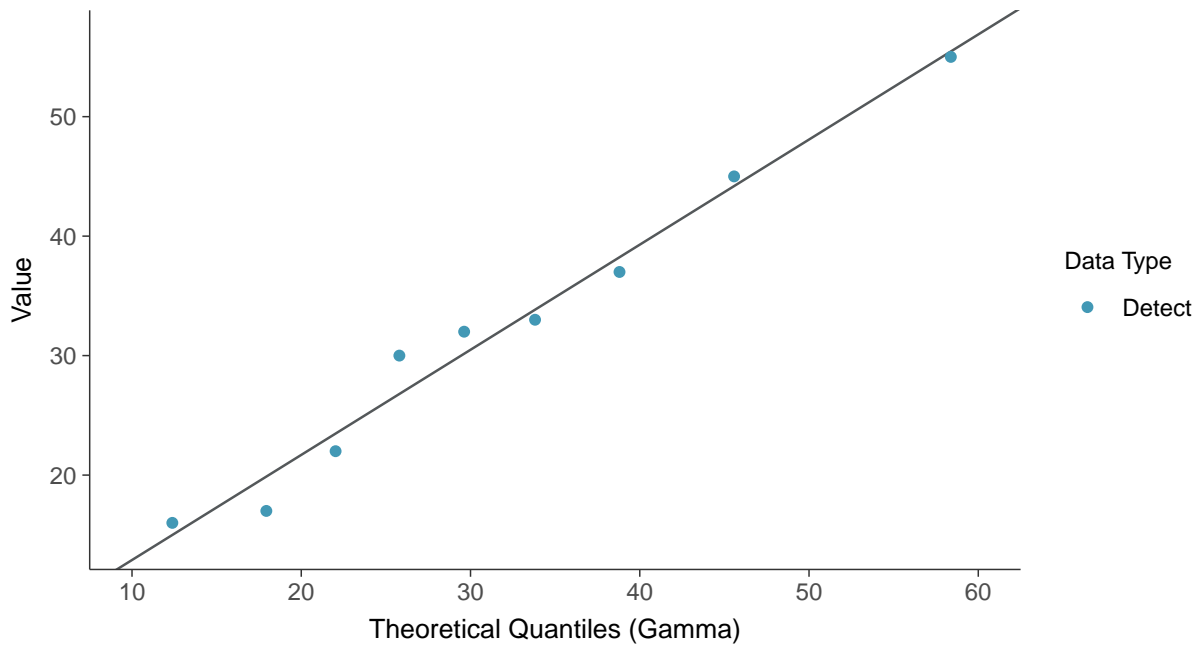
Sulfate, MW-13 (mg/L)





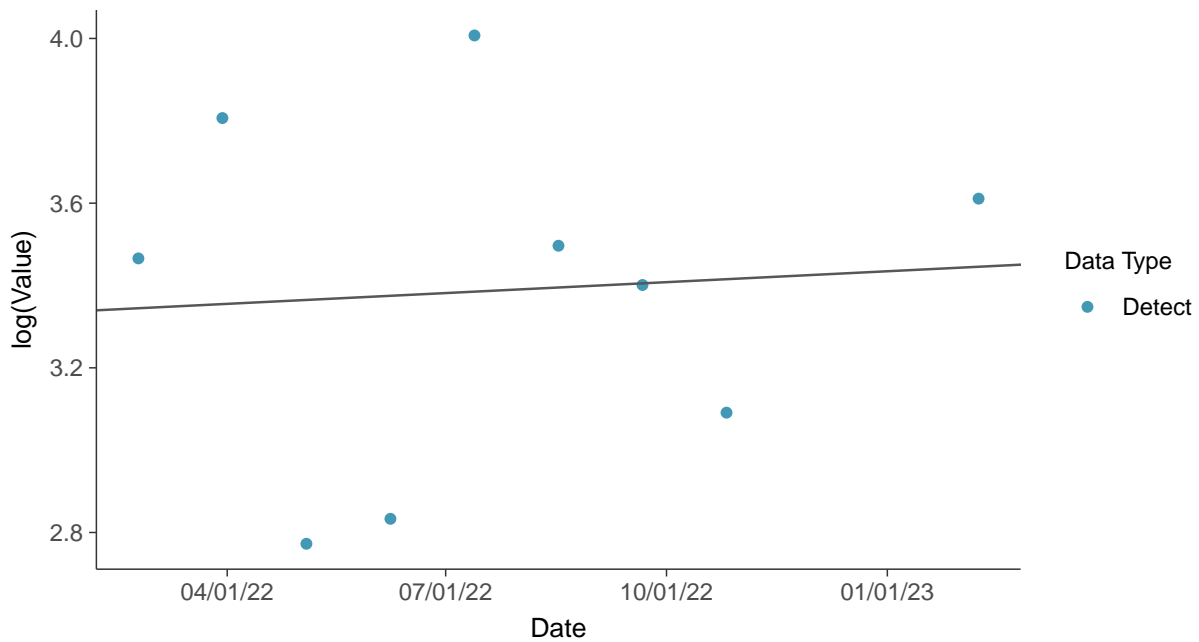
Gamma Q-Q plot

Sulfate, MW-13 (mg/L)



Trend Regression: Lognormal MLE

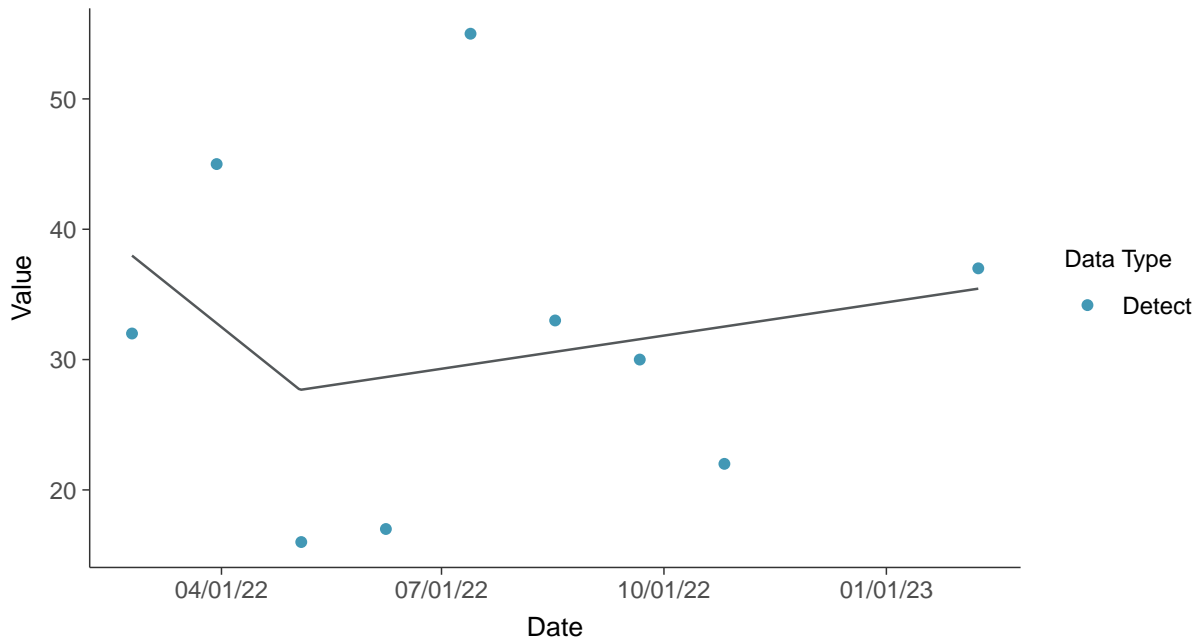
Sulfate, MW-13 (mg/L)





Trend Regression: Piecewise Linear-Linear

Sulfate, MW-13 (mg/L)

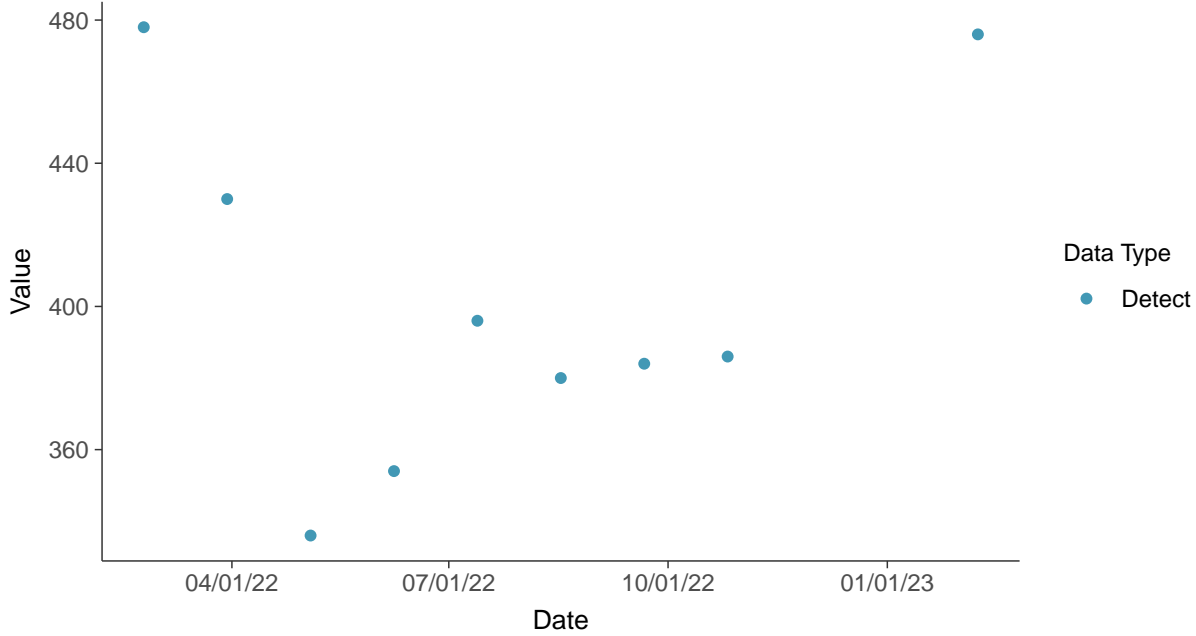


Appendix III: Total Dissolved Solids, MW-13

ID: 13_1_06

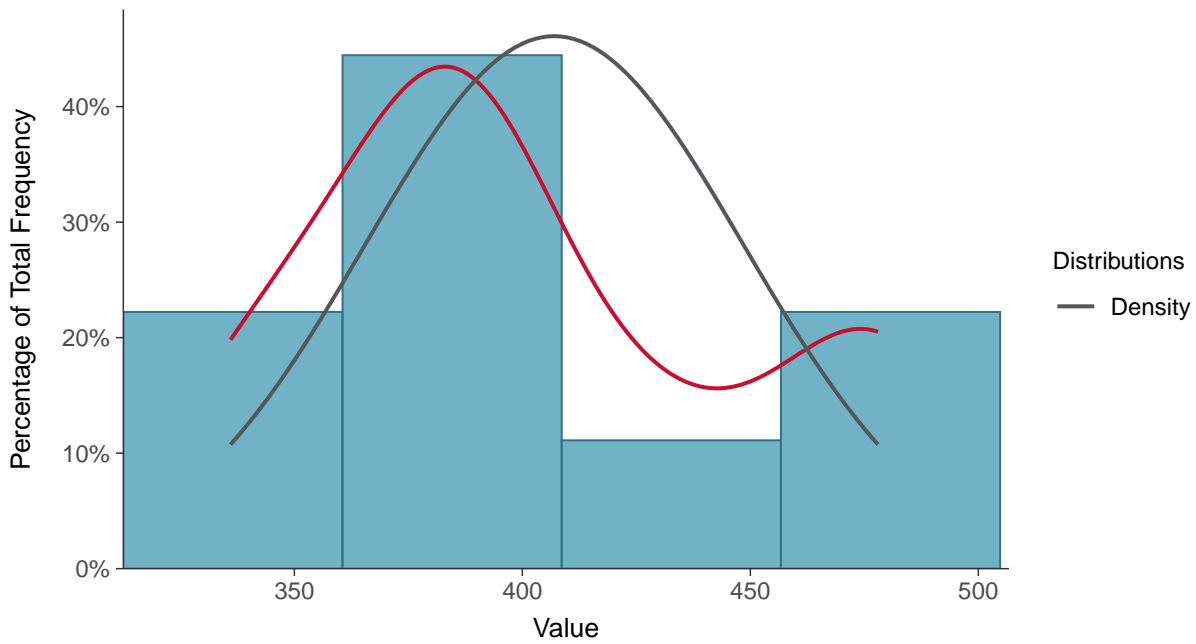
Scatter Plot

Total Dissolved Solids, MW-13 (mg/L)



Histogram

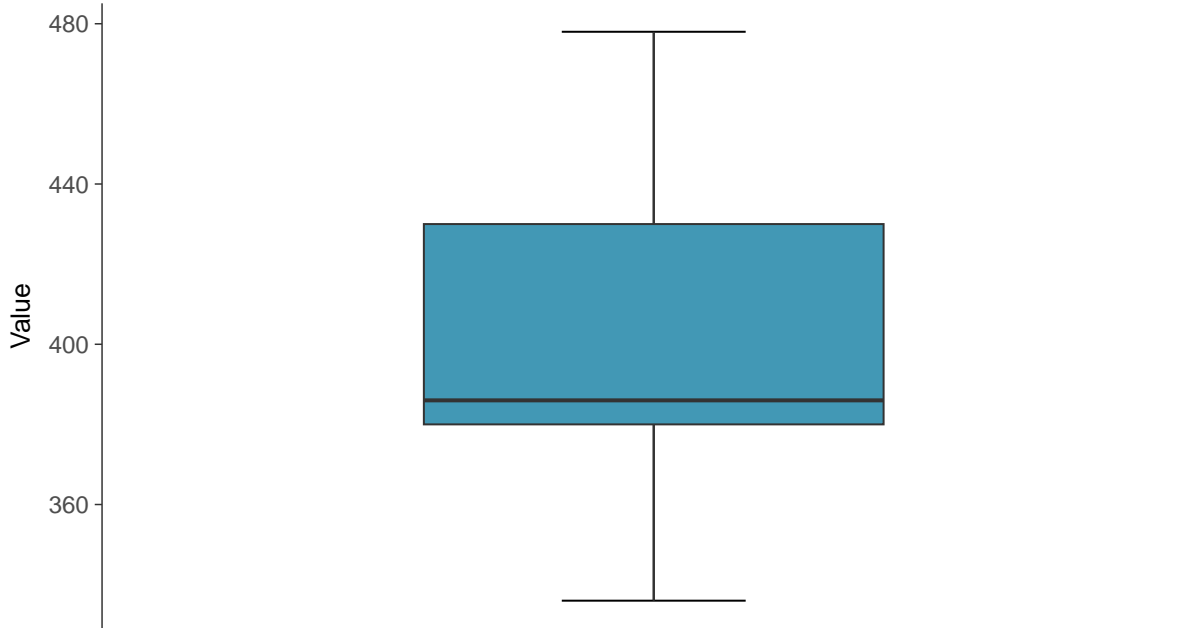
Total Dissolved Solids, MW-13 (mg/L)





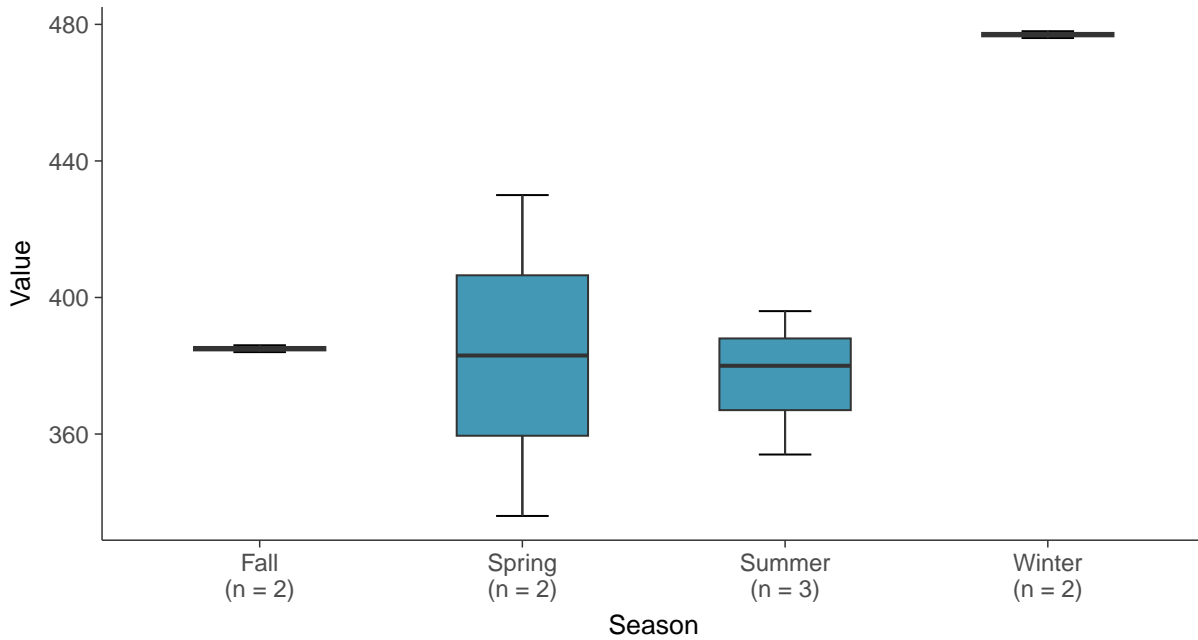
Boxplot

Total Dissolved Solids, MW-13 (mg/L)



Boxplot by Season

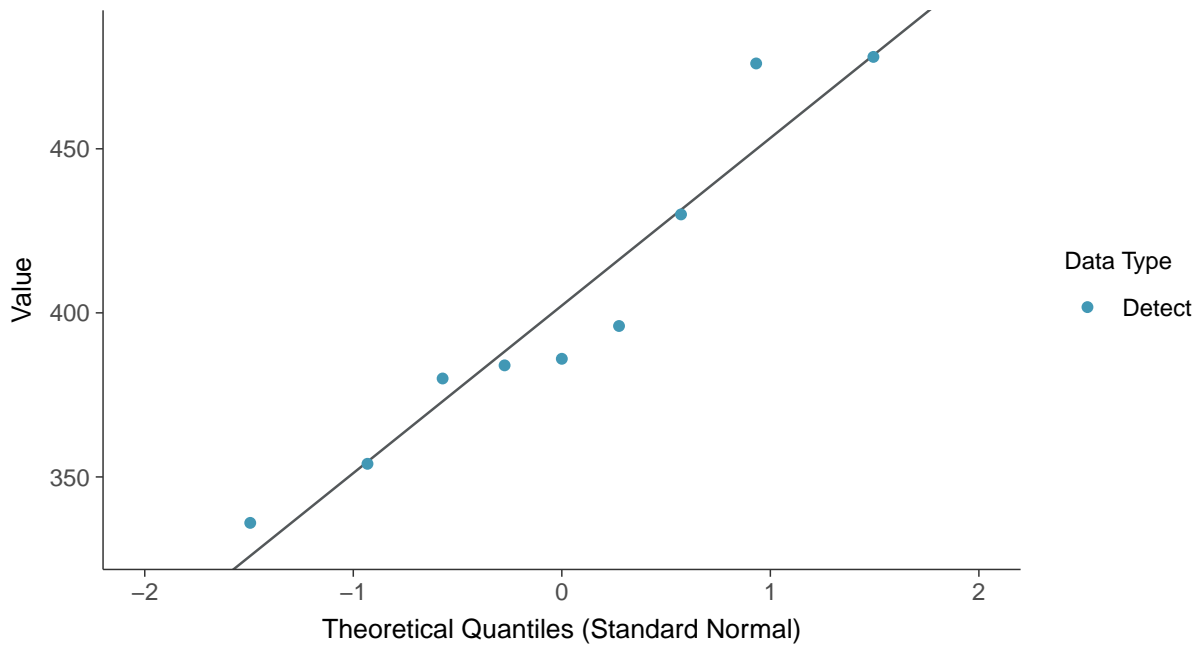
Total Dissolved Solids, MW-13 (mg/L)





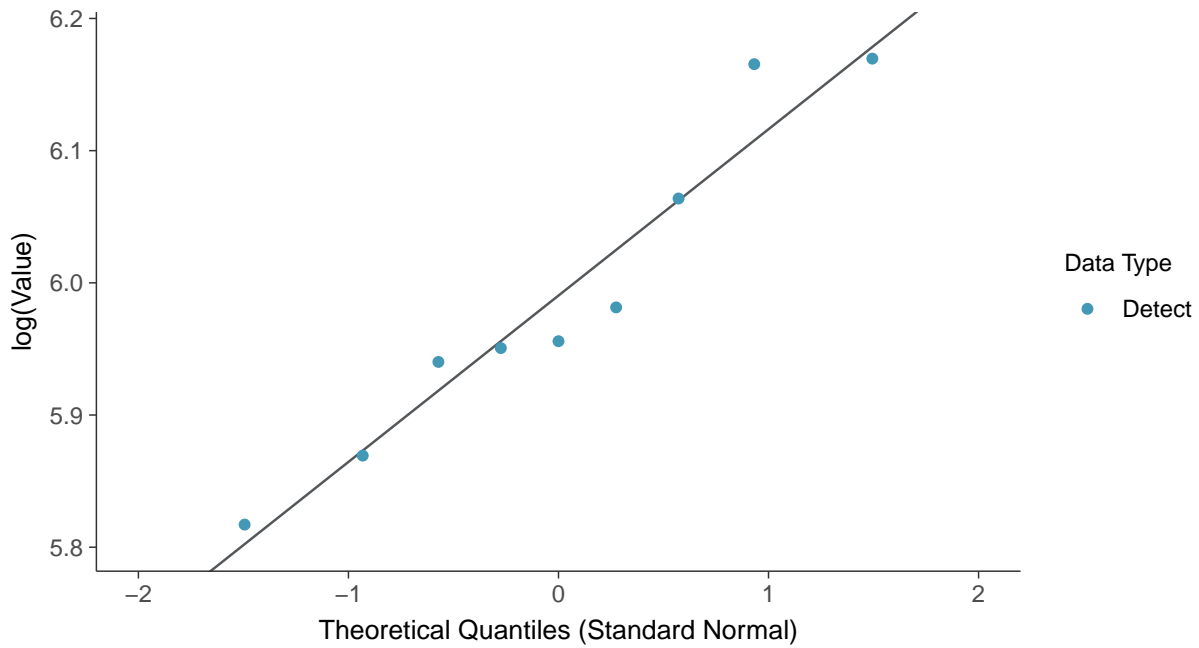
Normal Q-Q plot

Total Dissolved Solids, MW-13 (mg/L)



Lognormal Q-Q plot

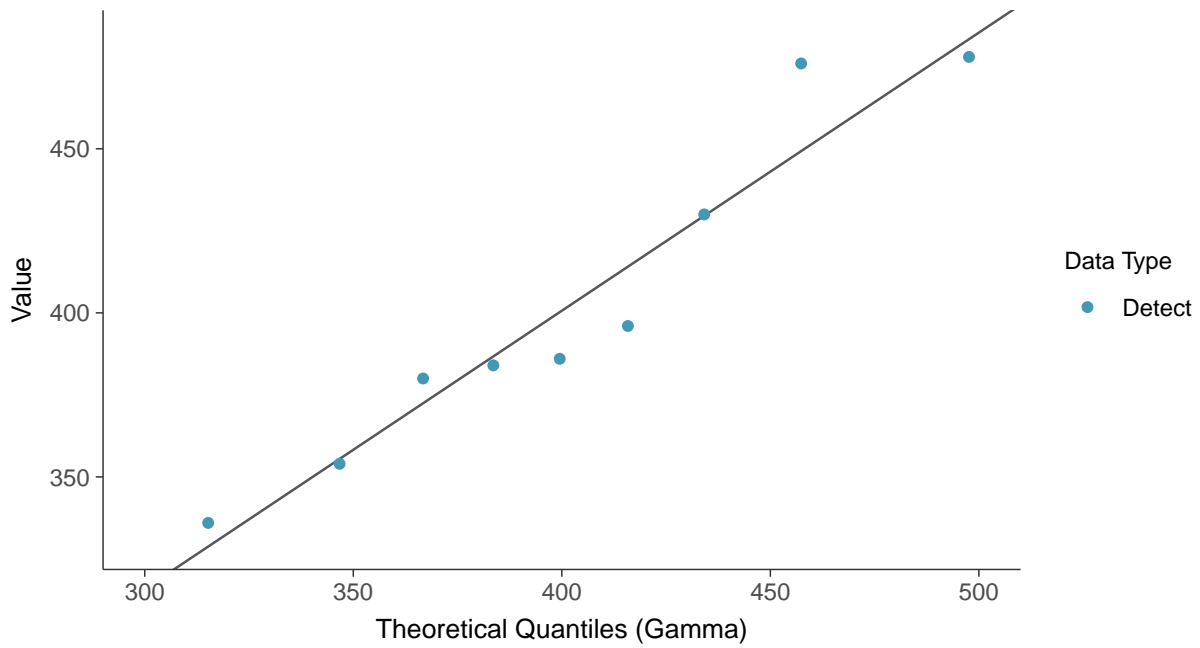
Total Dissolved Solids, MW-13 (mg/L)





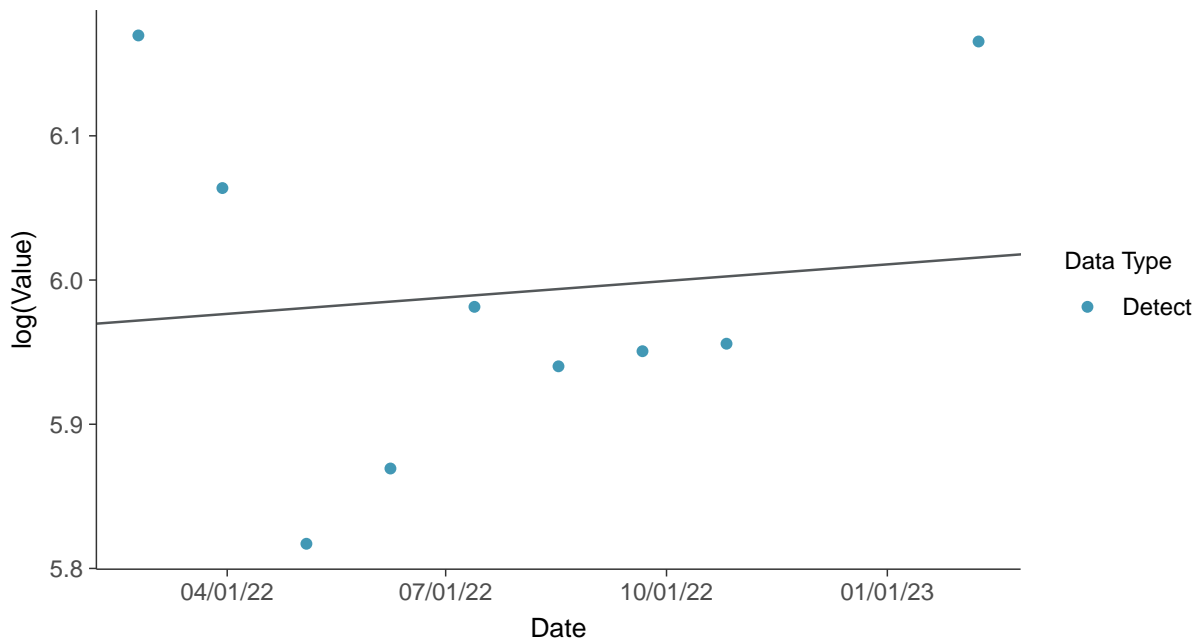
Gamma Q-Q plot

Total Dissolved Solids, MW-13 (mg/L)



Trend Regression: Lognormal MLE

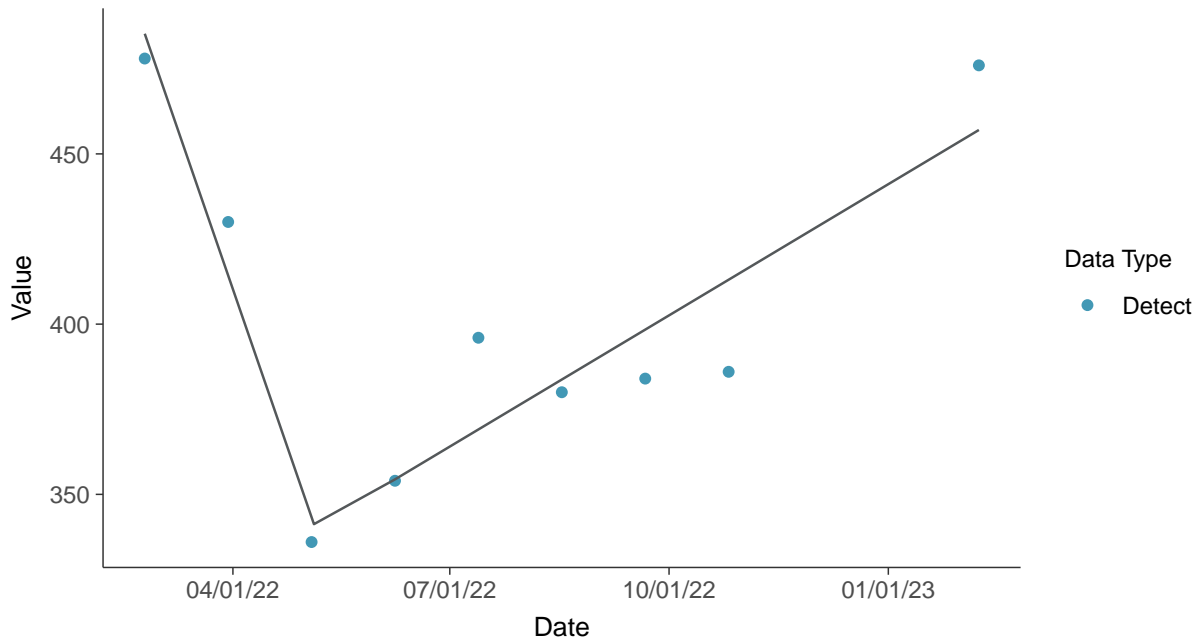
Total Dissolved Solids, MW-13 (mg/L)





Trend Regression: Piecewise Linear-Linear

Total Dissolved Solids, MW-13 (mg/L)



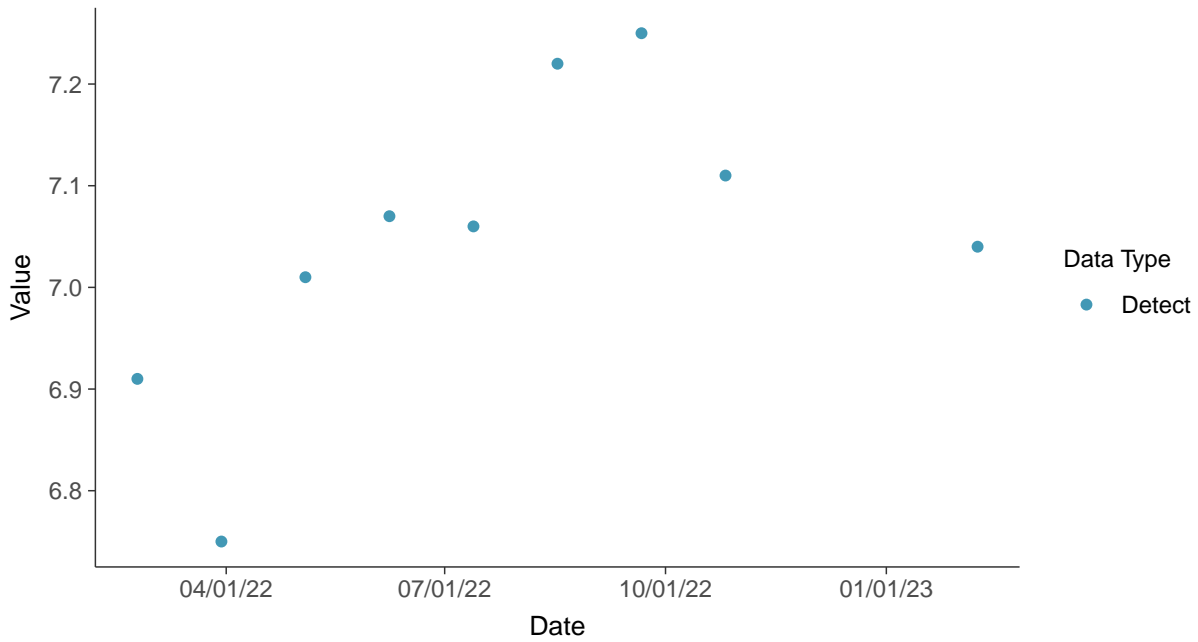


Appendix III: pH, Field, MW-13

ID: 13_1_07

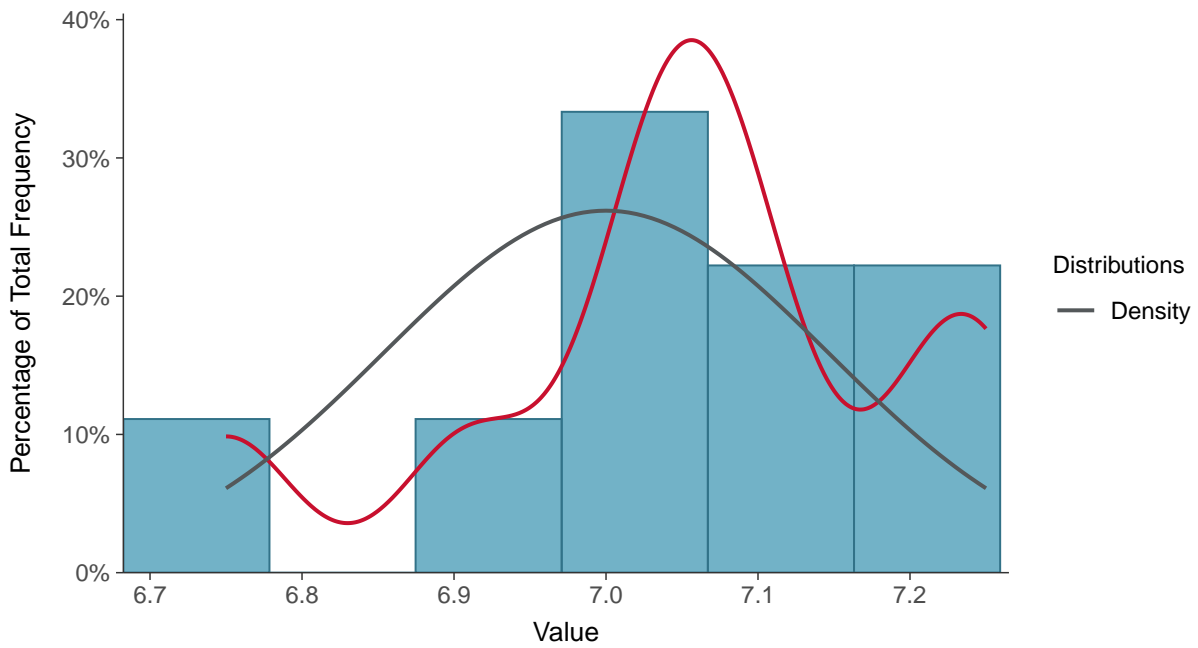
Scatter Plot

pH, Field, MW-13 (su)



Histogram

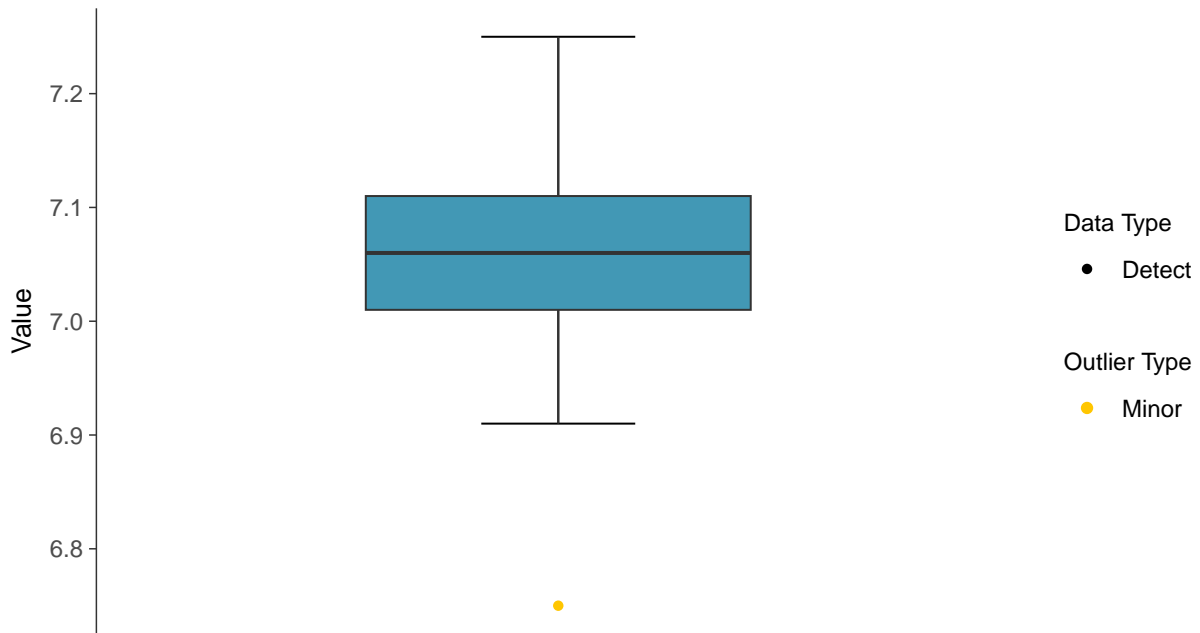
pH, Field, MW-13 (su)





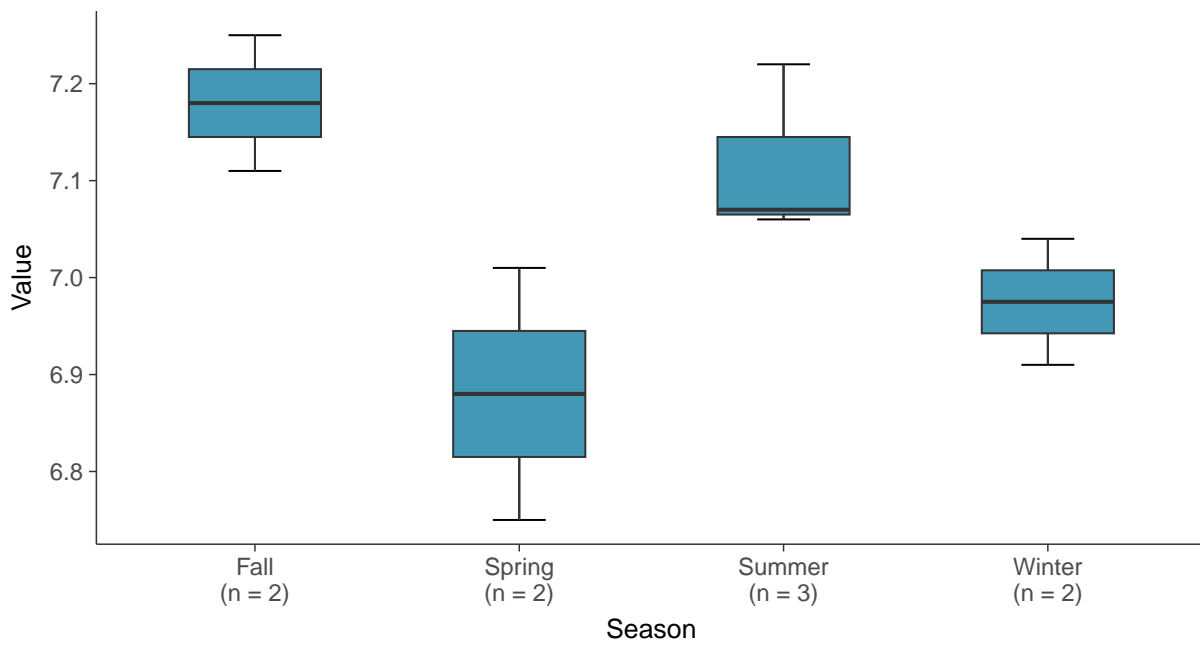
Boxplot

pH, Field, MW-13 (su)



Boxplot by Season

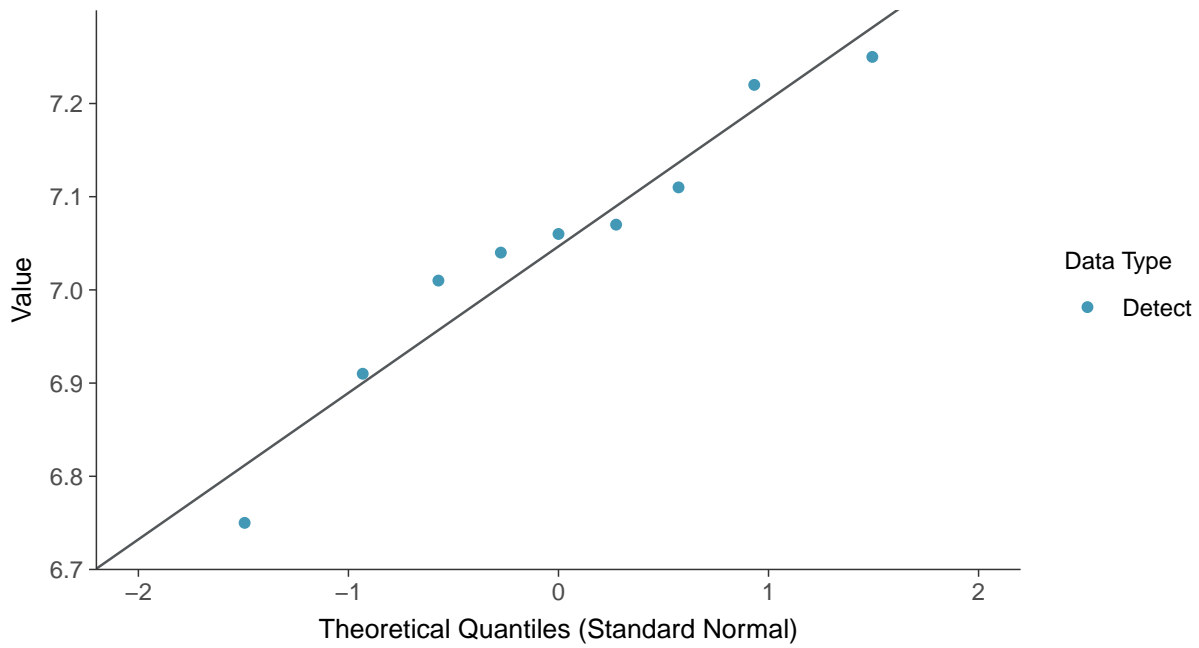
pH, Field, MW-13 (su)





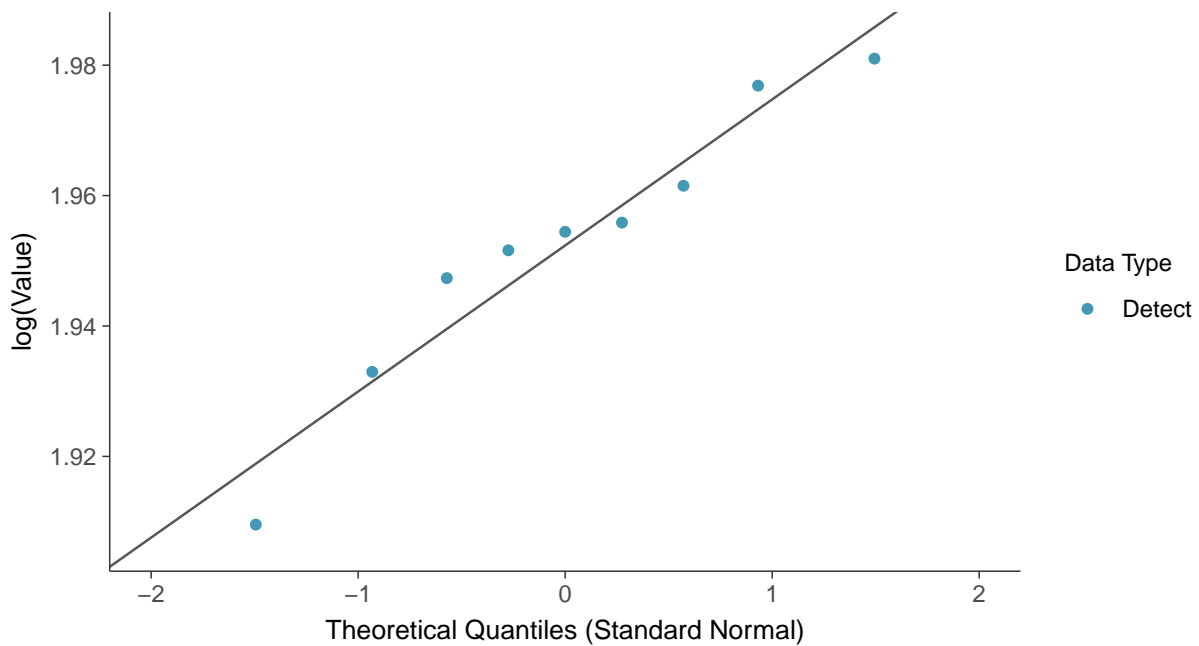
Normal Q-Q plot

pH, Field, MW-13 (su)



Lognormal Q-Q plot

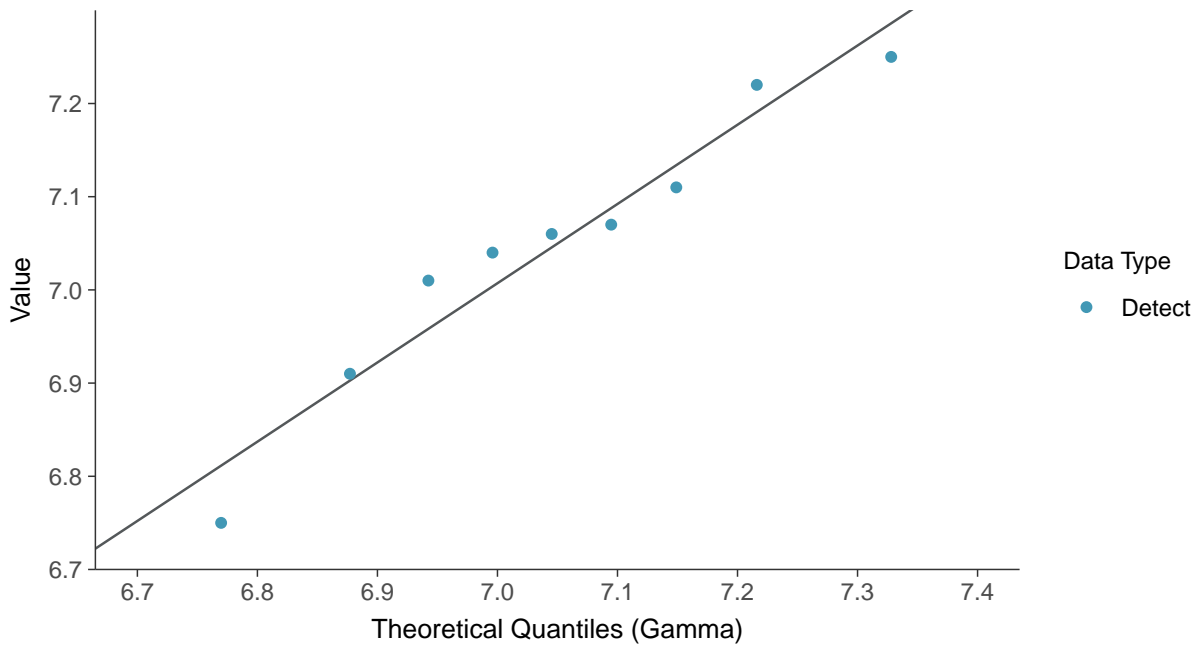
pH, Field, MW-13 (su)





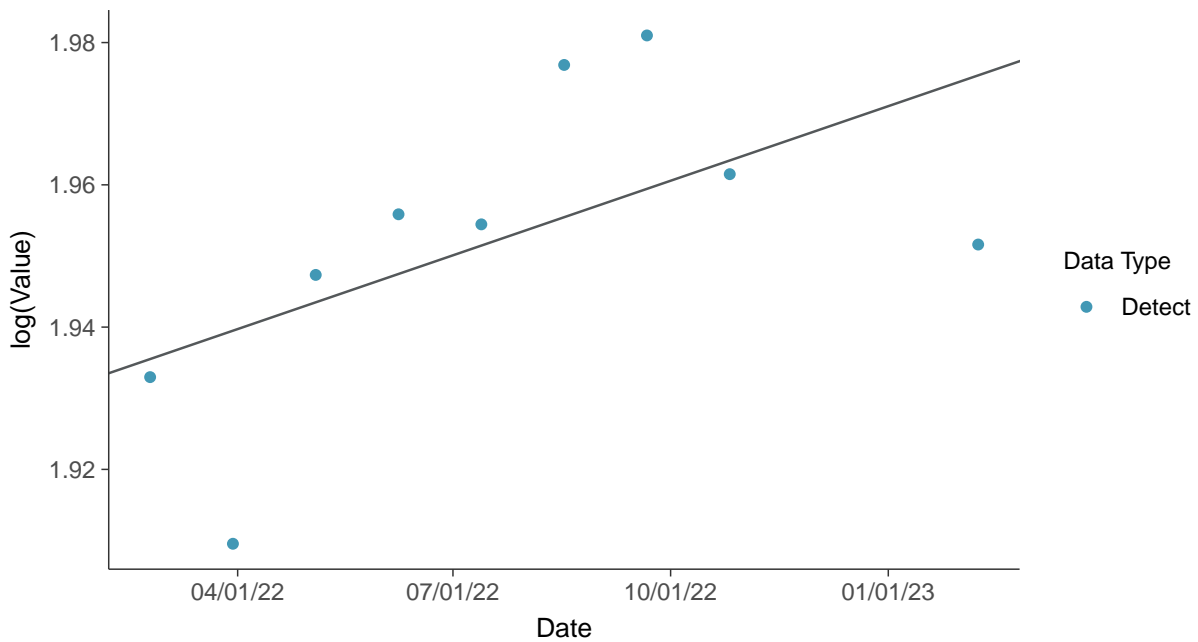
Gamma Q-Q plot

pH, Field, MW-13 (su)



Trend Regression: Lognormal MLE

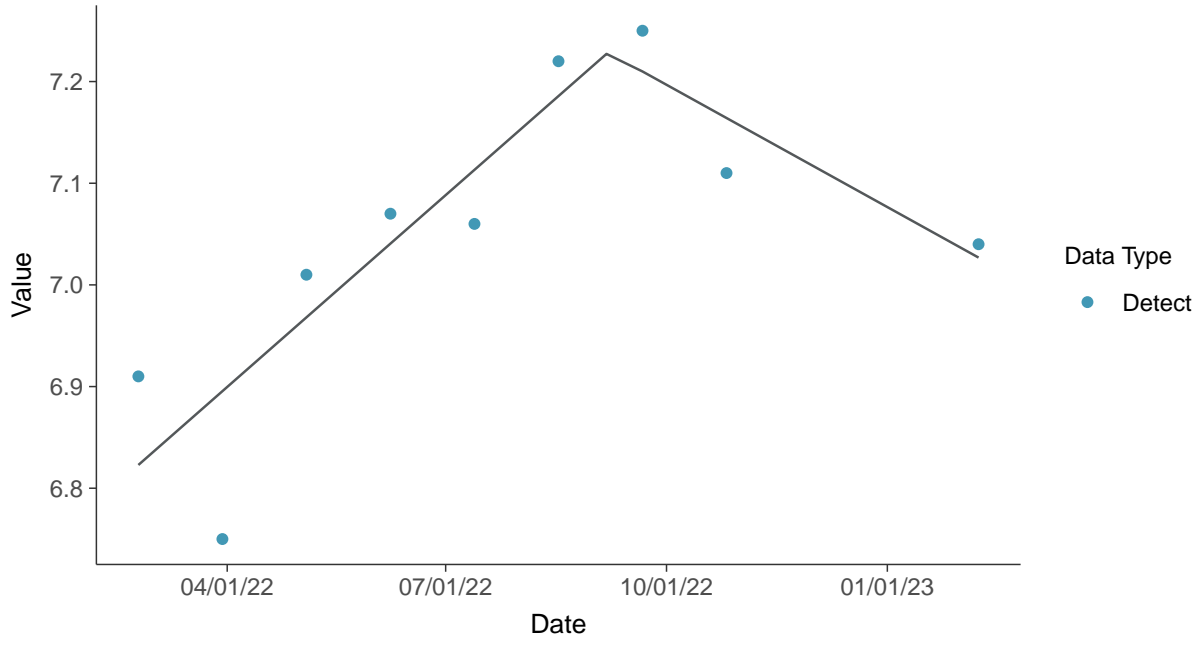
pH, Field, MW-13 (su)





Trend Regression: Piecewise Linear-Linear

pH, Field, MW-13 (su)



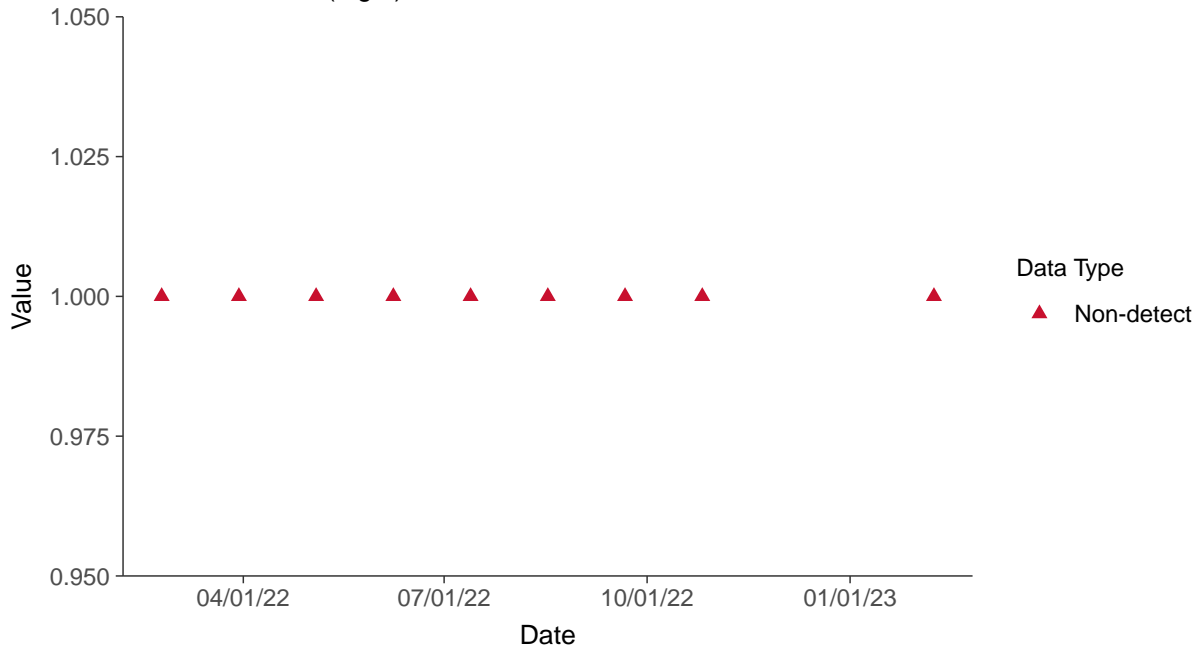


Appendix IV: Fluoride, MW-13

ID: 13_2_04

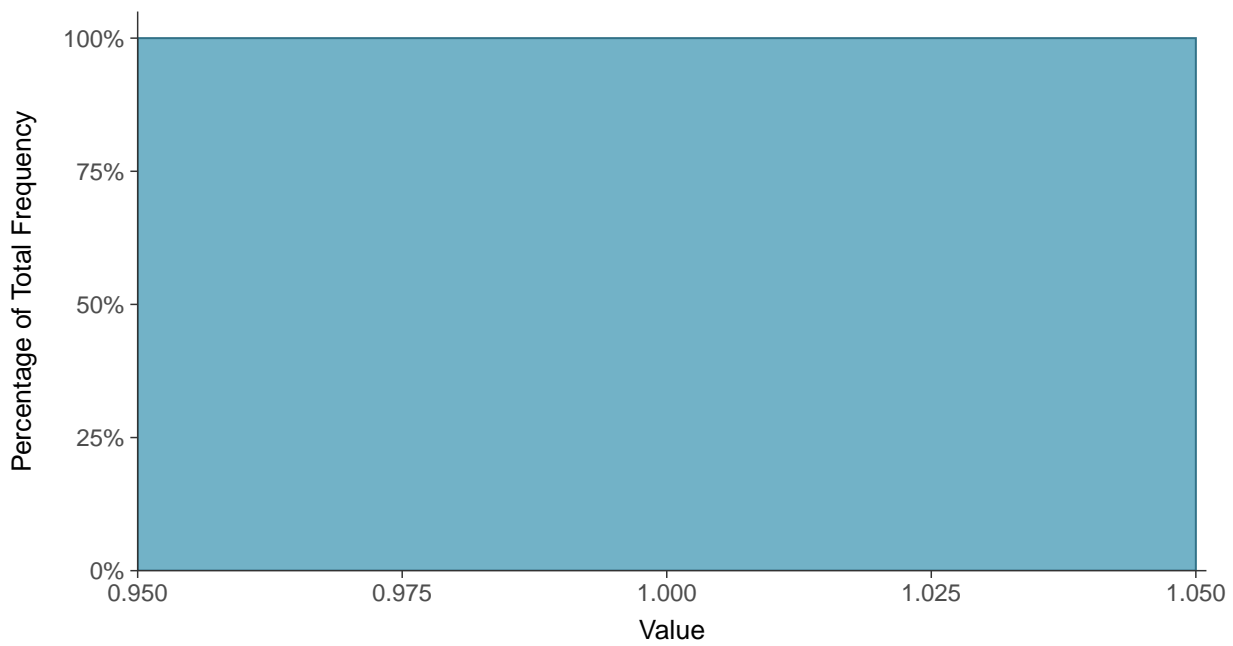
Scatter Plot

Fluoride, MW-13 (mg/L)



Histogram

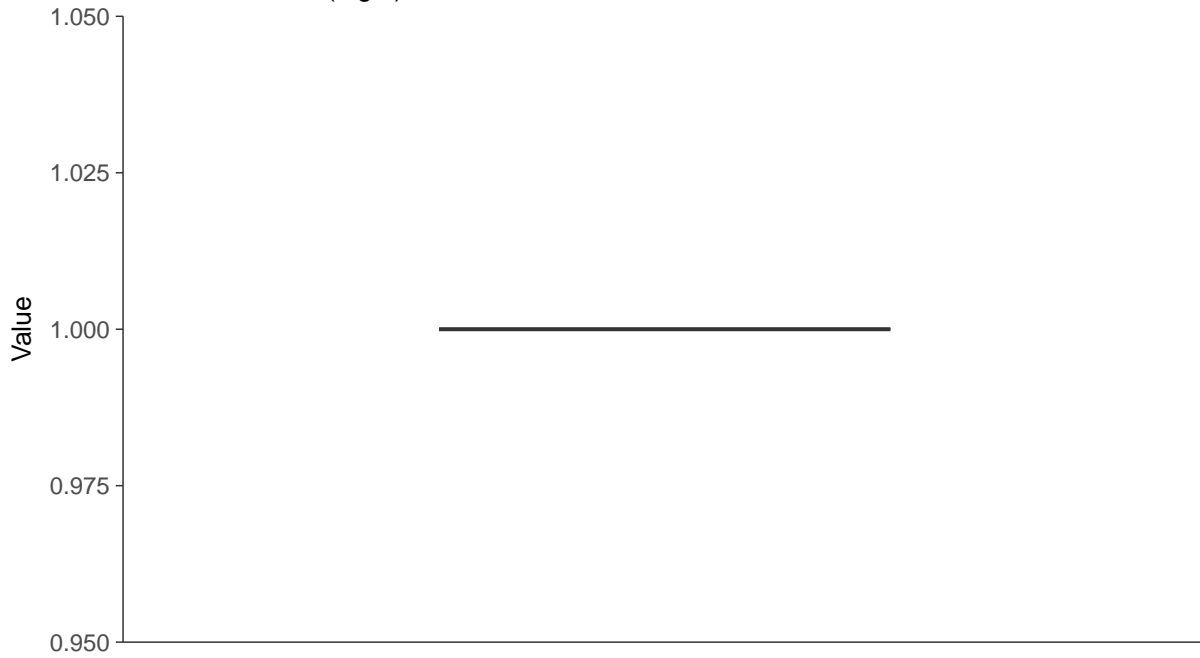
Fluoride, MW-13 (mg/L)





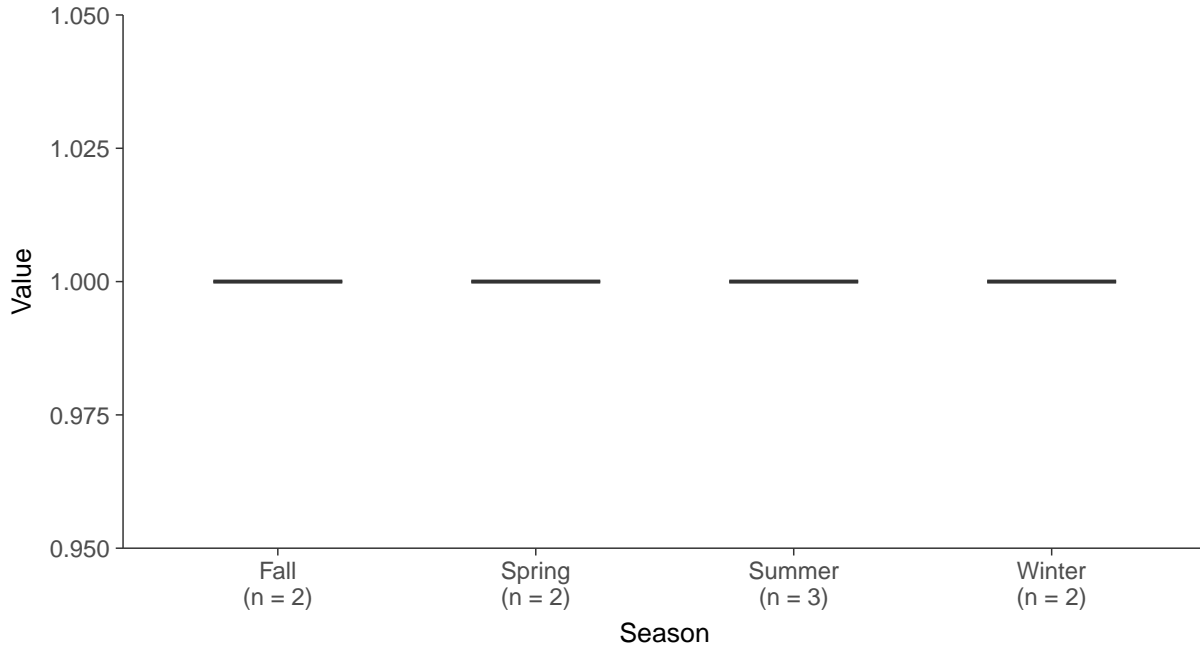
Boxplot

Fluoride, MW-13 (mg/L)



Boxplot by Season

Fluoride, MW-13 (mg/L)



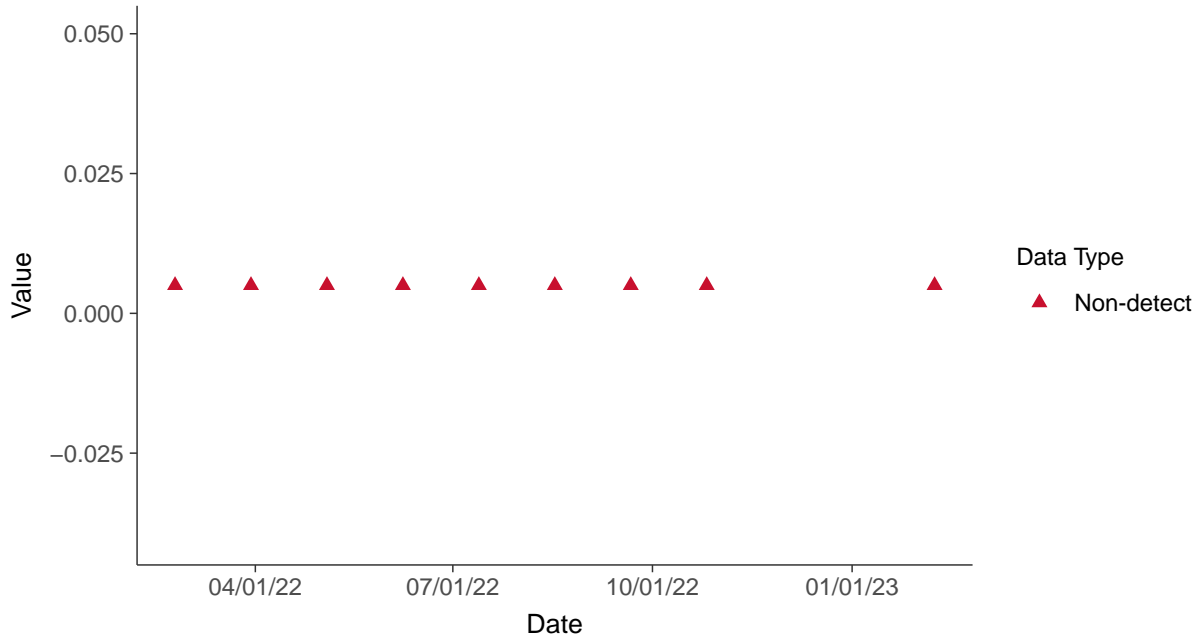


Appendix IV: Antimony, MW-13

ID: 13_2_08

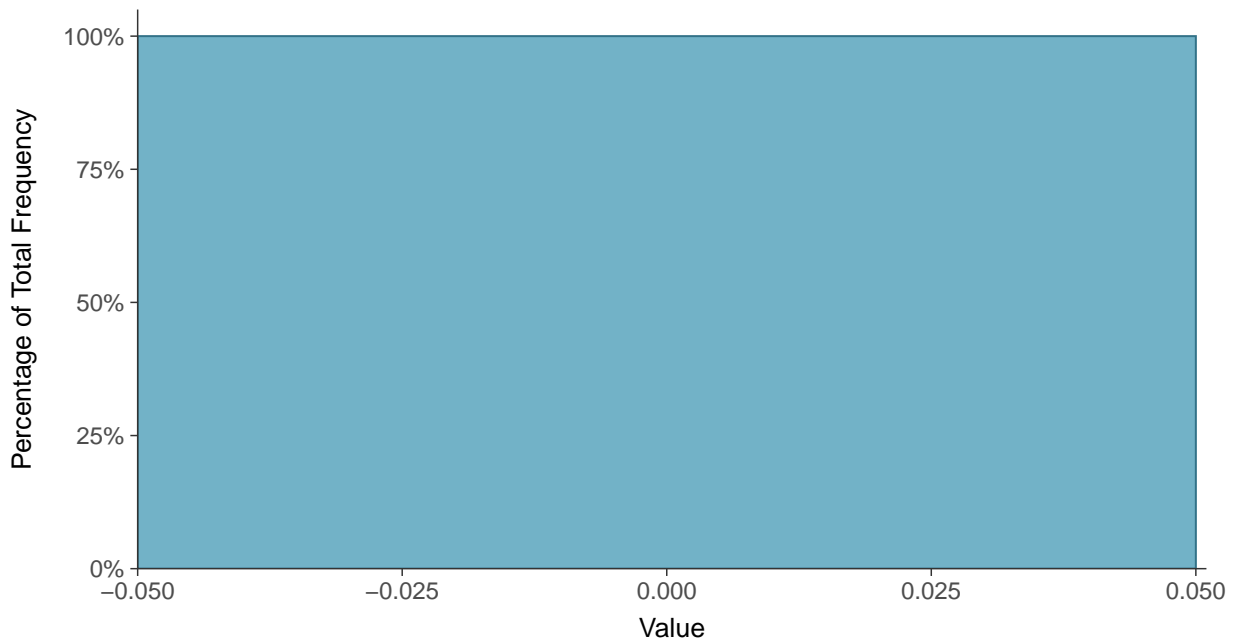
Scatter Plot

Antimony, MW-13 (mg/L)



Histogram

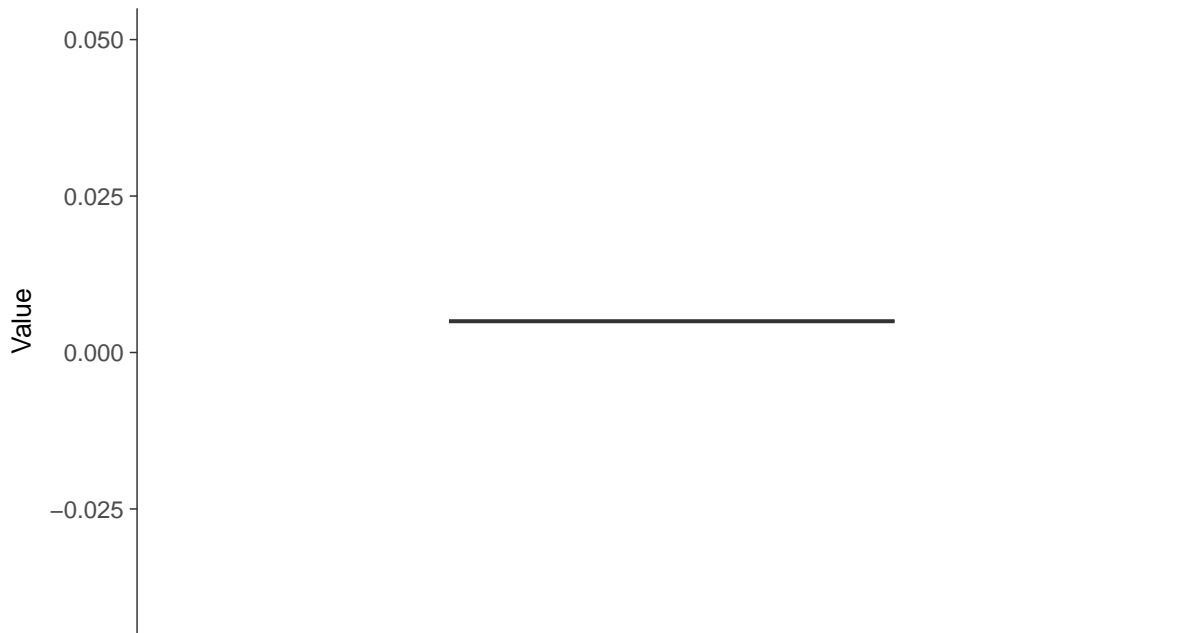
Antimony, MW-13 (mg/L)





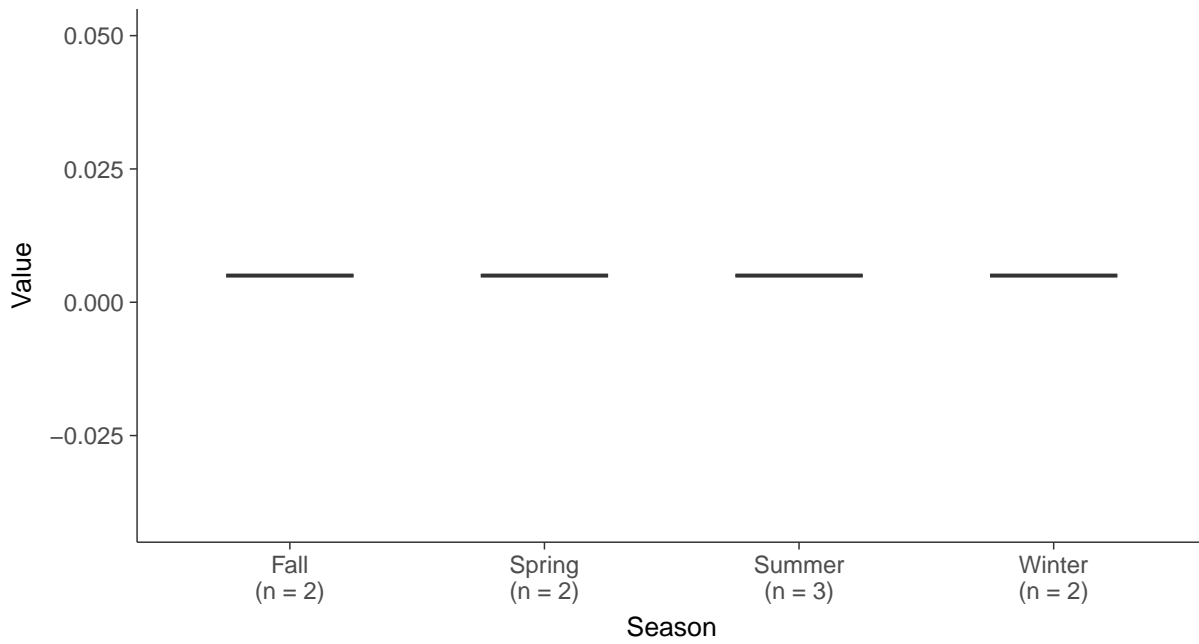
Boxplot

Antimony, MW-13 (mg/L)



Boxplot by Season

Antimony, MW-13 (mg/L)



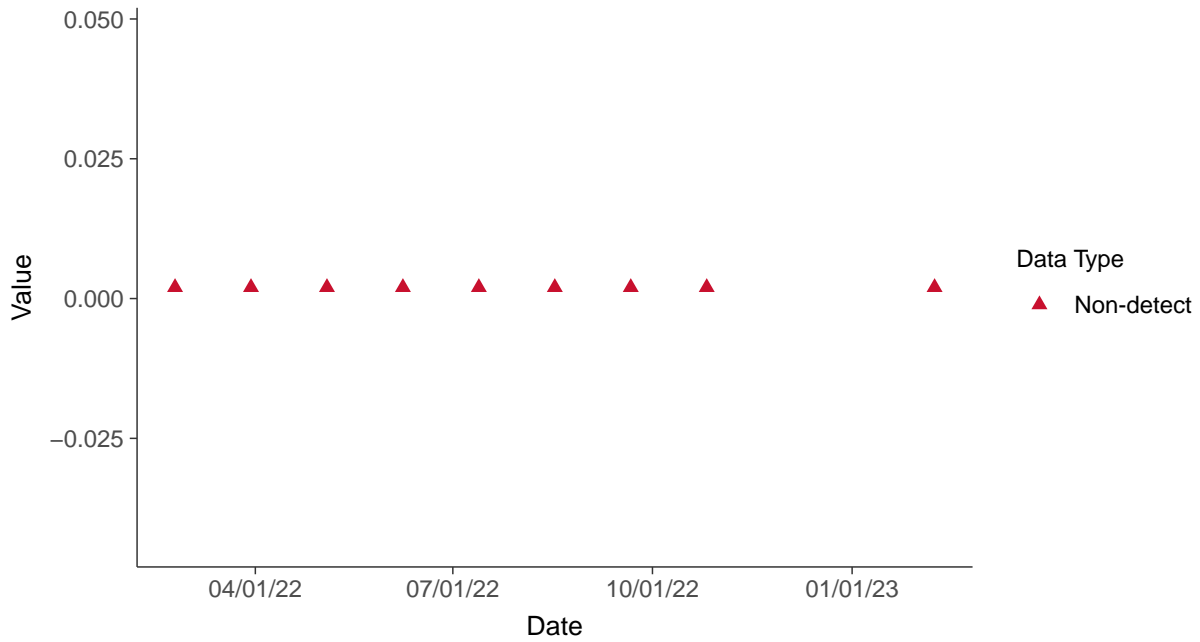


Appendix IV: Arsenic, MW-13

ID: 13_2_09

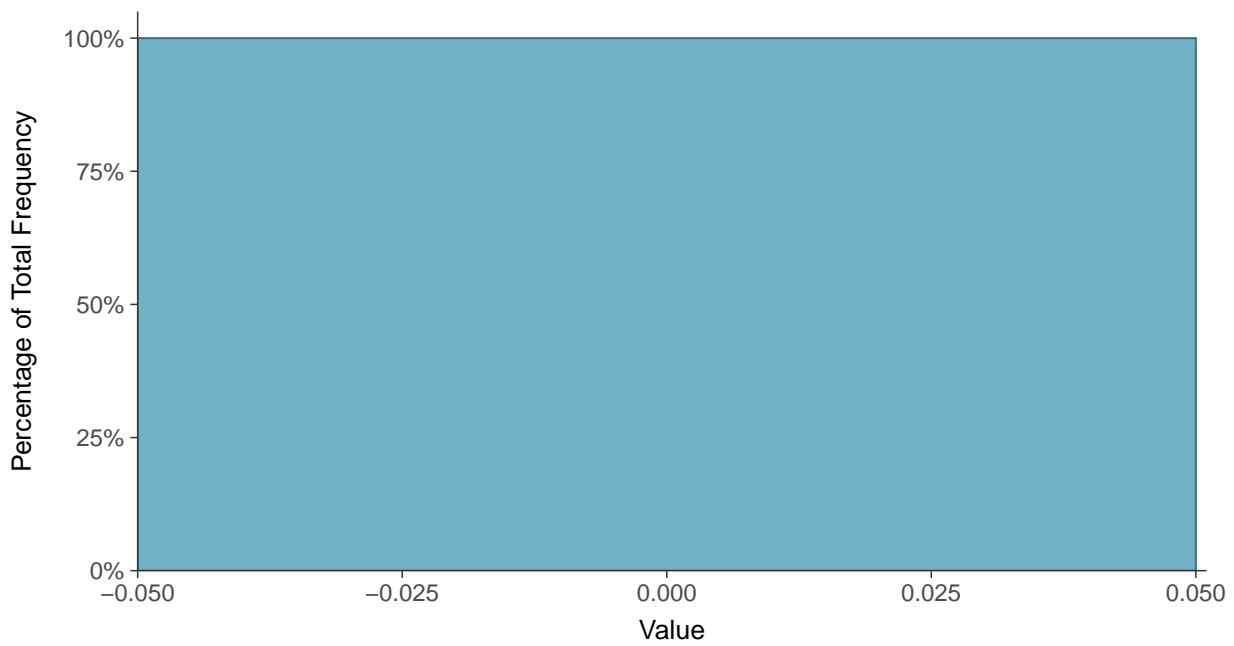
Scatter Plot

Arsenic, MW-13 (mg/L)



Histogram

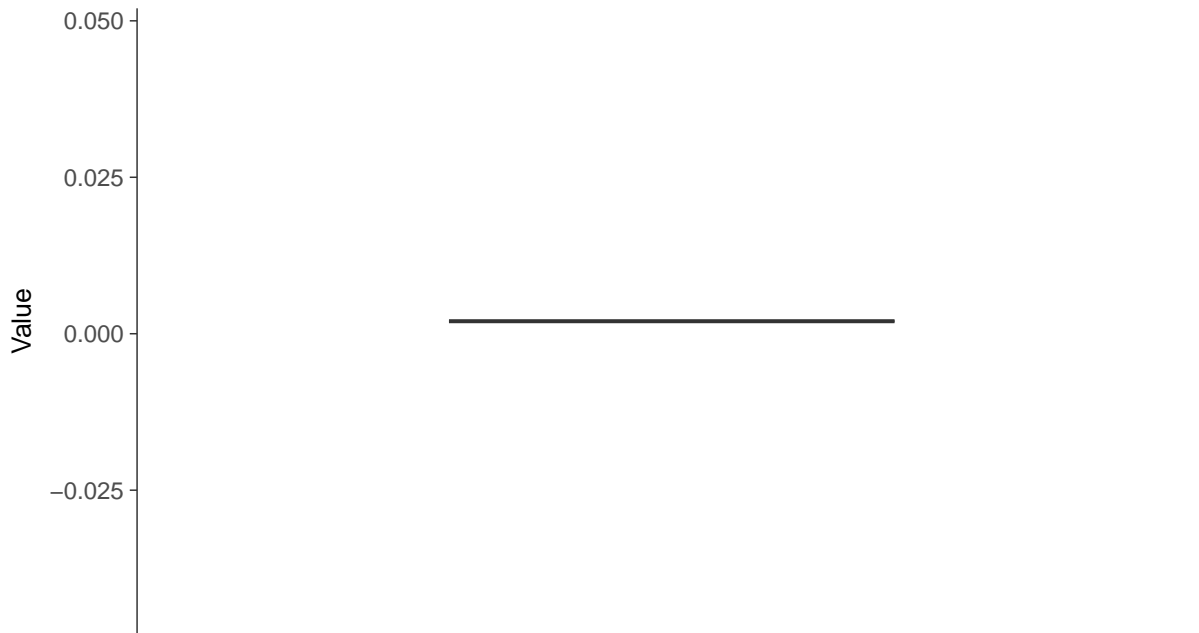
Arsenic, MW-13 (mg/L)





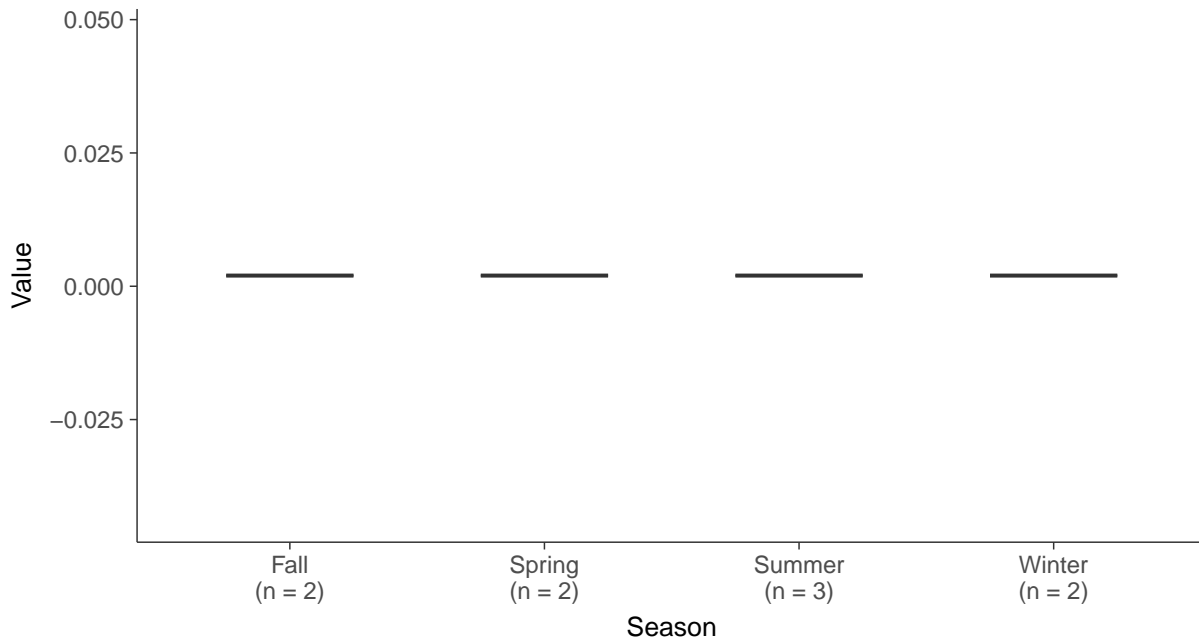
Boxplot

Arsenic, MW-13 (mg/L)



Boxplot by Season

Arsenic, MW-13 (mg/L)



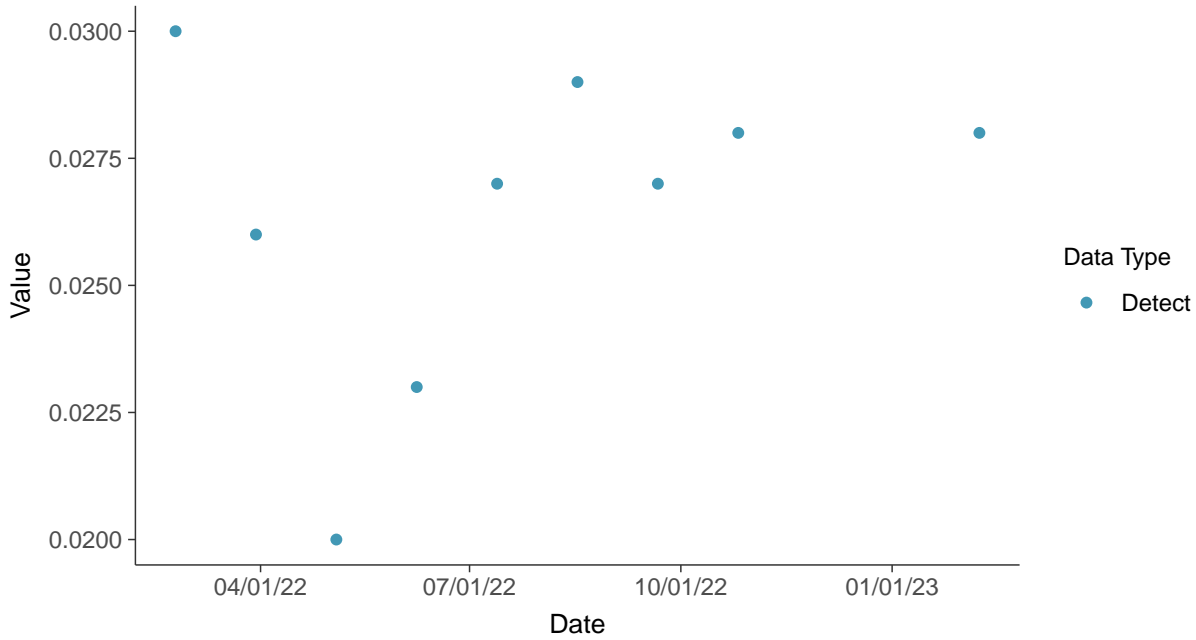


Appendix IV: Barium, MW-13

ID: 13_2_10

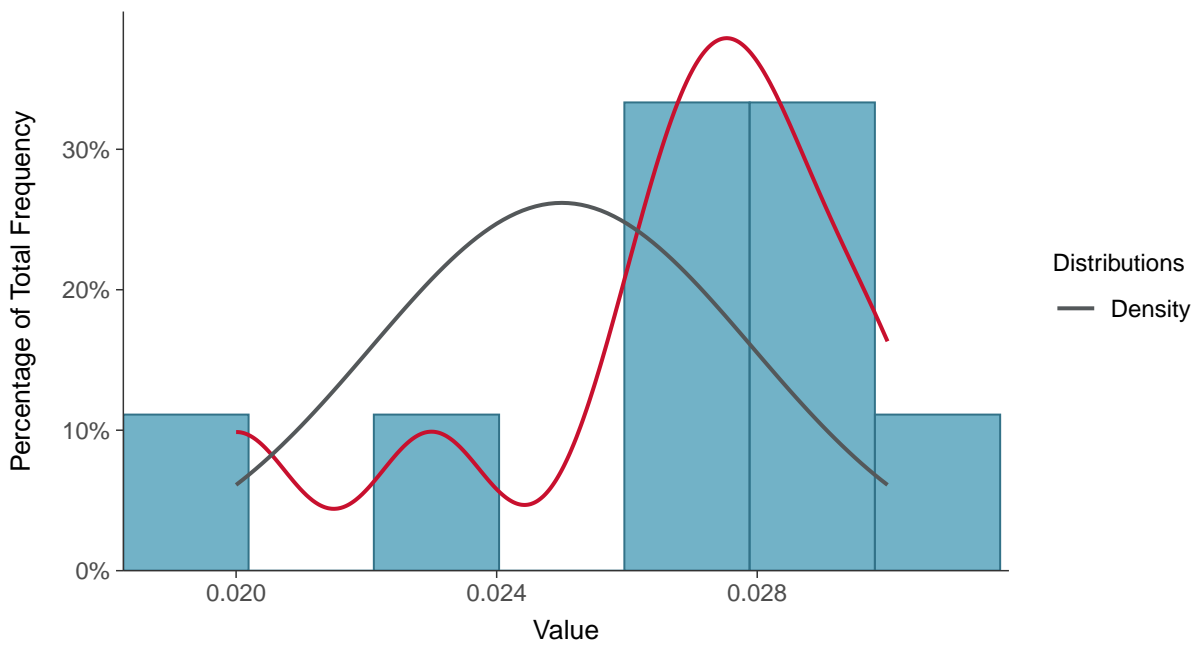
Scatter Plot

Barium, MW-13 (mg/L)



Histogram

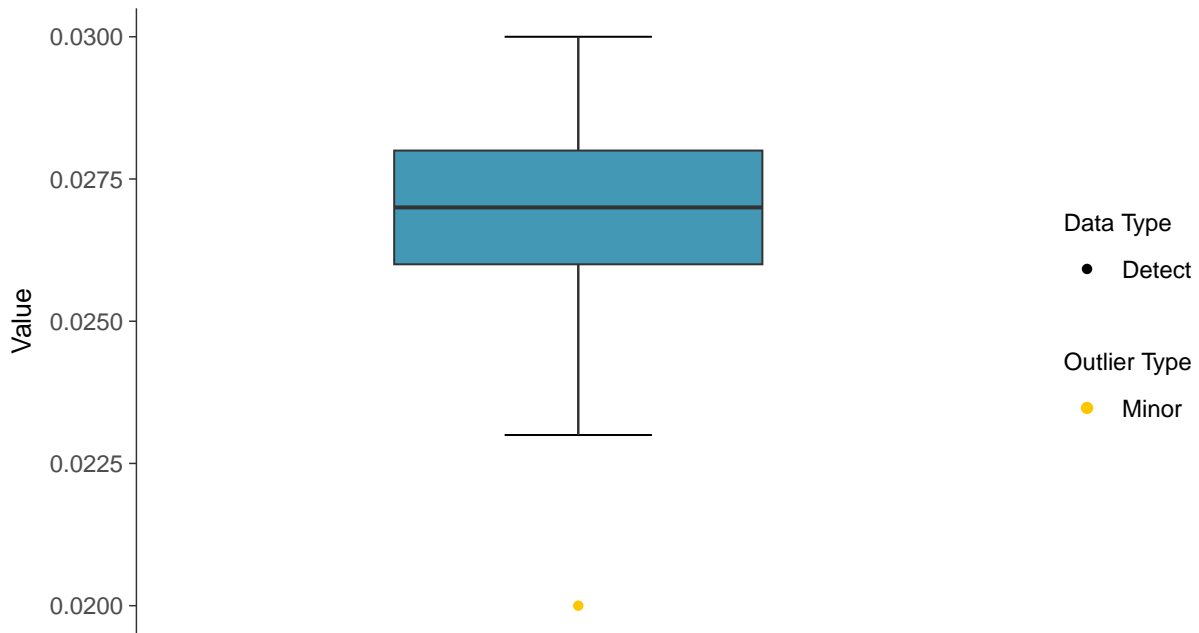
Barium, MW-13 (mg/L)





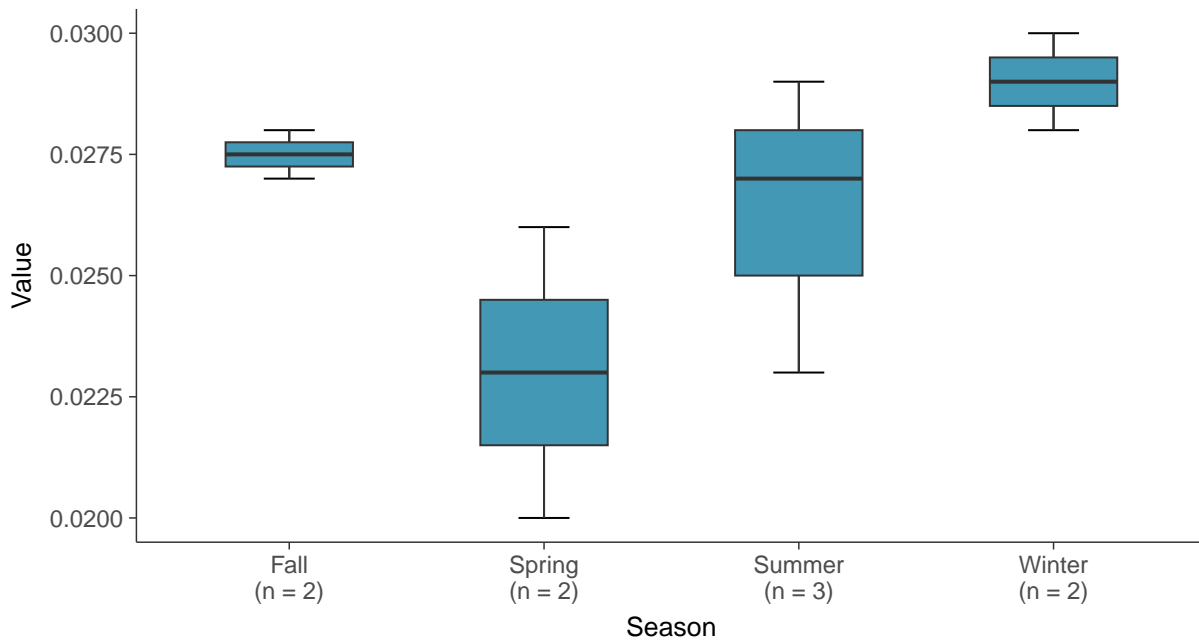
Boxplot

Barium, MW-13 (mg/L)



Boxplot by Season

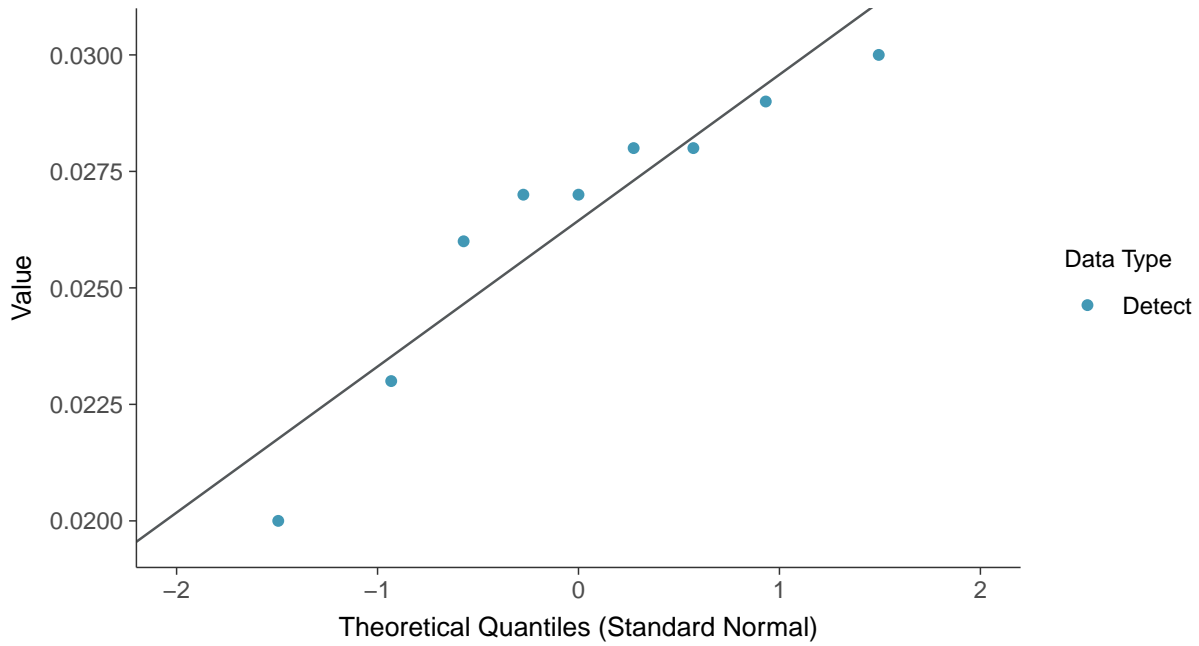
Barium, MW-13 (mg/L)





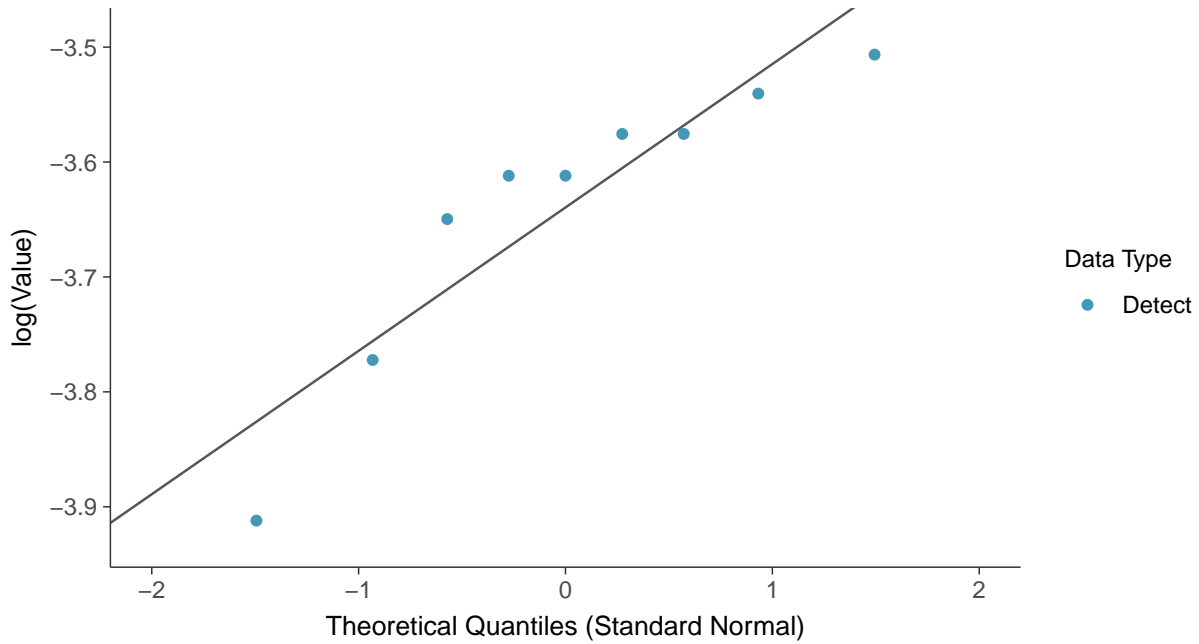
Normal Q-Q plot

Barium, MW-13 (mg/L)



Lognormal Q-Q plot

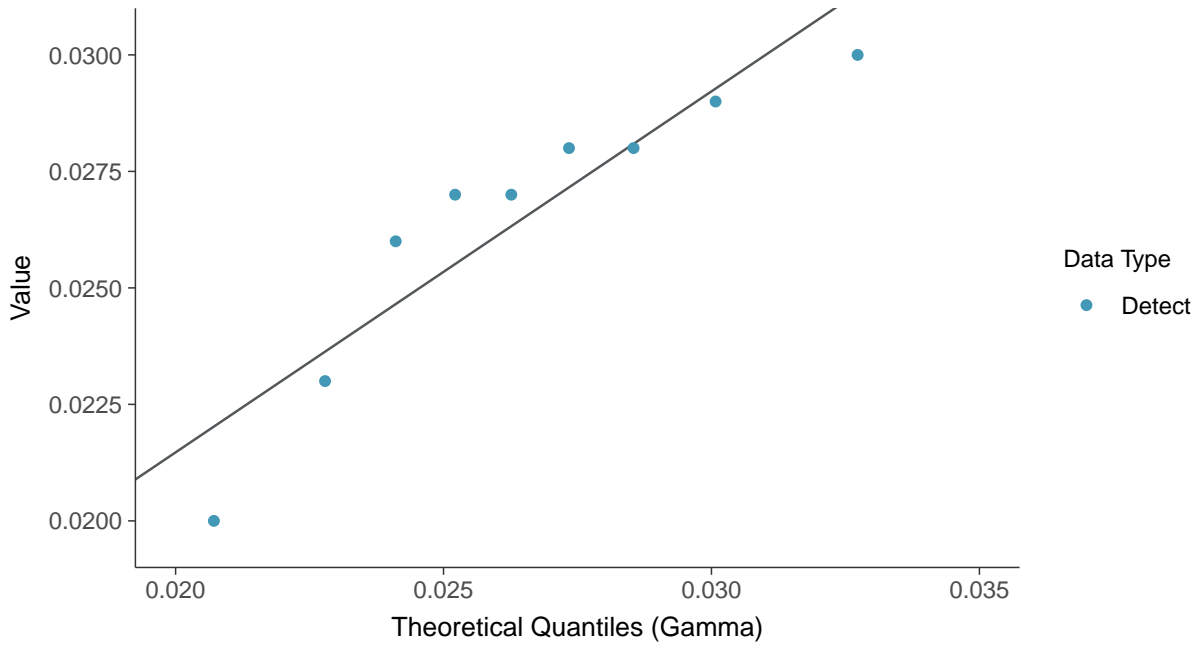
Barium, MW-13 (mg/L)





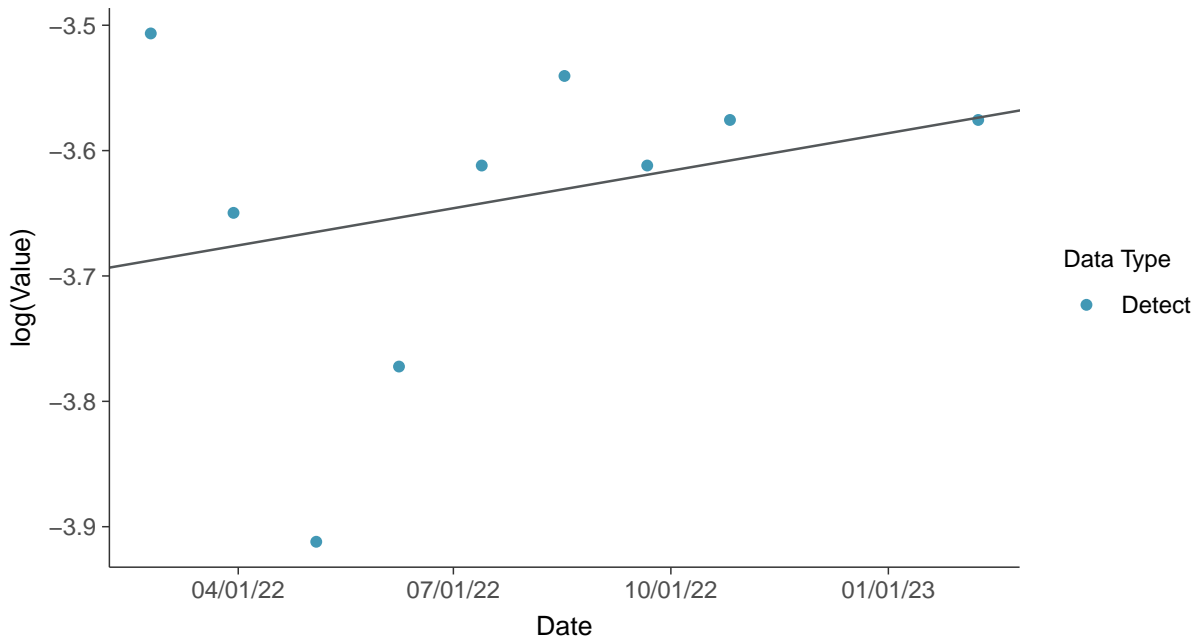
Gamma Q-Q plot

Barium, MW-13 (mg/L)



Trend Regression: Lognormal MLE

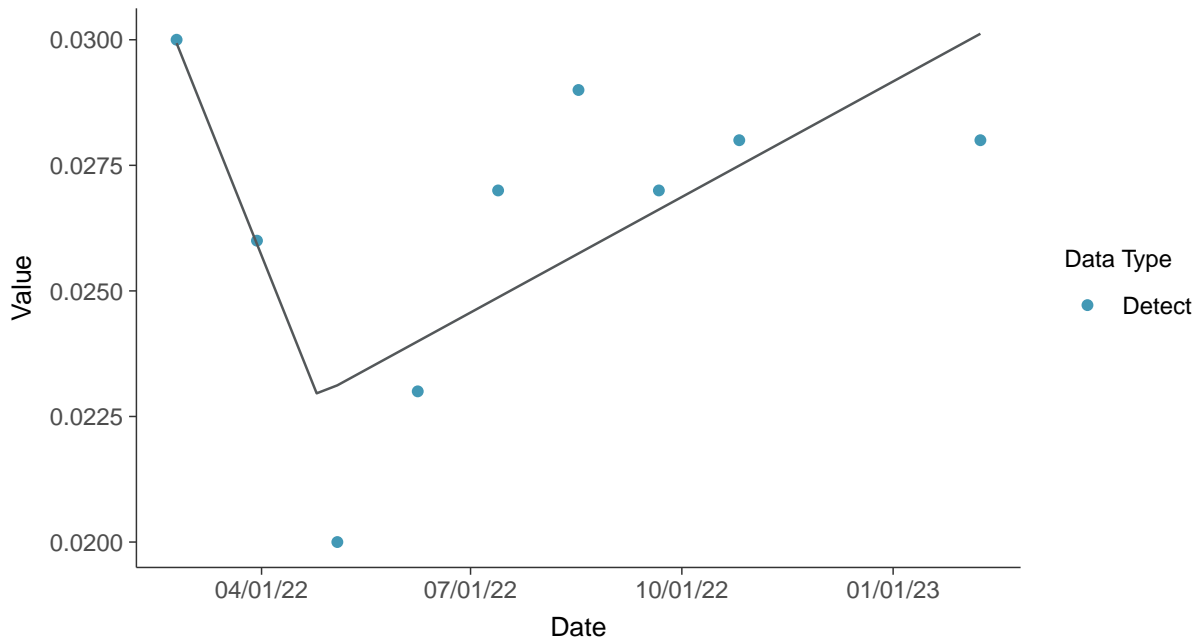
Barium, MW-13 (mg/L)





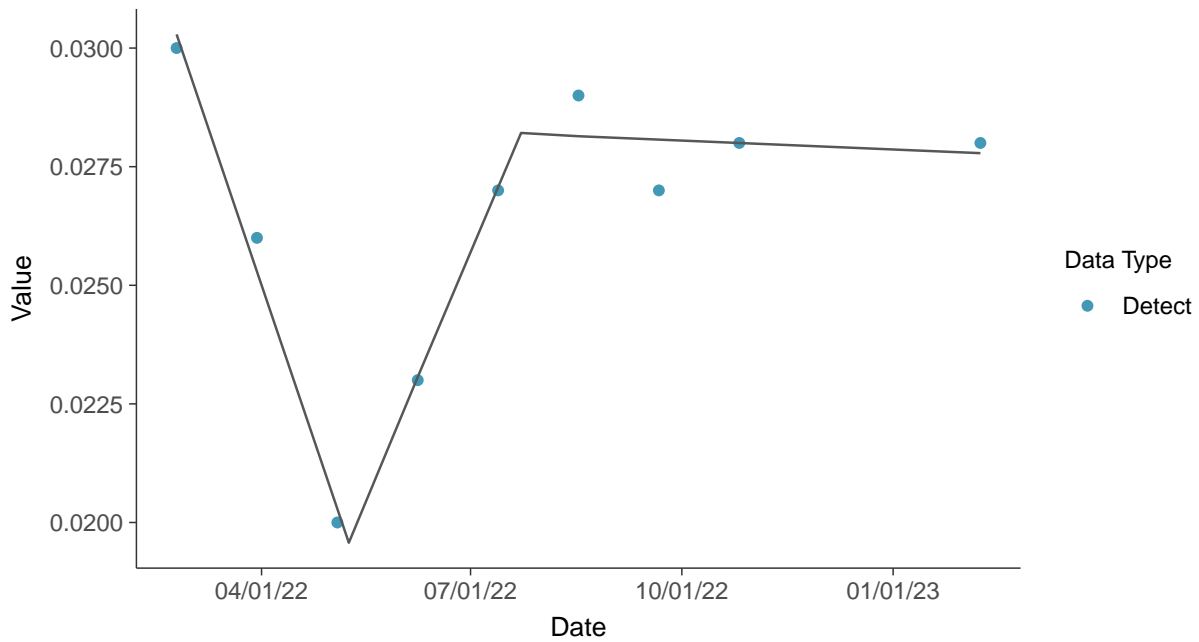
Trend Regression: Piecewise Linear-Linear

Barium, MW-13 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Barium, MW-13 (mg/L)



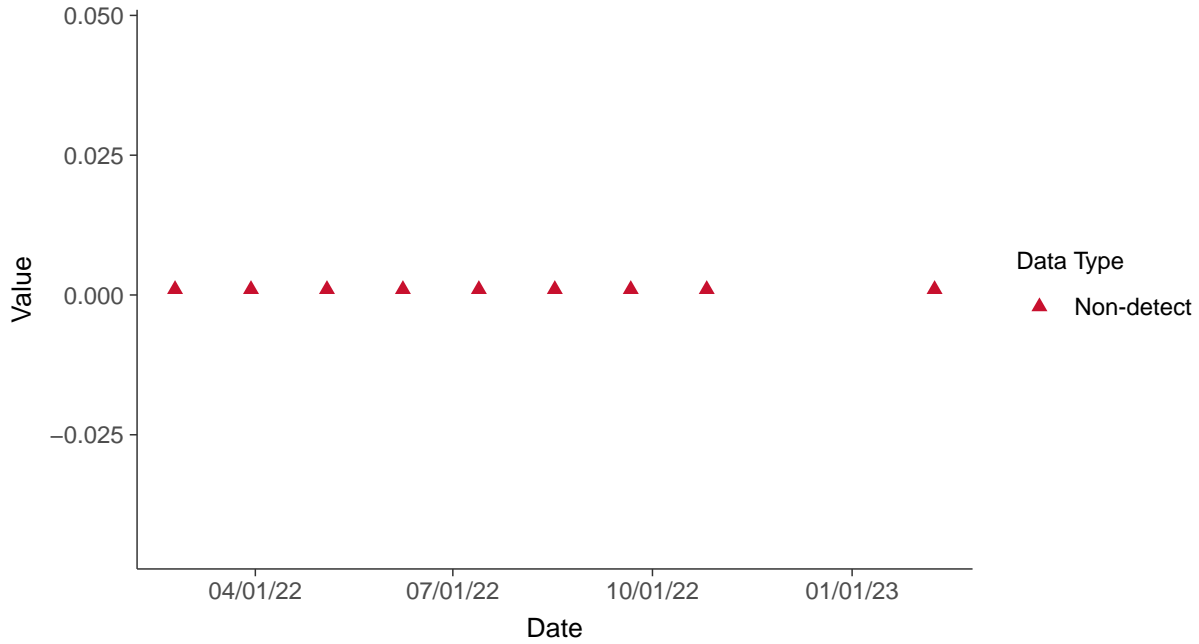


Appendix IV: Beryllium, MW-13

ID: 13_2_11

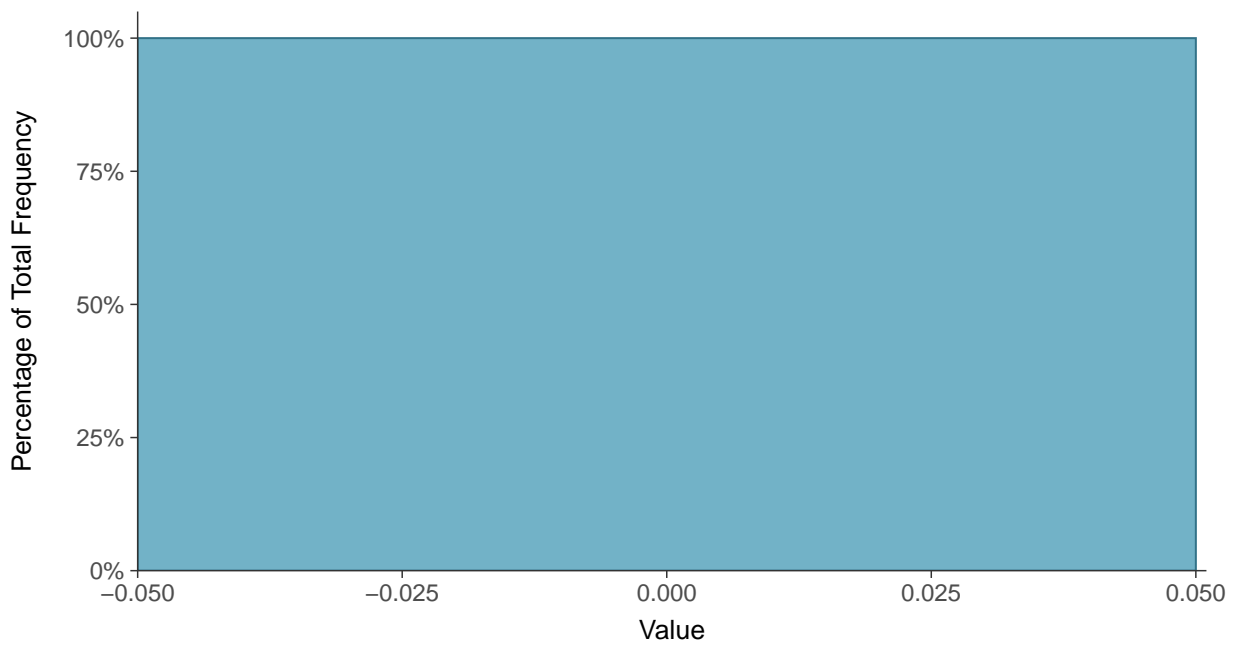
Scatter Plot

Beryllium, MW-13 (mg/L)



Histogram

Beryllium, MW-13 (mg/L)





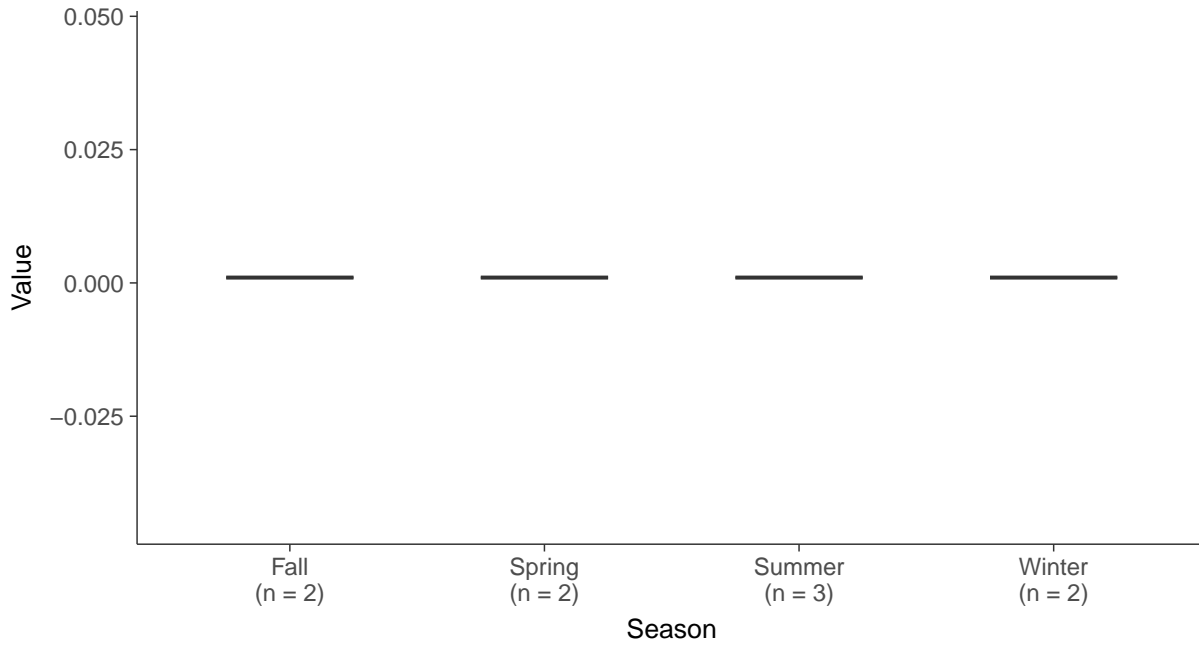
Boxplot

Beryllium, MW-13 (mg/L)



Boxplot by Season

Beryllium, MW-13 (mg/L)



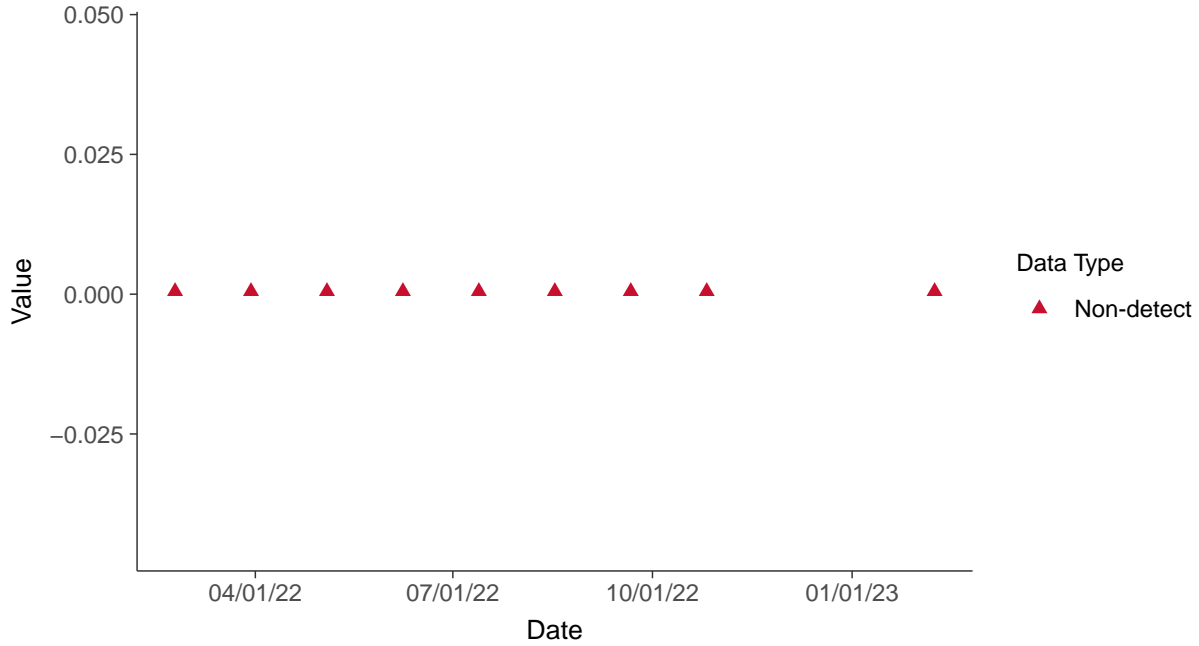


Appendix IV: Cadmium, MW-13

ID: 13_2_13

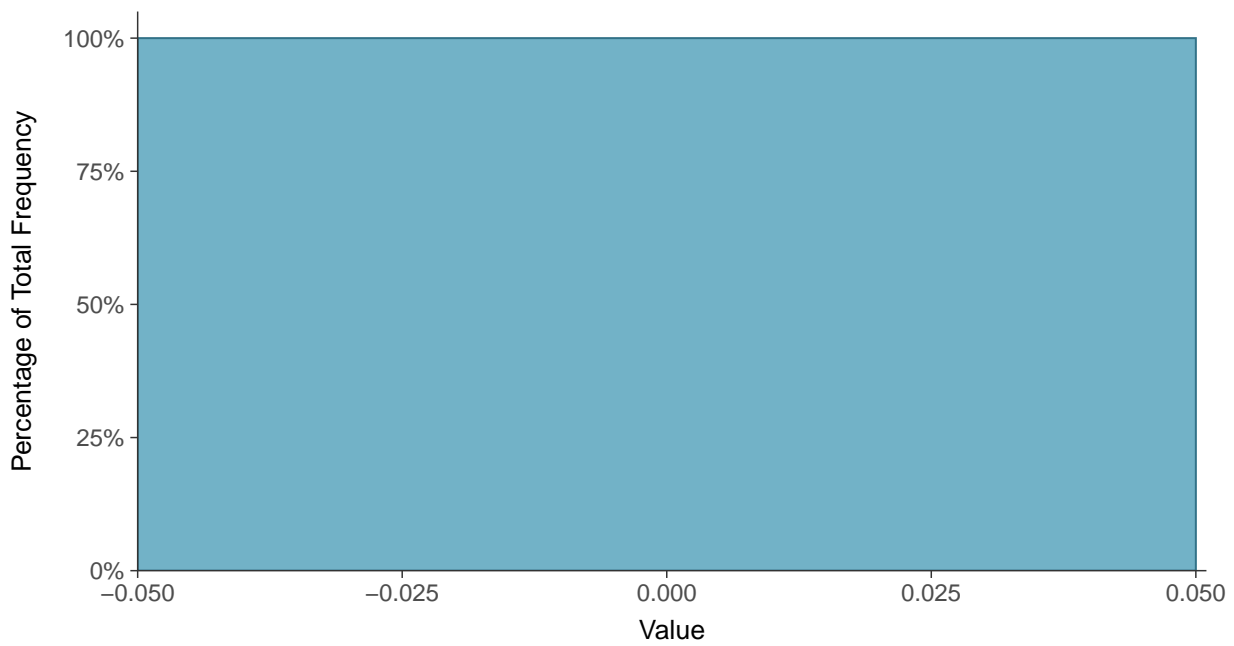
Scatter Plot

Cadmium, MW-13 (mg/L)



Histogram

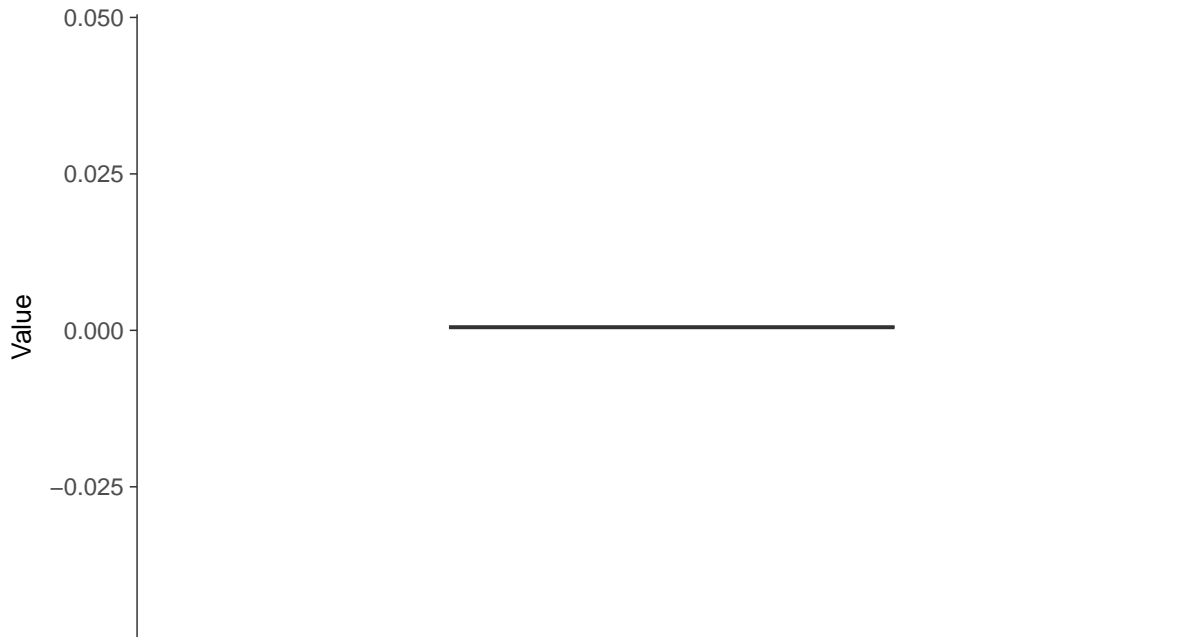
Cadmium, MW-13 (mg/L)





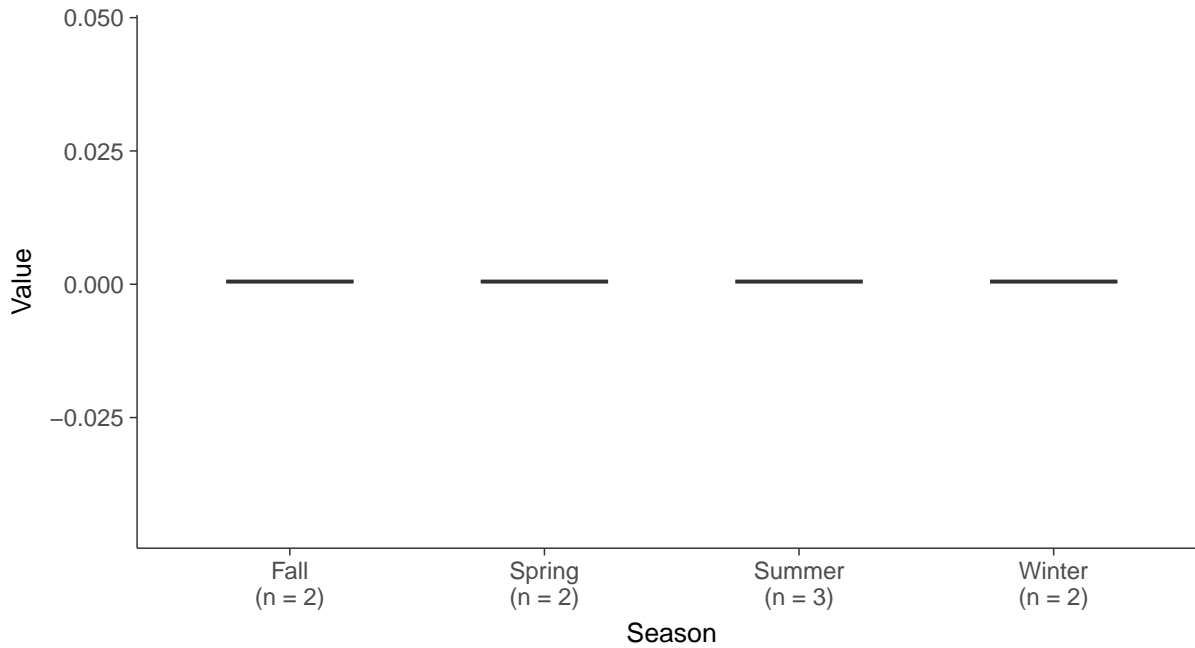
Boxplot

Cadmium, MW-13 (mg/L)



Boxplot by Season

Cadmium, MW-13 (mg/L)



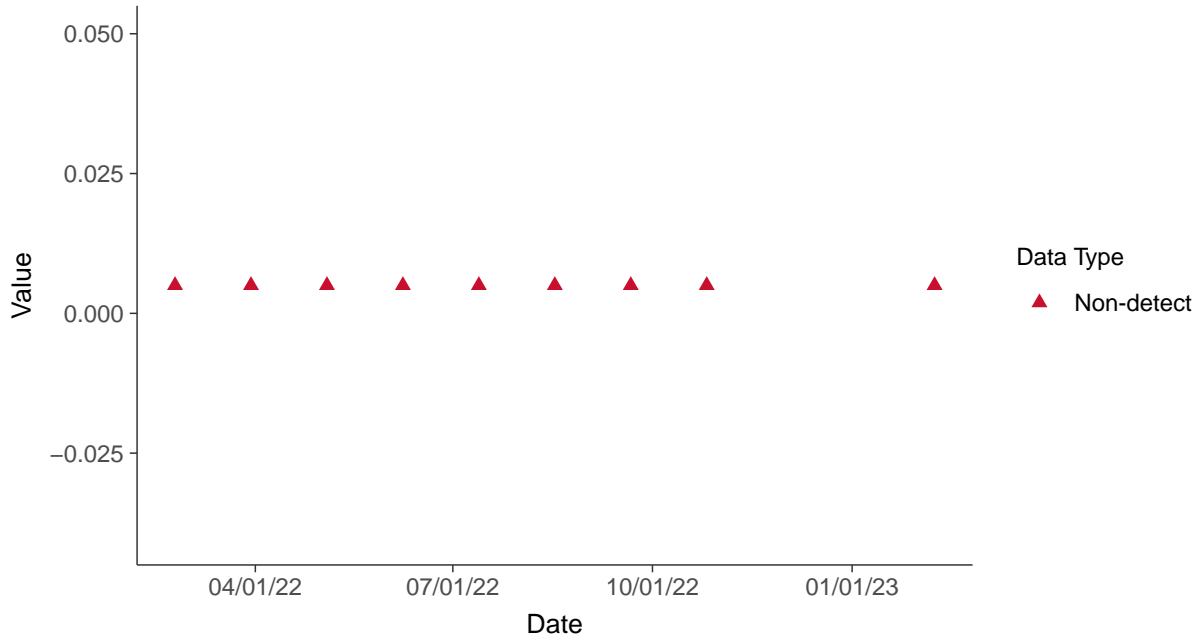


Appendix IV: Chromium, MW-13

ID: 13_2_15

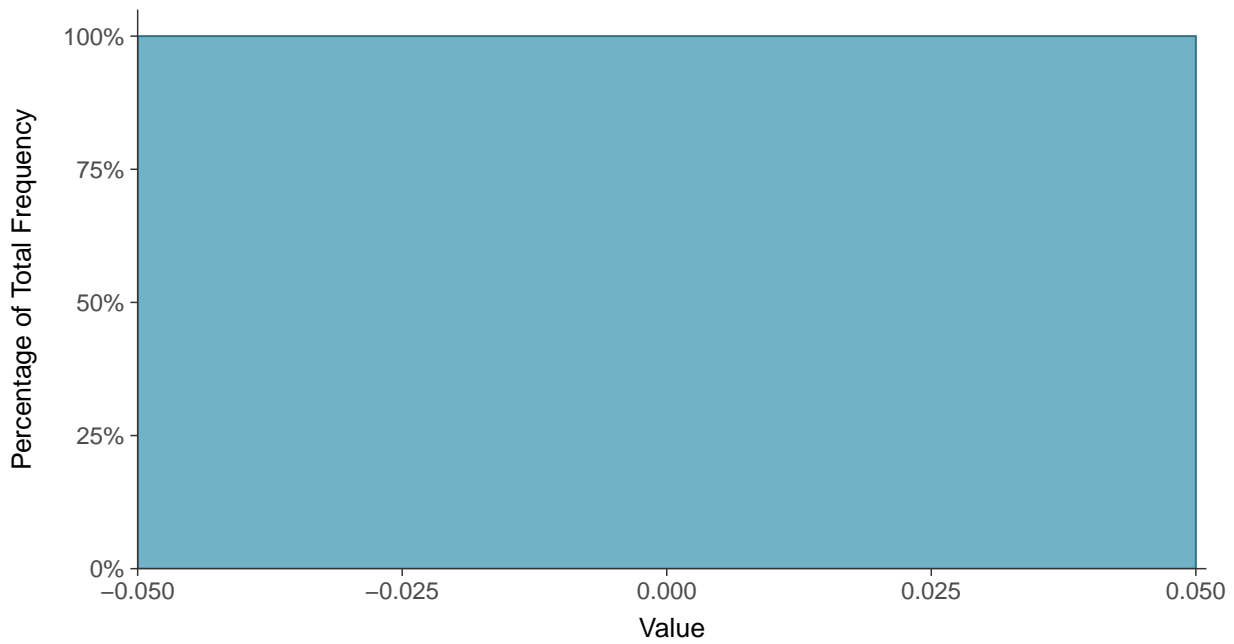
Scatter Plot

Chromium, MW-13 (mg/L)



Histogram

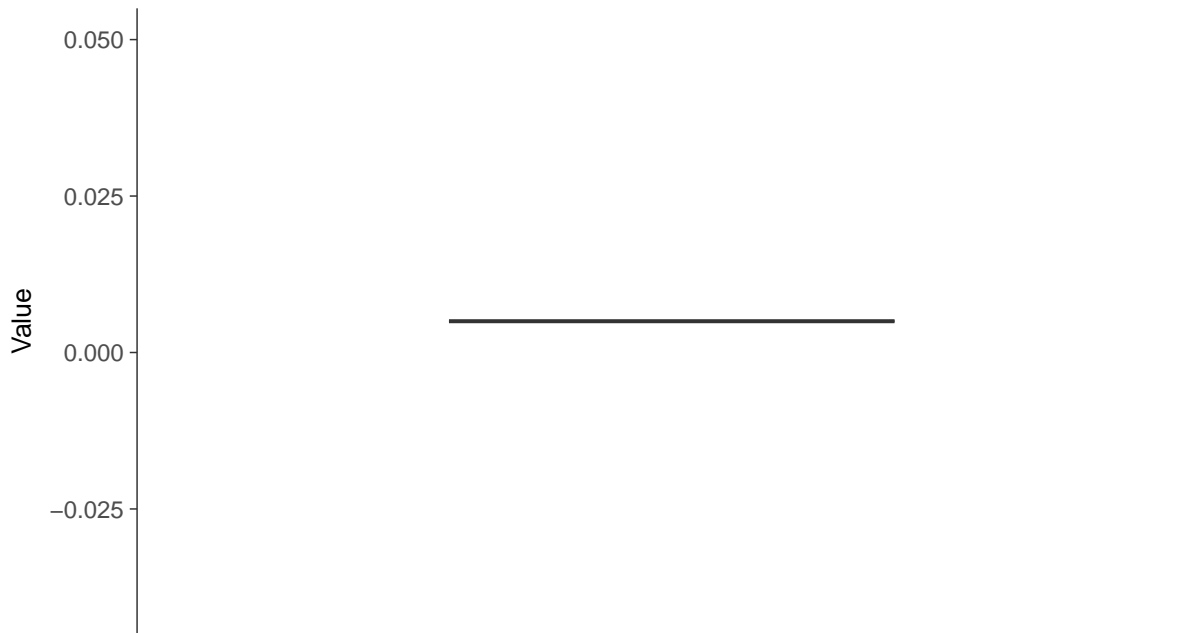
Chromium, MW-13 (mg/L)





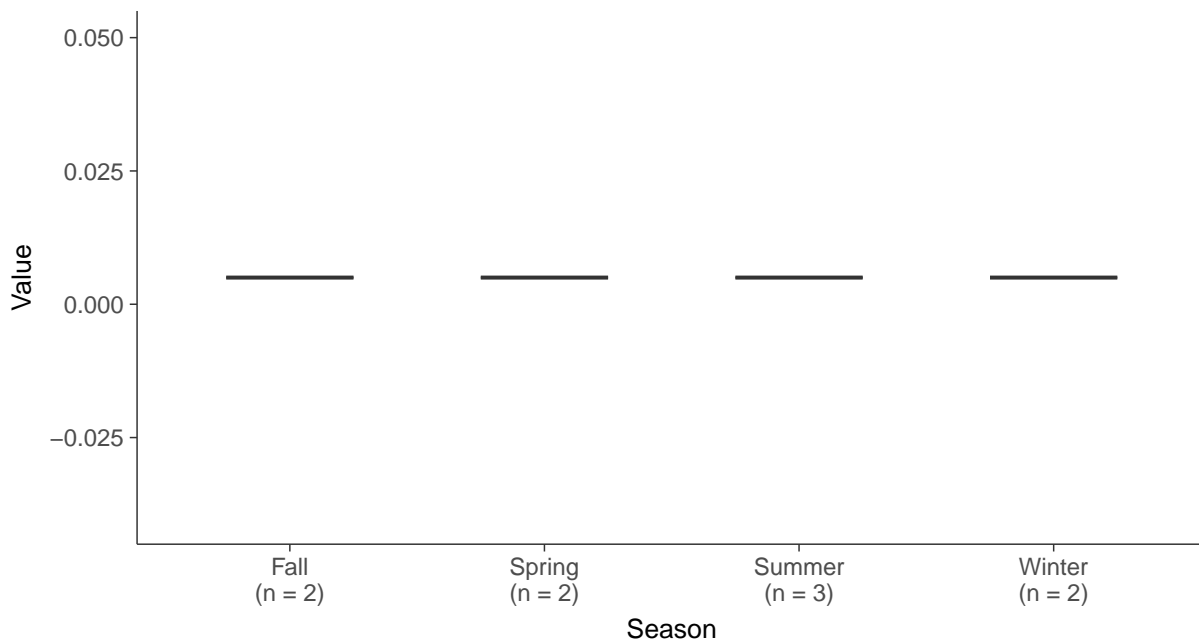
Boxplot

Chromium, MW-13 (mg/L)



Boxplot by Season

Chromium, MW-13 (mg/L)



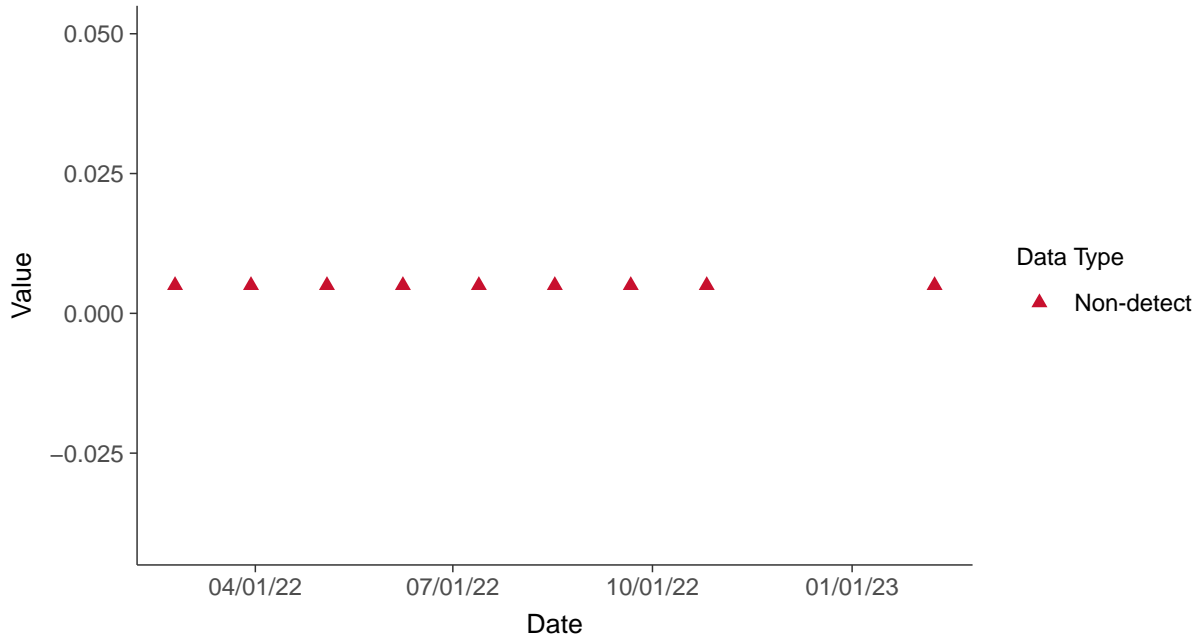


Appendix IV: Cobalt, MW-13

ID: 13_2_16

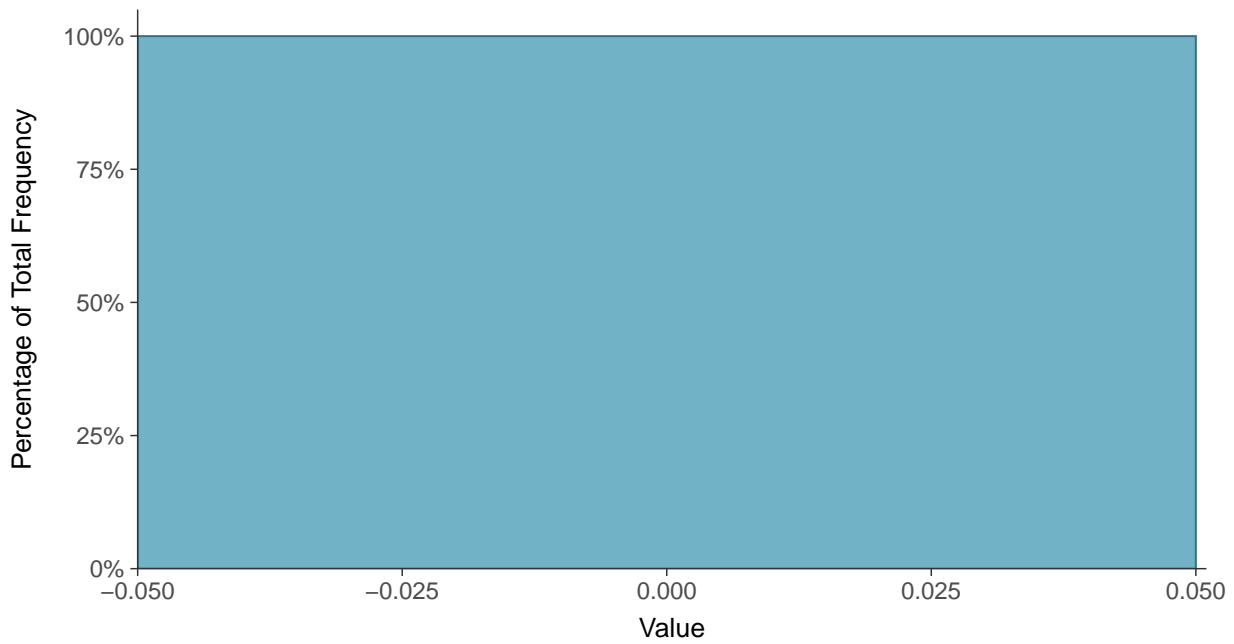
Scatter Plot

Cobalt, MW-13 (mg/L)



Histogram

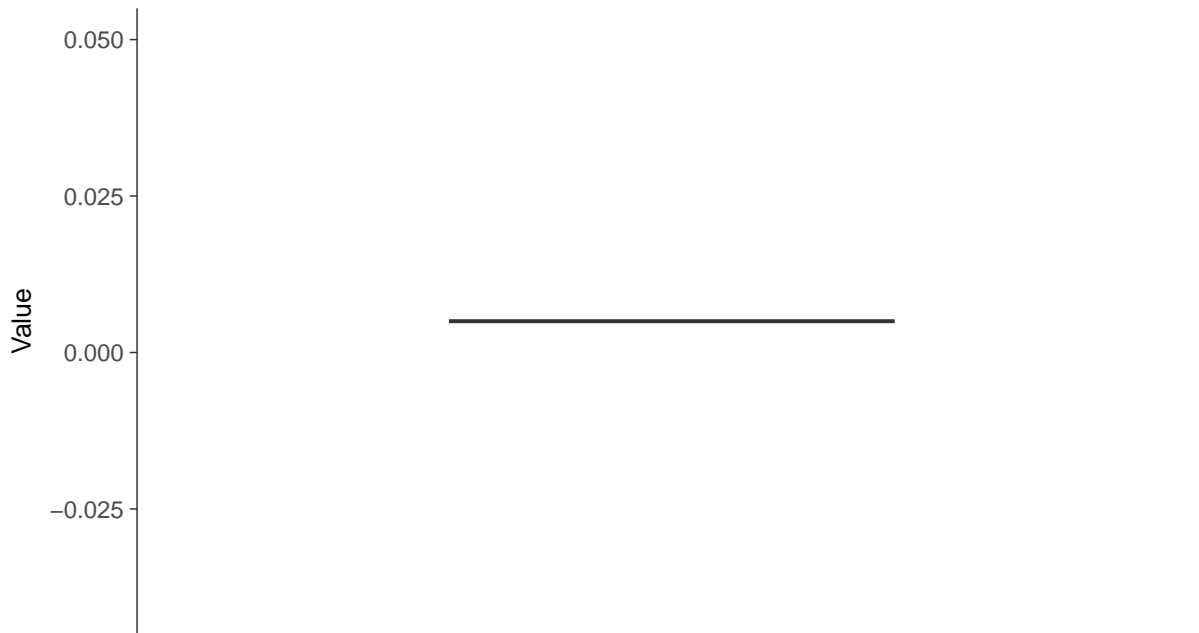
Cobalt, MW-13 (mg/L)





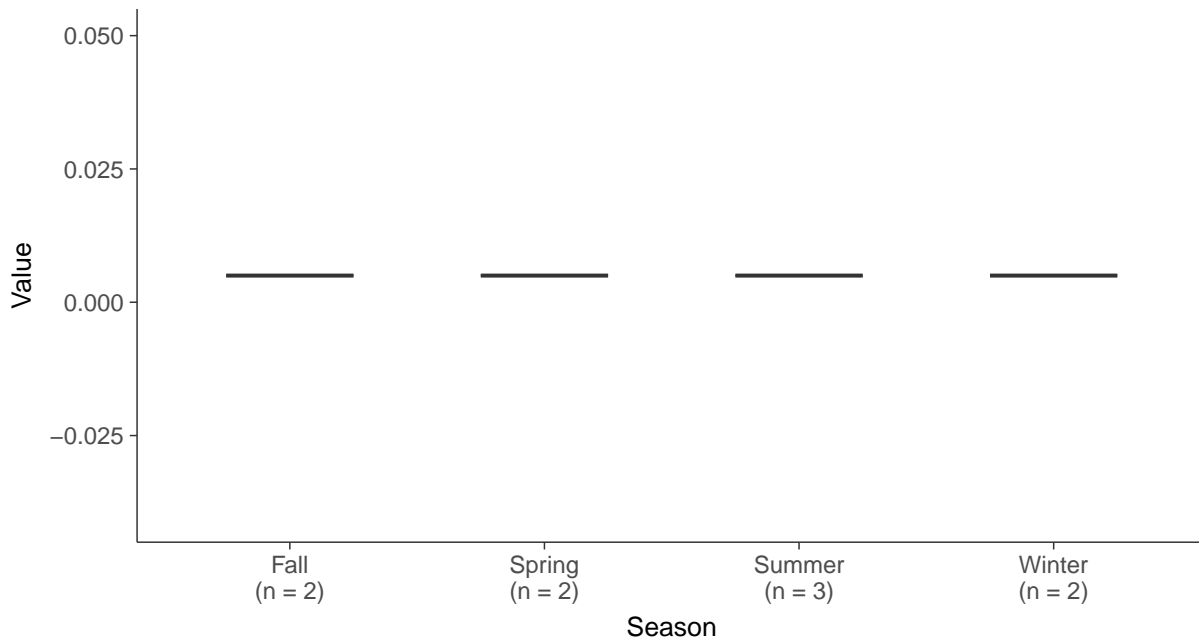
Boxplot

Cobalt, MW-13 (mg/L)



Boxplot by Season

Cobalt, MW-13 (mg/L)



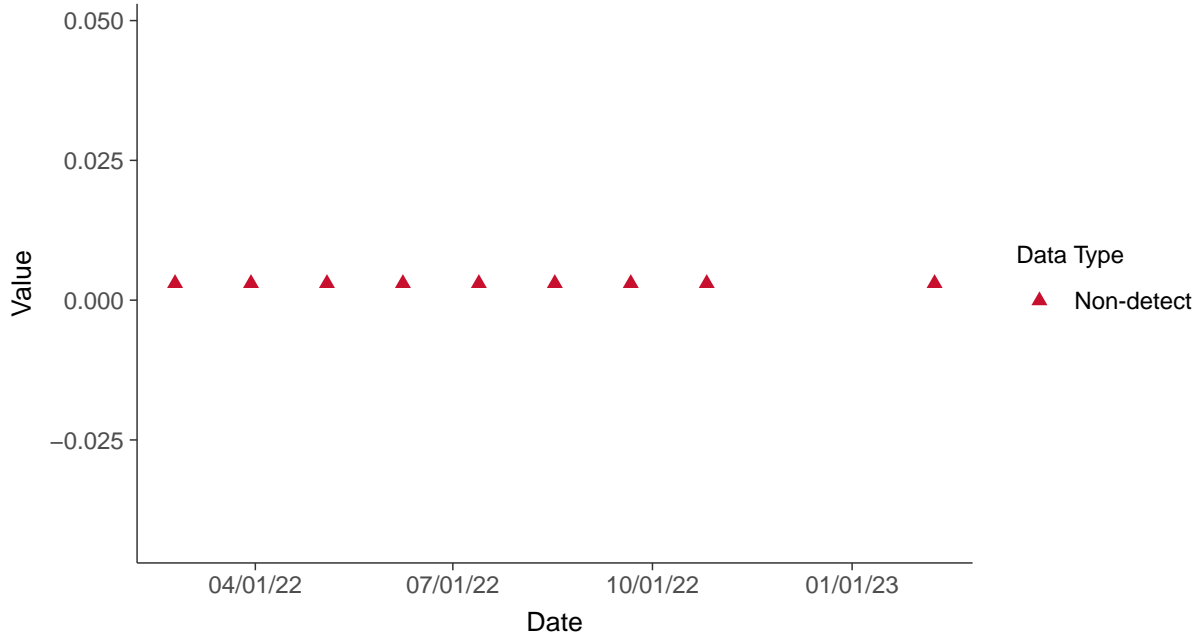


Appendix IV: Lead, MW-13

ID: 13_2_18

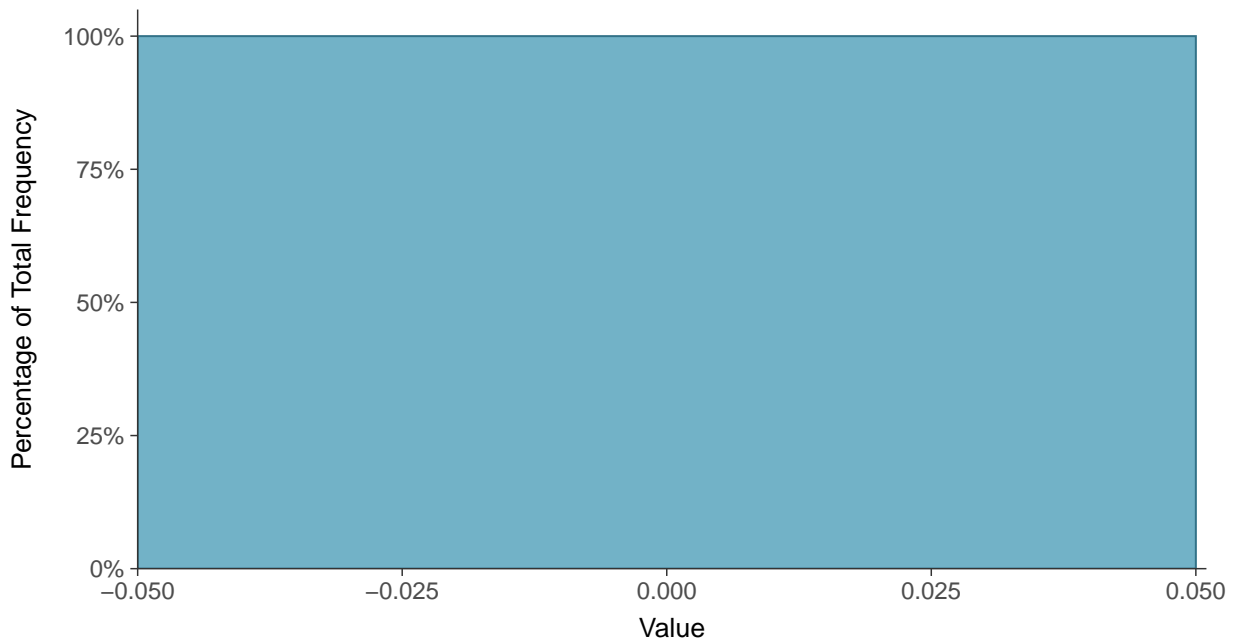
Scatter Plot

Lead, MW-13 (mg/L)



Histogram

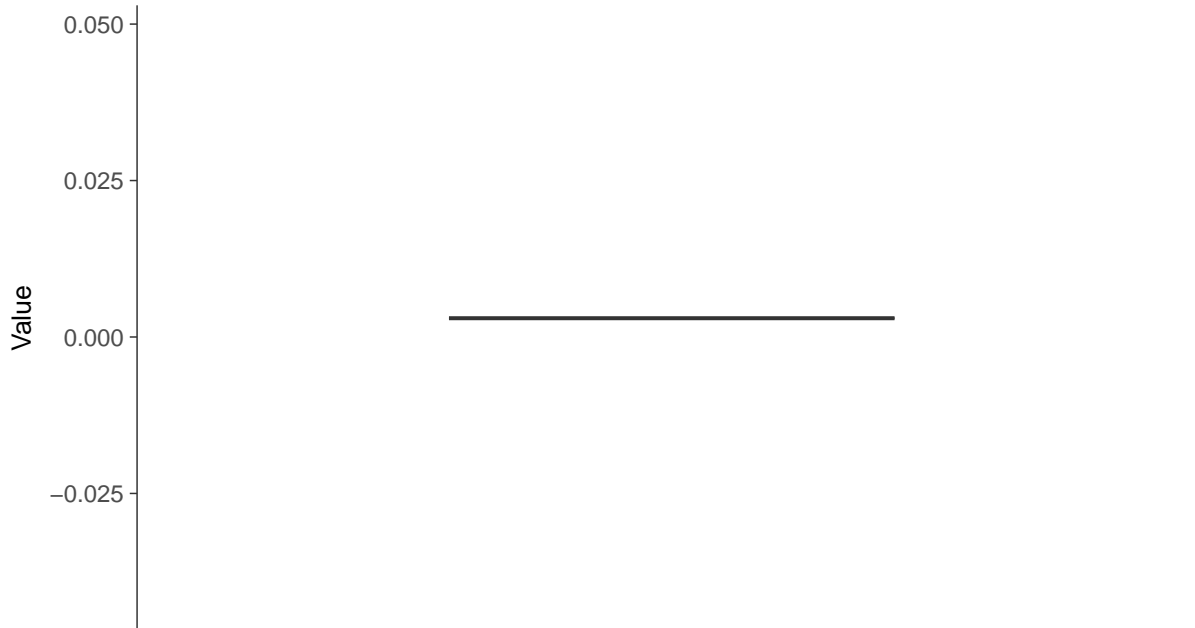
Lead, MW-13 (mg/L)





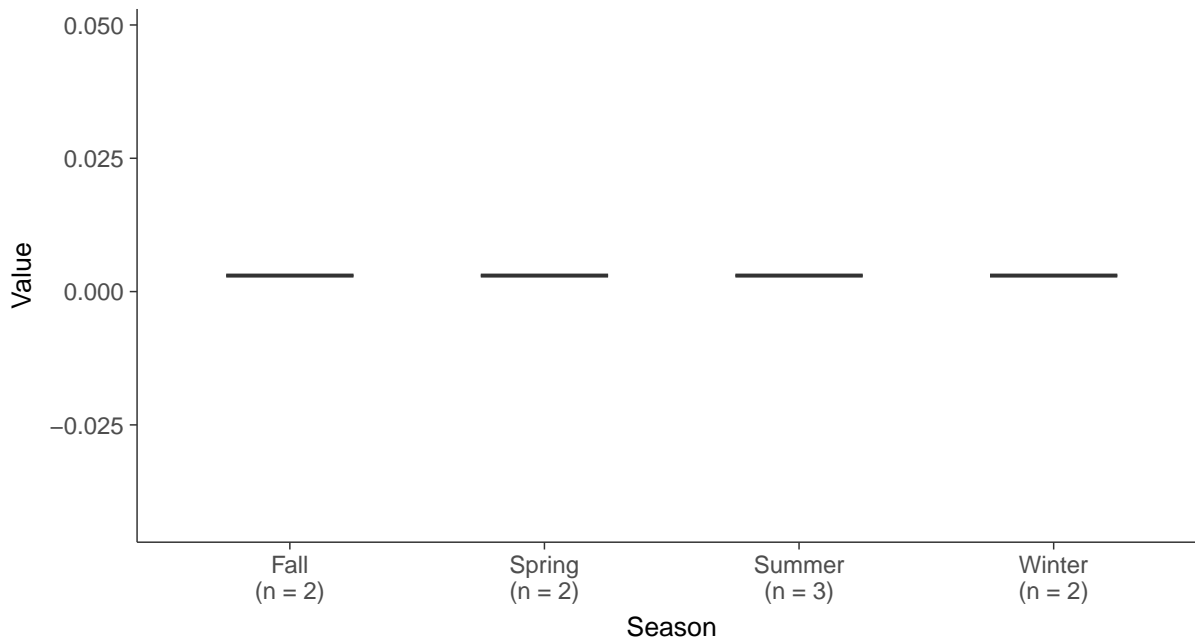
Boxplot

Lead, MW-13 (mg/L)



Boxplot by Season

Lead, MW-13 (mg/L)



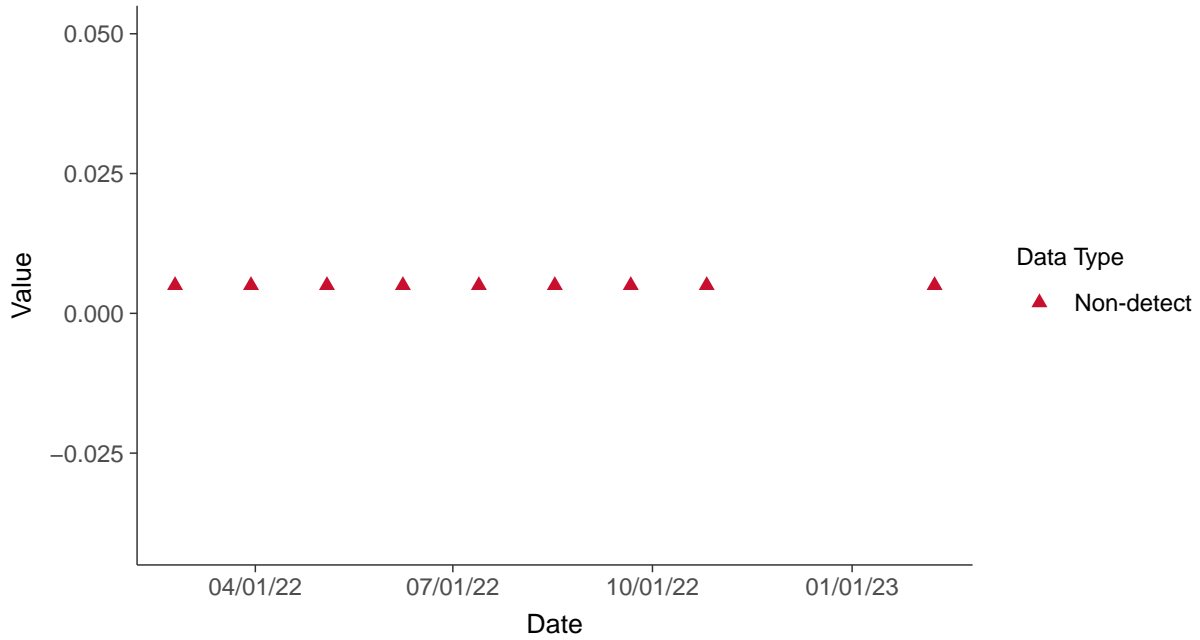


Appendix IV: Lithium, MW-13

ID: 13_2_19

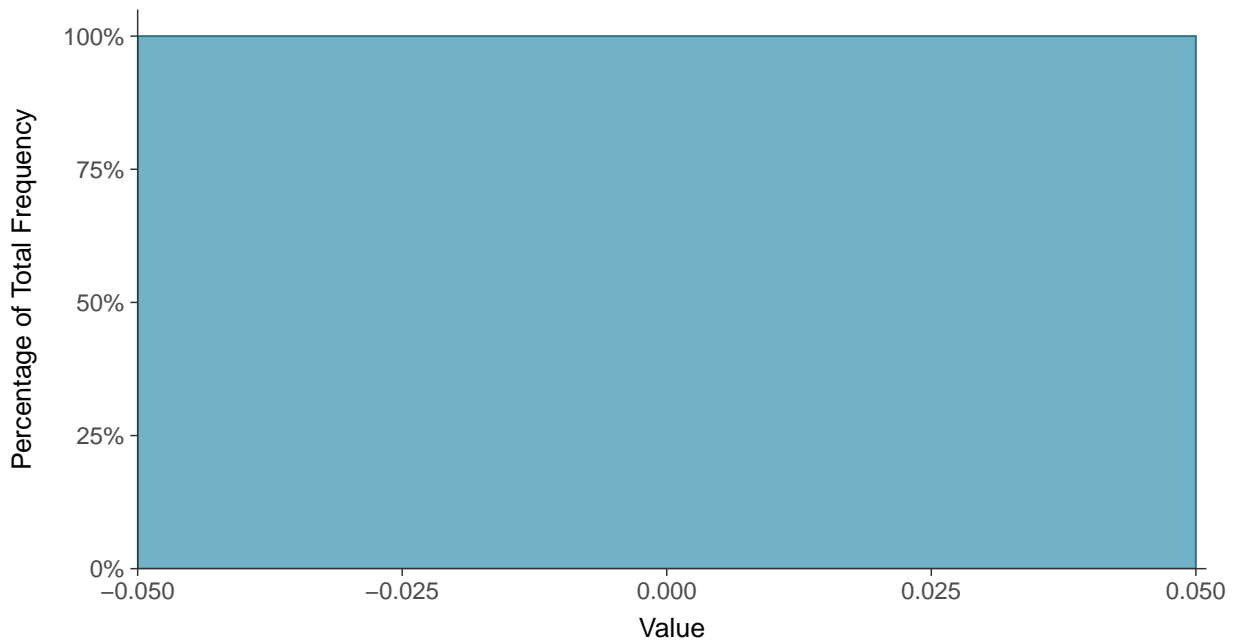
Scatter Plot

Lithium, MW-13 (mg/L)



Histogram

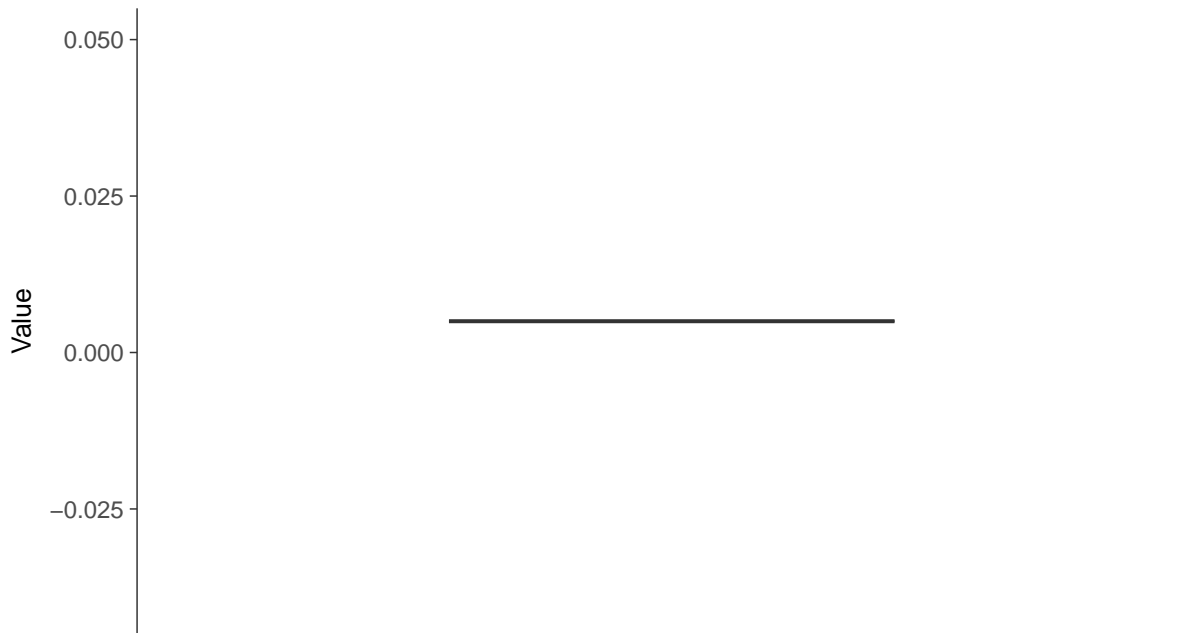
Lithium, MW-13 (mg/L)





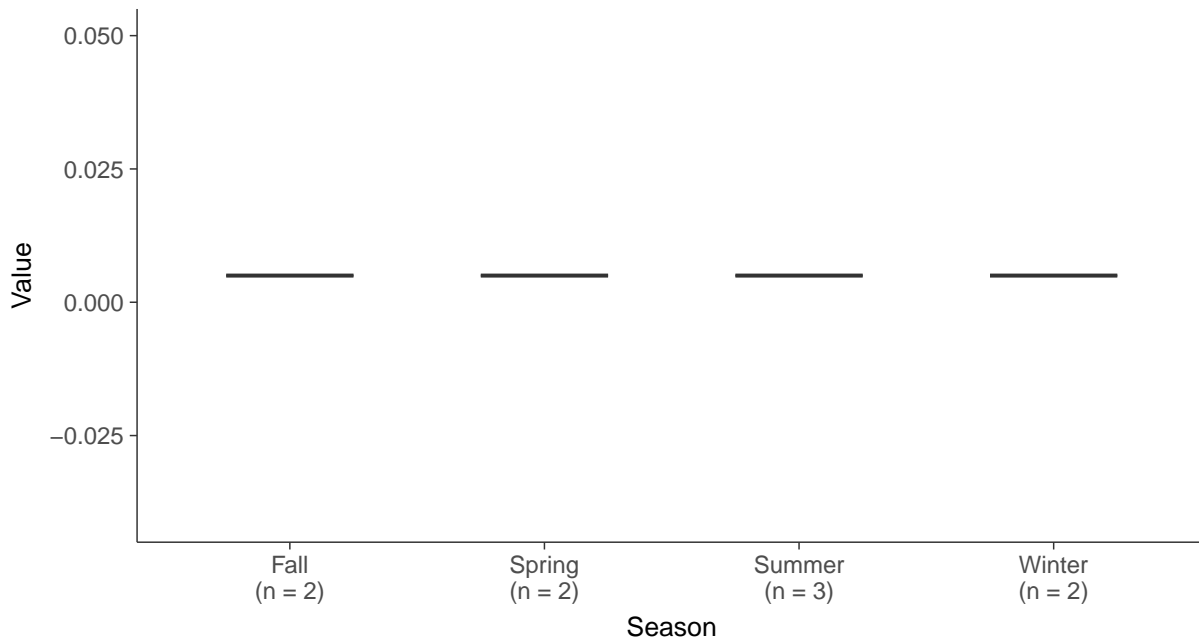
Boxplot

Lithium, MW-13 (mg/L)



Boxplot by Season

Lithium, MW-13 (mg/L)



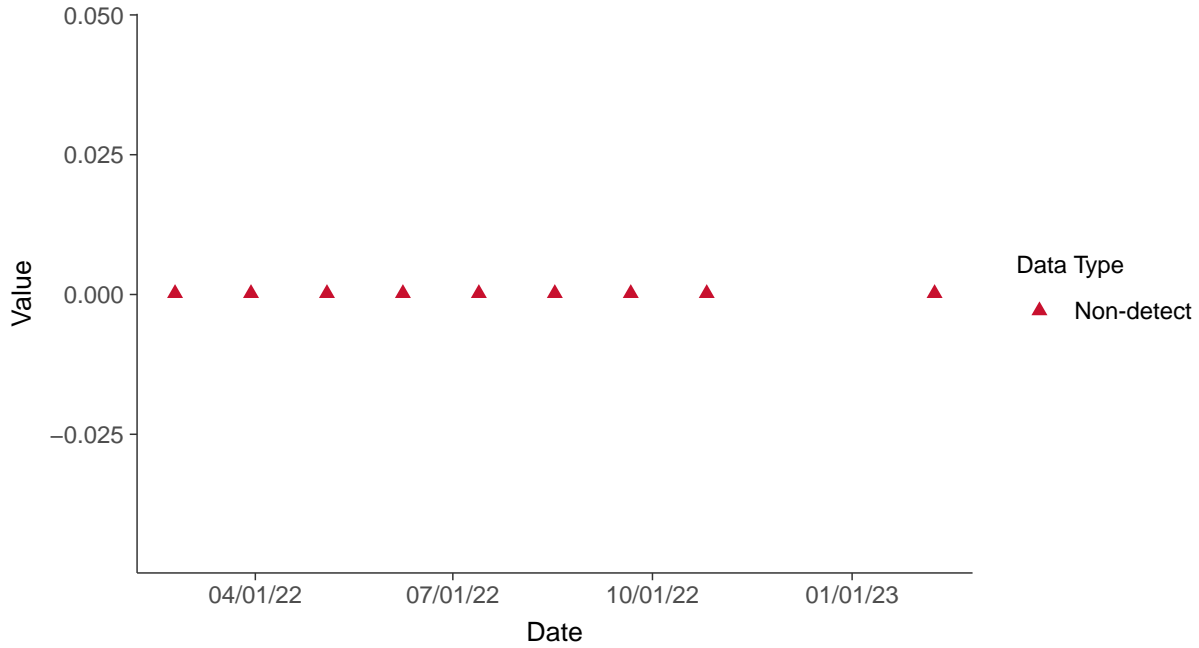


Appendix IV: Mercury, MW-13

ID: 13_2_21

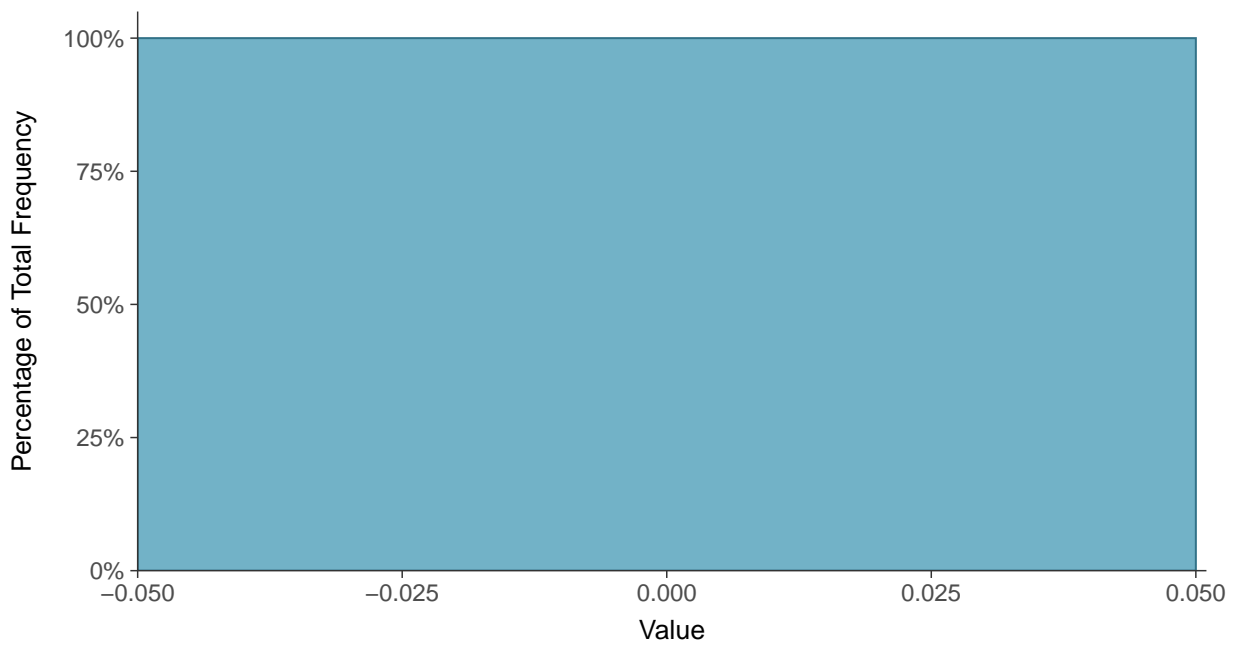
Scatter Plot

Mercury, MW-13 (mg/L)



Histogram

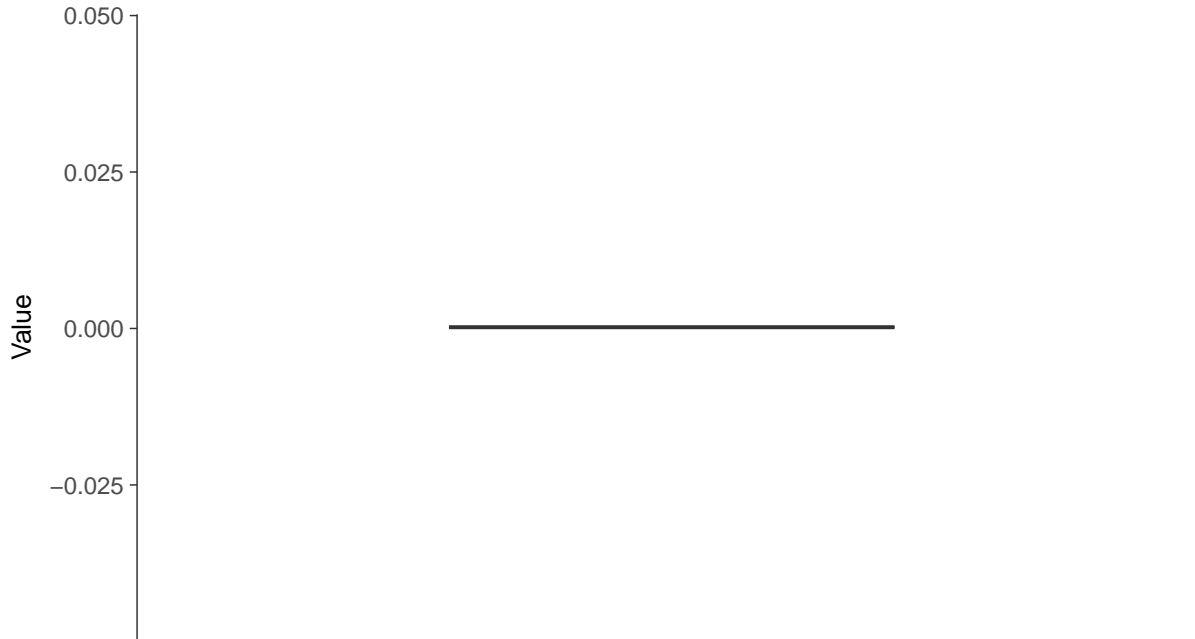
Mercury, MW-13 (mg/L)





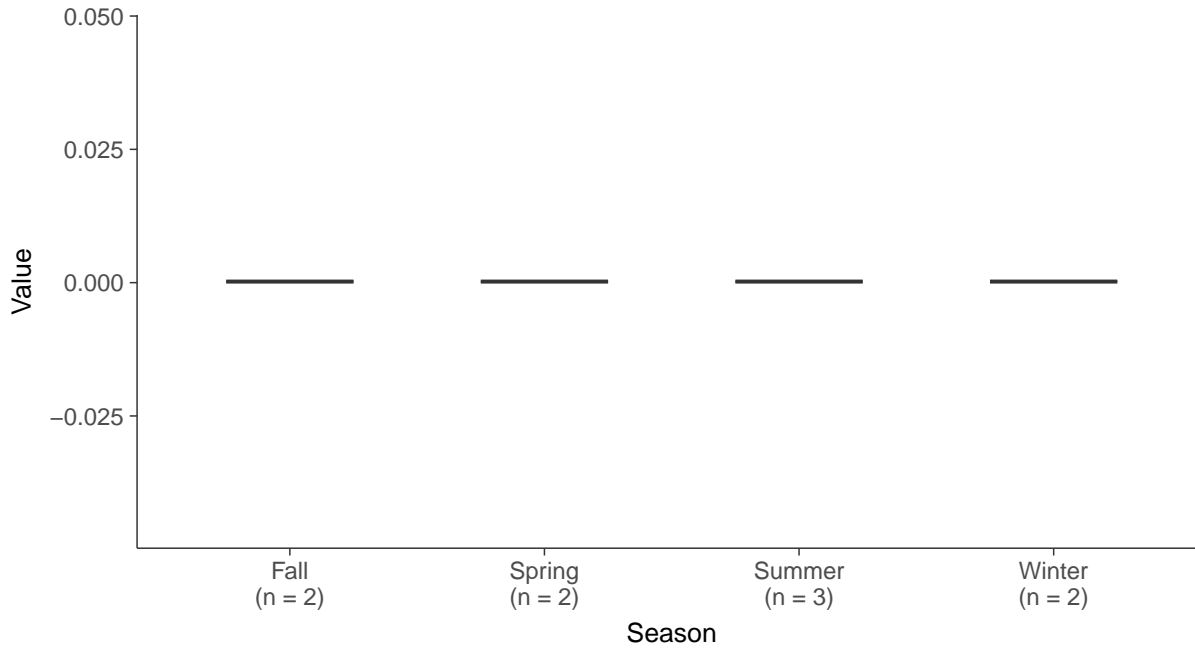
Boxplot

Mercury, MW-13 (mg/L)



Boxplot by Season

Mercury, MW-13 (mg/L)



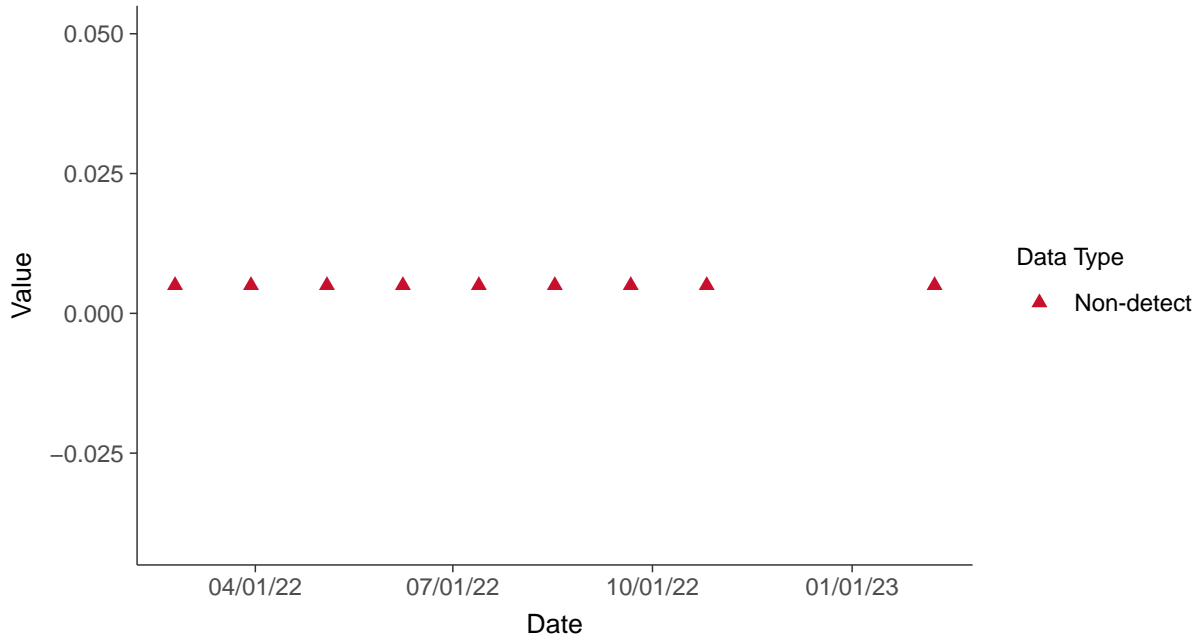


Appendix IV: Molybdenum, MW-13

ID: 13_2_22

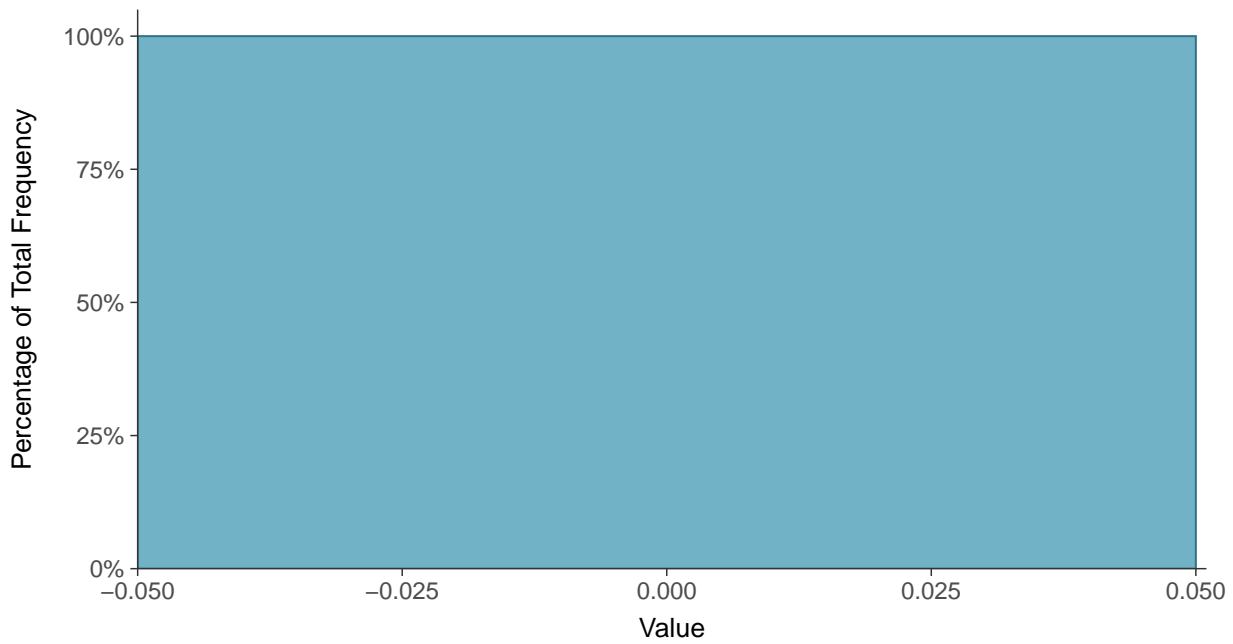
Scatter Plot

Molybdenum, MW-13 (mg/L)



Histogram

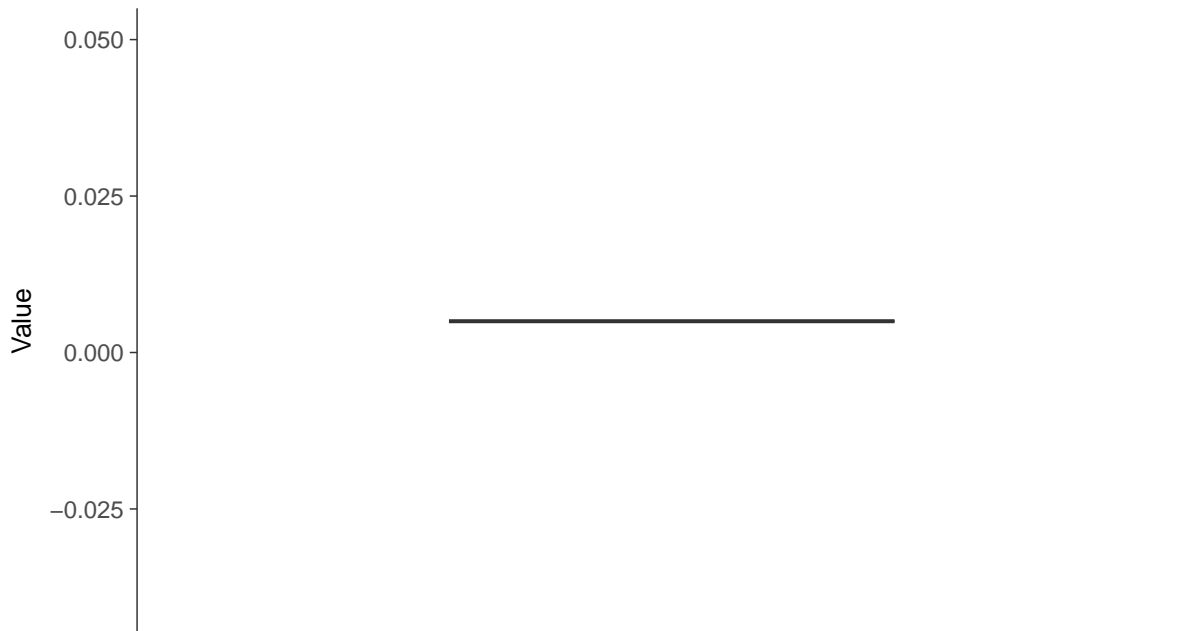
Molybdenum, MW-13 (mg/L)





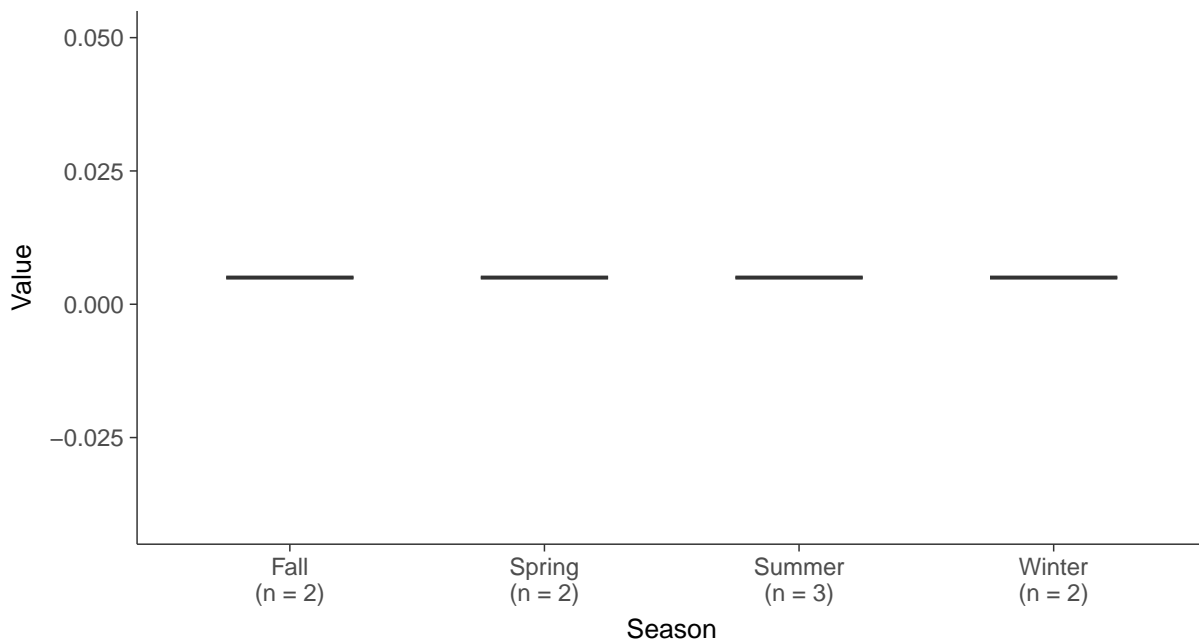
Boxplot

Molybdenum, MW-13 (mg/L)



Boxplot by Season

Molybdenum, MW-13 (mg/L)



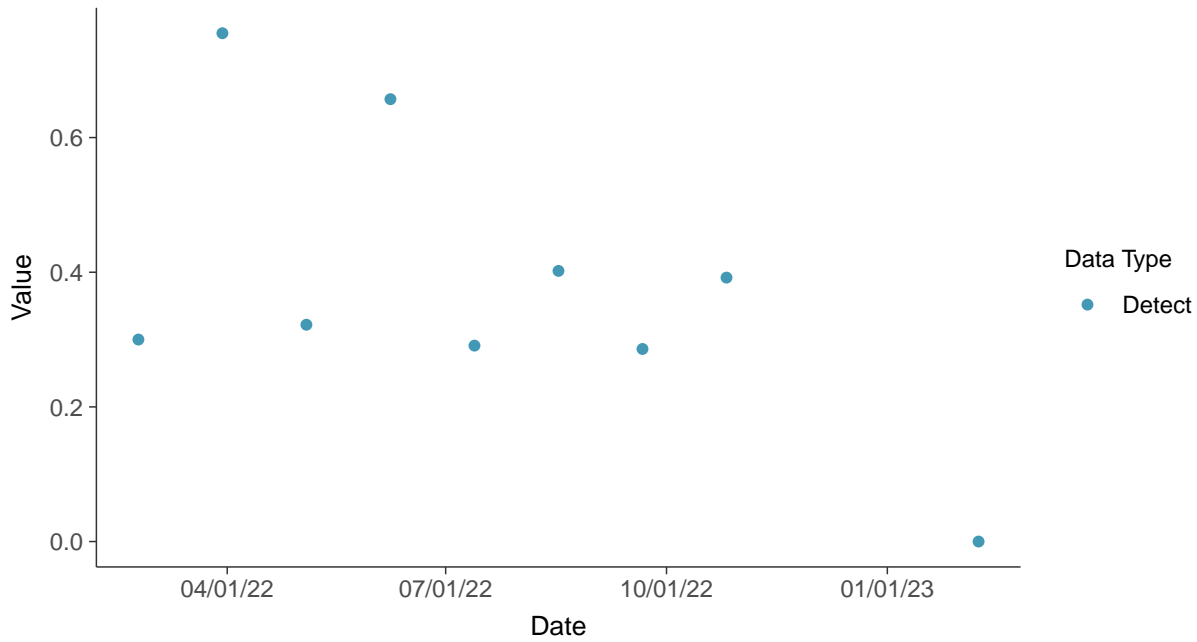


Appendix IV: Radium-226, MW-13

ID: 13_2_24

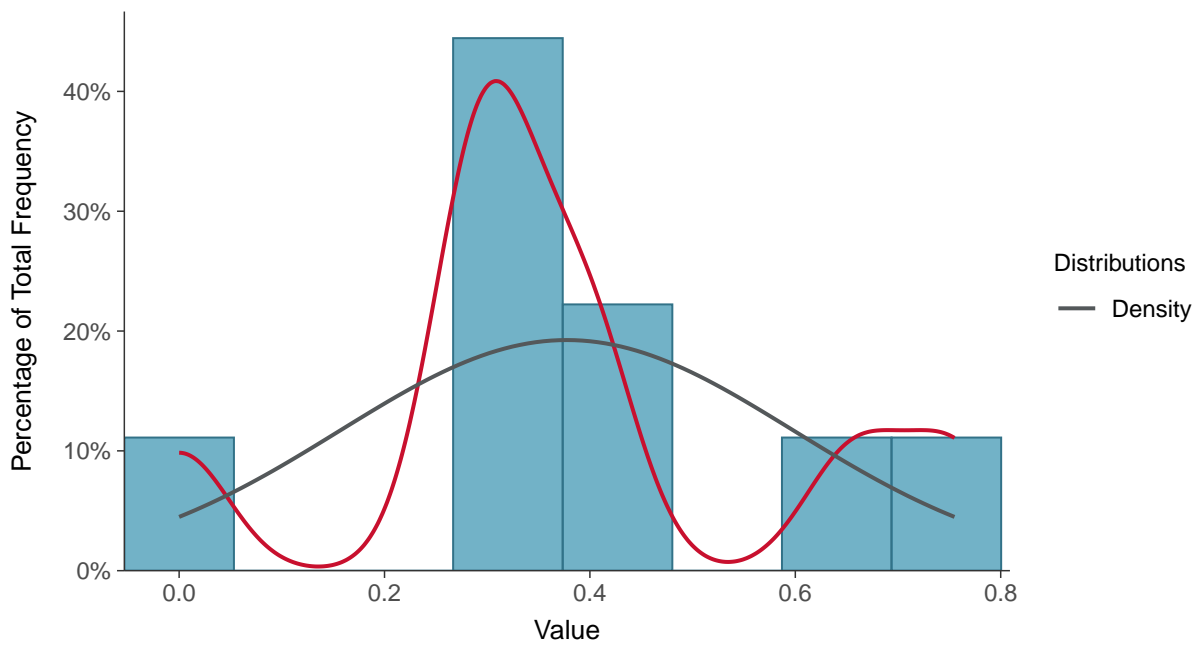
Scatter Plot

Radium-226, MW-13 (pCi/L)



Histogram

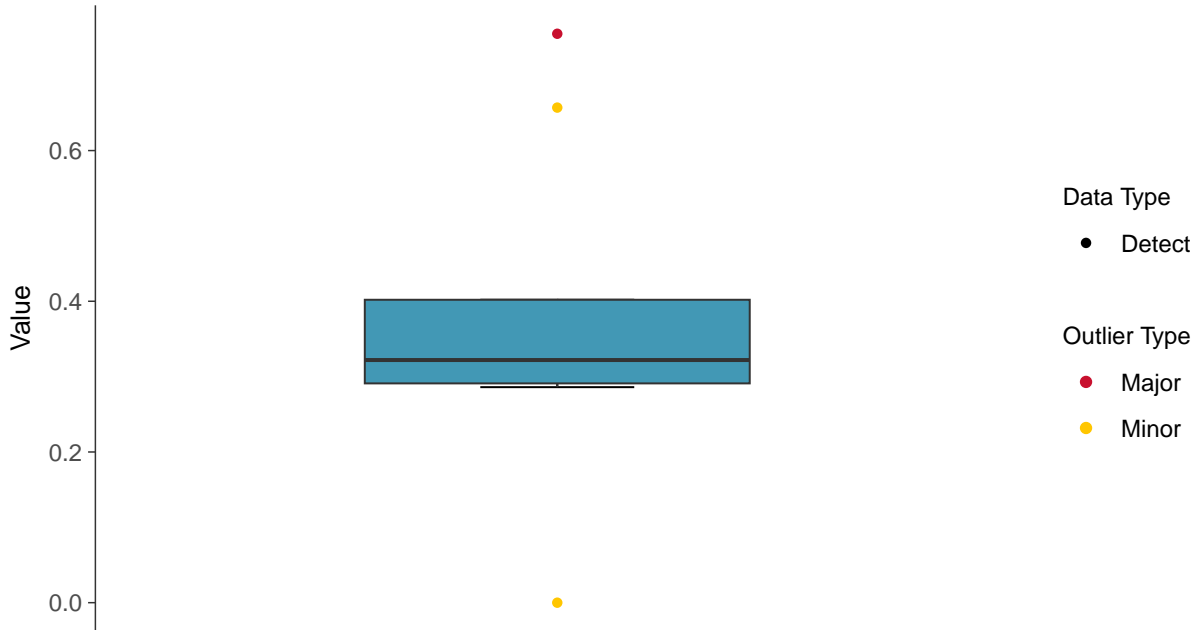
Radium-226, MW-13 (pCi/L)





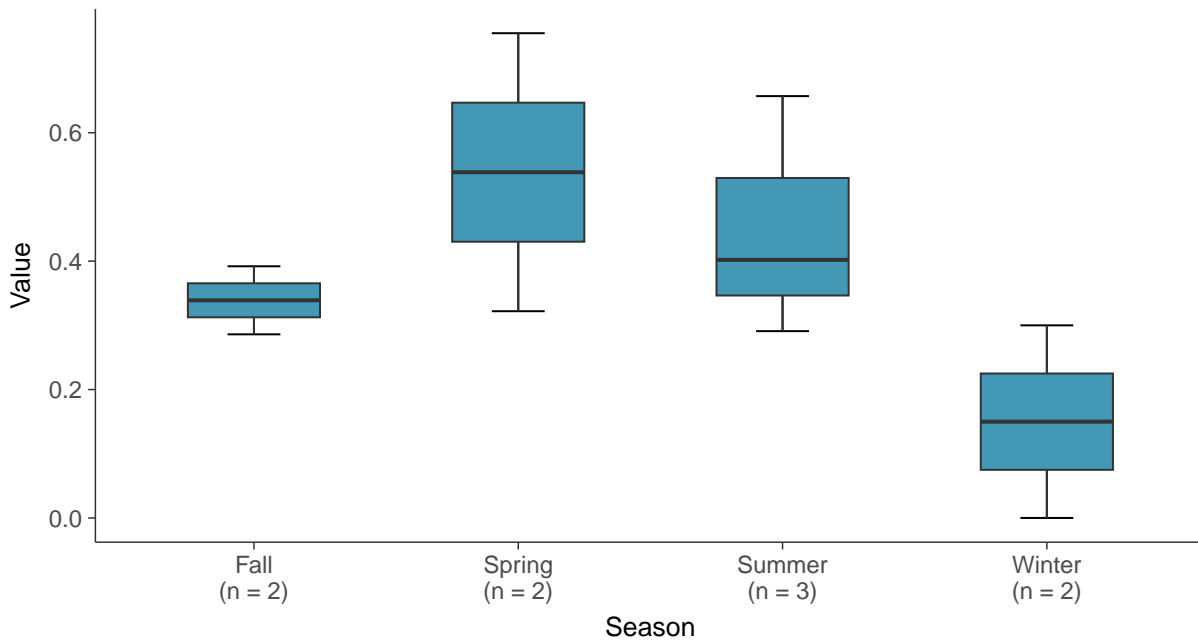
Boxplot

Radium-226, MW-13 (pCi/L)



Boxplot by Season

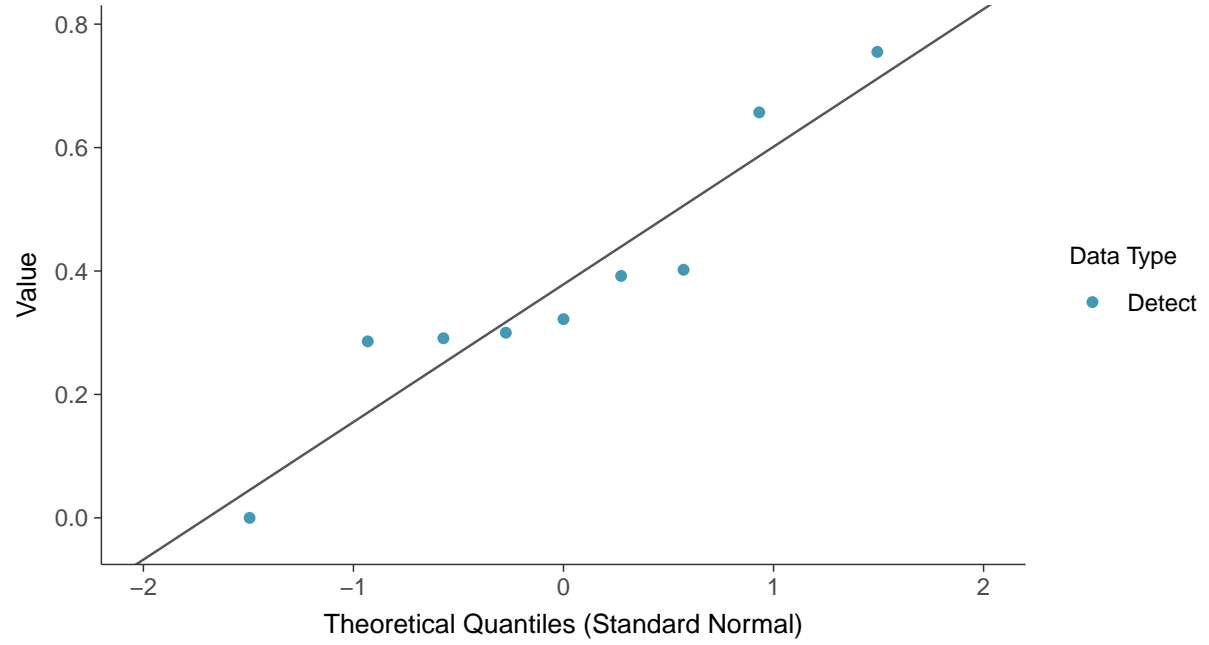
Radium-226, MW-13 (pCi/L)





Normal Q-Q plot

Radium-226, MW-13 (pCi/L)



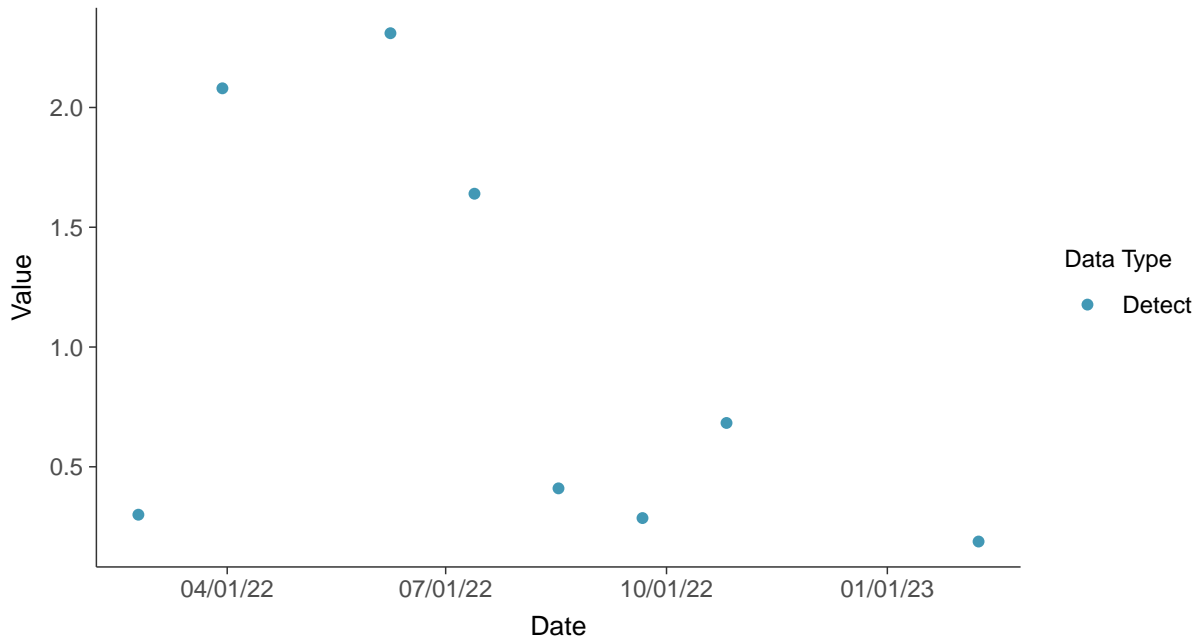


Appendix IV: Radium-226/228, MW-13

ID: 13_2_25

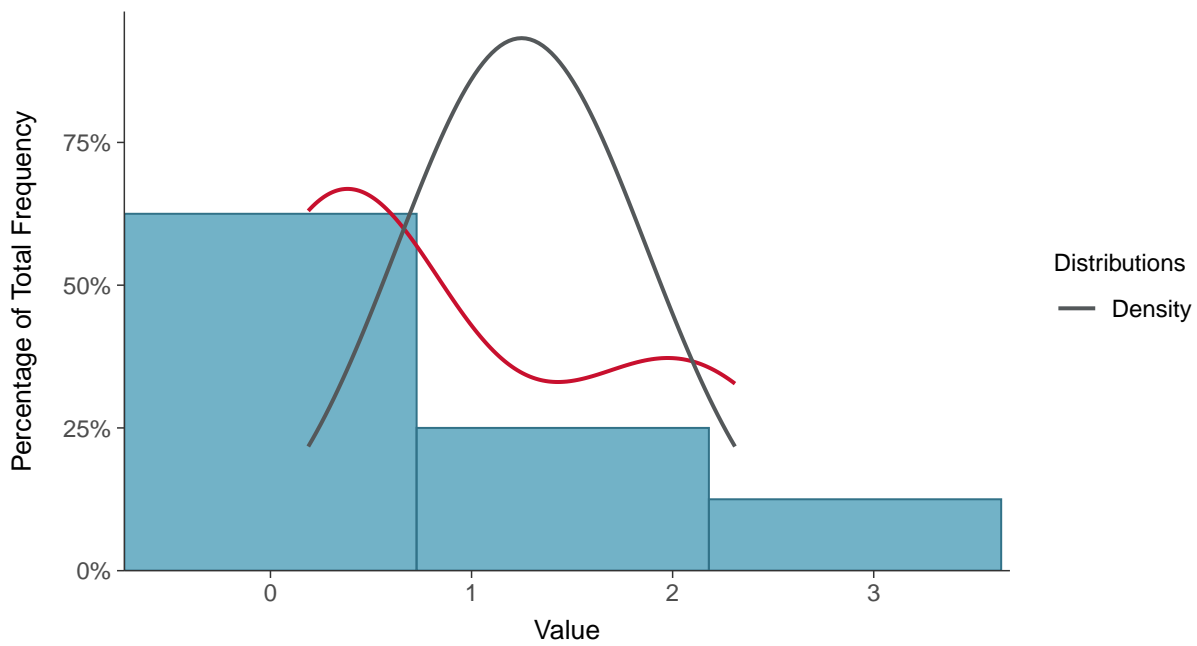
Scatter Plot

Radium-226/228, MW-13 (pCi/L)



Histogram

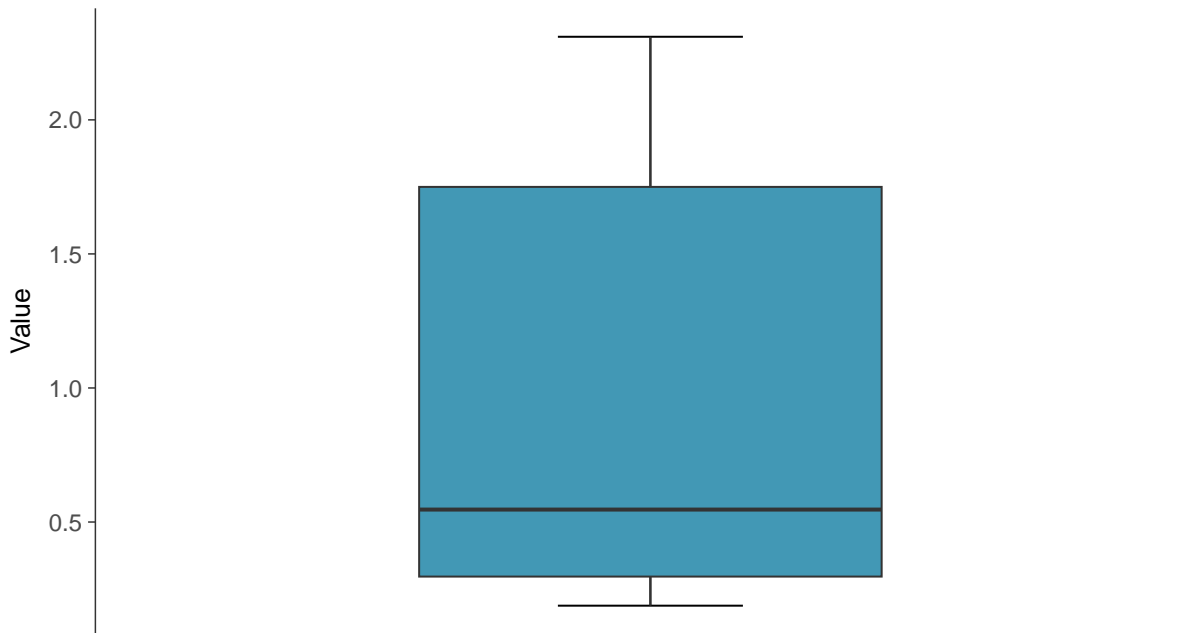
Radium-226/228, MW-13 (pCi/L)





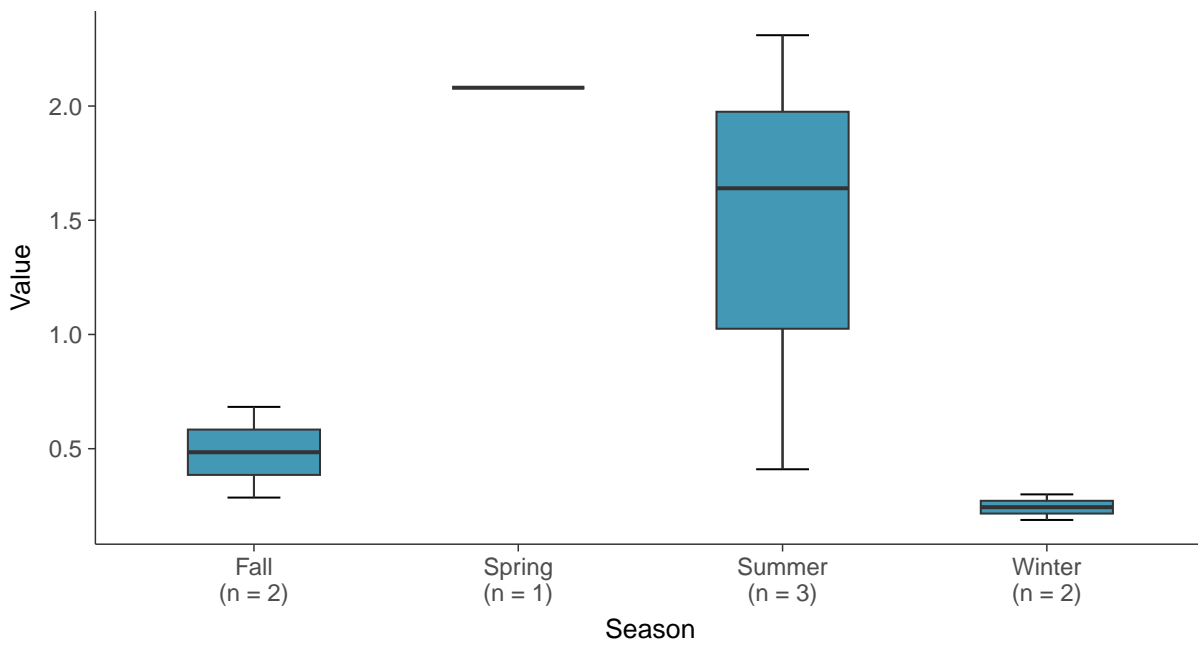
Boxplot

Radium-226/228, MW-13 (pCi/L)



Boxplot by Season

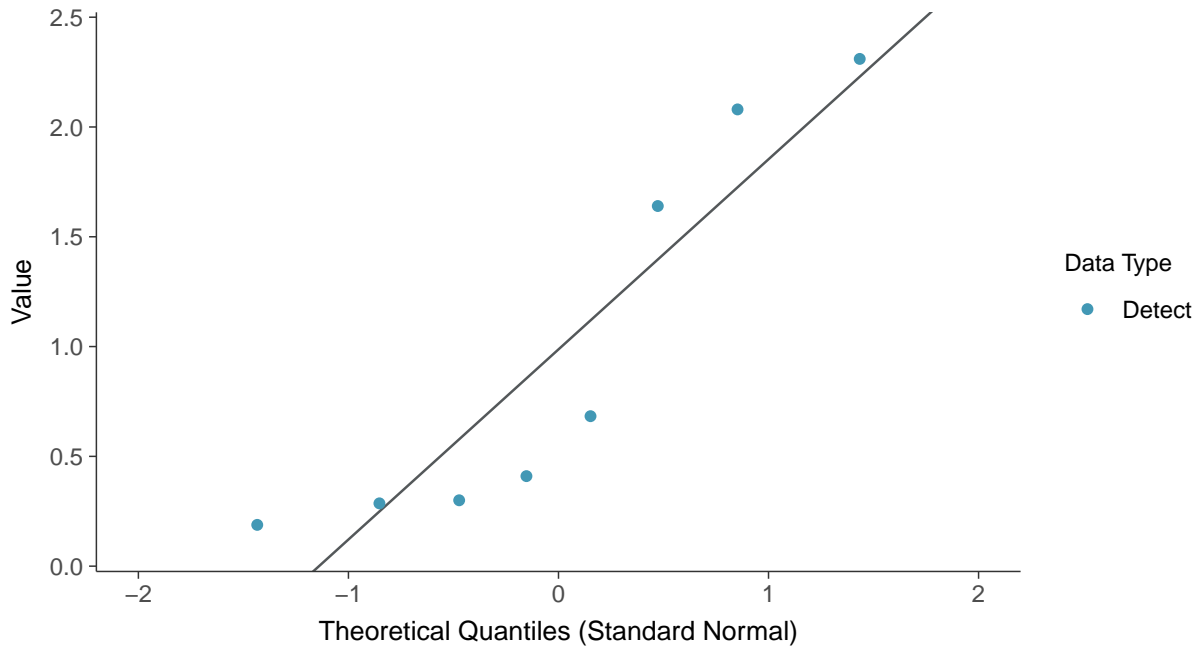
Radium-226/228, MW-13 (pCi/L)





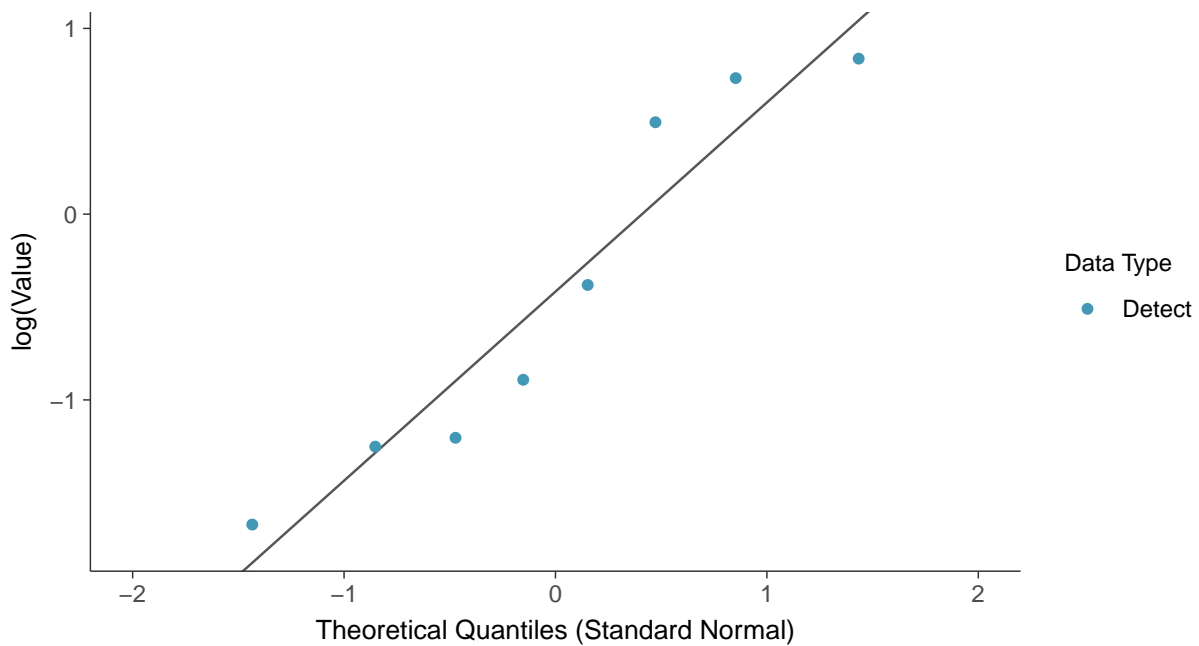
Normal Q-Q plot

Radium-226/228, MW-13 (pCi/L)



Lognormal Q-Q plot

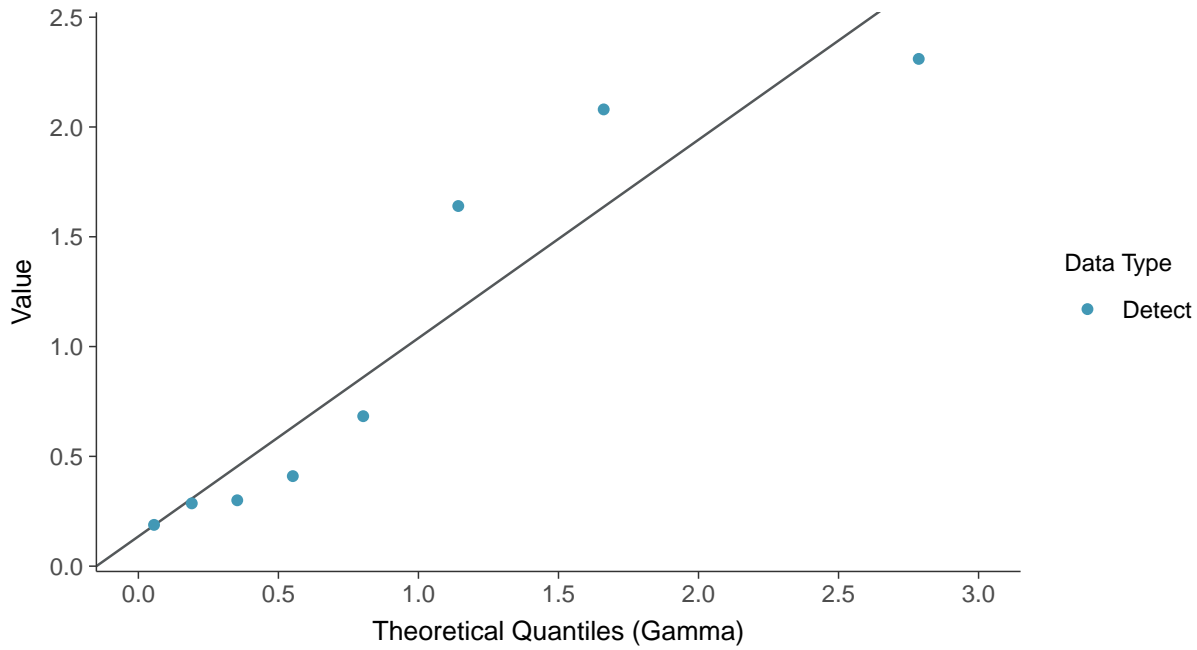
Radium-226/228, MW-13 (pCi/L)





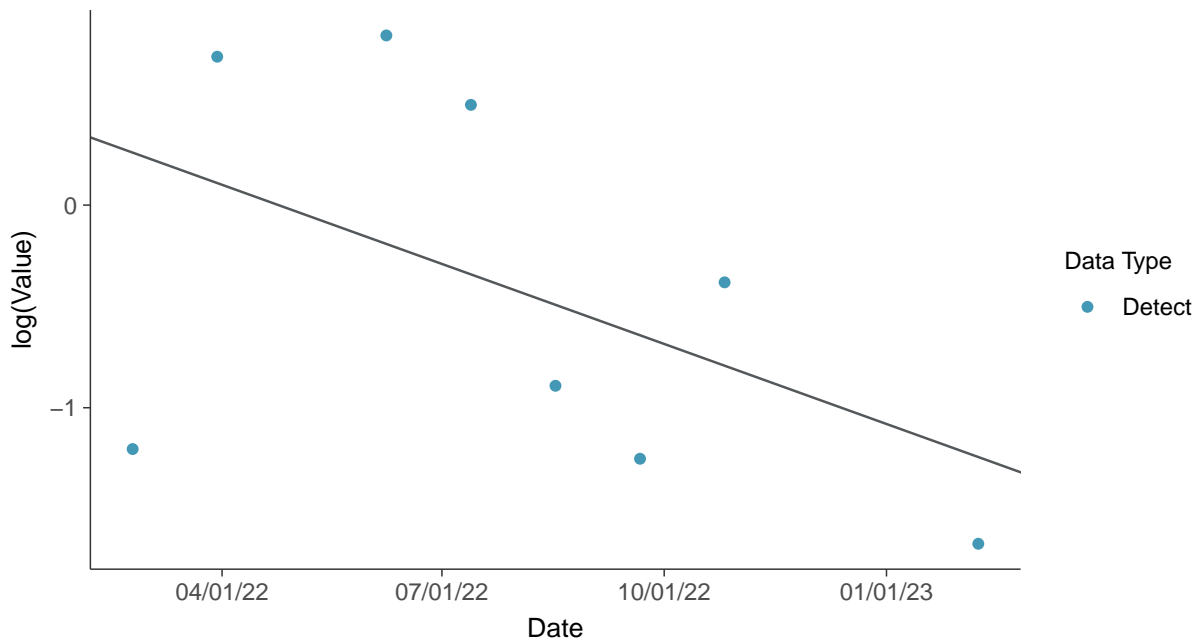
Gamma Q-Q plot

Radium-226/228, MW-13 (pCi/L)



Trend Regression: Lognormal MLE

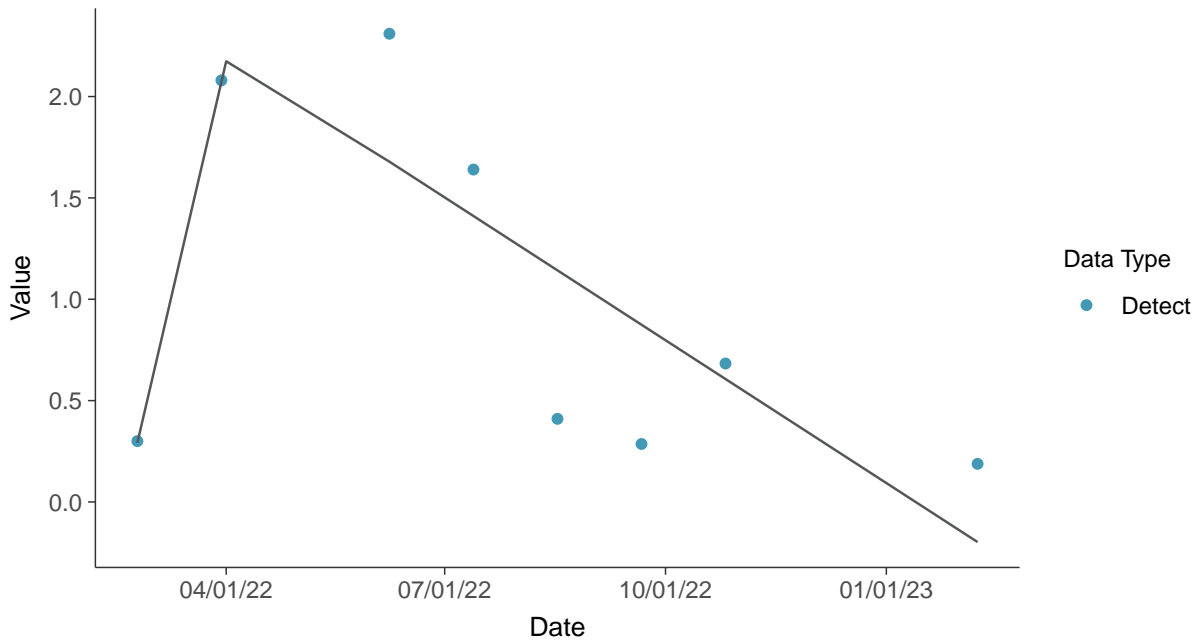
Radium-226/228, MW-13 (pCi/L)





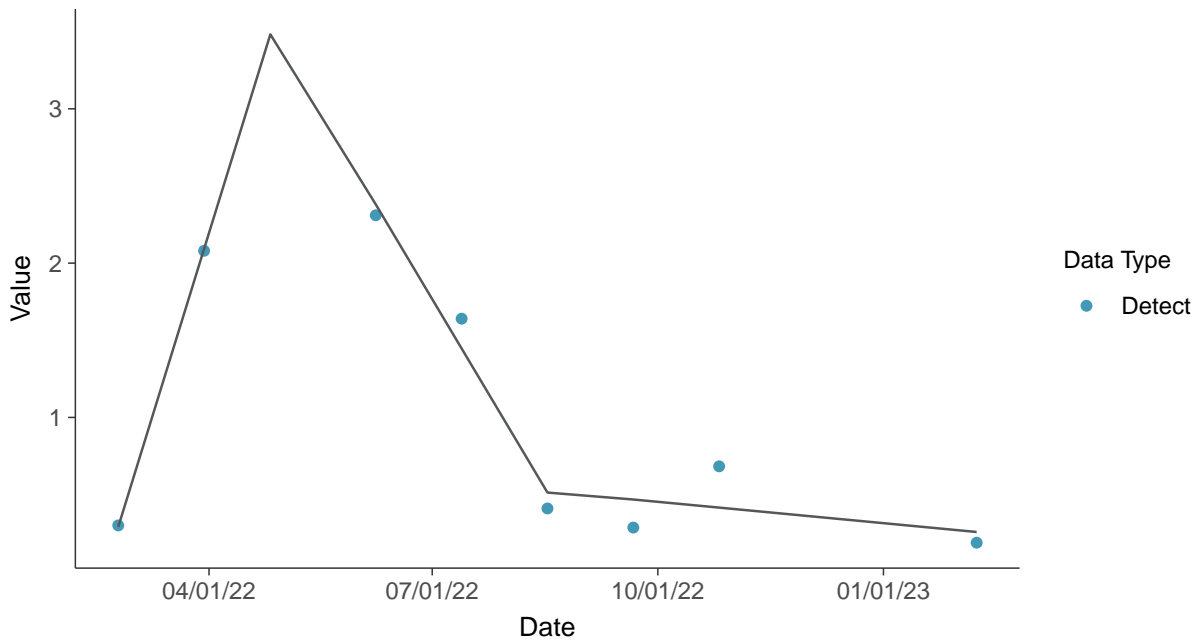
Trend Regression: Piecewise Linear-Linear

Radium-226/228, MW-13 (pCi/L)



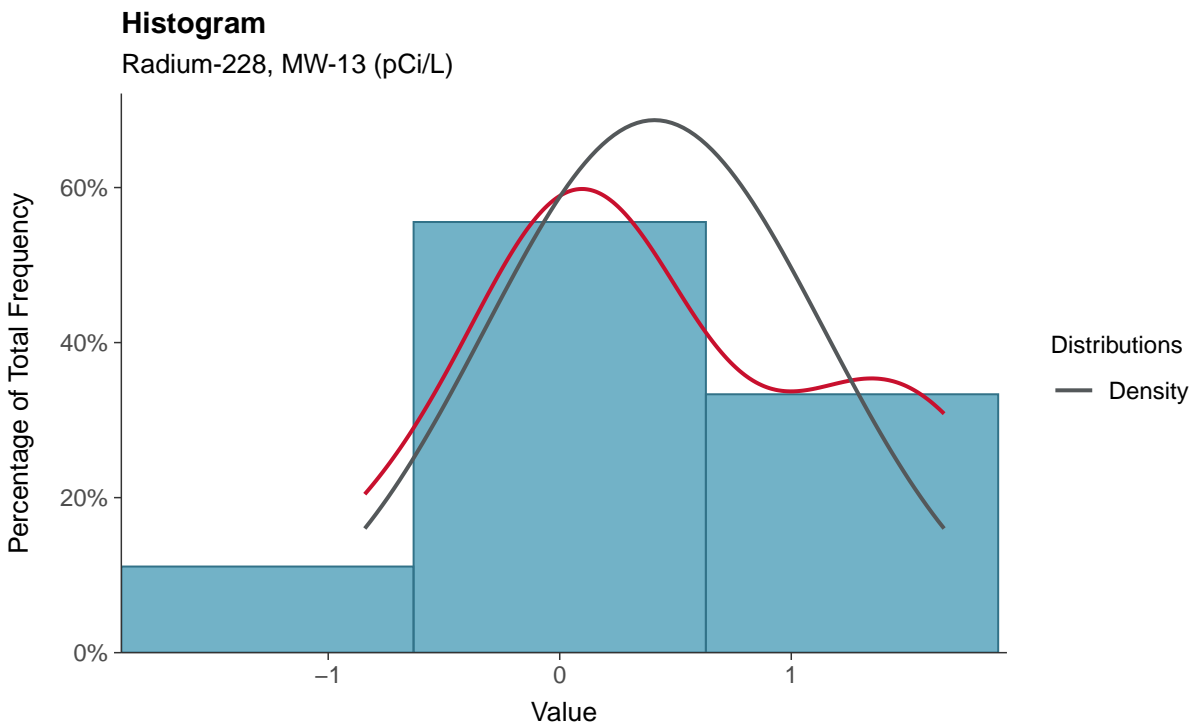
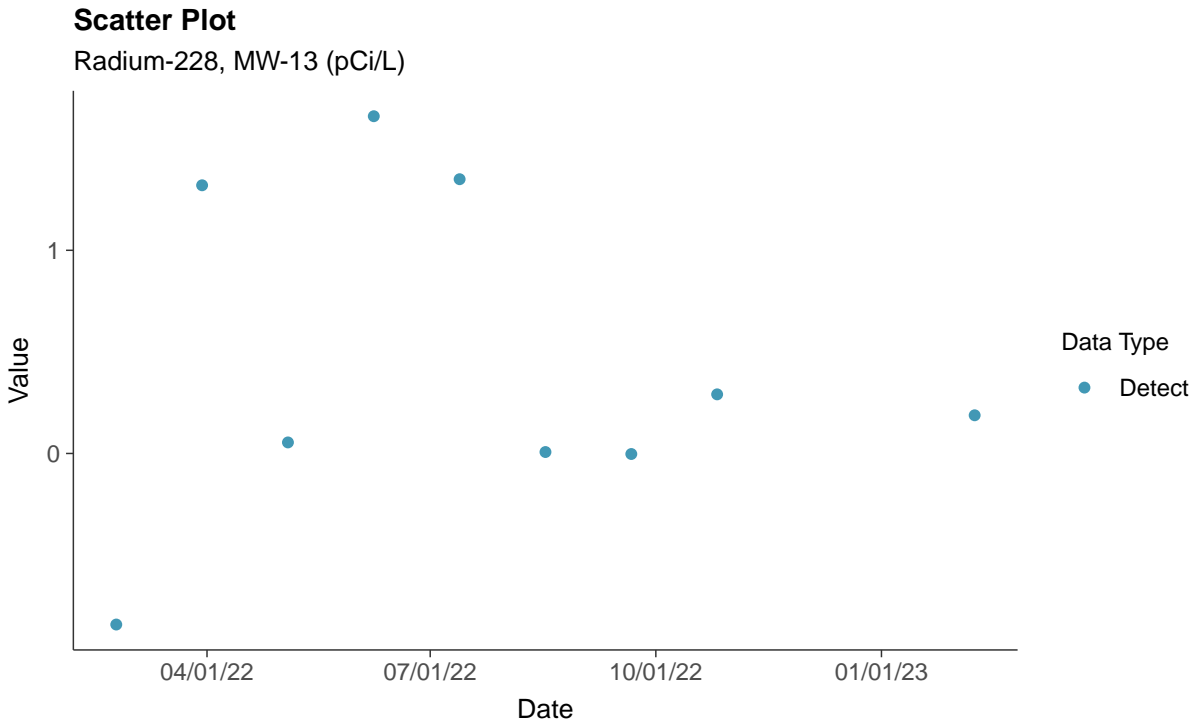
Trend Regression: Piecewise Linear-Linear-Linear

Radium-226/228, MW-13 (pCi/L)



Appendix IV: Radium-228, MW-13

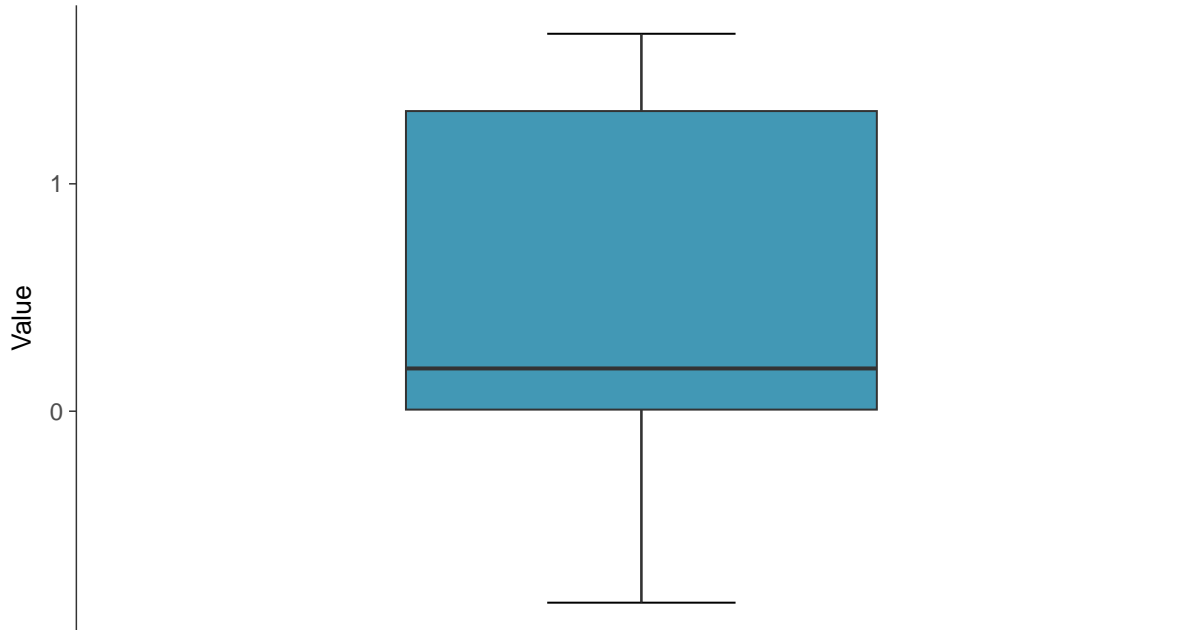
ID: 13_2_26





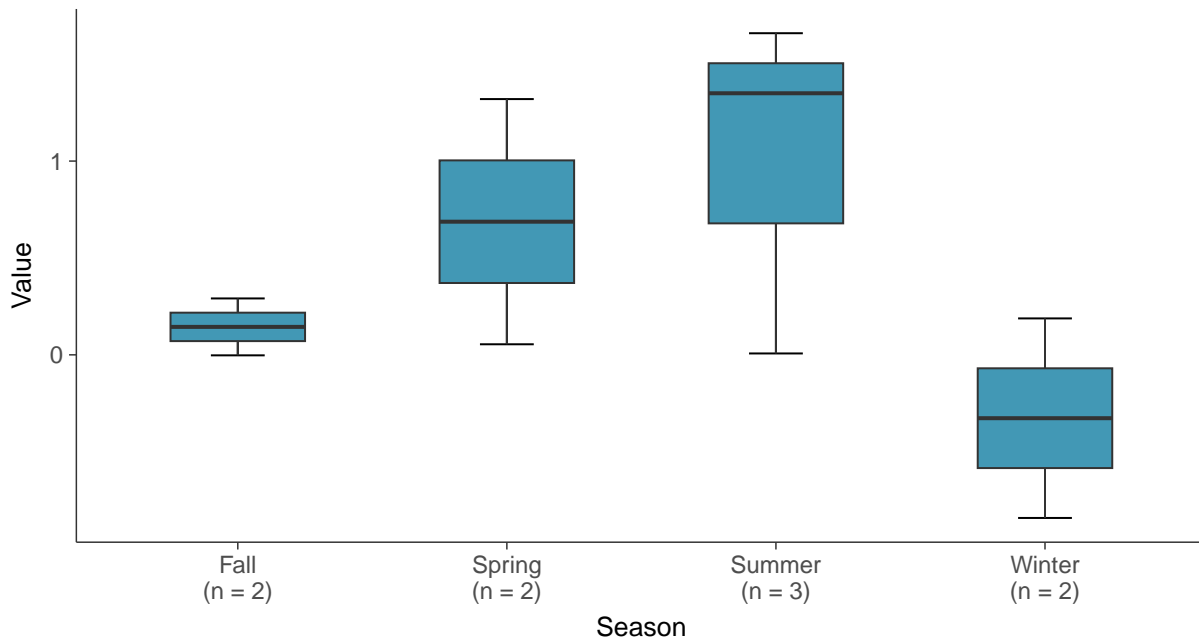
Boxplot

Radium-228, MW-13 (pCi/L)



Boxplot by Season

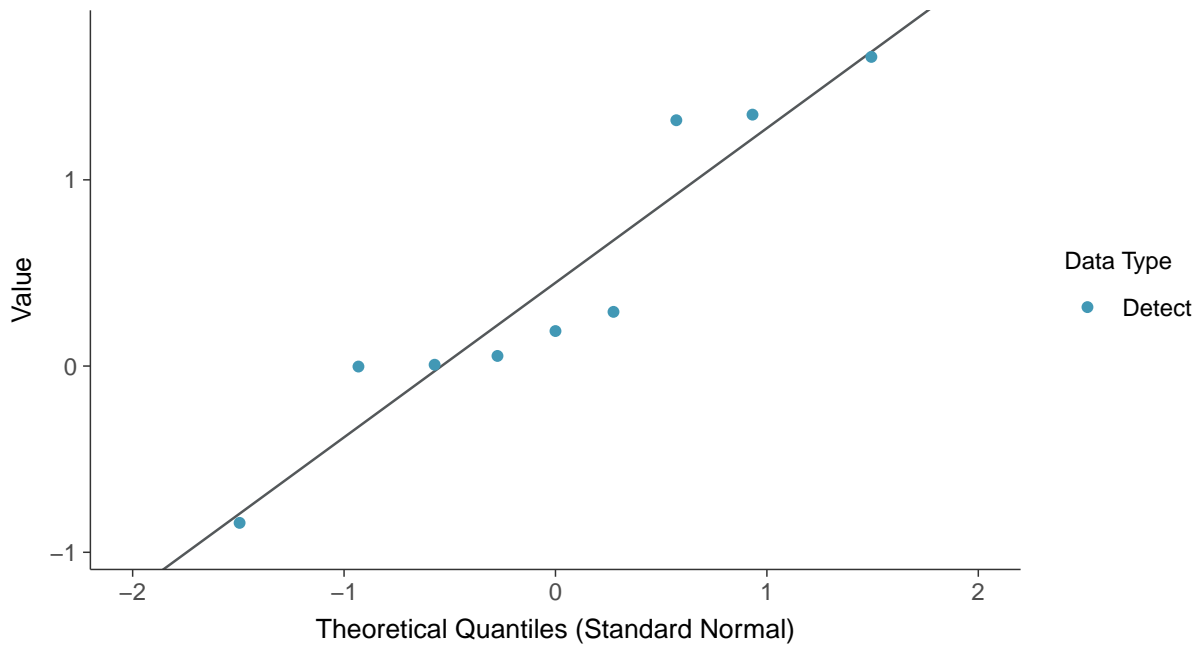
Radium-228, MW-13 (pCi/L)





Normal Q-Q plot

Radium-228, MW-13 (pCi/L)



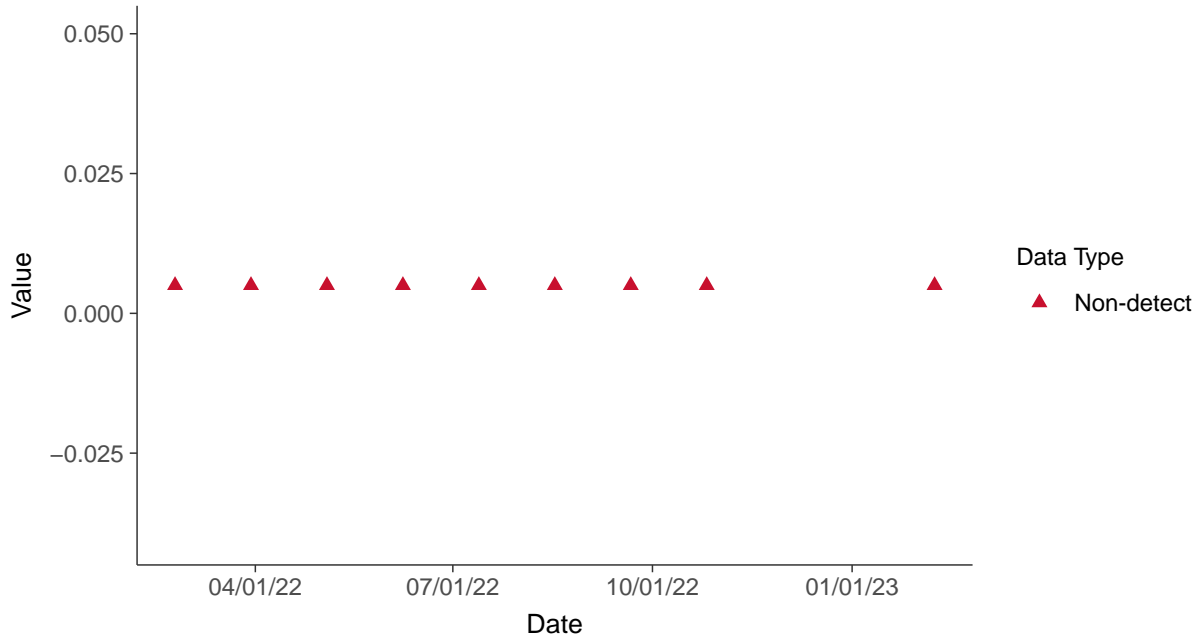


Appendix IV: Selenium, MW-13

ID: 13_2_27

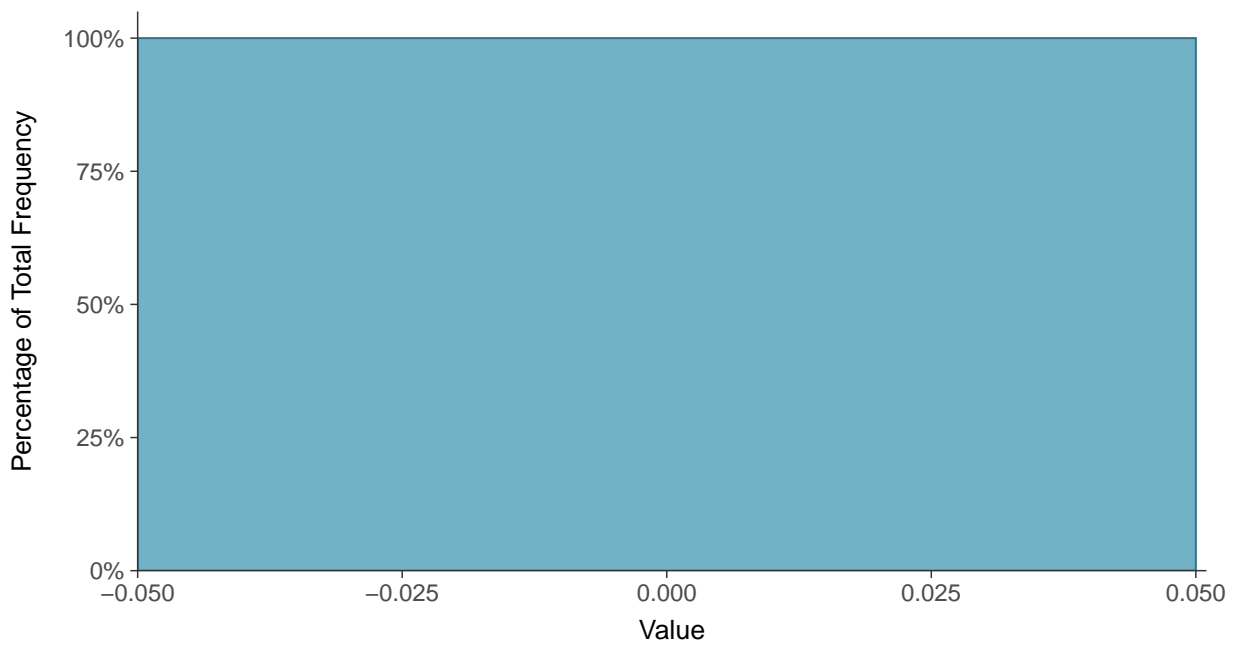
Scatter Plot

Selenium, MW-13 (mg/L)



Histogram

Selenium, MW-13 (mg/L)





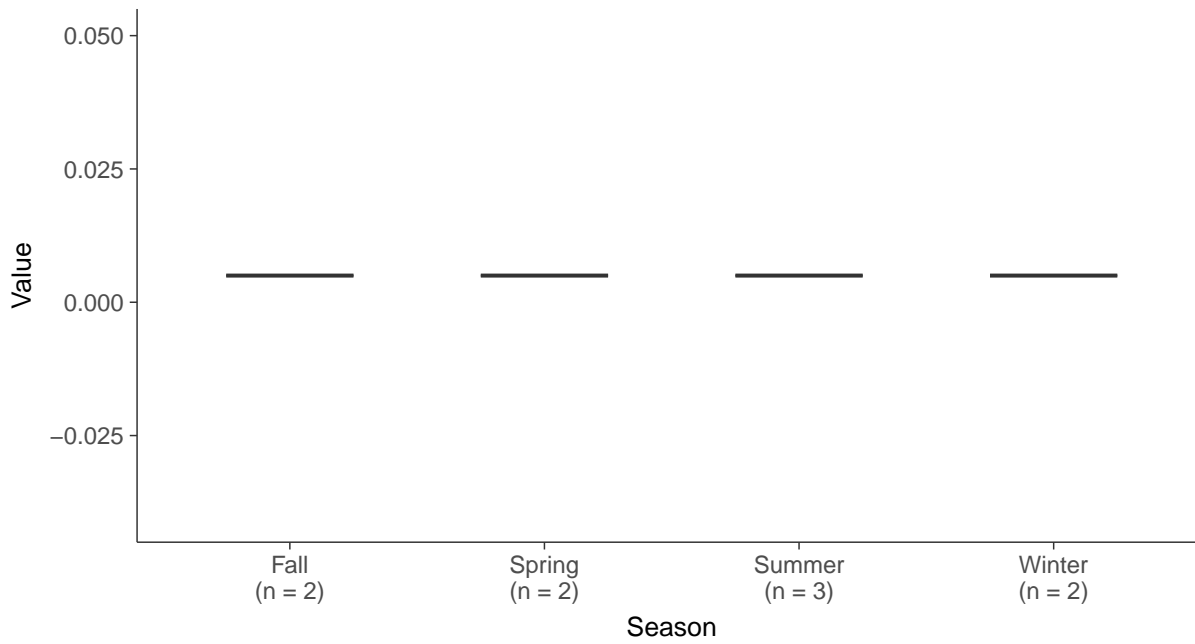
Boxplot

Selenium, MW-13 (mg/L)



Boxplot by Season

Selenium, MW-13 (mg/L)



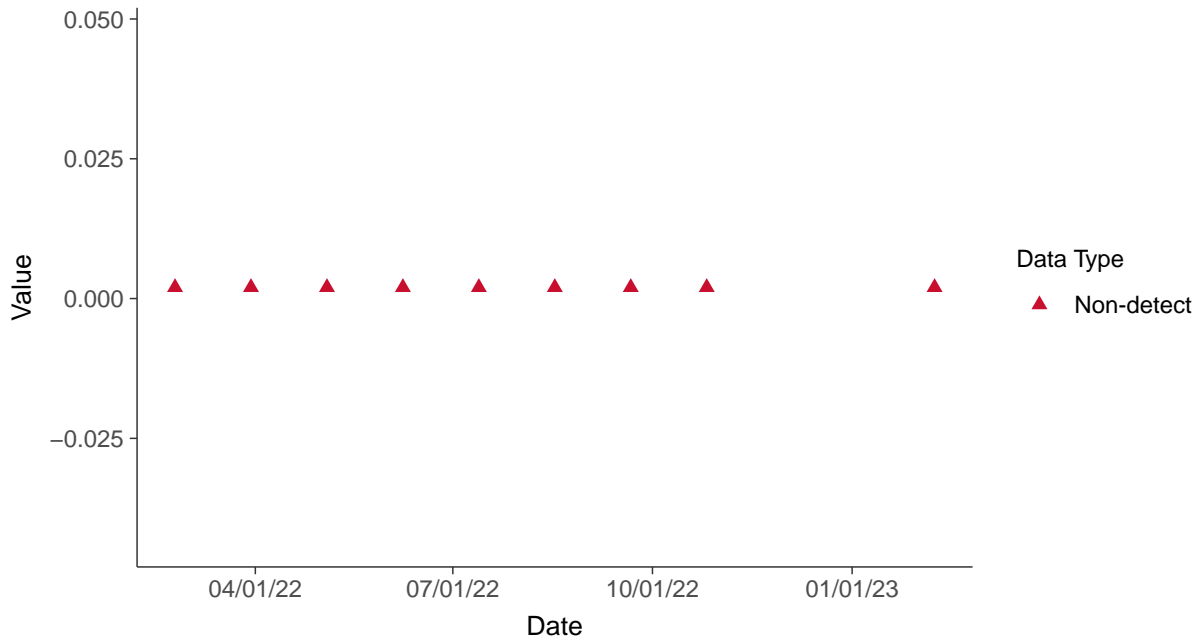


Appendix IV: Thallium, MW-13

ID: 13_2_29

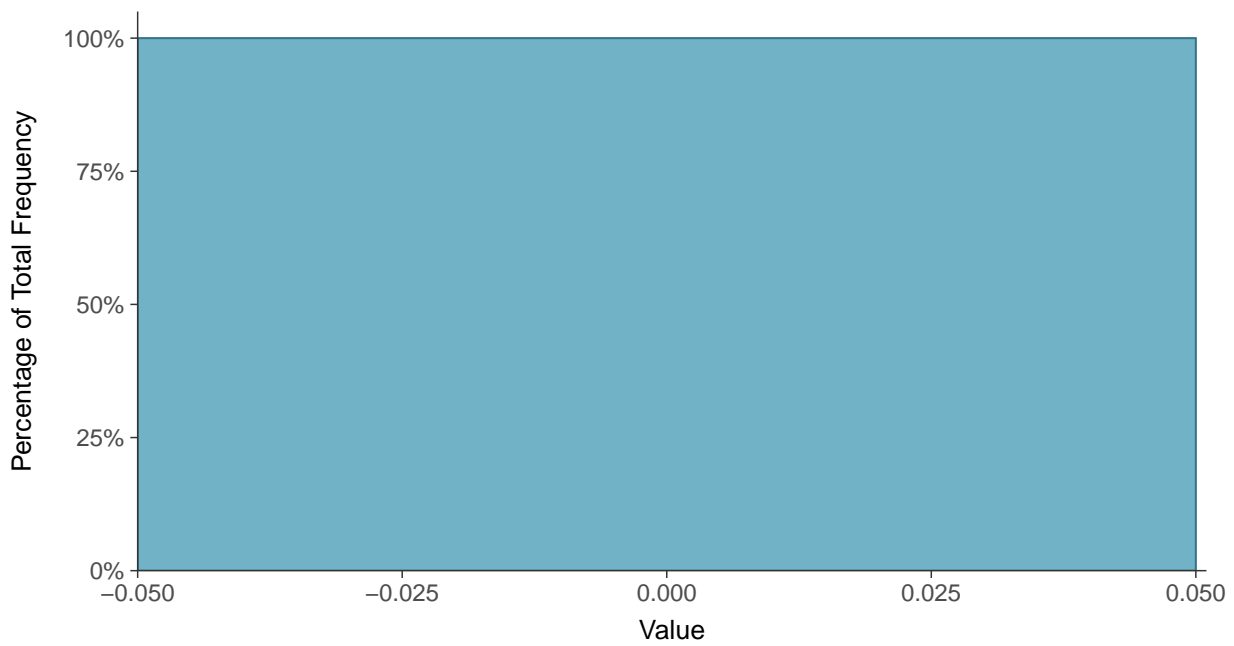
Scatter Plot

Thallium, MW-13 (mg/L)



Histogram

Thallium, MW-13 (mg/L)





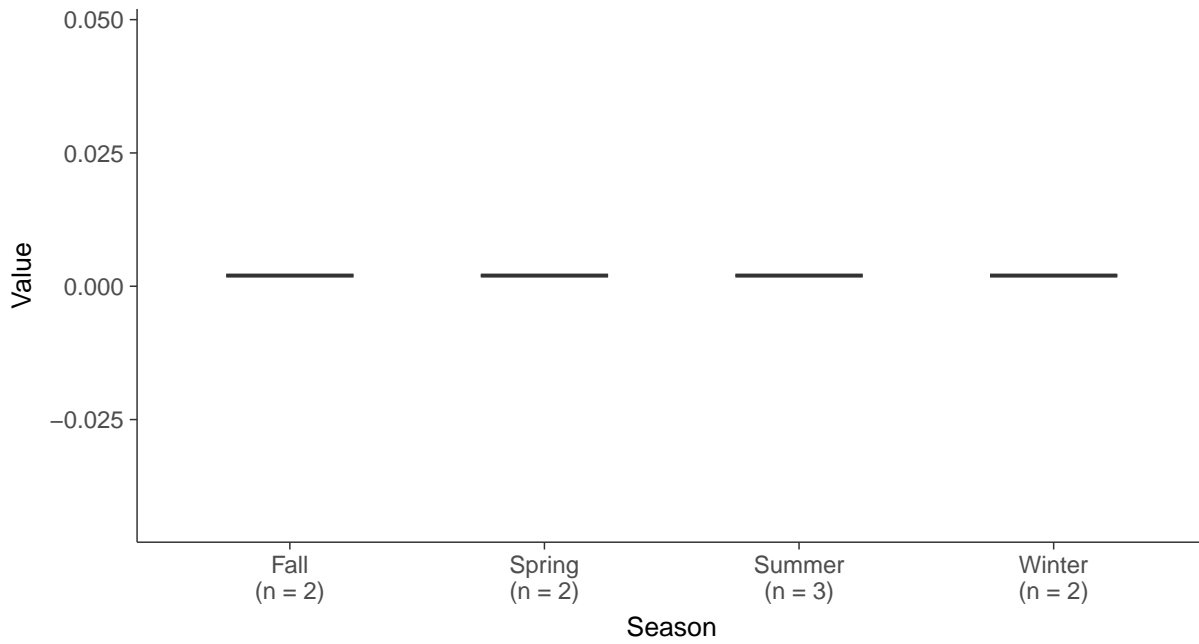
Boxplot

Thallium, MW-13 (mg/L)



Boxplot by Season

Thallium, MW-13 (mg/L)



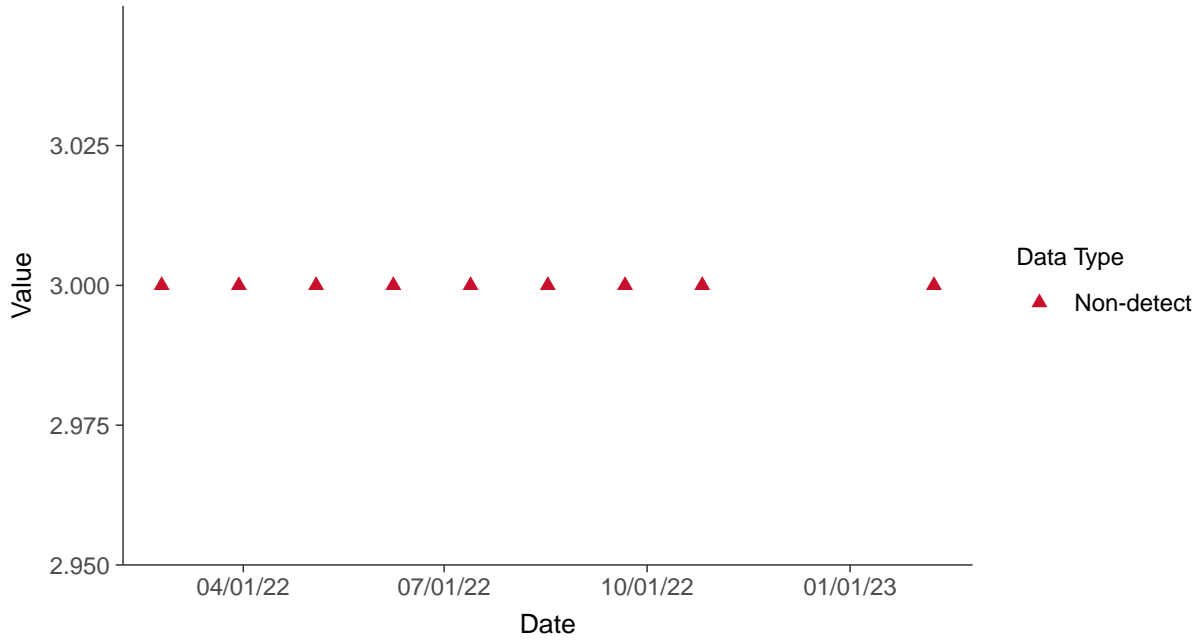


Appendix IV: Total Suspended Solids, MW-13

ID: 13_2_30

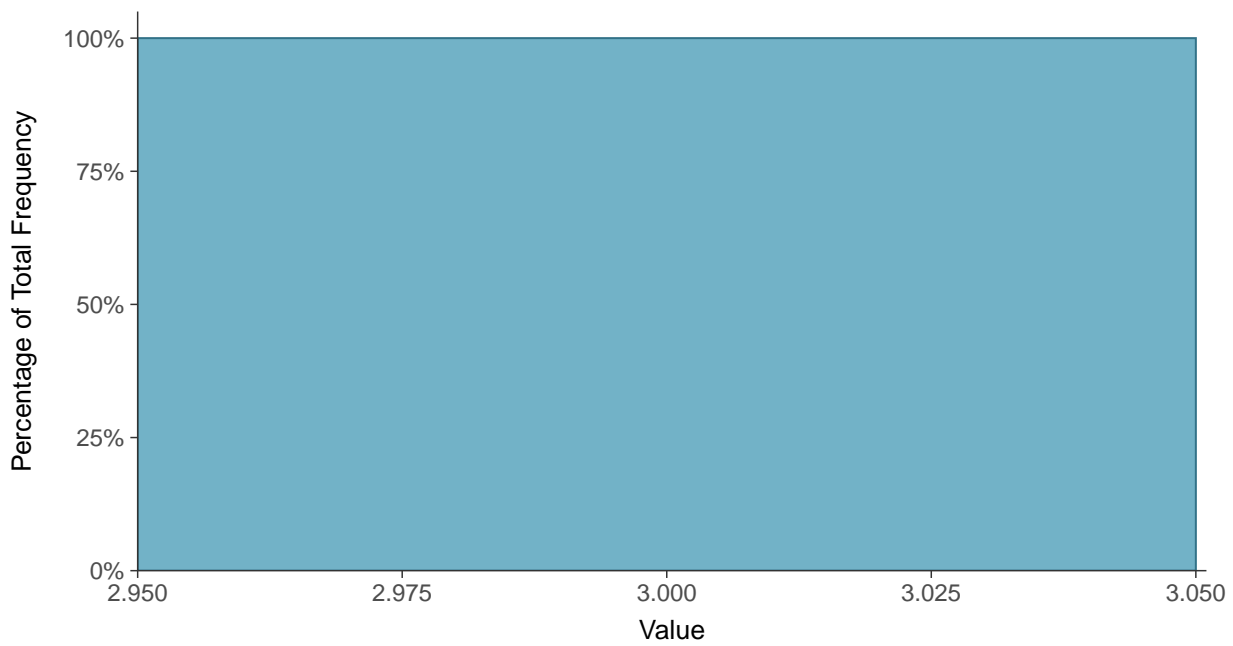
Scatter Plot

Total Suspended Solids, MW-13 (mg/L)



Histogram

Total Suspended Solids, MW-13 (mg/L)





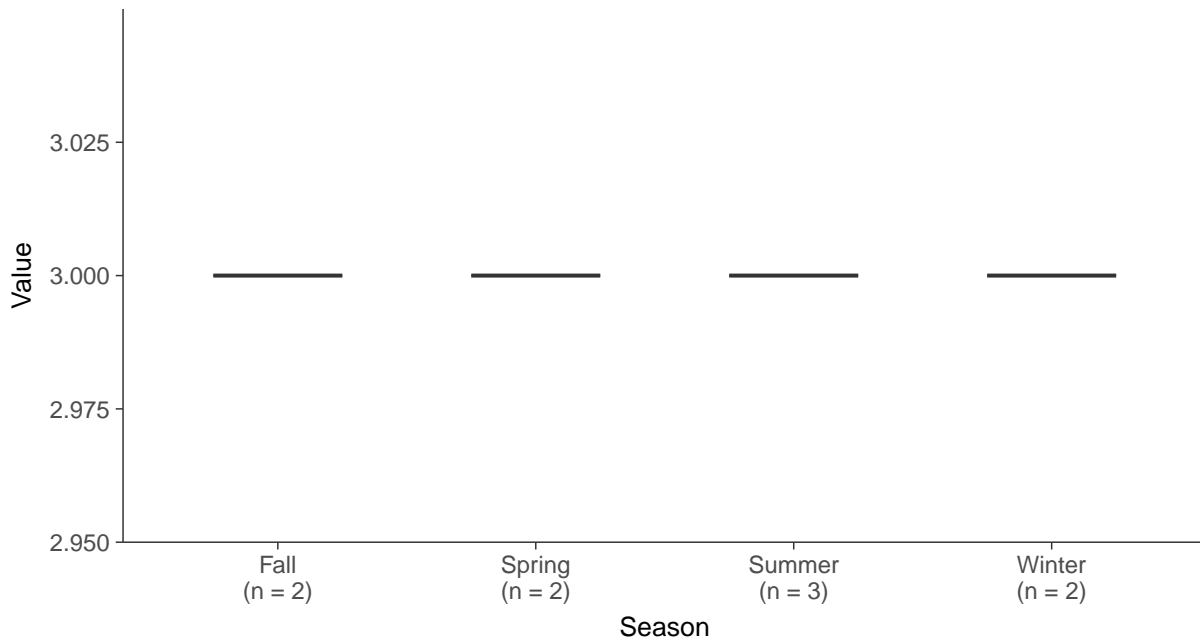
Boxplot

Total Suspended Solids, MW-13 (mg/L)



Boxplot by Season

Total Suspended Solids, MW-13 (mg/L)



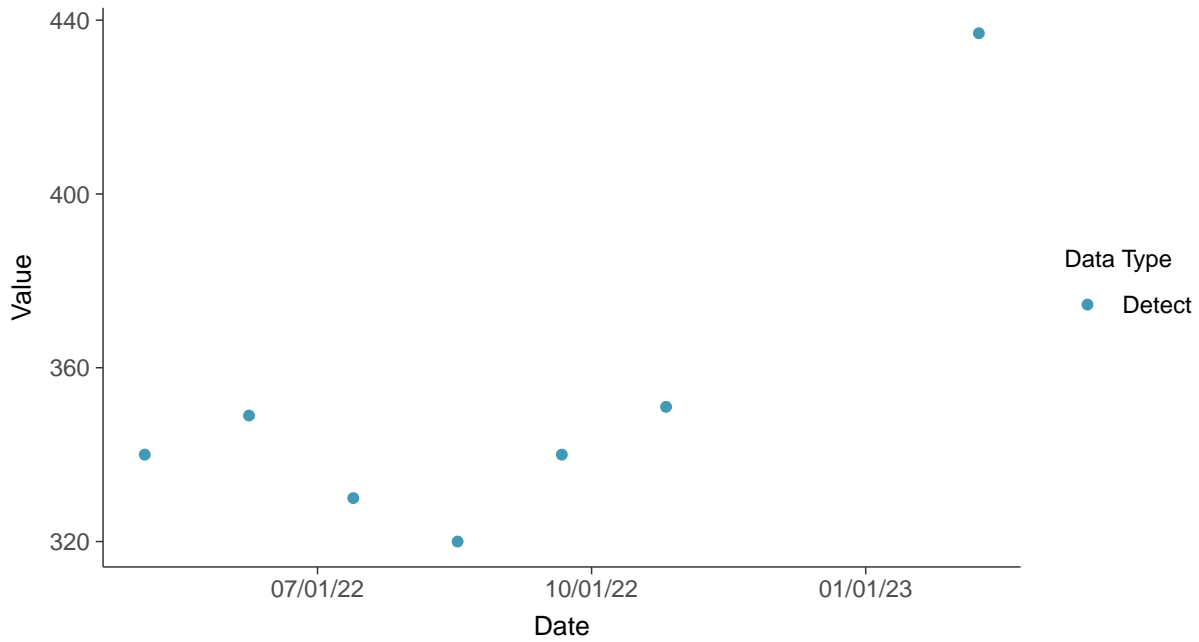


Other: Bicarbonate, MW-13

ID: 13_3_12

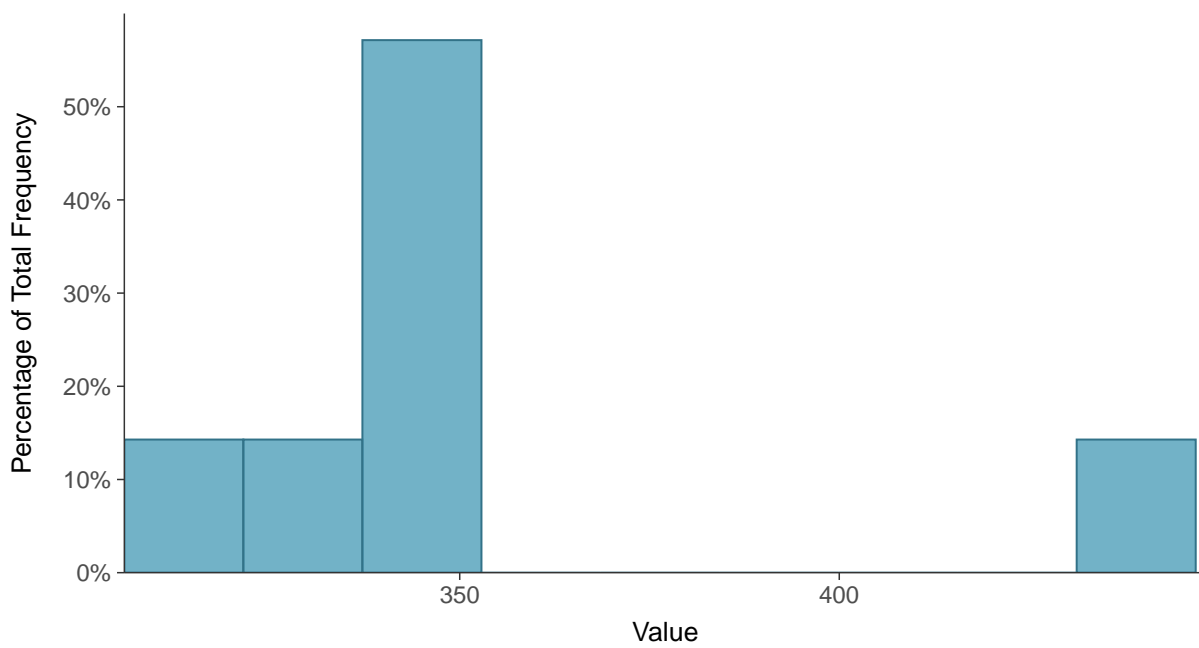
Scatter Plot

Bicarbonate, MW-13 (mg/L)



Histogram

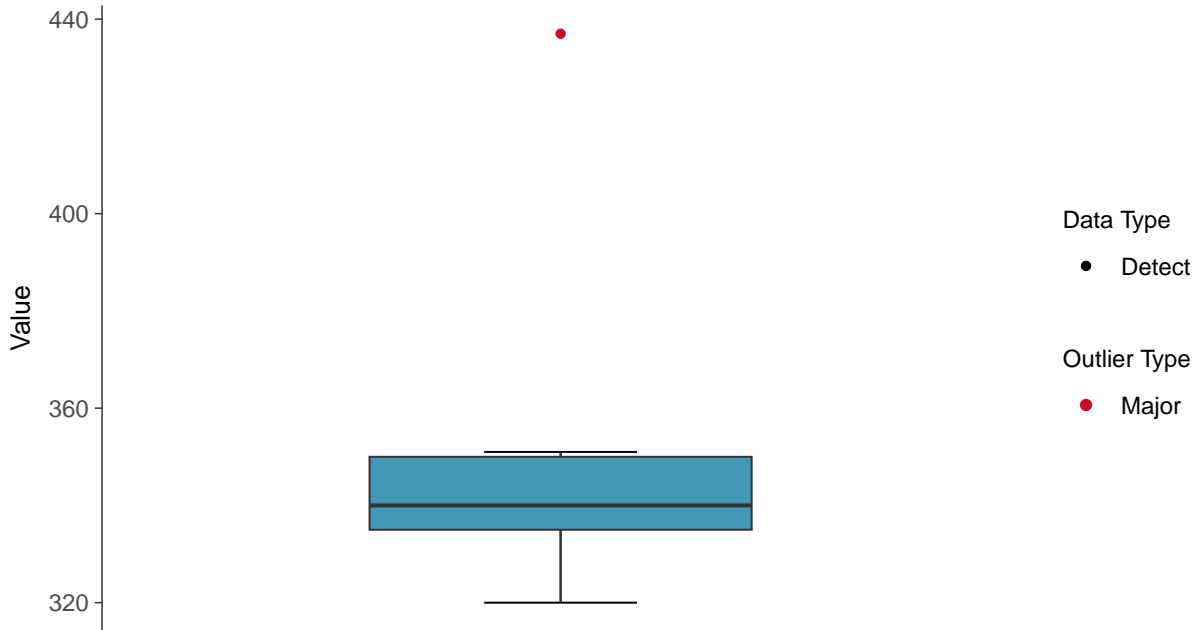
Bicarbonate, MW-13 (mg/L)





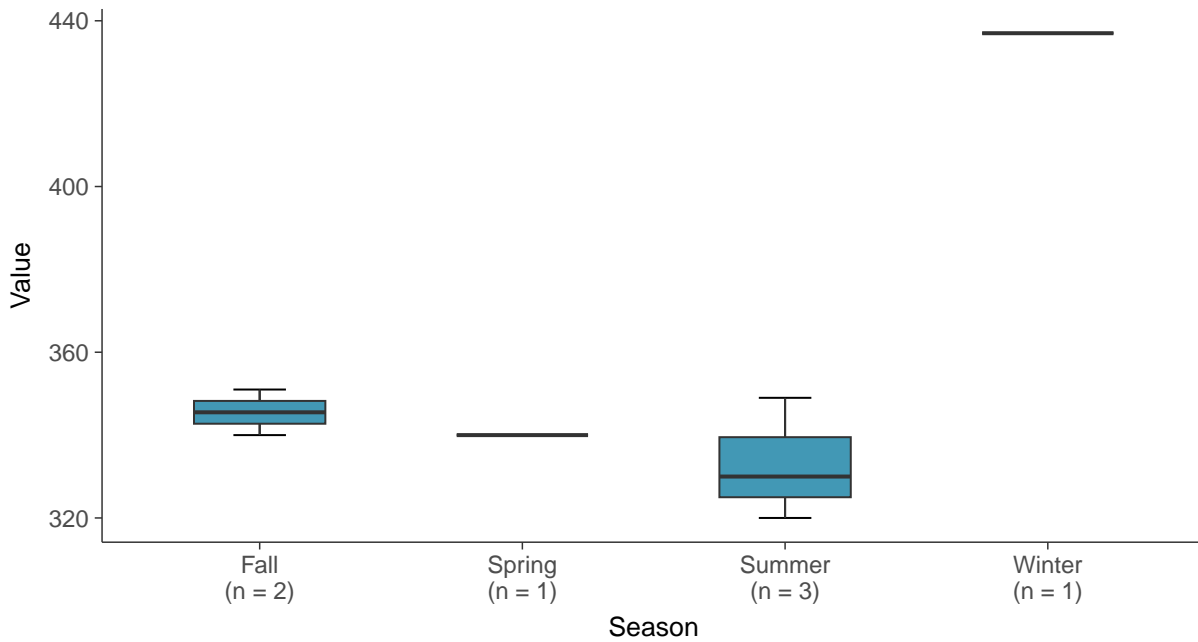
Boxplot

Bicarbonate, MW-13 (mg/L)



Boxplot by Season

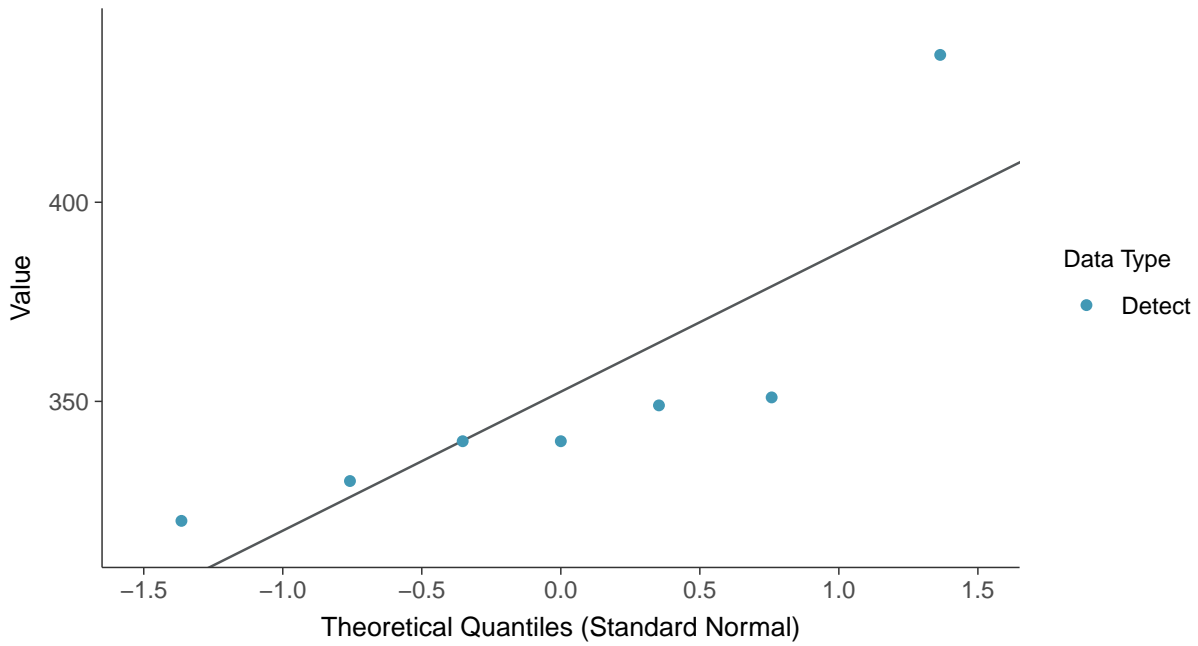
Bicarbonate, MW-13 (mg/L)





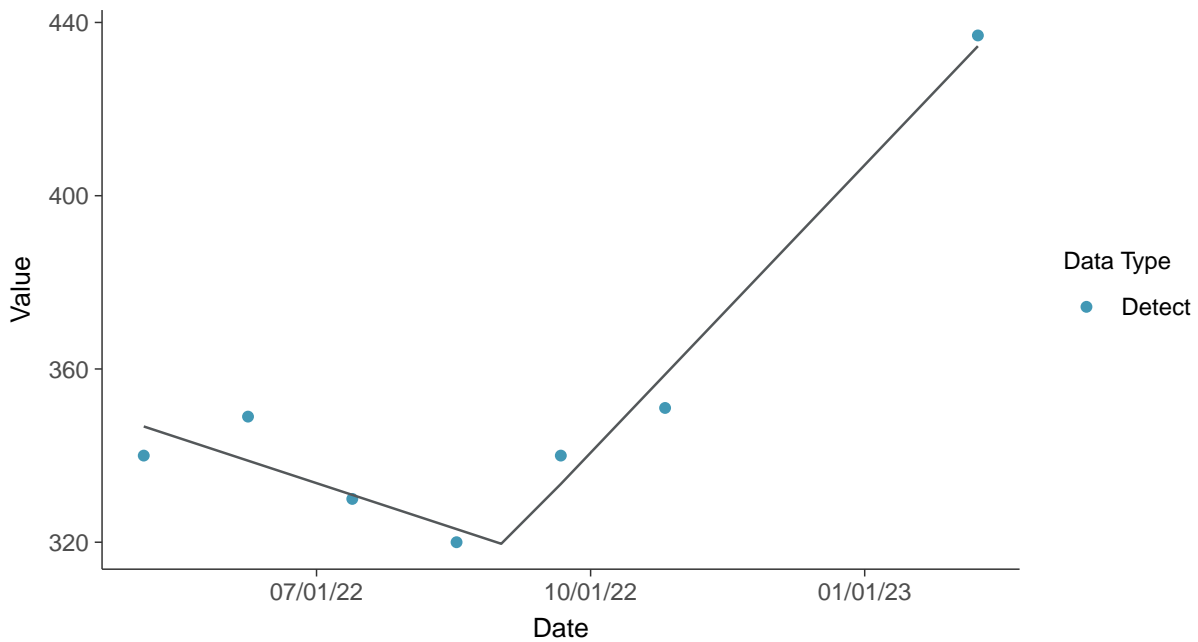
Normal Q-Q plot

Bicarbonate, MW-13 (mg/L)



Trend Regression: Piecewise Linear-Linear

Bicarbonate, MW-13 (mg/L)



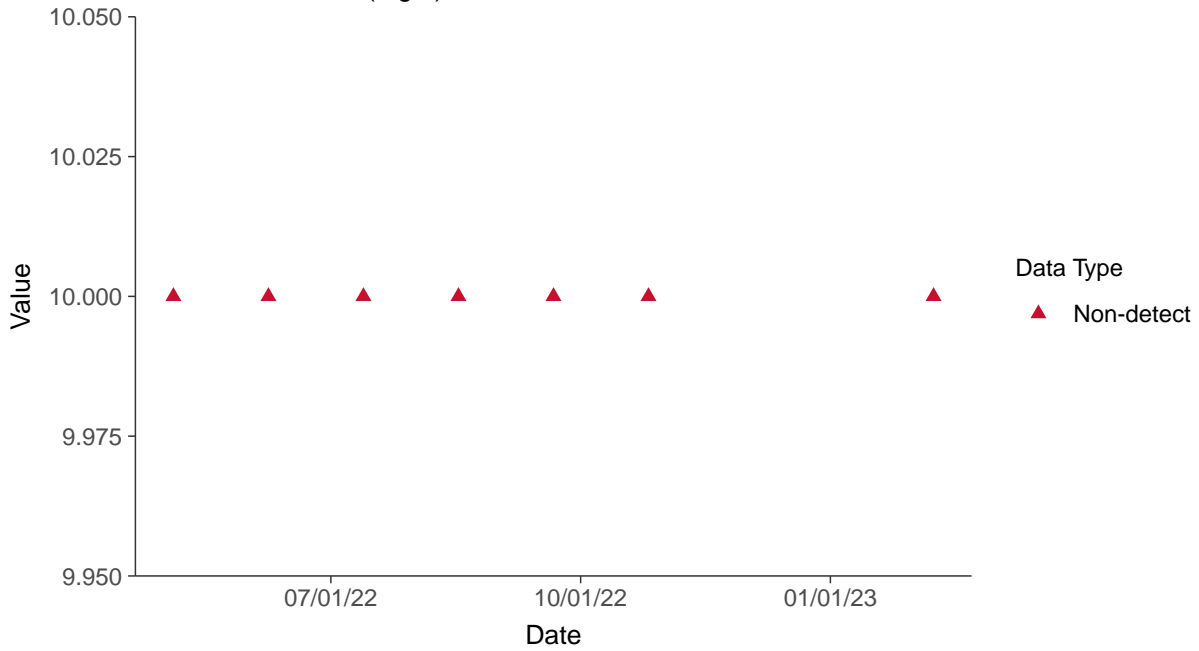


Other: Carbonate, MW-13

ID: 13_3_14

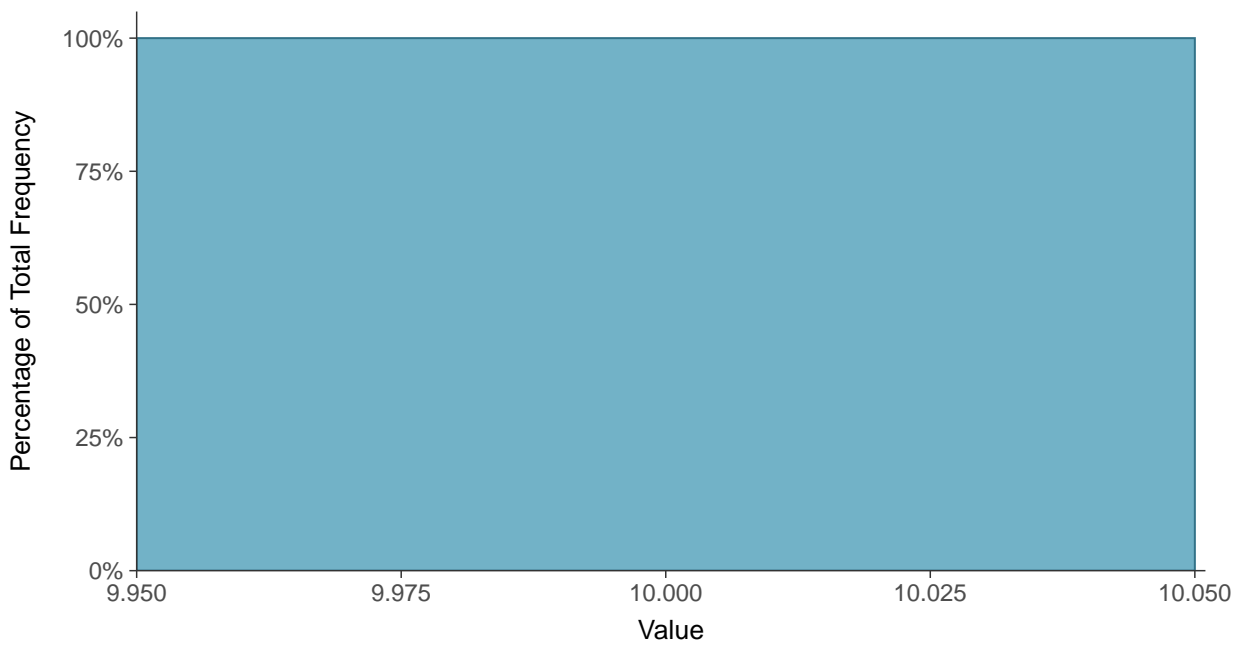
Scatter Plot

Carbonate, MW-13 (mg/L)



Histogram

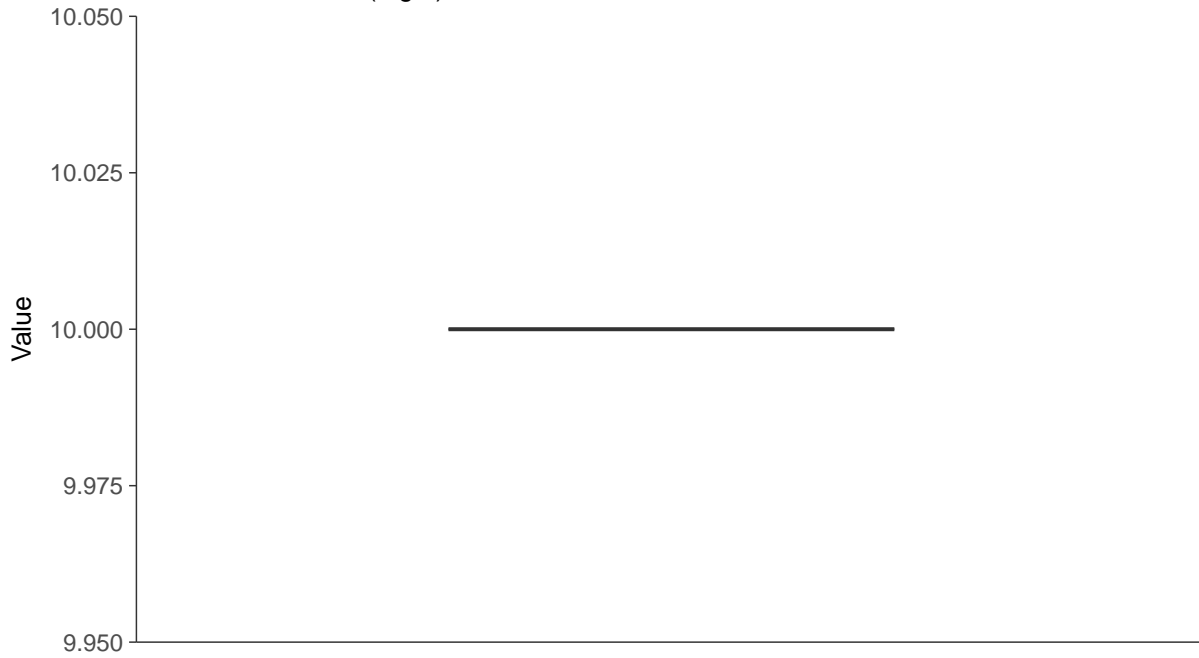
Carbonate, MW-13 (mg/L)





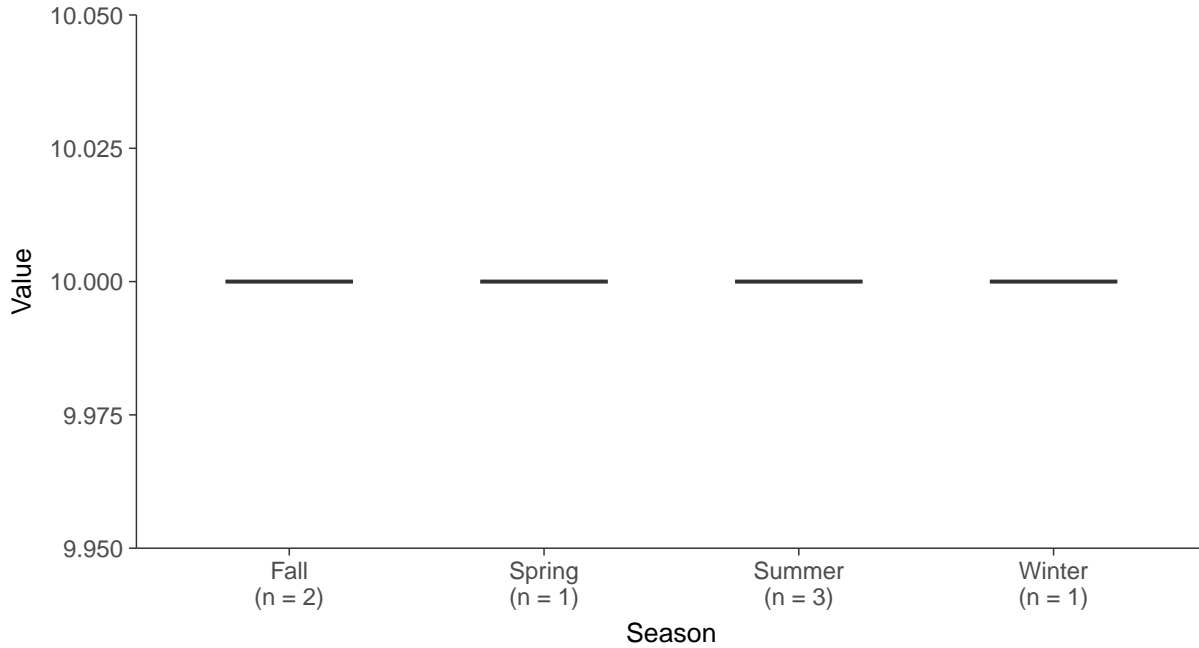
Boxplot

Carbonate, MW-13 (mg/L)



Boxplot by Season

Carbonate, MW-13 (mg/L)



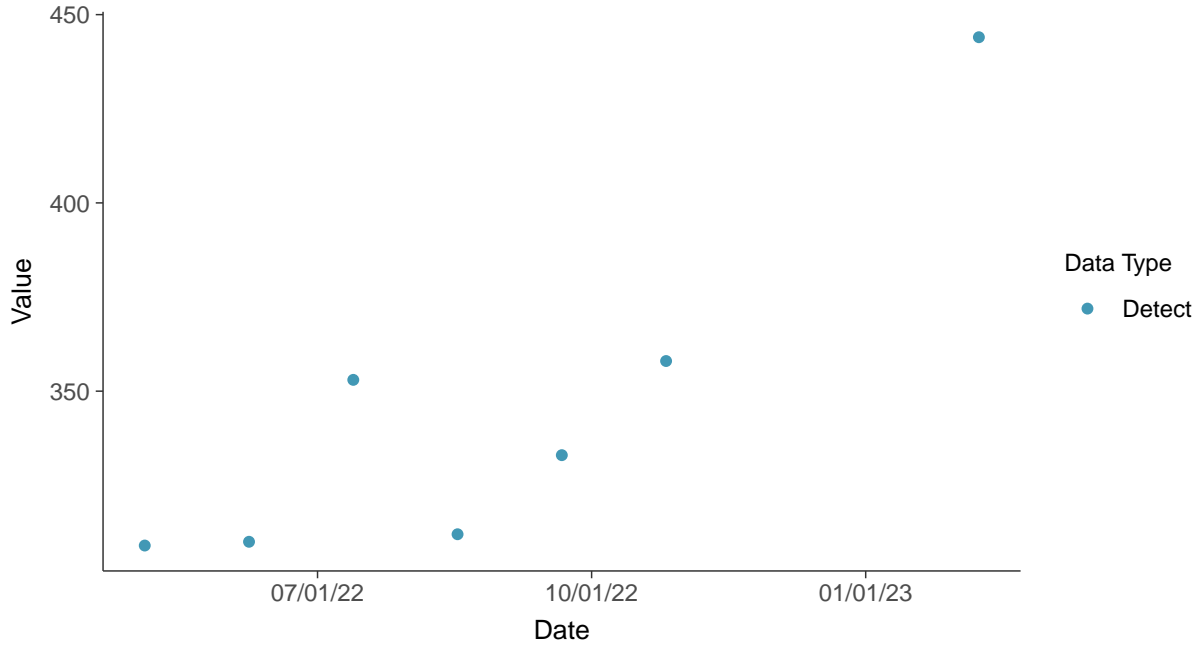


Other: Hardness, MW-13

ID: 13_3_17

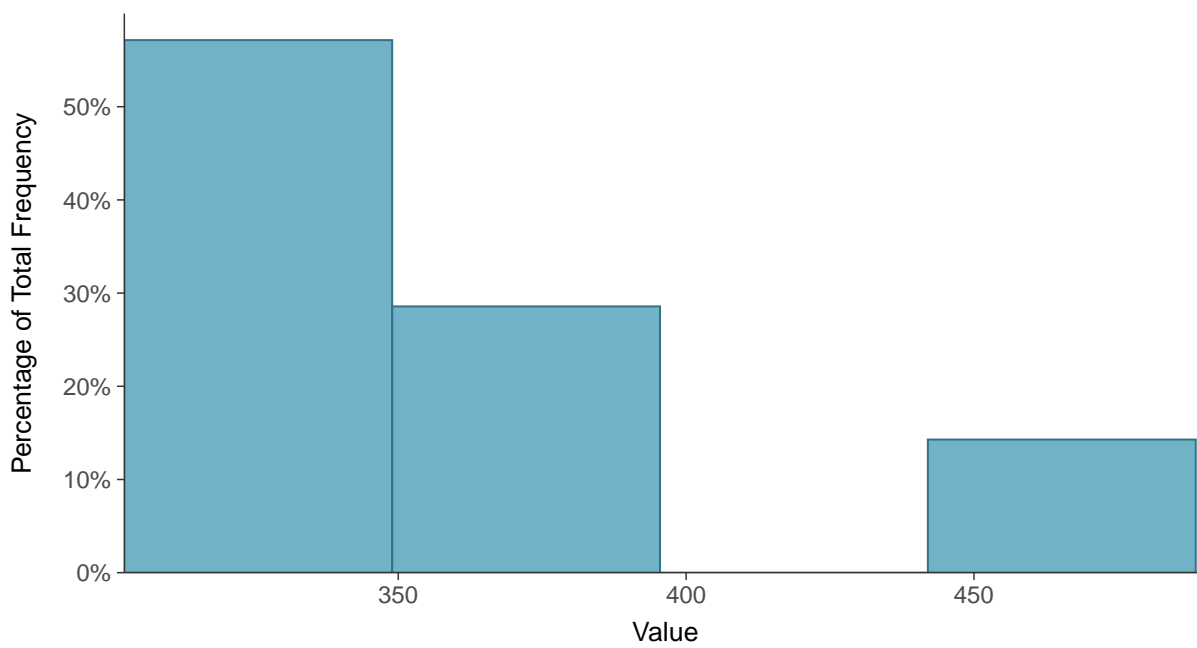
Scatter Plot

Hardness, MW-13 (mg/L)



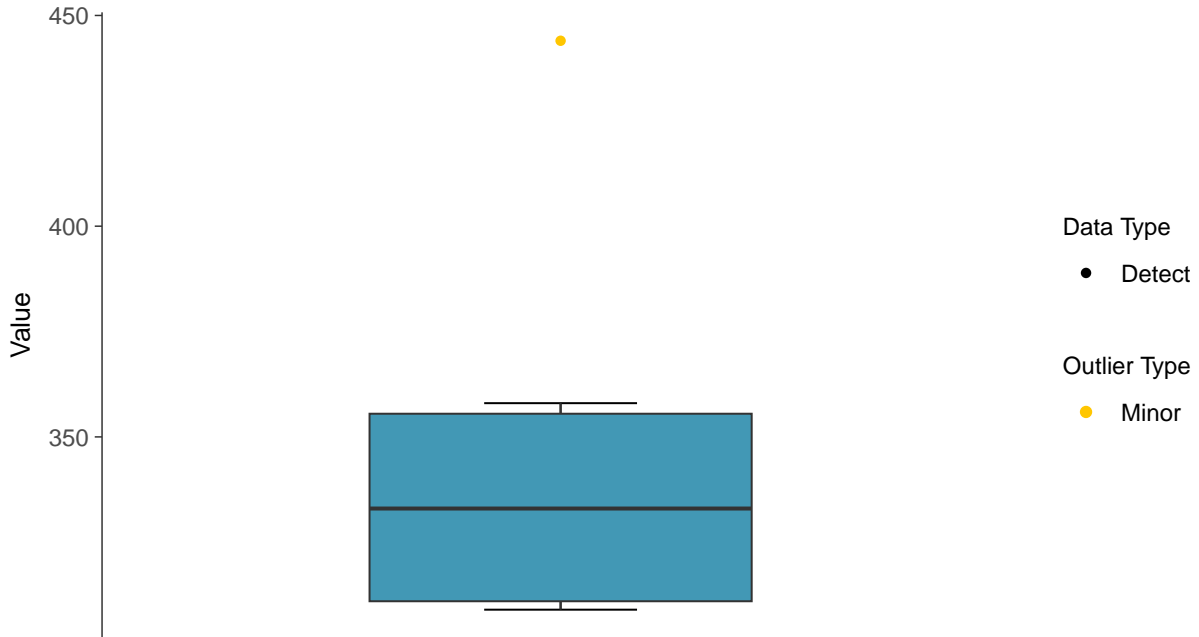
Histogram

Hardness, MW-13 (mg/L)



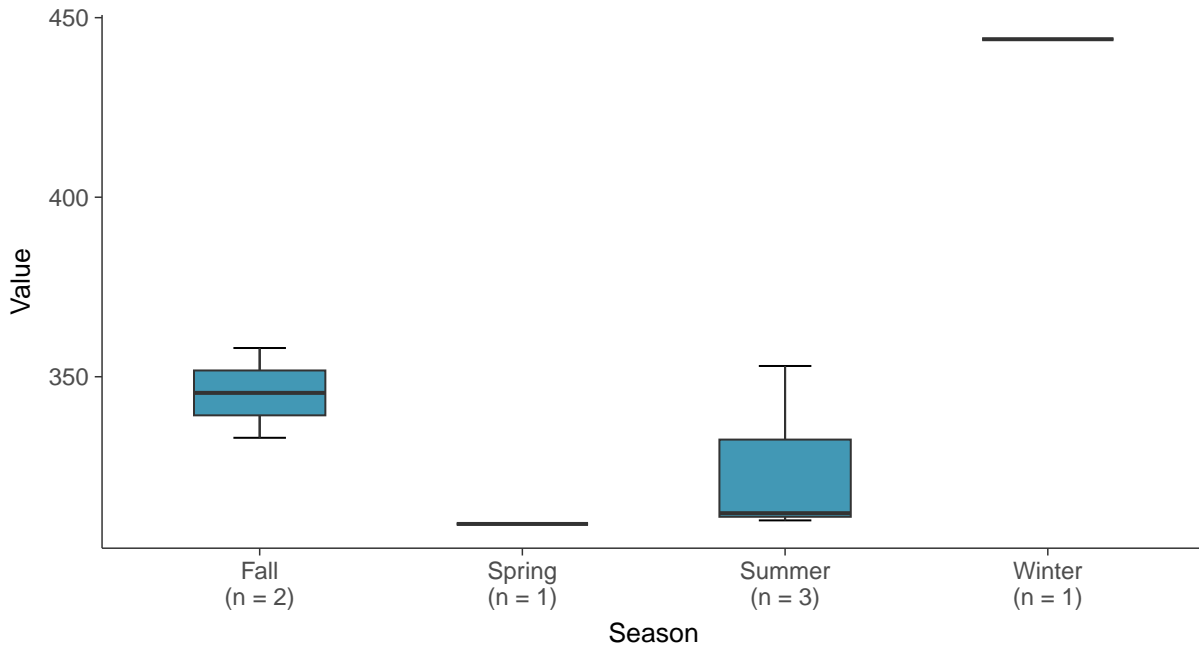
Boxplot

Hardness, MW-13 (mg/L)



Boxplot by Season

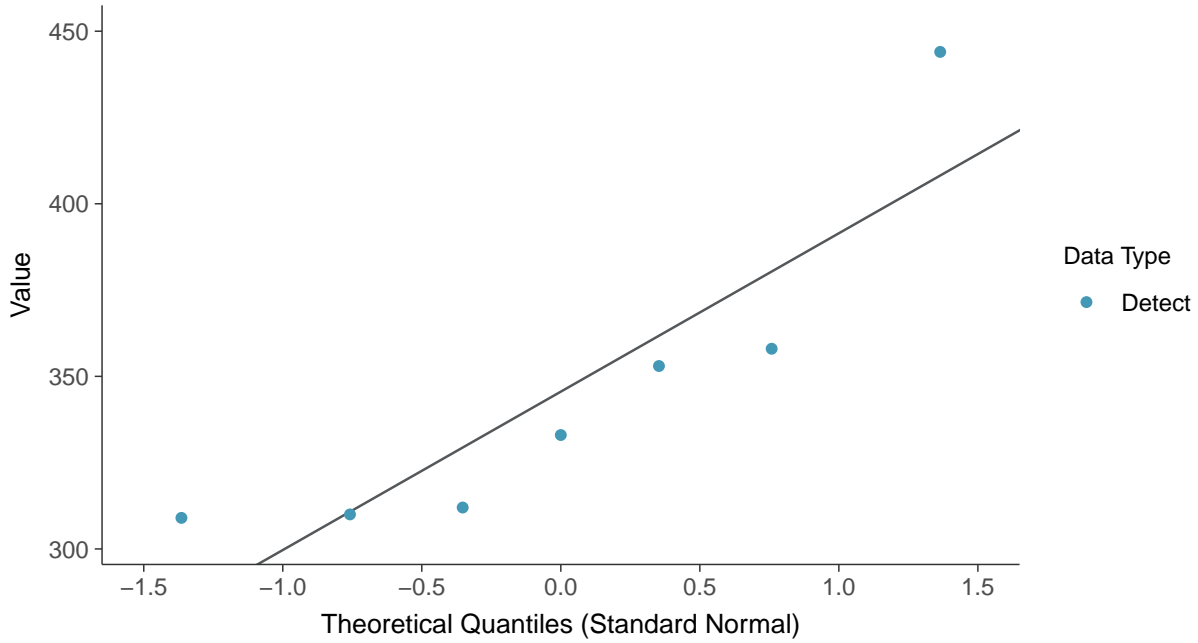
Hardness, MW-13 (mg/L)





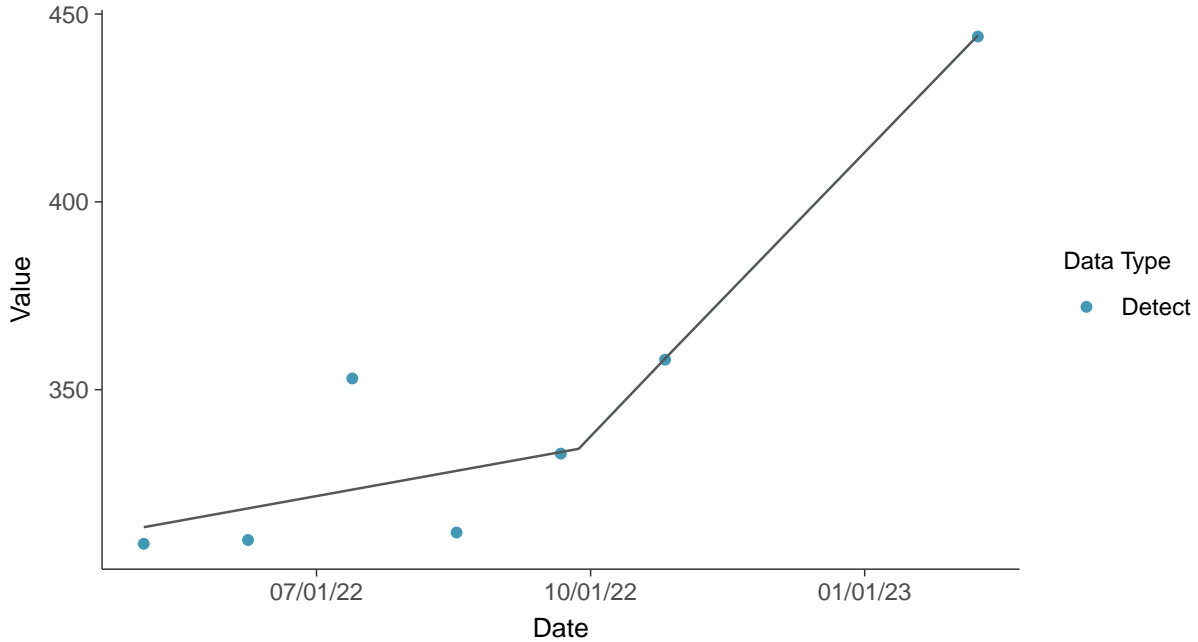
Normal Q-Q plot

Hardness, MW-13 (mg/L)



Trend Regression: Piecewise Linear-Linear

Hardness, MW-13 (mg/L)



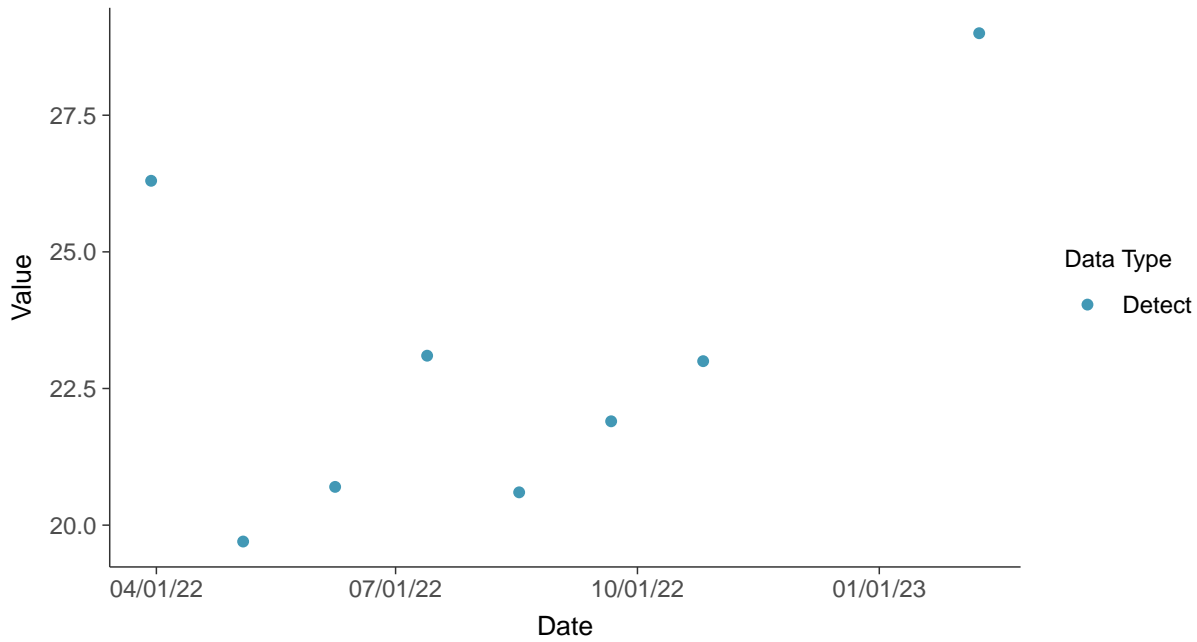


Other: Magnesium, MW-13

ID: 13_3_20

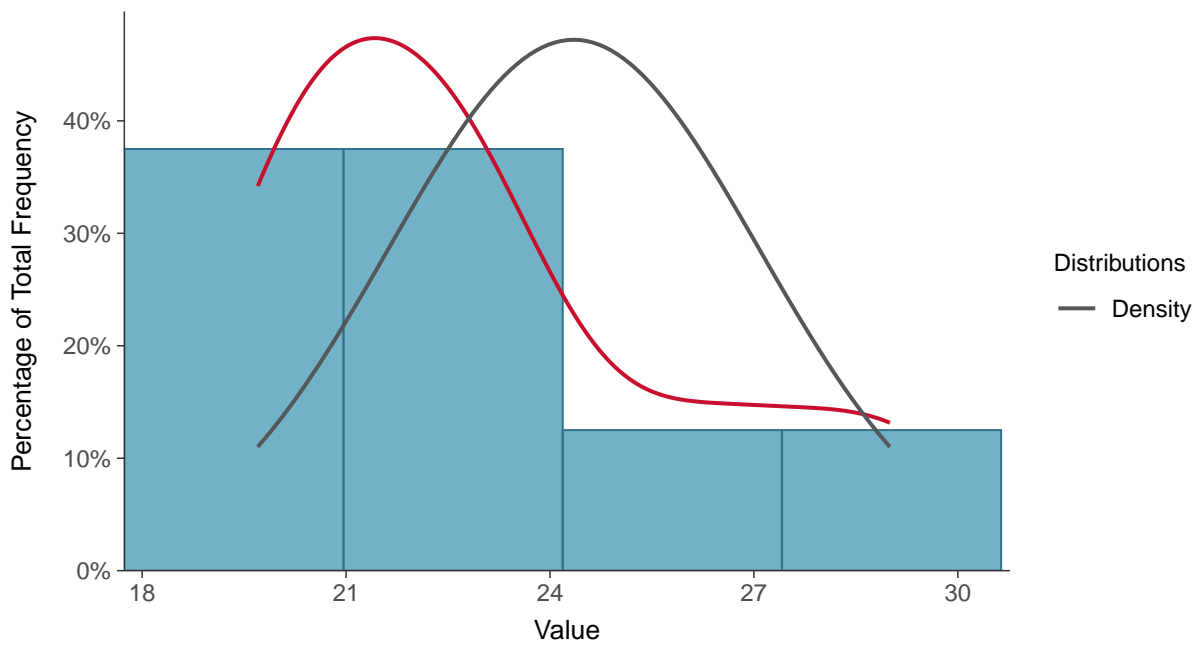
Scatter Plot

Magnesium, MW-13 (mg/L)



Histogram

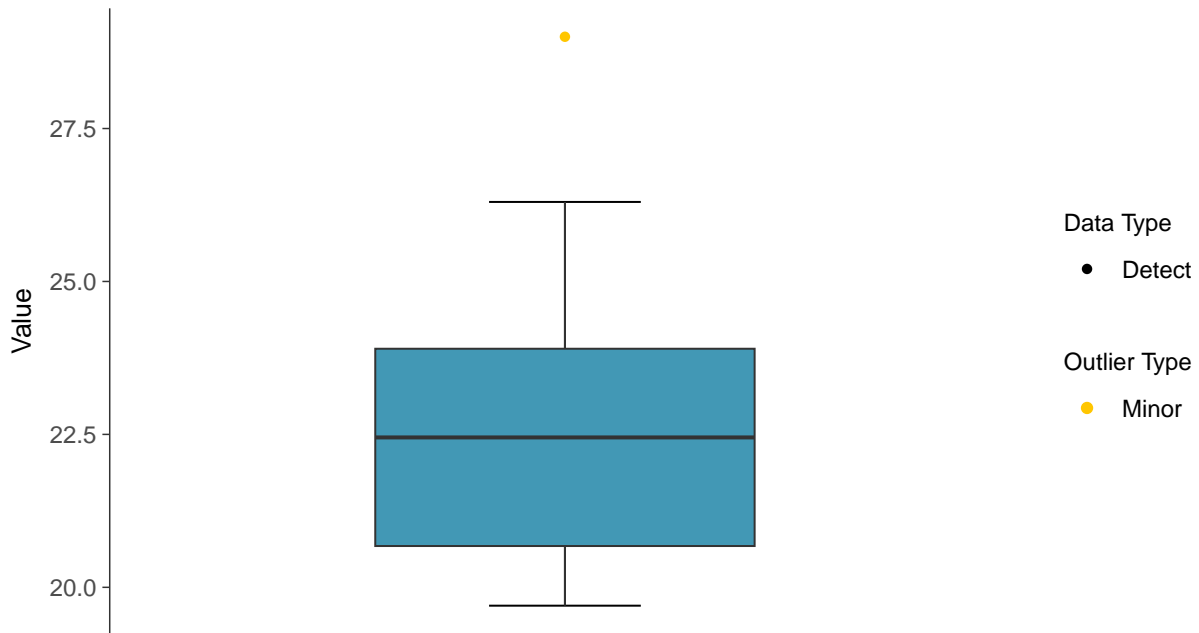
Magnesium, MW-13 (mg/L)





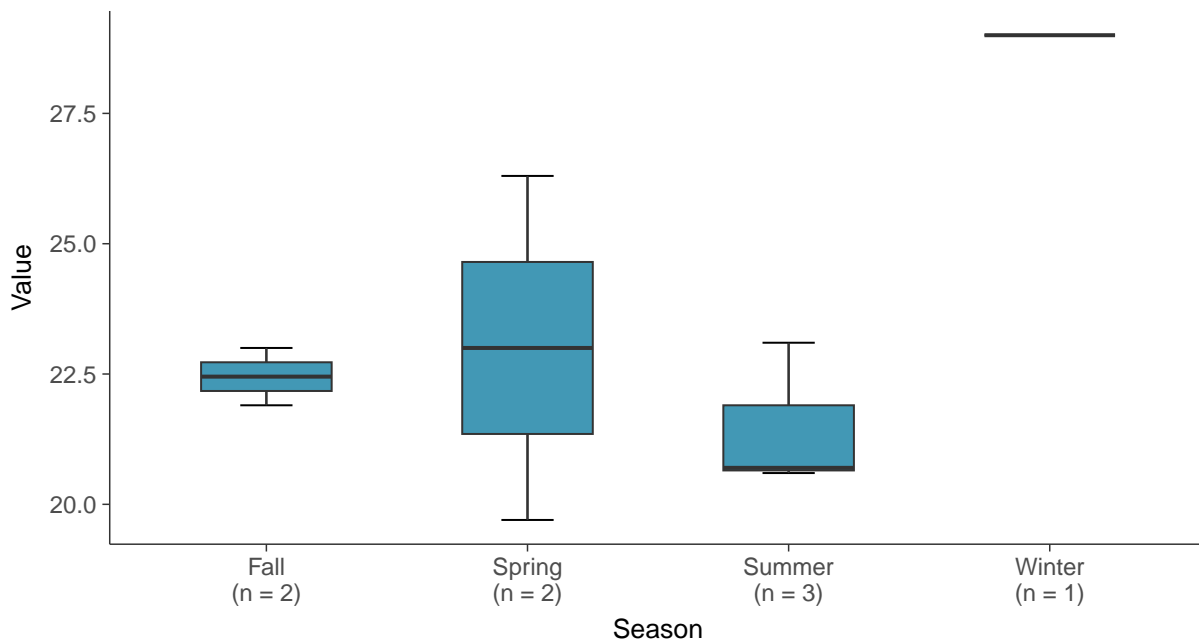
Boxplot

Magnesium, MW-13 (mg/L)



Boxplot by Season

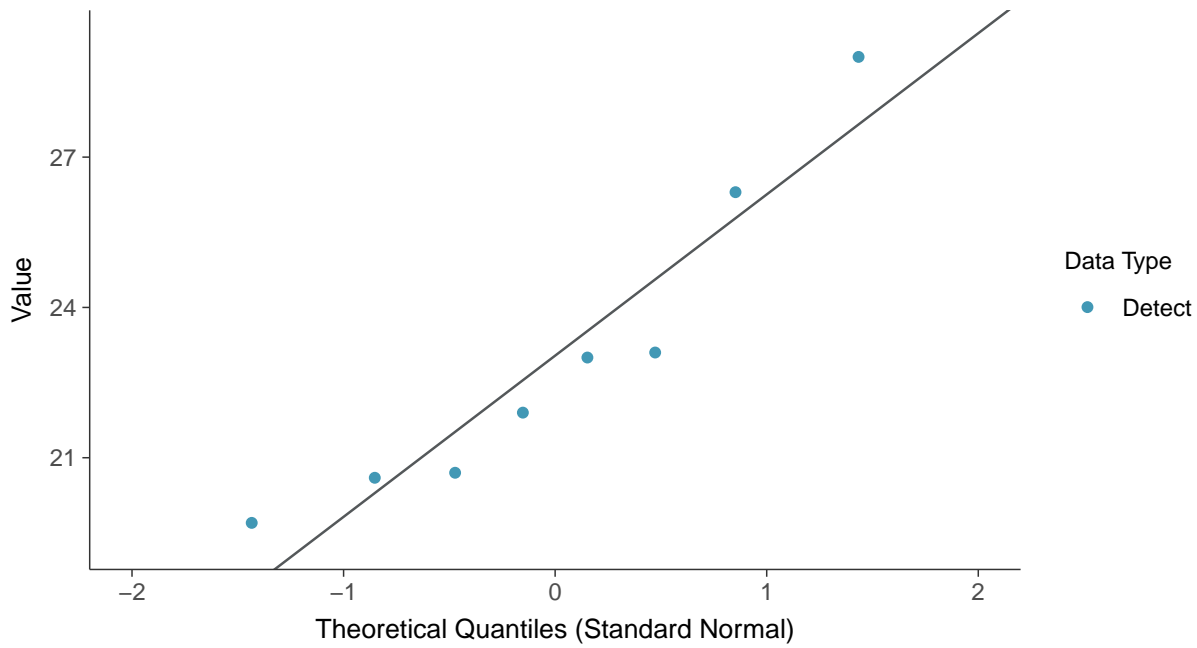
Magnesium, MW-13 (mg/L)





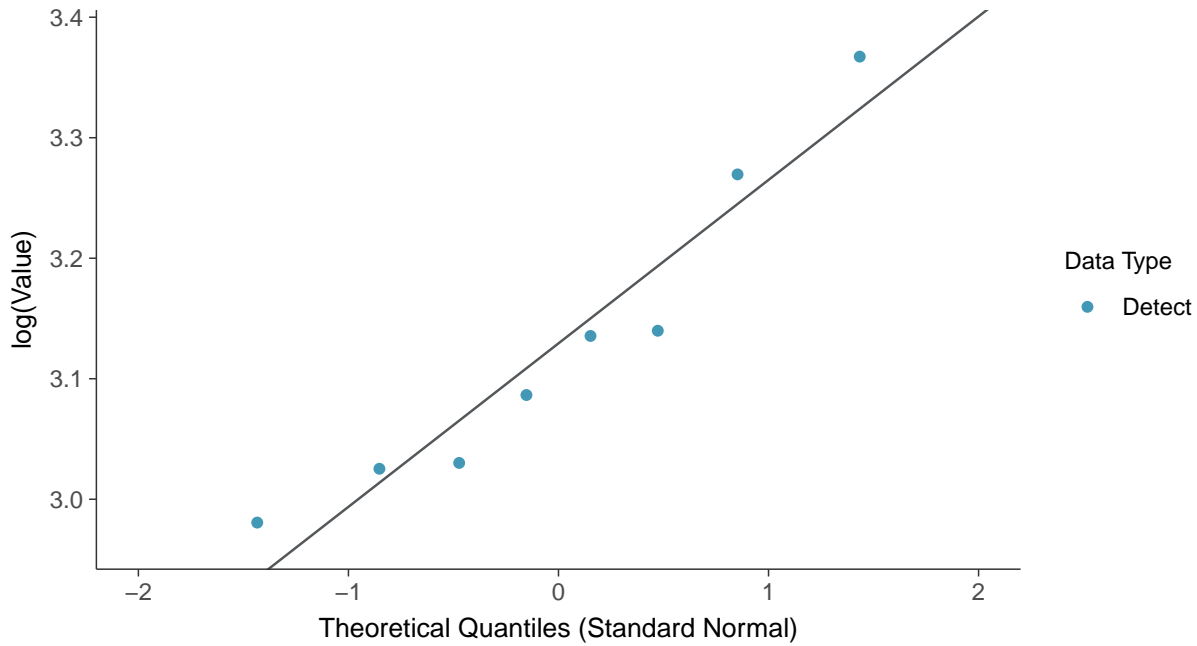
Normal Q-Q plot

Magnesium, MW-13 (mg/L)



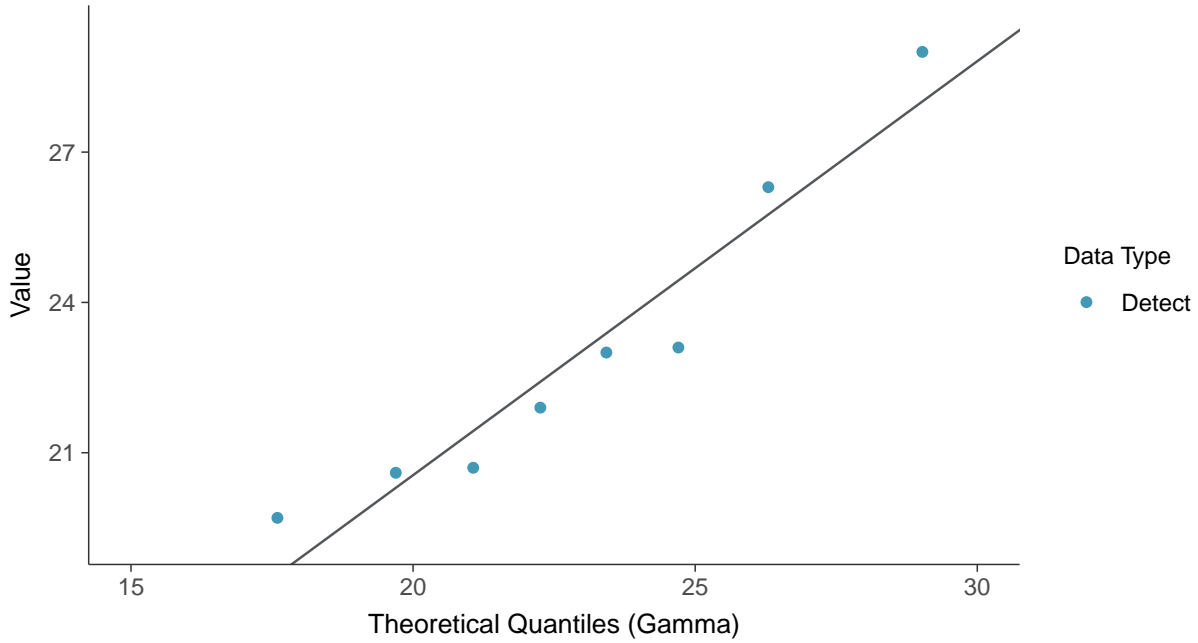
Lognormal Q-Q plot

Magnesium, MW-13 (mg/L)

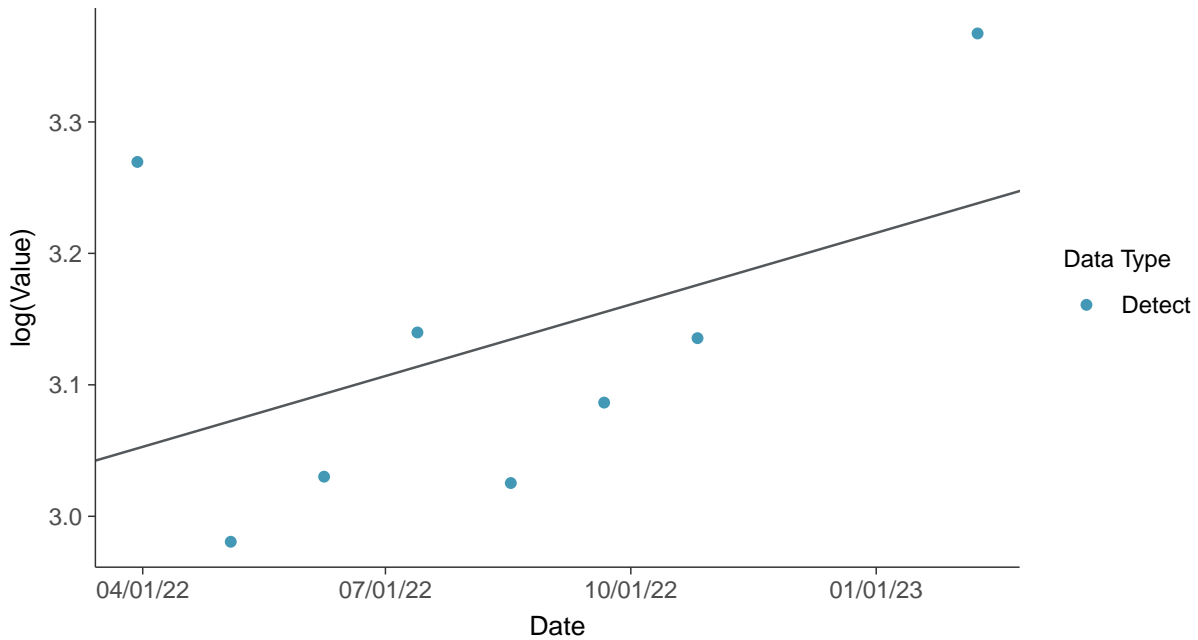




Gamma Q-Q plot
Magnesium, MW-13 (mg/L)



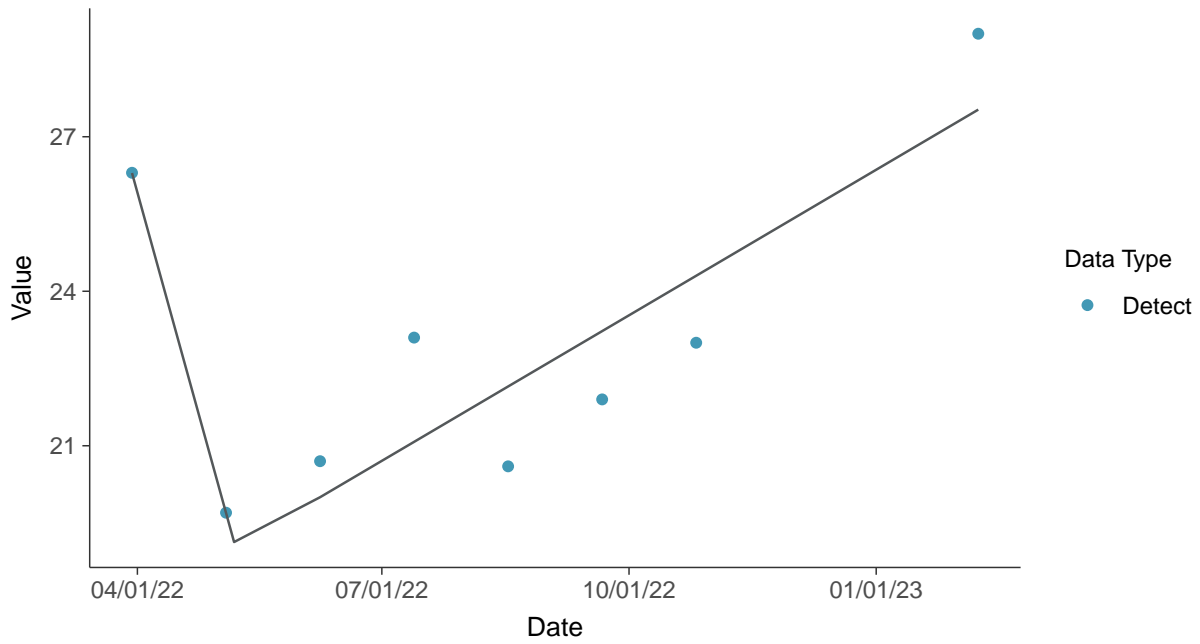
Trend Regression: Lognormal MLE
Magnesium, MW-13 (mg/L)





Trend Regression: Piecewise Linear-Linear

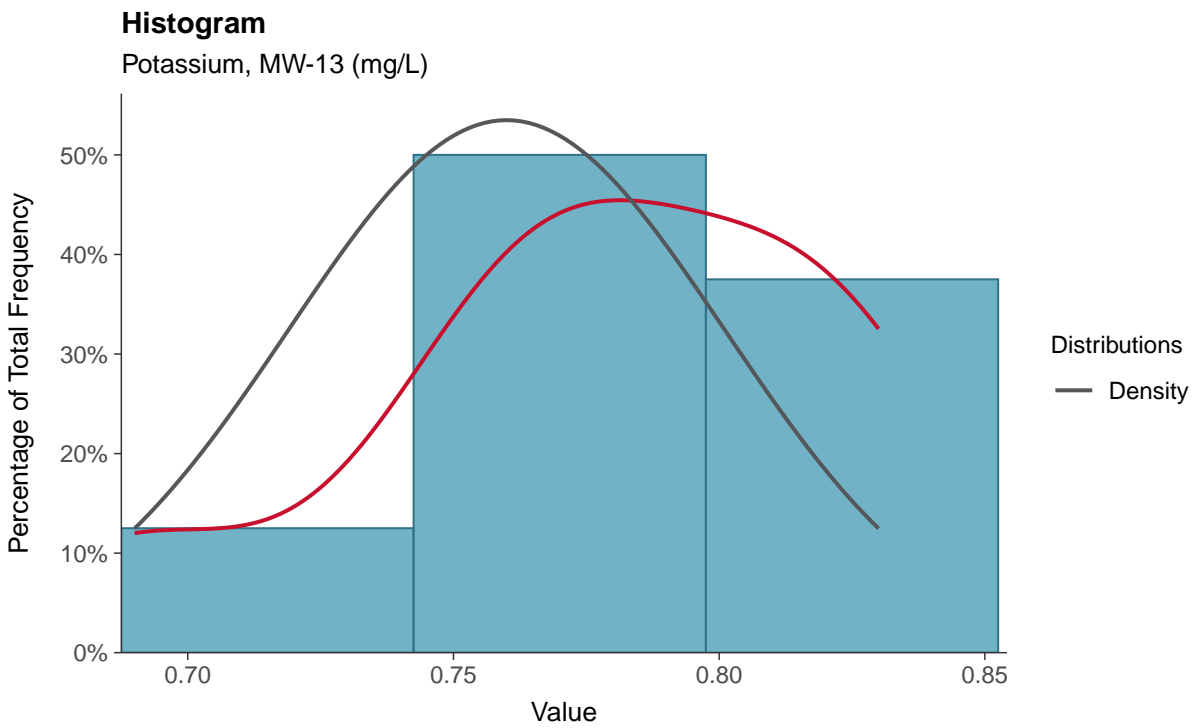
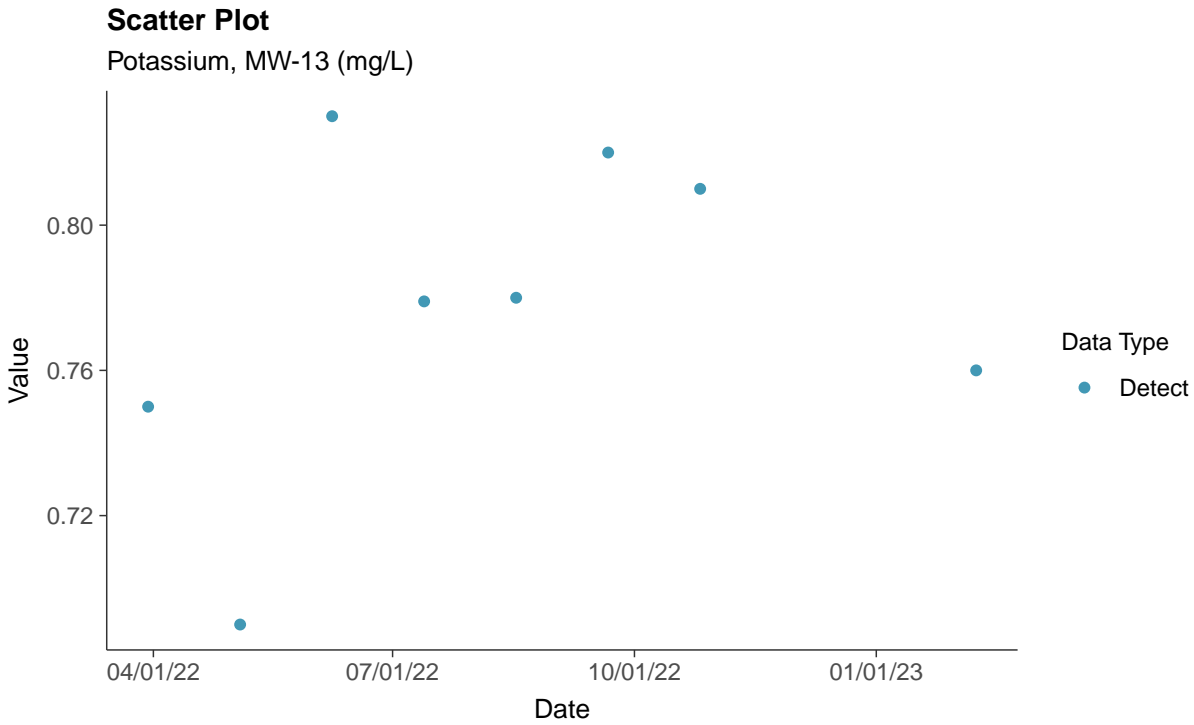
Magnesium, MW-13 (mg/L)





Other: Potassium, MW-13

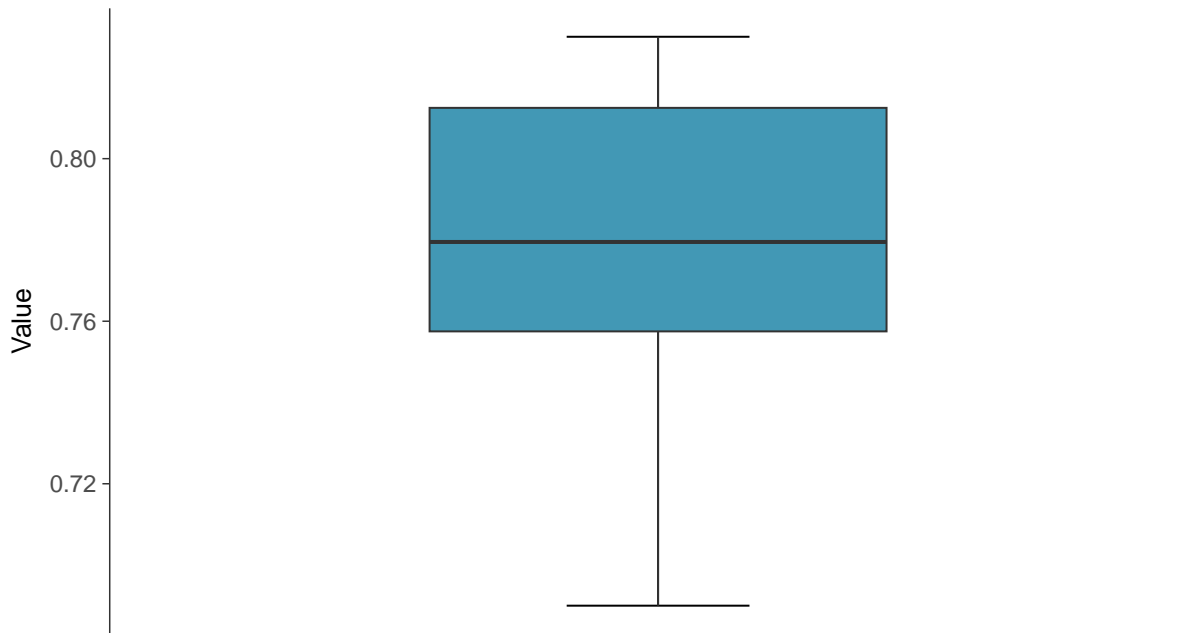
ID: 13_3_23





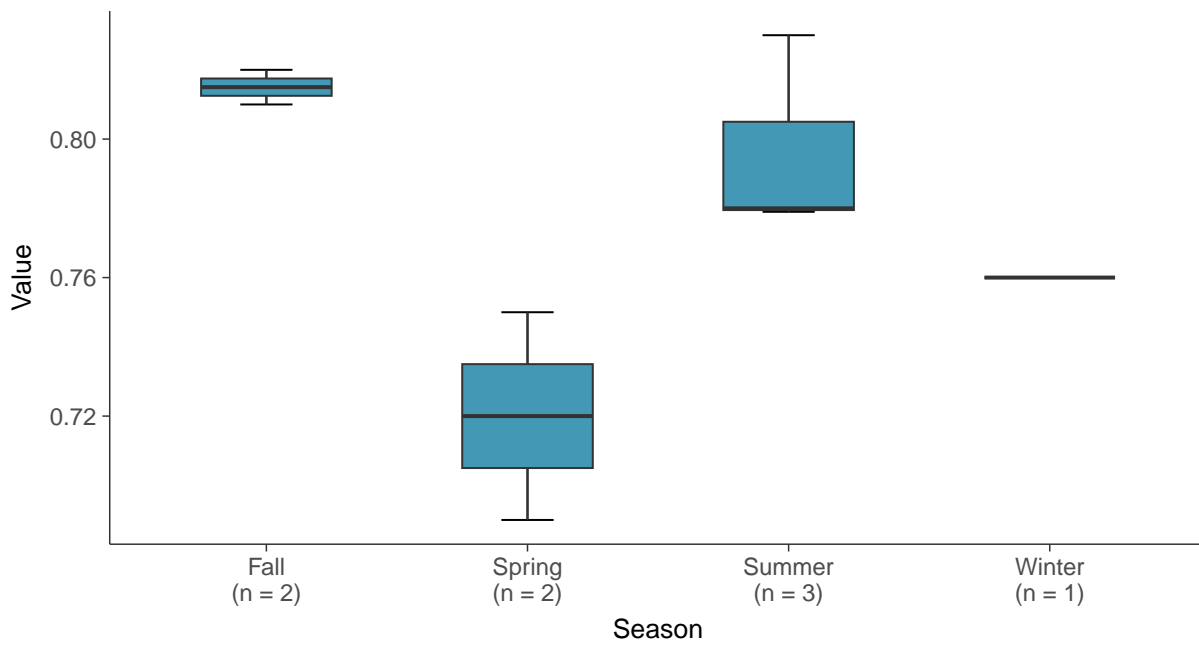
Boxplot

Potassium, MW-13 (mg/L)



Boxplot by Season

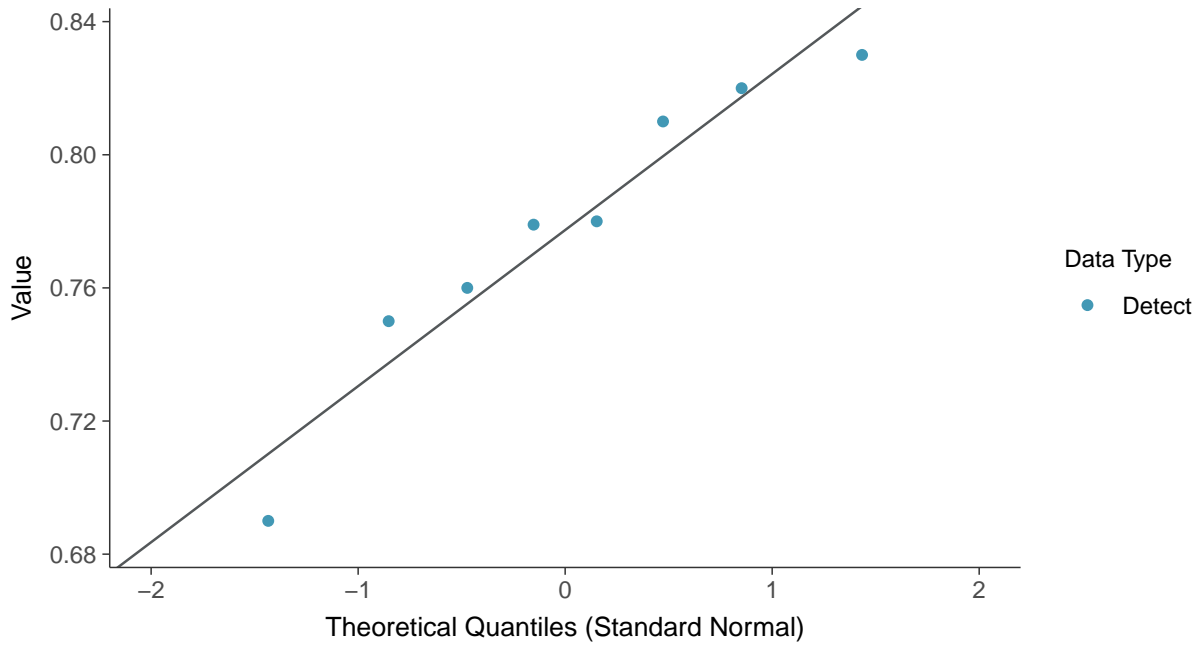
Potassium, MW-13 (mg/L)





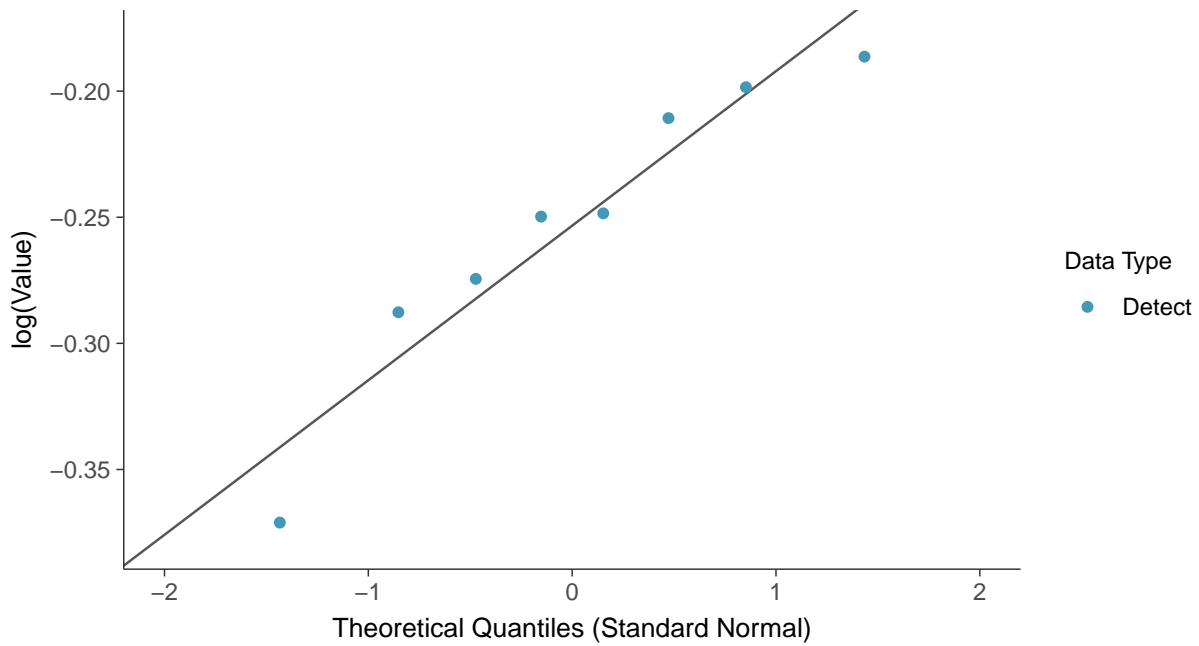
Normal Q-Q plot

Potassium, MW-13 (mg/L)



Lognormal Q-Q plot

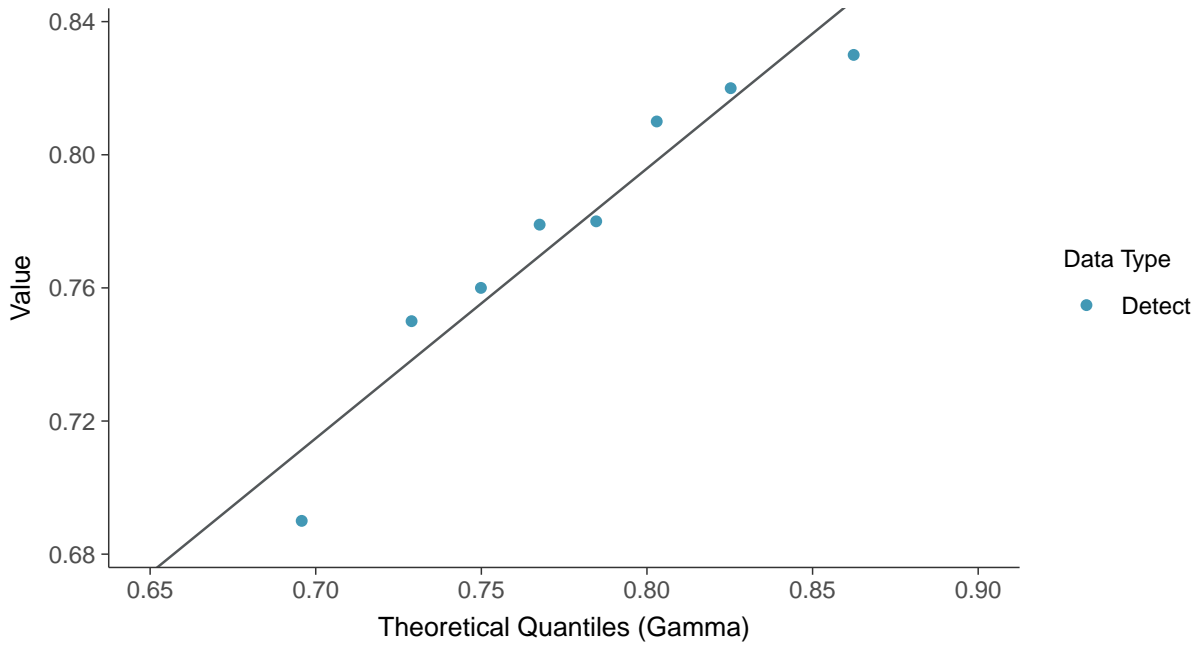
Potassium, MW-13 (mg/L)





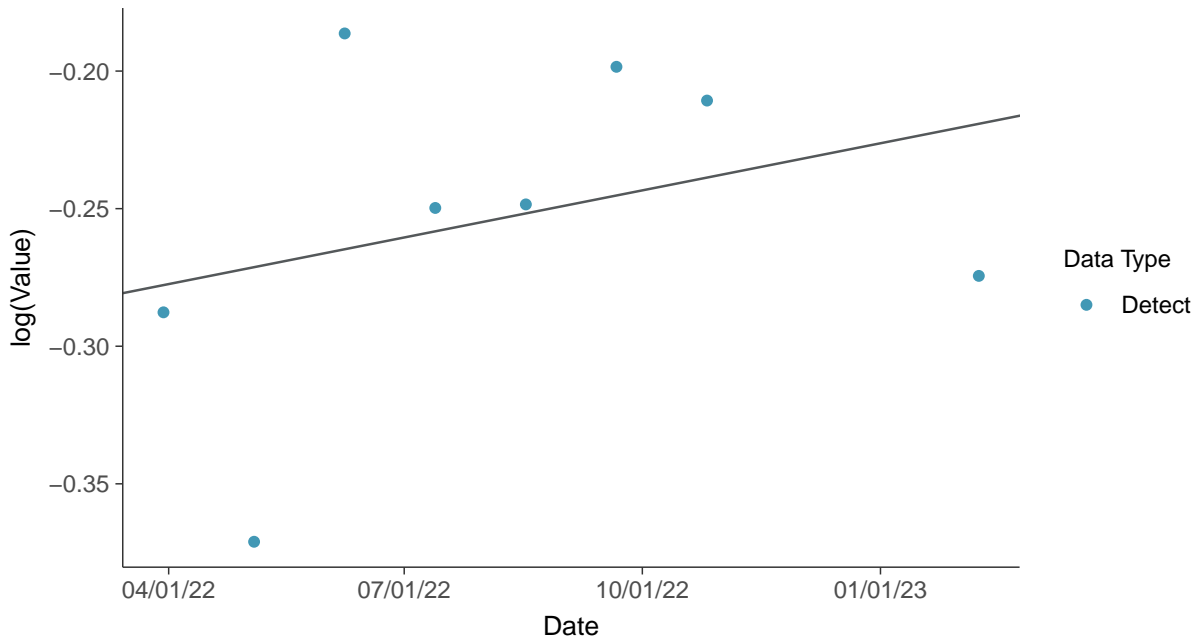
Gamma Q-Q plot

Potassium, MW-13 (mg/L)



Trend Regression: Lognormal MLE

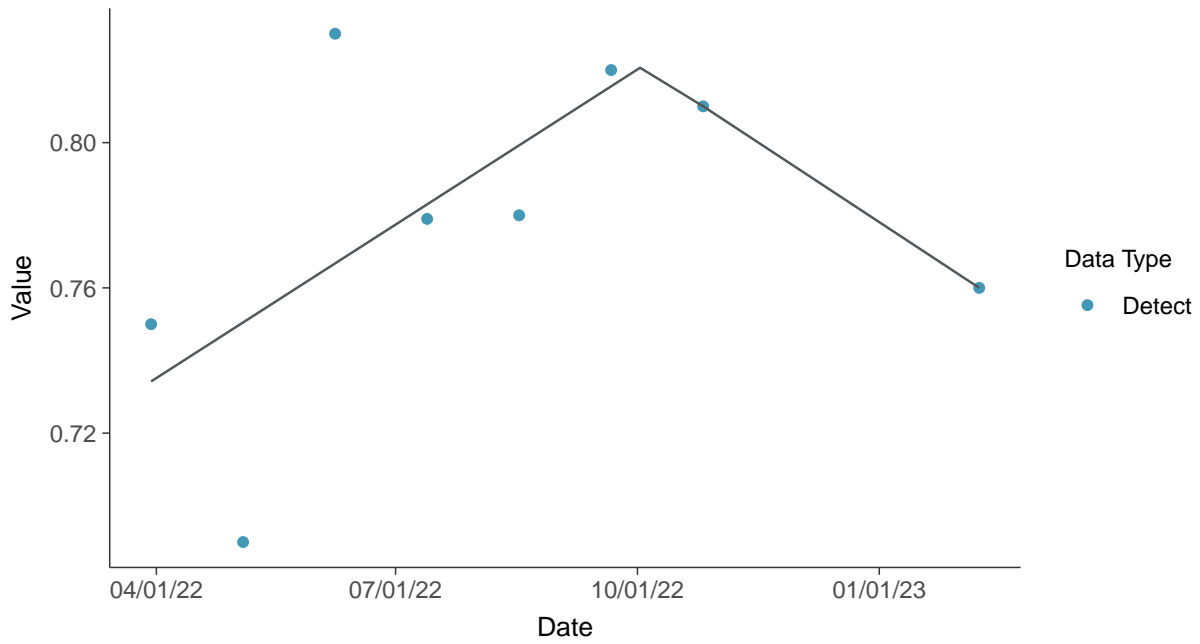
Potassium, MW-13 (mg/L)





Trend Regression: Piecewise Linear-Linear

Potassium, MW-13 (mg/L)

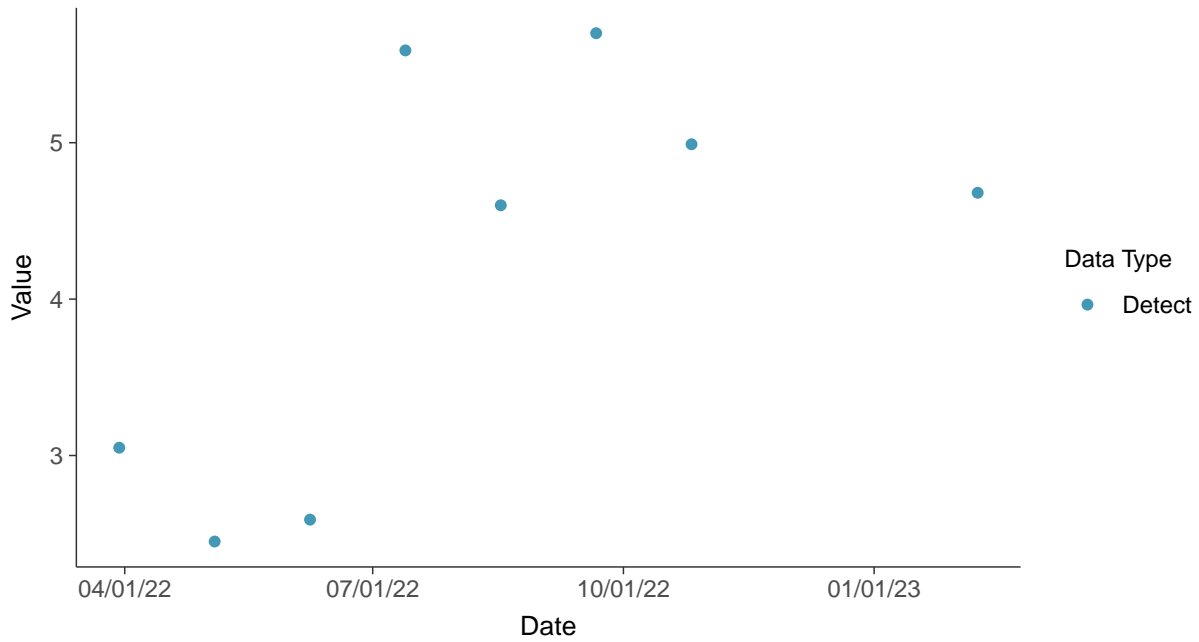


Other: Sodium, MW-13

ID: 13_3_28

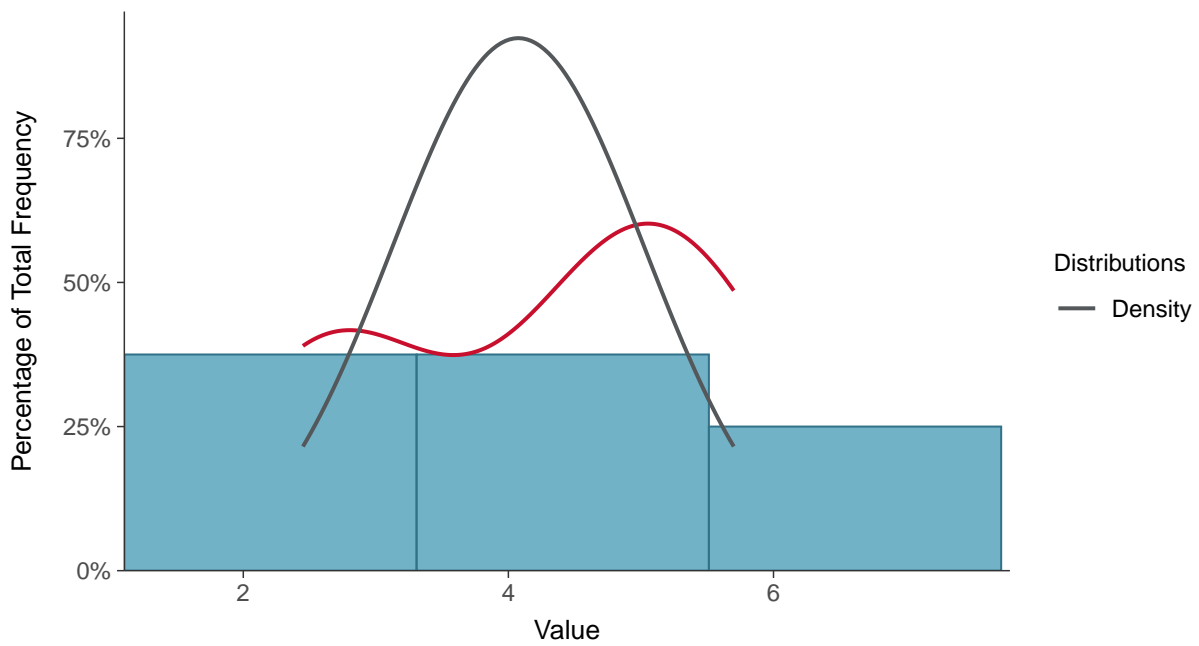
Scatter Plot

Sodium, MW-13 (mg/L)



Histogram

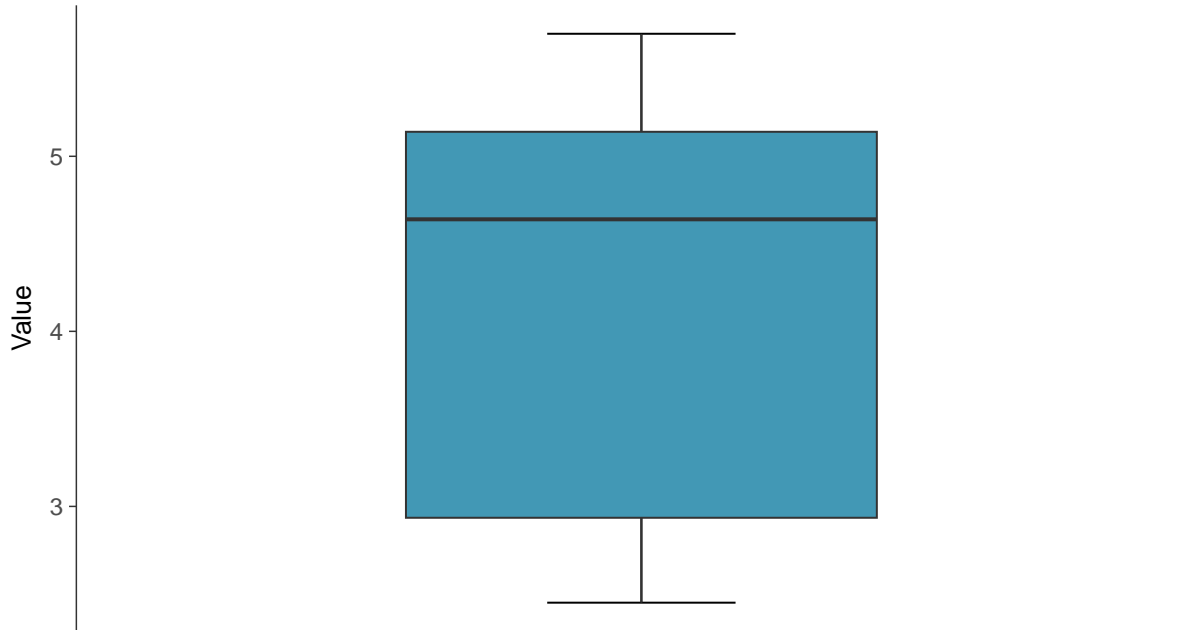
Sodium, MW-13 (mg/L)





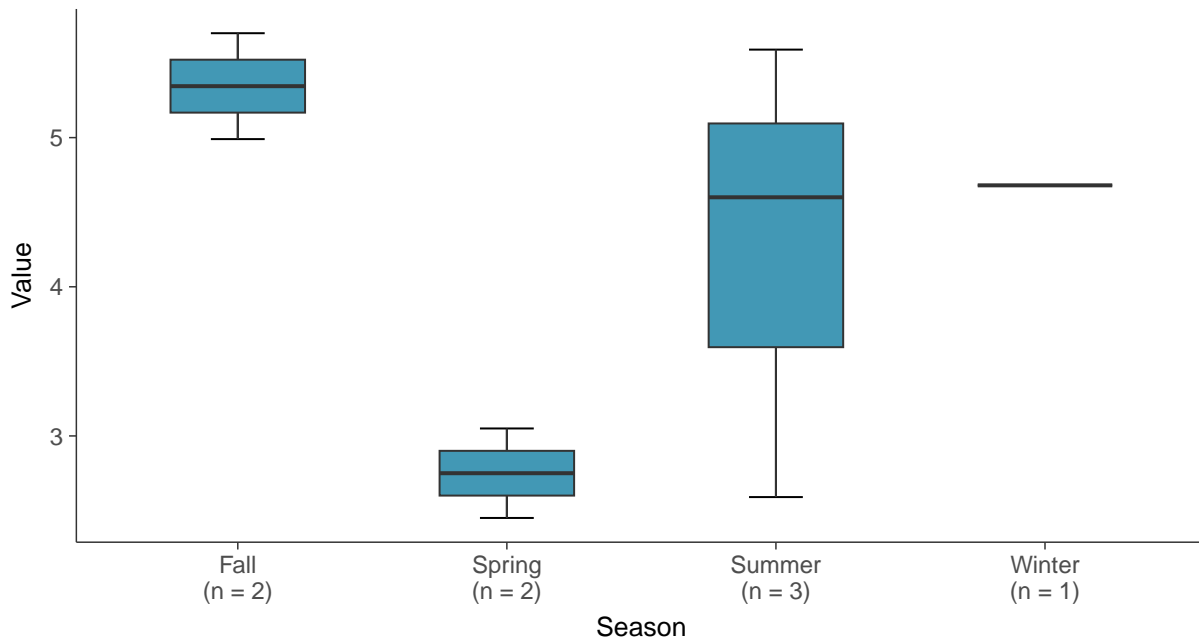
Boxplot

Sodium, MW-13 (mg/L)



Boxplot by Season

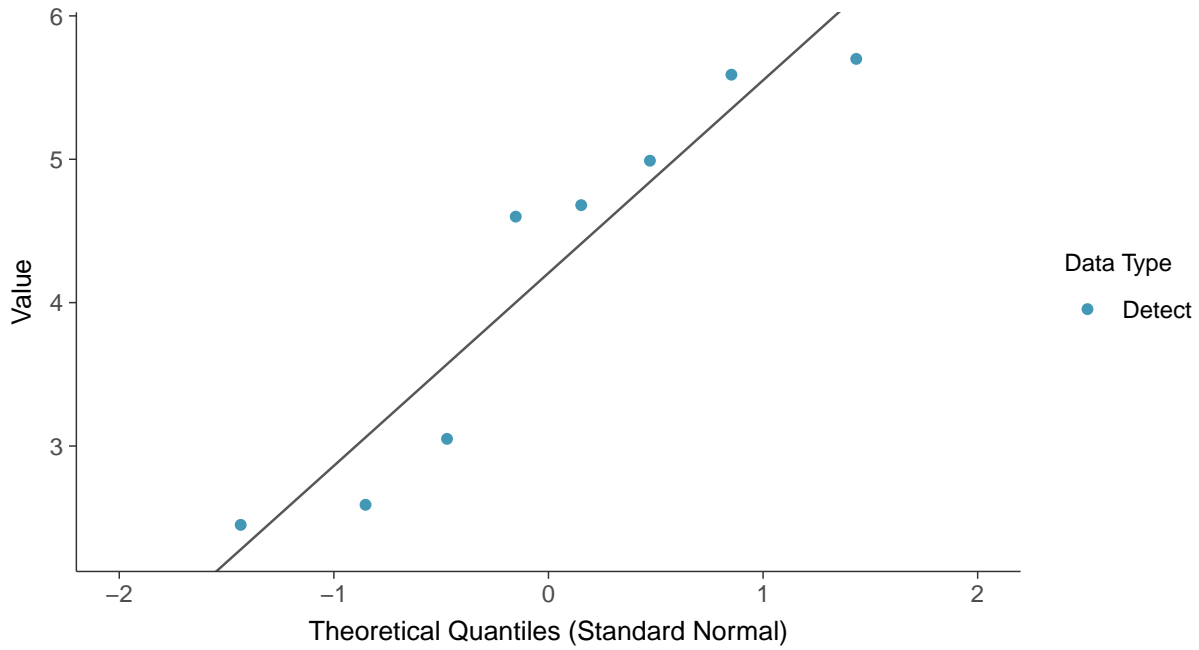
Sodium, MW-13 (mg/L)





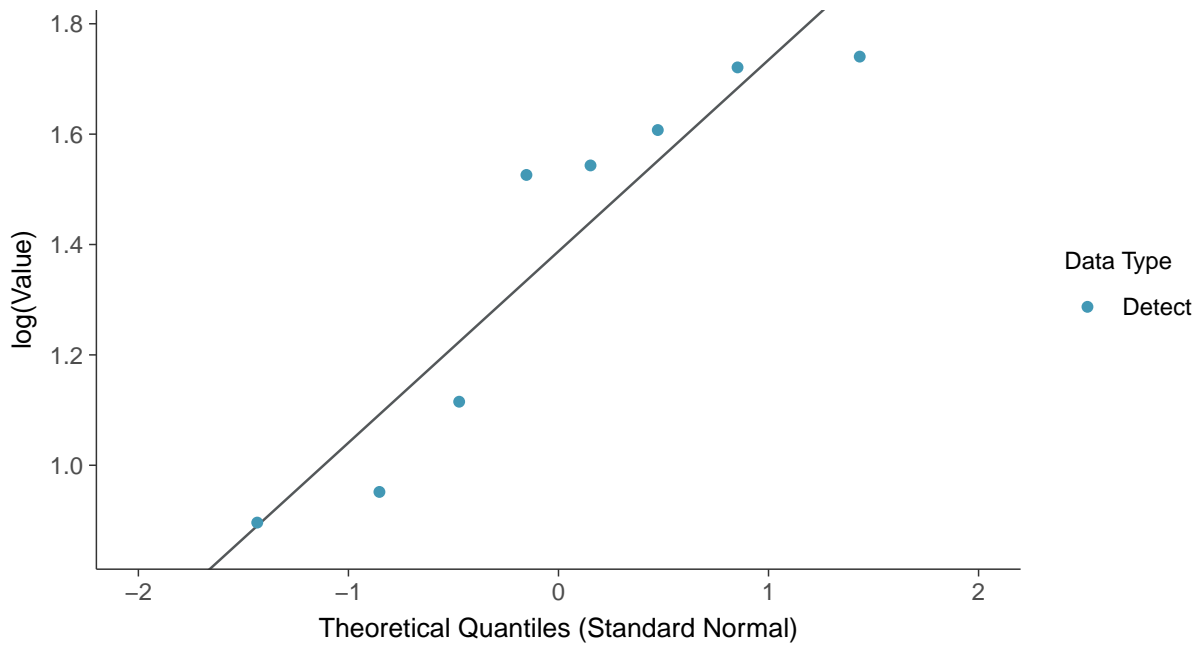
Normal Q-Q plot

Sodium, MW-13 (mg/L)



Lognormal Q-Q plot

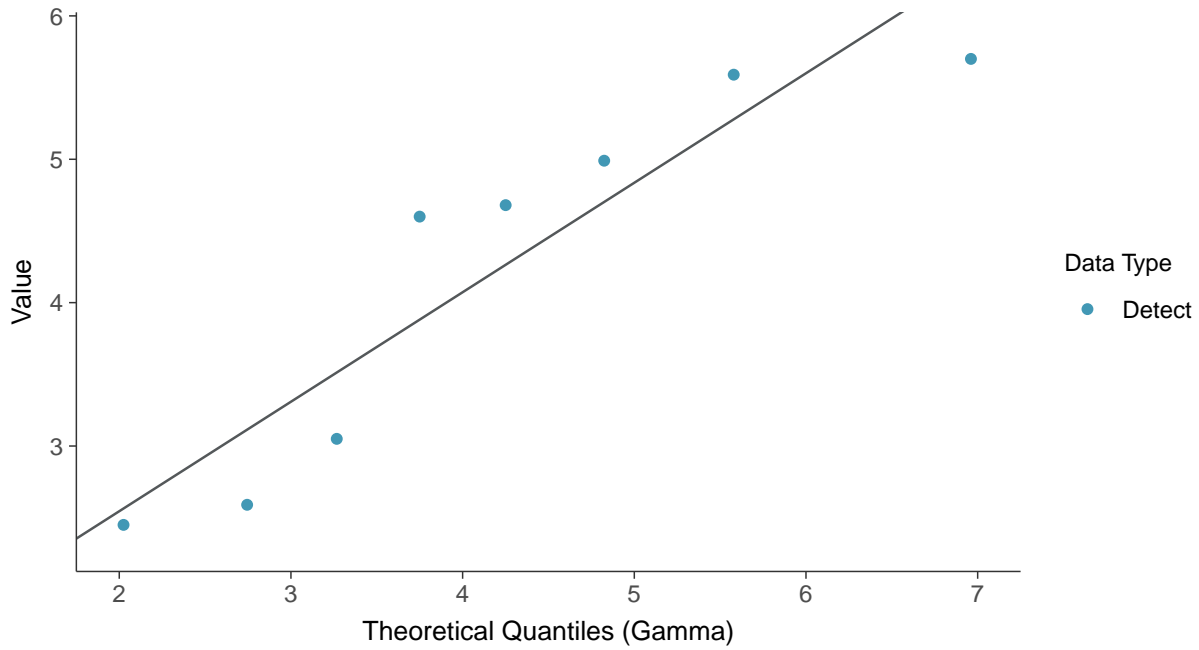
Sodium, MW-13 (mg/L)





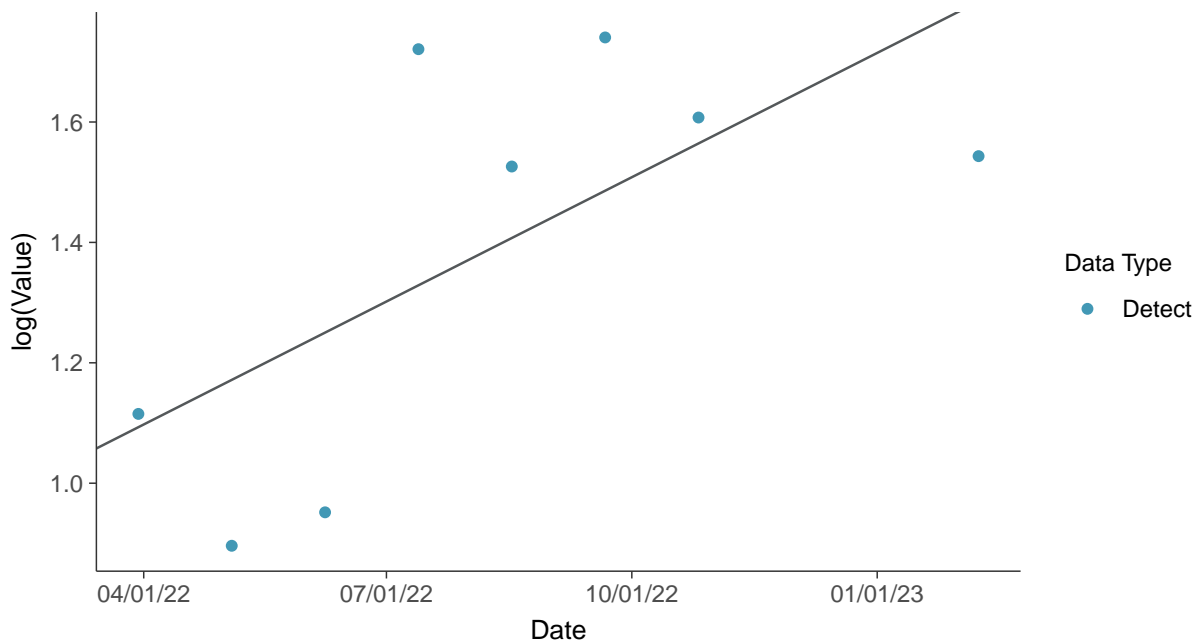
Gamma Q-Q plot

Sodium, MW-13 (mg/L)



Trend Regression: Lognormal MLE

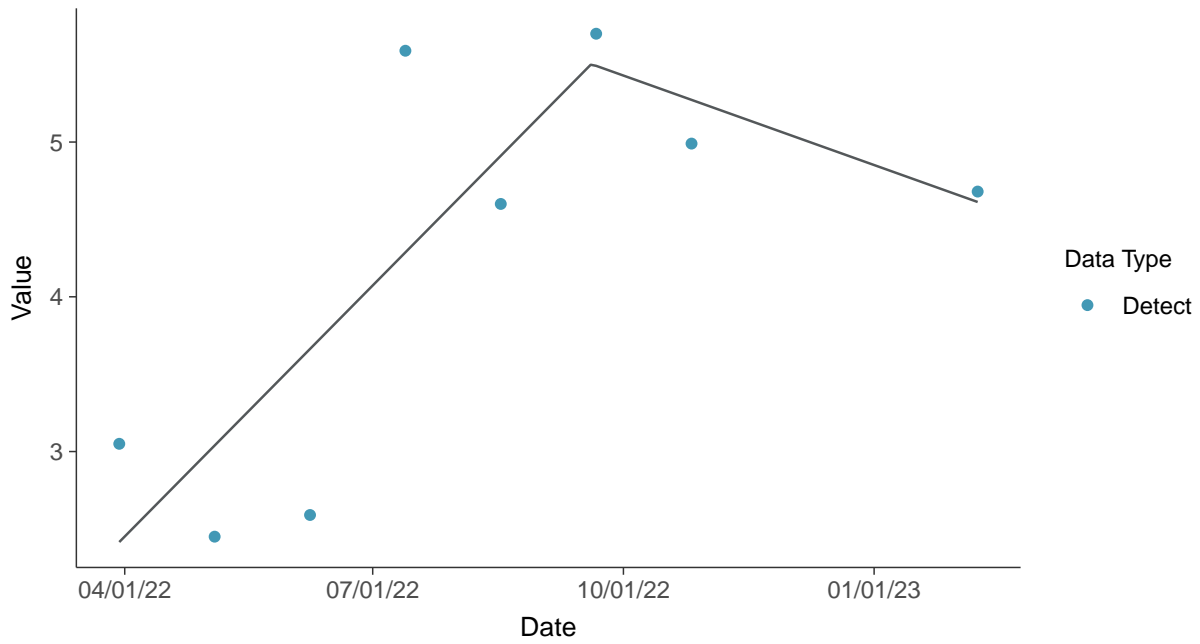
Sodium, MW-13 (mg/L)





Trend Regression: Piecewise Linear-Linear

Sodium, MW-13 (mg/L)



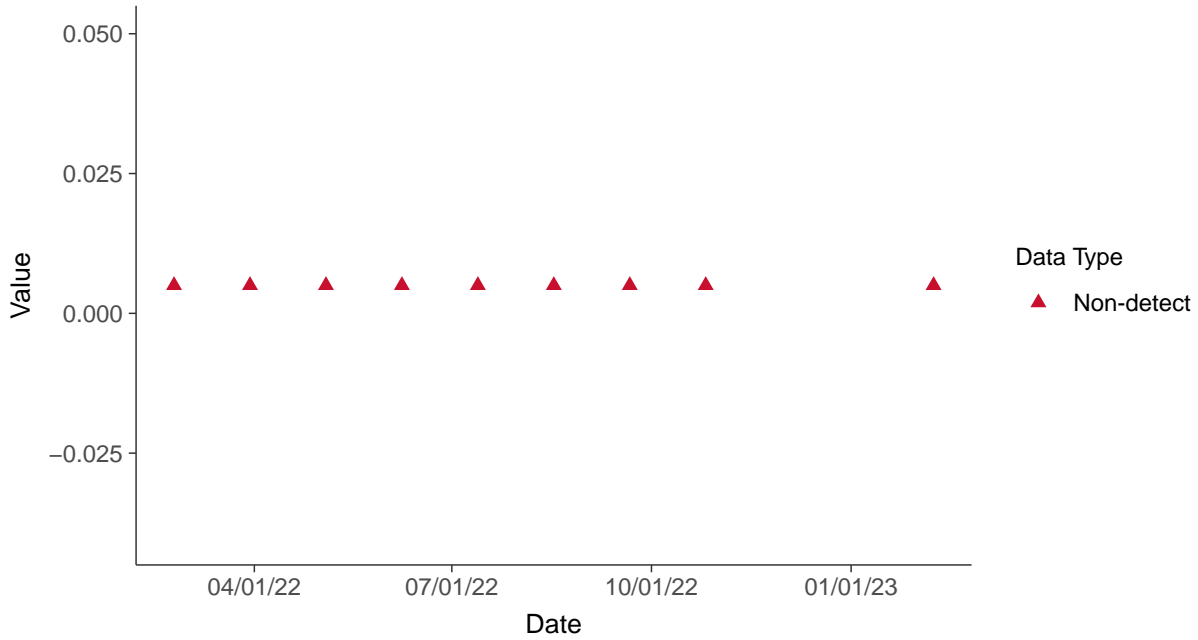


Part 115: Copper, MW-13

ID: 13_5_37

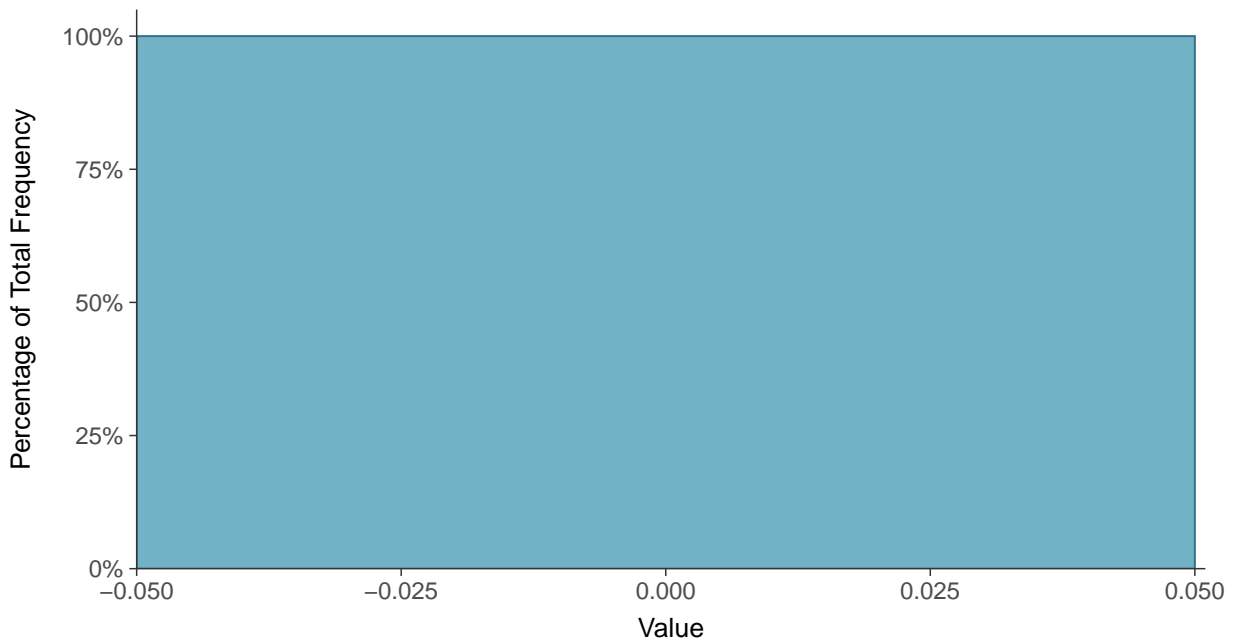
Scatter Plot

Copper, MW-13 (mg/L)



Histogram

Copper, MW-13 (mg/L)





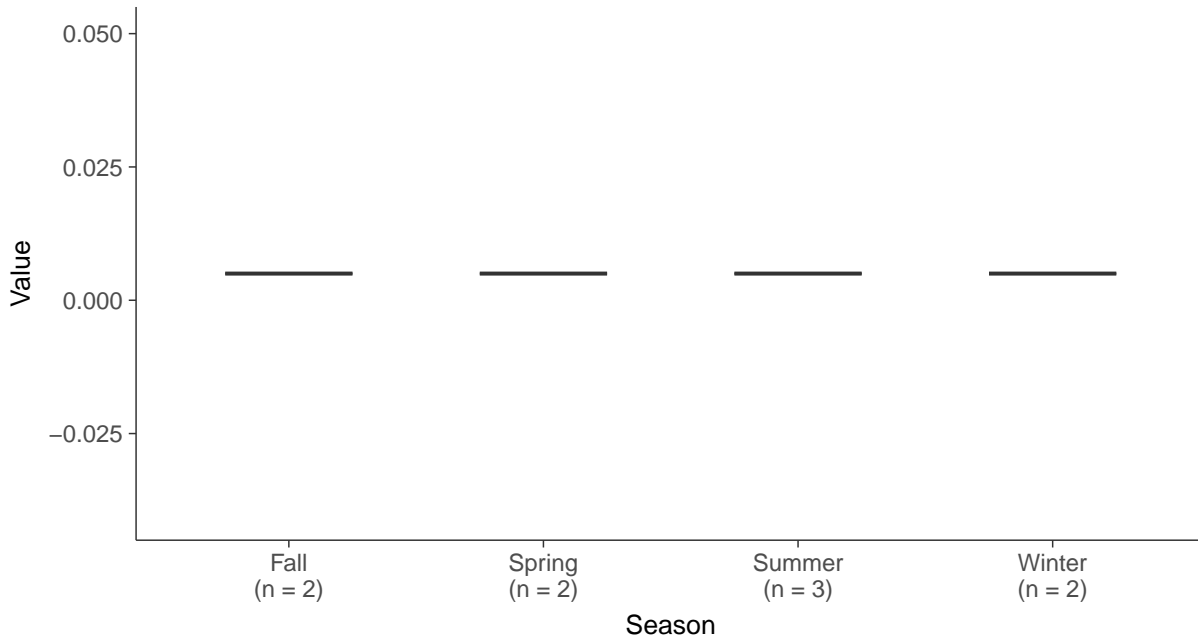
Boxplot

Copper, MW-13 (mg/L)



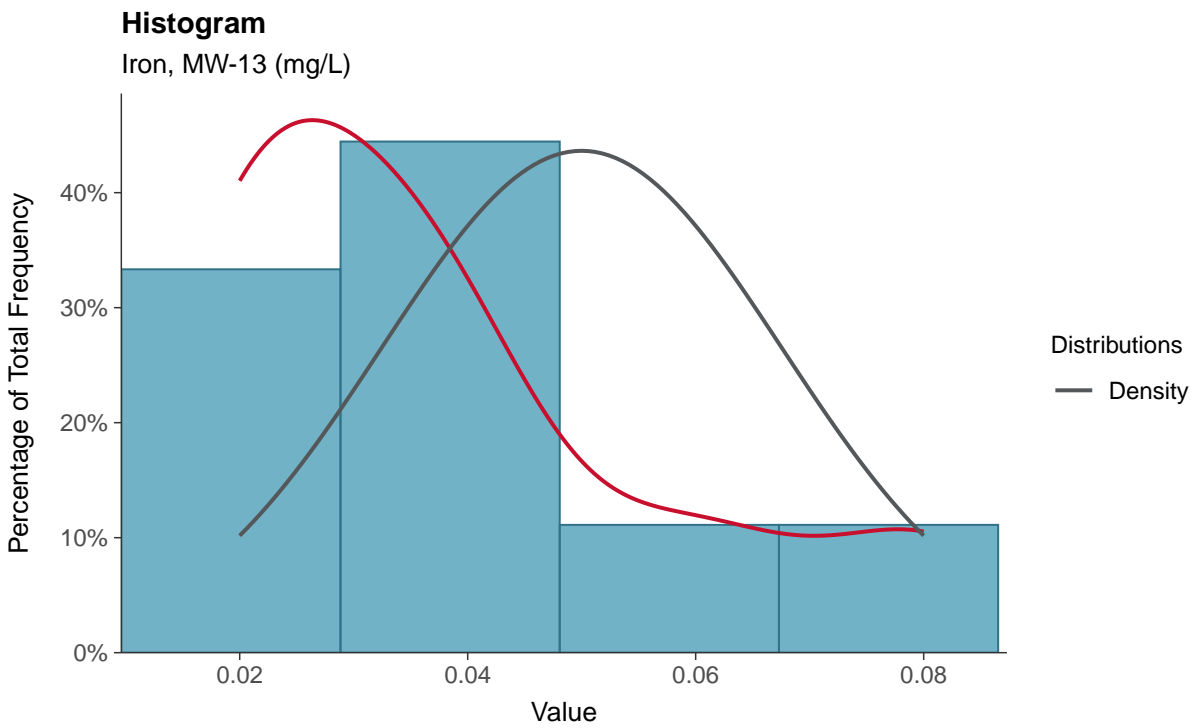
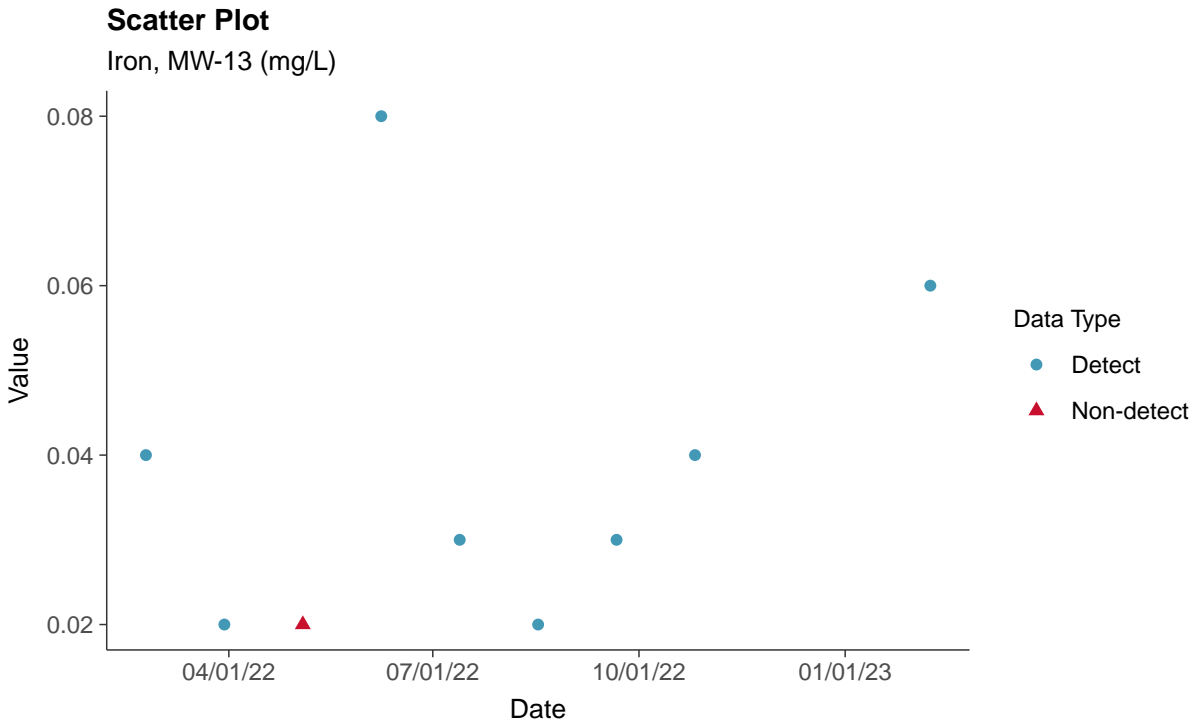
Boxplot by Season

Copper, MW-13 (mg/L)



Part 115: Iron, MW-13

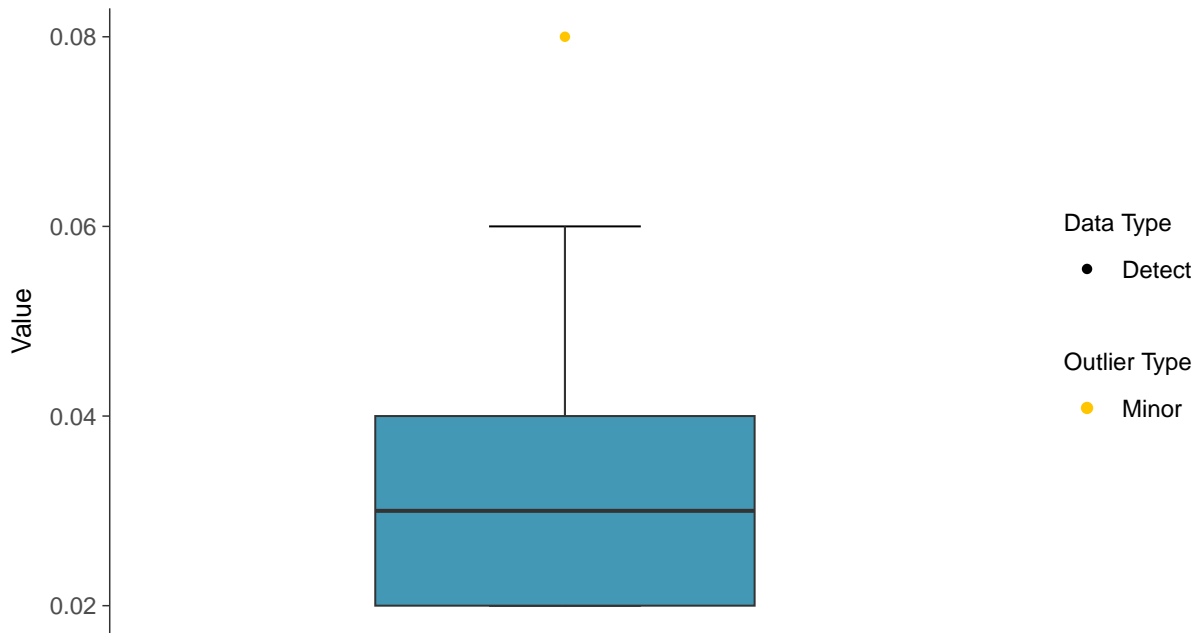
ID: 13_5_38





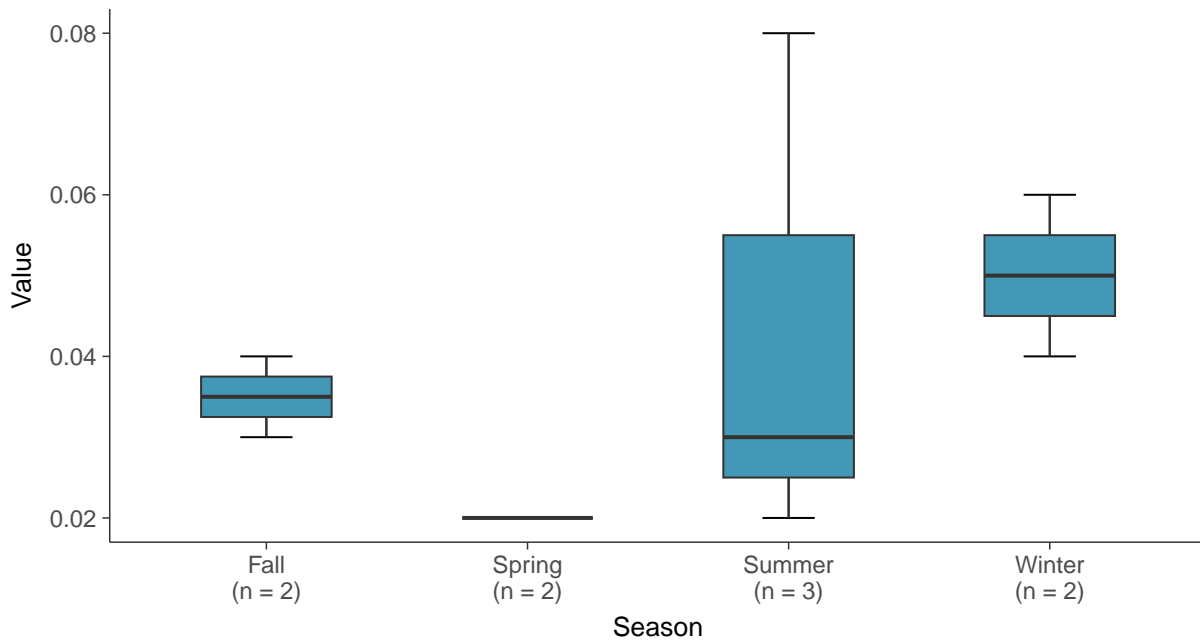
Boxplot

Iron, MW-13 (mg/L)



Boxplot by Season

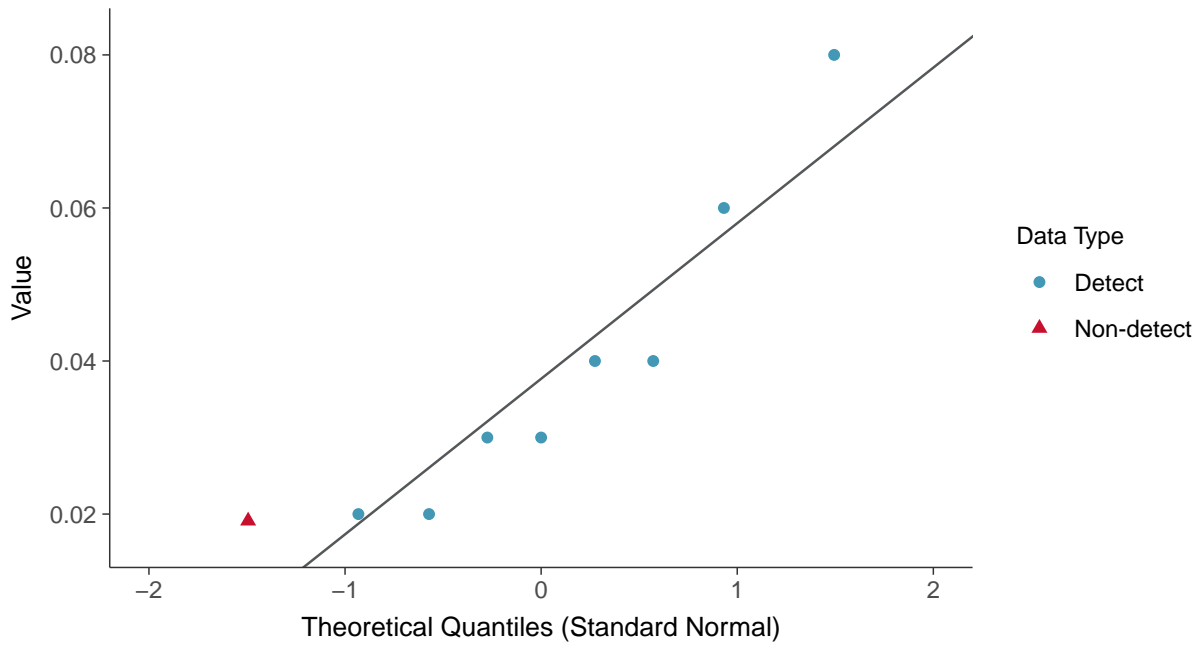
Iron, MW-13 (mg/L)





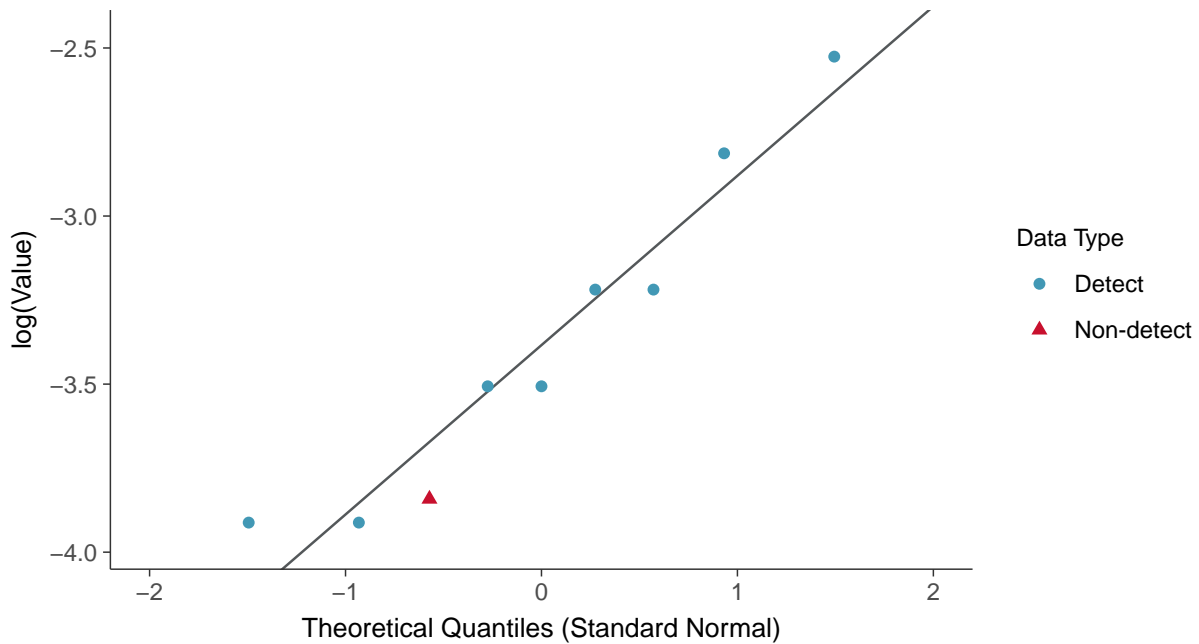
Normal Q-Q plot using ROS Imputed Estimates

Iron, MW-13 (mg/L)



Lognormal Q-Q plot using ROS Imputed Estimates

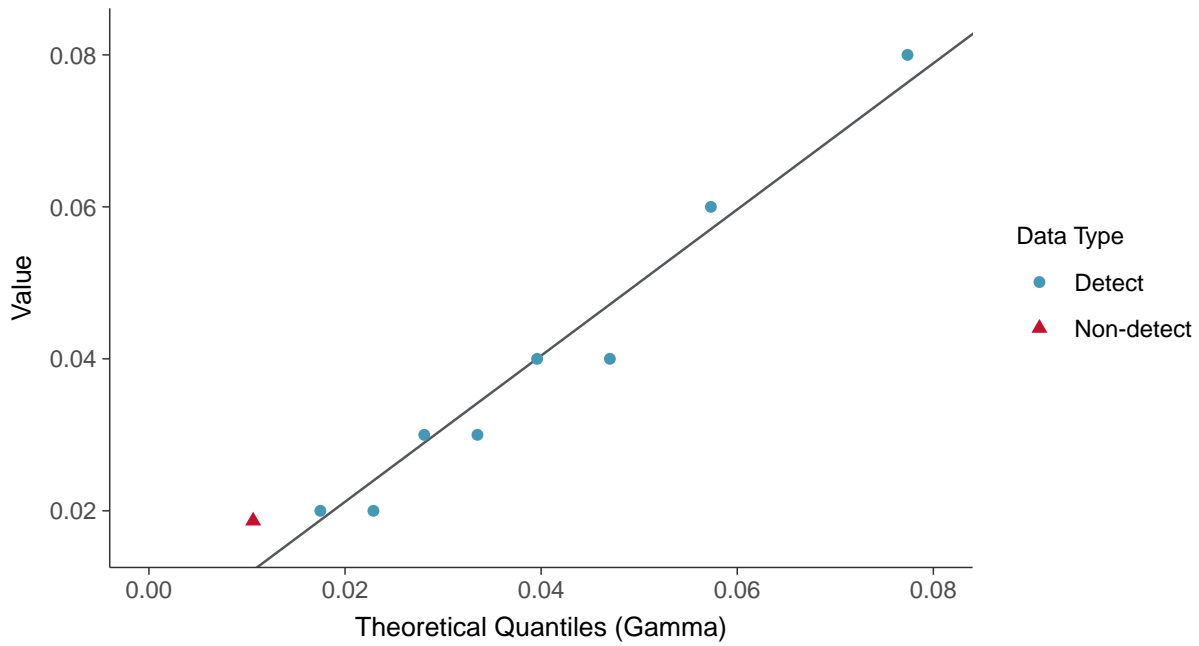
Iron, MW-13 (mg/L)





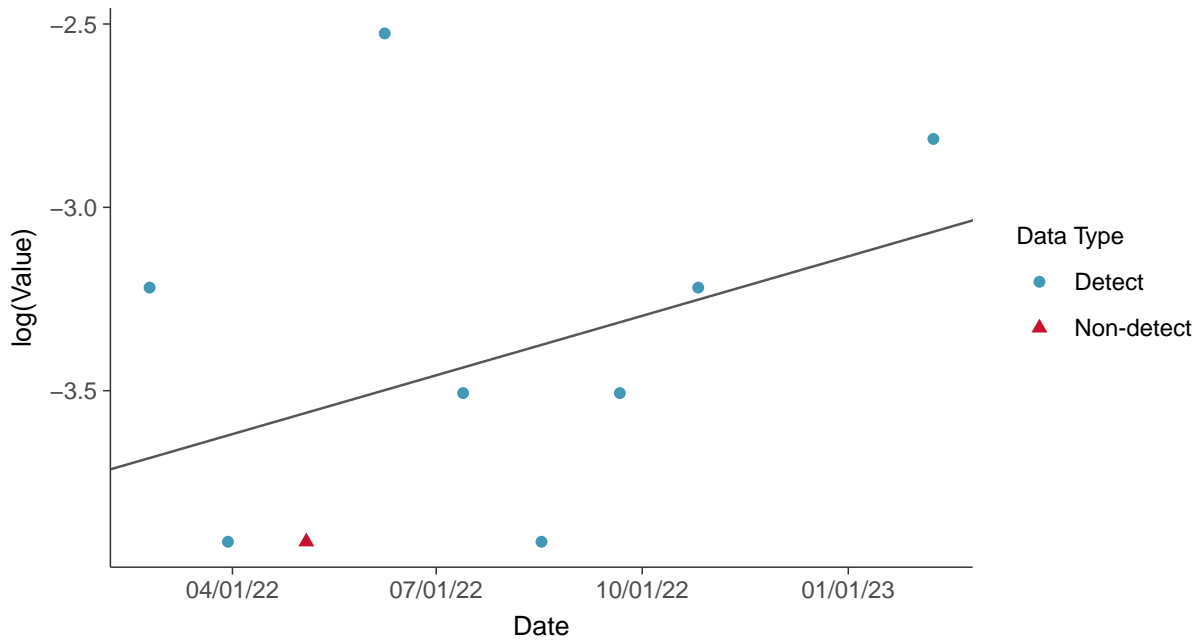
Gamma Q-Q plot using ROS Imputed Estimates

Iron, MW-13 (mg/L)



Trend Regression: Lognormal MLE

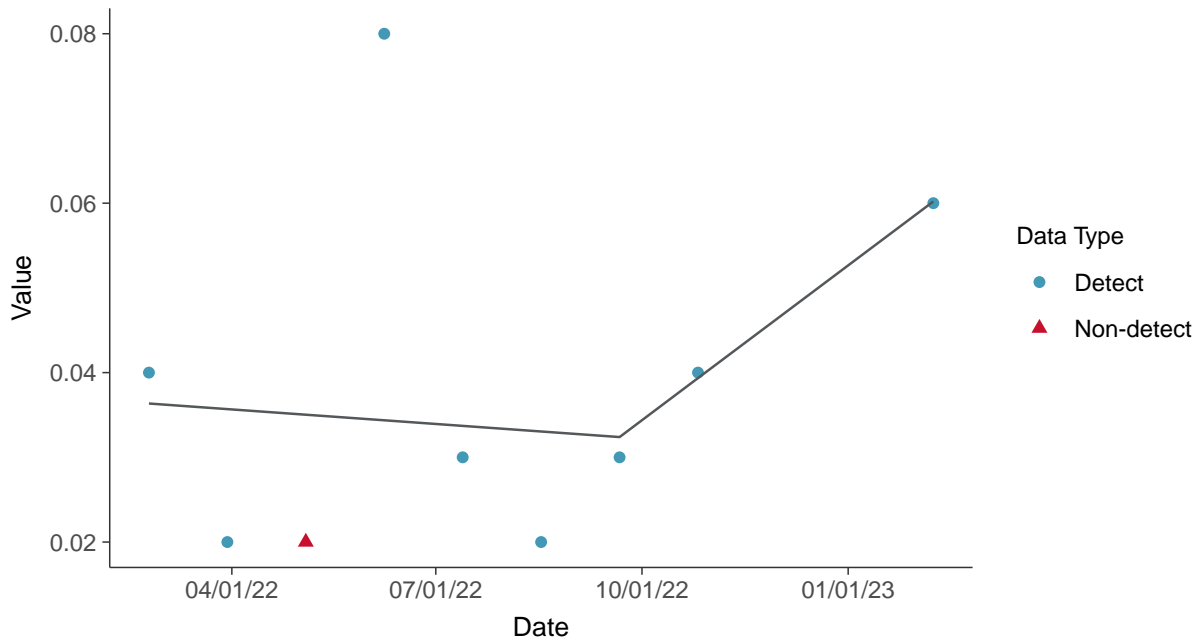
Iron, MW-13 (mg/L)





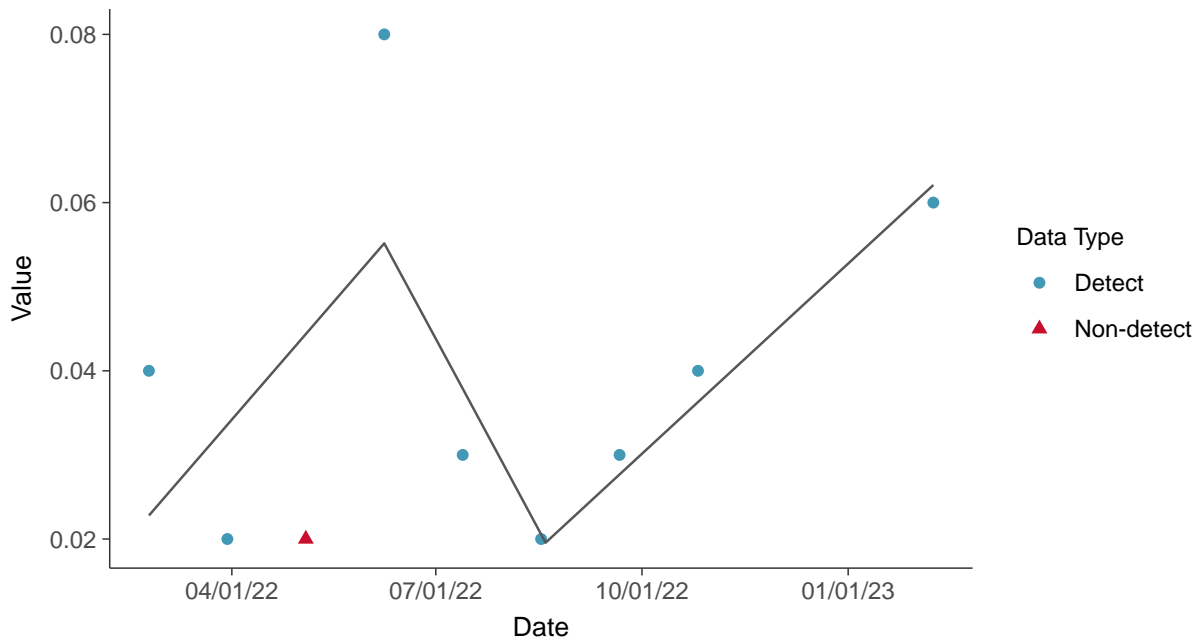
Trend Regression: Piecewise Linear-Linear

Iron, MW-13 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Iron, MW-13 (mg/L)



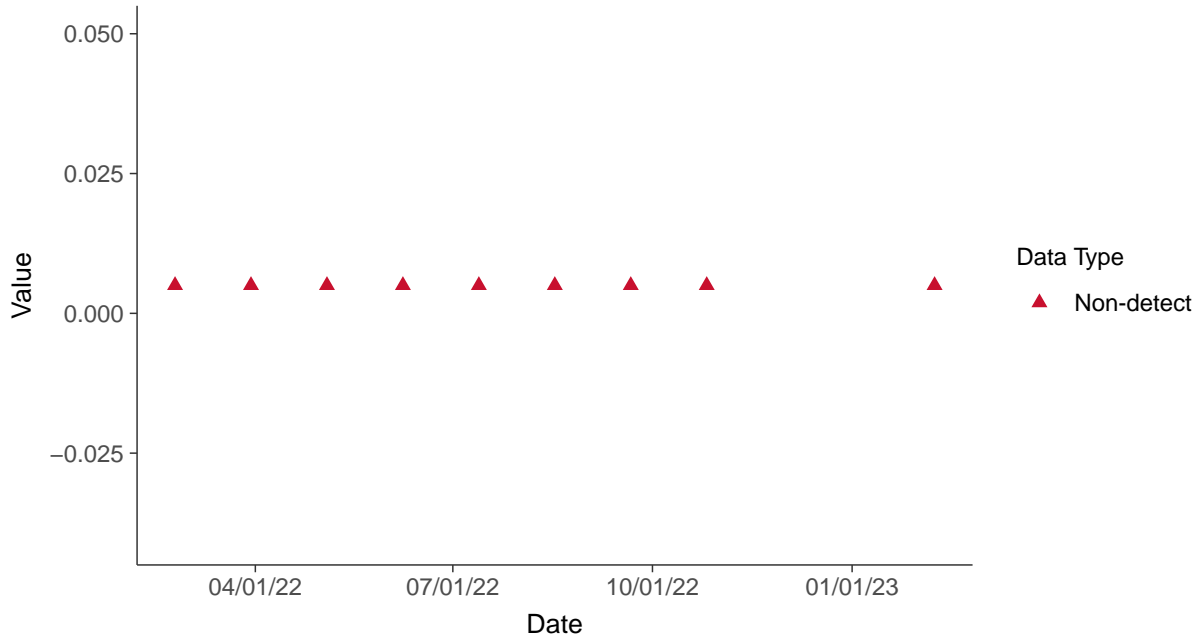


Part 115: Nickel, MW-13

ID: 13_5_39

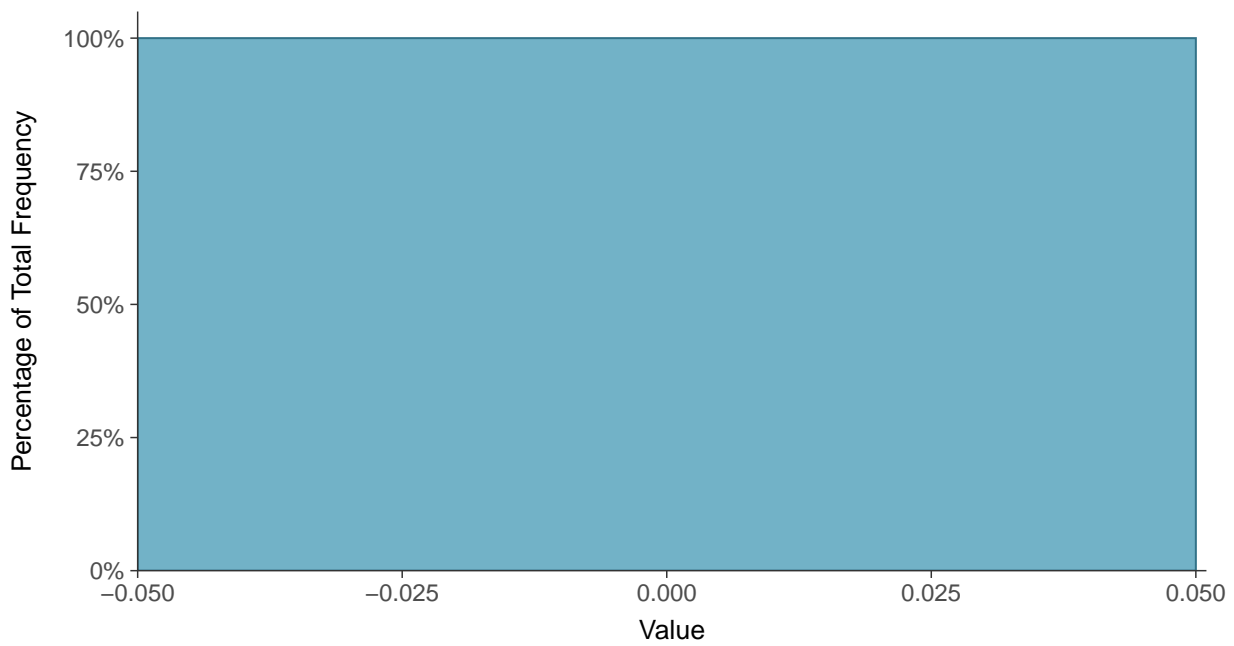
Scatter Plot

Nickel, MW-13 (mg/L)



Histogram

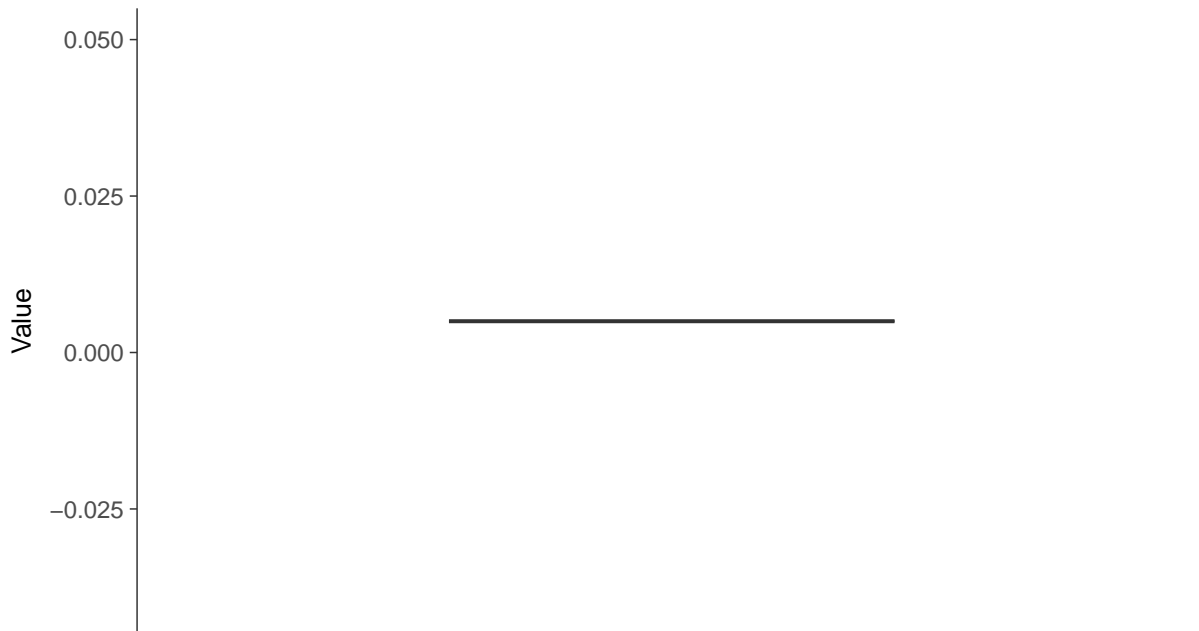
Nickel, MW-13 (mg/L)





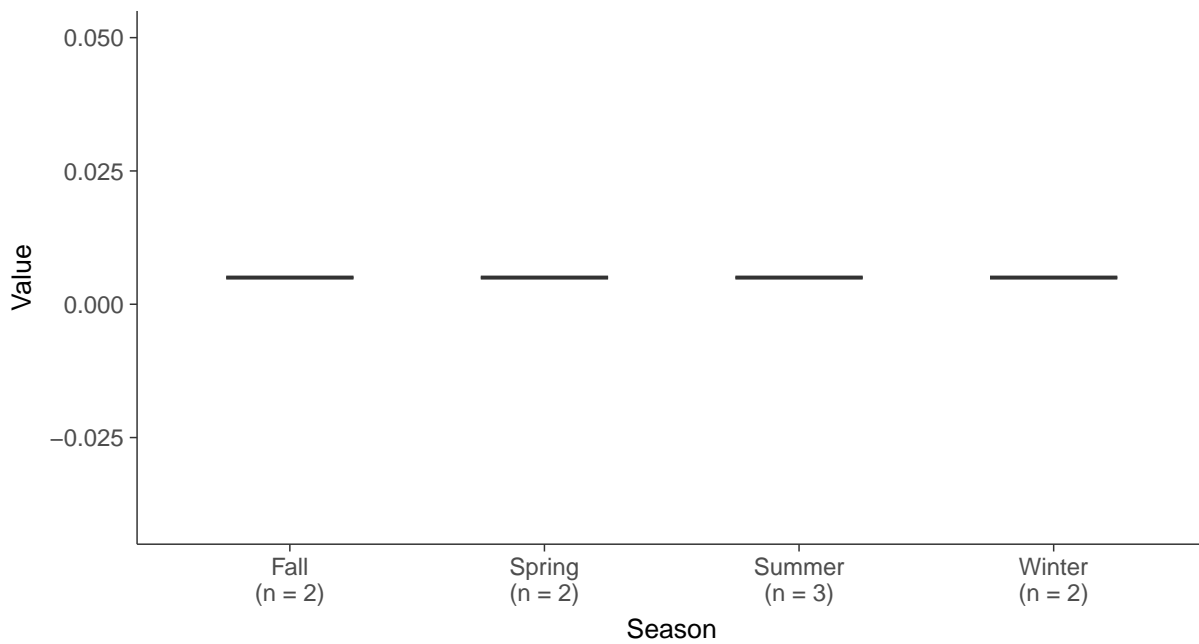
Boxplot

Nickel, MW-13 (mg/L)



Boxplot by Season

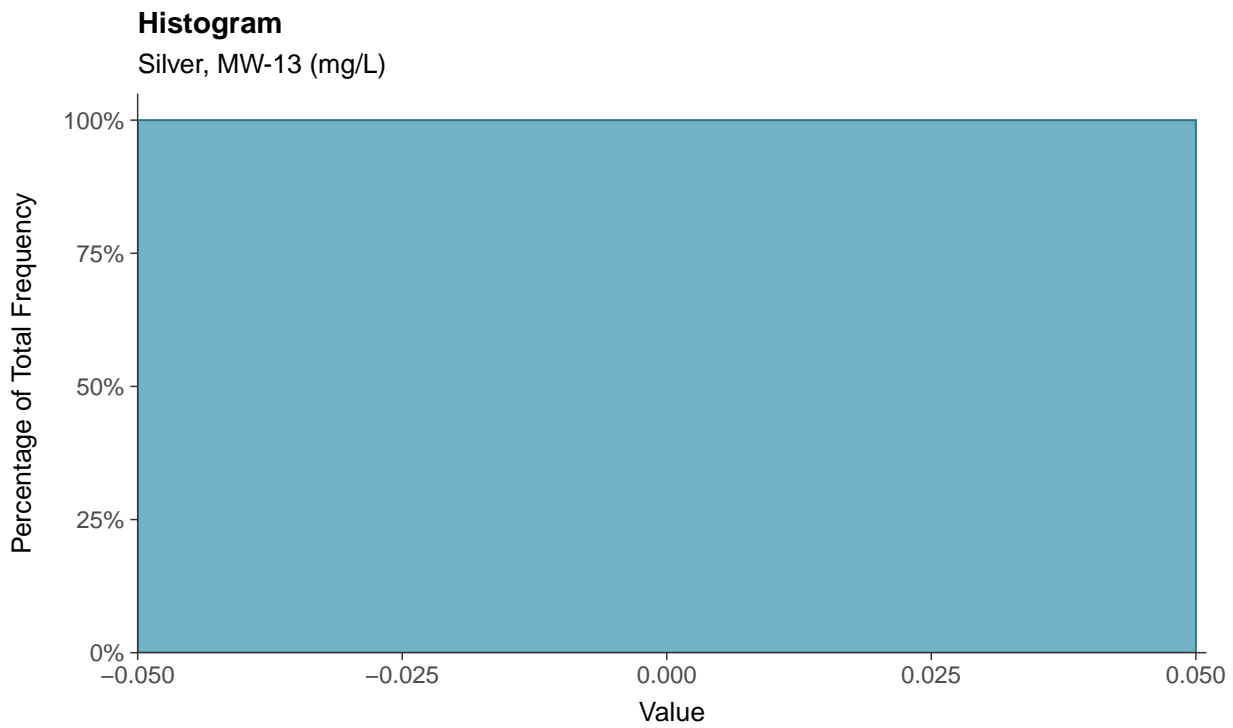
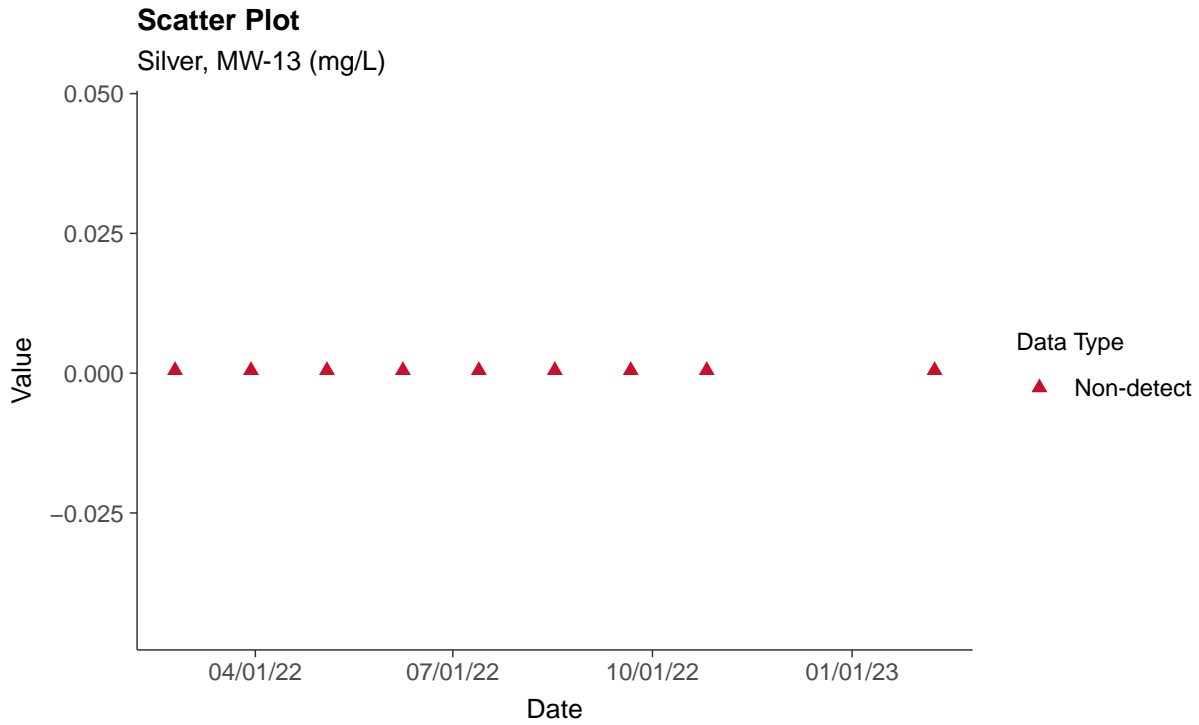
Nickel, MW-13 (mg/L)





Part 115: Silver, MW-13

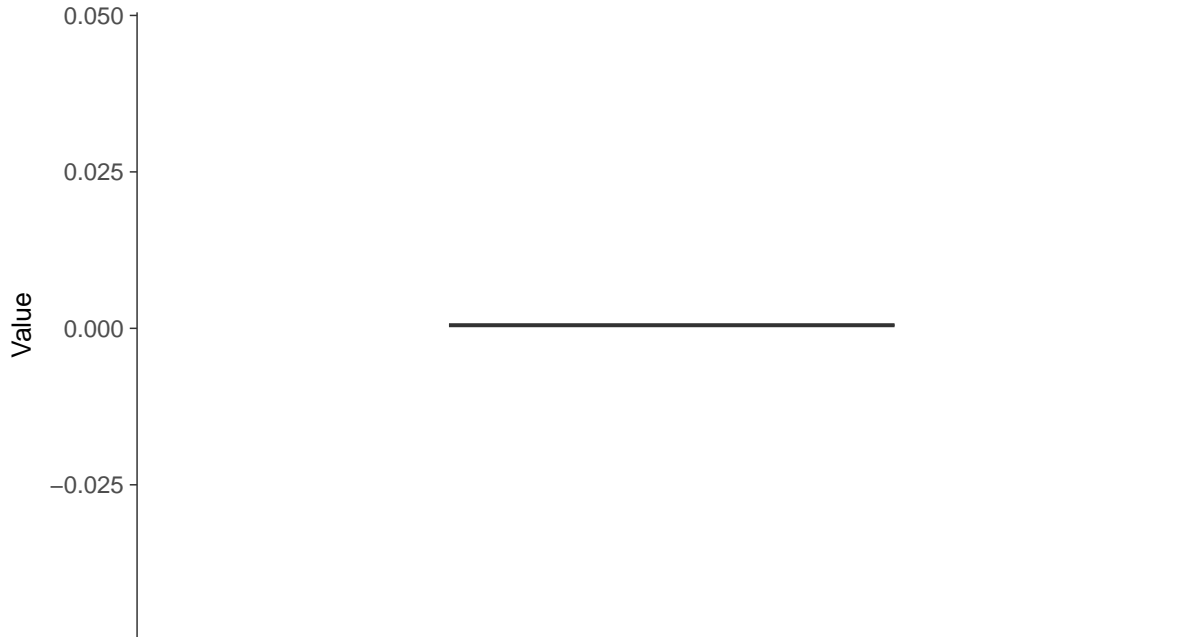
ID: 13_5_40





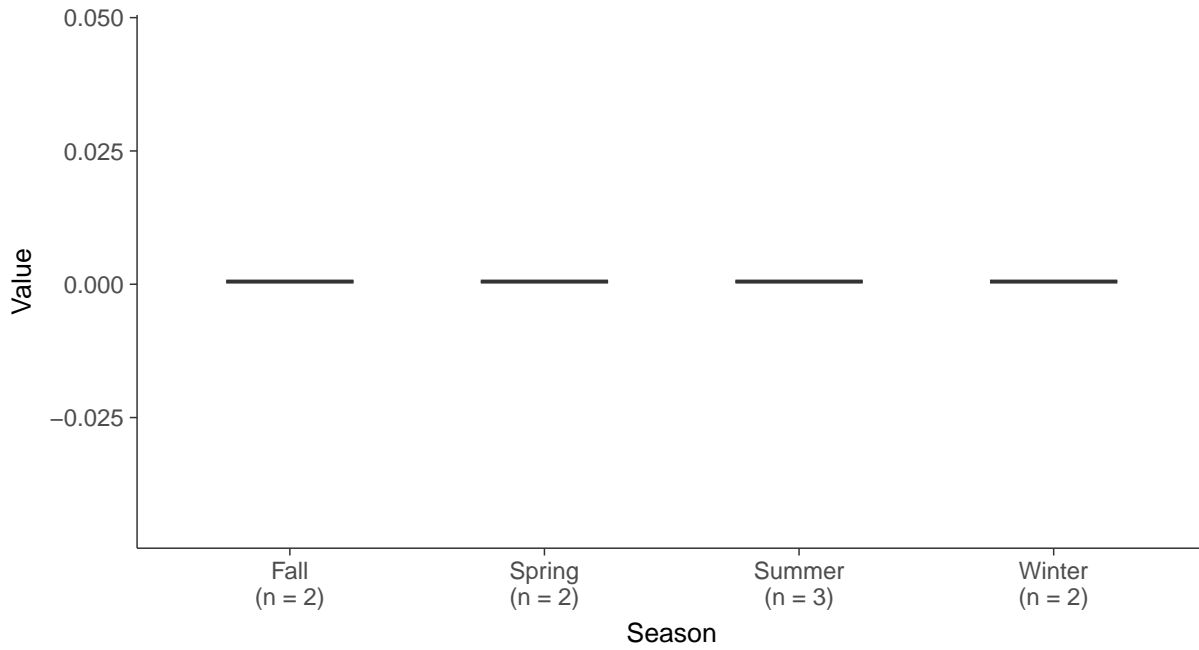
Boxplot

Silver, MW-13 (mg/L)



Boxplot by Season

Silver, MW-13 (mg/L)



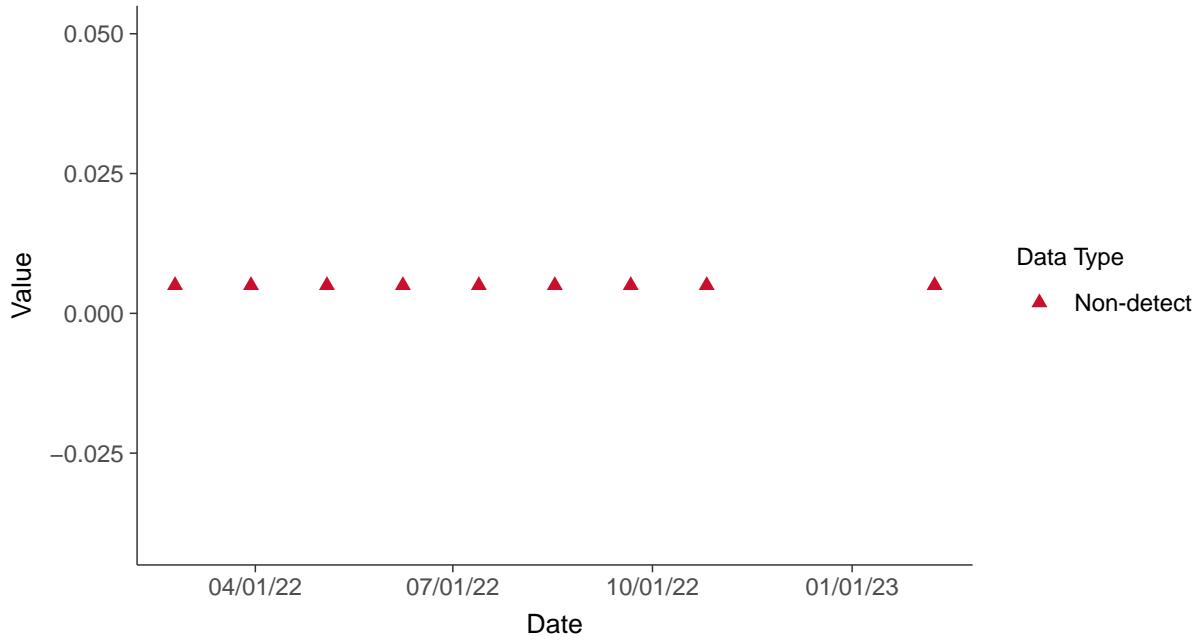


Part 115: Vanadium, MW-13

ID: 13_5_41

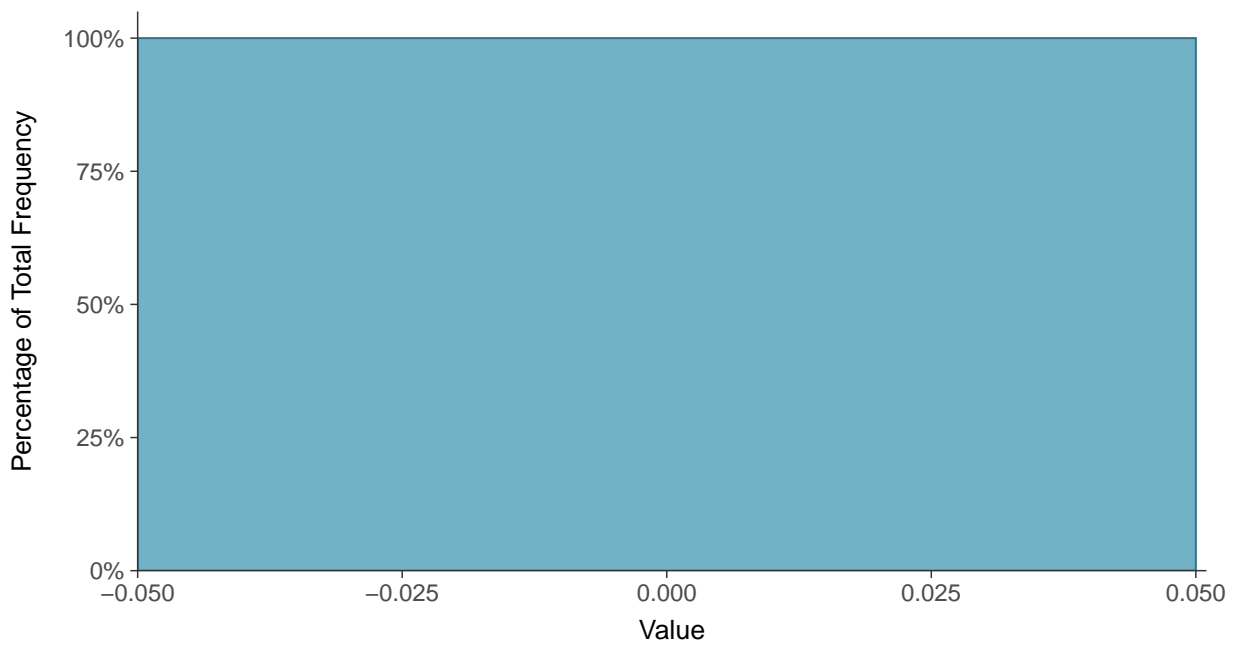
Scatter Plot

Vanadium, MW-13 (mg/L)



Histogram

Vanadium, MW-13 (mg/L)





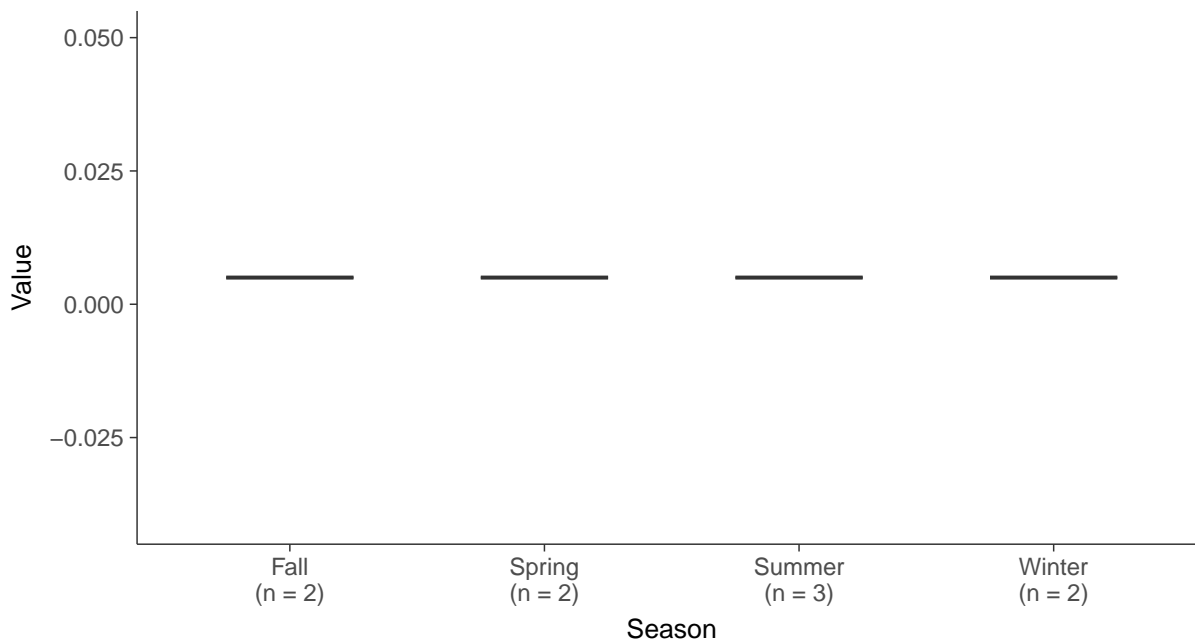
Boxplot

Vanadium, MW-13 (mg/L)



Boxplot by Season

Vanadium, MW-13 (mg/L)

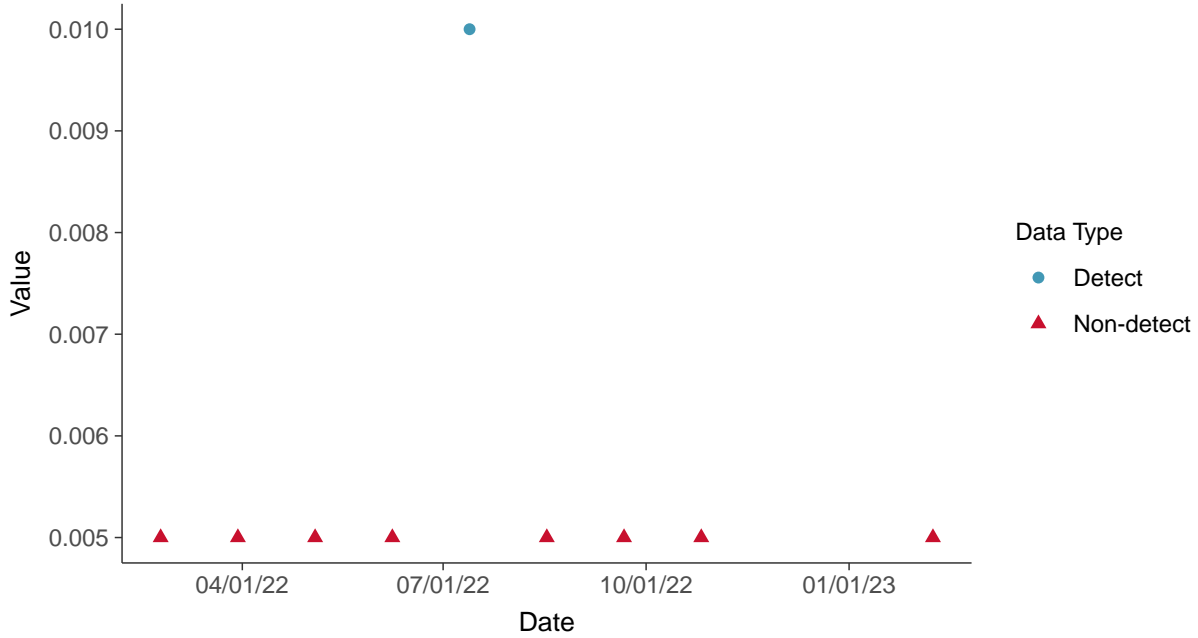


Part 115: Zinc, MW-13

ID: 13_5_42

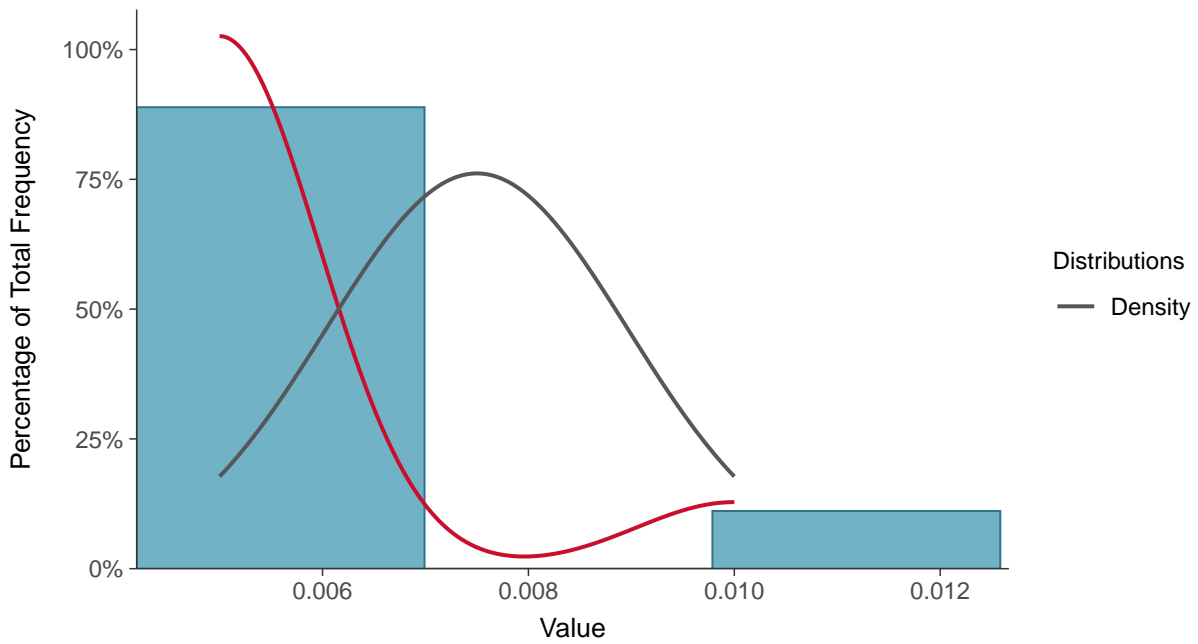
Scatter Plot

Zinc, MW-13 (mg/L)



Histogram

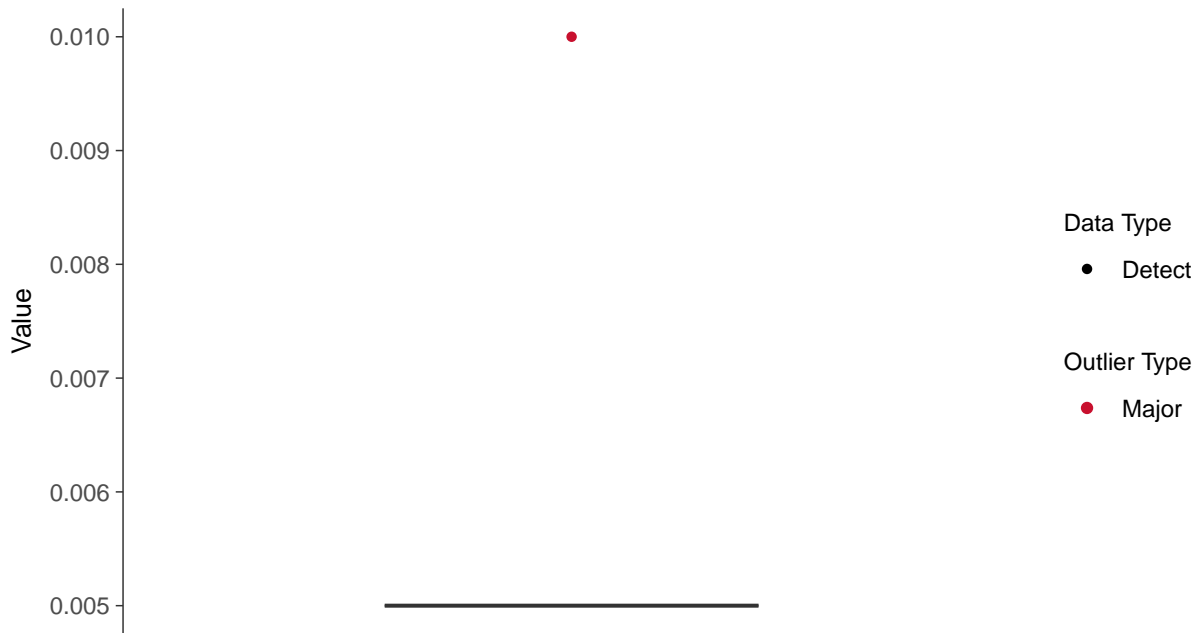
Zinc, MW-13 (mg/L)





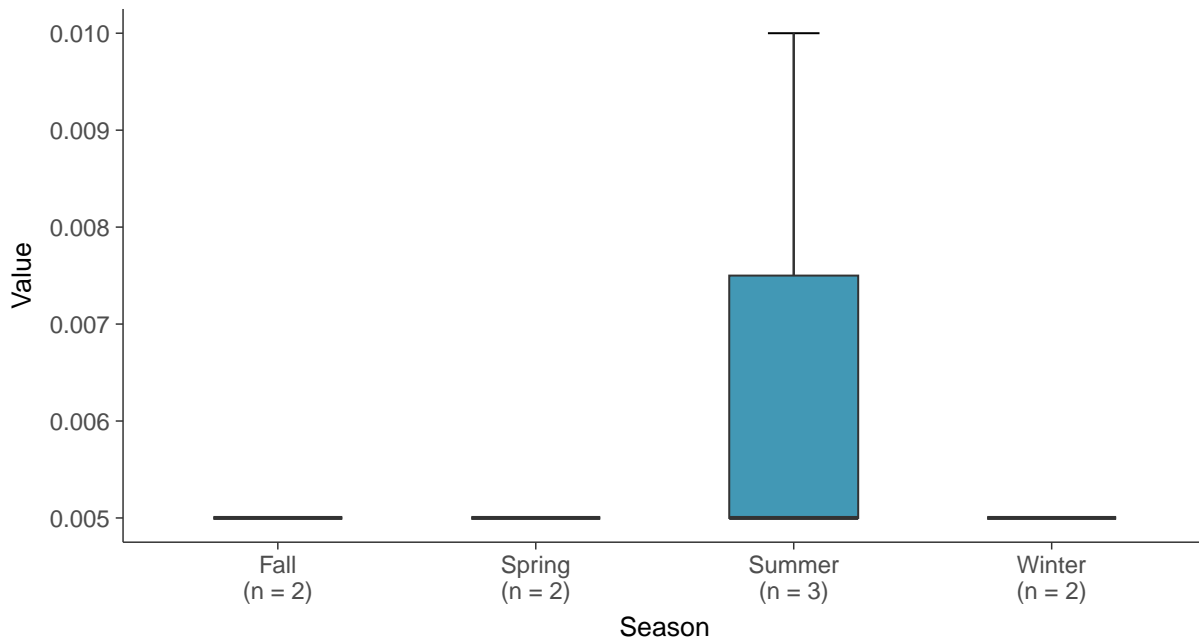
Boxplot

Zinc, MW-13 (mg/L)



Boxplot by Season

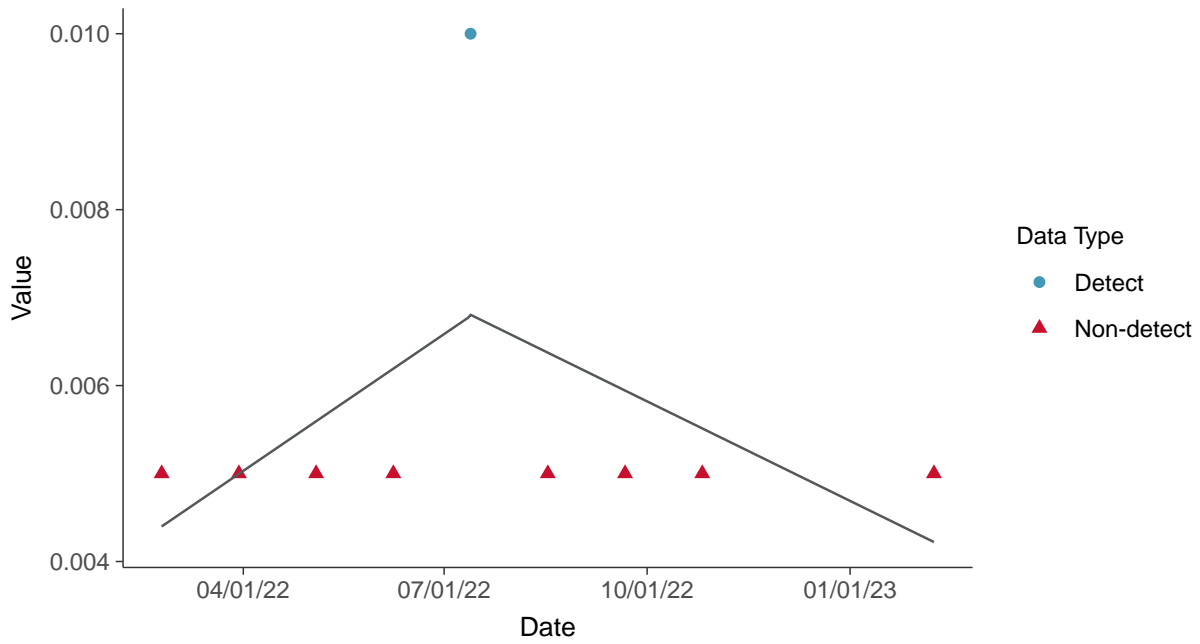
Zinc, MW-13 (mg/L)





Trend Regression: Piecewise Linear-Linear

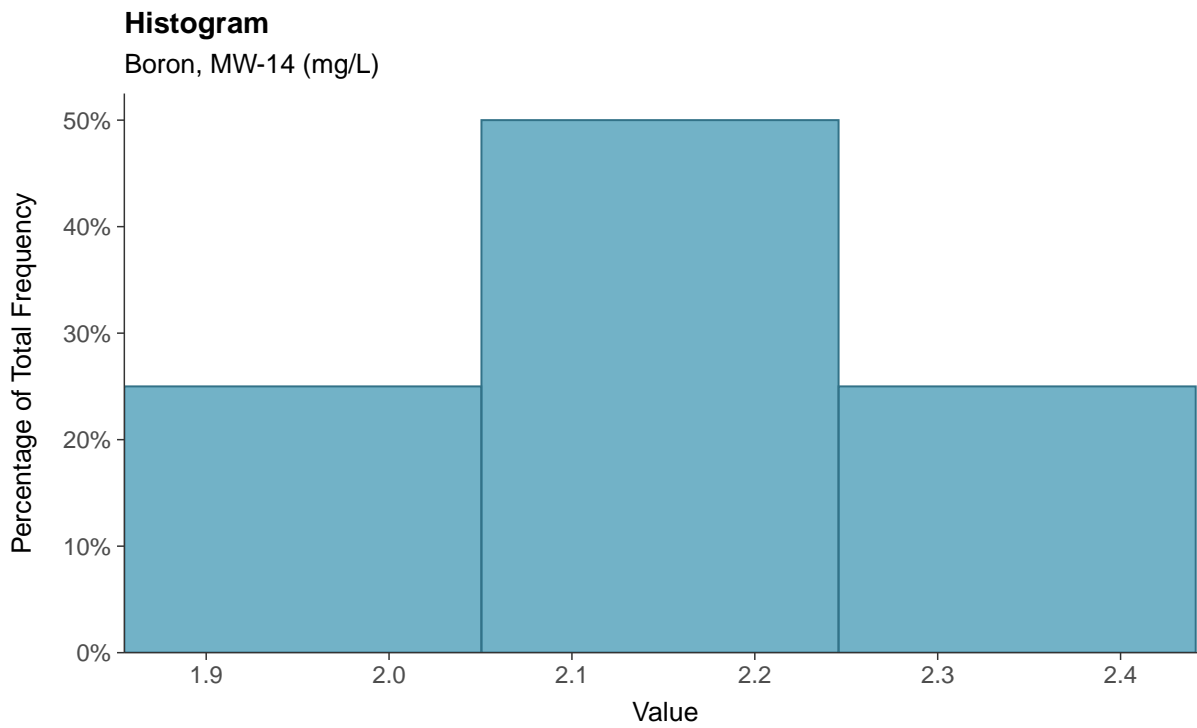
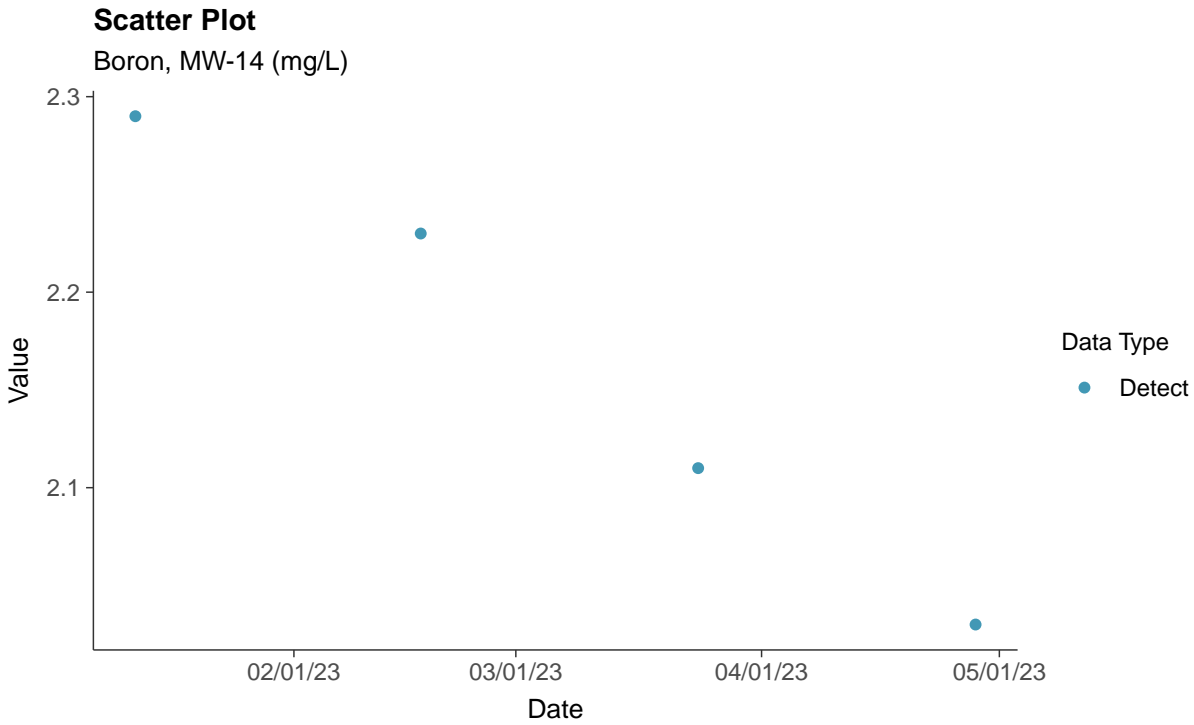
Zinc, MW-13 (mg/L)





Appendix III: Boron, MW-14

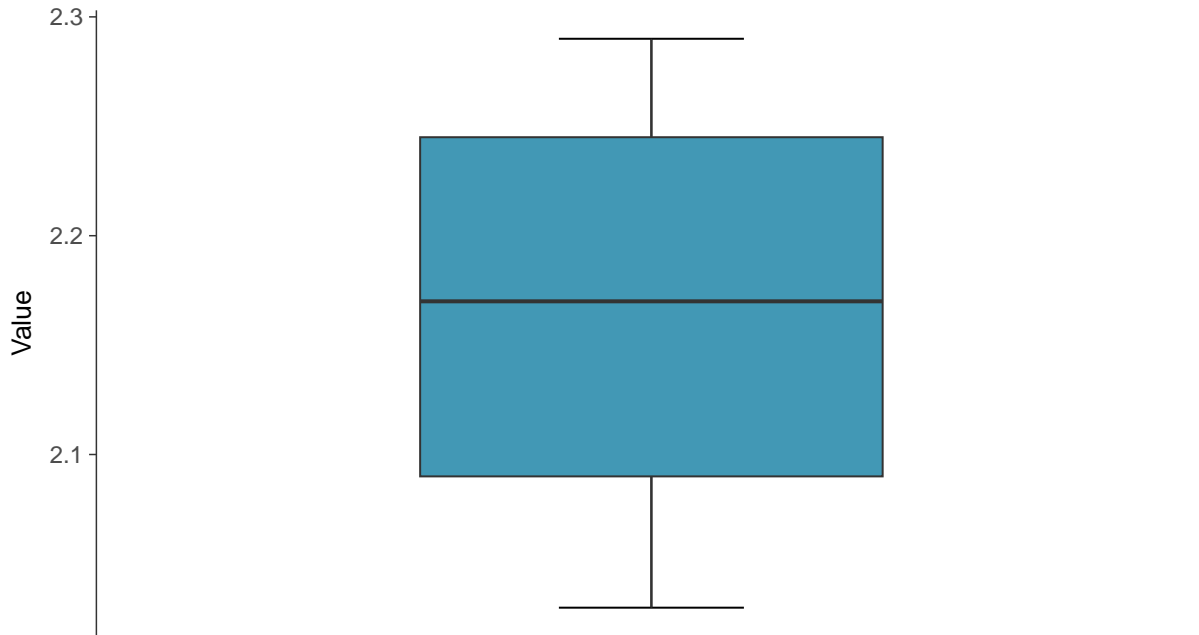
ID: 14_1_01





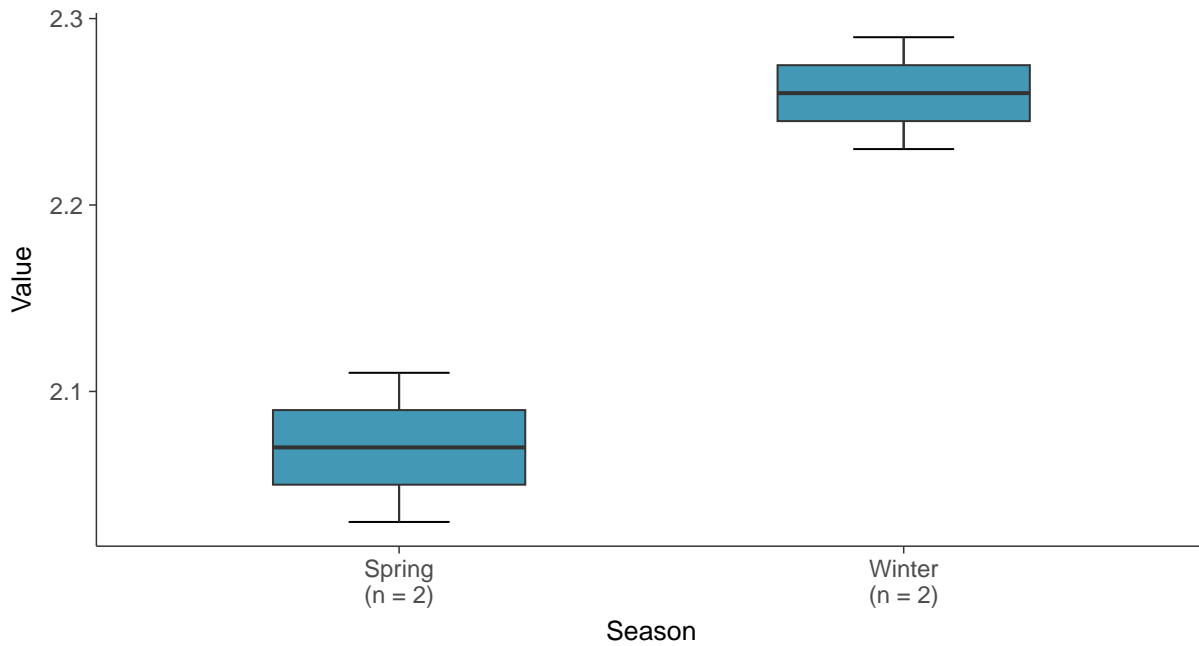
Boxplot

Boron, MW-14 (mg/L)



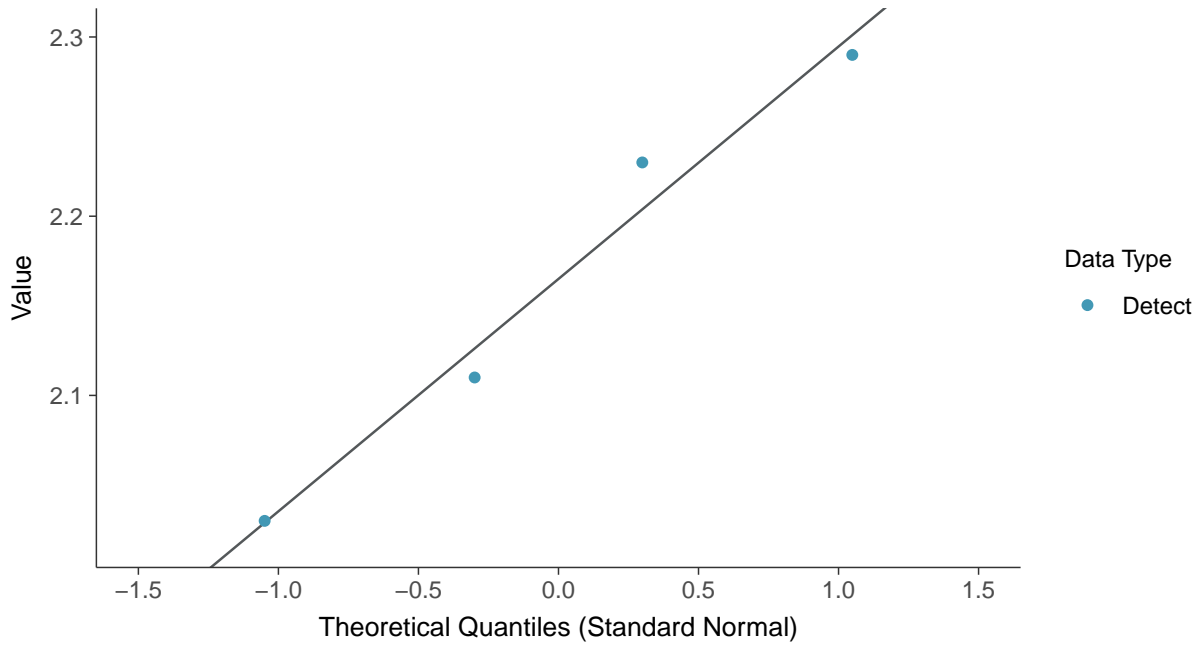
Boxplot by Season

Boron, MW-14 (mg/L)





Normal Q-Q plot
Boron, MW-14 (mg/L)



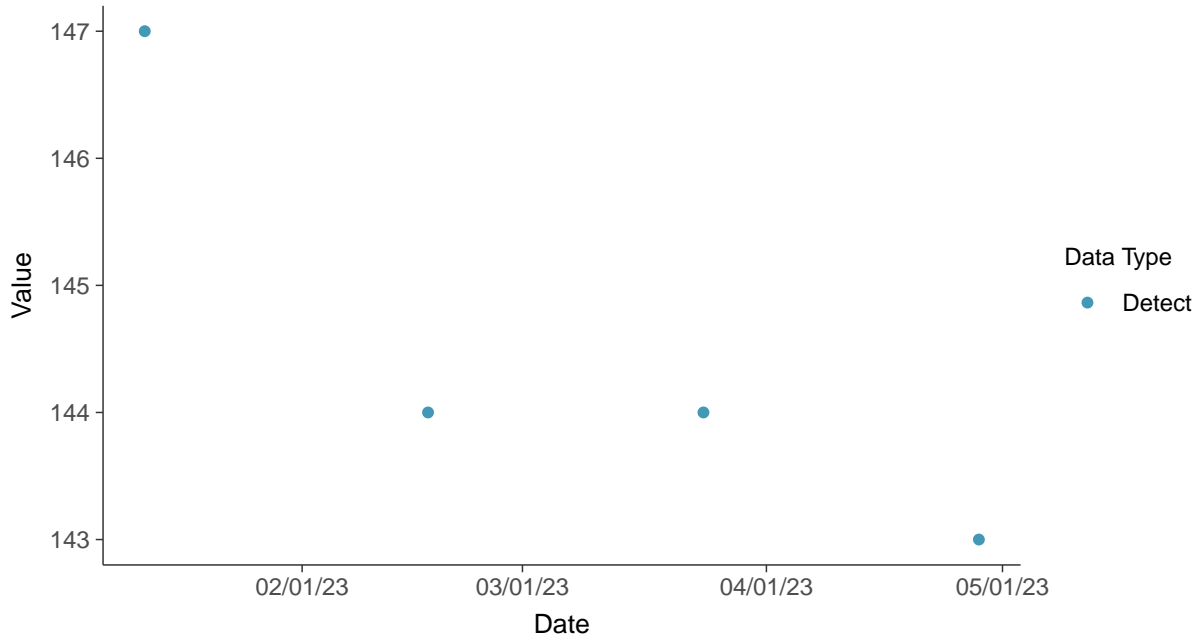


Appendix III: Calcium, MW-14

ID: 14_1_02

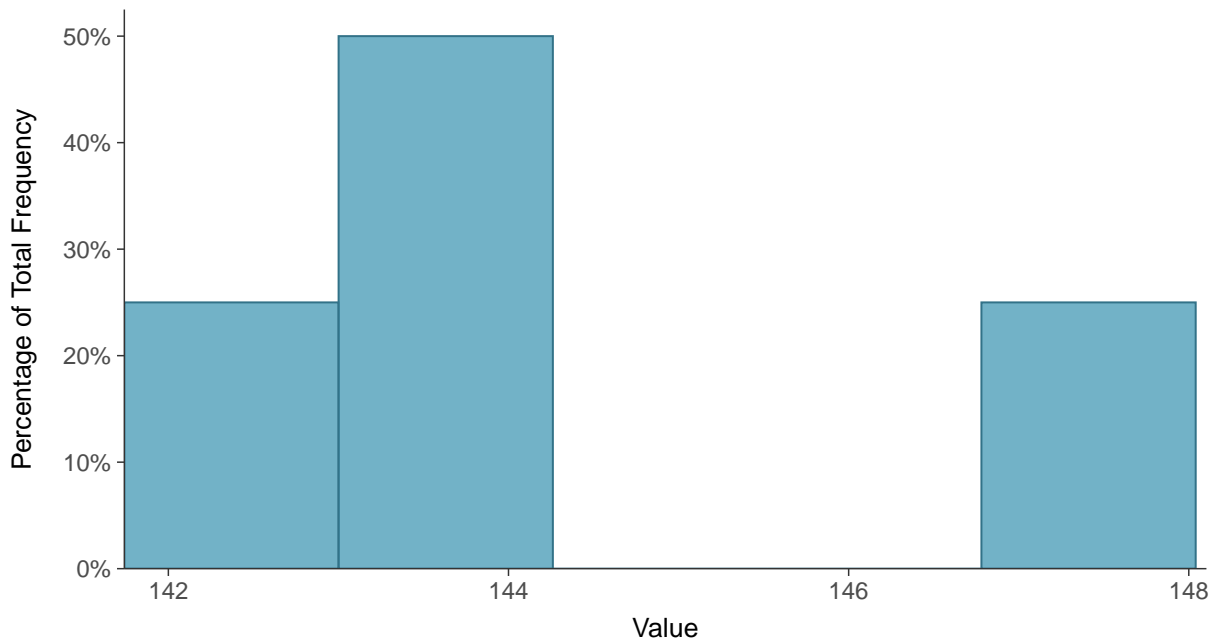
Scatter Plot

Calcium, MW-14 (mg/L)



Histogram

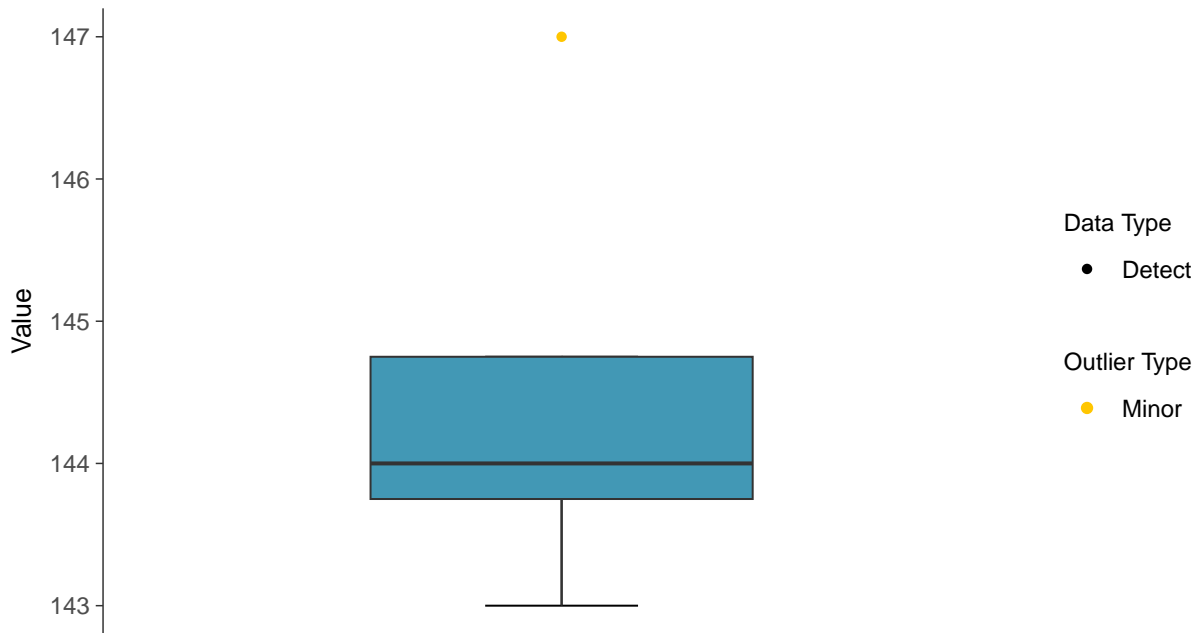
Calcium, MW-14 (mg/L)





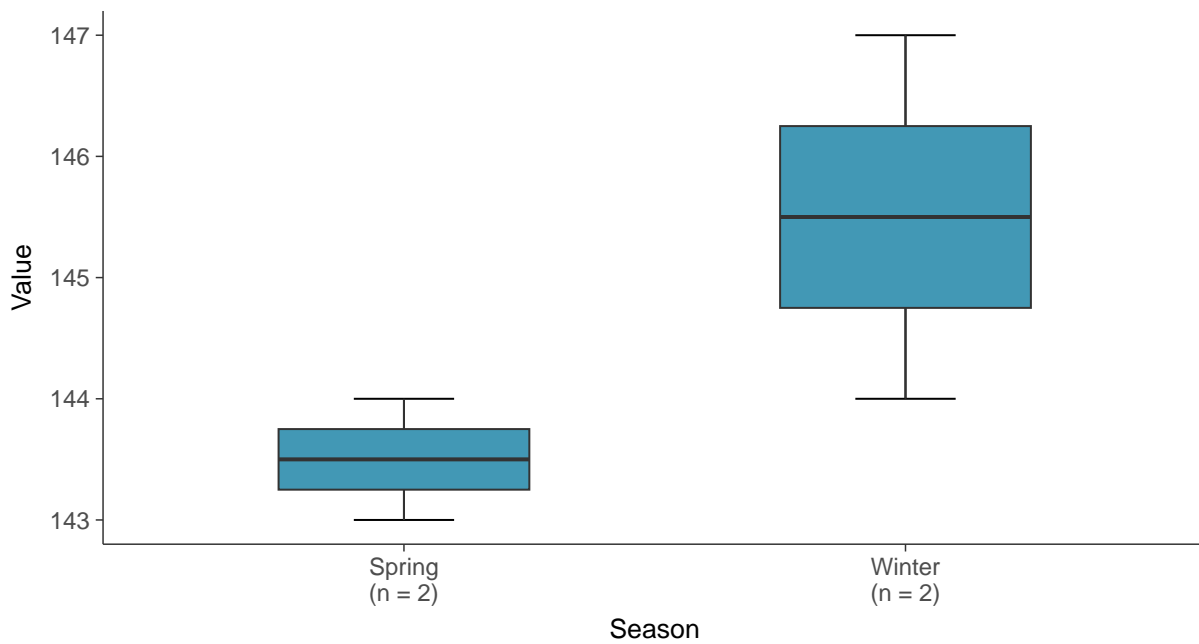
Boxplot

Calcium, MW-14 (mg/L)



Boxplot by Season

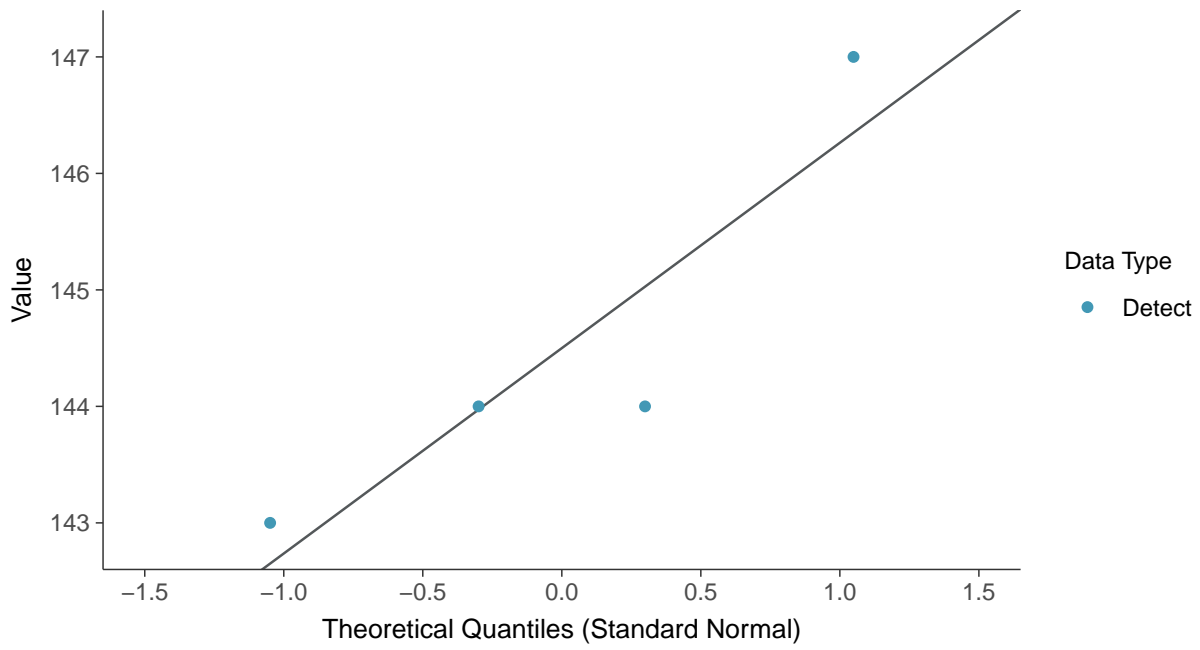
Calcium, MW-14 (mg/L)





Normal Q-Q plot

Calcium, MW-14 (mg/L)



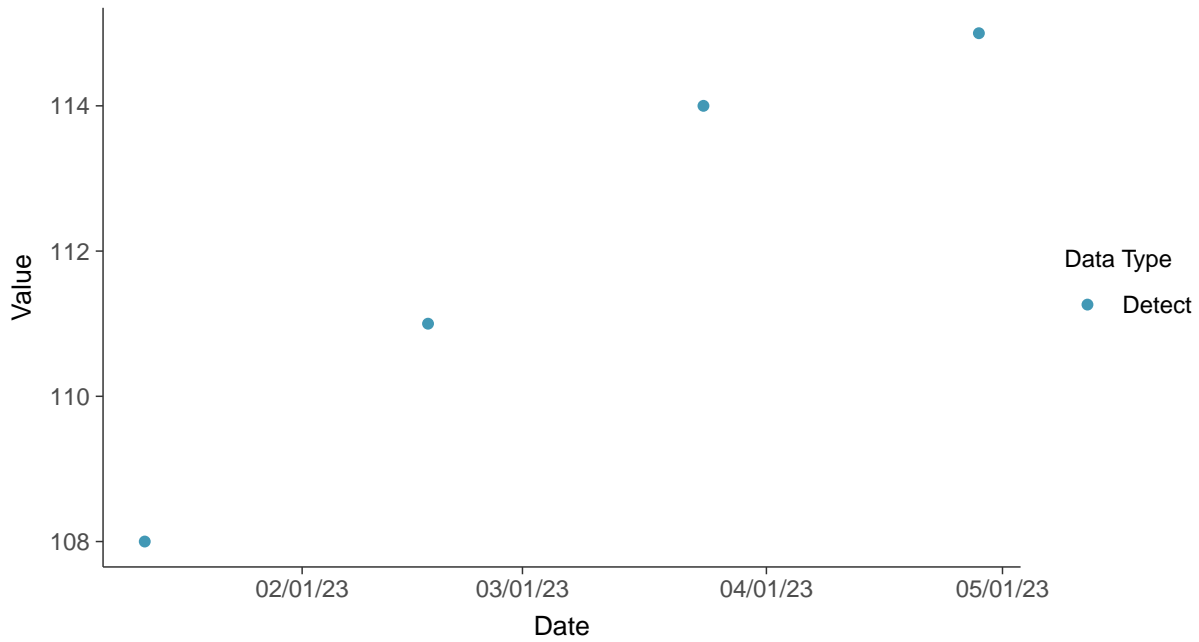


Appendix III: Chloride, MW-14

ID: 14_1_03

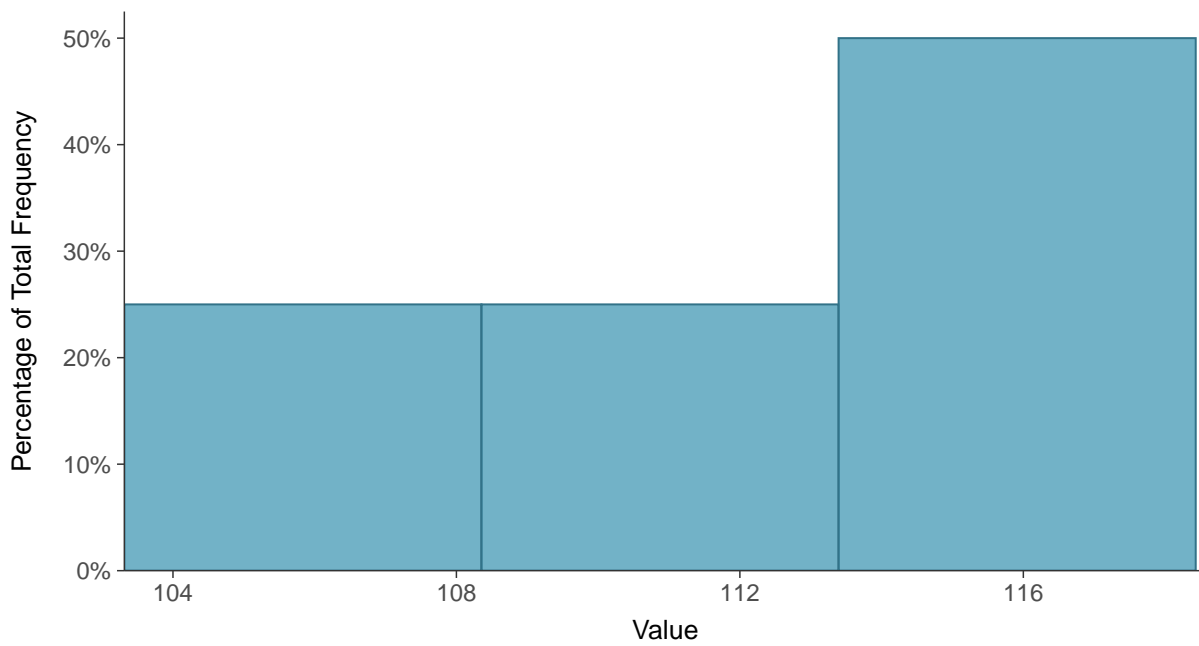
Scatter Plot

Chloride, MW-14 (mg/L)



Histogram

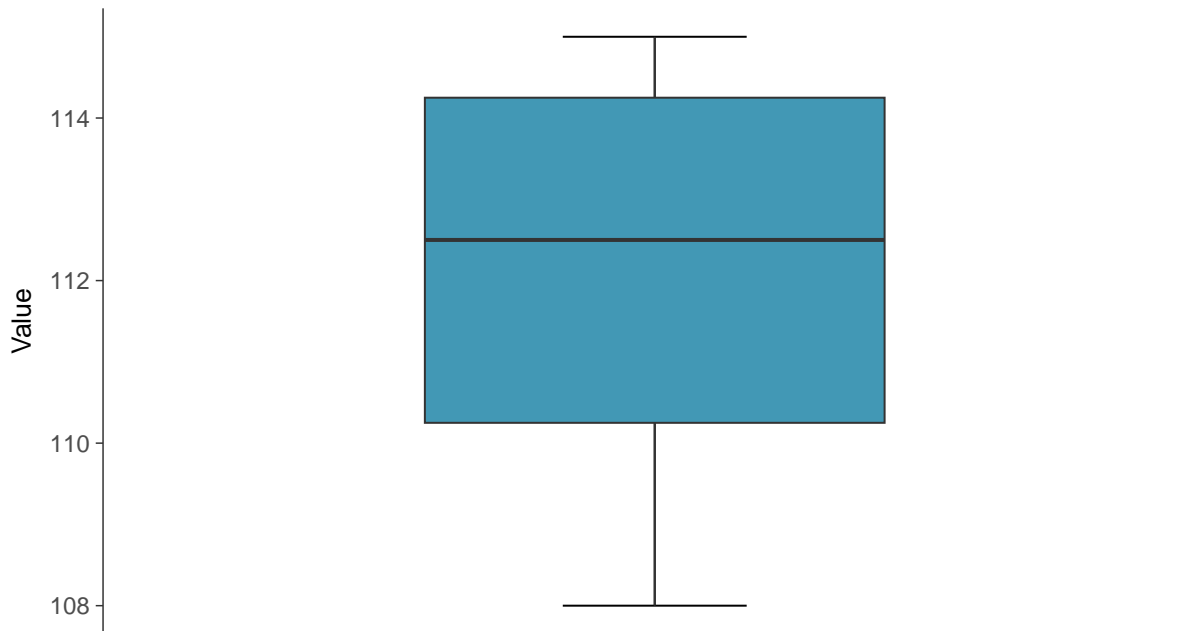
Chloride, MW-14 (mg/L)





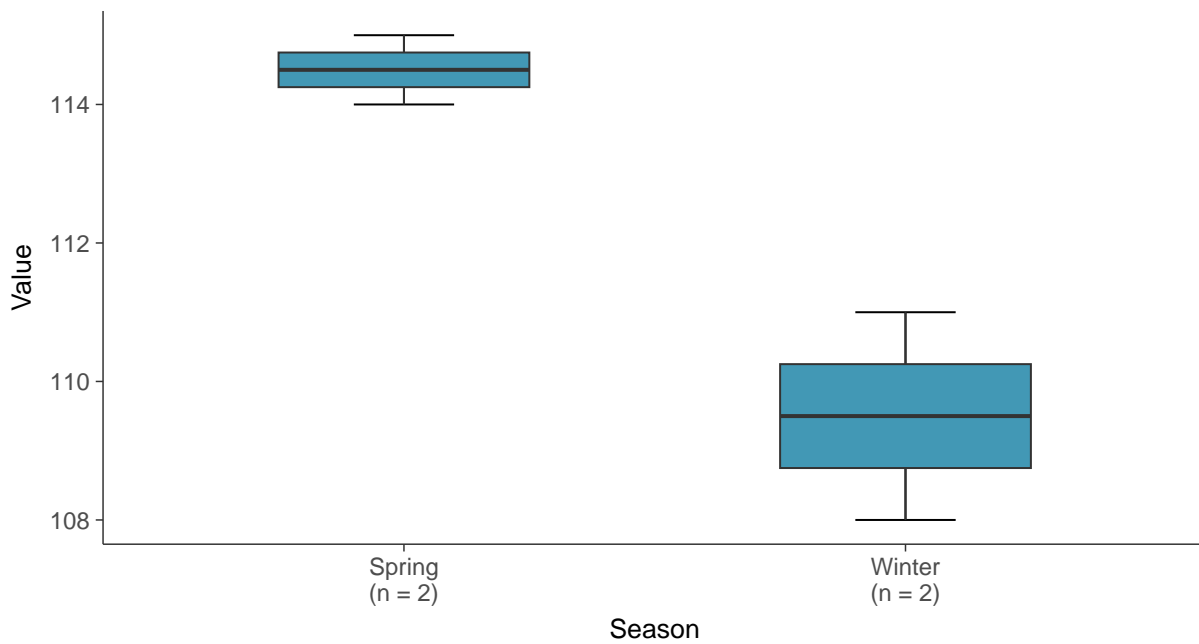
Boxplot

Chloride, MW-14 (mg/L)



Boxplot by Season

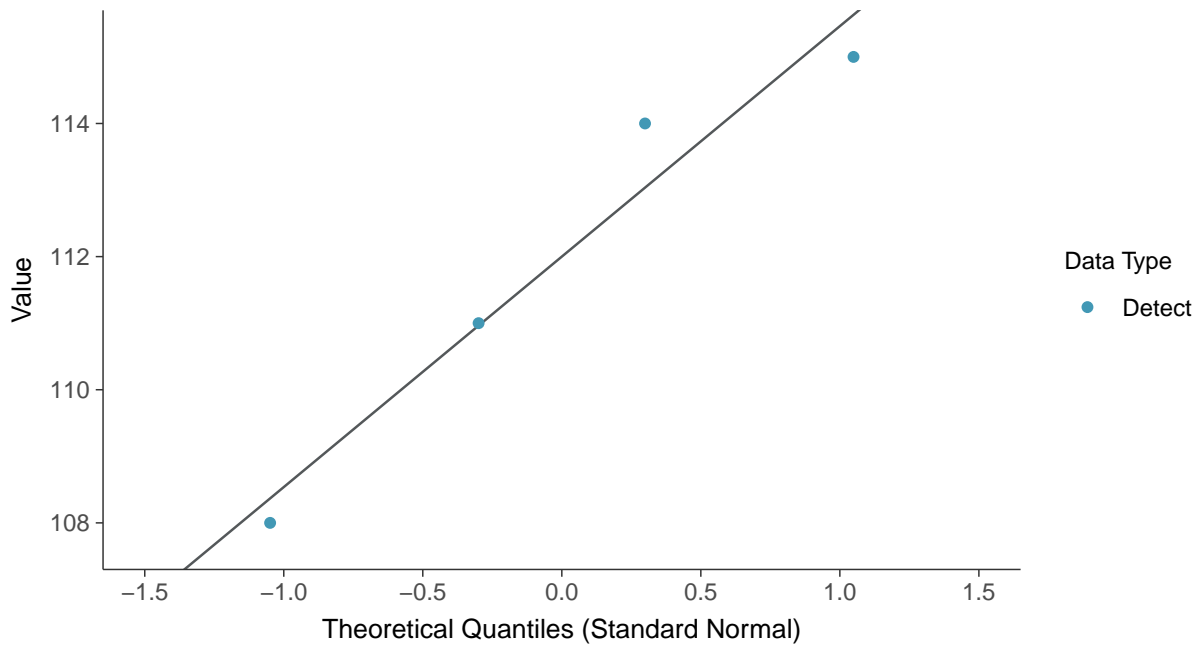
Chloride, MW-14 (mg/L)





Normal Q-Q plot

Chloride, MW-14 (mg/L)



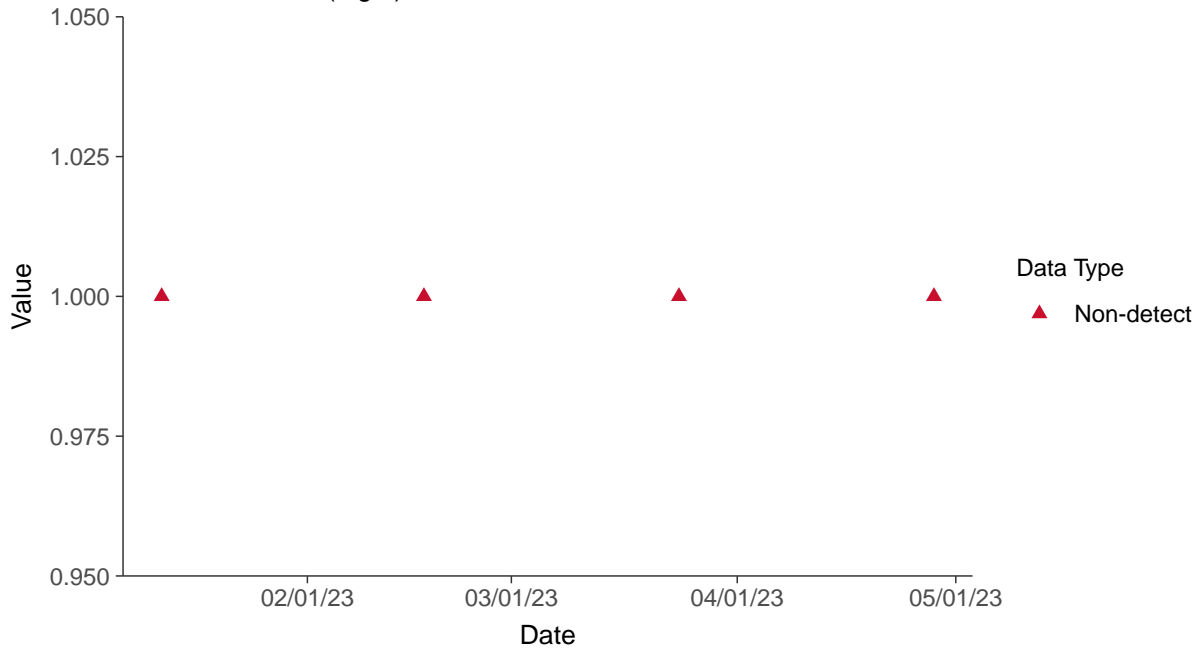


Appendix III: Fluoride, MW-14

ID: 14_1_04

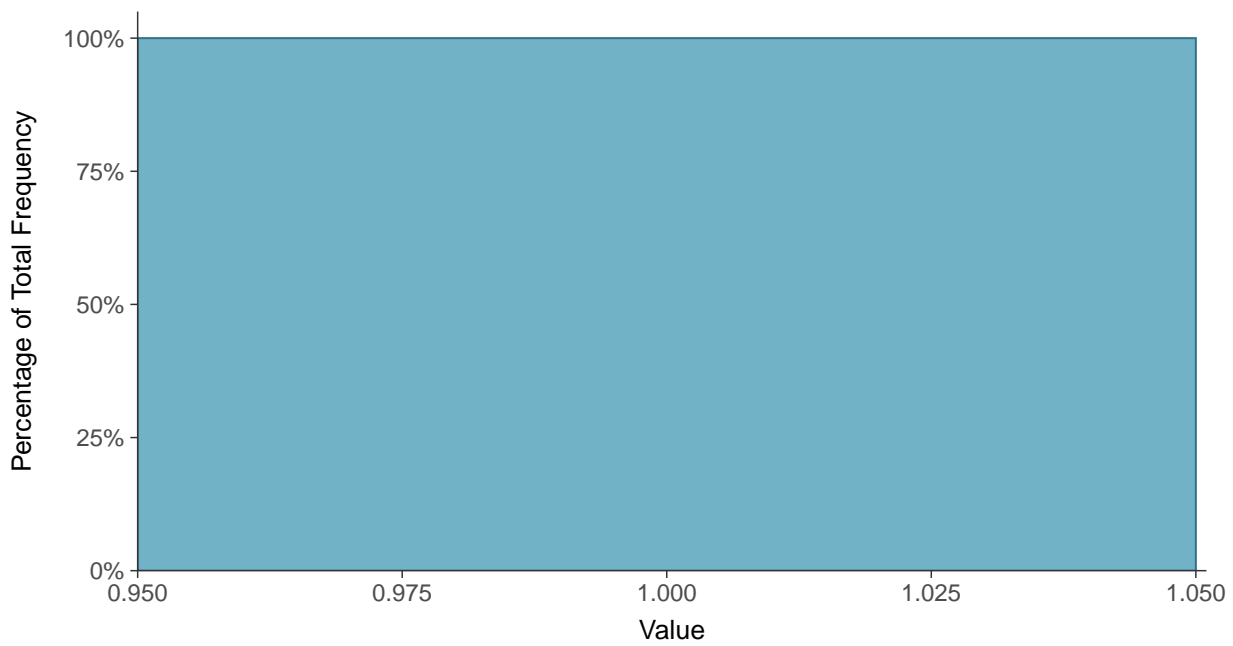
Scatter Plot

Fluoride, MW-14 (mg/L)



Histogram

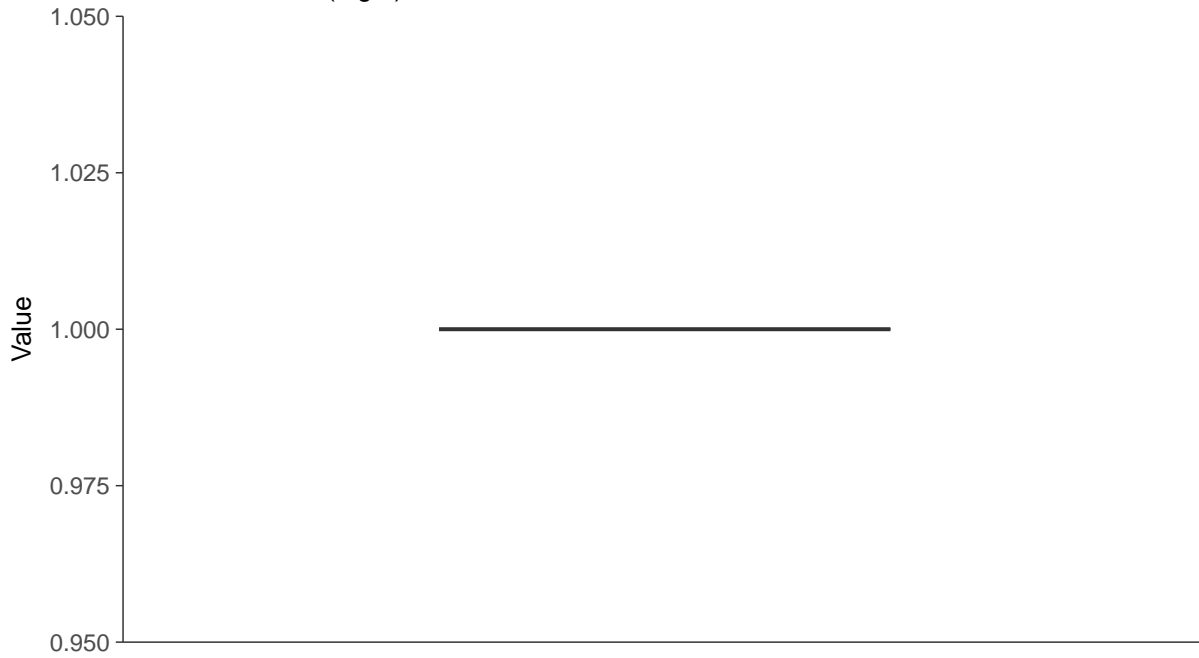
Fluoride, MW-14 (mg/L)





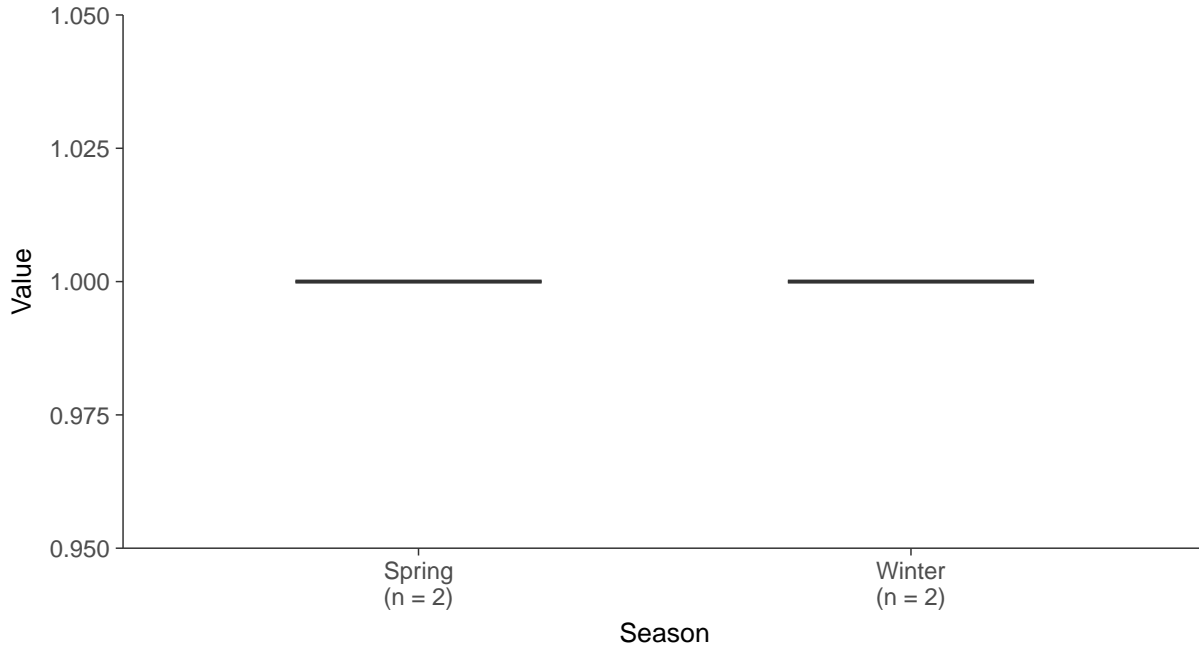
Boxplot

Fluoride, MW-14 (mg/L)



Boxplot by Season

Fluoride, MW-14 (mg/L)



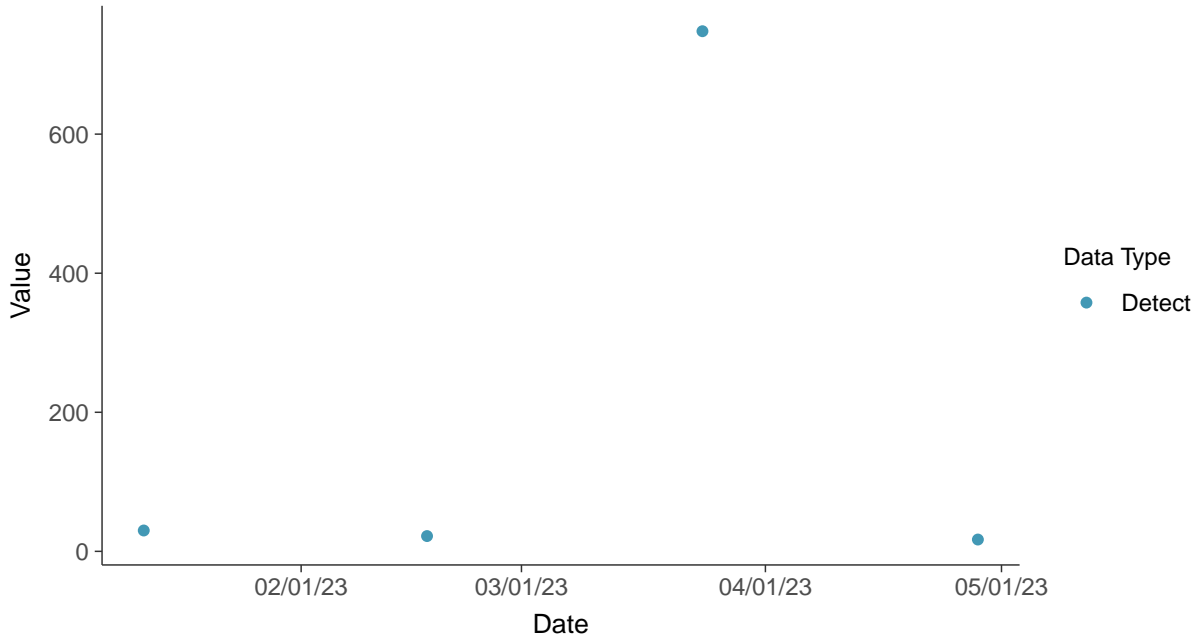


Appendix III: Sulfate, MW-14

ID: 14_1_05

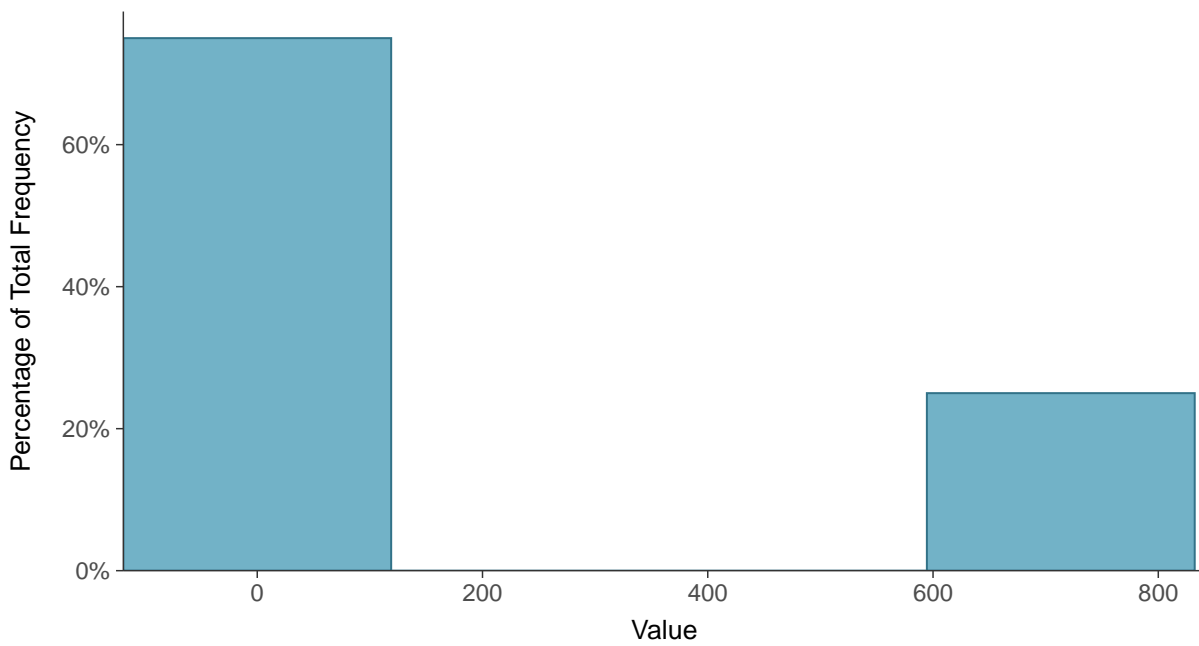
Scatter Plot

Sulfate, MW-14 (mg/L)



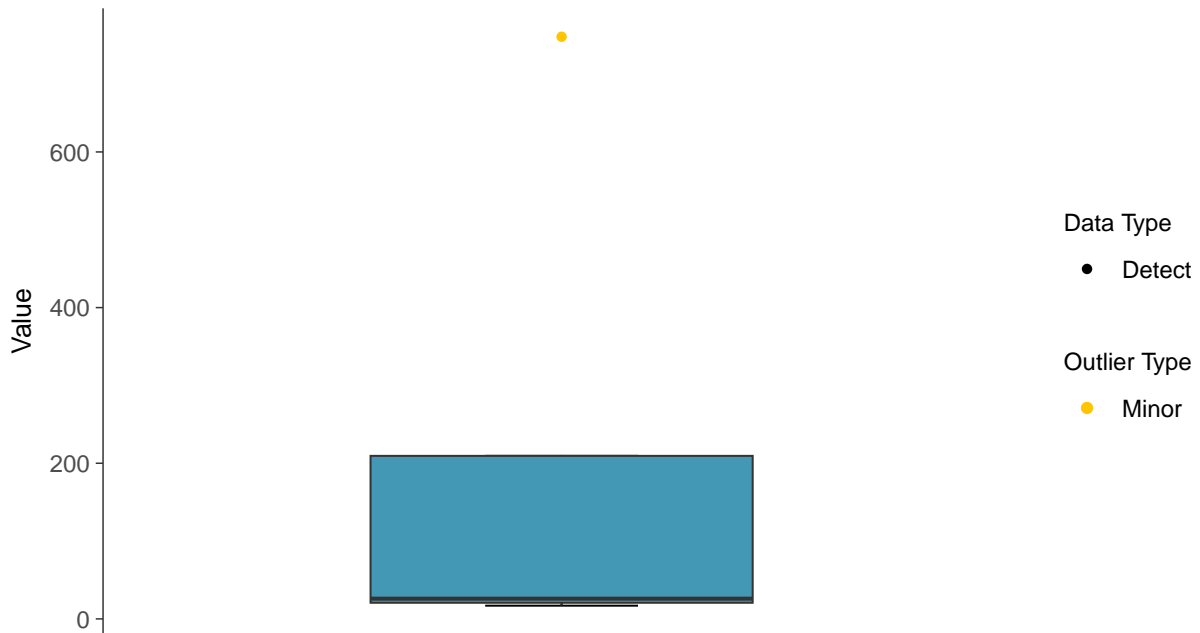
Histogram

Sulfate, MW-14 (mg/L)



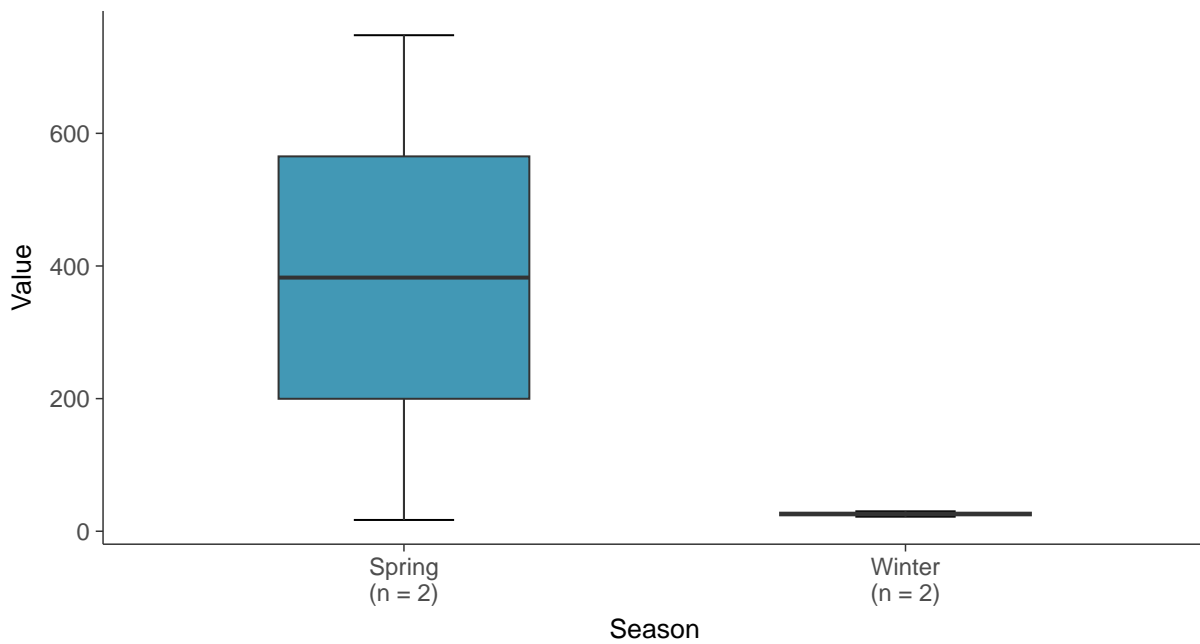
Boxplot

Sulfate, MW-14 (mg/L)



Boxplot by Season

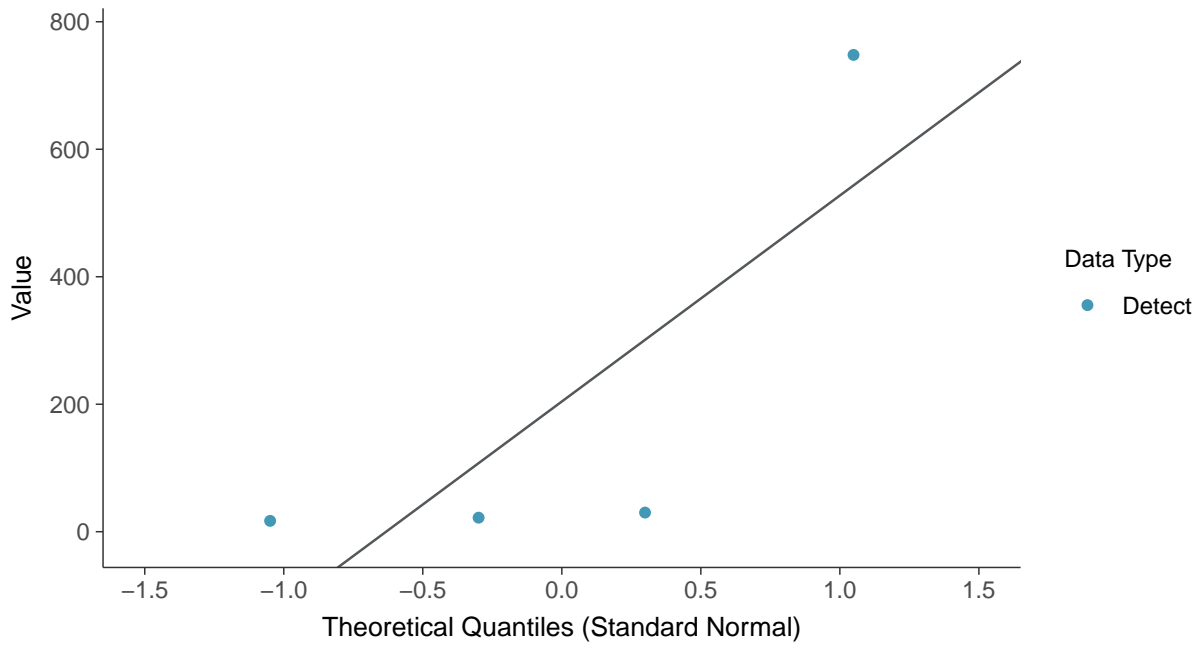
Sulfate, MW-14 (mg/L)





Normal Q-Q plot

Sulfate, MW-14 (mg/L)



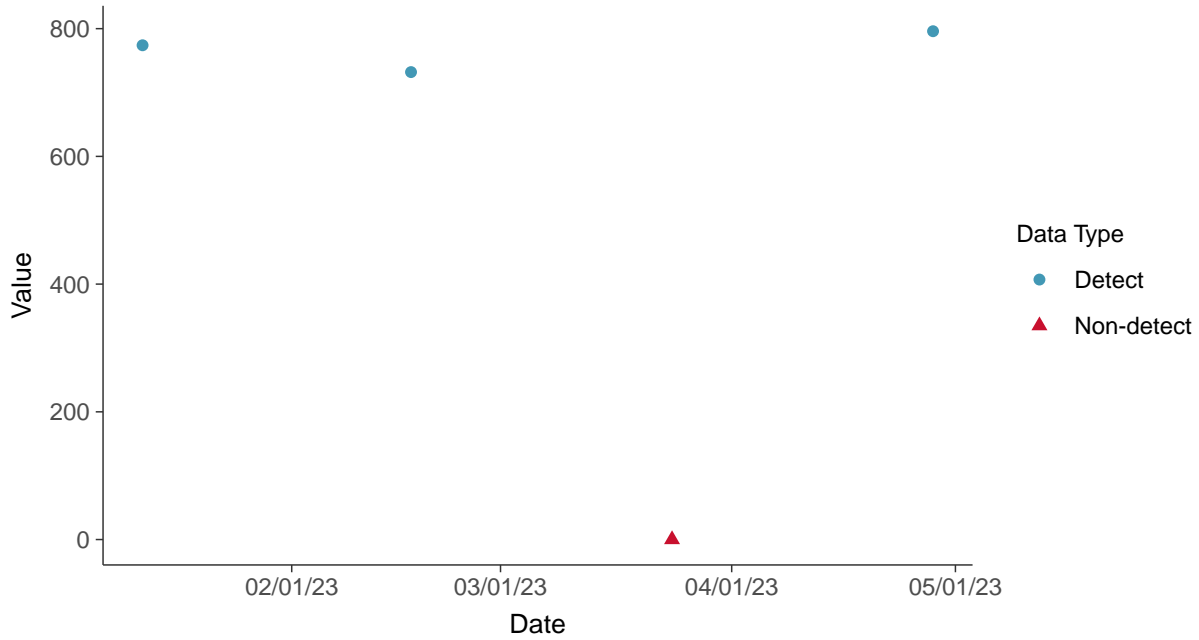


Appendix III: Total Dissolved Solids, MW-14

ID: 14_1_06

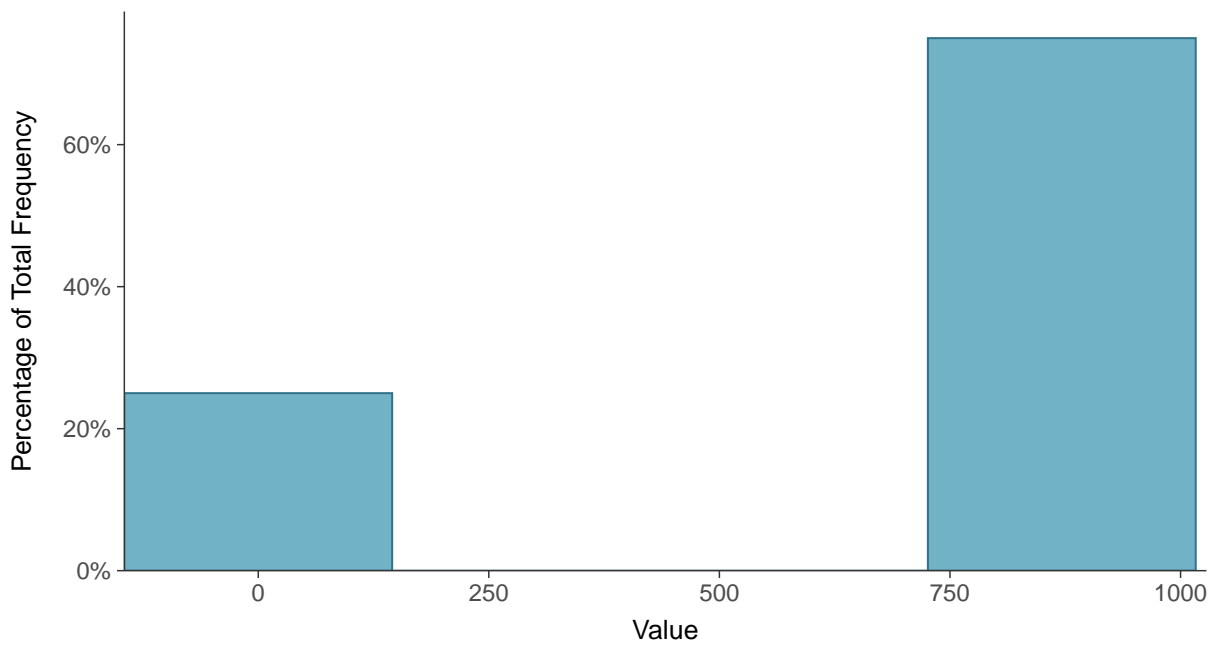
Scatter Plot

Total Dissolved Solids, MW-14 (mg/L)



Histogram

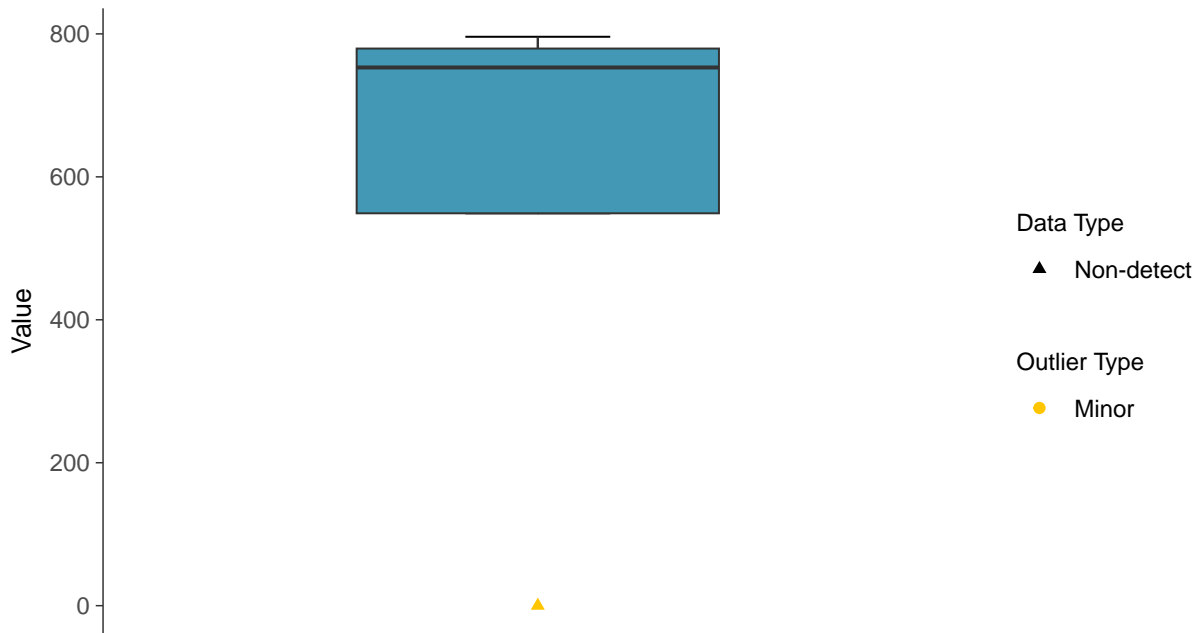
Total Dissolved Solids, MW-14 (mg/L)





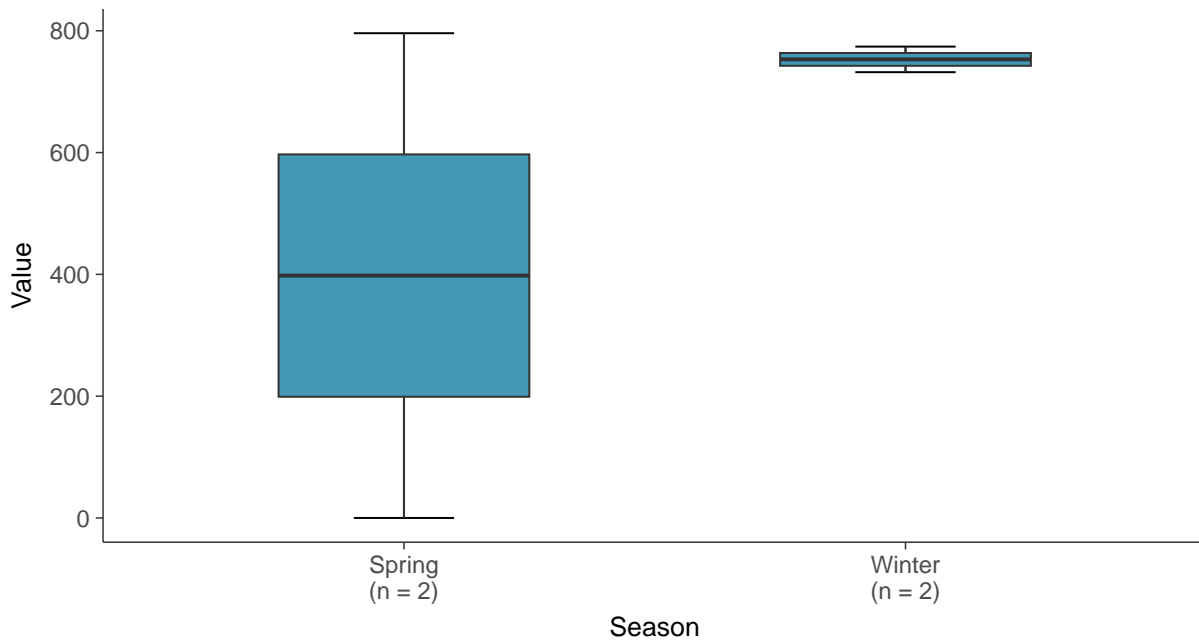
Boxplot

Total Dissolved Solids, MW-14 (mg/L)



Boxplot by Season

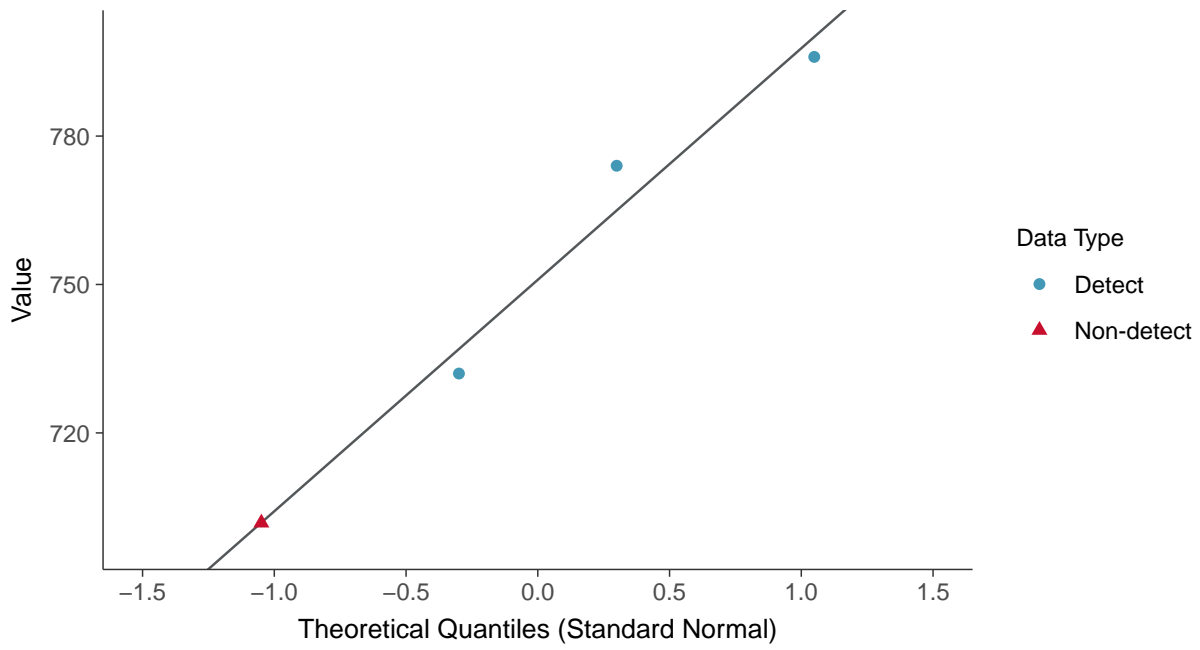
Total Dissolved Solids, MW-14 (mg/L)





Normal Q-Q plot using ROS Imputed Estimates

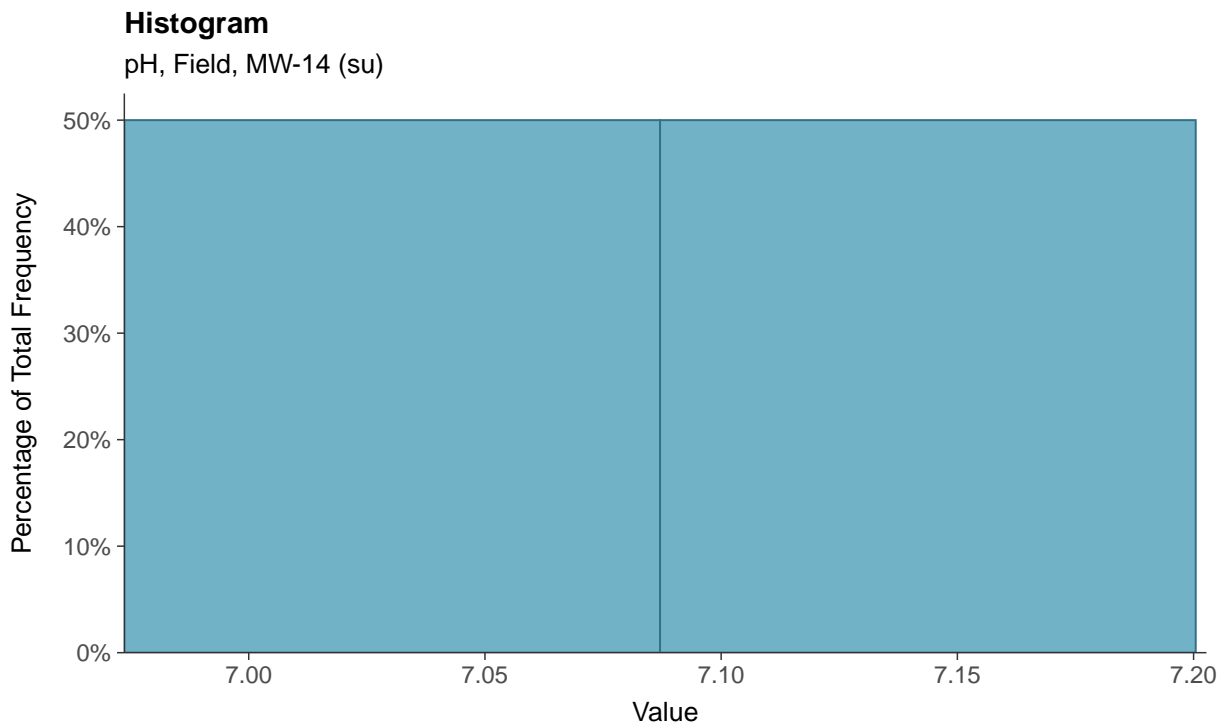
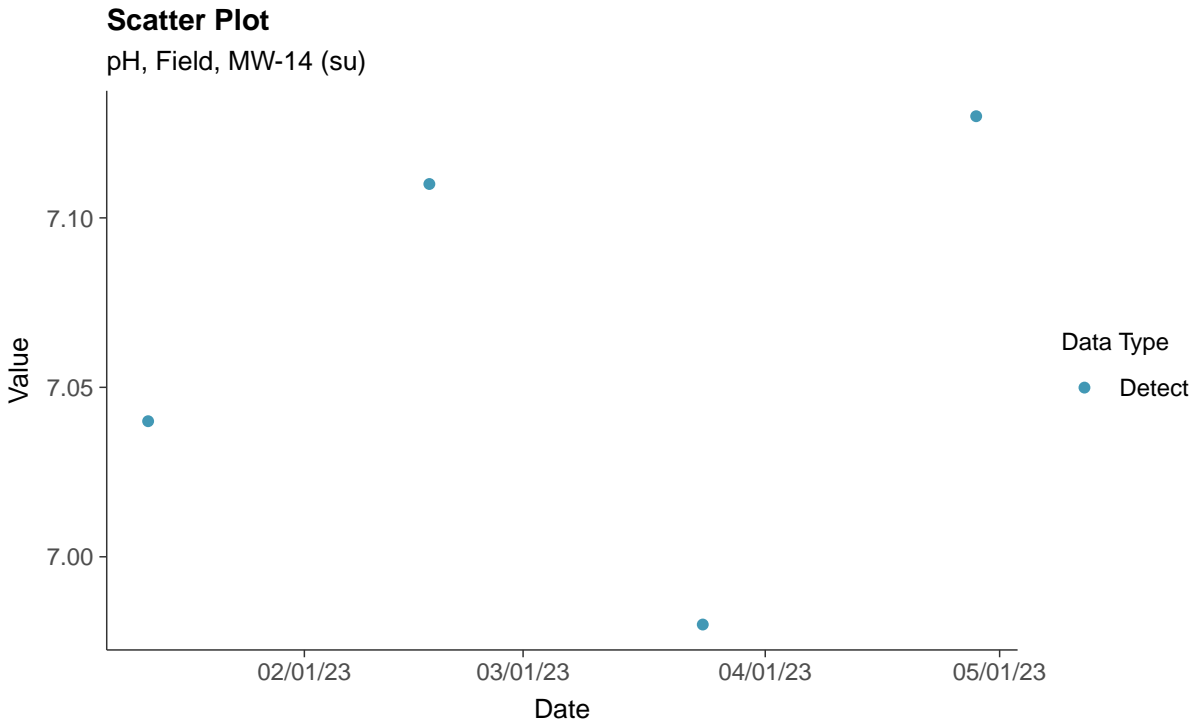
Total Dissolved Solids, MW-14 (mg/L)





Appendix III: pH, Field, MW-14

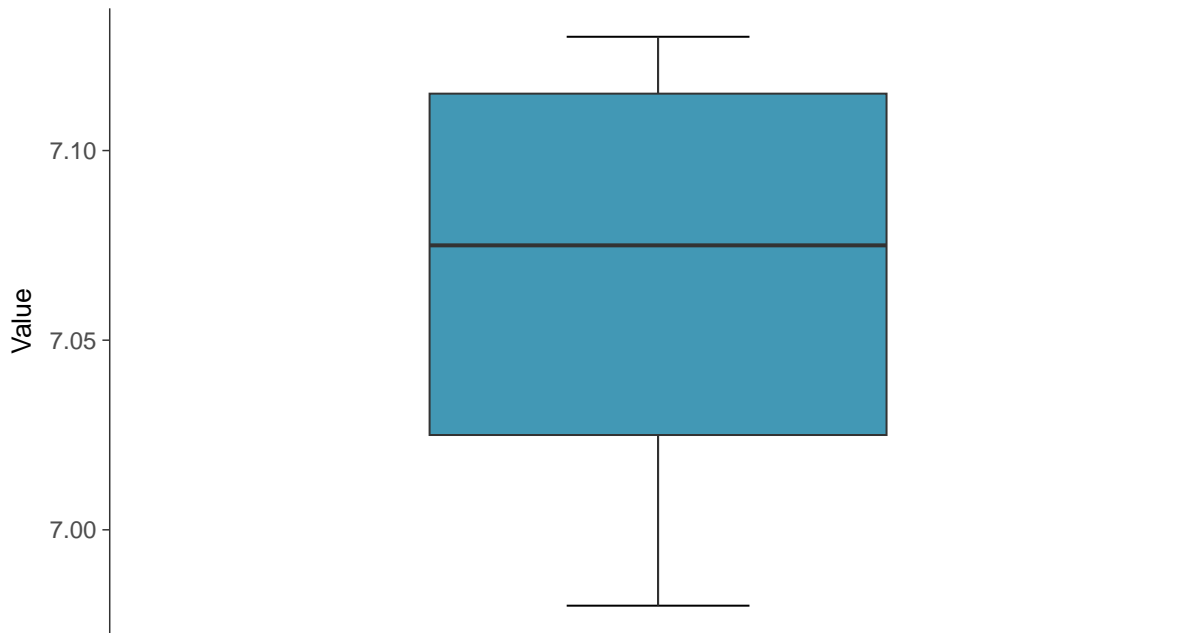
ID: 14_1_07





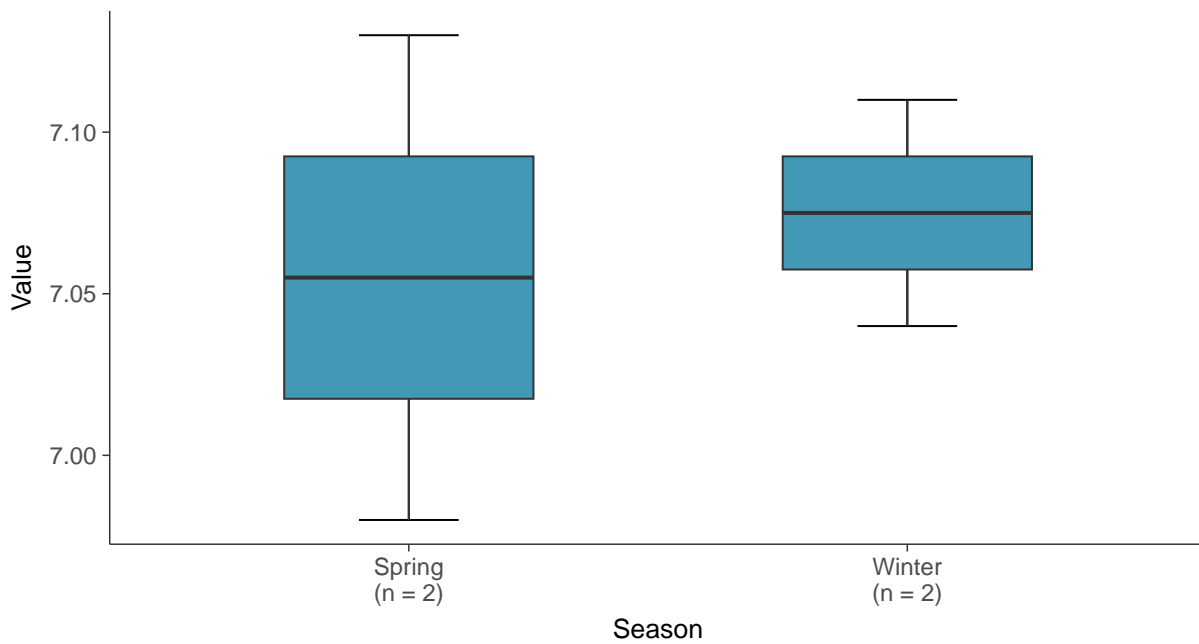
Boxplot

pH, Field, MW-14 (su)



Boxplot by Season

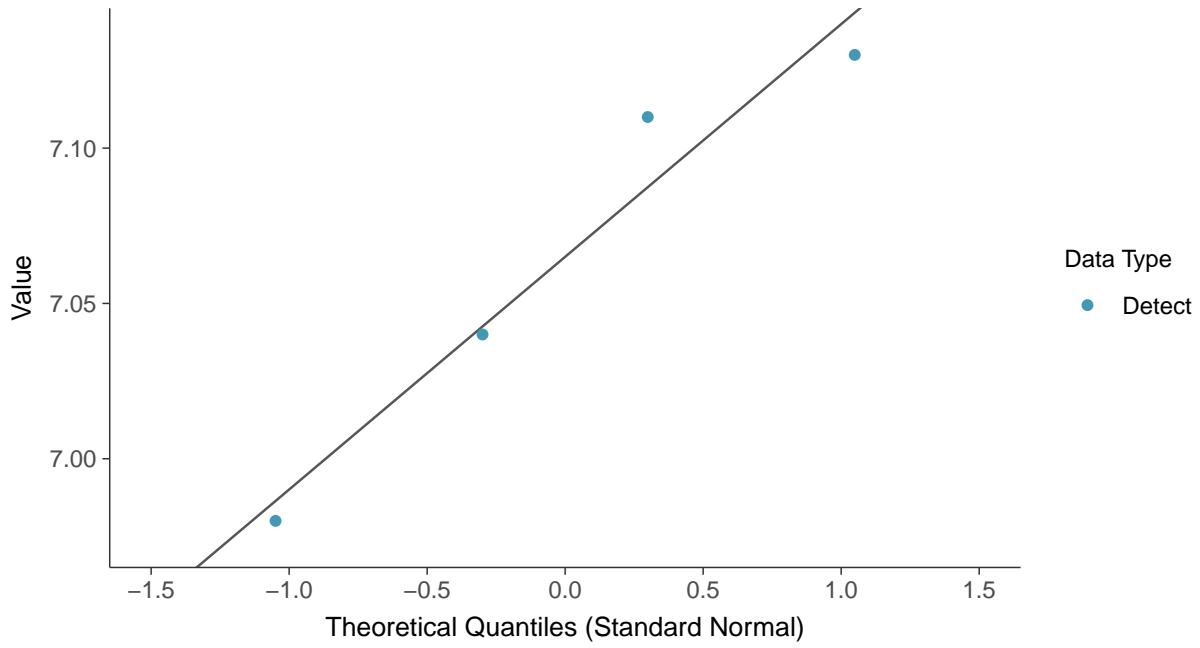
pH, Field, MW-14 (su)





Normal Q-Q plot

pH, Field, MW-14 (su)



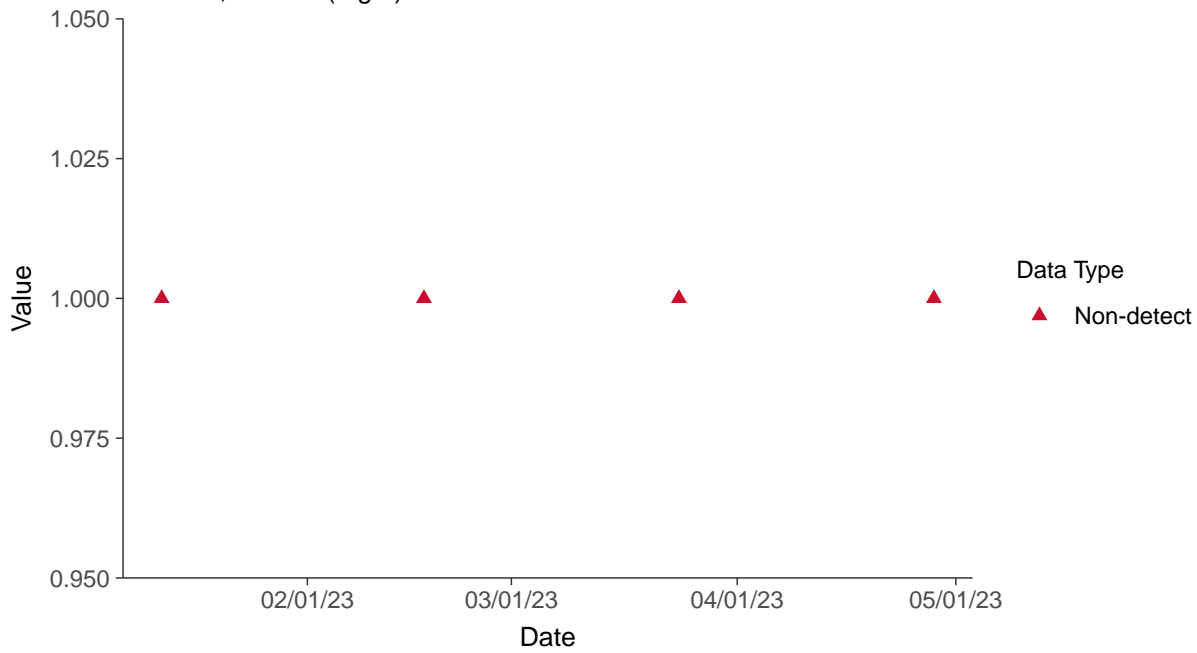


Appendix IV: Fluoride, MW-14

ID: 14_2_04

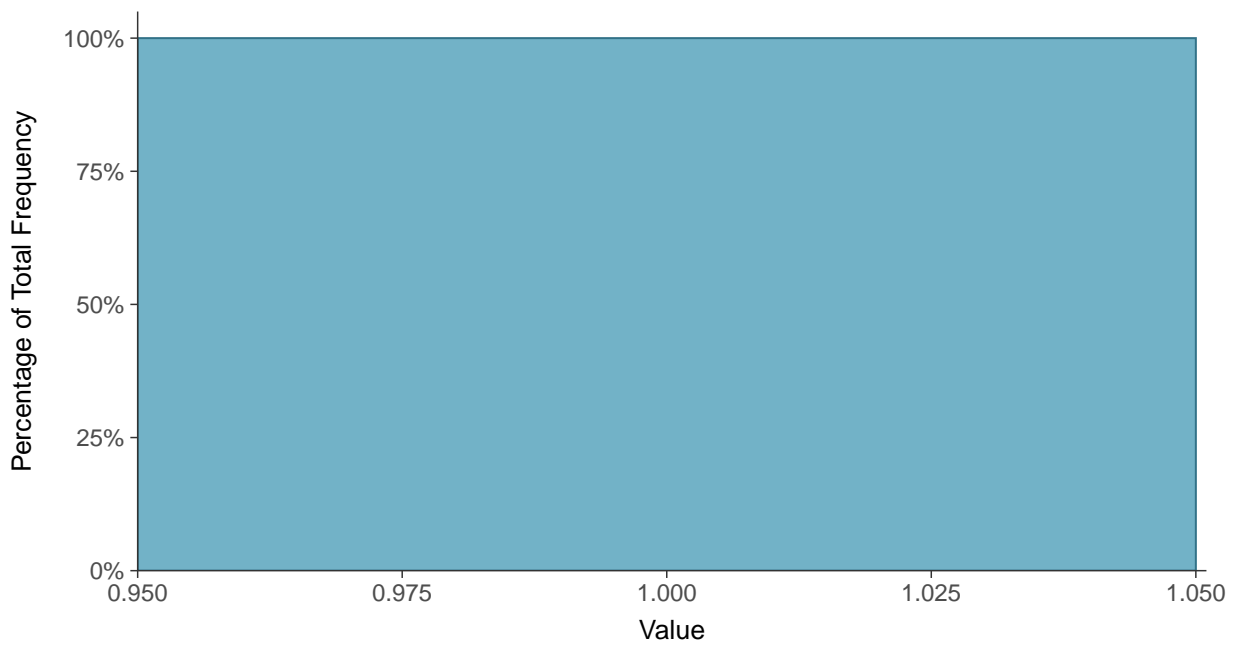
Scatter Plot

Fluoride, MW-14 (mg/L)



Histogram

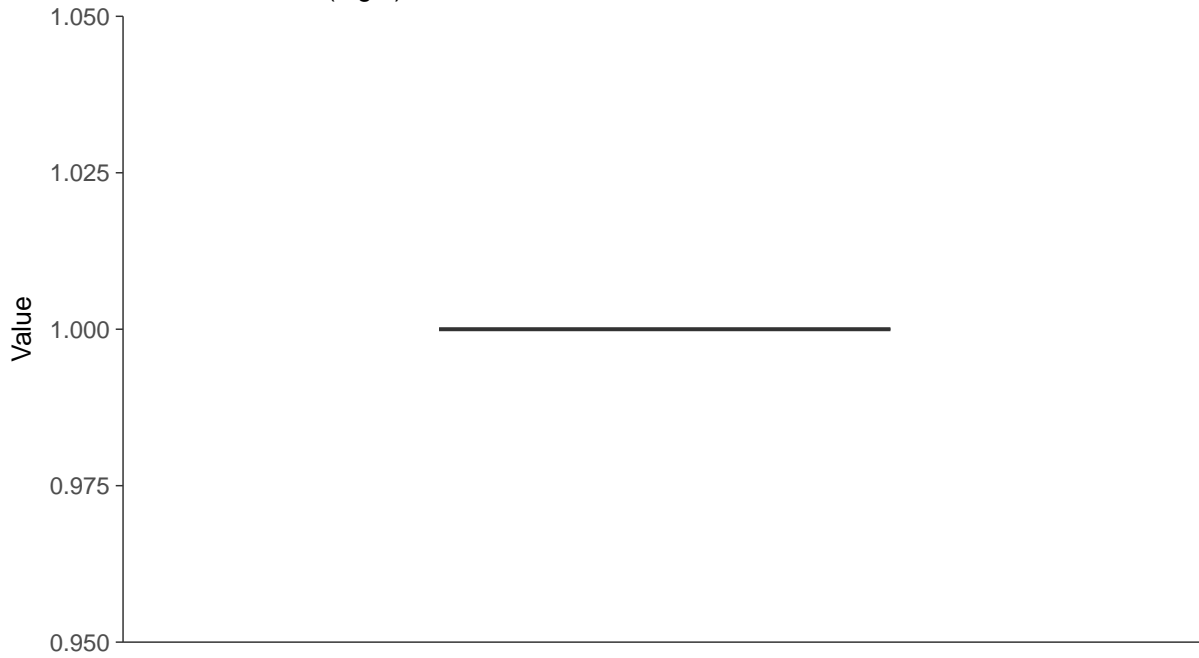
Fluoride, MW-14 (mg/L)





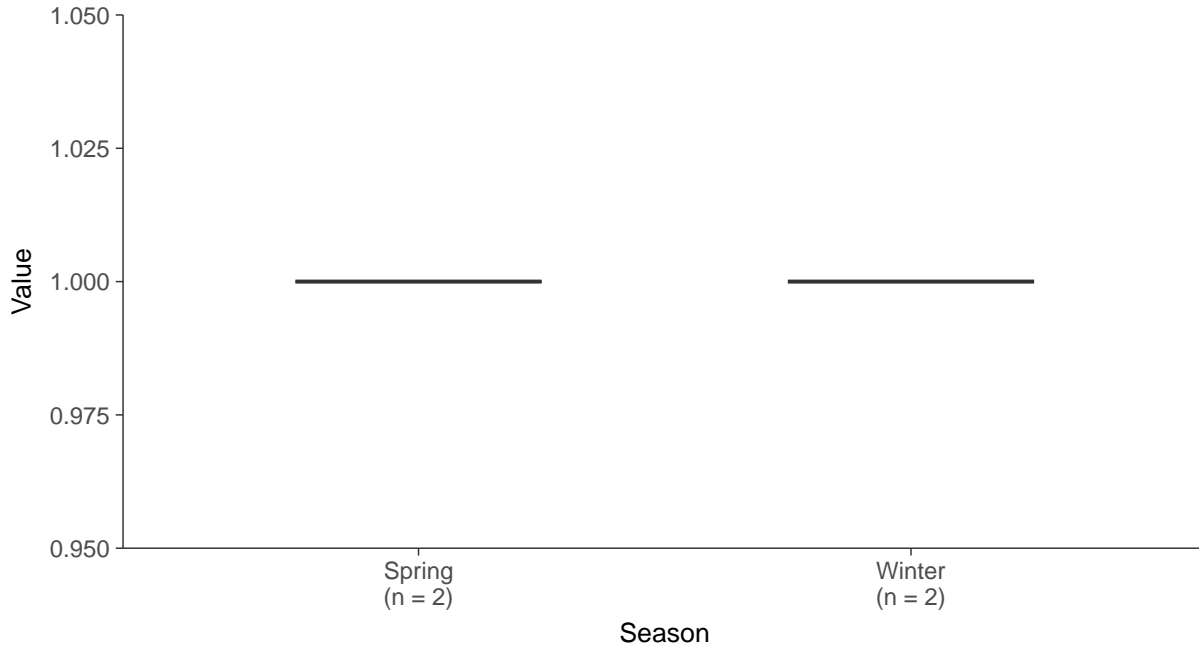
Boxplot

Fluoride, MW-14 (mg/L)



Boxplot by Season

Fluoride, MW-14 (mg/L)



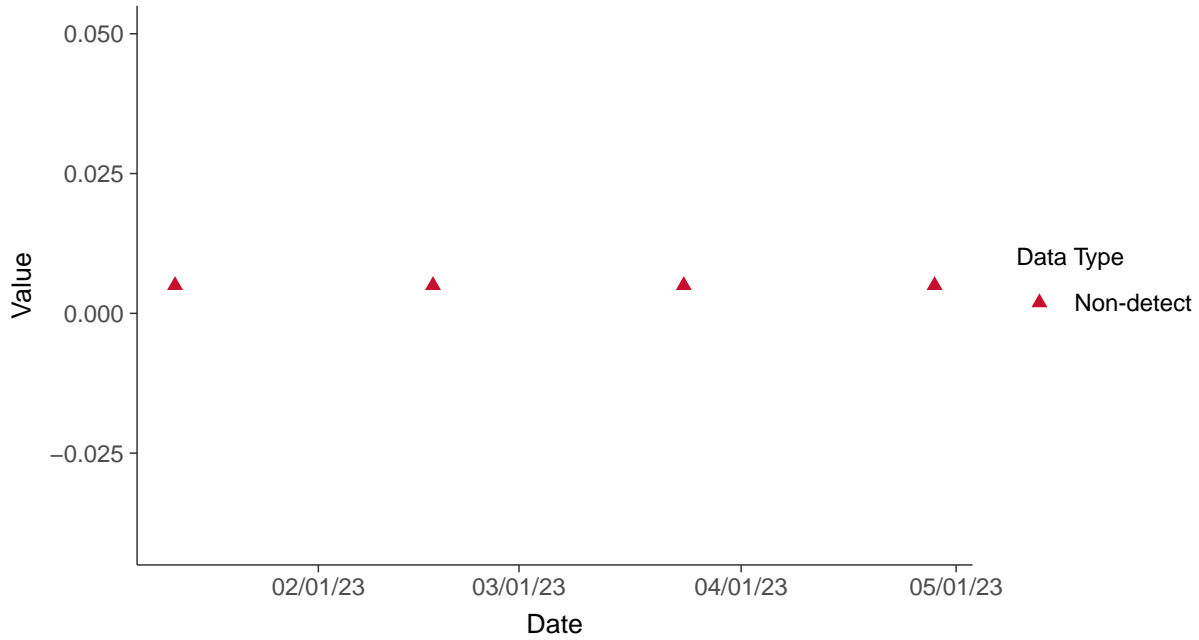


Appendix IV: Antimony, MW-14

ID: 14_2_08

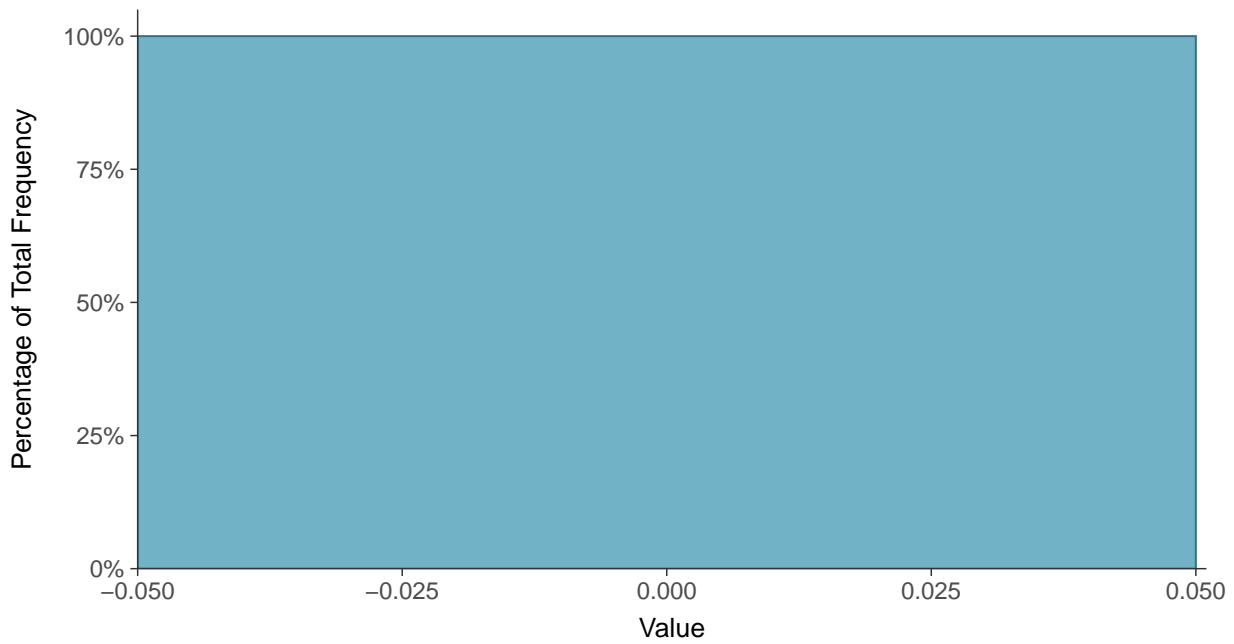
Scatter Plot

Antimony, MW-14 (mg/L)



Histogram

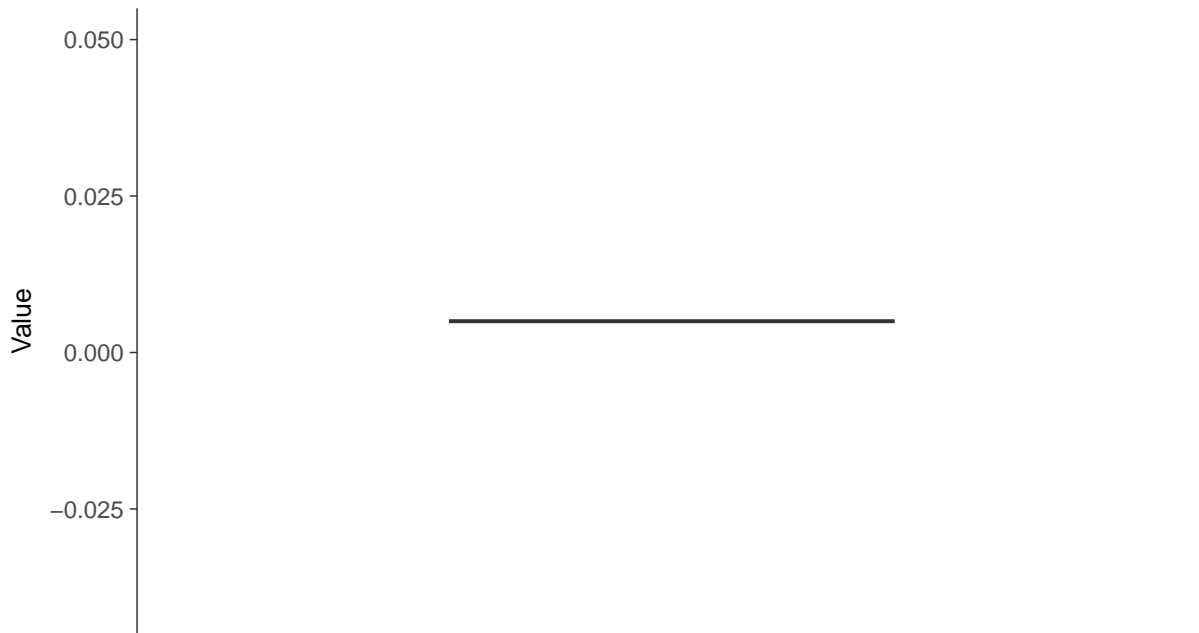
Antimony, MW-14 (mg/L)





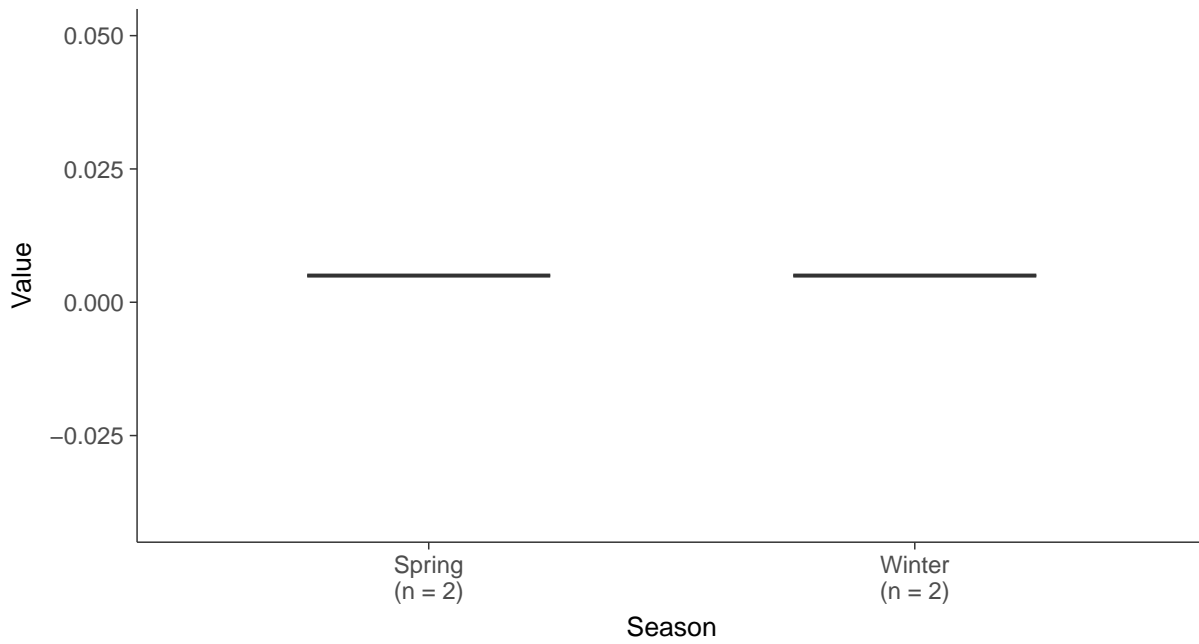
Boxplot

Antimony, MW-14 (mg/L)



Boxplot by Season

Antimony, MW-14 (mg/L)



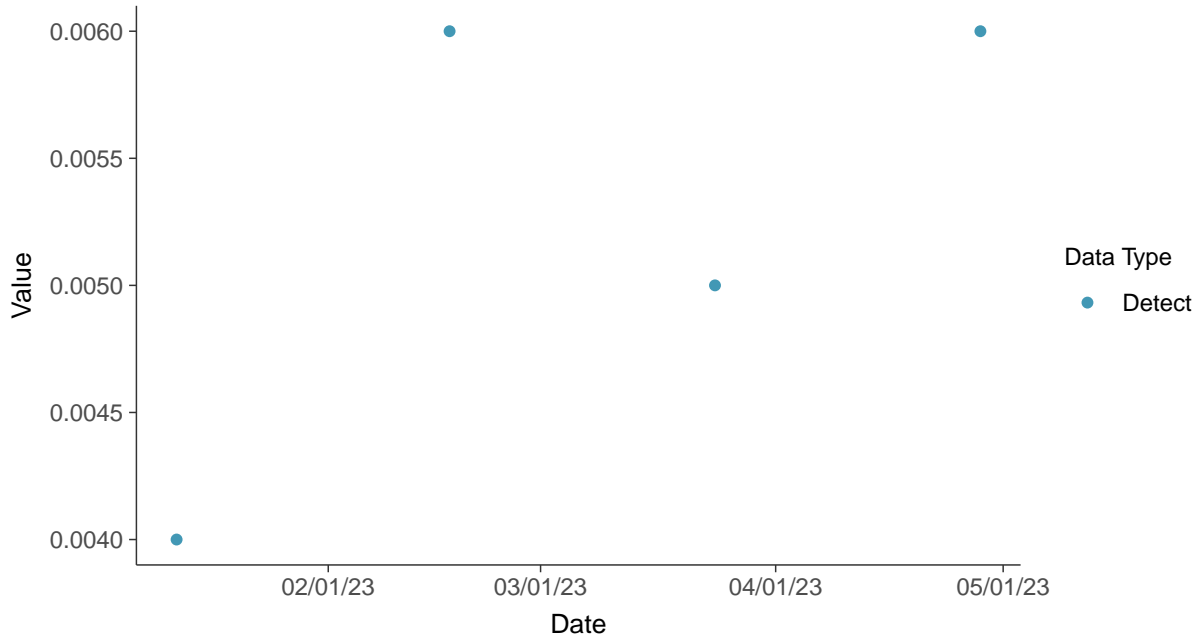


Appendix IV: Arsenic, MW-14

ID: 14_2_09

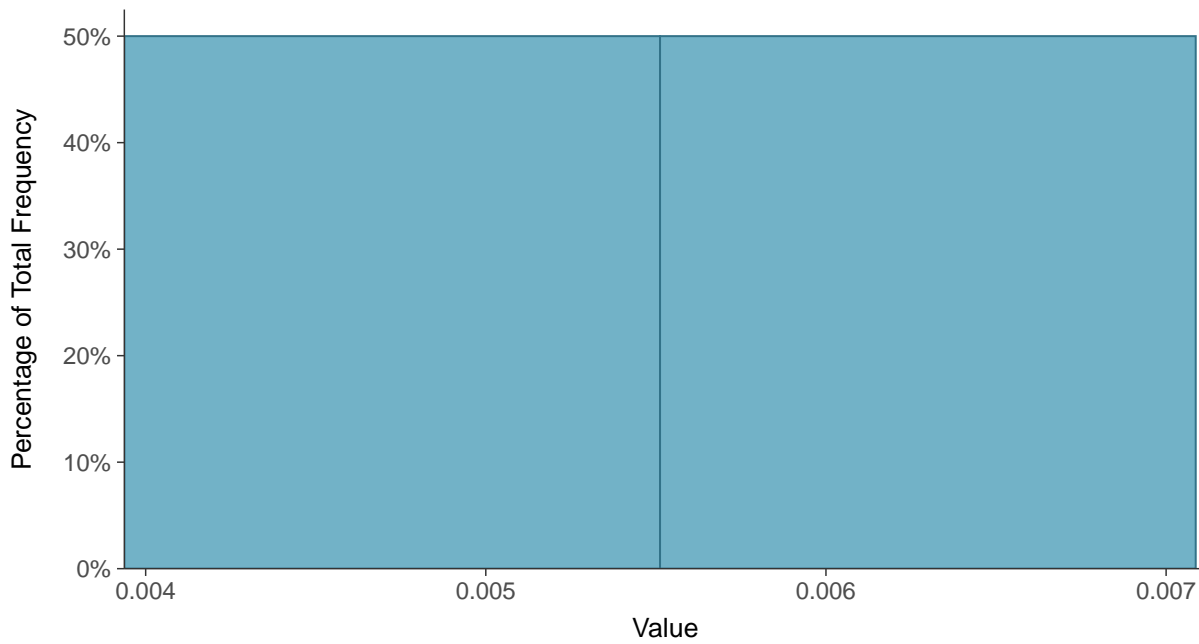
Scatter Plot

Arsenic, MW-14 (mg/L)



Histogram

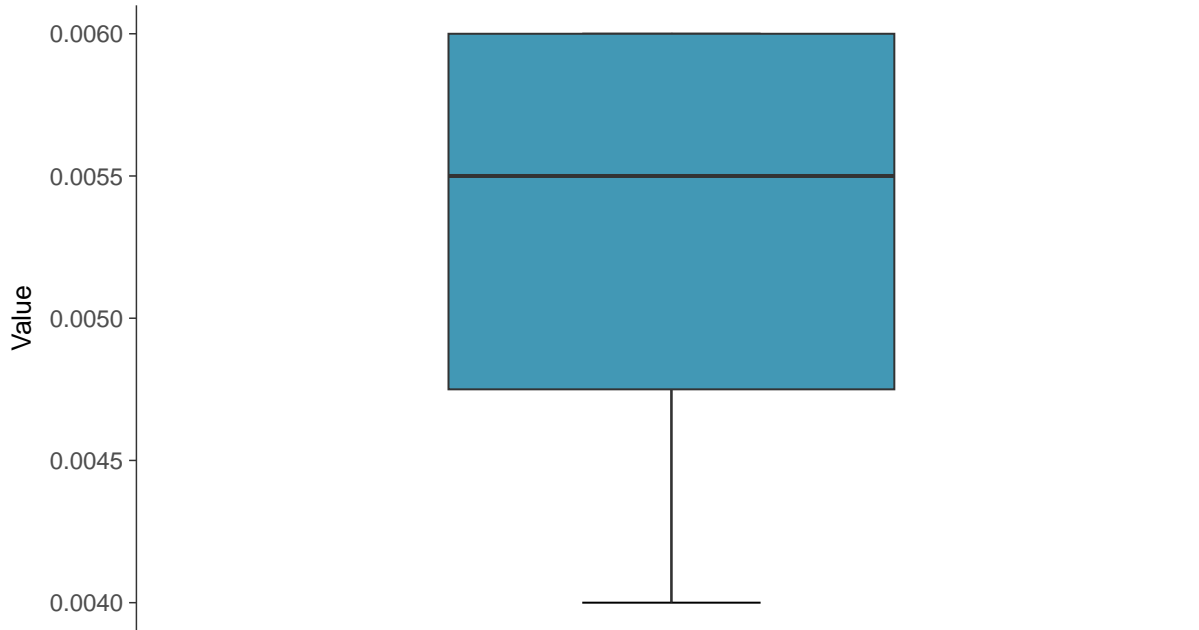
Arsenic, MW-14 (mg/L)





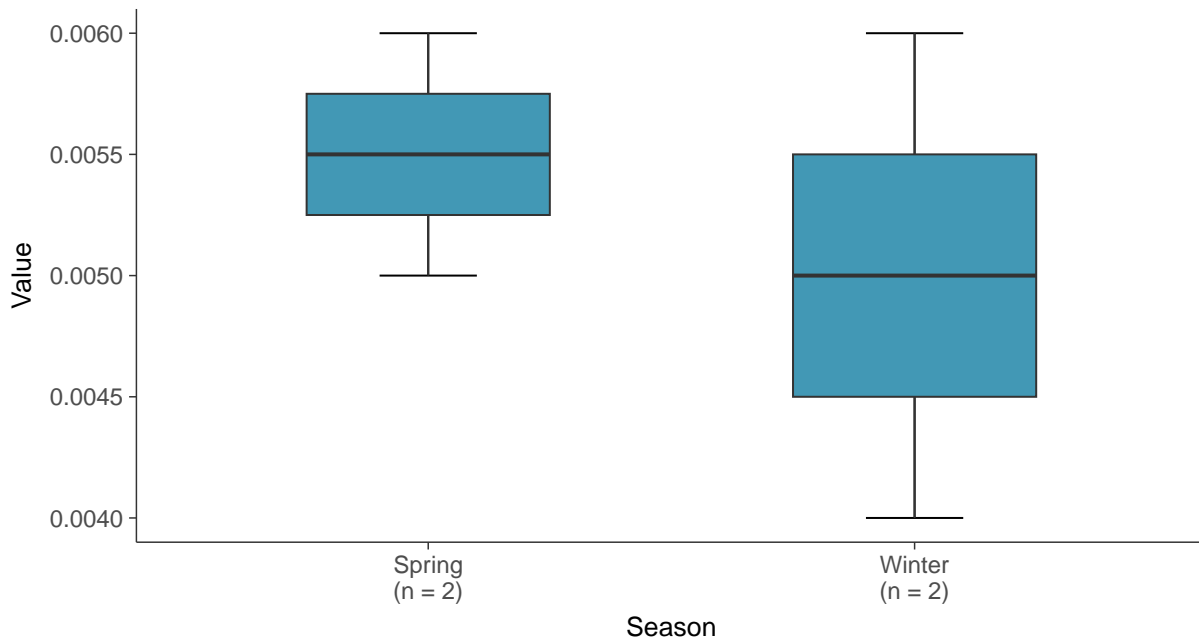
Boxplot

Arsenic, MW-14 (mg/L)



Boxplot by Season

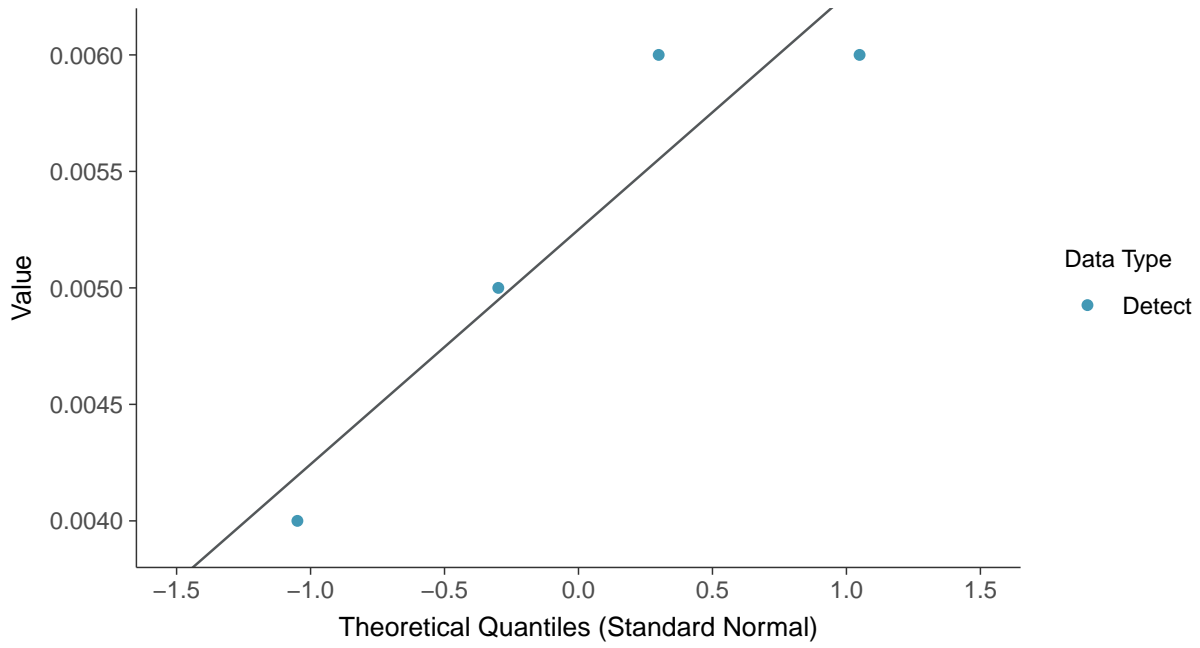
Arsenic, MW-14 (mg/L)





Normal Q-Q plot

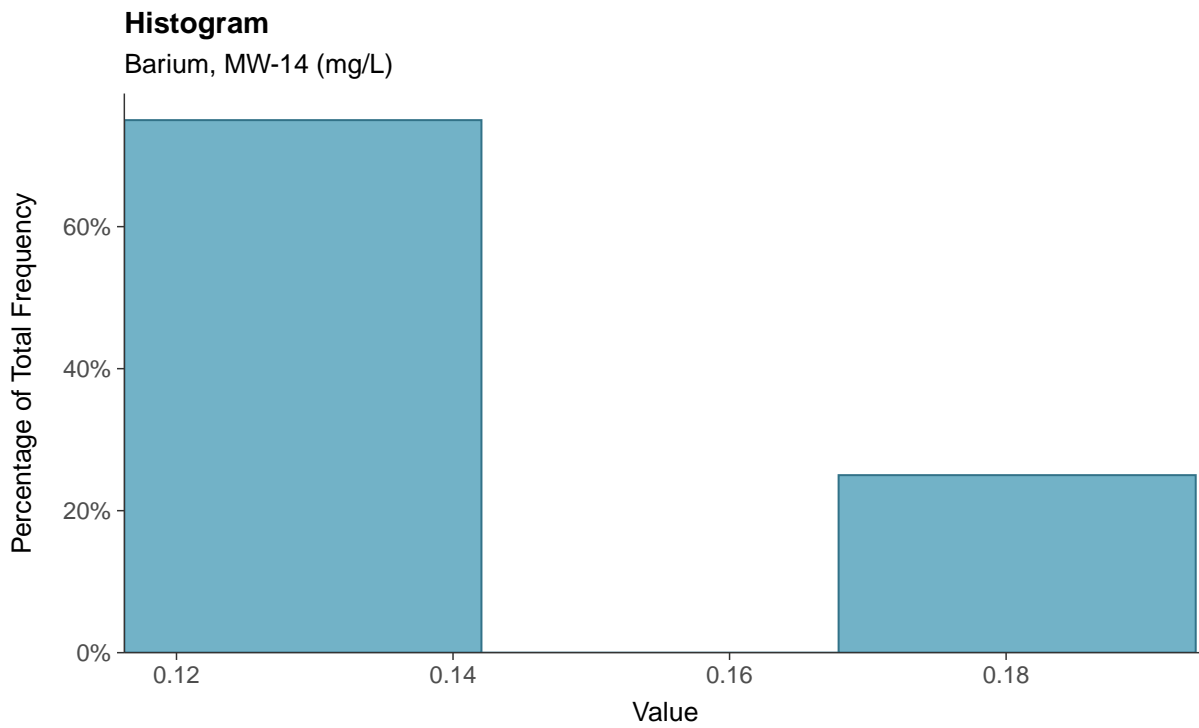
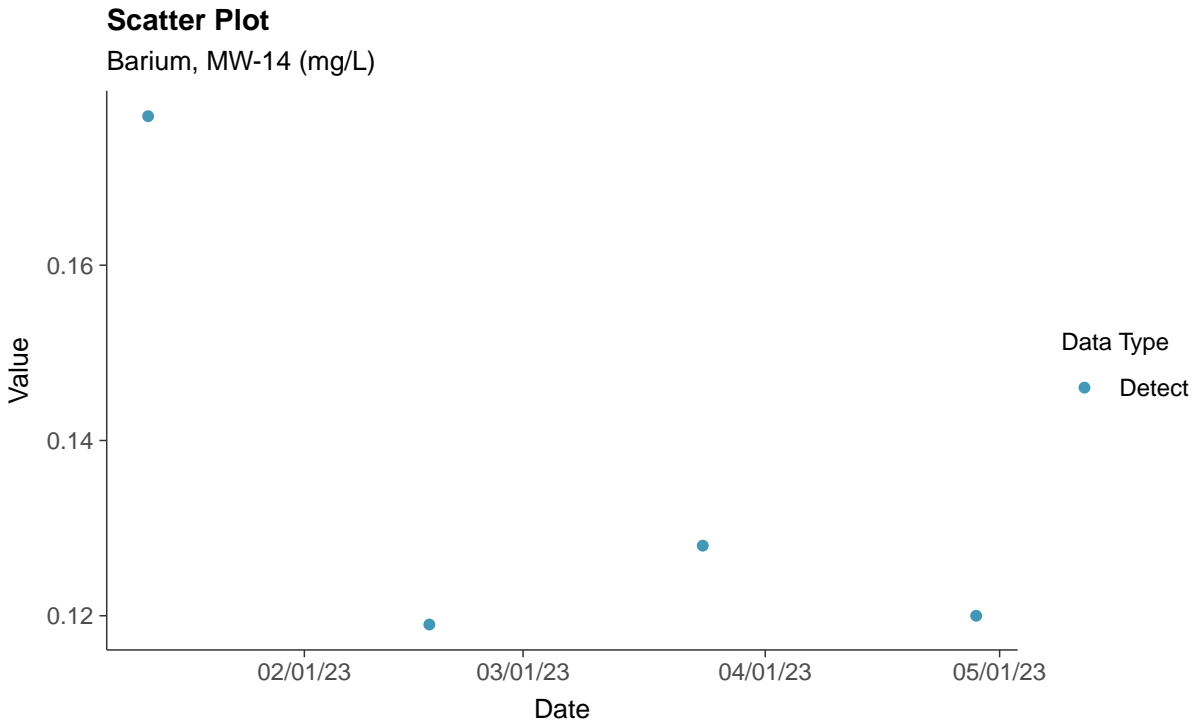
Arsenic, MW-14 (mg/L)





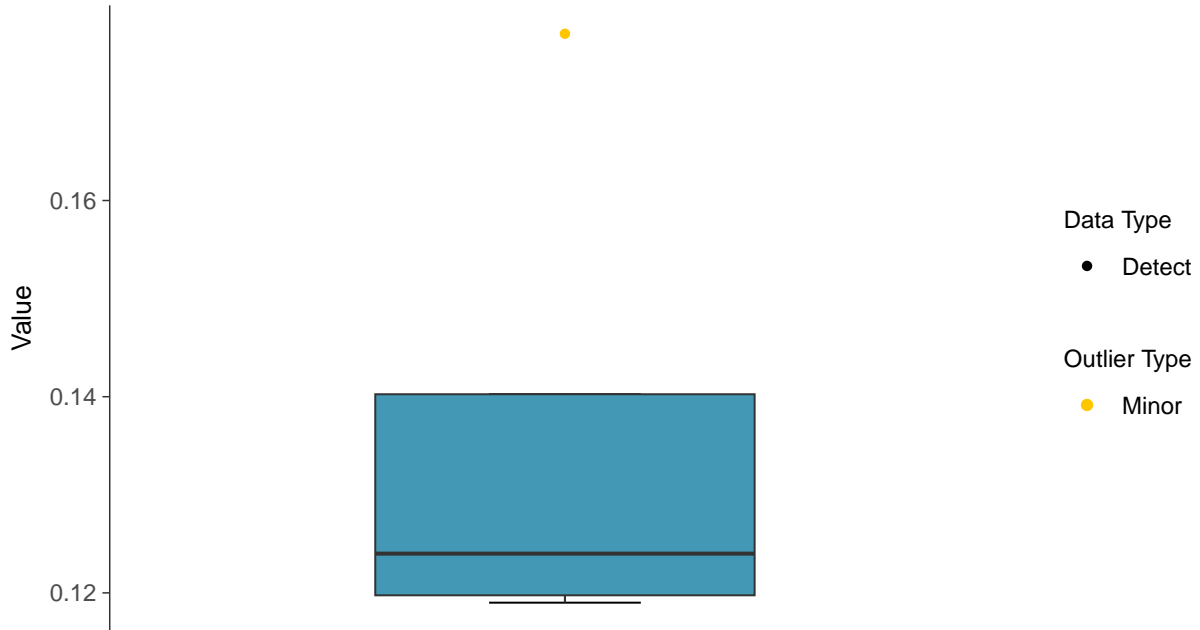
Appendix IV: Barium, MW-14

ID: 14_2_10



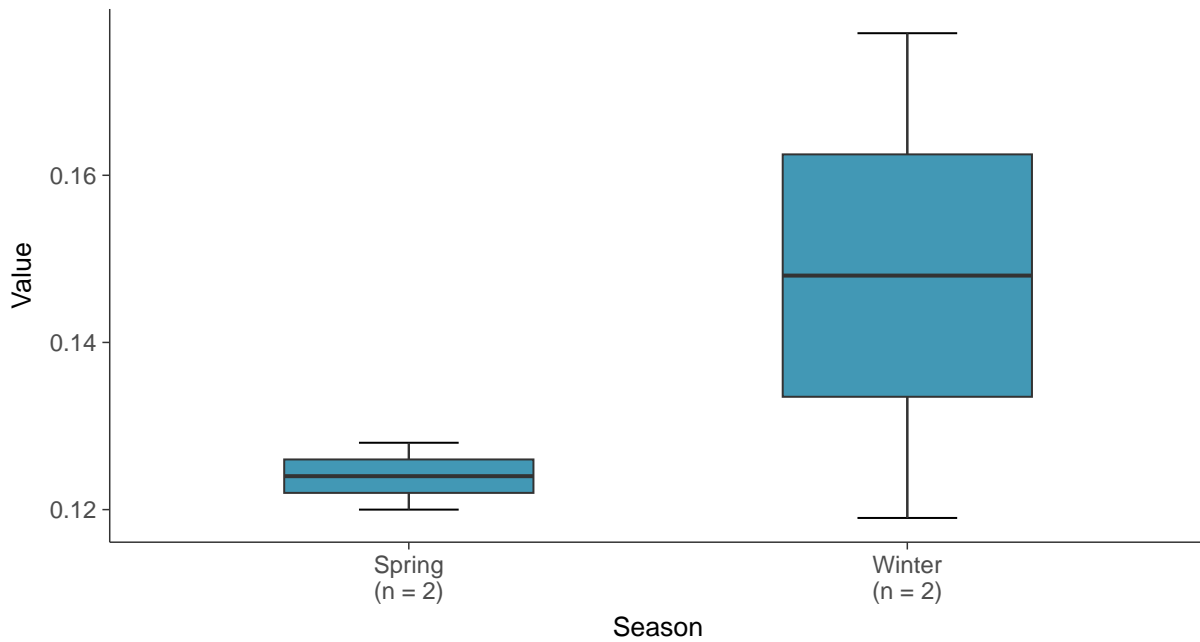
Boxplot

Barium, MW-14 (mg/L)



Boxplot by Season

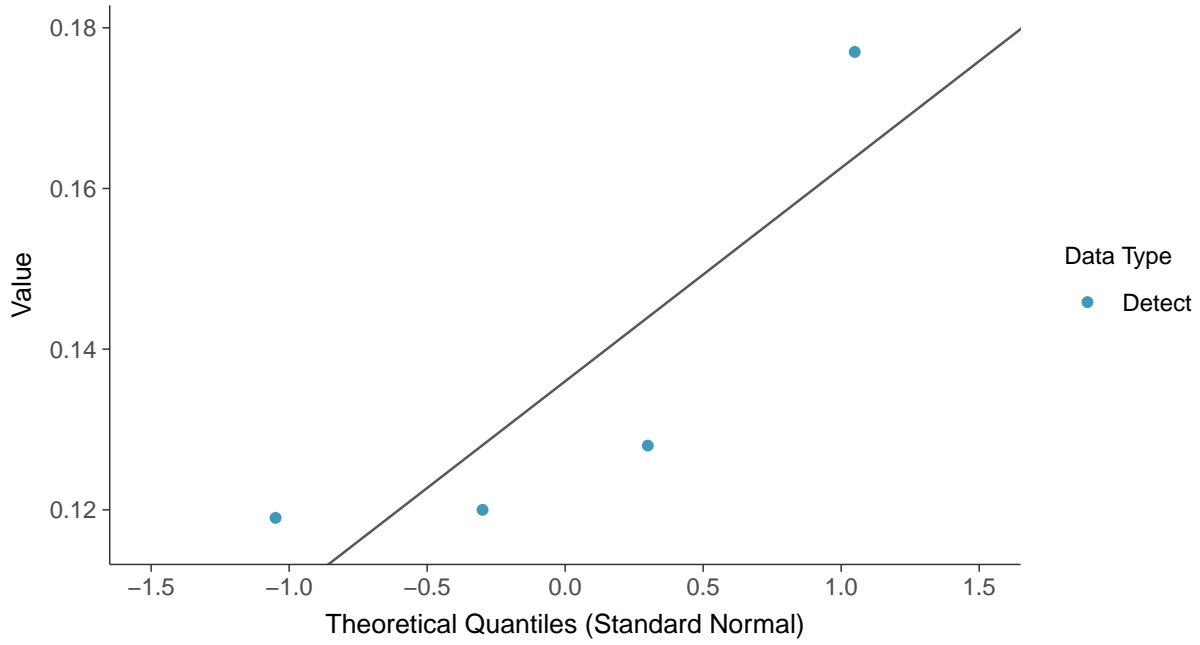
Barium, MW-14 (mg/L)





Normal Q-Q plot

Barium, MW-14 (mg/L)



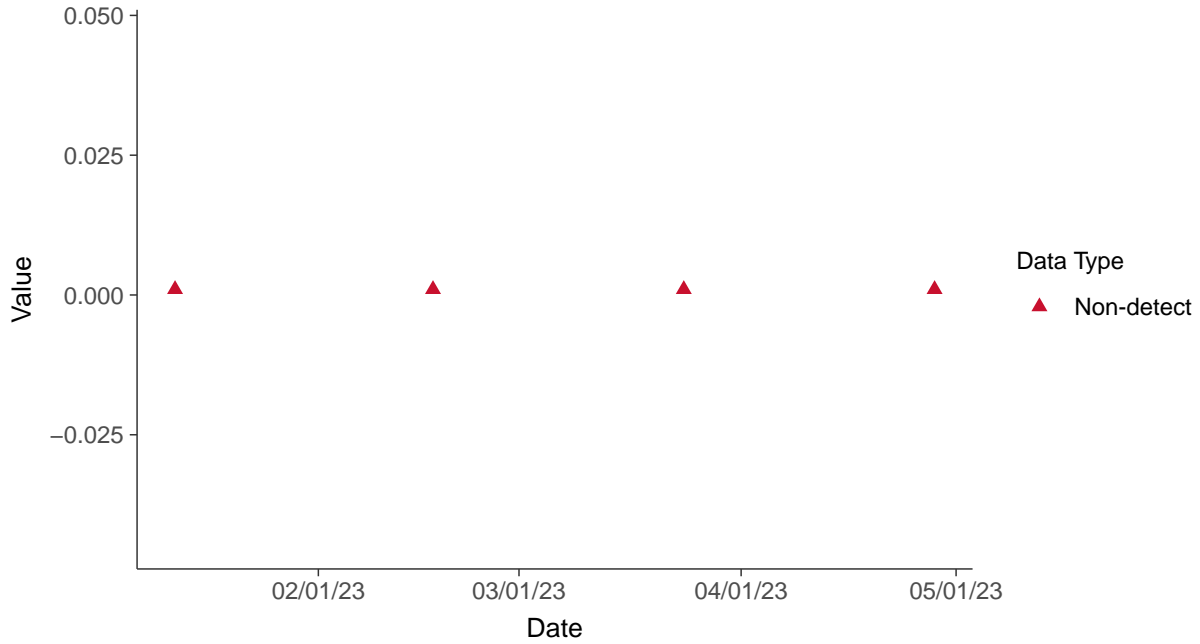


Appendix IV: Beryllium, MW-14

ID: 14_2_11

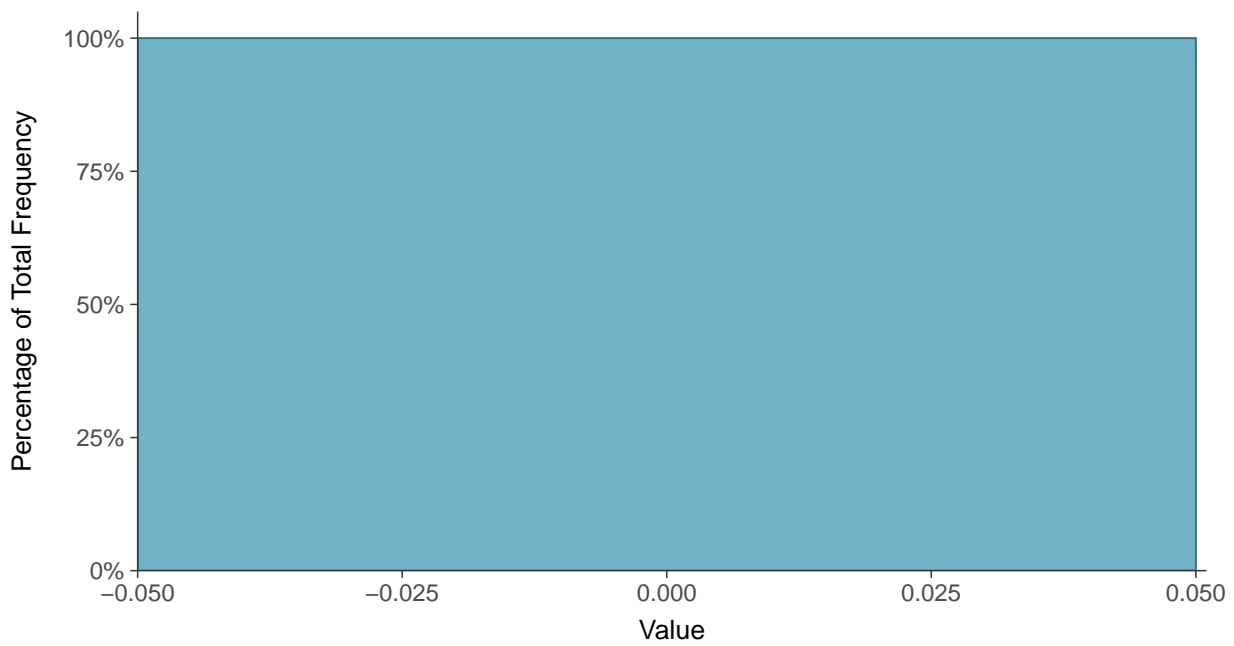
Scatter Plot

Beryllium, MW-14 (mg/L)



Histogram

Beryllium, MW-14 (mg/L)





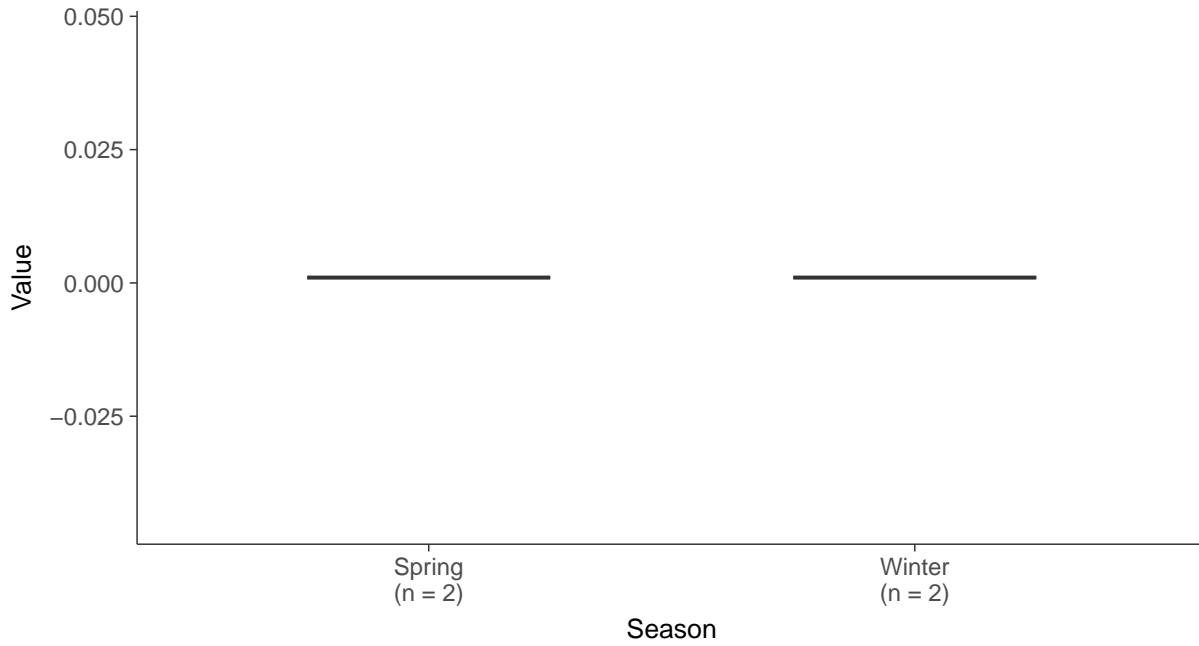
Boxplot

Beryllium, MW-14 (mg/L)



Boxplot by Season

Beryllium, MW-14 (mg/L)



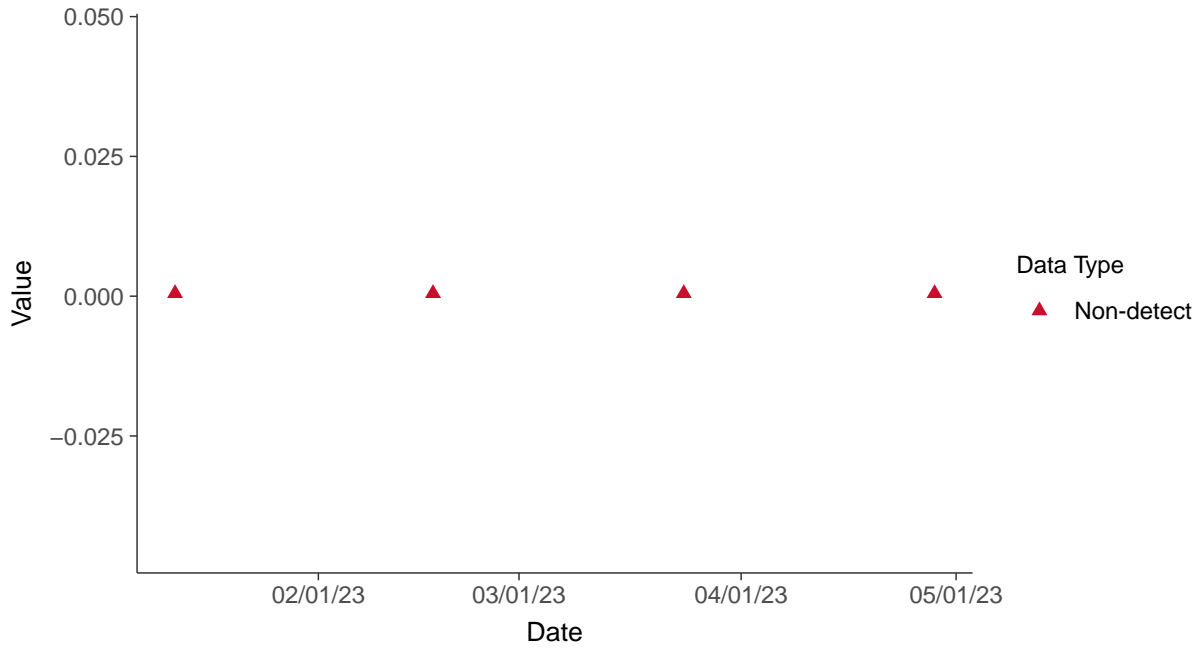


Appendix IV: Cadmium, MW-14

ID: 14_2_13

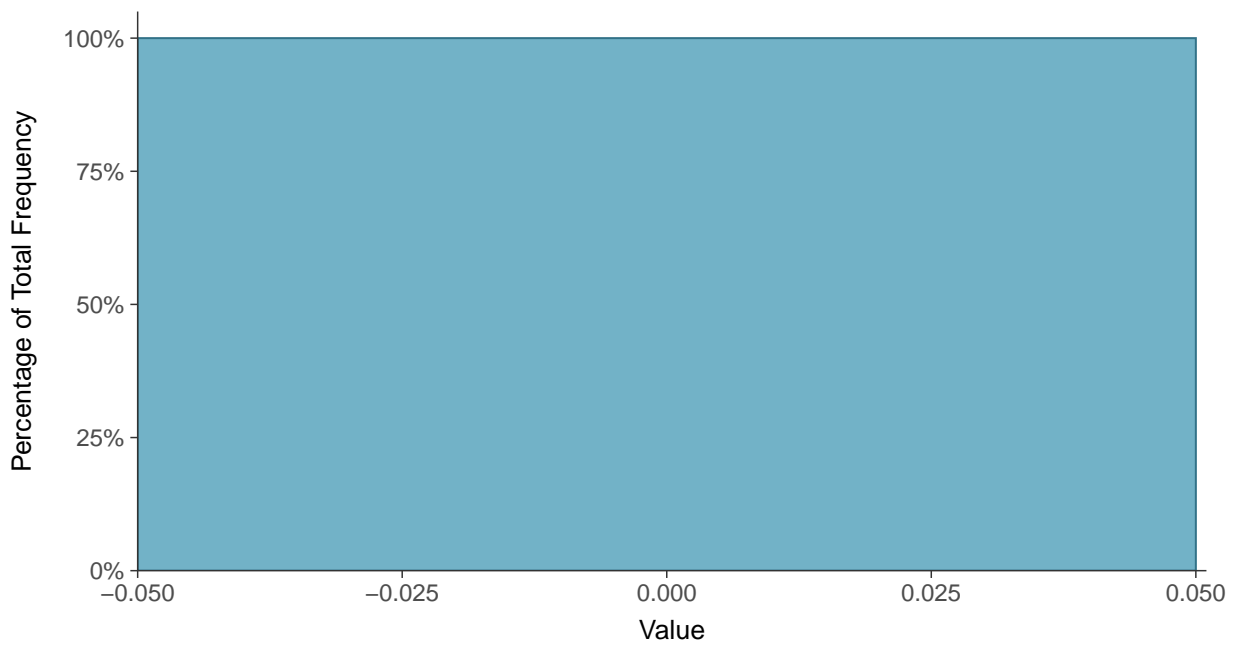
Scatter Plot

Cadmium, MW-14 (mg/L)



Histogram

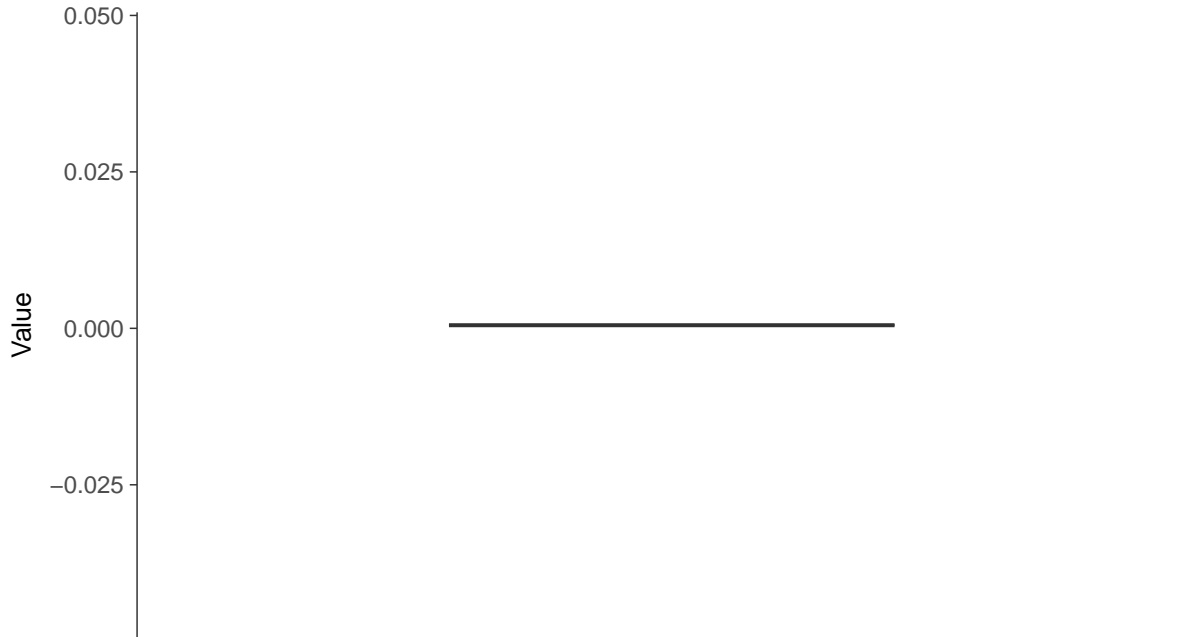
Cadmium, MW-14 (mg/L)





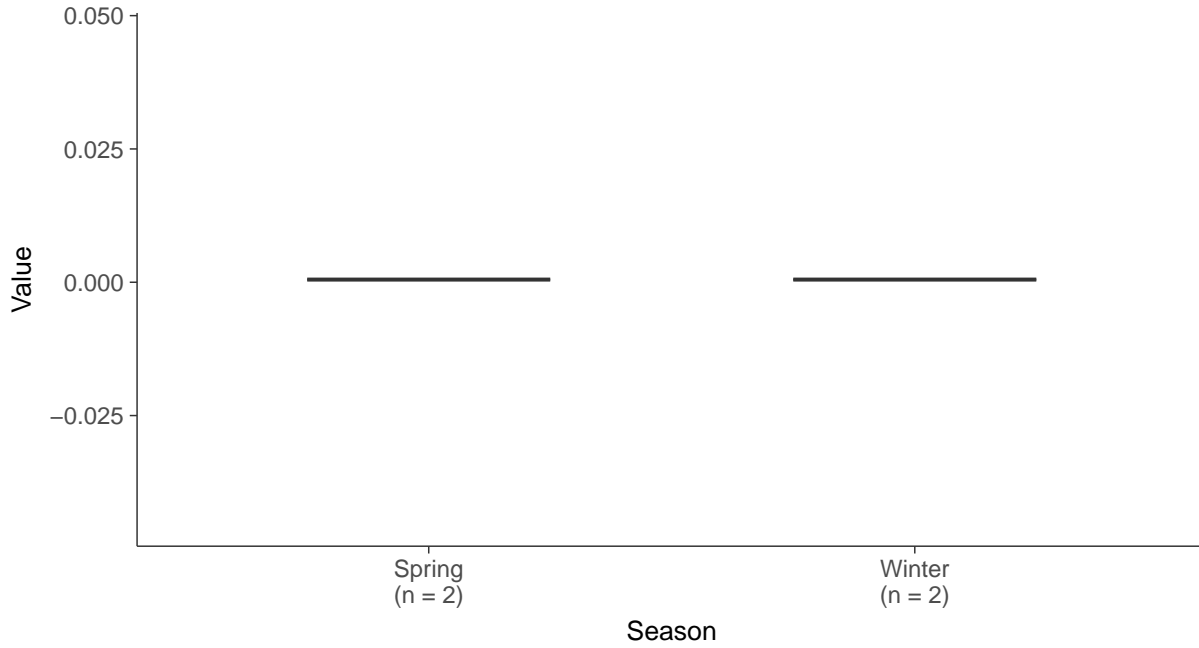
Boxplot

Cadmium, MW-14 (mg/L)



Boxplot by Season

Cadmium, MW-14 (mg/L)



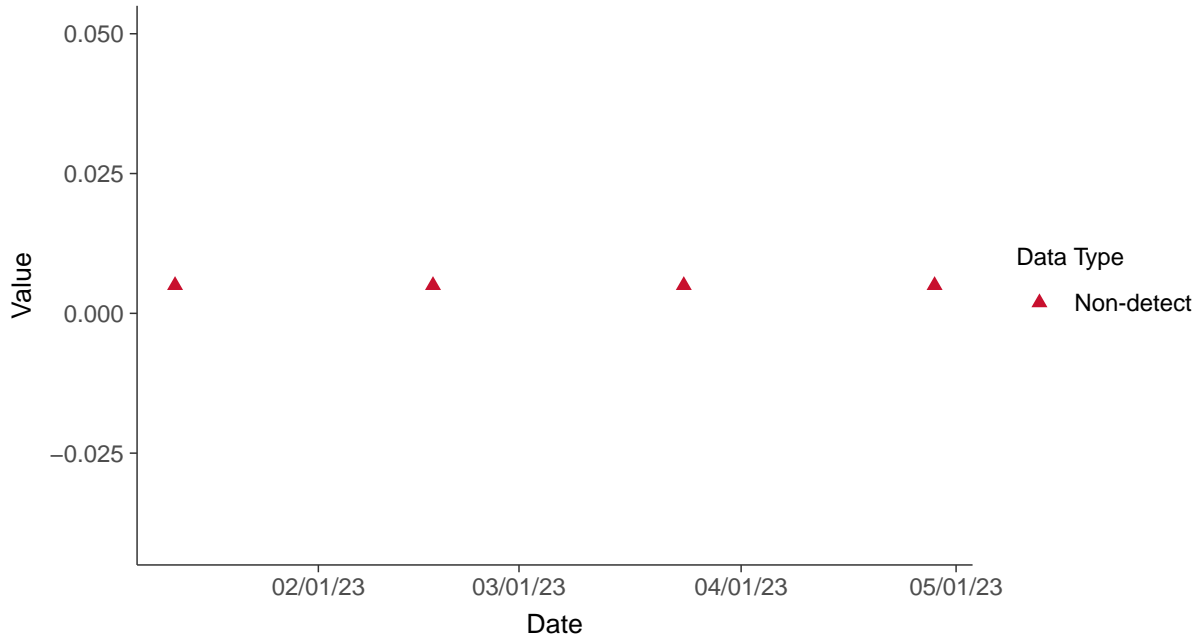


Appendix IV: Chromium, MW-14

ID: 14_2_15

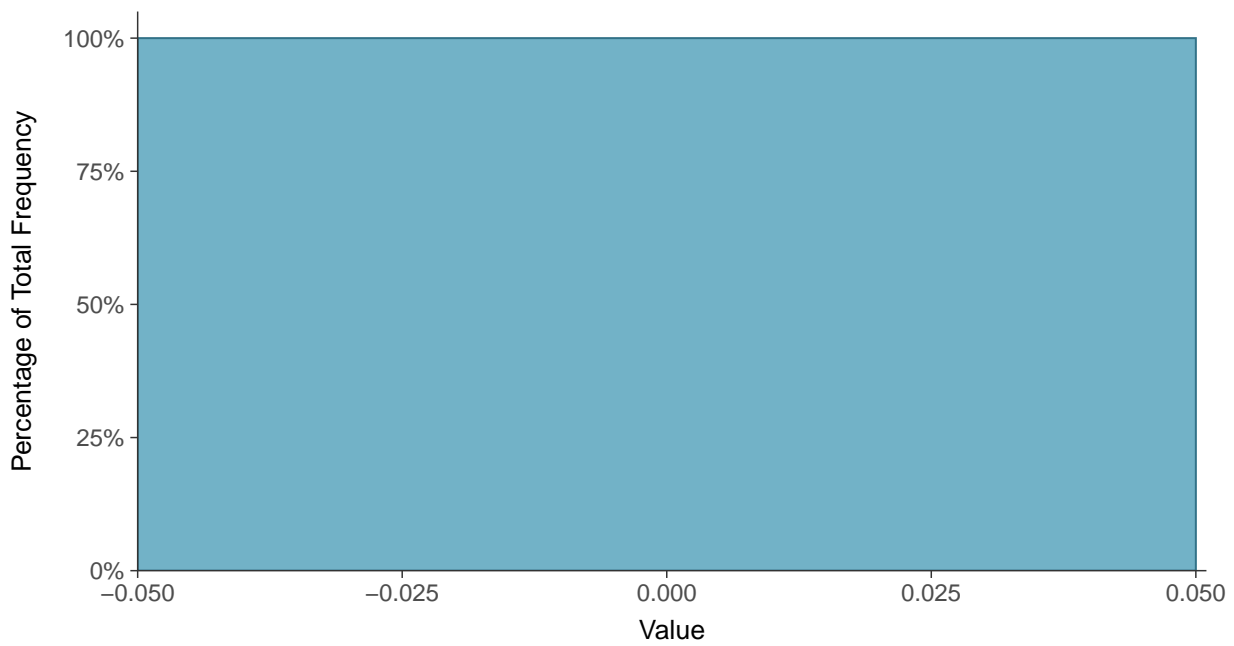
Scatter Plot

Chromium, MW-14 (mg/L)



Histogram

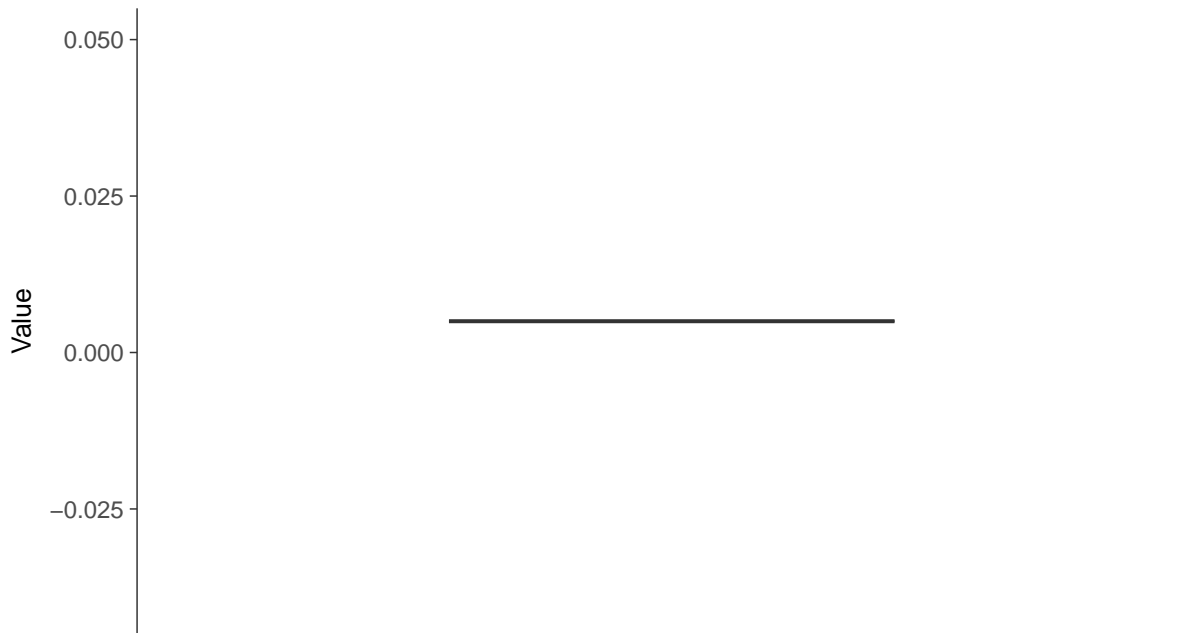
Chromium, MW-14 (mg/L)





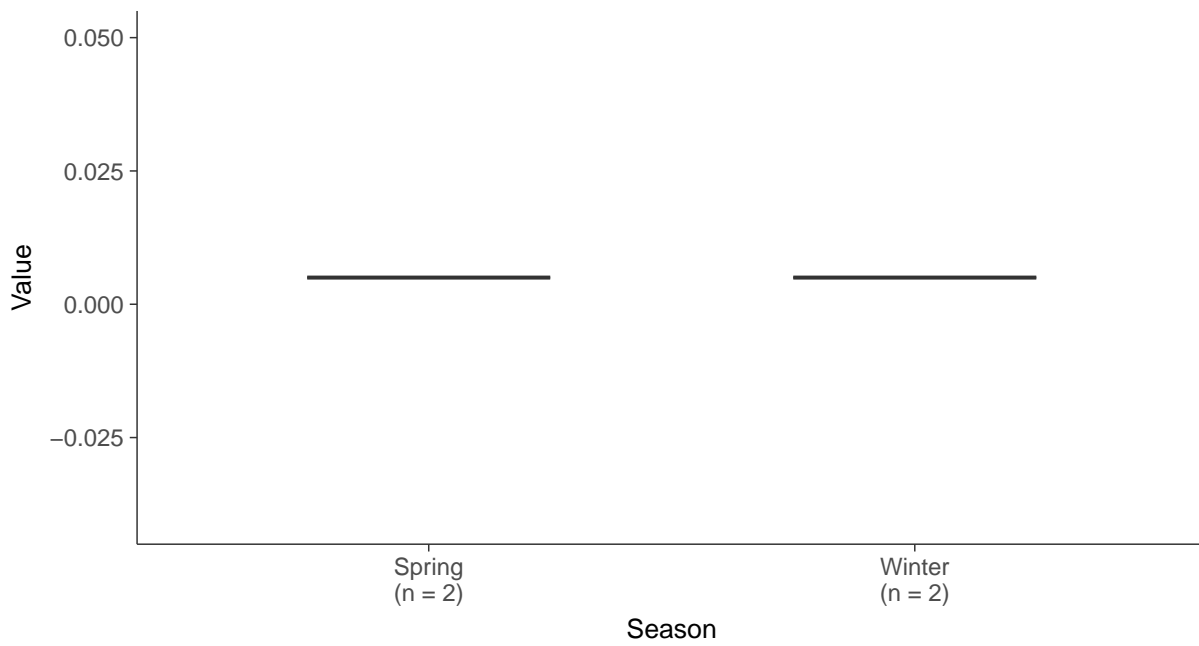
Boxplot

Chromium, MW-14 (mg/L)



Boxplot by Season

Chromium, MW-14 (mg/L)



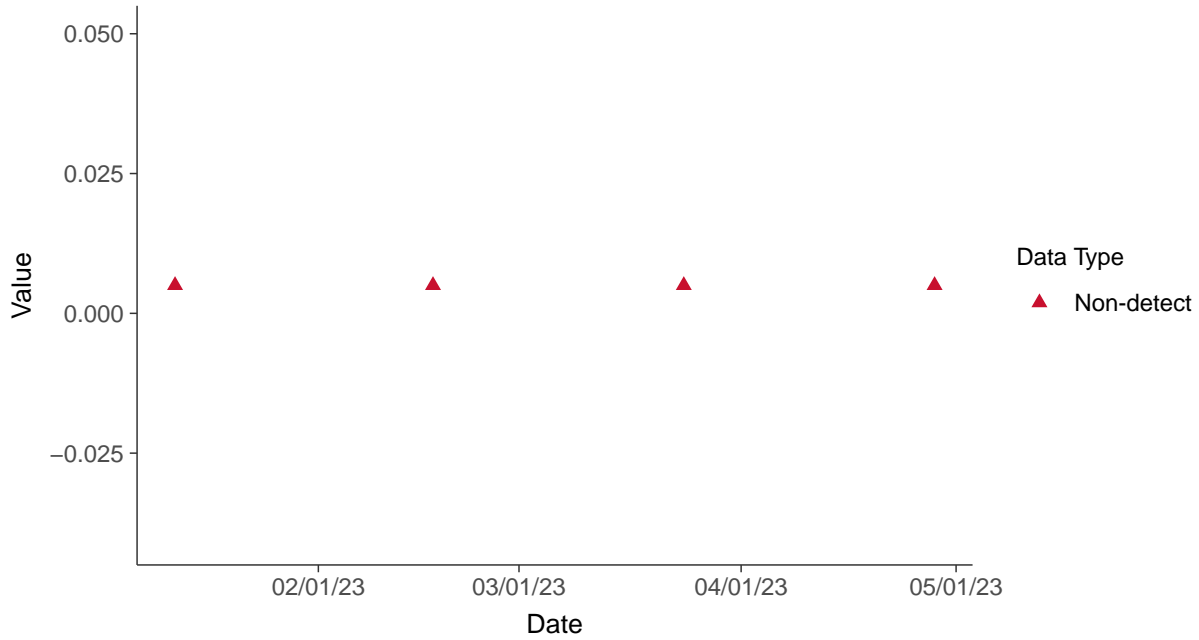


Appendix IV: Cobalt, MW-14

ID: 14_2_16

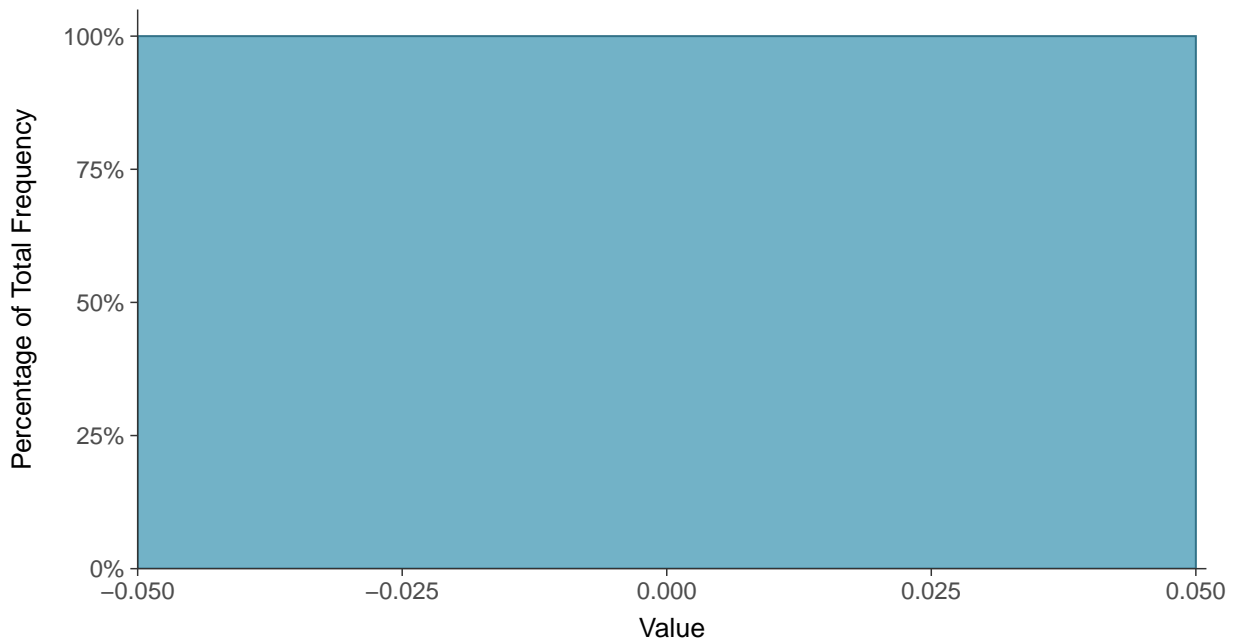
Scatter Plot

Cobalt, MW-14 (mg/L)



Histogram

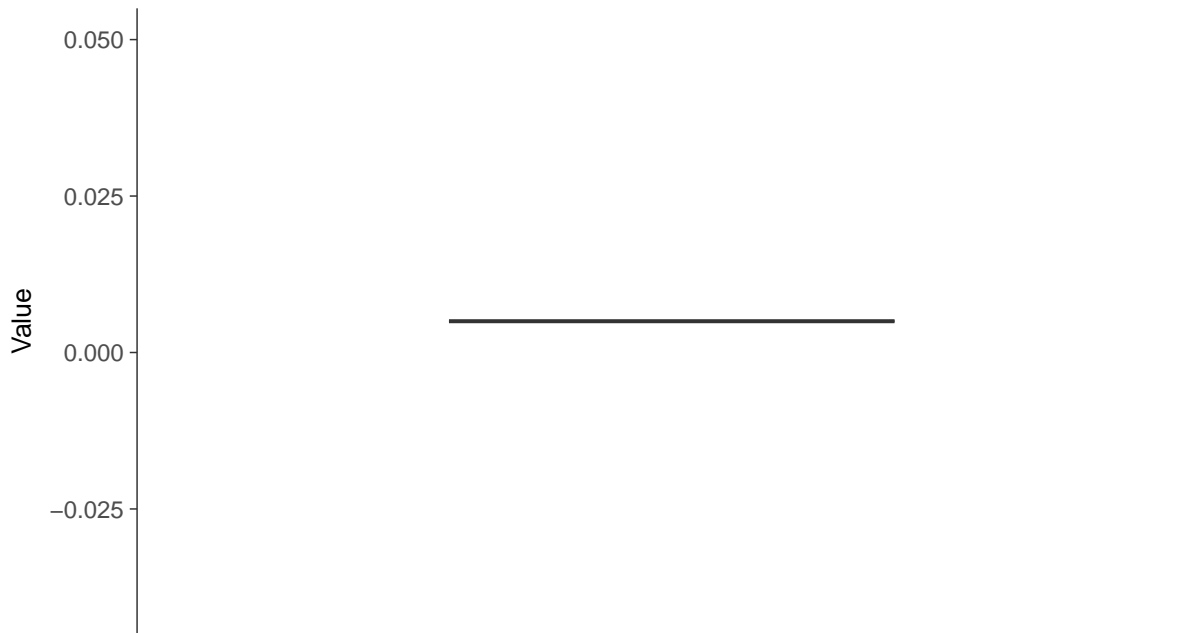
Cobalt, MW-14 (mg/L)





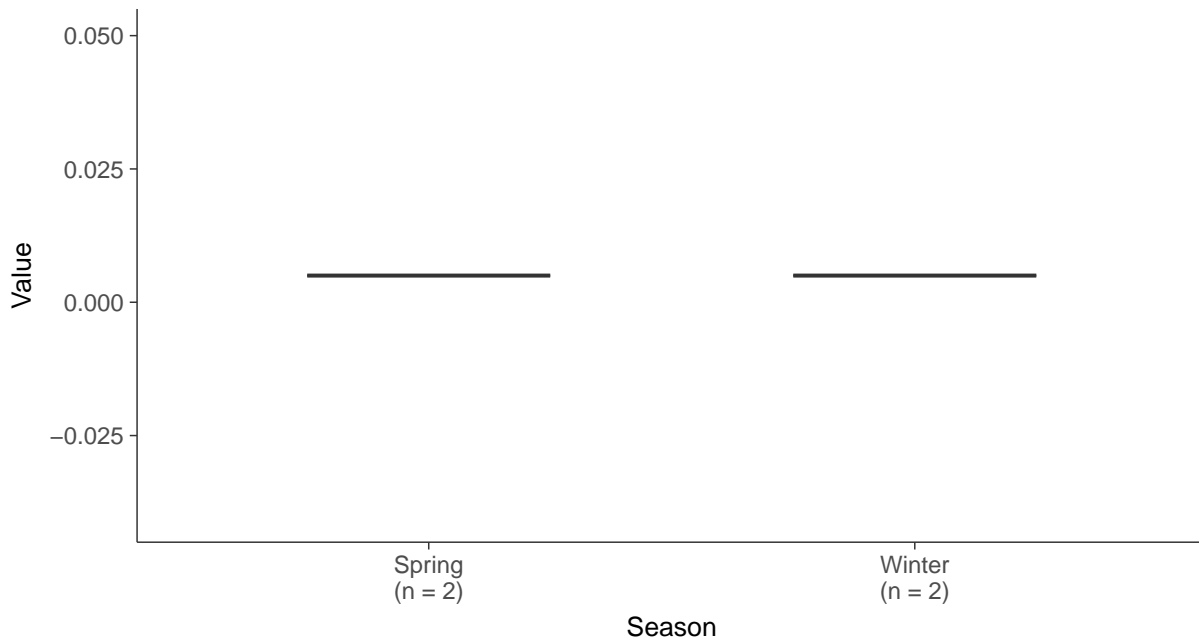
Boxplot

Cobalt, MW-14 (mg/L)



Boxplot by Season

Cobalt, MW-14 (mg/L)



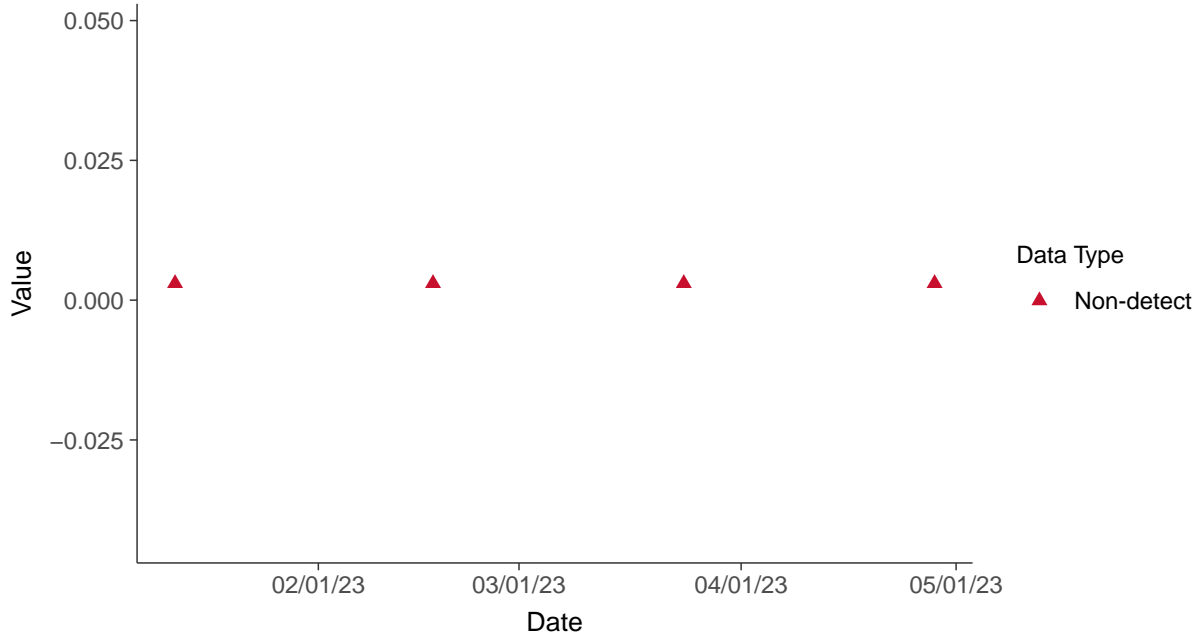


Appendix IV: Lead, MW-14

ID: 14_2_18

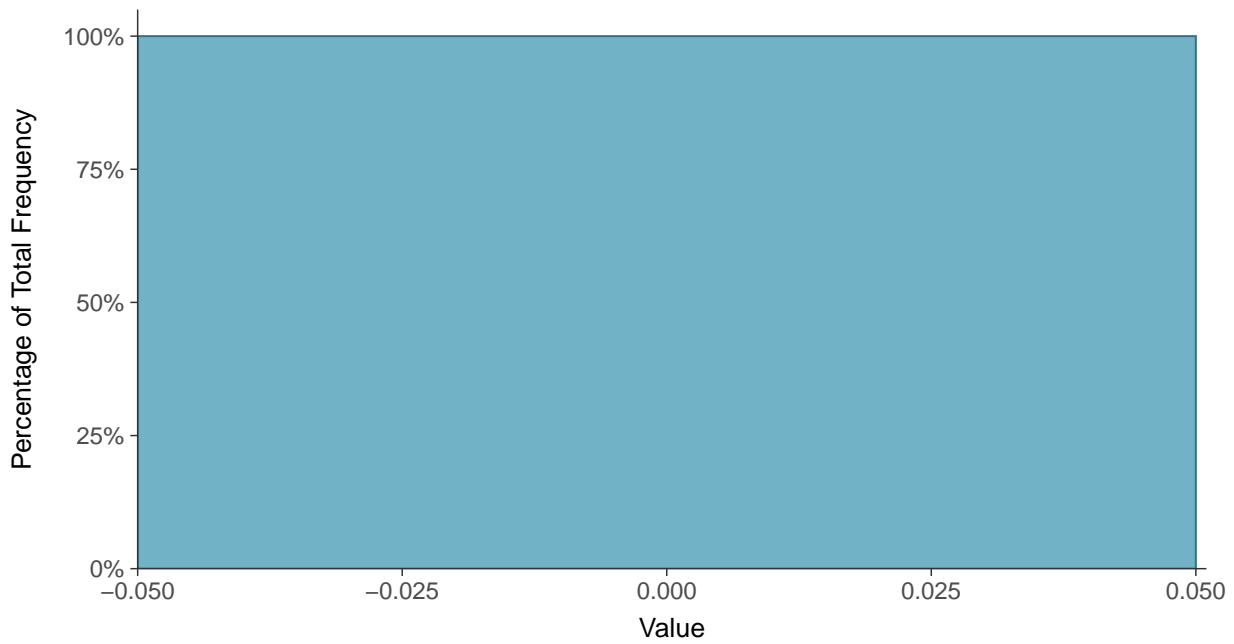
Scatter Plot

Lead, MW-14 (mg/L)



Histogram

Lead, MW-14 (mg/L)





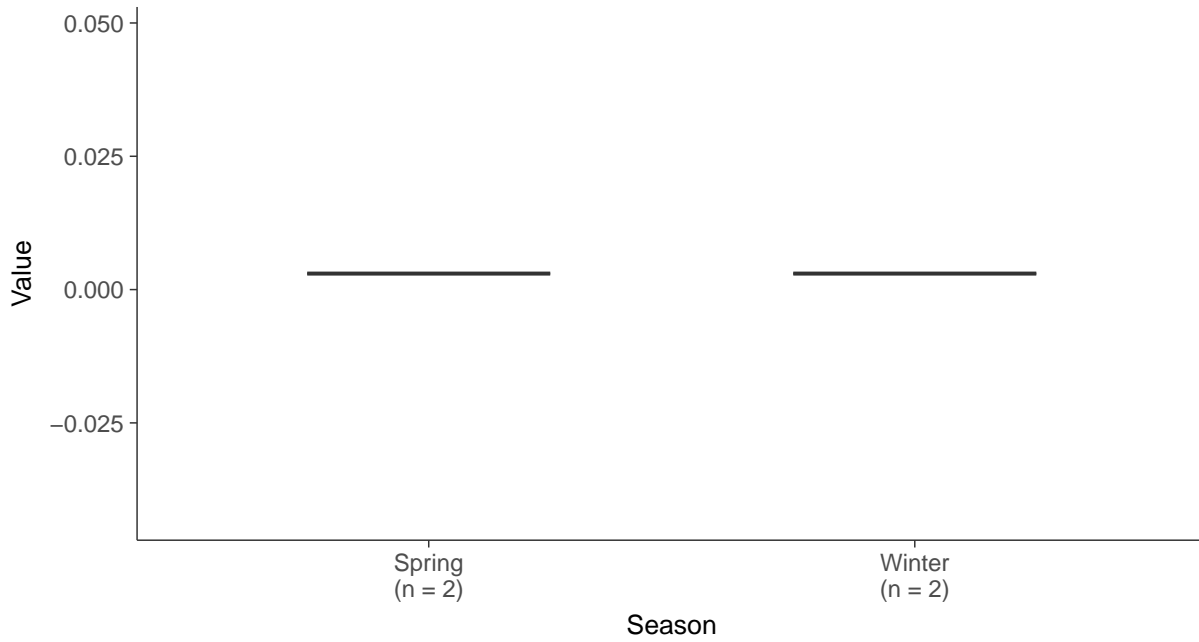
Boxplot

Lead, MW-14 (mg/L)



Boxplot by Season

Lead, MW-14 (mg/L)



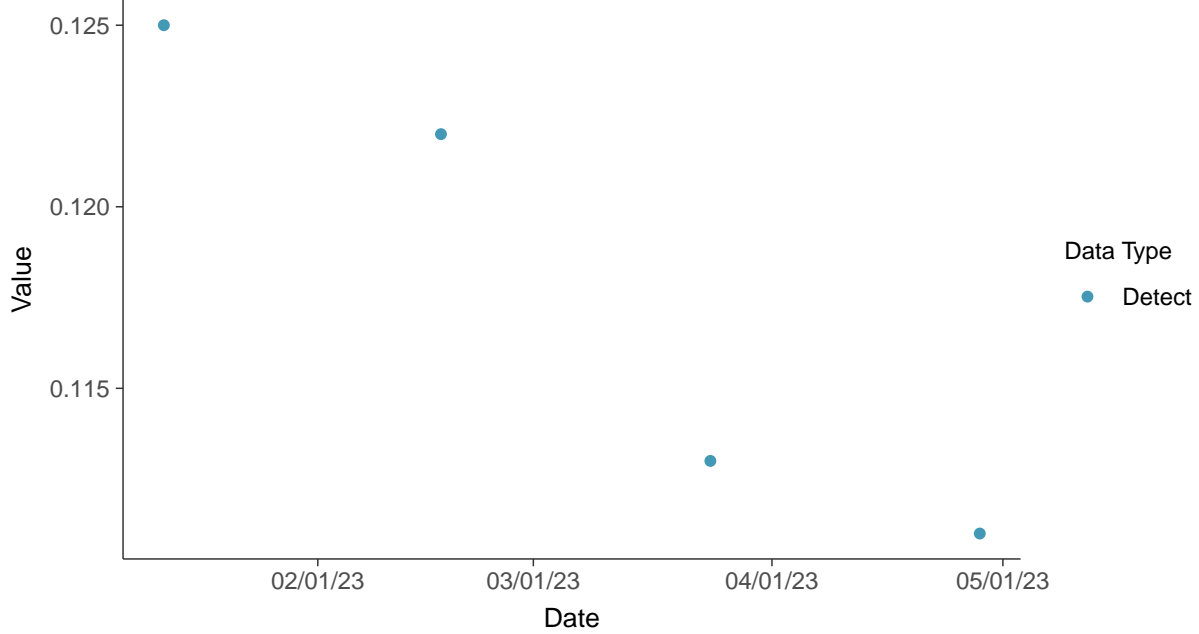


Appendix IV: Lithium, MW-14

ID: 14_2_19

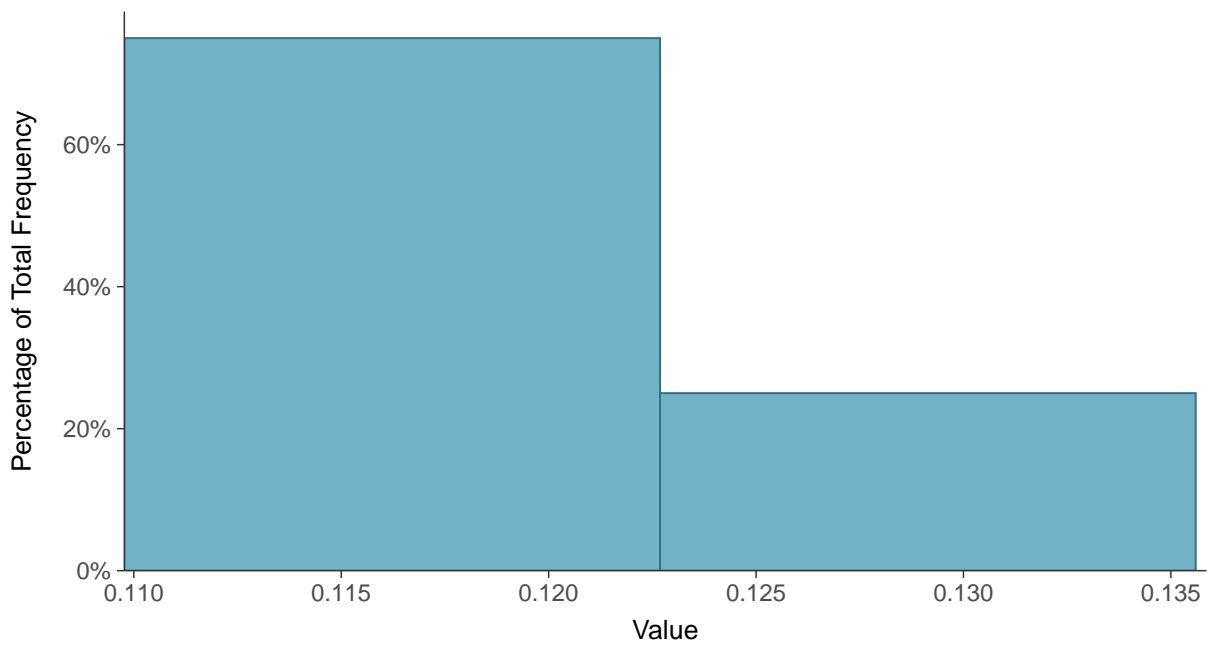
Scatter Plot

Lithium, MW-14 (mg/L)



Histogram

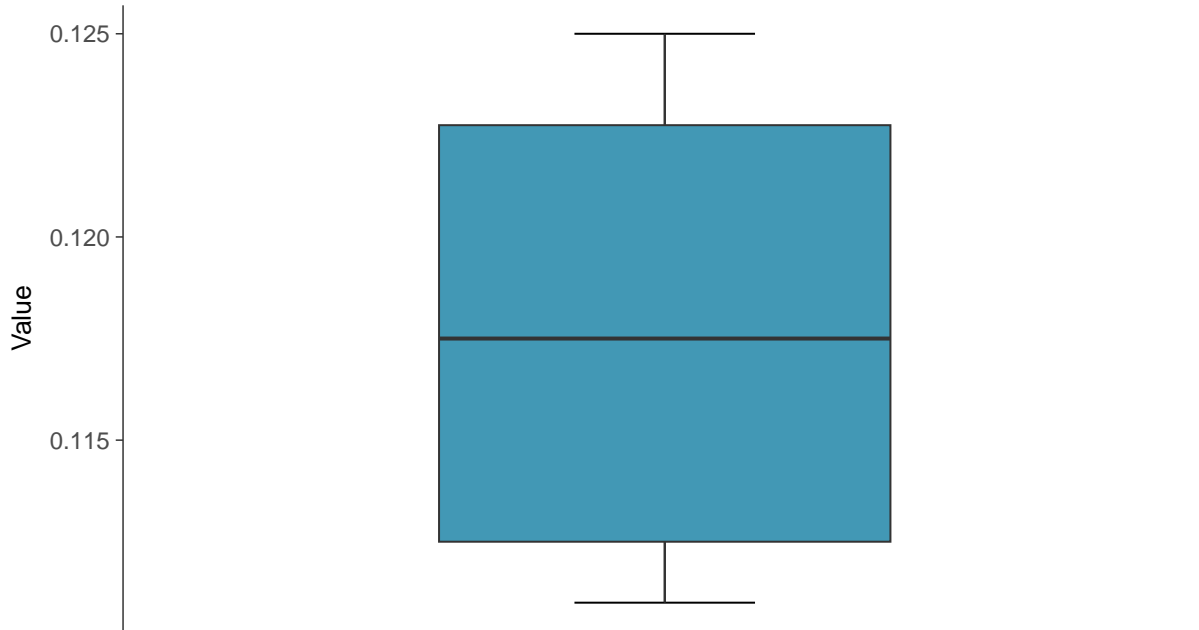
Lithium, MW-14 (mg/L)





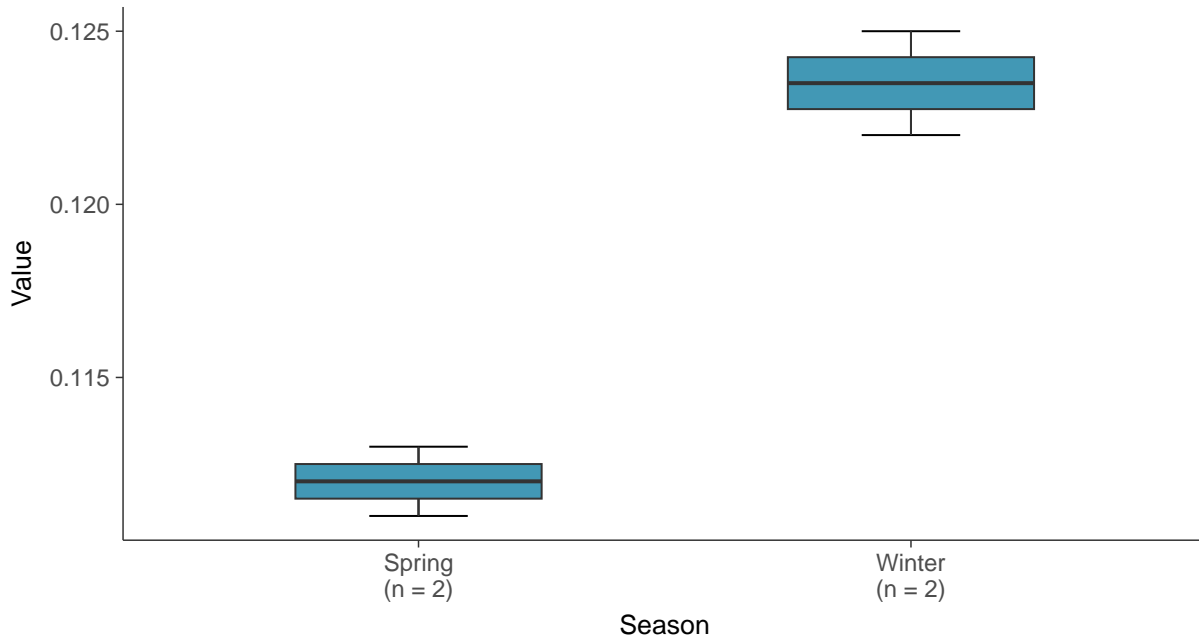
Boxplot

Lithium, MW-14 (mg/L)



Boxplot by Season

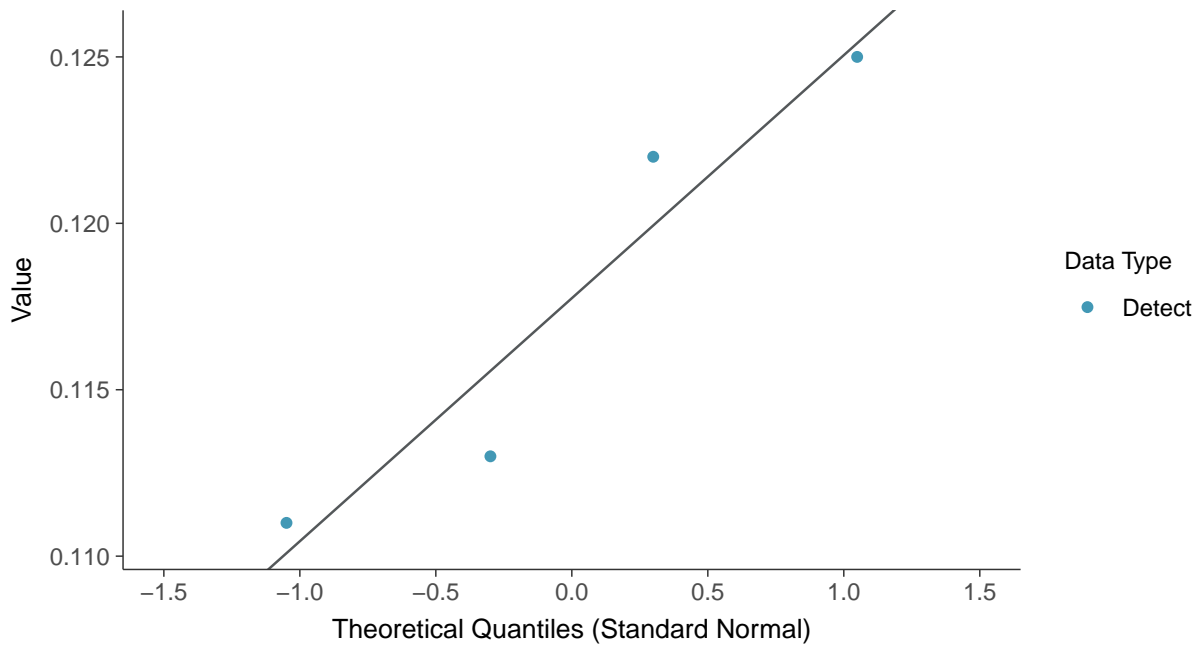
Lithium, MW-14 (mg/L)





Normal Q-Q plot

Lithium, MW-14 (mg/L)



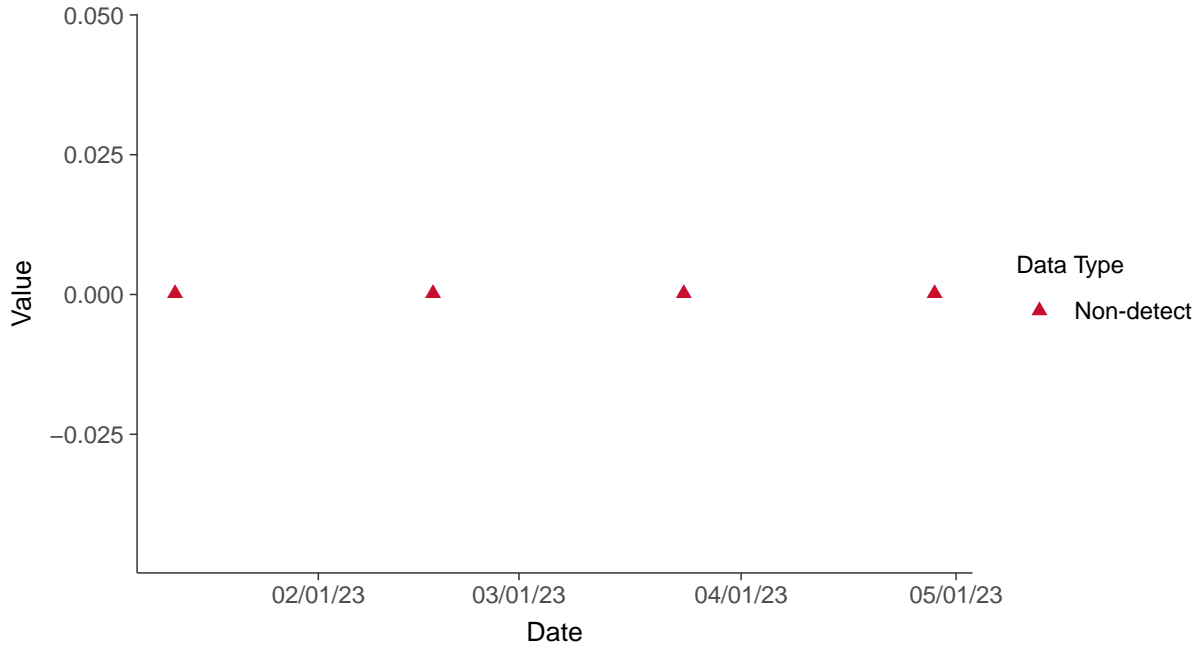


Appendix IV: Mercury, MW-14

ID: 14_2_21

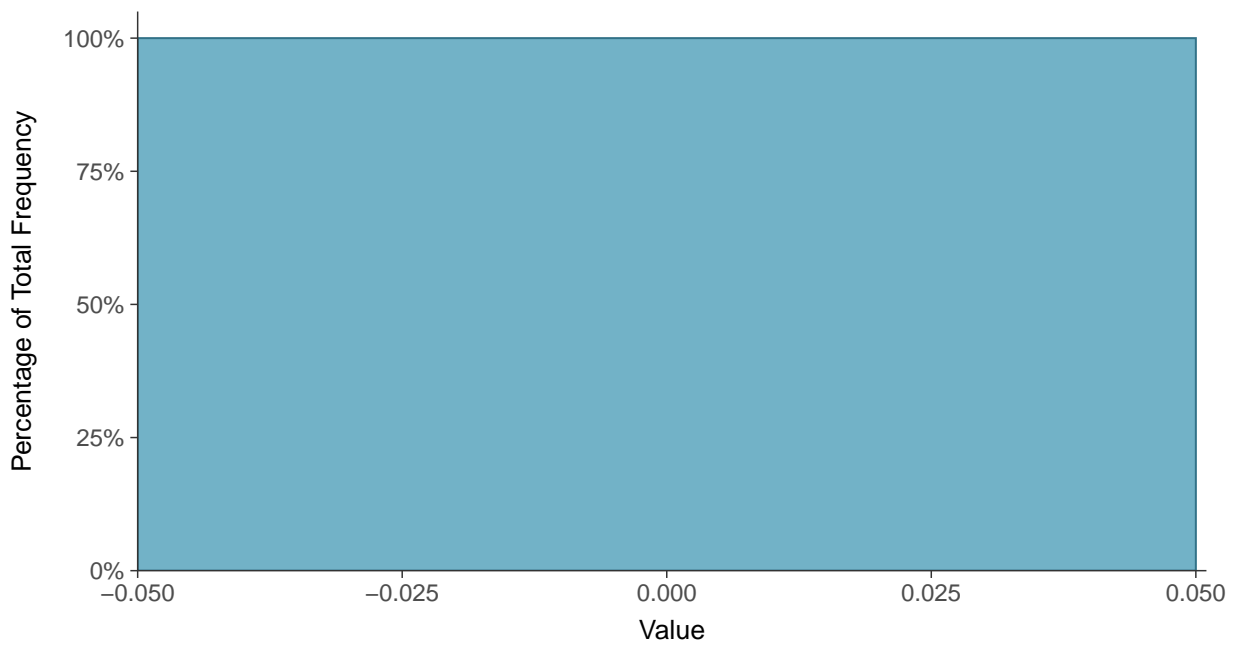
Scatter Plot

Mercury, MW-14 (mg/L)



Histogram

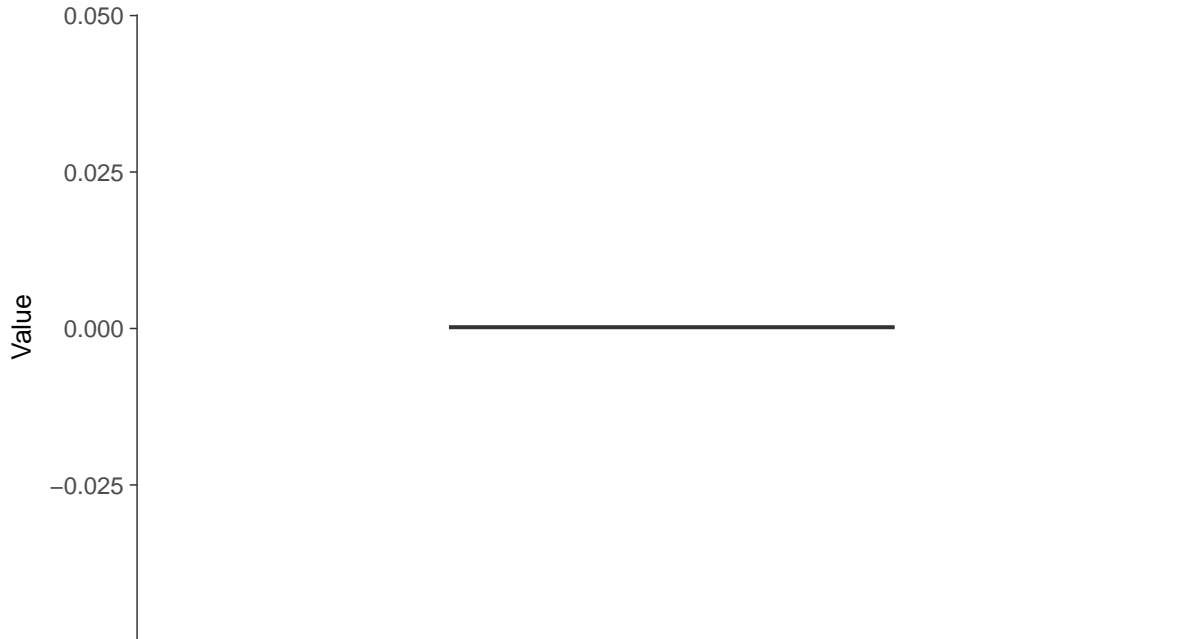
Mercury, MW-14 (mg/L)





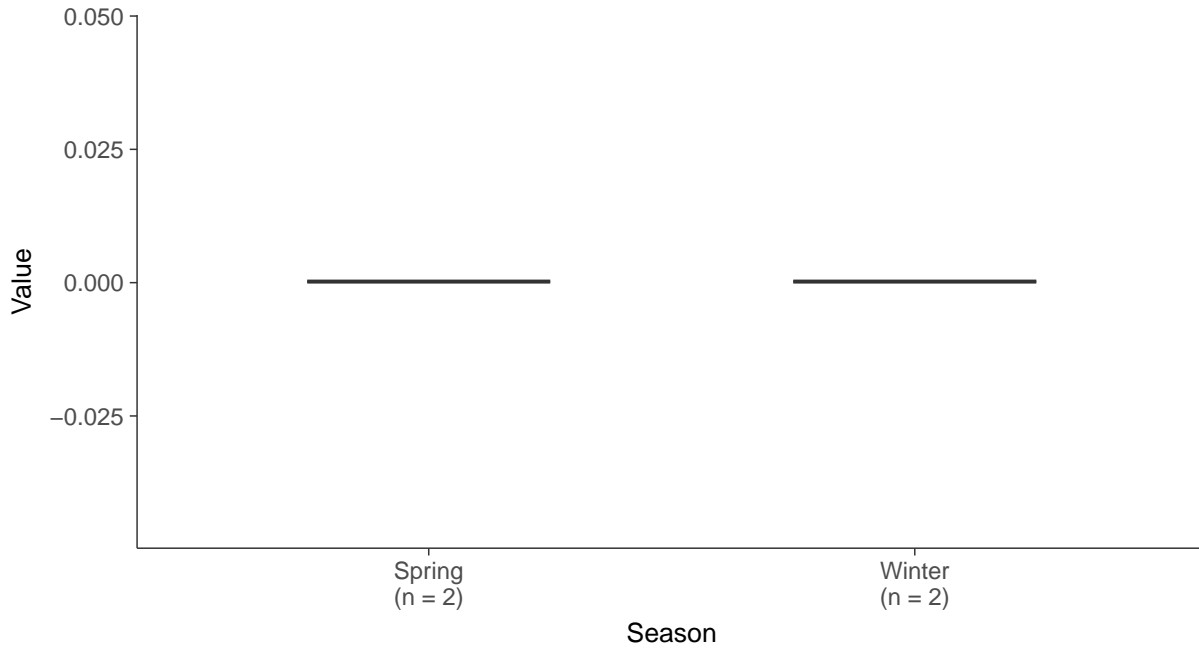
Boxplot

Mercury, MW-14 (mg/L)



Boxplot by Season

Mercury, MW-14 (mg/L)



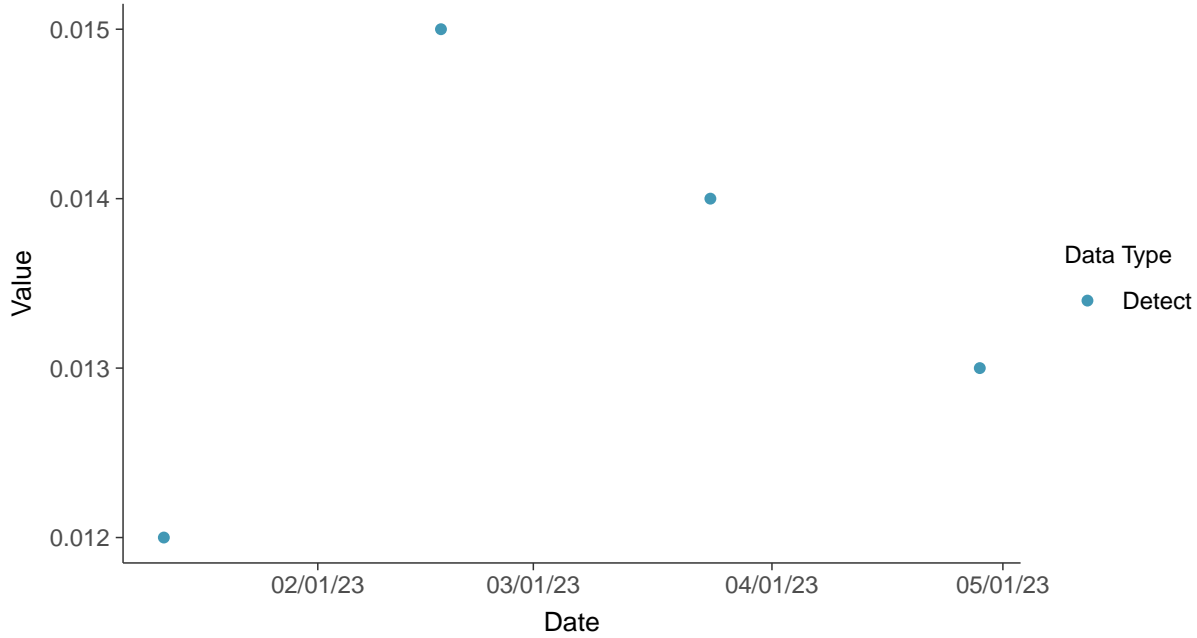


Appendix IV: Molybdenum, MW-14

ID: 14_2_22

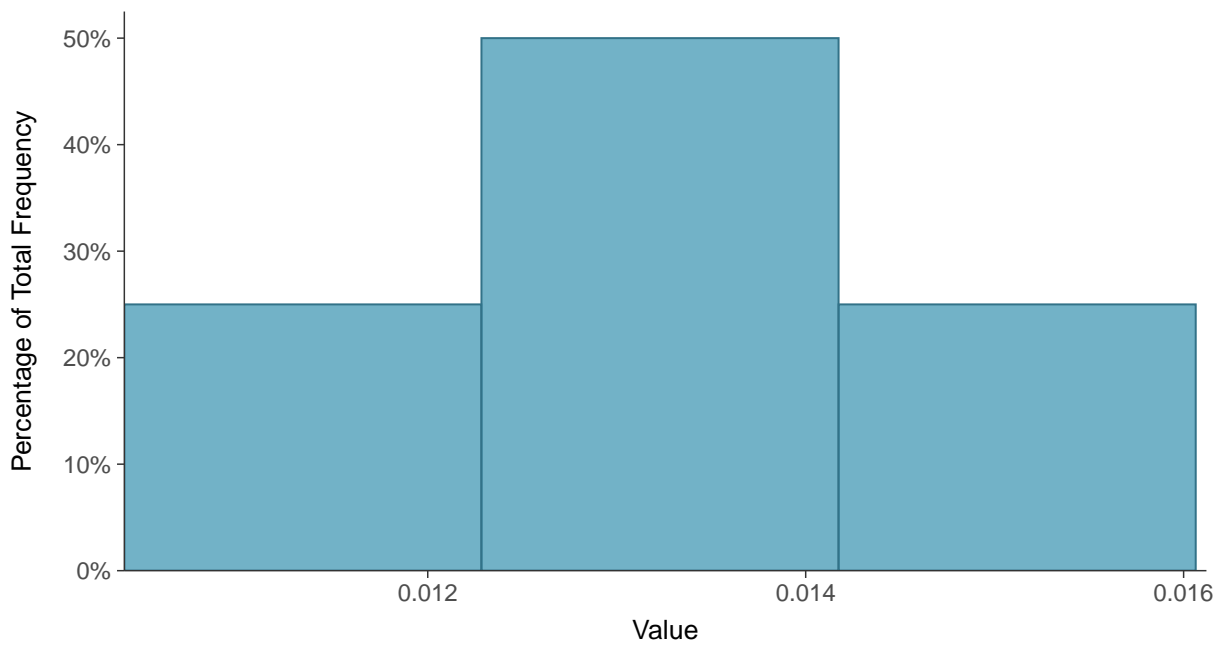
Scatter Plot

Molybdenum, MW-14 (mg/L)



Histogram

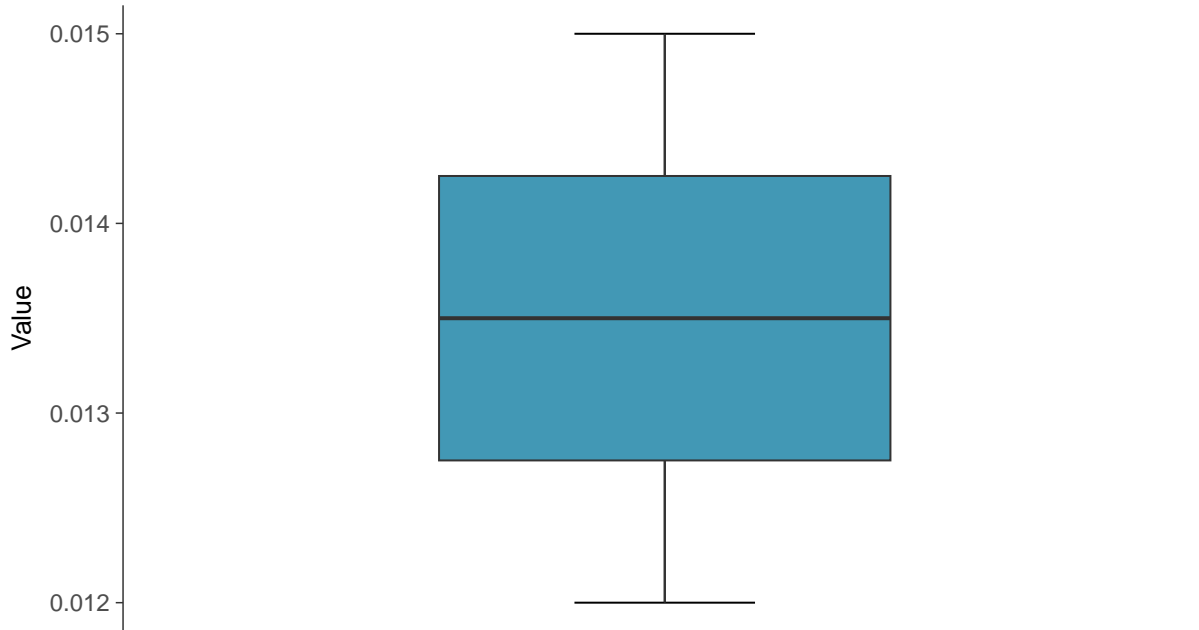
Molybdenum, MW-14 (mg/L)





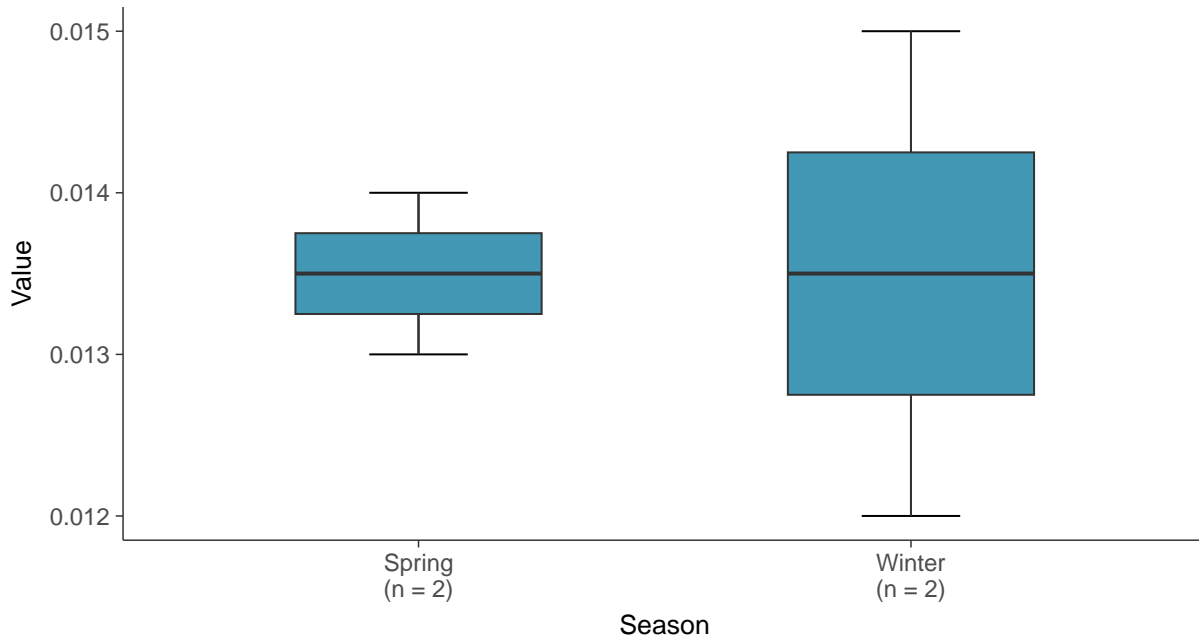
Boxplot

Molybdenum, MW-14 (mg/L)



Boxplot by Season

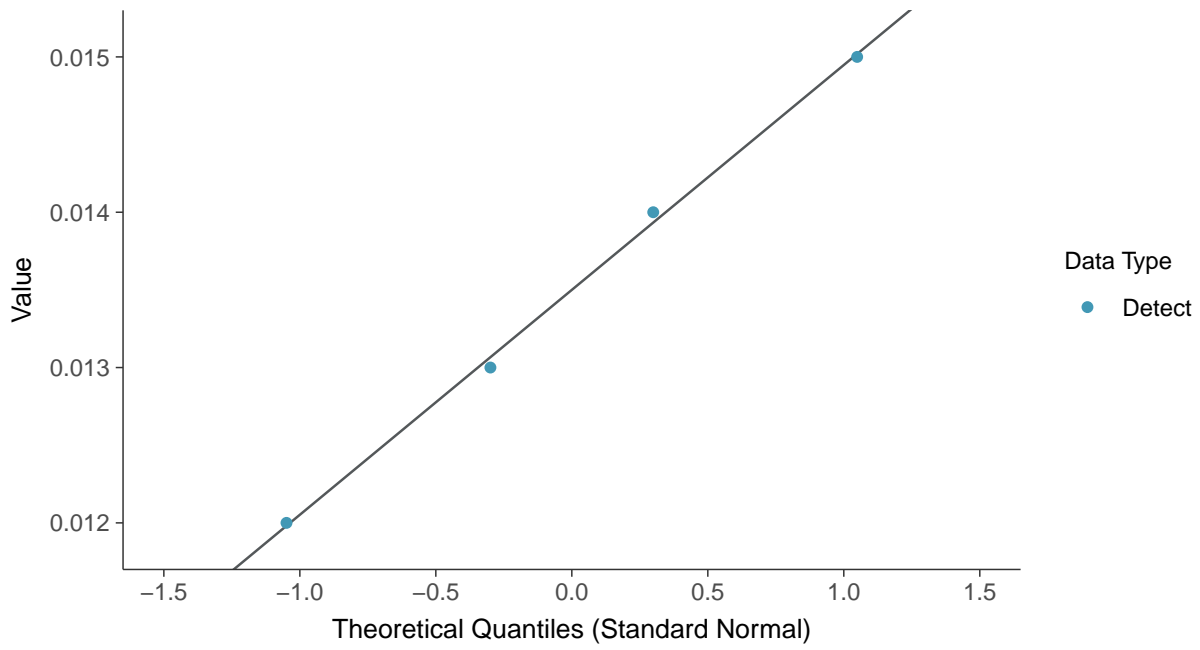
Molybdenum, MW-14 (mg/L)





Normal Q-Q plot

Molybdenum, MW-14 (mg/L)



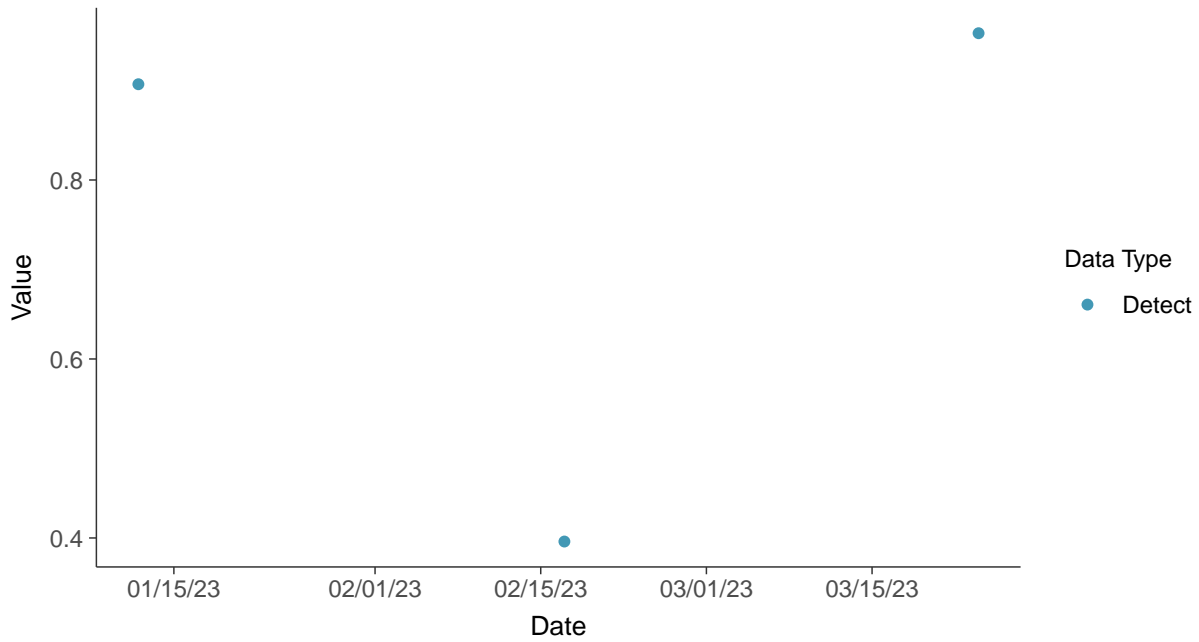


Appendix IV: Radium-226, MW-14

ID: 14_2_24

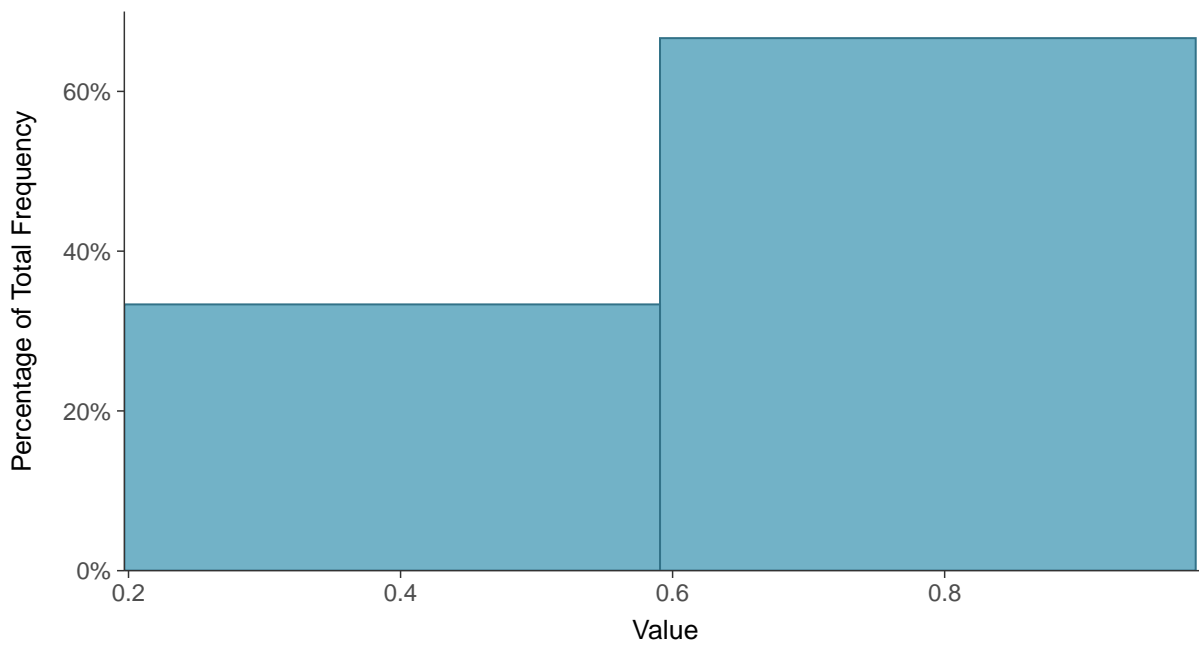
Scatter Plot

Radium-226, MW-14 (pCi/L)



Histogram

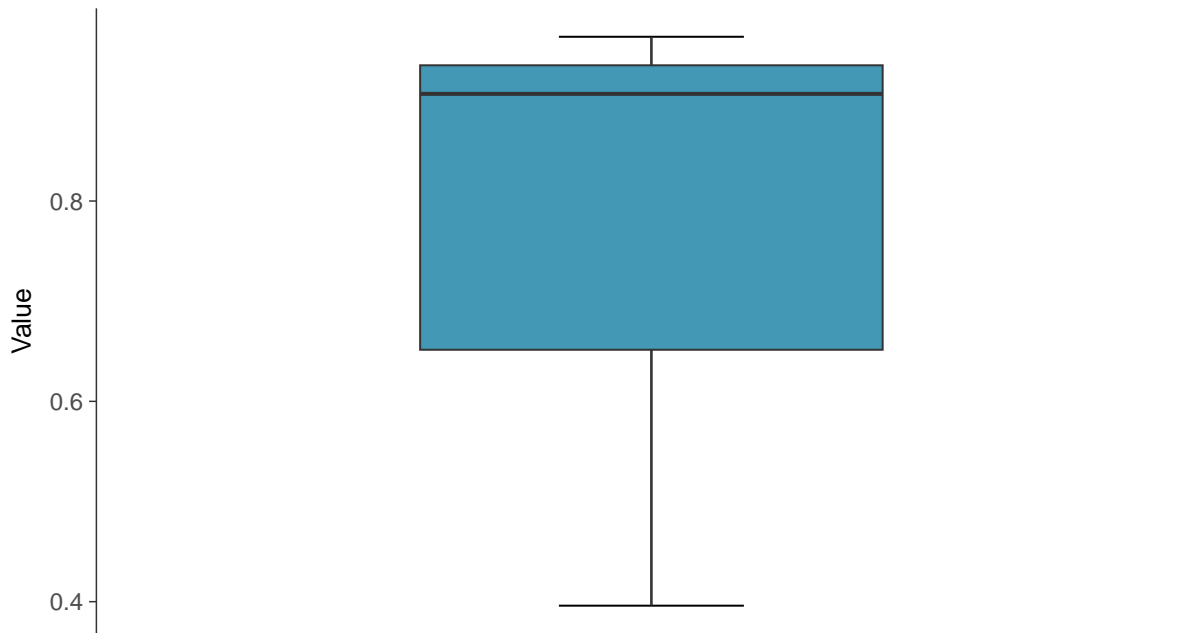
Radium-226, MW-14 (pCi/L)





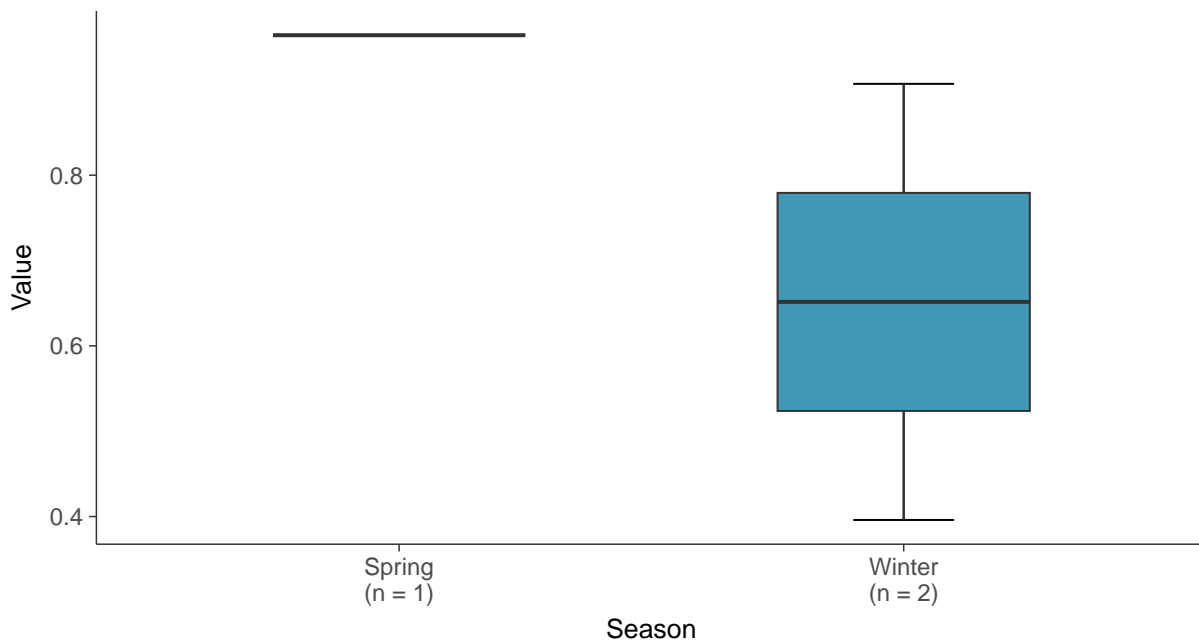
Boxplot

Radium-226, MW-14 (pCi/L)



Boxplot by Season

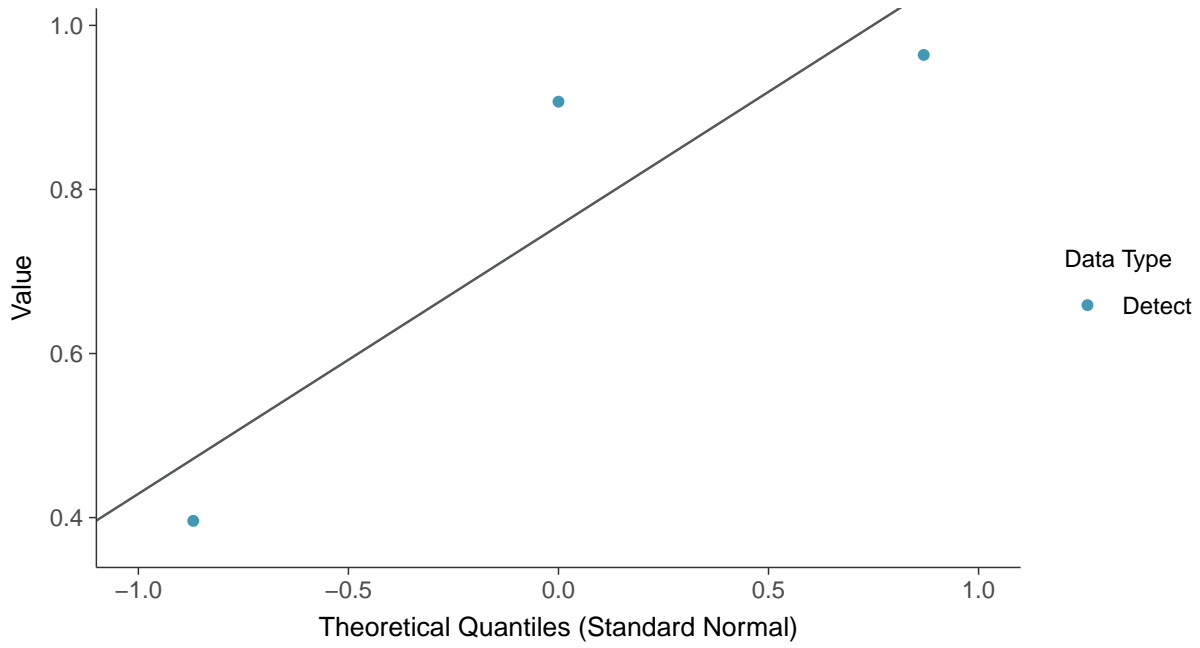
Radium-226, MW-14 (pCi/L)





Normal Q-Q plot

Radium-226, MW-14 (pCi/L)



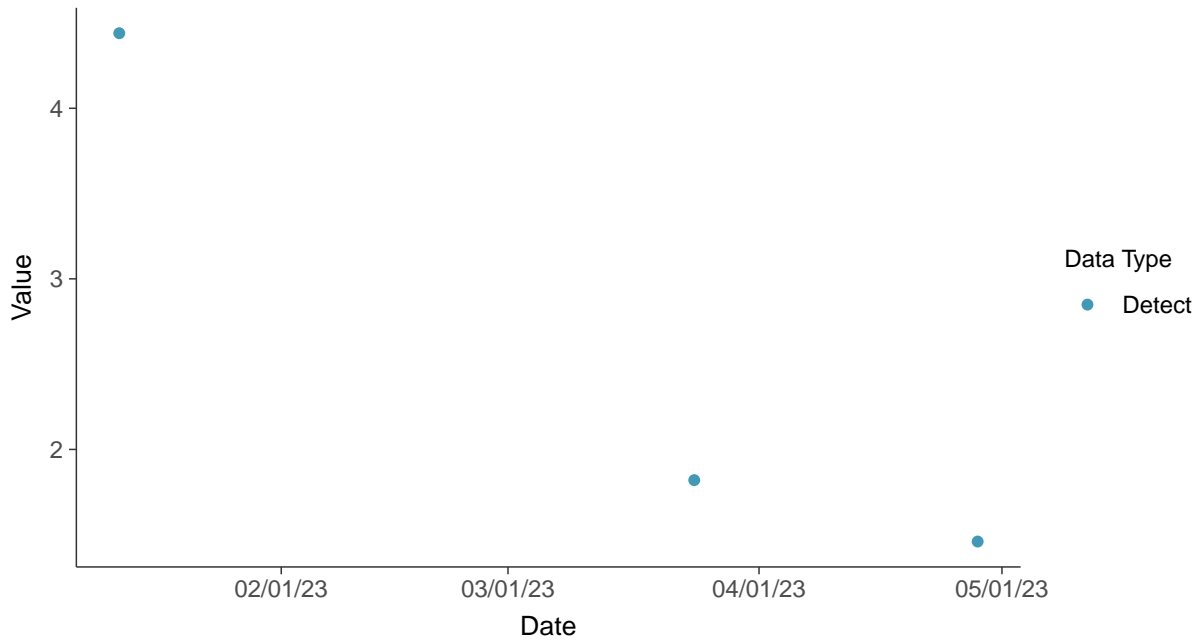


Appendix IV: Radium-226/228, MW-14

ID: 14_2_25

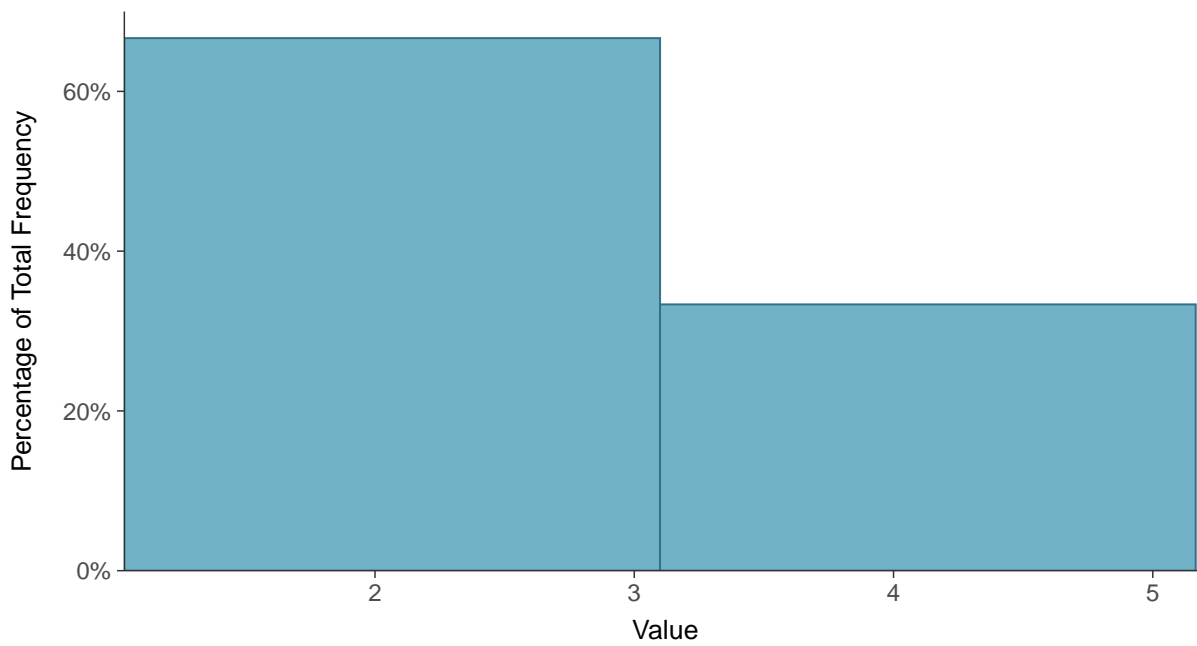
Scatter Plot

Radium-226/228, MW-14 (pCi/L)



Histogram

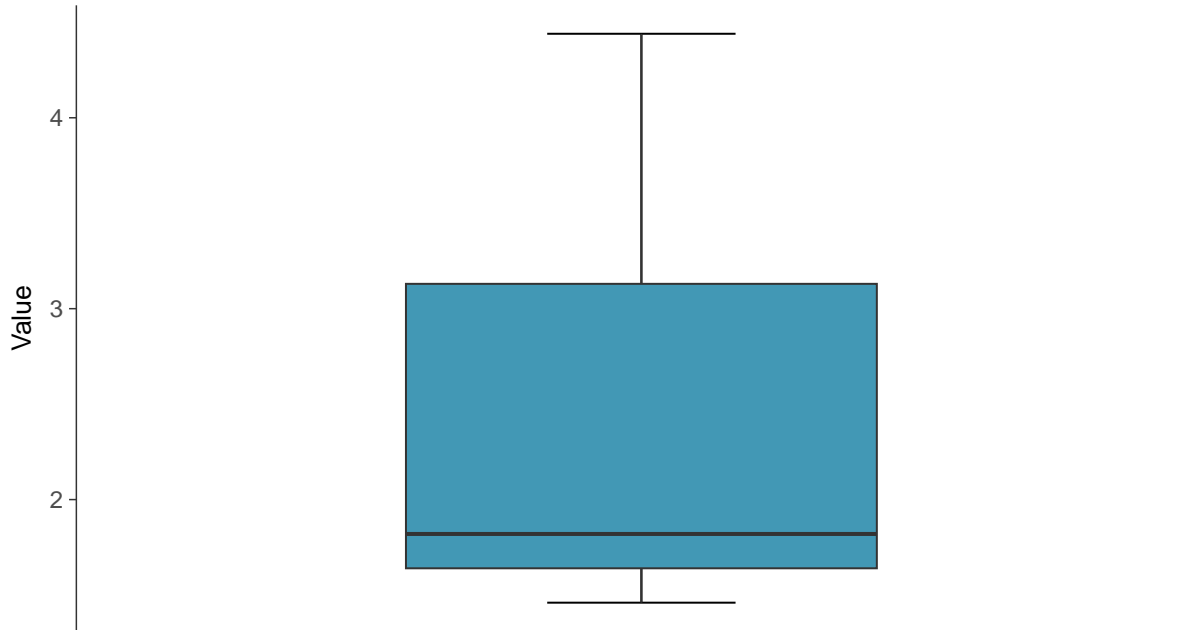
Radium-226/228, MW-14 (pCi/L)





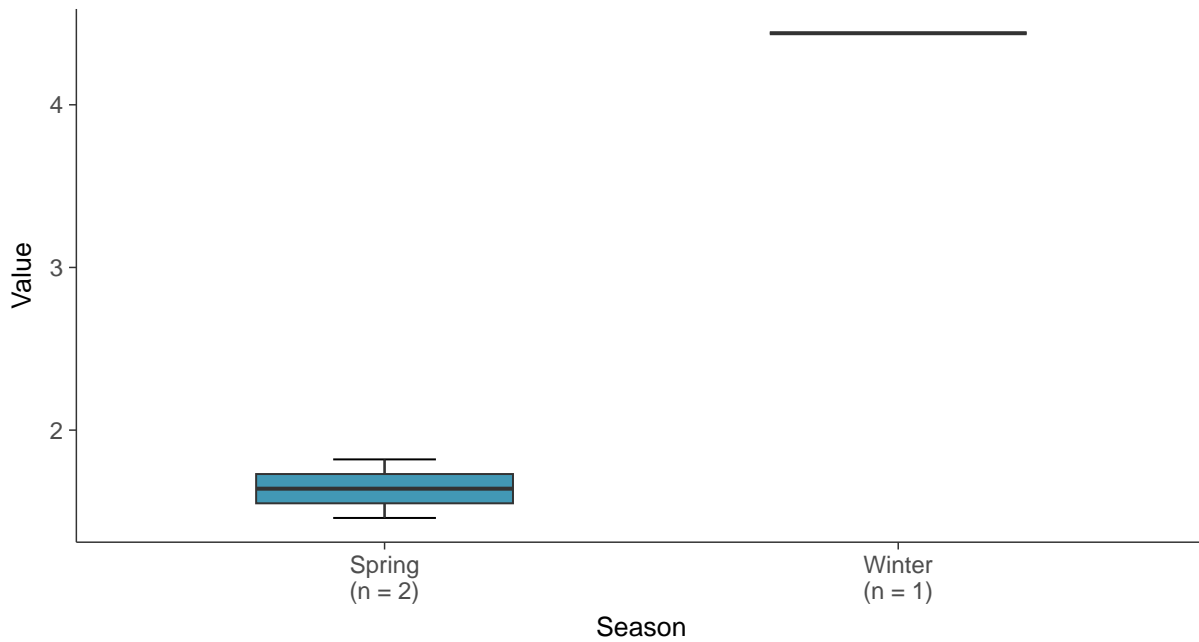
Boxplot

Radium-226/228, MW-14 (pCi/L)



Boxplot by Season

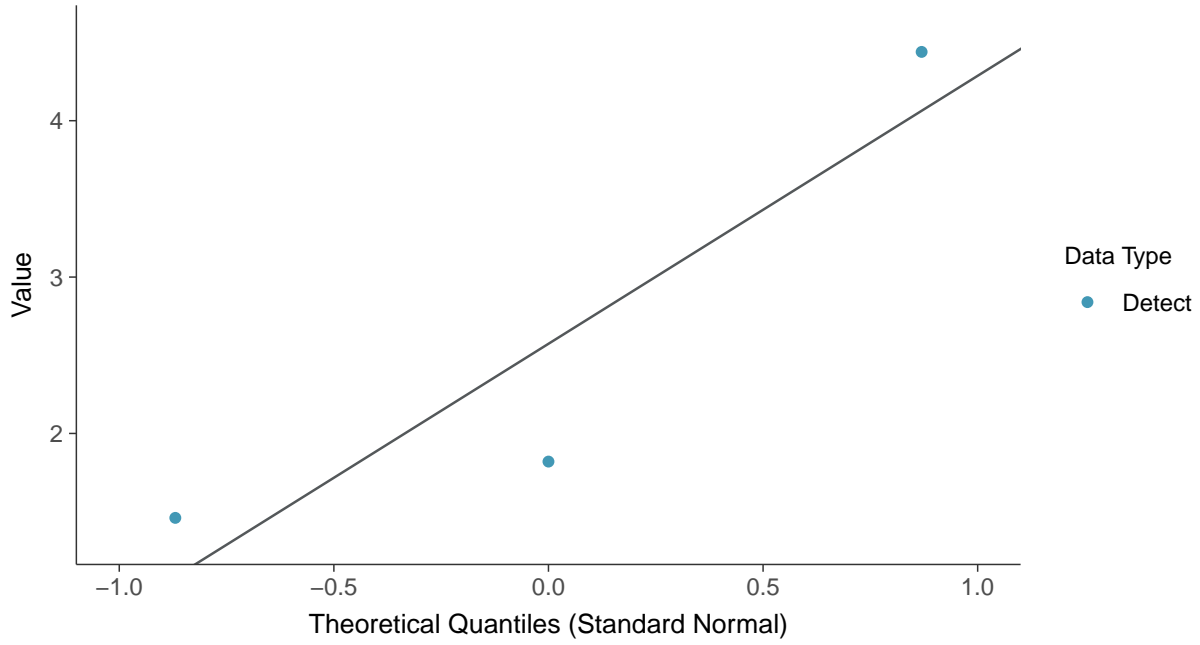
Radium-226/228, MW-14 (pCi/L)





Normal Q-Q plot

Radium-226/228, MW-14 (pCi/L)



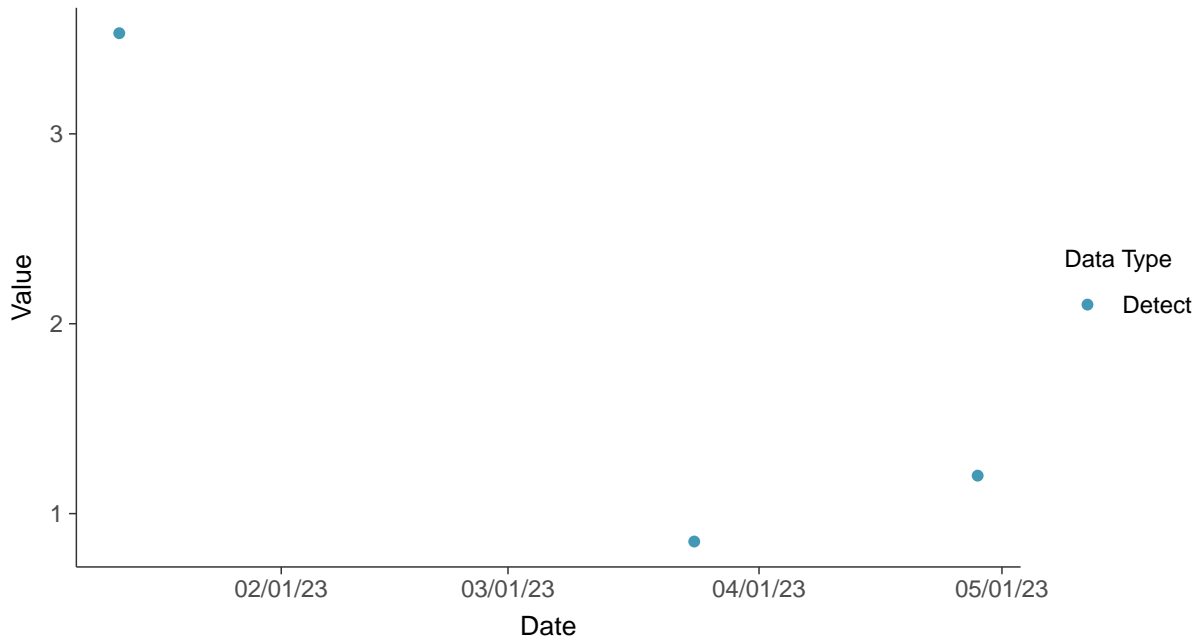


Appendix IV: Radium-228, MW-14

ID: 14_2_26

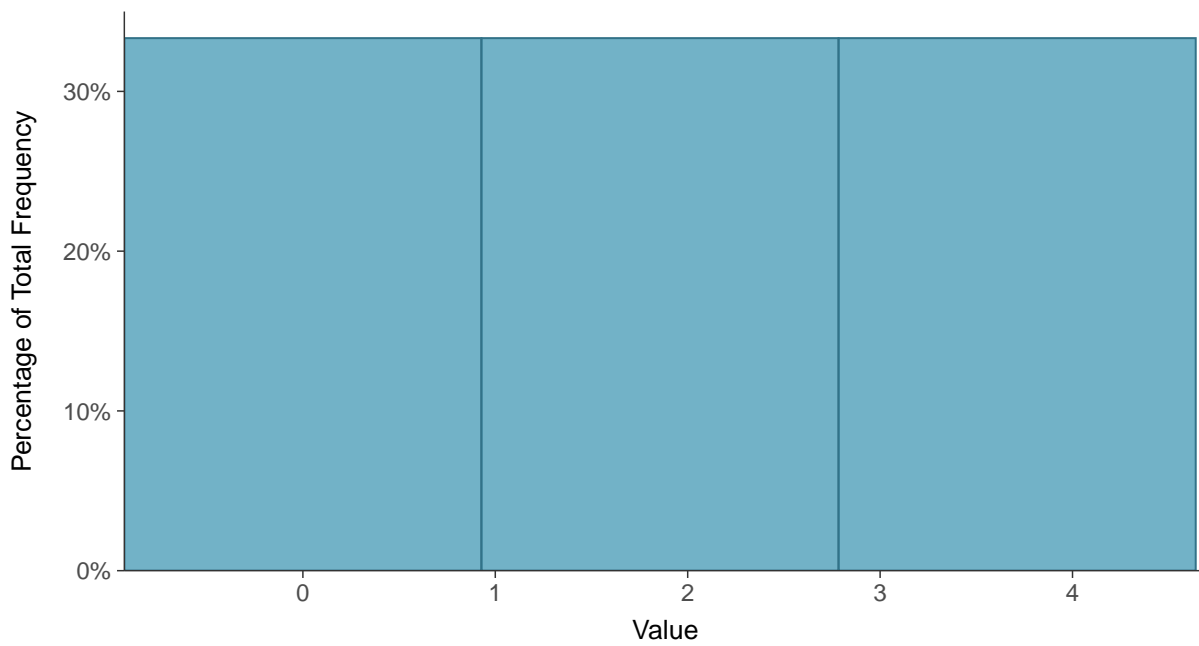
Scatter Plot

Radium-228, MW-14 (pCi/L)



Histogram

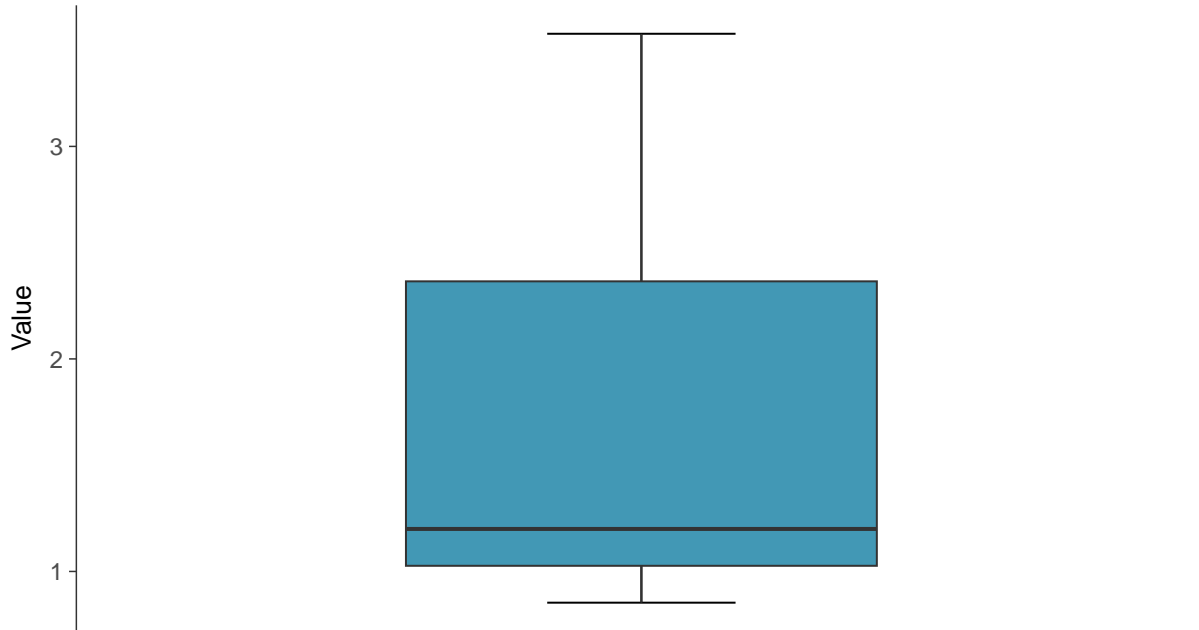
Radium-228, MW-14 (pCi/L)





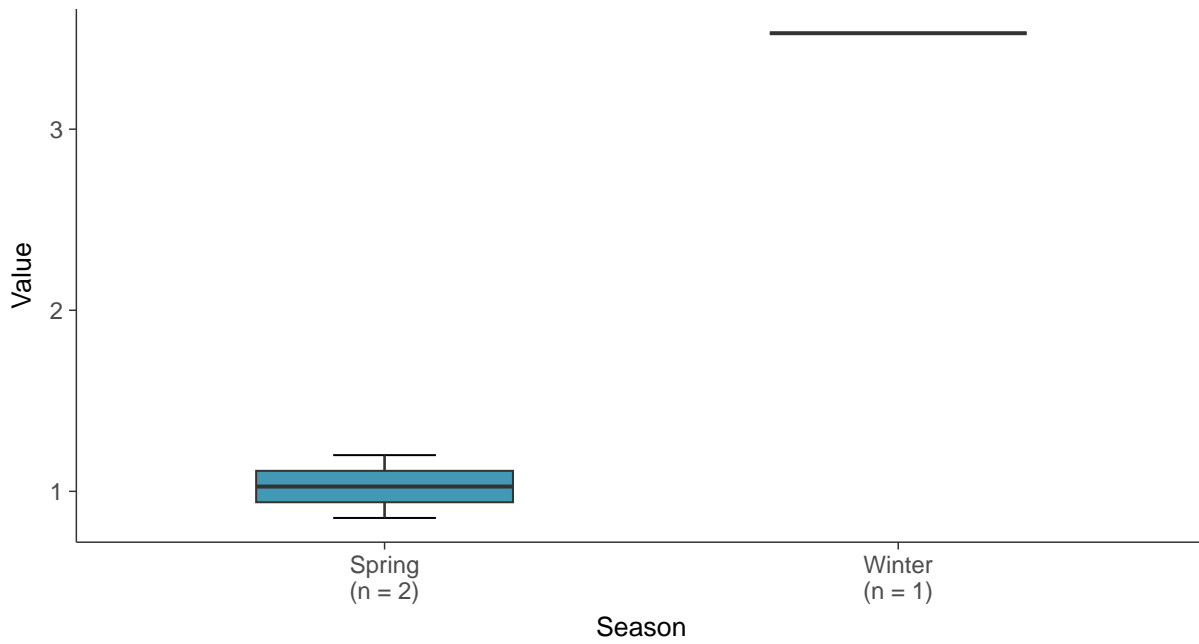
Boxplot

Radium-228, MW-14 (pCi/L)



Boxplot by Season

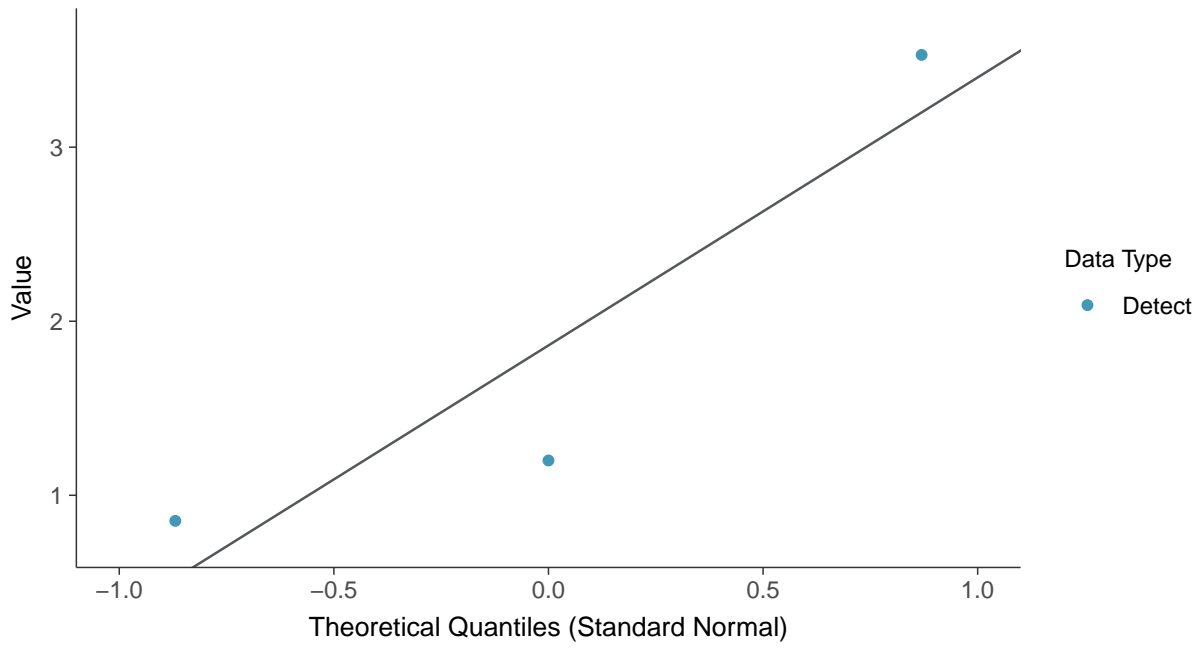
Radium-228, MW-14 (pCi/L)





Normal Q-Q plot

Radium-228, MW-14 (pCi/L)



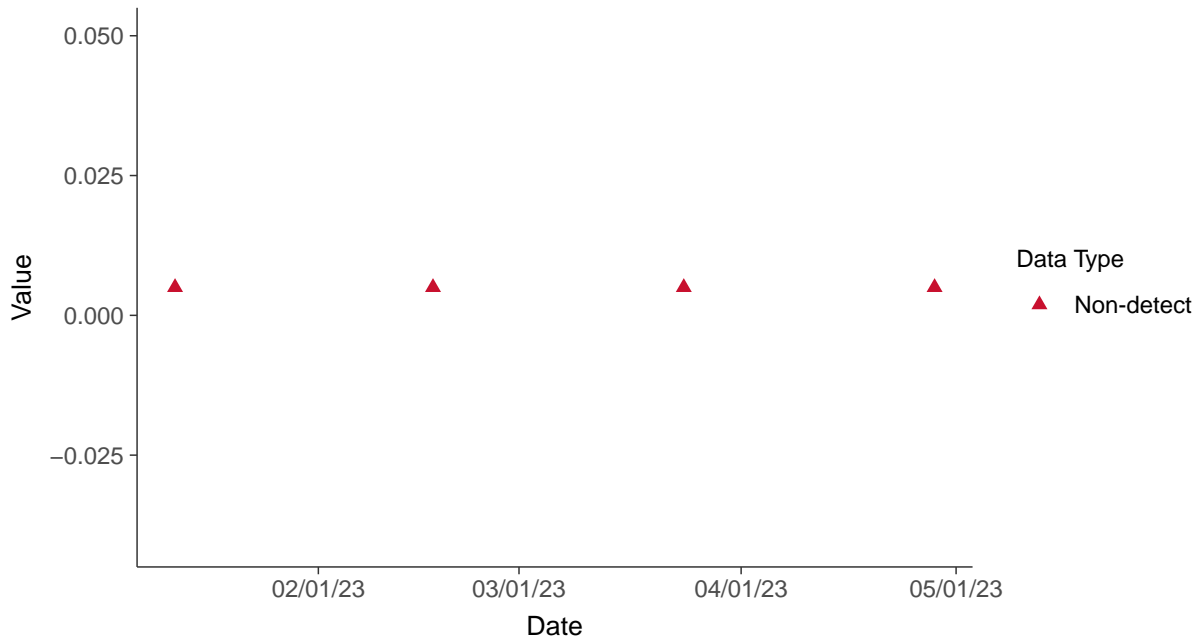


Appendix IV: Selenium, MW-14

ID: 14_2_27

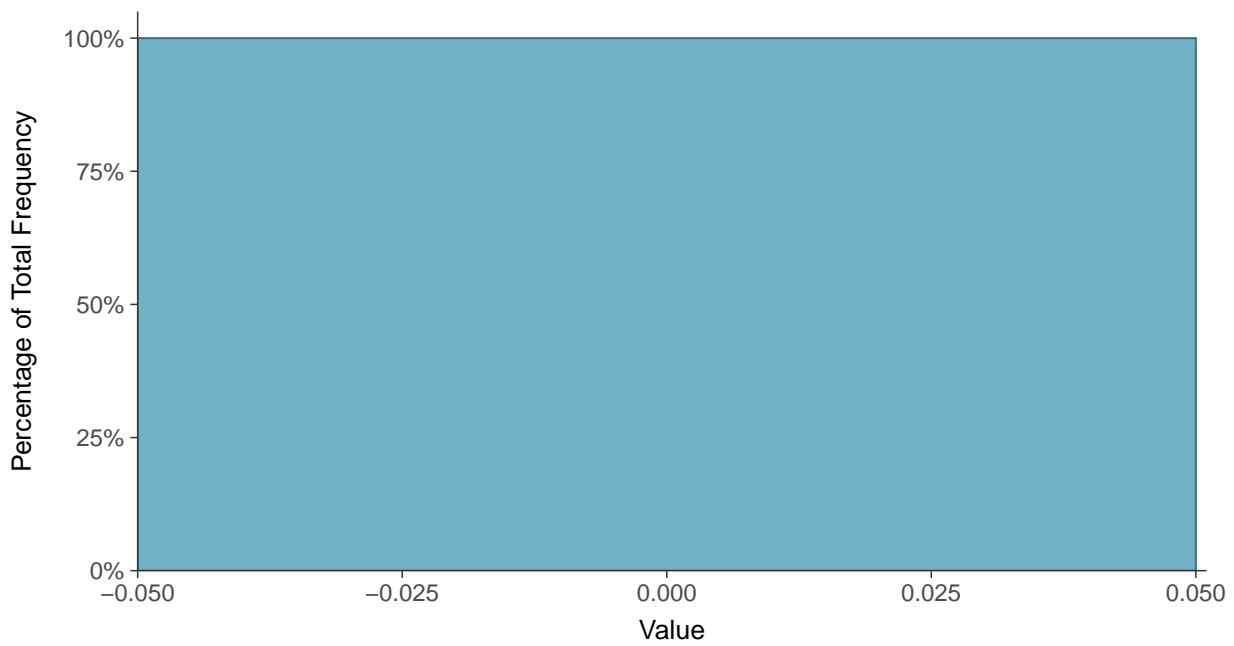
Scatter Plot

Selenium, MW-14 (mg/L)



Histogram

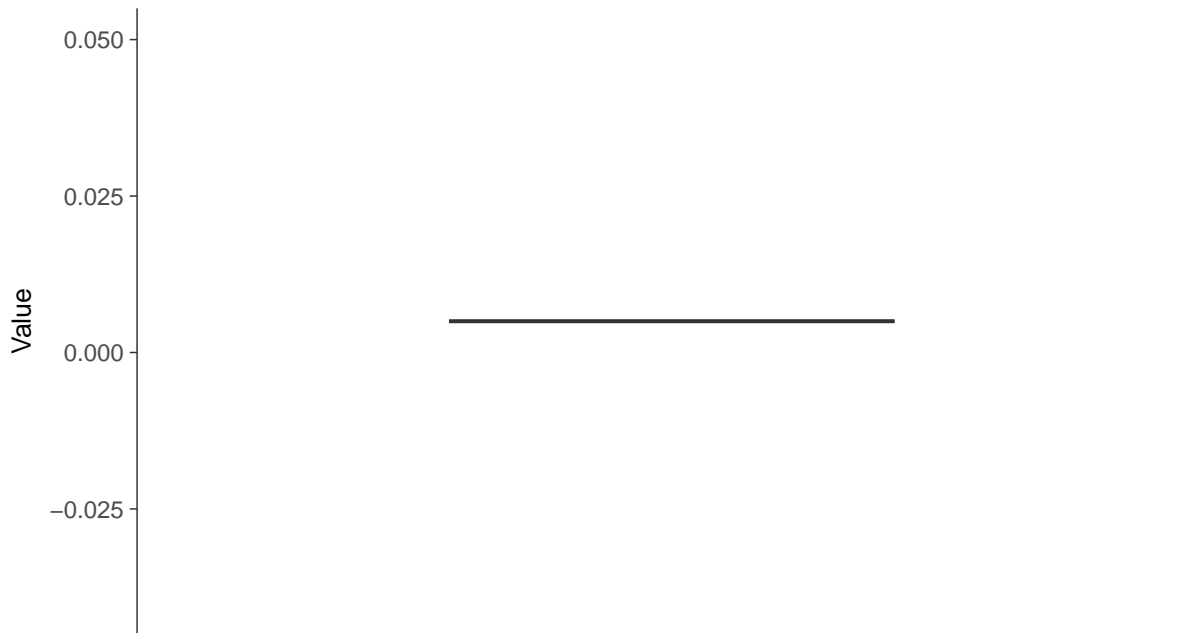
Selenium, MW-14 (mg/L)





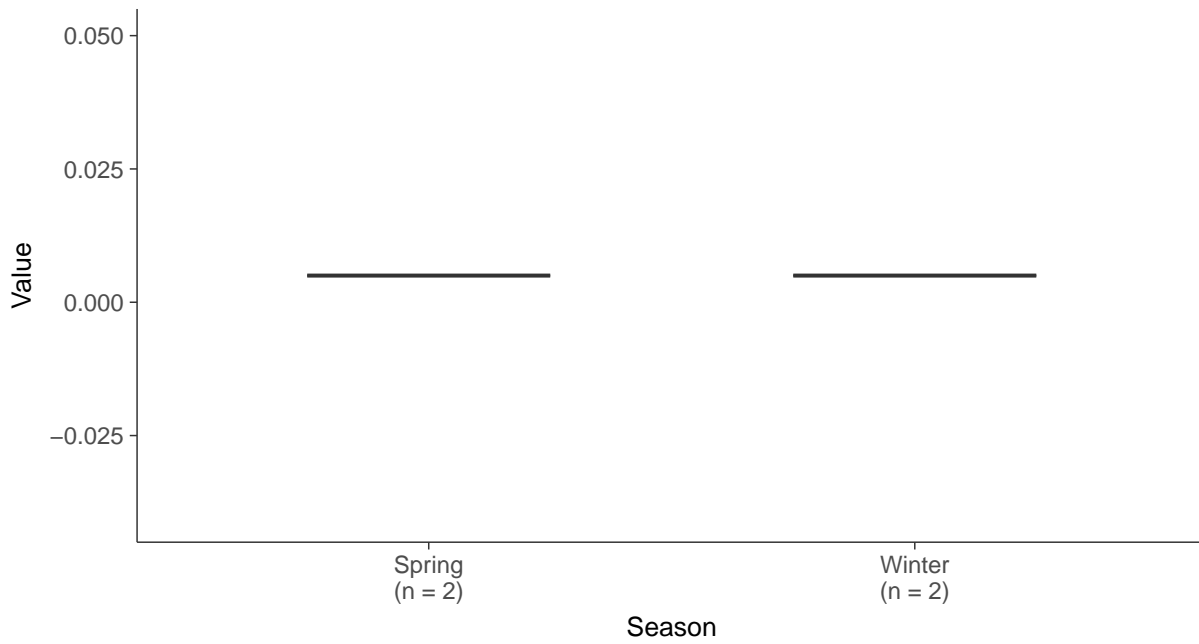
Boxplot

Selenium, MW-14 (mg/L)



Boxplot by Season

Selenium, MW-14 (mg/L)



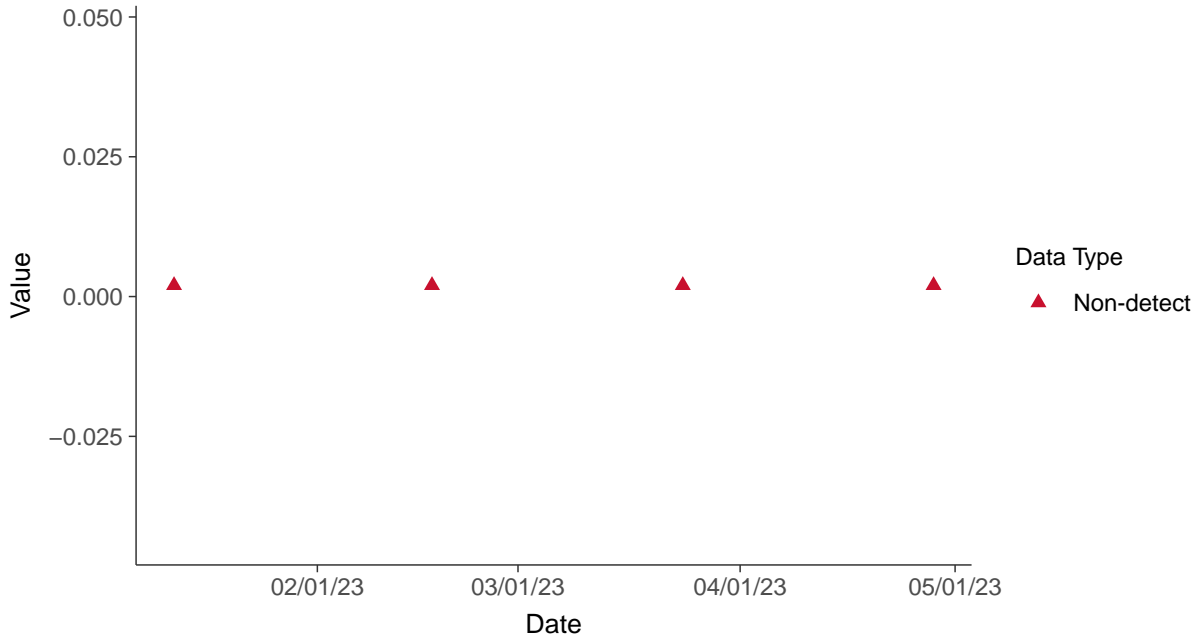


Appendix IV: Thallium, MW-14

ID: 14_2_29

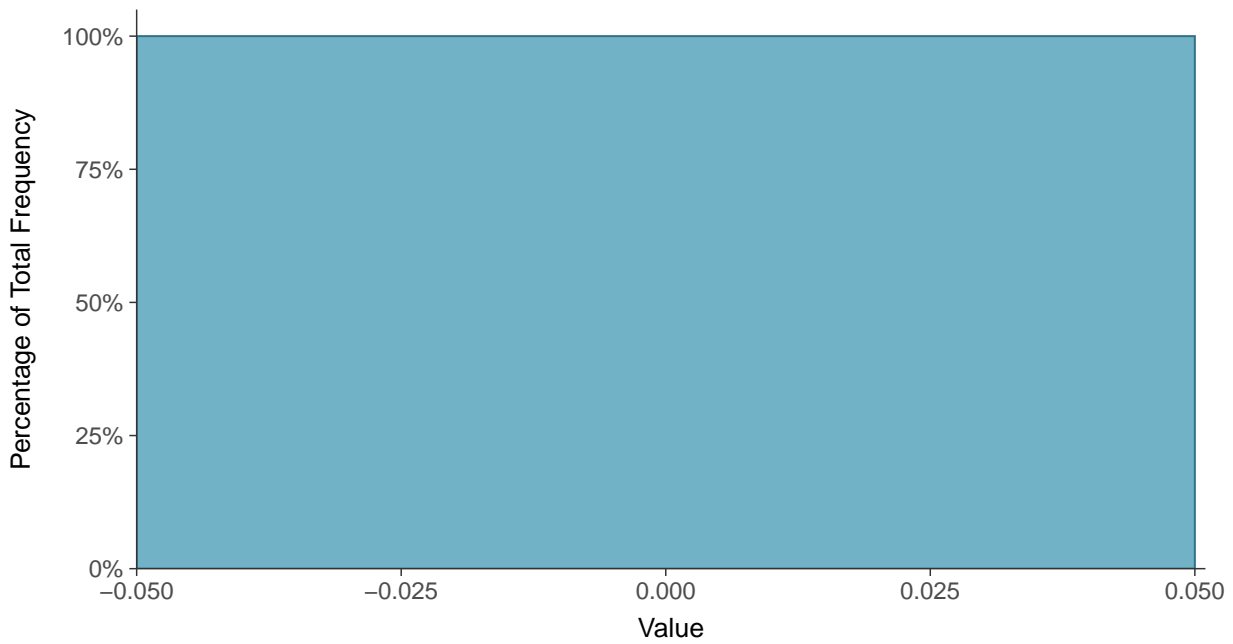
Scatter Plot

Thallium, MW-14 (mg/L)



Histogram

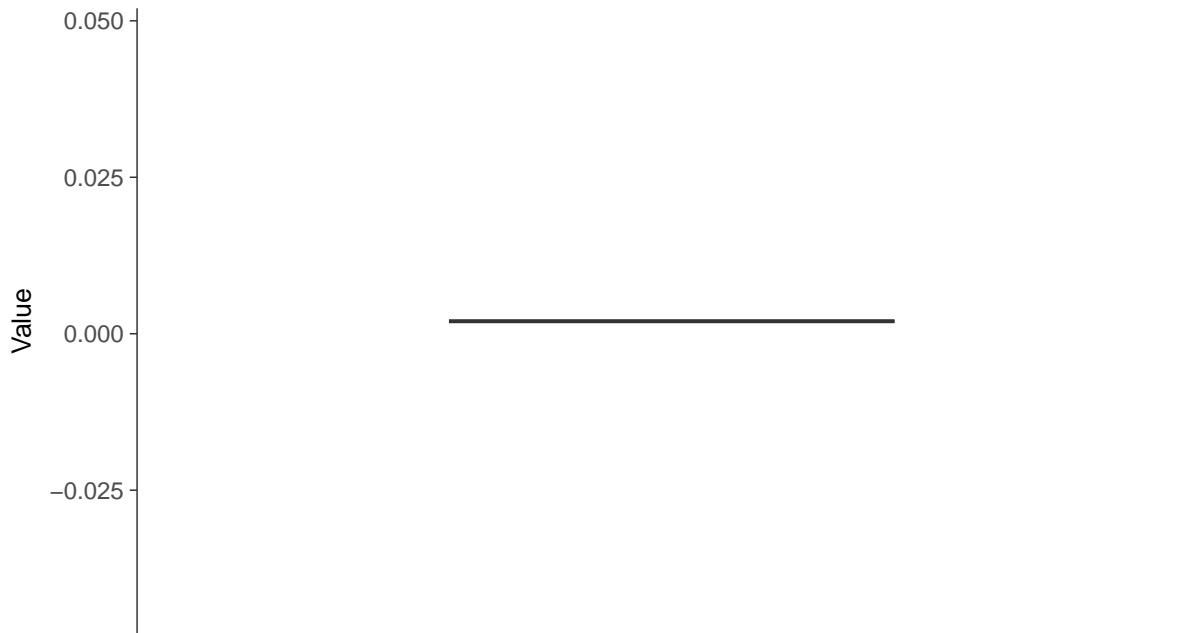
Thallium, MW-14 (mg/L)





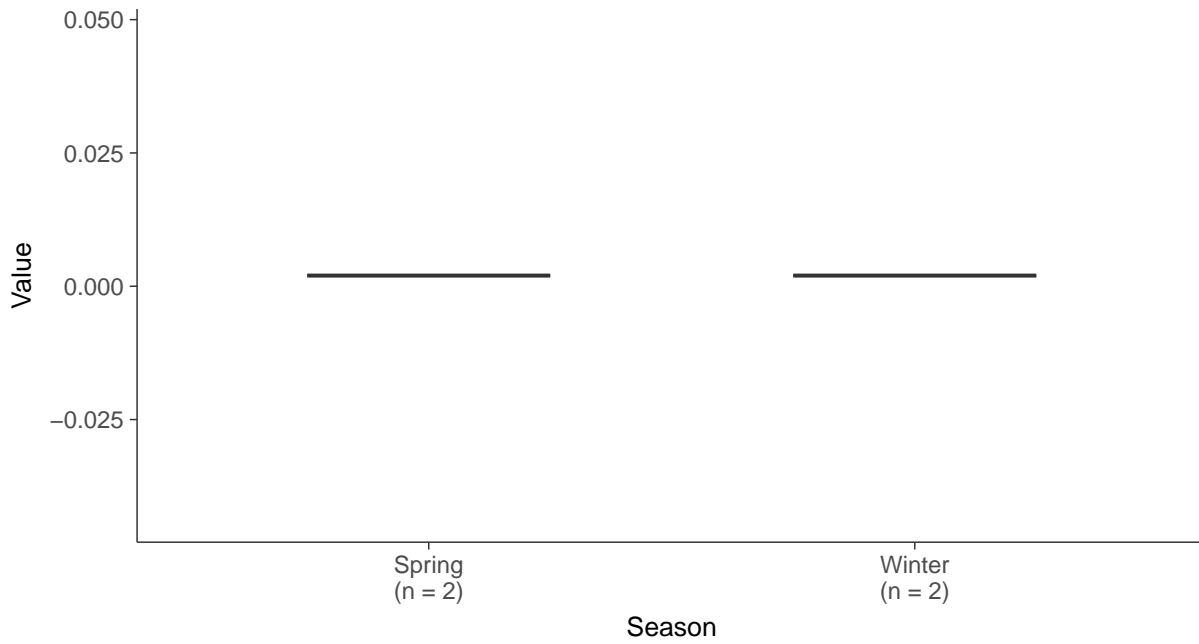
Boxplot

Thallium, MW-14 (mg/L)



Boxplot by Season

Thallium, MW-14 (mg/L)



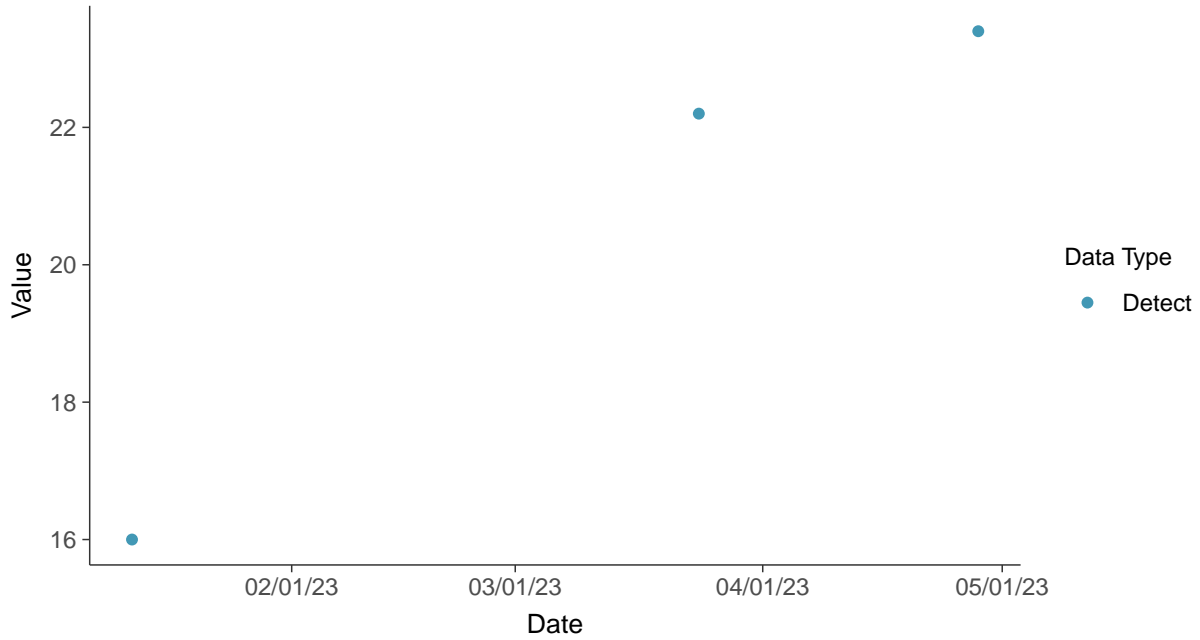


Appendix IV: Total Suspended Solids, MW-14

ID: 14_2_30

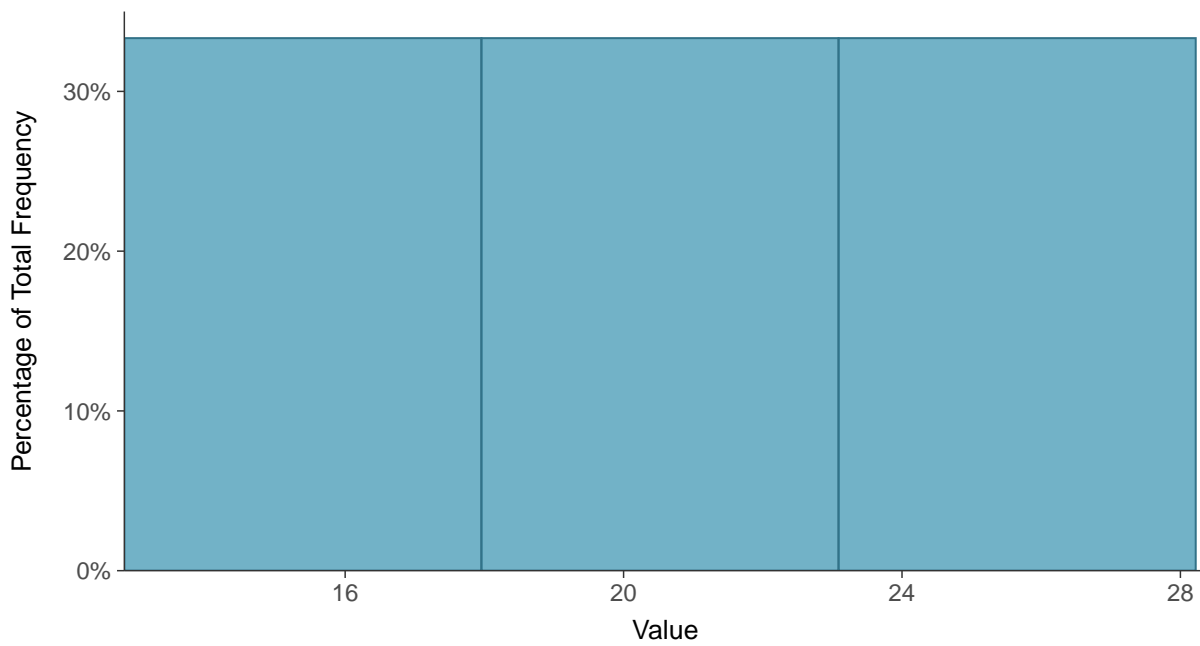
Scatter Plot

Total Suspended Solids, MW-14 (mg/L)



Histogram

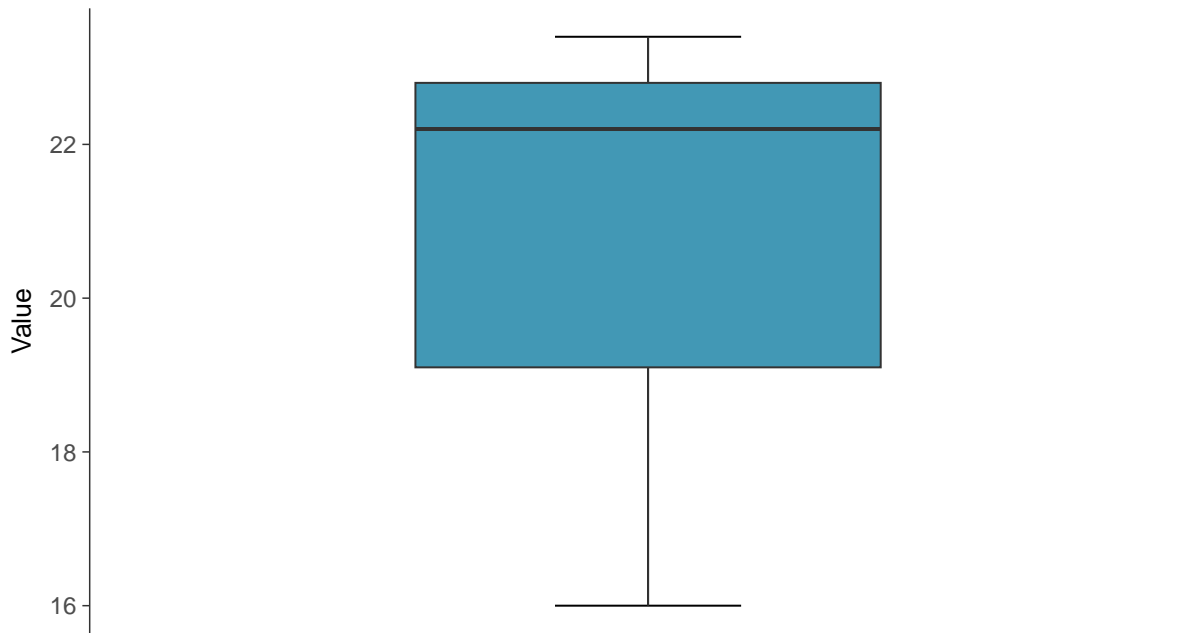
Total Suspended Solids, MW-14 (mg/L)





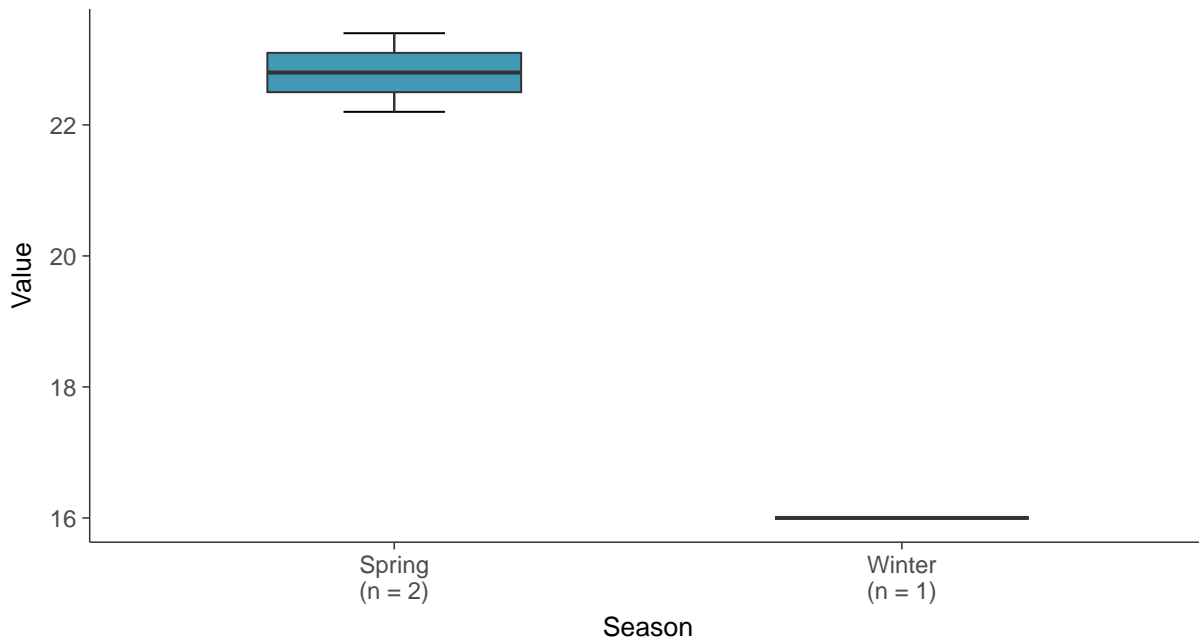
Boxplot

Total Suspended Solids, MW-14 (mg/L)



Boxplot by Season

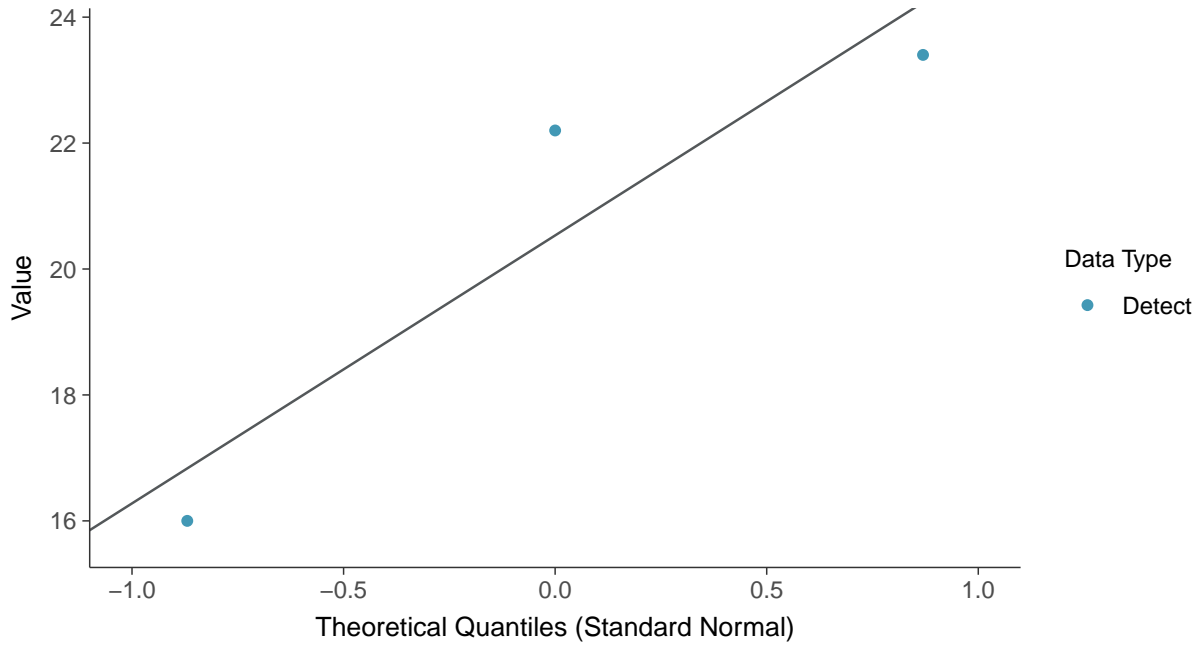
Total Suspended Solids, MW-14 (mg/L)





Normal Q-Q plot

Total Suspended Solids, MW-14 (mg/L)



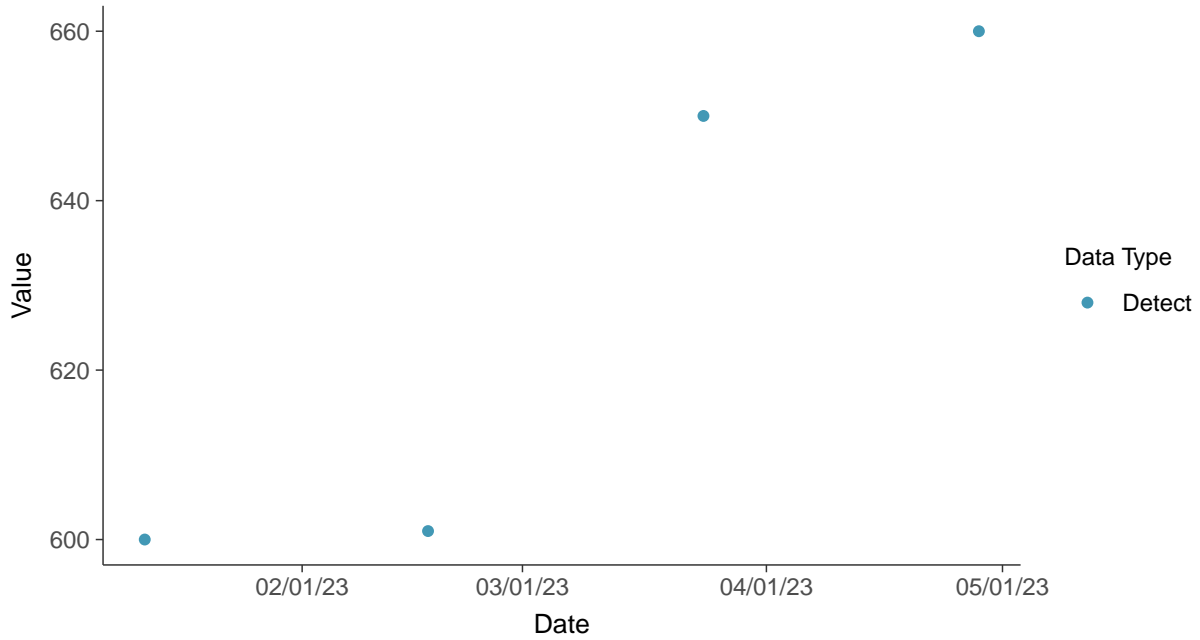


Other: Bicarbonate, MW-14

ID: 14_3_12

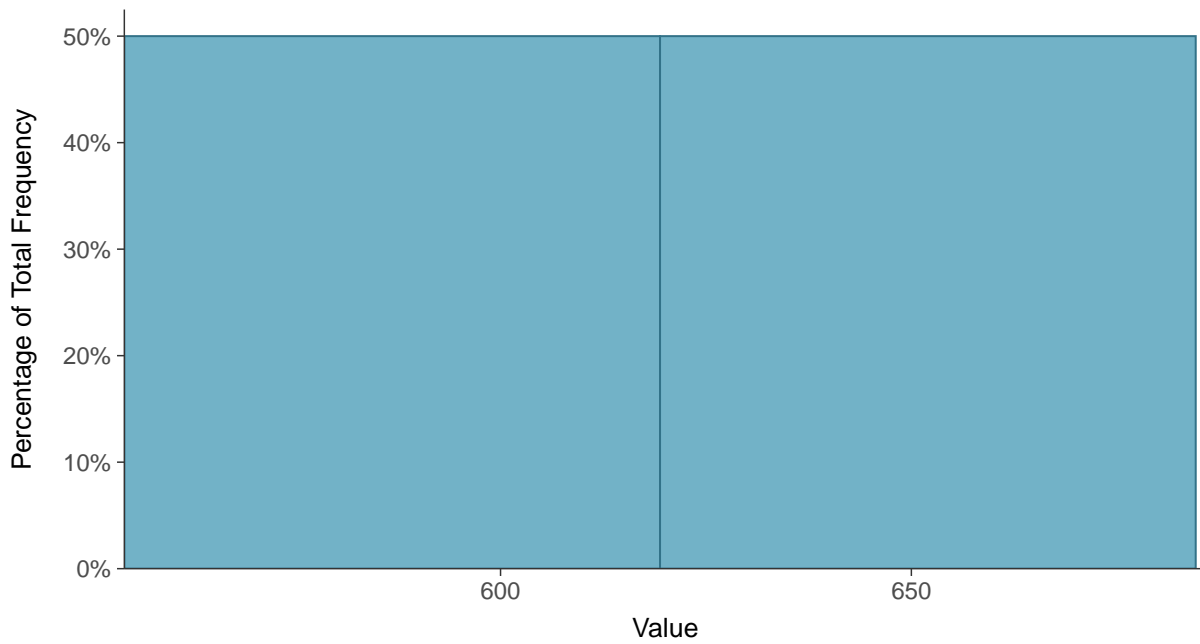
Scatter Plot

Bicarbonate, MW-14 (mg/L)



Histogram

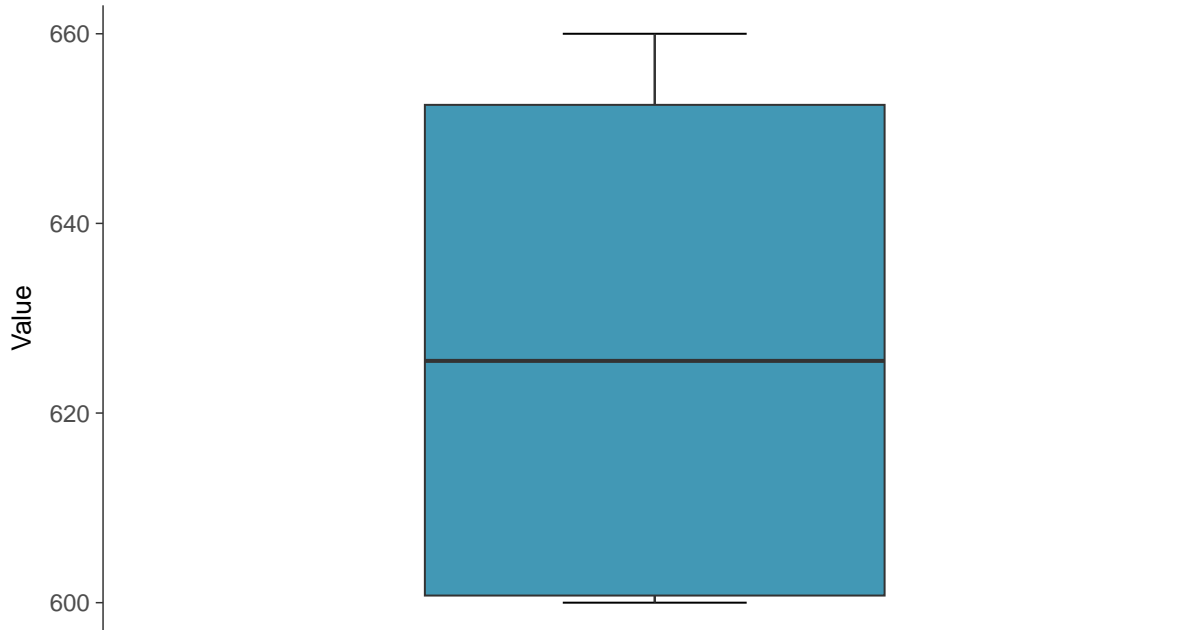
Bicarbonate, MW-14 (mg/L)





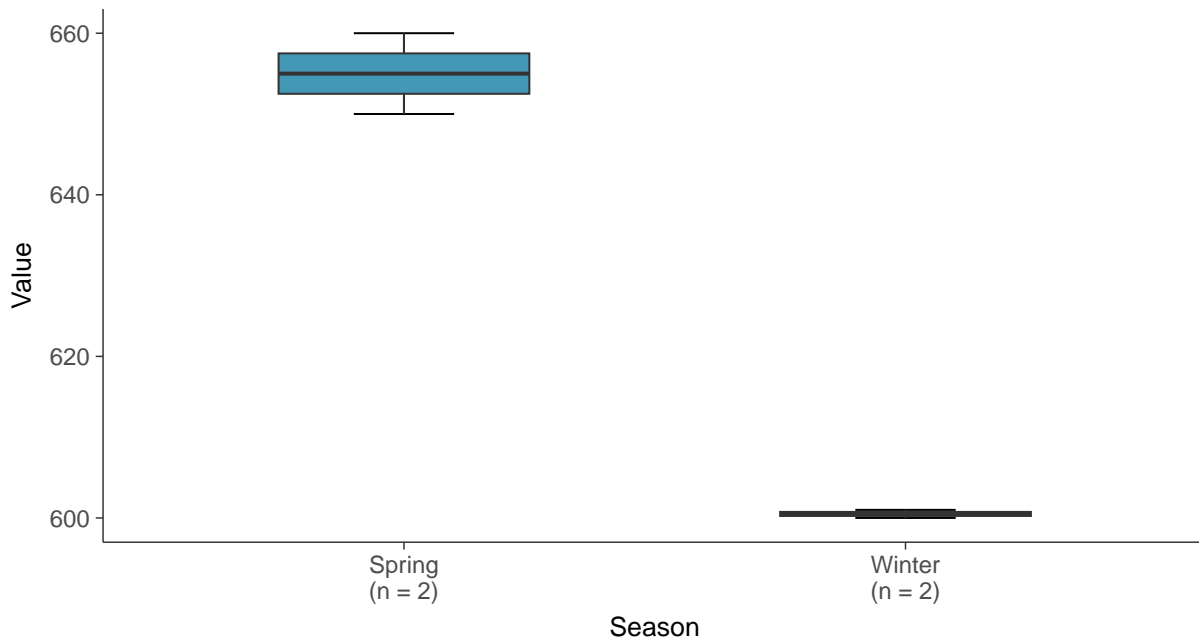
Boxplot

Bicarbonate, MW-14 (mg/L)



Boxplot by Season

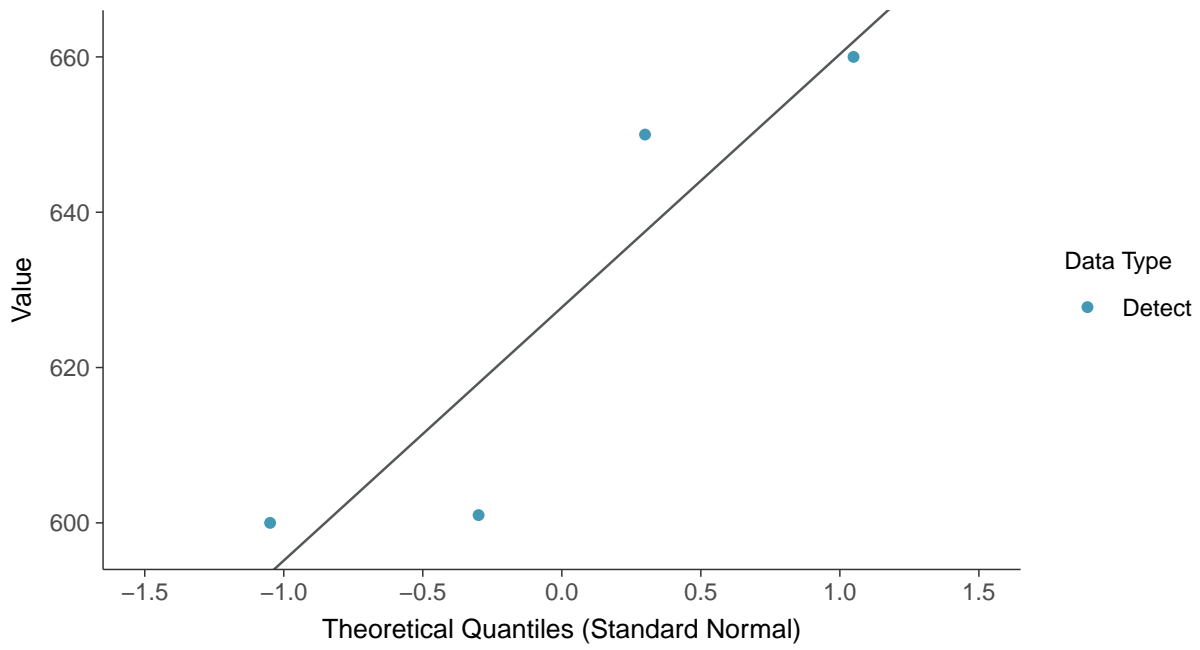
Bicarbonate, MW-14 (mg/L)





Normal Q-Q plot

Bicarbonate, MW-14 (mg/L)



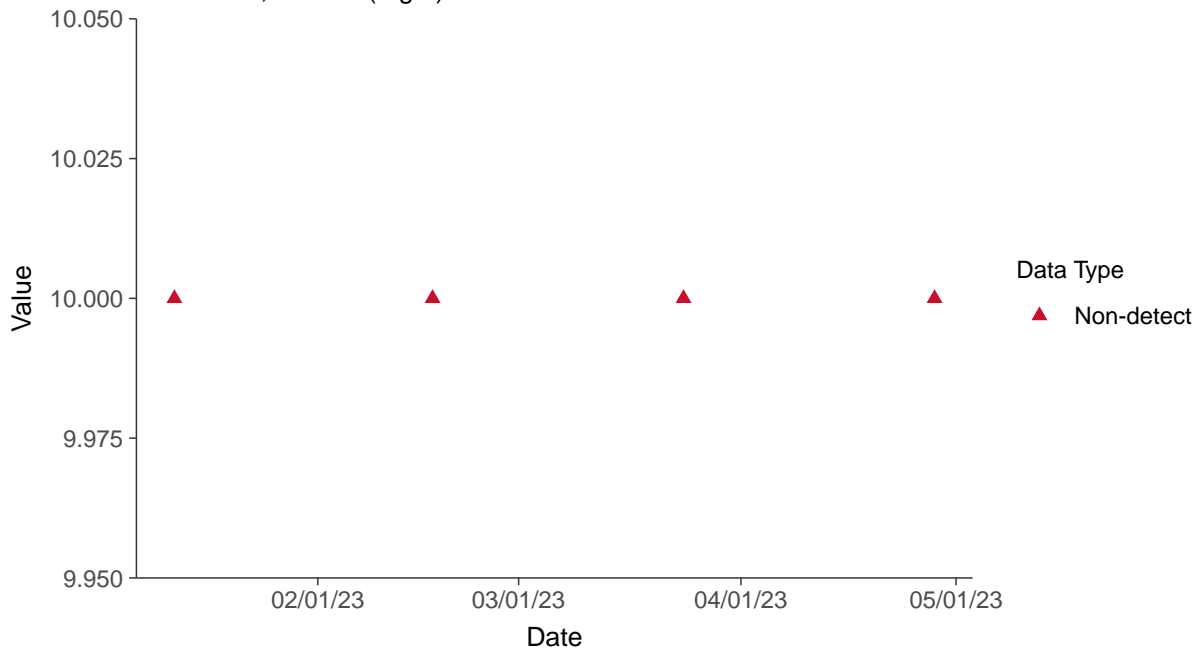


Other: Carbonate, MW-14

ID: 14_3_14

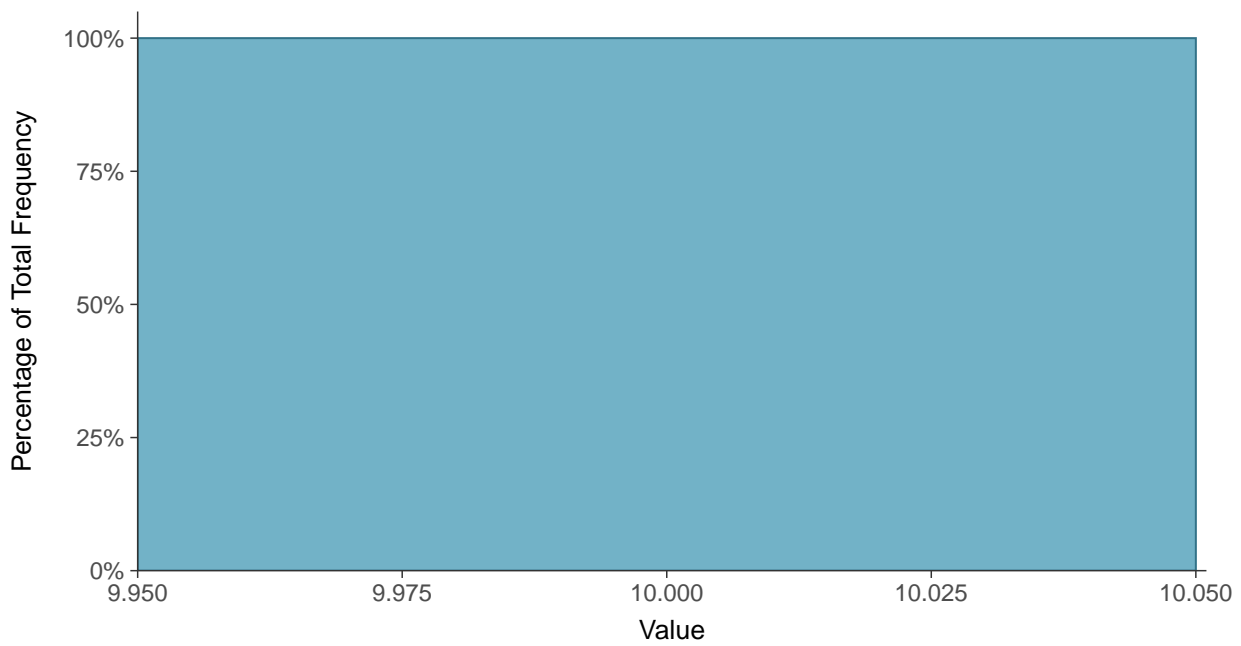
Scatter Plot

Carbonate, MW-14 (mg/L)



Histogram

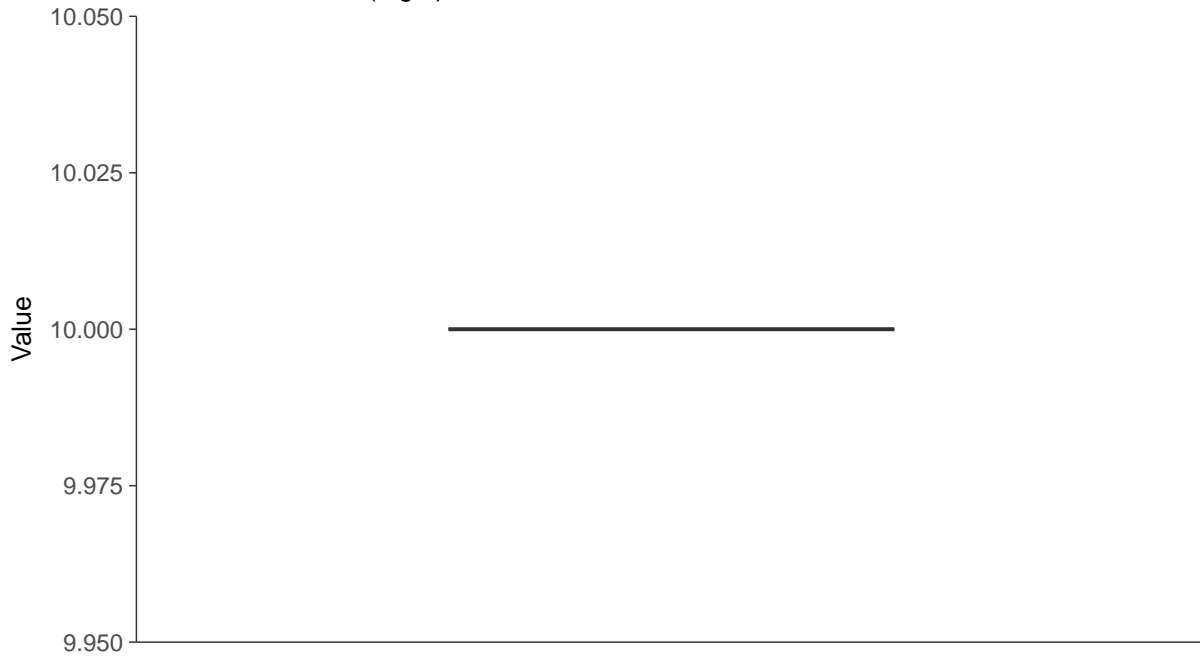
Carbonate, MW-14 (mg/L)





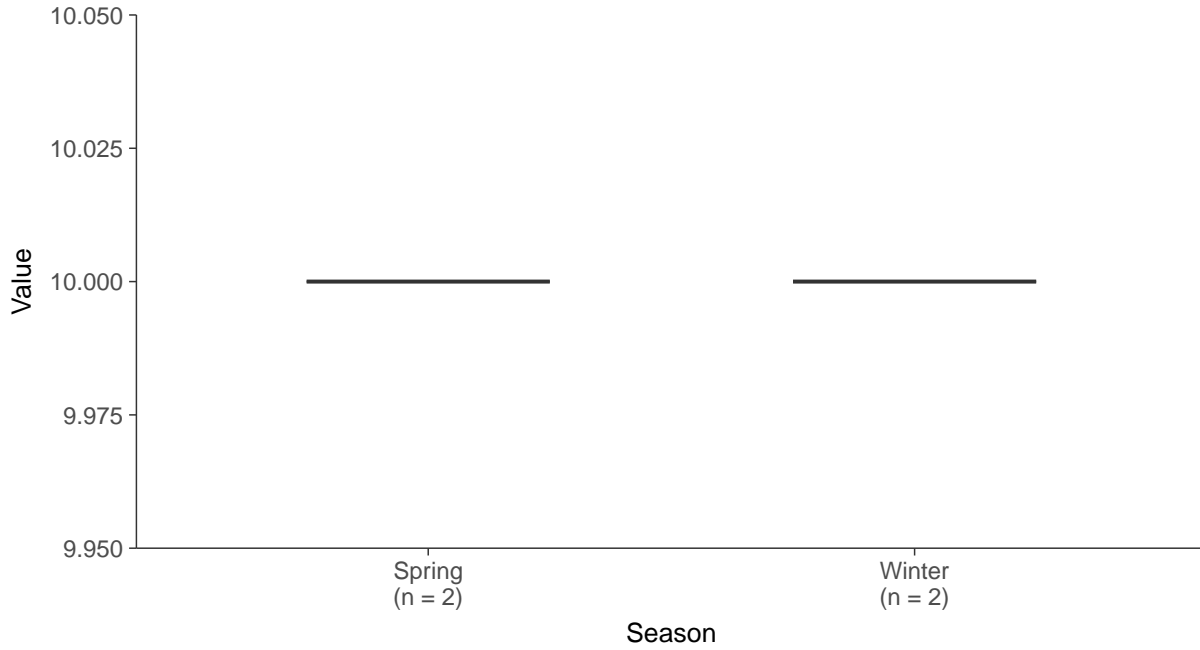
Boxplot

Carbonate, MW-14 (mg/L)



Boxplot by Season

Carbonate, MW-14 (mg/L)



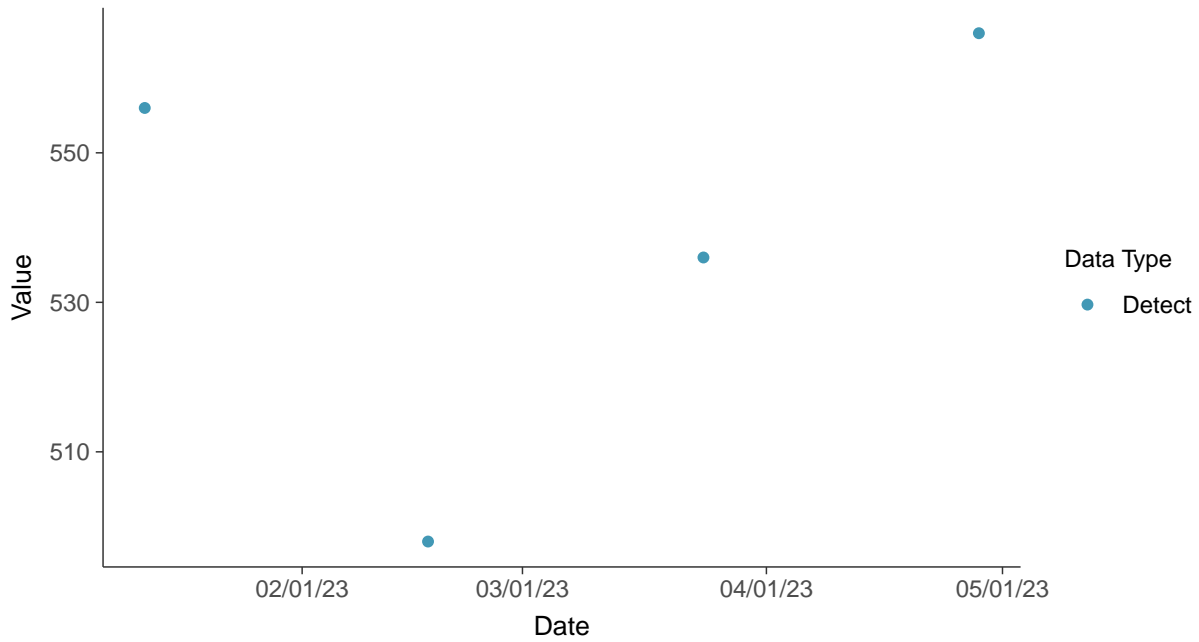


Other: Hardness, MW-14

ID: 14_3_17

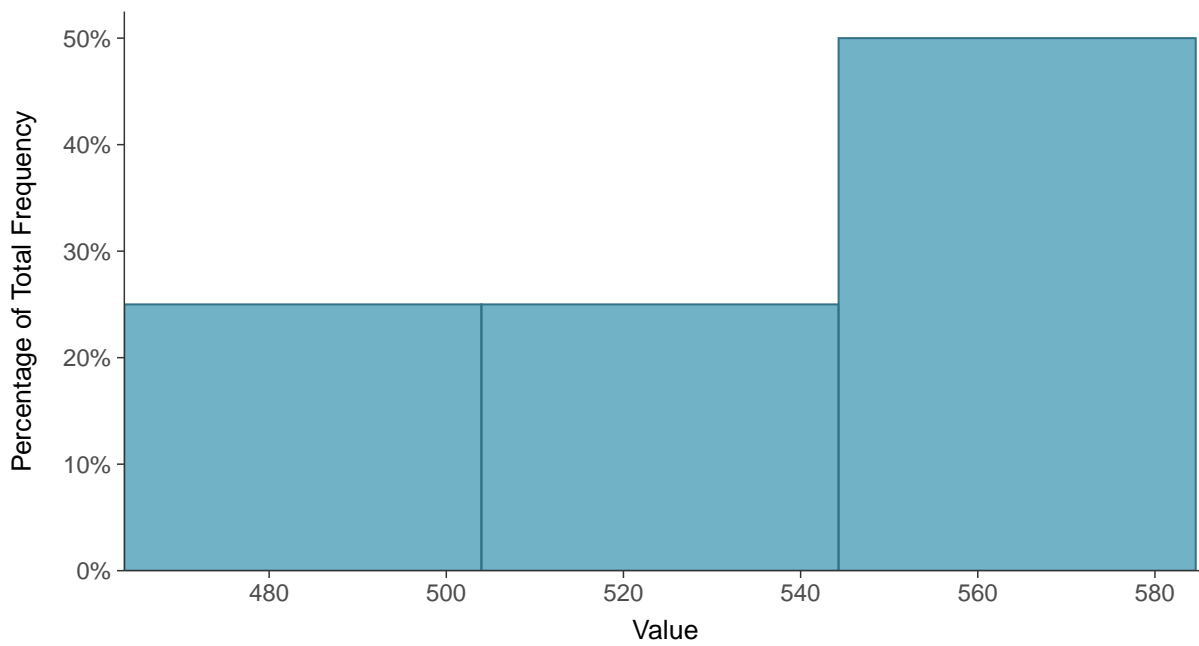
Scatter Plot

Hardness, MW-14 (mg/L)



Histogram

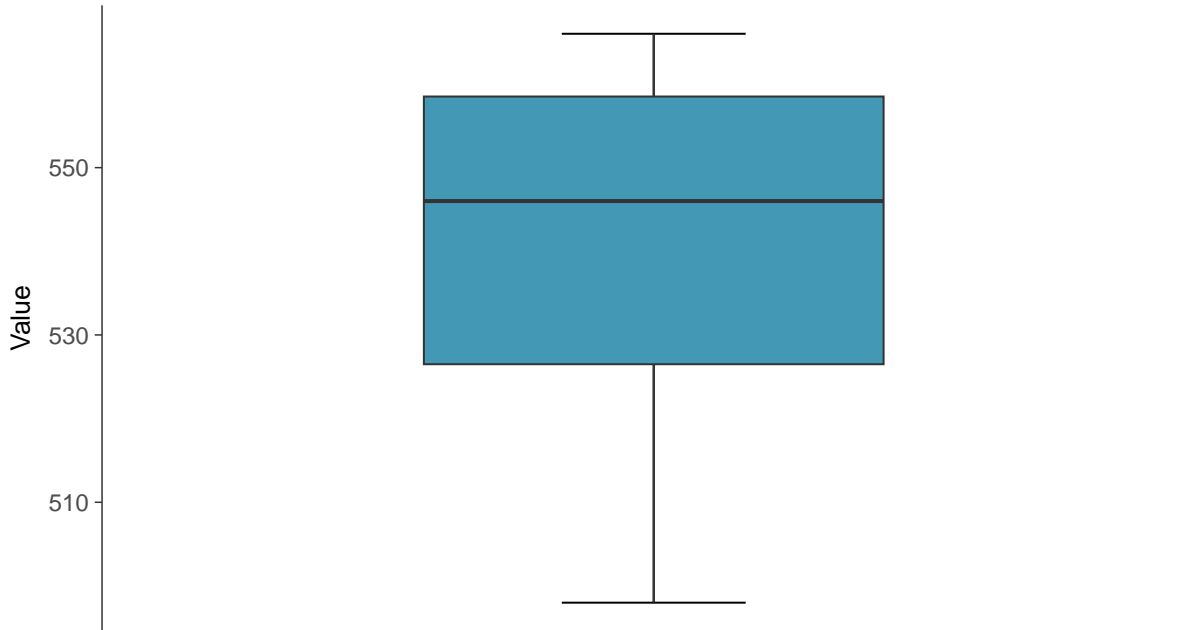
Hardness, MW-14 (mg/L)





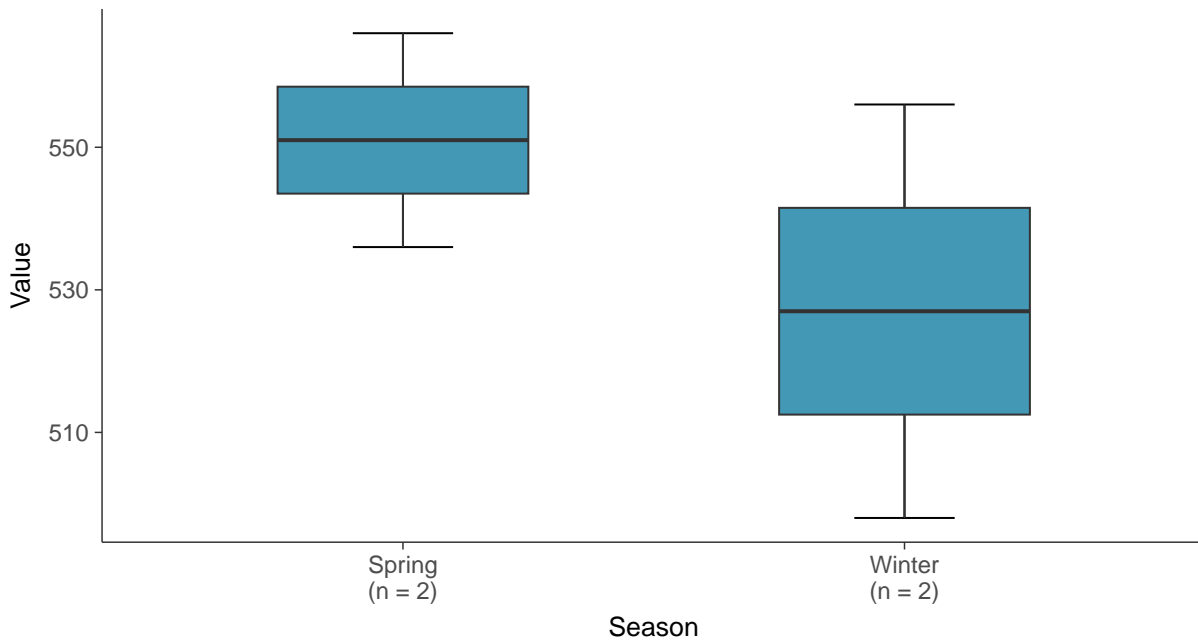
Boxplot

Hardness, MW-14 (mg/L)



Boxplot by Season

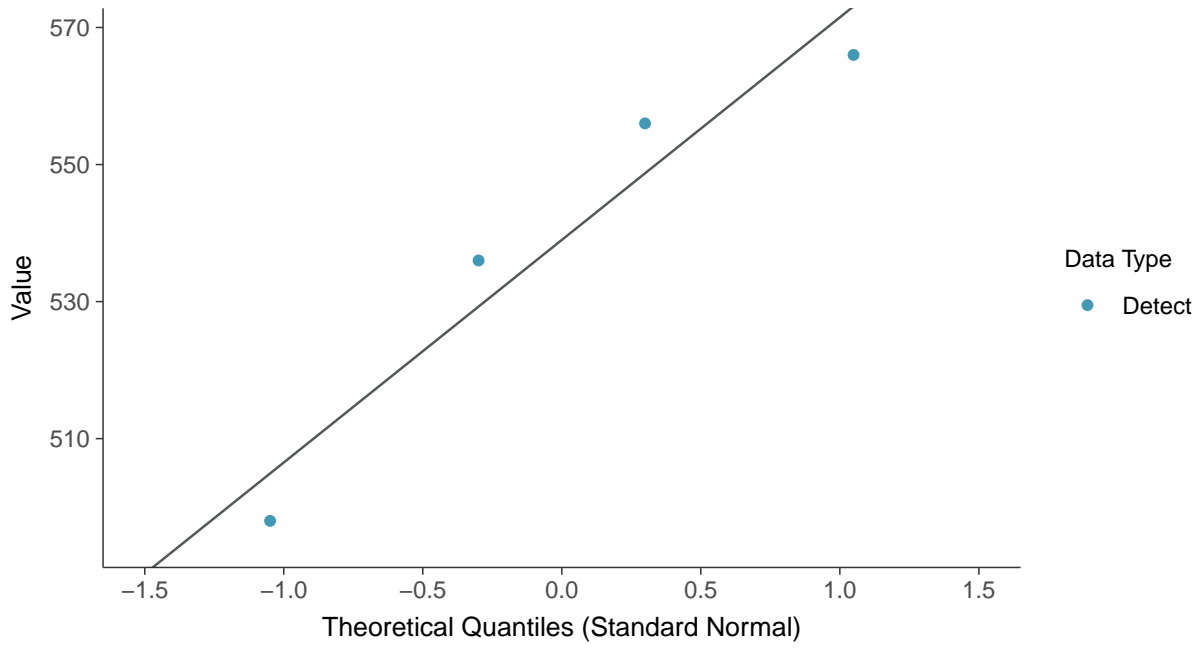
Hardness, MW-14 (mg/L)





Normal Q-Q plot

Hardness, MW-14 (mg/L)



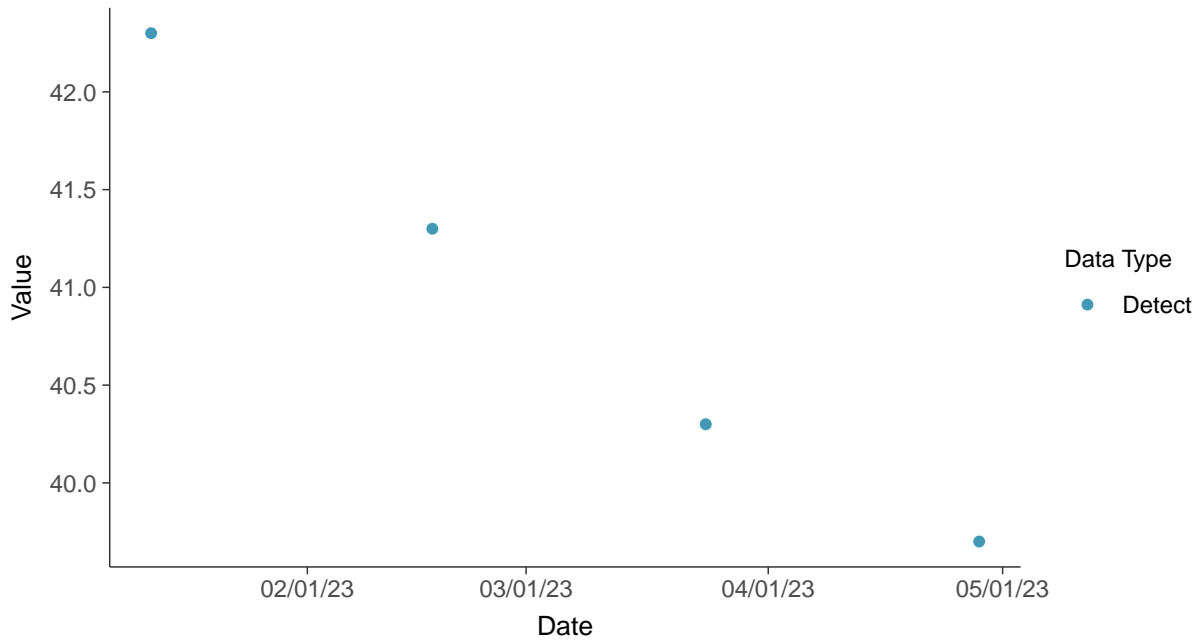


Other: Magnesium, MW-14

ID: 14_3_20

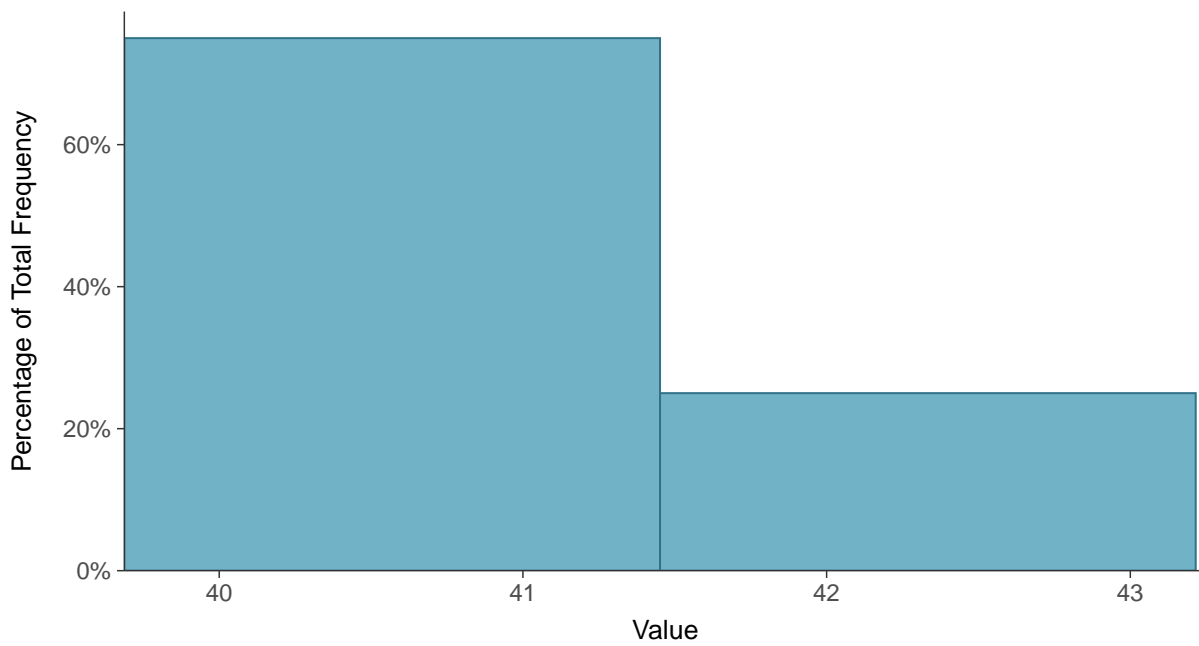
Scatter Plot

Magnesium, MW-14 (mg/L)



Histogram

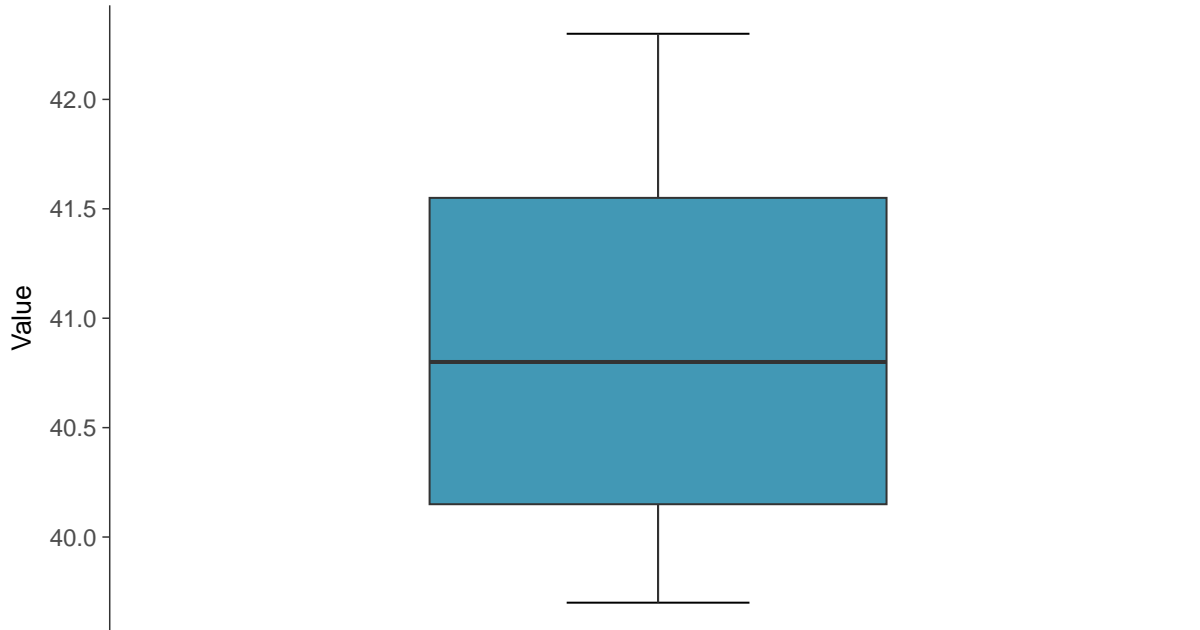
Magnesium, MW-14 (mg/L)





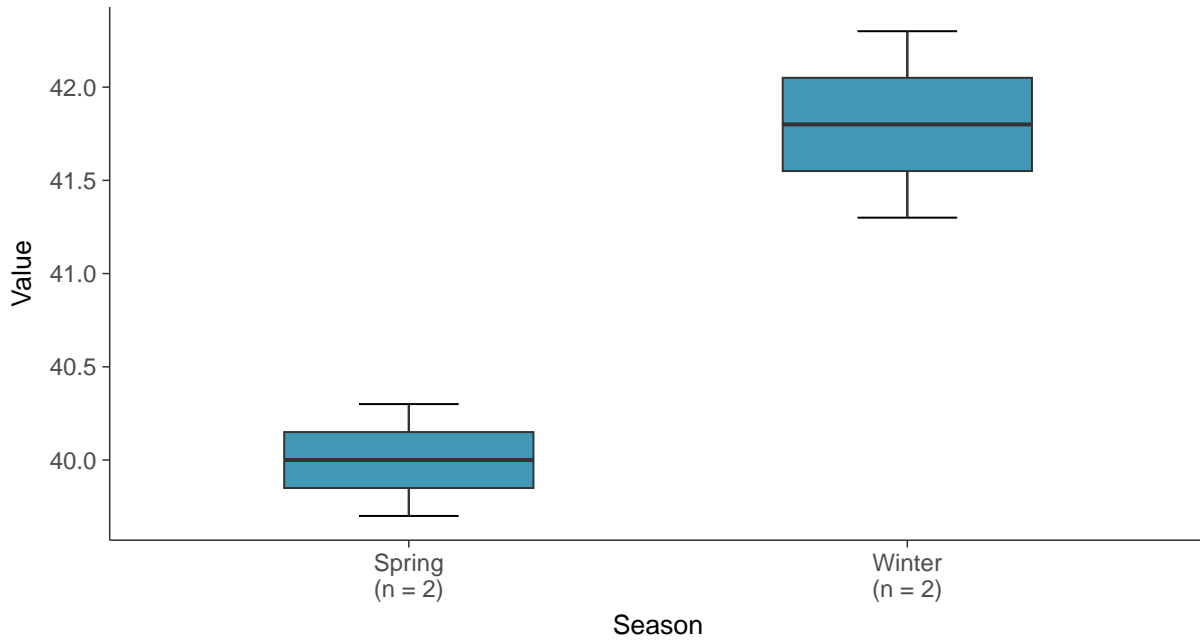
Boxplot

Magnesium, MW-14 (mg/L)



Boxplot by Season

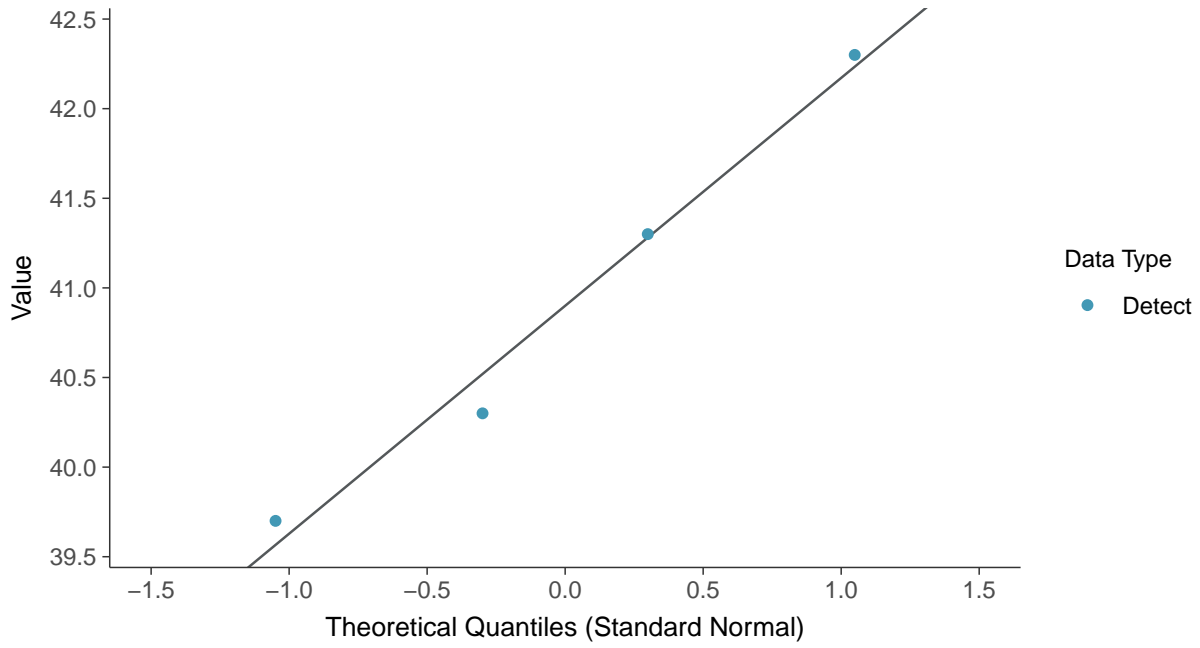
Magnesium, MW-14 (mg/L)





Normal Q-Q plot

Magnesium, MW-14 (mg/L)



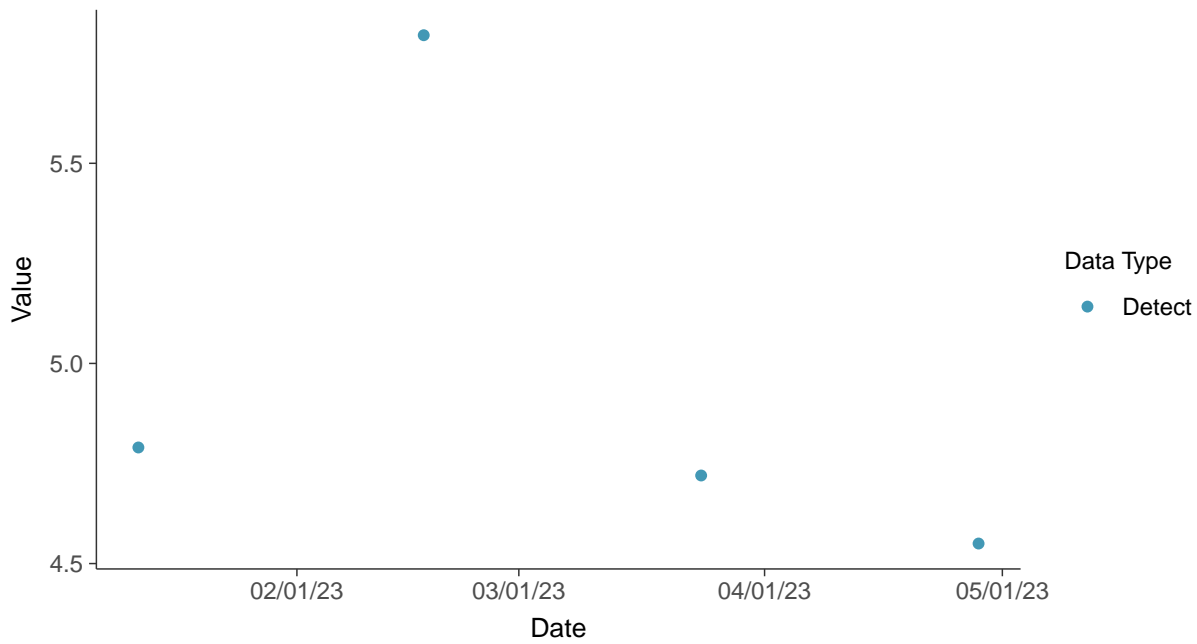


Other: Potassium, MW-14

ID: 14_3_23

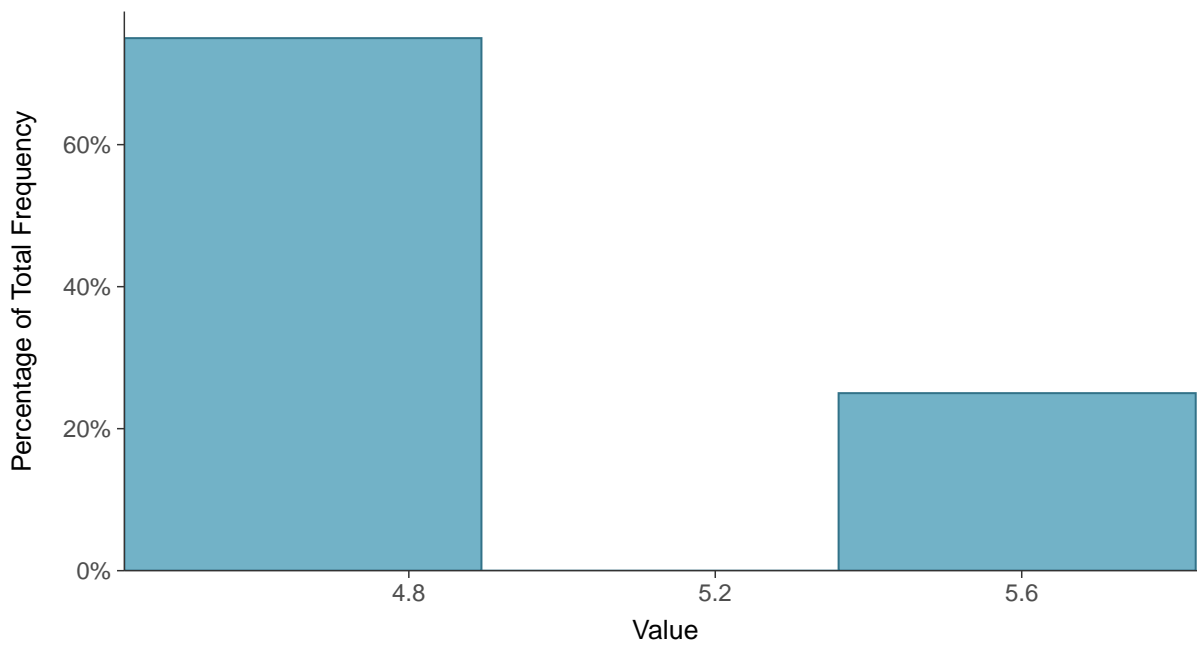
Scatter Plot

Potassium, MW-14 (mg/L)



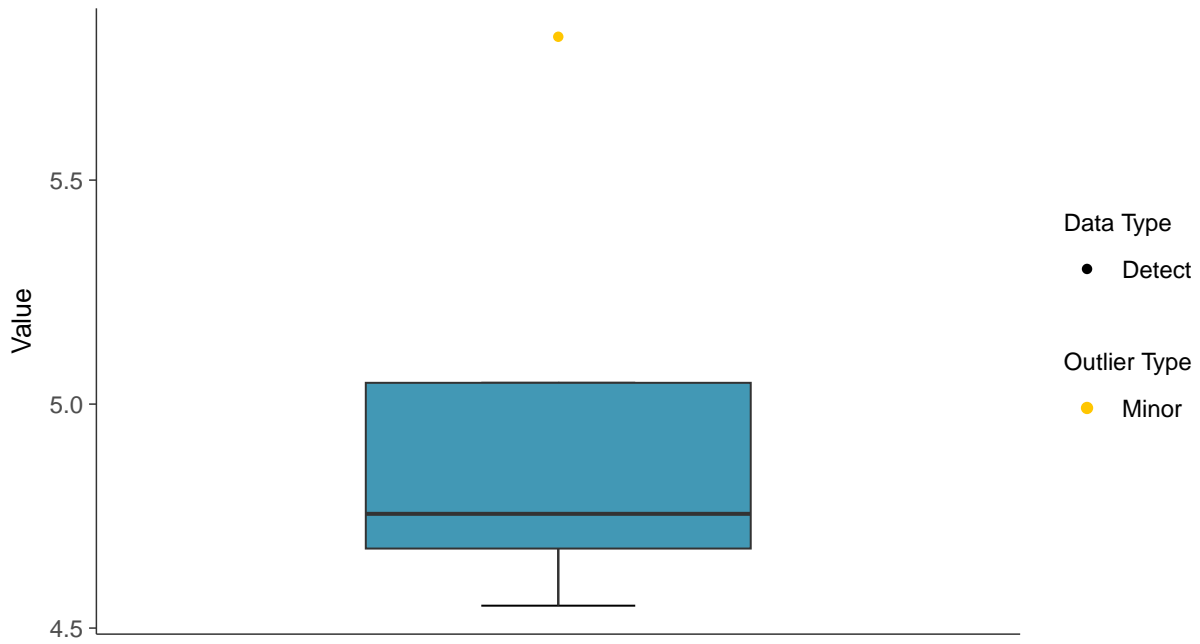
Histogram

Potassium, MW-14 (mg/L)



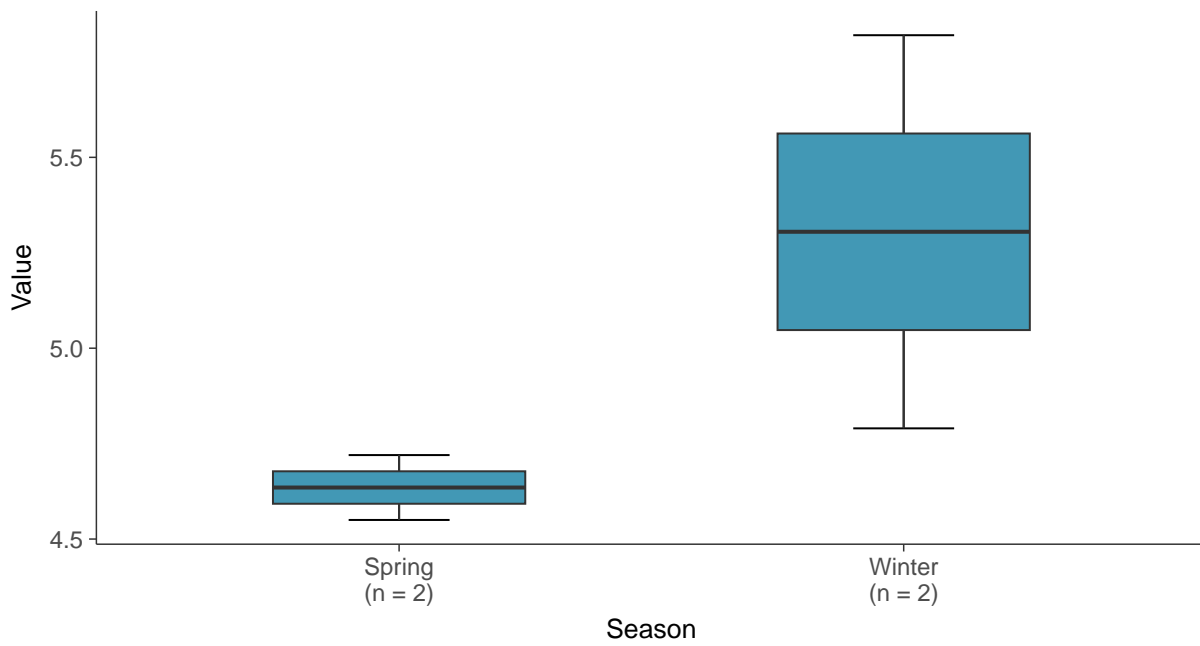
Boxplot

Potassium, MW-14 (mg/L)



Boxplot by Season

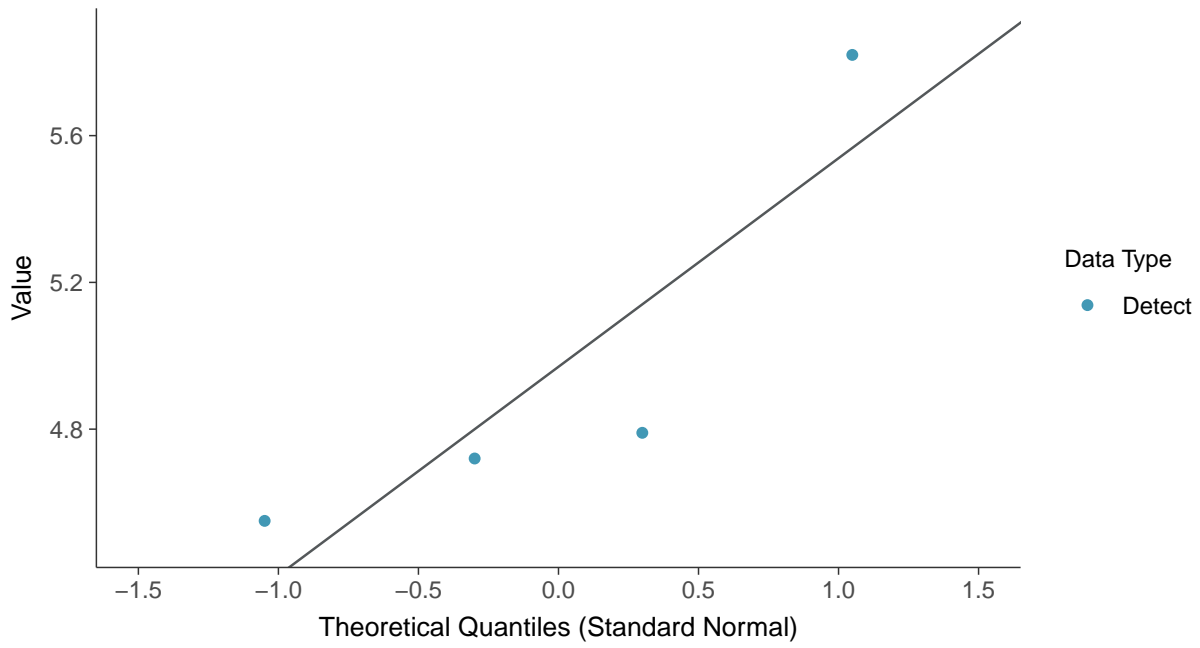
Potassium, MW-14 (mg/L)





Normal Q-Q plot

Potassium, MW-14 (mg/L)



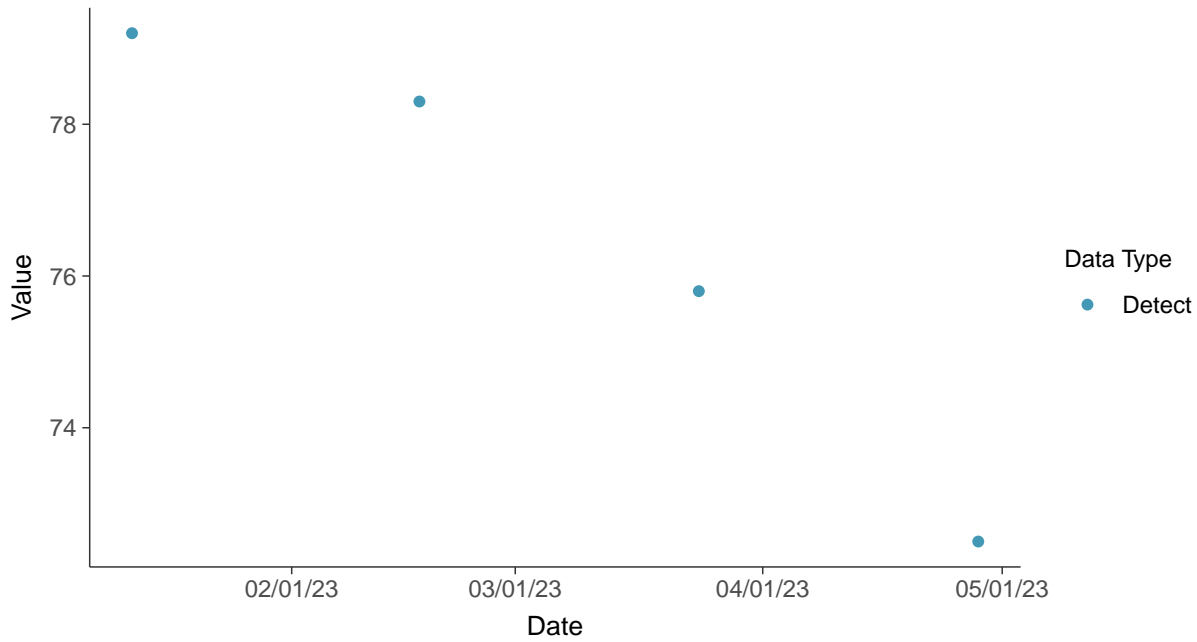


Other: Sodium, MW-14

ID: 14_3_28

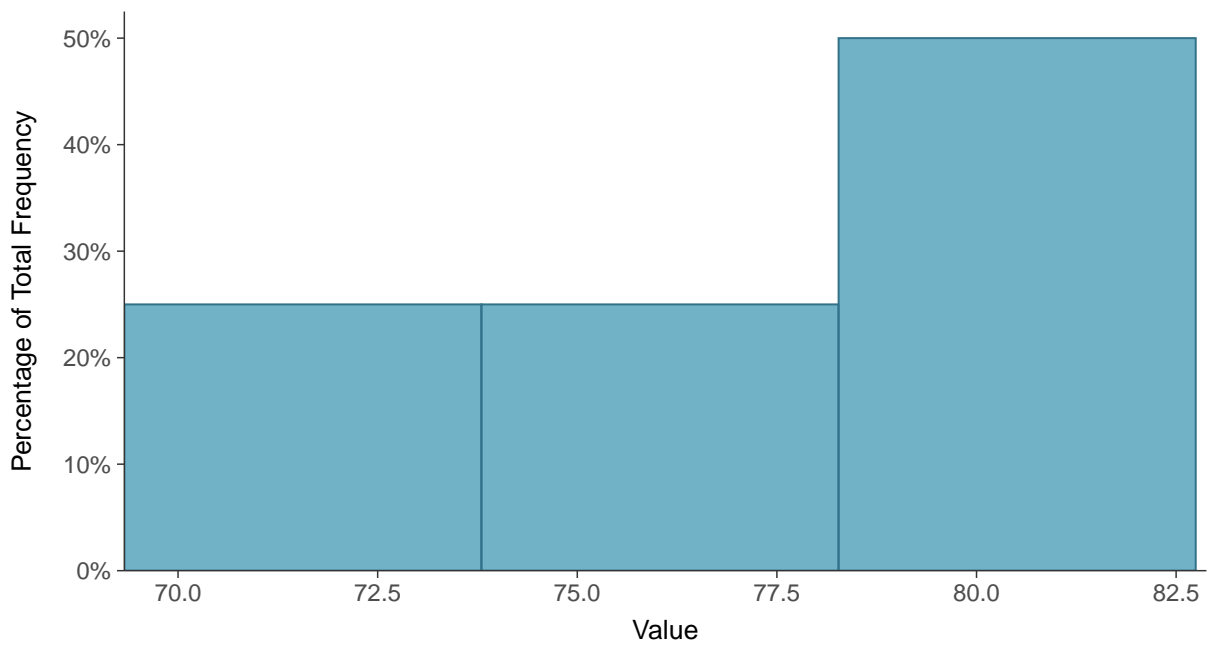
Scatter Plot

Sodium, MW-14 (mg/L)



Histogram

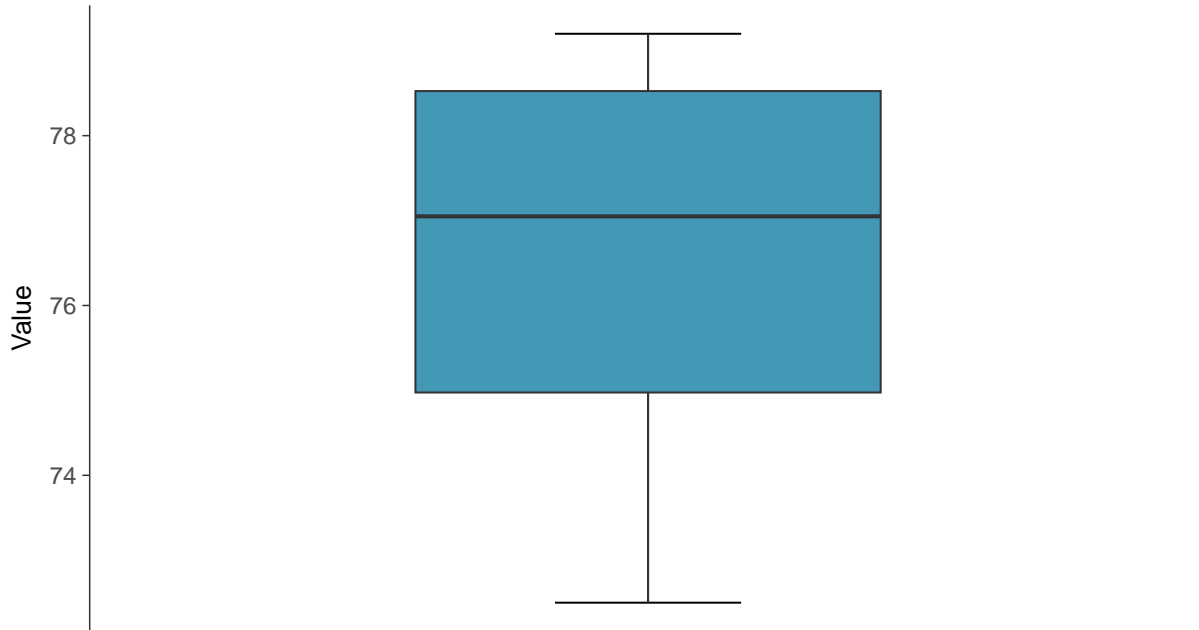
Sodium, MW-14 (mg/L)





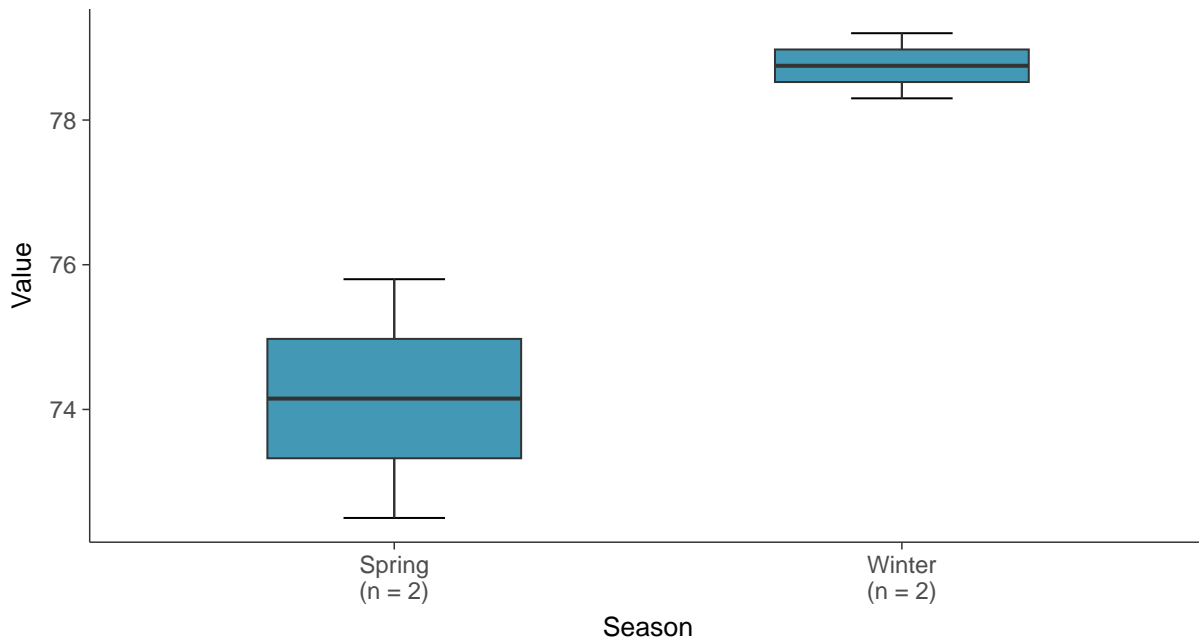
Boxplot

Sodium, MW-14 (mg/L)



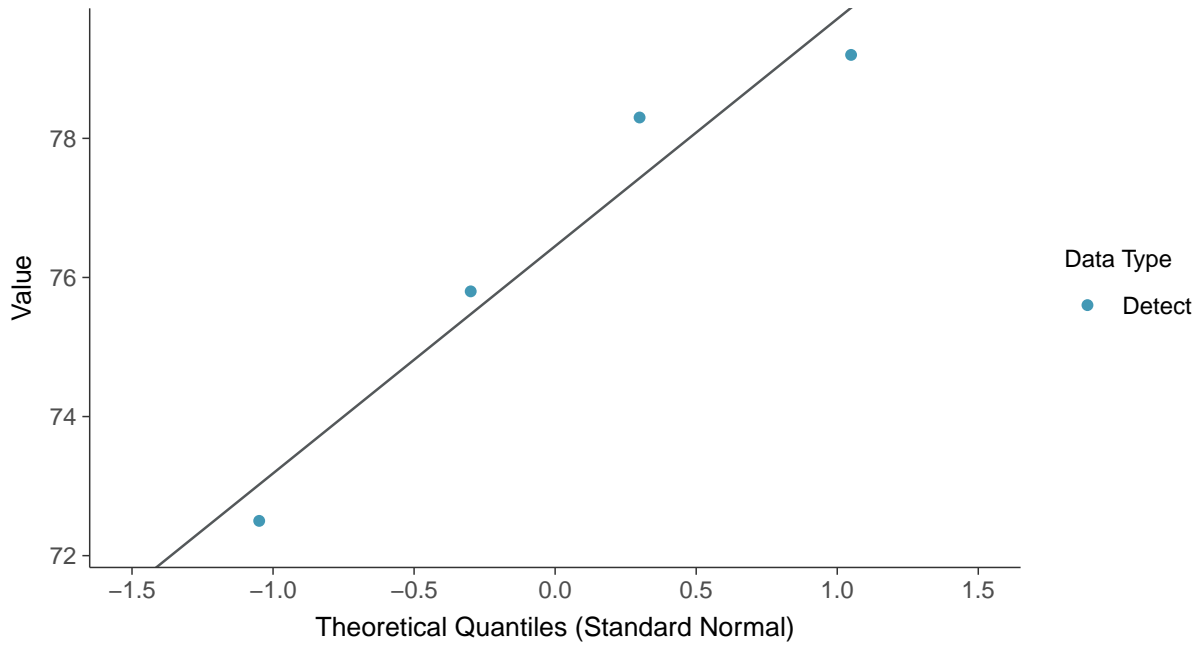
Boxplot by Season

Sodium, MW-14 (mg/L)





Normal Q-Q plot
Sodium, MW-14 (mg/L)



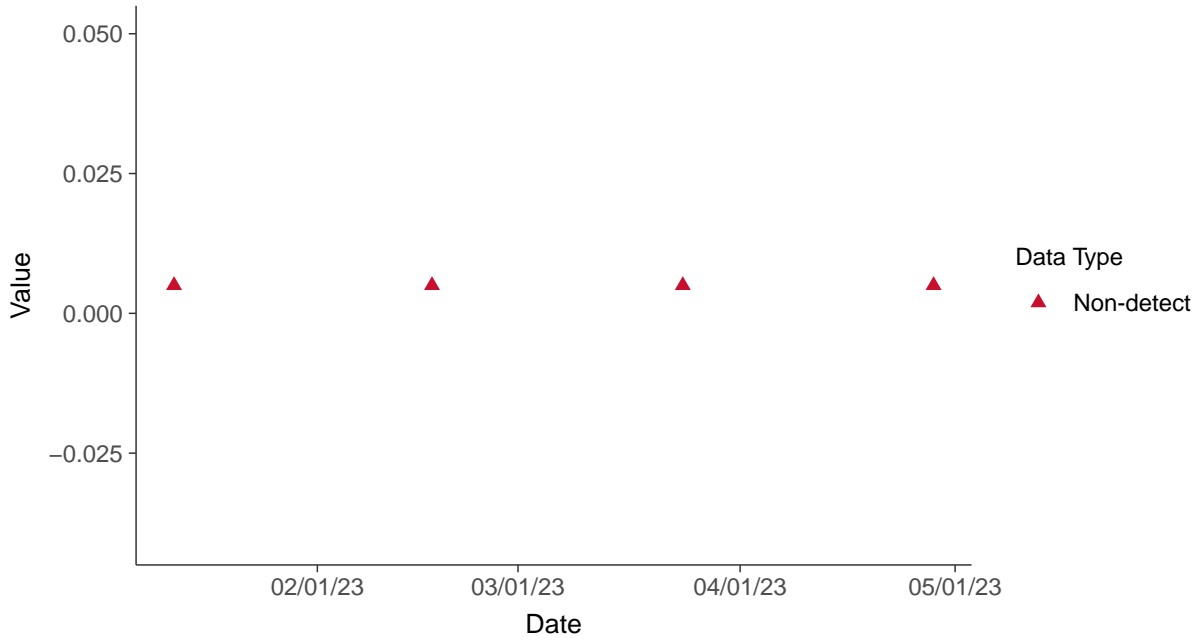


Part 115: Copper, MW-14

ID: 14_5_37

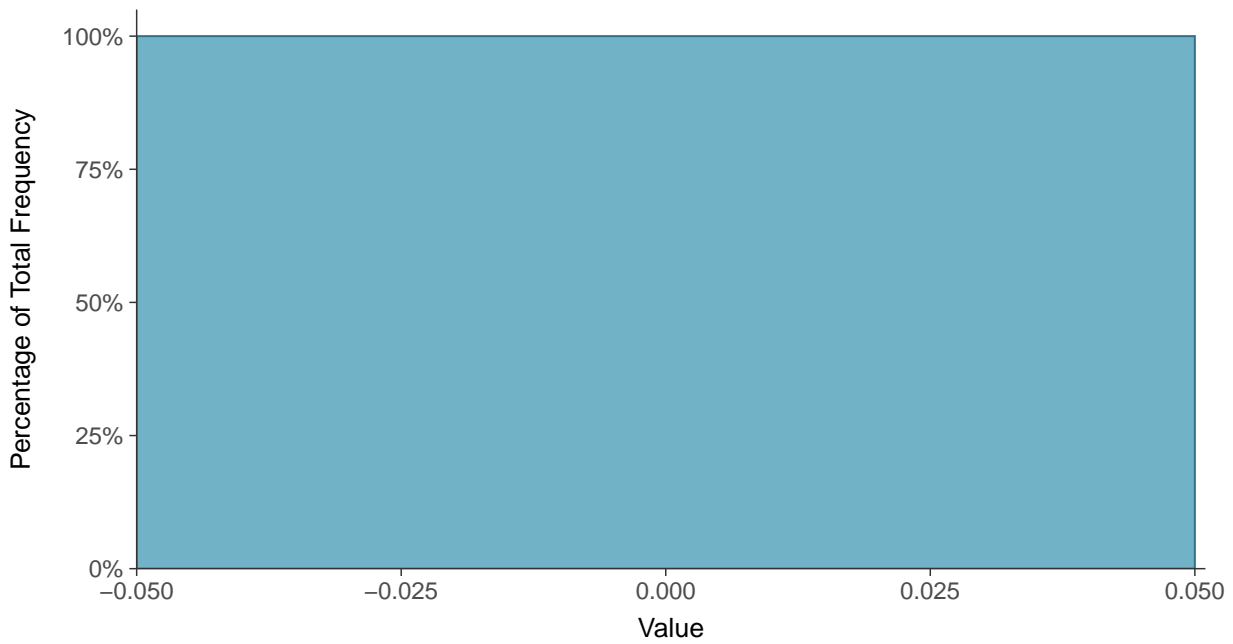
Scatter Plot

Copper, MW-14 (mg/L)



Histogram

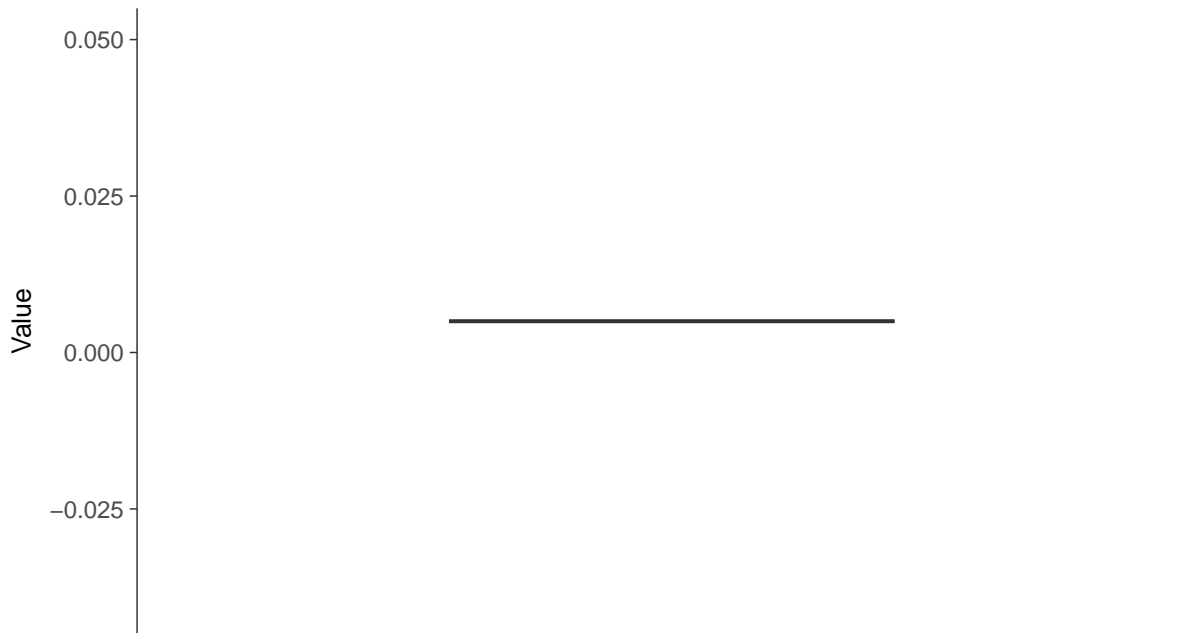
Copper, MW-14 (mg/L)





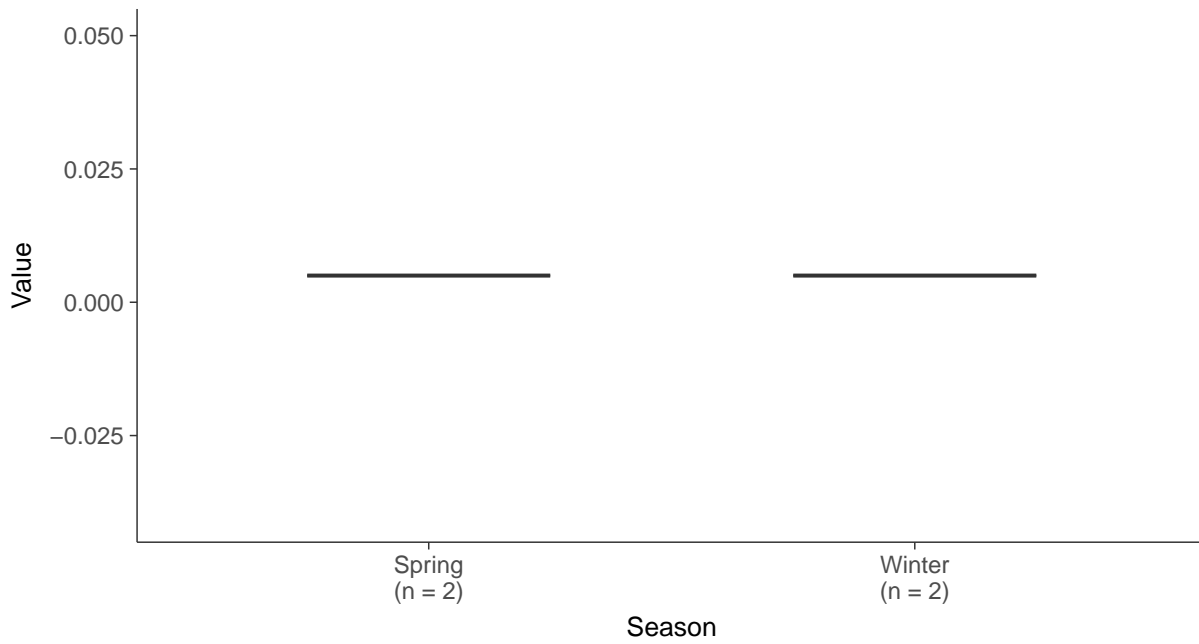
Boxplot

Copper, MW-14 (mg/L)



Boxplot by Season

Copper, MW-14 (mg/L)



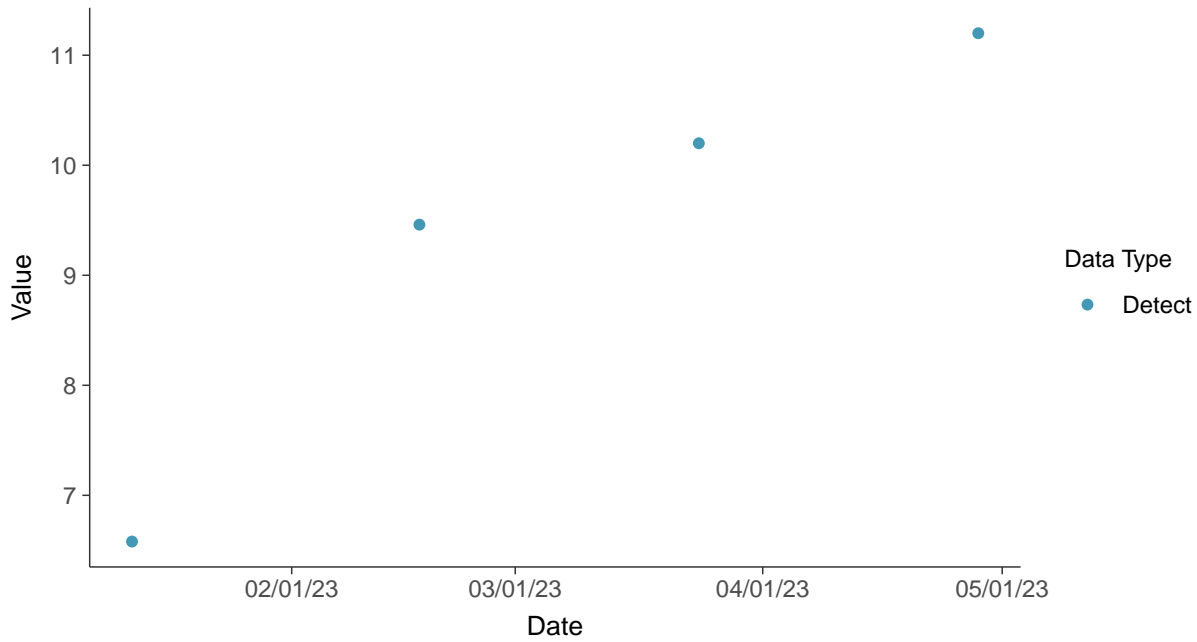


Part 115: Iron, MW-14

ID: 14_5_38

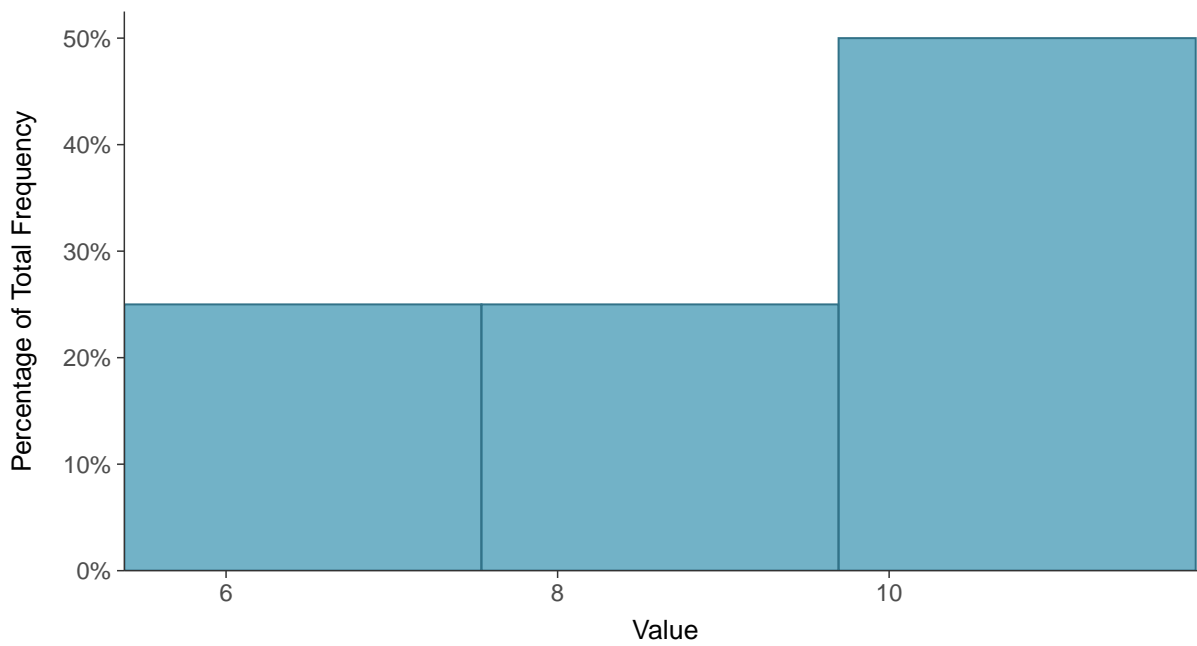
Scatter Plot

Iron, MW-14 (mg/L)



Histogram

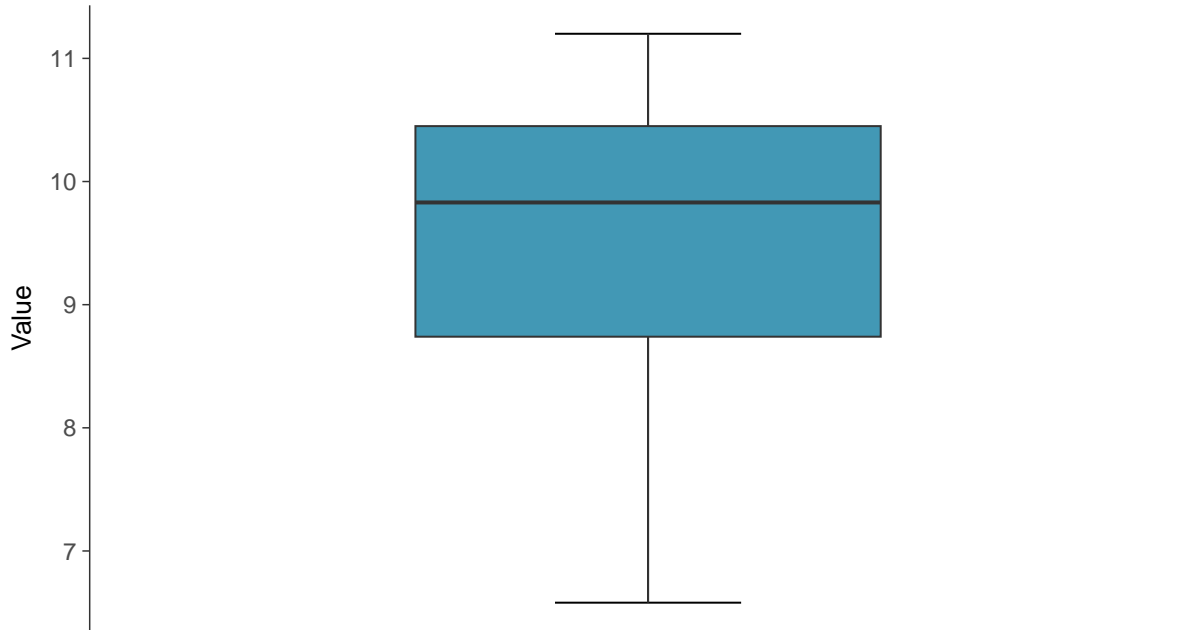
Iron, MW-14 (mg/L)





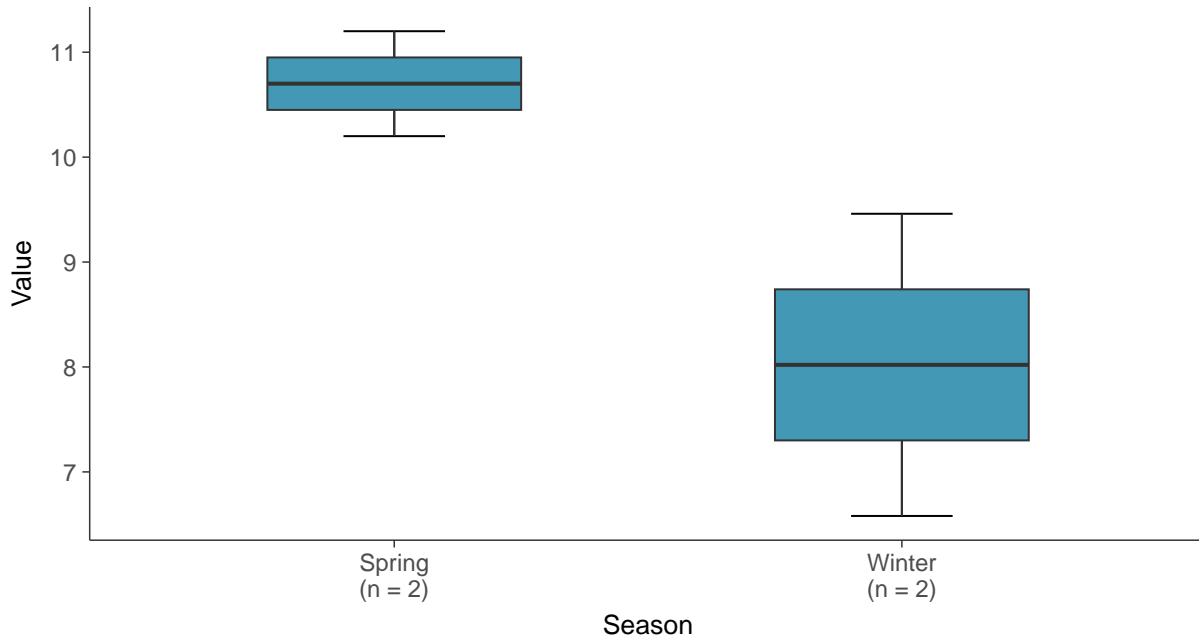
Boxplot

Iron, MW-14 (mg/L)



Boxplot by Season

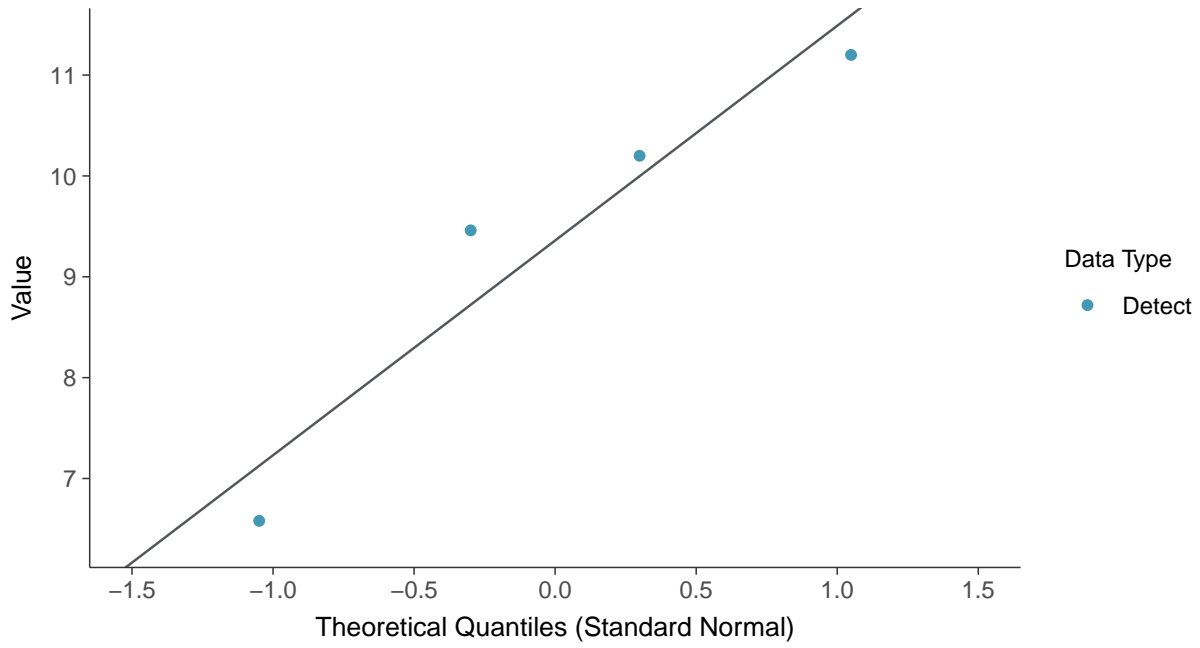
Iron, MW-14 (mg/L)





Normal Q-Q plot

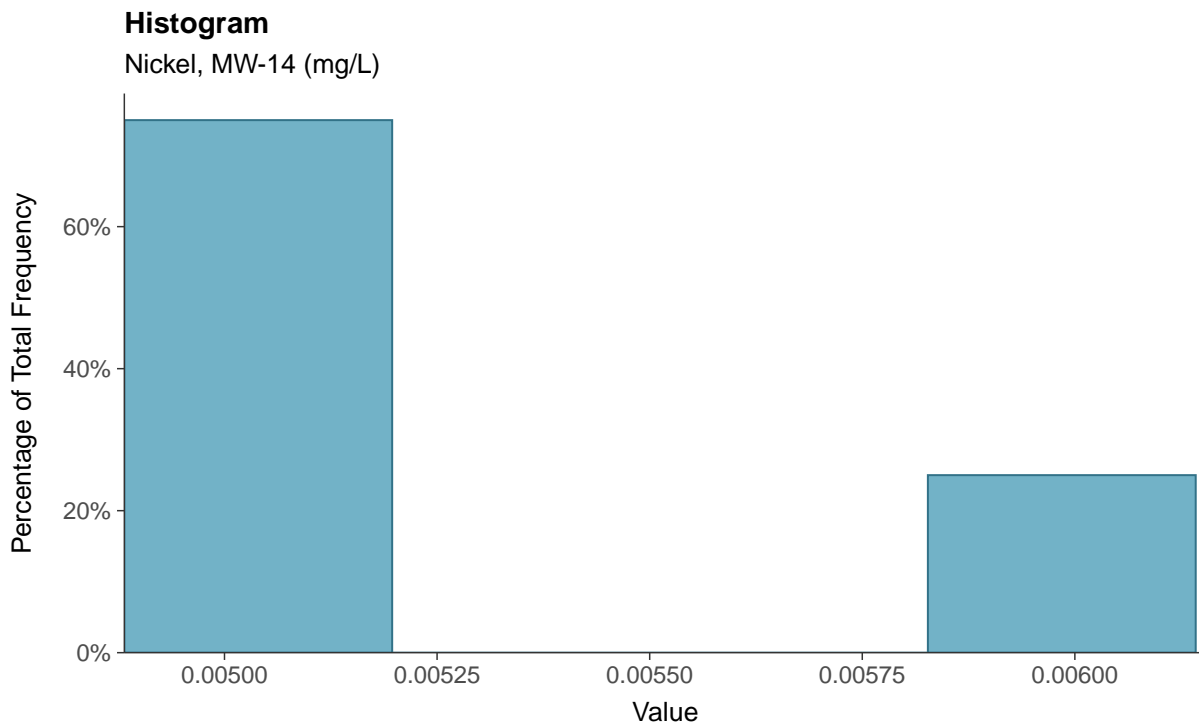
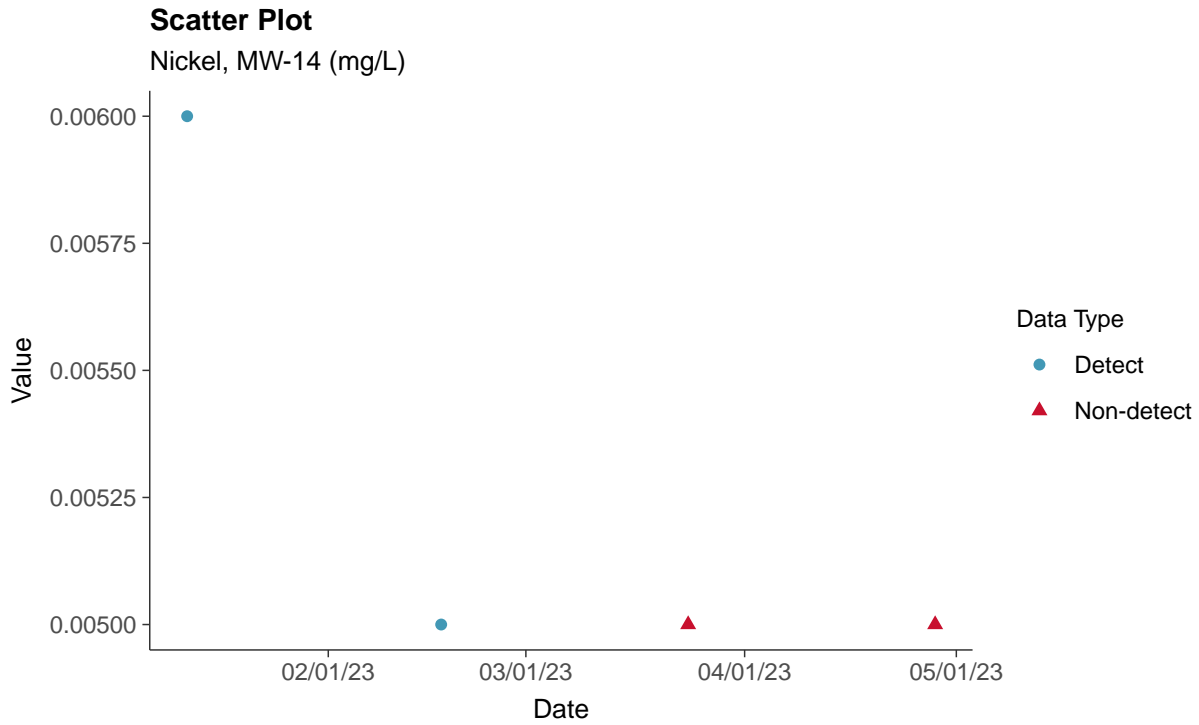
Iron, MW-14 (mg/L)





Part 115: Nickel, MW-14

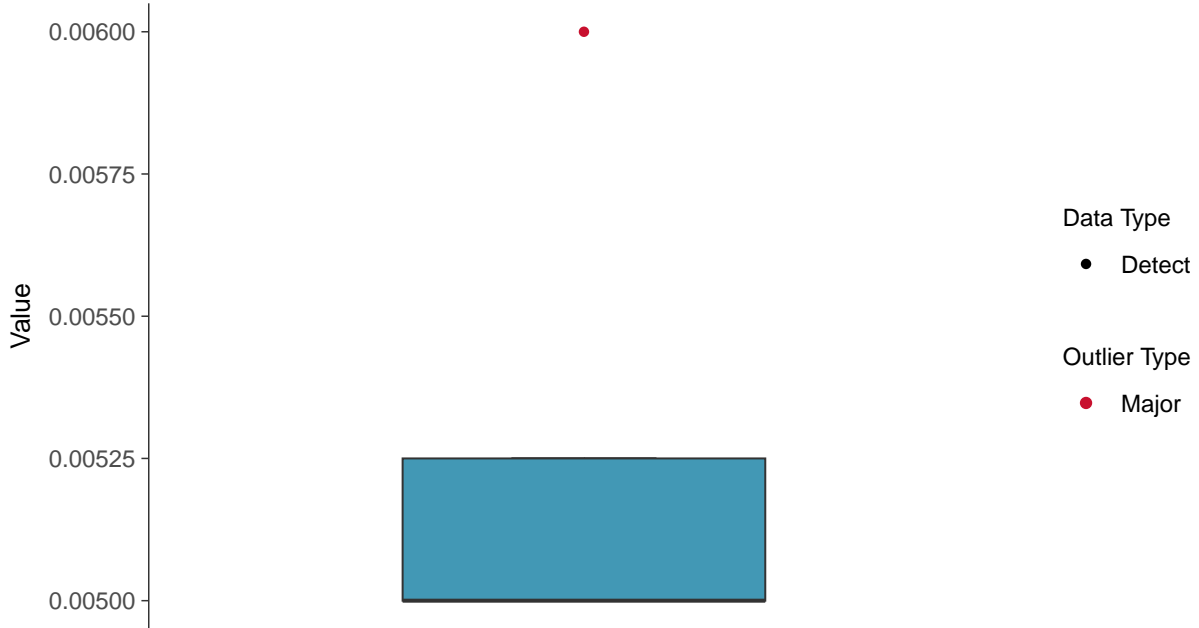
ID: 14_5_39





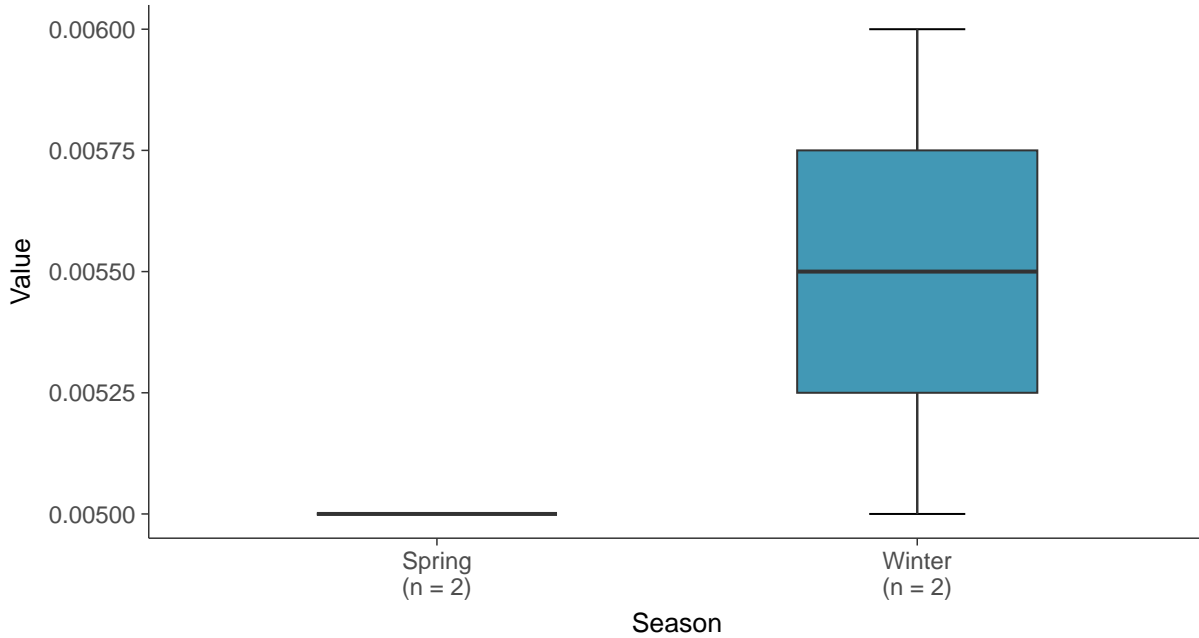
Boxplot

Nickel, MW-14 (mg/L)



Boxplot by Season

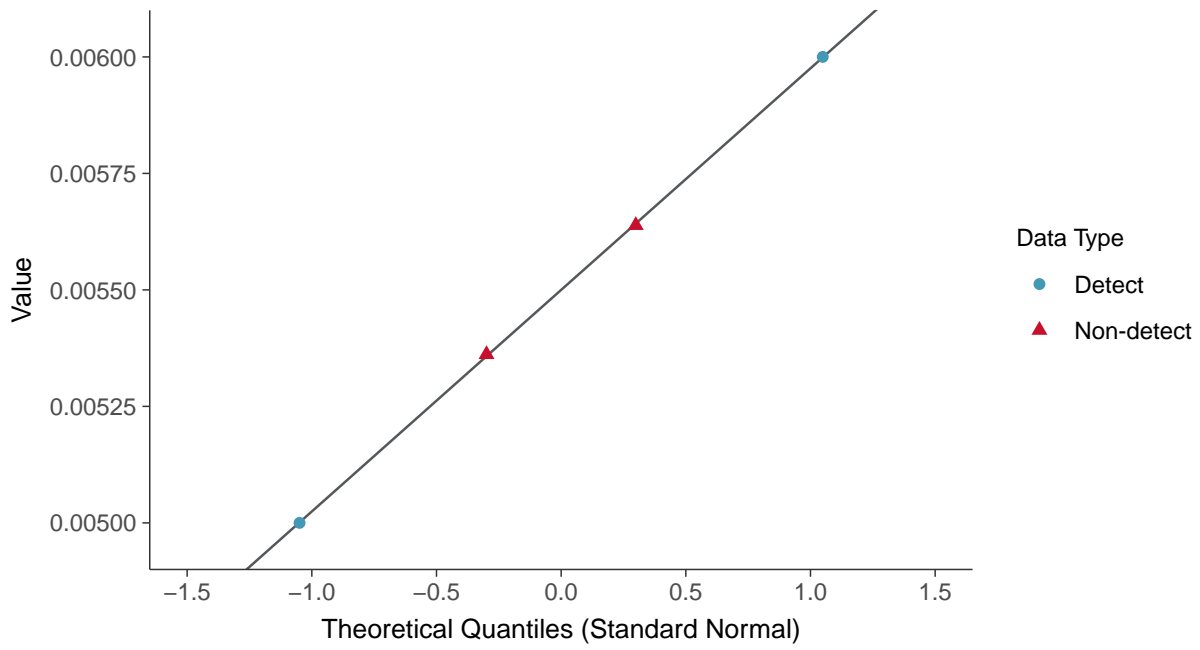
Nickel, MW-14 (mg/L)





Normal Q-Q plot using ROS Imputed Estimates

Nickel, MW-14 (mg/L)



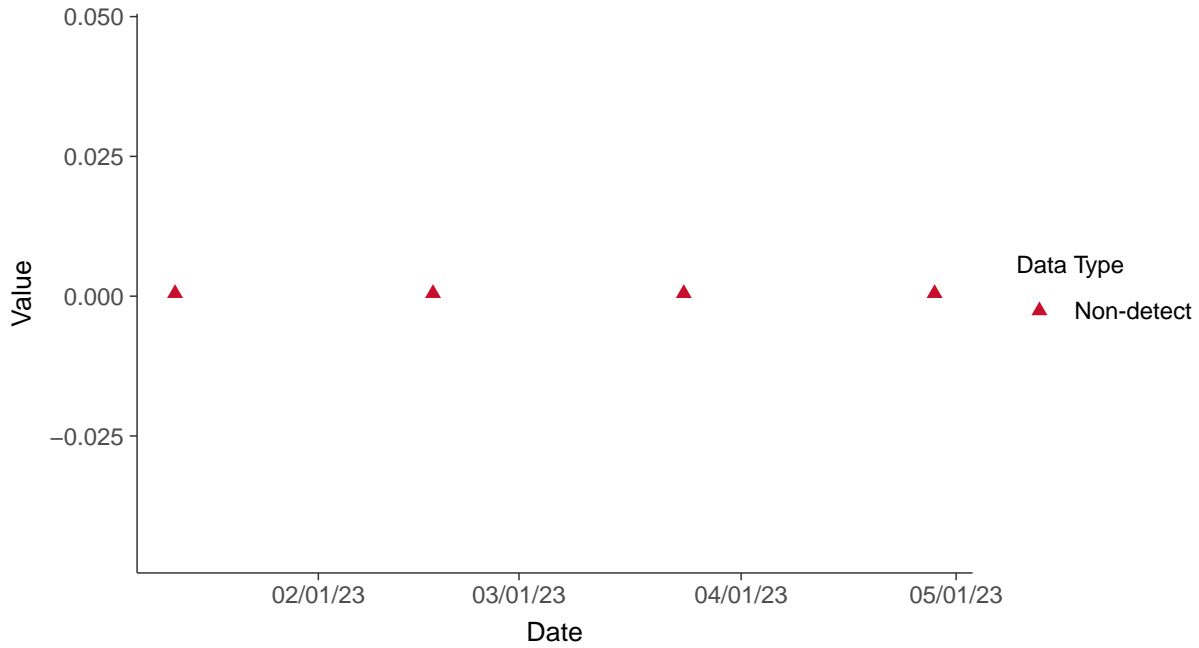


Part 115: Silver, MW-14

ID: 14_5_40

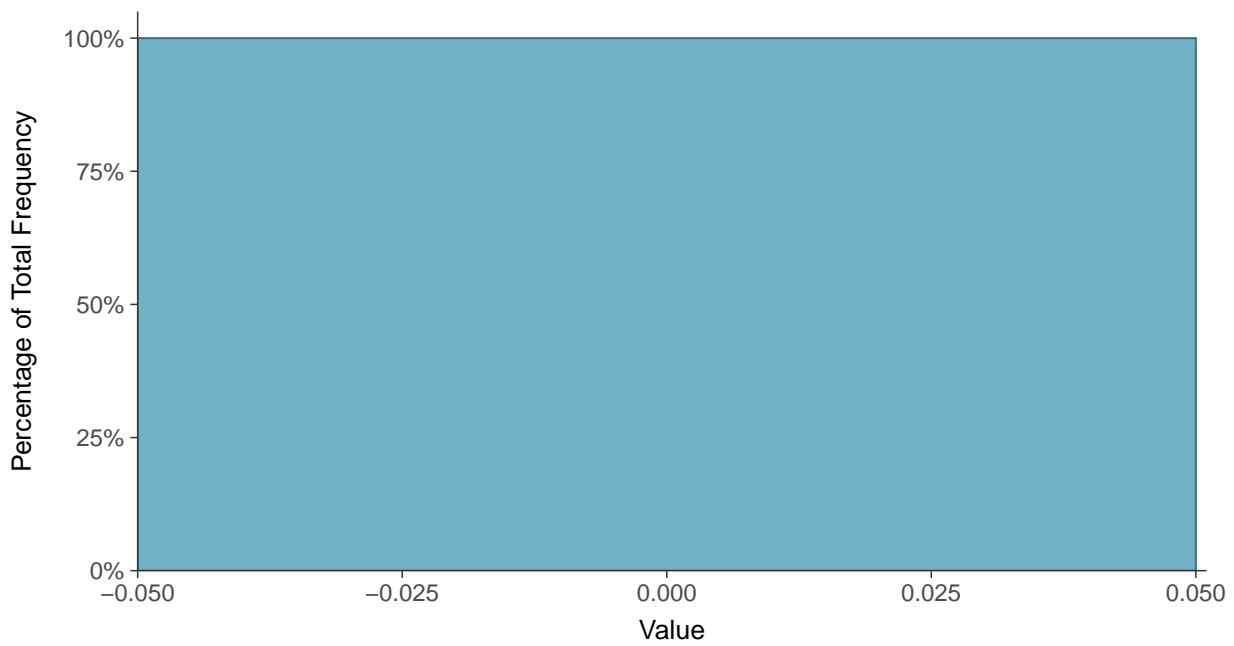
Scatter Plot

Silver, MW-14 (mg/L)



Histogram

Silver, MW-14 (mg/L)





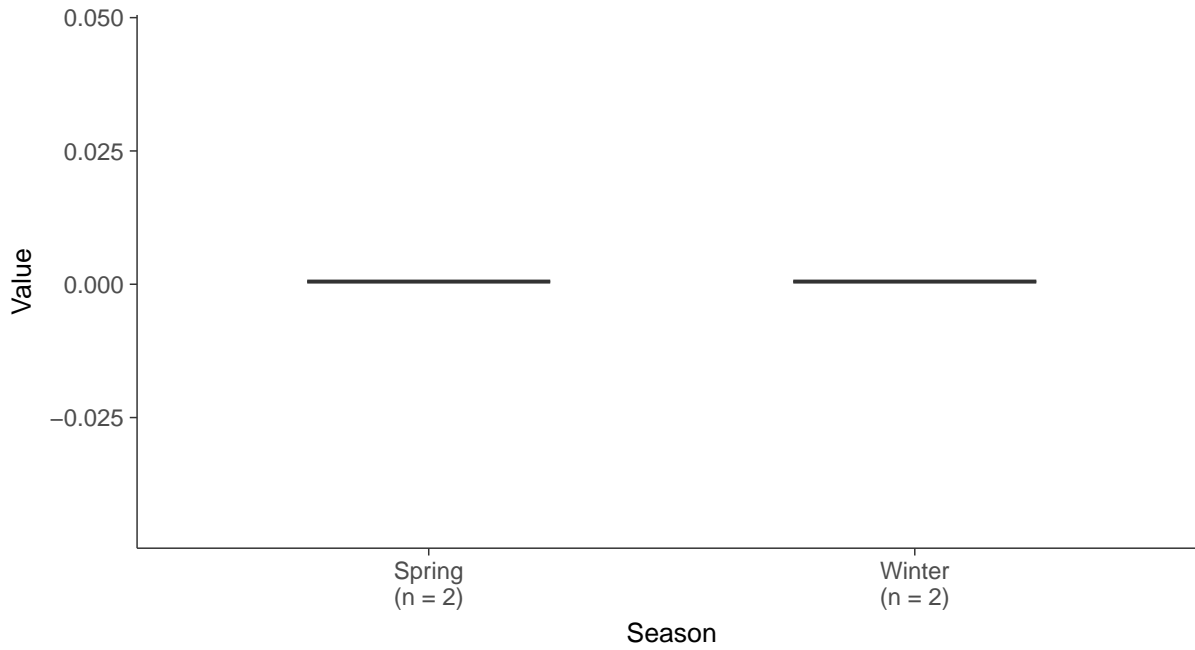
Boxplot

Silver, MW-14 (mg/L)



Boxplot by Season

Silver, MW-14 (mg/L)



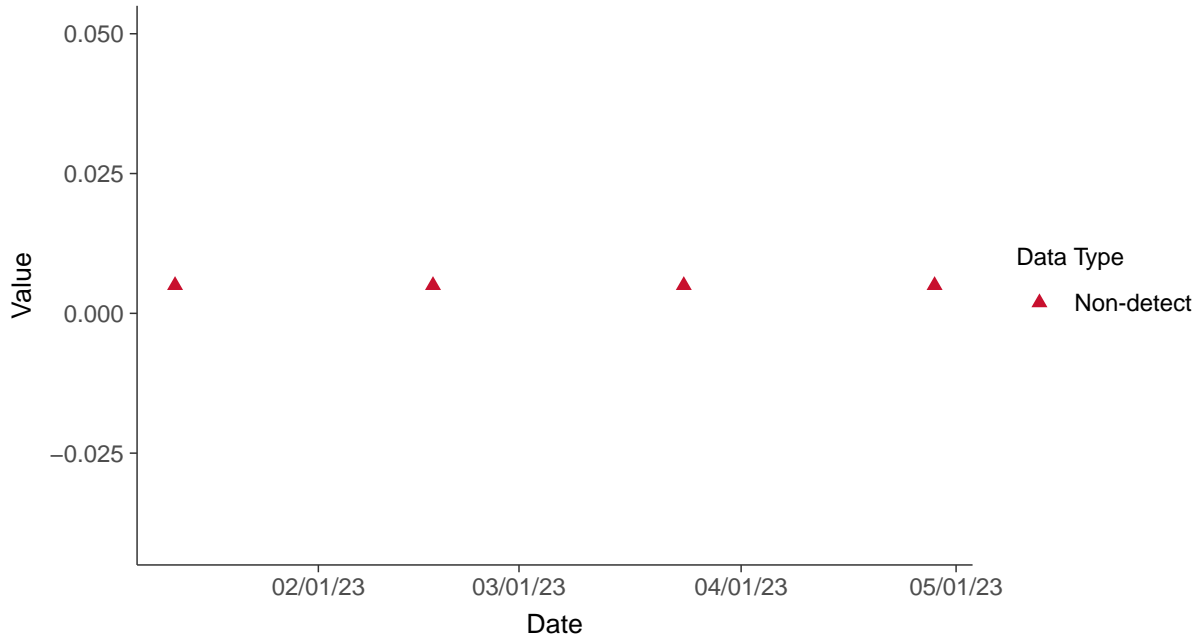


Part 115: Vanadium, MW-14

ID: 14_5_41

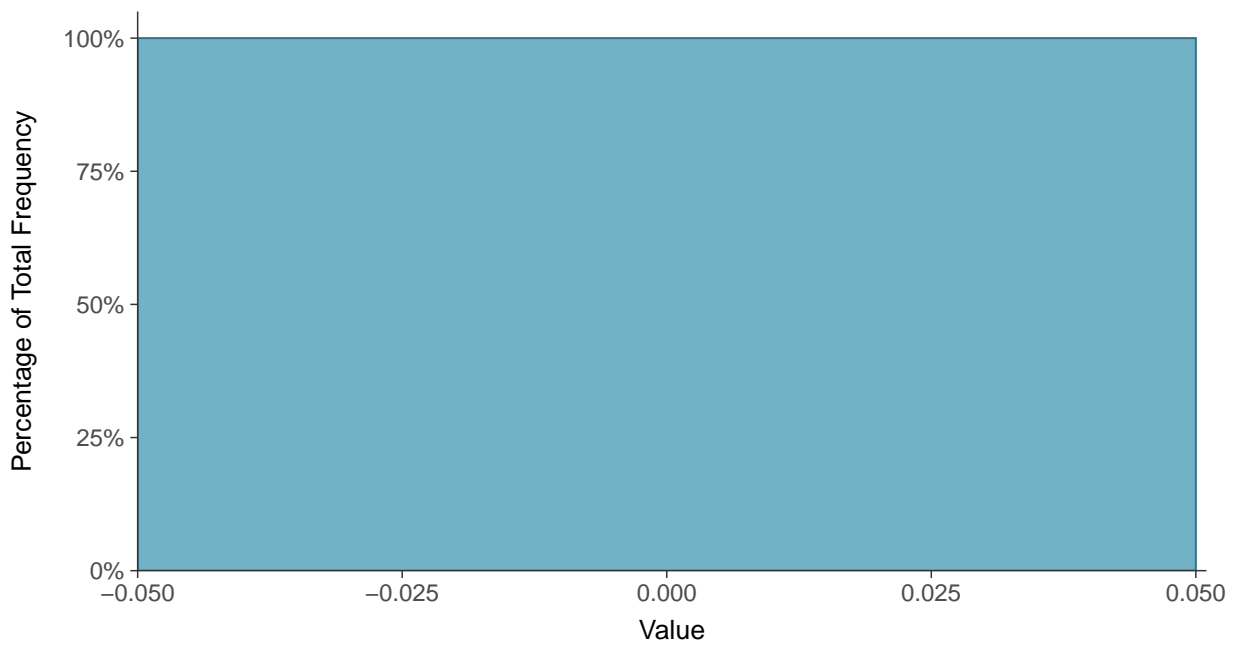
Scatter Plot

Vanadium, MW-14 (mg/L)



Histogram

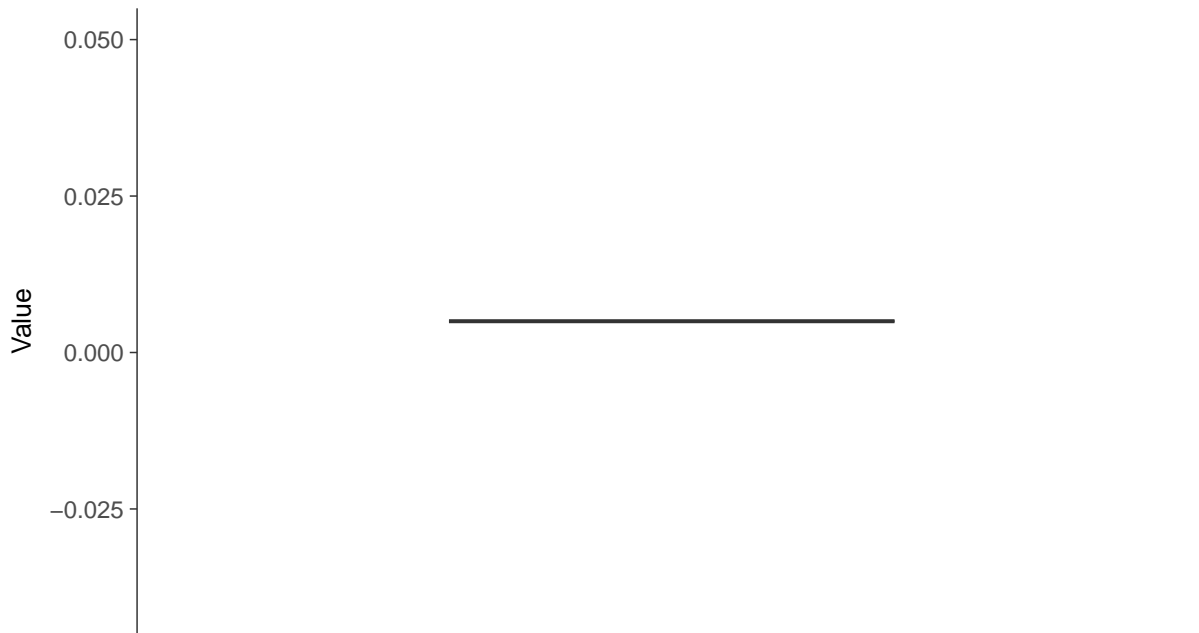
Vanadium, MW-14 (mg/L)





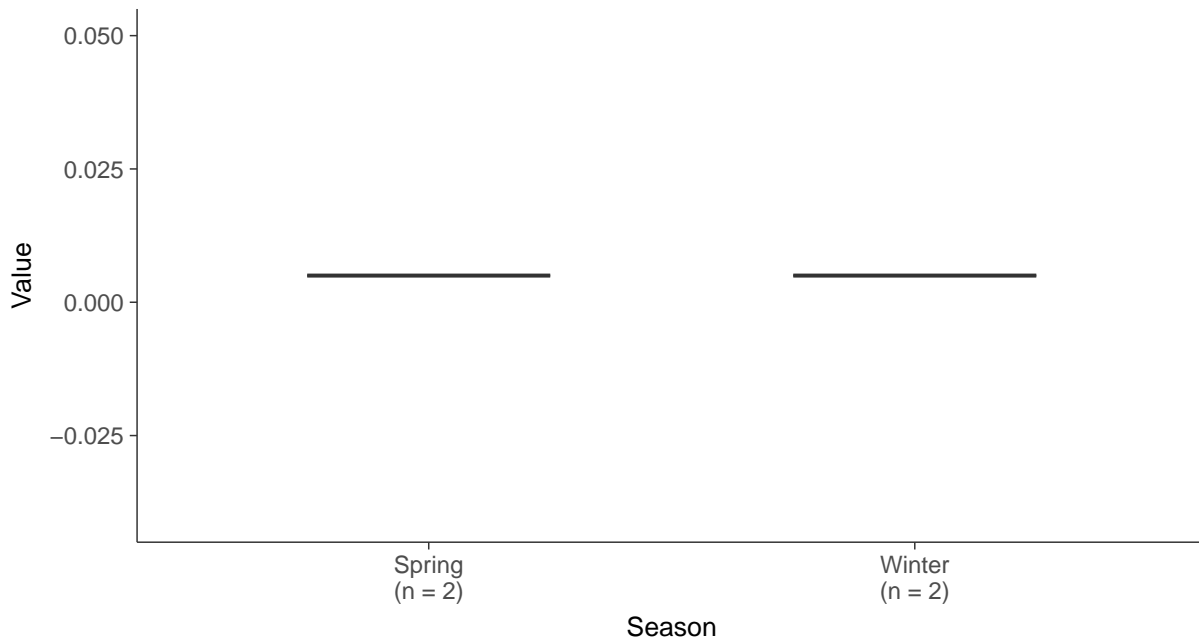
Boxplot

Vanadium, MW-14 (mg/L)



Boxplot by Season

Vanadium, MW-14 (mg/L)



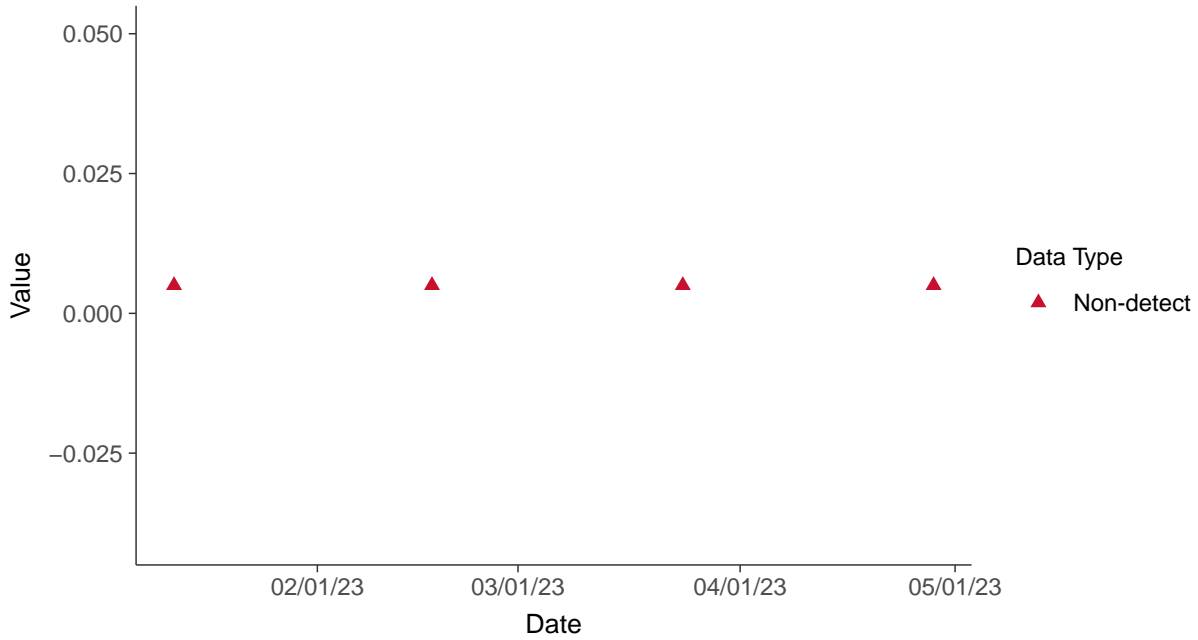


Part 115: Zinc, MW-14

ID: 14_5_42

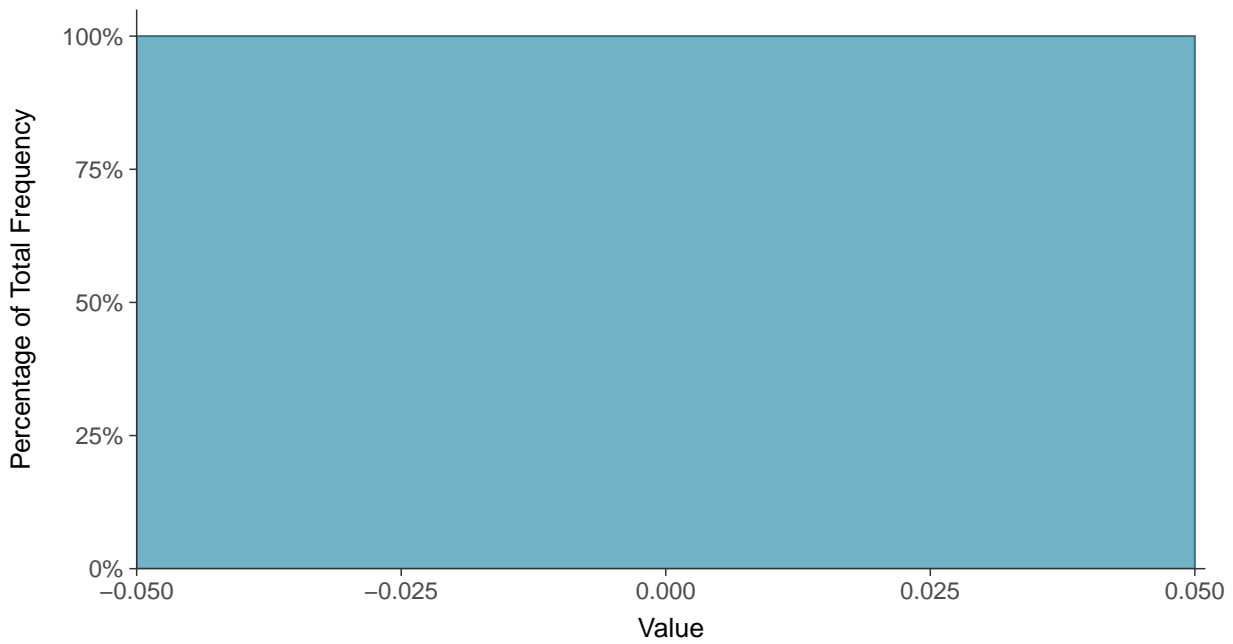
Scatter Plot

Zinc, MW-14 (mg/L)



Histogram

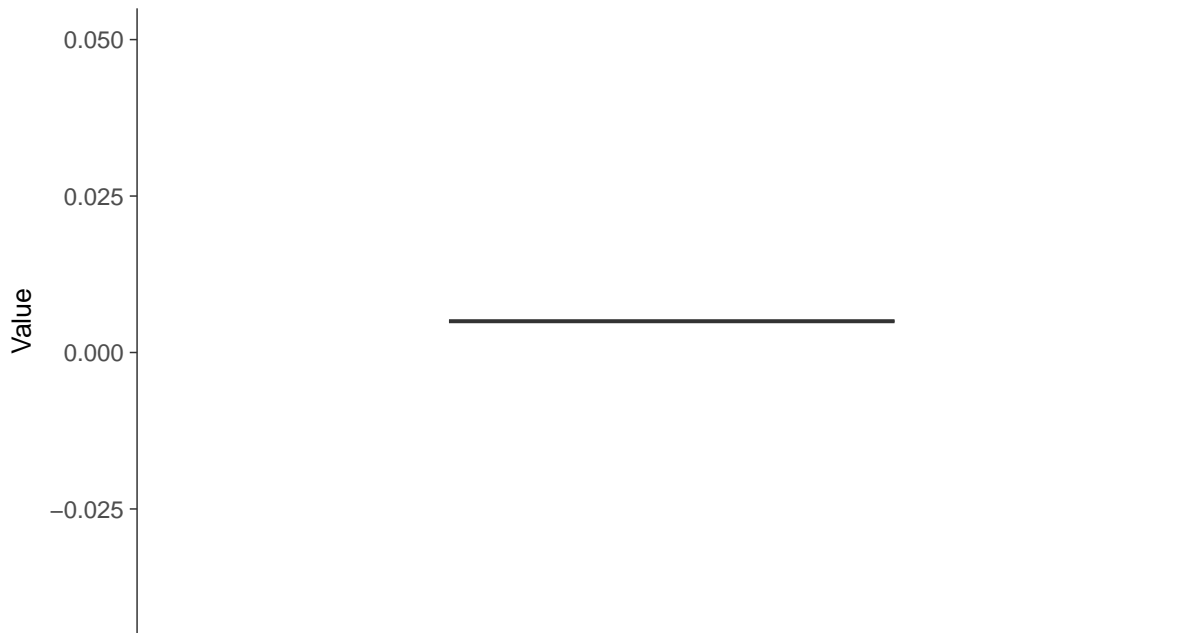
Zinc, MW-14 (mg/L)





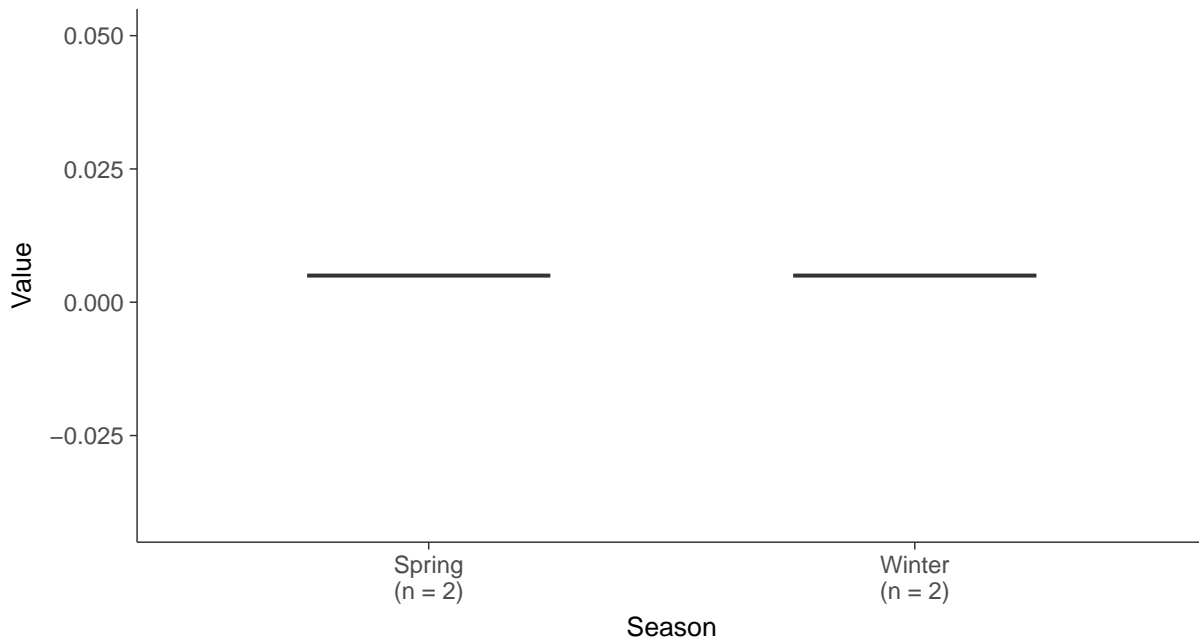
Boxplot

Zinc, MW-14 (mg/L)



Boxplot by Season

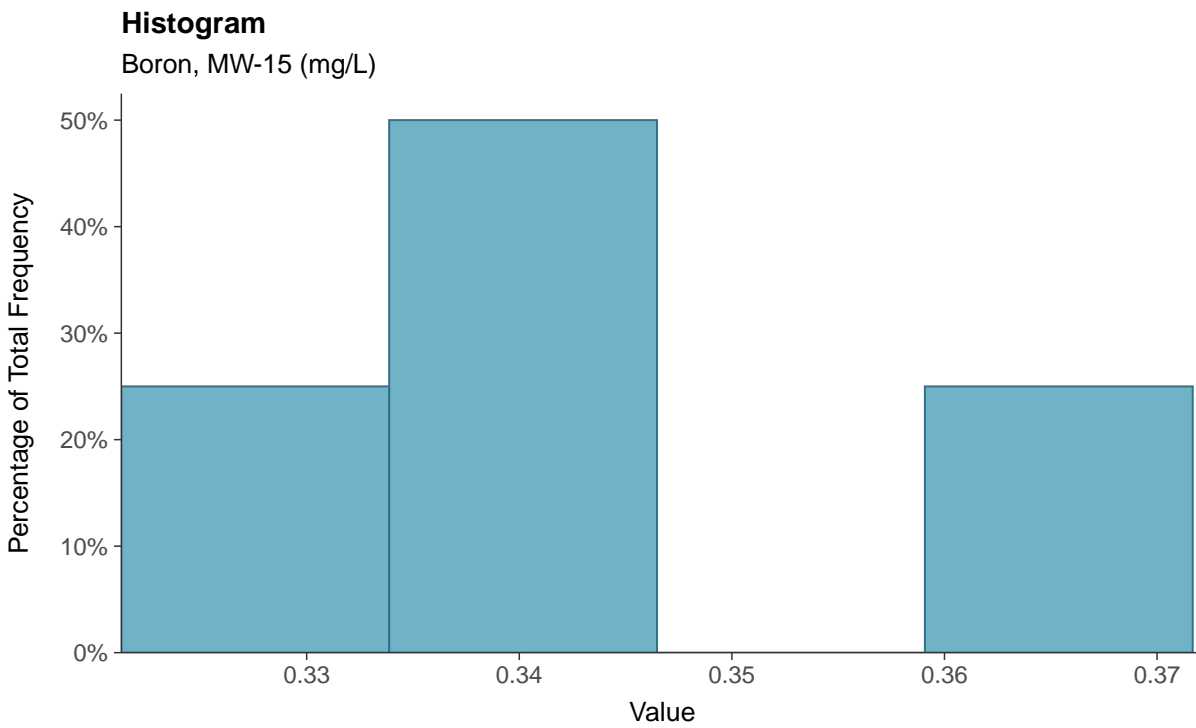
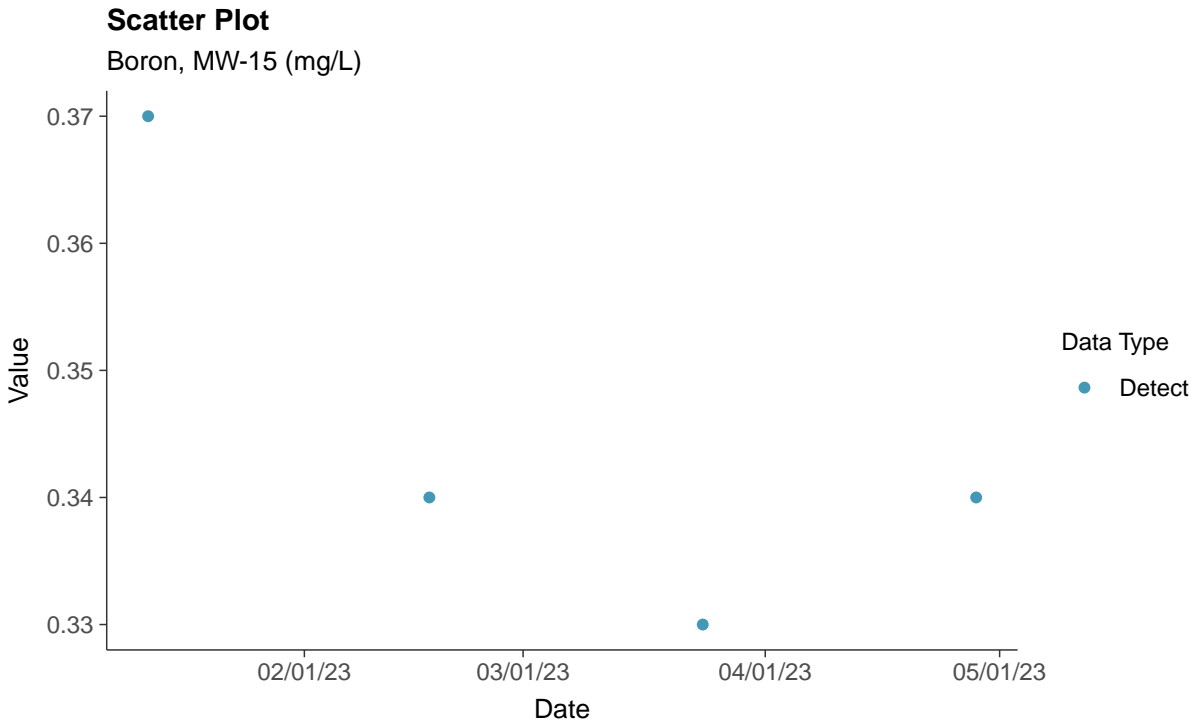
Zinc, MW-14 (mg/L)





Appendix III: Boron, MW-15

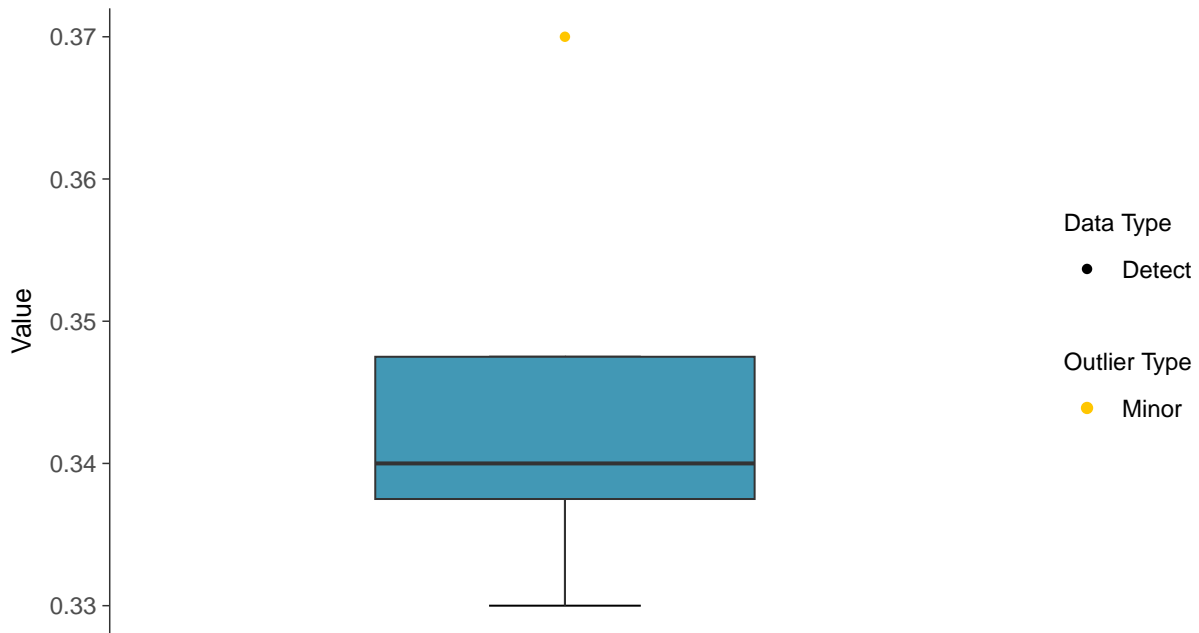
ID: 15_1_01





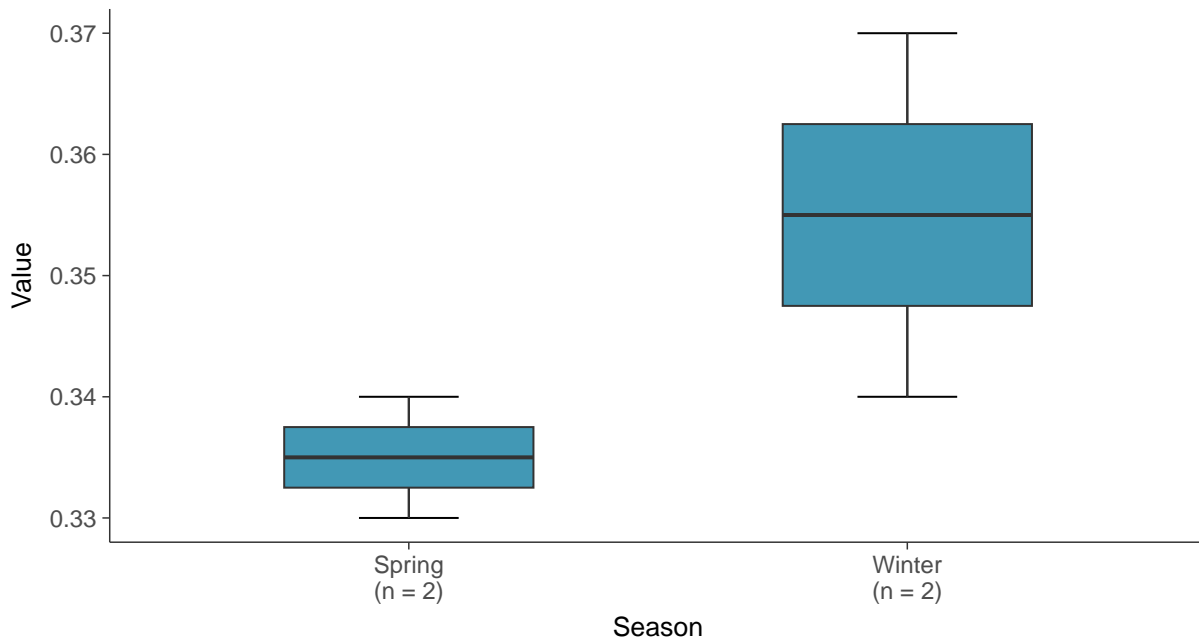
Boxplot

Boron, MW-15 (mg/L)



Boxplot by Season

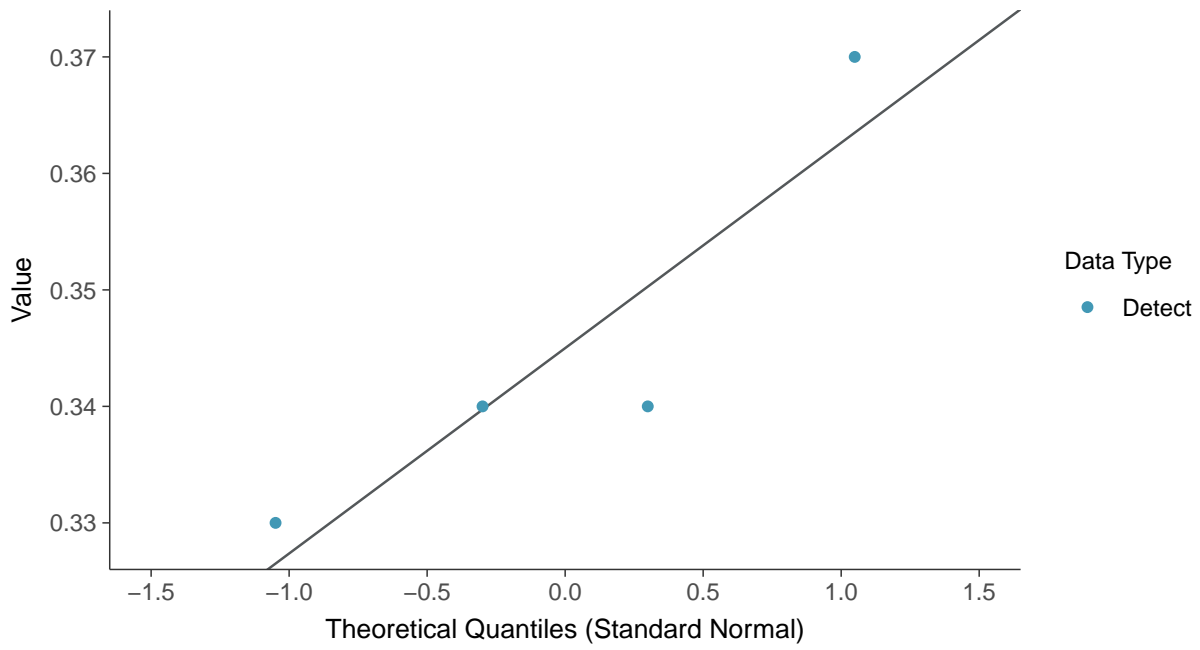
Boron, MW-15 (mg/L)





Normal Q-Q plot

Boron, MW-15 (mg/L)



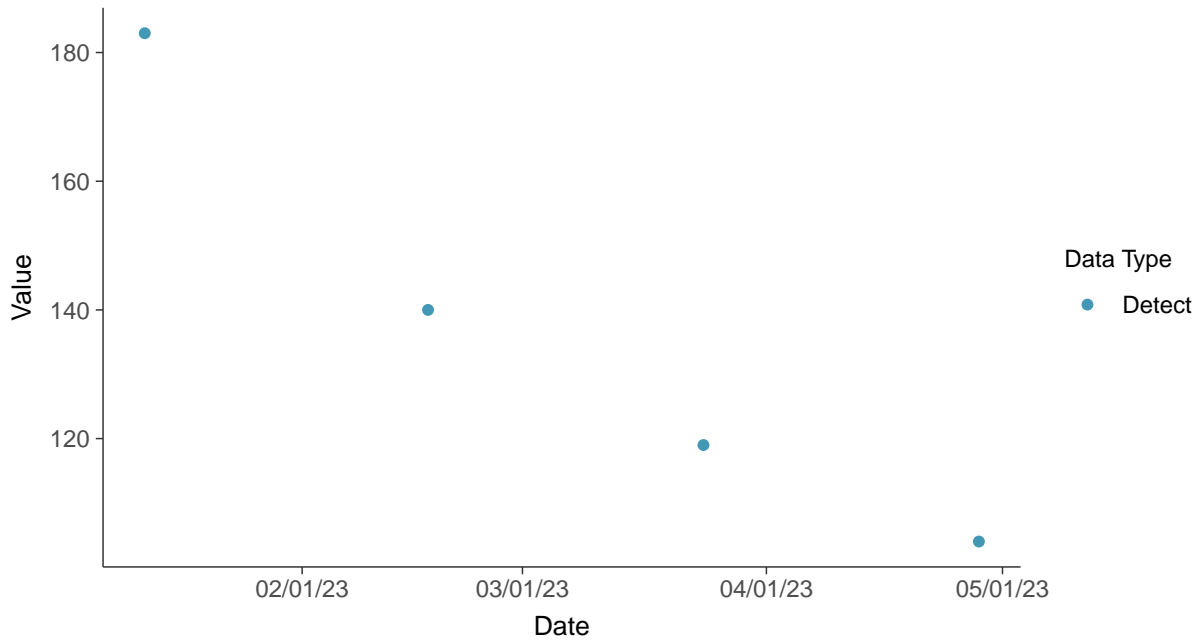


Appendix III: Calcium, MW-15

ID: 15_1_02

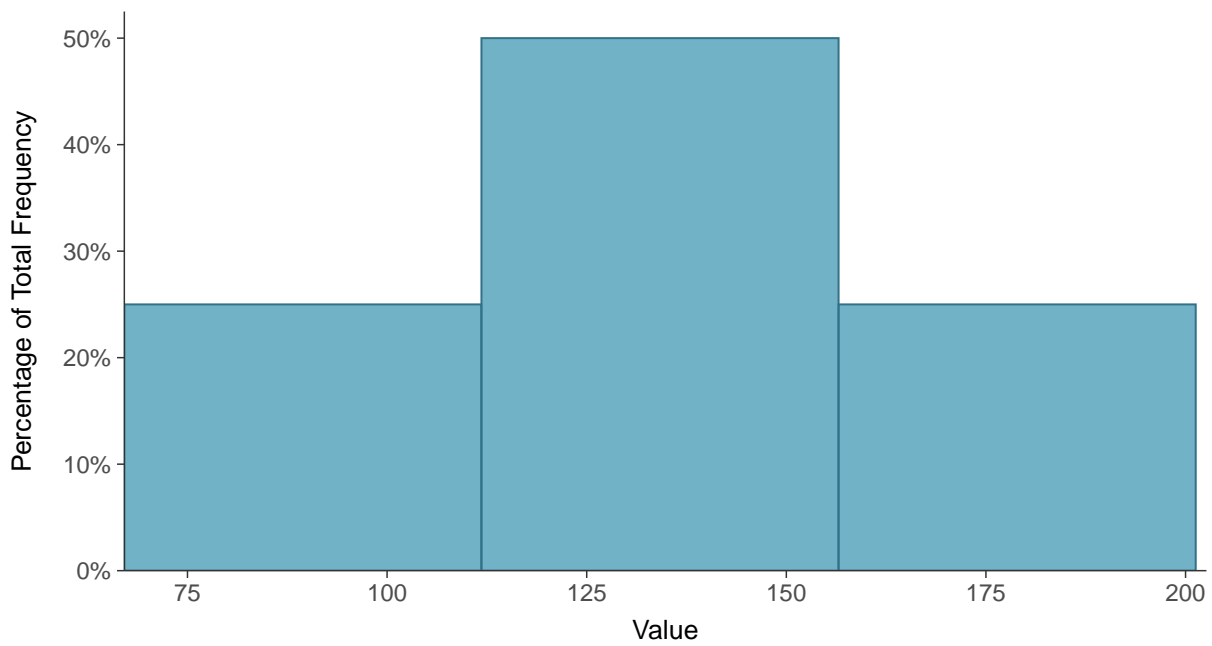
Scatter Plot

Calcium, MW-15 (mg/L)



Histogram

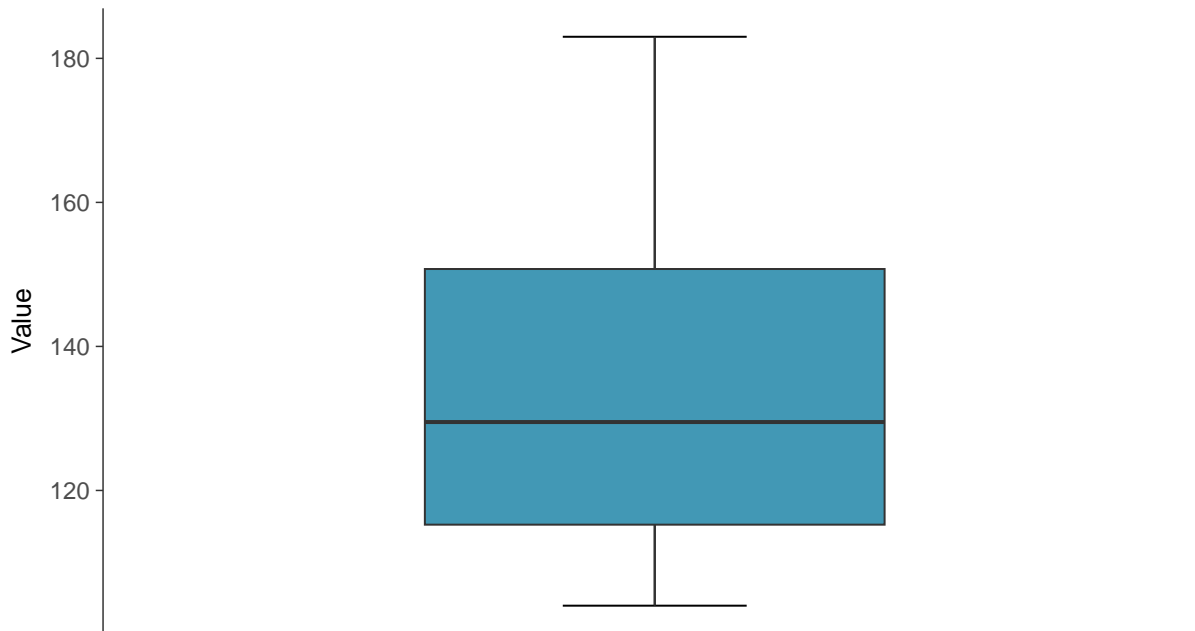
Calcium, MW-15 (mg/L)





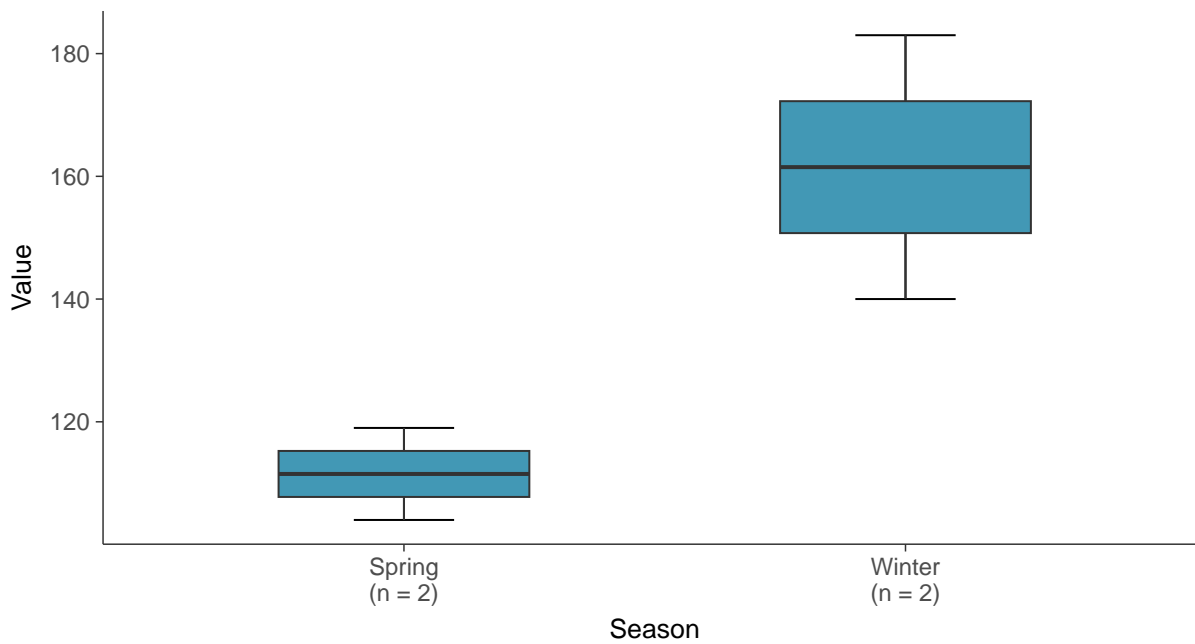
Boxplot

Calcium, MW-15 (mg/L)



Boxplot by Season

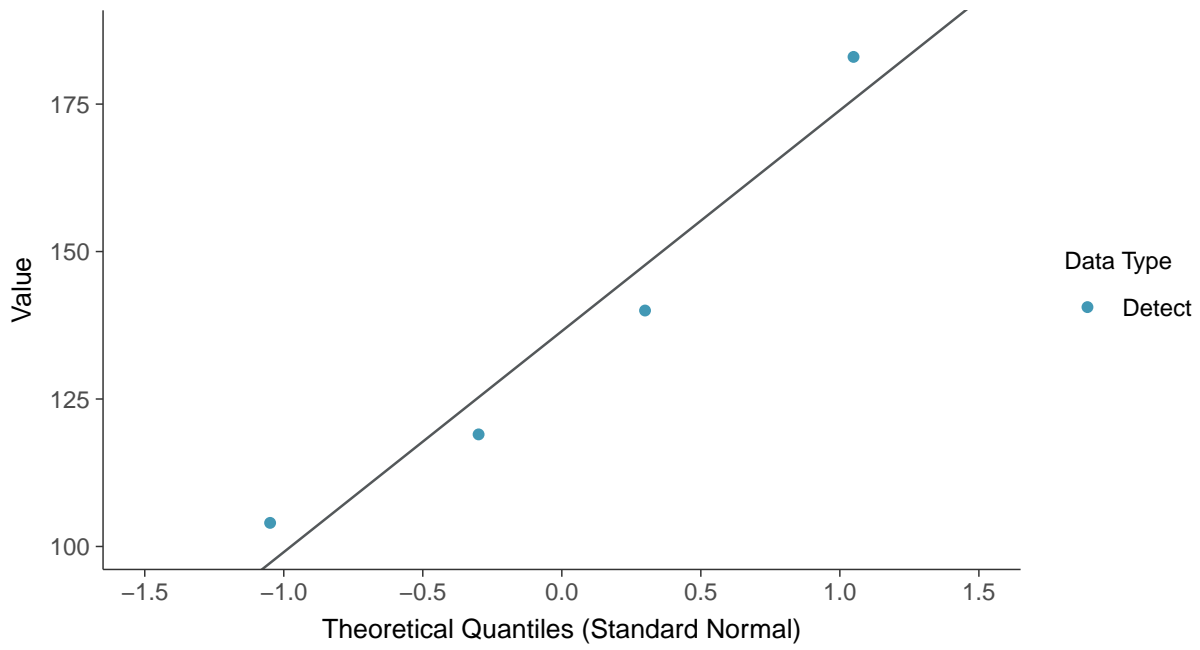
Calcium, MW-15 (mg/L)





Normal Q-Q plot

Calcium, MW-15 (mg/L)



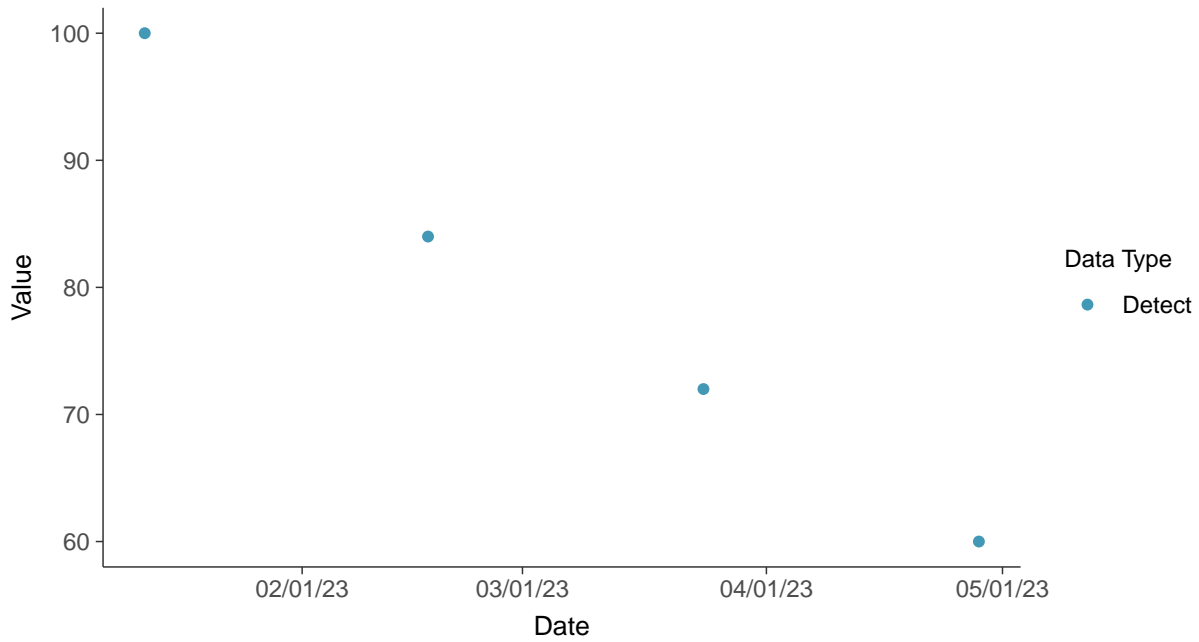


Appendix III: Chloride, MW-15

ID: 15_1_03

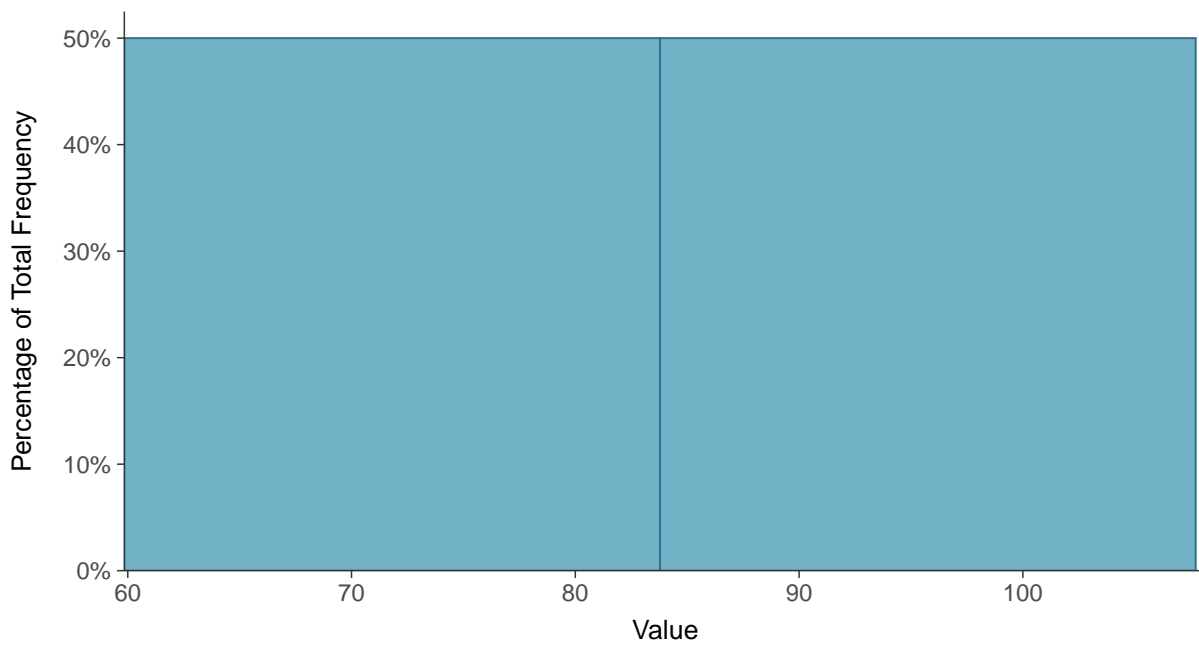
Scatter Plot

Chloride, MW-15 (mg/L)



Histogram

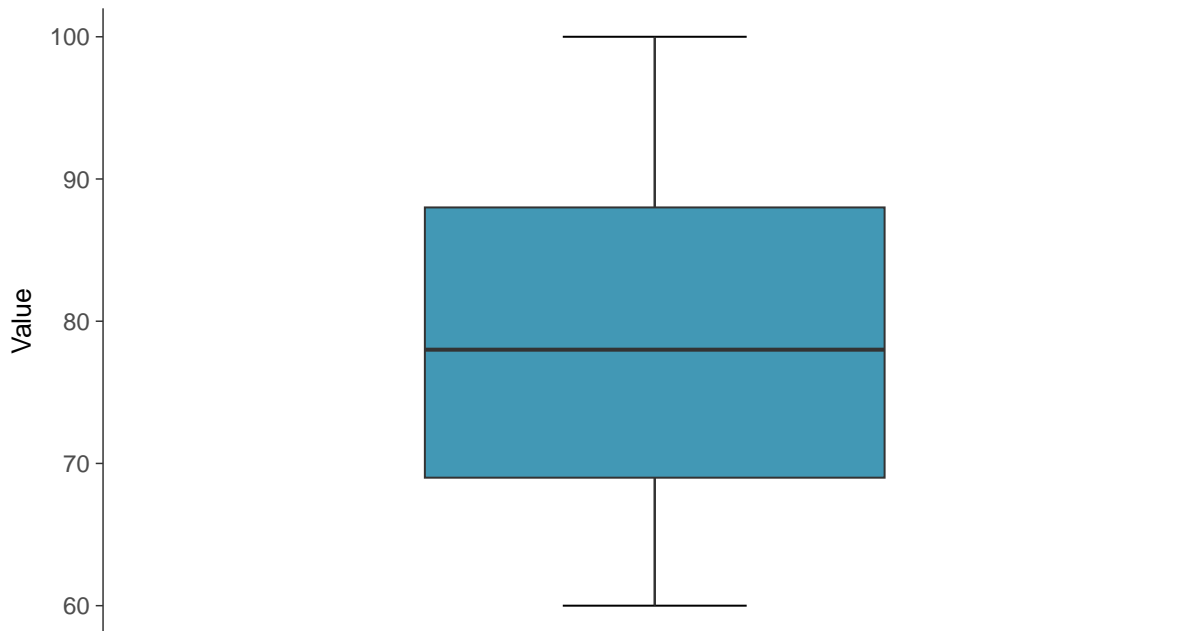
Chloride, MW-15 (mg/L)





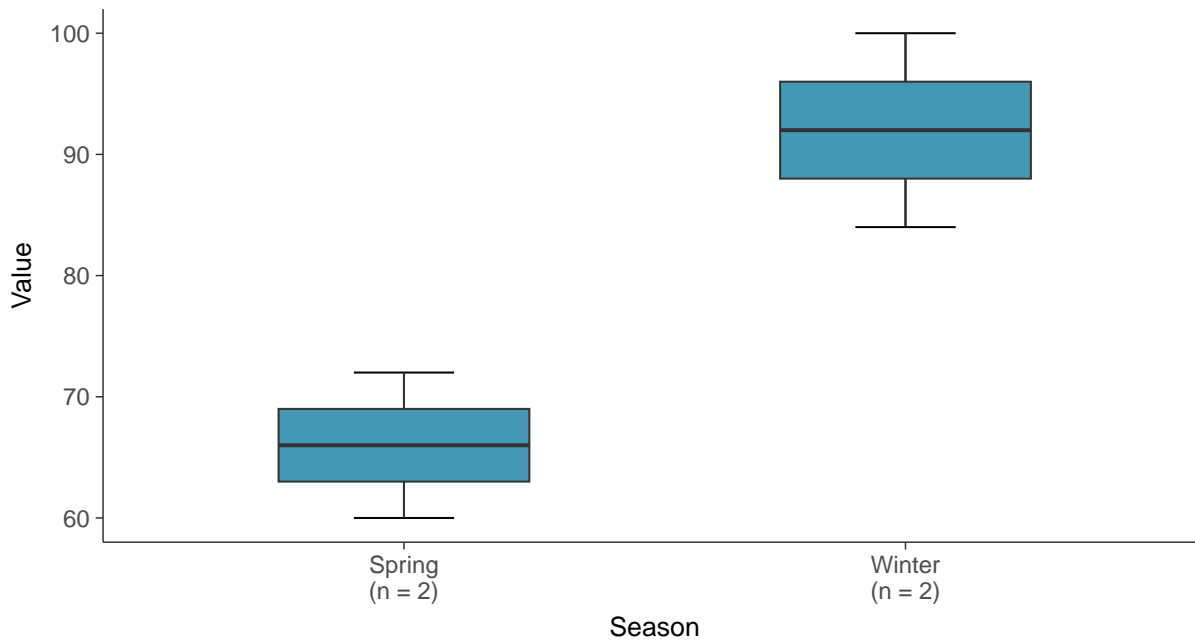
Boxplot

Chloride, MW-15 (mg/L)



Boxplot by Season

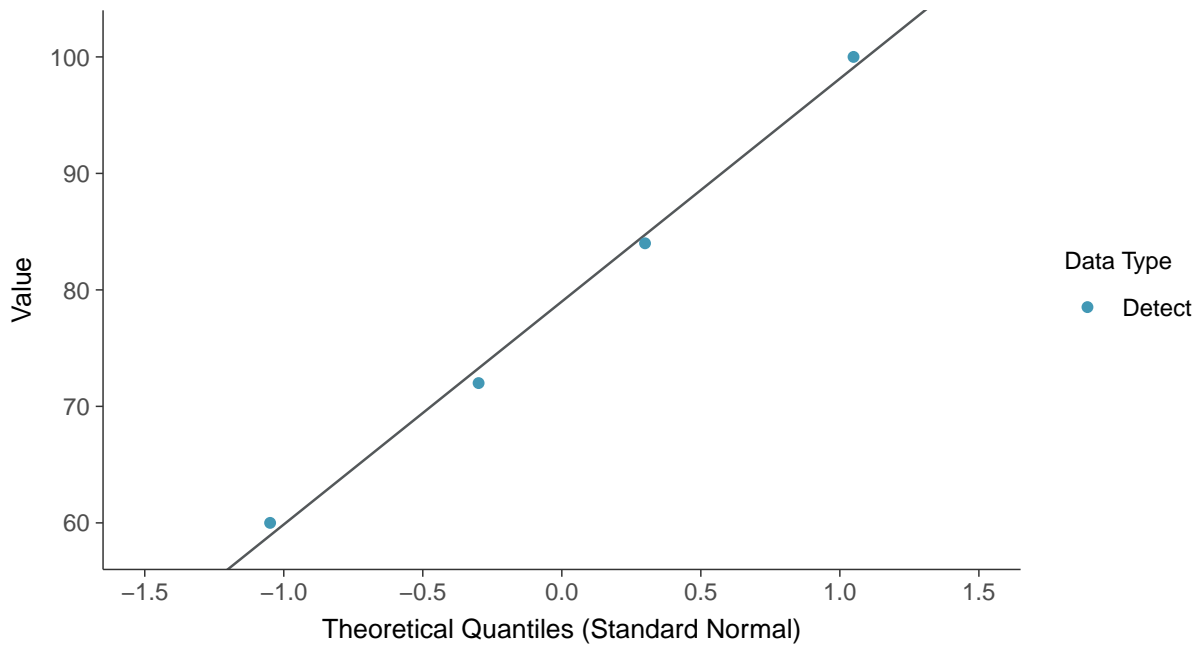
Chloride, MW-15 (mg/L)





Normal Q-Q plot

Chloride, MW-15 (mg/L)



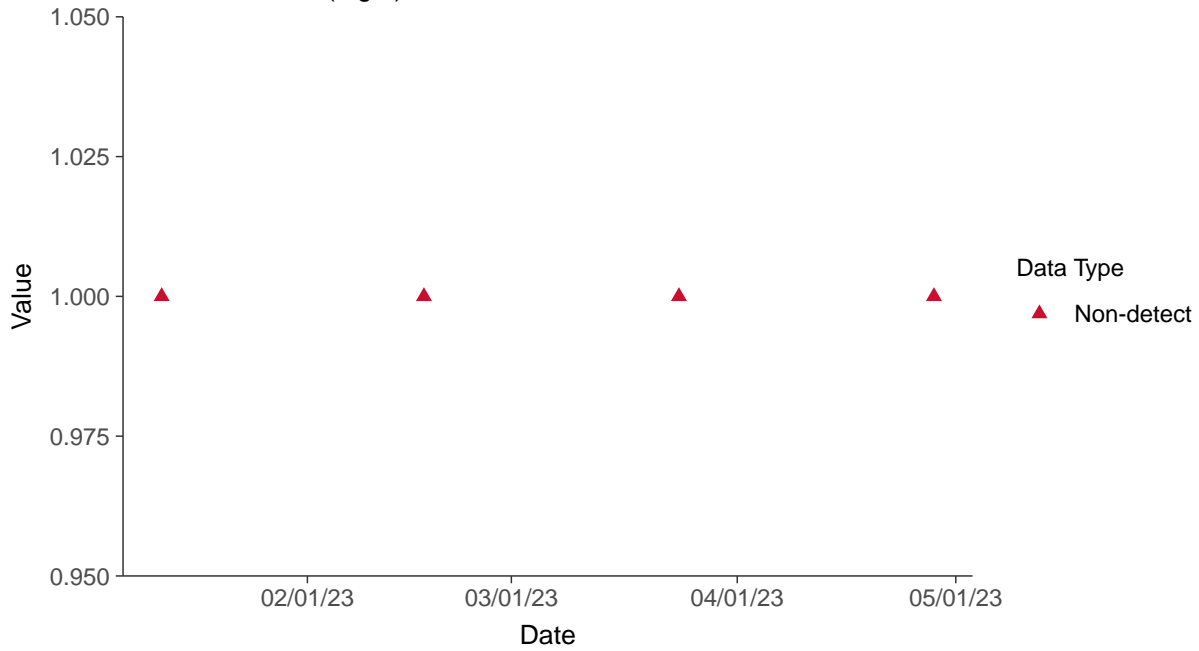


Appendix III: Fluoride, MW-15

ID: 15_1_04

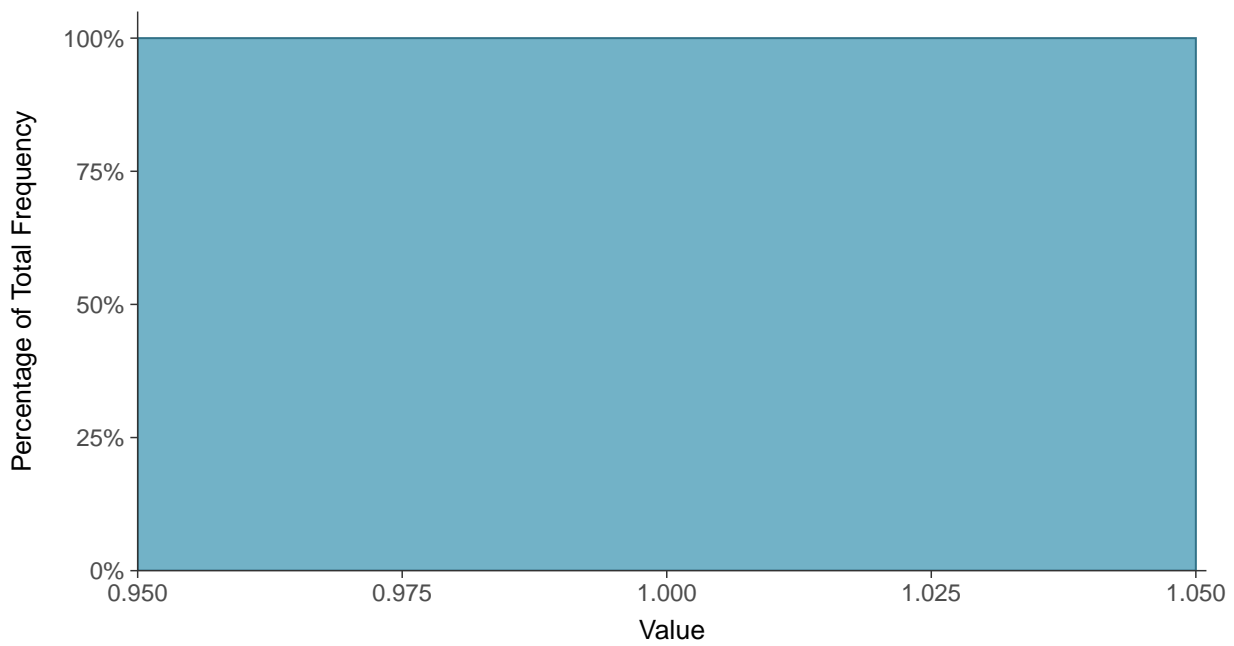
Scatter Plot

Fluoride, MW-15 (mg/L)



Histogram

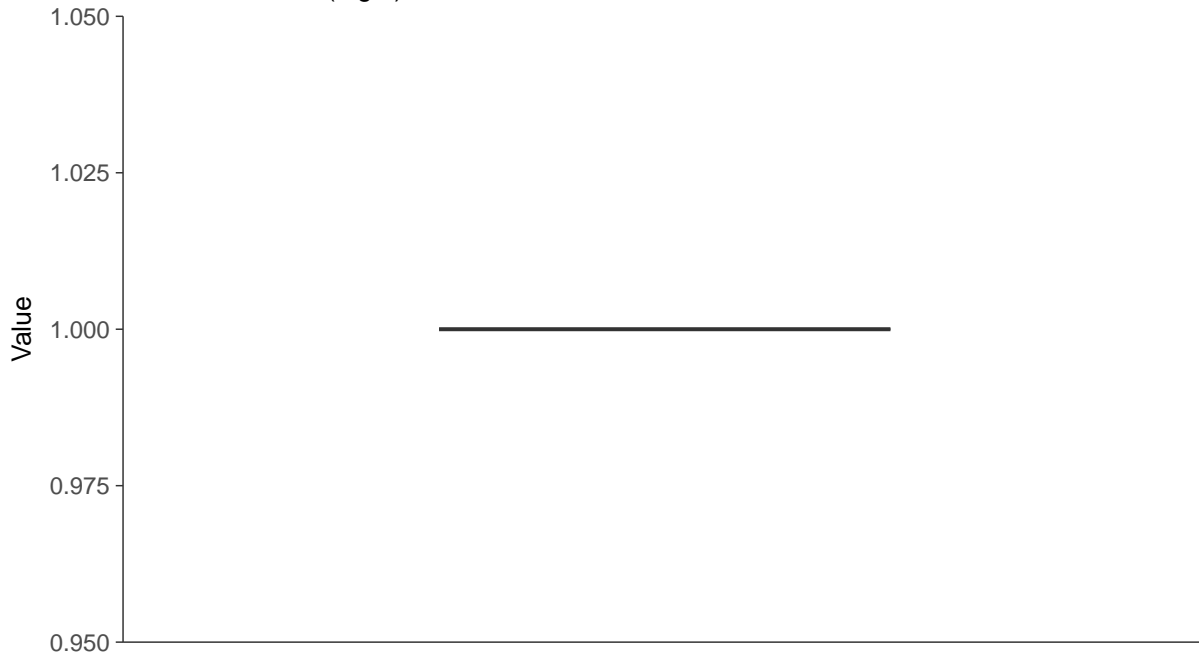
Fluoride, MW-15 (mg/L)





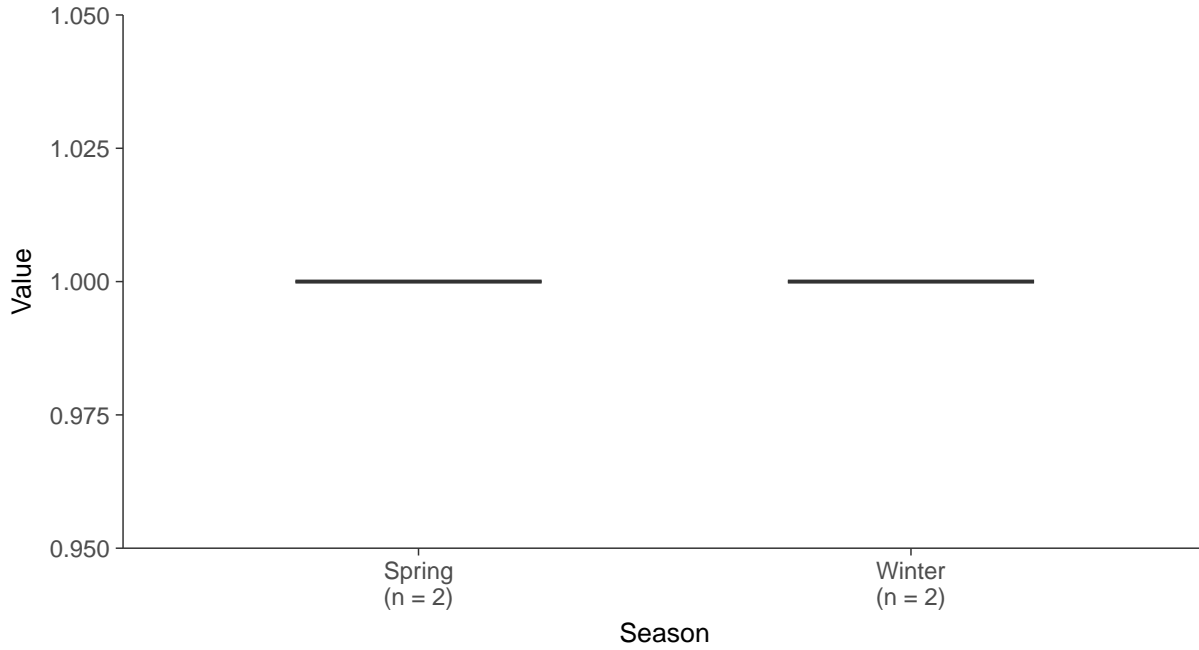
Boxplot

Fluoride, MW-15 (mg/L)



Boxplot by Season

Fluoride, MW-15 (mg/L)



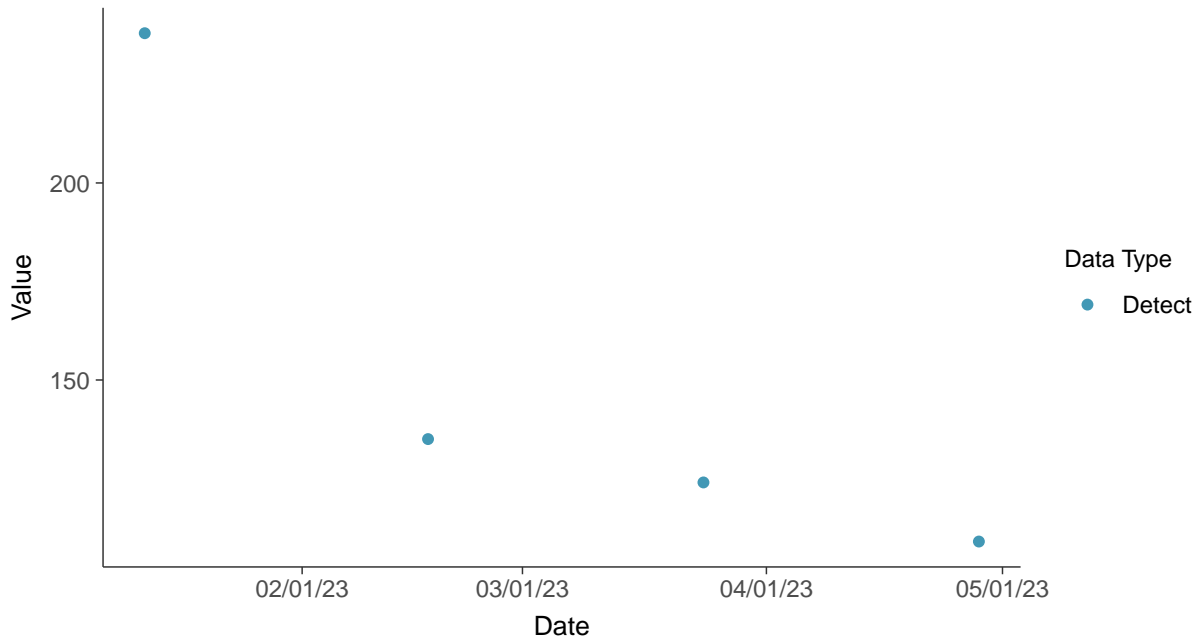


Appendix III: Sulfate, MW-15

ID: 15_1_05

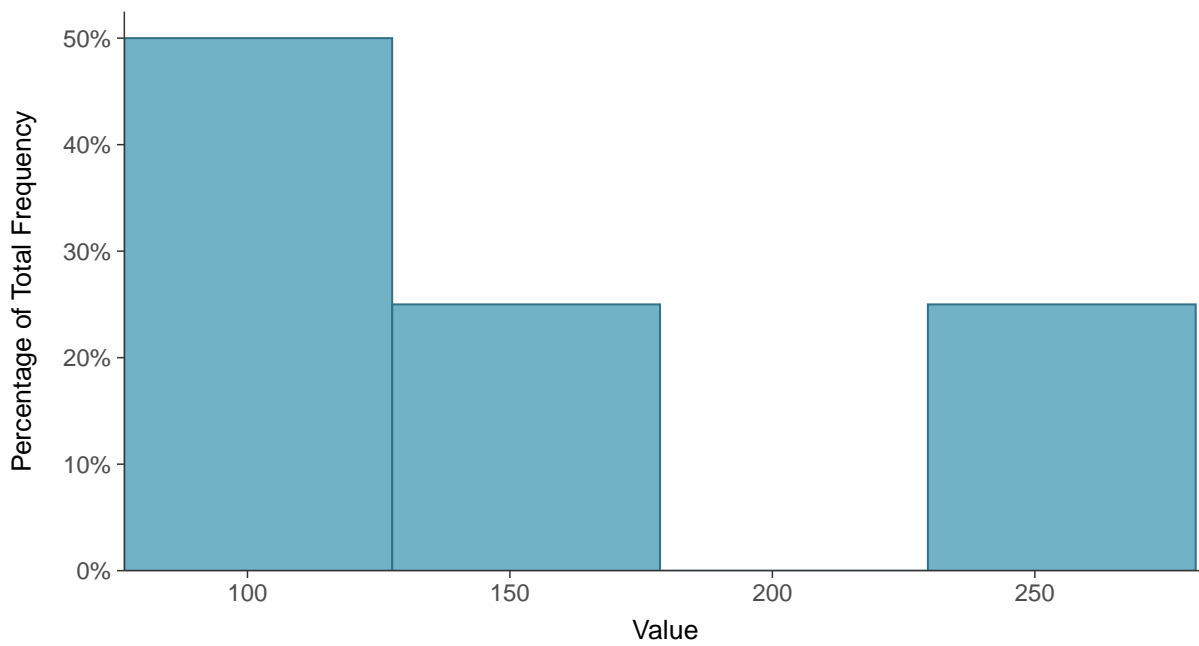
Scatter Plot

Sulfate, MW-15 (mg/L)



Histogram

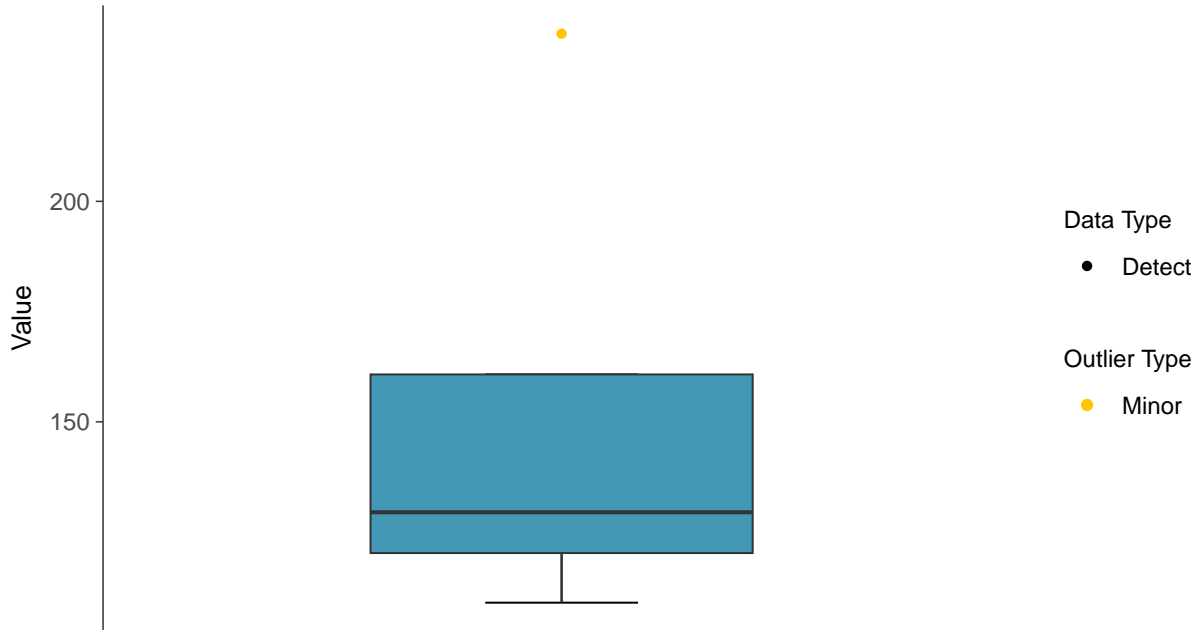
Sulfate, MW-15 (mg/L)





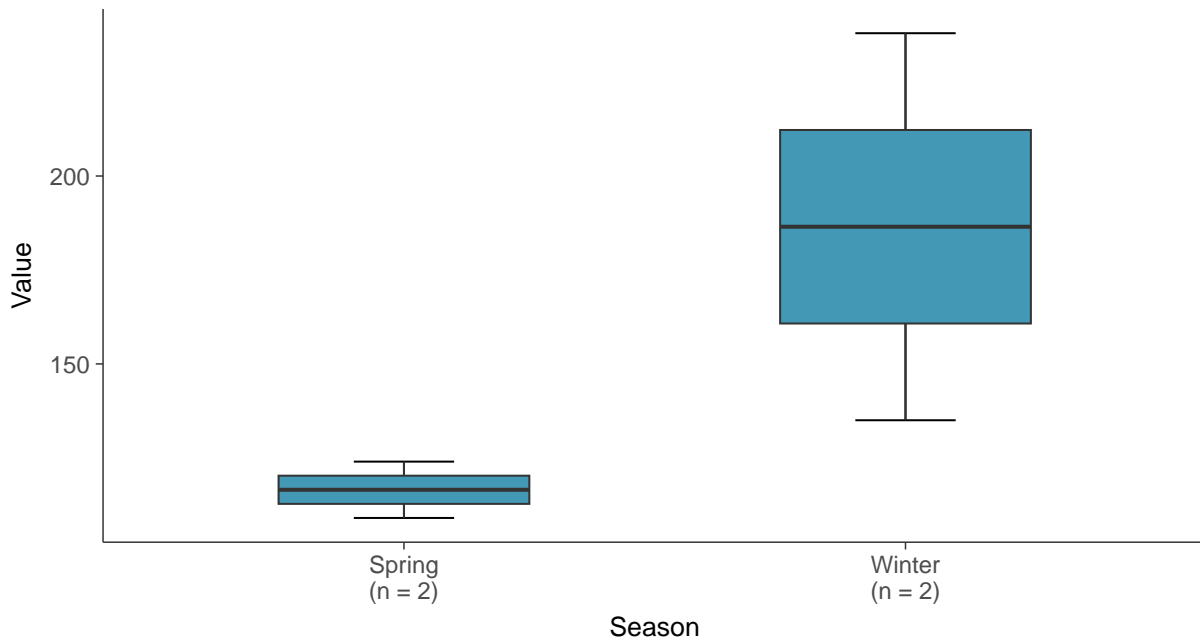
Boxplot

Sulfate, MW-15 (mg/L)



Boxplot by Season

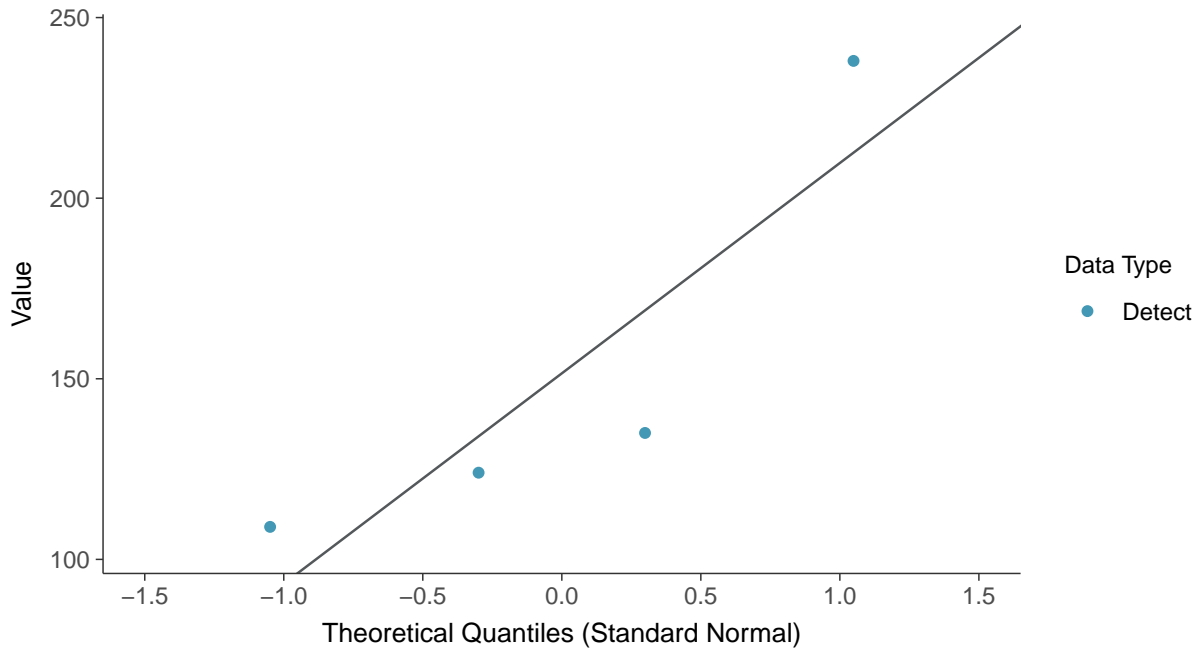
Sulfate, MW-15 (mg/L)





Normal Q-Q plot

Sulfate, MW-15 (mg/L)



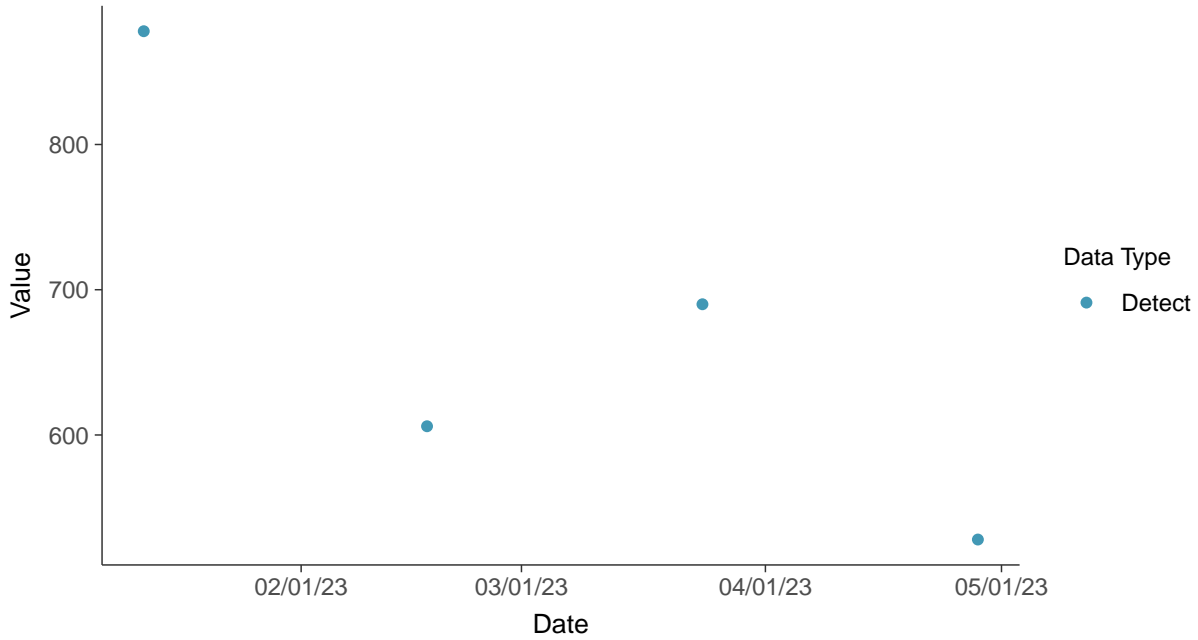


Appendix III: Total Dissolved Solids, MW-15

ID: 15_1_06

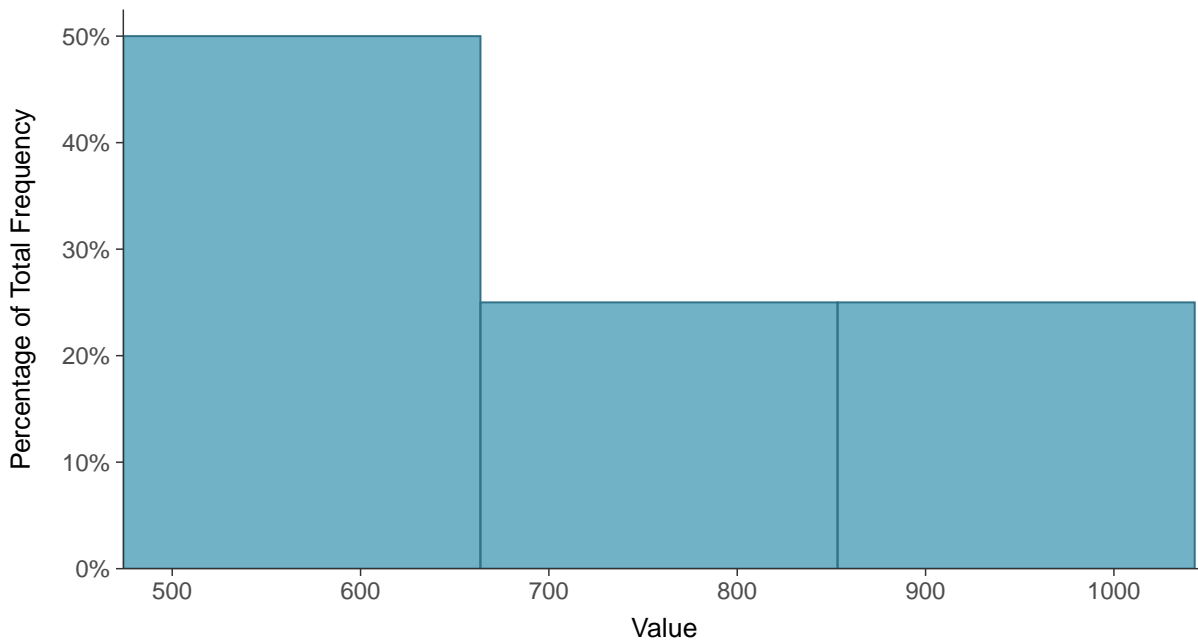
Scatter Plot

Total Dissolved Solids, MW-15 (mg/L)



Histogram

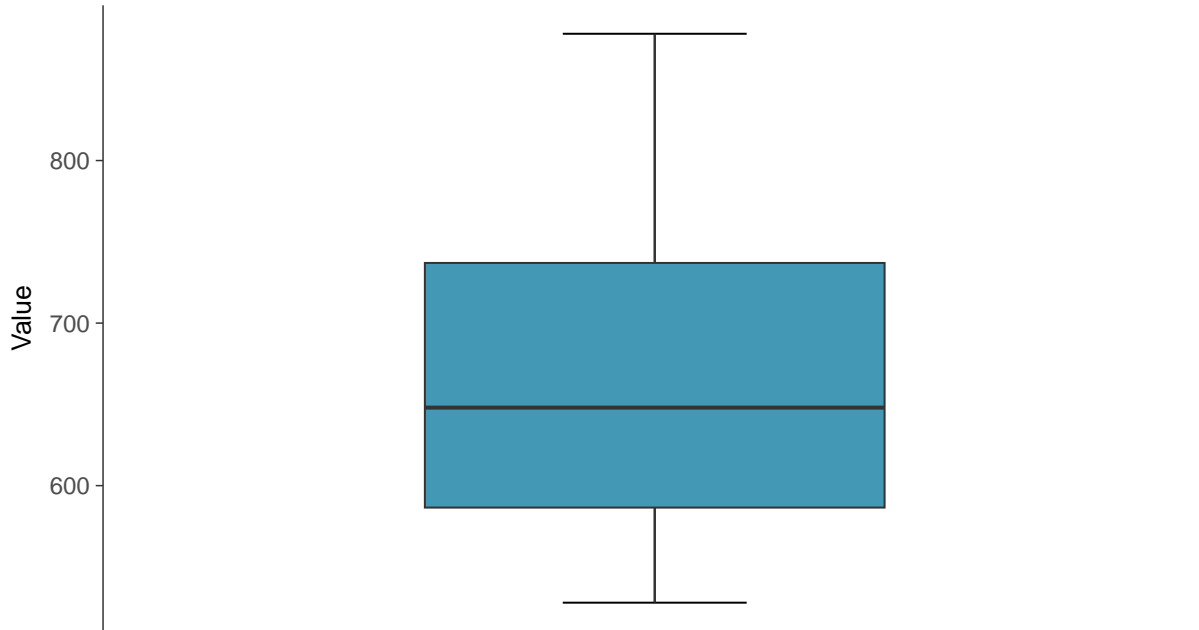
Total Dissolved Solids, MW-15 (mg/L)





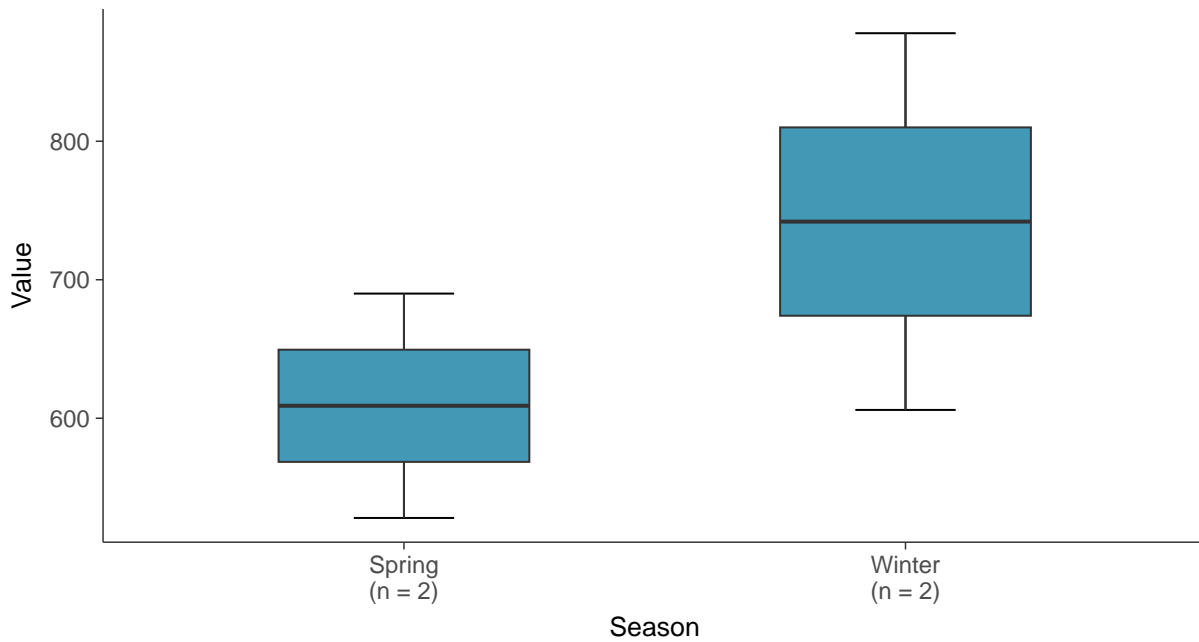
Boxplot

Total Dissolved Solids, MW-15 (mg/L)



Boxplot by Season

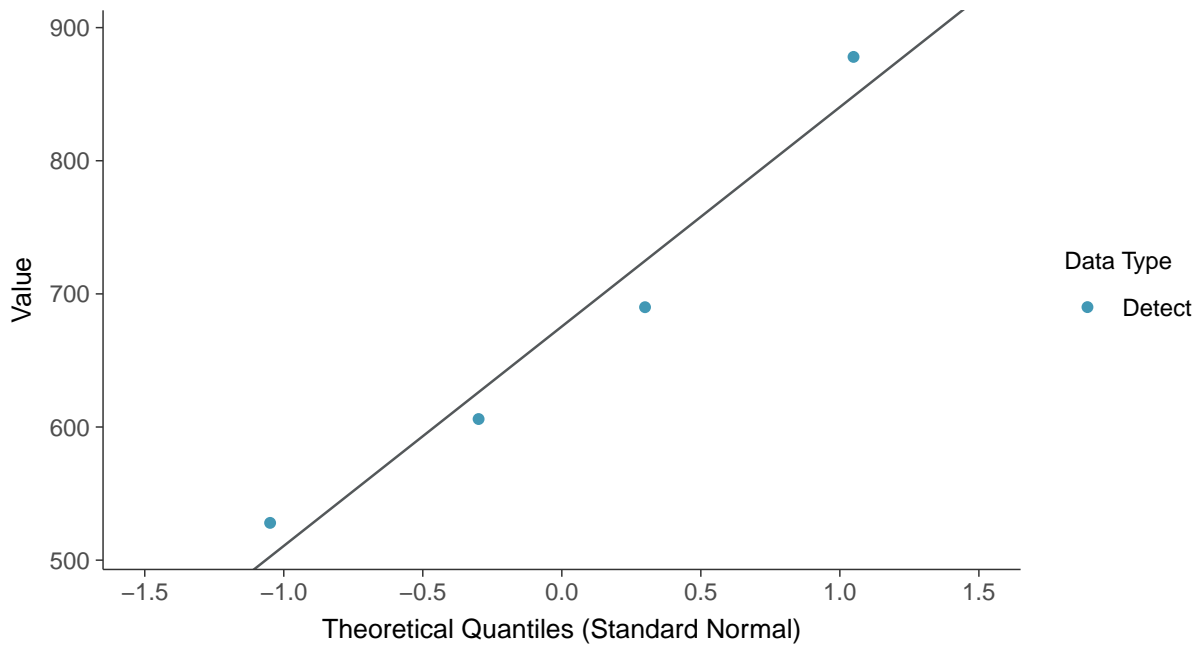
Total Dissolved Solids, MW-15 (mg/L)





Normal Q-Q plot

Total Dissolved Solids, MW-15 (mg/L)



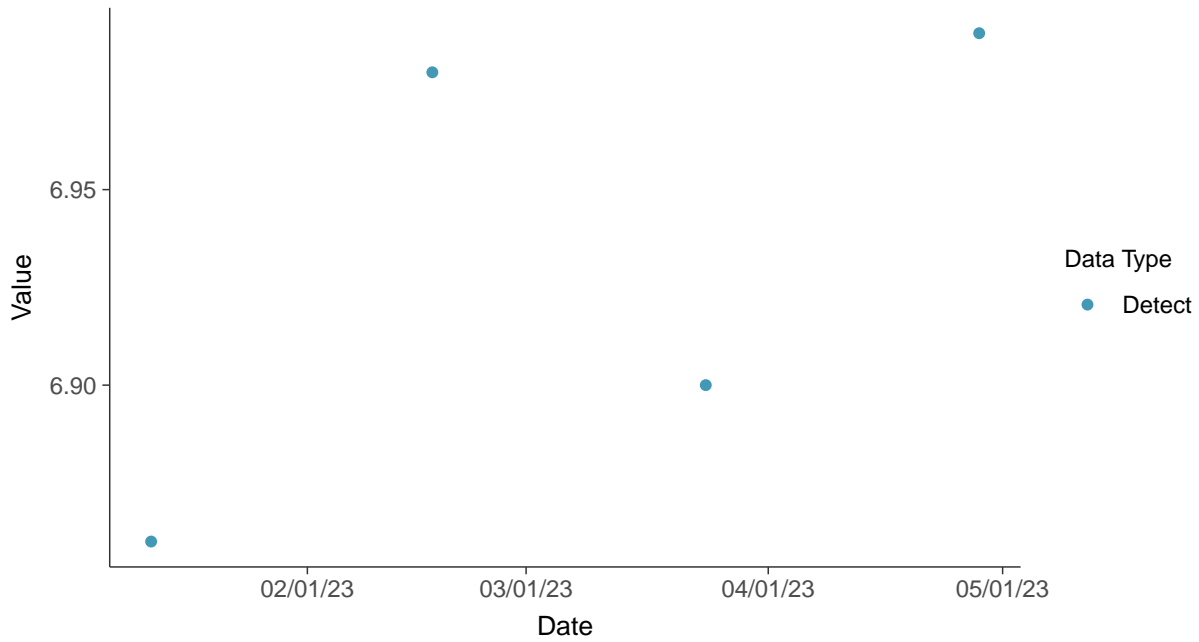


Appendix III: pH, Field, MW-15

ID: 15_1_07

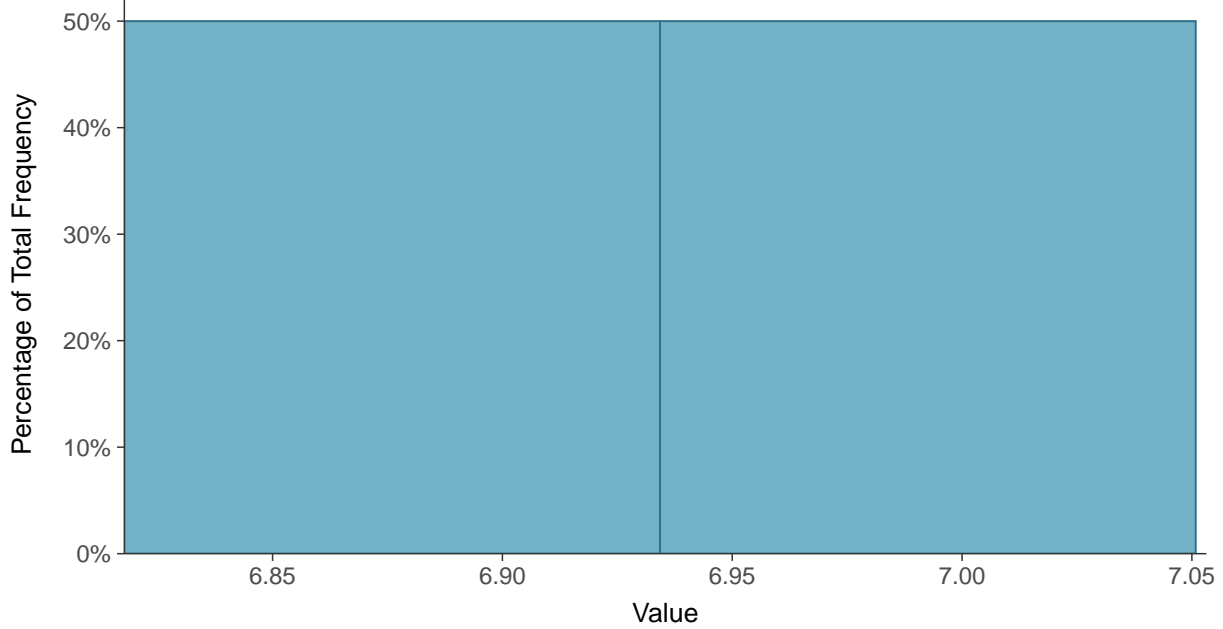
Scatter Plot

pH, Field, MW-15 (su)



Histogram

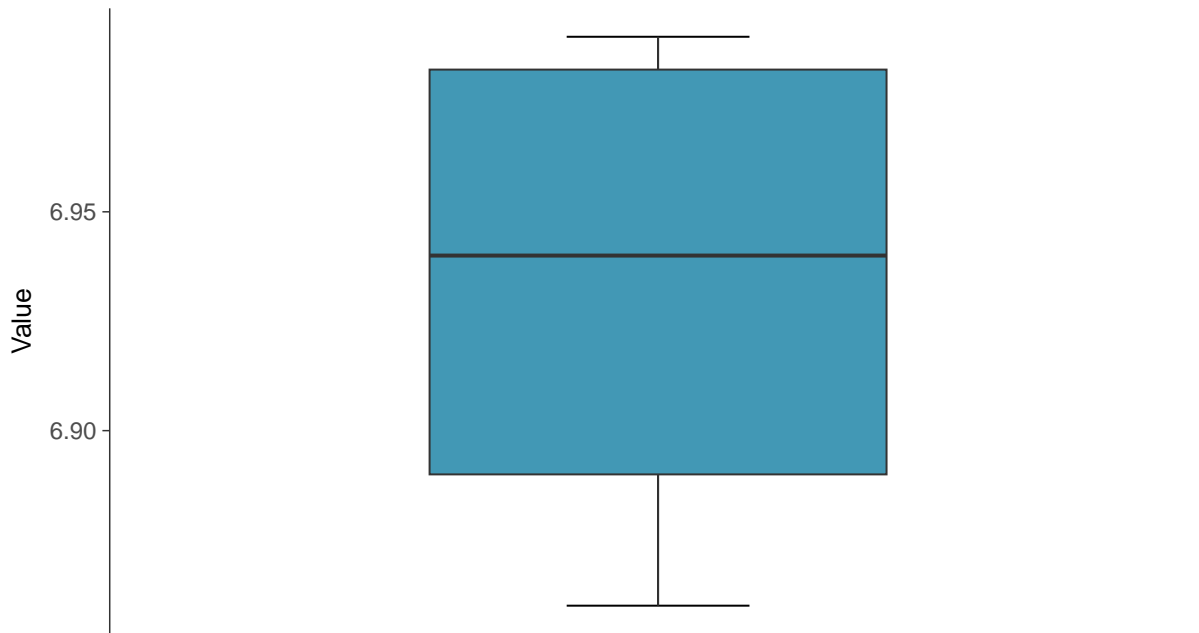
pH, Field, MW-15 (su)





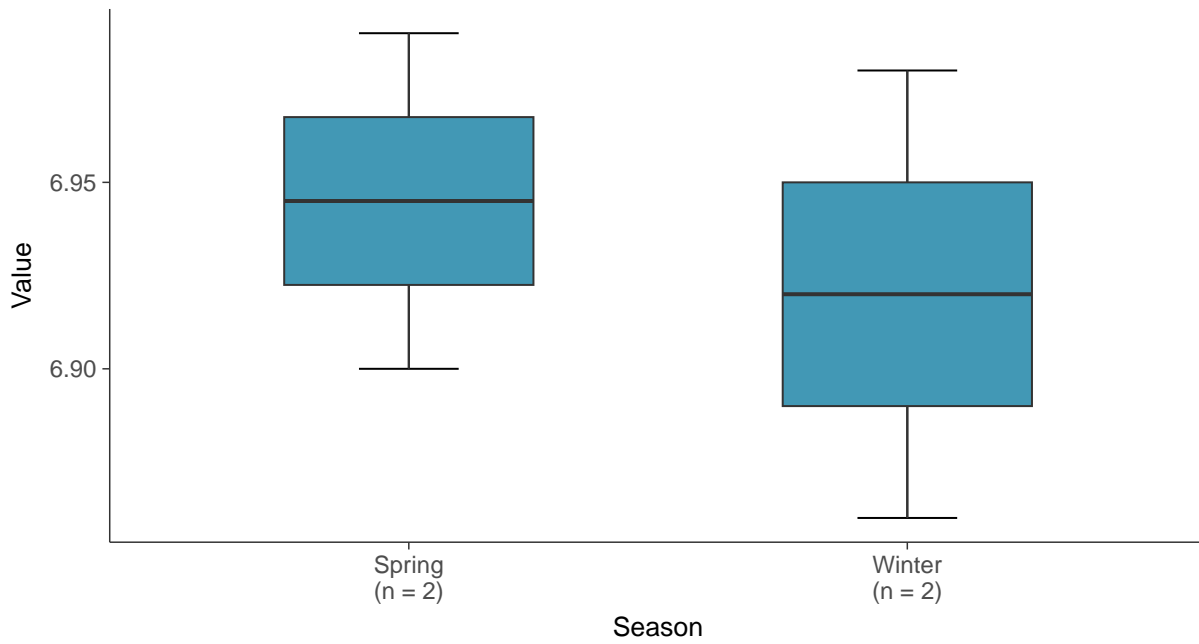
Boxplot

pH, Field, MW-15 (su)



Boxplot by Season

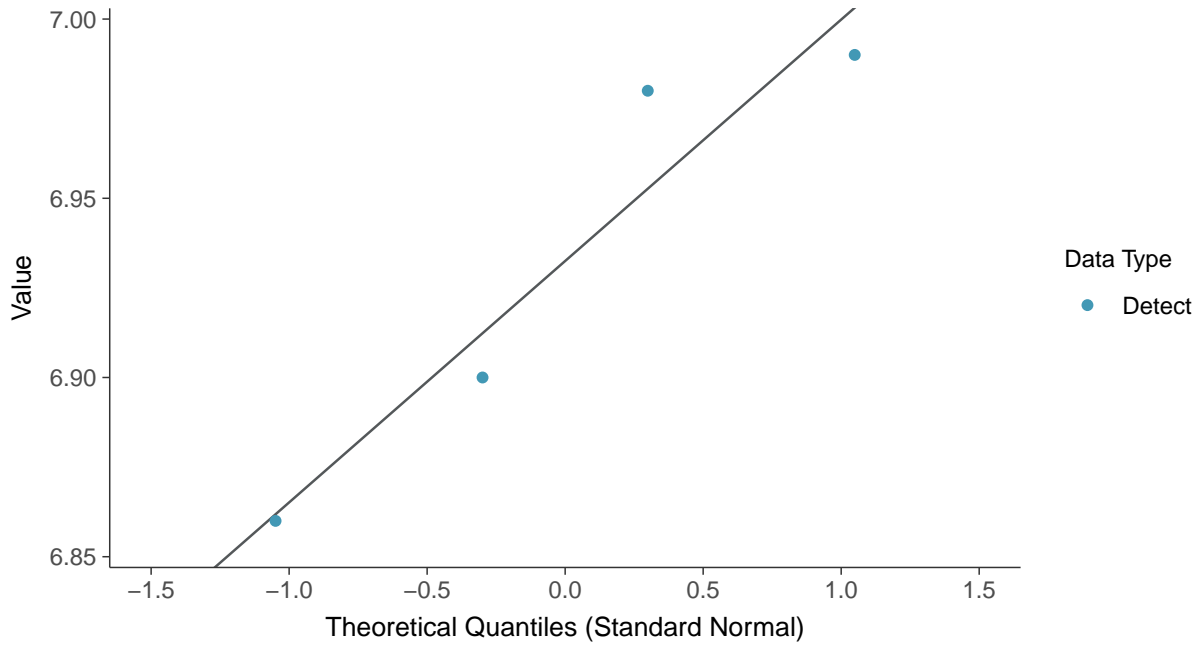
pH, Field, MW-15 (su)





Normal Q-Q plot

pH, Field, MW-15 (su)



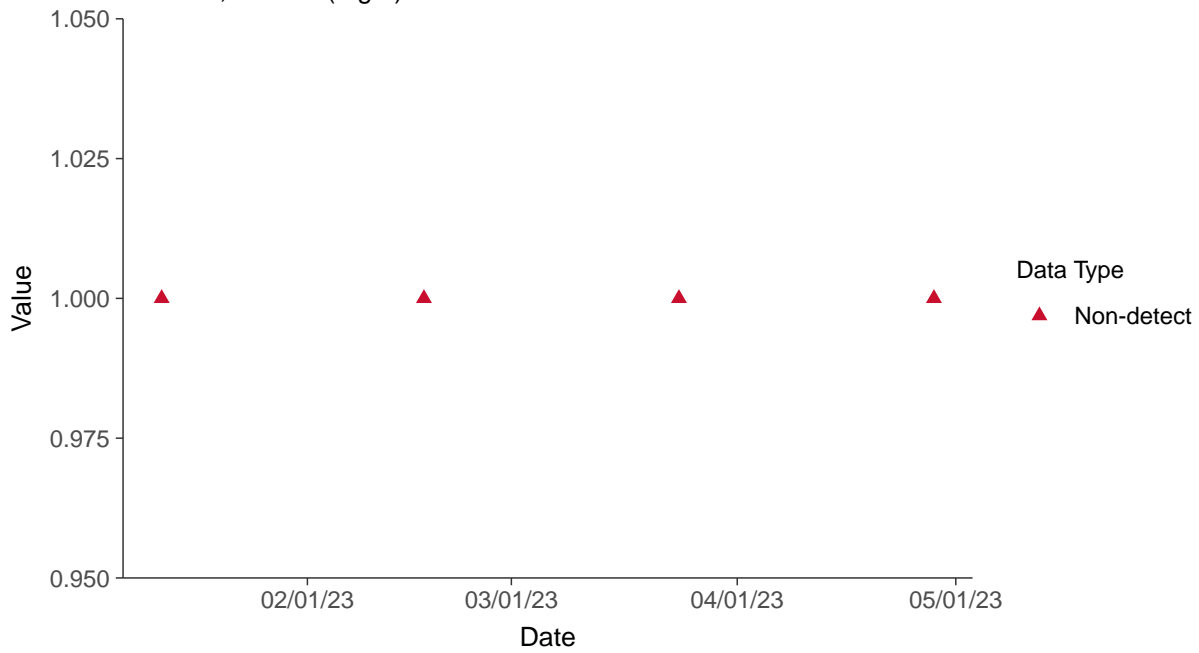


Appendix IV: Fluoride, MW-15

ID: 15_2_04

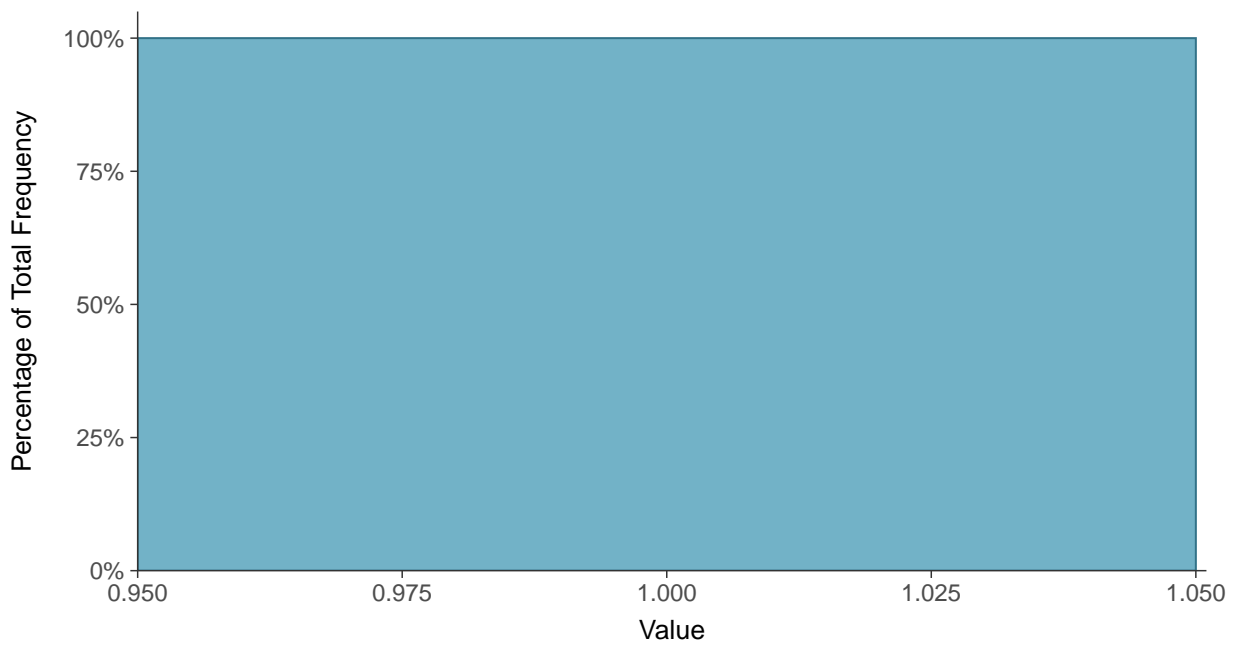
Scatter Plot

Fluoride, MW-15 (mg/L)



Histogram

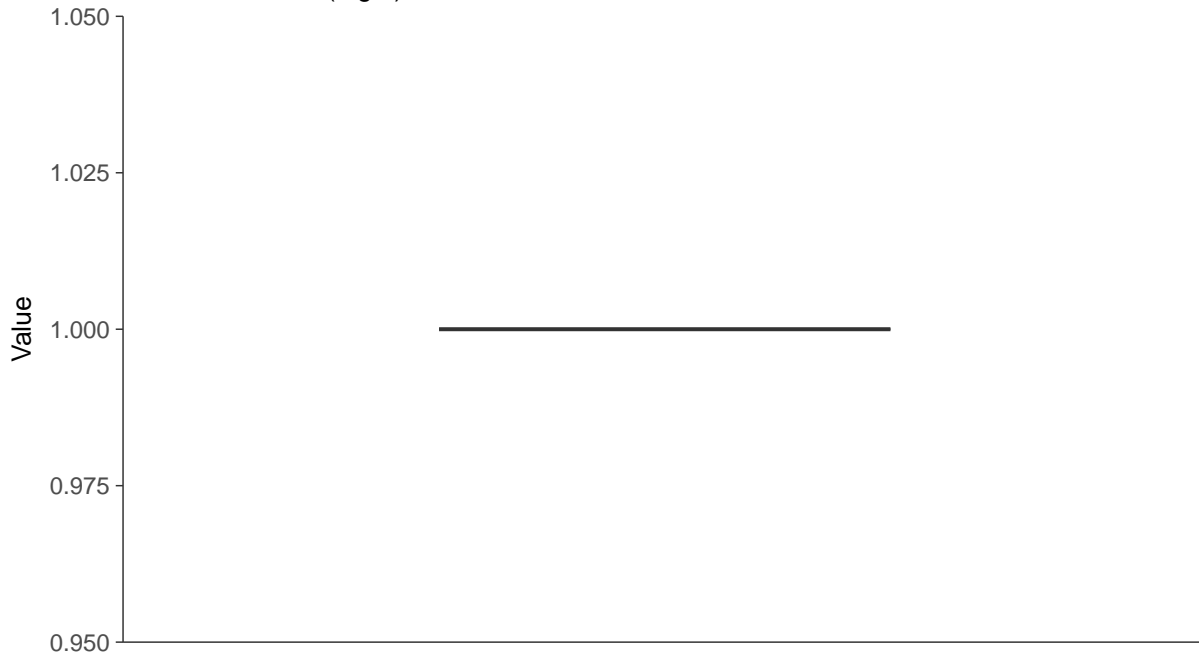
Fluoride, MW-15 (mg/L)





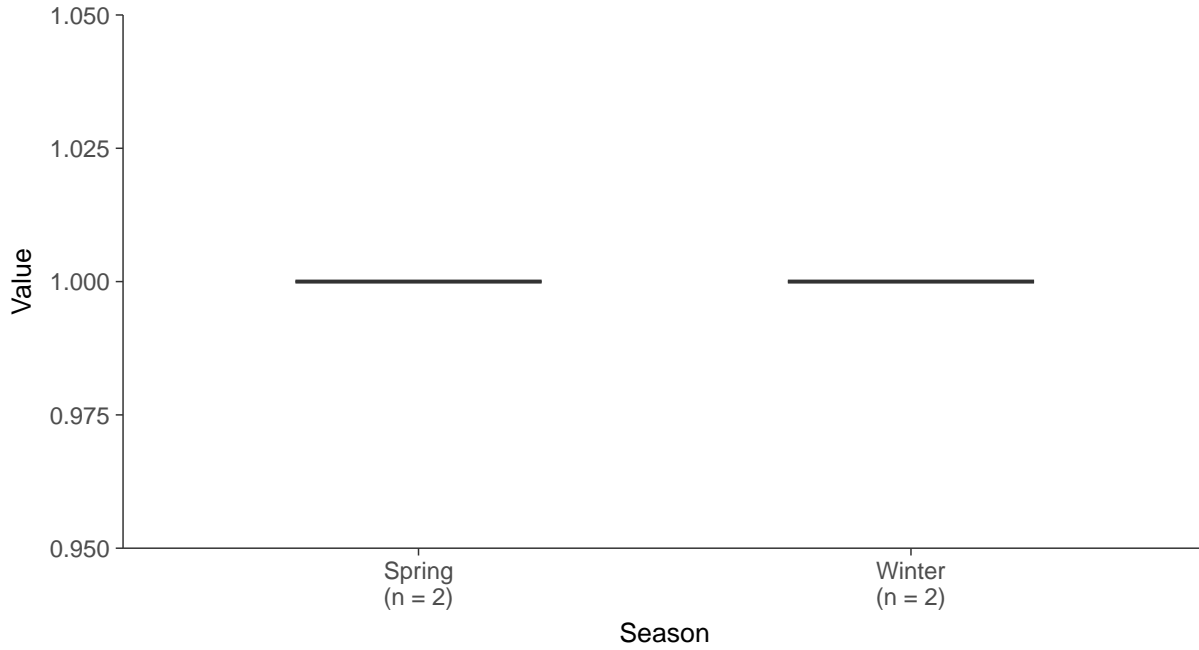
Boxplot

Fluoride, MW-15 (mg/L)



Boxplot by Season

Fluoride, MW-15 (mg/L)



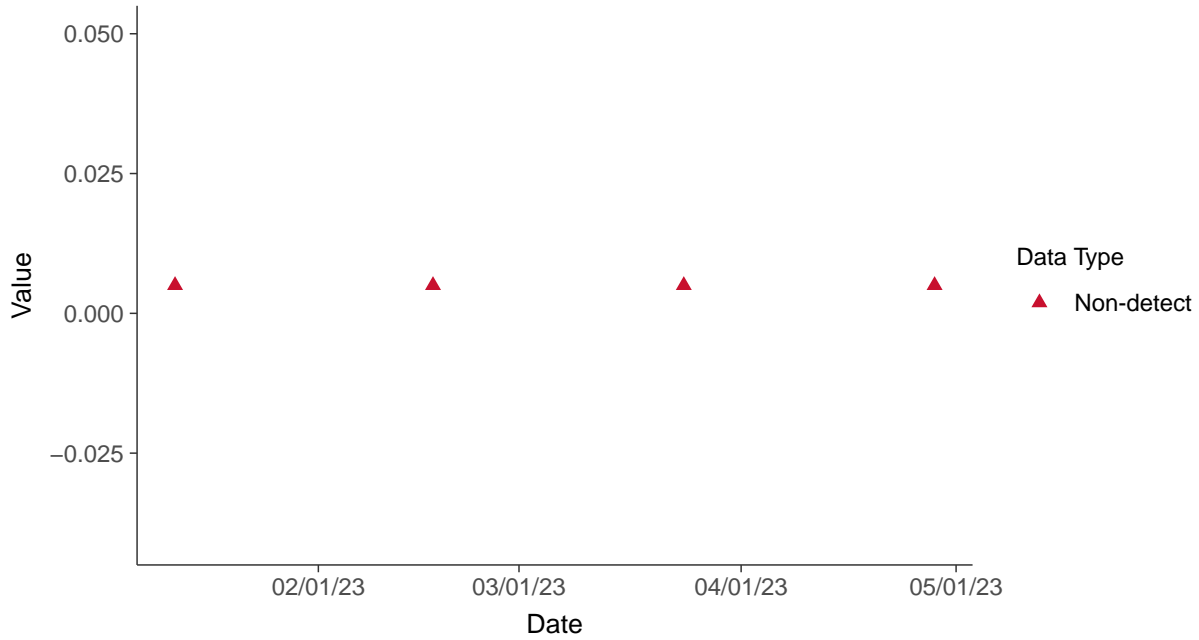


Appendix IV: Antimony, MW-15

ID: 15_2_08

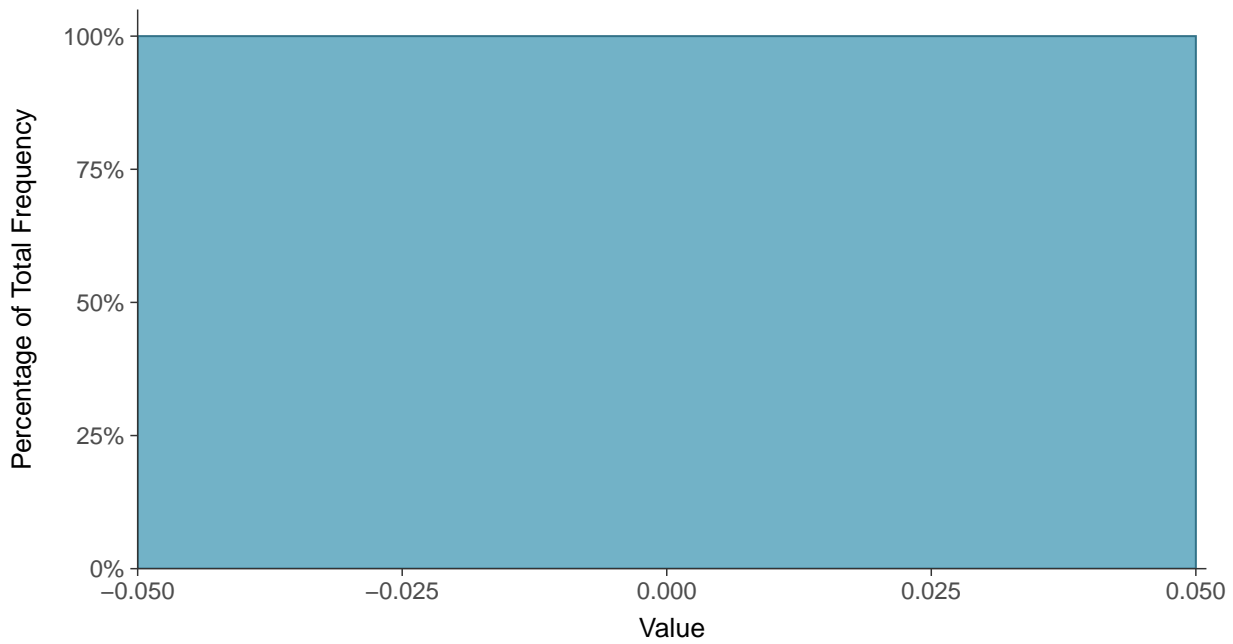
Scatter Plot

Antimony, MW-15 (mg/L)



Histogram

Antimony, MW-15 (mg/L)





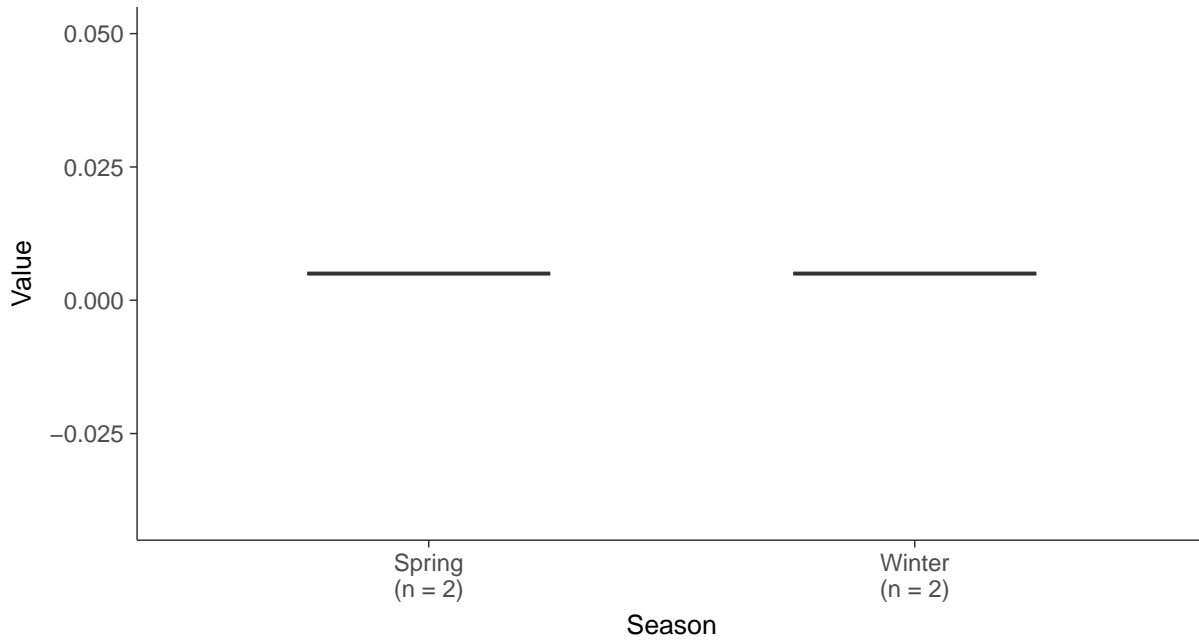
Boxplot

Antimony, MW-15 (mg/L)



Boxplot by Season

Antimony, MW-15 (mg/L)



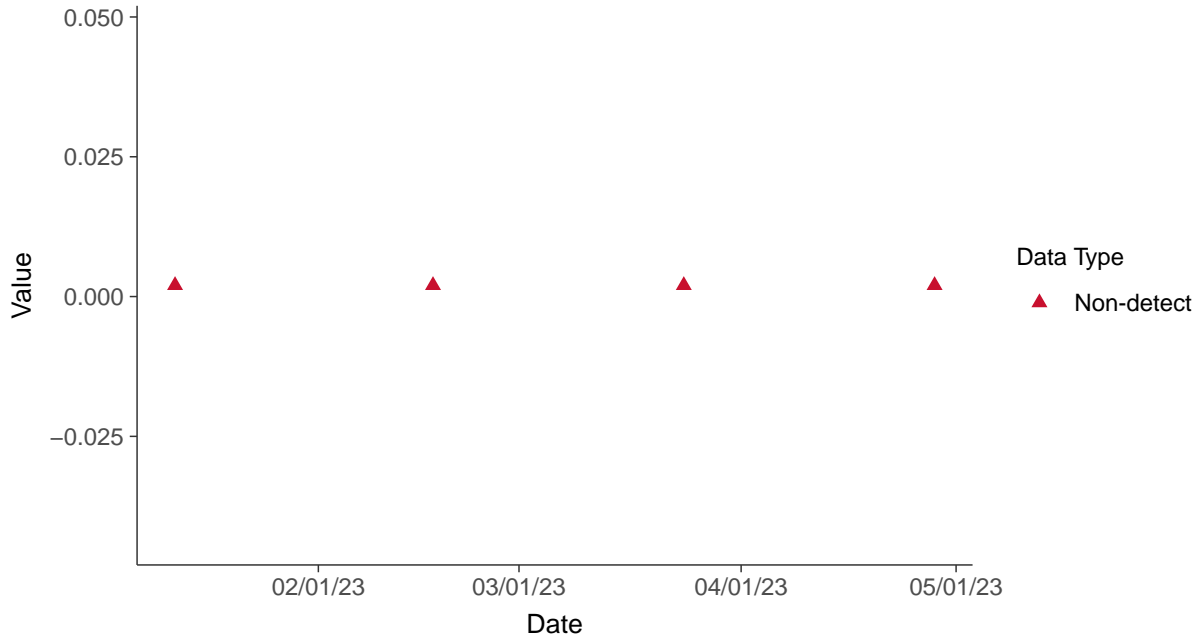


Appendix IV: Arsenic, MW-15

ID: 15_2_09

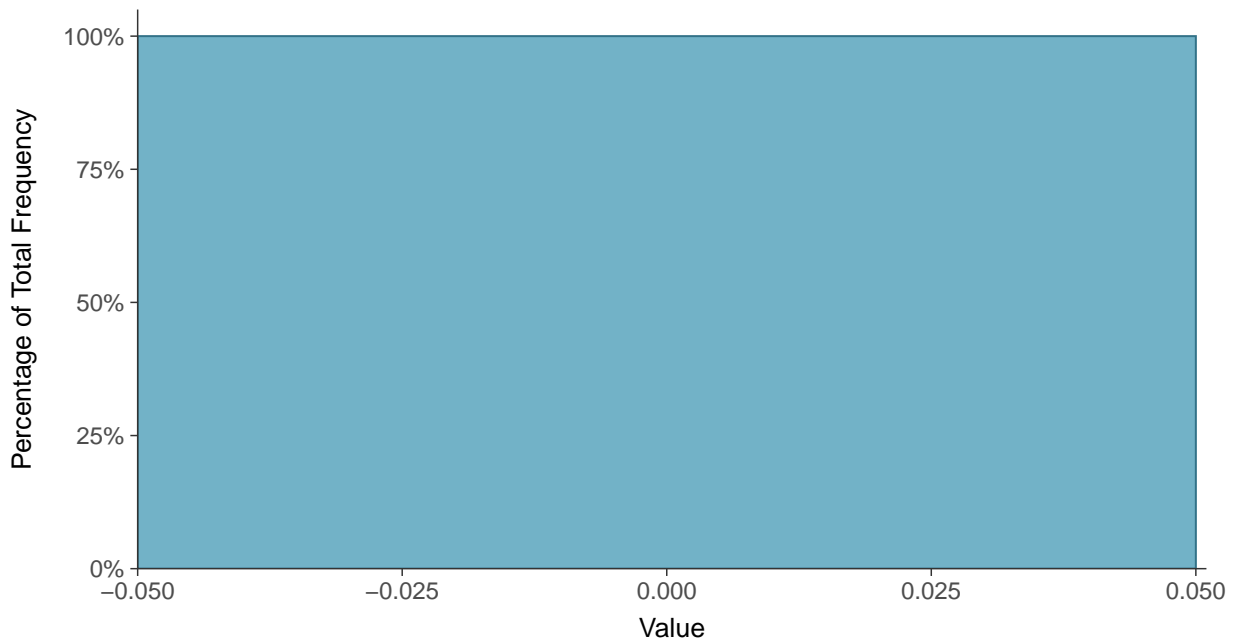
Scatter Plot

Arsenic, MW-15 (mg/L)



Histogram

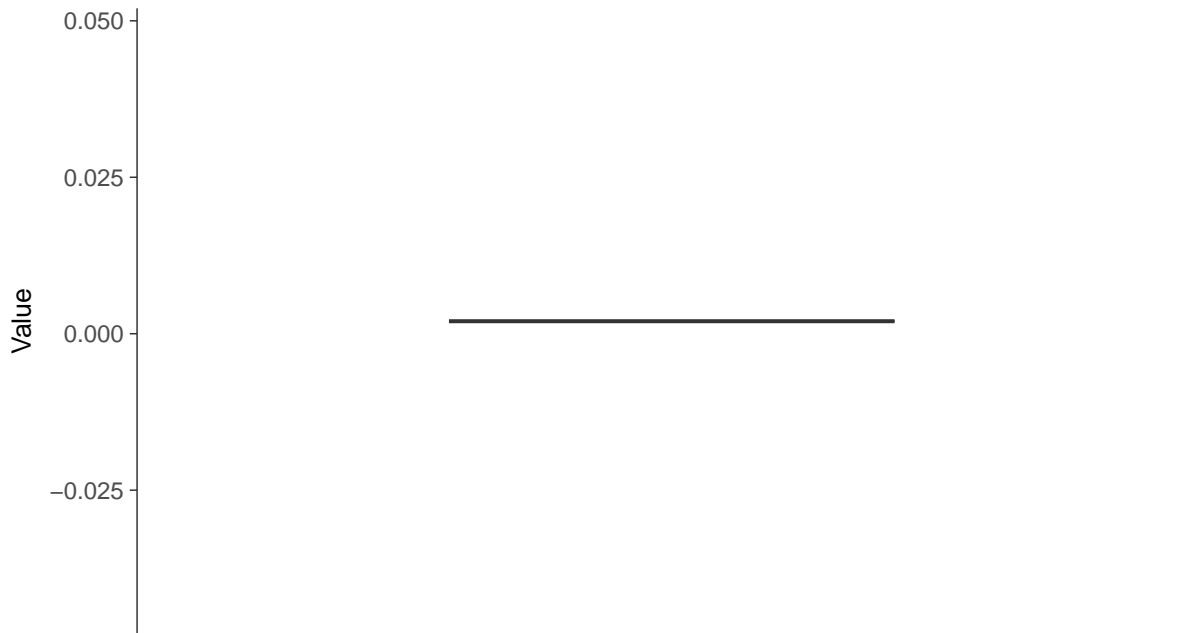
Arsenic, MW-15 (mg/L)





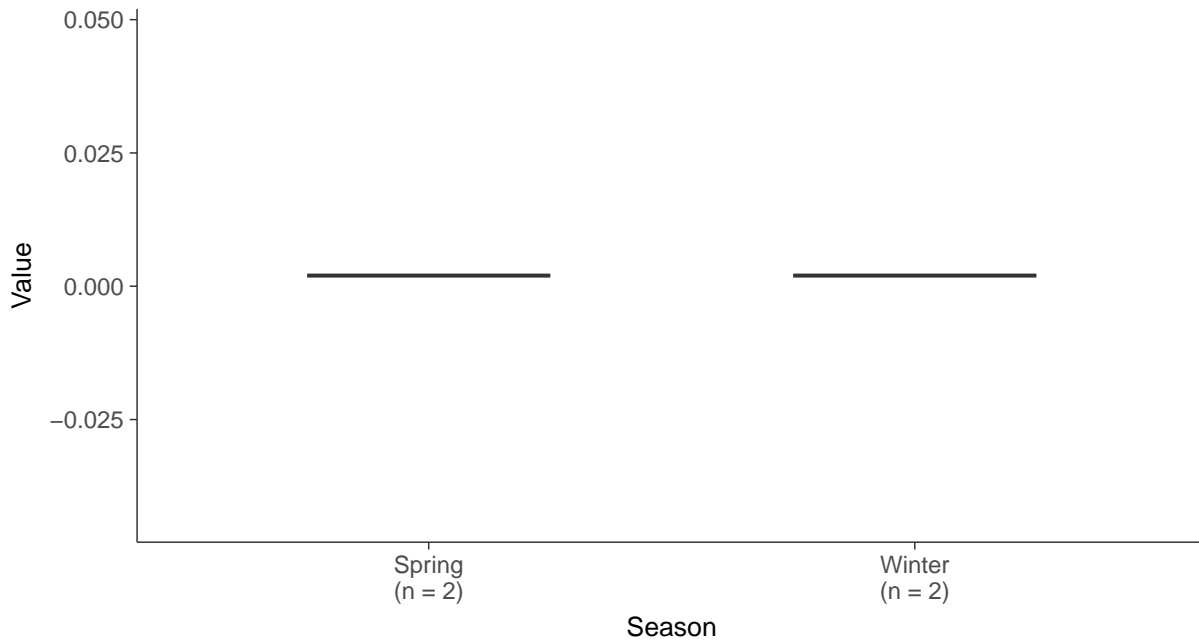
Boxplot

Arsenic, MW-15 (mg/L)



Boxplot by Season

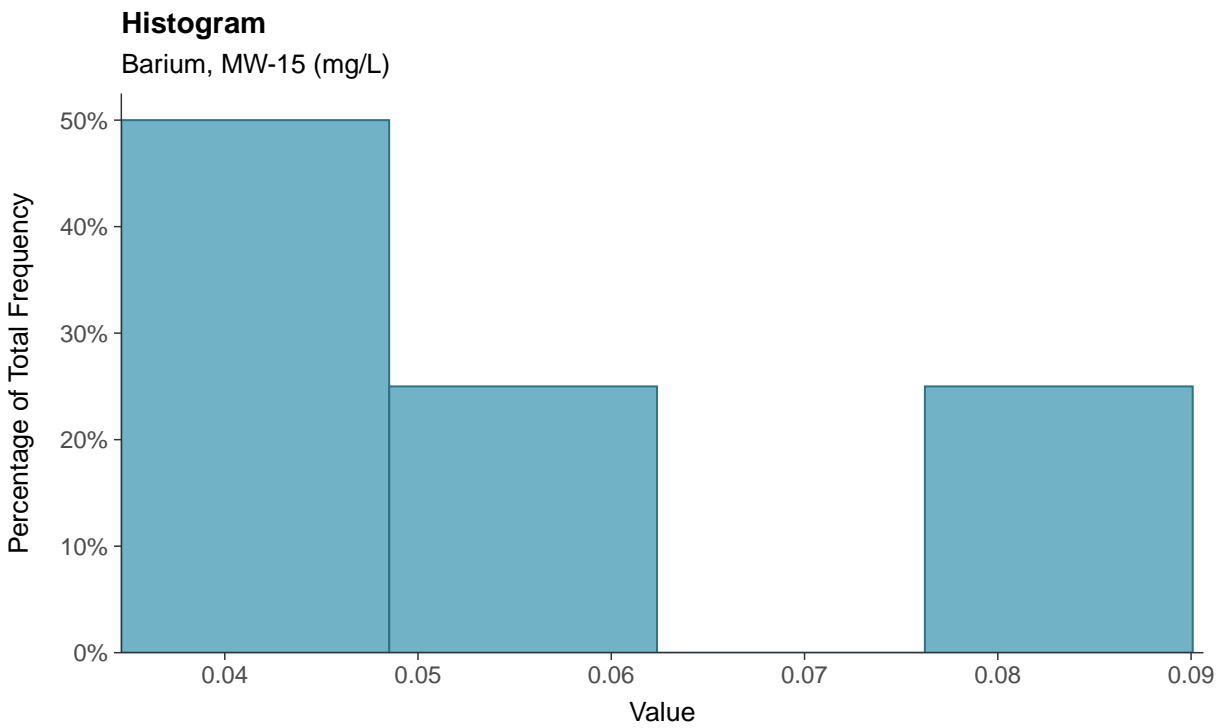
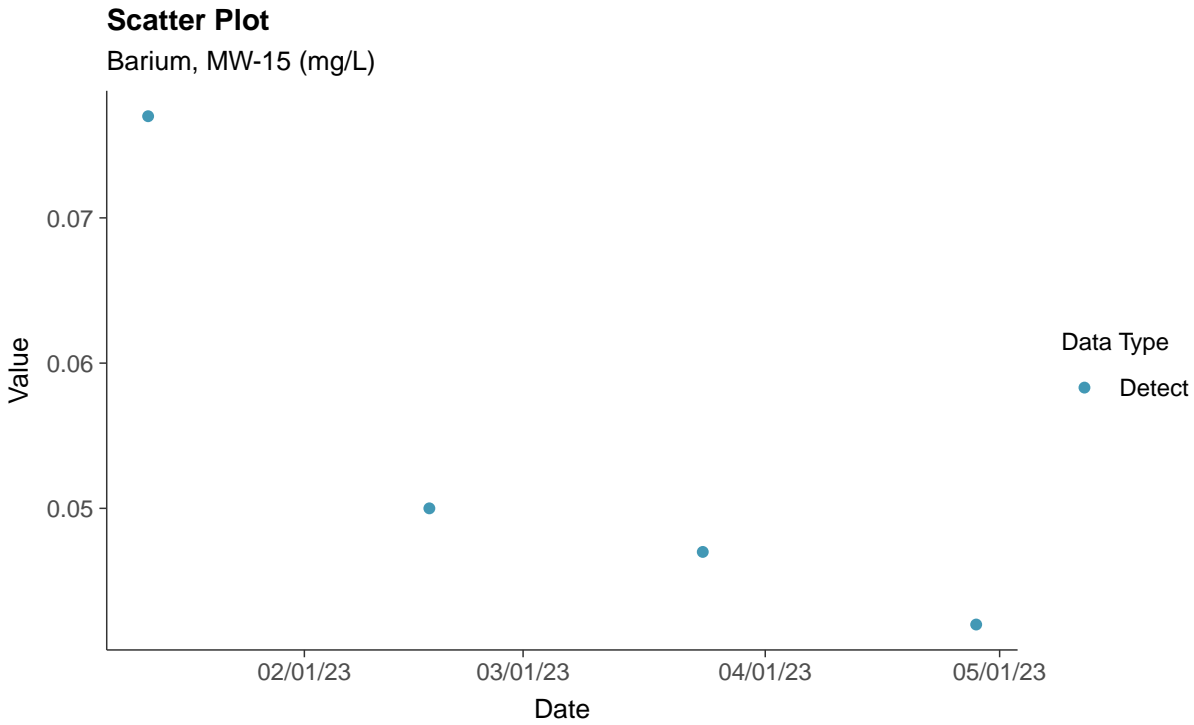
Arsenic, MW-15 (mg/L)





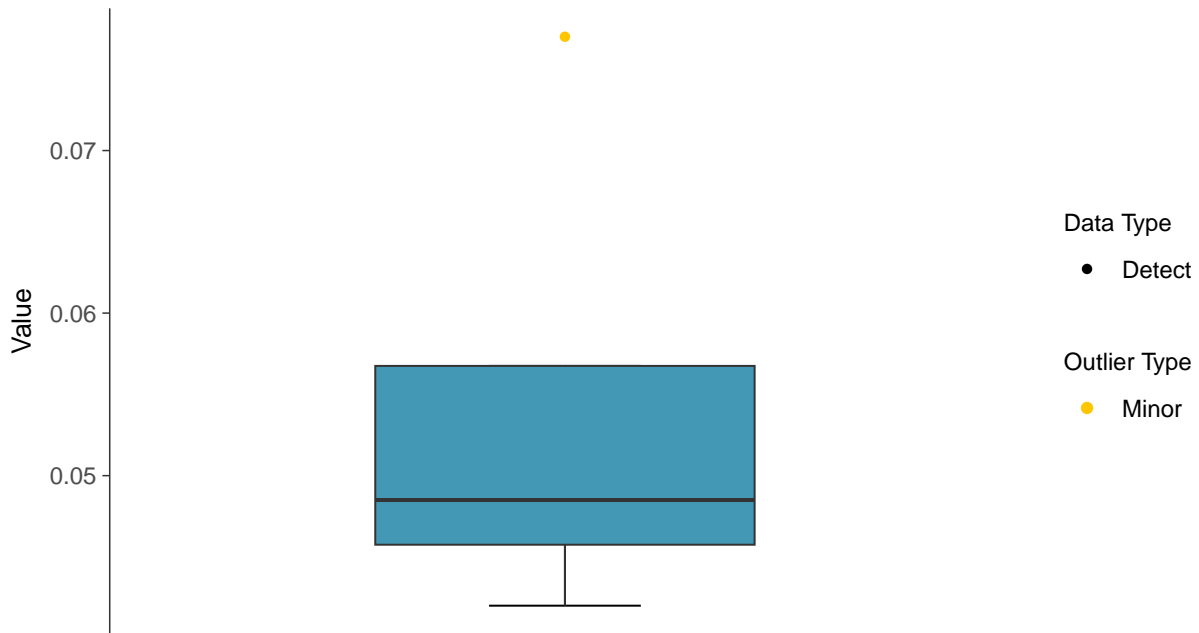
Appendix IV: Barium, MW-15

ID: 15_2_10



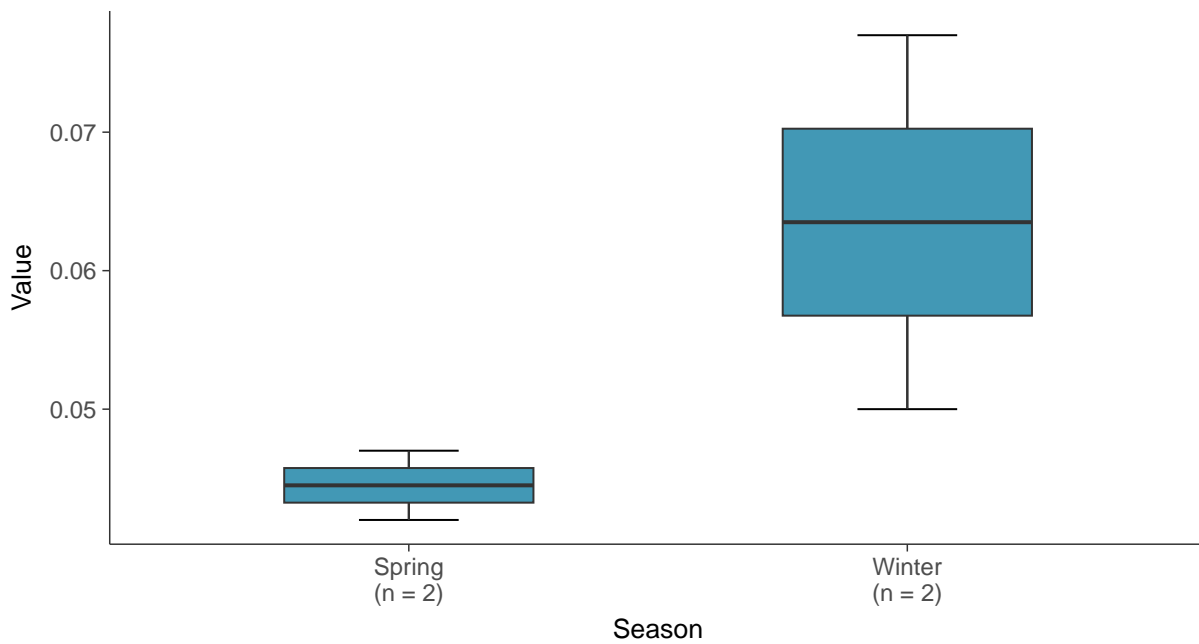
Boxplot

Barium, MW-15 (mg/L)



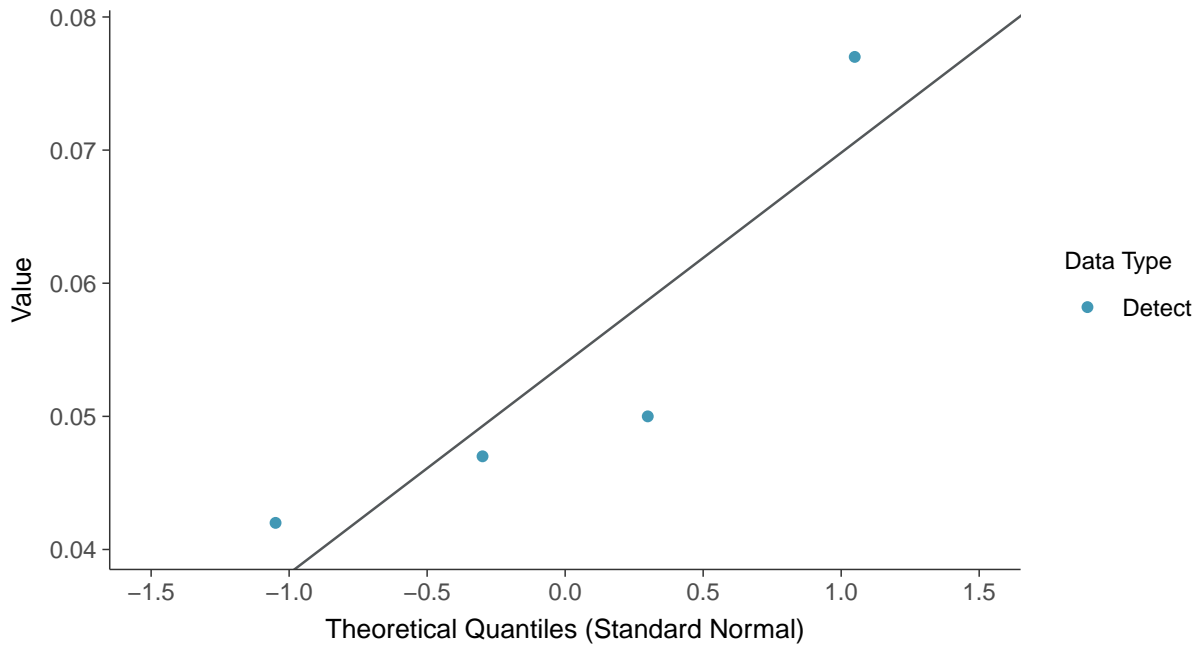
Boxplot by Season

Barium, MW-15 (mg/L)





Normal Q-Q plot
Barium, MW-15 (mg/L)



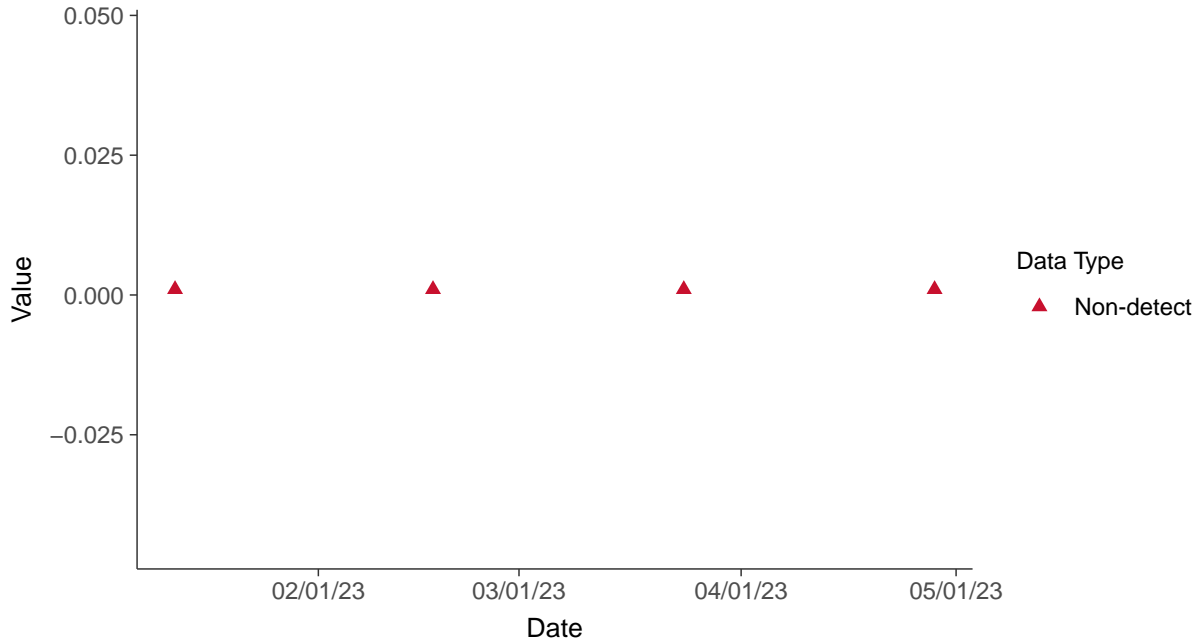


Appendix IV: Beryllium, MW-15

ID: 15_2_11

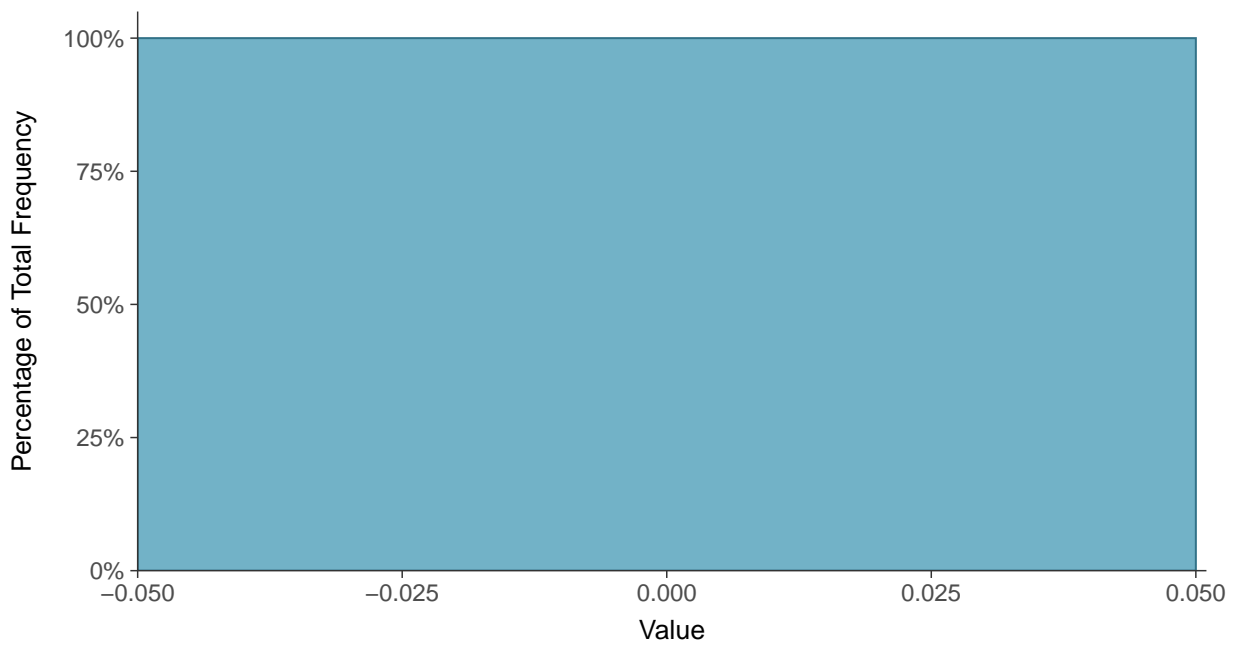
Scatter Plot

Beryllium, MW-15 (mg/L)



Histogram

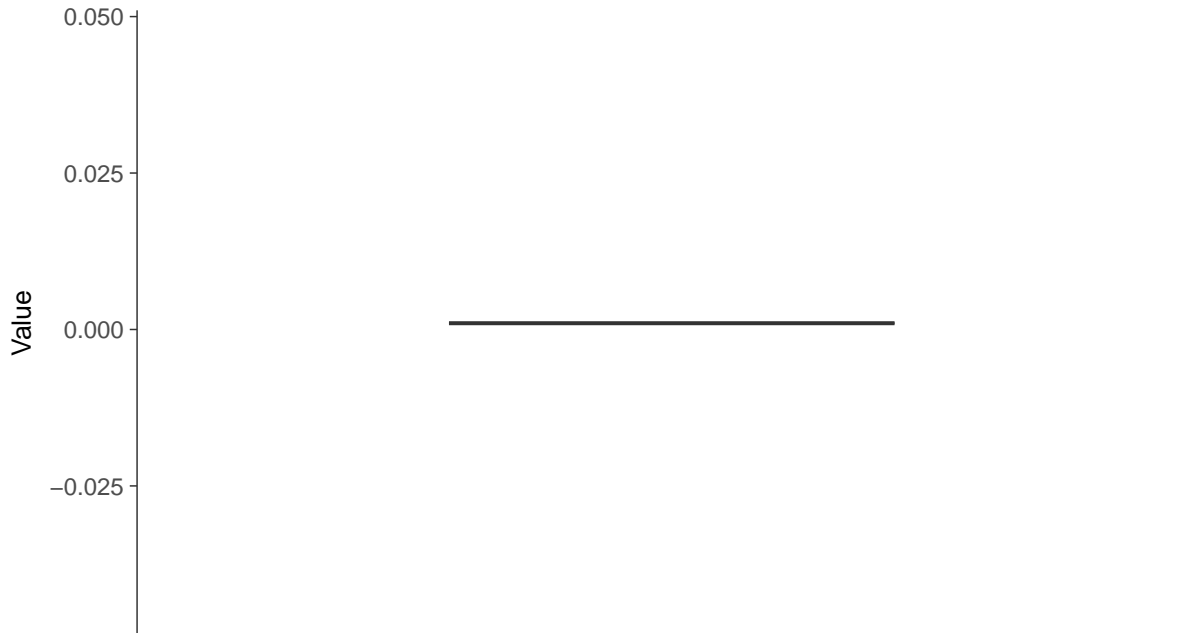
Beryllium, MW-15 (mg/L)





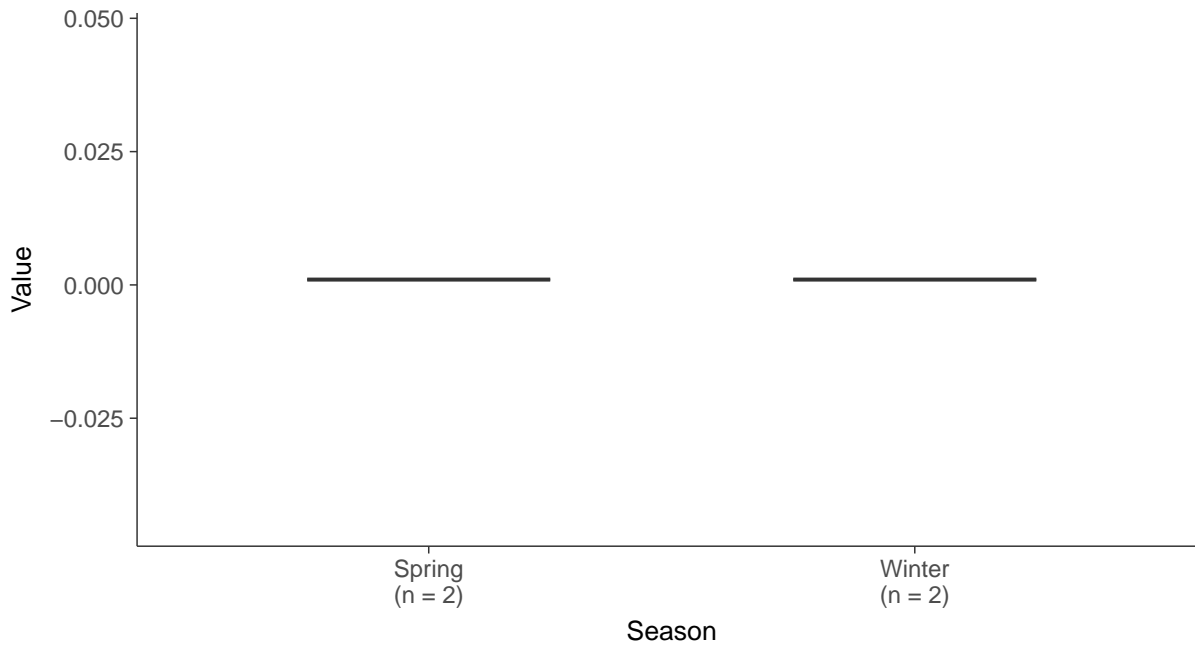
Boxplot

Beryllium, MW-15 (mg/L)



Boxplot by Season

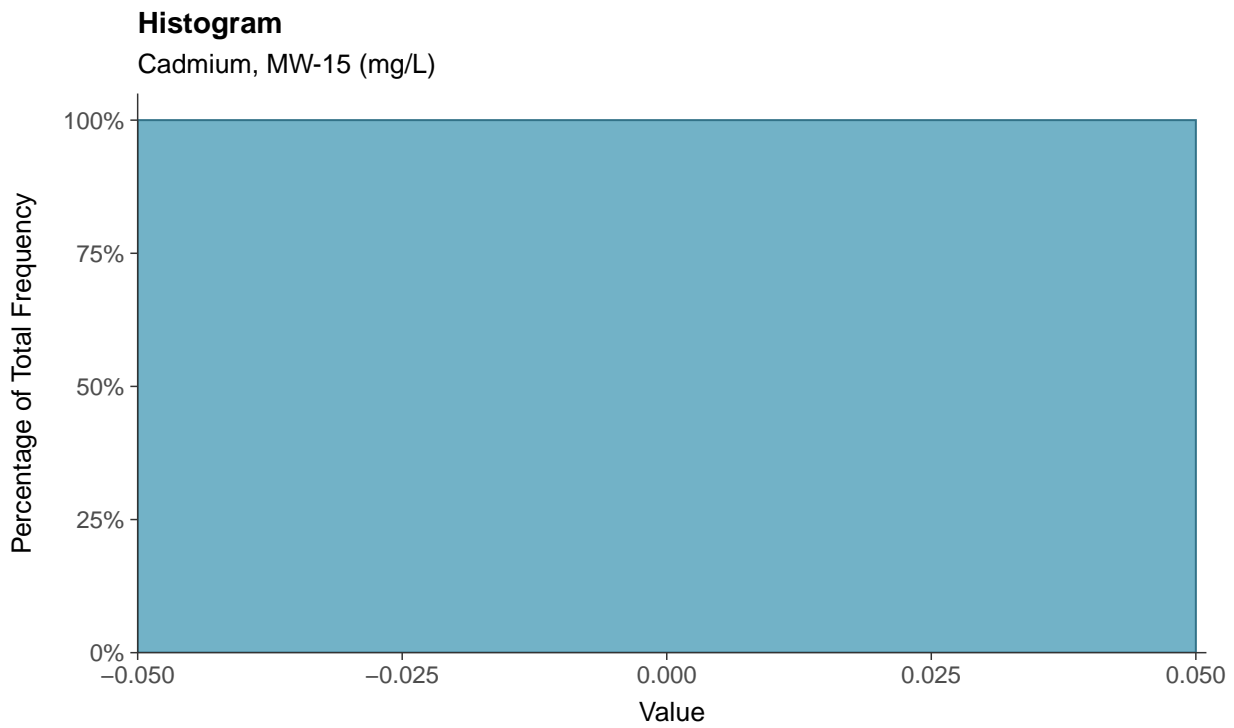
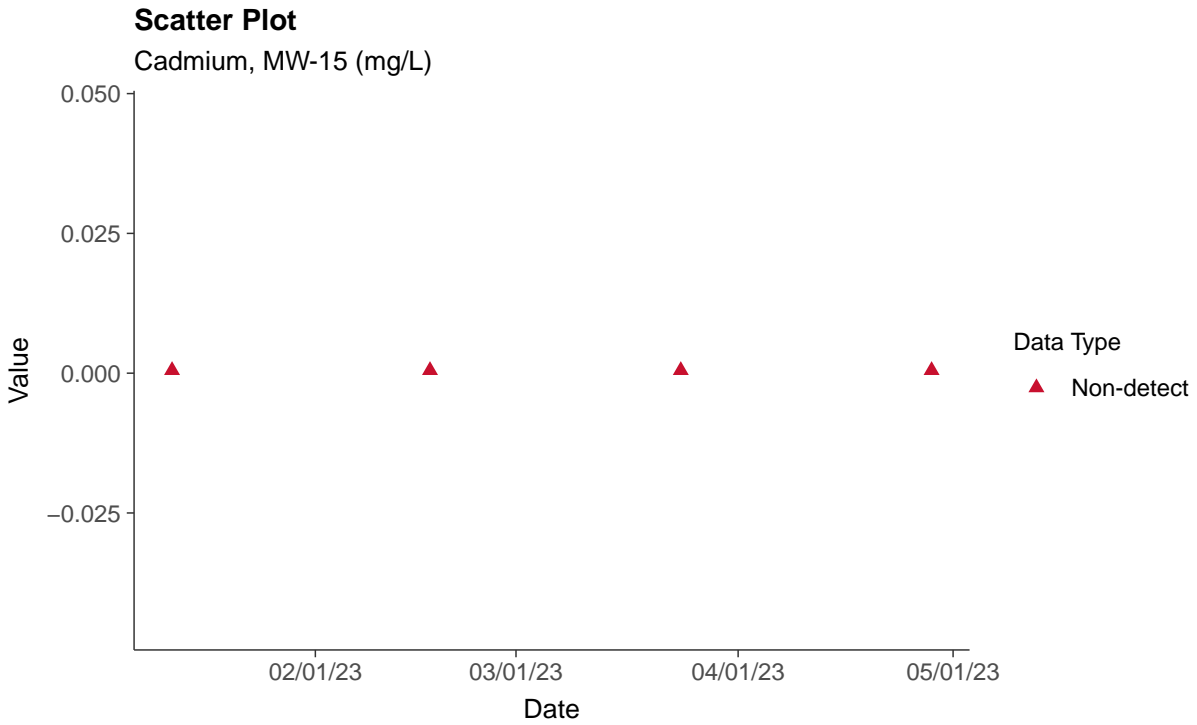
Beryllium, MW-15 (mg/L)





Appendix IV: Cadmium, MW-15

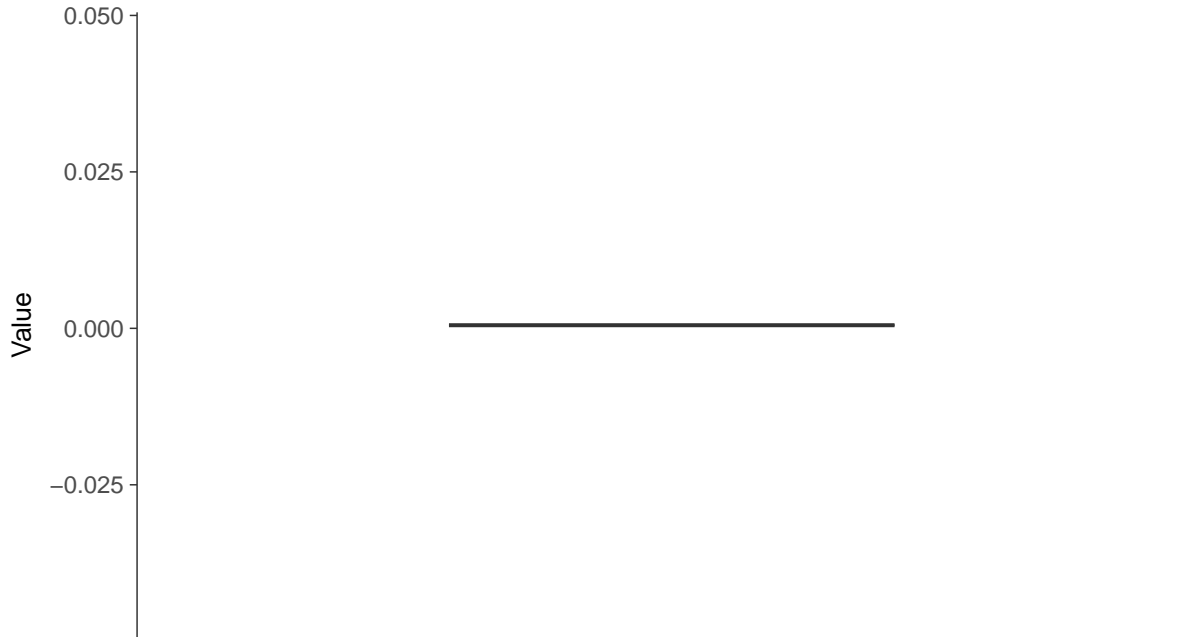
ID: 15_2_13





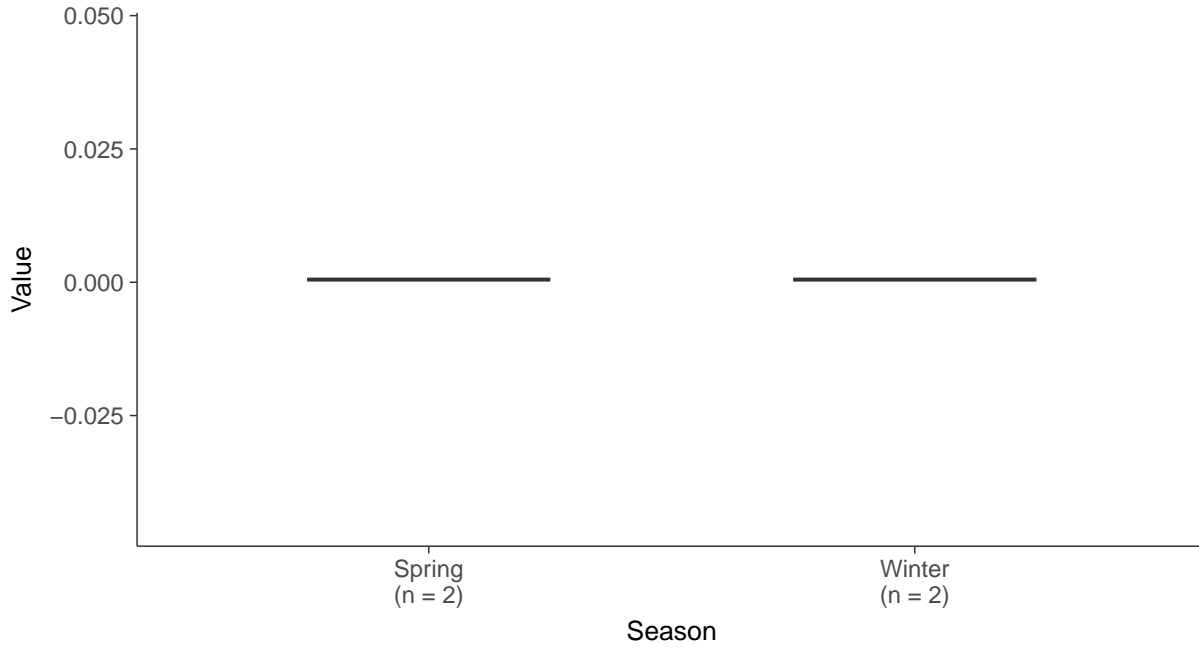
Boxplot

Cadmium, MW-15 (mg/L)



Boxplot by Season

Cadmium, MW-15 (mg/L)



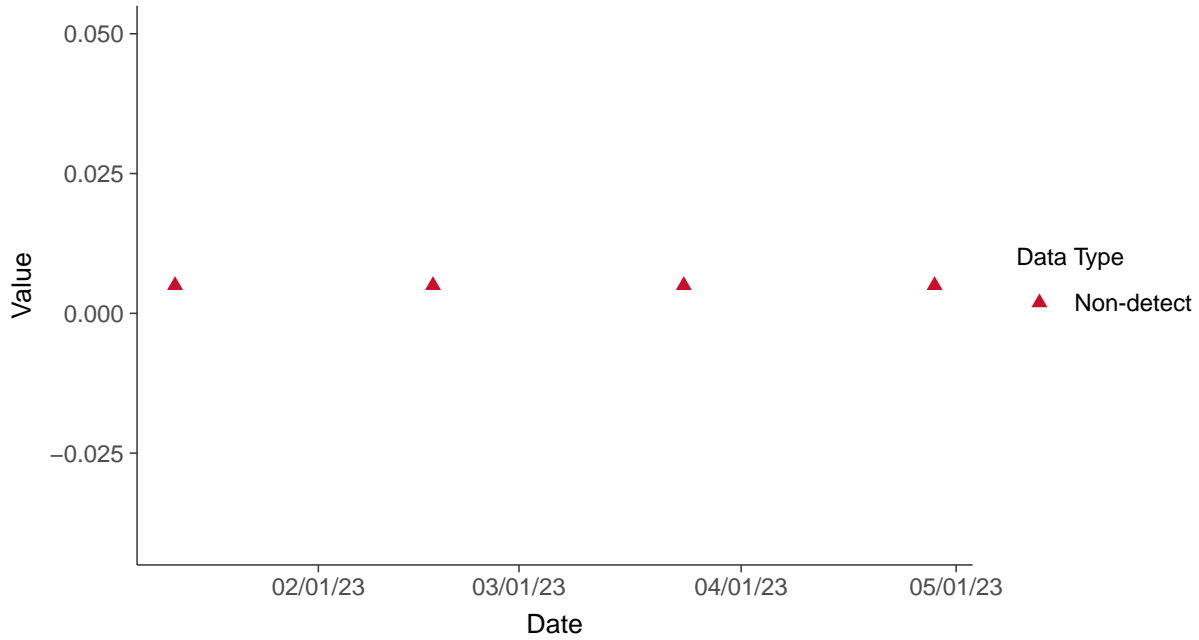


Appendix IV: Chromium, MW-15

ID: 15_2_15

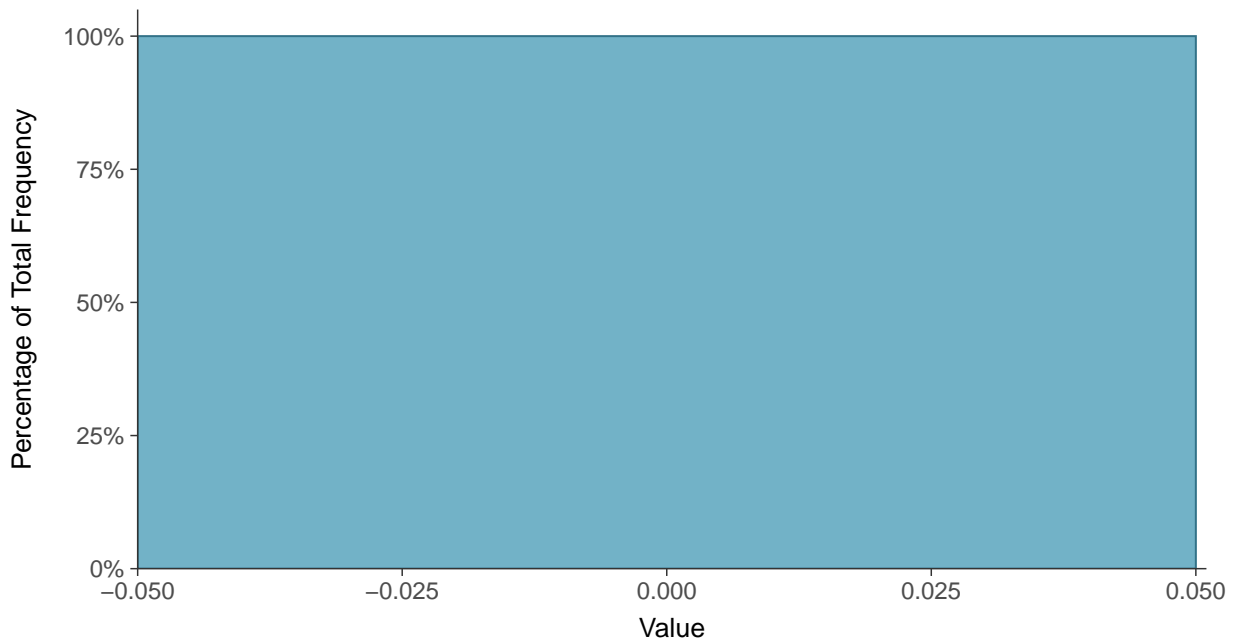
Scatter Plot

Chromium, MW-15 (mg/L)



Histogram

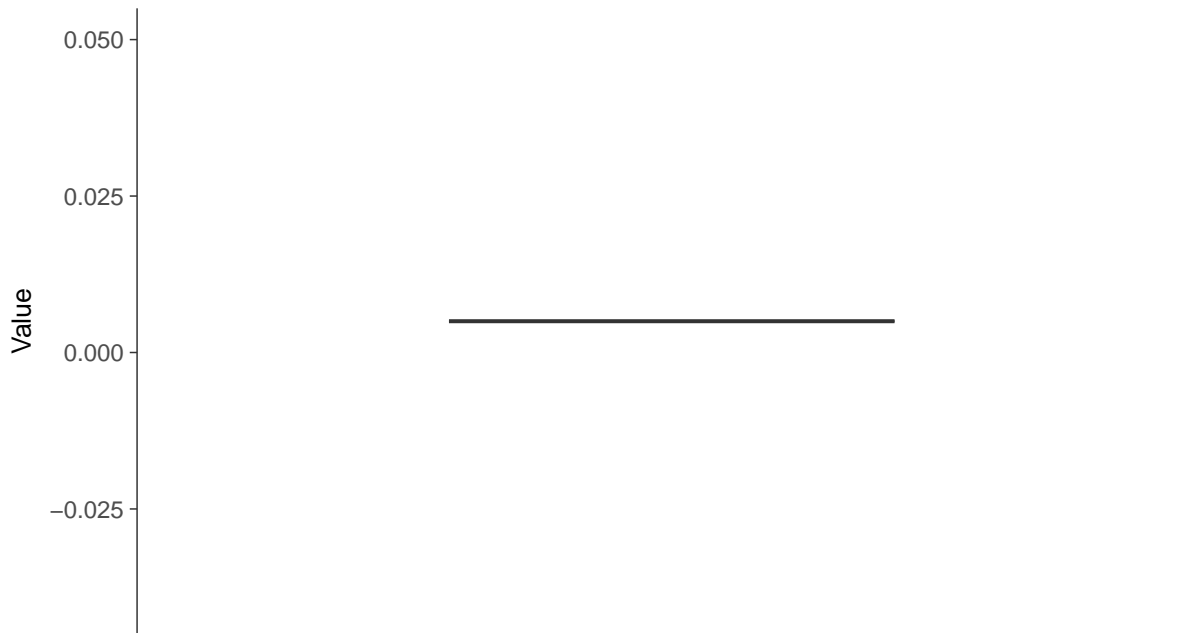
Chromium, MW-15 (mg/L)





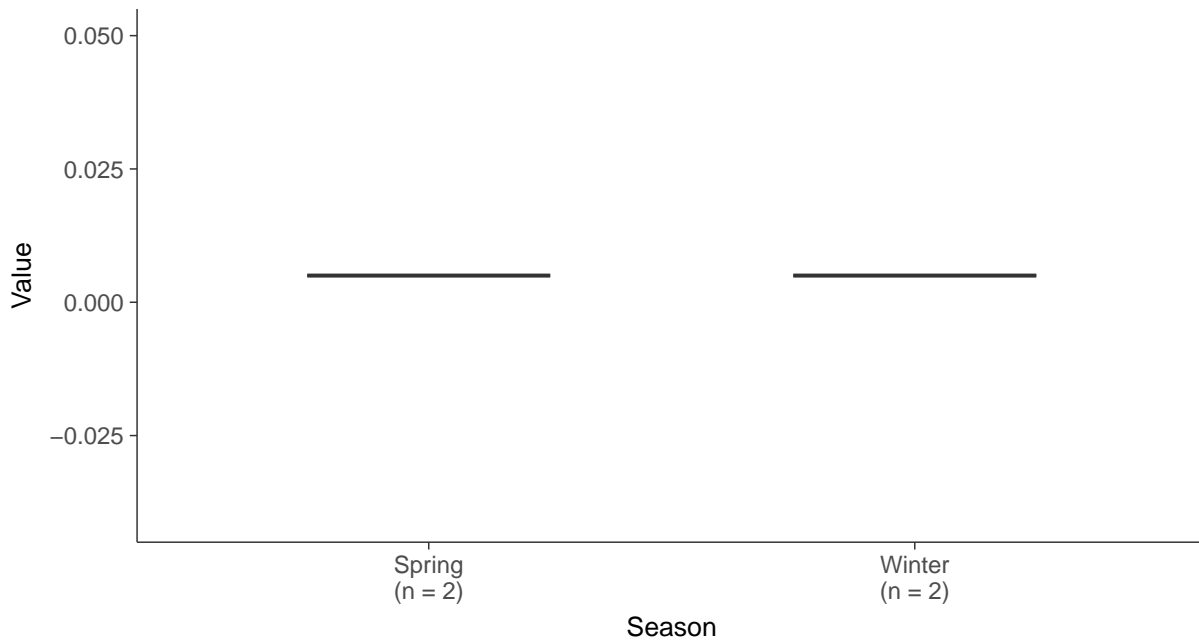
Boxplot

Chromium, MW-15 (mg/L)



Boxplot by Season

Chromium, MW-15 (mg/L)



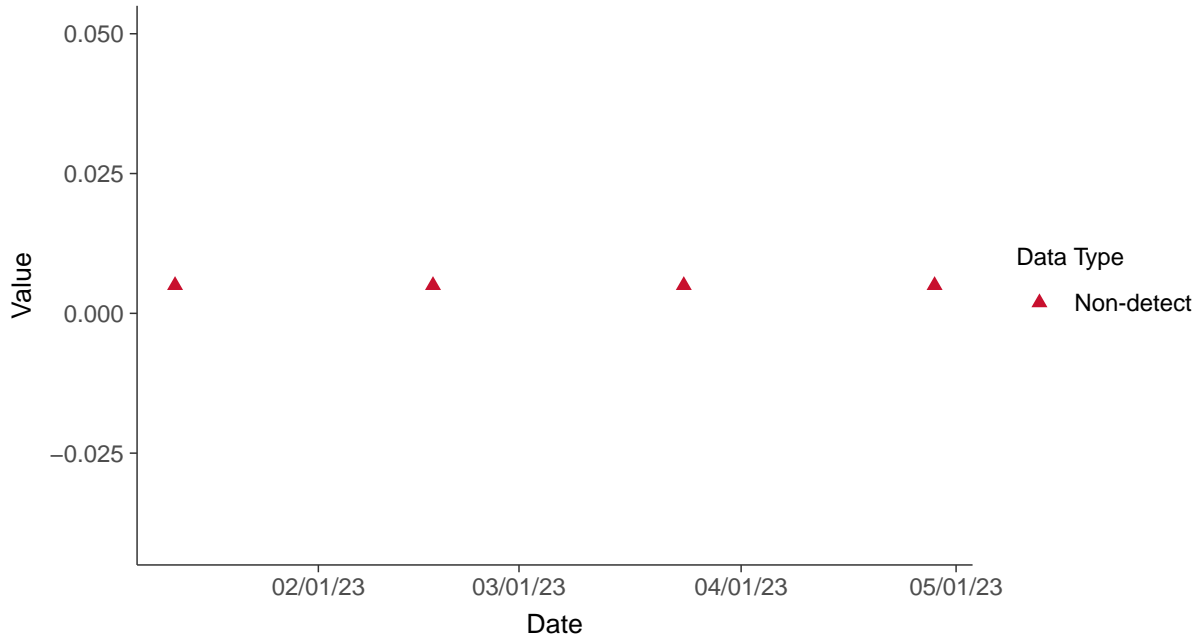


Appendix IV: Cobalt, MW-15

ID: 15_2_16

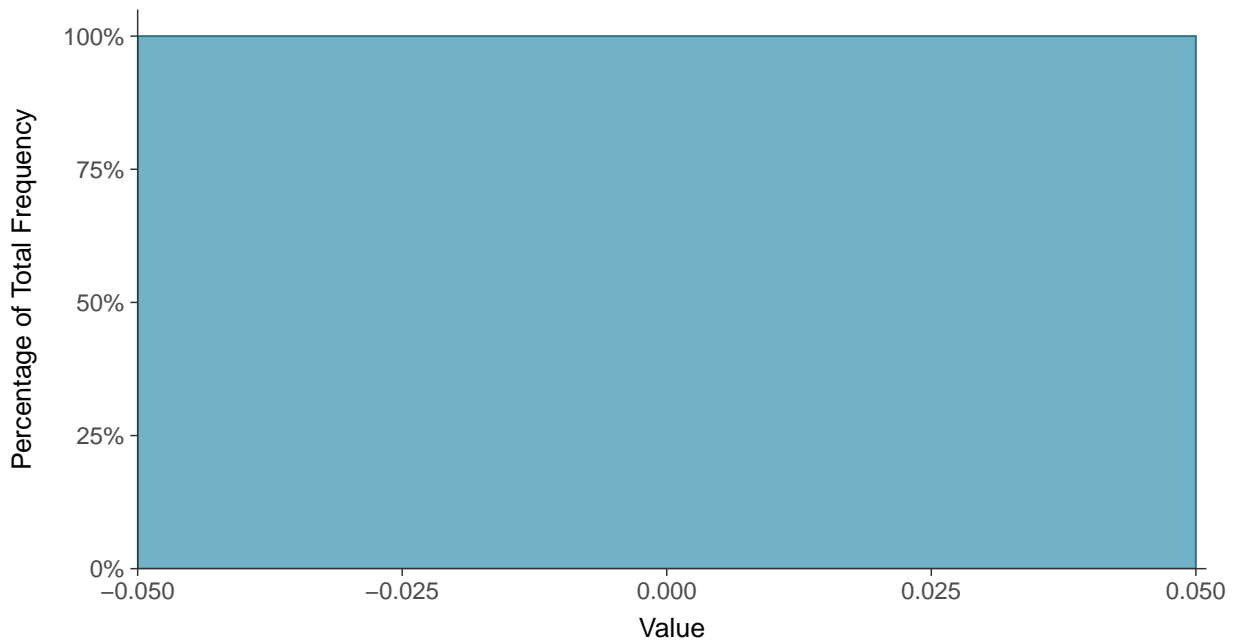
Scatter Plot

Cobalt, MW-15 (mg/L)



Histogram

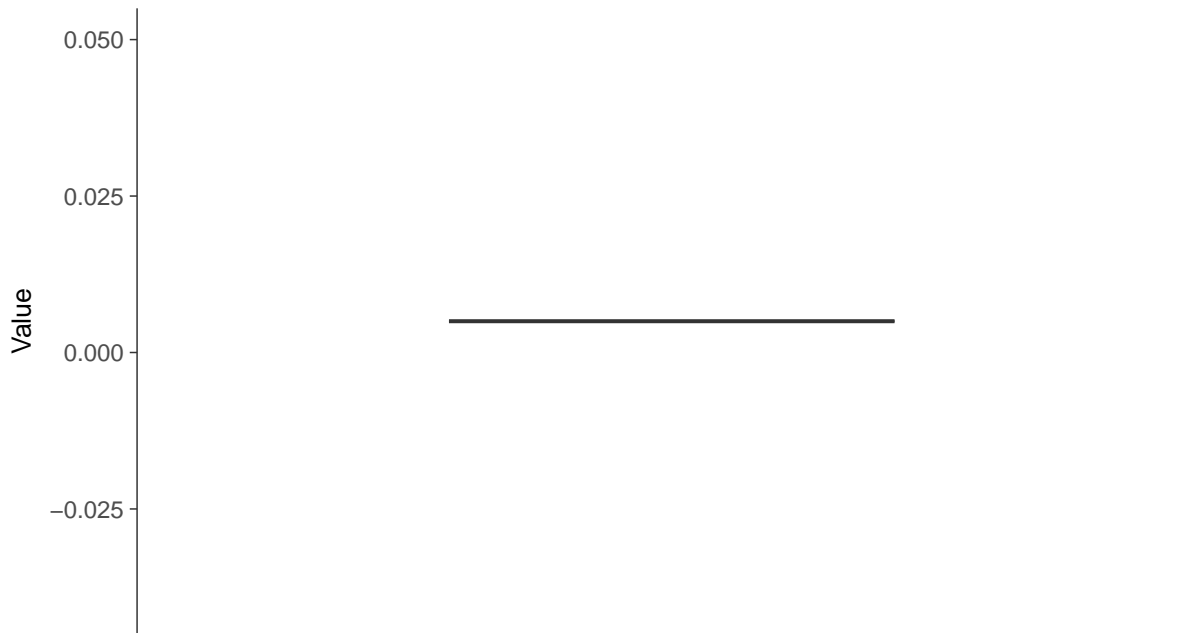
Cobalt, MW-15 (mg/L)





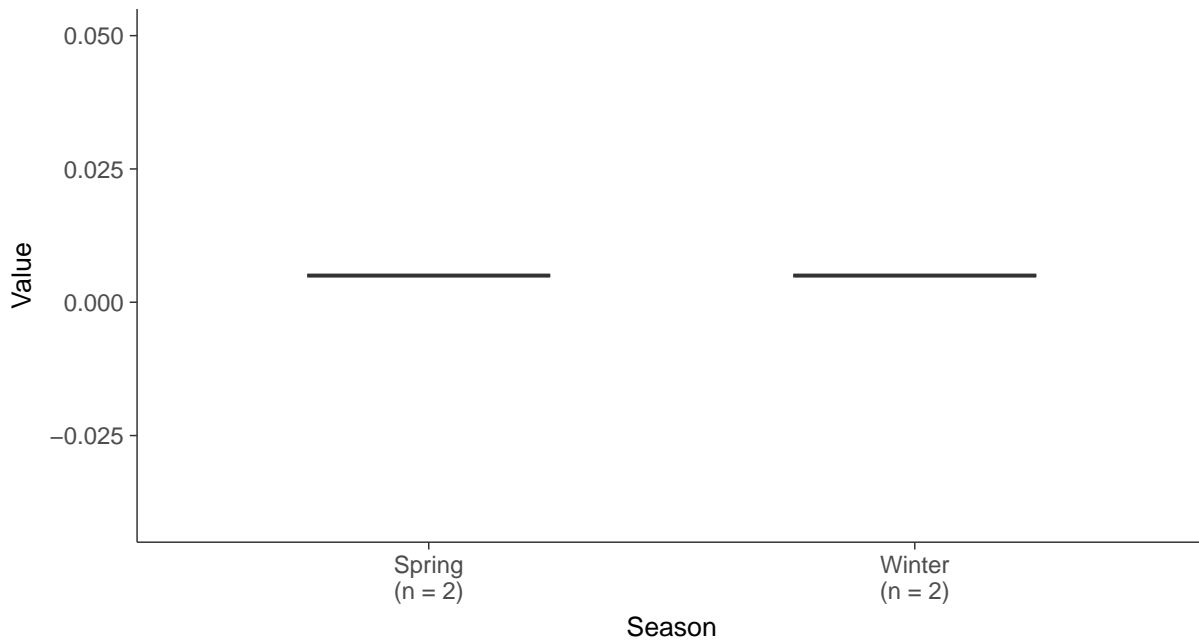
Boxplot

Cobalt, MW-15 (mg/L)



Boxplot by Season

Cobalt, MW-15 (mg/L)



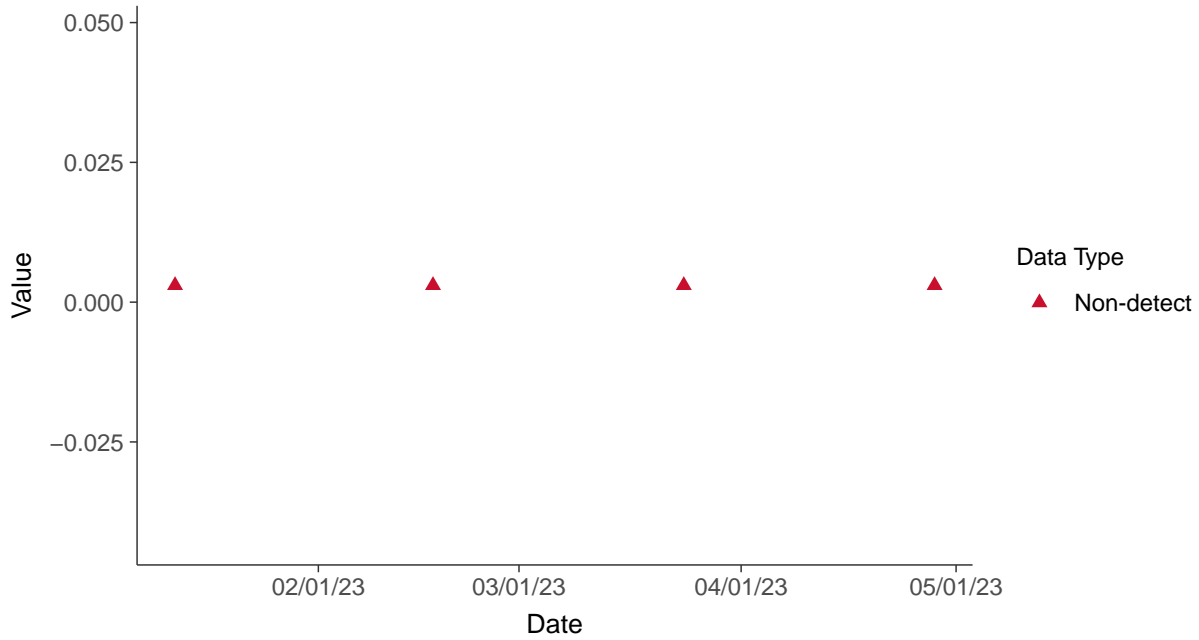


Appendix IV: Lead, MW-15

ID: 15_2_18

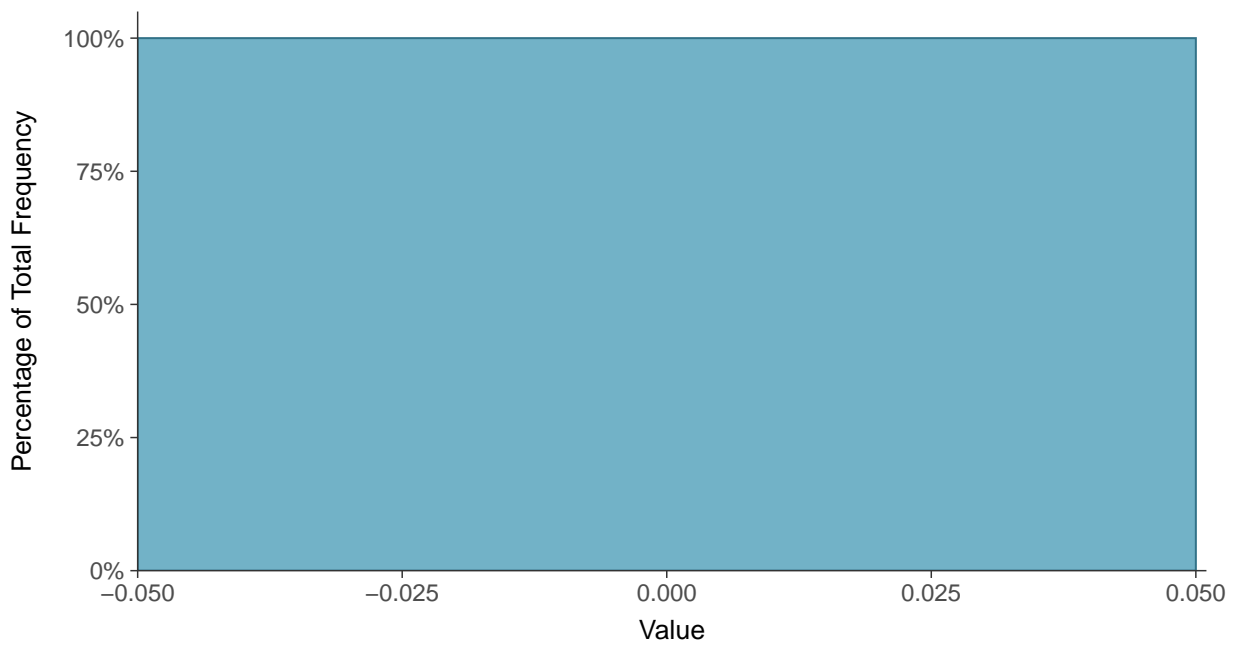
Scatter Plot

Lead, MW-15 (mg/L)



Histogram

Lead, MW-15 (mg/L)





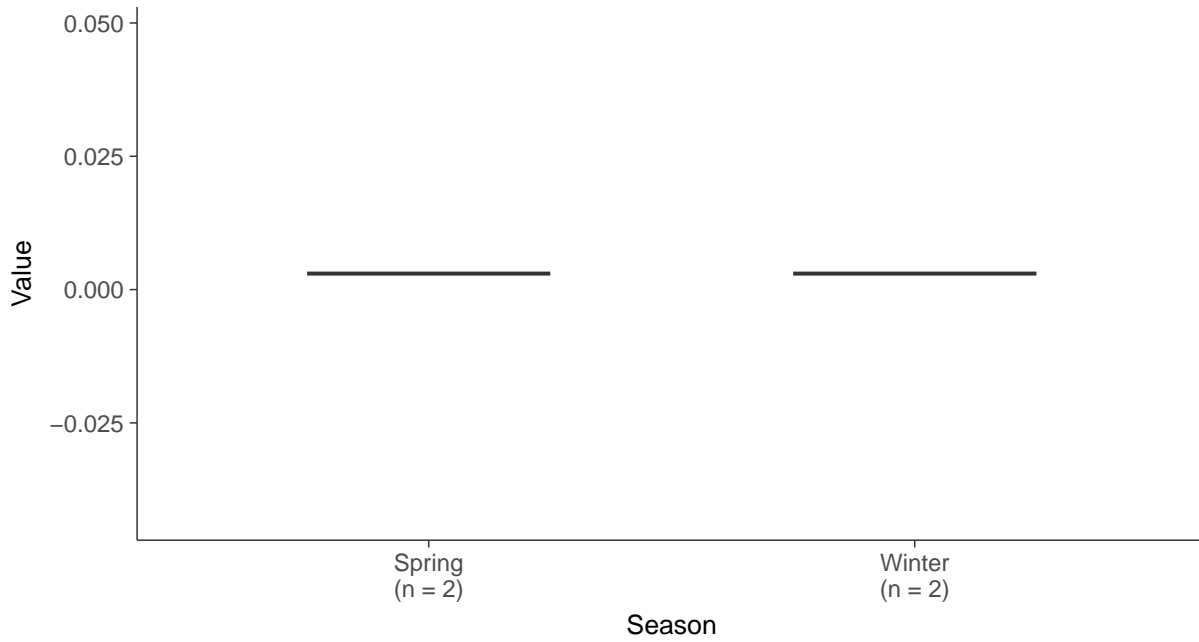
Boxplot

Lead, MW-15 (mg/L)



Boxplot by Season

Lead, MW-15 (mg/L)



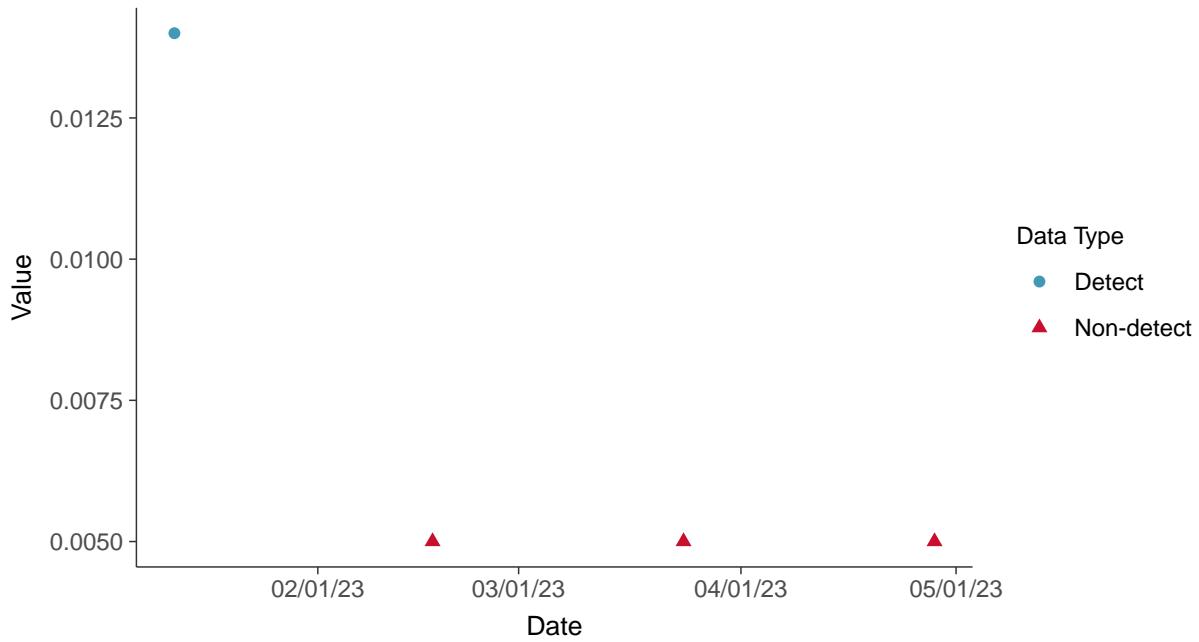


Appendix IV: Lithium, MW-15

ID: 15_2_19

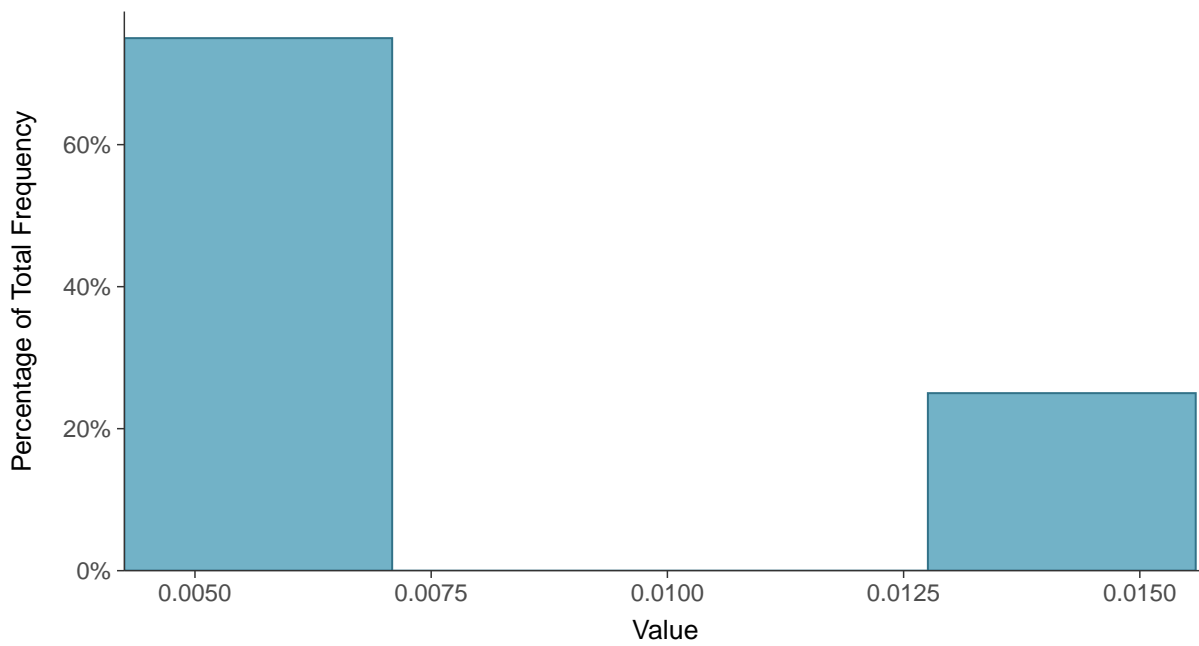
Scatter Plot

Lithium, MW-15 (mg/L)



Histogram

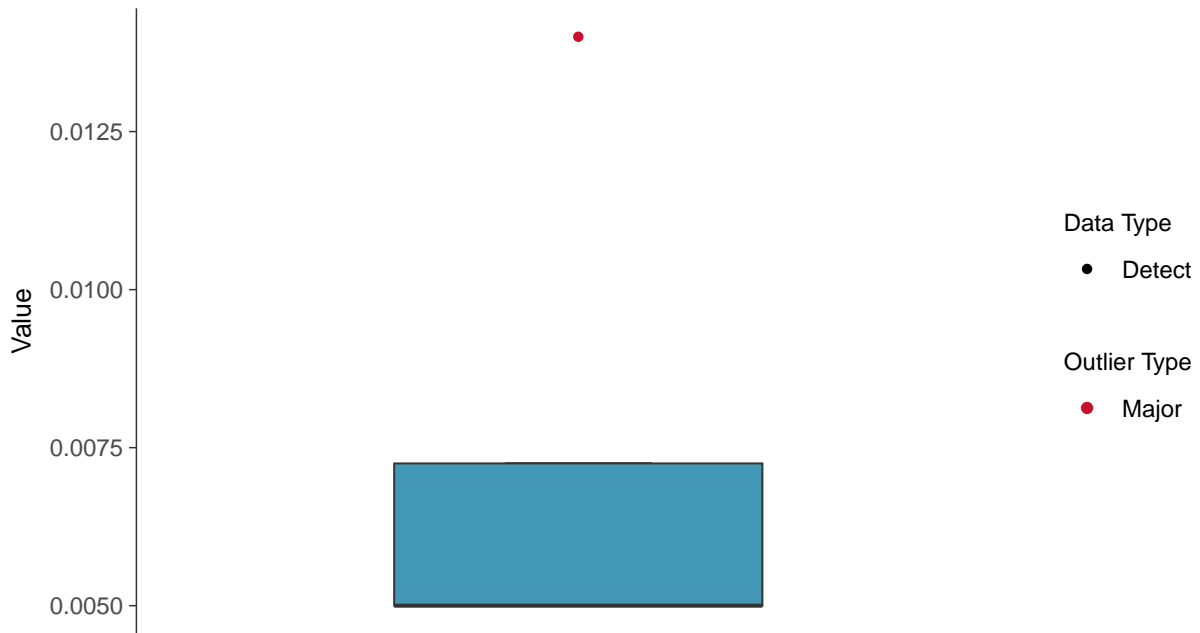
Lithium, MW-15 (mg/L)





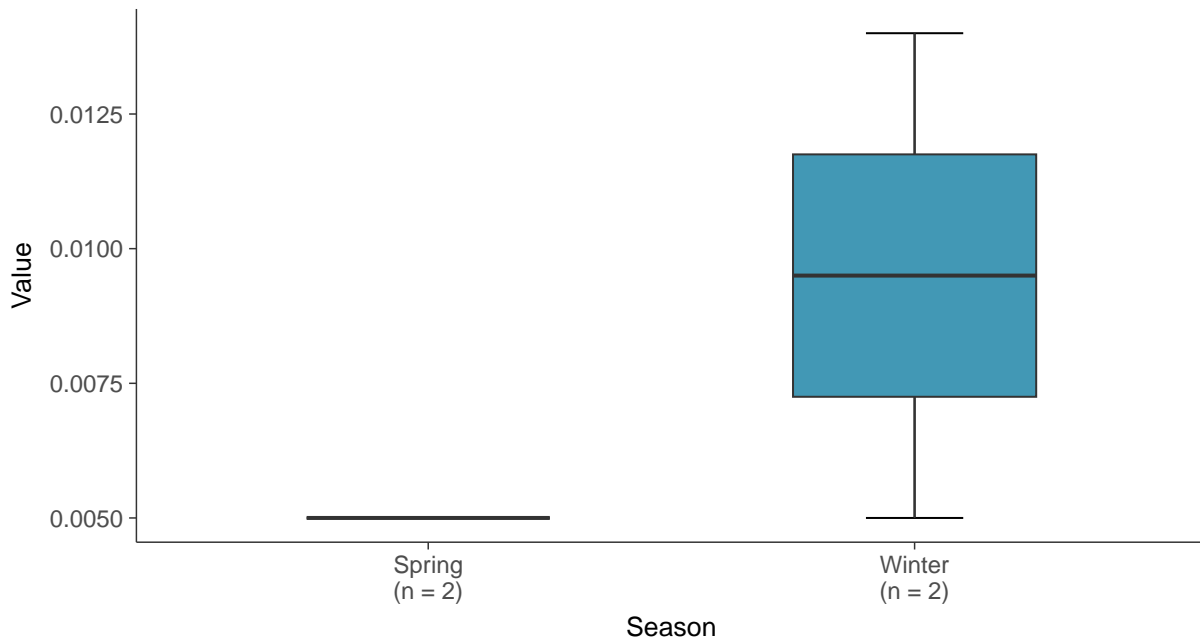
Boxplot

Lithium, MW-15 (mg/L)



Boxplot by Season

Lithium, MW-15 (mg/L)



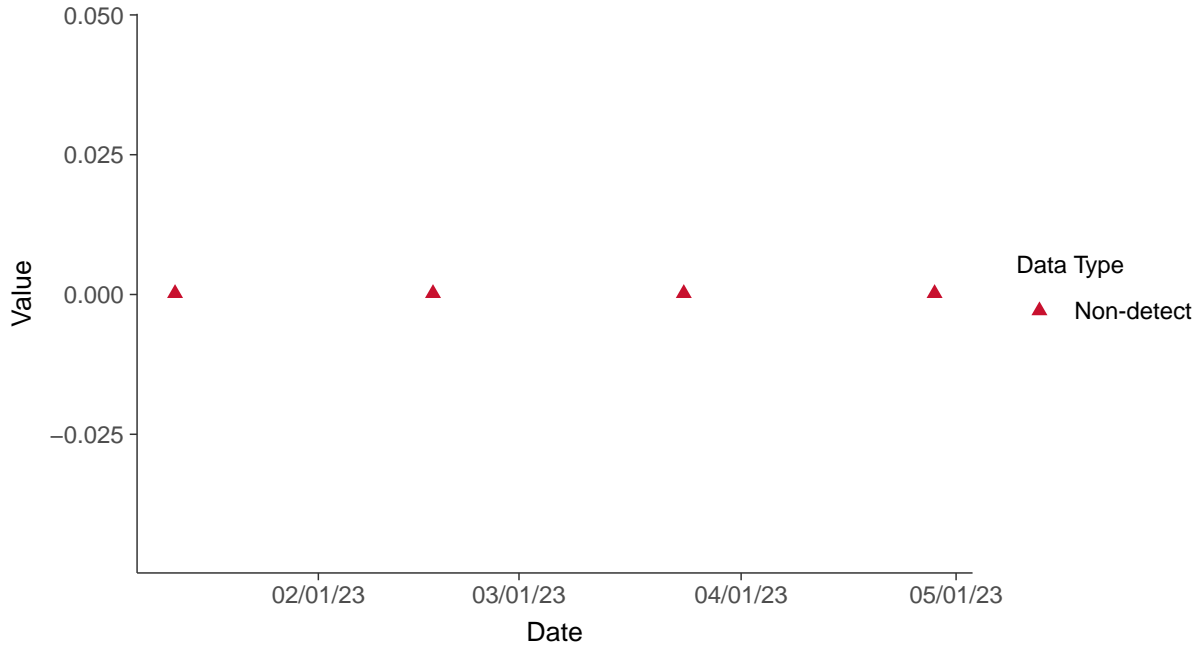


Appendix IV: Mercury, MW-15

ID: 15_2_21

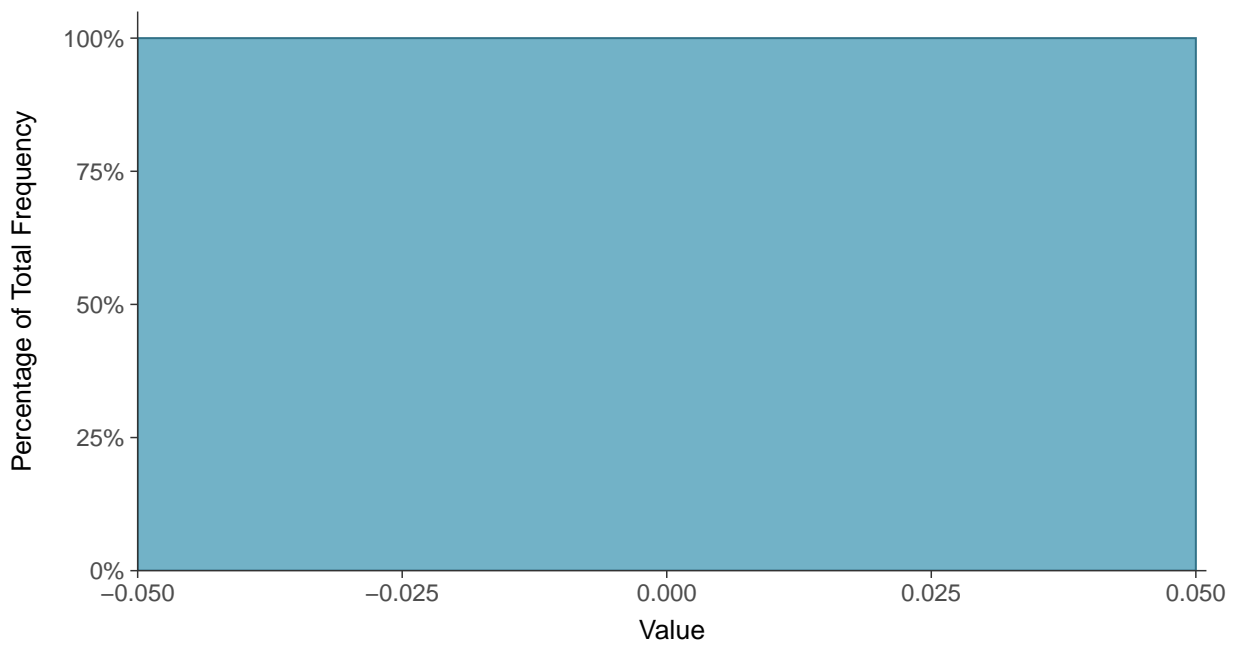
Scatter Plot

Mercury, MW-15 (mg/L)



Histogram

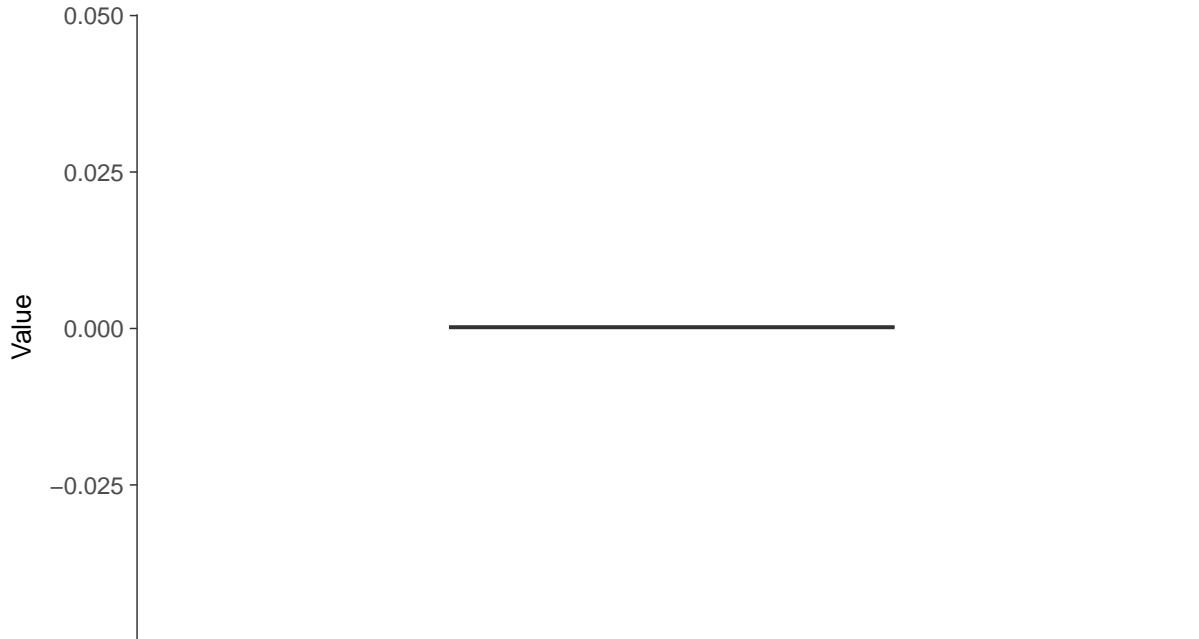
Mercury, MW-15 (mg/L)





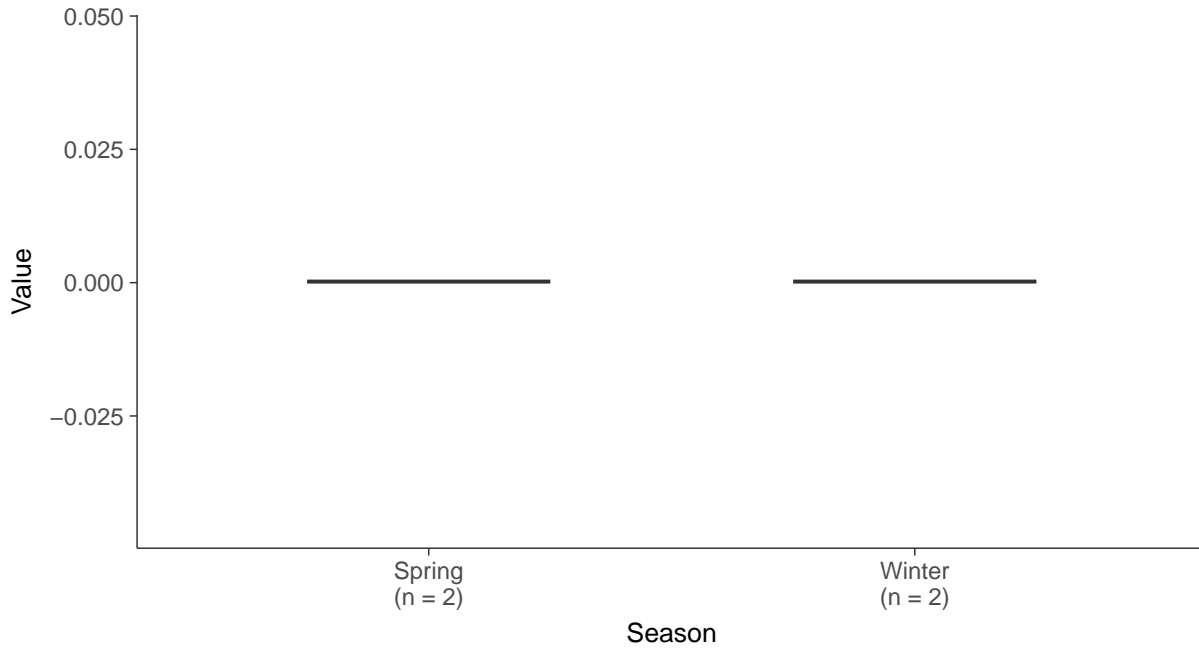
Boxplot

Mercury, MW-15 (mg/L)



Boxplot by Season

Mercury, MW-15 (mg/L)



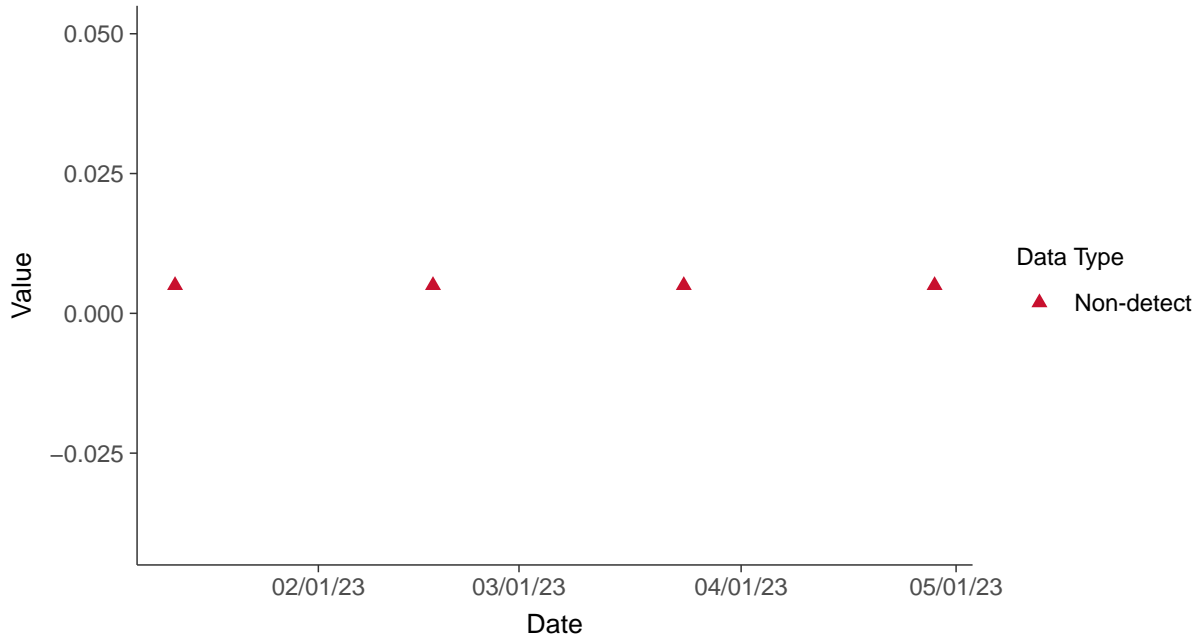


Appendix IV: Molybdenum, MW-15

ID: 15_2_22

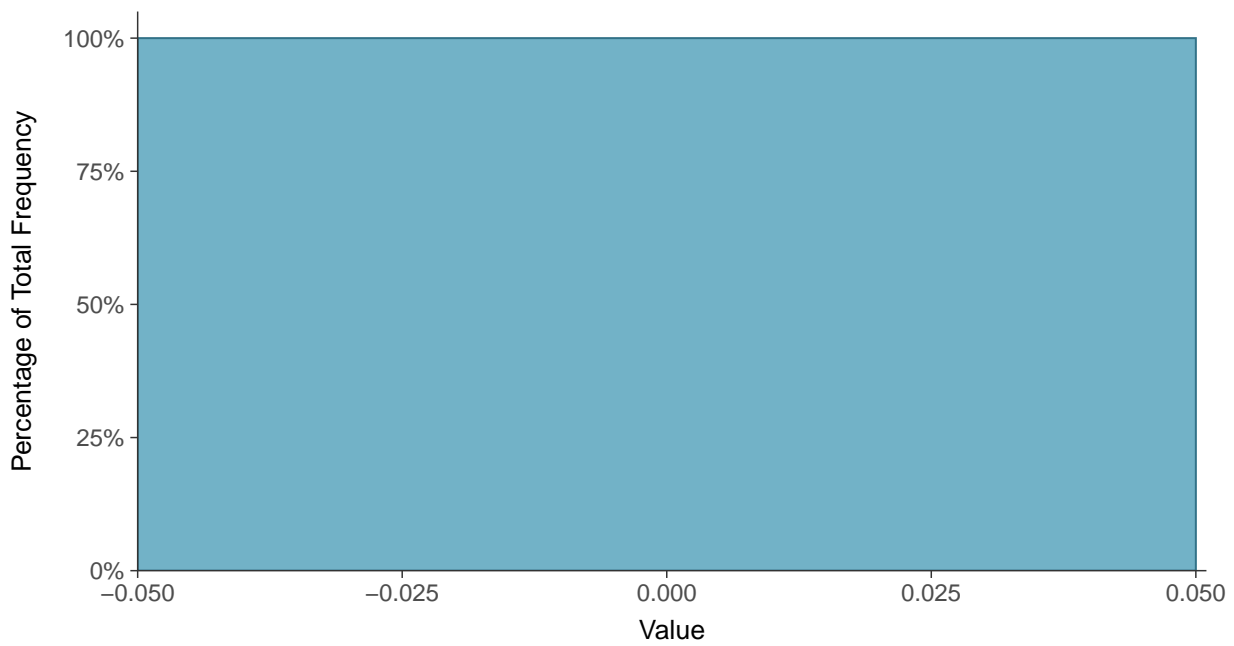
Scatter Plot

Molybdenum, MW-15 (mg/L)



Histogram

Molybdenum, MW-15 (mg/L)





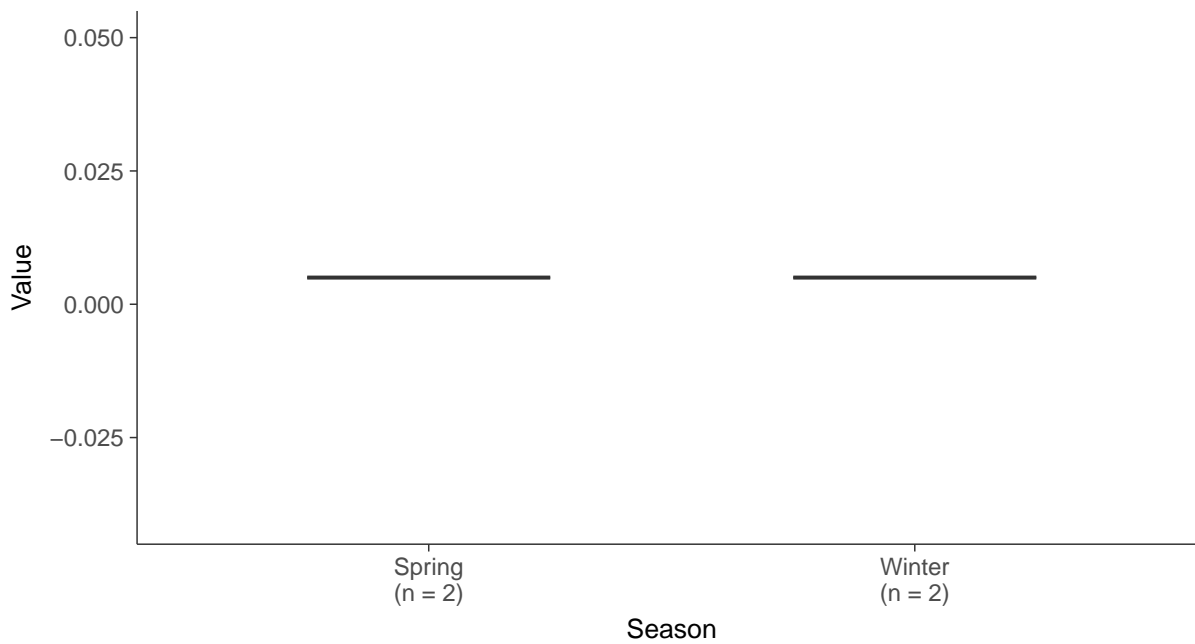
Boxplot

Molybdenum, MW-15 (mg/L)



Boxplot by Season

Molybdenum, MW-15 (mg/L)



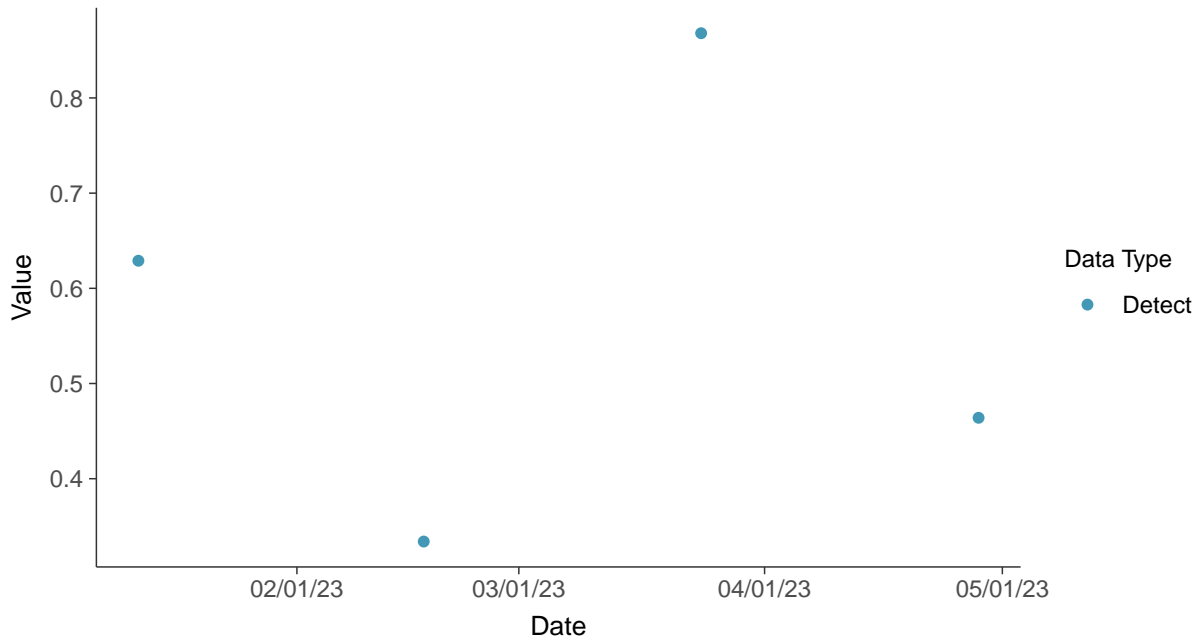


Appendix IV: Radium-226, MW-15

ID: 15_2_24

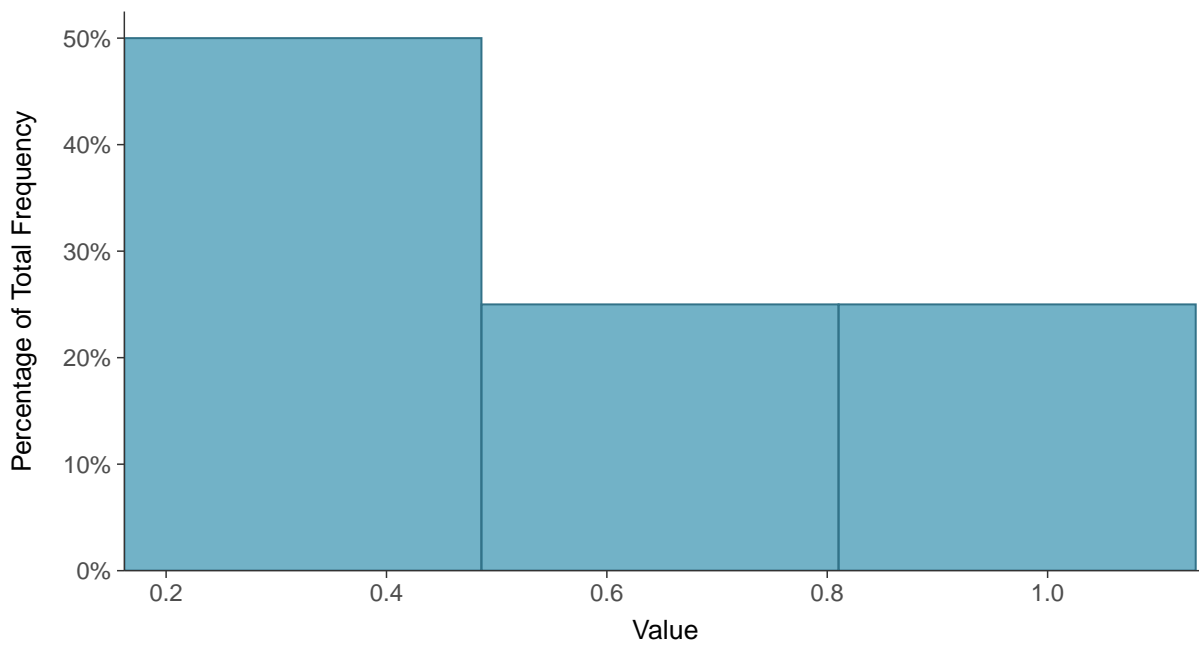
Scatter Plot

Radium-226, MW-15 (pCi/L)



Histogram

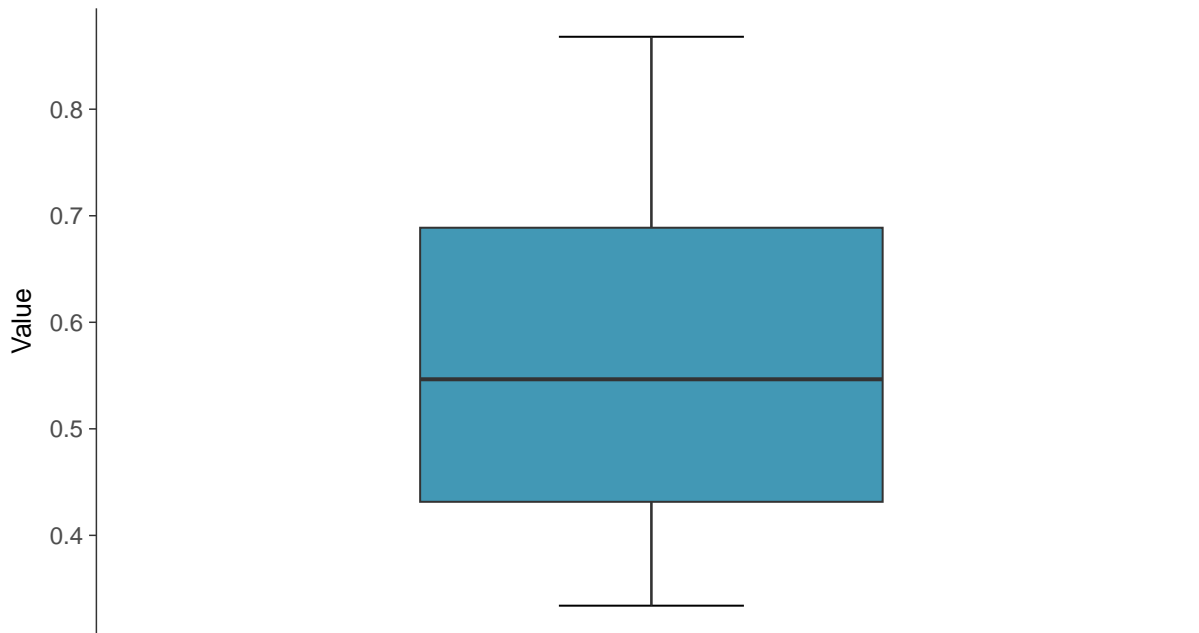
Radium-226, MW-15 (pCi/L)





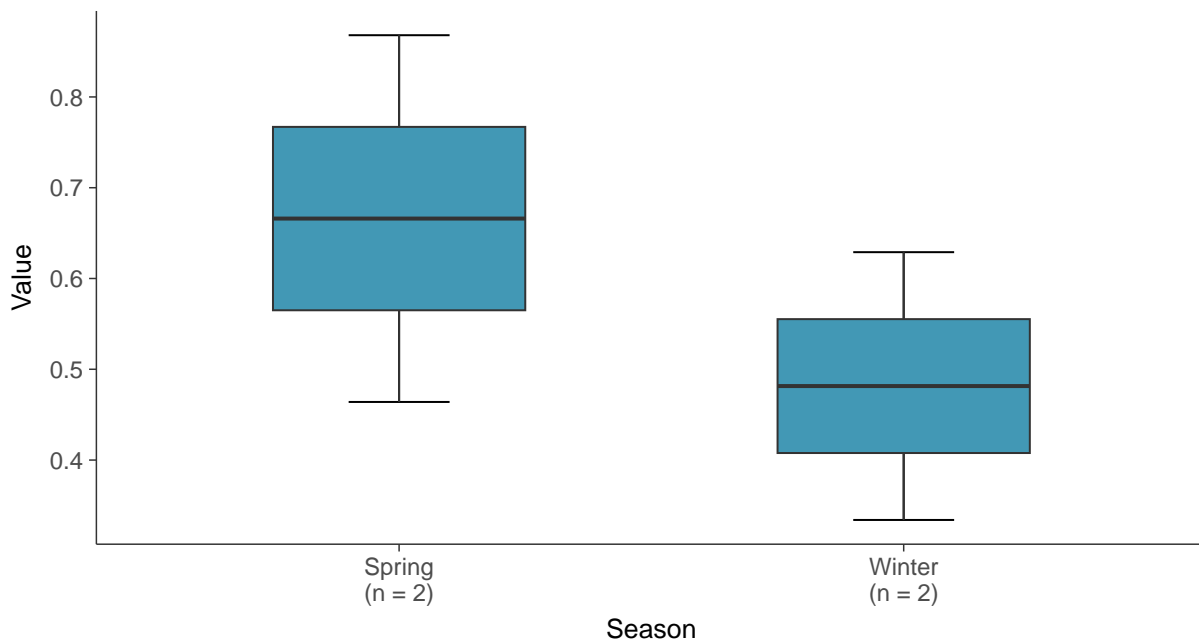
Boxplot

Radium-226, MW-15 (pCi/L)



Boxplot by Season

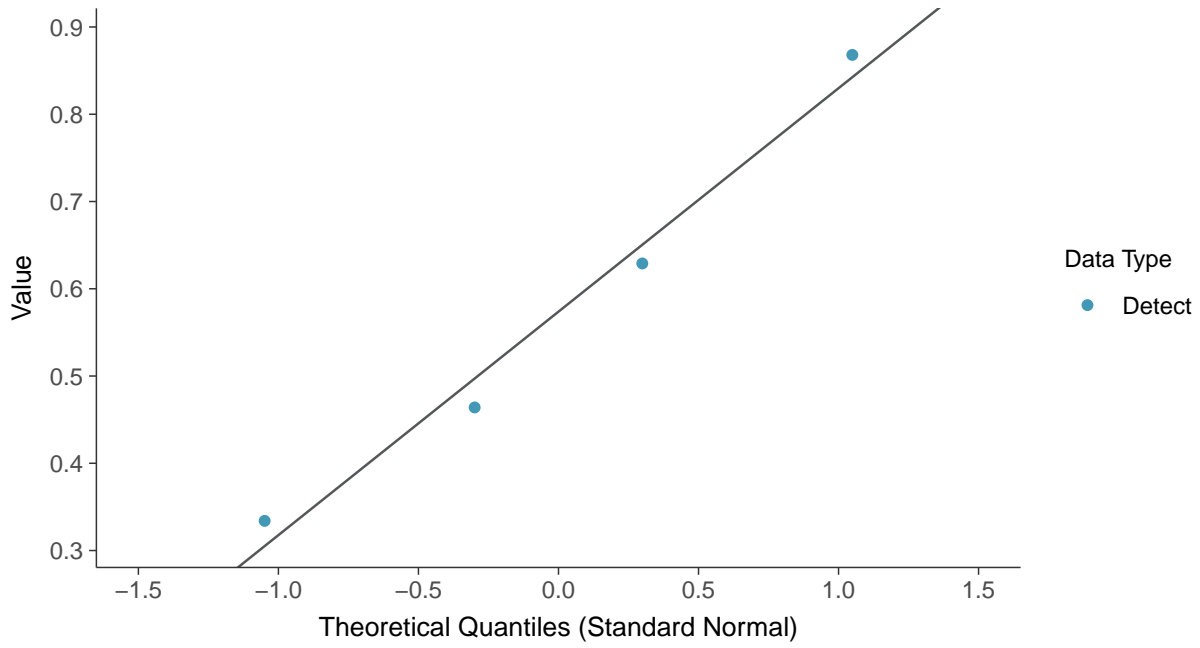
Radium-226, MW-15 (pCi/L)





Normal Q-Q plot

Radium-226, MW-15 (pCi/L)



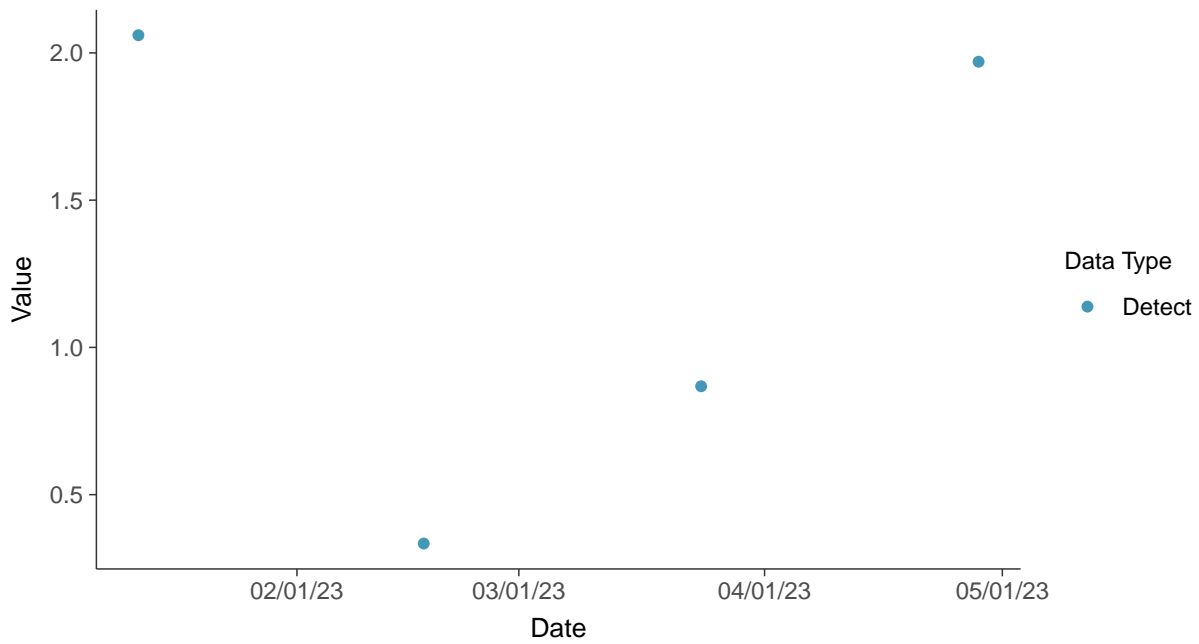


Appendix IV: Radium-226/228, MW-15

ID: 15_2_25

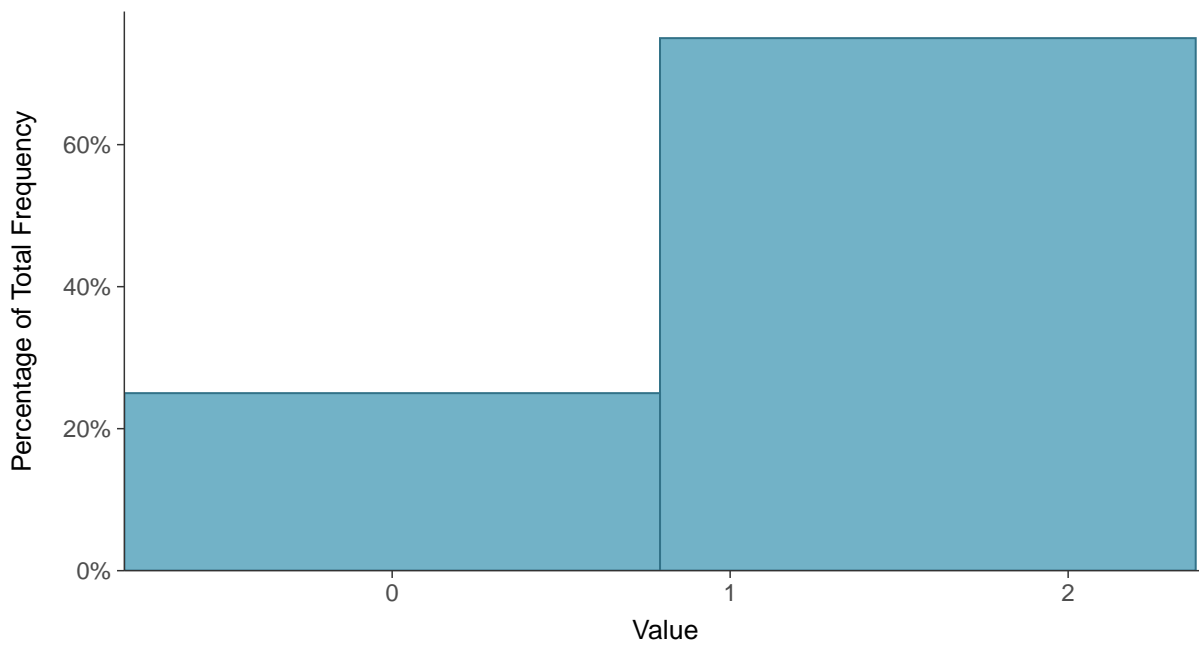
Scatter Plot

Radium-226/228, MW-15 (pCi/L)



Histogram

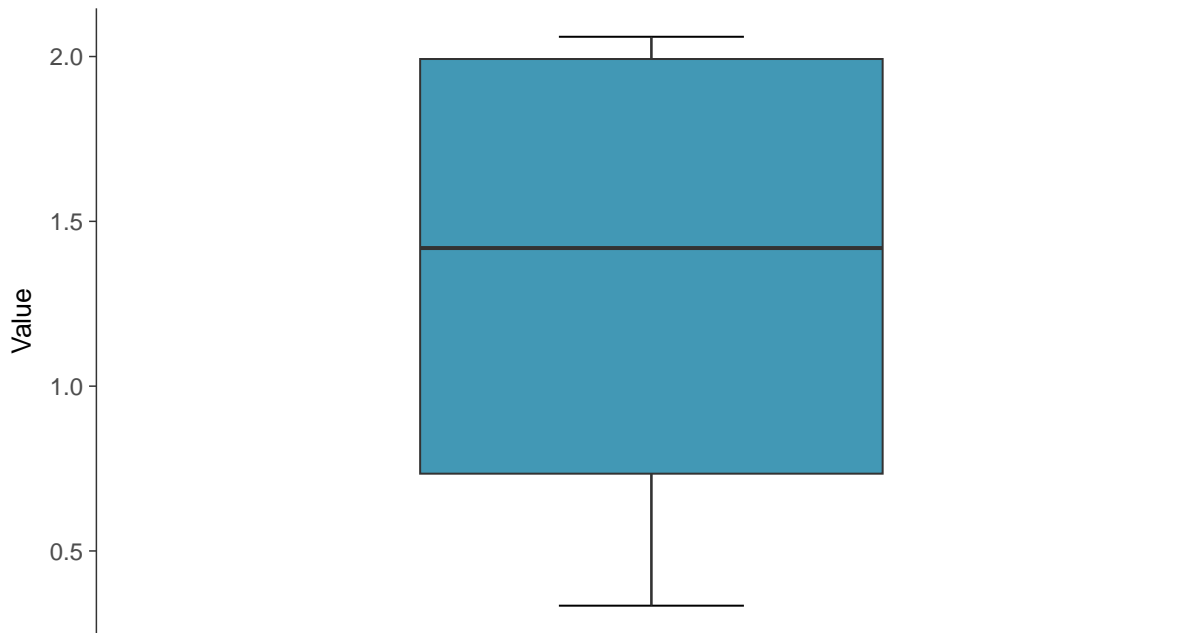
Radium-226/228, MW-15 (pCi/L)





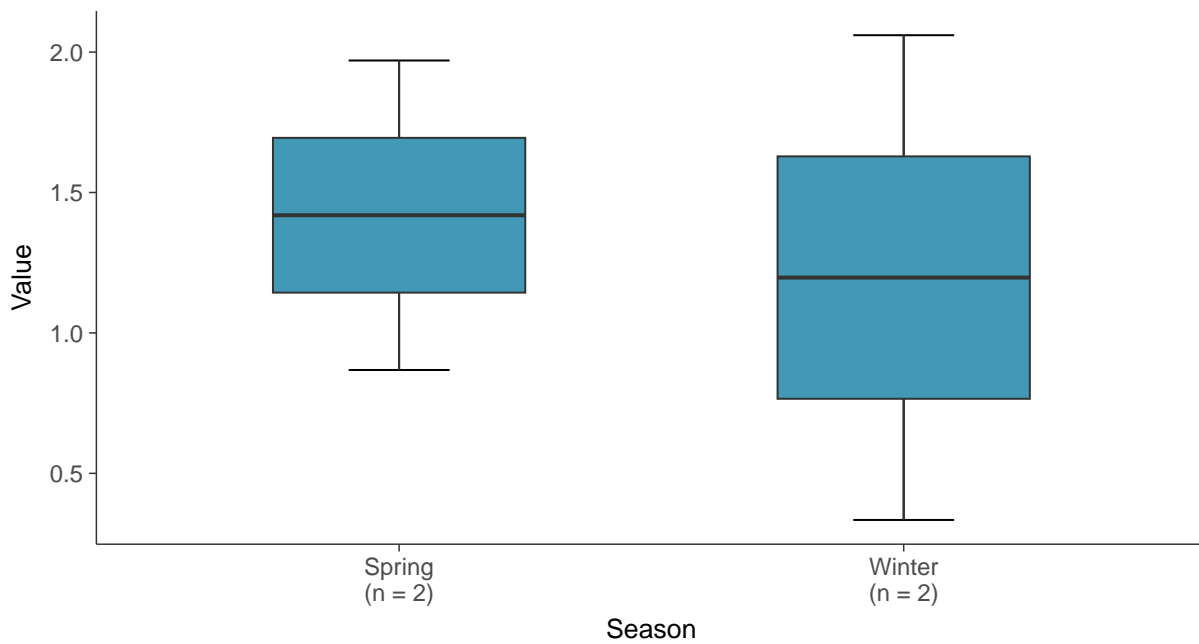
Boxplot

Radium-226/228, MW-15 (pCi/L)



Boxplot by Season

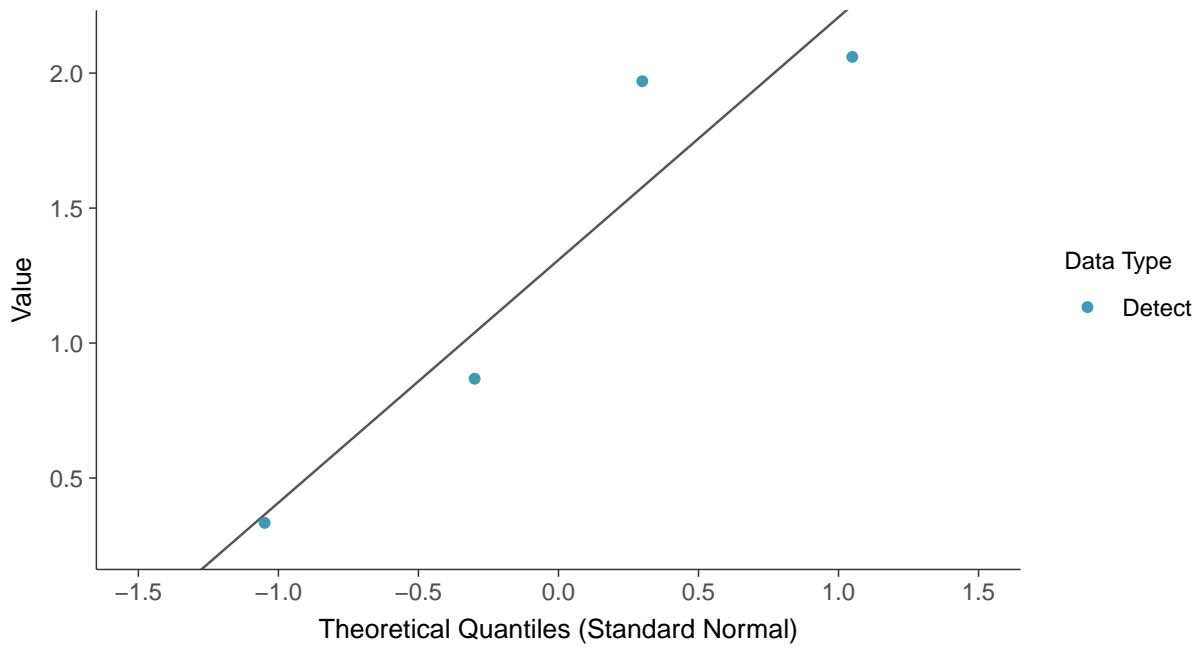
Radium-226/228, MW-15 (pCi/L)





Normal Q-Q plot

Radium-226/228, MW-15 (pCi/L)



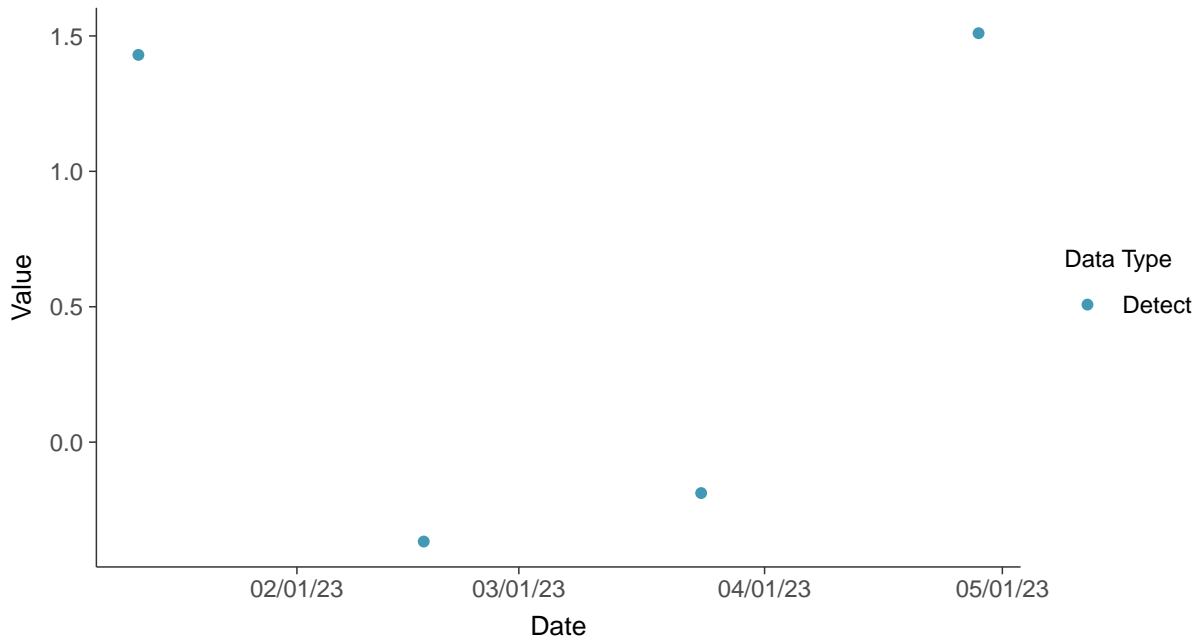


Appendix IV: Radium-228, MW-15

ID: 15_2_26

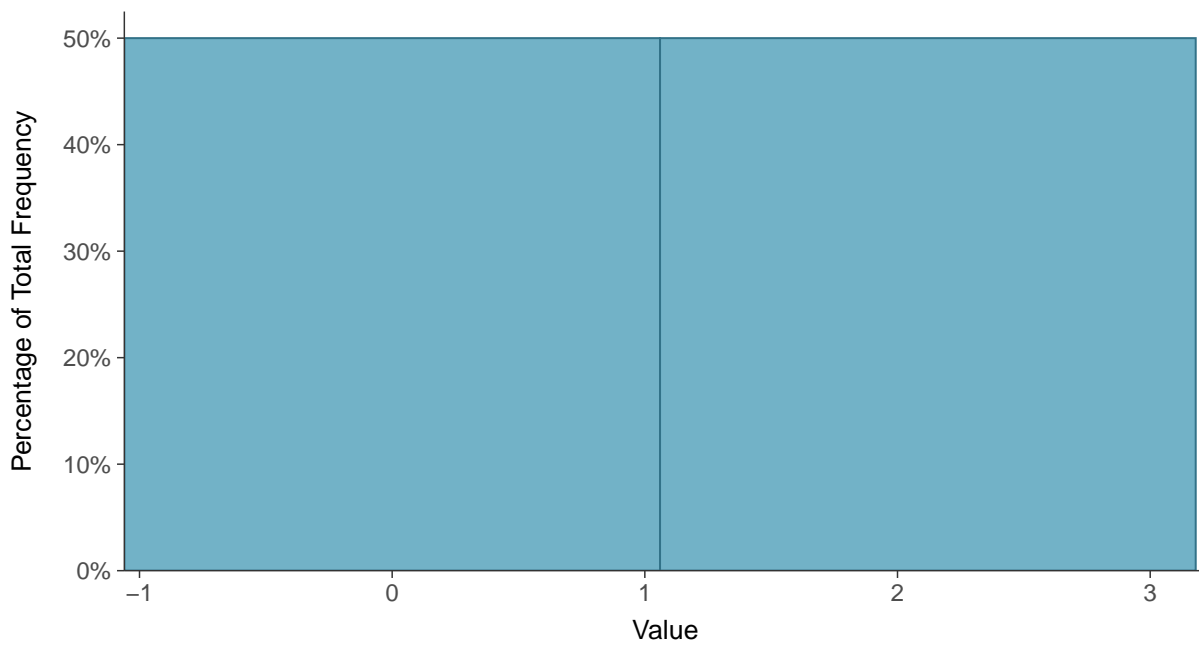
Scatter Plot

Radium-228, MW-15 (pCi/L)



Histogram

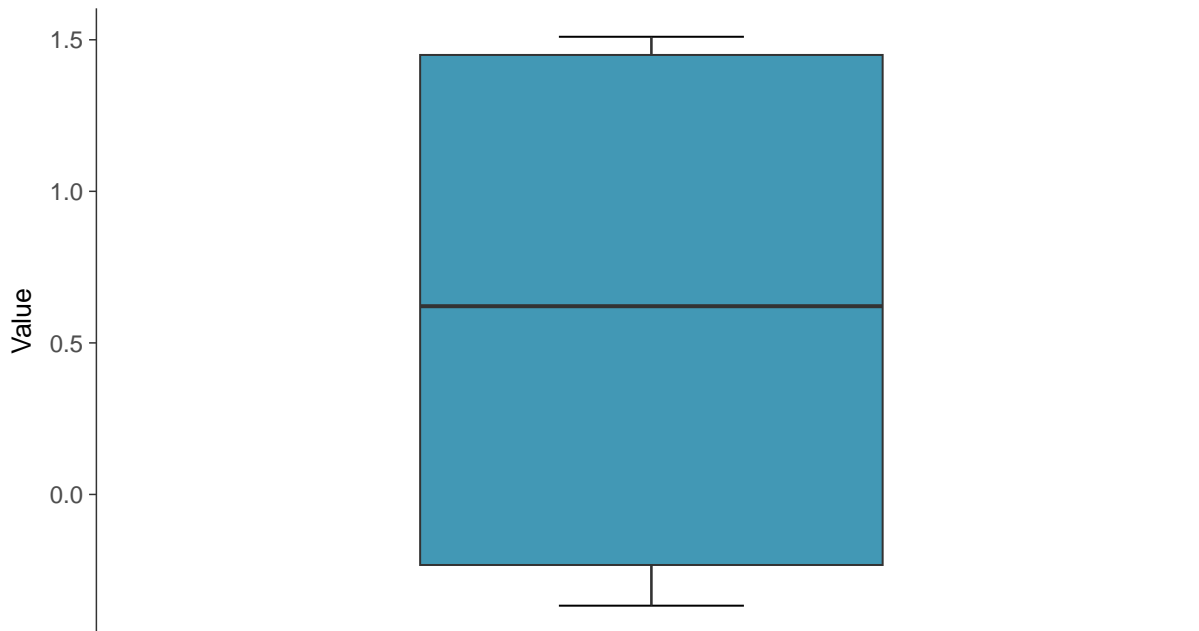
Radium-228, MW-15 (pCi/L)





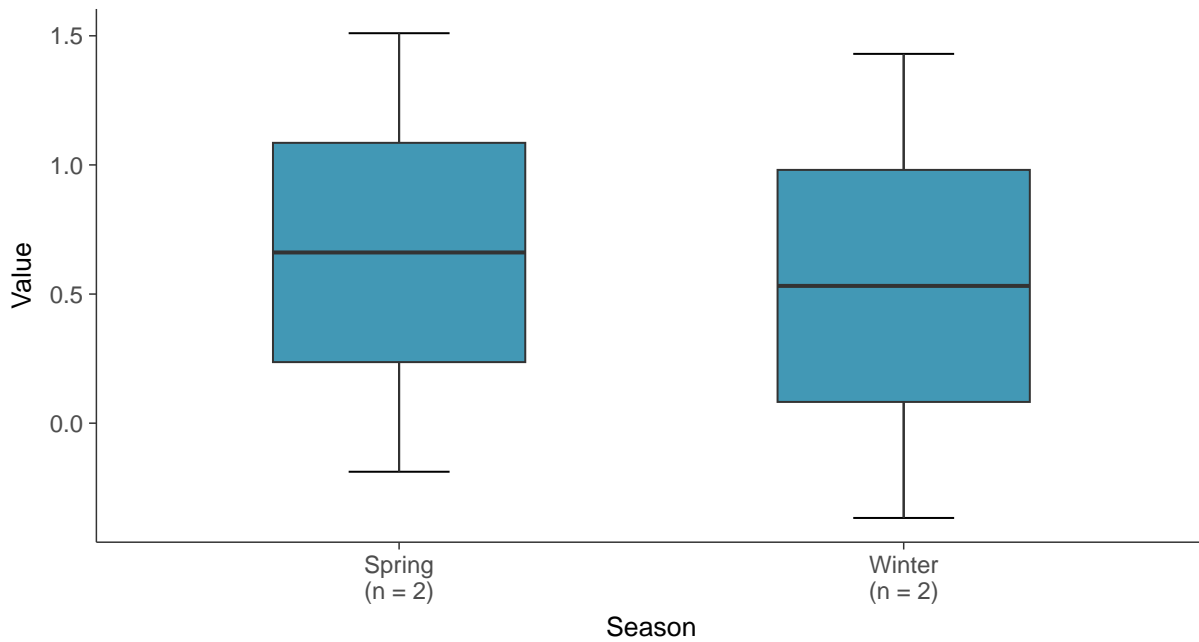
Boxplot

Radium-228, MW-15 (pCi/L)



Boxplot by Season

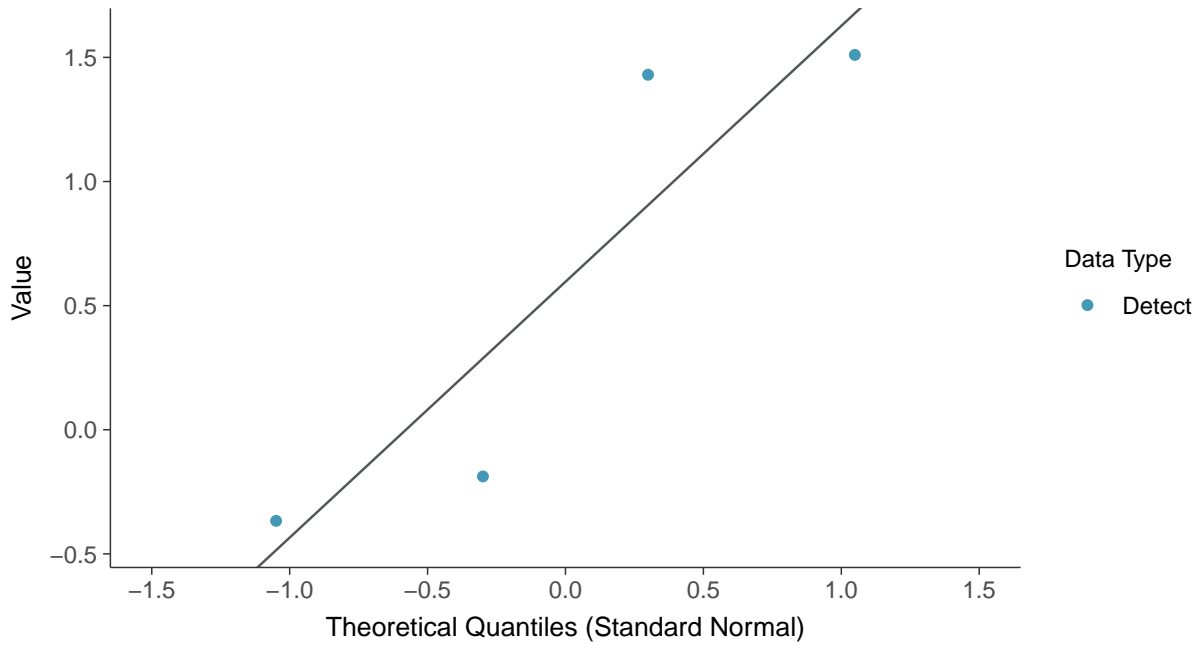
Radium-228, MW-15 (pCi/L)





Normal Q-Q plot

Radium-228, MW-15 (pCi/L)



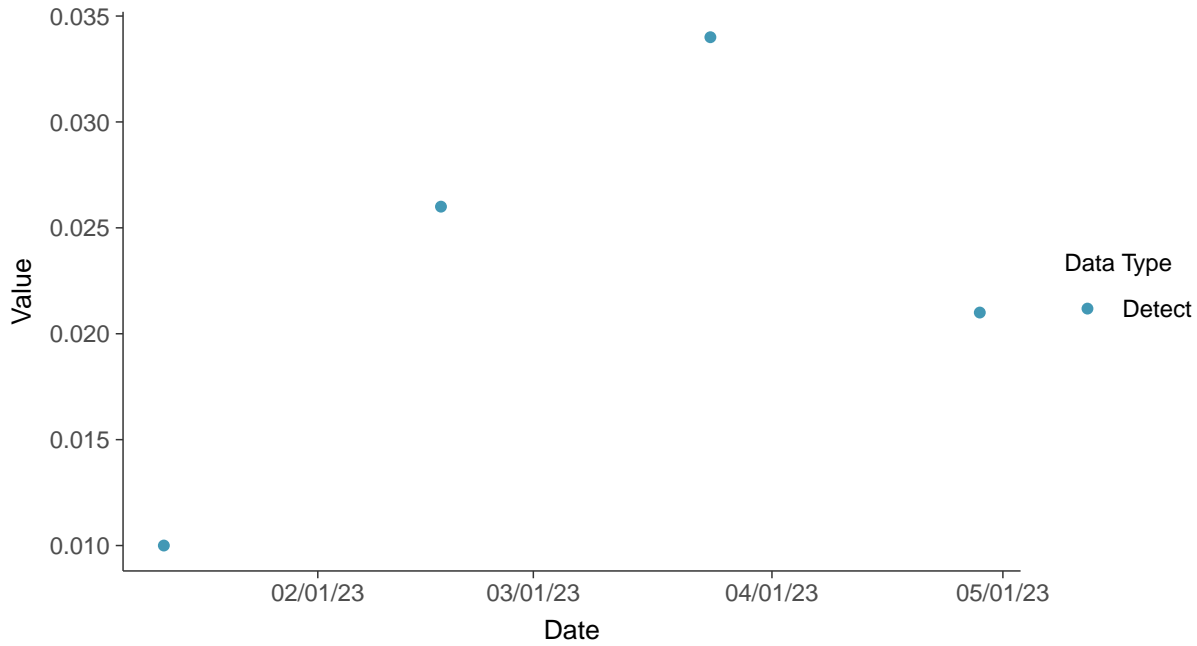


Appendix IV: Selenium, MW-15

ID: 15_2_27

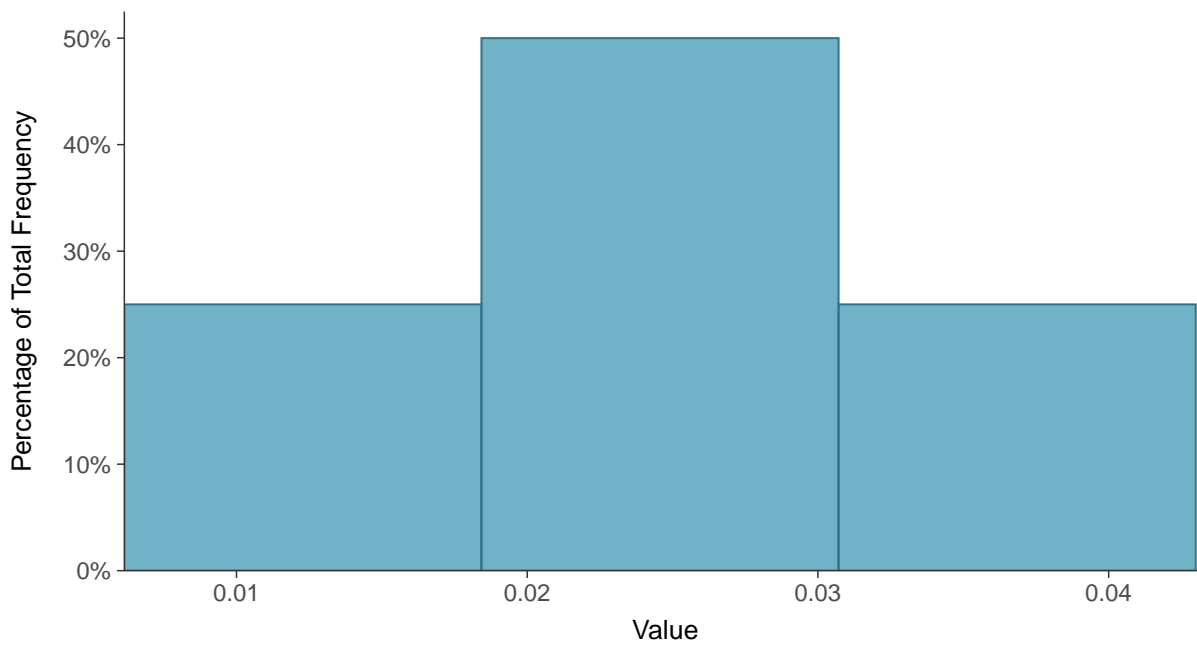
Scatter Plot

Selenium, MW-15 (mg/L)



Histogram

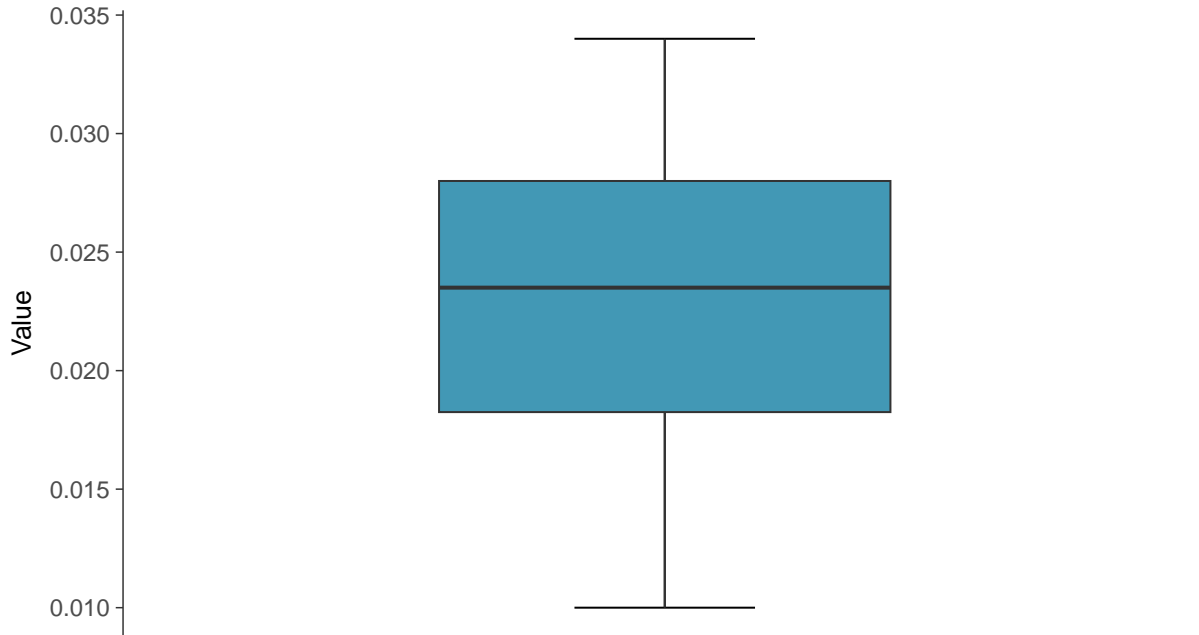
Selenium, MW-15 (mg/L)





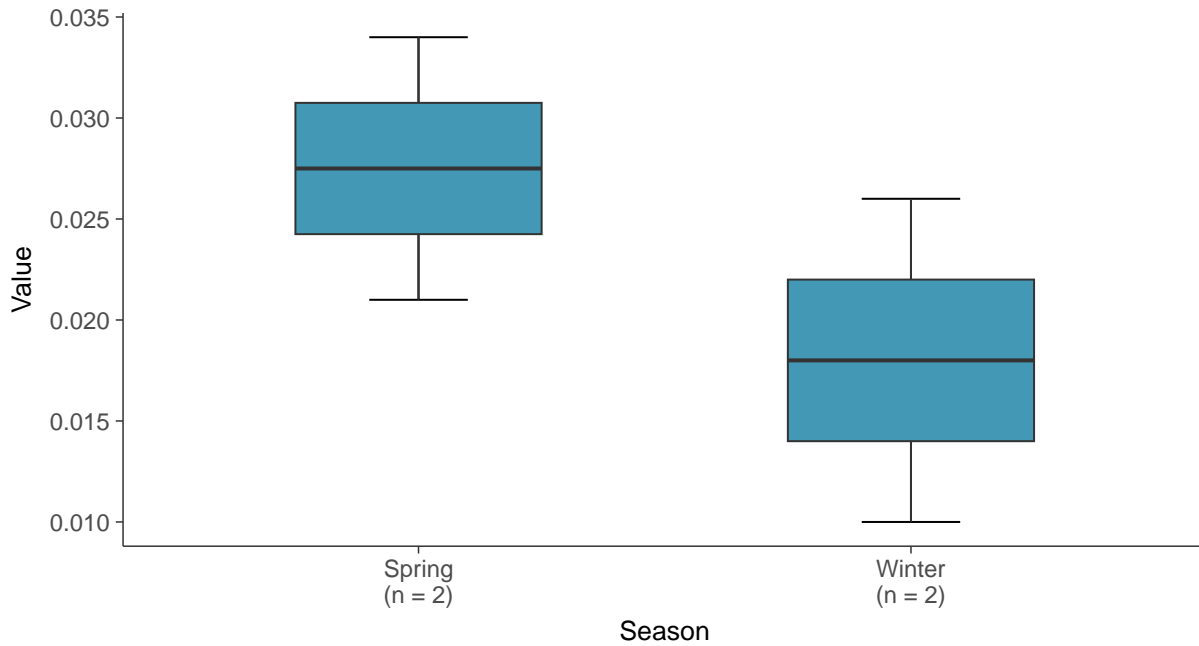
Boxplot

Selenium, MW-15 (mg/L)



Boxplot by Season

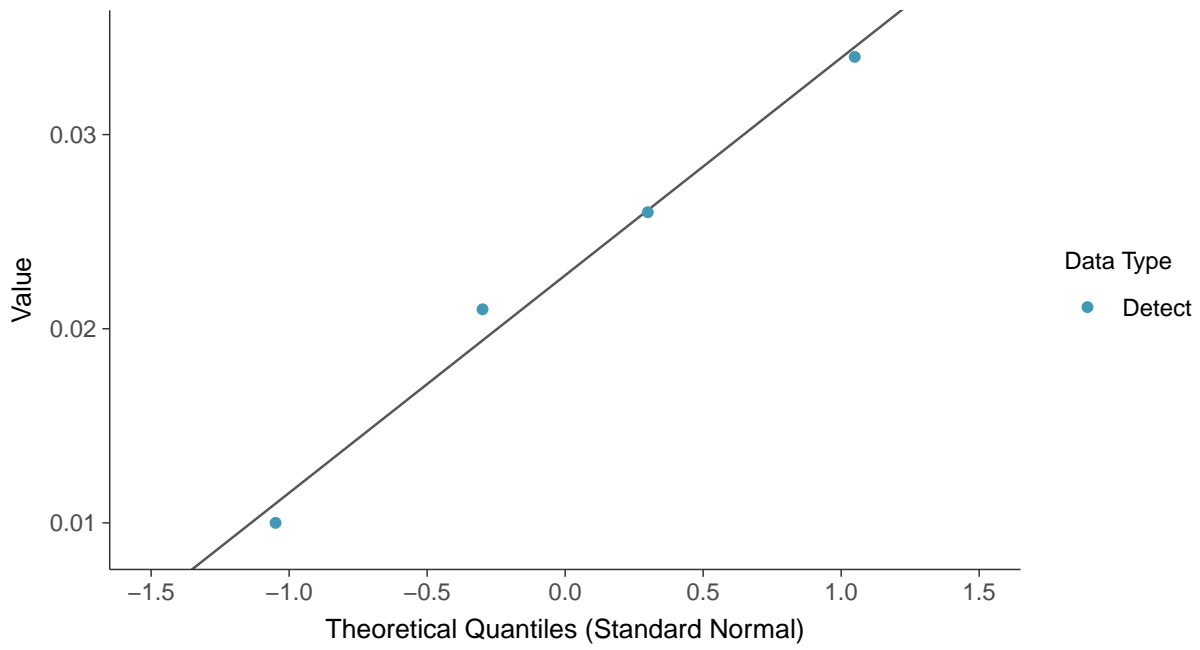
Selenium, MW-15 (mg/L)





Normal Q-Q plot

Selenium, MW-15 (mg/L)



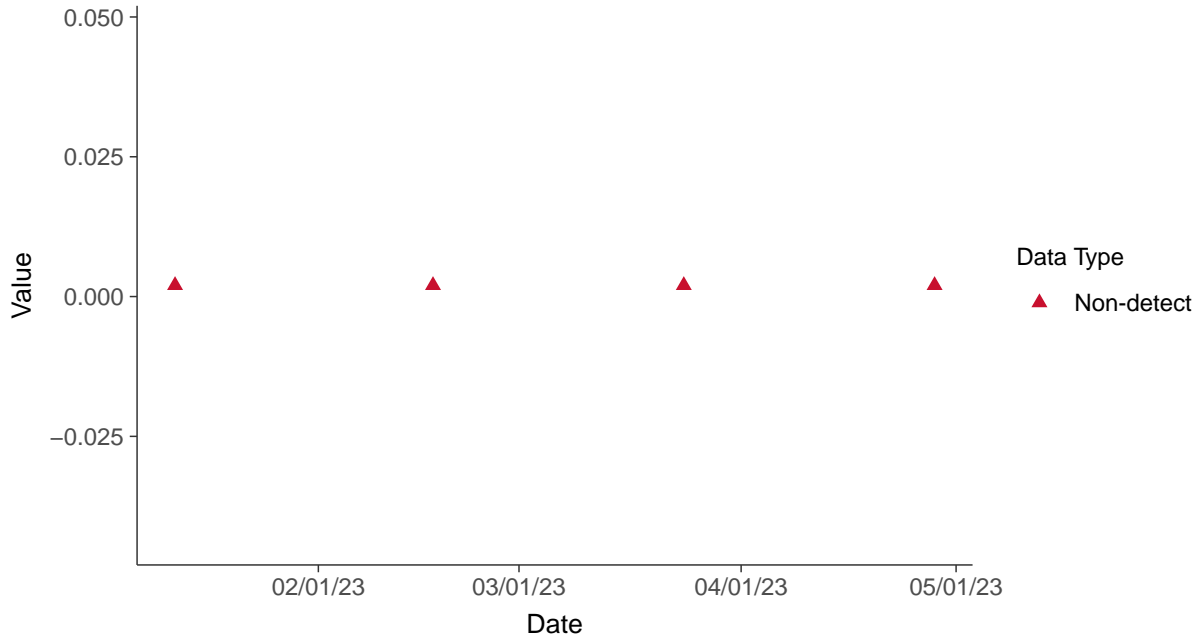


Appendix IV: Thallium, MW-15

ID: 15_2_29

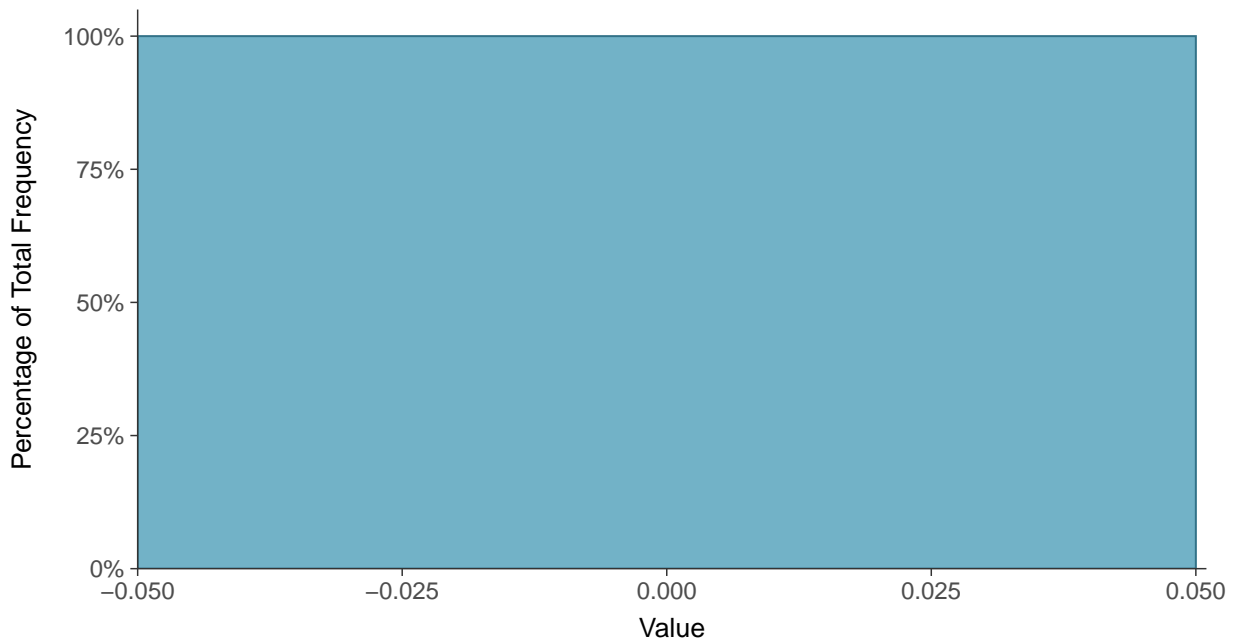
Scatter Plot

Thallium, MW-15 (mg/L)



Histogram

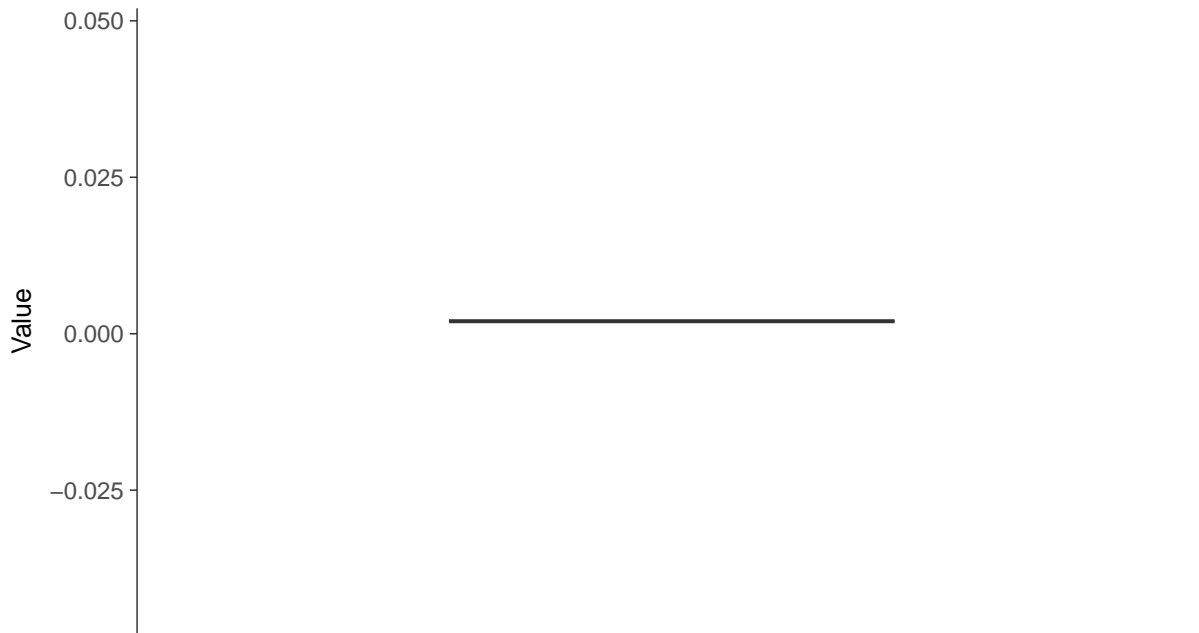
Thallium, MW-15 (mg/L)





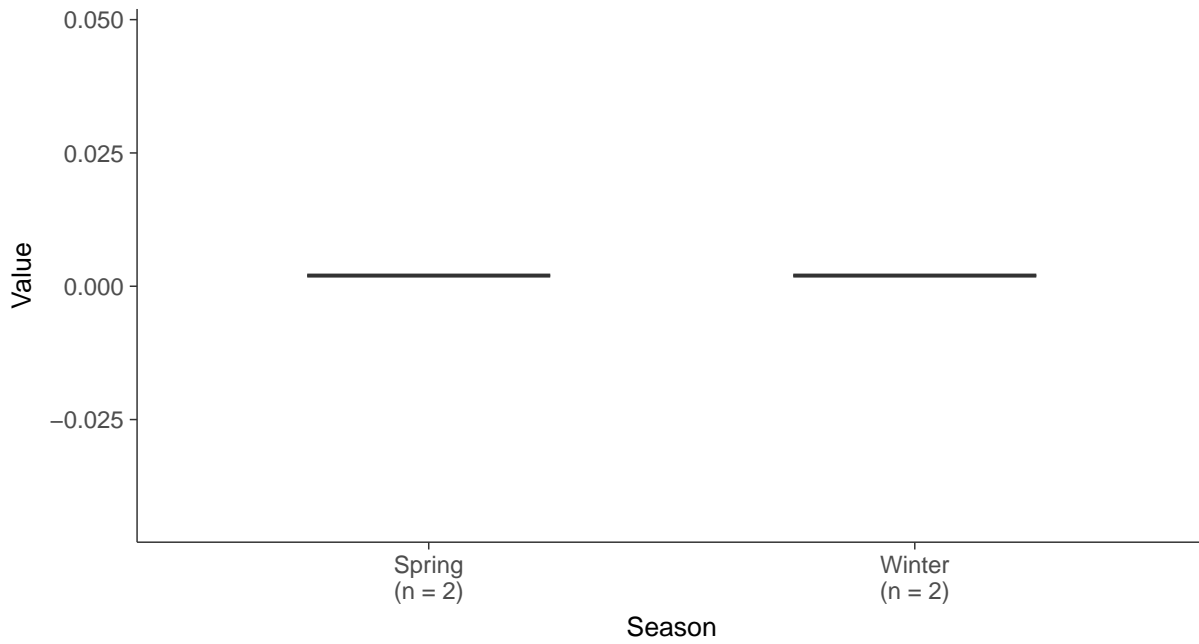
Boxplot

Thallium, MW-15 (mg/L)



Boxplot by Season

Thallium, MW-15 (mg/L)



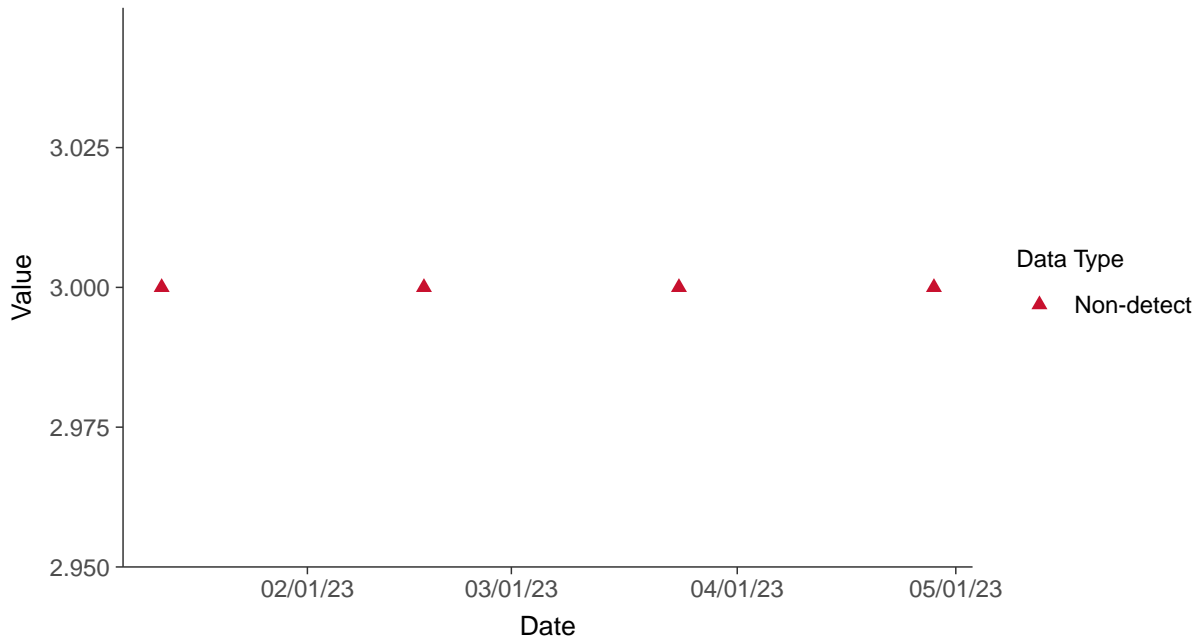


Appendix IV: Total Suspended Solids, MW-15

ID: 15_2_30

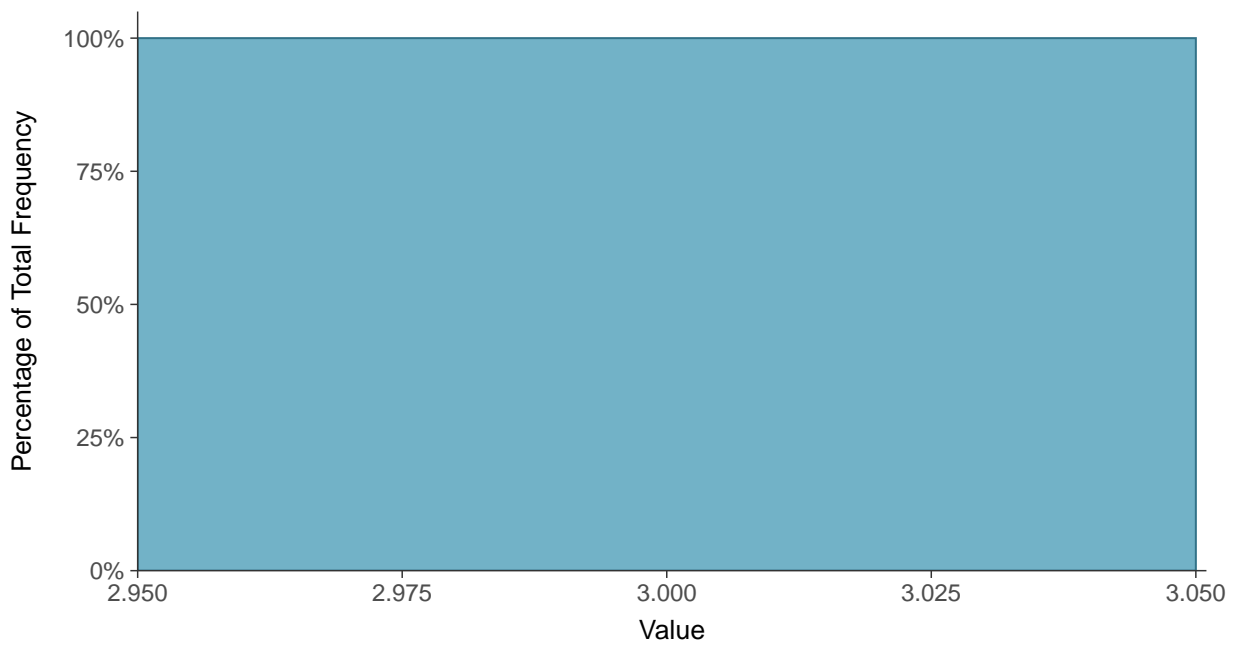
Scatter Plot

Total Suspended Solids, MW-15 (mg/L)



Histogram

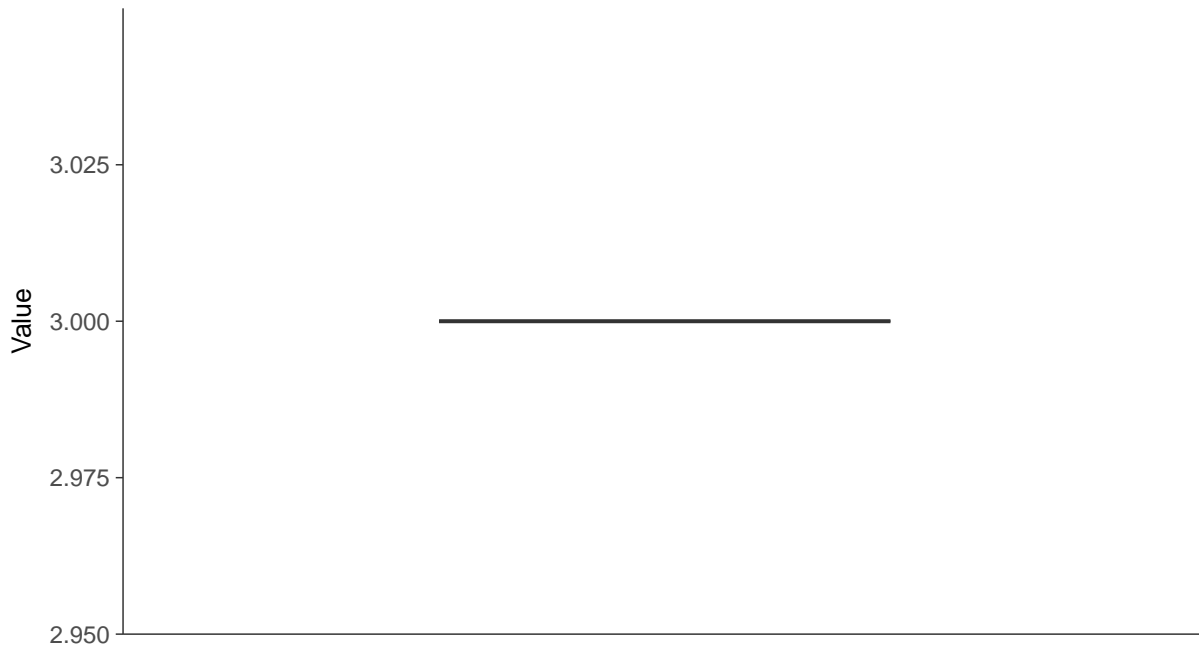
Total Suspended Solids, MW-15 (mg/L)





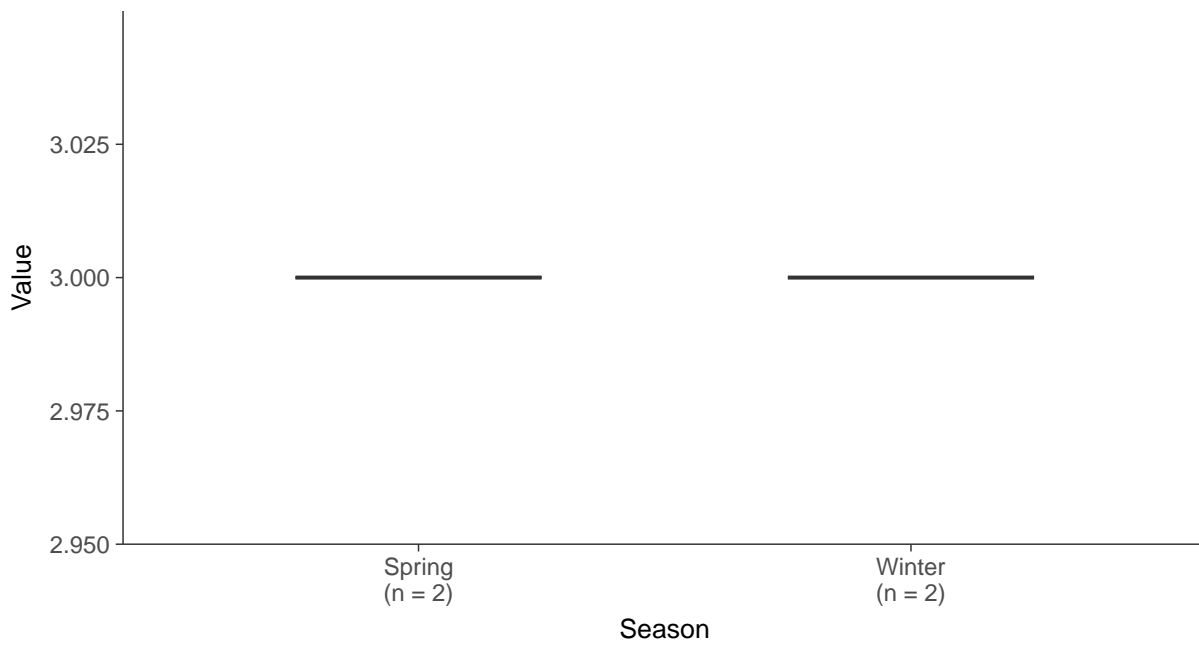
Boxplot

Total Suspended Solids, MW-15 (mg/L)



Boxplot by Season

Total Suspended Solids, MW-15 (mg/L)



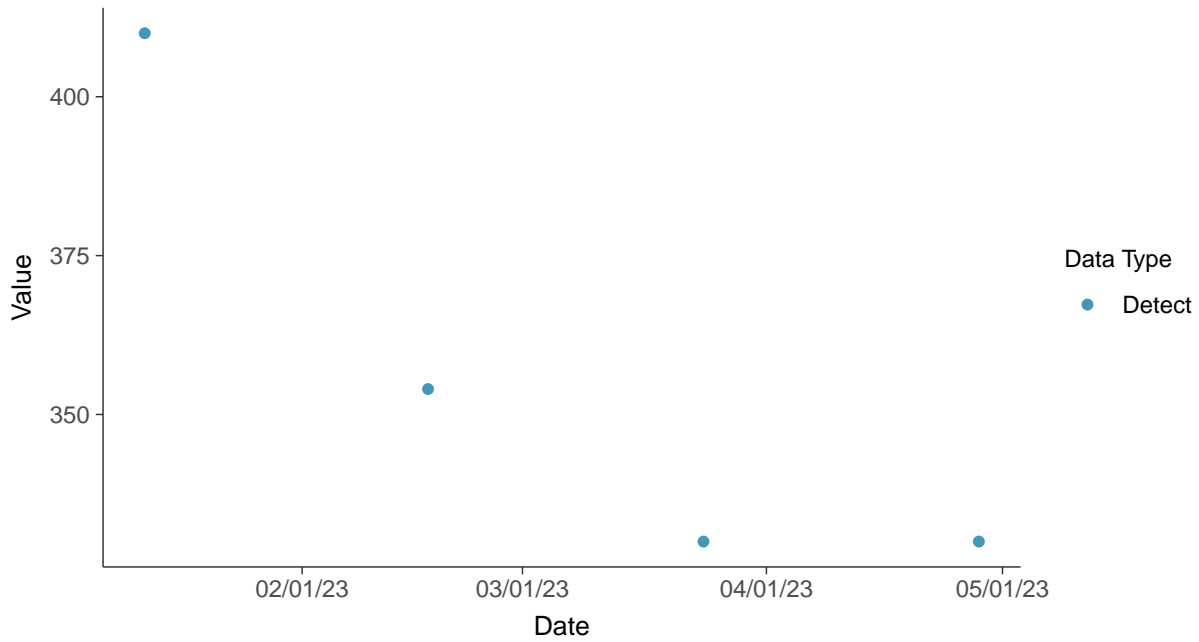


Other: Bicarbonate, MW-15

ID: 15_3_12

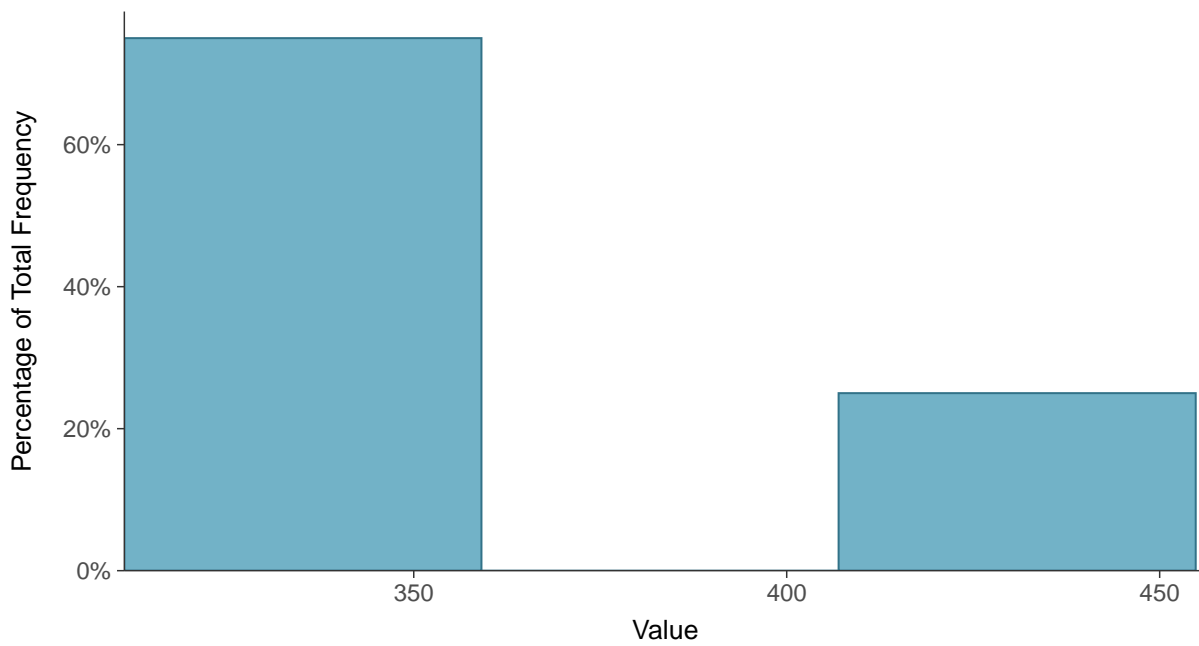
Scatter Plot

Bicarbonate, MW-15 (mg/L)



Histogram

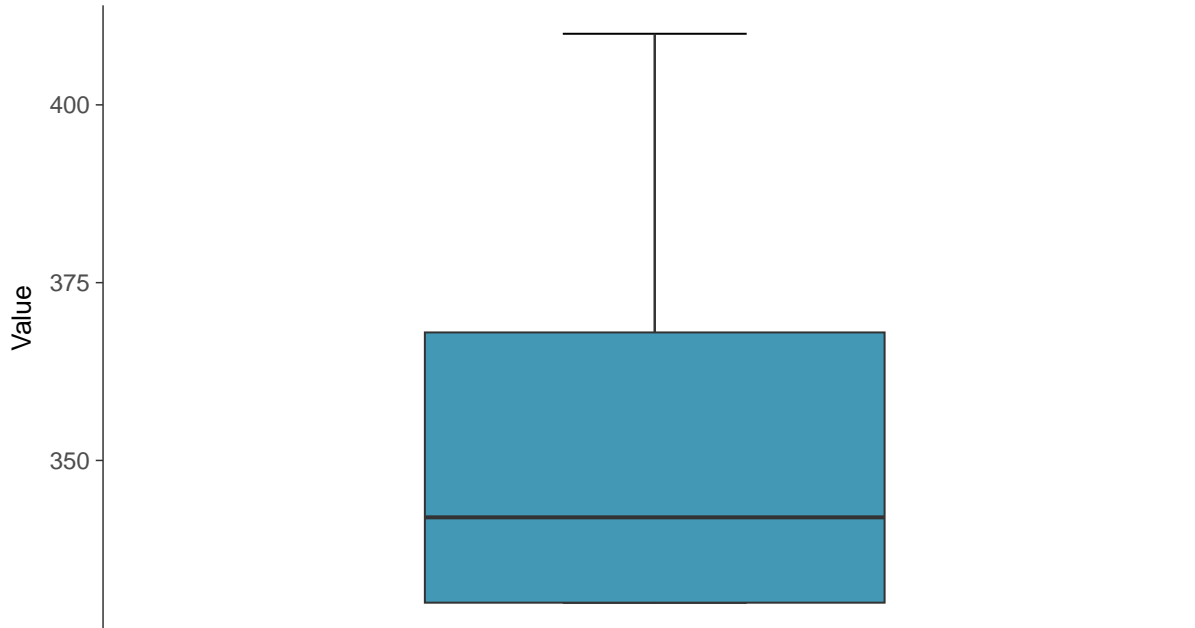
Bicarbonate, MW-15 (mg/L)





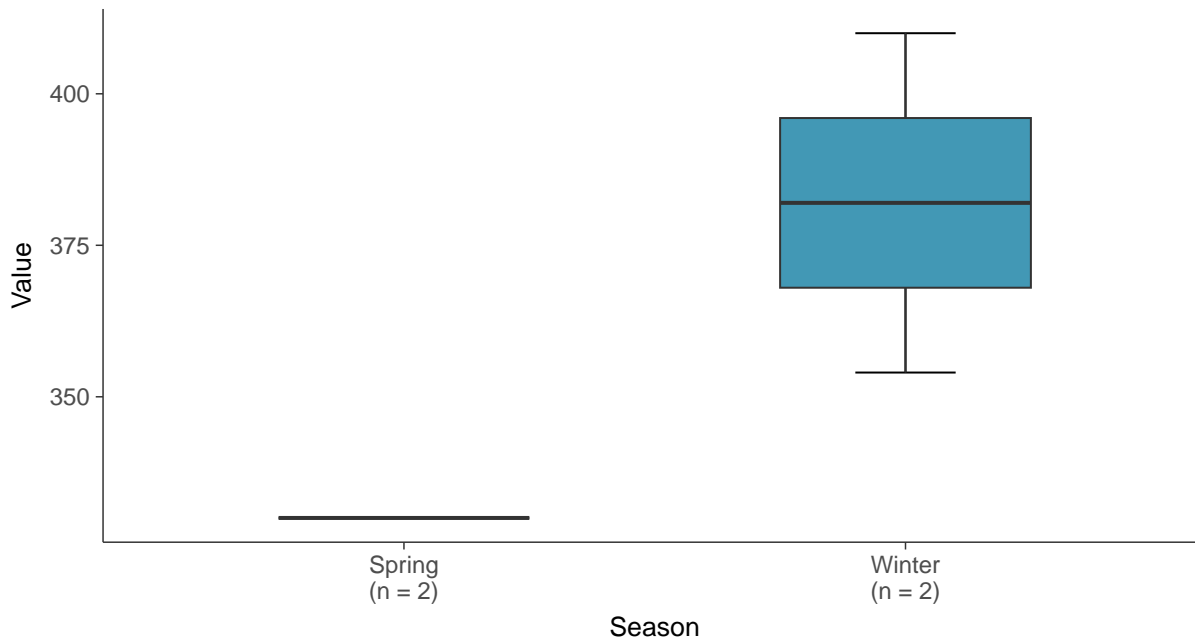
Boxplot

Bicarbonate, MW-15 (mg/L)



Boxplot by Season

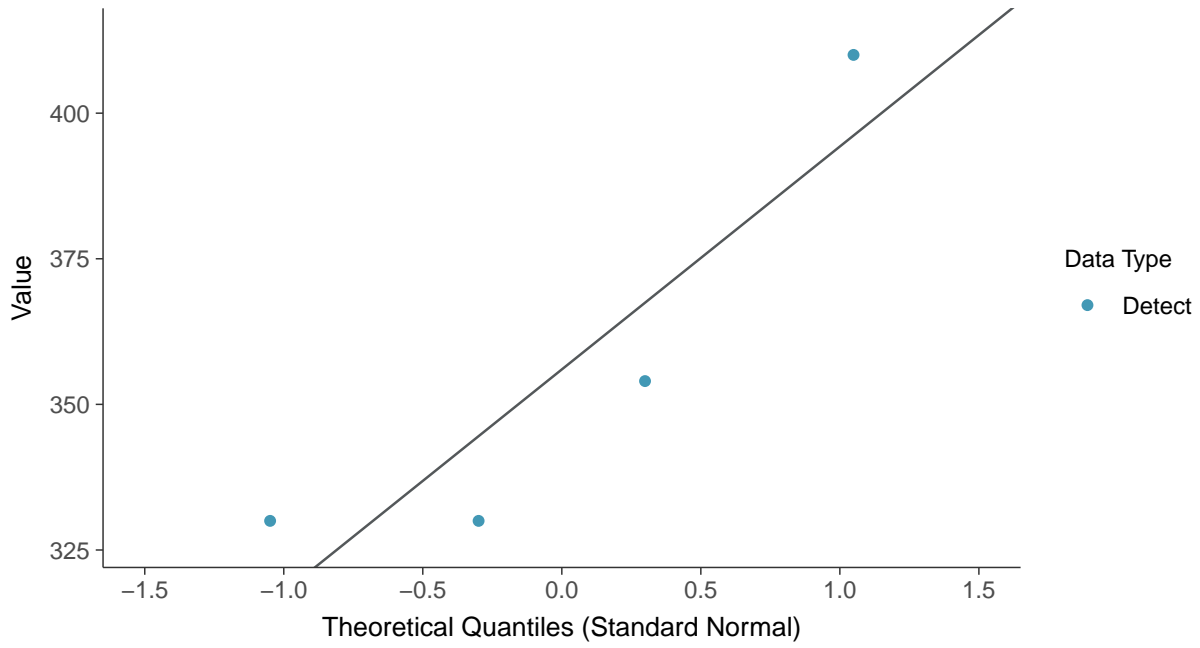
Bicarbonate, MW-15 (mg/L)





Normal Q-Q plot

Bicarbonate, MW-15 (mg/L)



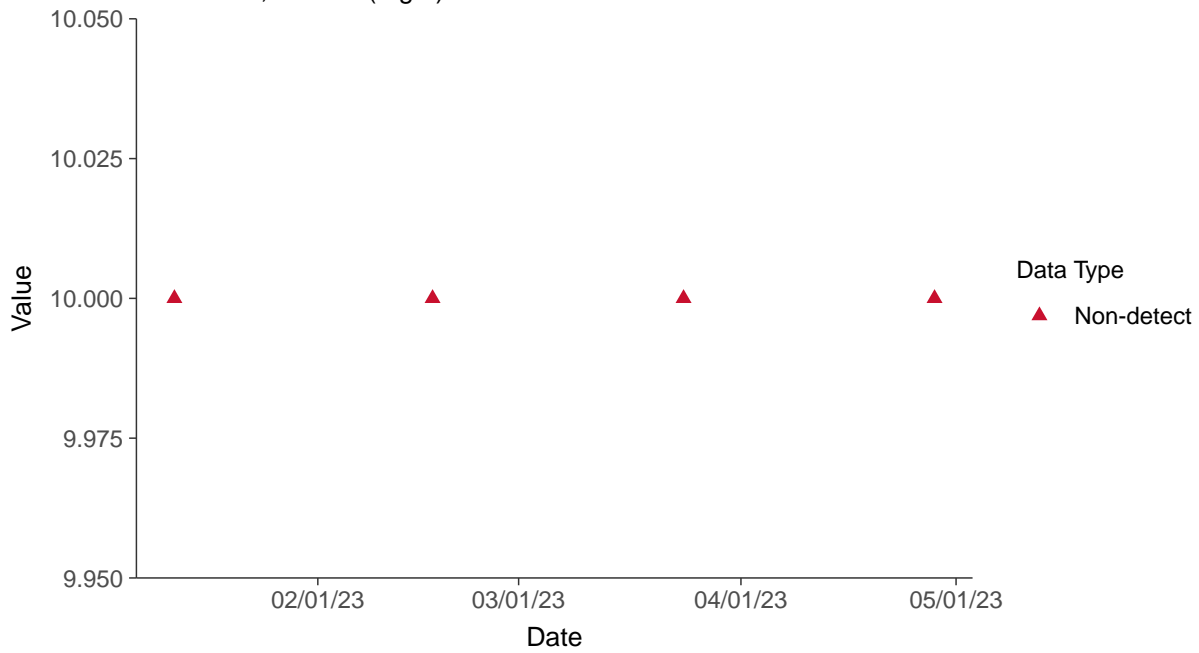


Other: Carbonate, MW-15

ID: 15_3_14

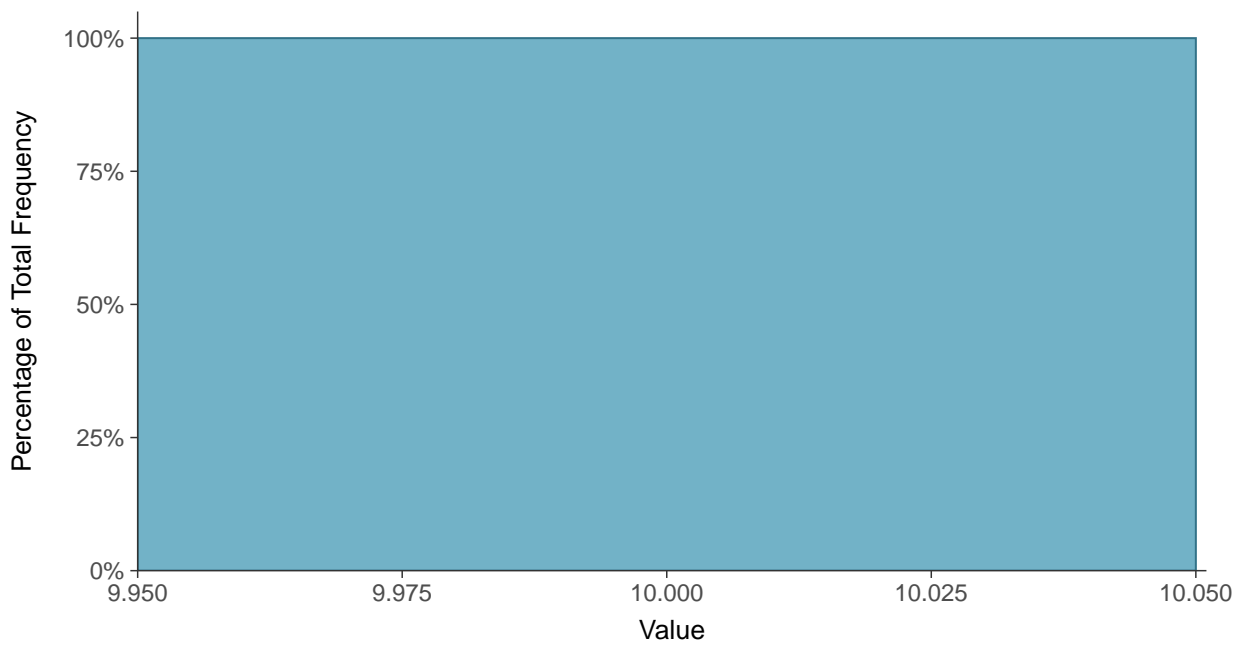
Scatter Plot

Carbonate, MW-15 (mg/L)



Histogram

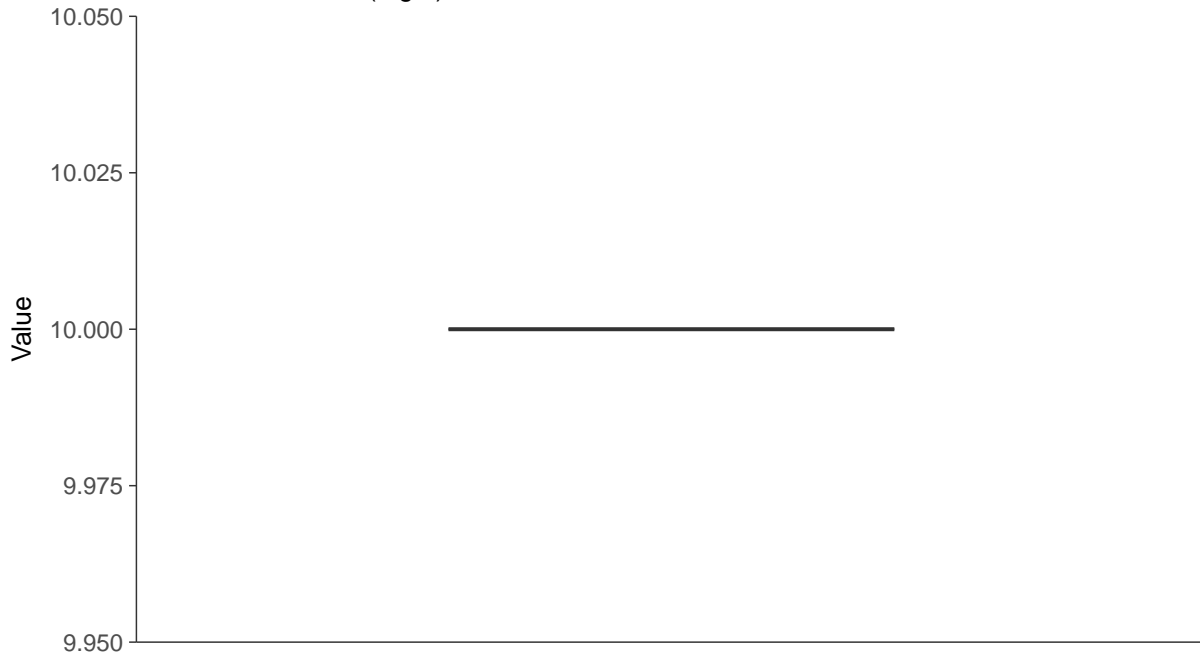
Carbonate, MW-15 (mg/L)





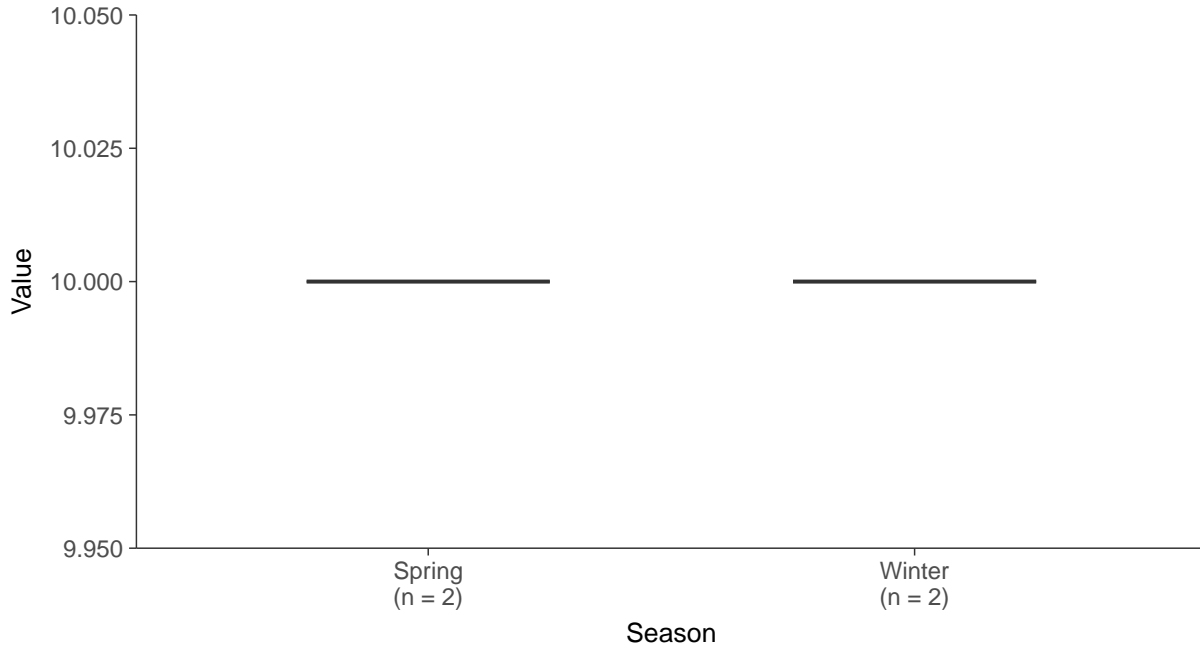
Boxplot

Carbonate, MW-15 (mg/L)



Boxplot by Season

Carbonate, MW-15 (mg/L)



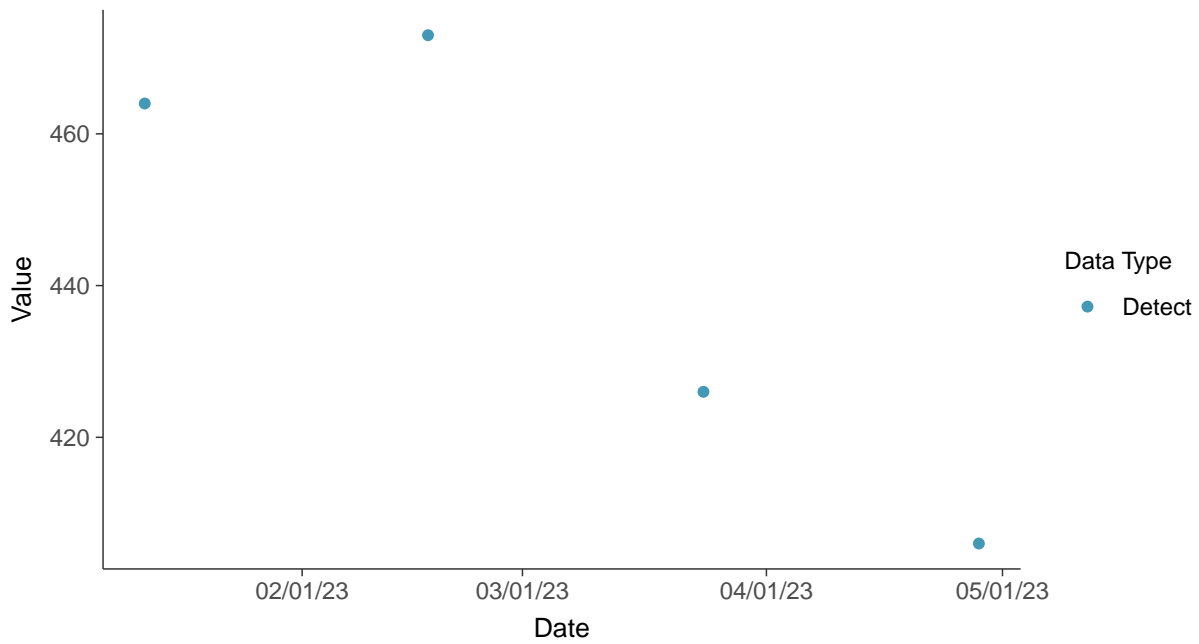


Other: Hardness, MW-15

ID: 15_3_17

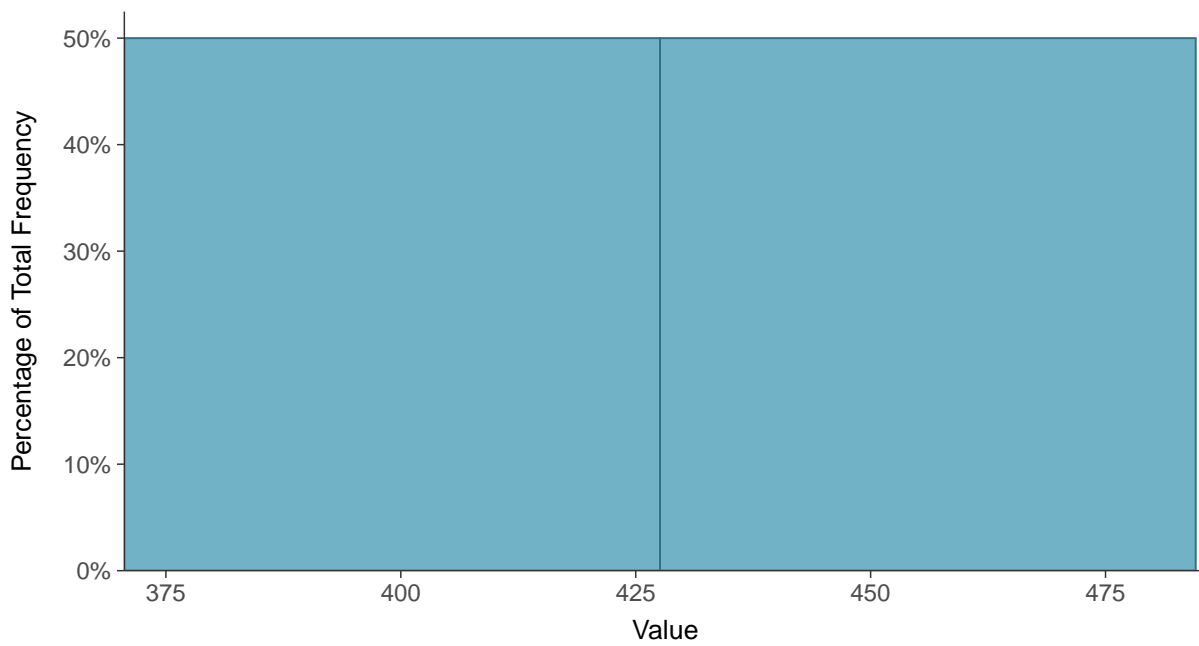
Scatter Plot

Hardness, MW-15 (mg/L)



Histogram

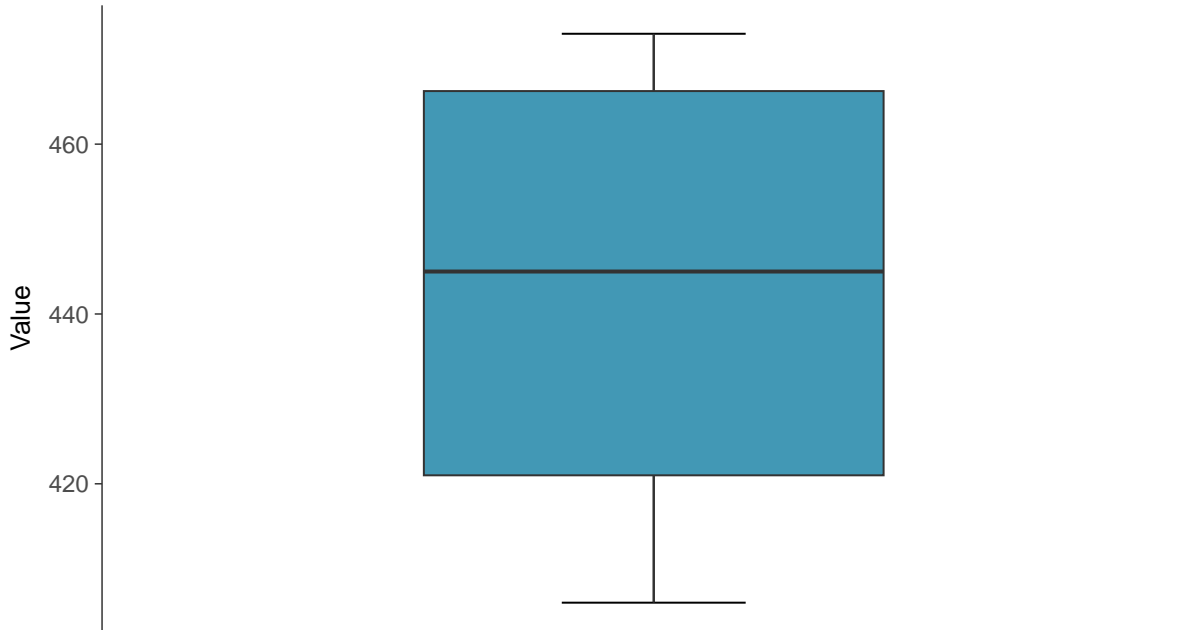
Hardness, MW-15 (mg/L)





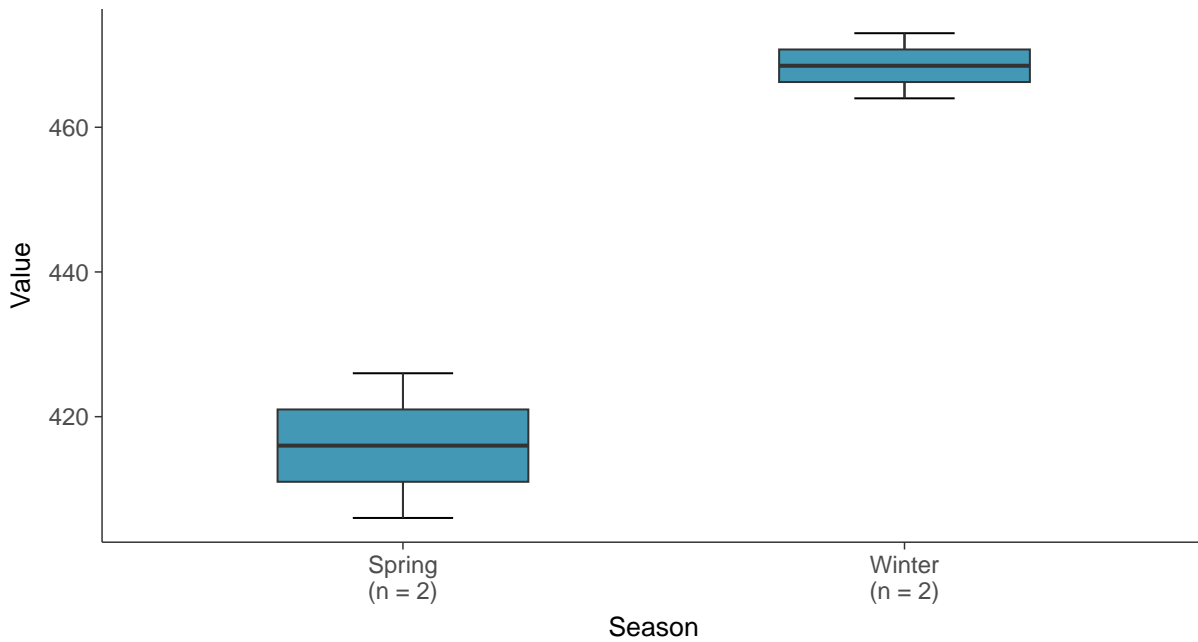
Boxplot

Hardness, MW-15 (mg/L)



Boxplot by Season

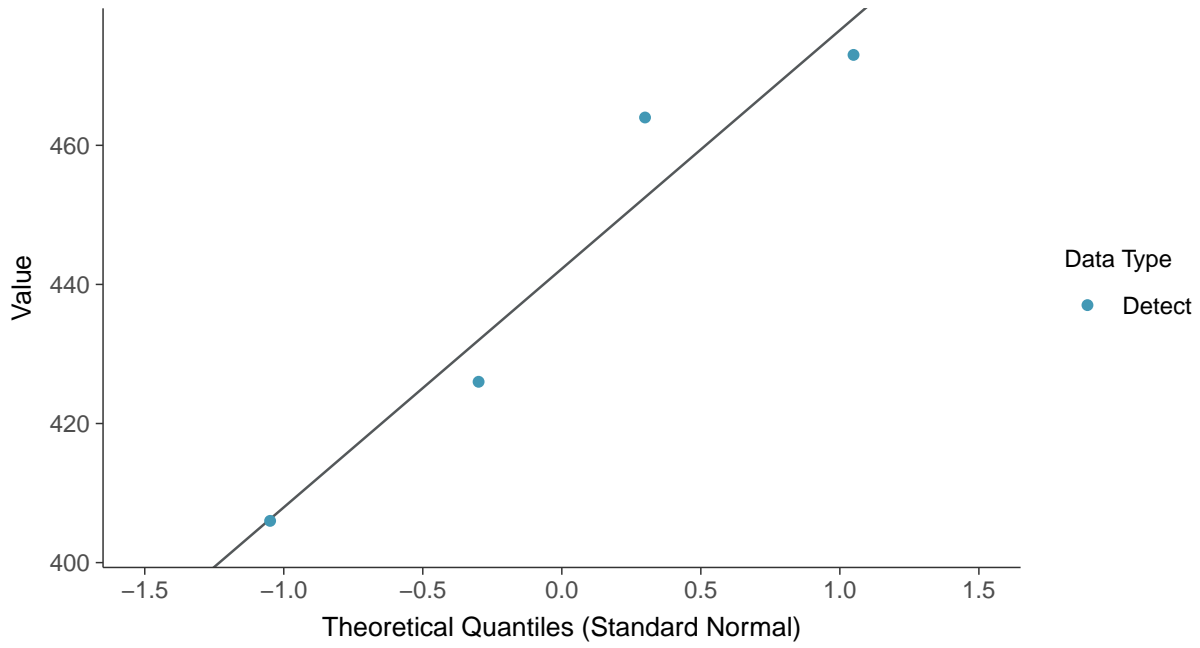
Hardness, MW-15 (mg/L)





Normal Q-Q plot

Hardness, MW-15 (mg/L)



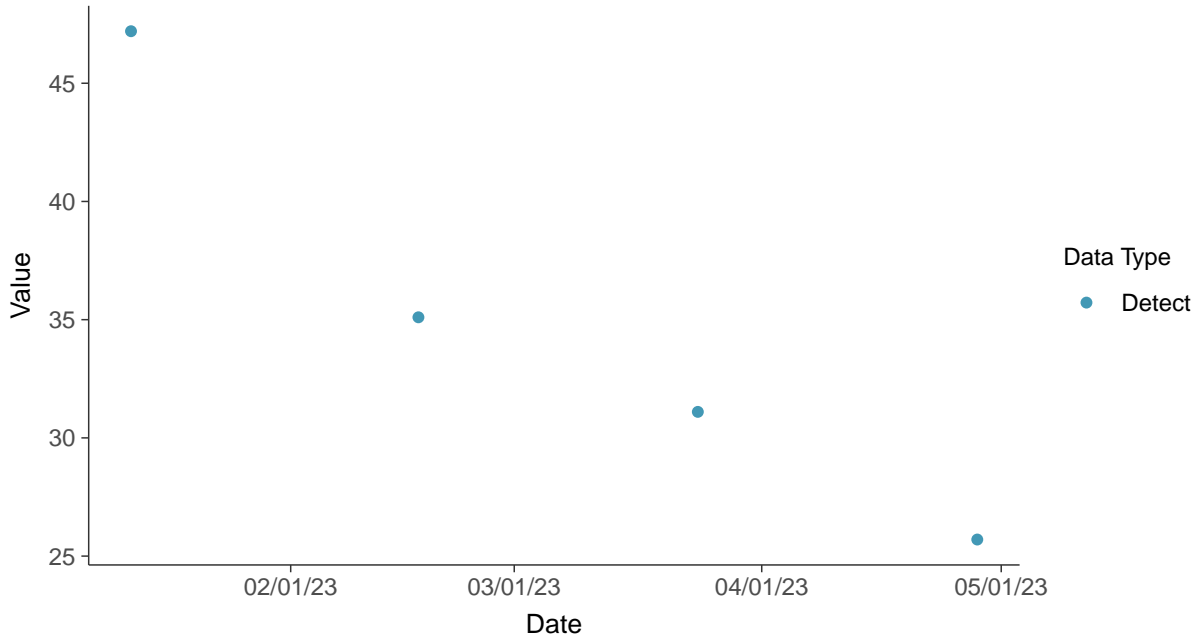


Other: Magnesium, MW-15

ID: 15_3_20

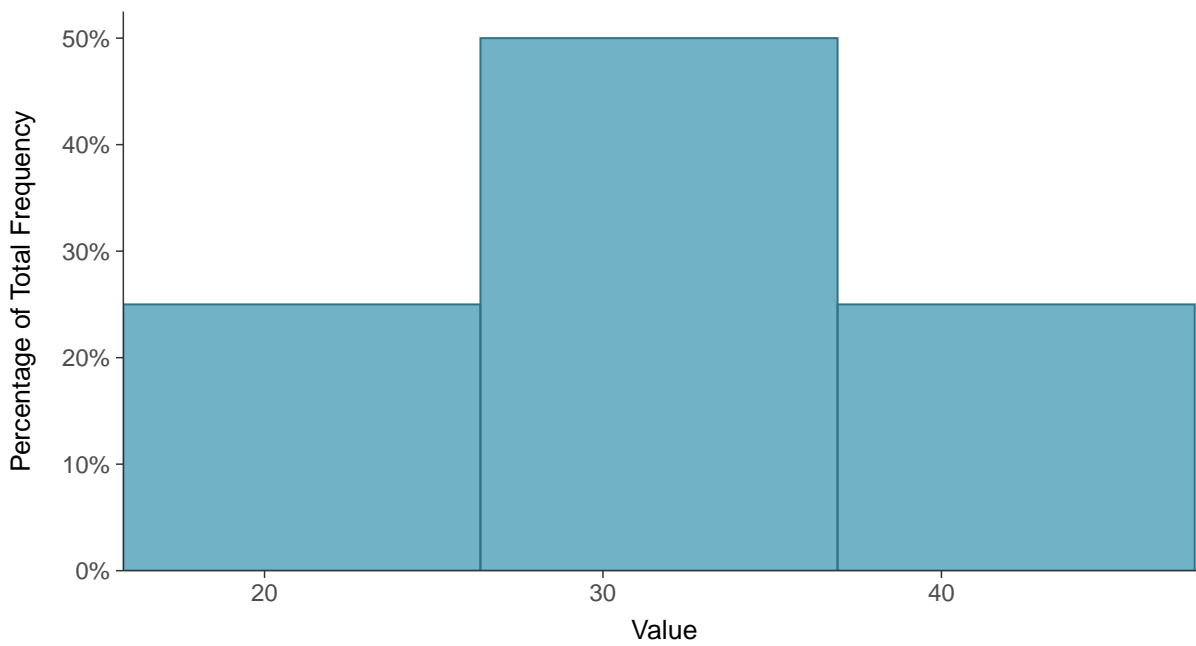
Scatter Plot

Magnesium, MW-15 (mg/L)



Histogram

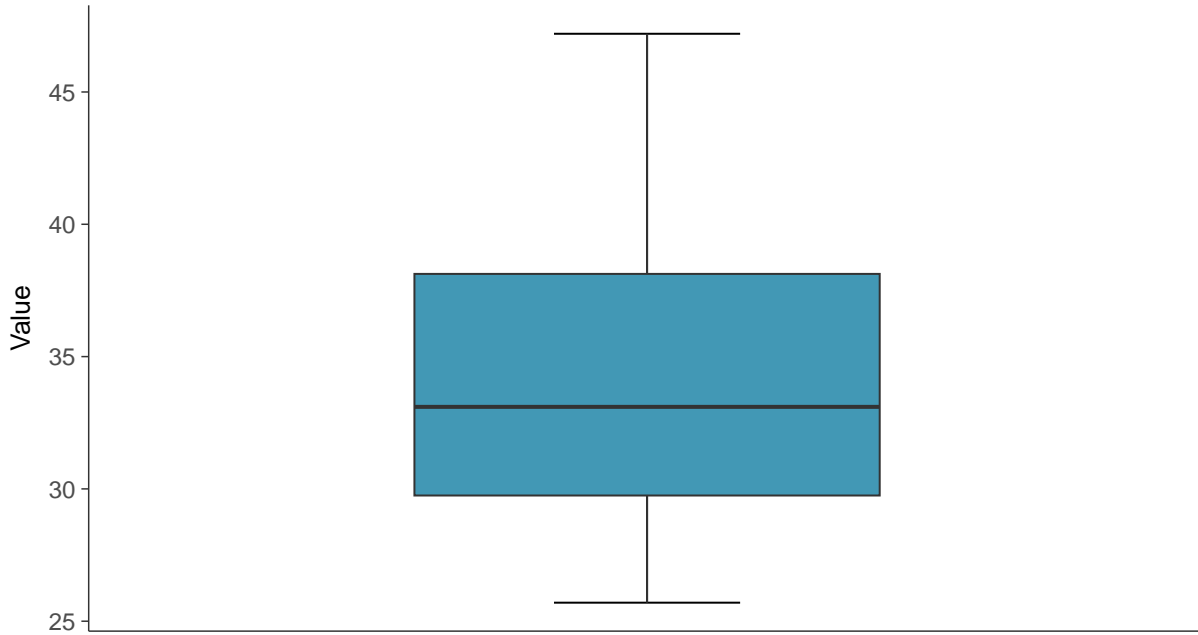
Magnesium, MW-15 (mg/L)





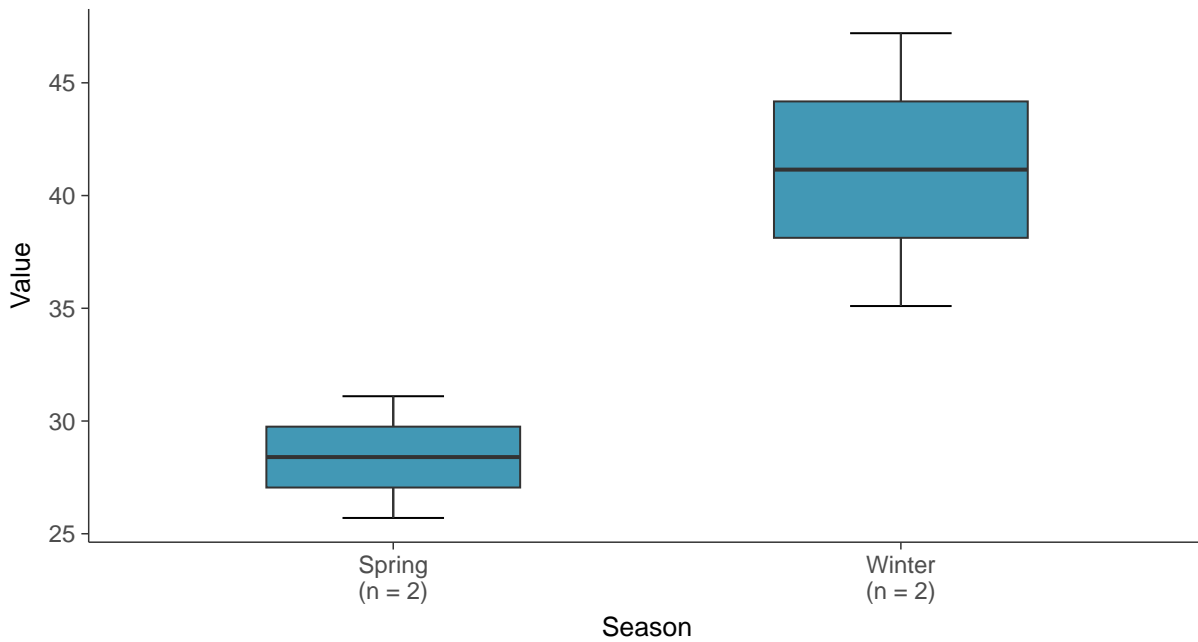
Boxplot

Magnesium, MW-15 (mg/L)



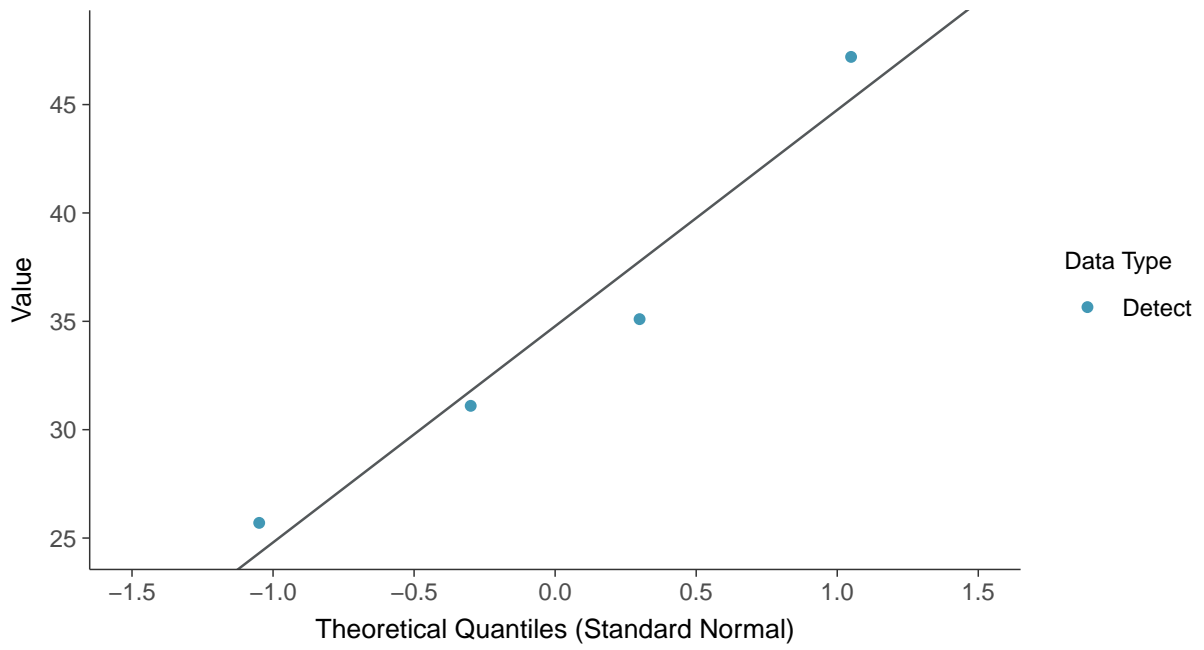
Boxplot by Season

Magnesium, MW-15 (mg/L)





Normal Q-Q plot
Magnesium, MW-15 (mg/L)



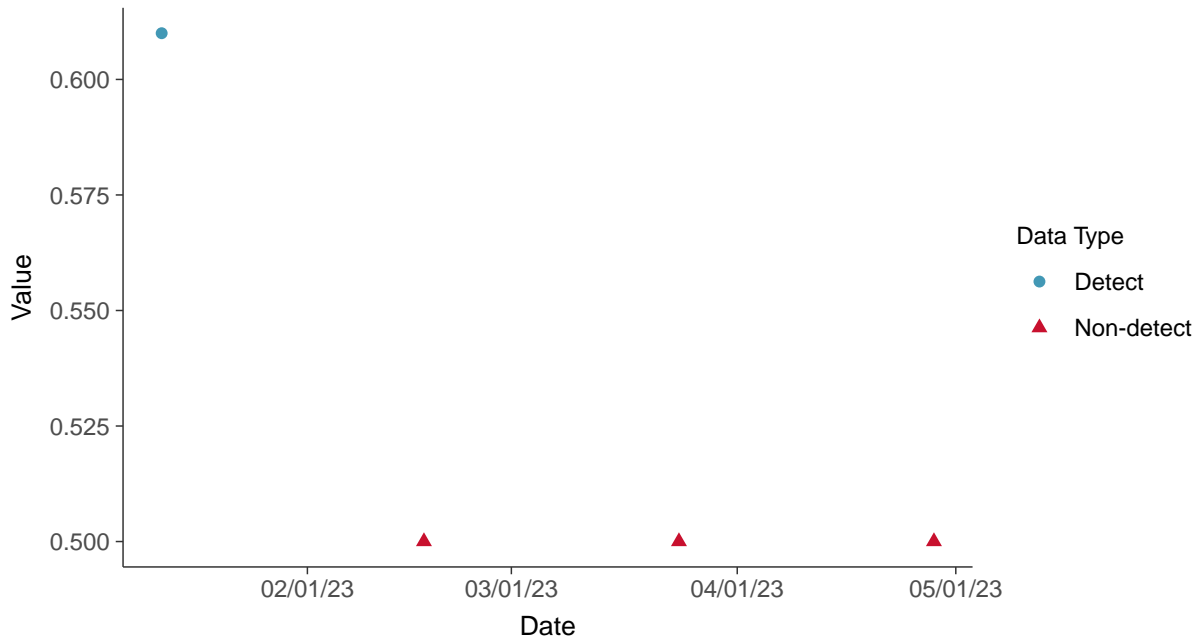


Other: Potassium, MW-15

ID: 15_3_23

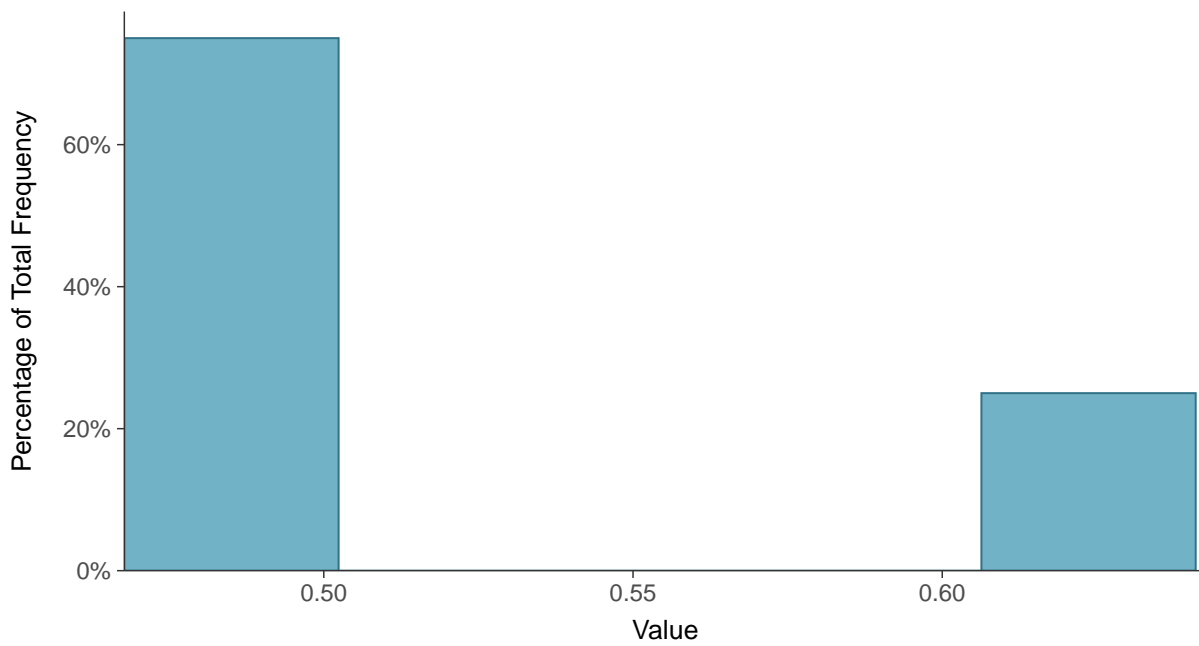
Scatter Plot

Potassium, MW-15 (mg/L)



Histogram

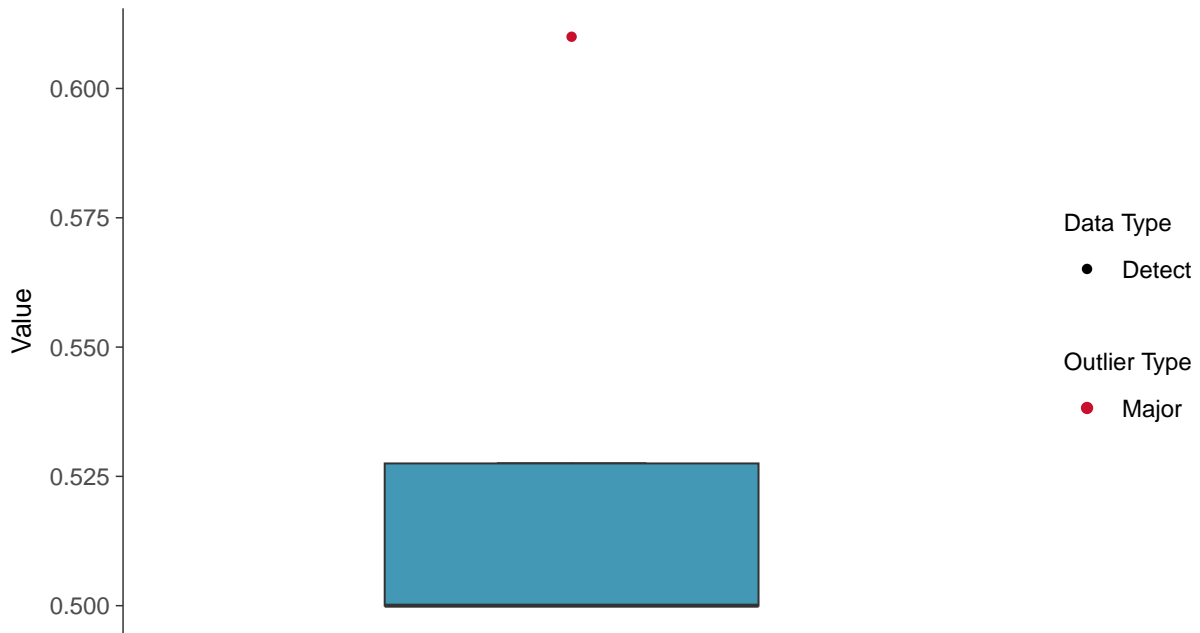
Potassium, MW-15 (mg/L)





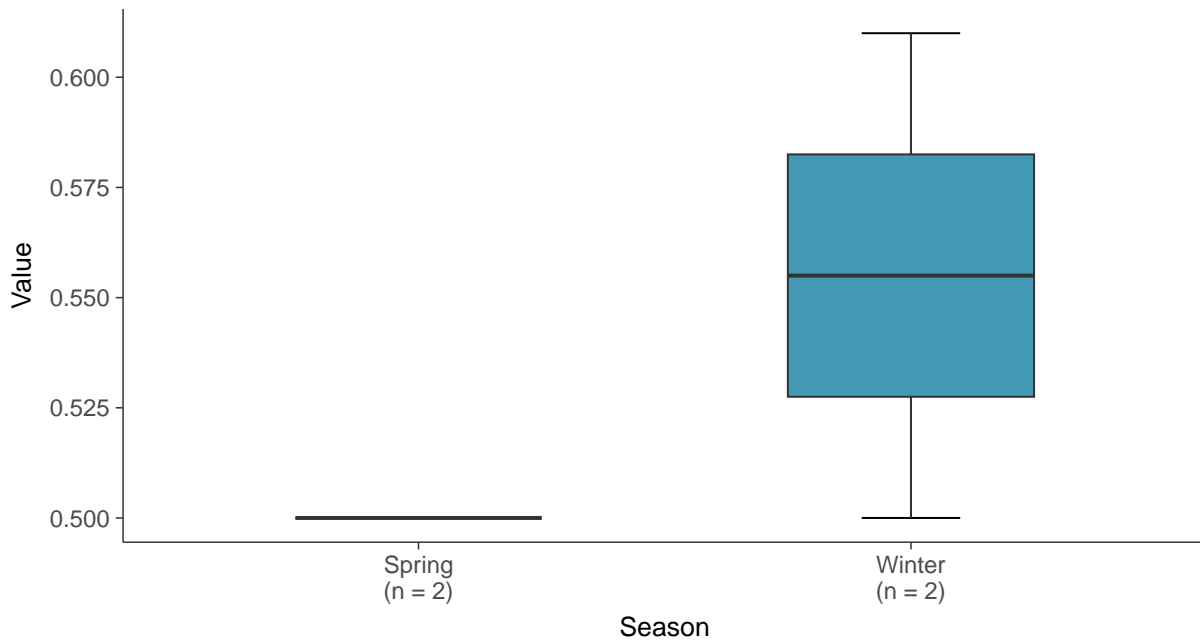
Boxplot

Potassium, MW-15 (mg/L)



Boxplot by Season

Potassium, MW-15 (mg/L)



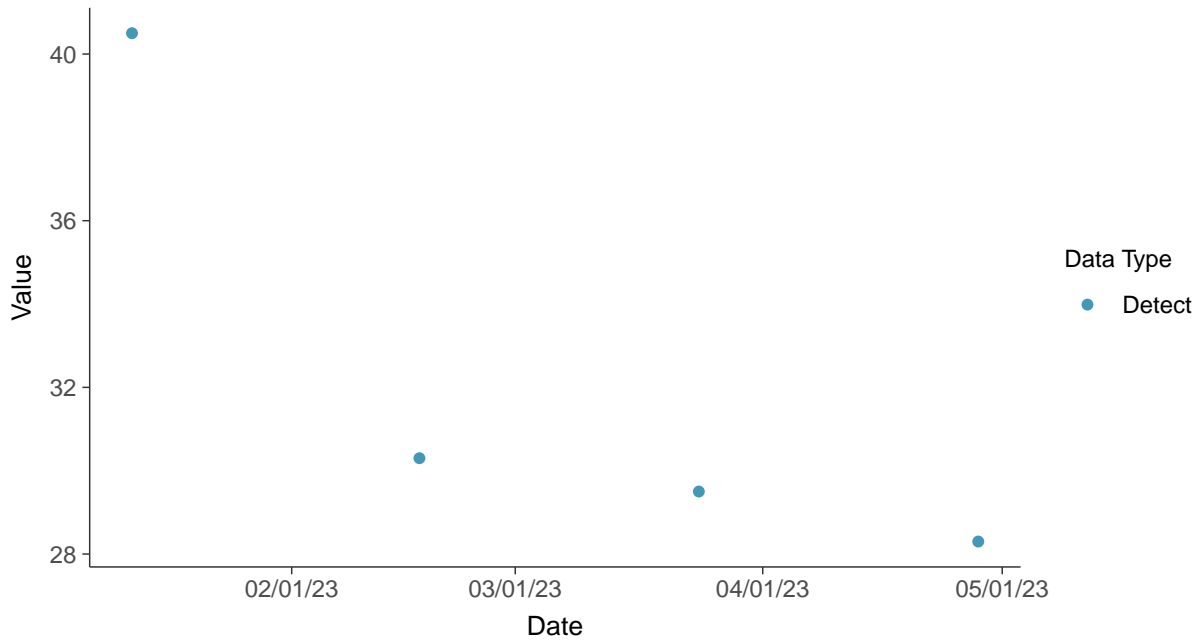


Other: Sodium, MW-15

ID: 15_3_28

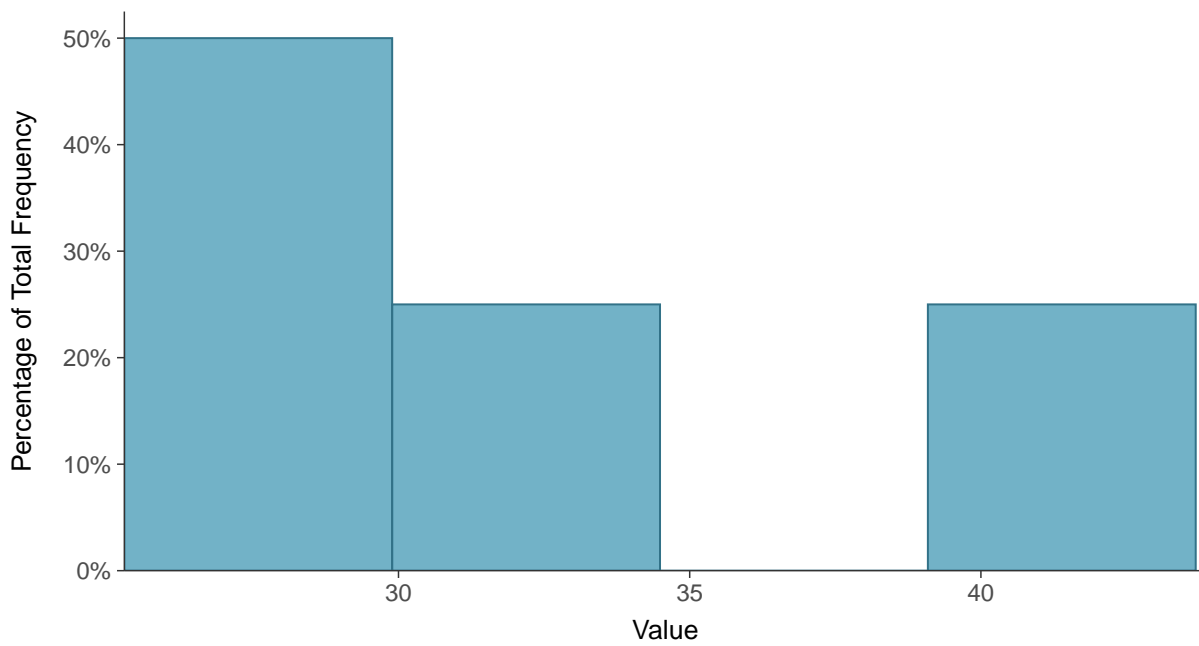
Scatter Plot

Sodium, MW-15 (mg/L)



Histogram

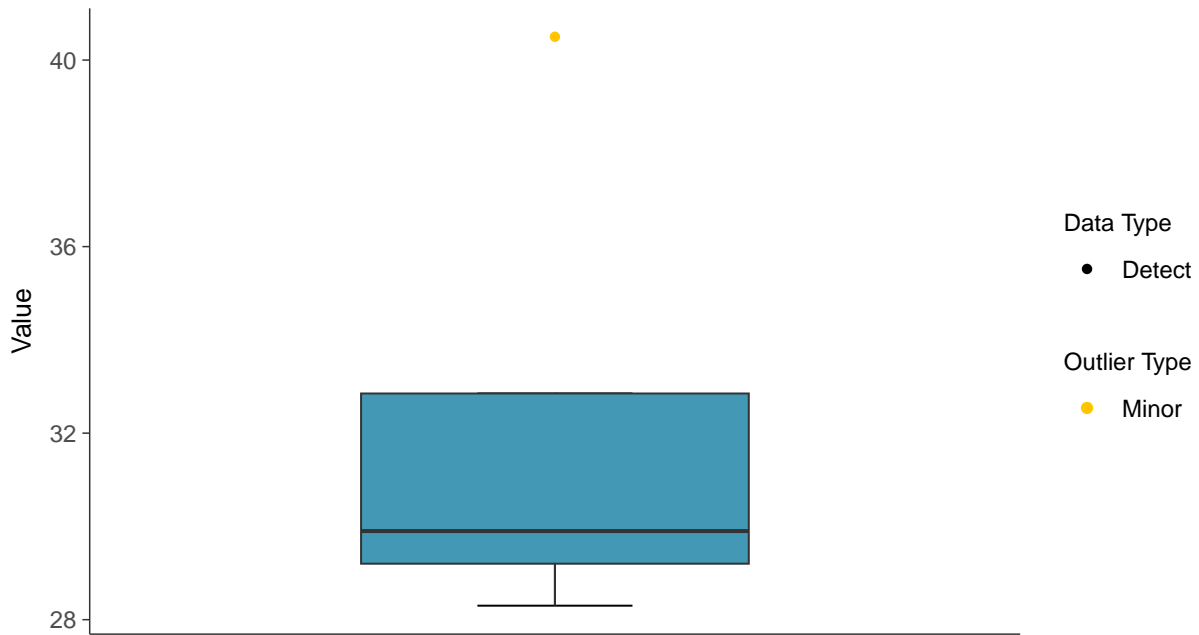
Sodium, MW-15 (mg/L)





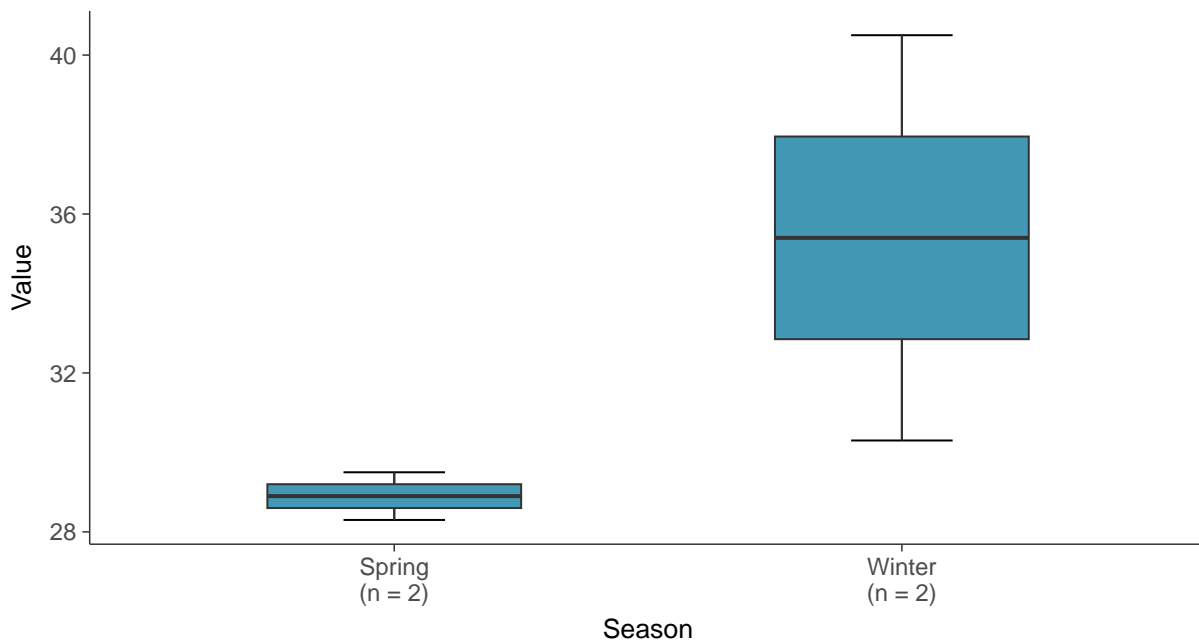
Boxplot

Sodium, MW-15 (mg/L)



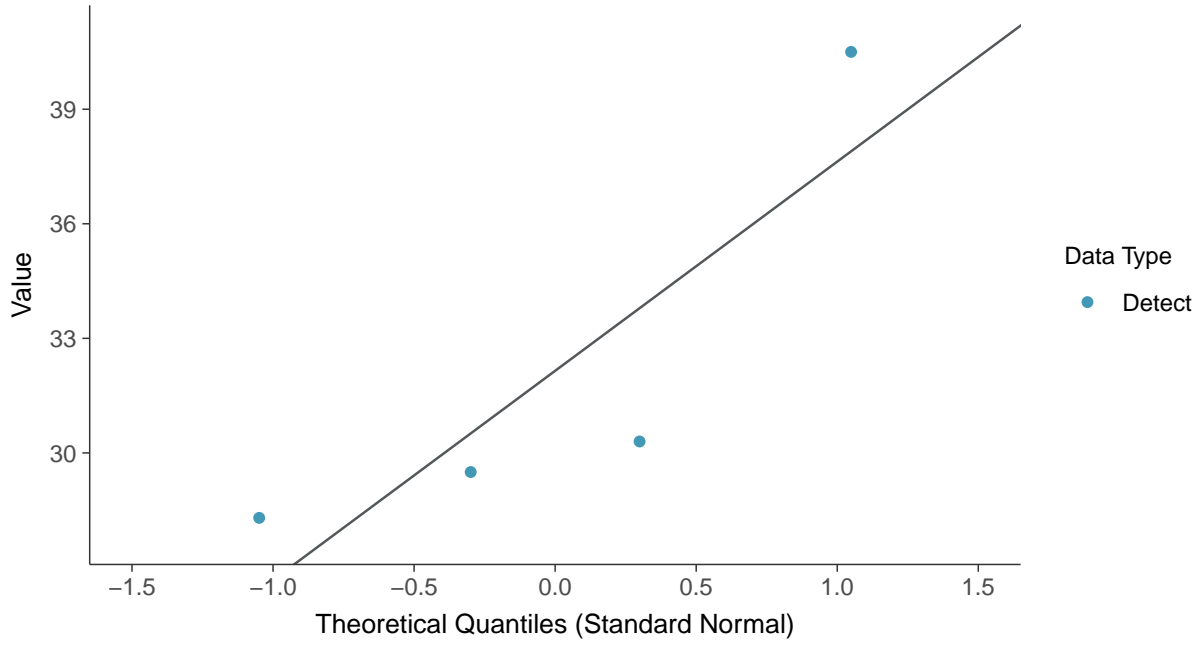
Boxplot by Season

Sodium, MW-15 (mg/L)





Normal Q-Q plot
Sodium, MW-15 (mg/L)



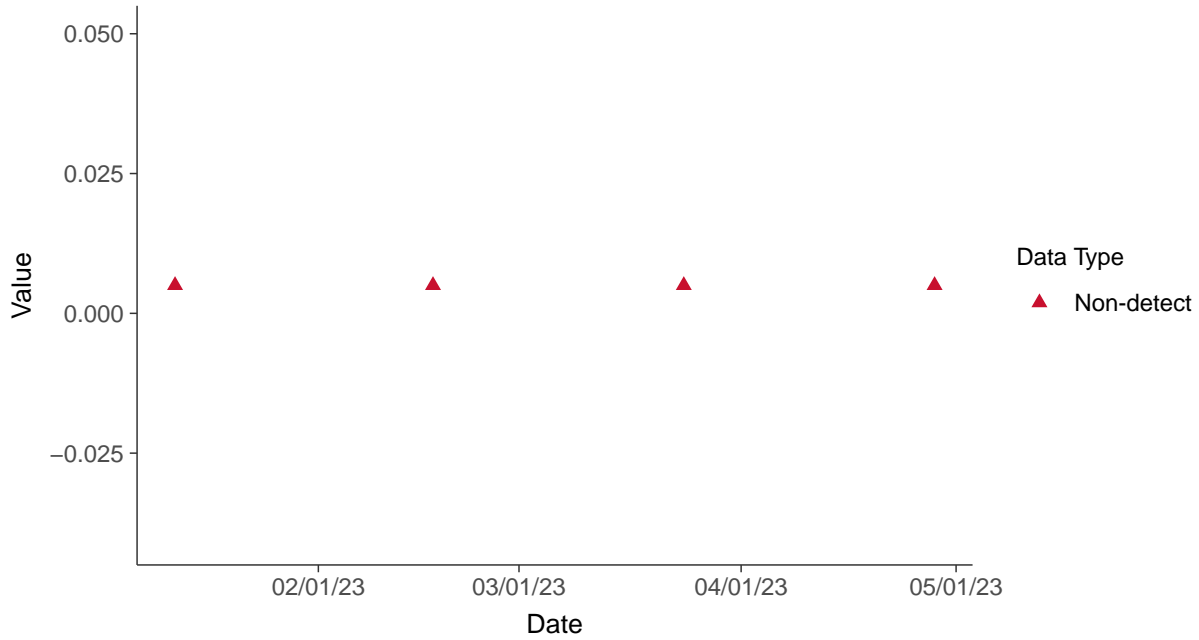


Part 115: Copper, MW-15

ID: 15_5_37

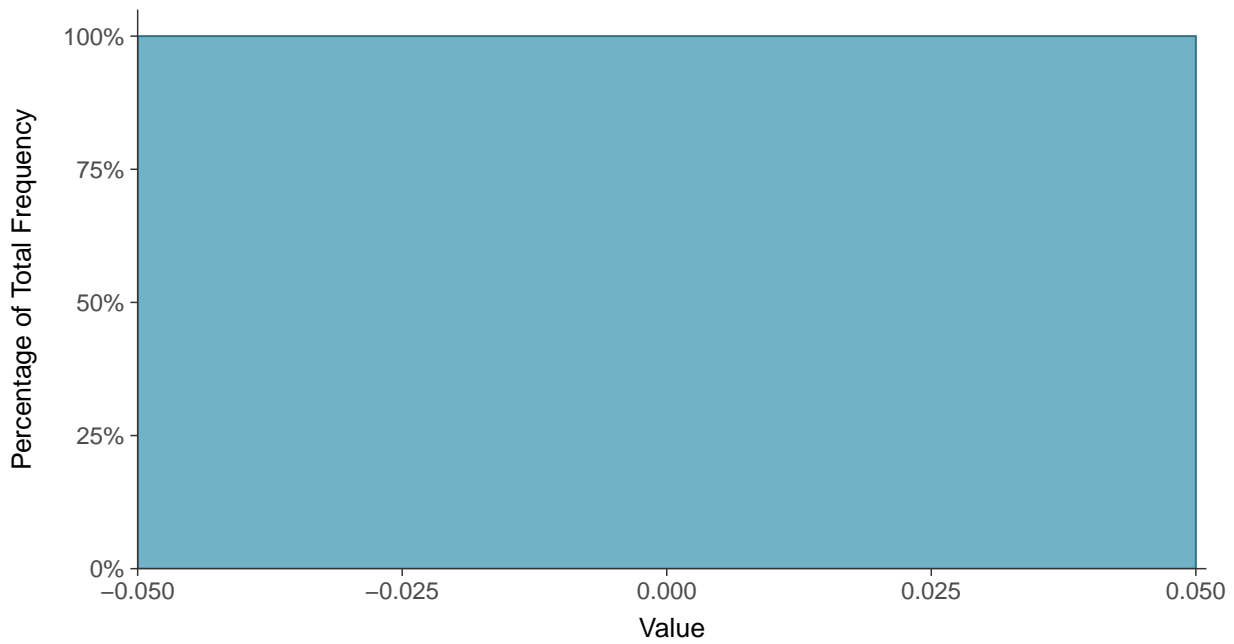
Scatter Plot

Copper, MW-15 (mg/L)



Histogram

Copper, MW-15 (mg/L)





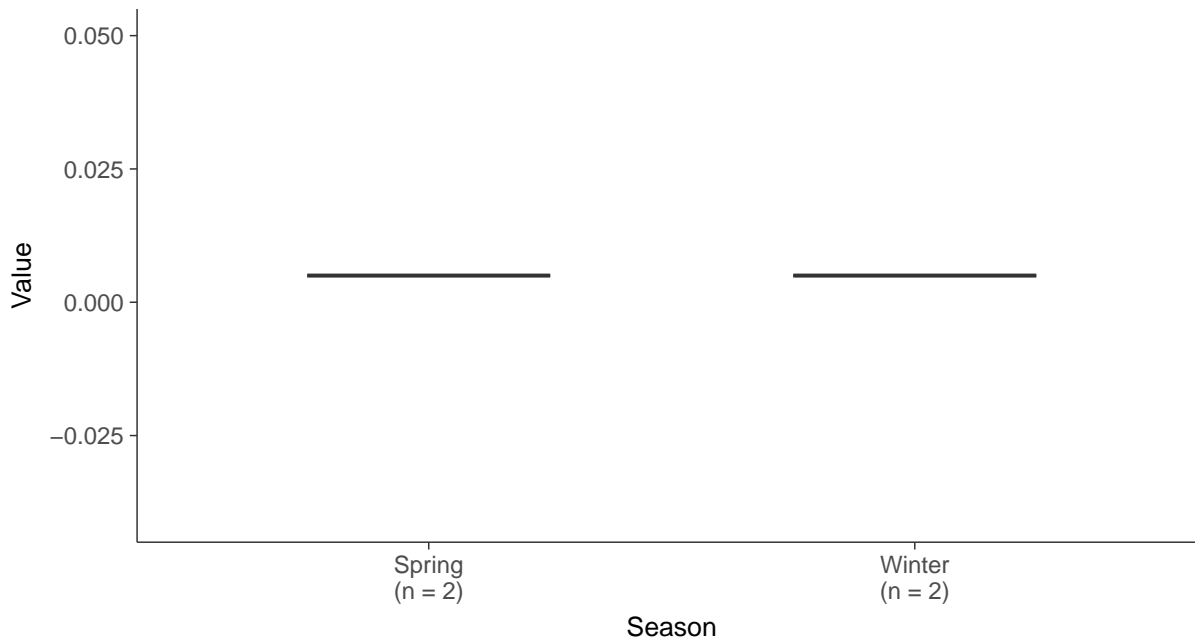
Boxplot

Copper, MW-15 (mg/L)



Boxplot by Season

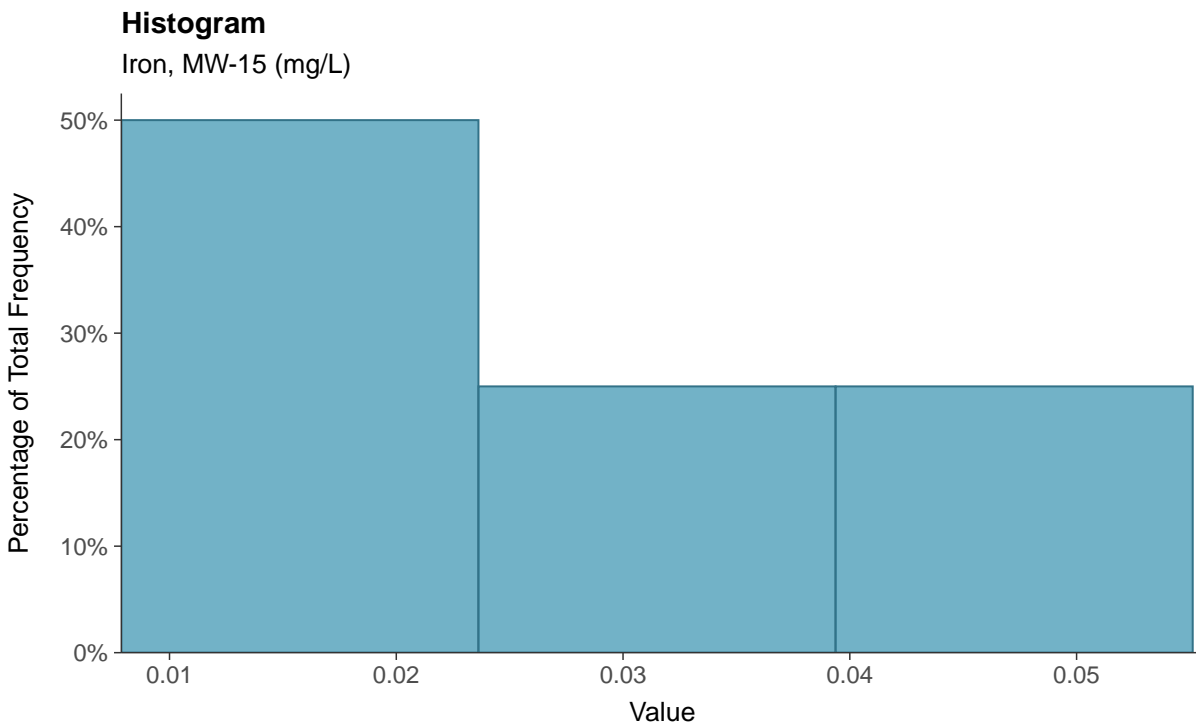
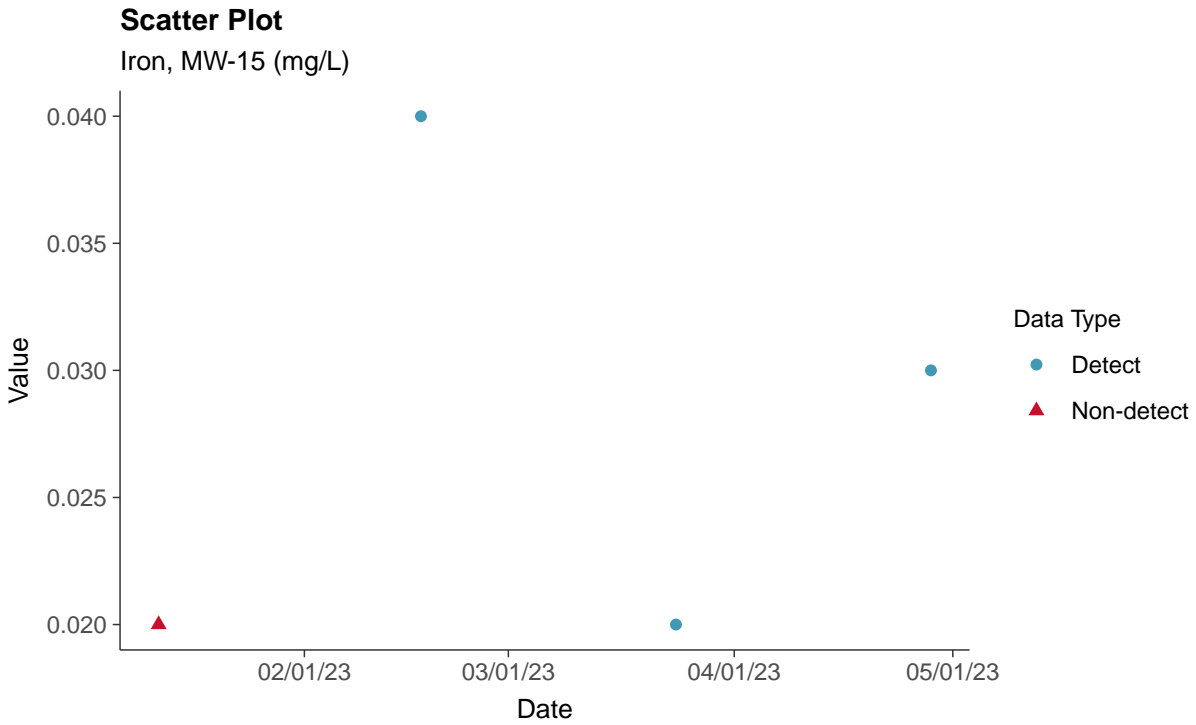
Copper, MW-15 (mg/L)





Part 115: Iron, MW-15

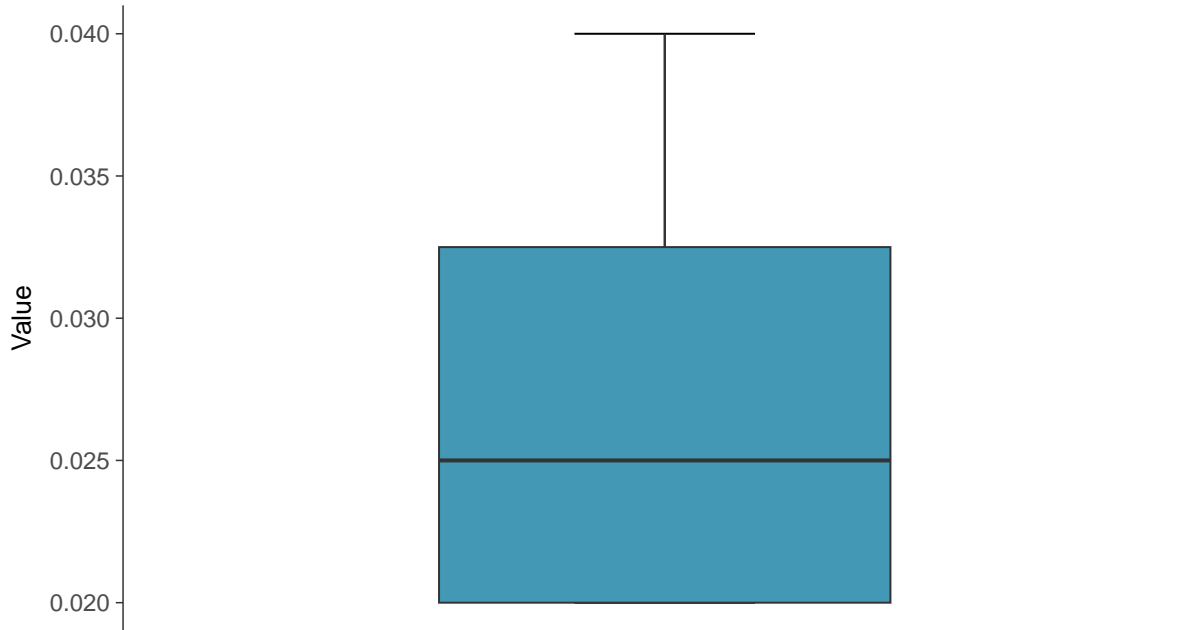
ID: 15_5_38





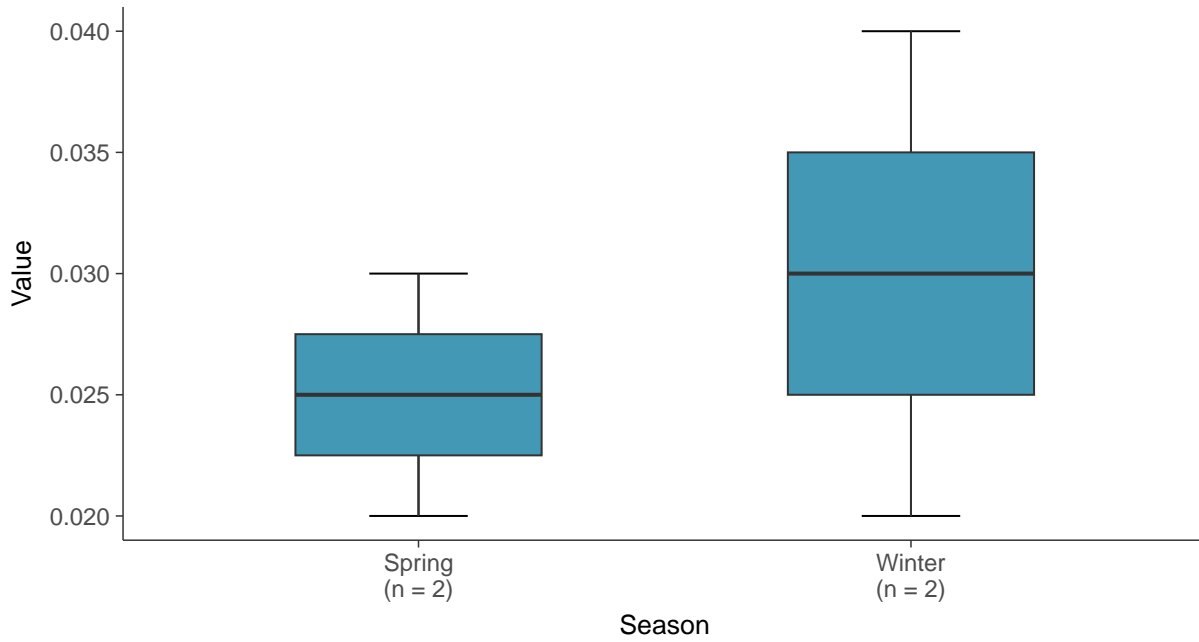
Boxplot

Iron, MW-15 (mg/L)



Boxplot by Season

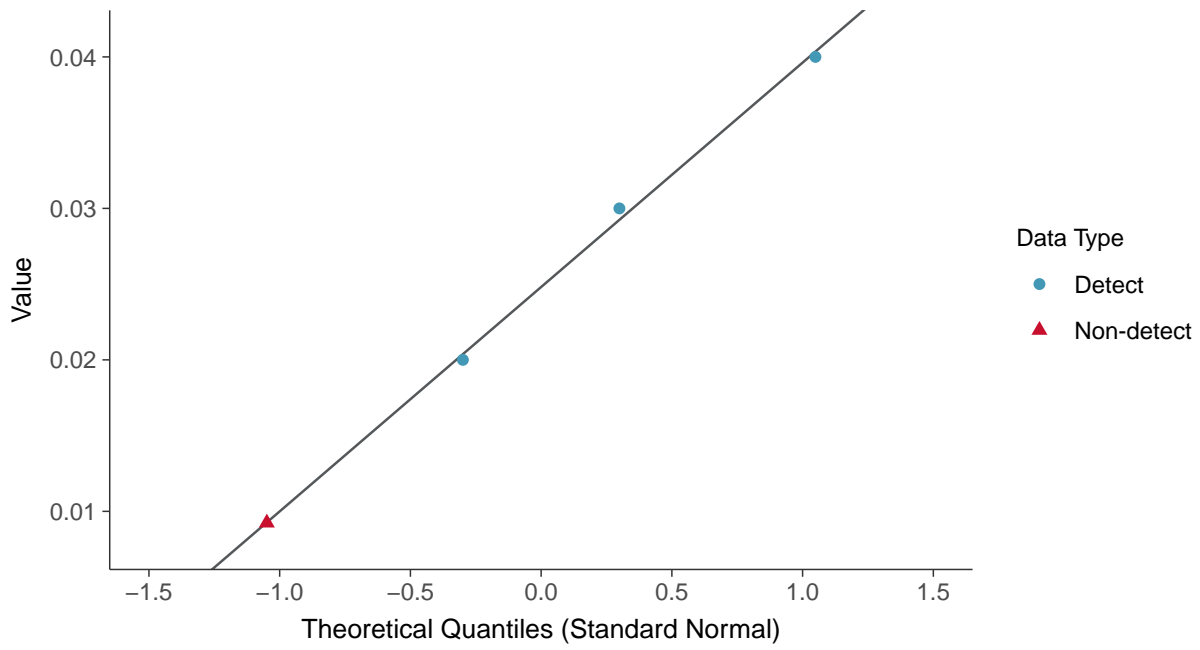
Iron, MW-15 (mg/L)





Normal Q-Q plot using ROS Imputed Estimates

Iron, MW-15 (mg/L)



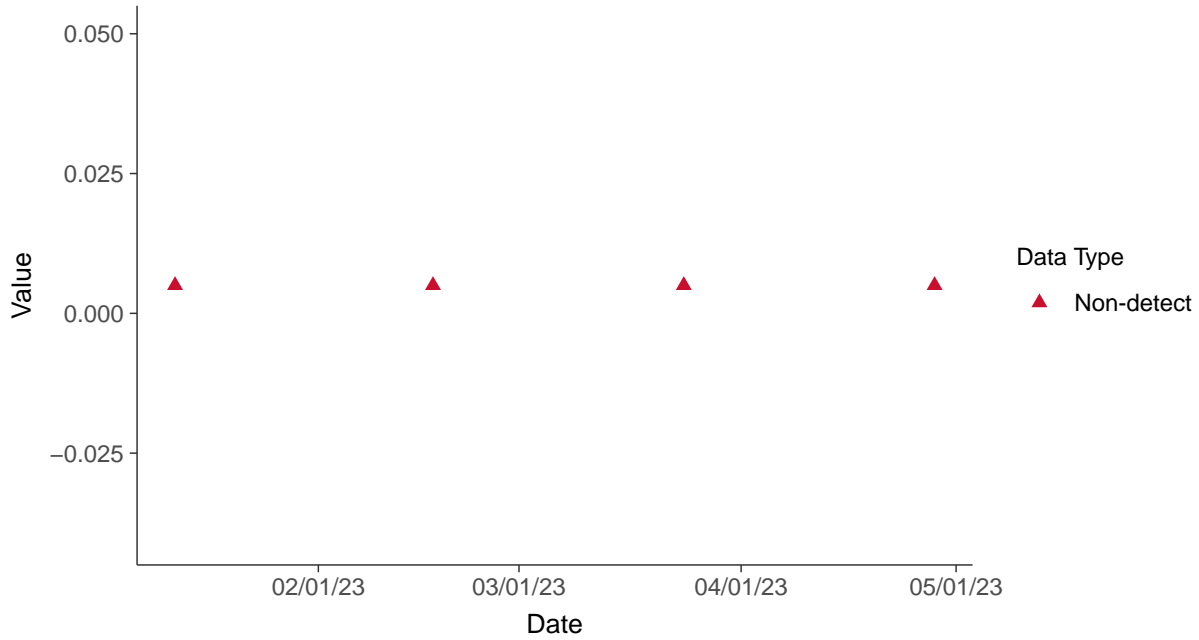


Part 115: Nickel, MW-15

ID: 15_5_39

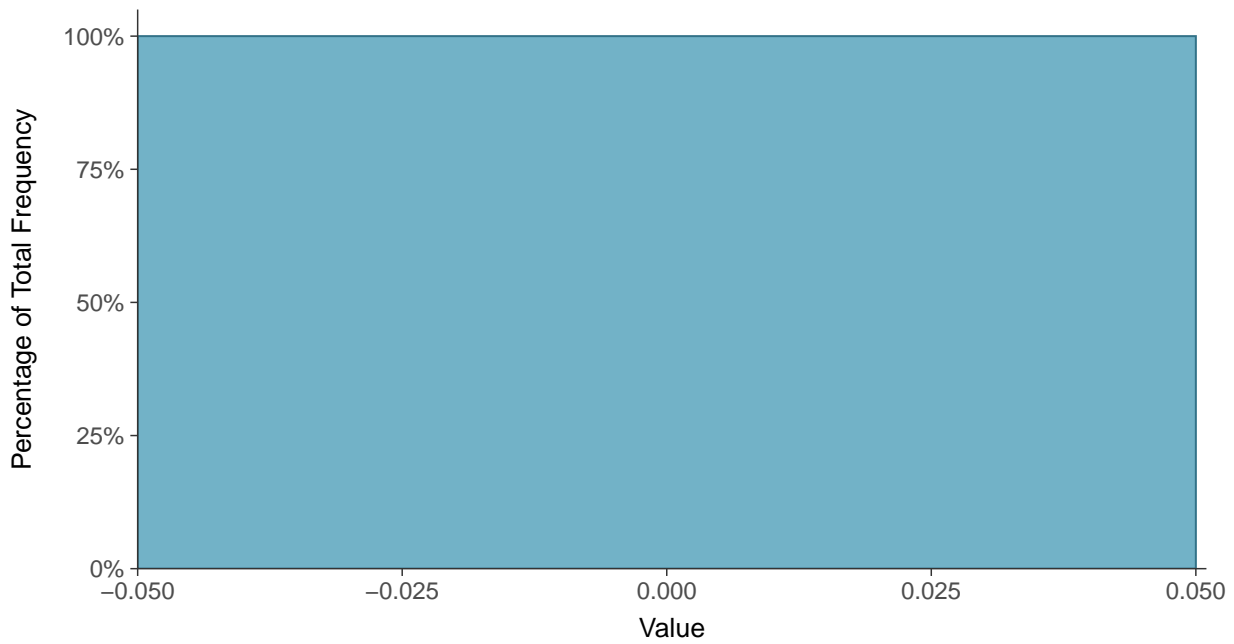
Scatter Plot

Nickel, MW-15 (mg/L)



Histogram

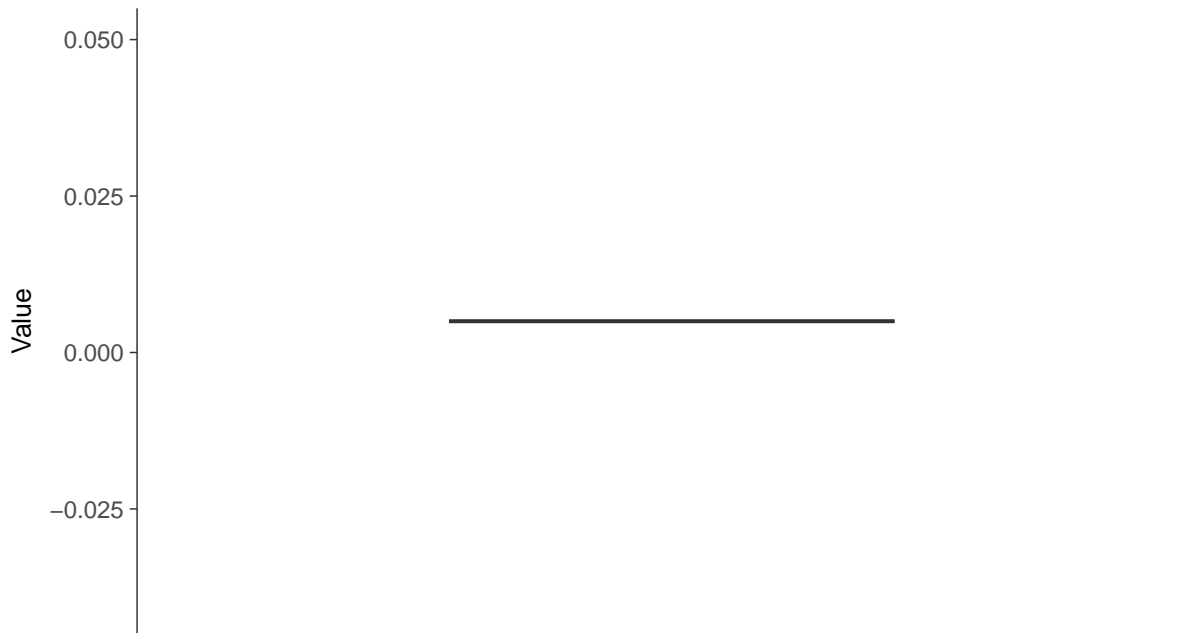
Nickel, MW-15 (mg/L)





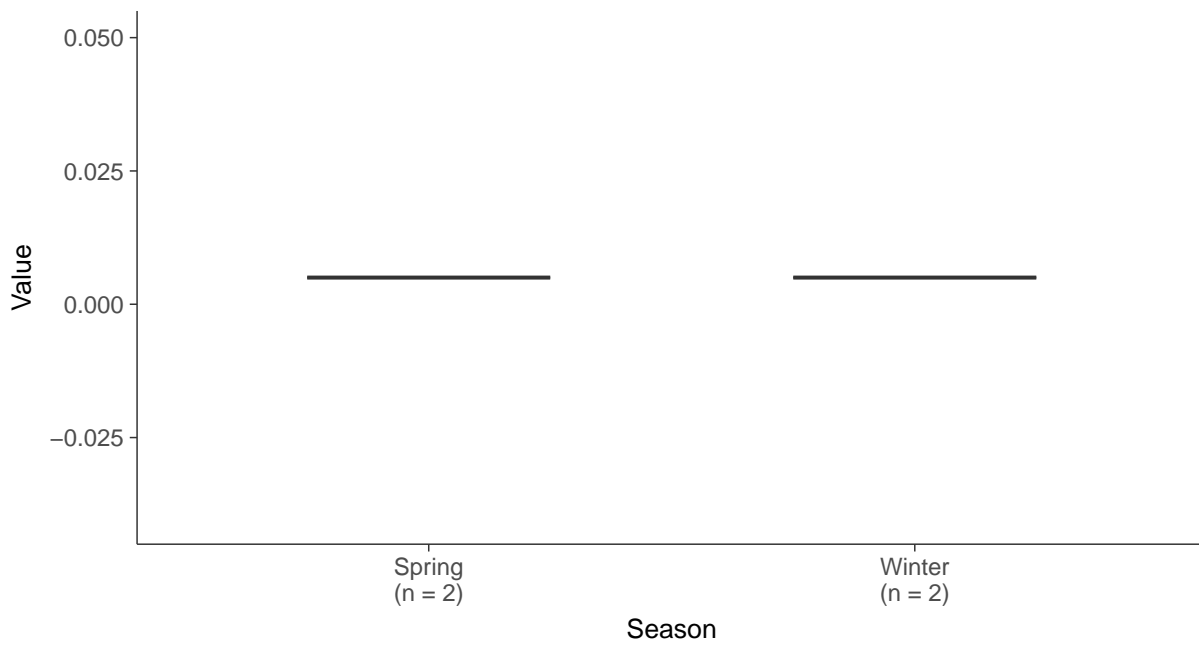
Boxplot

Nickel, MW-15 (mg/L)



Boxplot by Season

Nickel, MW-15 (mg/L)



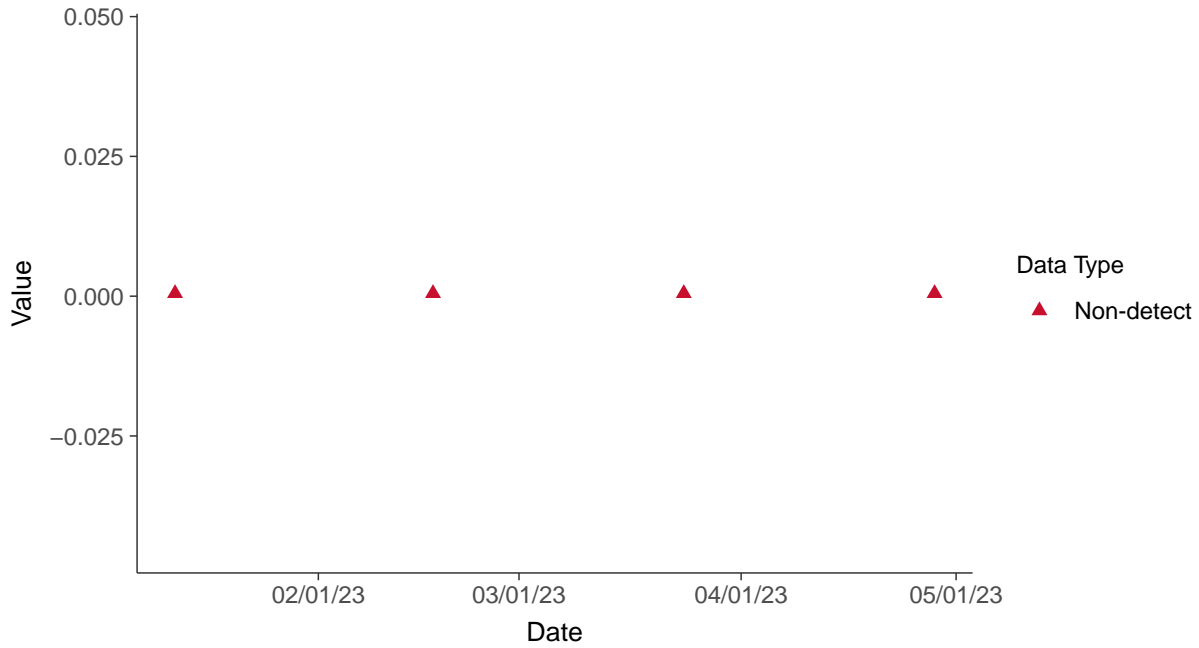


Part 115: Silver, MW-15

ID: 15_5_40

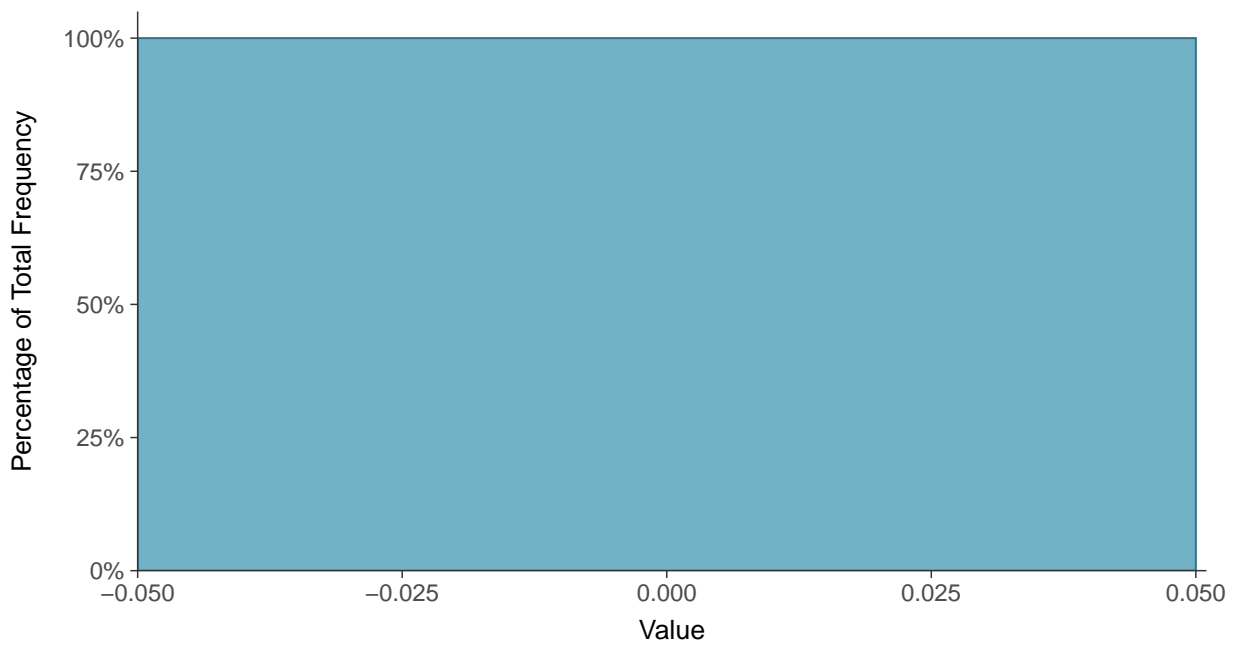
Scatter Plot

Silver, MW-15 (mg/L)



Histogram

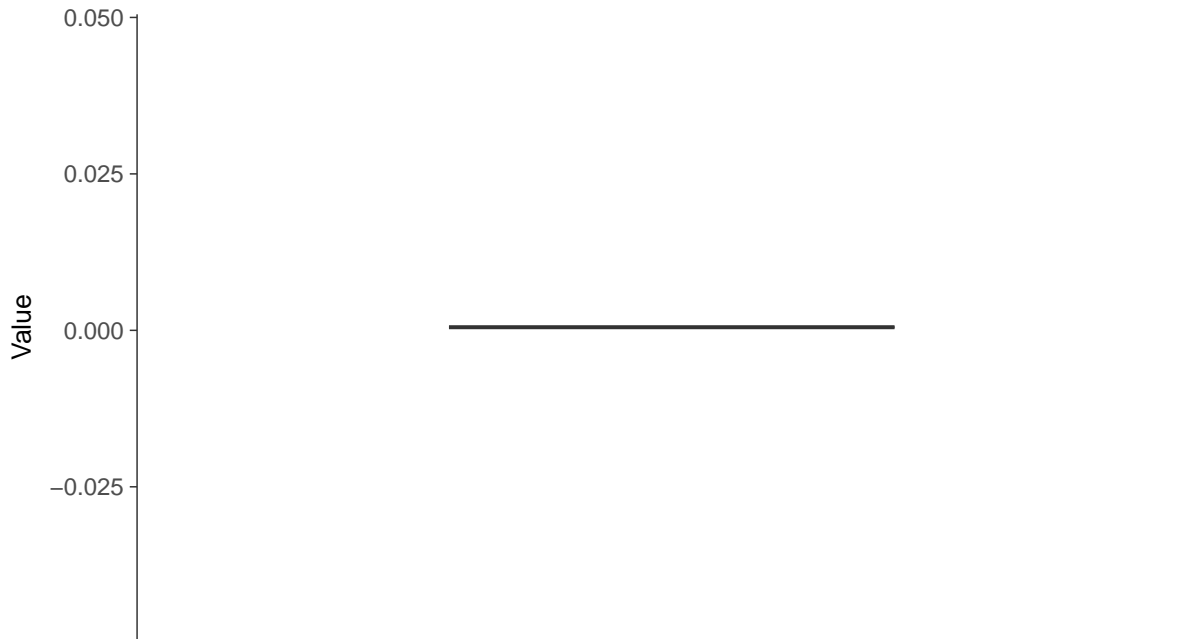
Silver, MW-15 (mg/L)





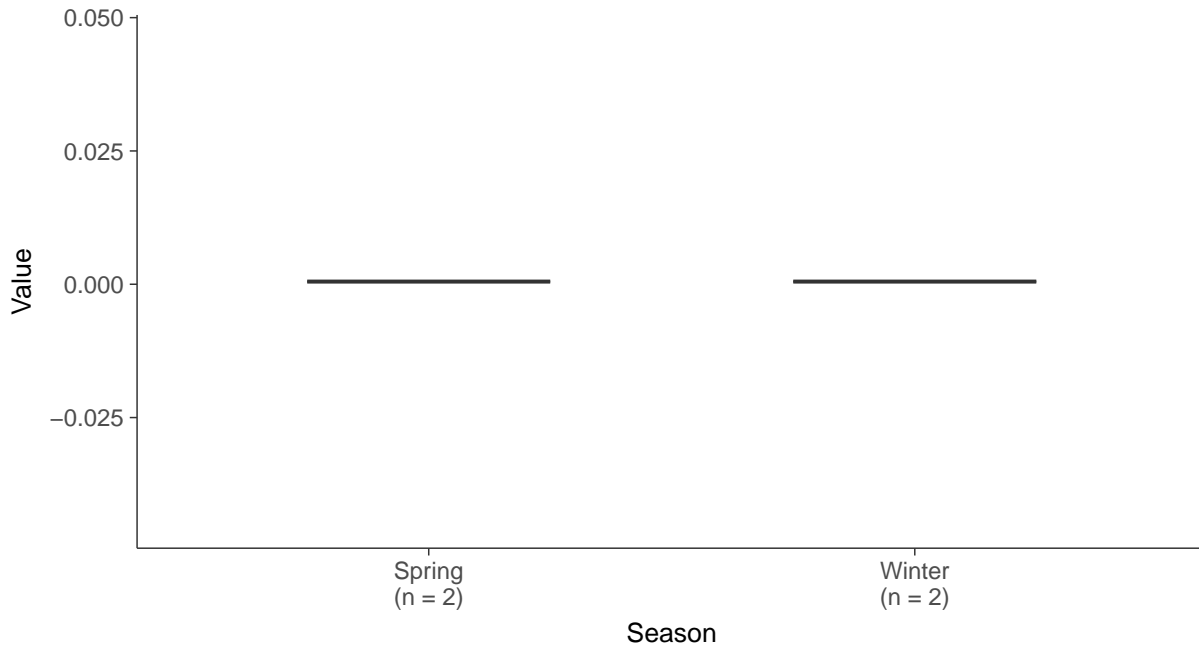
Boxplot

Silver, MW-15 (mg/L)



Boxplot by Season

Silver, MW-15 (mg/L)



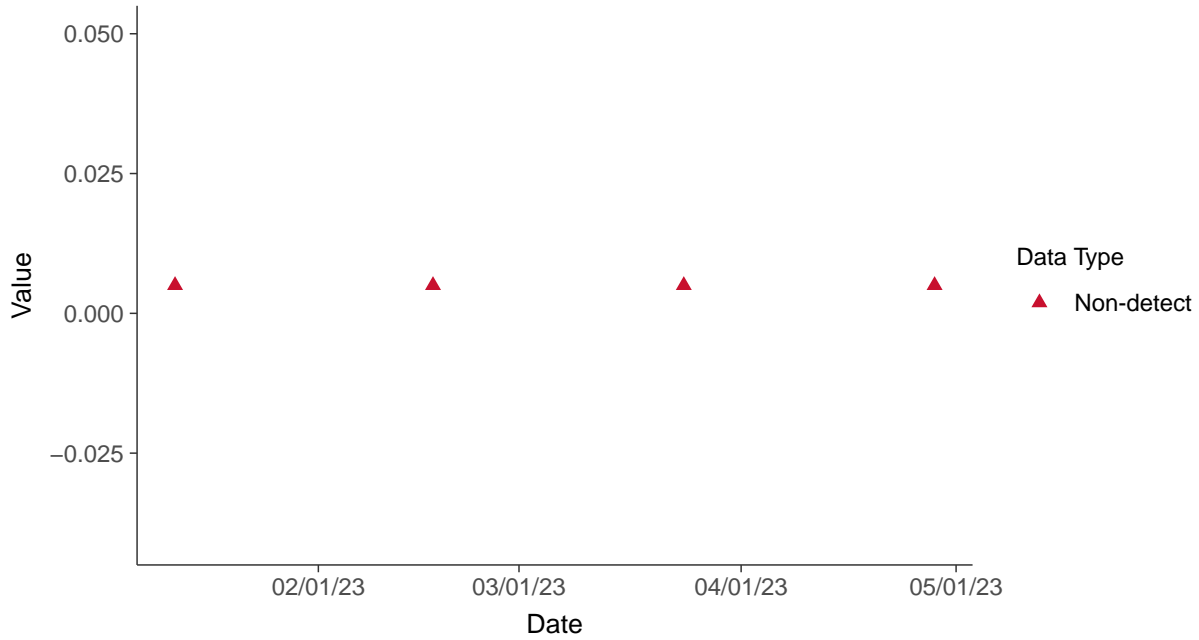


Part 115: Vanadium, MW-15

ID: 15_5_41

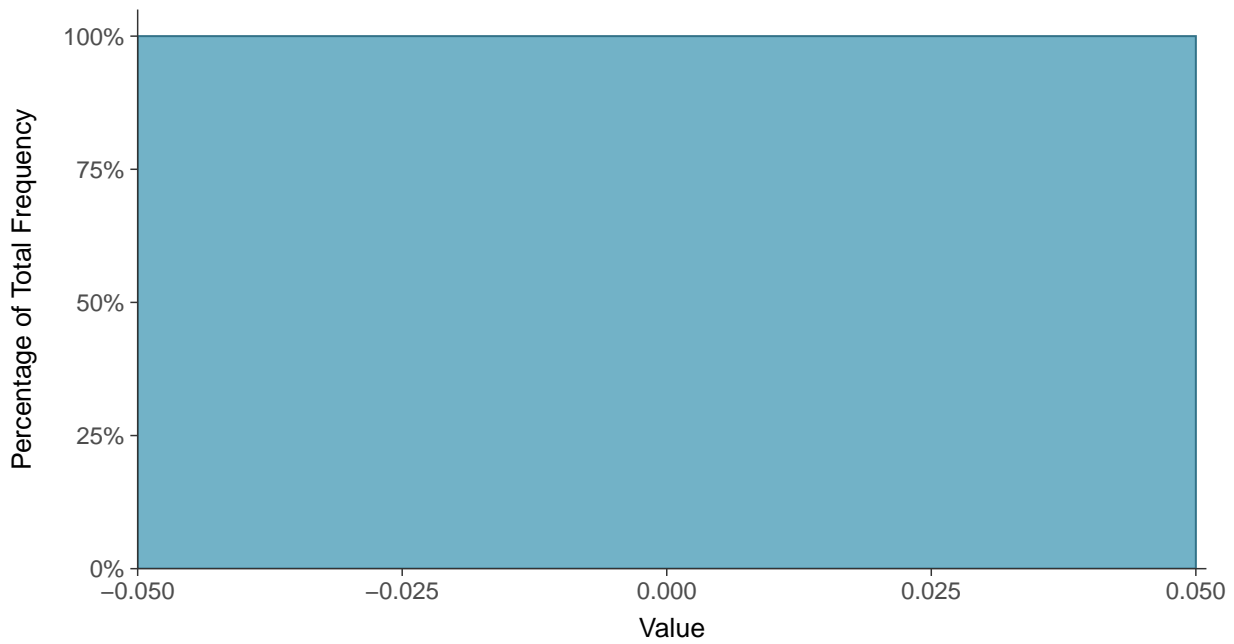
Scatter Plot

Vanadium, MW-15 (mg/L)



Histogram

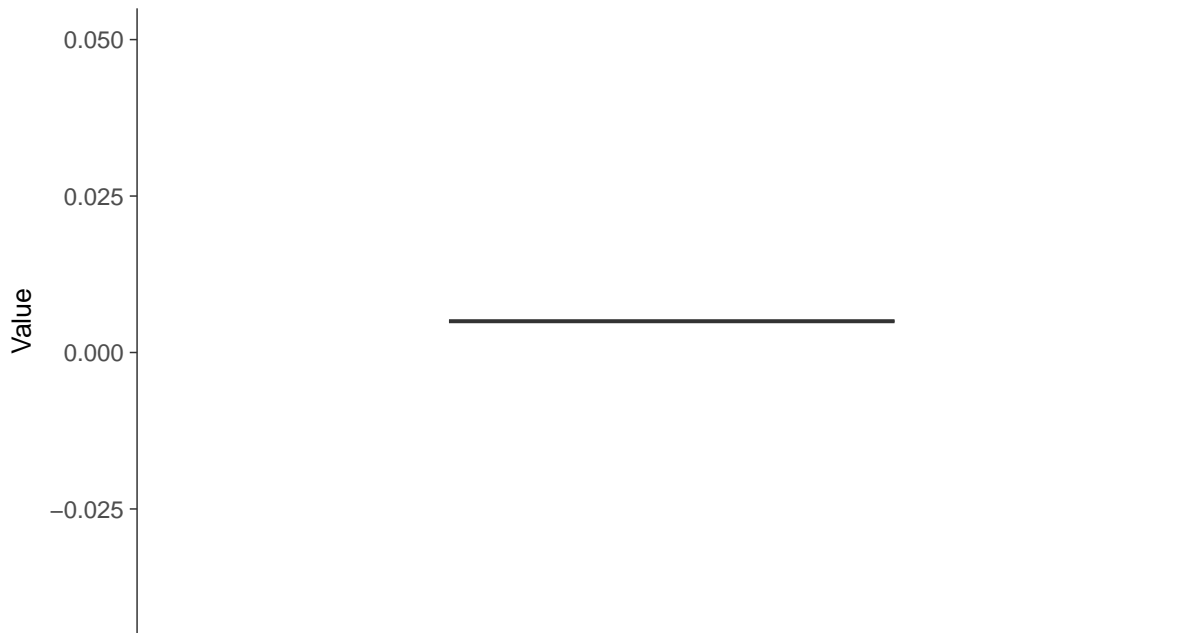
Vanadium, MW-15 (mg/L)





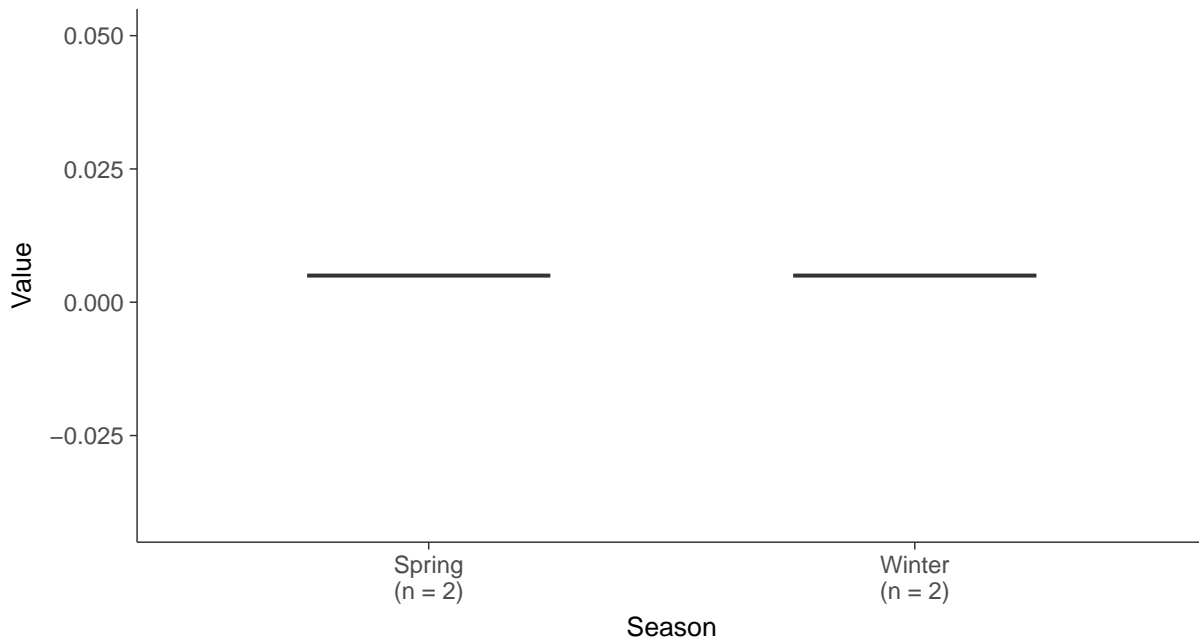
Boxplot

Vanadium, MW-15 (mg/L)



Boxplot by Season

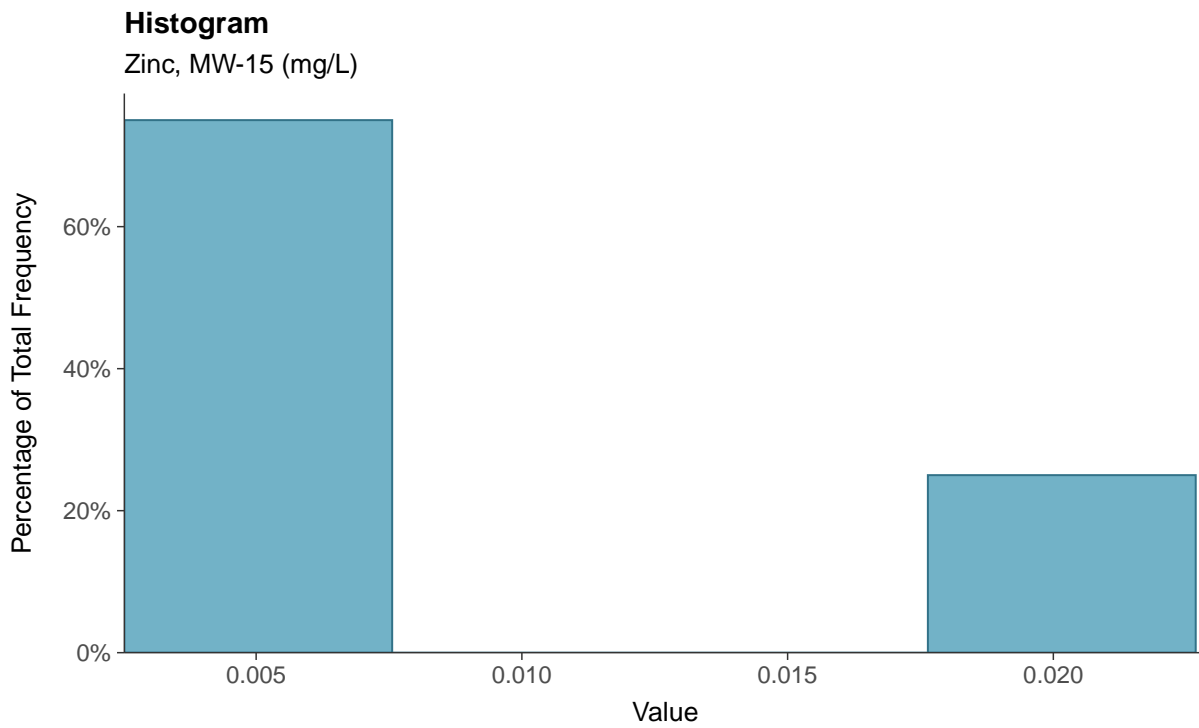
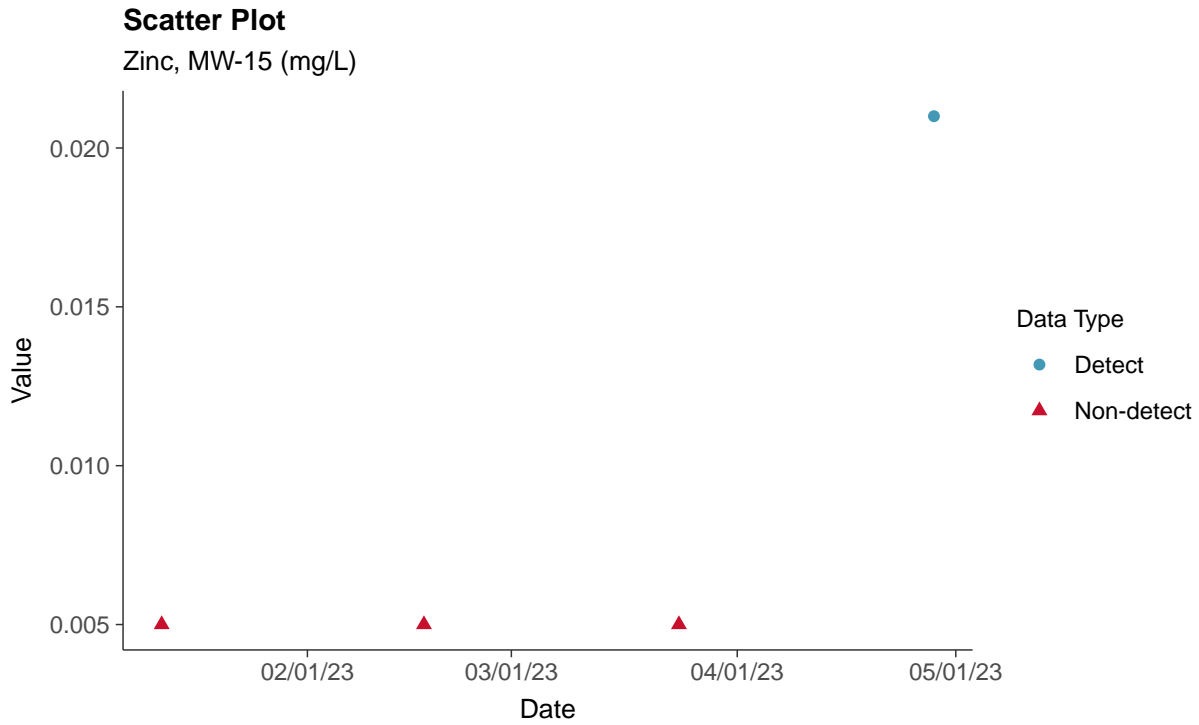
Vanadium, MW-15 (mg/L)





Part 115: Zinc, MW-15

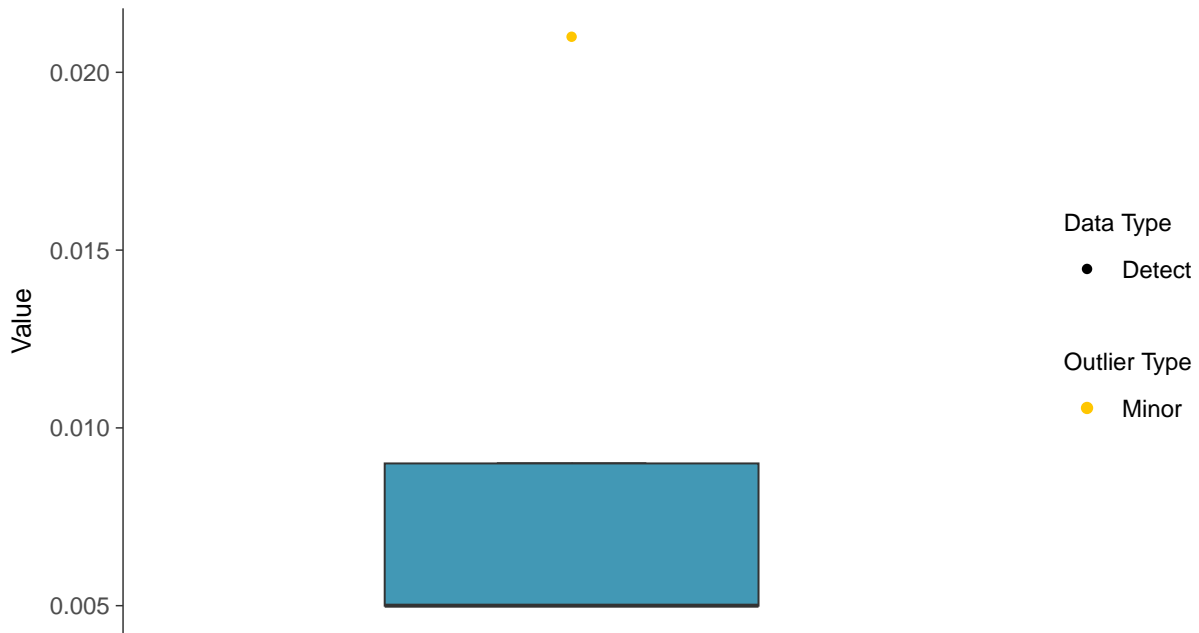
ID: 15_5_42





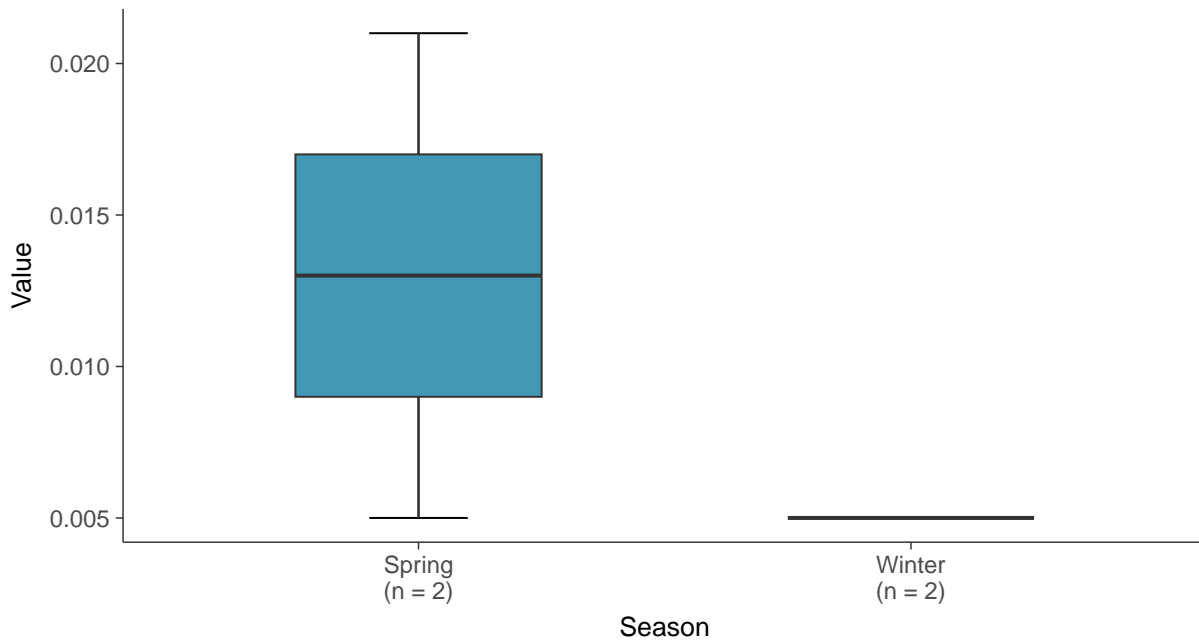
Boxplot

Zinc, MW-15 (mg/L)



Boxplot by Season

Zinc, MW-15 (mg/L)

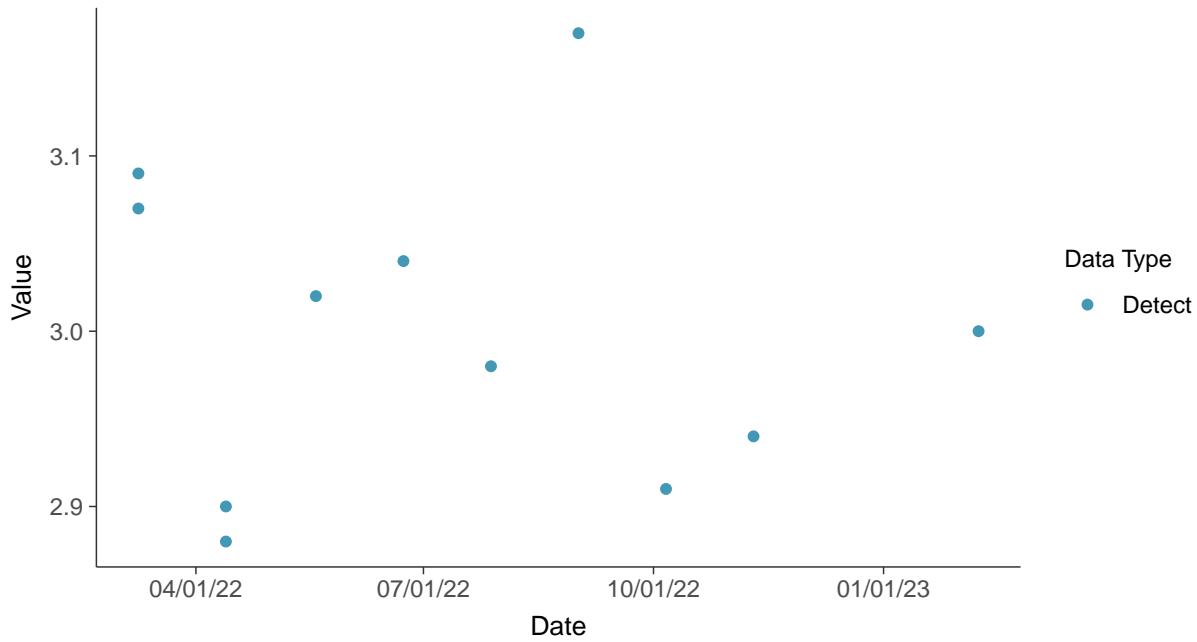


Appendix III: Boron, MW-7B

ID: 7B_1_01

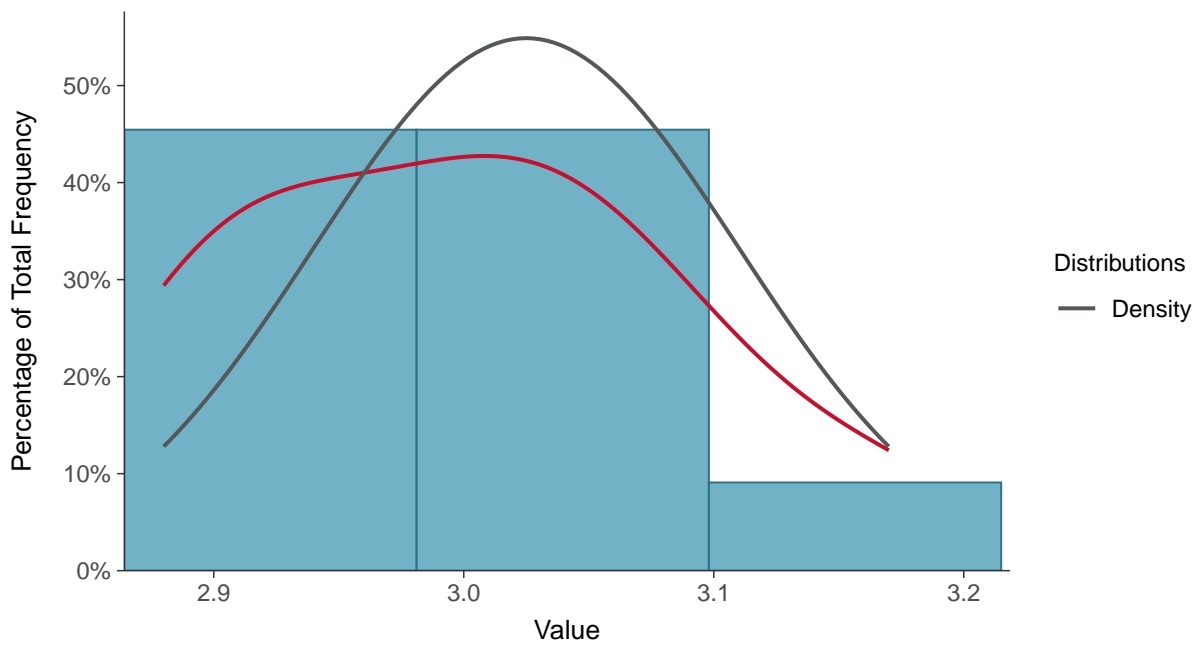
Scatter Plot

Boron, MW-7B (mg/L)



Histogram

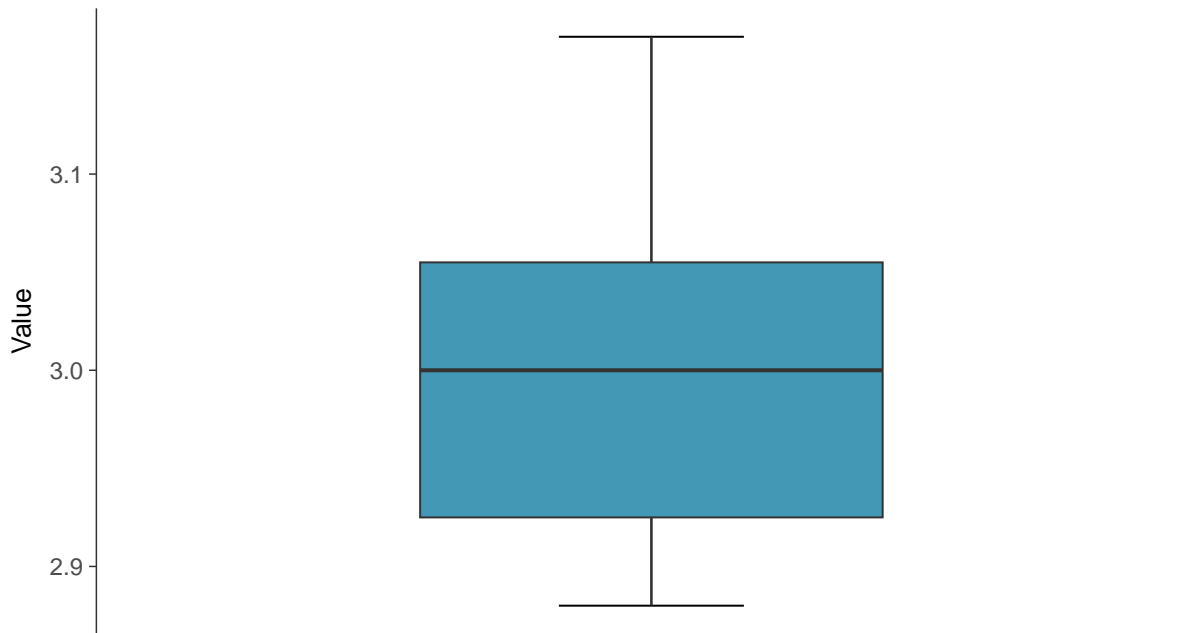
Boron, MW-7B (mg/L)





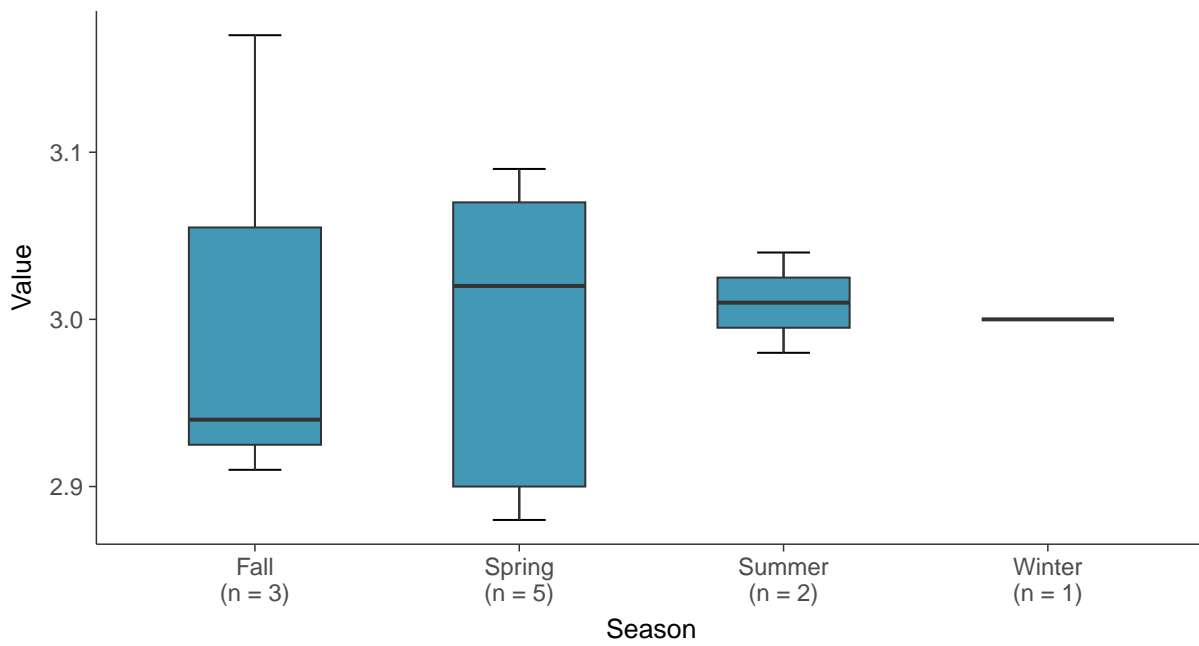
Boxplot

Boron, MW-7B (mg/L)



Boxplot by Season

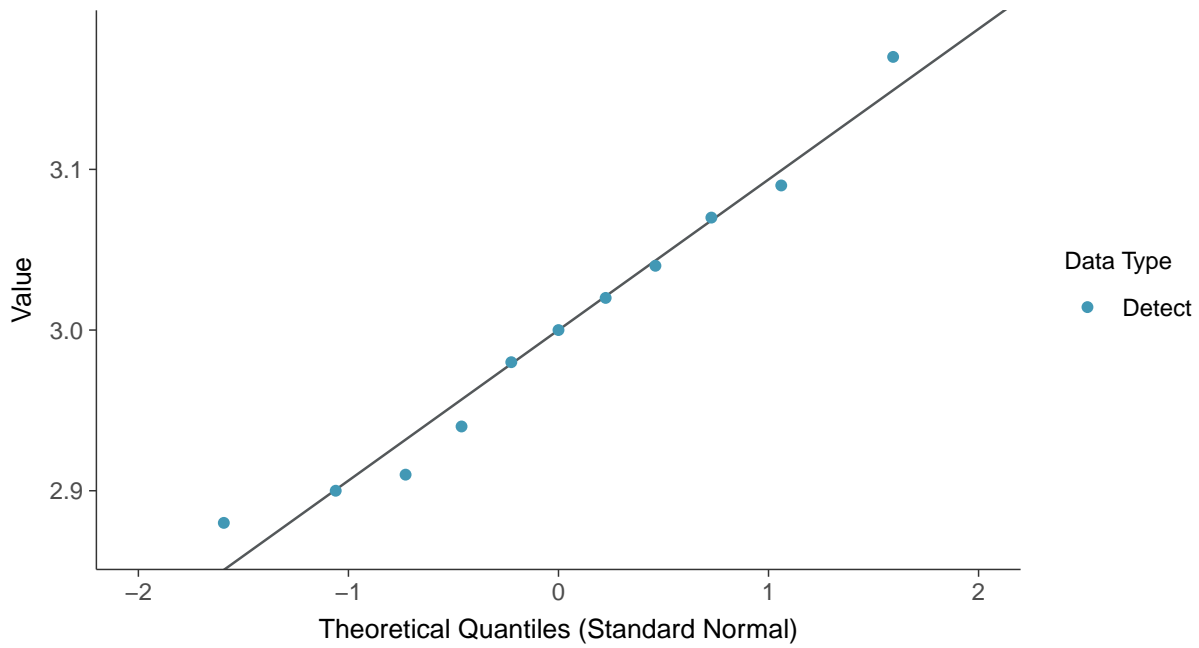
Boron, MW-7B (mg/L)





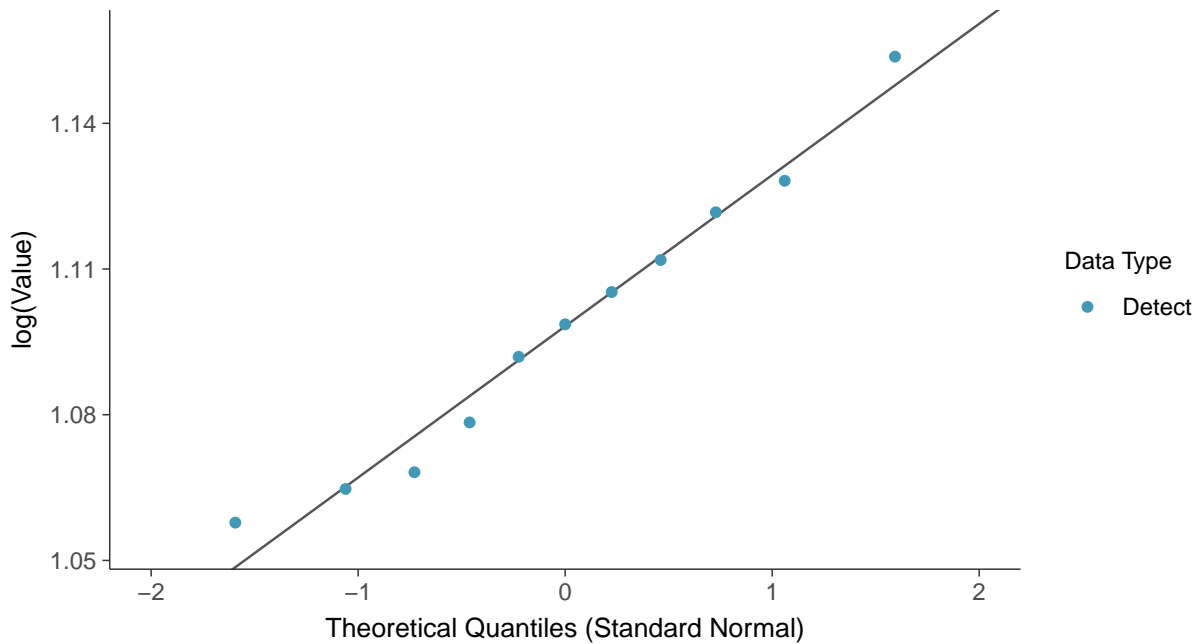
Normal Q-Q plot

Boron, MW-7B (mg/L)



Lognormal Q-Q plot

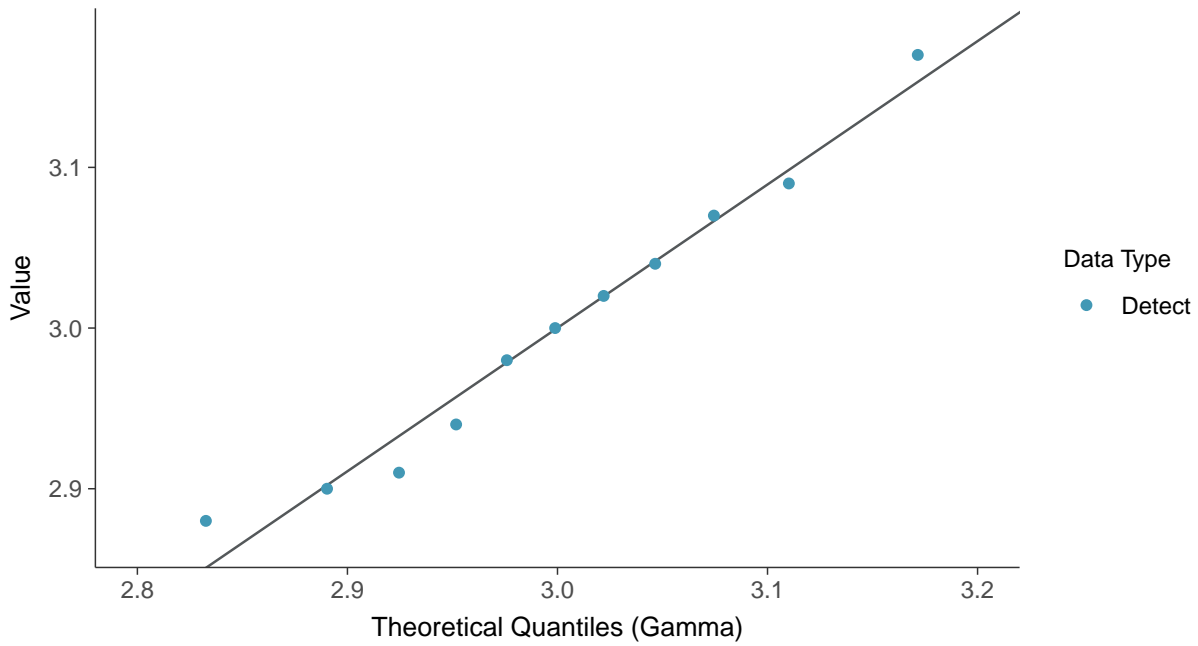
Boron, MW-7B (mg/L)





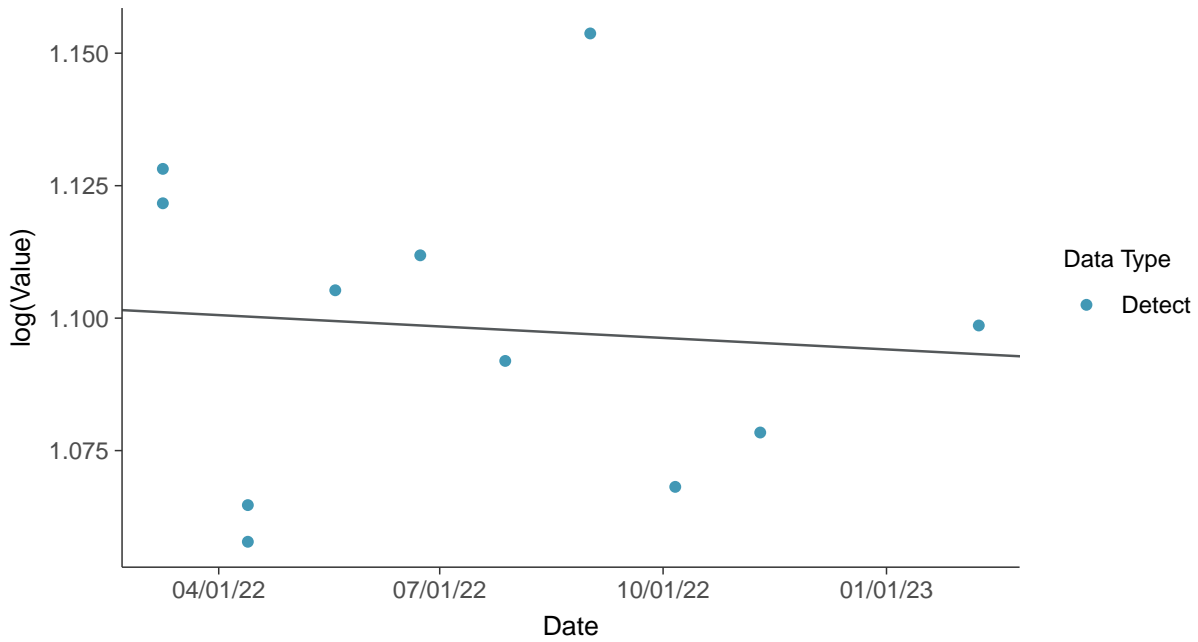
Gamma Q-Q plot

Boron, MW-7B (mg/L)



Trend Regression: Lognormal MLE

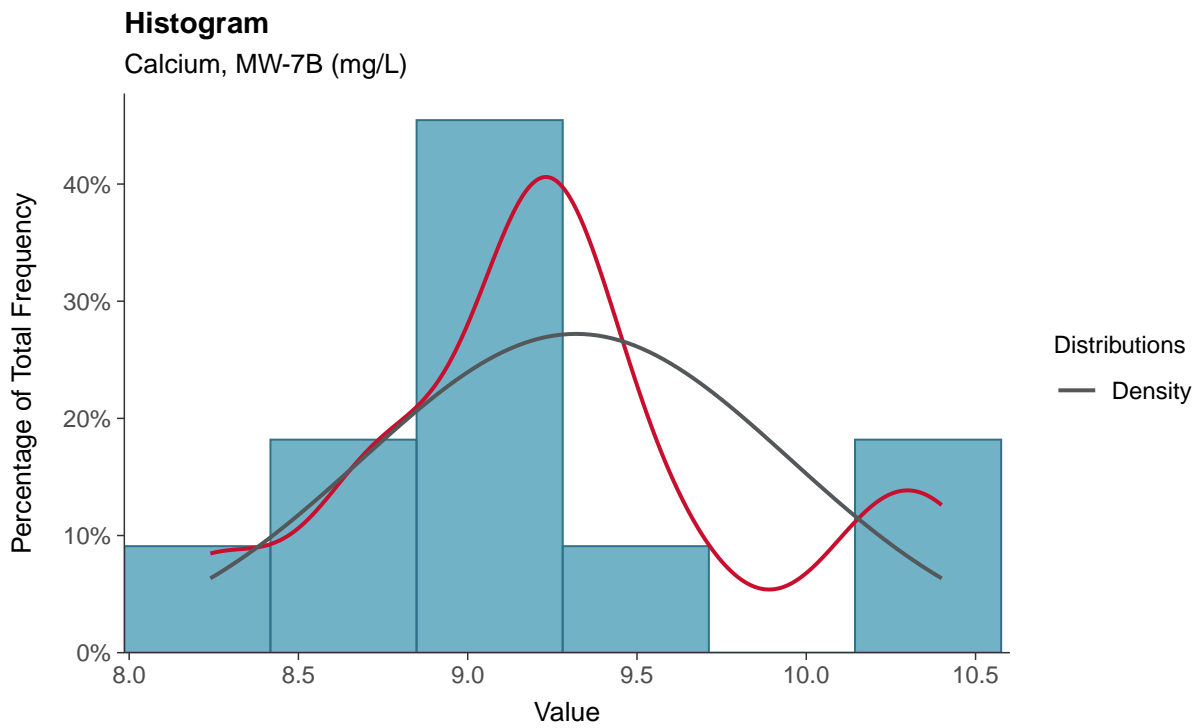
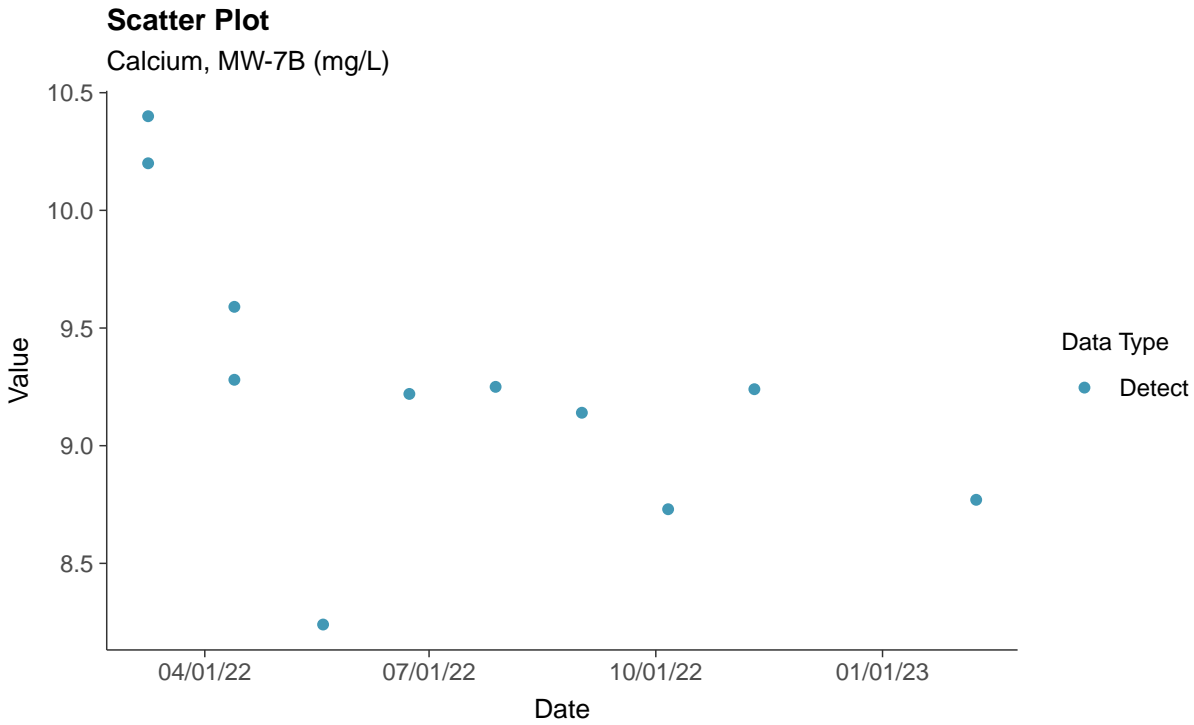
Boron, MW-7B (mg/L)





Appendix III: Calcium, MW-7B

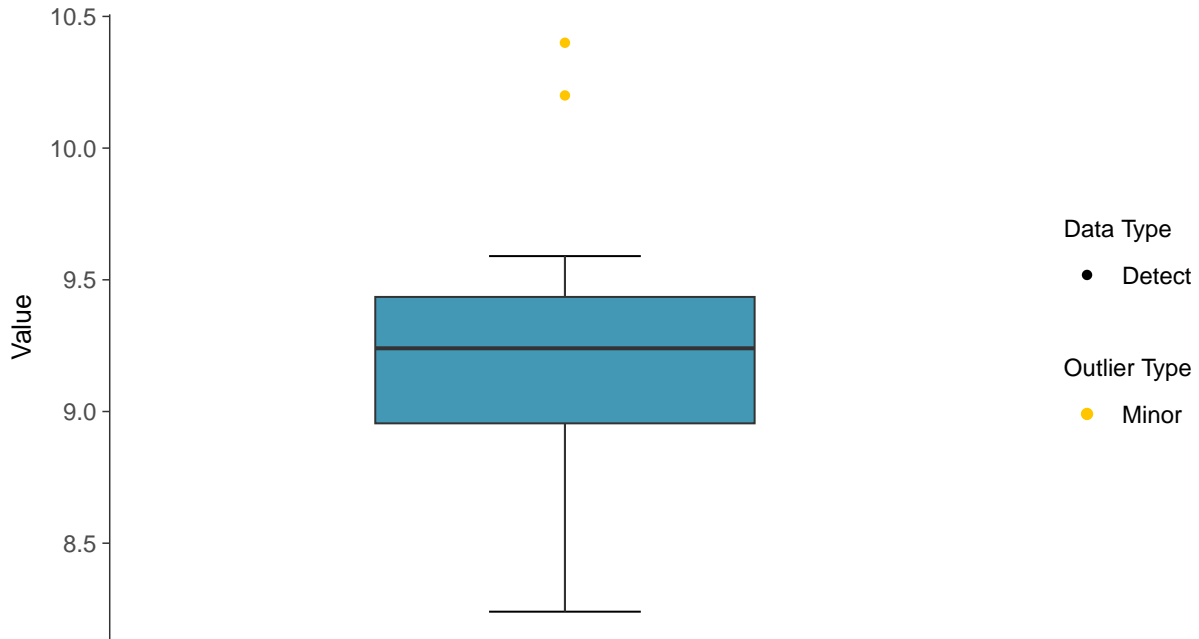
ID: 7B_1_02





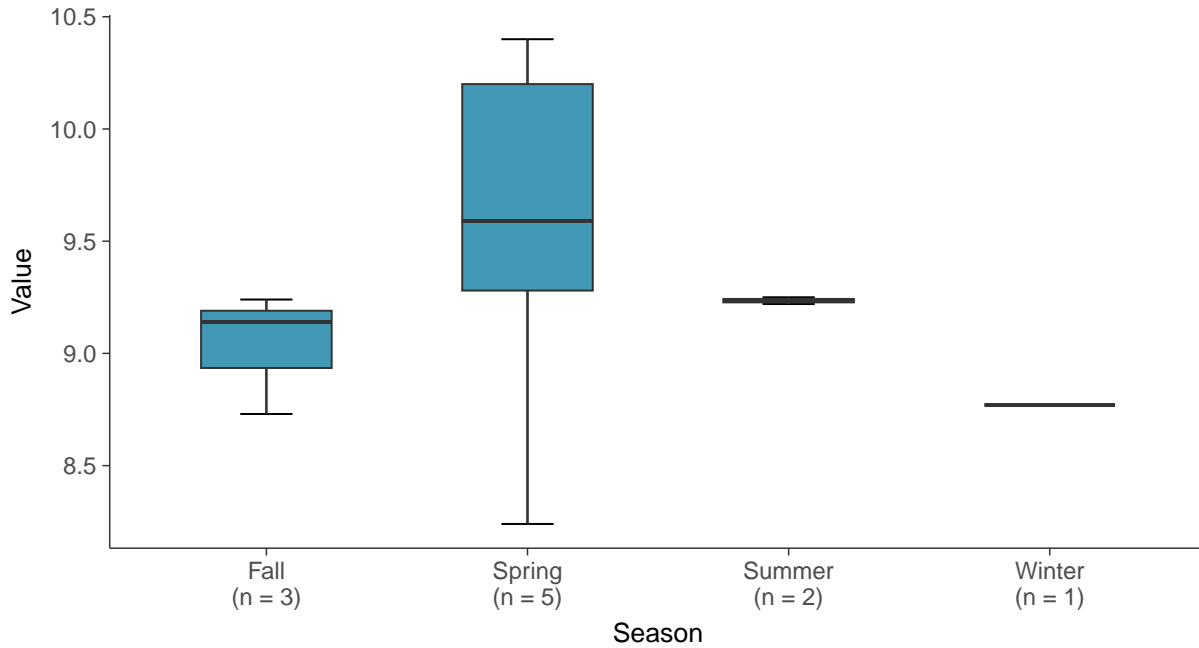
Boxplot

Calcium, MW-7B (mg/L)



Boxplot by Season

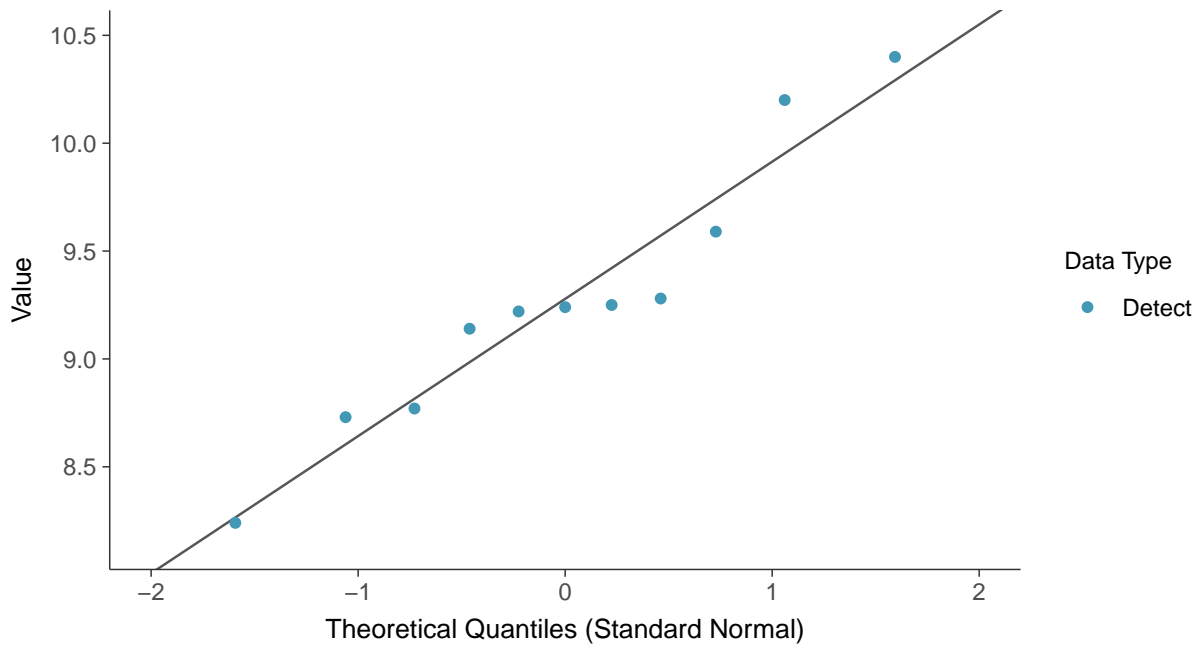
Calcium, MW-7B (mg/L)





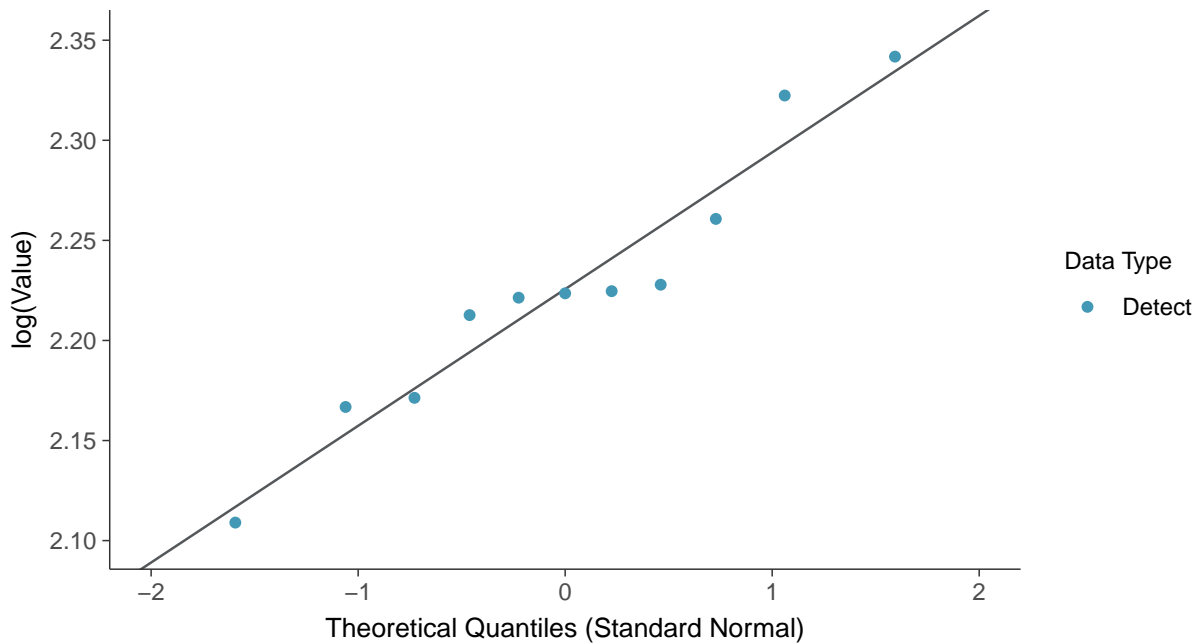
Normal Q-Q plot

Calcium, MW-7B (mg/L)



Lognormal Q-Q plot

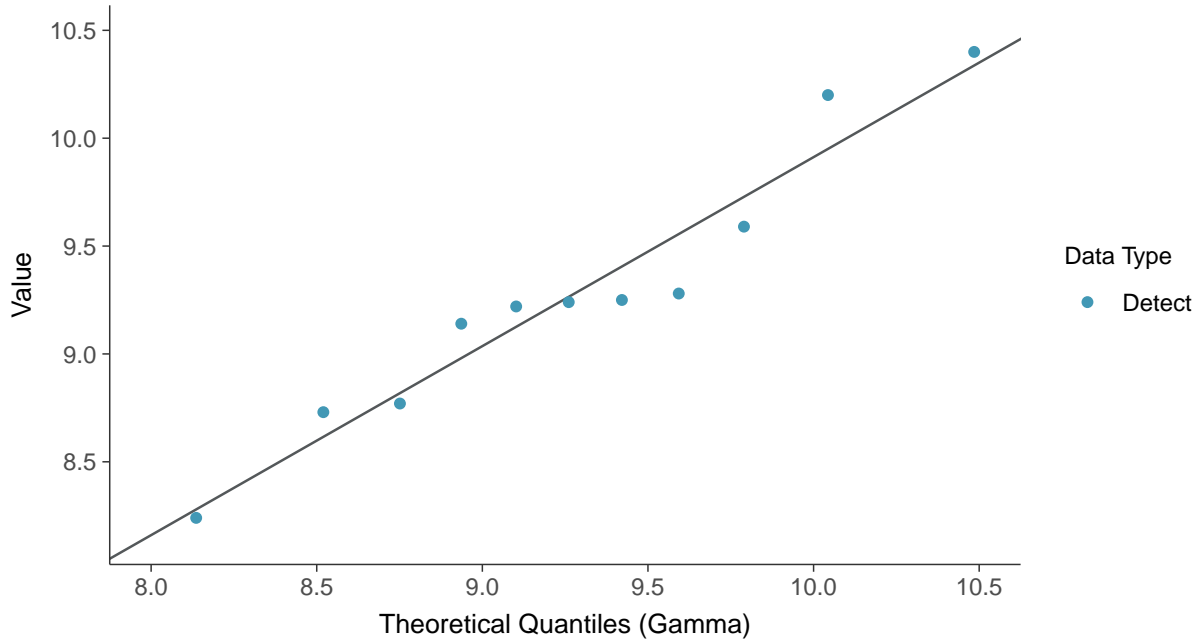
Calcium, MW-7B (mg/L)





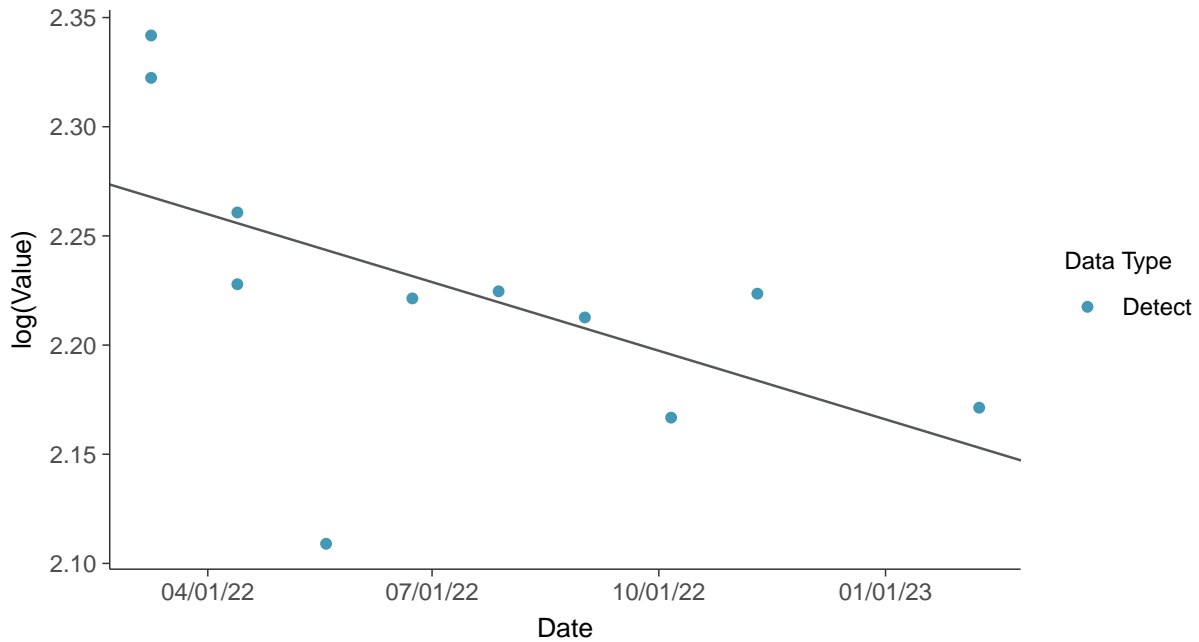
Gamma Q-Q plot

Calcium, MW-7B (mg/L)



Trend Regression: Lognormal MLE

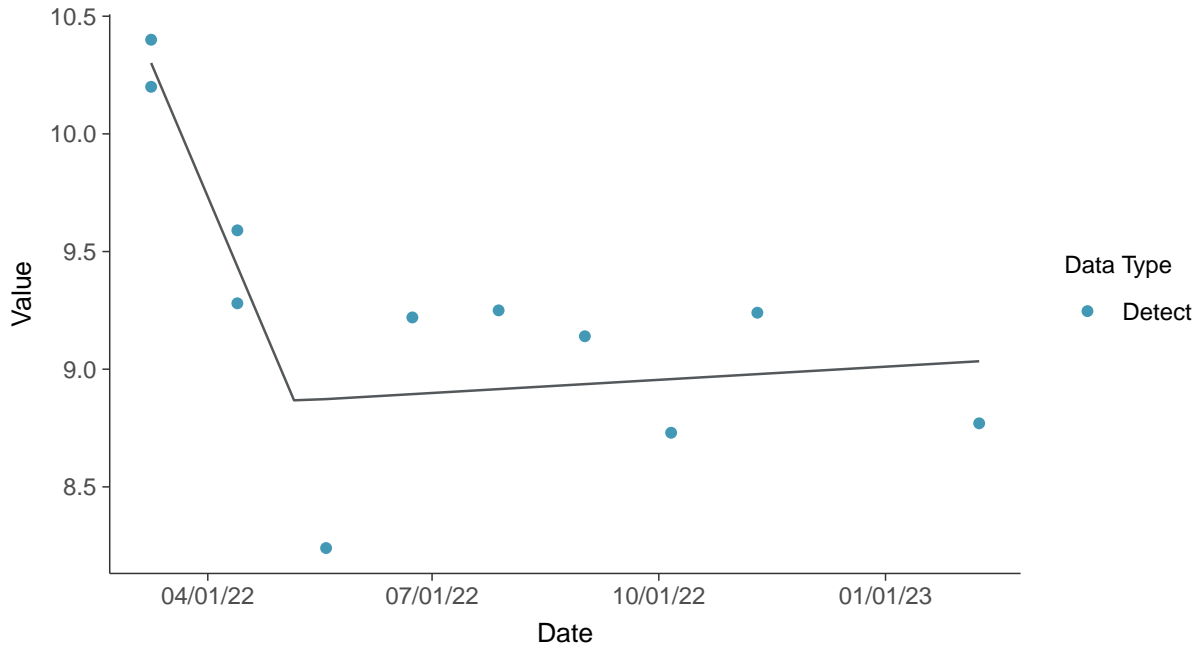
Calcium, MW-7B (mg/L)





Trend Regression: Piecewise Linear-Linear

Calcium, MW-7B (mg/L)



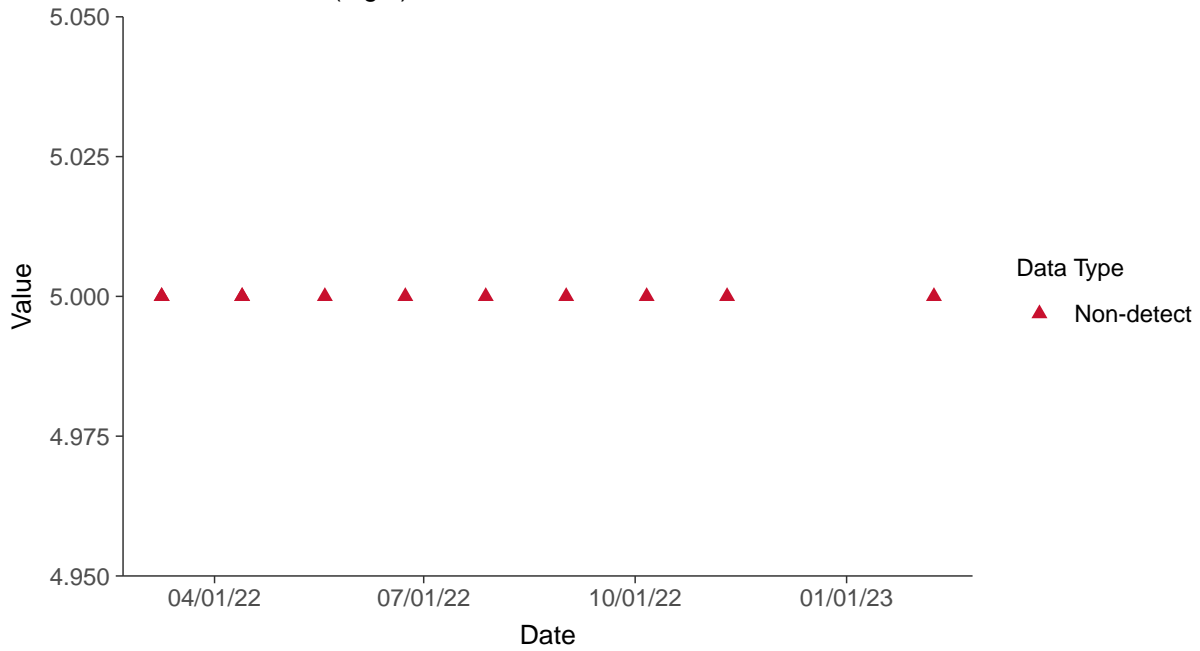


Appendix III: Chloride, MW-7B

ID: 7B_1_03

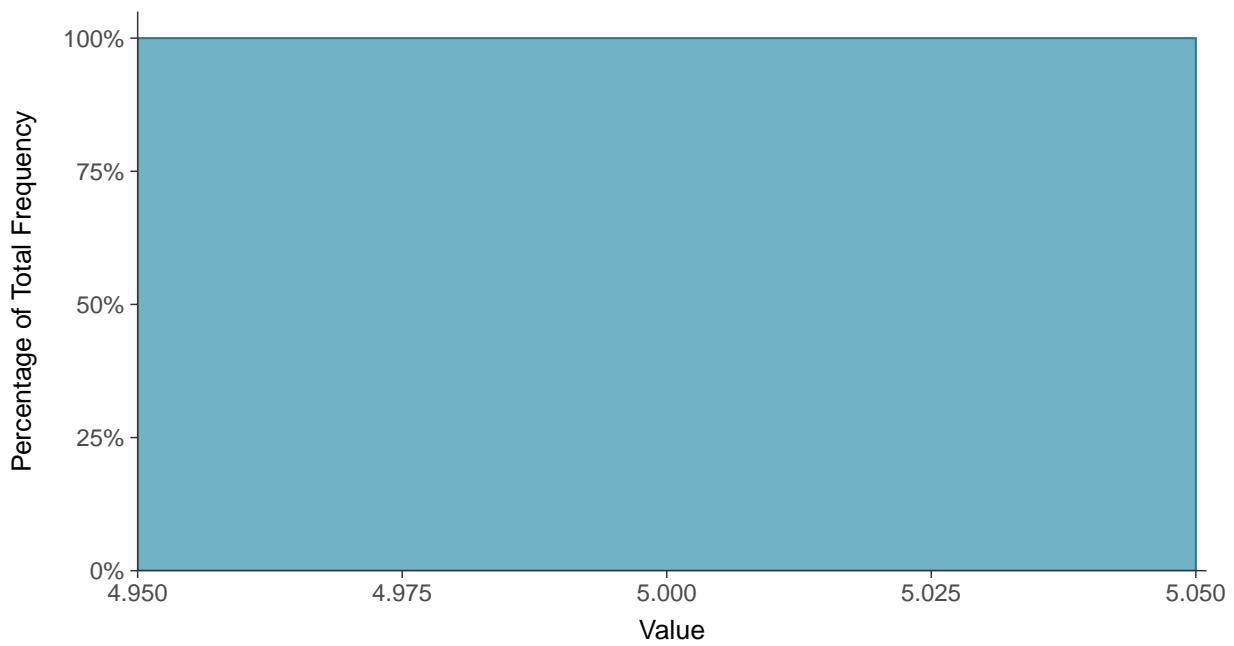
Scatter Plot

Chloride, MW-7B (mg/L)



Histogram

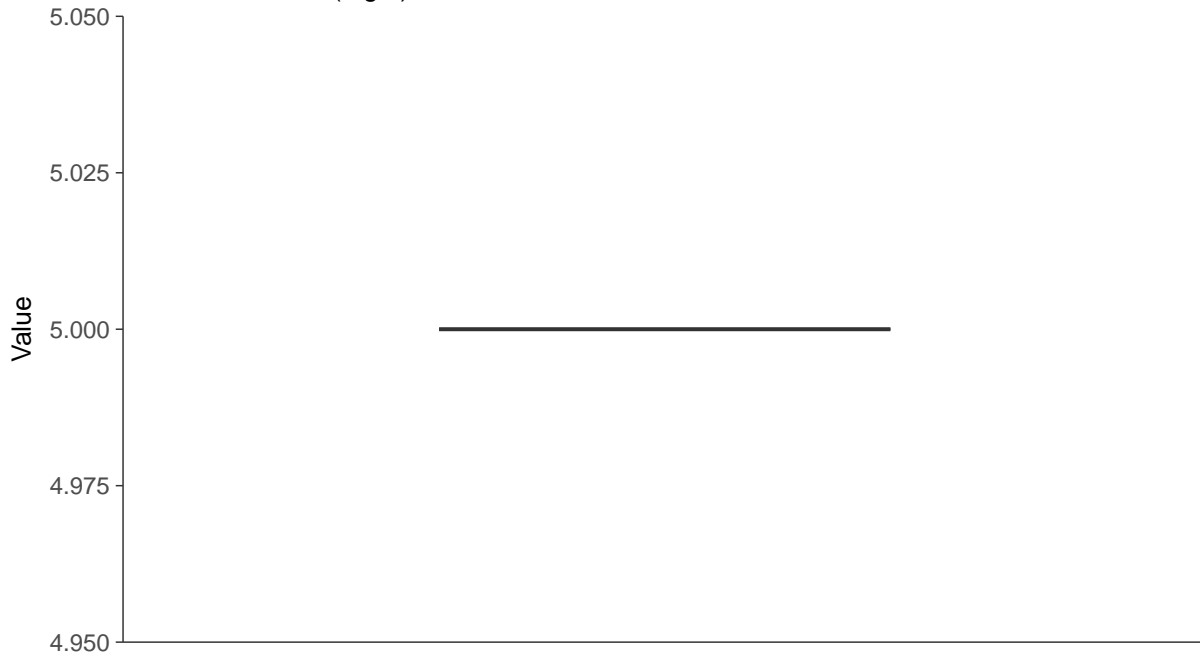
Chloride, MW-7B (mg/L)





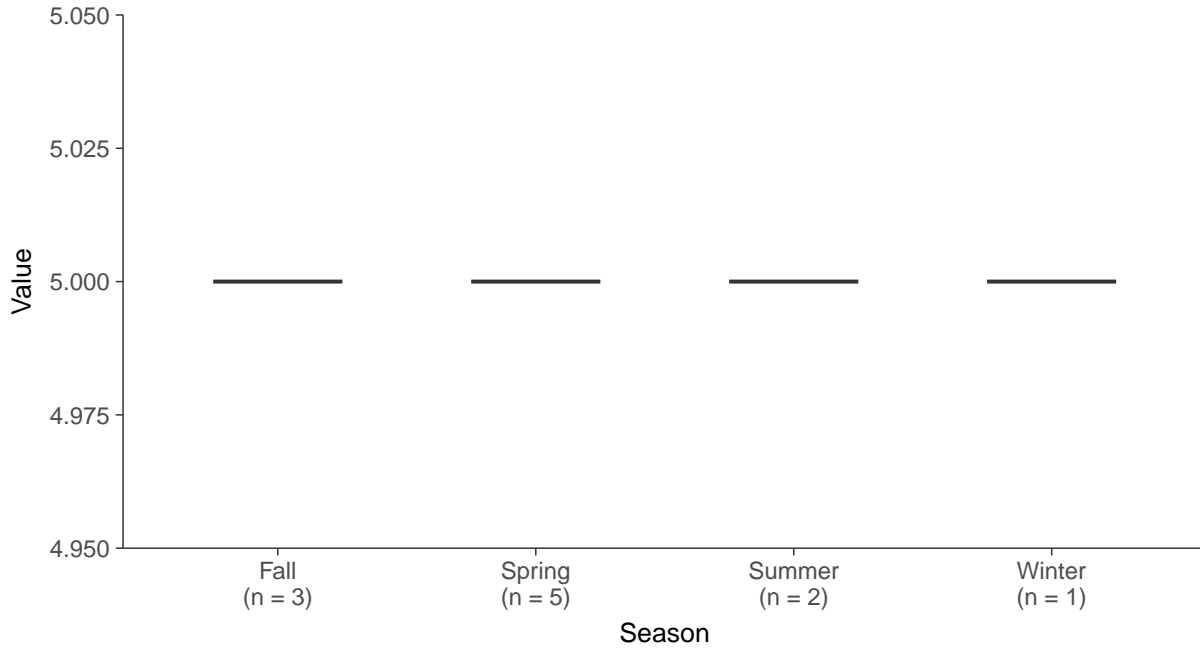
Boxplot

Chloride, MW-7B (mg/L)



Boxplot by Season

Chloride, MW-7B (mg/L)



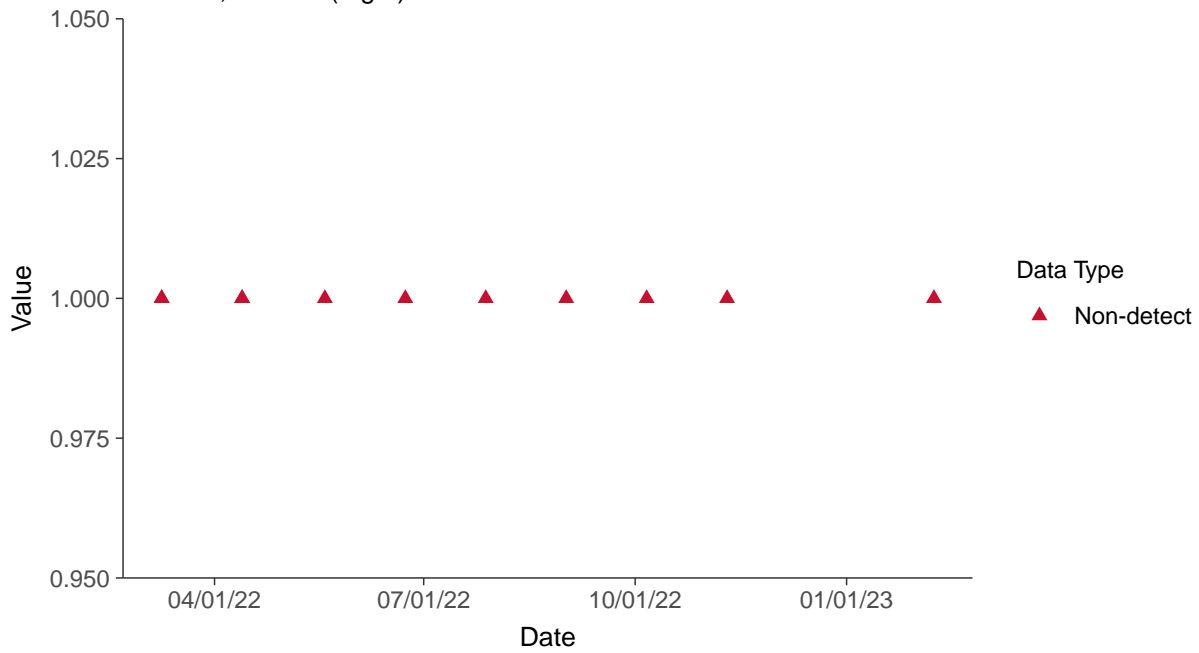


Appendix III: Fluoride, MW-7B

ID: 7B_1_04

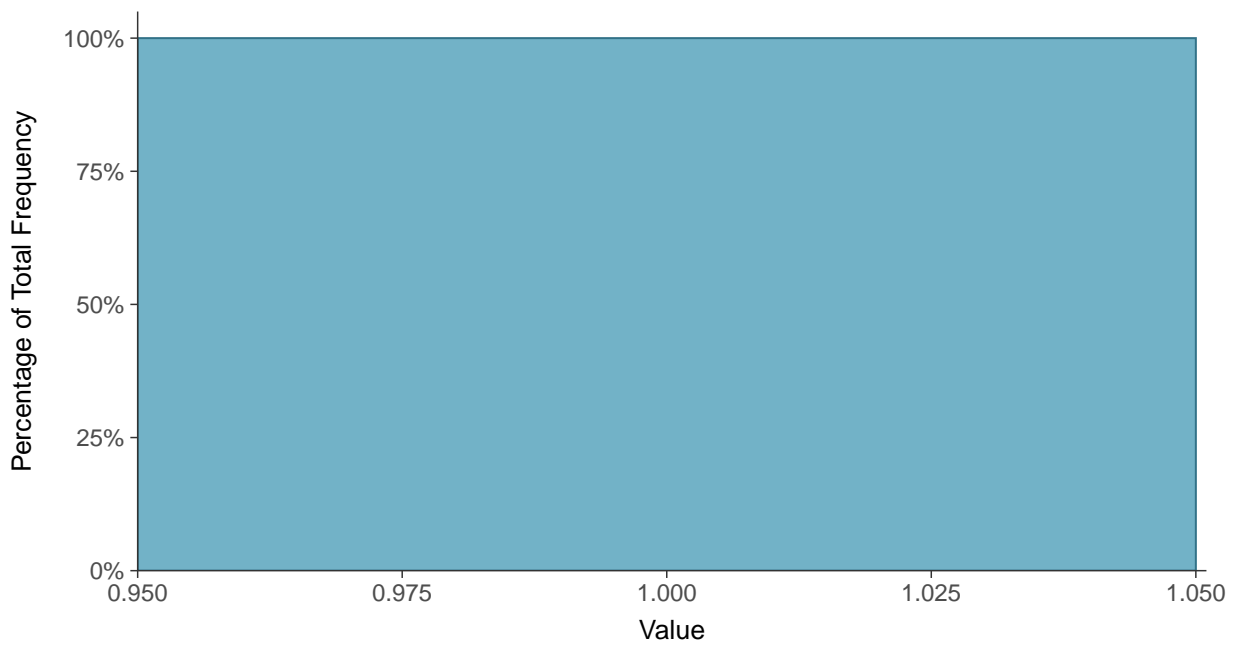
Scatter Plot

Fluoride, MW-7B (mg/L)



Histogram

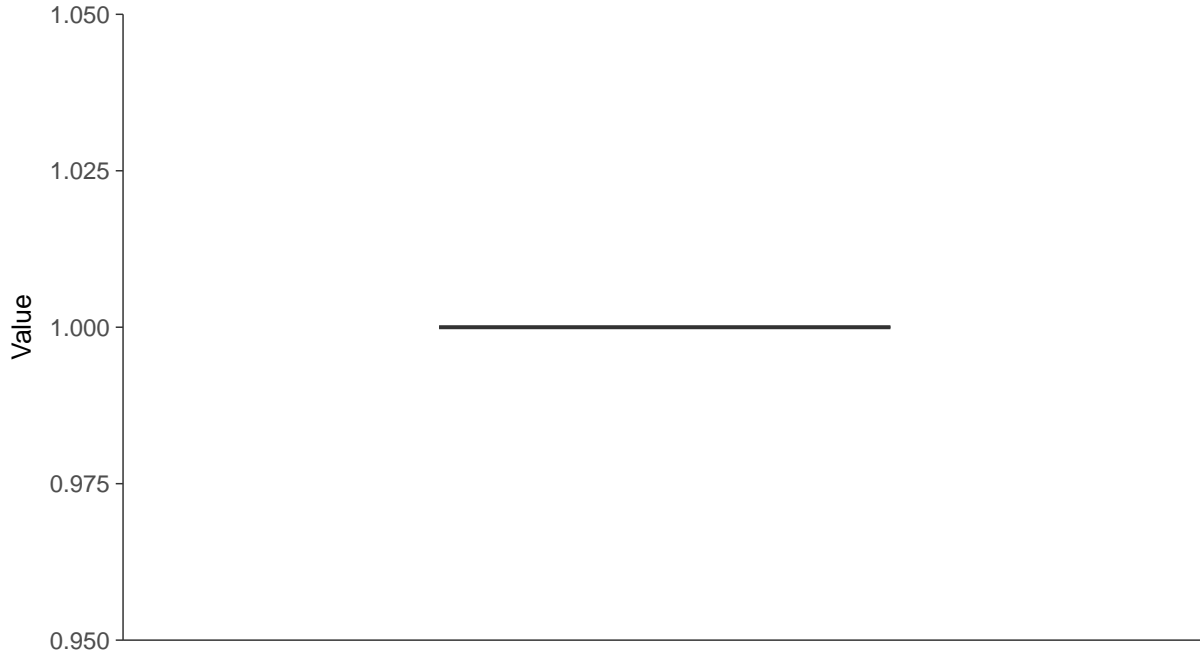
Fluoride, MW-7B (mg/L)





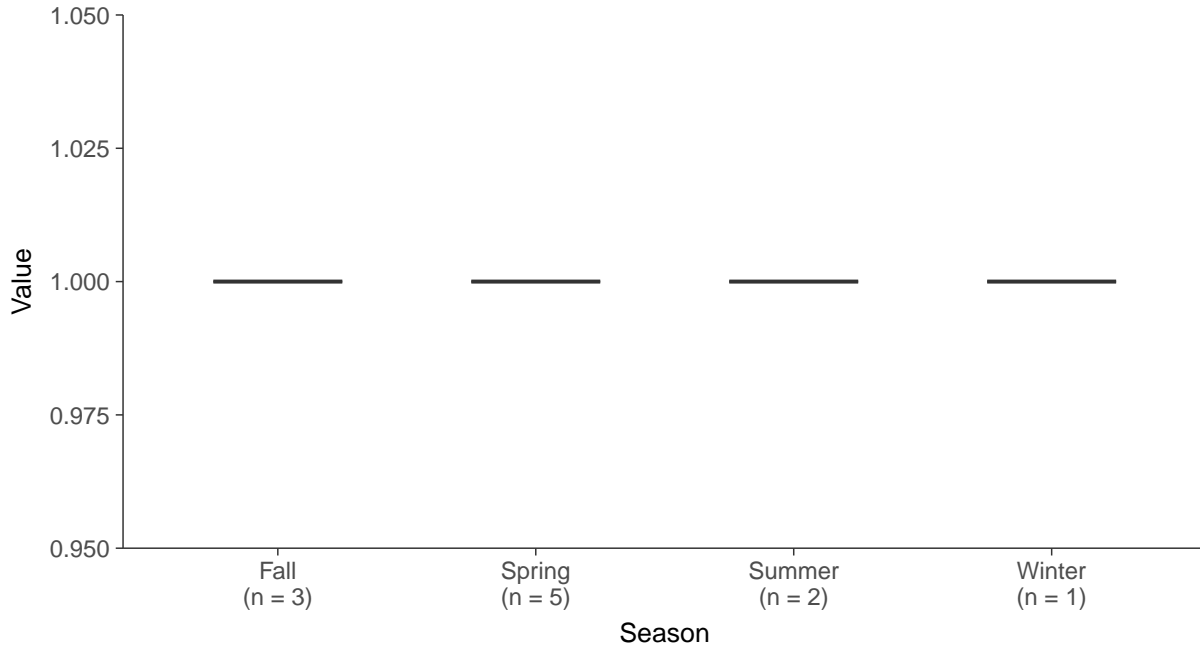
Boxplot

Fluoride, MW-7B (mg/L)



Boxplot by Season

Fluoride, MW-7B (mg/L)



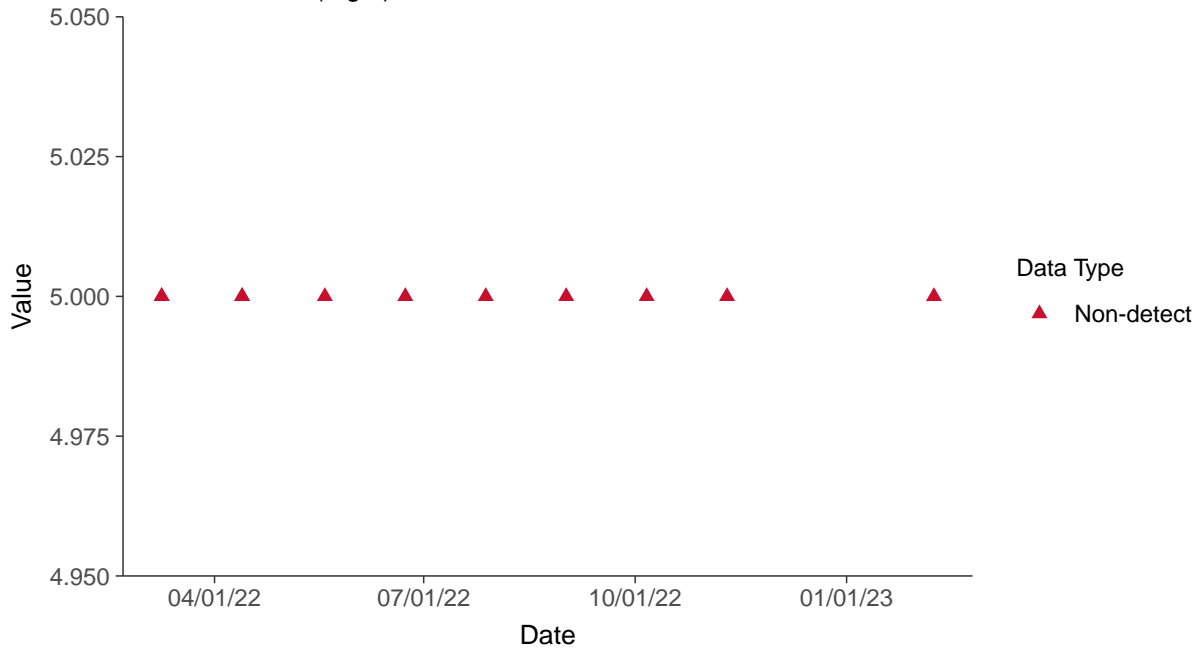


Appendix III: Sulfate, MW-7B

ID: 7B_1_05

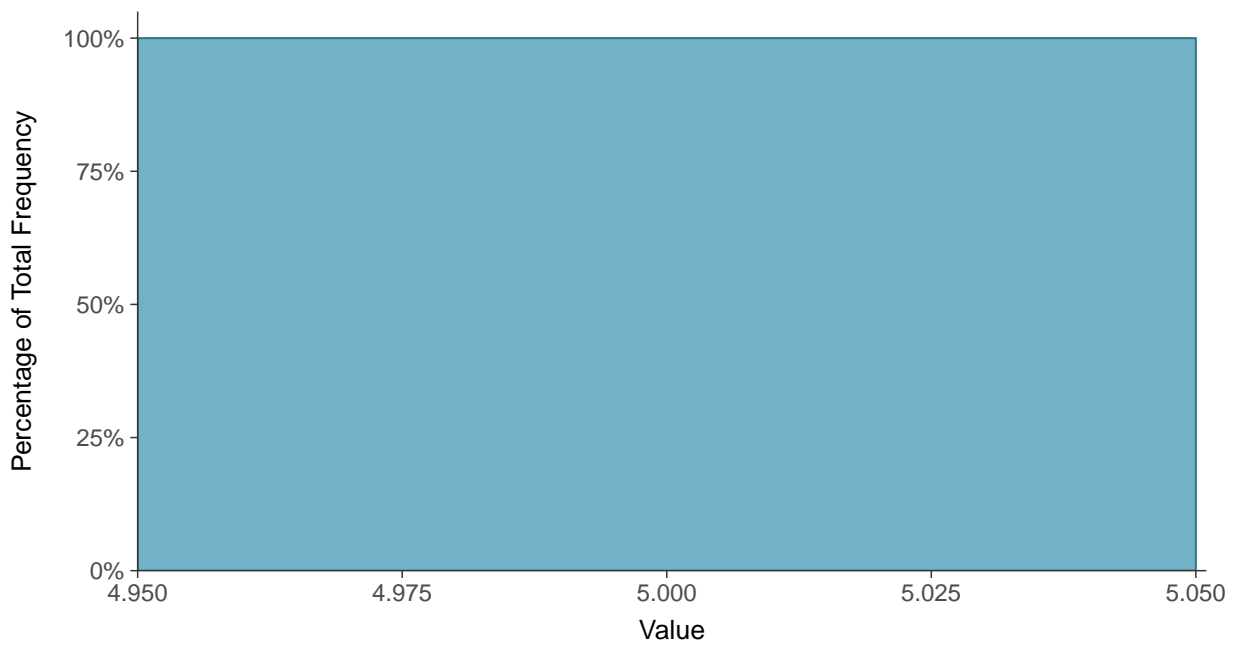
Scatter Plot

Sulfate, MW-7B (mg/L)



Histogram

Sulfate, MW-7B (mg/L)





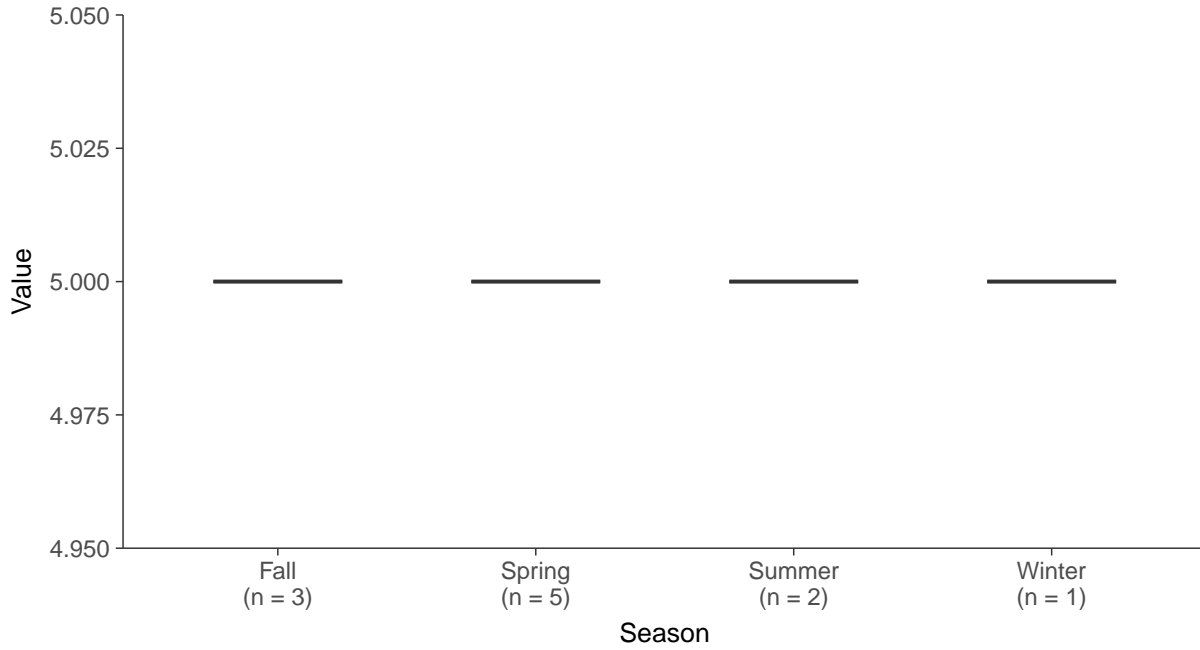
Boxplot

Sulfate, MW-7B (mg/L)



Boxplot by Season

Sulfate, MW-7B (mg/L)

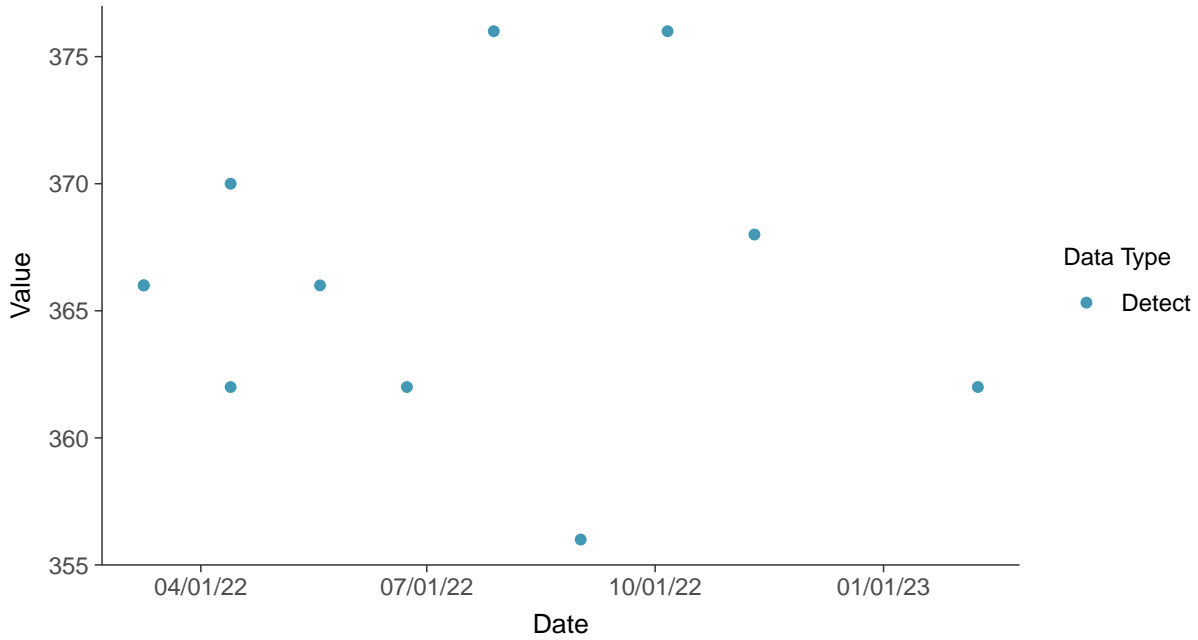


Appendix III: Total Dissolved Solids, MW-7B

ID: 7B_1_06

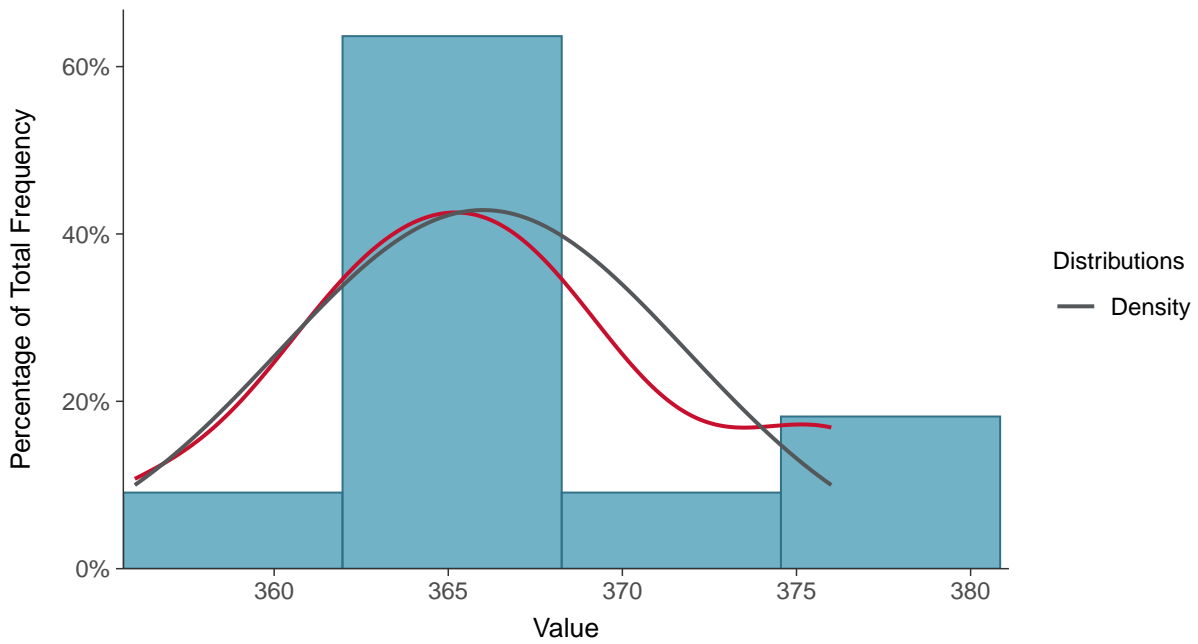
Scatter Plot

Total Dissolved Solids, MW-7B (mg/L)



Histogram

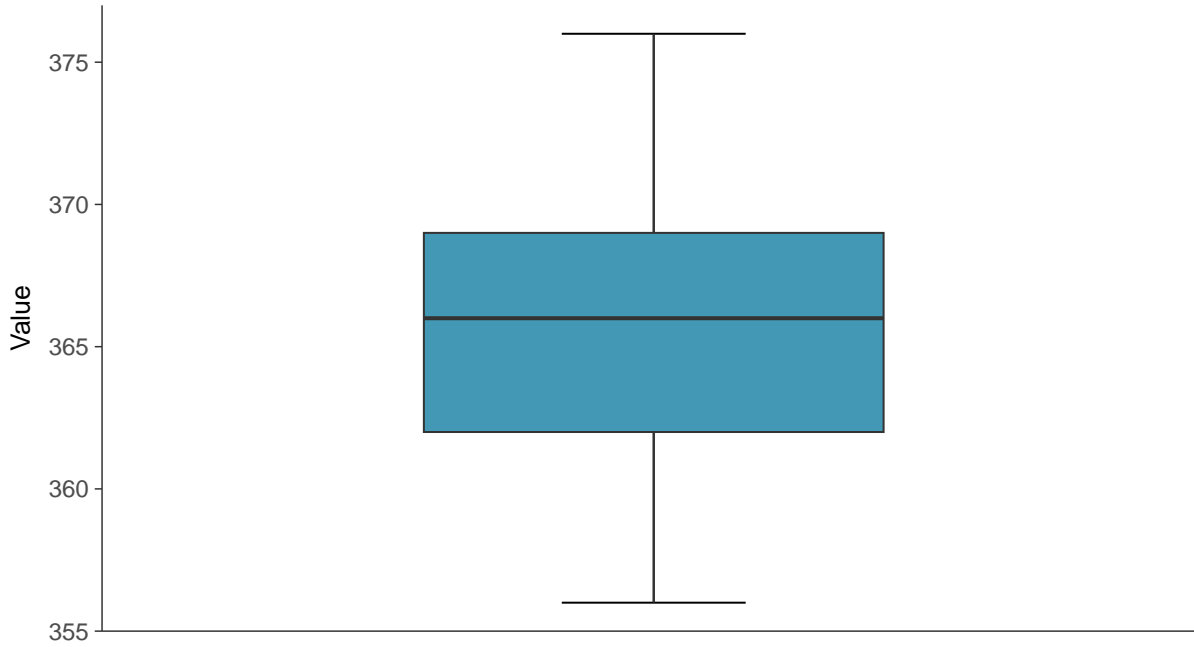
Total Dissolved Solids, MW-7B (mg/L)





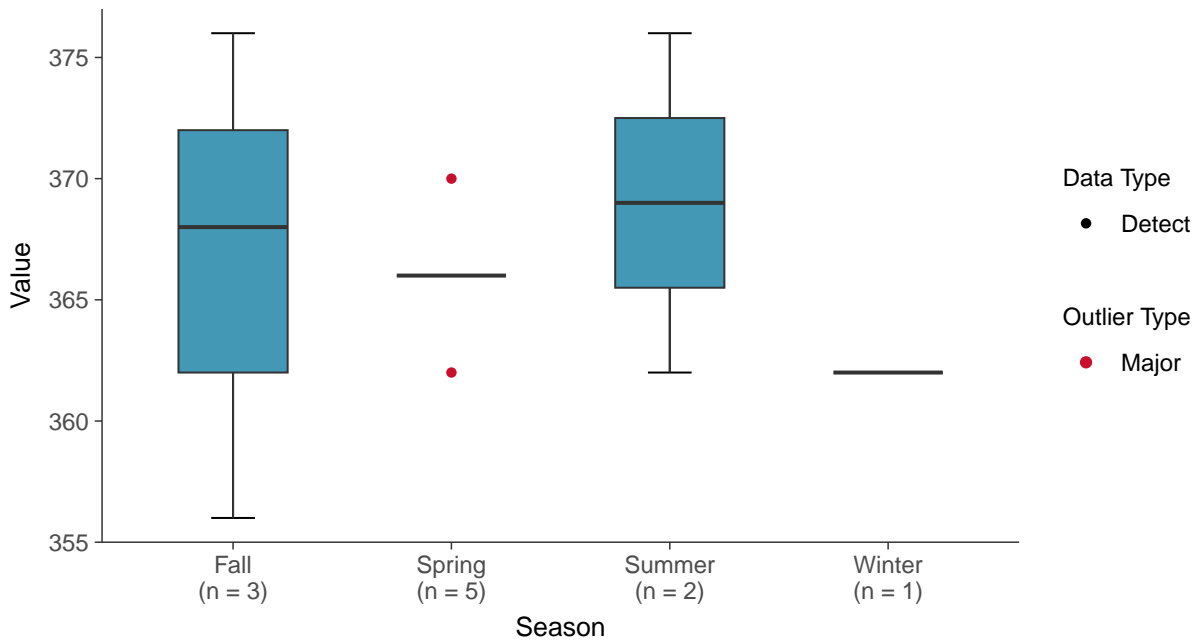
Boxplot

Total Dissolved Solids, MW-7B (mg/L)



Boxplot by Season

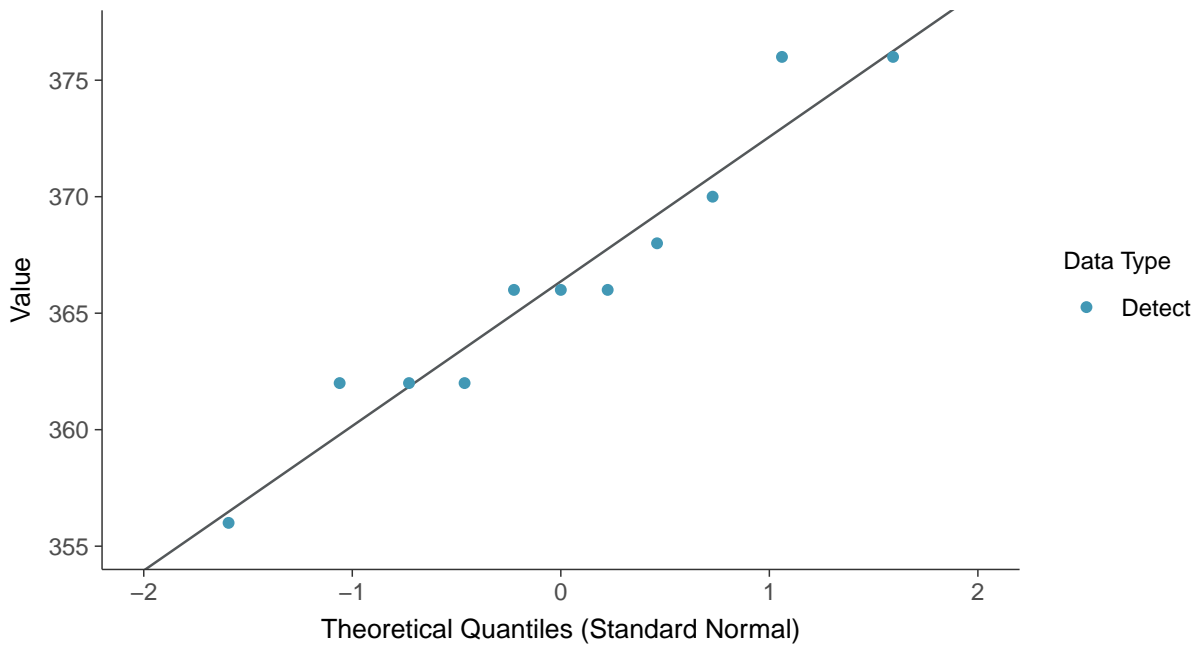
Total Dissolved Solids, MW-7B (mg/L)





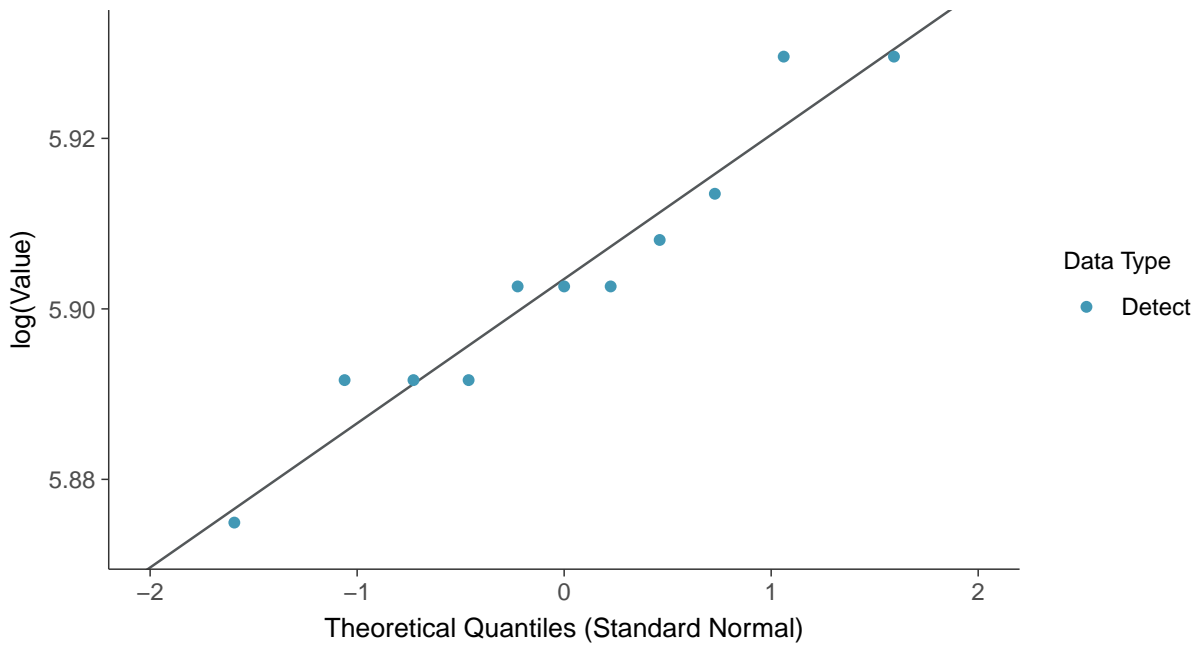
Normal Q-Q plot

Total Dissolved Solids, MW-7B (mg/L)



Lognormal Q-Q plot

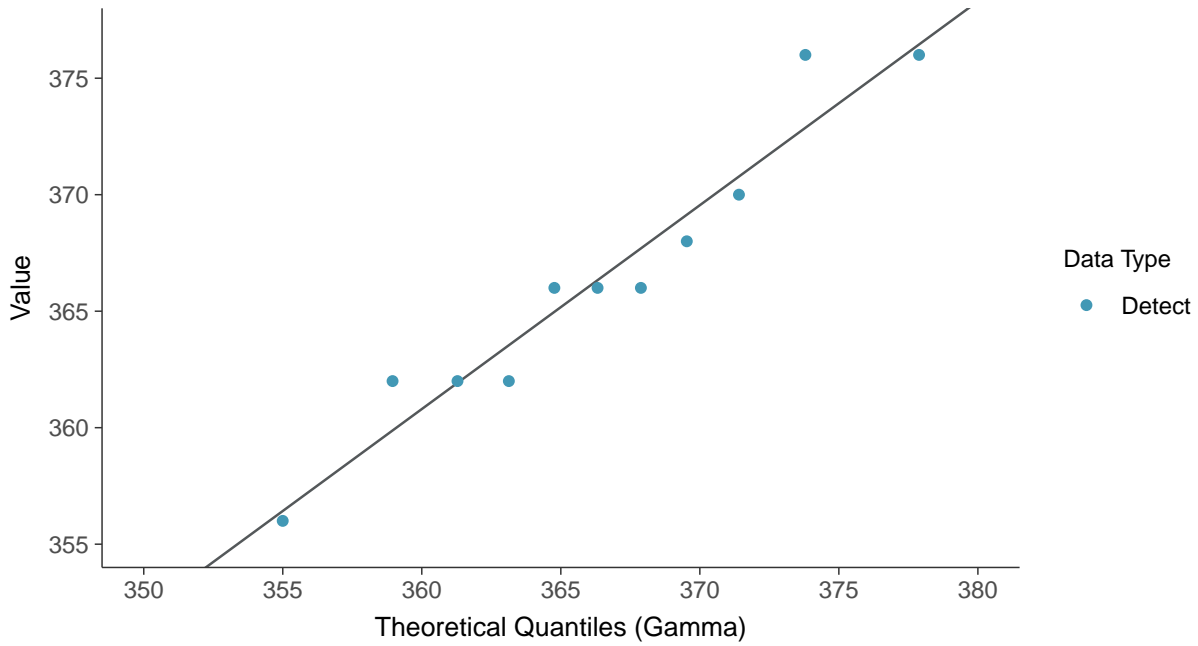
Total Dissolved Solids, MW-7B (mg/L)





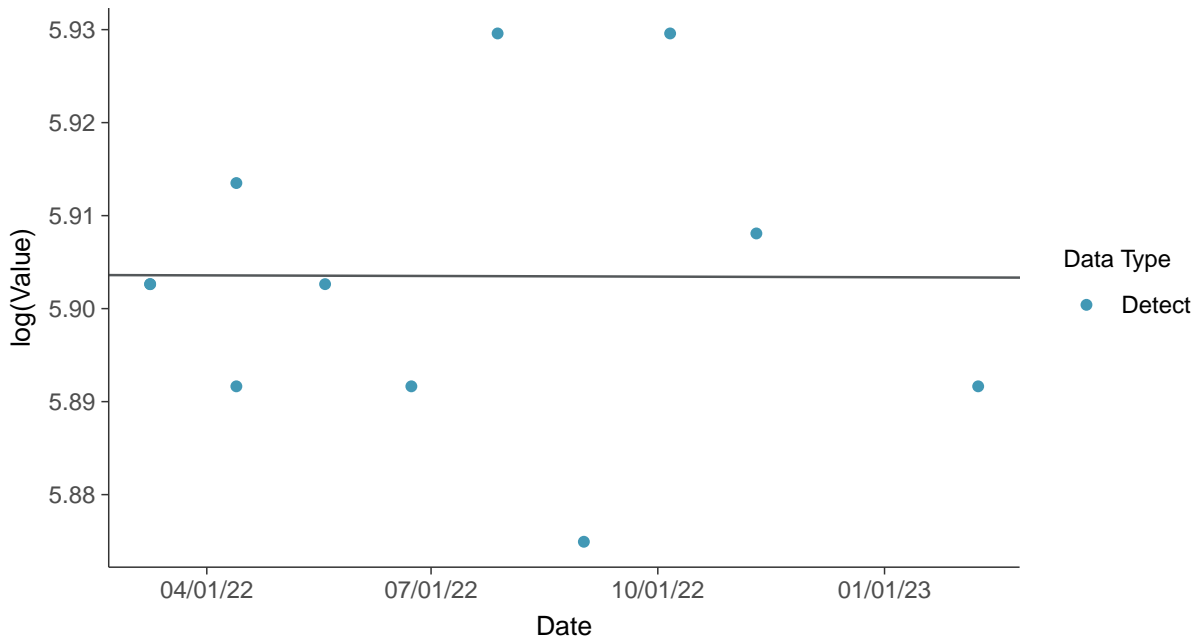
Gamma Q-Q plot

Total Dissolved Solids, MW-7B (mg/L)



Trend Regression: Lognormal MLE

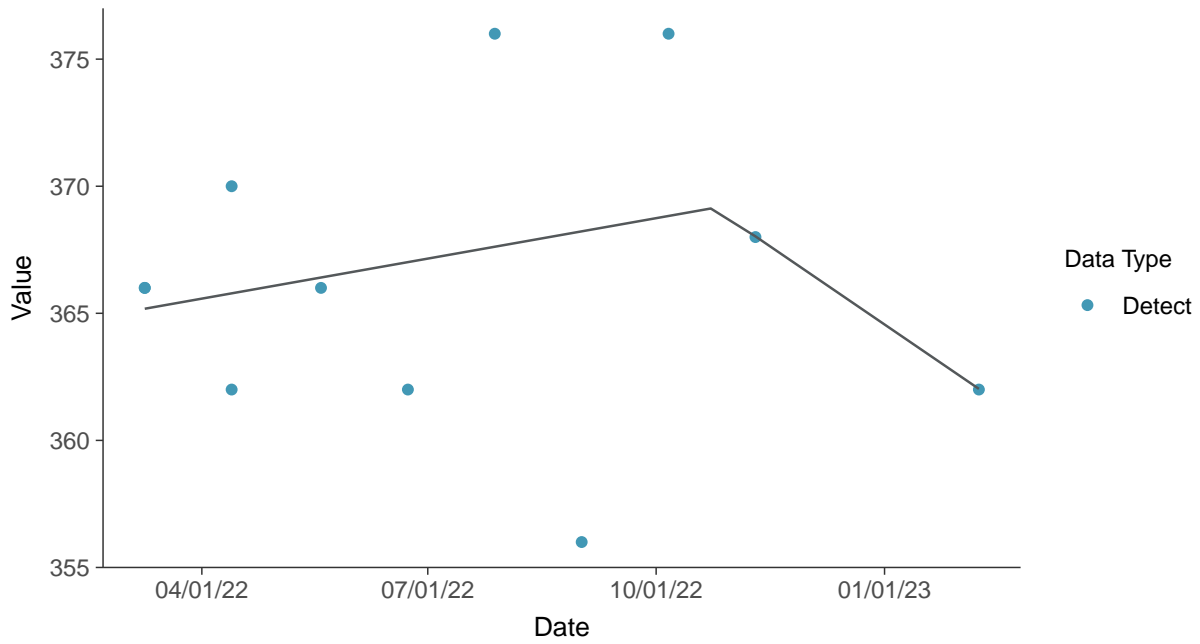
Total Dissolved Solids, MW-7B (mg/L)





Trend Regression: Piecewise Linear-Linear

Total Dissolved Solids, MW-7B (mg/L)



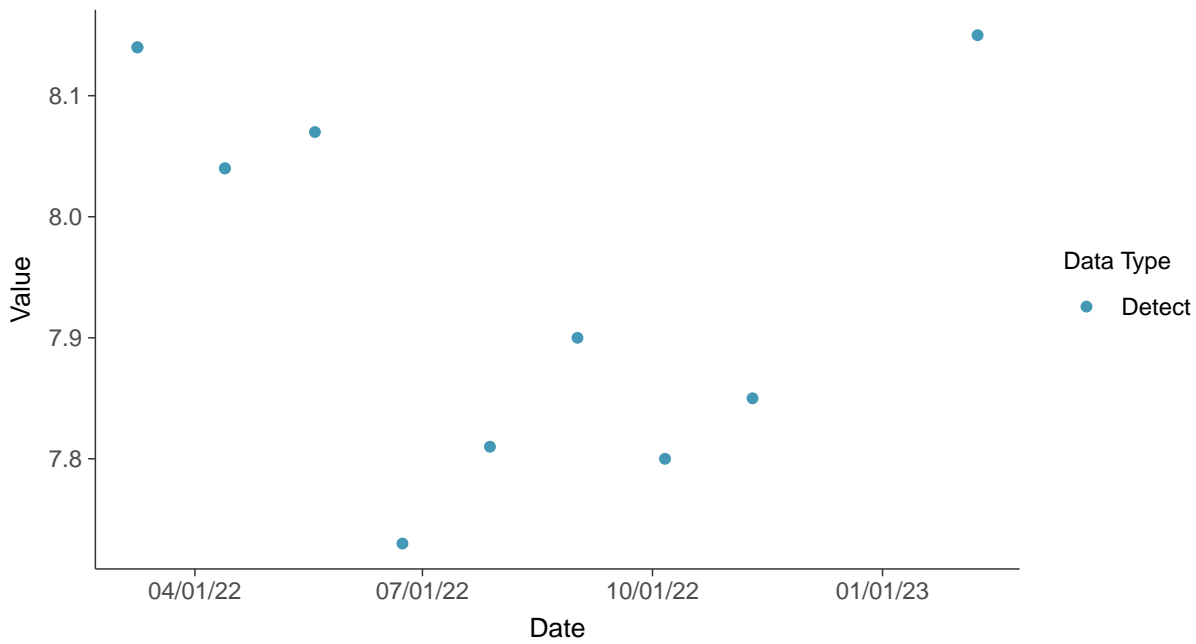


Appendix III: pH, Field, MW-7B

ID: 7B_1_07

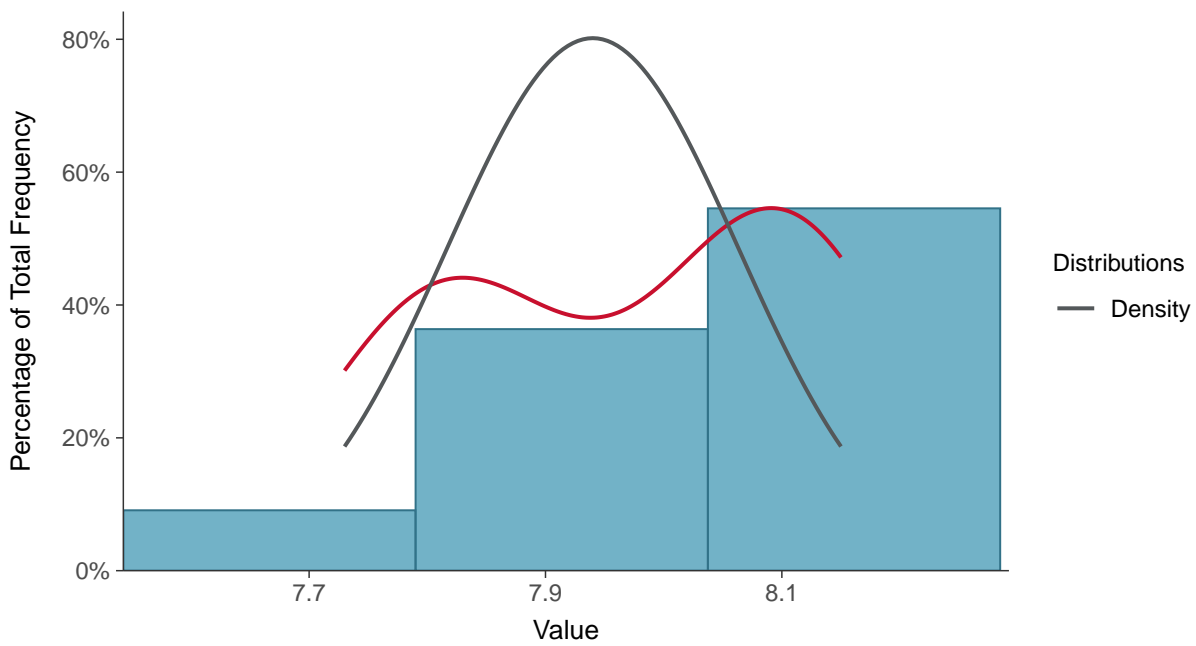
Scatter Plot

pH, Field, MW-7B (su)



Histogram

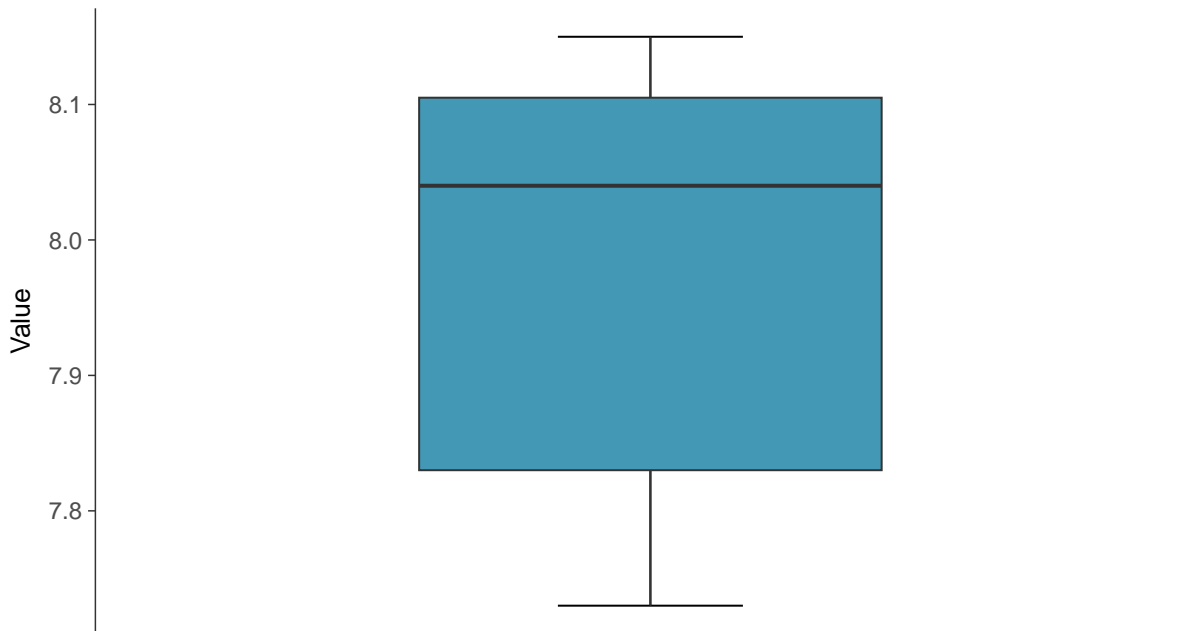
pH, Field, MW-7B (su)





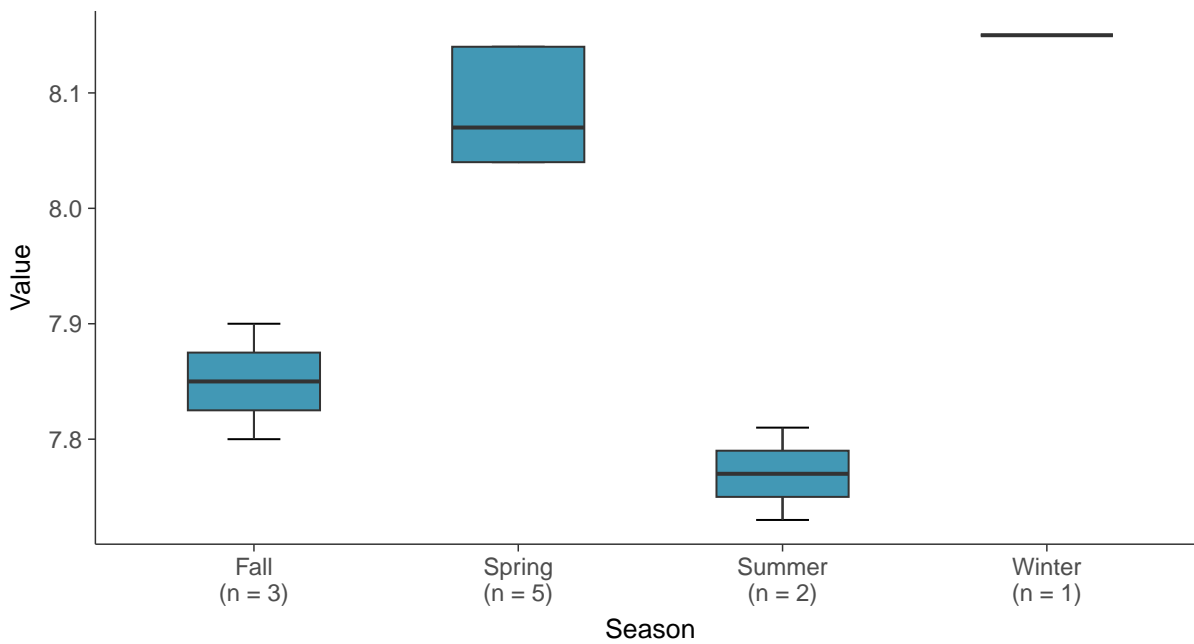
Boxplot

pH, Field, MW-7B (su)



Boxplot by Season

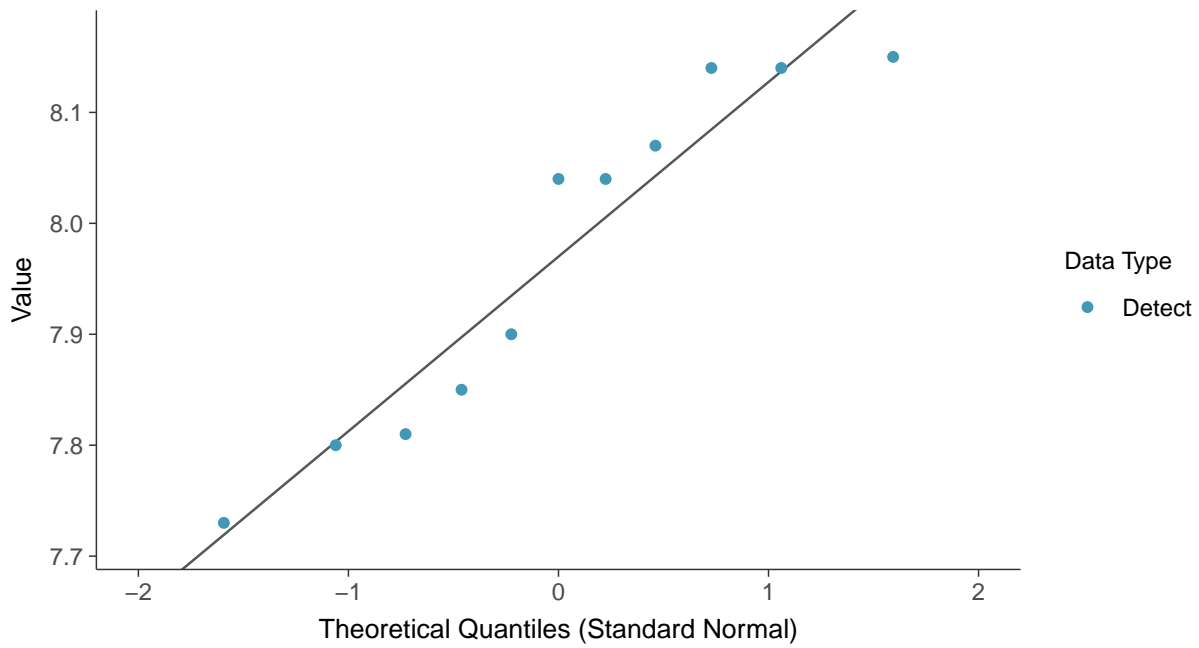
pH, Field, MW-7B (su)





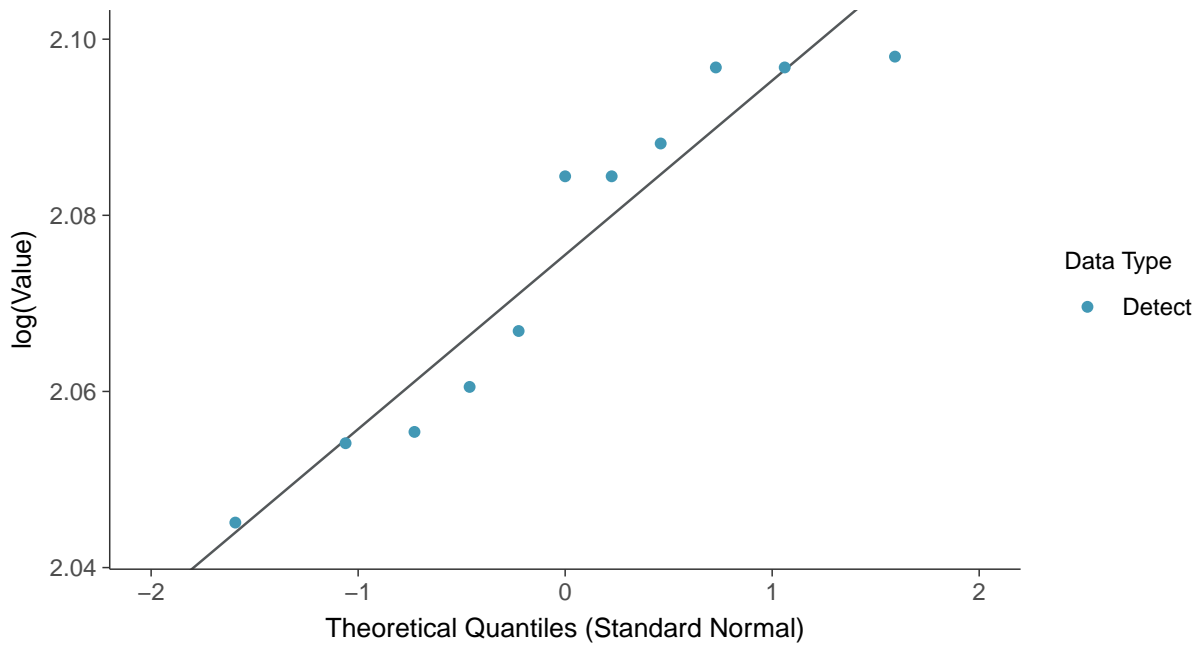
Normal Q-Q plot

pH, Field, MW-7B (su)



Lognormal Q-Q plot

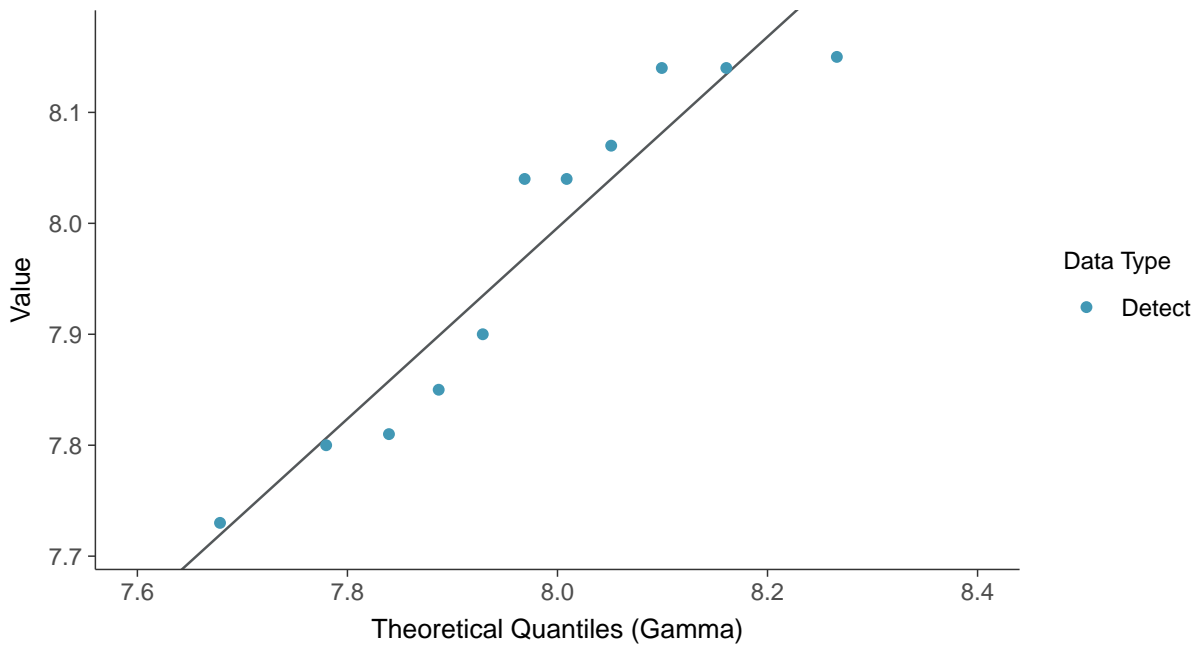
pH, Field, MW-7B (su)





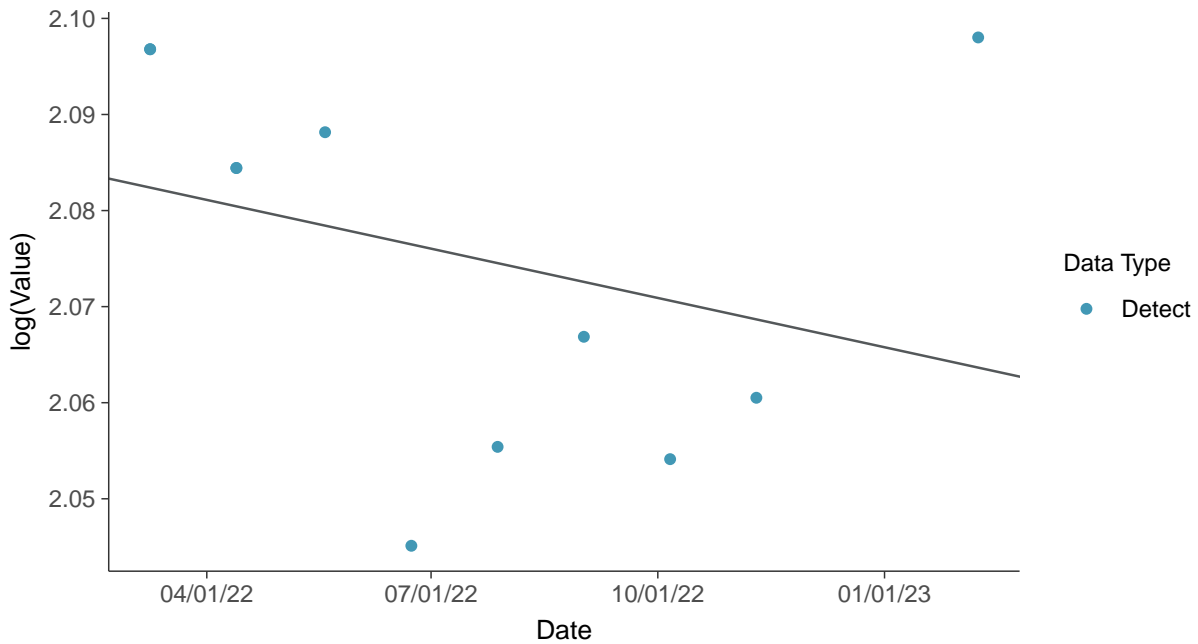
Gamma Q-Q plot

pH, Field, MW-7B (su)



Trend Regression: Lognormal MLE

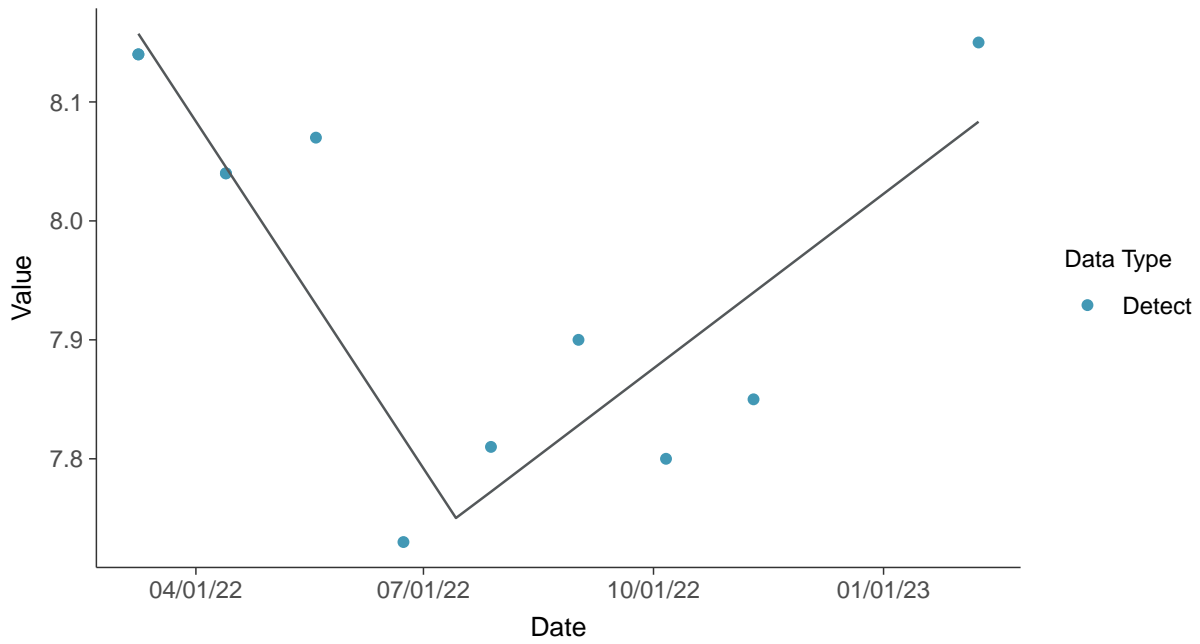
pH, Field, MW-7B (su)





Trend Regression: Piecewise Linear-Linear

pH, Field, MW-7B (su)



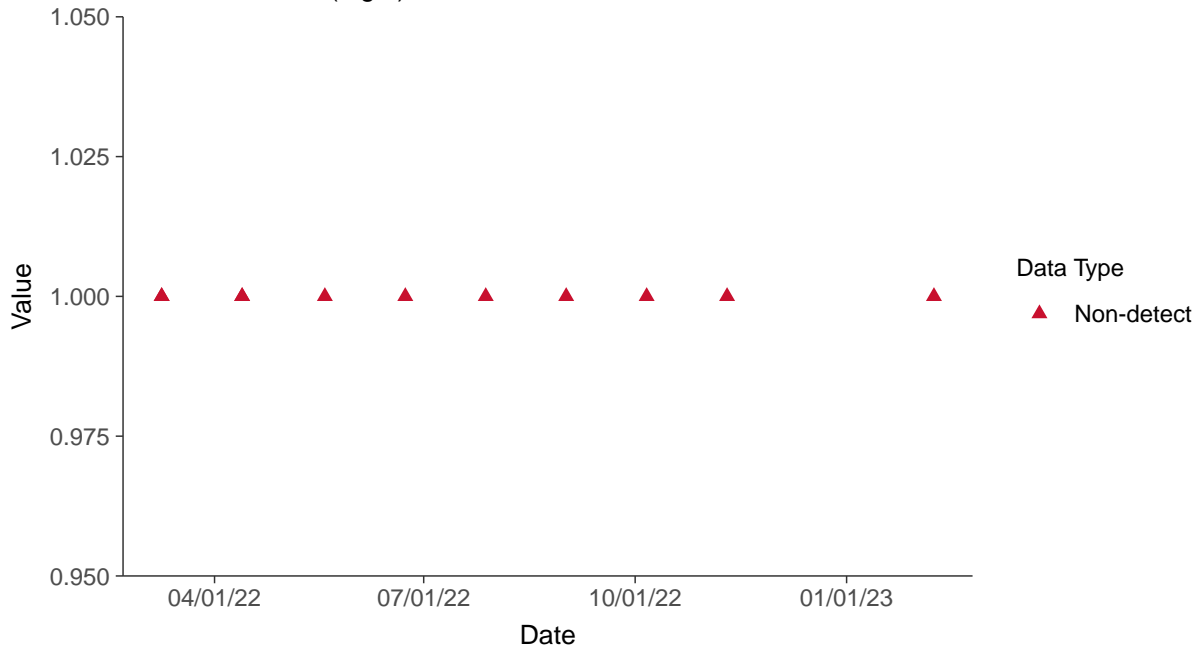


Appendix IV: Fluoride, MW-7B

ID: 7B_2_04

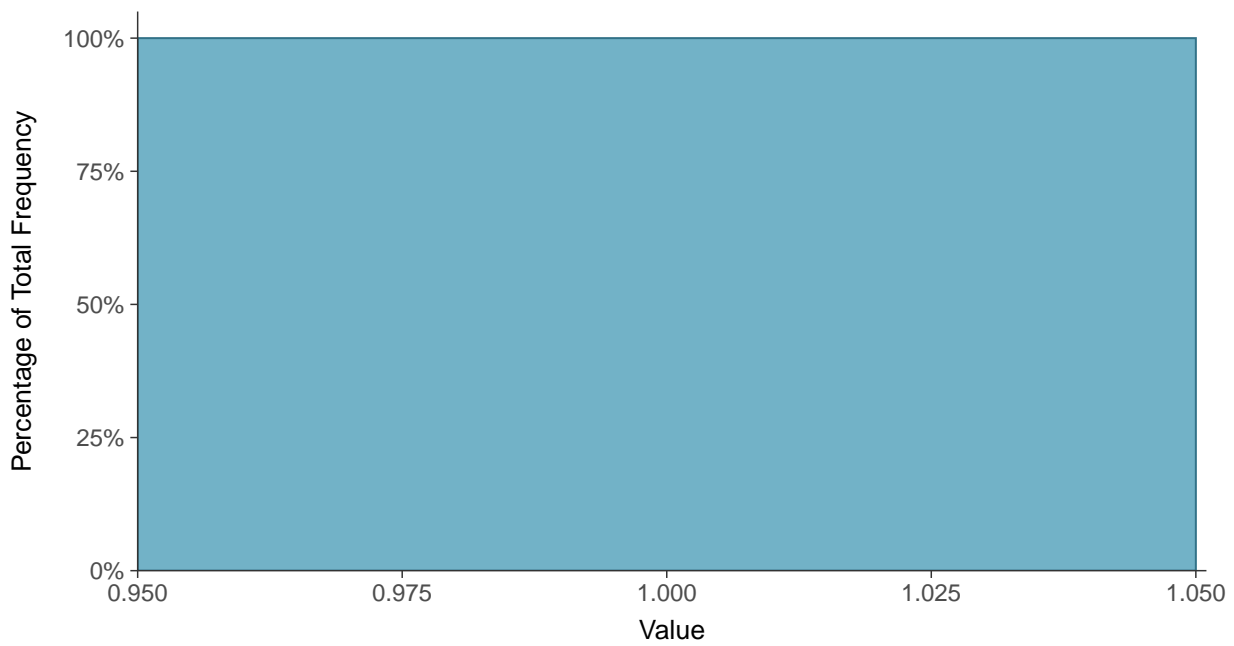
Scatter Plot

Fluoride, MW-7B (mg/L)



Histogram

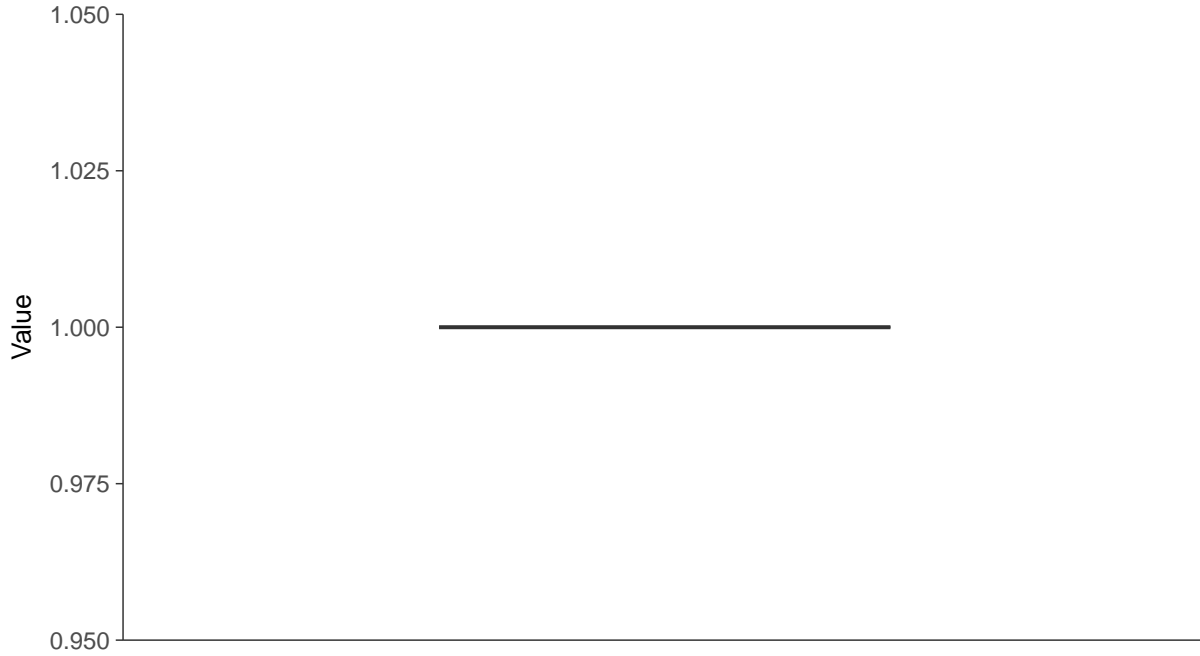
Fluoride, MW-7B (mg/L)





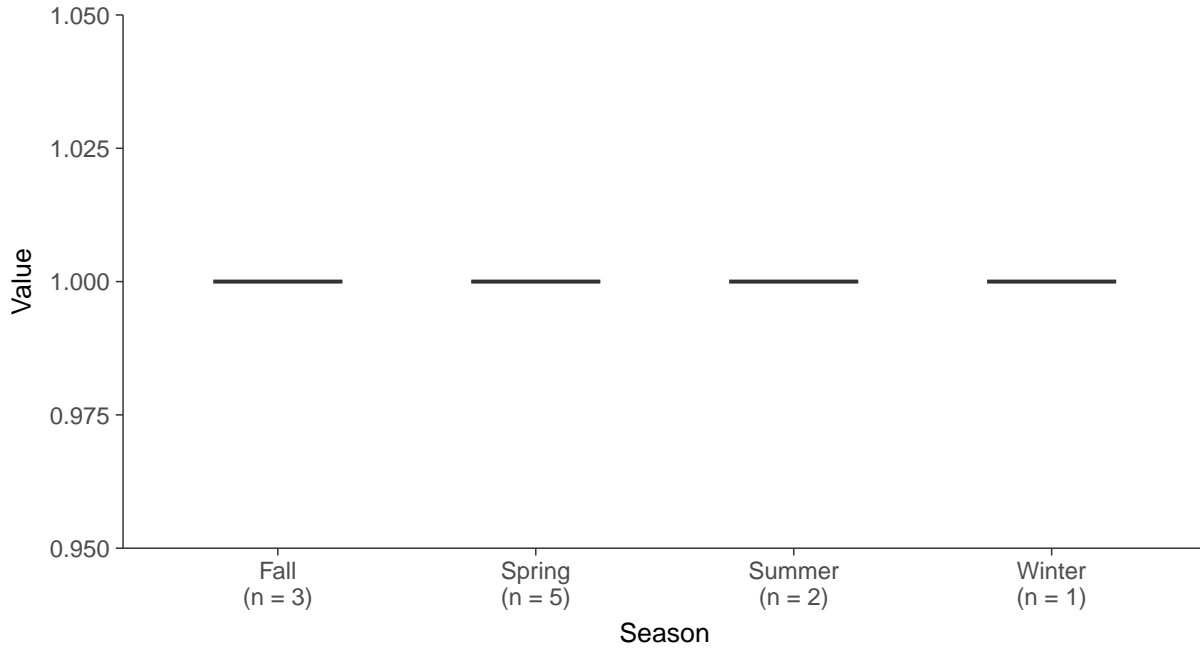
Boxplot

Fluoride, MW-7B (mg/L)



Boxplot by Season

Fluoride, MW-7B (mg/L)



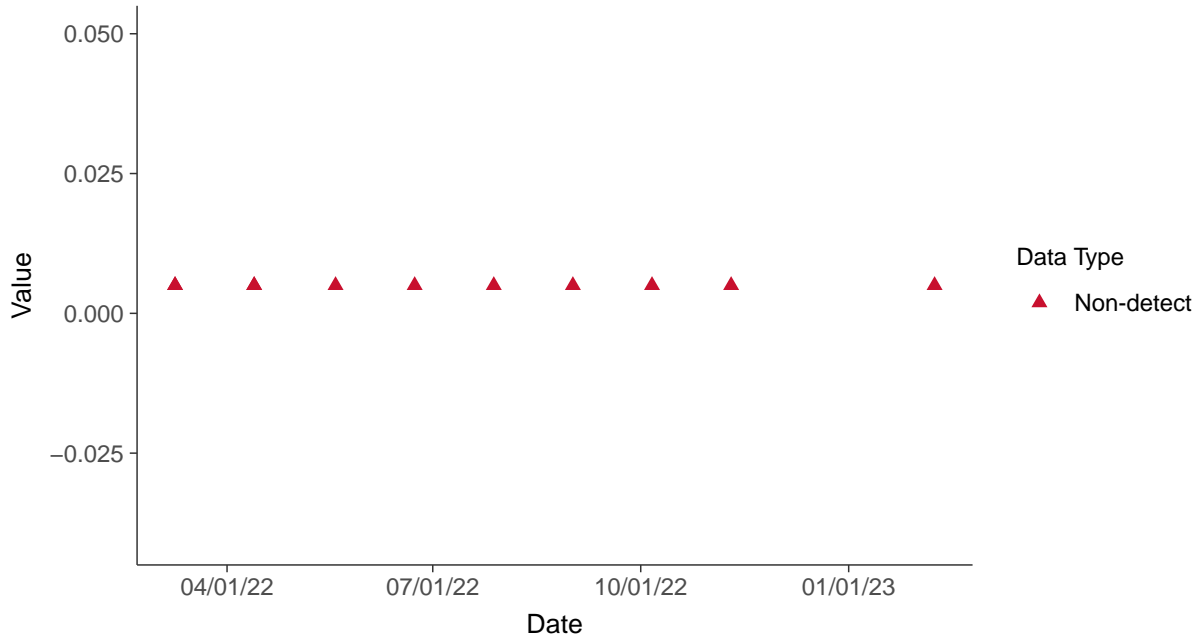


Appendix IV: Antimony, MW-7B

ID: 7B_2_08

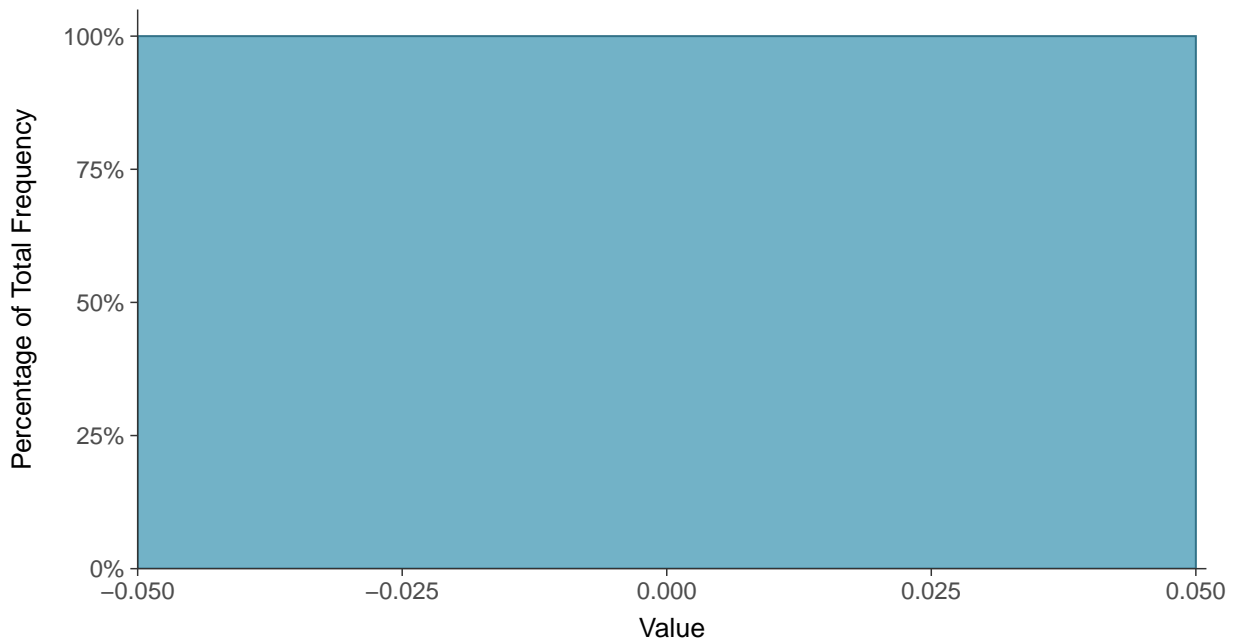
Scatter Plot

Antimony, MW-7B (mg/L)



Histogram

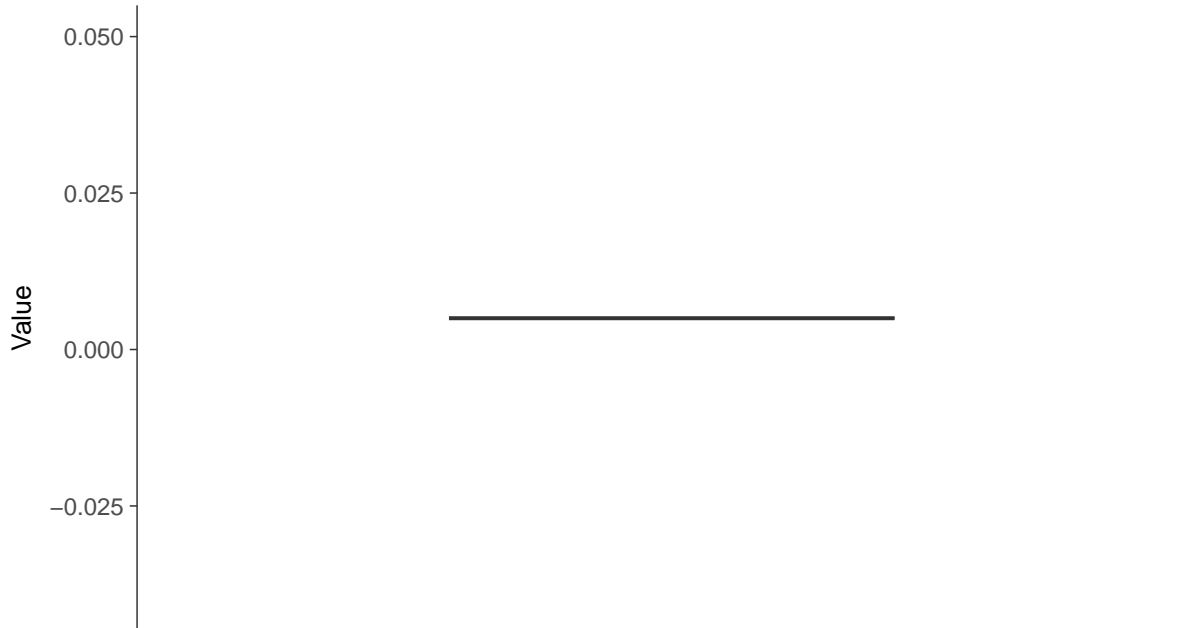
Antimony, MW-7B (mg/L)





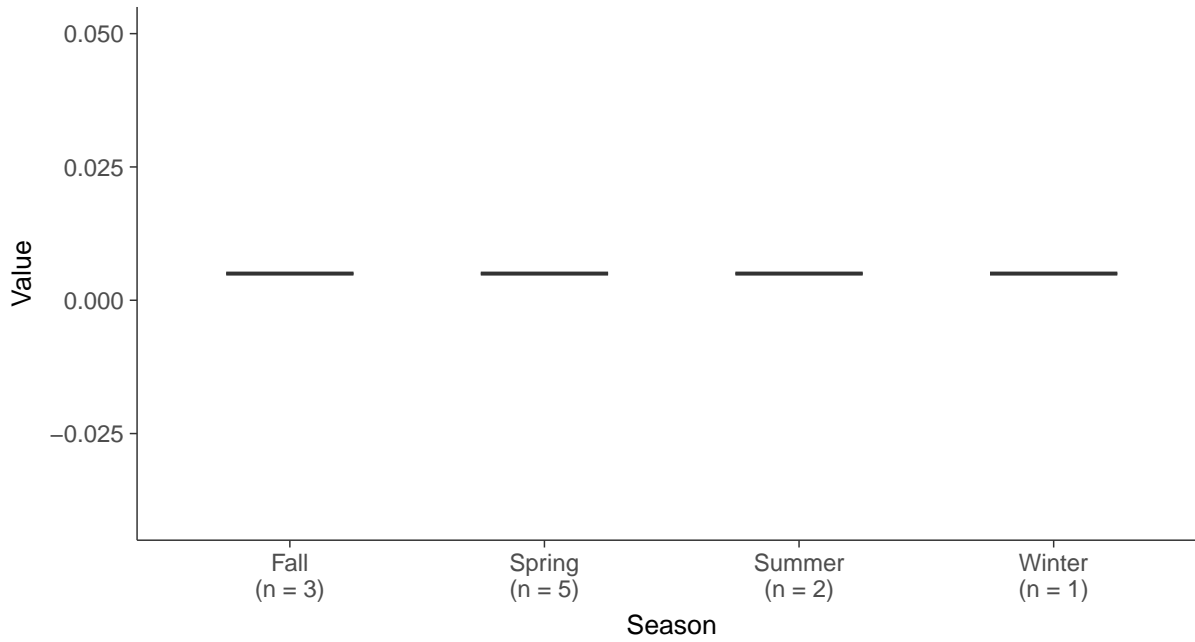
Boxplot

Antimony, MW-7B (mg/L)



Boxplot by Season

Antimony, MW-7B (mg/L)

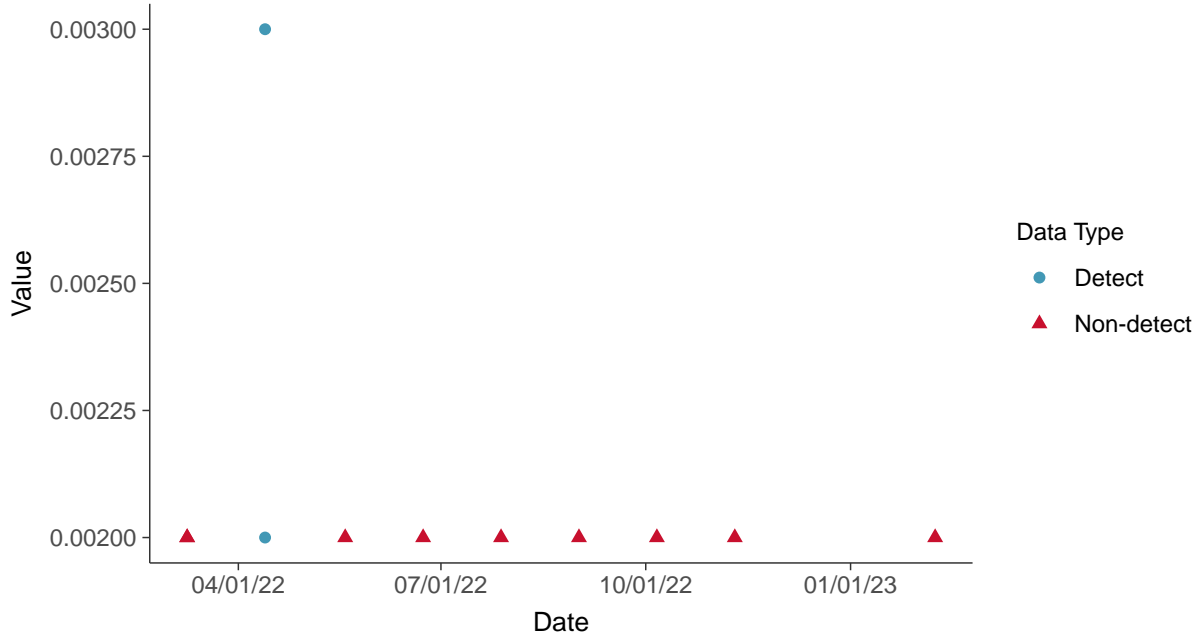


Appendix IV: Arsenic, MW-7B

ID: 7B_2_09

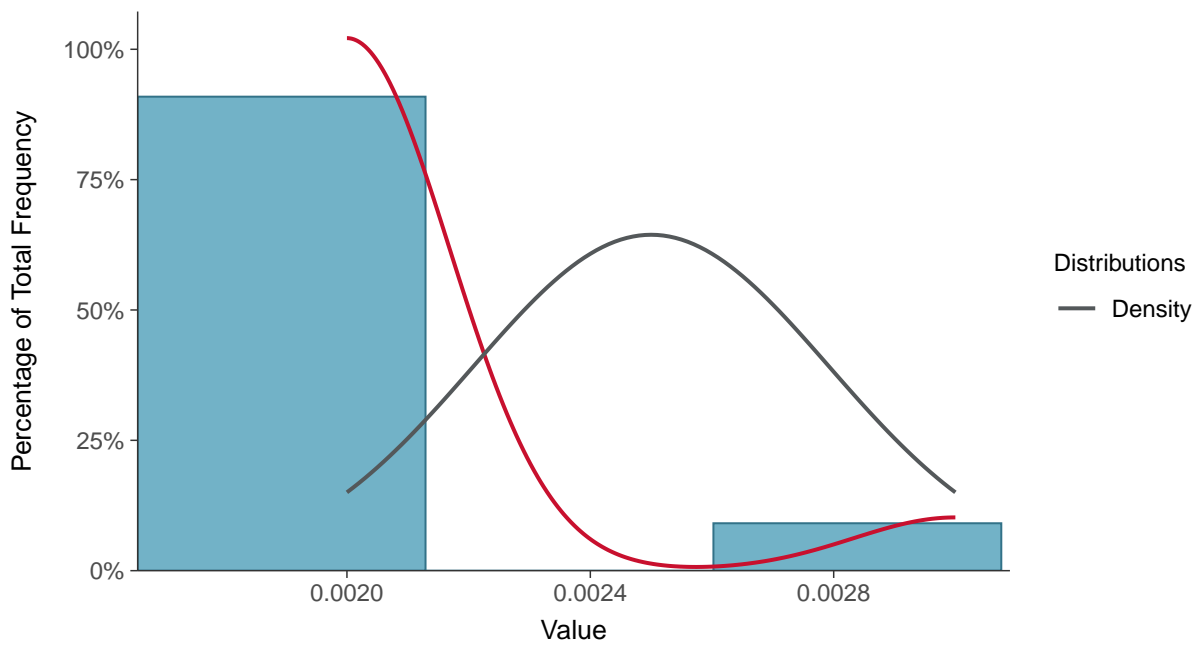
Scatter Plot

Arsenic, MW-7B (mg/L)



Histogram

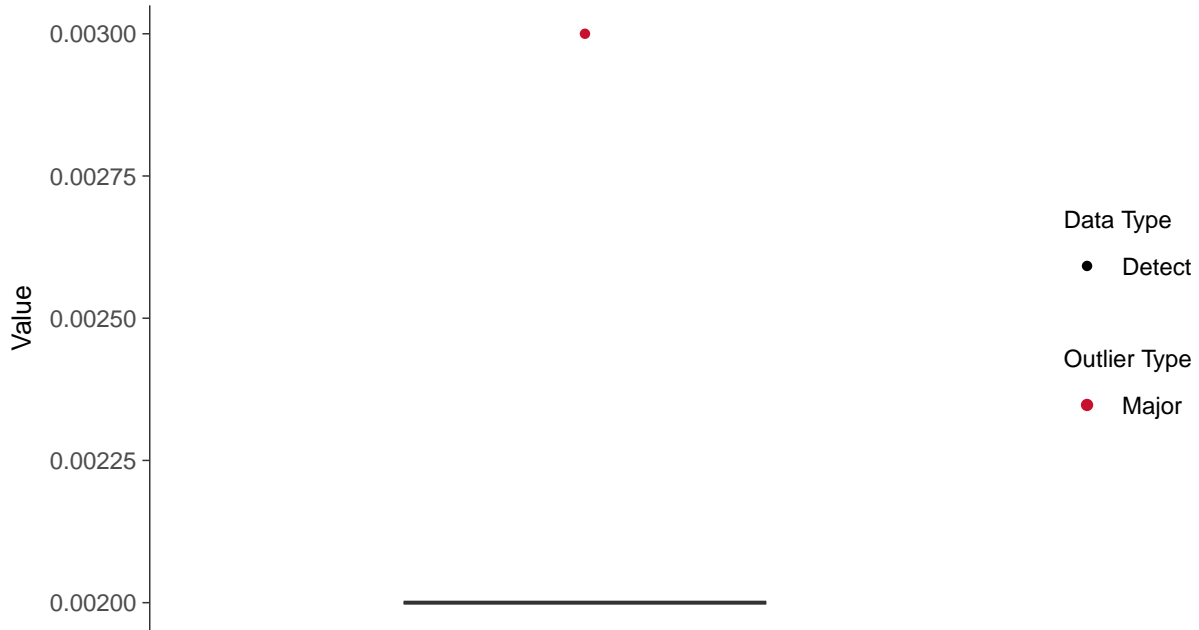
Arsenic, MW-7B (mg/L)





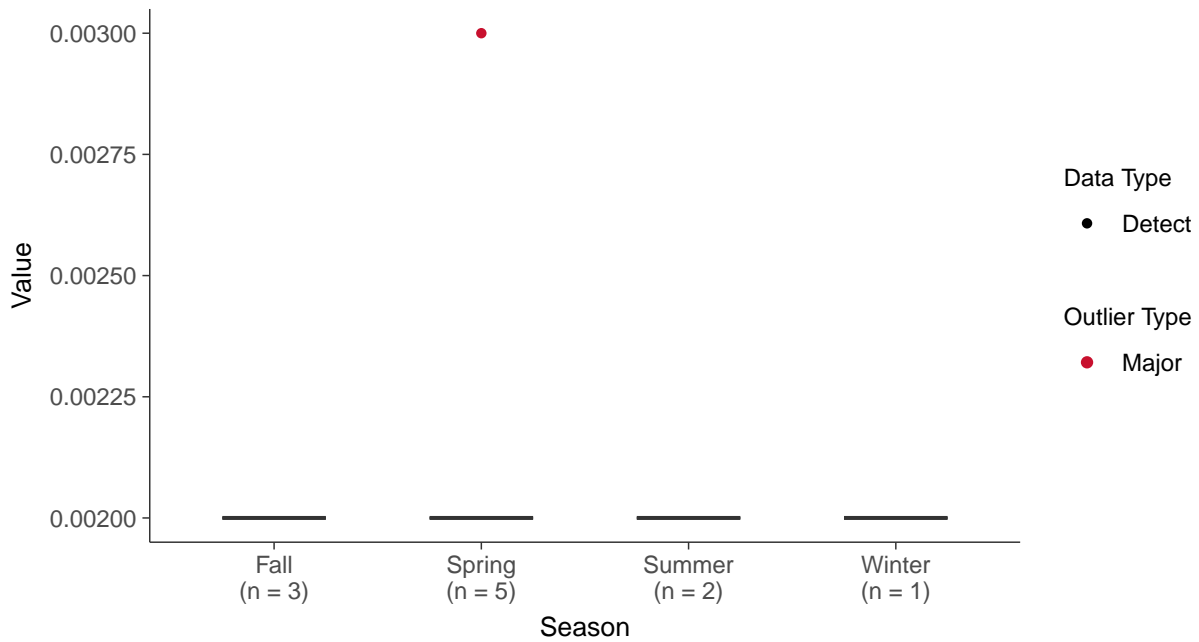
Boxplot

Arsenic, MW-7B (mg/L)



Boxplot by Season

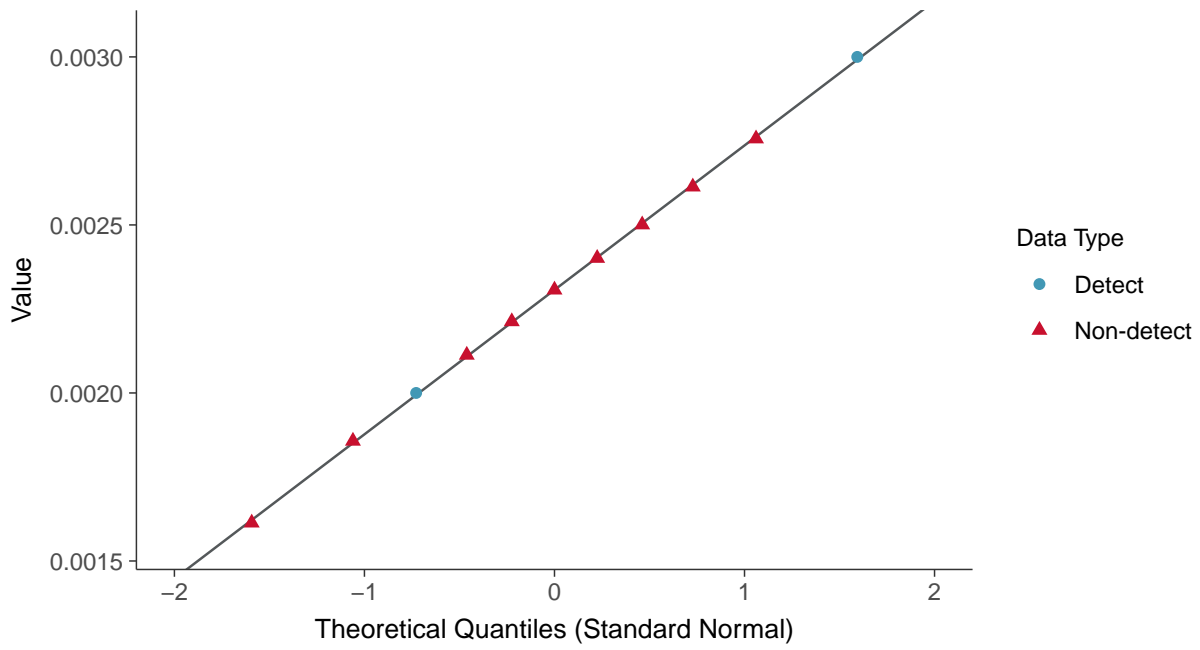
Arsenic, MW-7B (mg/L)





Normal Q-Q plot using ROS Imputed Estimates

Arsenic, MW-7B (mg/L)



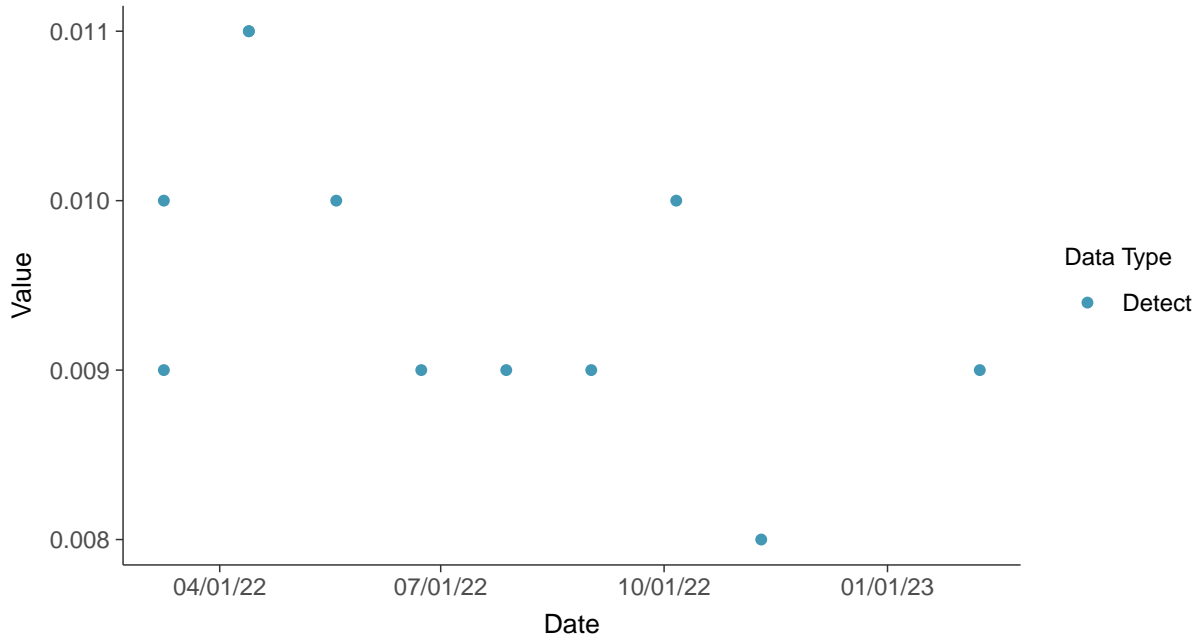


Appendix IV: Barium, MW-7B

ID: 7B_2_10

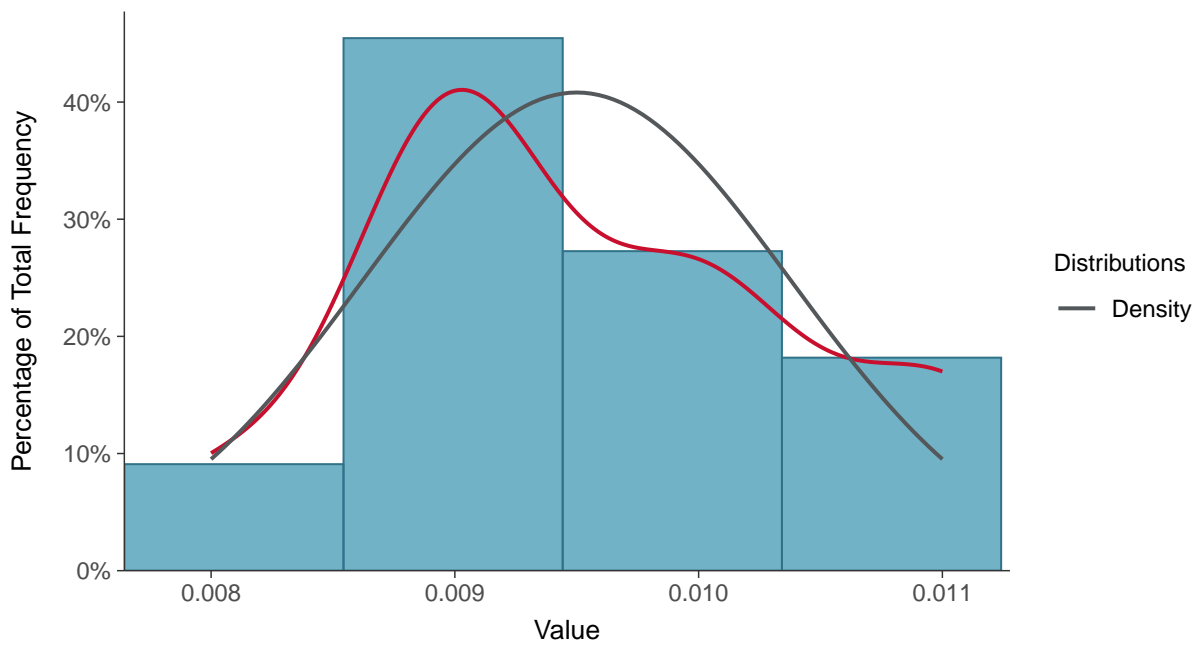
Scatter Plot

Barium, MW-7B (mg/L)



Histogram

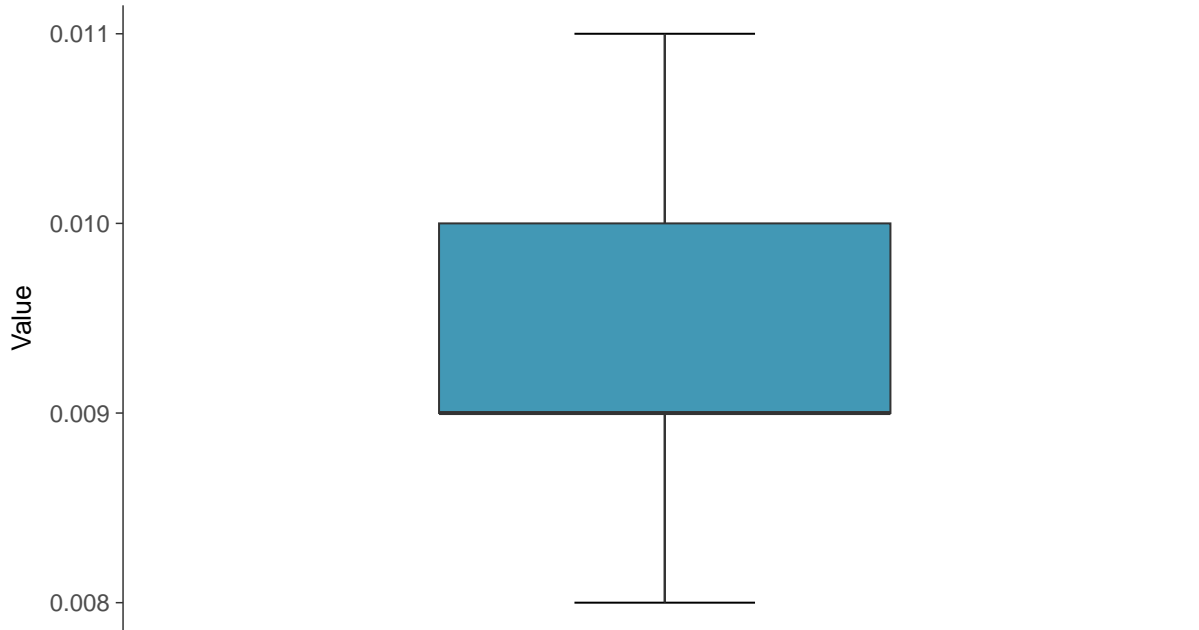
Barium, MW-7B (mg/L)





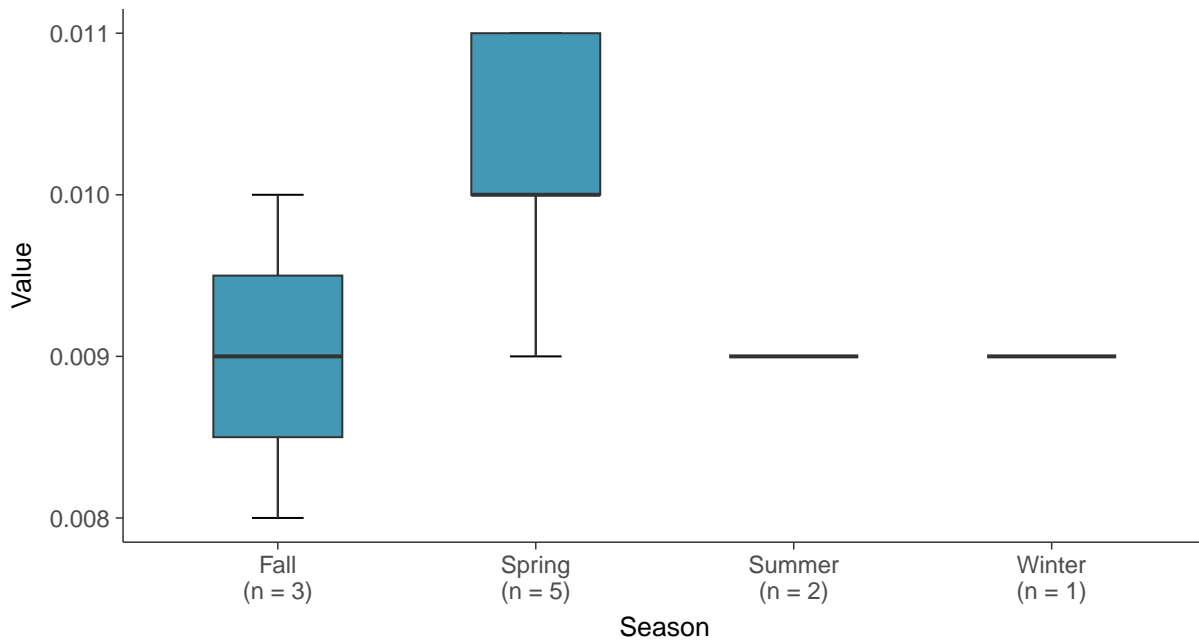
Boxplot

Barium, MW-7B (mg/L)



Boxplot by Season

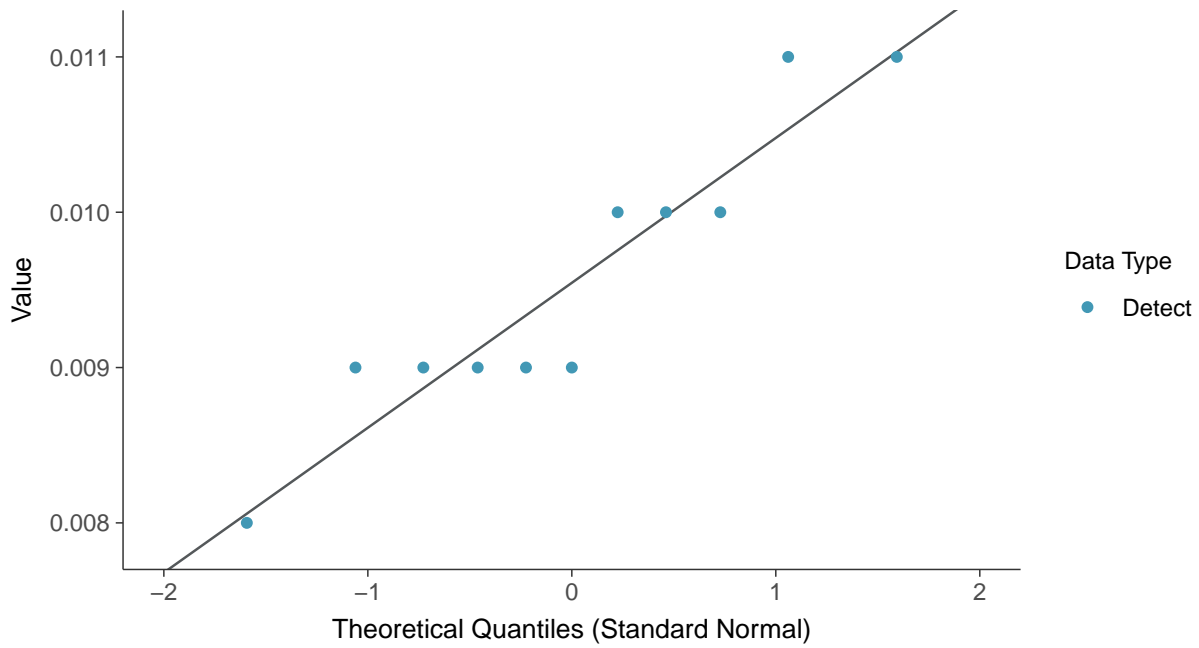
Barium, MW-7B (mg/L)





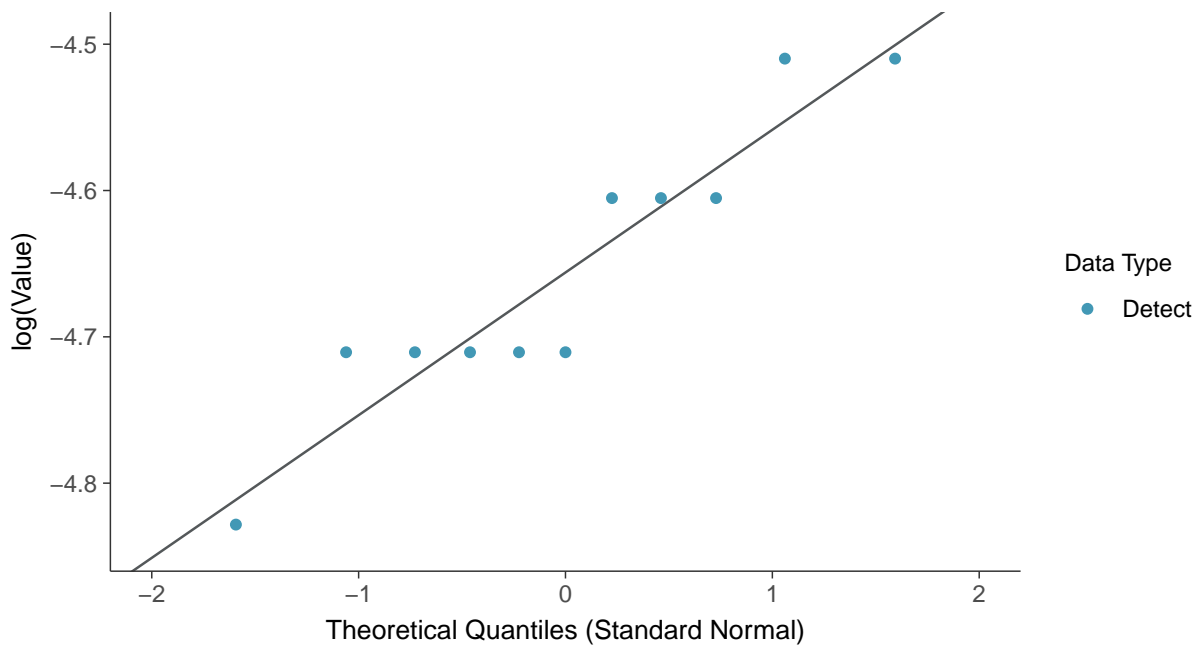
Normal Q-Q plot

Barium, MW-7B (mg/L)



Lognormal Q-Q plot

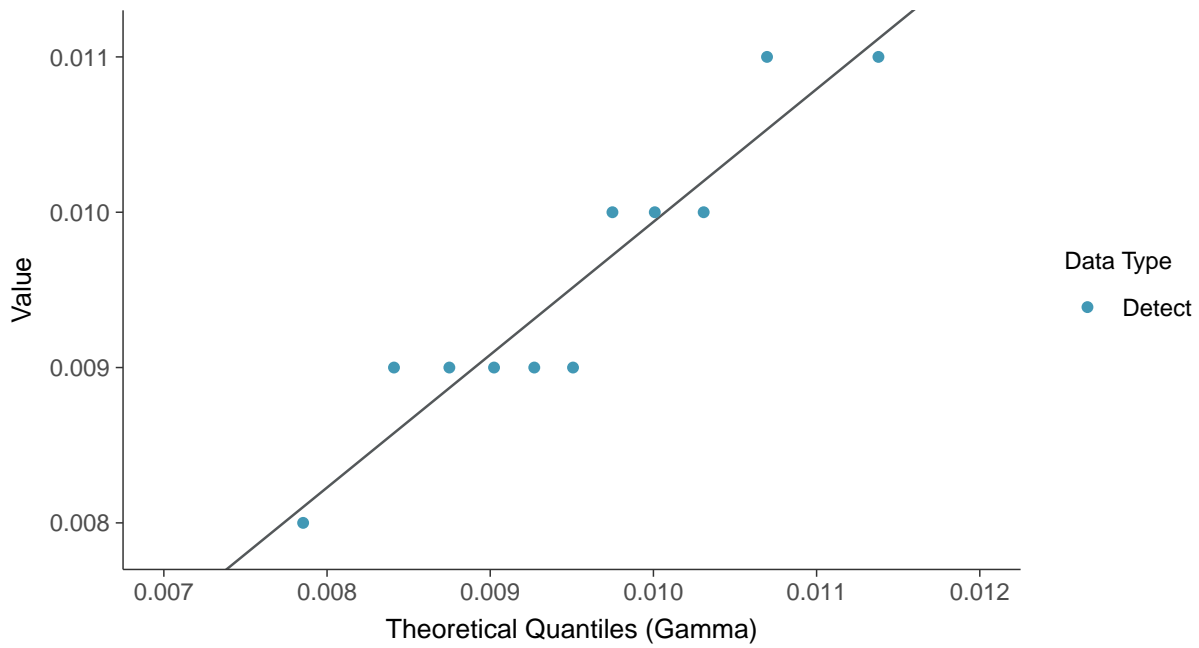
Barium, MW-7B (mg/L)





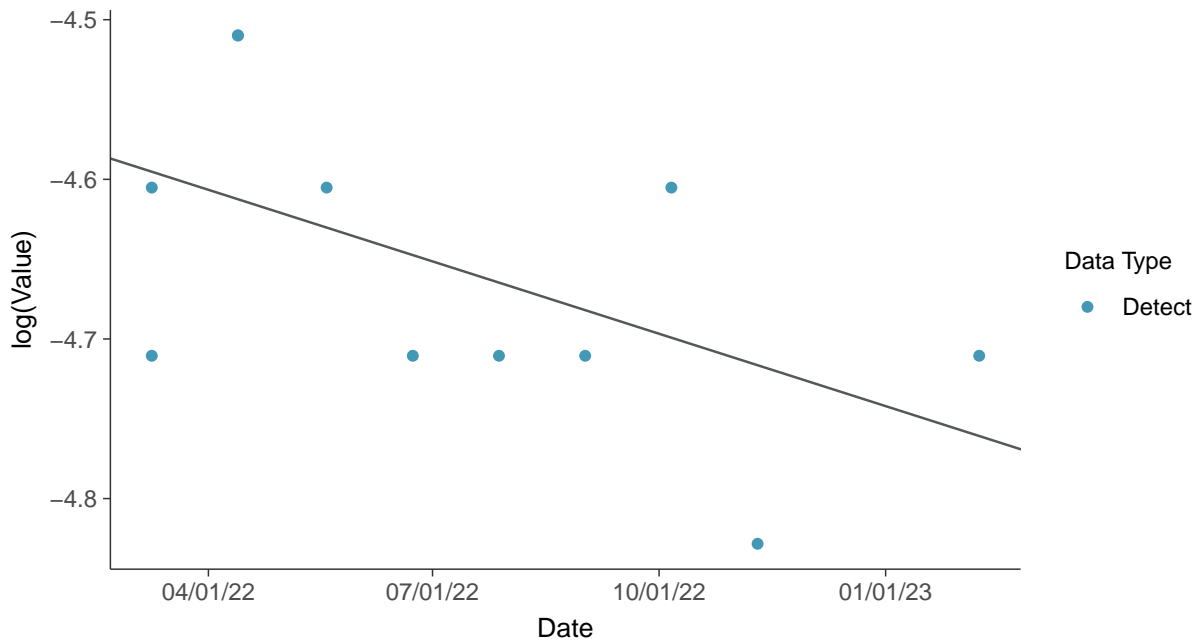
Gamma Q-Q plot

Barium, MW-7B (mg/L)



Trend Regression: Lognormal MLE

Barium, MW-7B (mg/L)



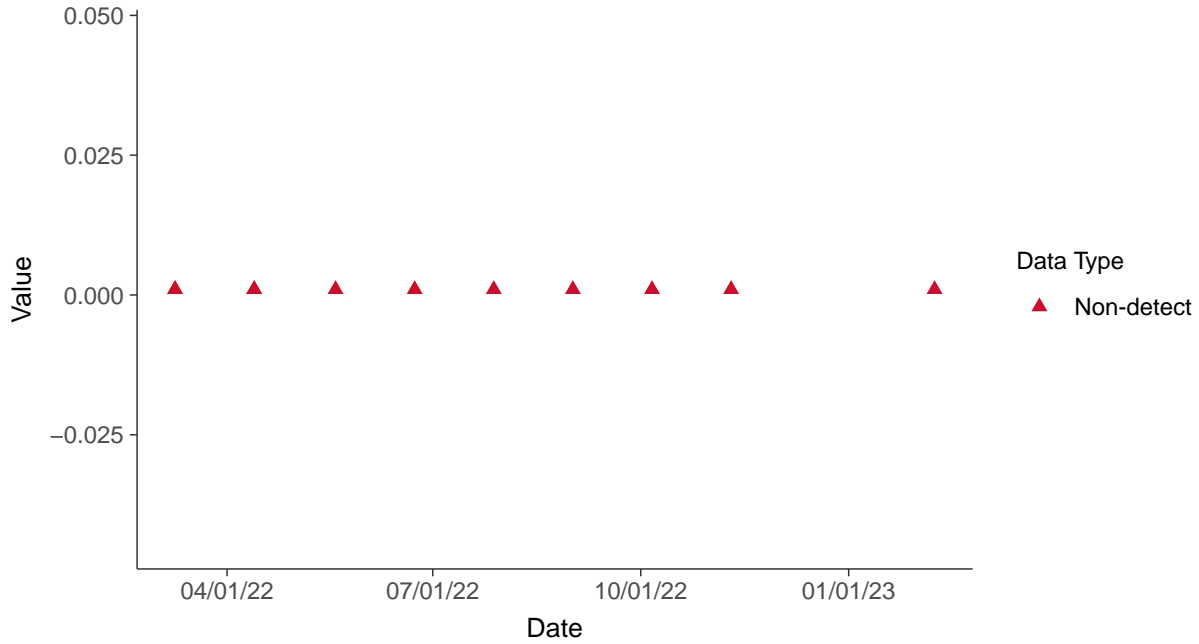


Appendix IV: Beryllium, MW-7B

ID: 7B_2_11

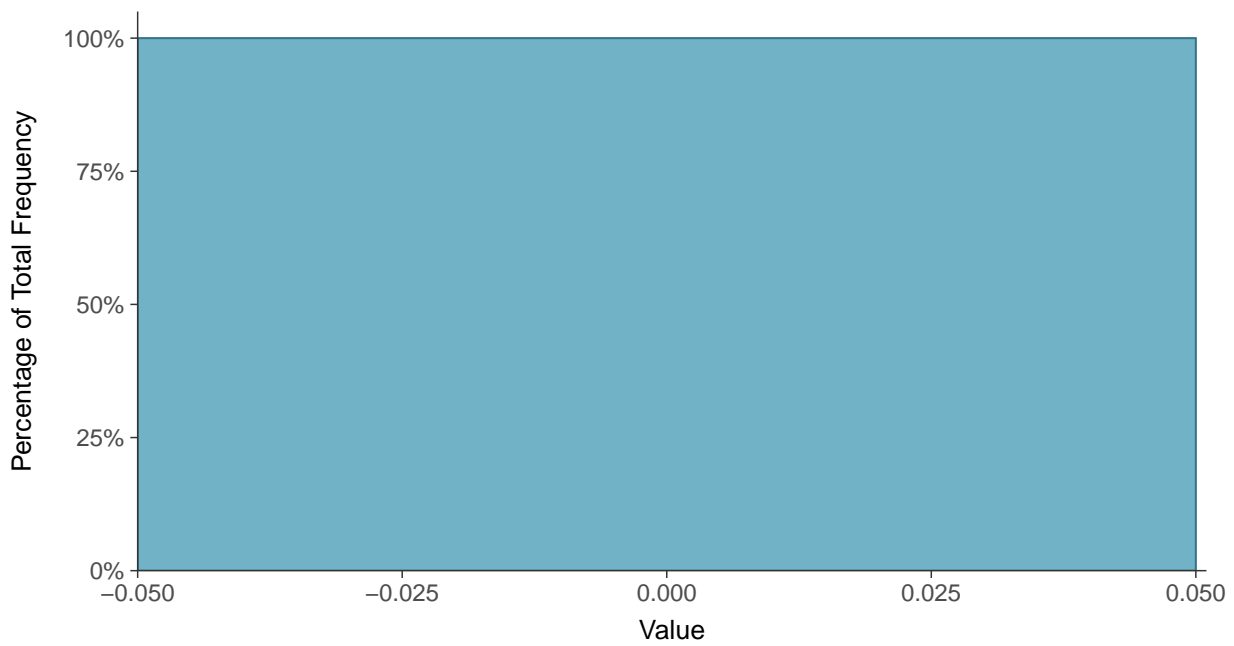
Scatter Plot

Beryllium, MW-7B (mg/L)



Histogram

Beryllium, MW-7B (mg/L)





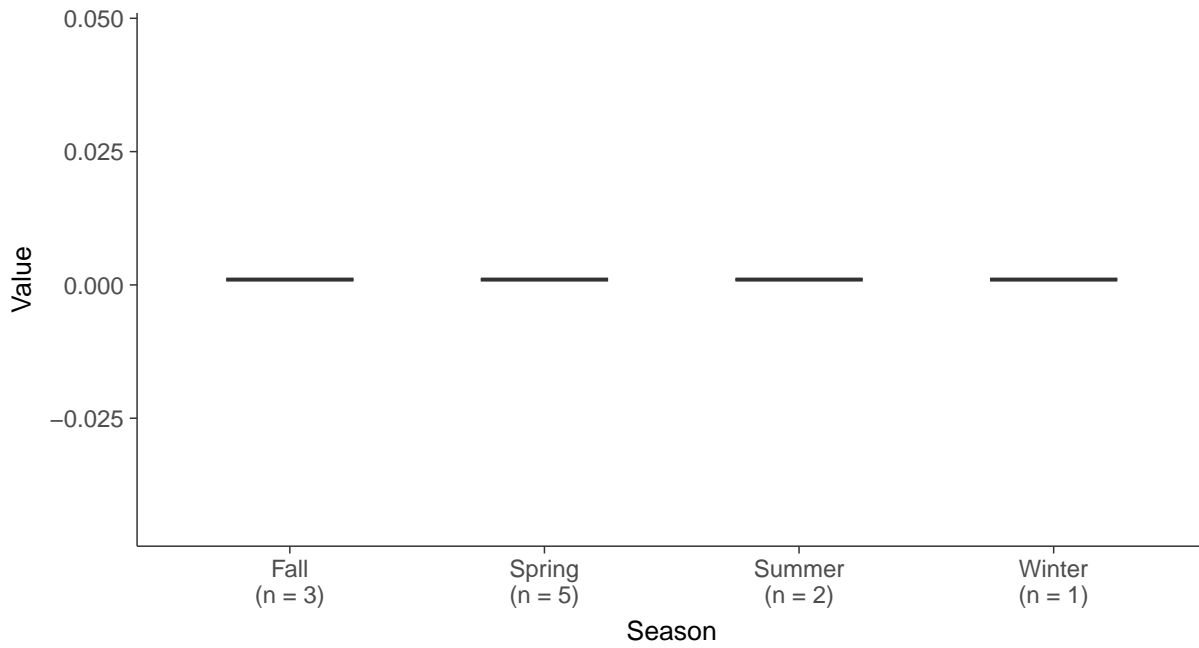
Boxplot

Beryllium, MW-7B (mg/L)



Boxplot by Season

Beryllium, MW-7B (mg/L)



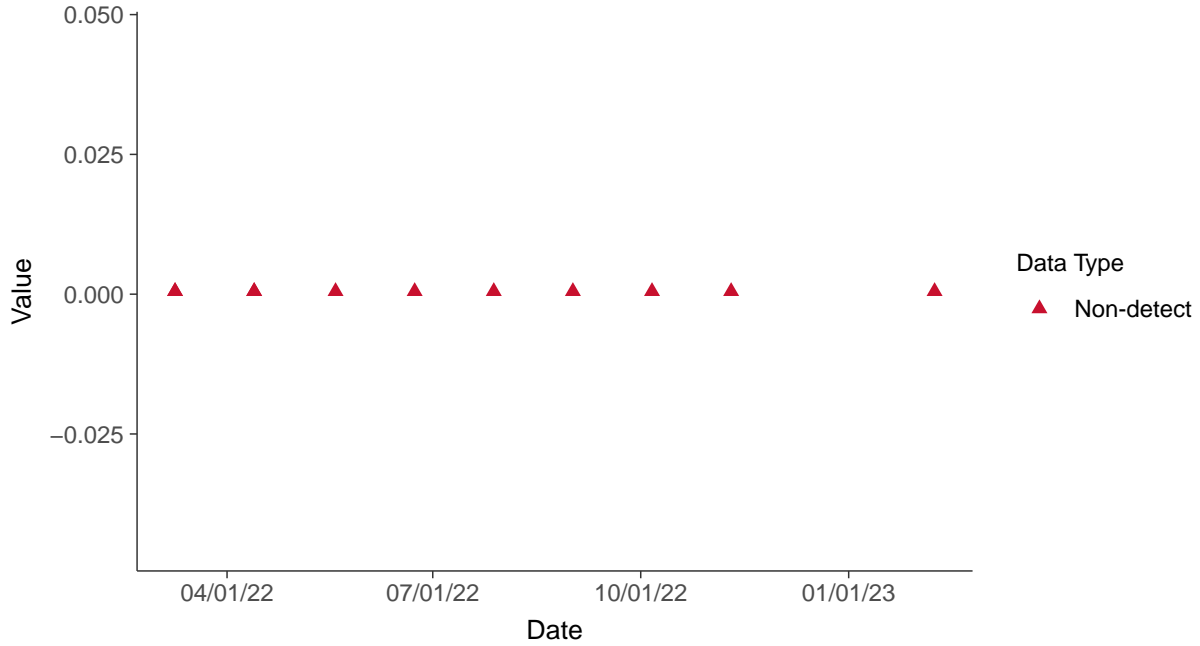


Appendix IV: Cadmium, MW-7B

ID: 7B_2_13

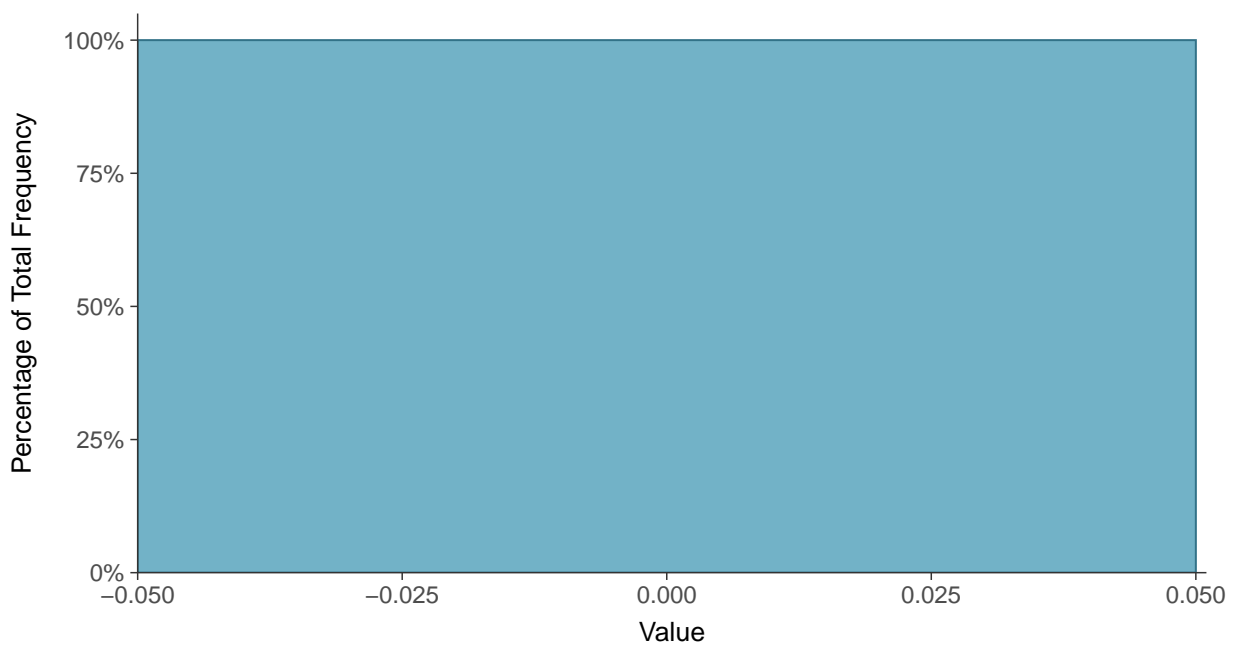
Scatter Plot

Cadmium, MW-7B (mg/L)



Histogram

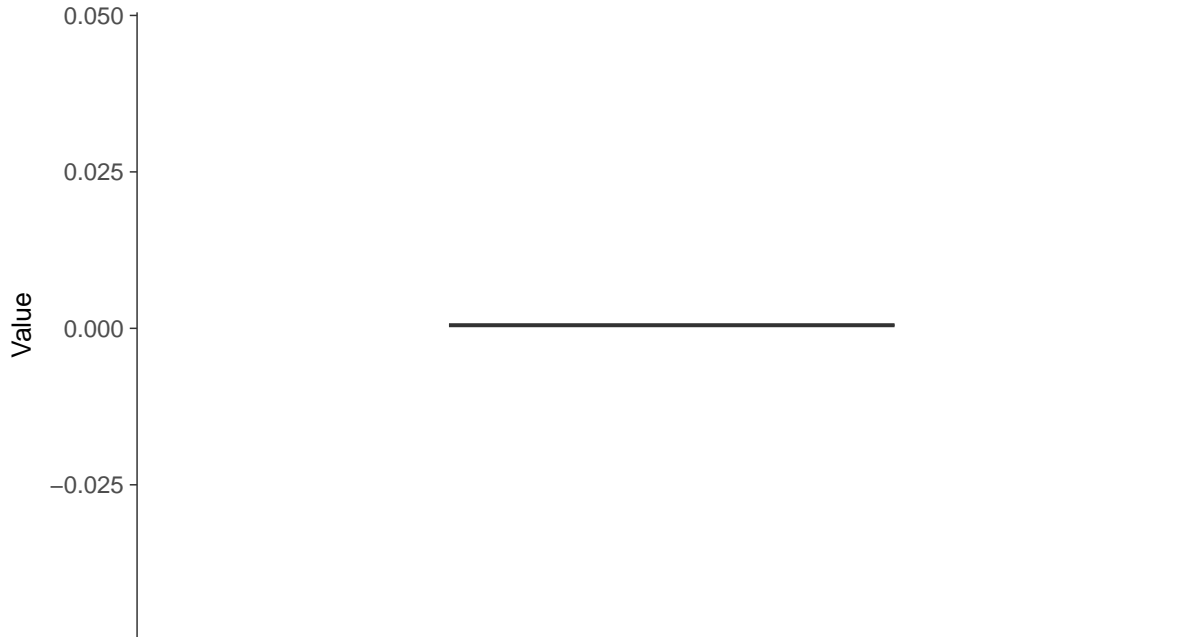
Cadmium, MW-7B (mg/L)





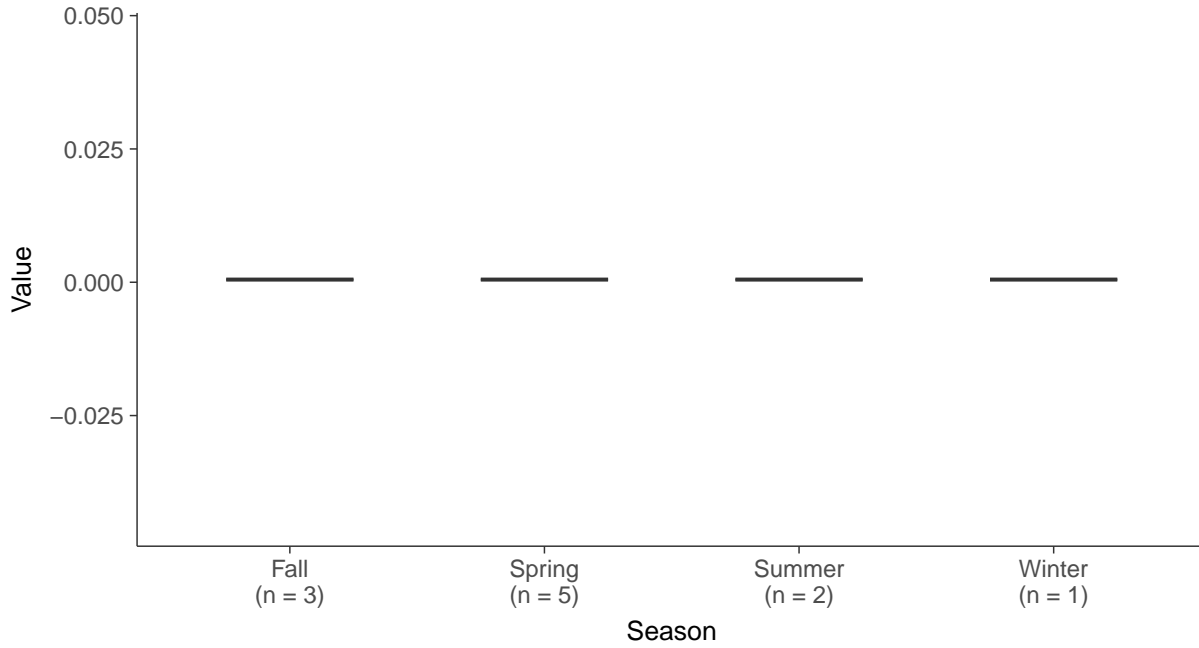
Boxplot

Cadmium, MW-7B (mg/L)



Boxplot by Season

Cadmium, MW-7B (mg/L)



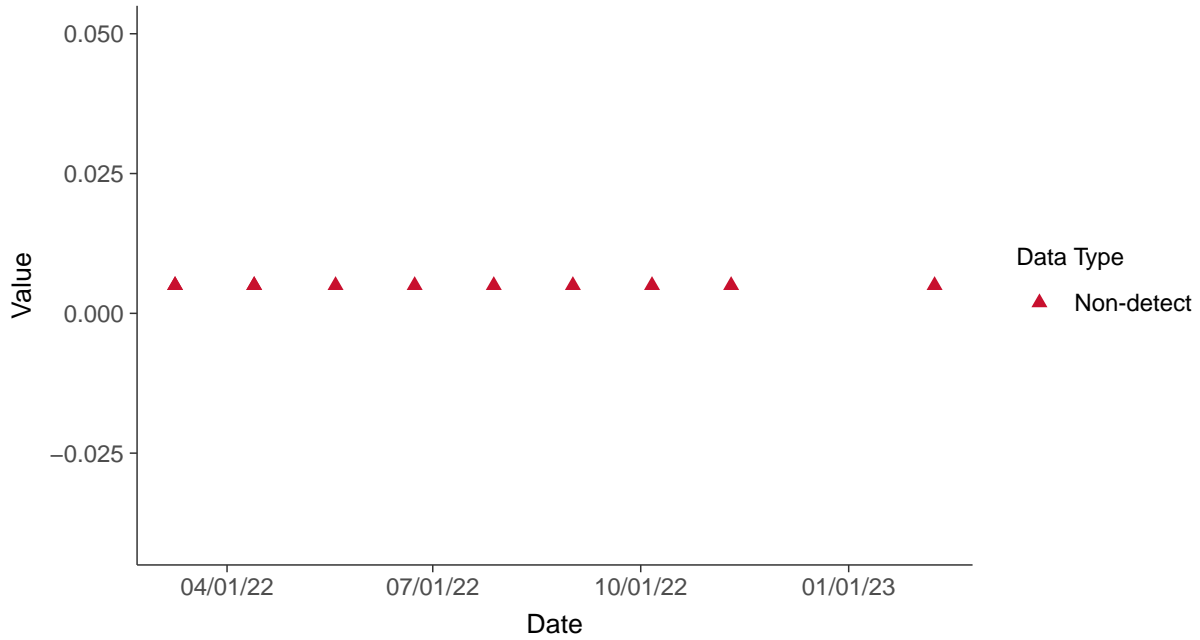


Appendix IV: Chromium, MW-7B

ID: 7B_2_15

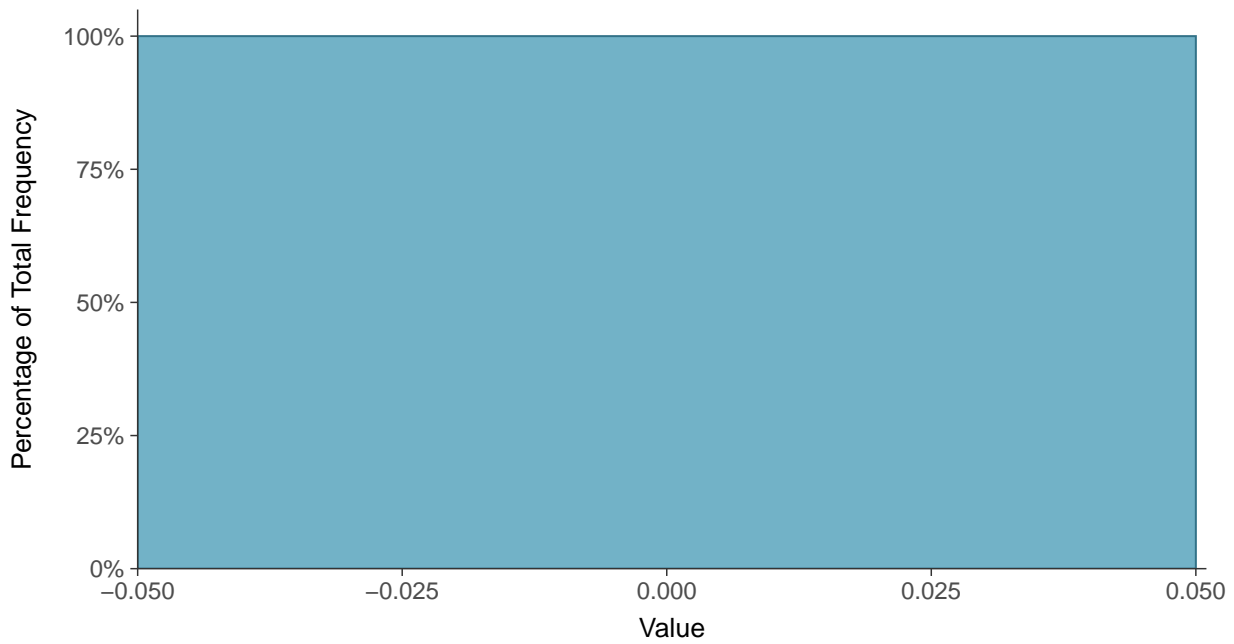
Scatter Plot

Chromium, MW-7B (mg/L)



Histogram

Chromium, MW-7B (mg/L)





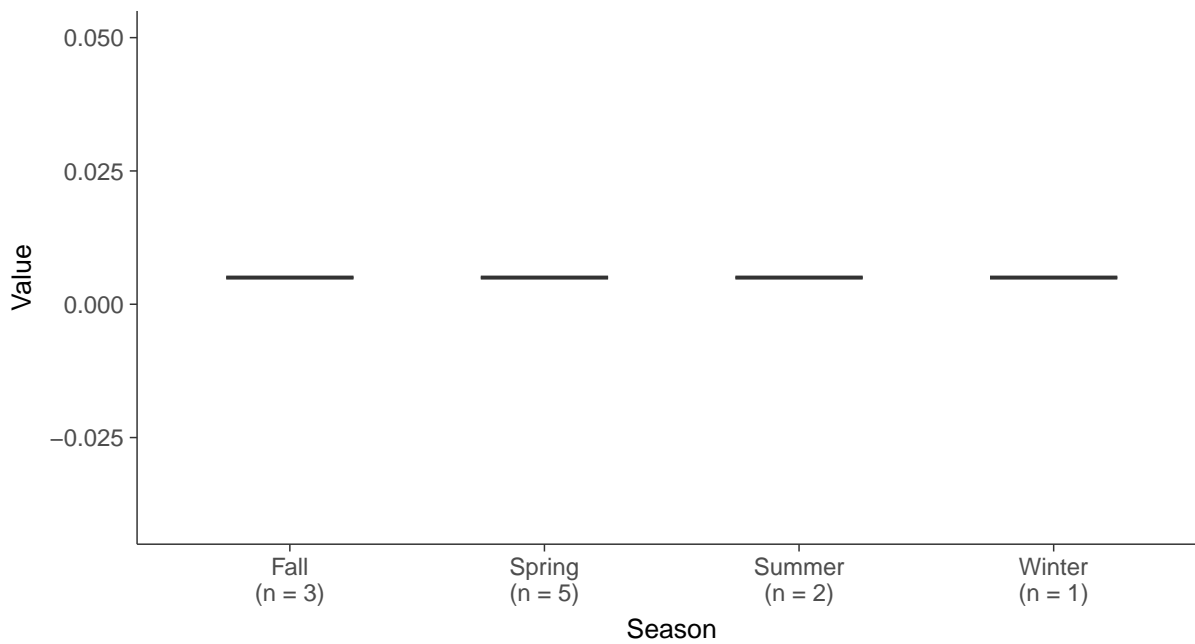
Boxplot

Chromium, MW-7B (mg/L)



Boxplot by Season

Chromium, MW-7B (mg/L)



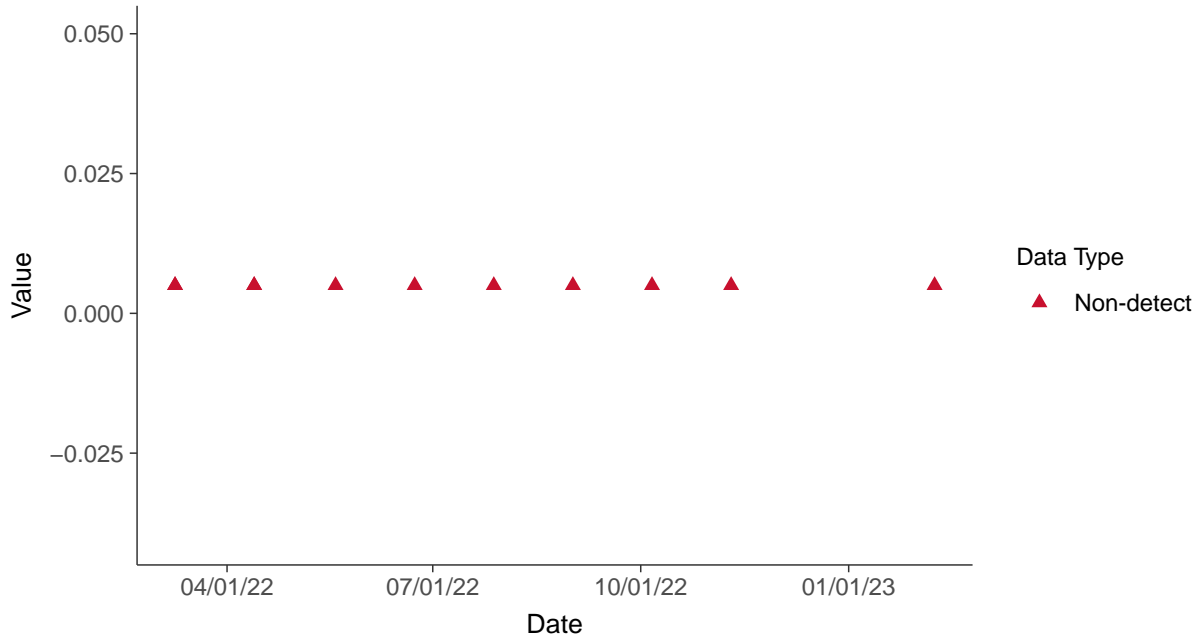


Appendix IV: Cobalt, MW-7B

ID: 7B_2_16

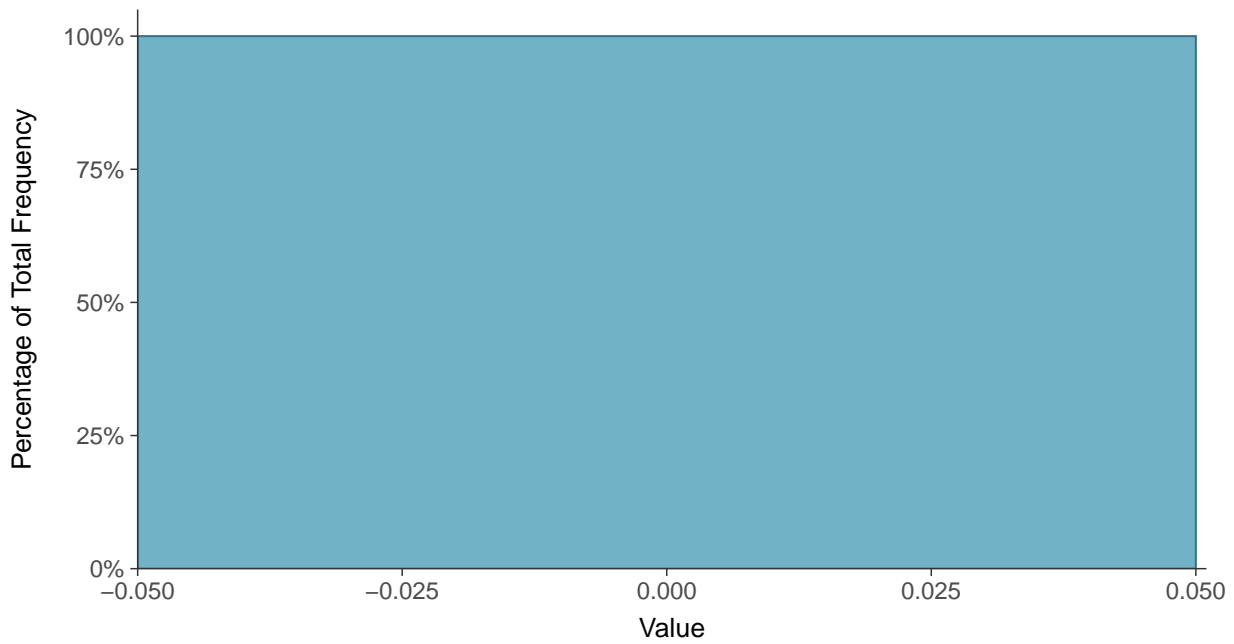
Scatter Plot

Cobalt, MW-7B (mg/L)



Histogram

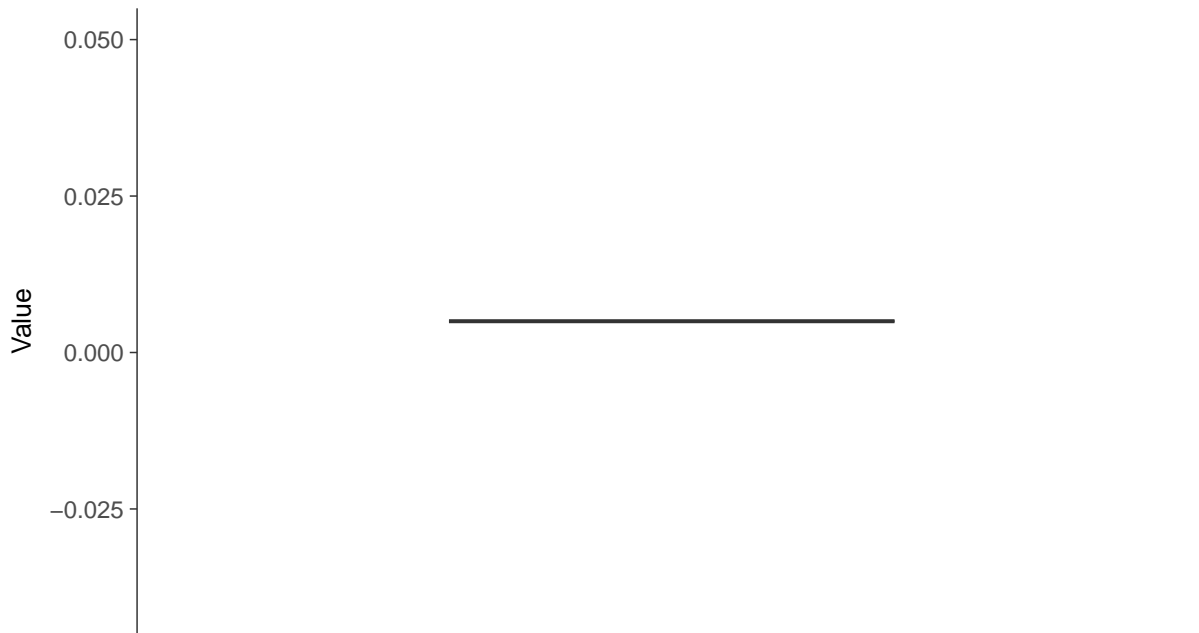
Cobalt, MW-7B (mg/L)





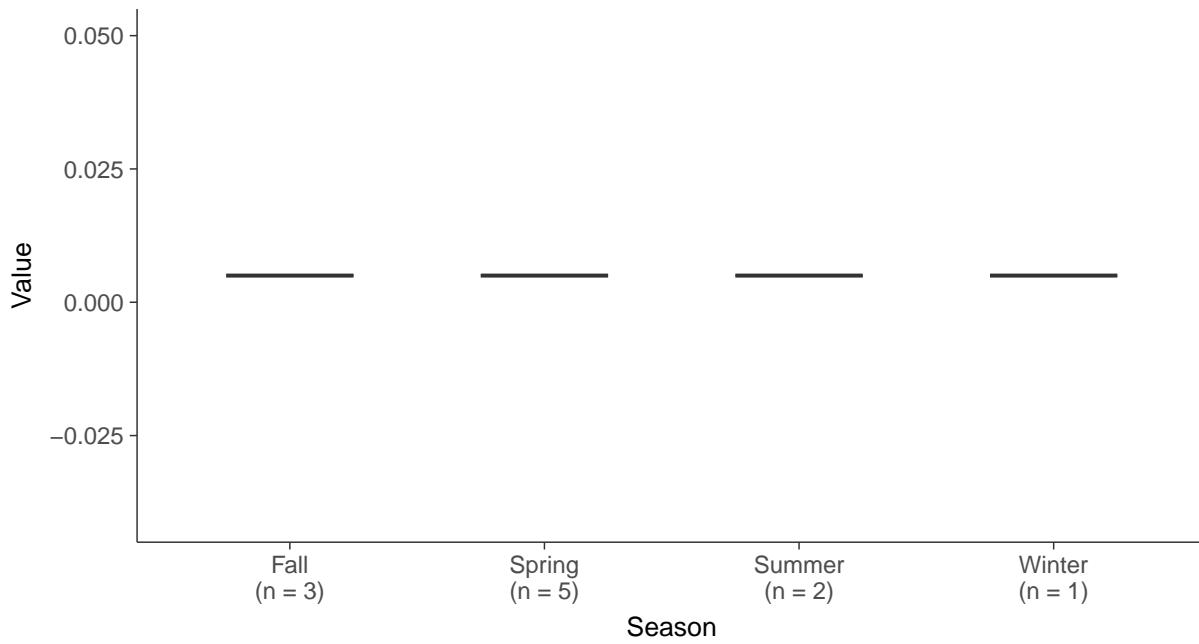
Boxplot

Cobalt, MW-7B (mg/L)



Boxplot by Season

Cobalt, MW-7B (mg/L)



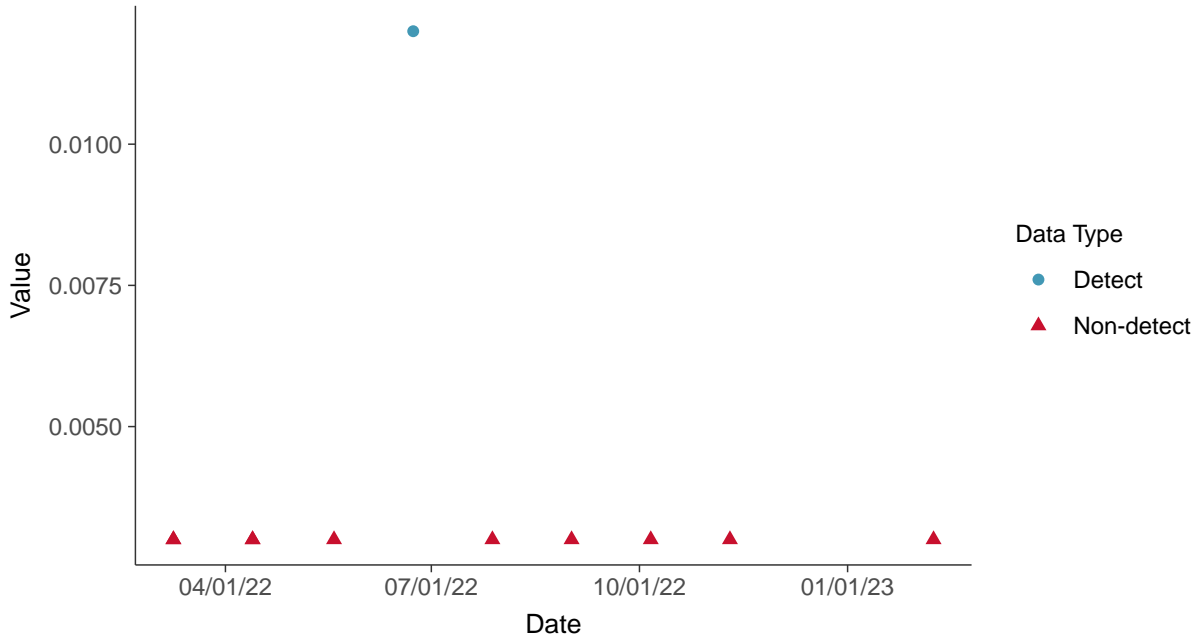


Appendix IV: Lead, MW-7B

ID: 7B_2_18

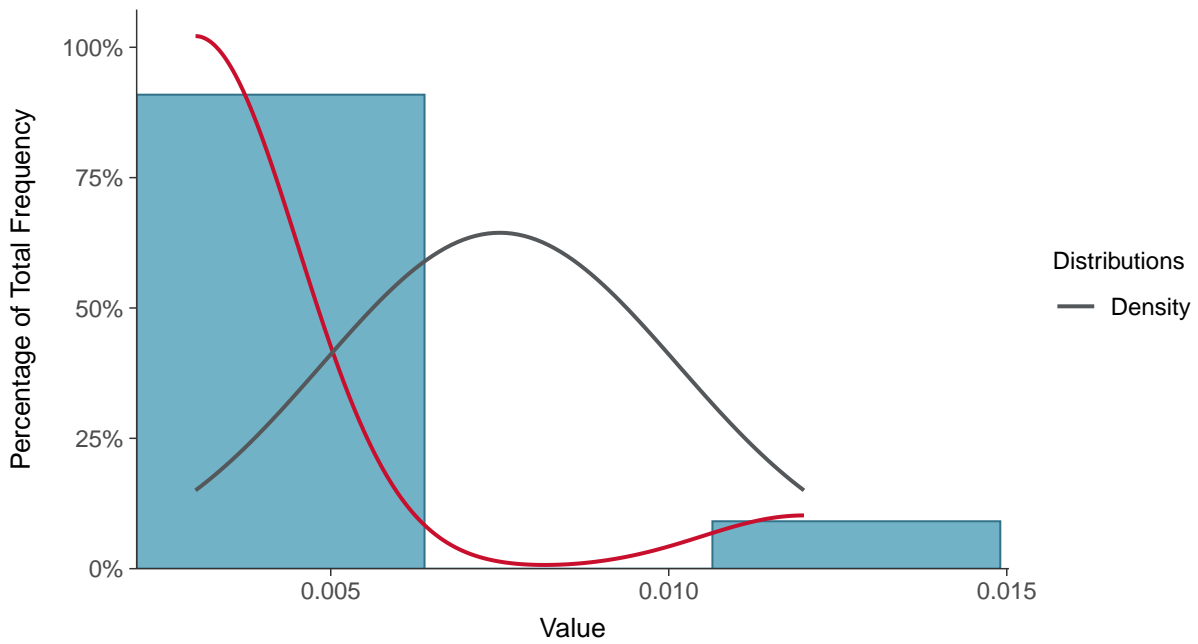
Scatter Plot

Lead, MW-7B (mg/L)



Histogram

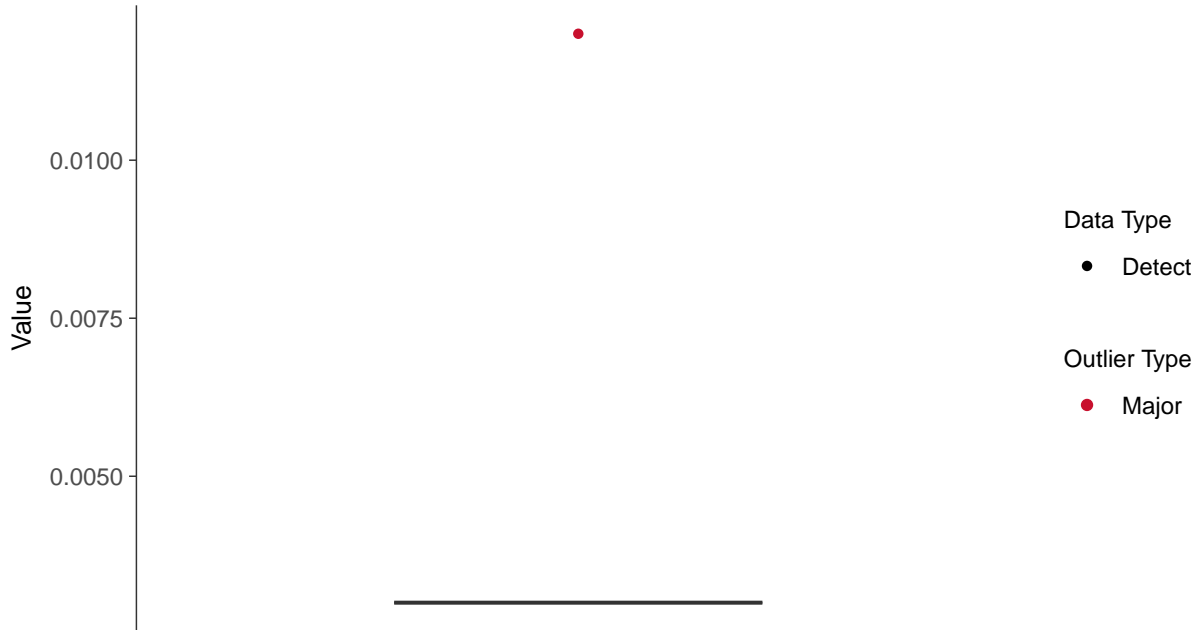
Lead, MW-7B (mg/L)





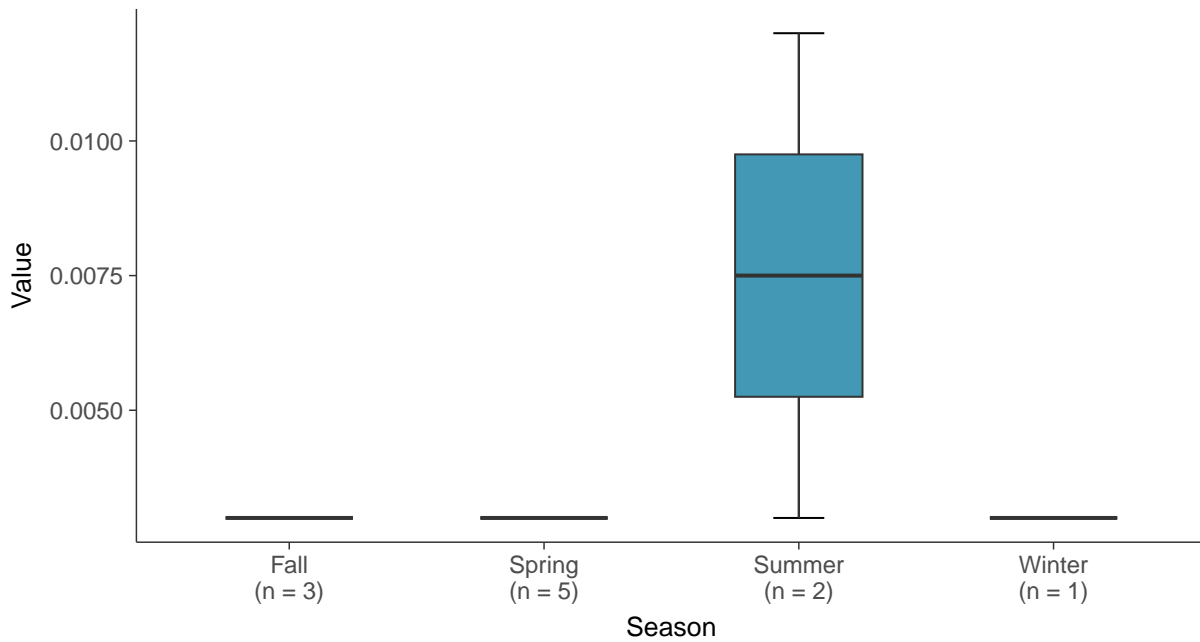
Boxplot

Lead, MW-7B (mg/L)



Boxplot by Season

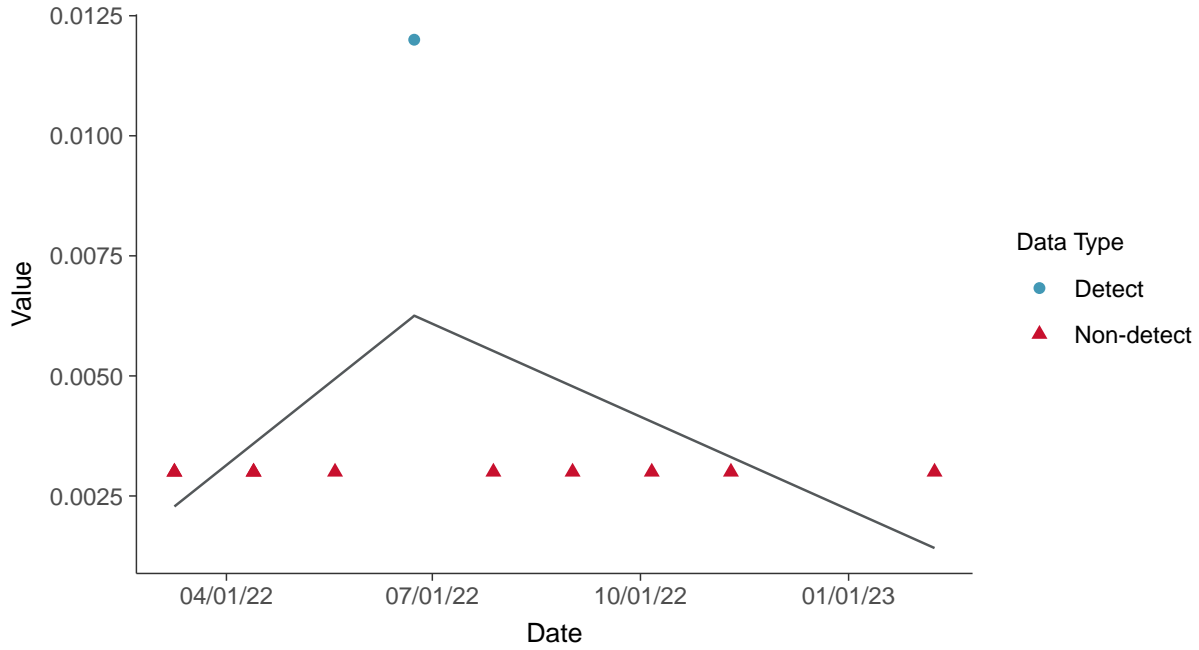
Lead, MW-7B (mg/L)





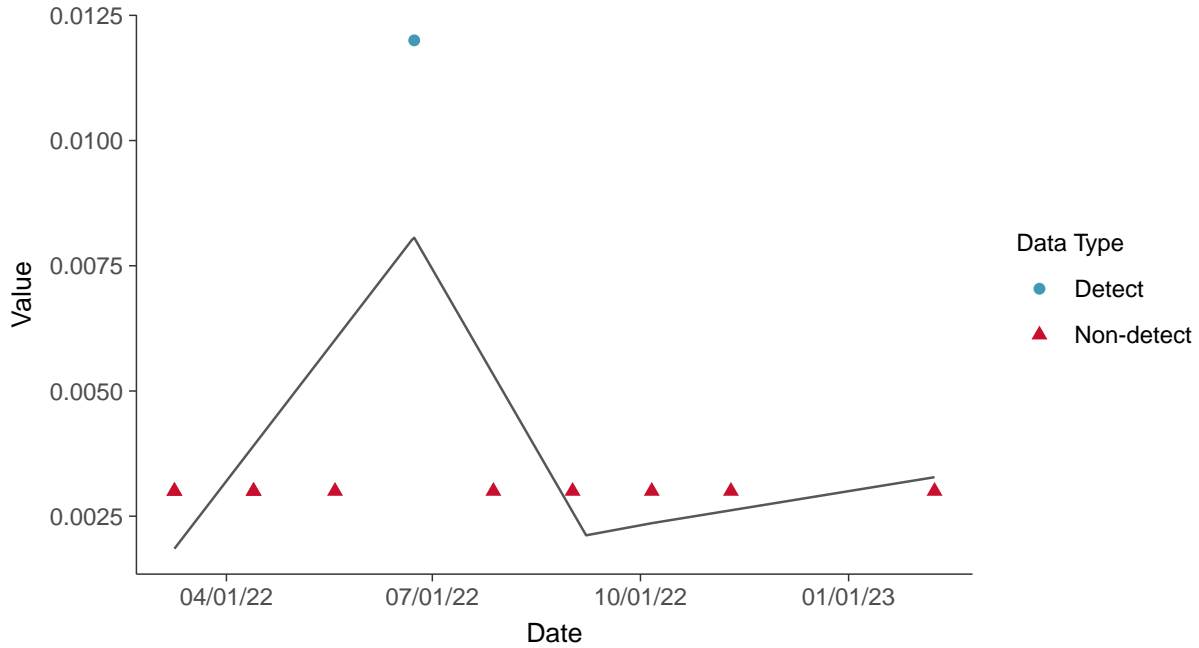
Trend Regression: Piecewise Linear-Linear

Lead, MW-7B (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Lead, MW-7B (mg/L)



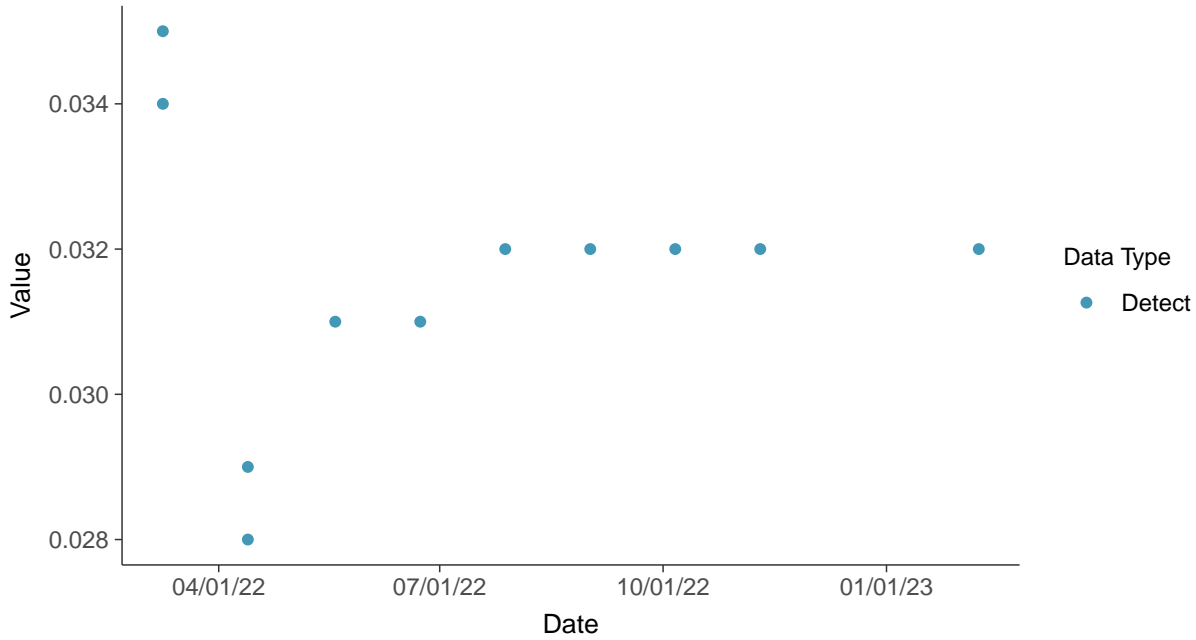


Appendix IV: Lithium, MW-7B

ID: 7B_2_19

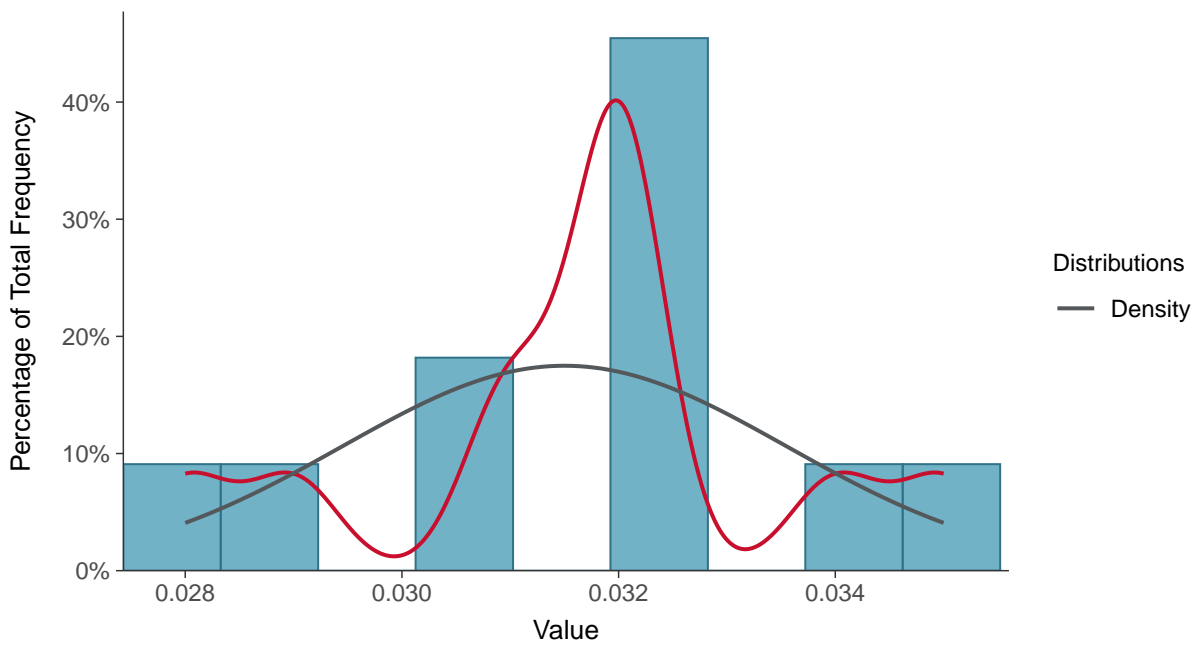
Scatter Plot

Lithium, MW-7B (mg/L)



Histogram

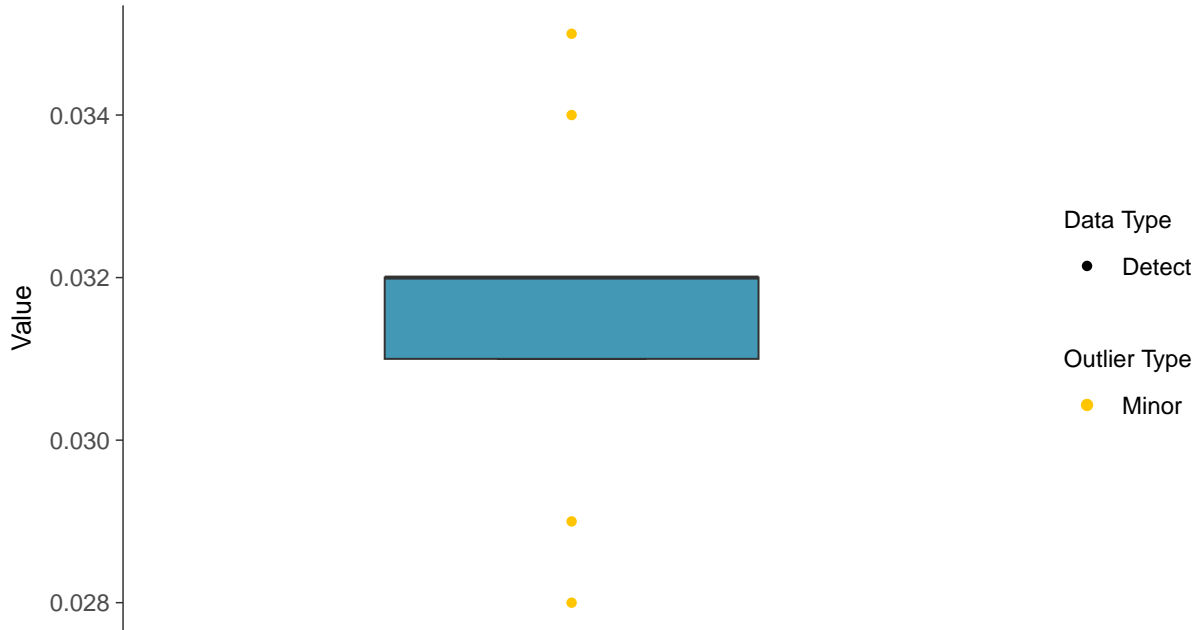
Lithium, MW-7B (mg/L)





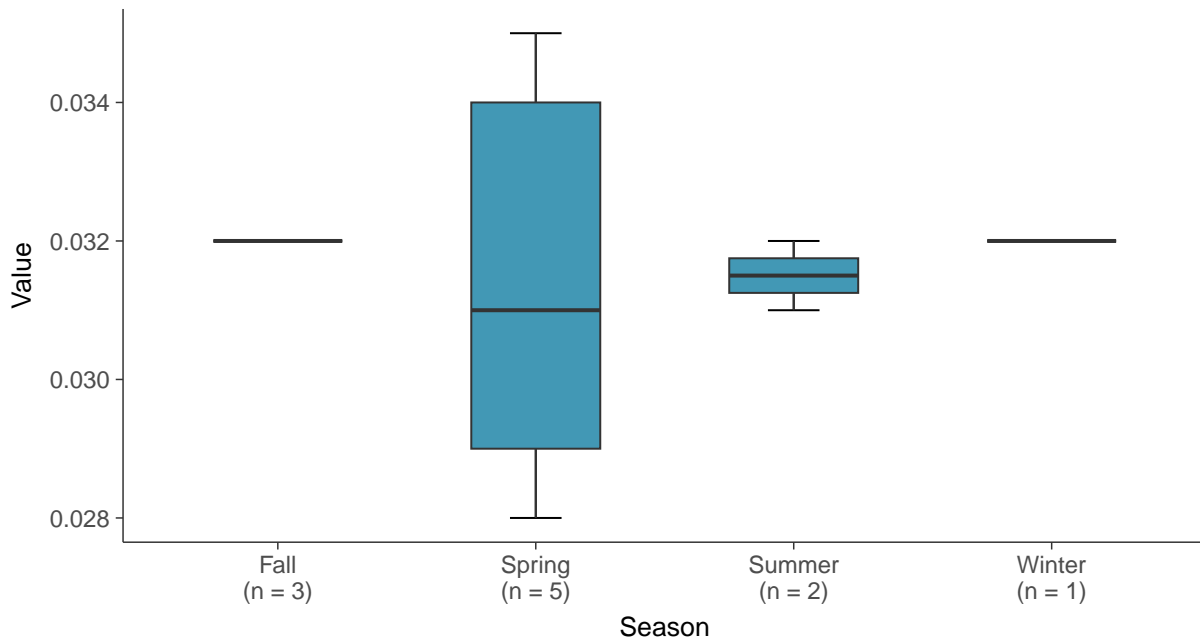
Boxplot

Lithium, MW-7B (mg/L)



Boxplot by Season

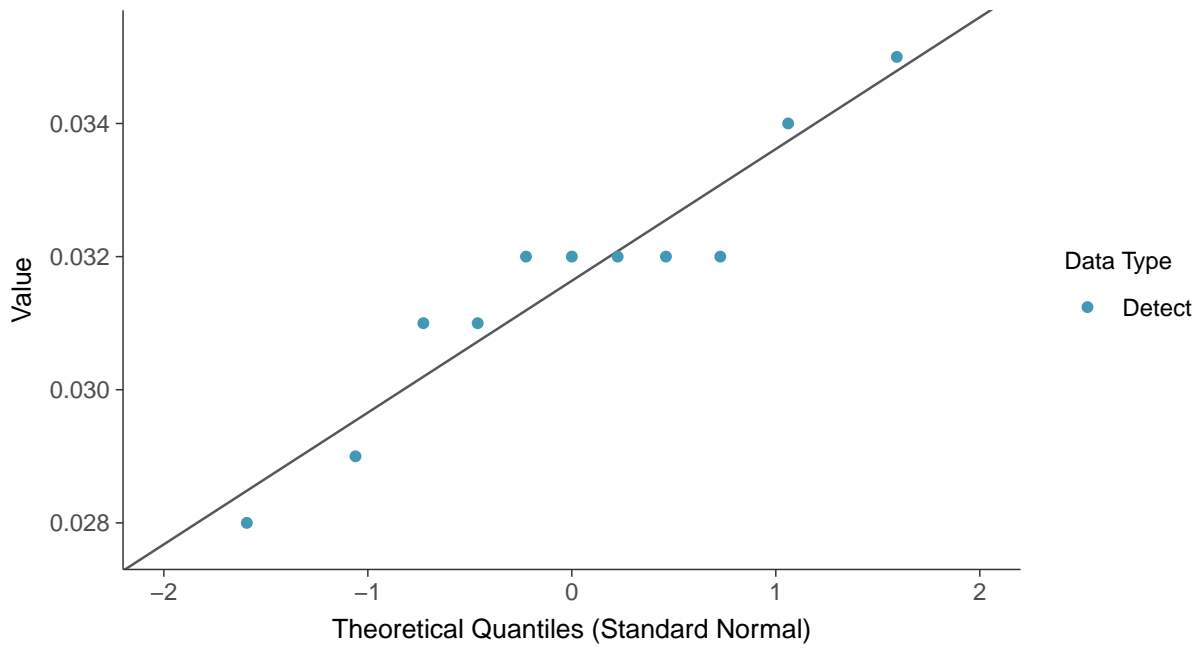
Lithium, MW-7B (mg/L)





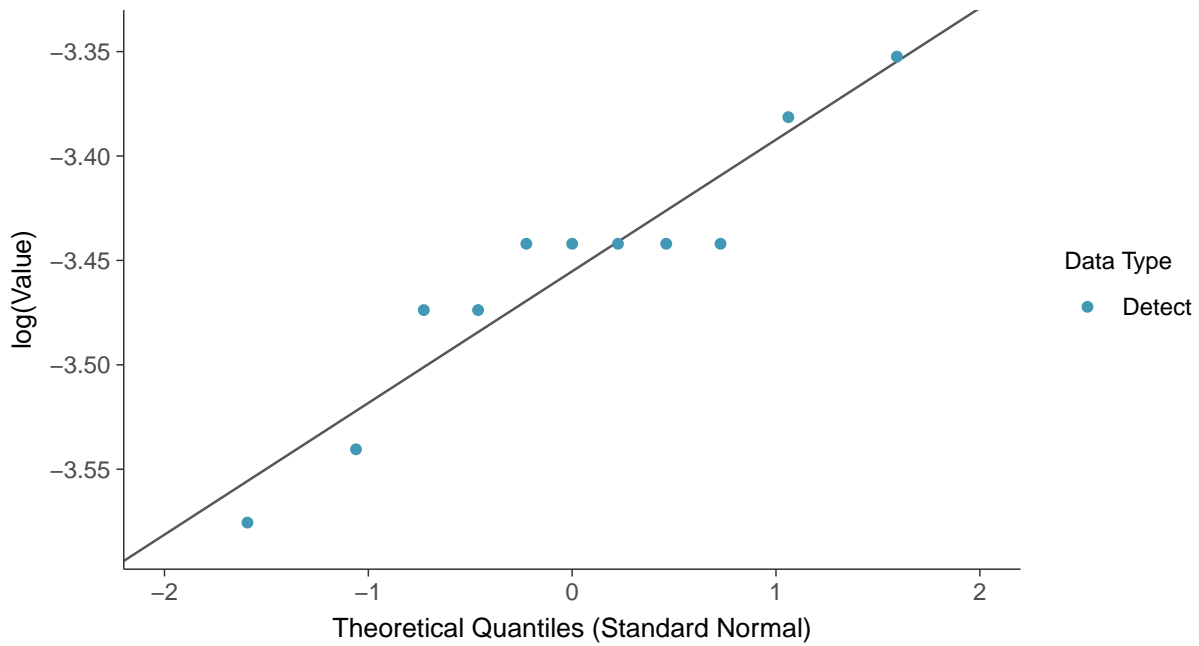
Normal Q-Q plot

Lithium, MW-7B (mg/L)



Lognormal Q-Q plot

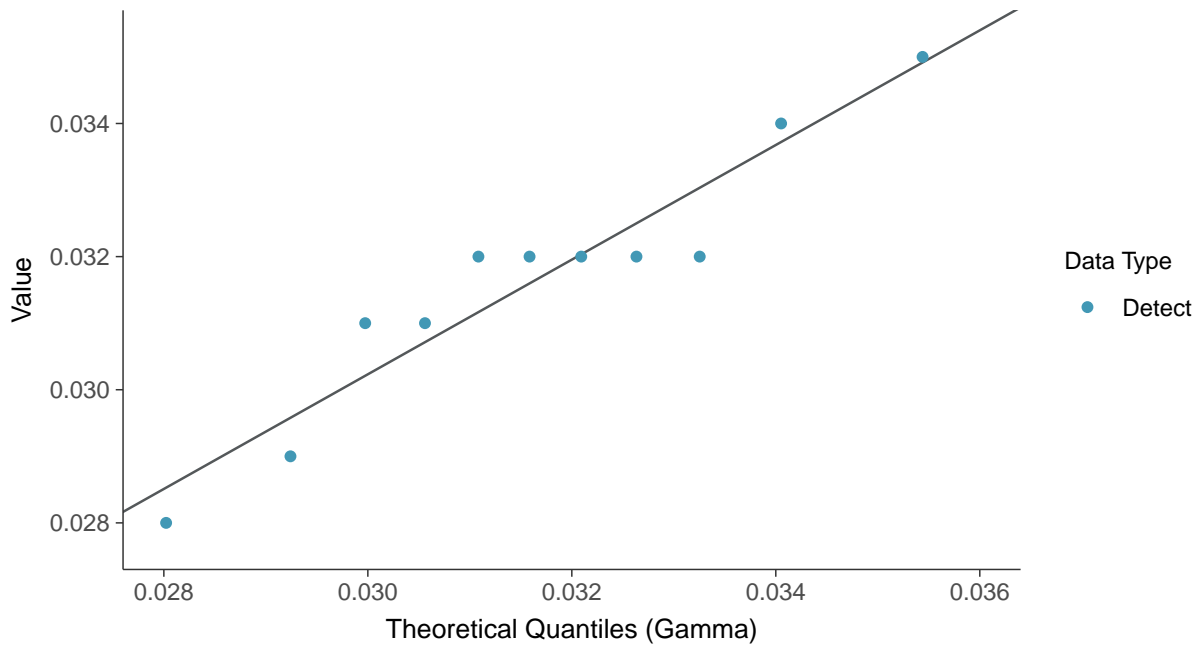
Lithium, MW-7B (mg/L)





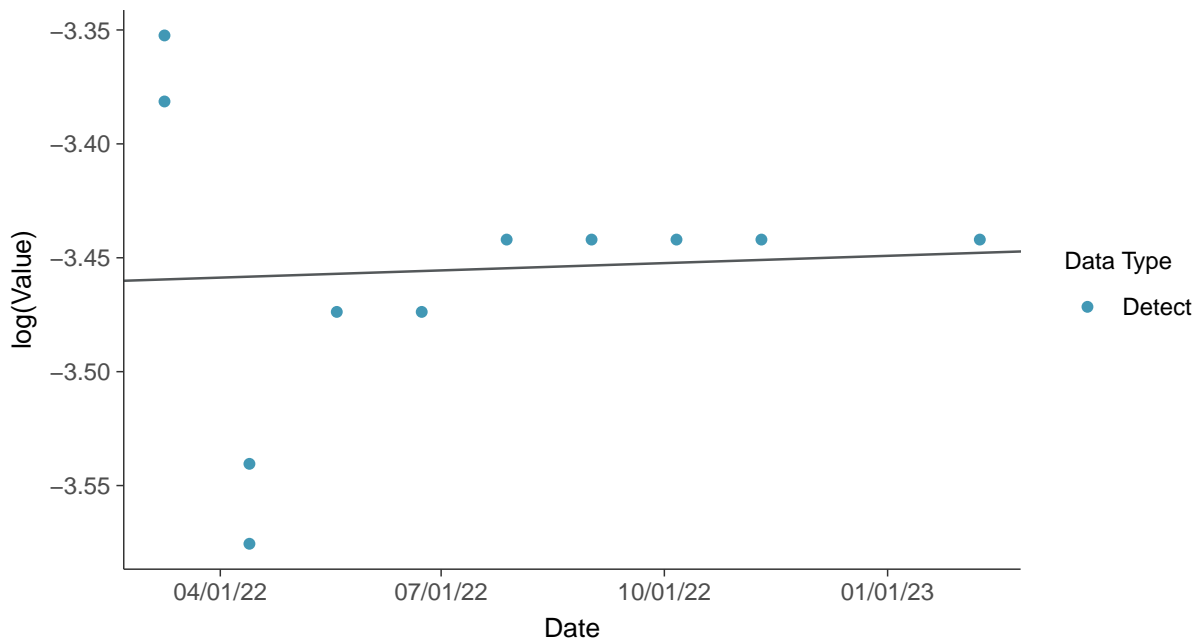
Gamma Q-Q plot

Lithium, MW-7B (mg/L)



Trend Regression: Lognormal MLE

Lithium, MW-7B (mg/L)



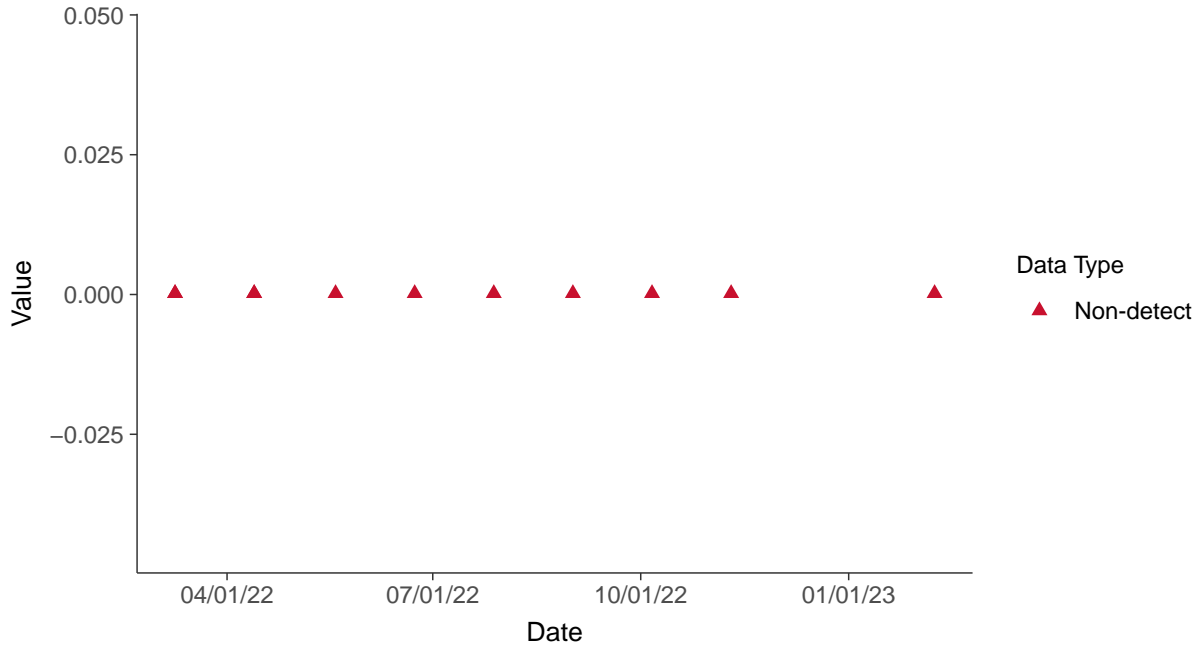


Appendix IV: Mercury, MW-7B

ID: 7B_2_21

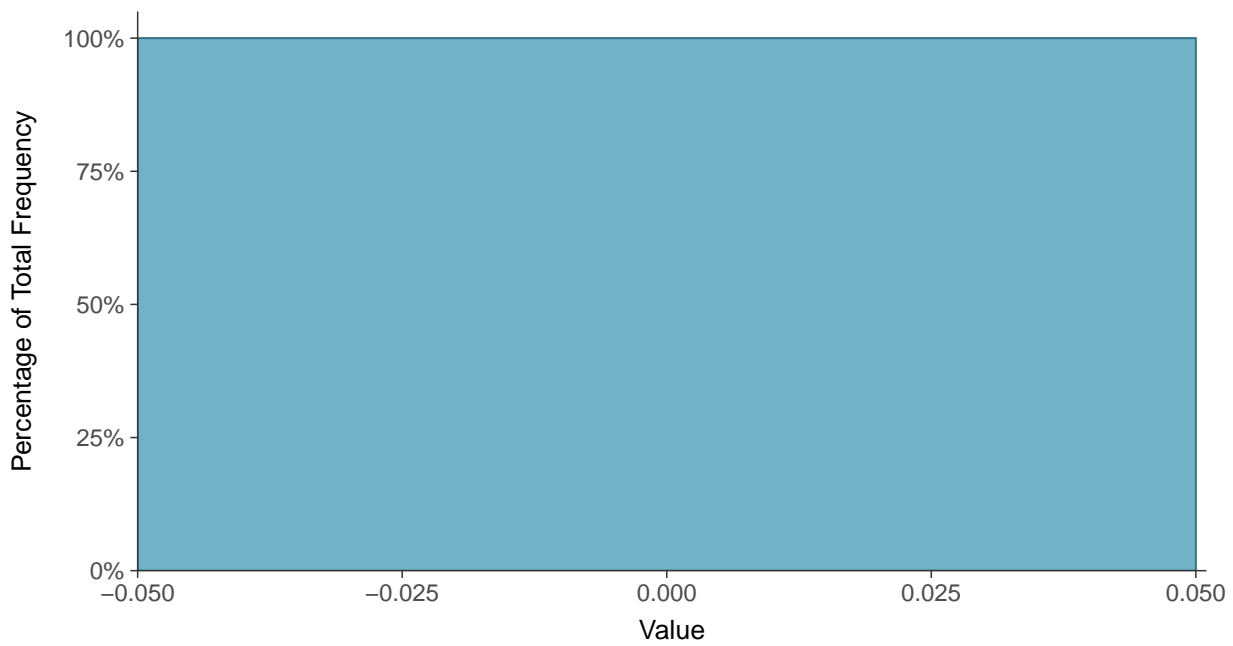
Scatter Plot

Mercury, MW-7B (mg/L)



Histogram

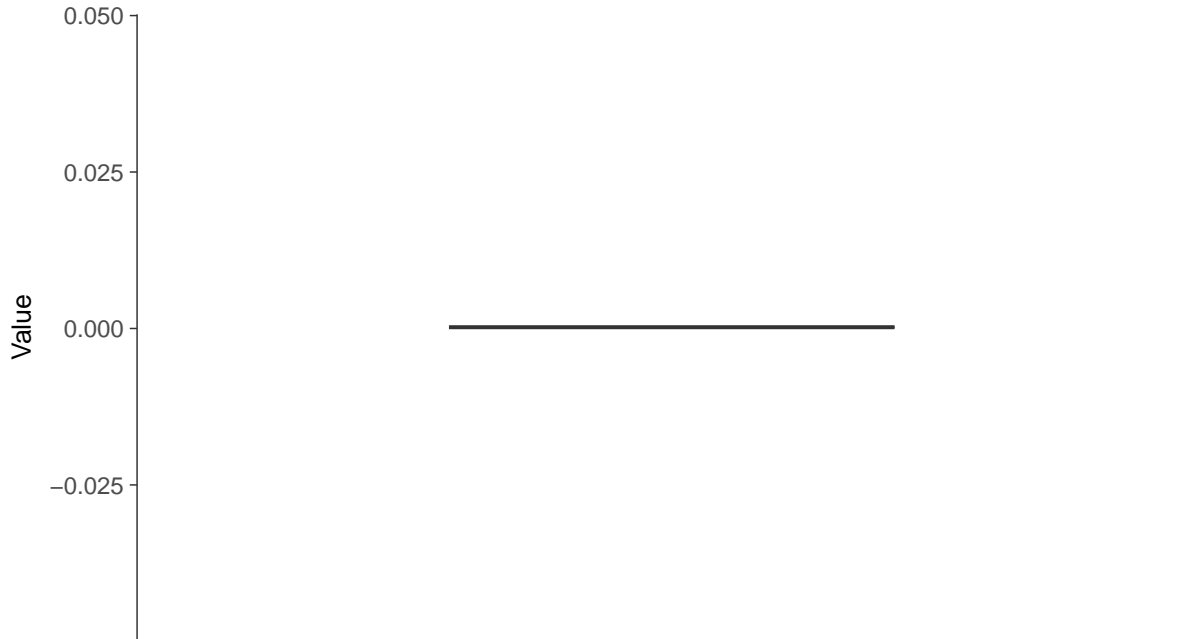
Mercury, MW-7B (mg/L)





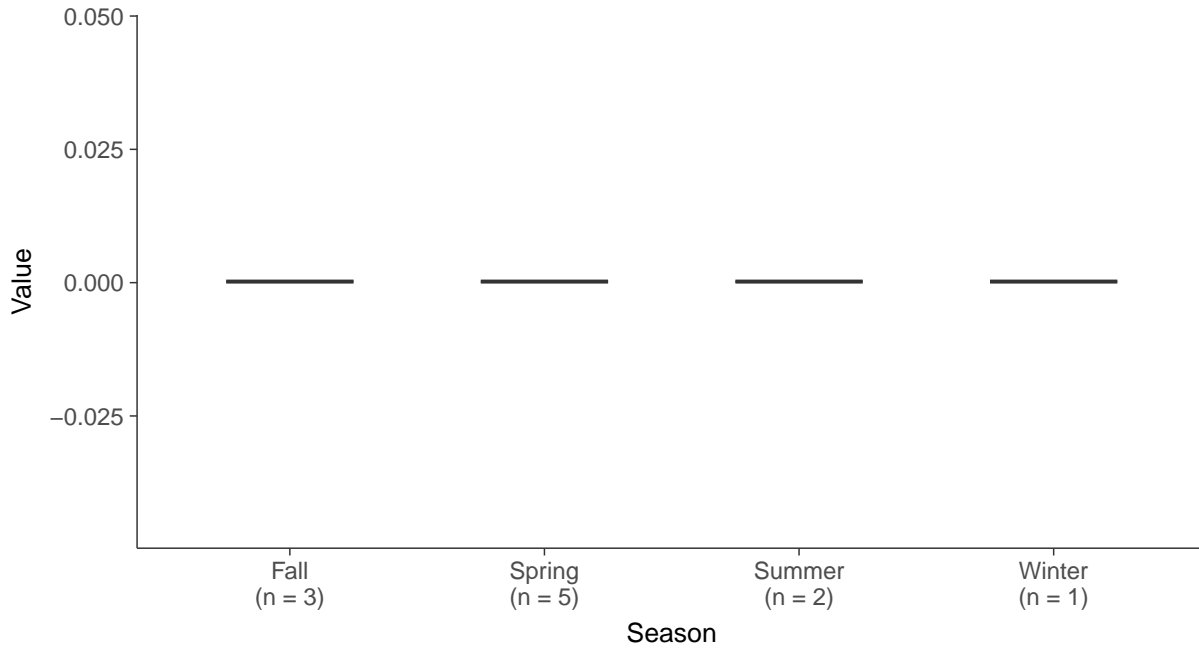
Boxplot

Mercury, MW-7B (mg/L)



Boxplot by Season

Mercury, MW-7B (mg/L)



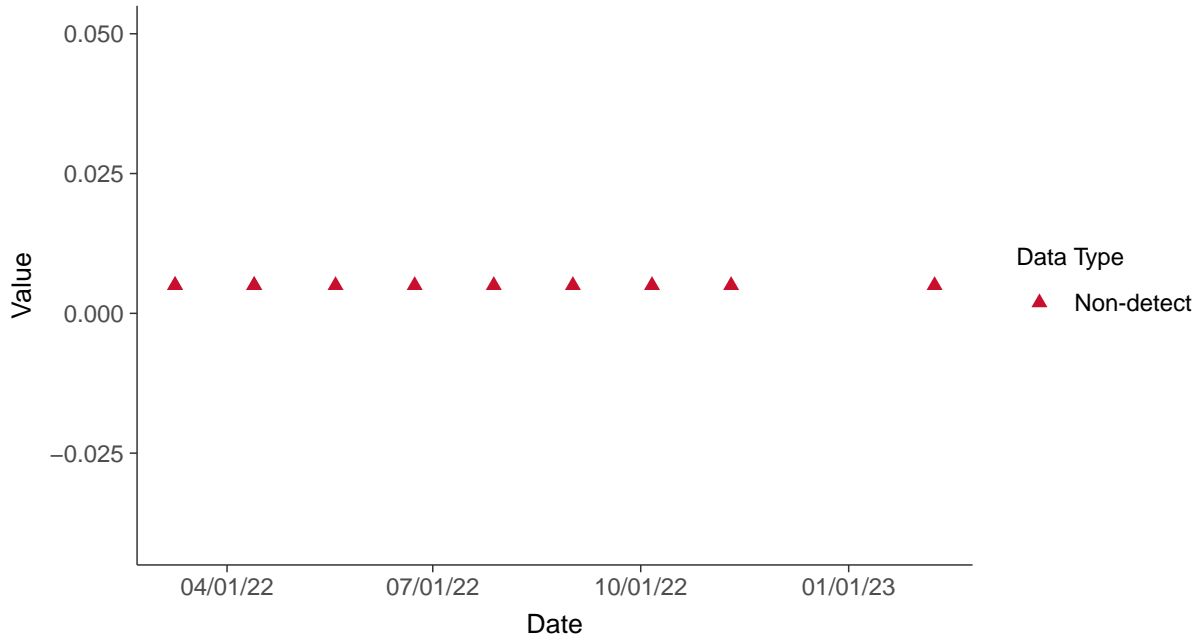


Appendix IV: Molybdenum, MW-7B

ID: 7B_2_22

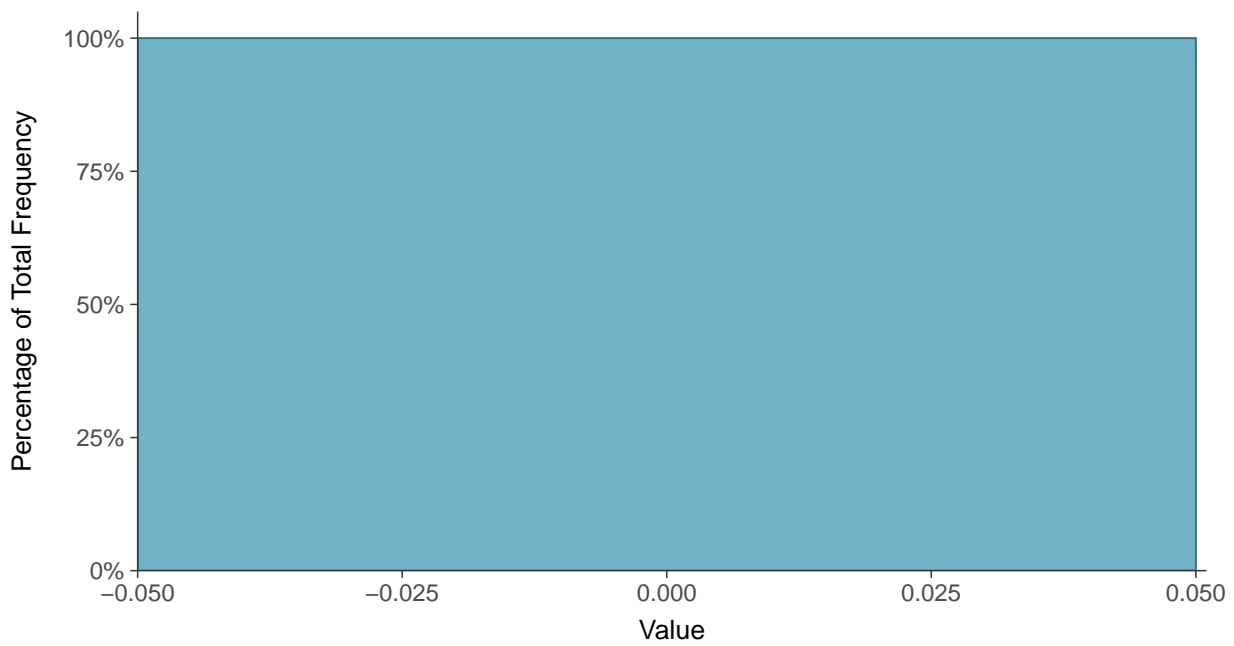
Scatter Plot

Molybdenum, MW-7B (mg/L)



Histogram

Molybdenum, MW-7B (mg/L)





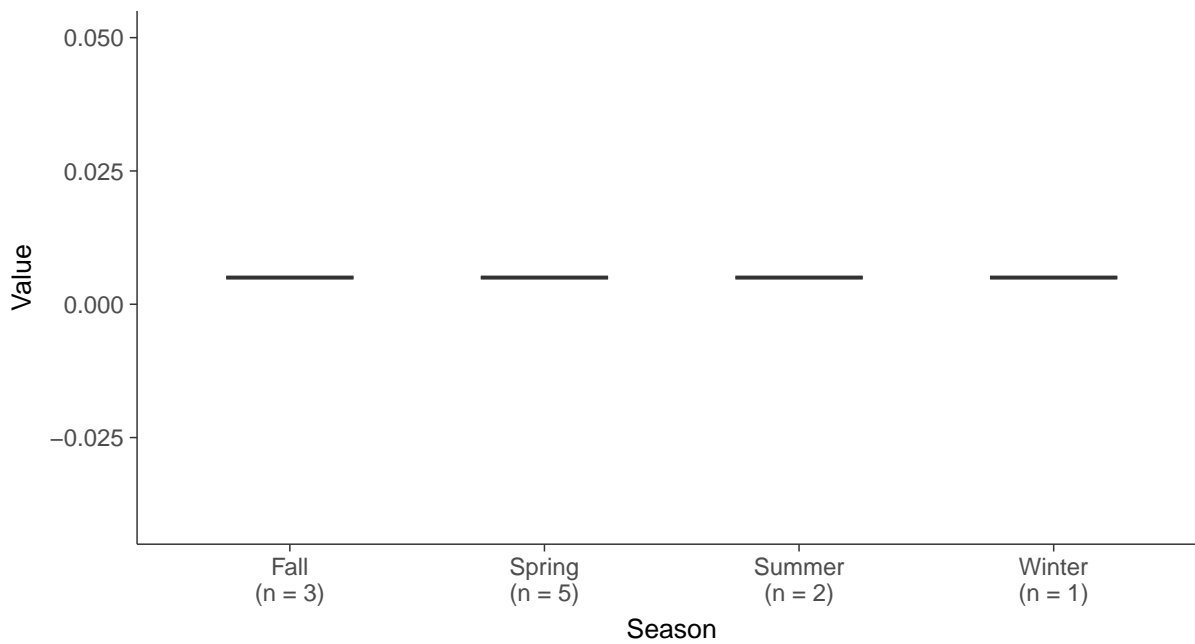
Boxplot

Molybdenum, MW-7B (mg/L)



Boxplot by Season

Molybdenum, MW-7B (mg/L)



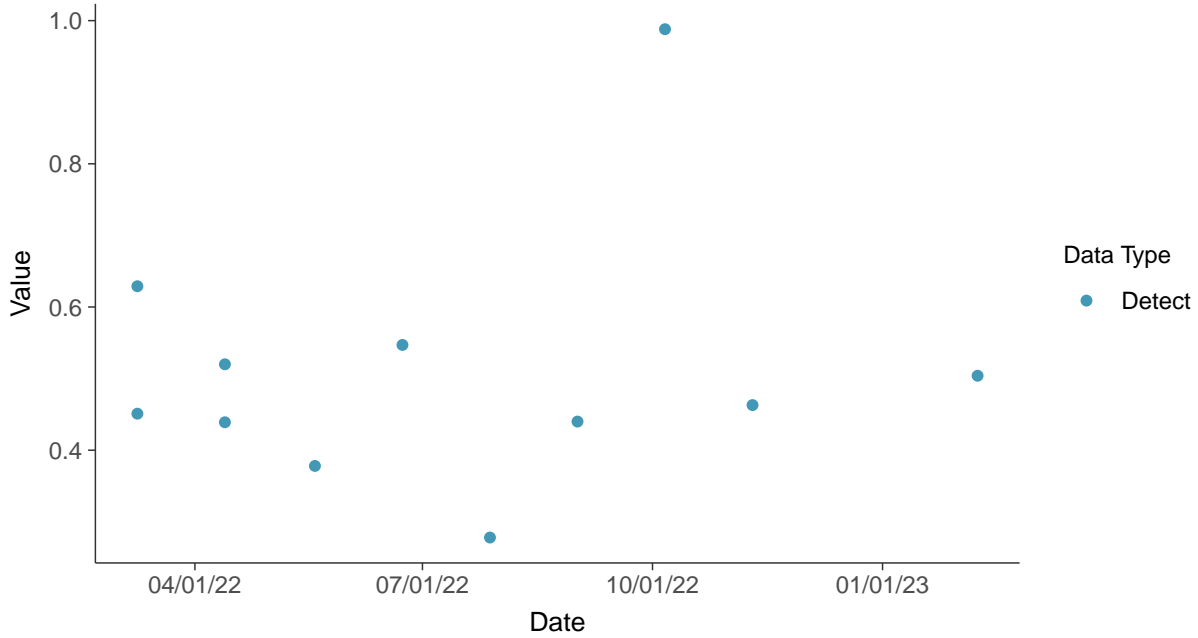


Appendix IV: Radium-226, MW-7B

ID: 7B_2_24

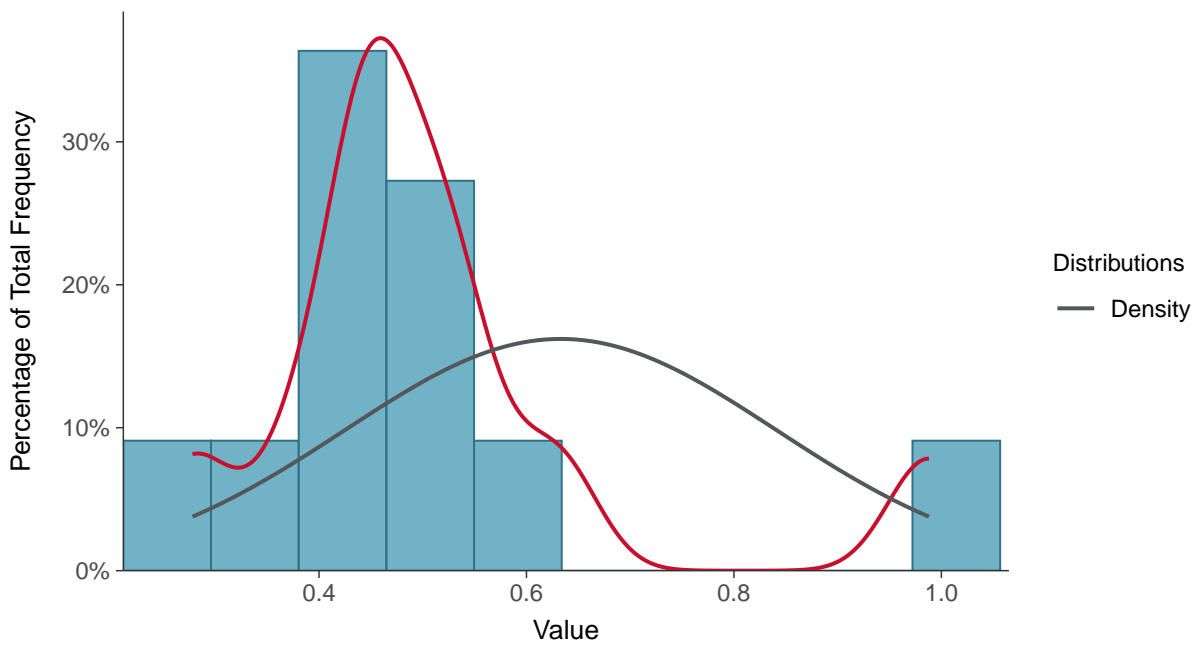
Scatter Plot

Radium-226, MW-7B (pCi/L)



Histogram

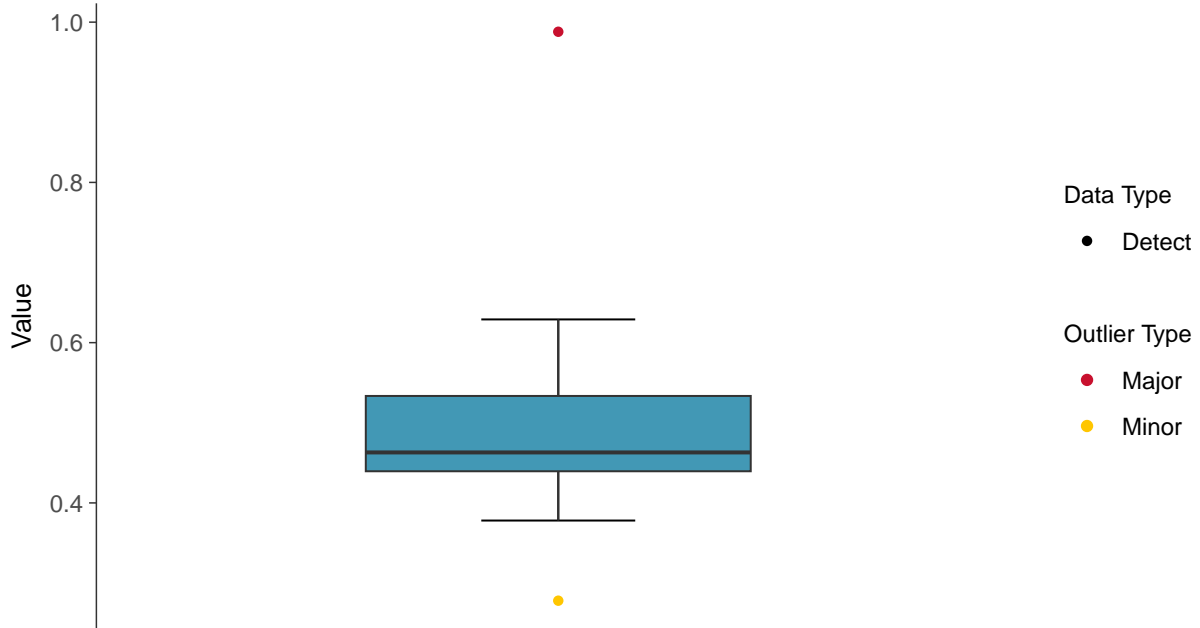
Radium-226, MW-7B (pCi/L)





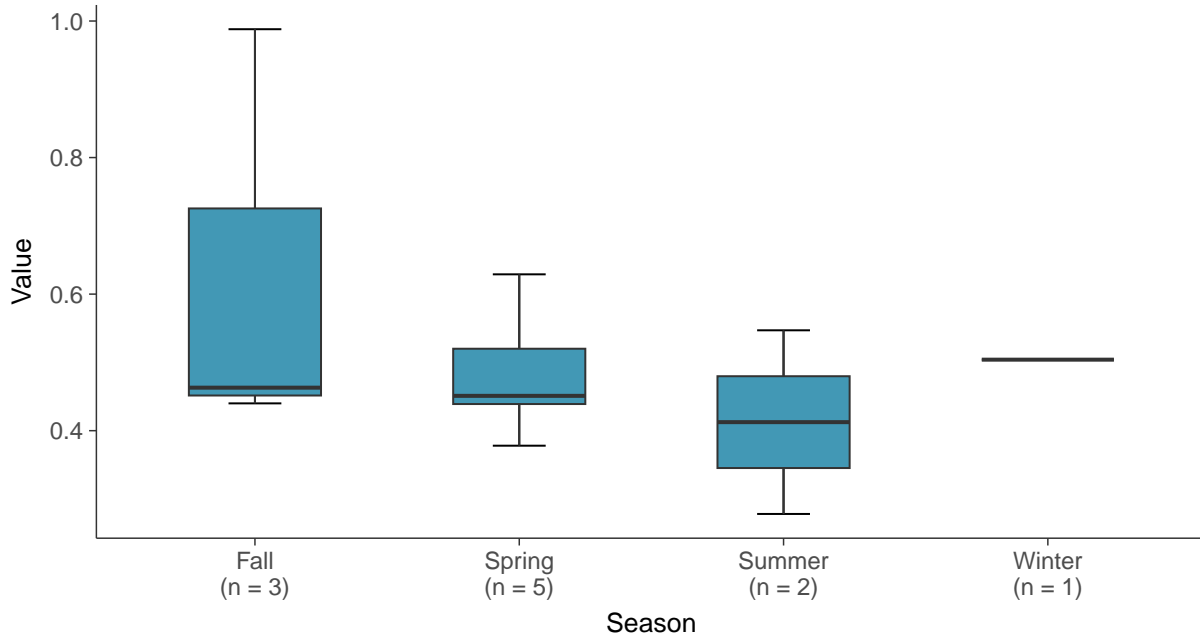
Boxplot

Radium-226, MW-7B (pCi/L)



Boxplot by Season

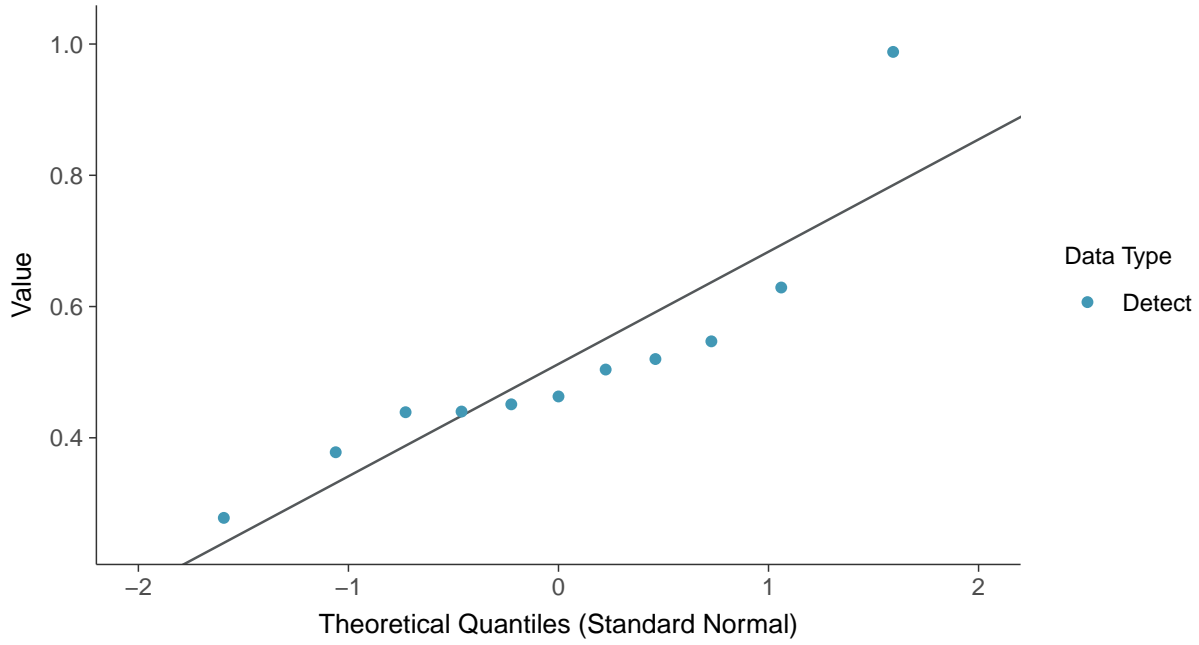
Radium-226, MW-7B (pCi/L)





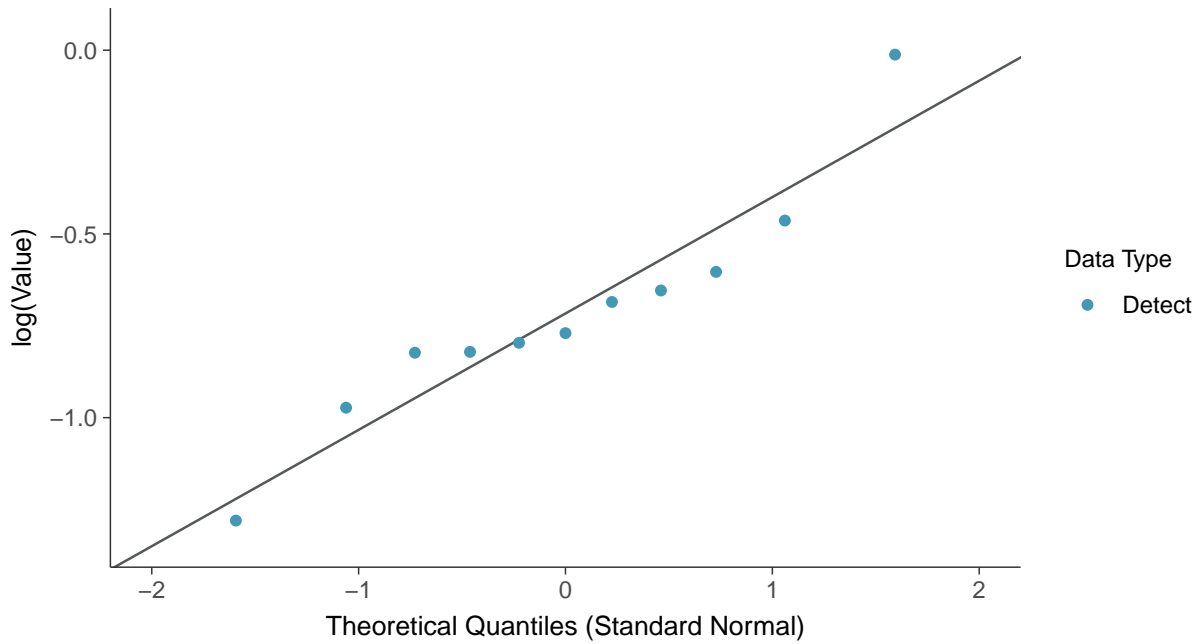
Normal Q-Q plot

Radium-226, MW-7B (pCi/L)



Lognormal Q-Q plot

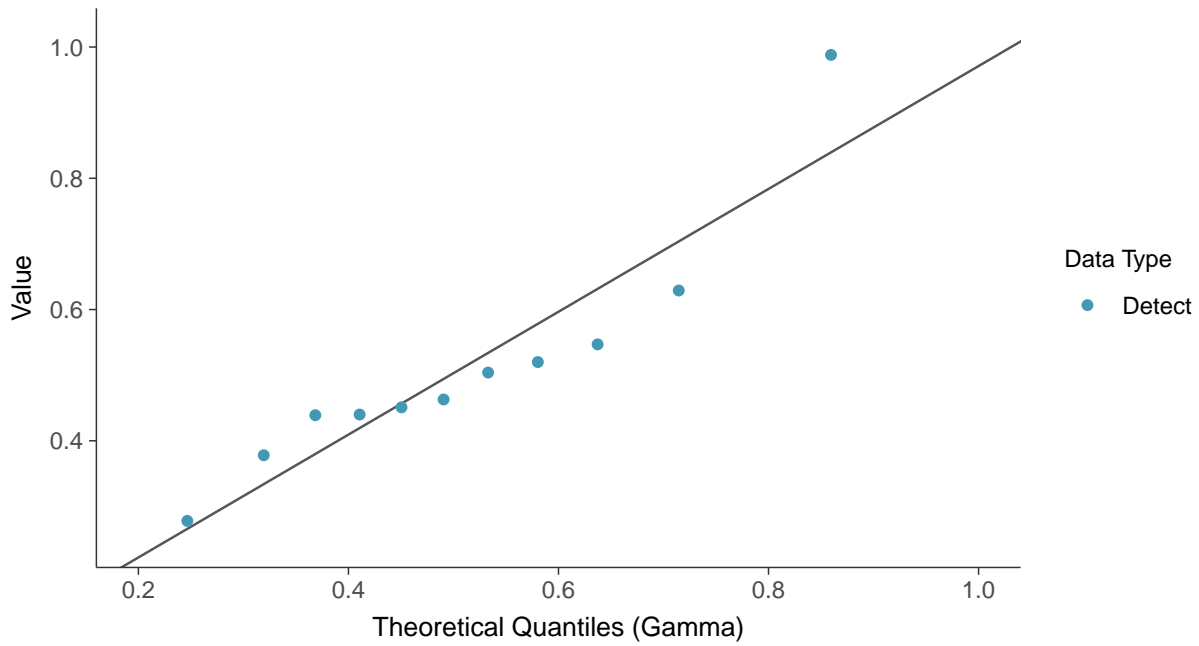
Radium-226, MW-7B (pCi/L)





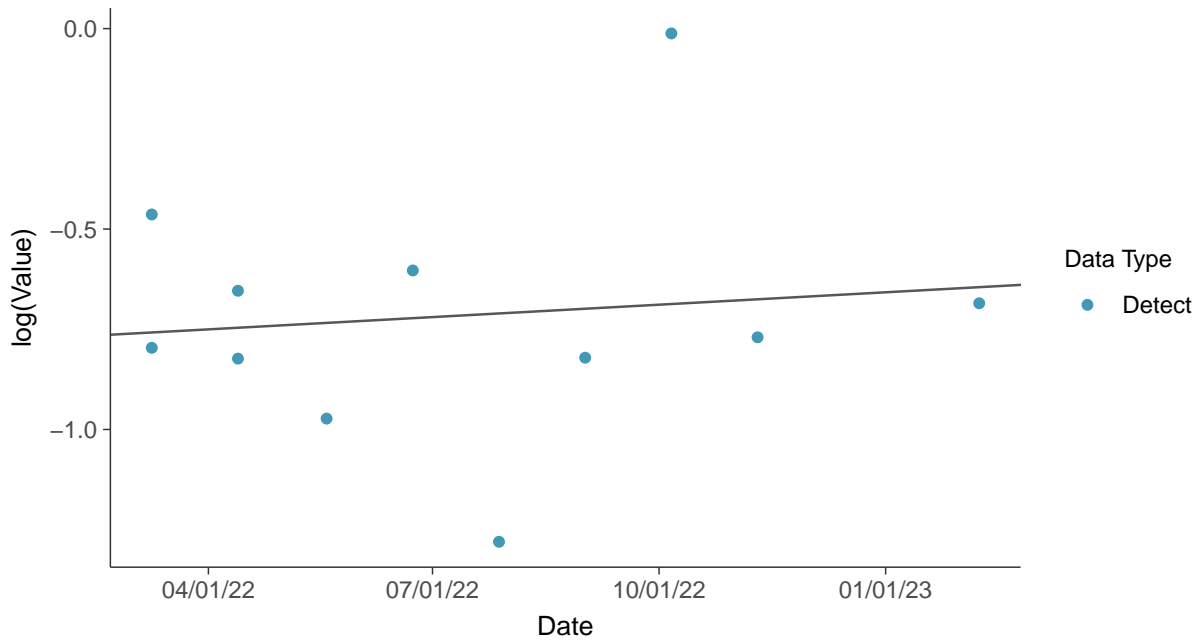
Gamma Q-Q plot

Radium-226, MW-7B (pCi/L)



Trend Regression: Lognormal MLE

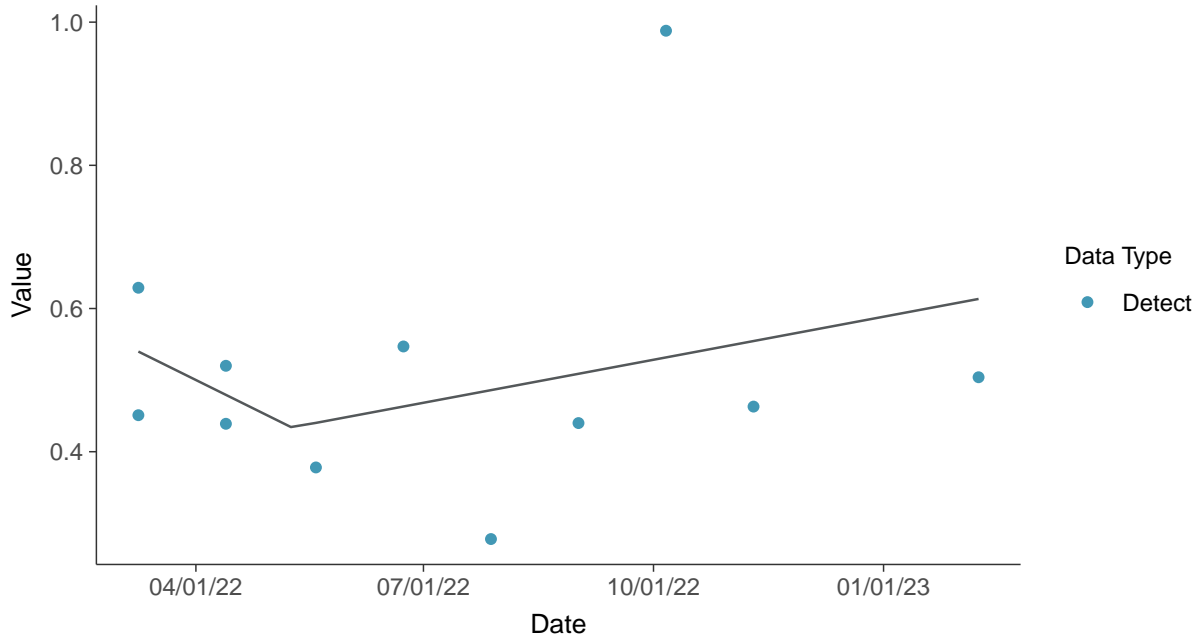
Radium-226, MW-7B (pCi/L)





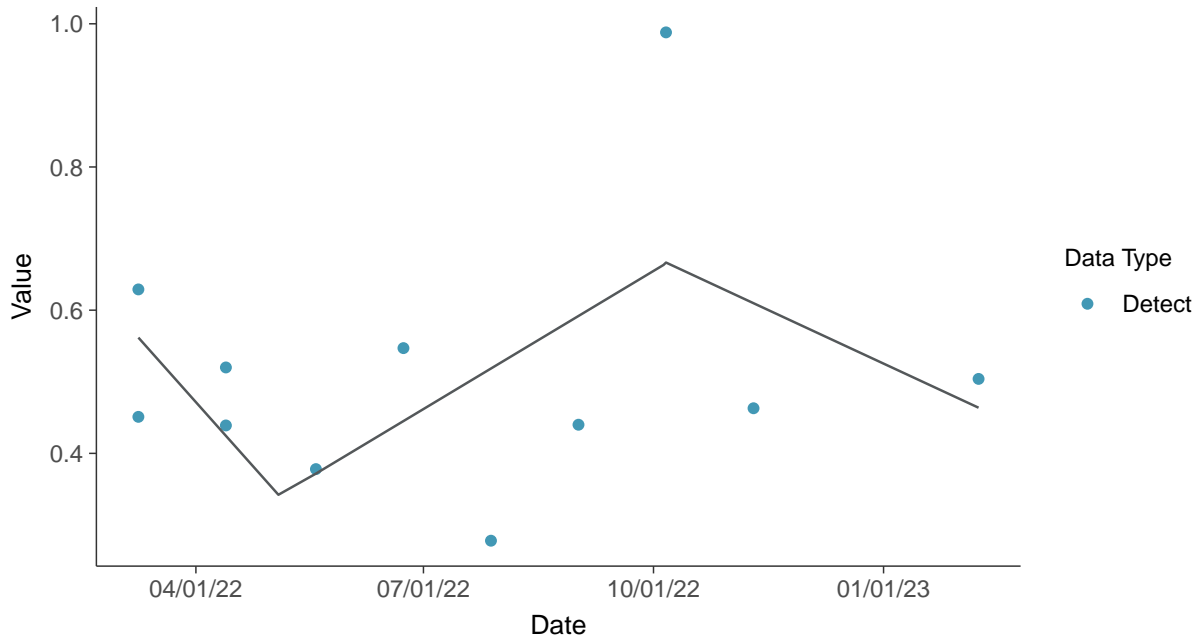
Trend Regression: Piecewise Linear-Linear

Radium-226, MW-7B (pCi/L)



Trend Regression: Piecewise Linear-Linear-Linear

Radium-226, MW-7B (pCi/L)



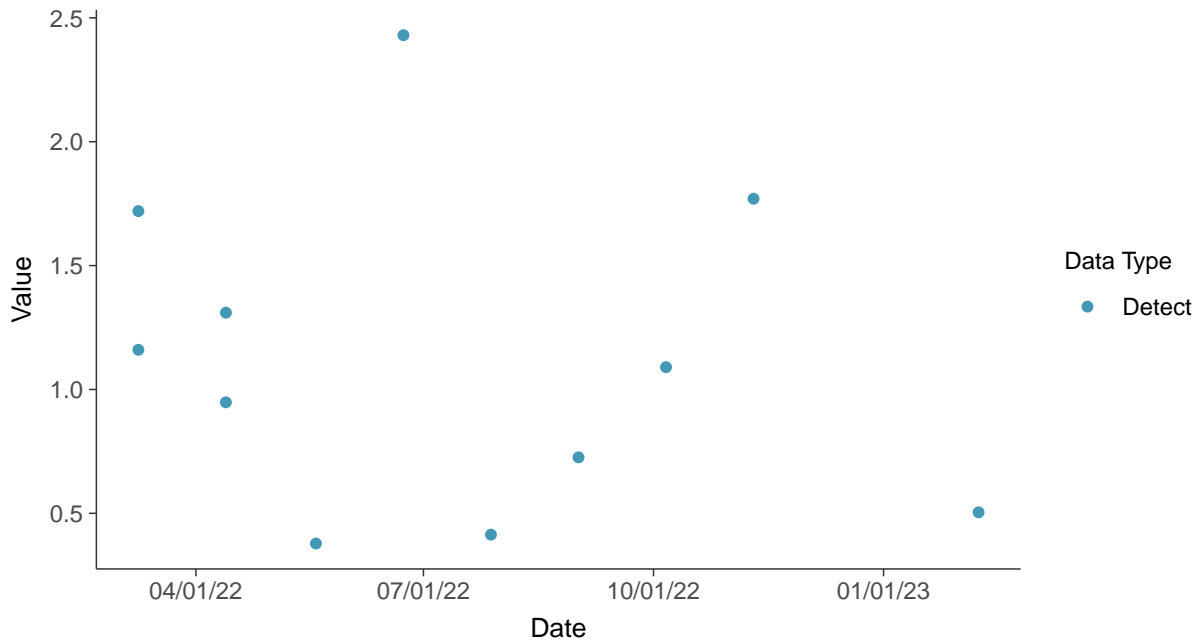


Appendix IV: Radium-226/228, MW-7B

ID: 7B_2_25

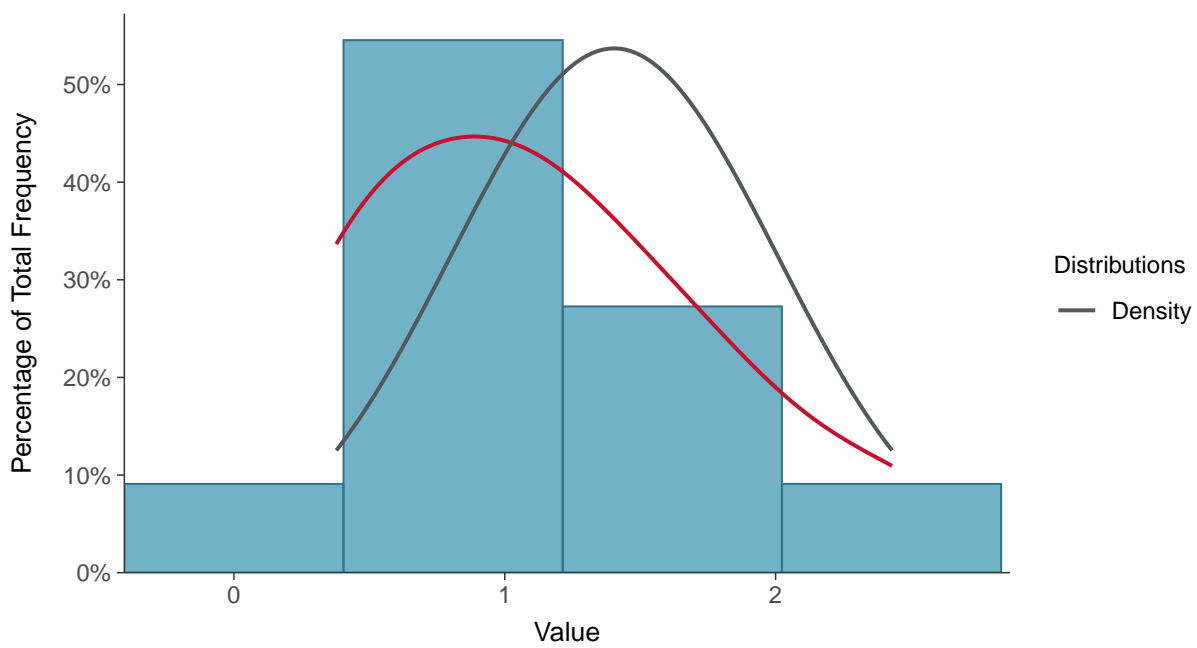
Scatter Plot

Radium-226/228, MW-7B (pCi/L)



Histogram

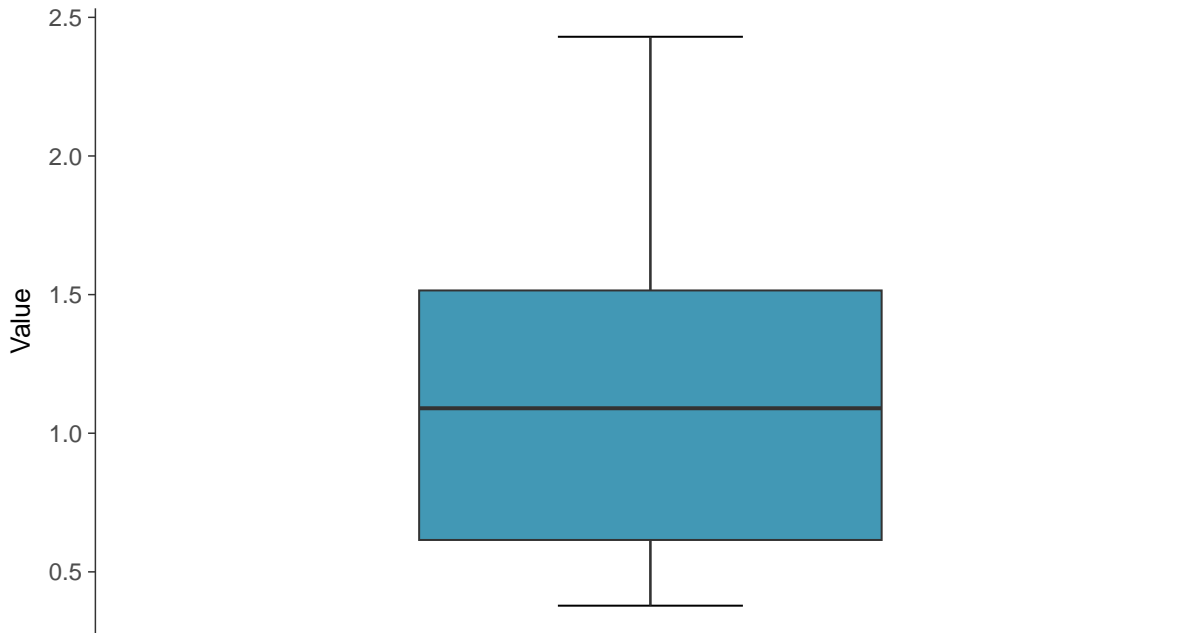
Radium-226/228, MW-7B (pCi/L)





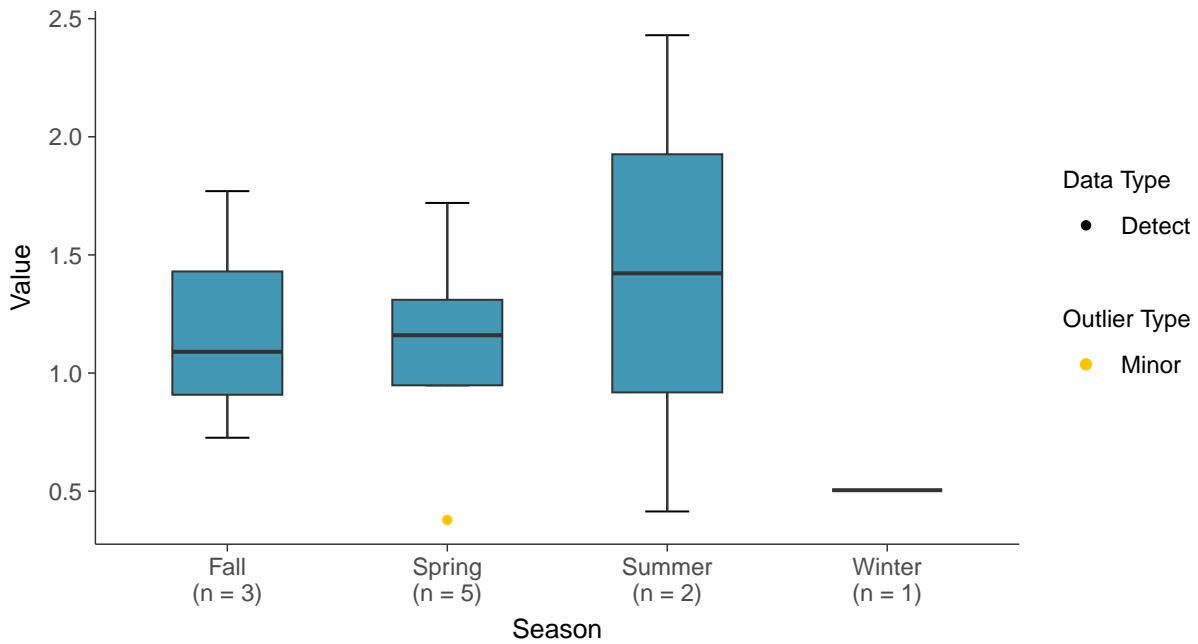
Boxplot

Radium-226/228, MW-7B (pCi/L)



Boxplot by Season

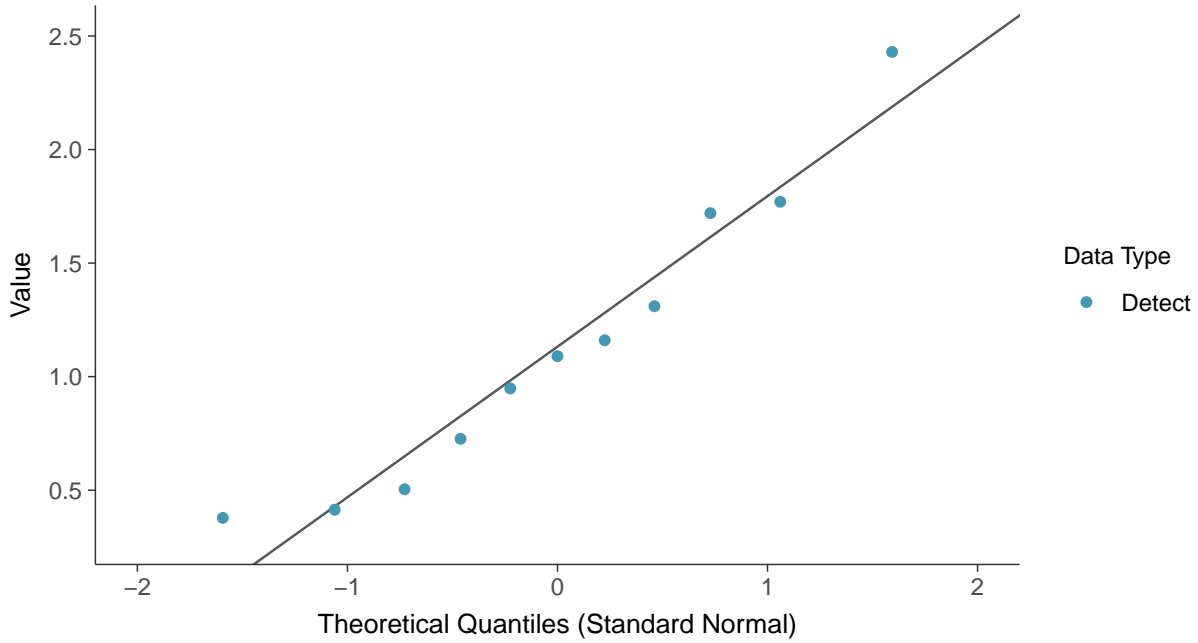
Radium-226/228, MW-7B (pCi/L)





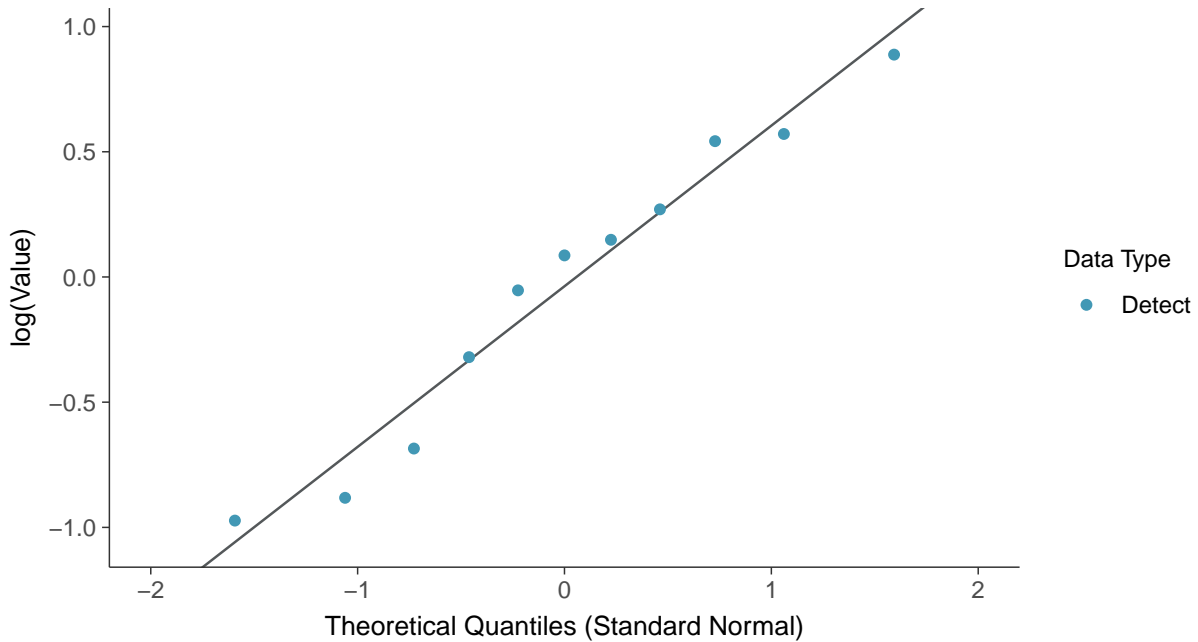
Normal Q-Q plot

Radium-226/228, MW-7B (pCi/L)



Lognormal Q-Q plot

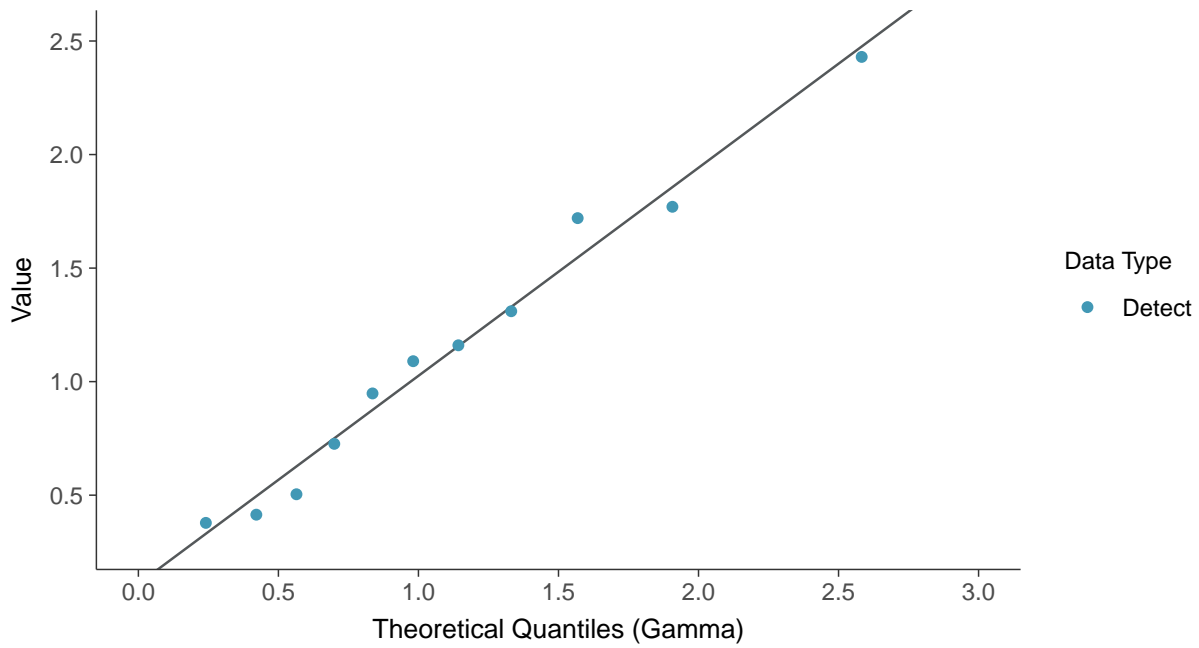
Radium-226/228, MW-7B (pCi/L)





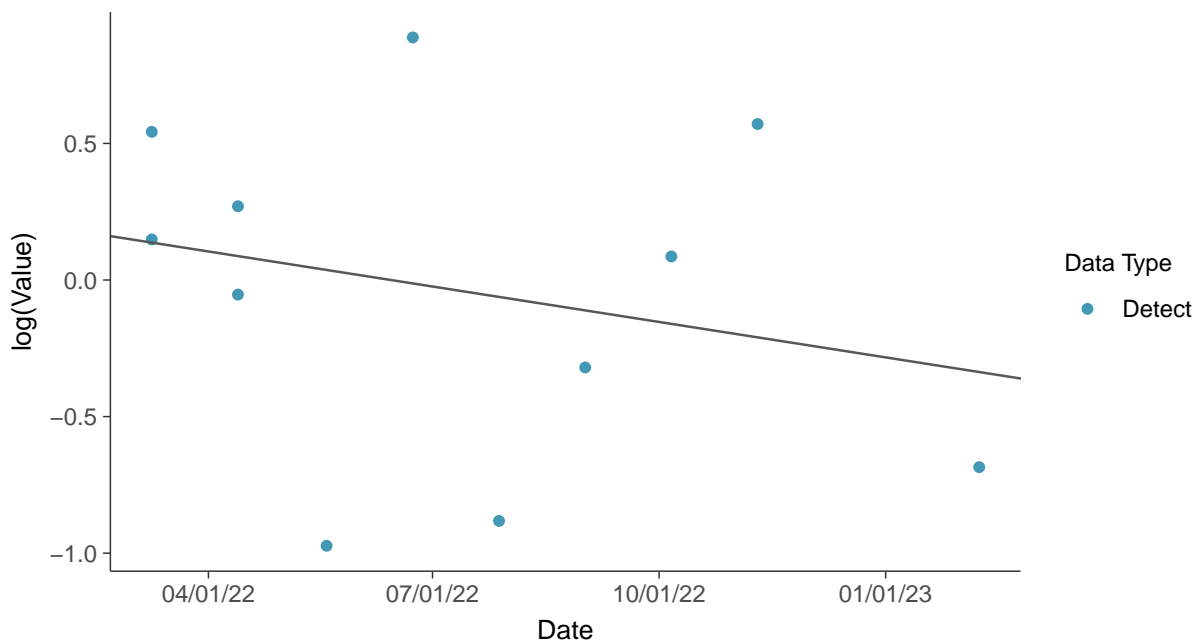
Gamma Q-Q plot

Radium-226/228, MW-7B (pCi/L)



Trend Regression: Lognormal MLE

Radium-226/228, MW-7B (pCi/L)



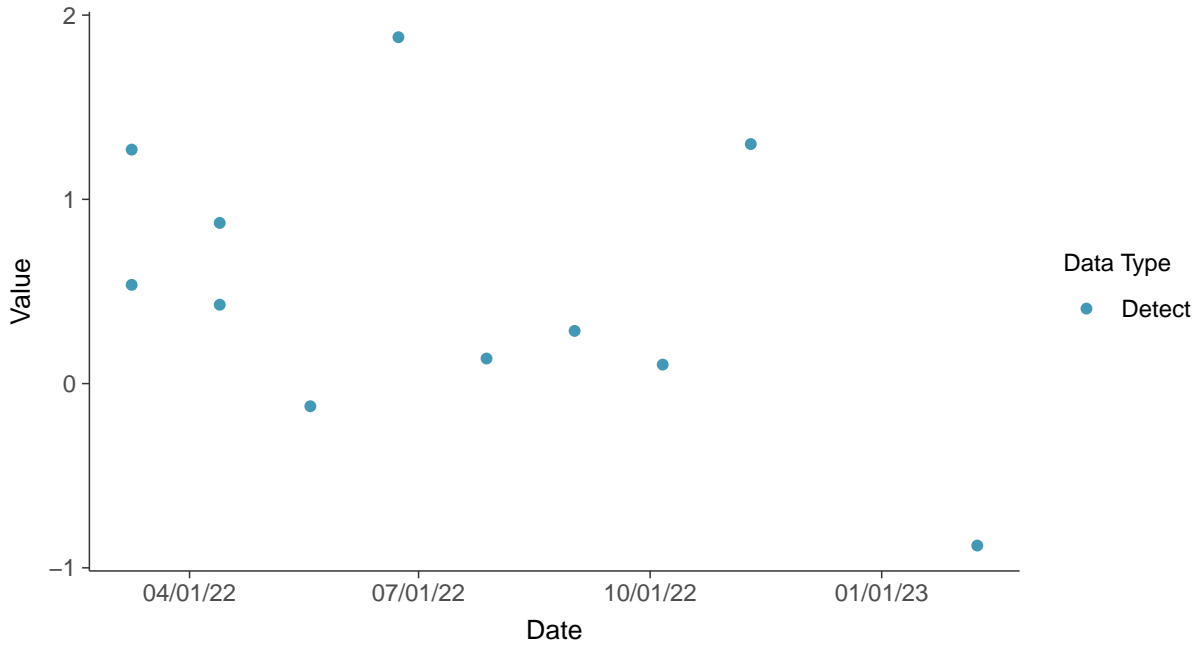


Appendix IV: Radium-228, MW-7B

ID: 7B_2_26

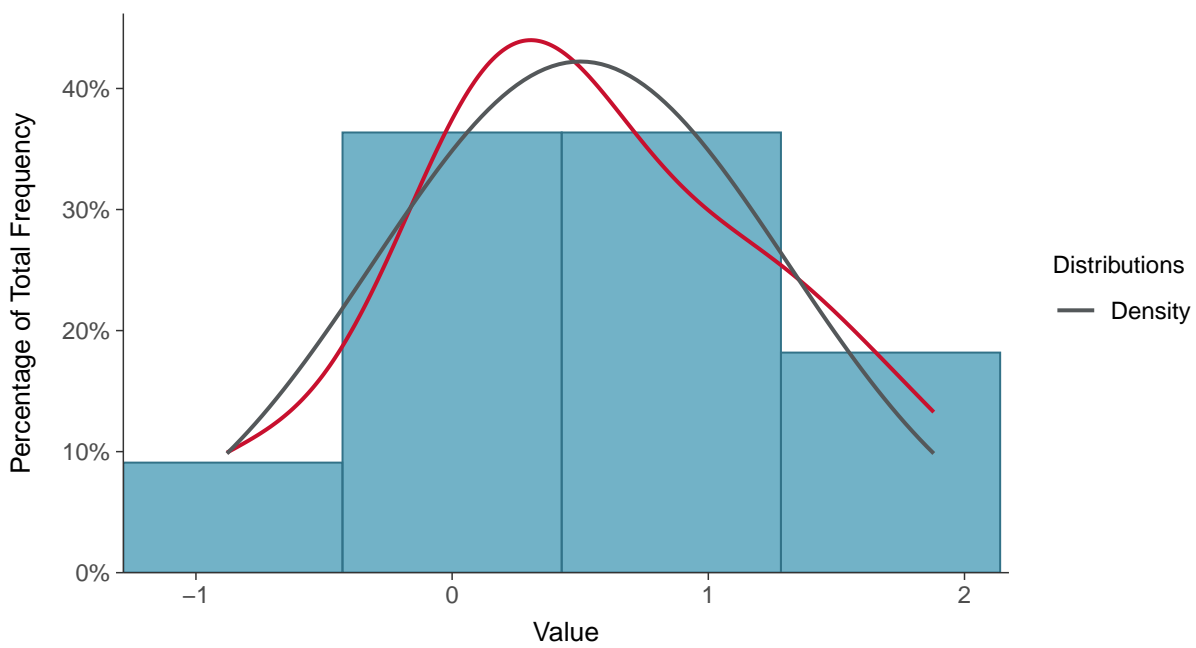
Scatter Plot

Radium-228, MW-7B (pCi/L)



Histogram

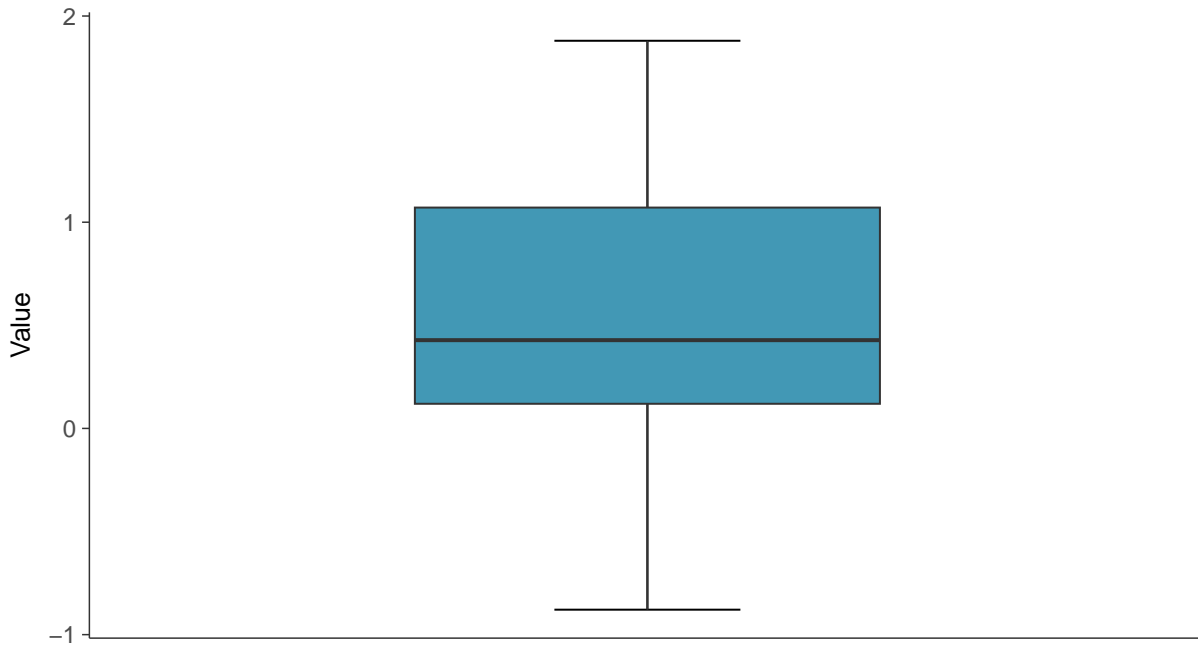
Radium-228, MW-7B (pCi/L)





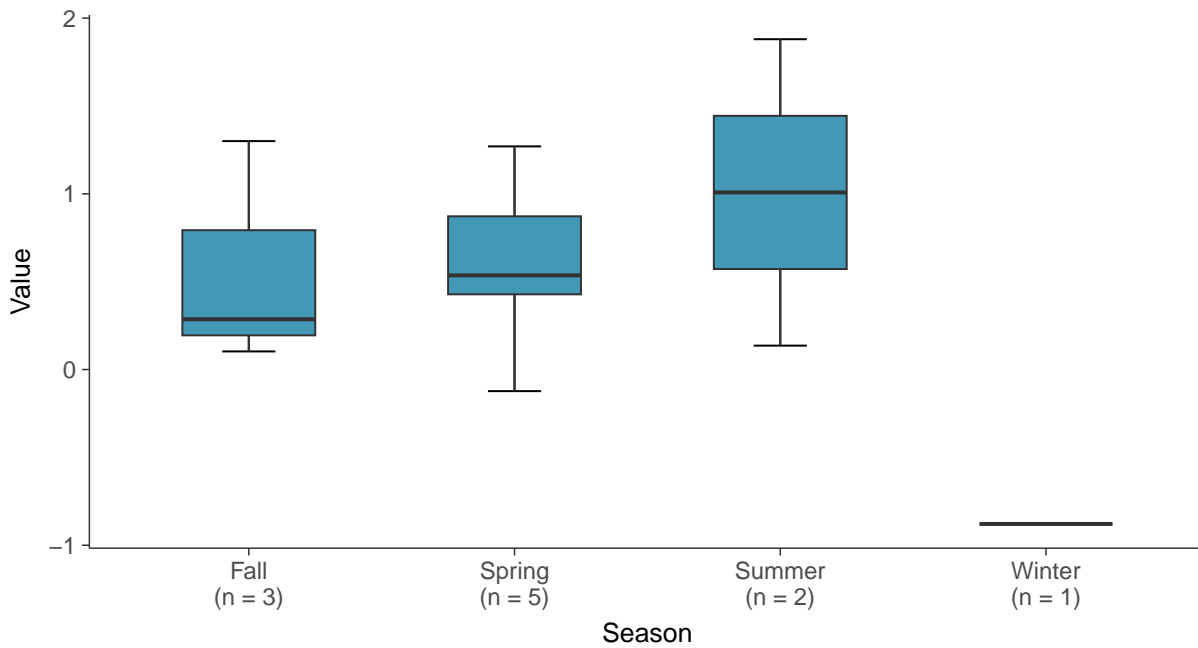
Boxplot

Radium-228, MW-7B (pCi/L)



Boxplot by Season

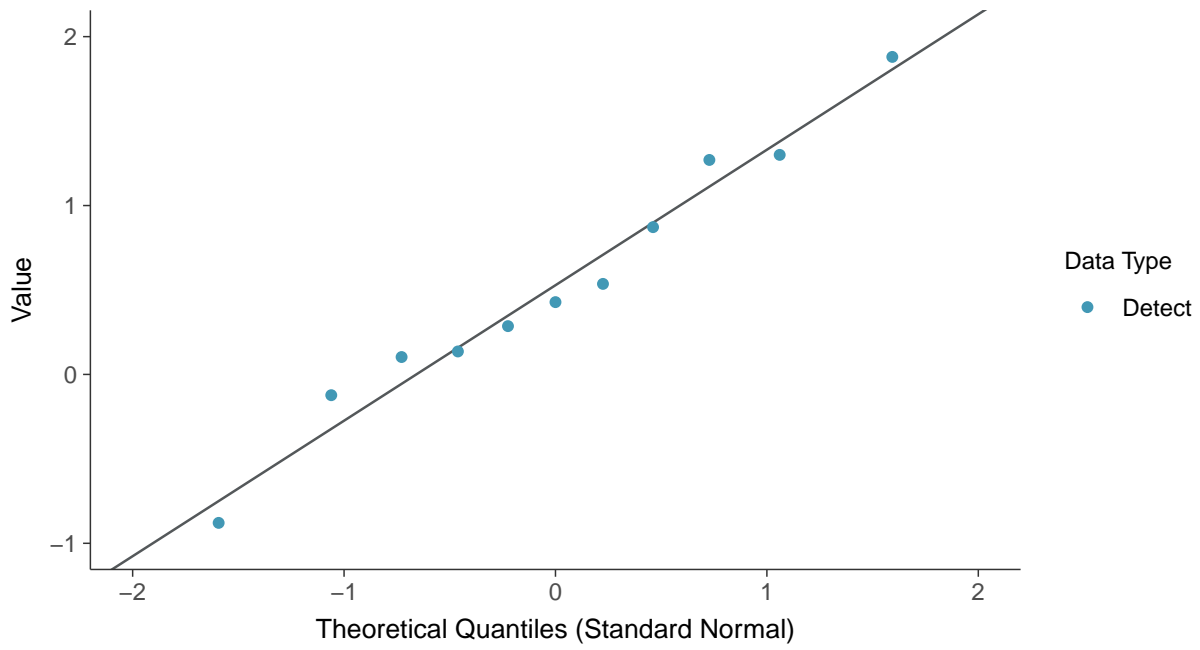
Radium-228, MW-7B (pCi/L)





Normal Q-Q plot

Radium-228, MW-7B (pCi/L)



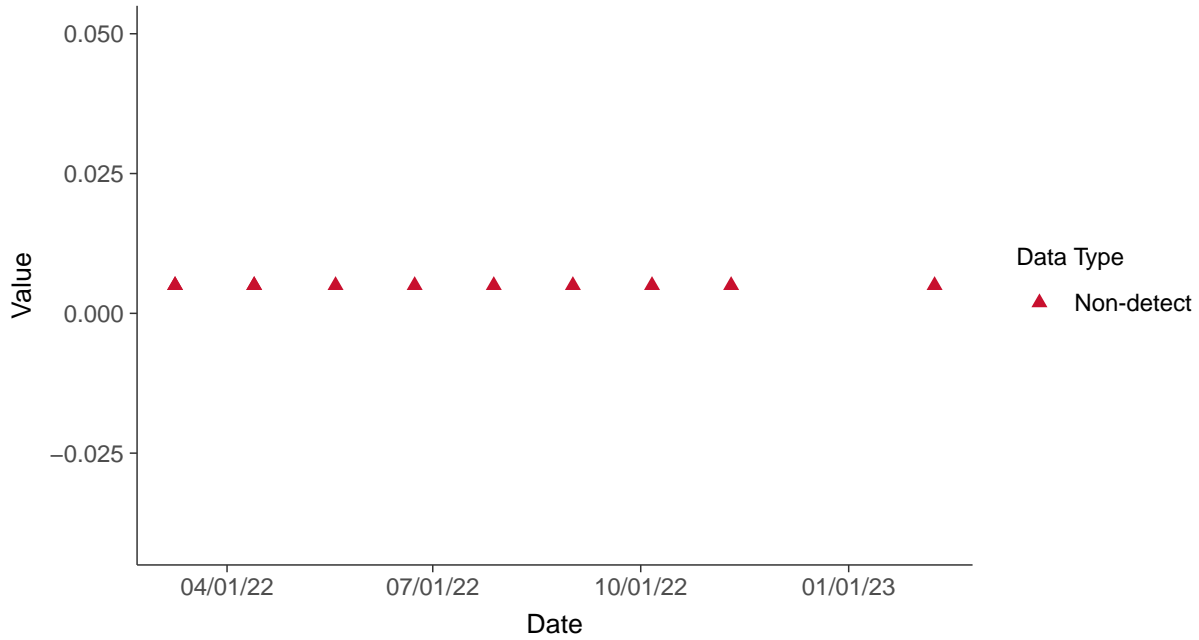


Appendix IV: Selenium, MW-7B

ID: 7B_2_27

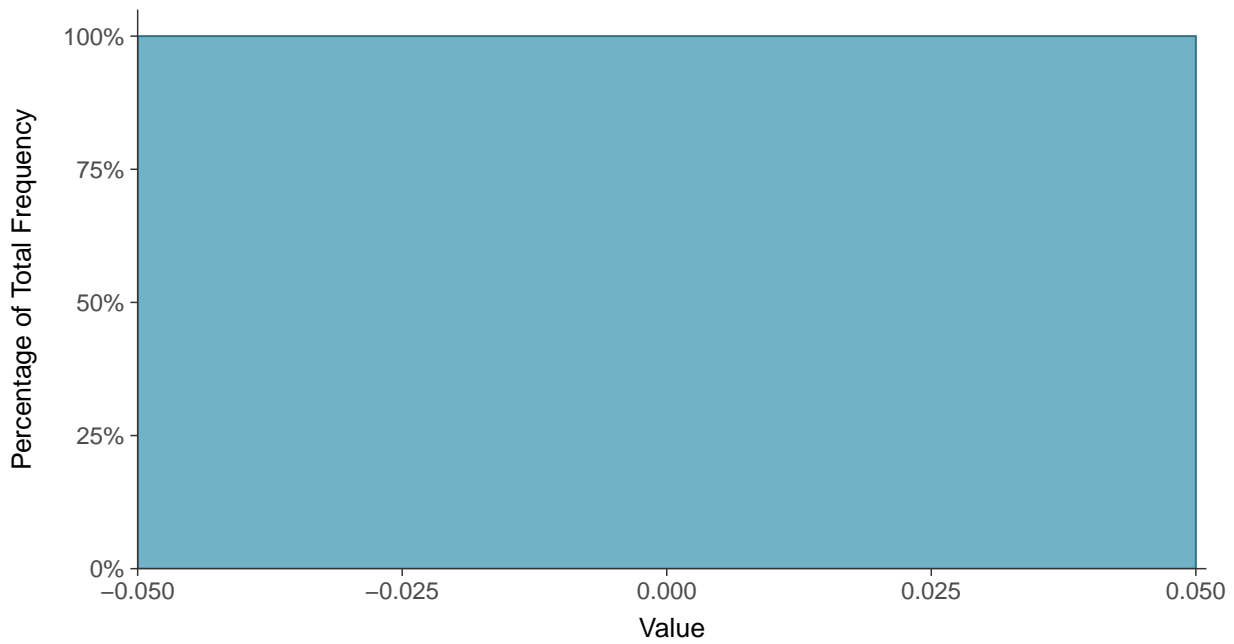
Scatter Plot

Selenium, MW-7B (mg/L)



Histogram

Selenium, MW-7B (mg/L)





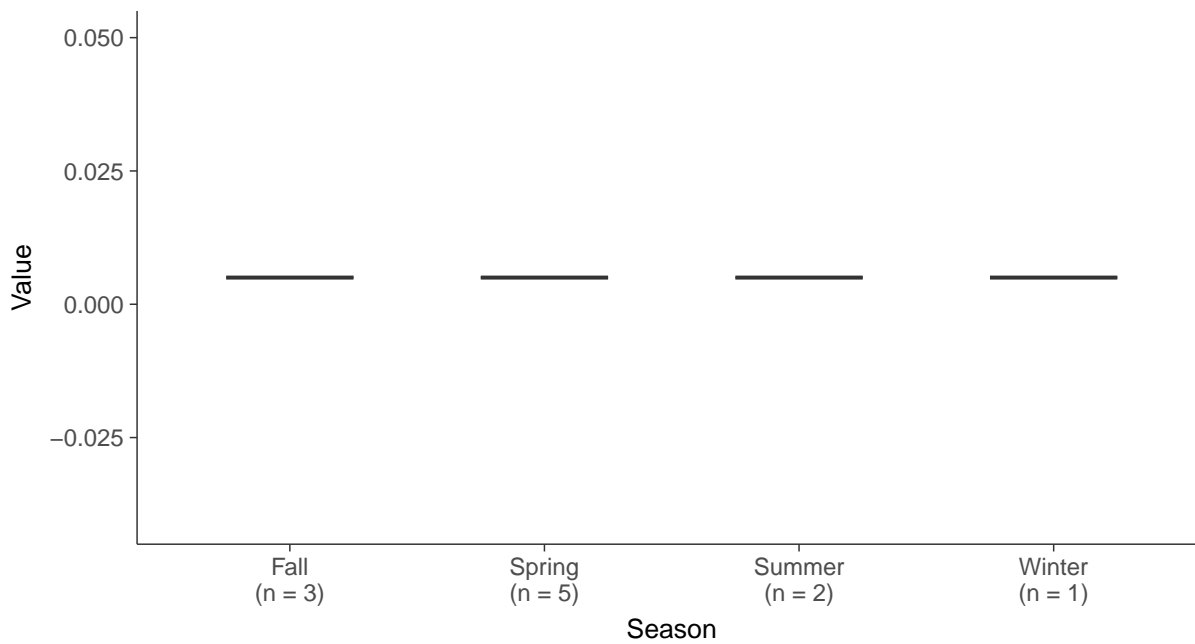
Boxplot

Selenium, MW-7B (mg/L)



Boxplot by Season

Selenium, MW-7B (mg/L)



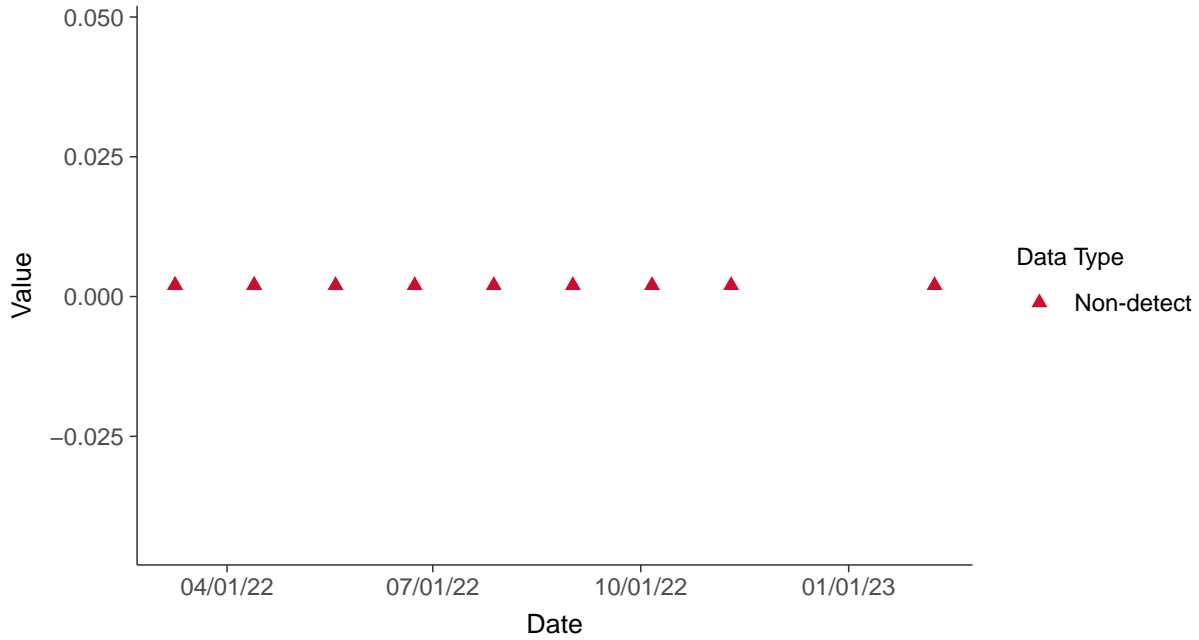


Appendix IV: Thallium, MW-7B

ID: 7B_2_29

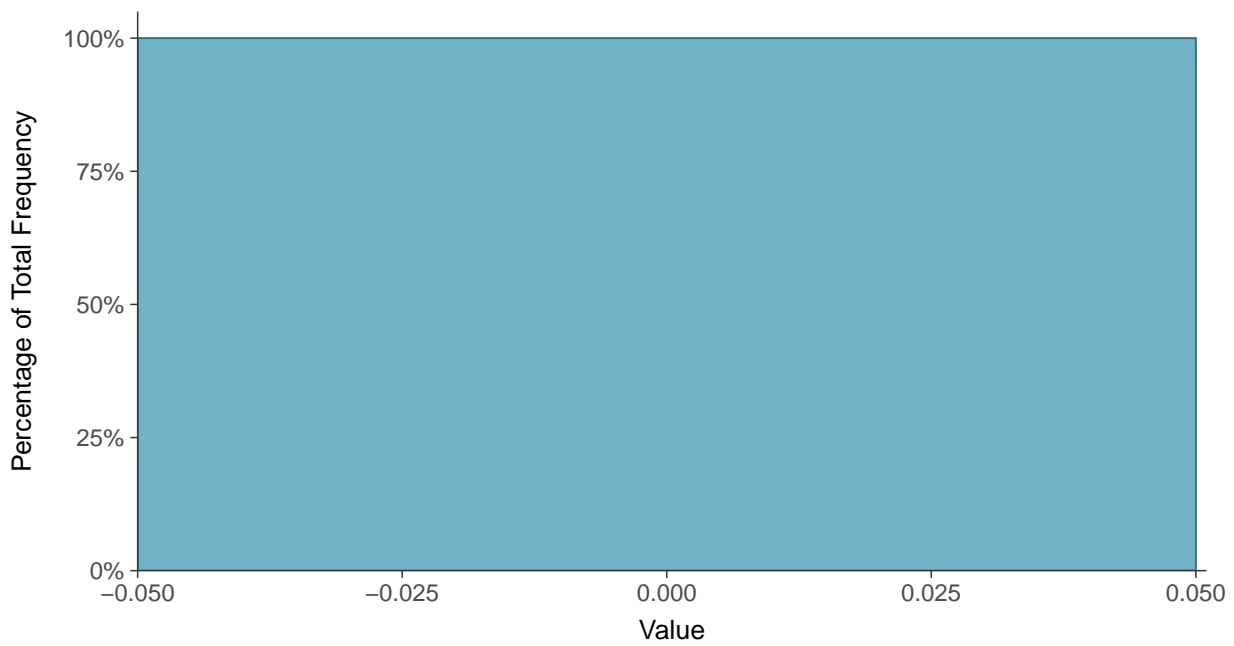
Scatter Plot

Thallium, MW-7B (mg/L)



Histogram

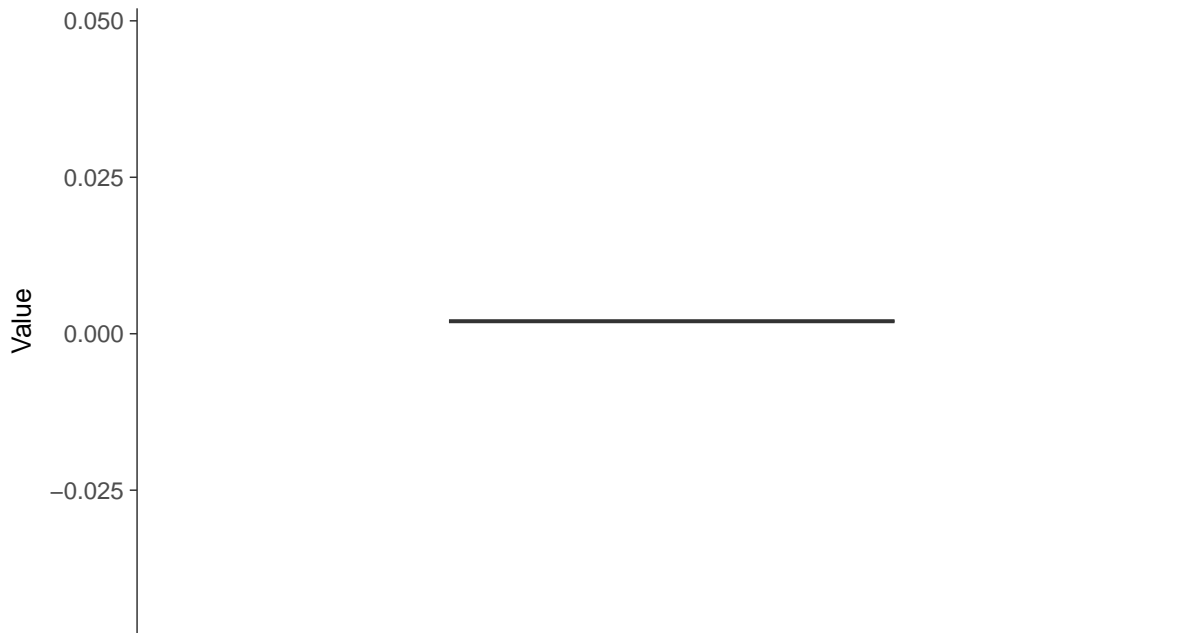
Thallium, MW-7B (mg/L)





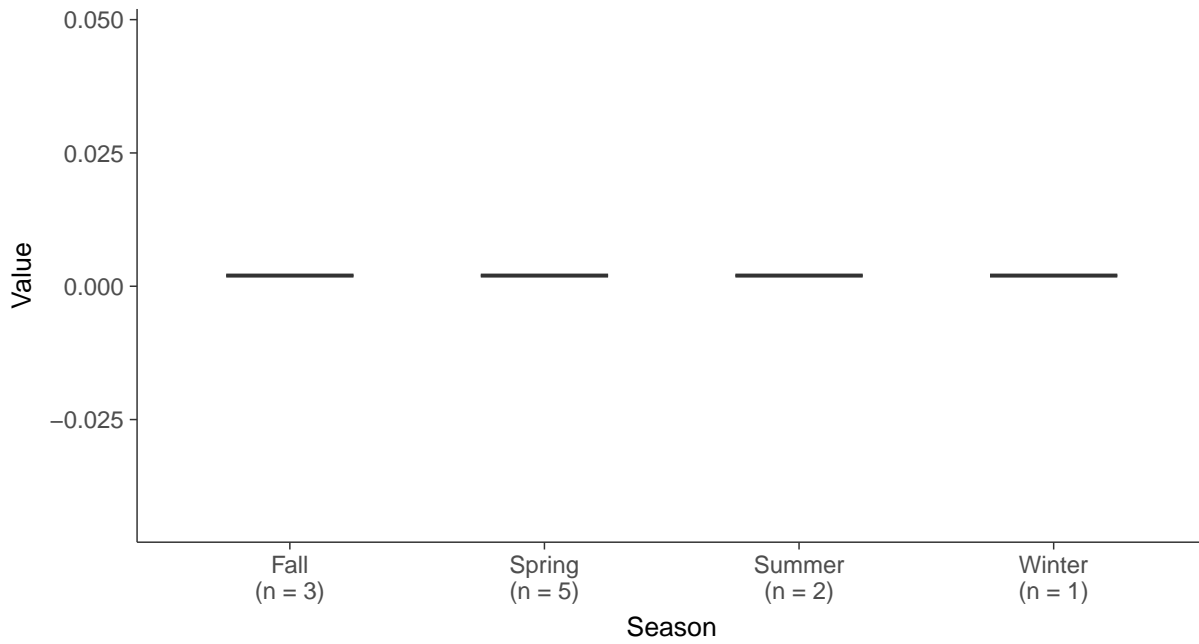
Boxplot

Thallium, MW-7B (mg/L)



Boxplot by Season

Thallium, MW-7B (mg/L)



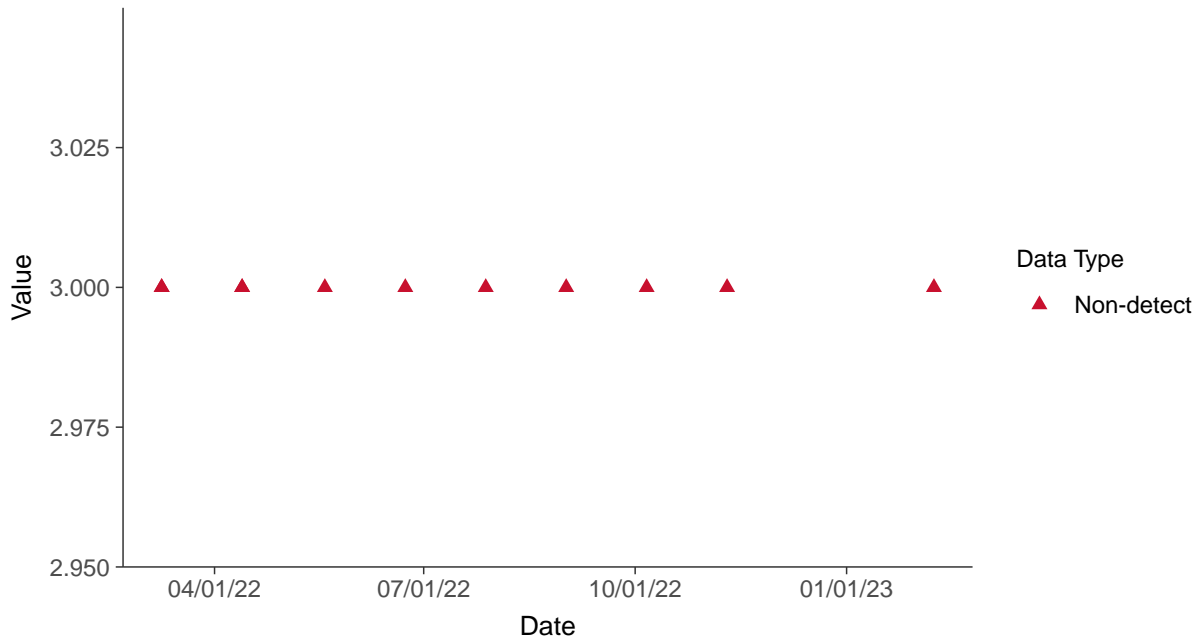


Appendix IV: Total Suspended Solids, MW-7B

ID: 7B_2_30

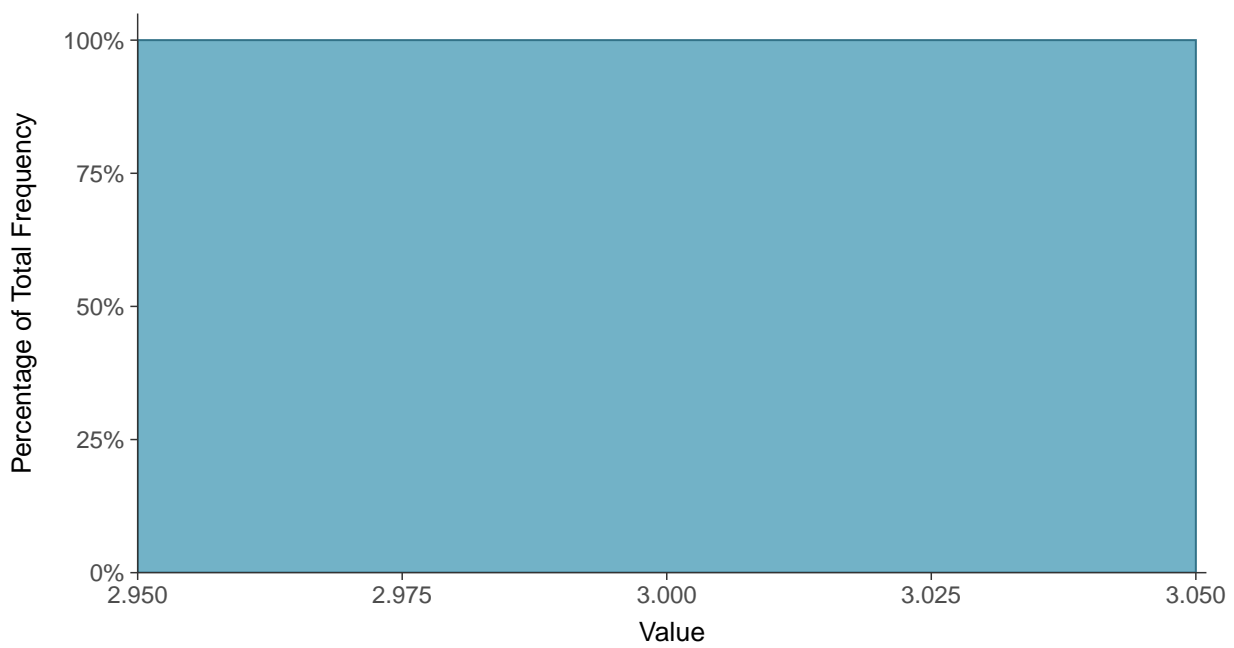
Scatter Plot

Total Suspended Solids, MW-7B (mg/L)



Histogram

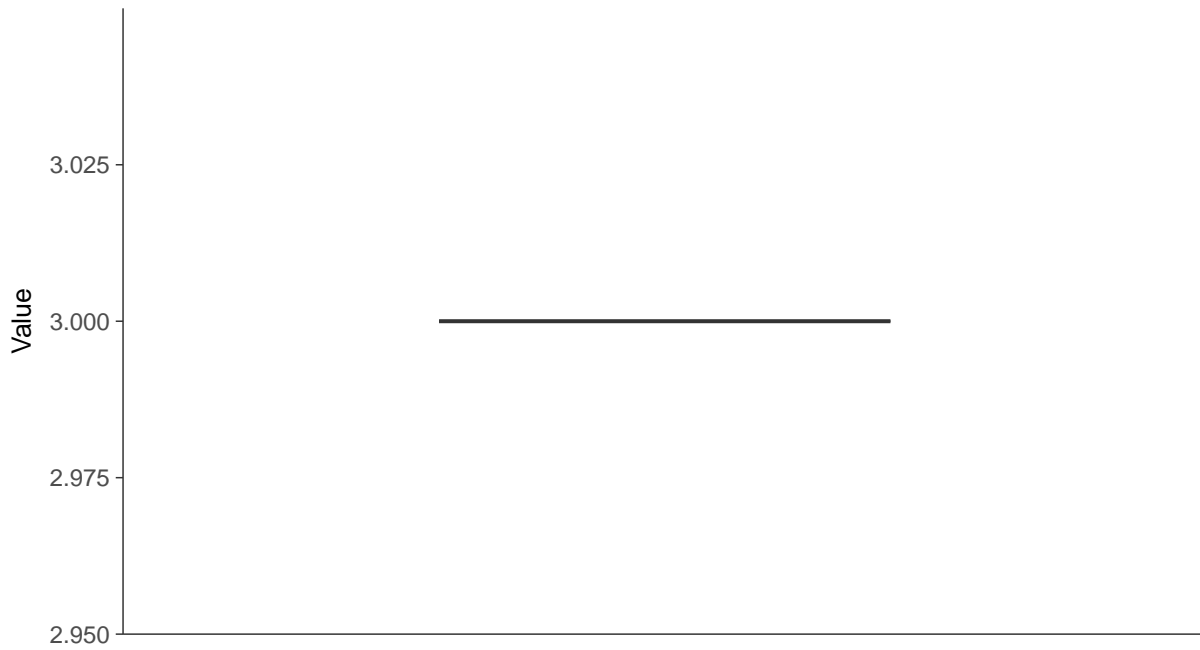
Total Suspended Solids, MW-7B (mg/L)





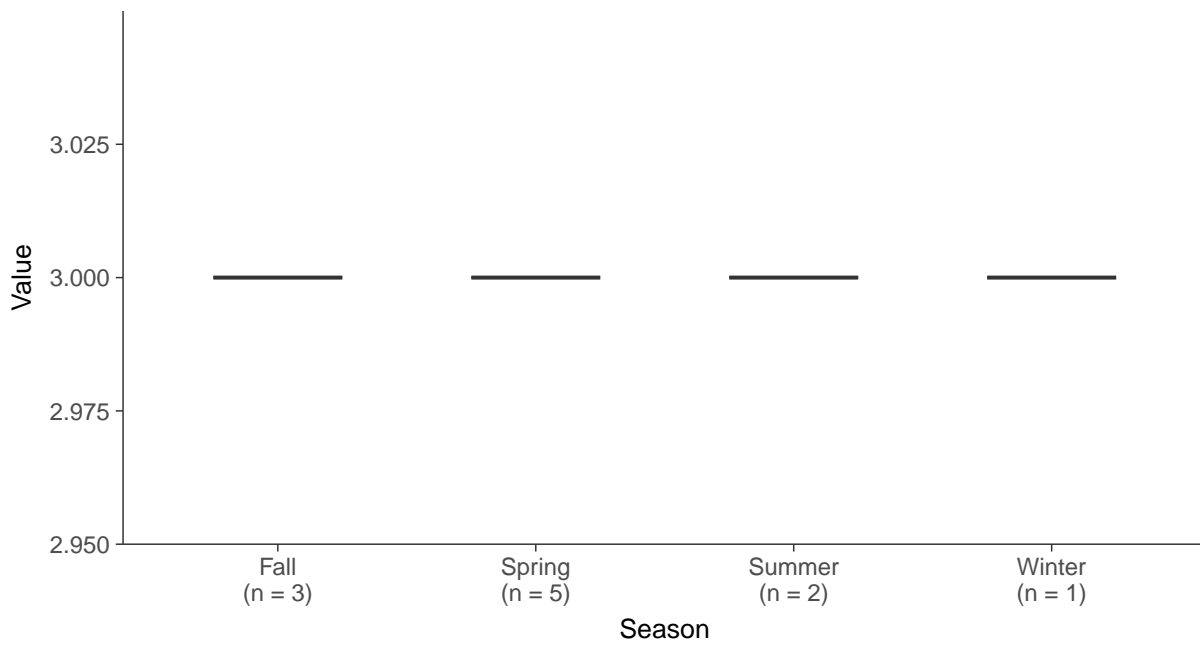
Boxplot

Total Suspended Solids, MW-7B (mg/L)



Boxplot by Season

Total Suspended Solids, MW-7B (mg/L)



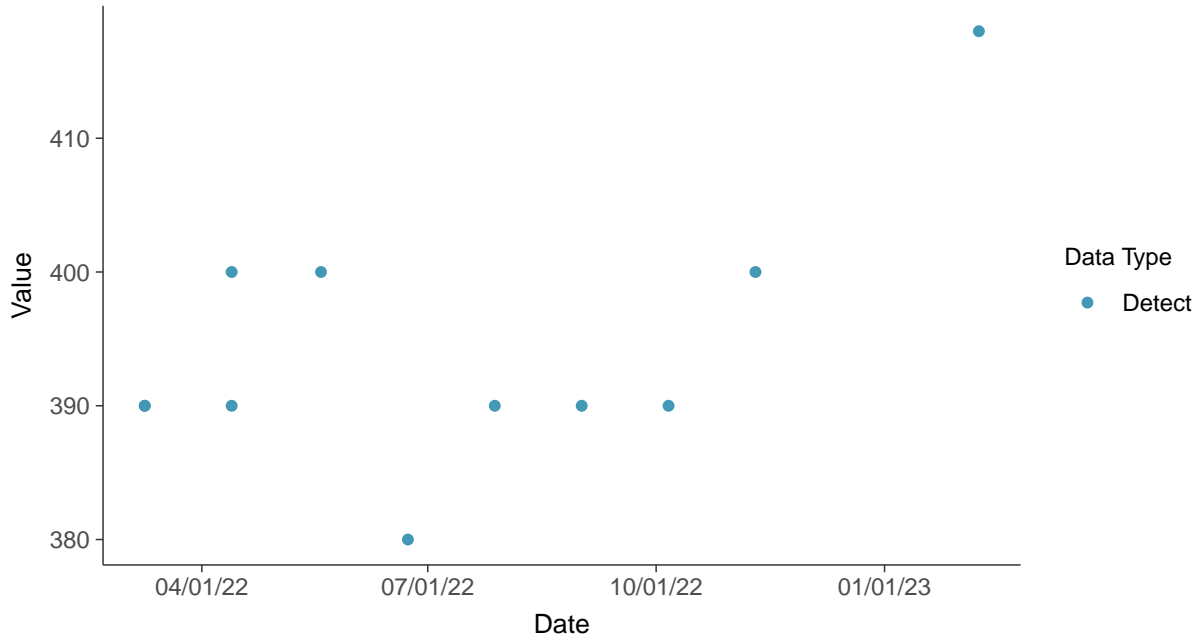


Other: Bicarbonate, MW-7B

ID: 7B_3_12

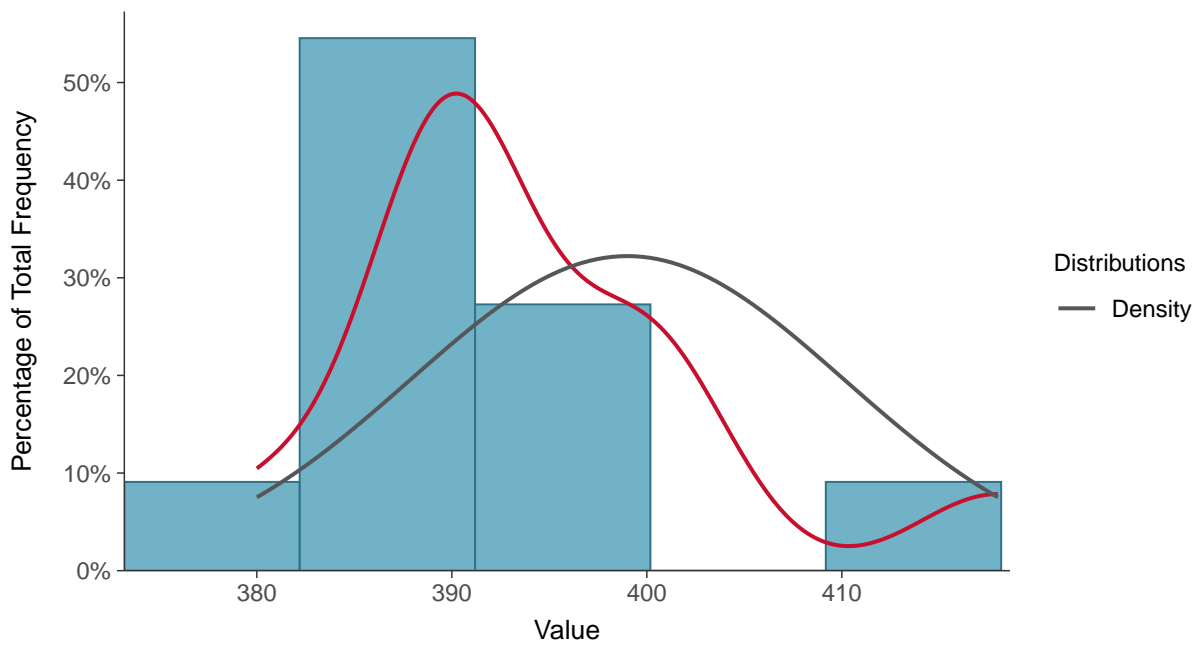
Scatter Plot

Bicarbonate, MW-7B (mg/L)



Histogram

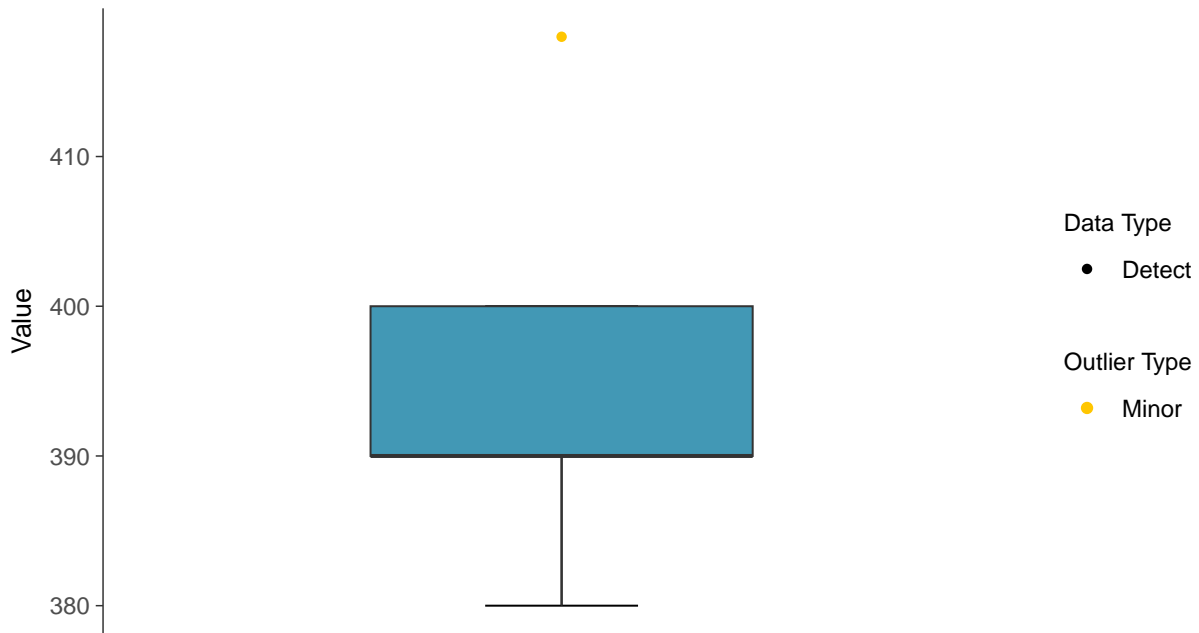
Bicarbonate, MW-7B (mg/L)





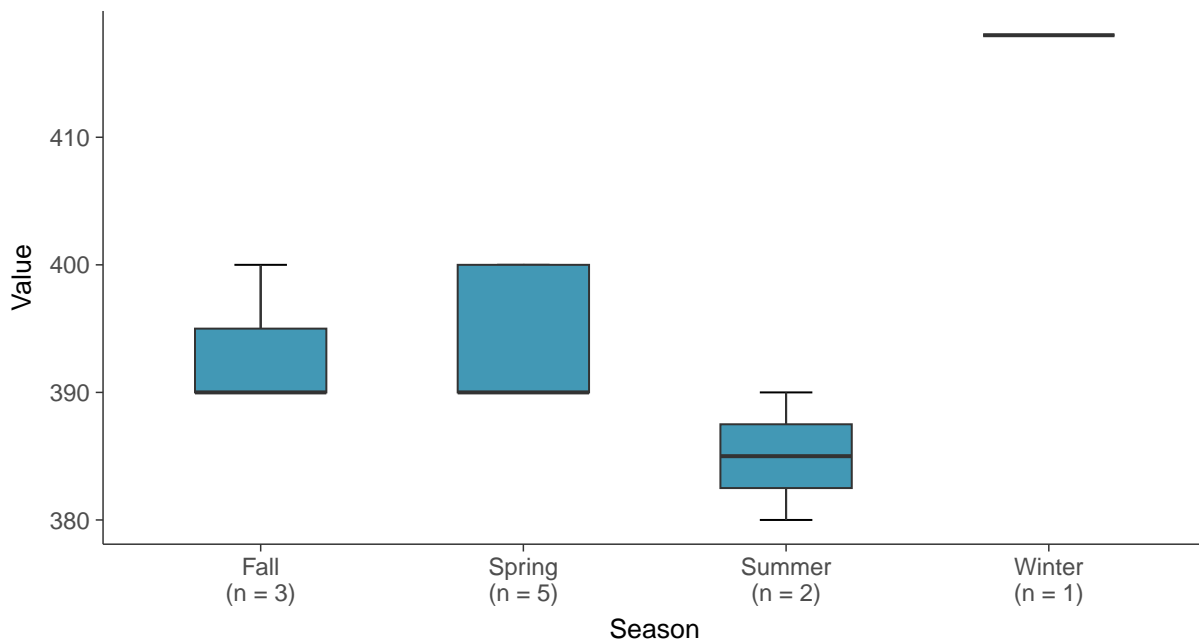
Boxplot

Bicarbonate, MW-7B (mg/L)



Boxplot by Season

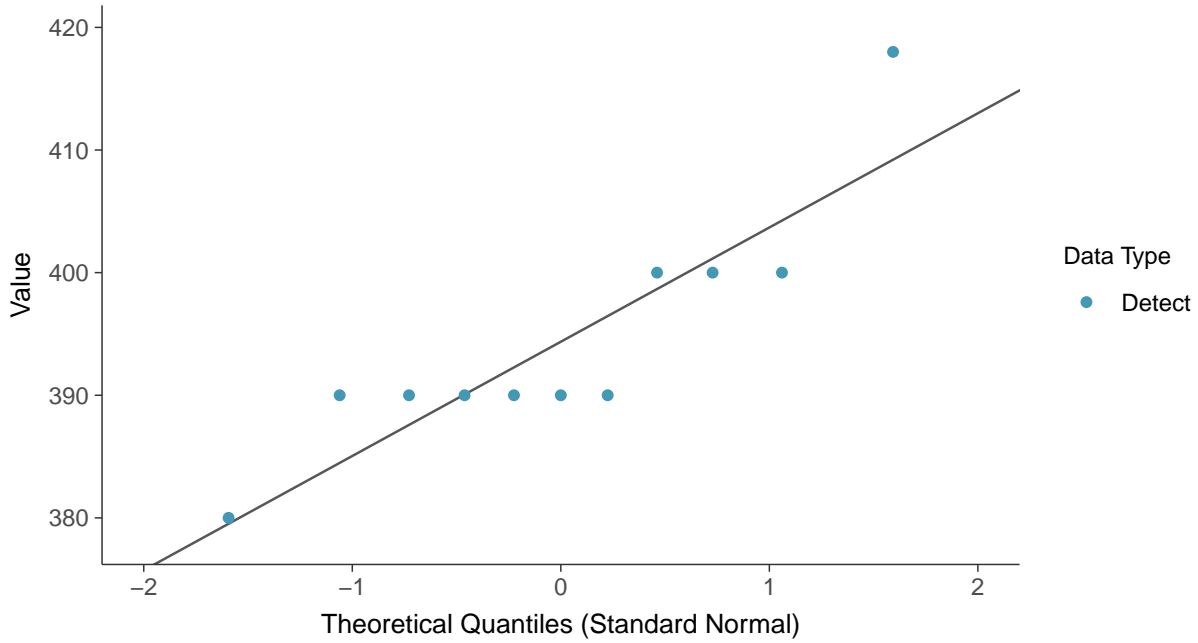
Bicarbonate, MW-7B (mg/L)





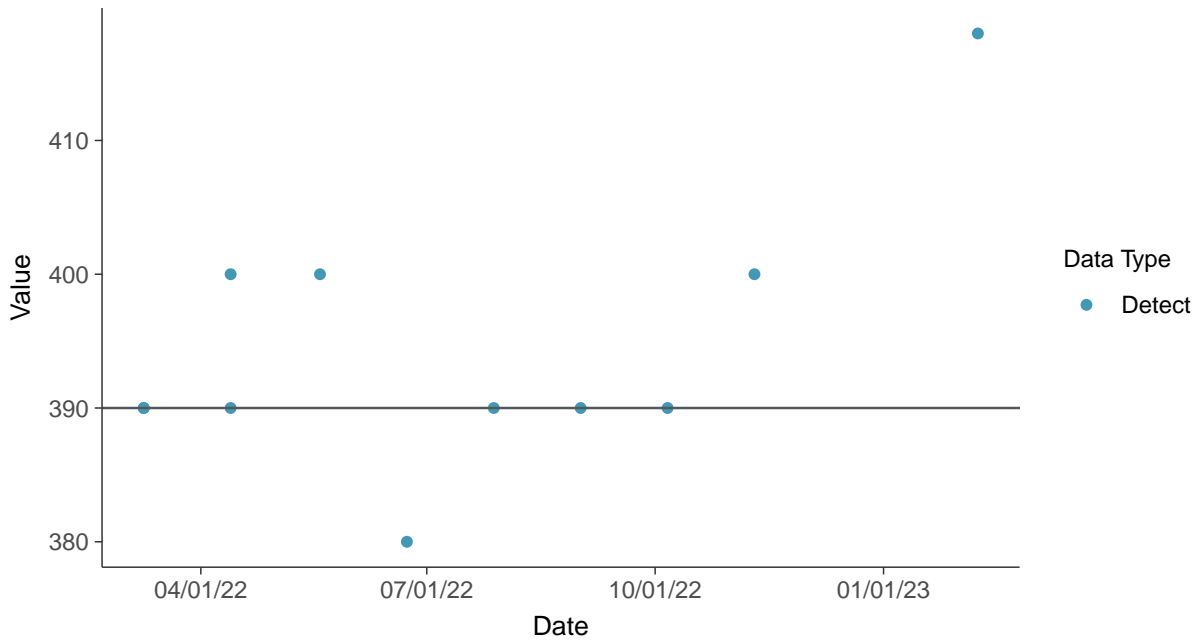
Normal Q-Q plot

Bicarbonate, MW-7B (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

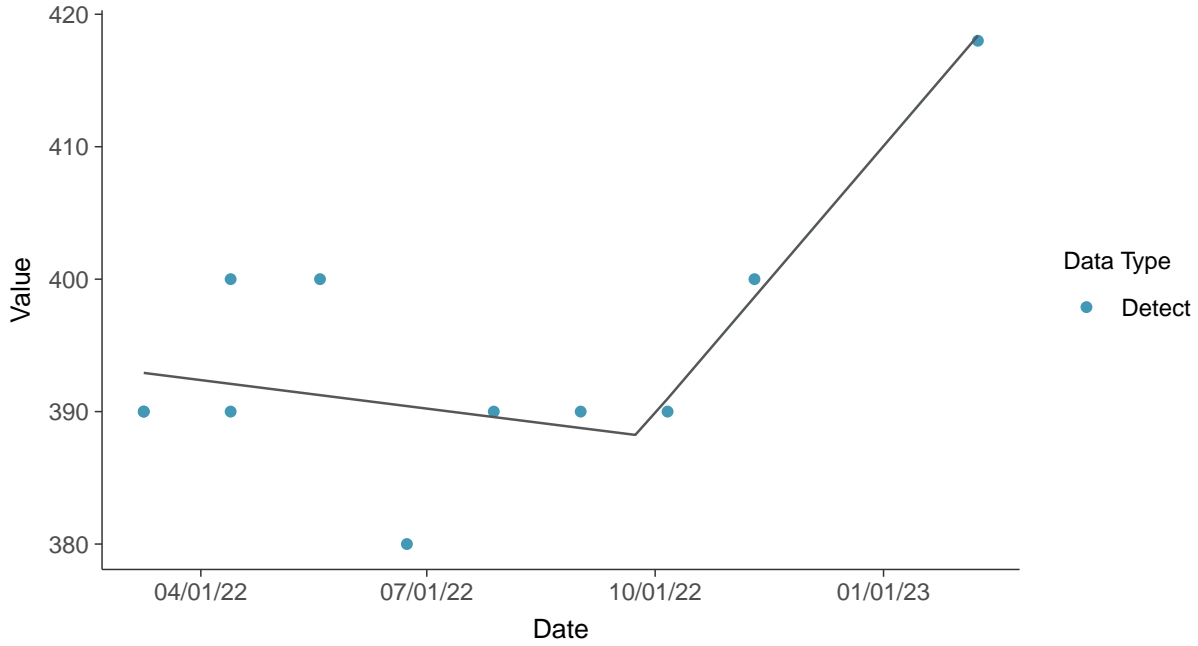
Bicarbonate, MW-7B (mg/L)





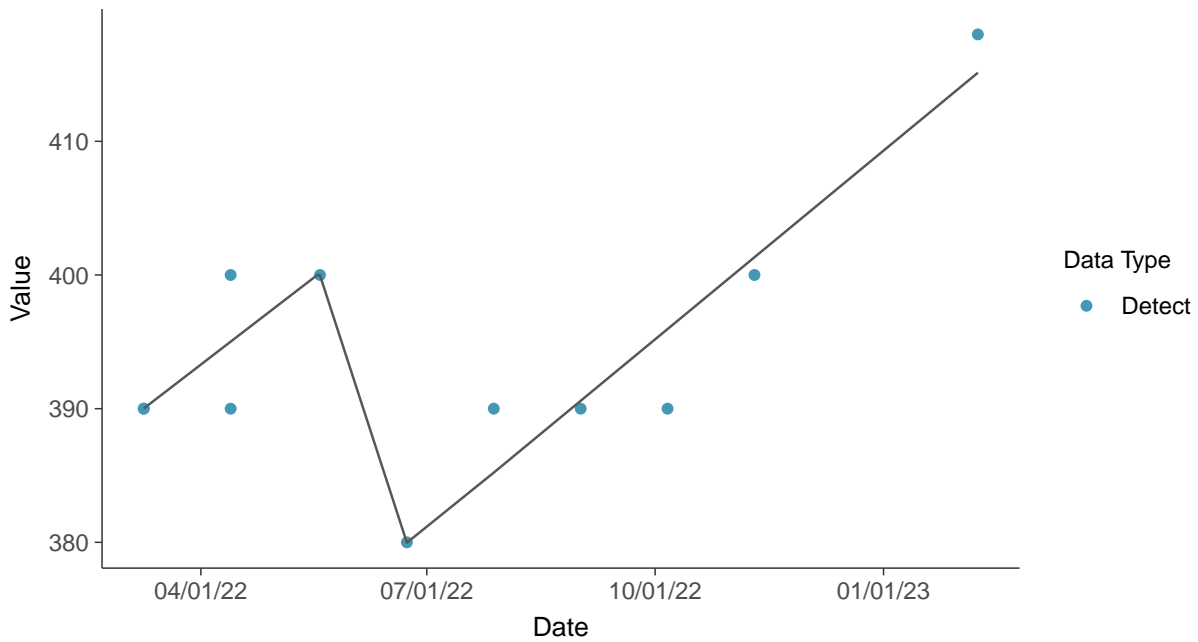
Trend Regression: Piecewise Linear-Linear

Bicarbonate, MW-7B (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Bicarbonate, MW-7B (mg/L)



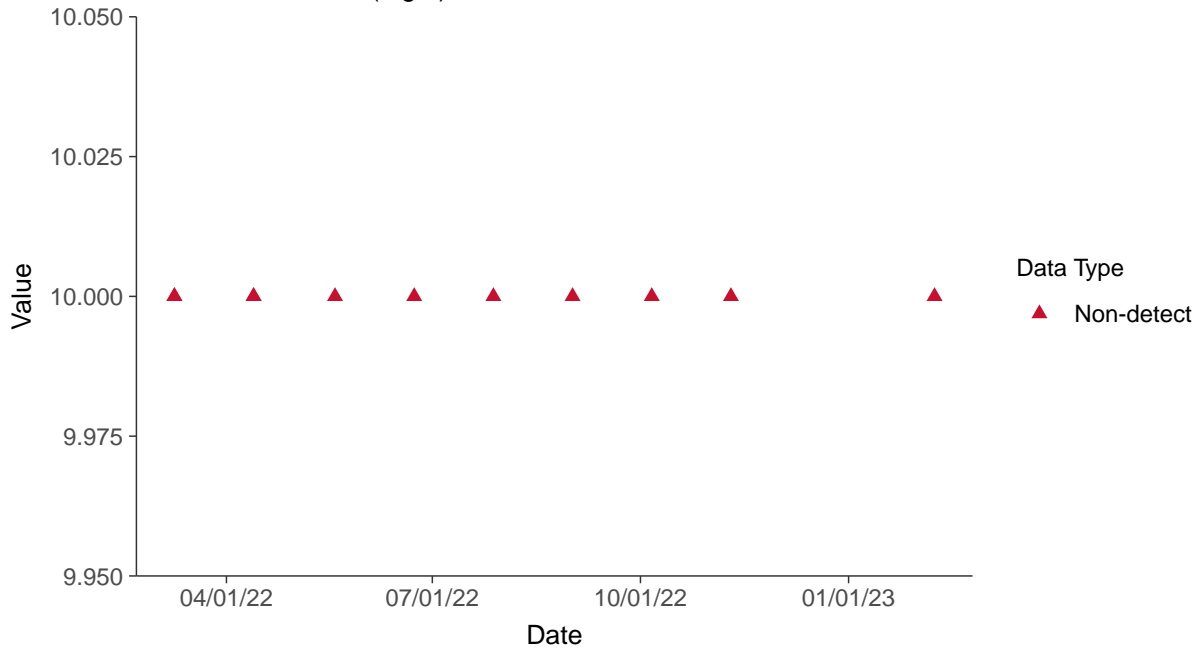


Other: Carbonate, MW-7B

ID: 7B_3_14

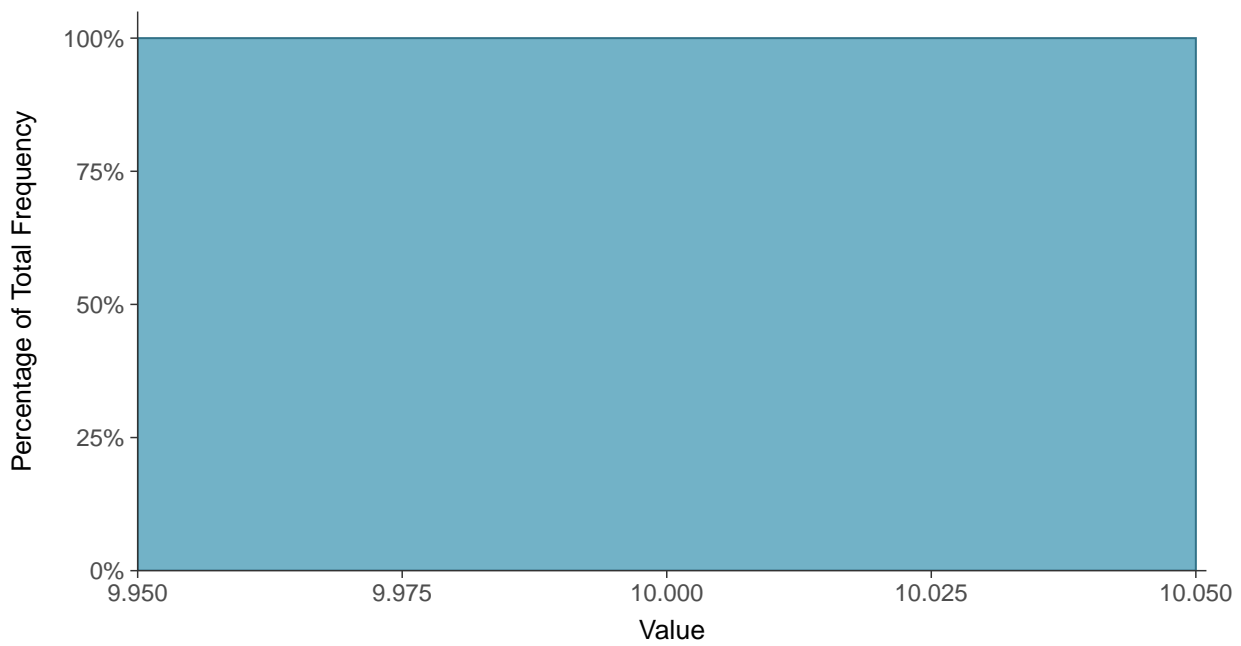
Scatter Plot

Carbonate, MW-7B (mg/L)



Histogram

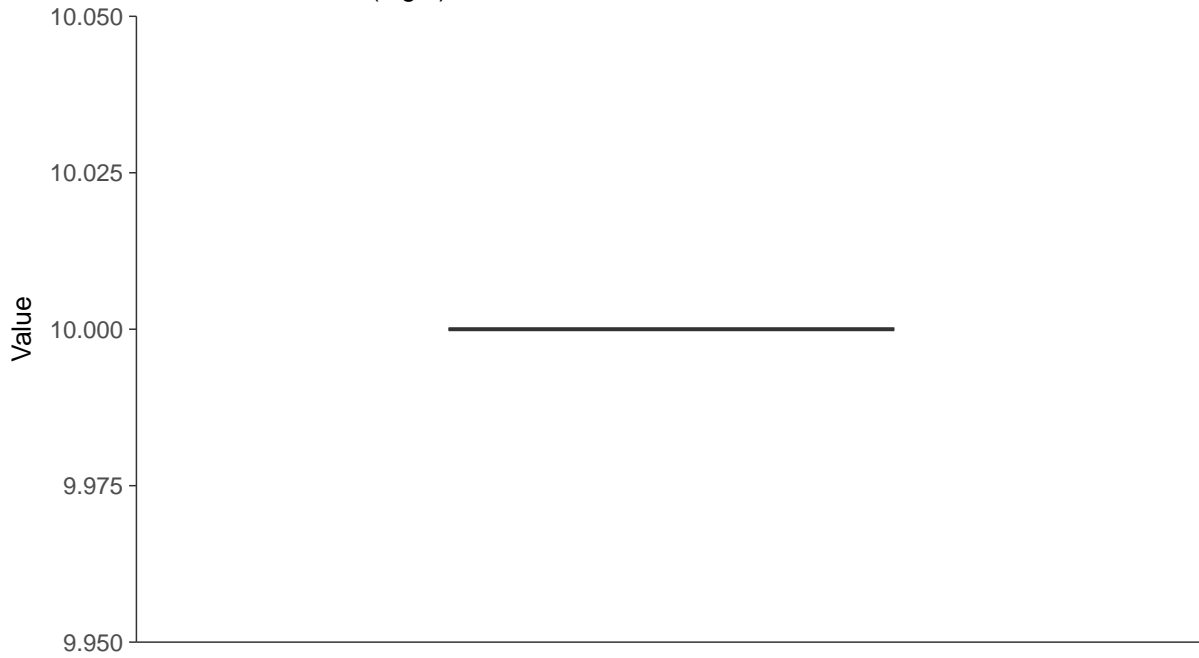
Carbonate, MW-7B (mg/L)





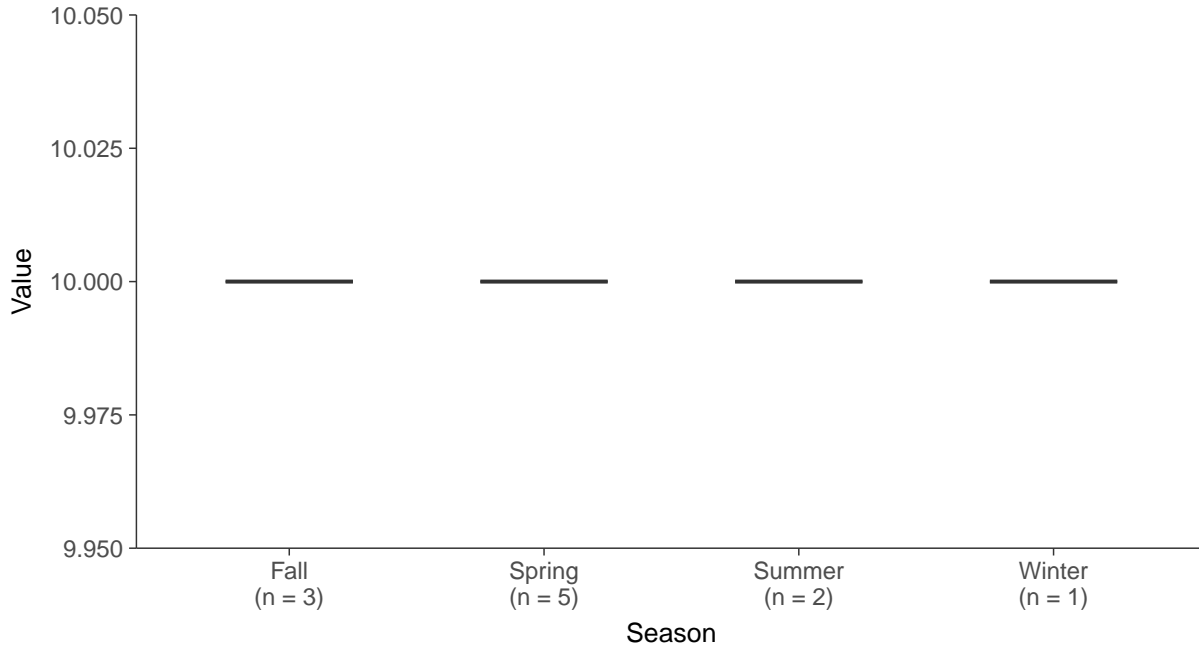
Boxplot

Carbonate, MW-7B (mg/L)



Boxplot by Season

Carbonate, MW-7B (mg/L)

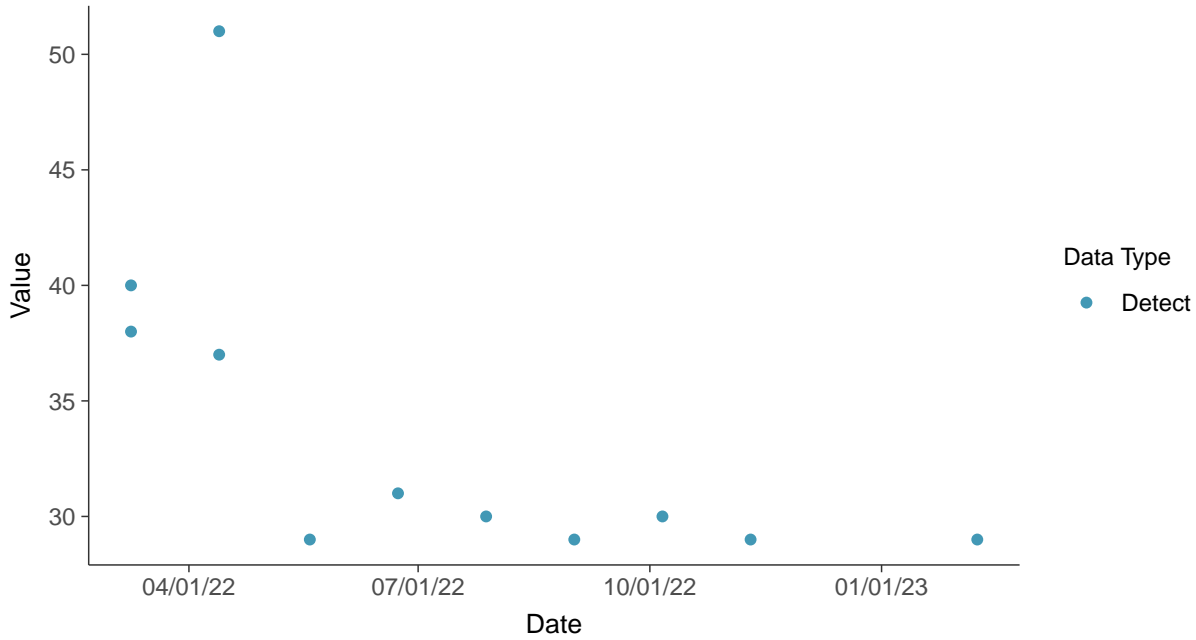


Other: Hardness, MW-7B

ID: 7B_3_17

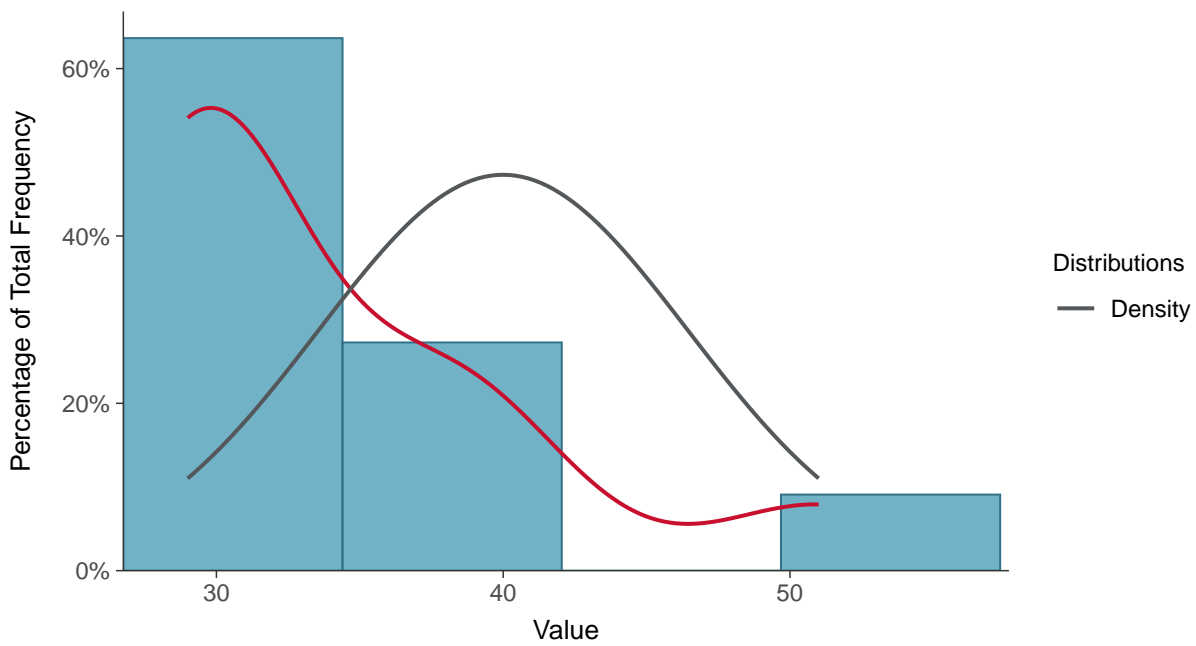
Scatter Plot

Hardness, MW-7B (mg/L)



Histogram

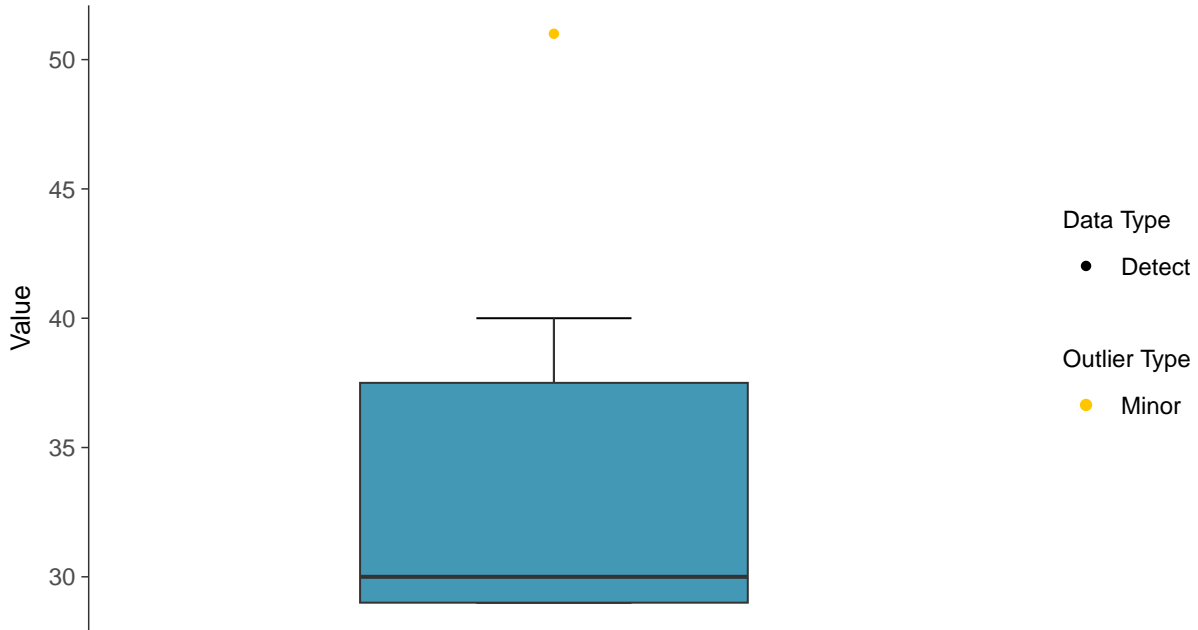
Hardness, MW-7B (mg/L)





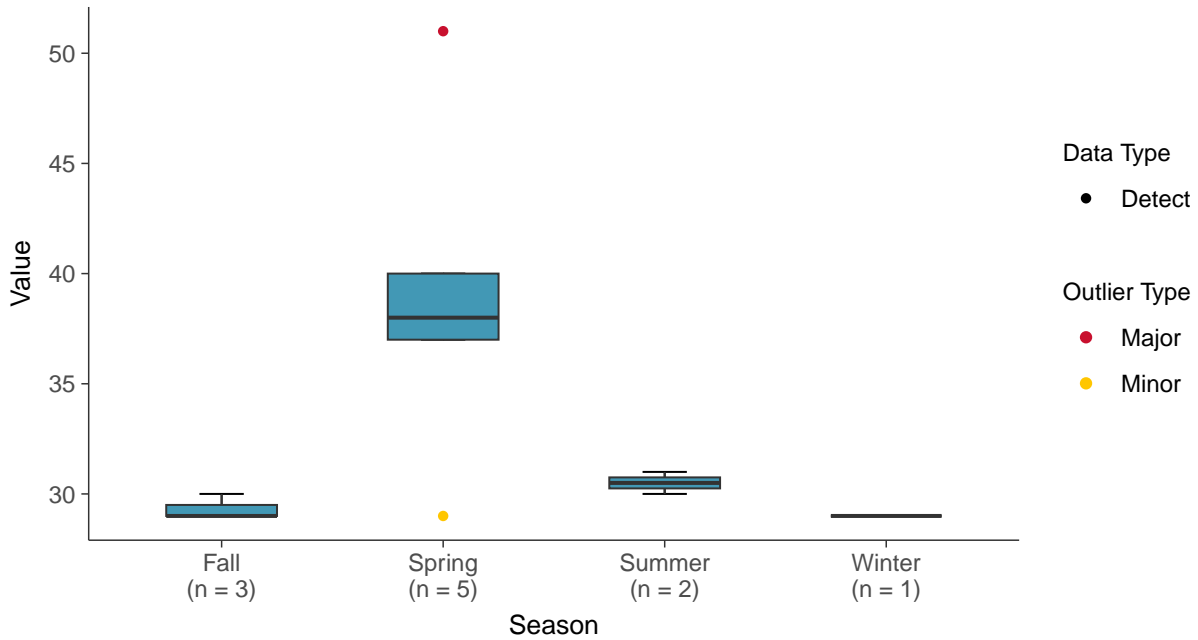
Boxplot

Hardness, MW-7B (mg/L)



Boxplot by Season

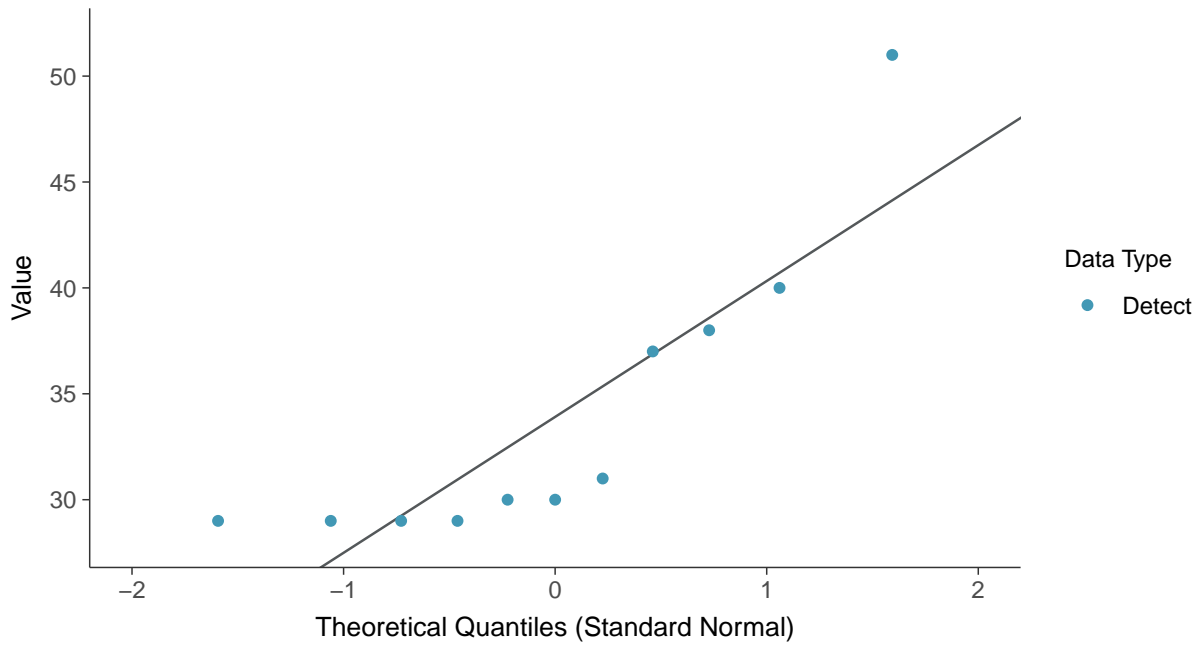
Hardness, MW-7B (mg/L)





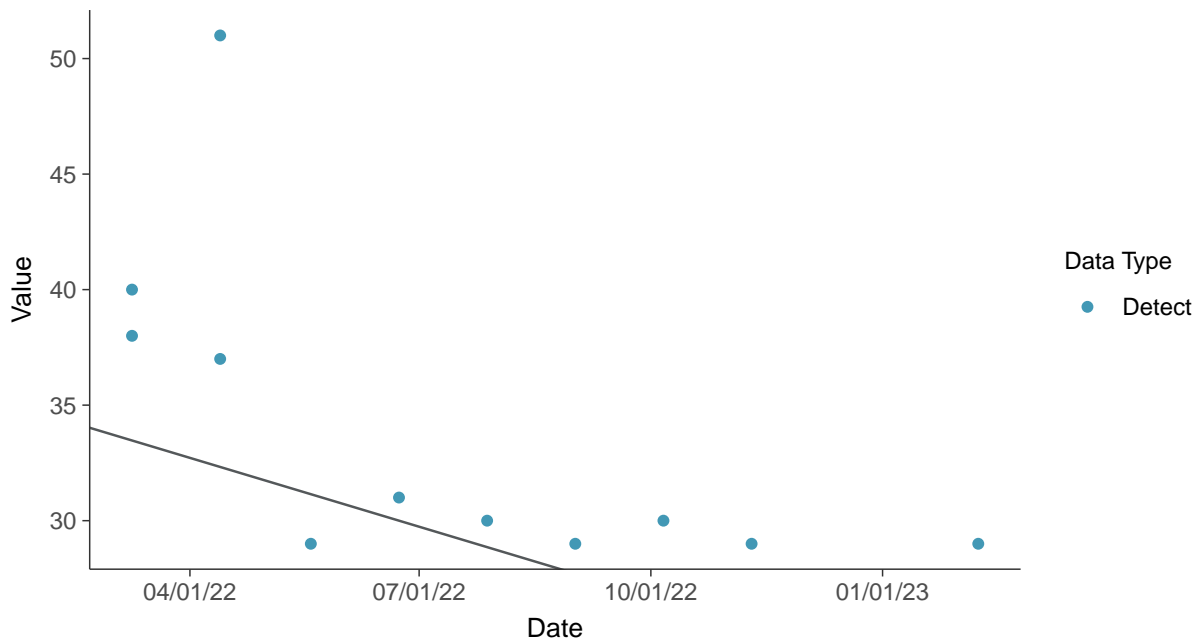
Normal Q-Q plot

Hardness, MW-7B (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

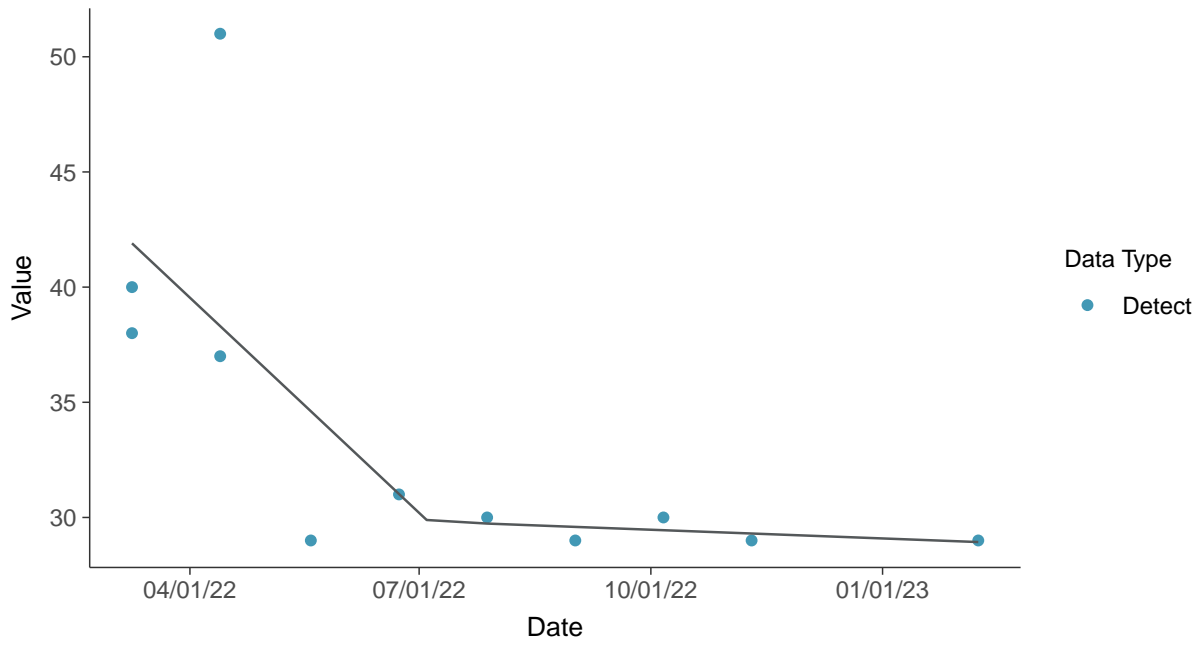
Hardness, MW-7B (mg/L)





Trend Regression: Piecewise Linear-Linear

Hardness, MW-7B (mg/L)



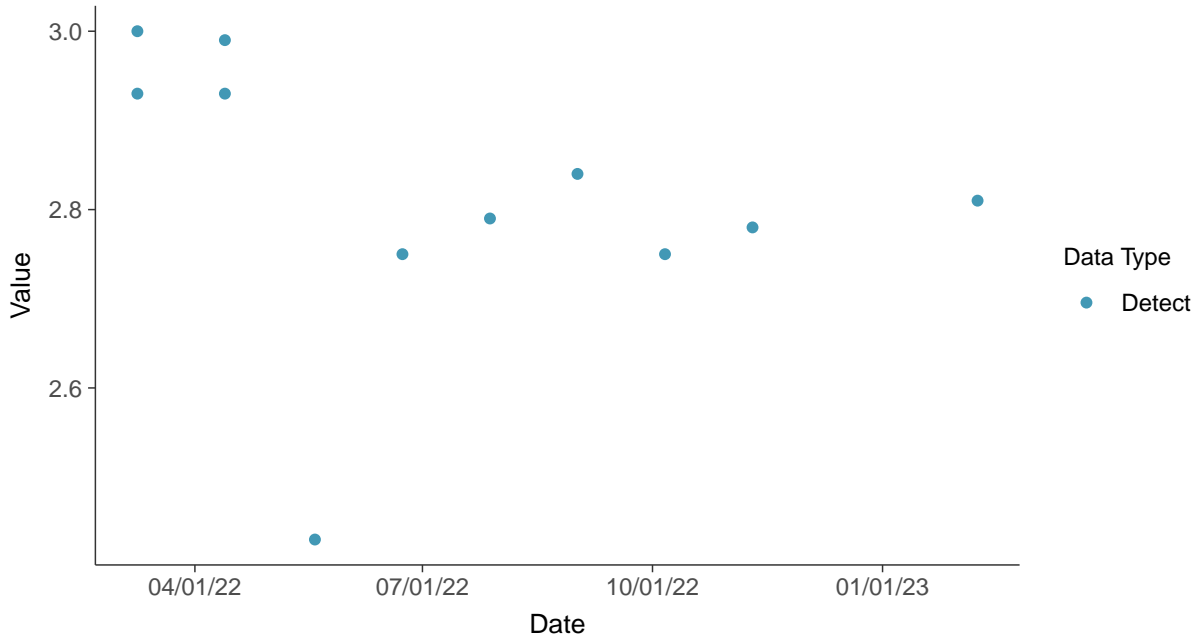


Other: Magnesium, MW-7B

ID: 7B_3_20

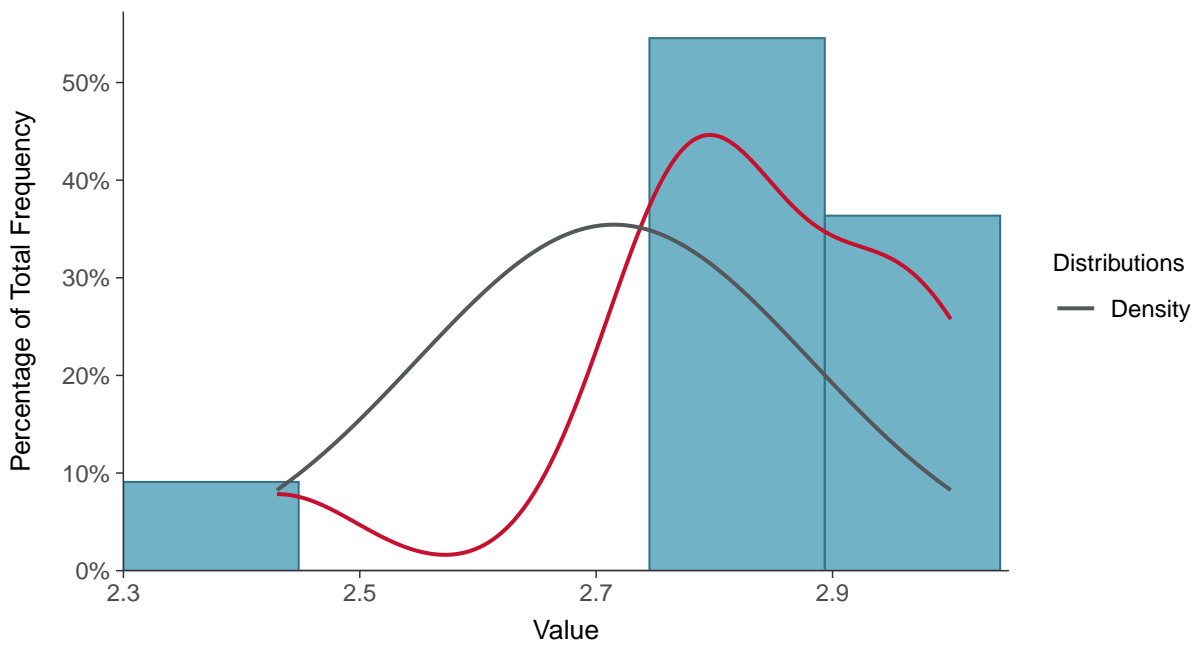
Scatter Plot

Magnesium, MW-7B (mg/L)



Histogram

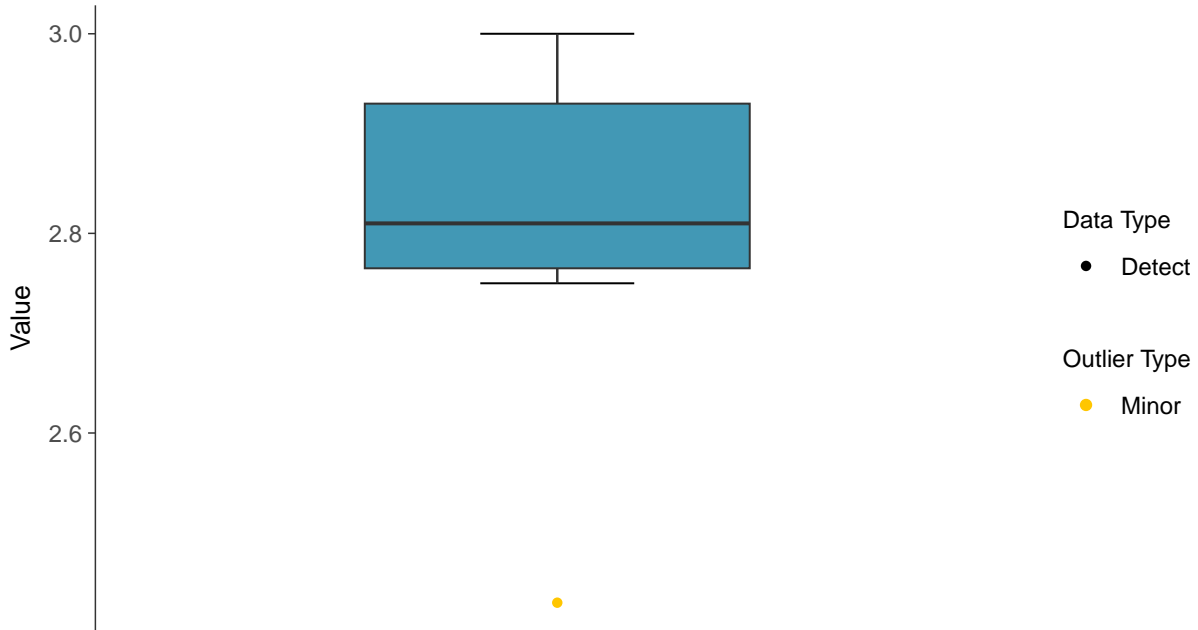
Magnesium, MW-7B (mg/L)





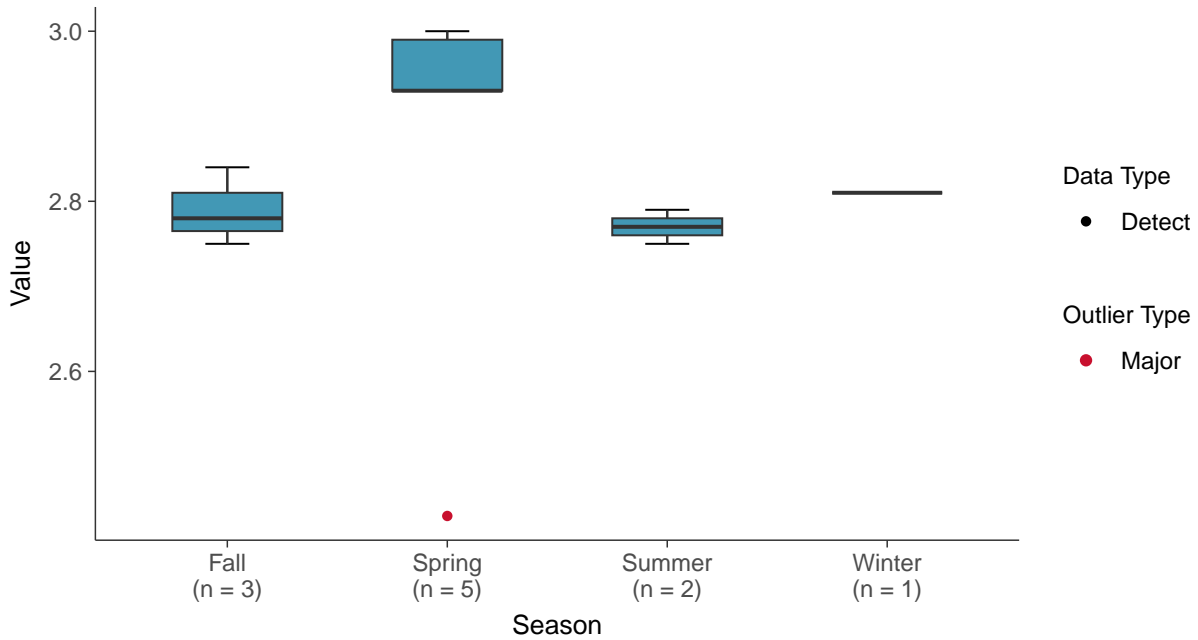
Boxplot

Magnesium, MW-7B (mg/L)



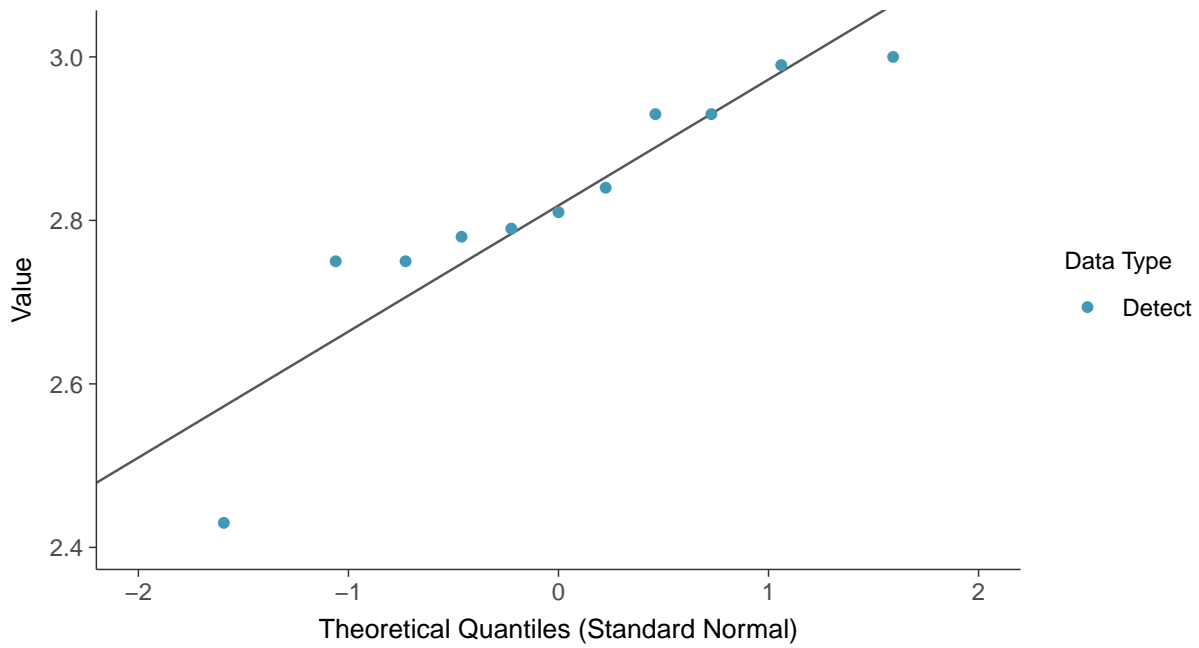
Boxplot by Season

Magnesium, MW-7B (mg/L)

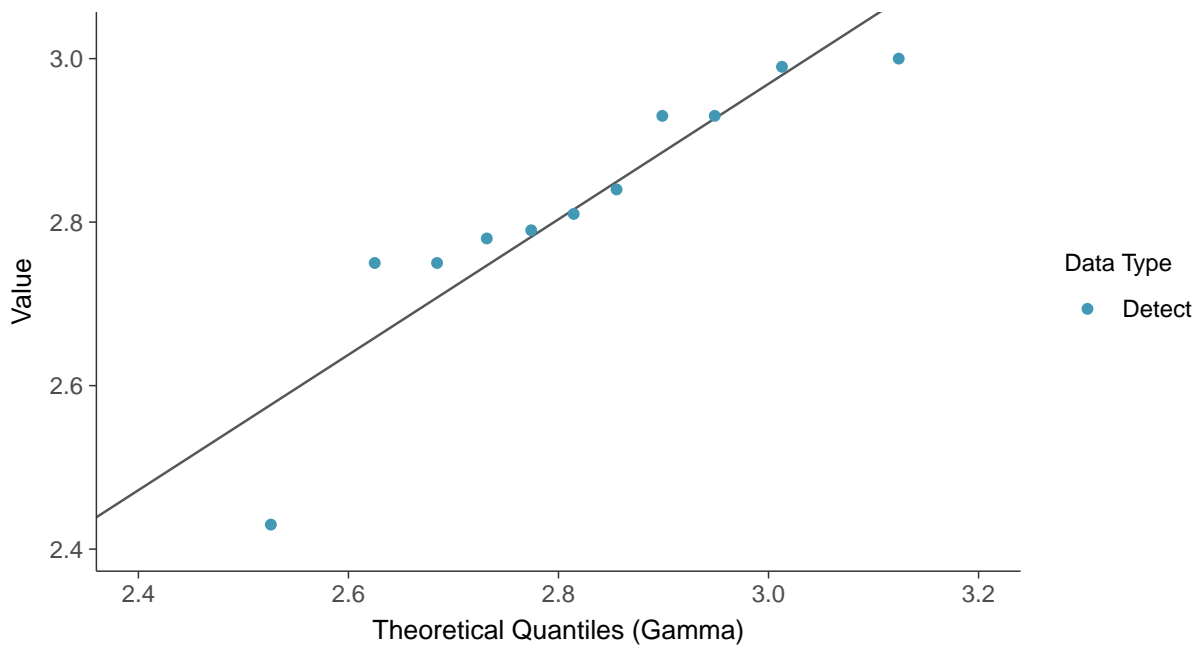




Normal Q-Q plot
Magnesium, MW-7B (mg/L)



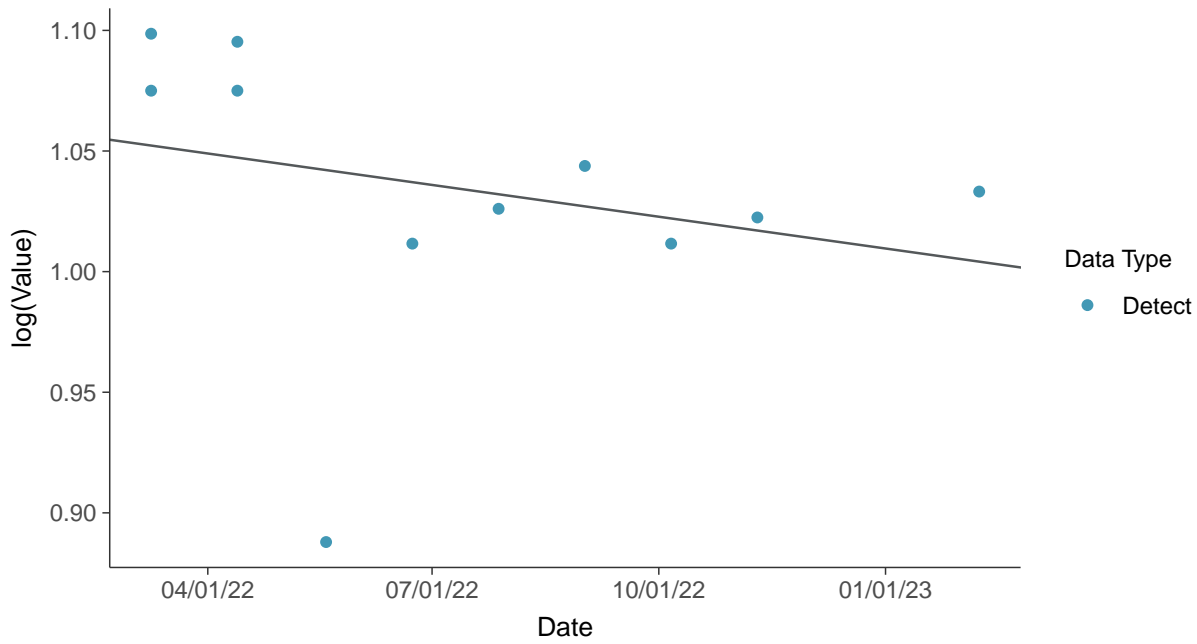
Gamma Q-Q plot
Magnesium, MW-7B (mg/L)





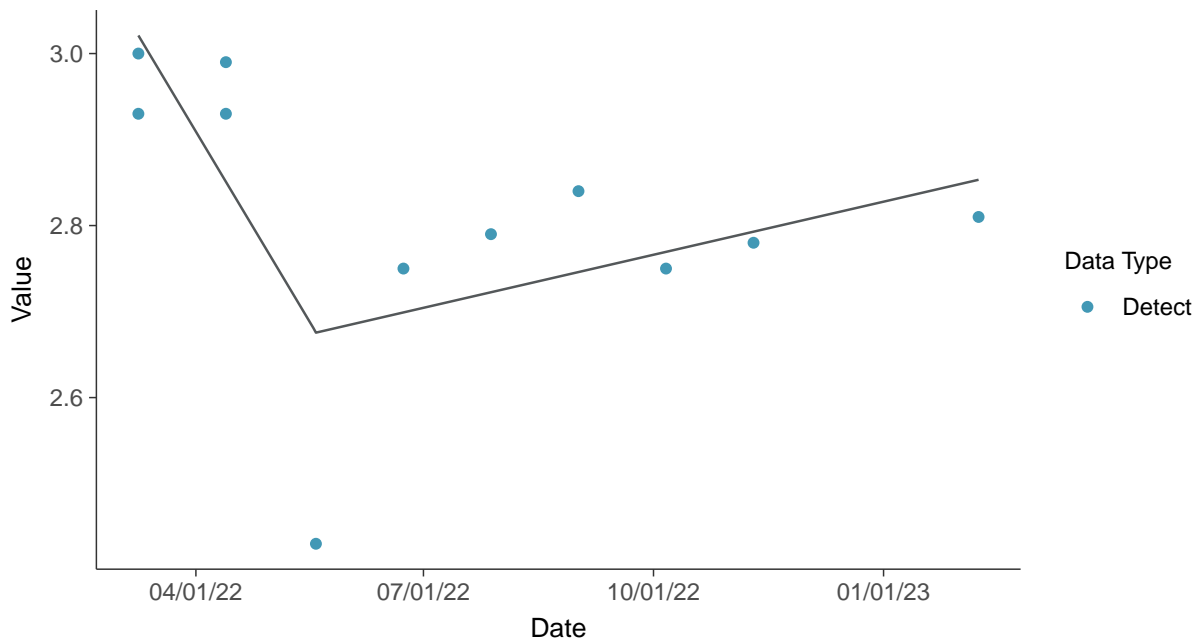
Trend Regression: Lognormal MLE

Magnesium, MW-7B (mg/L)



Trend Regression: Piecewise Linear-Linear

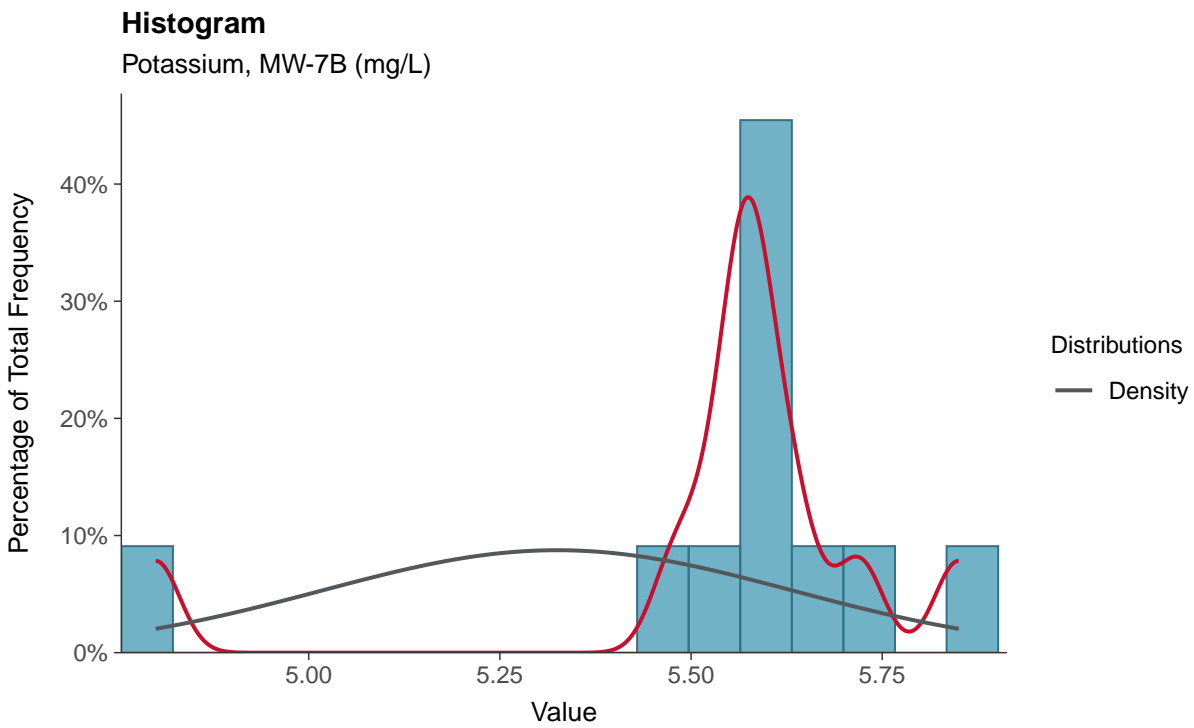
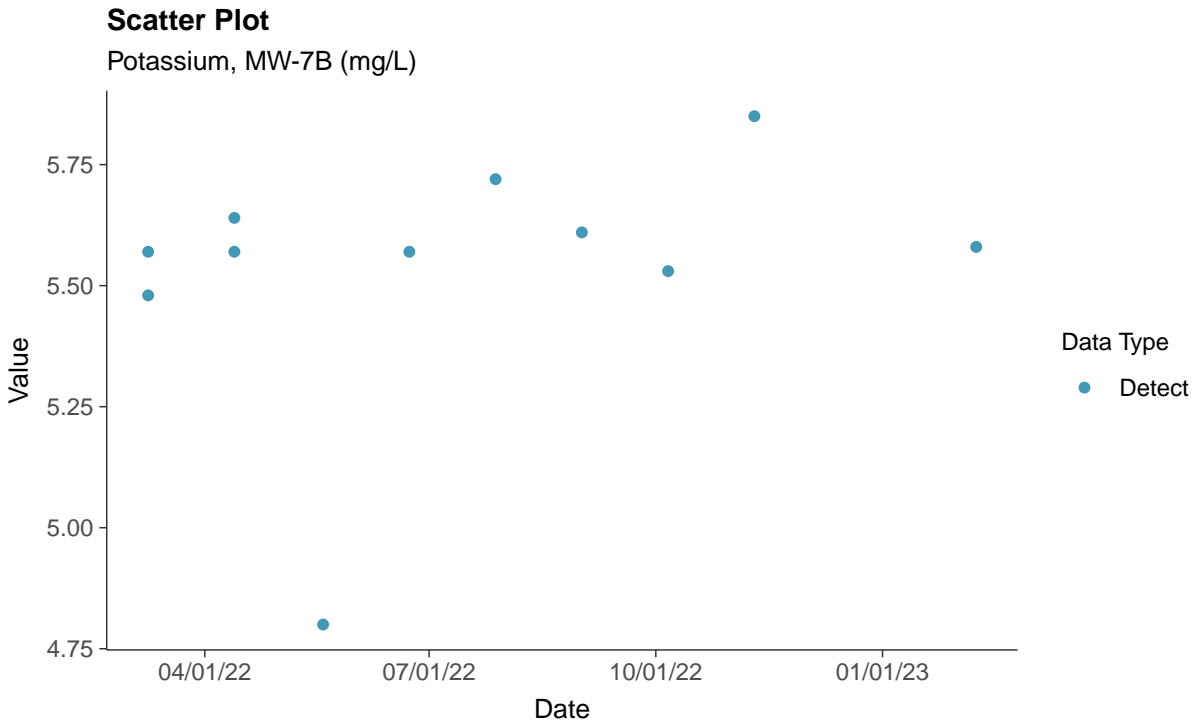
Magnesium, MW-7B (mg/L)





Other: Potassium, MW-7B

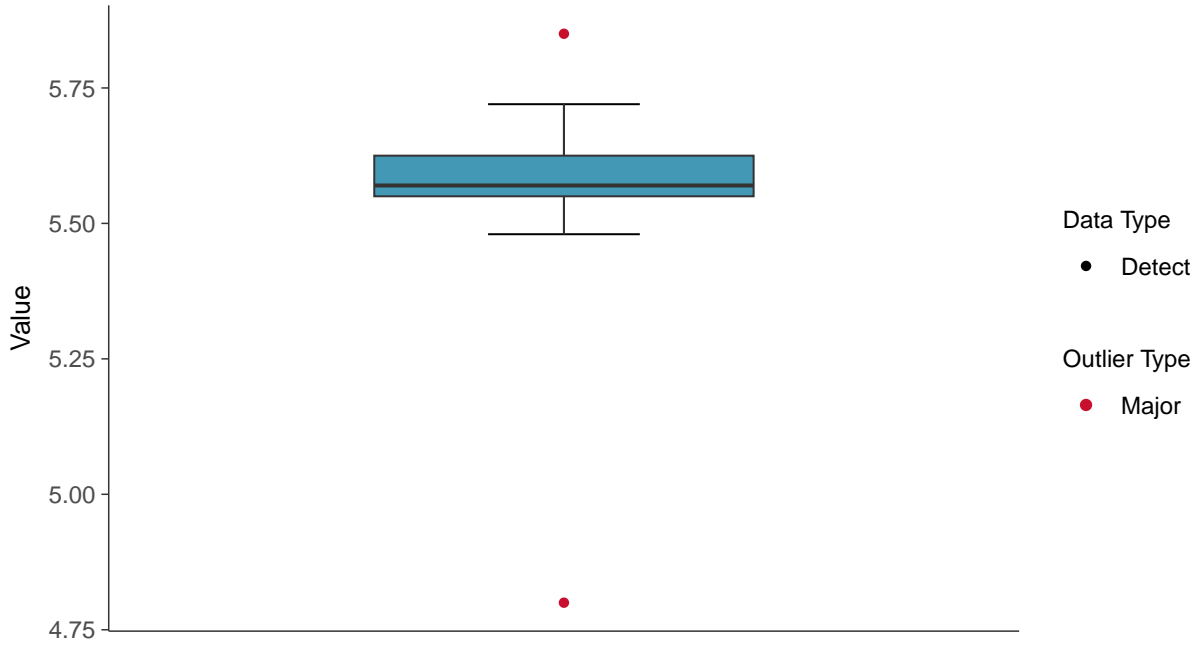
ID: 7B_3_23





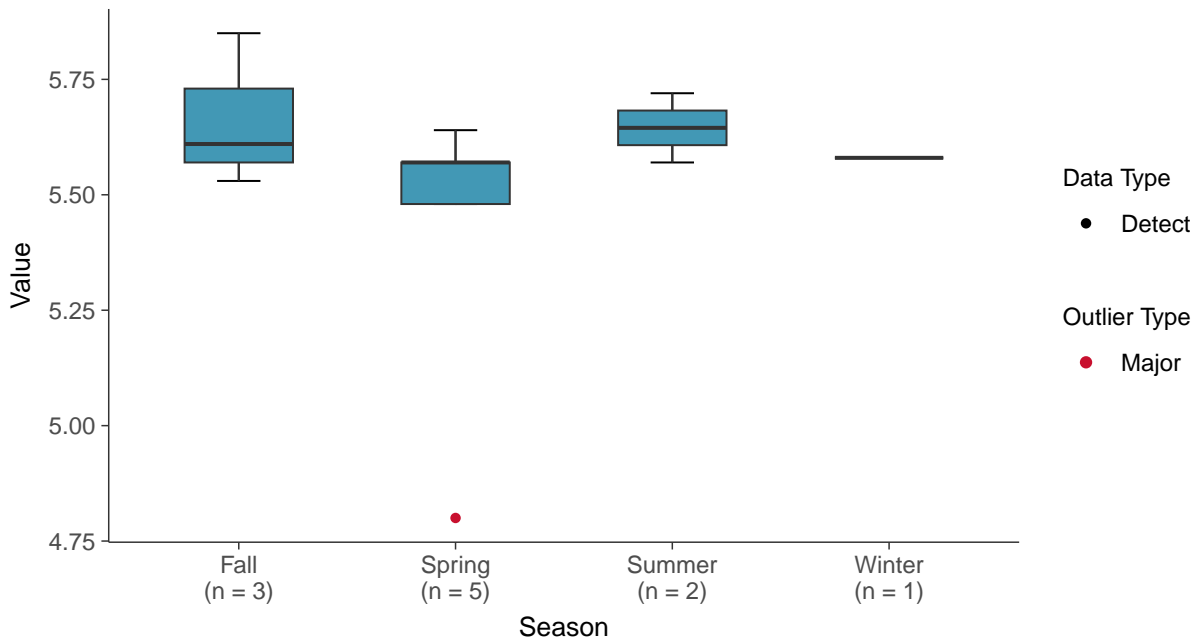
Boxplot

Potassium, MW-7B (mg/L)



Boxplot by Season

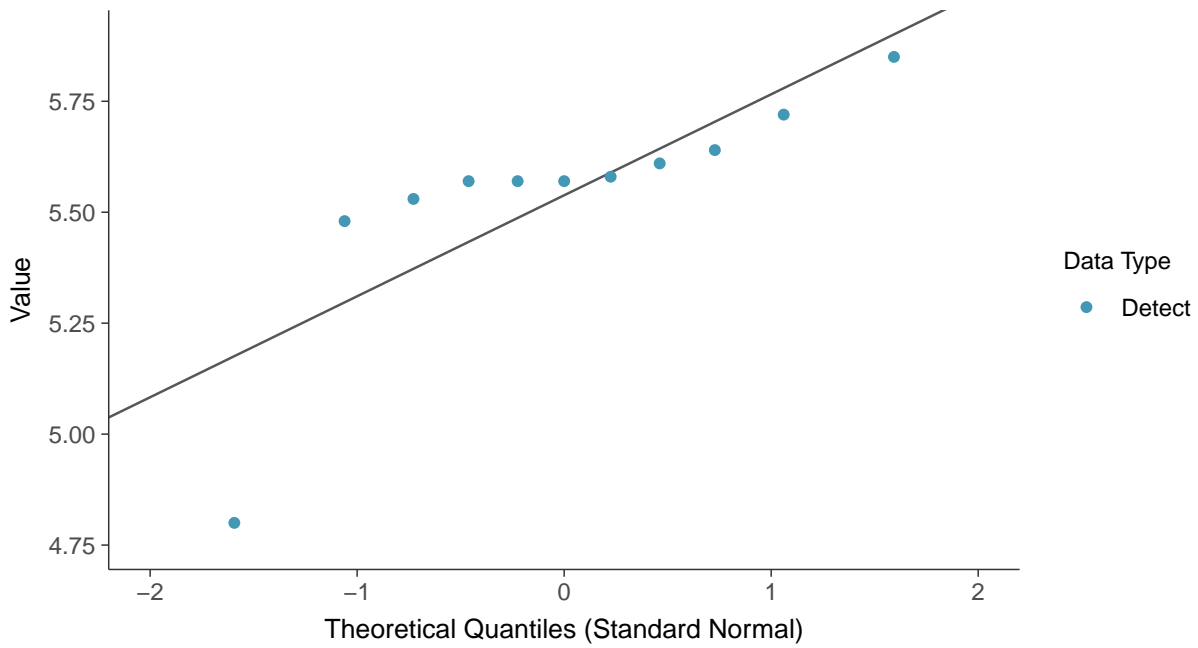
Potassium, MW-7B (mg/L)





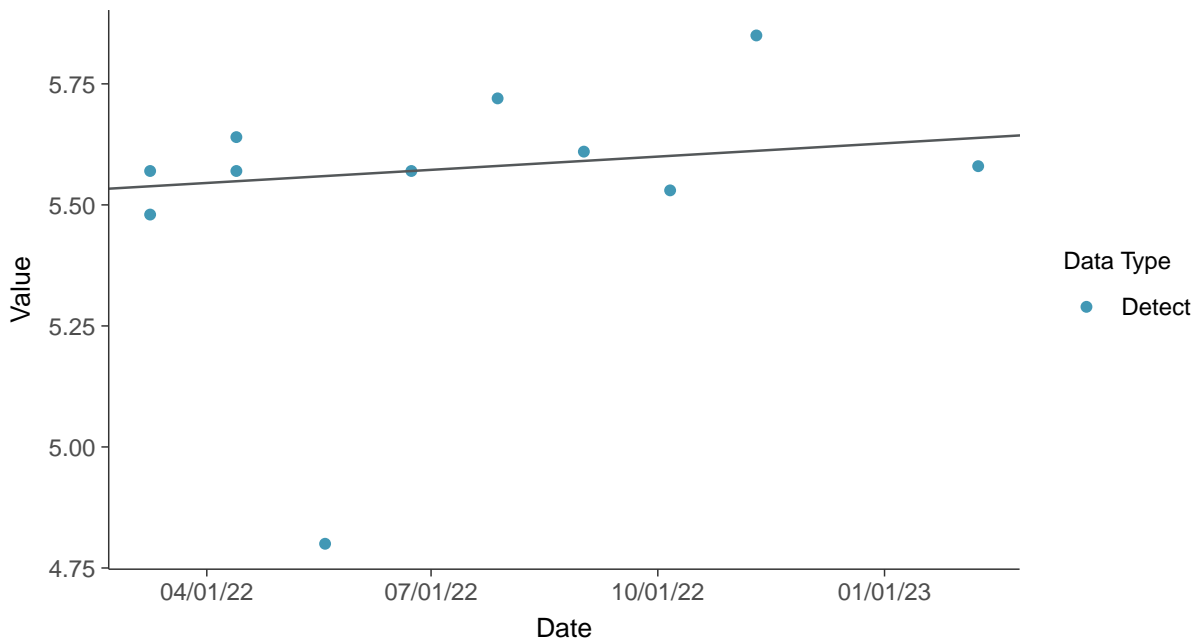
Normal Q-Q plot

Potassium, MW-7B (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

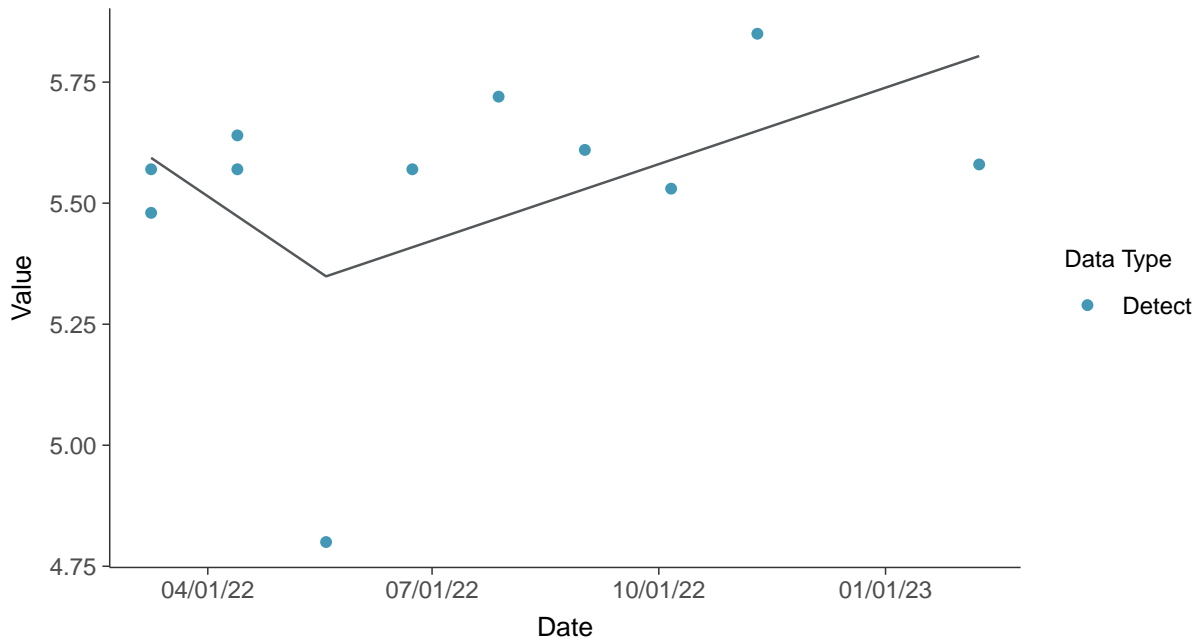
Potassium, MW-7B (mg/L)





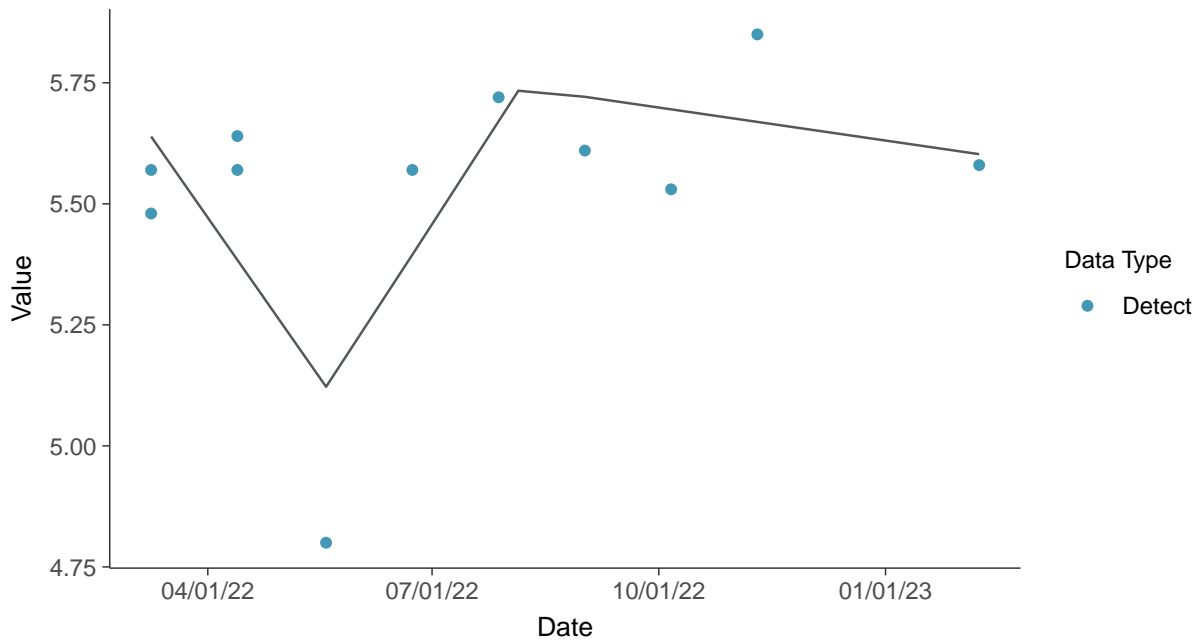
Trend Regression: Piecewise Linear-Linear

Potassium, MW-7B (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Potassium, MW-7B (mg/L)



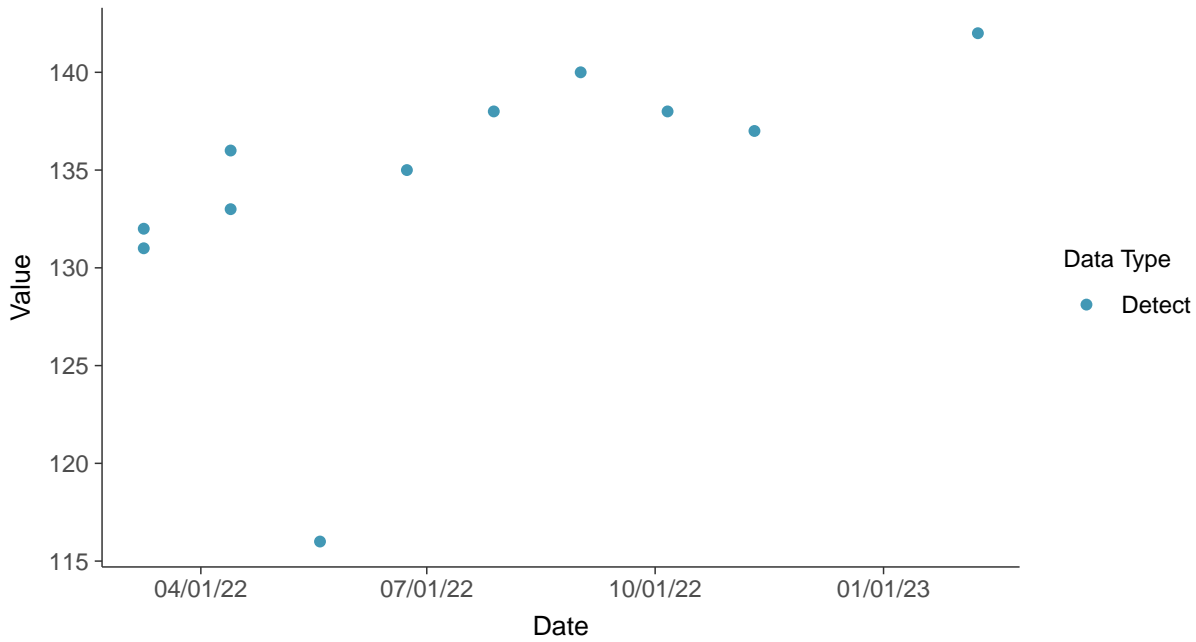


Other: Sodium, MW-7B

ID: 7B_3_28

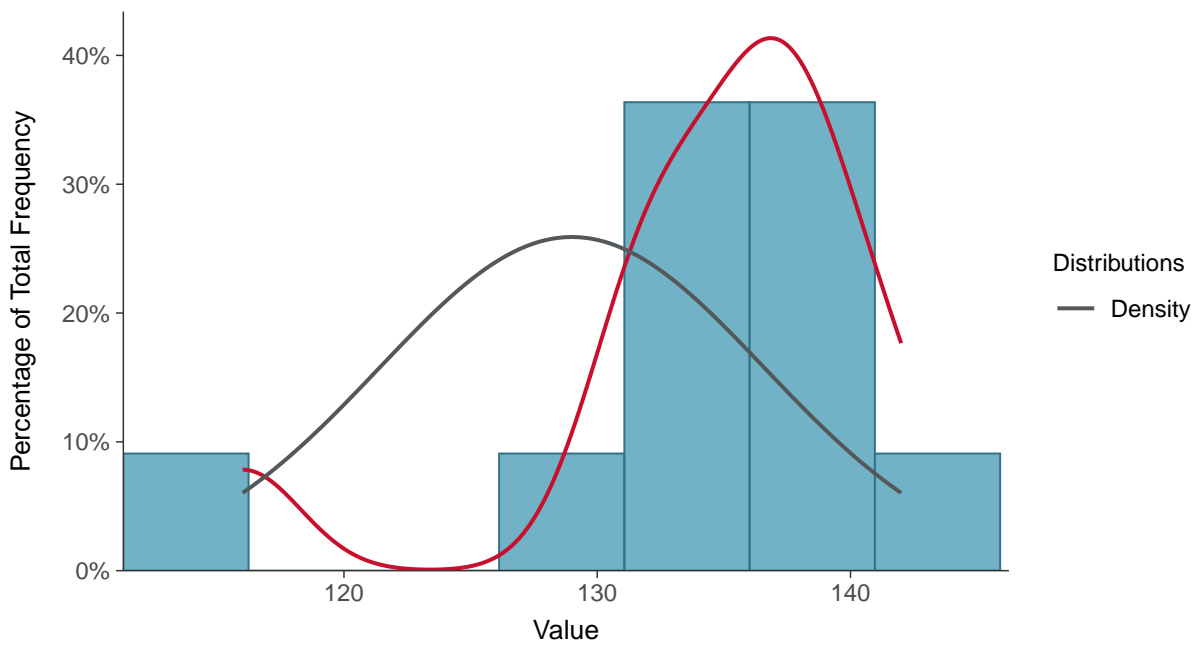
Scatter Plot

Sodium, MW-7B (mg/L)



Histogram

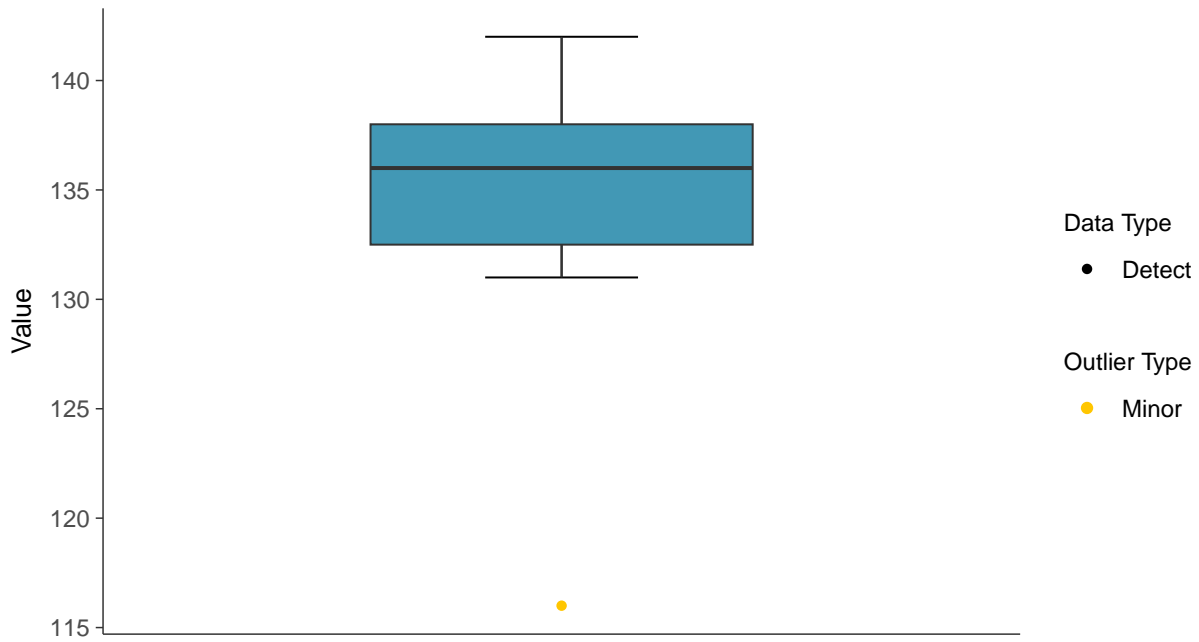
Sodium, MW-7B (mg/L)





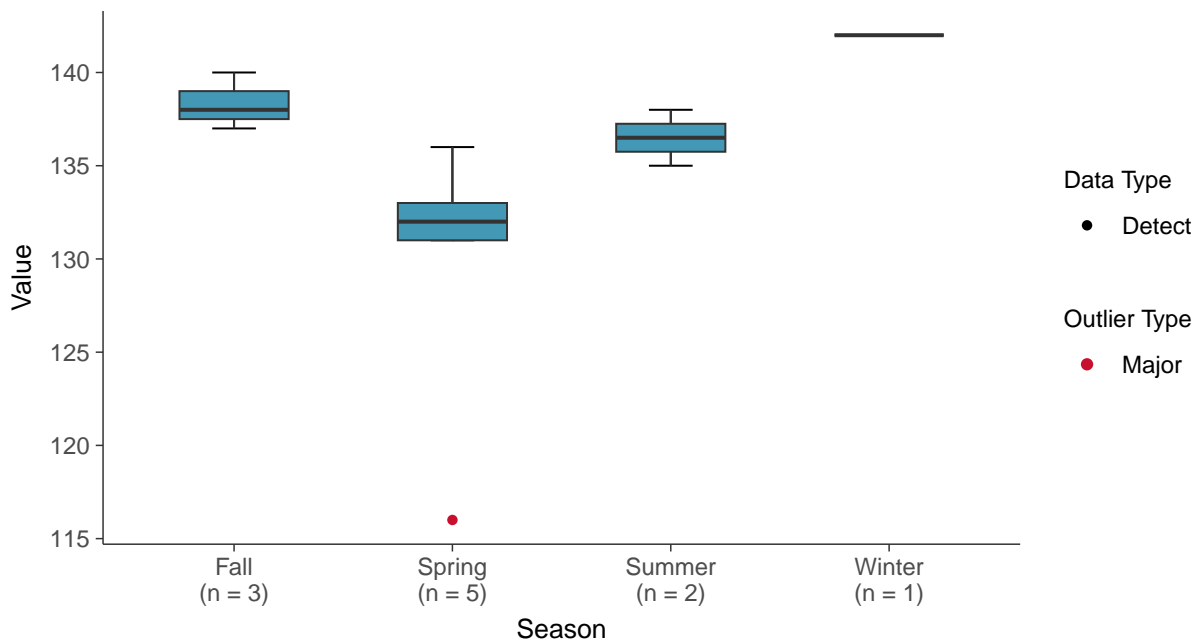
Boxplot

Sodium, MW-7B (mg/L)



Boxplot by Season

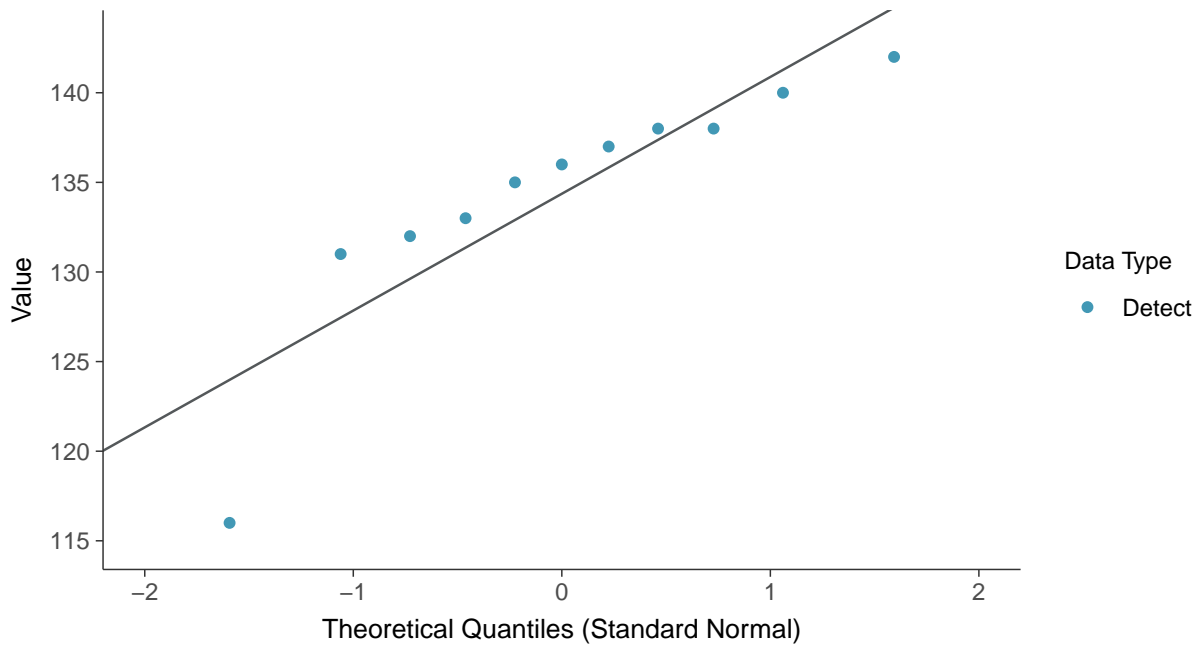
Sodium, MW-7B (mg/L)





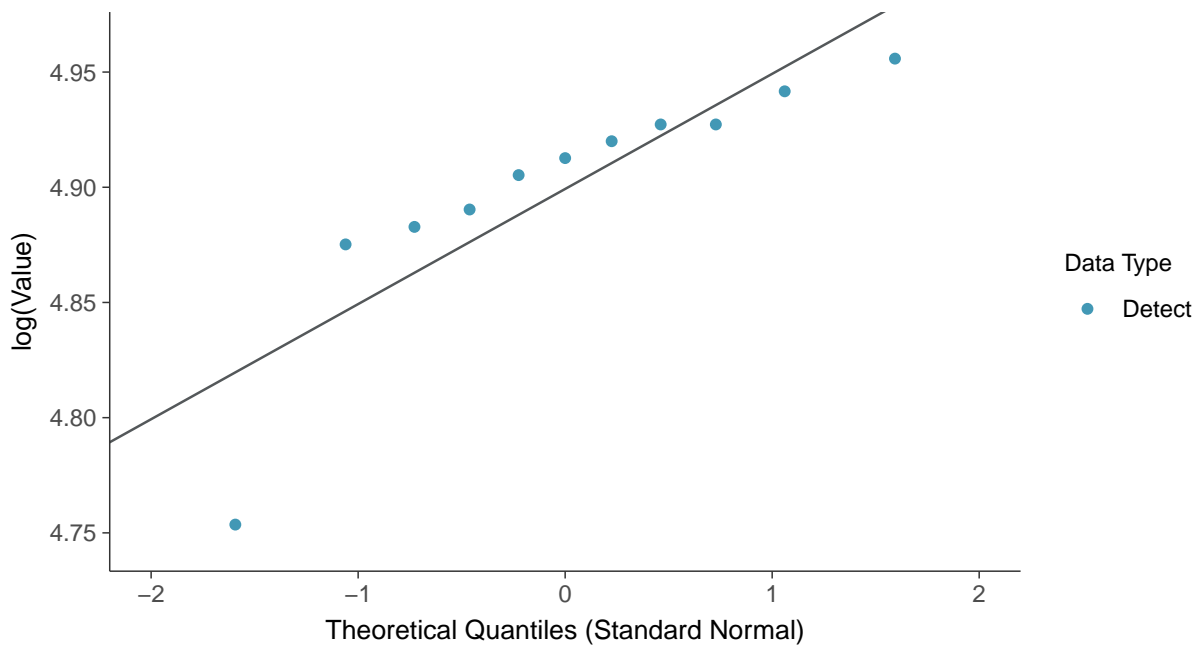
Normal Q-Q plot

Sodium, MW-7B (mg/L)



Lognormal Q-Q plot

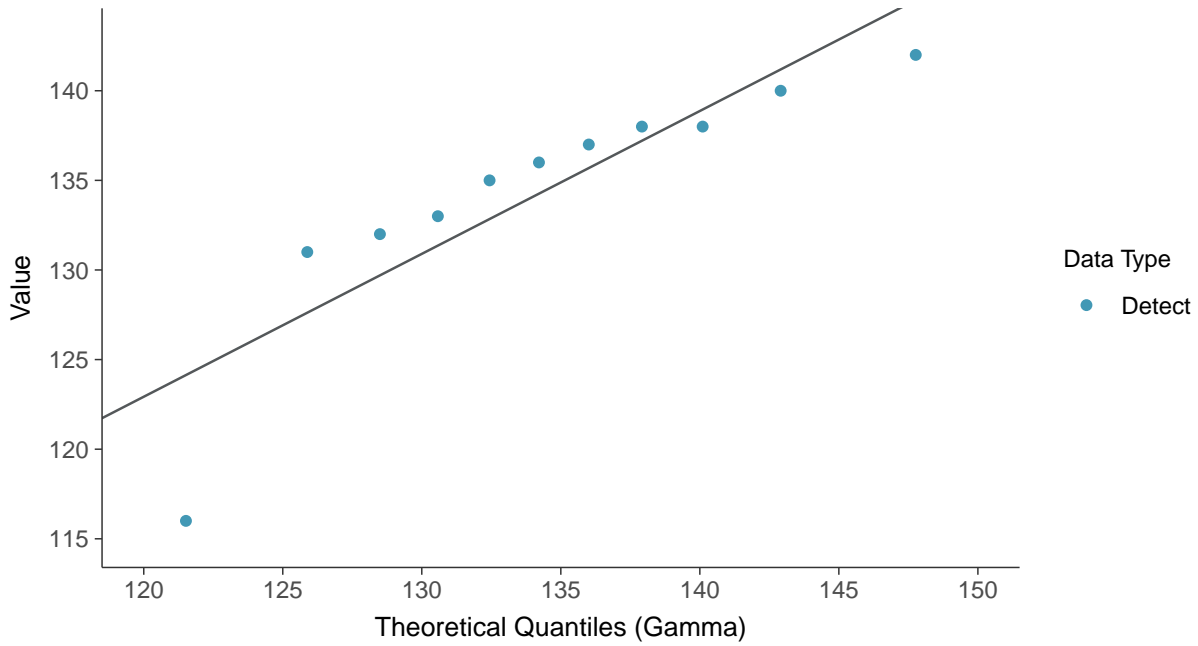
Sodium, MW-7B (mg/L)





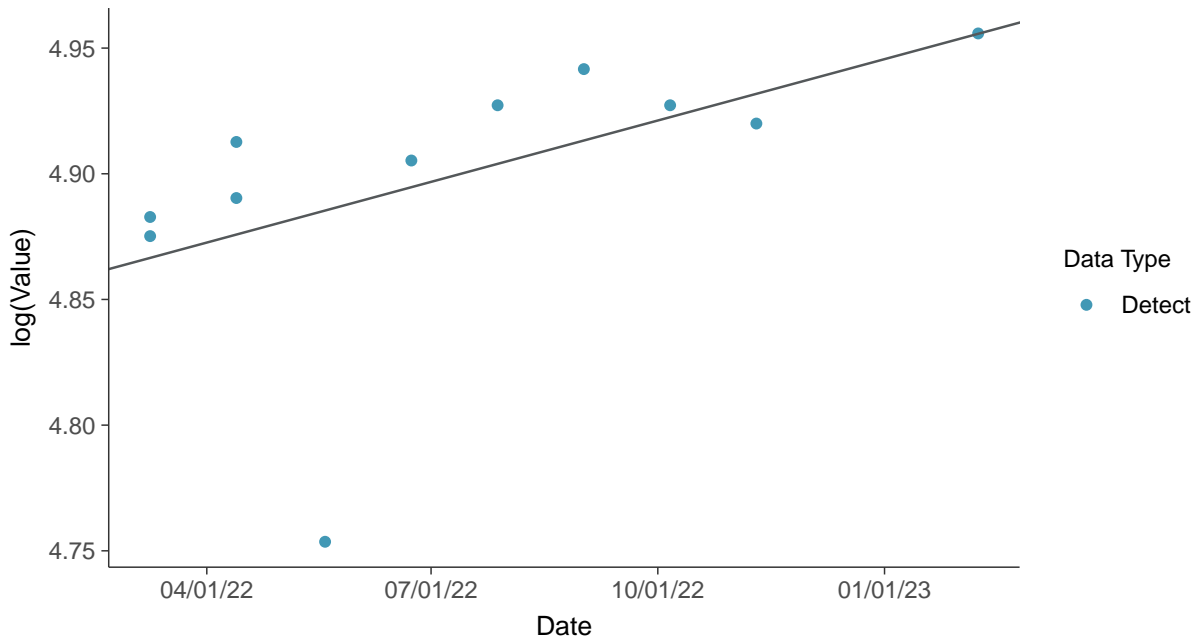
Gamma Q-Q plot

Sodium, MW-7B (mg/L)



Trend Regression: Lognormal MLE

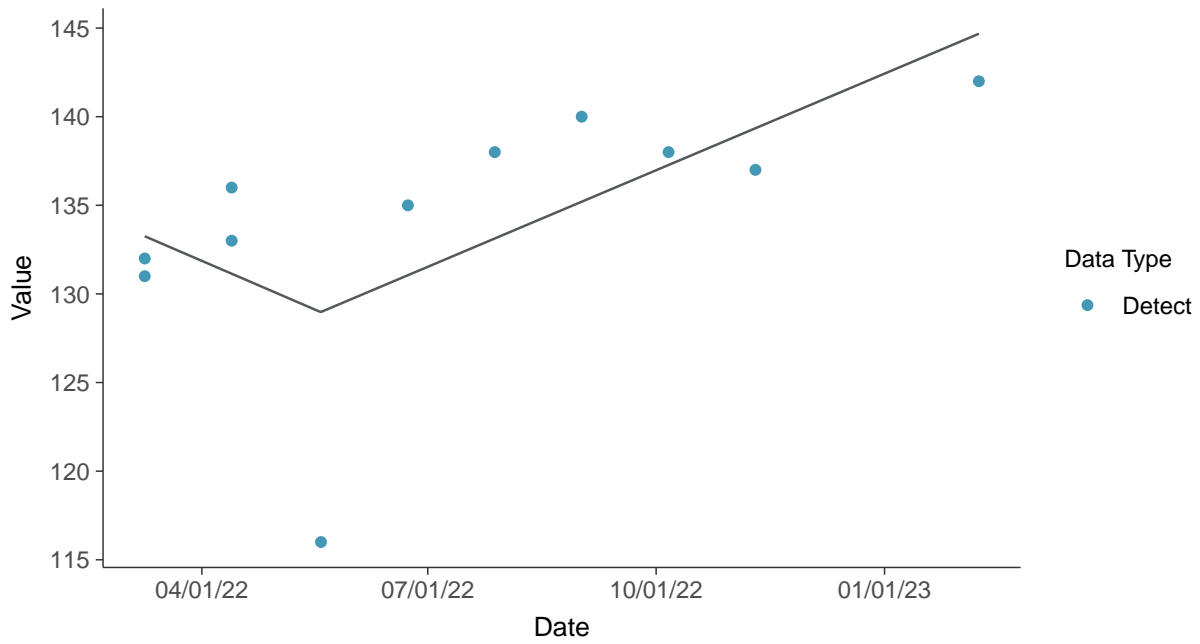
Sodium, MW-7B (mg/L)





Trend Regression: Piecewise Linear-Linear

Sodium, MW-7B (mg/L)



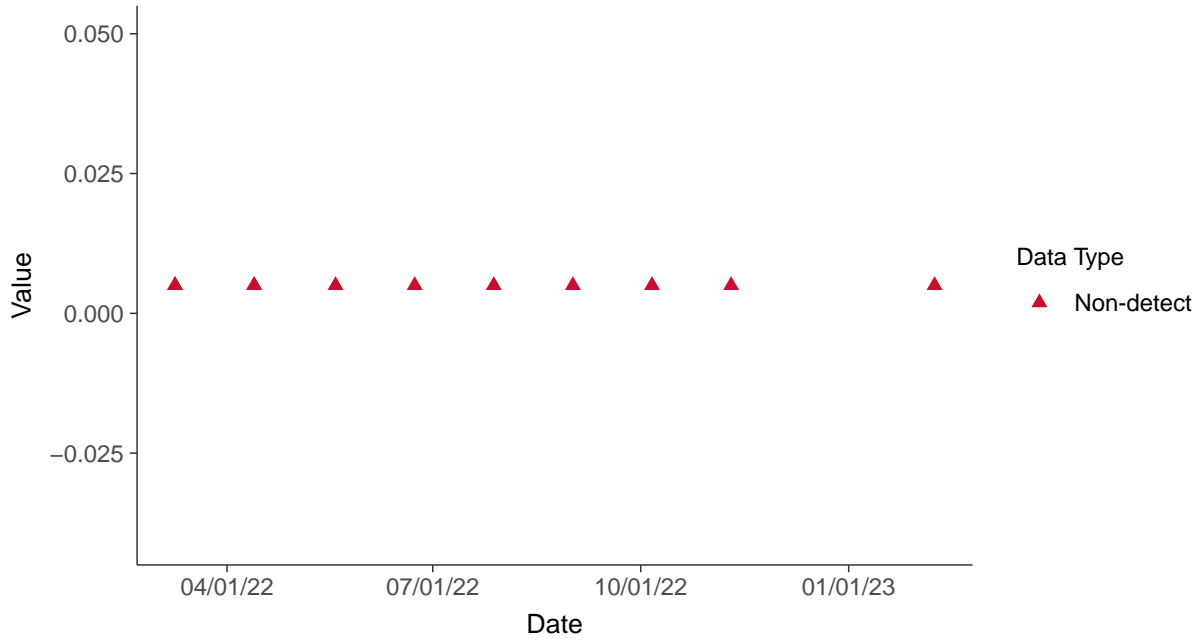


Part 115: Copper, MW-7B

ID: 7B_5_37

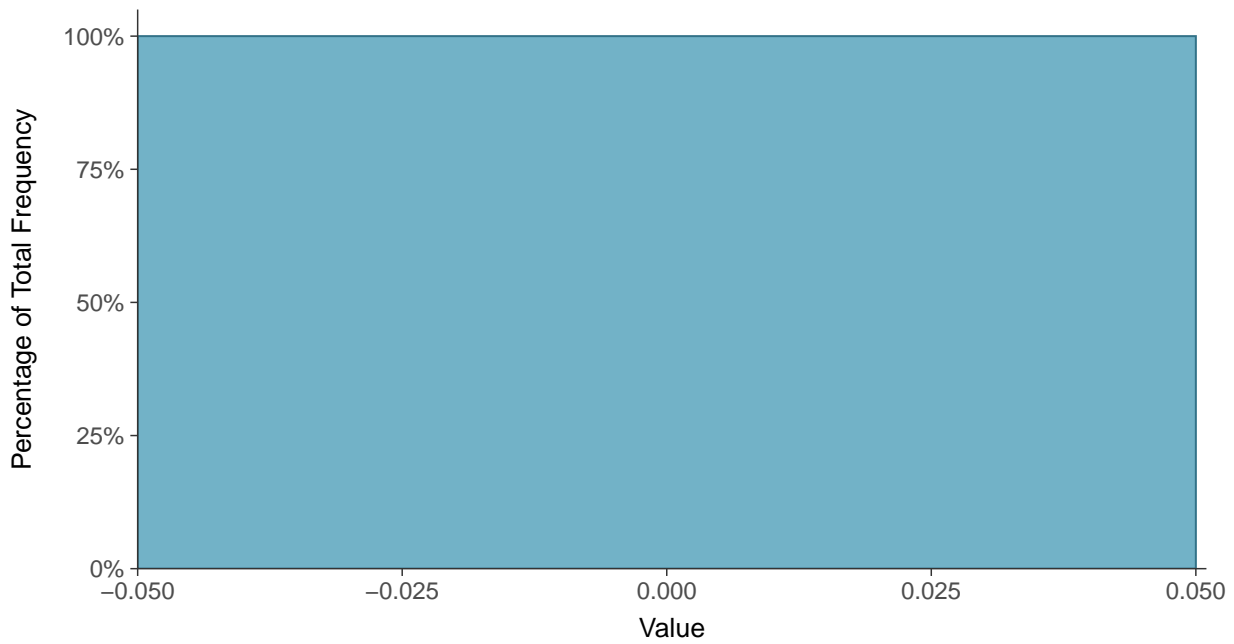
Scatter Plot

Copper, MW-7B (mg/L)



Histogram

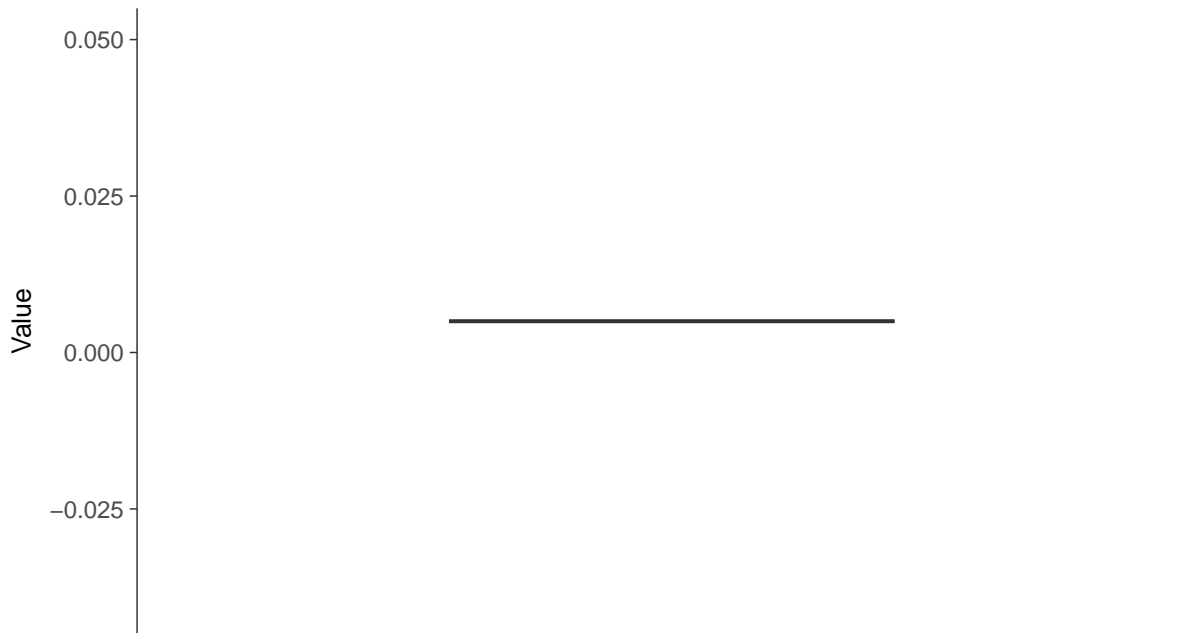
Copper, MW-7B (mg/L)





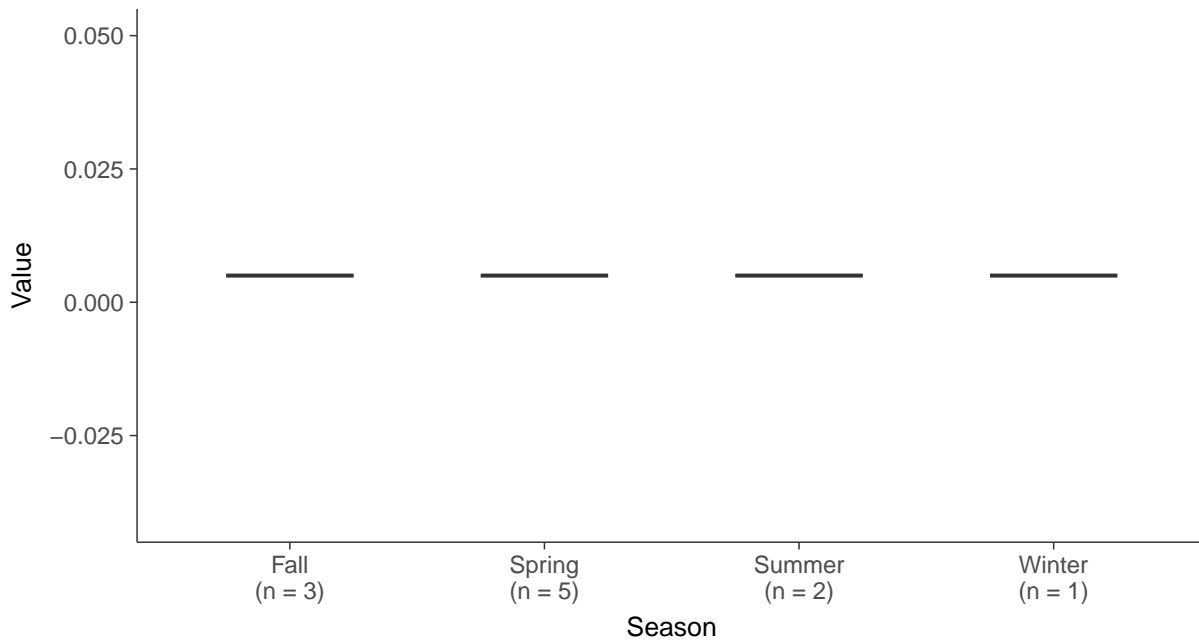
Boxplot

Copper, MW-7B (mg/L)



Boxplot by Season

Copper, MW-7B (mg/L)



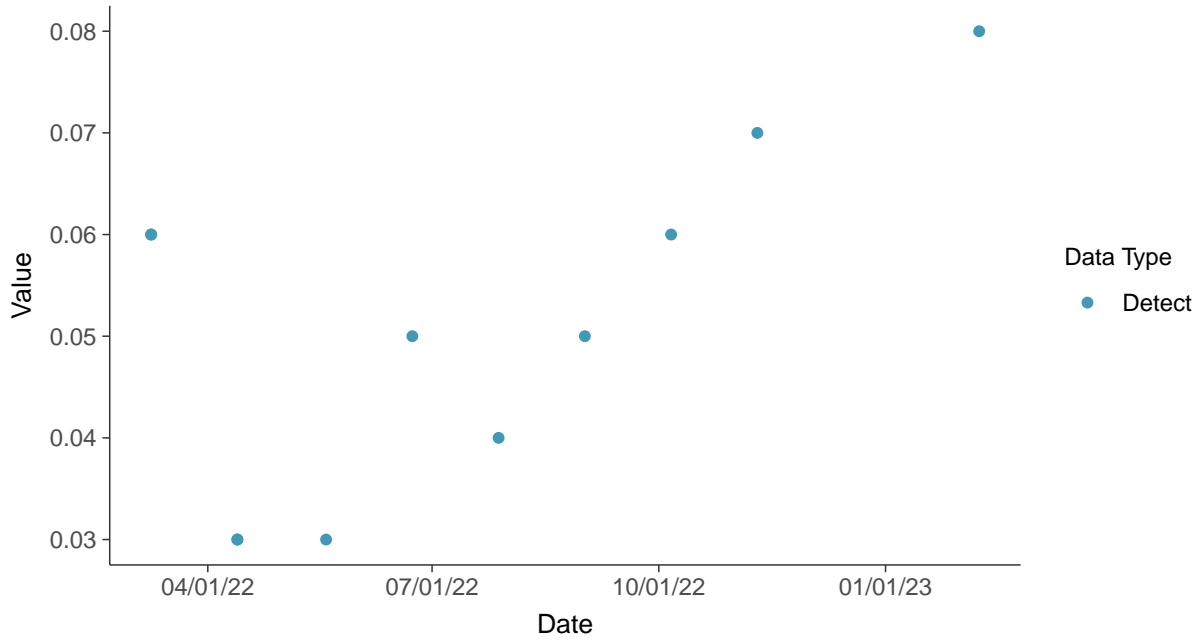


Part 115: Iron, MW-7B

ID: 7B_5_38

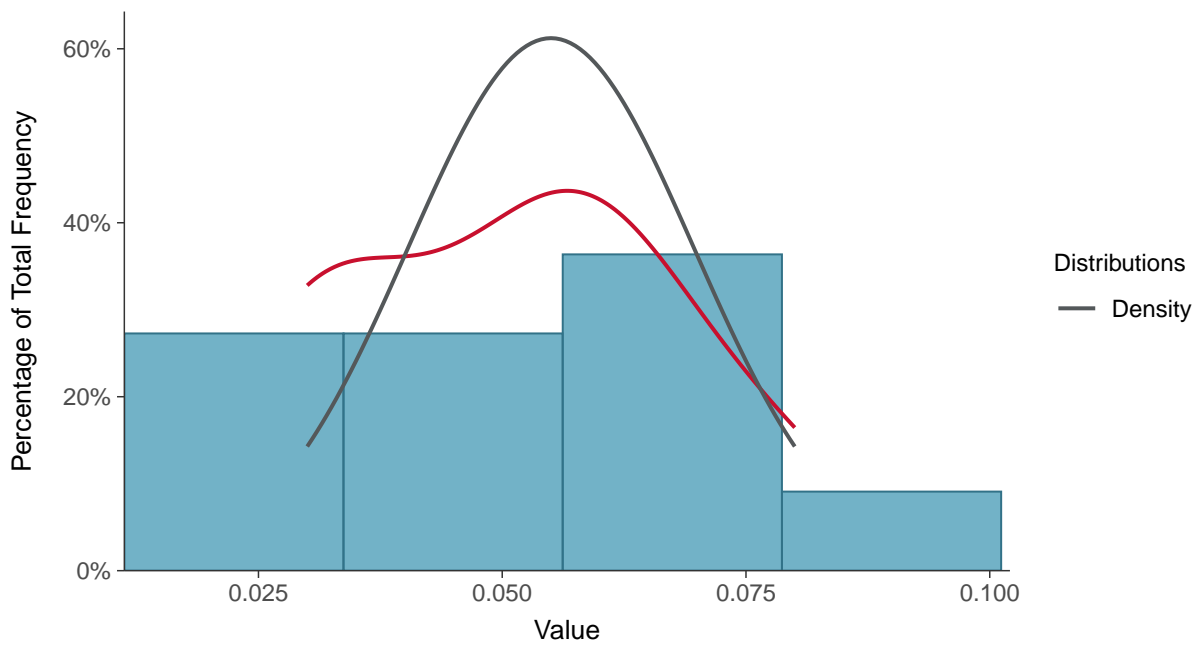
Scatter Plot

Iron, MW-7B (mg/L)



Histogram

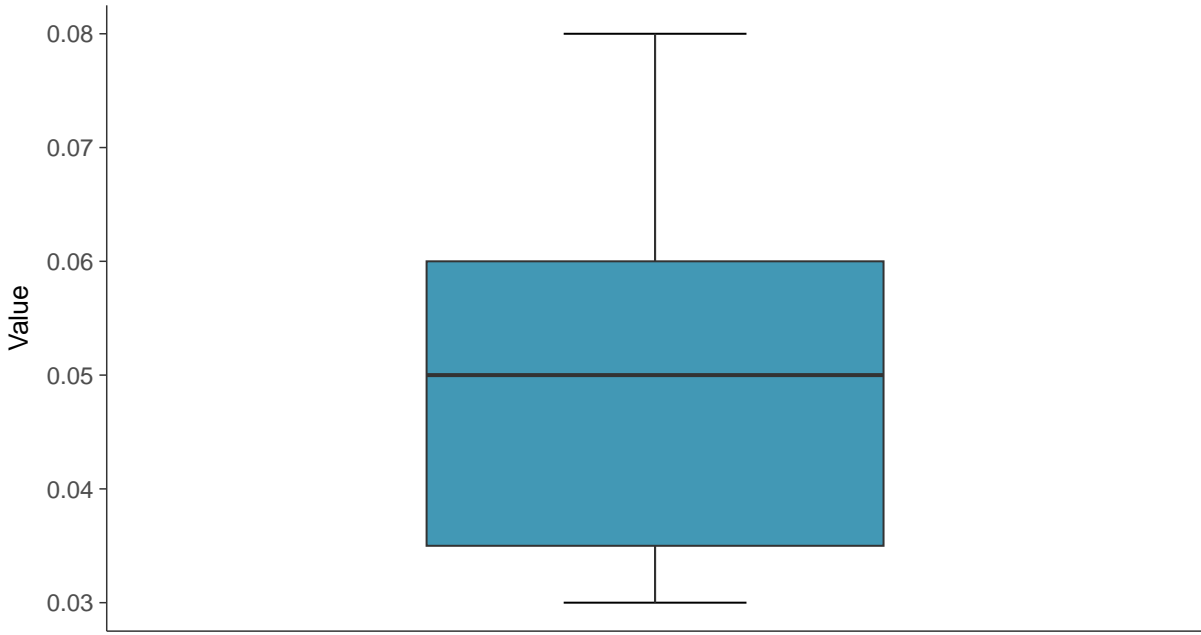
Iron, MW-7B (mg/L)





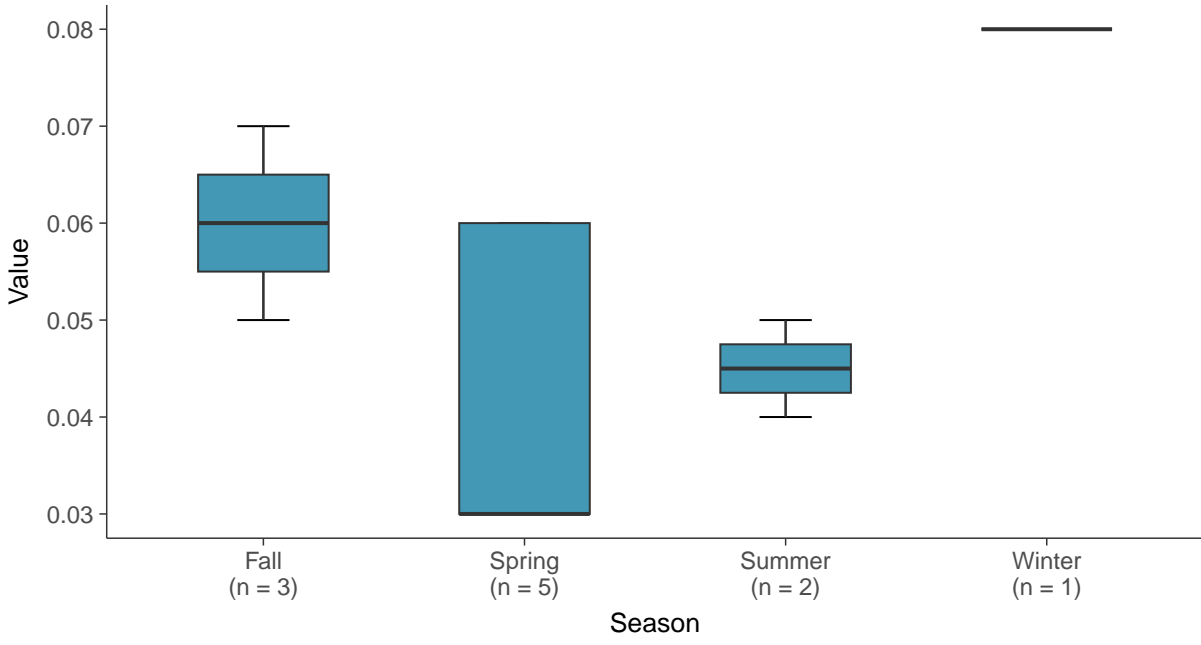
Boxplot

Iron, MW-7B (mg/L)



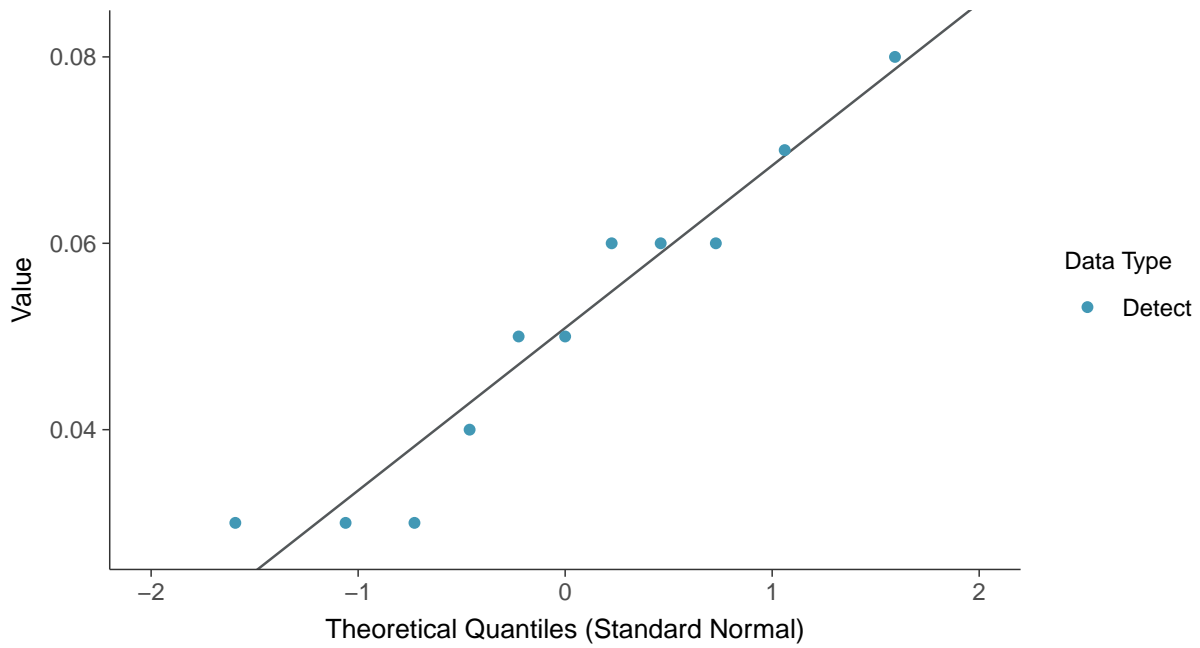
Boxplot by Season

Iron, MW-7B (mg/L)

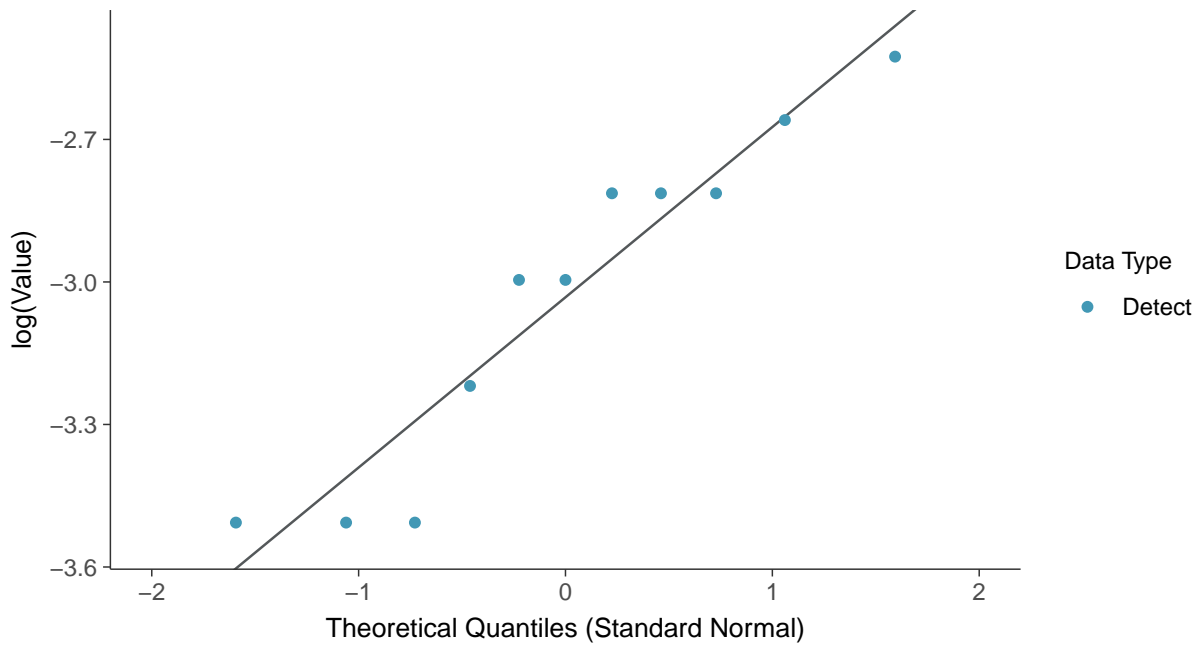




Normal Q-Q plot
Iron, MW-7B (mg/L)



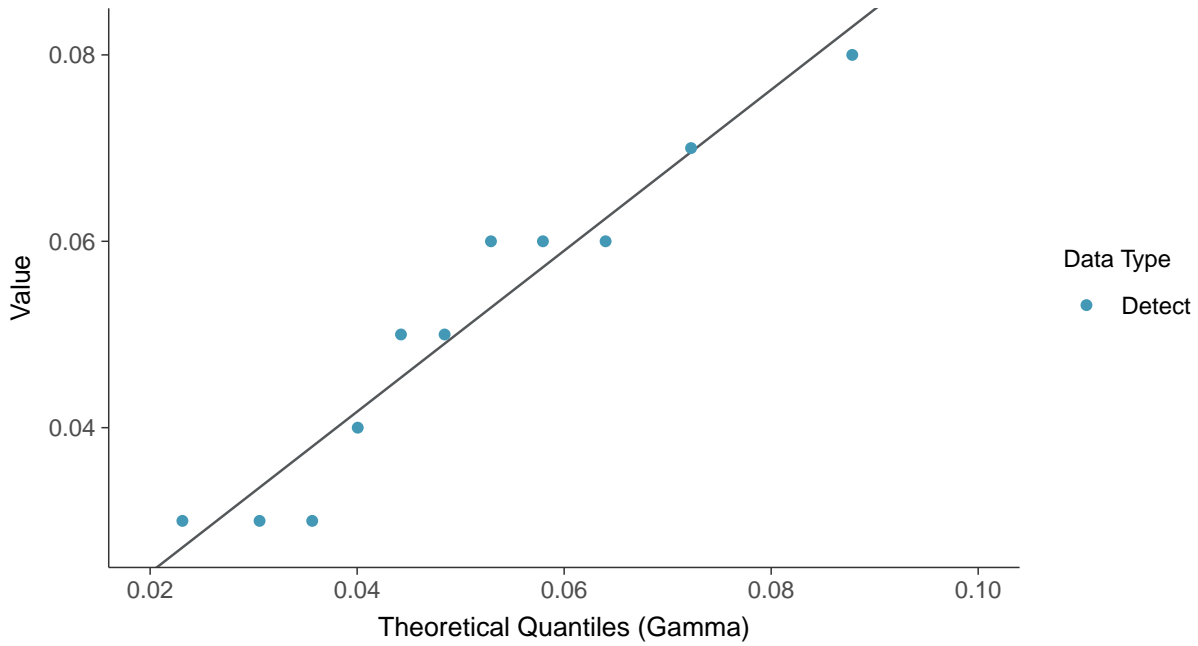
Lognormal Q-Q plot
Iron, MW-7B (mg/L)





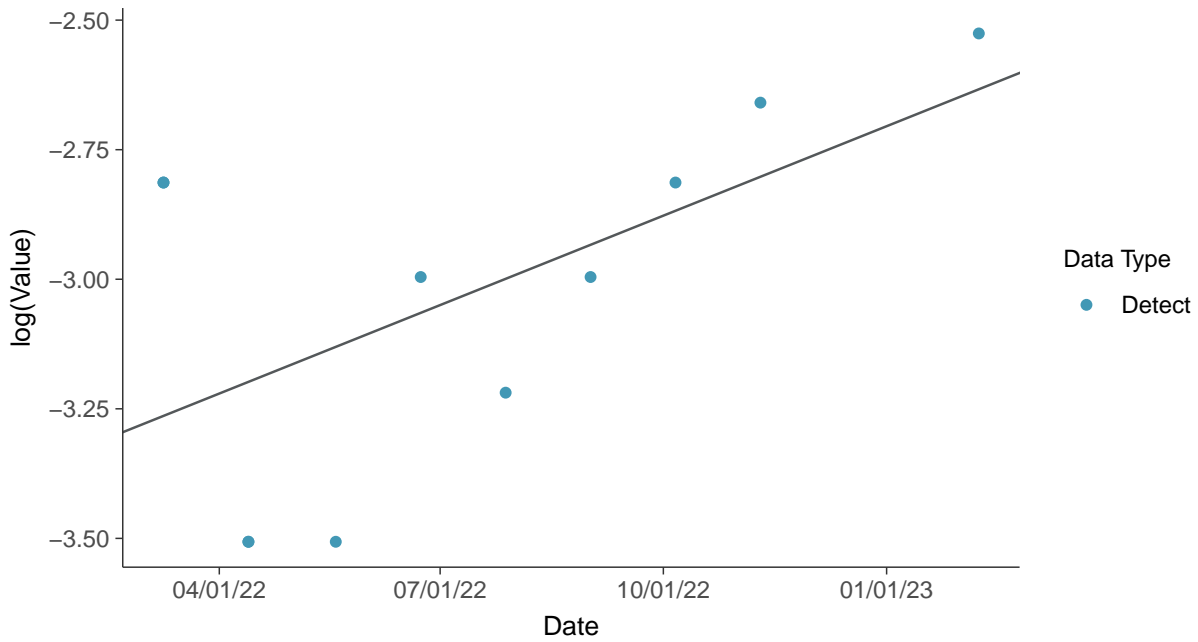
Gamma Q-Q plot

Iron, MW-7B (mg/L)



Trend Regression: Lognormal MLE

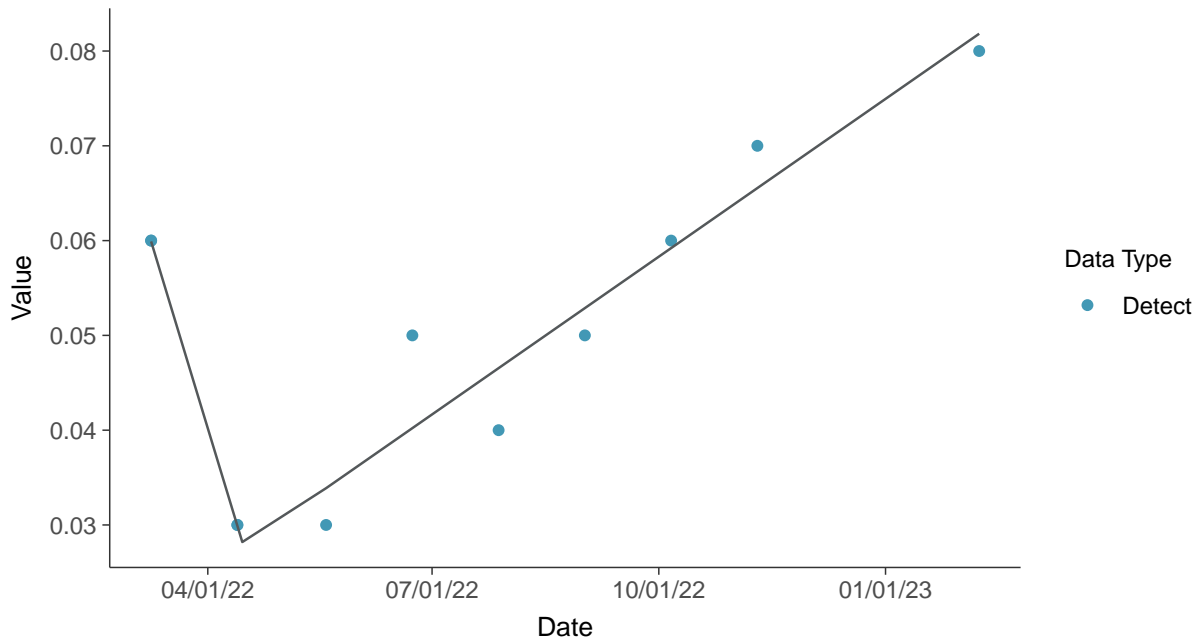
Iron, MW-7B (mg/L)





Trend Regression: Piecewise Linear-Linear

Iron, MW-7B (mg/L)



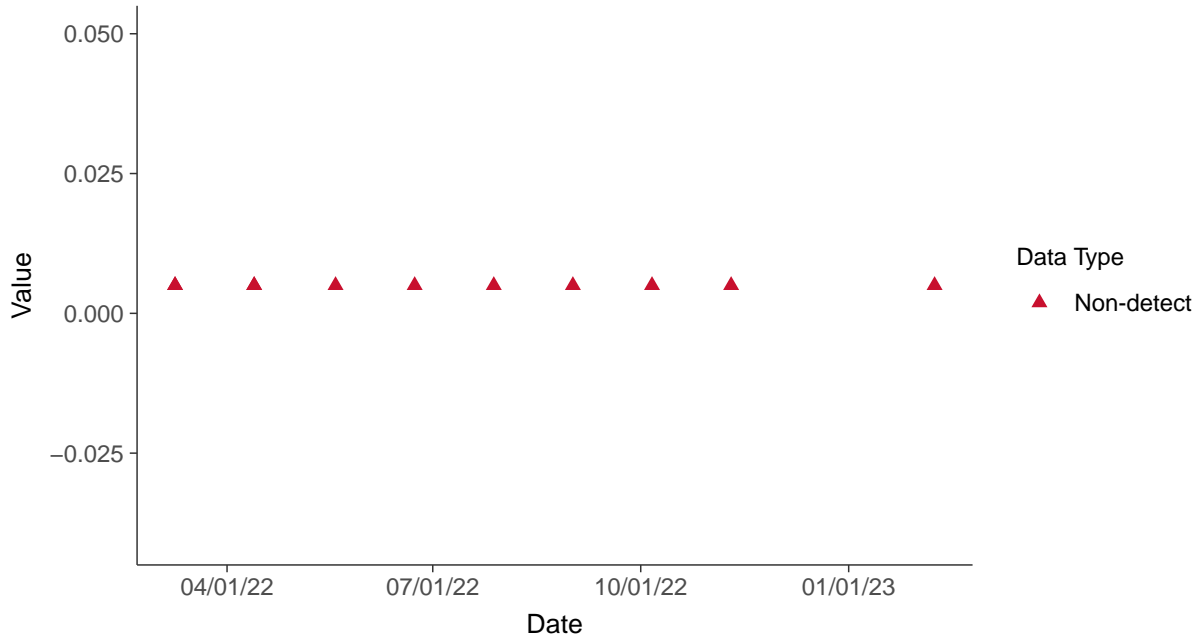


Part 115: Nickel, MW-7B

ID: 7B_5_39

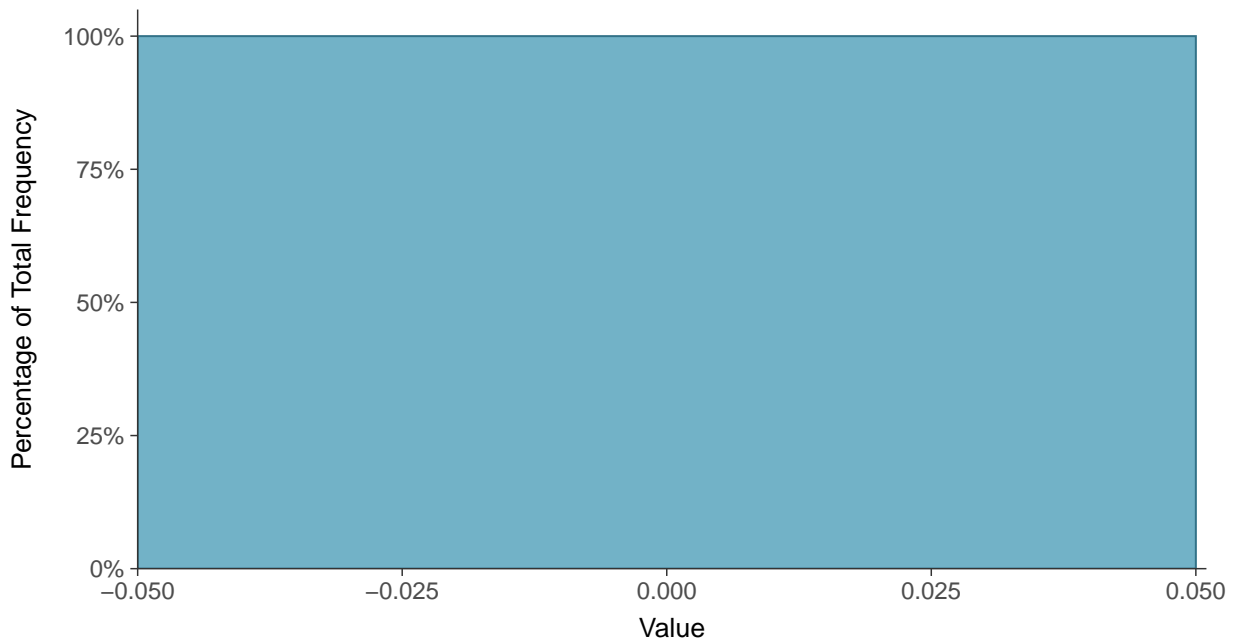
Scatter Plot

Nickel, MW-7B (mg/L)



Histogram

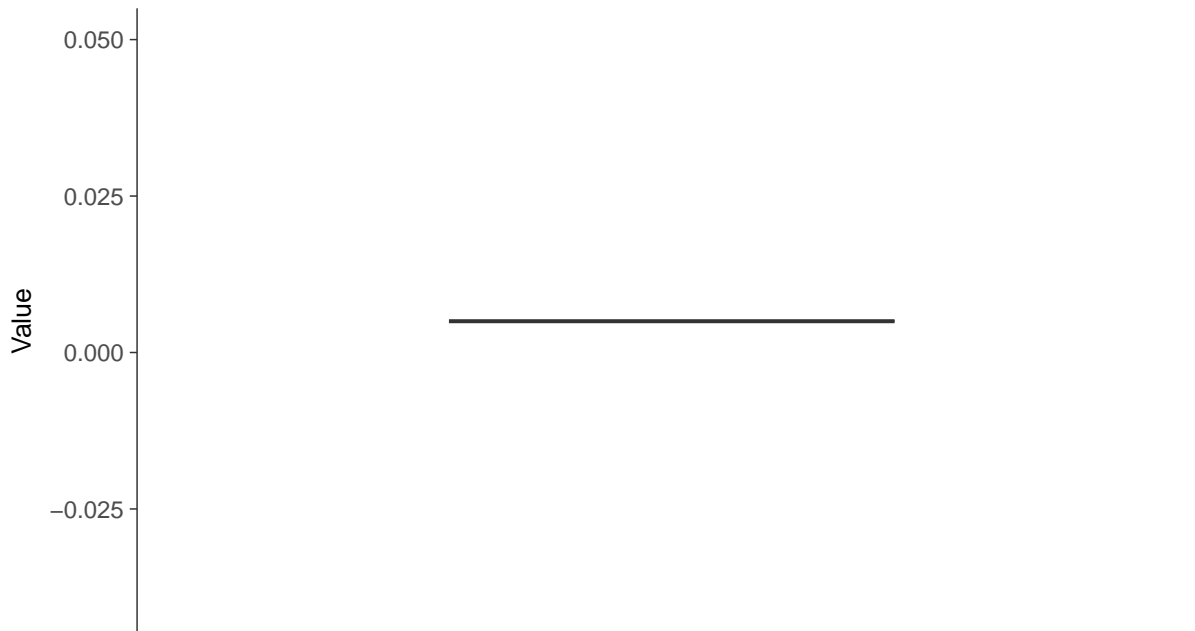
Nickel, MW-7B (mg/L)





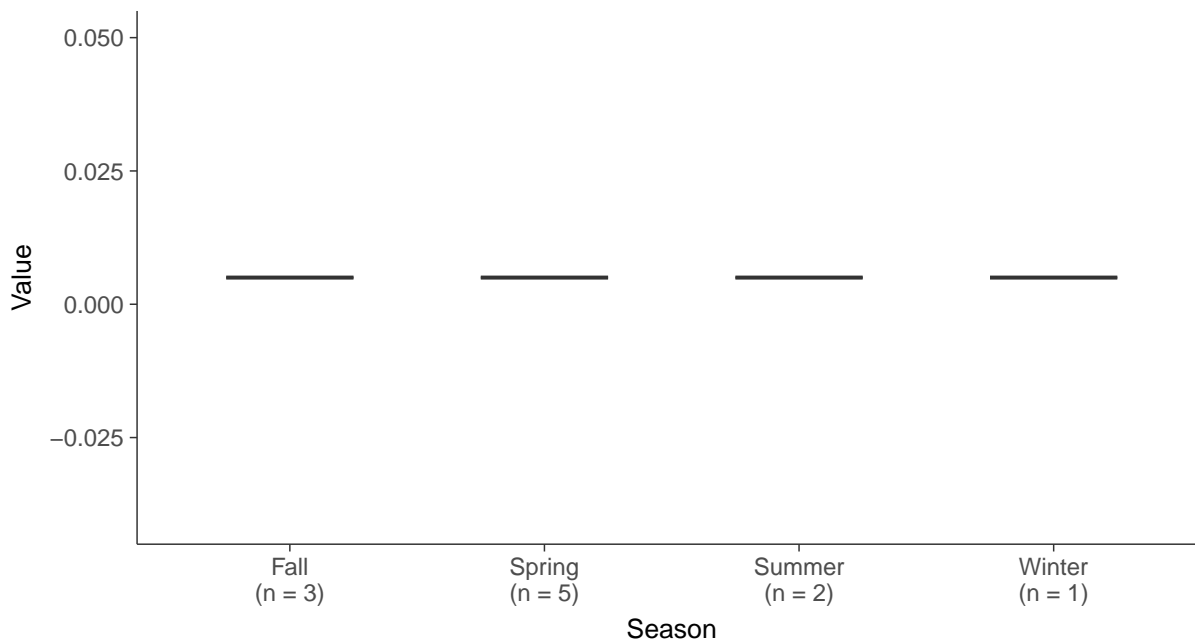
Boxplot

Nickel, MW-7B (mg/L)



Boxplot by Season

Nickel, MW-7B (mg/L)



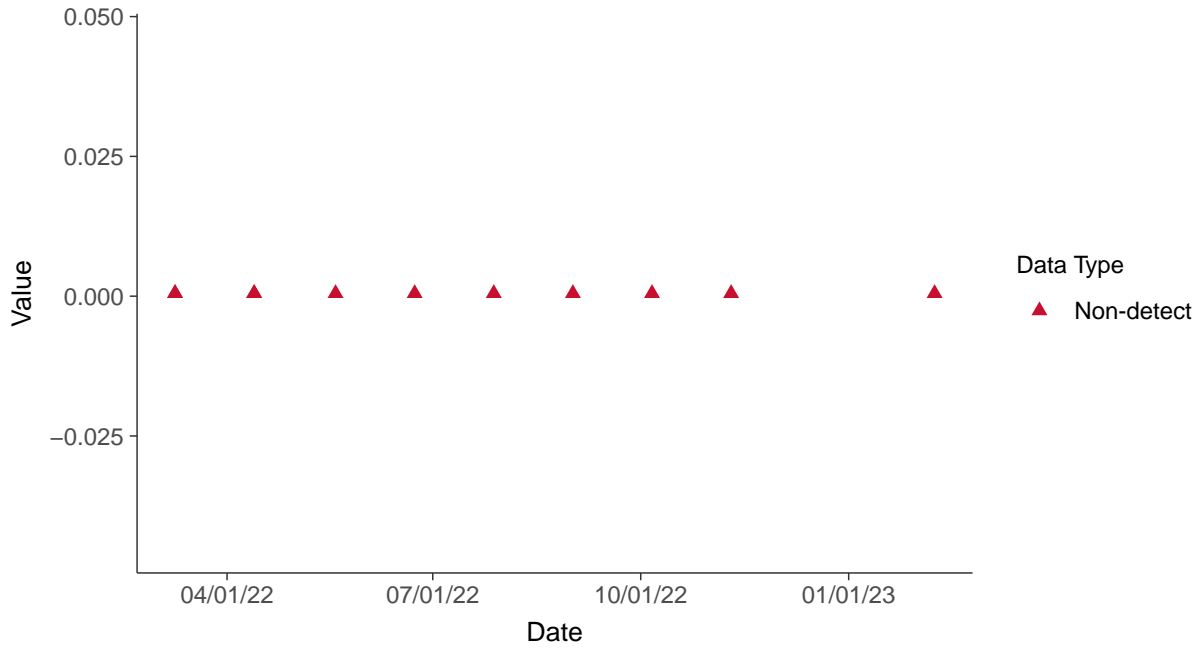


Part 115: Silver, MW-7B

ID: 7B_5_40

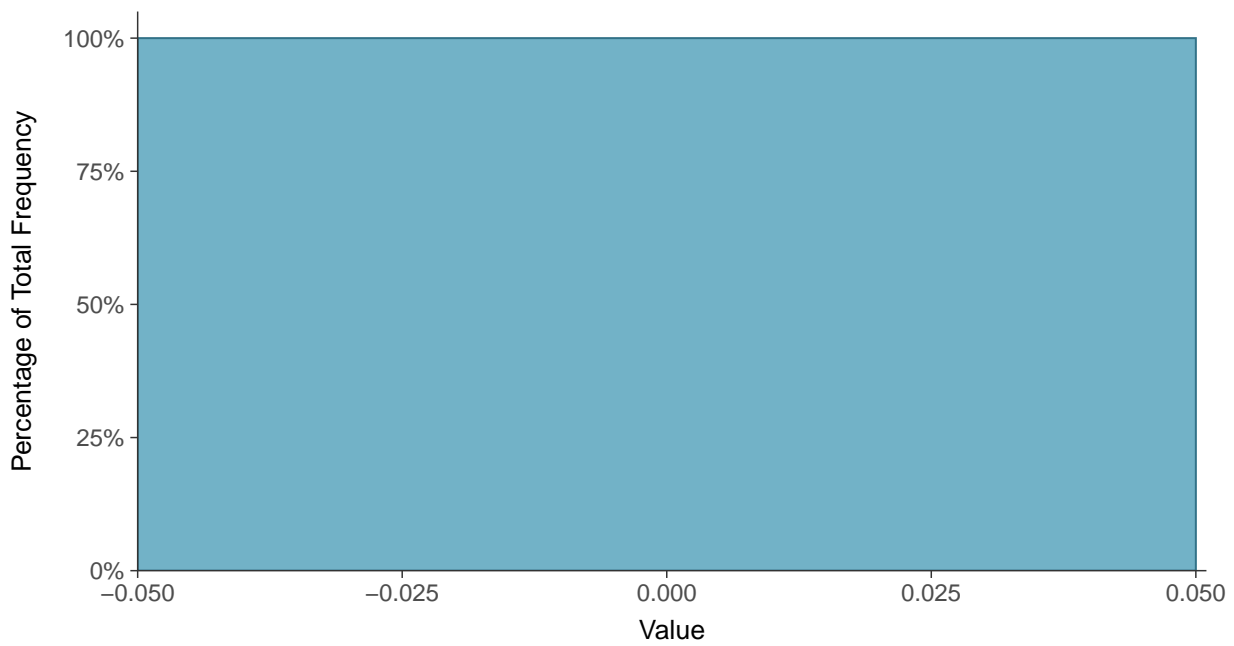
Scatter Plot

Silver, MW-7B (mg/L)



Histogram

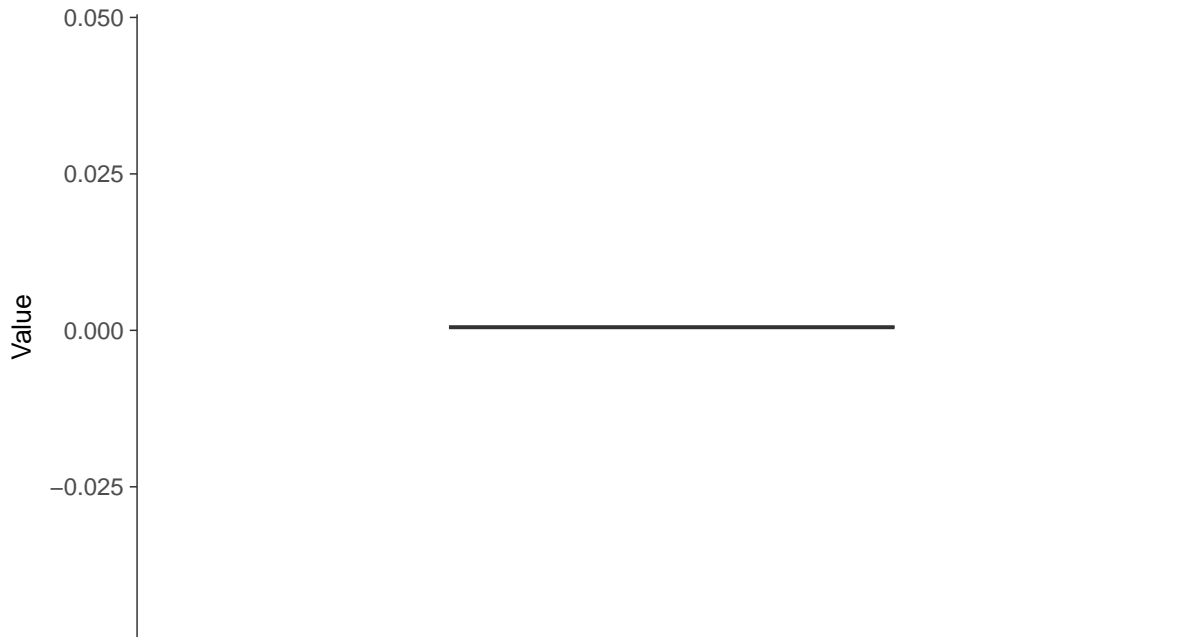
Silver, MW-7B (mg/L)





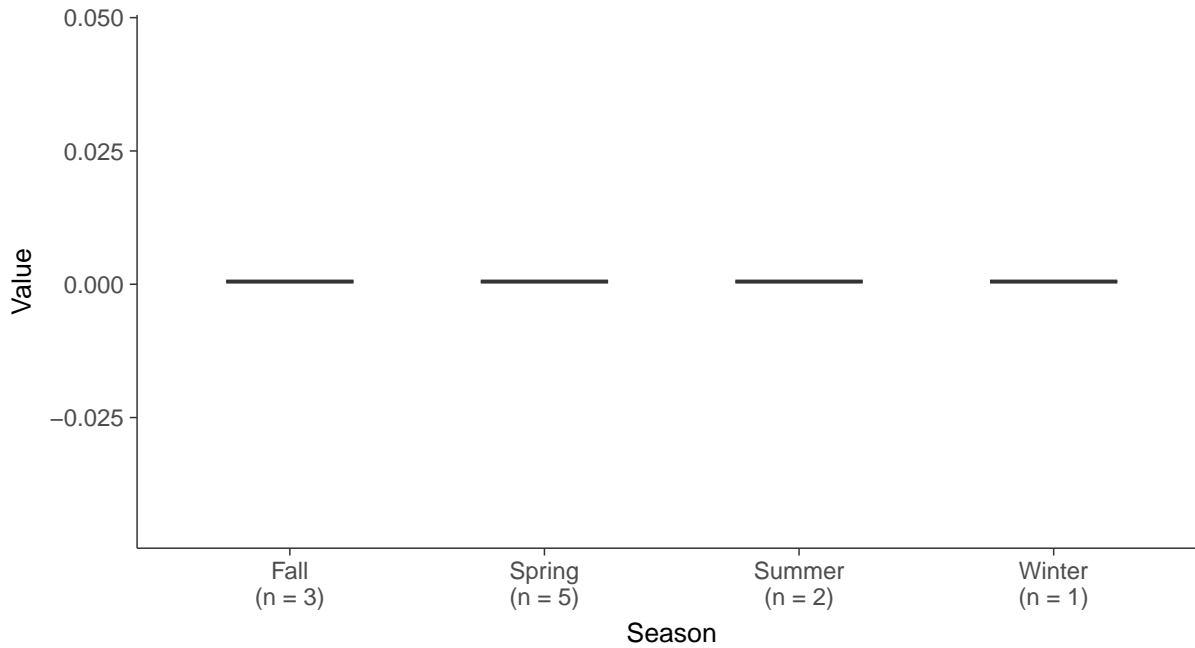
Boxplot

Silver, MW-7B (mg/L)



Boxplot by Season

Silver, MW-7B (mg/L)



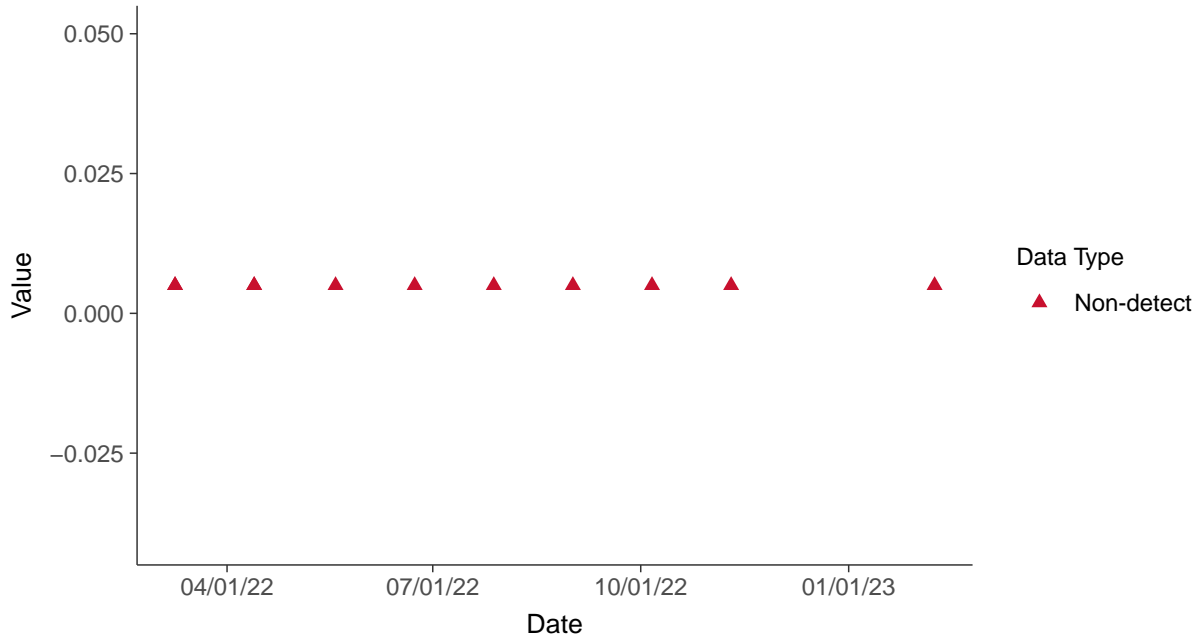


Part 115: Vanadium, MW-7B

ID: 7B_5_41

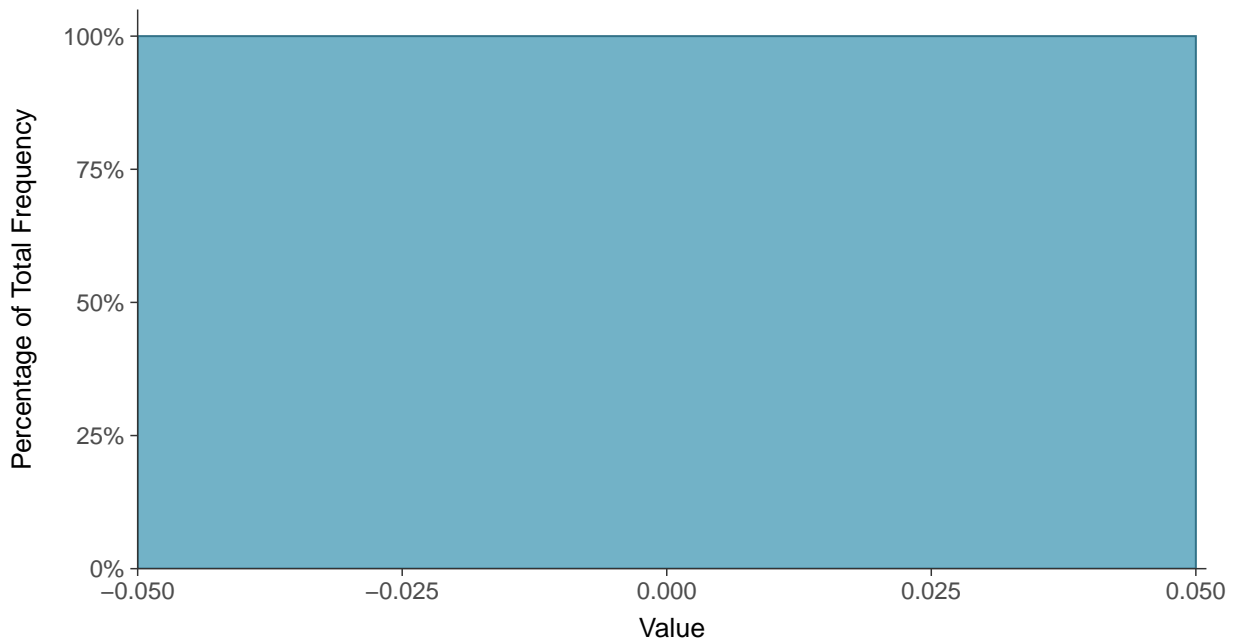
Scatter Plot

Vanadium, MW-7B (mg/L)



Histogram

Vanadium, MW-7B (mg/L)





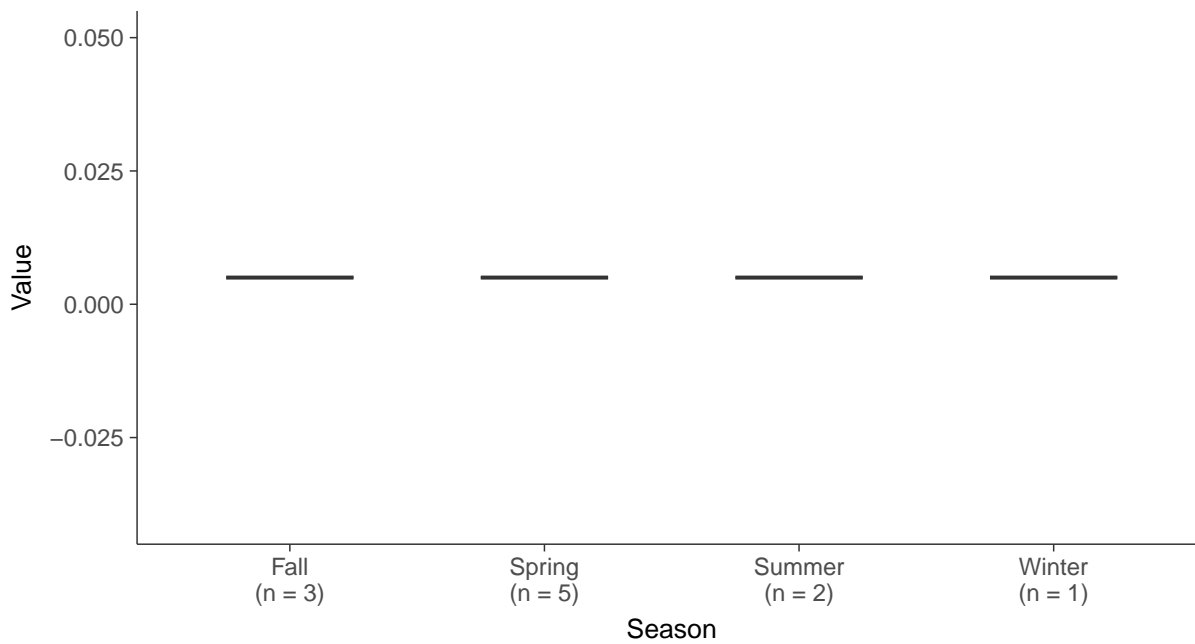
Boxplot

Vanadium, MW-7B (mg/L)



Boxplot by Season

Vanadium, MW-7B (mg/L)



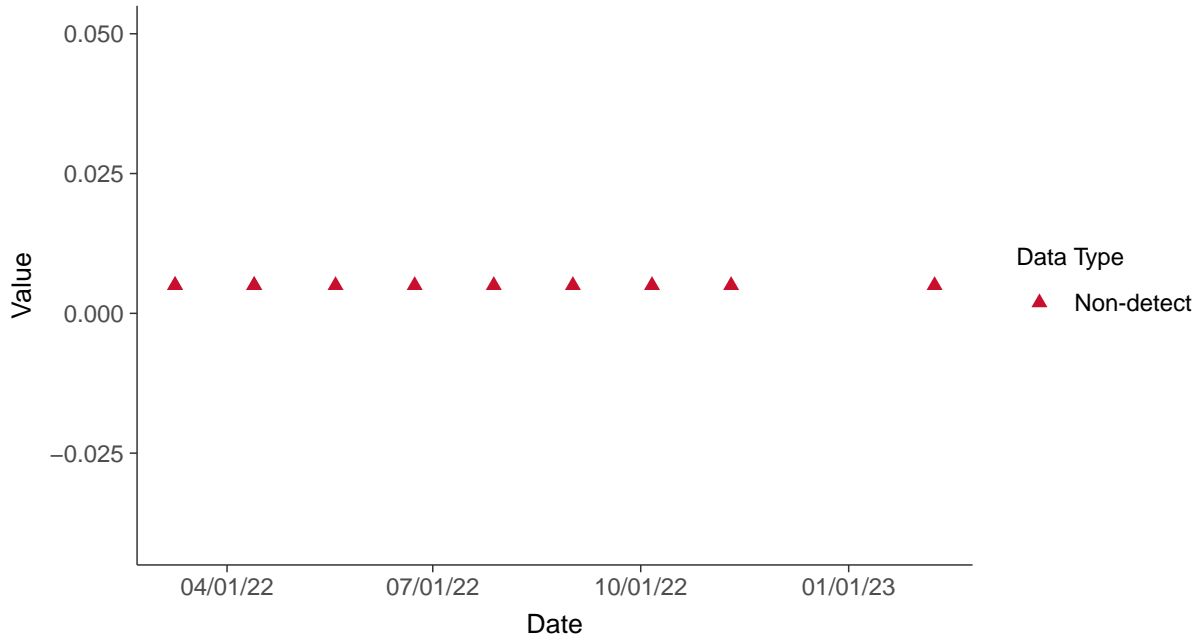


Part 115: Zinc, MW-7B

ID: 7B_5_42

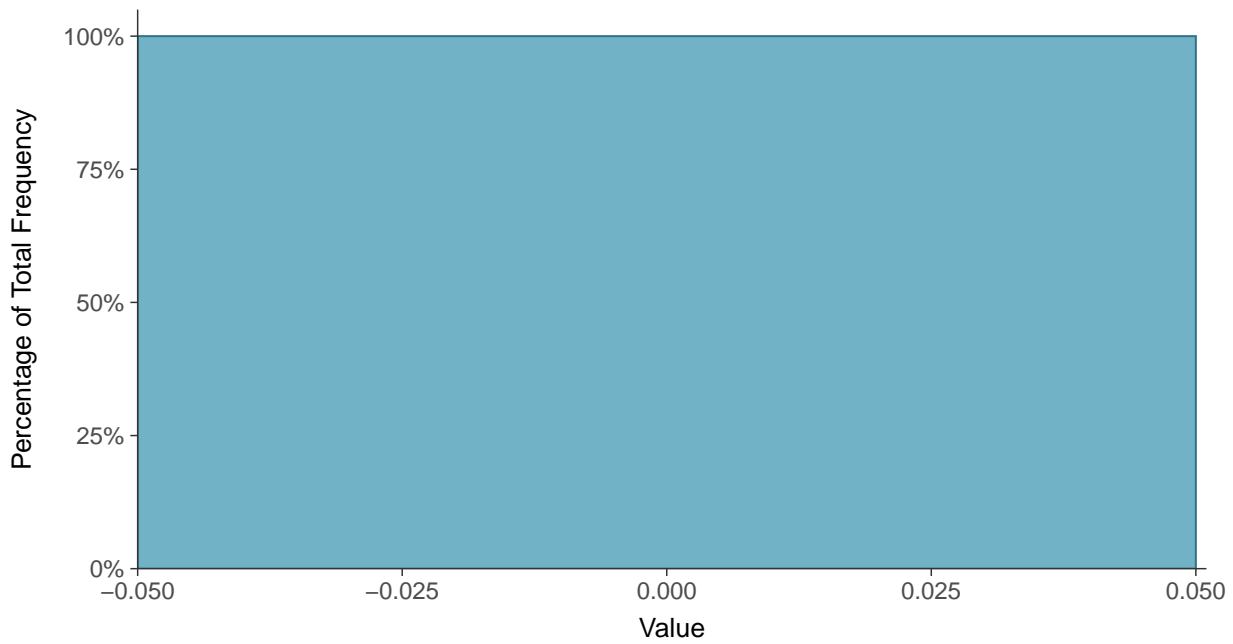
Scatter Plot

Zinc, MW-7B (mg/L)



Histogram

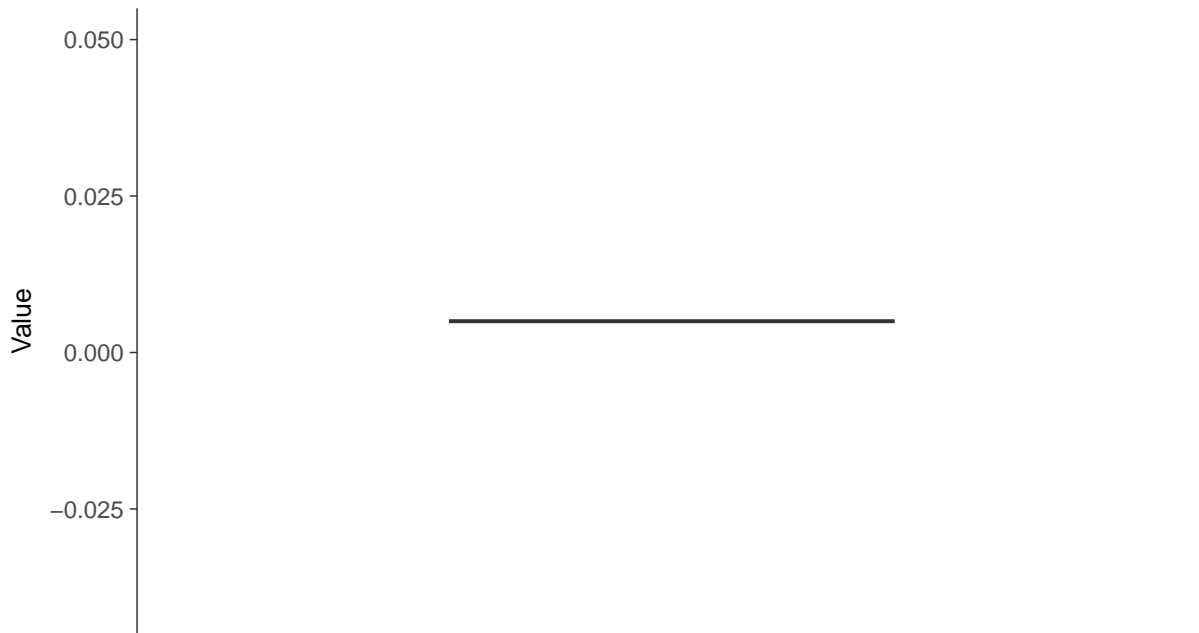
Zinc, MW-7B (mg/L)





Boxplot

Zinc, MW-7B (mg/L)



Boxplot by Season

Zinc, MW-7B (mg/L)

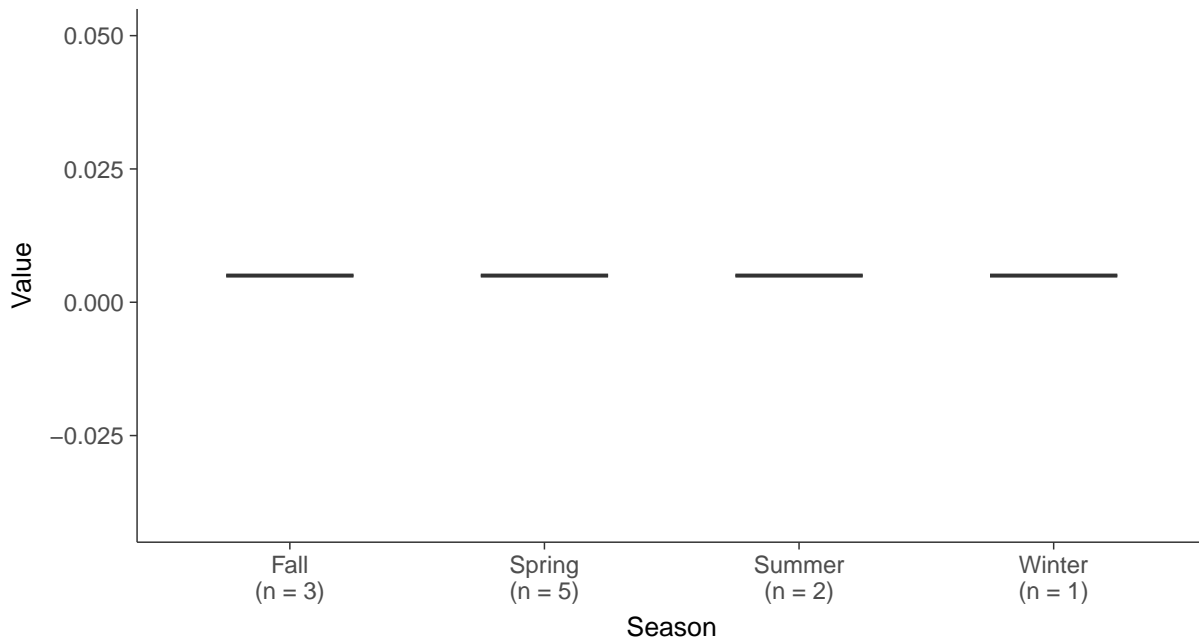


Table 1: Summary Statistics, Non-Detects Included (*continued*)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Date Range	Distributions Fit ^a	Recommended Distribution	Mean	Median	Minimum	Maximum	SD	CV	MAD/0.675	Skewness	Kurtosis
03_1_06	MW-3	Appendix III	Total Dissolved Solids	mg/L	5	0	0%	2021-05-04 to 2023-02-07		Nonparametric	1472	1480	1440	1500	25.9	0.0176	29.6	-0.363	-2.41
03_1_07	MW-3	Appendix III	pH, Field	su	5	0	0%	2021-05-04 to 2023-02-07		Nonparametric	7.23	7.23	7.15	7.28	0.0532	0.00736	0.0593	-0.592	-0.809
03_2_04	MW-3	Appendix IV	Fluoride	mg/L	5	5	100%	2021-05-04 to 2023-02-07		Nonparametric	1.00	1.00	1.00	1.00	0	0	0	NA	NA
03_2_08	MW-3	Appendix IV	Antimony	mg/L	5	5	100%	2021-05-04 to 2023-02-07		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
03_2_09	MW-3	Appendix IV	Arsenic	mg/L	5	0	0%	2021-05-04 to 2023-02-07		Nonparametric	0.00300	0.00300	0.00300	0.00300	0	0	0	NA	NA
03_2_10	MW-3	Appendix IV	Barium	mg/L	5	0	0%	2021-05-04 to 2023-02-07		Nonparametric	0.0200	0.0200	0.0190	0.0210	0.00100	0.0500	0.00148	0	-3.00
03_2_11	MW-3	Appendix IV	Beryllium	mg/L	5	5	100%	2021-05-04 to 2023-02-07		Nonparametric	0.00100	0.00100	0.00100	0.00100	0	0	0	NA	NA
03_2_13	MW-3	Appendix IV	Cadmium	mg/L	5	5	100%	2021-05-04 to 2023-02-07		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA
03_2_15	MW-3	Appendix IV	Chromium	mg/L	5	5	100%	2021-05-04 to 2023-02-07		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
03_2_16	MW-3	Appendix IV	Cobalt	mg/L	5	5	100%	2021-05-04 to 2023-02-07		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
03_2_18	MW-3	Appendix IV	Lead	mg/L	5	5	100%	2021-05-04 to 2023-02-07		Nonparametric	0.00300	0.00300	0.00300	0.00300	0	0	0	NA	NA
03_2_19	MW-3	Appendix IV	Lithium	mg/L	5	0	0%	2021-05-04 to 2023-02-07		Nonparametric	0.0844	0.0860	0.0770	0.0910	0.00522	0.0619	0.00593	-0.360	0.289
03_2_21	MW-3	Appendix IV	Mercury	mg/L	5	5	100%	2021-05-04 to 2023-02-07		Nonparametric	0.000200	0.000200	0.000200	0.000200	0	0	0	NA	NA
03_2_22	MW-3	Appendix IV	Molybdenum	mg/L	5	0	0%	2021-05-04 to 2023-02-07		Nonparametric	0.165	0.162	0.153	0.182	0.0106	0.0645	0.00296	1.28	2.79
03_2_24	MW-3	Appendix IV	Radium-226	pCi/L	5	0	0%	2021-05-04 to 2023-02-07		Nonparametric	0.413	0.437	0.152	0.566	0.170	0.411	0.173	-0.979	0.397
03_2_25	MW-3	Appendix IV	Radium-226/228	pCi/L	5	0	0%	2021-05-04 to 2023-02-07		Nonparametric	1.97	2.18	1.11	2.92	0.792	0.402	1.10	-0.109	-2.38
03_2_26	MW-3	Appendix IV	Radium-228	pCi/L	5	0	0%	2021-05-04 to 2023-02-07		Nonparametric	1.56	1.61	0.760	2.56	0.727	0.466	0.959	0.351	-1.06
03_2_27	MW-3	Appendix IV	Selenium	mg/L	5	5	100%	2021-05-04 to 2023-02-07		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
03_2_29	MW-3	Appendix IV	Thallium	mg/L	5	5	100%	2021-05-04 to 2023-02-07		Nonparametric	0.00200	0.00200	0.00200	0.00200	0	0	0	NA	NA
03_2_30	MW-3	Appendix IV	Total Suspended Solids	mg/L	5	1	20%	2021-05-04 to 2023-02-07		Nonparametric	2.60	3.00	1.00	4.00	1.14	0.439	1.48	-0.405	-0.178
03_3_12	MW-3	Other	Bicarbonate	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	212	212	210	215	3.54	0.0166	3.70	NA	NA
03_3_14	MW-3	Other	Carbonate	mg/L	2	2	100%	2022-08-02 to 2023-02-07		Nonparametric	10.0	10.0	10.0	10.0	0	0	0	NA	NA
03_3_17	MW-3	Other	Hardness	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	790	790	784	795	7.78	0.00985	8.15	NA	NA
03_3_20	MW-3	Other	Magnesium	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	46.2	46.2	45.9	46.5	0.424	0.00918	0.444	NA	NA
03_3_23	MW-3	Other	Potassium	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	1.67	1.67	1.67	1.67	0	0	0	NA	NA
03_3_28	MW-3	Other	Sodium	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	112	112	111	113	1.41	0.0126	1.48	NA	NA
03_5_37	MW-3	Part 115	Copper	mg/L	5	5	100%	2021-05-04 to 2023-02-07		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
03_5_38	MW-3	Part 115	Iron	mg/L	5	0	0%	2021-05-04 to 2023-02-07		Nonparametric	1.97	2.01	1.80	2.05	0.102	0.0517	0.0593	-1.45	1.72
03_5_39	MW-3	Part 115	Nickel	mg/L	5	5	100%	2021-05-04 to 2023-02-07		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
03_5_40	MW-3	Part 115	Silver	mg/L	5	5	100%	2021-05-04 to 2023-02-07		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA
03_5_41	MW-3	Part 115	Vanadium	mg/L	5	5	100%	2021-05-04 to 2023-02-07		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
03_5_42	MW-3	Part 115	Zinc	mg/L	5	5	100%	2021-05-04 to 2023-02-07		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
05_1_01	MW-5	Appendix III	Boron	mg/L	16	0	0%	2020-04-28 to 2023-02-07	Nonparametric	Nonparametric	4.33	4.60	0.370	5.75	1.24	0.287	0.593	-2.35	6.94
05_1_02	MW-5	Appendix III	Calcium	mg/L	16	0	0%	2020-04-28 to 2023-02-07	Normal	Normal	248	248	70.1	372	69.0	0.279	45.9	-0.796	2.14
05_1_03	MW-5	Appendix III	Chloride	mg/L	15	0	0%	2020-04-28 to 2023-02-07	Gamma; Normal	Normal	71.3	75.0	43.0	83.0	10.9	0.153	10.4	-1.39	2.06
05_1_04	MW-5	Appendix III	Fluoride	mg/L	15	15	100%	2020-04-28 to 2023-02-07		Nonparametric	1.00	1.00	1.00	1.00	0	0	0	NA	NA
05_1_05	MW-5	Appendix III	Sulfate	mg/L	15	0	0%	2020-04-28 to 2023-02-07	Gamma; Normal	Normal	734	714	186	1170	257	0.350	236	-0.322	0.207
05_1_06	MW-5	Appendix III	Total Dissolved Solids	mg/L	15	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	1449	1520	592	2020	378	0.261	370	-0.583	0.489
05_1_07	MW-5	Appendix III	pH, Field	su	17	0	0%	2020-04-28 to 2023-02-07	Nonparametric	Nonparametric	7.18	7.24	6.40	7.45	0.260	0.0362	0.148	-2.17	5.01
05_2_04	MW-5	Appendix IV	Fluoride	mg/L	16	16	100%	2020-04-28 to 2023-02-07		Nonparametric	1.00	1.00	1.00	1.00	0	0	0	NA	NA
05_2_08	MW-5	Appendix IV	Antimony	mg/L	17	17	100%	2020-04-28 to 2023-02-07		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
05_2_09	MW-5	Appendix IV	Arsenic	mg/L	17	12	71%	2020-04-28 to 2023-02-07		Nonparametric	0.00253	0.00200	0.00200	0.00700	0.00137	0.543	0	2.79	7.51

(Table continues on next page)

^a Non-detects are excluded from goodness-of-fit tests.

Table 1: Summary Statistics, Non-Detects Included (continued)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Date Range	Distributions Fit ^a	Recommended Distribution	Mean	Median	Minimum	Maximum	SD	CV	MAD/0.675	Skewness	Kurtosis
06_2_18	MW-6	Appendix IV	Lead	mg/L	16	16	100%	2020-04-28 to 2023-02-07		Nonparametric	0.00300	0.00300	0.00300	0.00300	0	0	0	NA	NA
06_2_19	MW-6	Appendix IV	Lithium	mg/L	16	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	0.0476	0.0475	0.0370	0.0590	0.00717	0.151	0.00889	-0.0100	-1.06
06_2_21	MW-6	Appendix IV	Mercury	mg/L	16	16	100%	2020-04-28 to 2023-02-07		Nonparametric	0.000200	0.000200	0.000200	0.000200	0	0	0	NA	NA
06_2_22	MW-6	Appendix IV	Molybdenum	mg/L	16	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	0.0268	0.0275	0.0160	0.0360	0.00504	0.188	0.00444	-0.257	0.371
06_2_24	MW-6	Appendix IV	Radium-226	pCi/L	16	0	0%	2020-04-28 to 2023-02-07	Normal	Normal	0.347	0.361	-0.0445	0.961	0.256	0.738	0.238	0.470	0.958
06_2_25	MW-6	Appendix IV	Radium-226/228	pCi/L	16	0	0%	2020-04-28 to 2023-02-07	Normal	Normal	0.989	0.698	0	2.61	0.709	0.717	0.456	0.849	0.113
06_2_26	MW-6	Appendix IV	Radium-228	pCi/L	16	0	0%	2020-04-28 to 2023-02-07	Normal	Normal	0.465	0.354	-1.09	2.04	0.909	1.96	1.10	0.0138	-0.757
06_2_27	MW-6	Appendix IV	Selenium	mg/L	16	16	100%	2020-04-28 to 2023-02-07		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
06_2_29	MW-6	Appendix IV	Thallium	mg/L	16	16	100%	2020-04-28 to 2023-02-07		Nonparametric	0.00200	0.00200	0.00200	0.00200	0	0	0	NA	NA
06_2_30	MW-6	Appendix IV	Total Suspended Solids	mg/L	16	12	75%	2020-04-28 to 2023-02-07		Nonparametric	4.81	3.00	1.00	32.0	7.31	1.52	0	3.88	15.3
06_3_12	MW-6	Other	Bicarbonate	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	512	512	480	543	44.5	0.0871	46.7	NA	NA
06_3_14	MW-6	Other	Carbonate	mg/L	2	2	100%	2022-08-02 to 2023-02-07		Nonparametric	10.0	10.0	10.0	10.0	0	0	0	NA	NA
06_3_17	MW-6	Other	Hardness	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	578	578	532	624	65.1	0.113	68.1	NA	NA
06_3_20	MW-6	Other	Magnesium	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	36.1	36.1	32.9	39.4	4.60	0.127	4.81	NA	NA
06_3_23	MW-6	Other	Potassium	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	6.62	6.62	6.40	6.85	0.318	0.0480	0.333	NA	NA
06_3_28	MW-6	Other	Sodium	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	41.4	41.4	38.8	43.9	3.61	0.0872	3.78	NA	NA
06_5_37	MW-6	Part 115	Copper	mg/L	16	16	100%	2020-04-28 to 2023-02-07		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
06_5_38	MW-6	Part 115	Iron	mg/L	16	8	50%	2020-04-28 to 2023-02-07		Nonparametric	0.0419	0.0200	0.0200	0.200	0.0464	1.11	0	3.00	9.88
06_5_39	MW-6	Part 115	Nickel	mg/L	16	2	12%	2020-04-28 to 2023-02-07	Nonparametric	Nonparametric	0.00656	0.00700	0.00500	0.00800	0.000964	0.147	0.000741	-0.457	-0.591
06_5_40	MW-6	Part 115	Silver	mg/L	16	16	100%	2020-04-28 to 2023-02-07		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA
06_5_41	MW-6	Part 115	Vanadium	mg/L	16	16	100%	2020-04-28 to 2023-02-07		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
06_5_42	MW-6	Part 115	Zinc	mg/L	16	15	94%	2020-04-28 to 2023-02-07		Nonparametric	0.00681	0.00500	0.00500	0.0340	0.00725	1.06	0	4.00	16.0
07_1_01	MW-7	Appendix III	Boron	mg/L	10	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	1.94	1.88	1.36	2.75	0.399	0.206	0.363	0.541	1.01
07_1_02	MW-7	Appendix III	Calcium	mg/L	10	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	116	112	98.8	149	14.3	0.123	12.6	1.37	2.47
07_1_03	MW-7	Appendix III	Chloride	mg/L	10	0	0%	2021-06-15 to 2023-02-08	Nonparametric	Nonparametric	77.4	74.5	72.2	98.0	7.79	0.101	2.22	2.46	6.42
07_1_04	MW-7	Appendix III	Fluoride	mg/L	10	9	90%	2021-06-15 to 2023-02-08		Nonparametric	0.934	1.00	0.338	1.00	0.209	0.224	0	-3.16	10.0
07_1_05	MW-7	Appendix III	Sulfate	mg/L	10	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	201	194	175	260	24.5	0.122	17.8	1.71	3.63
07_1_06	MW-7	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	613	591	564	758	55.7	0.0908	32.6	2.26	5.86
07_1_07	MW-7	Appendix III	pH, Field	su	10	0	0%	2021-06-15 to 2023-02-08	Nonparametric	Nonparametric	7.53	7.47	7.24	8.18	0.254	0.0337	0.141	2.13	5.78
07_2_04	MW-7	Appendix IV	Fluoride	mg/L	10	9	90%	2021-06-15 to 2023-02-08		Nonparametric	0.934	1.00	0.338	1.00	0.209	0.224	0	-3.16	10.0
07_2_08	MW-7	Appendix IV	Antimony	mg/L	10	10	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
07_2_09	MW-7	Appendix IV	Arsenic	mg/L	10	0	0%	2021-06-15 to 2023-02-08	Lognormal; Normal	Normal	0.00550	0.00600	0.00400	0.00700	0.000972	0.177	0.000741	-0.454	-0.516
07_2_10	MW-7	Appendix IV	Barium	mg/L	10	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.0542	0.0545	0.0470	0.0620	0.00466	0.0860	0.00444	0.171	-0.457
07_2_11	MW-7	Appendix IV	Beryllium	mg/L	10	10	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00100	0.00100	0.00100	0.00100	0	0	0	NA	NA
07_2_13	MW-7	Appendix IV	Cadmium	mg/L	10	10	100%	2021-06-15 to 2023-02-08		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA
07_2_15	MW-7	Appendix IV	Chromium	mg/L	10	10	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
07_2_16	MW-7	Appendix IV	Cobalt	mg/L	10	10	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
07_2_18	MW-7	Appendix IV	Lead	mg/L	10	10	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00300	0.00300	0.00300	0.00300	0	0	0	NA	NA
07_2_19	MW-7	Appendix IV	Lithium	mg/L	10	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.0946	0.0965	0.0730	0.112	0.0104	0.110	0.00519	-0.635	1.61
07_2_21	MW-7	Appendix IV	Mercury	mg/L	10	9	90%	2021-06-15 to 2023-02-08		Nonparametric	0.000200	0.000200	0.000200	0.000200	0	0	0	NA	NA
07_2_22	MW-7	Appendix IV	Molybdenum	mg/L	10	0	0%	2021-06-15 to 2023-02-08	Nonparametric	Nonparametric	0.256	0.276	0.146	0.296	0.0526	0.206	0.0244	-1.59	1.31
07_2_24	MW-7	Appendix IV	Radium-226	pCi/L	10	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal	Gamma	0.968	0.792	0.253	2.64	0.660	0.682	0.259	2.06	5.05

(Table continues on next page)

^a Non-detects are excluded from goodness-of-fit tests.

**Table 1: Summary Statistics, Non-Detects Included (continued)**

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Date Range	Distributions Fit ^a	Recommended Distribution	Mean	Median	Minimum	Maximum	SD	CV	MAD/0.675	Skewness	Kurtosis
09_3_28	MW-9	Other	Sodium	mg/L	2	0	0%	2022-08-02 to 2023-02-08		Nonparametric	2.63	2.63	2.41	2.86	0.318	0.121	0.333	NA	NA
09_5_37	MW-9	Part 115	Copper	mg/L	10	10	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
09_5_38	MW-9	Part 115	Iron	mg/L	10	10	100%	2021-06-15 to 2023-02-08		Nonparametric	0.0200	0.0200	0.0200	0.0200	0	0	0	NA	NA
09_5_39	MW-9	Part 115	Nickel	mg/L	10	10	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
09_5_40	MW-9	Part 115	Silver	mg/L	10	10	100%	2021-06-15 to 2023-02-08		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA
09_5_41	MW-9	Part 115	Vanadium	mg/L	10	10	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
09_5_42	MW-9	Part 115	Zinc	mg/L	10	9	90%	2021-06-15 to 2023-02-08		Nonparametric	0.00540	0.00500	0.00500	0.00900	0.00126	0.234	0	3.16	10.0
10_1_01	MW-10	Appendix III	Boron	mg/L	11	0	0%	2021-06-15 to 2023-02-08	Nonparametric	Nonparametric	0.0527	0.0500	0.0400	0.0700	0.00786	0.149	0	0.935	1.65
10_1_02	MW-10	Appendix III	Calcium	mg/L	11	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	131	132	113	142	9.52	0.0725	7.41	-0.813	-0.128
10_1_03	MW-10	Appendix III	Chloride	mg/L	11	10	91%	2021-06-15 to 2023-02-08		Nonparametric	4.64	5.00	1.03	5.00	1.20	0.258	0	-3.32	11.0
10_1_04	MW-10	Appendix III	Fluoride	mg/L	11	10	91%	2021-06-15 to 2023-02-08		Nonparametric	0.915	1.00	0.0660	1.00	0.282	0.308	0	-3.32	11.0
10_1_05	MW-10	Appendix III	Sulfate	mg/L	11	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	13.8	14.0	9.00	18.0	2.77	0.201	2.96	-0.267	-0.466
10_1_06	MW-10	Appendix III	Total Dissolved Solids	mg/L	11	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	442	436	376	494	38.2	0.0865	56.3	-0.202	-0.967
10_1_07	MW-10	Appendix III	pH, Field	su	11	0	0%	2021-06-15 to 2023-02-08	Gamma	Gamma	6.75	6.70	6.49	7.30	0.216	0.0320	0.148	1.76	4.20
10_2_04	MW-10	Appendix IV	Fluoride	mg/L	11	10	91%	2021-06-15 to 2023-02-08		Nonparametric	0.915	1.00	0.0660	1.00	0.282	0.308	0	-3.32	11.0
10_2_08	MW-10	Appendix IV	Antimony	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
10_2_09	MW-10	Appendix IV	Arsenic	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00200	0.00200	0.00200	0.00200	0	0	0	NA	NA
10_2_10	MW-10	Appendix IV	Barium	mg/L	11	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.0406	0.0410	0.0360	0.0470	0.00364	0.0896	0.00444	0.205	-0.958
10_2_11	MW-10	Appendix IV	Beryllium	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00100	0.00100	0.00100	0.00100	0	0	0	NA	NA
10_2_13	MW-10	Appendix IV	Cadmium	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA
10_2_15	MW-10	Appendix IV	Chromium	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
10_2_16	MW-10	Appendix IV	Cobalt	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
10_2_18	MW-10	Appendix IV	Lead	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00300	0.00300	0.00300	0.00300	0	0	0	NA	NA
10_2_19	MW-10	Appendix IV	Lithium	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00545	0.00500	0.00500	0.0100	0.00151	0.276	0	3.32	11.0
10_2_21	MW-10	Appendix IV	Mercury	mg/L	11	10	91%	2021-06-15 to 2023-02-08		Nonparametric	0.000200	0.000200	0.000200	0.000200	0	0	0	NA	NA
10_2_22	MW-10	Appendix IV	Molybdenum	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
10_2_24	MW-10	Appendix IV	Radium-226	pCi/L	11	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.642	0.443	0.183	1.59	0.486	0.757	0.367	1.21	0.347
10_2_25	MW-10	Appendix IV	Radium-226/228	pCi/L	10	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.942	0.686	0.262	2.39	0.662	0.702	0.387	1.40	1.52
10_2_26	MW-10	Appendix IV	Radium-228	pCi/L	10	0	0%	2021-06-15 to 2023-02-08	Normal	Normal	0.0780	0.165	-0.994	0.929	0.623	7.99	0.354	-0.717	0.0783
10_2_27	MW-10	Appendix IV	Selenium	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
10_2_29	MW-10	Appendix IV	Thallium	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00200	0.00200	0.00200	0.00200	0	0	0	NA	NA
10_2_30	MW-10	Appendix IV	Total Suspended Solids	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	3.00	3.00	3.00	3.00	0	0	0	NA	NA
10_3_12	MW-10	Other	Bicarbonate	mg/L	3	0	0%	2022-08-02 to 2023-02-08		Nonparametric	496	522	440	525	48.2	0.0973	4.44	-1.72	NA
10_3_14	MW-10	Other	Carbonate	mg/L	3	3	100%	2022-08-02 to 2023-02-08		Nonparametric	10.0	10.0	10.0	10.0	0	0	0	NA	NA
10_3_17	MW-10	Other	Hardness	mg/L	3	0	0%	2022-08-02 to 2023-02-08		Nonparametric	434	460	382	461	45.3	0.104	1.48	-1.73	NA
10_3_20	MW-10	Other	Magnesium	mg/L	3	0	0%	2022-08-02 to 2023-02-08		Nonparametric	27.4	29.2	23.6	29.5	3.32	0.121	0.444	-1.72	NA
10_3_23	MW-10	Other	Potassium	mg/L	3	0	0%	2022-08-02 to 2023-02-08		Nonparametric	0.683	0.700	0.620	0.730	0.0569	0.0832	0.0444	-1.21	NA
10_3_28	MW-10	Other	Sodium	mg/L	3	0	0%	2022-08-02 to 2023-02-08		Nonparametric	2.50	2.54	2.24	2.73	0.247	0.0987	0.281	-0.653	NA
10_5_37	MW-10	Part 115	Copper	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
10_5_38	MW-10	Part 115	Iron	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	0.0200	0.0200	0.0200	0.0200	0	0	0	NA	NA
10_5_39	MW-10	Part 115	Nickel	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
10_5_40	MW-10	Part 115	Silver	mg/L	11	11	100%	2021-06-15 to 2023-02-08		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA

(Table continues on next page)

^a Non-detects are excluded from goodness-of-fit tests.



Table 1: Summary Statistics, Non-Detects Included (continued)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Date Range	Distributions Fit ^a	Recommended Distribution	Mean	Median	Minimum	Maximum	SD	CV	MAD/0.675	Skewness	Kurtosis
14_1_04	MW-14	Appendix III	Fluoride	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	1.00	1.00	1.00	1.00	0	0	0	NA	NA
14_1_05	MW-14	Appendix III	Sulfate	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	204	26.0	17.0	748	363	1.77	9.63	2.0	4.0
14_1_06	MW-14	Appendix III	Total Dissolved Solids	mg/L	4	1	25%	2023-01-12 to 2023-04-28		Nonparametric	576	753	0.00500	796	385	0.668	47.4	-1.97	3.90
14_1_07	MW-14	Appendix III	pH, Field	su	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	7.07	7.08	6.98	7.13	0.0686	0.00970	0.0667	-0.546	-2.25
14_2_04	MW-14	Appendix IV	Fluoride	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	1.00	1.00	1.00	1.00	0	0	0	NA	NA
14_2_08	MW-14	Appendix IV	Antimony	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
14_2_09	MW-14	Appendix IV	Arsenic	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	0.00525	0.00550	0.00400	0.00600	0.000957	0.182	0.000741	-0.855	-1.29
14_2_10	MW-14	Appendix IV	Barium	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	0.136	0.124	0.119	0.177	0.0276	0.203	0.00667	1.88	3.54
14_2_11	MW-14	Appendix IV	Beryllium	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00100	0.00100	0.00100	0.00100	0	0	0	NA	NA
14_2_13	MW-14	Appendix IV	Cadmium	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA
14_2_15	MW-14	Appendix IV	Chromium	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
14_2_16	MW-14	Appendix IV	Cobalt	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
14_2_18	MW-14	Appendix IV	Lead	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00300	0.00300	0.00300	0.00300	0	0	0	NA	NA
14_2_19	MW-14	Appendix IV	Lithium	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	0.118	0.117	0.111	0.125	0.00680	0.0578	0.00815	0.0914	-4.66
14_2_21	MW-14	Appendix IV	Mercury	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.000200	0.000200	0.000200	0.000200	0	0	0	NA	NA
14_2_22	MW-14	Appendix IV	Molybdenum	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	0.0135	0.0135	0.0120	0.0150	0.00129	0.0956	0.00148	0	-1.20
14_2_24	MW-14	Appendix IV	Radium-226	pCi/L	3	0	0%	2023-01-12 to 2023-03-24		Nonparametric	0.756	0.907	0.396	0.964	0.313	0.414	0.0844	-1.67	NA
14_2_25	MW-14	Appendix IV	Radium-226/228	pCi/L	3	0	0%	2023-01-12 to 2023-04-28		Nonparametric	2.57	1.82	1.46	4.44	1.63	0.632	0.533	1.64	NA
14_2_26	MW-14	Appendix IV	Radium-228	pCi/L	3	0	0%	2023-01-12 to 2023-04-28		Nonparametric	1.86	1.20	0.853	3.53	1.46	0.782	0.514	1.62	NA
14_2_27	MW-14	Appendix IV	Selenium	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
14_2_29	MW-14	Appendix IV	Thallium	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00200	0.00200	0.00200	0.00200	0	0	0	NA	NA
14_2_30	MW-14	Appendix IV	Total Suspended Solids	mg/L	3	0	0%	2023-01-12 to 2023-04-28		Nonparametric	20.5	22.2	16.0	23.4	3.97	0.193	1.78	-1.56	NA
14_3_12	MW-14	Other	Bicarbonate	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	628	626	600	660	31.7	0.0505	37.0	0.0844	-5.50
14_3_14	MW-14	Other	Carbonate	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	10.0	10.0	10.0	10.0	0	0	0	NA	NA
14_3_17	MW-14	Other	Hardness	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	539	546	498	566	30.0	0.0557	22.2	-1.09	0.576
14_3_20	MW-14	Other	Magnesium	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	40.9	40.8	39.7	42.3	1.14	0.0279	1.19	0.386	-1.65
14_3_23	MW-14	Other	Potassium	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	4.97	4.75	4.55	5.82	0.576	0.116	0.178	1.81	3.45
14_3_28	MW-14	Other	Sodium	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	76.5	77.0	72.5	79.2	3.00	0.0392	2.52	-0.858	-0.649
14_5_37	MW-14	Part 115	Copper	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
14_5_38	MW-14	Part 115	Iron	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	9.36	9.83	6.58	11.2	1.99	0.212	1.29	-1.25	1.87
14_5_39	MW-14	Part 115	Nickel	mg/L	4	2	50%	2023-01-12 to 2023-04-28		Nonparametric	0.00525	0.00500	0.00500	0.00600	0.000500	0.0952	0	2.00	4.0
14_5_40	MW-14	Part 115	Silver	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA
14_5_41	MW-14	Part 115	Vanadium	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
14_5_42	MW-14	Part 115	Zinc	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
15_1_01	MW-15	Appendix III	Boron	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	0.345	0.340	0.330	0.370	0.0173	0.0502	0.00741	1.54	2.89
15_1_02	MW-15	Appendix III	Calcium	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	136	130	104	183	34.3	0.252	26.7	1.00	0.612
15_1_03	MW-15	Appendix III	Chloride	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	79.0	78.0	60.0	100	17.1	0.216	17.8	0.292	-0.684
15_1_04	MW-15	Appendix III	Fluoride	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	1.00	1.00	1.00	1.00	0	0	0	NA	NA
15_1_05	MW-15	Appendix III	Sulfate	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	152	130	109	238	58.6	0.387	19.3	1.80	3.38
15_1_06	MW-15	Appendix III	Total Dissolved Solids	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	676	648	528	878	150	0.223	120	0.934	0.714
15_1_07	MW-15	Appendix III	pH, Field	su	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	6.93	6.94	6.86	6.99	0.0629	0.00908	0.0667	-0.316	-3.98
15_2_04	MW-15	Appendix IV	Fluoride	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	1.00	1.00	1.00	1.00	0	0	0	NA	NA

(Table continues on next page)

^a Non-detects are excluded from goodness-of-fit tests.

Table 1: Summary Statistics, Non-Detects Included (continued)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Date Range	Distributions Fit ^a	Recommended Distribution	Mean	Median	Minimum	Maximum	SD	CV	MAD/0.675	Skewness	Kurtosis
15_2_08	MW-15	Appendix IV	Antimony	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
15_2_09	MW-15	Appendix IV	Arsenic	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00200	0.00200	0.00200	0.00200	0	0	0	NA	NA
15_2_10	MW-15	Appendix IV	Barium	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	0.0540	0.0485	0.0420	0.0770	0.0157	0.290	0.00593	1.73	3.20
15_2_11	MW-15	Appendix IV	Beryllium	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00100	0.00100	0.00100	0.00100	0	0	0	NA	NA
15_2_13	MW-15	Appendix IV	Cadmium	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA
15_2_15	MW-15	Appendix IV	Chromium	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
15_2_16	MW-15	Appendix IV	Cobalt	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
15_2_18	MW-15	Appendix IV	Lead	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00300	0.00300	0.00300	0.00300	0	0	0	NA	NA
15_2_19	MW-15	Appendix IV	Lithium	mg/L	4	3	75%	2023-01-12 to 2023-04-28		Nonparametric	0.00725	0.00500	0.00500	0.0140	0.00450	0.621	0	2.00	4.00
15_2_21	MW-15	Appendix IV	Mercury	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.000200	0.000200	0.000200	0.000200	0	0	0	NA	NA
15_2_22	MW-15	Appendix IV	Molybdenum	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
15_2_24	MW-15	Appendix IV	Radium-226	pCi/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	0.574	0.546	0.334	0.868	0.230	0.401	0.219	0.575	-0.526
15_2_25	MW-15	Appendix IV	Radium-226/228	pCi/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	1.31	1.42	0.334	2.06	0.846	0.647	0.883	-0.324	-4.06
15_2_26	MW-15	Appendix IV	Radium-228	pCi/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	0.596	0.621	-0.367	1.51	1.01	1.70	1.26	-0.0216	-5.81
15_2_27	MW-15	Appendix IV	Selenium	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	0.0227	0.0235	0.0100	0.0340	0.0100	0.442	0.00963	-0.408	0.432
15_2_29	MW-15	Appendix IV	Thallium	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00200	0.00200	0.00200	0.00200	0	0	0	NA	NA
15_2_30	MW-15	Appendix IV	Total Suspended Solids	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	3.00	3.00	3.00	3.00	0	0	0	NA	NA
15_3_12	MW-15	Other	Bicarbonate	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	356	342	330	410	37.7	0.106	17.8	1.52	1.98
15_3_14	MW-15	Other	Carbonate	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	10.0	10.0	10.0	10.0	0	0	0	NA	NA
15_3_17	MW-15	Other	Hardness	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	442	445	406	473	31.6	0.0715	34.8	-0.265	-3.76
15_3_20	MW-15	Other	Magnesium	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	34.8	33.1	25.7	47.2	9.14	0.263	6.96	0.981	1.24
15_3_23	MW-15	Other	Potassium	mg/L	4	3	75%	2023-01-12 to 2023-04-28		Nonparametric	0.527	0.500	0.500	0.610	0.0550	0.104	0	2.00	4.00
15_3_28	MW-15	Other	Sodium	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	32.1	29.9	28.3	40.5	5.63	0.175	1.48	1.87	3.60
15_5_37	MW-15	Part 115	Copper	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
15_5_38	MW-15	Part 115	Iron	mg/L	4	1	25%	2023-01-12 to 2023-04-28		Nonparametric	0.0275	0.0250	0.0200	0.0400	0.00957	0.348	0.00741	0.855	-1.29
15_5_39	MW-15	Part 115	Nickel	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
15_5_40	MW-15	Part 115	Silver	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA
15_5_41	MW-15	Part 115	Vanadium	mg/L	4	4	100%	2023-01-12 to 2023-04-28		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
15_5_42	MW-15	Part 115	Zinc	mg/L	4	3	75%	2023-01-12 to 2023-04-28		Nonparametric	0.00900	0.00500	0.00500	0.0210	0.00800	0.889	0	2.00	4.0
7B_1_01	MW-7B	Appendix III	Boron	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	3.00	3.00	2.88	3.17	0.0897	0.0299	0.104	0.403	-0.441
7B_1_02	MW-7B	Appendix III	Calcium	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	9.28	9.24	8.24	10.4	0.622	0.0670	0.519	0.410	0.290
7B_1_03	MW-7B	Appendix III	Chloride	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	5.00	5.00	5.00	5.00	0	0	0	NA	NA
7B_1_04	MW-7B	Appendix III	Fluoride	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	1.00	1.00	1.00	1.00	0	0	0	NA	NA
7B_1_05	MW-7B	Appendix III	Sulfate	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	5.00	5.00	5.00	5.00	0	0	0	NA	NA
7B_1_06	MW-7B	Appendix III	Total Dissolved Solids	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	366	366	356	376	6.05	0.0165	5.93	0.264	-0.0660
7B_1_07	MW-7B	Appendix III	pH, Field	su	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	7.97	8.04	7.73	8.15	0.155	0.0195	0.163	-0.246	-1.68
7B_2_04	MW-7B	Appendix IV	Fluoride	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	1.00	1.00	1.00	1.00	0	0	0	NA	NA
7B_2_08	MW-7B	Appendix IV	Antimony	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
7B_2_09	MW-7B	Appendix IV	Arsenic	mg/L	11	9	82%	2022-03-09 to 2023-02-08		Nonparametric	0.00209	0.00200	0.00200	0.00300	0.000302	0.144	0	3.32	11.0
7B_2_10	MW-7B	Appendix IV	Barium	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.00955	0.00900	0.00800	0.0110	0.000934	0.0979	0.00148	0.290	-0.501
7B_2_11	MW-7B	Appendix IV	Beryllium	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	0.00100	0.00100	0.00100	0.00100	0	0	0	NA	NA
7B_2_13	MW-7B	Appendix IV	Cadmium	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA

(Table continues on next page)

^a Non-detects are excluded from goodness-of-fit tests.



Table 1: Summary Statistics, Non-Detects Included (continued)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Date Range	Distributions Fit ^a	Recommended Distribution	Mean	Median	Minimum	Maximum	SD	CV	MAD/0.675	Skewness	Kurtosis
7B_2_15	MW-7B	Appendix IV	Chromium	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
7B_2_16	MW-7B	Appendix IV	Cobalt	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
7B_2_18	MW-7B	Appendix IV	Lead	mg/L	11	10	91%	2022-03-09 to 2023-02-08		Nonparametric	0.00382	0.00300	0.00300	0.0120	0.00271	0.711	0	3.32	11.0
7B_2_19	MW-7B	Appendix IV	Lithium	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.0316	0.0320	0.0280	0.0350	0.00196	0.0621	0.00148	-0.249	0.557
7B_2_21	MW-7B	Appendix IV	Mercury	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	0.000200	0.000200	0.000200	0.000200	0	0	0	NA	NA
7B_2_22	MW-7B	Appendix IV	Molybdenum	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
7B_2_24	MW-7B	Appendix IV	Radium-226	pCi/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.512	0.463	0.278	0.988	0.182	0.355	0.0844	1.88	5.0
7B_2_25	MW-7B	Appendix IV	Radium-226/228	pCi/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	1.13	1.09	0.378	2.43	0.644	0.569	0.868	0.703	-0.0143
7B_2_26	MW-7B	Appendix IV	Radium-228	pCi/L	11	0	0%	2022-03-09 to 2023-02-08	Normal	Normal	0.528	0.428	-0.879	1.88	0.768	1.45	0.658	0.0447	0.138
7B_2_27	MW-7B	Appendix IV	Selenium	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
7B_2_29	MW-7B	Appendix IV	Thallium	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	0.00200	0.00200	0.00200	0.00200	0	0	0	NA	NA
7B_2_30	MW-7B	Appendix IV	Total Suspended Solids	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	3.00	3.00	3.00	3.00	0	0	0	NA	NA
7B_3_12	MW-7B	Other	Bicarbonate	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Nonparametric	Nonparametric	394	390	380	418	9.87	0.0250	0	1.31	2.78
7B_3_14	MW-7B	Other	Carbonate	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	10.0	10.0	10.0	10.0	0	0	0	NA	NA
7B_3_17	MW-7B	Other	Hardness	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Nonparametric	Nonparametric	33.9	30.0	29.0	51.0	7.01	0.207	1.48	1.67	2.67
7B_3_20	MW-7B	Other	Magnesium	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Normal	Normal	2.82	2.81	2.43	3.00	0.158	0.0561	0.0889	-1.40	3.15
7B_3_23	MW-7B	Other	Potassium	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Nonparametric	Nonparametric	5.54	5.57	4.80	5.85	0.264	0.0477	0.0593	-2.41	7.38
7B_3_28	MW-7B	Other	Sodium	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	134	136	116	142	6.95	0.0517	4.44	-2.01	5.18
7B_5_37	MW-7B	Part 115	Copper	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
7B_5_38	MW-7B	Part 115	Iron	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.0509	0.0500	0.0300	0.0800	0.0170	0.334	0.0148	0.127	-0.970
7B_5_39	MW-7B	Part 115	Nickel	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
7B_5_40	MW-7B	Part 115	Silver	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA
7B_5_41	MW-7B	Part 115	Vanadium	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
7B_5_42	MW-7B	Part 115	Zinc	mg/L	11	11	100%	2022-03-09 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA

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Table 2: Summary Statistics, Non-Detects Excluded (continued)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Date Range	Distributions Fit	Recommended Distribution	Mean	Median	Minimum	Maximum	SD	CV	MAD/0.675	Skewness	Kurtosis
05_1_02	MW-5	Appendix III	Calcium	mg/L	16	0	0%	2020-04-28 to 2023-02-07	Normal	Normal	248	248	70.1	372	69.0	0.279	45.9	-0.796	2.14
05_1_03	MW-5	Appendix III	Chloride	mg/L	15	0	0%	2020-04-28 to 2023-02-07	Gamma; Normal	Normal	71.3	75.0	43.0	83.0	10.9	0.153	10.4	-1.39	2.06
05_1_05	MW-5	Appendix III	Sulfate	mg/L	15	0	0%	2020-04-28 to 2023-02-07	Gamma; Normal	Normal	734	714	186	1170	257	0.350	236	-0.322	0.207
05_1_06	MW-5	Appendix III	Total Dissolved Solids	mg/L	15	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	1449	1520	592	2020	378	0.261	370	-0.583	0.489
05_1_07	MW-5	Appendix III	pH, Field	su	17	0	0%	2020-04-28 to 2023-02-07	Nonparametric	Nonparametric	7.18	7.24	6.40	7.45	0.260	0.0362	0.148	-2.17	5.01
05_2_09	MW-5	Appendix IV	Arsenic	mg/L	17	12	71%	2020-04-28 to 2023-02-07		Nonparametric	0.00380	0.00300	0.00200	0.00700	0.00217	0.571	0.00148	0.913	-0.738
05_2_10	MW-5	Appendix IV	Barium	mg/L	17	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	0.0451	0.0430	0.0330	0.0640	0.00837	0.186	0.00741	0.826	0.0343
05_2_15	MW-5	Appendix IV	Chromium	mg/L	17	15	88%	2020-04-28 to 2023-02-07		Nonparametric	0.00850	0.00850	0.00700	0.0100	0.00212	0.250	0.00222	NA	NA
05_2_16	MW-5	Appendix IV	Cobalt	mg/L	17	16	94%	2020-04-28 to 2023-02-07		Nonparametric	0.00600	0.00600	0.00600	0.00600	NA	NA	0	NA	NA
05_2_18	MW-5	Appendix IV	Lead	mg/L	17	14	82%	2020-04-28 to 2023-02-07		Nonparametric	0.00733	0.00500	0.00300	0.0140	0.00586	0.799	0.00296	1.51	NA
05_2_19	MW-5	Appendix IV	Lithium	mg/L	17	0	0%	2020-04-28 to 2023-02-07	Normal	Normal	0.0689	0.0740	0.0160	0.0910	0.0195	0.283	0.0163	-1.30	2.02
05_2_22	MW-5	Appendix IV	Molybdenum	mg/L	17	0	0%	2020-04-28 to 2023-02-07	Gamma; Normal	Normal	0.0496	0.0510	0.0100	0.0960	0.0179	0.360	0.0104	0.419	2.96
05_2_24	MW-5	Appendix IV	Radium-226	pCi/L	16	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal	Gamma	0.781	0.654	0.223	3.30	0.724	0.927	0.324	3.09	11
05_2_25	MW-5	Appendix IV	Radium-226/228	pCi/L	16	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	1.58	1.32	0.524	4.22	1.13	0.714	0.913	1.46	1.64
05_2_26	MW-5	Appendix IV	Radium-228	pCi/L	16	0	0%	2020-04-28 to 2023-02-07	Normal	Normal	0.744	0.525	-0.641	3.20	0.900	1.21	0.544	1.23	2.72
05_2_30	MW-5	Appendix IV	Total Suspended Solids	mg/L	16	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal	Gamma	29.6	18.5	4.00	161	39.6	1.34	17.0	2.77	8.59
05_3_12	MW-5	Other	Bicarbonate	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	300	300	280	320	28.3	0.0943	29.6	NA	NA
05_3_17	MW-5	Other	Hardness	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	688	688	629	748	84.1	0.122	88.1	NA	NA
05_3_20	MW-5	Other	Magnesium	mg/L	3	0	0%	2022-08-02 to 2023-02-07		Nonparametric	45.6	42.3	39.9	54.5	7.83	0.172	3.56	1.55	NA
05_3_23	MW-5	Other	Potassium	mg/L	3	0	0%	2022-08-02 to 2023-02-07		Nonparametric	4.09	4.06	3.77	4.44	0.336	0.0822	0.430	0.399	NA
05_3_28	MW-5	Other	Sodium	mg/L	3	0	0%	2022-08-02 to 2023-02-07		Nonparametric	59.7	57.4	52.3	69.5	8.83	0.148	7.56	1.11	NA
05_5_37	MW-5	Part 115	Copper	mg/L	17	12	71%	2020-04-28 to 2023-02-07		Nonparametric	0.0140	0.0110	0.00500	0.0260	0.00843	0.602	0.00889	0.677	-0.901
05_5_38	MW-5	Part 115	Iron	mg/L	17	2	12%	2020-04-28 to 2023-02-07	Gamma; Lognormal	Gamma	1.60	0.750	0.180	8.00	2.14	1.34	0.800	2.33	5.63
05_5_39	MW-5	Part 115	Nickel	mg/L	17	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	0.0116	0.0110	0.00500	0.0190	0.00405	0.347	0.00444	0.214	-0.617
05_5_41	MW-5	Part 115	Vanadium	mg/L	17	15	88%	2020-04-28 to 2023-02-07		Nonparametric	0.0105	0.0105	0.00900	0.0120	0.00212	0.202	0.00222	NA	NA
05_5_42	MW-5	Part 115	Zinc	mg/L	17	5	29%	2020-04-28 to 2023-02-07	Gamma; Lognormal	Gamma	0.0238	0.0125	0.00500	0.0980	0.0269	1.13	0.0111	2.21	5.36
06_1_01	MW-6	Appendix III	Boron	mg/L	15	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	0.813	0.800	0.490	1.09	0.185	0.228	0.237	-0.144	-1.11
06_1_02	MW-6	Appendix III	Calcium	mg/L	15	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	167	169	142	193	18.3	0.110	29.6	0.124	-1.36
06_1_03	MW-6	Appendix III	Chloride	mg/L	15	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	34.0	35.0	24.0	43.0	6.79	0.200	10.4	-0.0931	-1.70
06_1_05	MW-6	Appendix III	Sulfate	mg/L	15	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	187	183	123	264	50.3	0.269	71.1	0.214	-1.48
06_1_06	MW-6	Appendix III	Total Dissolved Solids	mg/L	15	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	760	738	598	898	96.4	0.127	121	-0.0534	-1.33
06_1_07	MW-6	Appendix III	pH, Field	su	16	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	6.74	6.73	6.35	7.11	0.173	0.0257	0.0815	0.00431	1.82
06_2_10	MW-6	Appendix IV	Barium	mg/L	16	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	0.0481	0.0480	0.0380	0.0570	0.00584	0.121	0.00741	-0.0703	-1.42
06_2_19	MW-6	Appendix IV	Lithium	mg/L	16	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	0.0476	0.0475	0.0370	0.0590	0.00717	0.151	0.00889	-0.0100	-1.06
06_2_22	MW-6	Appendix IV	Molybdenum	mg/L	16	0	0%	2020-04-28 to 2023-02-07	Gamma; Lognormal; Normal	Normal	0.0268	0.0275	0.0160	0.0360	0.00504	0.188	0.00444	-0.257	0.371
06_2_24	MW-6	Appendix IV	Radium-226	pCi/L	16	0	0%	2020-04-28 to 2023-02-07	Normal	Normal	0.347	0.361	-0.0445	0.961	0.256	0.738	0.238	0.470	0.958
06_2_25	MW-6	Appendix IV	Radium-226/228	pCi/L	16	0	0%	2020-04-28 to 2023-02-07	Normal	Normal	0.989	0.698	0	2.61	0.709	0.717	0.456	0.849	0.113
06_2_26	MW-6	Appendix IV	Radium-228	pCi/L	16	0	0%	2020-04-28 to 2023-02-07	Normal	Normal	0.465	0.354	-1.09	2.04	0.909	1.96	1.10	0.0138	-0.757
06_2_30	MW-6	Appendix IV	Total Suspended Solids	mg/L	16	12	75%	2020-04-28 to 2023-02-07		Nonparametric	10.2	4.00	1.00	32.0	14.7	1.43	3.70	1.87	3.54
06_3_12	MW-6	Other	Bicarbonate	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	512	512	480	543	44.5	0.0871	46.7	NA	NA
06_3_17	MW-6	Other	Hardness	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	578	578	532	624	65.1	0.113	68.1	NA	NA
06_3_20	MW-6	Other	Magnesium	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	36.1	36.1	32.9	39.4	4.60	0.127	4.81	NA	NA
06_3_23	MW-6	Other	Potassium	mg/L	2	0	0%	2022-08-02 to 2023-02-07		Nonparametric	6.62	6.62	6.40	6.85	0.318	0.0480	0.333	NA	NA

(Table continues on next page)

**Table 2:** Summary Statistics, Non-Detects Excluded *(continued)*

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Date Range	Distributions Fit	Recommended Distribution	Mean	Median	Minimum	Maximum	SD	CV	MAD/0.675	Skewness	Kurtosis
08_3_12	MW-8	Other	Bicarbonate	mg/L	2	0	0%	2022-08-02 to 2023-02-08		Nonparametric	425	425	410	440	21.2	0.0499	22.2	NA	NA
08_3_17	MW-8	Other	Hardness	mg/L	2	0	0%	2022-08-02 to 2023-02-08		Nonparametric	366	366	347	384	26.2	0.0716	27.4	NA	NA
08_3_20	MW-8	Other	Magnesium	mg/L	2	0	0%	2022-08-02 to 2023-02-08		Nonparametric	30.4	30.4	28.9	31.8	2.05	0.0676	2.15	NA	NA
08_3_23	MW-8	Other	Potassium	mg/L	2	0	0%	2022-08-02 to 2023-02-08		Nonparametric	0.550	0.550	0.530	0.570	0.0283	0.0514	0.0296	NA	NA
08_3_28	MW-8	Other	Sodium	mg/L	2	0	0%	2022-08-02 to 2023-02-08		Nonparametric	13.4	13.4	12.7	14.2	1.06	0.0789	1.11	NA	NA
08_5_38	MW-8	Part 115	Iron	mg/L	10	9	90%	2021-06-15 to 2023-02-08		Nonparametric	0.0200	0.0200	0.0200	0.0200	NA	NA	0	NA	NA
09_1_02	MW-9	Appendix III	Calcium	mg/L	10	0	0%	2021-06-15 to 2023-02-08	Nonparametric	Nonparametric	71.6	73.8	61.8	78.0	6.49	0.0905	5.93	-0.563	-1.44
09_1_03	MW-9	Appendix III	Chloride	mg/L	10	9	90%	2021-06-15 to 2023-02-08		Nonparametric	1.11	1.11	1.11	1.11	NA	NA	0	NA	NA
09_1_04	MW-9	Appendix III	Fluoride	mg/L	10	9	90%	2021-06-15 to 2023-02-08		Nonparametric	0.0330	0.0330	0.0330	0.0330	NA	NA	0	NA	NA
09_1_05	MW-9	Appendix III	Sulfate	mg/L	10	8	80%	2021-06-15 to 2023-02-08		Nonparametric	4.29	4.29	3.58	5.00	1.00	0.234	1.05	NA	NA
09_1_06	MW-9	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	252	245	232	280	15.7	0.0623	7.41	0.863	-0.423
09_1_07	MW-9	Appendix III	pH, Field	su	10	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	7.32	7.28	7.14	7.74	0.182	0.0248	0.141	1.42	2.21
09_2_04	MW-9	Appendix IV	Fluoride	mg/L	10	9	90%	2021-06-15 to 2023-02-08		Nonparametric	0.0330	0.0330	0.0330	0.0330	NA	NA	0	NA	NA
09_2_10	MW-9	Appendix IV	Barium	mg/L	10	0	0%	2021-06-15 to 2023-02-08		Nonparametric	0.0139	0.0140	0.0130	0.0150	0.000876	0.0630	0.00148	0.223	-1.73
09_2_24	MW-9	Appendix IV	Radium-226	pCi/L	7	0	0%	2021-06-15 to 2023-02-08		Nonparametric	0.606	0.533	0.0527	1.67	0.534	0.881	0.391	1.47	2.72
09_2_25	MW-9	Appendix IV	Radium-226/228	pCi/L	9	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	1.33	1.25	0.177	2.37	0.848	0.639	1.07	-0.00100	-1.88
09_2_26	MW-9	Appendix IV	Radium-228	pCi/L	9	0	0%	2021-06-15 to 2023-02-08	Normal	Normal	0.732	0.453	-0.0915	1.88	0.742	1.01	0.606	0.609	-1.47
09_3_12	MW-9	Other	Bicarbonate	mg/L	2	0	0%	2022-08-02 to 2023-02-08		Nonparametric	298	298	260	336	53.7	0.180	56.3	NA	NA
09_3_17	MW-9	Other	Hardness	mg/L	2	0	0%	2022-08-02 to 2023-02-08		Nonparametric	240	240	218	261	30.4	0.127	31.9	NA	NA
09_3_20	MW-9	Other	Magnesium	mg/L	2	0	0%	2022-08-02 to 2023-02-08		Nonparametric	17.3	17.3	15.2	19.4	2.97	0.172	3.11	NA	NA
09_3_23	MW-9	Other	Potassium	mg/L	2	0	0%	2022-08-02 to 2023-02-08		Nonparametric	1.01	1.01	0.930	1.09	0.113	0.112	0.119	NA	NA
09_3_28	MW-9	Other	Sodium	mg/L	2	0	0%	2022-08-02 to 2023-02-08		Nonparametric	2.63	2.63	2.41	2.86	0.318	0.121	0.333	NA	NA
09_5_42	MW-9	Part 115	Zinc	mg/L	10	9	90%	2021-06-15 to 2023-02-08		Nonparametric	0.00900	0.00900	0.00900	0.00900	NA	NA	0	NA	NA
10_1_01	MW-10	Appendix III	Boron	mg/L	11	0	0%	2021-06-15 to 2023-02-08	Nonparametric	Nonparametric	0.0527	0.0500	0.0400	0.0700	0.00786	0.149	0	0.935	1.65
10_1_02	MW-10	Appendix III	Calcium	mg/L	11	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	131	132	113	142	9.52	0.0725	7.41	-0.813	-0.128
10_1_03	MW-10	Appendix III	Chloride	mg/L	11	10	91%	2021-06-15 to 2023-02-08		Nonparametric	1.03	1.03	1.03	1.03	NA	NA	0	NA	NA
10_1_04	MW-10	Appendix III	Fluoride	mg/L	11	10	91%	2021-06-15 to 2023-02-08		Nonparametric	0.0660	0.0660	0.0660	0.0660	NA	NA	0	NA	NA
10_1_05	MW-10	Appendix III	Sulfate	mg/L	11	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	13.8	14.0	9.00	18.0	2.77	0.201	2.96	-0.267	-0.466
10_1_06	MW-10	Appendix III	Total Dissolved Solids	mg/L	11	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	442	436	376	494	38.2	0.0865	56.3	-0.202	-0.967
10_1_07	MW-10	Appendix III	pH, Field	su	11	0	0%	2021-06-15 to 2023-02-08	Gamma	Gamma	6.75	6.70	6.49	7.30	0.216	0.0320	0.148	1.76	4.20
10_2_04	MW-10	Appendix IV	Fluoride	mg/L	11	10	91%	2021-06-15 to 2023-02-08		Nonparametric	0.0660	0.0660	0.0660	0.0660	NA	NA	0	NA	NA
10_2_10	MW-10	Appendix IV	Barium	mg/L	11	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.0406	0.0410	0.0360	0.0470	0.00364	0.0896	0.00444	0.205	-0.958
10_2_21	MW-10	Appendix IV	Mercury	mg/L	11	10	91%	2021-06-15 to 2023-02-08		Nonparametric	0.000200	0.000200	0.000200	0.000200	NA	NA	0	NA	NA
10_2_24	MW-10	Appendix IV	Radium-226	pCi/L	11	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.642	0.443	0.183	1.59	0.486	0.757	0.367	1.21	0.347
10_2_25	MW-10	Appendix IV	Radium-226/228	pCi/L	10	0	0%	2021-06-15 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.942	0.686	0.262	2.39	0.662	0.702	0.387	1.40	1.52
10_2_26	MW-10	Appendix IV	Radium-228	pCi/L	10	0	0%	2021-06-15 to 2023-02-08	Normal	Normal	0.0780	0.165	-0.994	0.929	0.623	7.99	0.354	-0.717	0.0783
10_3_12	MW-10	Other	Bicarbonate	mg/L	3	0	0%	2022-08-02 to 2023-02-08		Nonparametric	496	522	440	525	48.2	0.0973	4.44	-1.72	NA
10_3_17	MW-10	Other	Hardness	mg/L	3	0	0%	2022-08-02 to 2023-02-08		Nonparametric	434	460	382	461	45.3	0.104	1.48	-1.73	NA
10_3_20	MW-10	Other	Magnesium	mg/L	3	0	0%	2022-08-02 to 2023-02-08		Nonparametric	27.4	29.2	23.6	29.5	3.32	0.121	0.444	-1.72	NA
10_3_23	MW-10	Other	Potassium	mg/L	3	0	0%	2022-08-02 to 2023-02-08		Nonparametric	0.683	0.700	0.620	0.730	0.0569	0.0832	0.0444	-1.21	NA
10_3_28	MW-10	Other	Sodium	mg/L	3	0	0%	2022-08-02 to 2023-02-08		Nonparametric	2.50	2.54	2.24	2.73	0.247	0.0987	0.281	-0.653	NA
10_5_42	MW-10	Part 115	Zinc	mg/L	11	9	82%	2021-06-15 to 2023-02-08		Nonparametric	0.0145	0.0145	0.00900	0.0200	0.00778	0.536	0.00815	NA	NA
13_1_01	MW-13	Appendix III	Boron	mg/L	9	0	0%	2022-02-23 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.174	0.180	0.140	0.220	0.0260	0.149	0.0296	0.245	-0.143

(Table continues on next page)

Table 2: Summary Statistics, Non-Detects Excluded (continued)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Date Range	Distributions Fit	Recommended Distribution	Mean	Median	Minimum	Maximum	SD	CV	MAD/0.675	Skewness	Kurtosis
15_2_10	MW-15	Appendix IV	Barium	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	0.0540	0.0485	0.0420	0.0770	0.0157	0.290	0.00593	1.73	3.20
15_2_19	MW-15	Appendix IV	Lithium	mg/L	4	3	75%	2023-01-12 to 2023-04-28		Nonparametric	0.0140	0.0140	0.0140	0.0140	NA	NA	0	NA	NA
15_2_24	MW-15	Appendix IV	Radium-226	pCi/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	0.574	0.546	0.334	0.868	0.230	0.401	0.219	0.575	-0.526
15_2_25	MW-15	Appendix IV	Radium-226/228	pCi/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	1.31	1.42	0.334	2.06	0.846	0.647	0.883	-0.324	-4.06
15_2_26	MW-15	Appendix IV	Radium-228	pCi/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	0.596	0.621	-0.367	1.51	1.01	1.70	1.26	-0.0216	-5.81
15_2_27	MW-15	Appendix IV	Selenium	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	0.0227	0.0235	0.0100	0.0340	0.0100	0.442	0.00963	-0.408	0.432
15_3_12	MW-15	Other	Bicarbonate	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	356	342	330	410	37.7	0.106	17.8	1.52	1.98
15_3_17	MW-15	Other	Hardness	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	442	445	406	473	31.6	0.0715	34.8	-0.265	-3.76
15_3_20	MW-15	Other	Magnesium	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	34.8	33.1	25.7	47.2	9.14	0.263	6.96	0.981	1.24
15_3_23	MW-15	Other	Potassium	mg/L	4	3	75%	2023-01-12 to 2023-04-28		Nonparametric	0.610	0.610	0.610	0.610	NA	NA	0	NA	NA
15_3_28	MW-15	Other	Sodium	mg/L	4	0	0%	2023-01-12 to 2023-04-28		Nonparametric	32.1	29.9	28.3	40.5	5.63	0.175	1.48	1.87	3.60
15_5_38	MW-15	Part 115	Iron	mg/L	4	1	25%	2023-01-12 to 2023-04-28		Nonparametric	0.0300	0.0300	0.0200	0.0400	0.0100	0.333	0.0148	0.000000000000000159	NA
15_5_42	MW-15	Part 115	Zinc	mg/L	4	3	75%	2023-01-12 to 2023-04-28		Nonparametric	0.0210	0.0210	0.0210	0.0210	NA	NA	0	NA	NA
7B_1_01	MW-7B	Appendix III	Boron	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	3.00	3.00	2.88	3.17	0.0897	0.0299	0.104	0.403	-0.441
7B_1_02	MW-7B	Appendix III	Calcium	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	9.28	9.24	8.24	10.4	0.622	0.0670	0.519	0.410	0.290
7B_1_06	MW-7B	Appendix III	Total Dissolved Solids	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	366	366	356	376	6.05	0.0165	5.93	0.264	-0.0660
7B_1_07	MW-7B	Appendix III	pH, Field	su	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	7.97	8.04	7.73	8.15	0.155	0.0195	0.163	-0.246	-1.68
7B_2_09	MW-7B	Appendix IV	Arsenic	mg/L	11	9	82%	2022-03-09 to 2023-02-08		Nonparametric	0.00250	0.00250	0.00200	0.00300	0.000707	0.283	0.000741	NA	NA
7B_2_10	MW-7B	Appendix IV	Barium	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.00955	0.00900	0.00800	0.0110	0.000934	0.0979	0.00148	0.290	-0.501
7B_2_18	MW-7B	Appendix IV	Lead	mg/L	11	10	91%	2022-03-09 to 2023-02-08		Nonparametric	0.0120	0.0120	0.0120	0.0120	NA	NA	0	NA	NA
7B_2_19	MW-7B	Appendix IV	Lithium	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.0316	0.0320	0.0280	0.0350	0.00196	0.0621	0.00148	-0.249	0.557
7B_2_24	MW-7B	Appendix IV	Radium-226	pCi/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.512	0.463	0.278	0.988	0.182	0.355	0.0844	1.88	5.0
7B_2_25	MW-7B	Appendix IV	Radium-226/228	pCi/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	1.13	1.09	0.378	2.43	0.644	0.569	0.868	0.703	-0.0143
7B_2_26	MW-7B	Appendix IV	Radium-228	pCi/L	11	0	0%	2022-03-09 to 2023-02-08	Normal	Normal	0.528	0.428	-0.879	1.88	0.768	1.45	0.658	0.0447	0.138
7B_3_12	MW-7B	Other	Bicarbonate	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Nonparametric	Nonparametric	394	390	380	418	9.87	0.0250	0	1.31	2.78
7B_3_17	MW-7B	Other	Hardness	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Nonparametric	Nonparametric	33.9	30.0	29.0	51.0	7.01	0.207	1.48	1.67	2.67
7B_3_20	MW-7B	Other	Magnesium	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Normal	Normal	2.82	2.81	2.43	3.00	0.158	0.0561	0.0889	-1.40	3.15
7B_3_23	MW-7B	Other	Potassium	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Nonparametric	Nonparametric	5.54	5.57	4.80	5.85	0.264	0.0477	0.0593	-2.41	7.38
7B_3_28	MW-7B	Other	Sodium	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	134	136	116	142	6.95	0.0517	4.44	-2.01	5.18
7B_5_38	MW-7B	Part 115	Iron	mg/L	11	0	0%	2022-03-09 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.0509	0.0500	0.0300	0.0800	0.0170	0.334	0.0148	0.127	-0.970



Table 3: Goodness-of-Fit Tests, Non-Detects Excluded

Table with 24 columns: ID, Well, Constituent Type, Constituent, Unit, n, No. NDs, % NDs, Normal (S-W, Lilliefors), Lognormal (S-W, Lilliefors), Gamma (K-S, A-D), Log-SD (NDs excl.), ProUCL Distributions Fit, Recommended Distribution.

(Table continues on next page)

Note: p-values above 0.05 suggest a fit to the tested distribution; a distribution passes its GOF test when at least one of the two p-values is above 0.05.



Table 3: Goodness-of-Fit Tests, Non-Detects Excluded (continued)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Normal				Lognormal				Gamma				Log-SD (NDs excl.)	ProUCL Distributions Fit	Recommended Distribution
								S-W		Lilliefors		S-W		Lilliefors		K-S		A-D				
								Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value			
06_2_22	MW-6	Appendix IV	Molybdenum	mg/L	16	0	0%	0.983	0.983	0.101	0.935	0.949	0.481	0.134	0.616	0.117	>= 0.10	0.257	>= 0.10	0.201	Gamma; Lognormal; Normal	Normal
06_2_24	MW-6	Appendix IV	Radium-226	pCi/L	16	0	0%	0.952	0.528	0.129	0.677	NA	NA	NA	NA	NA		NA		NA	Normal	Normal
06_2_25	MW-6	Appendix IV	Radium-226/228	pCi/L	16	0	0%	0.915	0.140	0.190	0.126	NA	NA	NA	NA	NA		NA		NA	Normal	Normal
06_2_26	MW-6	Appendix IV	Radium-228	pCi/L	16	0	0%	0.974	0.896	0.127	0.699	NA	NA	NA	NA	NA		NA		NA	Normal	Normal
06_5_39	MW-6	Part 115	Nickel	mg/L	16	2	12%	0.850	0.022	0.320	0.000	0.832	0.013	0.335	0.000	0.334	< 0.01	1.221	< 0.01	0.124	Nonparametric	Nonparametric
07_1_01	MW-7	Appendix III	Boron	mg/L	10	0	0%	0.942	0.578	0.162	0.648	0.952	0.691	0.177	0.500	0.161	>= 0.10	0.304	>= 0.10	0.206	Gamma; Lognormal; Normal	Normal
07_1_02	MW-7	Appendix III	Calcium	mg/L	10	0	0%	0.893	0.183	0.215	0.210	0.928	0.429	0.203	0.290	0.208	>= 0.10	0.385	>= 0.10	0.117	Gamma; Lognormal; Normal	Normal
07_1_03	MW-7	Appendix III	Chloride	mg/L	10	0	0%	0.661	0.000	0.322	0.004	0.690	0.001	0.318	0.005	0.326	< 0.01	1.354	< 0.01	0.092	Nonparametric	Nonparametric
07_1_05	MW-7	Appendix III	Sulfate	mg/L	10	0	0%	0.848	0.055	0.193	0.359	0.890	0.168	0.169	0.578	0.175	>= 0.10	0.475	>= 0.10	0.114	Gamma; Lognormal; Normal	Normal
07_1_06	MW-7	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	0.737	0.002	0.254	0.066	0.772	0.007	0.247	0.086	0.247	0.05 <= p < 0.10	0.956	0.01 <= p < 0.05	0.085	Gamma; Lognormal; Normal	Normal
07_1_07	MW-7	Appendix III	pH, Field	su	10	0	0%	0.768	0.006	0.314	0.006	0.783	0.009	0.306	0.008	0.306	0.01 <= p < 0.05	0.921	0.01 <= p < 0.05	0.033	Nonparametric	Nonparametric
07_2_09	MW-7	Appendix IV	Arsenic	mg/L	10	0	0%	0.868	0.095	0.297	0.013	0.846	0.052	0.308	0.008	0.320	< 0.01	0.865	0.01 <= p < 0.05	0.187	Lognormal; Normal	Normal
07_2_10	MW-7	Appendix IV	Barium	mg/L	10	0	0%	0.977	0.950	0.150	0.758	0.980	0.965	0.138	0.853	0.134	>= 0.10	0.166	>= 0.10	0.086	Gamma; Lognormal; Normal	Normal
07_2_19	MW-7	Appendix IV	Lithium	mg/L	10	0	0%	0.940	0.556	0.202	0.296	0.916	0.323	0.197	0.333	0.184	>= 0.10	0.425	>= 0.10	0.115	Gamma; Lognormal; Normal	Normal
07_2_22	MW-7	Appendix IV	Molybdenum	mg/L	10	0	0%	0.739	0.003	0.327	0.003	0.700	0.001	0.361	0.001	0.354	< 0.01	1.383	< 0.01	0.245	Nonparametric	Nonparametric
07_2_24	MW-7	Appendix IV	Radium-226	pCi/L	10	0	0%	0.780	0.008	0.283	0.022	0.943	0.582	0.190	0.387	0.229	>= 0.10	0.485	>= 0.10	0.608	Gamma; Lognormal	Gamma
07_2_25	MW-7	Appendix IV	Radium-226/228	pCi/L	10	0	0%	0.925	0.399	0.153	0.728	0.954	0.721	0.130	0.901	0.117	>= 0.10	0.183	>= 0.10	0.700	Gamma; Lognormal; Normal	Normal
07_2_26	MW-7	Appendix IV	Radium-228	pCi/L	10	0	0%	0.963	0.819	0.132	0.891	NA	NA	NA	NA	NA		NA		NA	Normal	Normal
07_5_38	MW-7	Part 115	Iron	mg/L	10	0	0%	0.681	0.001	0.366	0.000	0.809	0.018	0.304	0.009	0.323	< 0.01	0.997	< 0.01	0.270	Nonparametric	Nonparametric
08_1_01	MW-8	Appendix III	Boron	mg/L	10	1	10%	0.788	0.015	0.265	0.069	0.920	0.388	0.245	0.122	0.229	>= 0.10	0.555	>= 0.10	0.470	Gamma; Lognormal; Normal	Normal
08_1_02	MW-8	Appendix III	Calcium	mg/L	10	0	0%	0.988	0.994	0.138	0.852	0.988	0.993	0.142	0.821	0.152	>= 0.10	0.148	>= 0.10	0.055	Gamma; Lognormal; Normal	Normal
08_1_03	MW-8	Appendix III	Chloride	mg/L	10	2	20%	0.736	0.006	0.286	0.054	0.973	0.922	0.148	0.870	0.199	>= 0.10	0.380	>= 0.10	0.775	Gamma; Lognormal; Normal	Normal
08_1_05	MW-8	Appendix III	Sulfate	mg/L	10	0	0%	0.857	0.071	0.268	0.040	0.917	0.335	0.216	0.205	0.245	>= 0.10	0.479	>= 0.10	0.512	Gamma; Lognormal; Normal	Normal
08_1_06	MW-8	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	0.879	0.126	0.230	0.141	0.891	0.175	0.221	0.182	0.224	>= 0.10	0.530	>= 0.10	0.054	Gamma; Lognormal; Normal	Normal
08_1_07	MW-8	Appendix III	pH, Field	su	10	0	0%	0.754	0.004	0.262	0.049	0.766	0.006	0.254	0.066	0.252	0.05 <= p < 0.10	0.877	0.01 <= p < 0.05	0.032	Gamma; Lognormal	Gamma
08_2_10	MW-8	Appendix IV	Barium	mg/L	10	0	0%	0.920	0.353	0.241	0.102	0.943	0.584	0.213	0.225	0.219	>= 0.10	0.375	>= 0.10	0.153	Gamma; Lognormal; Normal	Normal
08_2_24	MW-8	Appendix IV	Radium-226	pCi/L	10	0	0%	0.740	0.003	0.316	0.005	0.914	0.307	0.178	0.494	0.239	>= 0.10	0.676	0.05 <= p < 0.10	0.917	Gamma; Lognormal	Gamma
08_2_25	MW-8	Appendix IV	Radium-226/228	pCi/L	10	0	0%	0.845	0.051	0.238	0.110	0.957	0.751	0.176	0.510	0.209	>= 0.10	0.270	>= 0.10	1.197	Gamma; Lognormal; Normal	Gamma
08_2_26	MW-8	Appendix IV	Radium-228	pCi/L	10	0	0%	0.852	0.062	0.269	0.038	NA	NA	NA	NA	NA		NA		NA	Normal	Normal
09_1_02	MW-9	Appendix III	Calcium	mg/L	10	0	0%	0.840	0.044	0.278	0.028	0.836	0.040	0.277	0.028	0.293	0.01 <= p < 0.05	0.770	0.01 <= p < 0.05	0.093	Nonparametric	Nonparametric
09_1_06	MW-9	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	0.879	0.127	0.244	0.093	0.888	0.161	0.238	0.111	0.246	0.05 <= p < 0.10	0.631	0.05 <= p < 0.10	0.061	Gamma; Lognormal; Normal	Normal
09_1_07	MW-9	Appendix III	pH, Field	su	10	0	0%	0.871	0.103	0.196	0.341	0.878	0.124	0.193	0.363	0.198	>= 0.10	0.490	>= 0.10	0.024	Gamma; Lognormal; Normal	Normal
09_2_10	MW-9	Appendix IV	Barium	mg/L	10	0	0%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		0.063		Nonparametric
09_2_25	MW-9	Appendix IV	Radium-226/228	pCi/L	9	0	0%	0.900	0.254	0.210	0.305	0.889	0.196	0.214	0.276	0.233	>= 0.10	0.399	>= 0.10	0.887	Gamma; Lognormal; Normal	Normal
09_2_26	MW-9	Appendix IV	Radium-228	pCi/L	9	0	0%	0.873	0.133	0.202	0.361	NA	NA	NA	NA	NA		NA		NA	Normal	Normal
10_1_01	MW-10	Appendix III	Boron	mg/L	11	0	0%	0.810	0.013	0.363	0.000	0.825	0.020	0.345	0.001	0.358	< 0.01	1.210	< 0.01	0.144	Nonparametric	Nonparametric
10_1_02	MW-10	Appendix III	Calcium	mg/L	11	0	0%	0.909	0.235	0.187	0.347	0.896	0.166	0.202	0.239	0.189	>= 0.10	0.478	>= 0.10	0.075	Gamma; Lognormal; Normal	Normal
10_1_05	MW-10	Appendix III	Sulfate	mg/L	11	0	0%	0.977	0.948	0.117	0.942	0.953	0.676	0.157	0.635	0.139	>= 0.10	0.218	>= 0.10	0.213	Gamma; Lognormal; Normal	Normal
10_1_06	MW-10	Appendix III	Total Dissolved Solids	mg/L	11	0	0%	0.951	0.652	0.165	0.548	0.949	0.629	0.165	0.549	0.178	>= 0.10	0.295	>= 0.10	0.088	Gamma; Lognormal; Normal	Normal

(Table continues on next page)

Note: p-values above 0.05 suggest a fit to the tested distribution; a distribution passes its GOF test when at least one of the two p-values is above 0.05.

Table 3: Goodness-of-Fit Tests, Non-Detects Excluded (continued)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Normal				Lognormal				Gamma				Log-SD (NDs excl.)	ProUCL Distributions Fit	Recommended Distribution
								S-W		Lilliefors		S-W		Lilliefors		K-S		A-D				
								Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value			
10_1_07	MW-10	Appendix III	pH, Field	su	11	0	0%	0.841	0.032	0.261	0.035	0.854	0.048	0.256	0.043	0.258	0.01 <= p < 0.05	0.667	0.05 <= p < 0.10	0.031	Gamma	Gamma
10_2_10	MW-10	Appendix IV	Barium	mg/L	11	0	0%	0.943	0.558	0.129	0.875	0.942	0.550	0.125	0.904	0.136	>= 0.10	0.296	>= 0.10	0.089	Gamma; Lognormal; Normal	Normal
10_2_24	MW-10	Appendix IV	Radium-226	pCi/L	11	0	0%	0.837	0.029	0.213	0.175	0.950	0.648	0.113	0.958	0.157	>= 0.10	0.338	>= 0.10	0.734	Gamma; Lognormal; Normal	Normal
10_2_25	MW-10	Appendix IV	Radium-226/228	pCi/L	10	0	0%	0.854	0.064	0.242	0.099	0.974	0.921	0.156	0.701	0.197	>= 0.10	0.310	>= 0.10	0.667	Gamma; Lognormal; Normal	Normal
10_2_26	MW-10	Appendix IV	Radium-228	pCi/L	10	0	0%	0.898	0.208	0.229	0.145	NA	NA	NA	NA	NA		NA		NA	Normal	Normal
13_1_01	MW-13	Appendix III	Boron	mg/L	9	0	0%	0.942	0.602	0.193	0.430	0.939	0.570	0.169	0.645	0.171	>= 0.10	0.316	>= 0.10	0.150	Gamma; Lognormal; Normal	Normal
13_1_02	MW-13	Appendix III	Calcium	mg/L	9	0	0%	0.818	0.032	0.257	0.088	0.829	0.044	0.248	0.113	0.257	>= 0.10	0.757	0.01 <= p < 0.05	0.152	Gamma; Lognormal; Normal	Normal
13_1_03	MW-13	Appendix III	Chloride	mg/L	9	2	22%	0.876	0.211	0.257	0.175	0.961	0.828	0.190	0.626	0.222	>= 0.10	0.323	>= 0.10	0.533	Gamma; Lognormal; Normal	Normal
13_1_05	MW-13	Appendix III	Sulfate	mg/L	9	0	0%	0.952	0.710	0.132	0.922	0.951	0.705	0.180	0.547	0.155	>= 0.10	0.234	>= 0.10	0.419	Gamma; Lognormal; Normal	Normal
13_1_06	MW-13	Appendix III	Total Dissolved Solids	mg/L	9	0	0%	0.910	0.315	0.216	0.260	0.927	0.450	0.196	0.408	0.204	>= 0.10	0.383	>= 0.10	0.122	Gamma; Lognormal; Normal	Normal
13_1_07	MW-13	Appendix III	pH, Field	su	9	0	0%	0.946	0.651	0.182	0.526	0.943	0.613	0.186	0.490	0.179	>= 0.10	0.297	>= 0.10	0.022	Gamma; Lognormal; Normal	Normal
13_2_10	MW-13	Appendix IV	Barium	mg/L	9	0	0%	0.886	0.180	0.237	0.153	0.853	0.081	0.253	0.100	0.253	>= 0.10	0.605	>= 0.10	0.127	Gamma; Lognormal; Normal	Normal
13_2_24	MW-13	Appendix IV	Radium-226	pCi/L	9	0	0%	0.912	0.329	0.235	0.162	NA	NA	NA	NA	NA		NA		NA	Normal	Normal
13_2_25	MW-13	Appendix IV	Radium-226/228	pCi/L	8	0	0%	0.818	0.044	0.260	0.113	0.893	0.249	0.197	0.480	0.225	>= 0.10	0.542	>= 0.10	0.989	Gamma; Lognormal; Normal	Normal
13_2_26	MW-13	Appendix IV	Radium-228	pCi/L	9	0	0%	0.900	0.250	0.242	0.132	NA	NA	NA	NA	NA		NA		NA	Normal	Normal
13_3_20	MW-13	Other	Magnesium	mg/L	8	0	0%	0.894	0.254	0.242	0.181	0.917	0.407	0.218	0.317	0.225	>= 0.10	0.378	>= 0.10	0.132	Gamma; Lognormal; Normal	Normal
13_3_23	MW-13	Other	Potassium	mg/L	8	0	0%	0.933	0.539	0.148	0.874	0.921	0.436	0.157	0.811	0.154	>= 0.10	0.310	>= 0.10	0.060	Gamma; Lognormal; Normal	Normal
13_3_28	MW-13	Other	Sodium	mg/L	8	0	0%	0.873	0.161	0.242	0.180	0.850	0.095	0.281	0.063	0.279	0.05 <= p < 0.10	0.596	>= 0.10	0.345	Gamma; Lognormal; Normal	Normal
13_5_38	MW-13	Part 115	Iron	mg/L	9	1	11%	0.876	0.173	0.250	0.149	0.935	0.567	0.163	0.769	0.189	>= 0.10	0.333	>= 0.10	0.490	Gamma; Lognormal; Normal	Normal
7B_1_01	MW-7B	Appendix III	Boron	mg/L	11	0	0%	0.966	0.842	0.115	0.952	0.968	0.863	0.116	0.946	0.127	>= 0.10	0.185	>= 0.10	0.030	Gamma; Lognormal; Normal	Normal
7B_1_02	MW-7B	Appendix III	Calcium	mg/L	11	0	0%	0.938	0.497	0.226	0.120	0.945	0.577	0.214	0.171	0.218	>= 0.10	0.407	>= 0.10	0.067	Gamma; Lognormal; Normal	Normal
7B_1_06	MW-7B	Appendix III	Total Dissolved Solids	mg/L	11	0	0%	0.935	0.460	0.160	0.597	0.936	0.477	0.157	0.626	0.159	>= 0.10	0.385	>= 0.10	0.016	Gamma; Lognormal; Normal	Normal
7B_1_07	MW-7B	Appendix III	pH, Field	su	11	0	0%	0.891	0.143	0.219	0.147	0.891	0.143	0.221	0.138	0.229	>= 0.10	0.570	>= 0.10	0.020	Gamma; Lognormal; Normal	Normal
7B_2_10	MW-7B	Appendix IV	Barium	mg/L	11	0	0%	0.887	0.127	0.266	0.029	0.892	0.147	0.257	0.040	0.269	0.01 <= p < 0.05	0.686	0.05 <= p < 0.10	0.097	Gamma; Lognormal; Normal	Normal
7B_2_19	MW-7B	Appendix IV	Lithium	mg/L	11	0	0%	0.918	0.299	0.245	0.065	0.912	0.260	0.235	0.091	0.234	>= 0.10	0.604	>= 0.10	0.063	Gamma; Lognormal; Normal	Normal
7B_2_24	MW-7B	Appendix IV	Radium-226	pCi/L	11	0	0%	0.818	0.016	0.243	0.069	0.929	0.400	0.186	0.360	0.194	>= 0.10	0.537	>= 0.10	0.315	Gamma; Lognormal; Normal	Normal
7B_2_25	MW-7B	Appendix IV	Radium-226/228	pCi/L	11	0	0%	0.937	0.489	0.121	0.924	0.951	0.658	0.126	0.893	0.136	>= 0.10	0.219	>= 0.10	0.616	Gamma; Lognormal; Normal	Normal
7B_2_26	MW-7B	Appendix IV	Radium-228	pCi/L	11	0	0%	0.979	0.962	0.132	0.853	NA	NA	NA	NA	NA		NA		NA	Normal	Normal
7B_3_12	MW-7B	Other	Bicarbonate	mg/L	11	0	0%	0.821	0.018	0.307	0.005	0.828	0.022	0.306	0.005	0.313	< 0.01	1.000	< 0.01	0.025	Nonparametric	Nonparametric
7B_3_17	MW-7B	Other	Hardness	mg/L	11	0	0%	0.752	0.002	0.297	0.007	0.782	0.005	0.288	0.011	0.299	< 0.01	1.087	< 0.01	0.186	Nonparametric	Nonparametric
7B_3_20	MW-7B	Other	Magnesium	mg/L	11	0	0%	0.862	0.060	0.242	0.070	0.840	0.032	0.256	0.043	0.240	0.05 <= p < 0.10	0.614	>= 0.10	0.058	Gamma; Normal	Normal
7B_3_23	MW-7B	Other	Potassium	mg/L	11	0	0%	0.699	0.000	0.322	0.002	0.675	0.000	0.335	0.001	0.323	< 0.01	1.507	< 0.01	0.050	Nonparametric	Nonparametric
7B_3_28	MW-7B	Other	Sodium	mg/L	11	0	0%	0.809	0.012	0.223	0.131	0.783	0.006	0.238	0.083	0.219	>= 0.10	0.836	0.01 <= p < 0.05	0.054	Gamma; Lognormal; Normal	Normal
7B_5_38	MW-7B	Part 115	Iron	mg/L	11	0	0%	0.921	0.329	0.163	0.567	0.894	0.154	0.186	0.353	0.188	>= 0.10	0.490	>= 0.10	0.354	Gamma; Lognormal; Normal	Normal

Note: p-values above 0.05 suggest a fit to the tested distribution; a distribution passes its GOF test when at least one of the two p-values is above 0.05.



Table 4: Autocorrelation Tests, Non-Detects Excluded

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Autocorrelation	Box-Ljung p-value	Sig.
02_1_01	MW-2	Appendix III	Boron	mg/L	15	0	0%	0.685	0.003	**
02_1_02	MW-2	Appendix III	Calcium	mg/L	15	0	0%	0.700	0.003	**
02_1_03	MW-2	Appendix III	Chloride	mg/L	15	0	0%	0.528	0.024	*
02_1_05	MW-2	Appendix III	Sulfate	mg/L	15	0	0%	0.707	0.003	**
02_1_06	MW-2	Appendix III	Total Dissolved Solids	mg/L	15	0	0%	0.706	0.003	**
02_1_07	MW-2	Appendix III	pH, Field	su	16	0	0%	0.193	0.397	
02_2_09	MW-2	Appendix IV	Arsenic	mg/L	16	13	81%	-0.667	0.068	
02_2_10	MW-2	Appendix IV	Barium	mg/L	16	0	0%	-0.393	0.085	
02_2_19	MW-2	Appendix IV	Lithium	mg/L	16	0	0%	0.637	0.005	**
02_2_22	MW-2	Appendix IV	Molybdenum	mg/L	16	0	0%	0.347	0.129	
02_2_24	MW-2	Appendix IV	Radium-226	pCi/L	16	0	0%	-0.358	0.117	
02_2_25	MW-2	Appendix IV	Radium-226/228	pCi/L	16	0	0%	-0.148	0.515	
02_2_26	MW-2	Appendix IV	Radium-228	pCi/L	16	0	0%	-0.029	0.899	
02_2_30	MW-2	Appendix IV	Total Suspended Solids	mg/L	16	4	25%	0.257	0.314	
02_3_12	MW-2	Other	Bicarbonate	mg/L	2	0	0%	-0.500	0.157	
02_3_17	MW-2	Other	Hardness	mg/L	2	0	0%	-0.500	0.157	
02_3_20	MW-2	Other	Magnesium	mg/L	2	0	0%	-0.500	0.157	
02_3_23	MW-2	Other	Potassium	mg/L	2	0	0%	-0.500	0.157	
02_3_28	MW-2	Other	Sodium	mg/L	2	0	0%	-0.500	0.157	
02_5_38	MW-2	Part 115	Iron	mg/L	16	0	0%	0.266	0.243	
02_5_39	MW-2	Part 115	Nickel	mg/L	16	0	0%	0.603	0.008	**
02_5_42	MW-2	Part 115	Zinc	mg/L	16	13	81%	-0.167	0.648	
03_1_01	MW-3	Appendix III	Boron	mg/L	5	0	0%	-0.671	0.047	*
03_1_02	MW-3	Appendix III	Calcium	mg/L	5	0	0%	-0.502	0.138	
03_1_03	MW-3	Appendix III	Chloride	mg/L	5	0	0%	0.429	0.204	
03_1_05	MW-3	Appendix III	Sulfate	mg/L	5	0	0%	-0.437	0.197	
03_1_06	MW-3	Appendix III	Total Dissolved Solids	mg/L	5	0	0%	0.439	0.194	
03_1_07	MW-3	Appendix III	pH, Field	su	5	0	0%	0.373	0.270	
03_2_09	MW-3	Appendix IV	Arsenic	mg/L	5	0	0%	NA	NA	
03_2_10	MW-3	Appendix IV	Barium	mg/L	5	0	0%	0.500	0.139	
03_2_19	MW-3	Appendix IV	Lithium	mg/L	5	0	0%	-0.133	0.693	
03_2_22	MW-3	Appendix IV	Molybdenum	mg/L	5	0	0%	-0.015	0.966	
03_2_24	MW-3	Appendix IV	Radium-226	pCi/L	5	0	0%	-0.521	0.123	
03_2_25	MW-3	Appendix IV	Radium-226/228	pCi/L	5	0	0%	0.360	0.287	
03_2_26	MW-3	Appendix IV	Radium-228	pCi/L	5	0	0%	0.315	0.352	
03_2_30	MW-3	Appendix IV	Total Suspended Solids	mg/L	5	1	20%	-0.150	0.671	
03_3_12	MW-3	Other	Bicarbonate	mg/L	2	0	0%	-0.500	0.157	
03_3_17	MW-3	Other	Hardness	mg/L	2	0	0%	-0.500	0.157	
03_3_20	MW-3	Other	Magnesium	mg/L	2	0	0%	-0.500	0.157	
03_3_23	MW-3	Other	Potassium	mg/L	2	0	0%	NA	NA	
03_3_28	MW-3	Other	Sodium	mg/L	2	0	0%	-0.500	0.157	
03_5_38	MW-3	Part 115	Iron	mg/L	5	0	0%	-0.116	0.731	

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 4: Autocorrelation Tests, Non-Detects Excluded (*continued*)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Autocorrelation	Box-Ljung p-value	Sig.
05_1_01	MW-5	Appendix III	Boron	mg/L	16	0	0%	0.085	0.711	
05_1_02	MW-5	Appendix III	Calcium	mg/L	16	0	0%	0.436	0.056	
05_1_03	MW-5	Appendix III	Chloride	mg/L	15	0	0%	0.373	0.112	
05_1_05	MW-5	Appendix III	Sulfate	mg/L	15	0	0%	0.368	0.116	
05_1_06	MW-5	Appendix III	Total Dissolved Solids	mg/L	15	0	0%	0.411	0.079	
05_1_07	MW-5	Appendix III	pH, Field	su	17	0	0%	-0.145	0.516	
05_2_09	MW-5	Appendix IV	Arsenic	mg/L	17	12	71%	-0.268	0.428	
05_2_10	MW-5	Appendix IV	Barium	mg/L	17	0	0%	0.299	0.178	
05_2_15	MW-5	Appendix IV	Chromium	mg/L	17	15	88%	-0.500	0.157	
05_2_16	MW-5	Appendix IV	Cobalt	mg/L	17	16	94%	NA	NA	
05_2_18	MW-5	Appendix IV	Lead	mg/L	17	14	82%	-0.273	0.454	
05_2_19	MW-5	Appendix IV	Lithium	mg/L	17	0	0%	0.031	0.891	
05_2_22	MW-5	Appendix IV	Molybdenum	mg/L	17	0	0%	0.108	0.626	
05_2_24	MW-5	Appendix IV	Radium-226	pCi/L	16	0	0%	0.007	0.975	
05_2_25	MW-5	Appendix IV	Radium-226/228	pCi/L	16	0	0%	0.161	0.480	
05_2_26	MW-5	Appendix IV	Radium-228	pCi/L	16	0	0%	-0.058	0.800	
05_2_30	MW-5	Appendix IV	Total Suspended Solids	mg/L	16	0	0%	-0.021	0.928	
05_3_12	MW-5	Other	Bicarbonate	mg/L	2	0	0%	-0.500	0.157	
05_3_17	MW-5	Other	Hardness	mg/L	2	0	0%	-0.500	0.157	
05_3_20	MW-5	Other	Magnesium	mg/L	3	0	0%	-0.087	0.812	
05_3_23	MW-5	Other	Potassium	mg/L	3	0	0%	-0.543	0.137	
05_3_28	MW-5	Other	Sodium	mg/L	3	0	0%	-0.035	0.924	
05_5_37	MW-5	Part 115	Copper	mg/L	17	12	71%	-0.549	0.104	
05_5_38	MW-5	Part 115	Iron	mg/L	17	2	12%	0.028	0.906	
05_5_39	MW-5	Part 115	Nickel	mg/L	17	0	0%	0.484	0.030	*
05_5_41	MW-5	Part 115	Vanadium	mg/L	17	15	88%	-0.500	0.157	
05_5_42	MW-5	Part 115	Zinc	mg/L	17	5	29%	-0.259	0.312	
06_1_01	MW-6	Appendix III	Boron	mg/L	15	0	0%	0.608	0.009	**
06_1_02	MW-6	Appendix III	Calcium	mg/L	15	0	0%	0.390	0.096	
06_1_03	MW-6	Appendix III	Chloride	mg/L	15	0	0%	0.616	0.009	**
06_1_05	MW-6	Appendix III	Sulfate	mg/L	15	0	0%	0.608	0.009	**
06_1_06	MW-6	Appendix III	Total Dissolved Solids	mg/L	15	0	0%	0.585	0.013	*
06_1_07	MW-6	Appendix III	pH, Field	su	16	0	0%	0.011	0.961	
06_2_10	MW-6	Appendix IV	Barium	mg/L	16	0	0%	0.552	0.015	*
06_2_19	MW-6	Appendix IV	Lithium	mg/L	16	0	0%	0.654	0.004	**
06_2_22	MW-6	Appendix IV	Molybdenum	mg/L	16	0	0%	-0.009	0.968	
06_2_24	MW-6	Appendix IV	Radium-226	pCi/L	16	0	0%	-0.200	0.380	
06_2_25	MW-6	Appendix IV	Radium-226/228	pCi/L	16	0	0%	0.259	0.256	
06_2_26	MW-6	Appendix IV	Radium-228	pCi/L	16	0	0%	0.300	0.189	
06_2_30	MW-6	Appendix IV	Total Suspended Solids	mg/L	16	12	75%	-0.099	0.780	
06_3_12	MW-6	Other	Bicarbonate	mg/L	2	0	0%	-0.500	0.157	
06_3_17	MW-6	Other	Hardness	mg/L	2	0	0%	-0.500	0.157	

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 4: Autocorrelation Tests, Non-Detects Excluded (*continued*)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Autocorrelation	Box-Ljung p-value	Sig.
06_3_20	MW-6	Other	Magnesium	mg/L	2	0	0%	-0.500	0.157	
06_3_23	MW-6	Other	Potassium	mg/L	2	0	0%	-0.500	0.157	
06_3_28	MW-6	Other	Sodium	mg/L	2	0	0%	-0.500	0.157	
06_5_38	MW-6	Part 115	Iron	mg/L	16	8	50%	0.285	0.336	
06_5_39	MW-6	Part 115	Nickel	mg/L	16	2	12%	0.114	0.636	
06_5_42	MW-6	Part 115	Zinc	mg/L	16	15	94%	NA	NA	
07_1_01	MW-7	Appendix III	Boron	mg/L	10	0	0%	0.100	0.715	
07_1_02	MW-7	Appendix III	Calcium	mg/L	10	0	0%	0.063	0.819	
07_1_03	MW-7	Appendix III	Chloride	mg/L	10	0	0%	0.199	0.467	
07_1_04	MW-7	Appendix III	Fluoride	mg/L	10	9	90%	NA	NA	
07_1_05	MW-7	Appendix III	Sulfate	mg/L	10	0	0%	0.000	0.999	
07_1_06	MW-7	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	0.070	0.797	
07_1_07	MW-7	Appendix III	pH, Field	su	10	0	0%	-0.116	0.673	
07_2_04	MW-7	Appendix IV	Fluoride	mg/L	10	9	90%	NA	NA	
07_2_09	MW-7	Appendix IV	Arsenic	mg/L	10	0	0%	0.500	0.068	
07_2_10	MW-7	Appendix IV	Barium	mg/L	10	0	0%	-0.031	0.910	
07_2_19	MW-7	Appendix IV	Lithium	mg/L	10	0	0%	0.193	0.482	
07_2_21	MW-7	Appendix IV	Mercury	mg/L	10	9	90%	NA	NA	
07_2_22	MW-7	Appendix IV	Molybdenum	mg/L	10	0	0%	0.431	0.116	
07_2_24	MW-7	Appendix IV	Radium-226	pCi/L	10	0	0%	-0.319	0.244	
07_2_25	MW-7	Appendix IV	Radium-226/228	pCi/L	10	0	0%	-0.374	0.172	
07_2_26	MW-7	Appendix IV	Radium-228	pCi/L	10	0	0%	0.023	0.934	
07_2_30	MW-7	Appendix IV	Total Suspended Solids	mg/L	10	9	90%	NA	NA	
07_3_12	MW-7	Other	Bicarbonate	mg/L	2	0	0%	-0.500	0.157	
07_3_17	MW-7	Other	Hardness	mg/L	2	0	0%	-0.500	0.157	
07_3_20	MW-7	Other	Magnesium	mg/L	2	0	0%	NA	NA	
07_3_23	MW-7	Other	Potassium	mg/L	2	0	0%	-0.500	0.157	
07_3_28	MW-7	Other	Sodium	mg/L	2	0	0%	-0.500	0.157	
07_5_38	MW-7	Part 115	Iron	mg/L	10	0	0%	-0.046	0.865	
07_5_42	MW-7	Part 115	Zinc	mg/L	10	7	70%	-0.667	0.068	
08_1_01	MW-8	Appendix III	Boron	mg/L	10	1	10%	0.035	0.903	
08_1_02	MW-8	Appendix III	Calcium	mg/L	10	0	0%	0.374	0.172	
08_1_03	MW-8	Appendix III	Chloride	mg/L	10	2	20%	-0.268	0.365	
08_1_04	MW-8	Appendix III	Fluoride	mg/L	10	9	90%	NA	NA	
08_1_05	MW-8	Appendix III	Sulfate	mg/L	10	0	0%	-0.030	0.913	
08_1_06	MW-8	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	-0.182	0.506	
08_1_07	MW-8	Appendix III	pH, Field	su	10	0	0%	-0.214	0.435	
08_2_04	MW-8	Appendix IV	Fluoride	mg/L	10	9	90%	NA	NA	
08_2_10	MW-8	Appendix IV	Barium	mg/L	10	0	0%	0.237	0.388	
08_2_19	MW-8	Appendix IV	Lithium	mg/L	10	5	50%	0.300	0.375	
08_2_22	MW-8	Appendix IV	Molybdenum	mg/L	10	8	80%	-0.500	0.157	
08_2_24	MW-8	Appendix IV	Radium-226	pCi/L	10	0	0%	0.443	0.106	

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 4: Autocorrelation Tests, Non-Detects Excluded (*continued*)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Autocorrelation	Box-Ljung p-value	Sig.
08_2_25	MW-8	Appendix IV	Radium-226/228	pCi/L	10	0	0%	0.318	0.245	
08_2_26	MW-8	Appendix IV	Radium-228	pCi/L	10	0	0%	0.097	0.722	
08_2_30	MW-8	Appendix IV	Total Suspended Solids	mg/L	10	9	90%	NA	NA	
08_3_12	MW-8	Other	Bicarbonate	mg/L	2	0	0%	-0.500	0.157	
08_3_17	MW-8	Other	Hardness	mg/L	2	0	0%	-0.500	0.157	
08_3_20	MW-8	Other	Magnesium	mg/L	2	0	0%	-0.500	0.157	
08_3_23	MW-8	Other	Potassium	mg/L	2	0	0%	-0.500	0.157	
08_3_28	MW-8	Other	Sodium	mg/L	2	0	0%	-0.500	0.157	
08_5_38	MW-8	Part 115	Iron	mg/L	10	9	90%	NA	NA	
09_1_02	MW-9	Appendix III	Calcium	mg/L	10	0	0%	0.106	0.699	
09_1_03	MW-9	Appendix III	Chloride	mg/L	10	9	90%	NA	NA	
09_1_04	MW-9	Appendix III	Fluoride	mg/L	10	9	90%	NA	NA	
09_1_05	MW-9	Appendix III	Sulfate	mg/L	10	8	80%	-0.500	0.157	
09_1_06	MW-9	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	0.045	0.870	
09_1_07	MW-9	Appendix III	pH, Field	su	10	0	0%	-0.082	0.764	
09_2_04	MW-9	Appendix IV	Fluoride	mg/L	10	9	90%	NA	NA	
09_2_10	MW-9	Appendix IV	Barium	mg/L	10	0	0%	-0.030	0.912	
09_2_24	MW-9	Appendix IV	Radium-226	pCi/L	7	0	0%	0.122	0.693	
09_2_25	MW-9	Appendix IV	Radium-226/228	pCi/L	9	0	0%	-0.068	0.811	
09_2_26	MW-9	Appendix IV	Radium-228	pCi/L	9	0	0%	0.055	0.847	
09_3_12	MW-9	Other	Bicarbonate	mg/L	2	0	0%	-0.500	0.157	
09_3_17	MW-9	Other	Hardness	mg/L	2	0	0%	-0.500	0.157	
09_3_20	MW-9	Other	Magnesium	mg/L	2	0	0%	-0.500	0.157	
09_3_23	MW-9	Other	Potassium	mg/L	2	0	0%	-0.500	0.157	
09_3_28	MW-9	Other	Sodium	mg/L	2	0	0%	-0.500	0.157	
09_5_42	MW-9	Part 115	Zinc	mg/L	10	9	90%	NA	NA	
10_1_01	MW-10	Appendix III	Boron	mg/L	11	0	0%	-0.144	0.585	
10_1_02	MW-10	Appendix III	Calcium	mg/L	11	0	0%	-0.204	0.441	
10_1_03	MW-10	Appendix III	Chloride	mg/L	11	10	91%	NA	NA	
10_1_04	MW-10	Appendix III	Fluoride	mg/L	11	10	91%	NA	NA	
10_1_05	MW-10	Appendix III	Sulfate	mg/L	11	0	0%	-0.110	0.677	
10_1_06	MW-10	Appendix III	Total Dissolved Solids	mg/L	11	0	0%	0.012	0.963	
10_1_07	MW-10	Appendix III	pH, Field	su	11	0	0%	-0.220	0.405	
10_2_04	MW-10	Appendix IV	Fluoride	mg/L	11	10	91%	NA	NA	
10_2_10	MW-10	Appendix IV	Barium	mg/L	11	0	0%	0.476	0.072	
10_2_21	MW-10	Appendix IV	Mercury	mg/L	11	10	91%	NA	NA	
10_2_24	MW-10	Appendix IV	Radium-226	pCi/L	11	0	0%	0.427	0.107	
10_2_25	MW-10	Appendix IV	Radium-226/228	pCi/L	10	0	0%	0.339	0.216	
10_2_26	MW-10	Appendix IV	Radium-228	pCi/L	10	0	0%	-0.054	0.842	
10_3_12	MW-10	Other	Bicarbonate	mg/L	3	0	0%	-0.185	0.613	
10_3_17	MW-10	Other	Hardness	mg/L	3	0	0%	-0.173	0.636	
10_3_20	MW-10	Other	Magnesium	mg/L	3	0	0%	-0.193	0.596	

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 4: Autocorrelation Tests, Non-Detects Excluded (*continued*)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Autocorrelation	Box-Ljung p-value	Sig.
10_3_23	MW-10	Other	Potassium	mg/L	3	0	0%	-0.620	0.089	
10_3_28	MW-10	Other	Sodium	mg/L	3	0	0%	-0.011	0.976	
10_5_42	MW-10	Part 115	Zinc	mg/L	11	9	82%	-0.500	0.157	
13_1_01	MW-13	Appendix III	Boron	mg/L	9	0	0%	0.517	0.069	
13_1_02	MW-13	Appendix III	Calcium	mg/L	9	0	0%	0.246	0.387	
13_1_03	MW-13	Appendix III	Chloride	mg/L	9	2	22%	0.462	0.134	
13_1_05	MW-13	Appendix III	Sulfate	mg/L	9	0	0%	-0.247	0.386	
13_1_06	MW-13	Appendix III	Total Dissolved Solids	mg/L	9	0	0%	0.172	0.546	
13_1_07	MW-13	Appendix III	pH, Field	su	9	0	0%	0.548	0.054	
13_2_10	MW-13	Appendix IV	Barium	mg/L	9	0	0%	0.354	0.213	
13_2_24	MW-13	Appendix IV	Radium-226	pCi/L	9	0	0%	-0.261	0.359	
13_2_25	MW-13	Appendix IV	Radium-226/228	pCi/L	8	0	0%	0.378	0.201	
13_2_26	MW-13	Appendix IV	Radium-228	pCi/L	9	0	0%	-0.175	0.537	
13_3_12	MW-13	Other	Bicarbonate	mg/L	7	0	0%	0.127	0.681	
13_3_17	MW-13	Other	Hardness	mg/L	7	0	0%	0.165	0.593	
13_3_20	MW-13	Other	Magnesium	mg/L	8	0	0%	-0.011	0.969	
13_3_23	MW-13	Other	Potassium	mg/L	8	0	0%	-0.082	0.781	
13_3_28	MW-13	Other	Sodium	mg/L	8	0	0%	0.436	0.140	
13_5_38	MW-13	Part 115	Iron	mg/L	9	1	11%	-0.267	0.367	
13_5_42	MW-13	Part 115	Zinc	mg/L	9	8	89%	NA	NA	
14_1_01	MW-14	Appendix III	Boron	mg/L	4	0	0%	0.291	0.410	
14_1_02	MW-14	Appendix III	Calcium	mg/L	4	0	0%	-0.028	0.937	
14_1_03	MW-14	Appendix III	Chloride	mg/L	4	0	0%	0.267	0.451	
14_1_05	MW-14	Appendix III	Sulfate	mg/L	4	0	0%	-0.429	0.225	
14_1_06	MW-14	Appendix III	Total Dissolved Solids	mg/L	4	1	25%	-0.590	0.106	
14_1_07	MW-14	Appendix III	pH, Field	su	4	0	0%	-0.743	0.036	*
14_2_09	MW-14	Appendix IV	Arsenic	mg/L	4	0	0%	-0.477	0.177	
14_2_10	MW-14	Appendix IV	Barium	mg/L	4	0	0%	-0.189	0.593	
14_2_19	MW-14	Appendix IV	Lithium	mg/L	4	0	0%	0.308	0.384	
14_2_22	MW-14	Appendix IV	Molybdenum	mg/L	4	0	0%	-0.350	0.322	
14_2_24	MW-14	Appendix IV	Radium-226	pCi/L	3	0	0%	-0.661	0.070	
14_2_25	MW-14	Appendix IV	Radium-226/228	pCi/L	3	0	0%	-0.107	0.769	
14_2_26	MW-14	Appendix IV	Radium-228	pCi/L	3	0	0%	-0.240	0.512	
14_2_30	MW-14	Appendix IV	Total Suspended Solids	mg/L	3	0	0%	-0.088	0.809	
14_3_12	MW-14	Other	Bicarbonate	mg/L	4	0	0%	0.286	0.418	
14_3_17	MW-14	Other	Hardness	mg/L	4	0	0%	-0.242	0.494	
14_3_20	MW-14	Other	Magnesium	mg/L	4	0	0%	0.265	0.453	
14_3_23	MW-14	Other	Potassium	mg/L	4	0	0%	-0.262	0.458	
14_3_28	MW-14	Other	Sodium	mg/L	4	0	0%	0.239	0.499	
14_5_38	MW-14	Part 115	Iron	mg/L	4	0	0%	0.114	0.747	
14_5_39	MW-14	Part 115	Nickel	mg/L	4	2	50%	-0.500	0.157	
15_1_01	MW-15	Appendix III	Boron	mg/L	4	0	0%	0.028	0.937	

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 4: Autocorrelation Tests, Non-Detects Excluded (*continued*)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Autocorrelation	Box-Ljung p-value	Sig.
15_1_02	MW-15	Appendix III	Calcium	mg/L	4	0	0%	0.189	0.592	
15_1_03	MW-15	Appendix III	Chloride	mg/L	4	0	0%	0.232	0.512	
15_1_05	MW-15	Appendix III	Sulfate	mg/L	4	0	0%	0.019	0.957	
15_1_06	MW-15	Appendix III	Total Dissolved Solids	mg/L	4	0	0%	-0.254	0.473	
15_1_07	MW-15	Appendix III	pH, Field	su	4	0	0%	-0.577	0.102	
15_2_10	MW-15	Appendix IV	Barium	mg/L	4	0	0%	0.027	0.939	
15_2_19	MW-15	Appendix IV	Lithium	mg/L	4	3	75%	NA	NA	
15_2_24	MW-15	Appendix IV	Radium-226	pCi/L	4	0	0%	-0.729	0.039	*
15_2_25	MW-15	Appendix IV	Radium-226/228	pCi/L	4	0	0%	-0.277	0.433	
15_2_26	MW-15	Appendix IV	Radium-228	pCi/L	4	0	0%	-0.249	0.482	
15_2_27	MW-15	Appendix IV	Selenium	mg/L	4	0	0%	-0.081	0.819	
15_3_12	MW-15	Other	Bicarbonate	mg/L	4	0	0%	0.145	0.681	
15_3_17	MW-15	Other	Hardness	mg/L	4	0	0%	0.253	0.474	
15_3_20	MW-15	Other	Magnesium	mg/L	4	0	0%	0.145	0.683	
15_3_23	MW-15	Other	Potassium	mg/L	4	3	75%	NA	NA	
15_3_28	MW-15	Other	Sodium	mg/L	4	0	0%	-0.004	0.992	
15_5_38	MW-15	Part 115	Iron	mg/L	4	1	25%	-0.500	0.171	
15_5_42	MW-15	Part 115	Zinc	mg/L	4	3	75%	NA	NA	
7B_1_01	MW-7B	Appendix III	Boron	mg/L	11	0	0%	-0.080	0.763	
7B_1_02	MW-7B	Appendix III	Calcium	mg/L	11	0	0%	0.405	0.126	
7B_1_06	MW-7B	Appendix III	Total Dissolved Solids	mg/L	11	0	0%	-0.674	0.011	*
7B_1_07	MW-7B	Appendix III	pH, Field	su	11	0	0%	0.369	0.163	
7B_2_09	MW-7B	Appendix IV	Arsenic	mg/L	11	9	82%	-0.500	0.157	
7B_2_10	MW-7B	Appendix IV	Barium	mg/L	11	0	0%	0.226	0.392	
7B_2_18	MW-7B	Appendix IV	Lead	mg/L	11	10	91%	NA	NA	
7B_2_19	MW-7B	Appendix IV	Lithium	mg/L	11	0	0%	0.199	0.451	
7B_2_24	MW-7B	Appendix IV	Radium-226	pCi/L	11	0	0%	-0.213	0.420	
7B_2_25	MW-7B	Appendix IV	Radium-226/228	pCi/L	11	0	0%	-0.458	0.083	
7B_2_26	MW-7B	Appendix IV	Radium-228	pCi/L	11	0	0%	-0.439	0.097	
7B_3_12	MW-7B	Other	Bicarbonate	mg/L	11	0	0%	0.178	0.500	
7B_3_17	MW-7B	Other	Hardness	mg/L	11	0	0%	0.244	0.355	
7B_3_20	MW-7B	Other	Magnesium	mg/L	11	0	0%	0.226	0.393	
7B_3_23	MW-7B	Other	Potassium	mg/L	11	0	0%	-0.019	0.941	
7B_3_28	MW-7B	Other	Sodium	mg/L	11	0	0%	0.179	0.497	
7B_5_38	MW-7B	Part 115	Iron	mg/L	11	0	0%	0.528	0.046	*

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 5: Outlier Counts by Date

Date	Count
2020-04-28	2
2020-05-26	1
2020-11-06	1
2021-01-27	1
2021-05-04	1
2021-06-15	2
2021-08-24	1
2021-09-28	1
2021-12-07	1
2022-02-01	3
2022-02-17	2
2022-05-19	1
2022-08-02	1
2022-10-06	1
2023-02-08	2
2023-03-24	1

Table 6: Outliers Identified at the 1% Significance Level, Non-Detects Excluded

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	No. Detects	Date	Value
02_2_09	MW-2	Appendix IV	Arsenic	mg/L	16	13	81%	3	2022-02-01	0.00400
02_5_38	MW-2	Part 115	Iron	mg/L	16	0	0%	16	2022-02-01	1.93
02_5_42	MW-2	Part 115	Zinc	mg/L	16	13	81%	3	2020-05-26	0.0410
05_1_01	MW-5	Appendix III	Boron	mg/L	16	0	0%	16	2022-02-01	0.370
05_1_07	MW-5	Appendix III	pH, Field	su	17	0	0%	17	2021-05-04	6.40
05_2_24	MW-5	Appendix IV	Radium-226	pCi/L	16	0	0%	16	2020-11-06	3.30
05_2_30	MW-5	Appendix IV	Total Suspended Solids	mg/L	16	0	0%	16	2020-04-28	161
05_5_38	MW-5	Part 115	Iron	mg/L	17	2	12%	15	2020-04-28	8.00
05_5_42	MW-5	Part 115	Zinc	mg/L	17	5	29%	12	2021-01-27	0.0980
07_1_03	MW-7	Appendix III	Chloride	mg/L	10	0	0%	10	2022-08-02	98.0
07_1_06	MW-7	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	10	2022-02-17	758
07_1_07	MW-7	Appendix III	pH, Field	su	10	0	0%	10	2021-06-15	8.18
07_2_24	MW-7	Appendix IV	Radium-226	pCi/L	10	0	0%	10	2021-12-07	2.64
07_5_38	MW-7	Part 115	Iron	mg/L	10	0	0%	10	2022-02-17	2.81
07_5_42	MW-7	Part 115	Zinc	mg/L	10	7	70%	3	2021-08-24	0.0140
08_1_03	MW-8	Appendix III	Chloride	mg/L	10	2	20%	8	2021-09-28	59.0
08_1_07	MW-8	Appendix III	pH, Field	su	10	0	0%	10	2021-06-15	7.78
13_3_12	MW-13	Other	Bicarbonate	mg/L	7	0	0%	7	2023-02-08	437
13_3_17	MW-13	Other	Hardness	mg/L	7	0	0%	7	2023-02-08	444
14_1_05	MW-14	Appendix III	Sulfate	mg/L	4	0	0%	4	2023-03-24	748
7B_2_24	MW-7B	Appendix IV	Radium-226	pCi/L	11	0	0%	11	2022-10-06	0.988

(Table continues on next page)

Table 6: Outliers Identified at the 1% Significance Level, Non-Detects Excluded (*continued*)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	No. Detects	Date	Value
7B_3_23	MW-7B	Other	Potassium	mg/L	11	0	0%	11	2022-05-19	4.80



Table 7: Seasonality Tests

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full											Without Non-Detects										
						Sample Size					p-Value						Sample Size					p-Value					
						Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA						
02_1_01	MW-2	Appendix III	Boron	mg/L	0%	3	3	5	4	15	0.043	*	0.012	*	0.012	*	3	3	5	4	15	0.043	*	0.012	*	0.012	*
02_1_02	MW-2	Appendix III	Calcium	mg/L	0%	3	3	5	4	15	0.194		0.278		0.293		3	3	5	4	15	0.194		0.278		0.293	
02_1_03	MW-2	Appendix III	Chloride	mg/L	0%	3	3	5	4	15	0.015	*	0.001	***	0.001	***	3	3	5	4	15	0.015	*	0.001	***	0.001	***
02_1_04	MW-2	Appendix III	Fluoride	mg/L	100%	3	3	5	4	15	NA		0.277		NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
02_1_05	MW-2	Appendix III	Sulfate	mg/L	0%	3	3	5	4	15	0.063		0.071		0.103		3	3	5	4	15	0.063		0.071		0.103	
02_1_06	MW-2	Appendix III	Total Dissolved Solids	mg/L	0%	3	3	5	4	15	0.084		0.103		0.131		3	3	5	4	15	0.084		0.103		0.131	
02_1_07	MW-2	Appendix III	pH, Field	su	0%	3	3	5	5	16	0.458		0.313		0.309		3	3	5	5	16	0.458		0.313		0.309	
02_2_04	MW-2	Appendix IV	Fluoride	mg/L	100%	3	3	5	5	16	NA		NA		NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
02_2_08	MW-2	Appendix IV	Antimony	mg/L	100%	3	3	5	5	16	NA		0.236		0.236		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
02_2_09	MW-2	Appendix IV	Arsenic	mg/L	81%	3	3	5	5	16	0.228		0.236		0.236		2	0	0	1	3	0.480		0.667		0.667	
02_2_10	MW-2	Appendix IV	Barium	mg/L	0%	3	3	5	5	16	0.964		0.959		0.977		3	3	5	5	16	0.964		0.959		0.977	
02_2_11	MW-2	Appendix IV	Beryllium	mg/L	100%	3	3	5	5	16	NA		0.236		NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
02_2_13	MW-2	Appendix IV	Cadmium	mg/L	100%	3	3	5	5	16	NA		0.236		NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
02_2_15	MW-2	Appendix IV	Chromium	mg/L	100%	3	3	5	5	16	NA		0.236		0.236		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
02_2_16	MW-2	Appendix IV	Cobalt	mg/L	100%	3	3	5	5	16	NA		0.236		0.236		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
02_2_18	MW-2	Appendix IV	Lead	mg/L	100%	3	3	5	5	16	NA		0.236		0.236		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
02_2_19	MW-2	Appendix IV	Lithium	mg/L	0%	3	3	5	5	16	0.047	*	0.015	*	0.020	*	3	3	5	5	16	0.047	*	0.015	*	0.020	*
02_2_21	MW-2	Appendix IV	Mercury	mg/L	100%	3	3	5	5	16	NA		0.236		0.236		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
02_2_22	MW-2	Appendix IV	Molybdenum	mg/L	0%	3	3	5	5	16	0.134		0.169		0.170		3	3	5	5	16	0.134		0.169		0.170	
02_2_24	MW-2	Appendix IV	Radium-226	pCi/L	0%	3	3	5	5	16	0.933		0.948		0.982		3	3	5	5	16	0.933		0.948		0.982	
02_2_25	MW-2	Appendix IV	Radium-226/228	pCi/L	0%	3	3	5	5	16	0.946		0.848		0.972		3	3	5	5	16	0.946		0.848		0.972	
02_2_26	MW-2	Appendix IV	Radium-228	pCi/L	0%	3	3	5	5	16	0.743		0.887		NA		3	3	5	5	16	0.743		0.887		NA	
02_2_27	MW-2	Appendix IV	Selenium	mg/L	100%	3	3	5	5	16	NA		0.236		0.236		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
02_2_29	MW-2	Appendix IV	Thallium	mg/L	100%	3	3	5	5	16	NA		0.236		0.236		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
02_2_30	MW-2	Appendix IV	Total Suspended Solids	mg/L	25%	3	3	5	5	16	0.161		0.133		0.158		3	2	3	4	12	0.133		0.106		0.145	
02_3_12	MW-2	Other	Bicarbonate	mg/L	0%	1	0	1	0	2	0.317		NA		NA		1	0	1	0	2	0.317		NA		NA	
02_3_14	MW-2	Other	Carbonate	mg/L	100%	1	0	1	0	2	NA		NA		NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
02_3_17	MW-2	Other	Hardness	mg/L	0%	1	0	1	0	2	0.317		NA		NA		1	0	1	0	2	0.317		NA		NA	
02_3_20	MW-2	Other	Magnesium	mg/L	0%	1	0	1	0	2	0.317		NA		NA		1	0	1	0	2	0.317		NA		NA	
02_3_23	MW-2	Other	Potassium	mg/L	0%	1	0	1	0	2	0.317		NA		NA		1	0	1	0	2	0.317		NA		NA	
02_3_28	MW-2	Other	Sodium	mg/L	0%	1	0	1	0	2	0.317		NA		NA		1	0	1	0	2	0.317		NA		NA	
02_5_37	MW-2	Part 115	Copper	mg/L	100%	3	3	5	5	16	NA		0.236		0.236		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
02_5_38	MW-2	Part 115	Iron	mg/L	0%	3	3	5	5	16	0.470		0.073		0.139		3	3	5	5	16	0.470		0.073		0.139	
02_5_39	MW-2	Part 115	Nickel	mg/L	0%	3	3	5	5	16	0.012	*	0.039	*	0.052		3	3	5	5	16	0.012	*	0.039	*	0.052	
02_5_40	MW-2	Part 115	Silver	mg/L	100%	3	3	5	5	16	NA		0.236		NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
02_5_41	MW-2	Part 115	Vanadium	mg/L	100%	3	3	5	5	16	NA		0.236		0.236		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
02_5_42	MW-2	Part 115	Zinc	mg/L	81%	3	3	5	5	16	0.572		0.256		0.304		1	1	1	0	3	0.368		NA		NA	
03_1_01	MW-3	Appendix III	Boron	mg/L	0%	2	1	2	0	5	0.165		0.109		0.101		2	1	2	0	5	0.165		0.109		0.101	
03_1_02	MW-3	Appendix III	Calcium	mg/L	0%	2	1	2	0	5	0.165		0.328		0.338		2	1	2	0	5	0.165		0.328		0.338	

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 7: Seasonality Tests (continued)

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full						Without Non-Detects															
						Sample Size					p-Value			Sample Size					p-Value								
						Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA						
03_1_03	MW-3	Appendix III	Chloride	mg/L	0%	2	1	2	0	5	0.301	0.561	0.546	2	1	2	0	5	0.301	0.561	0.546						
03_1_04	MW-3	Appendix III	Fluoride	mg/L	100%	2	1	2	0	5	NA	0.000	***	NA	NA	NA	NA	NA	NA	NA	NA	NA					
03_1_05	MW-3	Appendix III	Sulfate	mg/L	0%	2	1	2	0	5	0.623	0.844	0.843	2	1	2	0	5	0.623	0.844	0.843						
03_1_06	MW-3	Appendix III	Total Dissolved Solids	mg/L	0%	2	1	2	0	5	0.741	0.840	0.840	2	1	2	0	5	0.741	0.840	0.840						
03_1_07	MW-3	Appendix III	pH, Field	su	0%	2	1	2	0	5	0.497	0.746	0.746	2	1	2	0	5	0.497	0.746	0.746						
03_2_04	MW-3	Appendix IV	Fluoride	mg/L	100%	2	1	2	0	5	NA	0.000	***	NA	NA	NA	NA	NA	NA	NA	NA	NA					
03_2_08	MW-3	Appendix IV	Antimony	mg/L	100%	2	1	2	0	5	NA	0.000	***	0.000	***	NA	NA	NA	NA	NA	NA	NA					
03_2_09	MW-3	Appendix IV	Arsenic	mg/L	0%	2	1	2	0	5	NA	0.000	***	NA	2	1	2	0	5	NA	0.000	***	NA				
03_2_10	MW-3	Appendix IV	Barium	mg/L	0%	2	1	2	0	5	0.472	0.625	0.631	2	1	2	0	5	0.472	0.625	0.631						
03_2_11	MW-3	Appendix IV	Beryllium	mg/L	100%	2	1	2	0	5	NA	NA	0.000	***	NA	NA	NA	NA	NA	NA	NA	NA					
03_2_13	MW-3	Appendix IV	Cadmium	mg/L	100%	2	1	2	0	5	NA	NA	0.000	***	NA	NA	NA	NA	NA	NA	NA	NA					
03_2_15	MW-3	Appendix IV	Chromium	mg/L	100%	2	1	2	0	5	NA	0.000	***	0.000	***	NA	NA	NA	NA	NA	NA	NA					
03_2_16	MW-3	Appendix IV	Cobalt	mg/L	100%	2	1	2	0	5	NA	0.000	***	0.000	***	NA	NA	NA	NA	NA	NA	NA					
03_2_18	MW-3	Appendix IV	Lead	mg/L	100%	2	1	2	0	5	NA	0.000	***	NA	NA	NA	NA	NA	NA	NA	NA	NA					
03_2_19	MW-3	Appendix IV	Lithium	mg/L	0%	2	1	2	0	5	0.217	0.188	0.175	2	1	2	0	5	0.217	0.188	0.175						
03_2_21	MW-3	Appendix IV	Mercury	mg/L	100%	2	1	2	0	5	NA	NA	0.000	***	NA	NA	NA	NA	NA	NA	NA	NA					
03_2_22	MW-3	Appendix IV	Molybdenum	mg/L	0%	2	1	2	0	5	0.191	0.449	0.443	2	1	2	0	5	0.191	0.449	0.443						
03_2_24	MW-3	Appendix IV	Radium-226	pCi/L	0%	2	1	2	0	5	0.165	0.179	0.309	2	1	2	0	5	0.165	0.179	0.309						
03_2_25	MW-3	Appendix IV	Radium-226/228	pCi/L	0%	2	1	2	0	5	0.741	0.667	0.623	2	1	2	0	5	0.741	0.667	0.623						
03_2_26	MW-3	Appendix IV	Radium-228	pCi/L	0%	2	1	2	0	5	0.368	0.623	0.497	2	1	2	0	5	0.368	0.623	0.497						
03_2_27	MW-3	Appendix IV	Selenium	mg/L	100%	2	1	2	0	5	NA	0.000	***	0.000	***	NA	NA	NA	NA	NA	NA	NA					
03_2_29	MW-3	Appendix IV	Thallium	mg/L	100%	2	1	2	0	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA					
03_2_30	MW-3	Appendix IV	Total Suspended Solids	mg/L	20%	2	1	2	0	5	0.924	0.962	0.901	1	1	2	0	4	0.861	0.949	0.941						
03_3_12	MW-3	Other	Bicarbonate	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA						
03_3_14	MW-3	Other	Carbonate	mg/L	100%	1	0	1	0	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA					
03_3_17	MW-3	Other	Hardness	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA						
03_3_20	MW-3	Other	Magnesium	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA						
03_3_23	MW-3	Other	Potassium	mg/L	0%	1	0	1	0	2	NA	NA	NA	1	0	1	0	2	NA	NA	NA						
03_3_28	MW-3	Other	Sodium	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA						
03_5_37	MW-3	Part 115	Copper	mg/L	100%	2	1	2	0	5	NA	0.000	***	0.000	***	NA	NA	NA	NA	NA	NA	NA					
03_5_38	MW-3	Part 115	Iron	mg/L	0%	2	1	2	0	5	1.000	0.854	0.845	2	1	2	0	5	1.000	0.854	0.845						
03_5_39	MW-3	Part 115	Nickel	mg/L	100%	2	1	2	0	5	NA	0.000	***	0.000	***	NA	NA	NA	NA	NA	NA	NA					
03_5_40	MW-3	Part 115	Silver	mg/L	100%	2	1	2	0	5	NA	NA	0.000	***	NA	NA	NA	NA	NA	NA	NA	NA					
03_5_41	MW-3	Part 115	Vanadium	mg/L	100%	2	1	2	0	5	NA	0.000	***	0.000	***	NA	NA	NA	NA	NA	NA	NA					
03_5_42	MW-3	Part 115	Zinc	mg/L	100%	2	1	2	0	5	NA	0.000	***	0.000	***	NA	NA	NA	NA	NA	NA	NA					
05_1_01	MW-5	Appendix III	Boron	mg/L	0%	4	3	5	4	16	0.023	*	0.039	*	0.175	4	3	5	4	16	0.023	*	0.039	*	0.175		
05_1_02	MW-5	Appendix III	Calcium	mg/L	0%	4	3	5	4	16	0.037	*	0.015	*	0.037	*	4	3	5	4	16	0.037	*	0.015	*	0.037	*
05_1_03	MW-5	Appendix III	Chloride	mg/L	0%	3	3	5	4	15	0.033	*	0.005	**	0.007	**	3	3	5	4	15	0.033	*	0.005	**	0.007	**
05_1_04	MW-5	Appendix III	Fluoride	mg/L	100%	3	3	5	4	15	NA	0.277	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05



Table 7: Seasonality Tests (continued)

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full										Without Non-Detects											
						Sample Size					p-Value					Sample Size					p-Value						
						Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA						
05_1_05	MW-5	Appendix III	Sulfate	mg/L	0%	3	3	5	4	15	0.029	*	0.008	**	0.009	**	3	3	5	4	15	0.029	*	0.008	**	0.009	**
05_1_06	MW-5	Appendix III	Total Dissolved Solids	mg/L	0%	3	3	5	4	15	0.038	*	0.008	**	0.009	**	3	3	5	4	15	0.038	*	0.008	**	0.009	**
05_1_07	MW-5	Appendix III	pH, Field	su	0%	4	3	5	5	17	0.387		0.372		0.367		4	3	5	5	17	0.387		0.372		0.367	
05_2_04	MW-5	Appendix IV	Fluoride	mg/L	100%	3	3	5	5	16	NA		NA		NA		NA	NA	NA	NA	NA	NA		NA		NA	
05_2_08	MW-5	Appendix IV	Antimony	mg/L	100%	4	3	5	5	17	NA		NA		0.200		NA	NA	NA	NA	NA	NA		NA		NA	
05_2_09	MW-5	Appendix IV	Arsenic	mg/L	71%	4	3	5	5	17	0.628		0.518		0.552		1	3	1	0	5	0.325		0.319		0.449	
05_2_10	MW-5	Appendix IV	Barium	mg/L	0%	4	3	5	5	17	0.455		0.319		0.375		4	3	5	5	17	0.455		0.319		0.375	
05_2_11	MW-5	Appendix IV	Beryllium	mg/L	100%	4	3	5	5	17	NA		NA		0.200		NA	NA	NA	NA	NA	NA		NA		NA	
05_2_13	MW-5	Appendix IV	Cadmium	mg/L	100%	4	3	5	5	17	NA		NA		NA		NA	NA	NA	NA	NA	NA		NA		NA	
05_2_15	MW-5	Appendix IV	Chromium	mg/L	88%	4	3	5	5	17	0.355		0.281		0.302		1	1	0	0	2	0.317		NA		NA	
05_2_16	MW-5	Appendix IV	Cobalt	mg/L	94%	4	3	5	5	17	0.198		0.200		0.200		0	1	0	0	1	NA		NA		NA	
05_2_18	MW-5	Appendix IV	Lead	mg/L	82%	4	3	5	5	17	0.381		0.422		0.441		1	1	1	0	3	0.368		NA		NA	
05_2_19	MW-5	Appendix IV	Lithium	mg/L	0%	4	3	5	5	17	0.727		0.837		0.755		4	3	5	5	17	0.727		0.837		0.755	
05_2_21	MW-5	Appendix IV	Mercury	mg/L	100%	4	3	5	5	17	NA		0.200		0.200		NA	NA	NA	NA	NA	NA		NA		NA	
05_2_22	MW-5	Appendix IV	Molybdenum	mg/L	0%	4	3	5	5	17	0.249		0.211		0.359		4	3	5	5	17	0.249		0.211		0.359	
05_2_24	MW-5	Appendix IV	Radium-226	pCi/L	0%	3	3	5	5	16	0.246		0.369		0.176		3	3	5	5	16	0.246		0.369		0.176	
05_2_25	MW-5	Appendix IV	Radium-226/228	pCi/L	0%	3	3	5	5	16	0.097		0.147		0.086		3	3	5	5	16	0.097		0.147		0.086	
05_2_26	MW-5	Appendix IV	Radium-228	pCi/L	0%	3	3	5	5	16	0.115		0.044	*	NA		3	3	5	5	16	0.115		0.044	*	NA	
05_2_27	MW-5	Appendix IV	Selenium	mg/L	100%	4	3	5	5	17	NA		NA		0.200		NA	NA	NA	NA	NA	NA		NA		NA	
05_2_29	MW-5	Appendix IV	Thallium	mg/L	100%	4	3	5	5	17	NA		NA		0.200		NA	NA	NA	NA	NA	NA		NA		NA	
05_2_30	MW-5	Appendix IV	Total Suspended Solids	mg/L	0%	3	3	5	5	16	0.491		0.449		0.630		3	3	5	5	16	0.491		0.449		0.630	
05_3_12	MW-5	Other	Bicarbonate	mg/L	0%	1	0	1	0	2	0.317		NA		NA		1	0	1	0	2	0.317		NA		NA	
05_3_14	MW-5	Other	Carbonate	mg/L	100%	1	0	1	0	2	NA		NA		NA		NA	NA	NA	NA	NA	NA		NA		NA	
05_3_17	MW-5	Other	Hardness	mg/L	0%	1	0	1	0	2	0.317		NA		NA		1	0	1	0	2	0.317		NA		NA	
05_3_20	MW-5	Other	Magnesium	mg/L	0%	2	0	1	0	3	0.221		0.098		0.113		2	0	1	0	3	0.221		0.098		0.113	
05_3_23	MW-5	Other	Potassium	mg/L	0%	2	0	1	0	3	0.221		0.383		0.368		2	0	1	0	3	0.221		0.383		0.368	
05_3_28	MW-5	Other	Sodium	mg/L	0%	2	0	1	0	3	0.221		0.186		0.208		2	0	1	0	3	0.221		0.186		0.208	
05_5_37	MW-5	Part 115	Copper	mg/L	71%	4	3	5	5	17	0.992		0.863		0.951		1	1	2	1	5	0.849		0.952		0.964	
05_5_38	MW-5	Part 115	Iron	mg/L	12%	4	3	5	5	17	0.119		0.203		0.192		3	3	5	4	15	0.146		0.272		0.148	
05_5_39	MW-5	Part 115	Nickel	mg/L	0%	4	3	5	5	17	0.055		0.036	*	0.023	*	4	3	5	5	17	0.055		0.036	*	0.023	*
05_5_40	MW-5	Part 115	Silver	mg/L	100%	4	3	5	5	17	NA		NA		NA		NA	NA	NA	NA	NA	NA		NA		NA	
05_5_41	MW-5	Part 115	Vanadium	mg/L	88%	4	3	5	5	17	0.355		0.322		0.343		1	1	0	0	2	0.317		NA		NA	
05_5_42	MW-5	Part 115	Zinc	mg/L	29%	4	3	5	5	17	0.549		0.217		0.370		3	2	5	2	12	0.438		0.215		0.331	
06_1_01	MW-6	Appendix III	Boron	mg/L	0%	3	3	5	4	15	0.011	*	0.000	***	0.000	***	3	3	5	4	15	0.011	*	0.000	***	0.000	***
06_1_02	MW-6	Appendix III	Calcium	mg/L	0%	3	3	5	4	15	0.019	*	0.003	**	0.003	**	3	3	5	4	15	0.019	*	0.003	**	0.003	**
06_1_03	MW-6	Appendix III	Chloride	mg/L	0%	3	3	5	4	15	0.017	*	0.004	**	0.004	**	3	3	5	4	15	0.017	*	0.004	**	0.004	**
06_1_04	MW-6	Appendix III	Fluoride	mg/L	100%	3	3	5	4	15	NA		0.277		NA		NA	NA	NA	NA	NA	NA		NA		NA	
06_1_05	MW-6	Appendix III	Sulfate	mg/L	0%	3	3	5	4	15	0.025	*	0.004	**	0.005	**	3	3	5	4	15	0.025	*	0.004	**	0.005	**
06_1_06	MW-6	Appendix III	Total Dissolved Solids	mg/L	0%	3	3	5	4	15	0.011	*	0.001	***	0.001	***	3	3	5	4	15	0.011	*	0.001	***	0.001	***

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 7: Seasonality Tests (continued)

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full							Without Non-Detects														
						Sample Size					p-Value		Sample Size					p-Value									
						Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA						
06_1_07	MW-6	Appendix III	pH, Field	su	0%	3	3	5	5	16	0.628	0.620	0.613	3	3	5	5	16	0.628	0.620	0.613						
06_2_04	MW-6	Appendix IV	Fluoride	mg/L	100%	3	3	5	5	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA						
06_2_08	MW-6	Appendix IV	Antimony	mg/L	100%	3	3	5	5	16	NA	0.236	0.236	NA	NA	NA	NA	NA	NA	NA	NA						
06_2_09	MW-6	Appendix IV	Arsenic	mg/L	100%	3	3	5	5	16	NA	0.236	0.236	NA	NA	NA	NA	NA	NA	NA	NA						
06_2_10	MW-6	Appendix IV	Barium	mg/L	0%	3	3	5	5	16	0.023	*	0.010	**	0.012	*	3	3	5	5	16	0.023	*	0.010	**	0.012	*
06_2_11	MW-6	Appendix IV	Beryllium	mg/L	100%	3	3	5	5	16	NA	0.236	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06_2_13	MW-6	Appendix IV	Cadmium	mg/L	100%	3	3	5	5	16	NA	0.236	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06_2_15	MW-6	Appendix IV	Chromium	mg/L	100%	3	3	5	5	16	NA	0.236	0.236	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06_2_16	MW-6	Appendix IV	Cobalt	mg/L	100%	3	3	5	5	16	NA	0.236	0.236	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06_2_18	MW-6	Appendix IV	Lead	mg/L	100%	3	3	5	5	16	NA	0.236	0.236	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06_2_19	MW-6	Appendix IV	Lithium	mg/L	0%	3	3	5	5	16	0.017	*	0.002	**	0.003	**	3	3	5	5	16	0.017	*	0.002	**	0.003	**
06_2_21	MW-6	Appendix IV	Mercury	mg/L	100%	3	3	5	5	16	NA	0.236	0.236	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06_2_22	MW-6	Appendix IV	Molybdenum	mg/L	0%	3	3	5	5	16	0.085	0.106	0.125	3	3	5	5	16	0.085	0.106	0.125						
06_2_24	MW-6	Appendix IV	Radium-226	pCi/L	0%	3	3	5	5	16	0.043	*	0.037	*	NA		3	3	5	5	16	0.043	*	0.037	*	NA	
06_2_25	MW-6	Appendix IV	Radium-226/228	pCi/L	0%	3	3	5	5	16	0.201	0.125	NA	3	3	5	5	16	0.201	0.125	NA						
06_2_26	MW-6	Appendix IV	Radium-228	pCi/L	0%	3	3	5	5	16	0.706	0.776	NA	3	3	5	5	16	0.706	0.776	NA						
06_2_27	MW-6	Appendix IV	Selenium	mg/L	100%	3	3	5	5	16	NA	0.236	0.236	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06_2_29	MW-6	Appendix IV	Thallium	mg/L	100%	3	3	5	5	16	NA	0.236	0.236	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
06_2_30	MW-6	Appendix IV	Total Suspended Solids	mg/L	75%	3	3	5	5	16	0.261	0.236	0.226	1	1	1	1	4	0.392	NA	NA						
06_3_12	MW-6	Other	Bicarbonate	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA						
06_3_14	MW-6	Other	Carbonate	mg/L	100%	1	0	1	0	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA						
06_3_17	MW-6	Other	Hardness	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA						
06_3_20	MW-6	Other	Magnesium	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA						
06_3_23	MW-6	Other	Potassium	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA						
06_3_28	MW-6	Other	Sodium	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA						
06_5_37	MW-6	Part 115	Copper	mg/L	100%	3	3	5	5	16	NA	0.236	0.236	NA	NA	NA	NA	NA	NA	NA	NA						
06_5_38	MW-6	Part 115	Iron	mg/L	50%	3	3	5	5	16	0.134	0.085	0.084	1	2	5	0	8	0.129	0.083	0.098						
06_5_39	MW-6	Part 115	Nickel	mg/L	12%	3	3	5	5	16	0.050	0.034	*	0.032	*	3	2	4	5	14	0.034	*	0.008	**	0.006	**	
06_5_40	MW-6	Part 115	Silver	mg/L	100%	3	3	5	5	16	NA	0.236	NA	NA	NA	NA	NA	NA	NA	NA	NA						
06_5_41	MW-6	Part 115	Vanadium	mg/L	100%	3	3	5	5	16	NA	0.236	0.236	NA	NA	NA	NA	NA	NA	NA	NA						
06_5_42	MW-6	Part 115	Zinc	mg/L	94%	3	3	5	5	16	0.228	0.236	0.236	0	1	0	0	1	NA	NA	NA						
07_1_01	MW-7	Appendix III	Boron	mg/L	0%	4	0	4	2	10	0.375	0.484	0.567	4	0	4	2	10	0.375	0.484	0.567						
07_1_02	MW-7	Appendix III	Calcium	mg/L	0%	4	0	4	2	10	0.506	0.401	0.432	4	0	4	2	10	0.506	0.401	0.432						
07_1_03	MW-7	Appendix III	Chloride	mg/L	0%	4	0	4	2	10	0.818	0.732	0.746	4	0	4	2	10	0.818	0.732	0.746						
07_1_04	MW-7	Appendix III	Fluoride	mg/L	90%	4	0	4	2	10	0.472	0.528	0.528	1	0	0	0	1	NA	NA	NA						
07_1_05	MW-7	Appendix III	Sulfate	mg/L	0%	4	0	4	2	10	0.032	*	0.092	0.068		4	0	4	2	10	0.032	*	0.092	0.068			
07_1_06	MW-7	Appendix III	Total Dissolved Solids	mg/L	0%	4	0	4	2	10	0.375	0.349	0.345	4	0	4	2	10	0.375	0.349	0.345						
07_1_07	MW-7	Appendix III	pH, Field	su	0%	4	0	4	2	10	0.600	0.551	0.554	4	0	4	2	10	0.600	0.551	0.554						
07_2_04	MW-7	Appendix IV	Fluoride	mg/L	90%	4	0	4	2	10	0.472	0.528	0.528	1	0	0	0	1	NA	NA	NA						

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 7: Seasonality Tests *(continued)*

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full									Without Non-Detects										
						Sample Size					p-Value				Sample Size					p-Value					
						Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA				
07_2_08	MW-7	Appendix IV	Antimony	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
07_2_09	MW-7	Appendix IV	Arsenic	mg/L	0%	4	0	4	2	10	0.710	0.809	0.848	4	0	4	2	10	0.710	0.809	0.848	NA	NA	NA	
07_2_10	MW-7	Appendix IV	Barium	mg/L	0%	4	0	4	2	10	0.658	0.781	0.795	4	0	4	2	10	0.658	0.781	0.795	NA	NA	NA	
07_2_11	MW-7	Appendix IV	Beryllium	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
07_2_13	MW-7	Appendix IV	Cadmium	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
07_2_15	MW-7	Appendix IV	Chromium	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
07_2_16	MW-7	Appendix IV	Cobalt	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
07_2_18	MW-7	Appendix IV	Lead	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
07_2_19	MW-7	Appendix IV	Lithium	mg/L	0%	4	0	4	2	10	0.224	0.703	0.751	4	0	4	2	10	0.224	0.703	0.751	NA	NA	NA	
07_2_21	MW-7	Appendix IV	Mercury	mg/L	90%	4	0	4	2	10	NA	0.528	0.528	0	0	1	0	1	NA	NA	NA	NA	NA		
07_2_22	MW-7	Appendix IV	Molybdenum	mg/L	0%	4	0	4	2	10	0.372	0.741	0.737	4	0	4	2	10	0.372	0.741	0.737	NA	NA	NA	
07_2_24	MW-7	Appendix IV	Radium-226	pCi/L	0%	4	0	4	2	10	0.424	0.486	0.444	4	0	4	2	10	0.424	0.486	0.444	NA	NA	NA	
07_2_25	MW-7	Appendix IV	Radium-226/228	pCi/L	0%	4	0	4	2	10	0.909	0.886	0.876	4	0	4	2	10	0.909	0.886	0.876	NA	NA	NA	
07_2_26	MW-7	Appendix IV	Radium-228	pCi/L	0%	4	0	4	2	10	0.815	0.931	NA	4	0	4	2	10	0.815	0.931	NA	NA	NA		
07_2_27	MW-7	Appendix IV	Selenium	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
07_2_29	MW-7	Appendix IV	Thallium	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
07_2_30	MW-7	Appendix IV	Total Suspended Solids	mg/L	90%	4	0	4	2	10	0.472	0.528	0.528	1	0	0	0	1	NA	NA	NA	NA	NA		
07_3_12	MW-7	Other	Bicarbonate	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA	NA	NA		
07_3_14	MW-7	Other	Carbonate	mg/L	100%	1	0	1	0	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
07_3_17	MW-7	Other	Hardness	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA	NA	NA		
07_3_20	MW-7	Other	Magnesium	mg/L	0%	1	0	1	0	2	NA	NA	NA	1	0	1	0	2	NA	NA	NA	NA	NA		
07_3_23	MW-7	Other	Potassium	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA	NA	NA		
07_3_28	MW-7	Other	Sodium	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA	NA	NA		
07_5_37	MW-7	Part 115	Copper	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
07_5_38	MW-7	Part 115	Iron	mg/L	0%	4	0	4	2	10	0.229	0.511	0.559	4	0	4	2	10	0.229	0.511	0.559	NA	NA	NA	
07_5_39	MW-7	Part 115	Nickel	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
07_5_40	MW-7	Part 115	Silver	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
07_5_41	MW-7	Part 115	Vanadium	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
07_5_42	MW-7	Part 115	Zinc	mg/L	70%	4	0	4	2	10	0.060	0.220	0.135	0	0	3	0	3	NA	NA	NA	NA	NA		
08_1_01	MW-8	Appendix III	Boron	mg/L	10%	4	0	4	2	10	0.065	0.070	0.035	*	3	0	4	2	9	0.122	0.138	0.090	NA		
08_1_02	MW-8	Appendix III	Calcium	mg/L	0%	4	0	4	2	10	0.032	*	0.008	**	4	0	4	2	10	0.032	*	0.008	**	0.008	**
08_1_03	MW-8	Appendix III	Chloride	mg/L	20%	4	0	4	2	10	0.320	0.242	0.291	2	0	4	2	8	0.920	0.438	0.683	NA	NA	NA	
08_1_04	MW-8	Appendix III	Fluoride	mg/L	90%	4	0	4	2	10	0.472	0.528	0.528	1	0	0	0	1	NA	NA	NA	NA	NA	NA	
08_1_05	MW-8	Appendix III	Sulfate	mg/L	0%	4	0	4	2	10	0.215	0.415	0.403	4	0	4	2	10	0.215	0.415	0.403	NA	NA	NA	
08_1_06	MW-8	Appendix III	Total Dissolved Solids	mg/L	0%	4	0	4	2	10	0.993	0.828	0.838	4	0	4	2	10	0.993	0.828	0.838	NA	NA	NA	
08_1_07	MW-8	Appendix III	pH, Field	su	0%	4	0	4	2	10	0.959	0.839	0.851	4	0	4	2	10	0.959	0.839	0.851	NA	NA	NA	
08_2_04	MW-8	Appendix IV	Fluoride	mg/L	90%	4	0	4	2	10	0.472	0.528	0.528	1	0	0	0	1	NA	NA	NA	NA	NA	NA	
08_2_08	MW-8	Appendix IV	Antimony	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
08_2_09	MW-8	Appendix IV	Arsenic	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05



Table 7: Seasonality Tests (continued)

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full							Without Non-Detects														
						Sample Size					p-Value		Sample Size					p-Value									
						Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA						
08_2_10	MW-8	Appendix IV	Barium	mg/L	0%	4	0	4	2	10	0.361	0.327	0.305	4	0	4	2	10	0.361	0.327	0.305						
08_2_11	MW-8	Appendix IV	Beryllium	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA						
08_2_13	MW-8	Appendix IV	Cadmium	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA						
08_2_15	MW-8	Appendix IV	Chromium	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA						
08_2_16	MW-8	Appendix IV	Cobalt	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA						
08_2_18	MW-8	Appendix IV	Lead	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA						
08_2_19	MW-8	Appendix IV	Lithium	mg/L	50%	4	0	4	2	10	0.148	0.049	*	0.061	2	0	1	2	5	0.165	0.212	0.143					
08_2_21	MW-8	Appendix IV	Mercury	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA						
08_2_22	MW-8	Appendix IV	Molybdenum	mg/L	80%	4	0	4	2	10	0.272	0.321	0.335	0	0	1	1	2	0.317	NA	NA						
08_2_24	MW-8	Appendix IV	Radium-226	pCi/L	0%	4	0	4	2	10	0.372	0.115	0.270	4	0	4	2	10	0.372	0.115	0.270						
08_2_25	MW-8	Appendix IV	Radium-226/228	pCi/L	0%	4	0	4	2	10	0.646	0.462	0.830	4	0	4	2	10	0.646	0.462	0.830						
08_2_26	MW-8	Appendix IV	Radium-228	pCi/L	0%	4	0	4	2	10	0.692	0.765	NA	4	0	4	2	10	0.692	0.765	NA						
08_2_27	MW-8	Appendix IV	Selenium	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA						
08_2_29	MW-8	Appendix IV	Thallium	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA						
08_2_30	MW-8	Appendix IV	Total Suspended Solids	mg/L	90%	4	0	4	2	10	0.472	0.528	0.528	1	0	0	0	1	NA	NA	NA						
08_3_12	MW-8	Other	Bicarbonate	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA						
08_3_14	MW-8	Other	Carbonate	mg/L	100%	1	0	1	0	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA						
08_3_17	MW-8	Other	Hardness	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA						
08_3_20	MW-8	Other	Magnesium	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA						
08_3_23	MW-8	Other	Potassium	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA						
08_3_28	MW-8	Other	Sodium	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA						
08_5_37	MW-8	Part 115	Copper	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA						
08_5_38	MW-8	Part 115	Iron	mg/L	90%	4	0	4	2	10	NA	0.528	NA	1	0	0	0	1	NA	NA	NA						
08_5_39	MW-8	Part 115	Nickel	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA						
08_5_40	MW-8	Part 115	Silver	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA						
08_5_41	MW-8	Part 115	Vanadium	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA						
08_5_42	MW-8	Part 115	Zinc	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA						
09_1_01	MW-9	Appendix III	Boron	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA						
09_1_02	MW-9	Appendix III	Calcium	mg/L	0%	4	0	4	2	10	0.037	*	0.002	**	0.002	**	4	0	4	2	10	0.037	*	0.002	**	0.002	**
09_1_03	MW-9	Appendix III	Chloride	mg/L	90%	4	0	4	2	10	0.472	0.528	0.528	1	0	0	0	1	NA	NA	NA						
09_1_04	MW-9	Appendix III	Fluoride	mg/L	90%	4	0	4	2	10	0.472	0.528	0.528	1	0	0	0	1	NA	NA	NA						
09_1_05	MW-9	Appendix III	Sulfate	mg/L	80%	4	0	4	2	10	0.472	0.528	0.528	1	0	1	0	2	0.317	NA	NA						
09_1_06	MW-9	Appendix III	Total Dissolved Solids	mg/L	0%	4	0	4	2	10	0.030	*	0.034	*	0.032	*	4	0	4	2	10	0.030	*	0.034	*	0.032	*
09_1_07	MW-9	Appendix III	pH, Field	su	0%	4	0	4	2	10	0.564	0.534	0.535	4	0	4	2	10	0.564	0.534	0.535						
09_2_04	MW-9	Appendix IV	Fluoride	mg/L	90%	4	0	4	2	10	0.472	0.528	0.528	1	0	0	0	1	NA	NA	NA						
09_2_08	MW-9	Appendix IV	Antimony	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA						
09_2_09	MW-9	Appendix IV	Arsenic	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA						
09_2_10	MW-9	Appendix IV	Barium	mg/L	0%	4	0	4	2	10	0.412	0.452	0.457	4	0	4	2	10	0.412	0.452	0.457						
09_2_11	MW-9	Appendix IV	Beryllium	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA						

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05



Table 7: Seasonality Tests (continued)

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full										Without Non-Detects										
						Sample Size					p-Value					Sample Size					p-Value					
						Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA					
09_2_13	MW-9	Appendix IV	Cadmium	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_2_15	MW-9	Appendix IV	Chromium	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_2_16	MW-9	Appendix IV	Cobalt	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_2_18	MW-9	Appendix IV	Lead	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_2_19	MW-9	Appendix IV	Lithium	mg/L	100%	4	0	4	2	10	0.472	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_2_21	MW-9	Appendix IV	Mercury	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_2_22	MW-9	Appendix IV	Molybdenum	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_2_24	MW-9	Appendix IV	Radium-226	pCi/L	0%	3	0	3	1	7	0.319	0.477	0.329	3	0	3	1	7	0.319	0.477	0.329	NA	NA	NA	NA	NA
09_2_25	MW-9	Appendix IV	Radium-226/228	pCi/L	0%	4	0	3	2	9	0.212	0.306	0.317	4	0	3	2	9	0.212	0.306	0.317	NA	NA	NA	NA	NA
09_2_26	MW-9	Appendix IV	Radium-228	pCi/L	0%	4	0	3	2	9	0.494	0.536	NA	4	0	3	2	9	0.494	0.536	NA	NA	NA	NA	NA	NA
09_2_27	MW-9	Appendix IV	Selenium	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_2_29	MW-9	Appendix IV	Thallium	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_2_30	MW-9	Appendix IV	Total Suspended Solids	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_3_12	MW-9	Other	Bicarbonate	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA	NA	NA	NA	NA	NA
09_3_14	MW-9	Other	Carbonate	mg/L	100%	1	0	1	0	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_3_17	MW-9	Other	Hardness	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA	NA	NA	NA	NA	NA
09_3_20	MW-9	Other	Magnesium	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA	NA	NA	NA	NA	NA
09_3_23	MW-9	Other	Potassium	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA	NA	NA	NA	NA	NA
09_3_28	MW-9	Other	Sodium	mg/L	0%	1	0	1	0	2	0.317	NA	NA	1	0	1	0	2	0.317	NA	NA	NA	NA	NA	NA	NA
09_5_37	MW-9	Part 115	Copper	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_5_38	MW-9	Part 115	Iron	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_5_39	MW-9	Part 115	Nickel	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_5_40	MW-9	Part 115	Silver	mg/L	100%	4	0	4	2	10	NA	0.528	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_5_41	MW-9	Part 115	Vanadium	mg/L	100%	4	0	4	2	10	NA	0.528	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
09_5_42	MW-9	Part 115	Zinc	mg/L	90%	4	0	4	2	10	0.472	0.528	0.528	1	0	0	0	1	NA	NA	NA	NA	NA	NA	NA	NA
10_1_01	MW-10	Appendix III	Boron	mg/L	0%	5	0	4	2	11	0.476	0.349	0.383	5	0	4	2	11	0.476	0.349	0.383	NA	NA	NA	NA	NA
10_1_02	MW-10	Appendix III	Calcium	mg/L	0%	5	0	4	2	11	0.157	0.134	0.142	5	0	4	2	11	0.157	0.134	0.142	NA	NA	NA	NA	NA
10_1_03	MW-10	Appendix III	Chloride	mg/L	91%	5	0	4	2	11	0.549	0.600	0.600	1	0	0	0	1	NA	NA	NA	NA	NA	NA	NA	NA
10_1_04	MW-10	Appendix III	Fluoride	mg/L	91%	5	0	4	2	11	0.549	0.600	0.600	1	0	0	0	1	NA	NA	NA	NA	NA	NA	NA	NA
10_1_05	MW-10	Appendix III	Sulfate	mg/L	0%	5	0	4	2	11	0.529	0.515	0.483	5	0	4	2	11	0.529	0.515	0.483	NA	NA	NA	NA	NA
10_1_06	MW-10	Appendix III	Total Dissolved Solids	mg/L	0%	5	0	4	2	11	0.087	0.025 *	0.028 *	5	0	4	2	11	0.087	0.025 *	0.028 *	NA	NA	NA	NA	NA
10_1_07	MW-10	Appendix III	pH, Field	su	0%	5	0	4	2	11	0.598	0.432	0.434	5	0	4	2	11	0.598	0.432	0.434	NA	NA	NA	NA	NA
10_2_04	MW-10	Appendix IV	Fluoride	mg/L	91%	5	0	4	2	11	0.549	0.600	0.600	1	0	0	0	1	NA	NA	NA	NA	NA	NA	NA	NA
10_2_08	MW-10	Appendix IV	Antimony	mg/L	100%	5	0	4	2	11	NA	NA	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_2_09	MW-10	Appendix IV	Arsenic	mg/L	100%	5	0	4	2	11	NA	0.463	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_2_10	MW-10	Appendix IV	Barium	mg/L	0%	5	0	4	2	11	0.182	0.258	0.255	5	0	4	2	11	0.182	0.258	0.255	NA	NA	NA	NA	NA
10_2_11	MW-10	Appendix IV	Beryllium	mg/L	100%	5	0	4	2	11	NA	0.463	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_2_13	MW-10	Appendix IV	Cadmium	mg/L	100%	5	0	4	2	11	NA	0.463	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_2_15	MW-10	Appendix IV	Chromium	mg/L	100%	5	0	4	2	11	NA	NA	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05



Table 7: Seasonality Tests (continued)

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full							Without Non-Detects									
						Sample Size					p-Value			Sample Size					p-Value			
						Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	
10_2_16	MW-10	Appendix IV	Cobalt	mg/L	100%	5	0	4	2	11	NA	NA	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_2_18	MW-10	Appendix IV	Lead	mg/L	100%	5	0	4	2	11	NA	0.463	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_2_19	MW-10	Appendix IV	Lithium	mg/L	100%	5	0	4	2	11	0.417	0.463	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_2_21	MW-10	Appendix IV	Mercury	mg/L	91%	5	0	4	2	11	NA	NA	0.463	0	0	1	0	1	NA	NA	NA	NA
10_2_22	MW-10	Appendix IV	Molybdenum	mg/L	100%	5	0	4	2	11	NA	NA	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_2_24	MW-10	Appendix IV	Radium-226	pCi/L	0%	5	0	4	2	11	0.084	0.111	0.053	5	0	4	2	11	0.084	0.111	0.053	0.053
10_2_25	MW-10	Appendix IV	Radium-226/228	pCi/L	0%	4	0	4	2	10	0.026 *	0.027 *	0.012 *	4	0	4	2	10	0.026 *	0.027 *	0.012 *	0.012 *
10_2_26	MW-10	Appendix IV	Radium-228	pCi/L	0%	4	0	4	2	10	0.692	0.832	NA	4	0	4	2	10	0.692	0.832	NA	NA
10_2_27	MW-10	Appendix IV	Selenium	mg/L	100%	5	0	4	2	11	NA	NA	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_2_29	MW-10	Appendix IV	Thallium	mg/L	100%	5	0	4	2	11	NA	0.463	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_2_30	MW-10	Appendix IV	Total Suspended Solids	mg/L	100%	5	0	4	2	11	NA	0.463	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_3_12	MW-10	Other	Bicarbonate	mg/L	0%	2	0	1	0	3	0.221	0.020 *	0.018 *	2	0	1	0	3	0.221	0.020 *	0.018 *	0.018 *
10_3_14	MW-10	Other	Carbonate	mg/L	100%	2	0	1	0	3	NA	0.000 ***	0.000 ***	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_3_17	MW-10	Other	Hardness	mg/L	0%	2	0	1	0	3	0.221	0.007 **	0.006 **	2	0	1	0	3	0.221	0.007 **	0.006 **	0.006 **
10_3_20	MW-10	Other	Magnesium	mg/L	0%	2	0	1	0	3	0.221	0.029 *	0.026 *	2	0	1	0	3	0.221	0.029 *	0.026 *	0.026 *
10_3_23	MW-10	Other	Potassium	mg/L	0%	2	0	1	0	3	0.221	0.497	0.508	2	0	1	0	3	0.221	0.497	0.508	0.508
10_3_28	MW-10	Other	Sodium	mg/L	0%	2	0	1	0	3	0.221	0.251	0.235	2	0	1	0	3	0.221	0.251	0.235	0.235
10_5_37	MW-10	Part 115	Copper	mg/L	100%	5	0	4	2	11	NA	NA	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_5_38	MW-10	Part 115	Iron	mg/L	100%	5	0	4	2	11	NA	NA	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_5_39	MW-10	Part 115	Nickel	mg/L	100%	5	0	4	2	11	NA	NA	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_5_40	MW-10	Part 115	Silver	mg/L	100%	5	0	4	2	11	NA	0.463	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_5_41	MW-10	Part 115	Vanadium	mg/L	100%	5	0	4	2	11	NA	NA	0.463	NA	NA	NA	NA	NA	NA	NA	NA	NA
10_5_42	MW-10	Part 115	Zinc	mg/L	82%	5	0	4	2	11	0.783	0.723	0.778	1	0	1	0	2	0.317	NA	NA	NA
13_1_01	MW-13	Appendix III	Boron	mg/L	0%	2	2	3	2	9	0.074	0.004 **	0.003 **	2	2	3	2	9	0.074	0.004 **	0.003 **	0.003 **
13_1_02	MW-13	Appendix III	Calcium	mg/L	0%	2	2	3	2	9	0.211	0.064	0.077	2	2	3	2	9	0.211	0.064	0.077	0.077
13_1_03	MW-13	Appendix III	Chloride	mg/L	22%	2	2	3	2	9	0.288	0.478	0.417	1	1	3	2	7	0.135	0.045 *	0.039 *	0.039 *
13_1_04	MW-13	Appendix III	Fluoride	mg/L	100%	2	2	3	2	9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13_1_05	MW-13	Appendix III	Sulfate	mg/L	0%	2	2	3	2	9	0.774	0.918	0.926	2	2	3	2	9	0.774	0.918	0.926	0.926
13_1_06	MW-13	Appendix III	Total Dissolved Solids	mg/L	0%	2	2	3	2	9	0.230	0.069	0.098	2	2	3	2	9	0.230	0.069	0.098	0.098
13_1_07	MW-13	Appendix III	pH, Field	su	0%	2	2	3	2	9	0.087	0.145	0.146	2	2	3	2	9	0.087	0.145	0.146	0.146
13_2_04	MW-13	Appendix IV	Fluoride	mg/L	100%	2	2	3	2	9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13_2_08	MW-13	Appendix IV	Antimony	mg/L	100%	2	2	3	2	9	NA	NA	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA
13_2_09	MW-13	Appendix IV	Arsenic	mg/L	100%	2	2	3	2	9	NA	0.372	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA
13_2_10	MW-13	Appendix IV	Barium	mg/L	0%	2	2	3	2	9	0.206	0.289	0.298	2	2	3	2	9	0.206	0.289	0.298	0.298
13_2_11	MW-13	Appendix IV	Beryllium	mg/L	100%	2	2	3	2	9	NA	0.372	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA
13_2_13	MW-13	Appendix IV	Cadmium	mg/L	100%	2	2	3	2	9	NA	0.372	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA
13_2_15	MW-13	Appendix IV	Chromium	mg/L	100%	2	2	3	2	9	NA	NA	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA
13_2_16	MW-13	Appendix IV	Cobalt	mg/L	100%	2	2	3	2	9	NA	NA	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA
13_2_18	MW-13	Appendix IV	Lead	mg/L	100%	2	2	3	2	9	NA	0.372	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 7: Seasonality Tests (continued)

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full					Without Non-Detects														
						Sample Size					p-Value			Sample Size					p-Value						
						Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA				
13_2_19	MW-13	Appendix IV	Lithium	mg/L	100%	2	2	3	2	9	NA	NA	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA			
13_2_21	MW-13	Appendix IV	Mercury	mg/L	100%	2	2	3	2	9	NA	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
13_2_22	MW-13	Appendix IV	Molybdenum	mg/L	100%	2	2	3	2	9	NA	NA	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA			
13_2_24	MW-13	Appendix IV	Radium-226	pCi/L	0%	2	2	3	2	9	0.334	0.358	NA	2	2	3	2	9	0.334	0.358	NA	NA			
13_2_25	MW-13	Appendix IV	Radium-226/228	pCi/L	0%	2	1	3	2	8	0.205	0.211	0.166	2	1	3	2	8	0.205	0.211	0.166	0.166			
13_2_26	MW-13	Appendix IV	Radium-228	pCi/L	0%	2	2	3	2	9	0.473	0.348	NA	2	2	3	2	9	0.473	0.348	NA	NA			
13_2_27	MW-13	Appendix IV	Selenium	mg/L	100%	2	2	3	2	9	NA	NA	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA			
13_2_29	MW-13	Appendix IV	Thallium	mg/L	100%	2	2	3	2	9	NA	0.372	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA			
13_2_30	MW-13	Appendix IV	Total Suspended Solids	mg/L	100%	2	2	3	2	9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
13_3_12	MW-13	Other	Bicarbonate	mg/L	0%	1	1	3	2	7	0.330	0.021	*	0.031	*	1	1	3	2	7	0.330	0.021	*	0.031	*
13_3_14	MW-13	Other	Carbonate	mg/L	100%	1	1	3	2	7	NA	0.000	***	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
13_3_17	MW-13	Other	Hardness	mg/L	0%	1	1	3	2	7	0.206	0.058	0.079	1	1	3	2	7	0.206	0.058	0.079	0.079	0.079		
13_3_20	MW-13	Other	Magnesium	mg/L	0%	1	2	3	2	8	0.480	0.230	0.285	1	2	3	2	8	0.480	0.230	0.285	0.285	0.285		
13_3_23	MW-13	Other	Potassium	mg/L	0%	1	2	3	2	8	0.145	0.105	0.106	1	2	3	2	8	0.145	0.105	0.106	0.106	0.106		
13_3_28	MW-13	Other	Sodium	mg/L	0%	1	2	3	2	8	0.238	0.279	0.284	1	2	3	2	8	0.238	0.279	0.284	0.284	0.284		
13_5_37	MW-13	Part 115	Copper	mg/L	100%	2	2	3	2	9	NA	NA	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
13_5_38	MW-13	Part 115	Iron	mg/L	11%	2	2	3	2	9	0.258	0.569	0.390	2	1	3	2	8	0.452	0.765	0.633	0.633	0.633		
13_5_39	MW-13	Part 115	Nickel	mg/L	100%	2	2	3	2	9	NA	NA	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
13_5_40	MW-13	Part 115	Silver	mg/L	100%	2	2	3	2	9	NA	0.372	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
13_5_41	MW-13	Part 115	Vanadium	mg/L	100%	2	2	3	2	9	NA	NA	0.372	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
13_5_42	MW-13	Part 115	Zinc	mg/L	89%	2	2	3	2	9	0.572	0.667	0.667	0	0	1	0	1	NA	NA	NA	NA	NA	NA	
14_1_01	MW-14	Appendix III	Boron	mg/L	0%	2	2	0	0	4	0.121	0.063	0.064	2	2	0	0	4	0.121	0.063	0.064	0.064	0.064		
14_1_02	MW-14	Appendix III	Calcium	mg/L	0%	2	2	0	0	4	0.221	0.333	0.333	2	2	0	0	4	0.221	0.333	0.333	0.333	0.333		
14_1_03	MW-14	Appendix III	Chloride	mg/L	0%	2	2	0	0	4	0.121	0.087	0.090	2	2	0	0	4	0.121	0.087	0.090	0.090	0.090		
14_1_04	MW-14	Appendix III	Fluoride	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
14_1_05	MW-14	Appendix III	Sulfate	mg/L	0%	2	2	0	0	4	1.000	0.432	0.517	2	2	0	0	4	1.000	0.432	0.517	0.517	0.517		
14_1_06	MW-14	Appendix III	Total Dissolved Solids	mg/L	25%	2	2	0	0	4	1.000	0.467	0.426	2	1	0	0	3	0.221	0.447	0.454	0.454	0.454		
14_1_07	MW-14	Appendix III	pH, Field	su	0%	2	2	0	0	4	1.000	0.832	0.829	2	2	0	0	4	1.000	0.832	0.829	0.829	0.829		
14_2_04	MW-14	Appendix IV	Fluoride	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
14_2_08	MW-14	Appendix IV	Antimony	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
14_2_09	MW-14	Appendix IV	Arsenic	mg/L	0%	2	2	0	0	4	0.683	0.698	0.666	2	2	0	0	4	0.683	0.698	0.666	0.666	0.666		
14_2_10	MW-14	Appendix IV	Barium	mg/L	0%	2	2	0	0	4	1.000	0.498	0.515	2	2	0	0	4	1.000	0.498	0.515	0.515	0.515		
14_2_11	MW-14	Appendix IV	Beryllium	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
14_2_13	MW-14	Appendix IV	Cadmium	mg/L	100%	2	2	0	0	4	NA	NA	0.423	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
14_2_15	MW-14	Appendix IV	Chromium	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
14_2_16	MW-14	Appendix IV	Cobalt	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
14_2_18	MW-14	Appendix IV	Lead	mg/L	100%	2	2	0	0	4	NA	0.423	0.423	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
14_2_19	MW-14	Appendix IV	Lithium	mg/L	0%	2	2	0	0	4	0.121	0.024	*	0.023	*	2	2	0	0	4	0.121	0.024	*	0.023	*
14_2_21	MW-14	Appendix IV	Mercury	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 7: Seasonality Tests (continued)

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full							Without Non-Detects												
						Sample Size					p-Value		Sample Size					p-Value							
						Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA				
14_2_22	MW-14	Appendix IV	Molybdenum	mg/L	0%	2	2	0	0	4	1.000	1.000	0.967	2	2	0	0	4	1.000	1.000	0.967				
14_2_24	MW-14	Appendix IV	Radium-226	pCi/L	0%	2	1	0	0	3	0.221	0.609	0.628	2	1	0	0	3	0.221	0.609	0.628				
14_2_25	MW-14	Appendix IV	Radium-226/228	pCi/L	0%	1	2	0	0	3	0.221	0.071	0.120	1	2	0	0	3	0.221	0.071	0.120				
14_2_26	MW-14	Appendix IV	Radium-228	pCi/L	0%	1	2	0	0	3	0.221	0.076	0.148	1	2	0	0	3	0.221	0.076	0.148				
14_2_27	MW-14	Appendix IV	Selenium	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA				
14_2_29	MW-14	Appendix IV	Thallium	mg/L	100%	2	2	0	0	4	NA	NA	0.423	NA	NA	NA	NA	NA	NA	NA	NA				
14_2_30	MW-14	Appendix IV	Total Suspended Solids	mg/L	0%	1	2	0	0	3	0.221	0.097	0.082	1	2	0	0	3	0.221	0.097	0.082				
14_3_12	MW-14	Other	Bicarbonate	mg/L	0%	2	2	0	0	4	0.121	0.008	**	0.008	**	2	2	0	0	4	0.121	0.008	**	0.008	**
14_3_14	MW-14	Other	Carbonate	mg/L	100%	2	2	0	0	4	NA	NA	0.423	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
14_3_17	MW-14	Other	Hardness	mg/L	0%	2	2	0	0	4	0.439	0.539	0.535	2	2	0	0	4	0.439	0.539	0.535				
14_3_20	MW-14	Other	Magnesium	mg/L	0%	2	2	0	0	4	0.121	0.091	0.089	2	2	0	0	4	0.121	0.091	0.089				
14_3_23	MW-14	Other	Potassium	mg/L	0%	2	2	0	0	4	0.121	0.328	0.319	2	2	0	0	4	0.121	0.328	0.319				
14_3_28	MW-14	Other	Sodium	mg/L	0%	2	2	0	0	4	0.121	0.115	0.119	2	2	0	0	4	0.121	0.115	0.119				
14_5_37	MW-14	Part 115	Copper	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
14_5_38	MW-14	Part 115	Iron	mg/L	0%	2	2	0	0	4	0.121	0.221	0.247	2	2	0	0	4	0.121	0.221	0.247				
14_5_39	MW-14	Part 115	Nickel	mg/L	50%	2	2	0	0	4	0.317	0.423	0.423	2	0	0	0	2	NA	NA	NA	NA	NA	NA	NA
14_5_40	MW-14	Part 115	Silver	mg/L	100%	2	2	0	0	4	NA	NA	0.423	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
14_5_41	MW-14	Part 115	Vanadium	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
14_5_42	MW-14	Part 115	Zinc	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15_1_01	MW-15	Appendix III	Boron	mg/L	0%	2	2	0	0	4	0.221	0.333	0.330	2	2	0	0	4	0.221	0.333	0.330				
15_1_02	MW-15	Appendix III	Calcium	mg/L	0%	2	2	0	0	4	0.121	0.159	0.136	2	2	0	0	4	0.121	0.159	0.136				
15_1_03	MW-15	Appendix III	Chloride	mg/L	0%	2	2	0	0	4	0.121	0.122	0.119	2	2	0	0	4	0.121	0.122	0.119				
15_1_04	MW-15	Appendix III	Fluoride	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15_1_05	MW-15	Appendix III	Sulfate	mg/L	0%	2	2	0	0	4	0.121	0.311	0.275	2	2	0	0	4	0.121	0.311	0.275				
15_1_06	MW-15	Appendix III	Total Dissolved Solids	mg/L	0%	2	2	0	0	4	0.439	0.489	0.495	2	2	0	0	4	0.439	0.489	0.495				
15_1_07	MW-15	Appendix III	pH, Field	su	0%	2	2	0	0	4	0.439	0.771	0.770	2	2	0	0	4	0.439	0.771	0.770				
15_2_04	MW-15	Appendix IV	Fluoride	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15_2_08	MW-15	Appendix IV	Antimony	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15_2_09	MW-15	Appendix IV	Arsenic	mg/L	100%	2	2	0	0	4	NA	NA	0.423	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15_2_10	MW-15	Appendix IV	Barium	mg/L	0%	2	2	0	0	4	0.121	0.301	0.273	2	2	0	0	4	0.121	0.301	0.273				
15_2_11	MW-15	Appendix IV	Beryllium	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15_2_13	MW-15	Appendix IV	Cadmium	mg/L	100%	2	2	0	0	4	NA	NA	0.423	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15_2_15	MW-15	Appendix IV	Chromium	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15_2_16	MW-15	Appendix IV	Cobalt	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15_2_18	MW-15	Appendix IV	Lead	mg/L	100%	2	2	0	0	4	NA	0.423	0.423	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15_2_19	MW-15	Appendix IV	Lithium	mg/L	75%	2	2	0	0	4	0.317	0.423	0.423	1	0	0	0	1	NA	NA	NA	NA	NA	NA	NA
15_2_21	MW-15	Appendix IV	Mercury	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15_2_22	MW-15	Appendix IV	Molybdenum	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15_2_24	MW-15	Appendix IV	Radium-226	pCi/L	0%	2	2	0	0	4	0.439	0.538	0.541	2	2	0	0	4	0.439	0.538	0.541				

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 7: Seasonality Tests (continued)

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full										Without Non-Detects								
						Sample Size					p-Value					Sample Size					p-Value			
						Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA			
15_2_25	MW-15	Appendix IV	Radium-226/228	pCi/L	0%	2	2	0	0	4	1.000	0.848	0.693	2	2	0	0	4	1.000	0.848	0.693			
15_2_26	MW-15	Appendix IV	Radium-228	pCi/L	0%	2	2	0	0	4	0.439	0.926	NA	2	2	0	0	4	0.439	0.926	NA			
15_2_27	MW-15	Appendix IV	Selenium	mg/L	0%	2	2	0	0	4	0.439	0.454	0.445	2	2	0	0	4	0.439	0.454	0.445			
15_2_29	MW-15	Appendix IV	Thallium	mg/L	100%	2	2	0	0	4	NA	NA	0.423	NA	NA	NA	NA	NA	NA	NA	NA			
15_2_30	MW-15	Appendix IV	Total Suspended Solids	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
15_3_12	MW-15	Other	Bicarbonate	mg/L	0%	2	2	0	0	4	0.102	0.204	0.190	2	2	0	0	4	0.102	0.204	0.190			
15_3_14	MW-15	Other	Carbonate	mg/L	100%	2	2	0	0	4	NA	NA	0.423	NA	NA	NA	NA	NA	NA	NA	NA			
15_3_17	MW-15	Other	Hardness	mg/L	0%	2	2	0	0	4	0.121	0.041	0.044 *	2	2	0	0	4	0.121	0.041 *	0.044 *			
15_3_20	MW-15	Other	Magnesium	mg/L	0%	2	2	0	0	4	0.121	0.194	0.174	2	2	0	0	4	0.121	0.194	0.174			
15_3_23	MW-15	Other	Potassium	mg/L	75%	2	2	0	0	4	0.317	0.423	0.423	1	0	0	0	1	NA	NA	NA			
15_3_28	MW-15	Other	Sodium	mg/L	0%	2	2	0	0	4	0.121	0.333	0.319	2	2	0	0	4	0.121	0.333	0.319			
15_5_37	MW-15	Part 115	Copper	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
15_5_38	MW-15	Part 115	Iron	mg/L	25%	2	2	0	0	4	0.683	0.698	0.754	1	2	0	0	3	0.221	0.333	0.396			
15_5_39	MW-15	Part 115	Nickel	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
15_5_40	MW-15	Part 115	Silver	mg/L	100%	2	2	0	0	4	NA	NA	0.423	NA	NA	NA	NA	NA	NA	NA	NA			
15_5_41	MW-15	Part 115	Vanadium	mg/L	100%	2	2	0	0	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA			
15_5_42	MW-15	Part 115	Zinc	mg/L	75%	2	2	0	0	4	0.317	0.423	0.423	0	1	0	0	1	NA	NA	NA			
7B_1_01	MW-7B	Appendix III	Boron	mg/L	0%	1	5	2	3	11	0.996	0.996	0.996	1	5	2	3	11	0.996	0.996	0.996			
7B_1_02	MW-7B	Appendix III	Calcium	mg/L	0%	1	5	2	3	11	0.336	0.638	0.669	1	5	2	3	11	0.336	0.638	0.669			
7B_1_03	MW-7B	Appendix III	Chloride	mg/L	100%	1	5	2	3	11	NA	0.812	0.812	NA	NA	NA	NA	NA	NA	NA	NA			
7B_1_04	MW-7B	Appendix III	Fluoride	mg/L	100%	1	5	2	3	11	NA	0.812	NA	NA	NA	NA	NA	NA	NA	NA	NA			
7B_1_05	MW-7B	Appendix III	Sulfate	mg/L	100%	1	5	2	3	11	NA	0.812	0.812	NA	NA	NA	NA	NA	NA	NA	NA			
7B_1_06	MW-7B	Appendix III	Total Dissolved Solids	mg/L	0%	1	5	2	3	11	0.794	0.867	0.871	1	5	2	3	11	0.794	0.867	0.871			
7B_1_07	MW-7B	Appendix III	pH, Field	su	0%	1	5	2	3	11	0.036 *	0.000 ***	0.000 ***	1	5	2	3	11	0.036 *	0.000 ***	0.000 ***			
7B_2_04	MW-7B	Appendix IV	Fluoride	mg/L	100%	1	5	2	3	11	NA	0.812	NA	NA	NA	NA	NA	NA	NA	NA	NA			
7B_2_08	MW-7B	Appendix IV	Antimony	mg/L	100%	1	5	2	3	11	NA	NA	0.812	NA	NA	NA	NA	NA	NA	NA	NA			
7B_2_09	MW-7B	Appendix IV	Arsenic	mg/L	82%	1	5	2	3	11	0.753	0.812	0.812	0	2	0	0	2	NA	NA	NA			
7B_2_10	MW-7B	Appendix IV	Barium	mg/L	0%	1	5	2	3	11	0.206	0.217	0.223	1	5	2	3	11	0.206	0.217	0.223			
7B_2_11	MW-7B	Appendix IV	Beryllium	mg/L	100%	1	5	2	3	11	NA	0.812	0.812	NA	NA	NA	NA	NA	NA	NA	NA			
7B_2_13	MW-7B	Appendix IV	Cadmium	mg/L	100%	1	5	2	3	11	NA	0.812	0.812	NA	NA	NA	NA	NA	NA	NA	NA			
7B_2_15	MW-7B	Appendix IV	Chromium	mg/L	100%	1	5	2	3	11	NA	NA	0.812	NA	NA	NA	NA	NA	NA	NA	NA			
7B_2_16	MW-7B	Appendix IV	Cobalt	mg/L	100%	1	5	2	3	11	NA	NA	0.812	NA	NA	NA	NA	NA	NA	NA	NA			
7B_2_18	MW-7B	Appendix IV	Lead	mg/L	91%	1	5	2	3	11	0.212	0.217	0.217	0	0	1	0	1	NA	NA	NA			
7B_2_19	MW-7B	Appendix IV	Lithium	mg/L	0%	1	5	2	3	11	0.887	0.983	0.974	1	5	2	3	11	0.887	0.983	0.974			
7B_2_21	MW-7B	Appendix IV	Mercury	mg/L	100%	1	5	2	3	11	NA	NA	0.812	NA	NA	NA	NA	NA	NA	NA	NA			
7B_2_22	MW-7B	Appendix IV	Molybdenum	mg/L	100%	1	5	2	3	11	NA	NA	0.812	NA	NA	NA	NA	NA	NA	NA	NA			
7B_2_24	MW-7B	Appendix IV	Radium-226	pCi/L	0%	1	5	2	3	11	0.892	0.646	0.631	1	5	2	3	11	0.892	0.646	0.631			
7B_2_25	MW-7B	Appendix IV	Radium-226/228	pCi/L	0%	1	5	2	3	11	0.805	0.772	0.792	1	5	2	3	11	0.805	0.772	0.792			
7B_2_26	MW-7B	Appendix IV	Radium-228	pCi/L	0%	1	5	2	3	11	0.431	0.258	NA	1	5	2	3	11	0.431	0.258	NA			

(Table continues on next page)

*** p < 0.001, ** p < 0.01, * p < 0.05



Table 7: Seasonality Tests (continued)

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full							Without Non-Detects									
						Sample Size					p-Value		Sample Size					p-Value				
						Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	
7B_2_27	MW-7B	Appendix IV	Selenium	mg/L	100%	1	5	2	3	11	NA	NA	0.812	NA	NA	NA	NA	NA	NA	NA	NA	NA
7B_2_29	MW-7B	Appendix IV	Thallium	mg/L	100%	1	5	2	3	11	NA	0.812	0.812	NA	NA	NA	NA	NA	NA	NA	NA	NA
7B_2_30	MW-7B	Appendix IV	Total Suspended Solids	mg/L	100%	1	5	2	3	11	NA	0.812	0.812	NA	NA	NA	NA	NA	NA	NA	NA	NA
7B_3_12	MW-7B	Other	Bicarbonate	mg/L	0%	1	5	2	3	11	0.161	0.015 *	0.017 *	1	5	2	3	11	0.161	0.015 *	0.017 *	
7B_3_14	MW-7B	Other	Carbonate	mg/L	100%	1	5	2	3	11	NA	0.812	0.812	NA	NA	NA	NA	NA	NA	NA	NA	NA
7B_3_17	MW-7B	Other	Hardness	mg/L	0%	1	5	2	3	11	0.165	0.173	0.133	1	5	2	3	11	0.165	0.173	0.133	
7B_3_20	MW-7B	Other	Magnesium	mg/L	0%	1	5	2	3	11	0.386	0.932	0.957	1	5	2	3	11	0.386	0.932	0.957	
7B_3_23	MW-7B	Other	Potassium	mg/L	0%	1	5	2	3	11	0.534	0.611	0.624	1	5	2	3	11	0.534	0.611	0.624	
7B_3_28	MW-7B	Other	Sodium	mg/L	0%	1	5	2	3	11	0.053	0.190	0.219	1	5	2	3	11	0.053	0.190	0.219	
7B_5_37	MW-7B	Part 115	Copper	mg/L	100%	1	5	2	3	11	NA	NA	0.812	NA	NA	NA	NA	NA	NA	NA	NA	NA
7B_5_38	MW-7B	Part 115	Iron	mg/L	0%	1	5	2	3	11	0.184	0.123	0.188	1	5	2	3	11	0.184	0.123	0.188	
7B_5_39	MW-7B	Part 115	Nickel	mg/L	100%	1	5	2	3	11	NA	NA	0.812	NA	NA	NA	NA	NA	NA	NA	NA	NA
7B_5_40	MW-7B	Part 115	Silver	mg/L	100%	1	5	2	3	11	NA	0.812	0.812	NA	NA	NA	NA	NA	NA	NA	NA	NA
7B_5_41	MW-7B	Part 115	Vanadium	mg/L	100%	1	5	2	3	11	NA	NA	0.812	NA	NA	NA	NA	NA	NA	NA	NA	NA
7B_5_42	MW-7B	Part 115	Zinc	mg/L	100%	1	5	2	3	11	NA	NA	0.812	NA	NA	NA	NA	NA	NA	NA	NA	NA

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 8: Trend Tests: Lognormal MLE and MK

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Type	Method	Slope	p-value	Trend
02_1_01	MW-2	Appendix III	Boron	mg/L	15	0	0%	Parametric	Lognormal MLE	0.000160	0.305	↔
02_1_02	MW-2	Appendix III	Calcium	mg/L	15	0	0%	Parametric	Lognormal MLE	-0.000291	0.000	↓
02_1_03	MW-2	Appendix III	Chloride	mg/L	15	0	0%	Parametric	Lognormal MLE	0.000139	0.063	↔
02_1_05	MW-2	Appendix III	Sulfate	mg/L	15	0	0%	Parametric	Lognormal MLE	-0.000432	0.001	↓
02_1_06	MW-2	Appendix III	Total Dissolved Solids	mg/L	15	0	0%	Parametric	Lognormal MLE	-0.000251	0.000	↓
02_1_07	MW-2	Appendix III	pH, Field	su	16	0	0%	Parametric	Lognormal MLE	0.0000122	0.389	↔
02_2_10	MW-2	Appendix IV	Barium	mg/L	16	0	0%	Parametric	Lognormal MLE	-0.0000478	0.938	↔
02_2_19	MW-2	Appendix IV	Lithium	mg/L	16	0	0%	Parametric	Lognormal MLE	-0.000114	0.229	↔
02_2_22	MW-2	Appendix IV	Molybdenum	mg/L	16	0	0%	Parametric	Lognormal MLE	0.000375	0.003	↑
02_2_24	MW-2	Appendix IV	Radium-226	pCi/L	16	0	0%	Parametric	Lognormal MLE	-0.0000626	0.915	↔
02_2_25	MW-2	Appendix IV	Radium-226/228	pCi/L	16	0	0%	Parametric	Lognormal MLE	-0.000404	0.577	↔
02_2_30	MW-2	Appendix IV	Total Suspended Solids	mg/L	16	4	25%	Parametric	Lognormal MLE	0.00268	0.000	↑
02_5_38	MW-2	Part 115	Iron	mg/L	16	0	0%	Nonparametric	MK	0.000438	0.114	↔
02_5_39	MW-2	Part 115	Nickel	mg/L	16	0	0%	Nonparametric	MK	0	0.784	↔
05_1_01	MW-5	Appendix III	Boron	mg/L	16	0	0%	Nonparametric	MK	-0.00139	0.027	↔
05_1_02	MW-5	Appendix III	Calcium	mg/L	16	0	0%	Parametric	Lognormal MLE	-0.000640	0.003	↓
05_1_03	MW-5	Appendix III	Chloride	mg/L	15	0	0%	Parametric	Lognormal MLE	-0.000401	0.000	↓
05_1_05	MW-5	Appendix III	Sulfate	mg/L	15	0	0%	Parametric	Lognormal MLE	-0.000944	0.001	↓
05_1_06	MW-5	Appendix III	Total Dissolved Solids	mg/L	15	0	0%	Parametric	Lognormal MLE	-0.000679	0.000	↓
05_1_07	MW-5	Appendix III	pH, Field	su	17	0	0%	Nonparametric	MK	-0.000135	0.386	↔
05_2_10	MW-5	Appendix IV	Barium	mg/L	17	0	0%	Parametric	Lognormal MLE	-0.000200	0.091	↔
05_2_19	MW-5	Appendix IV	Lithium	mg/L	17	0	0%	Parametric	Lognormal MLE	-0.0000435	0.884	↔
05_2_22	MW-5	Appendix IV	Molybdenum	mg/L	17	0	0%	Parametric	Lognormal MLE	-0.000224	0.501	↔
05_2_24	MW-5	Appendix IV	Radium-226	pCi/L	16	0	0%	Parametric	Lognormal MLE	-0.000642	0.231	↔
05_2_25	MW-5	Appendix IV	Radium-226/228	pCi/L	16	0	0%	Parametric	Lognormal MLE	0.000154	0.780	↔
05_2_30	MW-5	Appendix IV	Total Suspended Solids	mg/L	16	0	0%	Parametric	Lognormal MLE	-0.000319	0.717	↔
05_5_38	MW-5	Part 115	Iron	mg/L	17	2	12%	Parametric	Lognormal MLE	-0.00127	0.341	↔
05_5_39	MW-5	Part 115	Nickel	mg/L	17	0	0%	Parametric	Lognormal MLE	-0.000857	0.000	↓
05_5_42	MW-5	Part 115	Zinc	mg/L	17	5	29%	Parametric	Lognormal MLE	-0.000837	0.361	↔
06_1_01	MW-6	Appendix III	Boron	mg/L	15	0	0%	Parametric	Lognormal MLE	0.000167	0.398	↔
06_1_02	MW-6	Appendix III	Calcium	mg/L	15	0	0%	Parametric	Lognormal MLE	0.0000957	0.281	↔
06_1_03	MW-6	Appendix III	Chloride	mg/L	15	0	0%	Parametric	Lognormal MLE	0.0000950	0.578	↔
06_1_05	MW-6	Appendix III	Sulfate	mg/L	15	0	0%	Parametric	Lognormal MLE	-0.0000262	0.991	↔
06_1_06	MW-6	Appendix III	Total Dissolved Solids	mg/L	15	0	0%	Parametric	Lognormal MLE	0.0000468	0.662	↔
06_1_07	MW-6	Appendix III	pH, Field	su	16	0	0%	Parametric	Lognormal MLE	0.0000825	0.700	↔
06_2_10	MW-6	Appendix IV	Barium	mg/L	16	0	0%	Parametric	Lognormal MLE	-0.000174	0.062	↔
06_2_19	MW-6	Appendix IV	Lithium	mg/L	16	0	0%	Parametric	Lognormal MLE	0.000141	0.253	↔
06_2_22	MW-6	Appendix IV	Molybdenum	mg/L	16	0	0%	Parametric	Lognormal MLE	-0.0000694	0.678	↔
06_5_39	MW-6	Part 115	Nickel	mg/L	16	2	12%	Nonparametric	MK	0	0.558	↔
07_1_01	MW-7	Appendix III	Boron	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.000549	0.074	↔
07_1_02	MW-7	Appendix III	Calcium	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.000168	0.383	↔
07_1_03	MW-7	Appendix III	Chloride	mg/L	10	0	0%	Nonparametric	MK	0.0150	0.057	↔
07_1_05	MW-7	Appendix III	Sulfate	mg/L	10	0	0%	Parametric	Lognormal MLE	0.0000639	0.742	↔

(Table continues on next page)

Table 8: Trend Tests: Lognormal MLE and MK (*continued*)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Type	Method	Slope	p-value	Trend
07_1_06	MW-7	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.0000161	0.911	↔
07_1_07	MW-7	Appendix III	pH, Field	su	10	0	0%	Nonparametric	MK	0.0000985	0.651	↔
07_2_09	MW-7	Appendix IV	Arsenic	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.000870	0.000	↓
07_2_10	MW-7	Appendix IV	Barium	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.000251	0.042	↔
07_2_19	MW-7	Appendix IV	Lithium	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.000362	0.023	↔
07_2_22	MW-7	Appendix IV	Molybdenum	mg/L	10	0	0%	Nonparametric	MK	0.00000952	0.928	↔
07_2_24	MW-7	Appendix IV	Radium-226	pCi/L	10	0	0%	Parametric	Lognormal MLE	0.000524	0.609	↔
07_2_25	MW-7	Appendix IV	Radium-226/228	pCi/L	10	0	0%	Parametric	Lognormal MLE	0.000916	0.431	↔
07_5_38	MW-7	Part 115	Iron	mg/L	10	0	0%	Nonparametric	MK	0.000571	0.592	↔
08_1_01	MW-8	Appendix III	Boron	mg/L	10	1	10%	Parametric	Lognormal MLE	-0.000753	0.404	↔
08_1_02	MW-8	Appendix III	Calcium	mg/L	10	0	0%	Parametric	Lognormal MLE	0.000213	0.001	↑
08_1_03	MW-8	Appendix III	Chloride	mg/L	10	2	20%	Parametric	Lognormal MLE	0.000418	0.800	↔
08_1_05	MW-8	Appendix III	Sulfate	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.000268	0.759	↔
08_1_06	MW-8	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	Parametric	Lognormal MLE	0.000142	0.079	↔
08_1_07	MW-8	Appendix III	pH, Field	su	10	0	0%	Parametric	Lognormal MLE	-0.0000288	0.594	↔
08_2_10	MW-8	Appendix IV	Barium	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.000318	0.186	↔
08_2_24	MW-8	Appendix IV	Radium-226	pCi/L	10	0	0%	Parametric	Lognormal MLE	-0.00156	0.296	↔
08_2_25	MW-8	Appendix IV	Radium-226/228	pCi/L	10	0	0%	Parametric	Lognormal MLE	-0.000844	0.677	↔
09_1_02	MW-9	Appendix III	Calcium	mg/L	10	0	0%	Nonparametric	MK	0.0465	0.127	↔
09_1_06	MW-9	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	Parametric	Lognormal MLE	0.000202	0.015	↔
09_1_07	MW-9	Appendix III	pH, Field	su	10	0	0%	Parametric	Lognormal MLE	0.0000172	0.679	↔
09_2_10	MW-9	Appendix IV	Barium	mg/L	10	0	0%	Nonparametric	MK	-0.00000188	0.180	↔
09_2_25	MW-9	Appendix IV	Radium-226/228	pCi/L	9	0	0%	Parametric	Lognormal MLE	0.00213	0.125	↔
10_1_01	MW-10	Appendix III	Boron	mg/L	11	0	0%	Nonparametric	MK	0	0.313	↔
10_1_02	MW-10	Appendix III	Calcium	mg/L	11	0	0%	Parametric	Lognormal MLE	0.0000857	0.402	↔
10_1_05	MW-10	Appendix III	Sulfate	mg/L	11	0	0%	Parametric	Lognormal MLE	-0.000130	0.663	↔
10_1_06	MW-10	Appendix III	Total Dissolved Solids	mg/L	11	0	0%	Parametric	Lognormal MLE	0.000207	0.052	↔
10_1_07	MW-10	Appendix III	pH, Field	su	11	0	0%	Parametric	Lognormal MLE	-0.0000264	0.544	↔
10_2_10	MW-10	Appendix IV	Barium	mg/L	11	0	0%	Parametric	Lognormal MLE	-0.000358	0.000	↓
10_2_24	MW-10	Appendix IV	Radium-226	pCi/L	11	0	0%	Parametric	Lognormal MLE	-0.000261	0.801	↔
10_2_25	MW-10	Appendix IV	Radium-226/228	pCi/L	10	0	0%	Parametric	Lognormal MLE	0.00142	0.178	↔
13_1_01	MW-13	Appendix III	Boron	mg/L	9	0	0%	Parametric	Lognormal MLE	0.000921	0.006	↑
13_1_02	MW-13	Appendix III	Calcium	mg/L	9	0	0%	Parametric	Lognormal MLE	-0.000159	0.728	↔
13_1_03	MW-13	Appendix III	Chloride	mg/L	9	2	22%	Parametric	Lognormal MLE	0.00693	0.000	↑
13_1_05	MW-13	Appendix III	Sulfate	mg/L	9	0	0%	Parametric	Lognormal MLE	0.000288	0.819	↔
13_1_06	MW-13	Appendix III	Total Dissolved Solids	mg/L	9	0	0%	Parametric	Lognormal MLE	0.000125	0.732	↔
13_1_07	MW-13	Appendix III	pH, Field	su	9	0	0%	Parametric	Lognormal MLE	0.000114	0.032	↔
13_2_10	MW-13	Appendix IV	Barium	mg/L	9	0	0%	Parametric	Lognormal MLE	0.000326	0.377	↔
13_2_25	MW-13	Appendix IV	Radium-226/228	pCi/L	8	0	0%	Parametric	Lognormal MLE	-0.00429	0.108	↔
13_3_20	MW-13	Other	Magnesium	mg/L	8	0	0%	Parametric	Lognormal MLE	0.000592	0.144	↔
13_3_23	MW-13	Other	Potassium	mg/L	8	0	0%	Parametric	Lognormal MLE	0.000186	0.341	↔
13_3_28	MW-13	Other	Sodium	mg/L	8	0	0%	Parametric	Lognormal MLE	0.00224	0.012	↔
13_5_38	MW-13	Part 115	Iron	mg/L	9	1	11%	Parametric	Lognormal MLE	0.00176	0.258	↔

(Table continues on next page)



Table 8: Trend Tests: Lognormal MLE and MK (continued)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Type	Method	Slope	p-value	Trend
7B_1_01	MW-7B	Appendix III	Boron	mg/L	11	0	0%	Parametric	Lognormal MLE	-0.0000236	0.773	↔
7B_1_02	MW-7B	Appendix III	Calcium	mg/L	11	0	0%	Parametric	Lognormal MLE	-0.000342	0.024	↔
7B_1_06	MW-7B	Appendix III	Total Dissolved Solids	mg/L	11	0	0%	Parametric	Lognormal MLE	-0.00000728	0.987	↔
7B_1_07	MW-7B	Appendix III	pH, Field	su	11	0	0%	Parametric	Lognormal MLE	-0.0000558	0.275	↔
7B_2_10	MW-7B	Appendix IV	Barium	mg/L	11	0	0%	Parametric	Lognormal MLE	-0.000493	0.027	↔
7B_2_19	MW-7B	Appendix IV	Lithium	mg/L	11	0	0%	Parametric	Lognormal MLE	0.0000348	0.840	↔
7B_2_24	MW-7B	Appendix IV	Radium-226	pCi/L	11	0	0%	Parametric	Lognormal MLE	0.000336	0.696	↔
7B_2_25	MW-7B	Appendix IV	Radium-226/228	pCi/L	11	0	0%	Parametric	Lognormal MLE	-0.00141	0.390	↔
7B_3_12	MW-7B	Other	Bicarbonate	mg/L	11	0	0%	Nonparametric	MK	0	0.257	↔
7B_3_17	MW-7B	Other	Hardness	mg/L	11	0	0%	Nonparametric	MK	-0.0327	0.008	↓
7B_3_20	MW-7B	Other	Magnesium	mg/L	11	0	0%	Parametric	Lognormal MLE	-0.000143	0.353	↔
7B_3_23	MW-7B	Other	Potassium	mg/L	11	0	0%	Nonparametric	MK	0.000298	0.235	↔
7B_3_28	MW-7B	Other	Sodium	mg/L	11	0	0%	Parametric	Lognormal MLE	0.000265	0.035	↔
7B_5_38	MW-7B	Part 115	Iron	mg/L	11	0	0%	Parametric	Lognormal MLE	0.00188	0.018	↔

Table 9: Trend Tests: Piecewise Linear-Linear

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Line 1			Line 2			Break 1	R-Squared	Overall Trend
								Slope	p-Value	Trend	Slope	p-Value	Trend			
02_1_01	MW-2	Appendix III	Boron	mg/L	15	0	0%	0.0184	0.000	↑	-0.00121	0.010	↓	2020-09-24	0.888	↔
02_1_02	MW-2	Appendix III	Calcium	mg/L	15	0	0%	0.257	0.044	↔	-0.0820	0.000	↓	2020-07-25	0.929	↔
02_1_03	MW-2	Appendix III	Chloride	mg/L	15	0	0%	0.175	0.006	↑	-0.000259	0.958	↔	2020-08-24	0.737	↔
02_1_05	MW-2	Appendix III	Sulfate	mg/L	15	0	0%	2.10	0.000	↑	-0.309	0.000	↓	2020-08-10	0.953	↔
02_1_06	MW-2	Appendix III	Total Dissolved Solids	mg/L	15	0	0%	2.79	0.001	↑	-0.456	0.000	↓	2020-08-05	0.938	↔
02_1_07	MW-2	Appendix III	pH, Field	su	16	0	0%	0.000794	0.264	↔	-0.0000135	0.936	↔	2020-10-19	0.150	↔
02_2_09	MW-2	Appendix IV	Arsenic	mg/L	16	13	81%	0.0000189	0.013	↔	-0.00000311	0.339	↔	2022-02-01	0.445	↔
02_2_10	MW-2	Appendix IV	Barium	mg/L	16	0	0%	0.0000566	0.241	↔	-0.0000317	0.179	↔	2022-06-08	0.250	↔
02_2_19	MW-2	Appendix IV	Lithium	mg/L	16	0	0%	0.000100	0.001	↑	-0.0000209	0.000	↓	2020-10-18	0.794	↔
02_2_22	MW-2	Appendix IV	Molybdenum	mg/L	16	0	0%	0.0000153	0.270	↔	0.00000310	0.092	↔	2020-09-27	0.494	↔
02_2_24	MW-2	Appendix IV	Radium-226	pCi/L	16	0	0%	-0.00274	0.467	↔	0.0000340	0.885	↔	2020-08-17	0.173	↔
02_2_25	MW-2	Appendix IV	Radium-226/228	pCi/L	16	0	0%	0.00133	0.181	↔	-0.00403	0.390	↔	2022-02-01	0.258	↔
02_2_26	MW-2	Appendix IV	Radium-228	pCi/L	16	0	0%	0.00130	0.133	↔	-0.00480	0.243	↔	2022-02-01	0.393	↔
02_2_30	MW-2	Appendix IV	Total Suspended Solids	mg/L	16	4	25%	0.0235	0.213	↔	0.0168	0.011	↔	2021-01-26	0.753	↔
02_5_38	MW-2	Part 115	Iron	mg/L	16	0	0%	-0.00768	0.323	↔	0.00101	0.004	↑	2020-06-25	0.535	↔
02_5_39	MW-2	Part 115	Nickel	mg/L	16	0	0%	0.0000750	0.000	↑	-0.00000929	0.000	↓	2020-09-08	0.877	↔
02_5_42	MW-2	Part 115	Zinc	mg/L	16	13	81%	-0.000114	0.268	↔	0.000000529	0.955	↔	2020-08-28	0.242	↔
03_1_05	MW-3	Appendix III	Sulfate	mg/L	5	0	0%	-0.0856	0.651	↔	0.122	0.660	↔	2022-03-09	0.499	↔
03_2_19	MW-3	Appendix IV	Lithium	mg/L	5	0	0%	0.0000283	0.454	↔	-0.0000476	0.412	↔	2022-07-14	0.788	↔
03_2_25	MW-3	Appendix IV	Radium-226/228	pCi/L	5	0	0%	0.00498	0.251	↔	-0.00392	0.420	↔	2022-06-26	0.934	↔
03_2_26	MW-3	Appendix IV	Radium-228	pCi/L	5	0	0%	0.00431	0.106	↔	-0.00503	0.133	↔	2022-07-23	0.990	↔
05_1_01	MW-5	Appendix III	Boron	mg/L	16	0	0%	-0.00466	0.009	↓	0.00329	0.607	↔	2022-02-01	0.519	↔

(Table continues on next page)

Table 9: Trend Tests: Piecewise Linear-Linear (continued)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Line 1			Line 2			Break 1	R-Squared	Overall Trend
								Slope	p-Value	Trend	Slope	p-Value	Trend			
05_1_02	MW-5	Appendix III	Calcium	mg/L	16	0	0%	-0.254	0.007	↓	0.118	0.724	↔	2022-02-01	0.575	↔
05_1_07	MW-5	Appendix III	pH, Field	su	17	0	0%	-0.00104	0.339	↔	0.000444	0.318	↔	2021-05-03	0.167	↔
05_2_10	MW-5	Appendix IV	Barium	mg/L	17	0	0%	-0.000100	0.015	↔	0.00000317	0.678	↔	2020-11-05	0.523	↔
05_2_16	MW-5	Appendix IV	Cobalt	mg/L	17	16	94%	-0.0000357	0.000	↓	0.00000000000851	0.365	↔	2020-05-26	1.000	↔
05_2_18	MW-5	Appendix IV	Lead	mg/L	17	14	82%	0.00000936	0.092	↔	-0.0000149	0.074	↔	2022-01-31	0.370	↔
05_2_19	MW-5	Appendix IV	Lithium	mg/L	17	0	0%	-0.0000467	0.126	↔	0.000109	0.380	↔	2022-02-01	0.266	↔
05_2_22	MW-5	Appendix IV	Molybdenum	mg/L	17	0	0%	-0.000209	0.031	↔	0.0000174	0.352	↔	2020-10-25	0.388	↔
05_2_24	MW-5	Appendix IV	Radium-226	pCi/L	16	0	0%	-0.000988	0.428	↔	0.000533	0.929	↔	2022-02-01	0.071	↔
05_2_25	MW-5	Appendix IV	Radium-226/228	pCi/L	16	0	0%	0.00747	0.223	↔	-0.00152	0.418	↔	2020-11-26	0.169	↔
05_2_26	MW-5	Appendix IV	Radium-228	pCi/L	16	0	0%	0.00535	0.255	↔	-0.000921	0.522	↔	2021-01-26	0.223	↔
05_2_30	MW-5	Appendix IV	Total Suspended Solids	mg/L	16	0	0%	-5.00	0.000	↓	0.00491	0.801	↔	2020-05-26	0.786	↔
05_5_38	MW-5	Part 115	Iron	mg/L	17	2	12%	-0.217	0.005	↓	0.000369	0.721	↔	2020-05-31	0.690	↔
05_5_39	MW-5	Part 115	Nickel	mg/L	17	0	0%	-0.0000238	0.130	↔	-0.00000547	0.187	↔	2020-12-16	0.577	↔
05_5_42	MW-5	Part 115	Zinc	mg/L	17	5	29%	0.0000731	0.580	↔	-0.0000314	0.378	↔	2021-01-26	0.082	↔
06_1_01	MW-6	Appendix III	Boron	mg/L	15	0	0%	0.00324	0.061	↔	-0.000180	0.248	↔	2020-09-14	0.569	↔
06_1_02	MW-6	Appendix III	Calcium	mg/L	15	0	0%	0.264	0.172	↔	-0.00592	0.737	↔	2020-09-11	0.399	↔
06_1_03	MW-6	Appendix III	Chloride	mg/L	15	0	0%	0.111	0.129	↔	-0.00528	0.428	↔	2020-09-01	0.391	↔
06_1_05	MW-6	Appendix III	Sulfate	mg/L	15	0	0%	0.836	0.129	↔	-0.0621	0.226	↔	2020-08-26	0.368	↔
06_1_06	MW-6	Appendix III	Total Dissolved Solids	mg/L	15	0	0%	1.77	0.077	↔	-0.0940	0.300	↔	2020-08-28	0.451	↔
06_1_07	MW-6	Appendix III	pH, Field	su	16	0	0%	0.00261	0.184	↔	-0.000118	0.504	↔	2020-08-25	0.283	↔
06_2_10	MW-6	Appendix IV	Barium	mg/L	16	0	0%	0.0000724	0.074	↔	-0.0000158	0.006	↓	2020-09-20	0.558	↔
06_2_19	MW-6	Appendix IV	Lithium	mg/L	16	0	0%	0.000120	0.004	↑	-0.00000673	0.230	↔	2020-10-02	0.666	↔
06_2_22	MW-6	Appendix IV	Molybdenum	mg/L	16	0	0%	0.0000786	0.164	↔	-0.00000595	0.248	↔	2020-08-24	0.306	↔
06_2_25	MW-6	Appendix IV	Radium-226/228	pCi/L	16	0	0%	0.00547	0.037	↔	-0.00130	0.268	↔	2021-03-04	0.452	↔
06_2_26	MW-6	Appendix IV	Radium-228	pCi/L	16	0	0%	0.00352	0.026	↔	-0.00843	0.005	↓	2022-01-18	0.605	↔
06_2_30	MW-6	Appendix IV	Total Suspended Solids	mg/L	16	12	75%	0.0258	0.089	↔	-0.0428	0.104	↔	2022-01-31	0.389	↔
06_5_38	MW-6	Part 115	Iron	mg/L	16	8	50%	-0.000893	0.027	↔	0.00000529	0.874	↔	2020-09-04	0.634	↔
06_5_39	MW-6	Part 115	Nickel	mg/L	16	2	12%	0.0000357	0.055	↔	-0.00000185	0.014	↔	2020-07-10	0.619	↔
06_5_42	MW-6	Part 115	Zinc	mg/L	16	15	94%	-0.000104	0.215	↔	0.000000000000228	1.000	↔	2020-08-18	0.253	↔
07_1_01	MW-7	Appendix III	Boron	mg/L	10	0	0%	0.00260	0.113	↔	-0.00333	0.018	↔	2022-02-16	0.718	↔
07_1_02	MW-7	Appendix III	Calcium	mg/L	10	0	0%	0.115	0.036	↔	-0.112	0.175	↔	2022-02-17	0.690	↔
07_1_03	MW-7	Appendix III	Chloride	mg/L	10	0	0%	0.00916	0.922	↔	0.0325	0.117	↔	2021-11-01	0.458	↔
07_1_04	MW-7	Appendix III	Fluoride	mg/L	10	9	90%	-0.00148	0.499	↔	0.000597	0.388	↔	2021-12-06	0.208	↔
07_1_05	MW-7	Appendix III	Sulfate	mg/L	10	0	0%	0.210	0.065	↔	-0.127	0.453	↔	2022-02-17	0.495	↔
07_1_06	MW-7	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	0.509	0.029	↔	-0.376	0.260	↔	2022-02-17	0.644	↔
07_1_07	MW-7	Appendix III	pH, Field	su	10	0	0%	-0.0223	0.002	↓	0.000344	0.189	↔	2021-07-20	0.875	↔
07_2_04	MW-7	Appendix IV	Fluoride	mg/L	10	9	90%	-0.00148	0.499	↔	0.000597	0.388	↔	2021-12-06	0.208	↔
07_2_09	MW-7	Appendix IV	Arsenic	mg/L	10	0	0%	0.00000414	0.873	↔	-0.00000498	0.009	↓	2021-08-23	0.734	↔
07_2_10	MW-7	Appendix IV	Barium	mg/L	10	0	0%	0.00000498	0.809	↔	-0.0000260	0.466	↔	2022-02-17	0.380	↔
07_2_19	MW-7	Appendix IV	Lithium	mg/L	10	0	0%	0.0000647	0.020	↔	-0.0000982	0.001	↓	2022-02-16	0.911	↔
07_2_22	MW-7	Appendix IV	Molybdenum	mg/L	10	0	0%	0.000165	0.472	↔	-0.000352	0.013	↔	2021-12-11	0.761	↔
07_2_24	MW-7	Appendix IV	Radium-226	pCi/L	10	0	0%	0.00396	0.582	↔	-0.00127	0.570	↔	2021-12-06	0.132	↔

(Table continues on next page)



Table 9: Trend Tests: Piecewise Linear-Linear *(continued)*

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Line 1			Line 2			Break 1	R-Squared	Overall Trend
								Slope	p-Value	Trend	Slope	p-Value	Trend			
07_2_25	MW-7	Appendix IV	Radium-226/228	pCi/L	10	0	0%	-0.00578	0.386	↔	0.0189	0.121	↔	2022-06-12	0.485	↔
07_2_26	MW-7	Appendix IV	Radium-228	pCi/L	10	0	0%	-0.0133	0.143	↔	0.0104	0.032	↔	2022-01-03	0.641	↔
07_2_30	MW-7	Appendix IV	Total Suspended Solids	mg/L	10	9	90%	-0.00435	0.255	↔	0.00260	0.346	↔	2022-02-16	0.316	↔
07_5_38	MW-7	Part 115	Iron	mg/L	10	0	0%	0.00382	0.136	↔	-0.00328	0.091	↔	2022-02-16	0.539	↔
07_5_42	MW-7	Part 115	Zinc	mg/L	10	7	70%	0.0000571	0.678	↔	-0.0000556	0.448	↔	2021-07-28	0.127	↔
08_1_01	MW-8	Appendix III	Boron	mg/L	10	1	10%	-0.000325	0.286	↔	0.000104	0.629	↔	2022-02-16	0.273	↔
08_1_02	MW-8	Appendix III	Calcium	mg/L	10	0	0%	0.0339	0.191	↔	0.0121	0.503	↔	2022-02-02	0.562	↔
08_1_03	MW-8	Appendix III	Chloride	mg/L	10	2	20%	-0.0575	0.516	↔	0.0474	0.749	↔	2022-02-23	0.102	↔
08_1_04	MW-8	Appendix III	Fluoride	mg/L	10	9	90%	-0.00211	0.499	↔	0.000848	0.388	↔	2021-12-06	0.208	↔
08_1_05	MW-8	Appendix III	Sulfate	mg/L	10	0	0%	-0.0879	0.138	↔	0.0895	0.344	↔	2022-04-20	0.400	↔
08_1_06	MW-8	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	-0.0512	0.528	↔	0.253	0.099	↔	2022-06-09	0.562	↔
08_2_04	MW-8	Appendix IV	Fluoride	mg/L	10	9	90%	-0.00211	0.499	↔	0.000848	0.388	↔	2021-12-06	0.208	↔
08_2_10	MW-8	Appendix IV	Barium	mg/L	10	0	0%	-0.0000339	0.020	↔	0.0000158	0.419	↔	2022-03-12	0.650	↔
08_2_19	MW-8	Appendix IV	Lithium	mg/L	10	5	50%	-0.0000122	0.404	↔	0.0000105	0.665	↔	2022-06-06	0.175	↔
08_2_24	MW-8	Appendix IV	Radium-226	pCi/L	10	0	0%	0.00568	0.156	↔	-0.00343	0.083	↔	2022-01-10	0.544	↔
08_2_25	MW-8	Appendix IV	Radium-226/228	pCi/L	10	0	0%	0.0213	0.059	↔	-0.00880	0.087	↔	2022-01-10	0.658	↔
08_2_26	MW-8	Appendix IV	Radium-228	pCi/L	10	0	0%	0.0124	0.050	↔	-0.0167	0.098	↔	2022-06-02	0.623	↔
08_2_30	MW-8	Appendix IV	Total Suspended Solids	mg/L	10	9	90%	-0.00224	0.499	↔	0.000901	0.388	↔	2021-12-06	0.208	↔
09_1_02	MW-9	Appendix III	Calcium	mg/L	10	0	0%	0.100	0.089	↔	-0.0111	0.498	↔	2021-11-02	0.526	↔
09_1_03	MW-9	Appendix III	Chloride	mg/L	10	9	90%	-0.00870	0.499	↔	0.00351	0.388	↔	2021-12-06	0.208	↔
09_1_04	MW-9	Appendix III	Fluoride	mg/L	10	9	90%	-0.00216	0.499	↔	0.000872	0.388	↔	2021-12-06	0.208	↔
09_1_05	MW-9	Appendix III	Sulfate	mg/L	10	8	80%	-0.00318	0.499	↔	0.00128	0.388	↔	2021-12-06	0.208	↔
09_1_06	MW-9	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	0.127	0.119	↔	-0.00253	0.962	↔	2022-02-16	0.546	↔
09_1_07	MW-9	Appendix III	pH, Field	su	10	0	0%	-0.0154	0.004	↓	0.000504	0.028	↔	2021-07-21	0.861	↔
09_2_04	MW-9	Appendix IV	Fluoride	mg/L	10	9	90%	-0.00216	0.499	↔	0.000872	0.388	↔	2021-12-06	0.208	↔
09_2_10	MW-9	Appendix IV	Barium	mg/L	10	0	0%	-0.0000543	0.202	↔	0.0000526	0.444	↔	2022-06-09	0.352	↔
09_2_19	MW-9	Appendix IV	Lithium	mg/L	10	10	100%	-0.000143	0.000	↓	0.0000000000000104	0.380	↔	2021-07-20	1.000	↔
09_2_24	MW-9	Appendix IV	Radium-226	pCi/L	7	0	0%	0.00411	0.622	↔	-0.00241	0.255	↔	2021-12-06	0.434	↔
09_2_25	MW-9	Appendix IV	Radium-226/228	pCi/L	9	0	0%	0.00566	0.394	↔	0.00108	0.719	↔	2021-12-09	0.324	↔
09_5_42	MW-9	Part 115	Zinc	mg/L	10	9	90%	0.00000895	0.379	↔	-0.00000361	0.447	↔	2021-12-07	0.208	↔
10_1_01	MW-10	Appendix III	Boron	mg/L	11	0	0%	0.0000651	0.498	↔	-0.0000315	0.069	↔	2021-11-01	0.423	↔
10_1_03	MW-10	Appendix III	Chloride	mg/L	11	10	91%	-0.00871	0.473	↔	0.00313	0.320	↔	2021-12-06	0.210	↔
10_1_04	MW-10	Appendix III	Fluoride	mg/L	11	10	91%	-0.00205	0.473	↔	0.000736	0.320	↔	2021-12-06	0.210	↔
10_1_05	MW-10	Appendix III	Sulfate	mg/L	11	0	0%	0.0164	0.328	↔	-0.00944	0.363	↔	2022-01-11	0.239	↔
10_2_04	MW-10	Appendix IV	Fluoride	mg/L	11	10	91%	-0.00205	0.473	↔	0.000736	0.320	↔	2021-12-06	0.210	↔
10_2_10	MW-10	Appendix IV	Barium	mg/L	11	0	0%	-0.0000190	0.100	↔	-0.0000526	0.732	↔	2022-07-13	0.723	↔
10_2_19	MW-10	Appendix IV	Lithium	mg/L	11	11	100%	-0.000143	0.000	↓	0.00000000000000833	0.350	↔	2021-07-20	1.000	↔
10_2_24	MW-10	Appendix IV	Radium-226	pCi/L	11	0	0%	0.00458	0.147	↔	-0.00221	0.083	↔	2022-01-10	0.497	↔
10_2_25	MW-10	Appendix IV	Radium-226/228	pCi/L	10	0	0%	0.00710	0.257	↔	-0.00126	0.500	↔	2021-12-06	0.400	↔
10_5_42	MW-10	Part 115	Zinc	mg/L	11	9	82%	0.0000347	0.210	↔	-0.0000131	0.432	↔	2022-01-11	0.272	↔
13_1_02	MW-13	Appendix III	Calcium	mg/L	9	0	0%	-0.603	0.024	↔	0.128	0.046	↔	2022-05-19	0.819	↔
13_1_03	MW-13	Appendix III	Chloride	mg/L	9	2	22%	0.0760	0.007	↑	0.153	0.002	↑	2022-08-17	0.974	↑

(Table continues on next page)



Table 9: Trend Tests: Piecewise Linear-Linear (continued)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Line 1			Line 2			Break 1	R-Squared	Overall Trend
								Slope	p-Value	Trend	Slope	p-Value	Trend			
13_1_05	MW-13	Appendix III	Sulfate	mg/L	9	0	0%	-0.148	0.824	↔	0.0277	0.700	↔	2022-05-03	0.067	↔
13_1_06	MW-13	Appendix III	Total Dissolved Solids	mg/L	9	0	0%	-2.03	0.006	↓	0.419	0.014	↔	2022-05-05	0.879	↔
13_1_07	MW-13	Appendix III	pH, Field	su	9	0	0%	0.00207	0.019	↔	-0.00131	0.193	↔	2022-09-06	0.782	↔
13_2_10	MW-13	Appendix IV	Barium	mg/L	9	0	0%	-0.000114	0.306	↔	0.0000250	0.068	↔	2022-04-25	0.607	↔
13_2_25	MW-13	Appendix IV	Radium-226/228	pCi/L	8	0	0%	0.0509	0.108	↔	-0.00766	0.071	↔	2022-04-01	0.724	↔
13_3_12	MW-13	Other	Bicarbonate	mg/L	7	0	0%	-0.226	0.158	↔	0.722	0.004	↑	2022-09-01	0.970	↔
13_3_17	MW-13	Other	Hardness	mg/L	7	0	0%	0.143	0.493	↔	0.819	0.058	↔	2022-09-27	0.910	↔
13_3_20	MW-13	Other	Magnesium	mg/L	8	0	0%	-0.189	0.058	↔	0.0307	0.028	↔	2022-05-07	0.820	↔
13_3_23	MW-13	Other	Potassium	mg/L	8	0	0%	0.000464	0.210	↔	-0.000476	0.481	↔	2022-10-02	0.420	↔
13_3_28	MW-13	Other	Sodium	mg/L	8	0	0%	0.0178	0.114	↔	-0.00629	0.544	↔	2022-09-19	0.686	↔
13_5_38	MW-13	Part 115	Iron	mg/L	9	1	11%	-0.0000189	0.888	↔	0.000199	0.558	↔	2022-09-21	0.178	↔
13_5_42	MW-13	Part 115	Zinc	mg/L	9	8	89%	0.0000171	0.489	↔	-0.0000123	0.319	↔	2022-07-12	0.279	↔
7B_1_02	MW-7B	Appendix III	Calcium	mg/L	11	0	0%	-0.0247	0.048	↔	0.000607	0.723	↔	2022-05-06	0.763	↔
7B_1_06	MW-7B	Appendix III	Total Dissolved Solids	mg/L	11	0	0%	0.0173	0.600	↔	-0.0667	0.556	↔	2022-10-23	0.100	↔
7B_1_07	MW-7B	Appendix III	pH, Field	su	11	0	0%	-0.00321	0.012	↔	0.00160	0.030	↔	2022-07-14	0.776	↔
7B_2_18	MW-7B	Appendix IV	Lead	mg/L	11	10	91%	0.0000374	0.441	↔	-0.0000210	0.199	↔	2022-06-22	0.297	↔
7B_2_24	MW-7B	Appendix IV	Radium-226	pCi/L	11	0	0%	-0.00173	0.781	↔	0.000653	0.514	↔	2022-05-09	0.074	↔
7B_3_12	MW-7B	Other	Bicarbonate	mg/L	11	0	0%	-0.0236	0.535	↔	0.219	0.015	↔	2022-09-23	0.719	↔
7B_3_17	MW-7B	Other	Hardness	mg/L	11	0	0%	-0.103	0.130	↔	-0.00411	0.915	↔	2022-07-04	0.564	↔
7B_3_20	MW-7B	Other	Magnesium	mg/L	11	0	0%	-0.00486	0.223	↔	0.000671	0.284	↔	2022-05-18	0.548	↔
7B_3_23	MW-7B	Other	Potassium	mg/L	11	0	0%	-0.00345	0.678	↔	0.00172	0.216	↔	2022-05-18	0.225	↔
7B_3_28	MW-7B	Other	Sodium	mg/L	11	0	0%	-0.0604	0.747	↔	0.0592	0.077	↔	2022-05-18	0.425	↔
7B_5_38	MW-7B	Part 115	Iron	mg/L	11	0	0%	-0.000857	0.001	↓	0.000181	0.000	↑	2022-04-15	0.936	↔

Table 10: Trend Tests: Piecewise Linear-Linear-Linear

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Line 1			Line 2			Line 3			Break 1	Break 2	R-Squared	Overall Trend
								Slope	p-Value	Trend	Slope	p-Value	Trend	Slope	p-Value	Trend				
02_1_03	MW-2	Appendix III	Chloride	mg/L	15	0	0%	0.173	0.005	↑	-0.0278	0.205	↔	0.0146	0.180	↔	2020-09-09	2021-06-25	0.820	↔
02_1_07	MW-2	Appendix III	pH, Field	su	16	0	0%	0.00119	0.085	↔	-0.000743	0.417	↔	0.000409	0.161	↔	2020-10-19	2021-07-13	0.401	↔
02_2_09	MW-2	Appendix IV	Arsenic	mg/L	16	13	81%	-0.00000116	0.623	↔	0.00000278	0.038	↔	-0.00000377	0.247	↔	2020-10-20	2022-02-01	0.554	↔
02_2_10	MW-2	Appendix IV	Barium	mg/L	16	0	0%	-0.00000649	0.687	↔	0.0000124	0.302	↔	-0.0000337	0.177	↔	2020-12-17	2022-05-01	0.320	↔
02_2_19	MW-2	Appendix IV	Lithium	mg/L	16	0	0%	0.000102	0.001	↑	-0.0000227	0.036	↔	-0.00000935	0.746	↔	2020-10-18	2022-07-29	0.799	↔
02_2_22	MW-2	Appendix IV	Molybdenum	mg/L	16	0	0%	0.0000197	0.024	↔	-0.0000244	0.310	↔	0.00000765	0.012	↔	2020-11-03	2021-02-26	0.693	↔
02_2_24	MW-2	Appendix IV	Radium-226	pCi/L	16	0	0%	-0.00320	0.255	↔	0.000451	0.368	↔	-0.000867	0.632	↔	2020-08-20	2022-02-01	0.272	↔
02_2_25	MW-2	Appendix IV	Radium-226/228	pCi/L	16	0	0%	-0.0190	0.524	↔	0.00206	0.062	↔	-0.00469	0.298	↔	2020-06-20	2022-02-01	0.451	↔
02_2_30	MW-2	Appendix IV	Total Suspended Solids	mg/L	16	4	25%	0.0415	0.506	↔	0.0137	0.250	↔	0.0244	0.121	↔	2020-08-17	2022-01-08	0.766	↔
02_5_38	MW-2	Part 115	Iron	mg/L	16	0	0%	-0.00174	0.305	↔	0.00209	0.172	↔	-0.000714	0.530	↔	2020-10-24	2022-01-31	0.631	↔
02_5_39	MW-2	Part 115	Nickel	mg/L	16	0	0%	0.0000722	0.001	↑	-0.00000670	0.167	↔	-0.0000148	0.020	↔	2020-09-08	2022-01-31	0.893	↔
05_1_01	MW-5	Appendix III	Boron	mg/L	16	0	0%	0.00282	0.593	↔	-0.00810	0.265	↔	0.00520	0.109	↔	2020-11-29	2022-01-31	0.639	↔

(Table continues on next page)



Table 10: Trend Tests: Piecewise Linear-Linear-Linear (continued)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Line 1			Line 2			Line 3			Break 1	Break 2	R-Squared	Overall Trend
								Slope	p-Value	Trend	Slope	p-Value	Trend	Slope	p-Value	Trend				
05_1_02	MW-5	Appendix III	Calcium	mg/L	16	0	0%	0.277	0.341	↔	-0.398	0.009	↓	0.211	0.482	↔	2020-10-13	2022-02-01	0.721	↔
05_1_03	MW-5	Appendix III	Chloride	mg/L	15	0	0%	0.0382	0.385	↔	-0.0618	0.009	↓	0.0270	0.606	↔	2020-10-15	2022-02-01	0.755	↔
05_1_07	MW-5	Appendix III	pH, Field	su	17	0	0%	-0.00135	0.226	↔	0.00137	0.331	↔	-0.00143	0.424	↔	2021-05-03	2022-06-26	0.283	↔
05_2_09	MW-5	Appendix IV	Arsenic	mg/L	17	12	71%	-0.0000644	0.150	↔	0.0000158	0.013	↔	-0.0000114	0.121	↔	2021-04-02	2022-02-01	0.601	↔
05_2_10	MW-5	Appendix IV	Barium	mg/L	17	0	0%	-0.000112	0.002	↓	0.0000409	0.068	↔	-0.0000373	0.318	↔	2020-12-09	2022-02-01	0.703	↔
05_2_15	MW-5	Appendix IV	Chromium	mg/L	17	15	88%	-0.000177	0.000	↓	0.00000217	0.069	↔	-0.00000309	0.045	↔	2020-05-27	2022-01-31	0.925	↔
05_2_16	MW-5	Appendix IV	Cobalt	mg/L	17	16	94%	-0.0000357	0.000	↓	0.0000000000350	0.119	↔	-0.0000000000132	0.624	↔	2020-05-26	2020-10-27	1.000	↔
05_2_18	MW-5	Appendix IV	Lead	mg/L	17	14	82%	-0.0000172	0.511	↔	0.0000140	0.010	↔	-0.0000183	0.232	↔	2020-09-10	2022-02-01	0.521	↔
05_2_24	MW-5	Appendix IV	Radium-226	pCi/L	16	0	0%	-0.00943	0.465	↔	0.0114	0.487	↔	-0.00144	0.201	↔	2020-08-04	2020-11-05	0.230	↔
05_2_26	MW-5	Appendix IV	Radium-228	pCi/L	16	0	0%	0.000272	0.973	↔	0.0105	0.759	↔	-0.00148	0.339	↔	2020-09-15	2021-01-23	0.282	↔
05_5_37	MW-5	Part 115	Copper	mg/L	17	12	71%	0.000110	0.517	↔	-0.0000915	0.301	↔	0.00000272	0.725	↔	2020-07-20	2020-10-27	0.182	↔
05_5_38	MW-5	Part 115	Iron	mg/L	17	2	12%	-0.217	0.010	↓	0.0151	0.832	↔	0.000164	0.891	↔	2020-06-04	2020-08-10	0.697	↔
05_5_39	MW-5	Part 115	Nickel	mg/L	17	0	0%	-0.000107	0.172	↔	0.0000714	0.636	↔	-0.00000777	0.012	↔	2020-07-15	2020-08-19	0.645	↔
05_5_41	MW-5	Part 115	Vanadium	mg/L	17	15	88%	-0.000253	0.000	↓	0.00000426	0.014	↔	-0.00000611	0.287	↔	2020-05-27	2022-02-01	0.865	↔
05_5_42	MW-5	Part 115	Zinc	mg/L	17	5	29%	-0.000193	0.349	↔	0.000382	0.651	↔	-0.0000619	0.072	↔	2020-09-26	2021-01-26	0.364	↔
06_1_02	MW-6	Appendix III	Calcium	mg/L	15	0	0%	0.260	0.000	↑	-0.433	0.003	↓	0.0816	0.002	↑	2020-12-28	2021-05-27	0.891	↔
06_1_03	MW-6	Appendix III	Chloride	mg/L	15	0	0%	0.131	0.000	↑	-0.0506	0.000	↓	0.0404	0.002	↑	2020-09-20	2021-10-07	0.921	↔
06_1_05	MW-6	Appendix III	Sulfate	mg/L	15	0	0%	0.968	0.000	↑	-0.377	0.001	↓	0.287	0.006	↑	2020-09-15	2021-10-22	0.889	↔
06_1_06	MW-6	Appendix III	Total Dissolved Solids	mg/L	15	0	0%	1.93	0.001	↑	-0.904	0.003	↓	0.307	0.016	↔	2020-09-22	2021-06-12	0.873	↔
06_2_10	MW-6	Appendix IV	Barium	mg/L	16	0	0%	0.0000754	0.007	↑	-0.0000540	0.041	↔	0.00000177	0.844	↔	2020-10-18	2021-06-21	0.748	↔
06_2_19	MW-6	Appendix IV	Lithium	mg/L	16	0	0%	0.000126	0.000	↑	-0.0000356	0.061	↔	0.0000271	0.065	↔	2020-10-20	2021-11-27	0.849	↔
06_2_30	MW-6	Appendix IV	Total Suspended Solids	mg/L	16	12	75%	-0.0263	0.401	↔	0.0453	0.064	↔	-0.0562	0.235	↔	2020-11-10	2022-02-01	0.561	↔
06_5_38	MW-6	Part 115	Iron	mg/L	16	8	50%	-0.000893	0.043	↔	0.0000262	0.714	↔	-0.0000367	0.889	↔	2020-09-07	2022-02-01	0.639	↔
06_5_39	MW-6	Part 115	Nickel	mg/L	16	2	12%	0.0000291	0.018	↔	-0.0000118	0.278	↔	-0.000000795	0.451	↔	2020-08-13	2020-12-14	0.703	↔
07_1_01	MW-7	Appendix III	Boron	mg/L	10	0	0%	0.000281	0.945	↔	0.00416	0.328	↔	-0.00362	0.178	↔	2021-09-30	2022-02-17	0.753	↔
07_1_02	MW-7	Appendix III	Calcium	mg/L	10	0	0%	-0.00473	0.984	↔	0.184	0.126	↔	-0.125	0.192	↔	2021-09-23	2022-02-17	0.750	↔
07_1_04	MW-7	Appendix III	Fluoride	mg/L	10	9	90%	0.000972	0.867	↔	-0.00270	0.817	↔	0.000693	0.413	↔	2021-08-25	2021-12-06	0.259	↔
07_1_07	MW-7	Appendix III	pH, Field	su	10	0	0%	-0.0221	0.015	↔	0.0000184	0.997	↔	0.000371	0.335	↔	2021-07-20	2021-10-17	0.876	↔
07_2_04	MW-7	Appendix IV	Fluoride	mg/L	10	9	90%	0.000972	0.867	↔	-0.00270	0.817	↔	0.000693	0.413	↔	2021-08-25	2021-12-06	0.259	↔
07_2_09	MW-7	Appendix IV	Arsenic	mg/L	10	0	0%	0.00000992	0.730	↔	-0.00000747	0.171	↔	-0.000000488	0.926	↔	2021-08-16	2022-07-05	0.794	↔
07_2_10	MW-7	Appendix IV	Barium	mg/L	10	0	0%	-0.0000743	0.465	↔	0.0000430	0.502	↔	-0.0000333	0.140	↔	2021-09-14	2022-02-16	0.574	↔
07_2_19	MW-7	Appendix IV	Lithium	mg/L	10	0	0%	0.0000525	0.421	↔	0.0000770	0.453	↔	-0.000100	0.005	↓	2021-10-19	2022-02-16	0.913	↔
07_2_30	MW-7	Appendix IV	Total Suspended Solids	mg/L	10	9	90%	0.00319	0.722	↔	-0.0119	0.417	↔	0.00387	0.210	↔	2021-10-18	2022-02-16	0.525	↔
08_1_01	MW-8	Appendix III	Boron	mg/L	10	1	10%	0.000577	0.569	↔	-0.00113	0.291	↔	0.000153	0.360	↔	2021-09-27	2022-01-10	0.612	↔
08_1_03	MW-8	Appendix III	Chloride	mg/L	10	2	20%	0.282	0.264	↔	-0.350	0.638	↔	0.0668	0.289	↔	2021-09-28	2022-01-10	0.520	↔
08_1_04	MW-8	Appendix III	Fluoride	mg/L	10	9	90%	-0.00337	0.226	↔	0.00662	0.643	↔	-0.000585	0.831	↔	2021-12-07	2022-03-07	0.400	↔
08_1_06	MW-8	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	-0.229	0.801	↔	-0.0189	0.901	↔	0.253	0.181	↔	2021-08-06	2022-06-30	0.575	↔
08_2_04	MW-8	Appendix IV	Fluoride	mg/L	10	9	90%	-0.00337	0.226	↔	0.00662	0.643	↔	-0.000585	0.831	↔	2021-12-07	2022-03-07	0.400	↔
08_2_19	MW-8	Appendix IV	Lithium	mg/L	10	5	50%	0.0000257	0.577	↔	-0.0000571	0.442	↔	0.00000574	0.685	↔	2021-10-10	2022-01-14	0.372	↔
08_2_25	MW-8	Appendix IV	Radium-226/228	pCi/L	10	0	0%	-0.0213	0.716	↔	0.0315	0.141	↔	-0.0102	0.079	↔	2021-08-10	2022-01-10	0.770	↔
08_2_26	MW-8	Appendix IV	Radium-228	pCi/L	10	0	0%	-0.0143	0.802	↔	0.0163	0.143	↔	-0.0167	0.164	↔	2021-07-31	2022-05-13	0.668	↔
08_2_30	MW-8	Appendix IV	Total Suspended Solids	mg/L	10	9	90%	0.00108	0.901	↔	-0.00553	0.750	↔	0.00111	0.379	↔	2021-09-19	2021-12-06	0.283	↔

(Table continues on next page)



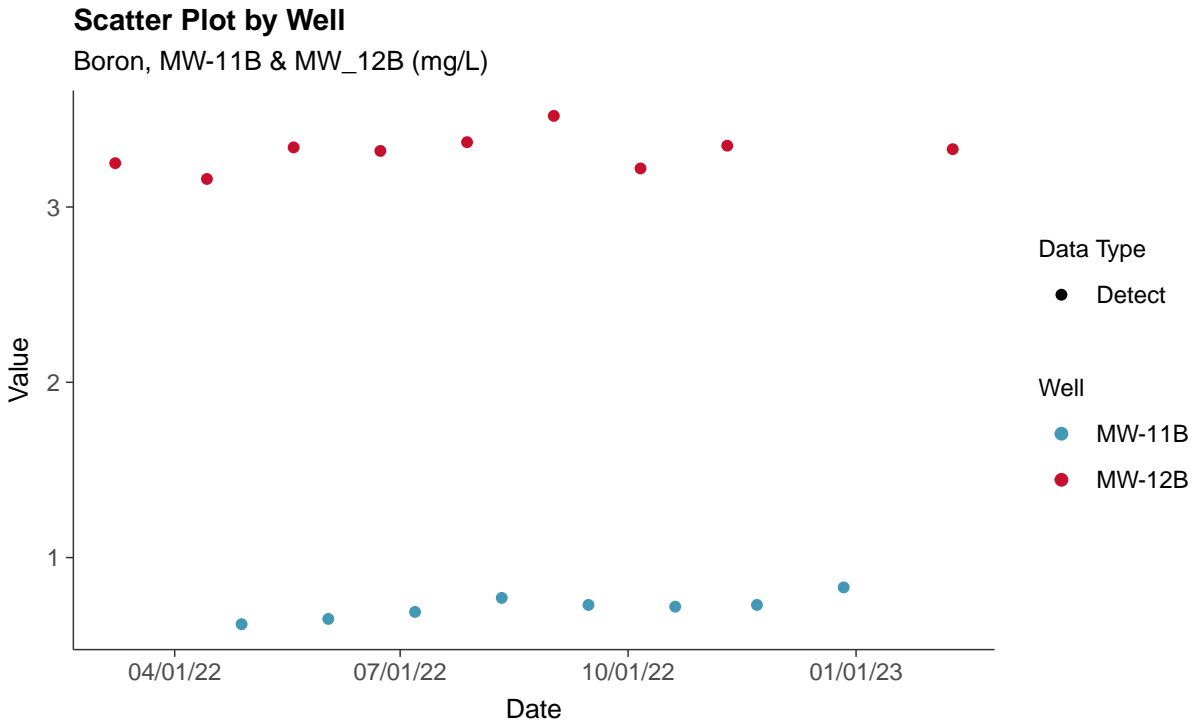
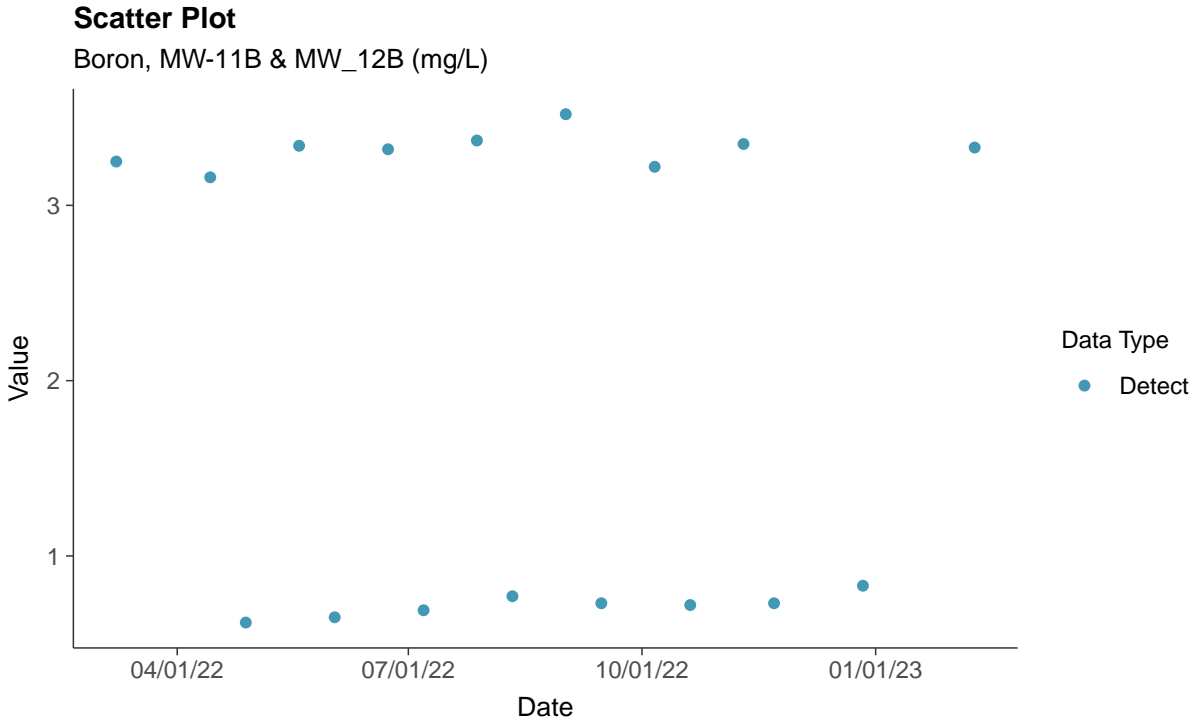
Table 10: Trend Tests: Piecewise Linear-Linear-Linear (continued)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Line 1			Line 2			Line 3			Break 1	Break 2	R-Squared	Overall Trend
								Slope	p-Value	Trend	Slope	p-Value	Trend	Slope	p-Value	Trend				
09_1_03	MW-9	Appendix III	Chloride	mg/L	10	9	90%	0.00420	0.901	↔	-0.0215	0.750	↔	0.00434	0.379	↔	2021-09-19	2021-12-06	0.283	↔
09_1_05	MW-9	Appendix III	Sulfate	mg/L	10	8	80%	-0.00429	0.321	↔	0.00546	0.810	↔	-0.00143	0.746	↔	2021-12-07	2022-05-16	0.320	↔
09_2_10	MW-9	Appendix IV	Barium	mg/L	10	0	0%	0.0000286	0.743	↔	-0.0000286	0.476	↔	0.0000287	0.467	↔	2021-11-14	2022-01-19	0.530	↔
09_5_42	MW-9	Part 115	Zinc	mg/L	10	9	90%	-0.0000587	0.867	↔	0.0000163	0.817	↔	-0.0000419	0.413	↔	2021-08-25	2021-12-06	0.259	↔
10_1_01	MW-10	Appendix III	Boron	mg/L	11	0	0%	0.0000930	0.254	↔	-0.000103	0.762	↔	-0.0000181	0.531	↔	2021-11-02	2022-02-05	0.483	↔
10_1_04	MW-10	Appendix III	Fluoride	mg/L	11	10	91%	-0.00278	0.392	↔	0.00336	0.624	↔	-0.000832	0.710	↔	2021-12-06	2022-05-21	0.320	↔
10_1_06	MW-10	Appendix III	Total Dissolved Solids	mg/L	11	0	0%	-0.454	0.399	↔	0.623	0.706	↔	0.0293	0.787	↔	2021-09-28	2022-01-10	0.490	↔
10_2_04	MW-10	Appendix IV	Fluoride	mg/L	11	10	91%	-0.00278	0.392	↔	0.00336	0.624	↔	-0.000832	0.710	↔	2021-12-06	2022-05-21	0.320	↔
10_2_10	MW-10	Appendix IV	Barium	mg/L	11	0	0%	0.000000000000326	1.000	↔	-0.0000857	0.388	↔	-0.00000558	0.494	↔	2021-12-02	2022-02-02	0.810	↔
10_2_19	MW-10	Appendix IV	Lithium	mg/L	11	11	100%	-0.000143	0.000	↓	0.0000000000000838	0.354	↔	-0.0000000000000403	0.684	↔	2021-07-20	2021-11-20	1.000	↔
10_2_25	MW-10	Appendix IV	Radium-226/228	pCi/L	10	0	0%	-0.0114	0.693	↔	0.0128	0.205	↔	-0.00175	0.459	↔	2021-08-09	2021-12-07	0.552	↔
10_5_42	MW-10	Part 115	Zinc	mg/L	11	9	82%	-0.000000000000294	1.000	↔	0.0000414	0.448	↔	-0.0000211	0.587	↔	2021-09-25	2022-03-13	0.239	↔
13_1_02	MW-13	Appendix III	Calcium	mg/L	9	0	0%	-0.602	0.031	↔	-0.00308	0.977	↔	0.295	0.066	↔	2022-05-04	2022-10-19	0.926	↔
13_2_10	MW-13	Appendix IV	Barium	mg/L	9	0	0%	-0.000143	0.005	↓	0.000114	0.056	↔	-0.00000204	0.793	↔	2022-05-09	2022-07-23	0.967	↔
13_2_25	MW-13	Appendix IV	Radium-226/228	pCi/L	8	0	0%	0.0515	0.047	↔	-0.0267	0.044	↔	-0.00150	0.641	↔	2022-04-26	2022-08-17	0.970	↔
13_5_38	MW-13	Part 115	Iron	mg/L	9	1	11%	0.000308	0.395	↔	-0.000495	0.649	↔	0.000246	0.375	↔	2022-06-08	2022-08-19	0.470	↔
7B_2_18	MW-7B	Appendix IV	Lead	mg/L	11	10	91%	0.0000587	0.246	↔	-0.0000782	0.204	↔	0.00000735	0.810	↔	2022-06-22	2022-09-07	0.523	↔
7B_2_24	MW-7B	Appendix IV	Radium-226	pCi/L	11	0	0%	-0.00392	0.562	↔	0.00210	0.491	↔	-0.00162	0.533	↔	2022-05-04	2022-10-05	0.261	↔
7B_3_12	MW-7B	Other	Bicarbonate	mg/L	11	0	0%	0.143	0.352	↔	-0.571	0.034	↔	0.153	0.005	↑	2022-05-18	2022-06-23	0.878	↔
7B_3_23	MW-7B	Other	Potassium	mg/L	11	0	0%	-0.00728	0.158	↔	0.00788	0.488	↔	-0.000740	0.749	↔	2022-05-19	2022-08-05	0.515	↔



Appendix III: Boron, MW-11B & MW_12B

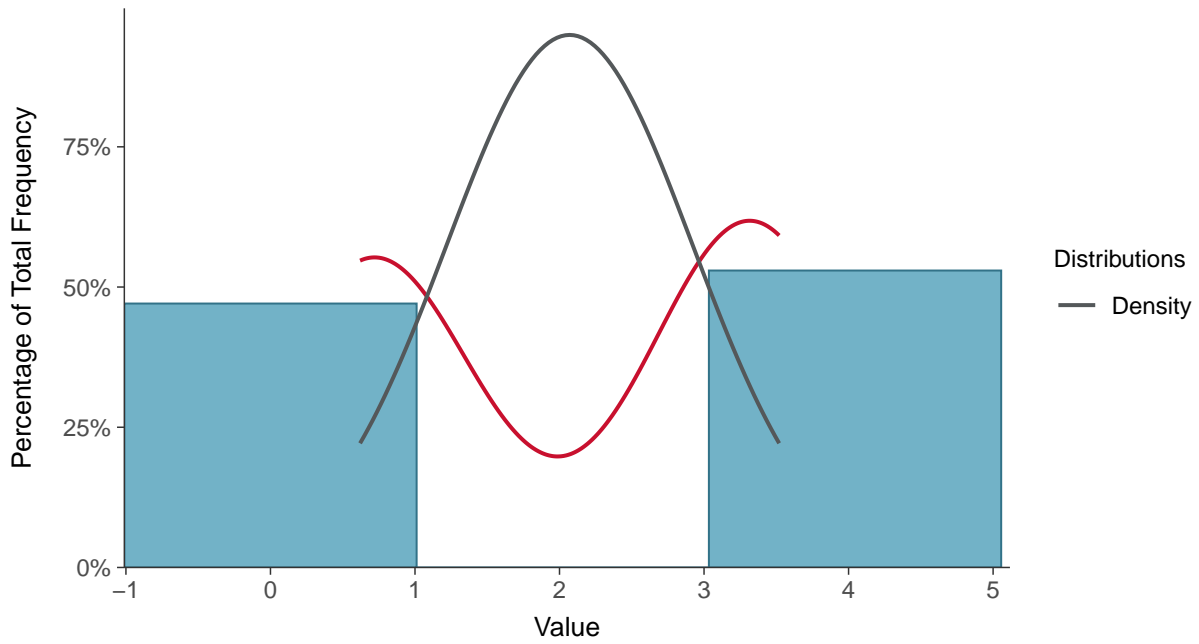
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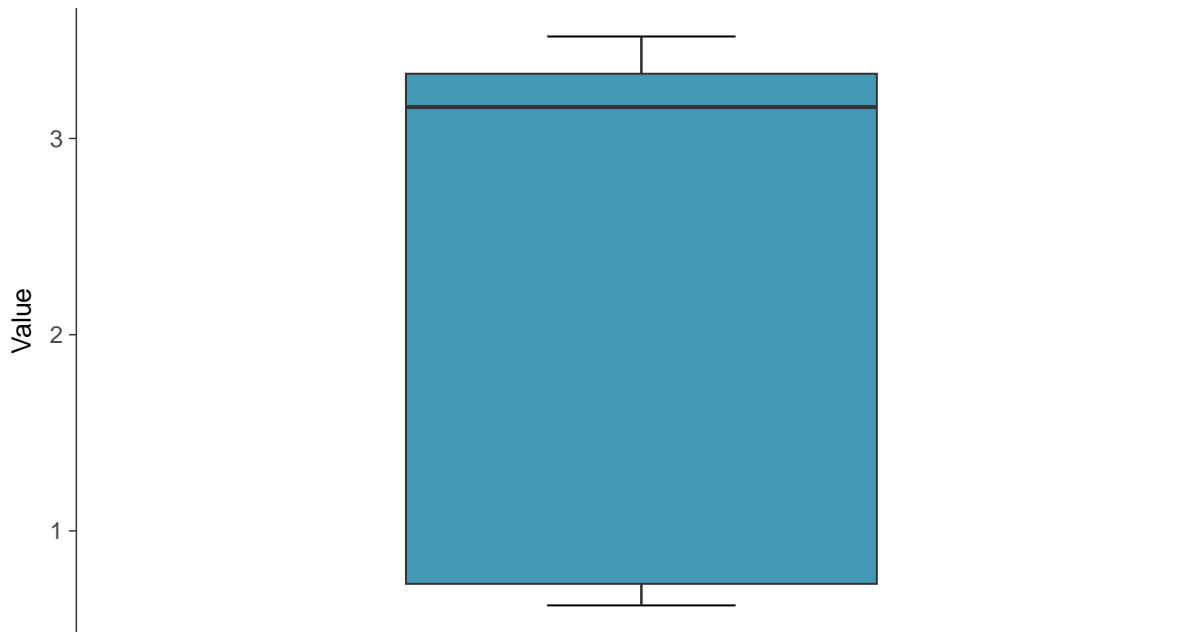
Histogram

Boron, MW-11B & MW_12B (mg/L)



Boxplot

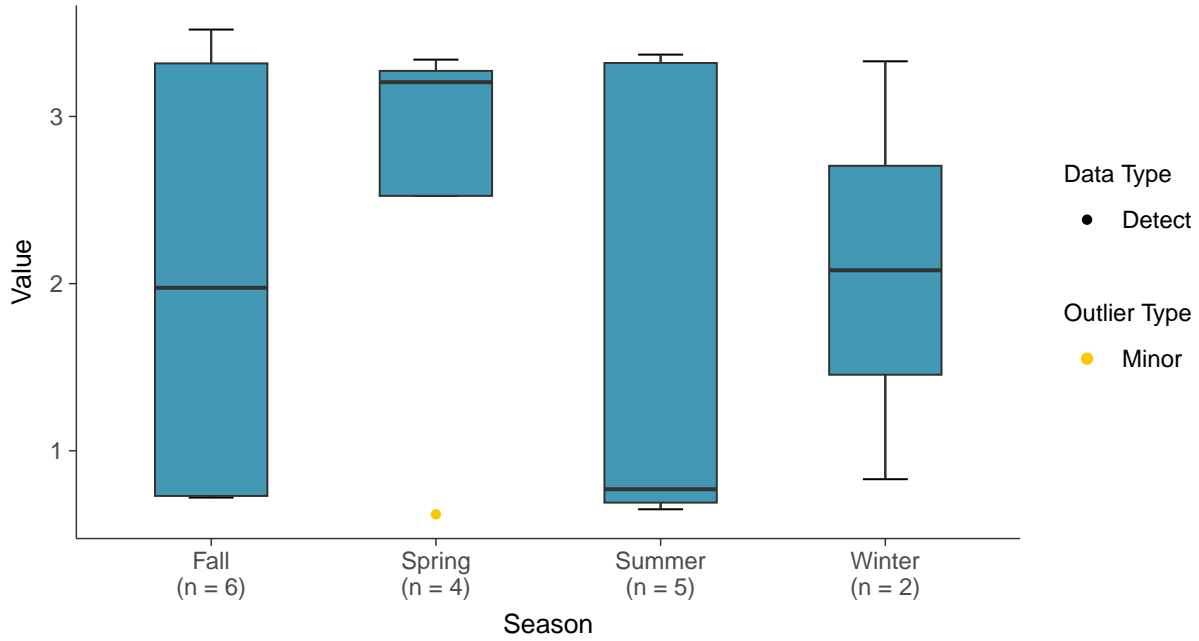
Boron, MW-11B & MW_12B (mg/L)





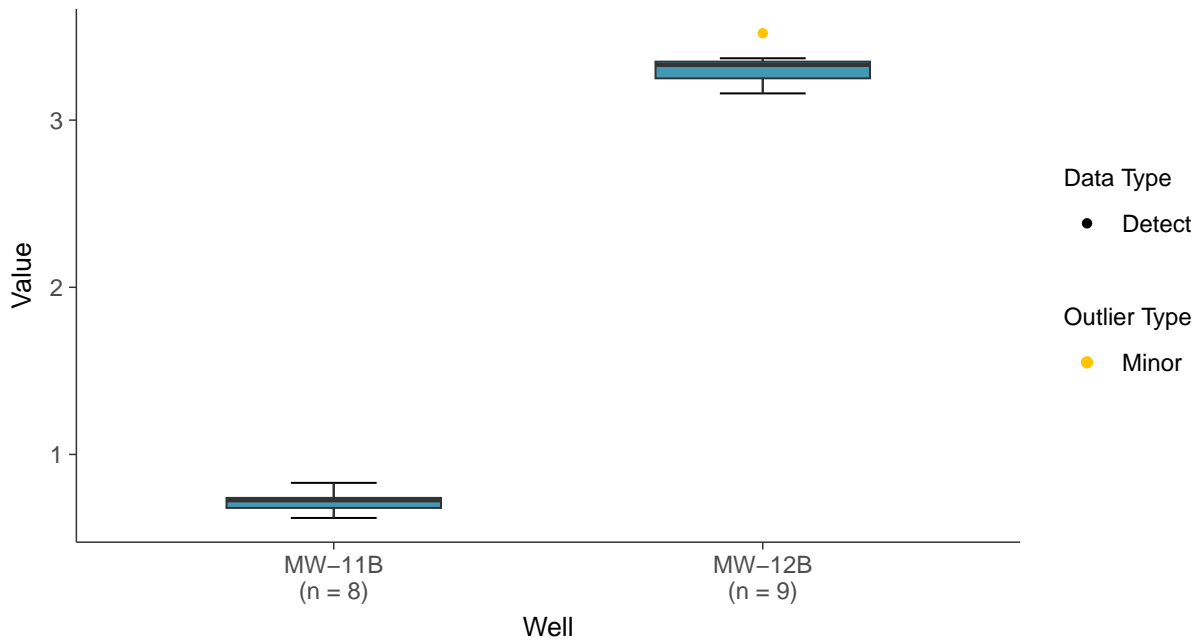
Boxplot by Season

Boron, MW-11B & MW_12B (mg/L)



Boxplot by Well

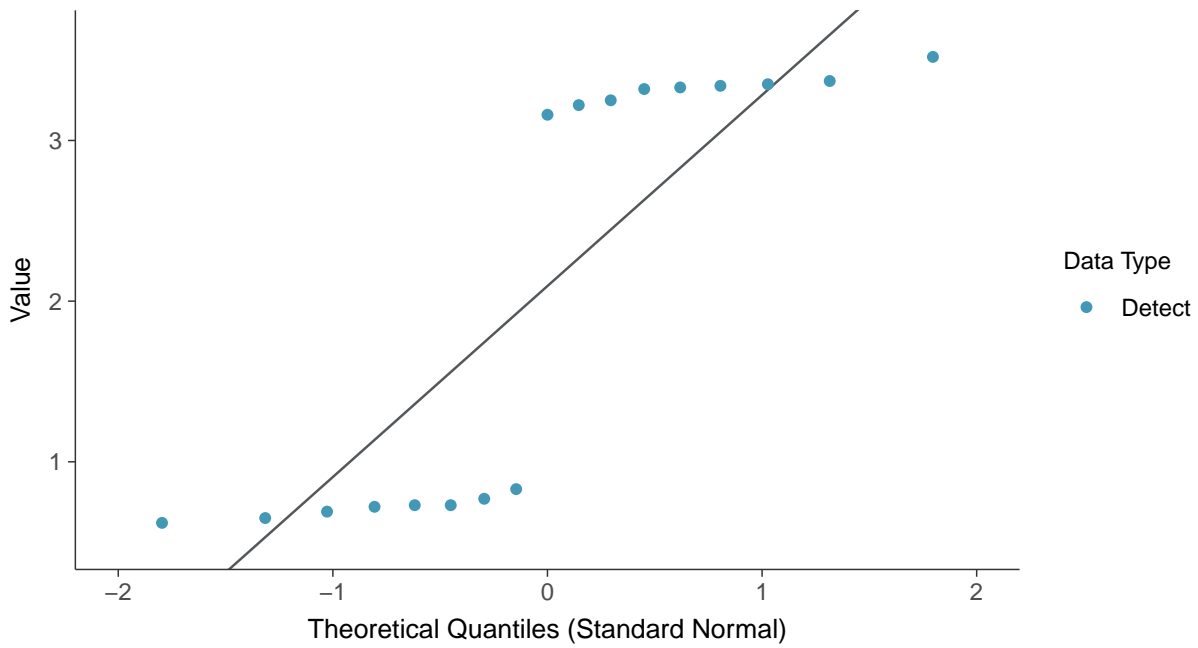
Boron, MW-11B & MW_12B (mg/L)





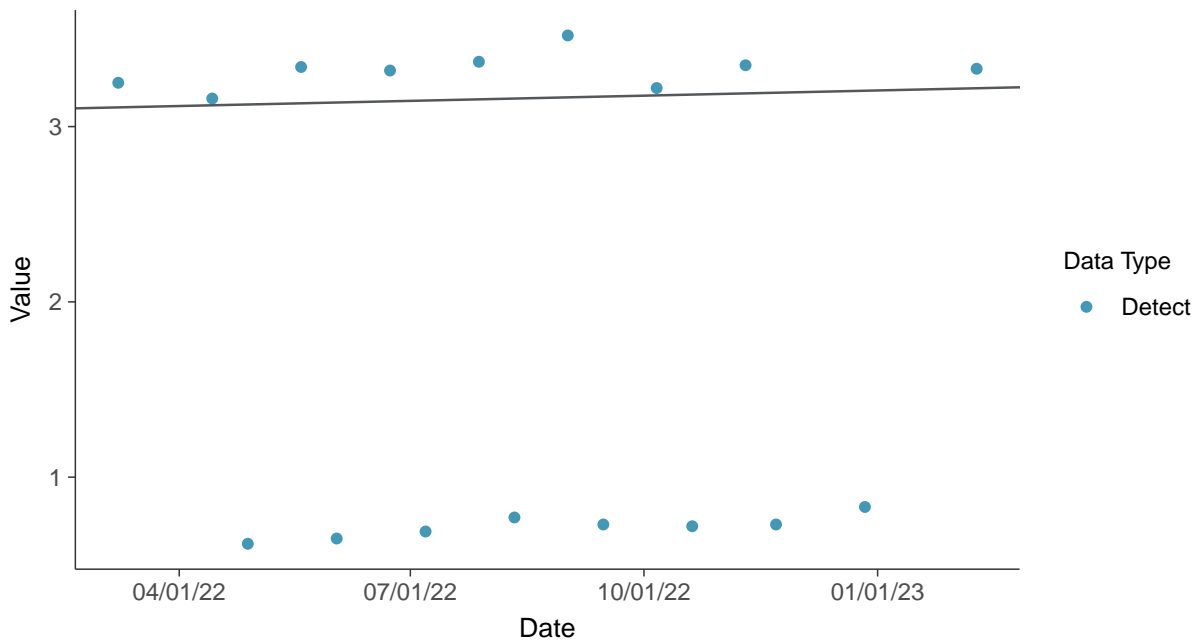
Normal Q-Q plot

Boron, MW-11B & MW_12B (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

Boron, MW-11B & MW_12B (mg/L)



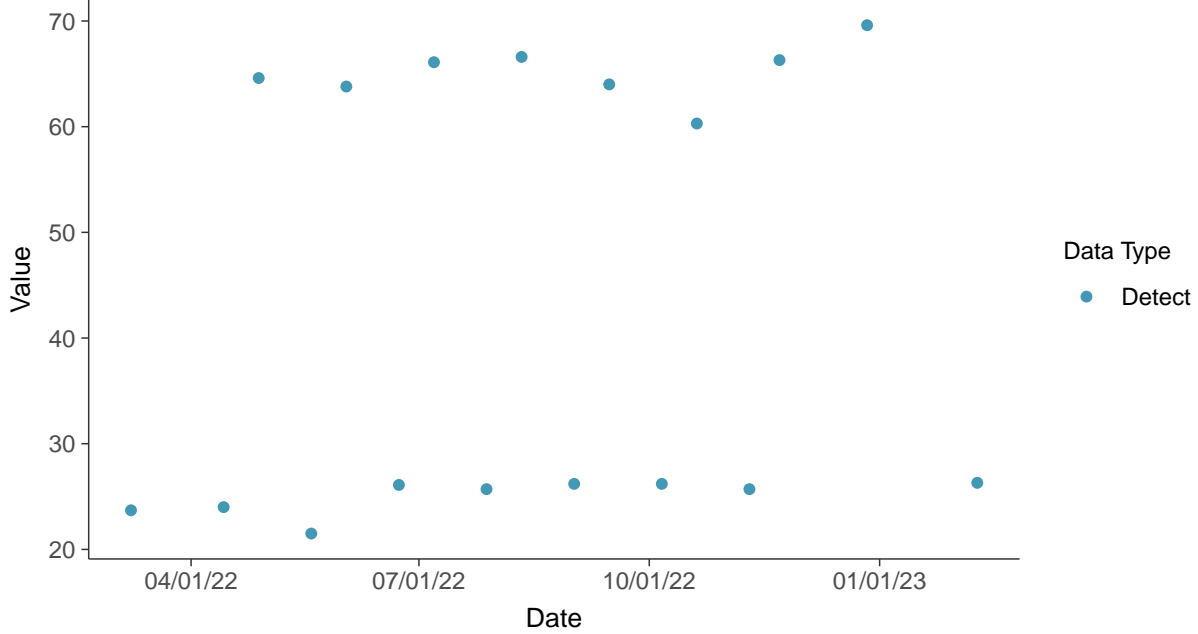


Appendix III: Calcium, MW-11B & MW_12B

ID: 1_02

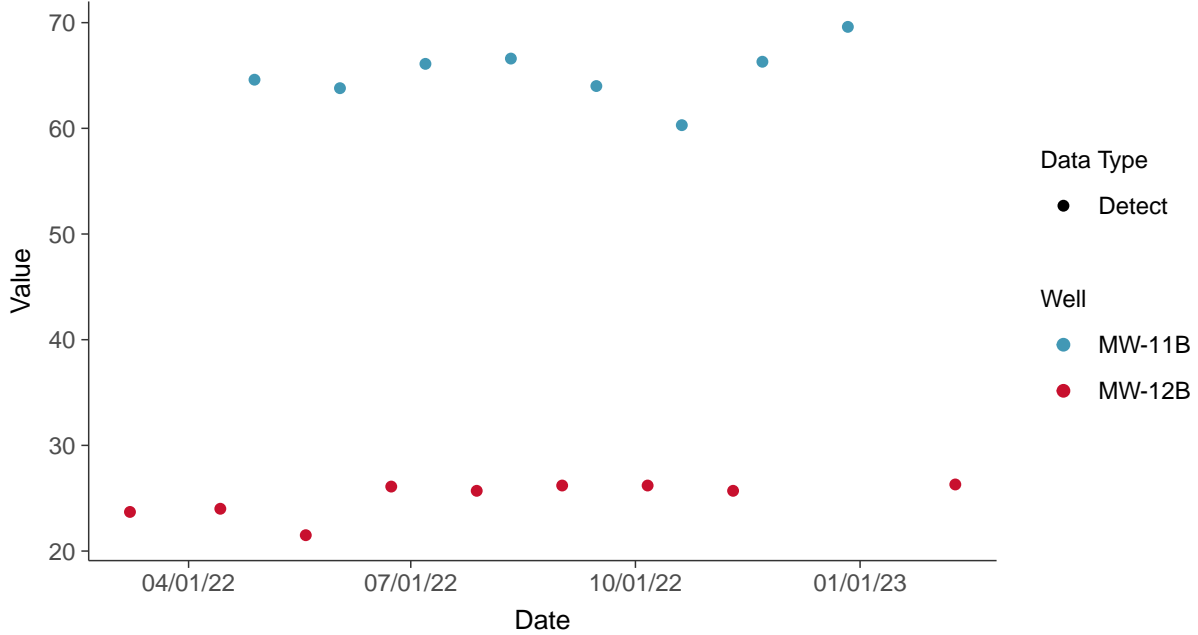
Scatter Plot

Calcium, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

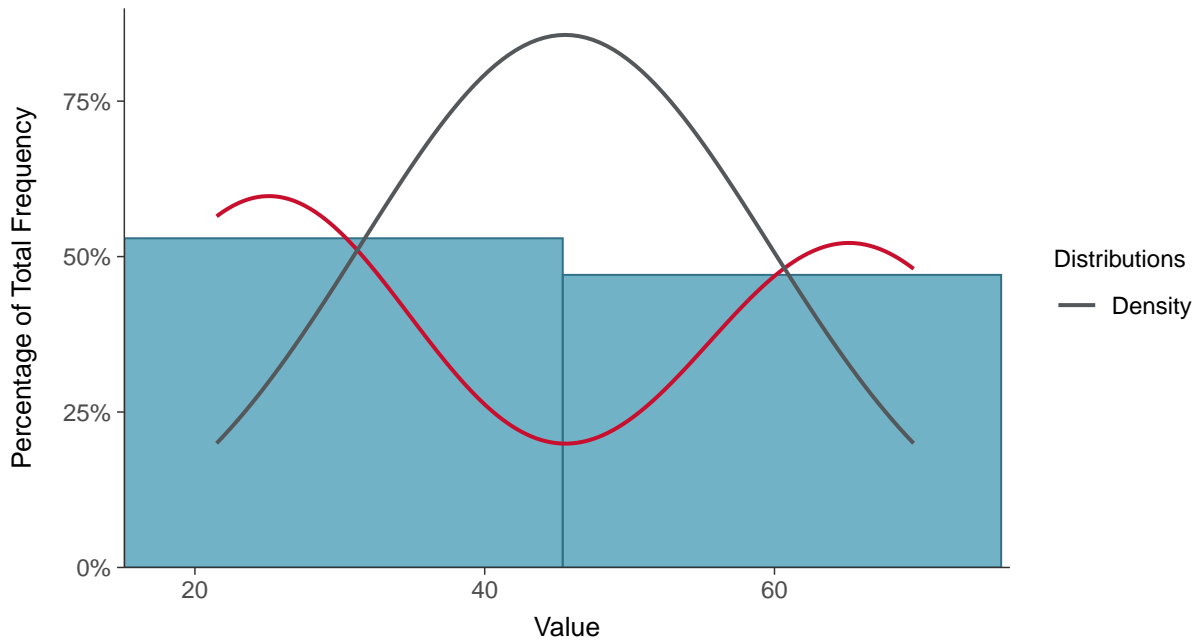
Calcium, MW-11B & MW_12B (mg/L)





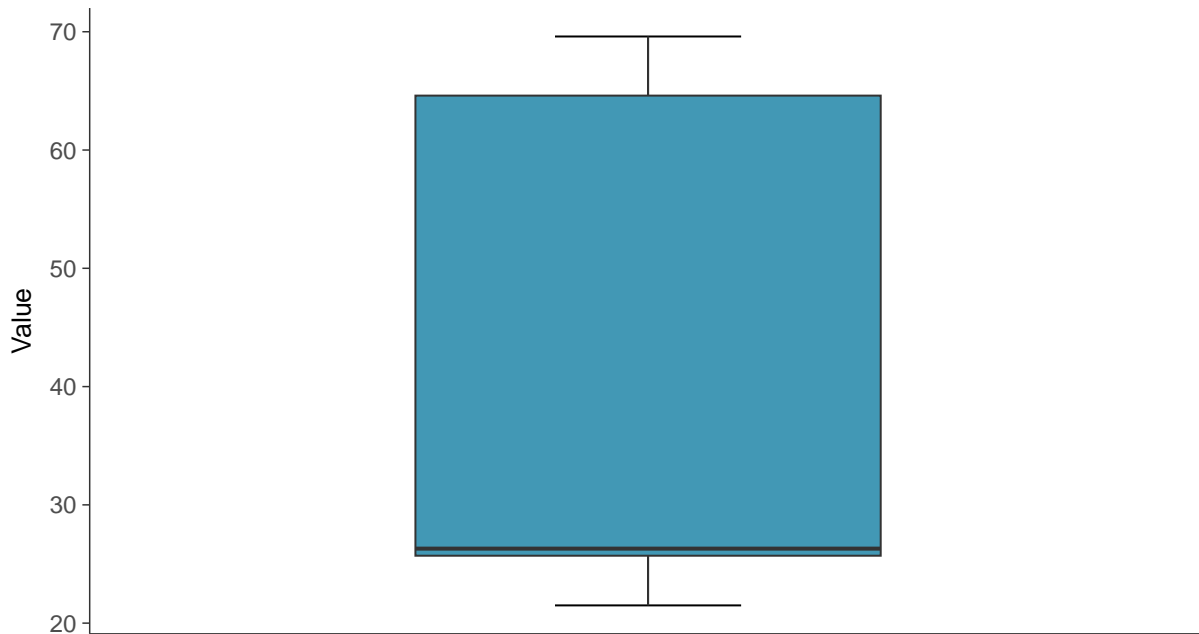
Histogram

Calcium, MW-11B & MW_12B (mg/L)



Boxplot

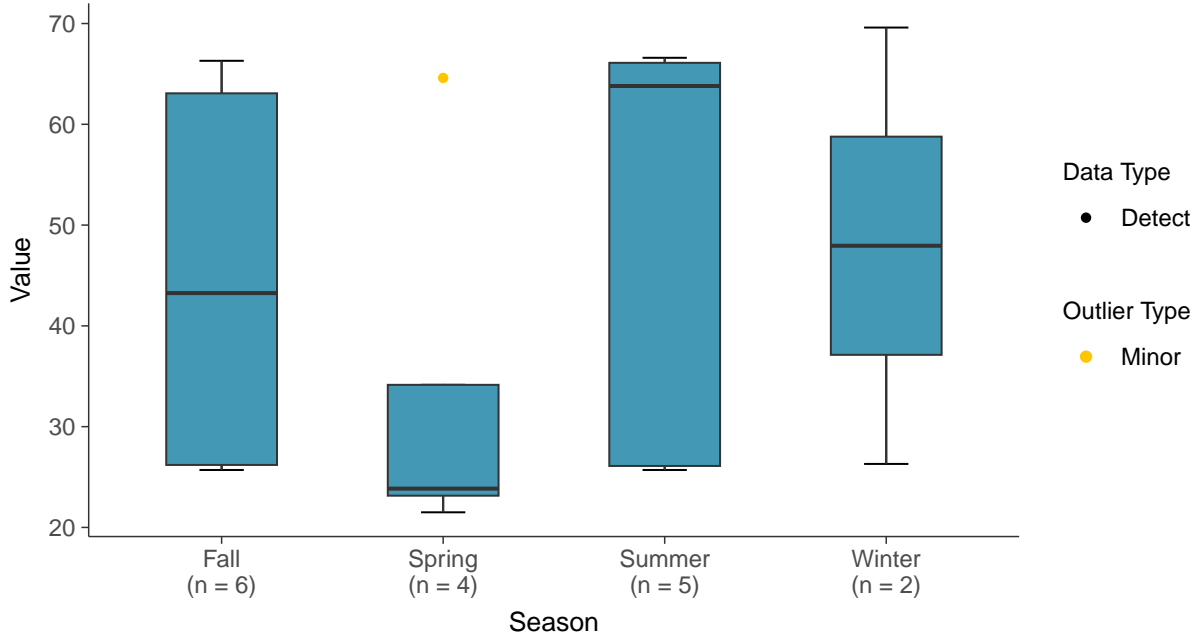
Calcium, MW-11B & MW_12B (mg/L)





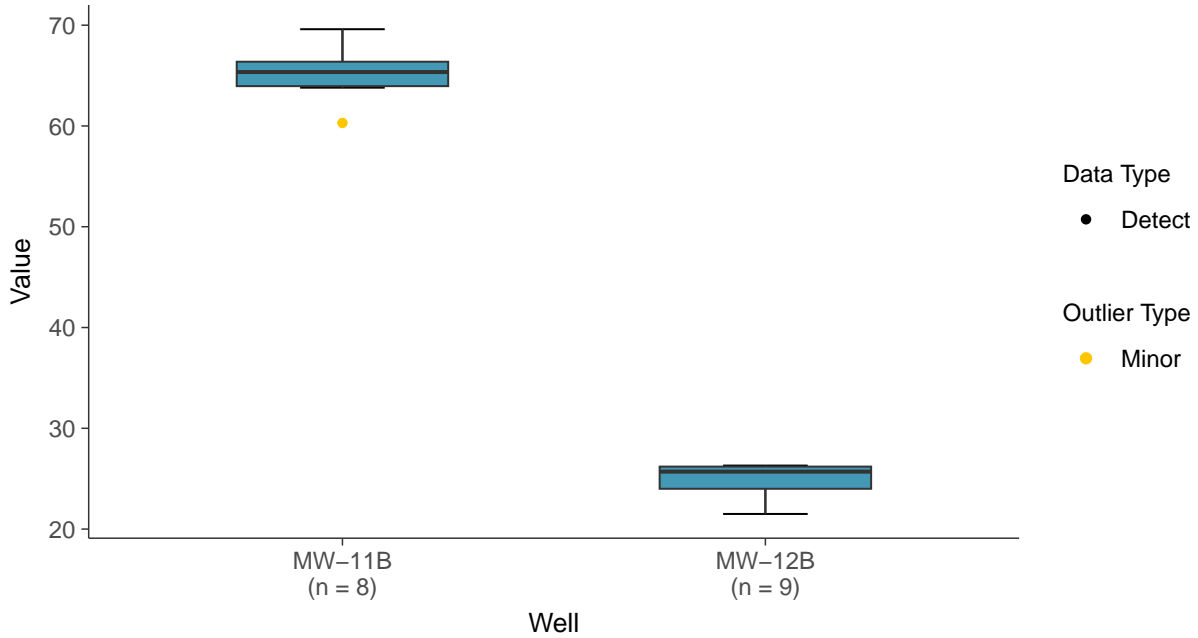
Boxplot by Season

Calcium, MW-11B & MW_12B (mg/L)



Boxplot by Well

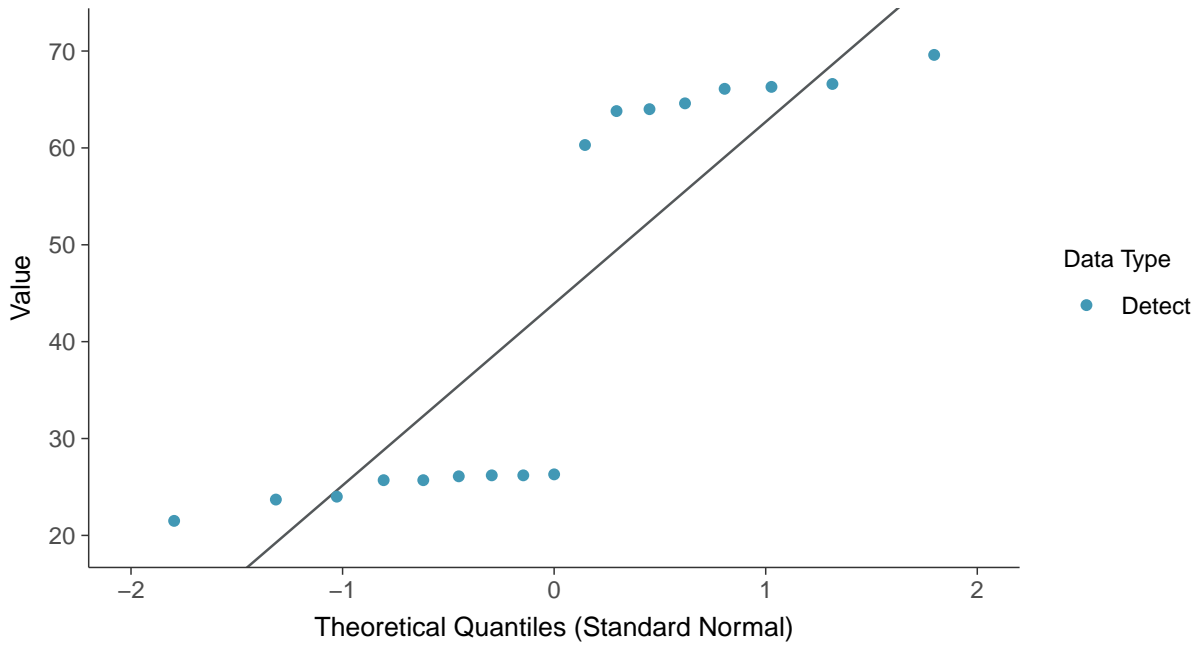
Calcium, MW-11B & MW_12B (mg/L)





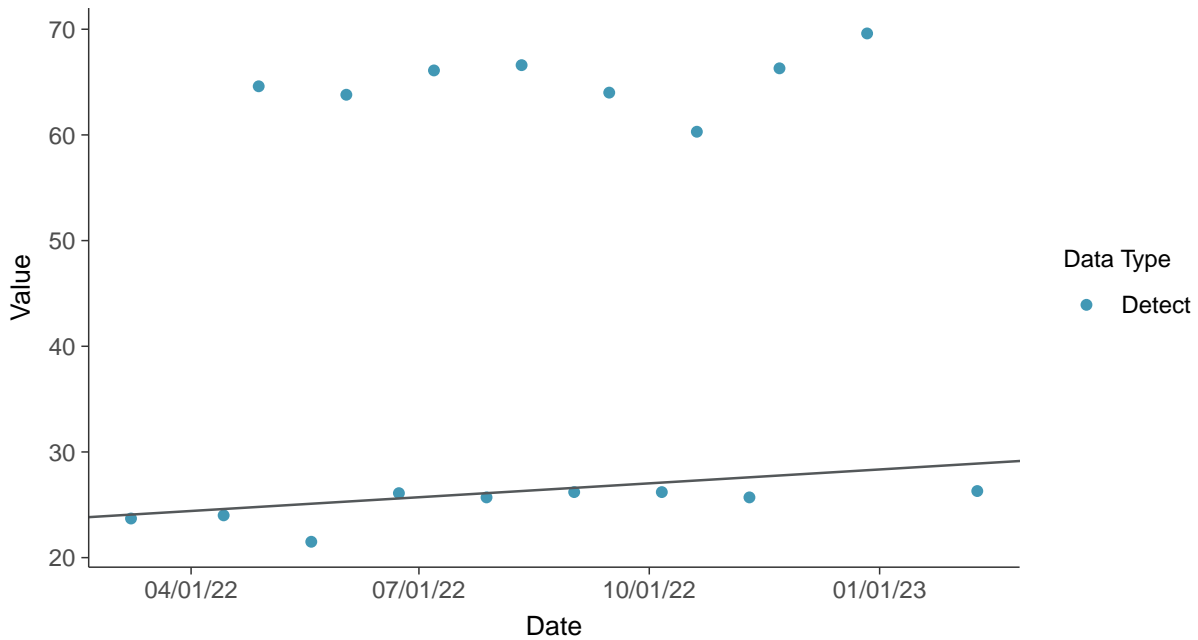
Normal Q-Q plot

Calcium, MW-11B & MW_12B (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

Calcium, MW-11B & MW_12B (mg/L)



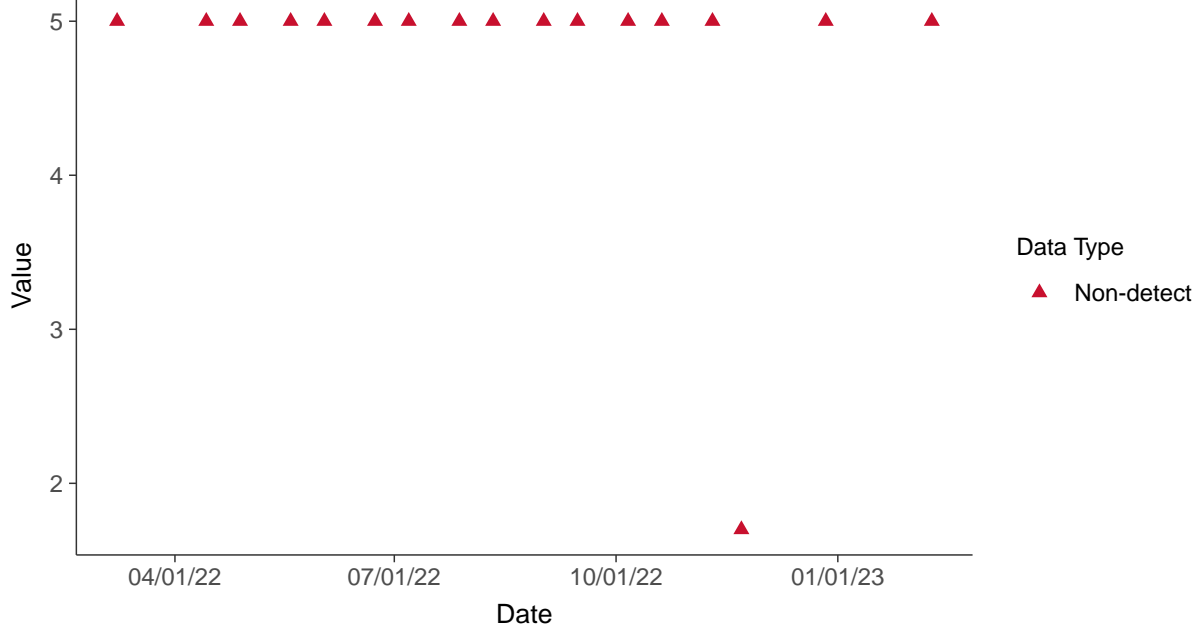


Appendix III: Chloride, MW-11B & MW_12B

ID: 1_03

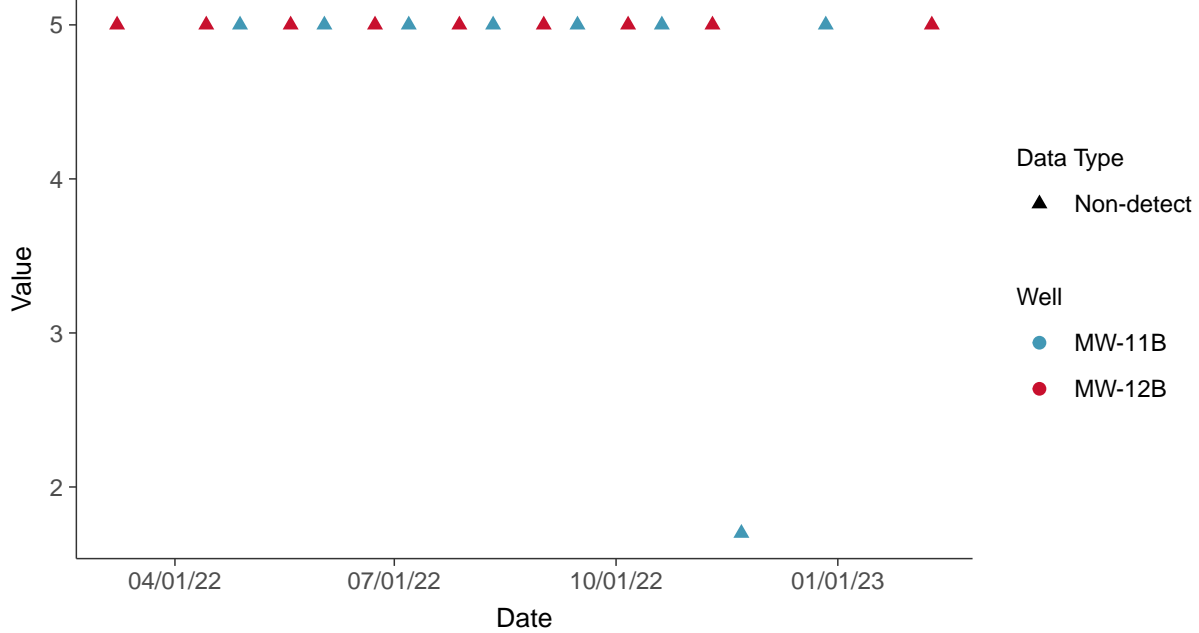
Scatter Plot

Chloride, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

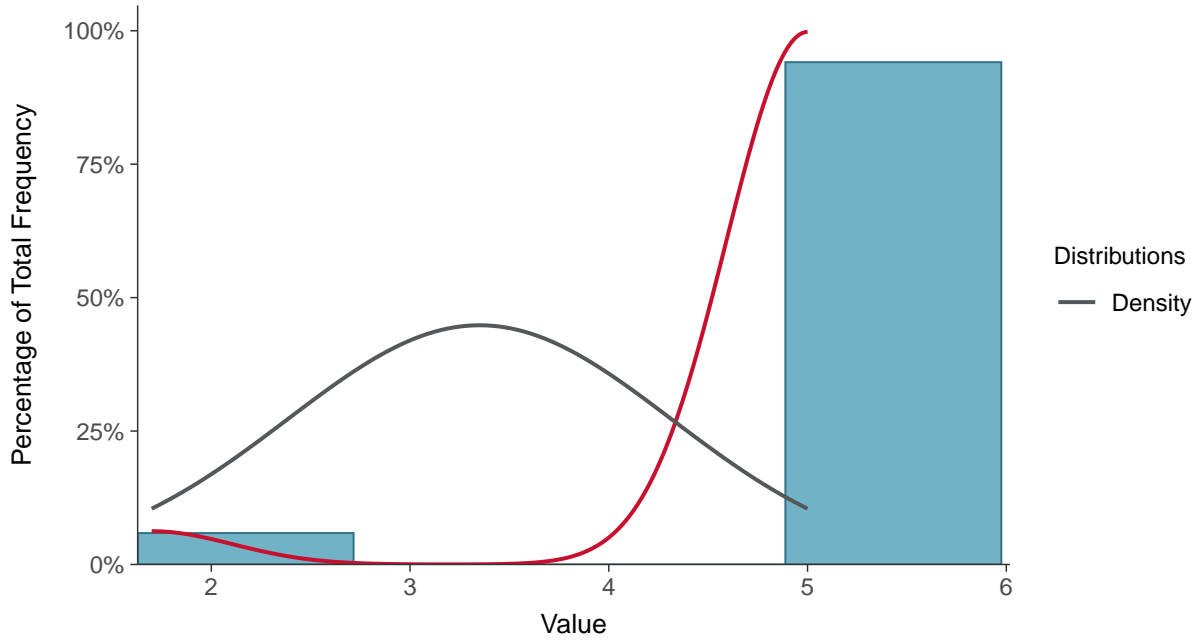
Chloride, MW-11B & MW_12B (mg/L)





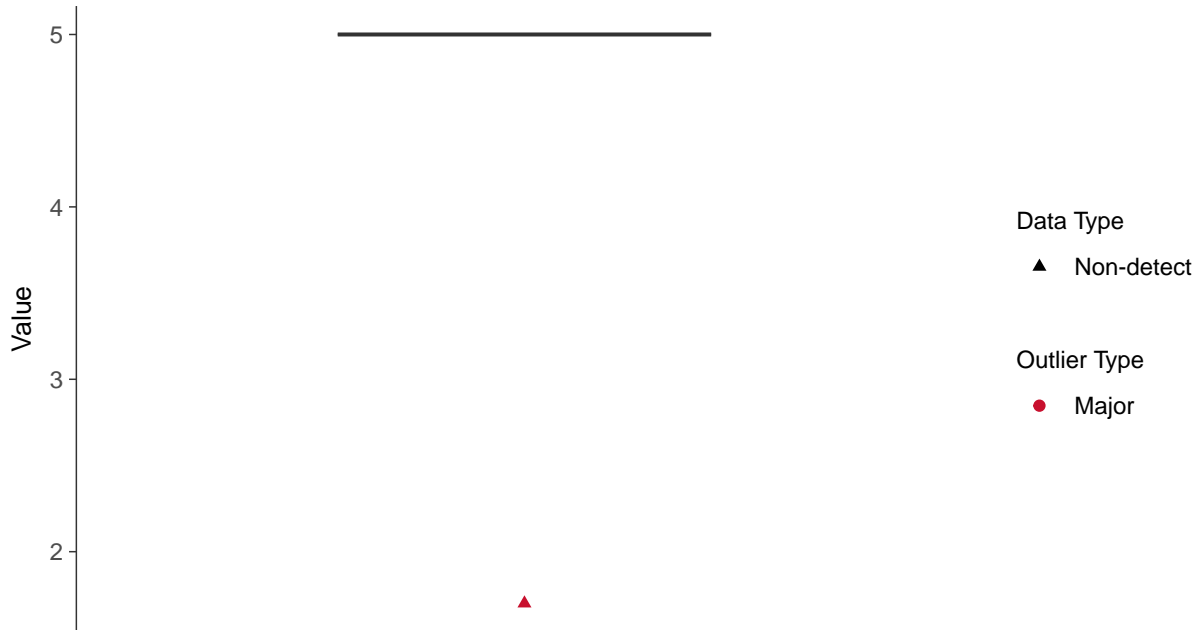
Histogram

Chloride, MW-11B & MW_12B (mg/L)



Boxplot

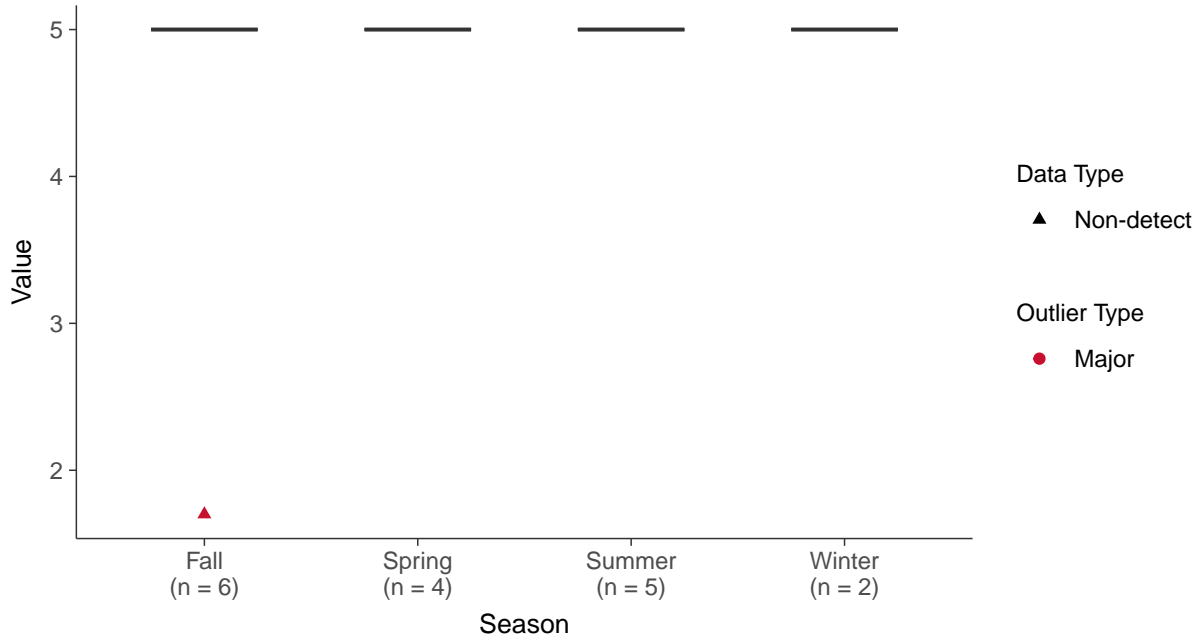
Chloride, MW-11B & MW_12B (mg/L)





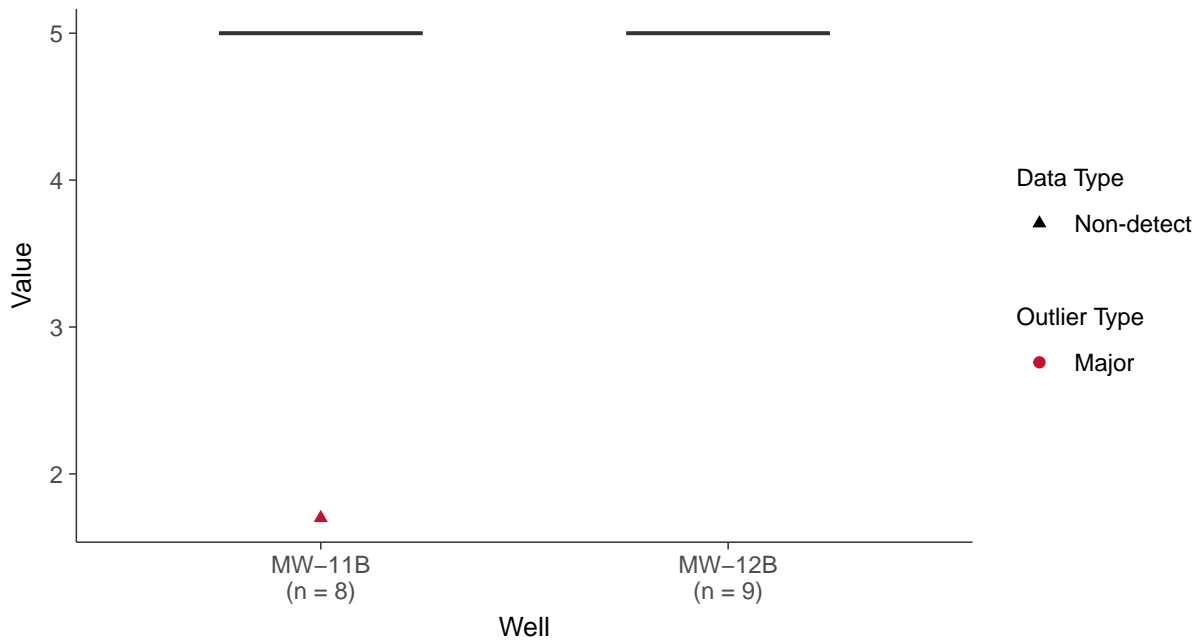
Boxplot by Season

Chloride, MW-11B & MW_12B (mg/L)



Boxplot by Well

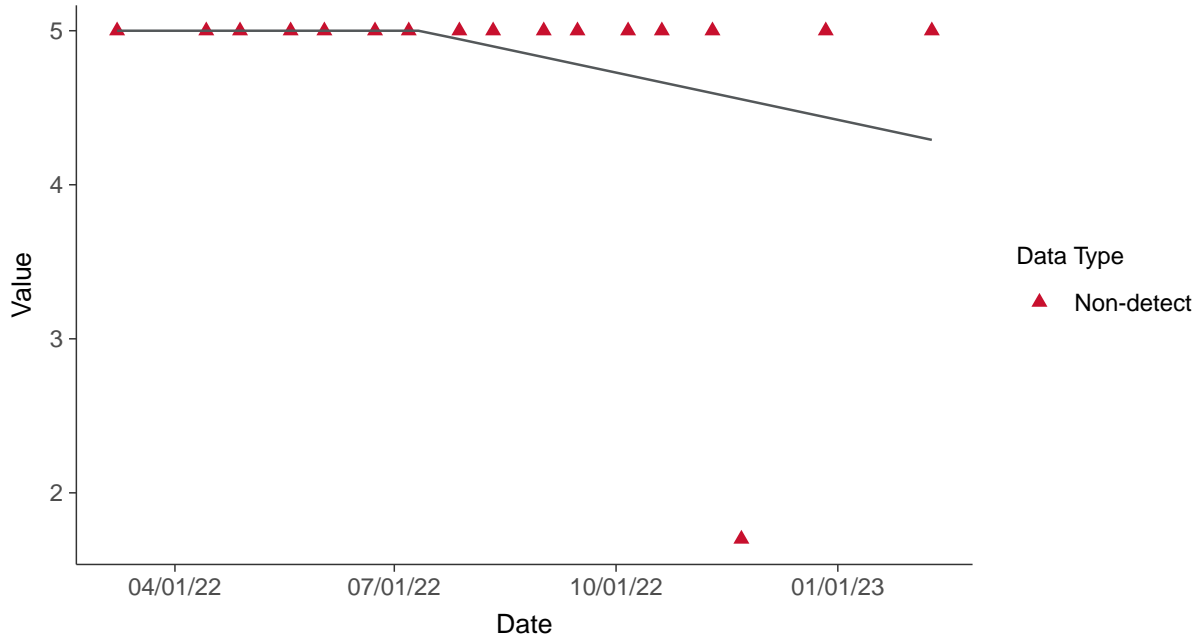
Chloride, MW-11B & MW_12B (mg/L)





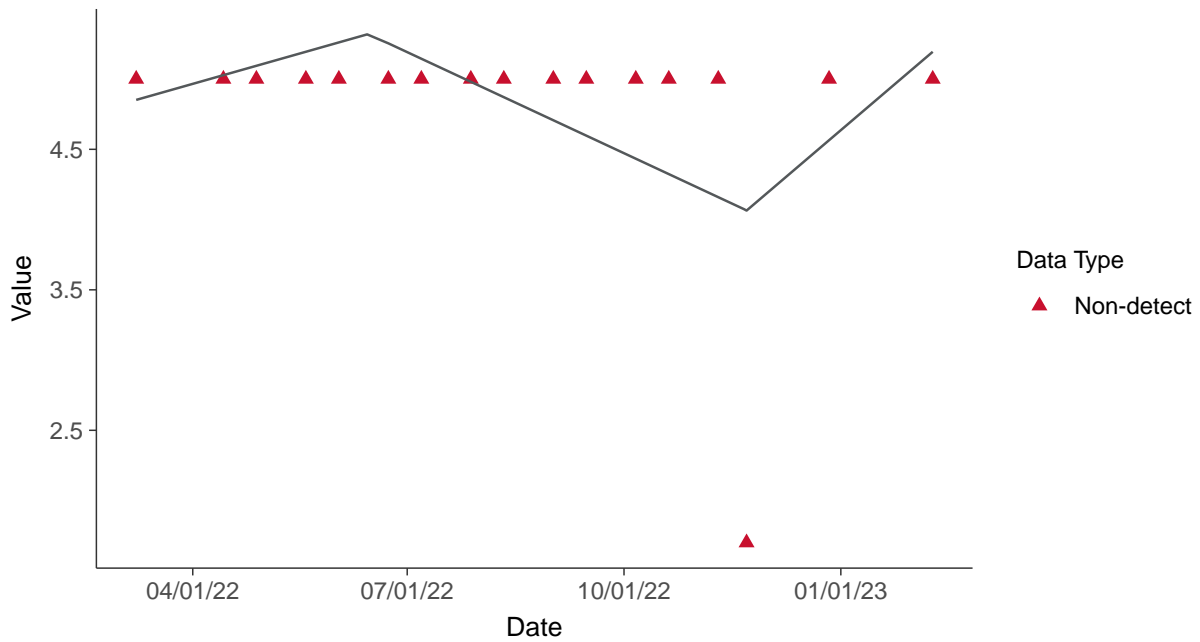
Trend Regression: Piecewise Linear-Linear

Chloride, MW-11B & MW_12B (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

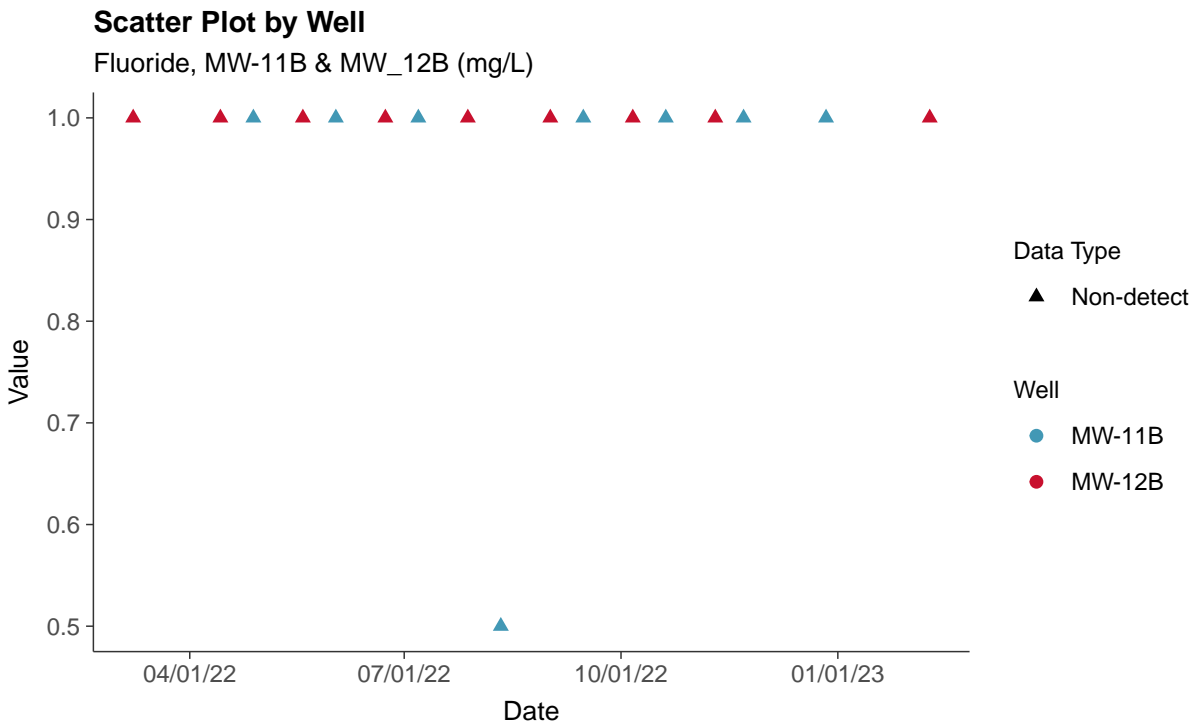
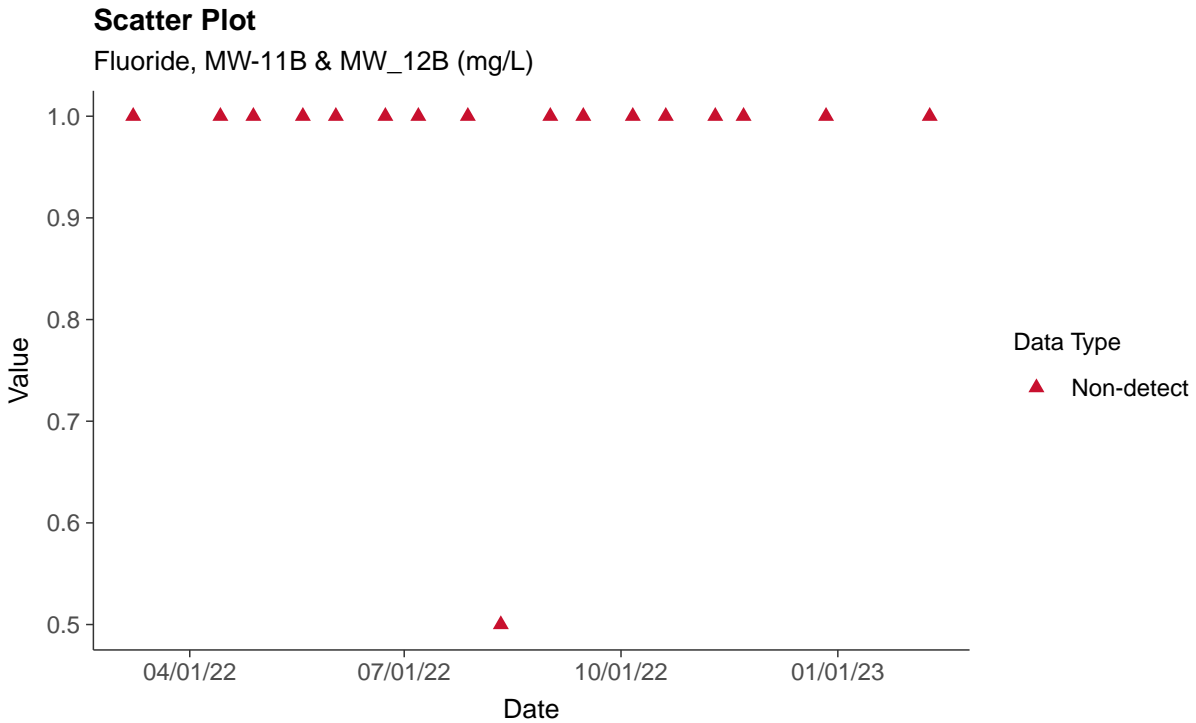
Chloride, MW-11B & MW_12B (mg/L)





Appendix III: Fluoride, MW-11B & MW_12B

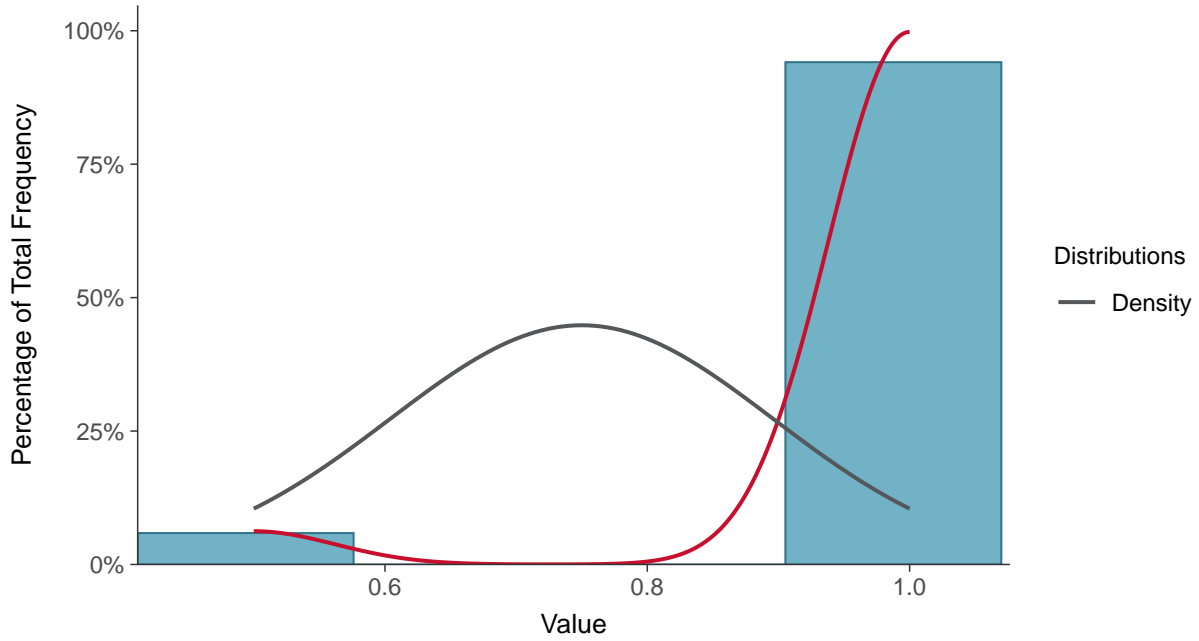
ID: 1_04





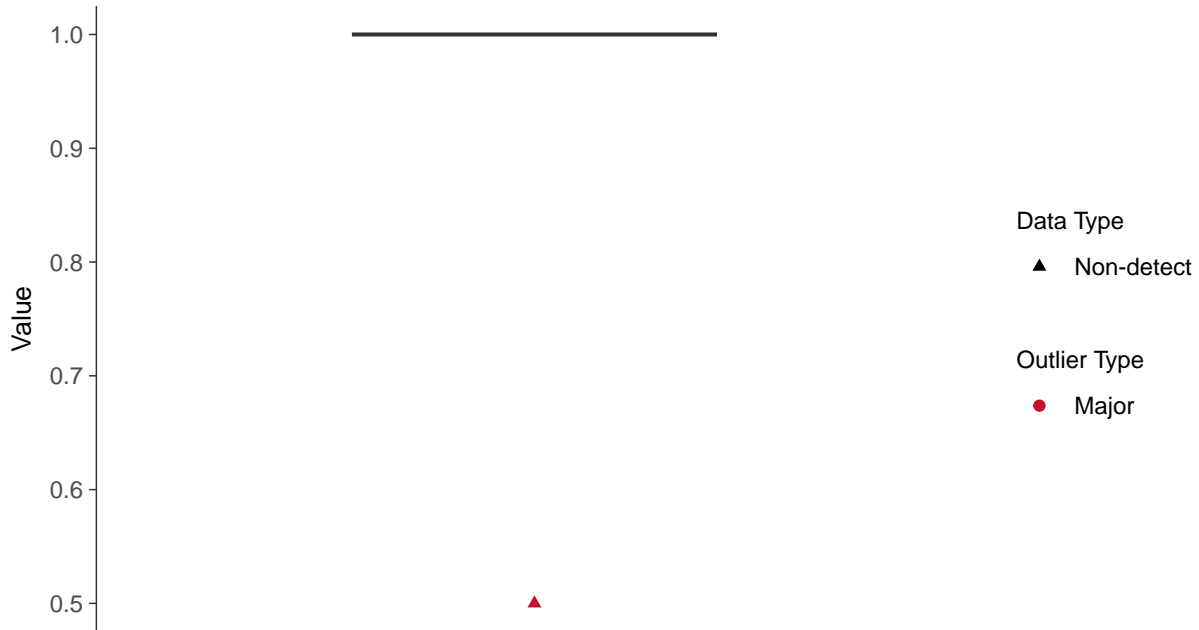
Histogram

Fluoride, MW-11B & MW_12B (mg/L)



Boxplot

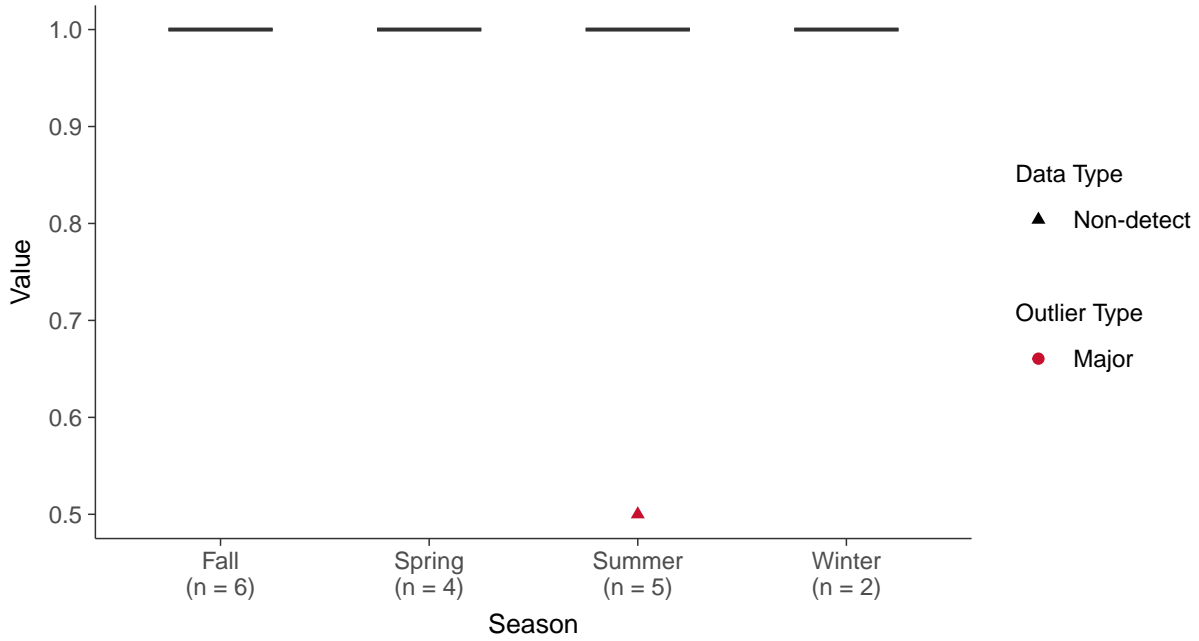
Fluoride, MW-11B & MW_12B (mg/L)





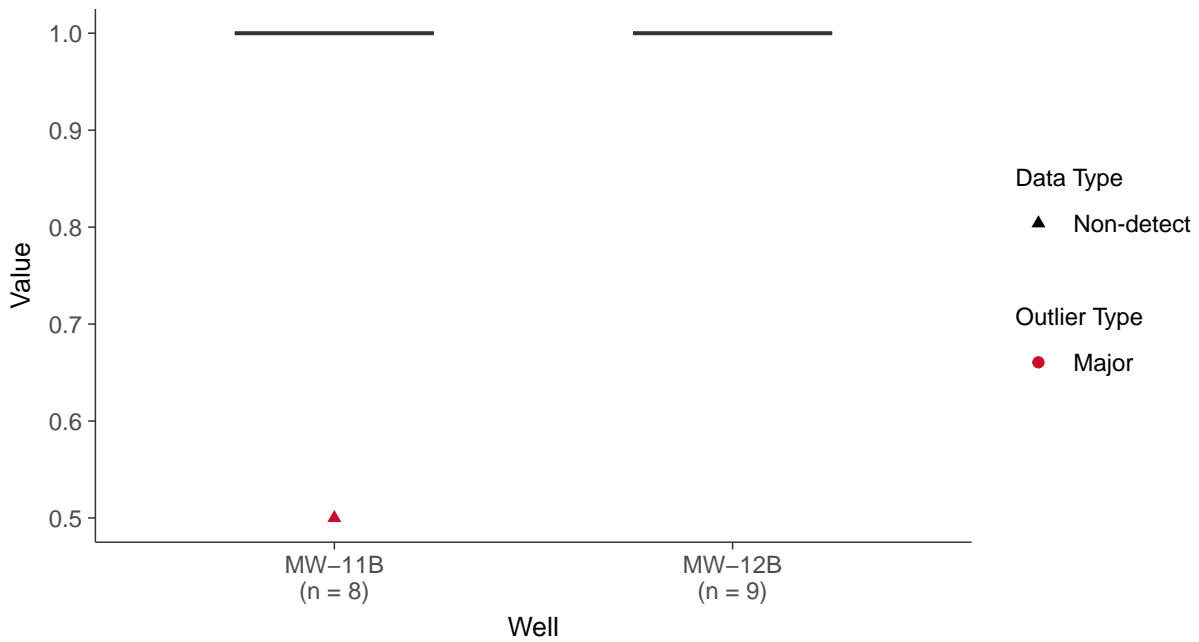
Boxplot by Season

Fluoride, MW-11B & MW_12B (mg/L)



Boxplot by Well

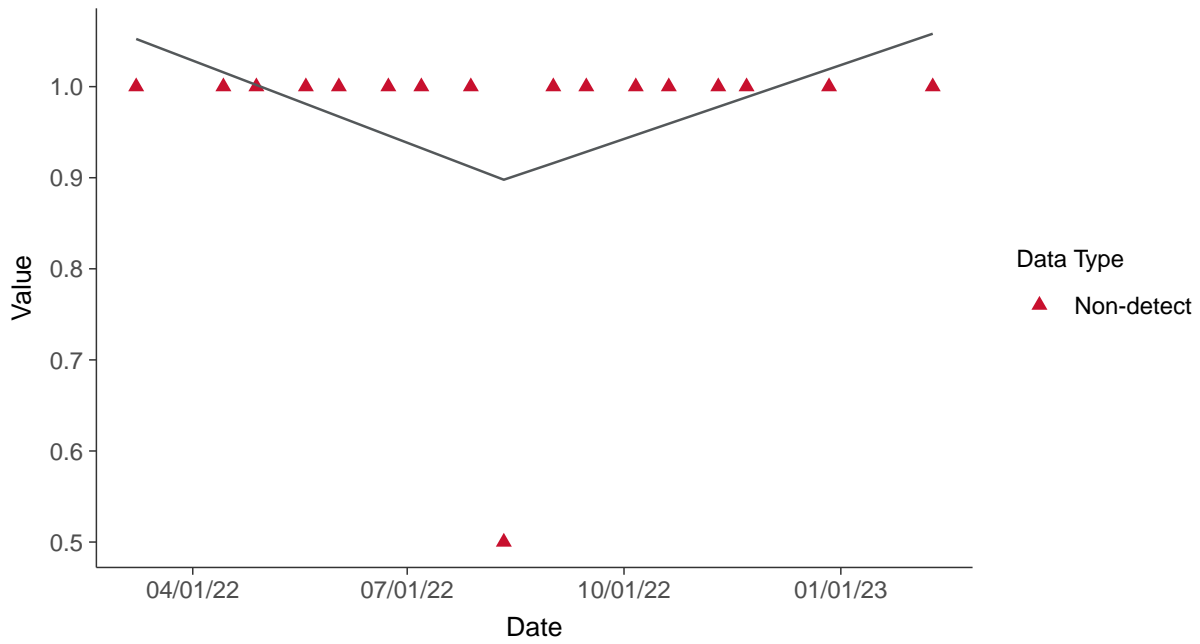
Fluoride, MW-11B & MW_12B (mg/L)





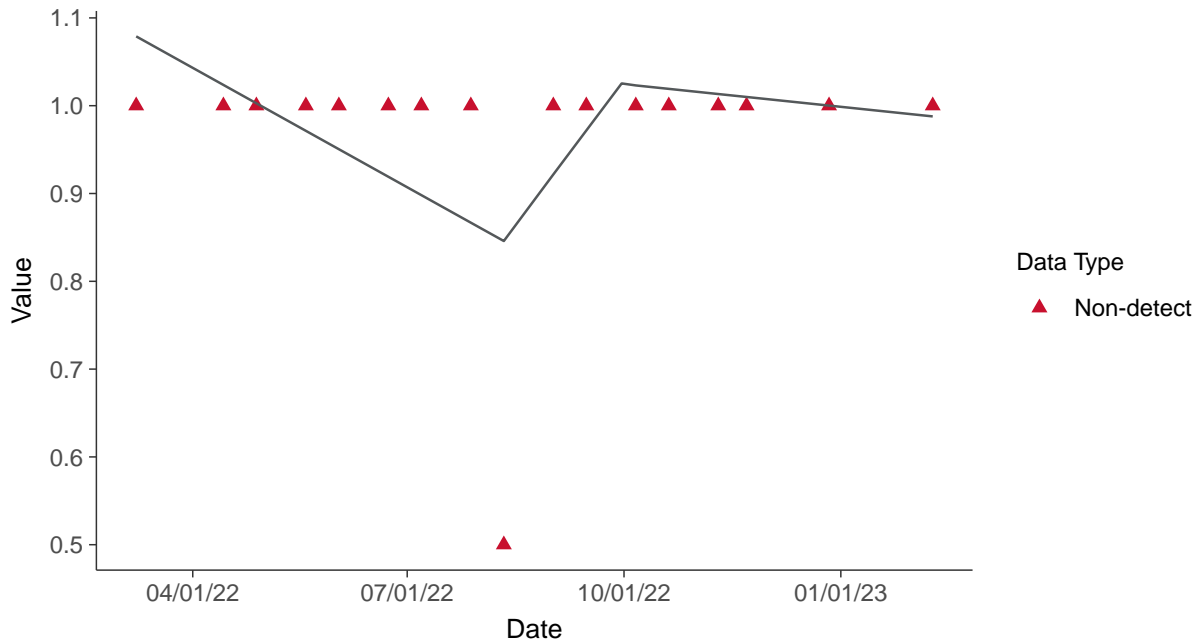
Trend Regression: Piecewise Linear-Linear

Fluoride, MW-11B & MW_12B (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Fluoride, MW-11B & MW_12B (mg/L)



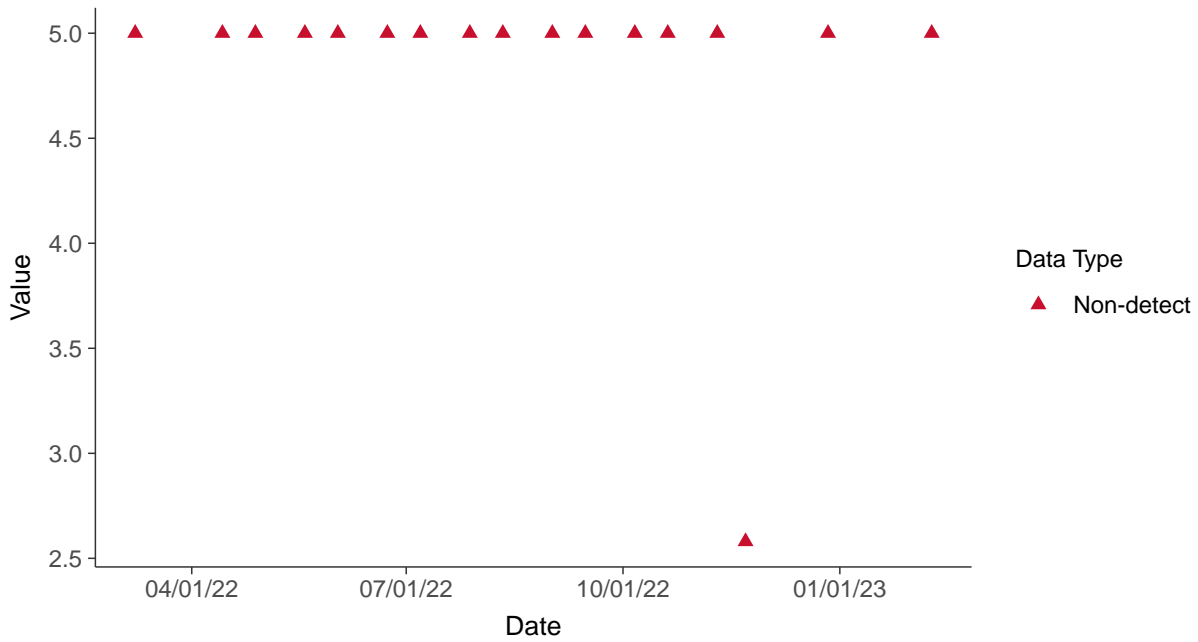


Appendix III: Sulfate, MW-11B & MW_12B

ID: 1_05

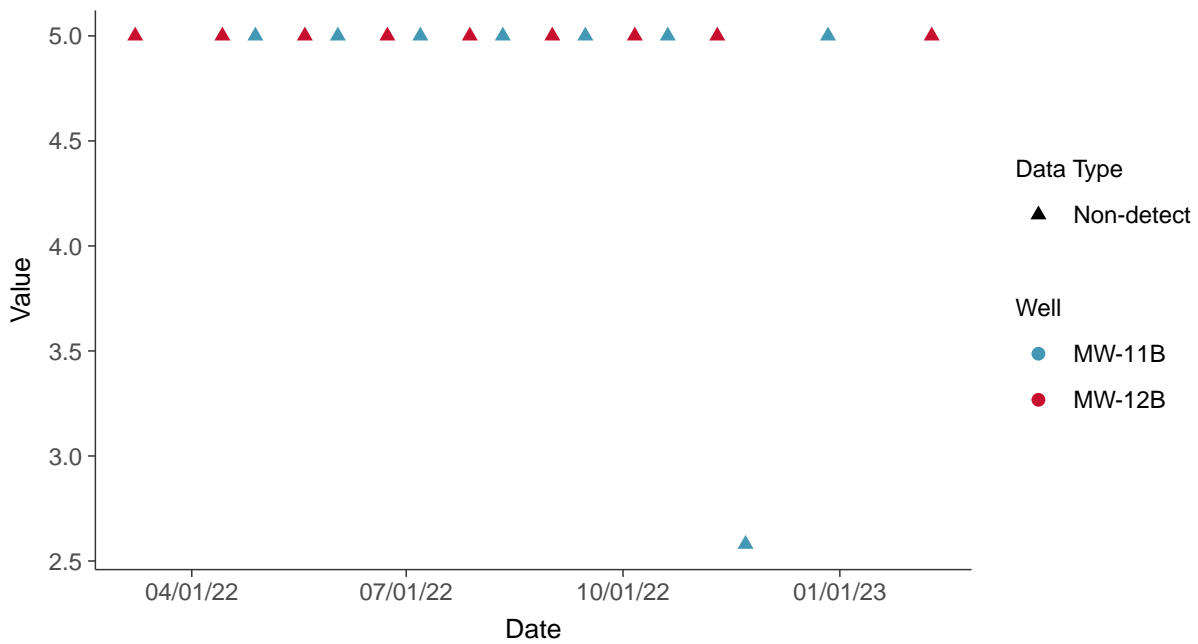
Scatter Plot

Sulfate, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

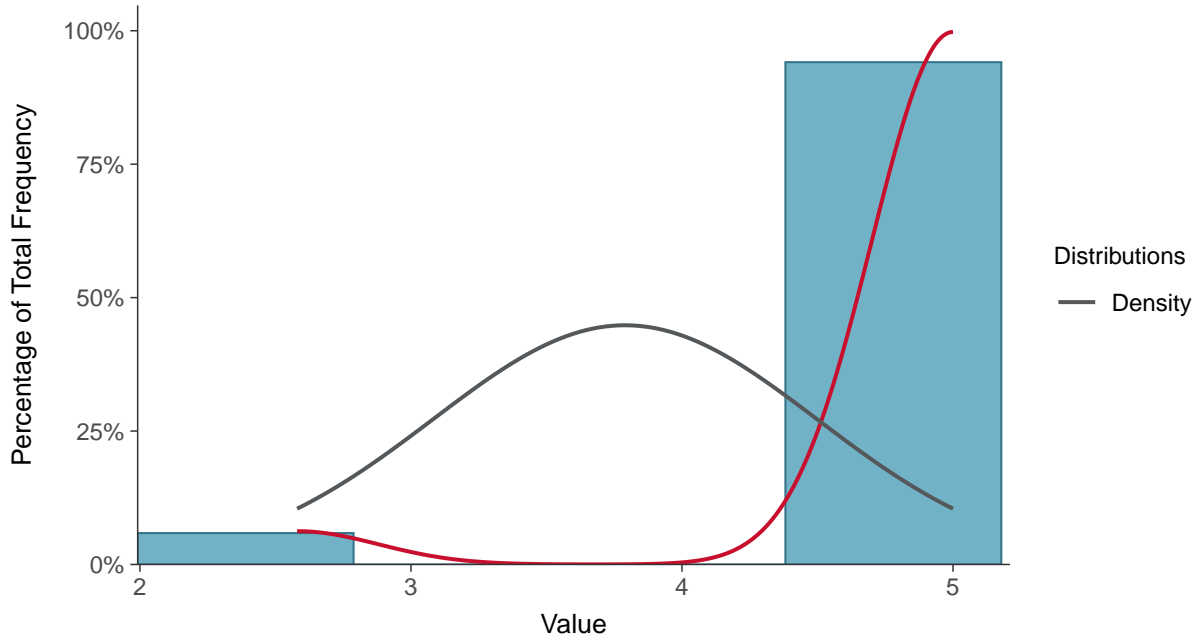
Sulfate, MW-11B & MW_12B (mg/L)





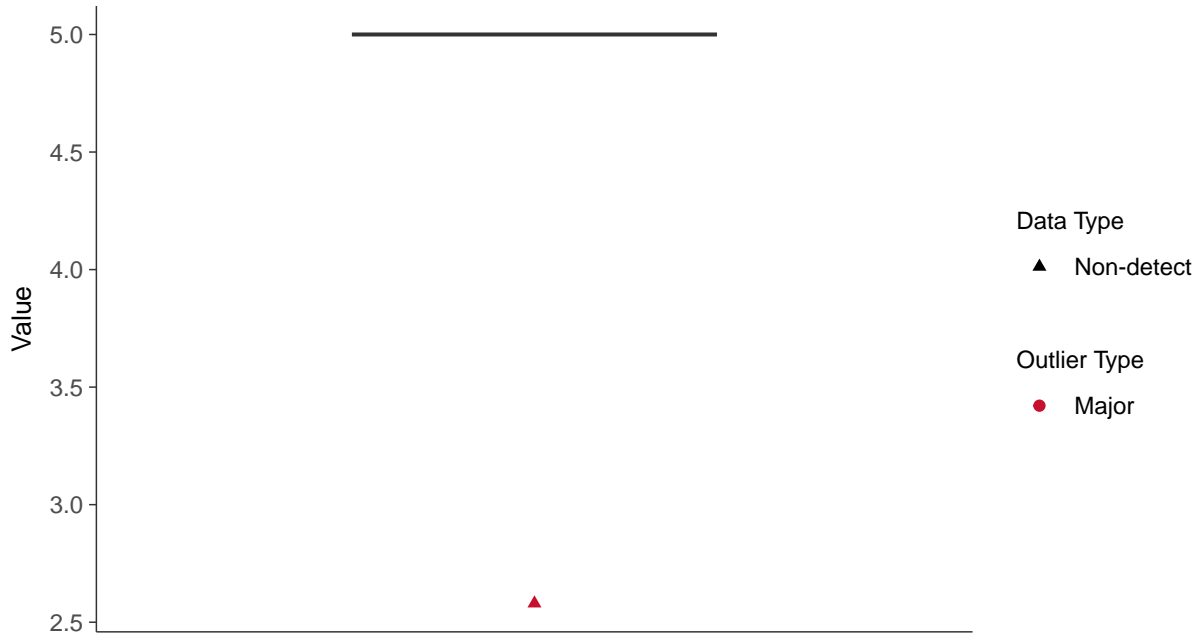
Histogram

Sulfate, MW-11B & MW_12B (mg/L)



Boxplot

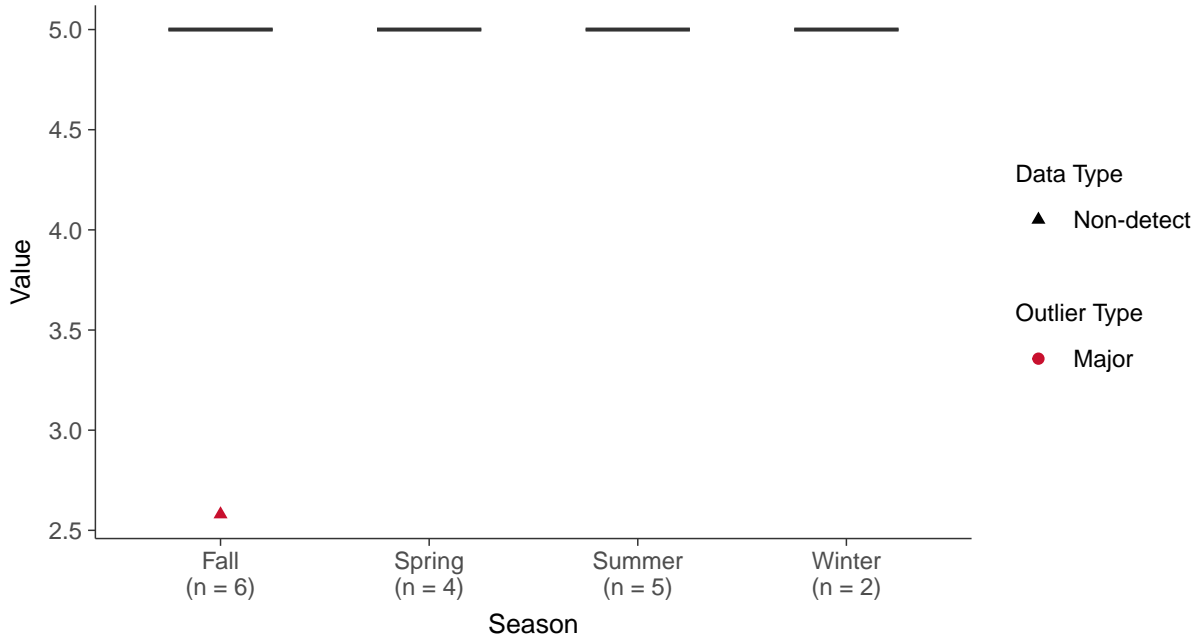
Sulfate, MW-11B & MW_12B (mg/L)





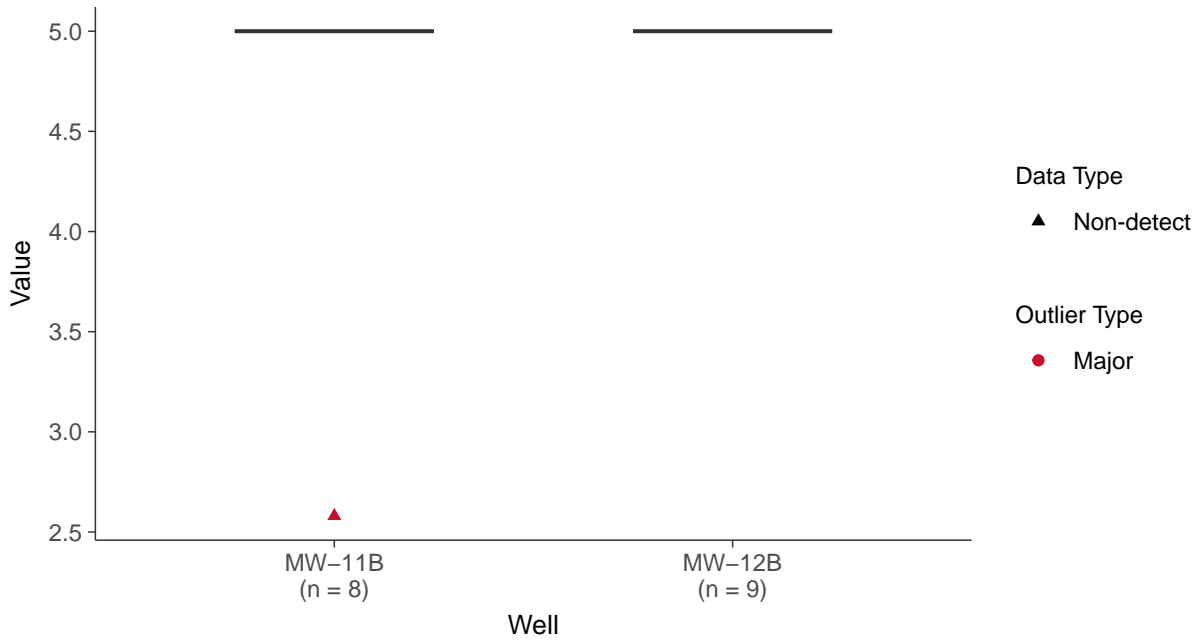
Boxplot by Season

Sulfate, MW-11B & MW_12B (mg/L)



Boxplot by Well

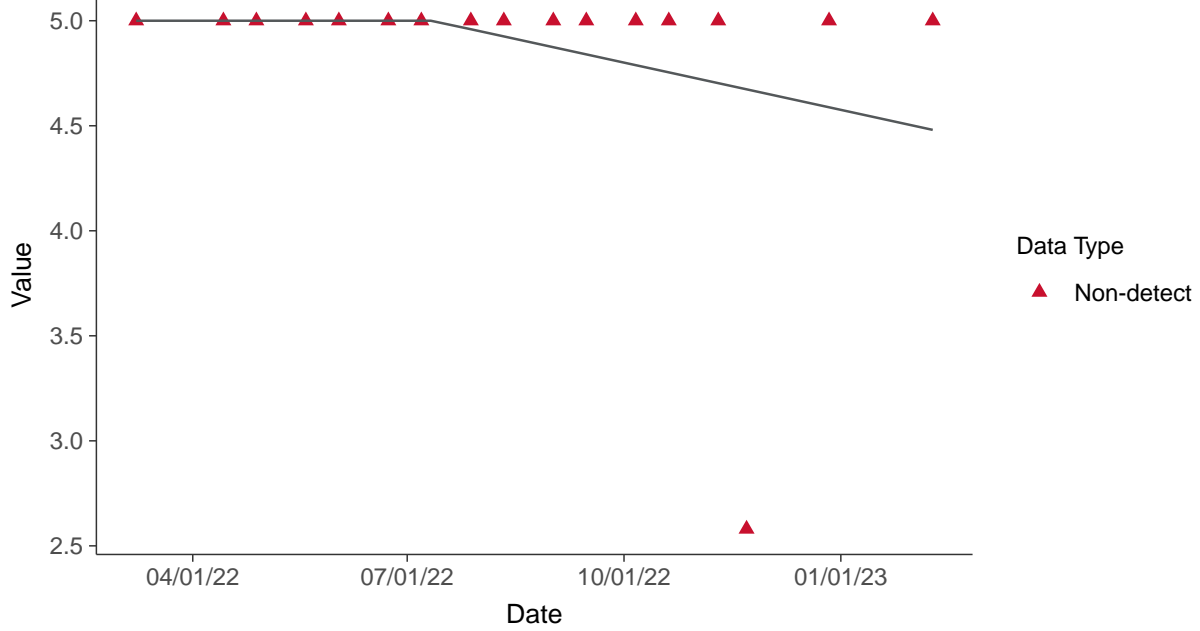
Sulfate, MW-11B & MW_12B (mg/L)





Trend Regression: Piecewise Linear-Linear

Sulfate, MW-11B & MW_12B (mg/L)



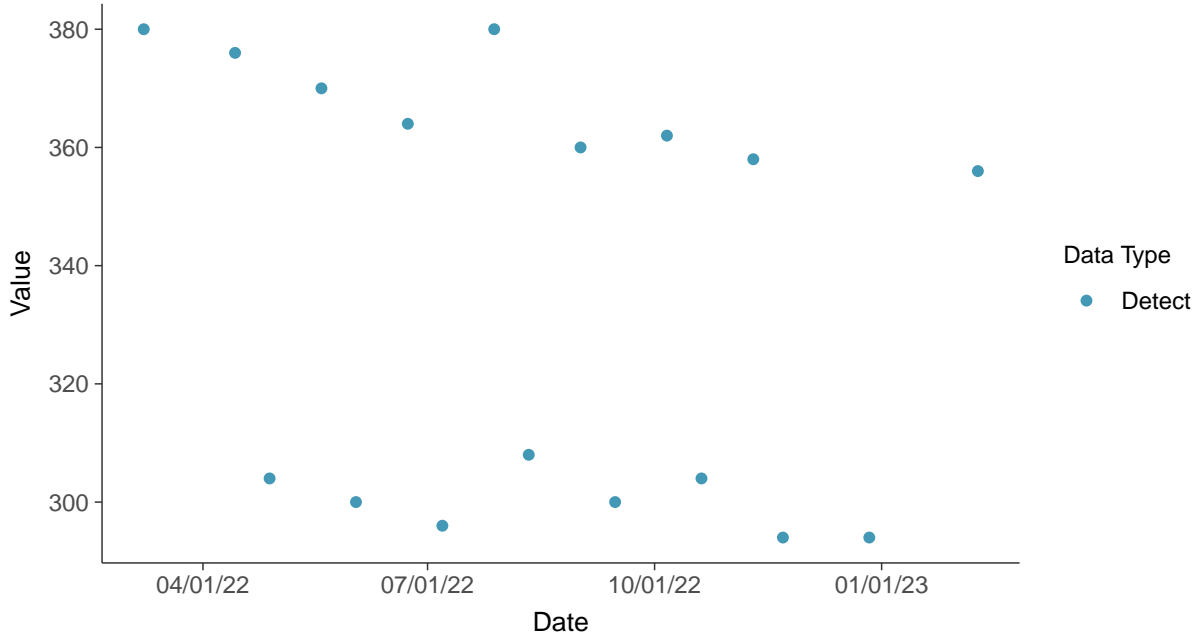


Appendix III: Total Dissolved Solids, MW-11B & MW_12B

ID: 1_06

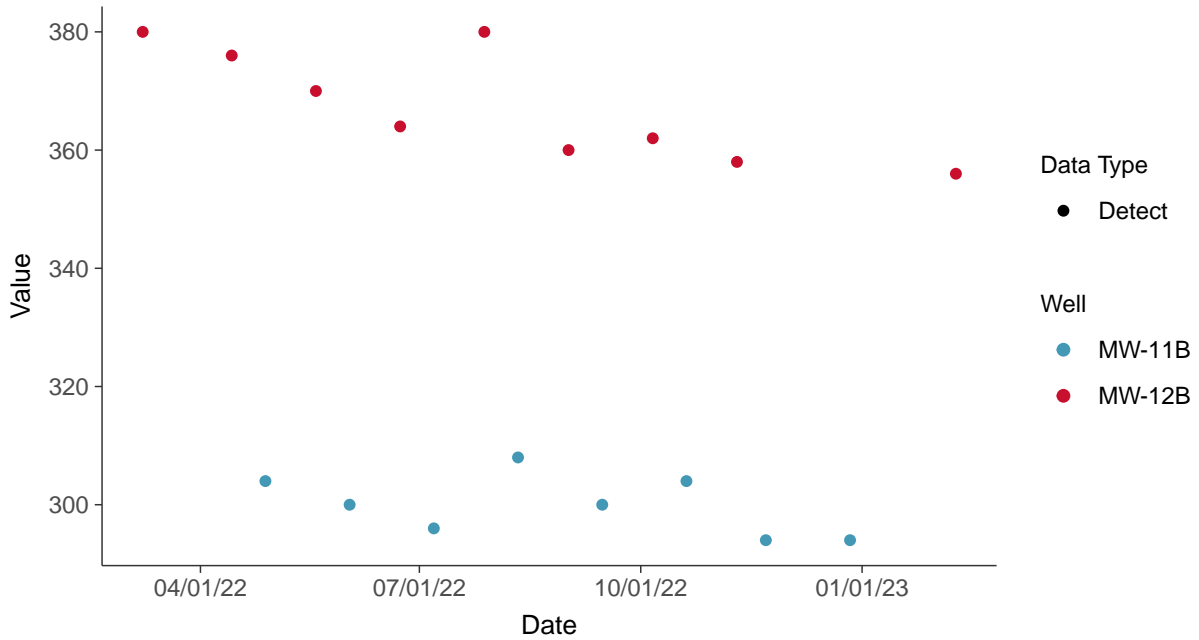
Scatter Plot

Total Dissolved Solids, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

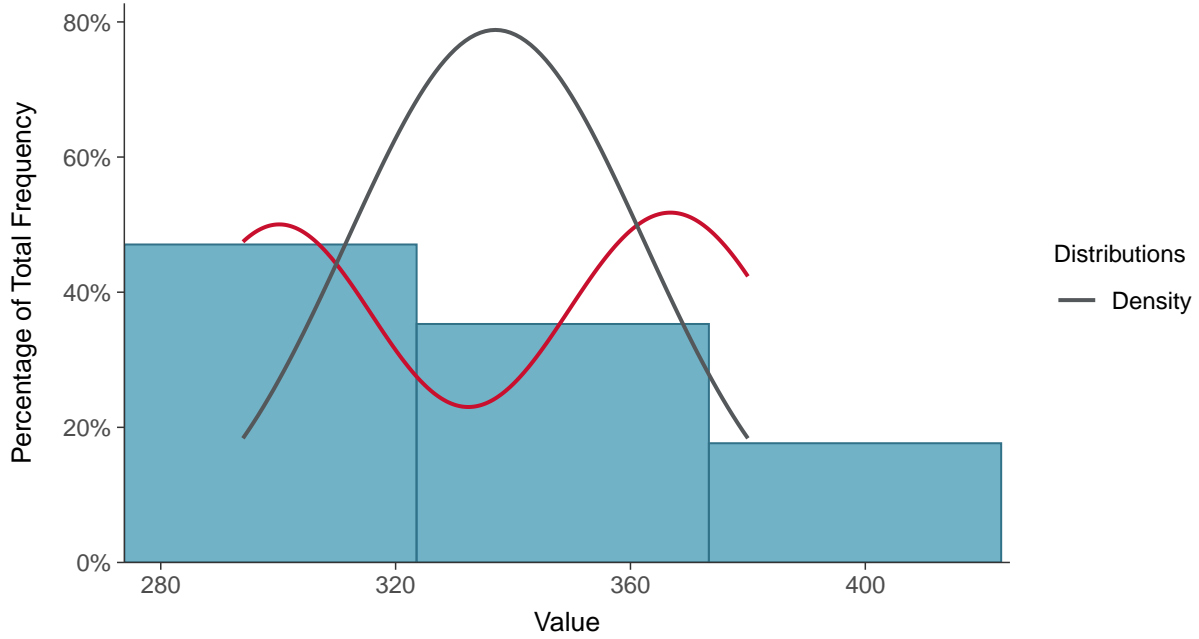
Total Dissolved Solids, MW-11B & MW_12B (mg/L)





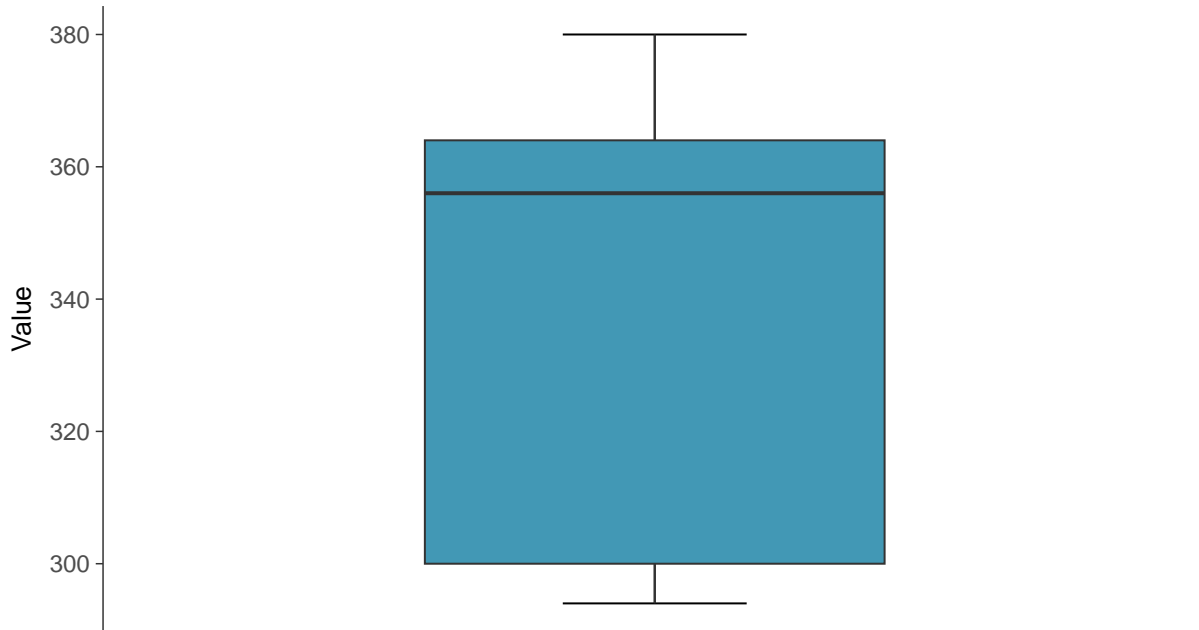
Histogram

Total Dissolved Solids, MW-11B & MW_12B (mg/L)



Boxplot

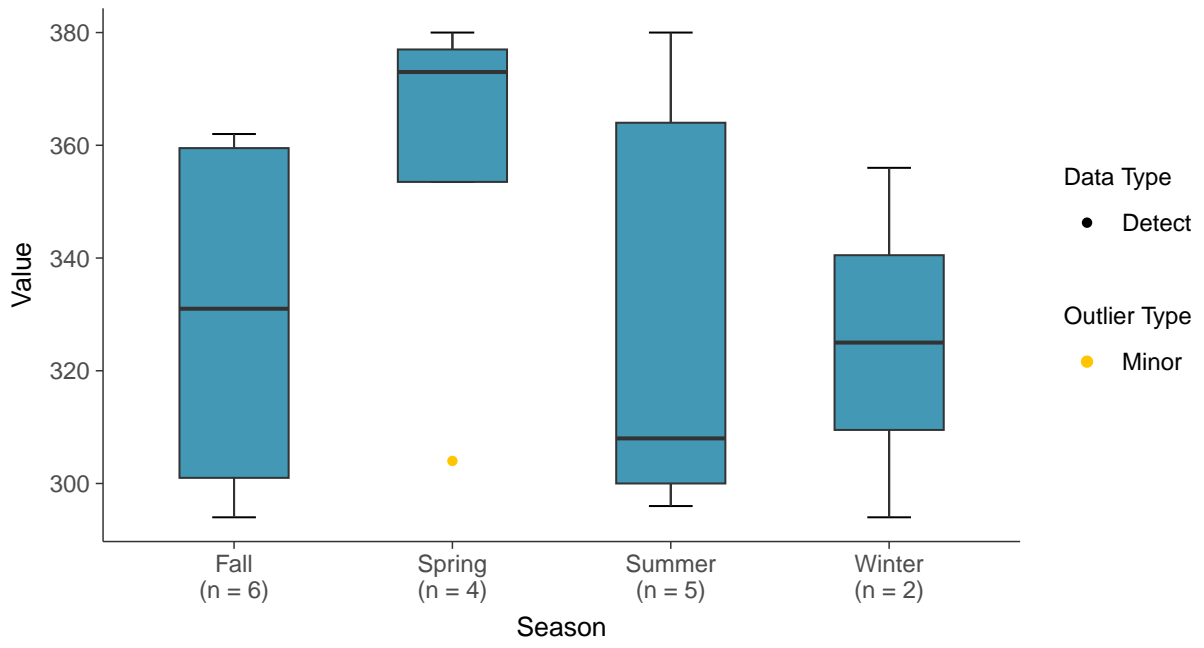
Total Dissolved Solids, MW-11B & MW_12B (mg/L)





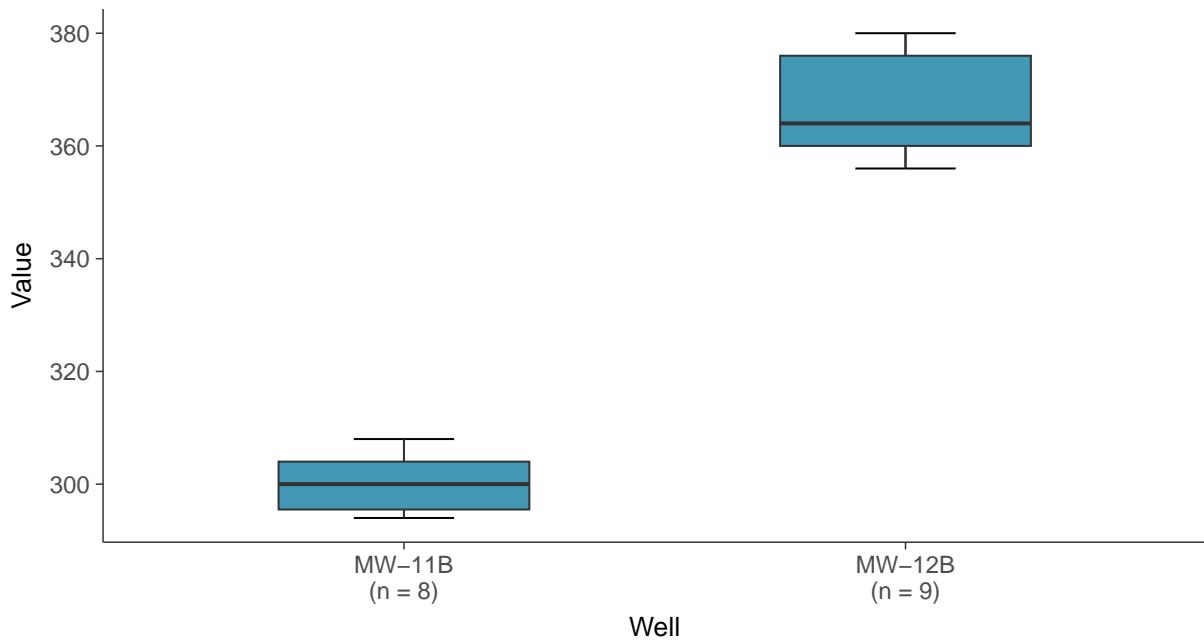
Boxplot by Season

Total Dissolved Solids, MW-11B & MW_12B (mg/L)



Boxplot by Well

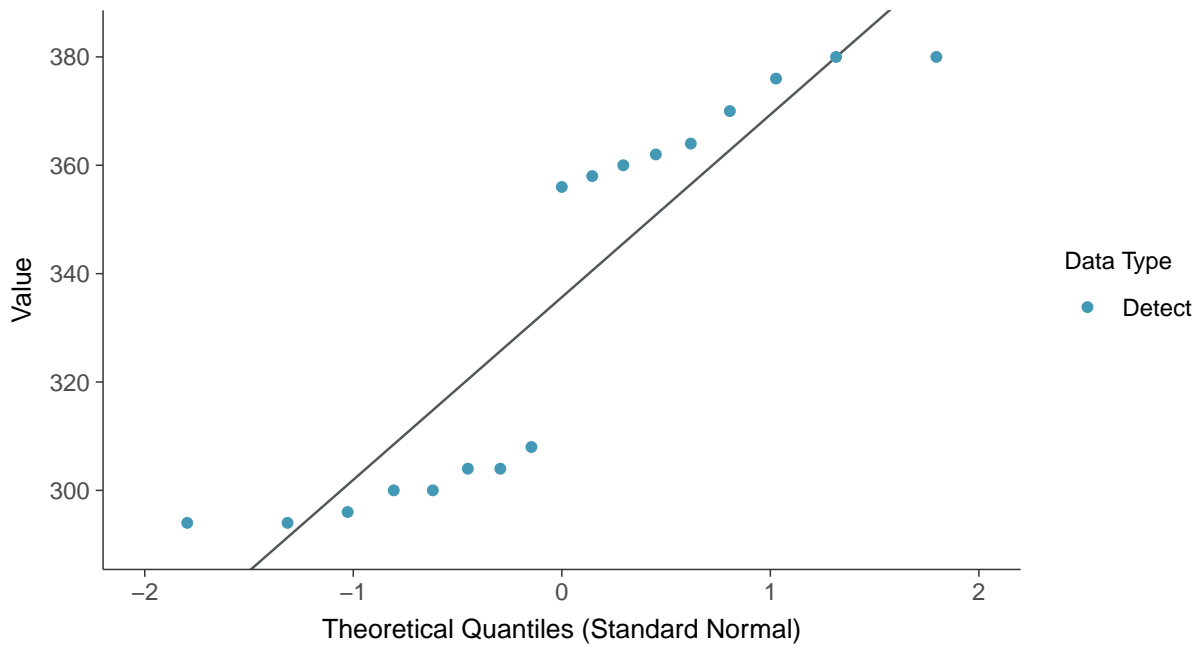
Total Dissolved Solids, MW-11B & MW_12B (mg/L)





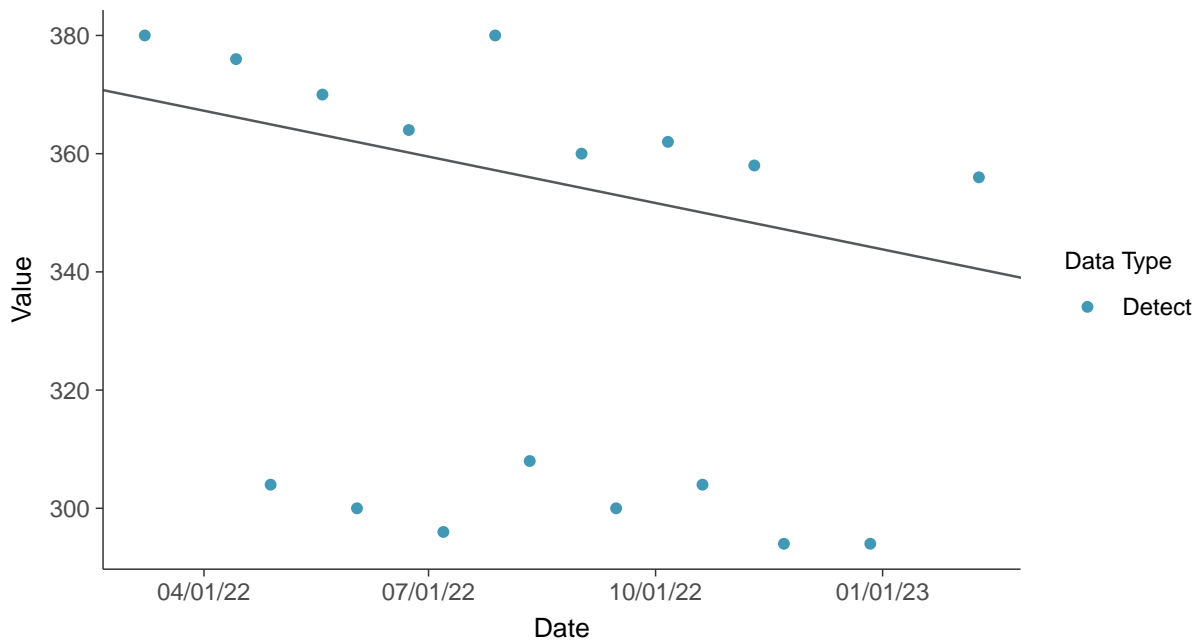
Normal Q-Q plot

Total Dissolved Solids, MW-11B & MW_12B (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

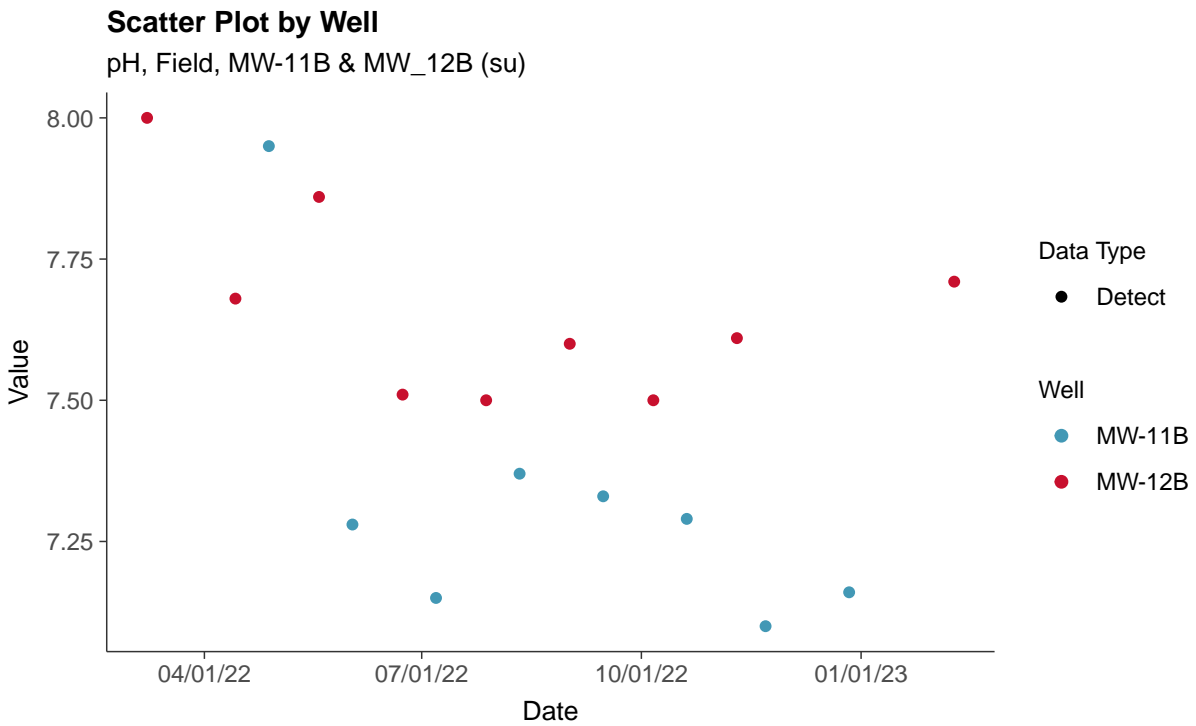
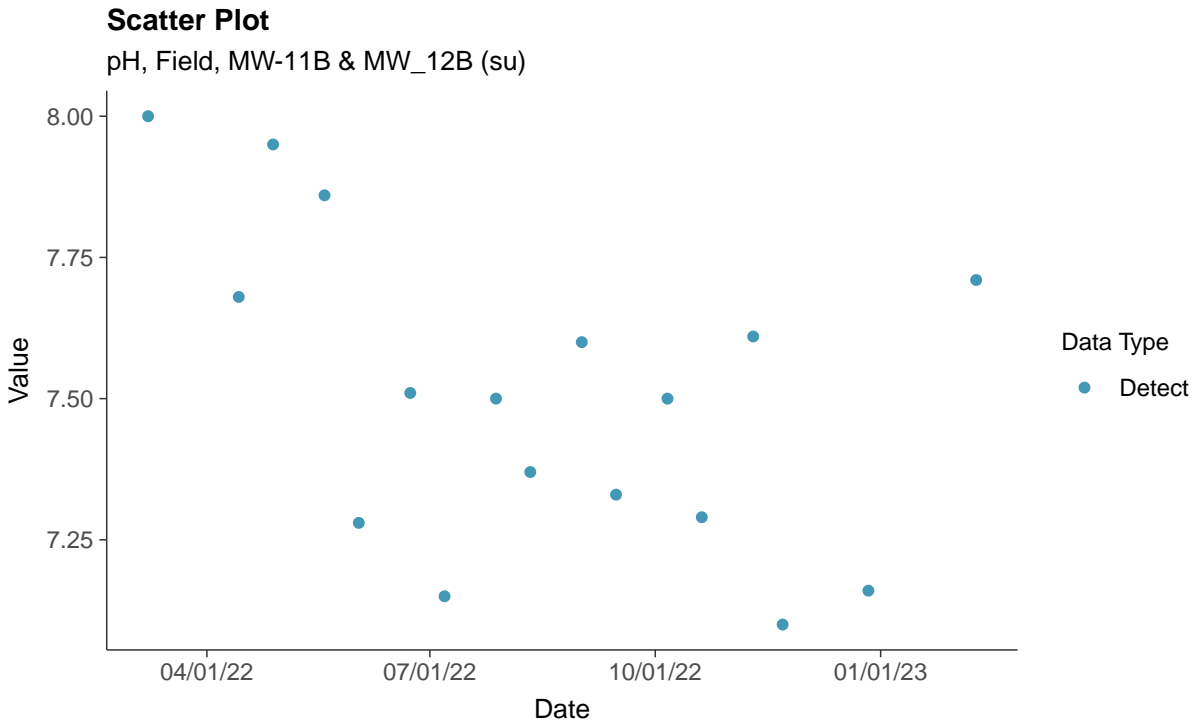
Total Dissolved Solids, MW-11B & MW_12B (mg/L)





Appendix III: pH, Field, MW-11B & MW_12B

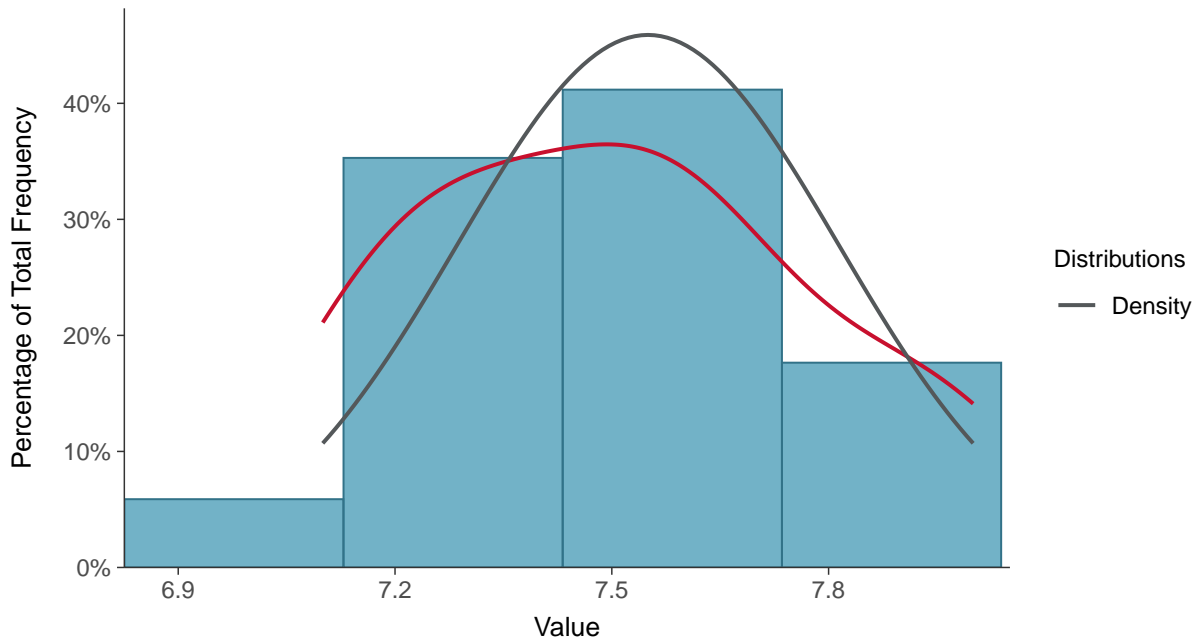
ID: 1_07





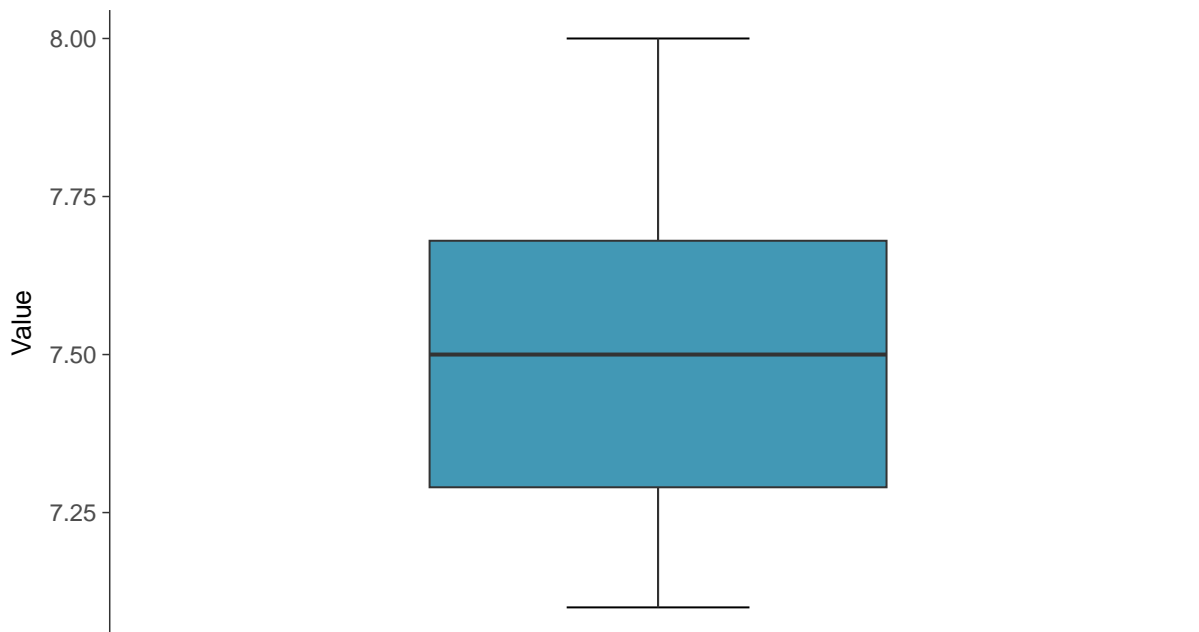
Histogram

pH, Field, MW-11B & MW_12B (su)



Boxplot

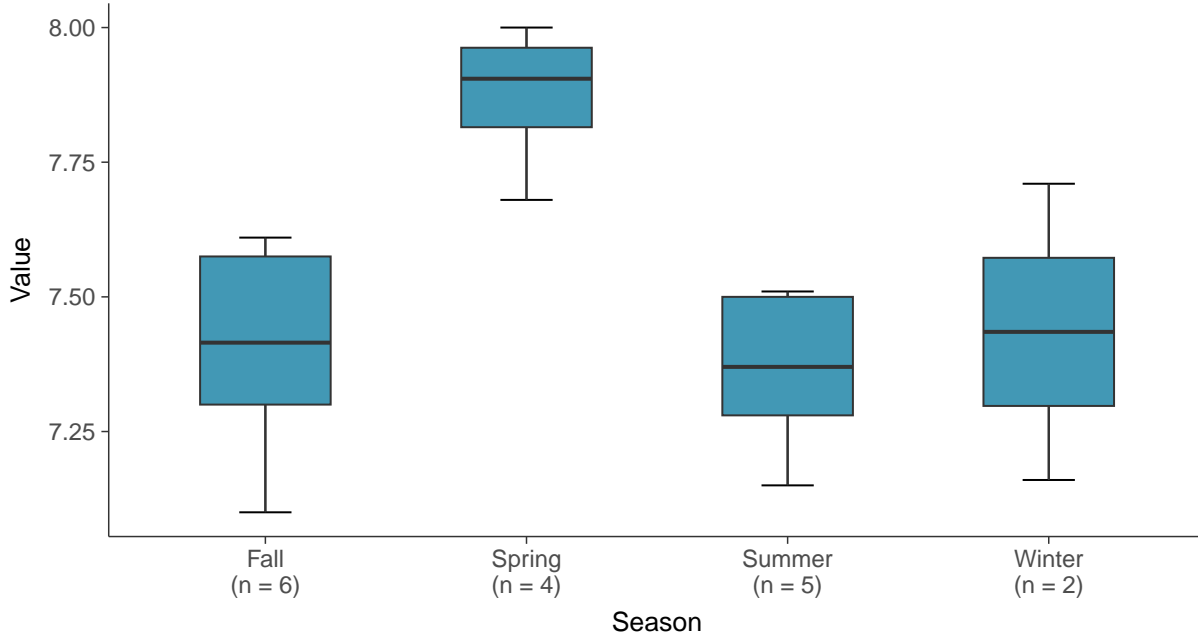
pH, Field, MW-11B & MW_12B (su)





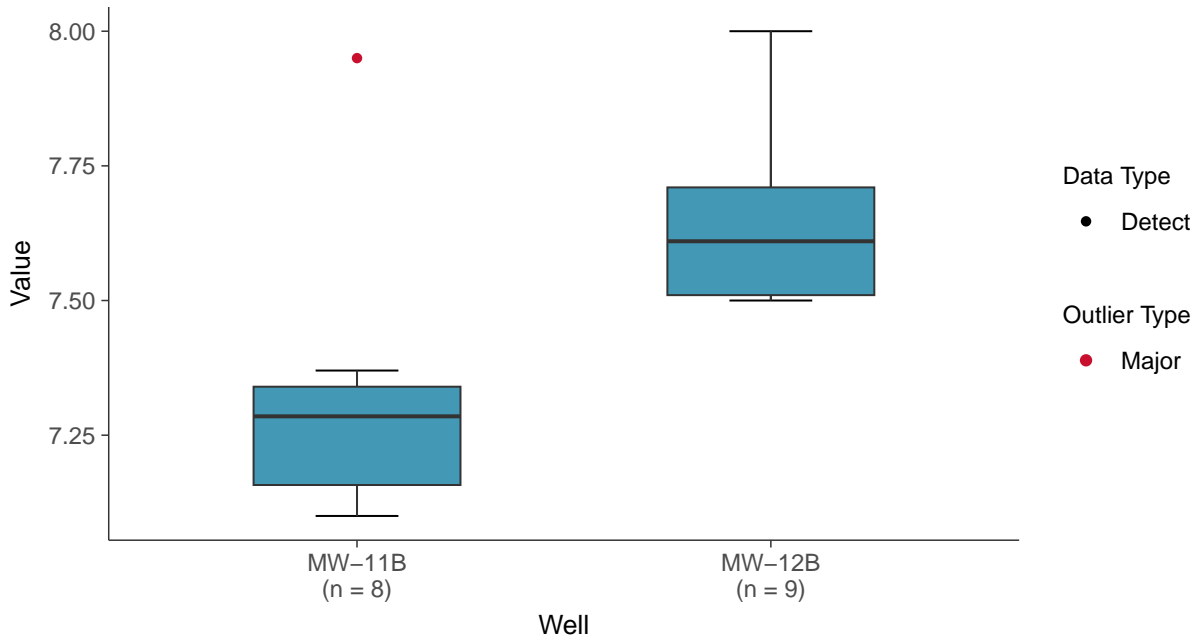
Boxplot by Season

pH, Field, MW-11B & MW_12B (su)



Boxplot by Well

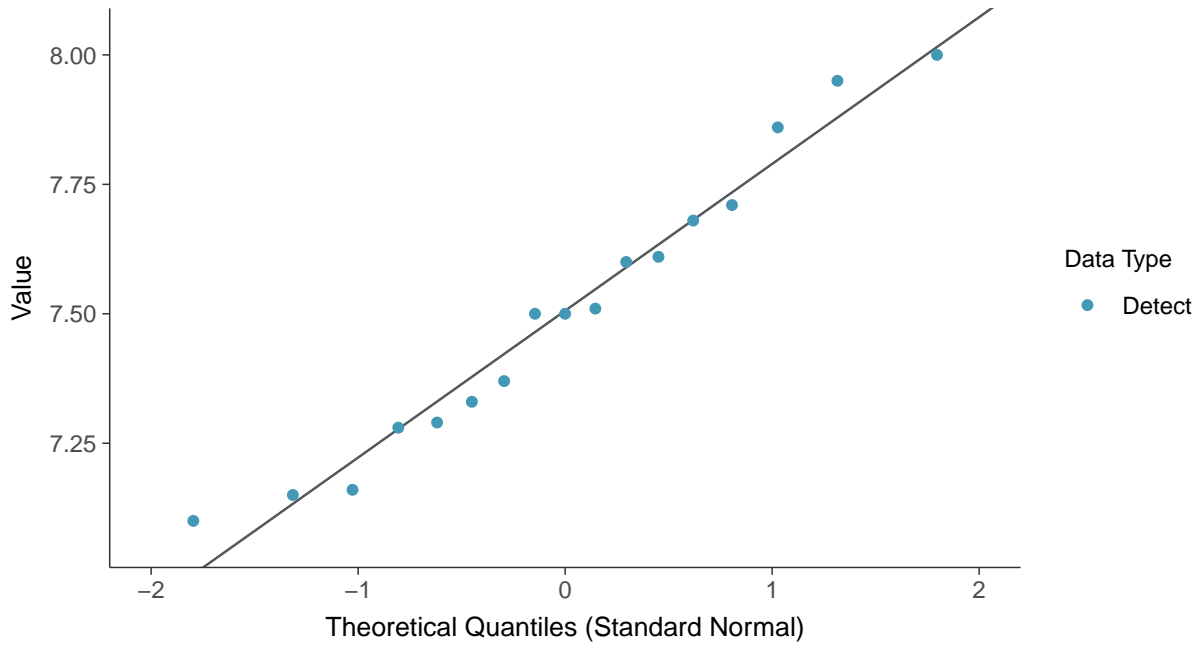
pH, Field, MW-11B & MW_12B (su)





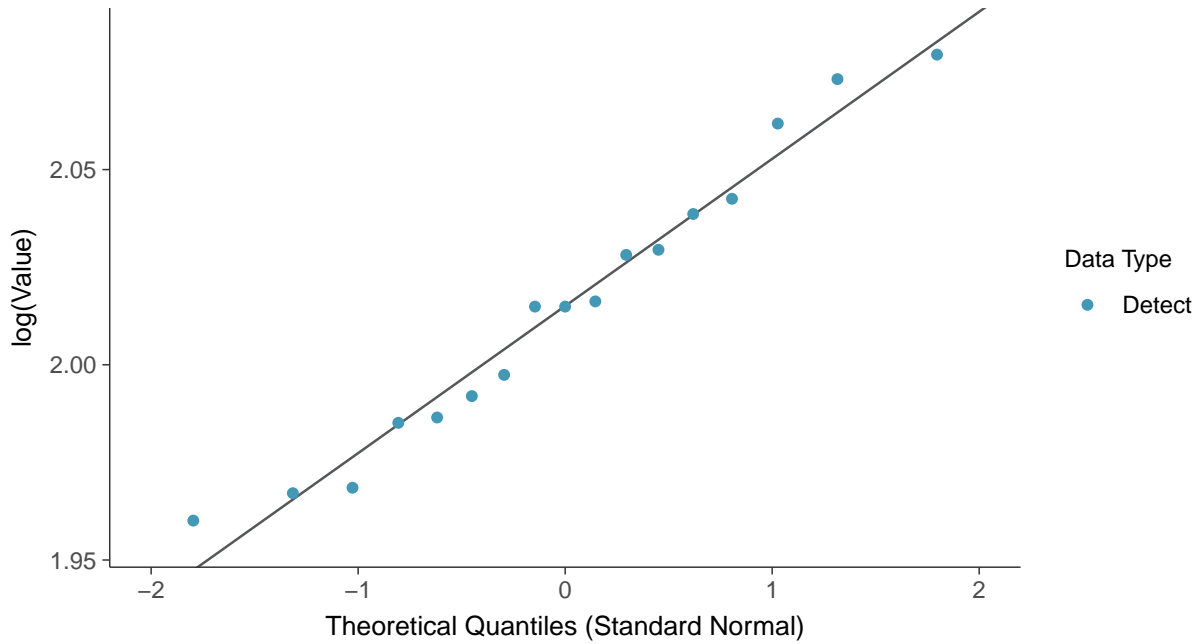
Normal Q-Q plot

pH, Field, MW-11B & MW_12B (su)



Lognormal Q-Q plot

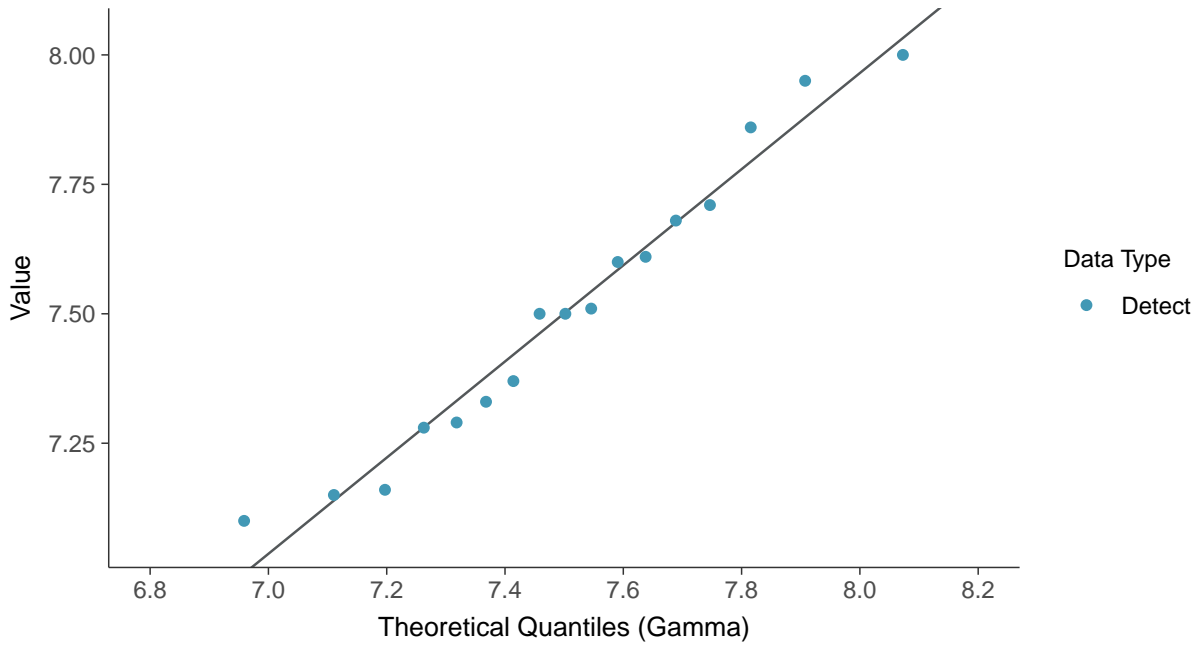
pH, Field, MW-11B & MW_12B (su)





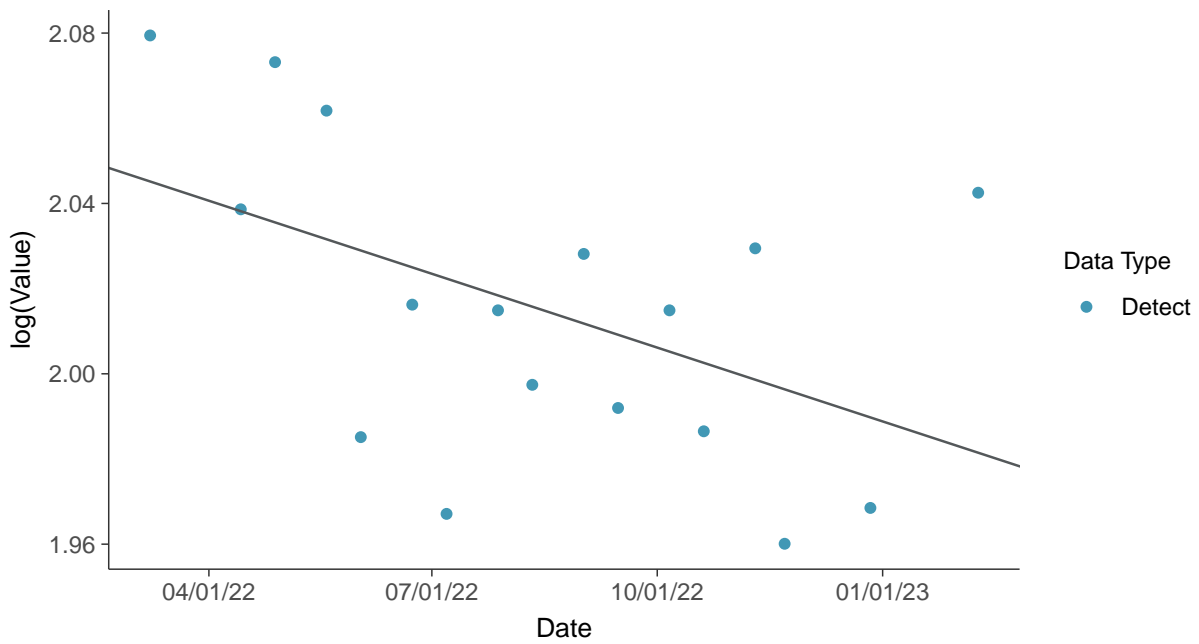
Gamma Q-Q plot

pH, Field, MW-11B & MW_12B (su)



Trend Regression: Lognormal MLE

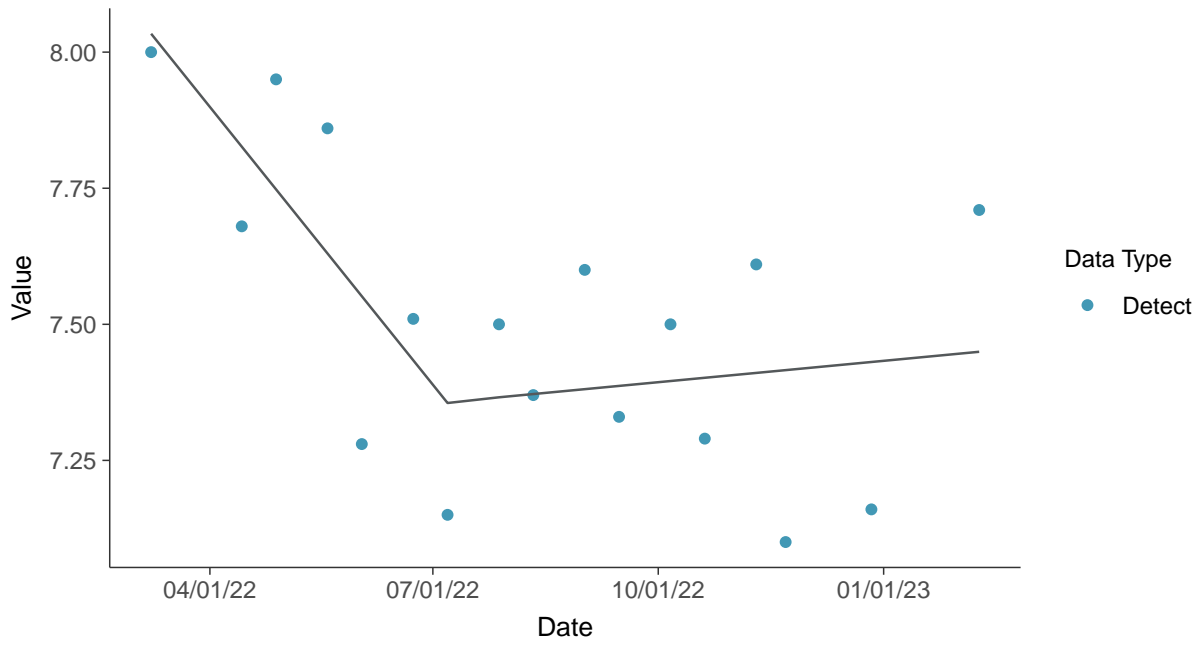
pH, Field, MW-11B & MW_12B (su)





Trend Regression: Piecewise Linear-Linear

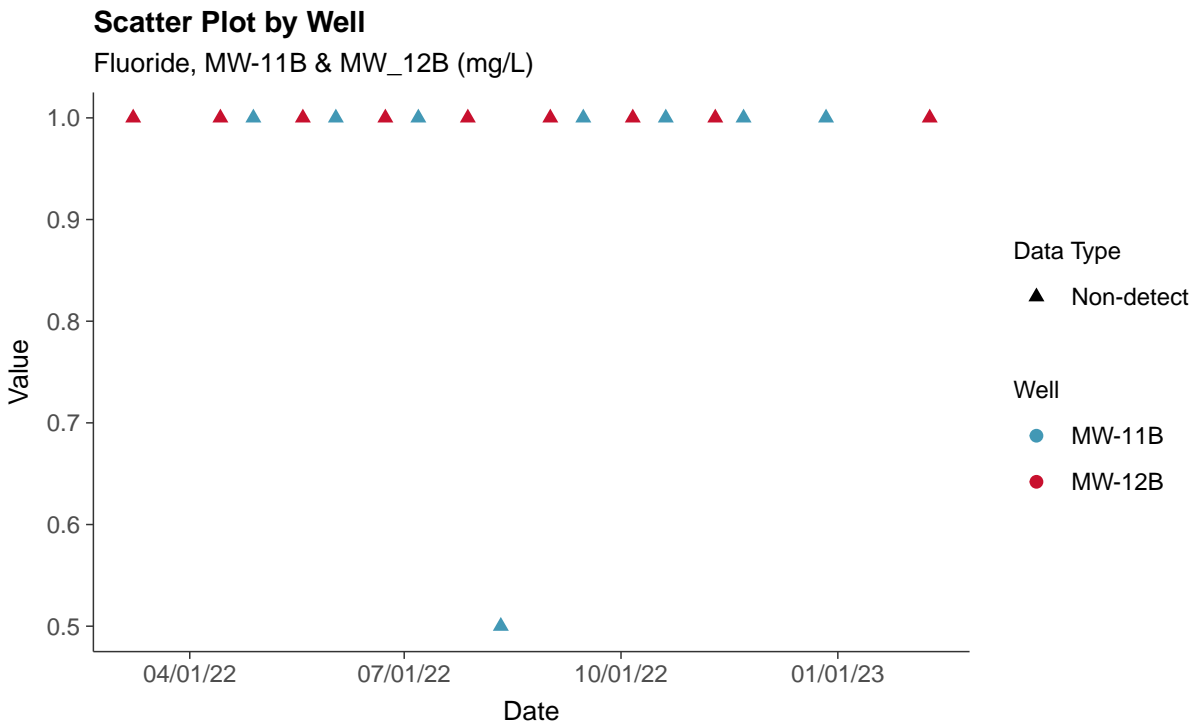
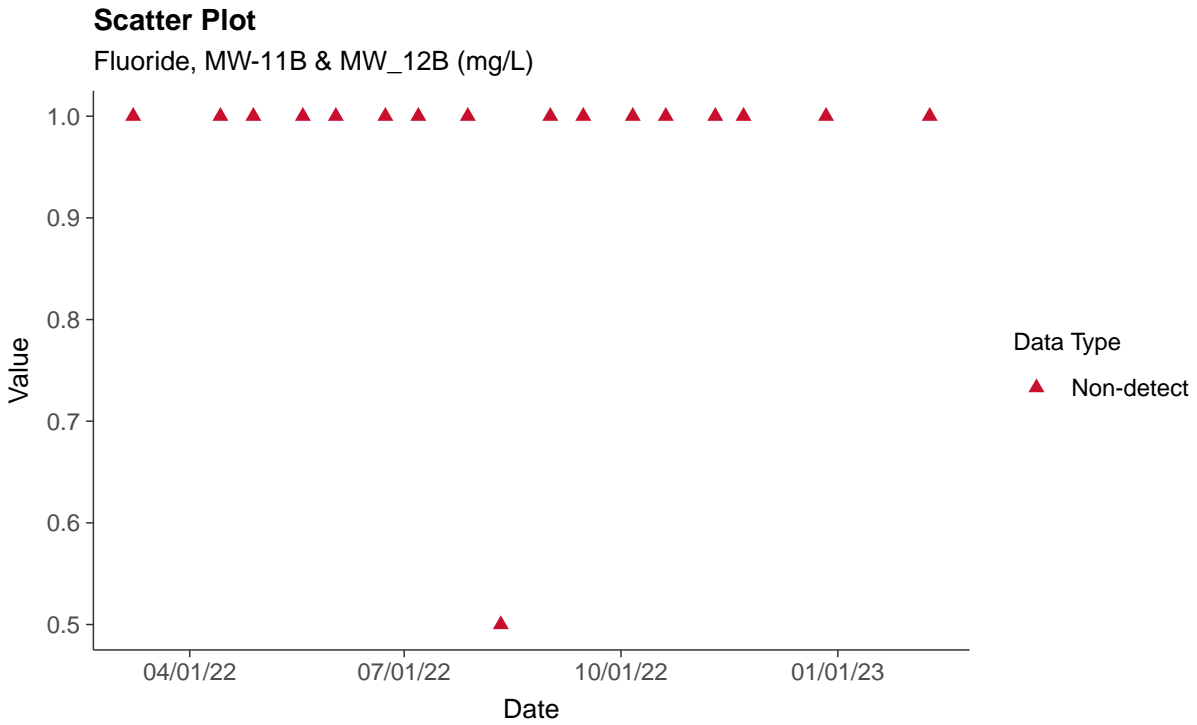
pH, Field, MW-11B & MW_12B (su)





Appendix IV: Fluoride, MW-11B & MW_12B

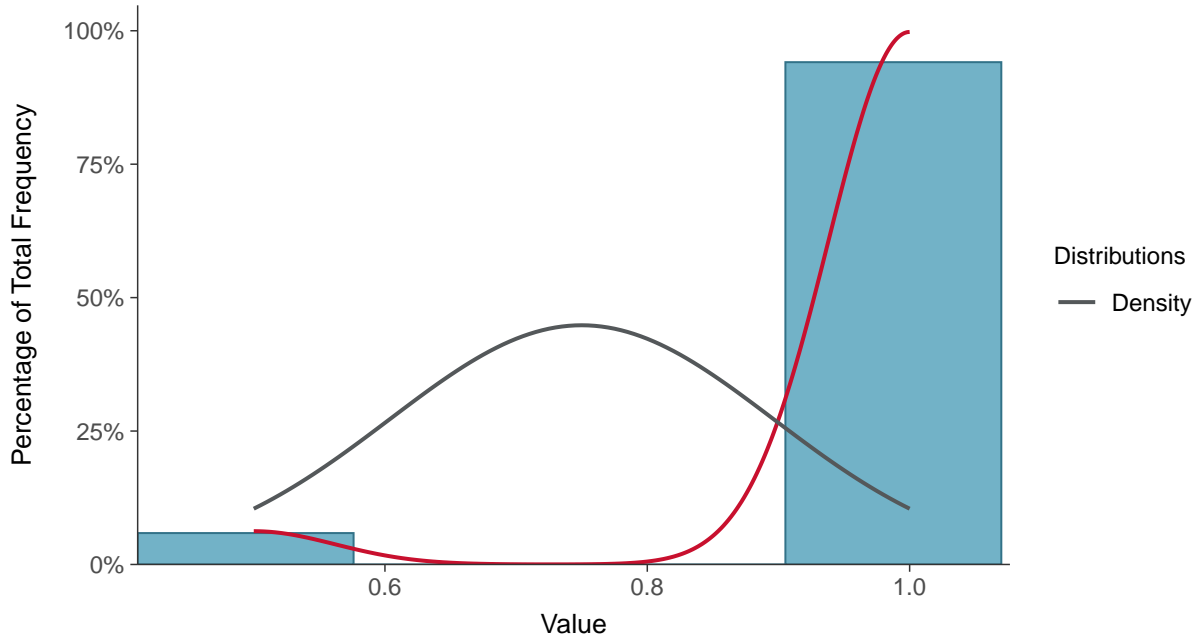
ID: 2_04





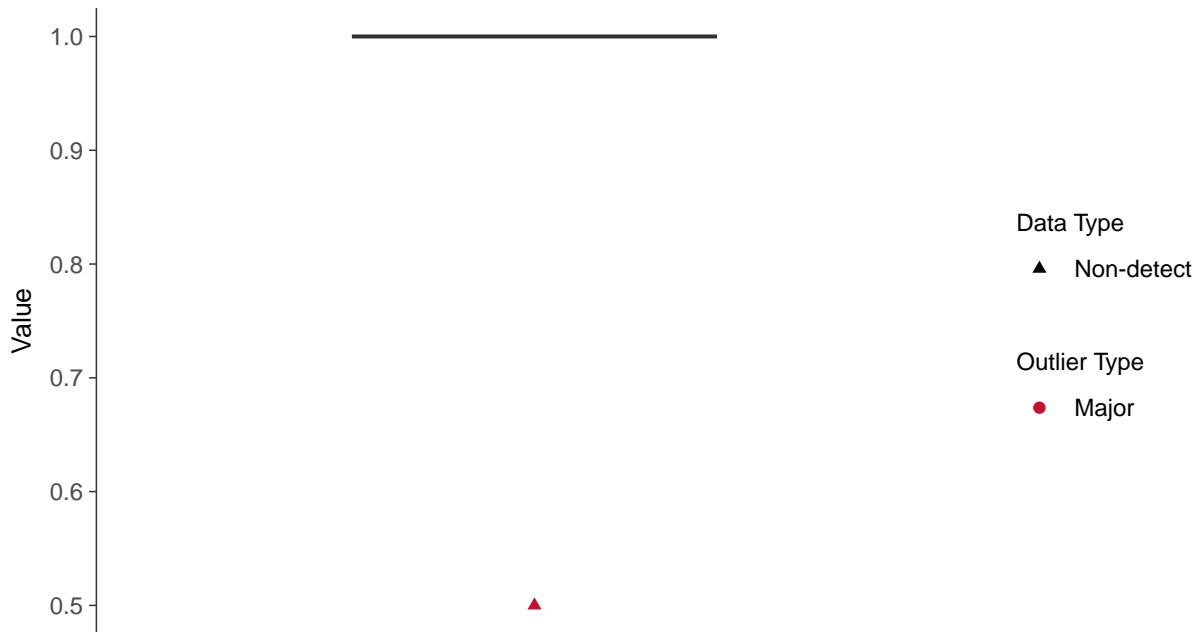
Histogram

Fluoride, MW-11B & MW_12B (mg/L)



Boxplot

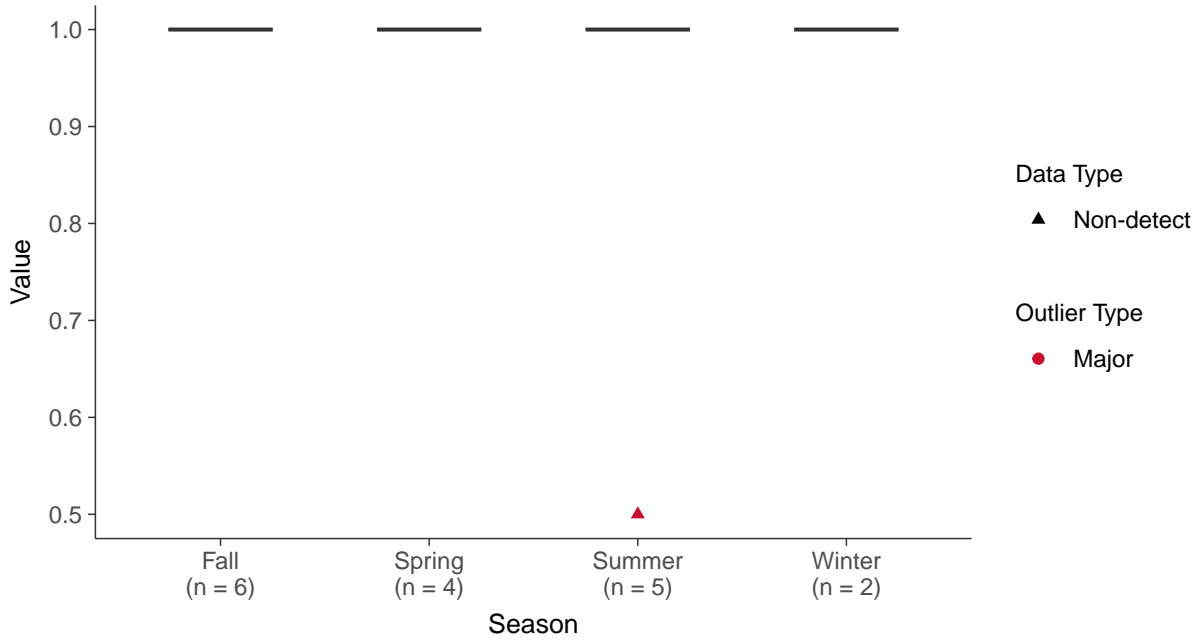
Fluoride, MW-11B & MW_12B (mg/L)





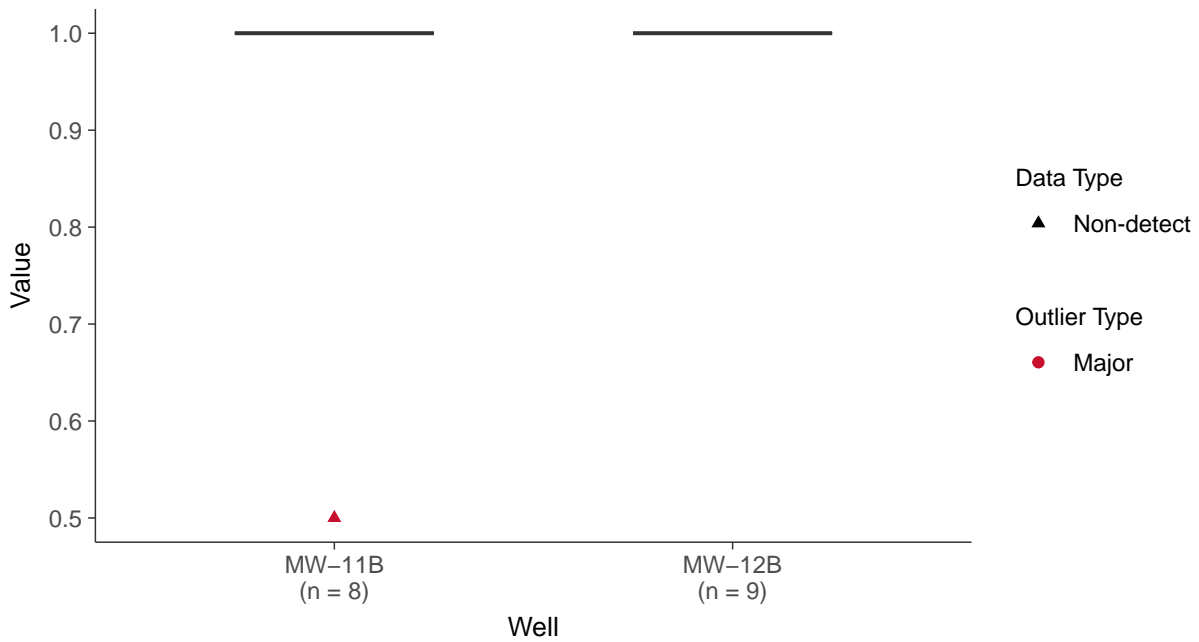
Boxplot by Season

Fluoride, MW-11B & MW_12B (mg/L)



Boxplot by Well

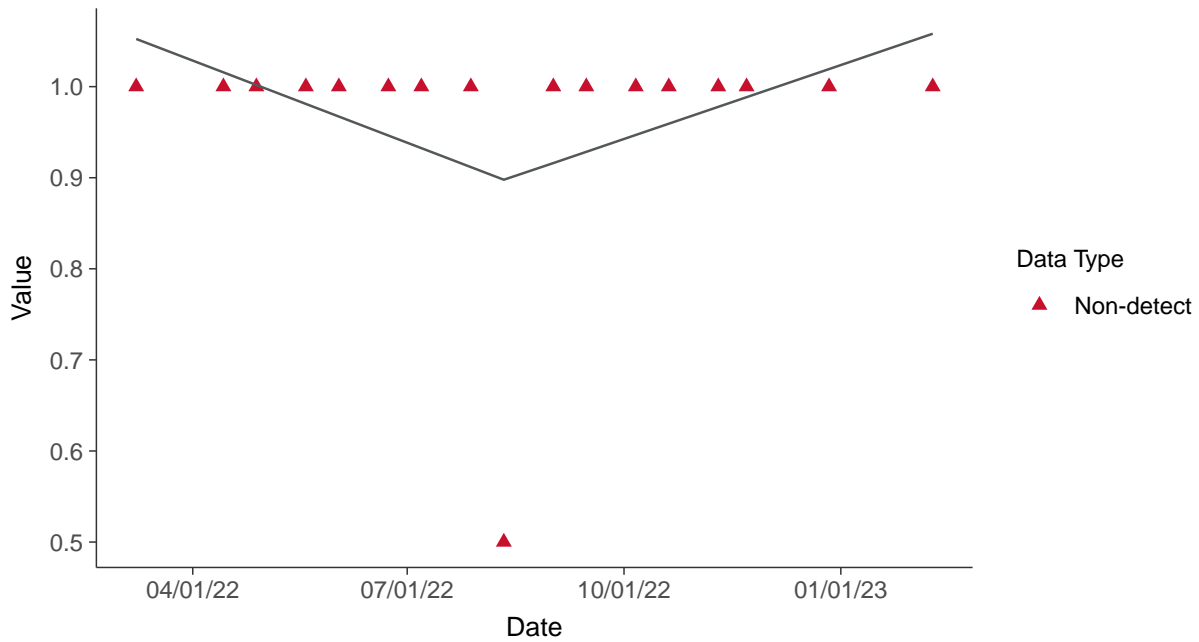
Fluoride, MW-11B & MW_12B (mg/L)





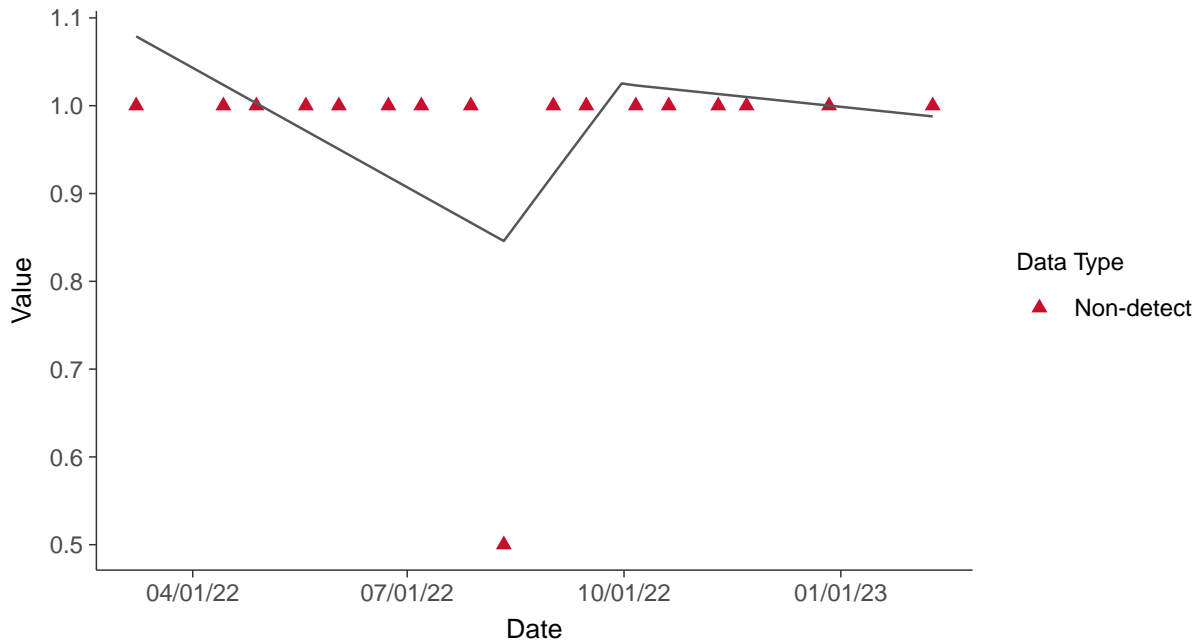
Trend Regression: Piecewise Linear-Linear

Fluoride, MW-11B & MW_12B (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Fluoride, MW-11B & MW_12B (mg/L)



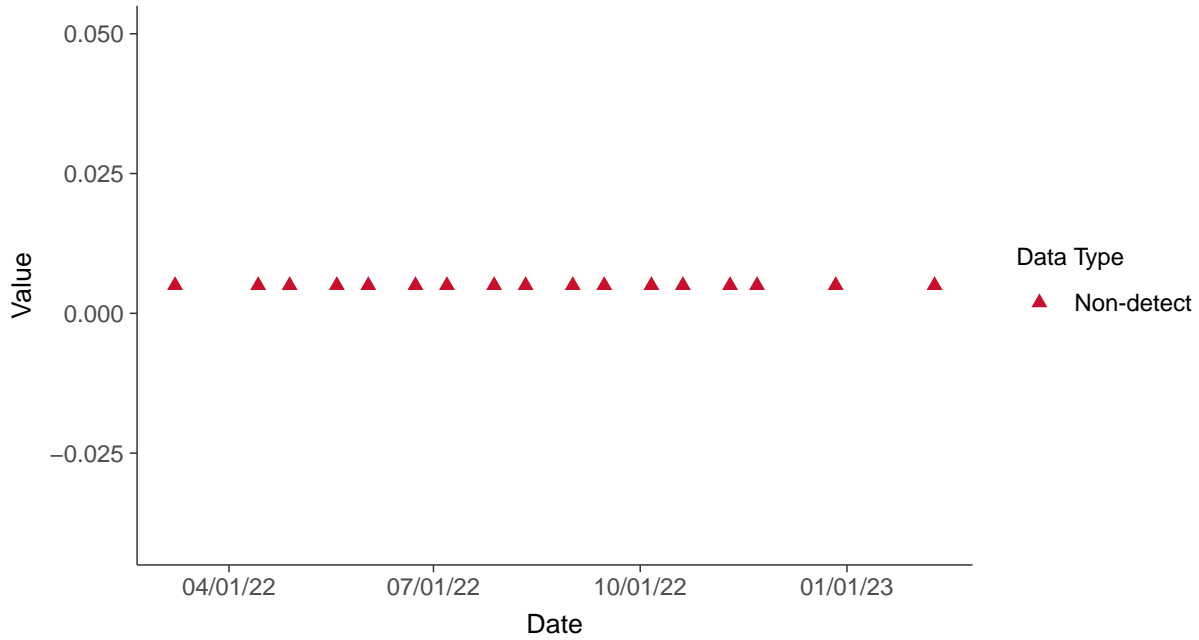


Appendix IV: Antimony, MW-11B & MW_12B

ID: 2_08

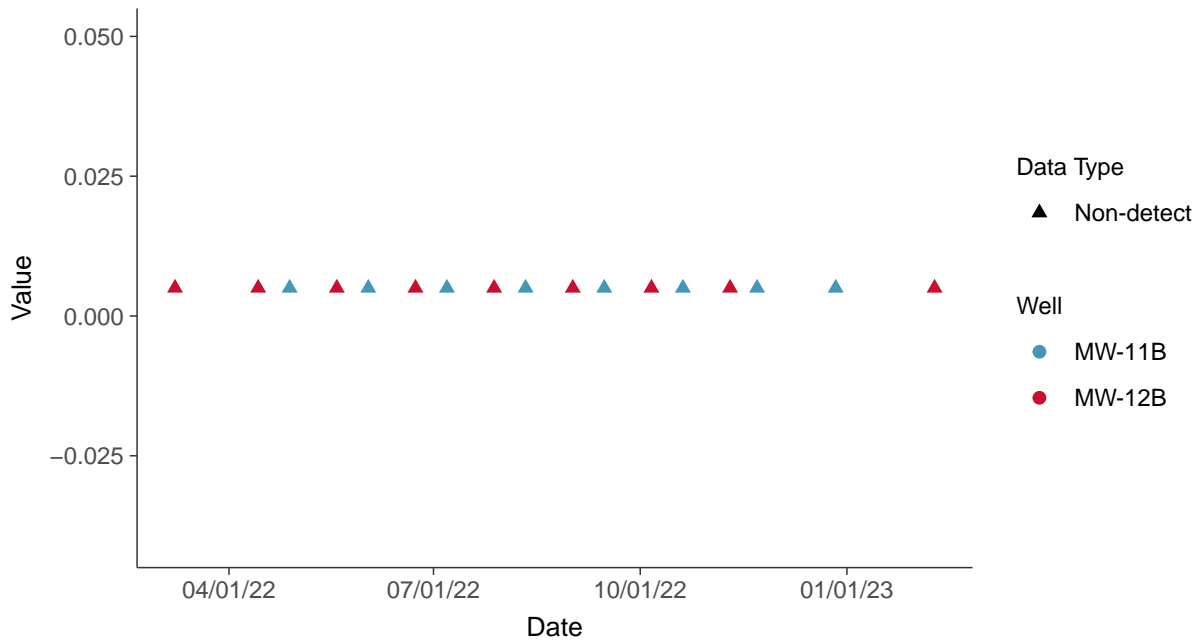
Scatter Plot

Antimony, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

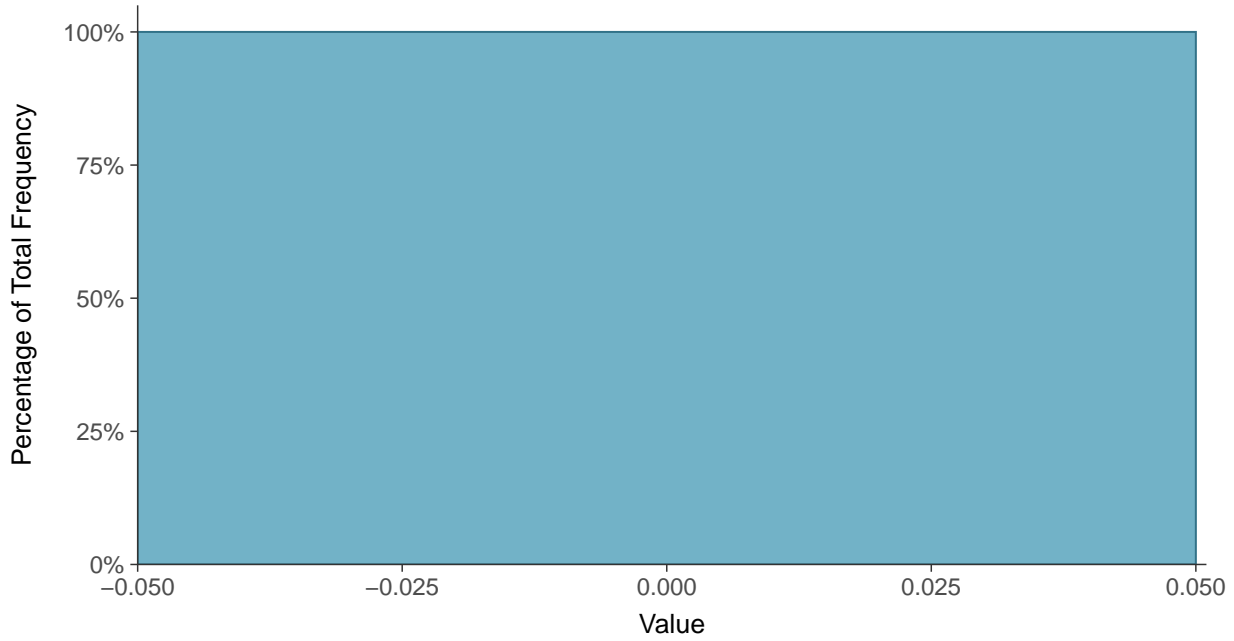
Antimony, MW-11B & MW_12B (mg/L)





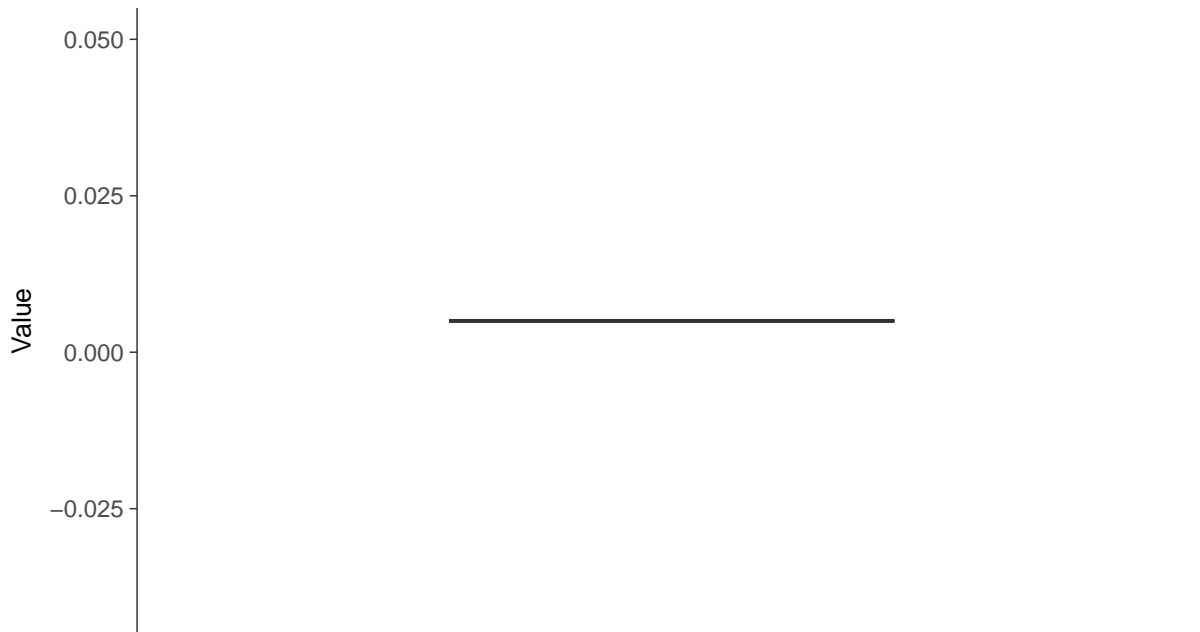
Histogram

Antimony, MW-11B & MW_12B (mg/L)



Boxplot

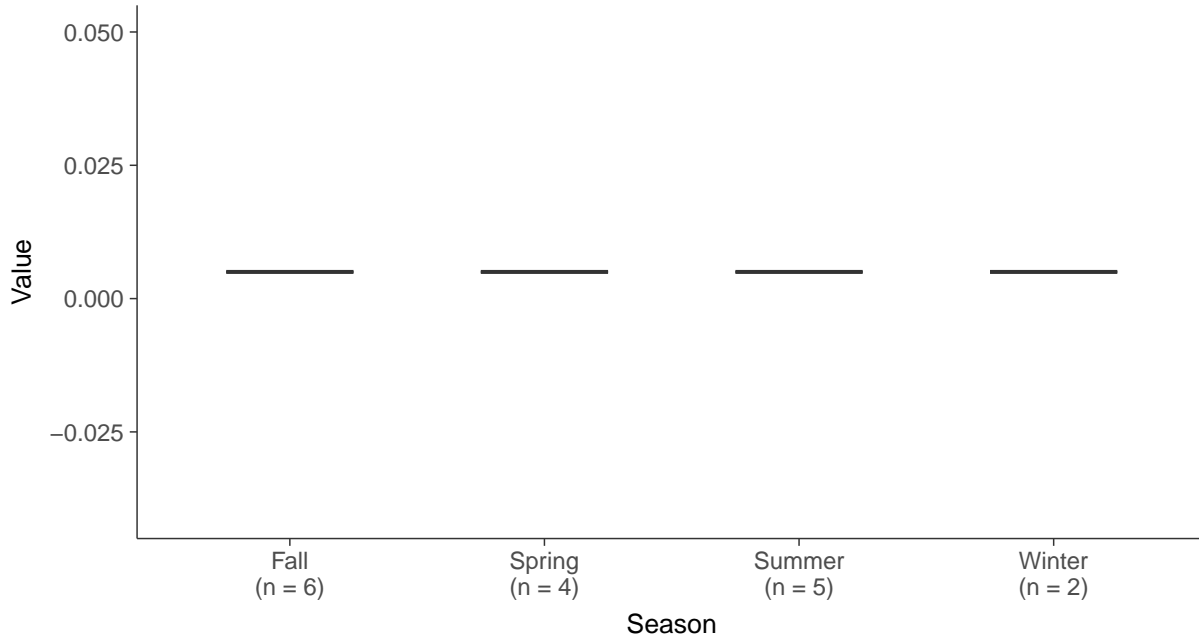
Antimony, MW-11B & MW_12B (mg/L)





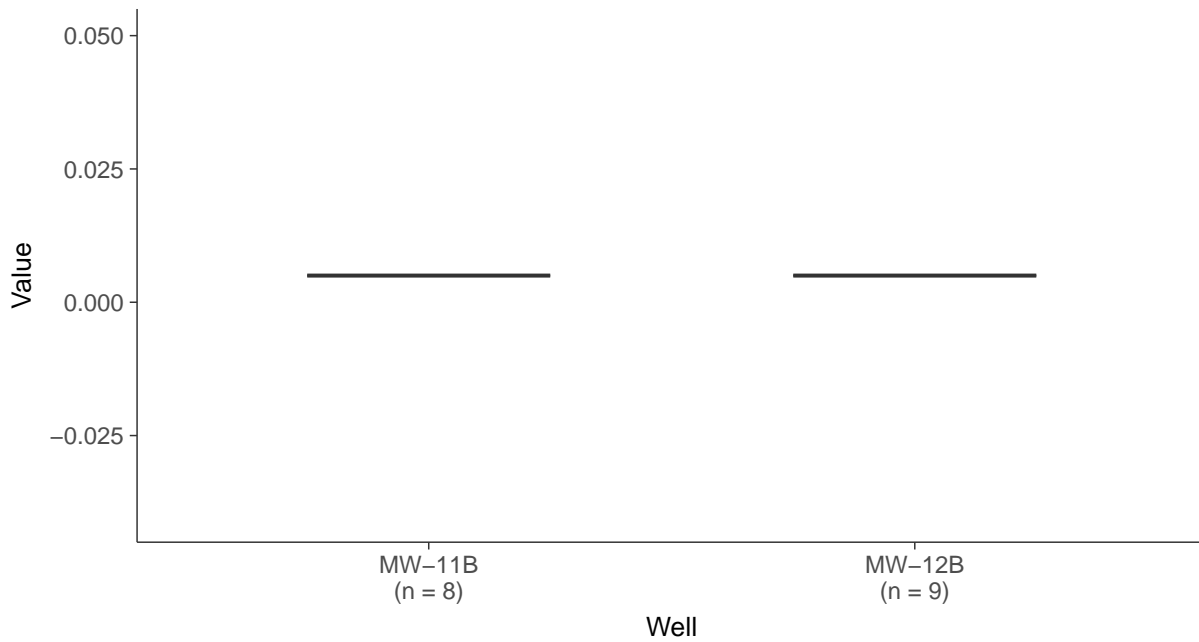
Boxplot by Season

Antimony, MW-11B & MW_12B (mg/L)



Boxplot by Well

Antimony, MW-11B & MW_12B (mg/L)



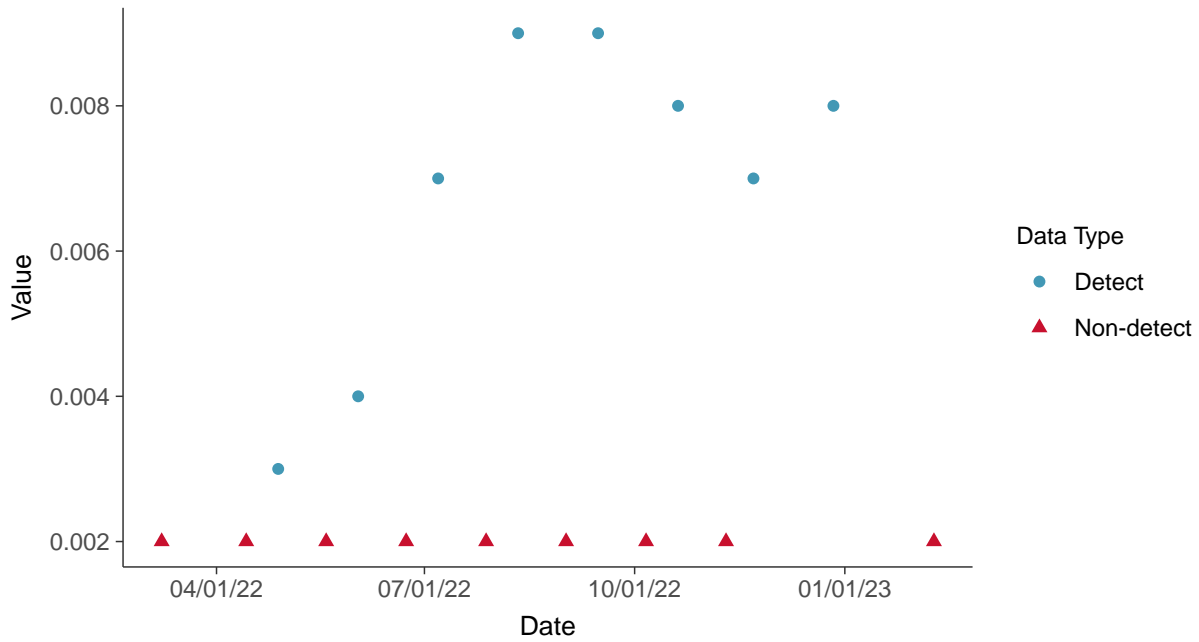


Appendix IV: Arsenic, MW-11B & MW_12B

ID: 2_09

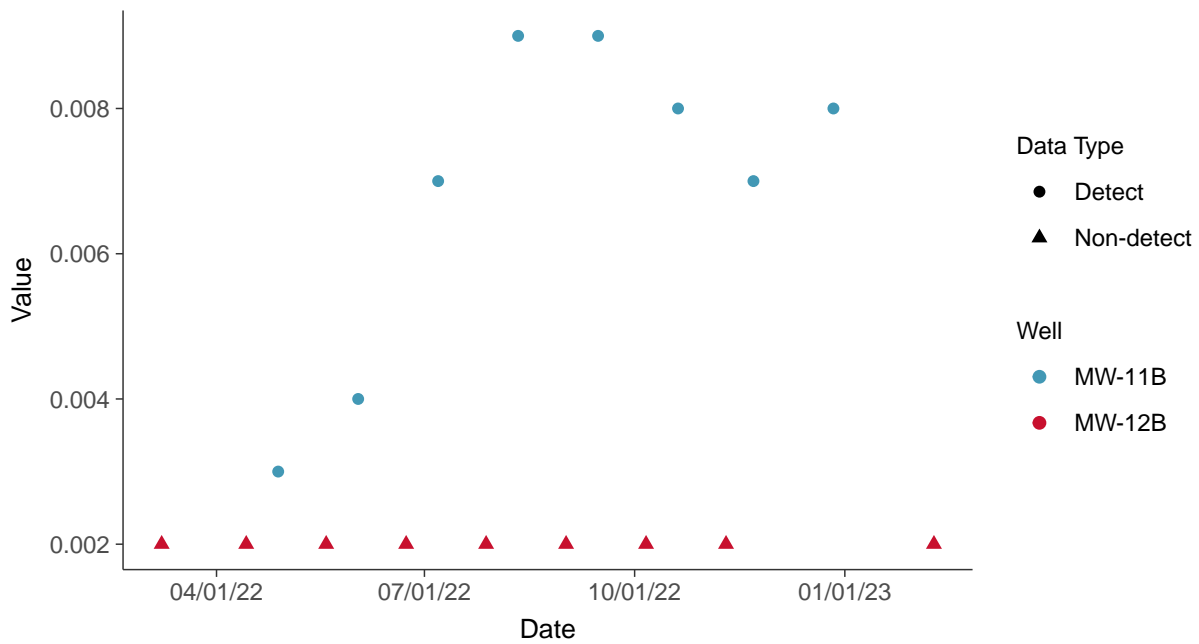
Scatter Plot

Arsenic, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

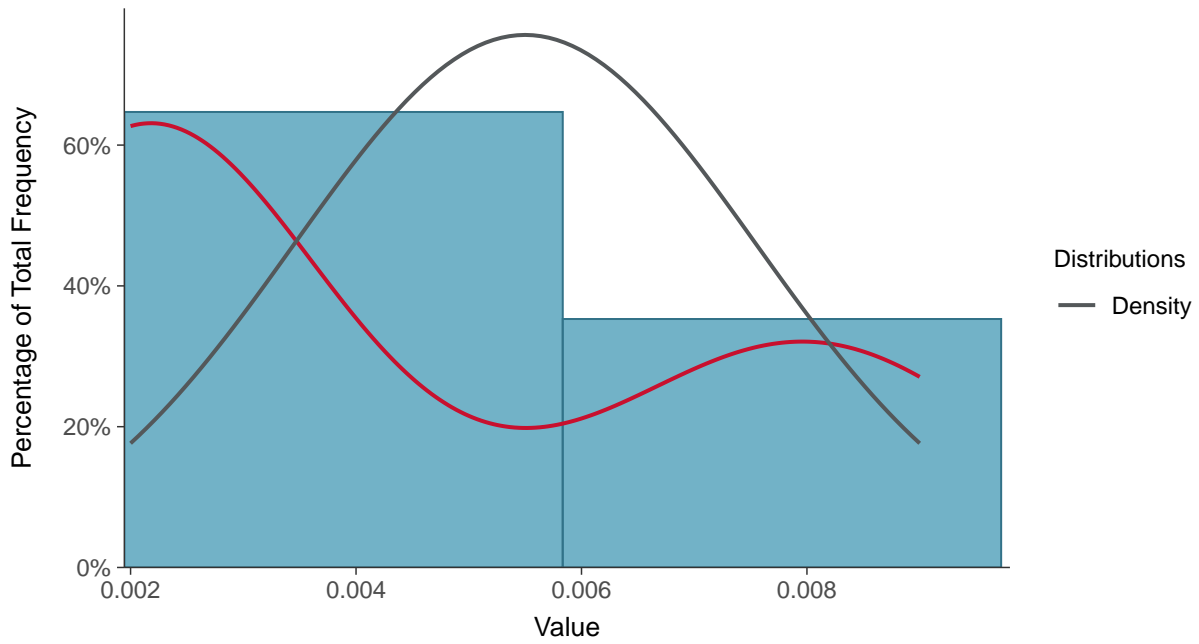
Arsenic, MW-11B & MW_12B (mg/L)





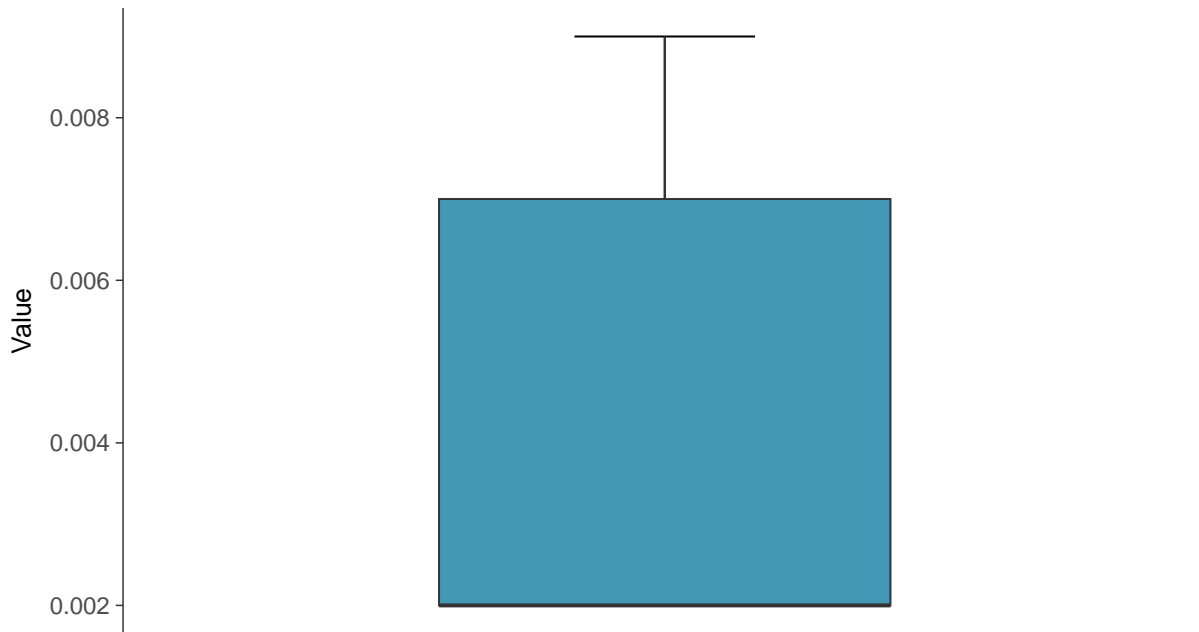
Histogram

Arsenic, MW-11B & MW_12B (mg/L)



Boxplot

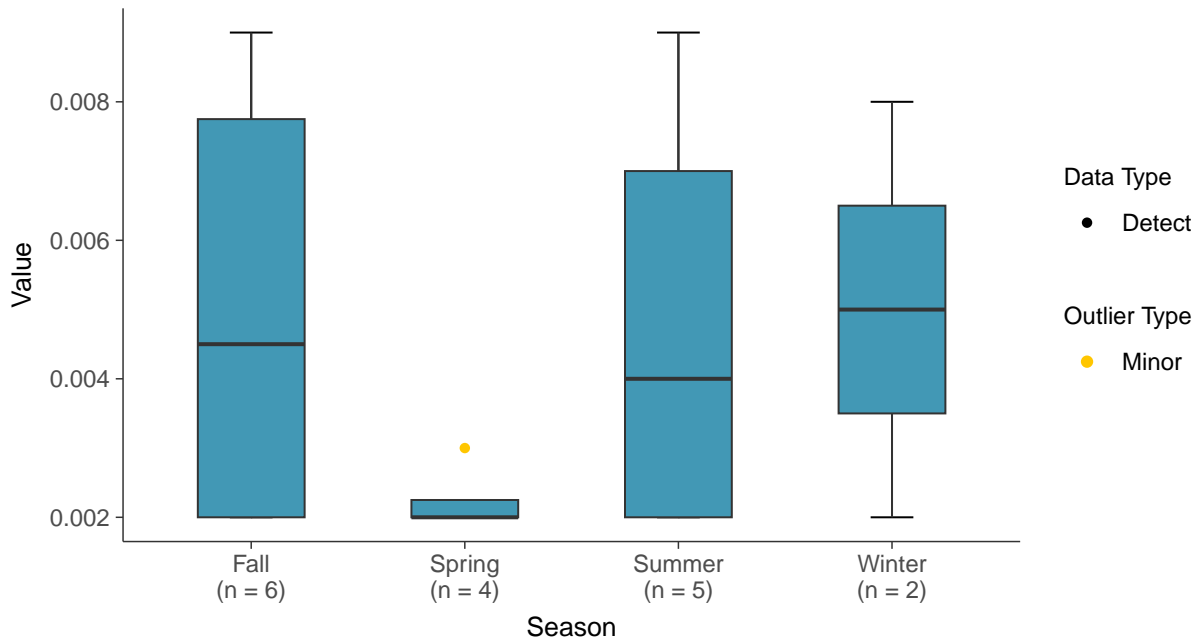
Arsenic, MW-11B & MW_12B (mg/L)





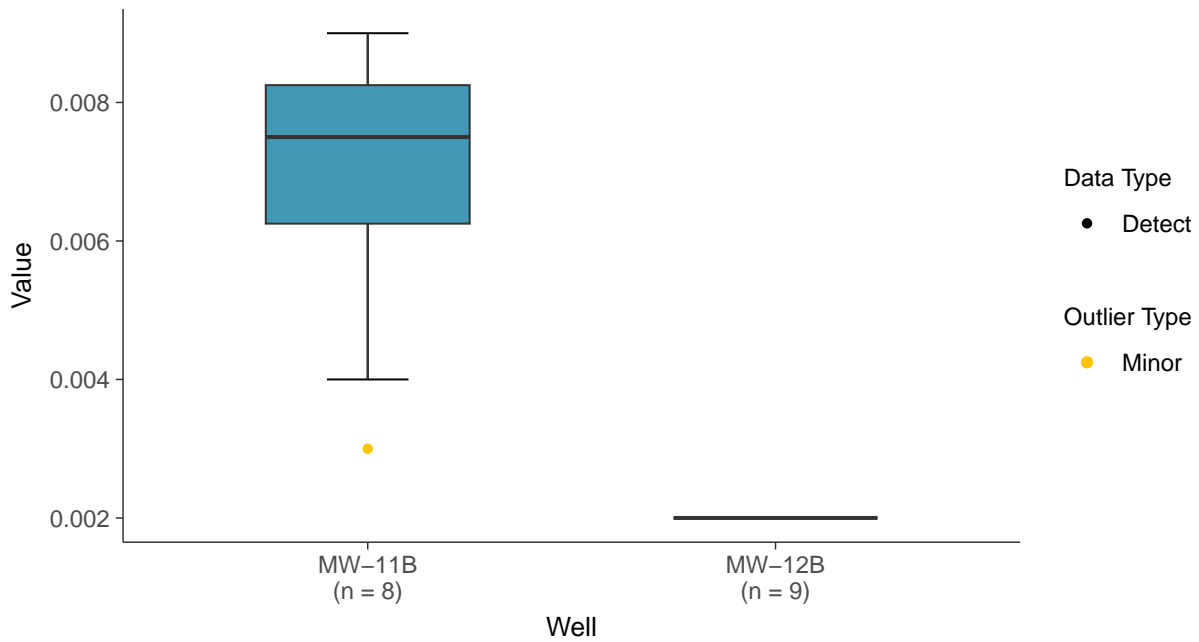
Boxplot by Season

Arsenic, MW-11B & MW_12B (mg/L)



Boxplot by Well

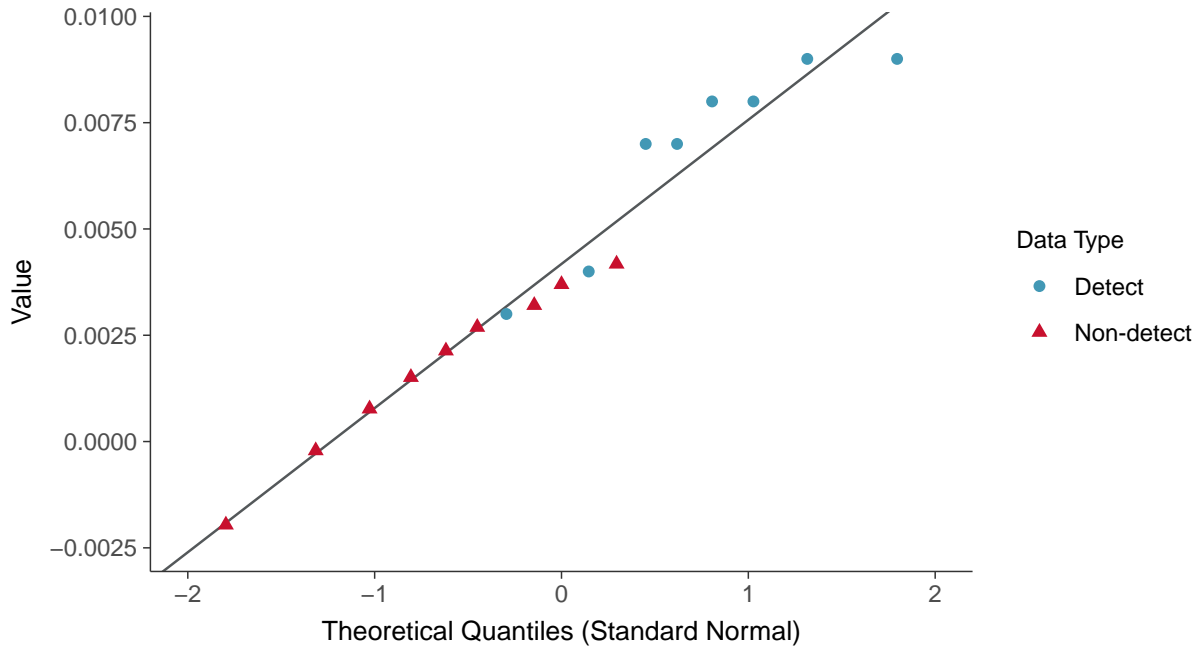
Arsenic, MW-11B & MW_12B (mg/L)





Normal Q-Q plot using ROS Imputed Estimates

Arsenic, MW-11B & MW_12B (mg/L)



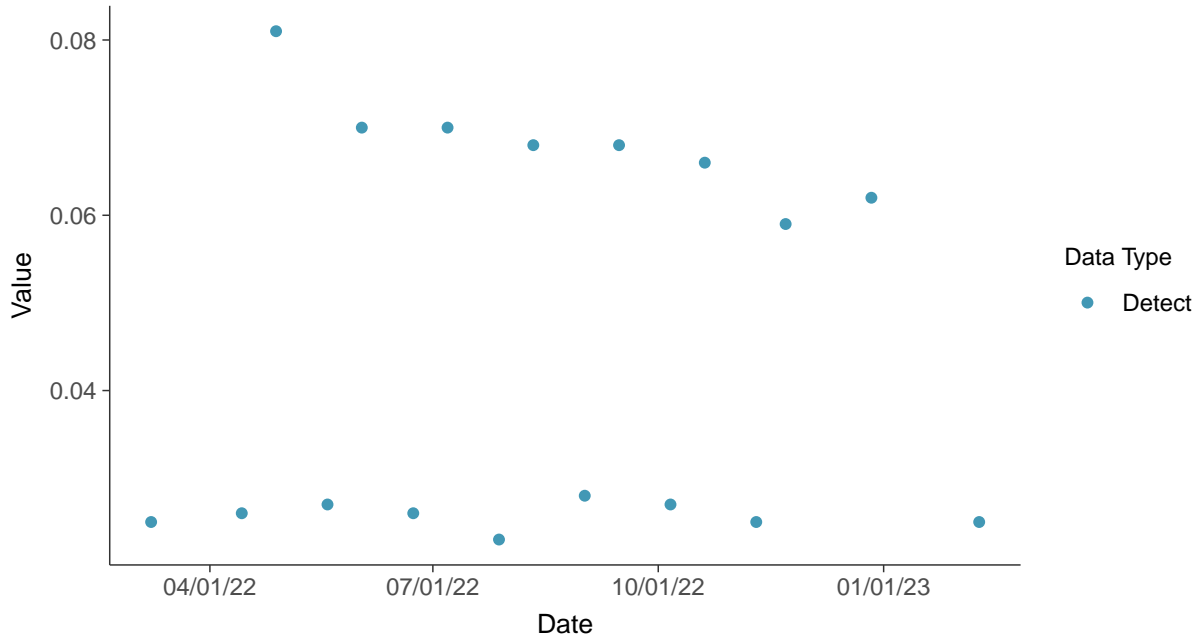


Appendix IV: Barium, MW-11B & MW_12B

ID: 2_10

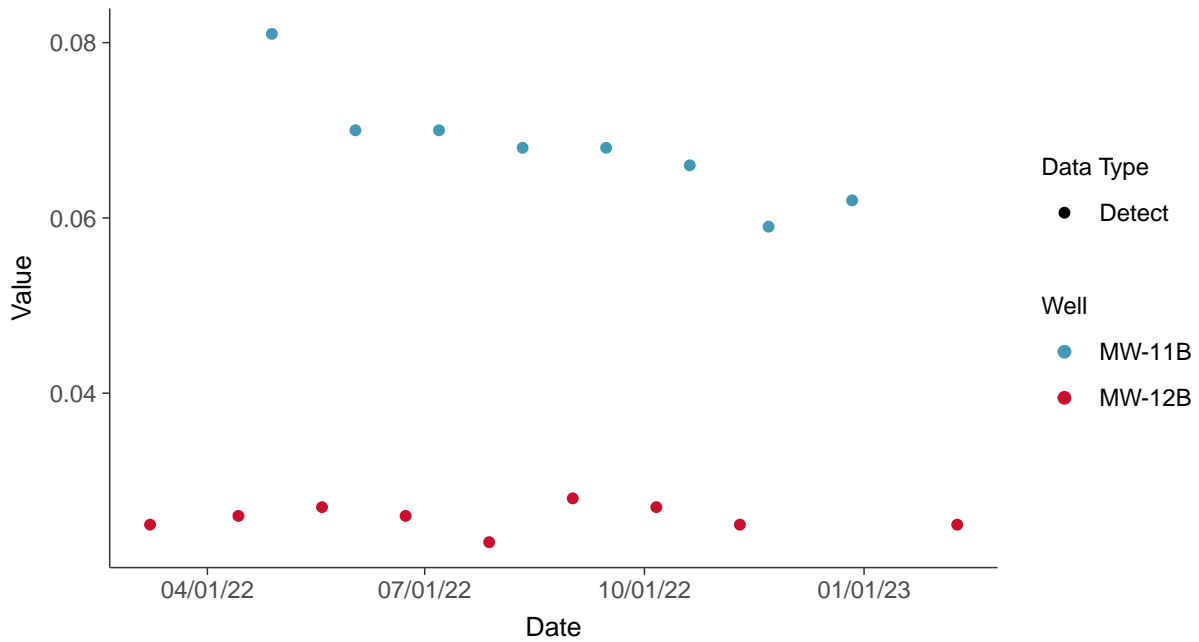
Scatter Plot

Barium, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

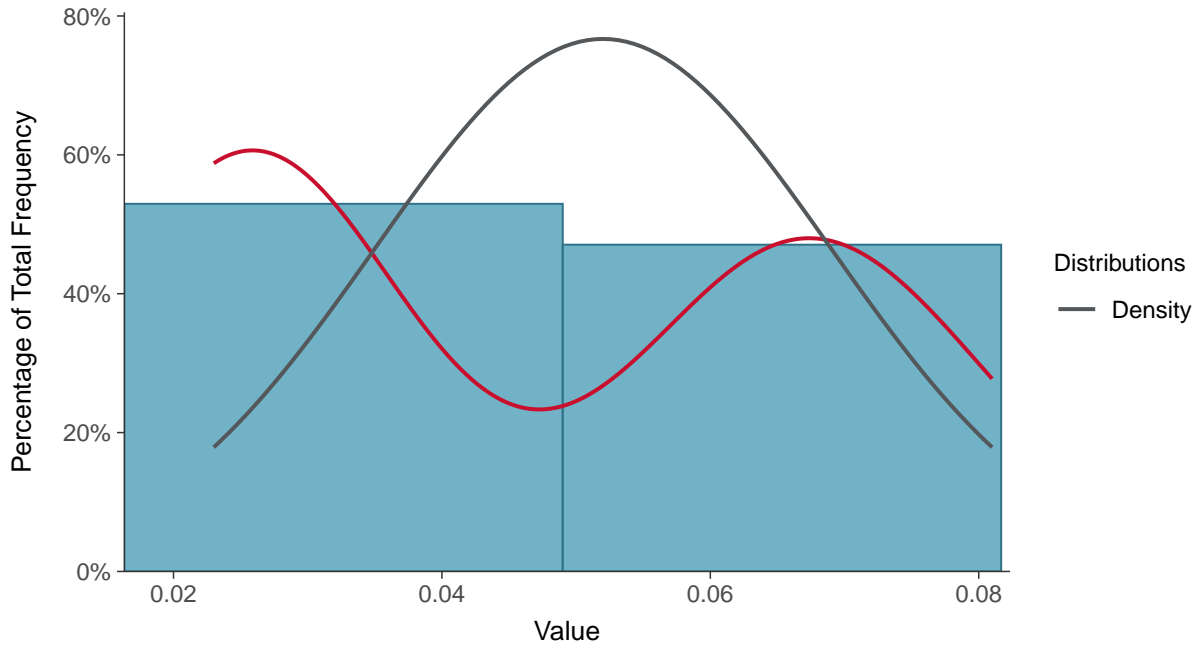
Barium, MW-11B & MW_12B (mg/L)





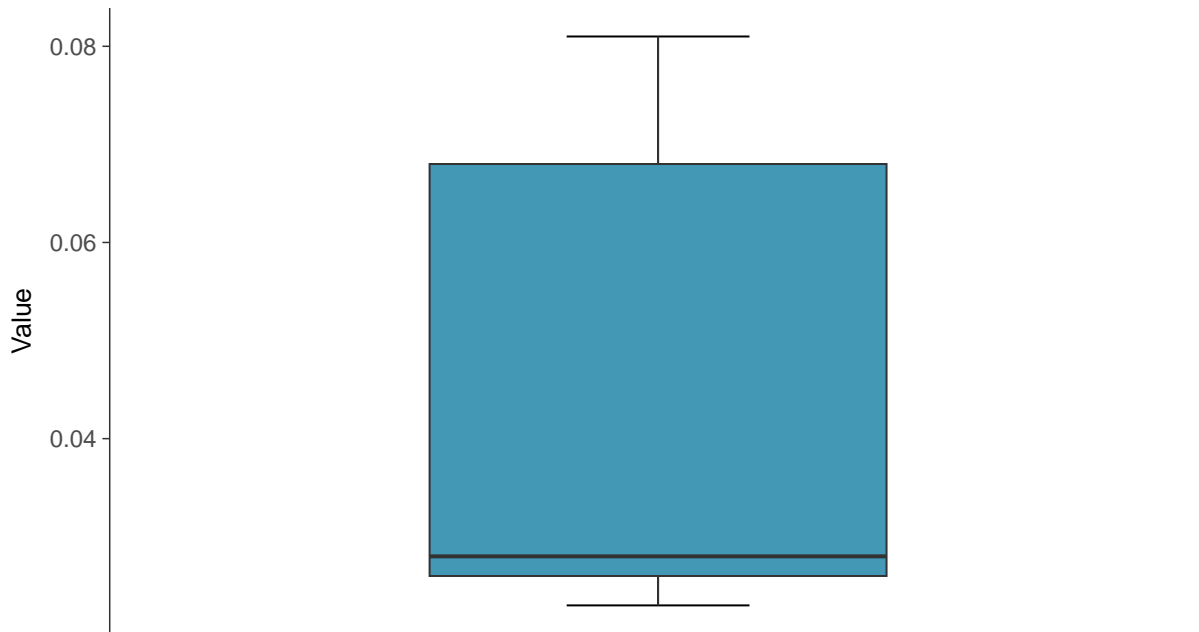
Histogram

Barium, MW-11B & MW_12B (mg/L)



Boxplot

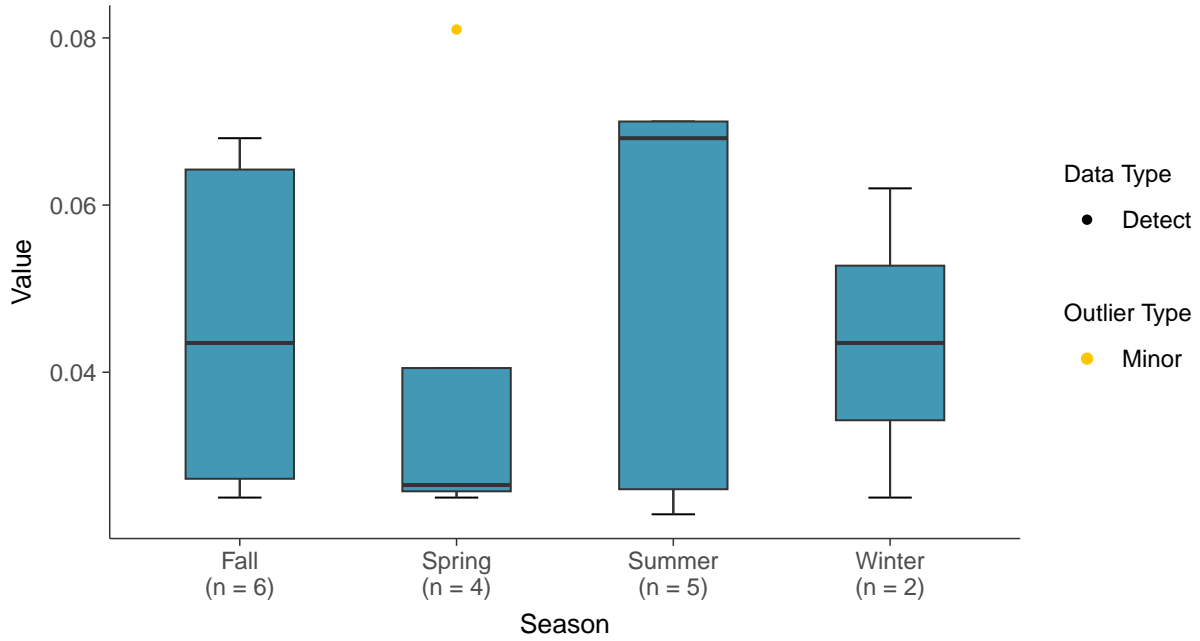
Barium, MW-11B & MW_12B (mg/L)





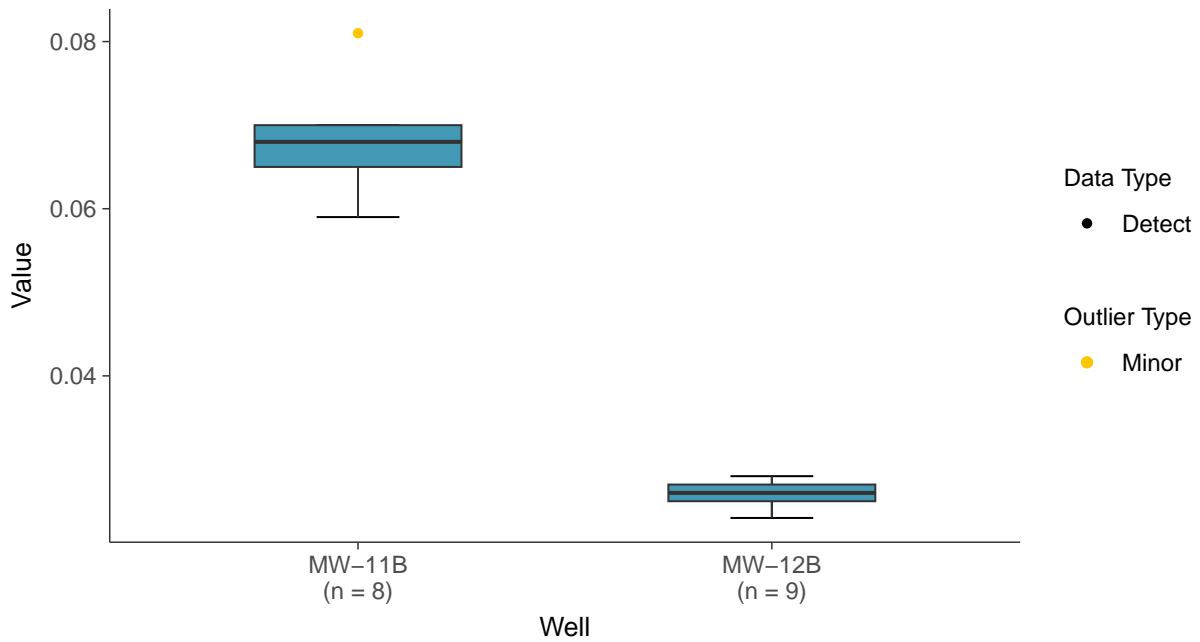
Boxplot by Season

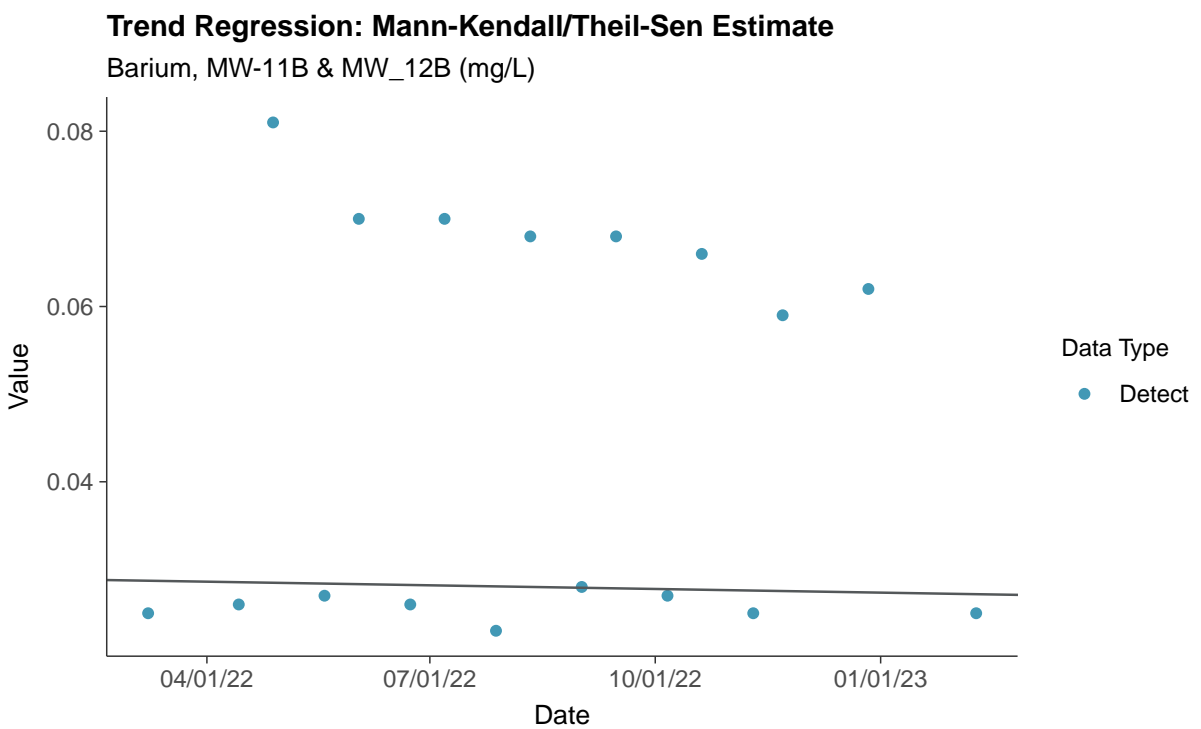
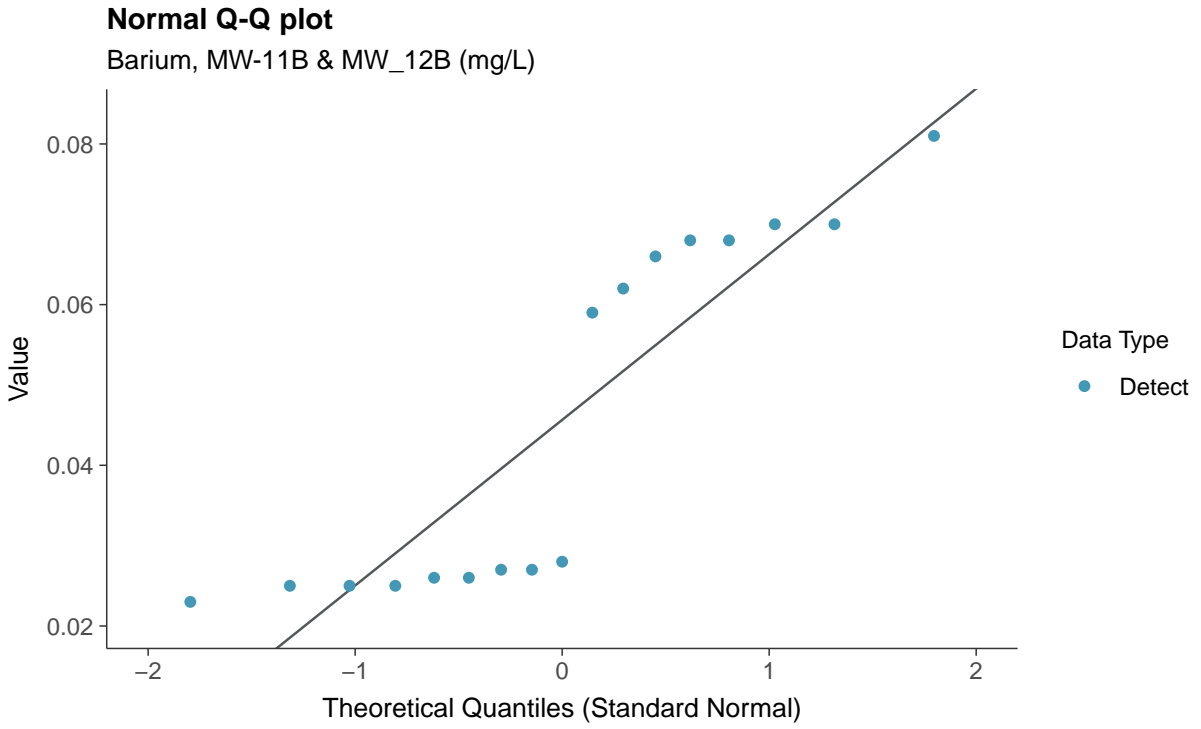
Barium, MW-11B & MW_12B (mg/L)



Boxplot by Well

Barium, MW-11B & MW_12B (mg/L)





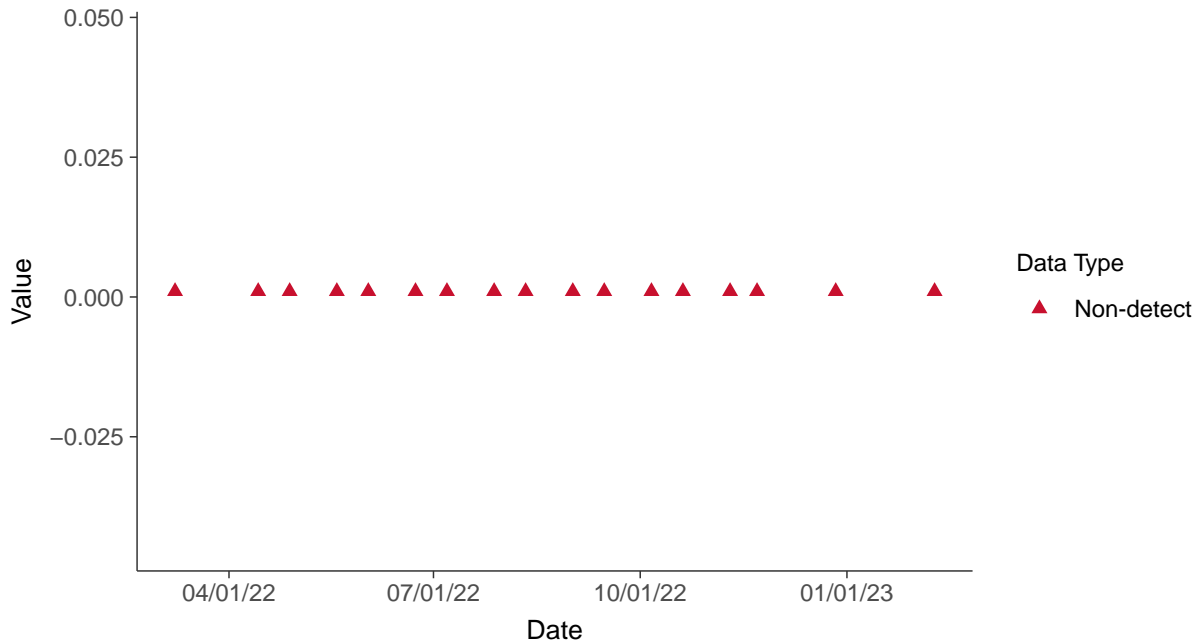


Appendix IV: Beryllium, MW-11B & MW_12B

ID: 2_11

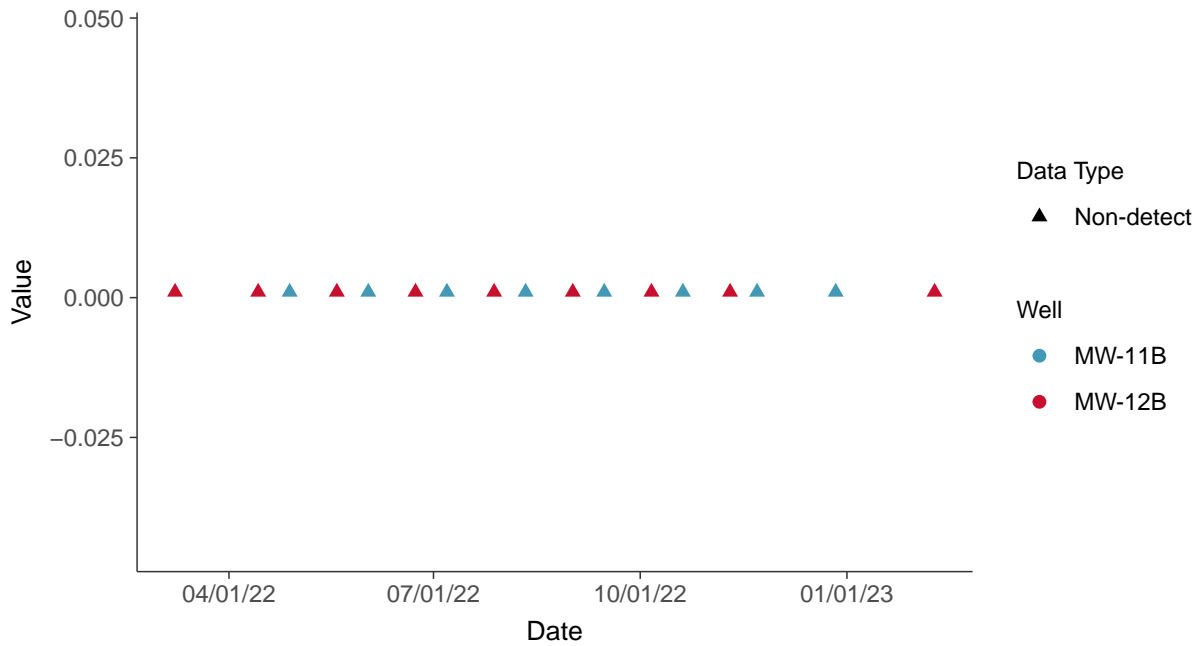
Scatter Plot

Beryllium, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

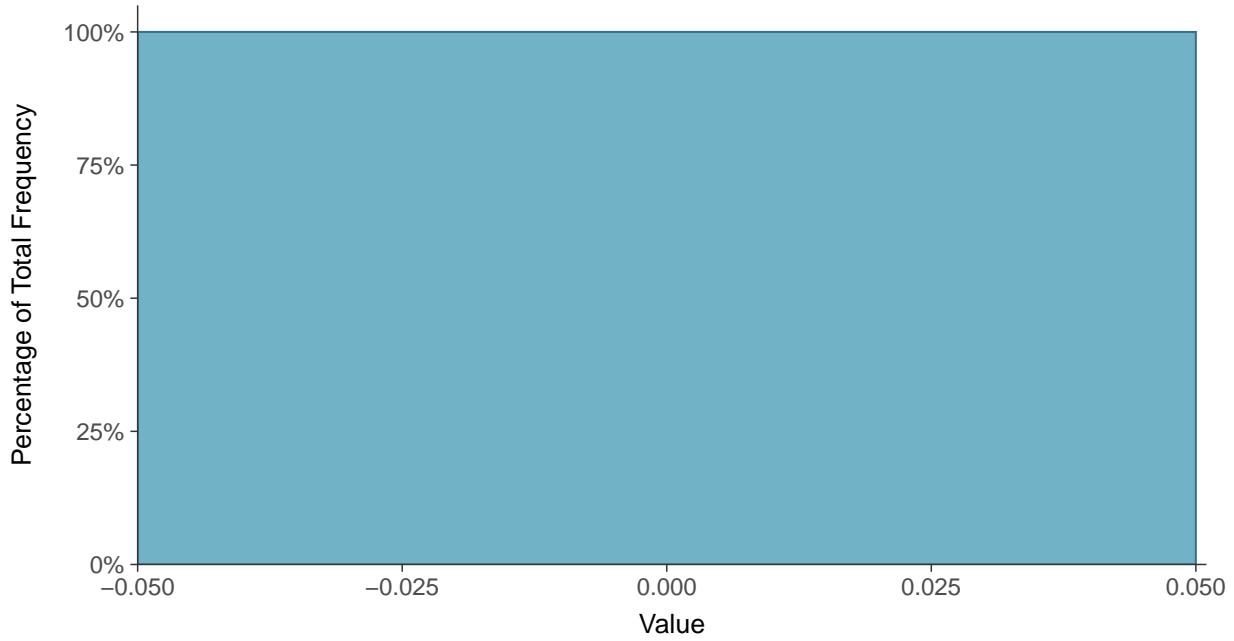
Beryllium, MW-11B & MW_12B (mg/L)





Histogram

Beryllium, MW-11B & MW_12B (mg/L)



Boxplot

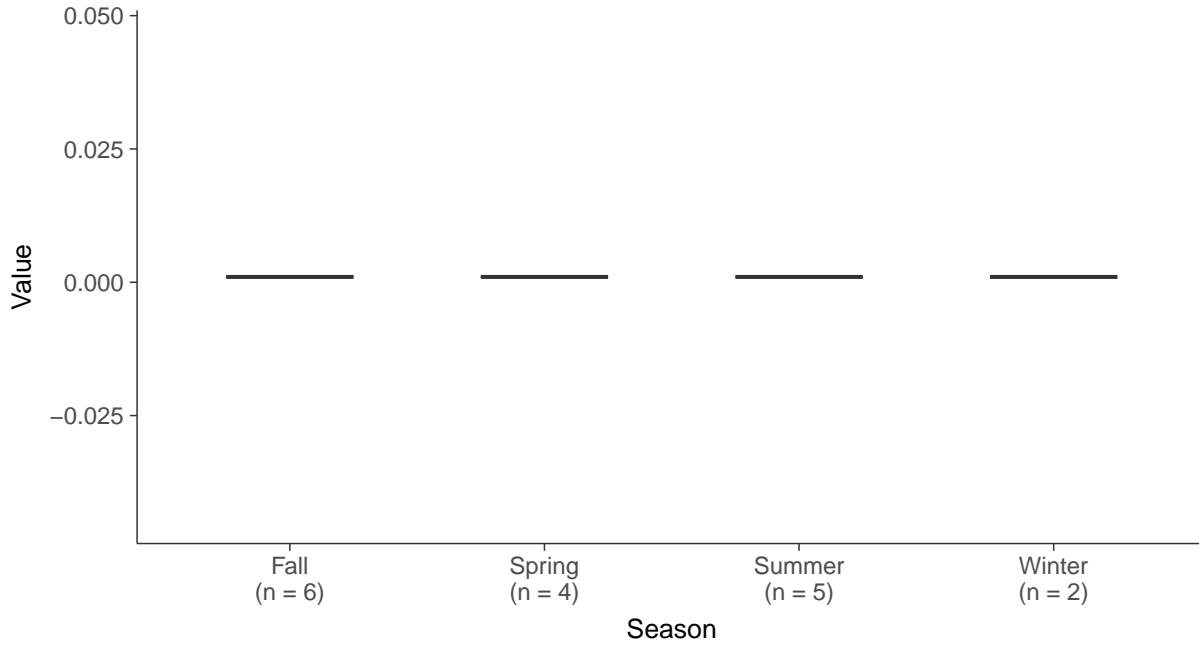
Beryllium, MW-11B & MW_12B (mg/L)





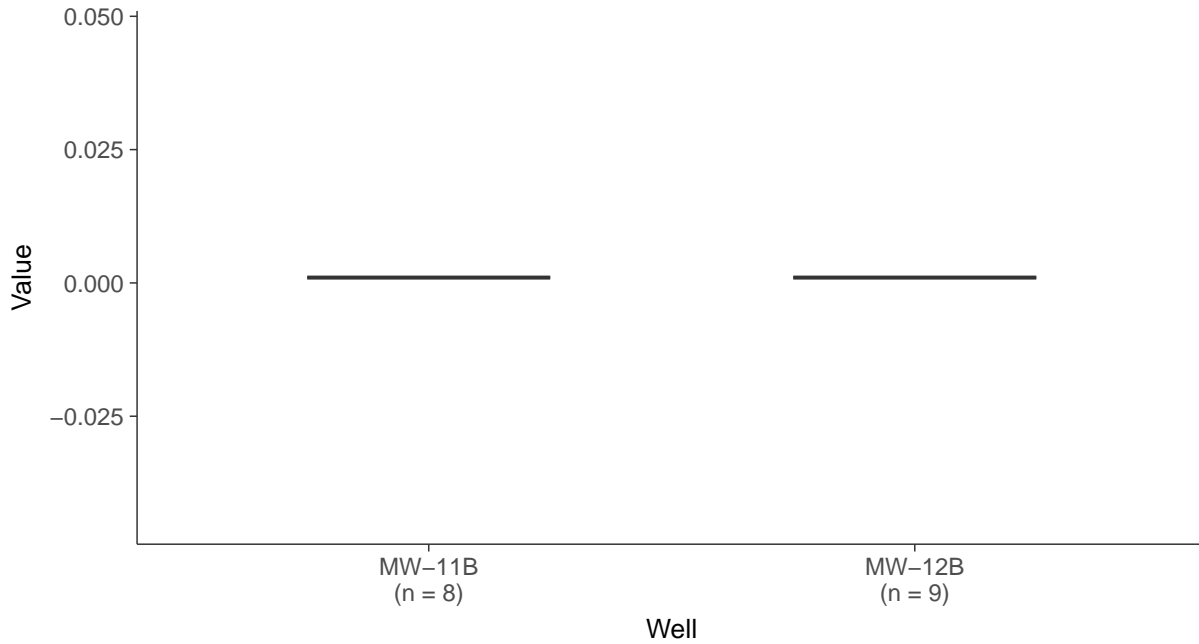
Boxplot by Season

Beryllium, MW-11B & MW_12B (mg/L)



Boxplot by Well

Beryllium, MW-11B & MW_12B (mg/L)



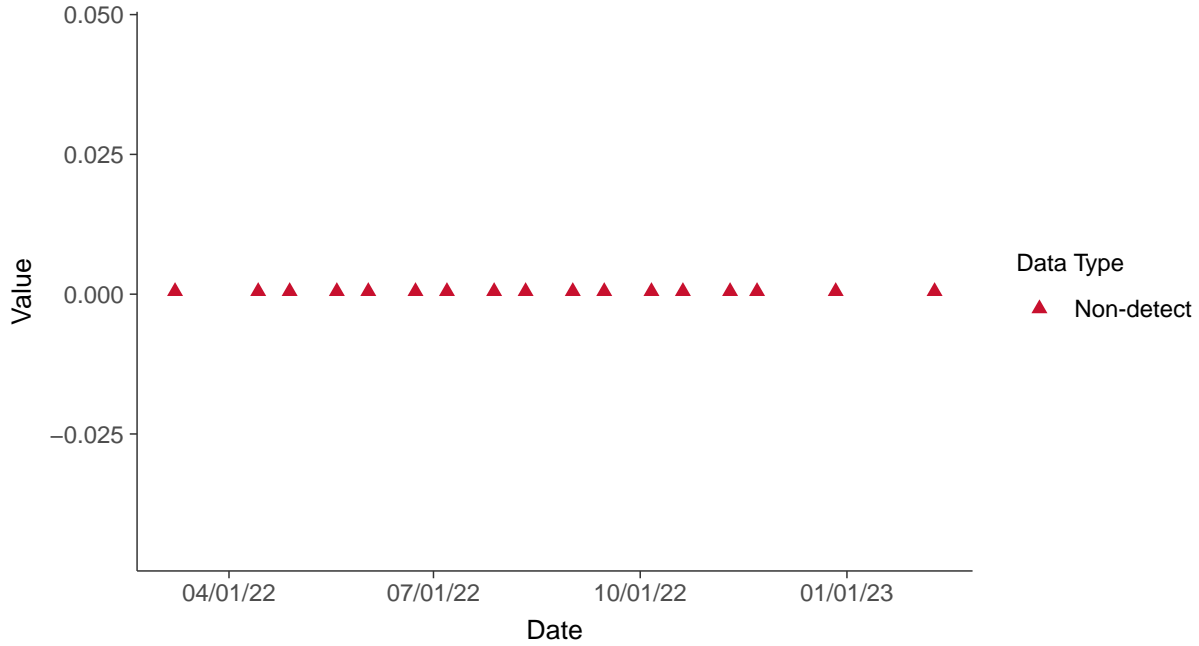


Appendix IV: Cadmium, MW-11B & MW_12B

ID: 2_12

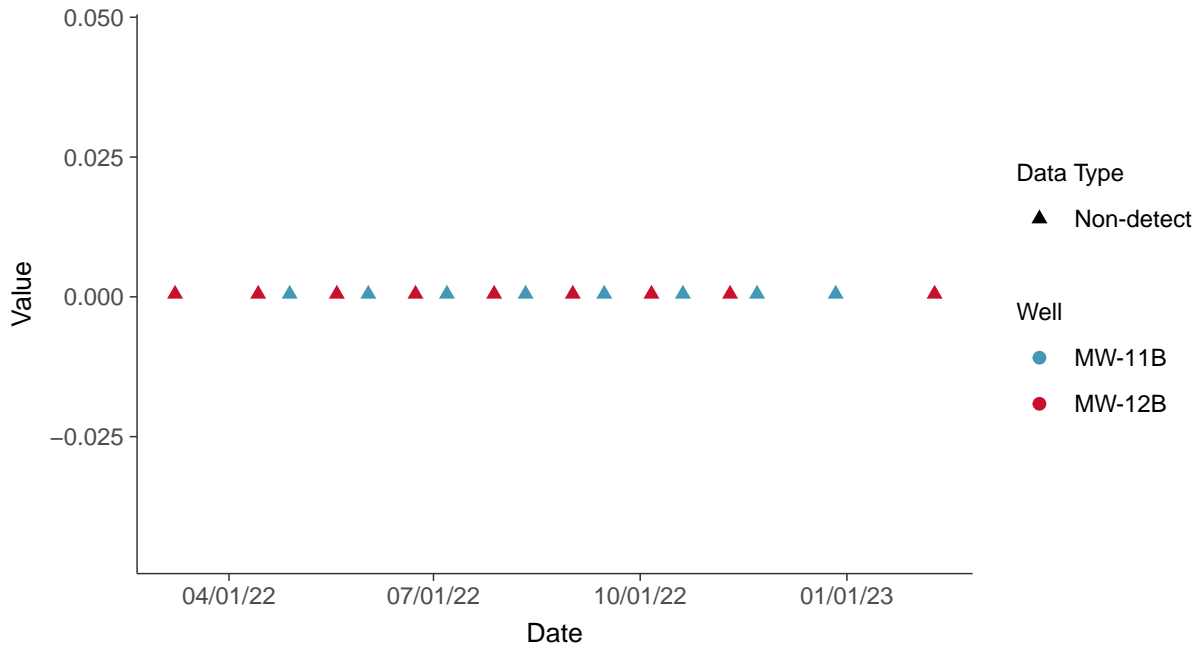
Scatter Plot

Cadmium, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

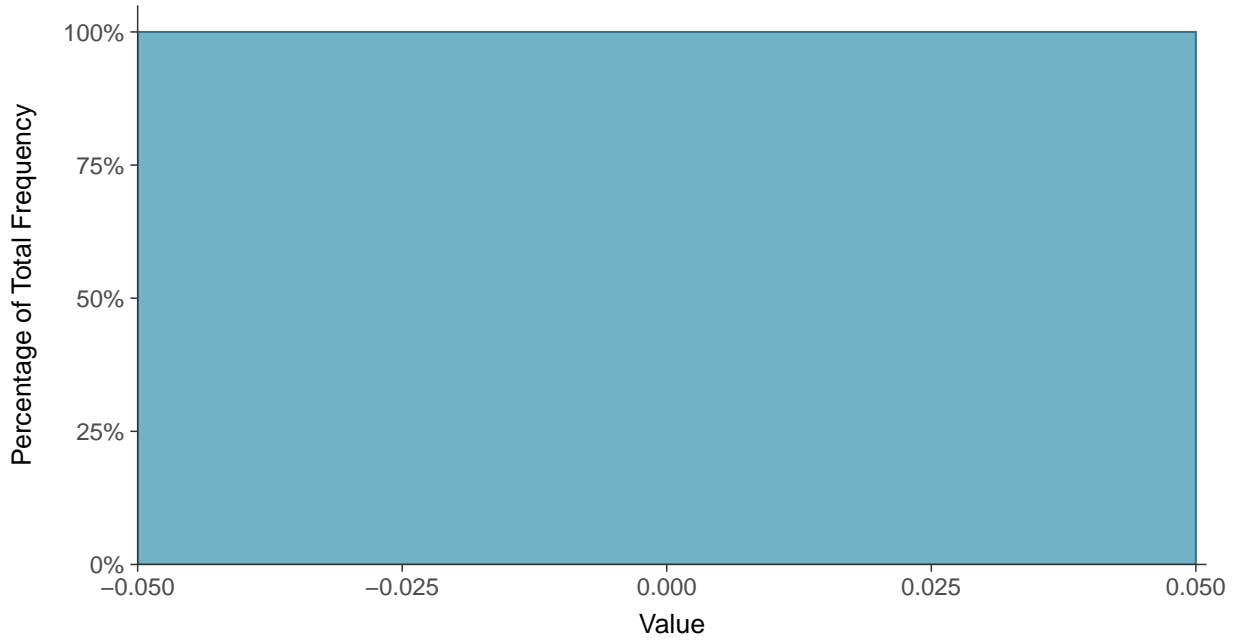
Cadmium, MW-11B & MW_12B (mg/L)





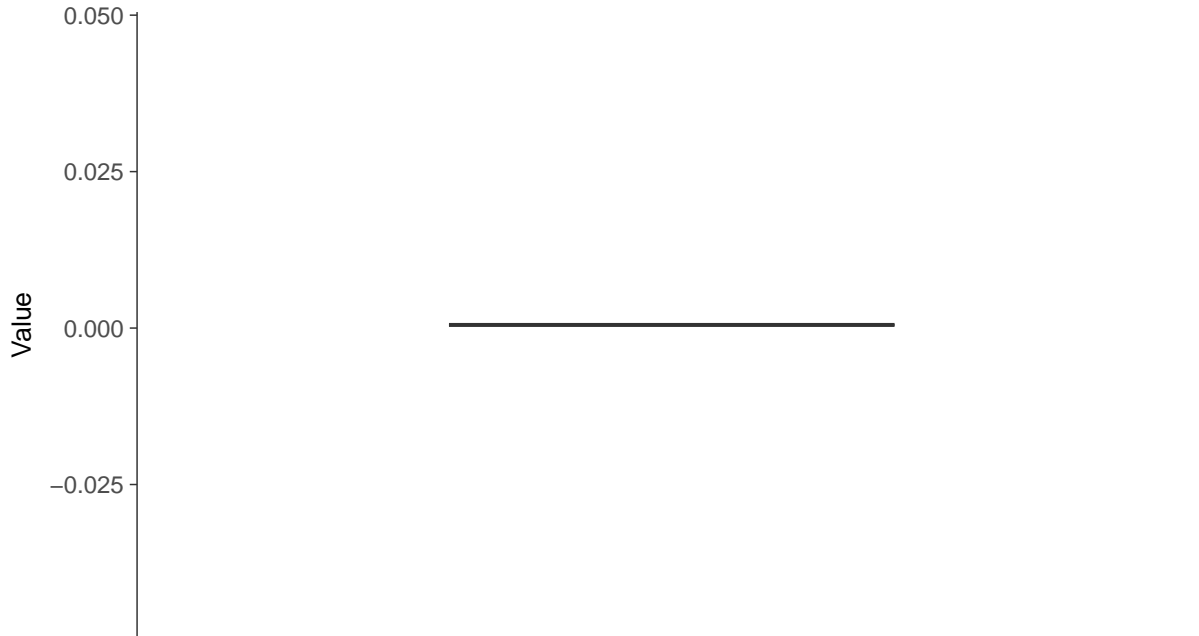
Histogram

Cadmium, MW-11B & MW_12B (mg/L)



Boxplot

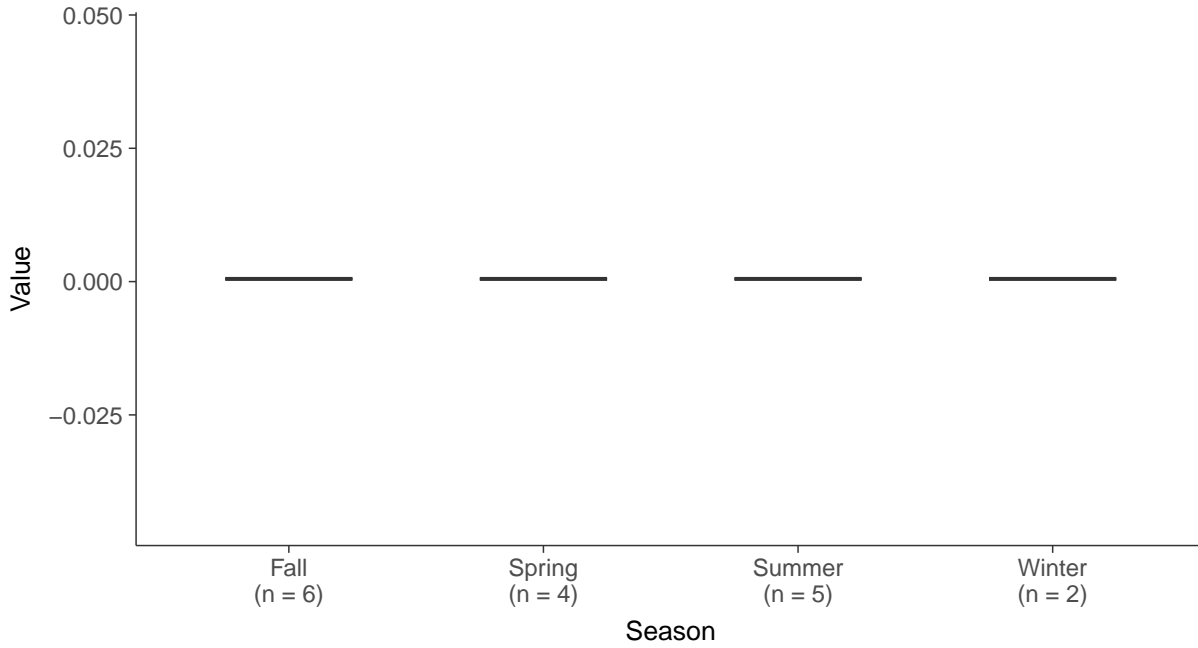
Cadmium, MW-11B & MW_12B (mg/L)





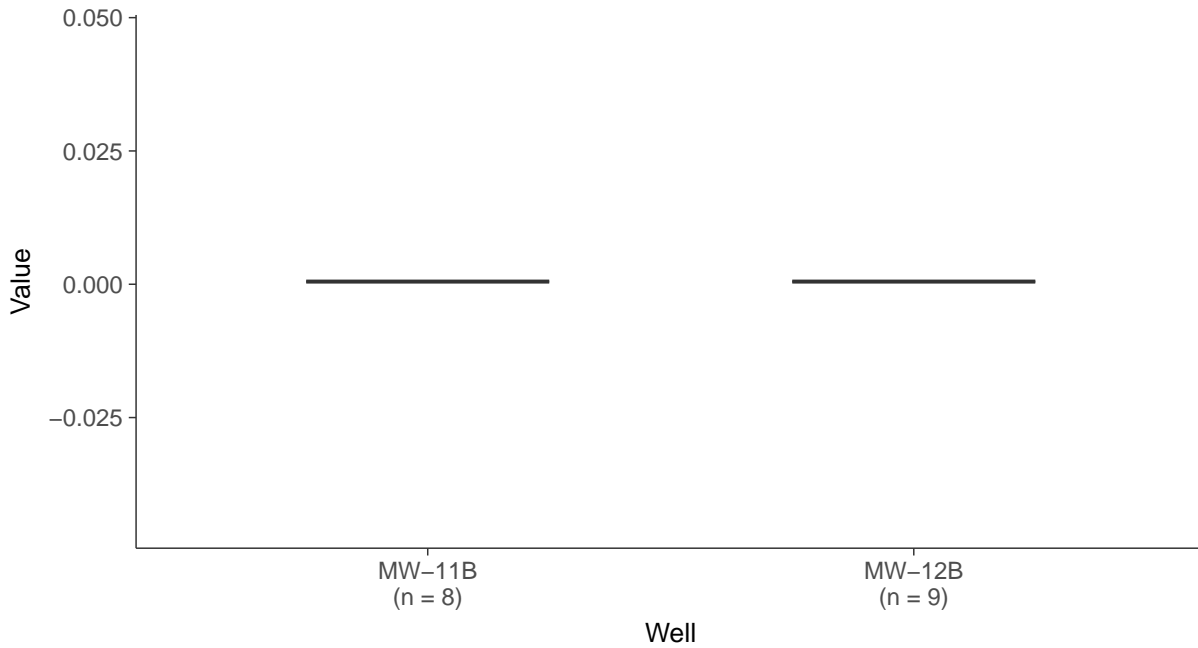
Boxplot by Season

Cadmium, MW-11B & MW_12B (mg/L)



Boxplot by Well

Cadmium, MW-11B & MW_12B (mg/L)



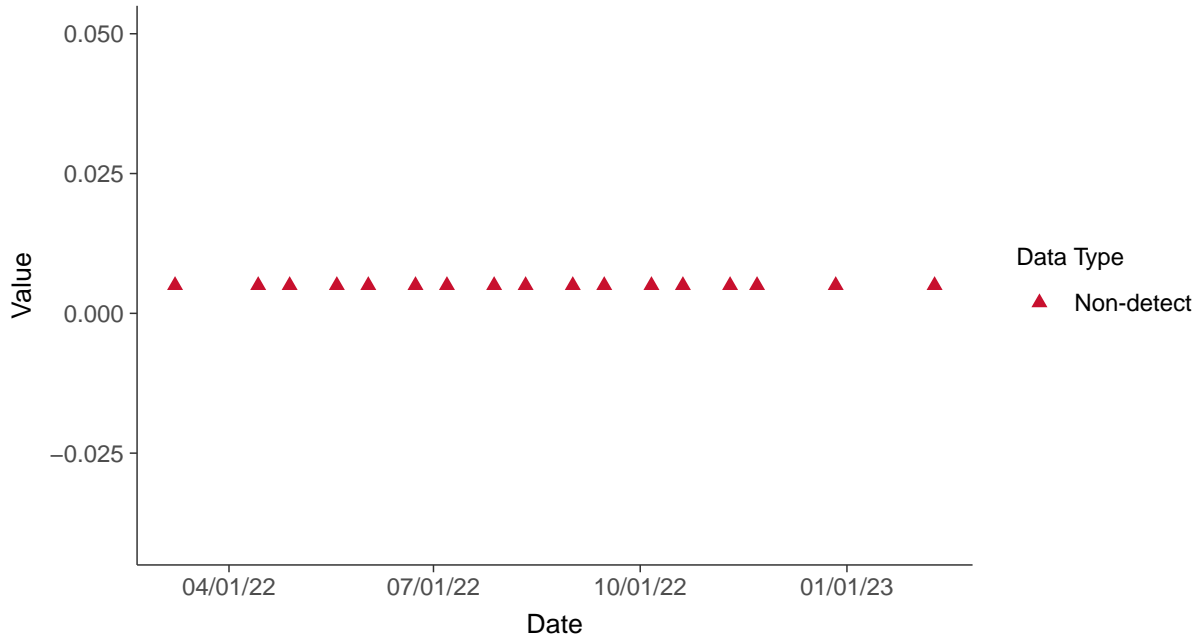


Appendix IV: Chromium, MW-11B & MW_12B

ID: 2_13

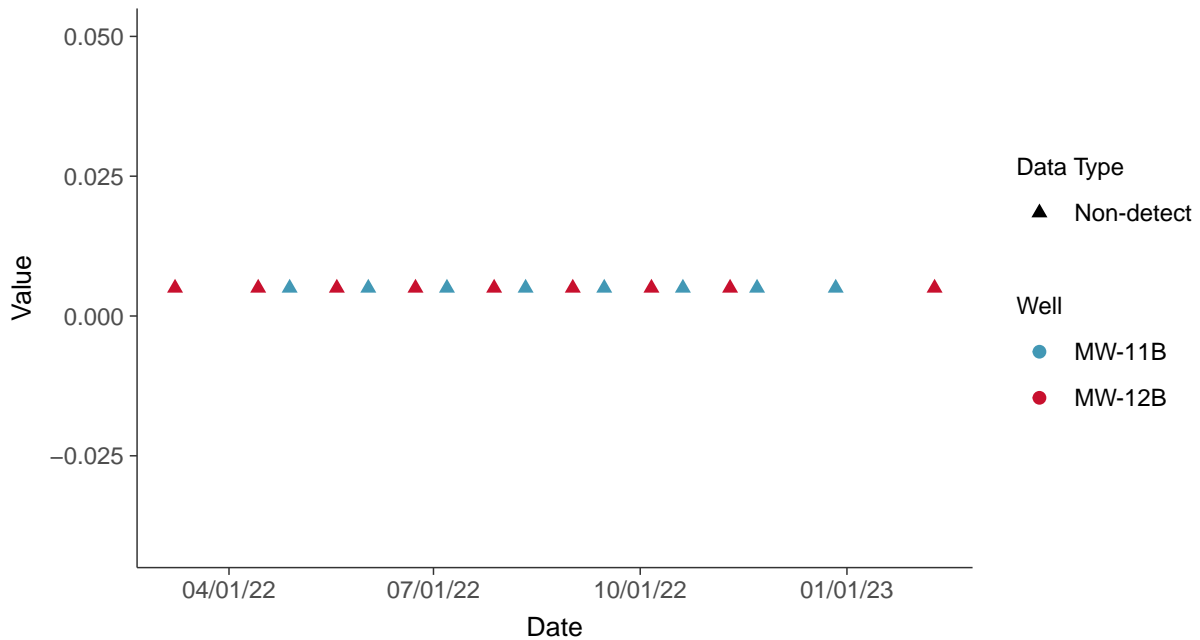
Scatter Plot

Chromium, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

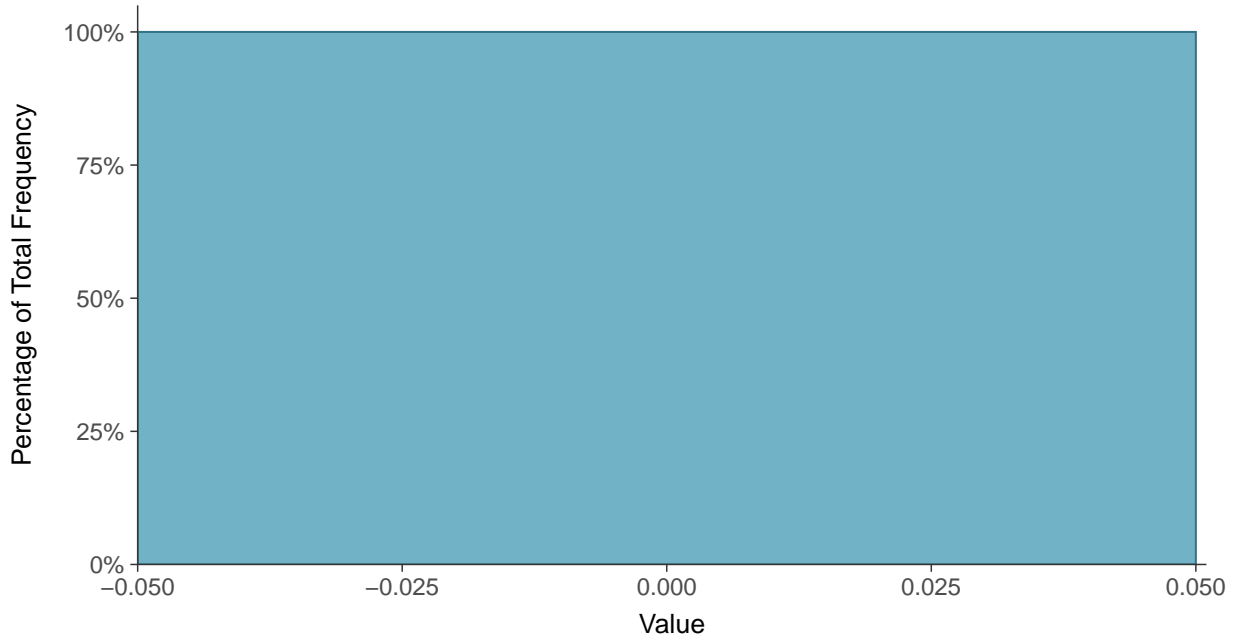
Chromium, MW-11B & MW_12B (mg/L)





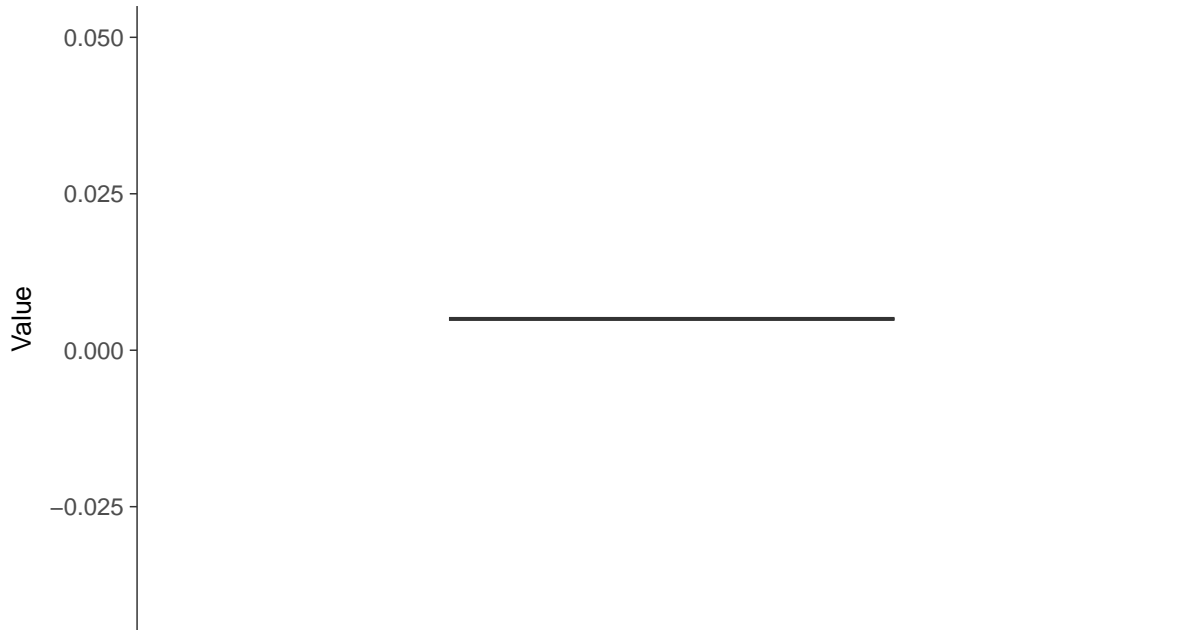
Histogram

Chromium, MW-11B & MW_12B (mg/L)



Boxplot

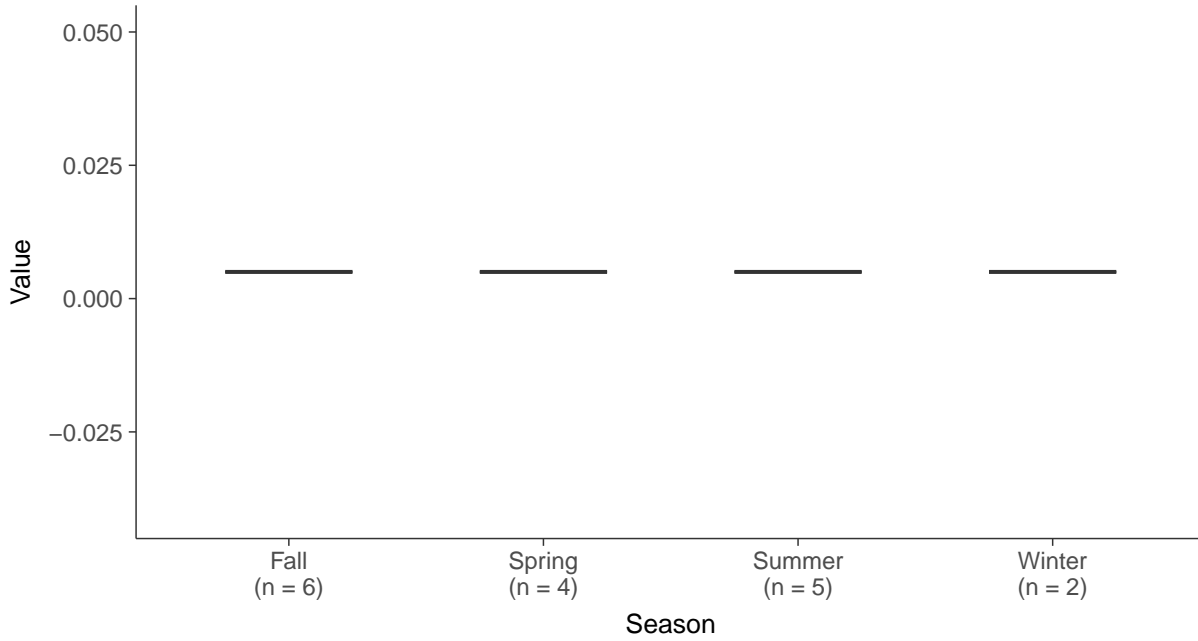
Chromium, MW-11B & MW_12B (mg/L)





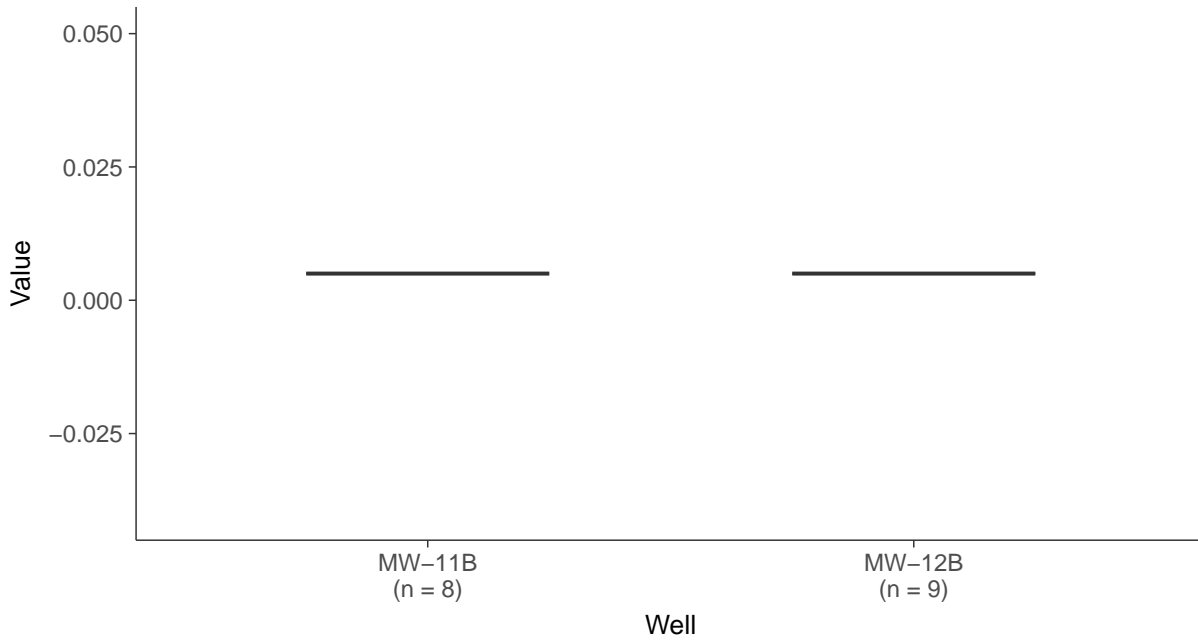
Boxplot by Season

Chromium, MW-11B & MW_12B (mg/L)



Boxplot by Well

Chromium, MW-11B & MW_12B (mg/L)



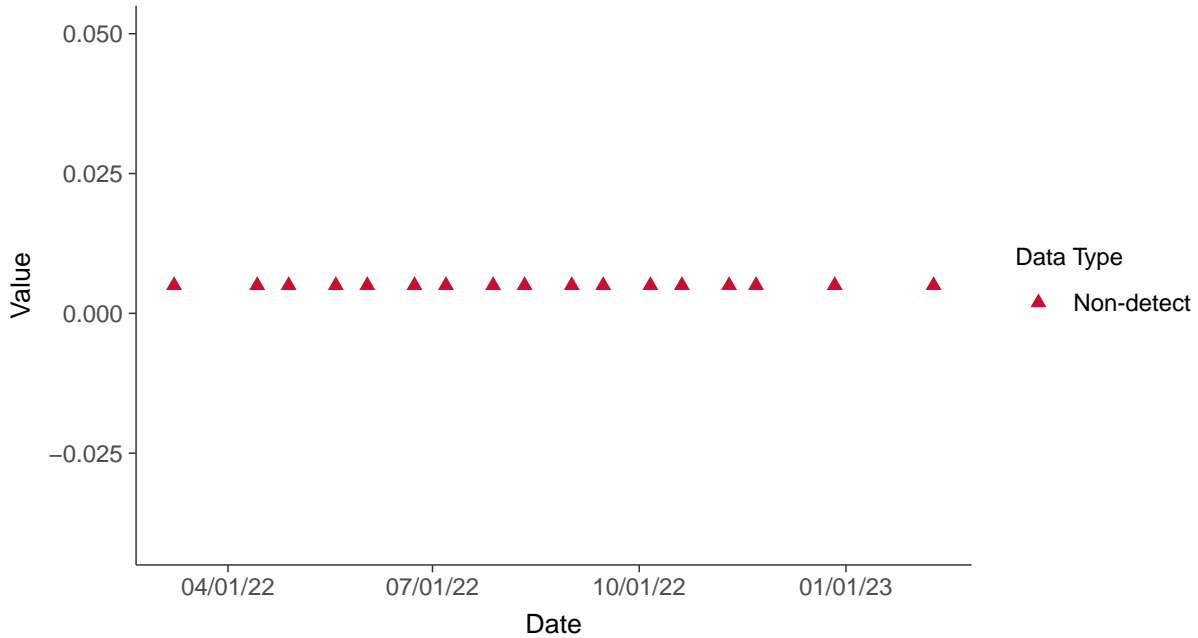


Appendix IV: Cobalt, MW-11B & MW_12B

ID: 2_14

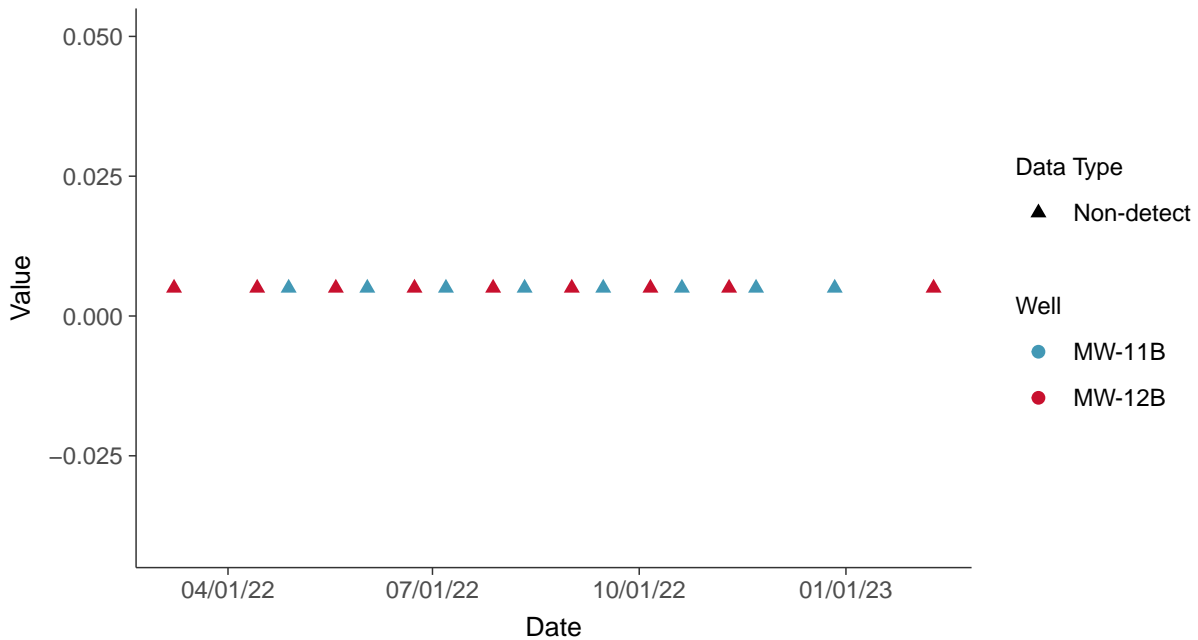
Scatter Plot

Cobalt, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

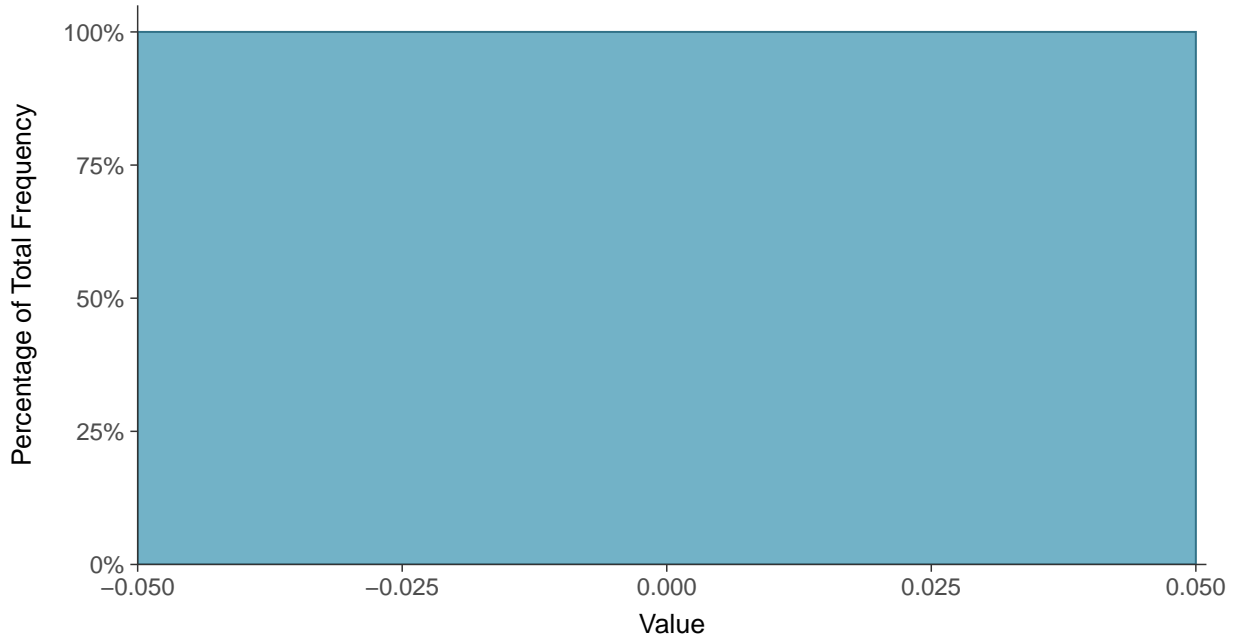
Cobalt, MW-11B & MW_12B (mg/L)





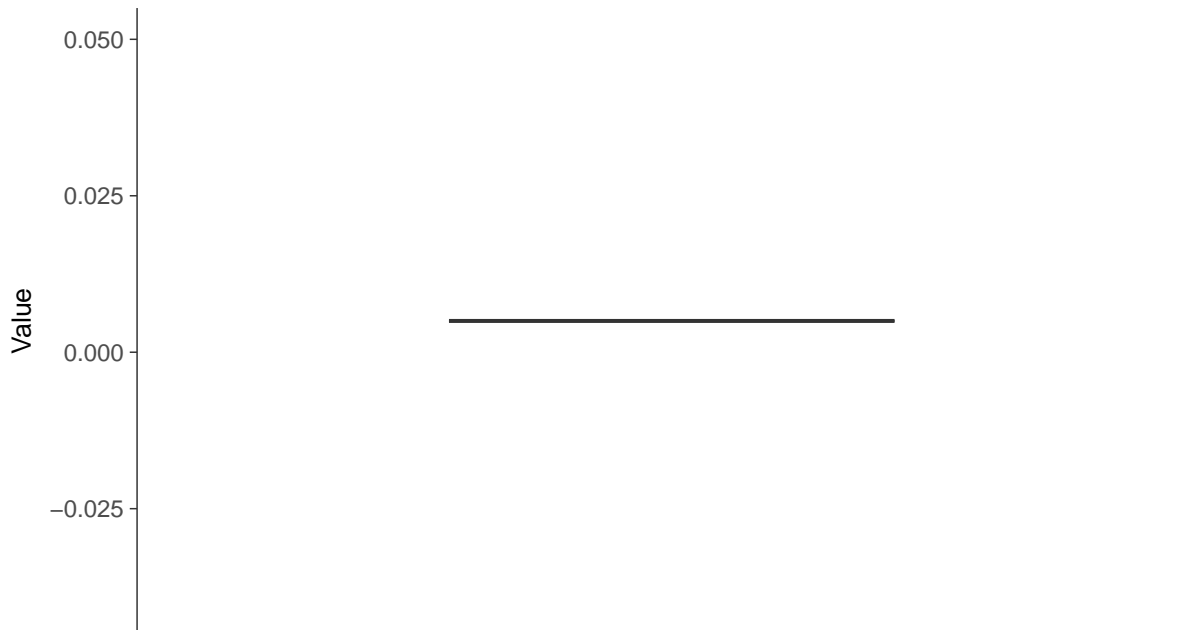
Histogram

Cobalt, MW-11B & MW_12B (mg/L)



Boxplot

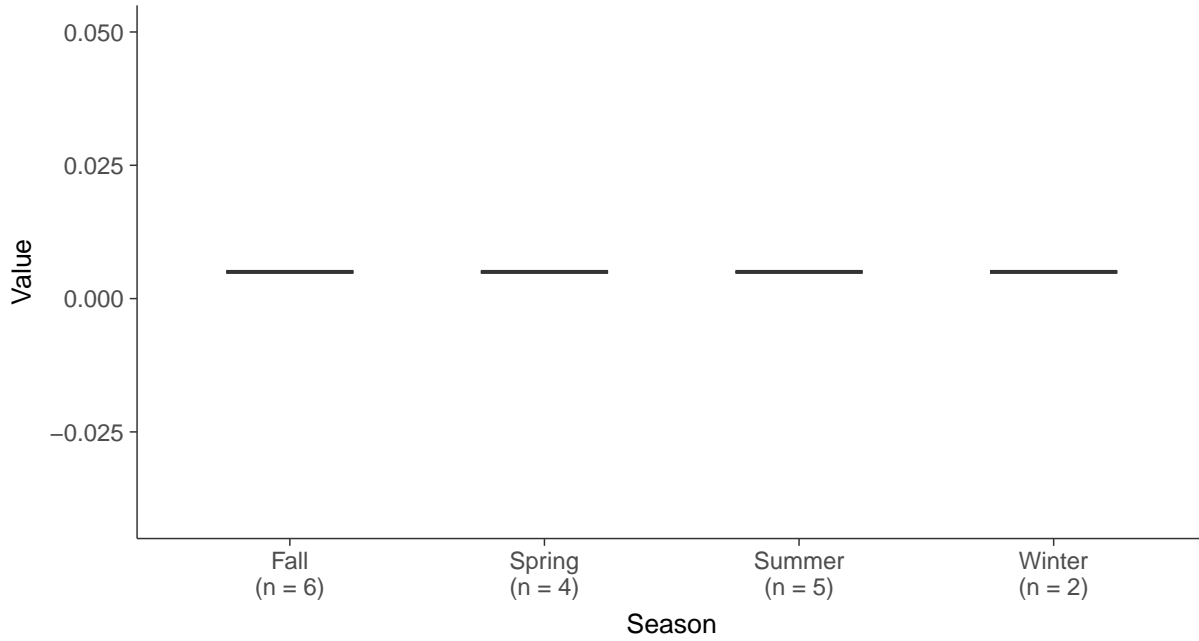
Cobalt, MW-11B & MW_12B (mg/L)





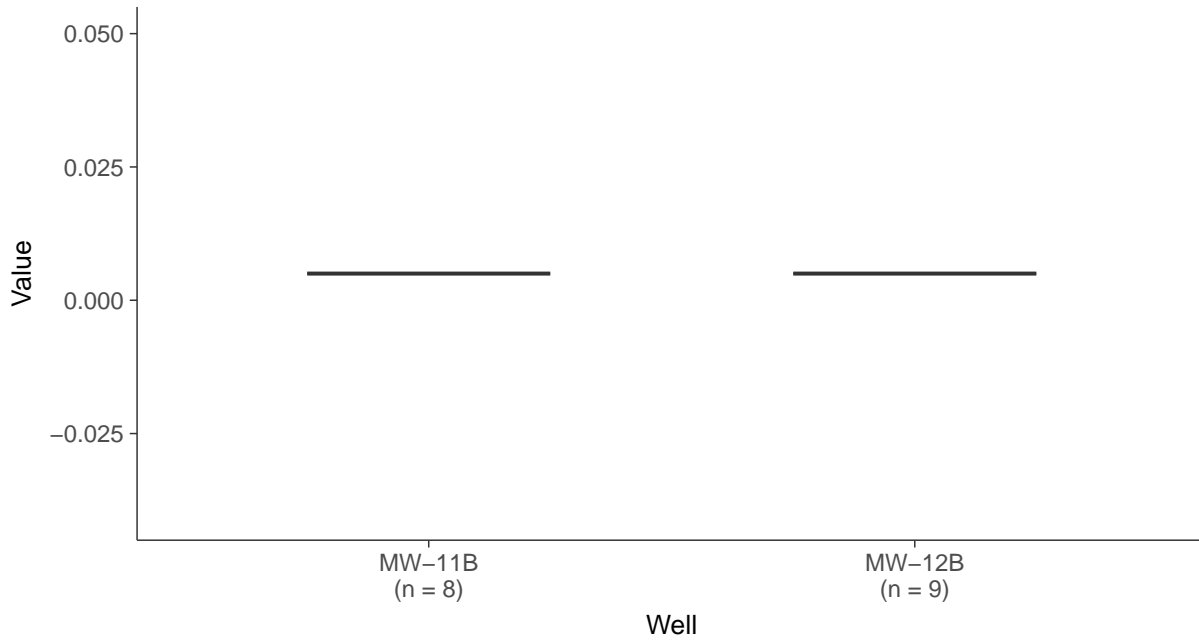
Boxplot by Season

Cobalt, MW-11B & MW_12B (mg/L)



Boxplot by Well

Cobalt, MW-11B & MW_12B (mg/L)



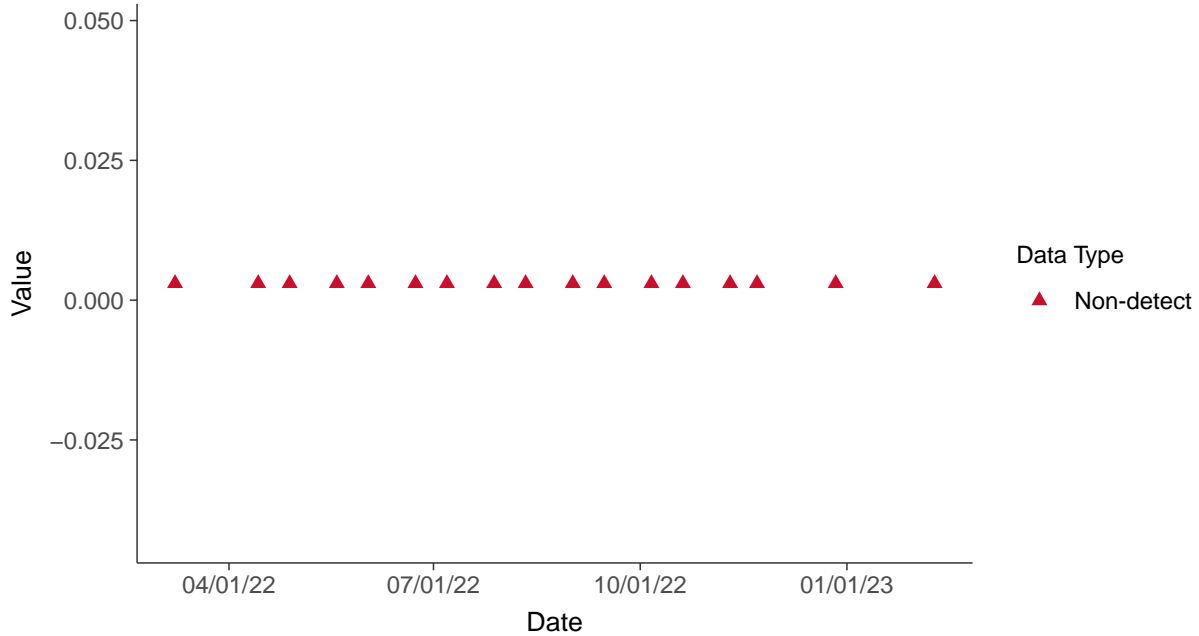


Appendix IV: Lead, MW-11B & MW_12B

ID: 2_15

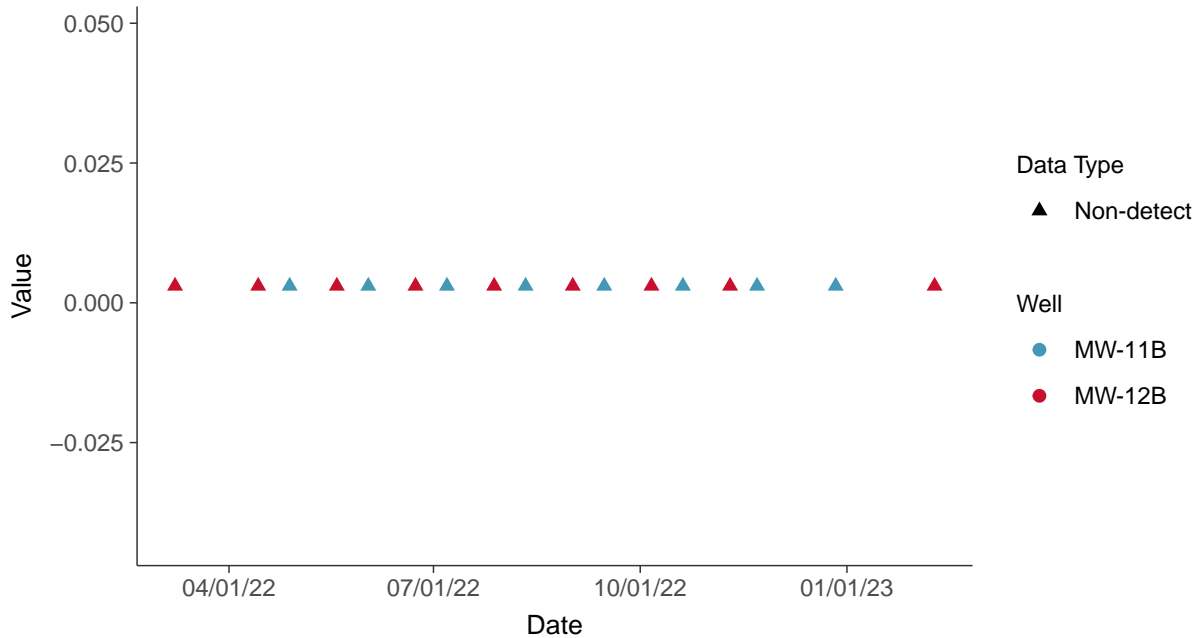
Scatter Plot

Lead, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

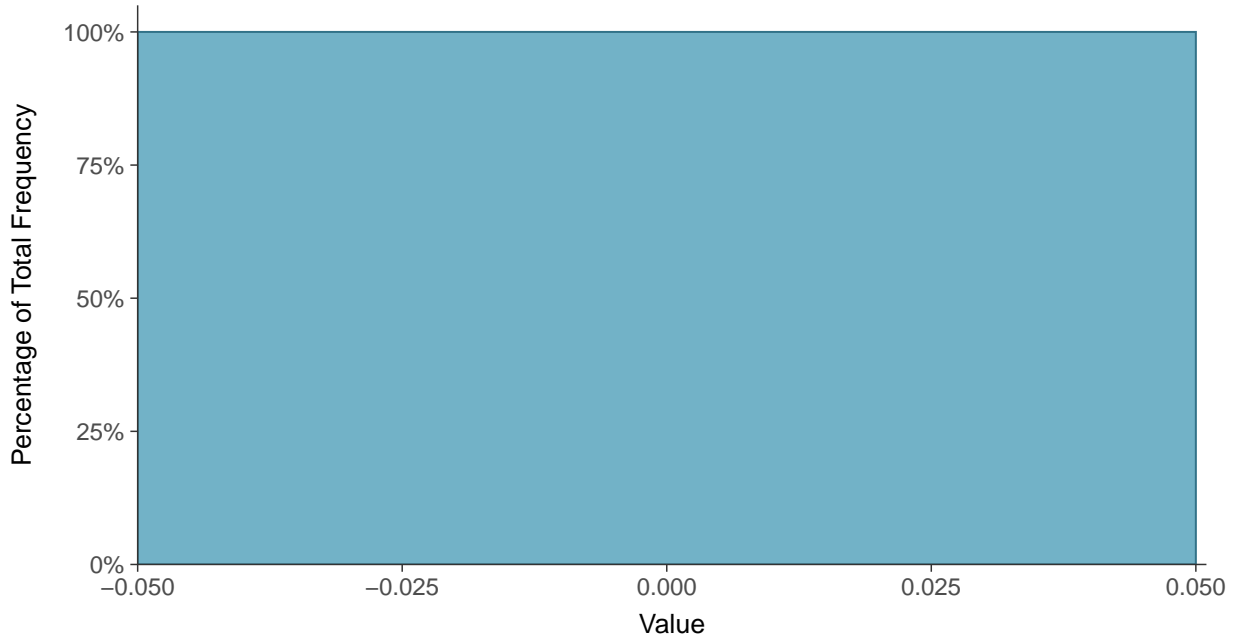
Lead, MW-11B & MW_12B (mg/L)





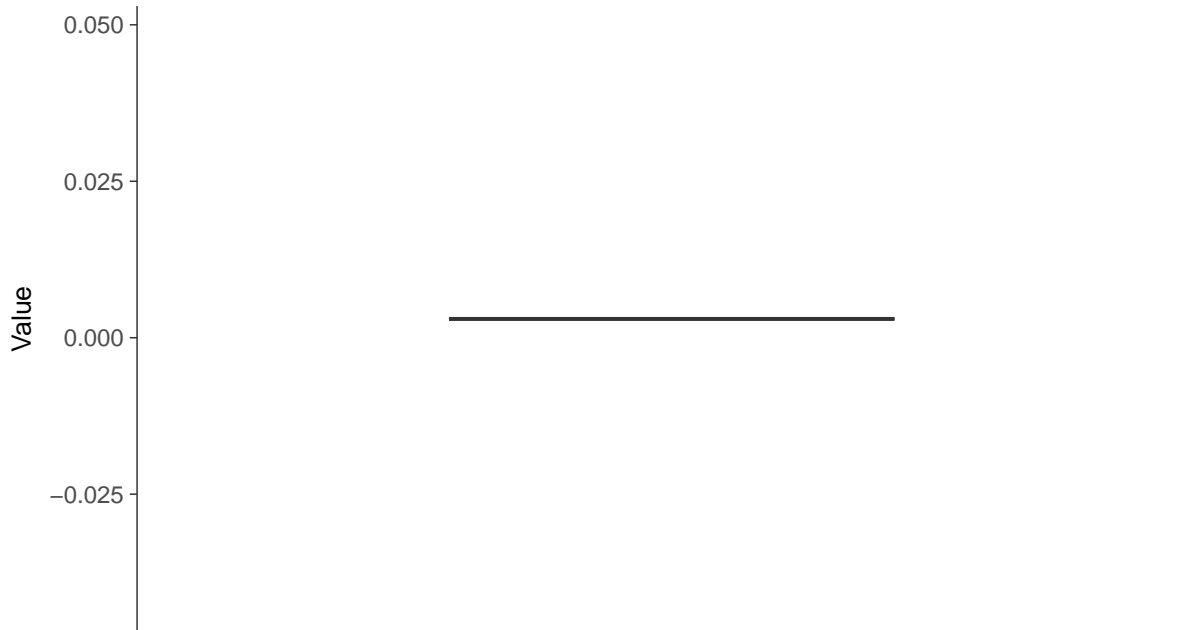
Histogram

Lead, MW-11B & MW_12B (mg/L)



Boxplot

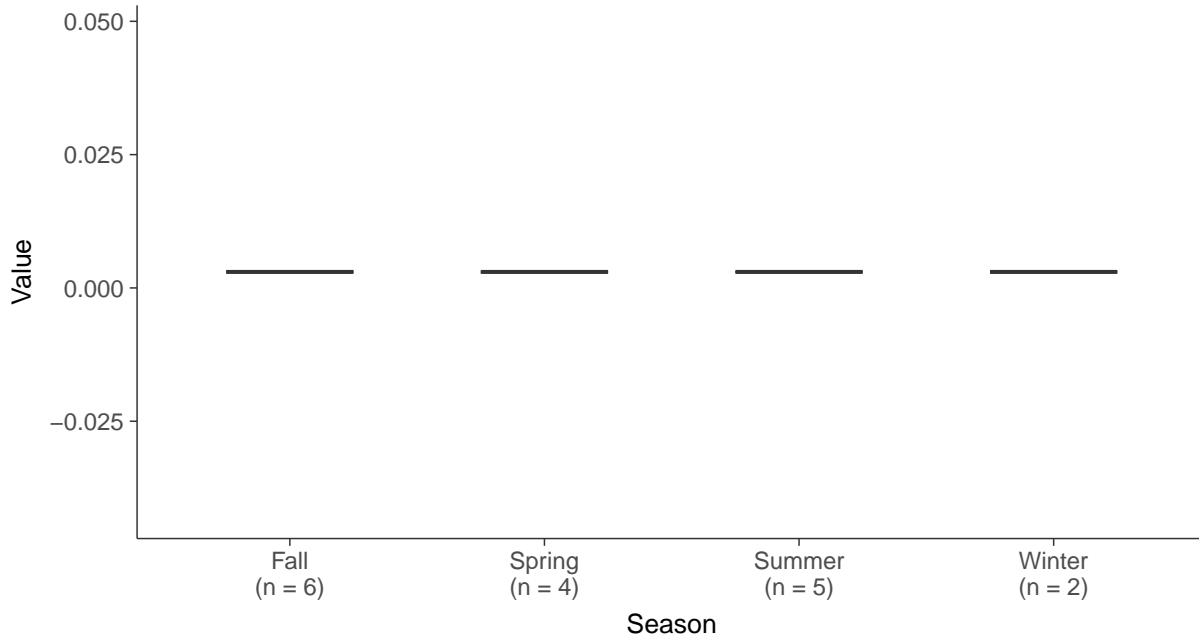
Lead, MW-11B & MW_12B (mg/L)





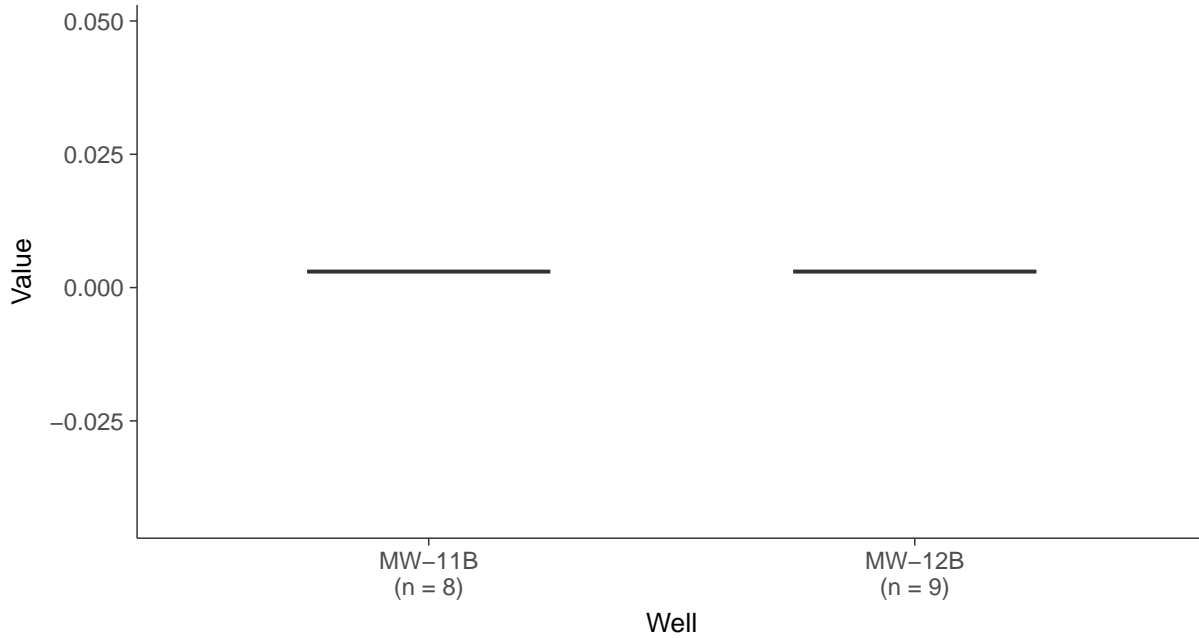
Boxplot by Season

Lead, MW-11B & MW_12B (mg/L)



Boxplot by Well

Lead, MW-11B & MW_12B (mg/L)



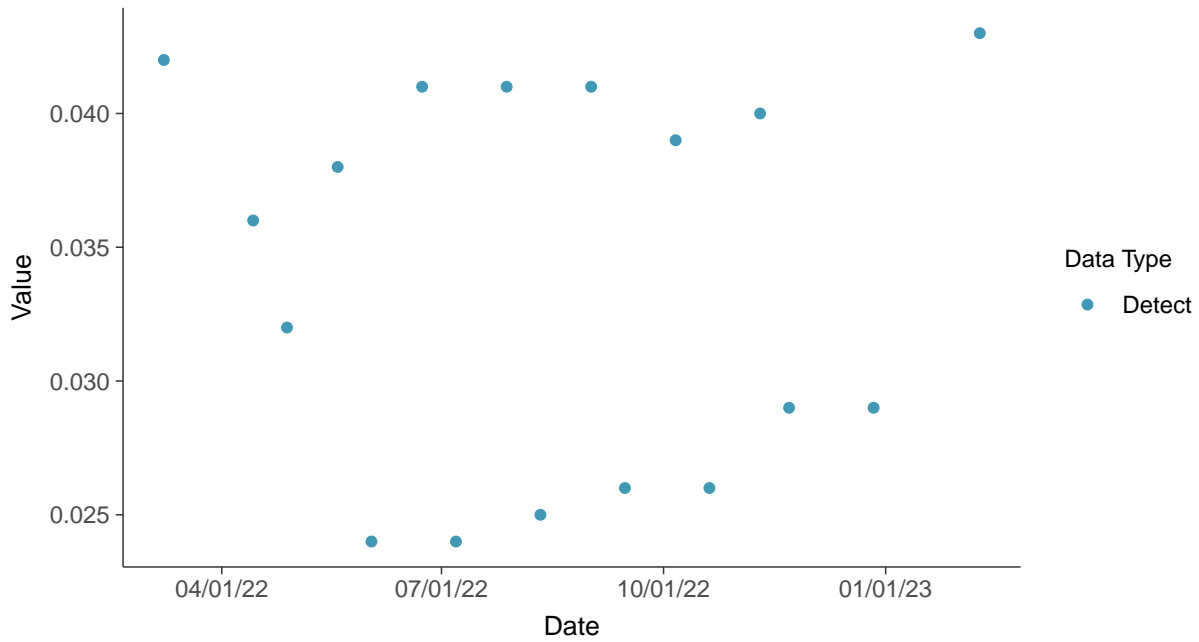


Appendix IV: Lithium, MW-11B & MW_12B

ID: 2_16

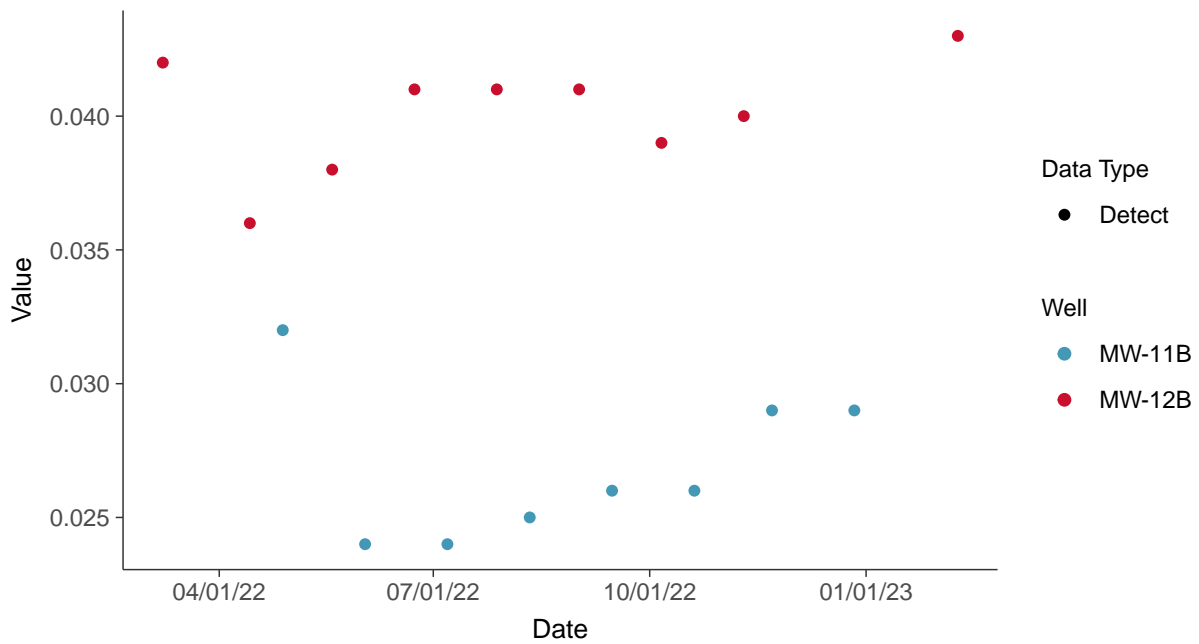
Scatter Plot

Lithium, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

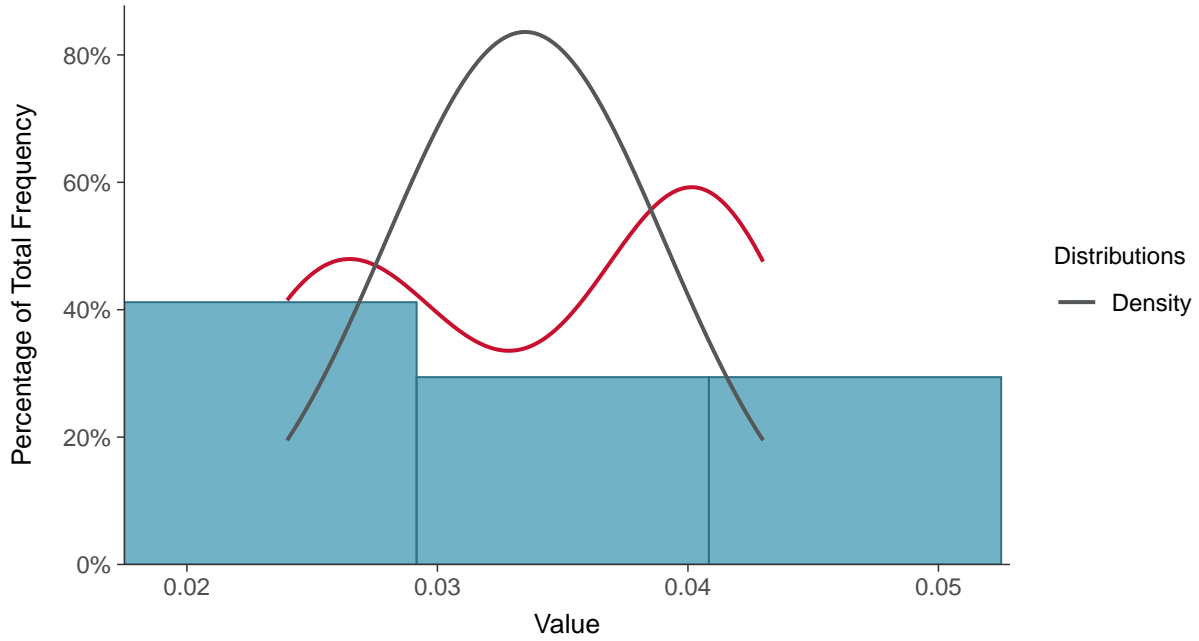
Lithium, MW-11B & MW_12B (mg/L)





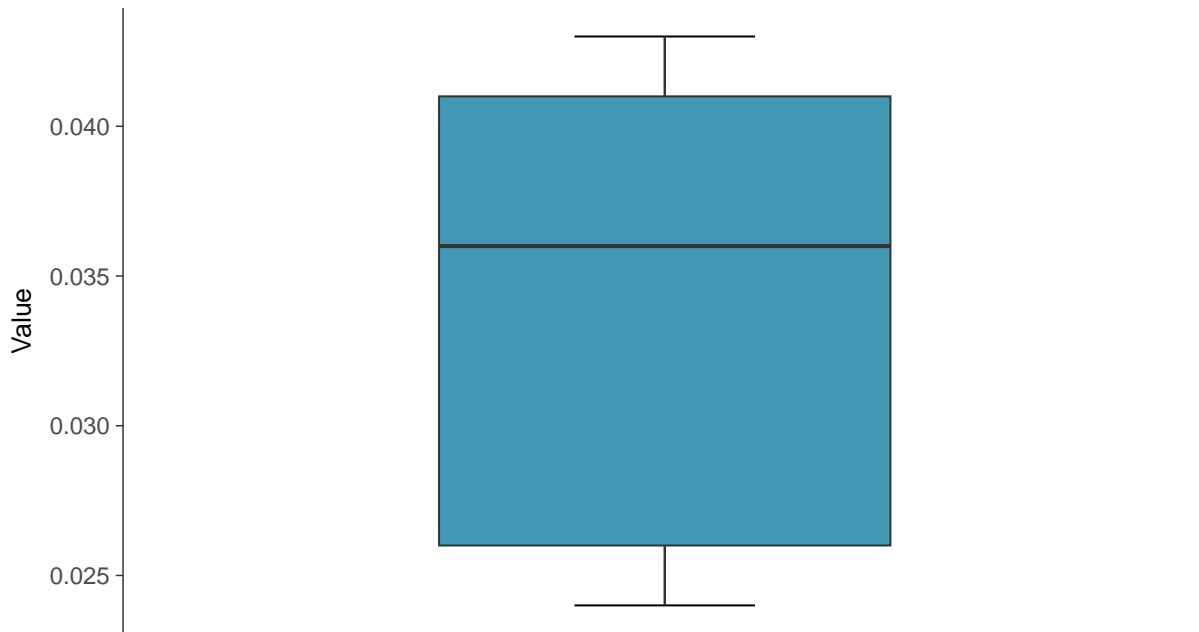
Histogram

Lithium, MW-11B & MW_12B (mg/L)



Boxplot

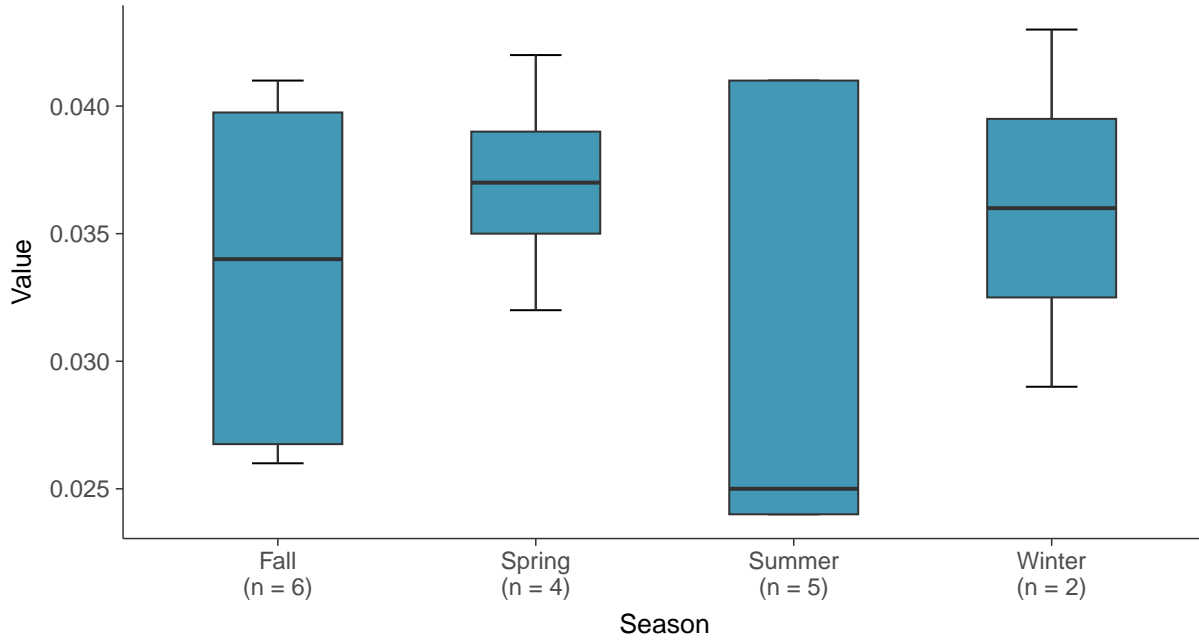
Lithium, MW-11B & MW_12B (mg/L)





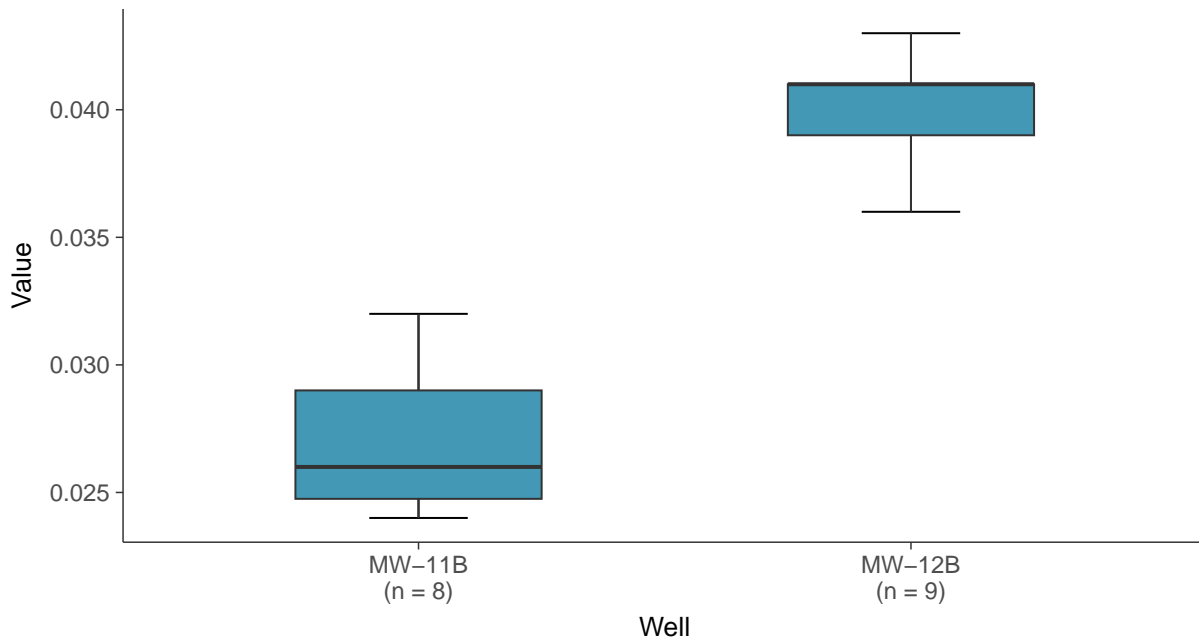
Boxplot by Season

Lithium, MW-11B & MW_12B (mg/L)



Boxplot by Well

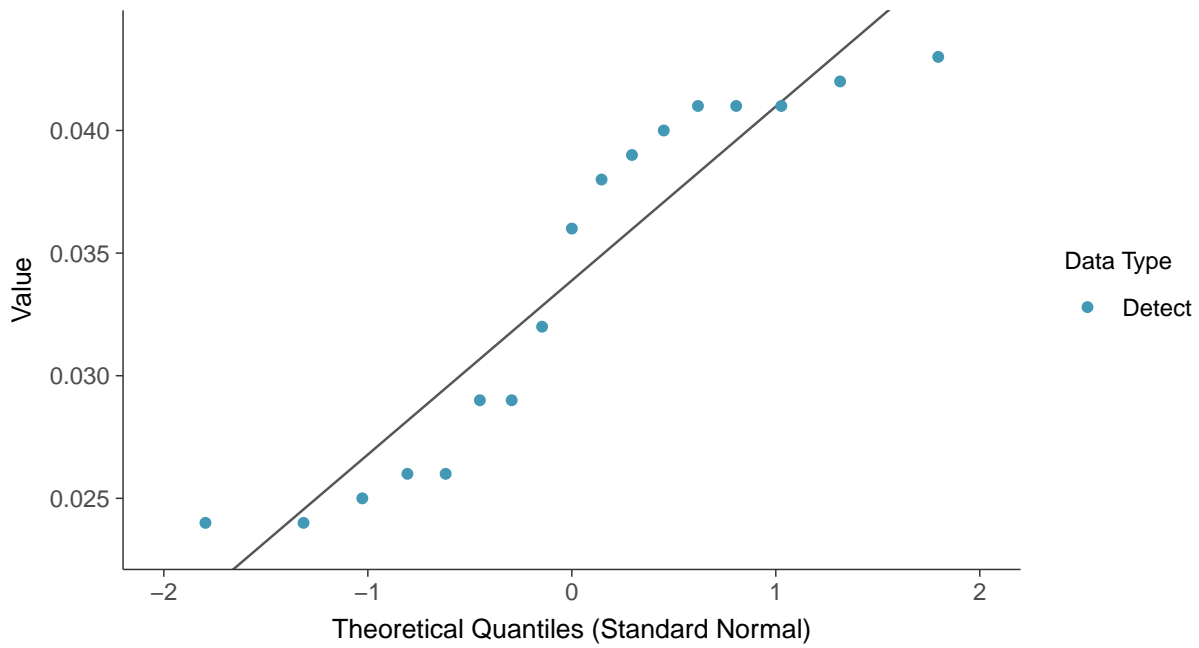
Lithium, MW-11B & MW_12B (mg/L)





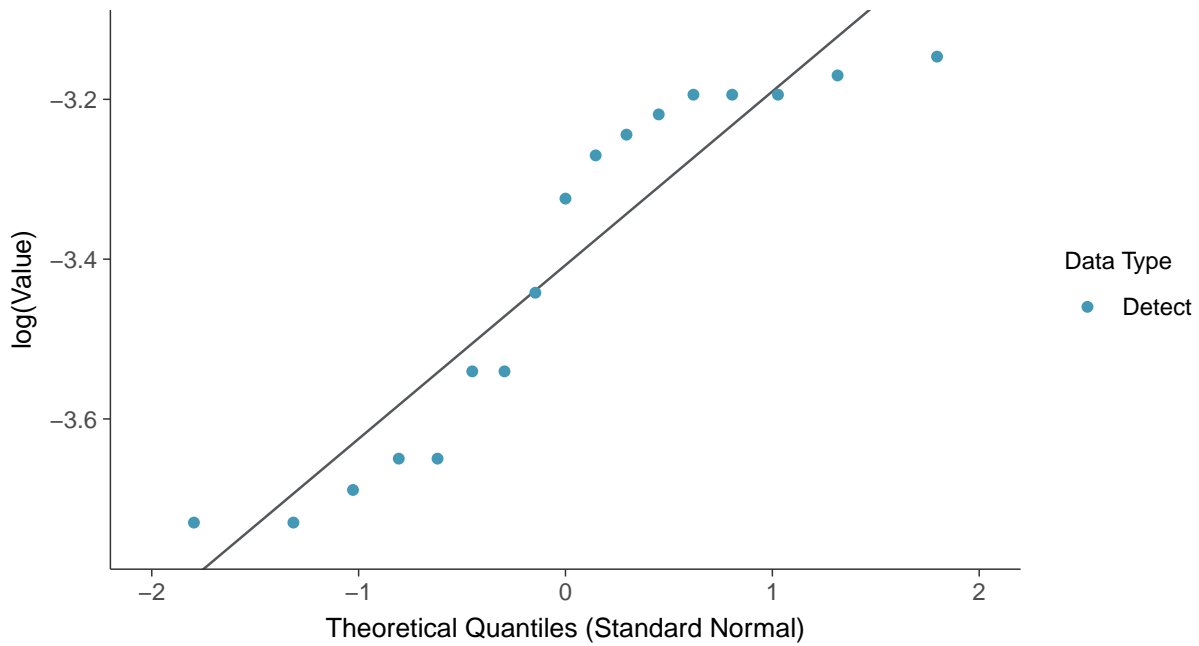
Normal Q-Q plot

Lithium, MW-11B & MW_12B (mg/L)



Lognormal Q-Q plot

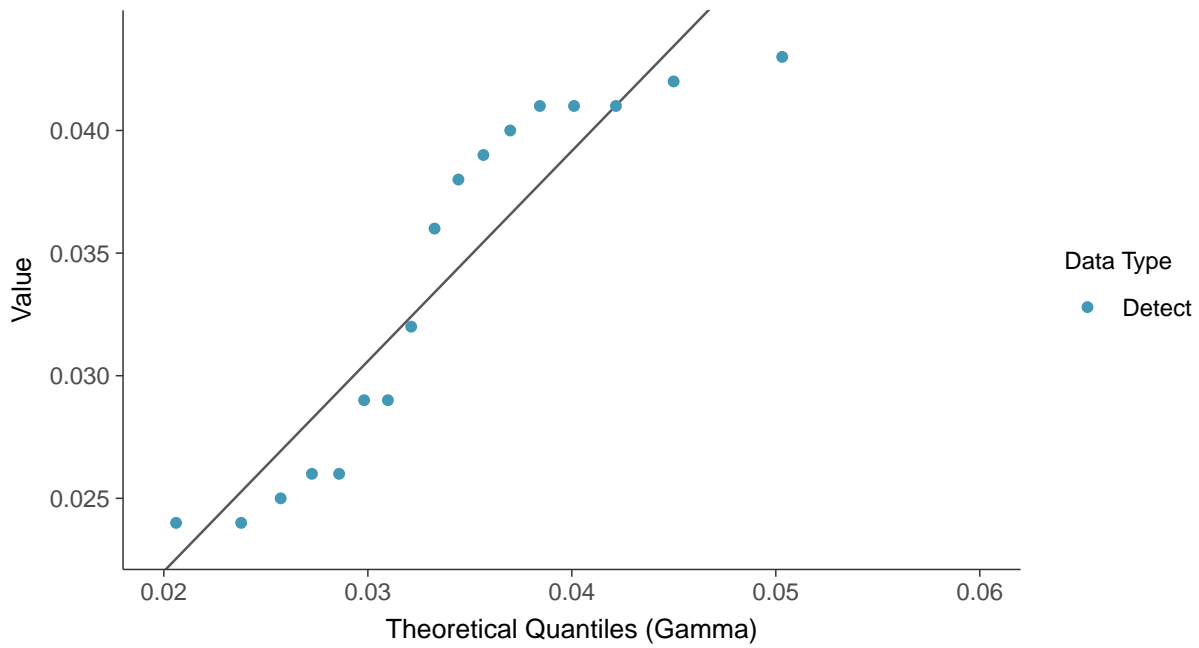
Lithium, MW-11B & MW_12B (mg/L)





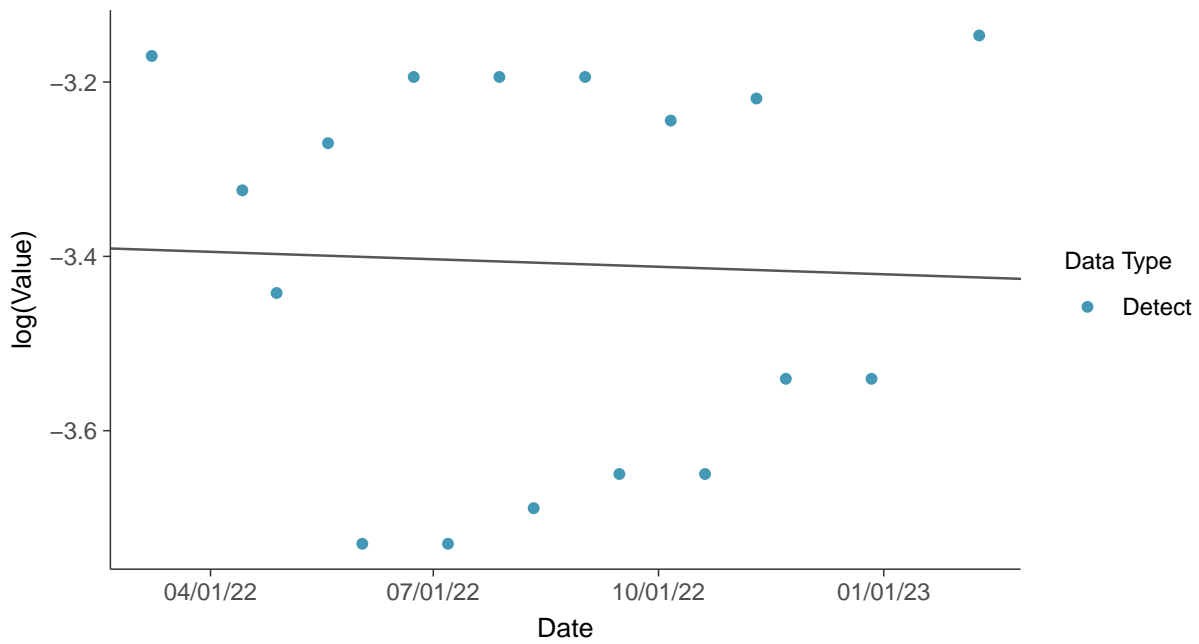
Gamma Q-Q plot

Lithium, MW-11B & MW_12B (mg/L)



Trend Regression: Lognormal MLE

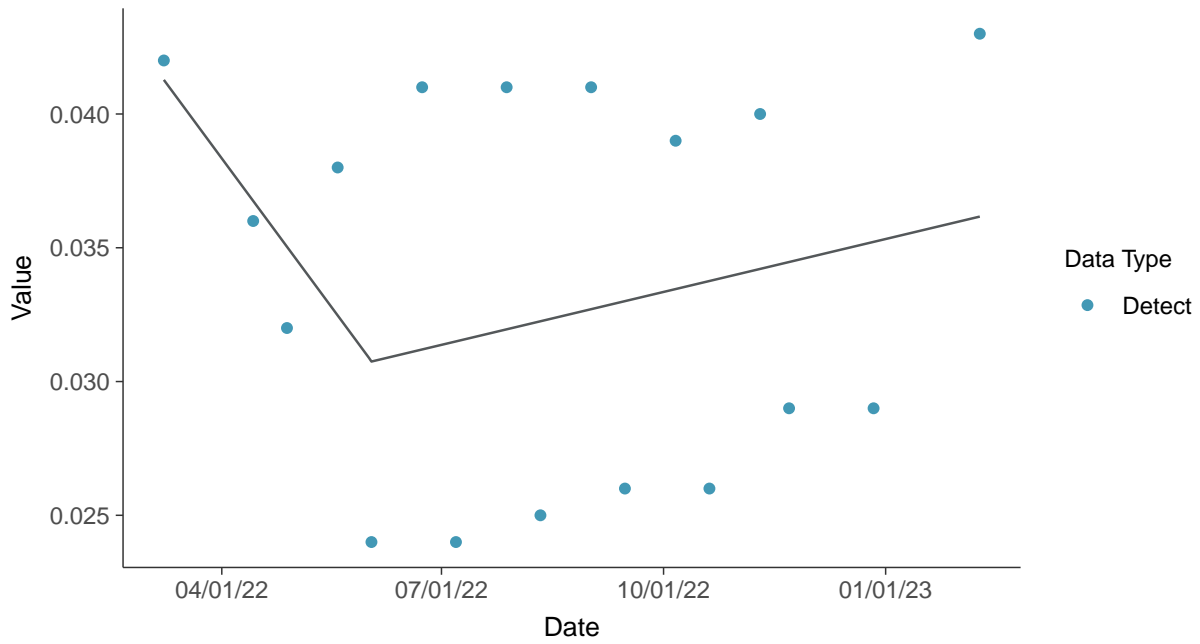
Lithium, MW-11B & MW_12B (mg/L)





Trend Regression: Piecewise Linear-Linear

Lithium, MW-11B & MW_12B (mg/L)



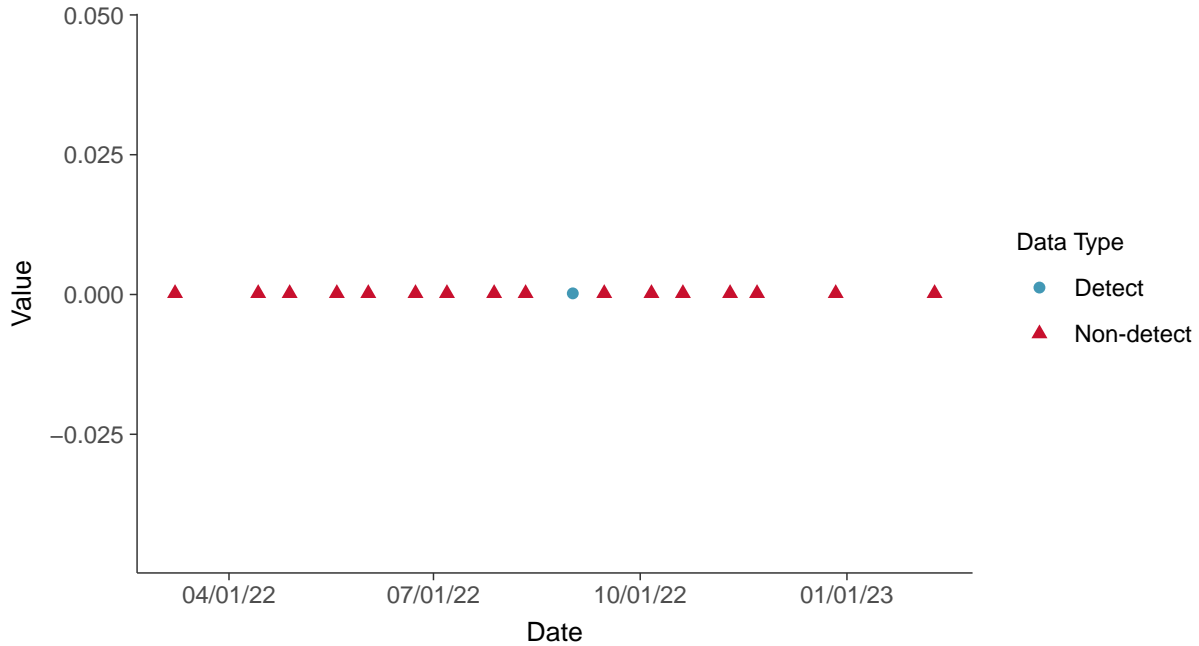


Appendix IV: Mercury, MW-11B & MW_12B

ID: 2_17

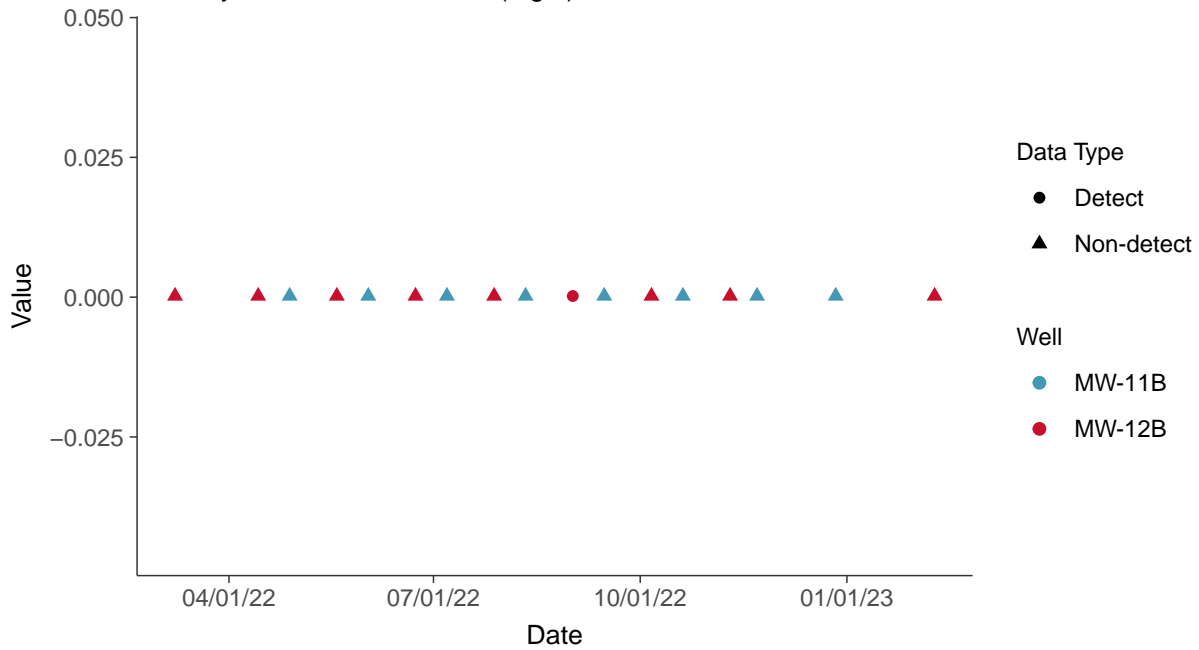
Scatter Plot

Mercury, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

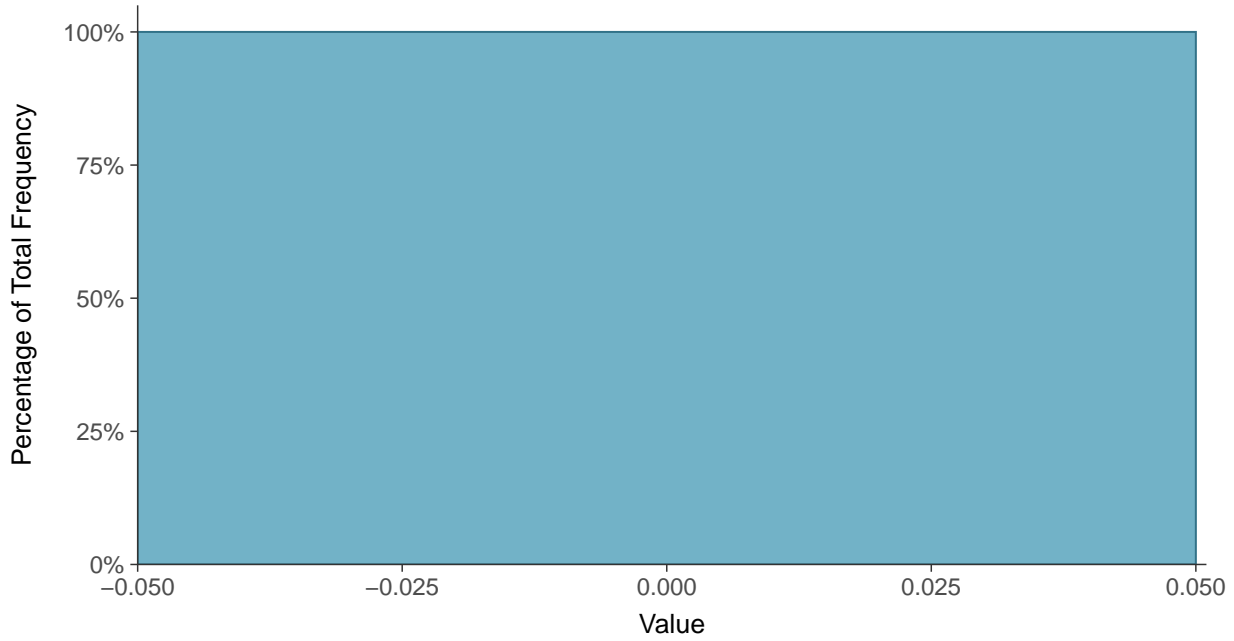
Mercury, MW-11B & MW_12B (mg/L)





Histogram

Mercury, MW-11B & MW_12B (mg/L)



Boxplot

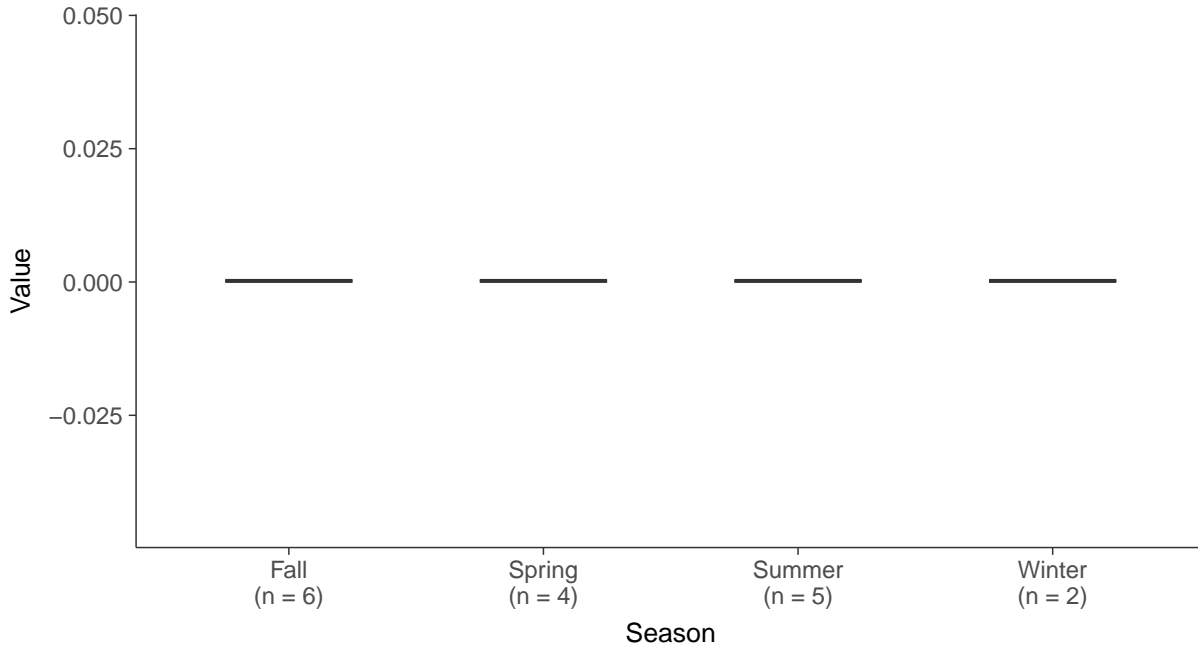
Mercury, MW-11B & MW_12B (mg/L)





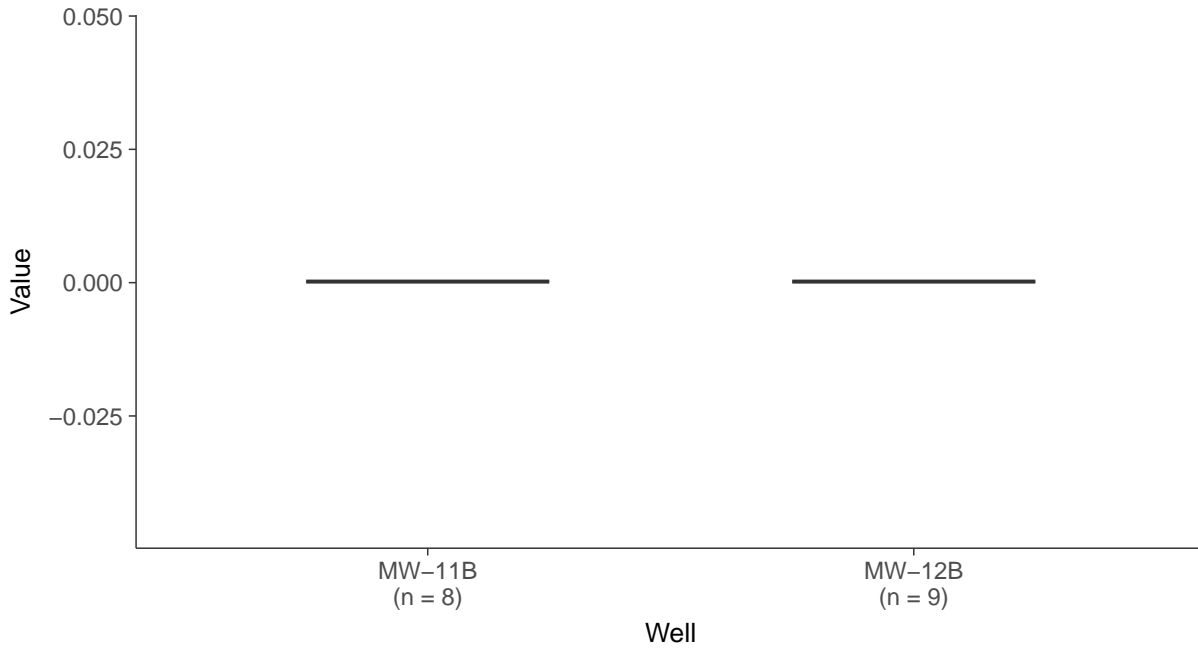
Boxplot by Season

Mercury, MW-11B & MW_12B (mg/L)



Boxplot by Well

Mercury, MW-11B & MW_12B (mg/L)



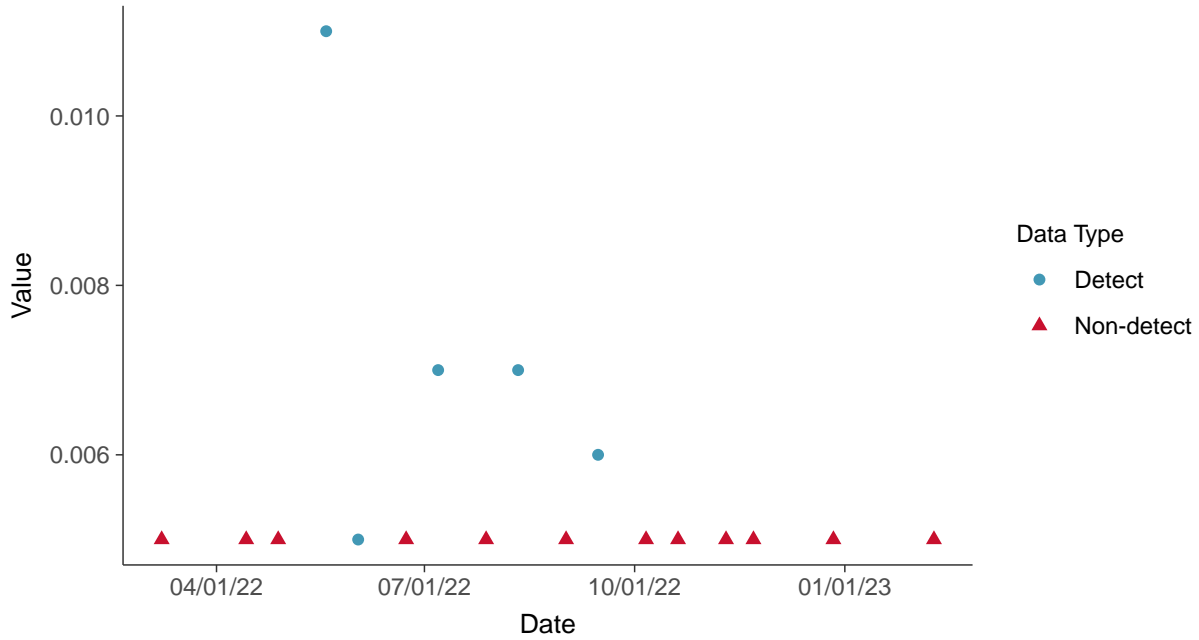


Appendix IV: Molybdenum, MW-11B & MW_12B

ID: 2_18

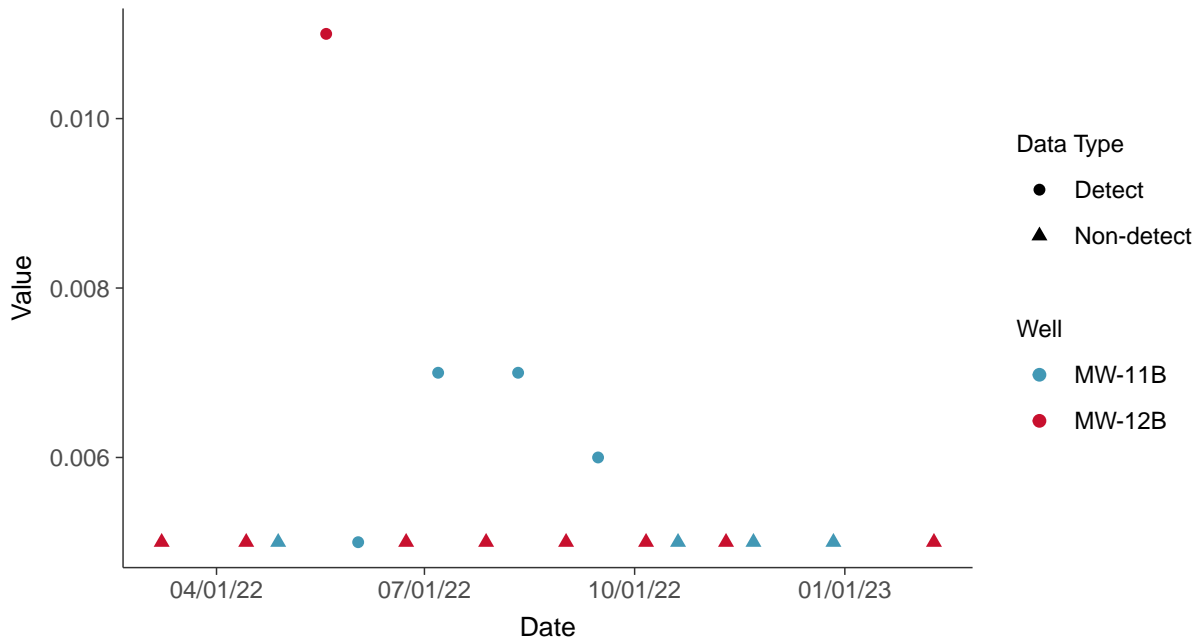
Scatter Plot

Molybdenum, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

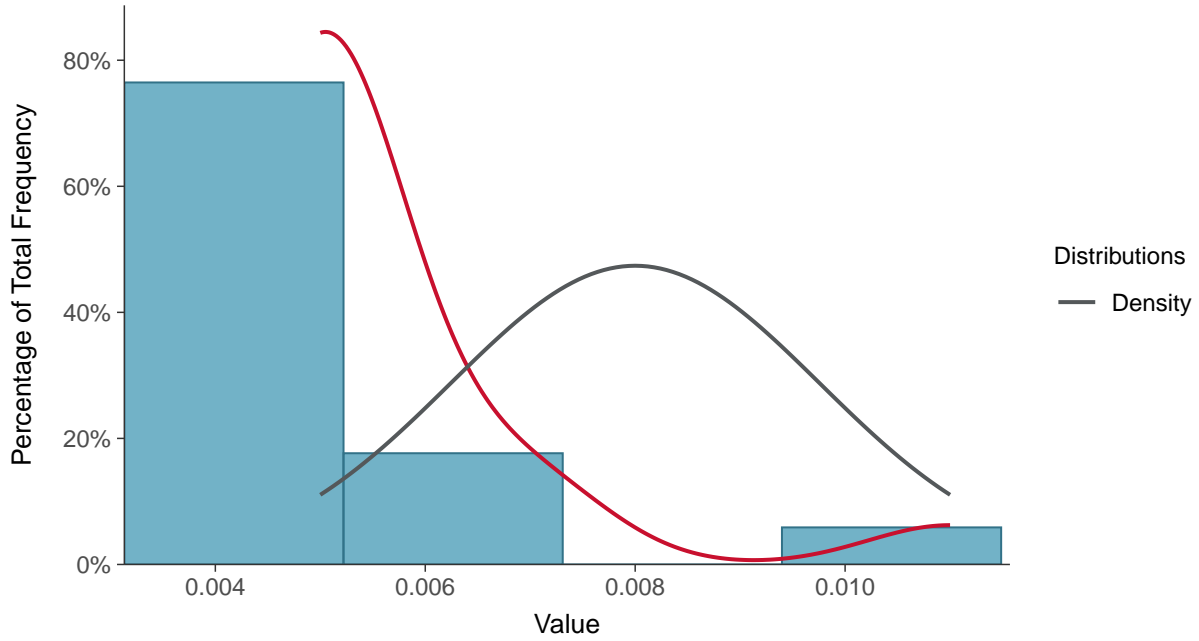
Molybdenum, MW-11B & MW_12B (mg/L)





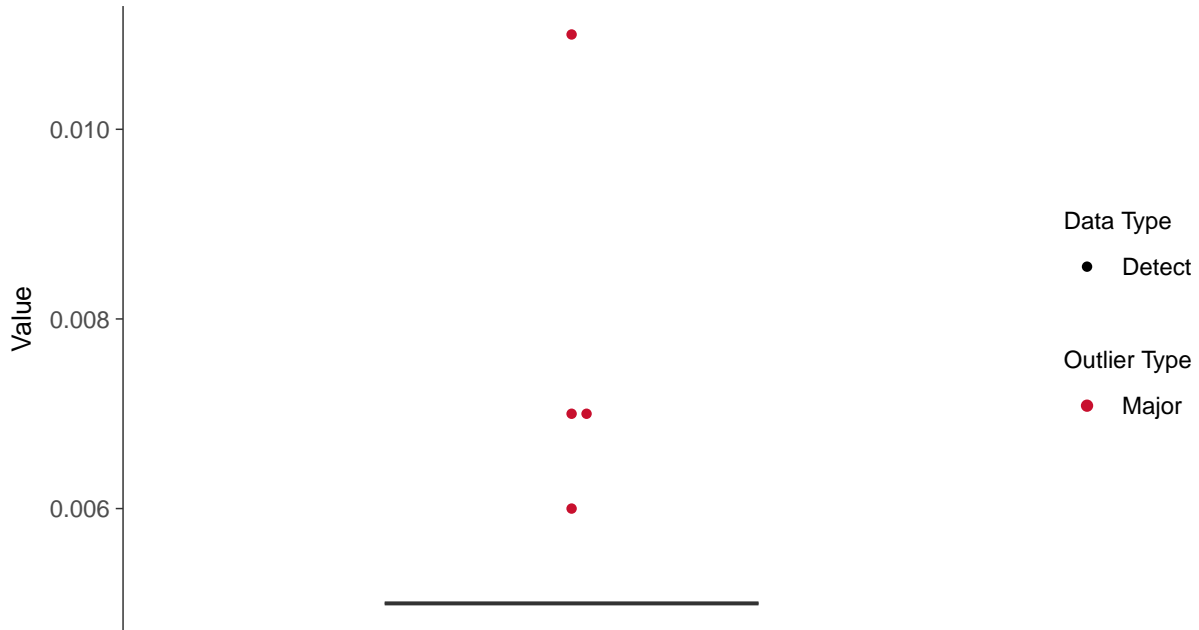
Histogram

Molybdenum, MW-11B & MW_12B (mg/L)



Boxplot

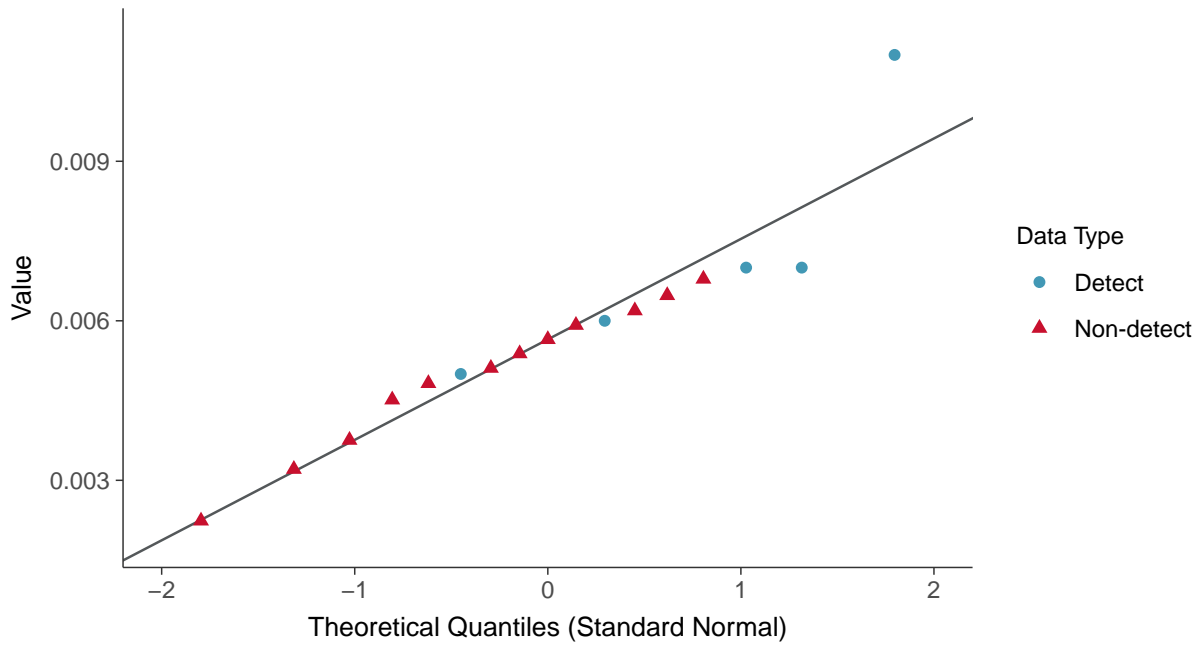
Molybdenum, MW-11B & MW_12B (mg/L)





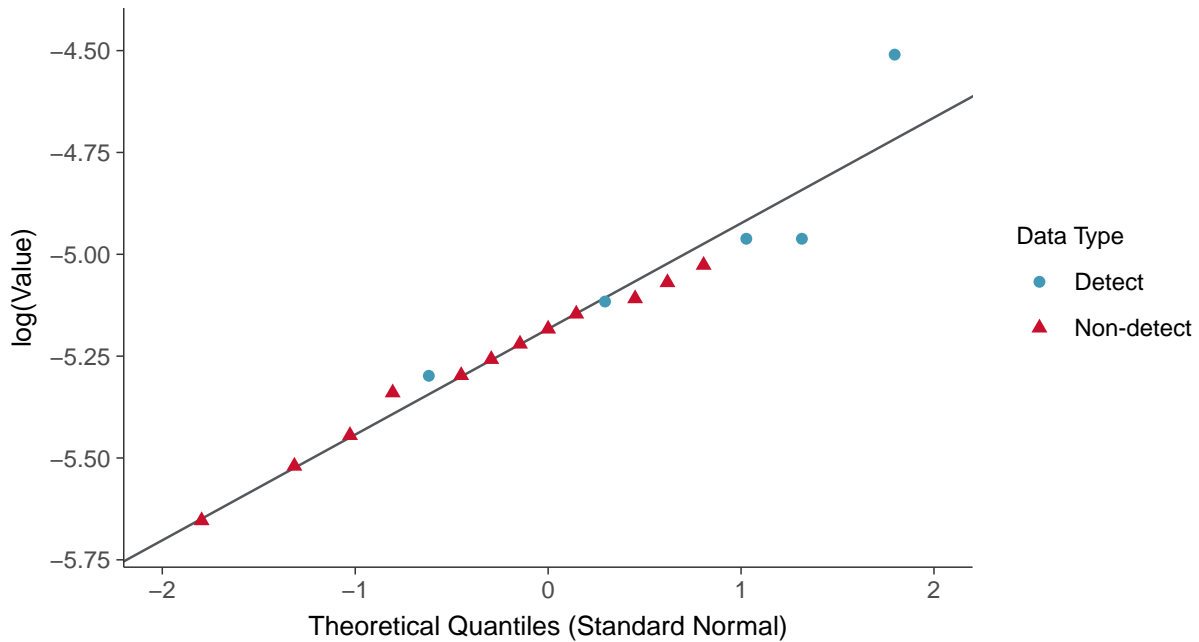
Normal Q-Q plot using ROS Imputed Estimates

Molybdenum, MW-11B & MW_12B (mg/L)



Lognormal Q-Q plot using ROS Imputed Estimates

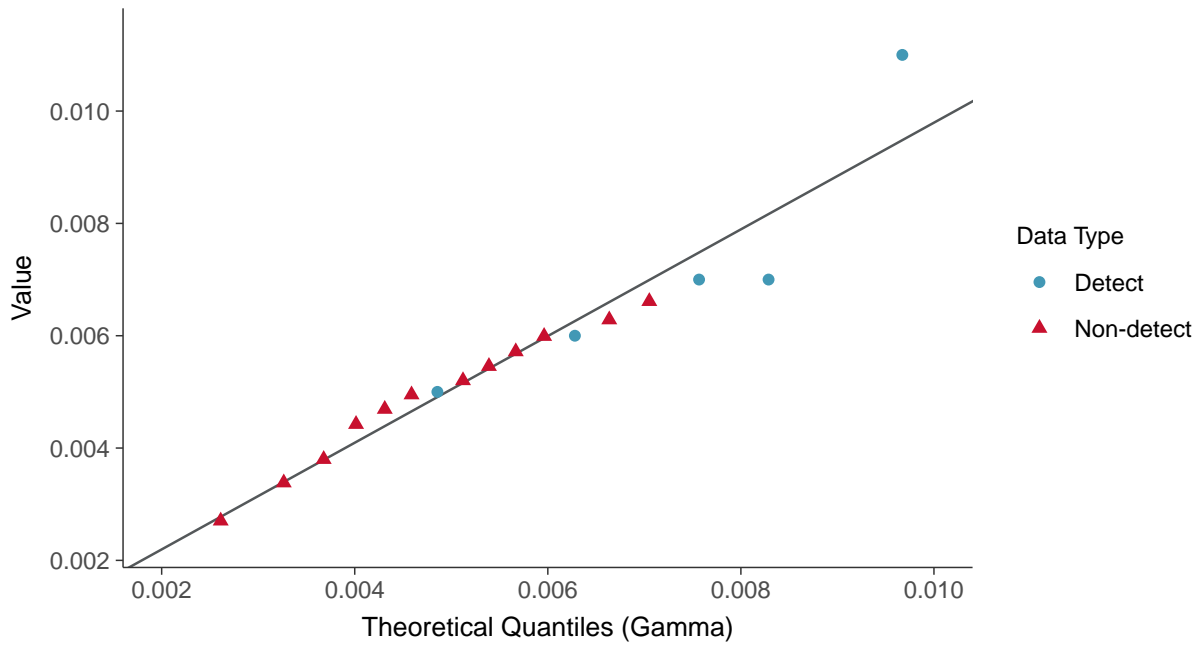
Molybdenum, MW-11B & MW_12B (mg/L)





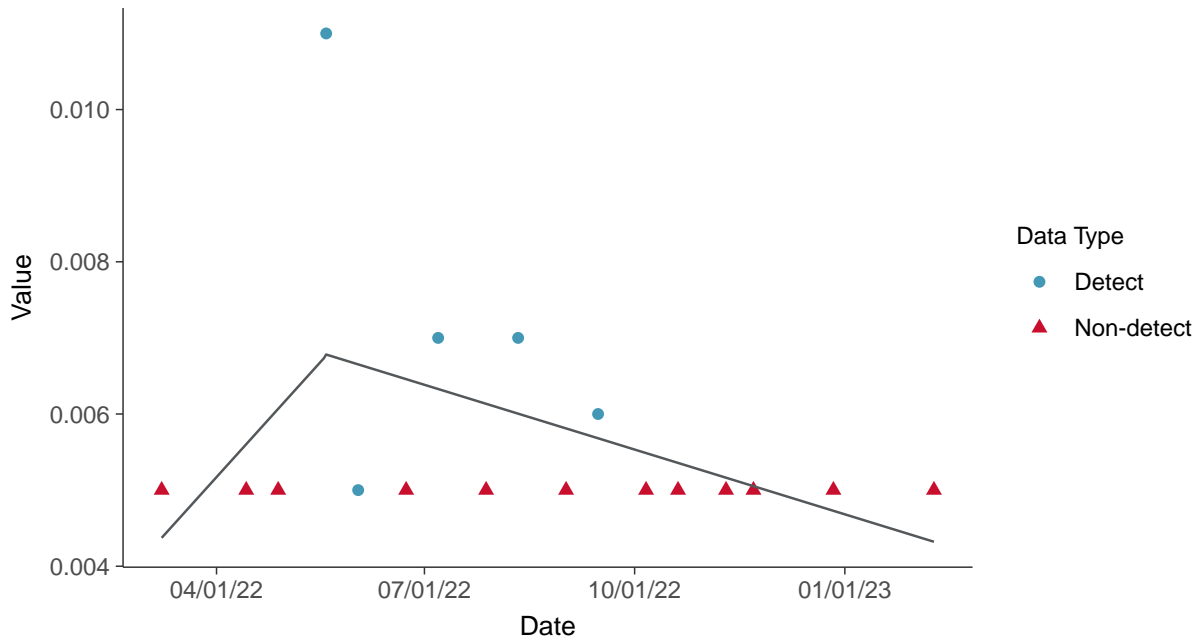
Gamma Q-Q plot using ROS Imputed Estimates

Molybdenum, MW-11B & MW_12B (mg/L)



Trend Regression: Piecewise Linear-Linear

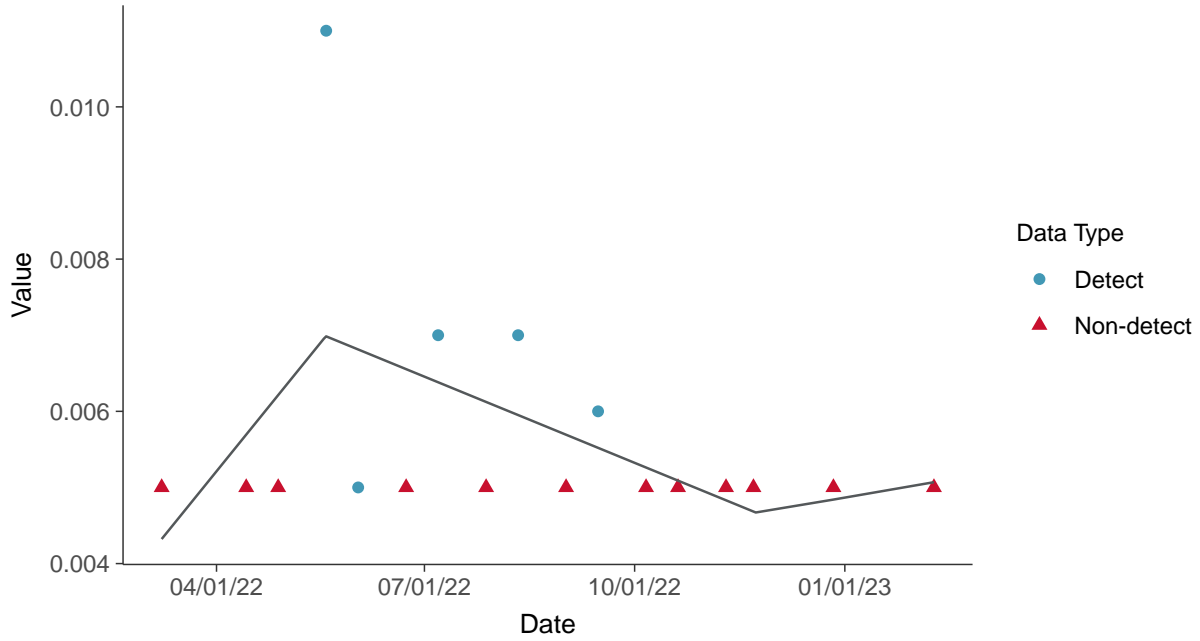
Molybdenum, MW-11B & MW_12B (mg/L)





Trend Regression: Piecewise Linear-Linear-Linear

Molybdenum, MW-11B & MW_12B (mg/L)



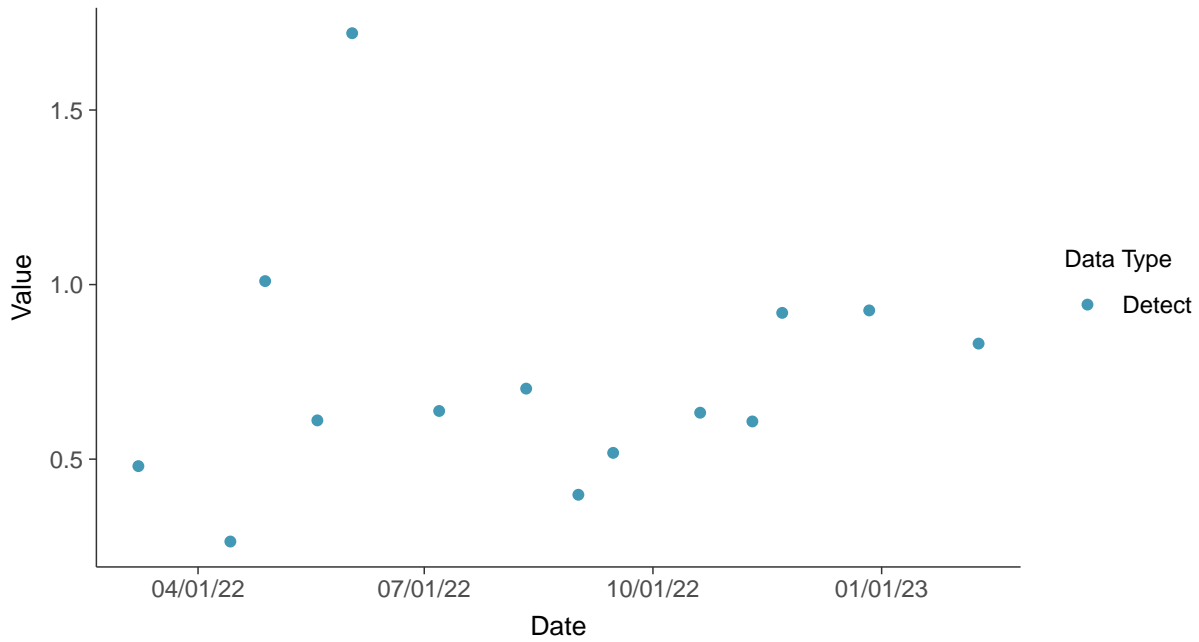


Appendix IV: Radium-226, MW-11B & MW_12B

ID: 2_19

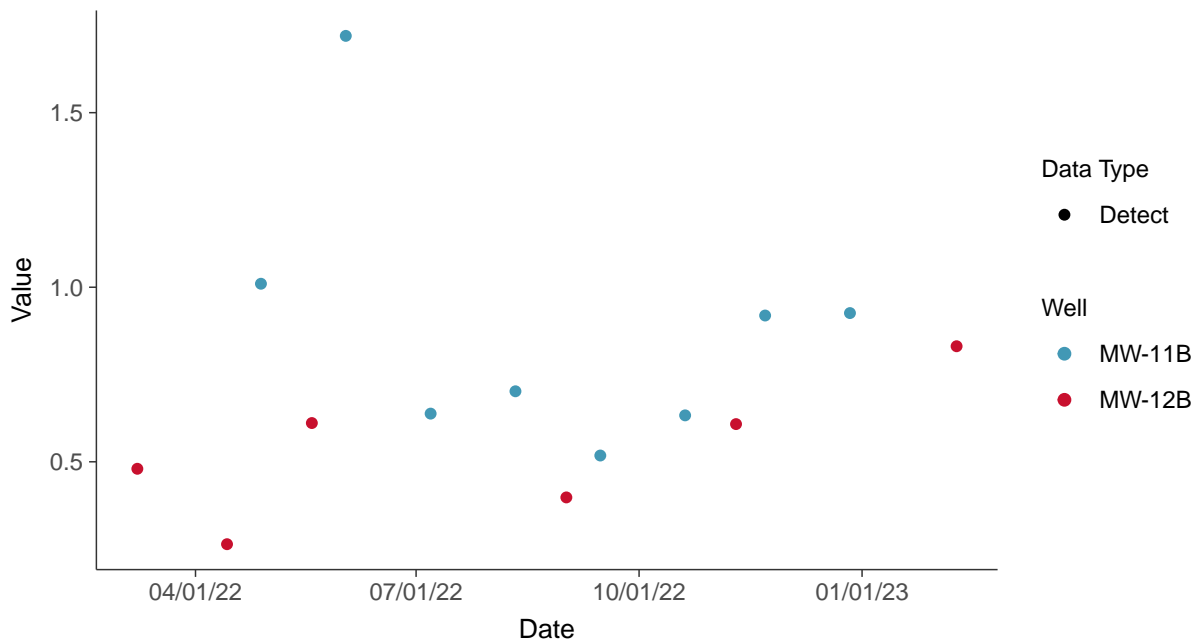
Scatter Plot

Radium-226, MW-11B & MW_12B (pCi/L)



Scatter Plot by Well

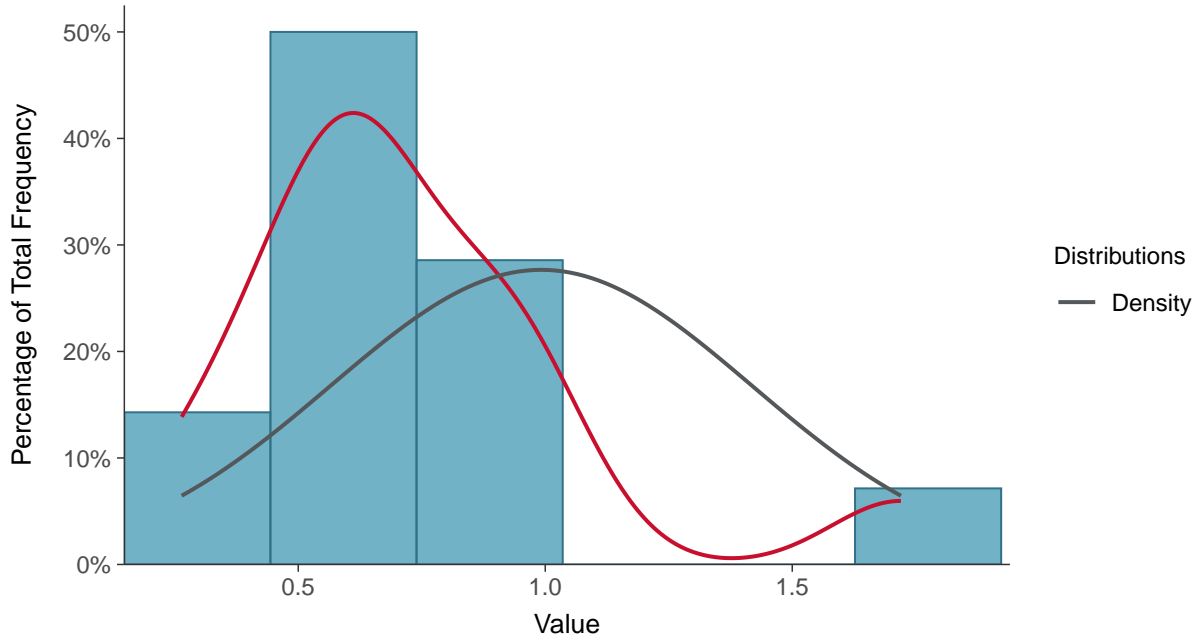
Radium-226, MW-11B & MW_12B (pCi/L)





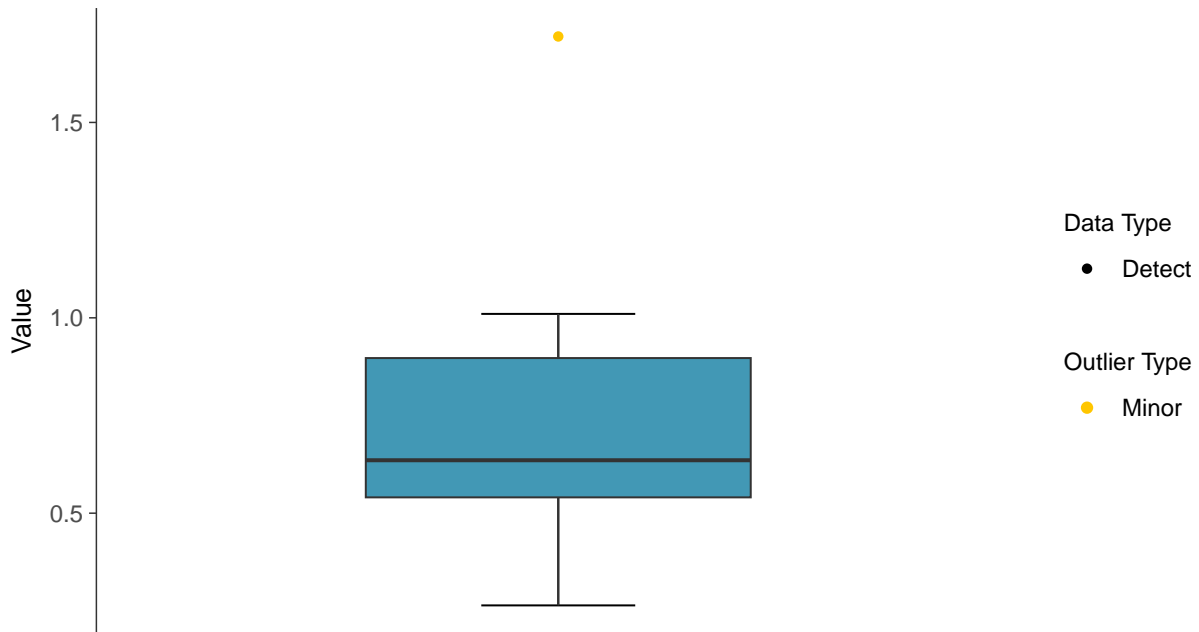
Histogram

Radium-226, MW-11B & MW_12B (pCi/L)



Boxplot

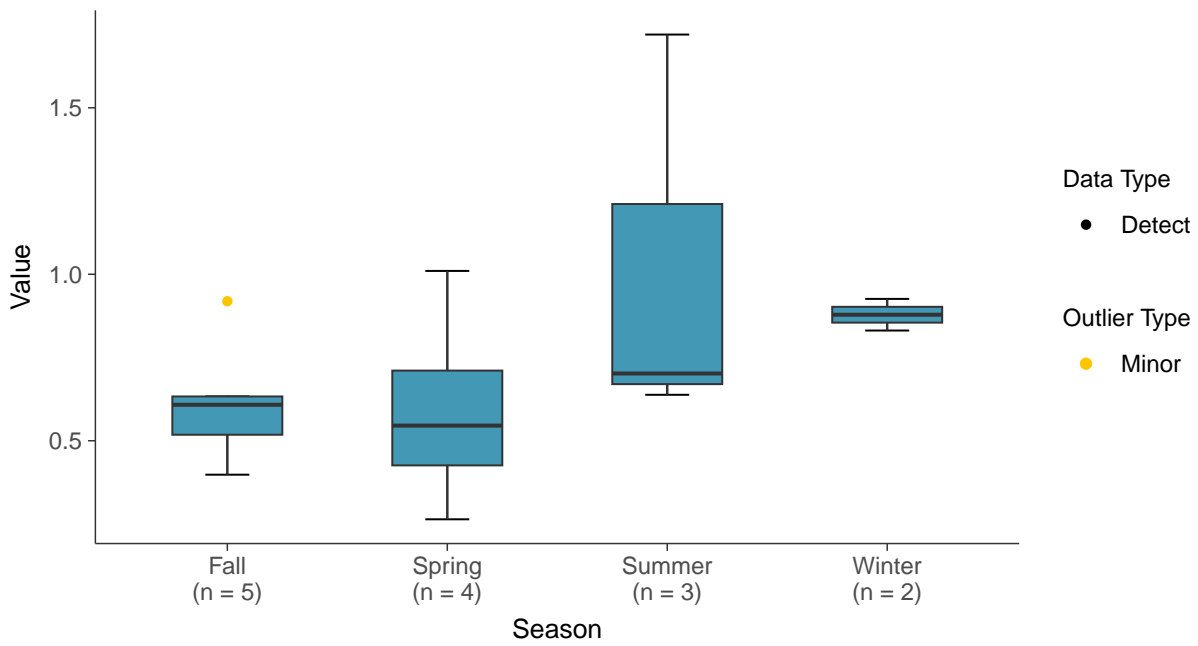
Radium-226, MW-11B & MW_12B (pCi/L)





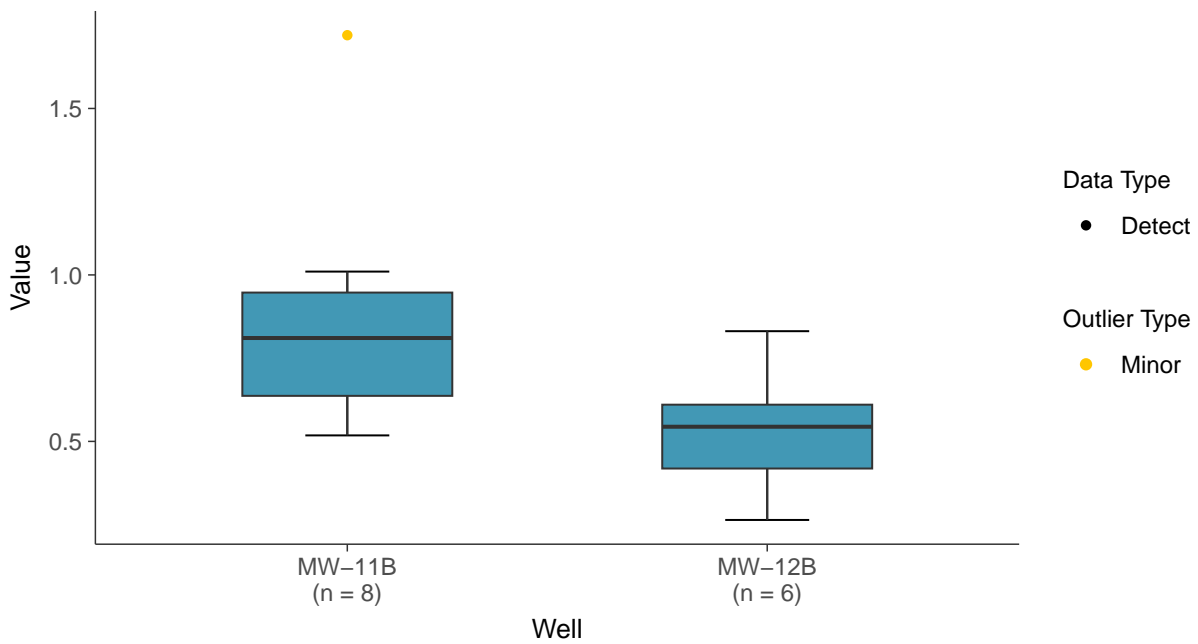
Boxplot by Season

Radium-226, MW-11B & MW_12B (pCi/L)



Boxplot by Well

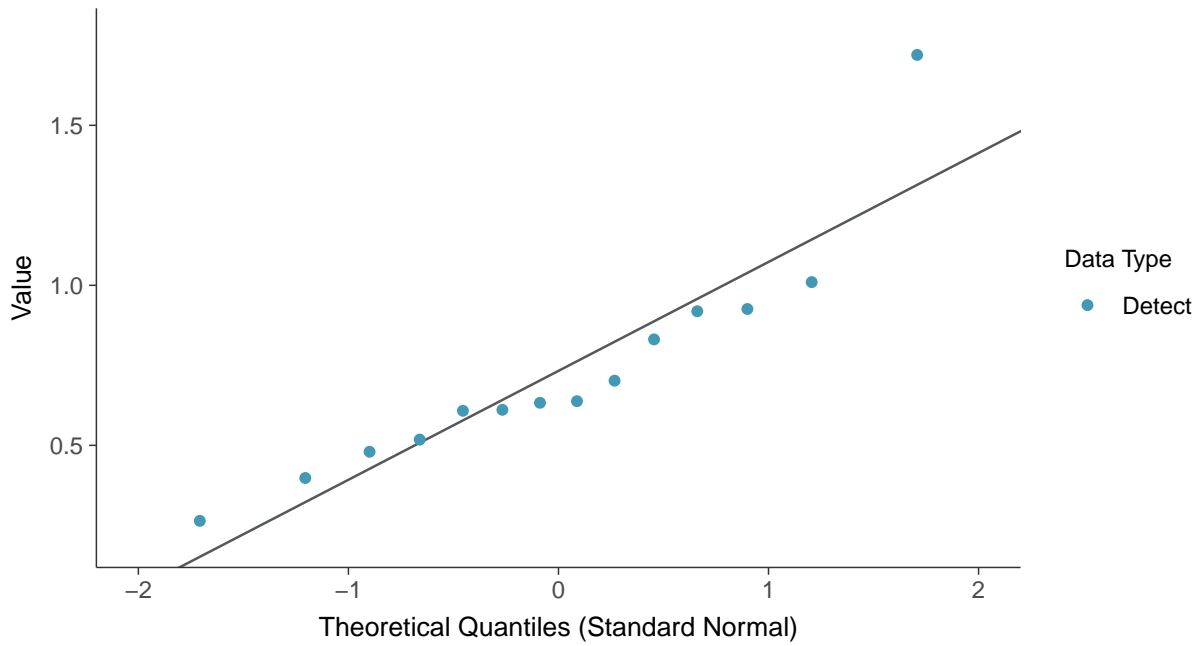
Radium-226, MW-11B & MW_12B (pCi/L)





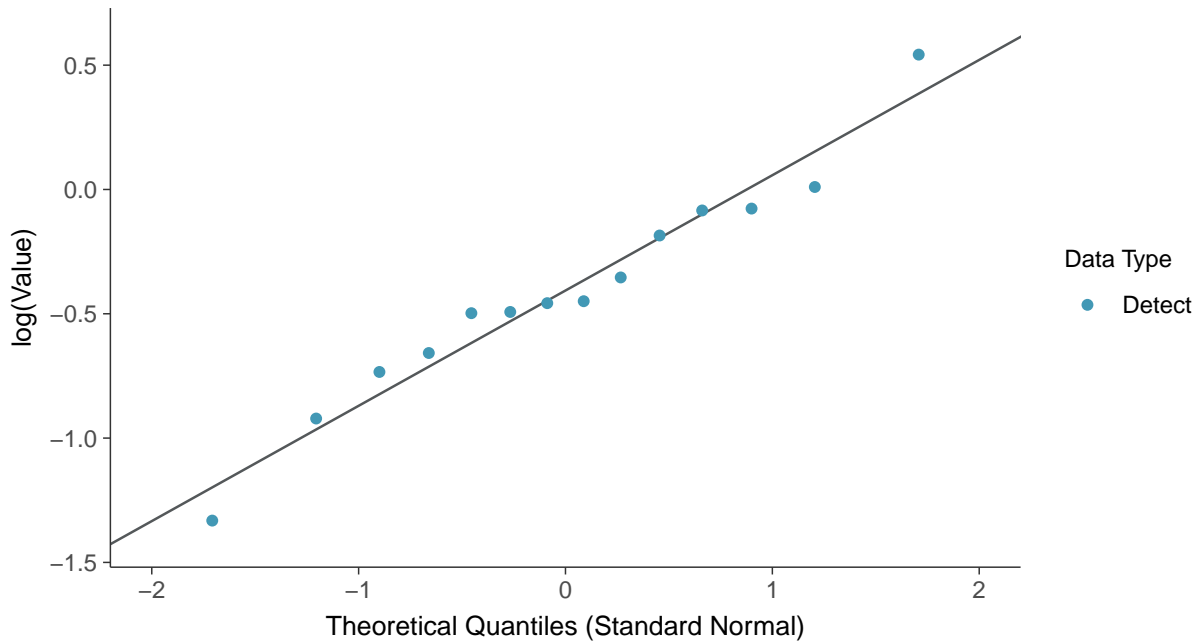
Normal Q-Q plot

Radium-226, MW-11B & MW_12B (pCi/L)



Lognormal Q-Q plot

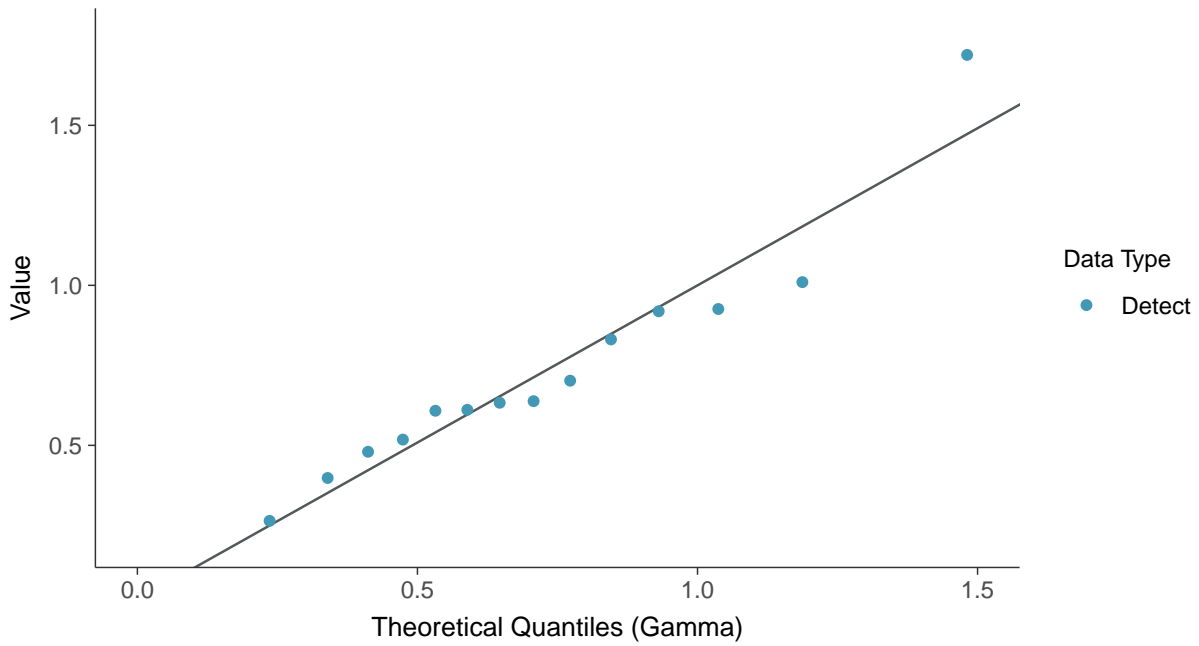
Radium-226, MW-11B & MW_12B (pCi/L)





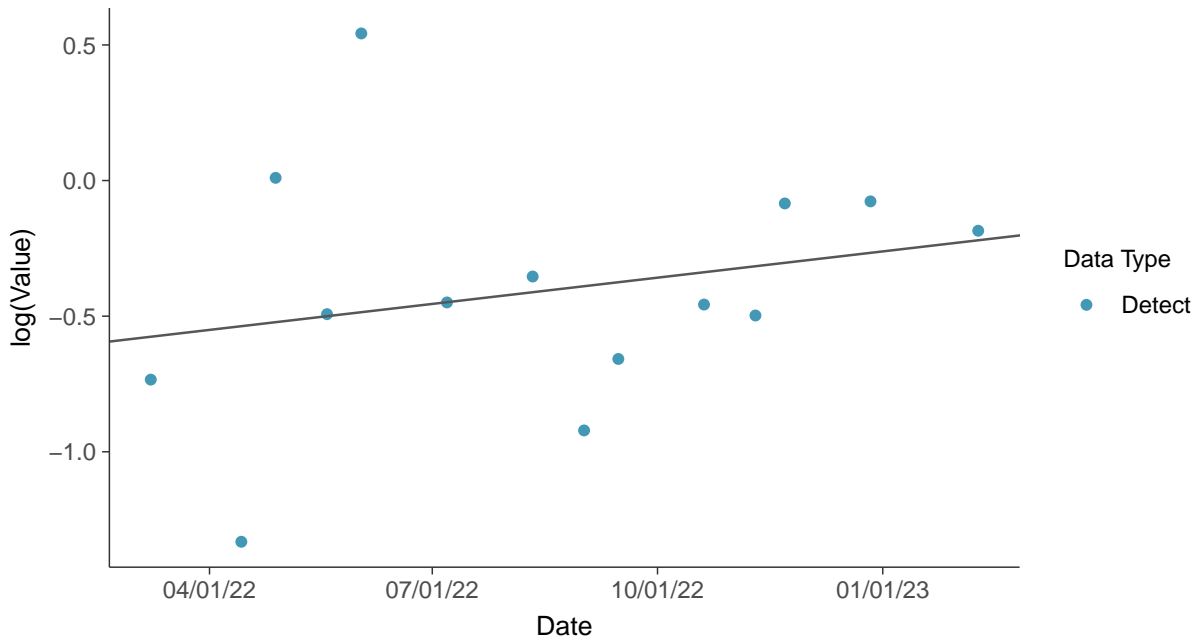
Gamma Q-Q plot

Radium-226, MW-11B & MW_12B (pCi/L)



Trend Regression: Lognormal MLE

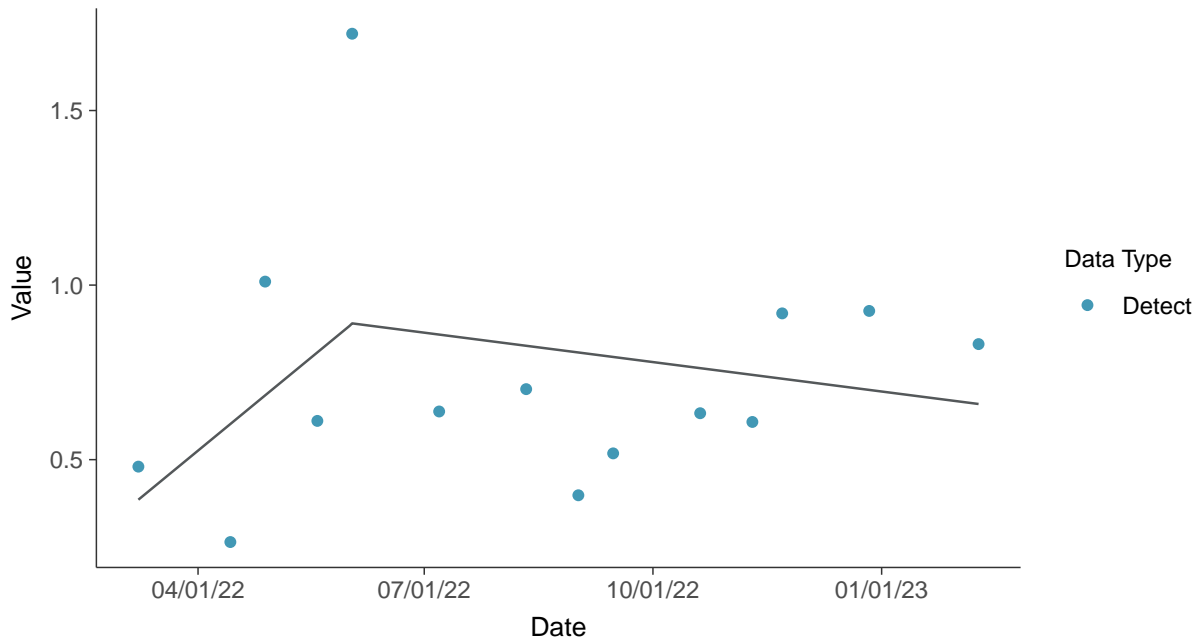
Radium-226, MW-11B & MW_12B (pCi/L)





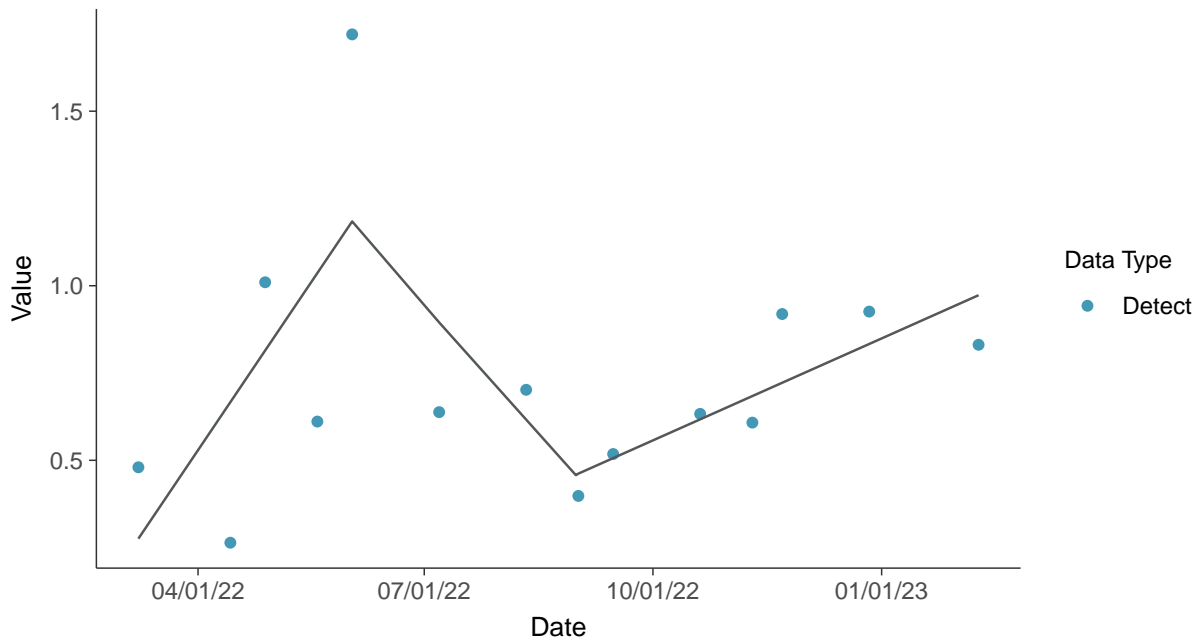
Trend Regression: Piecewise Linear-Linear

Radium-226, MW-11B & MW_12B (pCi/L)



Trend Regression: Piecewise Linear-Linear-Linear

Radium-226, MW-11B & MW_12B (pCi/L)



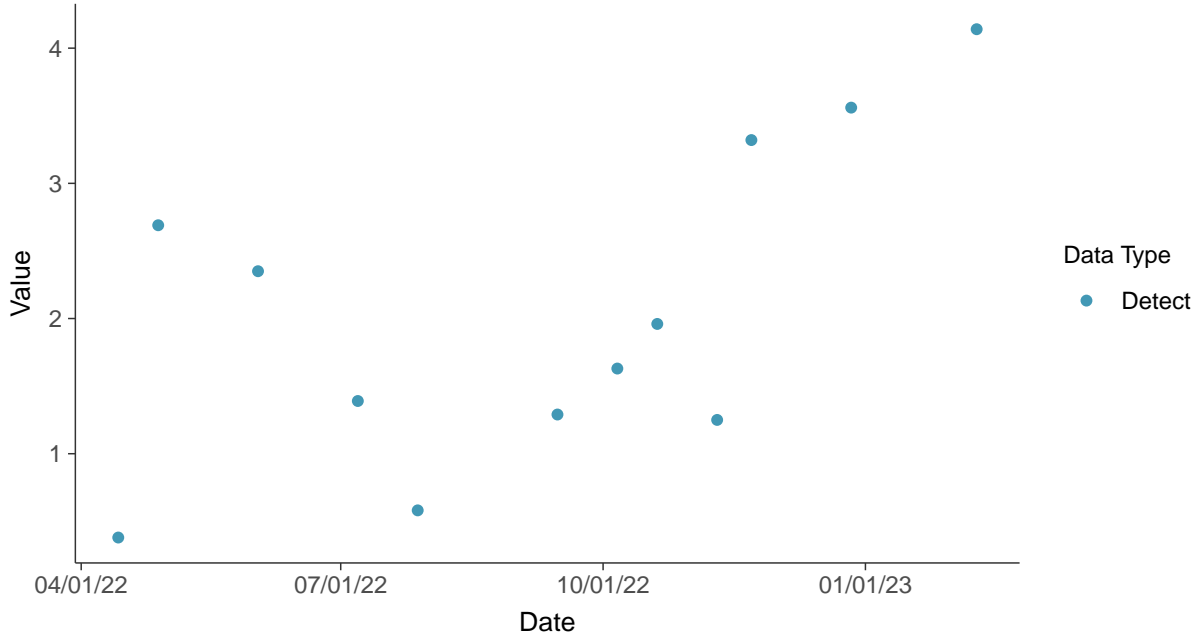


Appendix IV: Radium-226/228, MW-11B & MW_12B

ID: 2_20

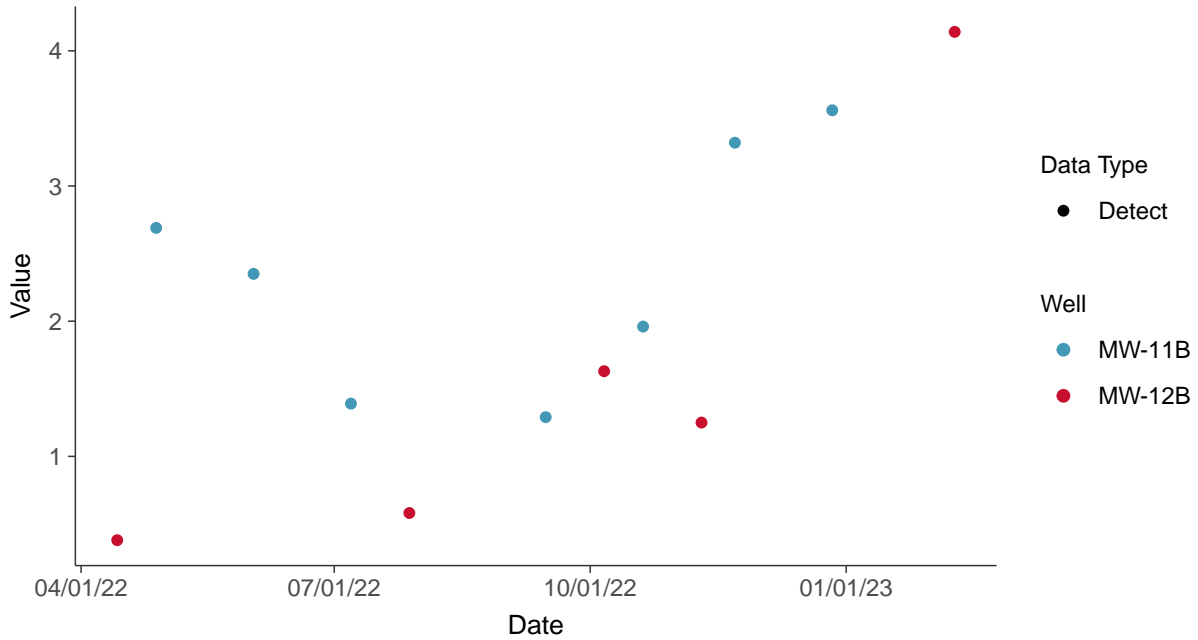
Scatter Plot

Radium-226/228, MW-11B & MW_12B (pCi/L)



Scatter Plot by Well

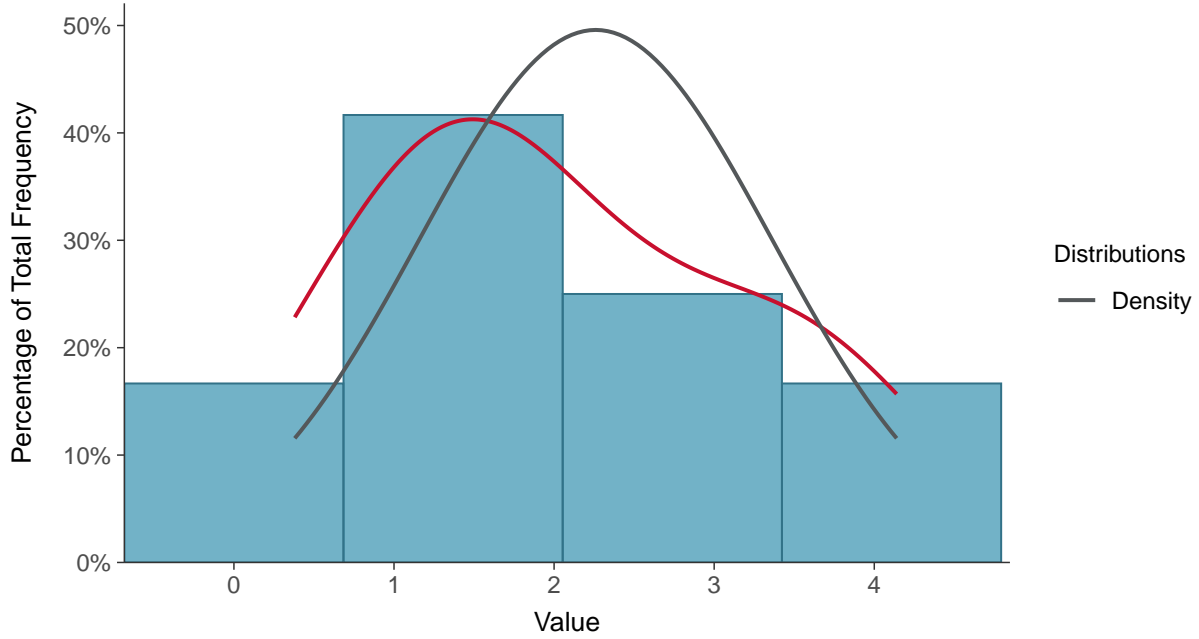
Radium-226/228, MW-11B & MW_12B (pCi/L)





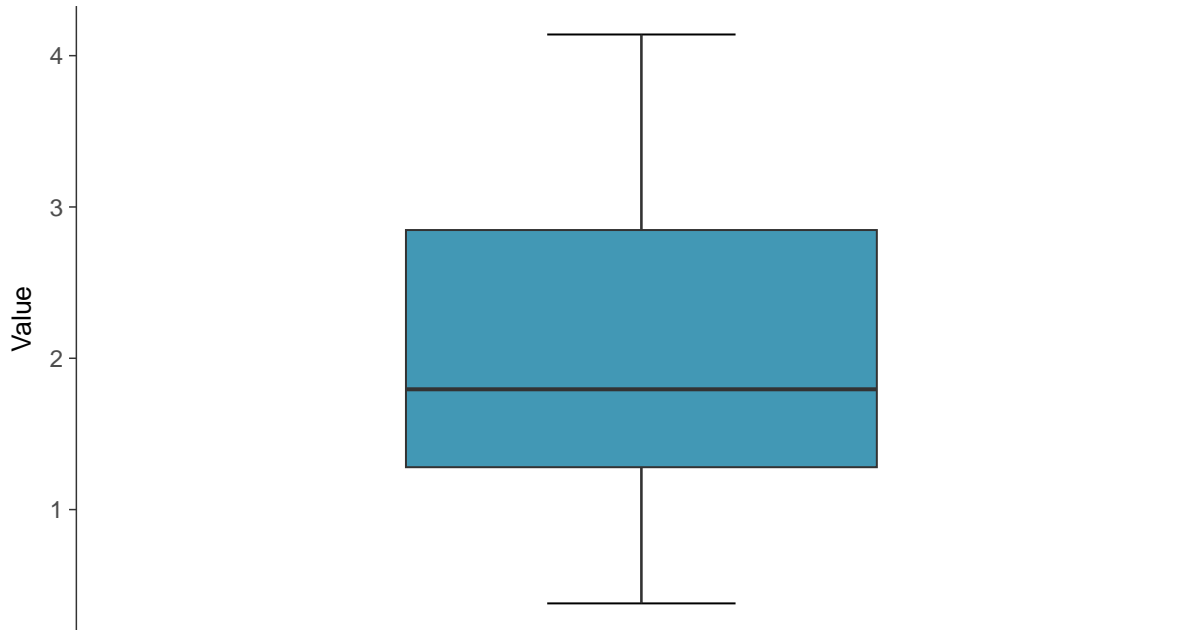
Histogram

Radium-226/228, MW-11B & MW_12B (pCi/L)



Boxplot

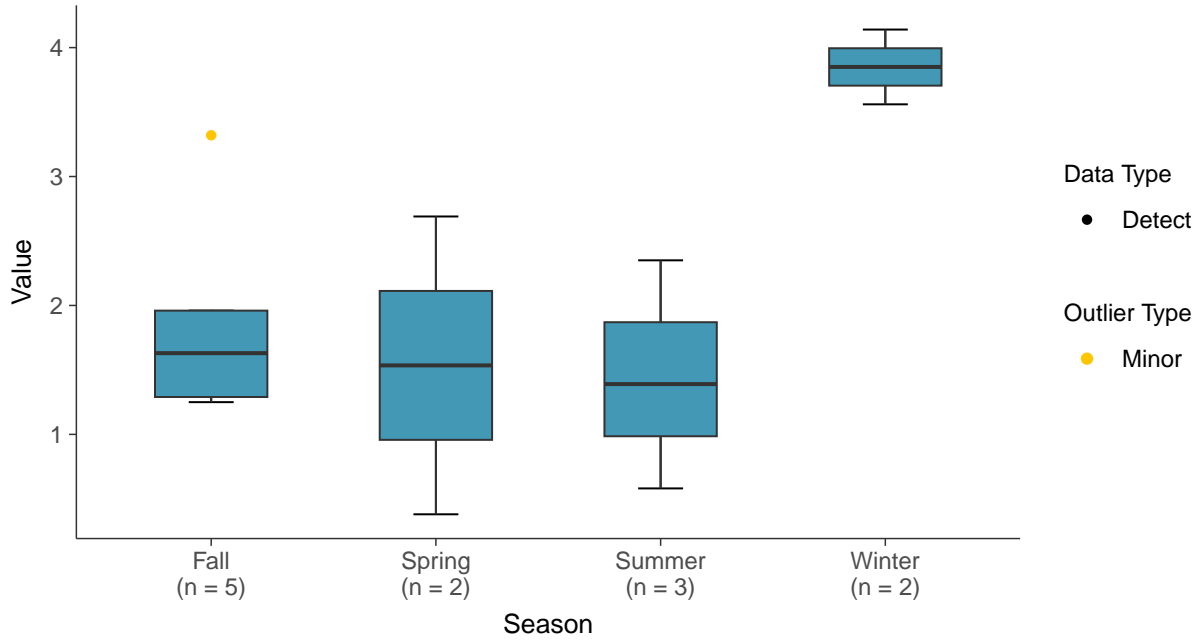
Radium-226/228, MW-11B & MW_12B (pCi/L)





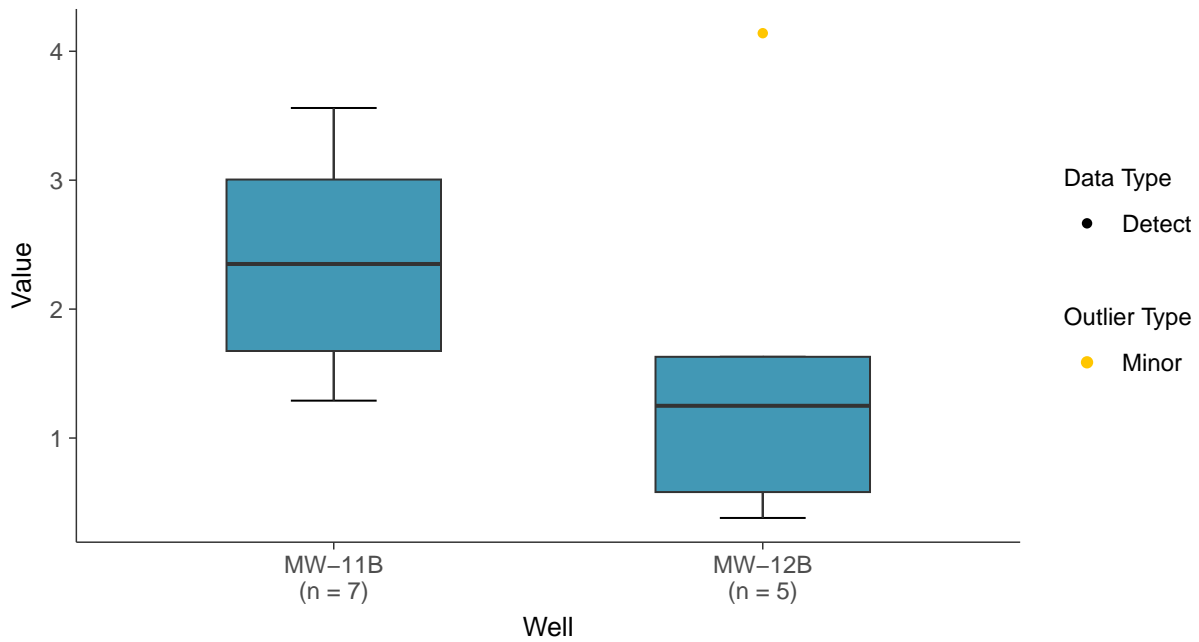
Boxplot by Season

Radium-226/228, MW-11B & MW_12B (pCi/L)



Boxplot by Well

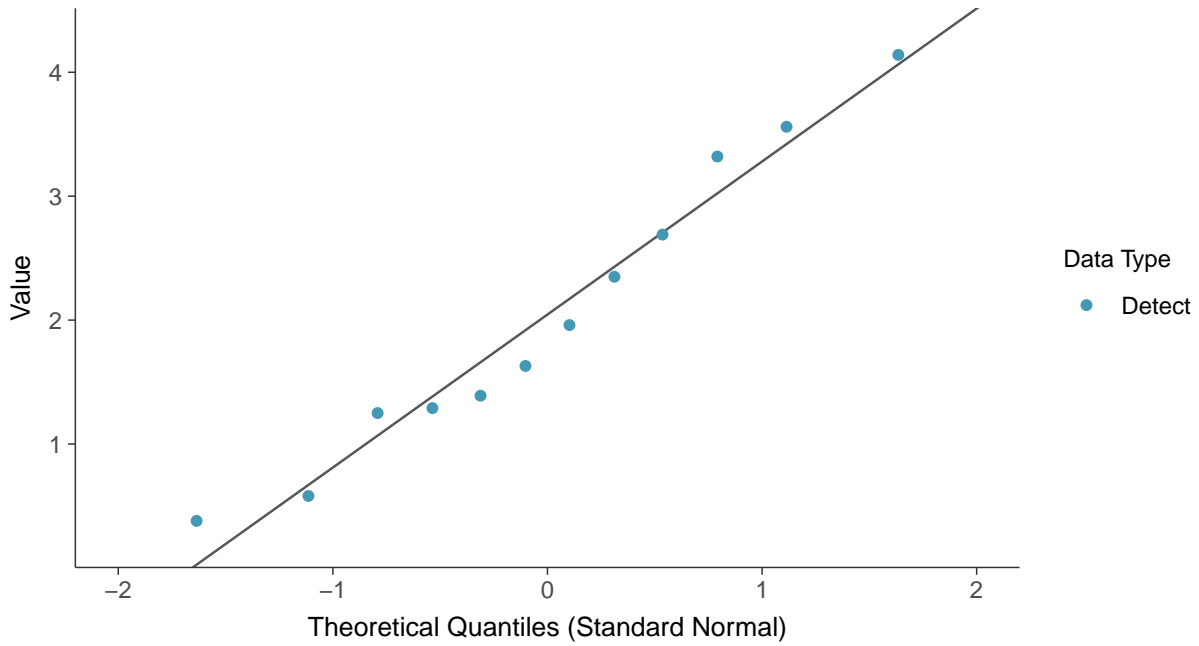
Radium-226/228, MW-11B & MW_12B (pCi/L)





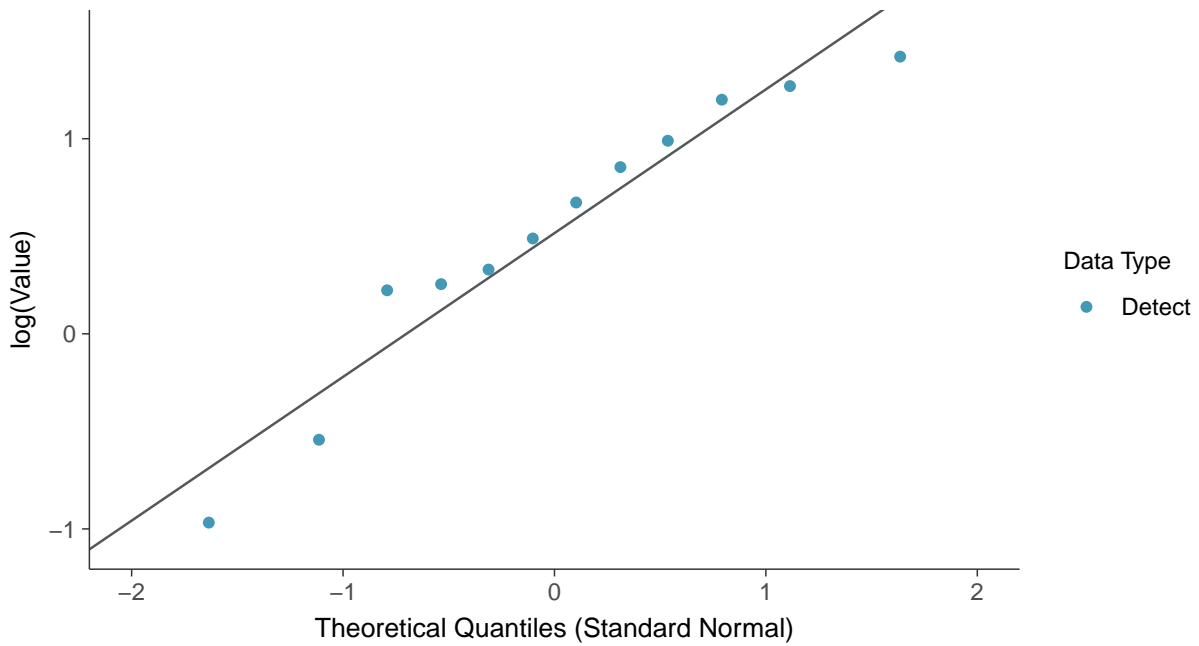
Normal Q-Q plot

Radium-226/228, MW-11B & MW_12B (pCi/L)



Lognormal Q-Q plot

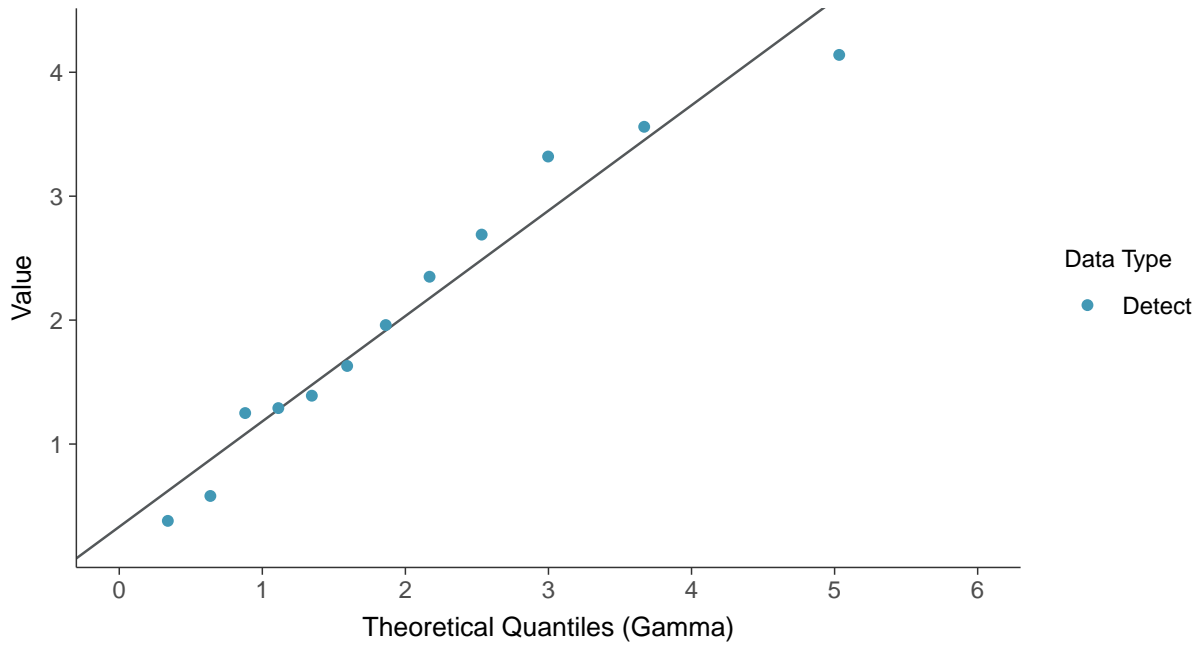
Radium-226/228, MW-11B & MW_12B (pCi/L)





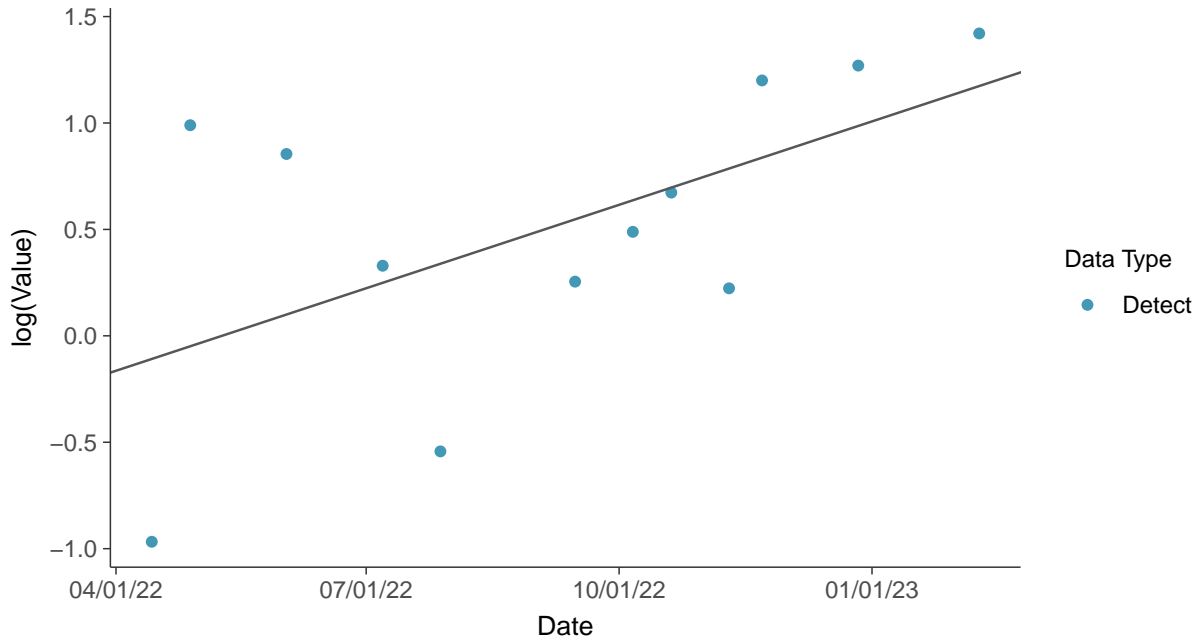
Gamma Q-Q plot

Radium-226/228, MW-11B & MW_12B (pCi/L)



Trend Regression: Lognormal MLE

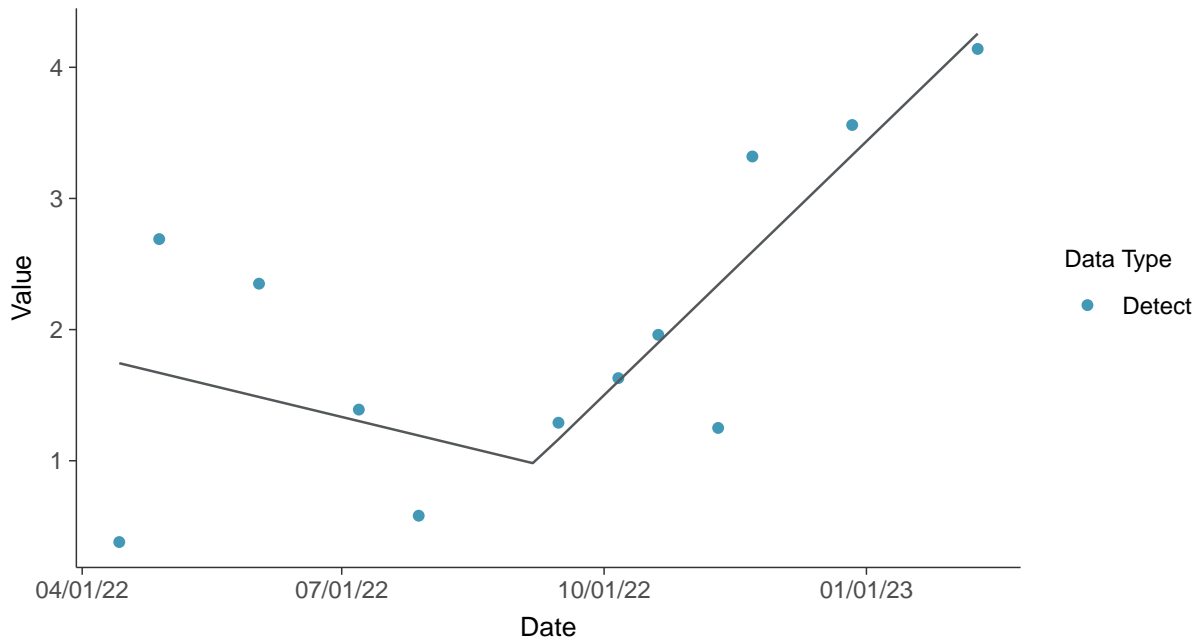
Radium-226/228, MW-11B & MW_12B (pCi/L)





Trend Regression: Piecewise Linear-Linear

Radium-226/228, MW-11B & MW_12B (pCi/L)



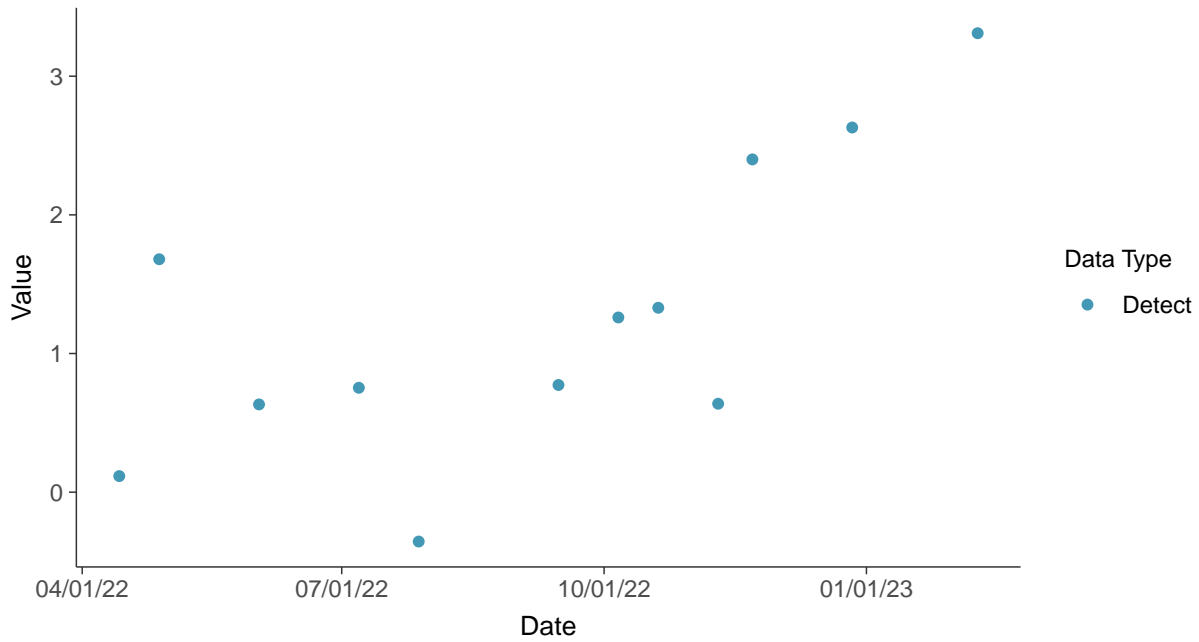


Appendix IV: Radium-228, MW-11B & MW_12B

ID: 2_21

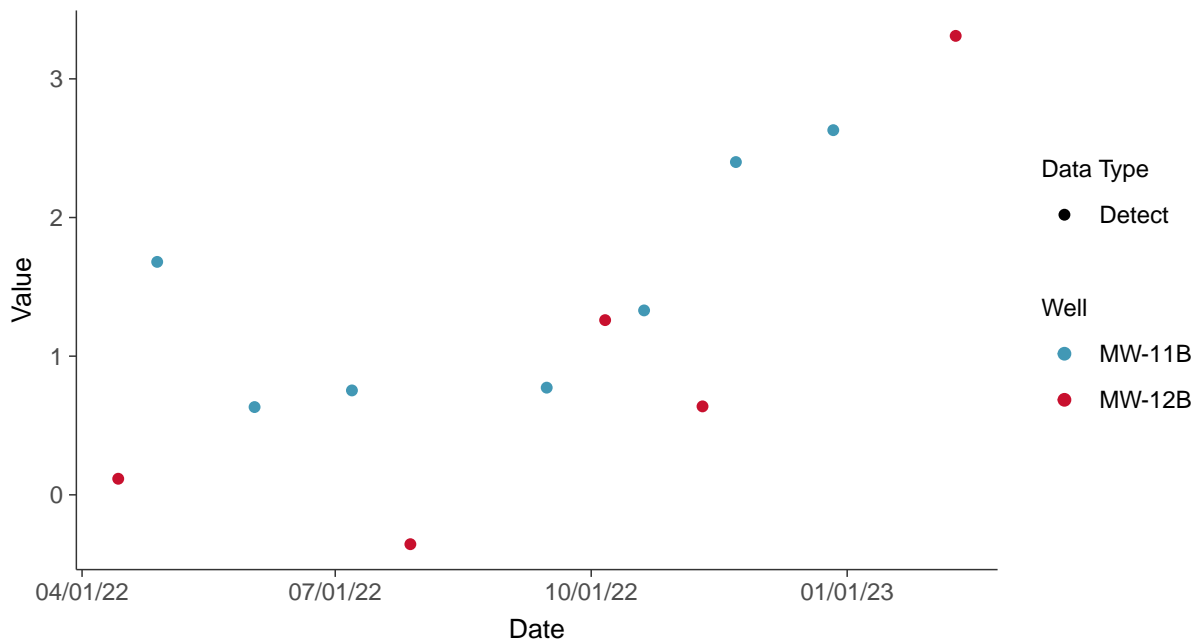
Scatter Plot

Radium-228, MW-11B & MW_12B (pCi/L)



Scatter Plot by Well

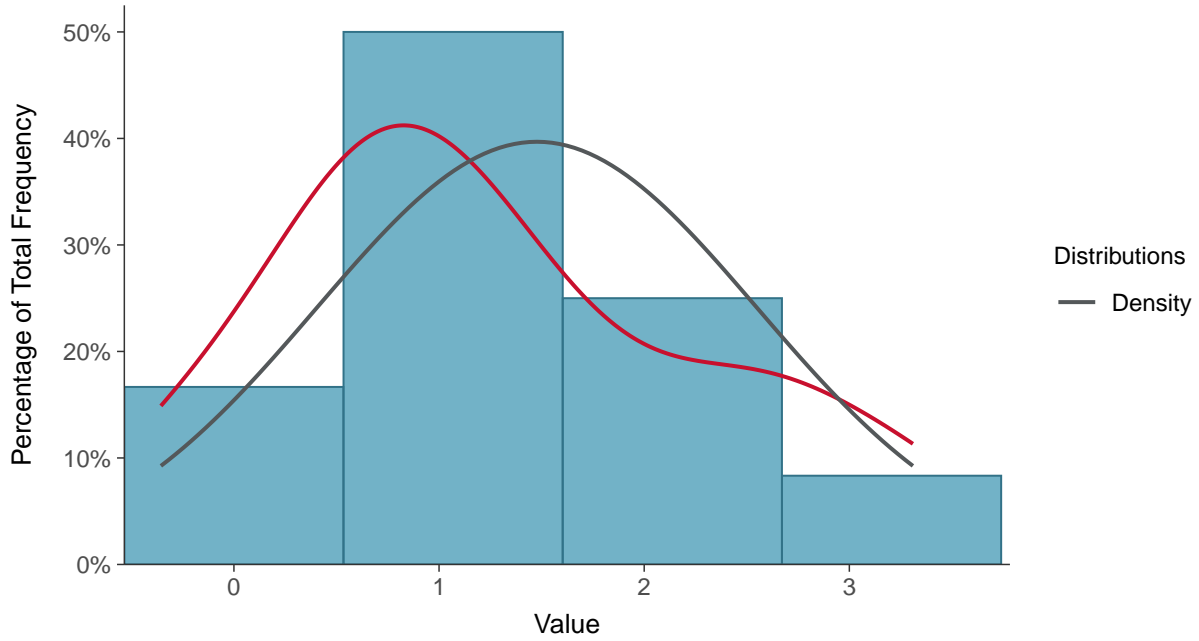
Radium-228, MW-11B & MW_12B (pCi/L)





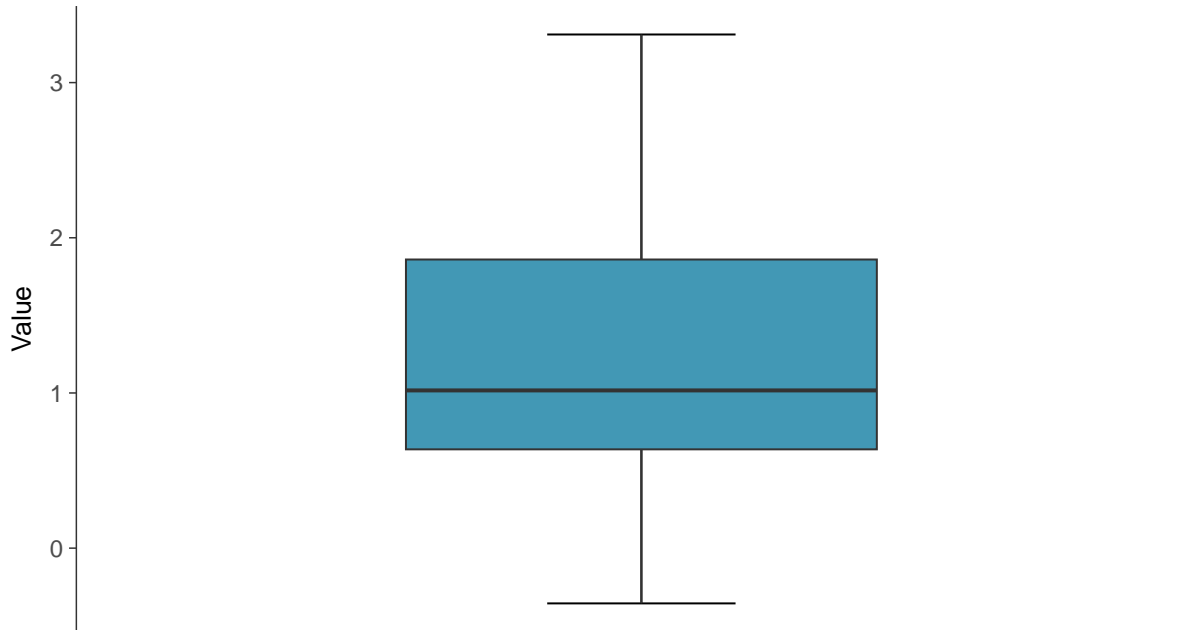
Histogram

Radium-228, MW-11B & MW_12B (pCi/L)



Boxplot

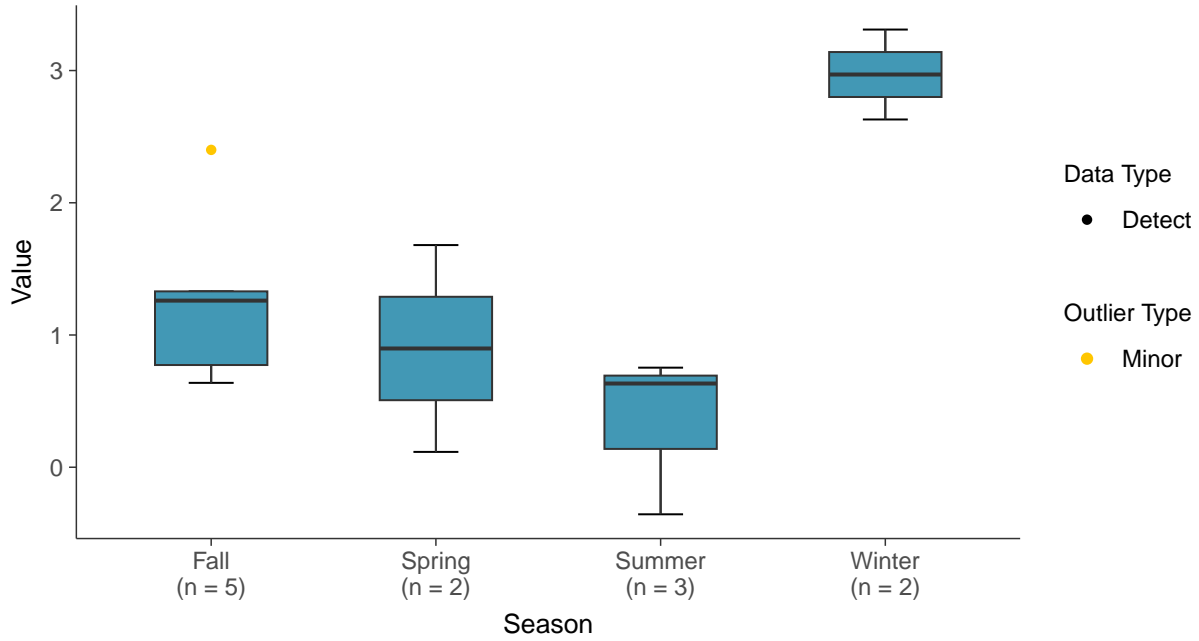
Radium-228, MW-11B & MW_12B (pCi/L)





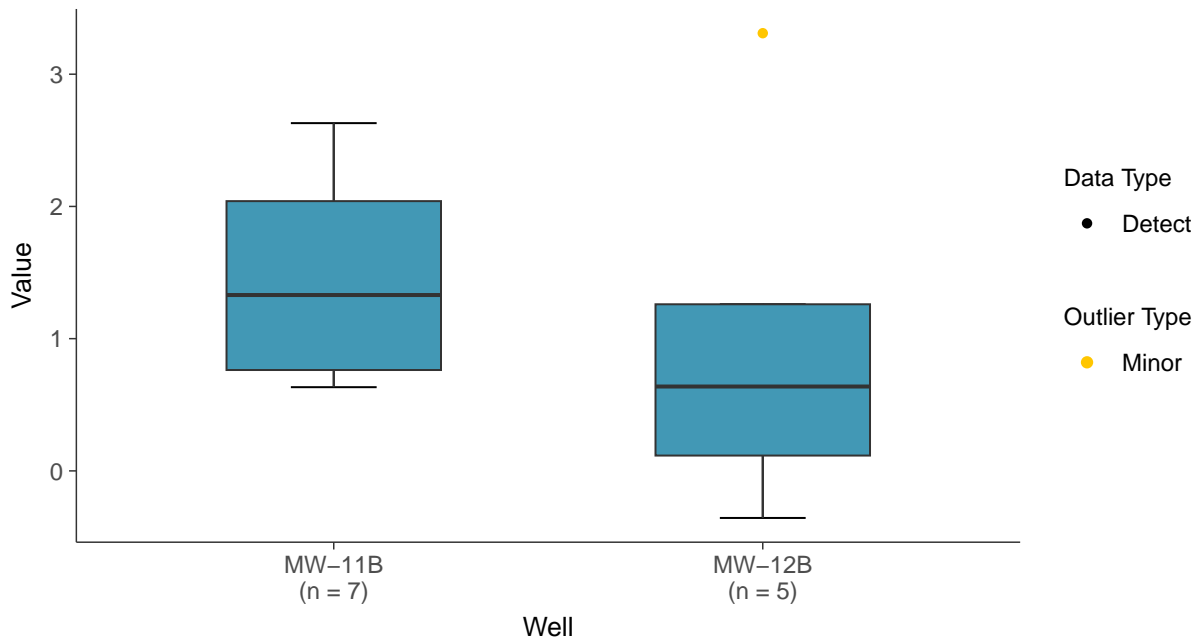
Boxplot by Season

Radium-228, MW-11B & MW_12B (pCi/L)



Boxplot by Well

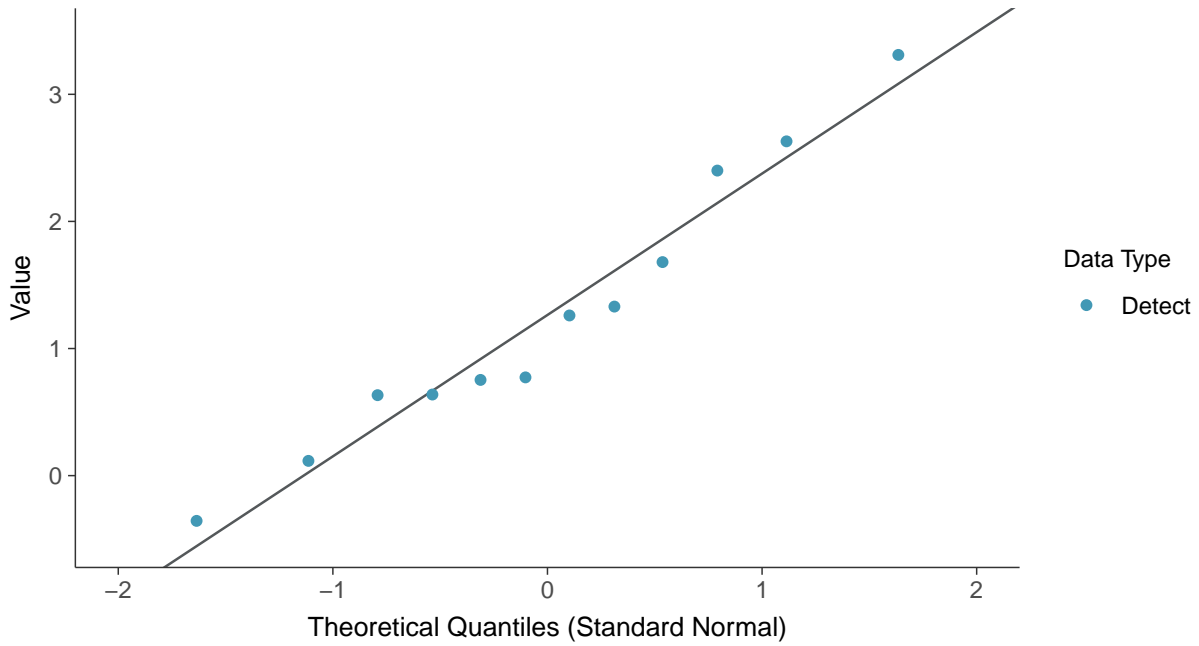
Radium-228, MW-11B & MW_12B (pCi/L)





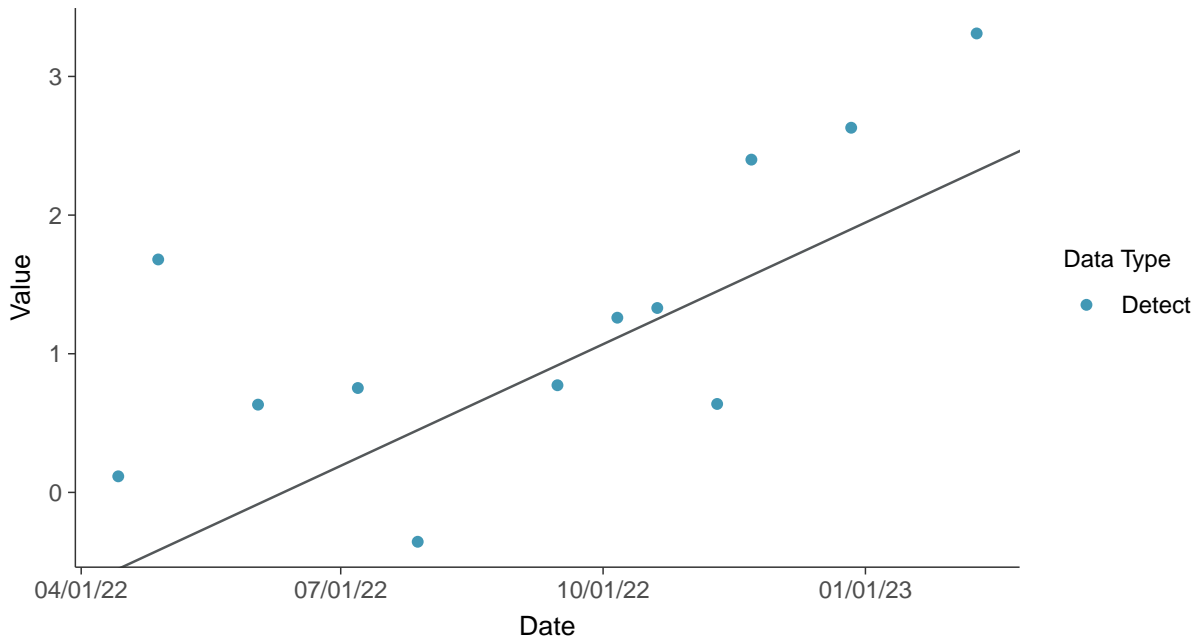
Normal Q-Q plot

Radium-228, MW-11B & MW_12B (pCi/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

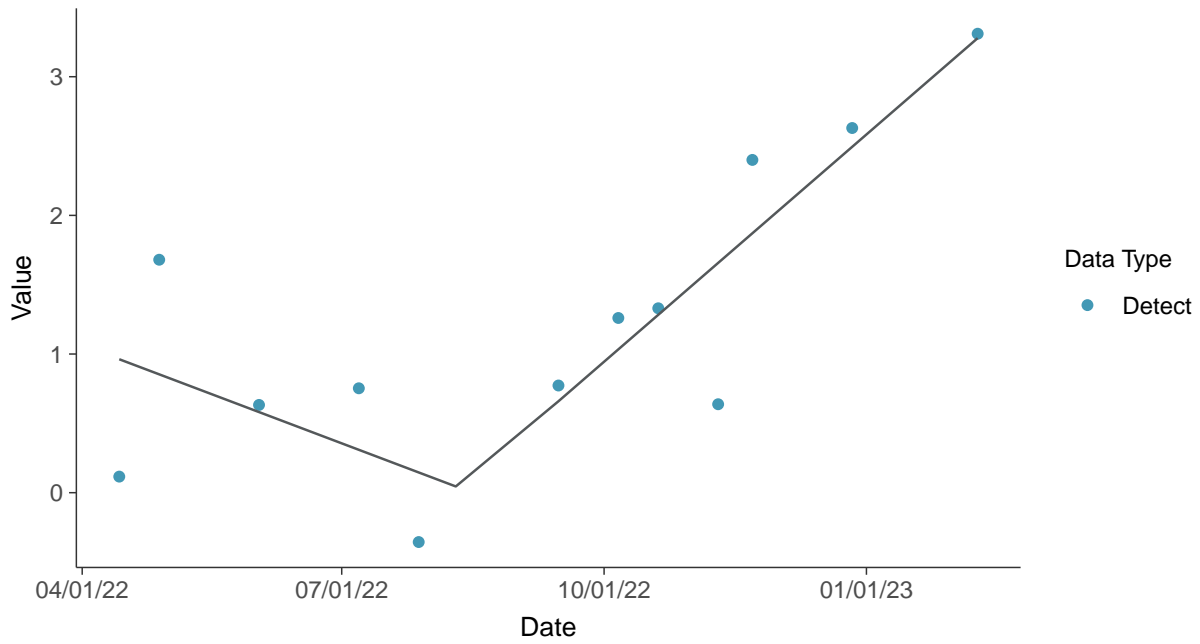
Radium-228, MW-11B & MW_12B (pCi/L)





Trend Regression: Piecewise Linear-Linear

Radium-228, MW-11B & MW_12B (pCi/L)



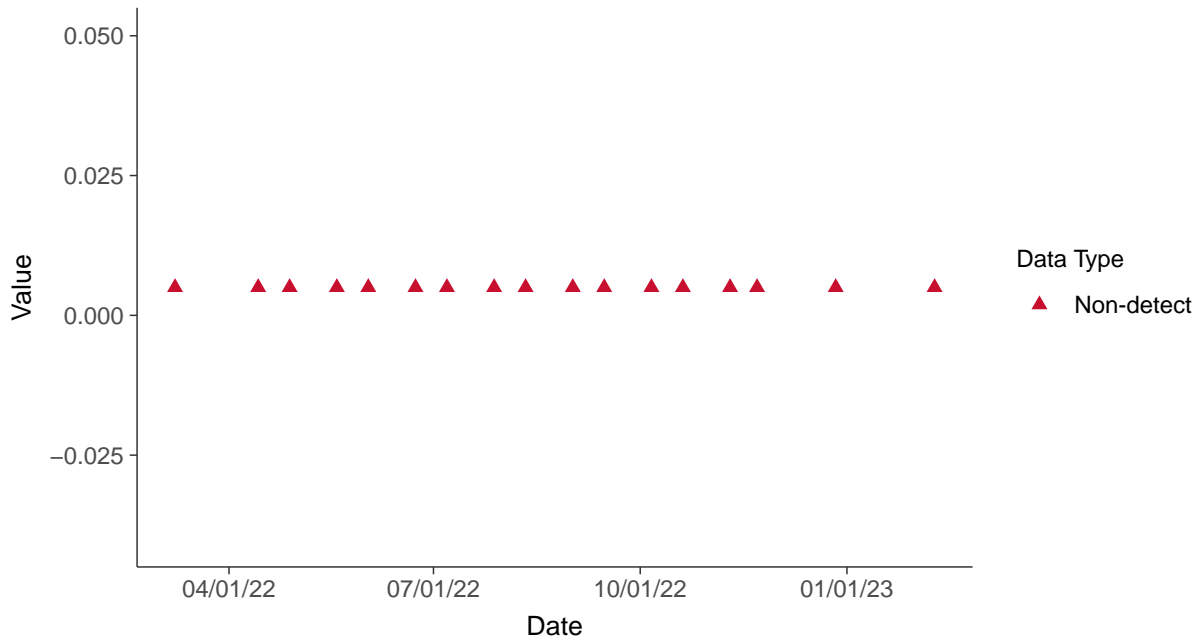


Appendix IV: Selenium, MW-11B & MW_12B

ID: 2_22

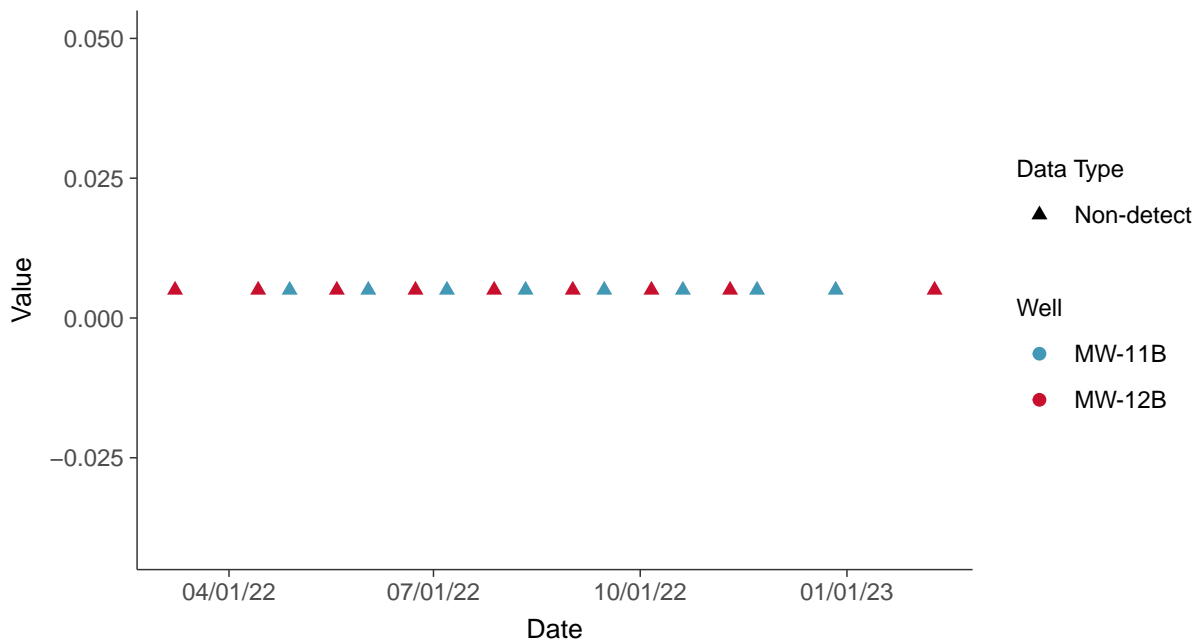
Scatter Plot

Selenium, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

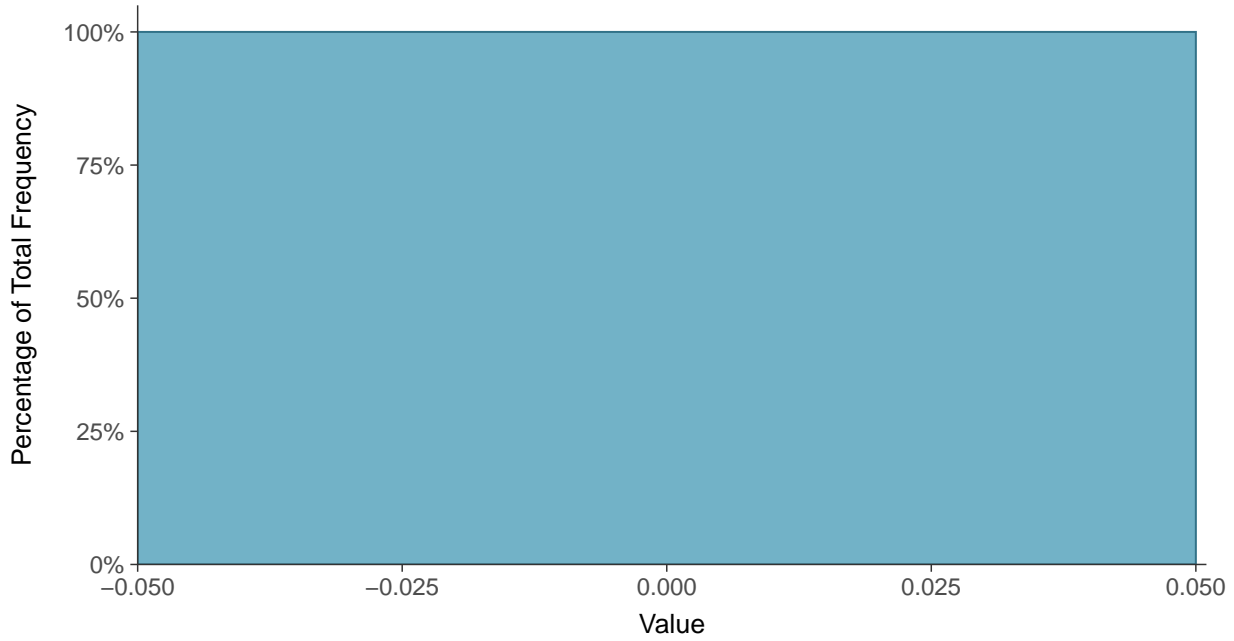
Selenium, MW-11B & MW_12B (mg/L)





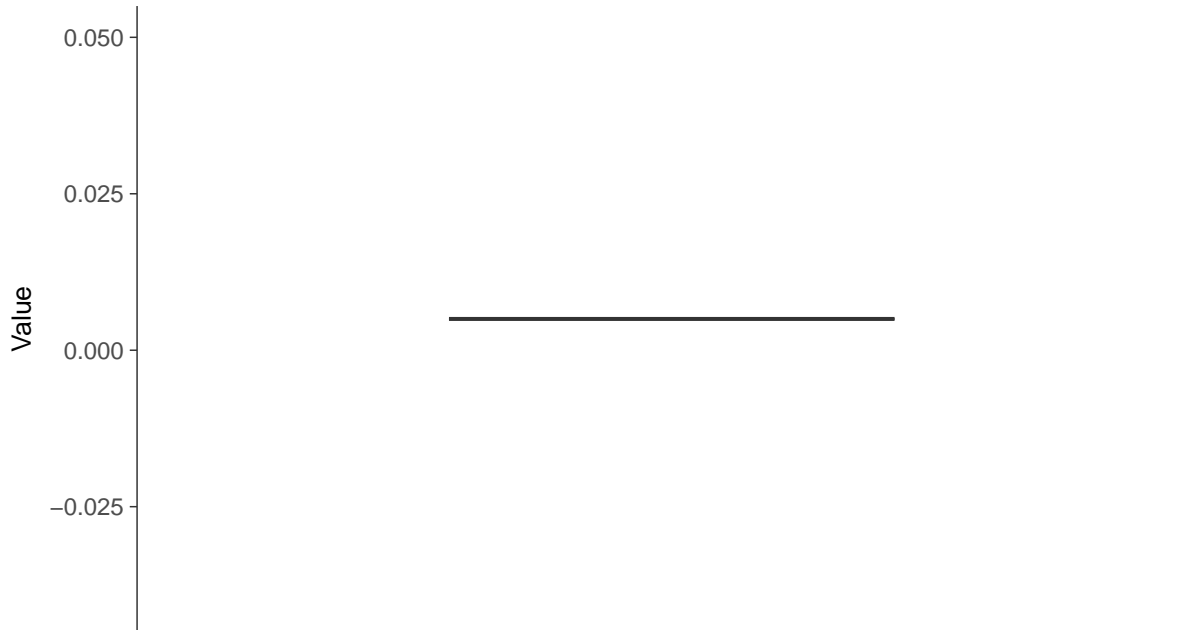
Histogram

Selenium, MW-11B & MW_12B (mg/L)



Boxplot

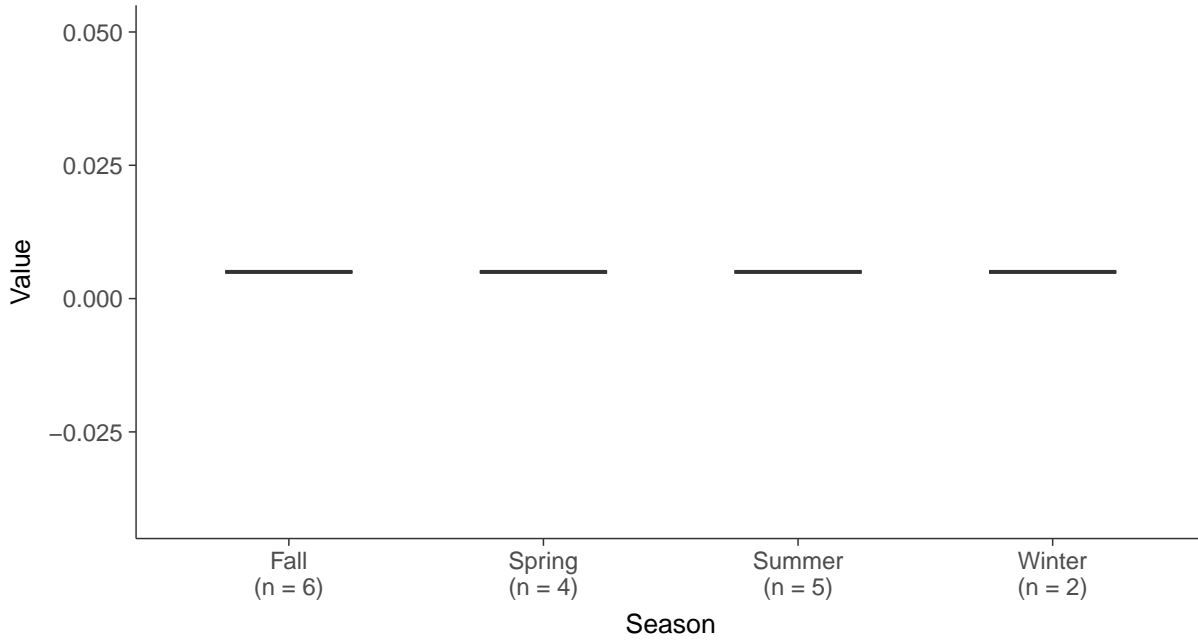
Selenium, MW-11B & MW_12B (mg/L)





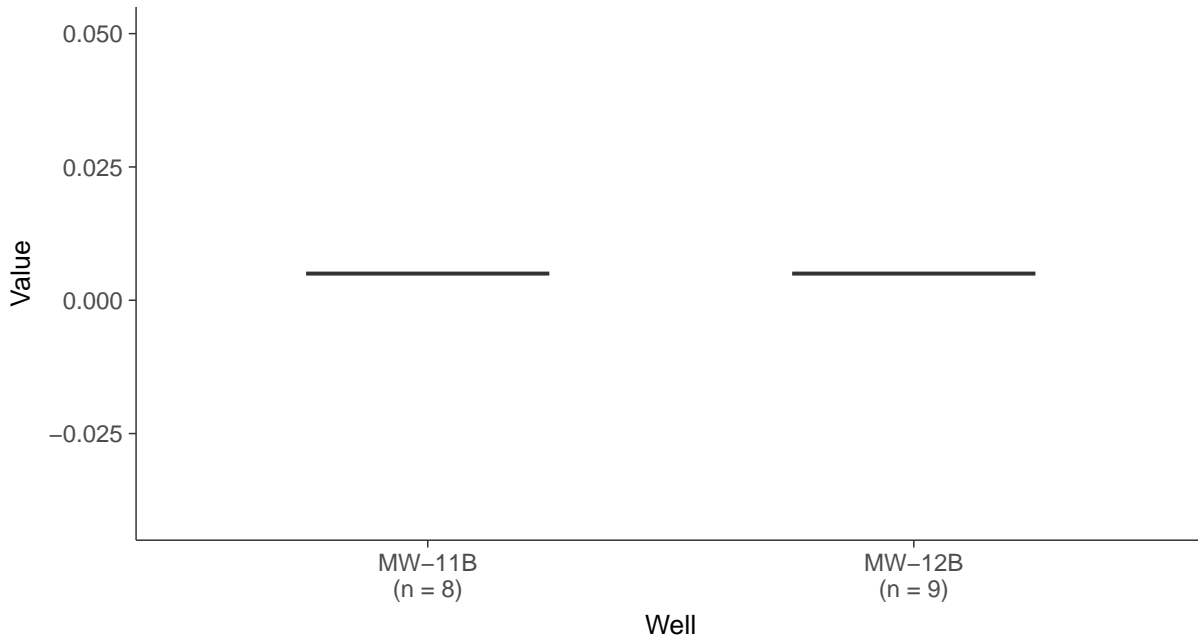
Boxplot by Season

Selenium, MW-11B & MW_12B (mg/L)



Boxplot by Well

Selenium, MW-11B & MW_12B (mg/L)



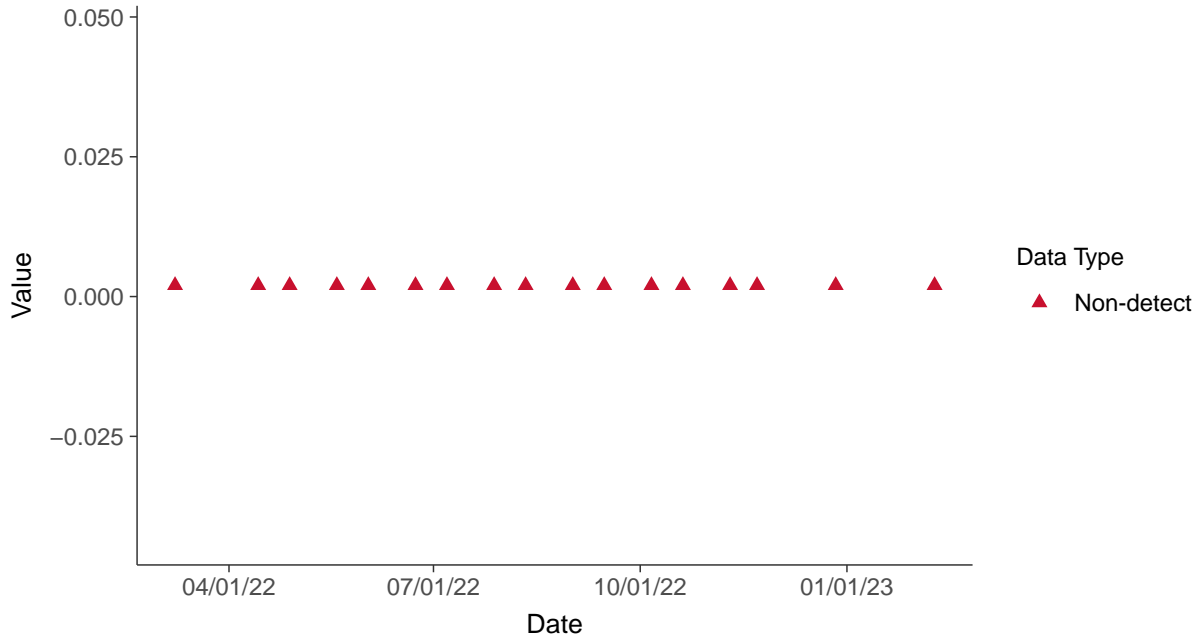


Appendix IV: Thallium, MW-11B & MW_12B

ID: 2_23

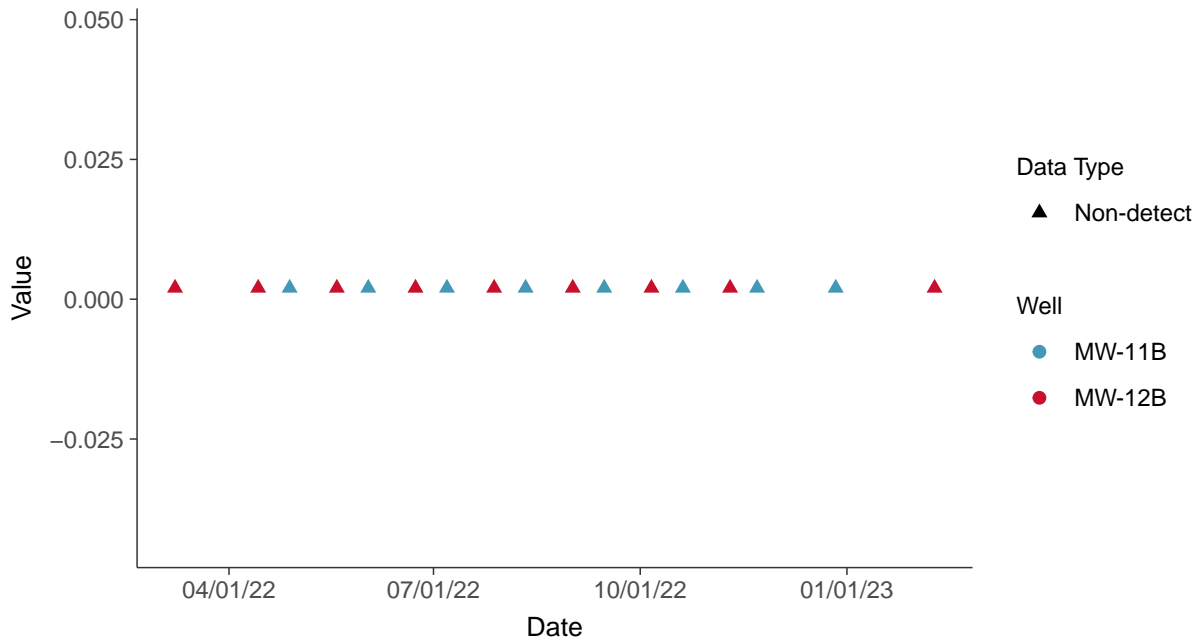
Scatter Plot

Thallium, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

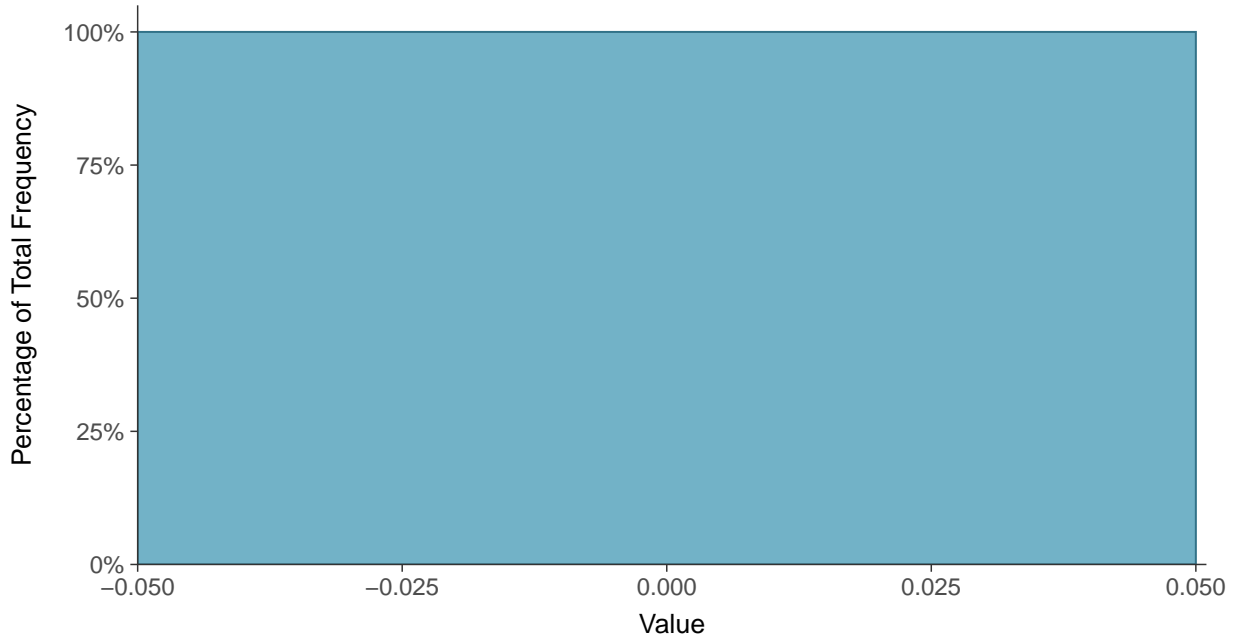
Thallium, MW-11B & MW_12B (mg/L)





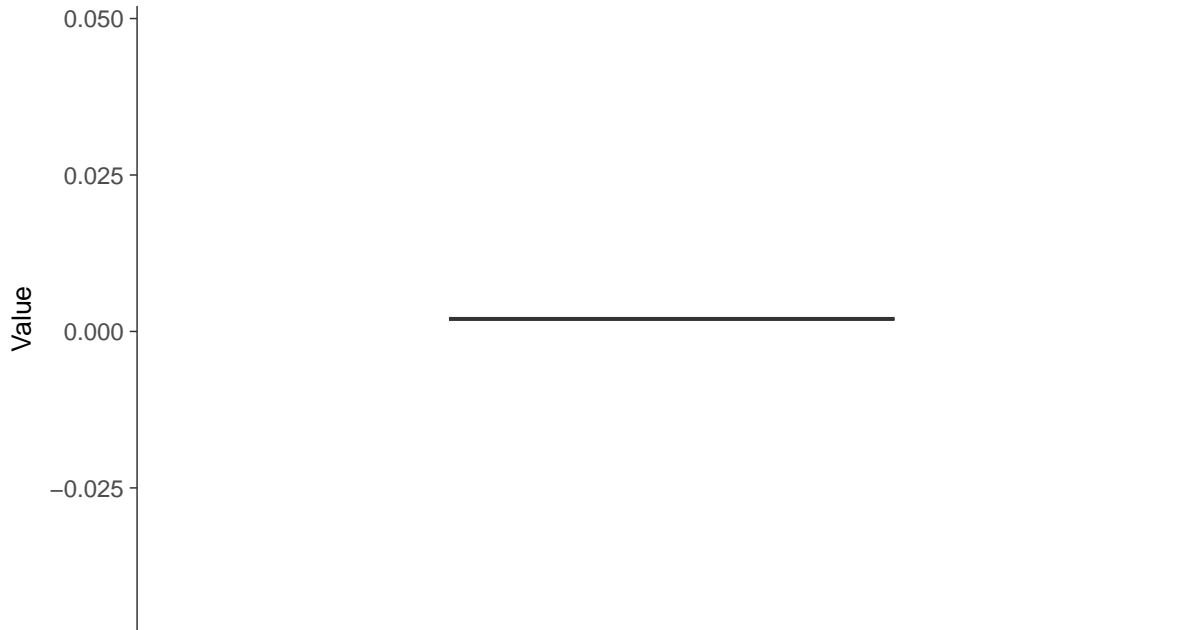
Histogram

Thallium, MW-11B & MW_12B (mg/L)



Boxplot

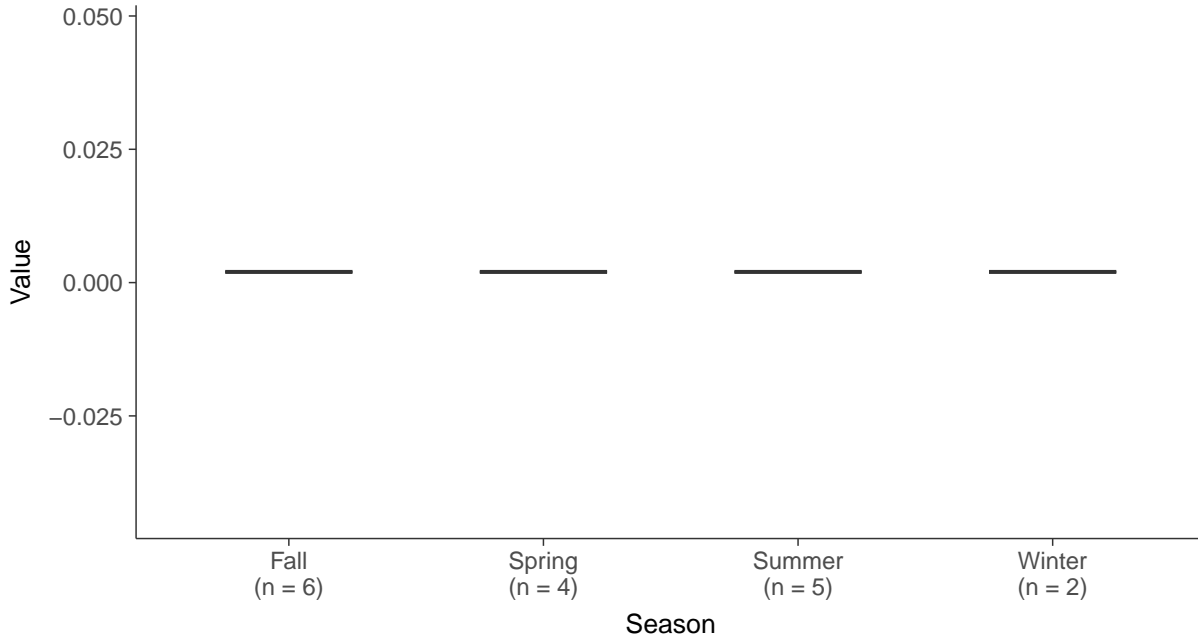
Thallium, MW-11B & MW_12B (mg/L)





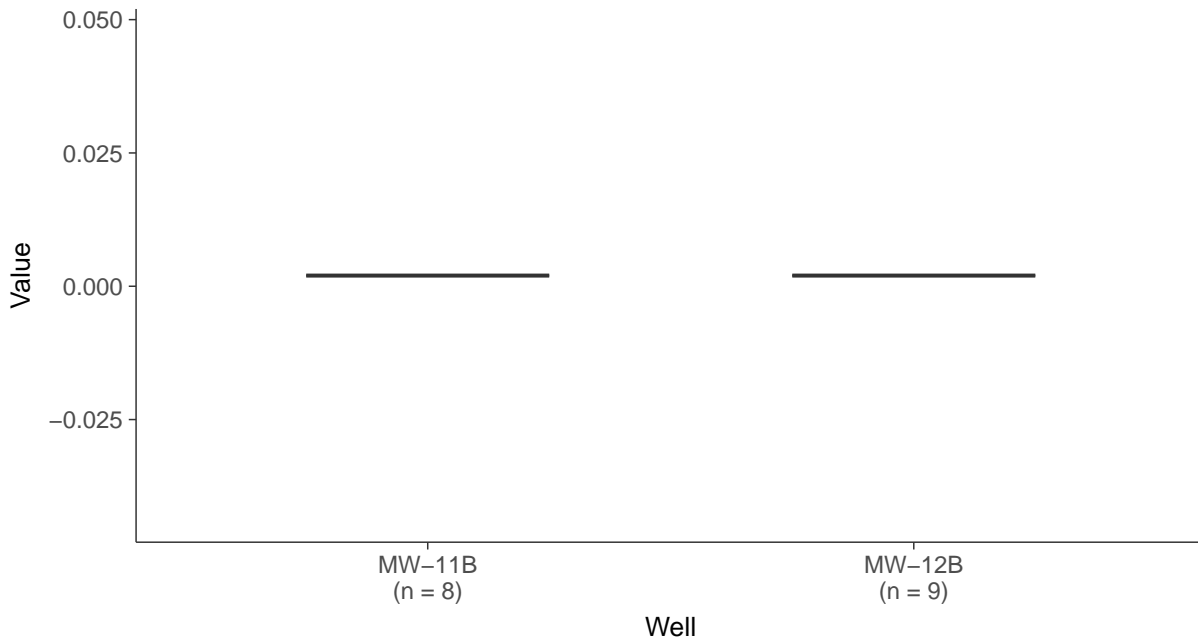
Boxplot by Season

Thallium, MW-11B & MW_12B (mg/L)



Boxplot by Well

Thallium, MW-11B & MW_12B (mg/L)



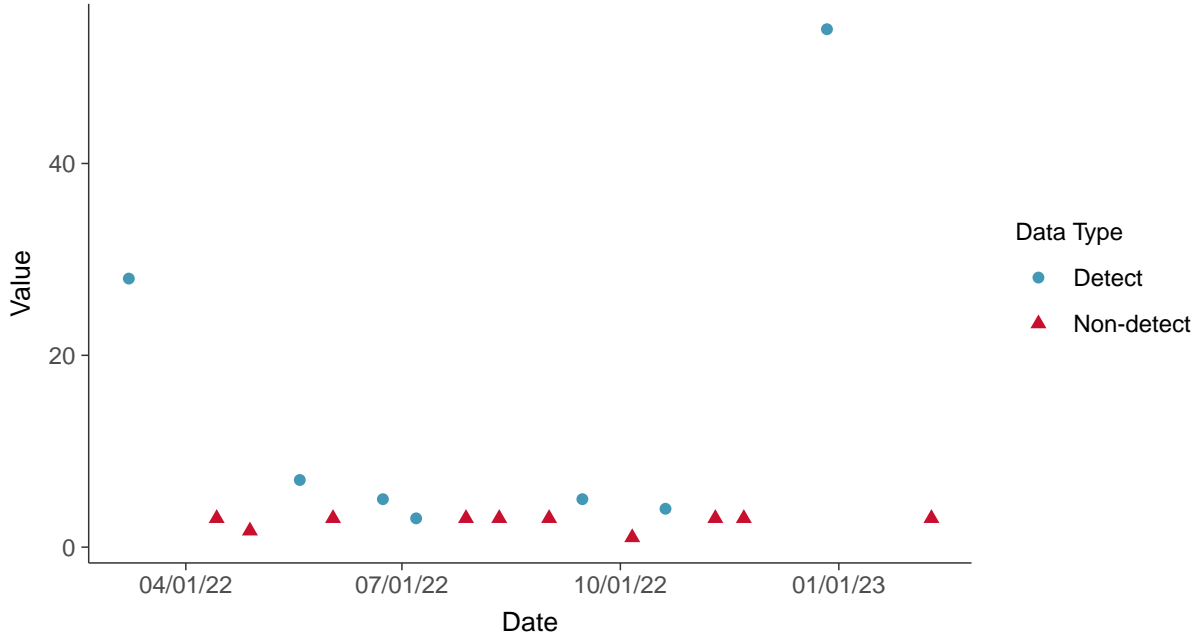


Appendix IV: Total Suspended Solids, MW-11B & MW_12B

ID: 2_24

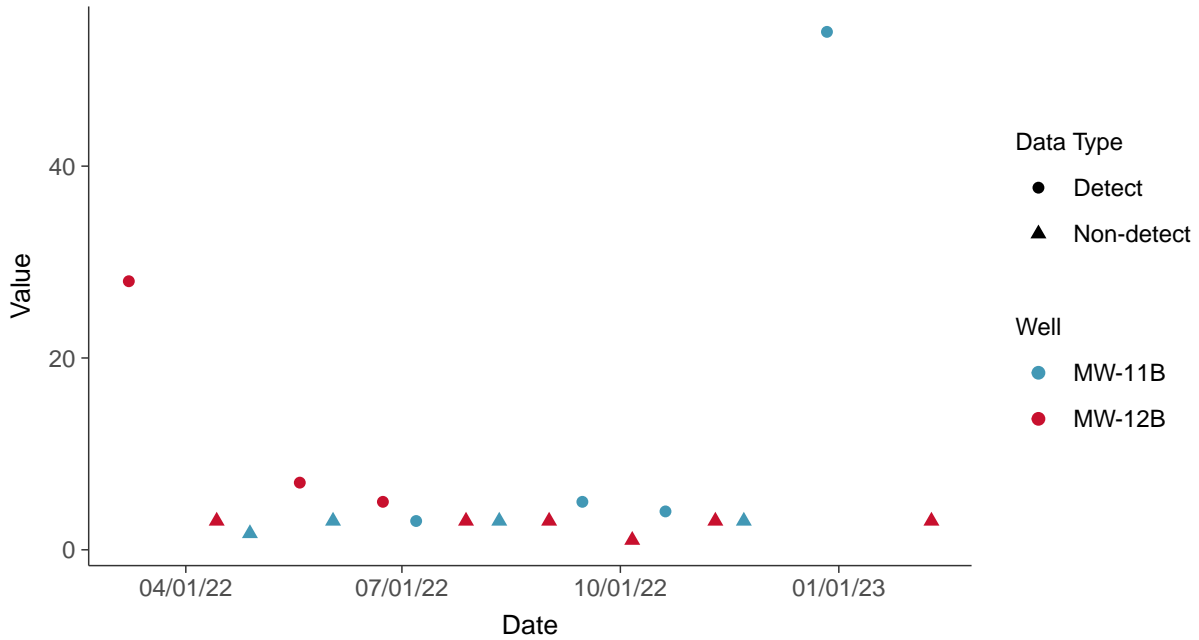
Scatter Plot

Total Suspended Solids, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

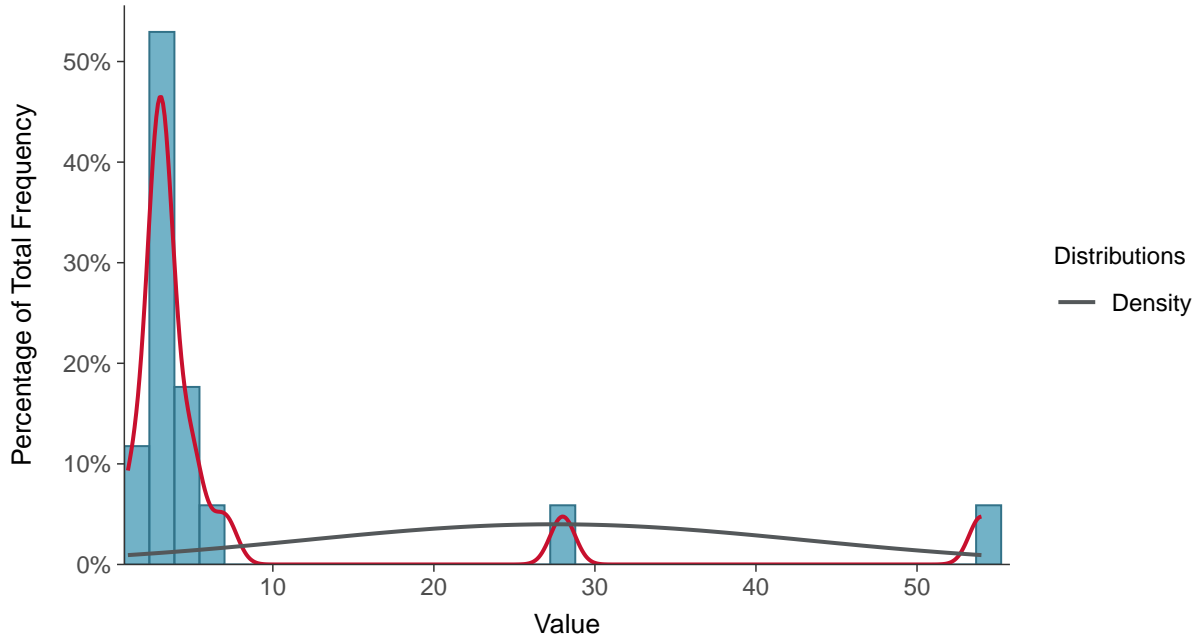
Total Suspended Solids, MW-11B & MW_12B (mg/L)





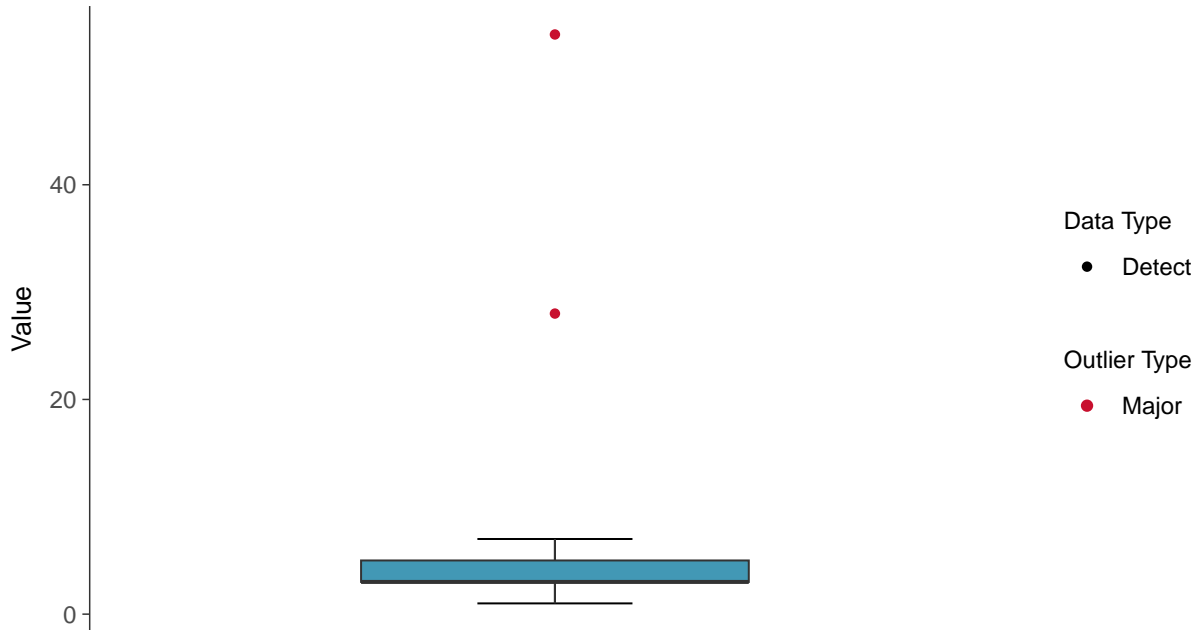
Histogram

Total Suspended Solids, MW-11B & MW_12B (mg/L)



Boxplot

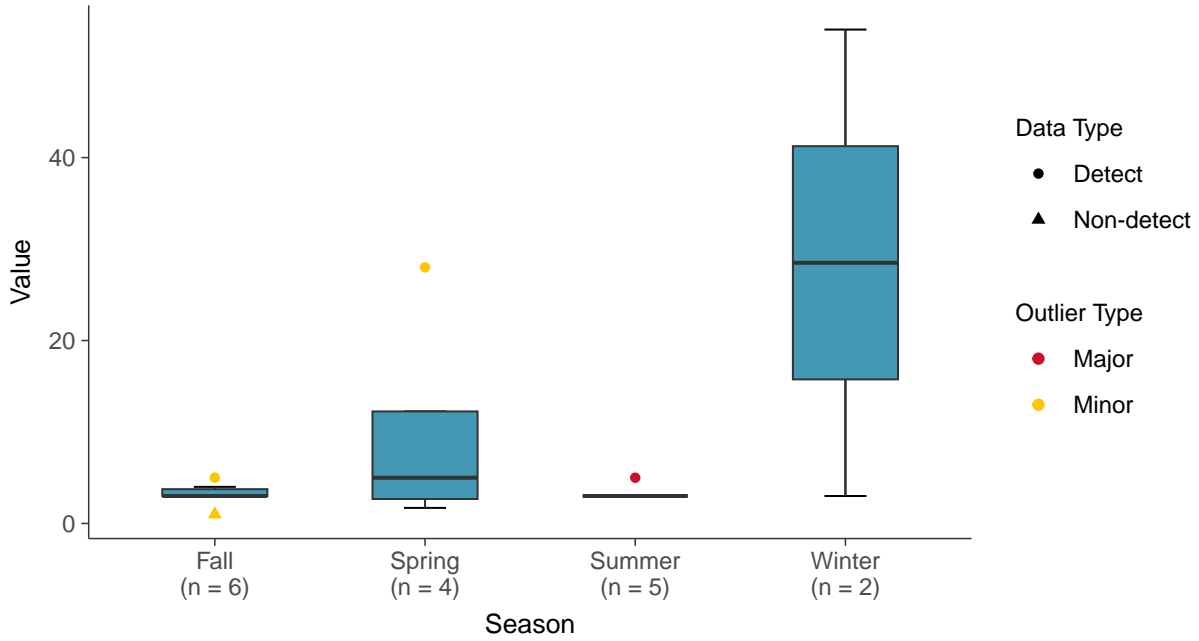
Total Suspended Solids, MW-11B & MW_12B (mg/L)





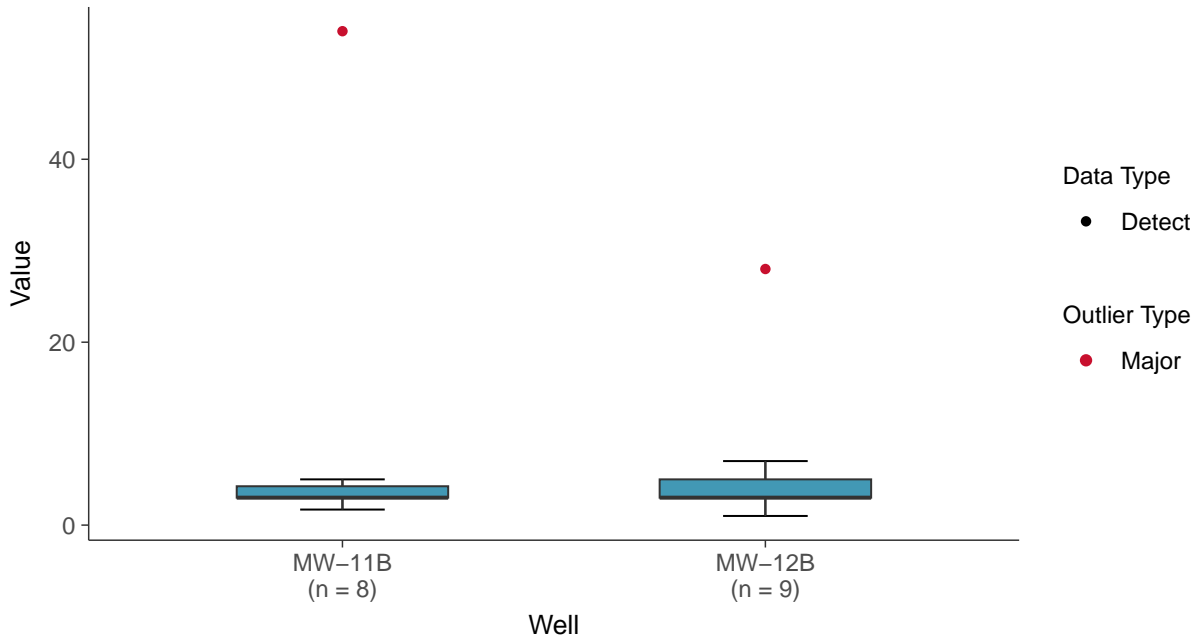
Boxplot by Season

Total Suspended Solids, MW-11B & MW_12B (mg/L)



Boxplot by Well

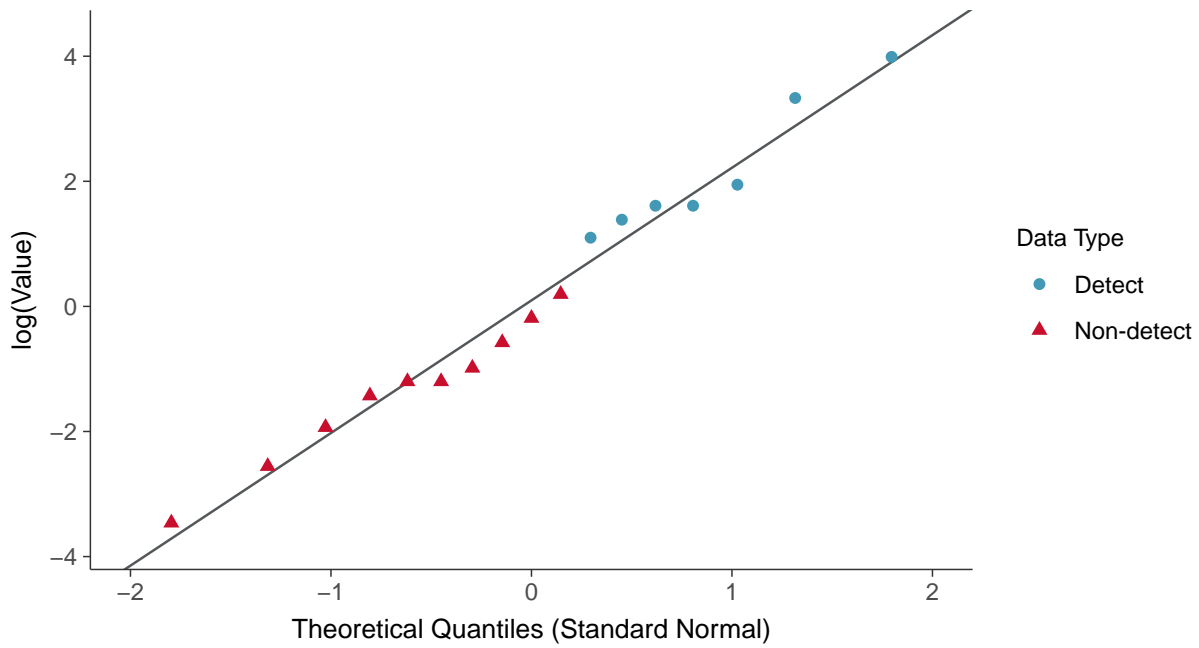
Total Suspended Solids, MW-11B & MW_12B (mg/L)





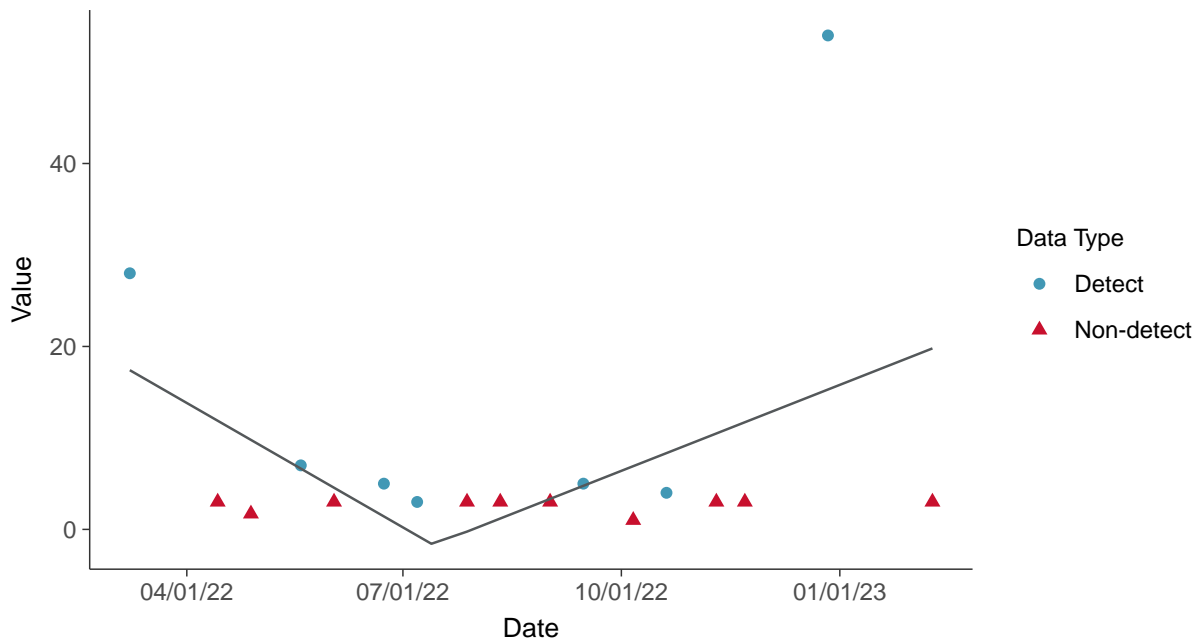
Lognormal Q-Q plot using ROS Imputed Estimates

Total Suspended Solids, MW-11B & MW_12B (mg/L)



Trend Regression: Piecewise Linear-Linear

Total Suspended Solids, MW-11B & MW_12B (mg/L)



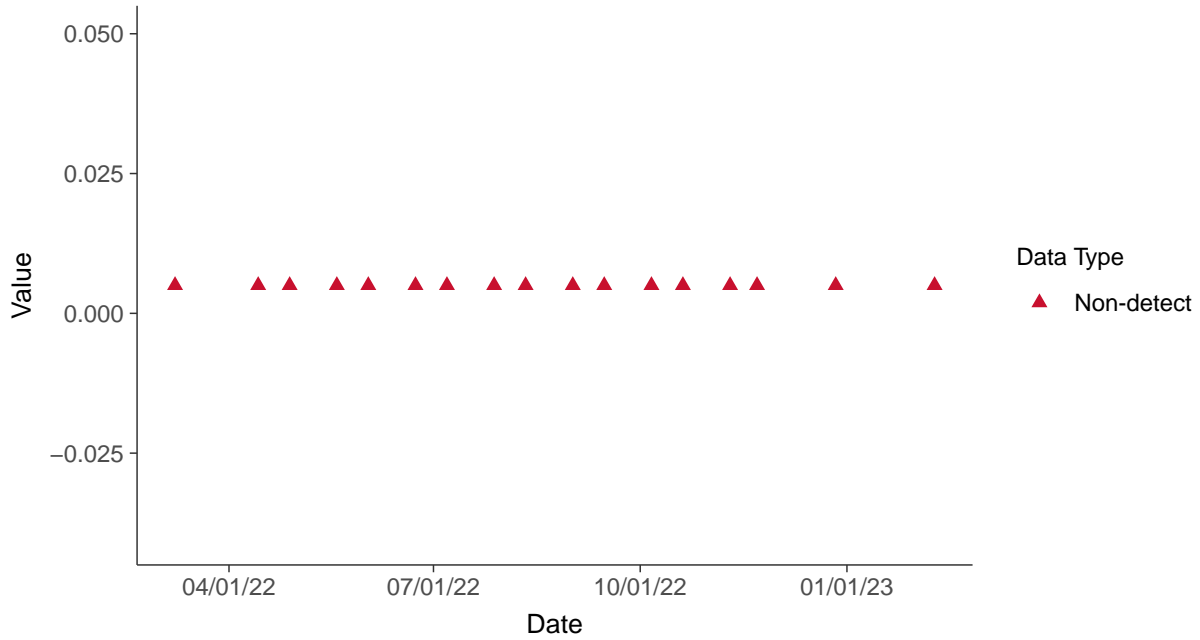


Part 115: Copper, MW-11B & MW_12B

ID: 5_37

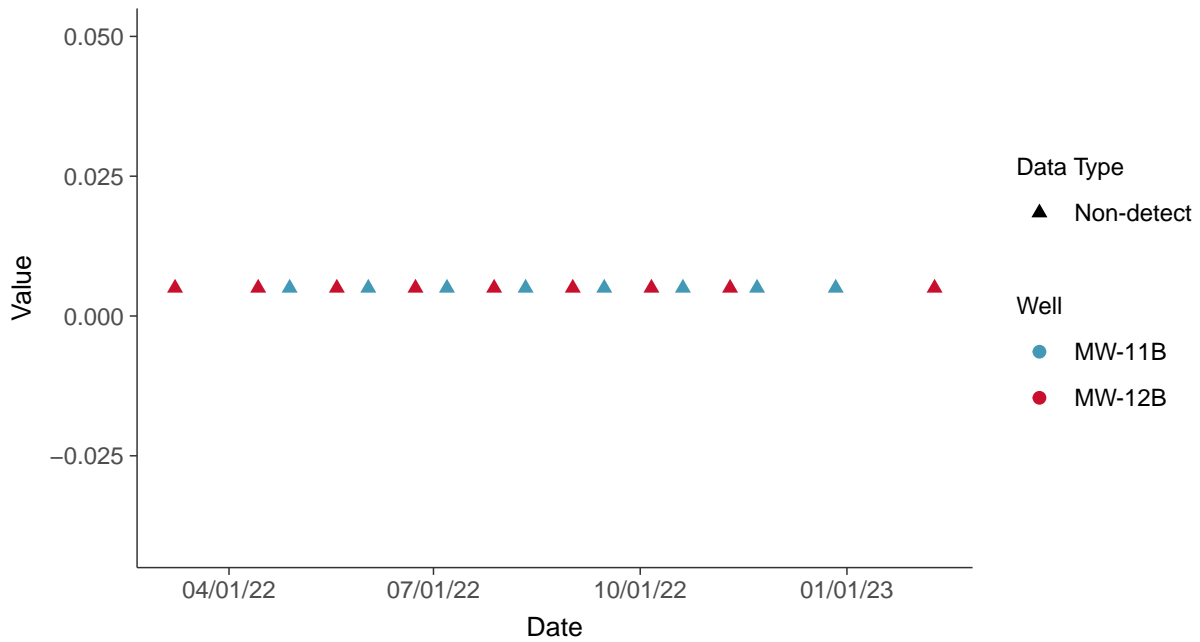
Scatter Plot

Copper, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

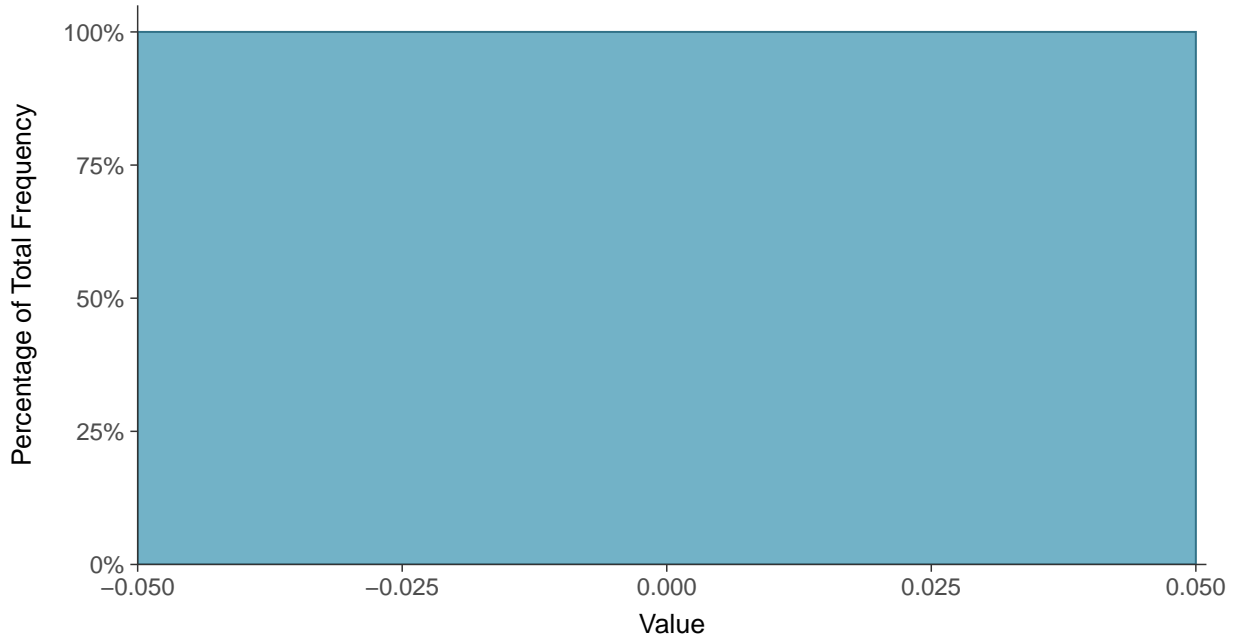
Copper, MW-11B & MW_12B (mg/L)





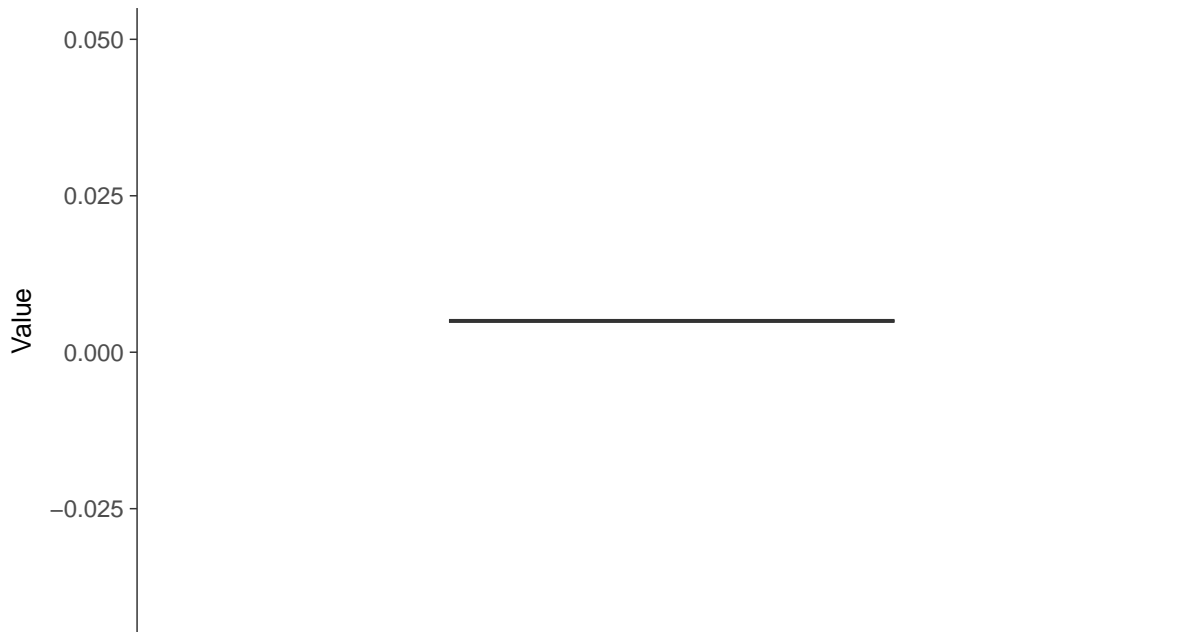
Histogram

Copper, MW-11B & MW_12B (mg/L)



Boxplot

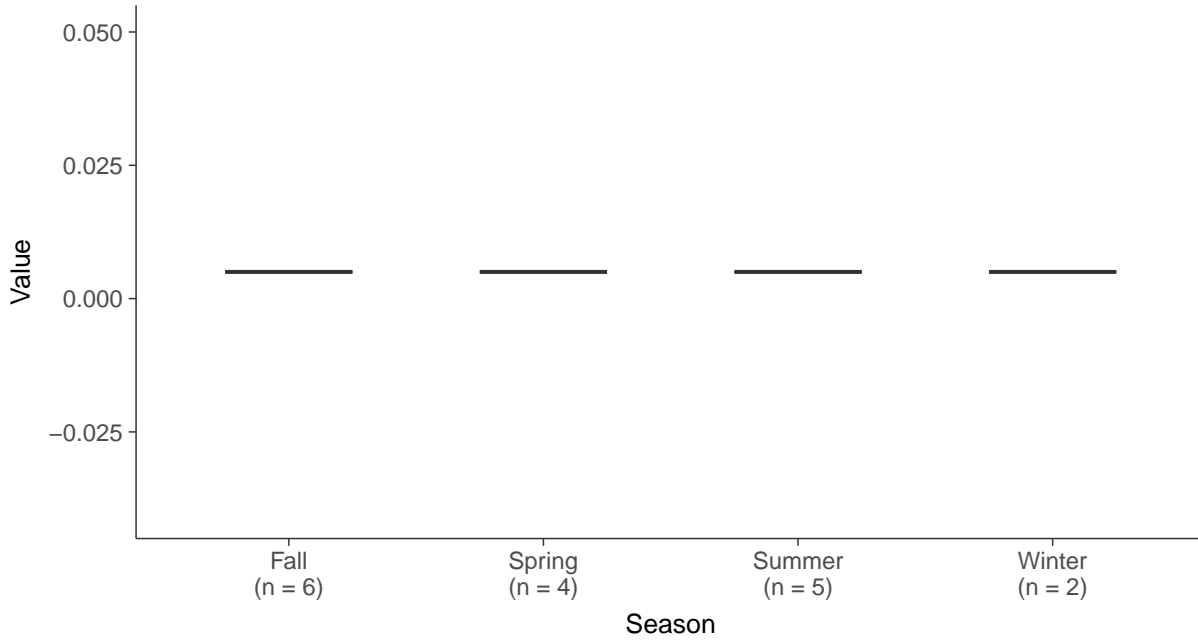
Copper, MW-11B & MW_12B (mg/L)





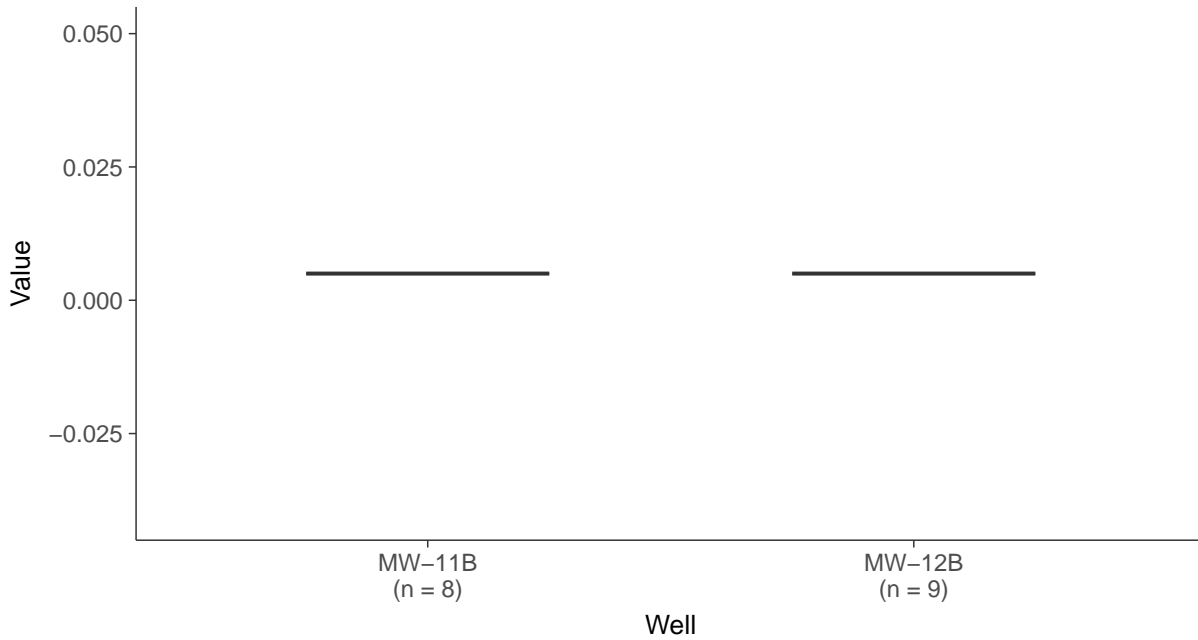
Boxplot by Season

Copper, MW-11B & MW_12B (mg/L)



Boxplot by Well

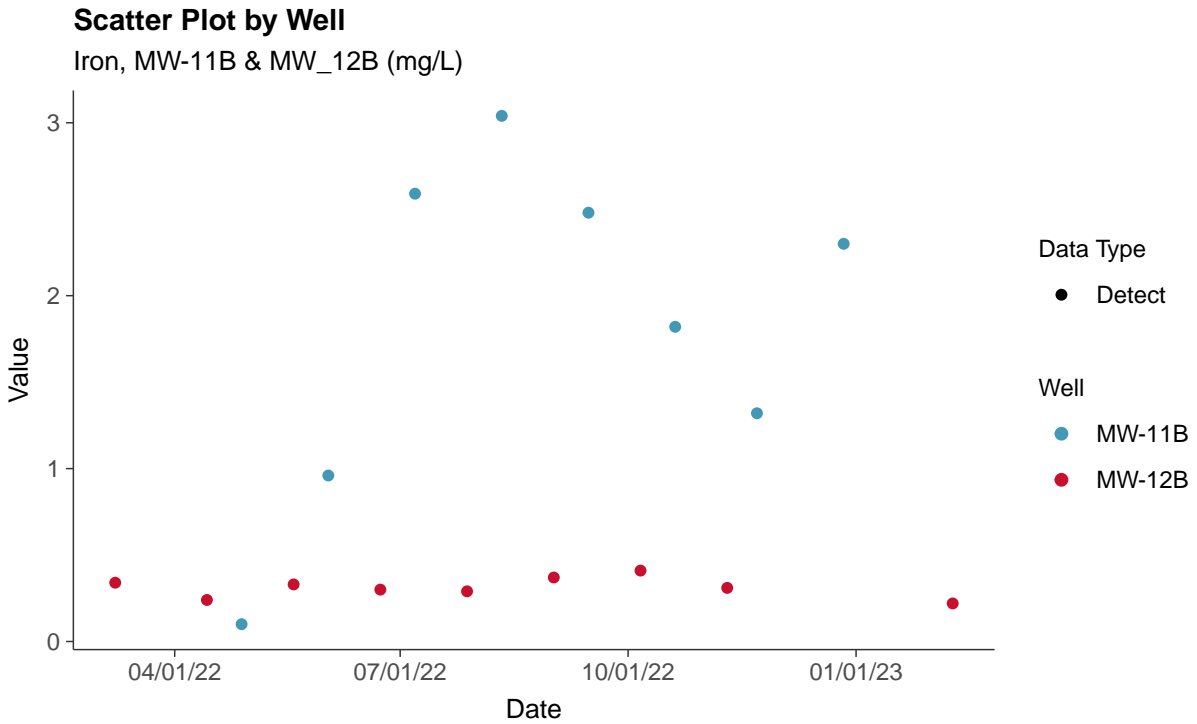
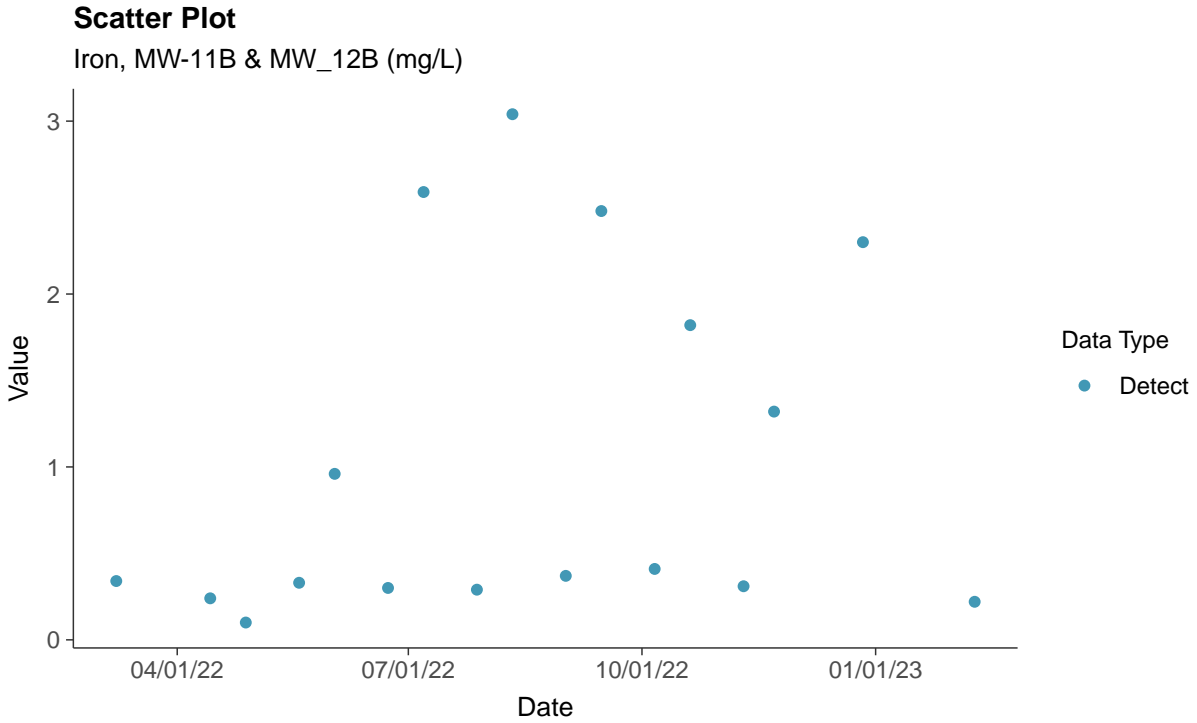
Copper, MW-11B & MW_12B (mg/L)





Part 115: Iron, MW-11B & MW_12B

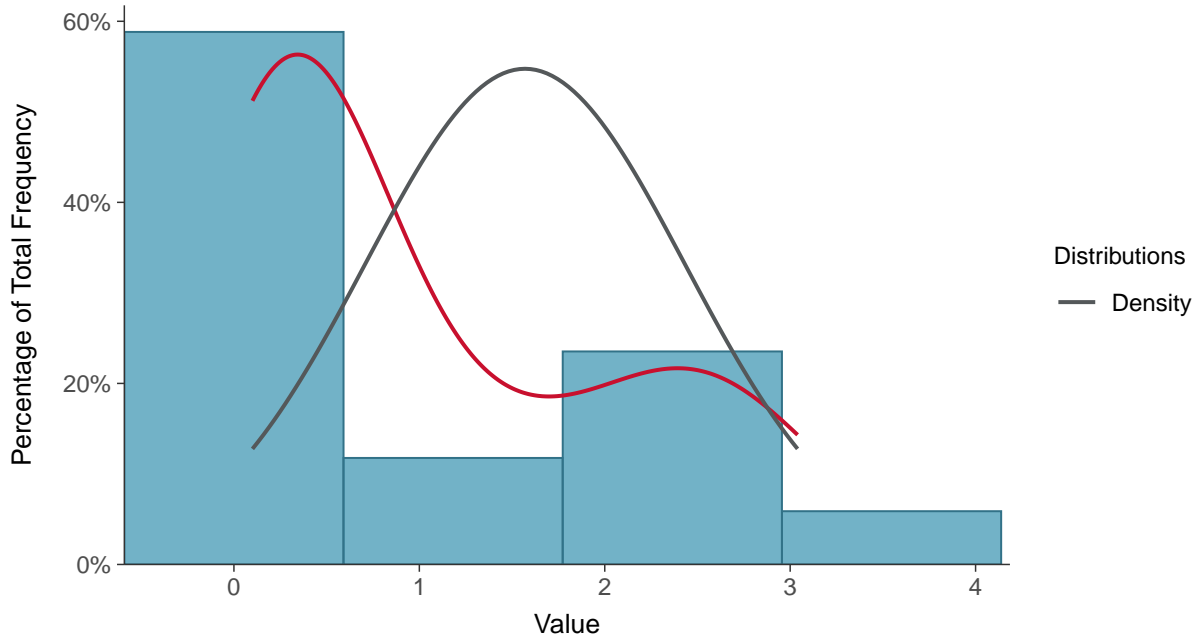
ID: 5_38





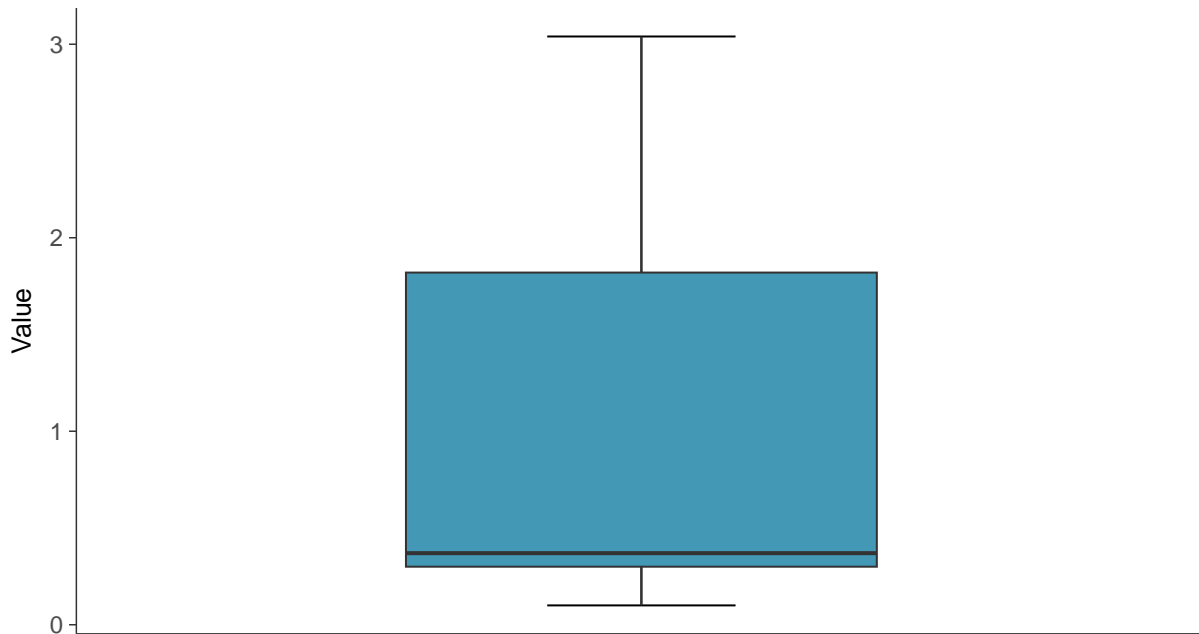
Histogram

Iron, MW-11B & MW_12B (mg/L)



Boxplot

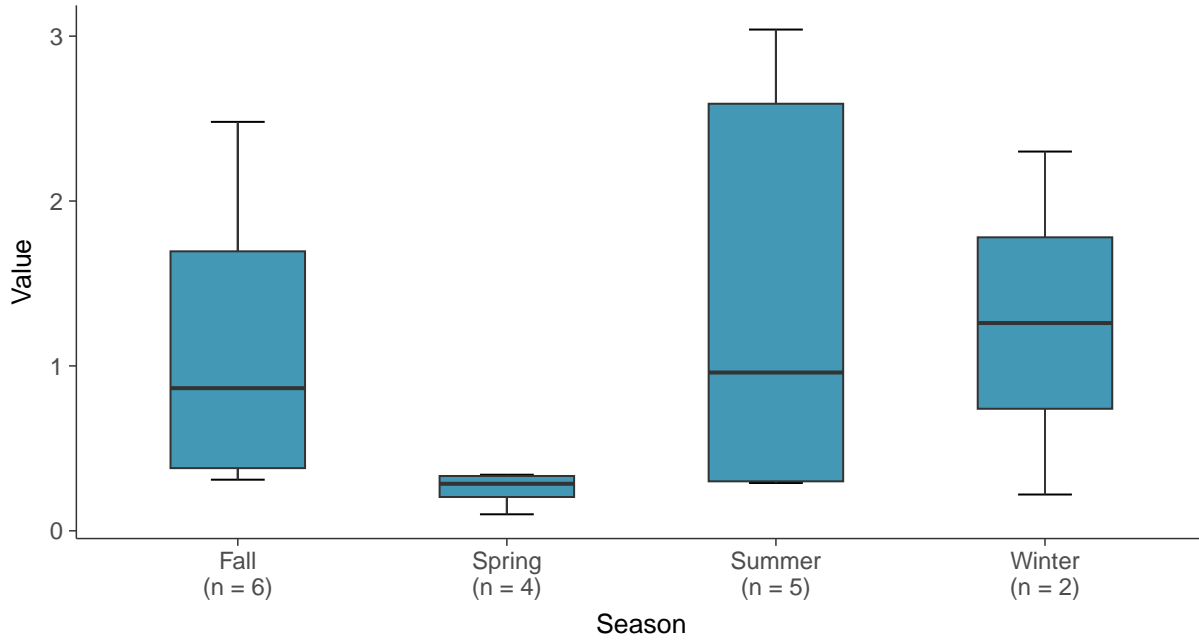
Iron, MW-11B & MW_12B (mg/L)





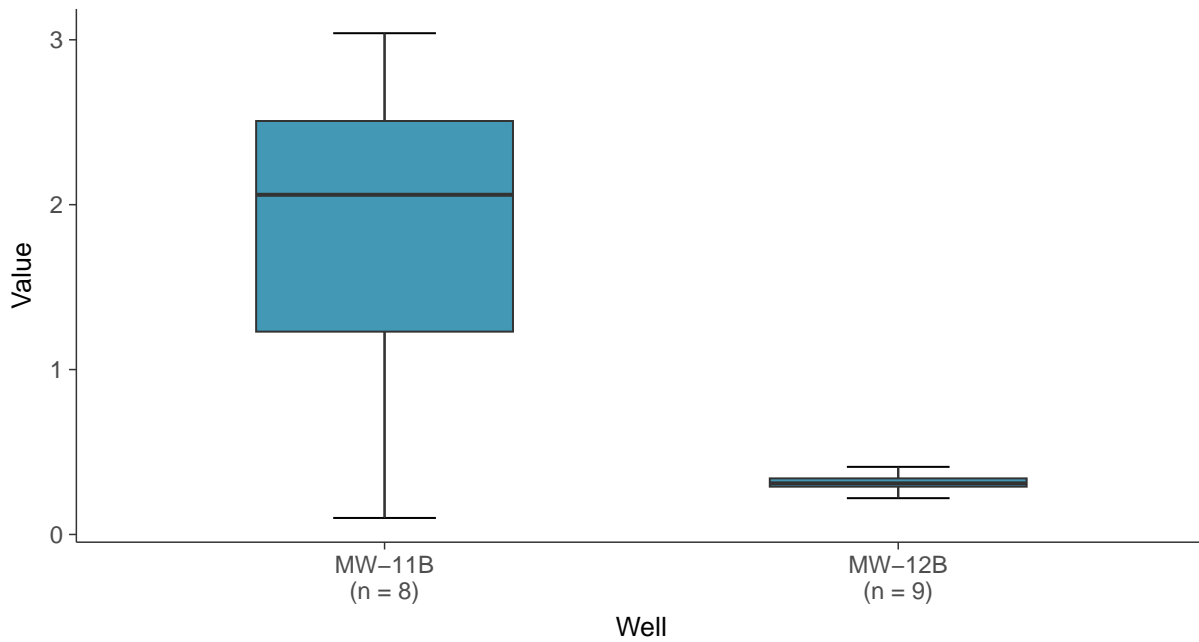
Boxplot by Season

Iron, MW-11B & MW_12B (mg/L)



Boxplot by Well

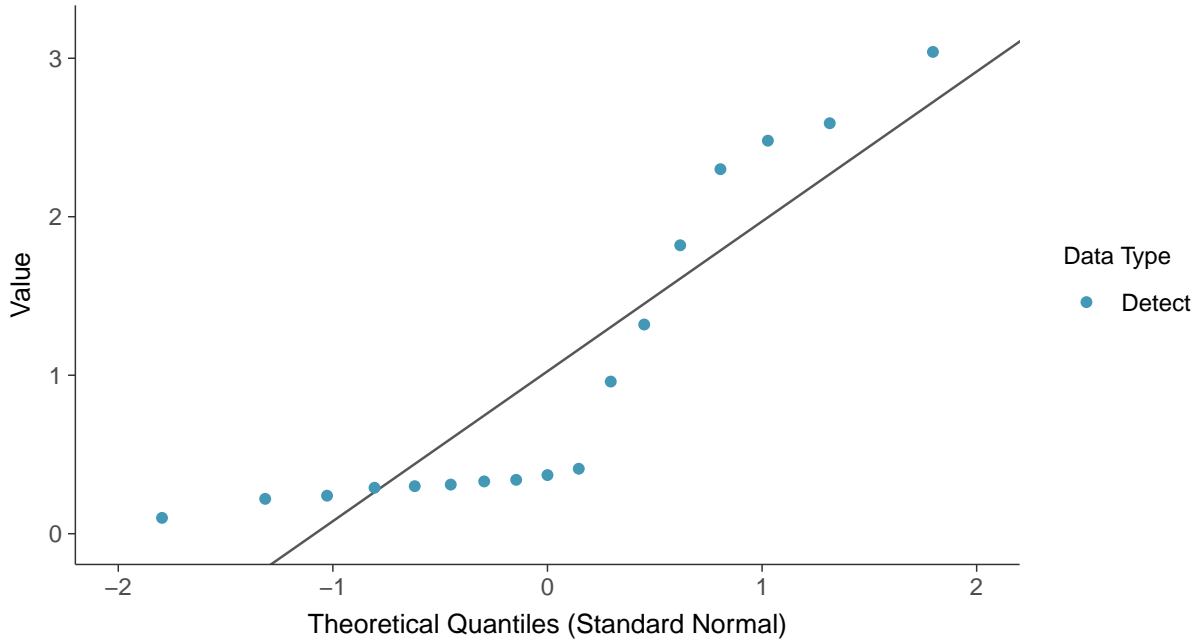
Iron, MW-11B & MW_12B (mg/L)





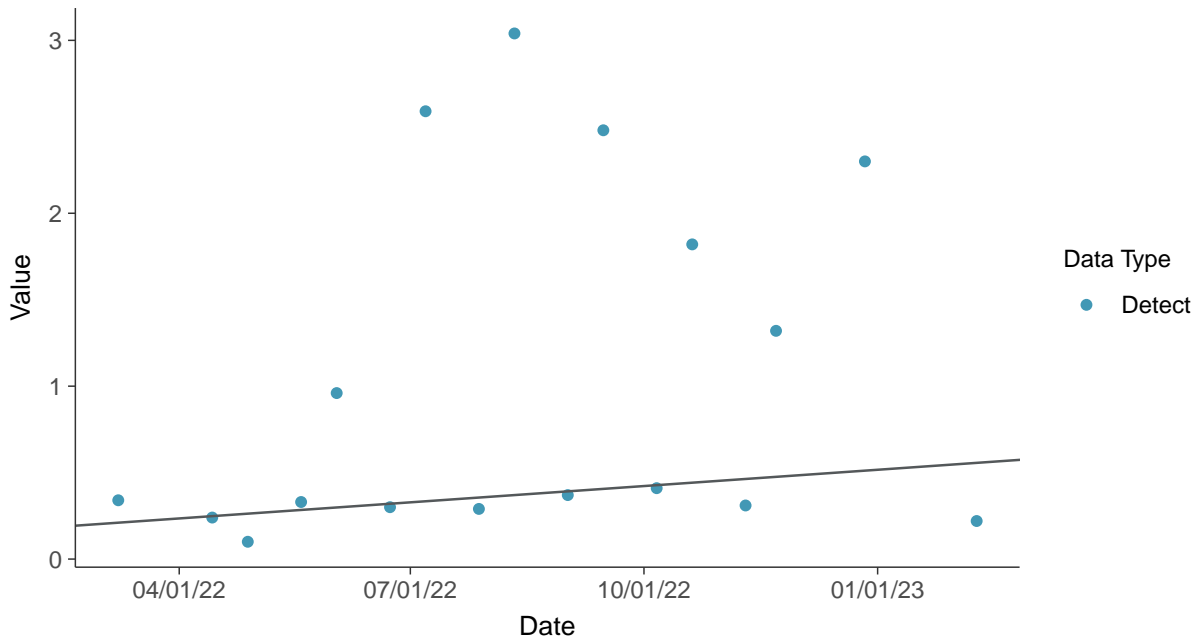
Normal Q-Q plot

Iron, MW-11B & MW_12B (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

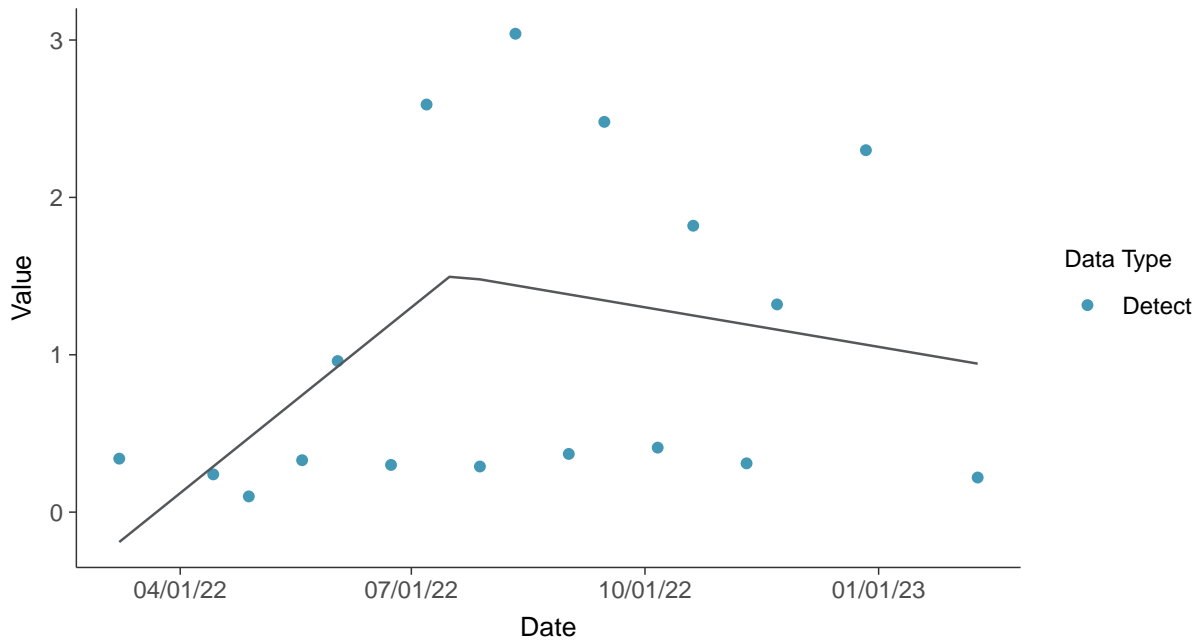
Iron, MW-11B & MW_12B (mg/L)





Trend Regression: Piecewise Linear-Linear

Iron, MW-11B & MW_12B (mg/L)



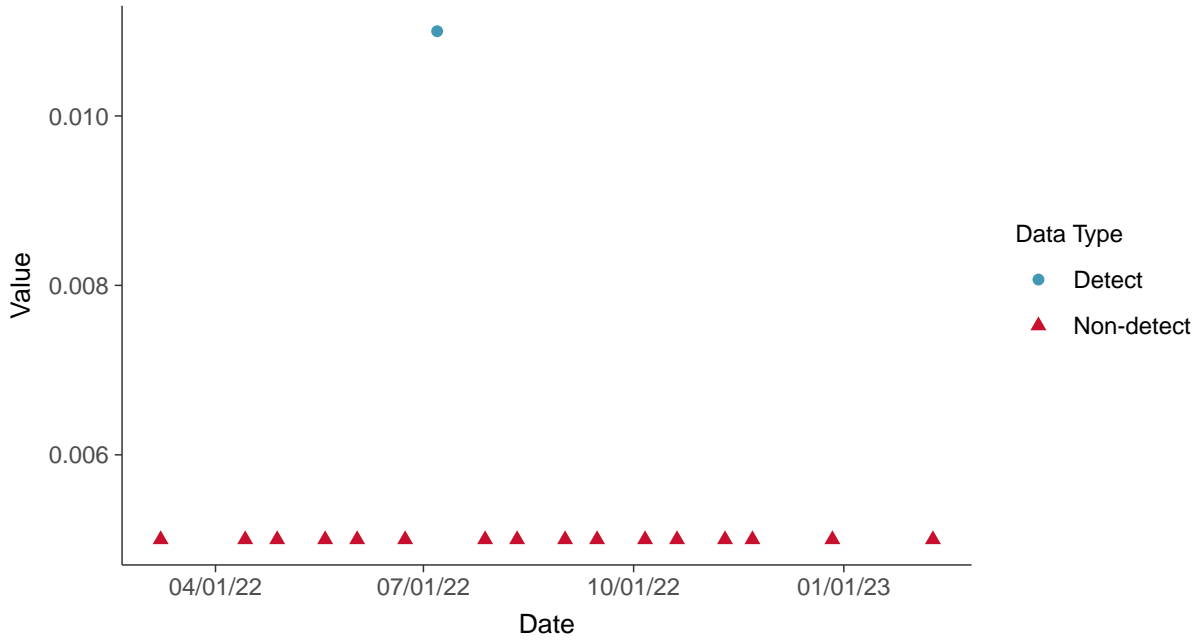


Part 115: Nickel, MW-11B & MW_12B

ID: 5_39

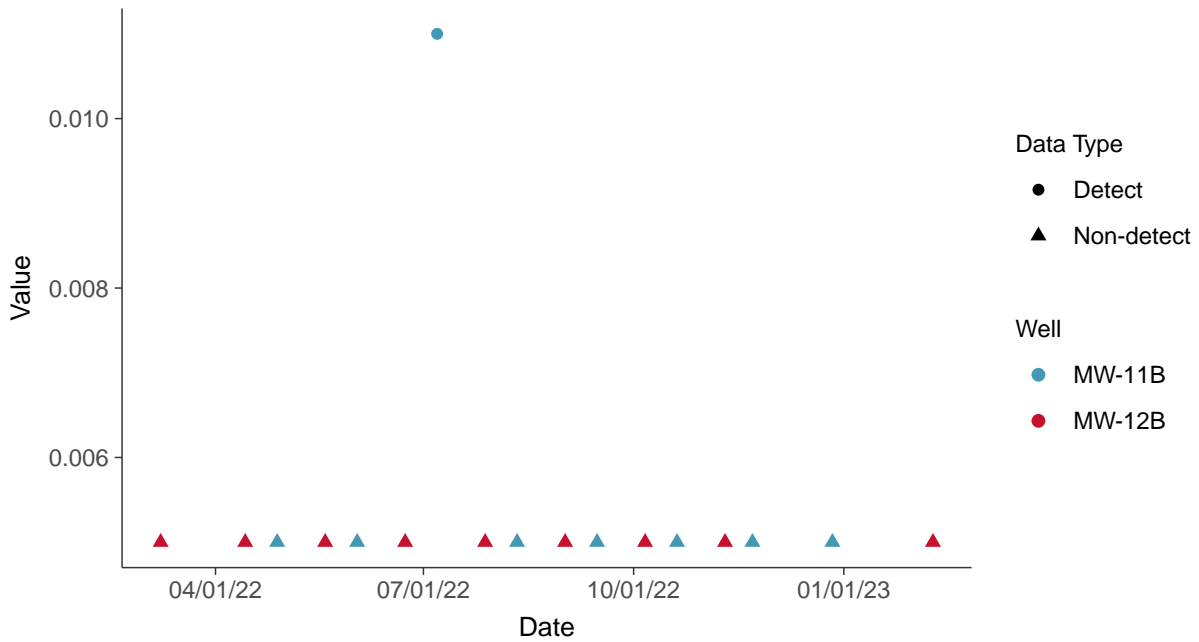
Scatter Plot

Nickel, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

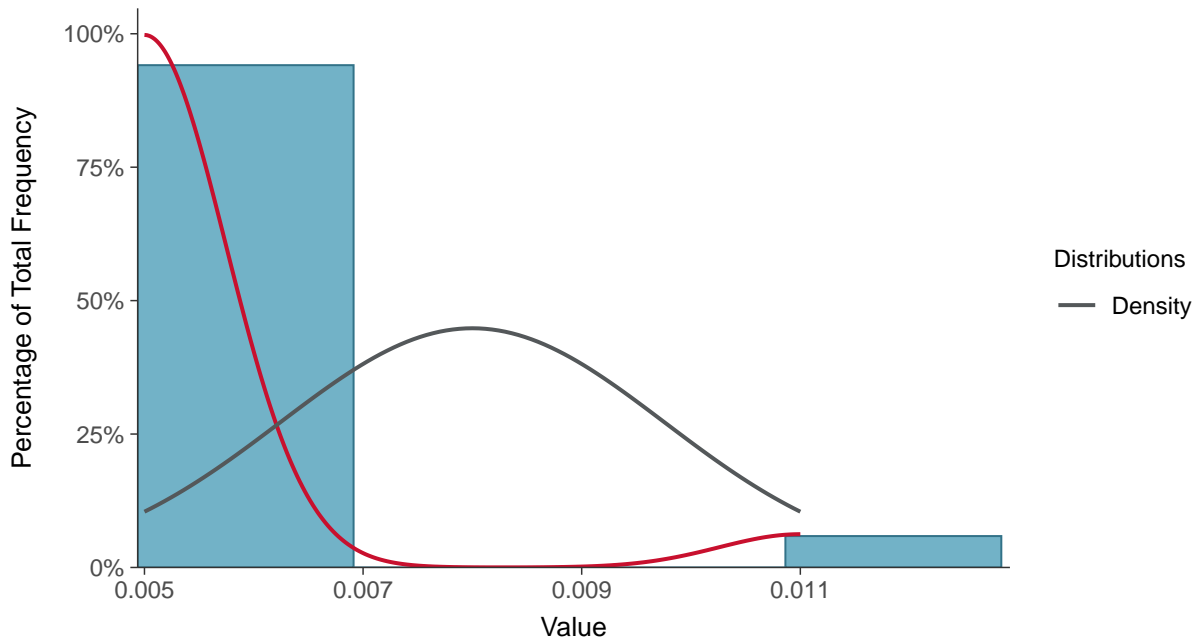
Nickel, MW-11B & MW_12B (mg/L)





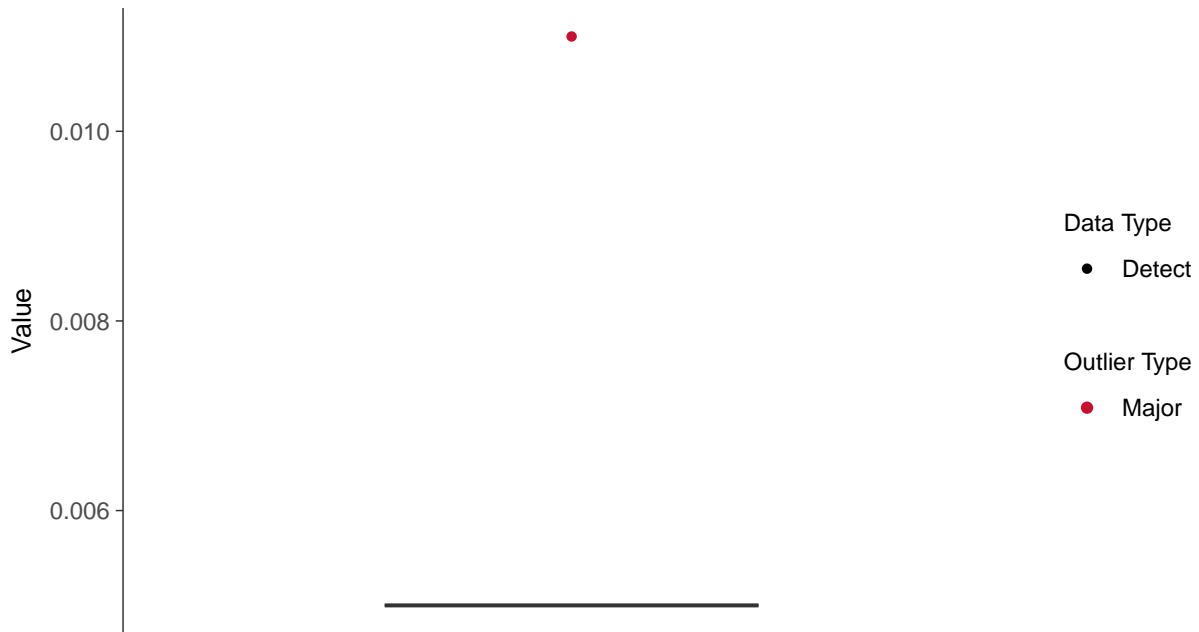
Histogram

Nickel, MW-11B & MW_12B (mg/L)



Boxplot

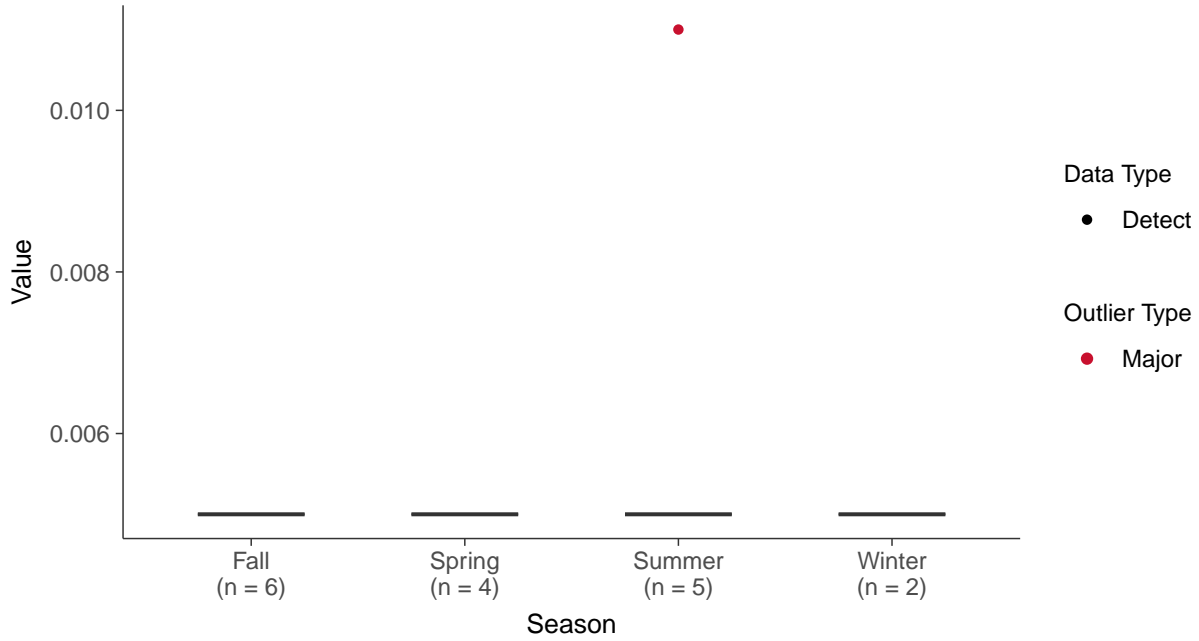
Nickel, MW-11B & MW_12B (mg/L)





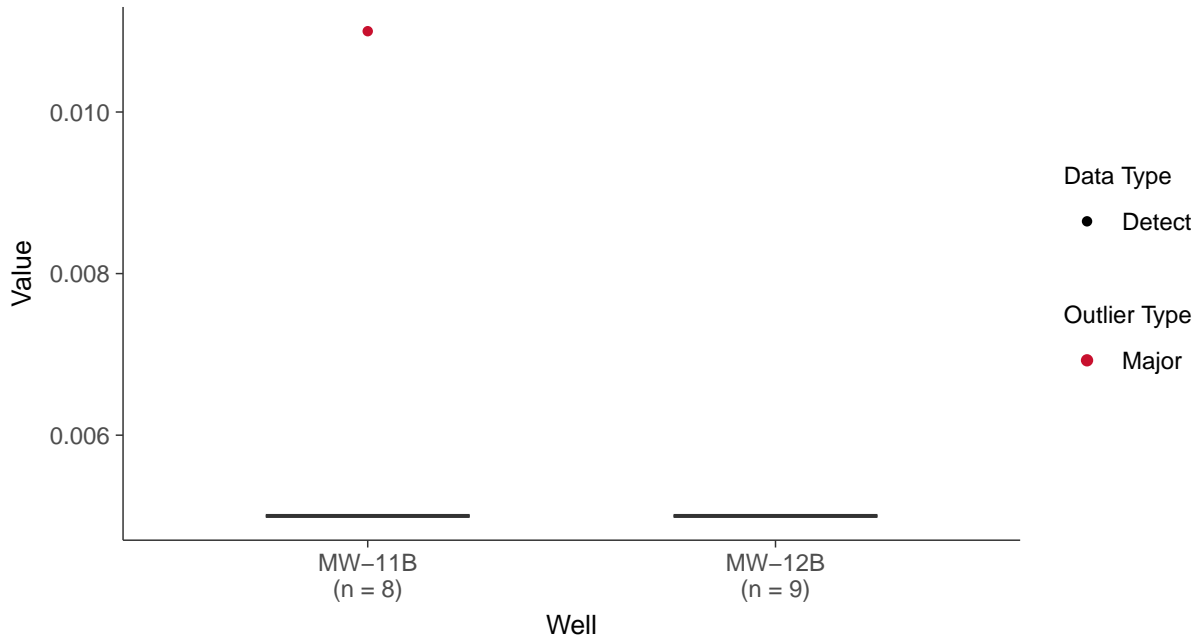
Boxplot by Season

Nickel, MW-11B & MW_12B (mg/L)



Boxplot by Well

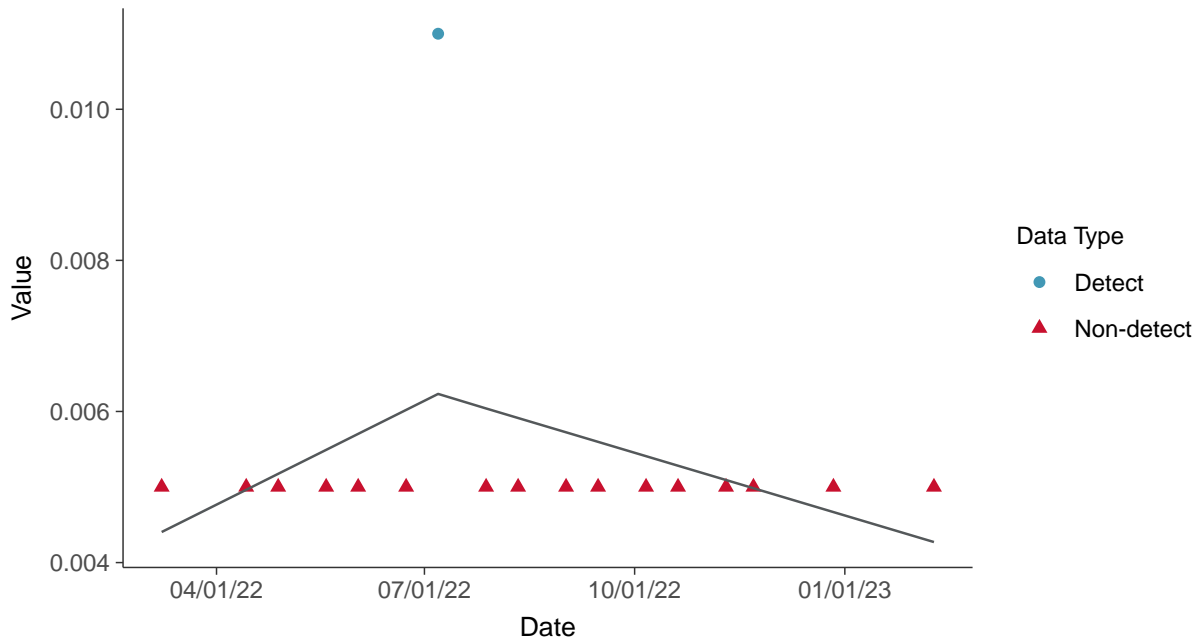
Nickel, MW-11B & MW_12B (mg/L)





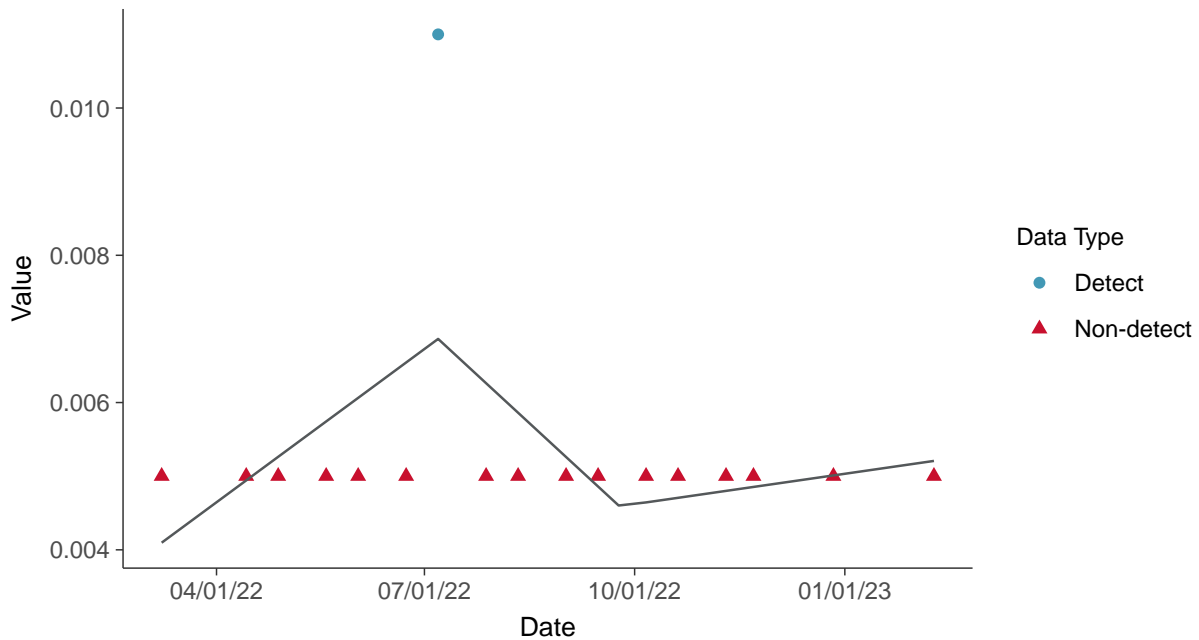
Trend Regression: Piecewise Linear-Linear

Nickel, MW-11B & MW_12B (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Nickel, MW-11B & MW_12B (mg/L)



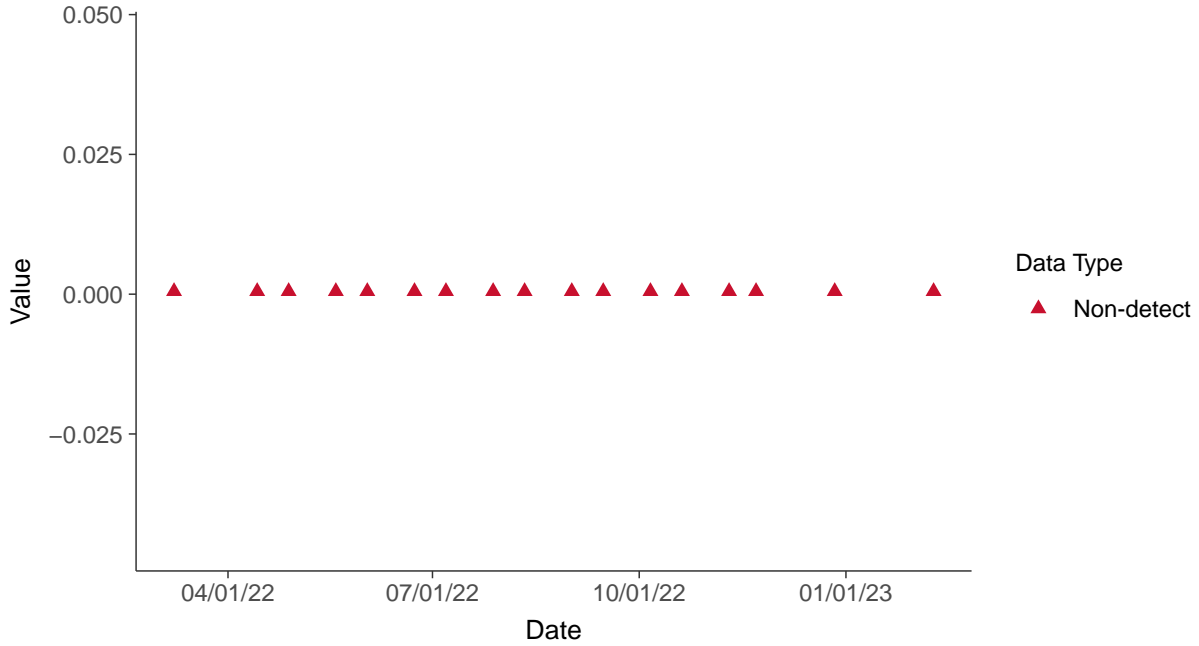


Part 115: Silver, MW-11B & MW_12B

ID: 5_40

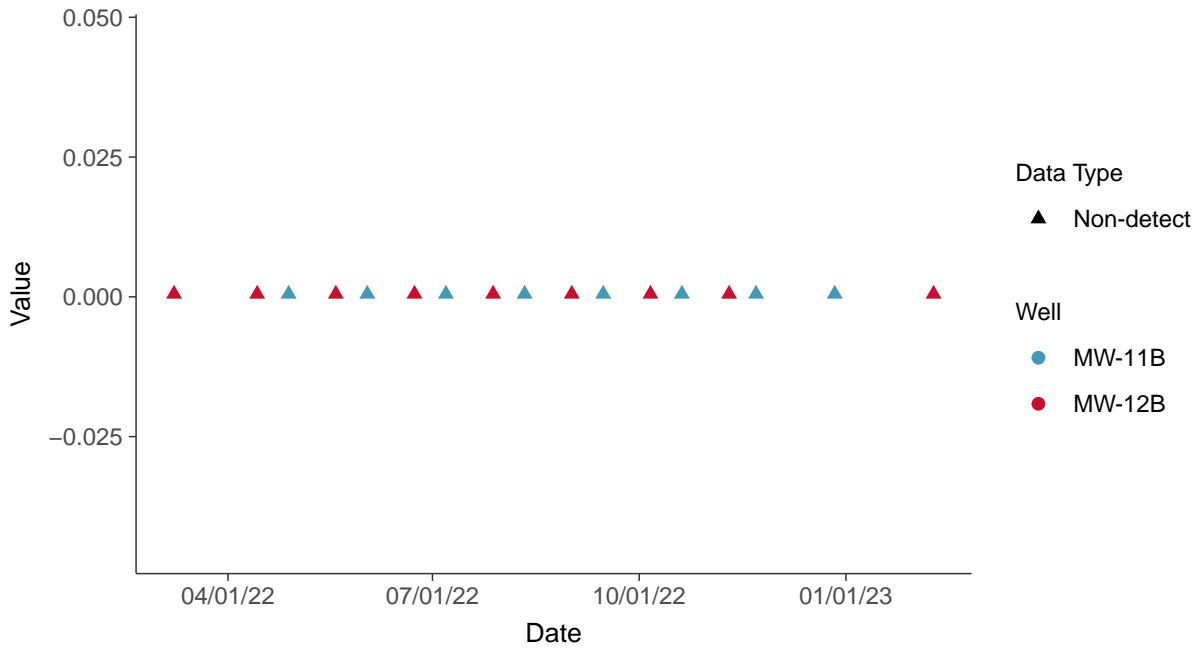
Scatter Plot

Silver, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

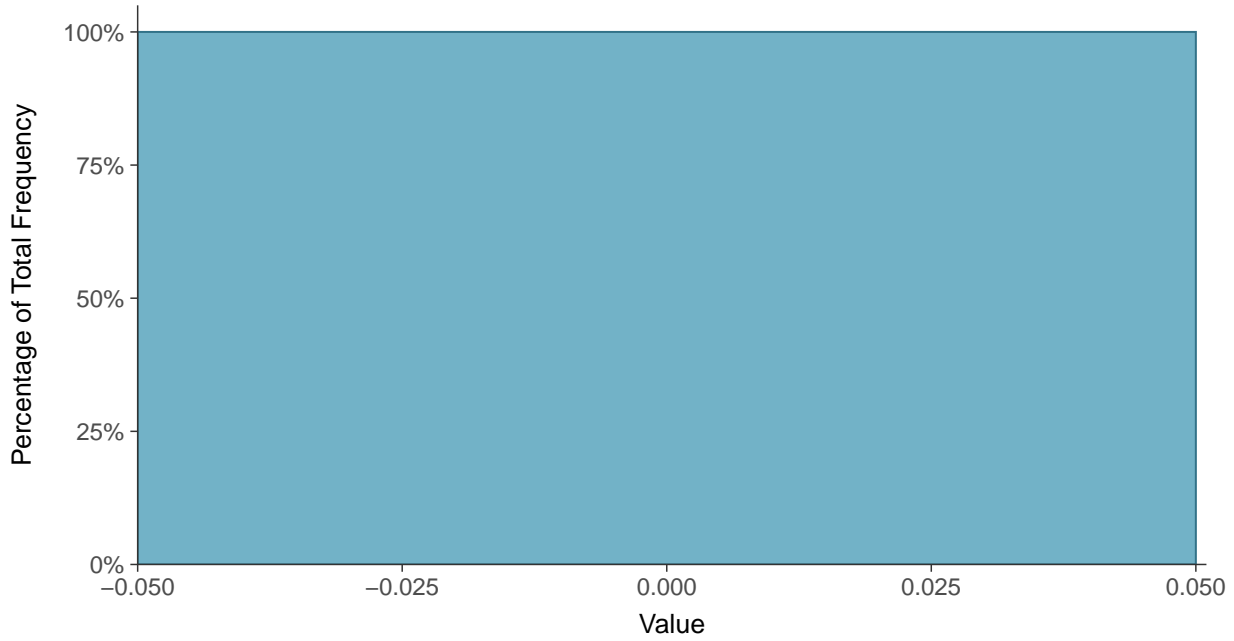
Silver, MW-11B & MW_12B (mg/L)





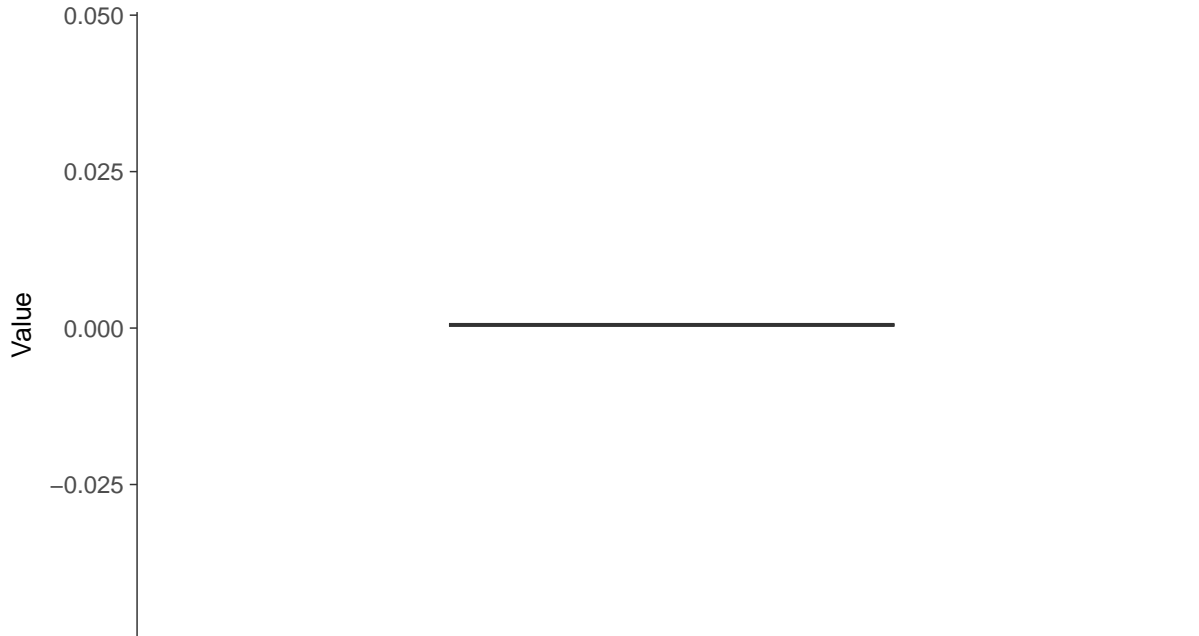
Histogram

Silver, MW-11B & MW_12B (mg/L)



Boxplot

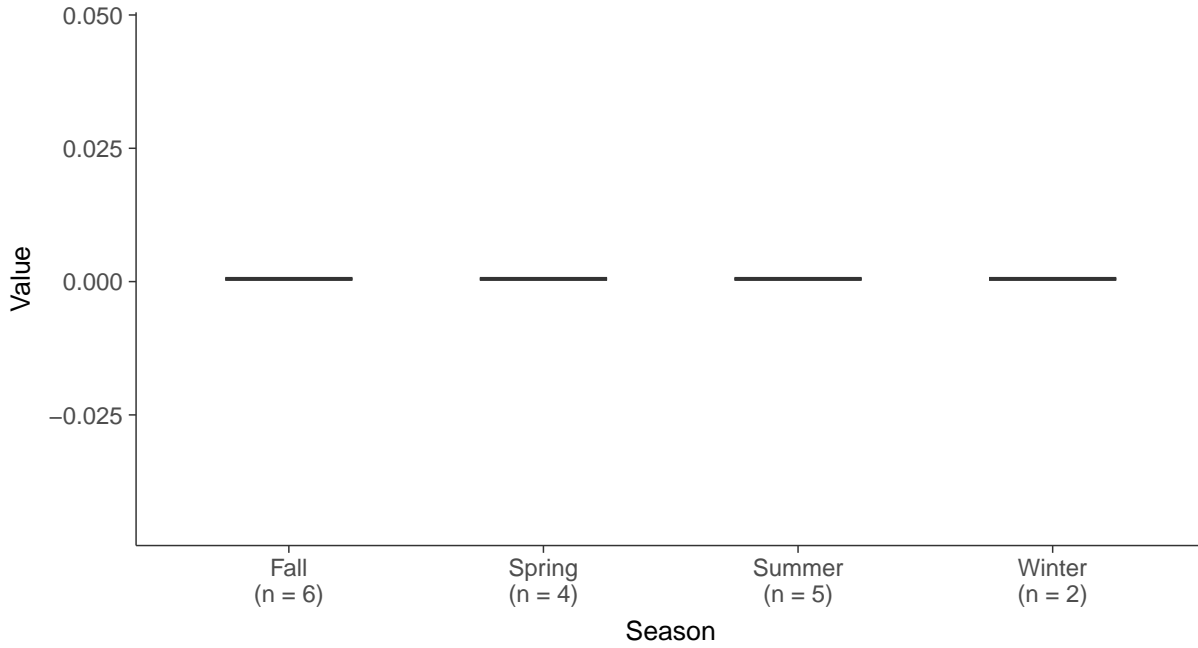
Silver, MW-11B & MW_12B (mg/L)





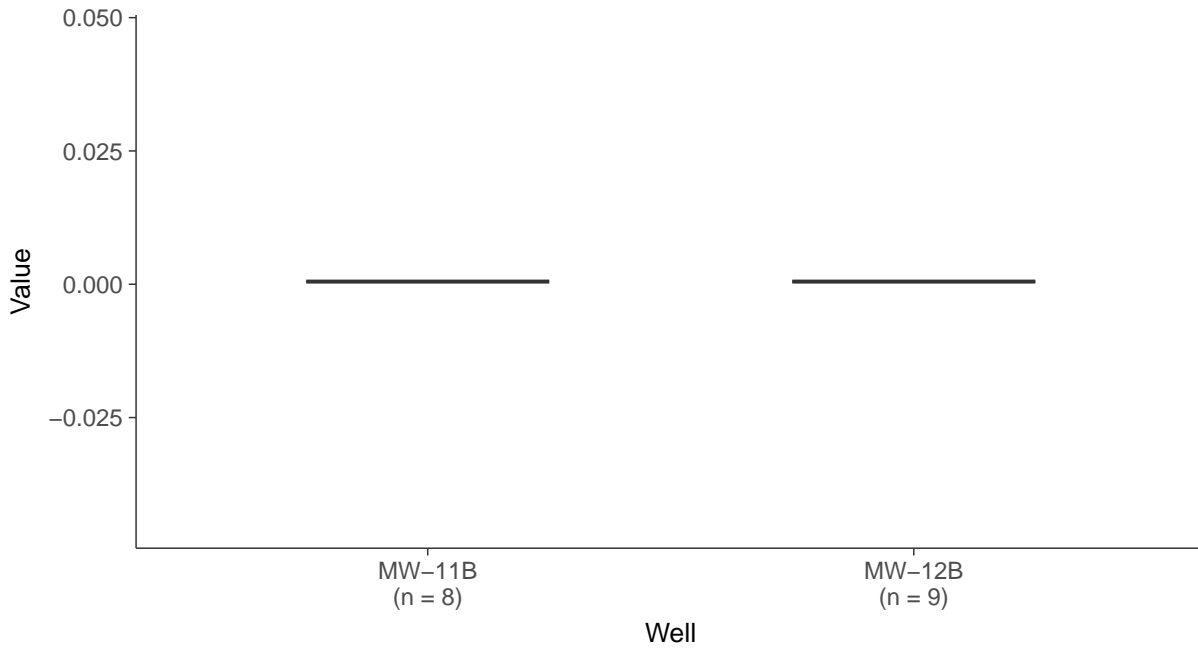
Boxplot by Season

Silver, MW-11B & MW_12B (mg/L)



Boxplot by Well

Silver, MW-11B & MW_12B (mg/L)



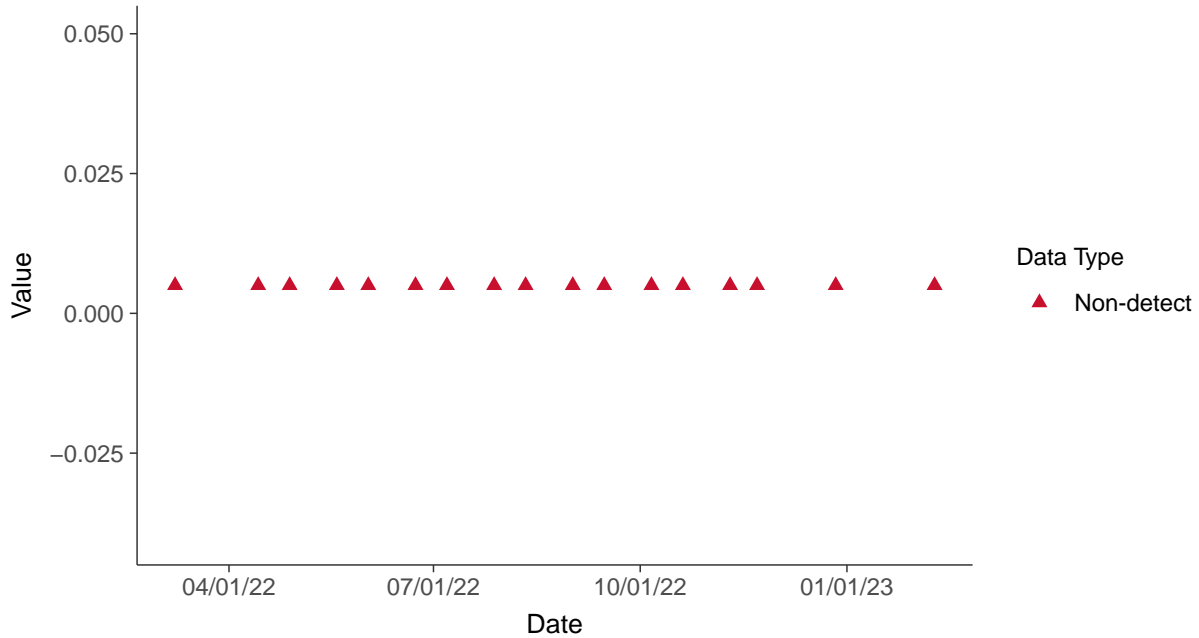


Part 115: Vanadium, MW-11B & MW_12B

ID: 5_41

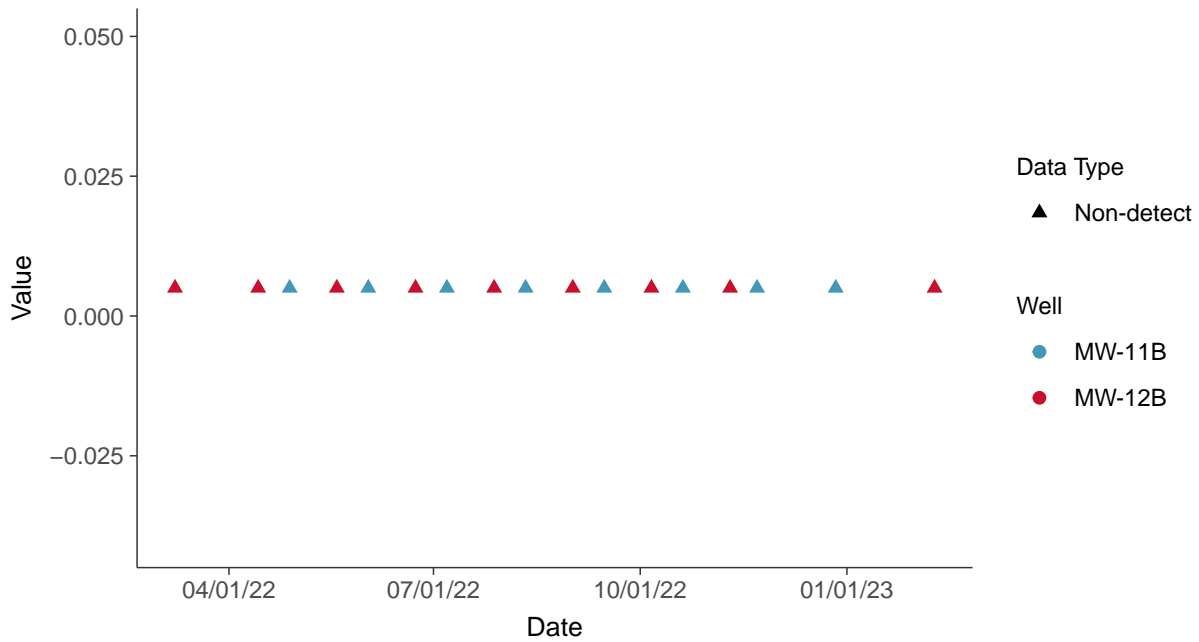
Scatter Plot

Vanadium, MW-11B & MW_12B (mg/L)



Scatter Plot by Well

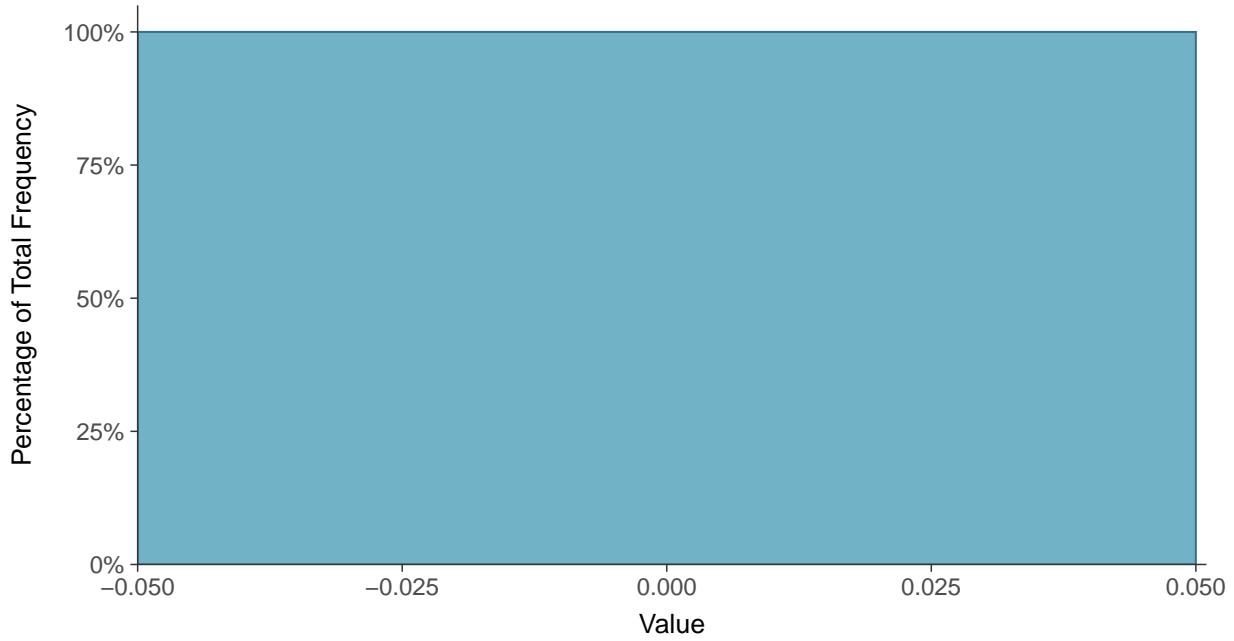
Vanadium, MW-11B & MW_12B (mg/L)





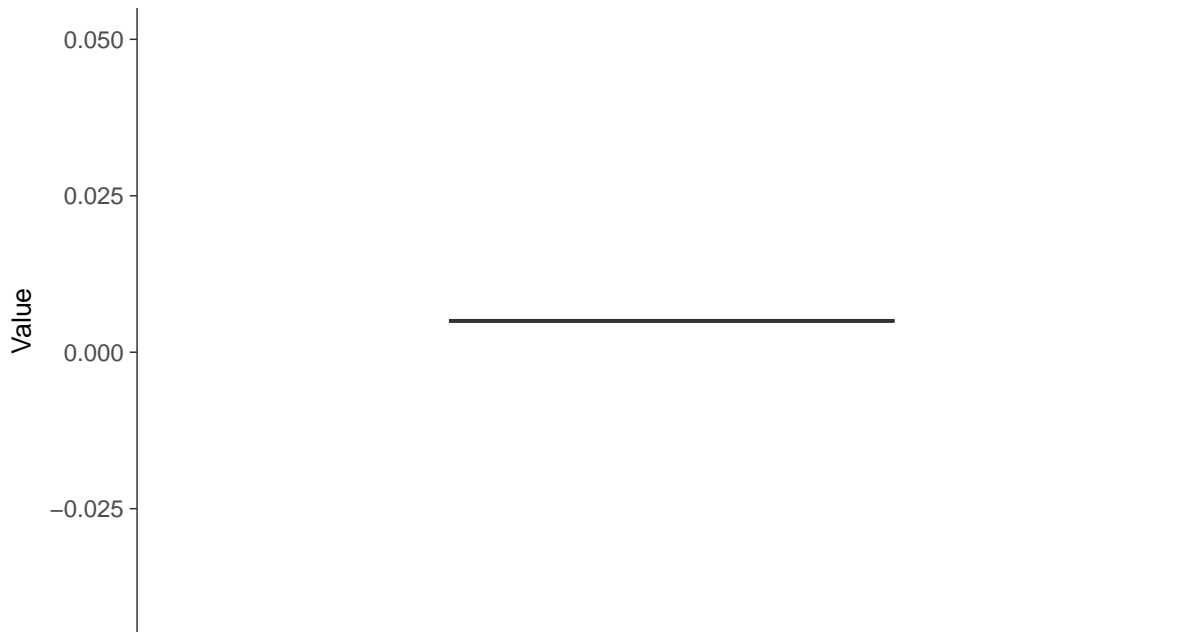
Histogram

Vanadium, MW-11B & MW_12B (mg/L)



Boxplot

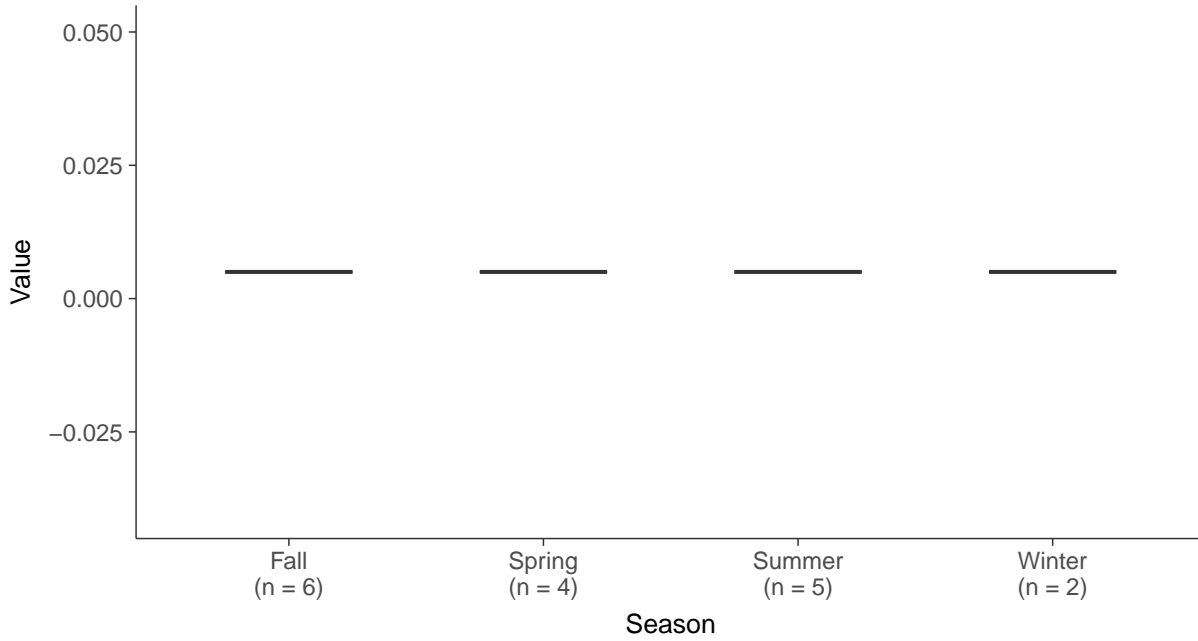
Vanadium, MW-11B & MW_12B (mg/L)





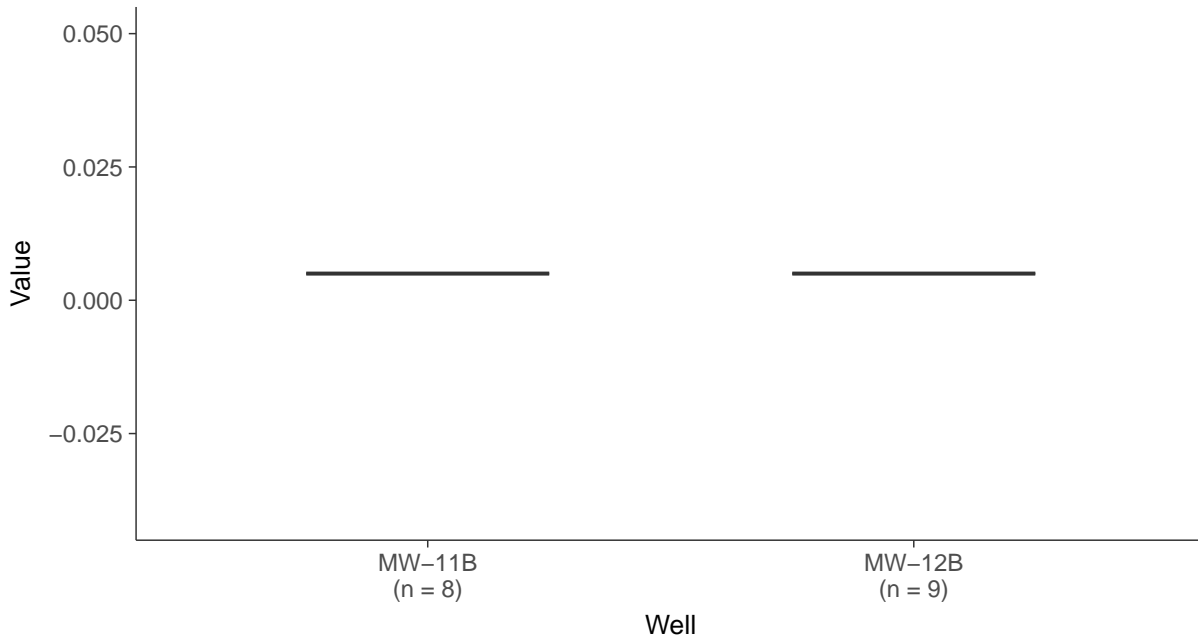
Boxplot by Season

Vanadium, MW-11B & MW_12B (mg/L)



Boxplot by Well

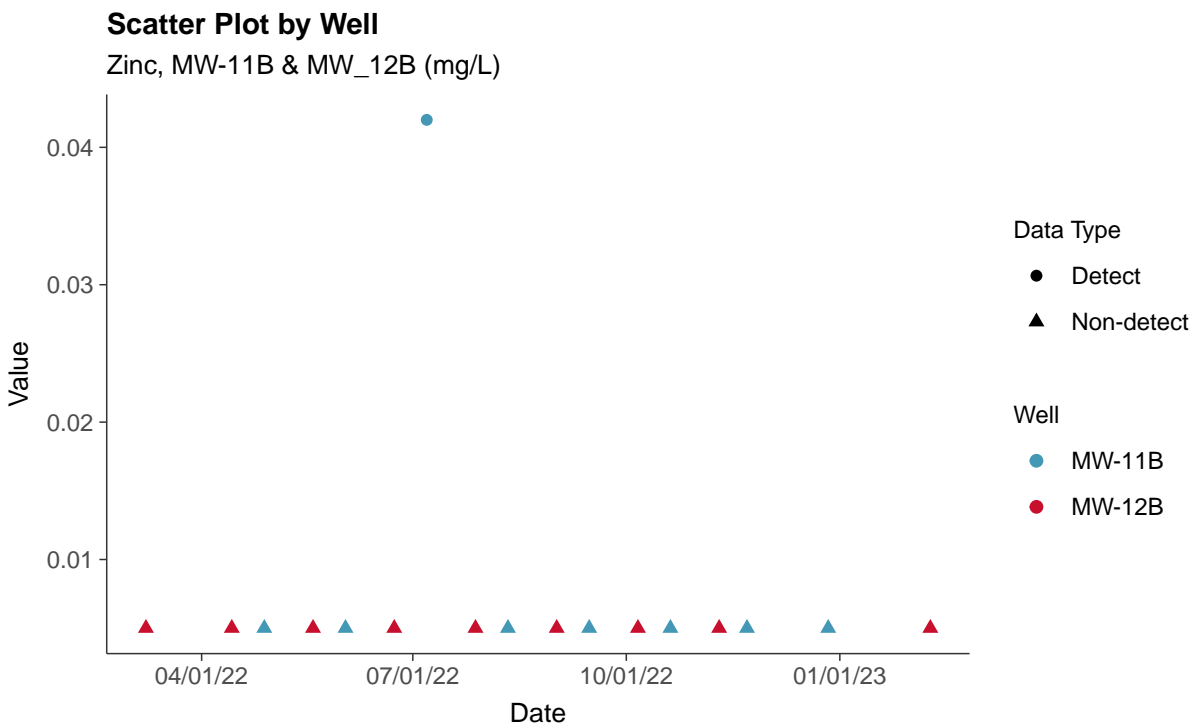
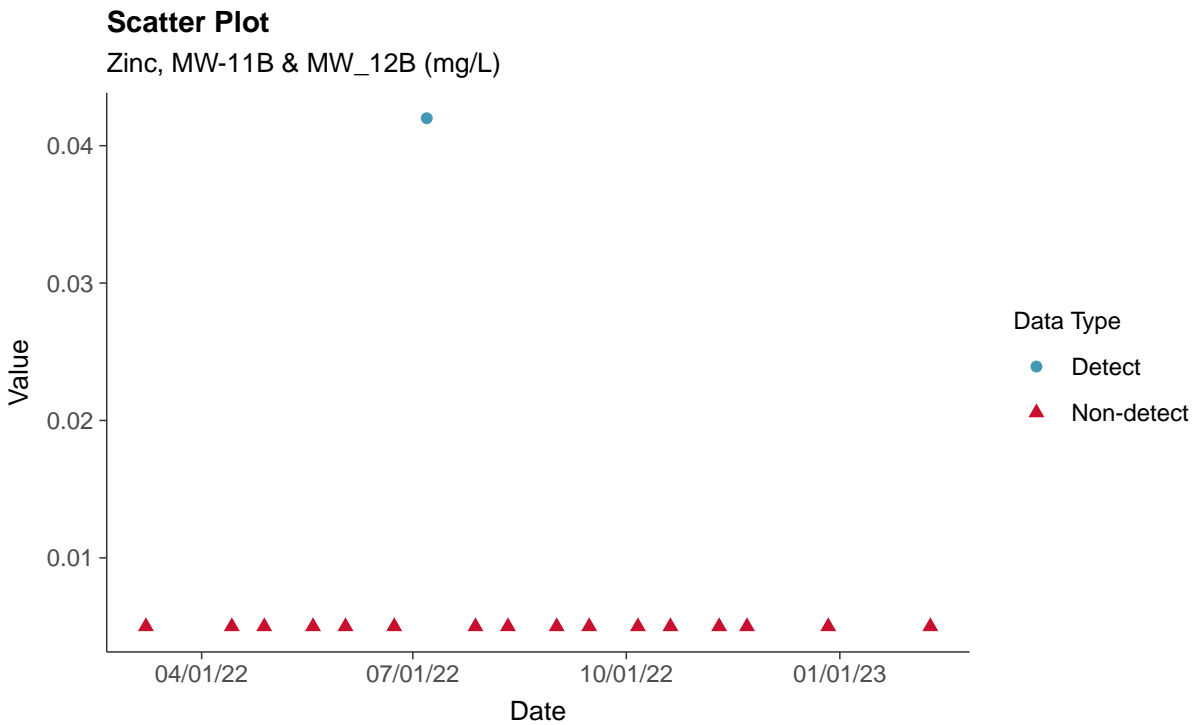
Vanadium, MW-11B & MW_12B (mg/L)





Part 115: Zinc, MW-11B & MW_12B

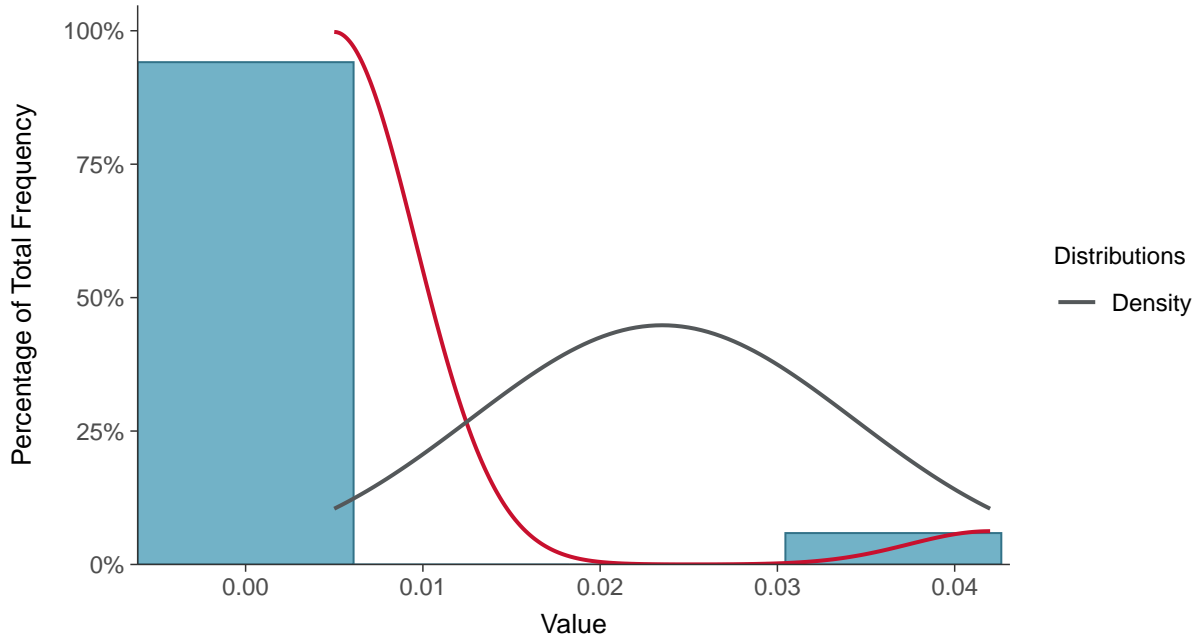
ID: 5_42





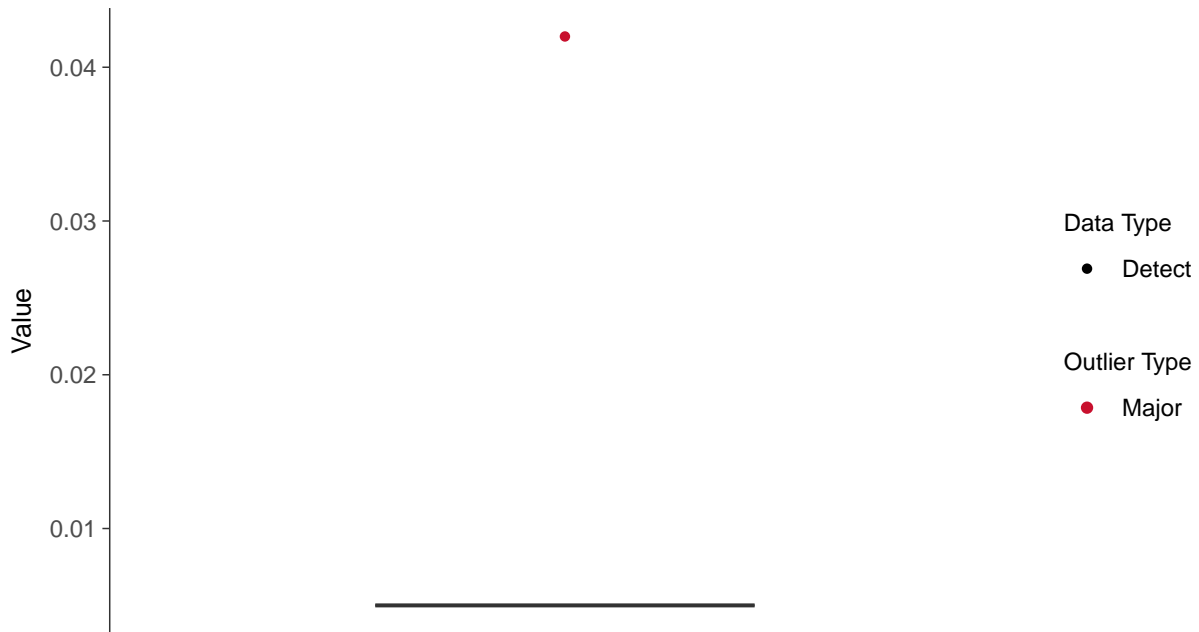
Histogram

Zinc, MW-11B & MW_12B (mg/L)



Boxplot

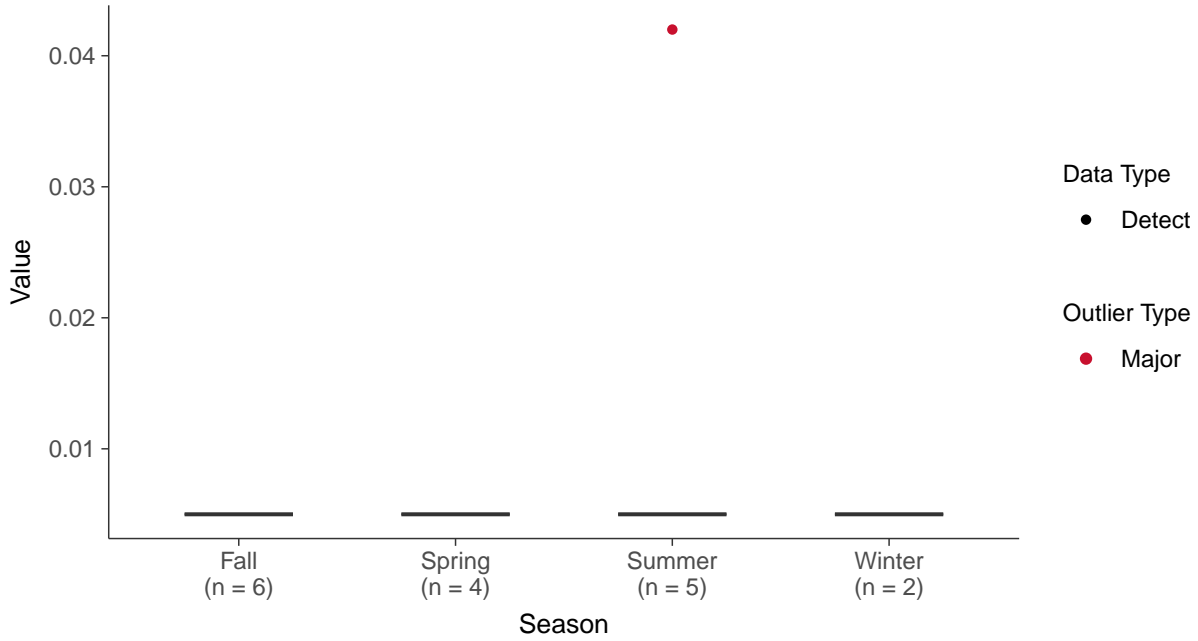
Zinc, MW-11B & MW_12B (mg/L)





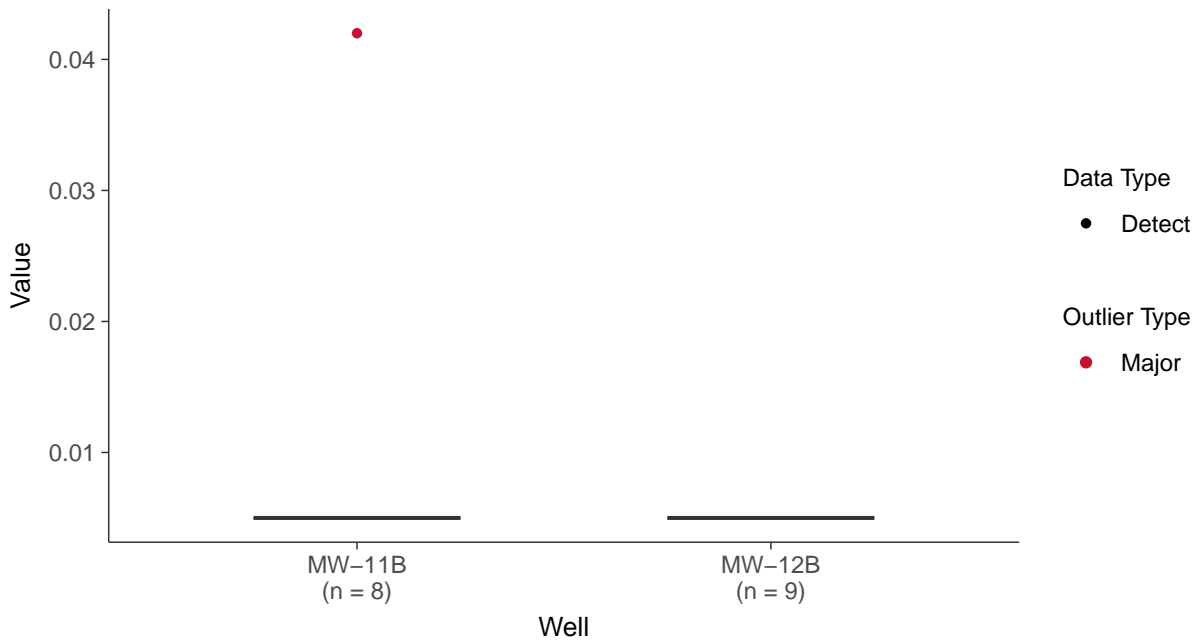
Boxplot by Season

Zinc, MW-11B & MW_12B (mg/L)



Boxplot by Well

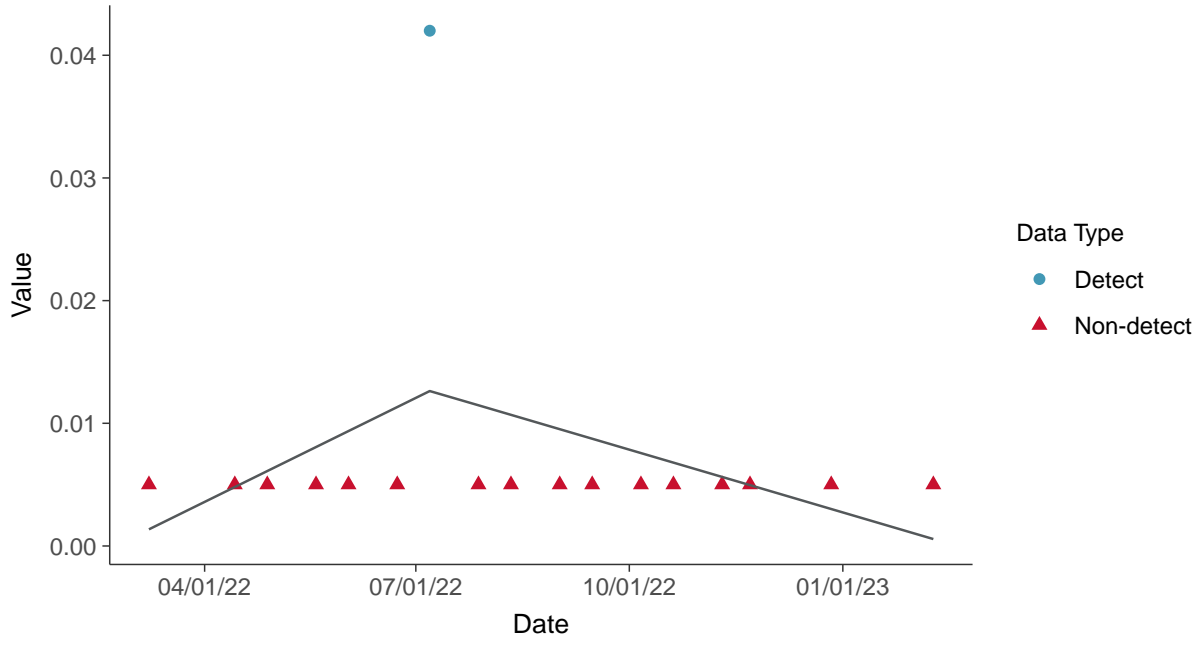
Zinc, MW-11B & MW_12B (mg/L)





Trend Regression: Piecewise Linear-Linear

Zinc, MW-11B & MW_12B (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Zinc, MW-11B & MW_12B (mg/L)

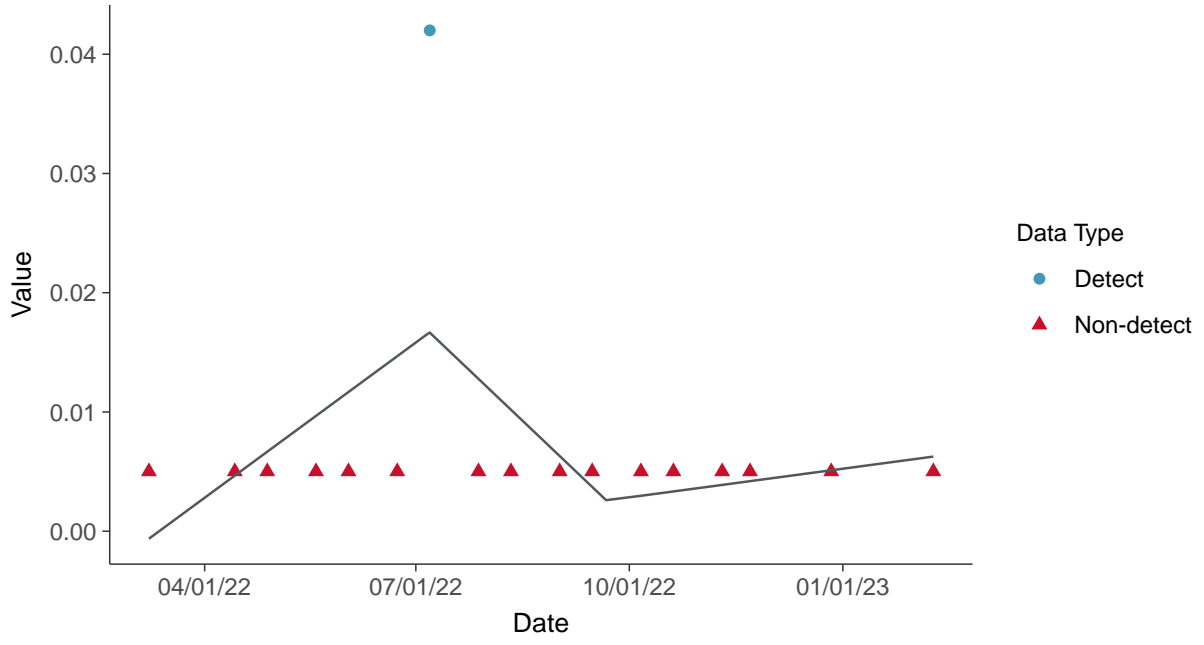




Table 1: Summary Statistics, Non-Detects Included

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Date Range	Distributions Fit ^a	Recommended Distribution	Mean	Median	Minimum	Maximum	SD	CV	MAD/0.675	Skewness	Kurtosis
1_01	MW-11B & MW_12B	Appendix III	Boron	mg/L	17	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	2.09	3.16	0.620	3.52	1.34	0.640	0.533	-0.123	-2.25
1_02	MW-11B & MW_12B	Appendix III	Calcium	mg/L	17	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	43.9	26.3	21.5	69.6	20.8	0.472	7.11	0.143	-2.20
1_03	MW-11B & MW_12B	Appendix III	Chloride	mg/L	17	17	100%	2022-03-08 to 2023-02-09		Nonparametric	4.81	5.00	1.70	5.00	0.800	0.167	0	-4.12	17.0
1_04	MW-11B & MW_12B	Appendix III	Fluoride	mg/L	17	17	100%	2022-03-08 to 2023-02-09		Nonparametric	0.971	1.00	0.500	1.00	0.121	0.125	0	-4.12	17.0
1_05	MW-11B & MW_12B	Appendix III	Sulfate	mg/L	17	17	100%	2022-03-08 to 2023-02-09		Nonparametric	4.86	5.00	2.58	5.00	0.587	0.121	0	-4.12	17.0
1_06	MW-11B & MW_12B	Appendix III	Total Dissolved Solids	mg/L	17	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	336	356	294	380	35.4	0.106	35.6	-0.0414	-2.04
1_07	MW-11B & MW_12B	Appendix III	pH, Field	su	17	0	0%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Normal	7.51	7.50	7.10	8.00	0.276	0.0367	0.311	0.289	-0.812
2_04	MW-11B & MW_12B	Appendix IV	Fluoride	mg/L	17	17	100%	2022-03-08 to 2023-02-09		Nonparametric	0.971	1.00	0.500	1.00	0.121	0.125	0	-4.12	17.0
2_08	MW-11B & MW_12B	Appendix IV	Antimony	mg/L	17	17	100%	2022-03-08 to 2023-02-09		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
2_09	MW-11B & MW_12B	Appendix IV	Arsenic	mg/L	17	9	53%	2022-03-08 to 2023-02-09	Normal	Nonparametric	0.00429	0.00200	0.00200	0.00900	0.00291	0.678	0	0.687	-1.48
2_10	MW-11B & MW_12B	Appendix IV	Barium	mg/L	17	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	0.0456	0.0280	0.0230	0.0810	0.0222	0.486	0.00741	0.253	-1.97
2_11	MW-11B & MW_12B	Appendix IV	Beryllium	mg/L	17	17	100%	2022-03-08 to 2023-02-09		Nonparametric	0.00100	0.00100	0.00100	0.00100	0	0	0	NA	NA
2_12	MW-11B & MW_12B	Appendix IV	Cadmium	mg/L	17	17	100%	2022-03-08 to 2023-02-09		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA
2_13	MW-11B & MW_12B	Appendix IV	Chromium	mg/L	17	17	100%	2022-03-08 to 2023-02-09		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
2_14	MW-11B & MW_12B	Appendix IV	Cobalt	mg/L	17	17	100%	2022-03-08 to 2023-02-09		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
2_15	MW-11B & MW_12B	Appendix IV	Lead	mg/L	17	17	100%	2022-03-08 to 2023-02-09		Nonparametric	0.00300	0.00300	0.00300	0.00300	0	0	0	NA	NA
2_16	MW-11B & MW_12B	Appendix IV	Lithium	mg/L	17	0	0%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Normal	0.0339	0.0360	0.0240	0.0430	0.00723	0.213	0.00889	-0.194	-1.80
2_17	MW-11B & MW_12B	Appendix IV	Mercury	mg/L	17	16	94%	2022-03-08 to 2023-02-09		Nonparametric	0.000200	0.000200	0.000200	0.000200	0	0	0	NA	NA
2_18	MW-11B & MW_12B	Appendix IV	Molybdenum	mg/L	17	12	71%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Nonparametric	0.00565	0.00500	0.00500	0.0110	0.00154	0.272	0	3.01	9.83
2_19	MW-11B & MW_12B	Appendix IV	Radium-226	pCi/L	14	0	0%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Normal	0.733	0.635	0.264	1.72	0.354	0.483	0.260	1.68	4.20
2_20	MW-11B & MW_12B	Appendix IV	Radium-226/228	pCi/L	12	0	0%	2022-04-14 to 2023-02-09	Gamma; Lognormal; Normal	Normal	2.05	1.79	0.380	4.14	1.19	0.581	1.07	0.390	-0.832
2_21	MW-11B & MW_12B	Appendix IV	Radium-228	pCi/L	12	0	0%	2022-04-14 to 2023-02-09	Normal	Nonparametric	1.26	1.02	-0.356	3.31	1.08	0.852	0.776	0.537	-0.310
2_22	MW-11B & MW_12B	Appendix IV	Selenium	mg/L	17	17	100%	2022-03-08 to 2023-02-09		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
2_23	MW-11B & MW_12B	Appendix IV	Thallium	mg/L	17	17	100%	2022-03-08 to 2023-02-09		Nonparametric	0.00200	0.00200	0.00200	0.00200	0	0	0	NA	NA
2_24	MW-11B & MW_12B	Appendix IV	Total Suspended Solids	mg/L	17	10	59%	2022-03-08 to 2023-02-09	Lognormal	Nonparametric	7.81	3.00	1.00	54.0	13.4	1.71	0	3.11	9.78
5_37	MW-11B & MW_12B	Part 115	Copper	mg/L	17	17	100%	2022-03-08 to 2023-02-09		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
5_38	MW-11B & MW_12B	Part 115	Iron	mg/L	17	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	1.02	0.370	0.100	3.04	1.01	0.989	0.222	0.926	-0.793
5_39	MW-11B & MW_12B	Part 115	Nickel	mg/L	17	16	94%	2022-03-08 to 2023-02-09		Nonparametric	0.00535	0.00500	0.00500	0.0110	0.00146	0.272	0	4.12	17.0
5_40	MW-11B & MW_12B	Part 115	Silver	mg/L	17	17	100%	2022-03-08 to 2023-02-09		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA
5_41	MW-11B & MW_12B	Part 115	Vanadium	mg/L	17	17	100%	2022-03-08 to 2023-02-09		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
5_42	MW-11B & MW_12B	Part 115	Zinc	mg/L	17	16	94%	2022-03-08 to 2023-02-09		Nonparametric	0.00718	0.00500	0.00500	0.0420	0.00897	1.25	0	4.12	17.0

^a Non-detects are excluded from goodness-of-fit tests.



Table 2: Summary Statistics, Non-Detects Excluded

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Date Range	Distributions Fit	Recommended Distribution	Mean	Median	Minimum	Maximum	SD	CV	MAD/0.675	Skewness	Kurtosis
1_01	MW-11B & MW_12B	Appendix III	Boron	mg/L	17	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	2.09	3.16	0.620	3.52	1.34	0.640	0.533	-0.123	-2.25
1_02	MW-11B & MW_12B	Appendix III	Calcium	mg/L	17	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	43.9	26.3	21.5	69.6	20.8	0.472	7.11	0.143	-2.20
1_06	MW-11B & MW_12B	Appendix III	Total Dissolved Solids	mg/L	17	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	336	356	294	380	35.4	0.106	35.6	-0.0414	-2.04
1_07	MW-11B & MW_12B	Appendix III	pH, Field	su	17	0	0%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Normal	7.51	7.50	7.10	8.00	0.276	0.0367	0.311	0.289	-0.812
2_09	MW-11B & MW_12B	Appendix IV	Arsenic	mg/L	17	9	53%	2022-03-08 to 2023-02-09	Normal	Nonparametric	0.00688	0.00750	0.00300	0.00900	0.00223	0.325	0.00148	-1.03	-0.234
2_10	MW-11B & MW_12B	Appendix IV	Barium	mg/L	17	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	0.0456	0.0280	0.0230	0.0810	0.0222	0.486	0.00741	0.253	-1.97
2_16	MW-11B & MW_12B	Appendix IV	Lithium	mg/L	17	0	0%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Normal	0.0339	0.0360	0.0240	0.0430	0.00723	0.213	0.00889	-0.194	-1.80
2_17	MW-11B & MW_12B	Appendix IV	Mercury	mg/L	17	16	94%	2022-03-08 to 2023-02-09		Nonparametric	0.000200	0.000200	0.000200	0.000200	NA	NA	0	NA	NA
2_18	MW-11B & MW_12B	Appendix IV	Molybdenum	mg/L	17	12	71%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Nonparametric	0.00720	0.00700	0.00500	0.0110	0.00228	0.317	0.00148	1.49	2.82
2_19	MW-11B & MW_12B	Appendix IV	Radium-226	pCi/L	14	0	0%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Normal	0.733	0.635	0.264	1.72	0.354	0.483	0.260	1.68	4.20
2_20	MW-11B & MW_12B	Appendix IV	Radium-226/228	pCi/L	12	0	0%	2022-04-14 to 2023-02-09	Gamma; Lognormal; Normal	Normal	2.05	1.79	0.380	4.14	1.19	0.581	1.07	0.390	-0.832
2_21	MW-11B & MW_12B	Appendix IV	Radium-228	pCi/L	12	0	0%	2022-04-14 to 2023-02-09	Normal	Nonparametric	1.26	1.02	-0.356	3.31	1.08	0.852	0.776	0.537	-0.310
2_24	MW-11B & MW_12B	Appendix IV	Total Suspended Solids	mg/L	17	10	59%	2022-03-08 to 2023-02-09	Lognormal	Nonparametric	15.1	5.00	3.00	54.0	19.2	1.27	2.96	1.80	2.69
5_38	MW-11B & MW_12B	Part 115	Iron	mg/L	17	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	1.02	0.370	0.100	3.04	1.01	0.989	0.222	0.926	-0.793
5_39	MW-11B & MW_12B	Part 115	Nickel	mg/L	17	16	94%	2022-03-08 to 2023-02-09		Nonparametric	0.0110	0.0110	0.0110	0.0110	NA	NA	0	NA	NA
5_42	MW-11B & MW_12B	Part 115	Zinc	mg/L	17	16	94%	2022-03-08 to 2023-02-09		Nonparametric	0.0420	0.0420	0.0420	0.0420	NA	NA	0	NA	NA

Table 3: Goodness-of-Fit Tests, Non-Detects Excluded

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Normal		Lognormal		Gamma				Log-SD (NDs excl.)	ProUCL Distributions Fit	Recommended Distribution				
								S-W		Lilliefors		S-W		Lilliefors					K-S		A-D	
								Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value				Stat.	p-Value	Stat.	p-Value
1_01	MW-11B & MW_12B	Appendix III	Boron	mg/L	17	0	0%	0.697	0.000	0.316	0.000	0.705	0.000	0.332	0.000	0.334	< 0.01	2.527	< 0.01	0.792	Nonparametric	Nonparametric
1_02	MW-11B & MW_12B	Appendix III	Calcium	mg/L	17	0	0%	0.728	0.000	0.332	0.000	0.737	0.000	0.319	0.000	0.331	< 0.01	2.284	< 0.01	0.496	Nonparametric	Nonparametric
1_03	MW-11B & MW_12B	Appendix III	Chloride	mg/L	17	17	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
1_04	MW-11B & MW_12B	Appendix III	Fluoride	mg/L	17	17	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
1_05	MW-11B & MW_12B	Appendix III	Sulfate	mg/L	17	17	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
1_06	MW-11B & MW_12B	Appendix III	Total Dissolved Solids	mg/L	17	0	0%	0.804	0.002	0.253	0.005	0.801	0.002	0.256	0.004	0.260	< 0.01	1.569	< 0.01	0.106	Nonparametric	Nonparametric
1_07	MW-11B & MW_12B	Appendix III	pH, Field	su	17	0	0%	0.958	0.597	0.101	0.918	0.960	0.635	0.097	0.942	0.103	>= 0.10	0.243	>= 0.10	0.037	Gamma; Lognormal; Normal	Normal
2_04	MW-11B & MW_12B	Appendix IV	Fluoride	mg/L	17	17	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_08	MW-11B & MW_12B	Appendix IV	Antimony	mg/L	17	17	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_09	MW-11B & MW_12B	Appendix IV	Arsenic	mg/L	17	9	53%	0.850	0.094	0.272	0.082	0.794	0.024	0.328	0.011	0.317	0.01 <= p < 0.05	0.764	0.01 <= p < 0.05	0.404	Normal	Nonparametric
2_10	MW-11B & MW_12B	Appendix IV	Barium	mg/L	17	0	0%	0.774	0.001	0.316	0.000	0.765	0.001	0.299	0.000	0.313	< 0.01	1.969	< 0.01	0.503	Nonparametric	Nonparametric
2_11	MW-11B & MW_12B	Appendix IV	Beryllium	mg/L	17	17	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_12	MW-11B & MW_12B	Appendix IV	Cadmium	mg/L	17	17	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_13	MW-11B & MW_12B	Appendix IV	Chromium	mg/L	17	17	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_14	MW-11B & MW_12B	Appendix IV	Cobalt	mg/L	17	17	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_15	MW-11B & MW_12B	Appendix IV	Lead	mg/L	17	17	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_16	MW-11B & MW_12B	Appendix IV	Lithium	mg/L	17	0	0%	0.861	0.016	0.186	0.121	0.855	0.013	0.202	0.063	0.204	0.05 <= p < 0.10	1.014	< 0.01	0.222	Gamma; Lognormal; Normal	Normal
2_17	MW-11B & MW_12B	Appendix IV	Mercury	mg/L	17	16	94%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_18	MW-11B & MW_12B	Appendix IV	Molybdenum	mg/L	17	12	71%	0.860	0.228	0.335	0.069	0.924	0.555	0.289	0.182	0.306	>= 0.10	0.389	>= 0.10	0.292	Gamma; Lognormal; Normal	Nonparametric
2_19	MW-11B & MW_12B	Appendix IV	Radium-226	pCi/L	14	0	0%	0.862	0.033	0.177	0.271	0.975	0.932	0.134	0.707	0.138	>= 0.10	0.296	>= 0.10	0.451	Gamma; Lognormal; Normal	Normal
2_20	MW-11B & MW_12B	Appendix IV	Radium-226/228	pCi/L	12	0	0%	0.956	0.731	0.137	0.776	0.931	0.396	0.176	0.387	0.132	>= 0.10	0.218	>= 0.10	0.722	Gamma; Lognormal; Normal	Normal
2_21	MW-11B & MW_12B	Appendix IV	Radium-228	pCi/L	12	0	0%	0.956	0.719	0.176	0.387	NA	NA	NA	NA	NA	NA	NA	NA	NA	Normal	Nonparametric
2_22	MW-11B & MW_12B	Appendix IV	Selenium	mg/L	17	17	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_23	MW-11B & MW_12B	Appendix IV	Thallium	mg/L	17	17	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
2_24	MW-11B & MW_12B	Appendix IV	Total Suspended Solids	mg/L	17	10	59%	0.697	0.003	0.378	0.003	0.838	0.095	0.285	0.090	0.344	0.01 <= p < 0.05	0.814	0.01 <= p < 0.05	1.087	Lognormal	Nonparametric
5_37	MW-11B & MW_12B	Part 115	Copper	mg/L	17	17	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
5_38	MW-11B & MW_12B	Part 115	Iron	mg/L	17	0	0%	0.787	0.001	0.316	0.000	0.890	0.047	0.236	0.013	0.281	< 0.01	1.153	< 0.01	1.067	Nonparametric	Nonparametric
5_39	MW-11B & MW_12B	Part 115	Nickel	mg/L	17	16	94%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
5_40	MW-11B & MW_12B	Part 115	Silver	mg/L	17	17	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
5_41	MW-11B & MW_12B	Part 115	Vanadium	mg/L	17	17	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric
5_42	MW-11B & MW_12B	Part 115	Zinc	mg/L	17	16	94%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	Nonparametric	Nonparametric

Note: p-values above 0.05 suggest a fit to the tested distribution; a distribution passes its GOF test when at least one of the two p-values is above 0.05.



Table 4: Autocorrelation Tests, Non-Detects Excluded

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Autocorrelation	Box-Ljung p-value	Sig.
1_01	MW-11B & MW_12B	Appendix III	Boron	mg/L	17	0	0%	-0.735	0.001	***
1_02	MW-11B & MW_12B	Appendix III	Calcium	mg/L	17	0	0%	-0.649	0.004	**
1_06	MW-11B & MW_12B	Appendix III	Total Dissolved Solids	mg/L	17	0	0%	-0.547	0.014	*
1_07	MW-11B & MW_12B	Appendix III	pH, Field	su	17	0	0%	0.180	0.418	
2_09	MW-11B & MW_12B	Appendix IV	Arsenic	mg/L	17	9	53%	0.523	0.077	
2_10	MW-11B & MW_12B	Appendix IV	Barium	mg/L	17	0	0%	-0.740	0.001	***
2_16	MW-11B & MW_12B	Appendix IV	Lithium	mg/L	17	0	0%	-0.728	0.001	**
2_17	MW-11B & MW_12B	Appendix IV	Mercury	mg/L	17	16	94%	NA	NA	
2_18	MW-11B & MW_12B	Appendix IV	Molybdenum	mg/L	17	12	71%	-0.367	0.277	
2_19	MW-11B & MW_12B	Appendix IV	Radium-226	pCi/L	14	0	0%	-0.067	0.782	
2_20	MW-11B & MW_12B	Appendix IV	Radium-226/228	pCi/L	12	0	0%	0.354	0.167	
2_21	MW-11B & MW_12B	Appendix IV	Radium-228	pCi/L	12	0	0%	0.376	0.141	
2_24	MW-11B & MW_12B	Appendix IV	Total Suspended Solids	mg/L	17	10	59%	-0.043	0.889	
5_38	MW-11B & MW_12B	Part 115	Iron	mg/L	17	0	0%	-0.417	0.061	
5_39	MW-11B & MW_12B	Part 115	Nickel	mg/L	17	16	94%	NA	NA	
5_42	MW-11B & MW_12B	Part 115	Zinc	mg/L	17	16	94%	NA	NA	

*** p < 0.001, ** p < 0.01, * p < 0.05



Table 7: Seasonality Tests

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full					Without Non-Detects																
						Sample Size					p-Value			Sample Size					p-Value								
						Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA						
1_01	MW-11B & MW_12B	Appendix III	Boron	mg/L	0%	2	4	5	6	17	0.931	0.860	0.859	2	4	5	6	17	0.931	0.860	0.859						
1_02	MW-11B & MW_12B	Appendix III	Calcium	mg/L	0%	2	4	5	6	17	0.215	0.726	0.674	2	4	5	6	17	0.215	0.726	0.674						
1_03	MW-11B & MW_12B	Appendix III	Chloride	mg/L	100%	2	4	5	6	17	0.608	0.650	0.650	NA	NA	NA	NA	NA	NA	NA	NA						
1_04	MW-11B & MW_12B	Appendix III	Fluoride	mg/L	100%	2	4	5	6	17	0.494	0.534	0.534	NA	NA	NA	NA	NA	NA	NA	NA						
1_05	MW-11B & MW_12B	Appendix III	Sulfate	mg/L	100%	2	4	5	6	17	0.608	0.650	0.650	NA	NA	NA	NA	NA	NA	NA	NA						
1_06	MW-11B & MW_12B	Appendix III	Total Dissolved Solids	mg/L	0%	2	4	5	6	17	0.250	0.611	0.627	2	4	5	6	17	0.250	0.611	0.627						
1_07	MW-11B & MW_12B	Appendix III	pH, Field	su	0%	2	4	5	6	17	0.040	*	0.008	**	0.009	**	2	4	5	6	17	0.040	*	0.008	**	0.009	**
2_04	MW-11B & MW_12B	Appendix IV	Fluoride	mg/L	100%	2	4	5	6	17	0.494	0.534	0.534	NA	NA	NA	NA	NA	NA	NA	NA						
2_08	MW-11B & MW_12B	Appendix IV	Antimony	mg/L	100%	2	4	5	6	17	NA	NA	0.383	NA	NA	NA	NA	NA	NA	NA	NA						
2_09	MW-11B & MW_12B	Appendix IV	Arsenic	mg/L	53%	2	4	5	6	17	0.607	0.496	0.526	1	1	3	3	8	0.420	0.281	0.179						
2_10	MW-11B & MW_12B	Appendix IV	Barium	mg/L	0%	2	4	5	6	17	0.874	0.908	0.895	2	4	5	6	17	0.874	0.908	0.895						
2_11	MW-11B & MW_12B	Appendix IV	Beryllium	mg/L	100%	2	4	5	6	17	NA	NA	0.383	NA	NA	NA	NA	NA	NA	NA	NA						
2_12	MW-11B & MW_12B	Appendix IV	Cadmium	mg/L	100%	2	4	5	6	17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA						
2_13	MW-11B & MW_12B	Appendix IV	Chromium	mg/L	100%	2	4	5	6	17	NA	NA	0.383	NA	NA	NA	NA	NA	NA	NA	NA						
2_14	MW-11B & MW_12B	Appendix IV	Cobalt	mg/L	100%	2	4	5	6	17	NA	NA	0.383	NA	NA	NA	NA	NA	NA	NA	NA						
2_15	MW-11B & MW_12B	Appendix IV	Lead	mg/L	100%	2	4	5	6	17	NA	0.383	0.383	NA	NA	NA	NA	NA	NA	NA	NA						
2_16	MW-11B & MW_12B	Appendix IV	Lithium	mg/L	0%	2	4	5	6	17	0.561	0.673	0.596	2	4	5	6	17	0.561	0.673	0.596						
2_17	MW-11B & MW_12B	Appendix IV	Mercury	mg/L	94%	2	4	5	6	17	NA	0.383	0.383	0	0	0	1	1	NA	NA	NA						
2_18	MW-11B & MW_12B	Appendix IV	Molybdenum	mg/L	71%	2	4	5	6	17	0.653	0.570	0.604	0	1	3	1	5	0.325	0.128	0.221						
2_19	MW-11B & MW_12B	Appendix IV	Radium-226	pCi/L	0%	2	4	3	5	14	0.231	0.348	0.331	2	4	3	5	14	0.231	0.348	0.331						
2_20	MW-11B & MW_12B	Appendix IV	Radium-226/228	pCi/L	0%	2	2	3	5	12	0.186	0.094	0.258	2	2	3	5	12	0.186	0.094	0.258						
2_21	MW-11B & MW_12B	Appendix IV	Radium-228	pCi/L	0%	2	2	3	5	12	0.074	0.023	*	NA	2	2	3	5	12	0.074	0.023	*	NA				
2_22	MW-11B & MW_12B	Appendix IV	Selenium	mg/L	100%	2	4	5	6	17	NA	NA	0.383	NA	NA	NA	NA	NA	NA	NA	NA						
2_23	MW-11B & MW_12B	Appendix IV	Thallium	mg/L	100%	2	4	5	6	17	NA	NA	0.383	NA	NA	NA	NA	NA	NA	NA	NA						
2_24	MW-11B & MW_12B	Appendix IV	Total Suspended Solids	mg/L	59%	2	4	5	6	17	0.694	0.088	0.225	1	2	2	2	7	0.174	0.052	0.101						
5_37	MW-11B & MW_12B	Part 115	Copper	mg/L	100%	2	4	5	6	17	NA	NA	0.383	NA	NA	NA	NA	NA	NA	NA	NA						
5_38	MW-11B & MW_12B	Part 115	Iron	mg/L	0%	2	4	5	6	17	0.240	0.374	0.206	2	4	5	6	17	0.240	0.374	0.206						
5_39	MW-11B & MW_12B	Part 115	Nickel	mg/L	94%	2	4	5	6	17	0.494	0.534	0.534	0	0	1	0	1	NA	NA	NA						
5_40	MW-11B & MW_12B	Part 115	Silver	mg/L	100%	2	4	5	6	17	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA						
5_41	MW-11B & MW_12B	Part 115	Vanadium	mg/L	100%	2	4	5	6	17	NA	NA	0.383	NA	NA	NA	NA	NA	NA	NA	NA						
5_42	MW-11B & MW_12B	Part 115	Zinc	mg/L	94%	2	4	5	6	17	0.494	0.534	0.534	0	0	1	0	1	NA	NA	NA						

*** p < 0.001, ** p < 0.01, * p < 0.05



Table 8: Spatial Variability Tests

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full						Without Non-Detects											
						Sample Size			p-Value			Sample Size			p-Value								
						MW-11B	MW-12B	Total	Kruskal-Wallis	ANOVA	Log ANOVA	MW-11B	MW-12B	Total	Kruskal-Wallis	ANOVA	Log ANOVA						
1_01	MW-11B & MW_12B	Appendix III	Boron	mg/L	0%	8	9	17	0.001	***	0.000	***	0.000	***	8	9	17	0.001	***	0.000	***	0.000	***
1_02	MW-11B & MW_12B	Appendix III	Calcium	mg/L	0%	8	9	17	0.001	***	0.000	***	0.000	***	8	9	17	0.001	***	0.000	***	0.000	***
1_03	MW-11B & MW_12B	Appendix III	Chloride	mg/L	100%	8	9	17	0.289		0.304		0.304		NA	NA	NA	NA		NA		NA	
1_04	MW-11B & MW_12B	Appendix III	Fluoride	mg/L	100%	8	9	17	0.289		0.304		0.304		NA	NA	NA	NA		NA		NA	
1_05	MW-11B & MW_12B	Appendix III	Sulfate	mg/L	100%	8	9	17	0.289		0.304		0.304		NA	NA	NA	NA		NA		NA	
1_06	MW-11B & MW_12B	Appendix III	Total Dissolved Solids	mg/L	0%	8	9	17	0.001	***	0.000	***	0.000	***	8	9	17	0.001	***	0.000	***	0.000	***
1_07	MW-11B & MW_12B	Appendix III	pH, Field	su	0%	8	9	17	0.007	**	0.007	**	0.006	**	8	9	17	0.007	**	0.007	**	0.006	**
2_04	MW-11B & MW_12B	Appendix IV	Fluoride	mg/L	100%	8	9	17	0.289		0.304		0.304		NA	NA	NA	NA		NA		NA	
2_08	MW-11B & MW_12B	Appendix IV	Antimony	mg/L	100%	8	9	17	NA		NA		0.362		NA	NA	NA	NA		NA		NA	
2_09	MW-11B & MW_12B	Appendix IV	Arsenic	mg/L	53%	8	9	17	0.000	***	0.000	***	0.000	***	8	0	8	NA		NA		NA	
2_10	MW-11B & MW_12B	Appendix IV	Barium	mg/L	0%	8	9	17	0.000	***	0.000	***	0.000	***	8	9	17	0.000	***	0.000	***	0.000	***
2_11	MW-11B & MW_12B	Appendix IV	Beryllium	mg/L	100%	8	9	17	NA		NA		0.362		NA	NA	NA	NA		NA		NA	
2_12	MW-11B & MW_12B	Appendix IV	Cadmium	mg/L	100%	8	9	17	NA		NA		NA		NA	NA	NA	NA		NA		NA	
2_13	MW-11B & MW_12B	Appendix IV	Chromium	mg/L	100%	8	9	17	NA		NA		0.362		NA	NA	NA	NA		NA		NA	
2_14	MW-11B & MW_12B	Appendix IV	Cobalt	mg/L	100%	8	9	17	NA		NA		0.362		NA	NA	NA	NA		NA		NA	
2_15	MW-11B & MW_12B	Appendix IV	Lead	mg/L	100%	8	9	17	NA		0.362		0.362		NA	NA	NA	NA		NA		NA	
2_16	MW-11B & MW_12B	Appendix IV	Lithium	mg/L	0%	8	9	17	0.001	***	0.000	***	0.000	***	8	9	17	0.001	***	0.000	***	0.000	***
2_17	MW-11B & MW_12B	Appendix IV	Mercury	mg/L	94%	8	9	17	NA		0.362		0.362		0	1	1	NA		NA		NA	
2_18	MW-11B & MW_12B	Appendix IV	Molybdenum	mg/L	71%	8	9	17	0.300		0.958		0.859		4	1	5	0.147		0.021	*	0.049	*
2_19	MW-11B & MW_12B	Appendix IV	Radium-226	pCi/L	0%	8	6	14	0.020	*	0.062		0.033	*	8	6	14	0.020	*	0.062		0.033	*
2_20	MW-11B & MW_12B	Appendix IV	Radium-226/228	pCi/L	0%	7	5	12	0.167		0.290		0.115		7	5	12	0.167		0.290		0.115	
2_21	MW-11B & MW_12B	Appendix IV	Radium-228	pCi/L	0%	7	5	12	0.291		0.489		NA		7	5	12	0.291		0.489		NA	
2_22	MW-11B & MW_12B	Appendix IV	Selenium	mg/L	100%	8	9	17	NA		NA		0.362		NA	NA	NA	NA		NA		NA	
2_23	MW-11B & MW_12B	Appendix IV	Thallium	mg/L	100%	8	9	17	NA		NA		0.362		NA	NA	NA	NA		NA		NA	
2_24	MW-11B & MW_12B	Appendix IV	Total Suspended Solids	mg/L	59%	8	9	17	0.958		0.621		0.815		4	3	7	0.372		0.851		0.773	
5_37	MW-11B & MW_12B	Part 115	Copper	mg/L	100%	8	9	17	NA		NA		0.362		NA	NA	NA	NA		NA		NA	
5_38	MW-11B & MW_12B	Part 115	Iron	mg/L	0%	8	9	17	0.009	**	0.000	***	0.001	**	8	9	17	0.009	**	0.000	***	0.001	**
5_39	MW-11B & MW_12B	Part 115	Nickel	mg/L	94%	8	9	17	0.289		0.304		0.304		1	0	1	NA		NA		NA	
5_40	MW-11B & MW_12B	Part 115	Silver	mg/L	100%	8	9	17	NA		NA		NA		NA	NA	NA	NA		NA		NA	
5_41	MW-11B & MW_12B	Part 115	Vanadium	mg/L	100%	8	9	17	NA		NA		0.362		NA	NA	NA	NA		NA		NA	
5_42	MW-11B & MW_12B	Part 115	Zinc	mg/L	94%	8	9	17	0.289		0.304		0.304		1	0	1	NA		NA		NA	

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 9: Trend Tests: Lognormal MLE and MK

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Type	Method	Slope	p-value	Trend
1_01	MW-11B & MW_12B	Appendix III	Boron	mg/L	17	0	0%	Nonparametric	MK	0.000323	0.564	↔
1_02	MW-11B & MW_12B	Appendix III	Calcium	mg/L	17	0	0%	Nonparametric	MK	0.0143	0.076	↔
1_06	MW-11B & MW_12B	Appendix III	Total Dissolved Solids	mg/L	17	0	0%	Nonparametric	MK	-0.0853	0.035	↔
1_07	MW-11B & MW_12B	Appendix III	pH, Field	su	17	0	0%	Parametric	Lognormal MLE	-0.000188	0.020	↔
2_10	MW-11B & MW_12B	Appendix IV	Barium	mg/L	17	0	0%	Nonparametric	MK	-0.00000455	0.678	↔
2_16	MW-11B & MW_12B	Appendix IV	Lithium	mg/L	17	0	0%	Parametric	Lognormal MLE	-0.0000936	0.868	↔
2_19	MW-11B & MW_12B	Appendix IV	Radium-226	pCi/L	14	0	0%	Parametric	Lognormal MLE	0.00105	0.351	↔
2_20	MW-11B & MW_12B	Appendix IV	Radium-226/228	pCi/L	12	0	0%	Parametric	Lognormal MLE	0.00426	0.016	↔
2_21	MW-11B & MW_12B	Appendix IV	Radium-228	pCi/L	12	0	0%	Nonparametric	MK	0.00953	0.011	↔
5_38	MW-11B & MW_12B	Part 115	Iron	mg/L	17	0	0%	Nonparametric	MK	0.00102	0.303	↔

Table 10: Trend Tests: Piecewise Linear-Linear

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Line 1			Line 2			Break 1	R-Squared	Overall Trend
								Slope	p-Value	Trend	Slope	p-Value	Trend			
1_03	MW-11B & MW_12B	Appendix III	Chloride	mg/L	17	17	100%	0.000000000264	1.000	↔	-0.00333	0.480	↔	2022-07-11	0.081	↔
1_04	MW-11B & MW_12B	Appendix III	Fluoride	mg/L	17	17	100%	-0.000991	0.267	↔	0.000882	0.329	↔	2022-08-11	0.155	↔
1_05	MW-11B & MW_12B	Appendix III	Sulfate	mg/L	17	17	100%	0.000000000174	1.000	↔	-0.00245	0.480	↔	2022-07-11	0.081	↔
1_07	MW-11B & MW_12B	Appendix III	pH, Field	su	17	0	0%	-0.00561	0.020	↔	0.000426	0.721	↔	2022-07-07	0.497	↔
2_04	MW-11B & MW_12B	Appendix IV	Fluoride	mg/L	17	17	100%	-0.000991	0.267	↔	0.000882	0.329	↔	2022-08-11	0.155	↔
2_16	MW-11B & MW_12B	Appendix IV	Lithium	mg/L	17	0	0%	-0.000122	0.408	↔	0.0000215	0.468	↔	2022-06-01	0.125	↔
2_18	MW-11B & MW_12B	Appendix IV	Molybdenum	mg/L	17	12	71%	0.0000332	0.422	↔	-0.00000925	0.099	↔	2022-05-18	0.235	↔
2_19	MW-11B & MW_12B	Appendix IV	Radium-226	pCi/L	14	0	0%	0.00586	0.433	↔	-0.000916	0.580	↔	2022-06-01	0.130	↔
2_20	MW-11B & MW_12B	Appendix IV	Radium-226/228	pCi/L	12	0	0%	-0.00526	0.597	↔	0.0210	0.016	↔	2022-09-06	0.625	↔
2_21	MW-11B & MW_12B	Appendix IV	Radium-228	pCi/L	12	0	0%	-0.00777	0.308	↔	0.0178	0.009	↑	2022-08-10	0.745	↔
2_24	MW-11B & MW_12B	Appendix IV	Total Suspended Solids	mg/L	17	10	59%	-0.149	0.266	↔	0.102	0.174	↔	2022-07-13	0.209	↔
5_38	MW-11B & MW_12B	Part 115	Iron	mg/L	17	0	0%	0.0130	0.208	↔	-0.00273	0.622	↔	2022-07-16	0.203	↔
5_39	MW-11B & MW_12B	Part 115	Nickel	mg/L	17	16	94%	0.0000151	0.315	↔	-0.0000902	0.279	↔	2022-07-07	0.156	↔
5_42	MW-11B & MW_12B	Part 115	Zinc	mg/L	17	16	94%	0.0000932	0.315	↔	-0.0000556	0.279	↔	2022-07-07	0.156	↔

Table 11: Trend Tests: Piecewise Linear-Linear-Linear

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Line 1			Line 2			Line 3			Break 1	Break 2	R-Squared	Overall Trend
								Slope	p-Value	Trend	Slope	p-Value	Trend	Slope	p-Value	Trend				
1_03	MW-11B & MW_12B	Appendix III	Chloride	mg/L	17	17	100%	0.00476	0.713	↔	-0.00782	0.234	↔	0.0143	0.362	↔	2022-06-14	2022-11-21	0.239	↔
1_04	MW-11B & MW_12B	Appendix III	Fluoride	mg/L	17	17	100%	-0.00149	0.113	↔	0.00358	0.783	↔	-0.000280	0.820	↔	2022-08-11	2022-09-30	0.266	↔
2_04	MW-11B & MW_12B	Appendix IV	Fluoride	mg/L	17	17	100%	-0.00149	0.113	↔	0.00358	0.783	↔	-0.000280	0.820	↔	2022-08-11	2022-09-30	0.266	↔
2_18	MW-11B & MW_12B	Appendix IV	Molybdenum	mg/L	17	12	71%	0.0000371	0.404	↔	-0.0000123	0.137	↔	0.00000519	0.921	↔	2022-05-18	2022-11-23	0.263	↔
2_19	MW-11B & MW_12B	Appendix IV	Radium-226	pCi/L	14	0	0%	0.0106	0.064	↔	-0.00795	0.566	↔	0.00317	0.219	↔	2022-06-02	2022-08-31	0.468	↔

(Table continues on next page)



Table 11: Trend Tests: Piecewise Linear-Linear-Linear (*continued*)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Line 1			Line 2			Line 3			Break 1	Break 2	R-Squared	Overall Trend
								Slope	p-Value	Trend	Slope	p-Value	Trend	Slope	p-Value	Trend				
5_39	MW-11B & MW_12B	Part 115	Nickel	mg/L	17	16	94%	0.0000229	0.146	↔	-0.0000286	0.487	↔	0.00000447	0.762	↔	2022-07-07	2022-09-24	0.268	↔
5_42	MW-11B & MW_12B	Part 115	Zinc	mg/L	17	16	94%	0.000143	0.214	↔	-0.000185	0.290	↔	0.0000261	0.774	↔	2022-07-06	2022-09-21	0.273	↔

Table 1: Summary Statistics, Non-Detects Included

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Date Range	Distributions Fit ^a	Recommended Distribution	Mean	Median	Minimum	Maximum	SD	CV	MAD/0.675	Skewness	Kurtosis
1_01	MW-7C	Appendix III	Boron	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	6.60	6.54	6.29	7.24	0.260	0.0393	0.141	1.74	4.09
1_02	MW-7C	Appendix III	Calcium	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Normal	Normal	244	246	183	277	25.5	0.104	10.4	-1.46	3.90
1_03	MW-7C	Appendix III	Chloride	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	93.8	93.0	90.0	101	3.08	0.0329	2.22	1.43	2.89
1_04	MW-7C	Appendix III	Fluoride	mg/L	10	10	100%	2022-03-10 to 2023-02-08		Nonparametric	1.00	1.00	1.00	1.00	0	0	0	NA	NA
1_05	MW-7C	Appendix III	Sulfate	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	705	695	660	761	35.8	0.0508	40.7	0.391	-1.37
1_06	MW-7C	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Nonparametric	Nonparametric	1404	1365	1360	1500	59.3	0.0422	7.41	0.937	-0.905
1_07	MW-7C	Appendix III	pH, Field	su	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	7.34	7.32	7.23	7.51	0.0968	0.0132	0.0889	0.727	-0.553
2_04	MW-7C	Appendix IV	Fluoride	mg/L	10	10	100%	2022-03-10 to 2023-02-08		Nonparametric	1.00	1.00	1.00	1.00	0	0	0	NA	NA
2_08	MW-7C	Appendix IV	Antimony	mg/L	10	10	100%	2022-03-10 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
2_09	MW-7C	Appendix IV	Arsenic	mg/L	10	0	0%	2022-03-10 to 2023-02-08		Nonparametric	0.00620	0.00600	0.00500	0.00700	0.000632	0.102	0	-0.132	0.179
2_10	MW-7C	Appendix IV	Barium	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.0436	0.0435	0.0410	0.0470	0.00232	0.0532	0.00370	0.142	-1.72
2_11	MW-7C	Appendix IV	Beryllium	mg/L	10	10	100%	2022-03-10 to 2023-02-08		Nonparametric	0.00100	0.00100	0.00100	0.00100	0	0	0	NA	NA
2_13	MW-7C	Appendix IV	Cadmium	mg/L	10	7	70%	2022-03-10 to 2023-02-08		Nonparametric	0.000590	0.000500	0.000500	0.000900	0.000152	0.258	0	1.38	0.431
2_15	MW-7C	Appendix IV	Chromium	mg/L	10	10	100%	2022-03-10 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
2_16	MW-7C	Appendix IV	Cobalt	mg/L	10	10	100%	2022-03-10 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
2_18	MW-7C	Appendix IV	Lead	mg/L	10	10	100%	2022-03-10 to 2023-02-08		Nonparametric	0.00300	0.00300	0.00300	0.00300	0	0	0	NA	NA
2_19	MW-7C	Appendix IV	Lithium	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.129	0.128	0.121	0.138	0.00533	0.0412	0.00519	0.428	-0.299
2_21	MW-7C	Appendix IV	Mercury	mg/L	10	10	100%	2022-03-10 to 2023-02-08		Nonparametric	0.000200	0.000200	0.000200	0.000200	0	0	0	NA	NA
2_22	MW-7C	Appendix IV	Molybdenum	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.399	0.404	0.377	0.422	0.0155	0.0388	0.0185	-0.211	-1.30
2_24	MW-7C	Appendix IV	Radium-226	pCi/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.694	0.643	0.193	1.11	0.273	0.393	0.313	-0.257	-0.184
2_25	MW-7C	Appendix IV	Radium-226/228	pCi/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	2.32	2.51	0.773	3.66	1.19	0.513	1.44	-0.239	-1.91
2_26	MW-7C	Appendix IV	Radium-228	pCi/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	1.63	1.75	0.204	3.09	1.01	0.619	1.27	-0.0299	-1.49
2_27	MW-7C	Appendix IV	Selenium	mg/L	10	10	100%	2022-03-10 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
2_29	MW-7C	Appendix IV	Thallium	mg/L	10	10	100%	2022-03-10 to 2023-02-08		Nonparametric	0.00200	0.00200	0.00200	0.00200	0	0	0	NA	NA
2_30	MW-7C	Appendix IV	Total Suspended Solids	mg/L	9	3	33%	2022-03-10 to 2023-02-08	Lognormal	Lognormal	8.44	7.00	3.00	27.0	7.45	0.882	4.44	2.29	5.96
3_12	MW-7C	Other	Bicarbonate	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	160	160	150	172	8.46	0.0528	14.8	0.0785	-1.34
3_14	MW-7C	Other	Carbonate	mg/L	10	10	100%	2022-03-10 to 2023-02-08		Nonparametric	10.0	10.0	10.0	10.0	0	0	0	NA	NA
3_17	MW-7C	Other	Hardness	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	785	770	740	860	43.0	0.0548	43.7	0.644	-1.04
3_20	MW-7C	Other	Magnesium	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	41.4	42.1	33.7	44.9	3.14	0.0758	2.30	-1.74	4.01
3_23	MW-7C	Other	Potassium	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	5.66	5.79	4.92	6.14	0.425	0.0751	0.326	-0.834	-0.612
3_28	MW-7C	Other	Sodium	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Nonparametric	Nonparametric	95.4	97	79.0	99.8	6.01	0.0631	2.22	-2.69	7.84
5_37	MW-7C	Part 115	Copper	mg/L	10	10	100%	2022-03-10 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
5_38	MW-7C	Part 115	Iron	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	4.02	4.11	3.67	4.34	0.229	0.0570	0.296	-0.201	-1.38
5_39	MW-7C	Part 115	Nickel	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Nonparametric	Nonparametric	0.00810	0.00800	0.00700	0.0110	0.00137	0.169	0.00148	1.40	1.21
5_40	MW-7C	Part 115	Silver	mg/L	10	10	100%	2022-03-10 to 2023-02-08		Nonparametric	0.000500	0.000500	0.000500	0.000500	0	0	0	NA	NA
5_41	MW-7C	Part 115	Vanadium	mg/L	10	10	100%	2022-03-10 to 2023-02-08		Nonparametric	0.00500	0.00500	0.00500	0.00500	0	0	0	NA	NA
5_42	MW-7C	Part 115	Zinc	mg/L	10	8	80%	2022-03-10 to 2023-02-08		Nonparametric	0.00530	0.00500	0.00500	0.00700	0.000675	0.127	0	2.28	4.77

^a Non-detects are excluded from goodness-of-fit tests.



Table 2: Summary Statistics, Non-Detects Excluded

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Date Range	Distributions Fit	Recommended Distribution	Mean	Median	Minimum	Maximum	SD	CV	MAD/0.675	Skewness	Kurtosis
1_01	MW-7C	Appendix III	Boron	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	6.60	6.54	6.29	7.24	0.260	0.0393	0.141	1.74	4.09
1_02	MW-7C	Appendix III	Calcium	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Normal	Normal	244	246	183	277	25.5	0.104	10.4	-1.46	3.90
1_03	MW-7C	Appendix III	Chloride	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	93.8	93.0	90.0	101	3.08	0.0329	2.22	1.43	2.89
1_05	MW-7C	Appendix III	Sulfate	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	705	695	660	761	35.8	0.0508	40.7	0.391	-1.37
1_06	MW-7C	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Nonparametric	Nonparametric	1404	1365	1360	1500	59.3	0.0422	7.41	0.937	-0.905
1_07	MW-7C	Appendix III	pH, Field	su	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	7.34	7.32	7.23	7.51	0.0968	0.0132	0.0889	0.727	-0.553
2_09	MW-7C	Appendix IV	Arsenic	mg/L	10	0	0%	2022-03-10 to 2023-02-08		Nonparametric	0.00620	0.00600	0.00500	0.00700	0.000632	0.102	0	-0.132	0.179
2_10	MW-7C	Appendix IV	Barium	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.0436	0.0435	0.0410	0.0470	0.00232	0.0532	0.00370	0.142	-1.72
2_13	MW-7C	Appendix IV	Cadmium	mg/L	10	7	70%	2022-03-10 to 2023-02-08		Nonparametric	0.000800	0.000800	0.000700	0.000900	0.000100	0.125	0.000148	-0.00000000000000485	NA
2_19	MW-7C	Appendix IV	Lithium	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.129	0.128	0.121	0.138	0.00533	0.0412	0.00519	0.428	-0.299
2_22	MW-7C	Appendix IV	Molybdenum	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.399	0.404	0.377	0.422	0.0155	0.0388	0.0185	-0.211	-1.30
2_24	MW-7C	Appendix IV	Radium-226	pCi/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	0.694	0.643	0.193	1.11	0.273	0.393	0.313	-0.257	-0.184
2_25	MW-7C	Appendix IV	Radium-226/228	pCi/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	2.32	2.51	0.773	3.66	1.19	0.513	1.44	-0.239	-1.91
2_26	MW-7C	Appendix IV	Radium-228	pCi/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	1.63	1.75	0.204	3.09	1.01	0.619	1.27	-0.0299	-1.49
2_30	MW-7C	Appendix IV	Total Suspended Solids	mg/L	9	3	33%	2022-03-10 to 2023-02-08	Lognormal	Lognormal	11.2	8.50	6.00	27.0	7.88	0.706	2.22	2.27	5.34
3_12	MW-7C	Other	Bicarbonate	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	160	160	150	172	8.46	0.0528	14.8	0.0785	-1.34
3_17	MW-7C	Other	Hardness	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	785	770	740	860	43.0	0.0548	43.7	0.644	-1.04
3_20	MW-7C	Other	Magnesium	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	41.4	42.1	33.7	44.9	3.14	0.0758	2.30	-1.74	4.01
3_23	MW-7C	Other	Potassium	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	5.66	5.79	4.92	6.14	0.425	0.0751	0.326	-0.834	-0.612
3_28	MW-7C	Other	Sodium	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Nonparametric	Nonparametric	95.4	97	79.0	99.8	6.01	0.0631	2.22	-2.69	7.84
5_38	MW-7C	Part 115	Iron	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Gamma; Lognormal; Normal	Normal	4.02	4.11	3.67	4.34	0.229	0.0570	0.296	-0.201	-1.38
5_39	MW-7C	Part 115	Nickel	mg/L	10	0	0%	2022-03-10 to 2023-02-08	Nonparametric	Nonparametric	0.00810	0.00800	0.00700	0.0110	0.00137	0.169	0.00148	1.40	1.21
5_42	MW-7C	Part 115	Zinc	mg/L	10	8	80%	2022-03-10 to 2023-02-08		Nonparametric	0.00650	0.00650	0.00600	0.00700	0.000707	0.109	0.000741	NA	NA

Table 3: Goodness-of-Fit Tests, Non-Detects Excluded

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Normal		Lognormal		Gamma				Log-SD (NDs excl.)	ProUCL Distributions Fit	Recommended Distribution				
								S-W		Lilliefors		S-W		Lilliefors					K-S		A-D	
								Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value				Stat.	p-Value	Stat.	p-Value
1_01	MW-7C	Appendix III	Boron	mg/L	10	0	0%	0.843	0.049	0.200	0.308	0.859	0.074	0.191	0.376	0.187	>= 0.10	0.613	>= 0.10	0.038	Gamma; Lognormal; Normal	Normal
1_02	MW-7C	Appendix III	Calcium	mg/L	10	0	0%	0.838	0.042	0.248	0.081	0.794	0.012	0.271	0.036	0.259	0.05 <= p < 0.10	0.838	0.01 <= p < 0.05	0.113	Gamma; Normal	Normal
1_03	MW-7C	Appendix III	Chloride	mg/L	10	0	0%	0.889	0.164	0.202	0.292	0.900	0.218	0.199	0.317	0.204	>= 0.10	0.458	>= 0.10	0.032	Gamma; Lognormal; Normal	Normal
1_04	MW-7C	Appendix III	Fluoride	mg/L	10	10	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
1_05	MW-7C	Appendix III	Sulfate	mg/L	10	0	0%	0.929	0.439	0.191	0.377	0.932	0.472	0.187	0.415	0.197	>= 0.10	0.341	>= 0.10	0.051	Gamma; Lognormal; Normal	Normal
1_06	MW-7C	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	0.744	0.003	0.317	0.005	0.746	0.003	0.316	0.006	0.324	< 0.01	1.195	< 0.01	0.042	Nonparametric	Nonparametric
1_07	MW-7C	Appendix III	pH, Field	su	10	0	0%	0.910	0.281	0.202	0.295	0.912	0.295	0.200	0.307	0.206	>= 0.10	0.420	>= 0.10	0.013	Gamma; Lognormal; Normal	Normal
2_04	MW-7C	Appendix IV	Fluoride	mg/L	10	10	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_08	MW-7C	Appendix IV	Antimony	mg/L	10	10	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_09	MW-7C	Appendix IV	Arsenic	mg/L	10	0	0%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		0.104		Nonparametric
2_10	MW-7C	Appendix IV	Barium	mg/L	10	0	0%	0.891	0.175	0.169	0.578	0.890	0.168	0.172	0.553	0.183	>= 0.10	0.488	>= 0.10	0.053	Gamma; Lognormal; Normal	Normal
2_11	MW-7C	Appendix IV	Beryllium	mg/L	10	10	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_13	MW-7C	Appendix IV	Cadmium	mg/L	10	7	70%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		0.126		Nonparametric
2_15	MW-7C	Appendix IV	Chromium	mg/L	10	10	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_16	MW-7C	Appendix IV	Cobalt	mg/L	10	10	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_18	MW-7C	Appendix IV	Lead	mg/L	10	10	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_19	MW-7C	Appendix IV	Lithium	mg/L	10	0	0%	0.953	0.708	0.140	0.834	0.958	0.765	0.133	0.885	0.136	>= 0.10	0.259	>= 0.10	0.041	Gamma; Lognormal; Normal	Normal
2_21	MW-7C	Appendix IV	Mercury	mg/L	10	10	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_22	MW-7C	Appendix IV	Molybdenum	mg/L	10	0	0%	0.938	0.534	0.167	0.600	0.936	0.505	0.173	0.540	0.175	>= 0.10	0.352	>= 0.10	0.039	Gamma; Lognormal; Normal	Normal
2_24	MW-7C	Appendix IV	Radium-226	pCi/L	10	0	0%	0.972	0.905	0.138	0.854	0.872	0.105	0.214	0.216	0.177	>= 0.10	0.364	>= 0.10	0.504	Gamma; Lognormal; Normal	Normal
2_25	MW-7C	Appendix IV	Radium-226/228	pCi/L	10	0	0%	0.858	0.072	0.223	0.171	0.834	0.038	0.247	0.084	0.254	0.05 <= p < 0.10	0.698	0.05 <= p < 0.10	0.634	Gamma; Lognormal; Normal	Normal
2_26	MW-7C	Appendix IV	Radium-228	pCi/L	10	0	0%	0.938	0.533	0.182	0.455	0.887	0.157	0.224	0.164	0.230	>= 0.10	0.408	>= 0.10	0.883	Gamma; Lognormal; Normal	Normal
2_27	MW-7C	Appendix IV	Selenium	mg/L	10	10	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_29	MW-7C	Appendix IV	Thallium	mg/L	10	10	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_30	MW-7C	Appendix IV	Total Suspended Solids	mg/L	9	3	33%	0.670	0.003	0.392	0.004	0.813	0.076	0.308	0.078	0.345	0.01 <= p < 0.05	0.769	0.01 <= p < 0.05	0.535	Lognormal	Lognormal
3_12	MW-7C	Other	Bicarbonate	mg/L	10	0	0%	0.857	0.071	0.209	0.245	0.856	0.069	0.200	0.309	0.203	>= 0.10	0.692	0.05 <= p < 0.10	0.053	Gamma; Lognormal; Normal	Normal
3_14	MW-7C	Other	Carbonate	mg/L	10	10	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
3_17	MW-7C	Other	Hardness	mg/L	10	0	0%	0.893	0.183	0.188	0.404	0.897	0.202	0.184	0.440	0.193	>= 0.10	0.489	>= 0.10	0.054	Gamma; Lognormal; Normal	Normal
3_20	MW-7C	Other	Magnesium	mg/L	10	0	0%	0.845	0.050	0.230	0.140	0.811	0.020	0.250	0.077	0.228	>= 0.10	0.692	0.05 <= p < 0.10	0.081	Gamma; Lognormal; Normal	Normal
3_23	MW-7C	Other	Potassium	mg/L	10	0	0%	0.891	0.176	0.216	0.206	0.880	0.129	0.229	0.144	0.226	>= 0.10	0.562	>= 0.10	0.077	Gamma; Lognormal; Normal	Normal
3_28	MW-7C	Other	Sodium	mg/L	10	0	0%	0.643	0.000	0.321	0.004	0.618	0.000	0.338	0.002	0.329	< 0.01	1.570	< 0.01	0.068	Nonparametric	Nonparametric
5_37	MW-7C	Part 115	Copper	mg/L	10	10	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
5_38	MW-7C	Part 115	Iron	mg/L	10	0	0%	0.917	0.329	0.254	0.066	0.914	0.310	0.261	0.052	0.268	0.01 <= p < 0.05	0.515	>= 0.10	0.057	Gamma; Lognormal; Normal	Normal
5_39	MW-7C	Part 115	Nickel	mg/L	10	0	0%	0.775	0.007	0.329	0.003	0.799	0.014	0.302	0.010	0.312	< 0.01	0.964	0.01 <= p < 0.05	0.157	Nonparametric	Nonparametric
5_40	MW-7C	Part 115	Silver	mg/L	10	10	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
5_41	MW-7C	Part 115	Vanadium	mg/L	10	10	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
5_42	MW-7C	Part 115	Zinc	mg/L	10	8	80%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		0.109		Nonparametric

Note: p-values above 0.05 suggest a fit to the tested distribution; a distribution passes its GOF test when at least one of the two p-values is above 0.05.

Table 4: Autocorrelation Tests, Non-Detects Excluded

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Autocorrelation	Box-Ljung p-value	Sig.
1_01	MW-7C	Appendix III	Boron	mg/L	10	0	0%	-0.312	0.254	
1_02	MW-7C	Appendix III	Calcium	mg/L	10	0	0%	0.081	0.766	
1_03	MW-7C	Appendix III	Chloride	mg/L	10	0	0%	0.271	0.323	
1_05	MW-7C	Appendix III	Sulfate	mg/L	10	0	0%	0.604	0.028	*
1_06	MW-7C	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	0.710	0.010	**
1_07	MW-7C	Appendix III	pH, Field	su	10	0	0%	0.326	0.234	
2_09	MW-7C	Appendix IV	Arsenic	mg/L	10	0	0%	0.211	0.441	
2_10	MW-7C	Appendix IV	Barium	mg/L	10	0	0%	-0.371	0.175	
2_13	MW-7C	Appendix IV	Cadmium	mg/L	10	7	70%	0.000	1.000	
2_19	MW-7C	Appendix IV	Lithium	mg/L	10	0	0%	0.217	0.429	
2_22	MW-7C	Appendix IV	Molybdenum	mg/L	10	0	0%	-0.384	0.161	
2_24	MW-7C	Appendix IV	Radium-226	pCi/L	10	0	0%	-0.162	0.555	
2_25	MW-7C	Appendix IV	Radium-226/228	pCi/L	10	0	0%	-0.017	0.951	
2_26	MW-7C	Appendix IV	Radium-228	pCi/L	10	0	0%	-0.019	0.944	
2_30	MW-7C	Appendix IV	Total Suspended Solids	mg/L	9	3	33%	0.093	0.774	
3_12	MW-7C	Other	Bicarbonate	mg/L	10	0	0%	-0.187	0.496	
3_17	MW-7C	Other	Hardness	mg/L	10	0	0%	0.667	0.015	*
3_20	MW-7C	Other	Magnesium	mg/L	10	0	0%	0.154	0.575	
3_23	MW-7C	Other	Potassium	mg/L	10	0	0%	0.244	0.374	
3_28	MW-7C	Other	Sodium	mg/L	10	0	0%	0.064	0.816	
5_38	MW-7C	Part 115	Iron	mg/L	10	0	0%	0.039	0.887	
5_39	MW-7C	Part 115	Nickel	mg/L	10	0	0%	0.473	0.084	
5_42	MW-7C	Part 115	Zinc	mg/L	10	8	80%	-0.500	0.157	

*** p < 0.001, ** p < 0.01, * p < 0.05



Table 5: Outlier Counts by Date

Date	Count
2022-03-10	1
2022-05-19	2
2022-09-01	1

Table 6: Outliers Identified at the 1% Significance Level, Non-Detects Excluded

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	No. Detects	Date	Value
1_01	MW-7C	Appendix III	Boron	mg/L	10	0	0%	10	2022-09-01	7.24
2_30	MW-7C	Appendix IV	Total Suspended Solids	mg/L	9	3	33%	6	2022-03-10	27.0
3_20	MW-7C	Other	Magnesium	mg/L	10	0	0%	10	2022-05-19	33.7
3_28	MW-7C	Other	Sodium	mg/L	10	0	0%	10	2022-05-19	79.0



Table 7: Seasonality Tests

ID	Well	Constituent Type	Constituent	Unit	% NDs	Full							Without Non-Detects														
						Sample Size					p-Value		Sample Size					p-Value									
						Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis	ANOVA	Log ANOVA						
1_01	MW-7C	Appendix III	Boron	mg/L	0%	1	4	2	3	10	0.911	0.865	0.876	1	4	2	3	10	0.911	0.865	0.876						
1_02	MW-7C	Appendix III	Calcium	mg/L	0%	1	4	2	3	10	0.584	0.996	0.999	1	4	2	3	10	0.584	0.996	0.999						
1_03	MW-7C	Appendix III	Chloride	mg/L	0%	1	4	2	3	10	0.069	0.134	0.122	1	4	2	3	10	0.069	0.134	0.122						
1_04	MW-7C	Appendix III	Fluoride	mg/L	100%	1	4	2	3	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA						
1_05	MW-7C	Appendix III	Sulfate	mg/L	0%	1	4	2	3	10	0.048	*	0.003	**	0.003	**	1	4	2	3	10	0.048	*	0.003	**	0.003	**
1_06	MW-7C	Appendix III	Total Dissolved Solids	mg/L	0%	1	4	2	3	10	0.053		0.007	**	0.006	**	1	4	2	3	10	0.053		0.007	**	0.006	**
1_07	MW-7C	Appendix III	pH, Field	su	0%	1	4	2	3	10	0.161	0.196	0.194	1	4	2	3	10	0.161	0.196	0.194						
2_04	MW-7C	Appendix IV	Fluoride	mg/L	100%	1	4	2	3	10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA						
2_08	MW-7C	Appendix IV	Antimony	mg/L	100%	1	4	2	3	10	NA	0.758	NA	NA	NA	NA	NA	NA	NA	NA	NA						
2_09	MW-7C	Appendix IV	Arsenic	mg/L	0%	1	4	2	3	10	0.129	0.112	0.128	1	4	2	3	10	0.129	0.112	0.128						
2_10	MW-7C	Appendix IV	Barium	mg/L	0%	1	4	2	3	10	0.236	0.223	0.214	1	4	2	3	10	0.236	0.223	0.214						
2_11	MW-7C	Appendix IV	Beryllium	mg/L	100%	1	4	2	3	10	NA	0.758	0.758	NA	NA	NA	NA	NA	NA	NA	NA						
2_13	MW-7C	Appendix IV	Cadmium	mg/L	70%	1	4	2	3	10	0.307	0.289	0.310	0	1	0	2	3	0.221	0.333	0.310						
2_15	MW-7C	Appendix IV	Chromium	mg/L	100%	1	4	2	3	10	NA	0.758	NA	NA	NA	NA	NA	NA	NA	NA	NA						
2_16	MW-7C	Appendix IV	Cobalt	mg/L	100%	1	4	2	3	10	NA	0.758	NA	NA	NA	NA	NA	NA	NA	NA	NA						
2_18	MW-7C	Appendix IV	Lead	mg/L	100%	1	4	2	3	10	NA	0.758	0.758	NA	NA	NA	NA	NA	NA	NA	NA						
2_19	MW-7C	Appendix IV	Lithium	mg/L	0%	1	4	2	3	10	0.686	0.725	0.730	1	4	2	3	10	0.686	0.725	0.730						
2_21	MW-7C	Appendix IV	Mercury	mg/L	100%	1	4	2	3	10	NA	0.758	0.758	NA	NA	NA	NA	NA	NA	NA	NA						
2_22	MW-7C	Appendix IV	Molybdenum	mg/L	0%	1	4	2	3	10	0.281	0.197	0.198	1	4	2	3	10	0.281	0.197	0.198						
2_24	MW-7C	Appendix IV	Radium-226	pCi/L	0%	1	4	2	3	10	0.484	0.476	0.558	1	4	2	3	10	0.484	0.476	0.558						
2_25	MW-7C	Appendix IV	Radium-226/228	pCi/L	0%	1	4	2	3	10	0.467	0.486	0.599	1	4	2	3	10	0.467	0.486	0.599						
2_26	MW-7C	Appendix IV	Radium-228	pCi/L	0%	1	4	2	3	10	0.482	0.465	0.551	1	4	2	3	10	0.482	0.465	0.551						
2_27	MW-7C	Appendix IV	Selenium	mg/L	100%	1	4	2	3	10	NA	0.758	NA	NA	NA	NA	NA	NA	NA	NA	NA						
2_29	MW-7C	Appendix IV	Thallium	mg/L	100%	1	4	2	3	10	NA	0.758	0.758	NA	NA	NA	NA	NA	NA	NA	NA						
2_30	MW-7C	Appendix IV	Total Suspended Solids	mg/L	33%	1	3	2	3	9	0.100	0.291	0.144	1	3	1	1	6	0.219	0.800	0.662						
3_12	MW-7C	Other	Bicarbonate	mg/L	0%	1	4	2	3	10	0.380	0.557	0.564	1	4	2	3	10	0.380	0.557	0.564						
3_14	MW-7C	Other	Carbonate	mg/L	100%	1	4	2	3	10	NA	0.758	NA	NA	NA	NA	NA	NA	NA	NA	NA						
3_17	MW-7C	Other	Hardness	mg/L	0%	1	4	2	3	10	0.075	0.006	**	0.006	**	1	4	2	3	10	0.075	0.006	**	0.006	**		
3_20	MW-7C	Other	Magnesium	mg/L	0%	1	4	2	3	10	0.349	0.929	0.939	1	4	2	3	10	0.349	0.929	0.939						
3_23	MW-7C	Other	Potassium	mg/L	0%	1	4	2	3	10	0.061	0.029	*	0.033	*	1	4	2	3	10	0.061	0.029	*	0.033	*		
3_28	MW-7C	Other	Sodium	mg/L	0%	1	4	2	3	10	0.194	0.687	0.702	1	4	2	3	10	0.194	0.687	0.702						
5_37	MW-7C	Part 115	Copper	mg/L	100%	1	4	2	3	10	NA	0.758	NA	NA	NA	NA	NA	NA	NA	NA	NA						
5_38	MW-7C	Part 115	Iron	mg/L	0%	1	4	2	3	10	0.068	0.018	*	0.016	*	1	4	2	3	10	0.068	0.018	*	0.016	*		
5_39	MW-7C	Part 115	Nickel	mg/L	0%	1	4	2	3	10	0.138	0.181	0.156	1	4	2	3	10	0.138	0.181	0.156						
5_40	MW-7C	Part 115	Silver	mg/L	100%	1	4	2	3	10	NA	0.758	0.758	NA	NA	NA	NA	NA	NA	NA	NA						
5_41	MW-7C	Part 115	Vanadium	mg/L	100%	1	4	2	3	10	NA	0.758	NA	NA	NA	NA	NA	NA	NA	NA	NA						
5_42	MW-7C	Part 115	Zinc	mg/L	80%	1	4	2	3	10	0.635	0.796	0.788	0	1	1	0	2	0.317	NA	NA						

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 8: Trend Tests: Lognormal MLE and MK

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Type	Method	Slope	p-value	Trend
1_01	MW-7C	Appendix III	Boron	mg/L	10	0	0%	Parametric	Lognormal MLE	0.00000184	0.987	↔
1_02	MW-7C	Appendix III	Calcium	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.000174	0.582	↔
1_03	MW-7C	Appendix III	Chloride	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.000124	0.138	↔
1_05	MW-7C	Appendix III	Sulfate	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.000318	0.002	↓
1_06	MW-7C	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	Nonparametric	MK	-0.452	0.005	↓
1_07	MW-7C	Appendix III	pH, Field	su	10	0	0%	Parametric	Lognormal MLE	-0.0000178	0.630	↔
2_09	MW-7C	Appendix IV	Arsenic	mg/L	10	0	0%	Nonparametric	MK	-0.00000427	0.022	↔
2_10	MW-7C	Appendix IV	Barium	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.000225	0.093	↔
2_19	MW-7C	Appendix IV	Lithium	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.0000389	0.738	↔
2_22	MW-7C	Appendix IV	Molybdenum	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.000141	0.167	↔
2_24	MW-7C	Appendix IV	Radium-226	pCi/L	10	0	0%	Parametric	Lognormal MLE	0.000336	0.814	↔
2_25	MW-7C	Appendix IV	Radium-226/228	pCi/L	10	0	0%	Parametric	Lognormal MLE	-0.00113	0.525	↔
2_26	MW-7C	Appendix IV	Radium-228	pCi/L	10	0	0%	Parametric	Lognormal MLE	-0.00189	0.440	↔
2_30	MW-7C	Appendix IV	Total Suspended Solids	mg/L	9	3	33%	Parametric	Lognormal MLE	-0.00431	0.105	↔
3_12	MW-7C	Other	Bicarbonate	mg/L	10	0	0%	Parametric	Lognormal MLE	0.0000877	0.553	↔
3_17	MW-7C	Other	Hardness	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.000427	0.000	↓
3_20	MW-7C	Other	Magnesium	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.0000203	0.930	↔
3_23	MW-7C	Other	Potassium	mg/L	10	0	0%	Parametric	Lognormal MLE	0.000527	0.000	↑
3_28	MW-7C	Other	Sodium	mg/L	10	0	0%	Nonparametric	MK	0.00746	0.367	↔
5_38	MW-7C	Part 115	Iron	mg/L	10	0	0%	Parametric	Lognormal MLE	-0.000328	0.010	↓
5_39	MW-7C	Part 115	Nickel	mg/L	10	0	0%	Nonparametric	MK	-0.00000805	0.009	↓

Table 9: Trend Tests: Piecewise Linear-Linear

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Line 1			Line 2			Break 1	R-Squared	Overall Trend
								Slope	p-Value	Trend	Slope	p-Value	Trend			
1_01	MW-7C	Appendix III	Boron	mg/L	10	0	0%	0.00173	0.334	↔	-0.00263	0.418	↔	2022-09-01	0.246	↔
1_02	MW-7C	Appendix III	Calcium	mg/L	10	0	0%	-0.810	0.278	↔	0.134	0.180	↔	2022-05-18	0.613	↔
1_03	MW-7C	Appendix III	Chloride	mg/L	10	0	0%	-0.0471	0.158	↔	0.0149	0.435	↔	2022-07-18	0.502	↔
1_05	MW-7C	Appendix III	Sulfate	mg/L	10	0	0%	-0.760	0.004	↓	0.0686	0.527	↔	2022-06-30	0.879	↔
1_06	MW-7C	Appendix III	Total Dissolved Solids	mg/L	10	0	0%	-1.29	0.000	↓	-0.0206	0.630	↔	2022-06-23	0.993	↔
1_07	MW-7C	Appendix III	pH, Field	su	10	0	0%	-0.000631	0.330	↔	0.00125	0.296	↔	2022-10-05	0.295	↔
2_09	MW-7C	Appendix IV	Arsenic	mg/L	10	0	0%	-0.00000611	0.036	↔	0.00000386	0.623	↔	2022-10-23	0.624	↔
2_13	MW-7C	Appendix IV	Cadmium	mg/L	10	7	70%	0.00000104	0.336	↔	-0.000000882	0.644	↔	2022-09-19	0.213	↔
2_19	MW-7C	Appendix IV	Lithium	mg/L	10	0	0%	0.0000407	0.368	↔	-0.0000627	0.212	↔	2022-08-19	0.329	↔
2_22	MW-7C	Appendix IV	Molybdenum	mg/L	10	0	0%	-0.000159	0.601	↔	-0.00000517	0.957	↔	2022-06-22	0.227	↔
2_24	MW-7C	Appendix IV	Radium-226	pCi/L	10	0	0%	-0.00314	0.136	↔	0.00341	0.132	↔	2022-07-28	0.514	↔
2_25	MW-7C	Appendix IV	Radium-226/228	pCi/L	10	0	0%	-0.0151	0.090	↔	0.0139	0.133	↔	2022-08-24	0.575	↔
2_26	MW-7C	Appendix IV	Radium-228	pCi/L	10	0	0%	-0.0120	0.113	↔	0.0106	0.178	↔	2022-08-31	0.555	↔
2_30	MW-7C	Appendix IV	Total Suspended Solids	mg/L	9	3	33%	-0.257	0.018	↔	0.00536	0.800	↔	2022-05-26	0.848	↔
3_17	MW-7C	Other	Hardness	mg/L	10	0	0%	-0.676	0.002	↓	-0.0376	0.653	↔	2022-07-27	0.949	↔

(Table continues on next page)

Table 9: Trend Tests: Piecewise Linear-Linear (*continued*)

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Line 1			Line 2			Break 1	R-Squared	Overall Trend
								Slope	p-Value	Trend	Slope	p-Value	Trend			
3_20	MW-7C	Other	Magnesium	mg/L	10	0	0%	-0.103	0.237	↔	0.0232	0.062	↔	2022-05-18	0.661	↔
3_23	MW-7C	Other	Potassium	mg/L	10	0	0%	0.00398	0.073	↔	0.0000751	0.983	↔	2022-10-05	0.651	↔
3_28	MW-7C	Other	Sodium	mg/L	10	0	0%	-0.136	0.483	↔	0.0537	0.064	↔	2022-05-18	0.499	↔
5_39	MW-7C	Part 115	Nickel	mg/L	10	0	0%	-0.0000714	0.008	↓	-0.00000338	0.208	↔	2022-04-15	0.902	↔

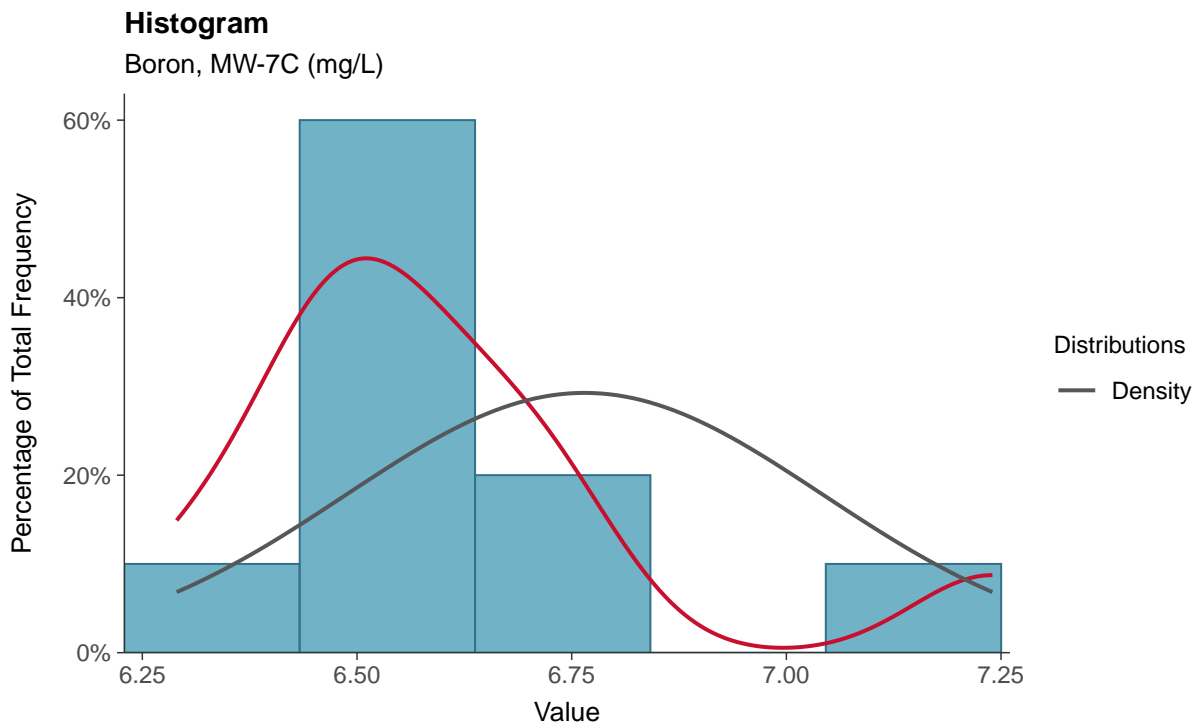
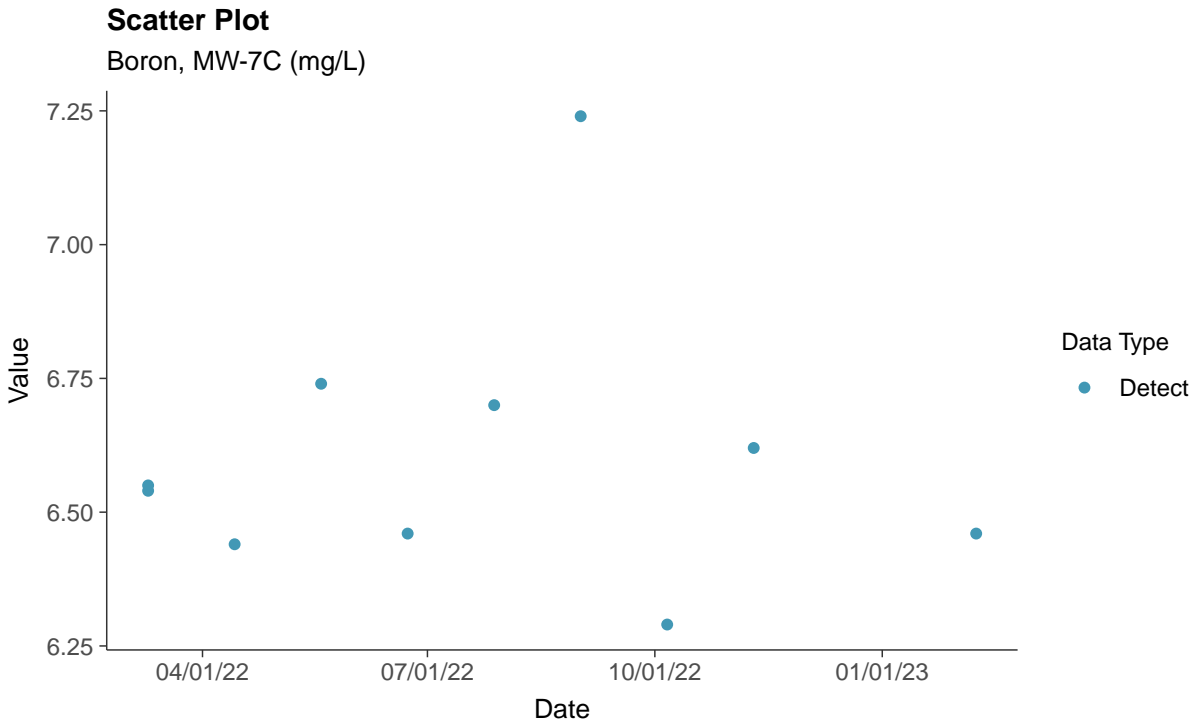
Table 10: Trend Tests: Piecewise Linear-Linear-Linear

ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Line 1			Line 2			Line 3			Break 1	Break 2	R-Squared	Overall Trend
								Slope	p-Value	Trend	Slope	p-Value	Trend	Slope	p-Value	Trend				
1_01	MW-7C	Appendix III	Boron	mg/L	10	0	0%	0.000522	0.932	↔	0.00251	0.862	↔	-0.00284	0.370	↔	2022-05-19	2022-08-31	0.257	↔
1_07	MW-7C	Appendix III	pH, Field	su	10	0	0%	0.00549	0.048	↔	-0.00307	0.052	↔	0.00107	0.084	↔	2022-04-19	2022-08-04	0.853	↔
3_20	MW-7C	Other	Magnesium	mg/L	10	0	0%	-0.128	0.161	↔	0.0567	0.259	↔	0.000642	0.973	↔	2022-05-18	2022-08-31	0.794	↔
3_23	MW-7C	Other	Potassium	mg/L	10	0	0%	0.000457	0.973	↔	0.00656	0.229	↔	0.000374	0.929	↔	2022-05-18	2022-09-01	0.679	↔
5_42	MW-7C	Part 115	Zinc	mg/L	10	8	80%	-0.0000311	0.329	↔	0.00000594	0.863	↔	-0.00000310	0.594	↔	2022-04-17	2022-07-27	0.373	↔



Appendix III: Boron, MW-7C

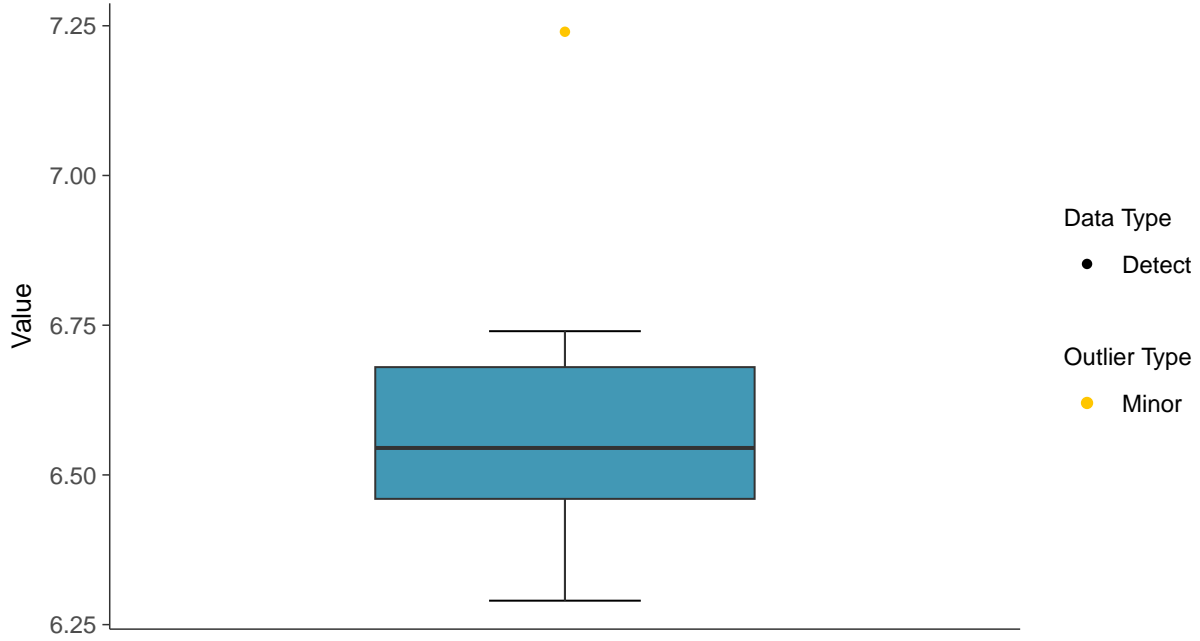
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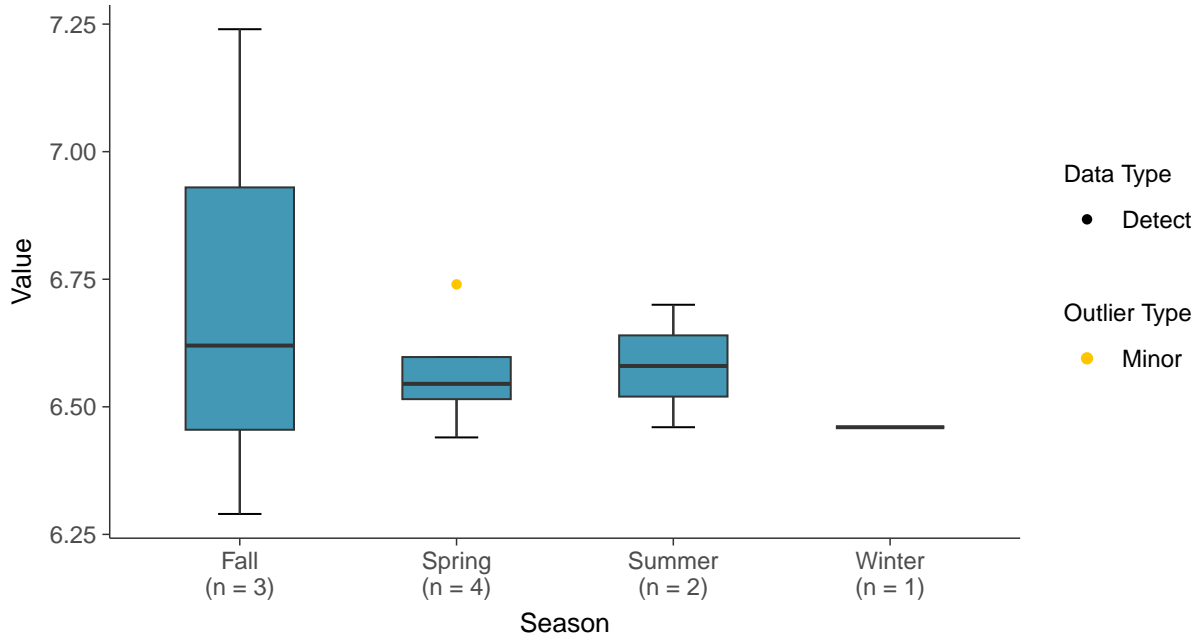
Boxplot

Boron, MW-7C (mg/L)



Boxplot by Season

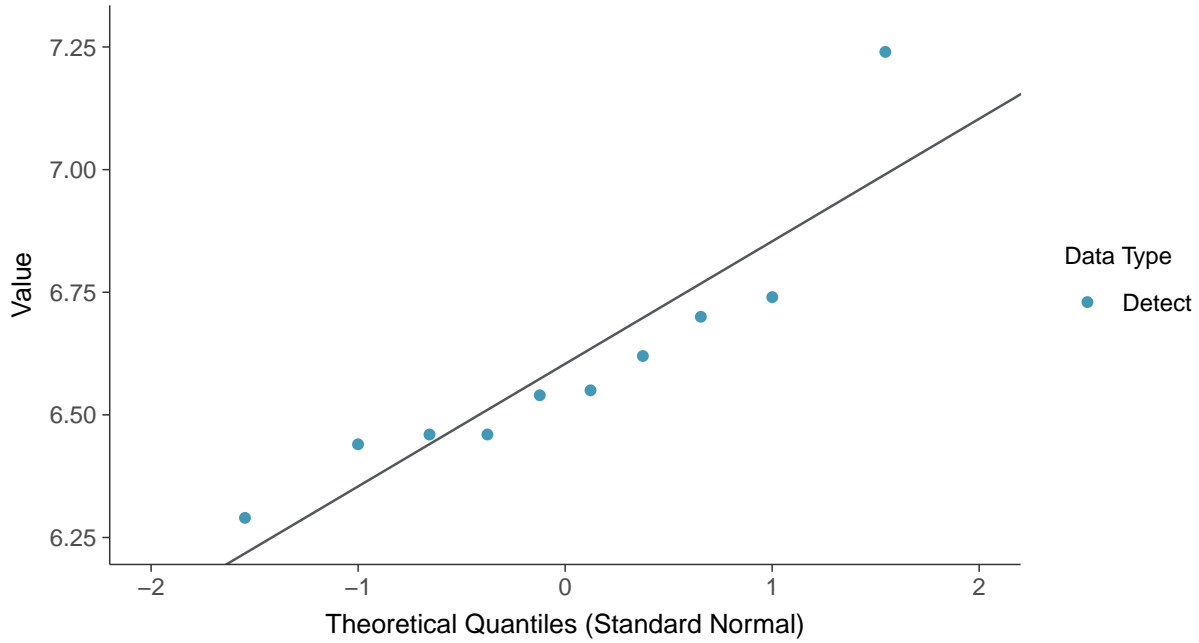
Boron, MW-7C (mg/L)





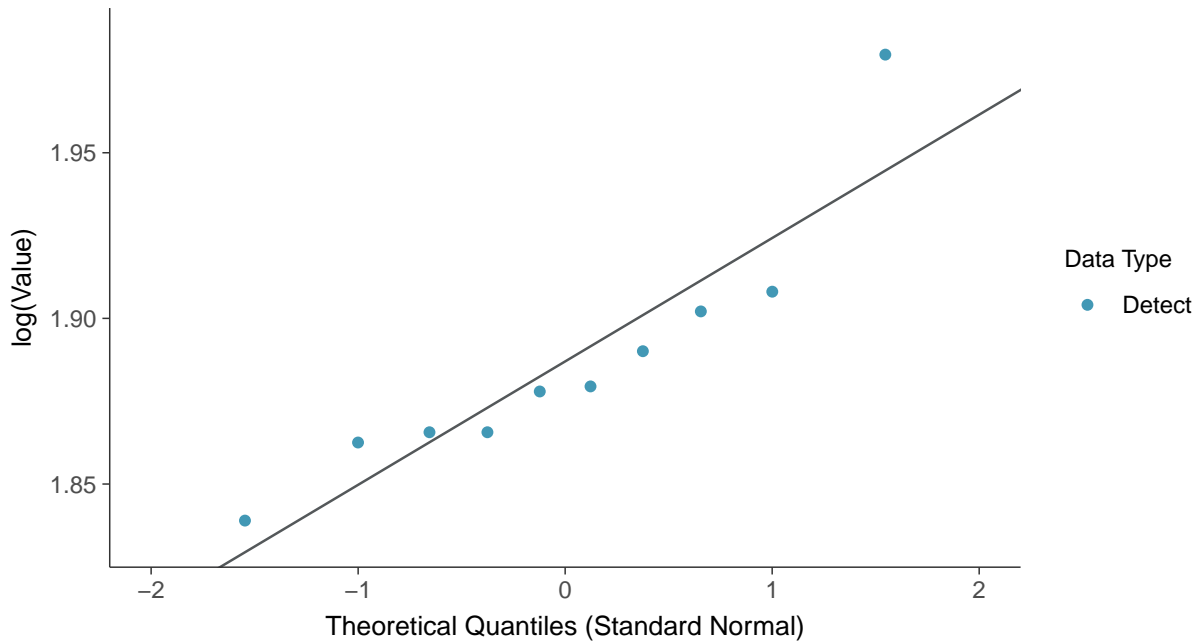
Normal Q-Q plot

Boron, MW-7C (mg/L)



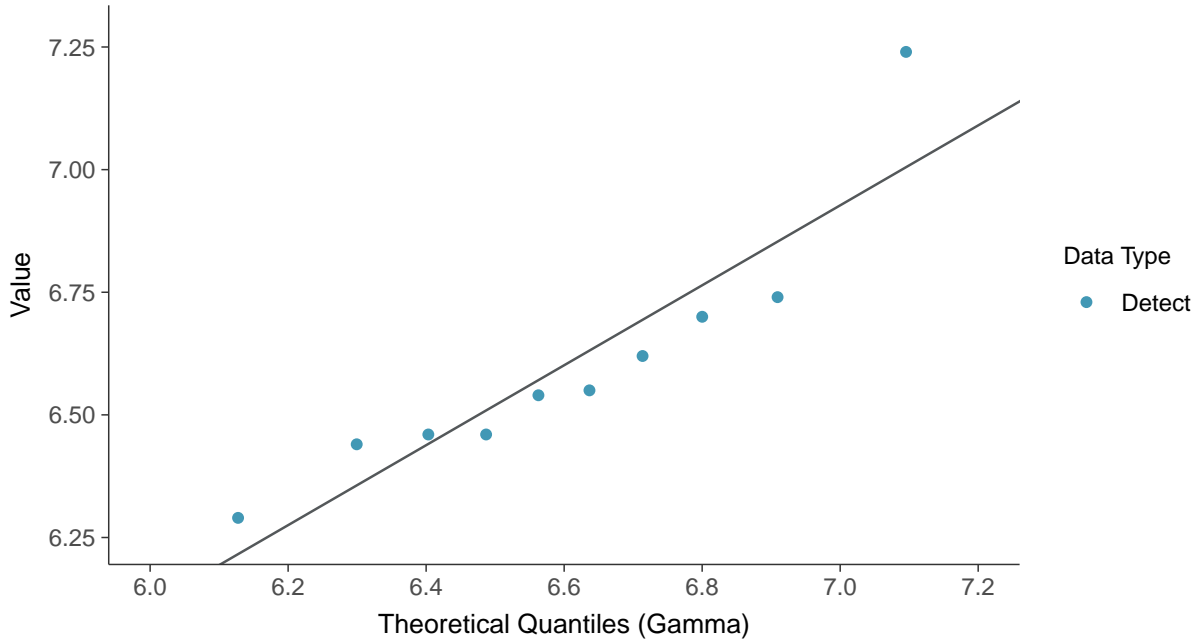
Lognormal Q-Q plot

Boron, MW-7C (mg/L)

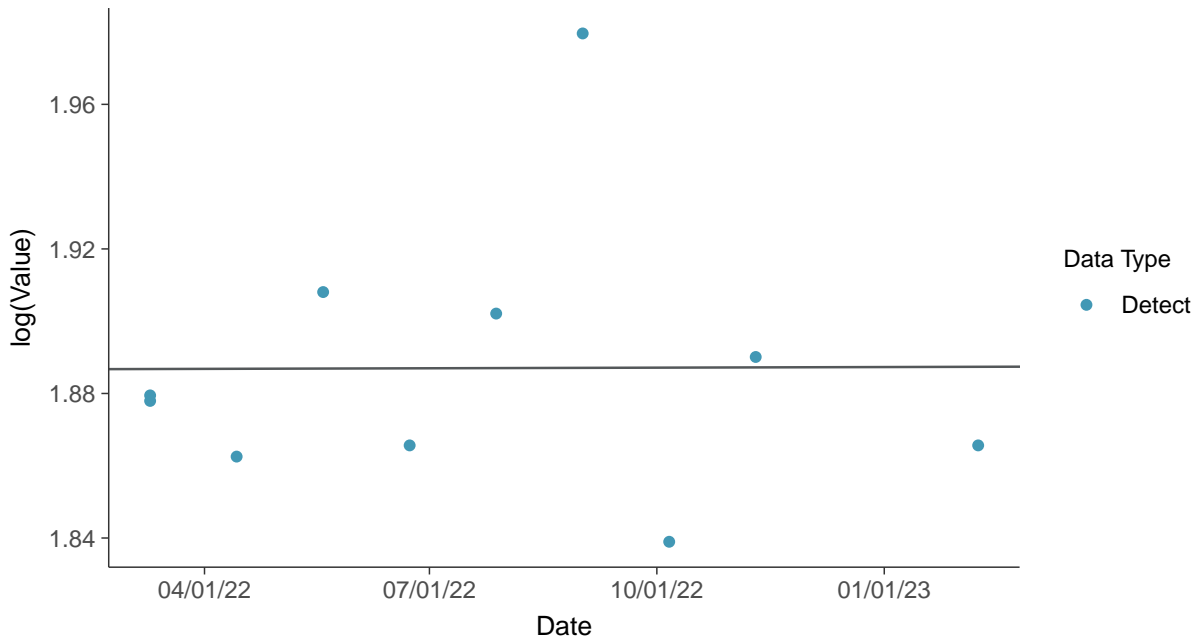




Gamma Q-Q plot
Boron, MW-7C (mg/L)

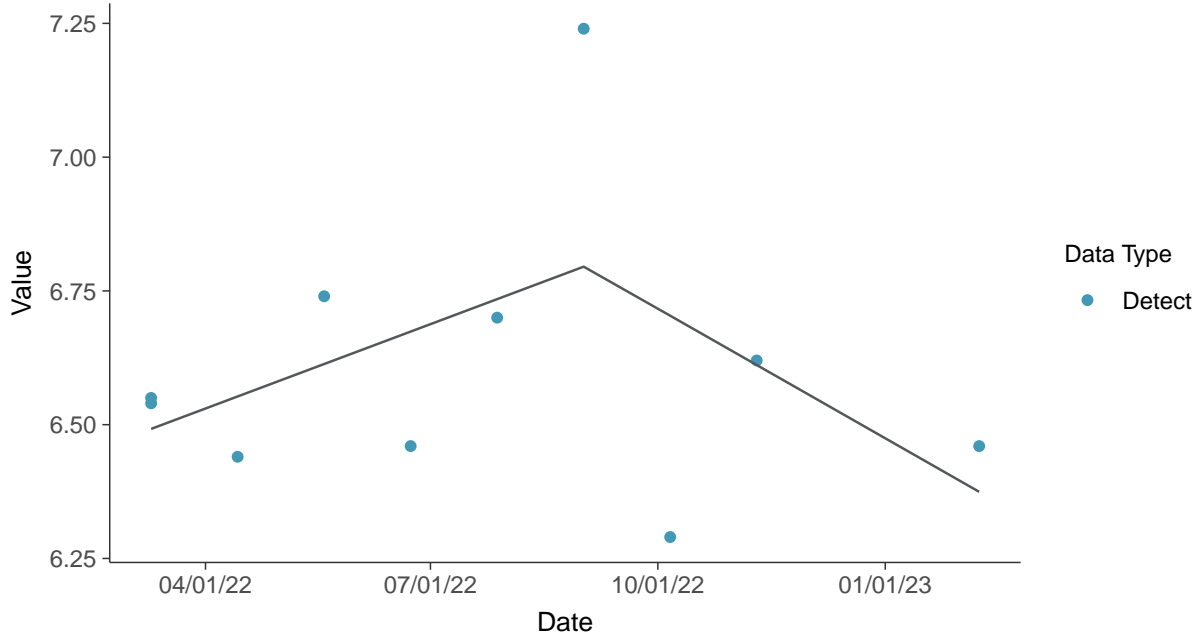


Trend Regression: Lognormal MLE
Boron, MW-7C (mg/L)

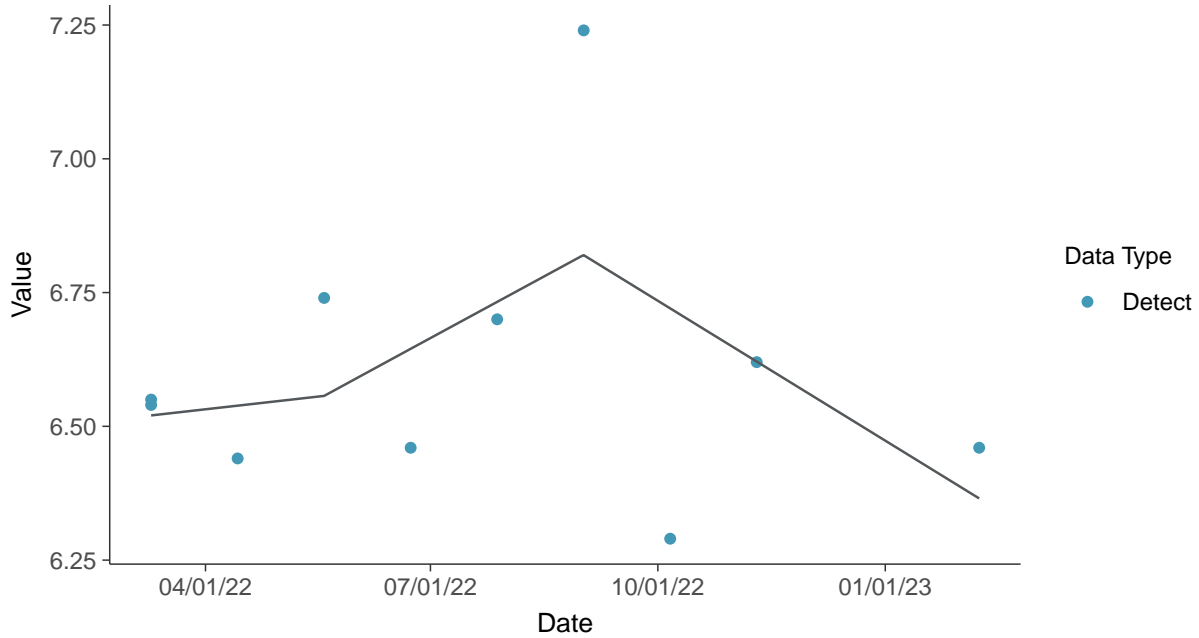




Trend Regression: Piecewise Linear-Linear
Boron, MW-7C (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear
Boron, MW-7C (mg/L)



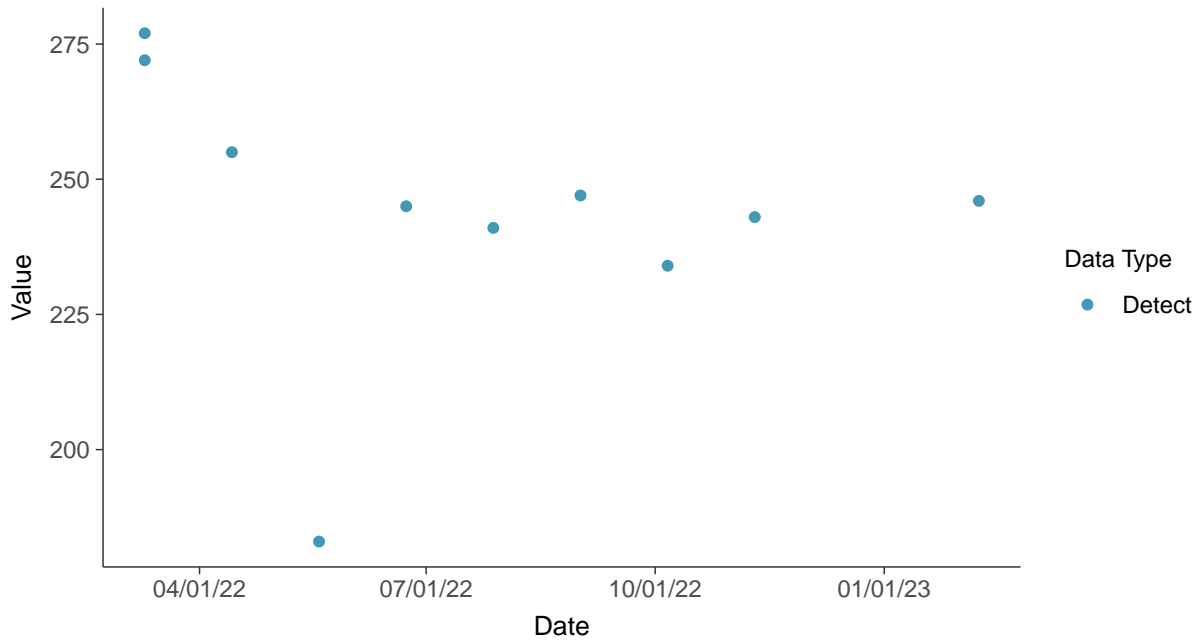


Appendix III: Calcium, MW-7C

ID: 1_02

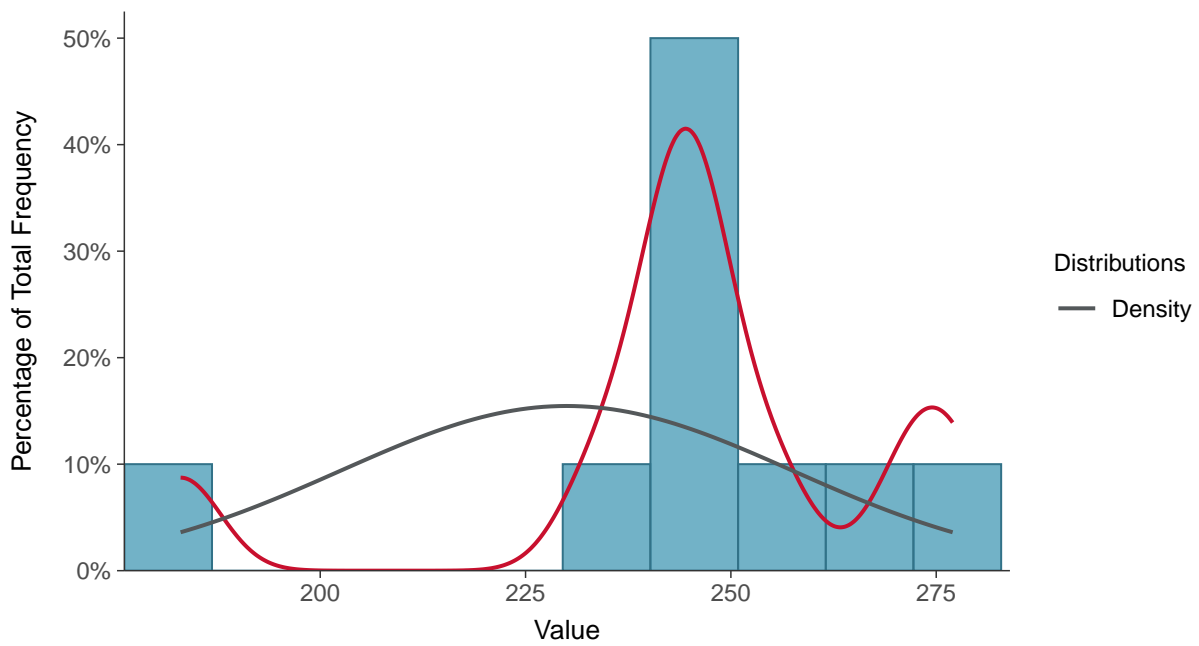
Scatter Plot

Calcium, MW-7C (mg/L)



Histogram

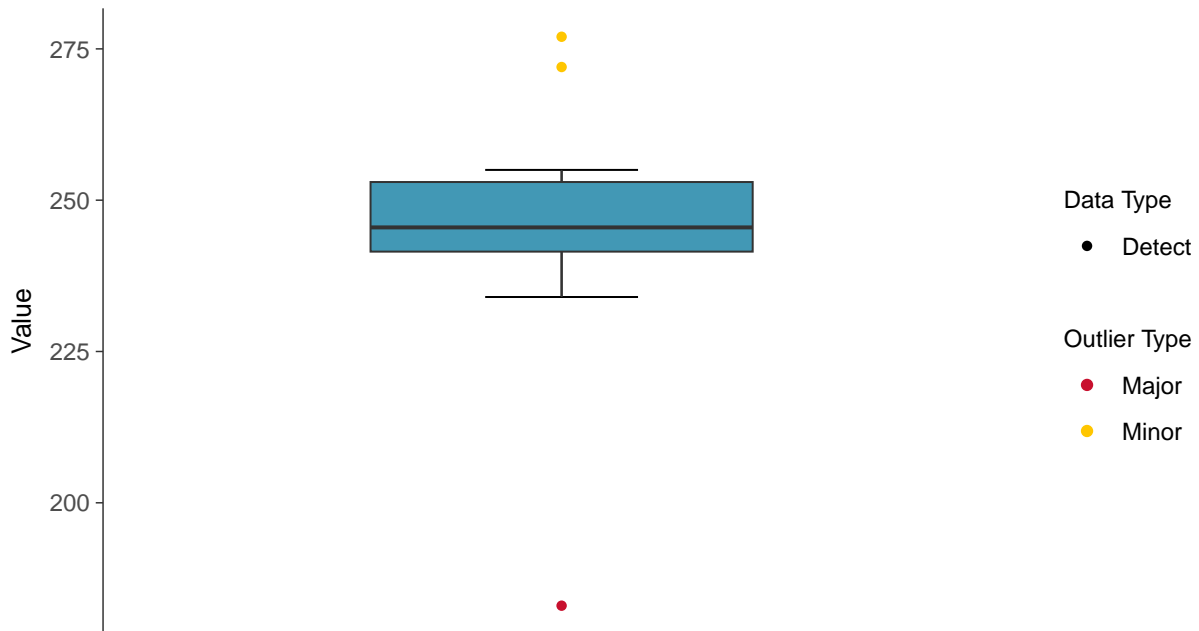
Calcium, MW-7C (mg/L)





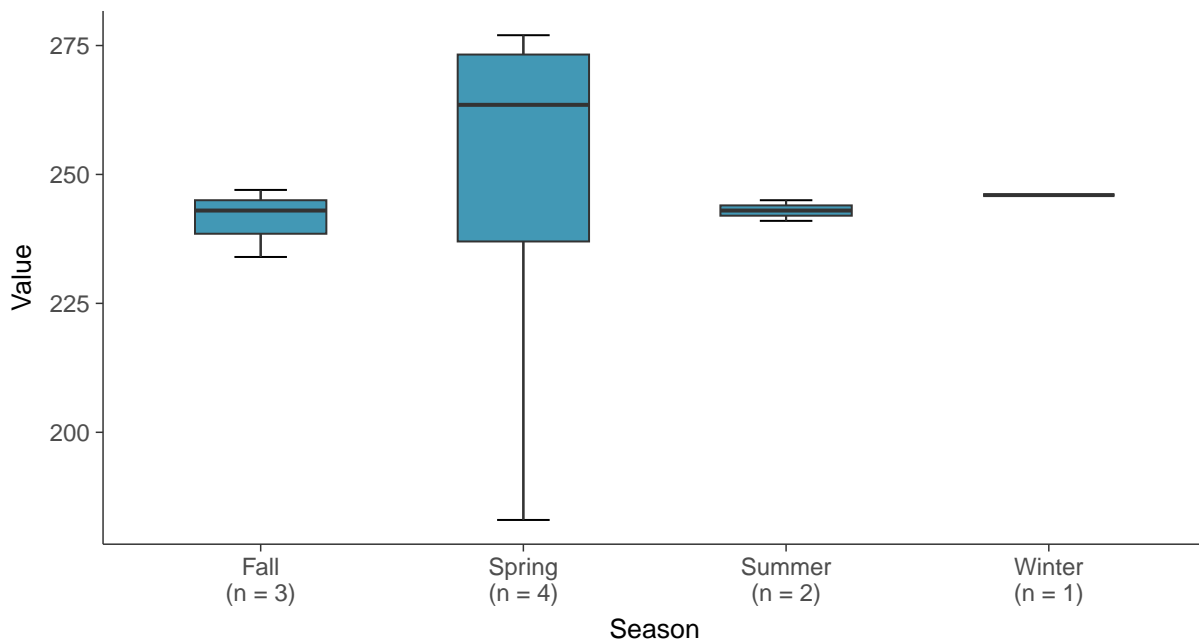
Boxplot

Calcium, MW-7C (mg/L)



Boxplot by Season

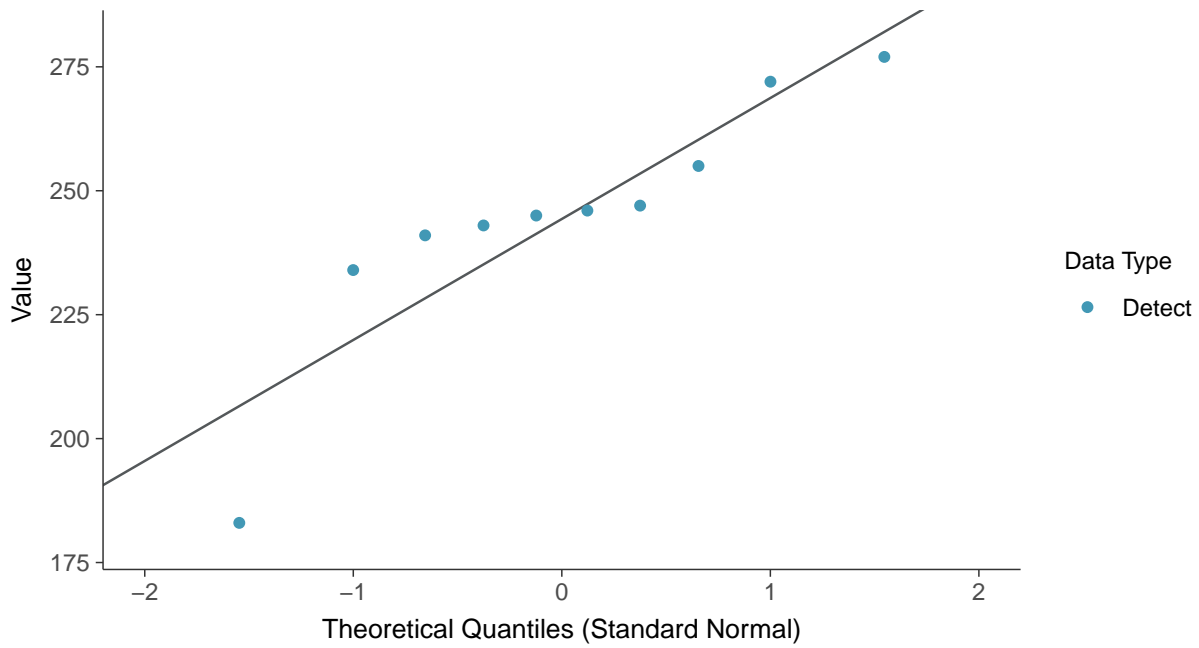
Calcium, MW-7C (mg/L)





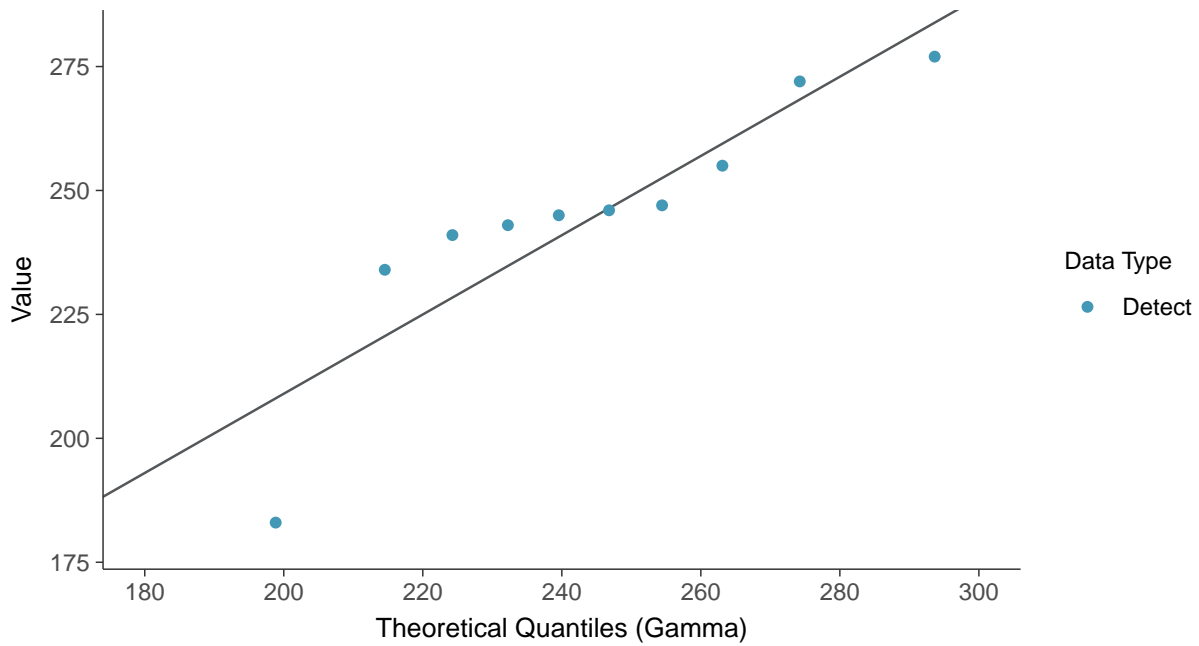
Normal Q-Q plot

Calcium, MW-7C (mg/L)



Gamma Q-Q plot

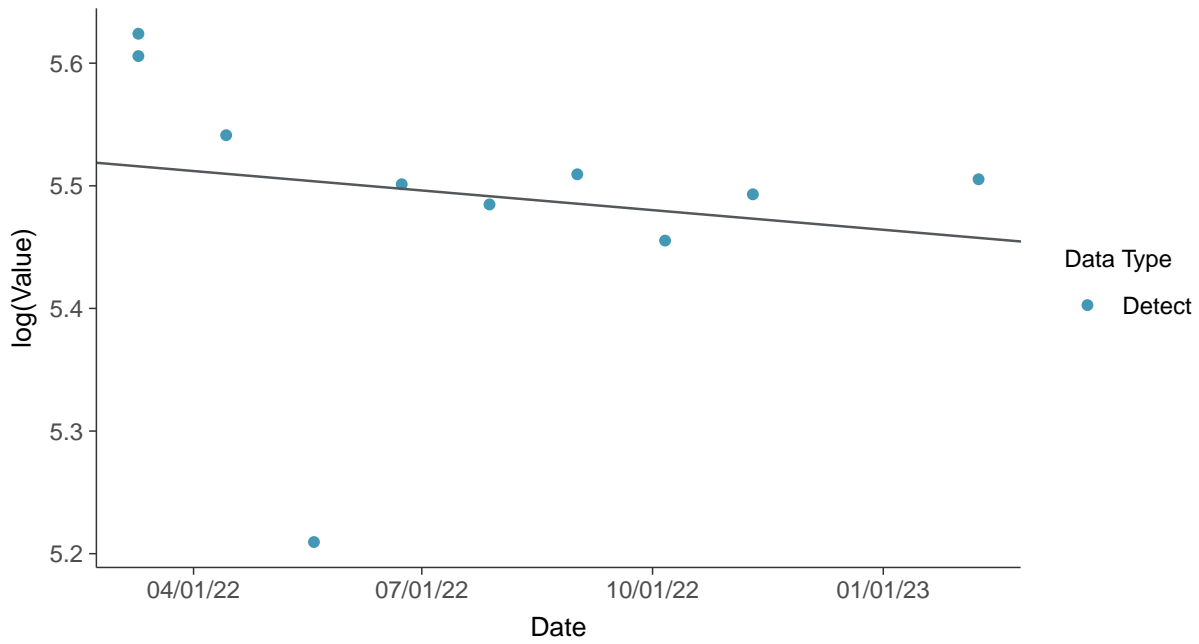
Calcium, MW-7C (mg/L)





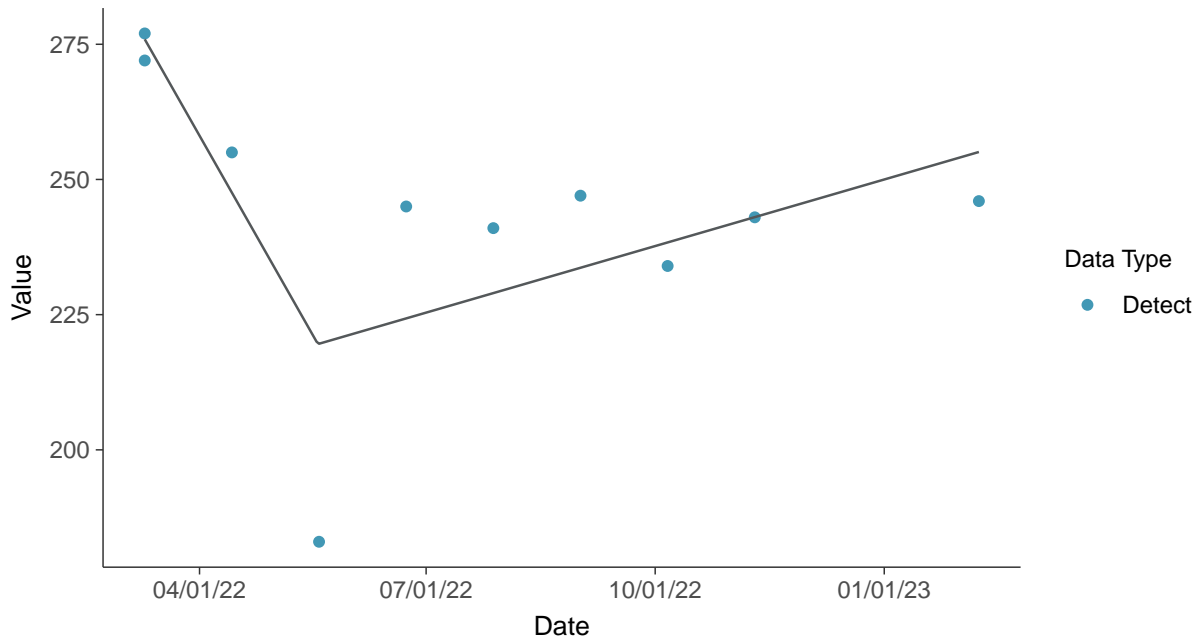
Trend Regression: Lognormal MLE

Calcium, MW-7C (mg/L)



Trend Regression: Piecewise Linear-Linear

Calcium, MW-7C (mg/L)



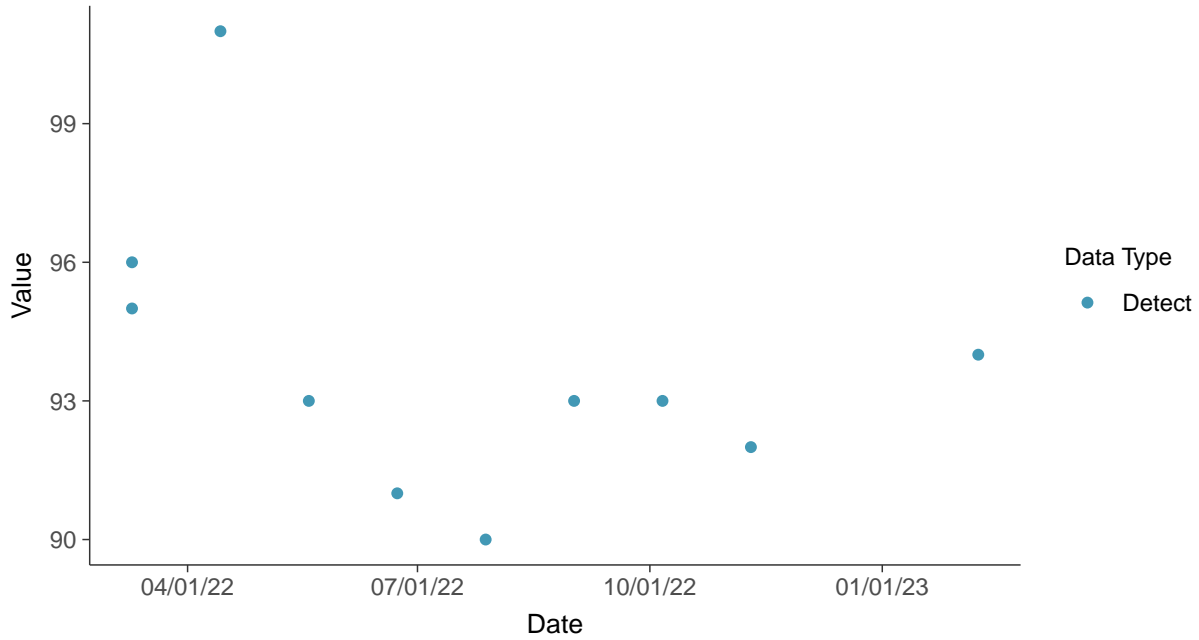


Appendix III: Chloride, MW-7C

ID: 1_03

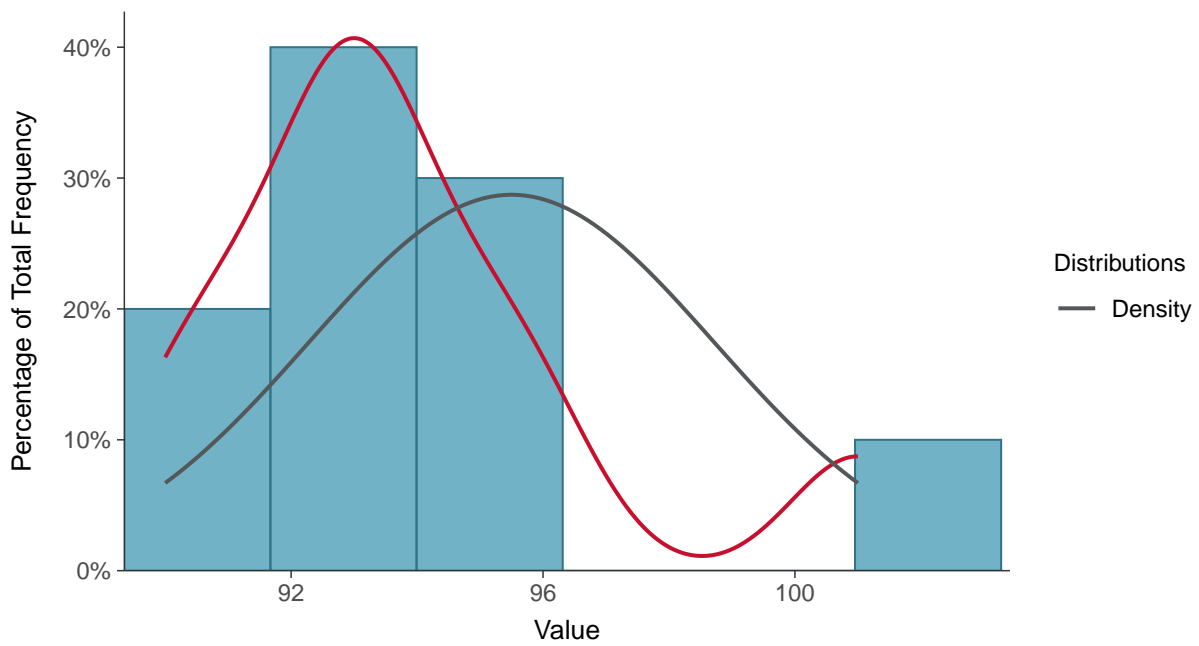
Scatter Plot

Chloride, MW-7C (mg/L)



Histogram

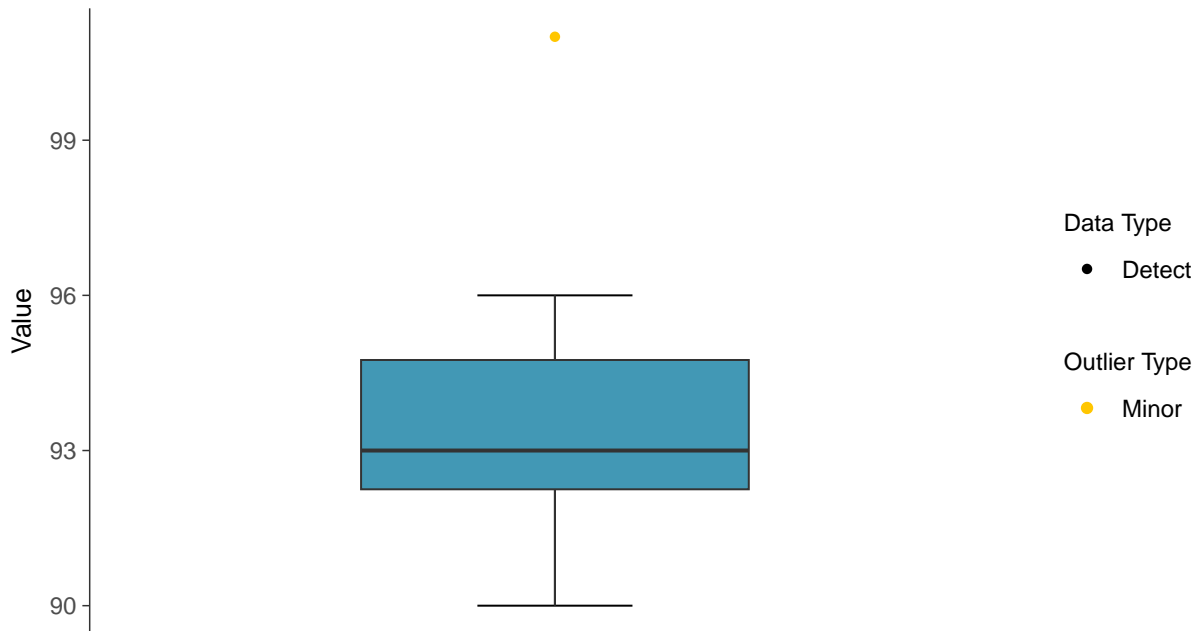
Chloride, MW-7C (mg/L)





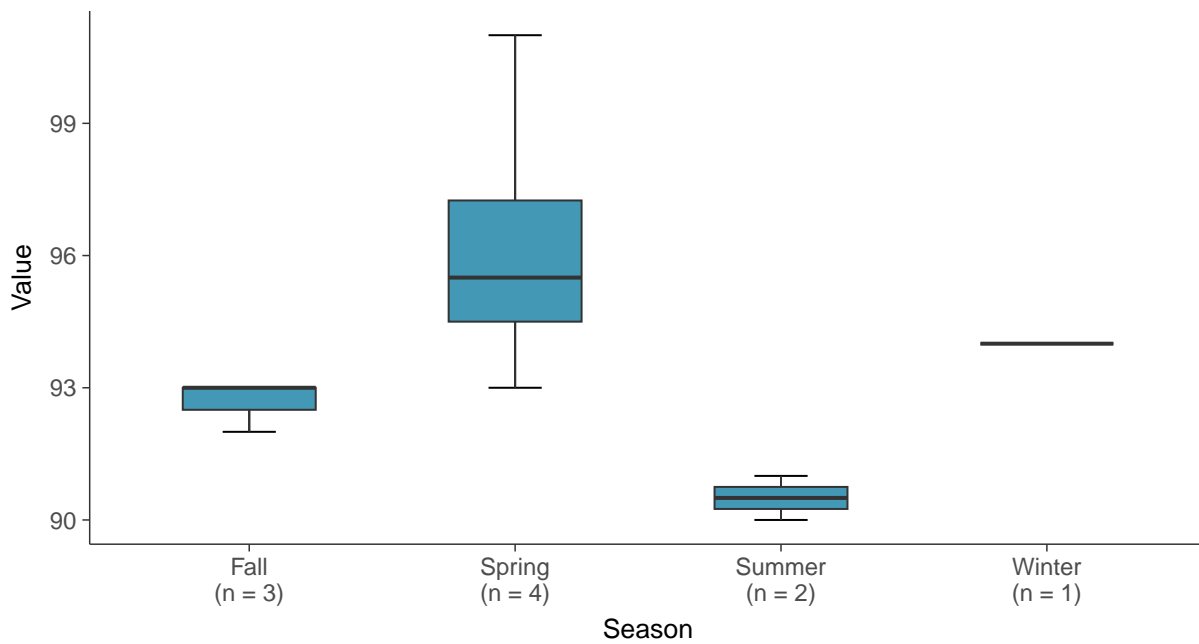
Boxplot

Chloride, MW-7C (mg/L)



Boxplot by Season

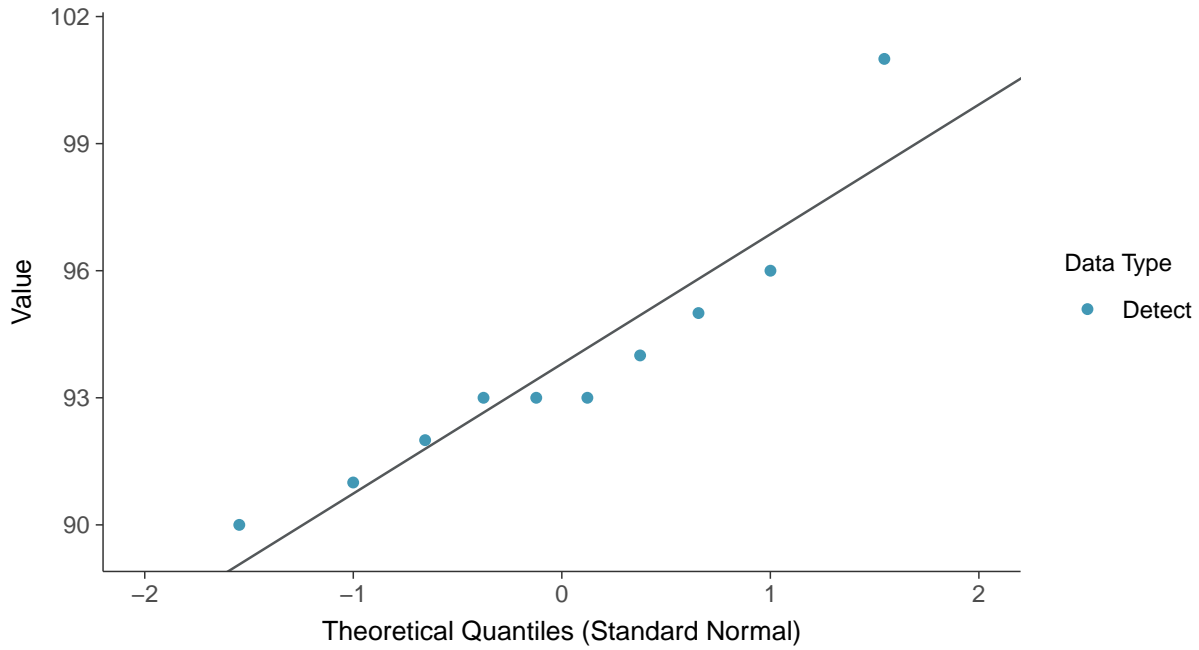
Chloride, MW-7C (mg/L)





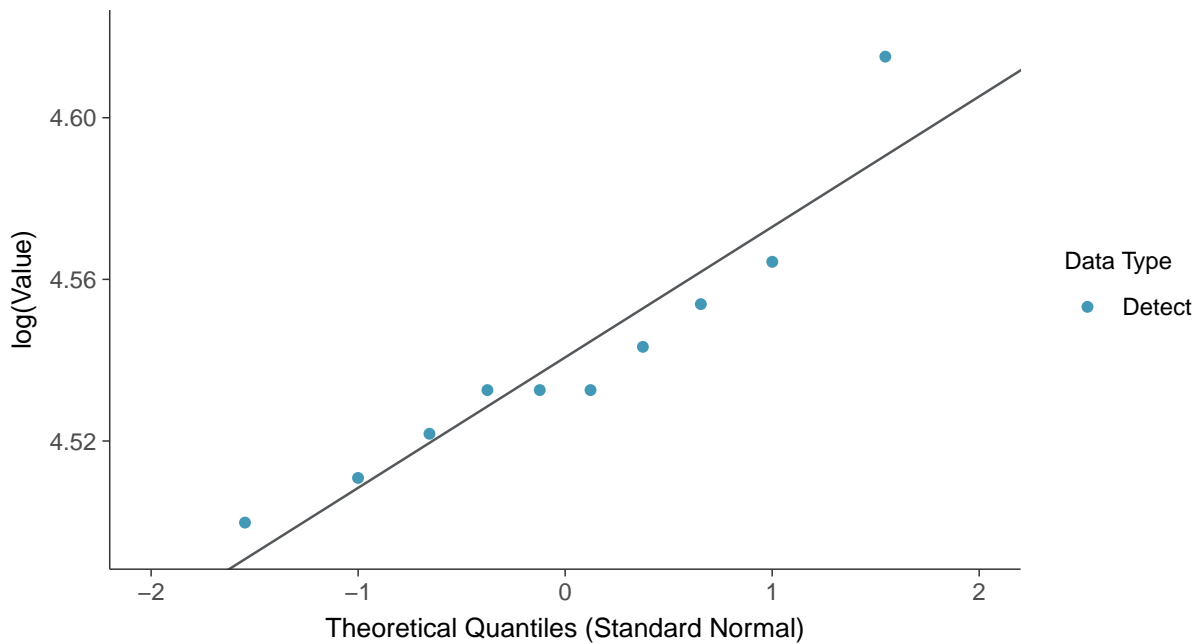
Normal Q-Q plot

Chloride, MW-7C (mg/L)



Lognormal Q-Q plot

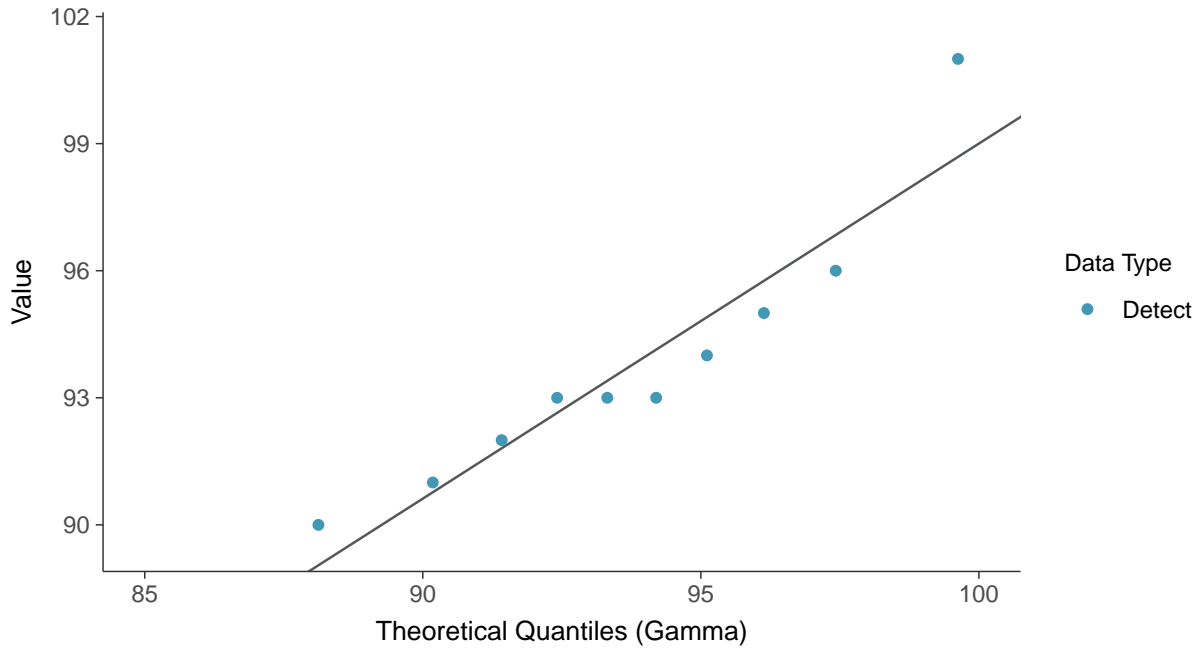
Chloride, MW-7C (mg/L)





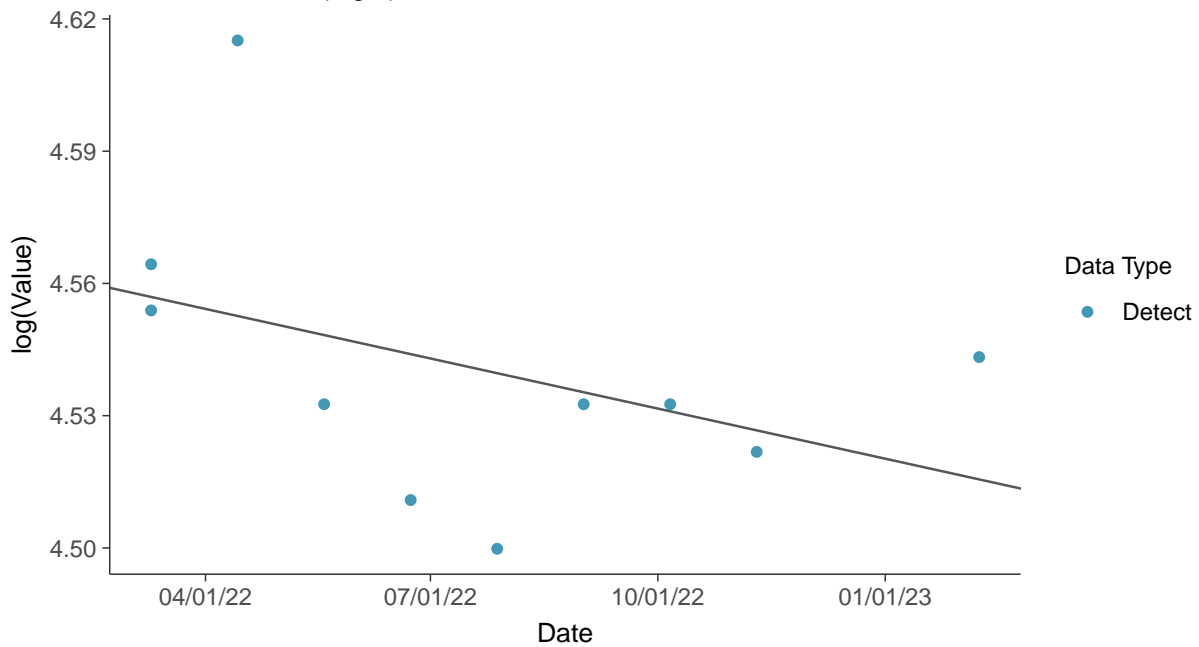
Gamma Q-Q plot

Chloride, MW-7C (mg/L)



Trend Regression: Lognormal MLE

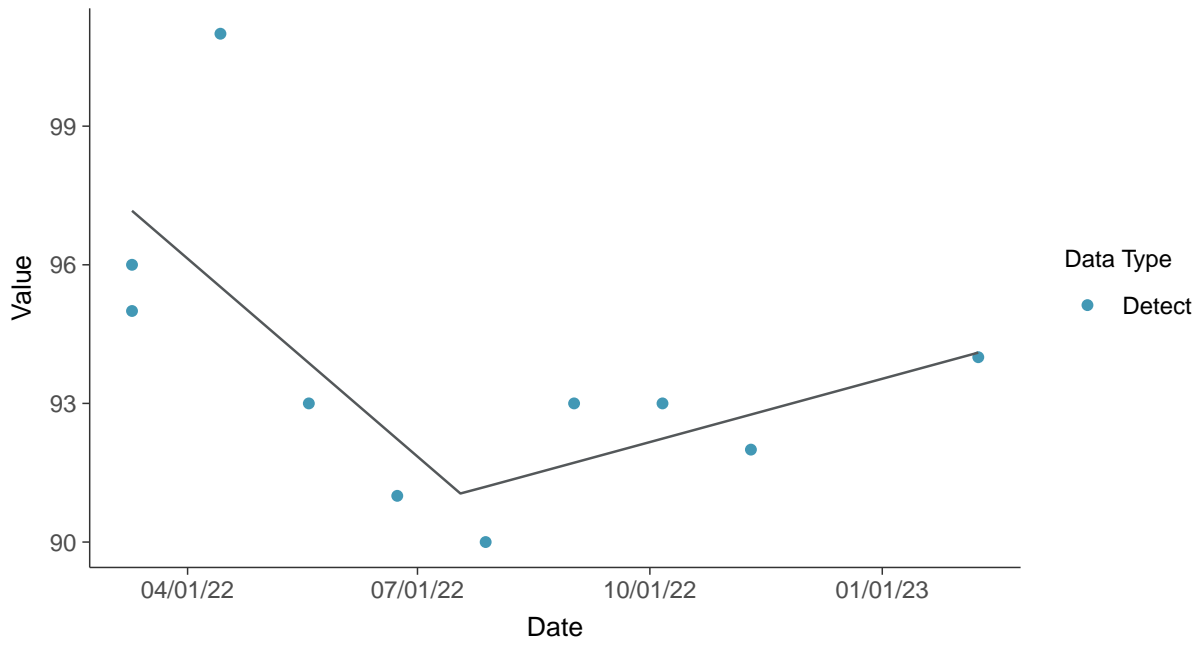
Chloride, MW-7C (mg/L)





Trend Regression: Piecewise Linear-Linear

Chloride, MW-7C (mg/L)



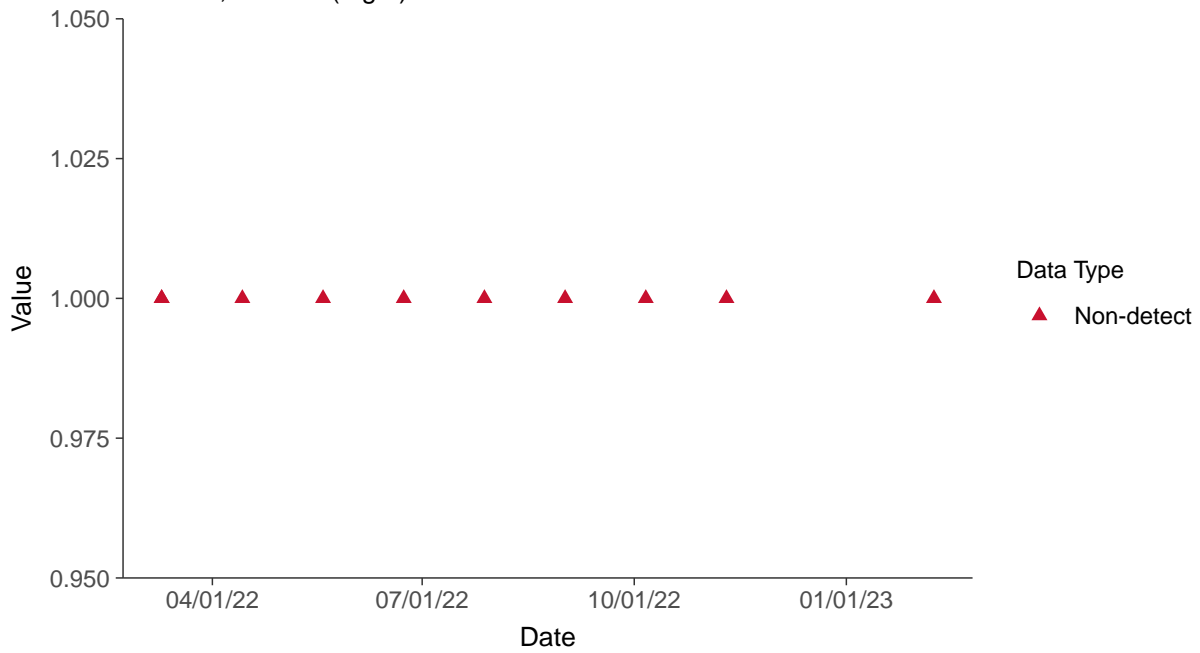


Appendix III: Fluoride, MW-7C

ID: 1_04

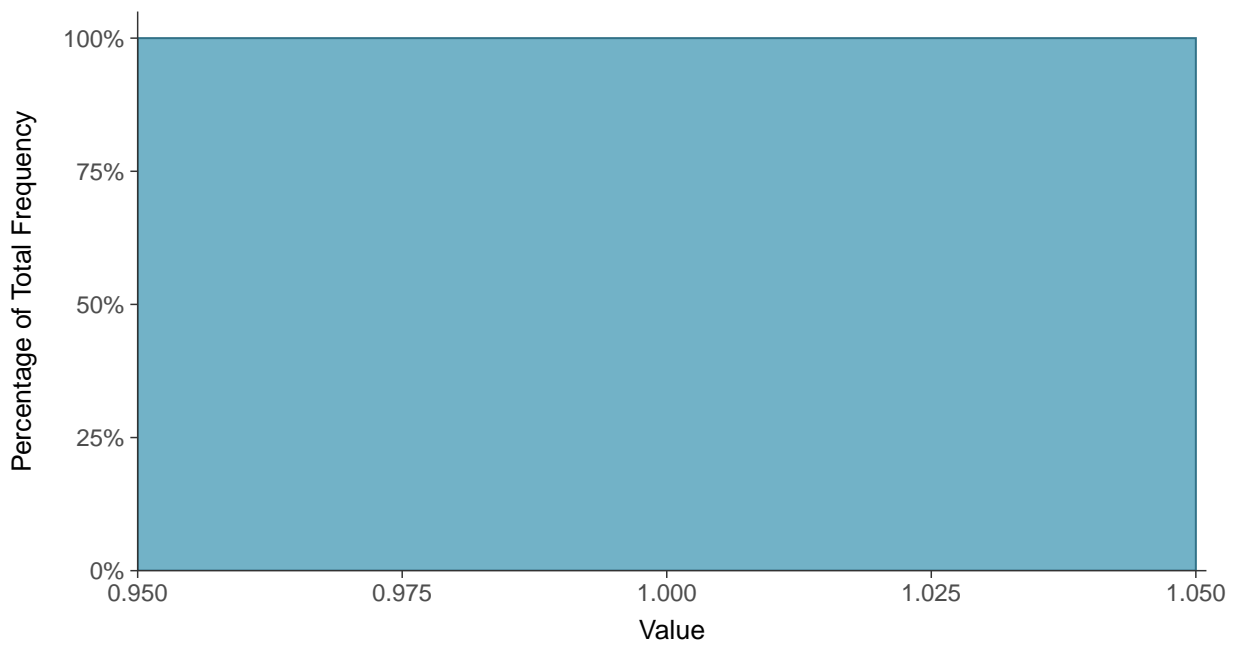
Scatter Plot

Fluoride, MW-7C (mg/L)



Histogram

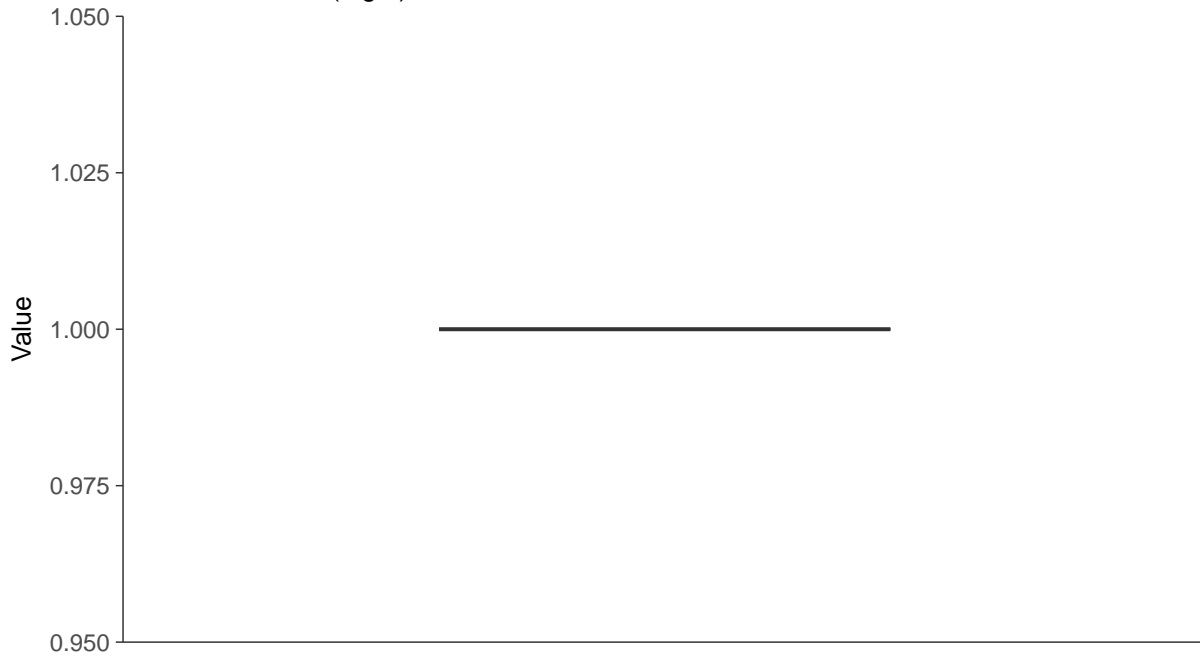
Fluoride, MW-7C (mg/L)





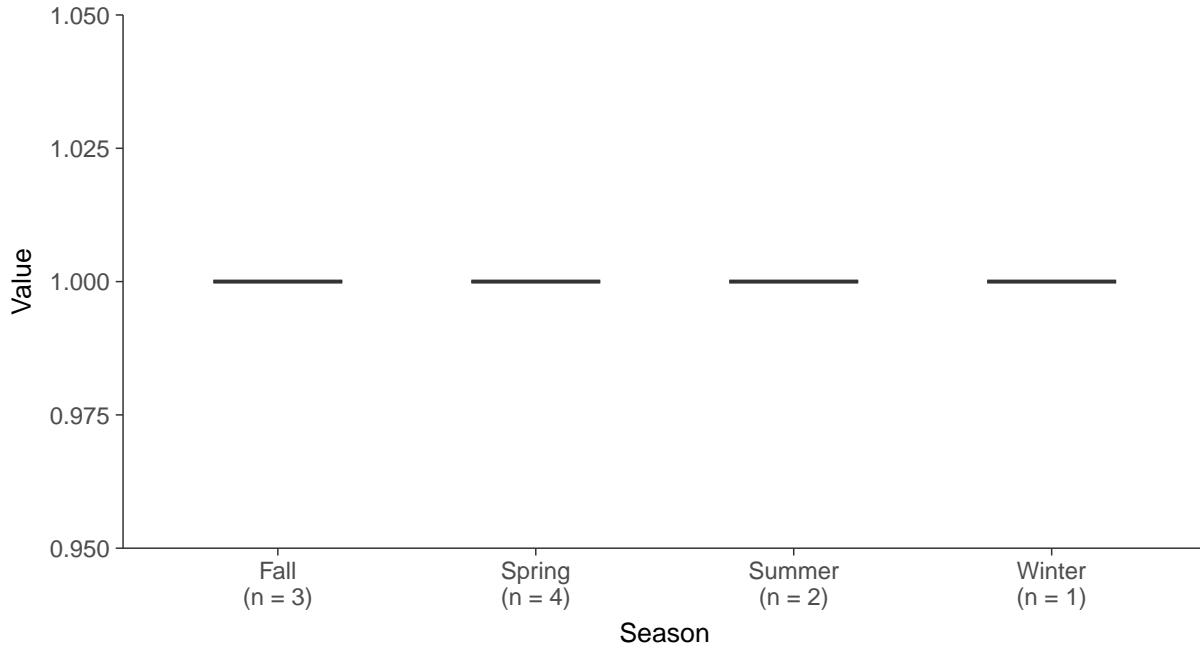
Boxplot

Fluoride, MW-7C (mg/L)



Boxplot by Season

Fluoride, MW-7C (mg/L)



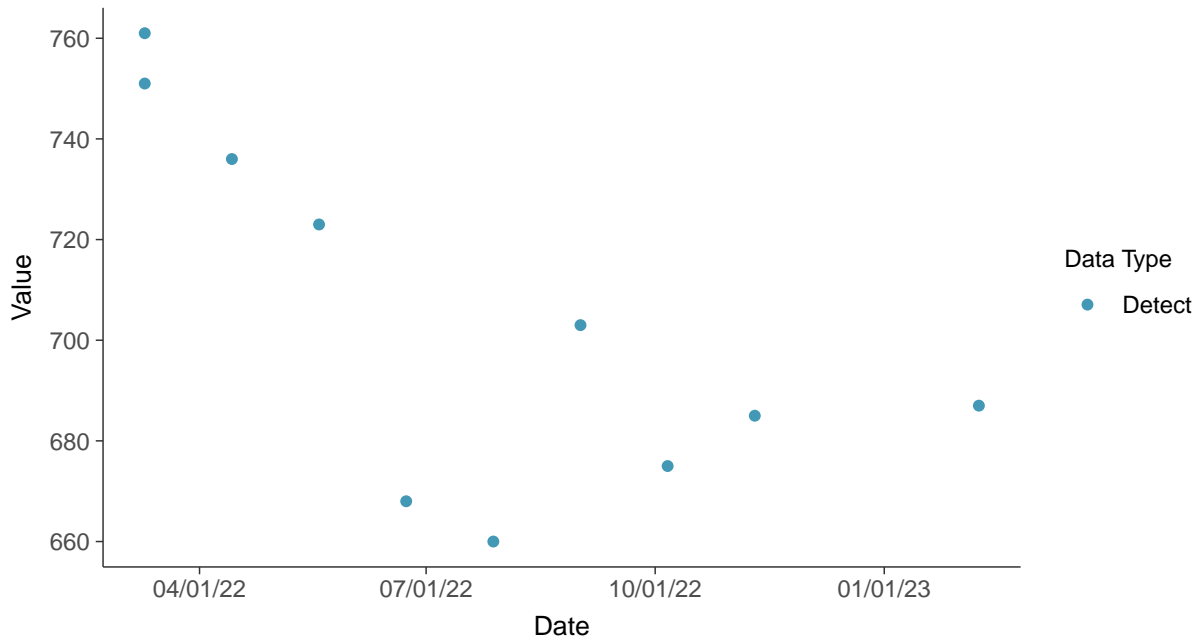


Appendix III: Sulfate, MW-7C

ID: 1_05

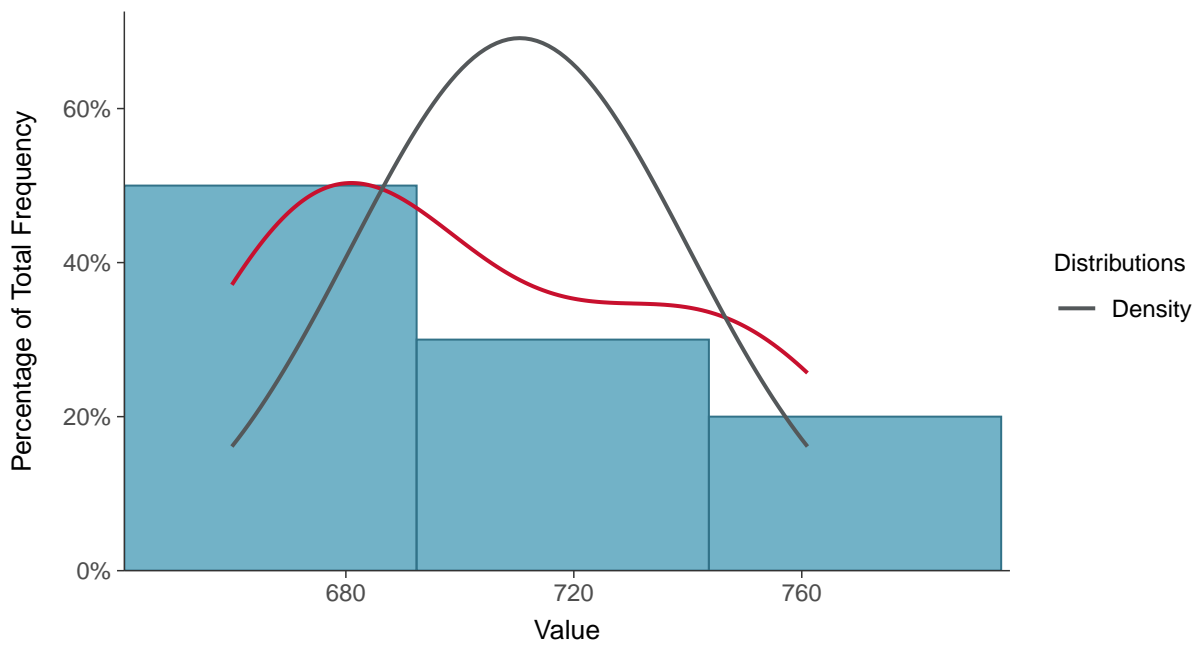
Scatter Plot

Sulfate, MW-7C (mg/L)



Histogram

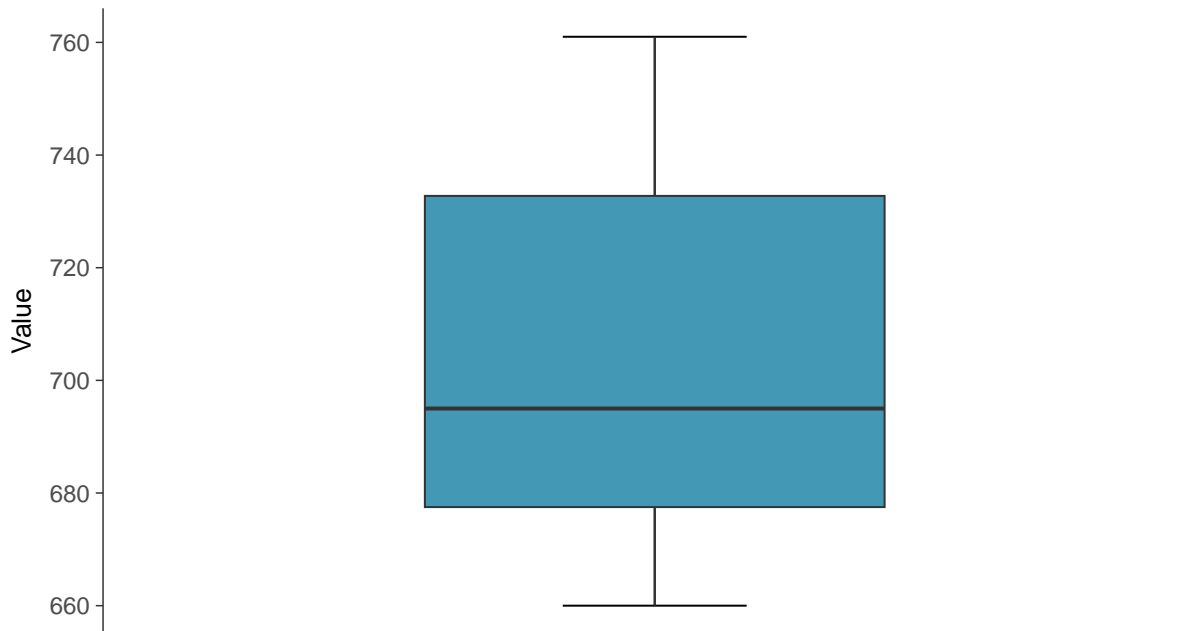
Sulfate, MW-7C (mg/L)





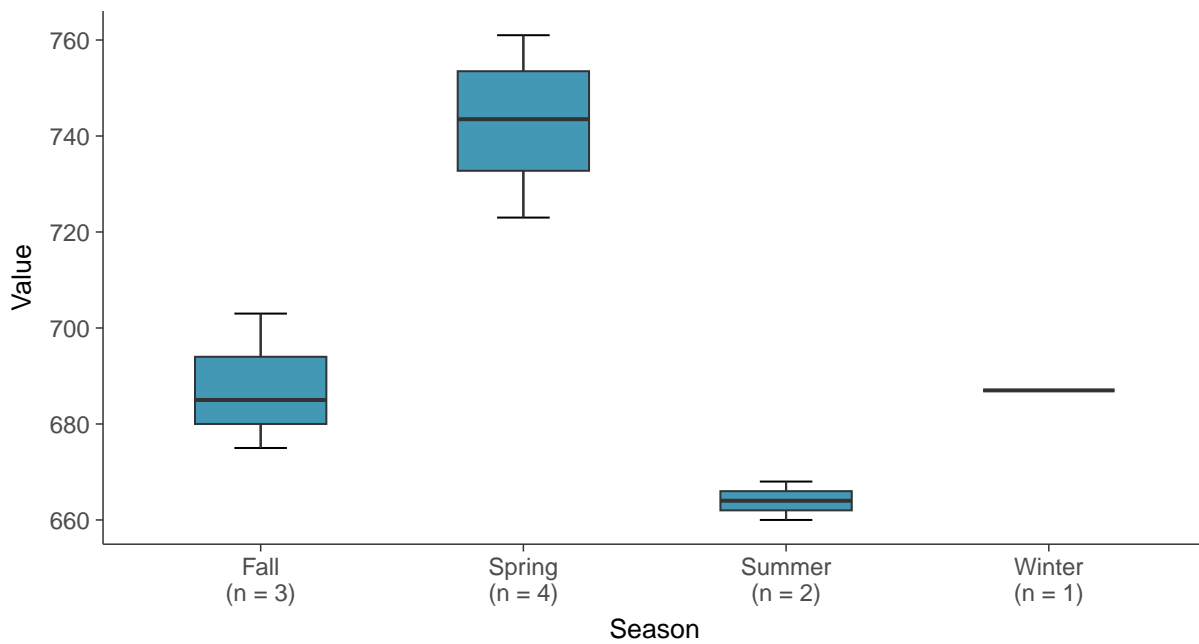
Boxplot

Sulfate, MW-7C (mg/L)



Boxplot by Season

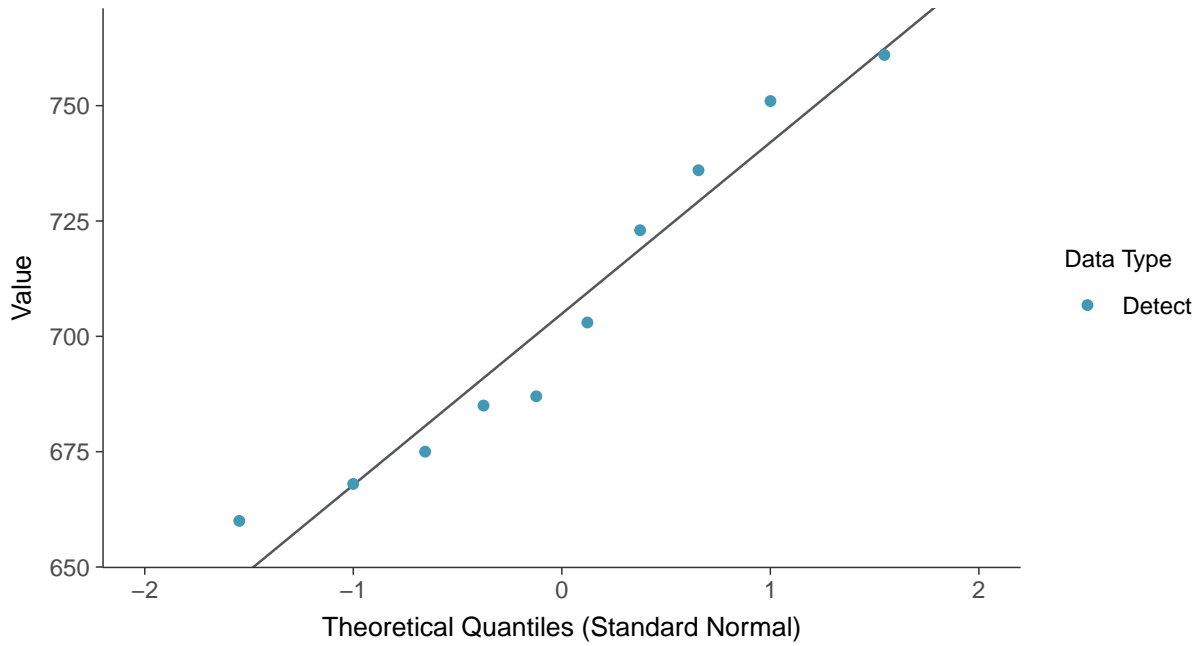
Sulfate, MW-7C (mg/L)





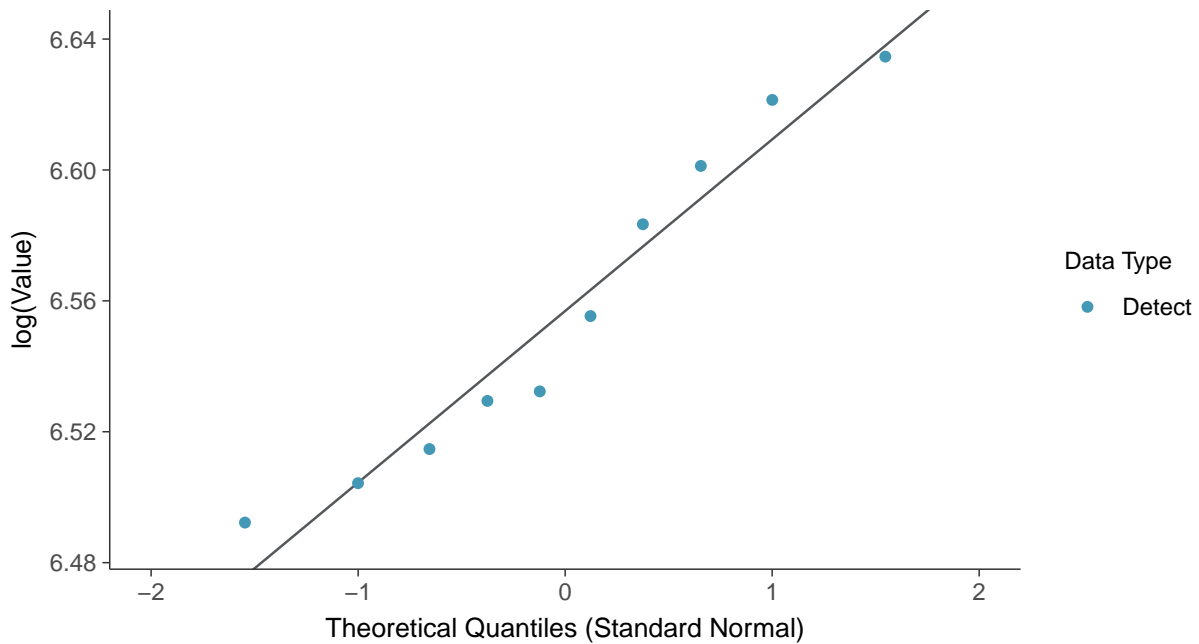
Normal Q-Q plot

Sulfate, MW-7C (mg/L)



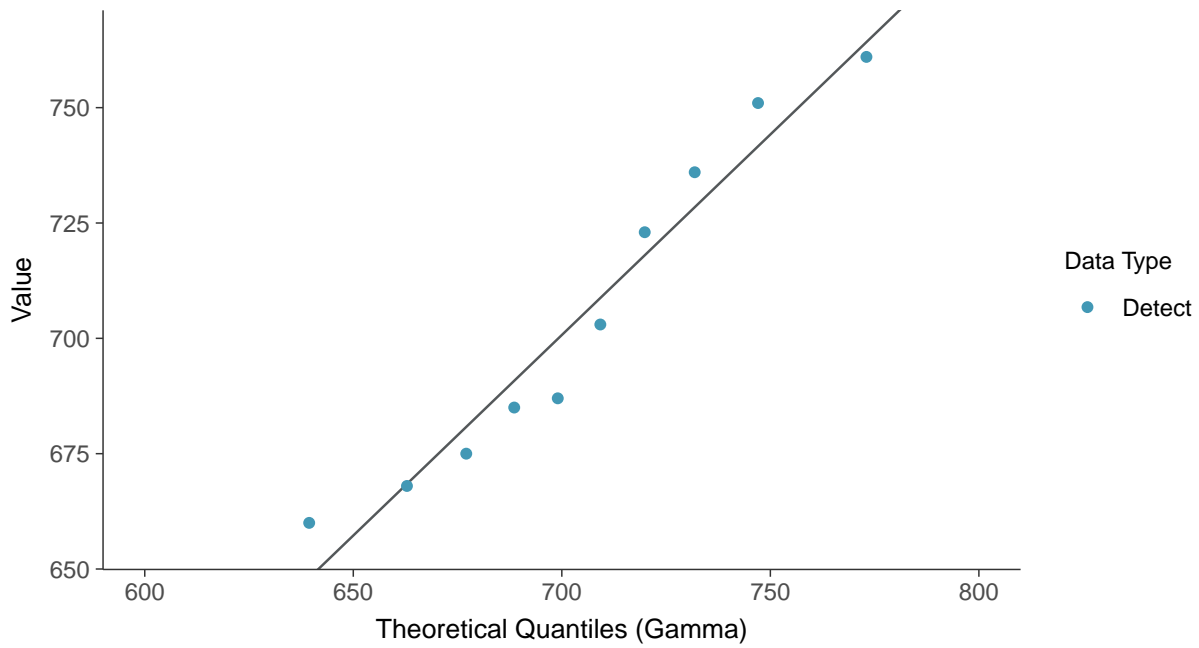
Lognormal Q-Q plot

Sulfate, MW-7C (mg/L)

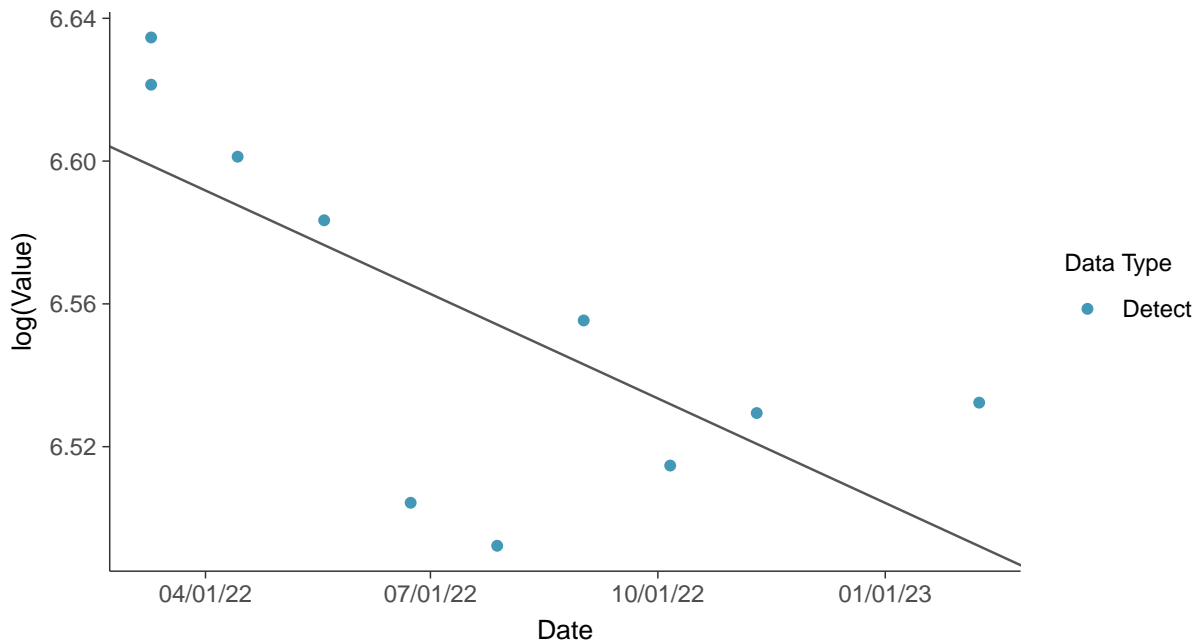




Gamma Q-Q plot
Sulfate, MW-7C (mg/L)



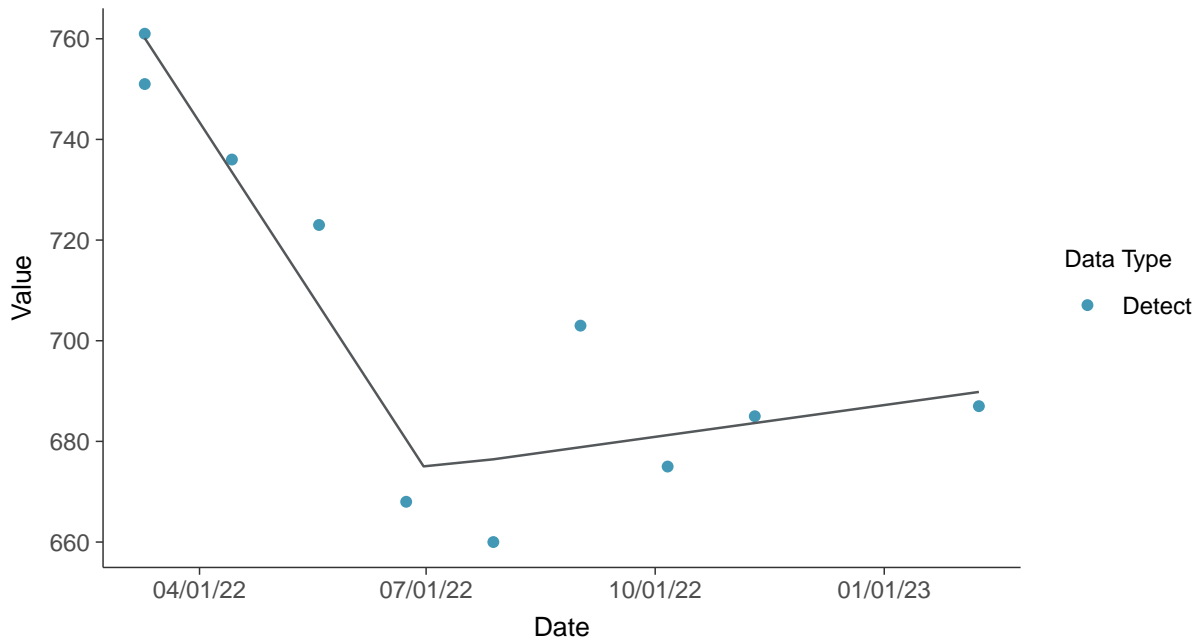
Trend Regression: Lognormal MLE
Sulfate, MW-7C (mg/L)





Trend Regression: Piecewise Linear-Linear

Sulfate, MW-7C (mg/L)



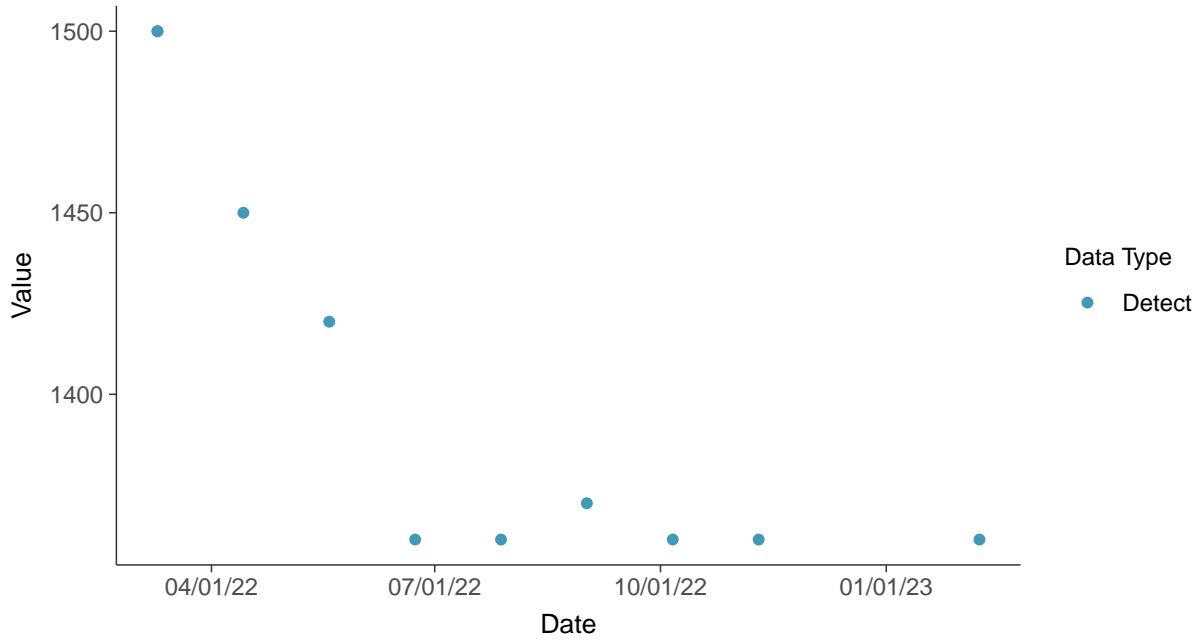


Appendix III: Total Dissolved Solids, MW-7C

ID: 1_06

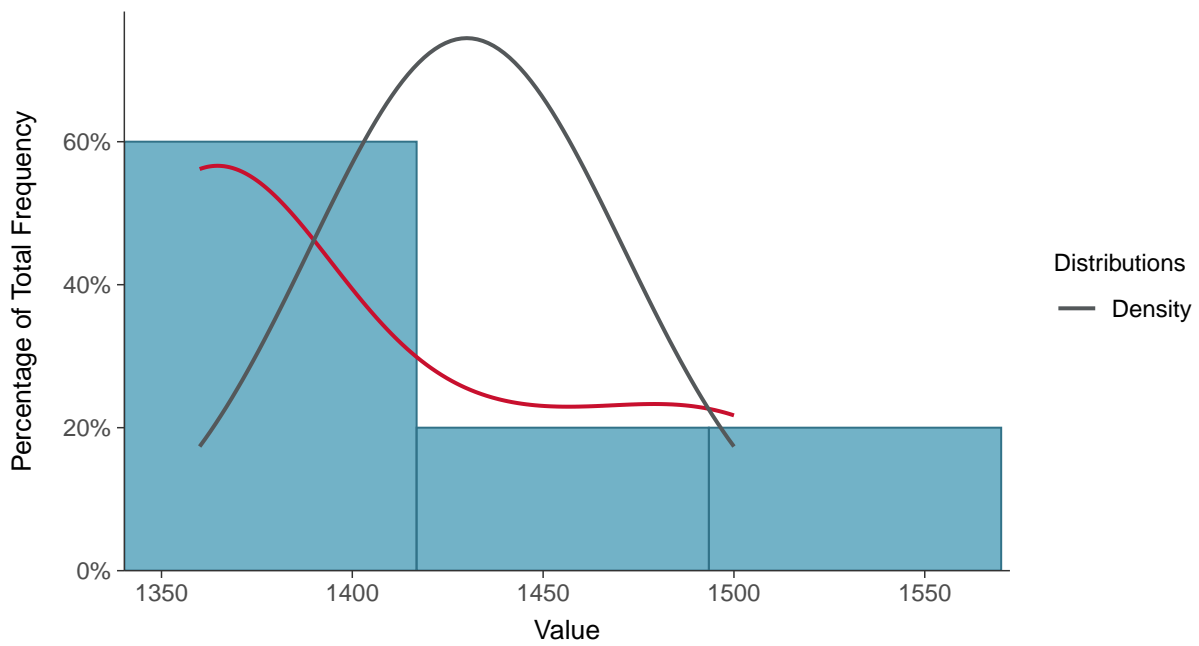
Scatter Plot

Total Dissolved Solids, MW-7C (mg/L)



Histogram

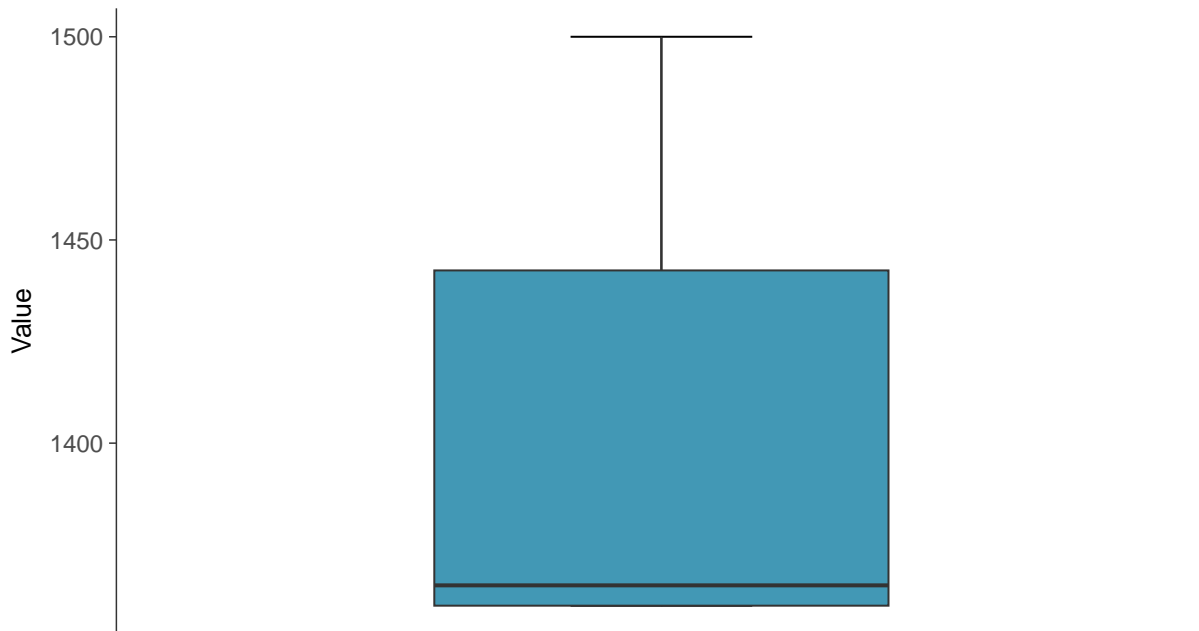
Total Dissolved Solids, MW-7C (mg/L)





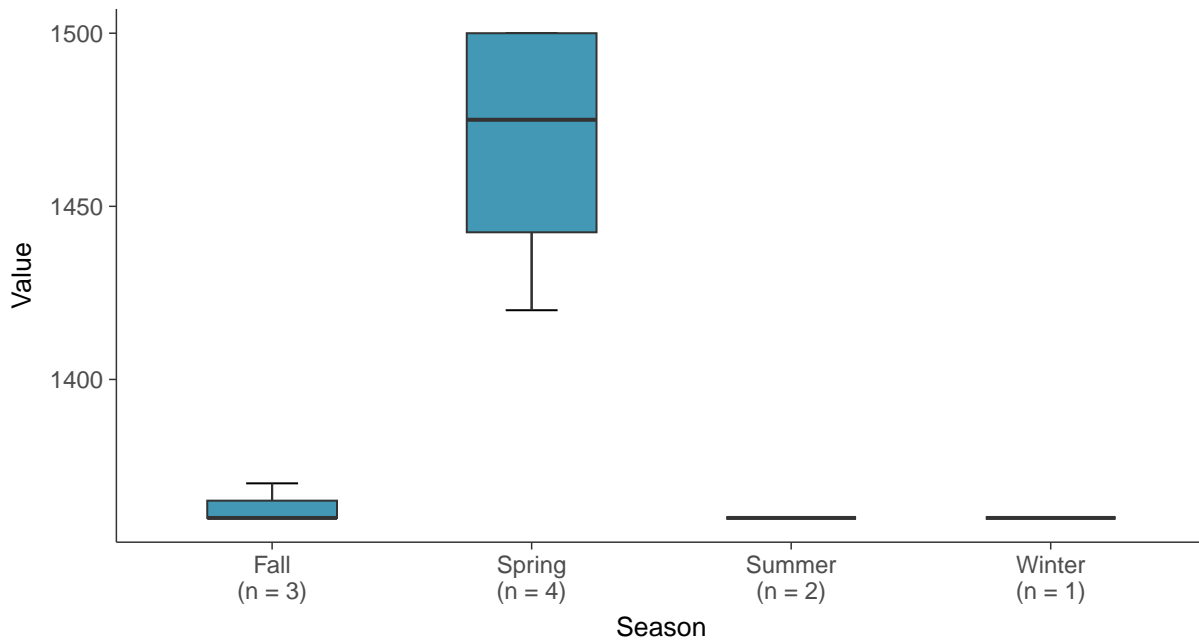
Boxplot

Total Dissolved Solids, MW-7C (mg/L)



Boxplot by Season

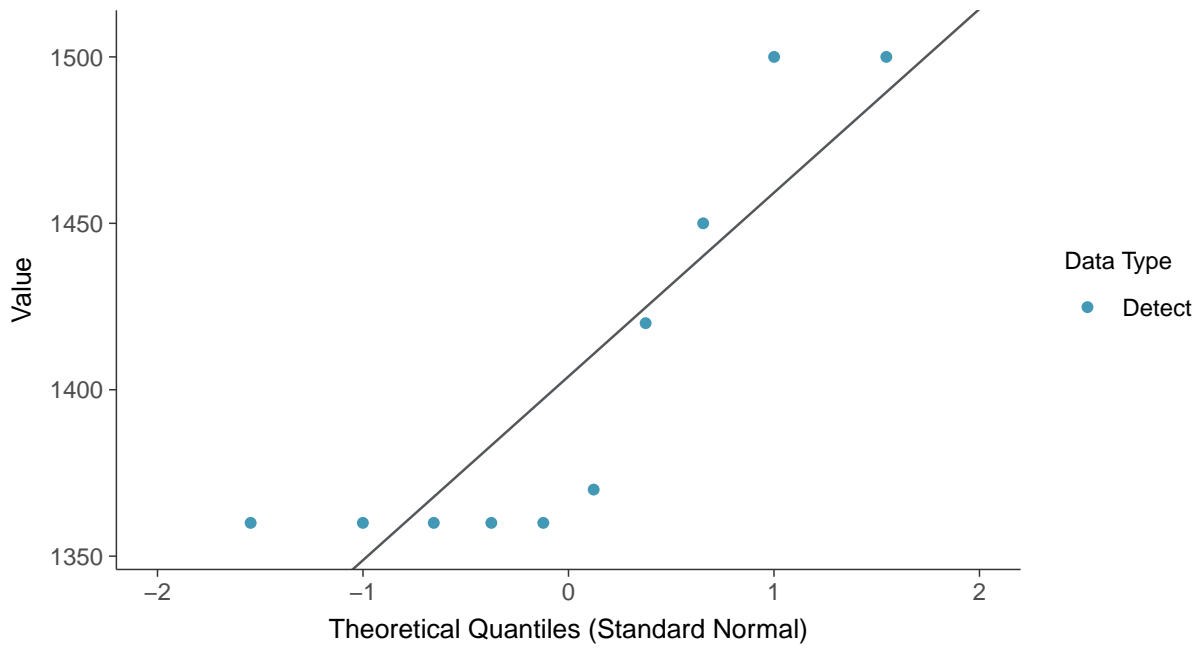
Total Dissolved Solids, MW-7C (mg/L)





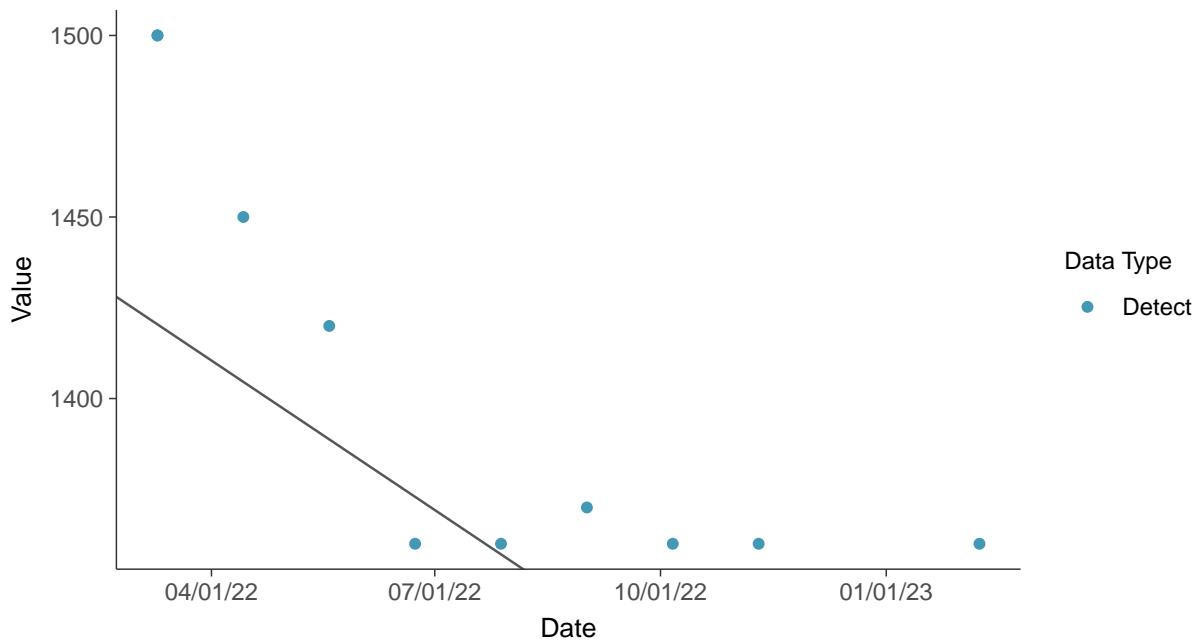
Normal Q-Q plot

Total Dissolved Solids, MW-7C (mg/L)



Trend Regression: Mann-Kendall/Theil-Sen Estimate

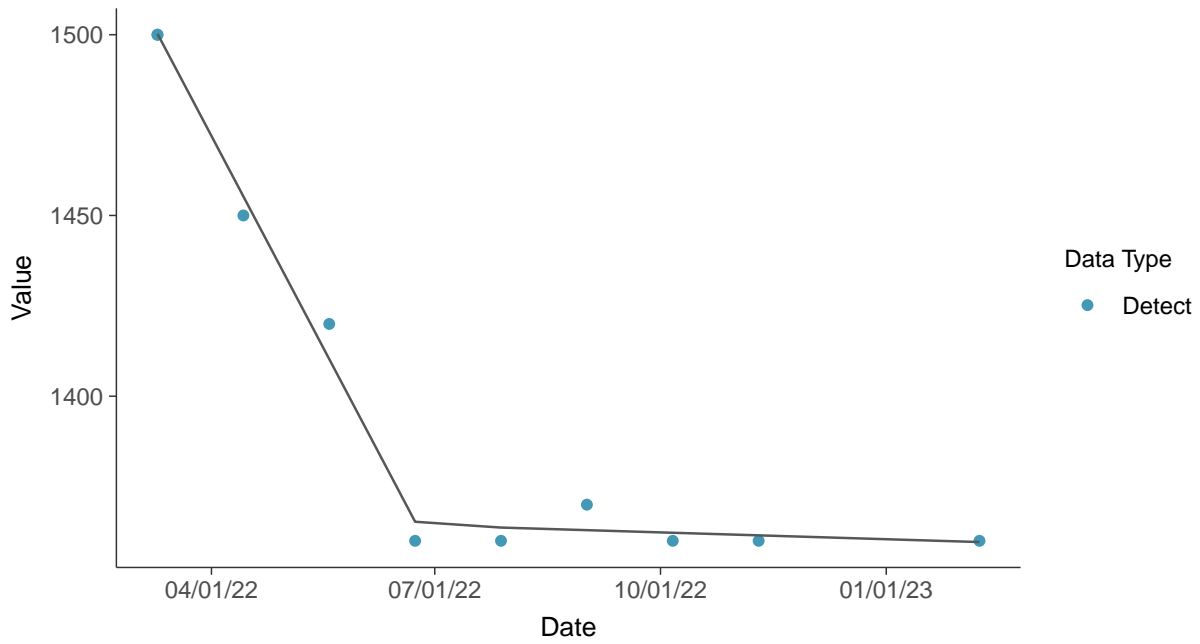
Total Dissolved Solids, MW-7C (mg/L)





Trend Regression: Piecewise Linear-Linear

Total Dissolved Solids, MW-7C (mg/L)



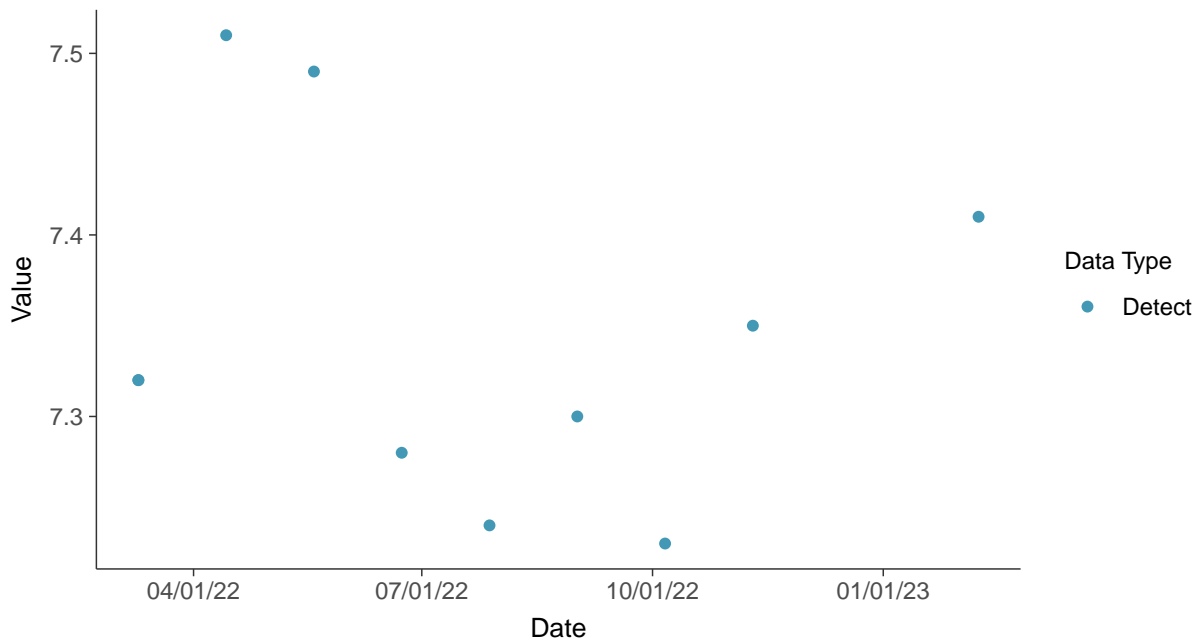


Appendix III: pH, Field, MW-7C

ID: 1_07

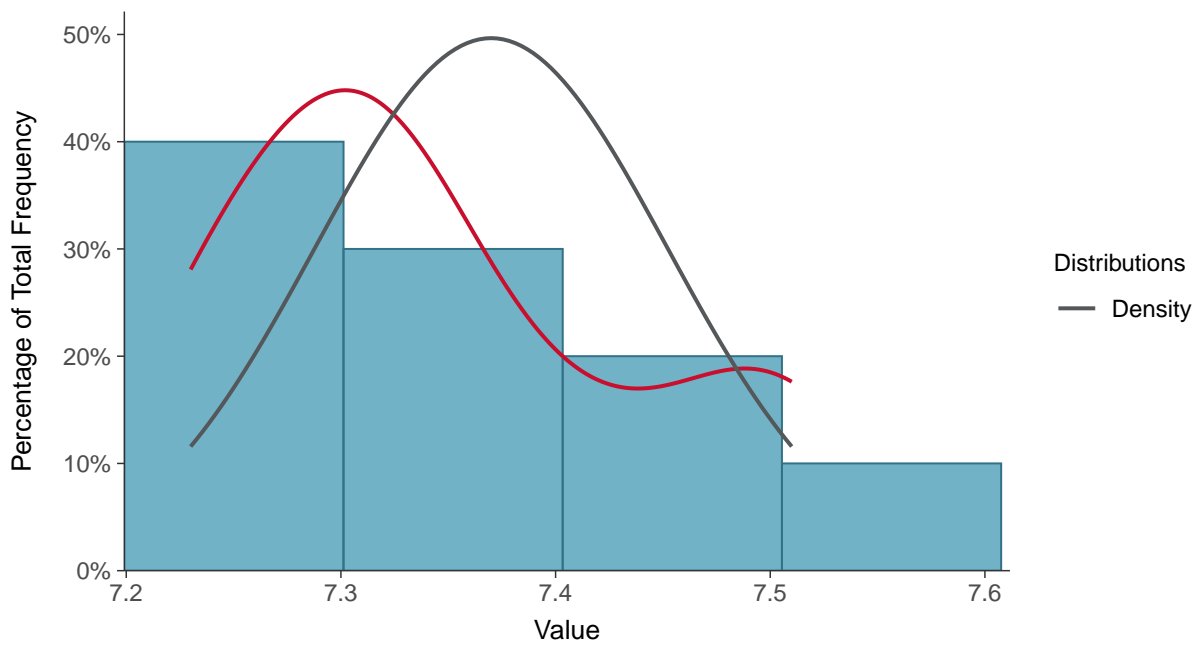
Scatter Plot

pH, Field, MW-7C (su)



Histogram

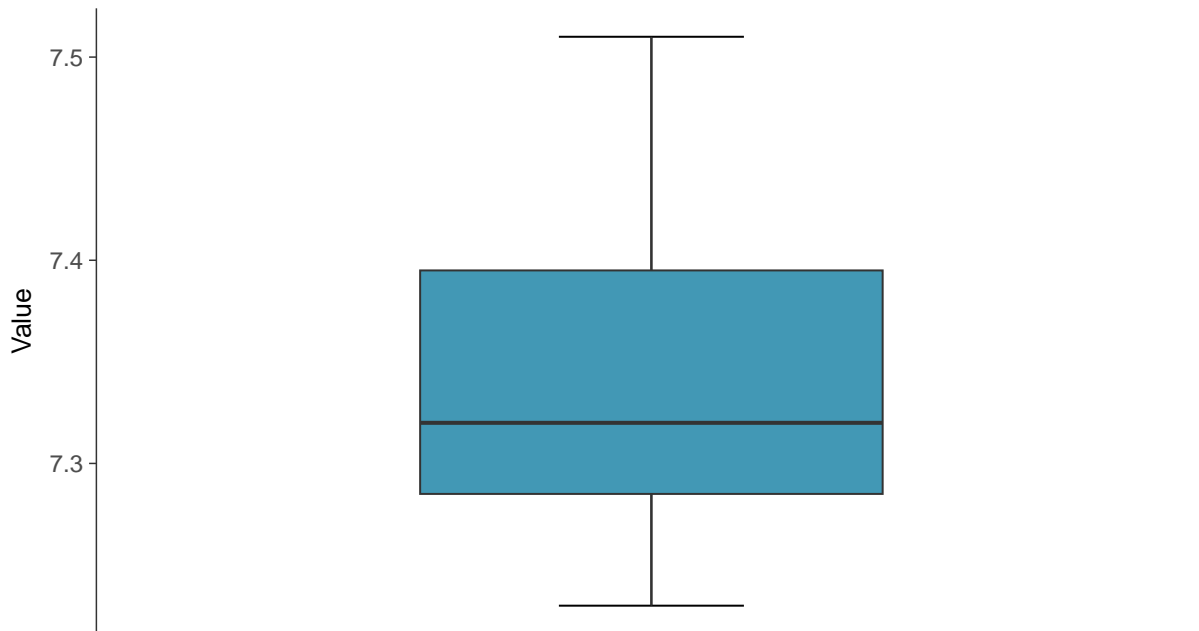
pH, Field, MW-7C (su)





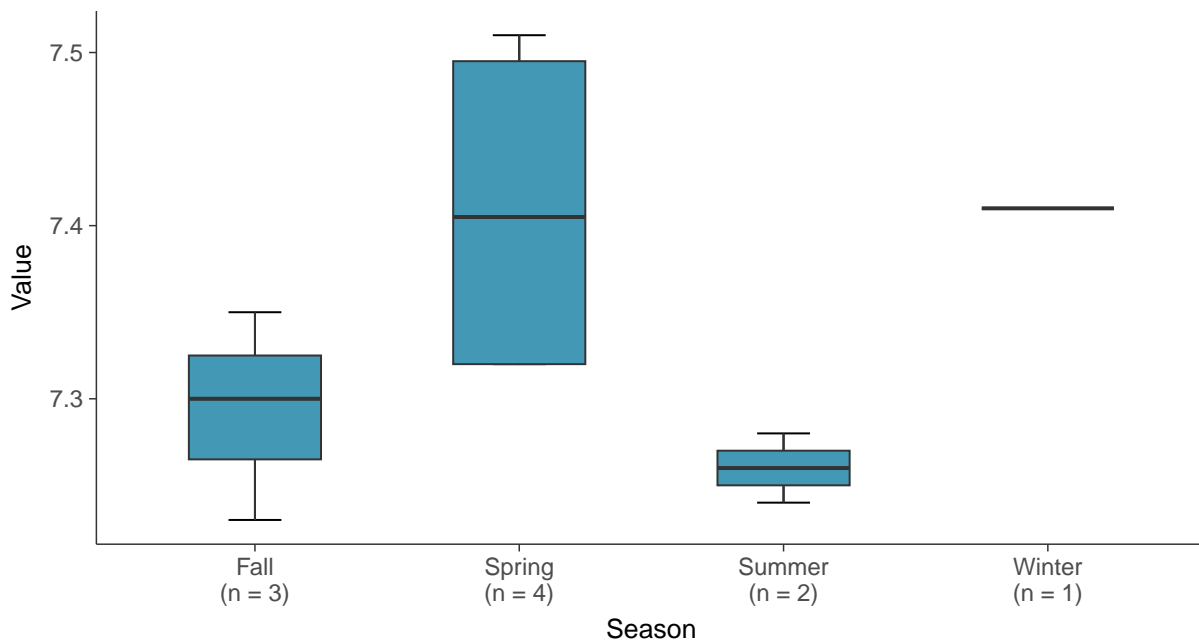
Boxplot

pH, Field, MW-7C (su)



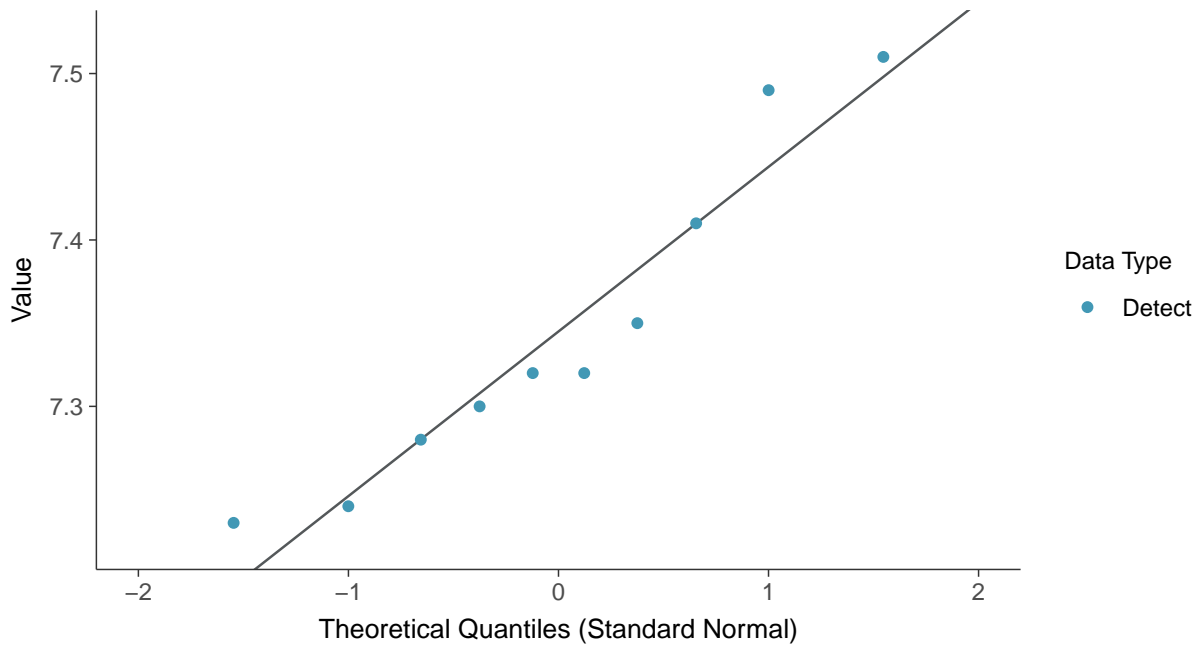
Boxplot by Season

pH, Field, MW-7C (su)

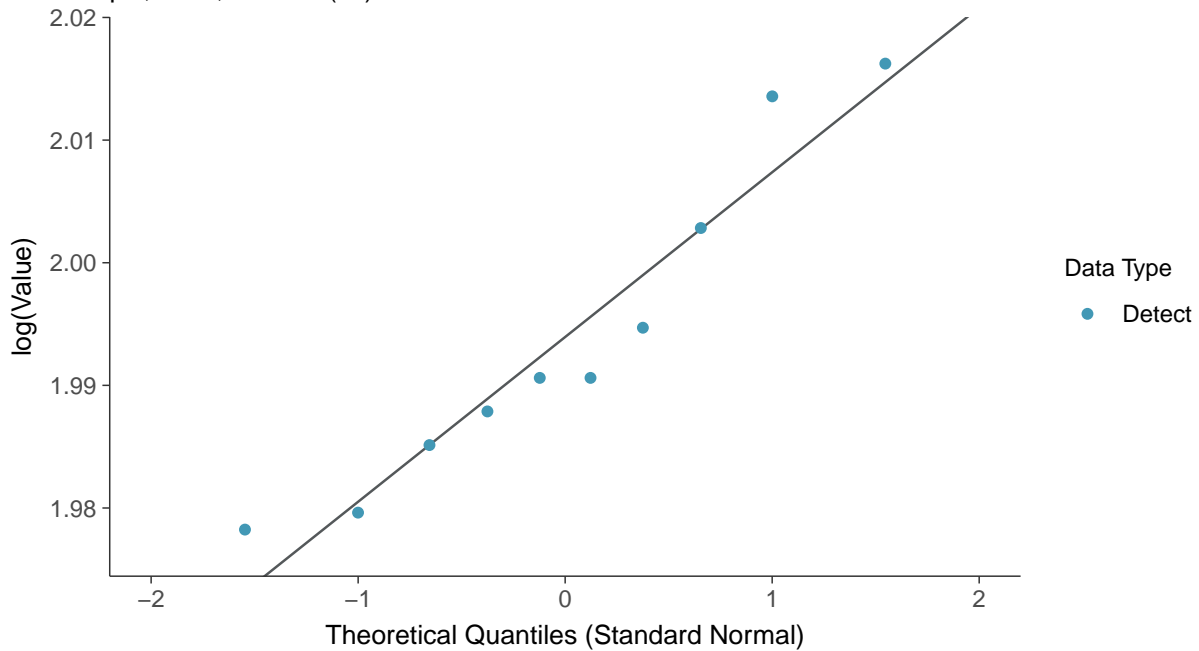




Normal Q-Q plot
pH, Field, MW-7C (su)



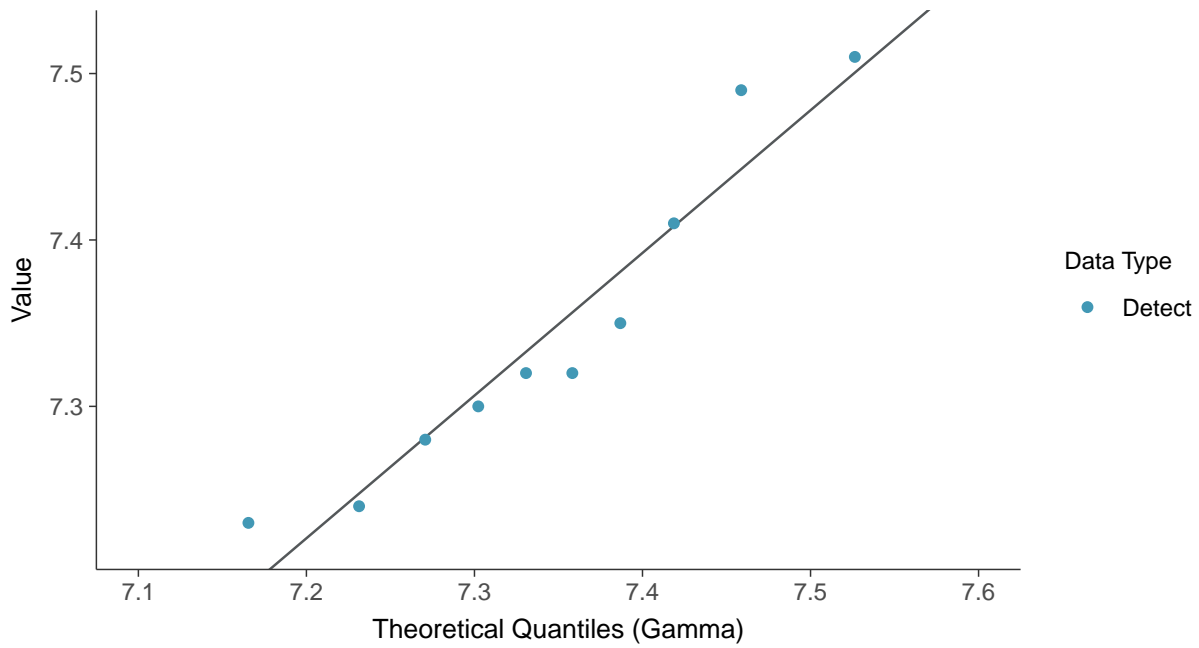
Lognormal Q-Q plot
pH, Field, MW-7C (su)





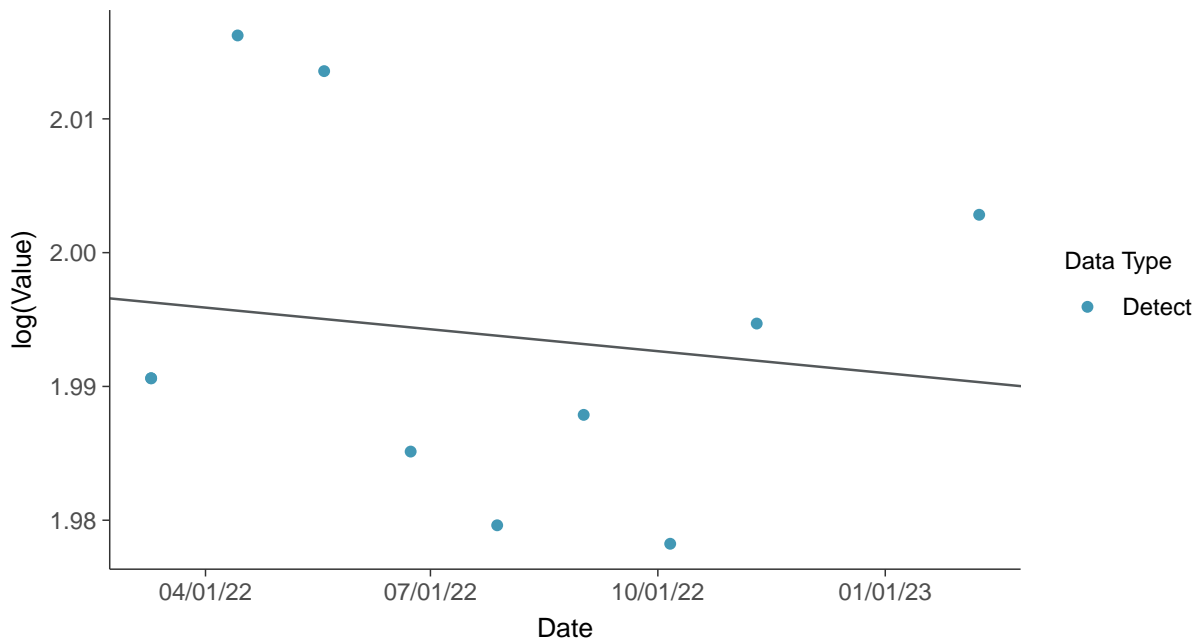
Gamma Q-Q plot

pH, Field, MW-7C (su)



Trend Regression: Lognormal MLE

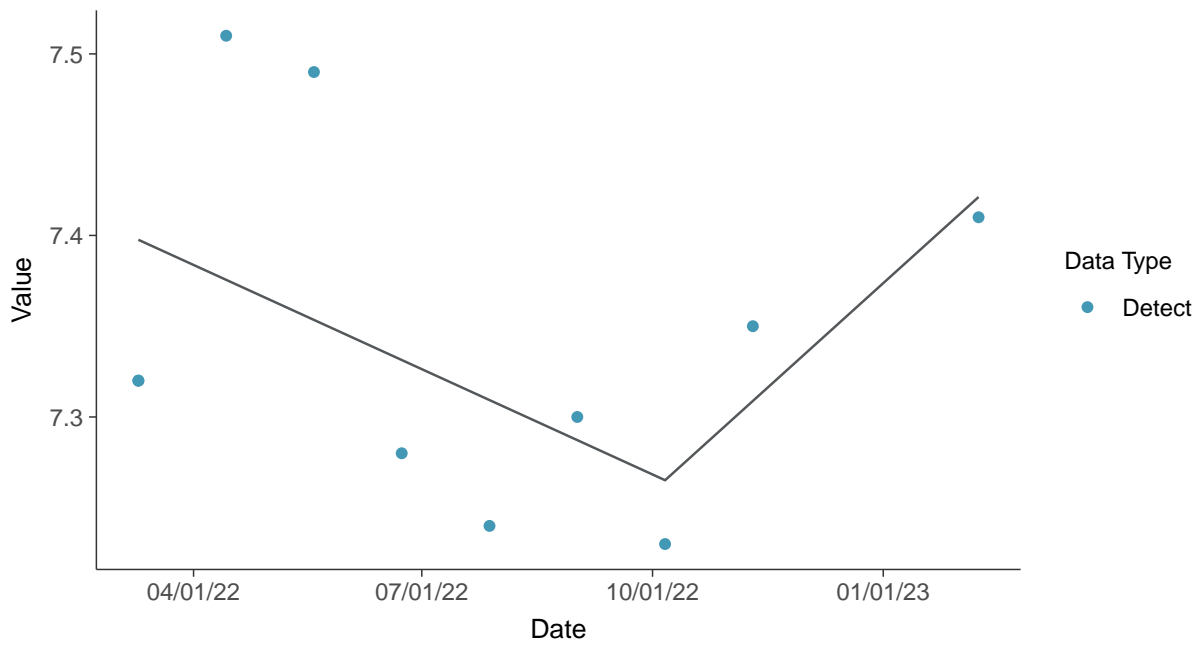
pH, Field, MW-7C (su)





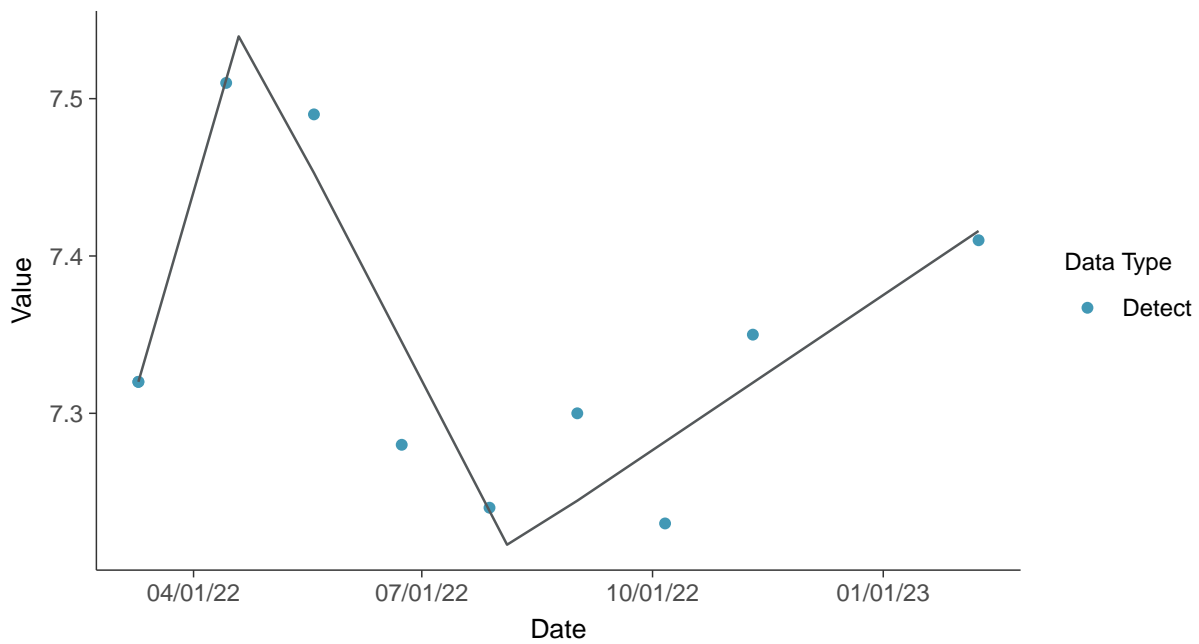
Trend Regression: Piecewise Linear-Linear

pH, Field, MW-7C (su)



Trend Regression: Piecewise Linear-Linear-Linear

pH, Field, MW-7C (su)



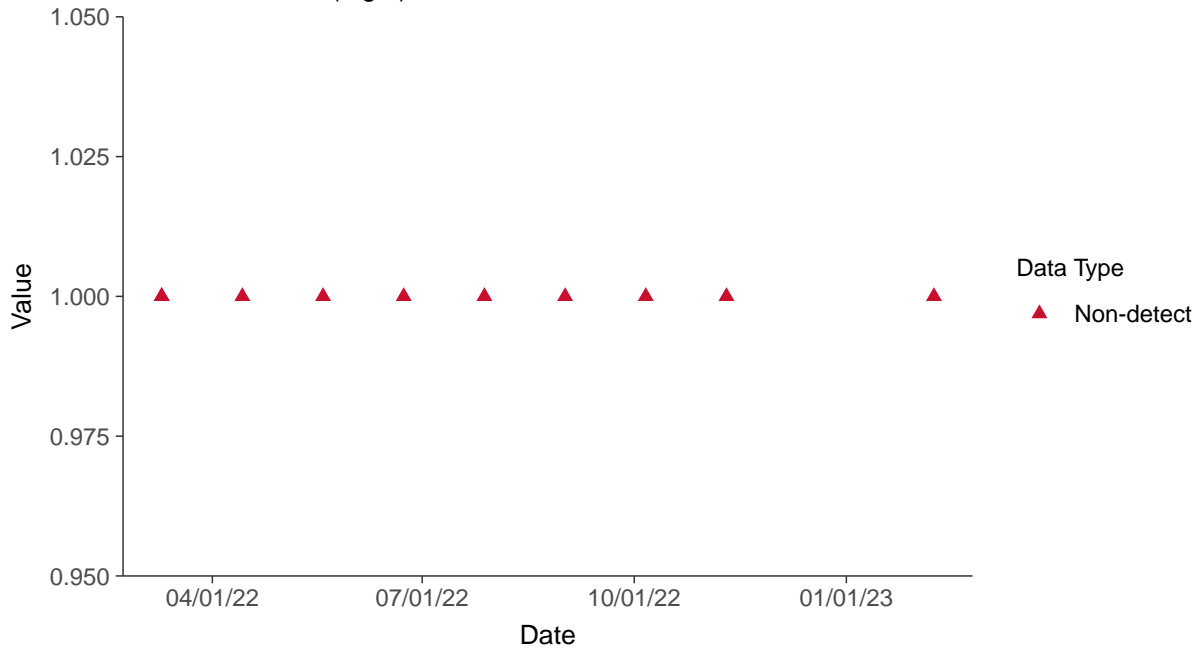


Appendix IV: Fluoride, MW-7C

ID: 2_04

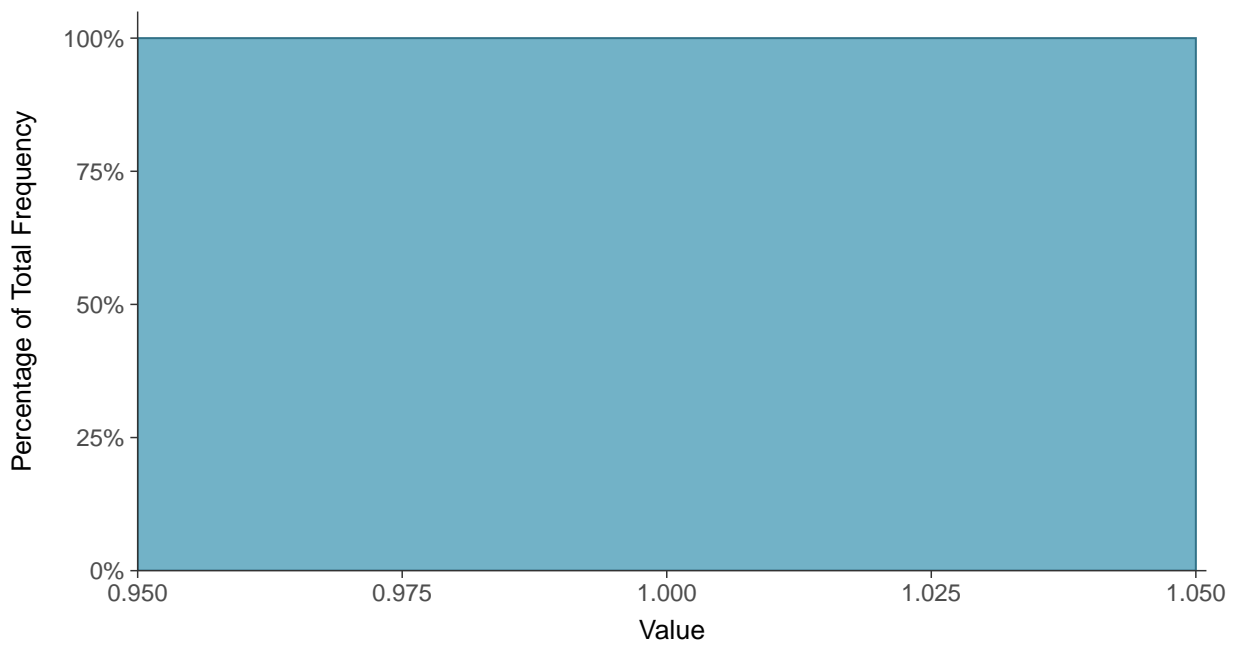
Scatter Plot

Fluoride, MW-7C (mg/L)



Histogram

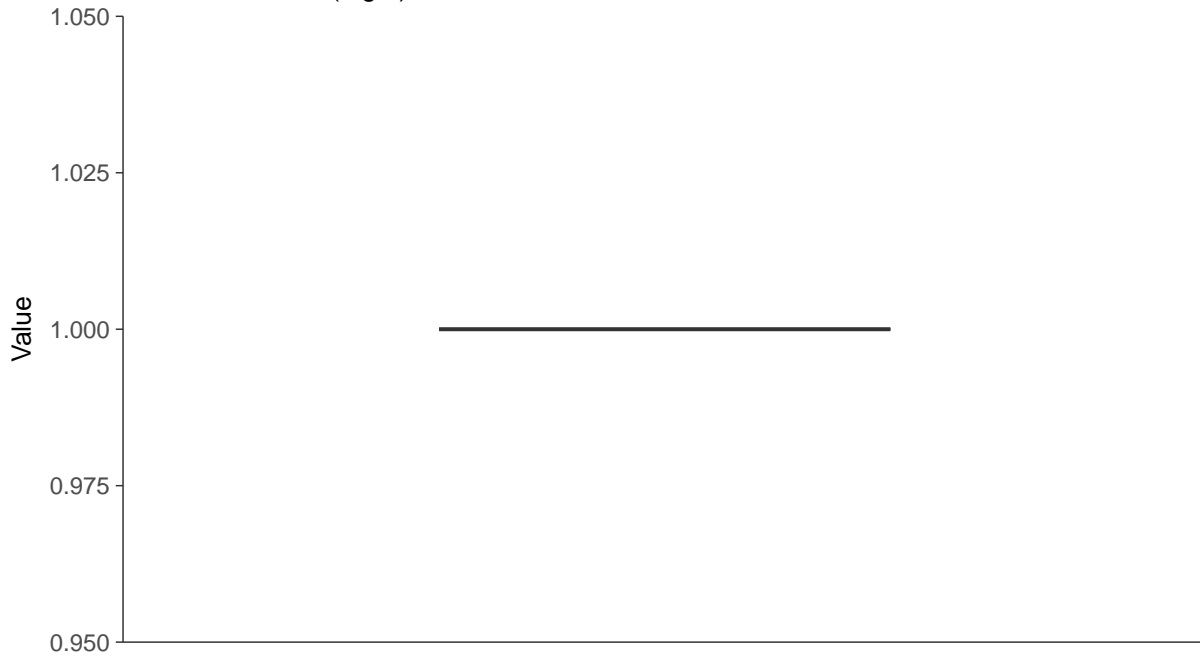
Fluoride, MW-7C (mg/L)





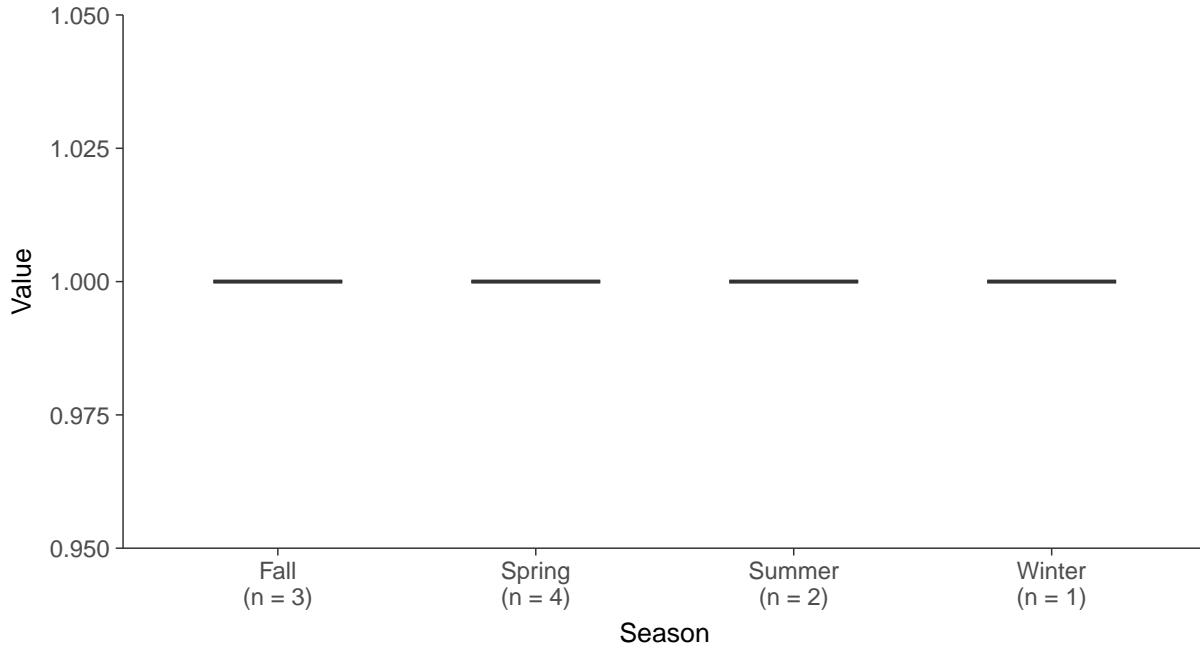
Boxplot

Fluoride, MW-7C (mg/L)



Boxplot by Season

Fluoride, MW-7C (mg/L)



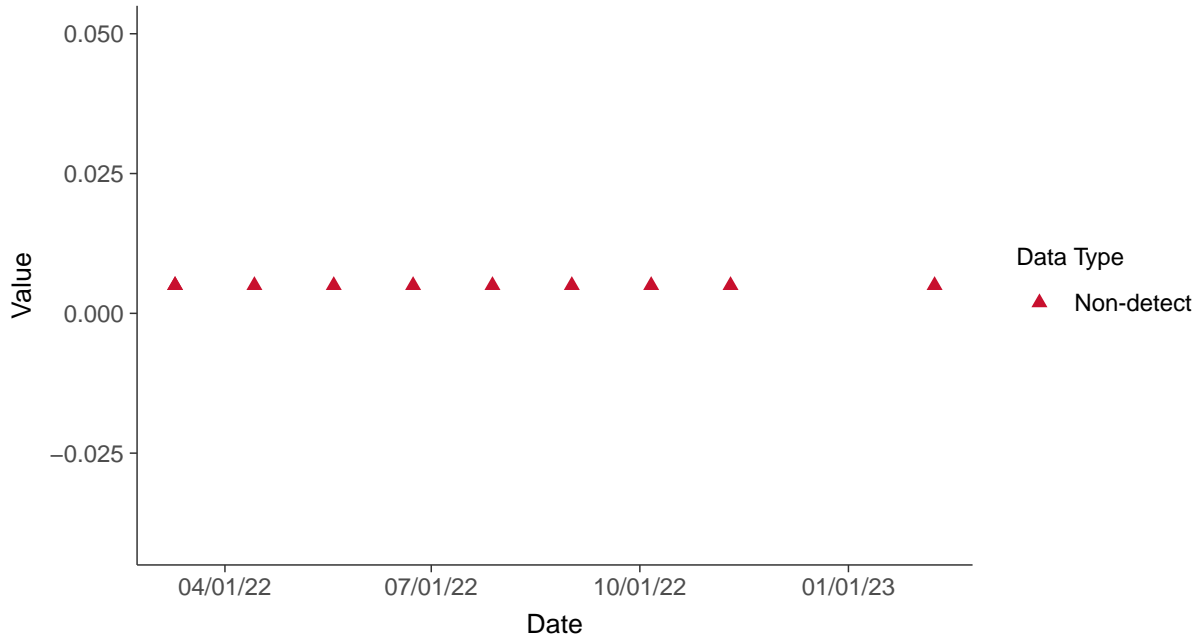


Appendix IV: Antimony, MW-7C

ID: 2_08

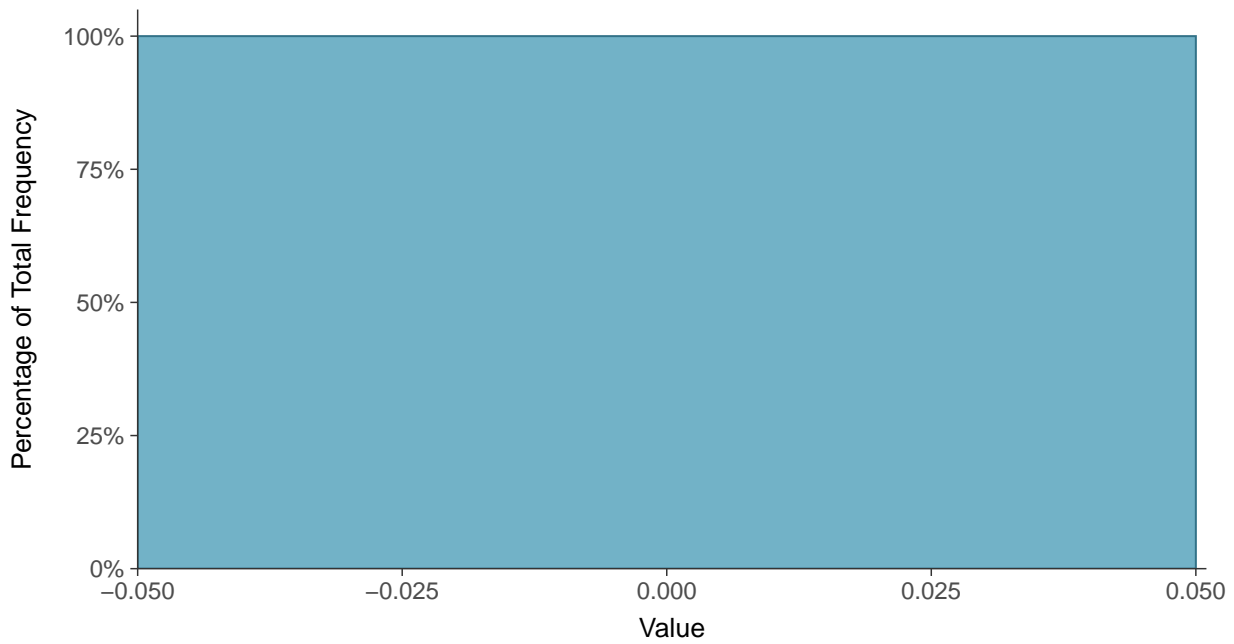
Scatter Plot

Antimony, MW-7C (mg/L)



Histogram

Antimony, MW-7C (mg/L)





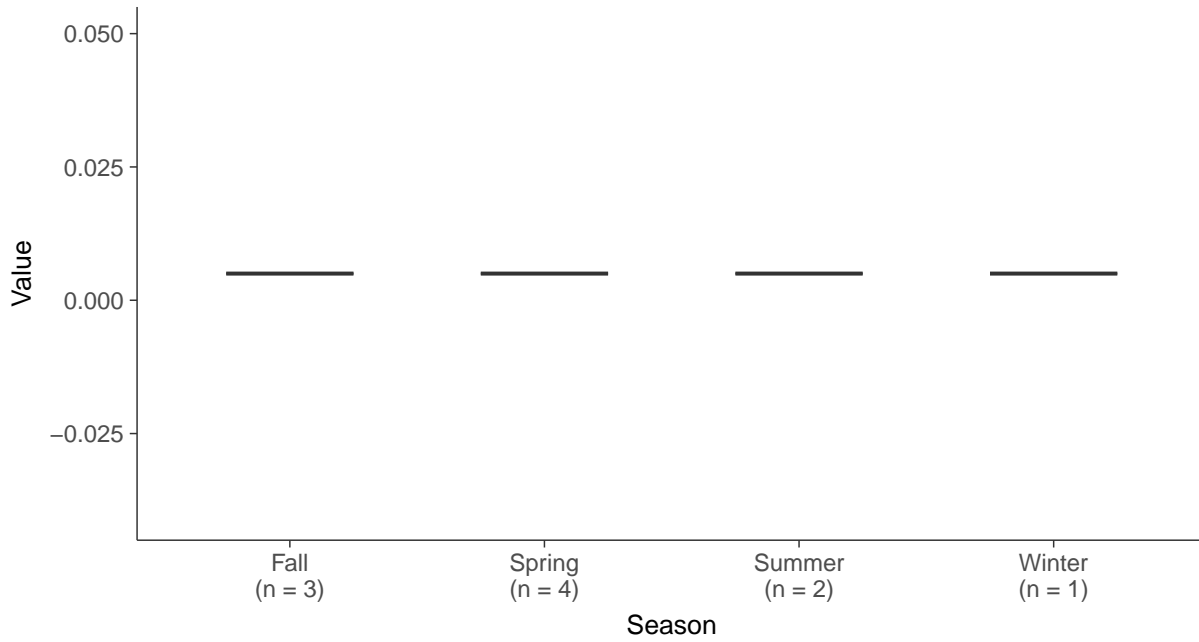
Boxplot

Antimony, MW-7C (mg/L)



Boxplot by Season

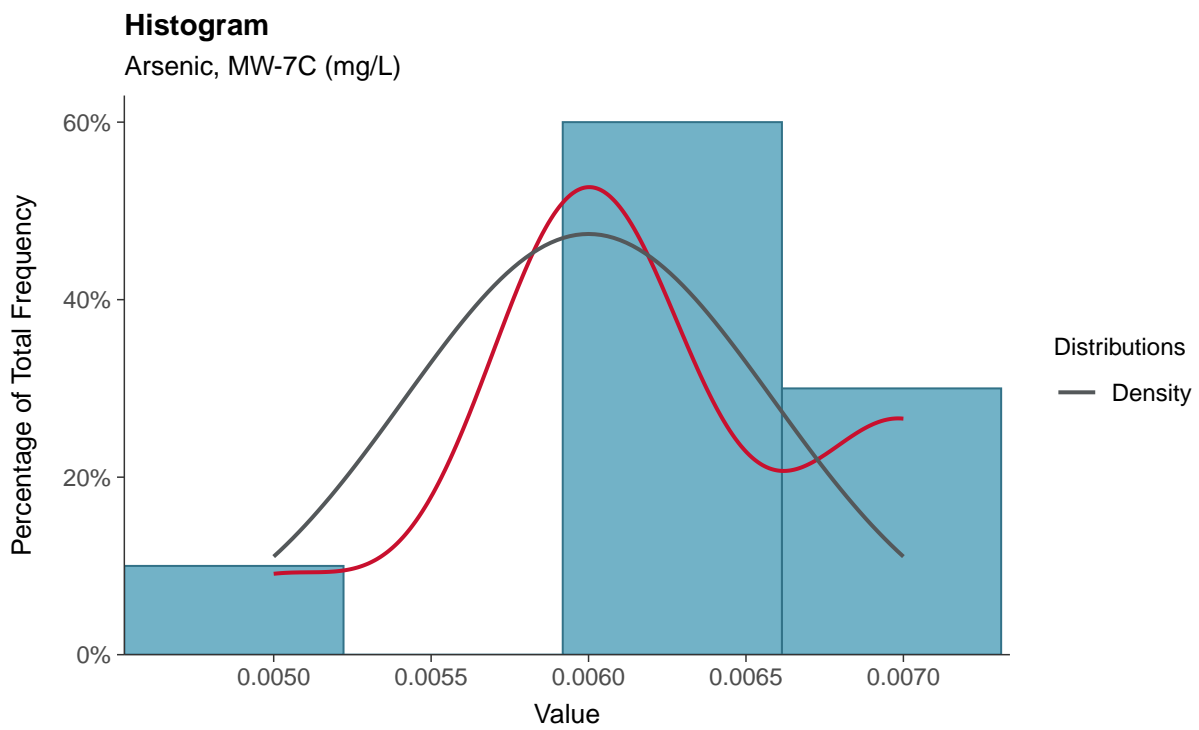
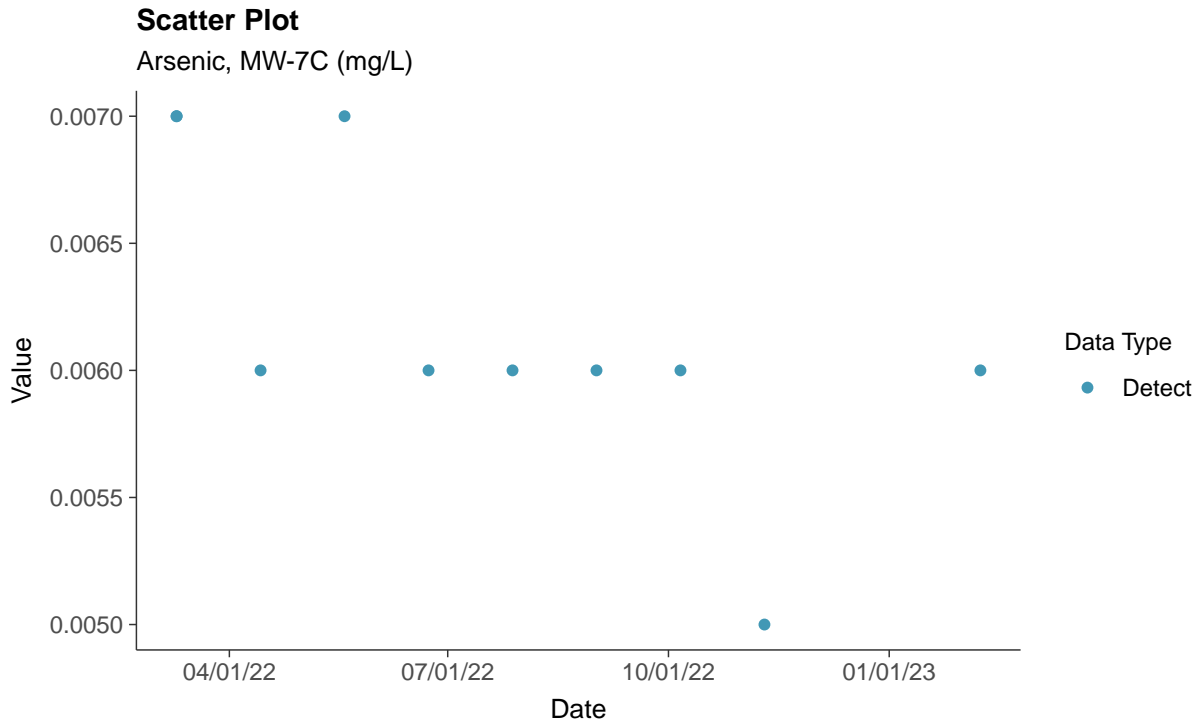
Antimony, MW-7C (mg/L)





Appendix IV: Arsenic, MW-7C

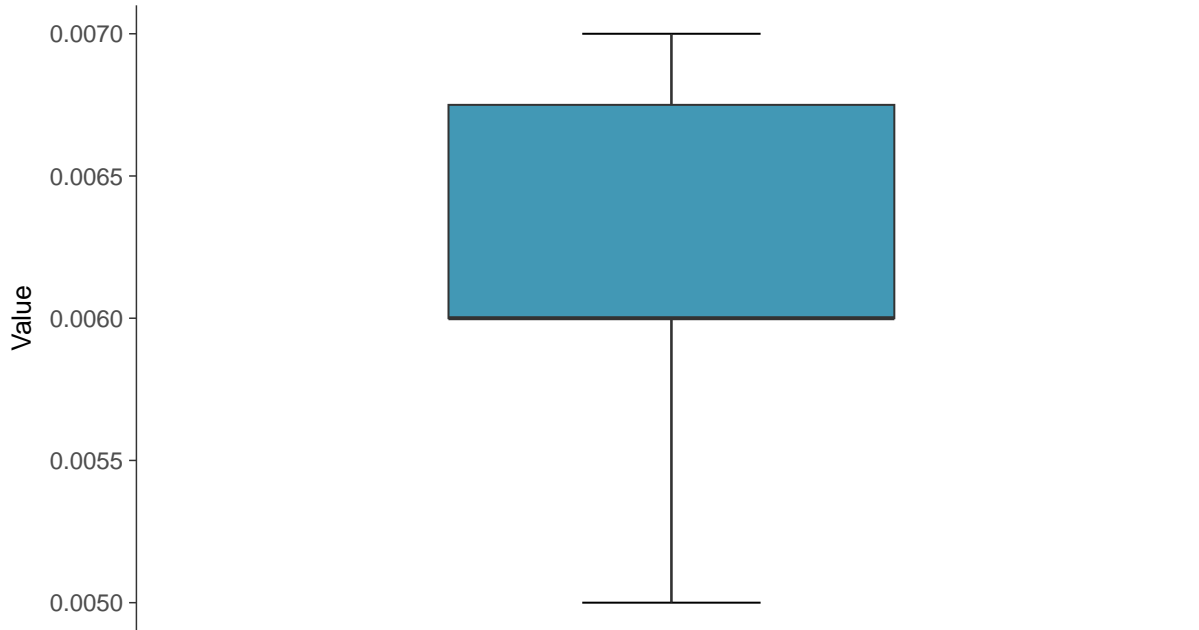
ID: 2_09





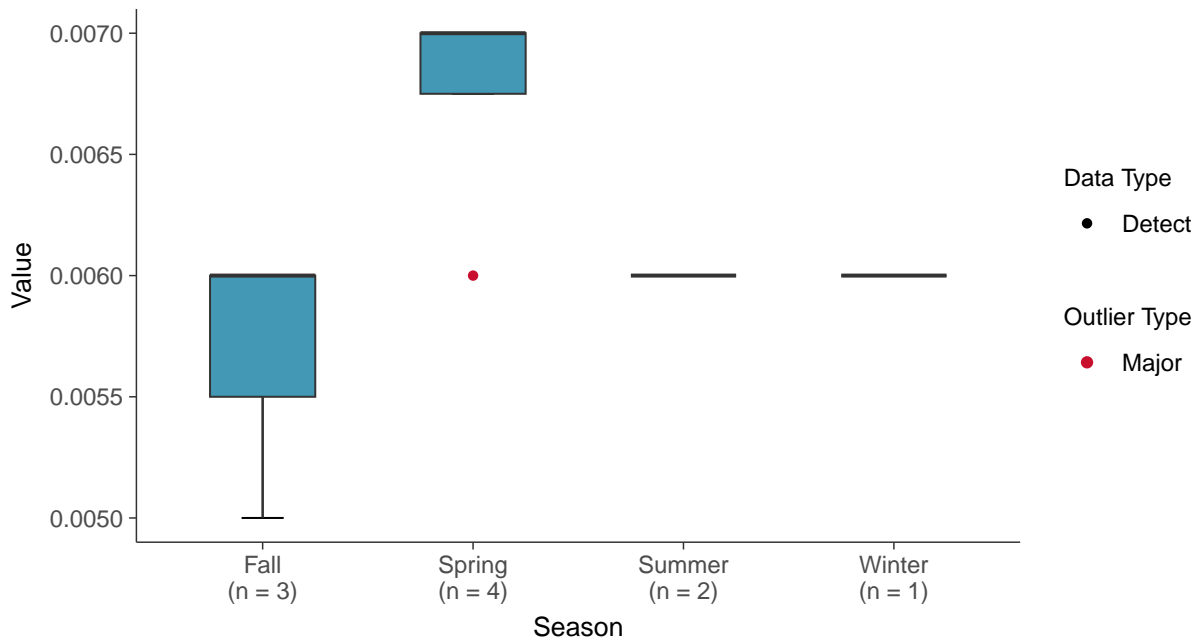
Boxplot

Arsenic, MW-7C (mg/L)



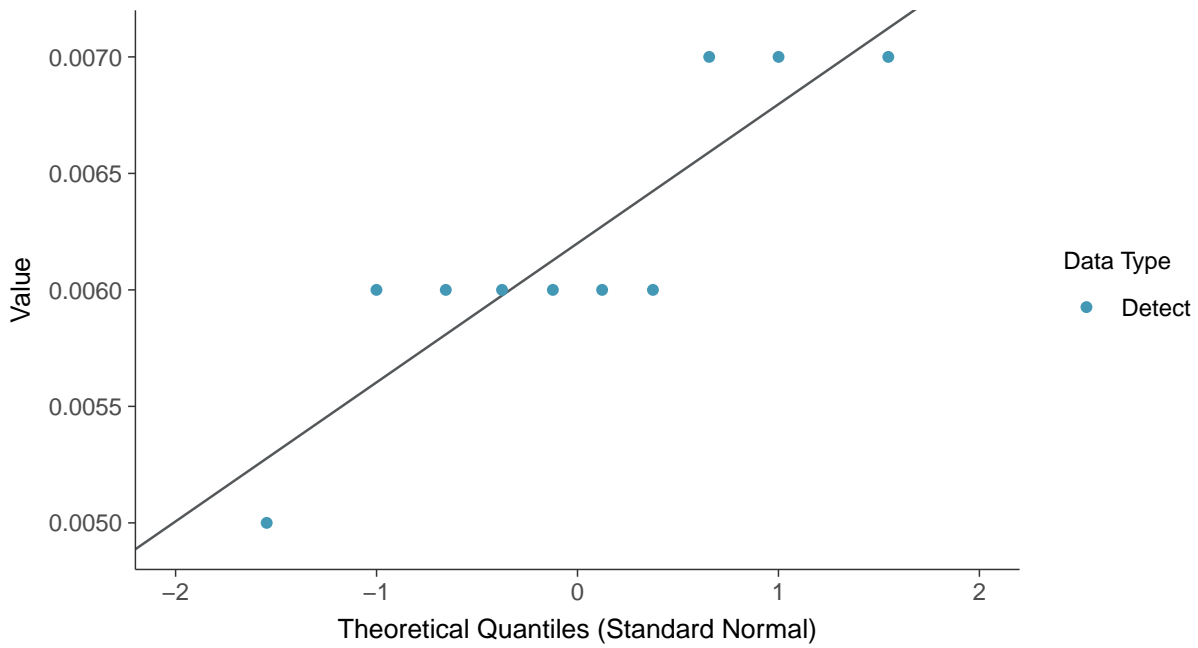
Boxplot by Season

Arsenic, MW-7C (mg/L)

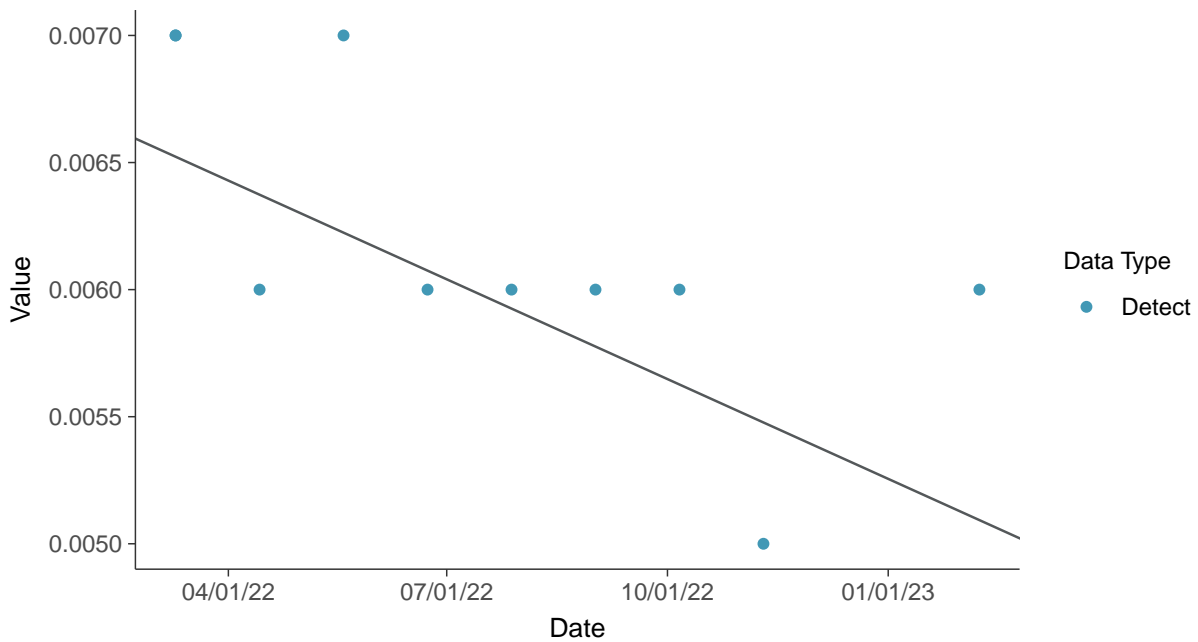




Normal Q-Q plot
Arsenic, MW-7C (mg/L)



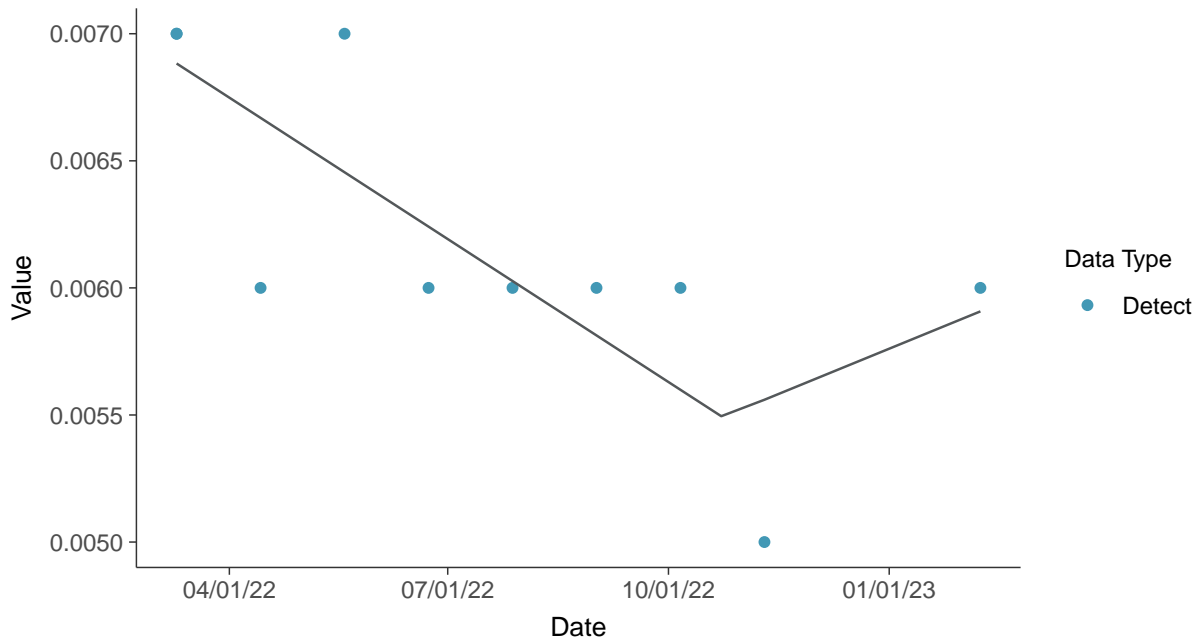
Trend Regression: Mann-Kendall/Theil-Sen Estimate
Arsenic, MW-7C (mg/L)





Trend Regression: Piecewise Linear-Linear

Arsenic, MW-7C (mg/L)



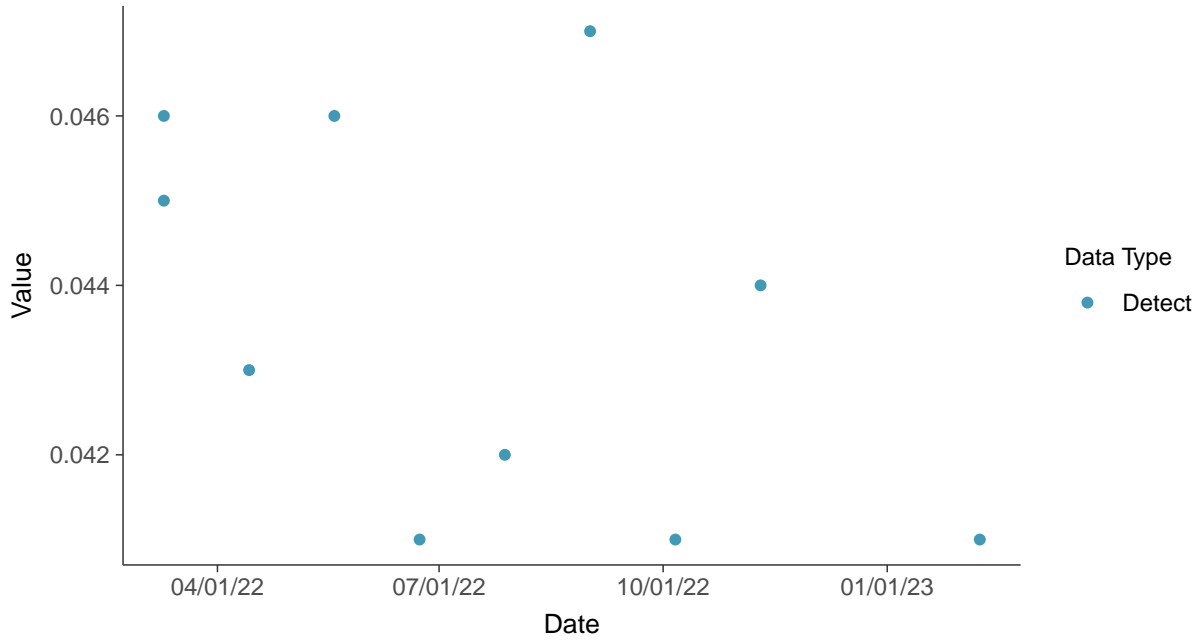


Appendix IV: Barium, MW-7C

ID: 2_10

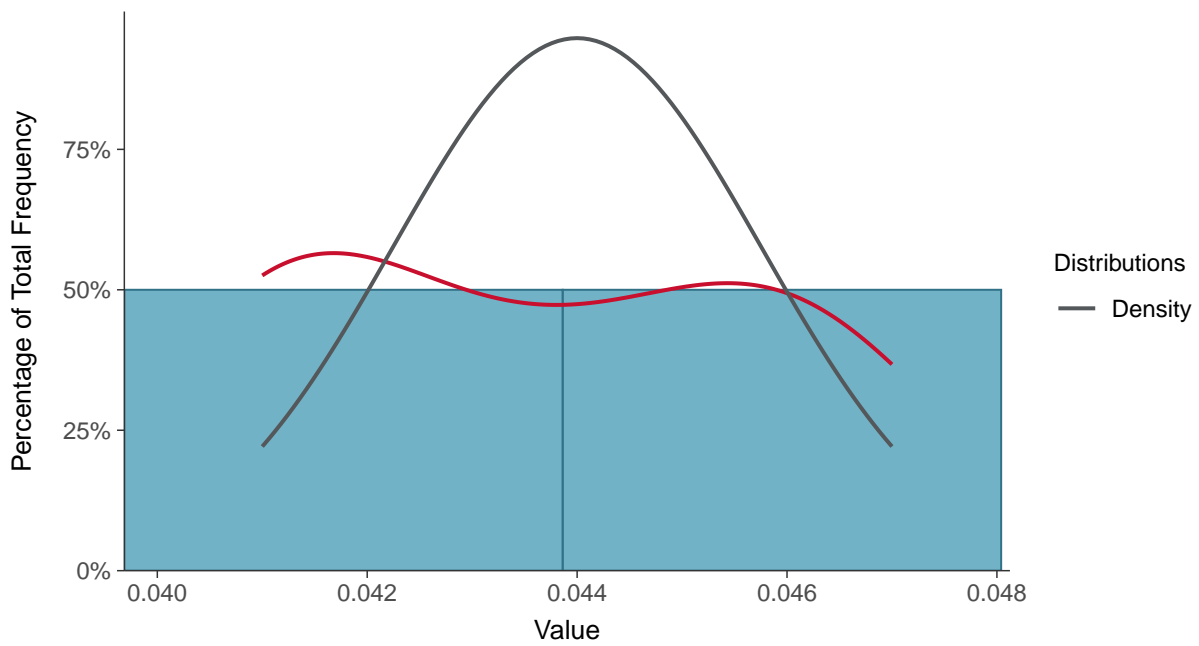
Scatter Plot

Barium, MW-7C (mg/L)



Histogram

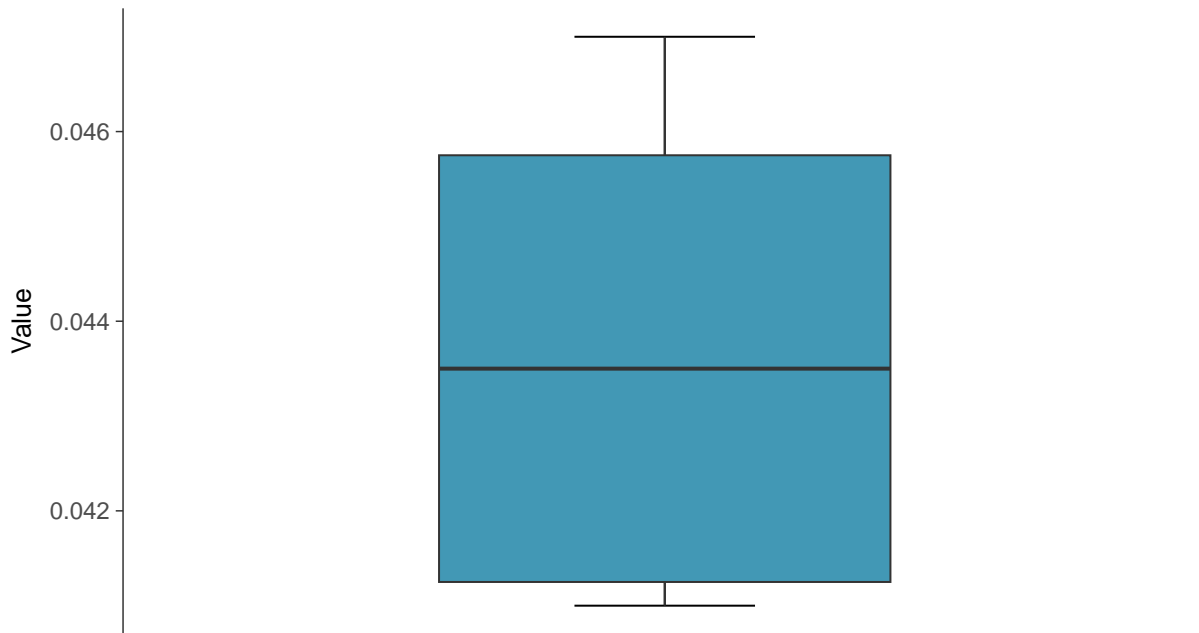
Barium, MW-7C (mg/L)





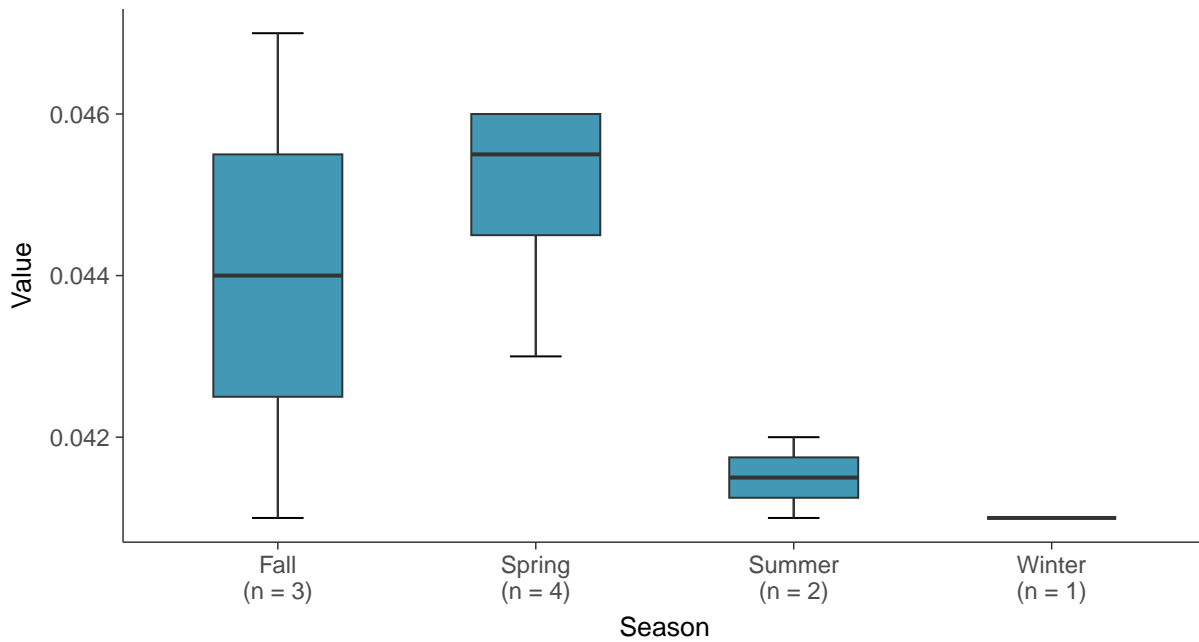
Boxplot

Barium, MW-7C (mg/L)



Boxplot by Season

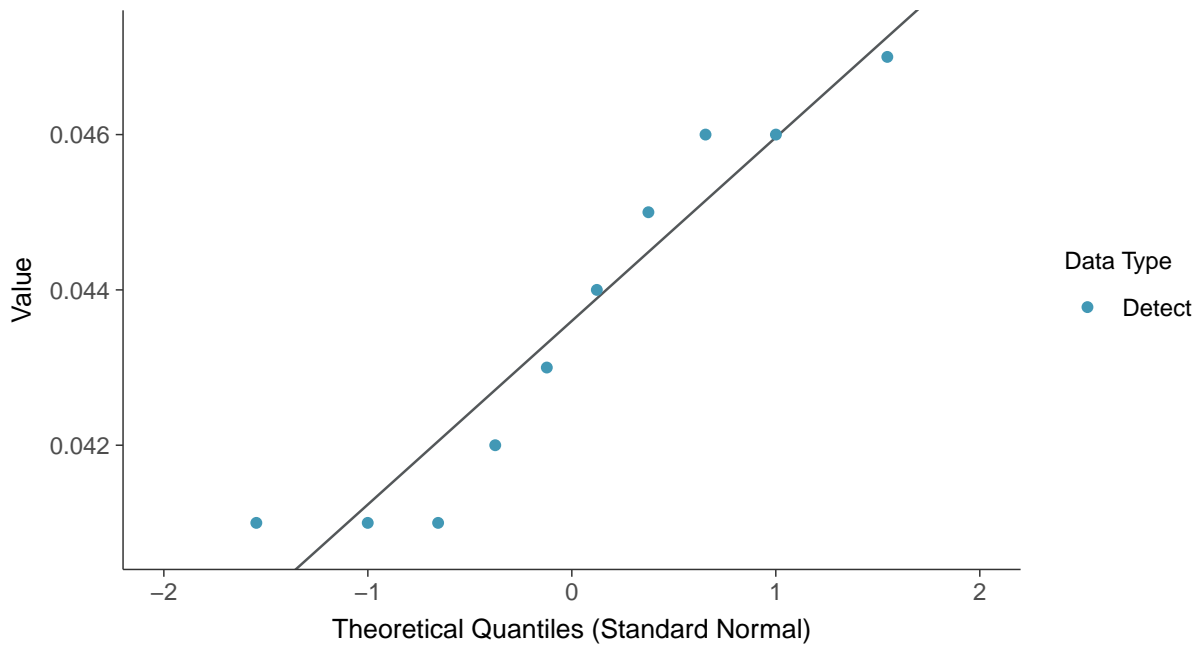
Barium, MW-7C (mg/L)





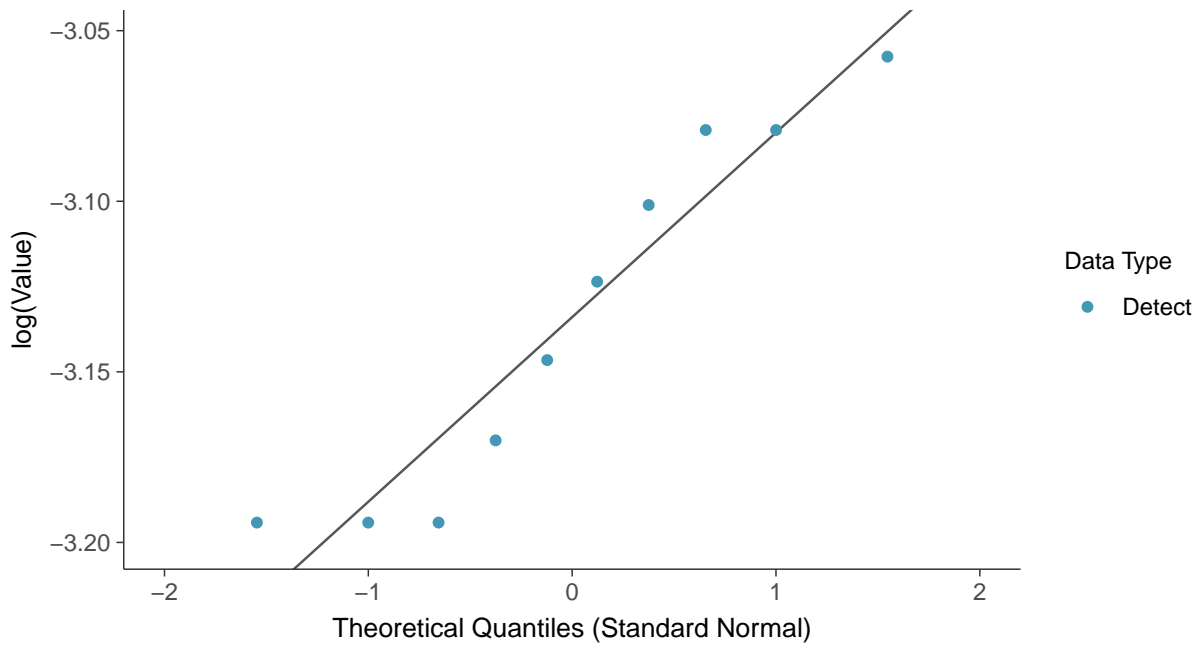
Normal Q-Q plot

Barium, MW-7C (mg/L)



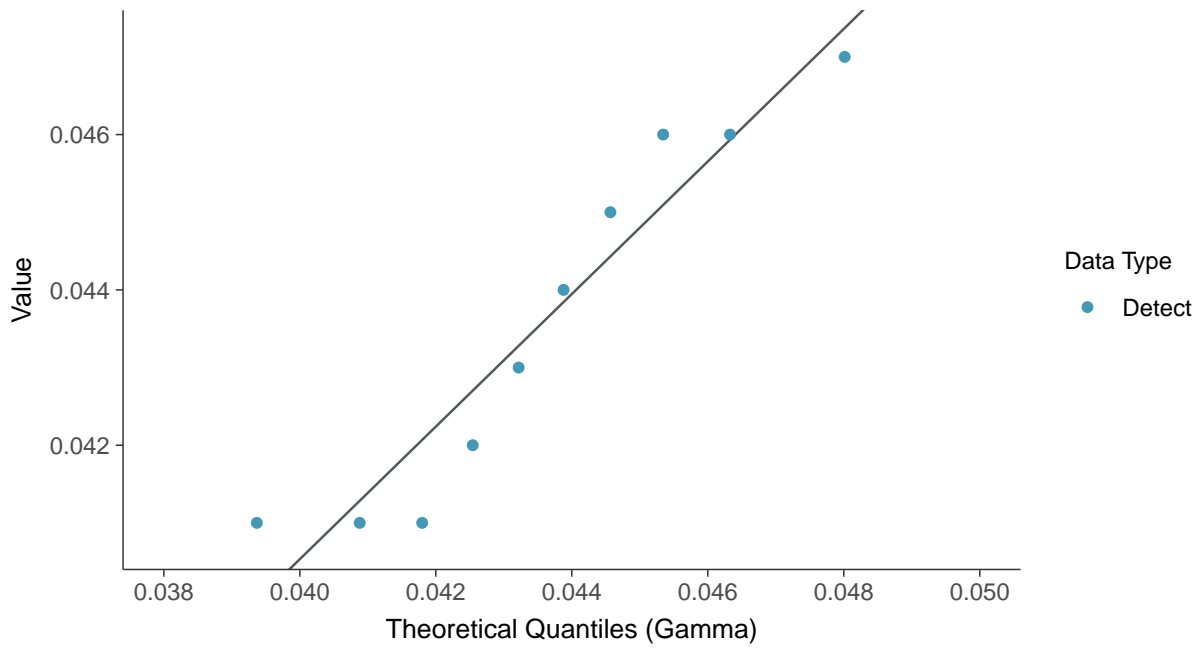
Lognormal Q-Q plot

Barium, MW-7C (mg/L)

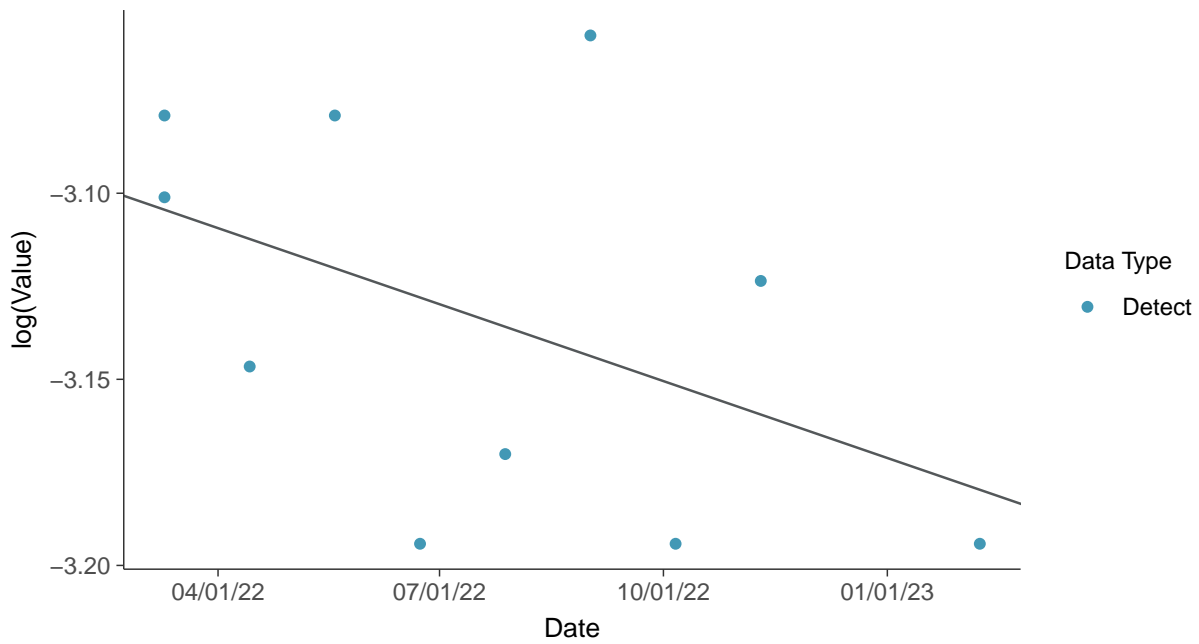




Gamma Q-Q plot
Barium, MW-7C (mg/L)



Trend Regression: Lognormal MLE
Barium, MW-7C (mg/L)



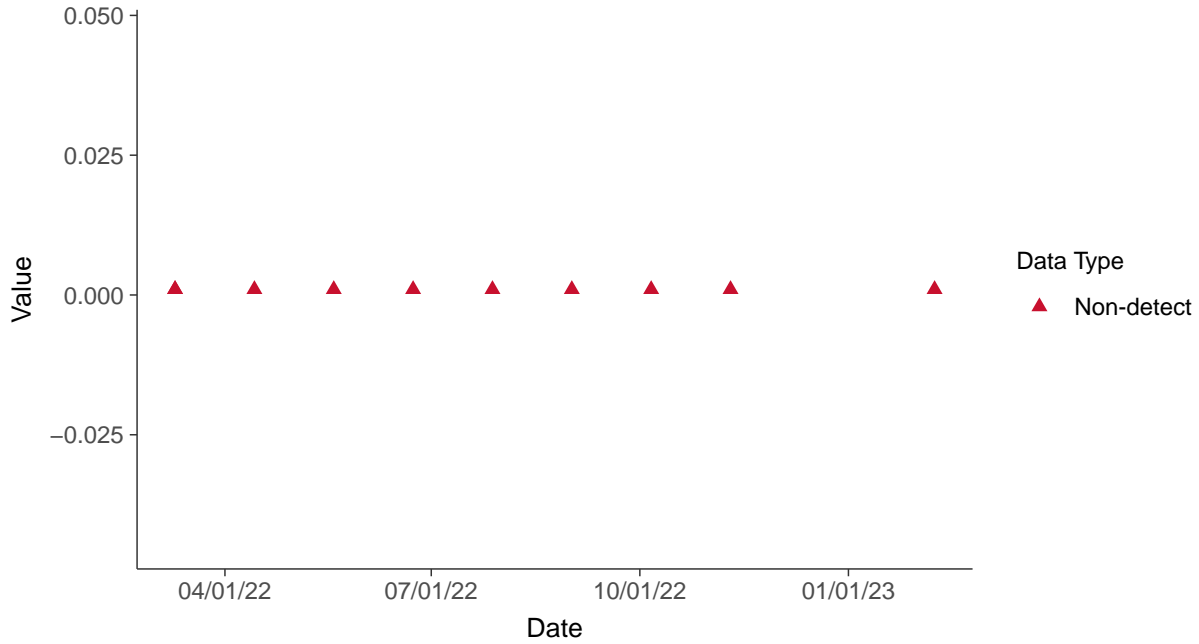


Appendix IV: Beryllium, MW-7C

ID: 2_11

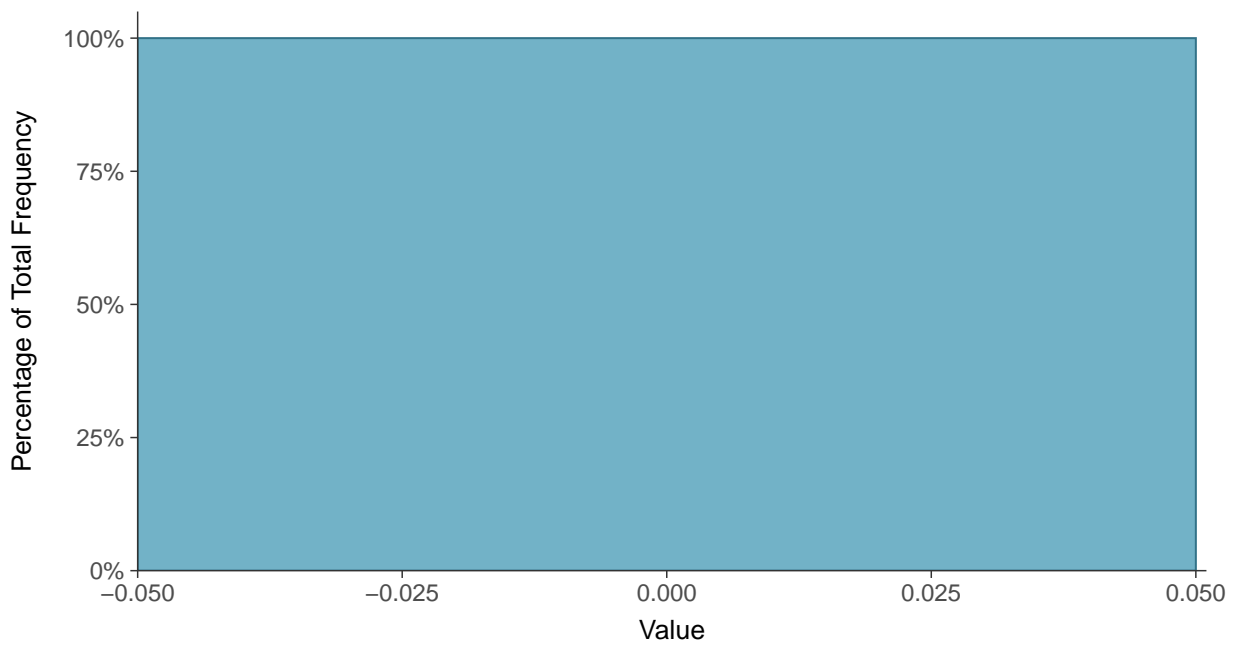
Scatter Plot

Beryllium, MW-7C (mg/L)



Histogram

Beryllium, MW-7C (mg/L)





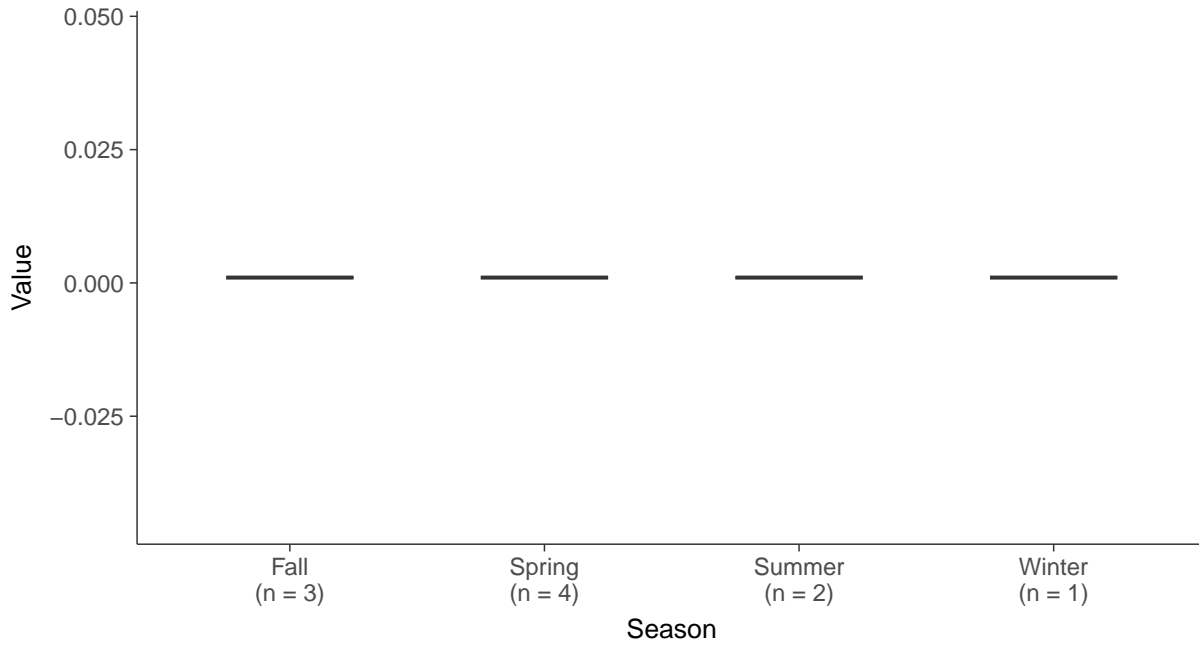
Boxplot

Beryllium, MW-7C (mg/L)



Boxplot by Season

Beryllium, MW-7C (mg/L)



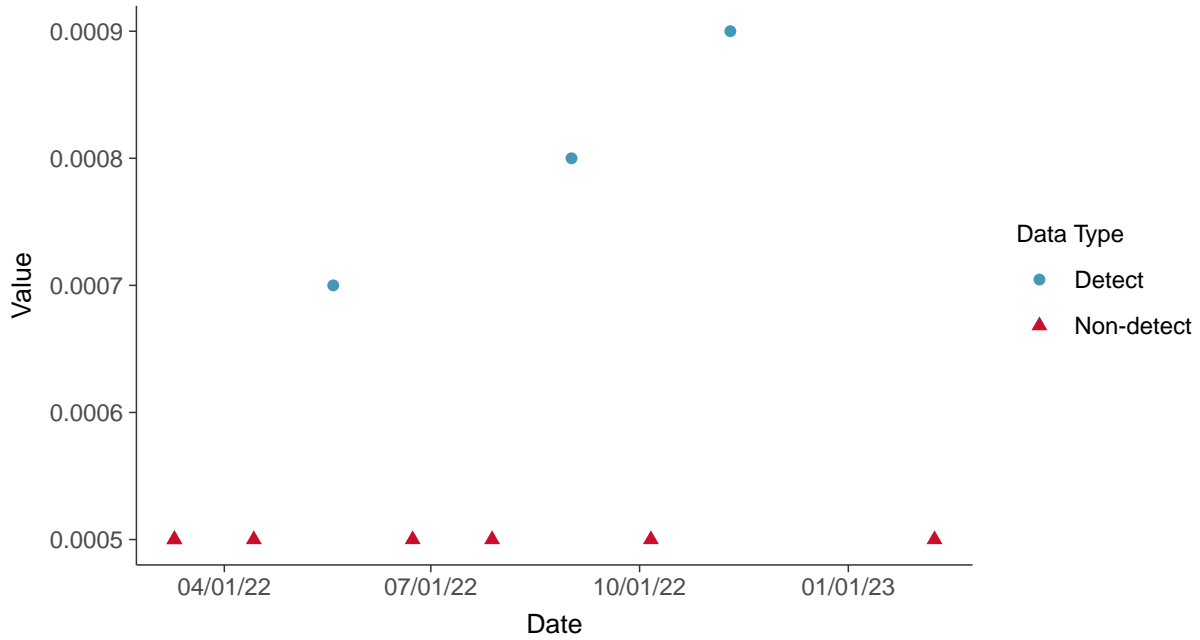


Appendix IV: Cadmium, MW-7C

ID: 2_13

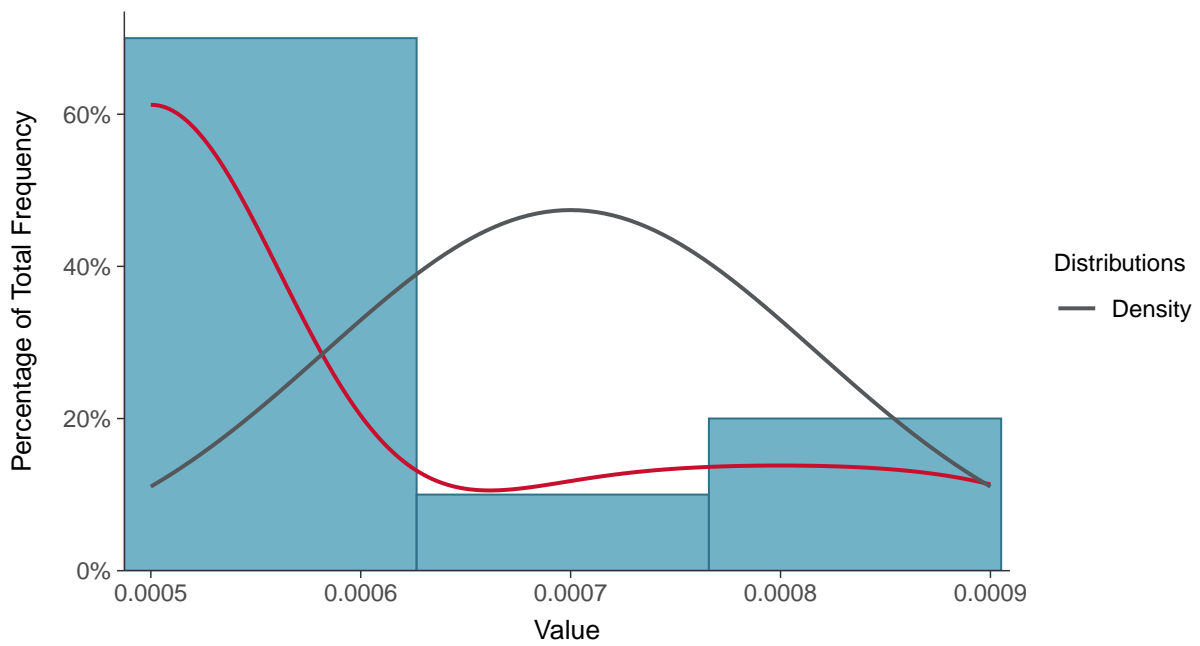
Scatter Plot

Cadmium, MW-7C (mg/L)



Histogram

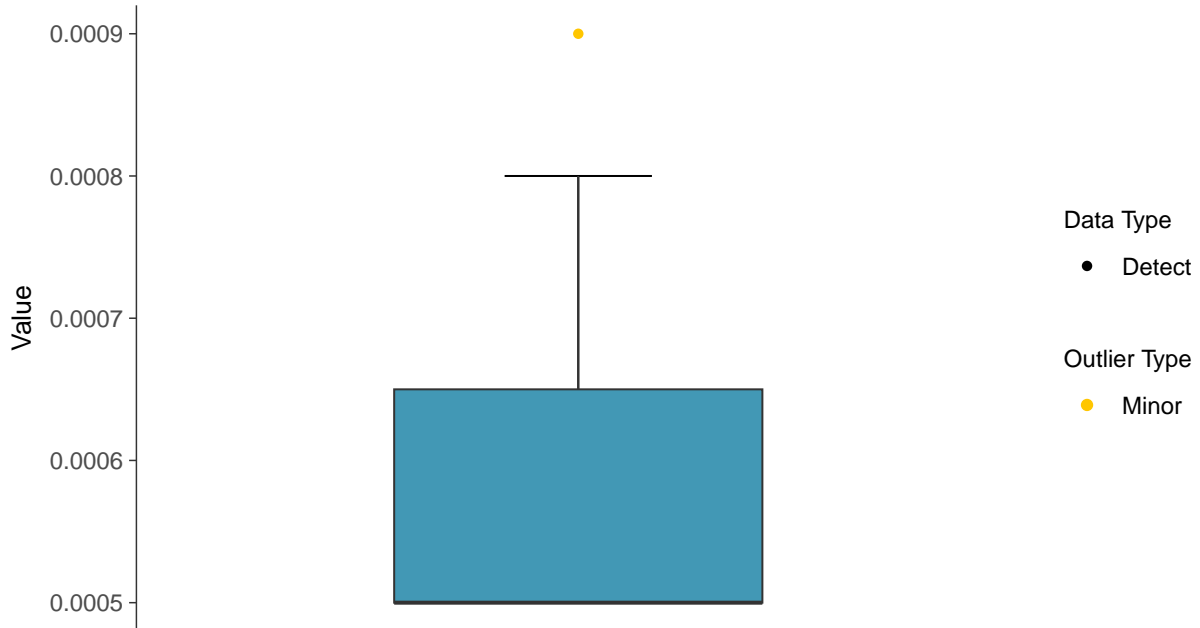
Cadmium, MW-7C (mg/L)





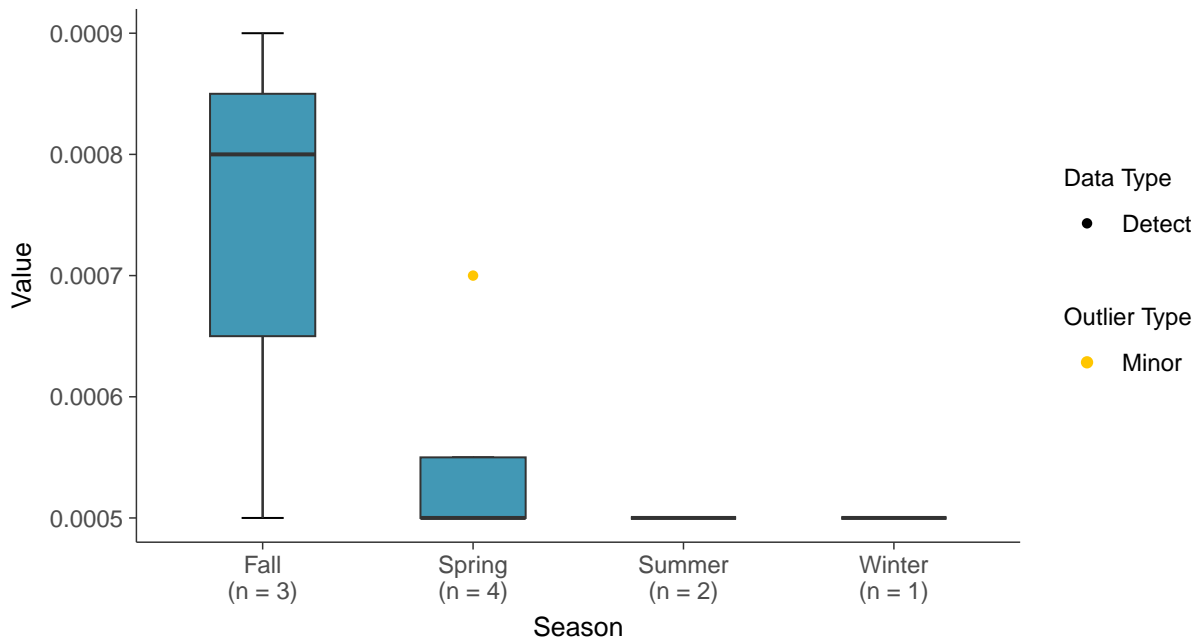
Boxplot

Cadmium, MW-7C (mg/L)



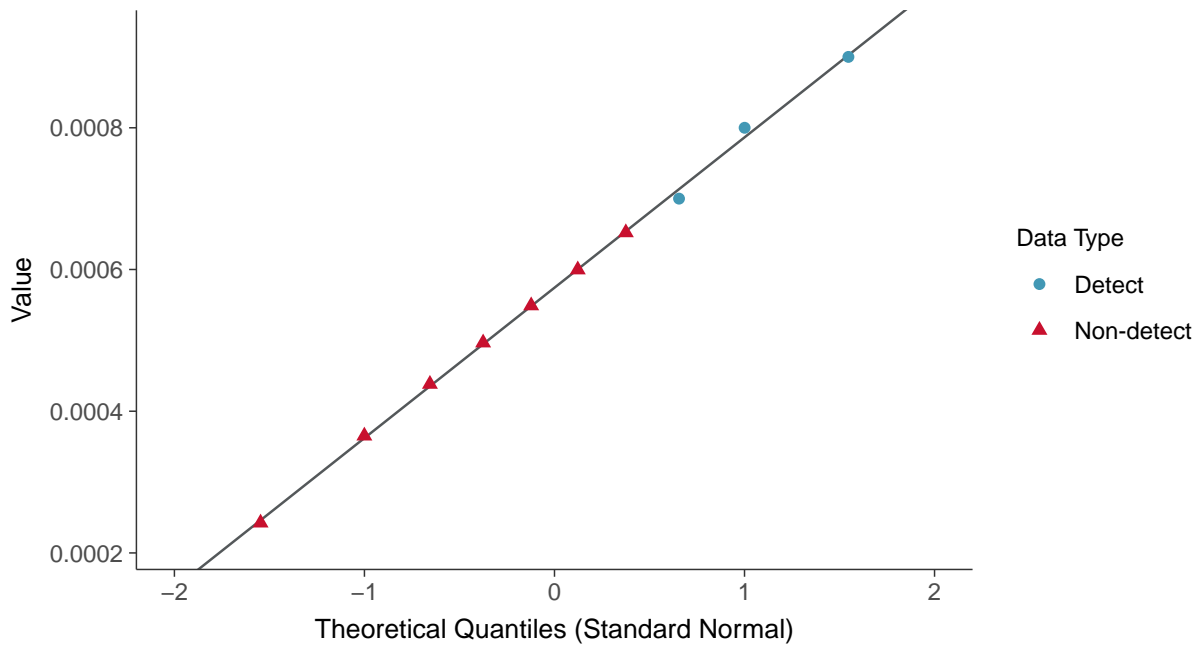
Boxplot by Season

Cadmium, MW-7C (mg/L)

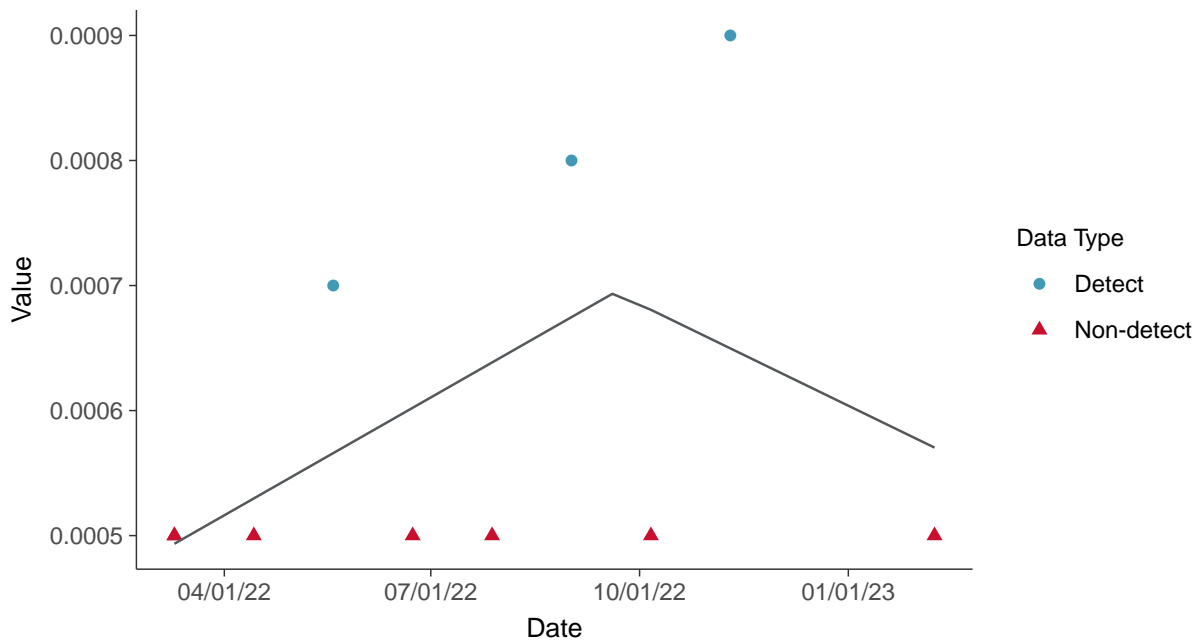




Normal Q-Q plot using ROS Imputed Estimates
Cadmium, MW-7C (mg/L)



Trend Regression: Piecewise Linear-Linear
Cadmium, MW-7C (mg/L)



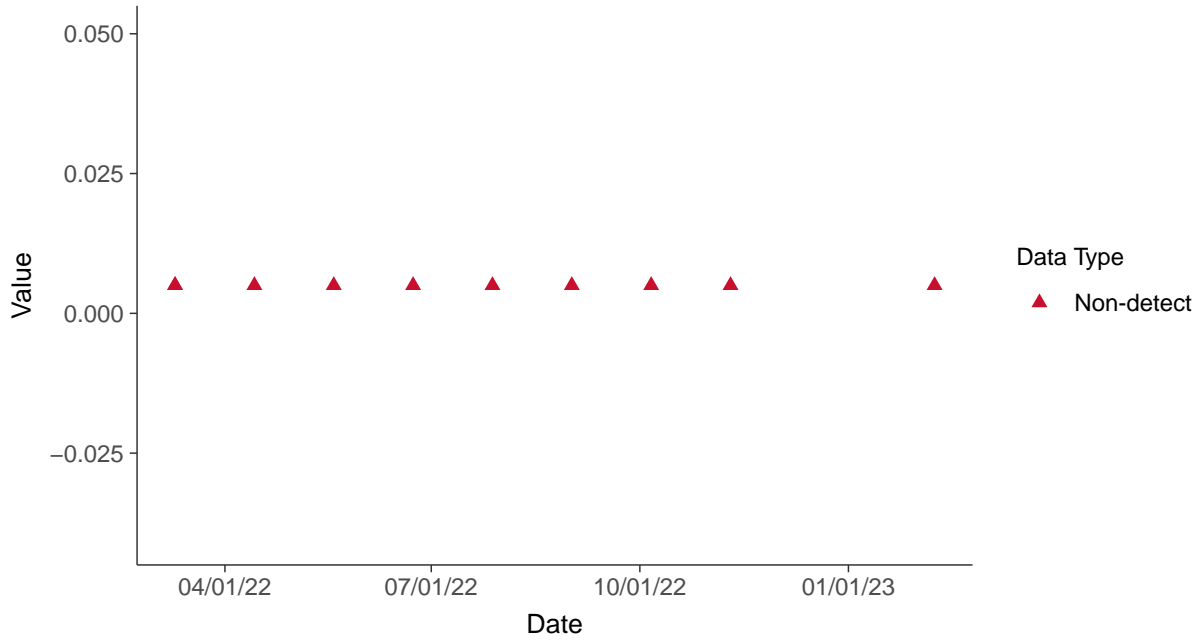


Appendix IV: Chromium, MW-7C

ID: 2_15

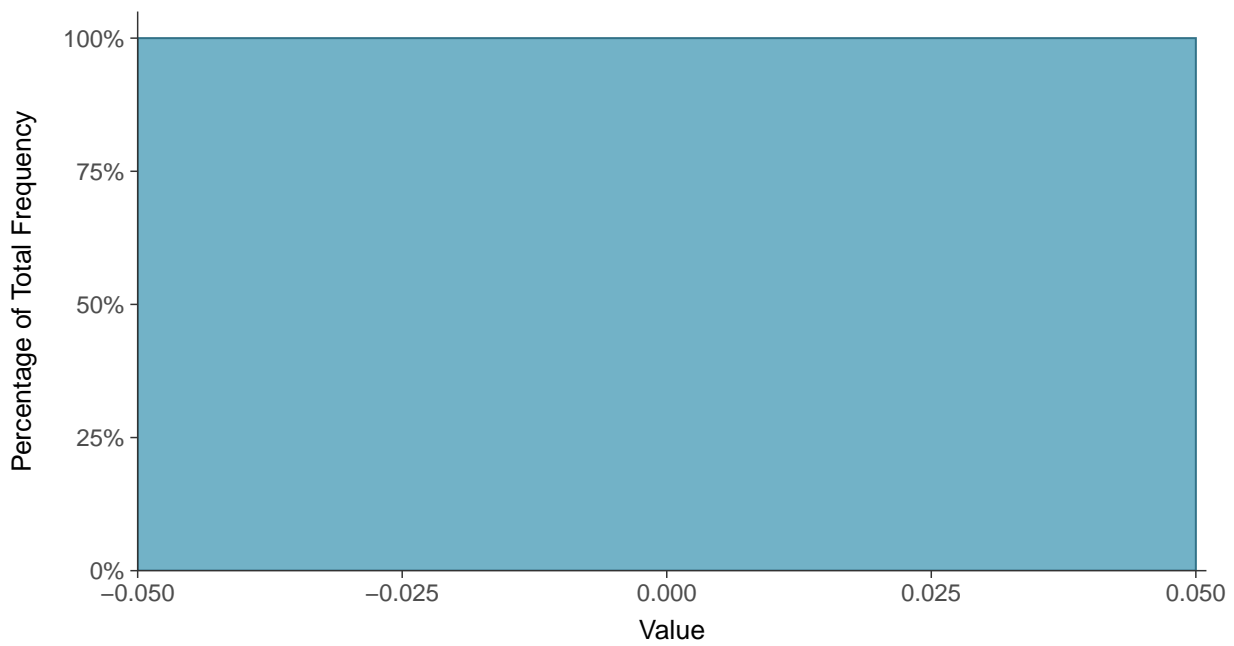
Scatter Plot

Chromium, MW-7C (mg/L)



Histogram

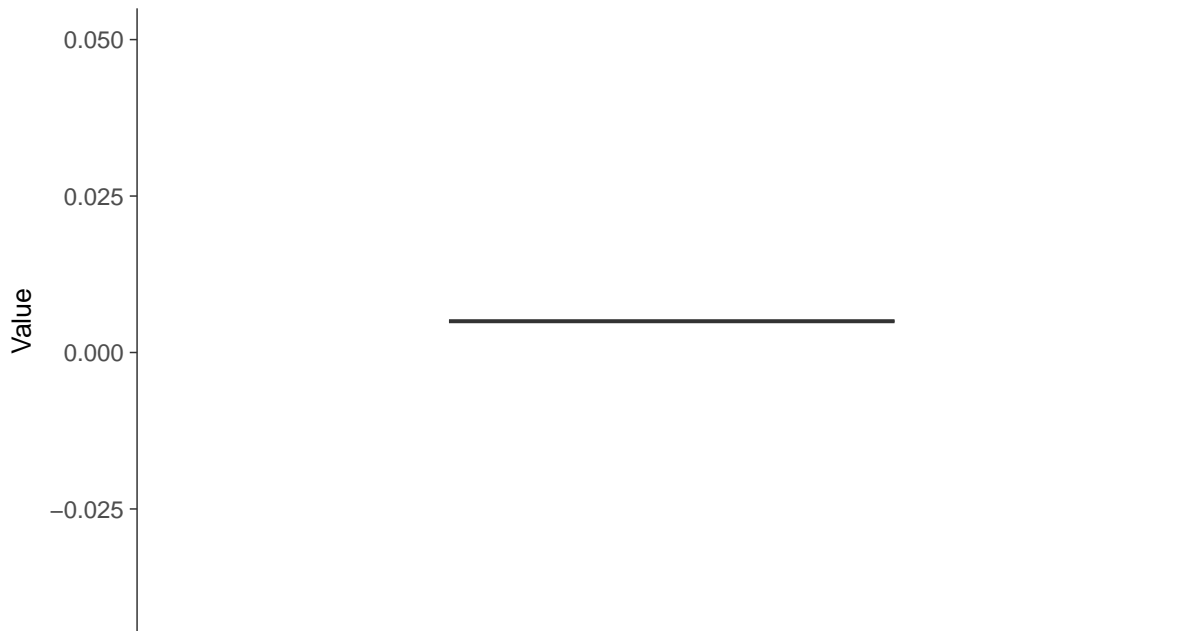
Chromium, MW-7C (mg/L)





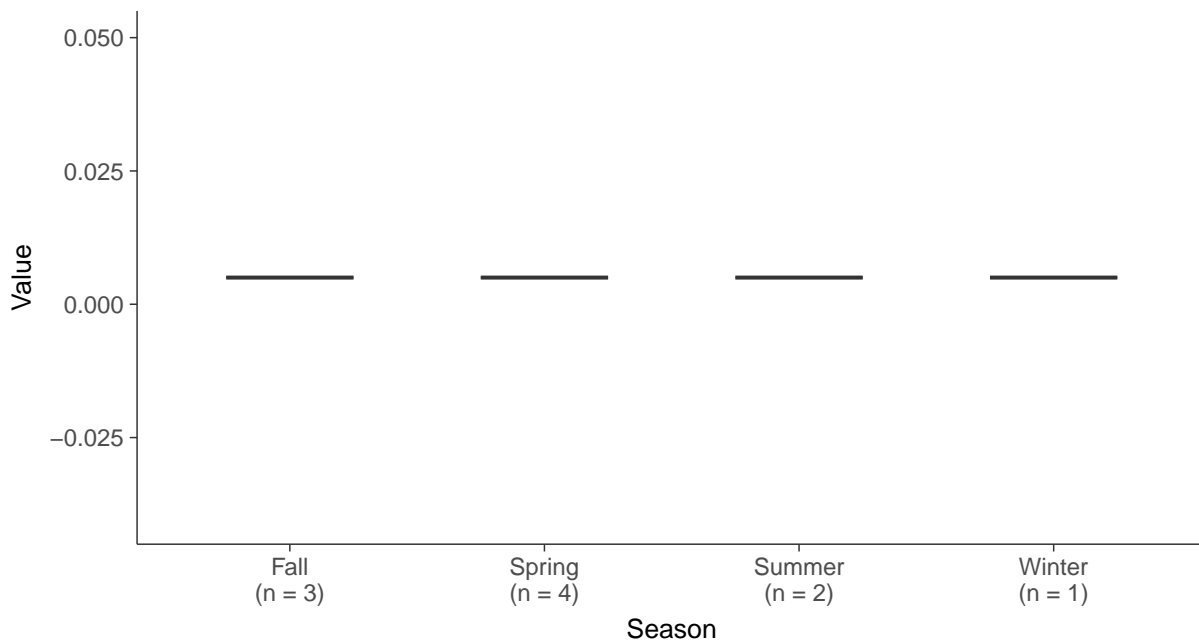
Boxplot

Chromium, MW-7C (mg/L)



Boxplot by Season

Chromium, MW-7C (mg/L)



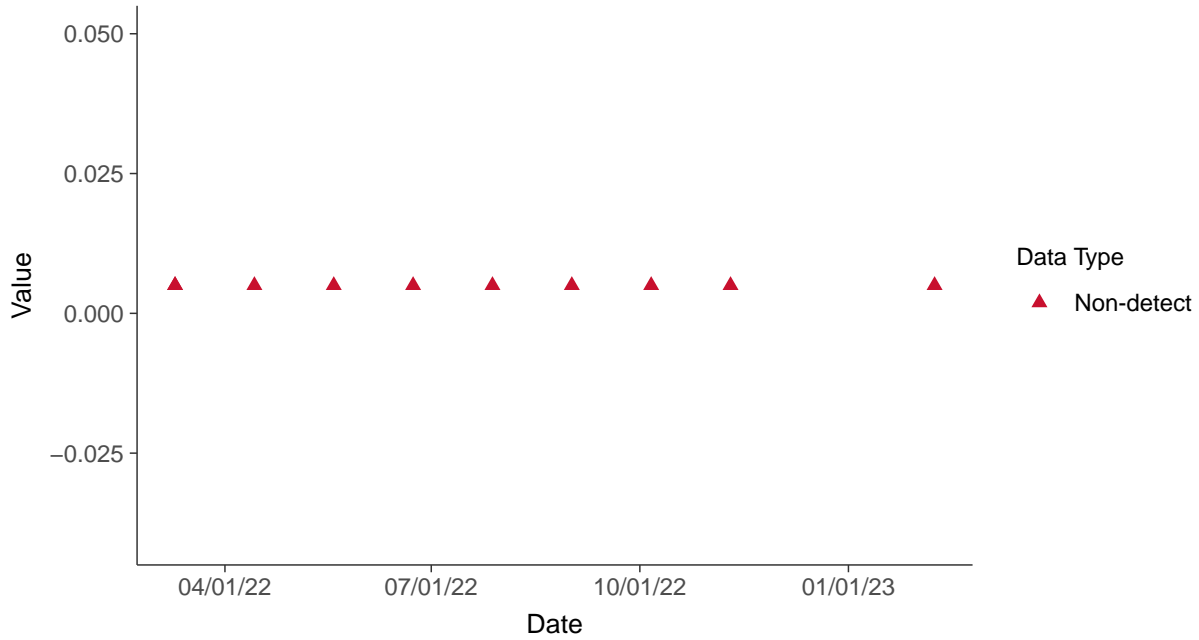


Appendix IV: Cobalt, MW-7C

ID: 2_16

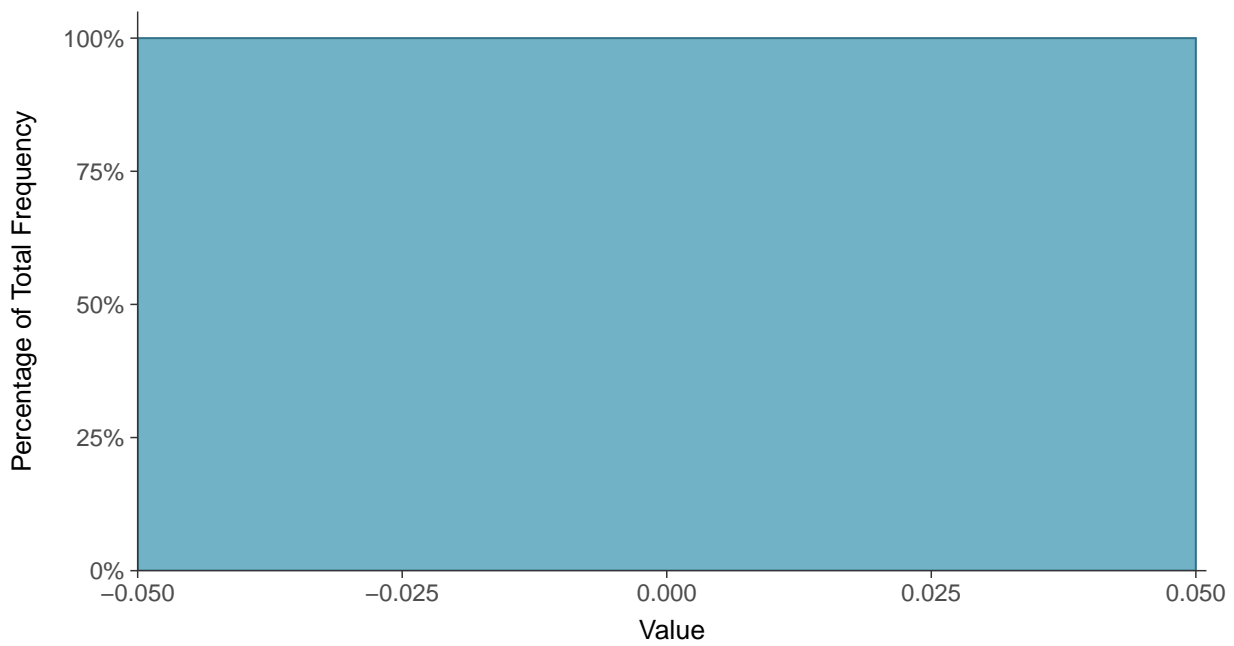
Scatter Plot

Cobalt, MW-7C (mg/L)



Histogram

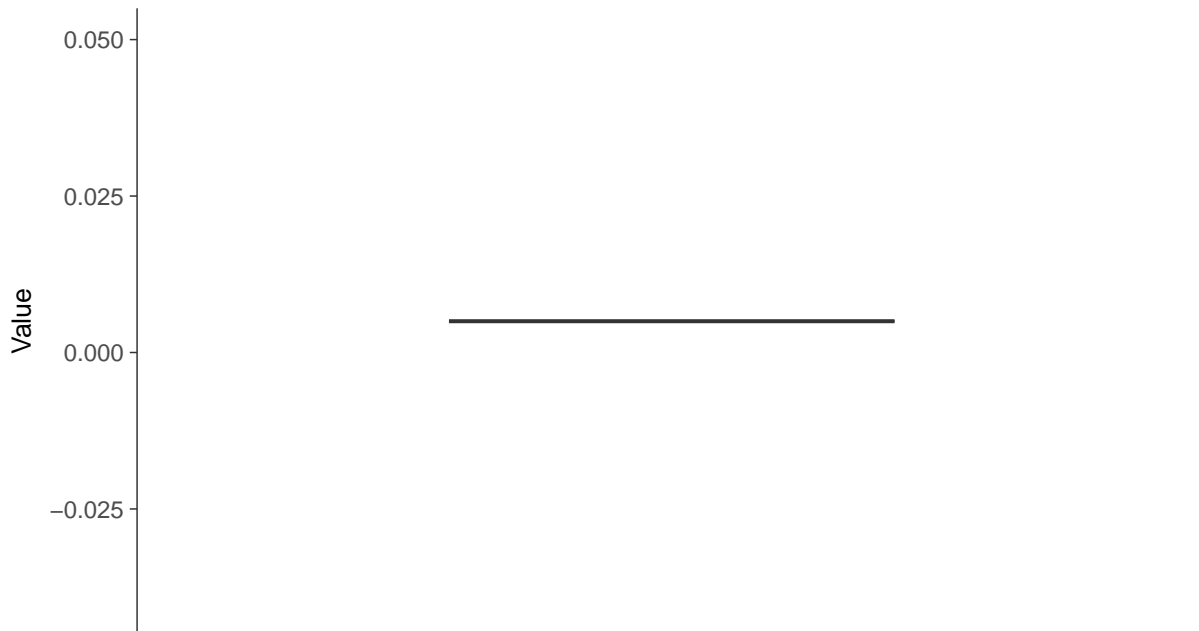
Cobalt, MW-7C (mg/L)





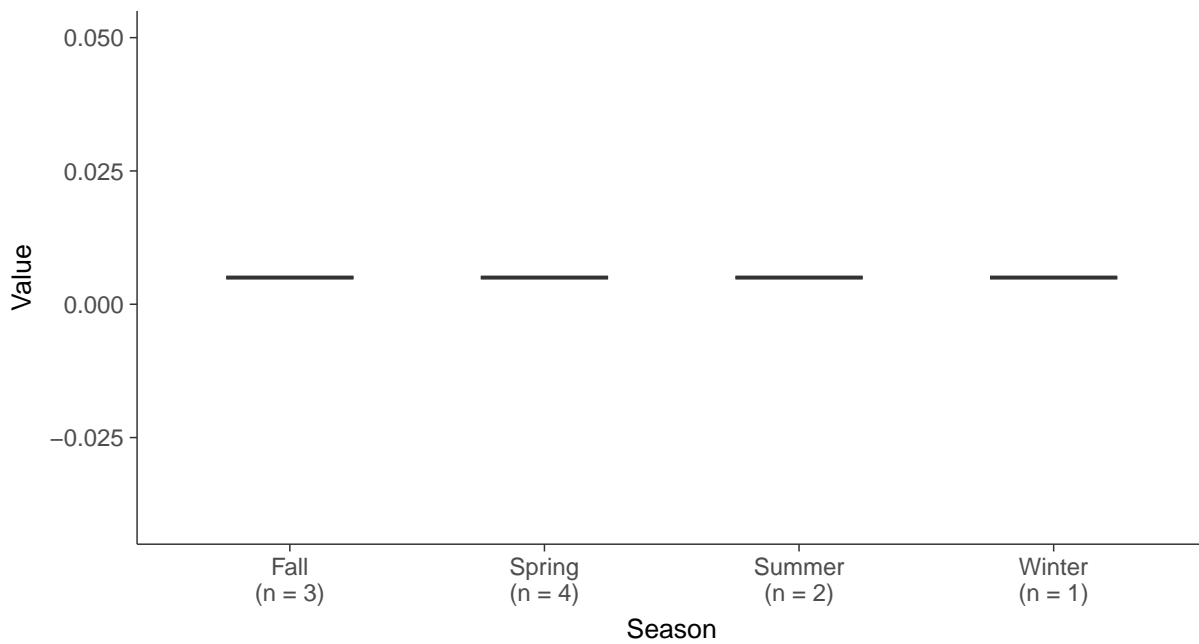
Boxplot

Cobalt, MW-7C (mg/L)



Boxplot by Season

Cobalt, MW-7C (mg/L)



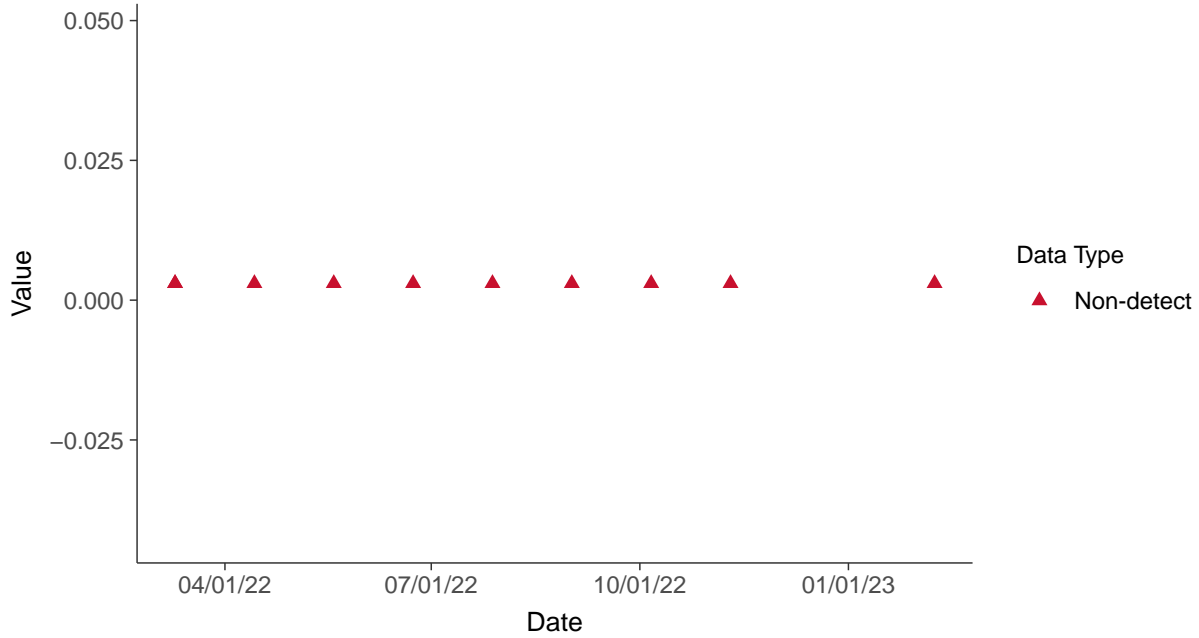


Appendix IV: Lead, MW-7C

ID: 2_18

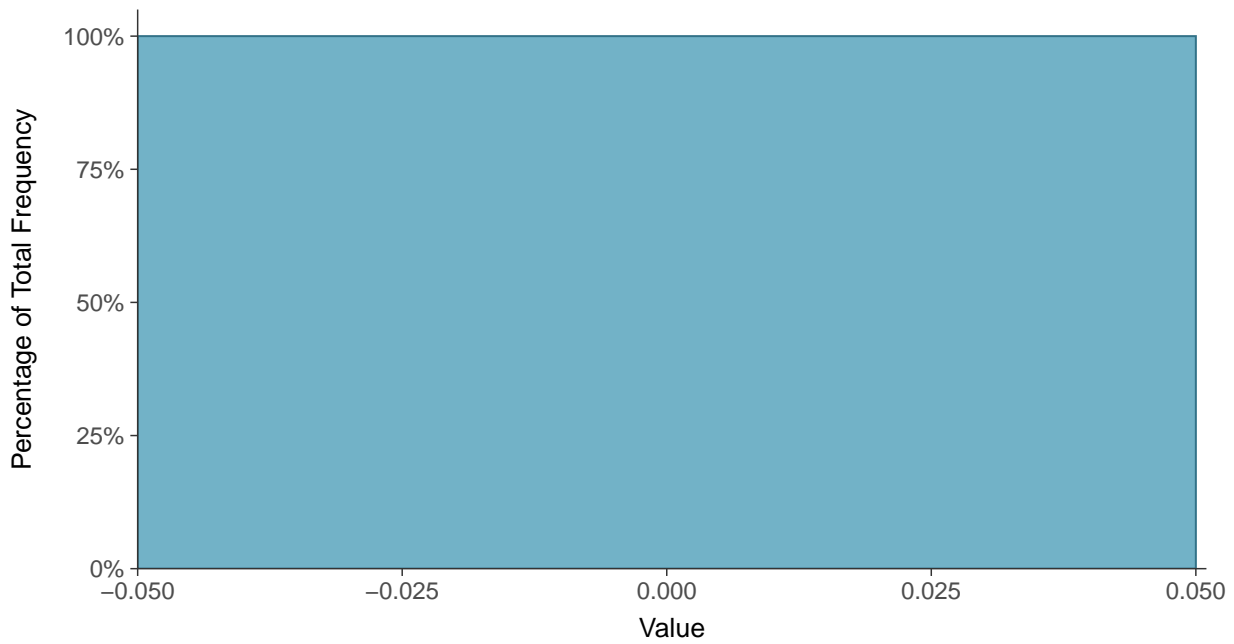
Scatter Plot

Lead, MW-7C (mg/L)



Histogram

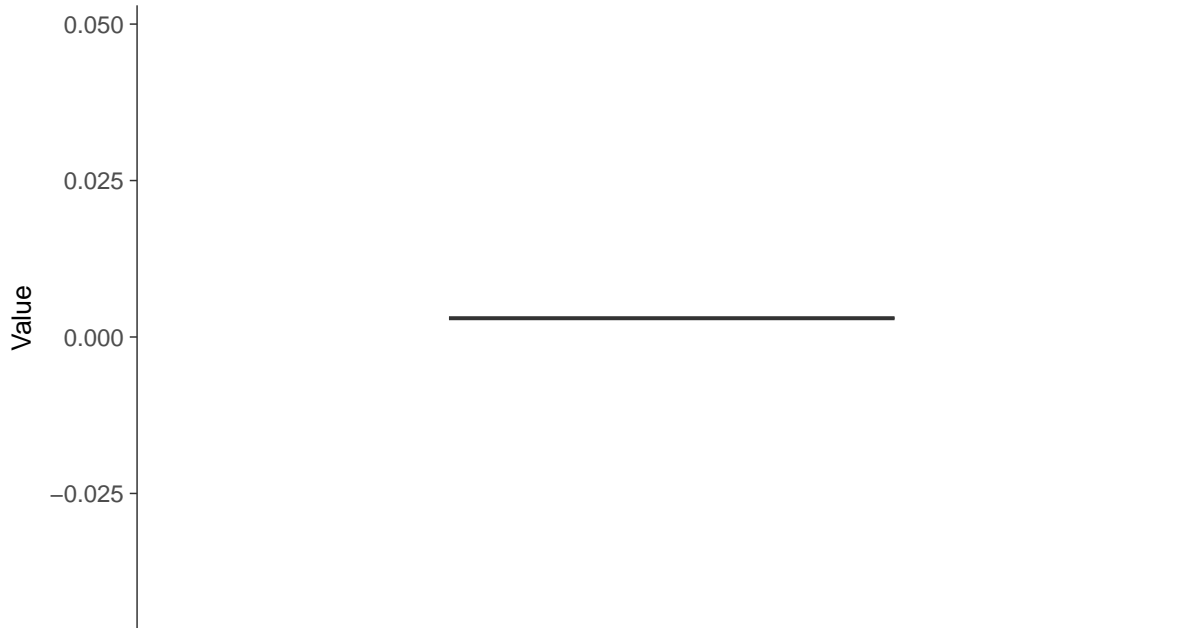
Lead, MW-7C (mg/L)





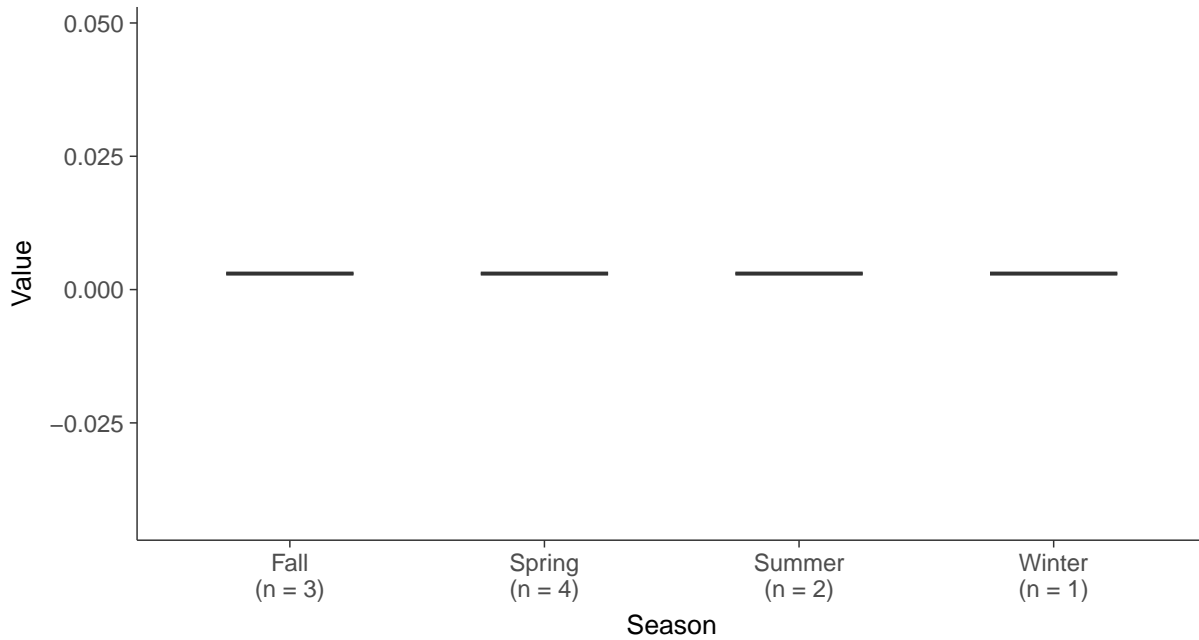
Boxplot

Lead, MW-7C (mg/L)



Boxplot by Season

Lead, MW-7C (mg/L)



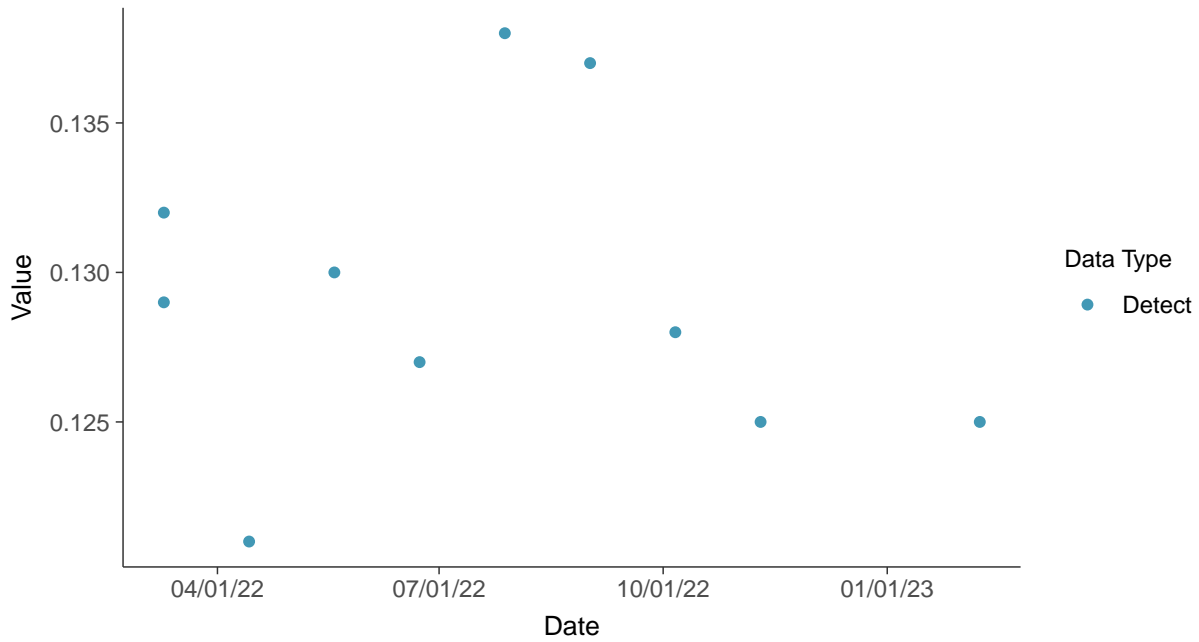


Appendix IV: Lithium, MW-7C

ID: 2_19

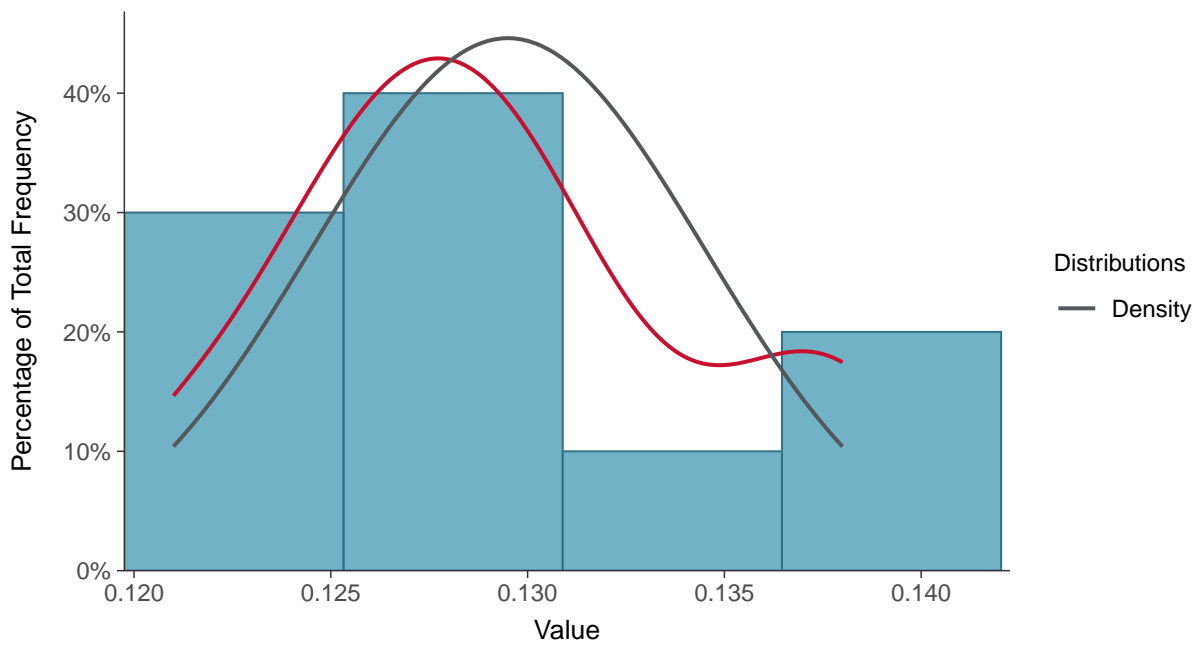
Scatter Plot

Lithium, MW-7C (mg/L)



Histogram

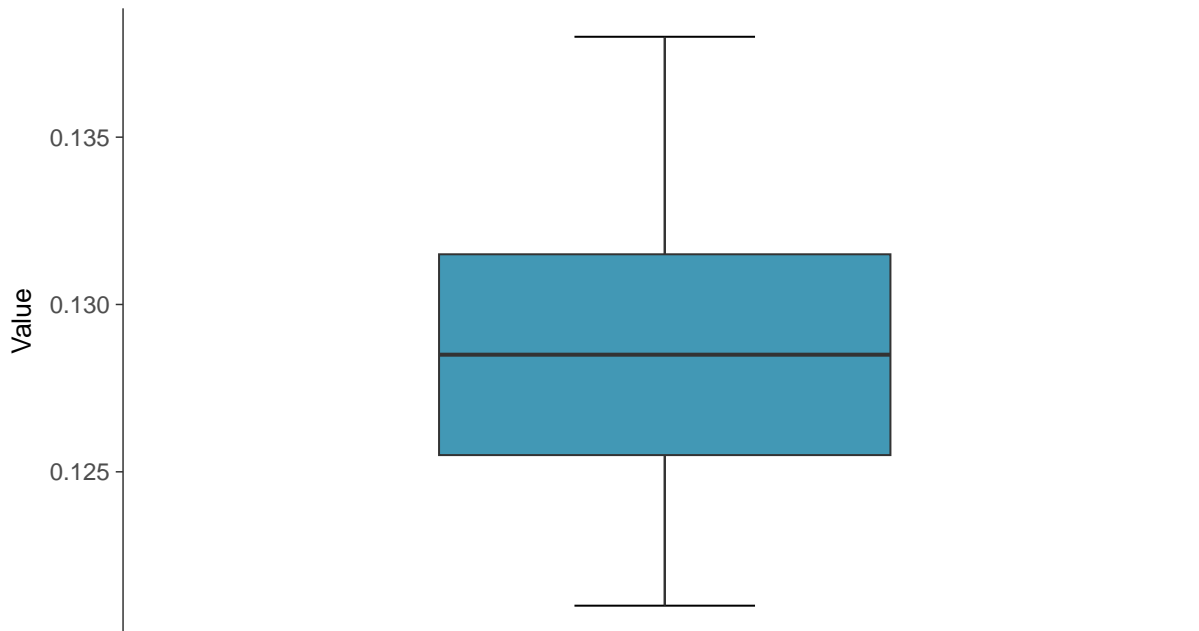
Lithium, MW-7C (mg/L)





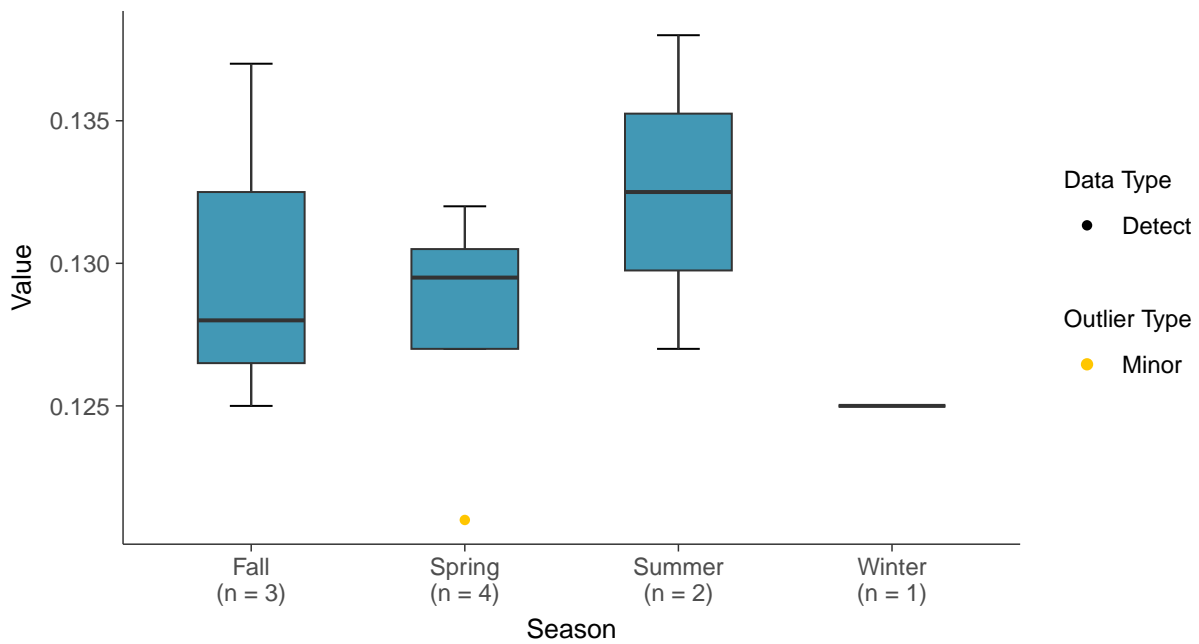
Boxplot

Lithium, MW-7C (mg/L)



Boxplot by Season

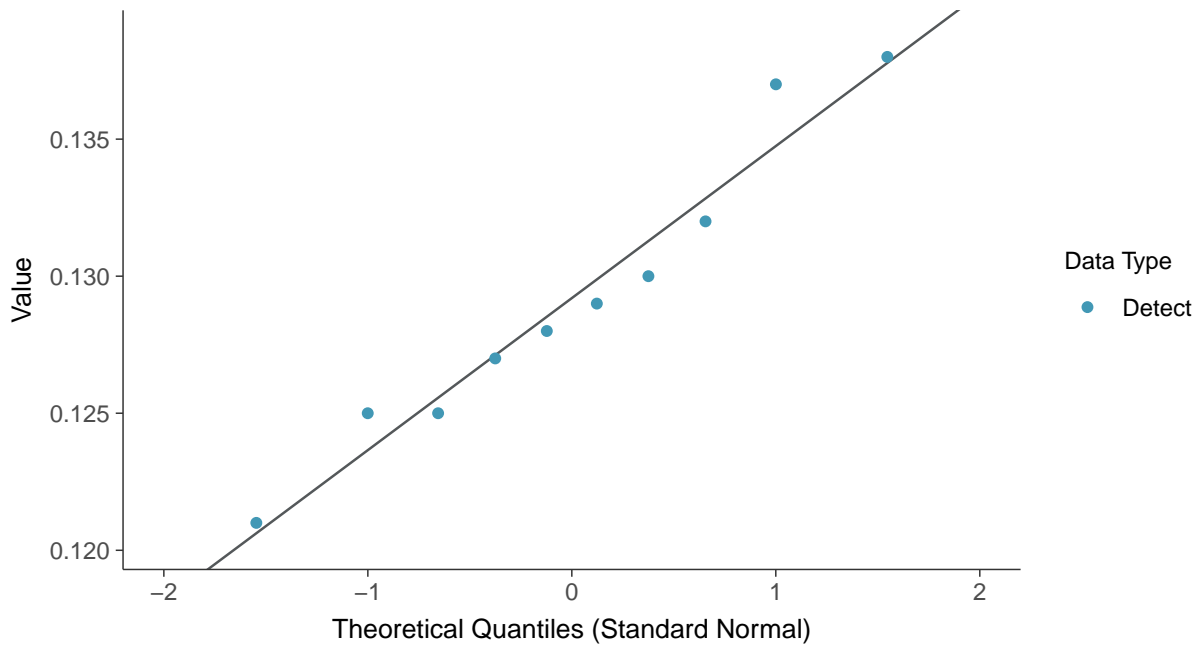
Lithium, MW-7C (mg/L)





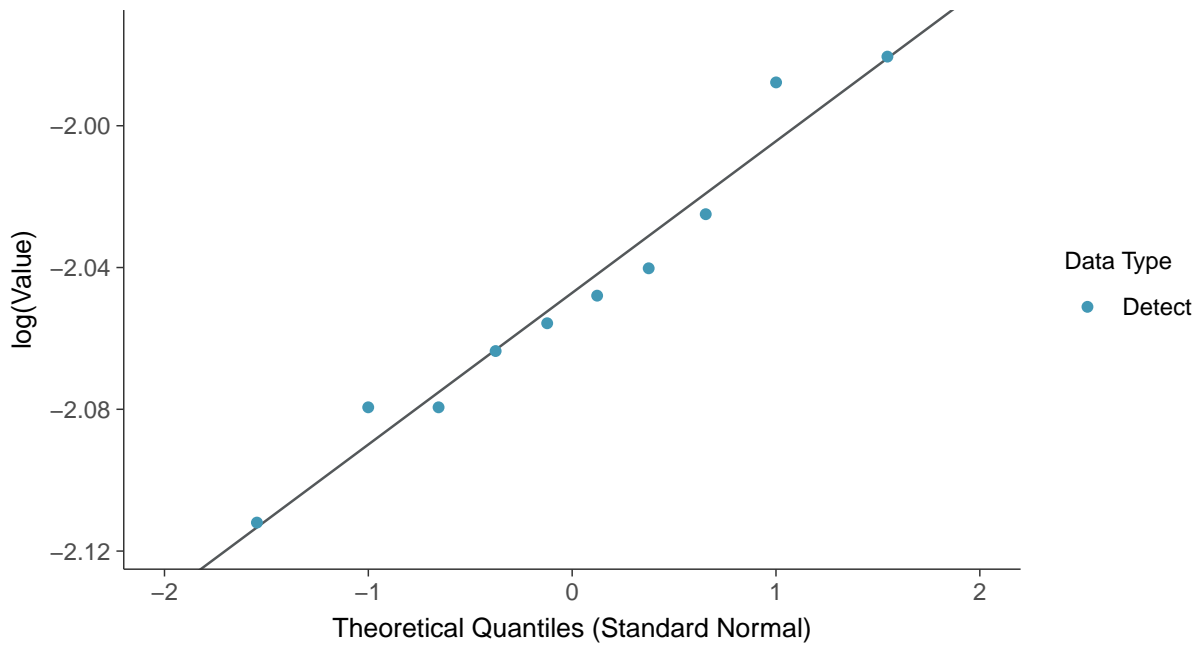
Normal Q-Q plot

Lithium, MW-7C (mg/L)



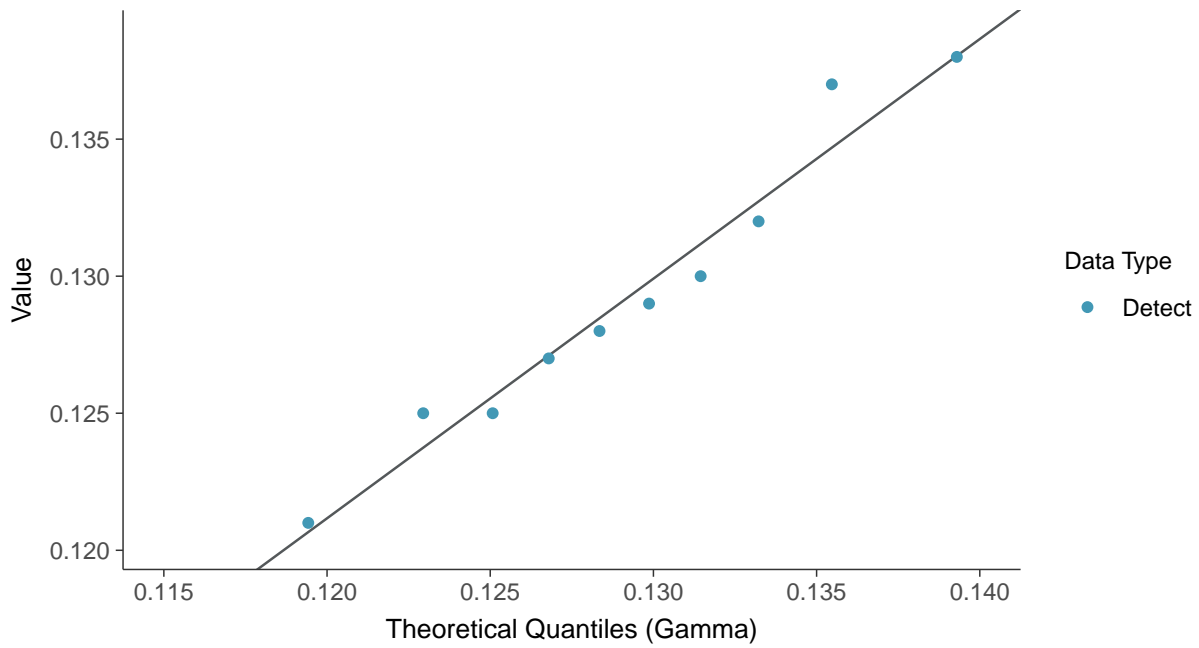
Lognormal Q-Q plot

Lithium, MW-7C (mg/L)

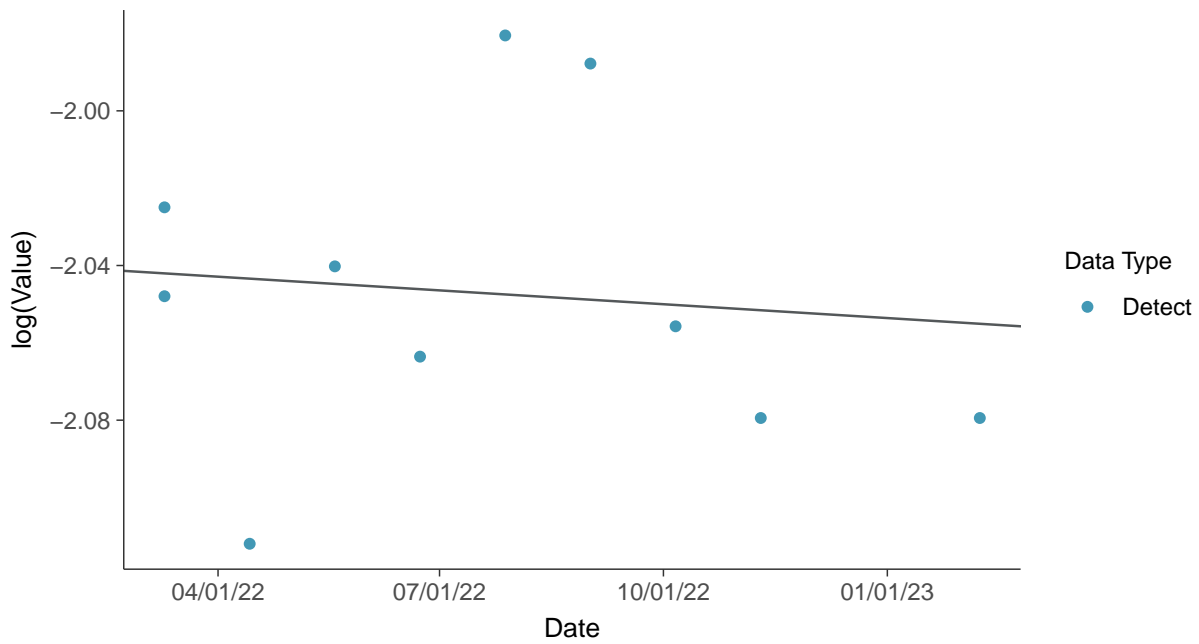




Gamma Q-Q plot
Lithium, MW-7C (mg/L)



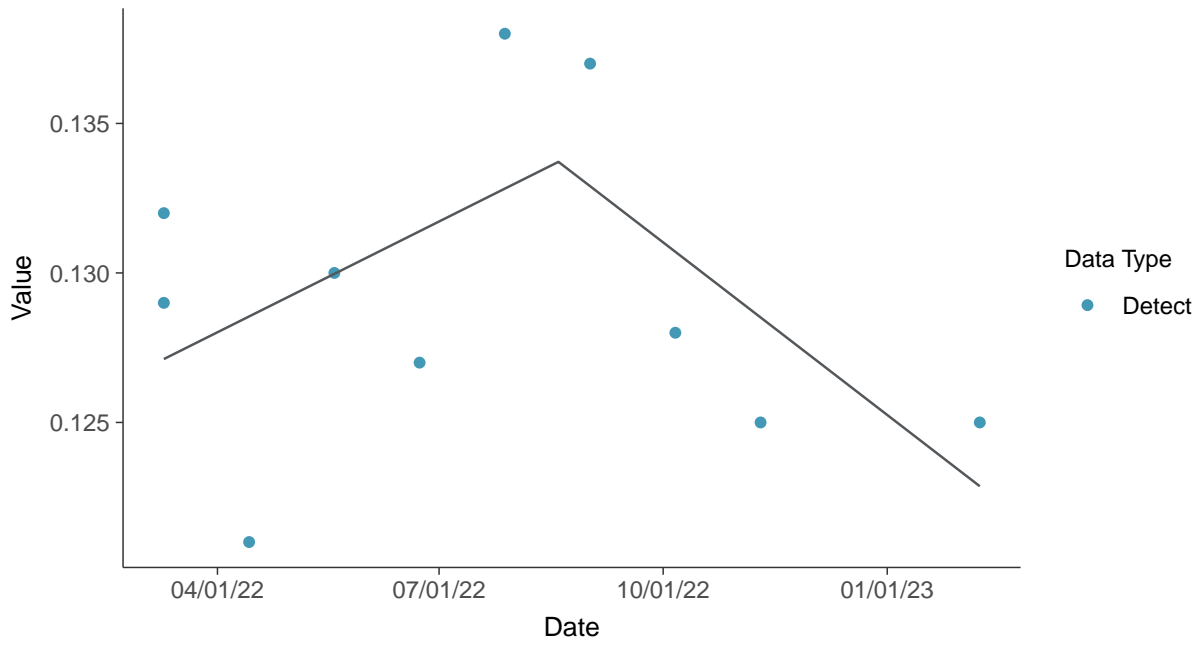
Trend Regression: Lognormal MLE
Lithium, MW-7C (mg/L)





Trend Regression: Piecewise Linear-Linear

Lithium, MW-7C (mg/L)



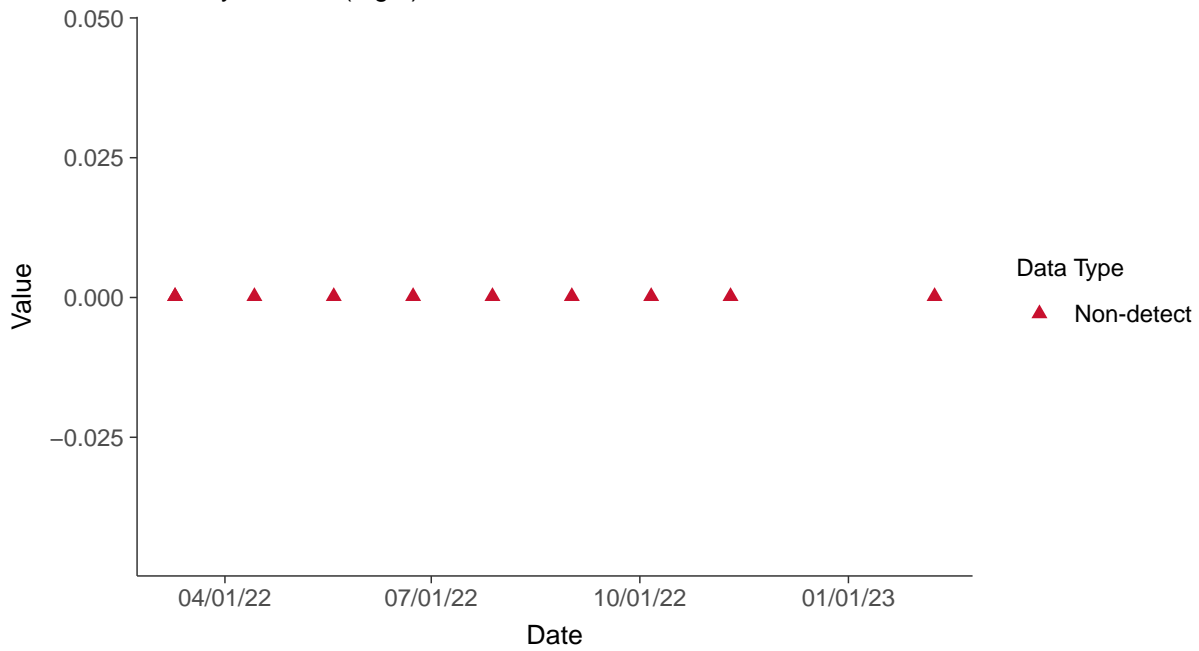


Appendix IV: Mercury, MW-7C

ID: 2_21

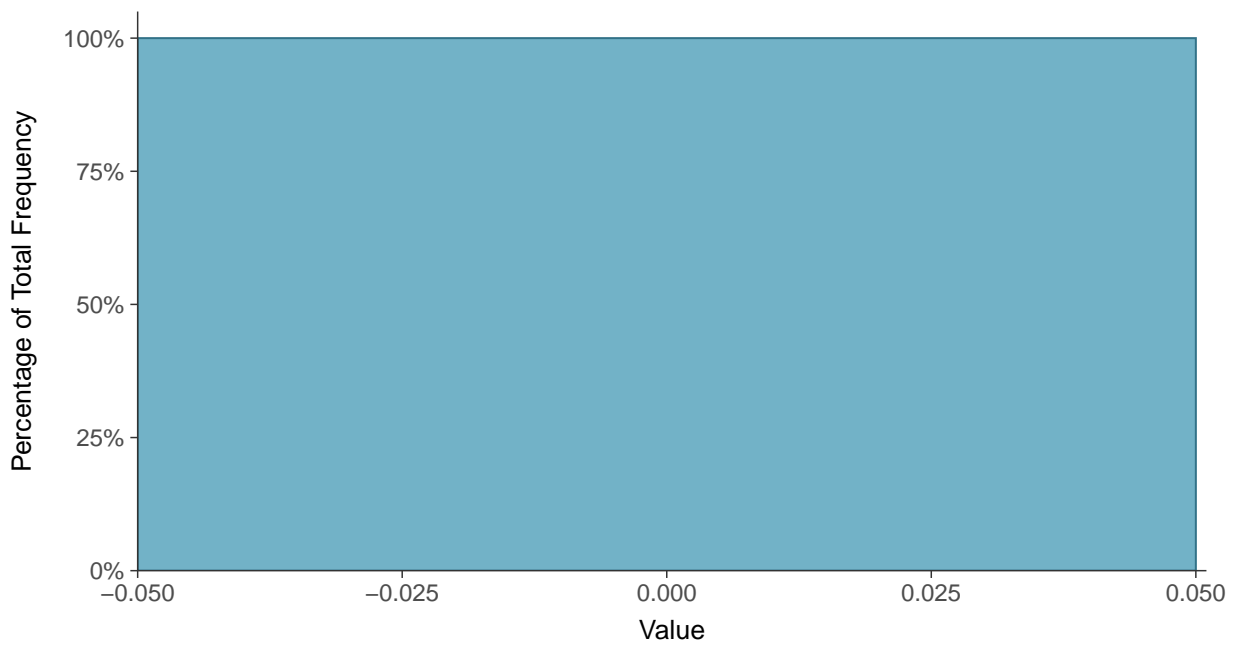
Scatter Plot

Mercury, MW-7C (mg/L)



Histogram

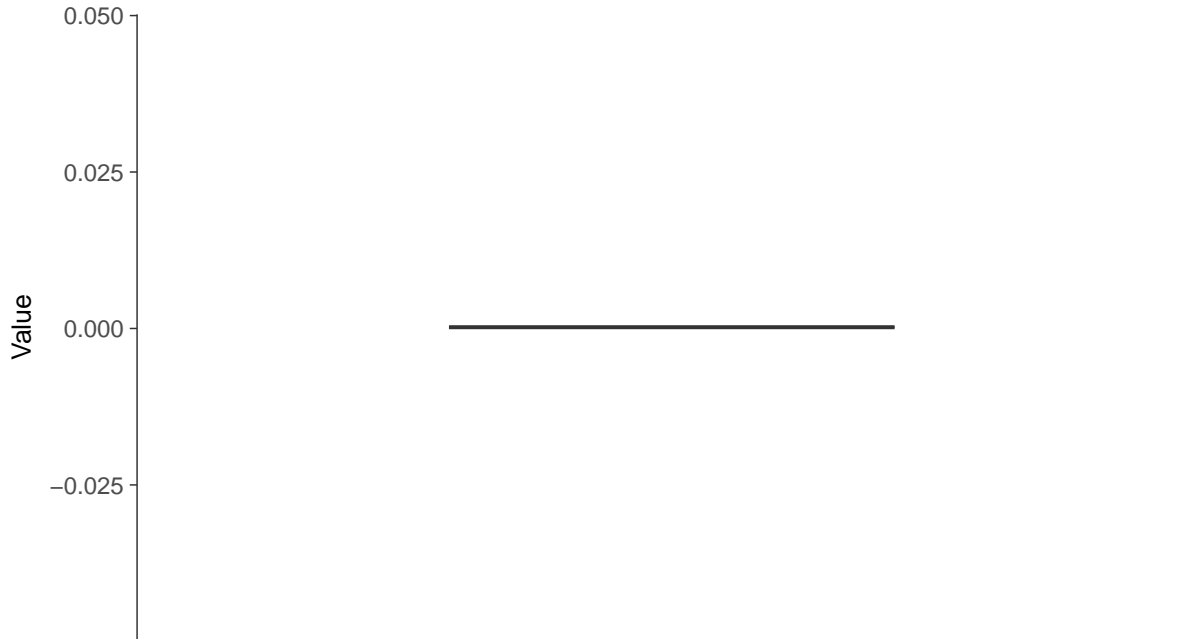
Mercury, MW-7C (mg/L)





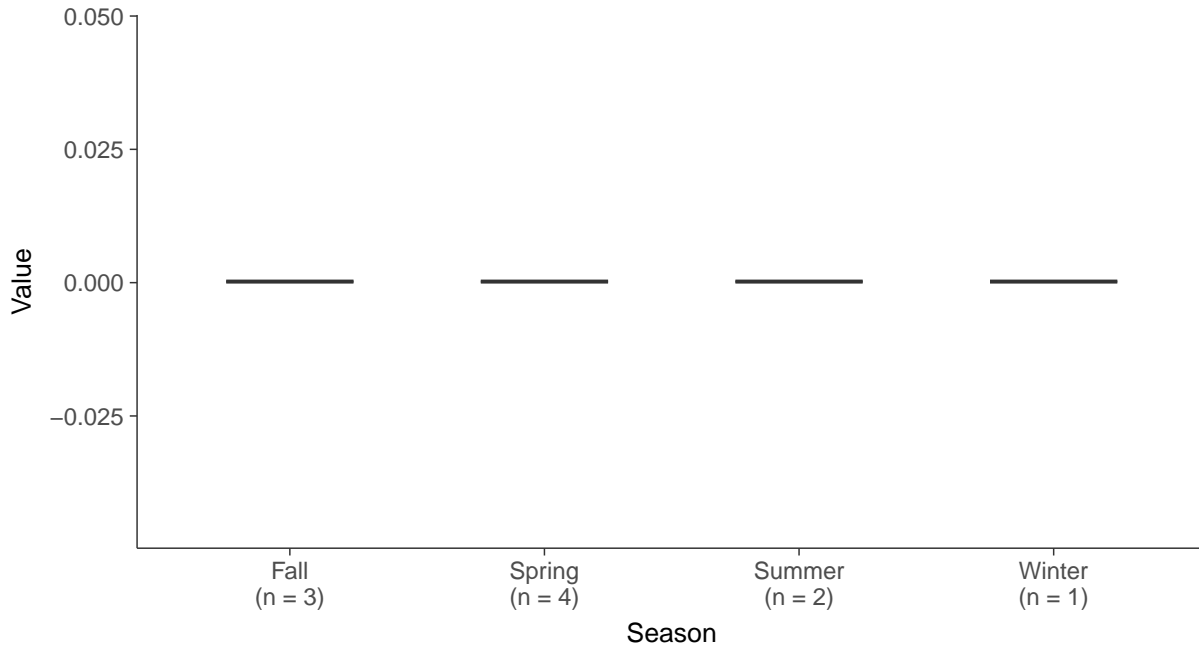
Boxplot

Mercury, MW-7C (mg/L)



Boxplot by Season

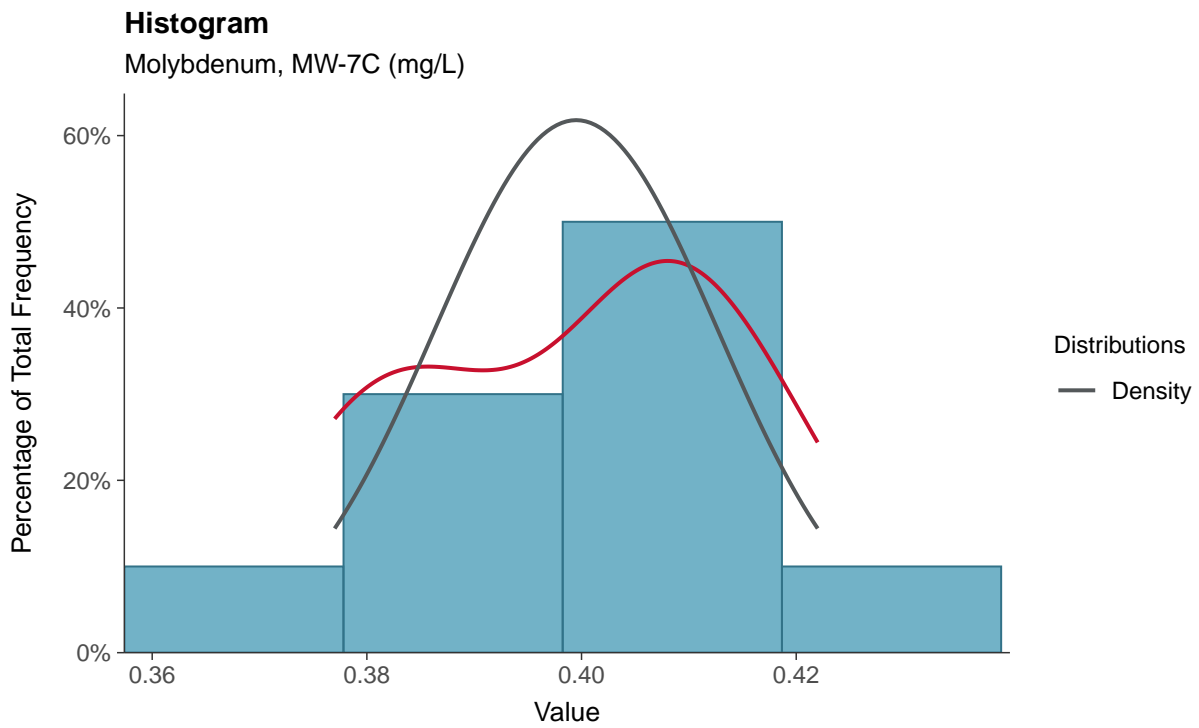
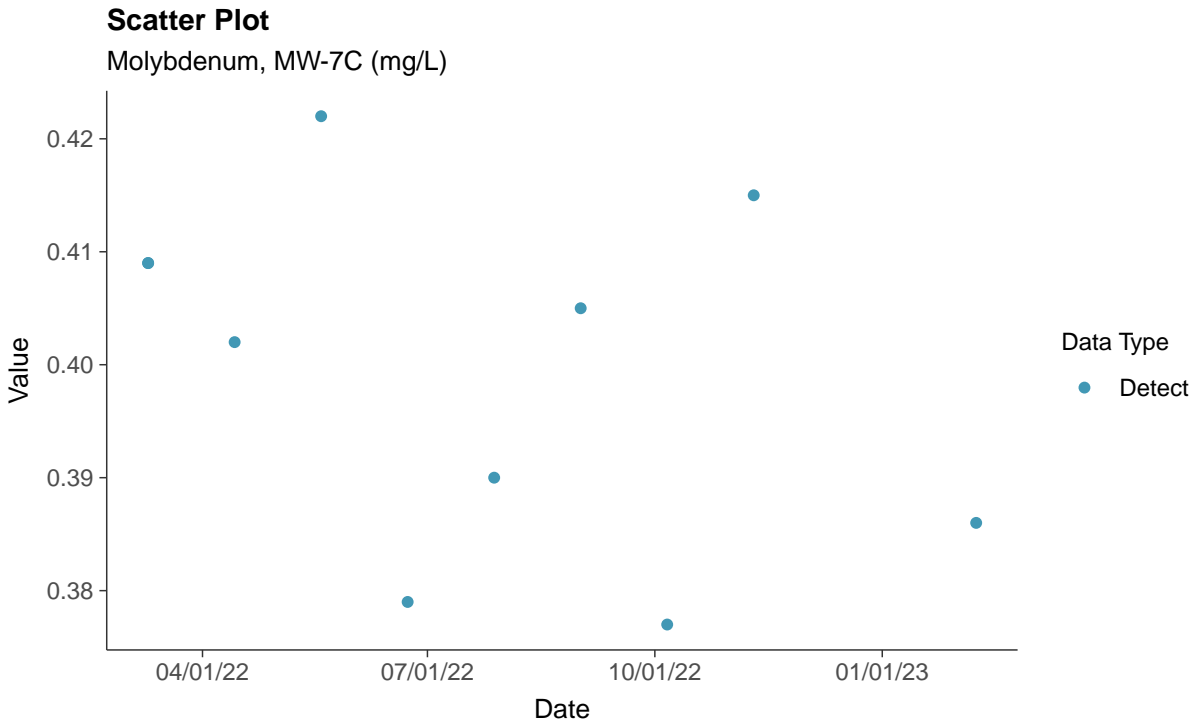
Mercury, MW-7C (mg/L)





Appendix IV: Molybdenum, MW-7C

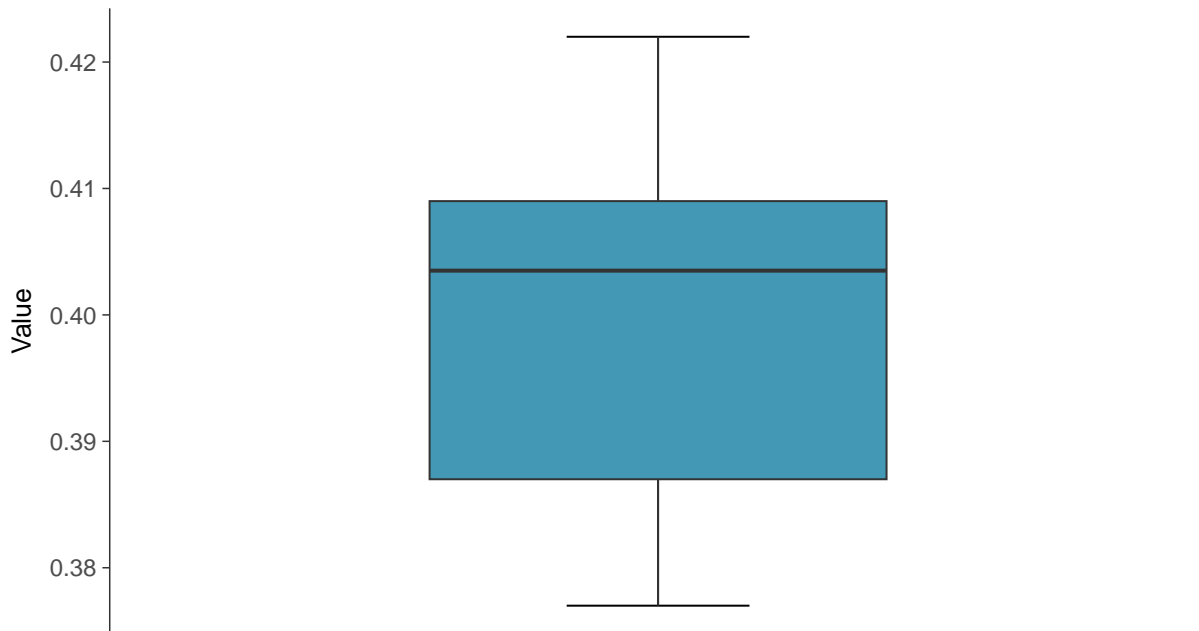
ID: 2_22





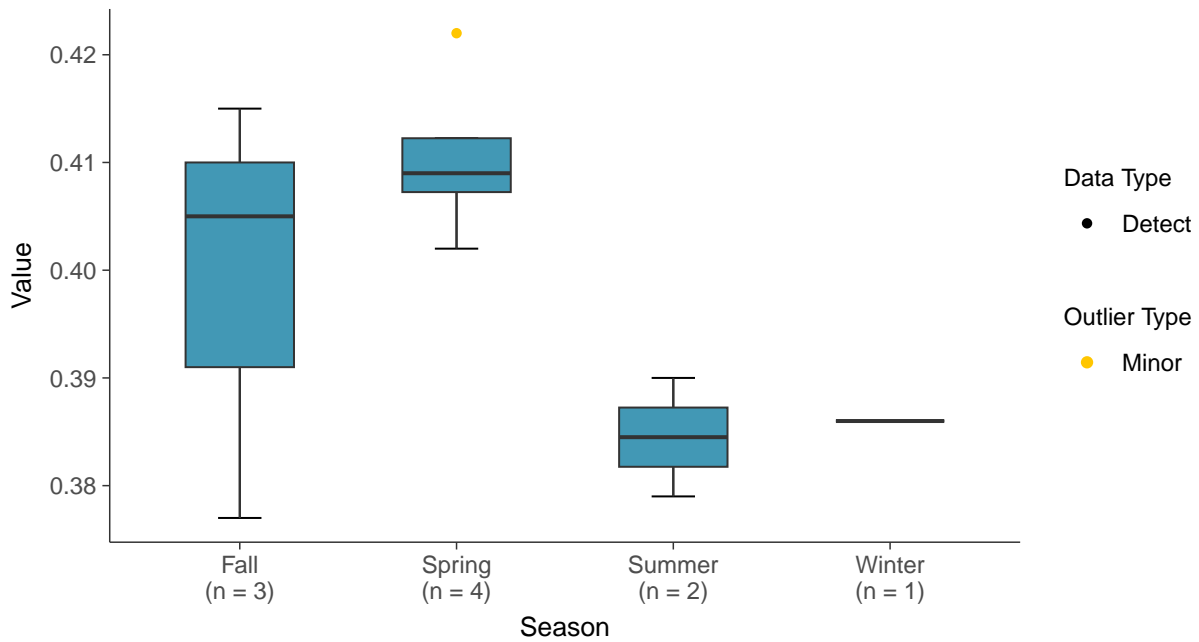
Boxplot

Molybdenum, MW-7C (mg/L)



Boxplot by Season

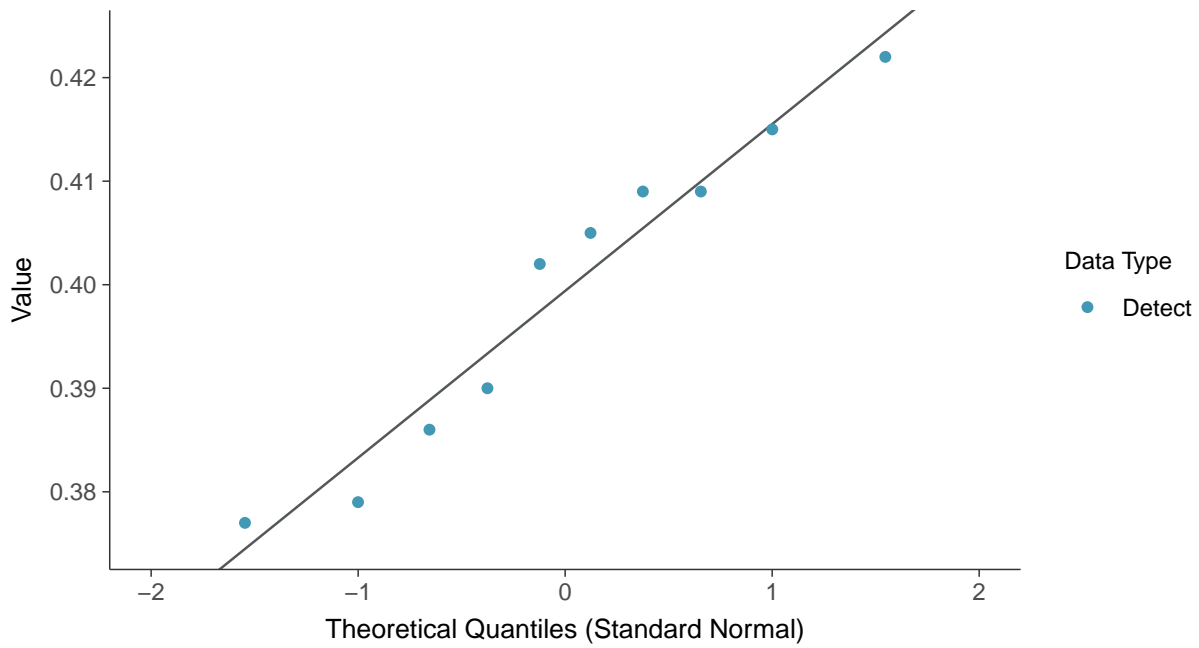
Molybdenum, MW-7C (mg/L)





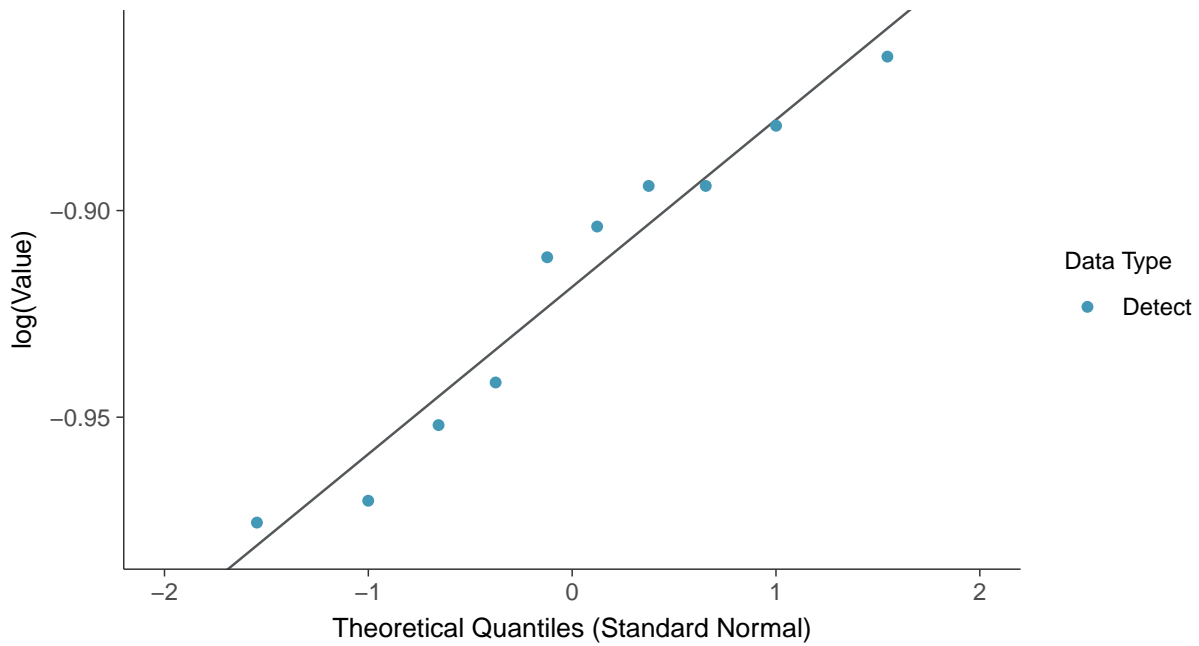
Normal Q-Q plot

Molybdenum, MW-7C (mg/L)



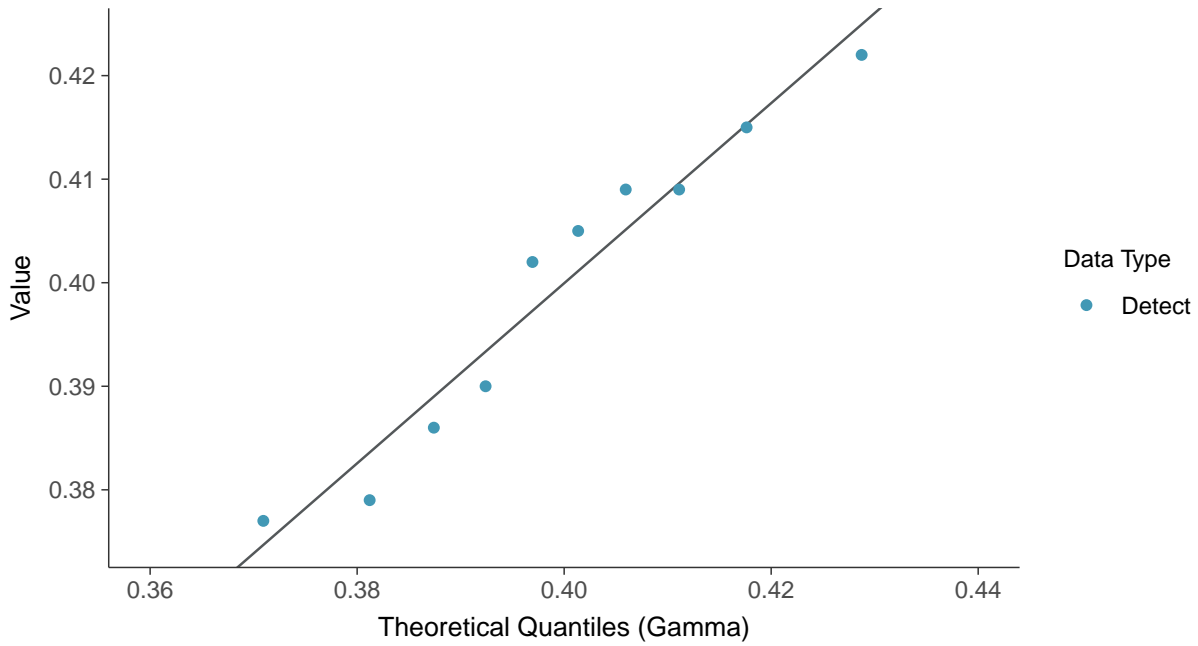
Lognormal Q-Q plot

Molybdenum, MW-7C (mg/L)

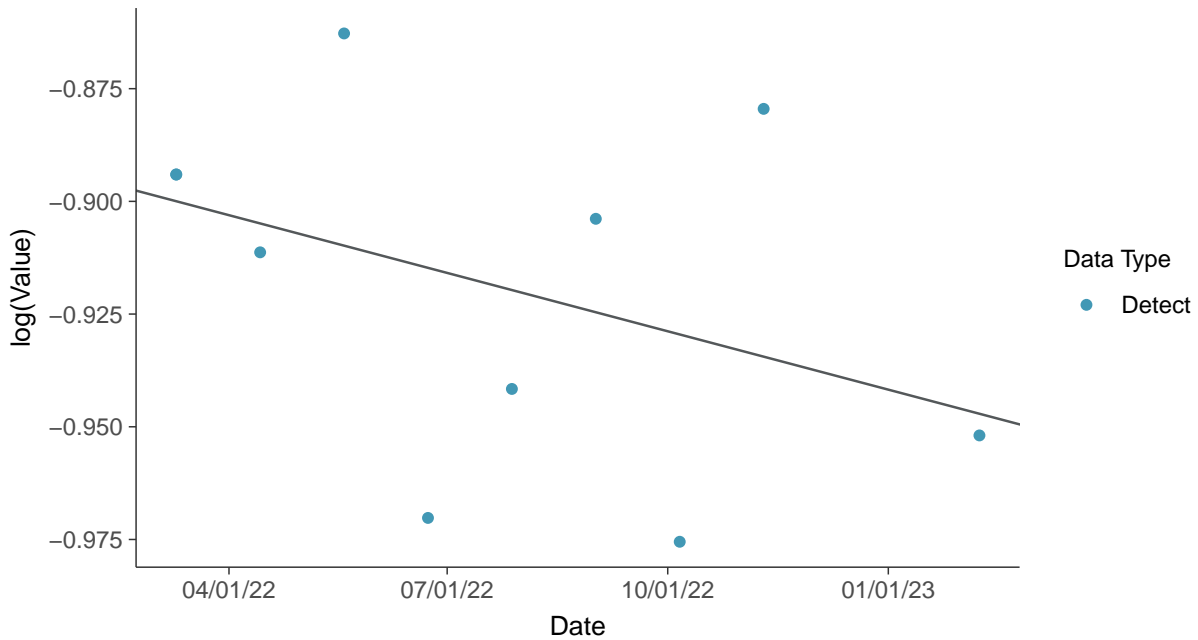




Gamma Q-Q plot
Molybdenum, MW-7C (mg/L)



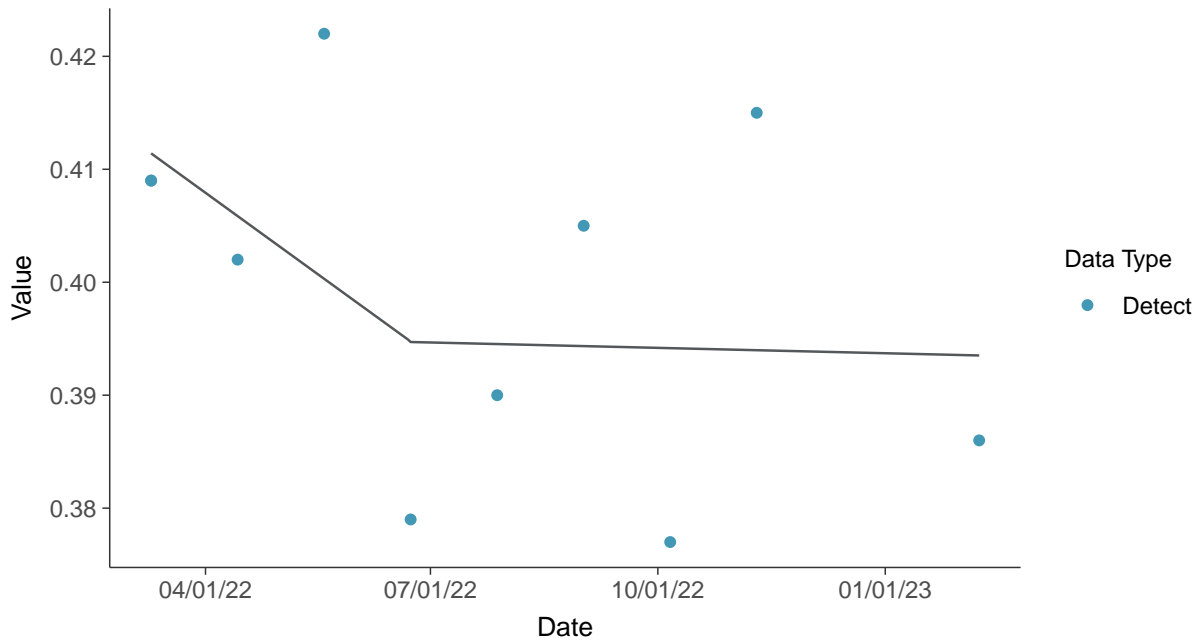
Trend Regression: Lognormal MLE
Molybdenum, MW-7C (mg/L)





Trend Regression: Piecewise Linear-Linear

Molybdenum, MW-7C (mg/L)



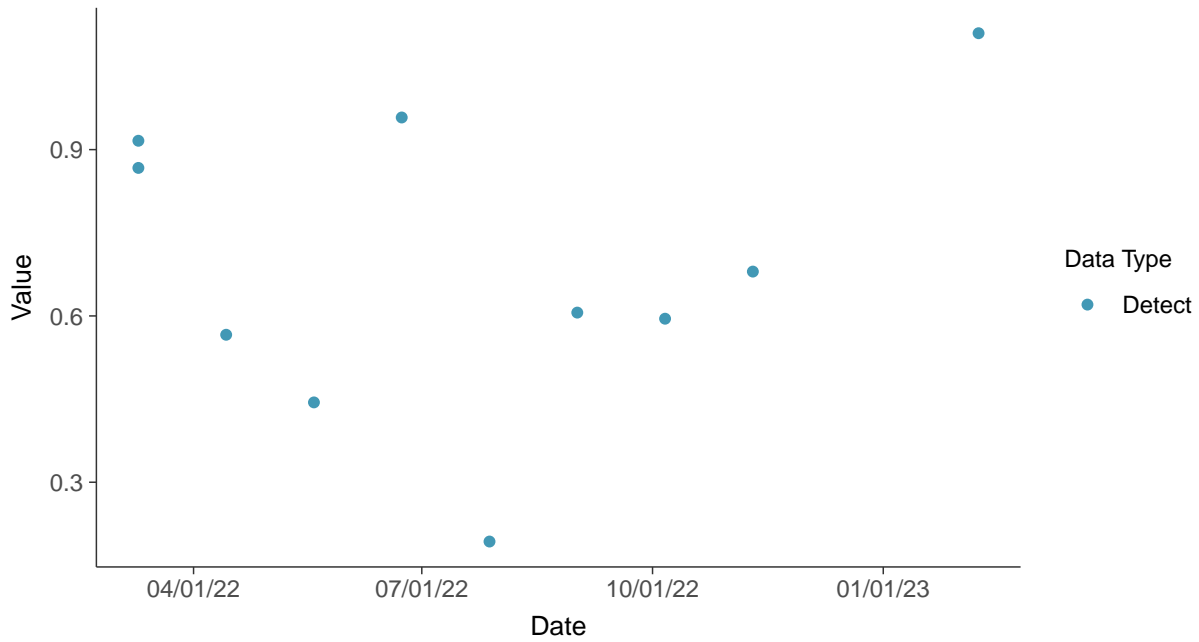


Appendix IV: Radium-226, MW-7C

ID: 2_24

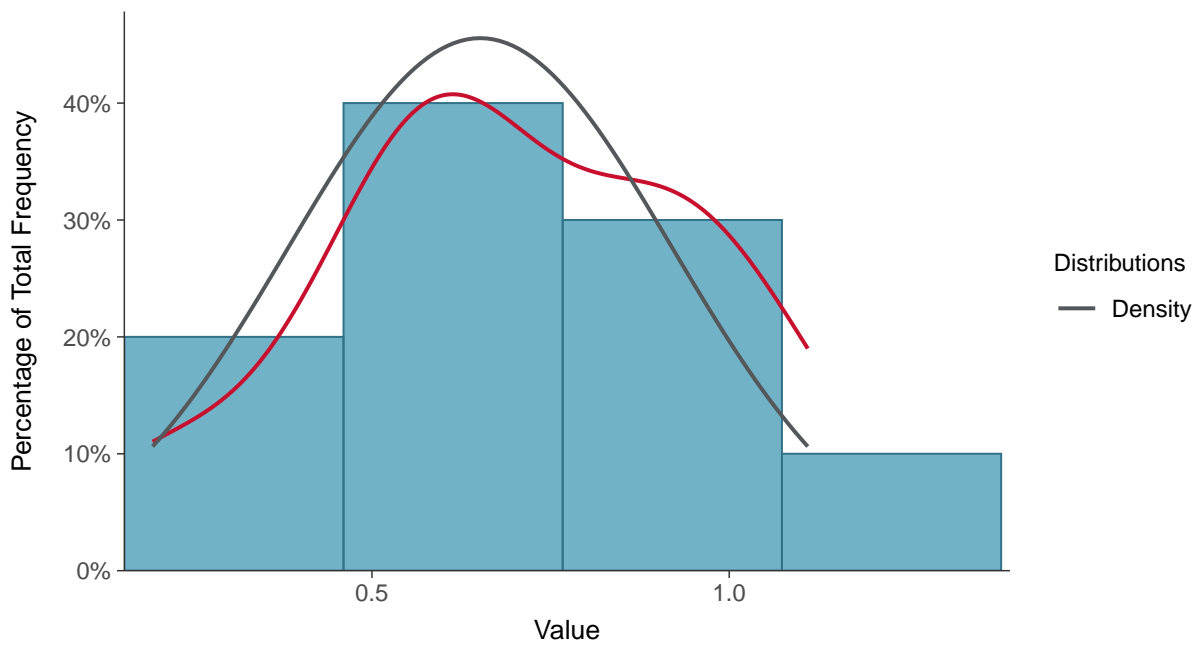
Scatter Plot

Radium-226, MW-7C (pCi/L)



Histogram

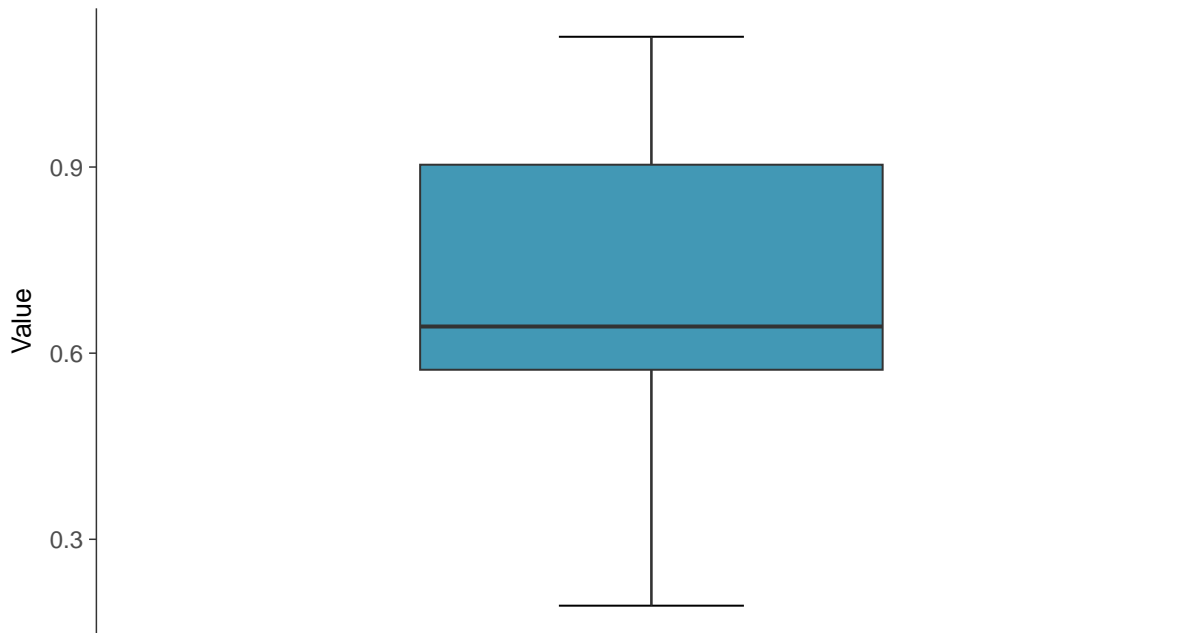
Radium-226, MW-7C (pCi/L)





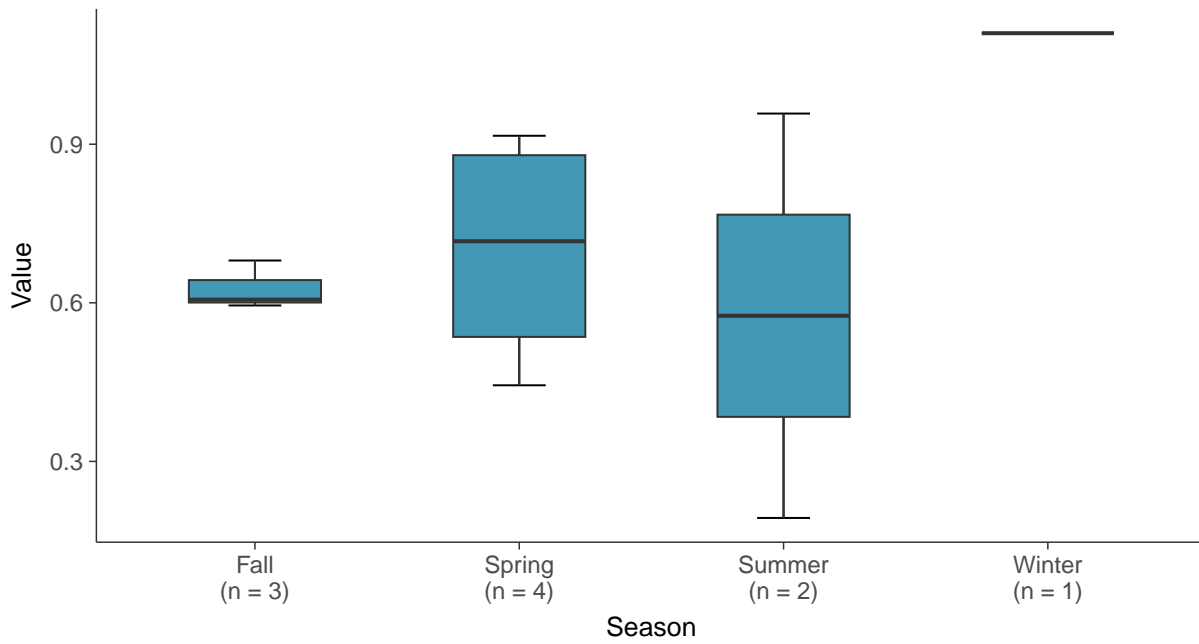
Boxplot

Radium-226, MW-7C (pCi/L)



Boxplot by Season

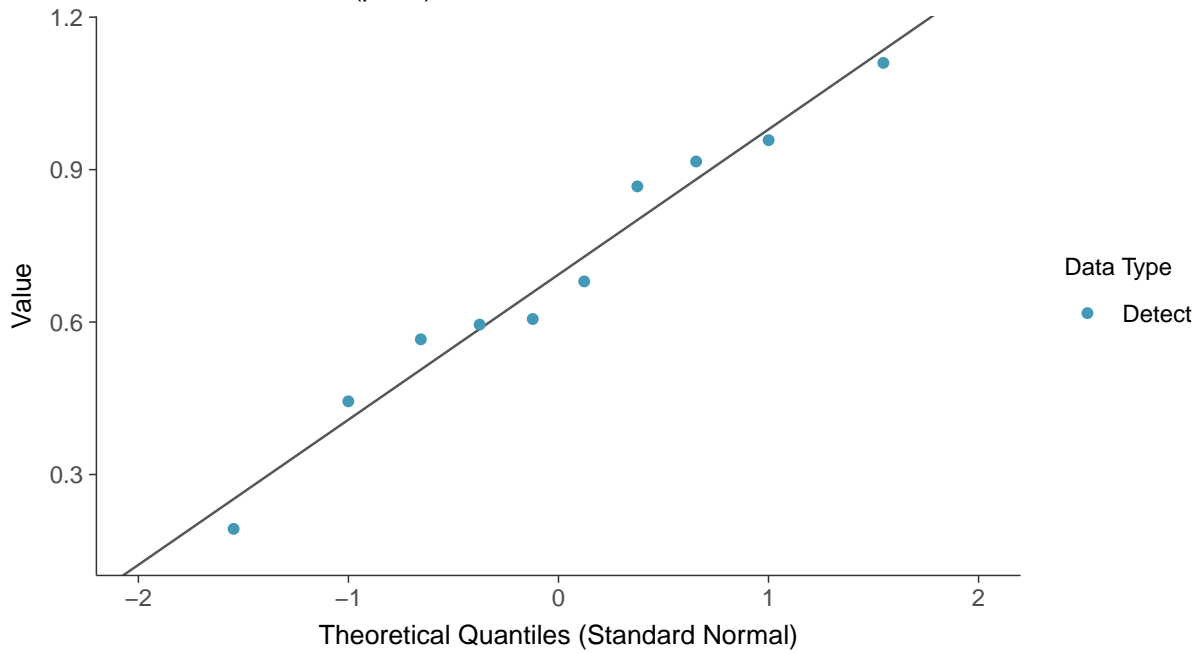
Radium-226, MW-7C (pCi/L)





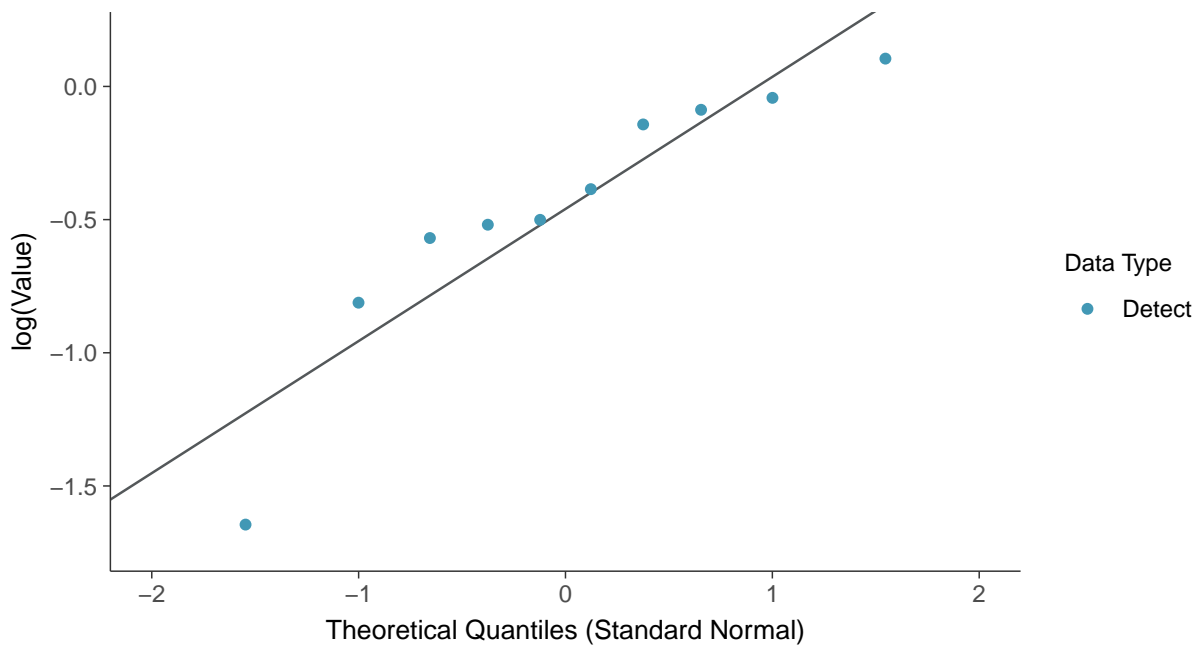
Normal Q-Q plot

Radium-226, MW-7C (pCi/L)



Lognormal Q-Q plot

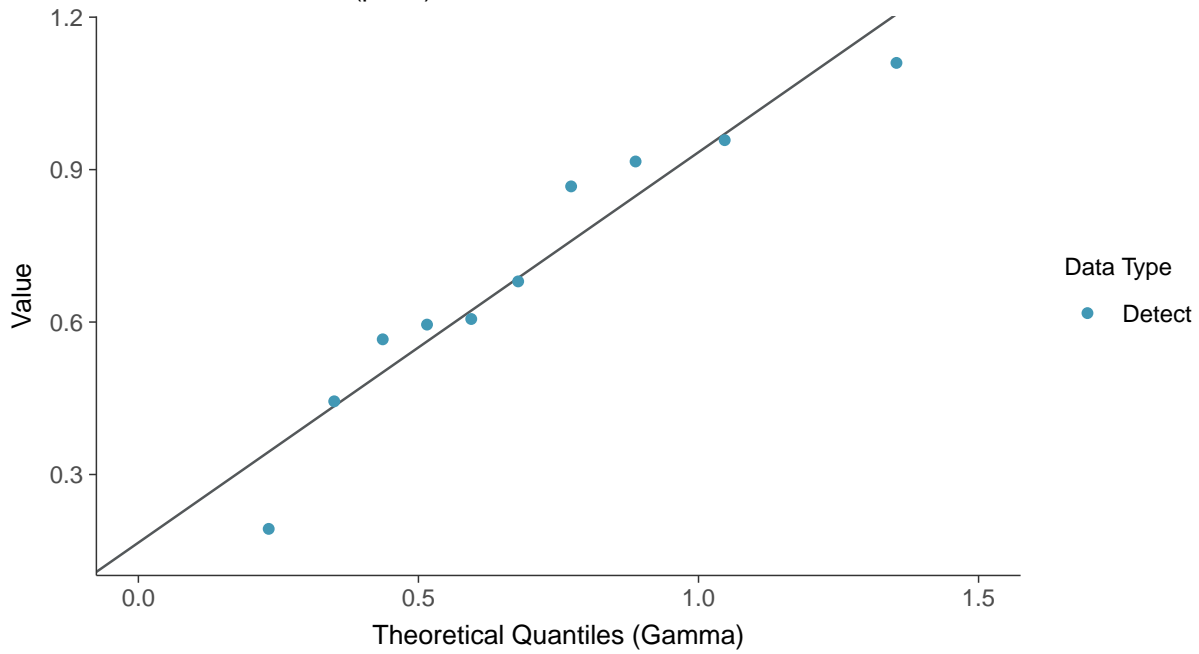
Radium-226, MW-7C (pCi/L)





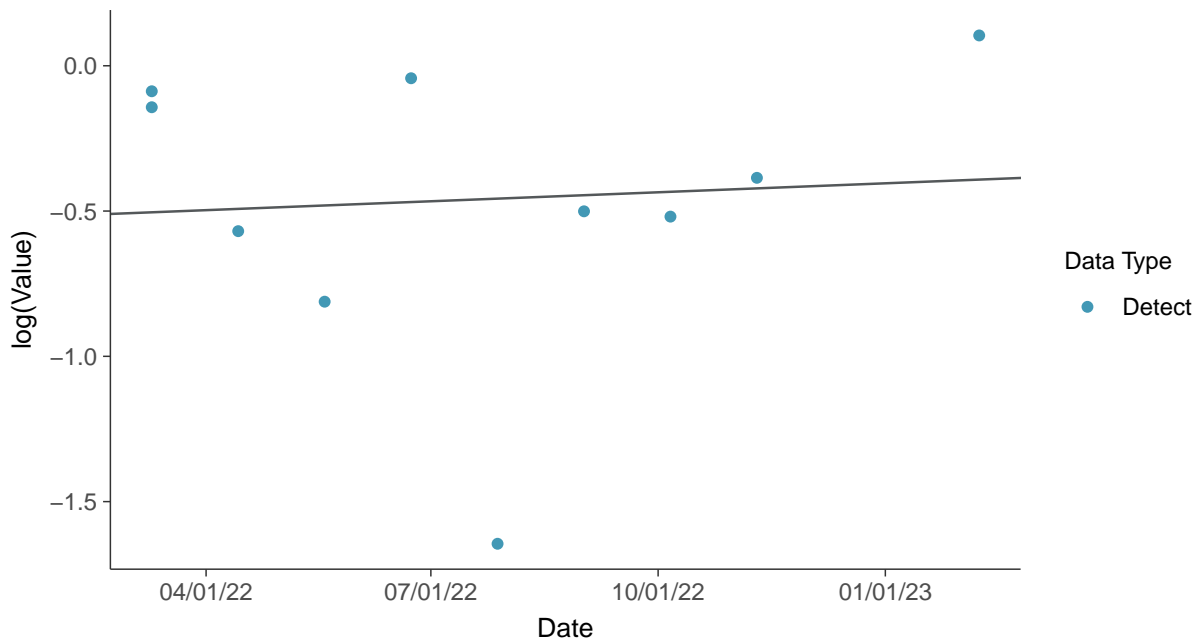
Gamma Q-Q plot

Radium-226, MW-7C (pCi/L)



Trend Regression: Lognormal MLE

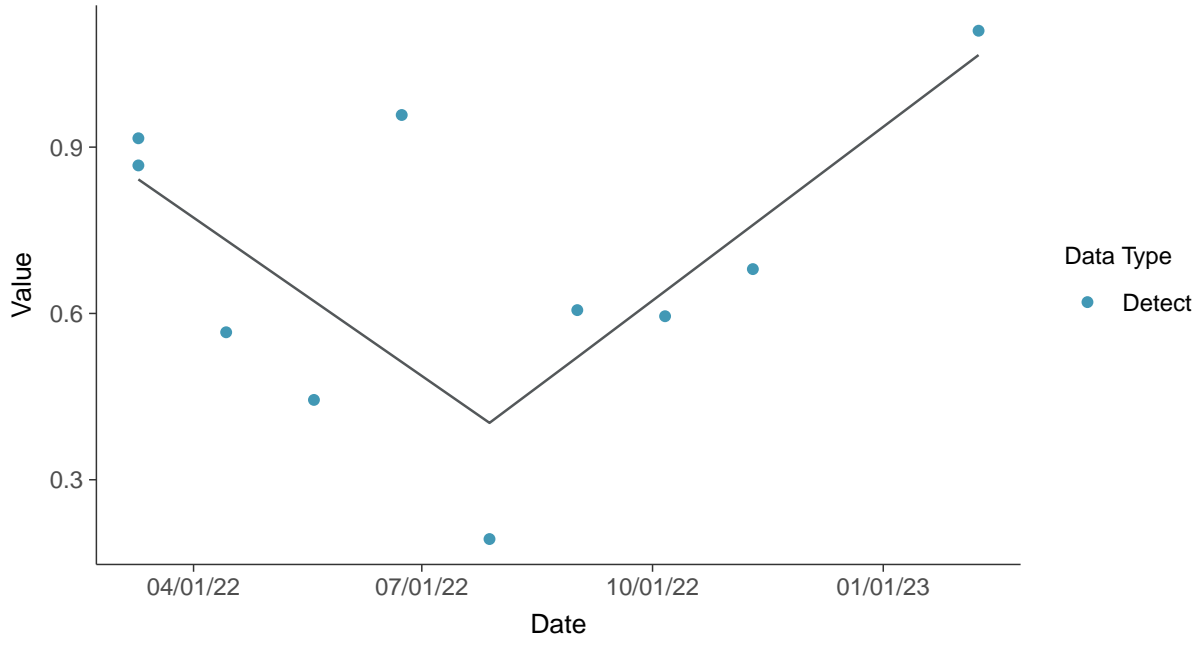
Radium-226, MW-7C (pCi/L)





Trend Regression: Piecewise Linear-Linear

Radium-226, MW-7C (pCi/L)



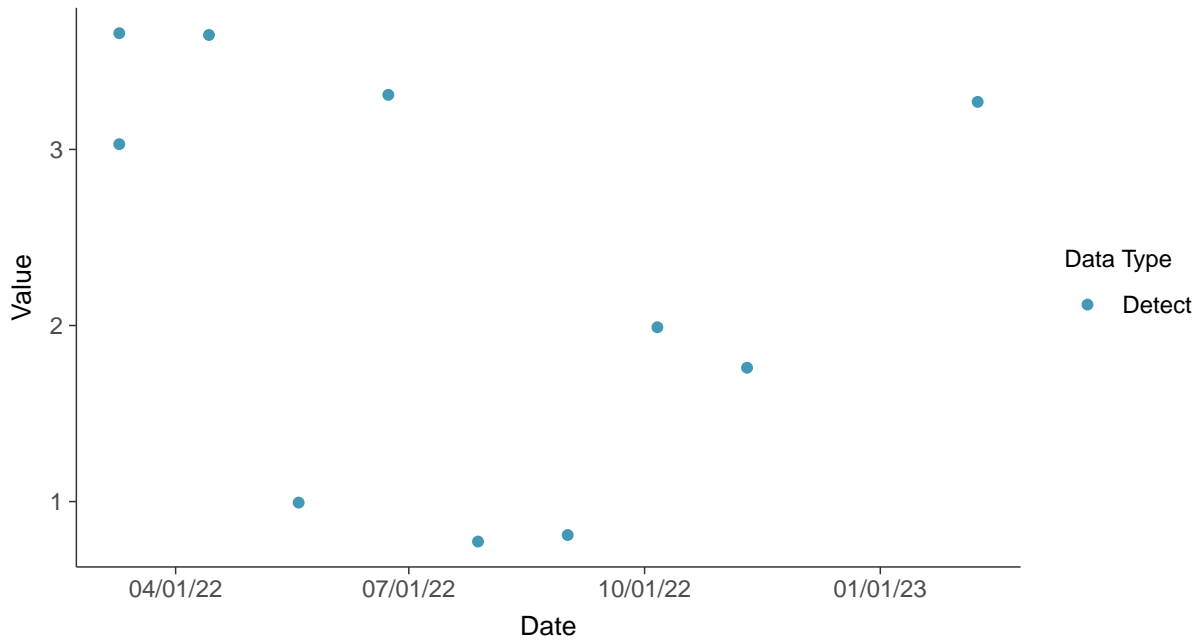


Appendix IV: Radium-226/228, MW-7C

ID: 2_25

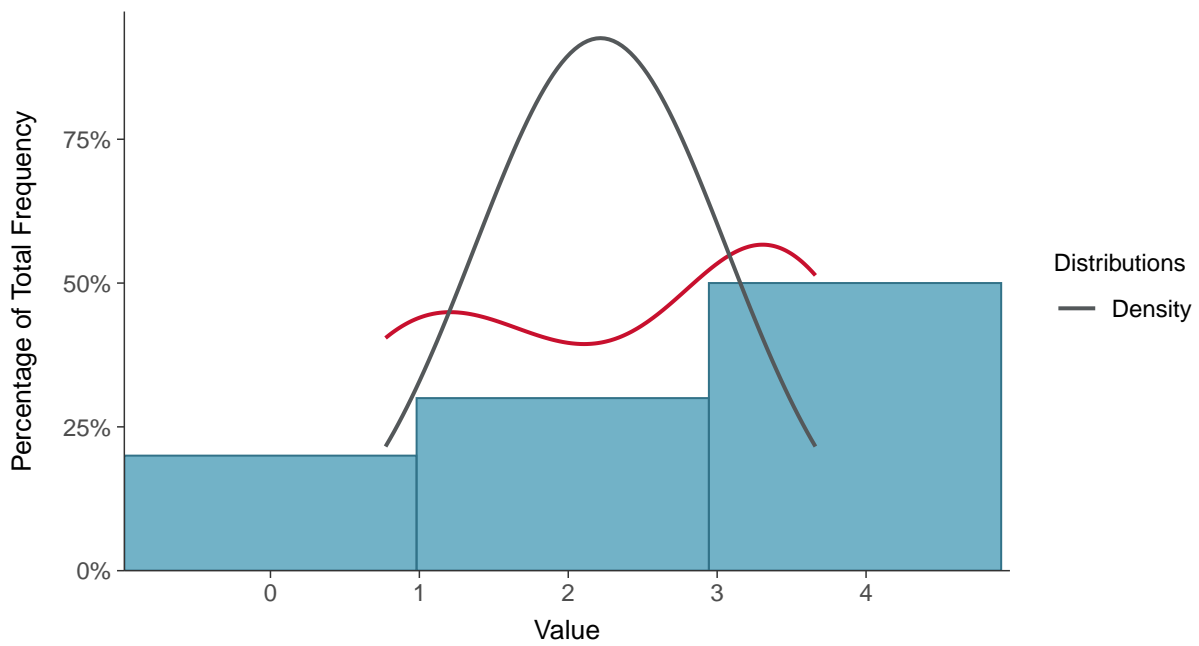
Scatter Plot

Radium-226/228, MW-7C (pCi/L)



Histogram

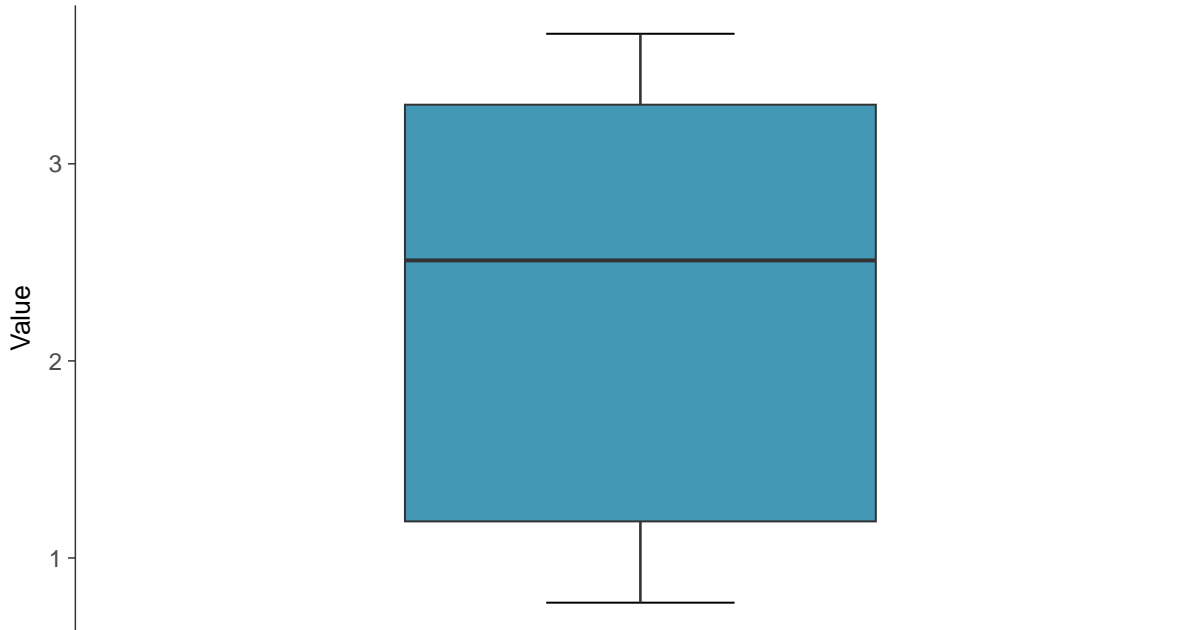
Radium-226/228, MW-7C (pCi/L)





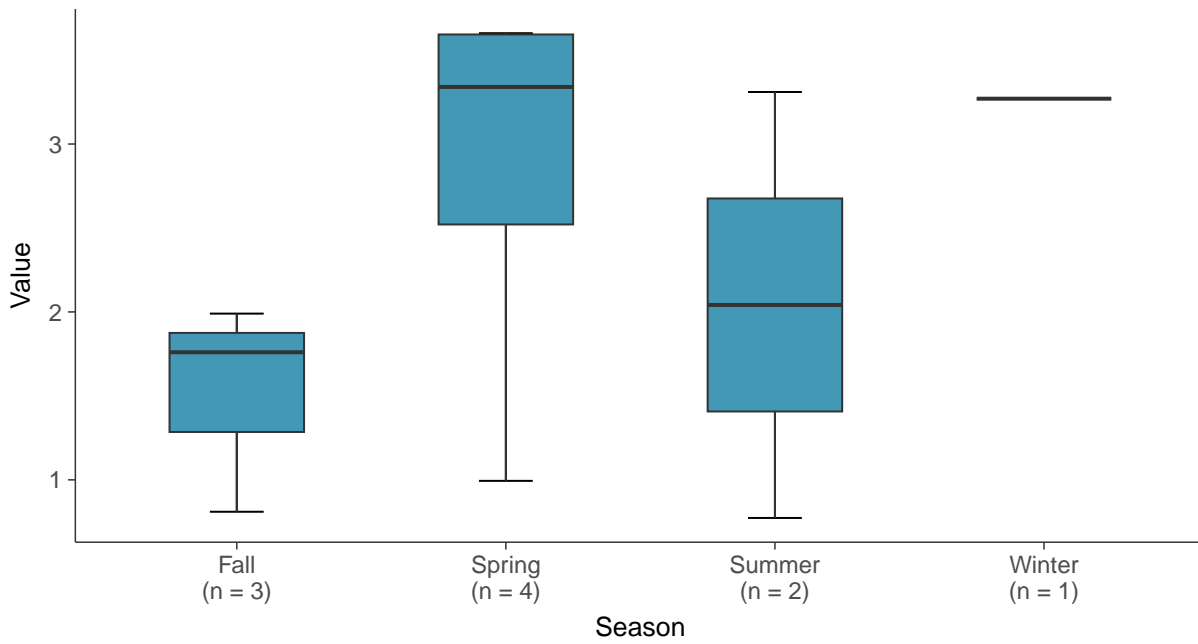
Boxplot

Radium-226/228, MW-7C (pCi/L)



Boxplot by Season

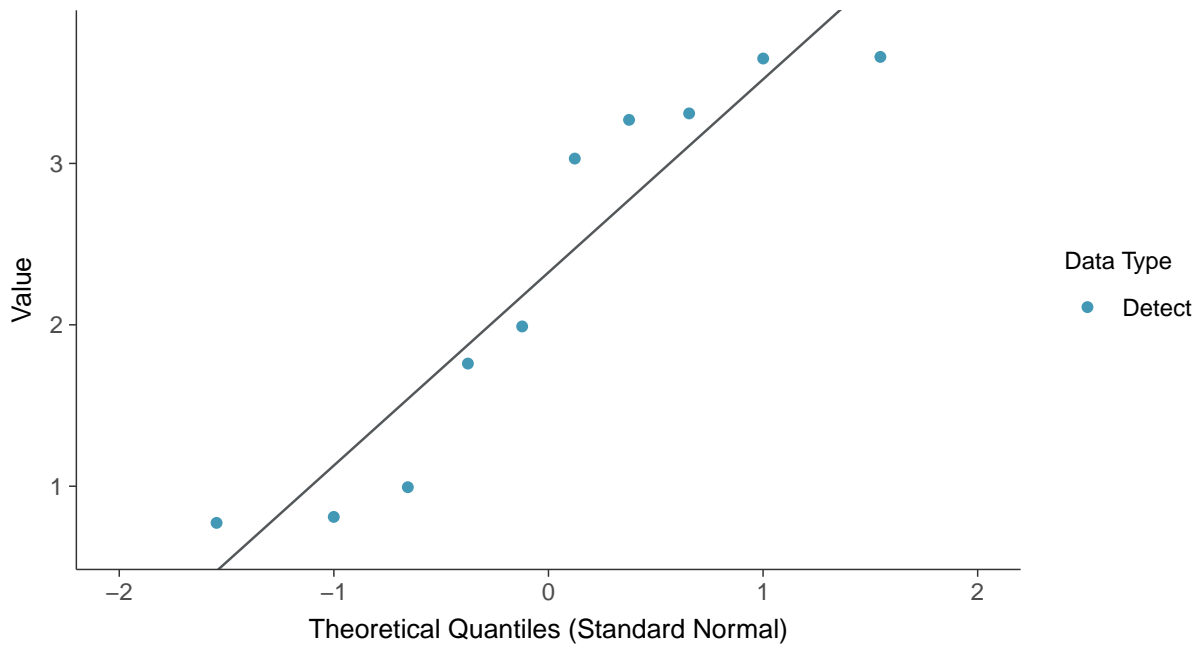
Radium-226/228, MW-7C (pCi/L)





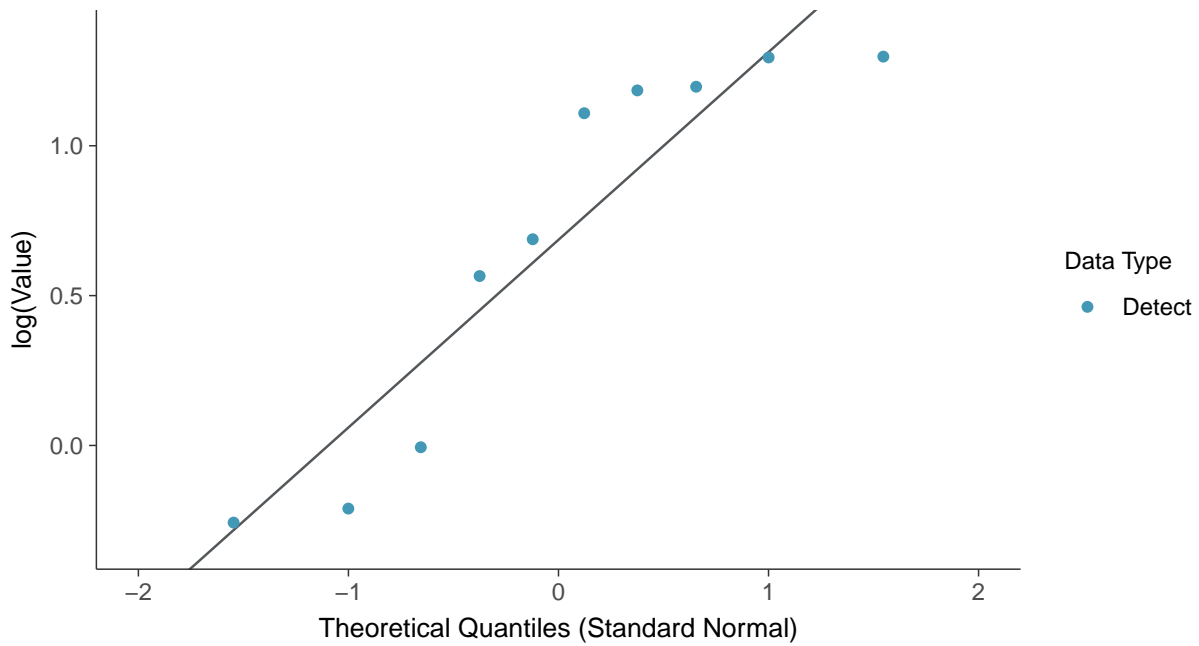
Normal Q-Q plot

Radium-226/228, MW-7C (pCi/L)



Lognormal Q-Q plot

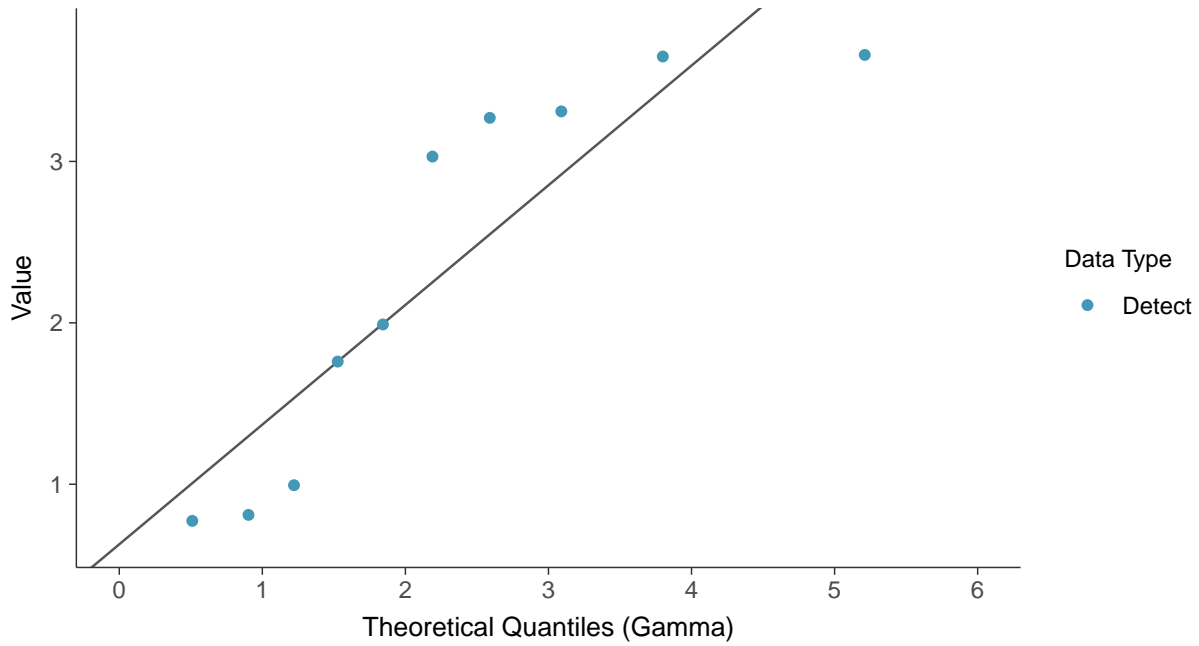
Radium-226/228, MW-7C (pCi/L)





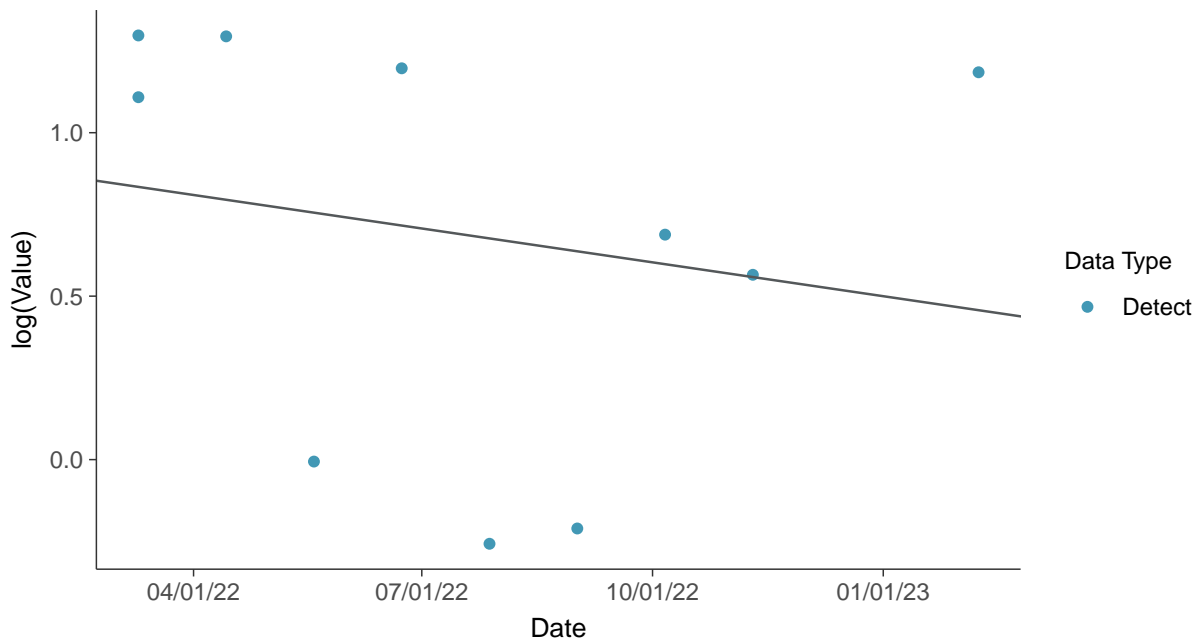
Gamma Q-Q plot

Radium-226/228, MW-7C (pCi/L)



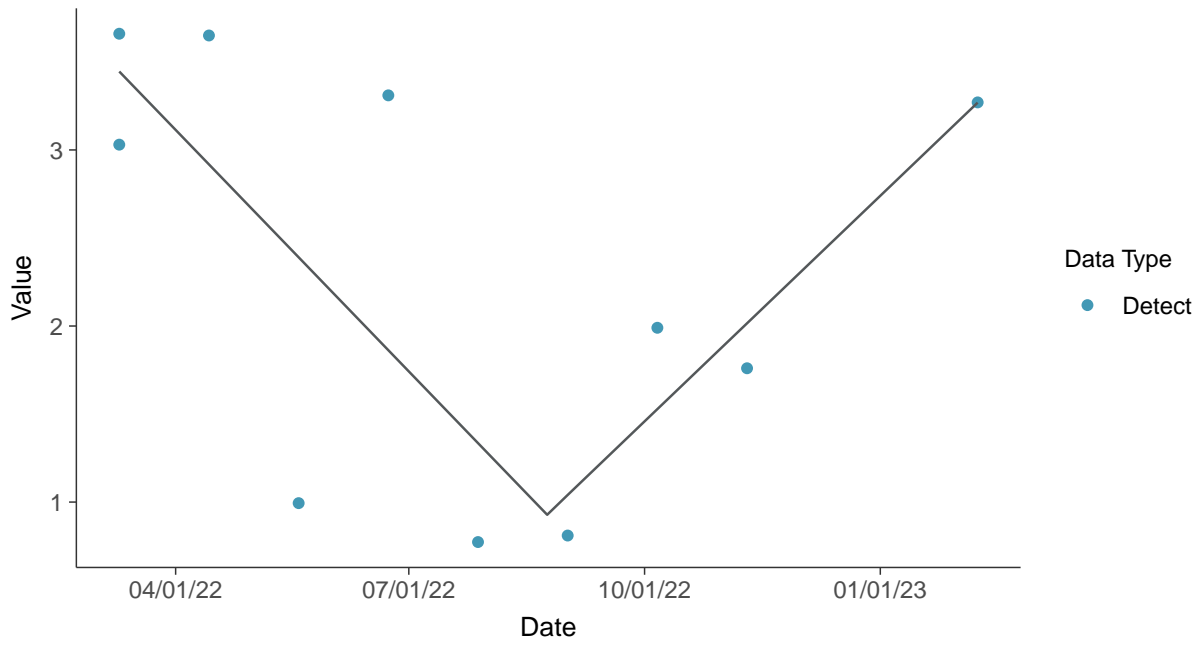
Trend Regression: Lognormal MLE

Radium-226/228, MW-7C (pCi/L)





Trend Regression: Piecewise Linear-Linear
Radium-226/228, MW-7C (pCi/L)



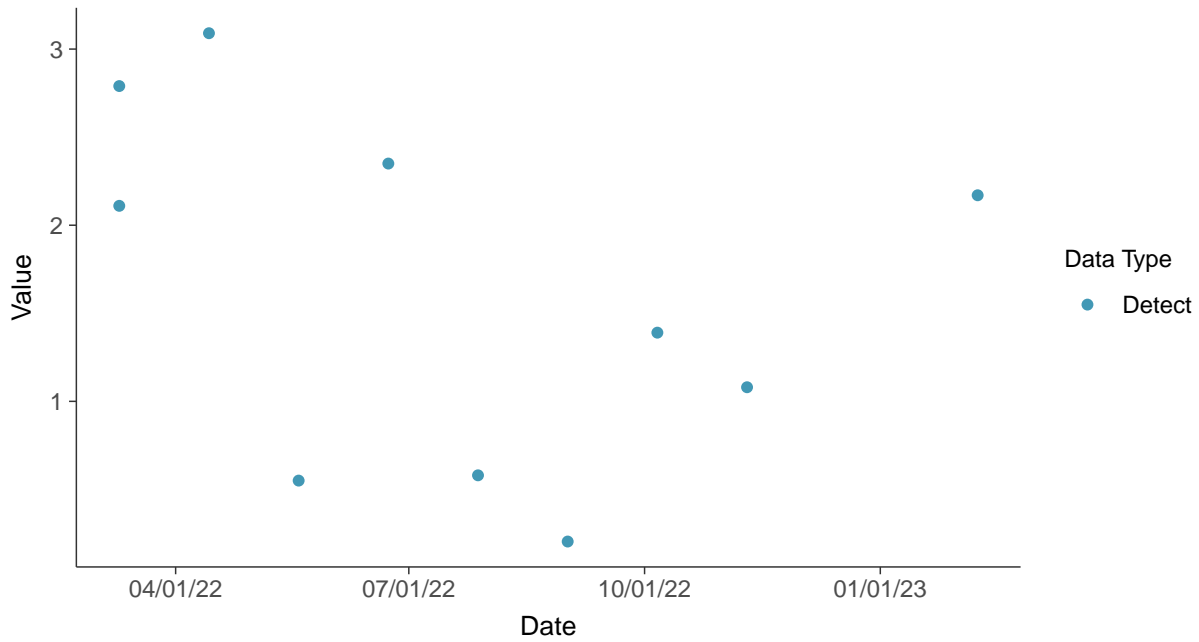


Appendix IV: Radium-228, MW-7C

ID: 2_26

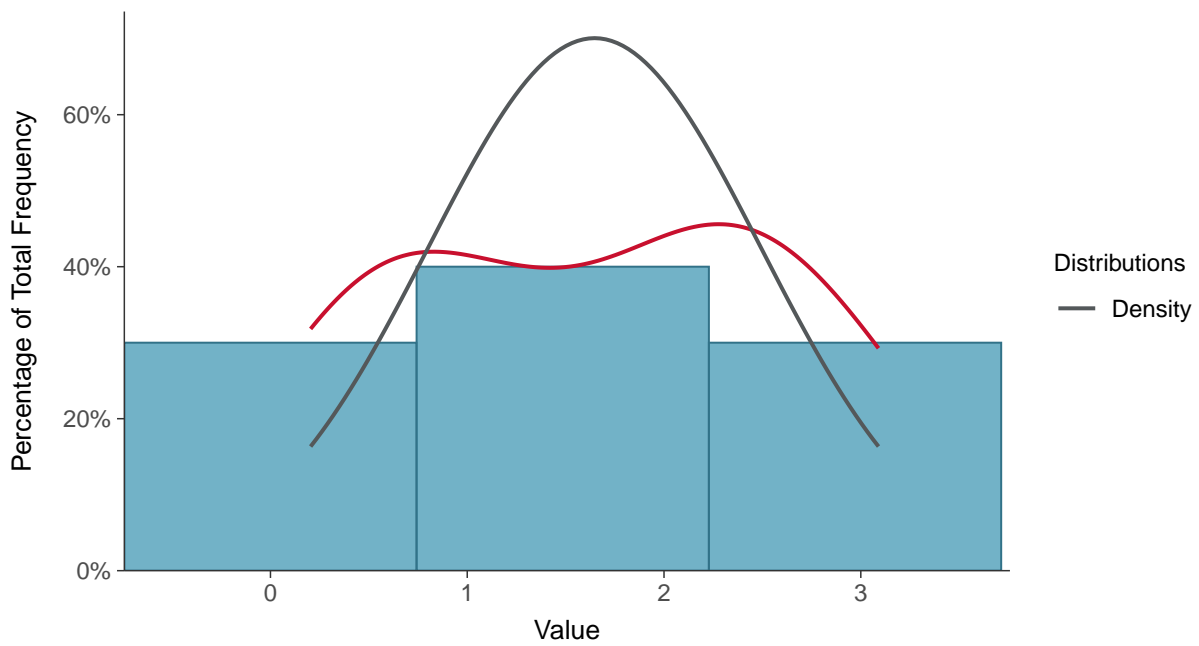
Scatter Plot

Radium-228, MW-7C (pCi/L)



Histogram

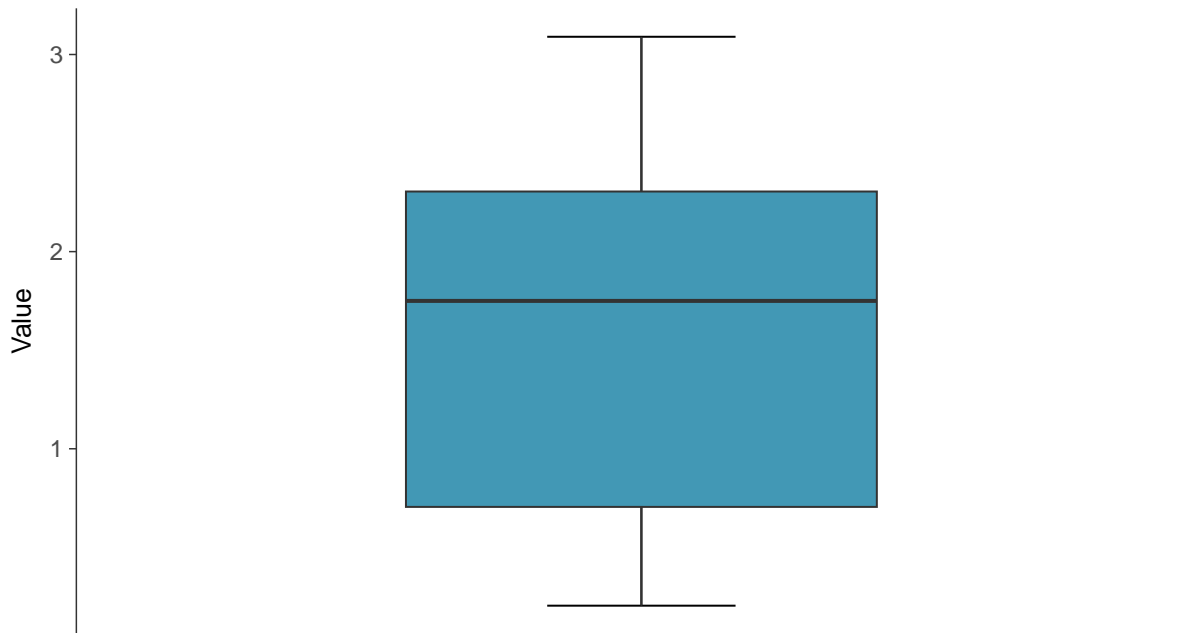
Radium-228, MW-7C (pCi/L)





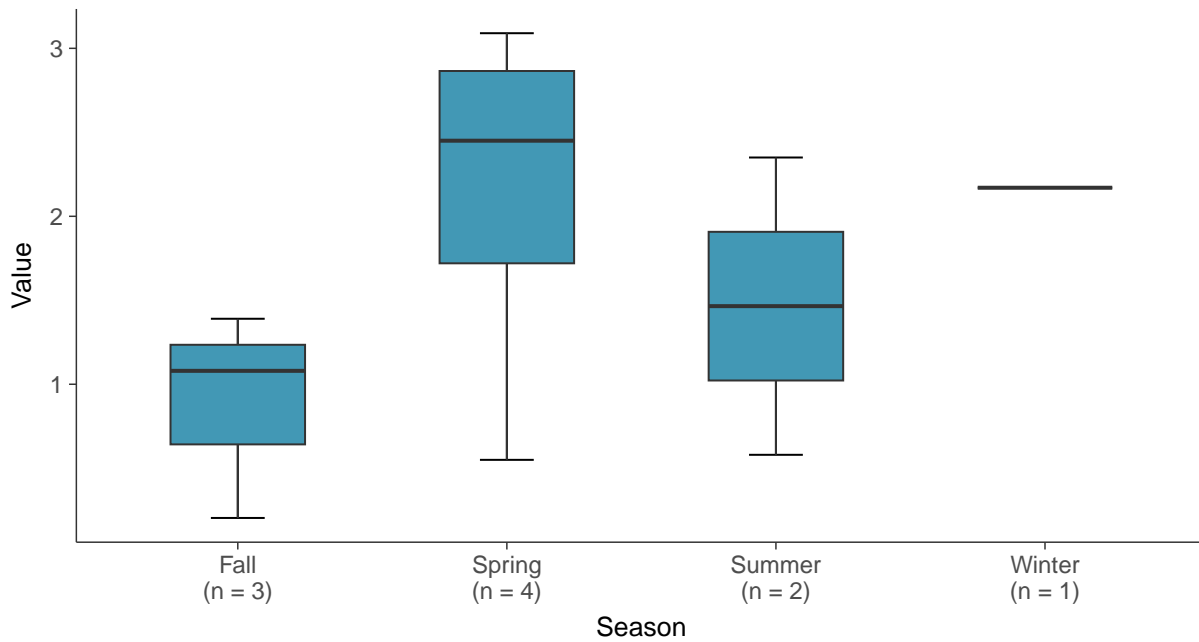
Boxplot

Radium-228, MW-7C (pCi/L)



Boxplot by Season

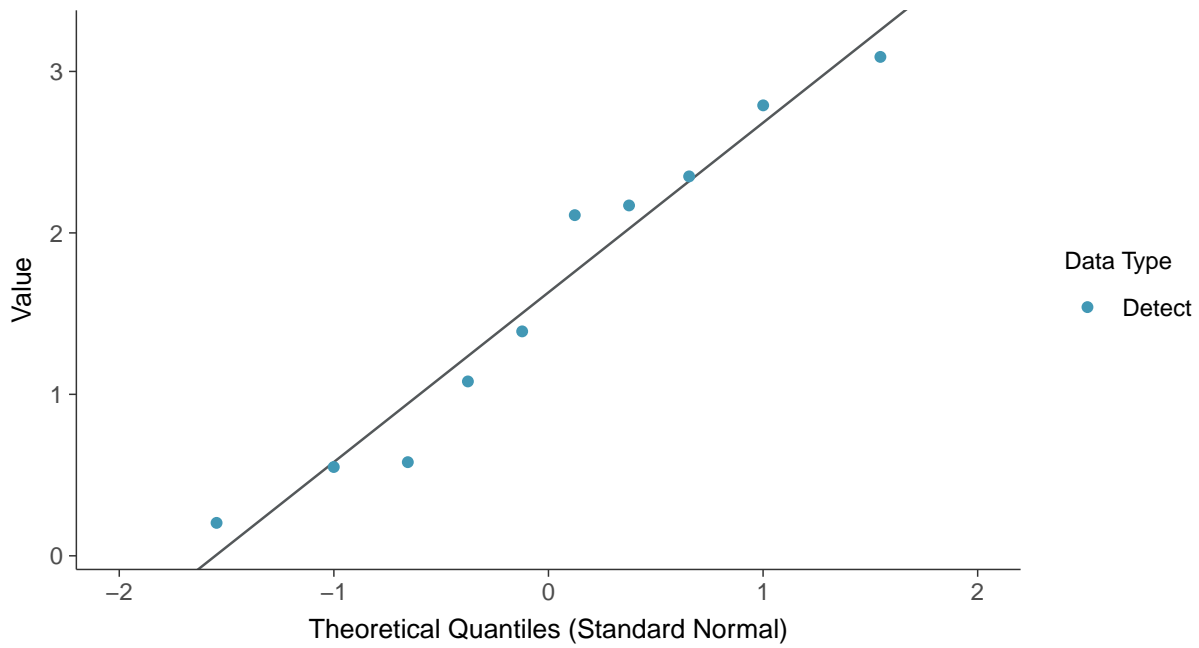
Radium-228, MW-7C (pCi/L)





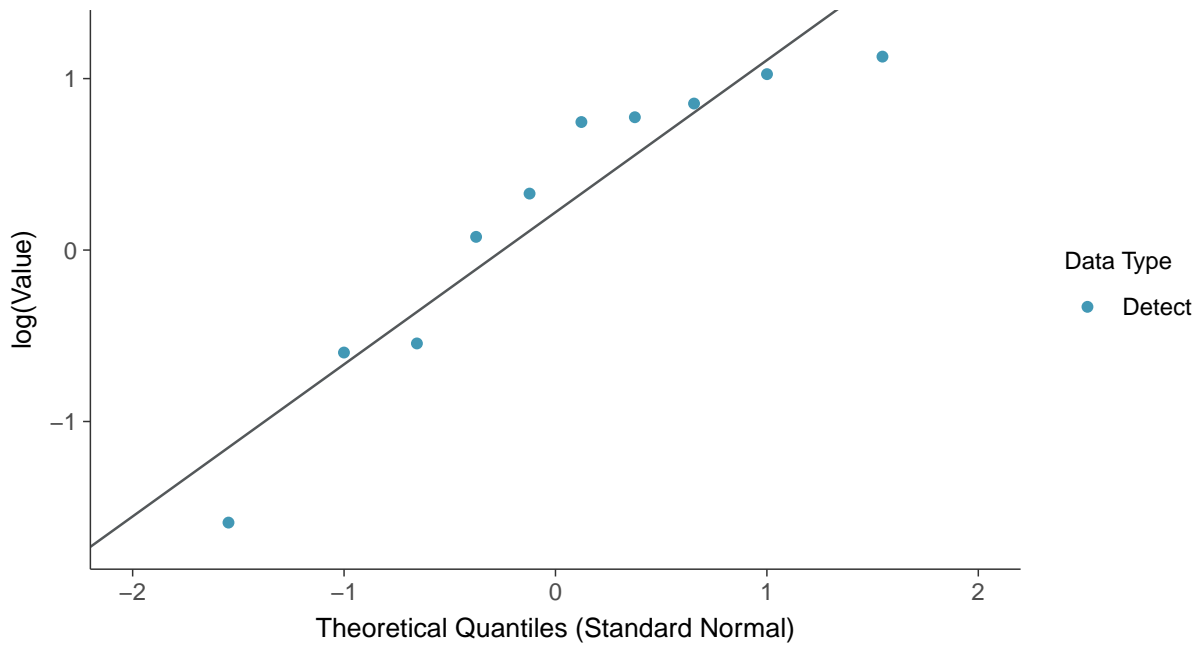
Normal Q-Q plot

Radium-228, MW-7C (pCi/L)



Lognormal Q-Q plot

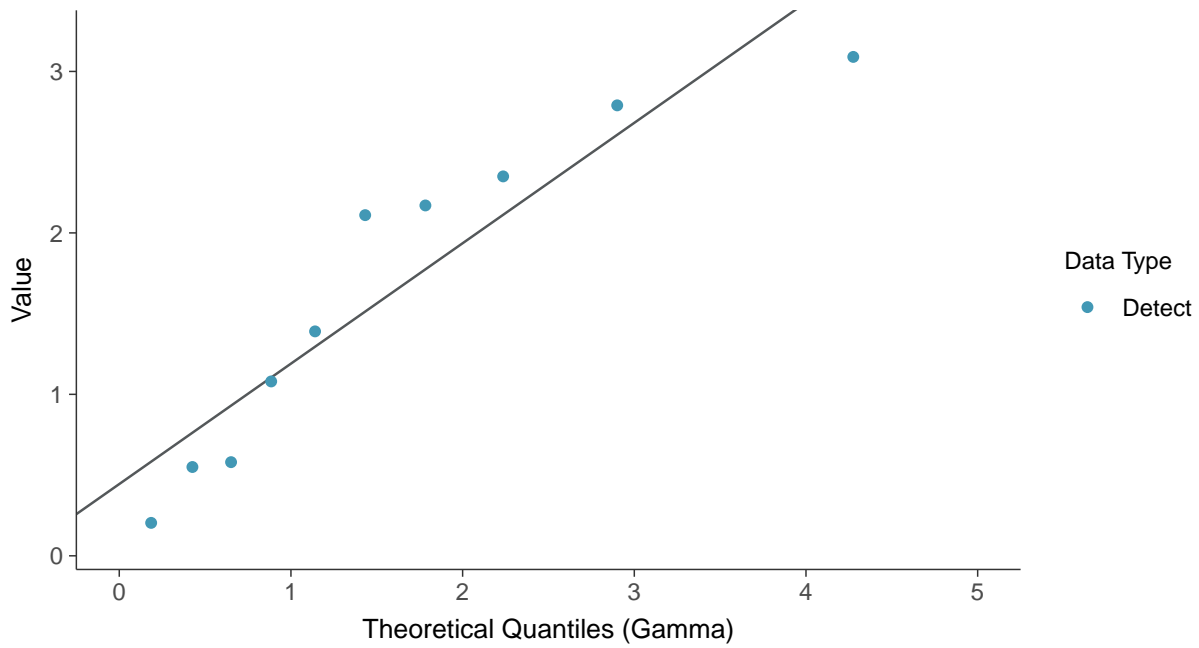
Radium-228, MW-7C (pCi/L)





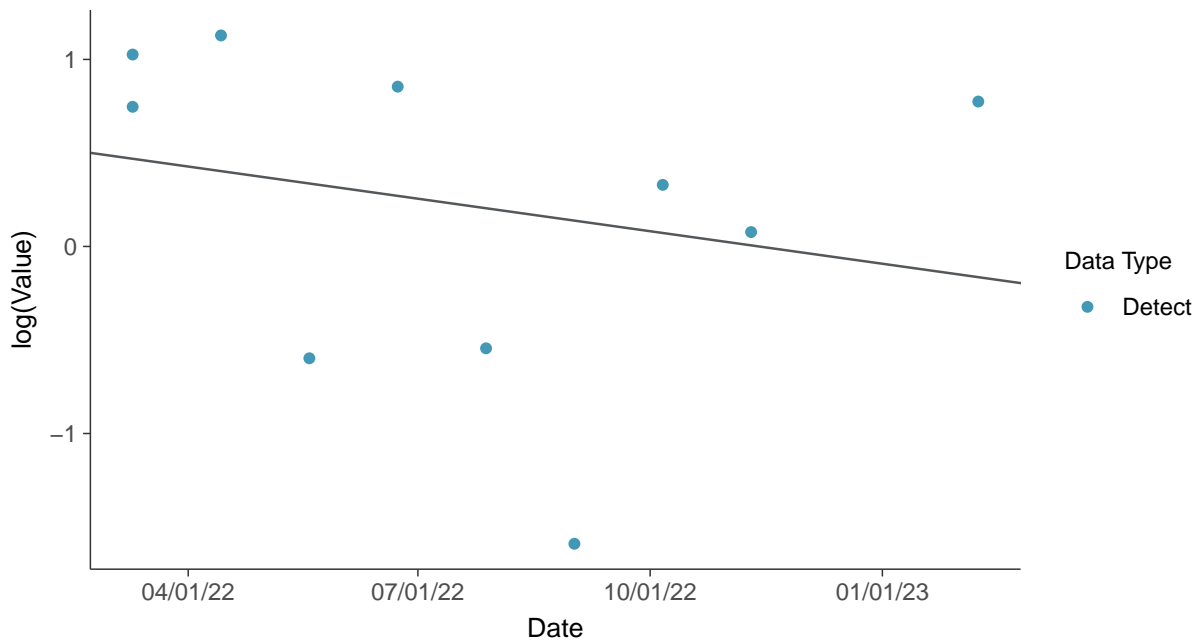
Gamma Q-Q plot

Radium-228, MW-7C (pCi/L)



Trend Regression: Lognormal MLE

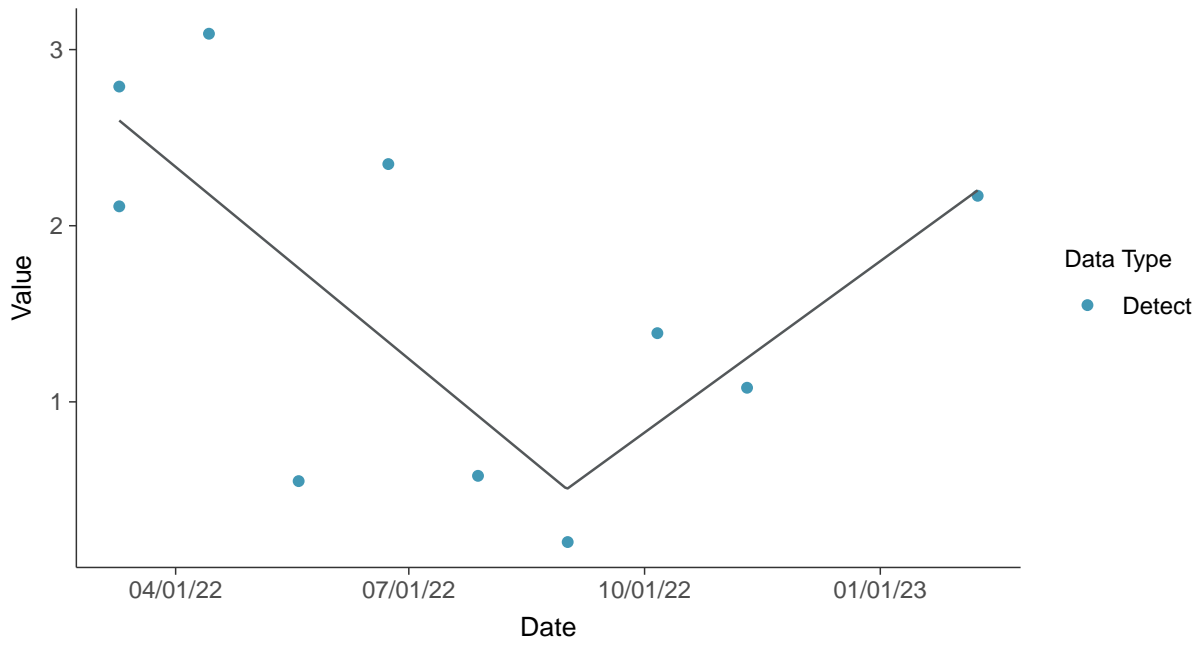
Radium-228, MW-7C (pCi/L)





Trend Regression: Piecewise Linear-Linear

Radium-228, MW-7C (pCi/L)



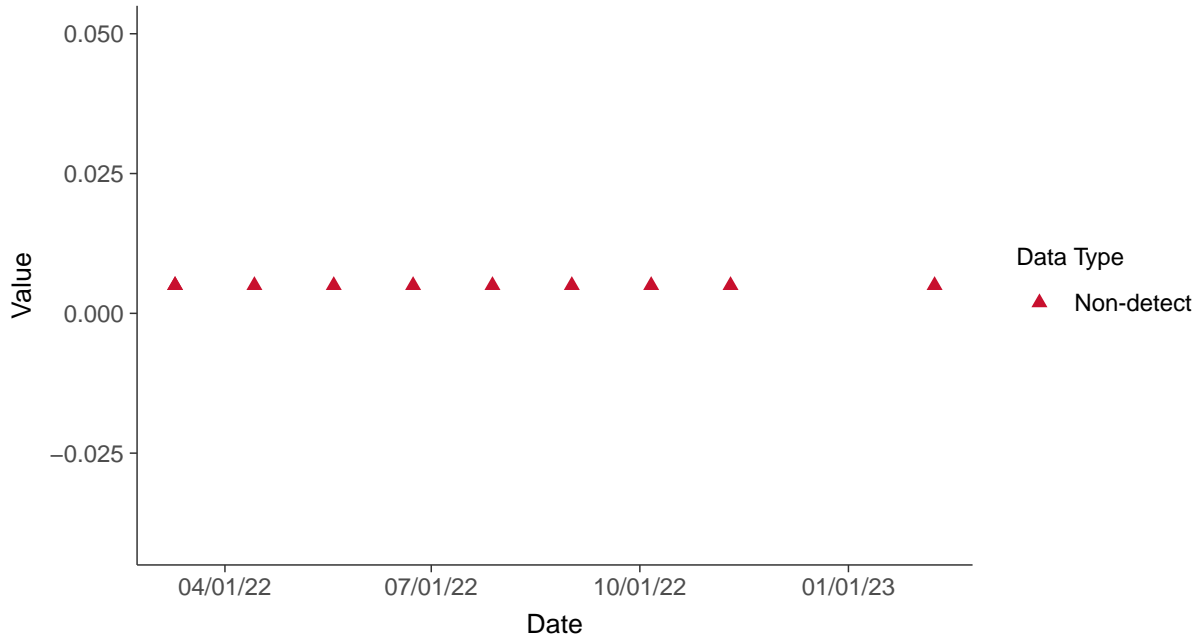


Appendix IV: Selenium, MW-7C

ID: 2_27

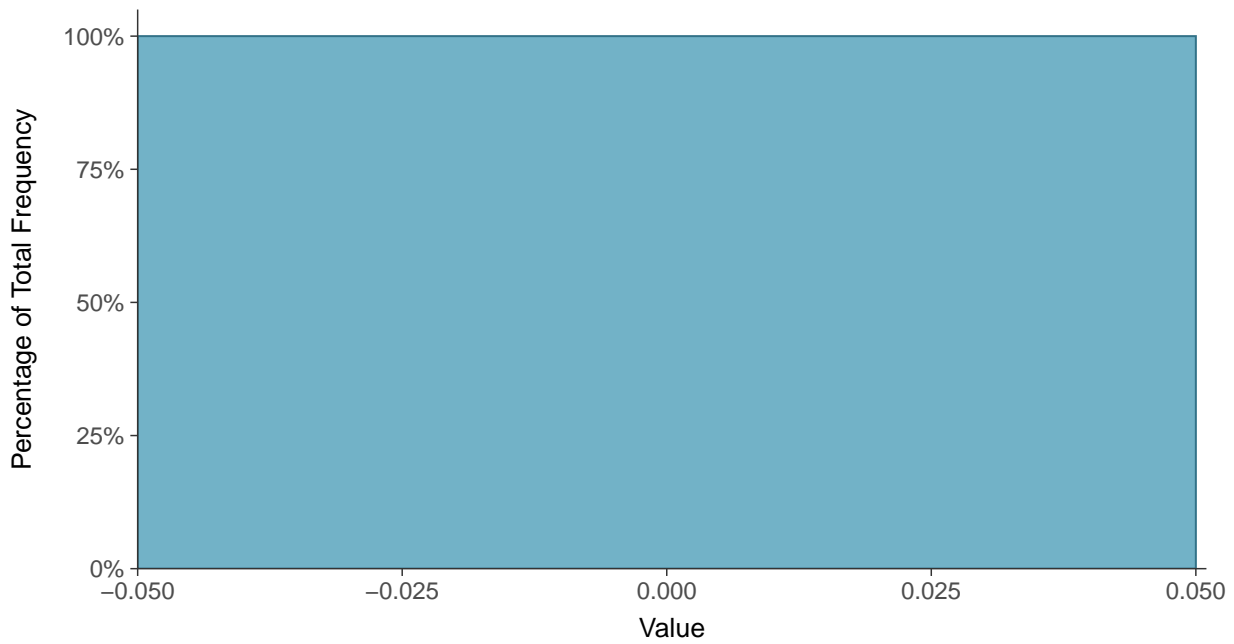
Scatter Plot

Selenium, MW-7C (mg/L)



Histogram

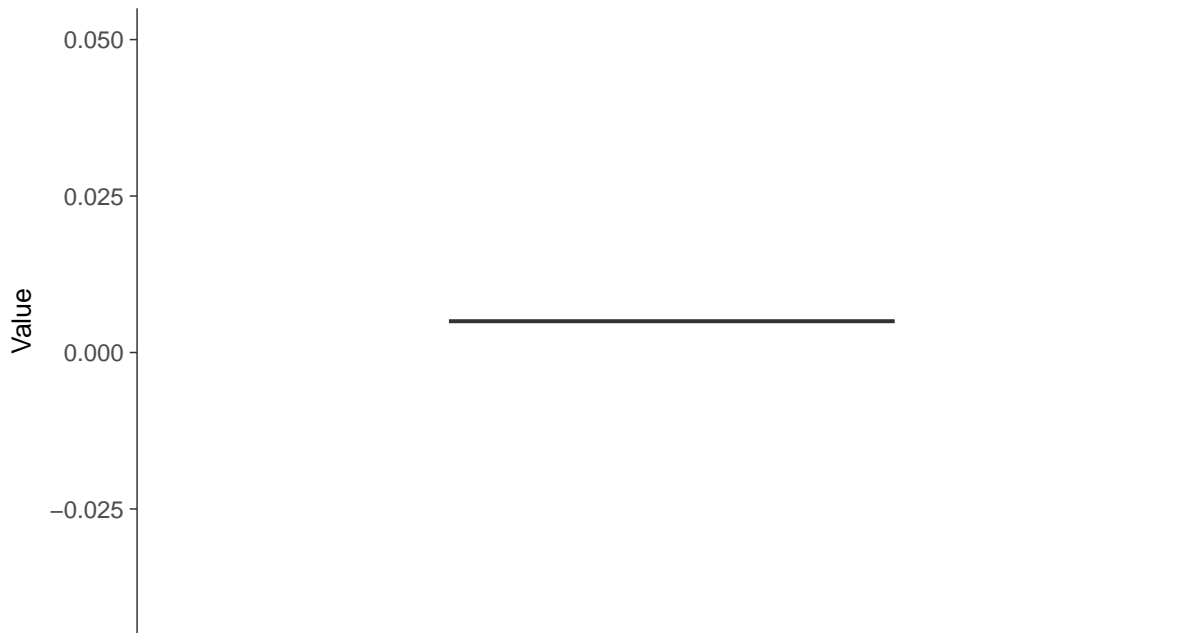
Selenium, MW-7C (mg/L)





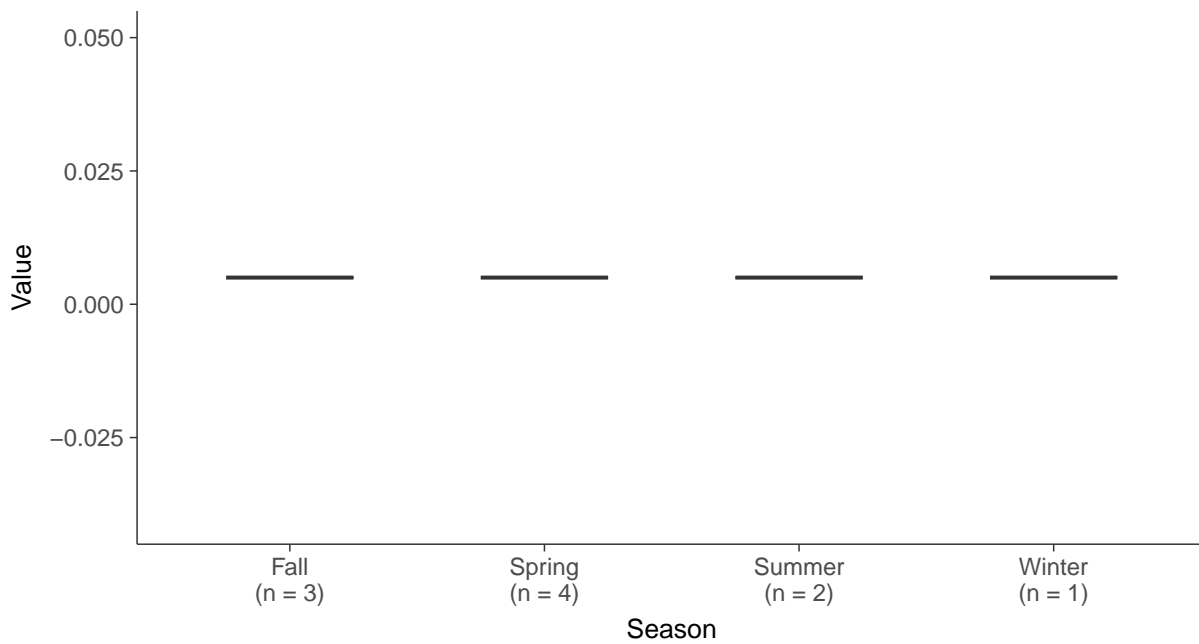
Boxplot

Selenium, MW-7C (mg/L)



Boxplot by Season

Selenium, MW-7C (mg/L)



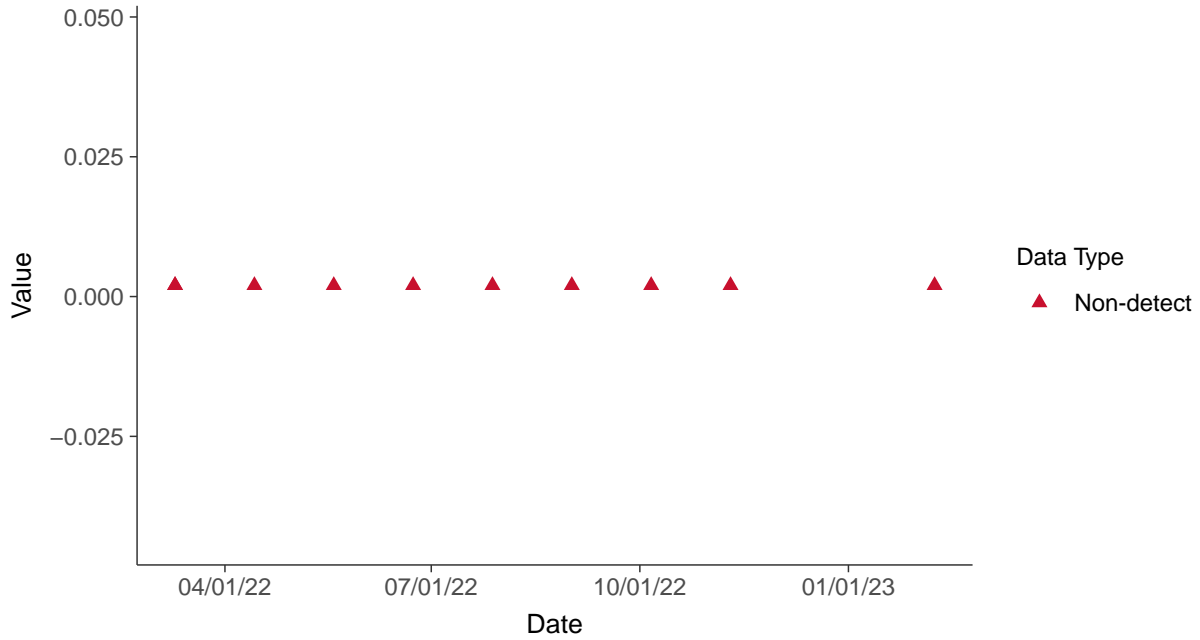


Appendix IV: Thallium, MW-7C

ID: 2_29

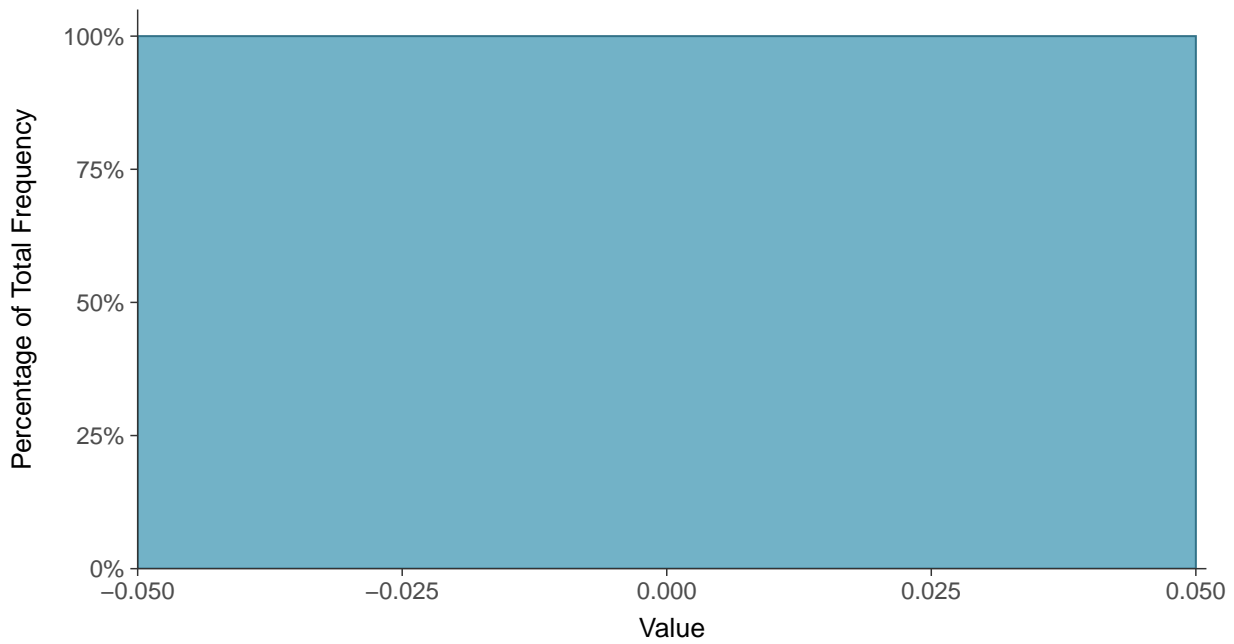
Scatter Plot

Thallium, MW-7C (mg/L)



Histogram

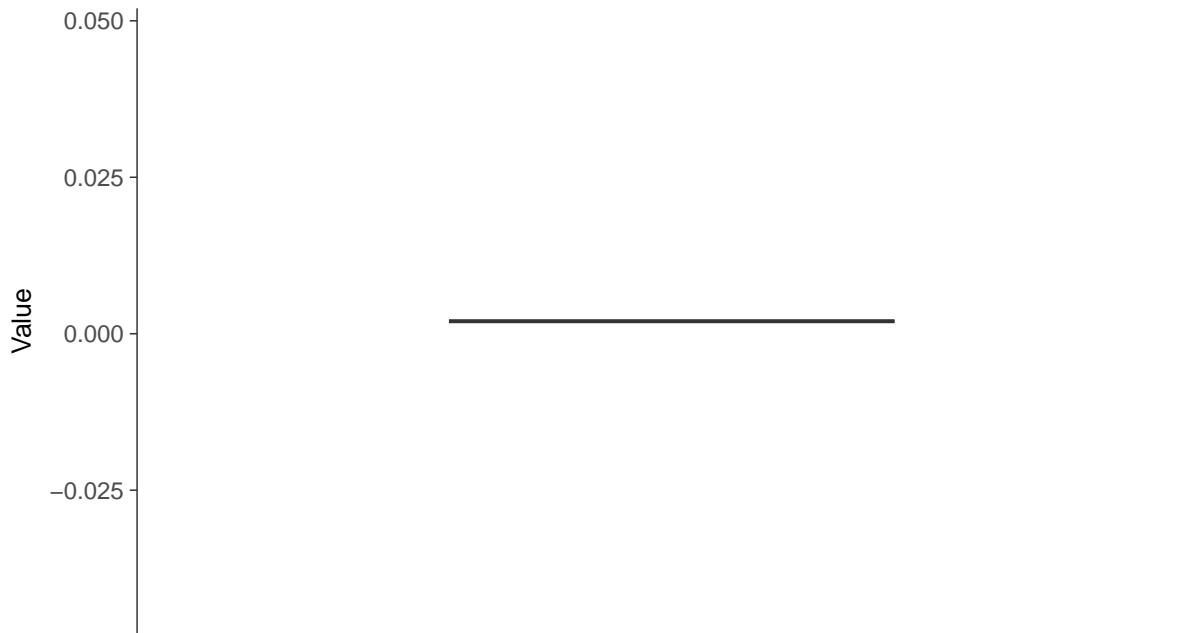
Thallium, MW-7C (mg/L)





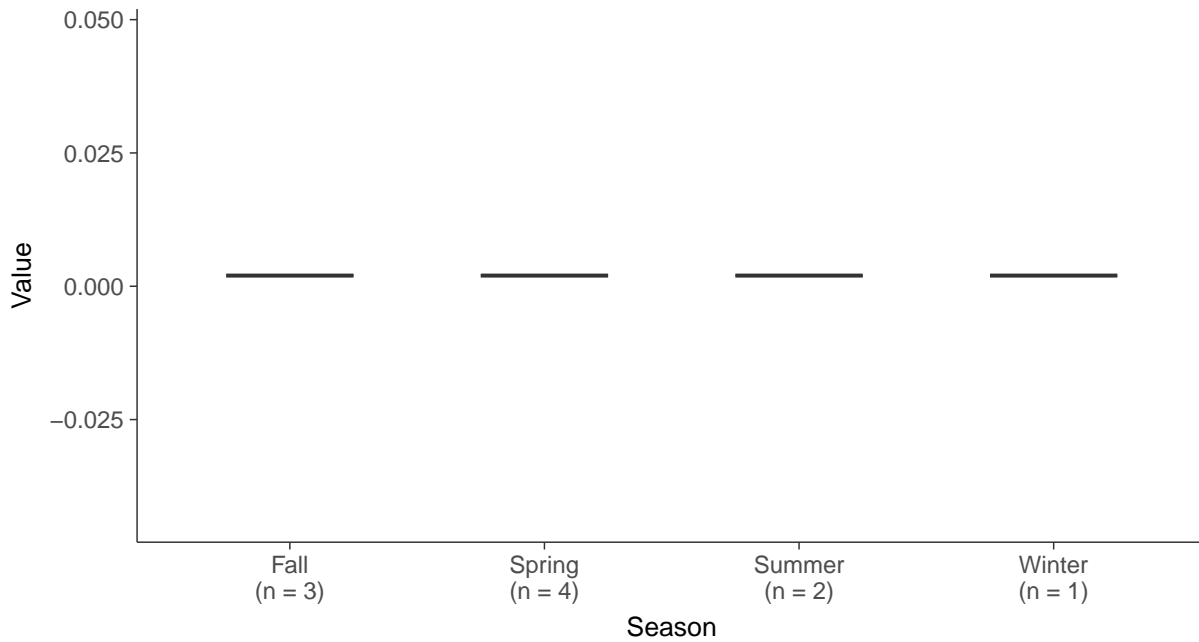
Boxplot

Thallium, MW-7C (mg/L)



Boxplot by Season

Thallium, MW-7C (mg/L)



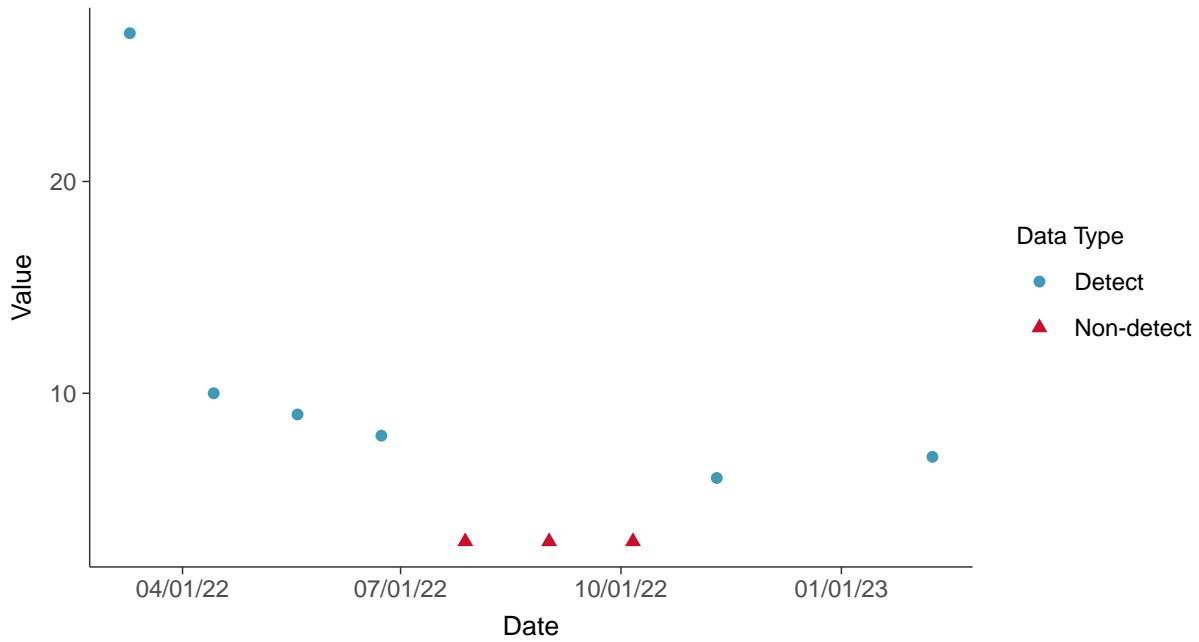


Appendix IV: Total Suspended Solids, MW-7C

ID: 2_30

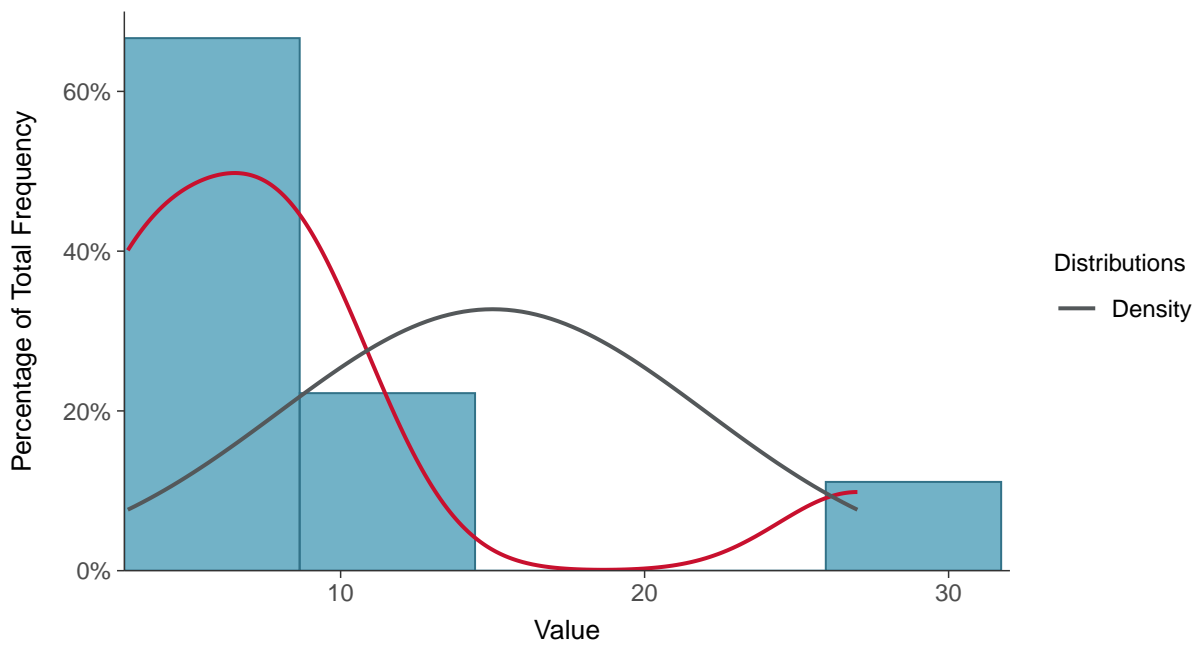
Scatter Plot

Total Suspended Solids, MW-7C (mg/L)



Histogram

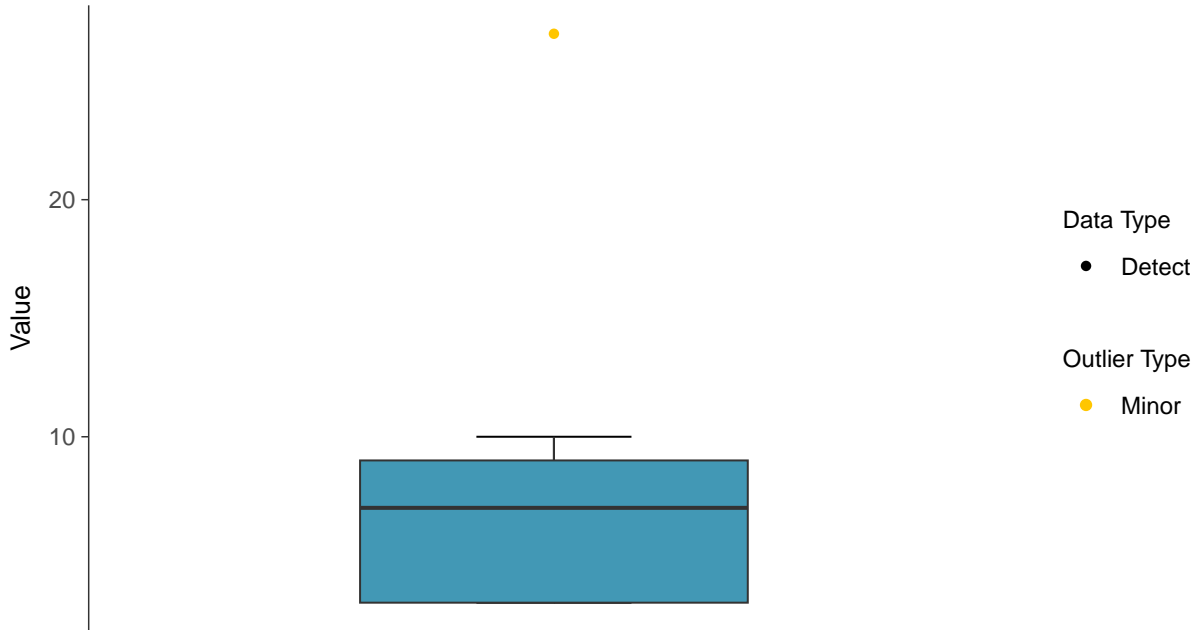
Total Suspended Solids, MW-7C (mg/L)





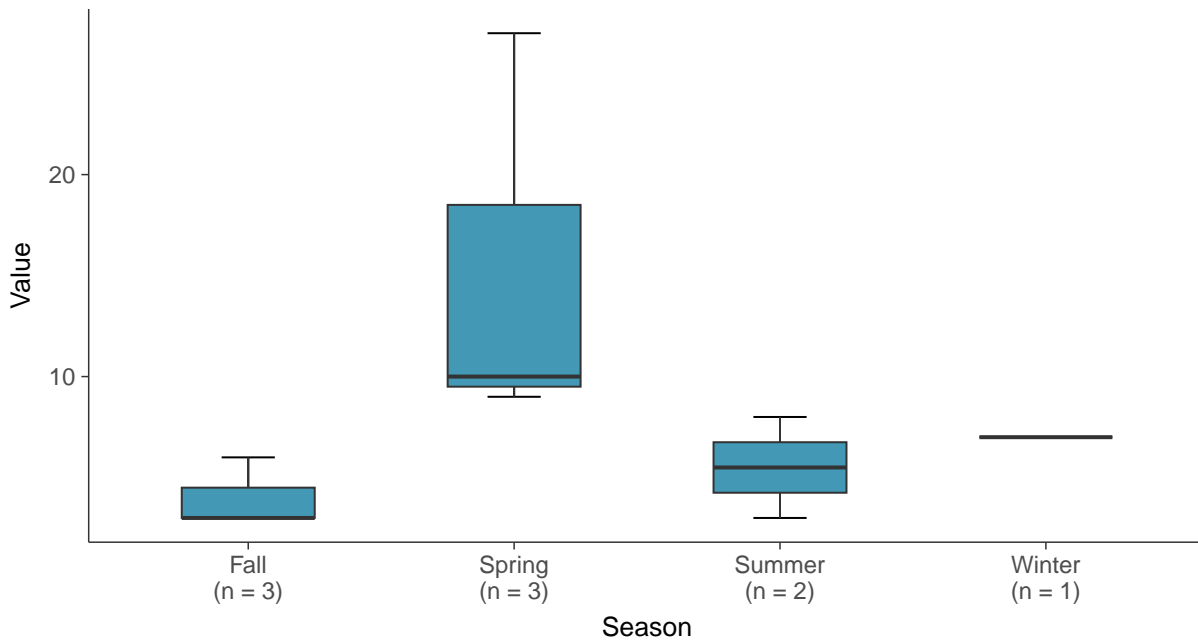
Boxplot

Total Suspended Solids, MW-7C (mg/L)



Boxplot by Season

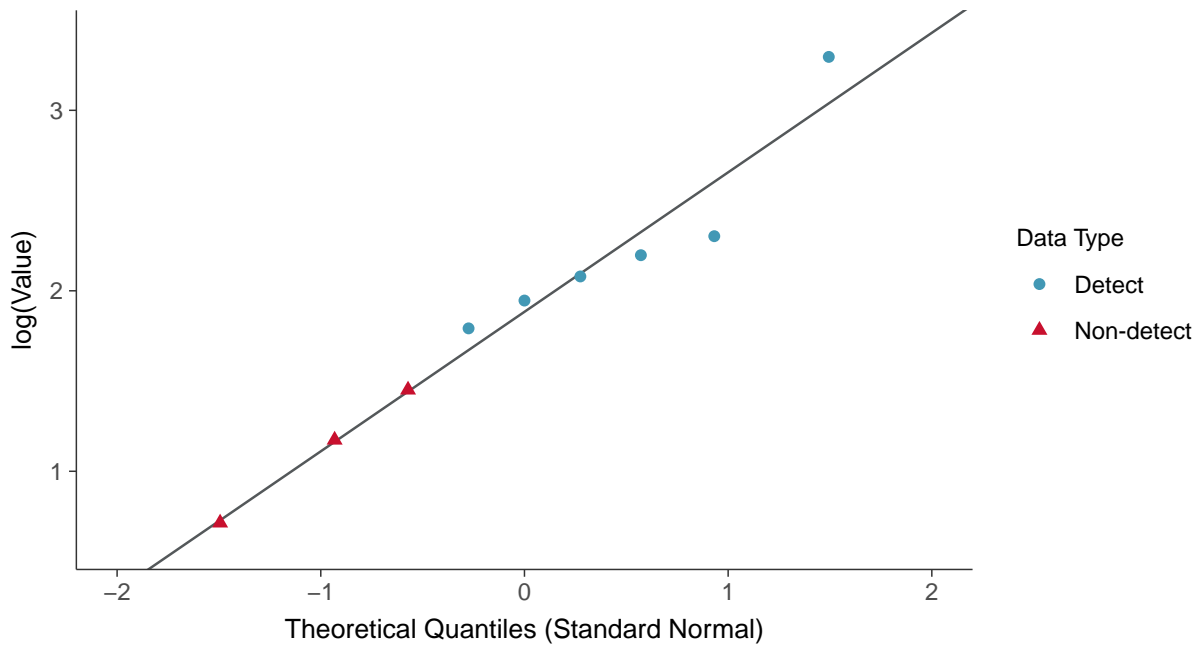
Total Suspended Solids, MW-7C (mg/L)





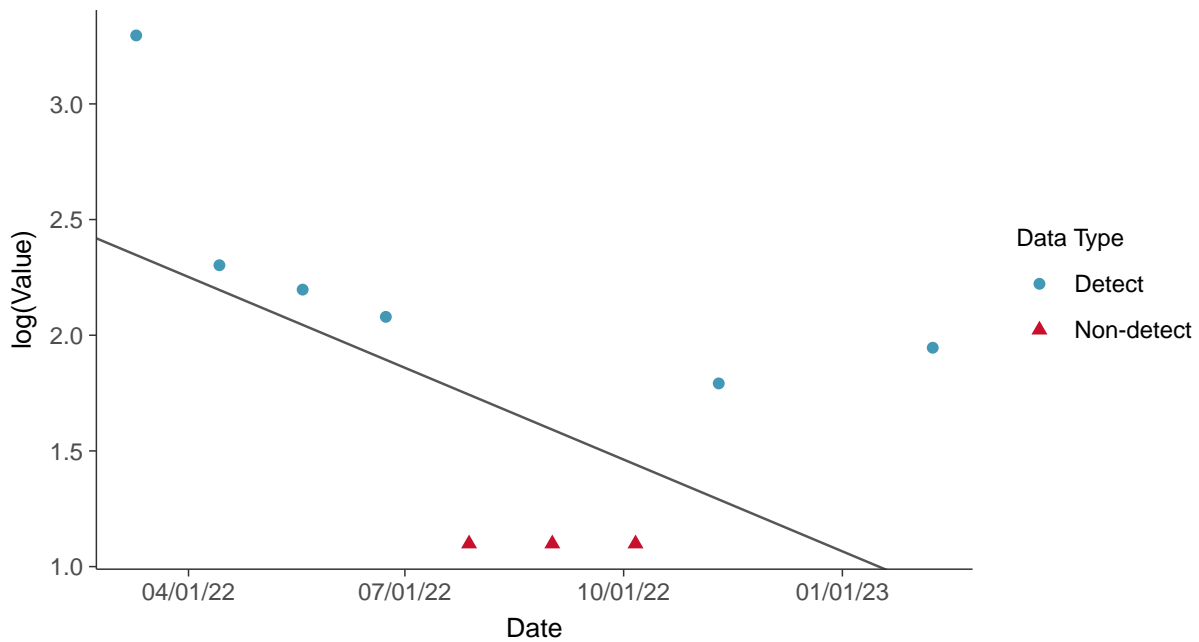
Lognormal Q-Q plot using ROS Imputed Estimates

Total Suspended Solids, MW-7C (mg/L)



Trend Regression: Lognormal MLE

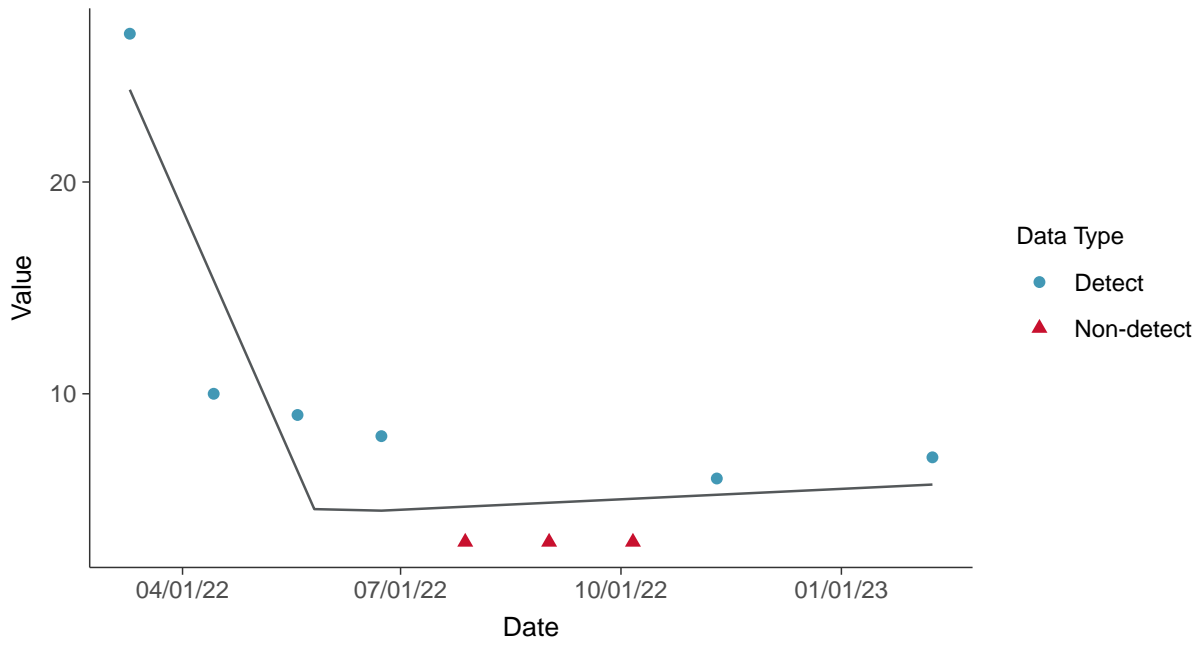
Total Suspended Solids, MW-7C (mg/L)





Trend Regression: Piecewise Linear-Linear

Total Suspended Solids, MW-7C (mg/L)



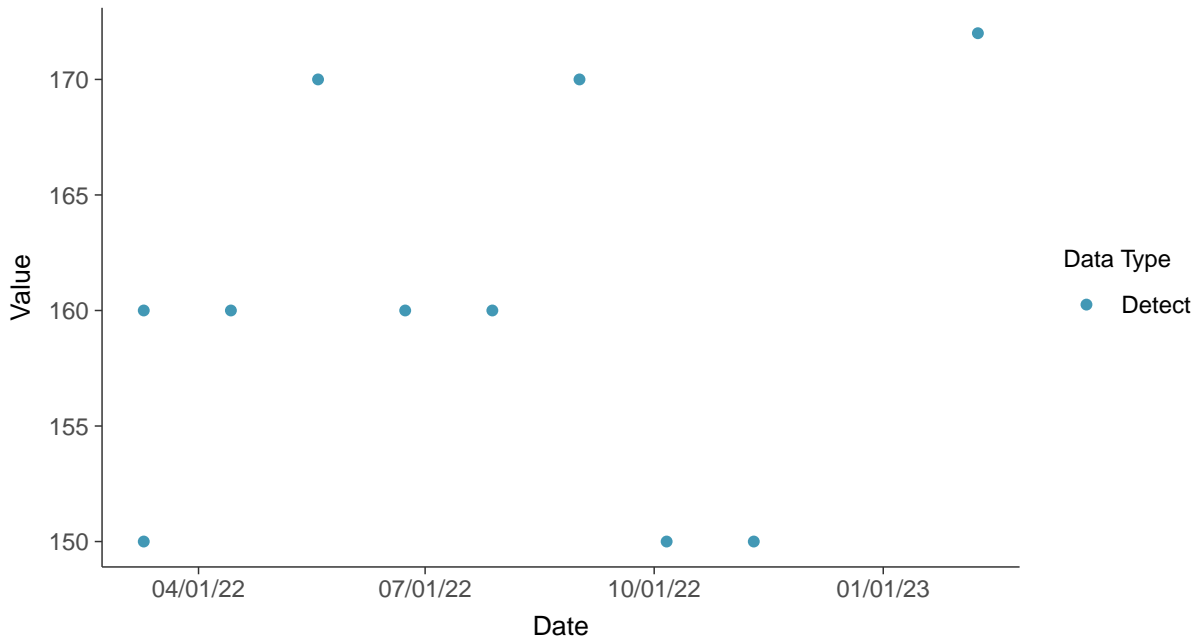


Other: Bicarbonate, MW-7C

ID: 3_12

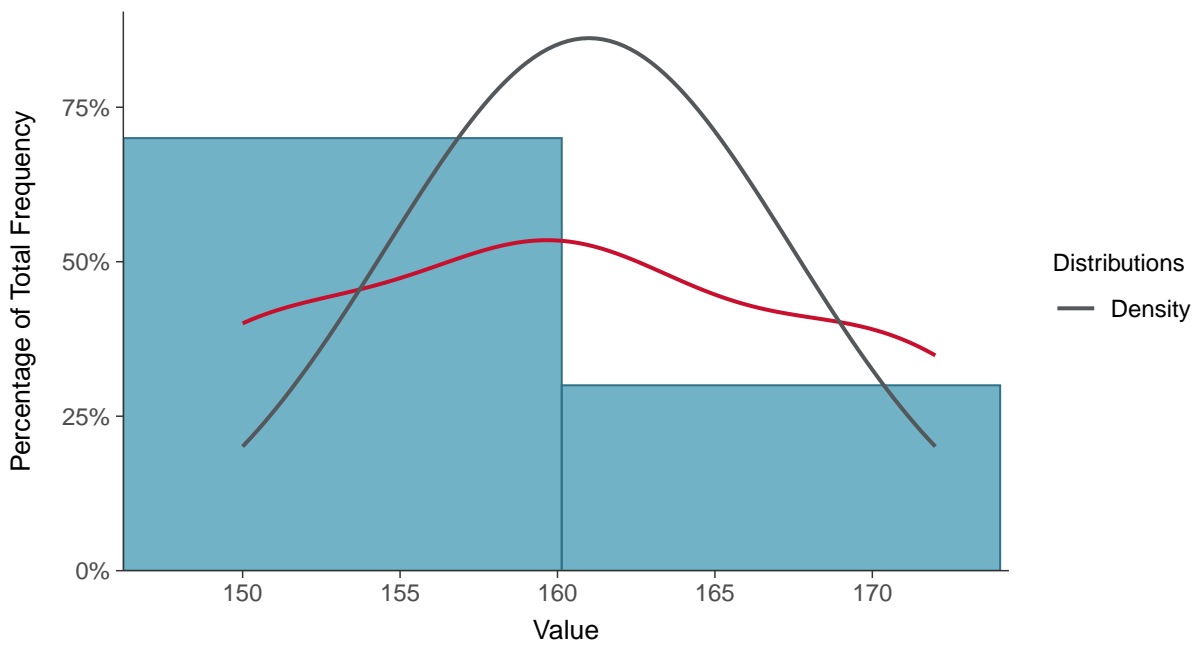
Scatter Plot

Bicarbonate, MW-7C (mg/L)



Histogram

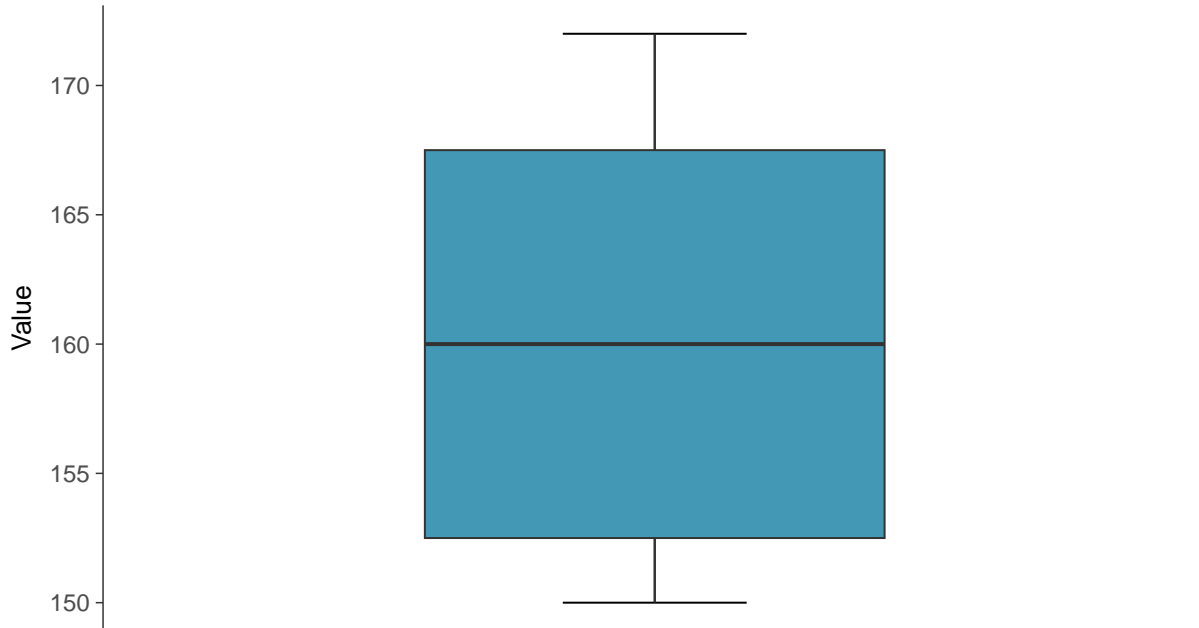
Bicarbonate, MW-7C (mg/L)





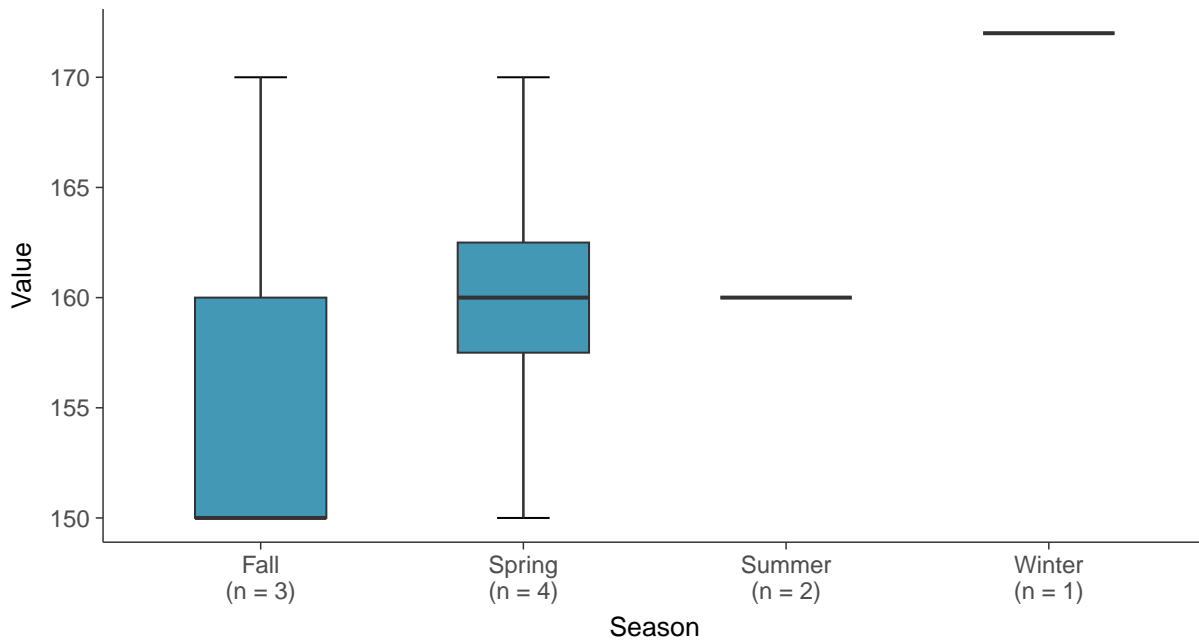
Boxplot

Bicarbonate, MW-7C (mg/L)



Boxplot by Season

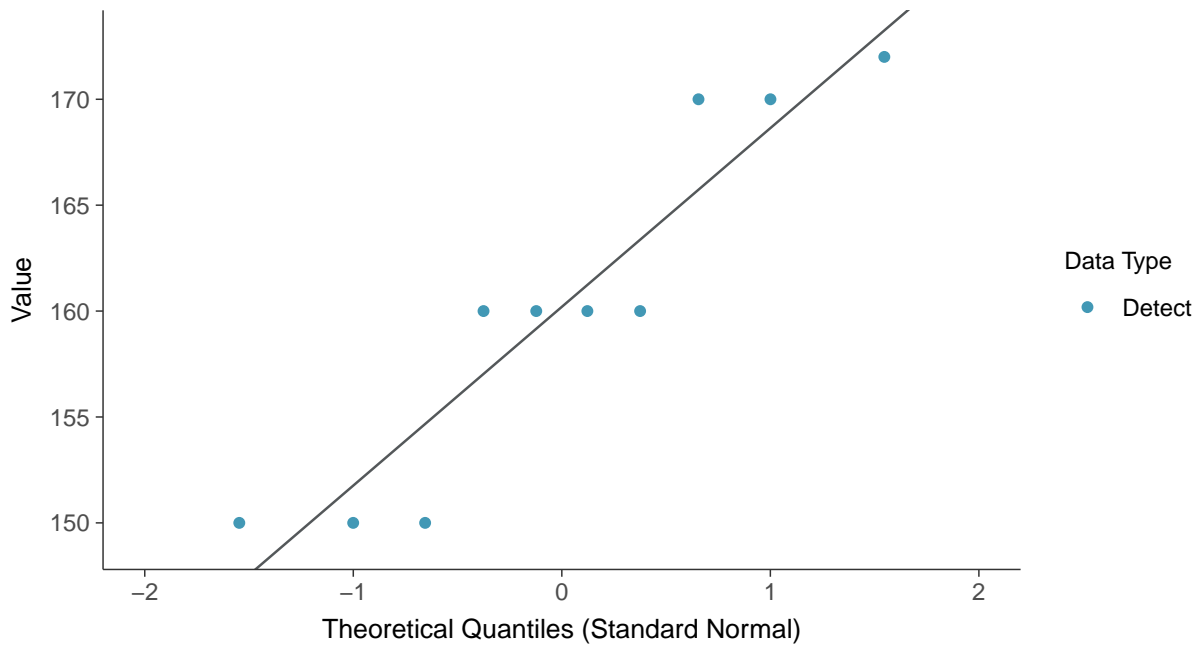
Bicarbonate, MW-7C (mg/L)





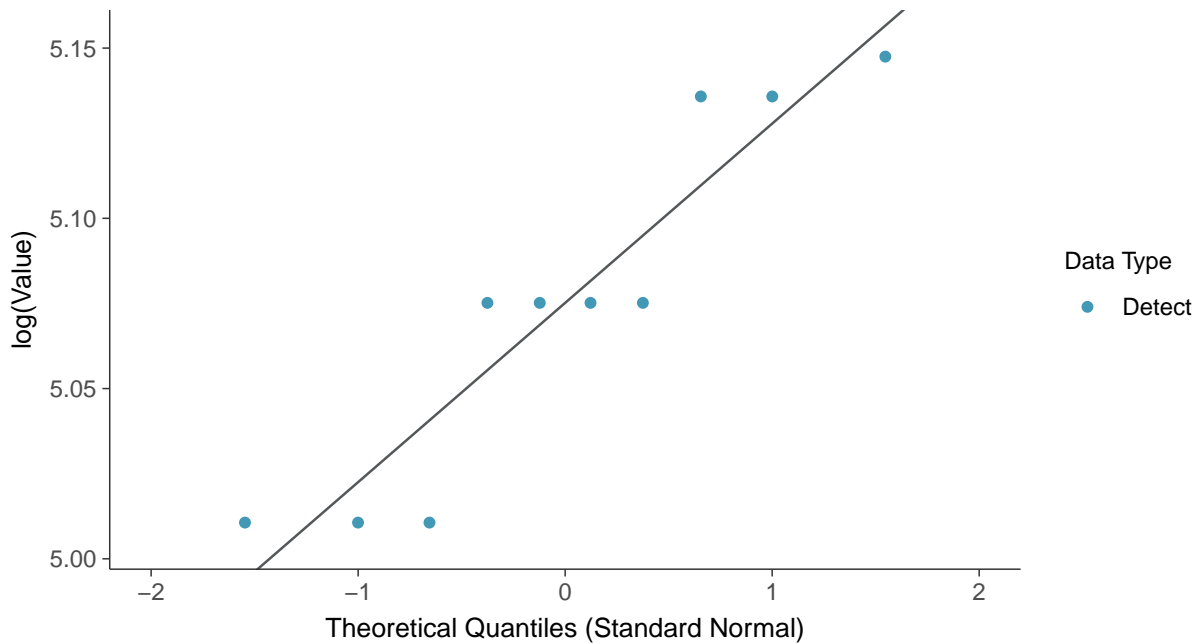
Normal Q-Q plot

Bicarbonate, MW-7C (mg/L)



Lognormal Q-Q plot

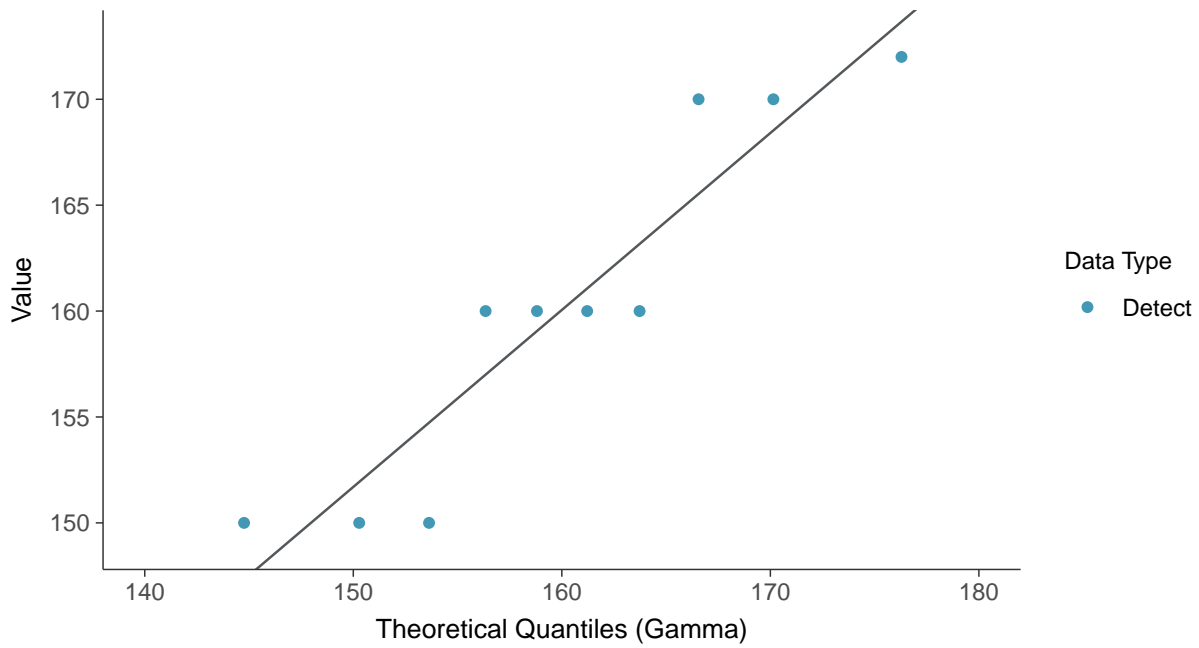
Bicarbonate, MW-7C (mg/L)





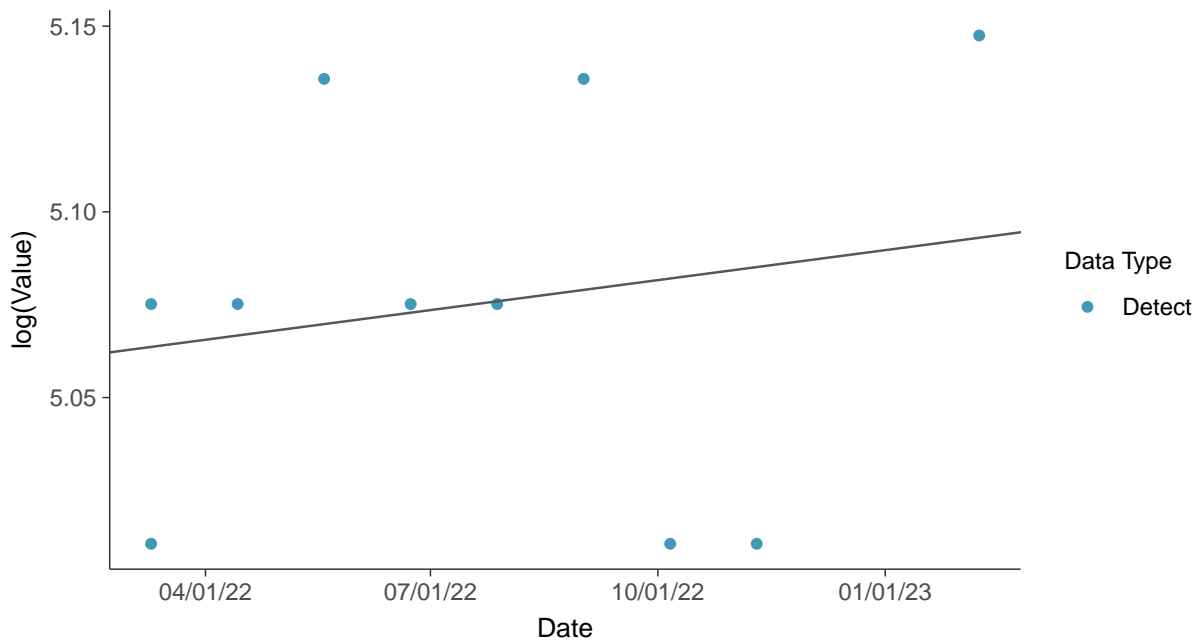
Gamma Q-Q plot

Bicarbonate, MW-7C (mg/L)



Trend Regression: Lognormal MLE

Bicarbonate, MW-7C (mg/L)



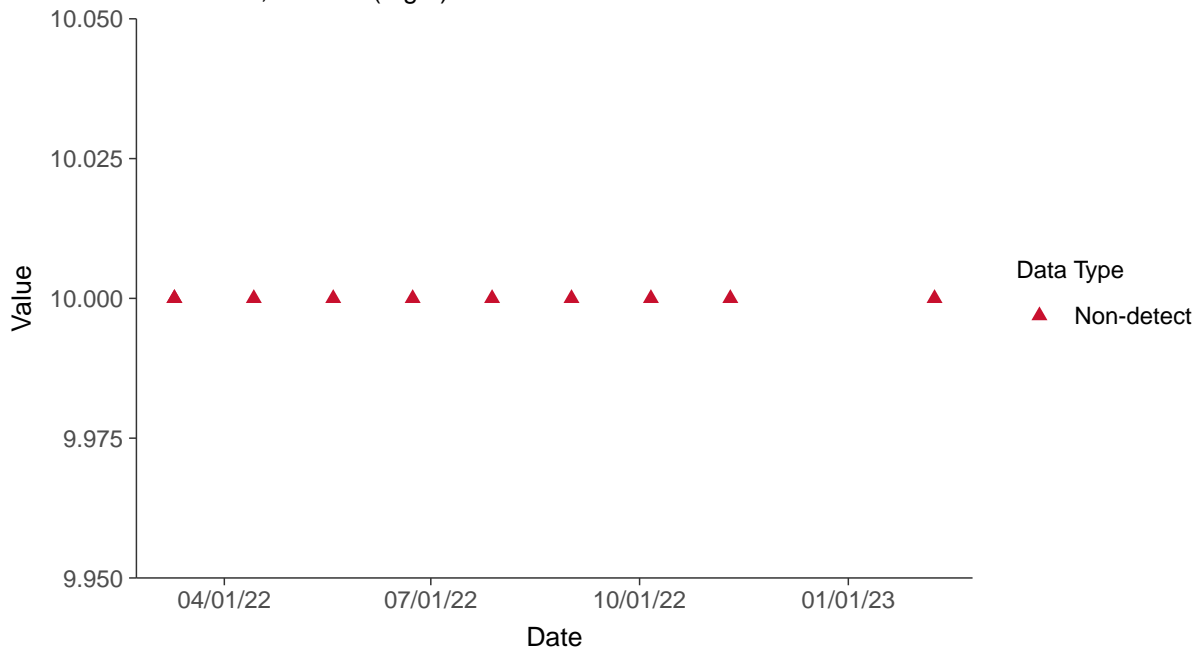


Other: Carbonate, MW-7C

ID: 3_14

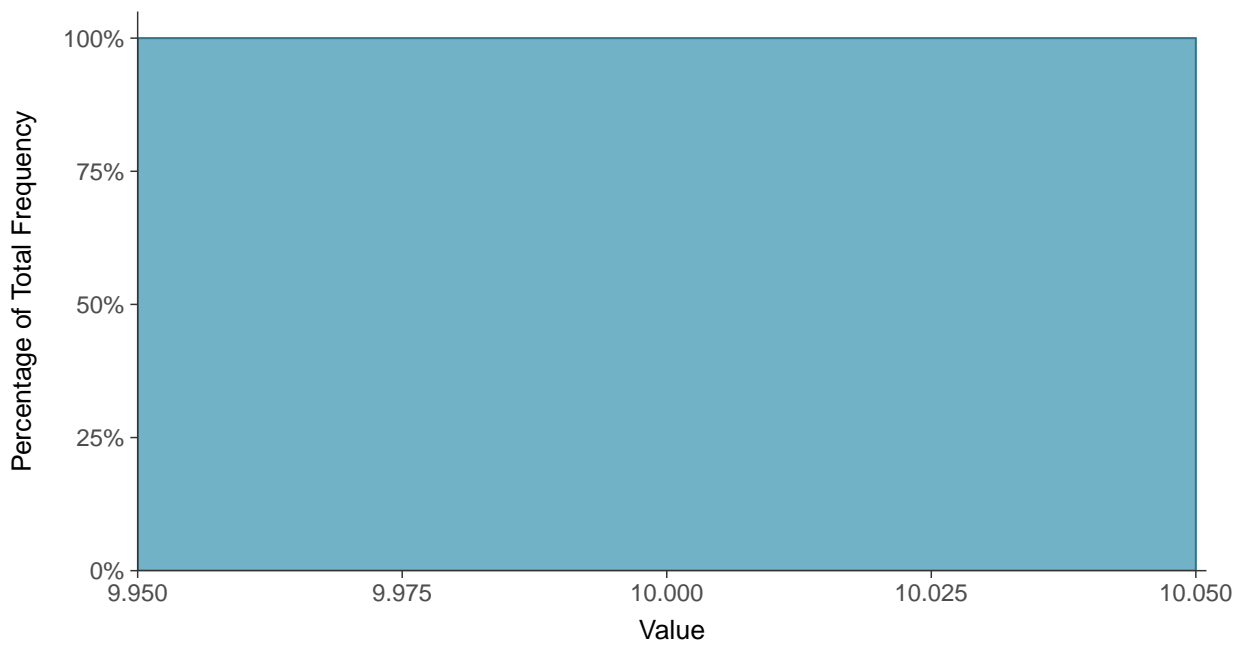
Scatter Plot

Carbonate, MW-7C (mg/L)



Histogram

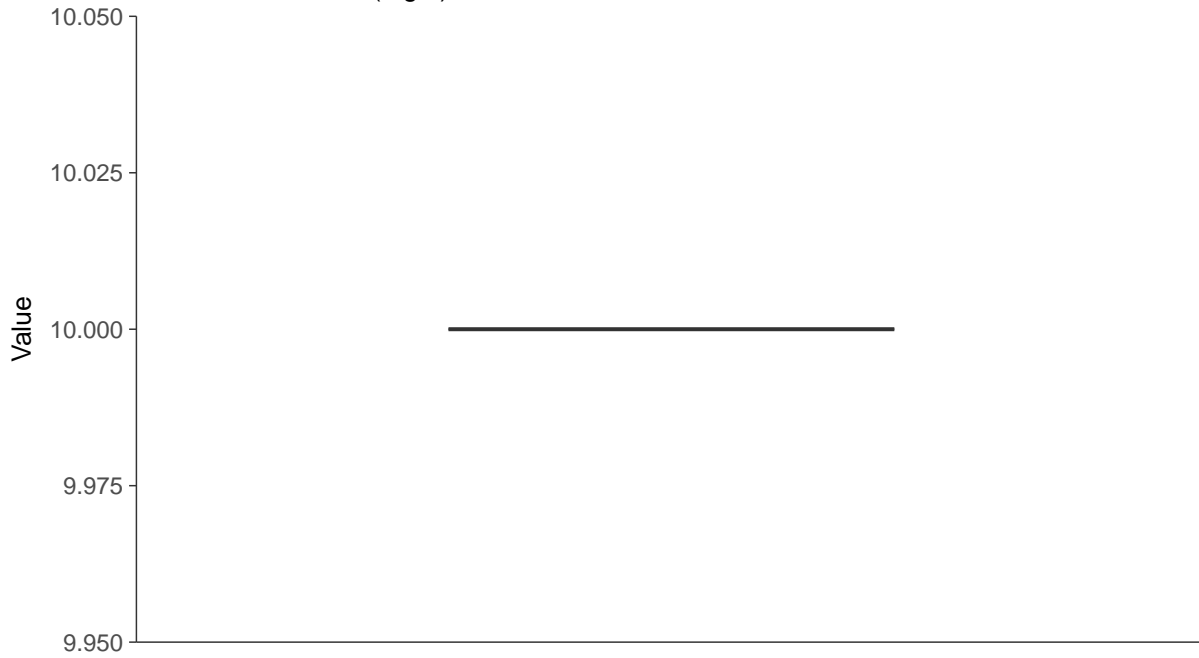
Carbonate, MW-7C (mg/L)





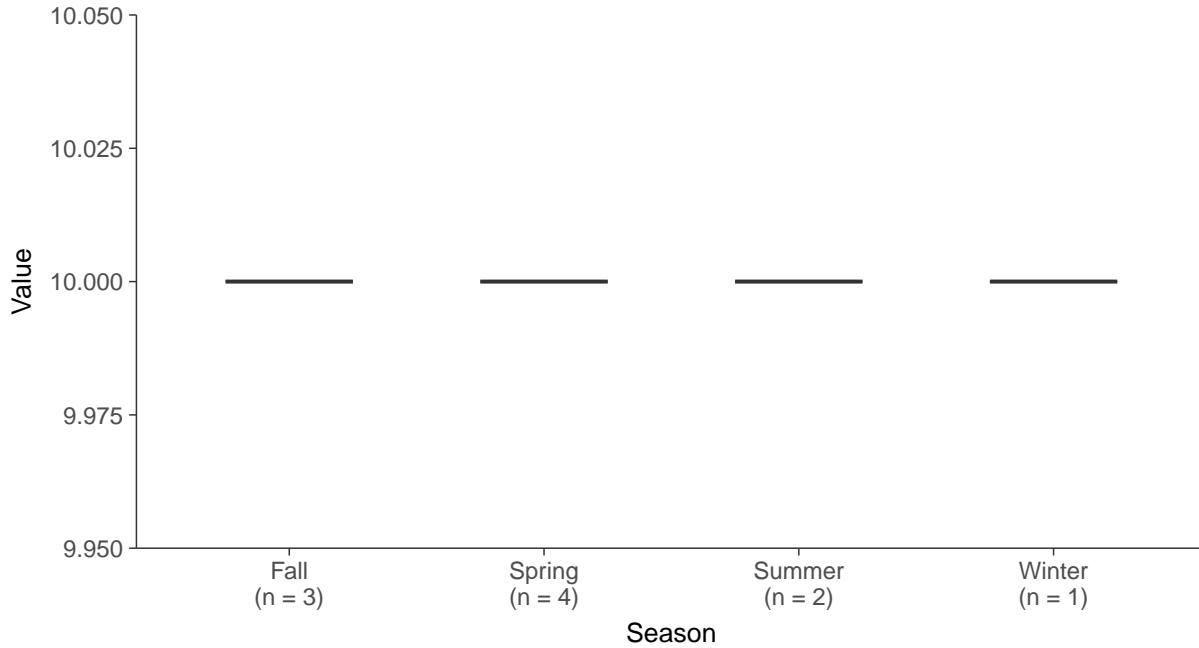
Boxplot

Carbonate, MW-7C (mg/L)



Boxplot by Season

Carbonate, MW-7C (mg/L)



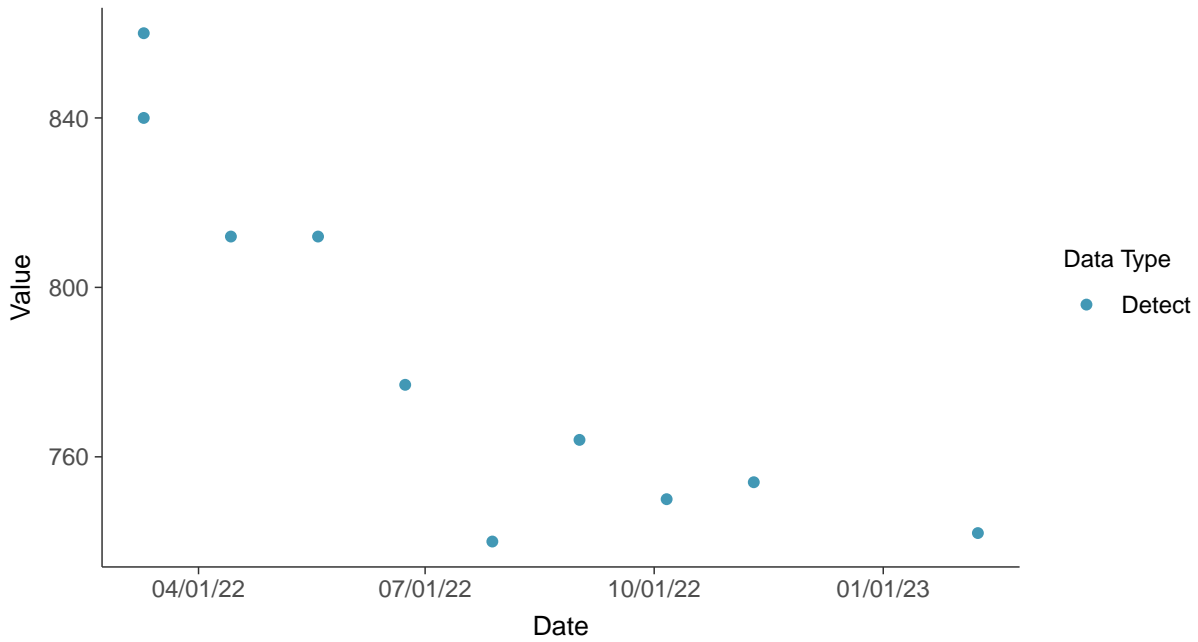


Other: Hardness, MW-7C

ID: 3_17

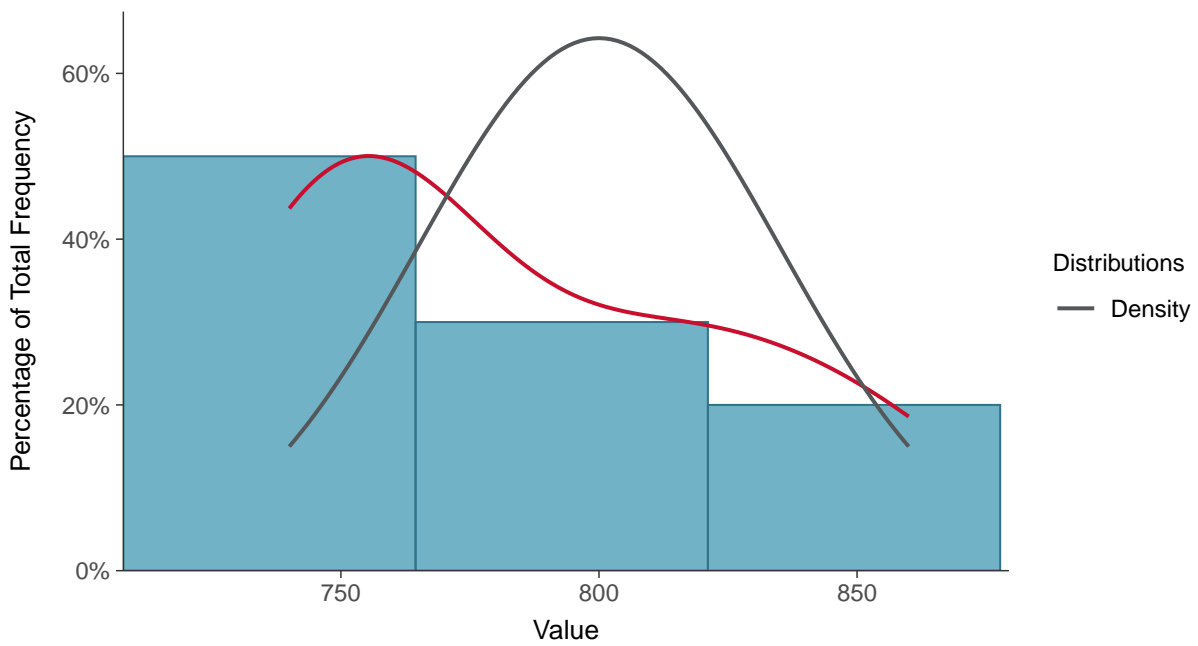
Scatter Plot

Hardness, MW-7C (mg/L)



Histogram

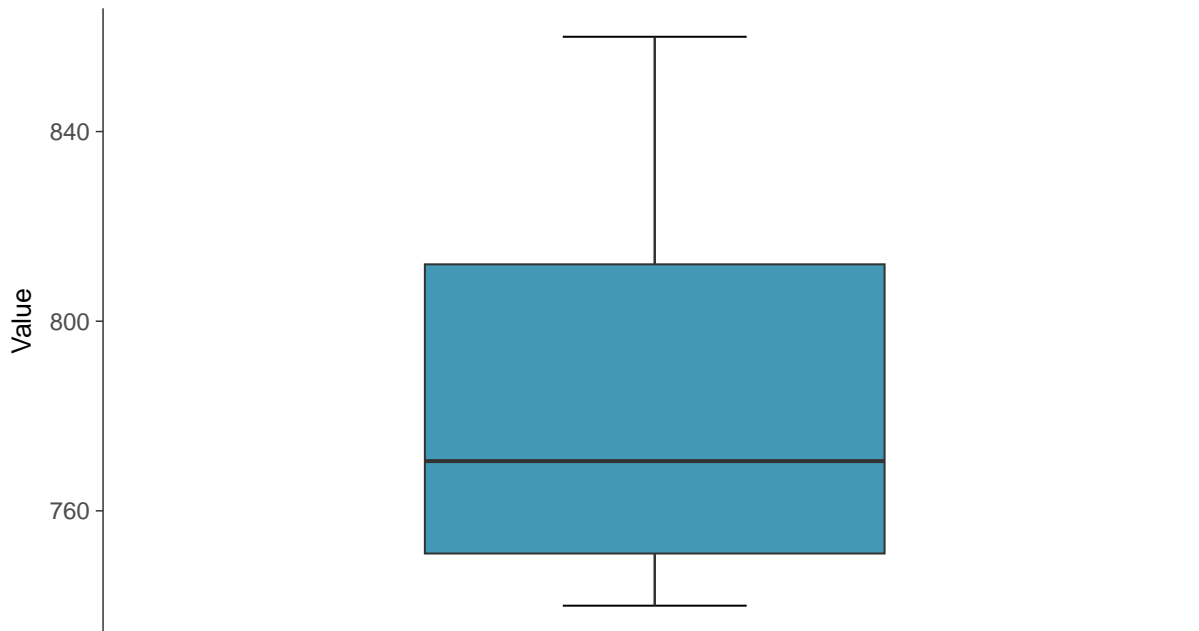
Hardness, MW-7C (mg/L)





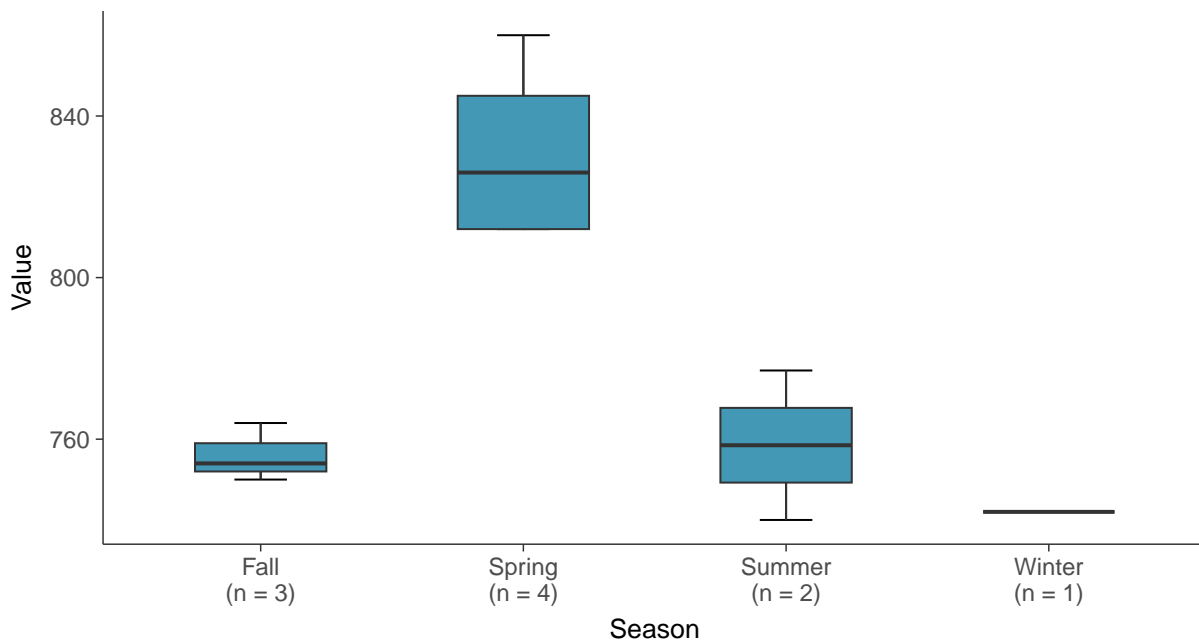
Boxplot

Hardness, MW-7C (mg/L)



Boxplot by Season

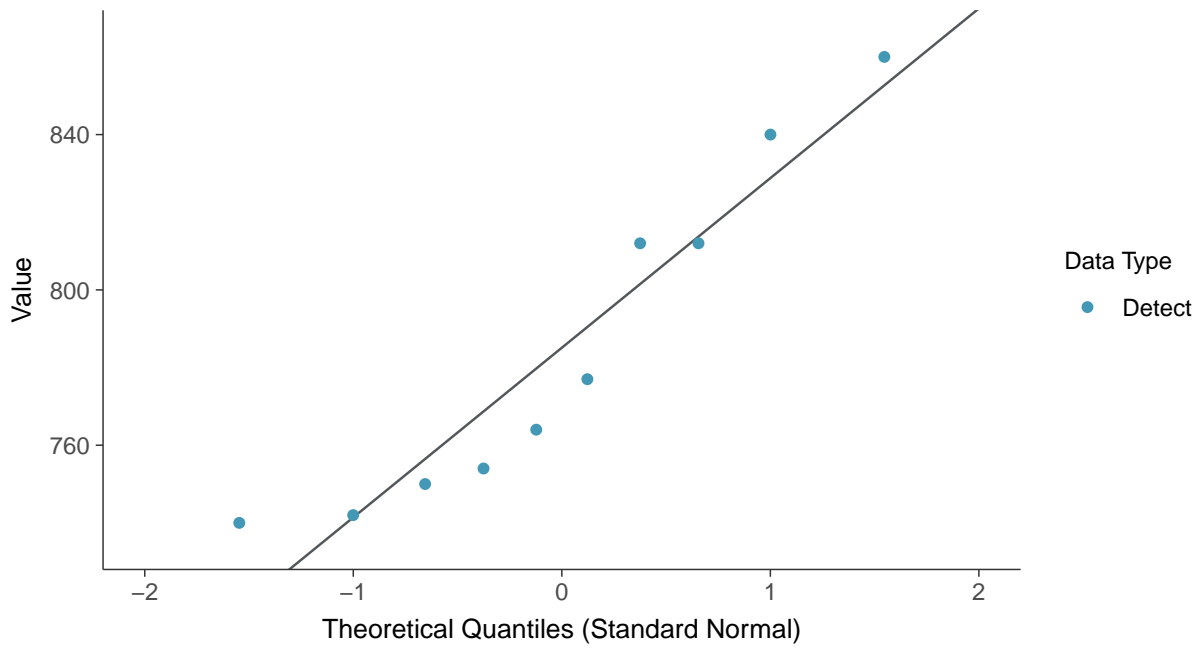
Hardness, MW-7C (mg/L)





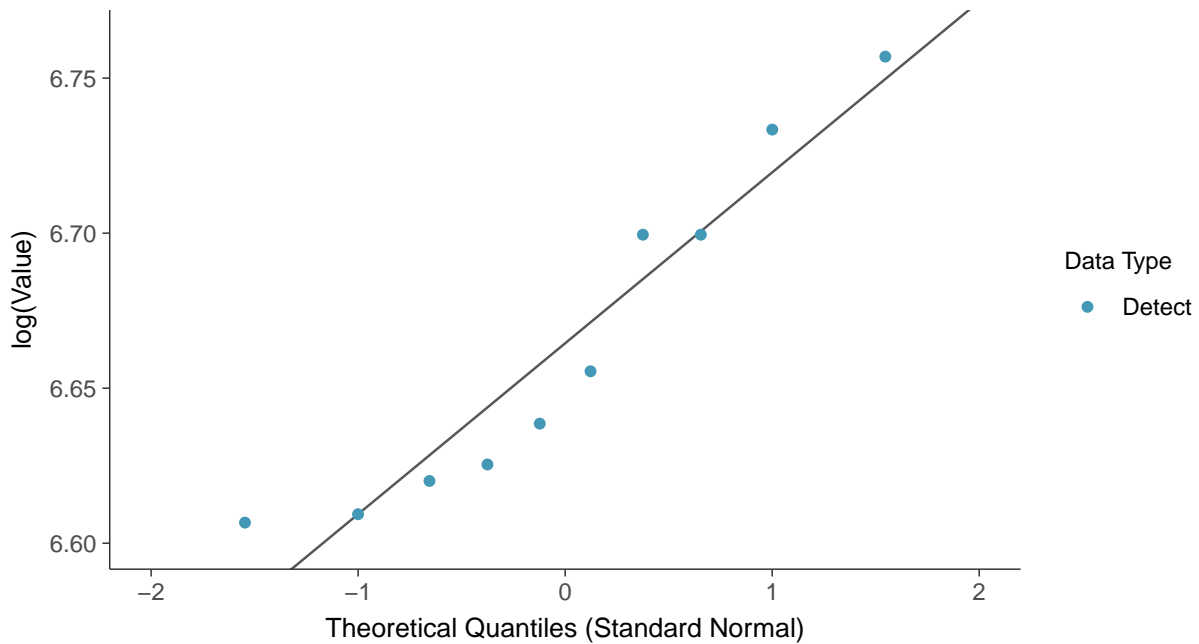
Normal Q-Q plot

Hardness, MW-7C (mg/L)



Lognormal Q-Q plot

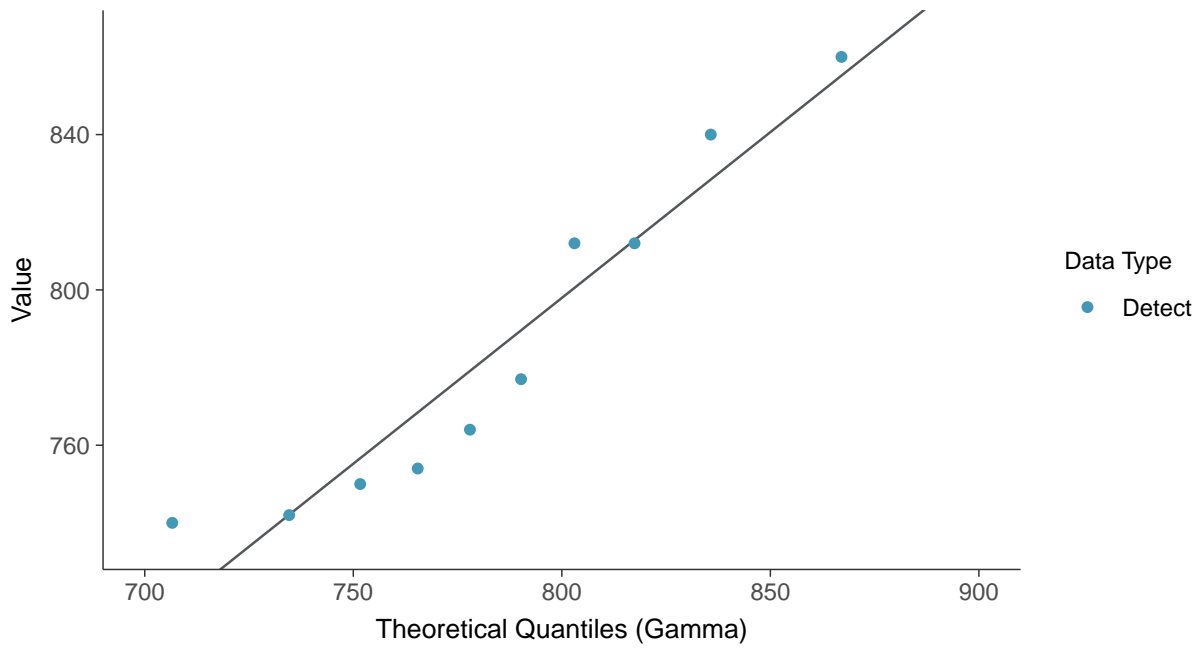
Hardness, MW-7C (mg/L)





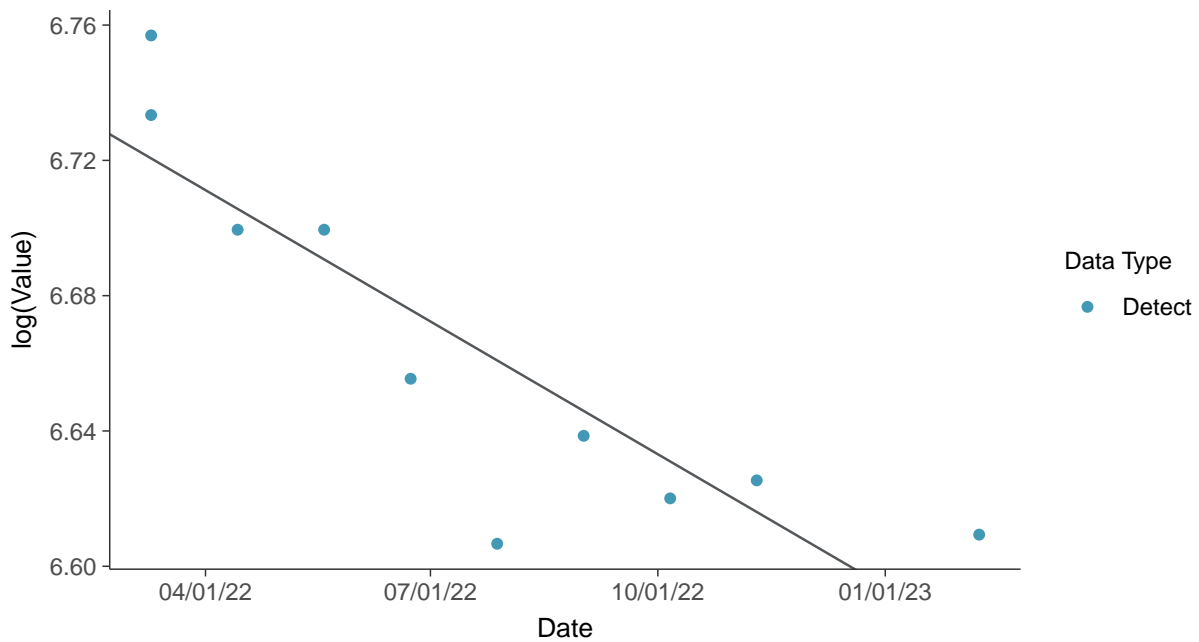
Gamma Q-Q plot

Hardness, MW-7C (mg/L)



Trend Regression: Lognormal MLE

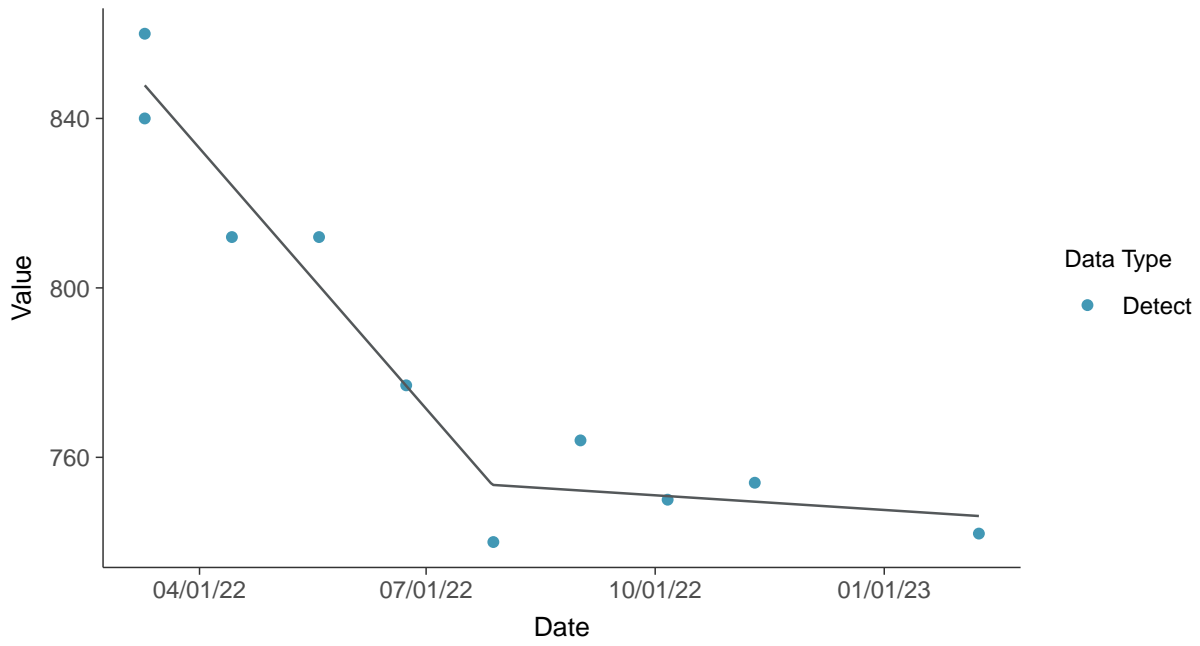
Hardness, MW-7C (mg/L)





Trend Regression: Piecewise Linear-Linear

Hardness, MW-7C (mg/L)



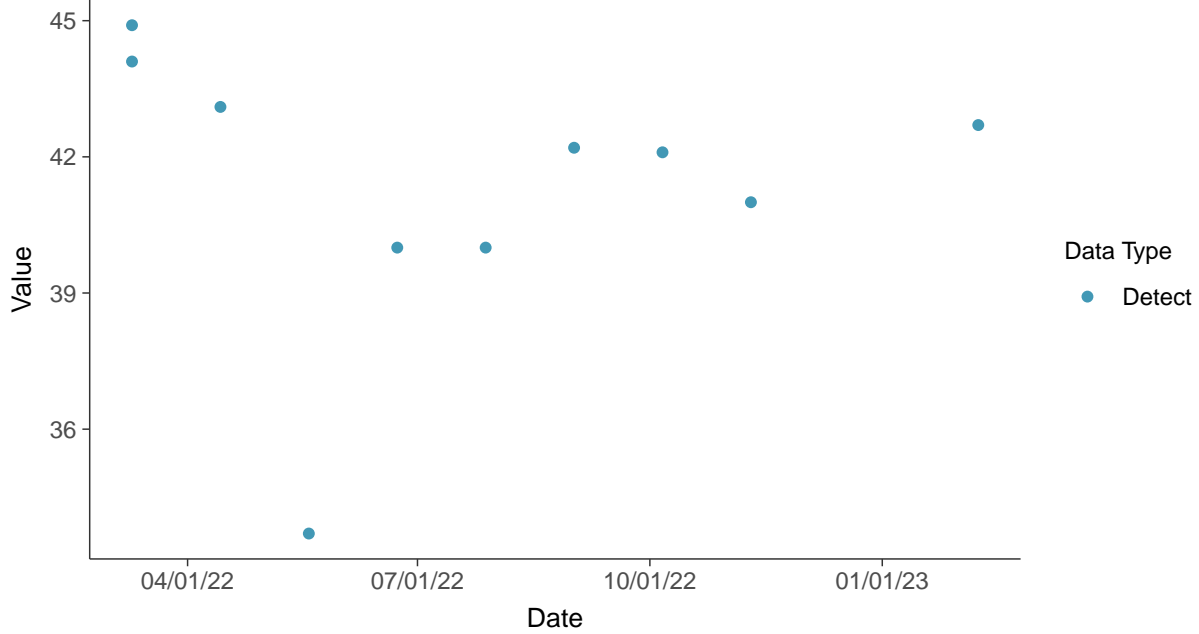


Other: Magnesium, MW-7C

ID: 3_20

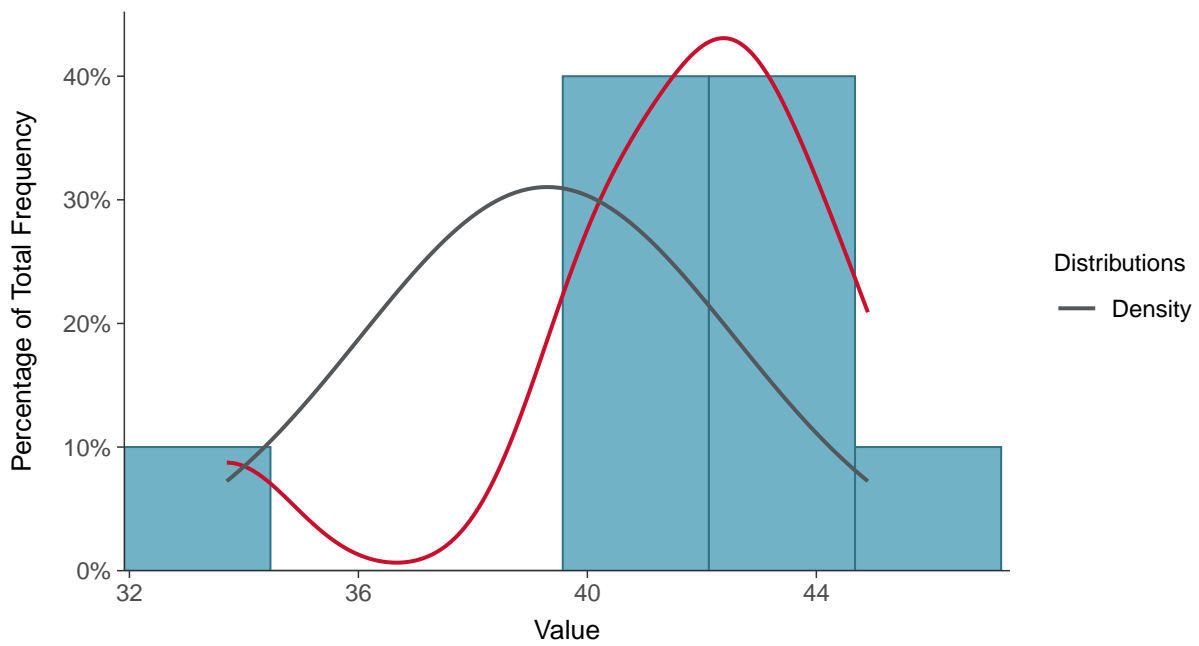
Scatter Plot

Magnesium, MW-7C (mg/L)



Histogram

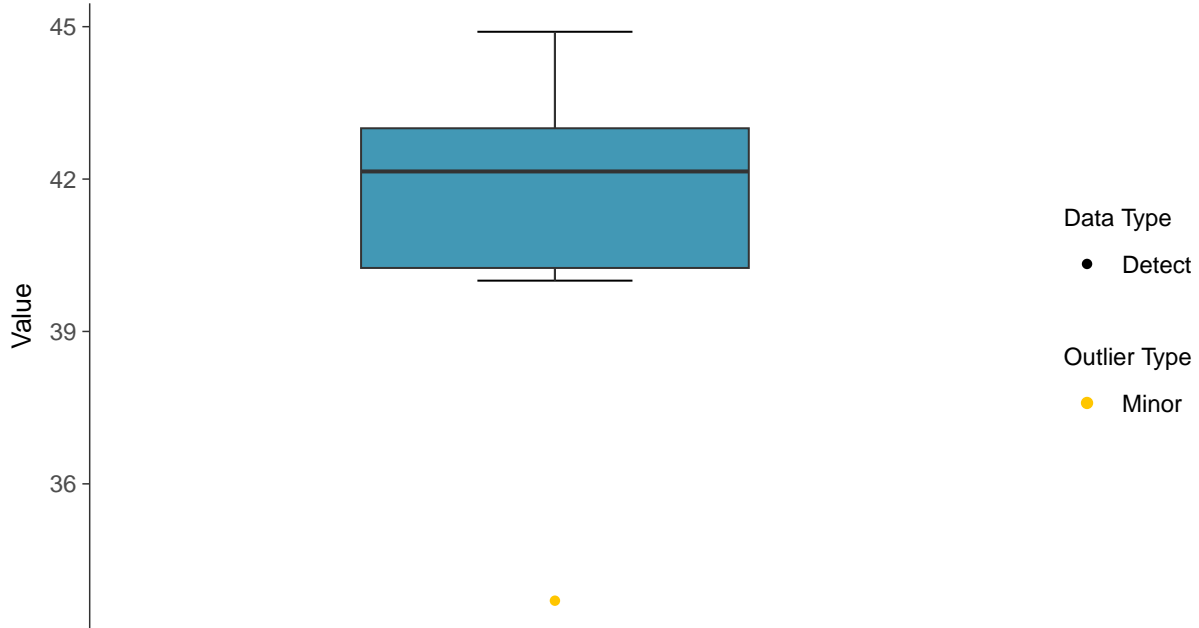
Magnesium, MW-7C (mg/L)





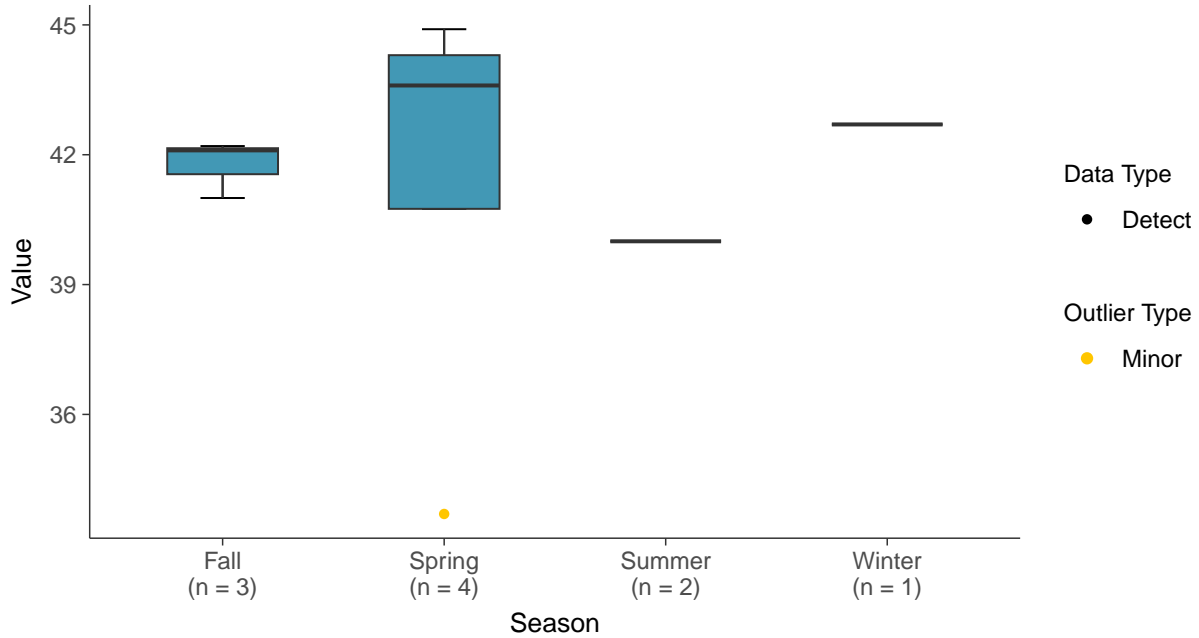
Boxplot

Magnesium, MW-7C (mg/L)



Boxplot by Season

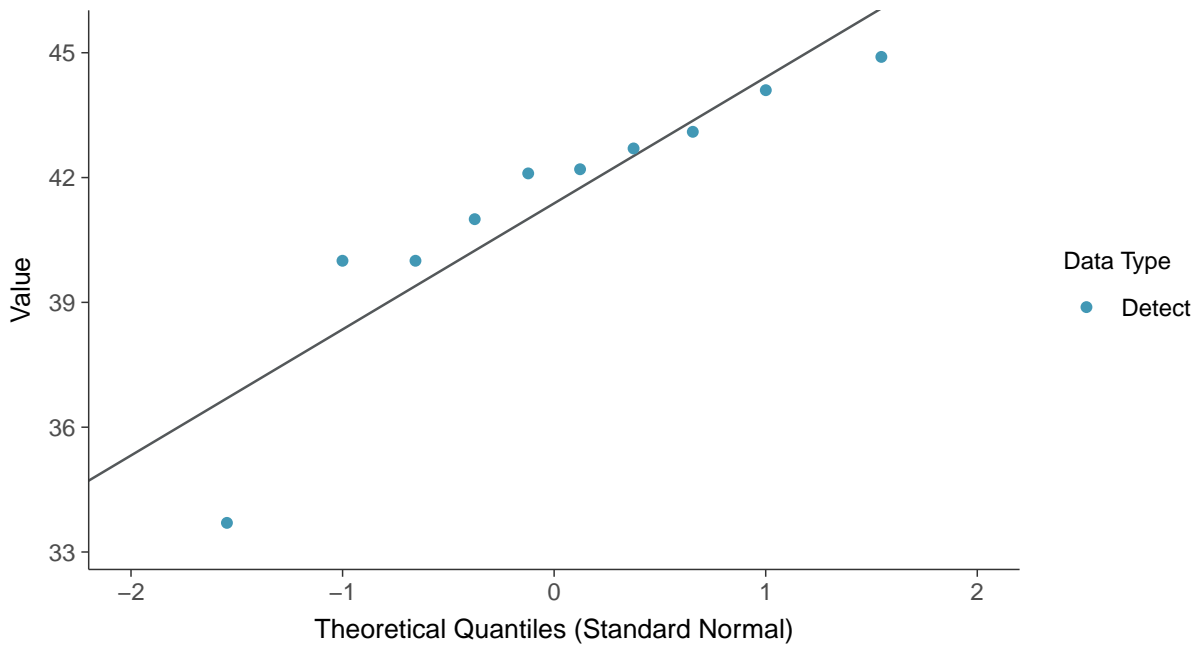
Magnesium, MW-7C (mg/L)





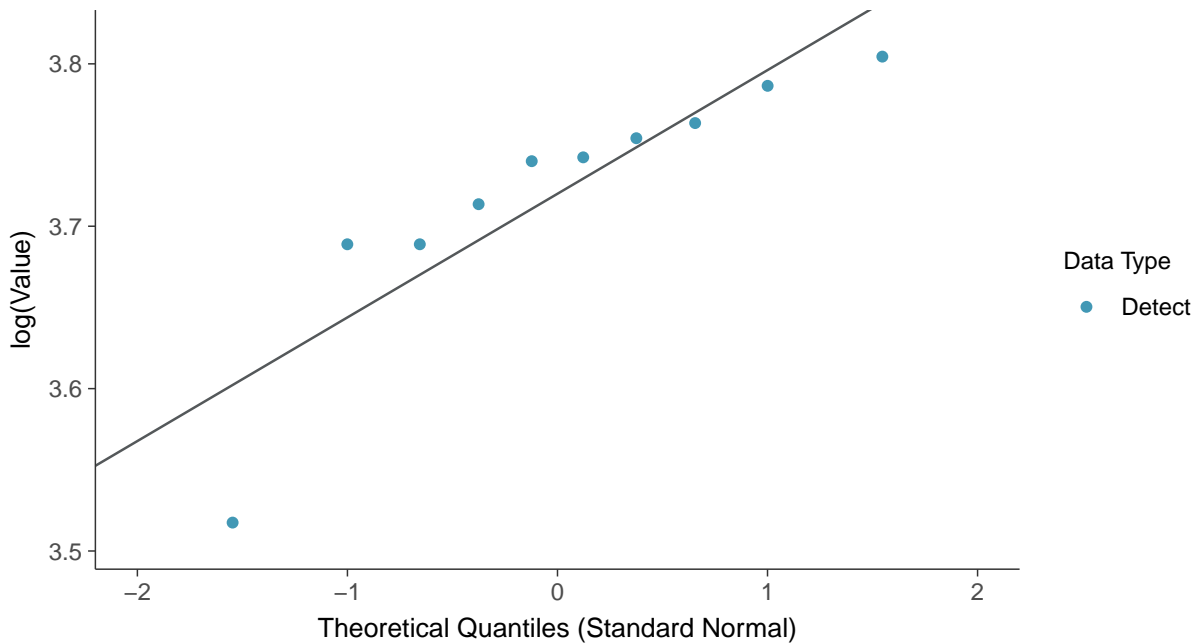
Normal Q-Q plot

Magnesium, MW-7C (mg/L)



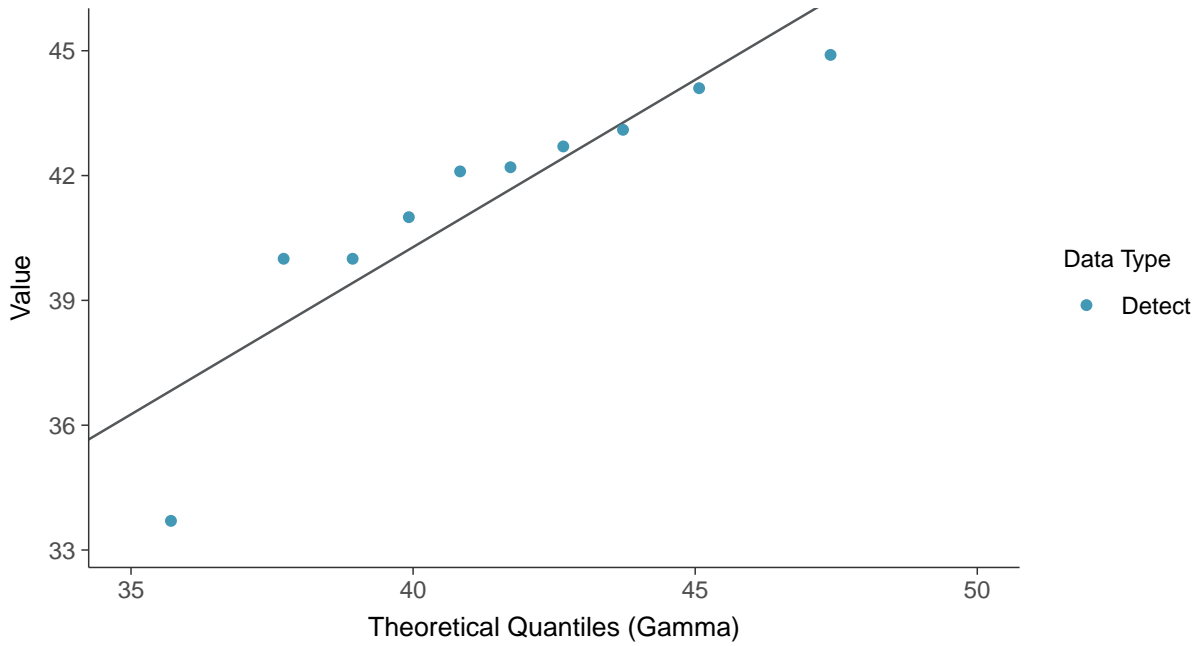
Lognormal Q-Q plot

Magnesium, MW-7C (mg/L)

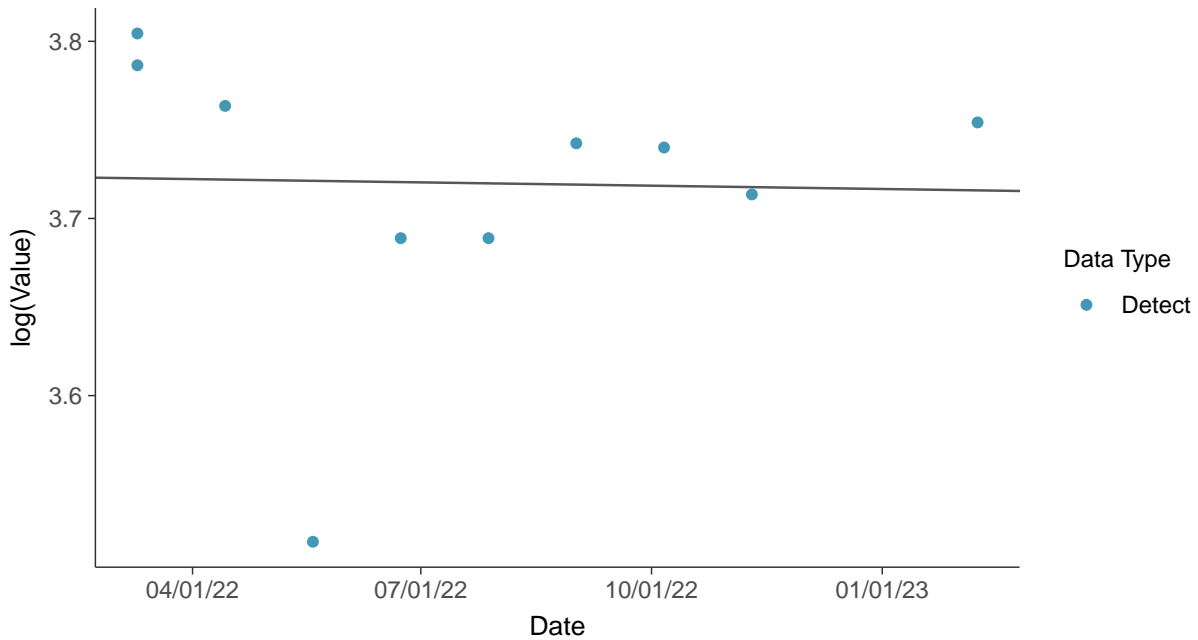




Gamma Q-Q plot
Magnesium, MW-7C (mg/L)



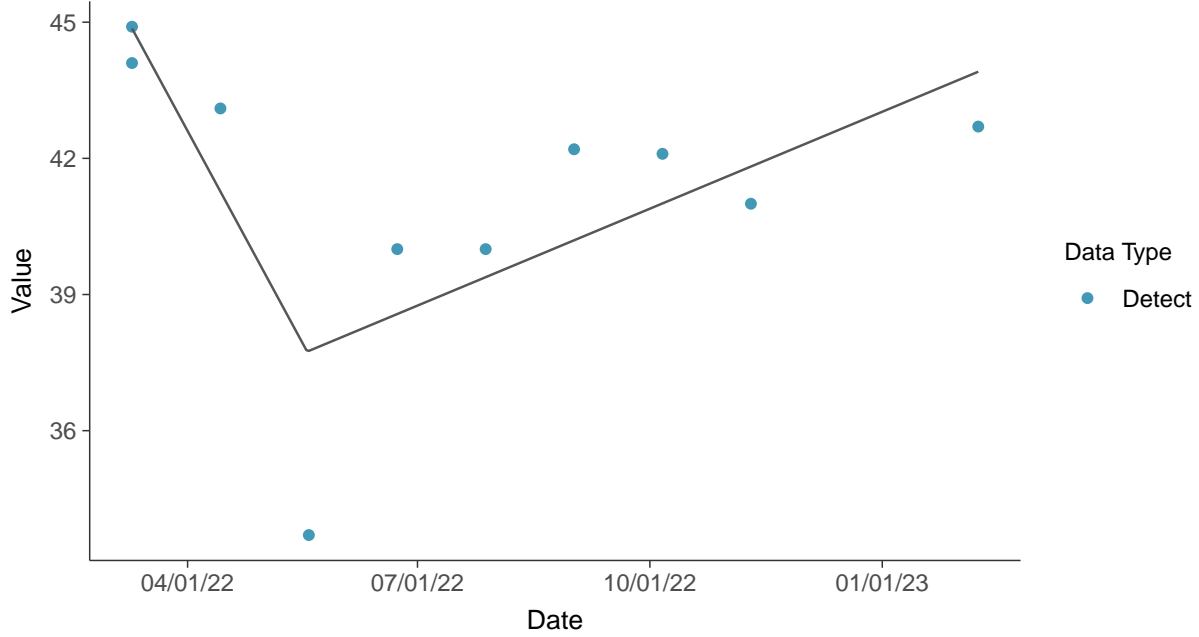
Trend Regression: Lognormal MLE
Magnesium, MW-7C (mg/L)





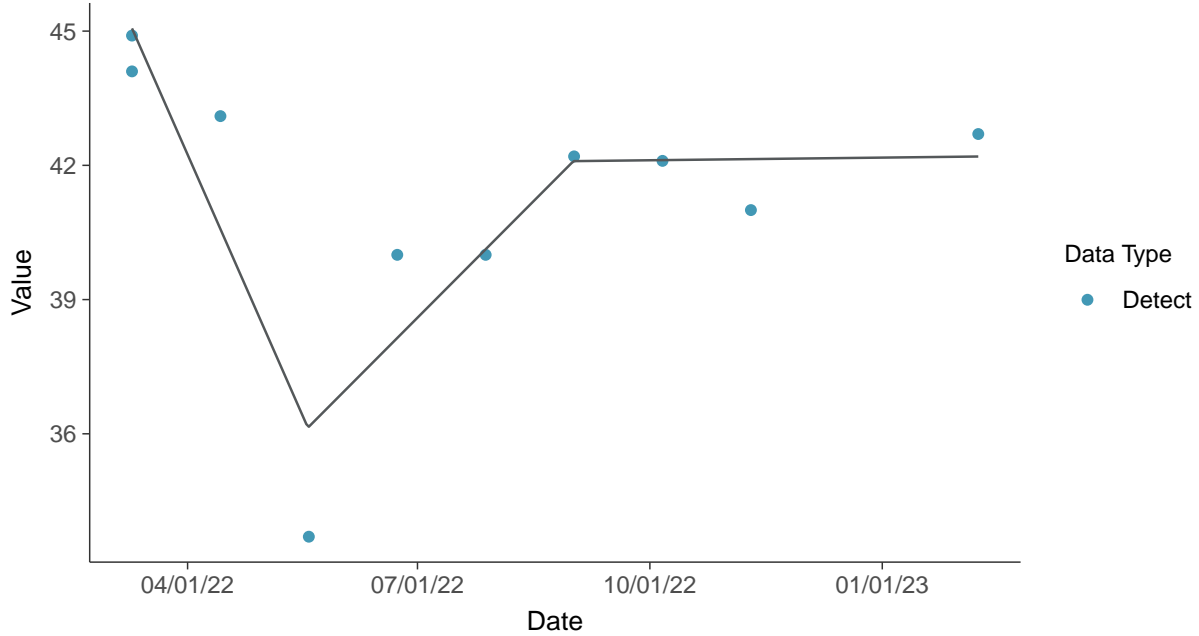
Trend Regression: Piecewise Linear-Linear

Magnesium, MW-7C (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Magnesium, MW-7C (mg/L)



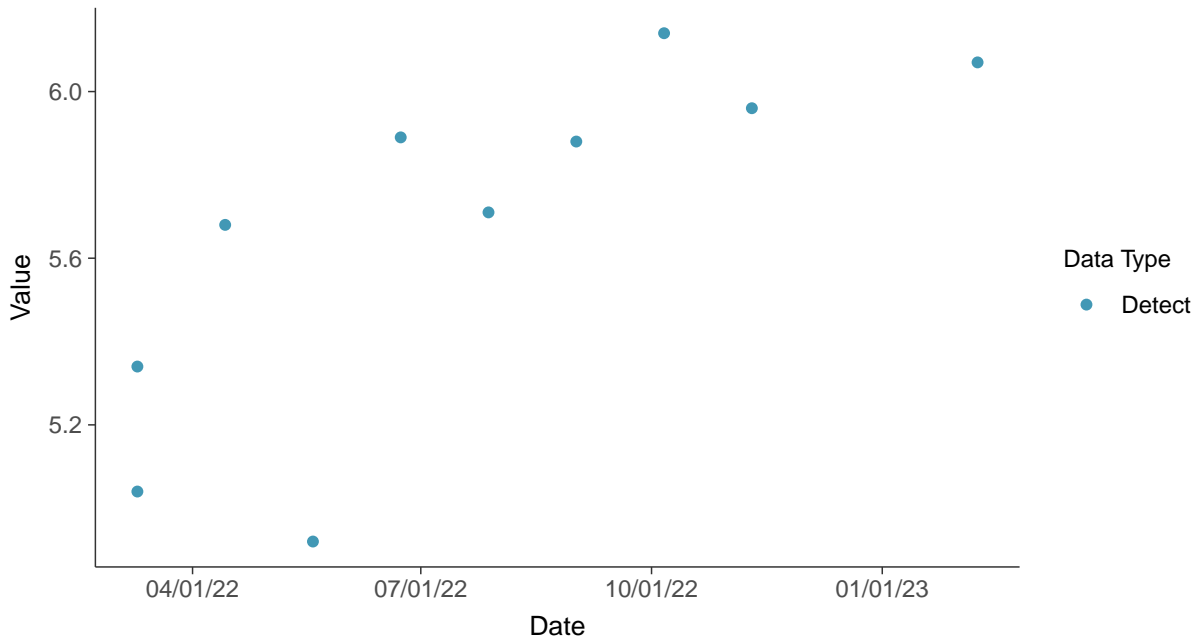


Other: Potassium, MW-7C

ID: 3_23

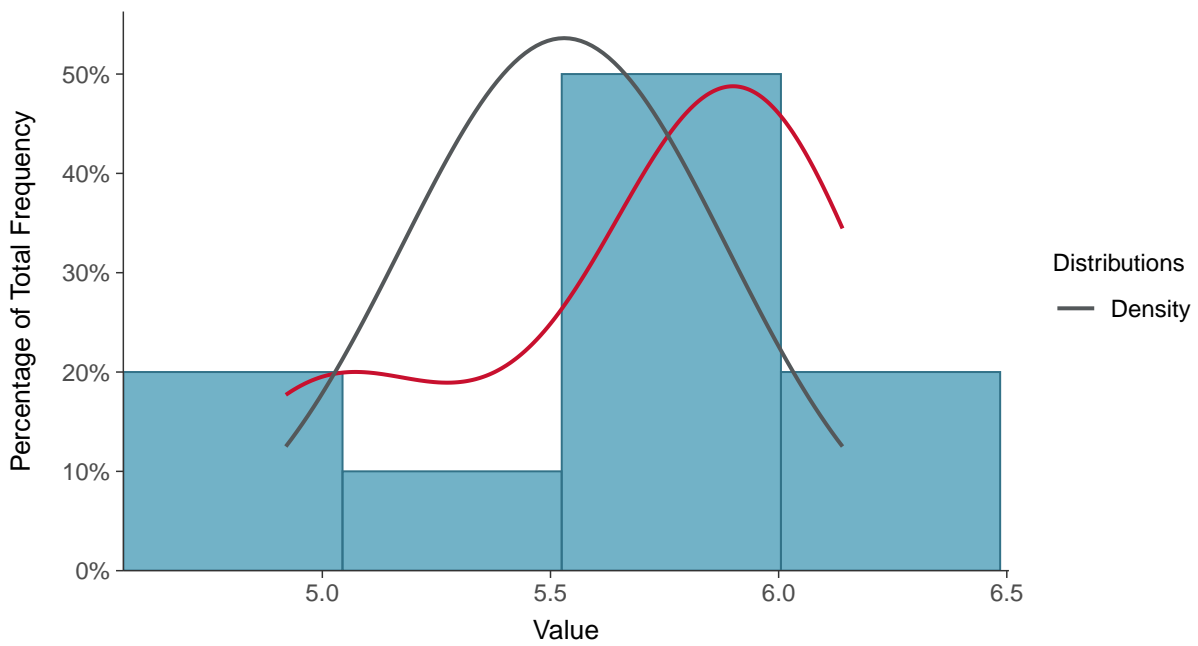
Scatter Plot

Potassium, MW-7C (mg/L)



Histogram

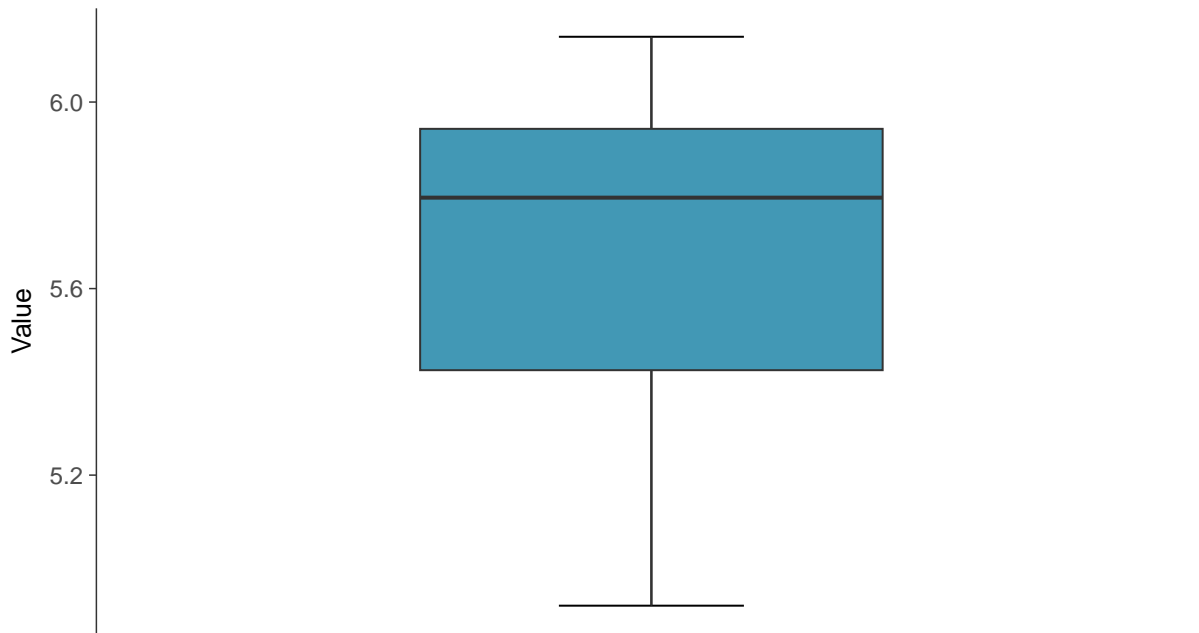
Potassium, MW-7C (mg/L)





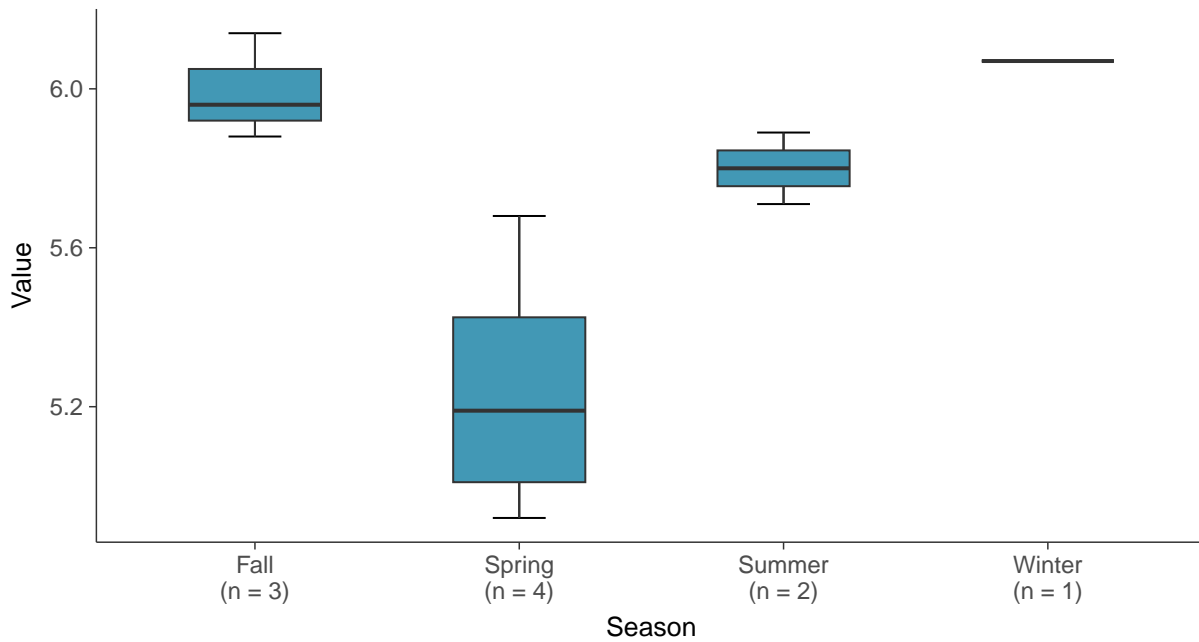
Boxplot

Potassium, MW-7C (mg/L)



Boxplot by Season

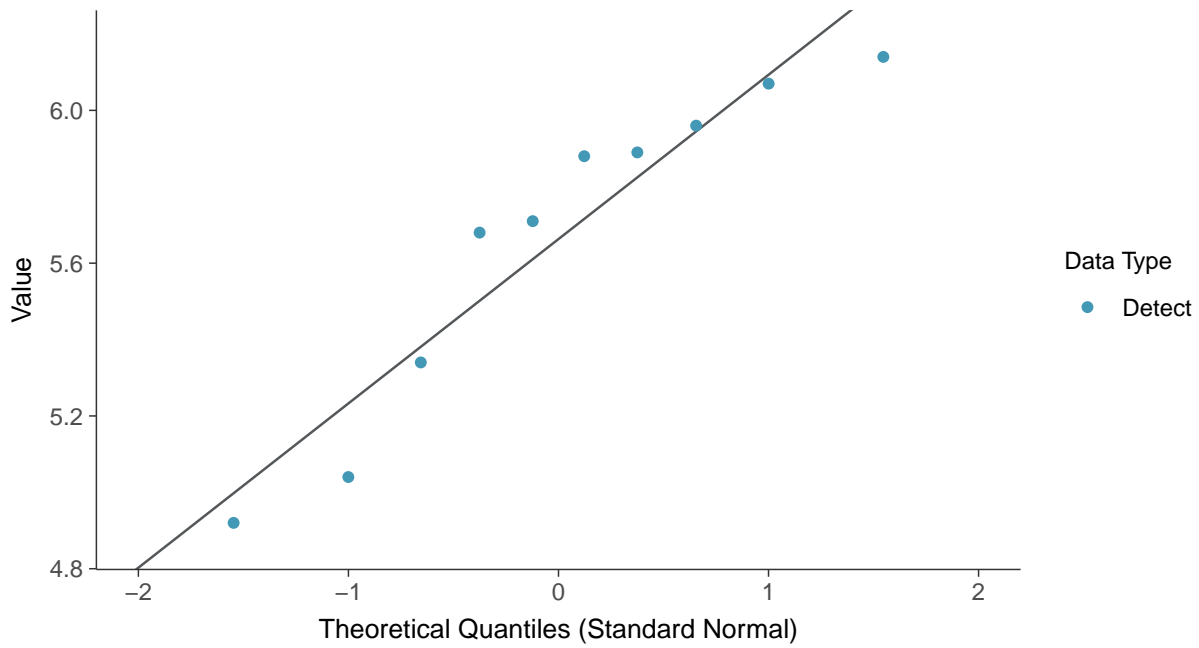
Potassium, MW-7C (mg/L)





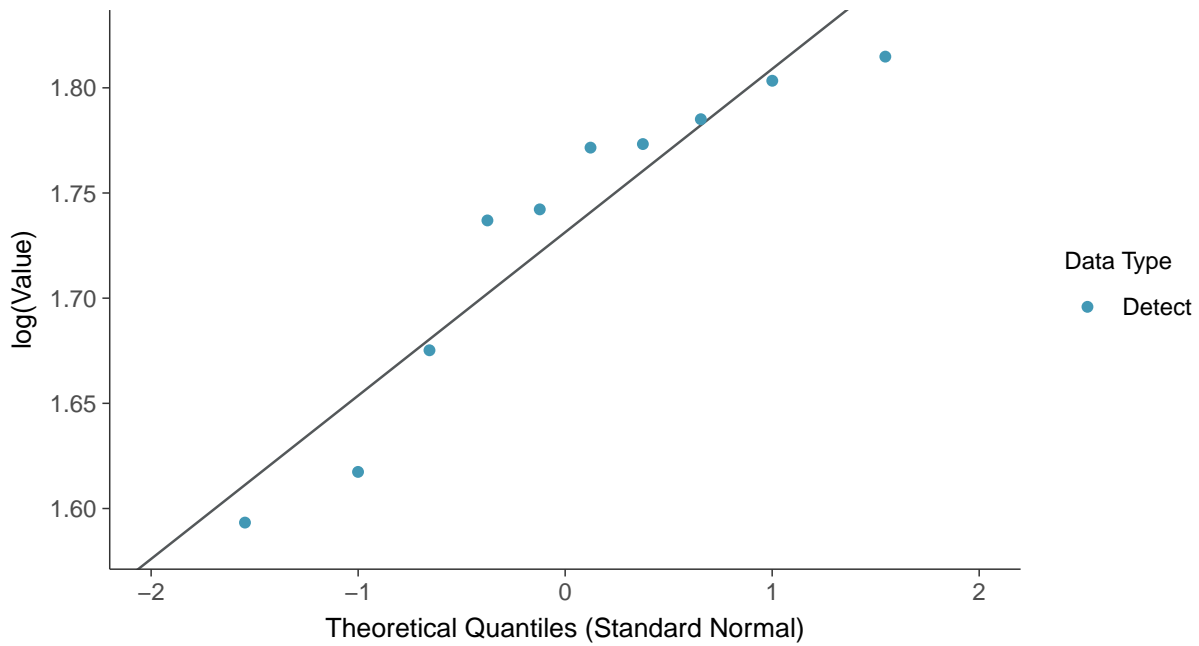
Normal Q-Q plot

Potassium, MW-7C (mg/L)



Lognormal Q-Q plot

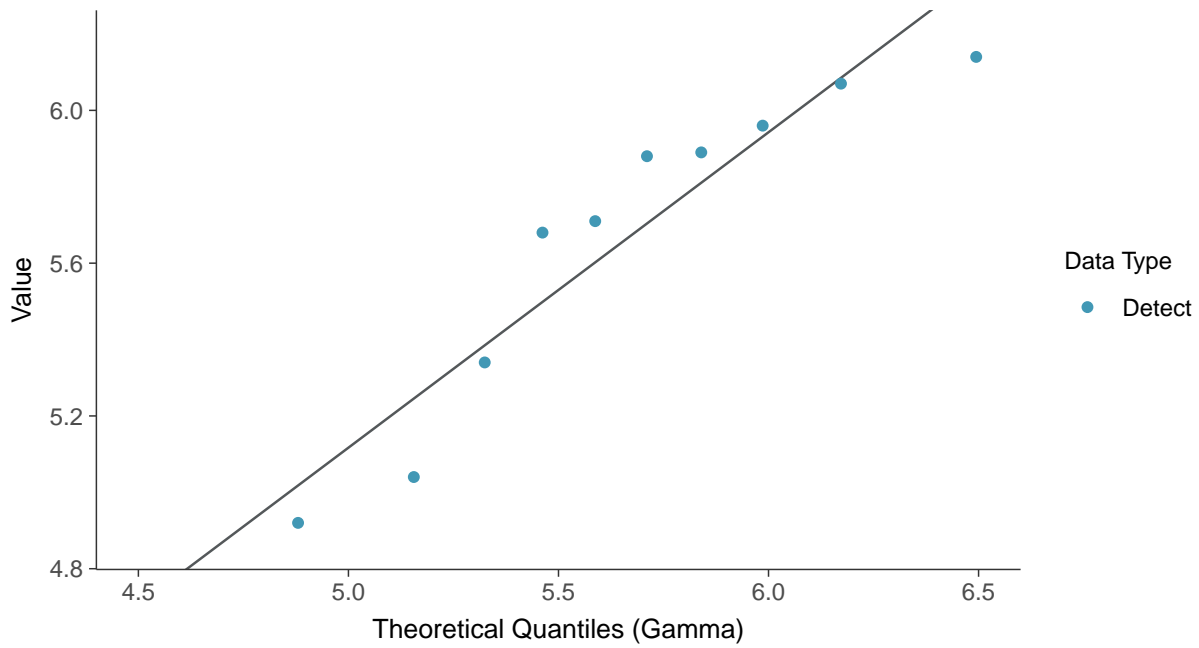
Potassium, MW-7C (mg/L)





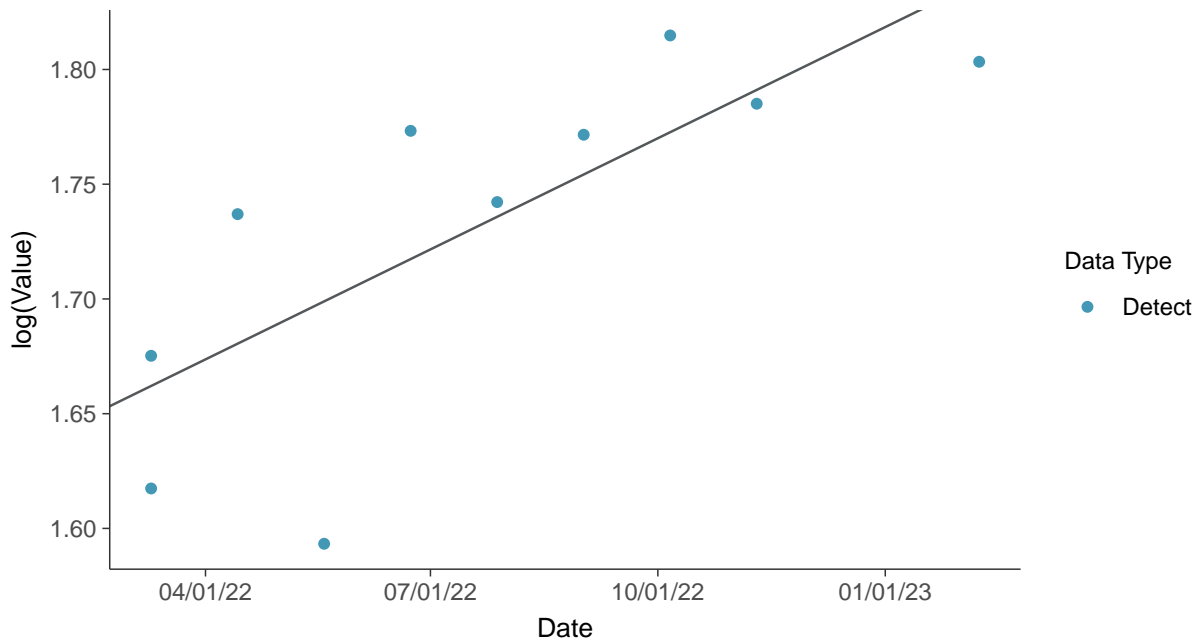
Gamma Q-Q plot

Potassium, MW-7C (mg/L)



Trend Regression: Lognormal MLE

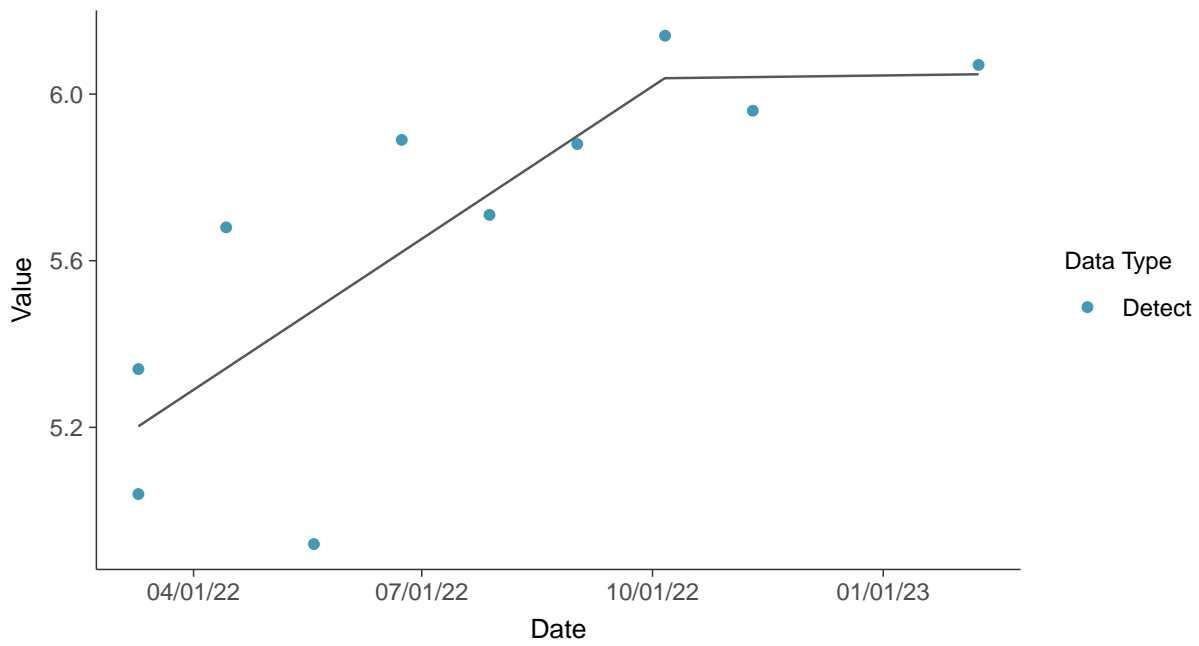
Potassium, MW-7C (mg/L)





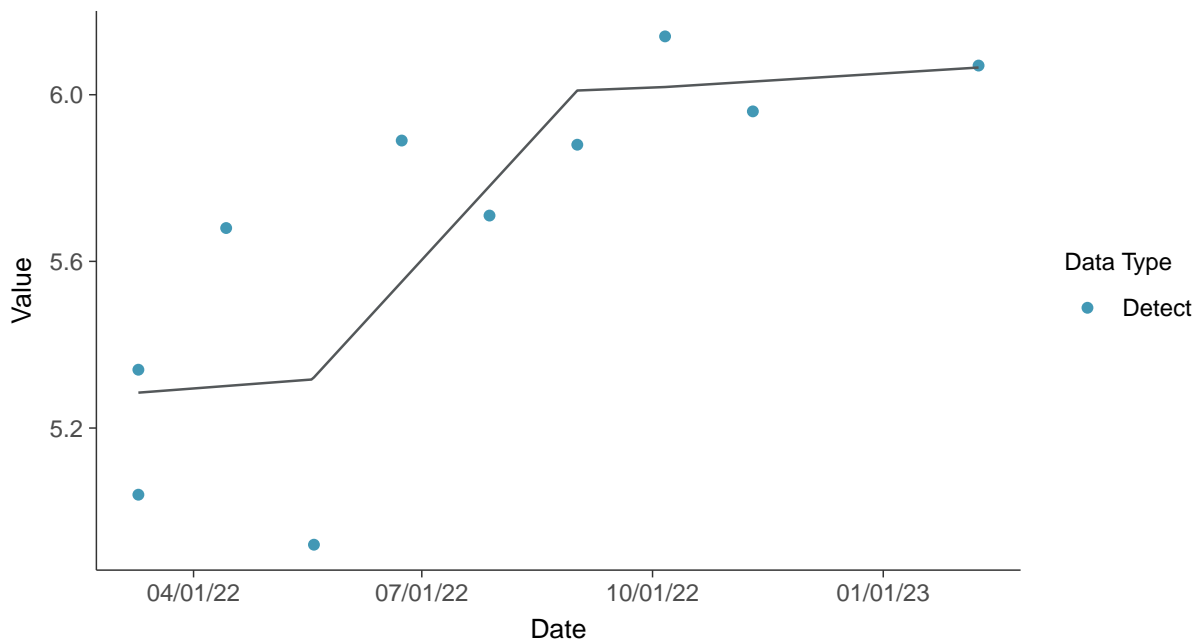
Trend Regression: Piecewise Linear-Linear

Potassium, MW-7C (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Potassium, MW-7C (mg/L)



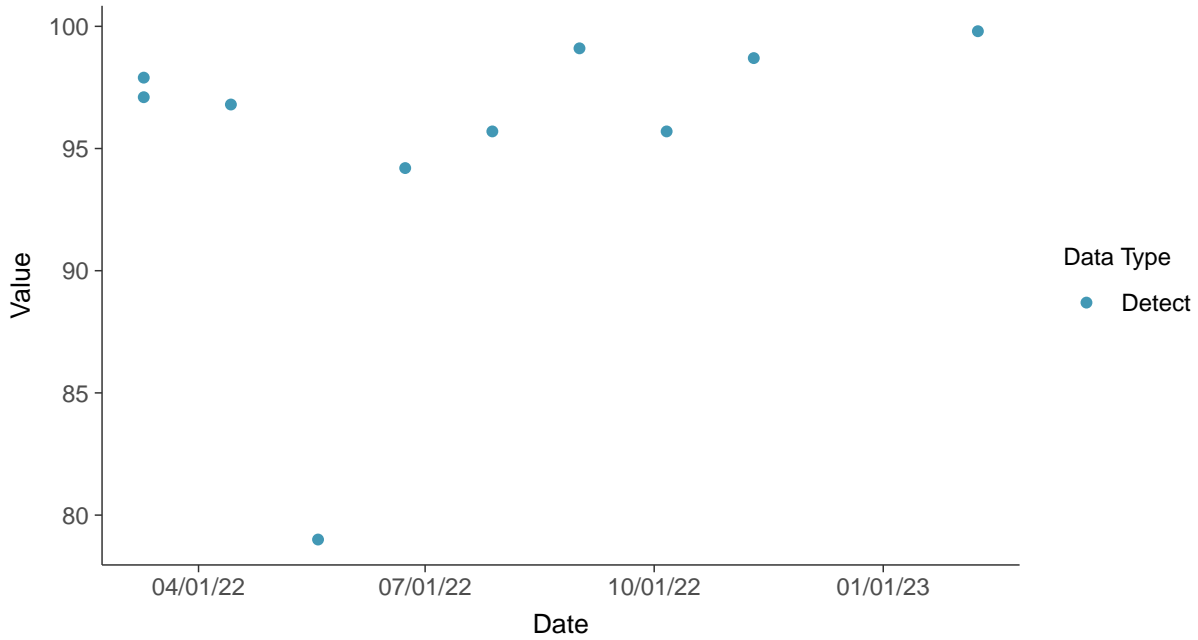


Other: Sodium, MW-7C

ID: 3_28

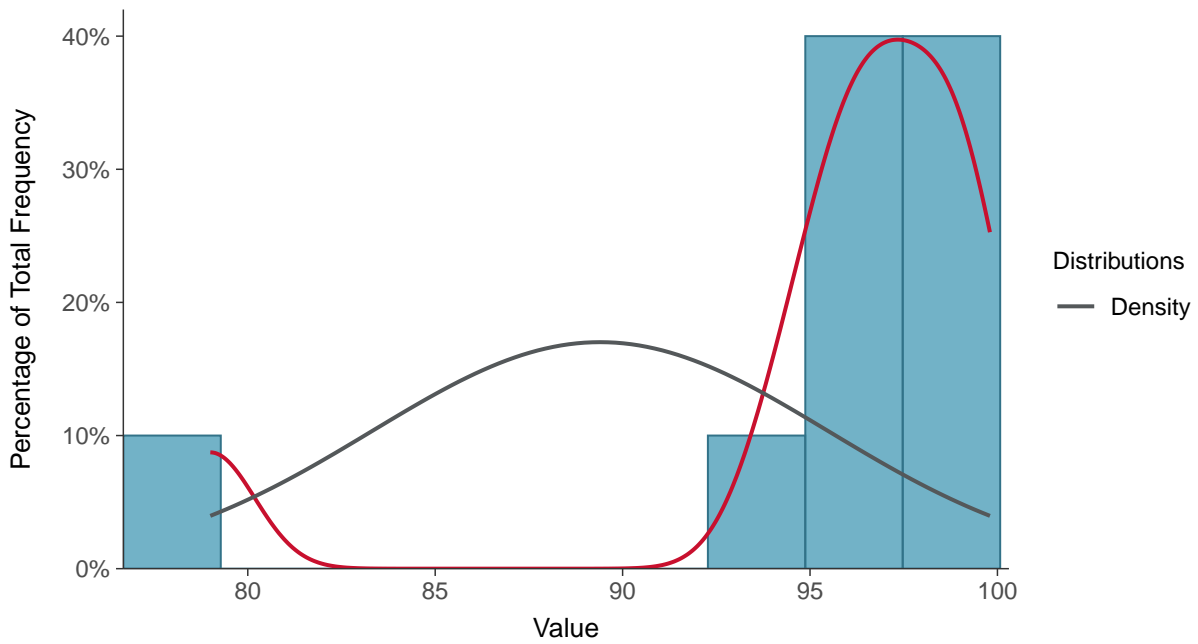
Scatter Plot

Sodium, MW-7C (mg/L)



Histogram

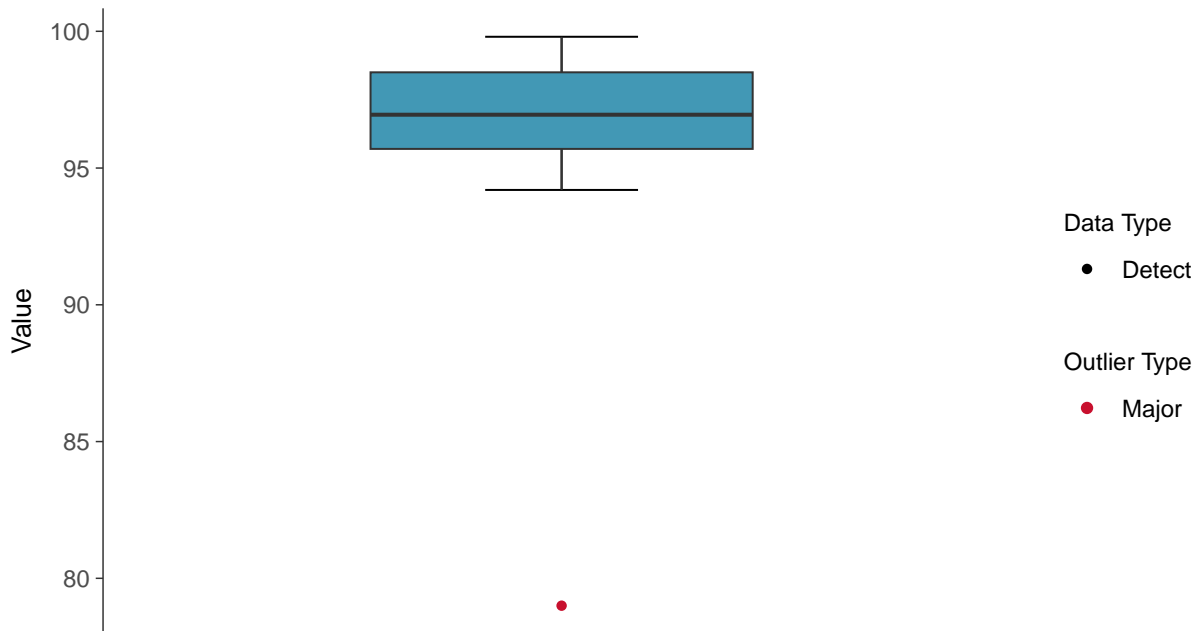
Sodium, MW-7C (mg/L)





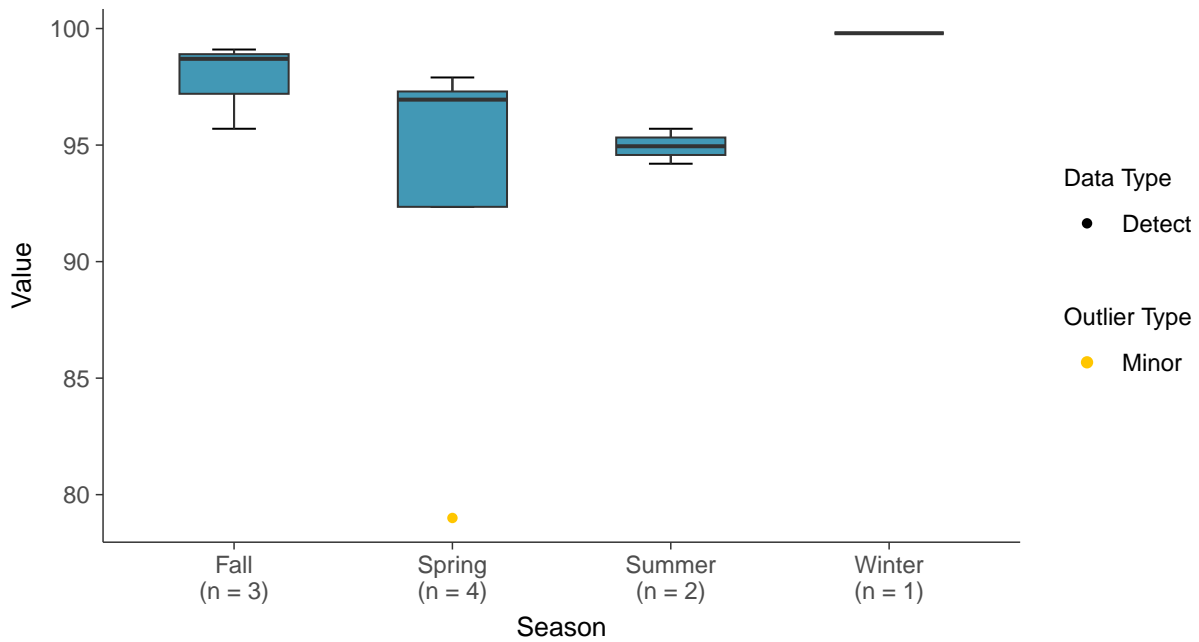
Boxplot

Sodium, MW-7C (mg/L)



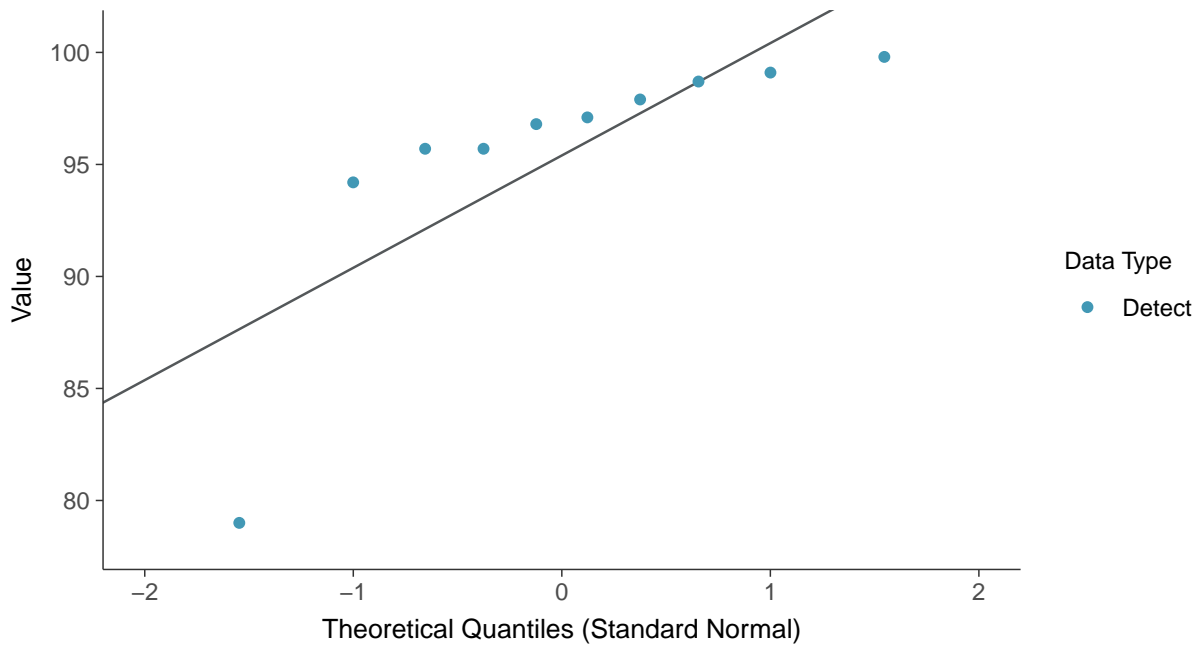
Boxplot by Season

Sodium, MW-7C (mg/L)

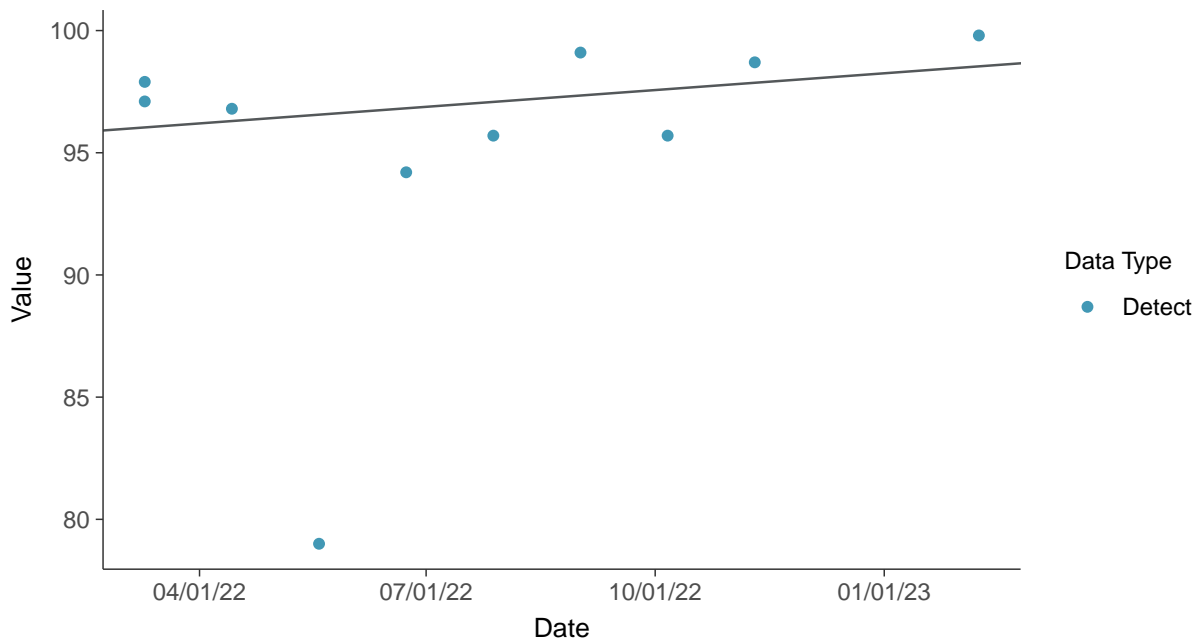




Normal Q-Q plot
Sodium, MW-7C (mg/L)



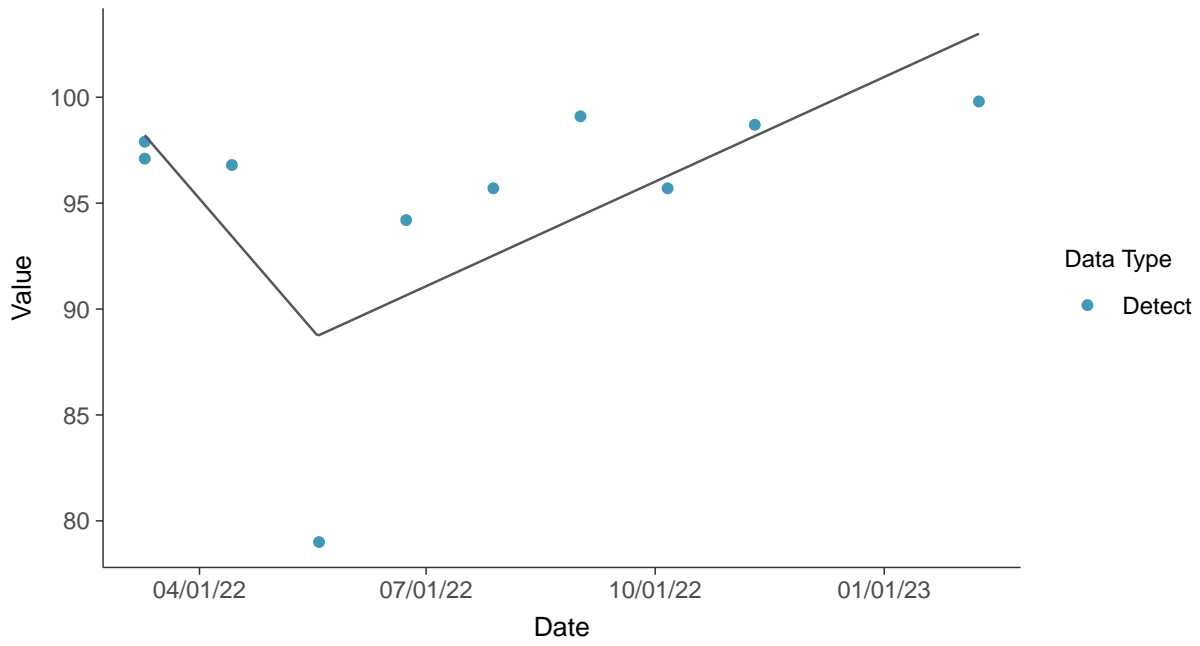
Trend Regression: Mann-Kendall/Theil-Sen Estimate
Sodium, MW-7C (mg/L)





Trend Regression: Piecewise Linear-Linear

Sodium, MW-7C (mg/L)



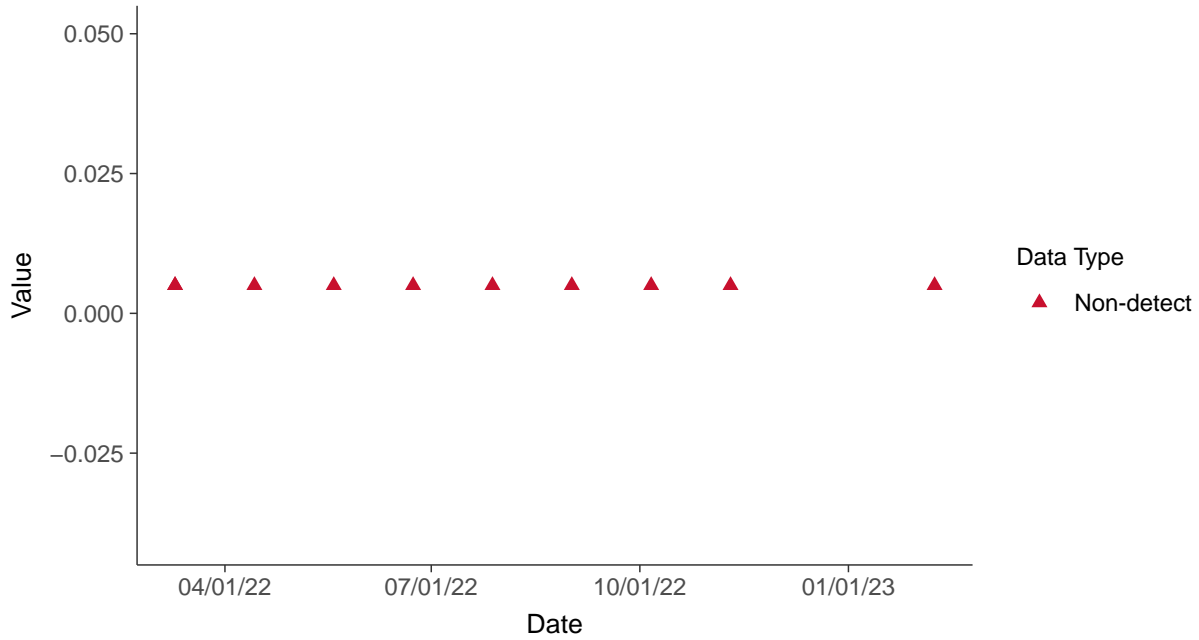


Part 115: Copper, MW-7C

ID: 5_37

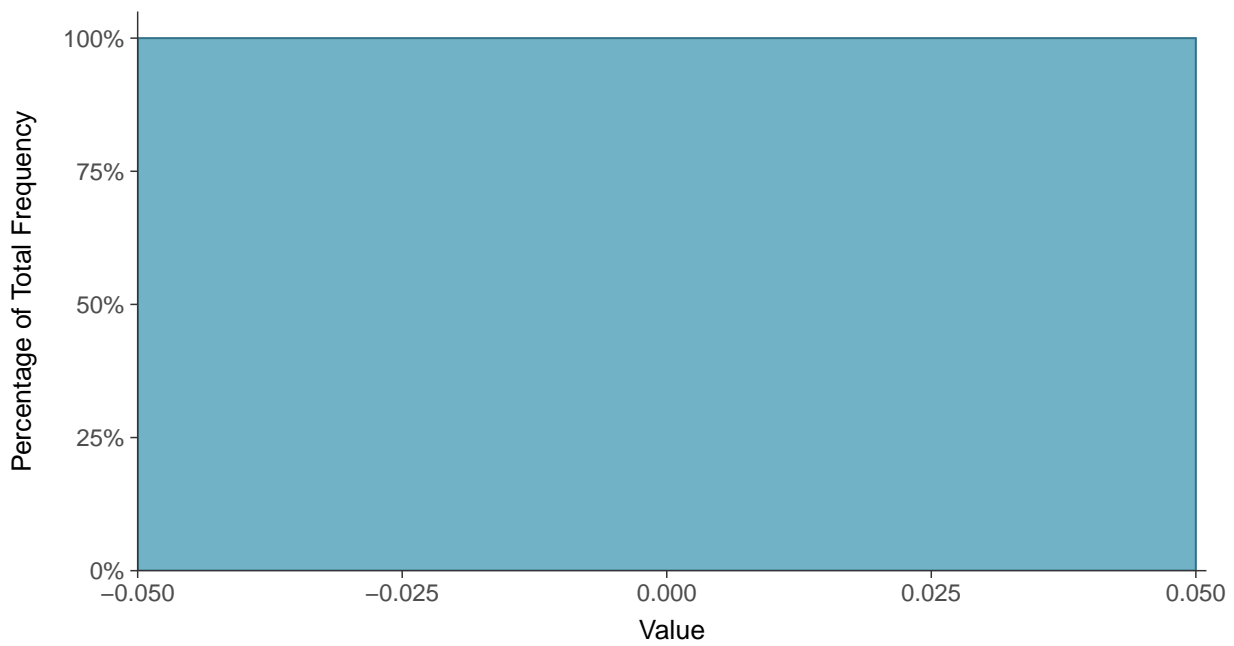
Scatter Plot

Copper, MW-7C (mg/L)



Histogram

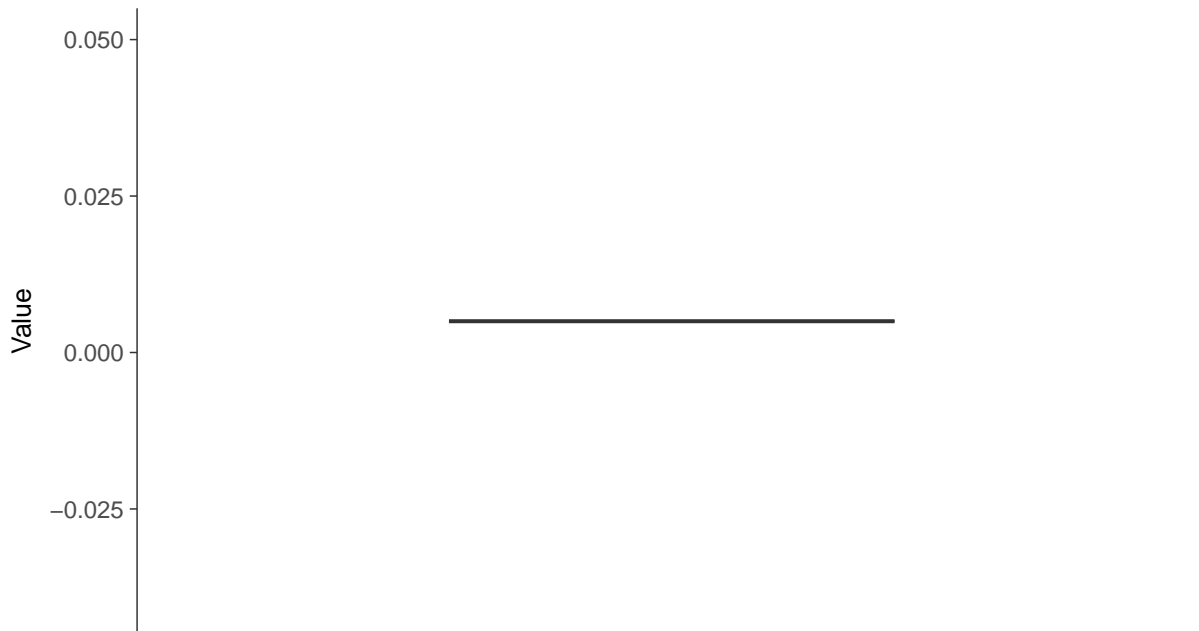
Copper, MW-7C (mg/L)





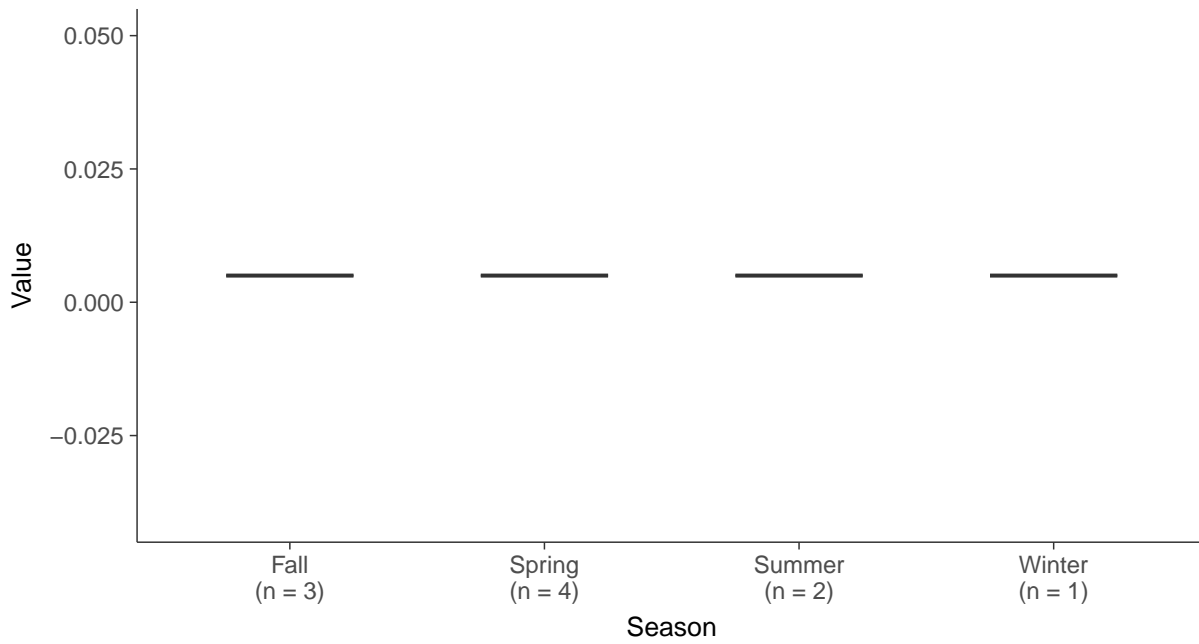
Boxplot

Copper, MW-7C (mg/L)



Boxplot by Season

Copper, MW-7C (mg/L)



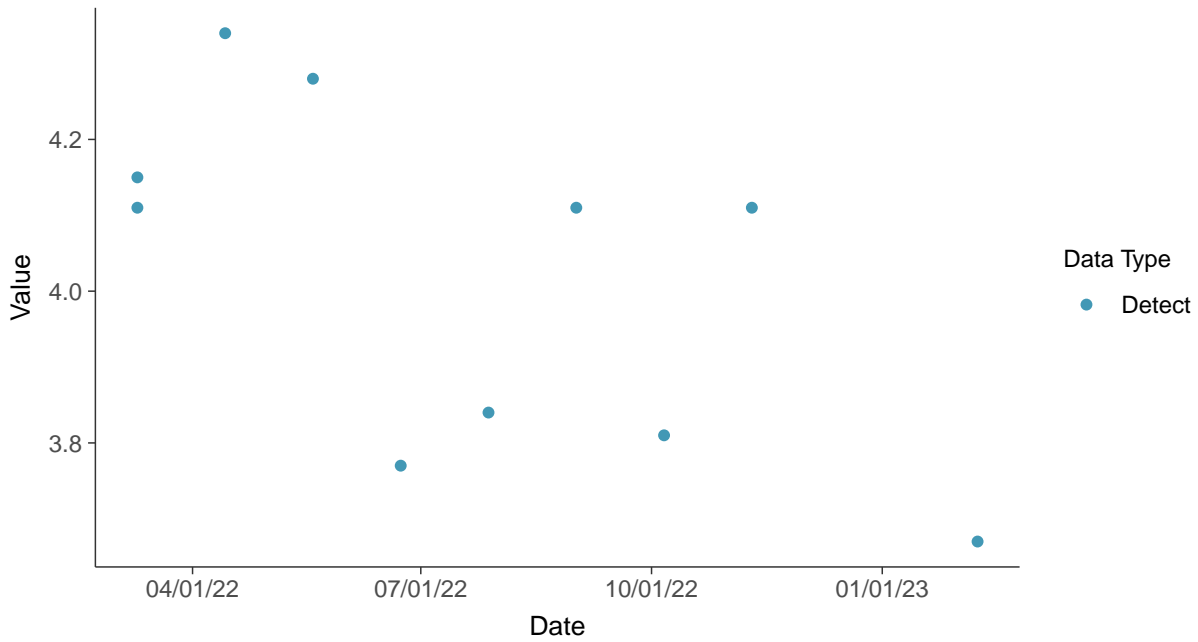


Part 115: Iron, MW-7C

ID: 5_38

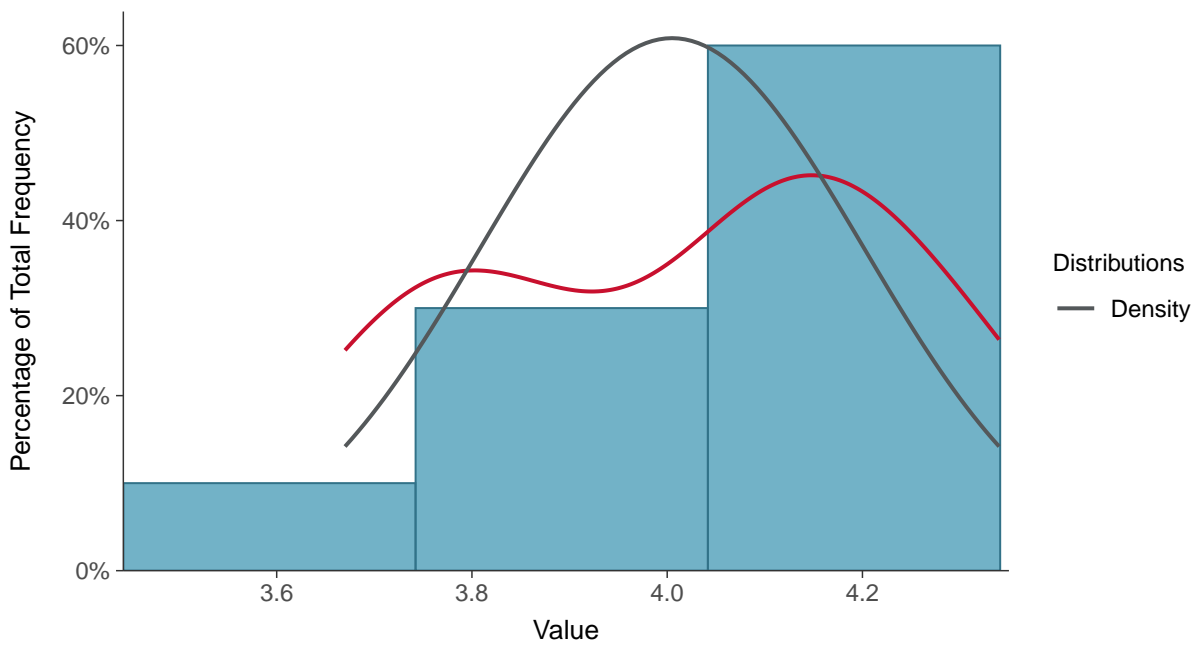
Scatter Plot

Iron, MW-7C (mg/L)



Histogram

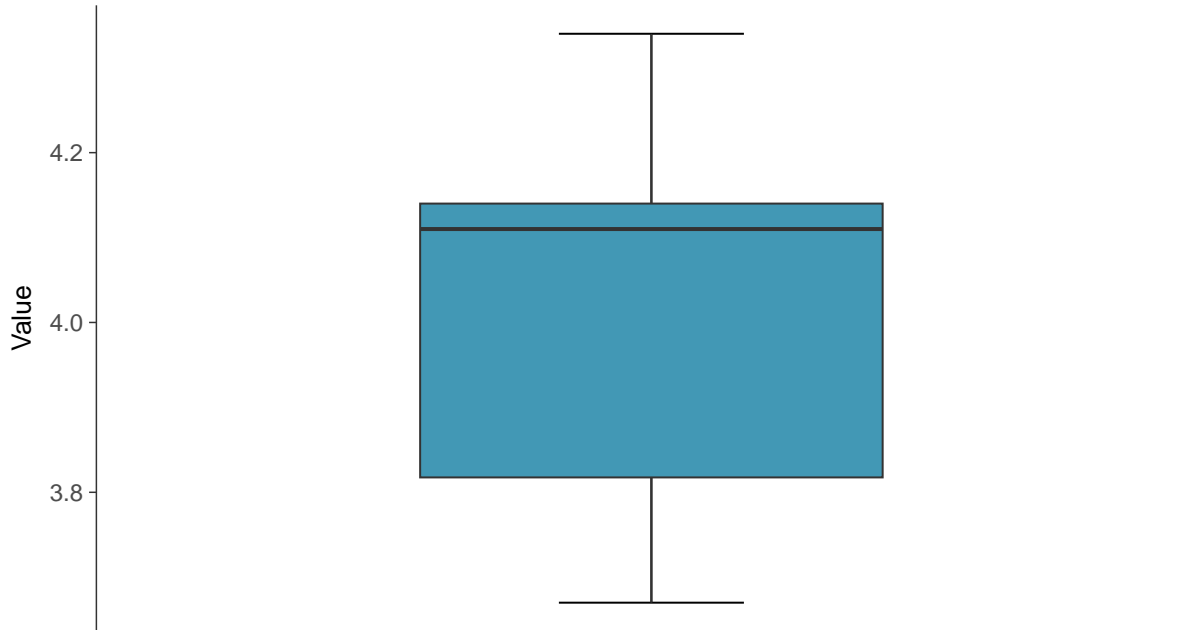
Iron, MW-7C (mg/L)





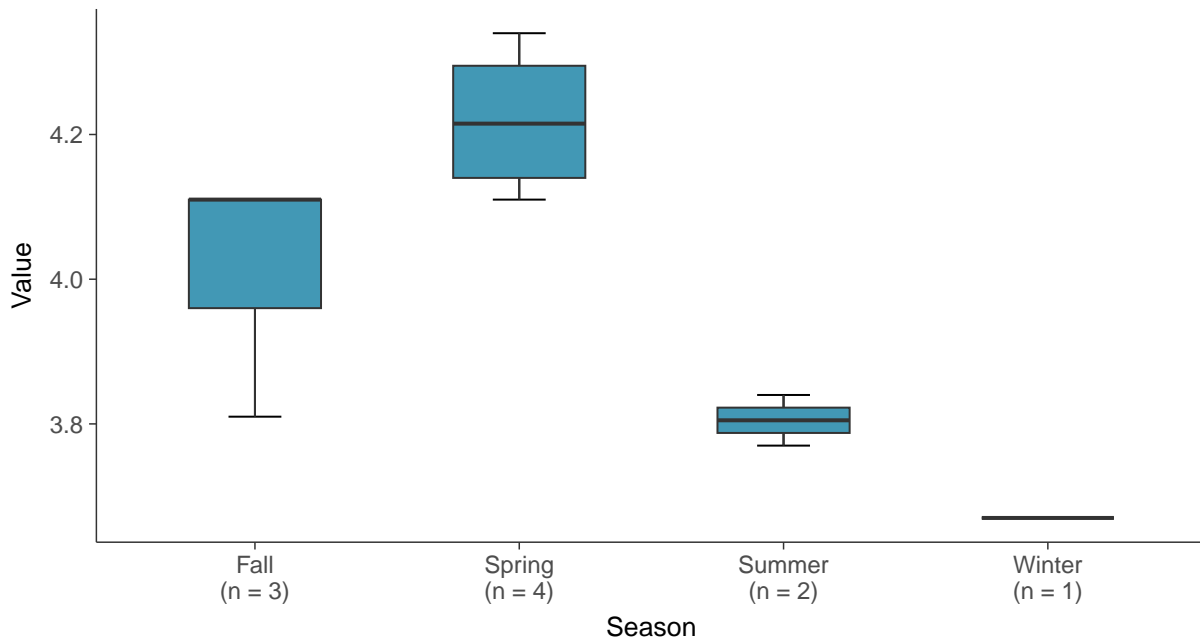
Boxplot

Iron, MW-7C (mg/L)



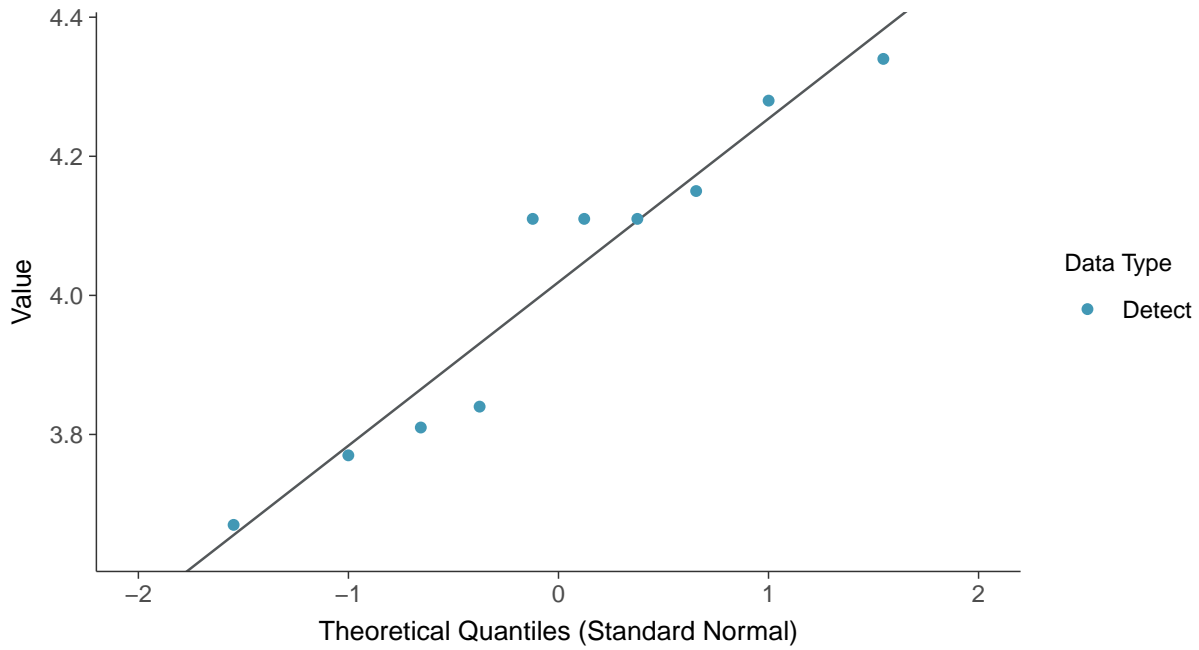
Boxplot by Season

Iron, MW-7C (mg/L)

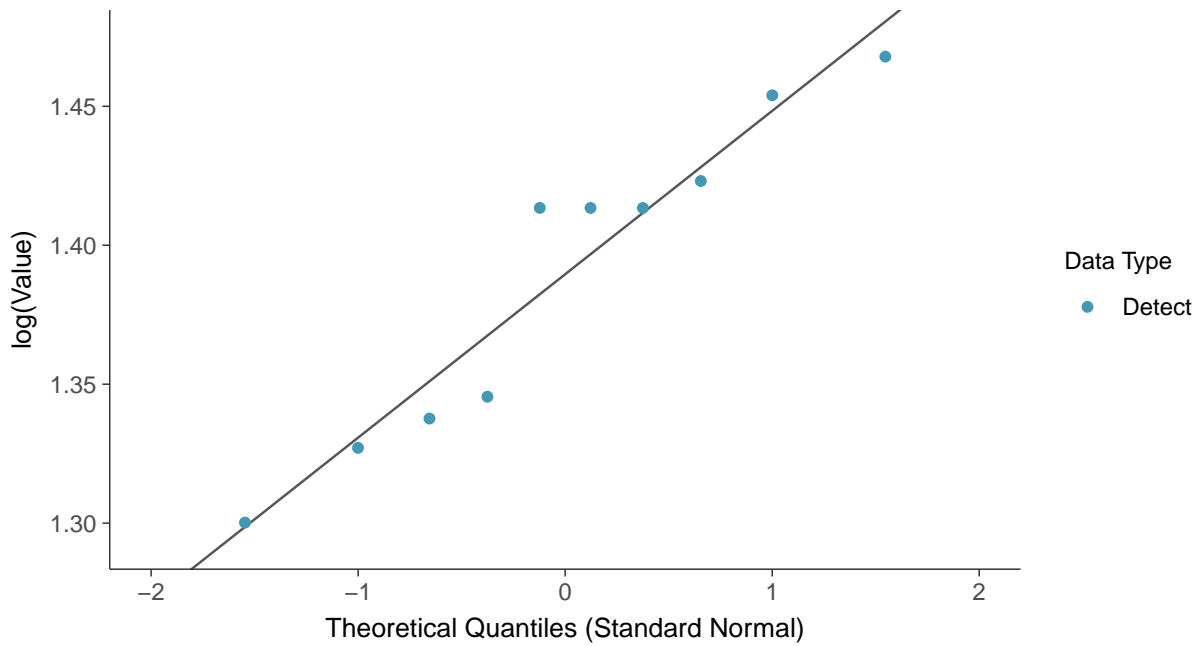




Normal Q-Q plot
Iron, MW-7C (mg/L)



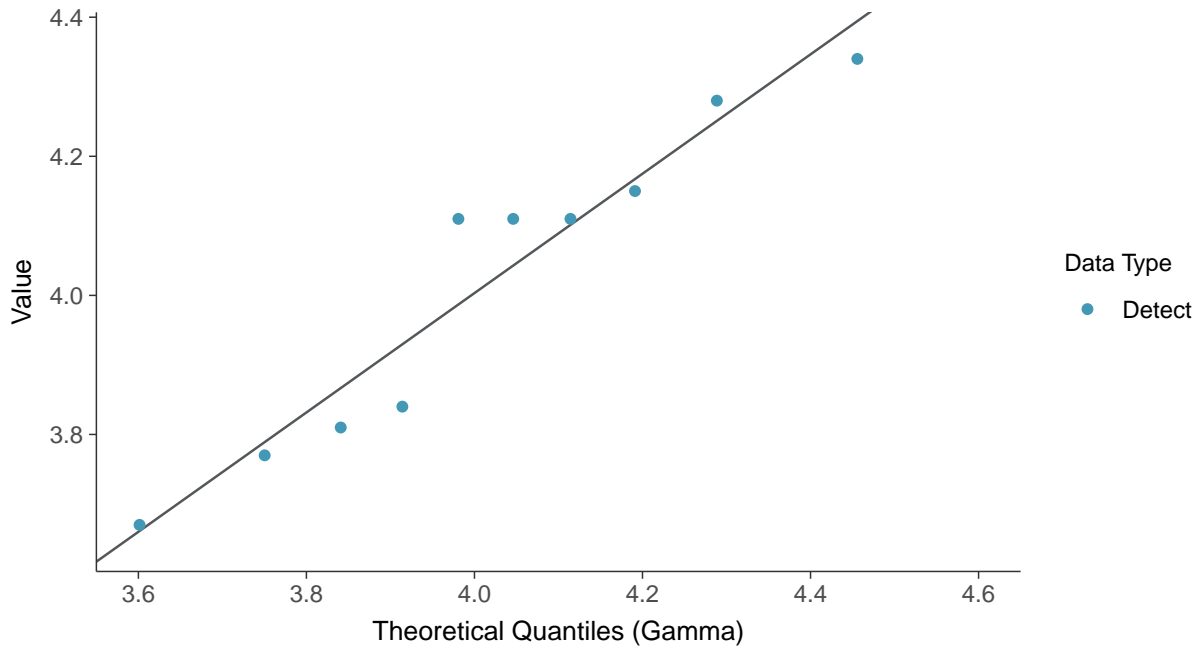
Lognormal Q-Q plot
Iron, MW-7C (mg/L)





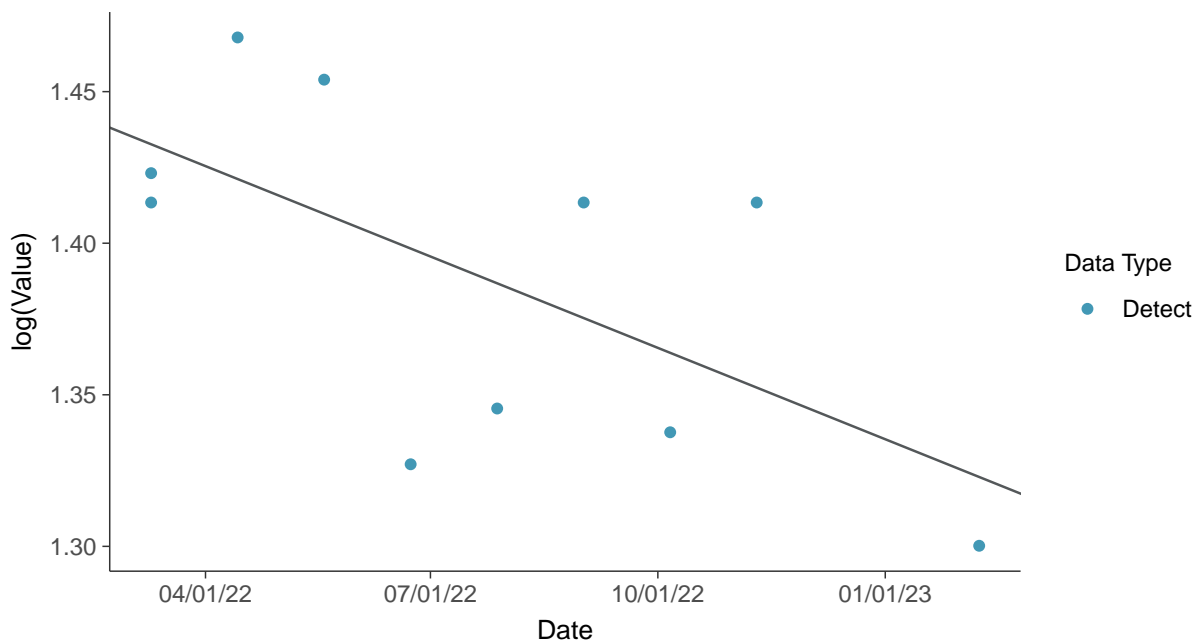
Gamma Q-Q plot

Iron, MW-7C (mg/L)



Trend Regression: Lognormal MLE

Iron, MW-7C (mg/L)



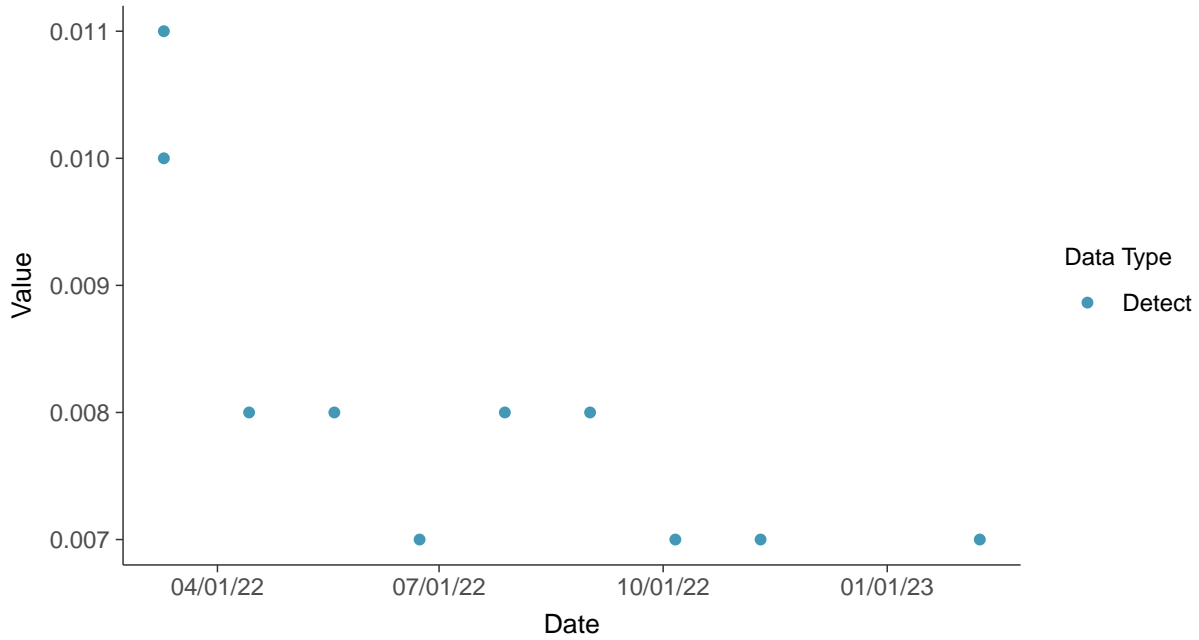


Part 115: Nickel, MW-7C

ID: 5_39

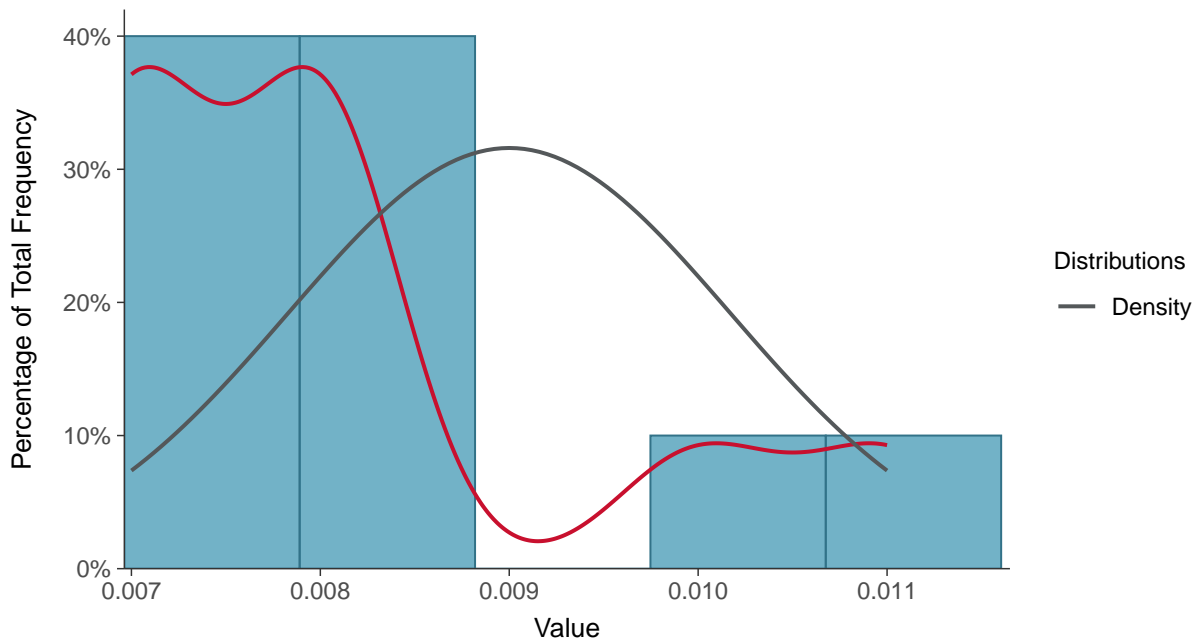
Scatter Plot

Nickel, MW-7C (mg/L)



Histogram

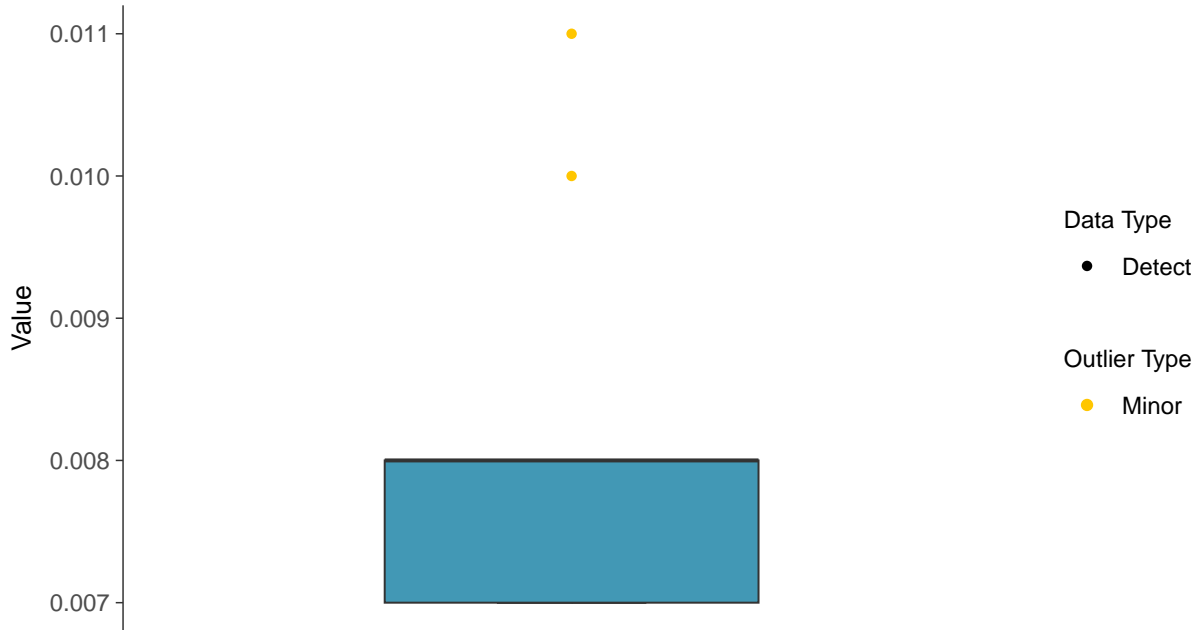
Nickel, MW-7C (mg/L)





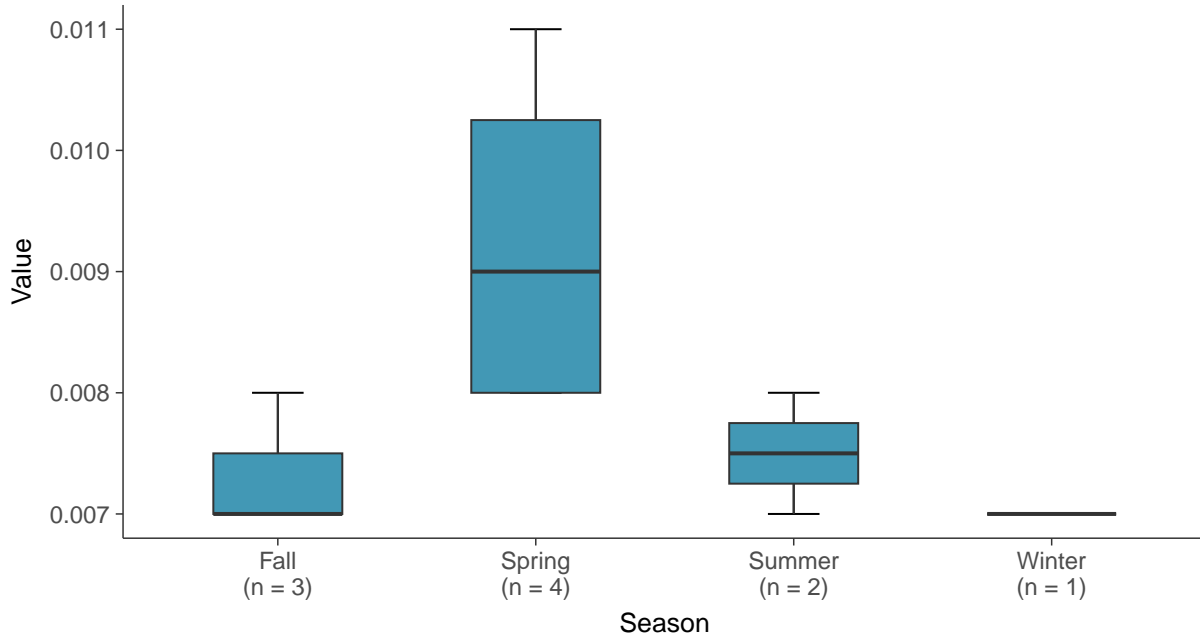
Boxplot

Nickel, MW-7C (mg/L)



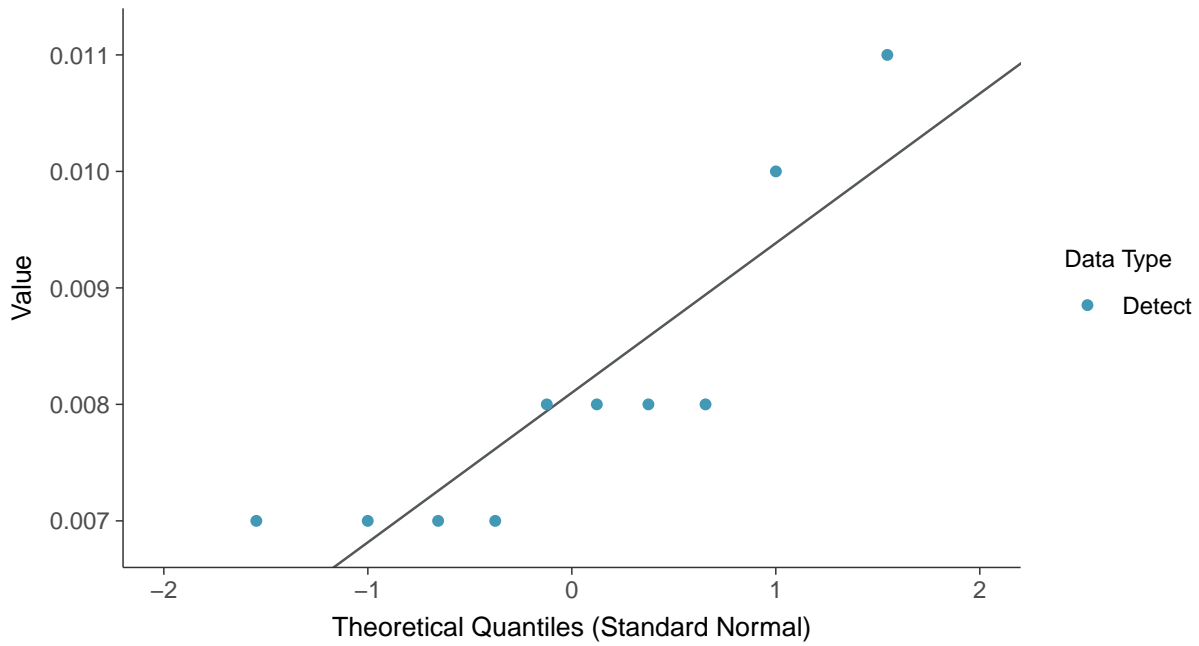
Boxplot by Season

Nickel, MW-7C (mg/L)

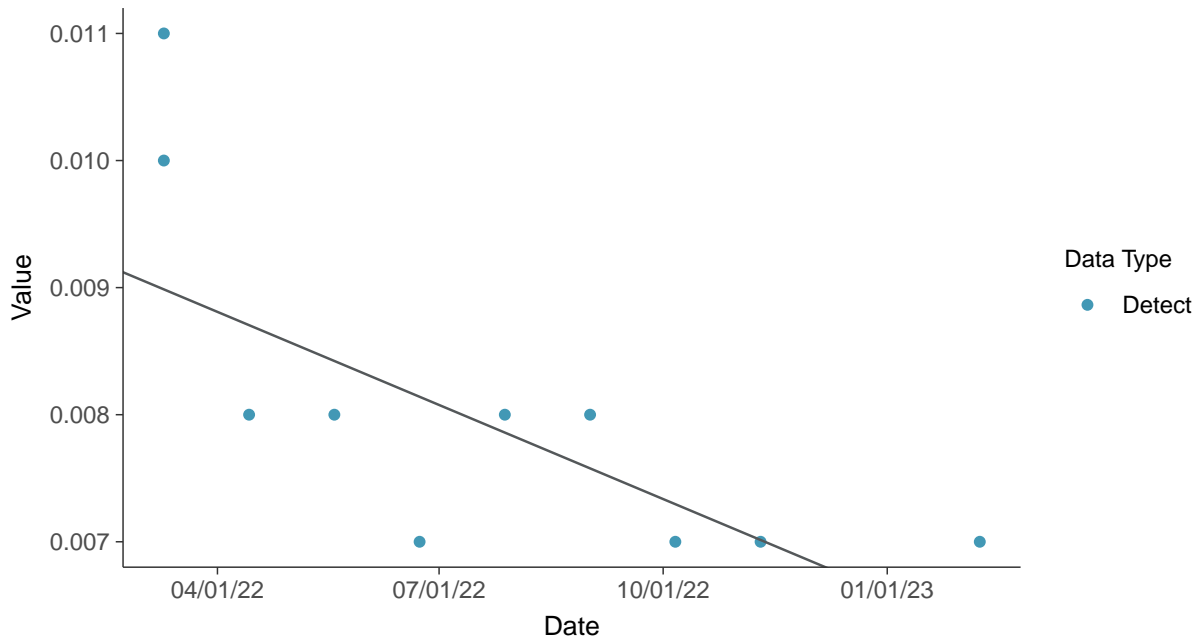




Normal Q-Q plot
Nickel, MW-7C (mg/L)



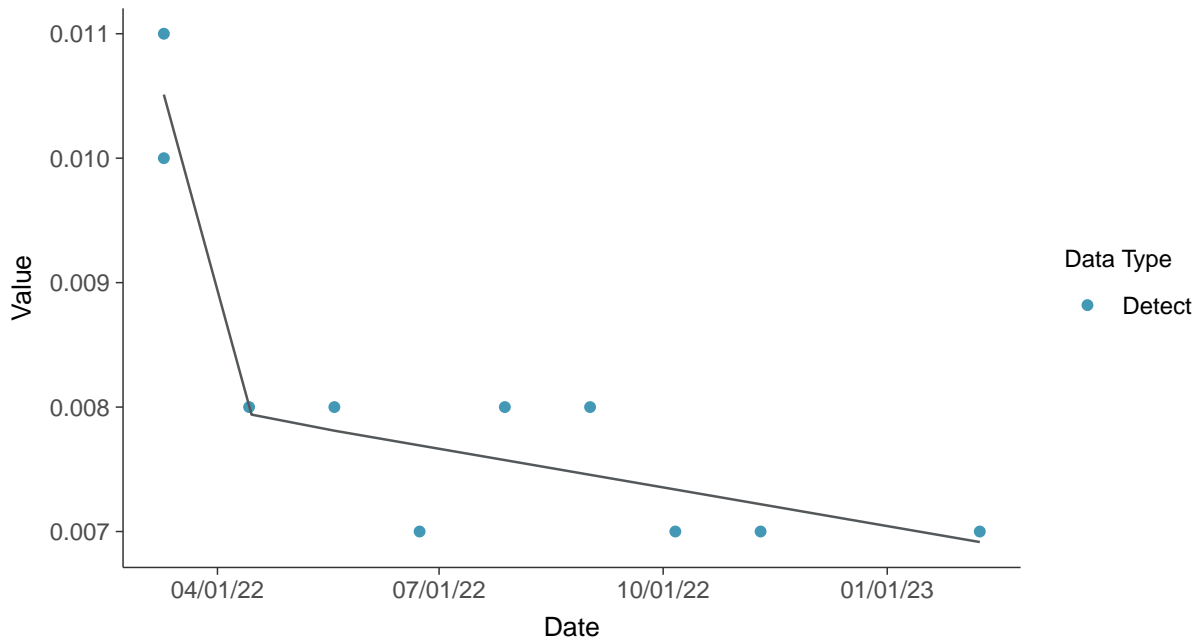
Trend Regression: Mann-Kendall/Theil-Sen Estimate
Nickel, MW-7C (mg/L)





Trend Regression: Piecewise Linear-Linear

Nickel, MW-7C (mg/L)



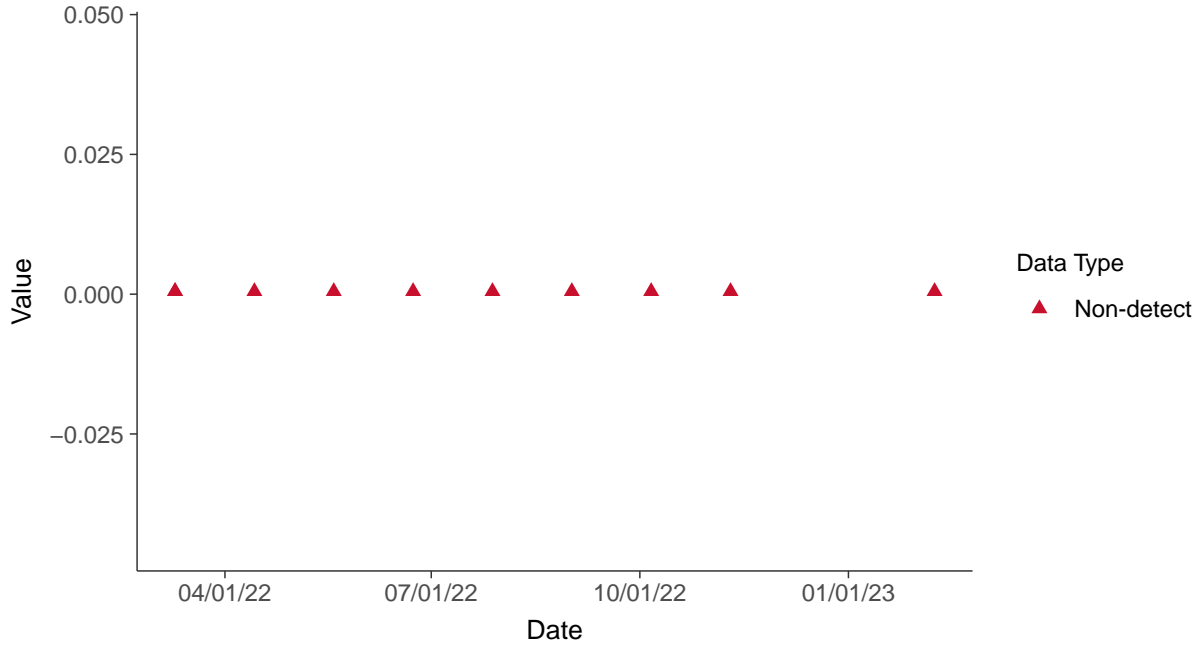


Part 115: Silver, MW-7C

ID: 5_40

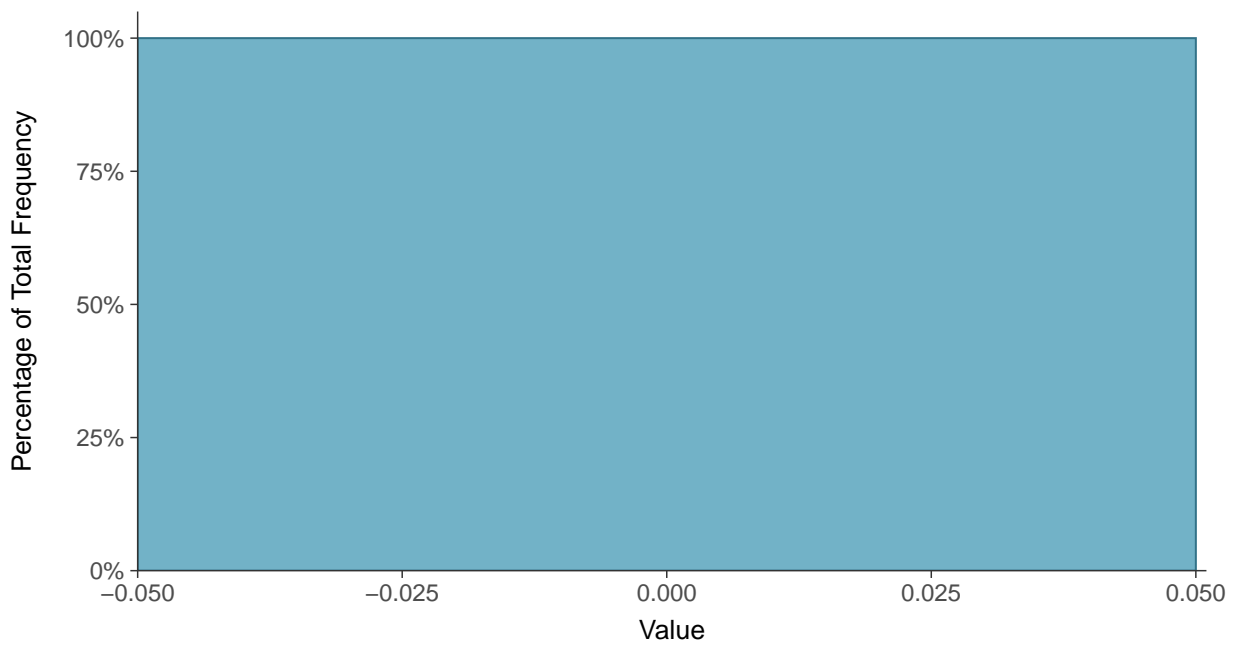
Scatter Plot

Silver, MW-7C (mg/L)



Histogram

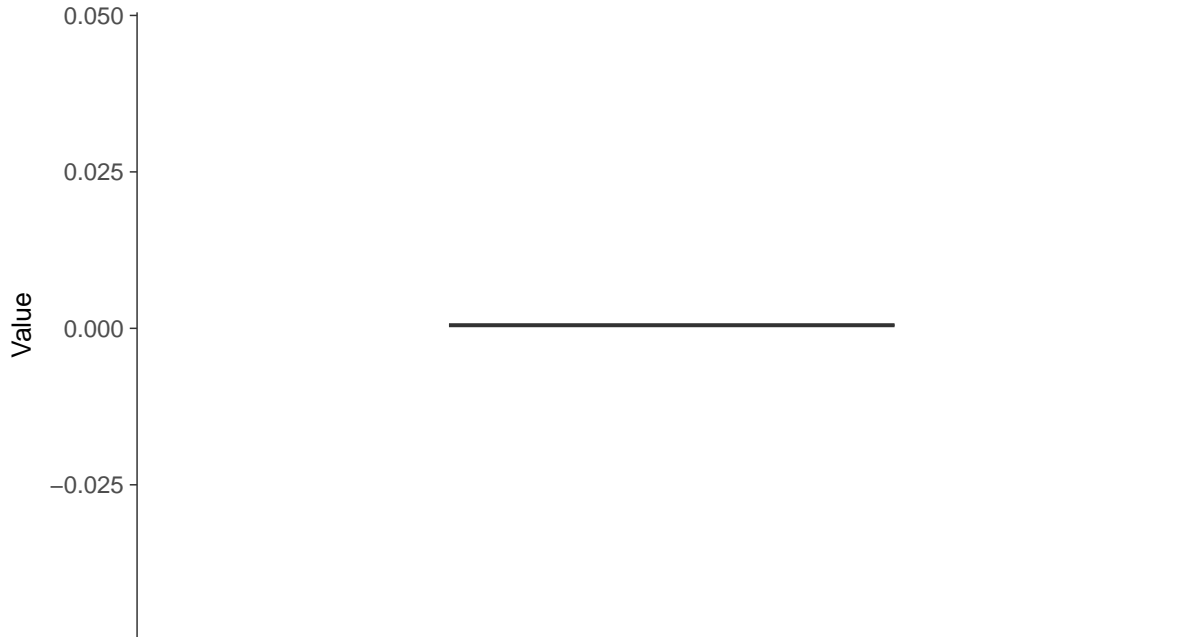
Silver, MW-7C (mg/L)





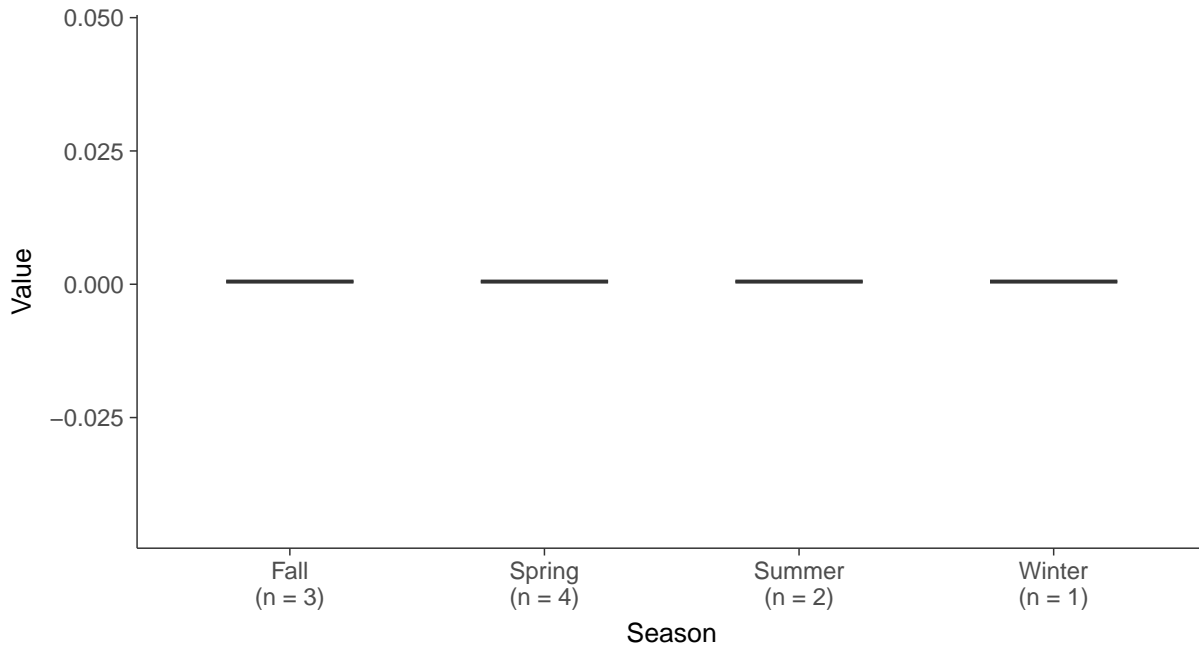
Boxplot

Silver, MW-7C (mg/L)



Boxplot by Season

Silver, MW-7C (mg/L)



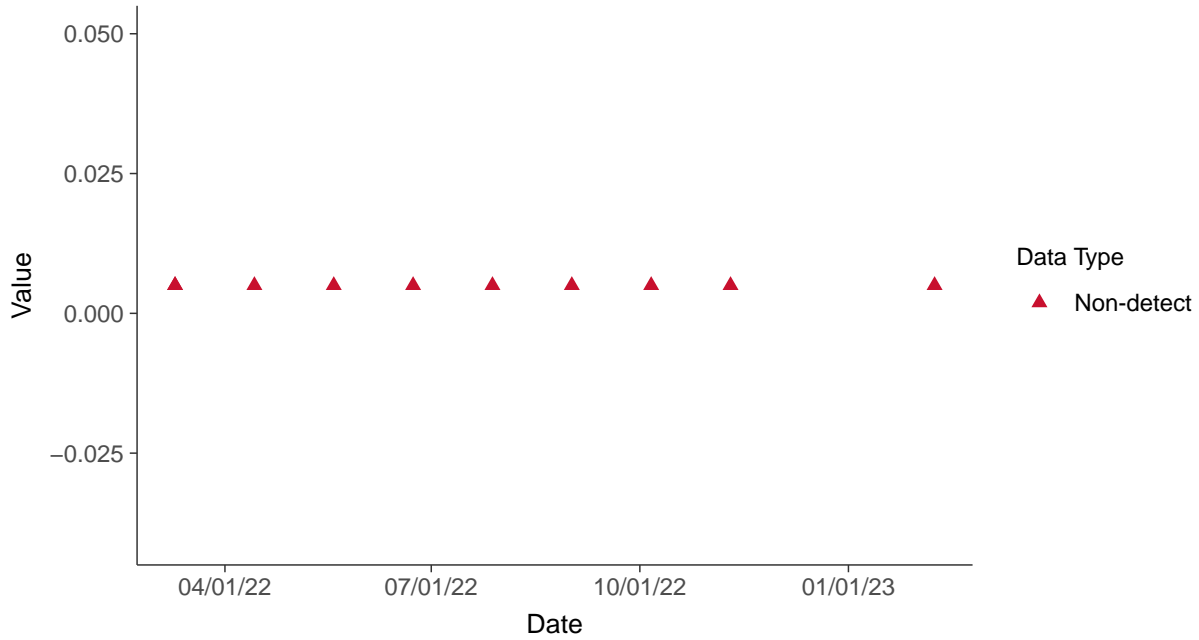


Part 115: Vanadium, MW-7C

ID: 5_41

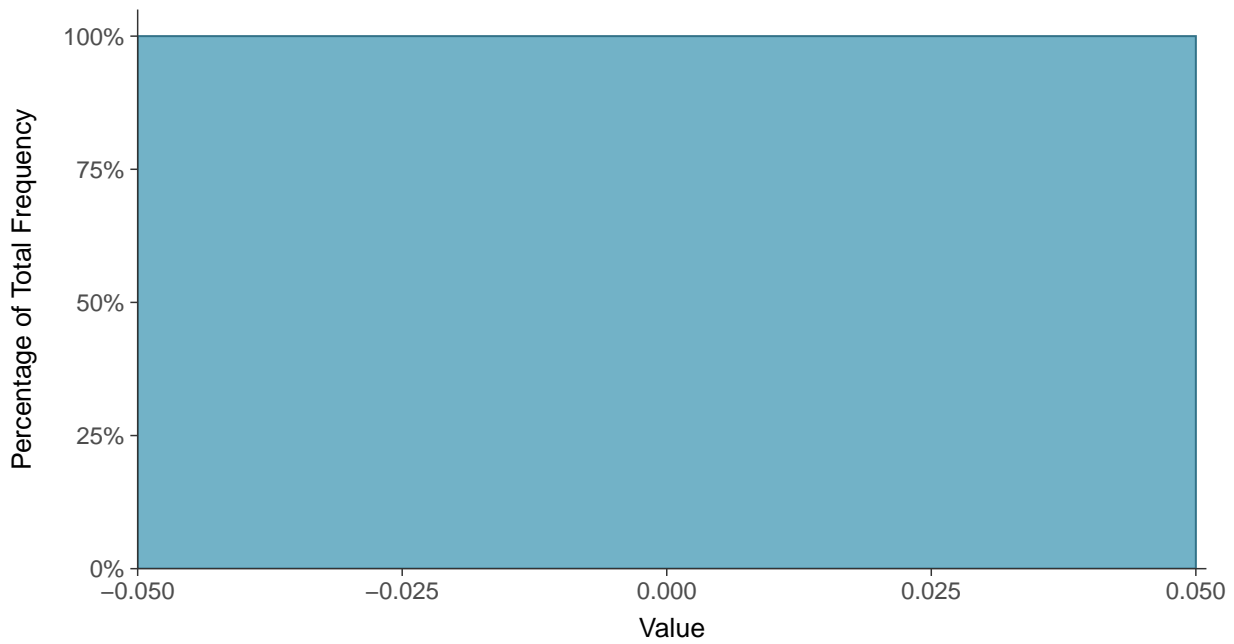
Scatter Plot

Vanadium, MW-7C (mg/L)



Histogram

Vanadium, MW-7C (mg/L)





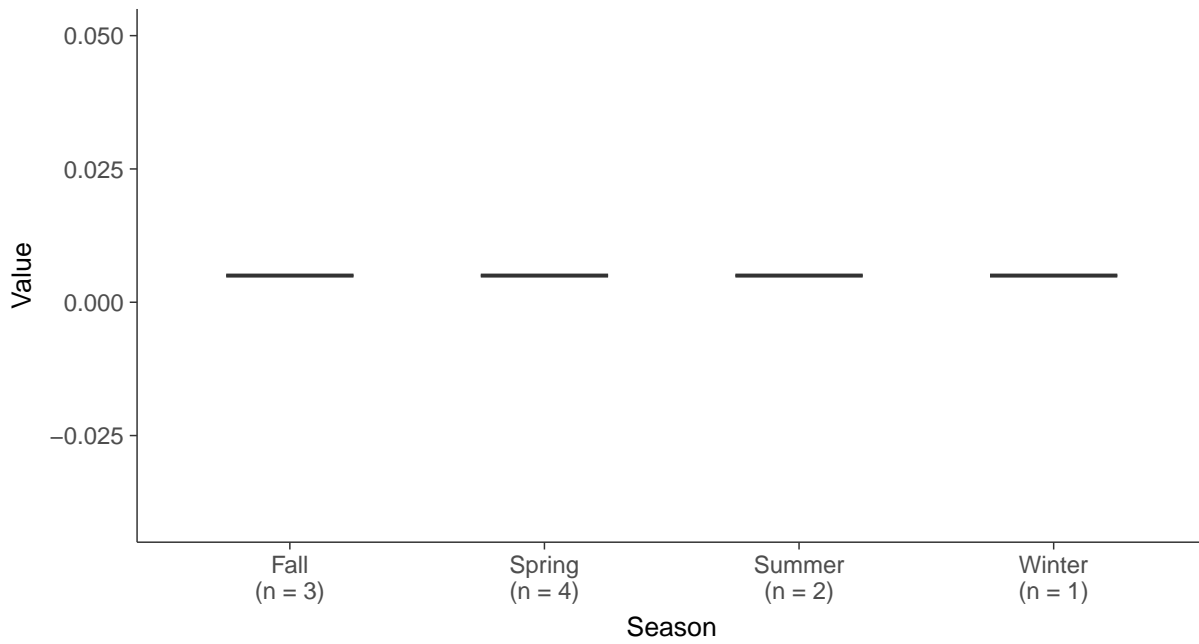
Boxplot

Vanadium, MW-7C (mg/L)



Boxplot by Season

Vanadium, MW-7C (mg/L)



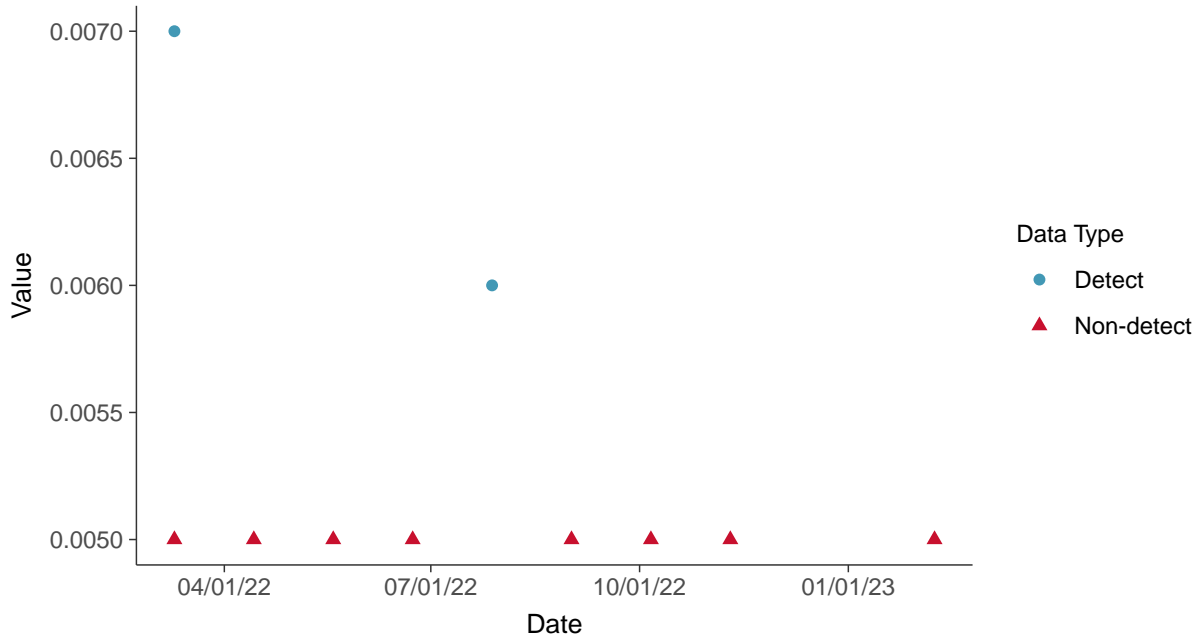


Part 115: Zinc, MW-7C

ID: 5_42

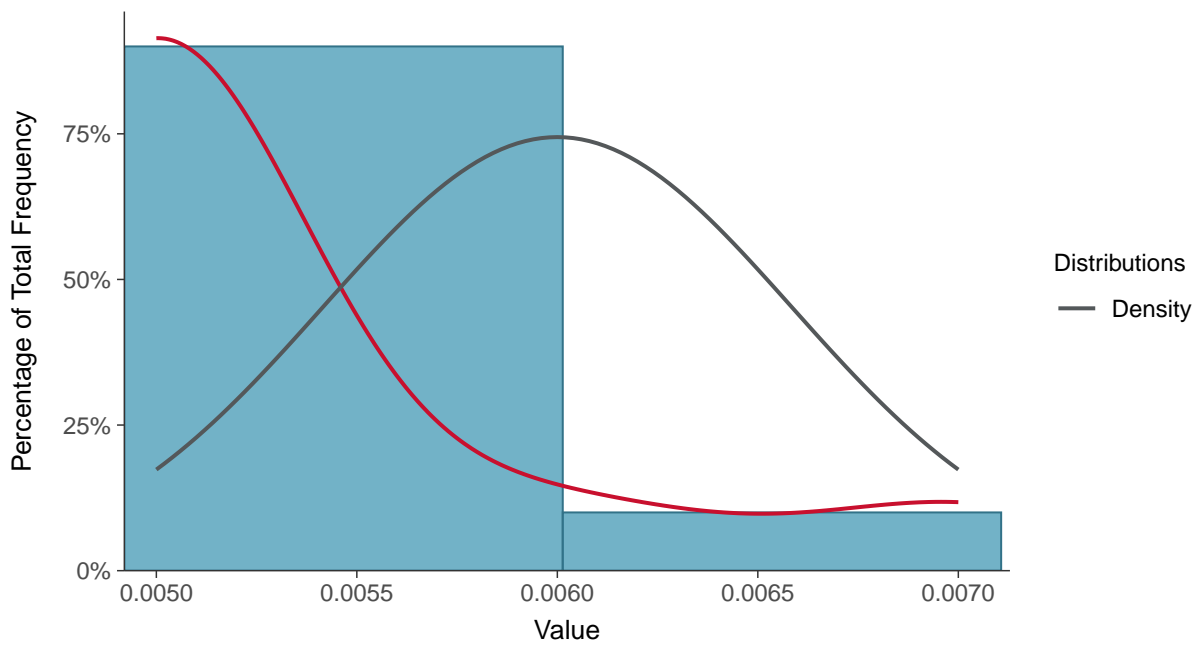
Scatter Plot

Zinc, MW-7C (mg/L)



Histogram

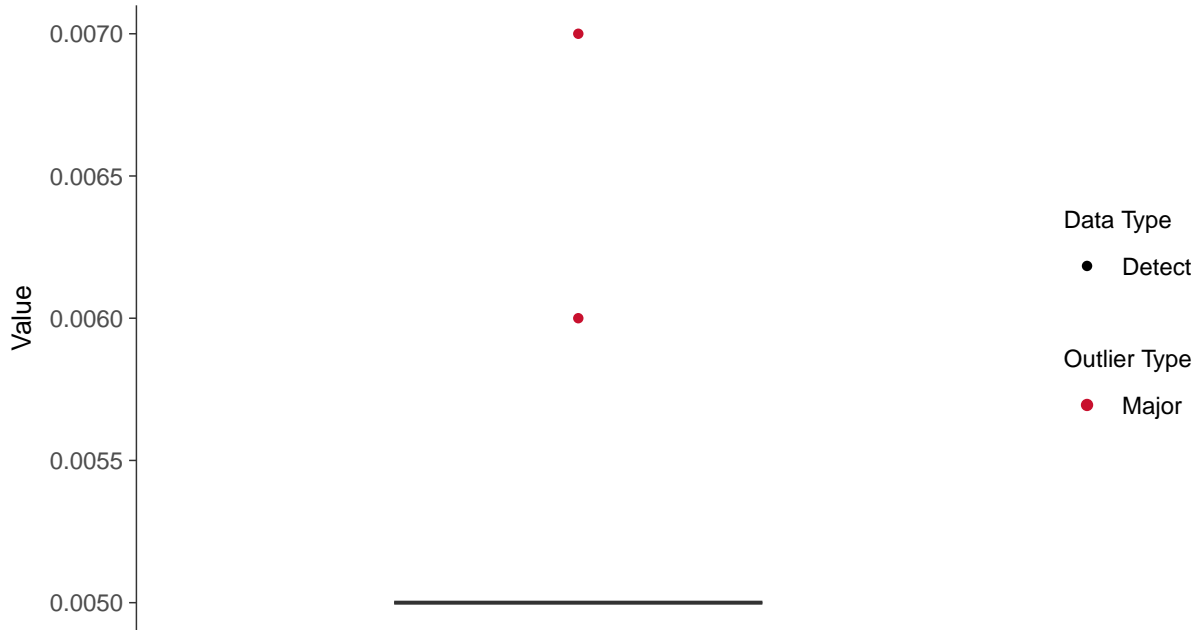
Zinc, MW-7C (mg/L)





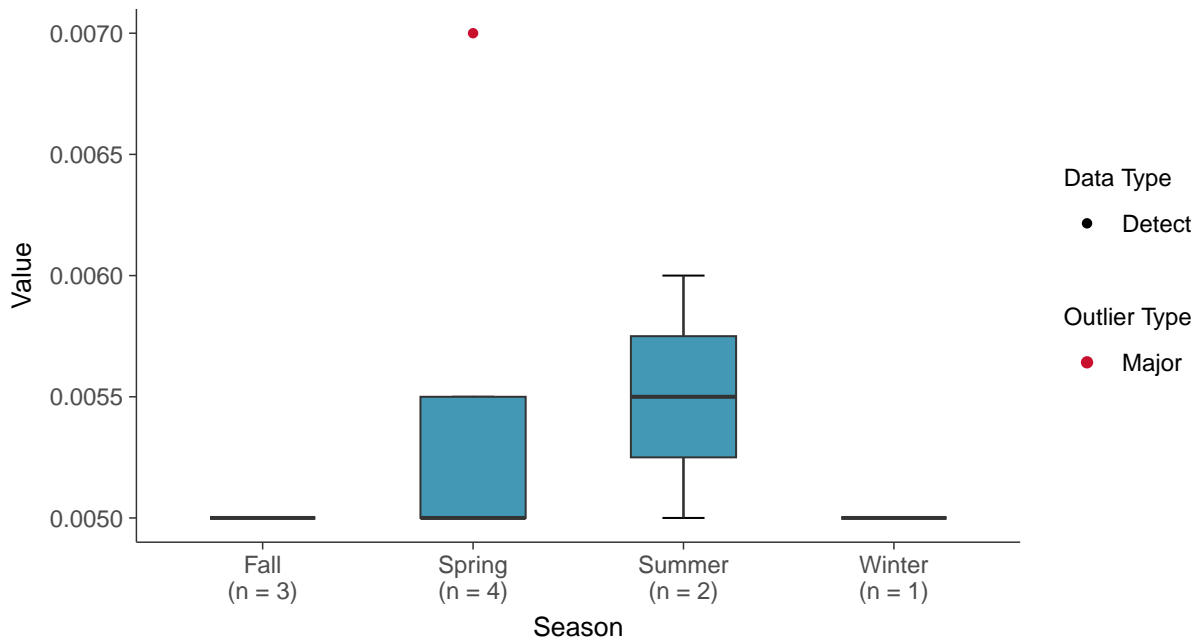
Boxplot

Zinc, MW-7C (mg/L)



Boxplot by Season

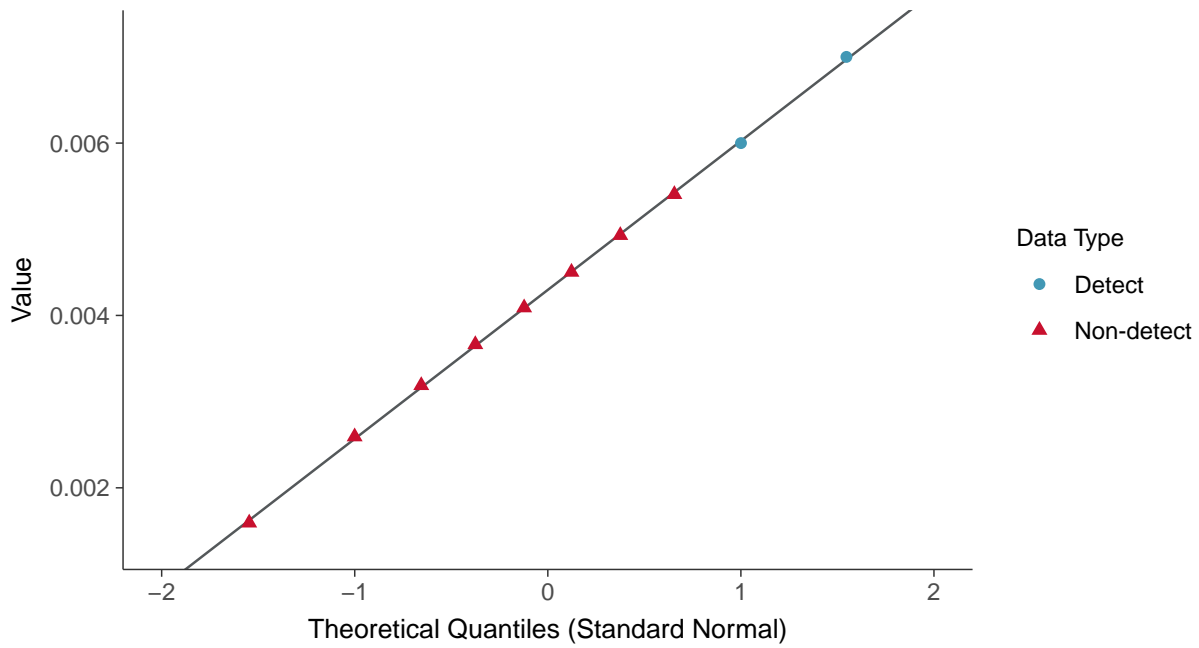
Zinc, MW-7C (mg/L)





Normal Q-Q plot using ROS Imputed Estimates

Zinc, MW-7C (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Zinc, MW-7C (mg/L)

