BACKGROUND WATER QUALITY STATISTICAL CERTIFICATION

for Compliance with the Coal Combustion Residuals (CCR) Rule

Erickson Power Station

Lansing Board of Water & Light

November 19, 2020

Revised March 8, 2024

Table of Contents

Certification iv
1.0 Introduction 1
2.0 Facility Description 2
2.1 Hydrogeology 2
2.2 Monitoring Well Network 2
3.0 Monitoring Methods 6
3.1 Monitoring Frequency 6
3.2 Water Levels and Sample Collection 7
3.3 Analytical Testing 7
4.0 Data Validation and Data Management 7
5.0 Water Levels and Flow Direction 7
6.0 Evaluation of Background Water Quality Data 8
6.1 Changes Since Previous Evaluation 8
6.2 Constituents 8
6.3 Outliers 10
6.4 Data Distributions 14
6.5 Seasonality 14
6.6 Autocorrelation 15
6.7 Trends 15
6.8 Spatial Variability 16
6.9 Summary of Statistical Analysis 19
6.10 Detection Monitoring Background Threshold Values 22
6.11 Assessment Monitoring Background Threshold Values 24
6.12 Groundwater Protection Standards for Assessment Monitoring 26
7.0 References 28

List of Tables

Table 1. Constituents of Interest....7
Table 2. Constituents – Glacial Aquifer (MW-1, MW-4, MW-11, MW-12)....8
Table 3. Constituents – Bedrock Aquifer (MW-11B, MW-12B)....9
Table 4. Outliers at the 1% Significance Level – Glacial....11
Table 5. Trend Tests at the 1% Significance Level – Glacial Aquifer....16
Table 6. Trend Tests at the 1% Significance Level – Bedrock Aquifer....16
Table 7. Summary of Statistical Analysis – Glacial Aquifer....20
Table 8. Summary of Statical Analysis – Bedrock Aquifer....21
Table 9. Background Threshold Values for Detection Monitoring – Glacial Aquifer....23
Table 10. Background Threshold Values for Detection Monitoring – Bedrock Aquifer....23
Table 11. Background Threshold Values for Assessment Monitoring – Glacial Aquifer....24
Table 12. Background Threshold Values for Assessment Monitoring – Bedrock Aquifer....25
Table 13. Upper Tolerance Limits with 95% Coverage and 95% Confidence – Glacial Aquifer....26
Table 14. Upper Tolerance Limits with 95% Coverage and 95% Confidence – Bedrock Aquifer....27

List of Figures

Figure 1. Vicinity Map for Erickson Power Station....4
Figure 2. Erickson Power Station – CCR Unit and Monitoring Well Location Map....5
Figure 3. Scatter Plot by Well, Sulfate, MW-1, MW-4, MW-11 and MW-12....12
Figure 4. Scatter Plot by Well, pH (Field), MW-1, MW-4, MW-11 and MW-12....12
Figure 5. Scatter Plot by Well, Arsenic, MW-1, MW-4, MW-11 and MW-12....13
Figure 6. Scatter Plot by Well, Barium, MW-1, MW-4, MW-11 and MW-12....13
Figure 7. Boxplot by Well, Arsenic, MW-1, MW-4, MW-11 and MW-12....18
Figure 8. Boxplot by Well, Boron, MW-11B and MW-12B....19

List of Appendices

Appendix A: Groundwater Contour Maps

Appendix B: Erickson BWL Bedrock Background Tables

Appendix C: Erickson BWL Glacial Background Tables

Appendix D: Erickson BWL Bedrock Background Plots

Appendix E: Erickson BWL Glacial Background Plots

Table of Abbreviations and Acronyms

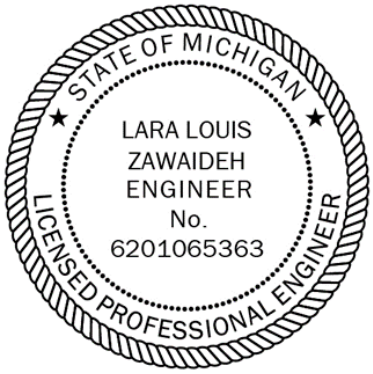
Abbreviation	Definition
BDL	below detection limits
BTV	background threshold value
CCR	Coal Combustion Residuals
COI	constituent of interest
EDD	electronic data deliverable
EGLE	Michigan Department of Environment, Great Lakes, and Energy
EPA	Environmental Protection Agency
MDL	method detection limit
ND	non-detects
SOP	Standard Operating Procedure
SSI	statistically significant increase
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
UPL	upper prediction limit

Certification

Background Water Quality Statistical Certification for Compliance with the Coal Combustion Residuals Rule

I hereby certify to the best of my knowledge that the selected statistical method is appropriate for evaluating the groundwater monitoring data for the CCR management area.

I am duly licensed Professional Engineer under the laws of the State of Michigan.



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1.0 Introduction

The U.S. Environmental Protection Agency's (EPA's) final Coal Combustion Residuals (CCR) Rule establishes a comprehensive set of requirements for the management and disposal of CCR (or coal ash) in landfills and surface impoundments by electric utilities. The former Erickson Power Station ("Erickson" or "Site"), located in Delta Township, Eaton County, Michigan (**Figure 1)**, is owned and operated by Lansing Board of Water and Light (BWL). Erickson Station was permanently shut down November 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. A 33-acre impoundment was physically closed by removal of CCR in 2014 is now referred to as the Former Impoundment (**Figure 2**). The three CCR impoundments are subject to the CCR Rule. Part §257.93 of the Rule requires that a certification be obtained from a professional engineer describing the statistical method selected to evaluate the groundwater monitoring data at the facility.

The objective of this report is to document the selection of the statistical method for each Appendix III and IV constituent of interest (COI) for each CCR facility. At Erickson, groundwater monitoring has been conducted to collect eight rounds of background sampling plus the initial detection monitoring as specified under CCR Rule Part §257.94. The water quality data collected from the monitoring wells located upgradient of the CCR unit has been compiled and statistically analyzed to develop the original background threshold values (BTVs) for the impoundments that were documented in the original version of this report issued November 19, 2020.

The objective of this report is to document the selection of the statistical method for each constituent of interest (COI). The water quality data collected from the monitoring wells located upgradient of the CCR unit has been compiled and statistically analyzed to update the background threshold values (BTVs) for the impoundments. The original version of this report issued November 19, 2020. This update reflects a recalculation of the BTVs for the glacial aquifer for the impoundments at the former Erickson to include more data into the background data set from the upgradient wells as a result of continued monitoring over time and includes data from between April 2020 and February 2023. Additionally, the background analysis for the glacial aquifer was expanded to include data from newer upgradient wells, MW-11 and MW-12, sampled between February 2022 and February 2023. As the project has progressed, BWL is evaluating the potential for migration of groundwater exceedances, and has therefore begun evaluating the deeper bedrock aquifer. Because of the lithologic difference between the glacial and bedrock aquifers beneath the site, which affects the groundwater quality, separate BTVs were developed for the glacial aquifer and the bedrock aquifer. Background values were developed for the bedrock aquifer from newer upgradient bedrock wells, MW-11B and MW-12B, from sampling conducted between March 2022 and December 2022.

This background water quality report documents the background sample events and describes the statistics performed to develop the BTVs.

2.0 Facility Description

The former 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. CCR materials were removed from the impoundments and disposed of at Granger Wood Street Landfill and verification efforts commenced. Through mid-November 2023, approximately 64,000 cubic yards of material (ash, liner, and CCR impacted riprap) have been removed of and disposed of offsite from the three impoundments. Verification was performed through visual, photographic, soil sampling, and laboratory analytical testing. Visual verification was performed in August 2023. Sampling was performed for the CWP in July 2023. Ash removal verification efforts for the Forebay, Retention Basin, and CWP are expected to be finalized in February 2024.

2.1 Hydrogeology

The three CCR impoundments 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, 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 directly in the glacial aquifer under the impoundments is east and does not vary with seasonality. To the east of the impoundments at the wetland groundwater turns to the north, following the topography along the Carrier Creek watershed. Groundwater flow in the bedrock aquifer is similar to that of the glacial aquifer, however the contours are slightly different. The lithology is different between the shallow glacial and deeper bedrock aquifers beneath the site, which affects the groundwater quality. Therefore, separate BTVs were developed for the glacial aquifer and the bedrock aquifer.

2.2 Monitoring Well Network

The monitoring system for the CCR impoundments includes the following wells (**Figure 2**):

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

2.2.1 Additional Wells

The 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 (GPS) in the impoundment waste boundary wells. These wells installed for plume delineation are referred to as nature and extent wells or perimeter/characterization wells: (**Figure 2**):

- Glacial downgradient wells to evaluate extent of GPS exceedances: MW-3, MW-7, MW-7C, MW-8, MW-9, MW-10, MW-13, MW-15, MW-16A, MW-16B, MW-100A, and MW-100B.
- Bedrock background (upgradient) wells: MW-11B, and MW-12B.
- Bedrock downgradient wells: MW-7B, MW-16C, MW-16D, MW-100C, and MW-100D.

The operation and monitoring of the CCR units are described further in the Groundwater Monitoring System Certification for Erickson Station (HDR, 2023).

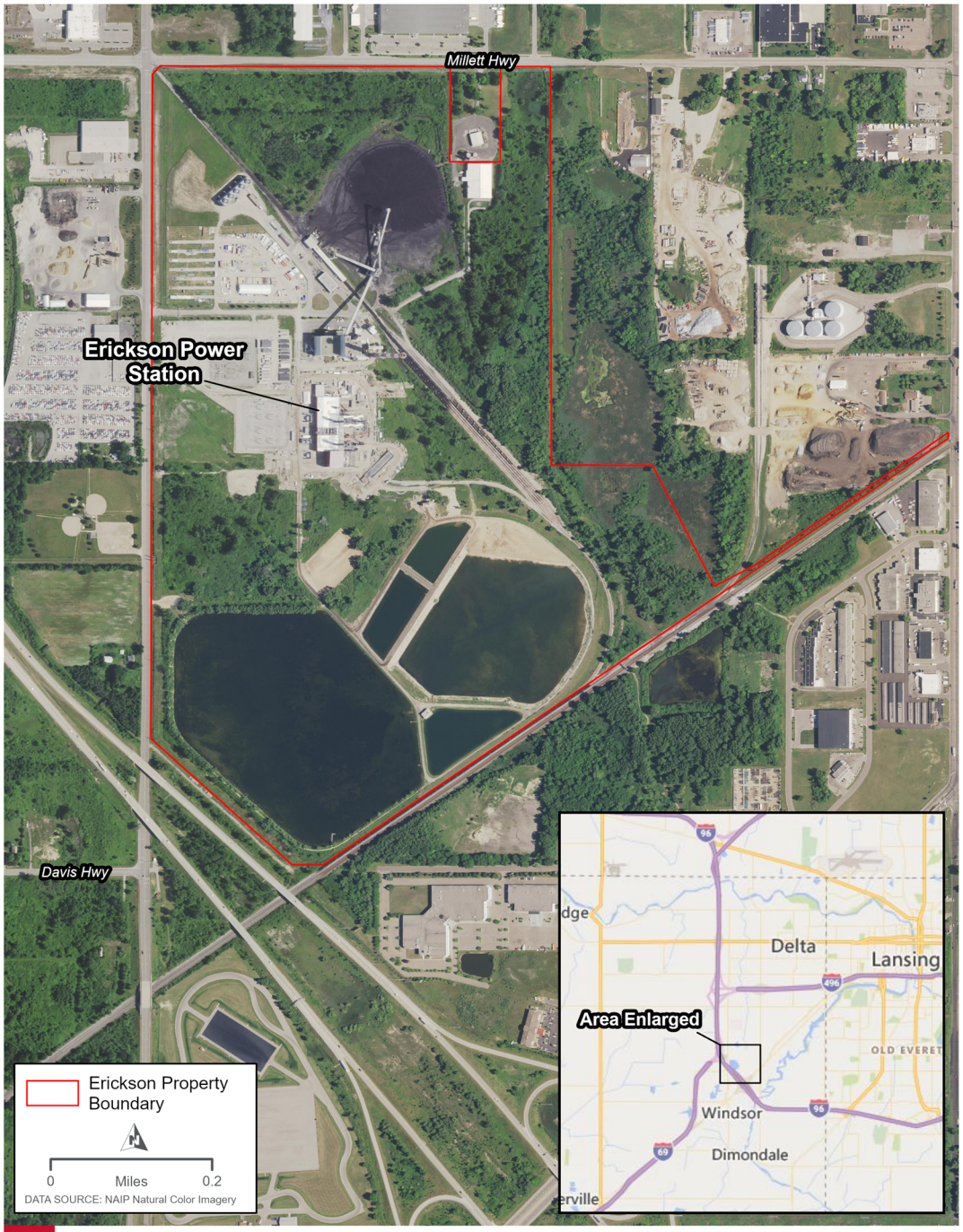


Figure 1. Vicinity Map for Erickson Power Station

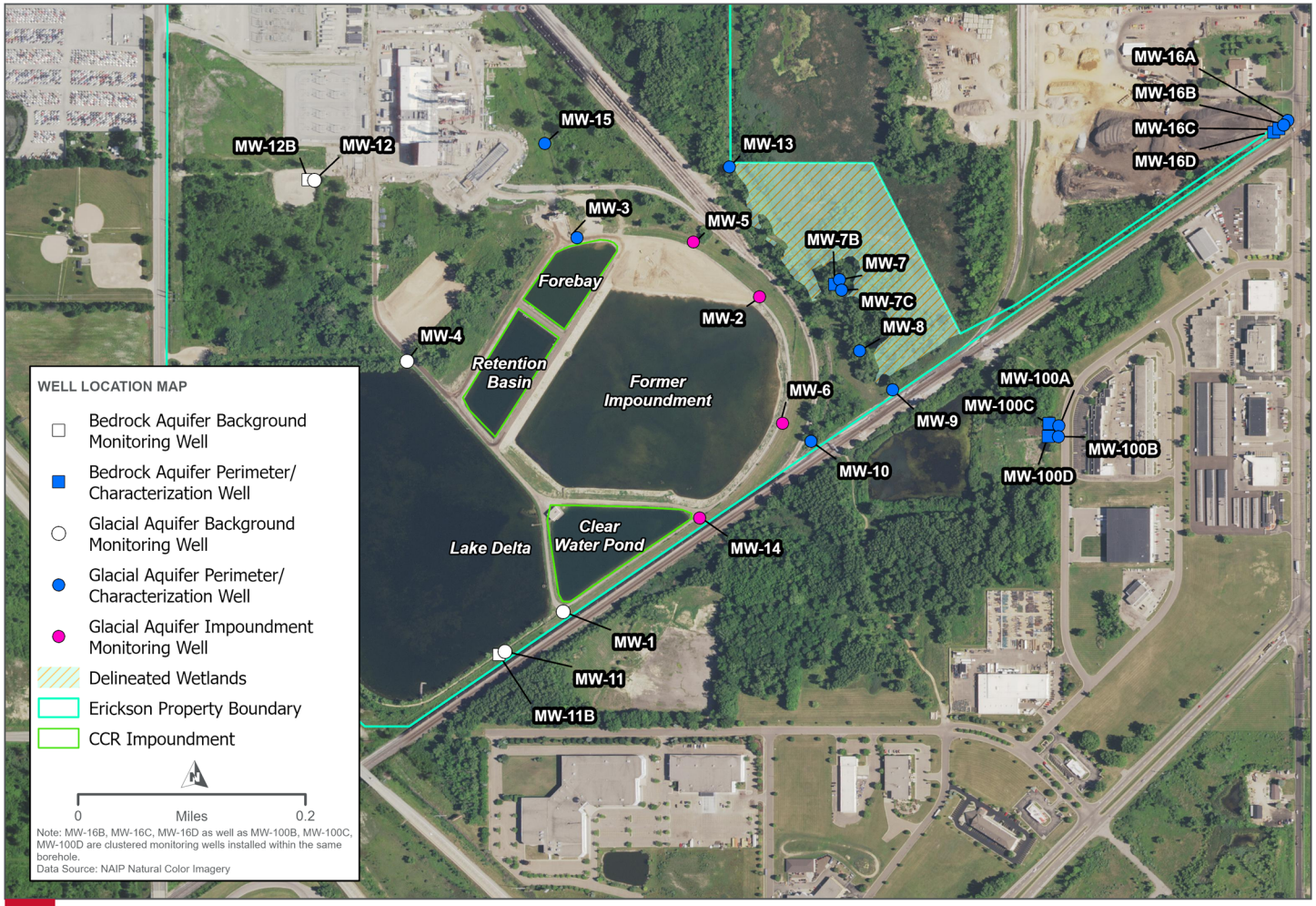


Figure 2. Erickson Power Station – CCR Unit and Monitoring Well Location Map

3.0 Monitoring Methods

3.1 Monitoring Frequency

3.1.1 Glacial Aquifer

Groundwater sampling events occurred between April 2020 and February 2023. Each round of sampling has included a sample collected from the glacial aquifer background wells for the impoundments at Erickson (MW-1 and MW-4). Data was collected from background wells MW-1 and MW-4 on the following dates:

- ✓ April 28, 2020
- ✓ May 26, 2020
- ✓ June 23, 2020
- ✓ July 21, 2020
- ✓ August 18, 2020
- ✓ September 15, 2020
- ✓ September 28, 2020
- ✓ October 12, 2020
- ✓ October 19, 2020
- ✓ November 6, 2020
- ✓ January 27, 2021
- ✓ August 3, 2021
- ✓ February 1, 2022
- ✓ August 2, 2022
- ✓ February 7, 2023

Additionally, as stipulated in the CCR Rule, eight background groundwater sampling events were completed to for MW-11 and MW-12, added to the network on February 17, 2022. After installation and development, sampling was conducted on a five-week frequency. Data was collected from background wells MW-11 and MW-12 on the following dates:

- ✓ February 23, 2022
- ✓ March 30, 2022
- ✓ May 4, 2022
- ✓ June 8, 2022
- ✓ July 13, 2022
- ✓ August 17, 2022
- ✓ September 21, 2022
- ✓ October 26, 2022
- ✓ February 9, 2023

This Background Memorandum presents the updated background values calculated from the data collected from all four of the background glacial wells.

3.1.2 Bedrock Aquifer

As stipulated in the CCR Rule, eight background groundwater sampling events for bedrock aquifer wells were completed between March 2022 and February 2023. This update to the Background Memorandum presents the statistics developed for the bedrock aquifer from the eight events, completed on the following dates:

- ✓ April 28, 2022
- ✓ June 2, 2022
- ✓ July 7, 2022
- ✓ August 11, 2022
- ✓ September 15, 2022
- ✓ October 20, 2022
- ✓ November 22, 2022
- ✓ December 27, 2022
- ✓ February 9, 2023

3.2 Water Levels and Sample Collection

Water levels were recorded for each of the monitoring wells when groundwater quality samples were collected. Groundwater sample collection protocols followed the Groundwater Sample Collection Standard Operating Procedure (SOP) (HDR, 2020). Water samples were delivered under Chain of Custody to Merit Laboratories, Inc, in Lansing, Michigan. Only the upgradient wells are discussed in this report, for update and development of BTVs.

3.3 Analytical Testing

Groundwater samples were analyzed for the parameters shown in **Error! Reference source not found.**, which include all of the parameters in Appendices III and IV of CCR Rule Part §257 and Total Suspended Solids (TSS). In addition to the parameters listed in **Error! Reference source not found.**, on occasion, samples were analyzed for general water quality parameters including alkalinity, magnesium, potassium, and sodium.

Table 1. Constituents of Interest	
Appendix III Constituents	Appendix IV Constituents
Boron	Antimony
Calcium	Arsenic
Chloride	Barium
Fluoride	Beryllium
pH	Cadmium
Sulfate	Chromium
Total Dissolved Solids (TDS)	Cobalt
	Fluoride
	Lead
	Lithium
	Mercury
	Molybdenum
	Selenium
Additional Parameters	Thallium
Total Suspended Solids (TSS)	Radium-226 and -228 combined

4.0 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, 2023). Data validation was conducted to eliminate data that did not meet validation criteria and designate a data qualifier for data quality limitation discovered.

5.0 Water Levels and Flow Direction

Water levels were measured in the monitoring wells during each sample event. The potentiometric water contours for October 2023 are displayed in **Appendix A**, which illustrate

the groundwater wells chosen for development of BTVs for the site are located upgradient of the CCR units. Groundwater flow under the impoundments at Erickson are generally west to east.

6.0 Evaluation of Background Water Quality Data

The background analyses detailed in the section below pertain to samples collected from the background wells for the impoundments at Erickson.

6.1 Changes Since Previous Evaluation

Background water quality data for the Erickson impoundments were previously evaluated in the Statistical Methods Certification dated November 19, 2020. This section summarizes the changes that have occurred since then and discusses the potential effects of these changes.

6.1.1 Glacial Aquifer

Background threshold values for the glacial aquifer at Erickson were previously established using pooled data from wells MW-1 and MW-4 between April 2020 and October 2020. The data was updated to include data collected at these wells through February 2023 and data collected from wells MW-11 and MW-12, located upgradient of the impoundments installed February 17, 2022 (Section 3.1.1).

6.1.2 Bedrock Aquifer

Background threshold values for the bedrock aquifer were developed using pooled data from MW-11B and MW-12B between March and February 2023.

6.2 Constituents

6.2.1 Glacial Aquifer

The statistical analysis for the glacial aquifer pertains to the samples pooled from background monitoring wells MW-1, MW-4, MW-11, and MW-12 for constituents listed in Appendix III and IV of the CCR Rule. Outliers for this dataset were identified, however all values were used for the purposes of calculating the BTVs for this aquifer. Outliers are further discussed in **Section 6.3** below.

The number of samples for each constituent of interest ranges between 48 and 50 samples for the descriptive analysis of the background monitoring well results. Only non-filtered Appendix III and Appendix IV sample results were utilized for the statistical analysis. Supplemental parameters such as TSS, temperature, magnesium, potassium, and sodium were not analyzed.

Reporting units, number of observations, number of non-detects (NDs), and percentage of NDs below detection limits (BDL) for each constituent are listed in **Error! Reference source not found.**.

Table 2. Constituents – Glacial Aquifer (MW-1, MW-4, MW-11, MW-12)

Constituent	Unit	n	No. NDs	% NDs
Appendix III				
Boron	mg/L	48	0	0%
Calcium	mg/L	48	0	0%

Chloride	mg/L	48	0	0%
Fluoride	mg/L	48	48	100%
Sulfate	mg/L	48	9	19%
Total Dissolved Solids	mg/L	48	0	0%
pH, Field	su	50	0	0%
Appendix IV				
Fluoride	mg/L	50	50	100%
Antimony	mg/L	50	50	100%
Arsenic	mg/L	50	3	6.0%
Barium	mg/L	50	0	0%
Beryllium	mg/L	50	50	100%
Cadmium	mg/L	50	50	100%
Chromium	mg/L	50	49	98%
Cobalt	mg/L	50	50	100%
Lead	mg/L	50	50	100%
Lithium	mg/L	50	11	22%
Mercury	mg/L	50	50	100%
Molybdenum	mg/L	50	38	76%
Radium-226/228	pCi/L	50	0	0%
Selenium	mg/L	50	50	100%
Thallium	mg/L	50	50	100%

6.2.2 Bedrock Aquifer

The statistical analysis for the bedrock aquifer pertains to samples collected from background monitoring wells MW-11B and MW-12B between March 2022 and February 2023 for constituents listed in Appendix III and IV of the CCR Rule. No outliers were identified for the purpose of calculating the BTVs for this aquifer.

A total of 18 samples were included for the descriptive analysis of the background monitoring well results for the monitored constituents. Only non-filtered Appendix III and Appendix IV sample results were utilized for the statistical analysis. Supplemental parameters such as TSS, temperature, magnesium, potassium, and sodium were not analyzed.

Reporting units, number of observations, number of non-detects (NDs), and percentage of NDs below detection limits (BDL) for each constituent are listed in **Error! Reference source not found.3**.

Table 3. Constituents – Bedrock Aquifer (MW-11B, MW-12B)				
Constituent	**Unit**	**n**	**No. BDLs**	**% BDL**
Appendix III				
Boron	mg/L	18	0	0%
Calcium	mg/L	18	0	0%
Chloride	mg/L	18	18	100%
Fluoride	mg/L	18	18	100%
Sulfate	mg/L	18	18	100%

Total Dissolved Solids	mg/L	18	0	0%
pH, Field	su	18	0	0%
Appendix IV				
Fluoride	mg/L	18	18	100%
Antimony	mg/L	18	18	100%
Arsenic	mg/L	18	9	50%
Barium	mg/L	18	0	0%
Beryllium	mg/L	18	18	100%
Cadmium	mg/L	18	18	100%
Chromium	mg/L	18	18	100%
Cobalt	mg/L	18	18	100%
Lead	mg/L	18	18	100%
Lithium	mg/L	18	0	0%
Mercury	mg/L	18	17	94%
Molybdenum	mg/L	18	13	72%
Radium-226/228	pCi/L	18	0	0%
Selenium	mg/L	18	18	100%
Thallium	mg/L	18	18	100%

6.3 Outliers

Outliers are values that are not representative of the population from which they are sampled. The data sets were screened for outliers using the Dixon's outlier test or Rosner's outlier test; the Dixon's test is used for sample sizes smaller than 25 and the Rosner's outlier test is used for sample sizes 25 and above. Both tests are conducted with NDs excluded and using a significance level of 1 percent.

Quality control conducted on the sampling protocols and laboratory results did not indicate reasons for the noted concentration of the outliers on the dates they were sampled. No unusual weather or anthropogenic activity occurred which could explain the higher concentrations.

For the purposes of estimating background field conditions, all values will be used for constituents flagged in the outlier tests except for one outlier detected for pH of 7.87 su on October 19, 2022. This value was not representative of pH field conditions measured on other dates and was therefore filtered from subsequent analysis. As the sample sizes per well are small (approximately 8 to 15), from a statistical perspective, the variability in the concentrations of these constituents will change as additional samples are obtained, approaching the true underlying variability of concentrations in groundwater in the vicinity of the background well. With the site pooling of wells to represent background field conditions, the samples when aggregated can have statistical outliers due to the differences in well (i.e., spatial) variability, and the fact that the pooled sample distribution is less likely to follow a normal distribution. While Sections 6.3.1 and 6.3.2 display the outlier analysis findings, the values flagged as statistical outliers are valid concentrations from the vicinity of the groundwater well from where they are sampled. All values were retained in the dataset to calculate background, except for the one outlier for pH of 7.87 su on October 19, 2022. The distributions for constituents flagged

in the outlier tests will continue to be monitored as sampling events are added to the background.

6.3.1 Glacial Aquifer

In the analysis of glacial monitoring wells, sulfate, pH, arsenic, barium, iron, and nickel had outliers. Outliers were identified for sulfate on nine dates from MW-12, for pH on October 19, 2020 from MW-4, for arsenic on nine dates from MW-1, for barium on nine dates from MW-12, and for nickel on October 26, 2022 from MW-11. Identified outliers are detailed in **Table 4** and plots for each data set containing an outlier are included in **Figure 3** to **Figure 6** below.

Table 4. Outliers at the 1% Significance Level – Glacial						
Constituent	**Unit**	**n**	**No. NDs**	**% NDs**	**Date**	**Value**
Appendix III						
Sulfate	mg/L	48	9	19%	2/23/2022	344
Sulfate	mg/L	48	9	19%	3/30/2022	308
Sulfate	mg/L	48	9	18%	5/4/2022	283
Sulfate	mg/L	48	9	18%	8/17/2022	256
Sulfate	mg/L	48	9	19%	9/21/2022	255
Sulfate	mg/L	48	9	19%	6/8/2022	254
Sulfate	mg/L	48	9	19%	10/26/2022	252
Sulfate	mg/L	48	9	19%	7/13/2022	250
Sulfate	mg/L	48	9	19%	2/9/2023	207
pH, Field	su	50	0	0%	19/10/2020	7.87
Appendix IV						
Arsenic	mg/L	50	3	6%	8/17/2022	0.021
Arsenic	mg/L	50	3	6%	9/21/2022	0.021
Arsenic	mg/L	50	3	6%	5/4/2022	0.02
Arsenic	mg/L	50	3	6%	10/26/2022	0.02
Arsenic	mg/L	50	3	6%	7/13/2022	0.019
Arsenic	mg/L	50	3	6%	2/23/2022	0.018
Arsenic	mg/L	50	3	6%	3/30/2022	0.018
Arsenic	mg/L	50	3	6%	6/8/2022	0.018
Arsenic	mg/L	50	3	6%	2/9/2023	0.017
Barium	mg/L	50	0	0%	10/26/2022	0.057
Barium	mg/L	50	0	0%	2/9/2023	0.058
Barium	mg/L	50	0	0%	6/8/2022	0.064
Barium	mg/L	50	0	0%	8/17/2022	0.064
Barium	mg/L	50	0	0%	9/21/2022	0.064
Barium	mg/L	50	0	0%	7/13/2022	0.067
Barium	mg/L	50	0	0%	2/23/2022	0.069
Barium	mg/L	50	0	0%	5/4/2022	0.07
Barium	mg/L	50	0	0%	3/30/2022	0.074

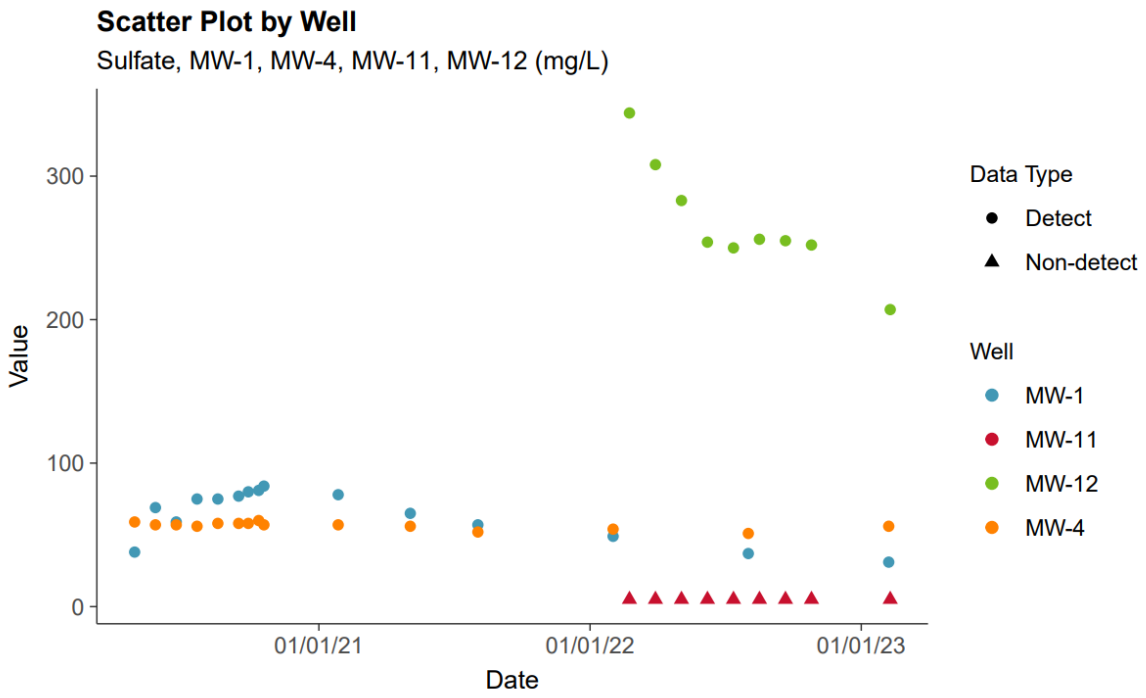


Figure 3. Scatter Plot by Well, Sulfate, MW-1, MW-4, MW-11 and MW-12

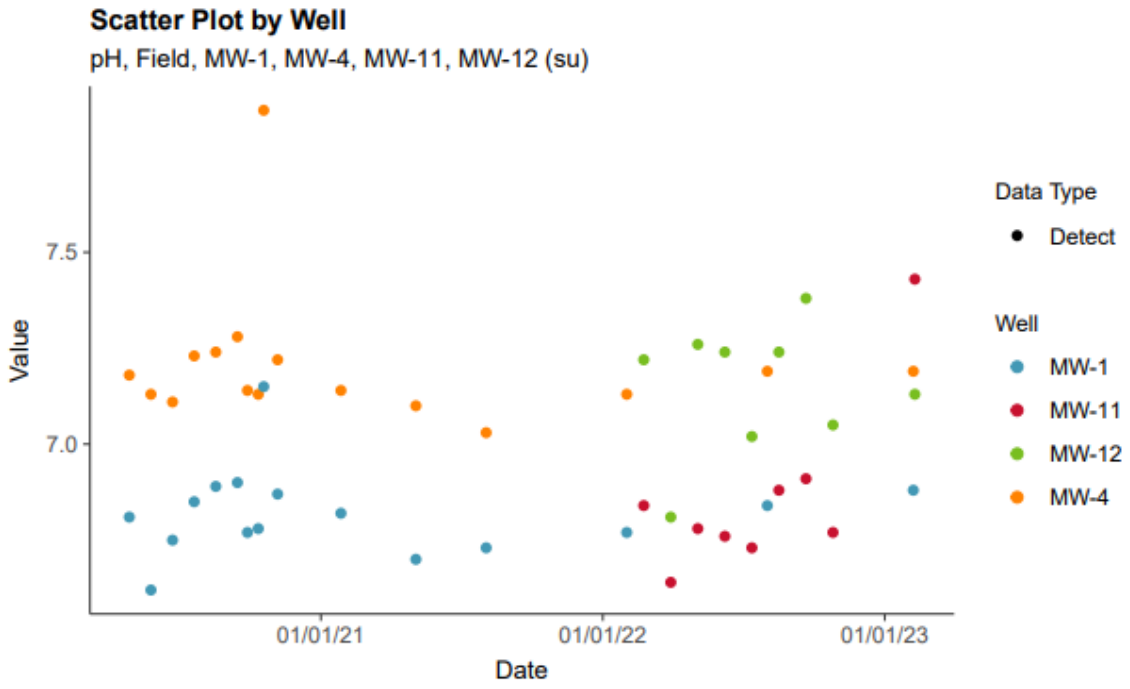


Figure 4. Scatter Plot by Well, pH (Field), MW-1, MW-4, MW-11 and MW-12

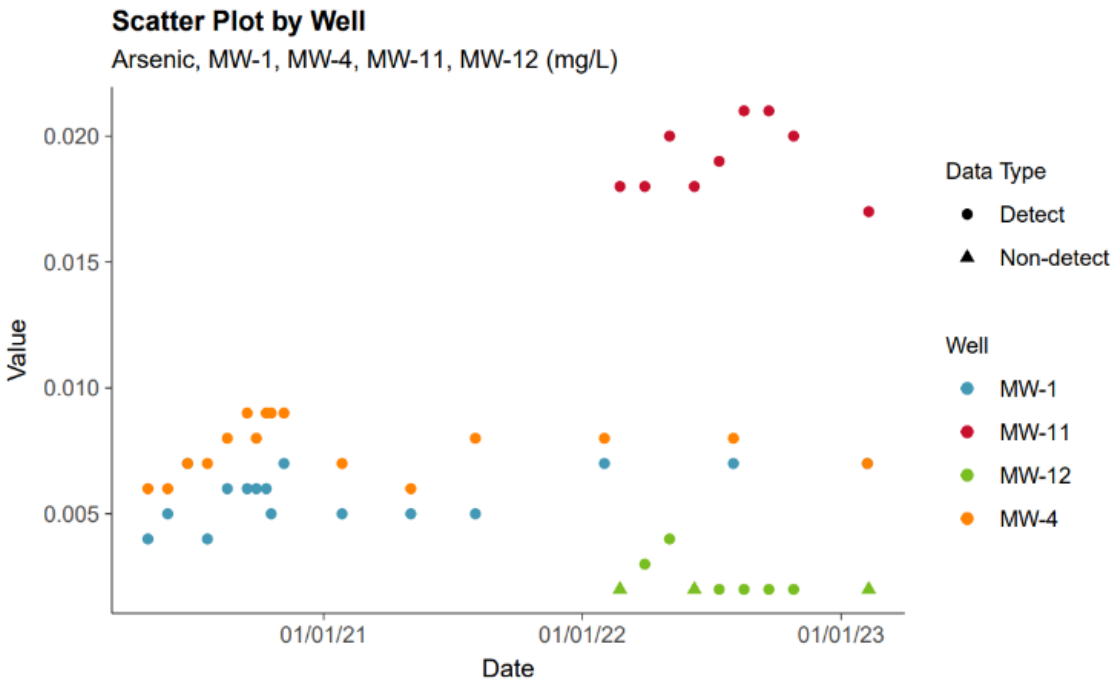


Figure 5. Scatter Plot by Well, Arsenic, MW-1, MW-4, MW-11 and MW-12

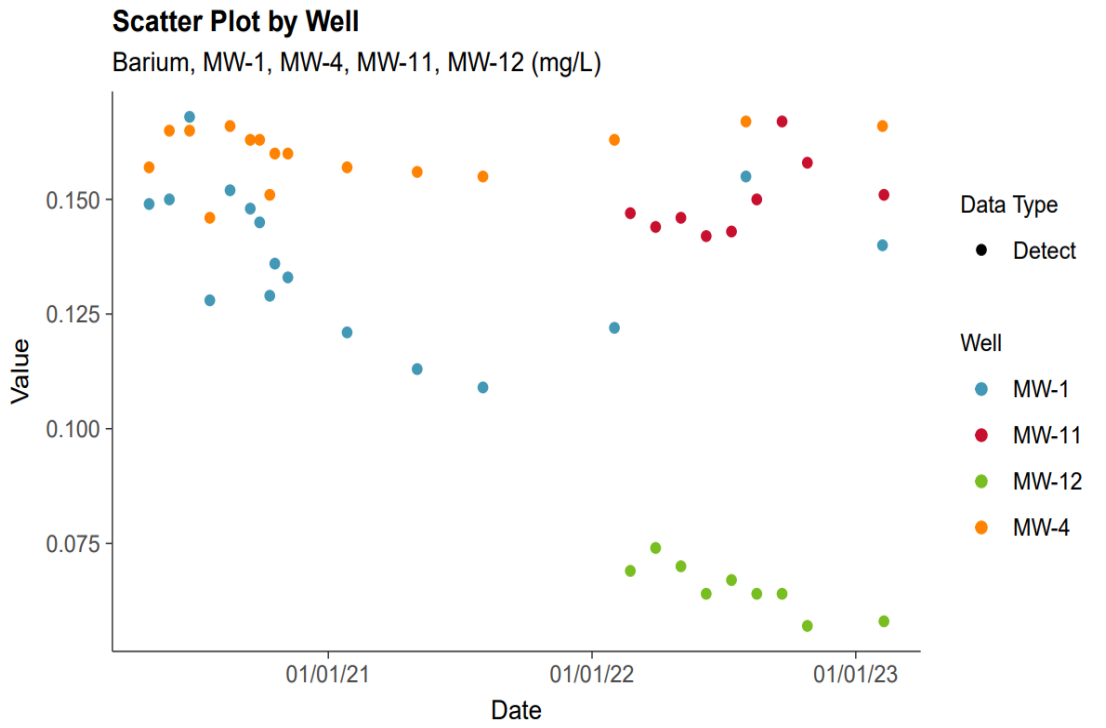


Figure 6. Scatter Plot by Well, Barium, MW-1, MW-4, MW-11 and MW-12

6.3.2 Bedrock Aquifer

In the analysis, no outliers were detected for any constituents of interest at MW-11B or MW-12B.

6.4 Data Distributions

Groundwater data were fit to known distribution models using goodness-of-fit (GOF) tests. GOF tests were not conducted on data sets with less than four detected values due to insufficient data. For purposes of estimating background concentration levels, nonparametric methods will be used on data sets with less than four detected values or more than 50 percent non-detects.

6.4.1 Glacial Aquifer

Appendix III constituents, boron, calcium, fluoride, sulfate, and field pH will be analyzed using nonparametric methods. Chloride and total dissolved solids are best described with a with normal and gamma distributions respectively. All Appendix IV constituents will be analyzed with nonparametric methods. All Part 115 constituents will be analyzed with nonparametric methods. Except for iron, all Part 115 constituents had nondetects over 50%. Additional sampling rounds are needed to determine if these constituents' data sets are better described using parametric distributions such as normal, lognormal, or gamma.

6.4.2 Bedrock Aquifer

All Appendix III constituents, with the exception of pH (field), will be analyzed using nonparametric methods. The constituent pH (field) is best described using a normal distribution. The Appendix IV constituents, fluoride, antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, mercury, molybdenum, selenium, and thallium, all had 50% or greater nondetects. These constituents and all other Appendix IV constituents, except lithium and radium-226/228, will be analyzed using nonparametric methods. Lithium and radium-226/228 are best described with a normal distribution. All Part 115 constituents will be analyzed using nonparametric methods.

6.5 Seasonality

Temporal variability in groundwater samples can be due to seasonal effects (i.e., seasonality) or temporal effects (i.e., autocorrelation or trends). 40 C.F.R. § 257.93(g)(6) requires that, if necessary, the statistical method must include procedures to control or correct for seasonal as well as temporal correlation in the data.

Groundwater data may exhibit predictable recurring increases and decreases in concentrations, termed seasonality. Constituents are analyzed for seasonality using the Kruskal-Wallis, ANOVA, and log-transformed ANOVA tests.

6.5.1 Glacial Aquifer

The glacial data contains constituents with 10 winter samples, 10 spring samples, 16 summer samples, and 12-14 fall samples. A minimum of eight sampling events per season is recommended to test for seasonal differences but at least twenty sampling events per season are recommended to de-seasonalize the data. Constituents will continue to be analyzed for

seasonality as additional sampling is conducted to determine if samples are affected by seasonality, and de-seasonalized if necessary, as additional sampling events become available. Of the groups that have sufficient sampling events to detect seasonality, radium-226/228 is identified as having seasonal trends at the 1% confidence level.

6.5.2 Bedrock Aquifer

The bedrock data contain 3 winter samples, 4 spring samples, 5 summer samples, and 6 fall samples. The sample sizes per season at the combined wells do not allow for accurate statistical analysis of seasonality; a minimum of eight sampling events (that is, eight distinct dates) per season is recommended to test for seasonal differences but at least twenty sampling events per season are recommended in order to de-seasonalize the data. Constituents will be analyzed for seasonality as additional sampling is conducted in order to determine if samples are affected by seasonality.

6.6 Autocorrelation

Autocorrelation occurs when values of a single variable data set are correlated over successive (i.e., lagged) time intervals. A minimum of at least fifty samples is recommended for autocorrelation tests using conventional estimators to perform well in assessing the test statistic's probability value. Constituents will be analyzed for autocorrelation as additional sampling is conducted.

6.7 Trends

A key assumption for hypothesis testing is that sample data are stationary through time, free of any trends. Constituents that follow a parametric distribution and do not demonstrate seasonality were analyzed for trends within the data set using a lognormal Maximum Likelihood Estimate (MLE) regression. The Mann-Kendall test and Theil-Sen slope was used to analyze linear trends for constituents that could not be fit to any of the three tested distributions. The Mann-Kendall test is suitable for data sets with no seasonality and only one unique MDL.

Results for both parametric and nonparametric trend tests are reported in **Table 5** and **Table 6**. Constituents with more 50% or more non-detects are not tested for trends given limited information in the datasets. For those datasets with less than 50% non-detects and are best described using nonparametric distribution assumptions, only those datasets with one unique MDL value are tested using the Mann-Kendall test given the test's assumptions. For parametric tests, the "Slope" column contains the MLE slope on a log-linear scale with respect to time (measured in days), and the "p-value" column contains the p-value associated with that slope. For nonparametric tests, the "Slope" column contains the Theil-Sen slope estimator, and the "p-value" column contains the p-value from the Mann-Kendall test. The "Trend" column indicates upward or downward trends when the p-value is below 1%.

6.7.1 Glacial Aquifer

At the 1% significance level, no upward trends were identified for any constituents of interest.

Table 5. Trend Tests at the 1% Significance Level – Glacial Aquifer								
Constituent	**Unit**	**n**	**No. BDL**	**% BDL**	**Method**	**Slope**	***p-value***	**Trend**
Appendix III								
Boron	mg/L	48	0	0%	MK	0	0.795	↔
Calcium	mg/L	48	0	0%	MK	-0.00210	0.831	↔
Chloride	mg/L	48	0	0%	Lognormal MLE	0.0000991	0.134	↔
Sulfate	mg/L	48	9	19%	MK	-0.00917	0.189	↔
Total Dissolved Solids	mg/L	48	0	0%	Lognormal MLE	0.000157	0.128	↔
pH, Field	su	50	0	0%	MK	0.0000381	0.598	↔
Appendix IV								
Arsenic	mg/L	50	8	15%	MK	0	0.473	↔
Barium	mg/L	50	3	0%	MK	-0.0000274	0.007	↓
Radium-226/228	pCi/L	50	0	0%	MK	0.000602	0.165	↔
Radium-226/228	pCi/L	46	0	0%	MK	0.000543	0.319605	↔

6.7.2 Bedrock Aquifer

At the 1% significance level, no upward trends were identified for any constituents of interest.

Table 6. Trend Tests at the 1% Significance Level – Bedrock Aquifer								
Constituent	**Unit**	**n**	**No. BDL**	**% BDL**	**Method**	**Slope**	**p-value**	**Trend**
Appendix III								
Boron	mg/L	18	0	0%	MK	0.000288	0.649	↔
Calcium	mg/L	18	0	0%	MK	0.0144	0.053	↔
Total Dissolved Solids	mg/L	18	0	0%	MK	-0.0881	0.011	↔
pH, Field	su	18	0	0%	Lognormal MLE	-0.000176	0.015	↔
Appendix IV								
Barium	mg/L	18	0	0%	MK	-0.00000166	0.819	↔
Lithium	mg/L	18	0	0%	Lognormal MLE	-0.000141	0.778	↔
Radium-226/228	pCi/L	18	0	0%	Lognormal MLE	0.00360	0.011	↔

6.8 Spatial Variability

An assumption when deriving background groundwater quality is that concentrations of constituents measured at the background wells over time when pooled represent an estimate of overall well field conditions for those constituents. This assumption implies the variability of the

concentrations per well is comparable and the values are independent of each other. A means to test this assumption is to study the spatial variability of the observations across the wells.

Spatial variability exists when the distribution or pattern of concentrations changes between well locations, either from natural or anthropogenic factors. To evaluate the potential for spatial variability in background wells, time series plots of concentrations were used for each constituent at each well (**Appendix C – Background Wells MW-11B and MW-12B & Appendix D Background Wells MW-1, -4, -11, -12**). Visual cues from the observed variability of concentrations across the wells per constituent were corroborated using both parametric and nonparametric ANOVA tests where appropriate that tested if differences in mean or median concentrations were statistically significant.

As reported below, spatial variability was detected in both the bedrock and glacial datasets. However, in cases where spatial variability was detected, nonparametric methods were used to calculate the background threshold values. Nonparametric methods avoid the use of erroneous assumptions regarding the underlying distribution that may arise when samples from wells with spatial variability are pooled. In cases where parametric methods were still used (glacial: chloride, molybdenum, total dissolved solids; bedrock: pH (field), lithium, radium-226/228), the averages across wells were not meaningfully different, and the range and variability of the pooled data were well approximated by a parametric distribution. For these reasons, further analysis to mitigate the impact of spatial variabilities such as redefining the background well network or sequestering sets of sampling events from analysis were not conducted.

6.8.1 Glacial Aquifer

Spatial variability was present in the data for 12 of the 27 constituents at the 1% level of significance based on the Kruskal-Wallis test for differences in medians (**Appendix C – Background Wells MW-11B and MW-12B, Table 8).** Potential spatial variability between background wells MW-1, MW-4, MW-11, and MW-12 was identified for twelve (12) constituents (boron, calcium, chloride, sulfate, total dissolved solids, pH (Field), arsenic, barium, lithium, molybdenum, iron, and nickel).

The constituents with a high level of nondetects that had sufficient detected data from which to test spatial variability were molybdenum (76%) and nickel (80%). Based solely on detected data, spatial variability was not noted at the 1% level of significance for either molybdenum or nickel. The constituents, fluoride, antimony, beryllium, cadmium, cobalt, mercury, selenium, thallium, copper, silver, and vanadium had 100% of their values as nondetects. Finally, chromium had over 90% of their values as nondetects and hence had insufficient detected data on which to test for spatial variability.

Figure 7 demonstrates an example of a constituent with 6% nondetects, arsenic, that exhibited spatial variability across the wells.

While statistically different well averages for the aforementioned constituents are flagged using the Kruskal-Wallis test at the 1% level of significance, the sample concentrations are approximately within an order of magnitude of each other and reflect the natural variability of the

concentrations for the constituents of interest across the background field area (see **Appendix E Background Wells MW-1, MW-4, MW-11 and MW-12, Scatter Plots**).

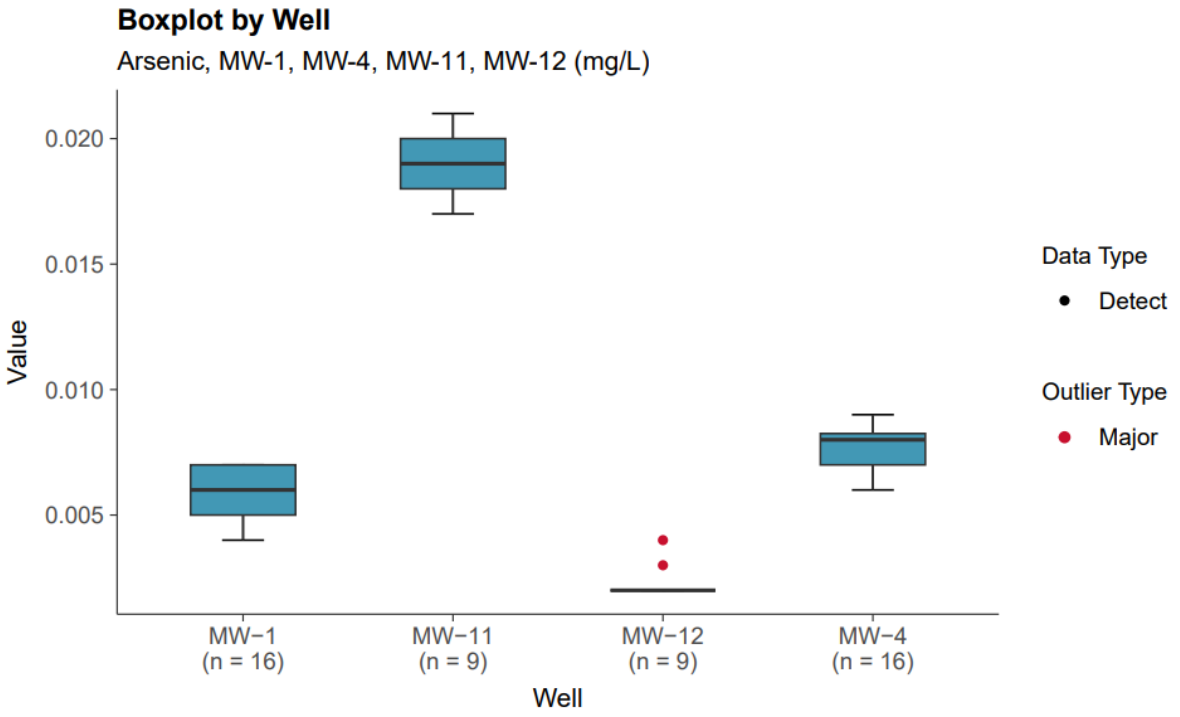


Figure 7. Boxplot by Well, Arsenic, MW-1, MW-4, MW-11 and MW-12

6.8.2 Bedrock Aquifer

The nonparametric ANOVA Kruskal-Wallis test including nondetects was the appropriate test to reference as pooling the data across the two wells yielded samples that could not be clearly described by parametric distributions. Spatial variability was present in the data for 8 of the 27 constituents at the 1% level of significance based on the Kruskal-Wallis test for differences in medians (**Appendix – B Background Wells MW-11B and MW-12B , Table 8).** Potential spatial variability between background wells MW-11B and MW-12B was identified for eight constituents (boron, calcium, total dissolved solids, pH (Field), arsenic, barium, lithium, iron). The remaining constituents that did not have evidence of spatial variability consistently had over half the observations as nondetects.

The constituents with a high level of nondetects that had sufficient detected data from which to test spatial variability were arsenic (50%) and molybdenum (72%). Based solely on detected data, spatial variability was not noted at the 1% level of significance for either arsenic or molybdenum. The constituents chloride, fluoride, sulfate, antimony, beryllium, cadmium, chromium, cobalt, lead, selenium, thallium, copper, silver, vanadium had 100% of their values as nondetects. Nickel, zinc, and mercury each had over 90% nondetects.

Figure 8 demonstrates an example of a constituent with 100% detected data, boron, that exhibited spatial variability across the wells. While statistically different well averages for the

aforementioned constituents are flagged using the Kruskal-Wallis test at the 1% level of significance, the sample concentrations are approximately within an order of magnitude of each other and reflect the natural variability of the concentrations for the constituents of interest across the background field area (see **Appendix D Background Wells MW-11B, MW-12B, Scatter Plots**).

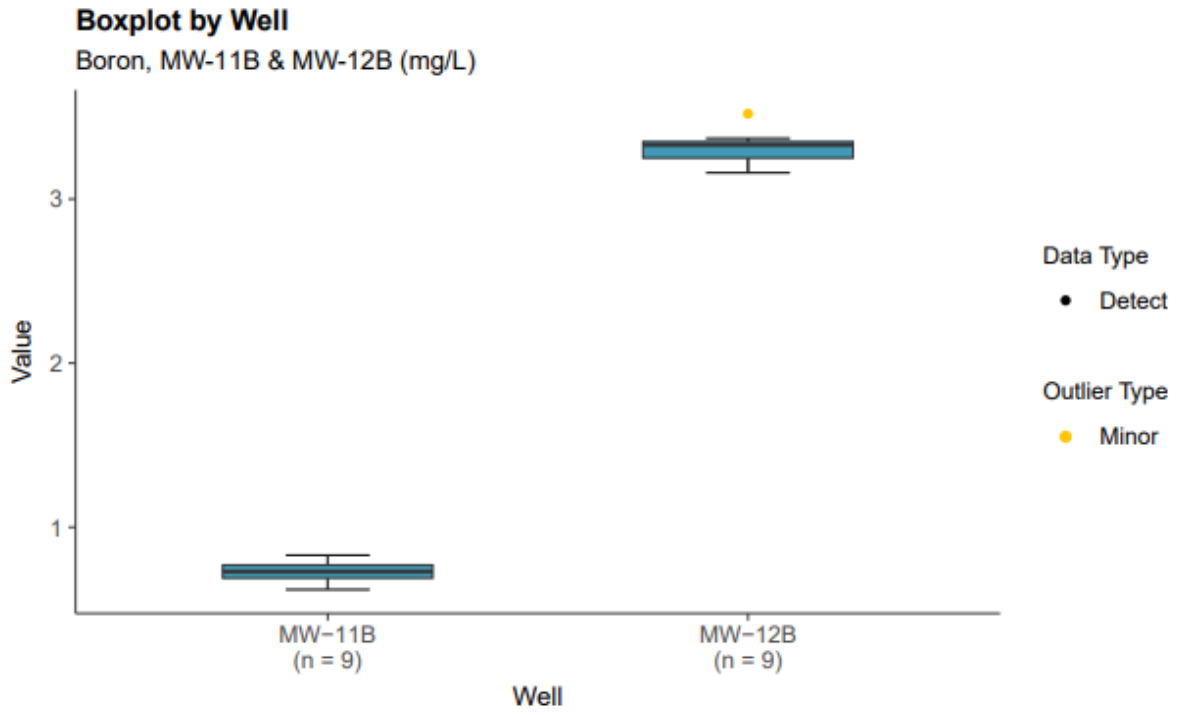


Figure 8. Boxplot by Well, Boron, MW-11B and MW-12B

6.9 Summary of Statistical Analysis

Table 7 and **Error! Reference source not found.** contain key summaries of the outlier tests, distribution tests, and trend tests for each constituent. A "✓" symbol denotes that the constituent was flagged by the indicated test. Additional sampling is necessary to determine the validity of outlier samples, distributional assumptions, and stationarity assumptions.

Table 7. Summary of Statistical Analysis – Glacial Aquifer			
Constituent	**Outliers**	**Nonparametric**	**Trend**
Appendix III			
Boron		✓	
Calcium		✓	
Chloride			
Fluoride		✓	
Sulfate	✓	✓	
Total Dissolved Solids			
pH, Field	✓	✓	
Appendix IV			
Fluoride		✓	
Antimony		✓	
Arsenic	✓	✓	
Barium	✓	✓	✓
Beryllium		✓	
Cadmium		✓	
Chromium		✓	
Cobalt		✓	
Lead		✓	
Lithium			
Mercury		✓	
Molybdenum		✓	
Radium-226/228		✓	
Selenium		✓	
Thallium		✓	
Selenium		✓	
Thallium		✓	

✓Constituent was flagged during statistical analysis

Table 8. Summary of Statical Analysis – Bedrock Aquifer			
Constituent	**Outliers**	**Nonparametric**	**Trend**
Appendix III			
Boron		✓	
Calcium		✓	
Chloride		✓	
Fluoride		✓	
Sulfate		✓	
Total Dissolved Solids		✓	
pH, Field			
Appendix IV			
Fluoride		✓	
Antimony		✓	
Arsenic		✓	
Barium		✓	
Beryllium		✓	
Cadmium		✓	
Chromium		✓	
Cobalt		✓	
Lead		✓	
Lithium			
Mercury		✓	
Molybdenum		✓	
Radium-226/228			
Selenium		✓	
Thallium		✓	

✓Constituent was flagged during statistical analysis

6.10 Detection Monitoring Background Threshold Values

Background threshold values (BTVs) were estimated to represent background concentration levels for future use in evaluating whether downgradient samples exhibit statistically significant increases (SSIs) during detection monitoring. The BTVs are the upper prediction limits (UPLs) of the background data, which are one of the statistical methods specified under 40 C.F.R. § 257.93(f)(3) for evaluating groundwater monitoring data. The number of verification samples and the significance levels associated with each UPL are chosen such that the site-wide false positive rate over all comparisons is no more than 10 percent and such that the power of each test exceeds the EPA Reference Power Curve (ERPC) at either 3 standard deviations above background, 4 standard deviations above background, or both.

Note that for pH, both the UPL and the lower prediction limit (LPL) are of interest as pH values above the UPL or below the LPL at the downgradient wells can be considered statistically significant.

For constituents that do not have any detected values, the maximum MDL is chosen as the BTV and the double quantification rule (DQR) is used to evaluate whether there is an SSI; that is, an SSI is registered for a downgradient well-constituent pair if there are two consecutive detections above the BTV. These constituents are excluded from the determination of target false positive rates.

Error! Reference source not found. and **Error! Reference source not found.** contain the estimated UPLs for Appendix III constituents for bedrock and glacial sediment layers. These UPLs are used during detection monitoring of the CCR Rule's implementation.

6.10.1 Glacial Aquifer

The number of retests and the rank of the order statistic for nonparametric UPLs are chosen such that the significance level does not exceed the per-constituent false positive rate of 0.0174, and such that the test power exceeds the EPA Reference Power Curve (ERPC) at either 3 standard deviations (SDs) above background, 4 SDs above background, or both. The maximum per-constituent false positive rate is computed based on a site-wide false positive rate of 10% subdivided across six constituents with at least one detected sample.

For parametric (normal, lognormal, or gamma) UPLs, the number of retests and the value of the K factor are chosen such that the significance level does not exceed the per-test false positive rate of 0.00110, and such that the test power exceeds the ERPC at either 3 SDs above background, 4 SDs above background, or both. The maximum per-test false positive rate is computed based on a site-wide false positive rate of 10% subdivided across six constituents and 16 downgradient wells.

Table 9 contains the estimated UPLs for Appendix III constituents for glacial sediment layers. These UPLs are used during detection monitoring of the CCR Rule's implementation.

Table 9. Background Threshold Values for Detection Monitoring – Glacial Aquifer							
Constituent	**Unit**	**n**	**No. BDL**	**% BDL**	**Recommended distribution**	**No. of verification samples**	**BTV (UPL)**
Appendix III							
Boron	mg/L	48	0	0%	Nonparametric	2	0.440
Calcium	mg/L	48	0	0%	Nonparametric	2	173
Chloride	mg/L	48	0	0%	Normal	0	106
Fluoride	mg/L	48	48	100%	Nonparametric	2	1.00*
Sulfate	mg/L	48	9	19%	Nonparametric	2	283
Total Dissolved Solids	mg/L	48	0	0%	Gamma	0	1,605
pH, Field, LPL	su	49	0	0%	Nonparametric	2	6.70
pH, Field, UPL	su	49	0	0%	Nonparametric	2	7.28

*Constituent is 100% non-detects. Double Quantification Rule (DQR) is recommended for determining if an exceedance has occurred.

6.10.2 Bedrock Aquifer

The number of retests and the rank of the order statistic for nonparametric UPLs are chosen such that the significance level does not exceed the per-constituent false positive rate of 0.0259, and such that the test power exceeds the EPA Reference Power Curve (ERPC) at either 3 standard deviations (SDs) above background, 4 SDs above background, or both. The maximum per-constituent false positive rate is computed based on a site-wide false positive rate of 10% subdivided across the four constituents that had at least one detected sample.

For parametric (normal, lognormal, or gamma) UPLs, the number of retests and the value of the K factor are chosen such that the significance level does not exceed the per-test false positive rate of 0.0053, and such that the test power exceeds the ERPC at either 3 SDs above background, 4 SDs above background, or both. The maximum per-test false positive rate is computed based on a site-wide false positive rate of 10% subdivided across four constituents and five downgradient wells.

Table 10 contains the estimated UPLs for Appendix III constituents for bedrock sediment layers. These UPLs are used during detection monitoring of the CCR Rule's implementation.

Table 10. Background Threshold Values for Detection Monitoring – Bedrock Aquifer							
Constituent	**Unit**	**n**	**No. BDL**	**% BDL**	**Recommended distribution**	**No. of verification samples**	**BTV (UPL)**
Appendix III							
Boron	mg/L	18	0	0%	Nonparametric	2	3.52
Calcium	mg/L	18	0	0%	Nonparametric	2	69.6
Chloride	mg/L	18	18	100%	Nonparametric	2	5.0*
Fluoride	mg/L	18	18	100%	Nonparametric	2	1.0*
Sulfate	mg/L	18	18	100%	Nonparametric	2	5.0*
Total Dissolved Solids	mg/L	18	0	0%	Nonparametric	2	380
pH, Field, LPL	su	18	0	0%	Normal	0	6.52
pH, Field, UPL	su	18	0	0%	Normal	0	8.47

*Constituent is 100% non-detects. Double Quantification Rule (DQR) is recommended for determining if an exceedance has occurred.

6.11 Assessment Monitoring Background Threshold Values

For the purpose of estimating background threshold values (BTVs) to represent background concentration levels and for future use in evaluating whether samples selected from downgradient wells exhibit statistically significant increases (SSIs) during assessment monitoring, all background samples per constituent from background wells in their respective aquifer were used.

6.11.1 Glacial Aquifer

The number of retests and the rank of the order statistic for nonparametric UPLs are chosen such that the significance level does not exceed the per-constituent false positive rate of 0.0105, and such that the test power exceeds the EPA Reference Power Curve (ERPC) at either 3 standard deviations (SDs) above background, 4 SDs above background, or both. The maximum per-constituent false positive rate is computed based on a site-wide false positive rate of 10% subdivided across ten constituents with at least one detected value.

For parametric (normal, lognormal, or gamma) UPLs, the number of retests and the value of the K factor are chosen such that the significance level does not exceed the per-test false positive rate of 0.0021, and such that the test power exceeds the ERPC at either 3 SDs above background, 4 SDs above background, or both. The maximum per-test false positive rate is computed based on a site-wide false positive rate of 10% subdivided across ten constituents and five downgradient wells.

Table 11. Background Threshold Values for Assessment Monitoring – Glacial Aquifer

Constituent	Units	n	NDs	% NDs	Recommended Distribution	No. of Verification Samples	BTV (UPL)
Appendix III							
Boron	mg/L	48	0	0%	Nonparametric	2	0.450
Calcium	mg/L	48	0	0%	Nonparametric	2	180
Chloride	mg/L	48	0	0%	Normal	1	92.9
Fluoride	mg/L	48	48	100%	Nonparametric	2	1.00*
Sulfate	mg/L	48	9	18%	Nonparametric	2	308
Total Dissolved Solids	mg/L	48	0	0%	Gamma	1	1,233
pH, Field, LPL	su	49	0	0%	Nonparametric	2	6.64
pH, Field, UPL	su	49	0	0%	Nonparametric	2	7.38
Appendix IV							
Fluoride	mg/L	50	50	100%	Nonparametric	2	1.00*
Antimony	mg/L	50	50	100%	Nonparametric	2	0.00500*
Arsenic	mg/L	50	3	6.0%	Nonparametric	2	0.0210
Barium	mg/L	50	0	0.0%	Nonparametric	2	0.167
Beryllium	mg/L	50	50	100%	Nonparametric	2	0.00100*
Cadmium	mg/L	50	50	100%	Nonparametric	2	0.00500*
Chromium	mg/L	50	49	98.0%	Nonparametric	2	0.00500
Cobalt	mg/L	50	50	100%	Nonparametric	2	0.00500*

Lead	mg/L	50	50	100%	Nonparametric	2	0.00300*
Lithium	mg/L	50	11	22.0%	Nonparametric	2	0.0390
Mercury	mg/L	50	50	100%	Nonparametric	2	0.000200*
Molybdenum	mg/L	50	38	76.0%	Nonparametric	2	0.0230
Radium-226/228	pCi/L	50	0	0.0%	Nonparametric	2	4.03
Selenium	mg/L	50	50	100%	Nonparametric	2	0.00500*
Thallium	mg/L	50	50	100%	Nonparametric	2	0.00200*

*Constituent is 100% non-detects. Double Quantification Rule (DQR) is recommended for determining if an exceedance has occurred.

6.11.2 Bedrock Aquifer

The number of retests and the rank of the order statistic for nonparametric UPLs are chosen such that the significance level does not exceed the per-constituent false positive rate of 0.0105, and such that the test power exceeds the EPA Reference Power Curve (ERPC) at either 3 standard deviations (SDs) above background, 4 SDs above background, or both. The maximum per-constituent false positive rate is computed based on a site-wide false positive rate of 10% subdivided across ten constituents with at least one detected value.

For parametric (normal, lognormal, or gamma) UPLs, the number of retests and the value of the K factor are chosen such that the significance level does not exceed the per-test false positive rate of 0.0021, and such that the test power exceeds the ERPC at either 3 SDs above background, 4 SDs above background, or both. The maximum per-test false positive rate is computed based on a site-wide false positive rate of 10% subdivided across ten constituents and five downgradient wells.

Table 12. Background Threshold Values for Assessment Monitoring – Bedrock Aquifer

Constituent	Units	n	NDs	% NDs	Recommended Distribution	No. of Verification Samples	BTV (UPL)
Appendix III							
Boron	mg/L	18	0	0%	Nonparametric	2	3.52
Calcium	mg/L	18	0	0%	Nonparametric	2	69.6
Chloride	mg/L	18	18	100%	Nonparametric	2	5.00*
Fluoride	mg/L	18	18	100%	Nonparametric	2	1.00*
Sulfate	mg/L	18	18	100%	Nonparametric	2	5.00*
Total Dissolved Solids	mg/L	18	0	0%	Nonparametric	2	380
pH, Field, LPL	su	18	0	0%	Normal	1	6.40
pH, Field, UPL	su	18	0	0%	Normal	1	8.59
Appendix IV							
Fluoride	mg/L	18	18	100%	Nonparametric	2	1.00*
Antimony	mg/L	18	18	100%	Nonparametric	2	0.00500*
Arsenic	mg/L	18	9	50%	Nonparametric	2	0.00900
Barium	mg/L	18	0	0%	Nonparametric	2	0.0810
Beryllium	mg/L	18	18	100%	Nonparametric	2	0.00100*
Cadmium	mg/L	18	18	100%	Nonparametric	2	0.000500*

Chromium	mg/L	18	18	100%	Nonparametric	2	0.00500*
Cobalt	mg/L	18	18	100%	Nonparametric	2	0.00500*
Lead	mg/L	18	18	100%	Nonparametric	2	0.00300*
Lithium	mg/L	18	0	0%	Normal	1	0.0495
Mercury	mg/L	18	17	94%	Nonparametric	2	0.000200
Molybdenum	mg/L	18	13	72%	Nonparametric	2	0.0110
Radium-226/228	pCi/L	18	0	0%	Normal	1	4.18
Selenium	mg/L	18	18	100%	Nonparametric	2	0.0500*
Thallium	mg/L	18	18	100%	Nonparametric	2	0.00200*

*Constituent is 100% non-detects. Double Quantification Rule (DQR) is recommended for determining if an exceedance has occurred.

6.12 Groundwater Protection Standards for Assessment Monitoring

The Unified Guidance has recommended that the upper tolerance limit (UTL) be used as a fixed value similar to a groundwater protection standard for constituents for which MCLs have not been established (USEPA, 2009). 40 C.F.R. § 257.95(h) requires that if no standard exists, then the background concentration is used. As such, UTLs are used during development of the Groundwater Protection Standard for the assessment monitoring program.

UTLs are estimated using a coverage proportion of 95% and a confidence level of 95%. However, nonparametric rank-based UTLs are unable to achieve both 95% coverage and 95% confidence when the sample size is below 60. In this case, nonparametric UTLs are chosen to maximize coverage while maintaining a 95% confidence level, as recommended by the Unified Guidance.

Table 13 and **Table 14** contain the estimated UTLs for Appendix IV constituents for glacial and bedrock sediment layers, respectively.

Table 13. Upper Tolerance Limits with 95% Coverage and 95% Confidence – Glacial Aquifer

Constituent	Unit	n	No. BDL	% BDL	Recommended distribution	UTL
Appendix IV						
Fluoride	mg/L	50	50	100%	Nonparametric	1.00*
Antimony	mg/L	50	50	100%	Nonparametric	0.00500*
Arsenic	mg/L	50	3	6%	Nonparametric	0.0210
Barium	mg/L	50	0	0%	Nonparametric	0.168
Beryllium	mg/L	50	50	100%	Nonparametric	0.00100*
Cadmium	mg/L	50	50	100%	Nonparametric	0.00500*
Chromium	mg/L	50	49	98%	Nonparametric	0.00500
Cobalt	mg/L	50	50	100%	Nonparametric	0.00500*
Lead	mg/L	50	50	100%	Nonparametric	0.00300*
Lithium	mg/L	50	11	22%	Nonparametric	0.0410

Mercury	mg/L	50	50	100%	Nonparametric	0.000200*
Molybdenum	mg/L	50	38	76%	Nonparametric	0.0240
Radium-226/228	pCi/L	50	0	0%	Nonparametric	5.00
Selenium	mg/L	50	50	100%	Nonparametric	0.00500*
Thallium	mg/L	50	50	100%	Nonparametric	0.00200*

*Constituent is 100% non-detects, so the maximum detection limit is chosen as the UTL.

Table 14. Upper Tolerance Limits with 95% Coverage and 95% Confidence – Bedrock Aquifer

Constituent	Unit	n	No. BDL	% BDL	Recommended distribution	UTL
Appendix IV						
Fluoride	mg/L	18	18	100%	Nonparametric	1.00*
Antimony	mg/L	18	18	100%	Nonparametric	0.00500*
Arsenic	mg/L	18	9	50%	Nonparametric	0.00900
Barium	mg/L	18	0	0%	Nonparametric	0.0810
Beryllium	mg/L	18	18	100%	Nonparametric	0.00100*
Cadmium	mg/L	18	18	100%	Nonparametric	0.000500*
Chromium	mg/L	18	18	100%	Nonparametric	0.00500*
Cobalt	mg/L	18	18	100%	Nonparametric	0.00500*
Lead	mg/L	18	18	100%	Nonparametric	0.00300*
Lithium	mg/L	18	0	0%	Normal	0.0510
Mercury	mg/L	18	17	94%	Nonparametric	0.000200
Molybdenum	mg/L	18	13	72%	Nonparametric	0.0110
Radium-226/228	pCi/L	18	0	0%	Normal	4.42
Selenium	mg/L	18	18	100%	Nonparametric	0.00500*
Thallium	mg/L	18	18	100%	Nonparametric	0.00200*

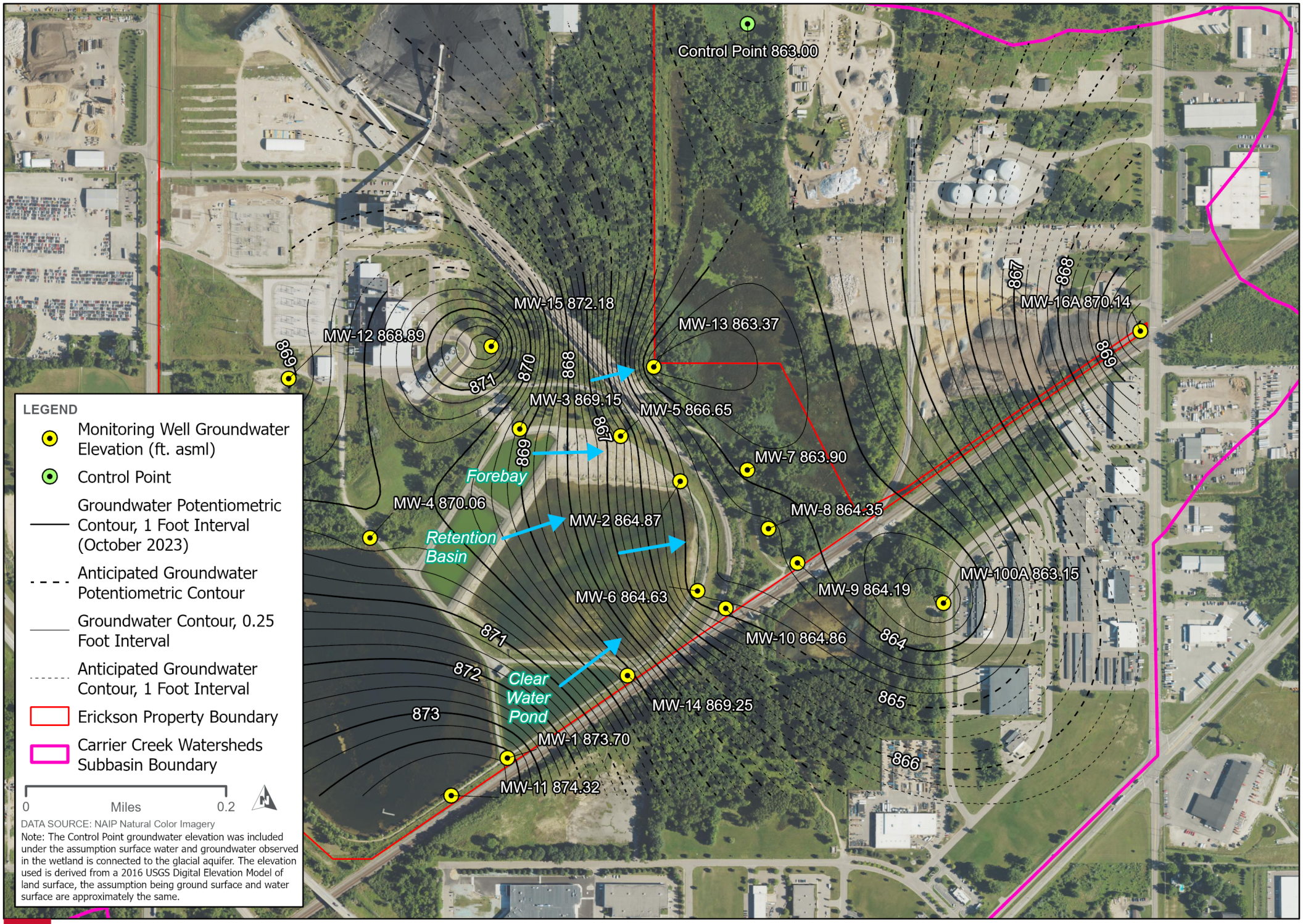
*Constituent is 100% non-detects, so the maximum detection limit is chosen as the UTL.

7.0 References

U.S. Environmental Protection Agency (USEPA), 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities: Unified Guidance. Office of Resource Conservation and Recovery, Program Implementation and Information Division, USEPA, EPA 530/R-09-007, 2009.

A

Groundwater Contour Maps



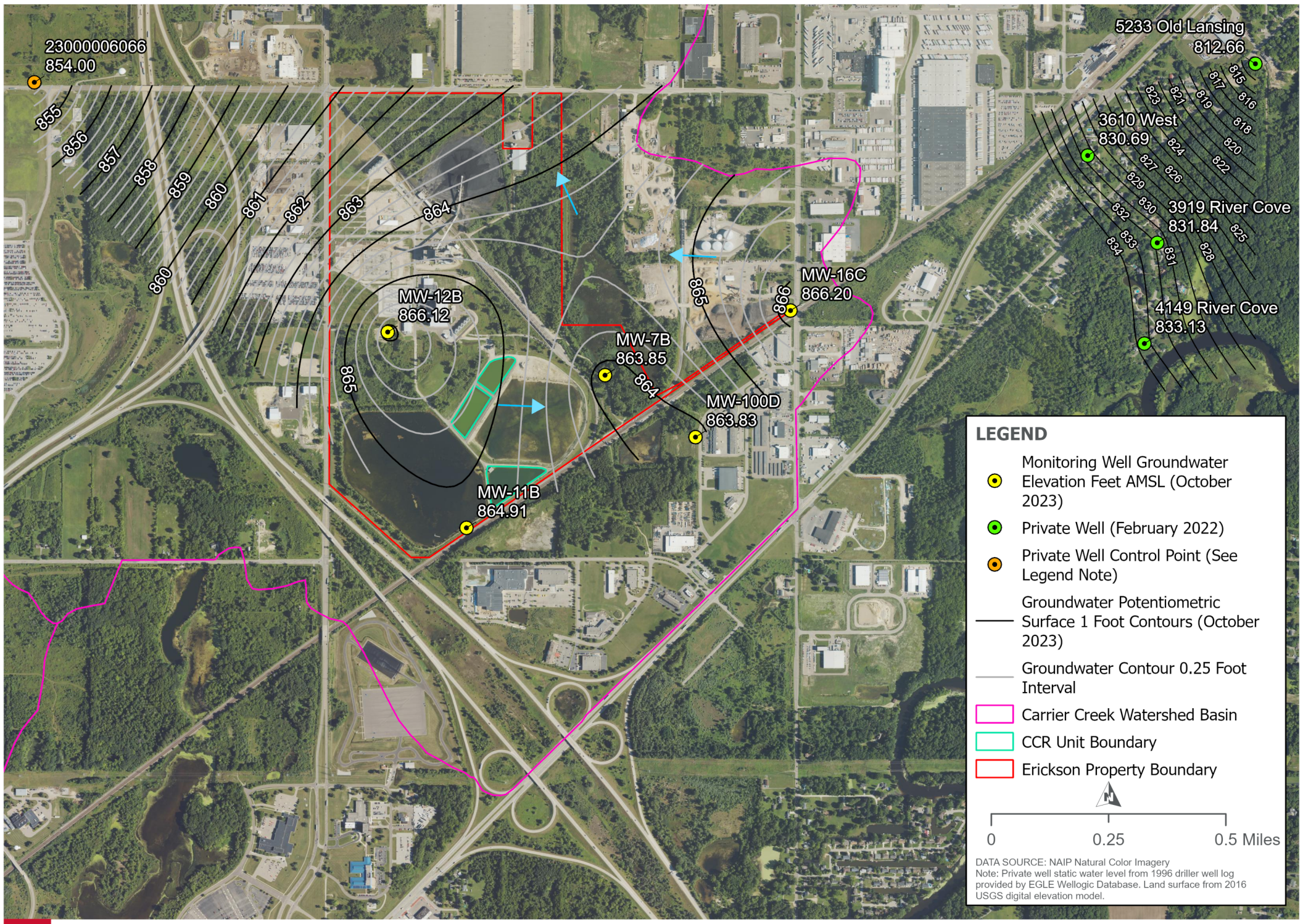
DATA SOURCE: NAIP Natural Color Imagery

Note: The Control Point groundwater elevation was included under the assumption surface water and groundwater observed in the wetland is connected to the glacial aquifer. The elevation used is derived from a 2016 USGS Digital Elevation Model of land surface, the assumption being ground surface and water surface are approximately the same.

HDR

ERICKSON POWER STATION

EATON COUNTY, MI



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ERICKSON POWER STATION

EATON COUNTY, MI

B

Erickson BWL Bedrock
Background Tables

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	18	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	2.02	2.0	0.620	3.52	1.34	0.661	1.91	0.00524	-2.24
1_02	MW-11B & MW-12B	Appendix III	Calcium	mg/L	18	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	45.1	43.3	21.5	69.6	20.8	0.460	29.7	0.0126	-2.21
1_03	MW-11B & MW-12B	Appendix III	Chloride	mg/L	18	18	100%	2022-03-08 to 2023-02-09		Nonparametric	4.82	5.00	1.70	5.00	0.778	0.161	0	-4.24	18.0
1_04	MW-11B & MW-12B	Appendix III	Fluoride	mg/L	18	18	100%	2022-03-08 to 2023-02-09		Nonparametric	0.972	1.00	0.500	1.00	0.118	0.121	0	-4.24	18.0
1_05	MW-11B & MW-12B	Appendix III	Sulfate	mg/L	18	18	100%	2022-03-08 to 2023-02-09		Nonparametric	4.87	5.00	2.58	5.00	0.570	0.117	0	-4.24	18.0
1_06	MW-11B & MW-12B	Appendix III	Total Dissolved Solids	mg/L	18	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	333	332	292	380	35.9	0.108	47.4	0.0721	-2.03
1_07	MW-11B & MW-12B	Appendix III	pH, Field	su	18	0	0%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Normal	7.50	7.50	7.10	8.00	0.270	0.0360	0.289	0.383	-0.701
2_04	MW-11B & MW-12B	Appendix IV	Fluoride	mg/L	18	18	100%	2022-03-08 to 2023-02-09		Nonparametric	0.972	1.00	0.500	1.00	0.118	0.121	0	-4.24	18.0
2_08	MW-11B & MW-12B	Appendix IV	Antimony	mg/L	18	18	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	18	9	50%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Nonparametric	0.00439	0.00250	0.00200	0.00900	0.00285	0.650	0.000741	0.584	-1.53
2_10	MW-11B & MW-12B	Appendix IV	Barium	mg/L	18	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	0.0466	0.0435	0.0230	0.0810	0.0219	0.470	0.0274	0.130	-1.99
2_11	MW-11B & MW-12B	Appendix IV	Beryllium	mg/L	18	18	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	18	18	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	18	18	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	18	18	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	18	18	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	18	0	0%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Normal	0.0337	0.0340	0.0240	0.0430	0.00704	0.209	0.0104	-0.123	-1.74
2_17	MW-11B & MW-12B	Appendix IV	Mercury	mg/L	18	17	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	18	13	72%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Nonparametric	0.00561	0.00500	0.00500	0.0110	0.00150	0.267	0	3.11	10.5
2_20	MW-11B & MW-12B	Appendix IV	Radium-226/228	pCi/L	18	0	0%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Normal	1.68	1.34	0.380	4.14	1.12	0.666	0.932	0.921	-0.0395
2_22	MW-11B & MW-12B	Appendix IV	Selenium	mg/L	18	18	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	18	18	100%	2022-03-08 to 2023-02-09		Nonparametric	0.00200	0.00200	0.00200	0.00200	0	0	0	NA	NA

[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	18	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	2.02	2.0	0.620	3.52	1.34	0.661	1.91	0.00524	-2.24
1_02	MW-11B & MW-12B	Appendix III	Calcium	mg/L	18	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	45.1	43.3	21.5	69.6	20.8	0.460	29.7	0.0126	-2.21
1_06	MW-11B & MW-12B	Appendix III	Total Dissolved Solids	mg/L	18	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	333	332	292	380	35.9	0.108	47.4	0.0721	-2.03
1_07	MW-11B & MW-12B	Appendix III	pH, Field	su	18	0	0%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Normal	7.50	7.50	7.10	8.00	0.270	0.0360	0.289	0.383	-0.701
2_09	MW-11B & MW-12B	Appendix IV	Arsenic	mg/L	18	9	50%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Nonparametric	0.00678	0.00700	0.00300	0.00900	0.00211	0.311	0.00148	-0.861	-0.275
2_10	MW-11B & MW-12B	Appendix IV	Barium	mg/L	18	0	0%	2022-03-08 to 2023-02-09	Nonparametric	Nonparametric	0.0466	0.0435	0.0230	0.0810	0.0219	0.470	0.0274	0.130	-1.99
2_16	MW-11B & MW-12B	Appendix IV	Lithium	mg/L	18	0	0%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Normal	0.0337	0.0340	0.0240	0.0430	0.00704	0.209	0.0104	-0.123	-1.74
2_17	MW-11B & MW-12B	Appendix IV	Mercury	mg/L	18	17	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	18	13	72%	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_20	MW-11B & MW-12B	Appendix IV	Radium-226/228	pCi/L	18	0	0%	2022-03-08 to 2023-02-09	Gamma; Lognormal; Normal	Normal	1.68	1.34	0.380	4.14	1.12	0.666	0.932	0.921	-0.0395

Table 3: Goodness-of-Fit Tests, Non-Detects Excluded

								Normal				Lognormal				Gamma						
								S-W		Lilliefors		S-W		Lilliefors		K-S		A-D				
ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Log-SD (NDs excl.)	ProUCL Distributions Fit	Recommended Distribution
1_01	MW-11B & MW-12B	Appendix III	Boron	mg/L	18	0	0%	0.698	0.000	0.314	0.000	0.711	0.000	0.318	0.000	0.320	< 0.01	2.623	< 0.01	0.786	Nonparametric	Nonparametric
1_02	MW-11B & MW-12B	Appendix III	Calcium	mg/L	18	0	0%	0.726	0.000	0.318	0.000	0.733	0.000	0.306	0.000	0.317	< 0.01	2.437	< 0.01	0.496	Nonparametric	Nonparametric
1_03	MW-11B & MW-12B	Appendix III	Chloride	mg/L	18	18	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
1_04	MW-11B & MW-12B	Appendix III	Fluoride	mg/L	18	18	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
1_05	MW-11B & MW-12B	Appendix III	Sulfate	mg/L	18	18	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
1_06	MW-11B & MW-12B	Appendix III	Total Dissolved Solids	mg/L	18	0	0%	0.803	0.002	0.259	0.002	0.802	0.002	0.251	0.004	0.260	< 0.01	1.645	< 0.01	0.108	Nonparametric	Nonparametric
1_07	MW-11B & MW-12B	Appendix III	pH, Field	su	18	0	0%	0.957	0.541	0.126	0.636	0.960	0.596	0.122	0.682	0.127	>= 0.10	0.263	>= 0.10	0.036	Gamma; Lognormal; Normal	Normal
2_04	MW-11B & MW-12B	Appendix IV	Fluoride	mg/L	18	18	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_08	MW-11B & MW-12B	Appendix IV	Antimony	mg/L	18	18	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_09	MW-11B & MW-12B	Appendix IV	Arsenic	mg/L	18	9	50%	0.896	0.231	0.209	0.311	0.836	0.052	0.258	0.084	0.249	>= 0.10	0.606	>= 0.10	0.379	Gamma; Lognormal; Normal	Nonparametric
2_10	MW-11B & MW-12B	Appendix IV	Barium	mg/L	18	0	0%	0.783	0.001	0.302	0.000	0.768	0.001	0.286	0.000	0.299	< 0.01	2.030	< 0.01	0.499	Nonparametric	Nonparametric
2_11	MW-11B & MW-12B	Appendix IV	Beryllium	mg/L	18	18	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_12	MW-11B & MW-12B	Appendix IV	Cadmium	mg/L	18	18	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_13	MW-11B & MW-12B	Appendix IV	Chromium	mg/L	18	18	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_14	MW-11B & MW-12B	Appendix IV	Cobalt	mg/L	18	18	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_15	MW-11B & MW-12B	Appendix IV	Lead	mg/L	18	18	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_16	MW-11B & MW-12B	Appendix IV	Lithium	mg/L	18	0	0%	0.878	0.024	0.173	0.167	0.875	0.021	0.187	0.095	0.189	0.05 <= p < 0.10	0.891	0.01 <= p < 0.05	0.216	Gamma; Lognormal; Normal	Normal
2_17	MW-11B & MW-12B	Appendix IV	Mercury	mg/L	18	17	94%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_18	MW-11B & MW-12B	Appendix IV	Molybdenum	mg/L	18	13	72%	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_20	MW-11B & MW-12B	Appendix IV	Radium-226/228	pCi/L	18	0	0%	0.905	0.070	0.184	0.109	0.966	0.720	0.108	0.835	0.099	>= 0.10	0.206	>= 0.10	0.714	Gamma; Lognormal; Normal	Normal
2_22	MW-11B & MW-12B	Appendix IV	Selenium	mg/L	18	18	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_23	MW-11B & MW-12B	Appendix IV	Thallium	mg/L	18	18	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		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	18	0	0%	-0.653	0.003	**
1_02	MW-11B & MW-12B	Appendix III	Calcium	mg/L	18	0	0%	-0.534	0.014	*
1_06	MW-11B & MW-12B	Appendix III	Total Dissolved Solids	mg/L	18	0	0%	-0.433	0.046	*
1_07	MW-11B & MW-12B	Appendix III	pH, Field	su	18	0	0%	0.246	0.258	
2_09	MW-11B & MW-12B	Appendix IV	Arsenic	mg/L	18	9	50%	0.495	0.081	
2_10	MW-11B & MW-12B	Appendix IV	Barium	mg/L	18	0	0%	-0.689	0.002	**
2_16	MW-11B & MW-12B	Appendix IV	Lithium	mg/L	18	0	0%	-0.687	0.002	**
2_17	MW-11B & MW-12B	Appendix IV	Mercury	mg/L	18	17	94%	NA	NA	
2_18	MW-11B & MW-12B	Appendix IV	Molybdenum	mg/L	18	13	72%	-0.367	0.277	
2_20	MW-11B & MW-12B	Appendix IV	Radium-226/228	pCi/L	18	0	0%	0.171	0.431	

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 5: Outlier Counts by Date

Date	Count
*	

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
*										

Table 7: Seasonality Tests

						Full								Without Non-Detects							
						Sample Size					p-Value			Sample Size					p-Value		
ID	Well	Constituent Type	Constituent	Unit	% NDs	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%	3	4	5	6	18	0.953	0.797	0.817	3	4	5	6	18	0.953	0.797	0.817
1_02	MW-11B & MW-12B	Appendix III	Calcium	mg/L	0%	3	4	5	6	18	0.154	0.605	0.562	3	4	5	6	18	0.154	0.605	0.562
1_03	MW-11B & MW-12B	Appendix III	Chloride	mg/L	100%	3	4	5	6	18	0.572	0.612	0.612	NA	NA	NA	NA	NA	NA	NA	NA
1_04	MW-11B & MW-12B	Appendix III	Fluoride	mg/L	100%	3	4	5	6	18	0.457	0.493	0.493	NA	NA	NA	NA	NA	NA	NA	NA
1_05	MW-11B & MW-12B	Appendix III	Sulfate	mg/L	100%	3	4	5	6	18	0.572	0.612	0.612	NA	NA	NA	NA	NA	NA	NA	NA
1_06	MW-11B & MW-12B	Appendix III	Total Dissolved Solids	mg/L	0%	3	4	5	6	18	0.126	0.456	0.466	3	4	5	6	18	0.126	0.456	0.466
1_07	MW-11B & MW-12B	Appendix III	pH, Field	su	0%	3	4	5	6	18	0.039 *	0.005 **	0.006 **	3	4	5	6	18	0.039 *	0.005 **	0.006 **
2_04	MW-11B & MW-12B	Appendix IV	Fluoride	mg/L	100%	3	4	5	6	18	0.457	0.493	0.493	NA	NA	NA	NA	NA	NA	NA	NA
2_08	MW-11B & MW-12B	Appendix IV	Antimony	mg/L	100%	3	4	5	6	18	NA	0.343	0.343	NA	NA	NA	NA	NA	NA	NA	NA
2_09	MW-11B & MW-12B	Appendix IV	Arsenic	mg/L	50%	3	4	5	6	18	0.530	0.429	0.440	2	1	3	3	9	0.372	0.249	0.140
2_10	MW-11B & MW-12B	Appendix IV	Barium	mg/L	0%	3	4	5	6	18	0.916	0.890	0.861	3	4	5	6	18	0.916	0.890	0.861
2_11	MW-11B & MW-12B	Appendix IV	Beryllium	mg/L	100%	3	4	5	6	18	NA	0.343	0.343	NA	NA	NA	NA	NA	NA	NA	NA
2_12	MW-11B & MW-12B	Appendix IV	Cadmium	mg/L	100%	3	4	5	6	18	NA	0.343	0.343	NA	NA	NA	NA	NA	NA	NA	NA
2_13	MW-11B & MW-12B	Appendix IV	Chromium	mg/L	100%	3	4	5	6	18	NA	0.343	0.343	NA	NA	NA	NA	NA	NA	NA	NA
2_14	MW-11B & MW-12B	Appendix IV	Cobalt	mg/L	100%	3	4	5	6	18	NA	0.343	0.343	NA	NA	NA	NA	NA	NA	NA	NA
2_15	MW-11B & MW-12B	Appendix IV	Lead	mg/L	100%	3	4	5	6	18	NA	0.343	0.343	NA	NA	NA	NA	NA	NA	NA	NA
2_16	MW-11B & MW-12B	Appendix IV	Lithium	mg/L	0%	3	4	5	6	18	0.604	0.689	0.600	3	4	5	6	18	0.604	0.689	0.600
2_17	MW-11B & MW-12B	Appendix IV	Mercury	mg/L	94%	3	4	5	6	18	NA	0.343	0.343	0	0	0	1	1	NA	NA	NA
2_18	MW-11B & MW-12B	Appendix IV	Molybdenum	mg/L	72%	3	4	5	6	18	0.578	0.511	0.539	0	1	3	1	5	0.325	0.128	0.221
2_20	MW-11B & MW-12B	Appendix IV	Radium-226/228	pCi/L	0%	3	4	5	6	18	0.149	0.084	0.192	3	4	5	6	18	0.149	0.084	0.192
2_22	MW-11B & MW-12B	Appendix IV	Selenium	mg/L	100%	3	4	5	6	18	NA	0.343	0.343	NA	NA	NA	NA	NA	NA	NA	NA
2_23	MW-11B & MW-12B	Appendix IV	Thallium	mg/L	100%	3	4	5	6	18	NA	0.343	0.343	NA	NA	NA	NA	NA	NA	NA	NA

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 8: Spatial Variability Tests

						Full									Without Non-Detects								
						Sample Size			p-Value						Sample Size			p-Value					
ID	Well	Constituent Type	Constituent	Unit	% NDs	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%	9	9	18	0.000	***	0.000	***	0.000	***	9	9	18	0.000	***	0.000	***	0.000	***
1_02	MW-11B & MW-12B	Appendix III	Calcium	mg/L	0%	9	9	18	0.000	***	0.000	***	0.000	***	9	9	18	0.000	***	0.000	***	0.000	***
1_03	MW-11B & MW-12B	Appendix III	Chloride	mg/L	100%	9	9	18	0.317		0.332		0.332		NA	NA	NA	NA		NA		NA	
1_04	MW-11B & MW-12B	Appendix III	Fluoride	mg/L	100%	9	9	18	0.317		0.332		0.332		NA	NA	NA	NA		NA		NA	
1_05	MW-11B & MW-12B	Appendix III	Sulfate	mg/L	100%	9	9	18	0.317		0.332		0.332		NA	NA	NA	NA		NA		NA	
1_06	MW-11B & MW-12B	Appendix III	Total Dissolved Solids	mg/L	0%	9	9	18	0.000	***	0.000	***	0.000	***	9	9	18	0.000	***	0.000	***	0.000	***
1_07	MW-11B & MW-12B	Appendix III	pH, Field	su	0%	9	9	18	0.004	**	0.005	**	0.004	**	9	9	18	0.004	**	0.005	**	0.004	**
2_04	MW-11B & MW-12B	Appendix IV	Fluoride	mg/L	100%	9	9	18	0.317		0.332		0.332		NA	NA	NA	NA		NA		NA	
2_08	MW-11B & MW-12B	Appendix IV	Antimony	mg/L	100%	9	9	18	NA		0.332		0.332		NA	NA	NA	NA		NA		NA	
2_09	MW-11B & MW-12B	Appendix IV	Arsenic	mg/L	50%	9	9	18	0.000	***	0.000	***	0.000	***	9	0	9	NA		NA		NA	
2_10	MW-11B & MW-12B	Appendix IV	Barium	mg/L	0%	9	9	18	0.000	***	0.000	***	0.000	***	9	9	18	0.000	***	0.000	***	0.000	***
2_11	MW-11B & MW-12B	Appendix IV	Beryllium	mg/L	100%	9	9	18	NA		0.332		0.332		NA	NA	NA	NA		NA		NA	
2_12	MW-11B & MW-12B	Appendix IV	Cadmium	mg/L	100%	9	9	18	NA		0.332		0.332		NA	NA	NA	NA		NA		NA	
2_13	MW-11B & MW-12B	Appendix IV	Chromium	mg/L	100%	9	9	18	NA		0.332		0.332		NA	NA	NA	NA		NA		NA	
2_14	MW-11B & MW-12B	Appendix IV	Cobalt	mg/L	100%	9	9	18	NA		0.332		0.332		NA	NA	NA	NA		NA		NA	
2_15	MW-11B & MW-12B	Appendix IV	Lead	mg/L	100%	9	9	18	NA		0.332		0.332		NA	NA	NA	NA		NA		NA	
2_16	MW-11B & MW-12B	Appendix IV	Lithium	mg/L	0%	9	9	18	0.000	***	0.000	***	0.000	***	9	9	18	0.000	***	0.000	***	0.000	***
2_17	MW-11B & MW-12B	Appendix IV	Mercury	mg/L	94%	9	9	18	NA		0.332		0.332		0	1	1	NA		NA		NA	
2_18	MW-11B & MW-12B	Appendix IV	Molybdenum	mg/L	72%	9	9	18	0.363		0.881		0.942		4	1	5	0.147		0.021	*	0.049	*
2_20	MW-11B & MW-12B	Appendix IV	Radium-226/228	pCi/L	0%	9	9	18	0.038	*	0.117		0.042	*	9	9	18	0.038	*	0.117		0.042	*
2_22	MW-11B & MW-12B	Appendix IV	Selenium	mg/L	100%	9	9	18	NA		0.332		0.332		NA	NA	NA	NA		NA		NA	
2_23	MW-11B & MW-12B	Appendix IV	Thallium	mg/L	100%	9	9	18	NA		0.332		0.332		NA	NA	NA	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	18	0	0%	Nonparametric	MK	0.000288	0.649	↔
1_02	MW-11B & MW-12B	Appendix III	Calcium	mg/L	18	0	0%	Nonparametric	MK	0.0144	0.053	↔
1_06	MW-11B & MW-12B	Appendix III	Total Dissolved Solids	mg/L	18	0	0%	Nonparametric	MK	-0.0881	0.011	↔
1_07	MW-11B & MW-12B	Appendix III	pH, Field	su	18	0	0%	Parametric	Lognormal MLE	-0.000176	0.015	↔
2_10	MW-11B & MW-12B	Appendix IV	Barium	mg/L	18	0	0%	Nonparametric	MK	-0.00000166	0.819	↔
2_16	MW-11B & MW-12B	Appendix IV	Lithium	mg/L	18	0	0%	Parametric	Lognormal MLE	-0.000141	0.778	↔
2_20	MW-11B & MW-12B	Appendix IV	Radium-226/228	pCi/L	18	0	0%	Parametric	Lognormal MLE	0.00360	0.011	↔

Table 10: Trend Tests: Piecewise Linear-Linear

								Line 1			Line 2					
ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Slope	p-Value	Trend	Slope	p-Value	Trend	Break 1	R-Squared	Overall Trend
1_01	MW-11B & MW-12B	Appendix III	Boron	mg/L	18	0	0%	-0.0282	0.610	↔	-0.000807	0.843	↔	2022-04-27	0.082	↔
1_02	MW-11B & MW-12B	Appendix III	Calcium	mg/L	18	0	0%	0.457	0.442	↔	0.0274	0.688	↔	2022-04-28	0.116	↔
1_03	MW-11B & MW-12B	Appendix III	Chloride	mg/L	18	18	100%	-0.000000000156	1.000	↔	-0.00200	0.534	↔	2022-06-05	0.050	↔
1_04	MW-11B & MW-12B	Appendix III	Fluoride	mg/L	18	18	100%	-0.000946	0.344	↔	0.000754	0.248	↔	2022-08-10	0.148	↔
1_05	MW-11B & MW-12B	Appendix III	Sulfate	mg/L	18	18	100%	0.000000000212	1.000	↔	-0.00147	0.534	↔	2022-06-05	0.050	↔
1_06	MW-11B & MW-12B	Appendix III	Total Dissolved Solids	mg/L	18	0	0%	-0.924	0.507	↔	-0.0775	0.455	↔	2022-04-27	0.195	↔
1_07	MW-11B & MW-12B	Appendix III	pH, Field	su	18	0	0%	-0.00550	0.043	↔	0.000255	0.775	↔	2022-07-06	0.501	↔
2_04	MW-11B & MW-12B	Appendix IV	Fluoride	mg/L	18	18	100%	-0.000946	0.344	↔	0.000754	0.248	↔	2022-08-10	0.148	↔
2_09	MW-11B & MW-12B	Appendix IV	Arsenic	mg/L	18	9	50%	0.0000273	0.181	↔	-0.00000287	0.866	↔	2022-08-11	0.202	↔
2_10	MW-11B & MW-12B	Appendix IV	Barium	mg/L	18	0	0%	0.000586	0.357	↔	-0.0000140	0.847	↔	2022-04-28	0.096	↔
2_16	MW-11B & MW-12B	Appendix IV	Lithium	mg/L	18	0	0%	-0.000189	0.354	↔	0.00000807	0.729	↔	2022-05-01	0.104	↔
2_18	MW-11B & MW-12B	Appendix IV	Molybdenum	mg/L	18	13	72%	0.0000321	0.265	↔	-0.00000837	0.111	↔	2022-05-19	0.233	↔
2_20	MW-11B & MW-12B	Appendix IV	Radium-226/228	pCi/L	18	0	0%	-0.00191	0.767	↔	0.0142	0.021	↔	2022-08-31	0.445	↔

Table 11: Trend Tests: Piecewise Linear-Linear-Linear

								Line 1			Line 2			Line 3						
ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Slope	p-Value	Trend	Slope	p-Value	Trend	Slope	p-Value	Trend	Break 1	Break 2	R-Squared	Overall Trend
1_03	MW-11B & MW-12B	Appendix III	Chloride	mg/L	18	18	100%	0.00204	0.643	↔	-0.0216	0.130	↔	0.0198	0.345	↔	2022-09-06	2022-11-22	0.392	↔
1_04	MW-11B & MW-12B	Appendix III	Fluoride	mg/L	18	18	100%	-0.00136	0.134	↔	0.00238	0.478	↔	-0.000330	0.822	↔	2022-08-11	2022-10-21	0.239	↔
2_04	MW-11B & MW-12B	Appendix IV	Fluoride	mg/L	18	18	100%	-0.00136	0.134	↔	0.00238	0.478	↔	-0.000330	0.822	↔	2022-08-11	2022-10-21	0.239	↔
2_10	MW-11B & MW-12B	Appendix IV	Barium	mg/L	18	0	0%	0.000745	0.280	↔	-0.000215	0.932	↔	0.0000147	0.876	↔	2022-04-28	2022-06-21	0.114	↔
2_18	MW-11B & MW-12B	Appendix IV	Molybdenum	mg/L	18	13	72%	0.0000370	0.227	↔	-0.0000123	0.168	↔	0.00000530	0.903	↔	2022-05-19	2022-11-25	0.271	↔
2_20	MW-11B & MW-12B	Appendix IV	Radium-226/228	pCi/L	18	0	0%	0.0281	0.273	↔	-0.0118	0.486	↔	0.0144	0.011	↔	2022-04-29	2022-08-10	0.529	↔

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Erickson BWL Glacial Background Tables

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-1, MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	48	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.181	0.145	0.0500	0.480	0.134	0.740	0.119	0.781	-0.660
1_02	MW-1, MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	48	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	139	144	98.4	185	24.3	0.174	23.7	-0.249	-1.12
1_03	MW-1, MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	48	0	0%	2020-04-28 to 2023-02-09	Gamma; Lognormal; Normal	Normal	67.8	68.0	44.0	94.0	10.9	0.161	8.89	0.122	0.341
1_04	MW-1, MW-4, MW-11, MW-12	Appendix III	Fluoride	mg/L	48	48	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-1, MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	48	9	19%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	88.6	57.5	5.00	344	91.5	1.03	29.6	1.51	1.07
1_06	MW-1, MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	48	0	0%	2020-04-28 to 2023-02-09	Gamma; Lognormal	Gamma	722	667	368	1140	193	0.267	167	0.762	-0.284
1_07	MW-1, MW-4, MW-11, MW-12	Appendix III	pH, Field	su	49	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	6.99	7.02	6.62	7.43	0.214	0.0306	0.296	0.0872	-1.24
2_04	MW-1, MW-4, MW-11, MW-12	Appendix IV	Fluoride	mg/L	50	50	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-1, MW-4, MW-11, MW-12	Appendix IV	Antimony	mg/L	50	50	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-1, MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	50	3	6%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.00814	0.00700	0.00200	0.0210	0.00560	0.688	0.00296	1.24	0.433
2_10	MW-1, MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	50	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.134	0.147	0.0570	0.168	0.0353	0.264	0.0222	-1.22	0.0721
2_11	MW-1, MW-4, MW-11, MW-12	Appendix IV	Beryllium	mg/L	50	50	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-1, MW-4, MW-11, MW-12	Appendix IV	Cadmium	mg/L	50	50	100%	2020-04-28 to 2023-02-09		Nonparametric	0.000590	0.000500	0.000500	0.00500	0.000636	1.08	0	7.07	50.0
2_15	MW-1, MW-4, MW-11, MW-12	Appendix IV	Chromium	mg/L	50	49	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-1, MW-4, MW-11, MW-12	Appendix IV	Cobalt	mg/L	50	50	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-1, MW-4, MW-11, MW-12	Appendix IV	Lead	mg/L	50	50	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-1, MW-4, MW-11, MW-12	Appendix IV	Lithium	mg/L	50	11	22%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.0176	0.0135	0.00500	0.0410	0.0111	0.629	0.0126	0.601	-0.918
2_21	MW-1, MW-4, MW-11, MW-12	Appendix IV	Mercury	mg/L	50	50	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-1, MW-4, MW-11, MW-12	Appendix IV	Molybdenum	mg/L	50	38	76%	2020-04-28 to 2023-02-09	Gamma; Lognormal; Normal	Nonparametric	0.00718	0.00500	0.00500	0.0240	0.00484	0.675	0	2.28	4.39
2_25	MW-1, MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	50	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	1.43	1.20	0	5.00	1.07	0.747	0.924	1.26	1.58
2_27	MW-1, MW-4, MW-11, MW-12	Appendix IV	Selenium	mg/L	50	50	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-1, MW-4, MW-11, MW-12	Appendix IV	Thallium	mg/L	50	50	100%	2020-04-28 to 2023-02-09		Nonparametric	0.00200	0.00200	0.00200	0.00200	0	0	0	NA	NA

[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-1, MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	48	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.181	0.145	0.0500	0.480	0.134	0.740	0.119	0.781	-0.660
1_02	MW-1, MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	48	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	139	144	98.4	185	24.3	0.174	23.7	-0.249	-1.12
1_03	MW-1, MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	48	0	0%	2020-04-28 to 2023-02-09	Gamma; Lognormal; Normal	Normal	67.8	68.0	44.0	94.0	10.9	0.161	8.89	0.122	0.341
1_05	MW-1, MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	48	9	19%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	108	59.0	31.0	344	91.2	0.844	14.8	1.42	0.413
1_06	MW-1, MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	48	0	0%	2020-04-28 to 2023-02-09	Gamma; Lognormal	Gamma	722	667	368	1140	193	0.267	167	0.762	-0.284
1_07	MW-1, MW-4, MW-11, MW-12	Appendix III	pH, Field	su	49	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	6.99	7.02	6.62	7.43	0.214	0.0306	0.296	0.0872	-1.24
2_09	MW-1, MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	50	3	6%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.00853	0.00700	0.00200	0.0210	0.00555	0.651	0.00296	1.23	0.309
2_10	MW-1, MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	50	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.134	0.147	0.0570	0.168	0.0353	0.264	0.0222	-1.22	0.0721
2_15	MW-1, MW-4, MW-11, MW-12	Appendix IV	Chromium	mg/L	50	49	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-1, MW-4, MW-11, MW-12	Appendix IV	Lithium	mg/L	50	11	22%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	0.0207	0.0210	0.00500	0.0410	0.0105	0.505	0.0163	0.354	-1.13
2_22	MW-1, MW-4, MW-11, MW-12	Appendix IV	Molybdenum	mg/L	50	38	76%	2020-04-28 to 2023-02-09	Gamma; Lognormal; Normal	Nonparametric	0.0141	0.0135	0.00500	0.0240	0.00601	0.427	0.00593	0.195	-0.586
2_25	MW-1, MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	50	0	0%	2020-04-28 to 2023-02-09	Nonparametric	Nonparametric	1.43	1.20	0	5.00	1.07	0.747	0.924	1.26	1.58

Table 3: Goodness-of-Fit Tests, Non-Detects Excluded

								Normal				Lognormal				Gamma						
								S-W		Lilliefors		S-W		Lilliefors		K-S		A-D				
ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Stat.	p-Value	Log-SD (NDs excl.)	ProUCL Distributions Fit	Recommended Distribution
1_01	MW-1, MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	48	0	0%	0.840	0.000	0.233	0.000	0.870	0.000	0.211	0.000	0.227	< 0.01	2.534	< 0.01	0.775	Nonparametric	Nonparametric
1_02	MW-1, MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	48	0	0%	0.926	0.005	0.154	0.006	0.906	0.001	0.161	0.003	0.159	< 0.01	1.918	< 0.01	0.182	Nonparametric	Nonparametric
1_03	MW-1, MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	48	0	0%	0.976	0.410	0.120	0.082	0.967	0.191	0.100	0.263	0.103	>= 0.10	0.527	>= 0.10	0.165	Gamma; Lognormal; Normal	Normal
1_04	MW-1, MW-4, MW-11, MW-12	Appendix III	Fluoride	mg/L	48	48	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
1_05	MW-1, MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	48	9	19%	0.677	0.000	0.373	0.000	0.796	0.000	0.262	0.000	0.312	< 0.01	4.729	< 0.01	0.678	Nonparametric	Nonparametric
1_06	MW-1, MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	48	0	0%	0.897	0.000	0.144	0.014	0.934	0.010	0.115	0.116	0.121	0.05 <= p < 0.10	1.361	< 0.01	0.258	Gamma; Lognormal	Gamma
1_07	MW-1, MW-4, MW-11, MW-12	Appendix III	pH, Field	su	49	0	0%	0.937	0.011	0.147	0.010	0.937	0.011	0.150	0.007	0.151	< 0.01	1.418	< 0.01	0.031	Nonparametric	Nonparametric
2_04	MW-1, MW-4, MW-11, MW-12	Appendix IV	Fluoride	mg/L	50	50	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_08	MW-1, MW-4, MW-11, MW-12	Appendix IV	Antimony	mg/L	50	50	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_09	MW-1, MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	50	3	6%	0.798	0.000	0.275	0.000	0.921	0.004	0.158	0.005	0.194	< 0.01	1.931	< 0.01	0.627	Nonparametric	Nonparametric
2_10	MW-1, MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	50	0	0%	0.785	0.000	0.231	0.000	0.719	0.000	0.268	0.000	0.259	< 0.01	5.444	< 0.01	0.336	Nonparametric	Nonparametric
2_11	MW-1, MW-4, MW-11, MW-12	Appendix IV	Beryllium	mg/L	50	50	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_13	MW-1, MW-4, MW-11, MW-12	Appendix IV	Cadmium	mg/L	50	50	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_15	MW-1, MW-4, MW-11, MW-12	Appendix IV	Chromium	mg/L	50	49	98%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_16	MW-1, MW-4, MW-11, MW-12	Appendix IV	Cobalt	mg/L	50	50	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_18	MW-1, MW-4, MW-11, MW-12	Appendix IV	Lead	mg/L	50	50	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_19	MW-1, MW-4, MW-11, MW-12	Appendix IV	Lithium	mg/L	50	11	22%	0.922	0.010	0.157	0.017	0.930	0.018	0.145	0.037	0.156	0.01 <= p < 0.05	0.979	0.01 <= p < 0.05	0.557	Nonparametric	Nonparametric
2_21	MW-1, MW-4, MW-11, MW-12	Appendix IV	Mercury	mg/L	50	50	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_22	MW-1, MW-4, MW-11, MW-12	Appendix IV	Molybdenum	mg/L	50	38	76%	0.965	0.849	0.106	0.969	0.938	0.469	0.181	0.338	0.153	>= 0.10	0.231	>= 0.10	0.487	Gamma; Lognormal; Normal	Nonparametric
2_25	MW-1, MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	50	0	0%	0.895	0.000	0.142	0.014	NA	NA	NA	NA	NA		NA		NA	Nonparametric	Nonparametric
2_27	MW-1, MW-4, MW-11, MW-12	Appendix IV	Selenium	mg/L	50	50	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		Nonparametric
2_29	MW-1, MW-4, MW-11, MW-12	Appendix IV	Thallium	mg/L	50	50	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA		NA		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-1, MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	48	0	0%	-0.714	0.000	***
1_02	MW-1, MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	48	0	0%	-0.695	0.000	***
1_03	MW-1, MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	48	0	0%	-0.344	0.014	*
1_05	MW-1, MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	48	9	19%	0.575	0.000	***
1_06	MW-1, MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	48	0	0%	-0.365	0.009	**
1_07	MW-1, MW-4, MW-11, MW-12	Appendix III	pH, Field	su	49	0	0%	-0.531	0.000	***
2_09	MW-1, MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	50	3	6%	-0.286	0.043	*
2_10	MW-1, MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	50	0	0%	-0.230	0.093	
2_15	MW-1, MW-4, MW-11, MW-12	Appendix IV	Chromium	mg/L	50	49	98%	NA	NA	
2_19	MW-1, MW-4, MW-11, MW-12	Appendix IV	Lithium	mg/L	50	11	22%	-0.474	0.002	**
2_22	MW-1, MW-4, MW-11, MW-12	Appendix IV	Molybdenum	mg/L	50	38	76%	0.554	0.030	*
2_25	MW-1, MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	50	0	0%	0.118	0.392	

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 5: Outlier Counts by Date

Date	Count
2022-02-23	3
2022-03-30	3
2022-05-04	3
2022-06-08	3
2022-07-13	3
2022-08-17	3
2022-09-21	3
2022-10-26	3
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_05	MW-12	Appendix III	Sulfate	mg/L	48	9	19%	39	2022-02-23	344
1_05	MW-12	Appendix III	Sulfate	mg/L	48	9	19%	39	2022-03-30	308
1_05	MW-12	Appendix III	Sulfate	mg/L	48	9	19%	39	2022-05-04	283
1_05	MW-12	Appendix III	Sulfate	mg/L	48	9	19%	39	2022-08-17	256
1_05	MW-12	Appendix III	Sulfate	mg/L	48	9	19%	39	2022-09-21	255
1_05	MW-12	Appendix III	Sulfate	mg/L	48	9	19%	39	2022-06-08	254
1_05	MW-12	Appendix III	Sulfate	mg/L	48	9	19%	39	2022-10-26	252
1_05	MW-12	Appendix III	Sulfate	mg/L	48	9	19%	39	2022-07-13	250
1_05	MW-12	Appendix III	Sulfate	mg/L	48	9	19%	39	2023-02-09	207
2_09	MW-11	Appendix IV	Arsenic	mg/L	50	3	6%	47	2022-08-17	0.0210
2_09	MW-11	Appendix IV	Arsenic	mg/L	50	3	6%	47	2022-09-21	0.0210
2_09	MW-11	Appendix IV	Arsenic	mg/L	50	3	6%	47	2022-05-04	0.0200
2_09	MW-11	Appendix IV	Arsenic	mg/L	50	3	6%	47	2022-10-26	0.0200
2_09	MW-11	Appendix IV	Arsenic	mg/L	50	3	6%	47	2022-07-13	0.0190
2_09	MW-11	Appendix IV	Arsenic	mg/L	50	3	6%	47	2022-02-23	0.0180
2_09	MW-11	Appendix IV	Arsenic	mg/L	50	3	6%	47	2022-03-30	0.0180
2_09	MW-11	Appendix IV	Arsenic	mg/L	50	3	6%	47	2022-06-08	0.0180
2_09	MW-11	Appendix IV	Arsenic	mg/L	50	3	6%	47	2023-02-09	0.0170
2_10	MW-12	Appendix IV	Barium	mg/L	50	0	0%	50	2022-10-26	0.0570
2_10	MW-12	Appendix IV	Barium	mg/L	50	0	0%	50	2023-02-09	0.0580
2_10	MW-12	Appendix IV	Barium	mg/L	50	0	0%	50	2022-06-08	0.0640
2_10	MW-12	Appendix IV	Barium	mg/L	50	0	0%	50	2022-08-17	0.0640
2_10	MW-12	Appendix IV	Barium	mg/L	50	0	0%	50	2022-09-21	0.0640
2_10	MW-12	Appendix IV	Barium	mg/L	50	0	0%	50	2022-07-13	0.0670
2_10	MW-12	Appendix IV	Barium	mg/L	50	0	0%	50	2022-02-23	0.0690
2_10	MW-12	Appendix IV	Barium	mg/L	50	0	0%	50	2022-05-04	0.0700
2_10	MW-12	Appendix IV	Barium	mg/L	50	0	0%	50	2022-03-30	0.0740

Table 7: Seasonality Tests

						Full												Without Non-Detects									
						Sample Size					p-Value							Sample Size					p-Value				
ID	Well	Constituent Type	Constituent	Unit	% NDs	Winter	Spring	Summer	Fall	Total	Kruskal-Wallis		ANOVA		Log ANOVA			Winter	Spring	Summer	Fall	Total	Kruskal-Wallis		ANOVA	Log ANOVA	
1_01	MW-1, MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	0%	10	10	16	12	48	0.704	NA	0.787	NA	0.899	NA		10	10	16	12	48	0.704	NA	0.787	0.899	NA
1_02	MW-1, MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	0%	10	10	16	12	48	0.932	NA	0.943	NA	0.952	NA		10	10	16	12	48	0.932	NA	0.943	0.952	NA
1_03	MW-1, MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	0%	10	10	16	12	48	0.570	NA	0.720	NA	0.764	NA		10	10	16	12	48	0.570	NA	0.720	0.764	NA
1_04	MW-1, MW-4, MW-11, MW-12	Appendix III	Fluoride	mg/L	100%	10	10	16	12	48	NA	NA	0.290	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1_05	MW-1, MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	19%	10	10	16	12	48	0.569	NA	0.995	NA	0.986	NA		8	8	13	10	39	0.386	NA	0.990	0.979	NA
1_06	MW-1, MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	0%	10	10	16	12	48	0.899	NA	0.972	NA	0.968	NA		10	10	16	12	48	0.899	NA	0.972	0.968	NA
1_07	MW-1, MW-4, MW-11, MW-12	Appendix III	pH, Field	su	0%	10	10	16	13	49	0.379	NA	0.406	NA	0.397	NA		10	10	16	13	49	0.379	NA	0.406	0.397	NA
2_04	MW-1, MW-4, MW-11, MW-12	Appendix IV	Fluoride	mg/L	100%	10	10	16	14	50	NA	NA	0.266	NA	NA	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2_08	MW-1, MW-4, MW-11, MW-12	Appendix IV	Antimony	mg/L	100%	10	10	16	14	50	NA	NA	0.266	NA	0.266	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2_09	MW-1, MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	6%	10	10	16	14	50	0.634	NA	0.989	NA	0.980	NA		8	10	15	14	47	0.390	NA	0.930	0.777	NA
2_10	MW-1, MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	0%	10	10	16	14	50	0.915	NA	0.948	NA	0.966	NA		10	10	16	14	50	0.915	NA	0.948	0.966	NA
2_11	MW-1, MW-4, MW-11, MW-12	Appendix IV	Beryllium	mg/L	100%	10	10	16	14	50	NA	NA	0.266	NA	0.266	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2_13	MW-1, MW-4, MW-11, MW-12	Appendix IV	Cadmium	mg/L	100%	10	10	16	14	50	0.261	NA	0.266	NA	0.266	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2_15	MW-1, MW-4, MW-11, MW-12	Appendix IV	Chromium	mg/L	98%	10	10	16	14	50	NA	NA	0.266	NA	0.266	NA		0	0	1	0	1	NA	NA	NA	NA	NA
2_16	MW-1, MW-4, MW-11, MW-12	Appendix IV	Cobalt	mg/L	100%	10	10	16	14	50	NA	NA	0.266	NA	0.266	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2_18	MW-1, MW-4, MW-11, MW-12	Appendix IV	Lead	mg/L	100%	10	10	16	14	50	NA	NA	0.266	NA	0.266	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2_19	MW-1, MW-4, MW-11, MW-12	Appendix IV	Lithium	mg/L	22%	10	10	16	14	50	0.714	NA	0.645	NA	0.849	NA		9	6	12	12	39	0.665	NA	0.639	0.748	NA
2_21	MW-1, MW-4, MW-11, MW-12	Appendix IV	Mercury	mg/L	100%	10	10	16	14	50	NA	NA	0.266	NA	0.266	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2_22	MW-1, MW-4, MW-11, MW-12	Appendix IV	Molybdenum	mg/L	76%	10	10	16	14	50	0.875	NA	0.649	NA	0.842	NA		3	2	4	3	12	0.097	NA	0.032	0.142	NA
2_25	MW-1, MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	0%	10	10	16	14	50	0.196	NA	0.113	NA	NA	NA		10	10	16	14	50	0.196	NA	0.113	NA	NA
2_27	MW-1, MW-4, MW-11, MW-12	Appendix IV	Selenium	mg/L	100%	10	10	16	14	50	NA	NA	0.266	NA	0.266	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2_29	MW-1, MW-4, MW-11, MW-12	Appendix IV	Thallium	mg/L	100%	10	10	16	14	50	NA	NA	0.266	NA	0.266	NA		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

*** p < 0.001, ** p < 0.01, * p < 0.05

Table 8: Spatial Variability Tests

						Full										Without Non-Detects									
						Sample Size				p-Value						Sample Size				p-Value					
ID	Well	Constituent Type	Constituent	Unit	% NDs	MW-1	MW-11	MW-12	MW-4	Total	Kruskal-Wallis		ANOVA		Log ANOVA		MW-1	MW-11	MW-12	MW-4	Total	Kruskal-Wallis		ANOVA		Log ANOVA	
1_01	MW-1, MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	0%	15	9	9	15	48	0.000	***	0.000	***	0.000	***	15	9	9	15	48	0.000	***	0.000	***	0.000	***
1_02	MW-1, MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	0%	15	9	9	15	48	0.000	***	0.000	***	0.000	***	15	9	9	15	48	0.000	***	0.000	***	0.000	***
1_03	MW-1, MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	0%	15	9	9	15	48	0.000	***	0.000	***	0.000	***	15	9	9	15	48	0.000	***	0.000	***	0.000	***
1_04	MW-1, MW-4, MW-11, MW-12	Appendix III	Fluoride	mg/L	100%	15	9	9	15	48	NA		0.545		NA		NA	NA	NA	NA	NA	NA		NA		NA	
1_05	MW-1, MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	19%	15	9	9	15	48	0.000	***	0.000	***	0.000	***	15	0	9	15	39	0.000	***	0.000	***	0.000	***
1_06	MW-1, MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	0%	15	9	9	15	48	0.000	***	0.000	***	0.000	***	15	9	9	15	48	0.000	***	0.000	***	0.000	***
1_07	MW-1, MW-4, MW-11, MW-12	Appendix III	pH, Field	su	0%	16	9	9	15	49	0.000	***	0.000	***	0.000	***	16	9	9	15	49	0.000	***	0.000	***	0.000	***
2_04	MW-1, MW-4, MW-11, MW-12	Appendix IV	Fluoride	mg/L	100%	16	9	9	16	50	NA		0.560		NA		NA	NA	NA	NA	NA	NA		NA		NA	
2_08	MW-1, MW-4, MW-11, MW-12	Appendix IV	Antimony	mg/L	100%	16	9	9	16	50	NA		0.560		0.560		NA	NA	NA	NA	NA	NA		NA		NA	
2_09	MW-1, MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	6%	16	9	9	16	50	0.000	***	0.000	***	0.000	***	16	9	6	16	47	0.000	***	0.000	***	0.000	***
2_10	MW-1, MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	0%	16	9	9	16	50	0.000	***	0.000	***	0.000	***	16	9	9	16	50	0.000	***	0.000	***	0.000	***
2_11	MW-1, MW-4, MW-11, MW-12	Appendix IV	Beryllium	mg/L	100%	16	9	9	16	50	NA		0.560		0.560		NA	NA	NA	NA	NA	NA		NA		NA	
2_13	MW-1, MW-4, MW-11, MW-12	Appendix IV	Cadmium	mg/L	100%	16	9	9	16	50	0.207		0.209		0.209		NA	NA	NA	NA	NA	NA		NA		NA	
2_15	MW-1, MW-4, MW-11, MW-12	Appendix IV	Chromium	mg/L	98%	16	9	9	16	50	NA		0.560		0.560		0	1	0	0	1	NA		NA		NA	
2_16	MW-1, MW-4, MW-11, MW-12	Appendix IV	Cobalt	mg/L	100%	16	9	9	16	50	NA		0.560		0.560		NA	NA	NA	NA	NA	NA		NA		NA	
2_18	MW-1, MW-4, MW-11, MW-12	Appendix IV	Lead	mg/L	100%	16	9	9	16	50	NA		0.560		0.560		NA	NA	NA	NA	NA	NA		NA		NA	
2_19	MW-1, MW-4, MW-11, MW-12	Appendix IV	Lithium	mg/L	22%	16	9	9	16	50	0.000	***	0.000	***	0.000	***	16	1	9	13	39	0.000	***	0.000	***	0.000	***
2_21	MW-1, MW-4, MW-11, MW-12	Appendix IV	Mercury	mg/L	100%	16	9	9	16	50	NA		0.560		0.560		NA	NA	NA	NA	NA	NA		NA		NA	
2_22	MW-1, MW-4, MW-11, MW-12	Appendix IV	Molybdenum	mg/L	76%	16	9	9	16	50	0.000	***	0.000	***	0.000	***	0	1	9	2	12	0.044	*	0.026	*	0.004	**
2_25	MW-1, MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	0%	16	9	9	16	50	0.074		0.135		NA		16	9	9	16	50	0.074		0.135		NA	
2_27	MW-1, MW-4, MW-11, MW-12	Appendix IV	Selenium	mg/L	100%	16	9	9	16	50	NA		0.560		0.560		NA	NA	NA	NA	NA	NA		NA		NA	
2_29	MW-1, MW-4, MW-11, MW-12	Appendix IV	Thallium	mg/L	100%	16	9	9	16	50	NA		0.560		0.560		NA	NA	NA	NA	NA	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-1, MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	48	0	0%	Nonparametric	MK	0	0.795	↔
1_02	MW-1, MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	48	0	0%	Nonparametric	MK	-0.00210	0.831	↔
1_03	MW-1, MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	48	0	0%	Parametric	Lognormal MLE	0.0000991	0.134	↔
1_05	MW-1, MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	48	9	19%	Nonparametric	MK	-0.00917	0.189	↔
1_06	MW-1, MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	48	0	0%	Parametric	Lognormal MLE	0.000157	0.128	↔
1_07	MW-1, MW-4, MW-11, MW-12	Appendix III	pH, Field	su	49	0	0%	Nonparametric	MK	0.0000493	0.495	↔
2_09	MW-1, MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	50	3	6%	Nonparametric	MK	0	0.473	↔
2_10	MW-1, MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	50	0	0%	Nonparametric	MK	-0.0000274	0.007	↓
2_25	MW-1, MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	50	0	0%	Nonparametric	MK	0.000602	0.165	↔

Table 10: Trend Tests: Piecewise Linear-Linear

								Line 1			Line 2					
ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Slope	p-Value	Trend	Slope	p-Value	Trend	Break 1	R-Squared	Overall Trend
1_01	MW-1, MW-4, MW-11, MW-12	Appendix III	Boron	mg/L	48	0	0%	-0.000297	0.448	↔	0.0000265	0.852	↔	2021-05-03	0.071	↔
1_02	MW-1, MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	48	0	0%	0.0124	0.285	↔	-0.101	0.993	↔	2022-10-26	0.029	↔
1_03	MW-1, MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	48	0	0%	-0.0380	0.374	↔	0.0171	0.071	↔	2020-12-28	0.103	↔
1_05	MW-1, MW-4, MW-11, MW-12	Appendix III	Sulfate	mg/L	48	9	19%	0.107	0.098	↔	-0.160	0.544	↔	2022-05-08	0.084	↔
1_06	MW-1, MW-4, MW-11, MW-12	Appendix III	Total Dissolved Solids	mg/L	48	0	0%	0.201	0.026	↔	-1.38	0.988	↔	2022-10-26	0.112	↔
1_07	MW-1, MW-4, MW-11, MW-12	Appendix III	pH, Field	su	49	0	0%	-0.0000191	0.846	↔	0.122	0.253	↔	2023-02-06	0.082	↔
2_09	MW-1, MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	50	3	6%	0.00000556	0.033	↔	-0.0000240	0.993	↔	2022-10-26	0.095	↔
2_10	MW-1, MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	50	0	0%	-0.0000612	0.009	↓	0.0000541	0.567	↔	2022-05-19	0.211	↔
2_19	MW-1, MW-4, MW-11, MW-12	Appendix IV	Lithium	mg/L	50	11	22%	-0.0000206	0.225	↔	0.0000101	0.593	↔	2021-11-08	0.096	↔
2_22	MW-1, MW-4, MW-11, MW-12	Appendix IV	Molybdenum	mg/L	50	38	76%	0.00000942	0.003	↑	-0.0000148	0.248	↔	2022-05-16	0.233	↔
2_25	MW-1, MW-4, MW-11, MW-12	Appendix IV	Radium-226/228	pCi/L	50	0	0%	0.00301	0.314	↔	-0.000607	0.589	↔	2021-05-03	0.082	↔

Table 11: Trend Tests: Piecewise Linear-Linear-Linear

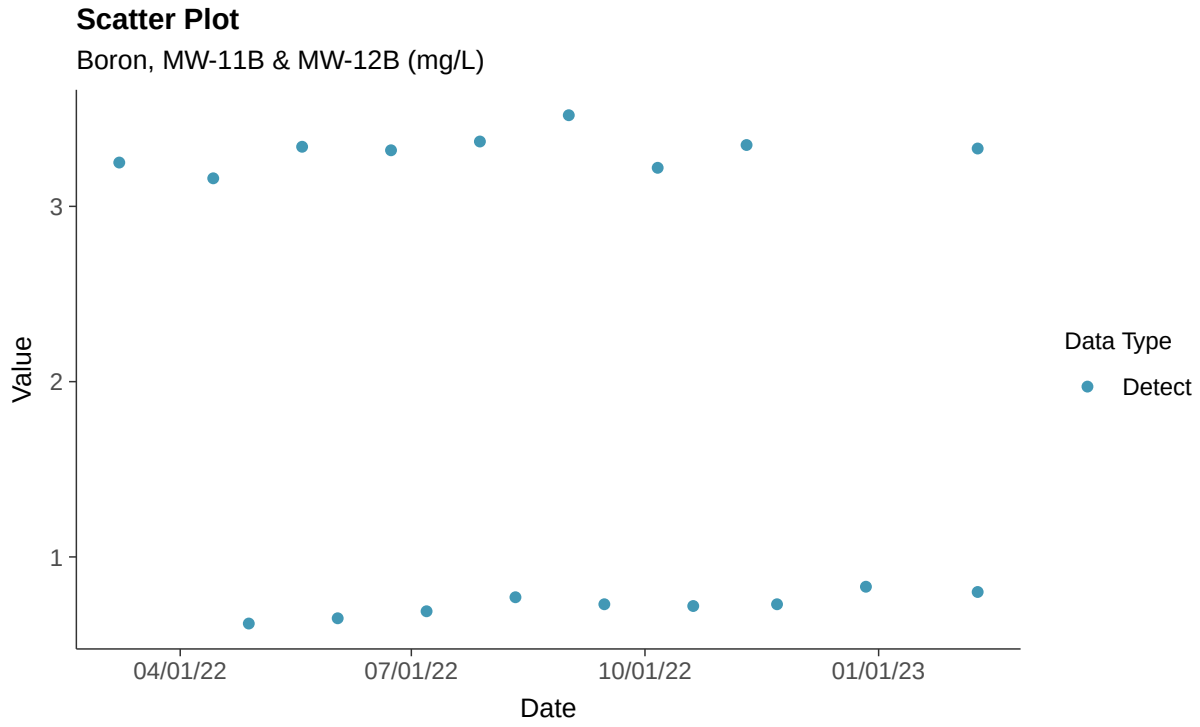
								Line 1			Line 2			Line 3						
ID	Well	Constituent Type	Constituent	Unit	n	No. NDs	% NDs	Slope	p-Value	Trend	Slope	p-Value	Trend	Slope	p-Value	Trend	Break 1	Break 2	R-Squared	Overall Trend
1_02	MW-1, MW-4, MW-11, MW-12	Appendix III	Calcium	mg/L	48	0	0%	-0.0515	0.608	↔	0.0383	0.467	↔	-0.0313	0.575	↔	2020-12-10	2022-03-25	0.041	↔
1_03	MW-1, MW-4, MW-11, MW-12	Appendix III	Chloride	mg/L	48	0	0%	-0.0286	0.064	↔	0.750	0.098	↔	-0.0373	0.088	↔	2022-01-17	2022-02-23	0.286	↔
1_07	MW-1, MW-4, MW-11, MW-12	Appendix III	pH, Field	su	49	0	0%	0.000953	0.698	↔	-0.000221	0.293	↔	0.000789	0.154	↔	2020-08-15	2022-03-30	0.088	↔
2_09	MW-1, MW-4, MW-11, MW-12	Appendix IV	Arsenic	mg/L	50	3	6%	0.000000651	0.940	↔	0.0000491	0.616	↔	-0.00000875	0.538	↔	2022-01-07	2022-04-10	0.105	↔
2_10	MW-1, MW-4, MW-11, MW-12	Appendix IV	Barium	mg/L	50	0	0%	0.000161	0.892	↔	-0.0000630	0.017	↔	0.0000541	0.575	↔	2020-05-26	2022-05-15	0.212	↔
2_13	MW-1, MW-4, MW-11, MW-12	Appendix IV	Cadmium	mg/L	50	50	100%	0.0000000192	0.999	↔	-0.00000000481	0.988	↔	0.0000110	0.970	↔	2020-06-29	2022-10-27	0.240	↔
2_19	MW-1, MW-4, MW-11, MW-12	Appendix IV	Lithium	mg/L	50	11	22%	0.0000349	0.528	↔	-0.0000760	0.403	↔	0.00000690	0.551	↔	2020-10-03	2021-03-22	0.131	↔

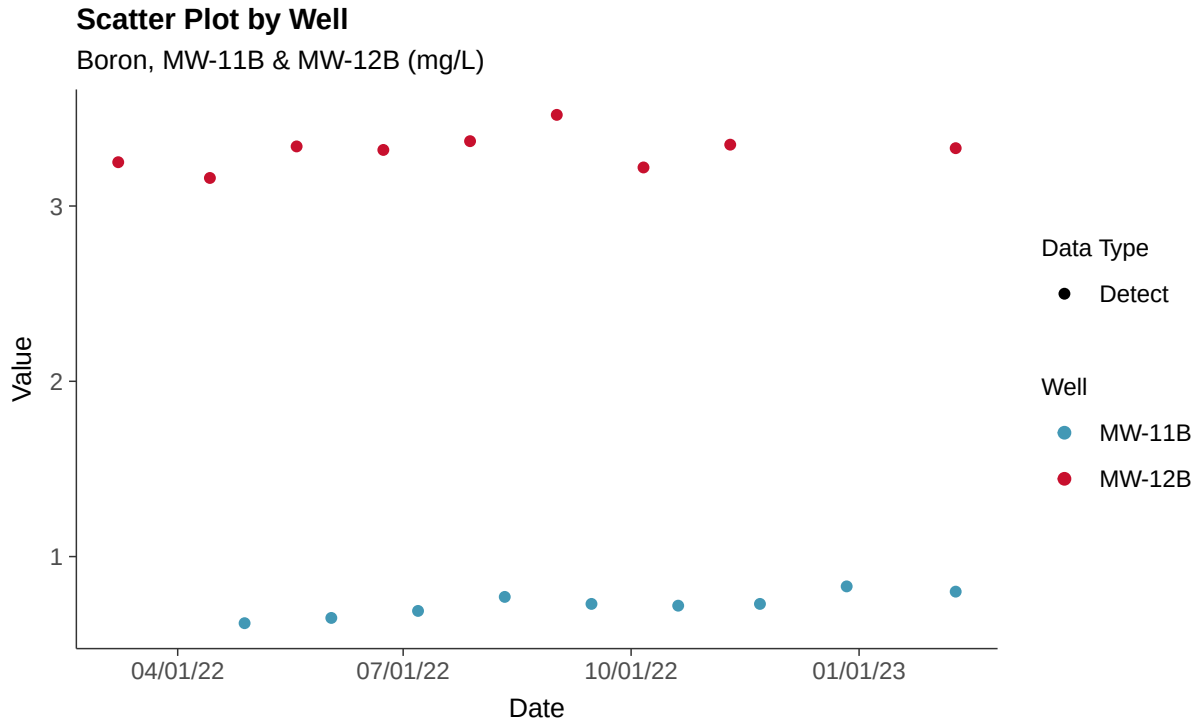
D

Erickson BWL Bedrock Background Plots

Appendix III: Boron, MW-11B & MW-12B

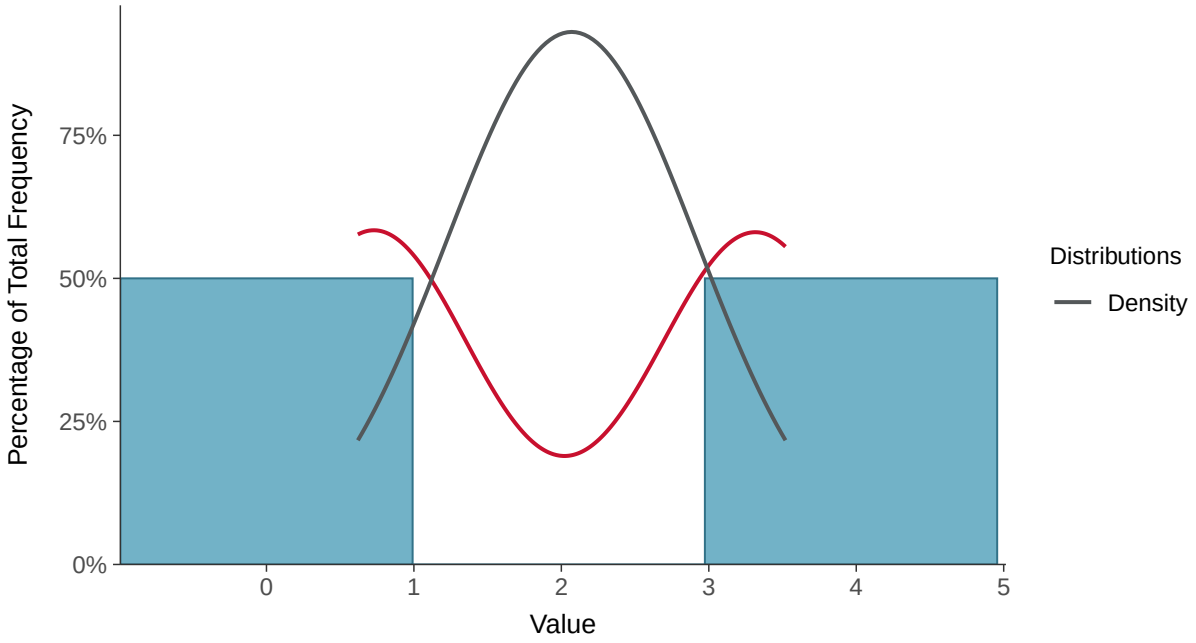
ID: 1_01





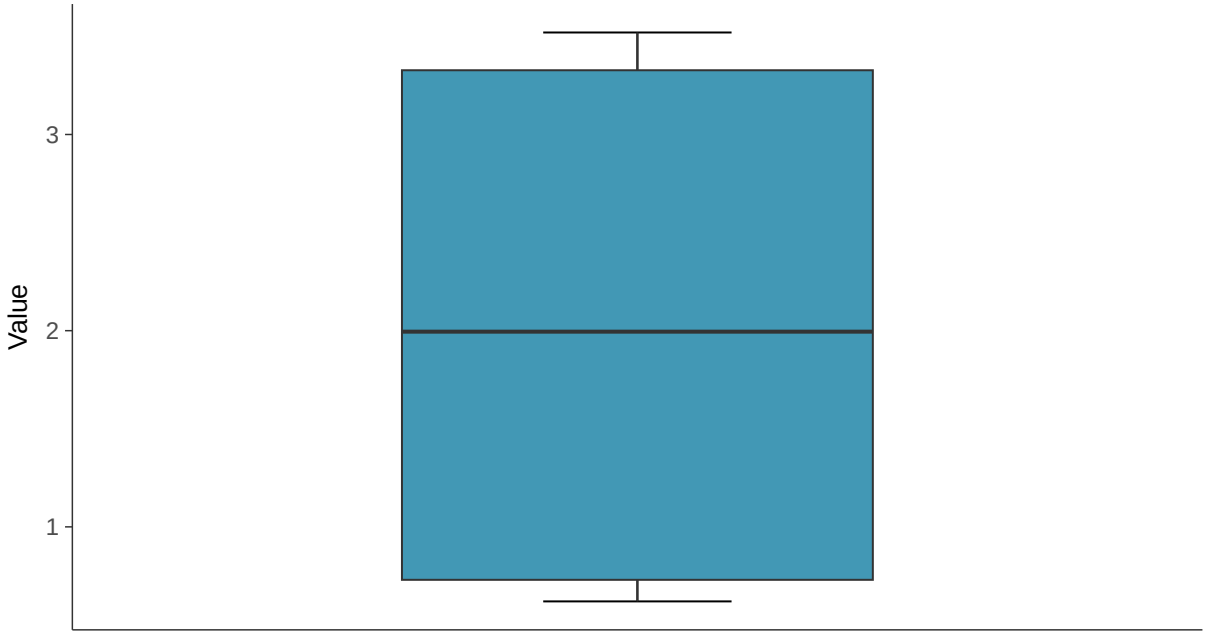
Histogram

Boron, MW-11B & MW-12B (mg/L)



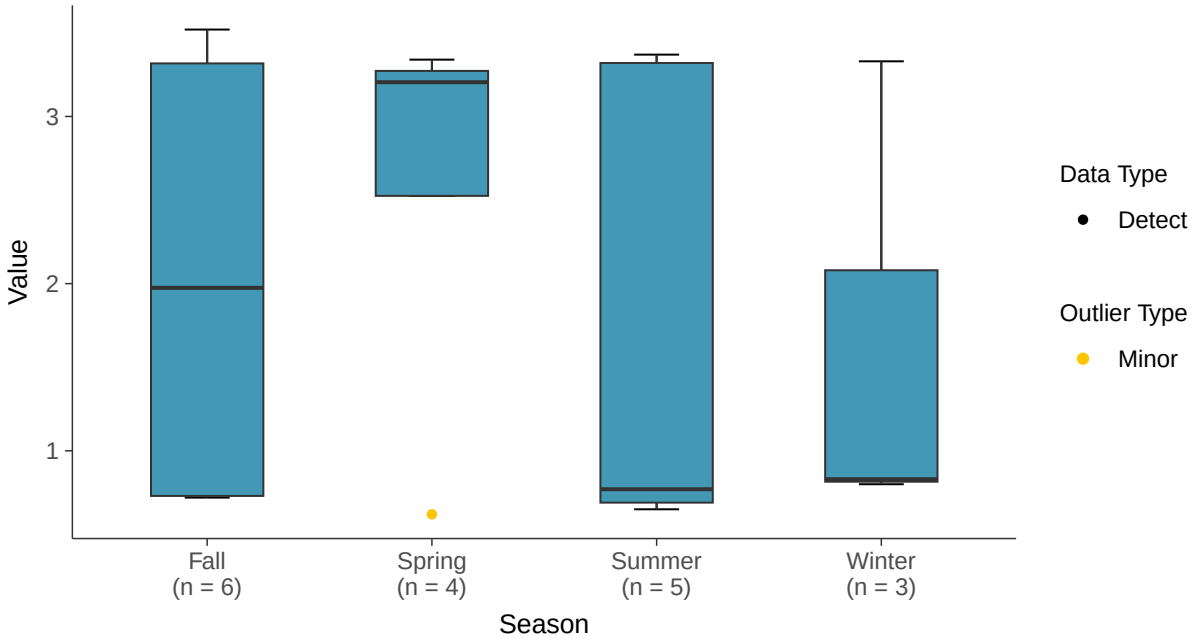
Boxplot

Boron, MW-11B & MW-12B (mg/L)



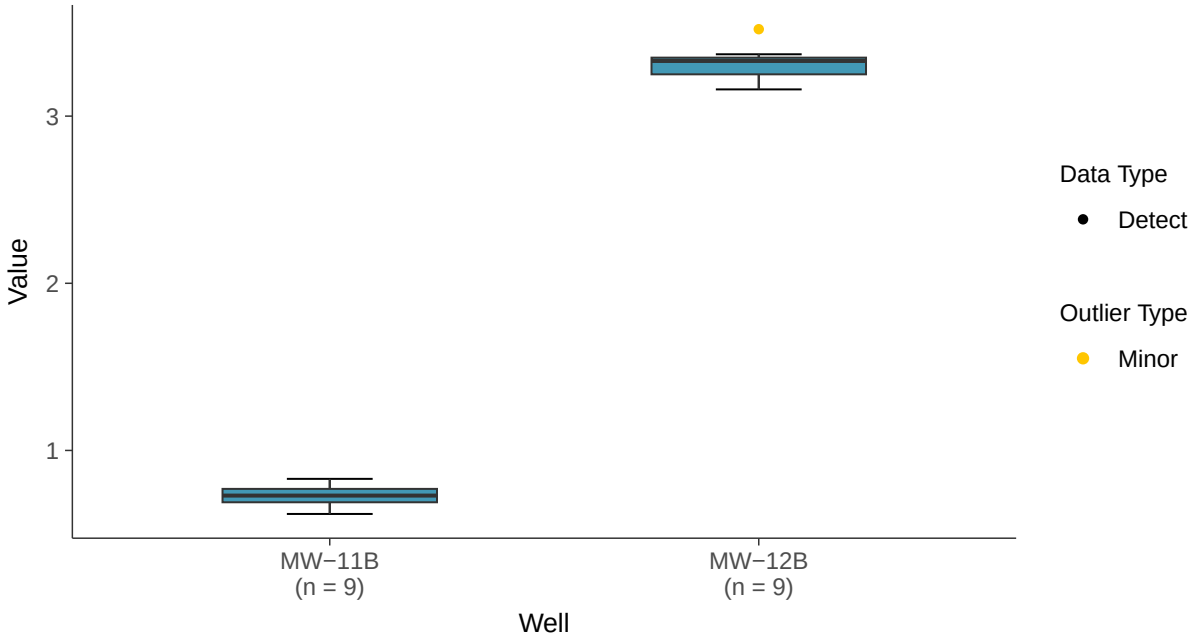
Boxplot by Season

Boron, MW-11B & MW-12B (mg/L)



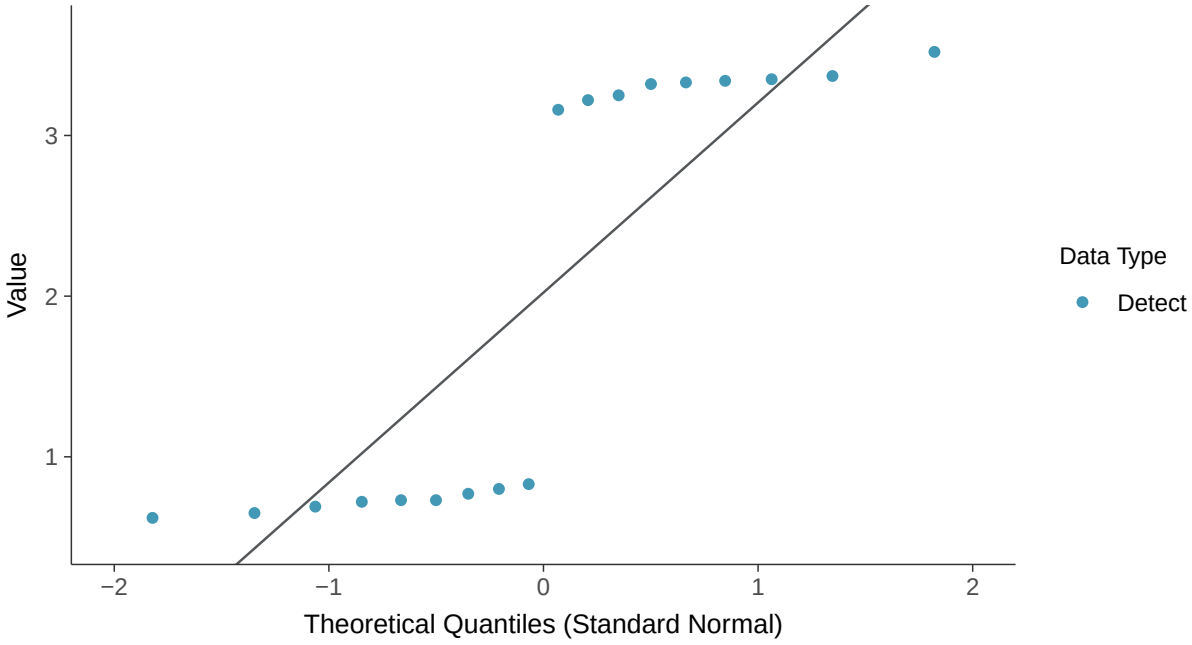
Boxplot by Well

Boron, MW-11B & MW-12B (mg/L)



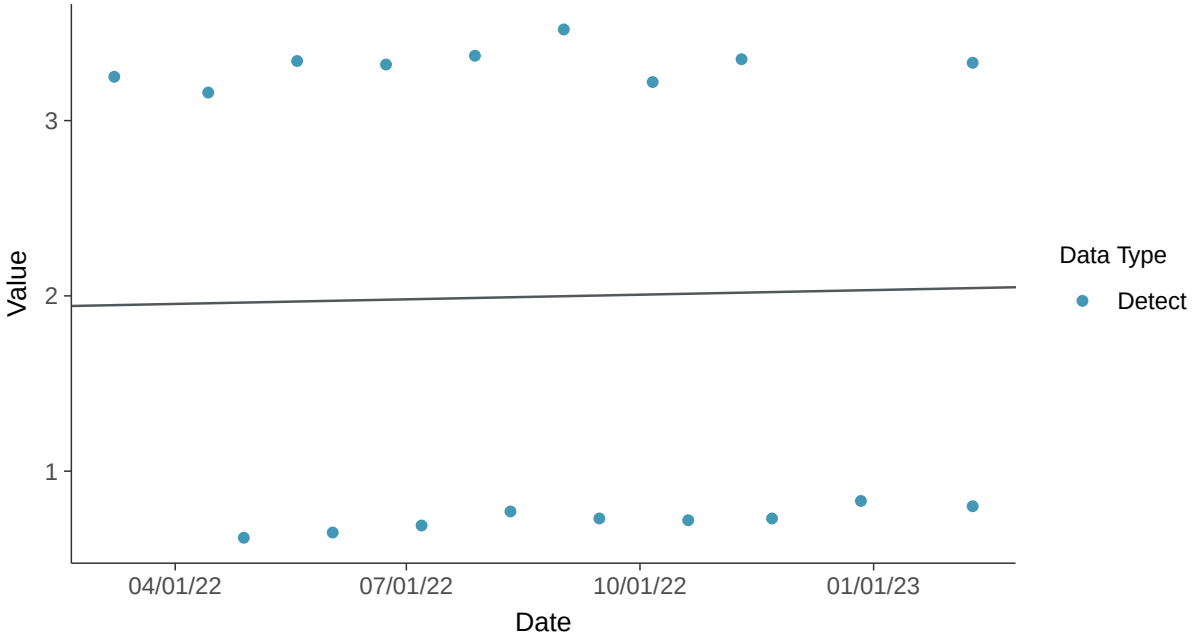
Normal Q-Q plot

Boron, MW-11B & MW-12B (mg/L)



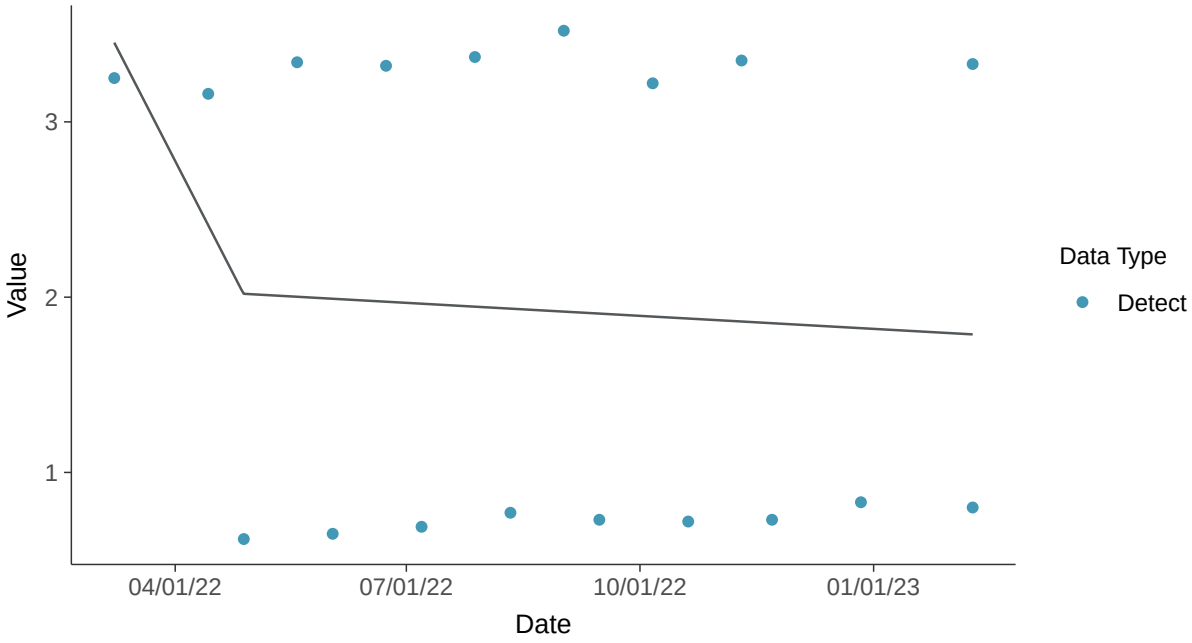
Trend Regression: Mann-Kendall/Theil-Sen Estimate

Boron, MW-11B & MW-12B (mg/L)



Trend Regression: Piecewise Linear-Linear

Boron, MW-11B & MW-12B (mg/L)

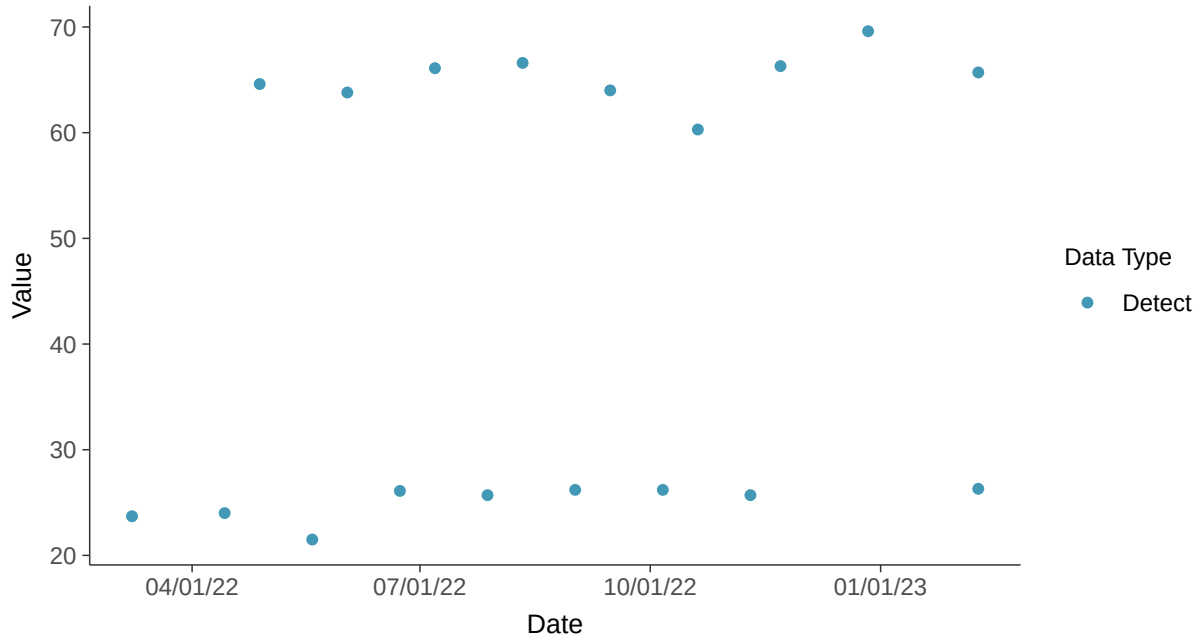


Appendix III: Calcium, MW-11B & MW-12B

ID: 1_02

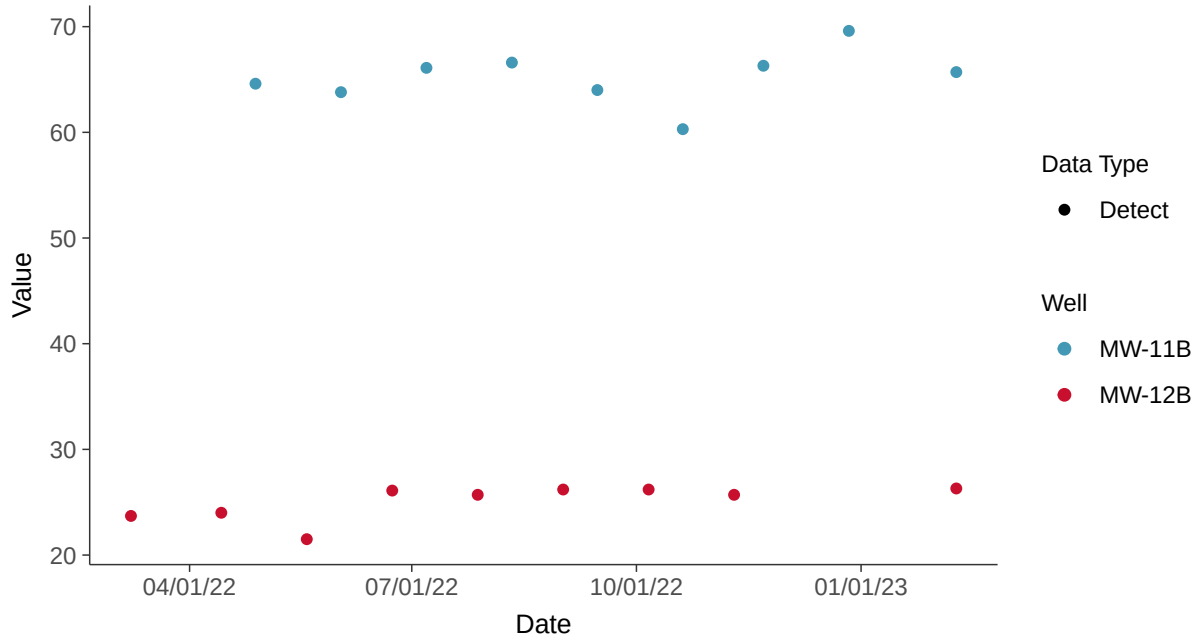
Scatter Plot

Calcium, MW-11B & MW-12B (mg/L)



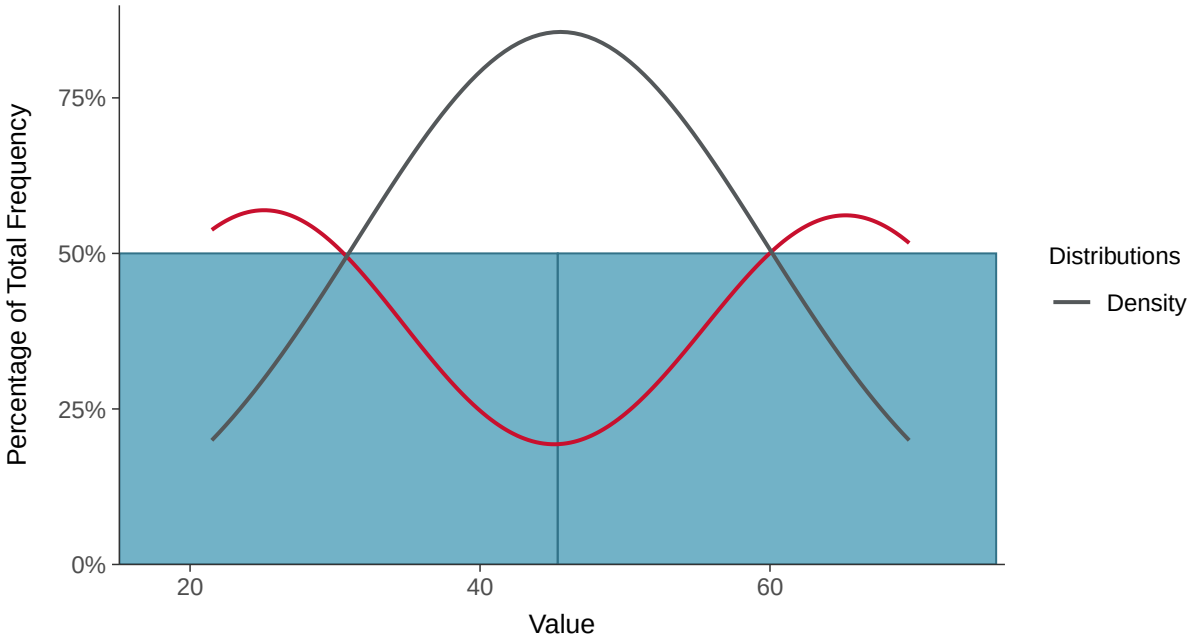
Scatter Plot by Well

Calcium, MW-11B & MW-12B (mg/L)



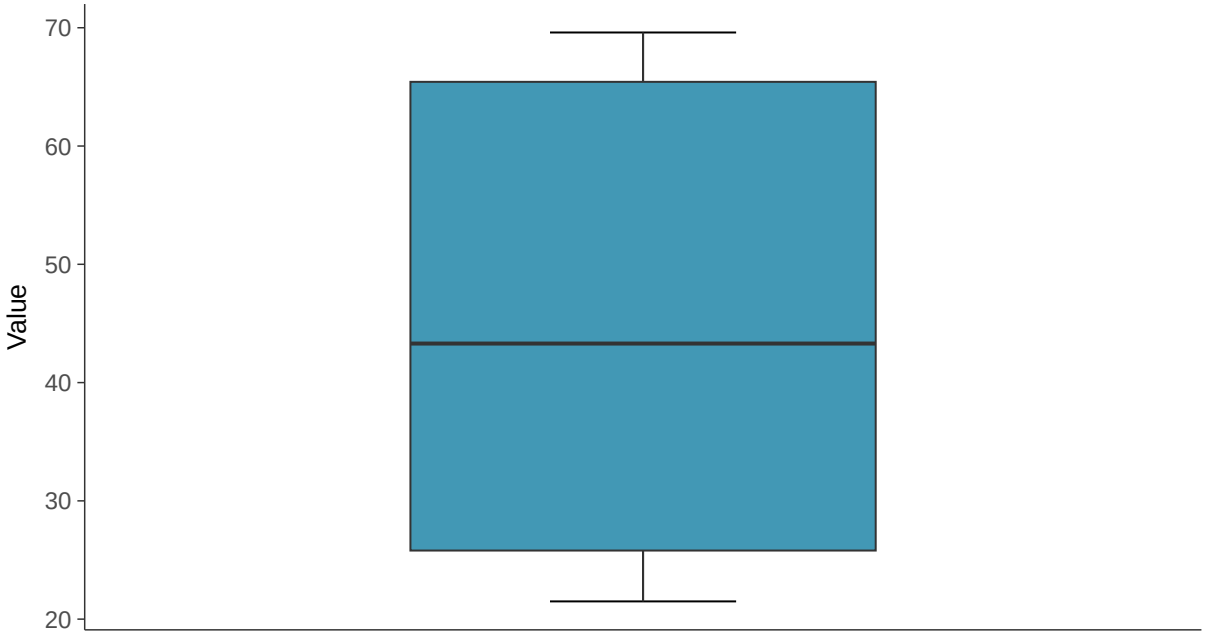
Histogram

Calcium, MW-11B & MW-12B (mg/L)



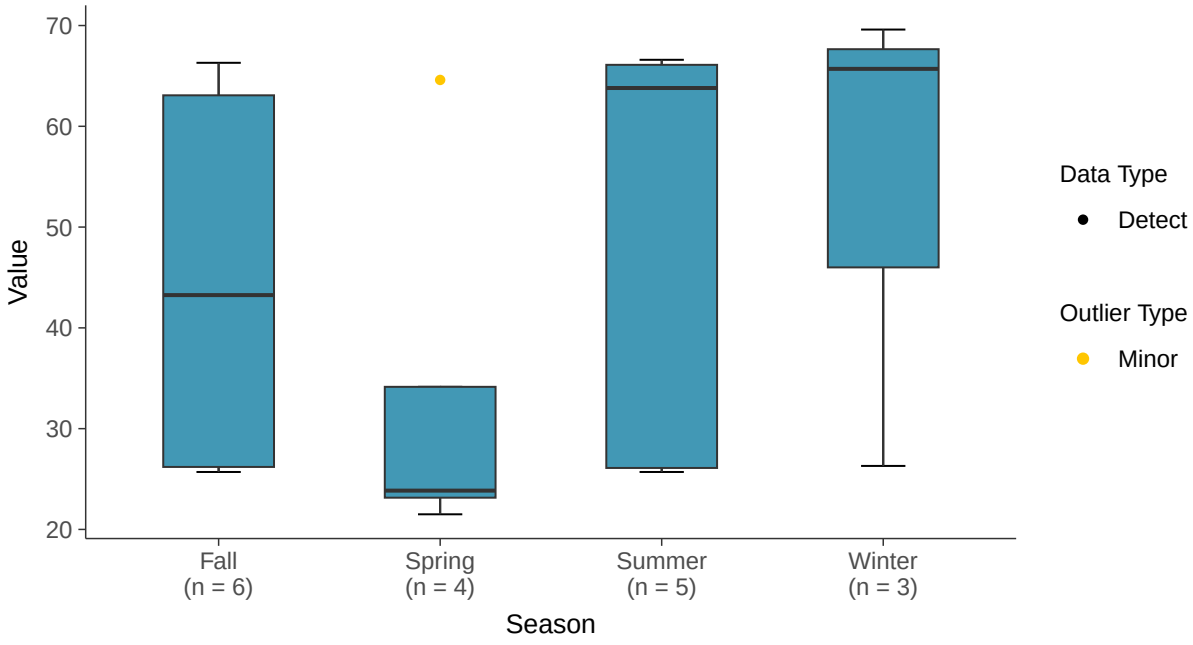
Boxplot

Calcium, MW-11B & MW-12B (mg/L)



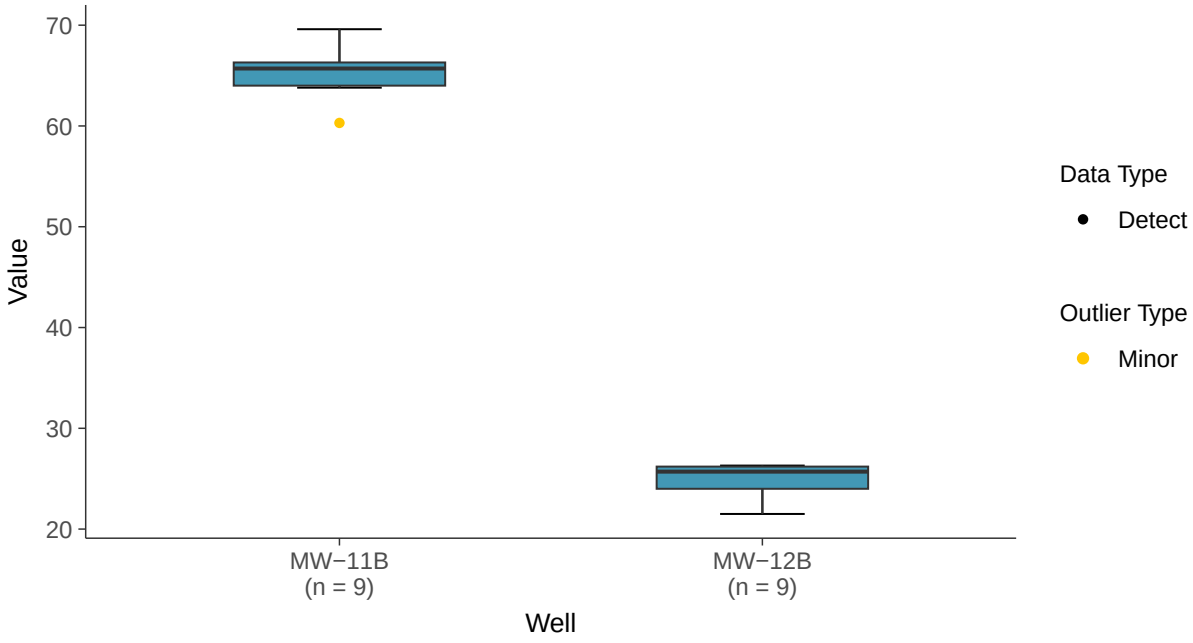
Boxplot by Season

Calcium, MW-11B & MW-12B (mg/L)



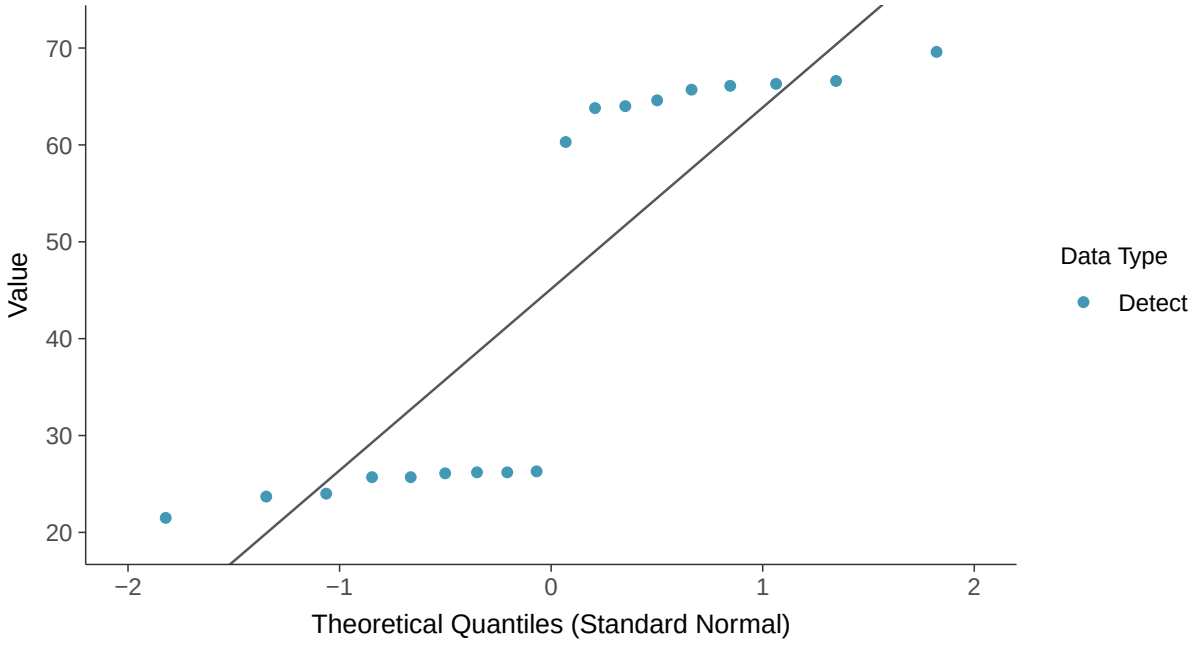
Boxplot by Well

Calcium, MW-11B & MW-12B (mg/L)



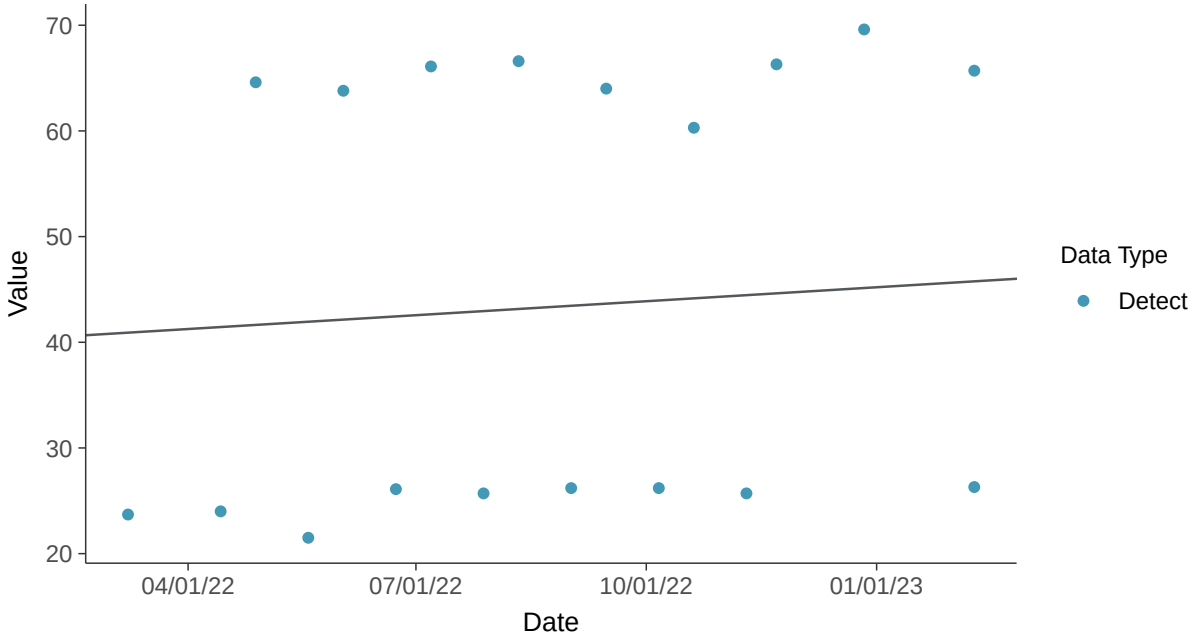
Normal Q-Q plot

Calcium, MW-11B & MW-12B (mg/L)



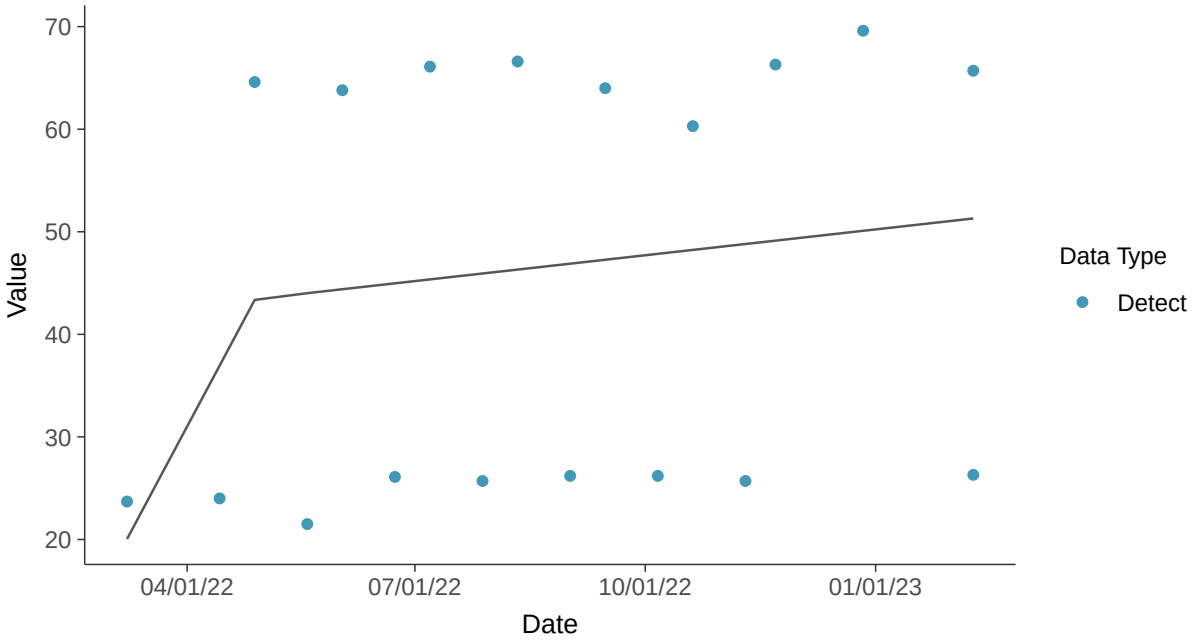
Trend Regression: Mann-Kendall/Theil-Sen Estimate

Calcium, MW-11B & MW-12B (mg/L)



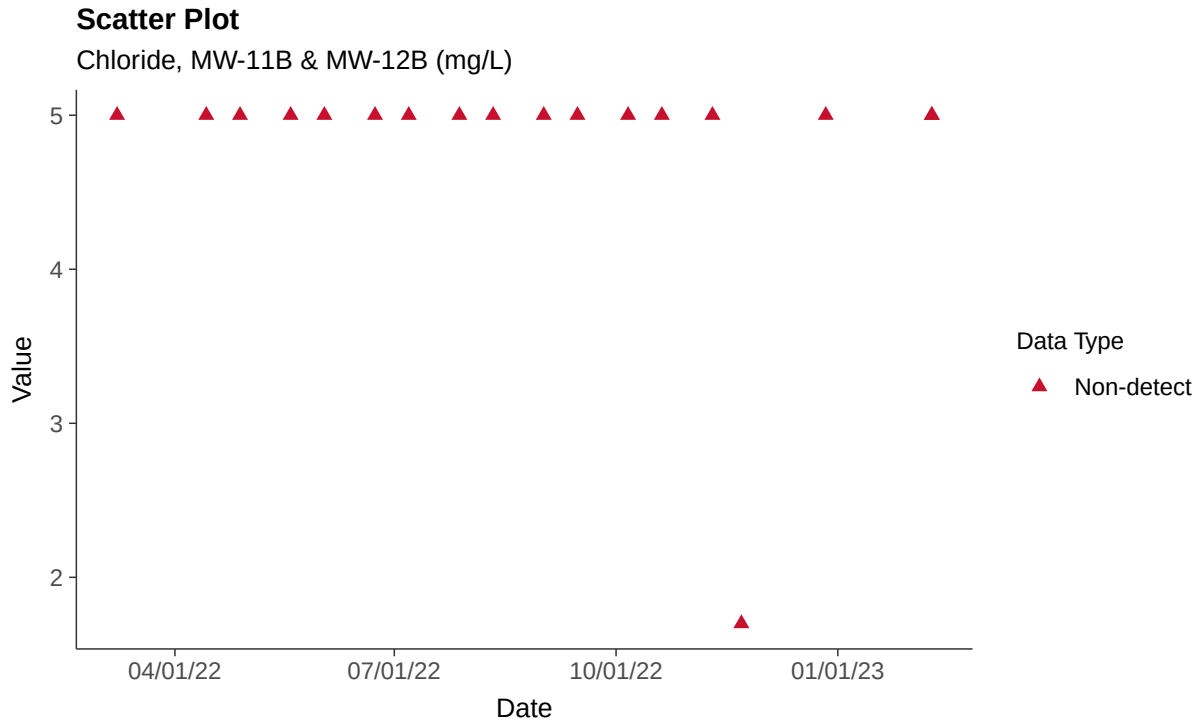
Trend Regression: Piecewise Linear-Linear

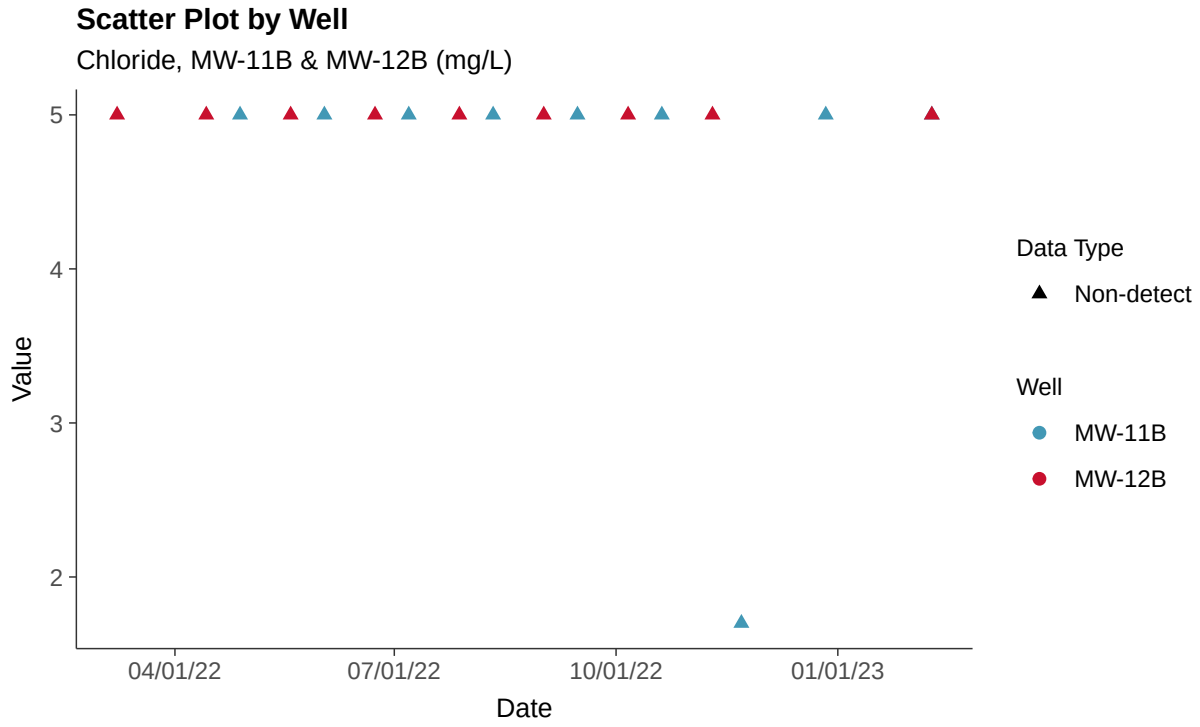
Calcium, MW-11B & MW-12B (mg/L)



Appendix III: Chloride, MW-11B & MW-12B

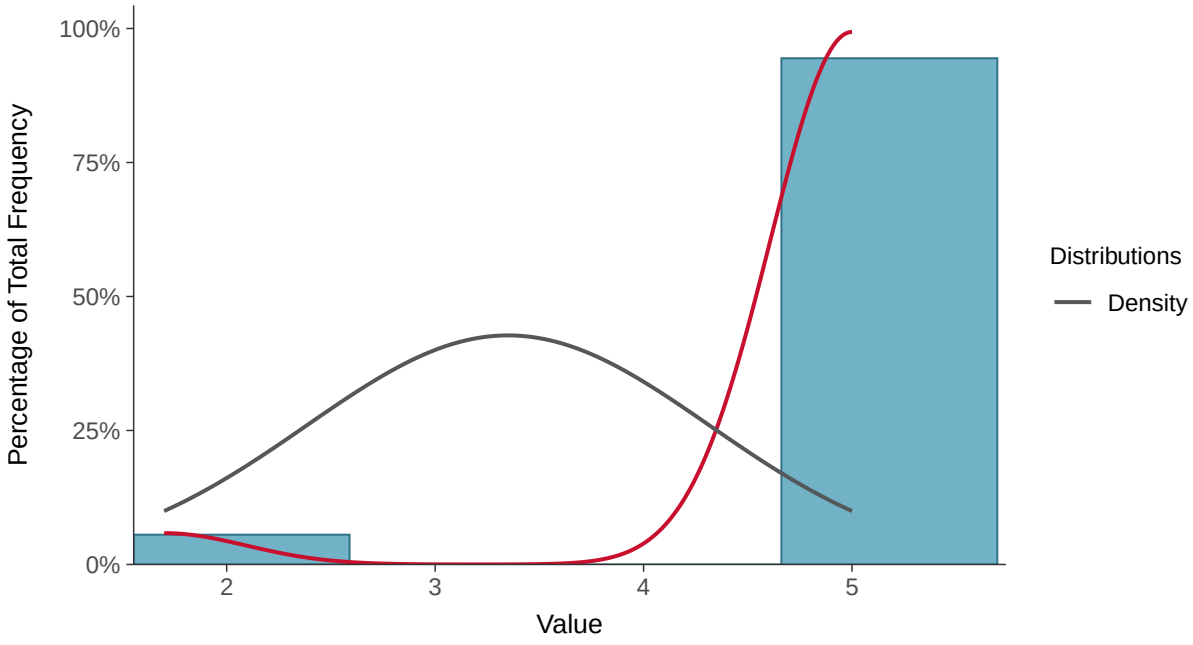
ID: 1_03





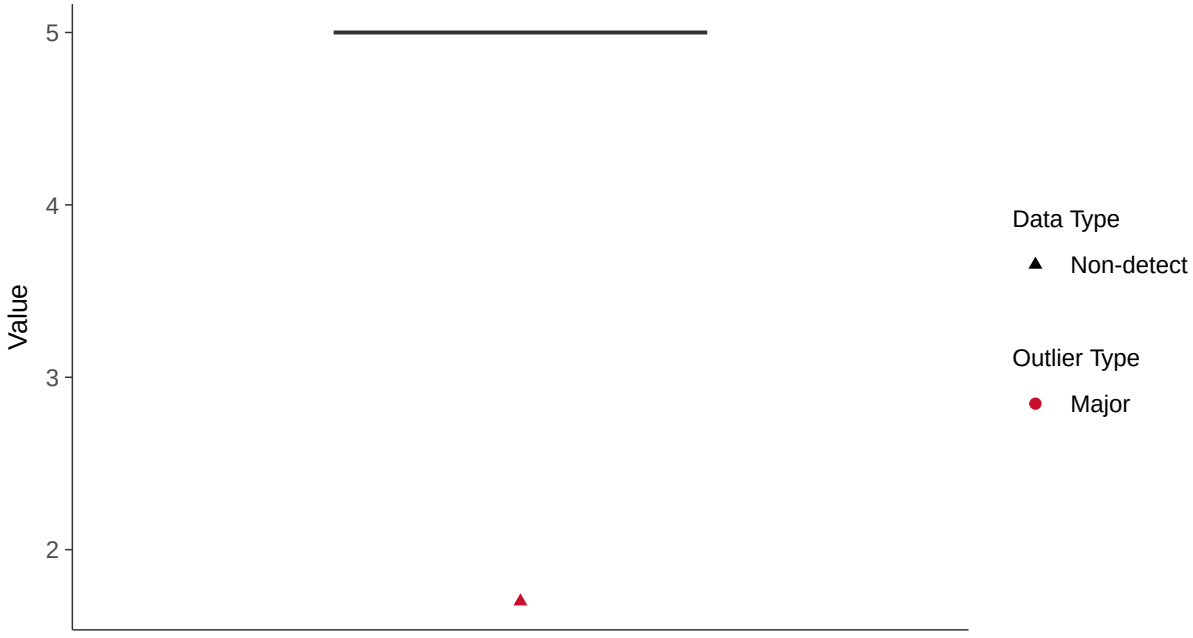
Histogram

Chloride, MW-11B & MW-12B (mg/L)



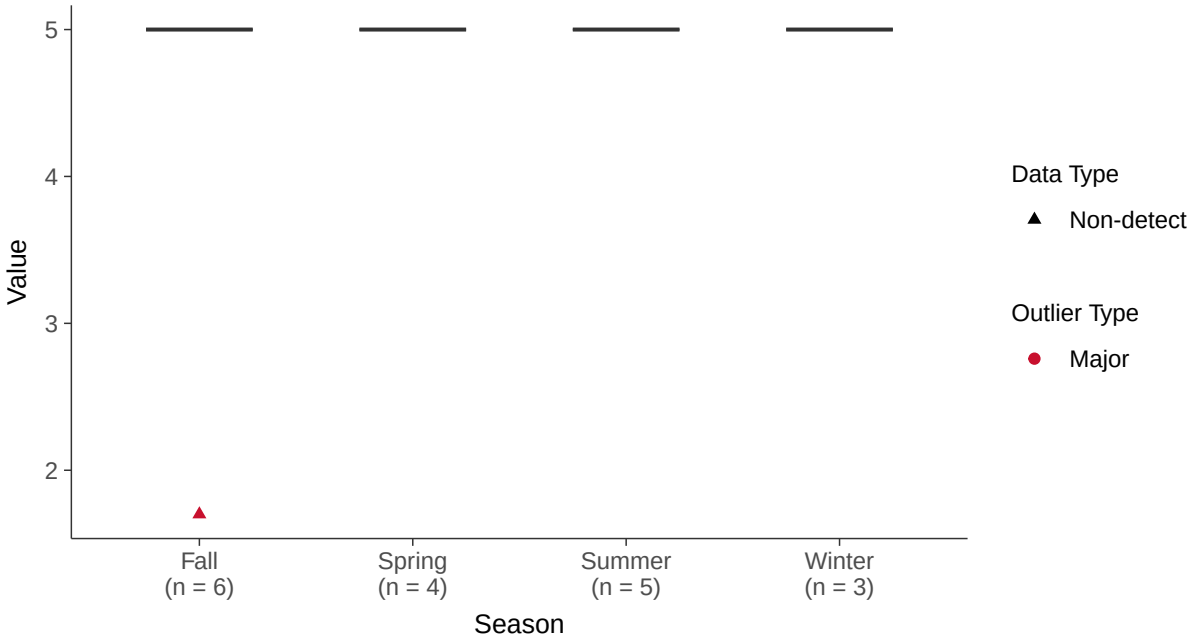
Boxplot

Chloride, MW-11B & MW-12B (mg/L)



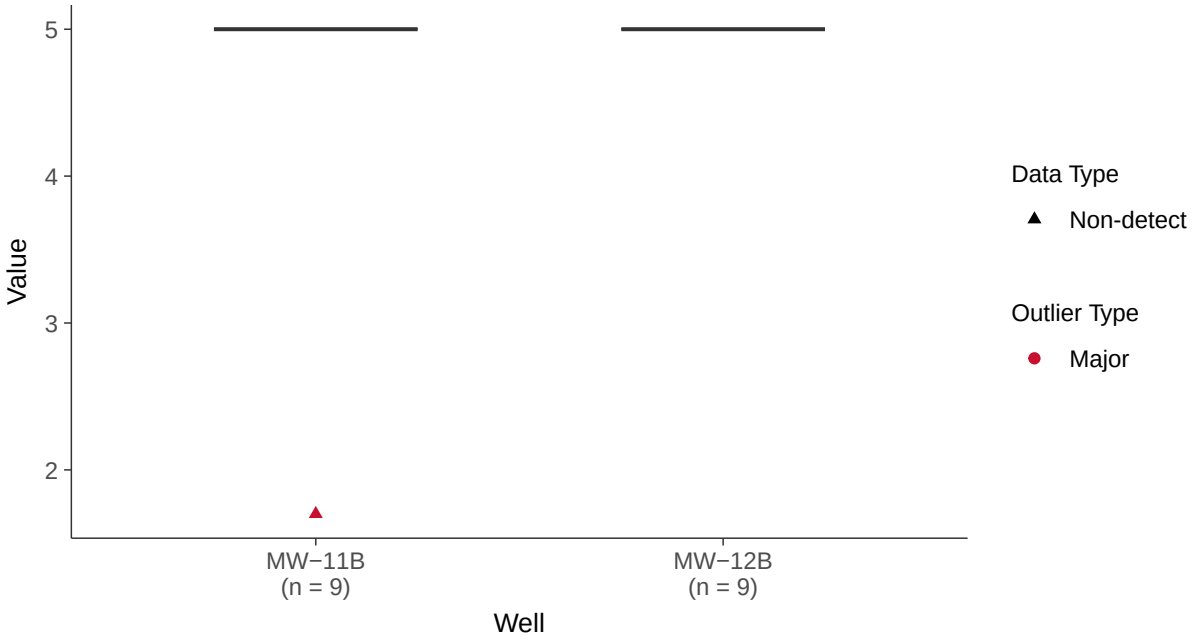
Boxplot by Season

Chloride, MW-11B & MW-12B (mg/L)



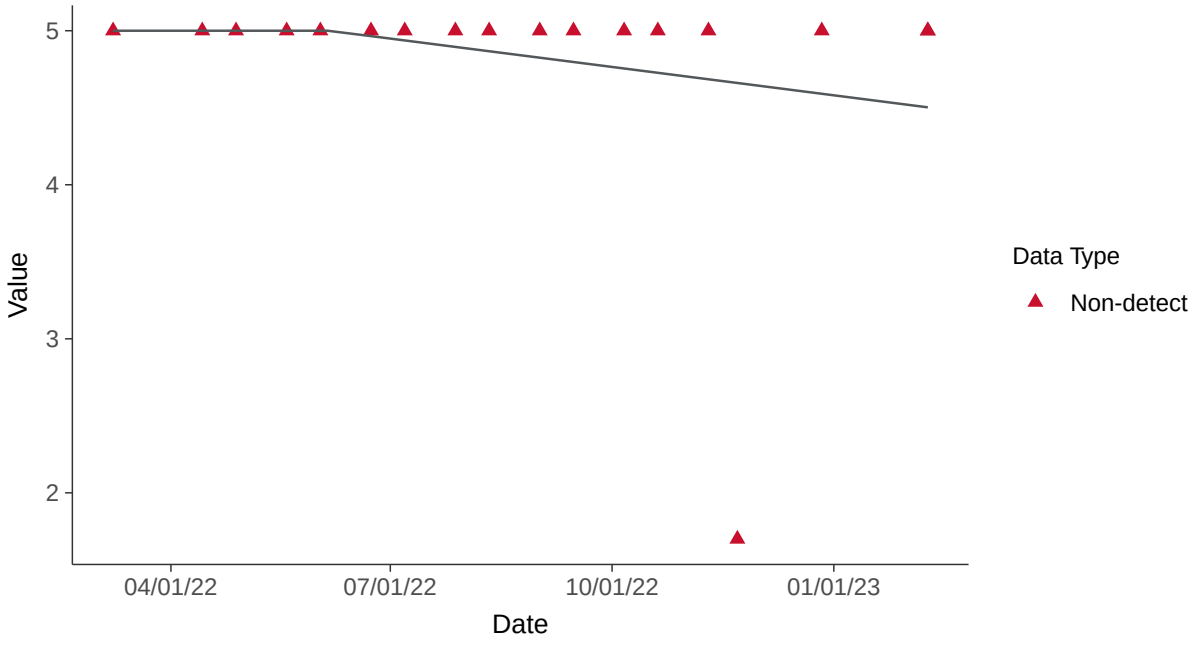
Boxplot by Well

Chloride, MW-11B & MW-12B (mg/L)



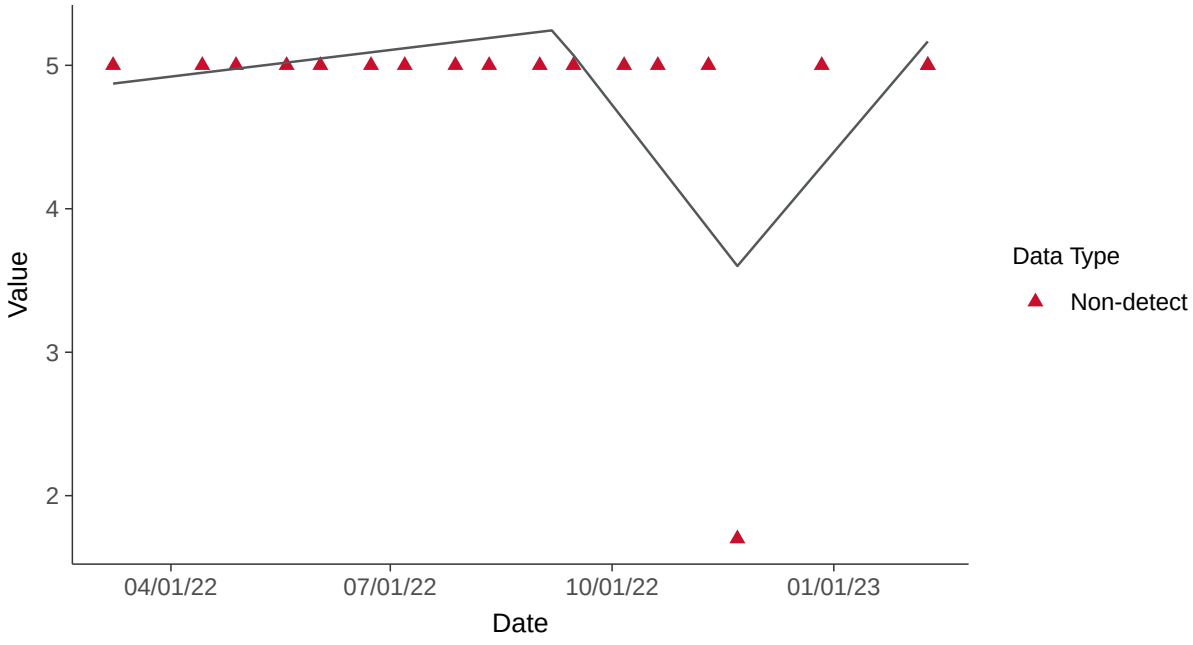
Trend Regression: Piecewise Linear-Linear

Chloride, MW-11B & MW-12B (mg/L)



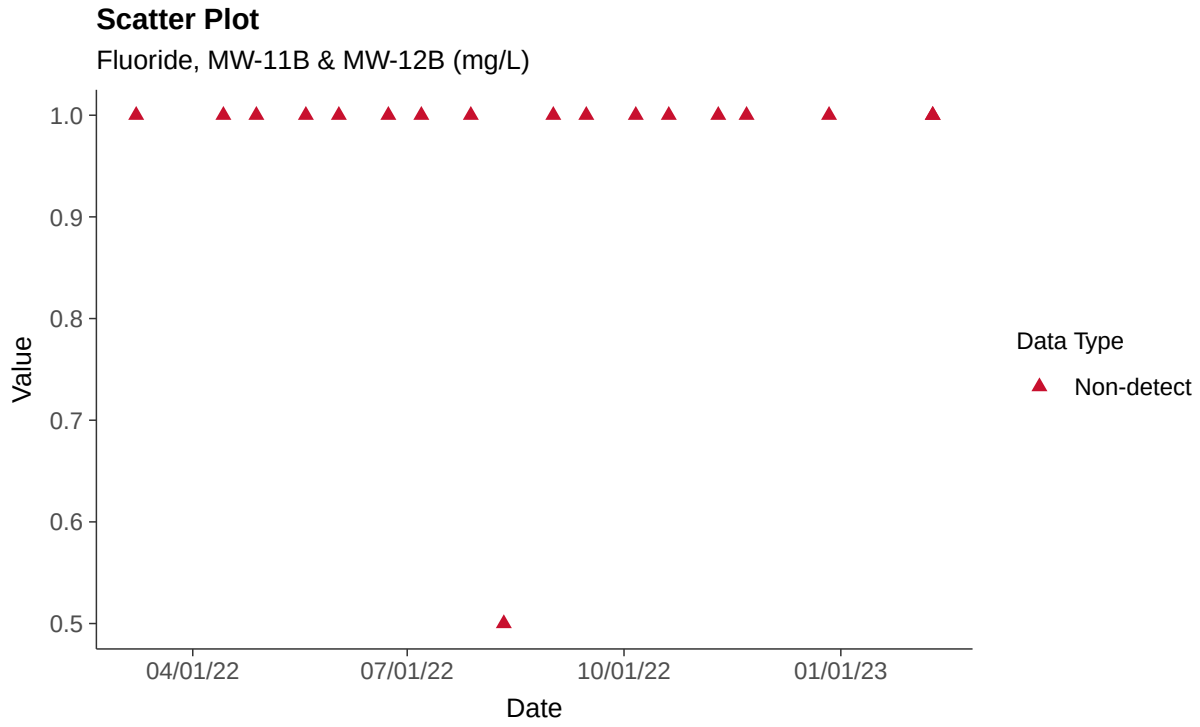
Trend Regression: Piecewise Linear-Linear-Linear

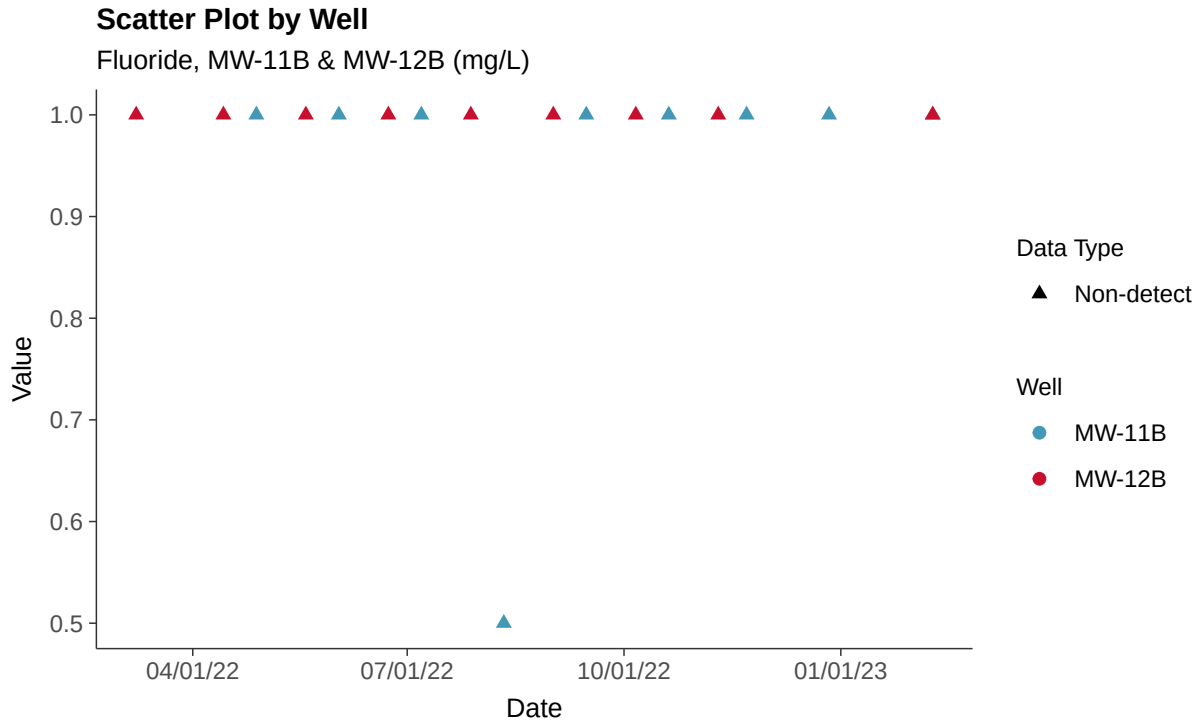
Chloride, MW-11B & MW-12B (mg/L)



Appendix III: Fluoride, MW-11B & MW-12B

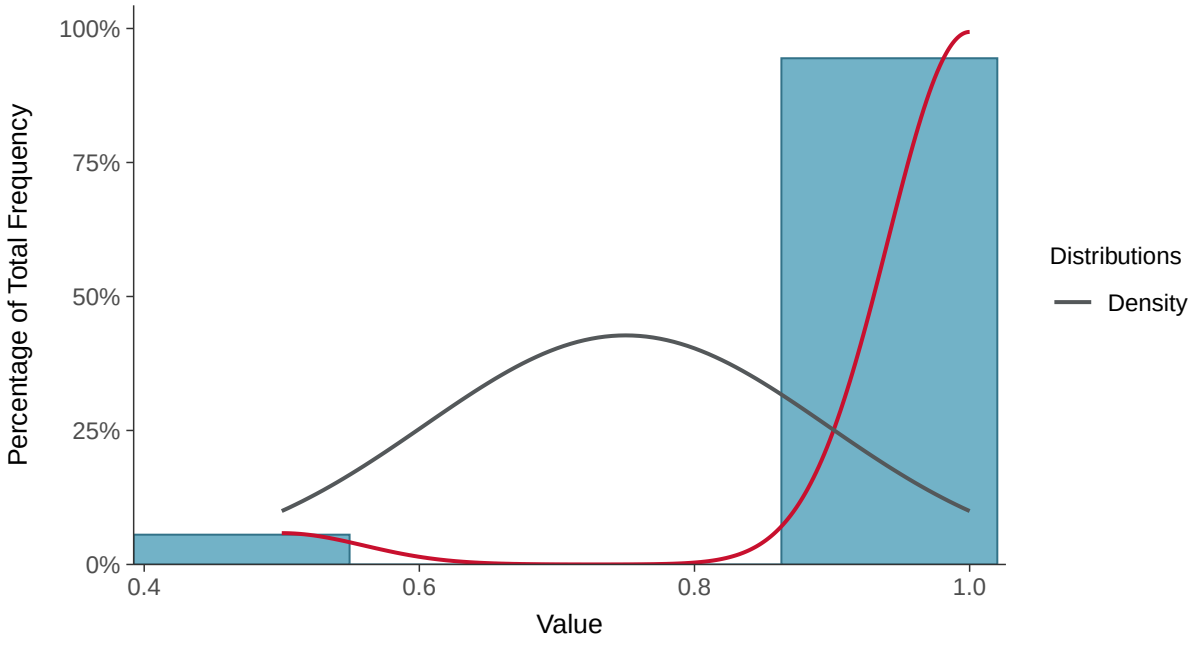
ID: 1_04





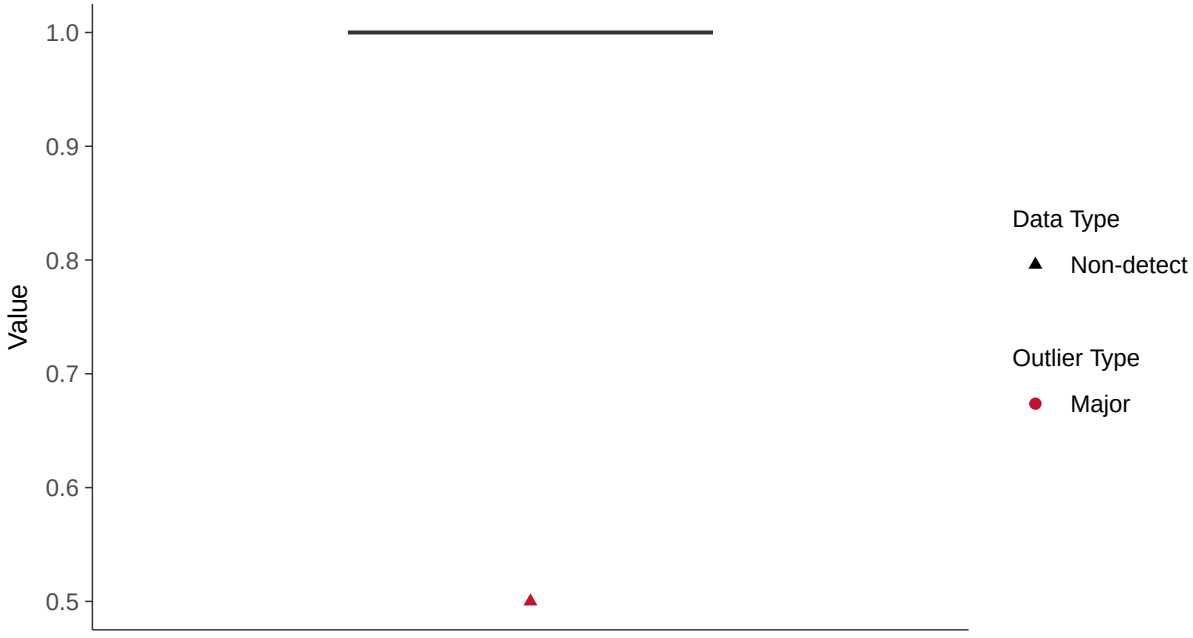
Histogram

Fluoride, MW-11B & MW-12B (mg/L)



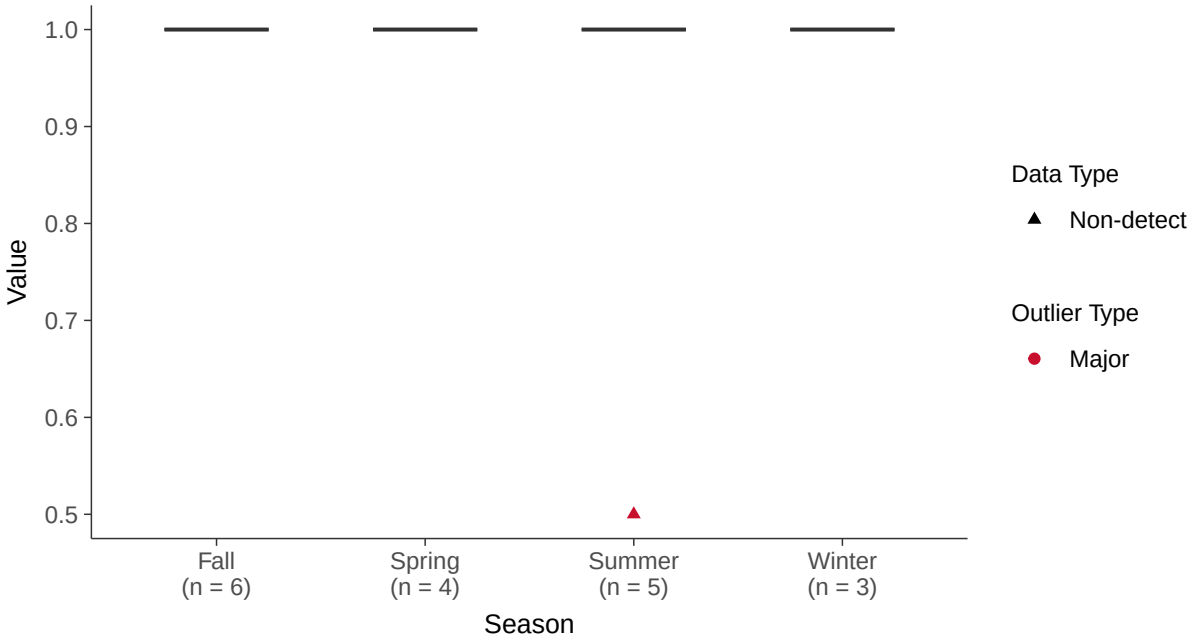
Boxplot

Fluoride, MW-11B & MW-12B (mg/L)



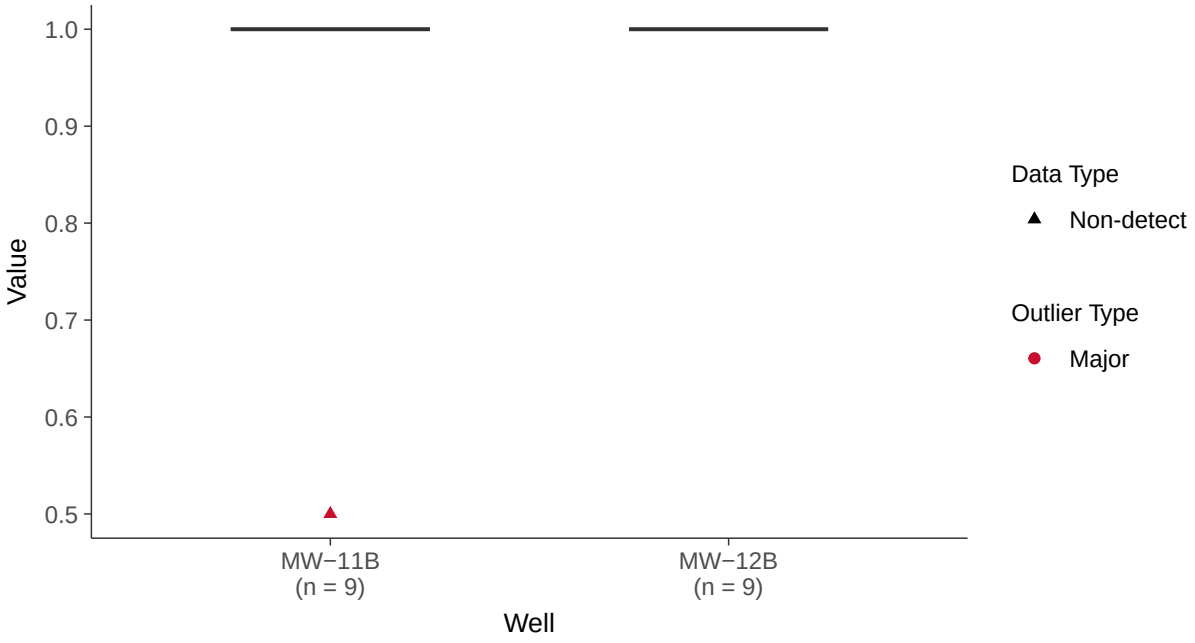
Boxplot by Season

Fluoride, MW-11B & MW-12B (mg/L)



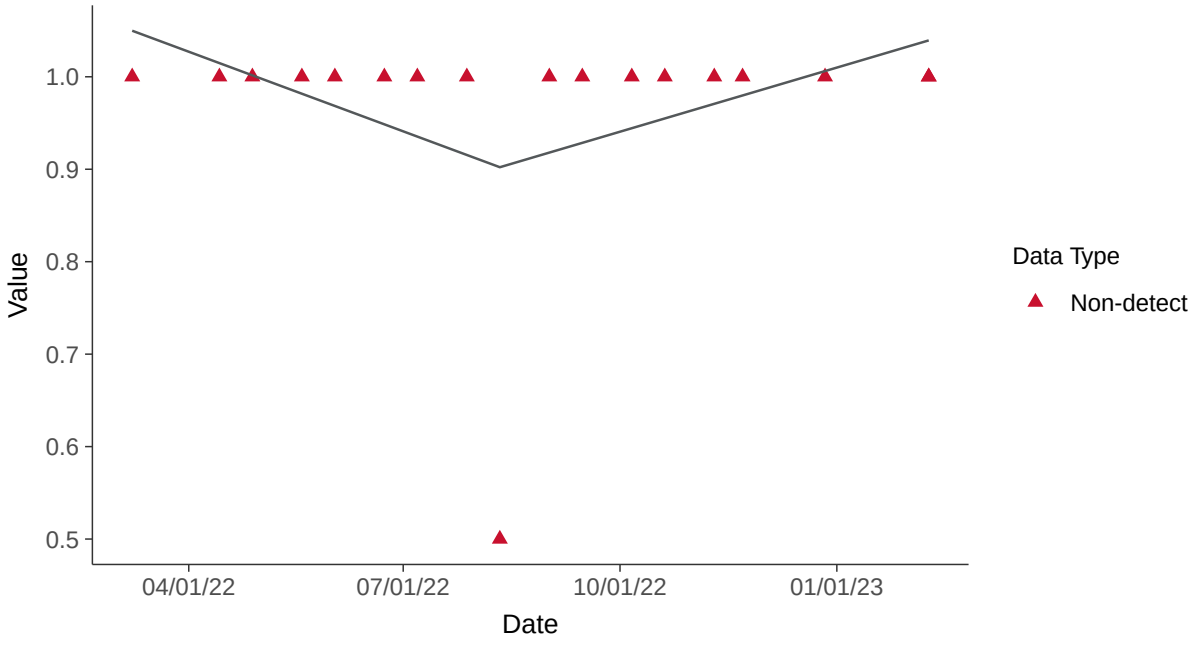
Boxplot by Well

Fluoride, MW-11B & MW-12B (mg/L)



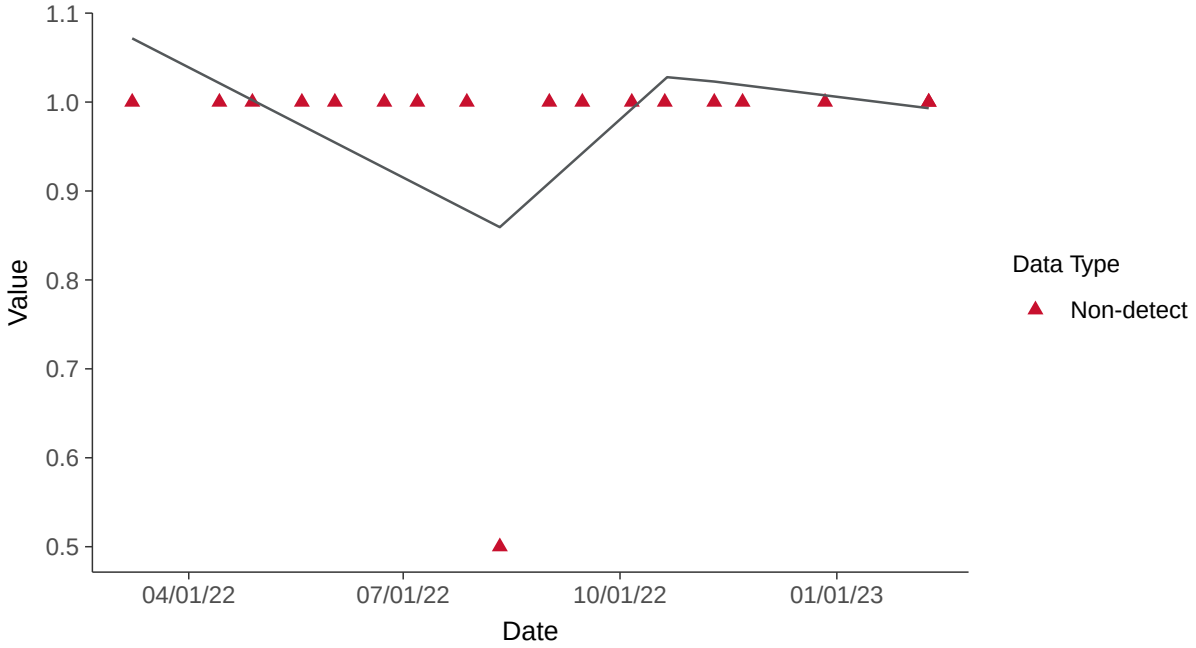
Trend Regression: Piecewise Linear-Linear

Fluoride, MW-11B & MW-12B (mg/L)



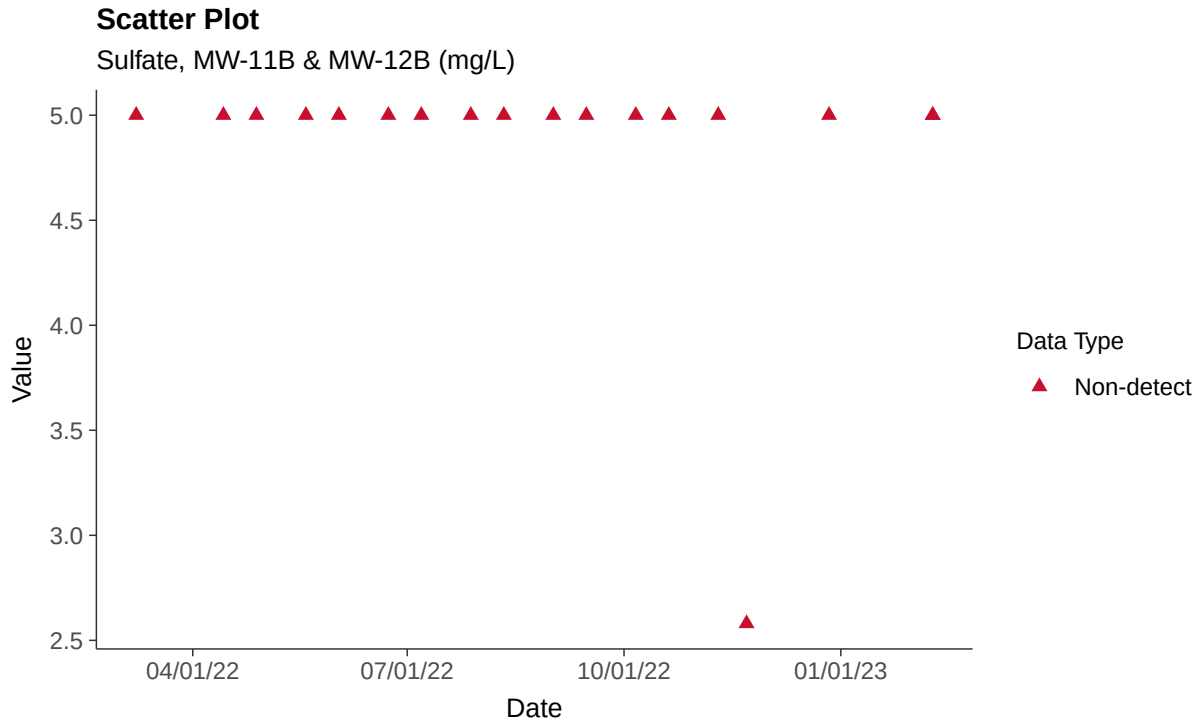
Trend Regression: Piecewise Linear-Linear-Linear

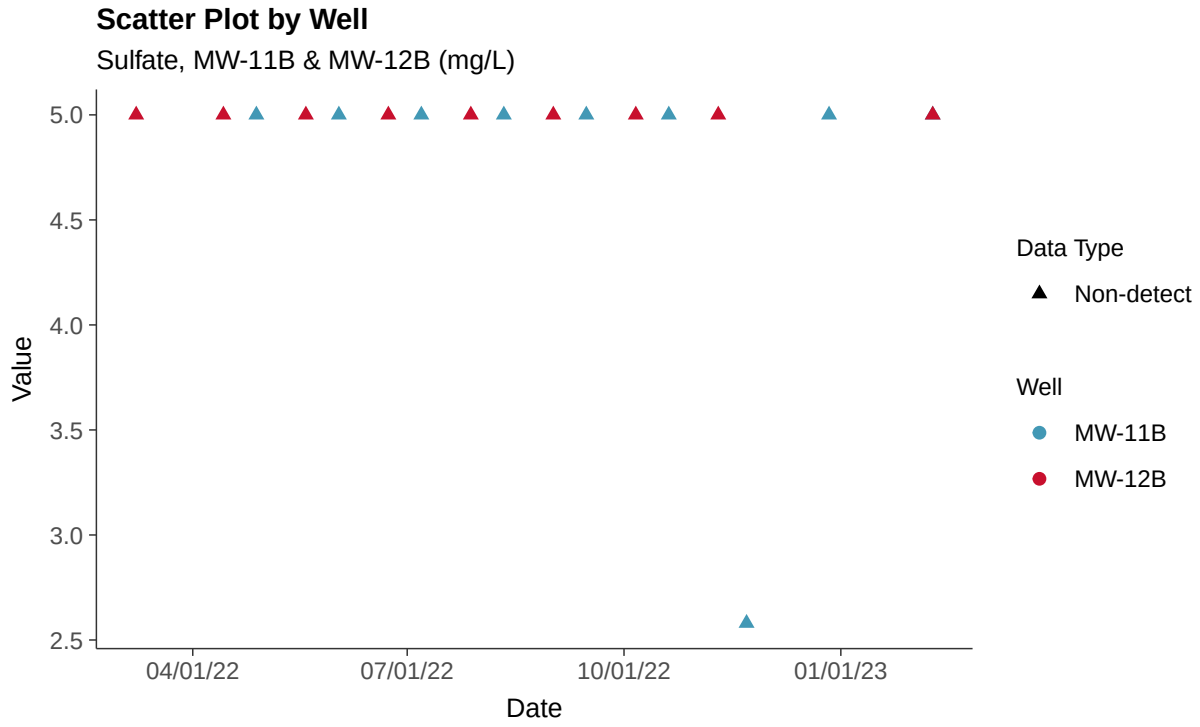
Fluoride, MW-11B & MW-12B (mg/L)



Appendix III: Sulfate, MW-11B & MW-12B

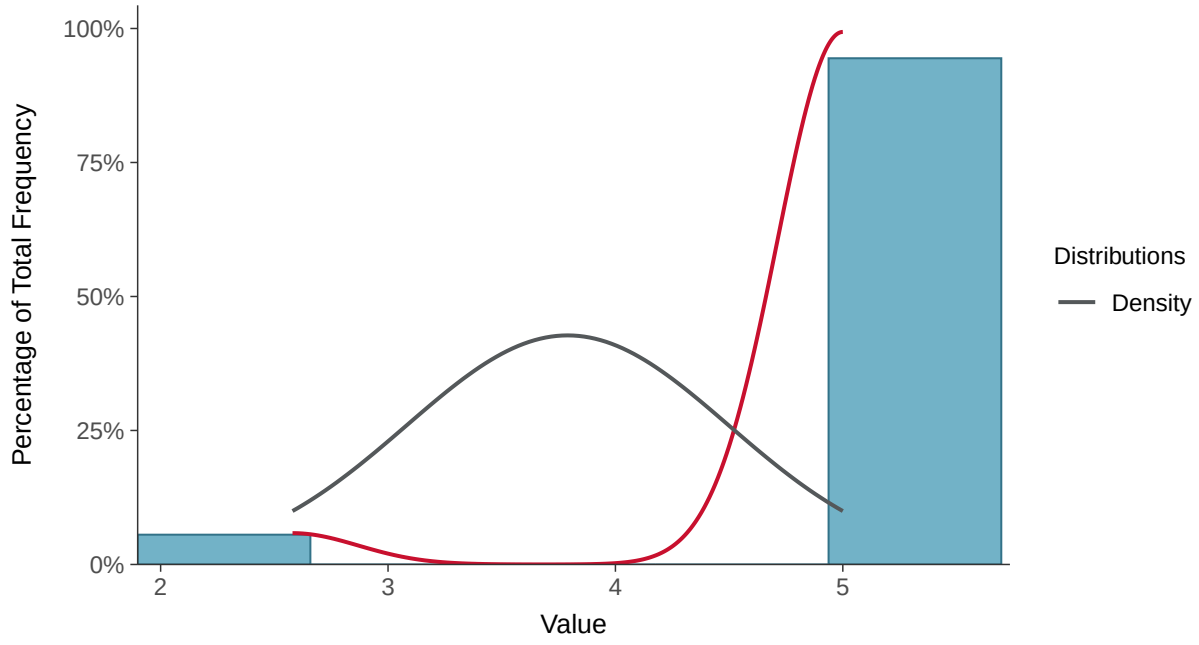
ID: 1_05





Histogram

Sulfate, MW-11B & MW-12B (mg/L)

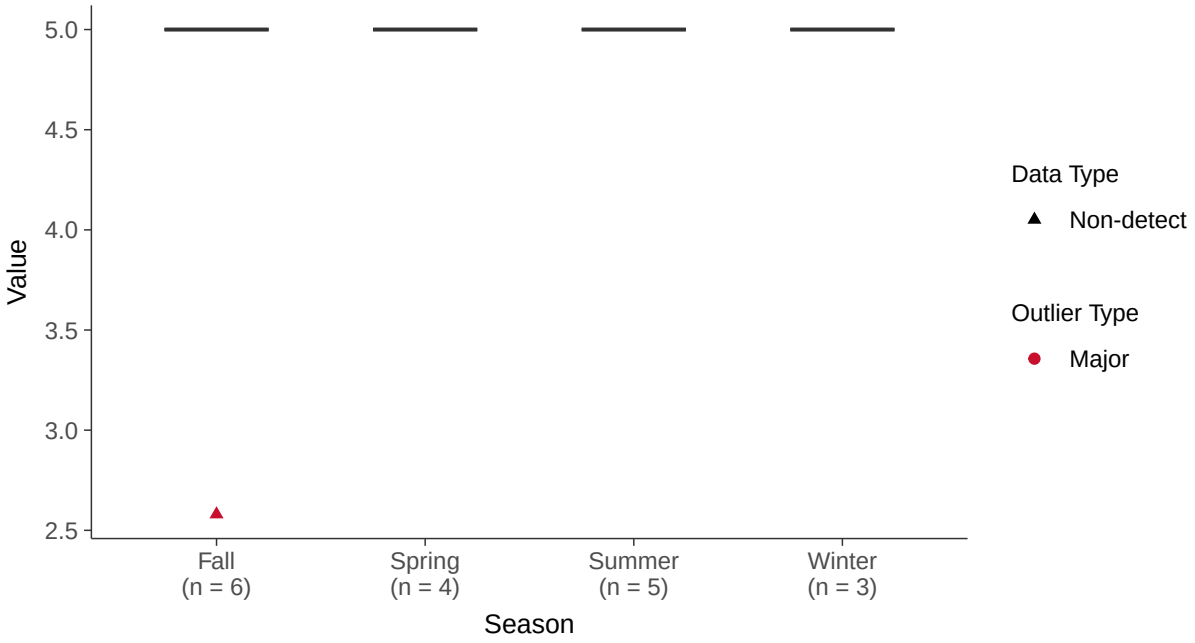


Boxplot

Sulfate, MW-11B & MW-12B (mg/L)

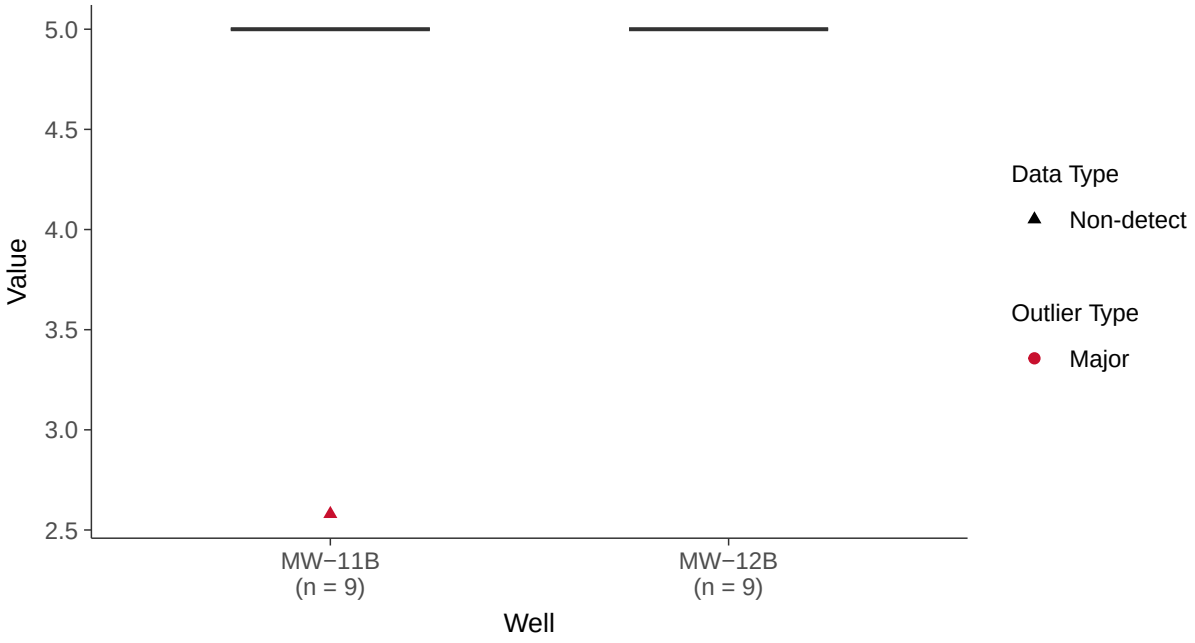
Boxplot by Season

Sulfate, MW-11B & MW-12B (mg/L)



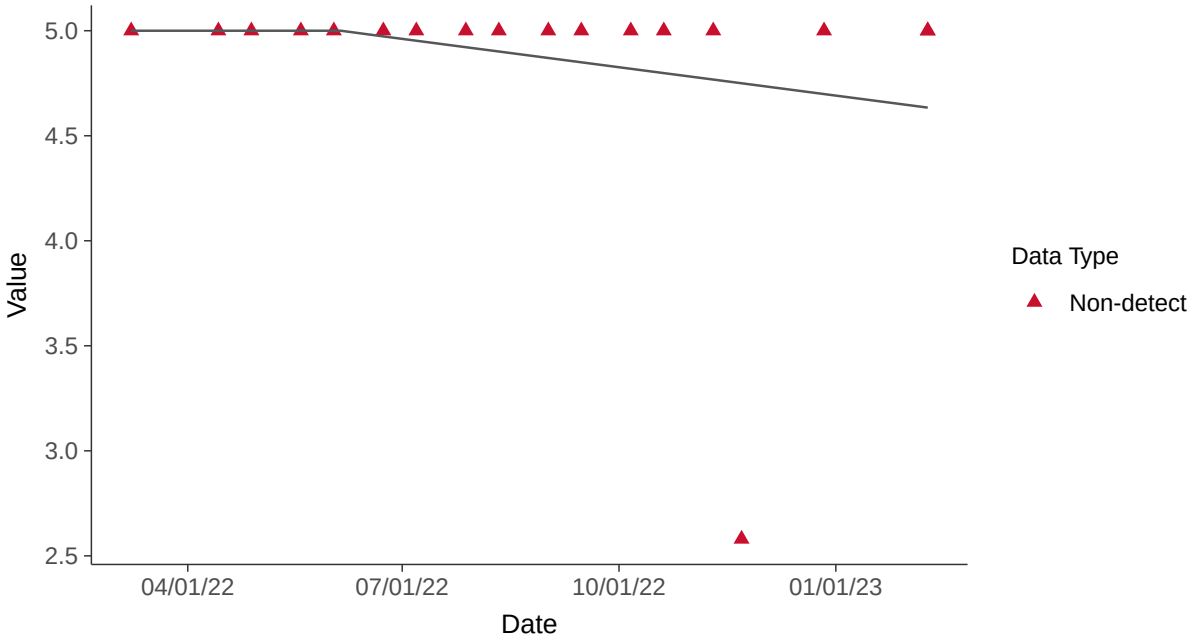
Boxplot by Well

Sulfate, MW-11B & MW-12B (mg/L)



Trend Regression: Piecewise Linear-Linear

Sulfate, MW-11B & MW-12B (mg/L)

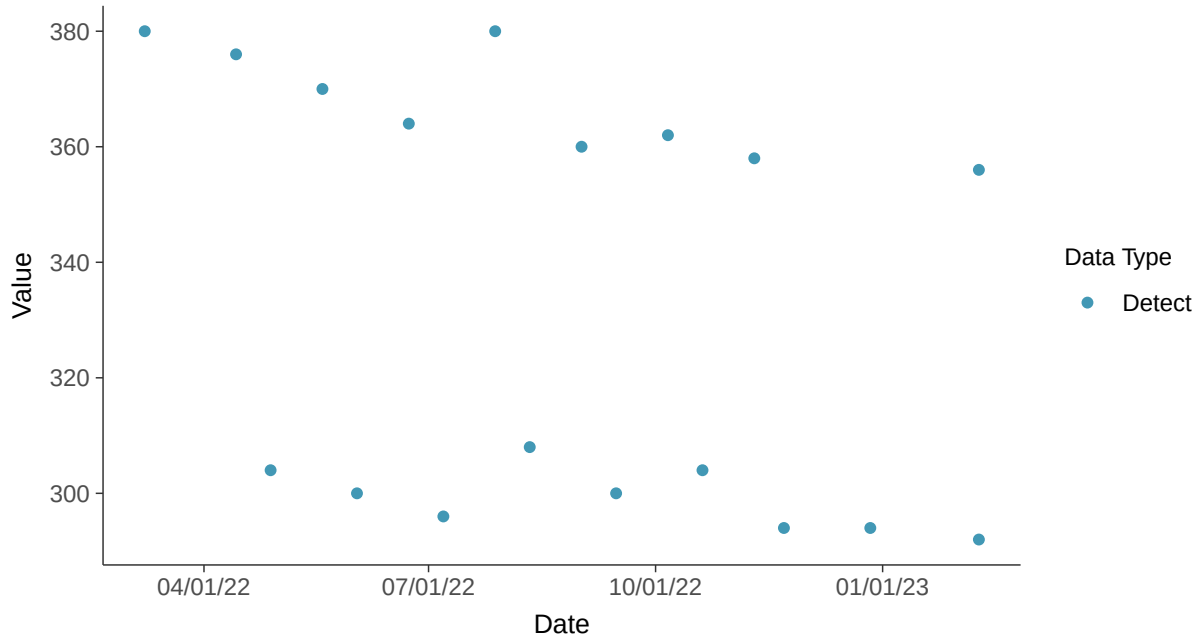


Appendix III: Total Dissolved Solids, MW-11B & MW-12B

ID: 1_06

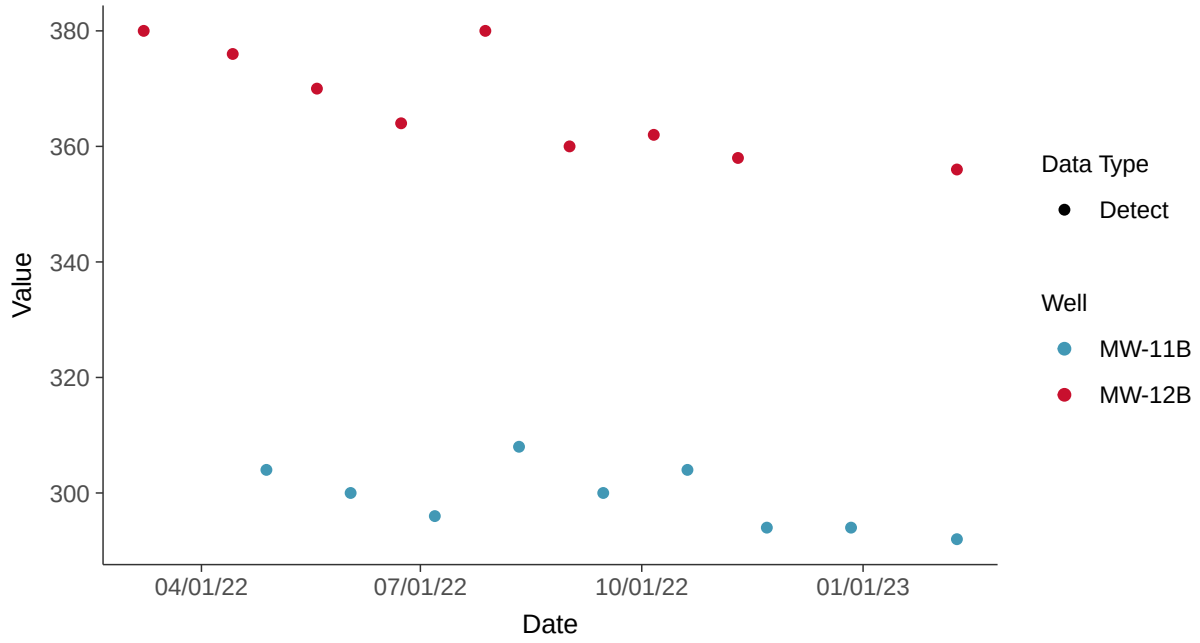
Scatter Plot

Total Dissolved Solids, MW-11B & MW-12B (mg/L)



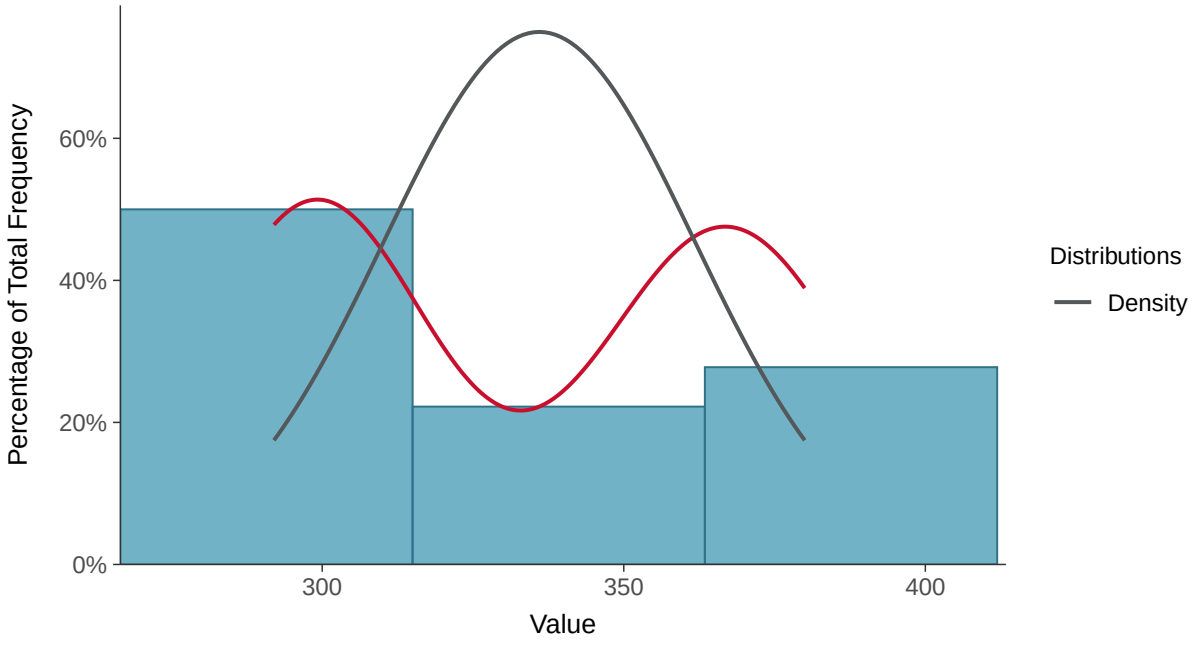
Scatter Plot by Well

Total Dissolved Solids, MW-11B & MW-12B (mg/L)



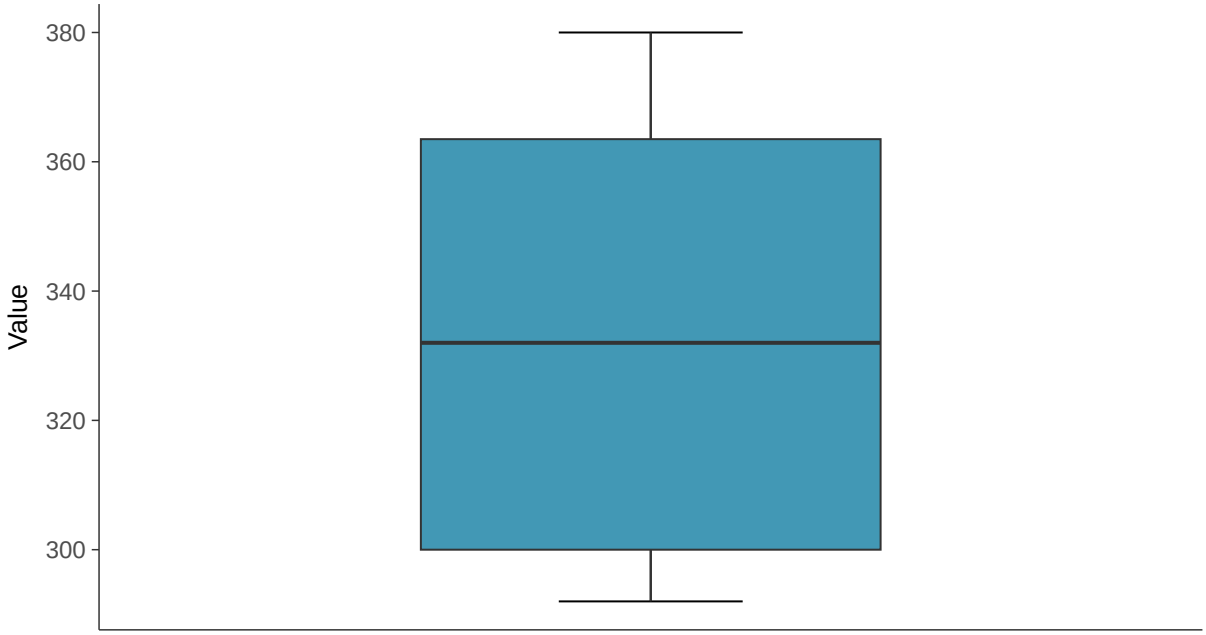
Histogram

Total Dissolved Solids, MW-11B & MW-12B (mg/L)



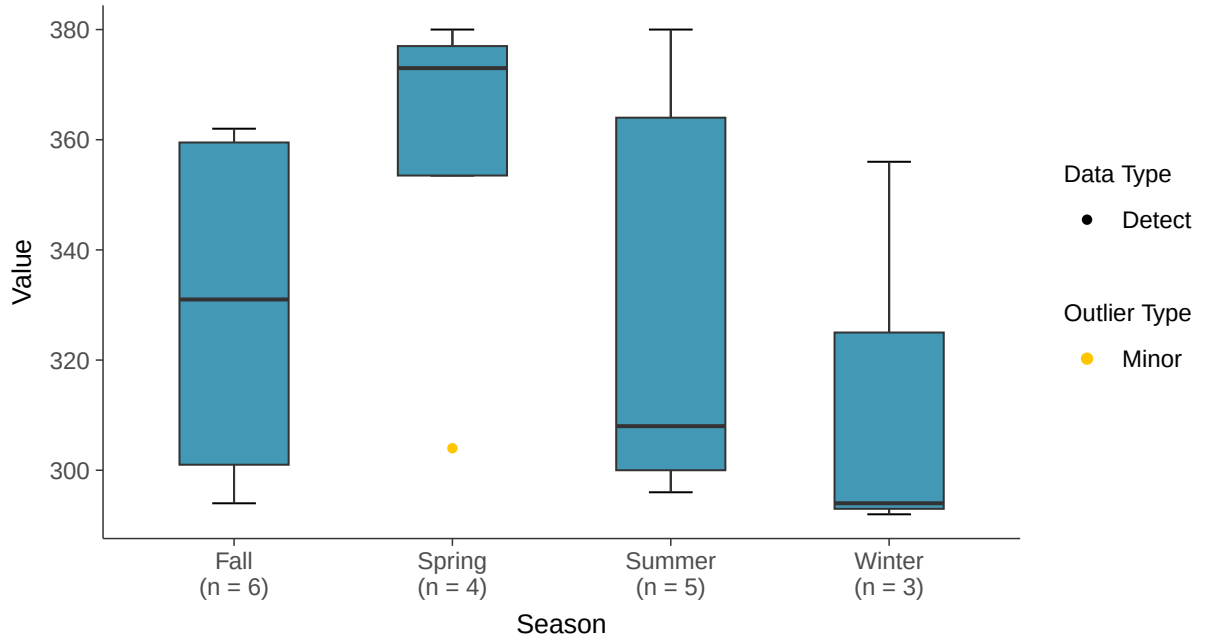
Boxplot

Total Dissolved Solids, MW-11B & MW-12B (mg/L)



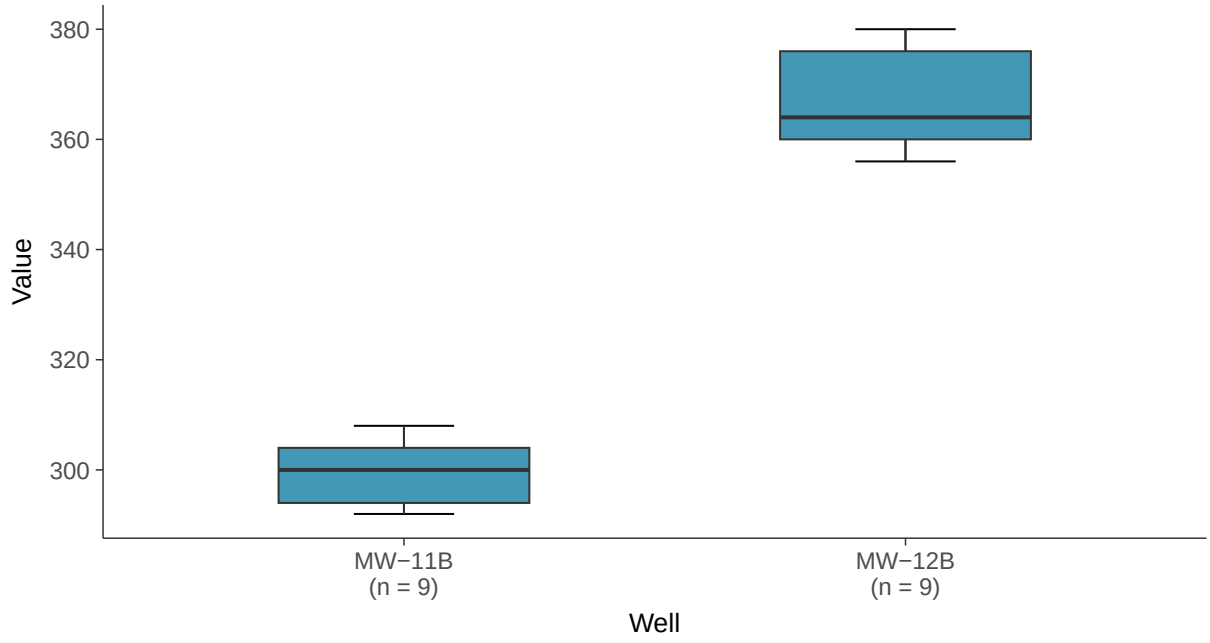
Boxplot by Season

Total Dissolved Solids, MW-11B & MW-12B (mg/L)



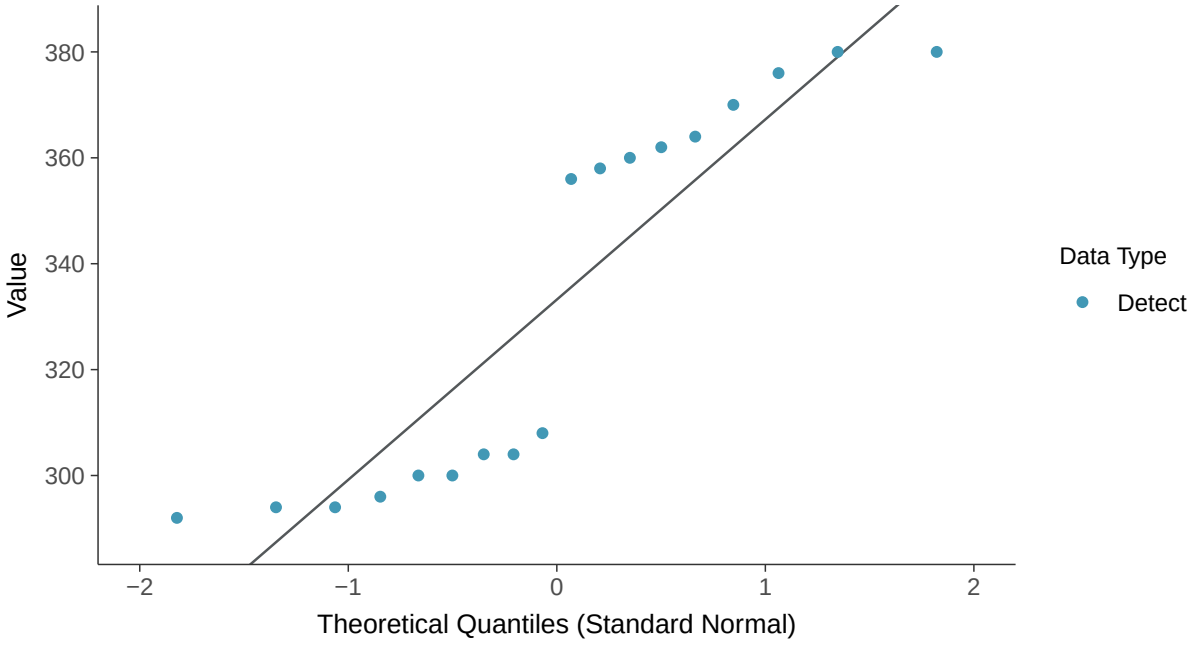
Boxplot by Well

Total Dissolved Solids, MW-11B & MW-12B (mg/L)



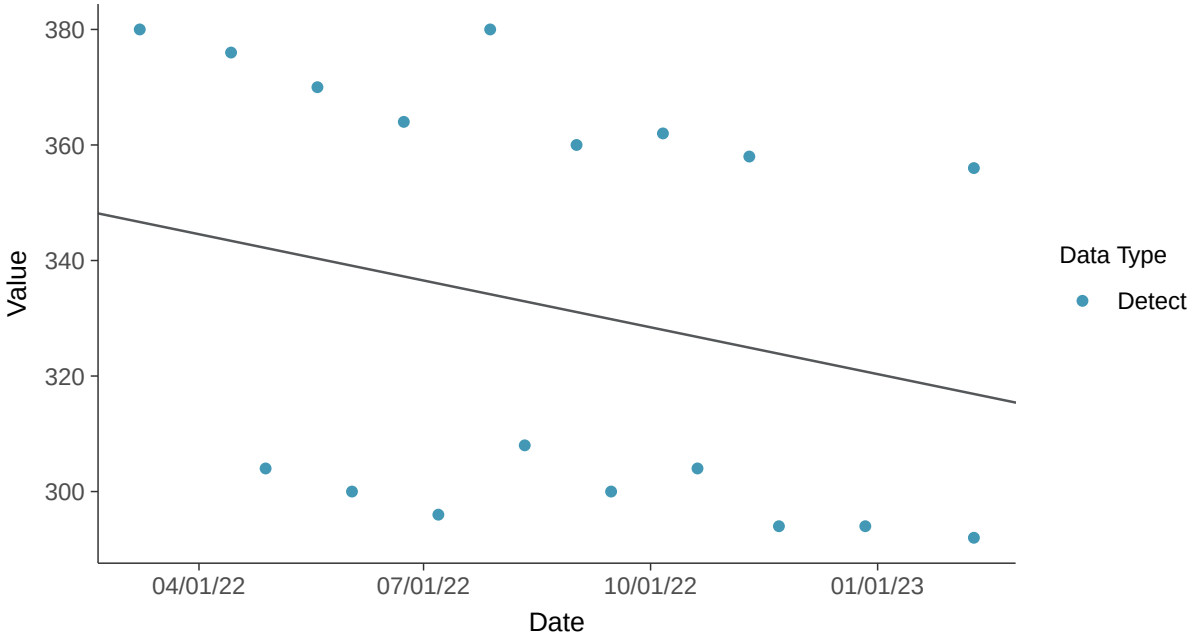
Normal Q-Q plot

Total Dissolved Solids, MW-11B & MW-12B (mg/L)



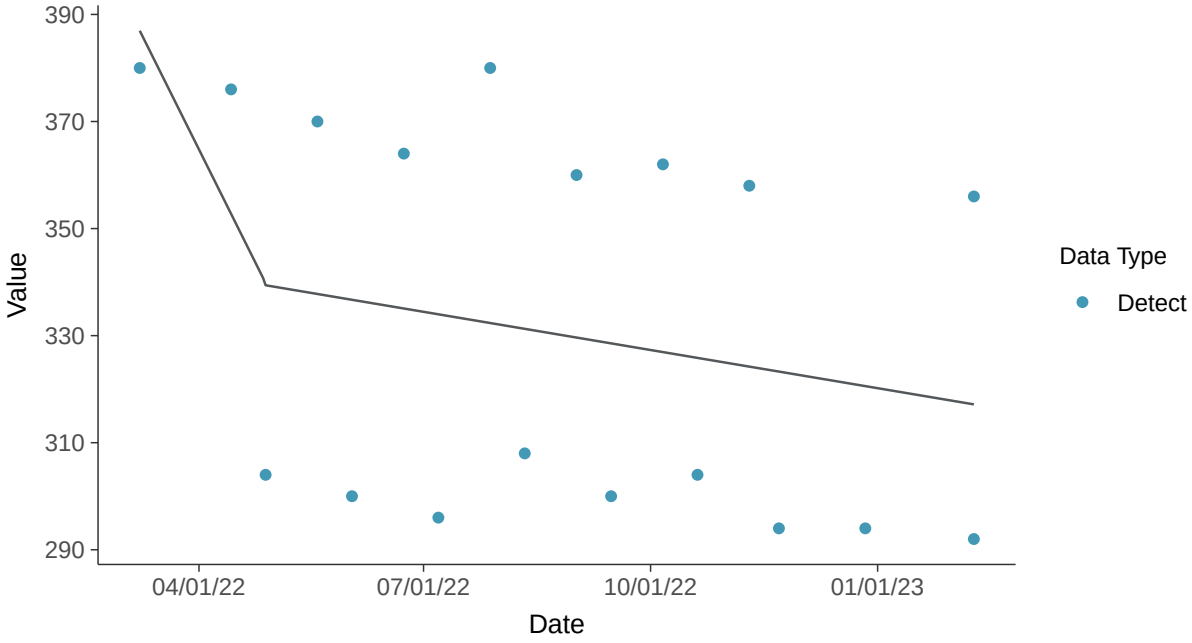
Trend Regression: Mann-Kendall/Theil-Sen Estimate

Total Dissolved Solids, MW-11B & MW-12B (mg/L)



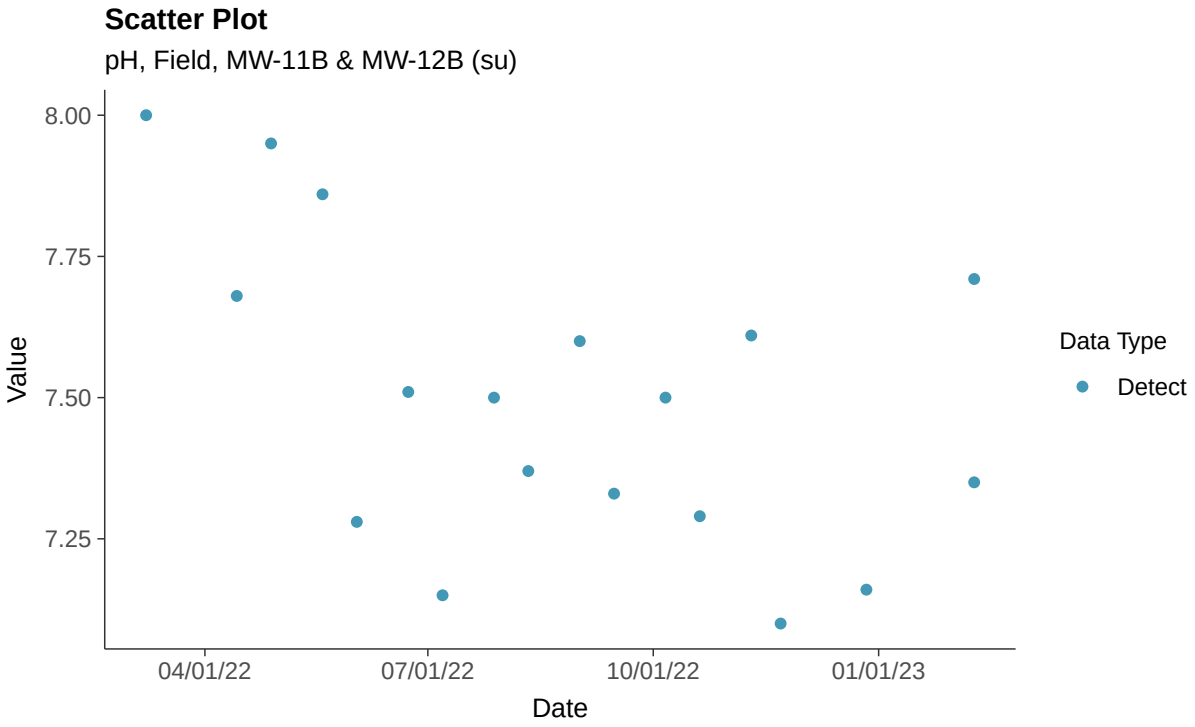
Trend Regression: Piecewise Linear-Linear

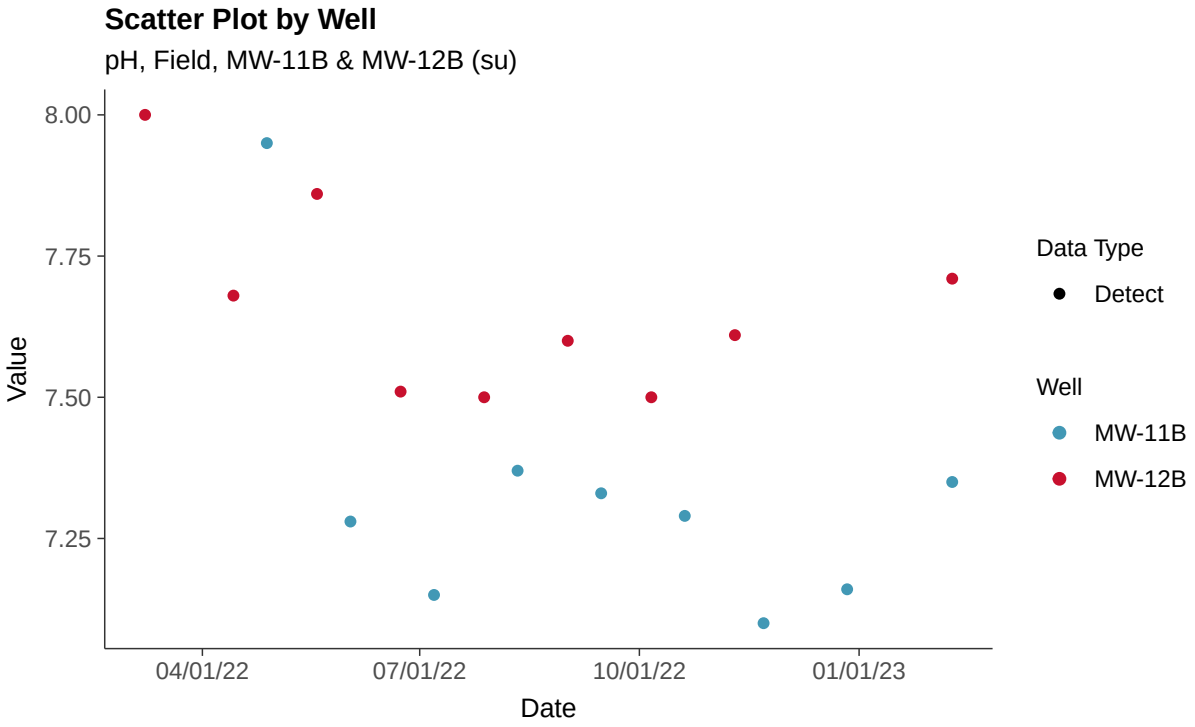
Total Dissolved Solids, MW-11B & MW-12B (mg/L)



Appendix III: pH, Field, MW-11B & MW-12B

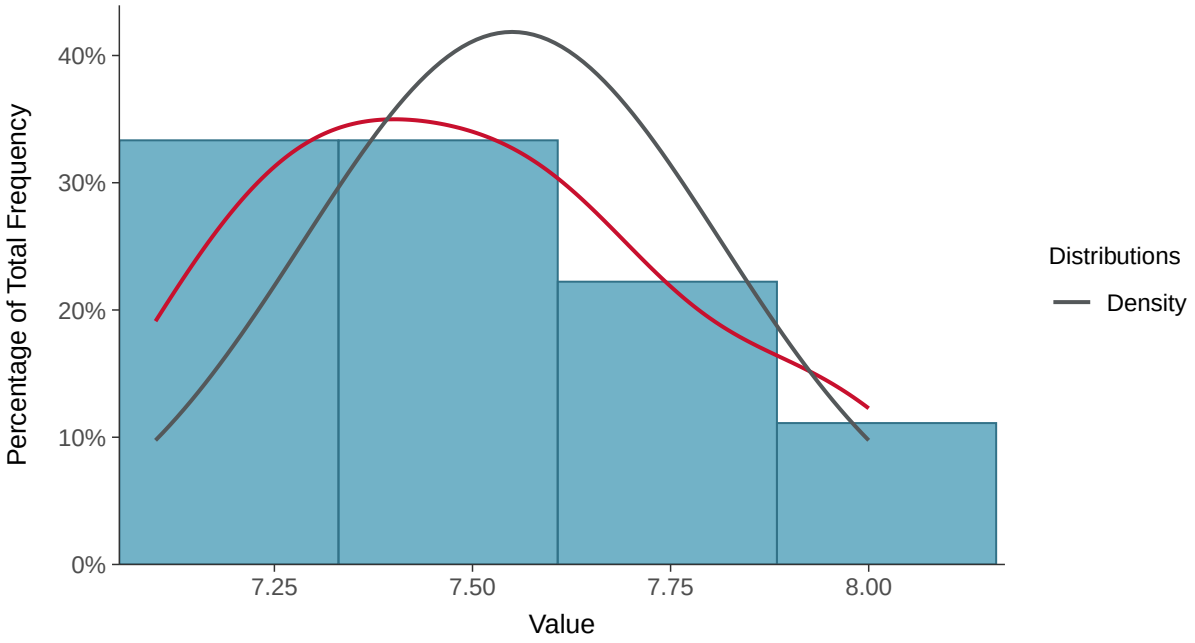
ID: 1_07





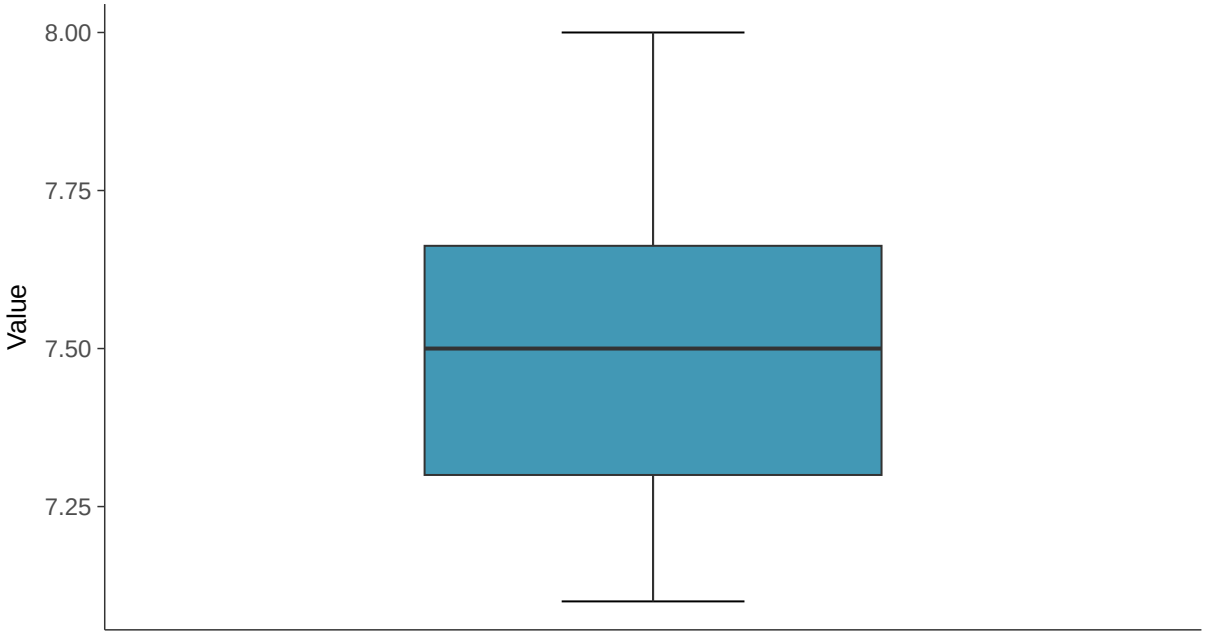
Histogram

pH, Field, MW-11B & MW-12B (su)



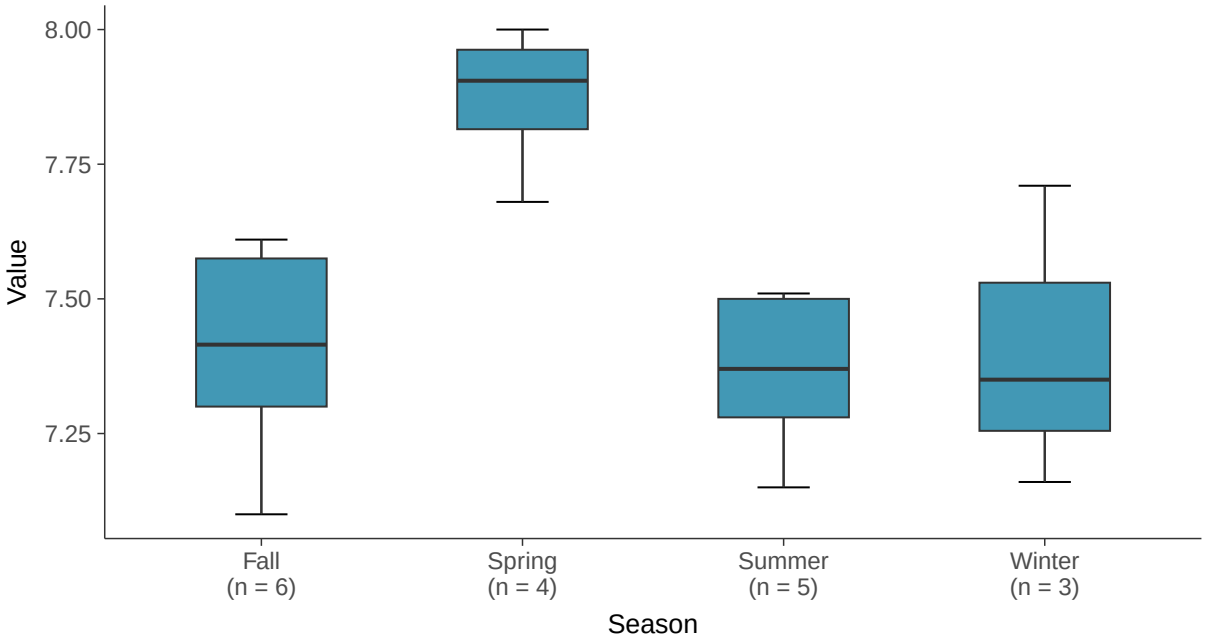
Boxplot

pH, Field, MW-11B & MW-12B (su)



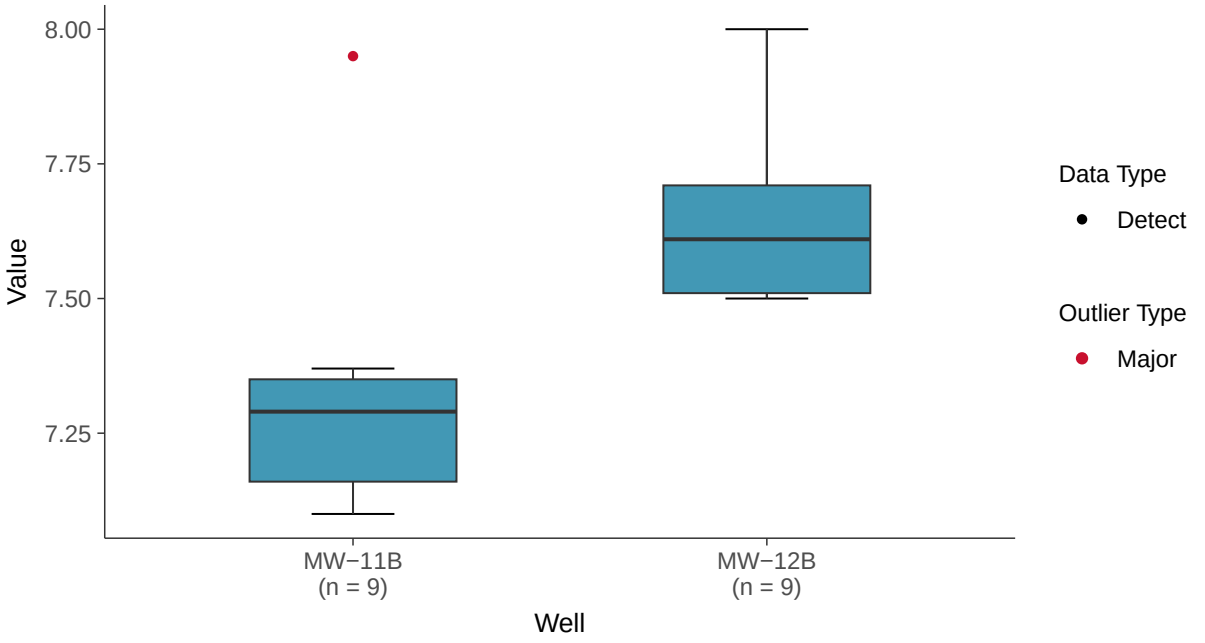
Boxplot by Season

pH, Field, MW-11B & MW-12B (su)



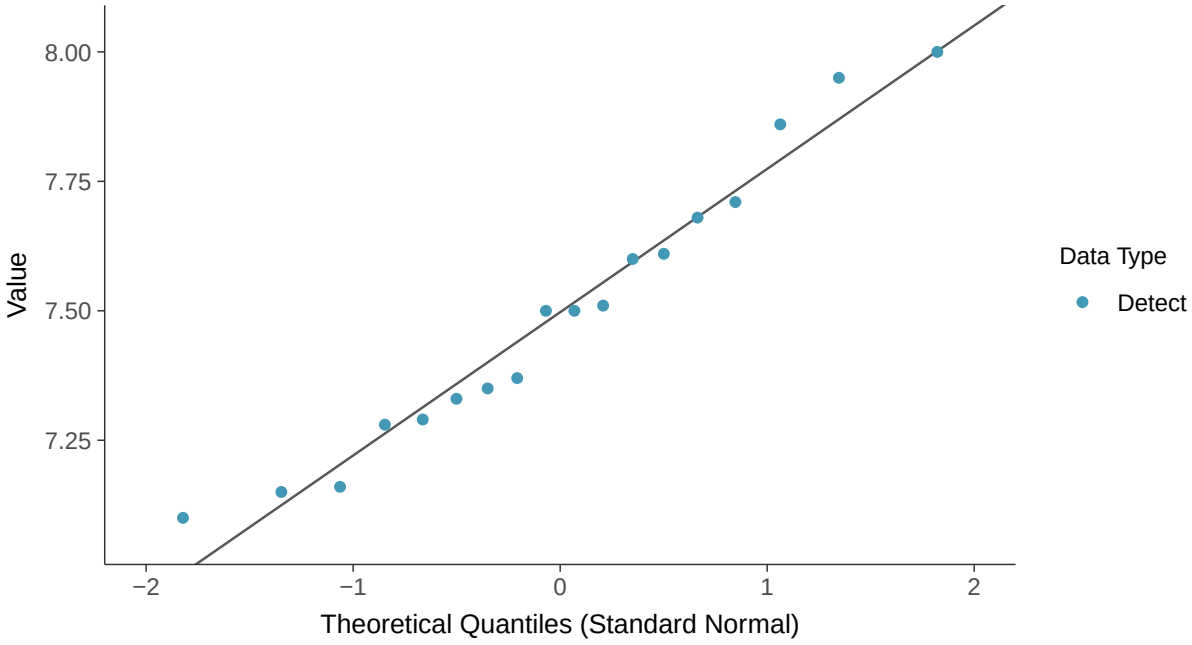
Boxplot by Well

pH, Field, MW-11B & MW-12B (su)



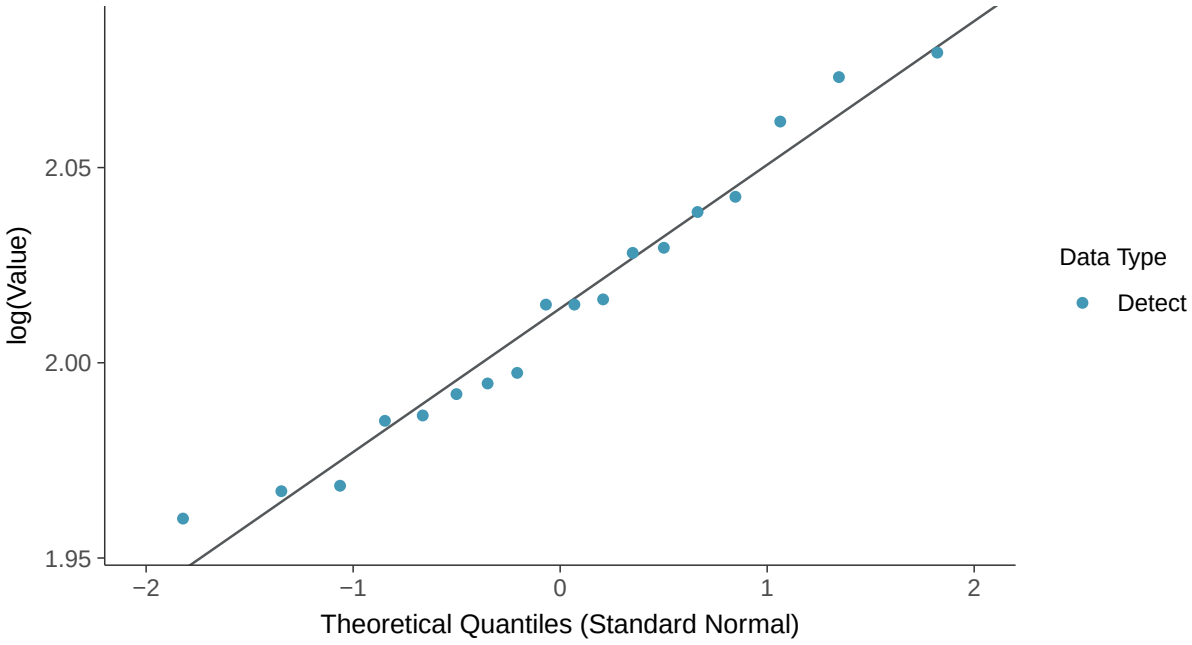
Normal Q-Q plot

pH, Field, MW-11B & MW-12B (su)



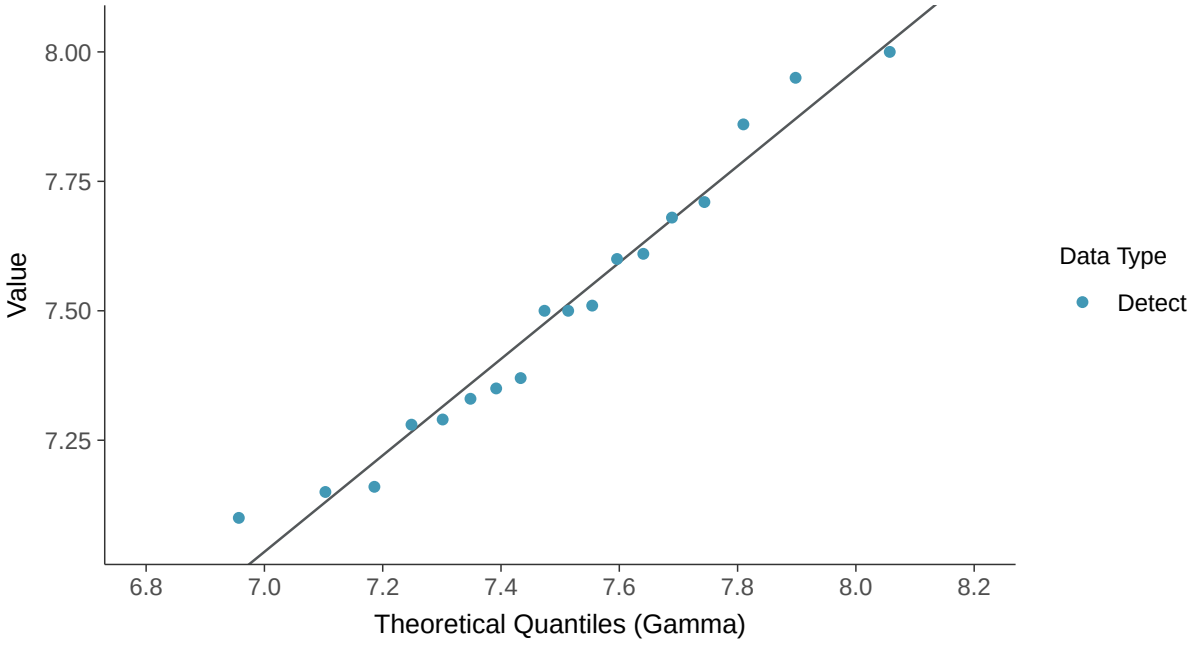
Lognormal Q-Q plot

pH, Field, MW-11B & MW-12B (su)



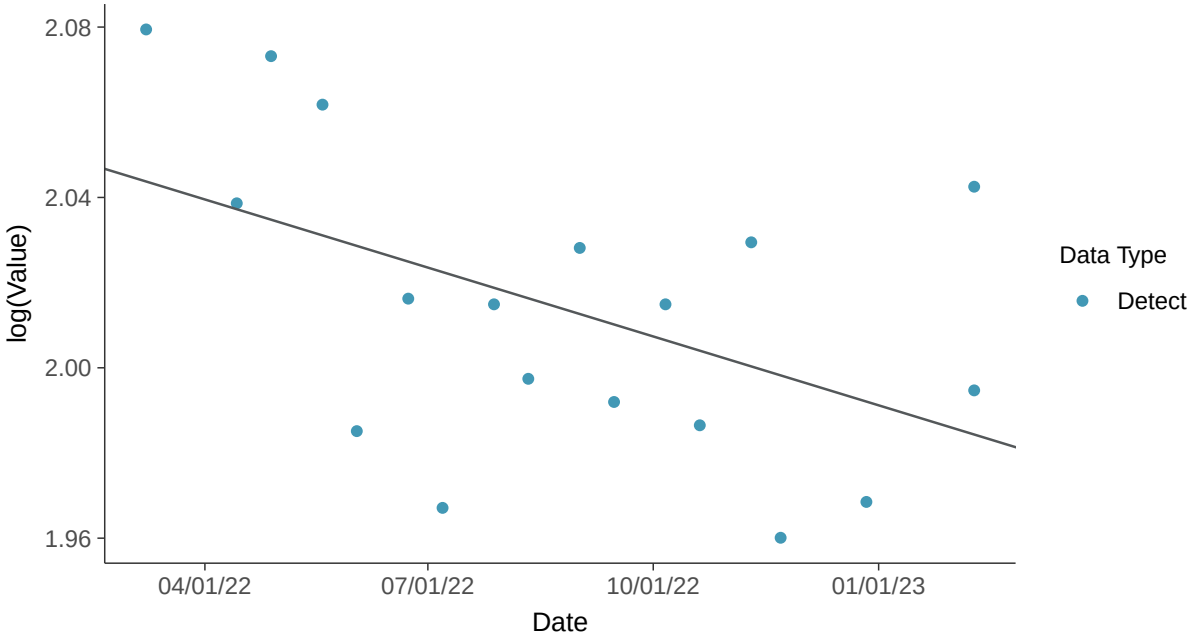
Gamma Q-Q plot

pH, Field, MW-11B & MW-12B (su)



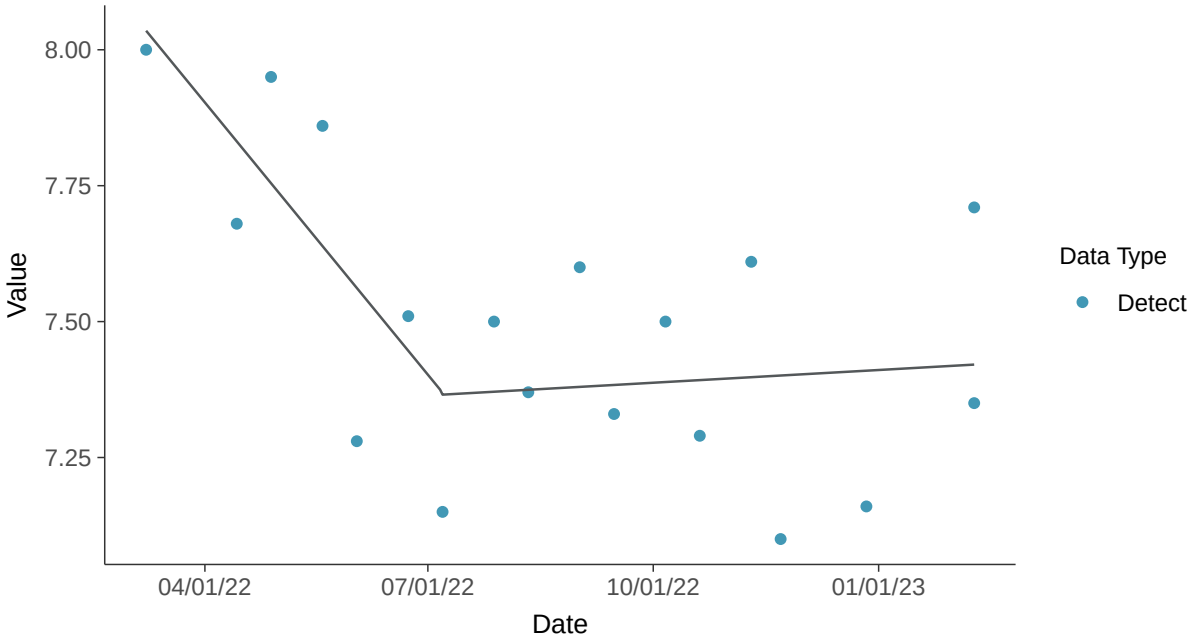
Trend Regression: Lognormal MLE

pH, Field, MW-11B & MW-12B (su)



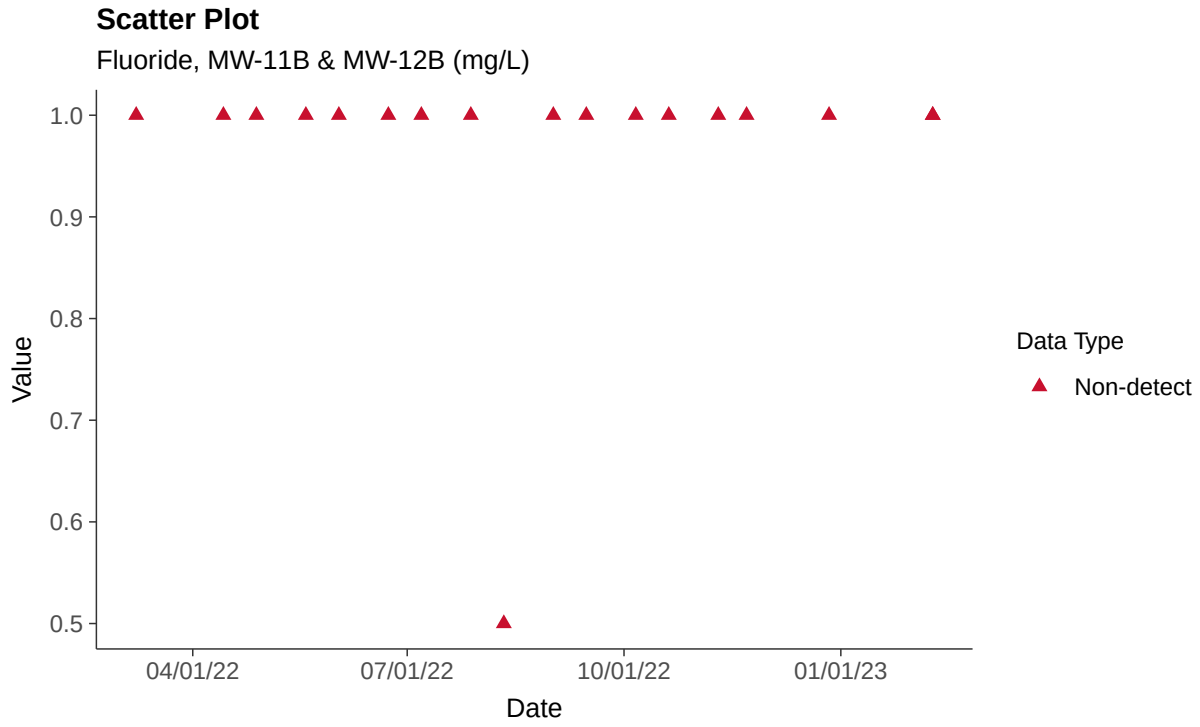
Trend Regression: Piecewise Linear-Linear

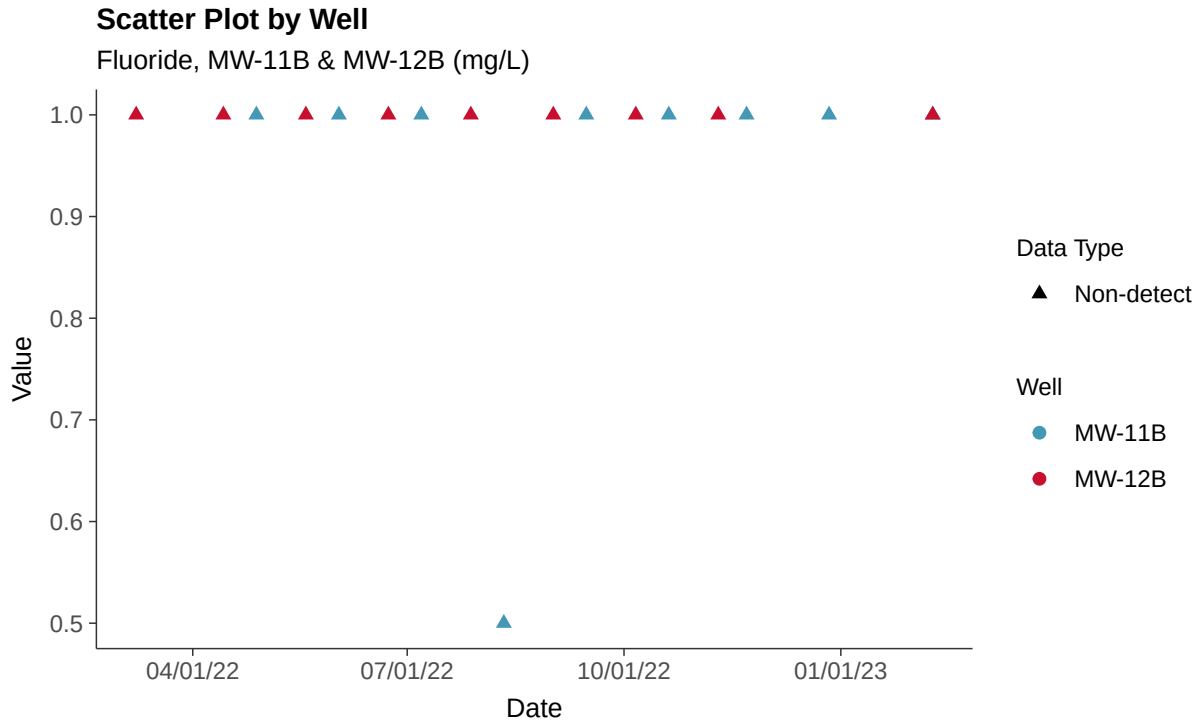
pH, Field, MW-11B & MW-12B (su)



Appendix IV: Fluoride, MW-11B & MW-12B

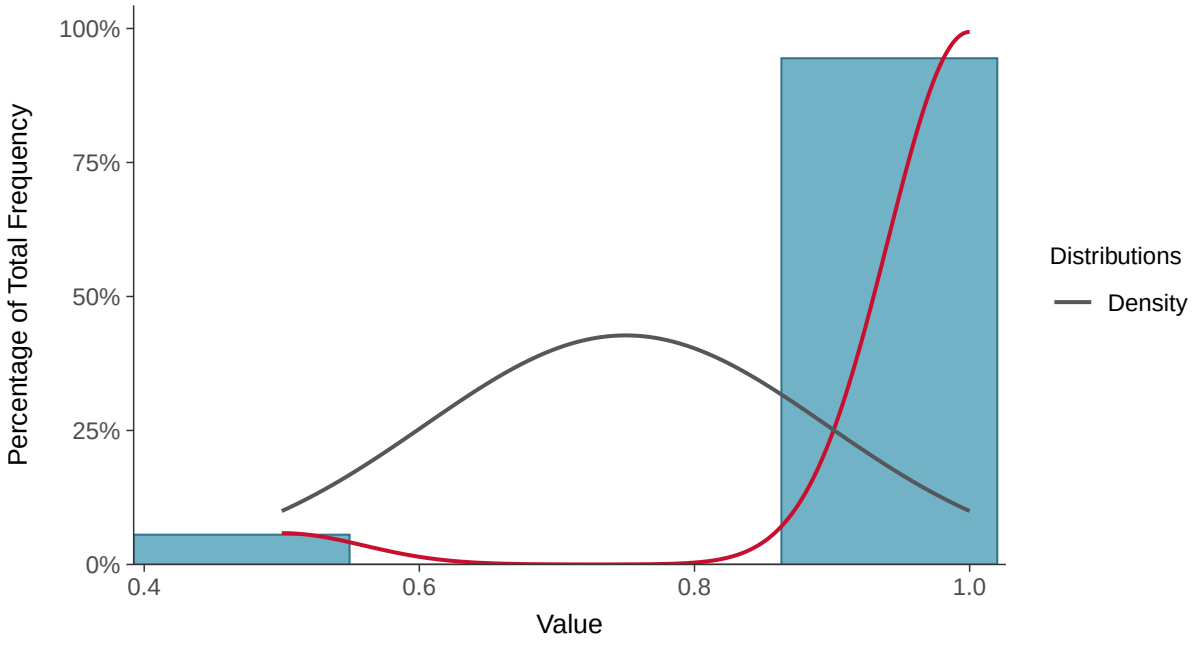
ID: 2_04





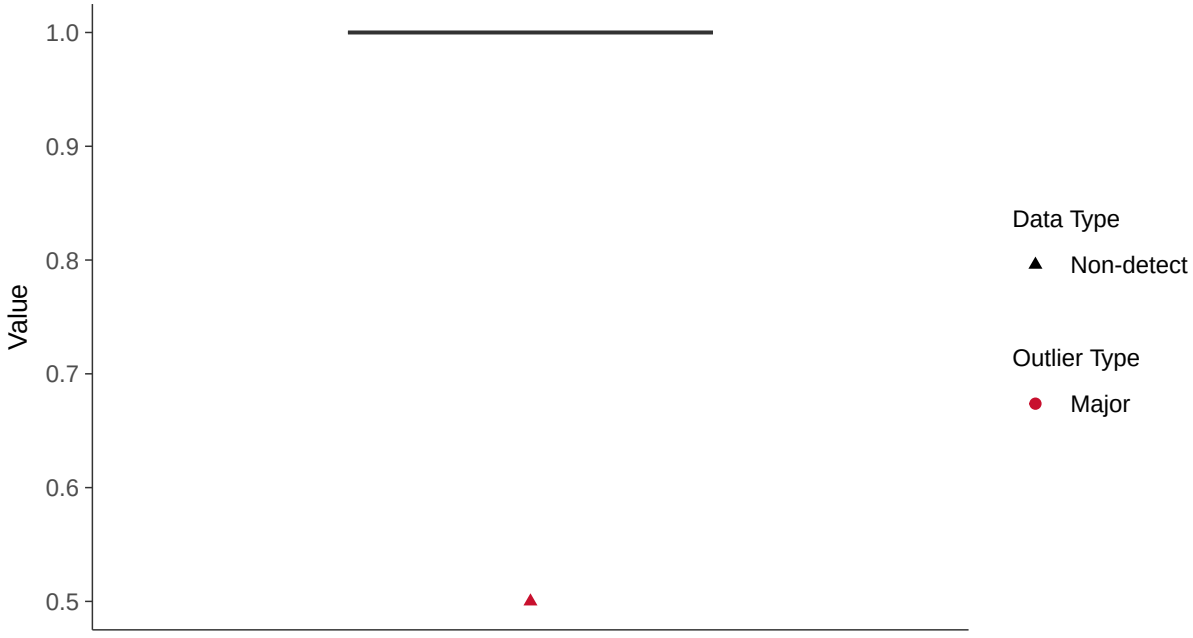
Histogram

Fluoride, MW-11B & MW-12B (mg/L)



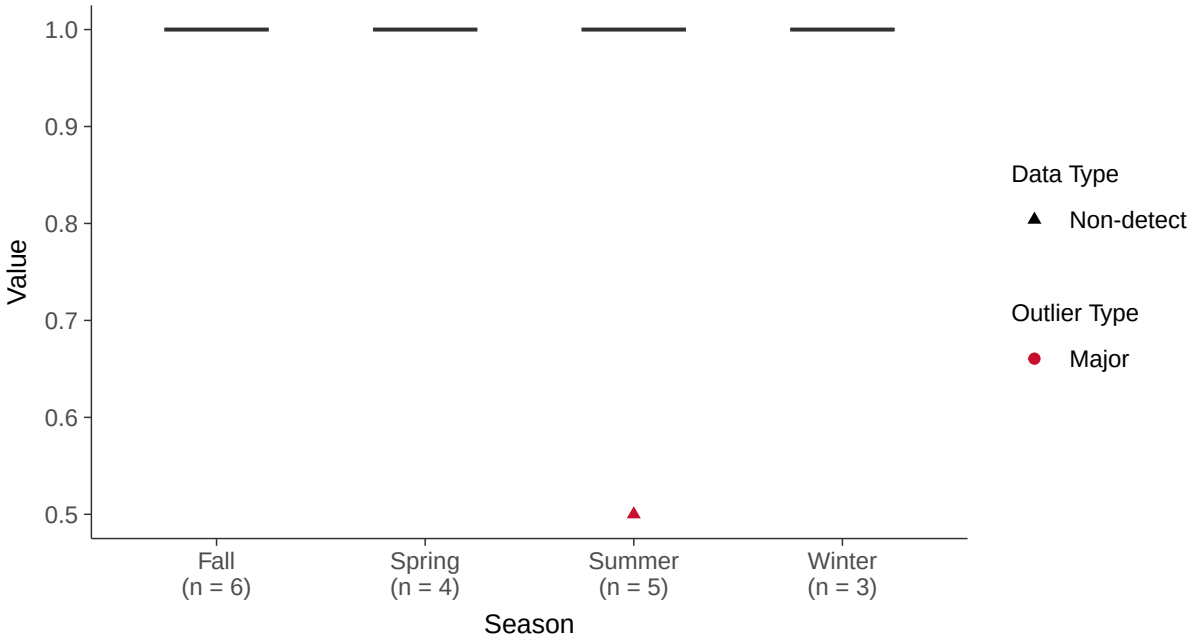
Boxplot

Fluoride, MW-11B & MW-12B (mg/L)



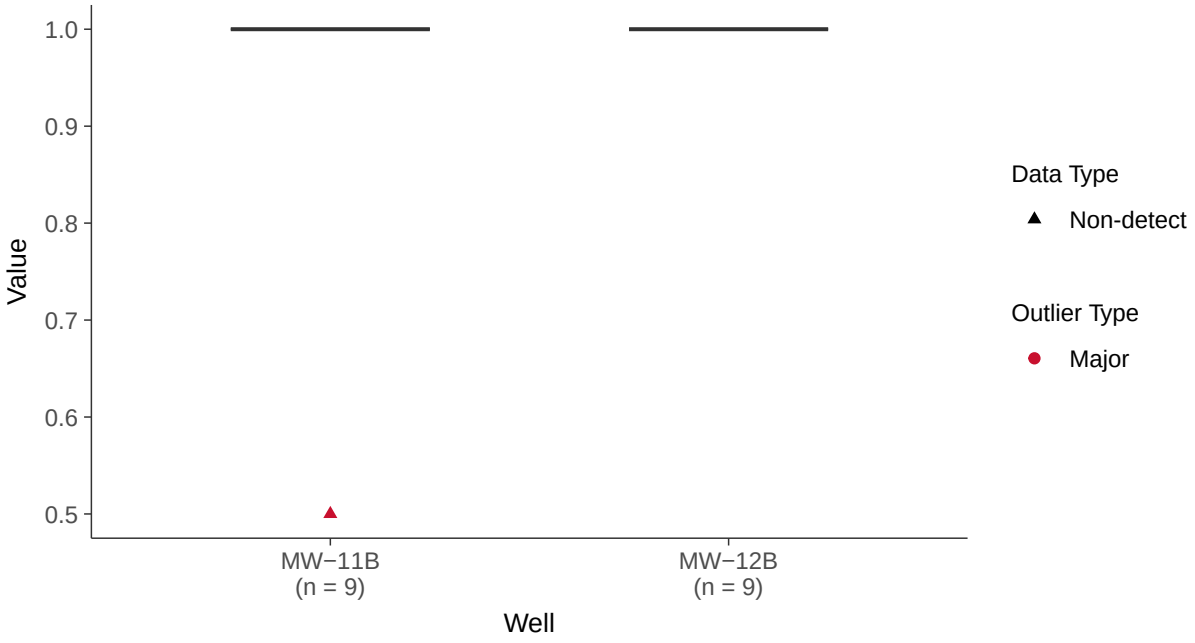
Boxplot by Season

Fluoride, MW-11B & MW-12B (mg/L)



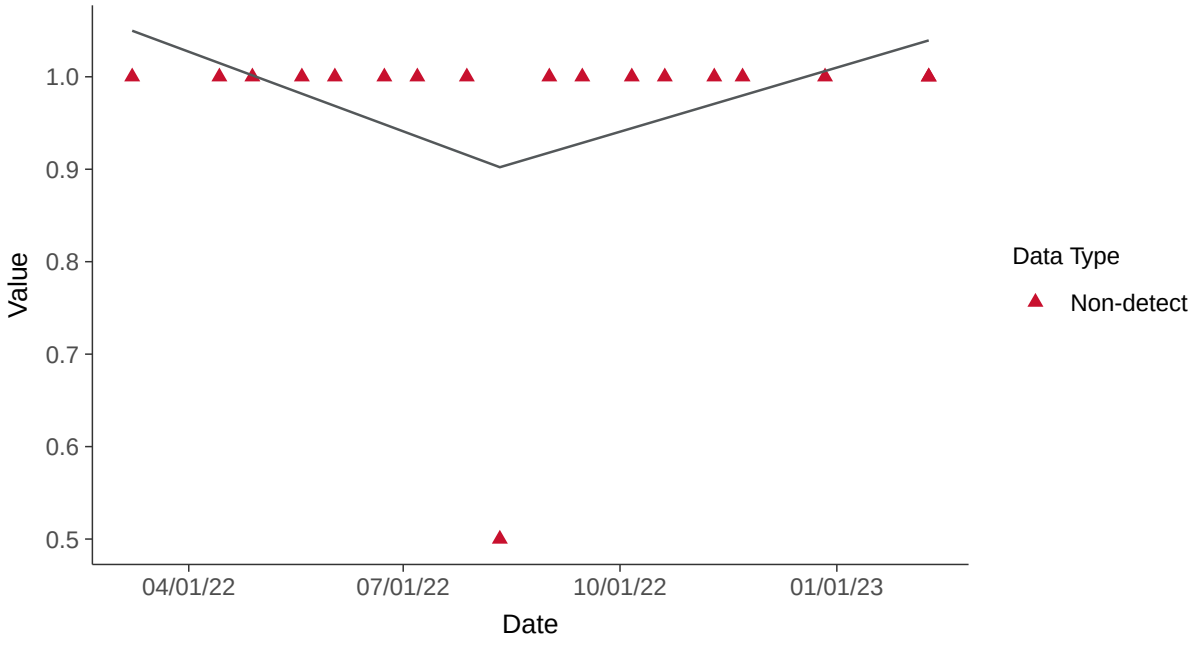
Boxplot by Well

Fluoride, MW-11B & MW-12B (mg/L)



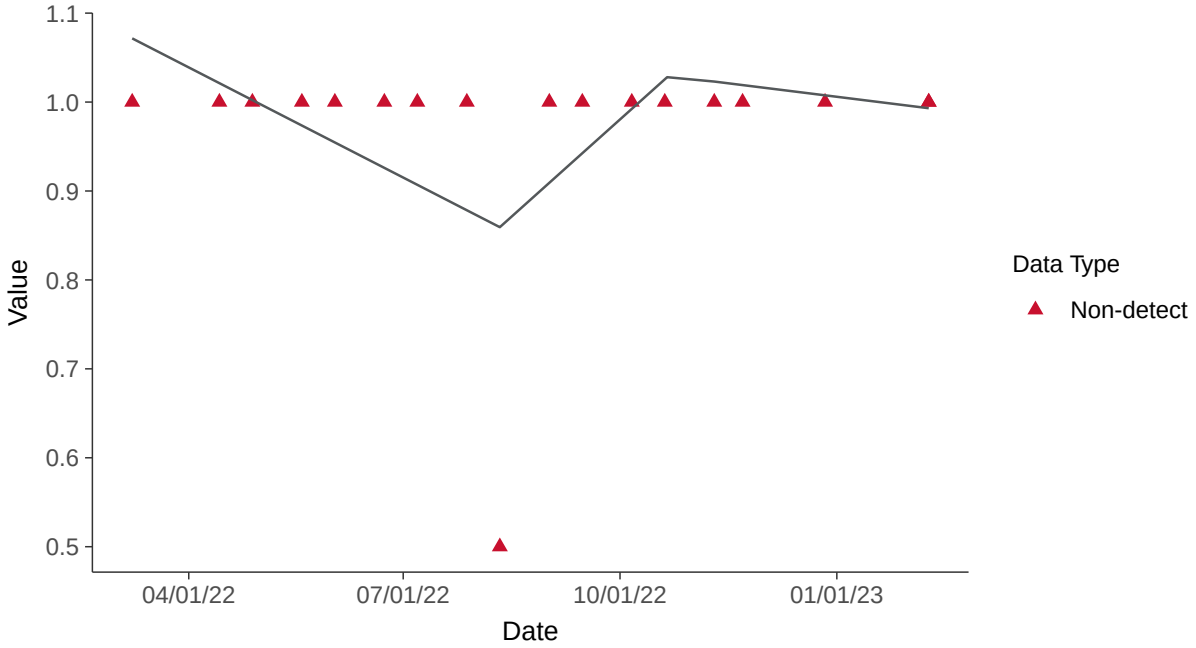
Trend Regression: Piecewise Linear-Linear

Fluoride, MW-11B & MW-12B (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Fluoride, MW-11B & MW-12B (mg/L)

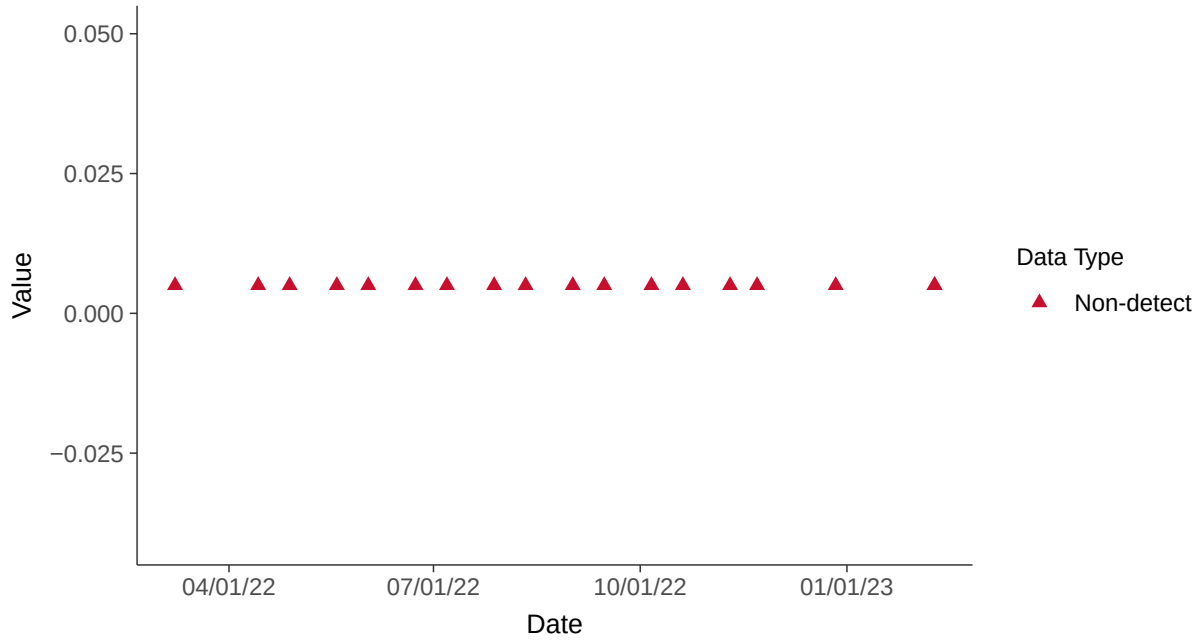


Appendix IV: Antimony, MW-11B & MW-12B

ID: 2_08

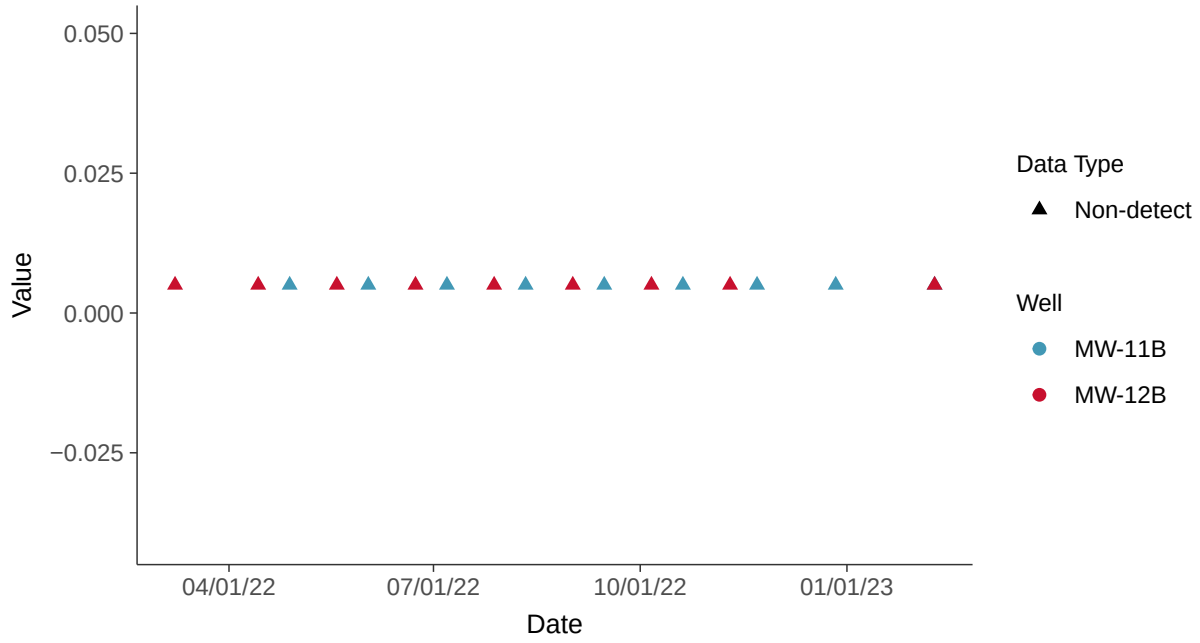
Scatter Plot

Antimony, MW-11B & MW-12B (mg/L)



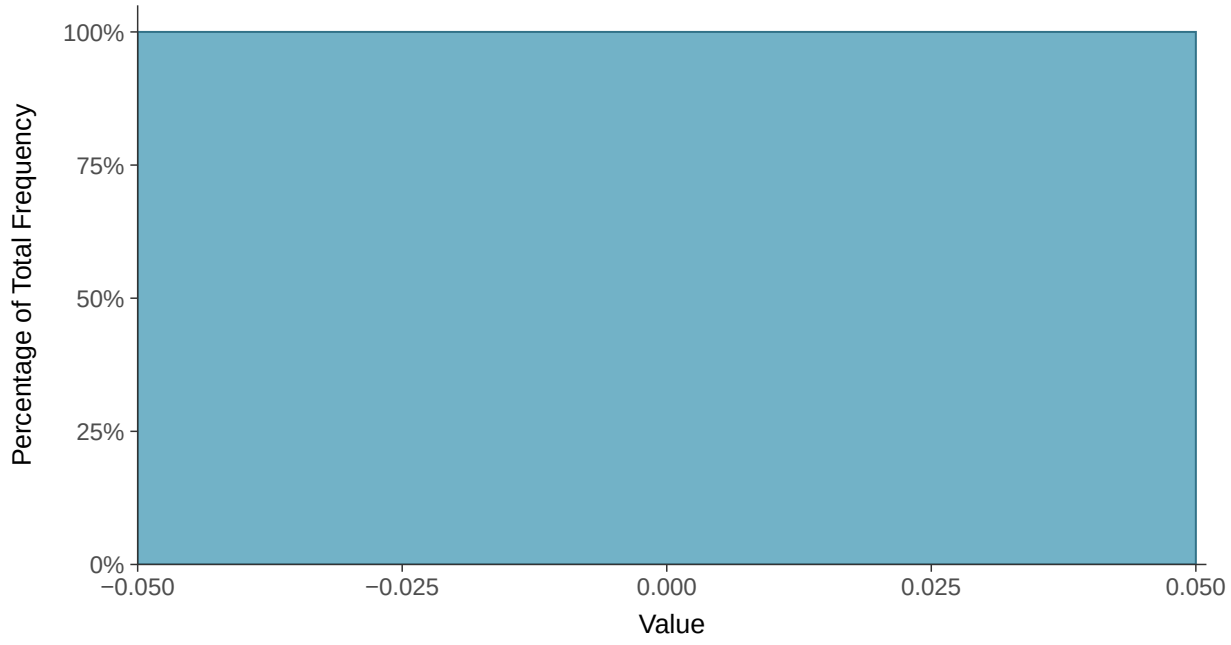
Scatter Plot by Well

Antimony, MW-11B & MW-12B (mg/L)



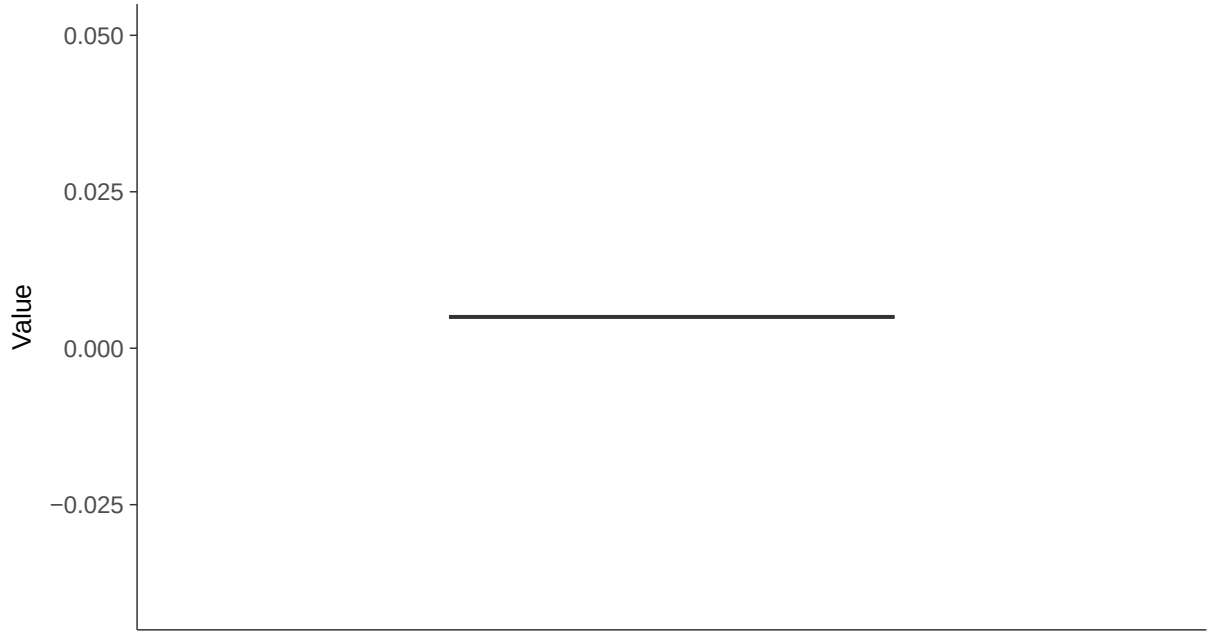
Histogram

Antimony, MW-11B & MW-12B (mg/L)



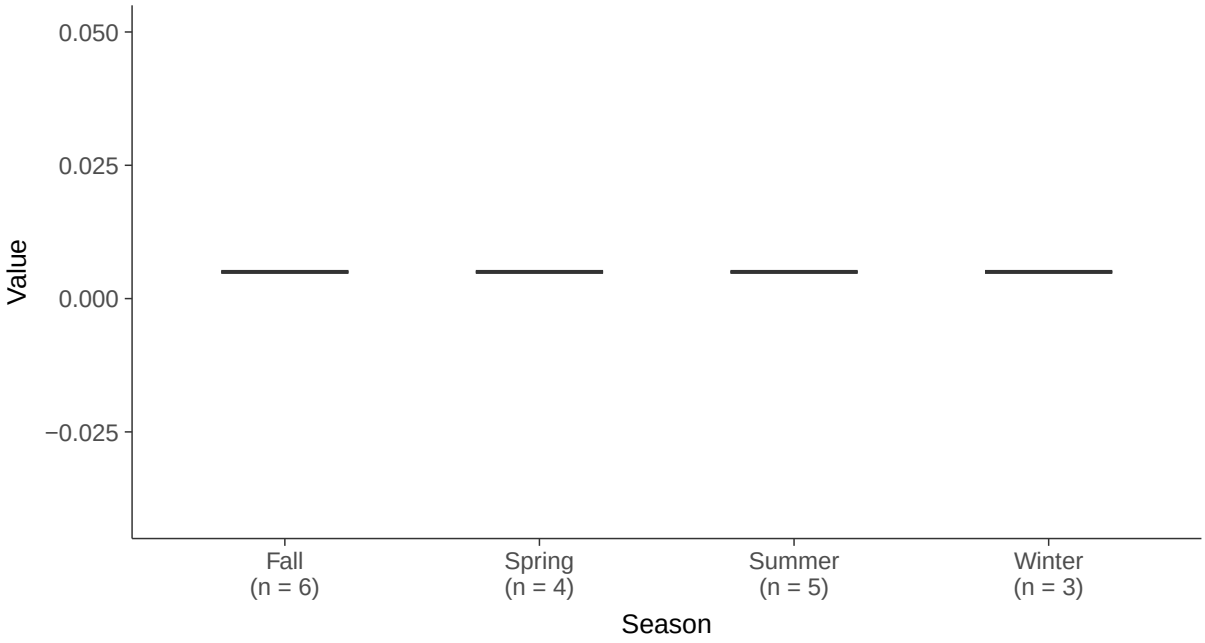
Boxplot

Antimony, MW-11B & MW-12B (mg/L)



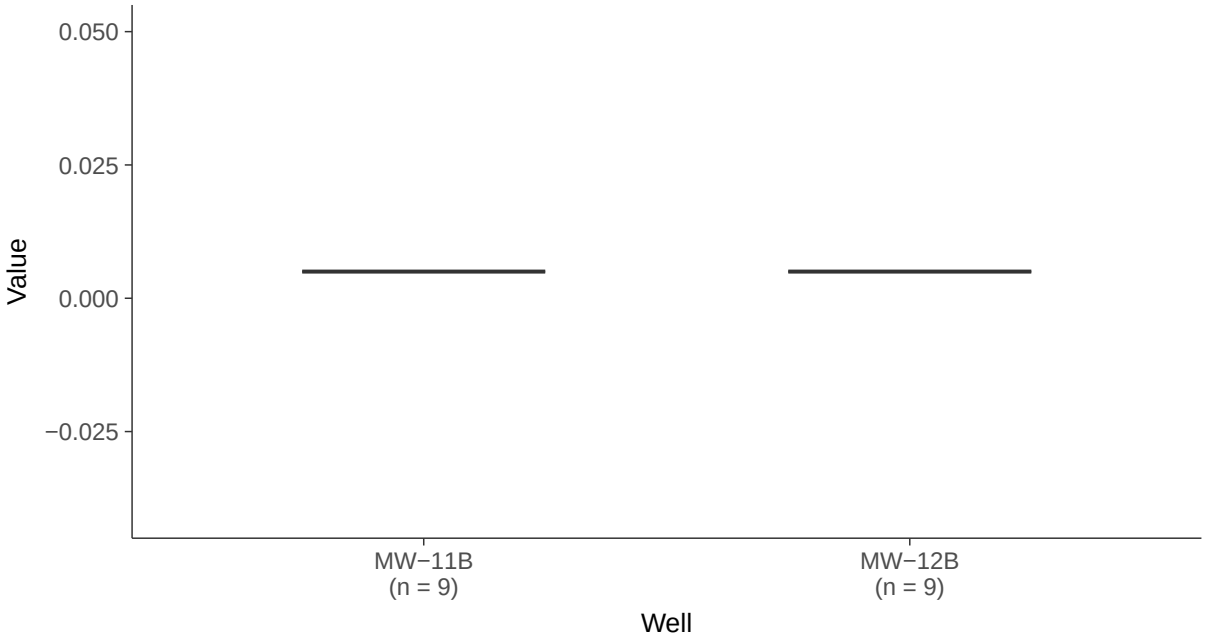
Boxplot by Season

Antimony, MW-11B & MW-12B (mg/L)



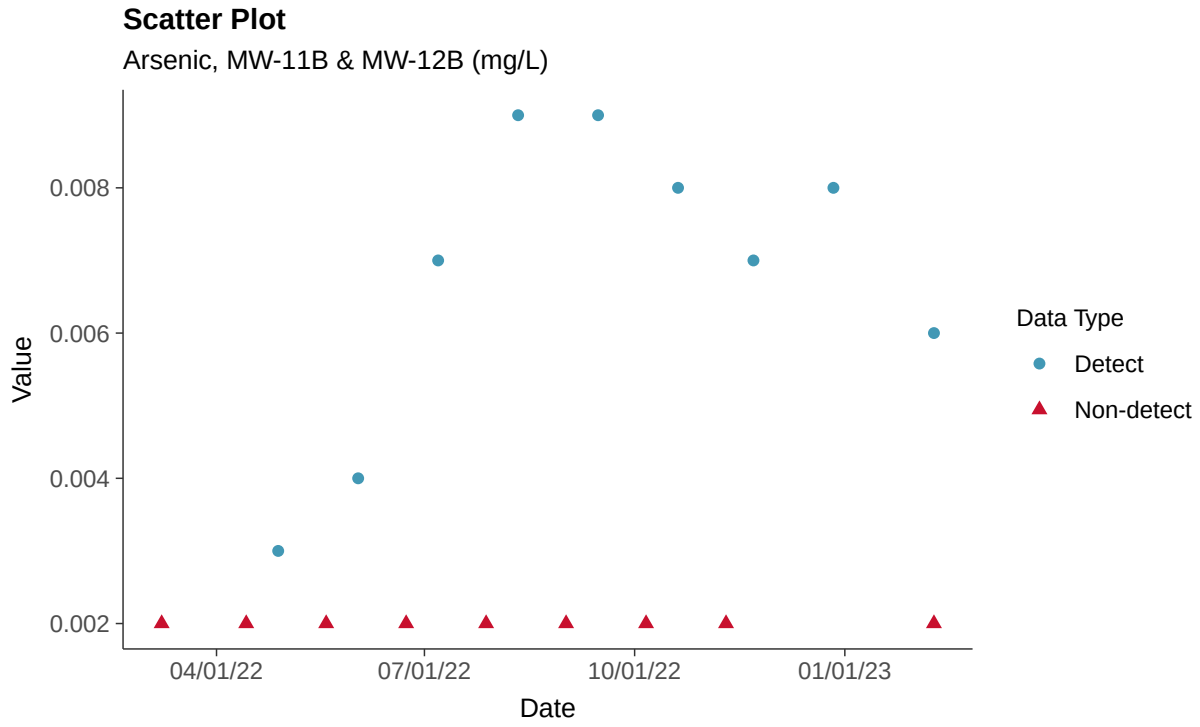
Boxplot by Well

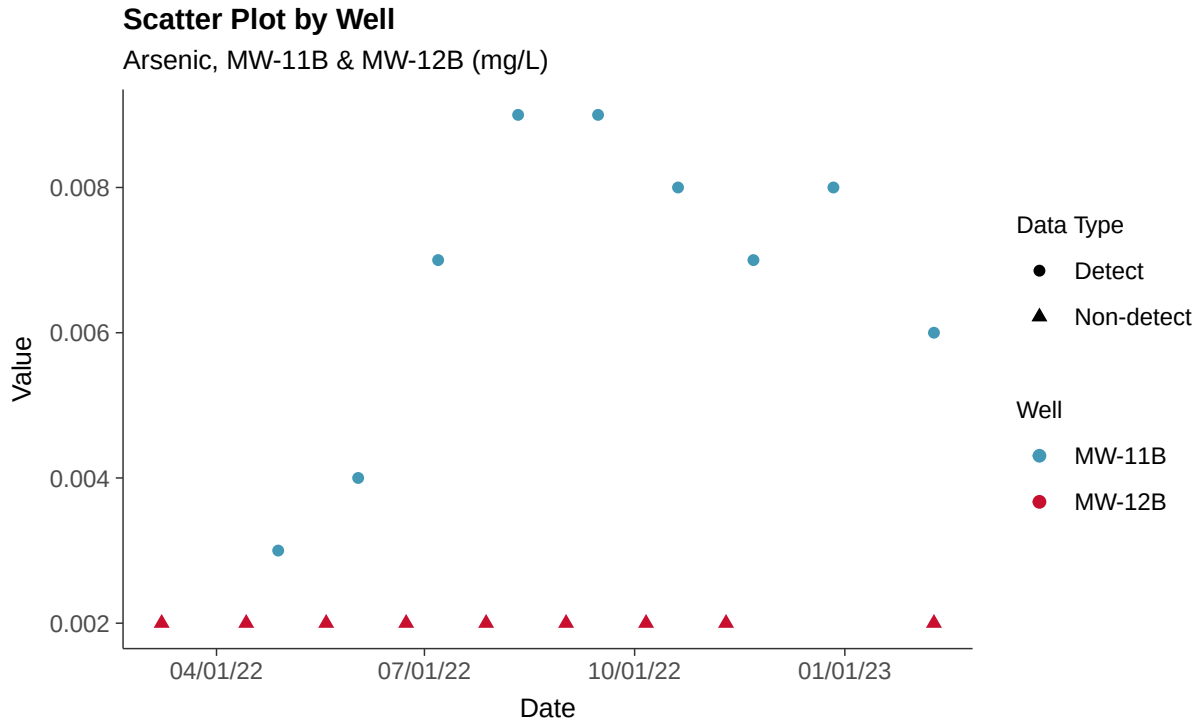
Antimony, MW-11B & MW-12B (mg/L)



Appendix IV: Arsenic, MW-11B & MW-12B

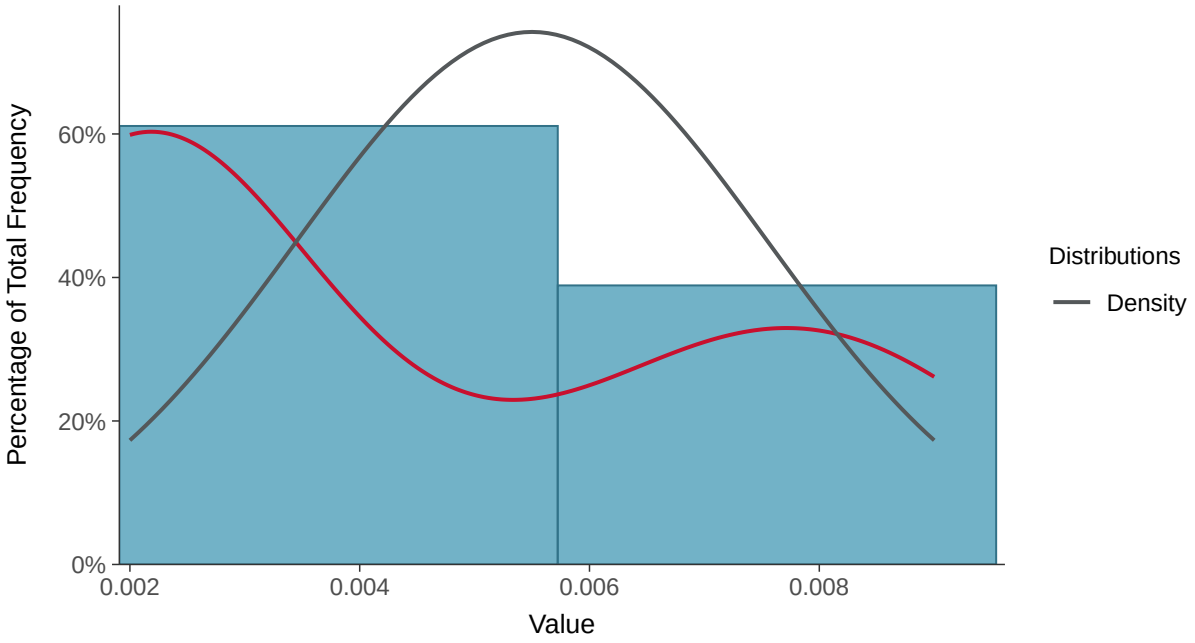
ID: 2_09





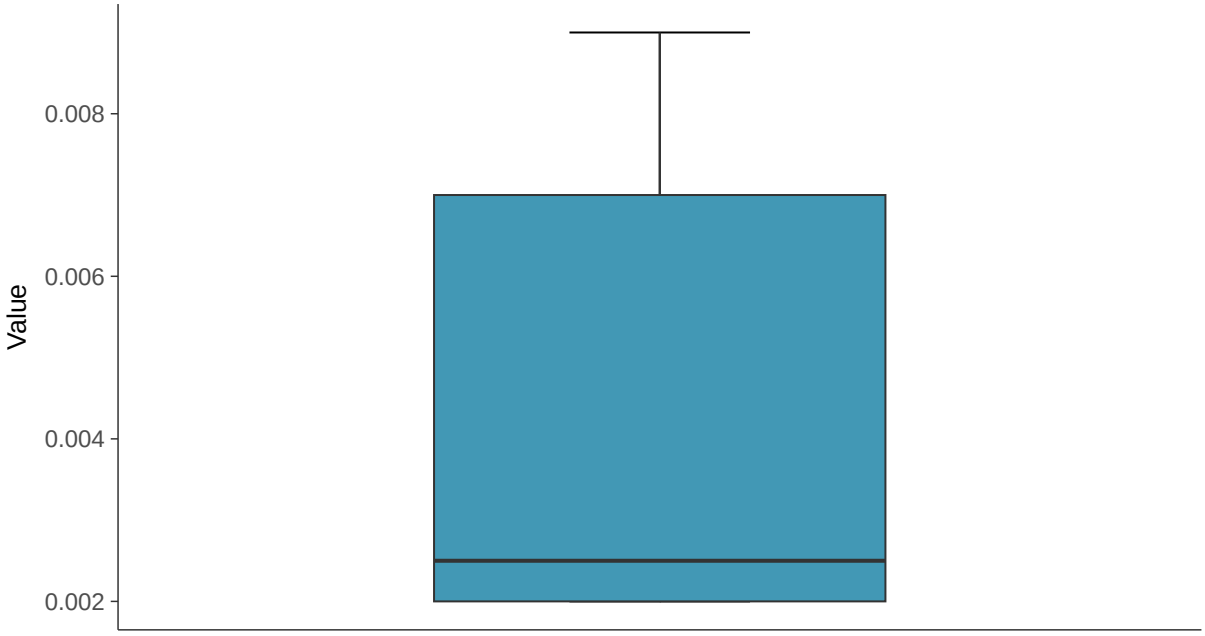
Histogram

Arsenic, MW-11B & MW-12B (mg/L)



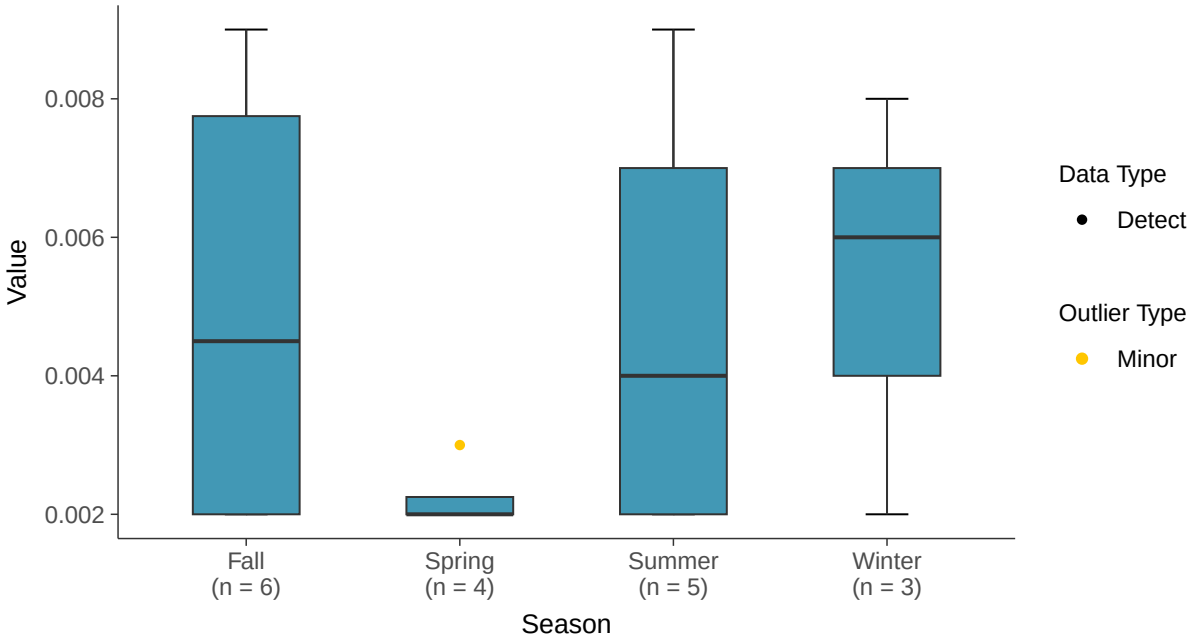
Boxplot

Arsenic, MW-11B & MW-12B (mg/L)



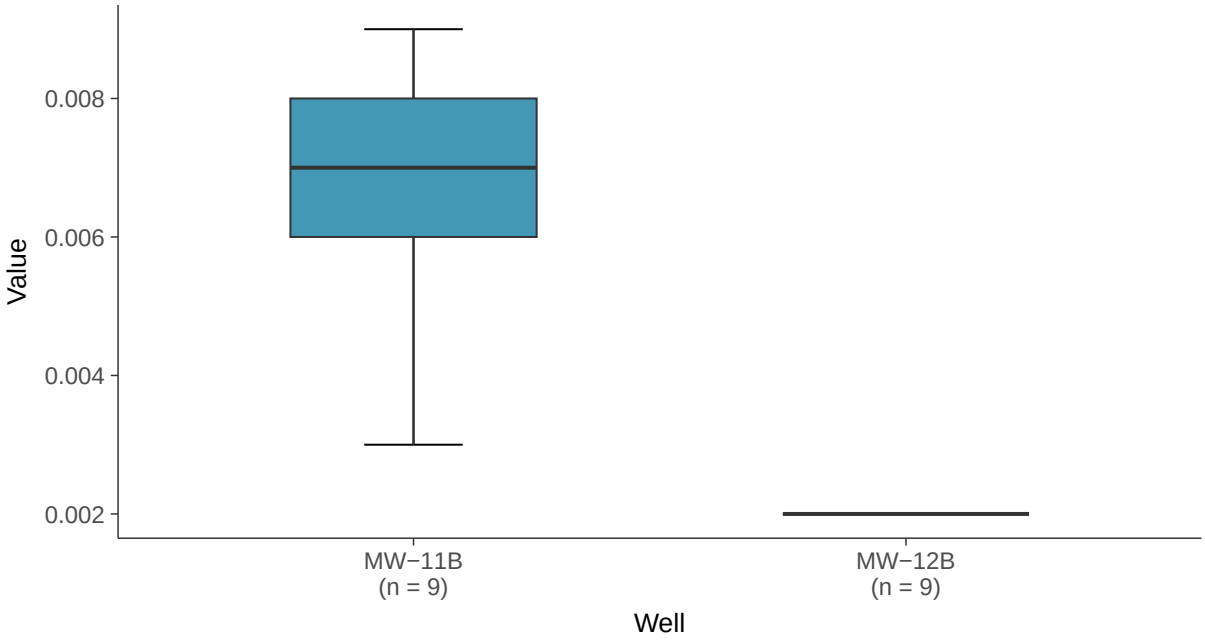
Boxplot by Season

Arsenic, MW-11B & MW-12B (mg/L)



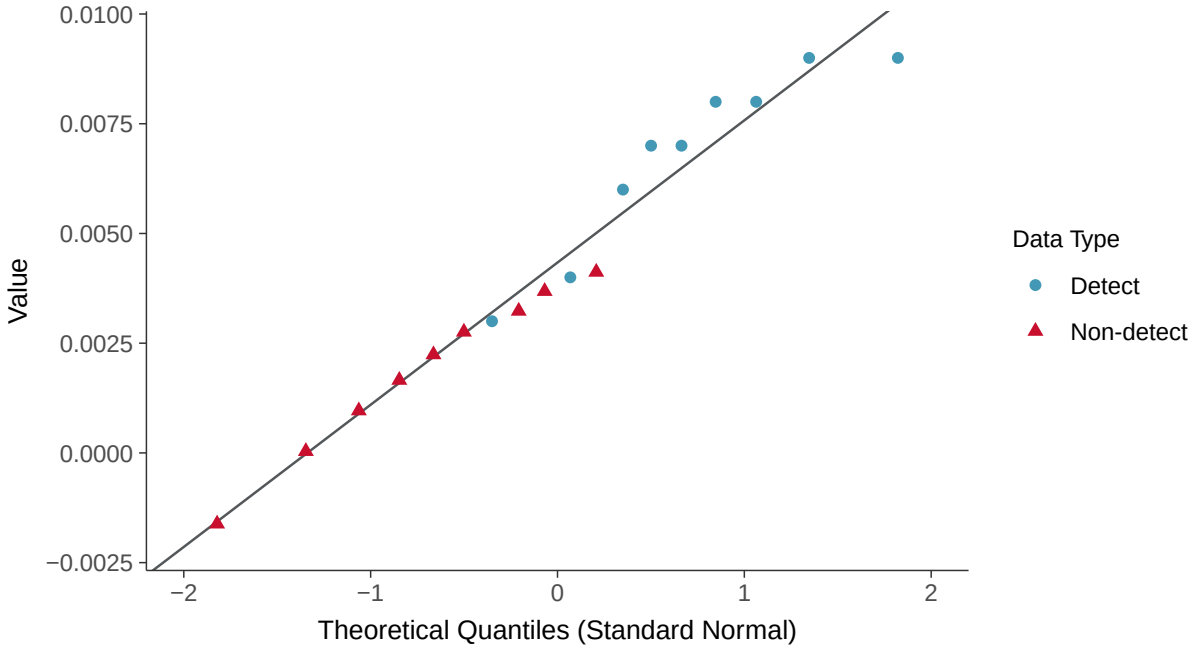
Boxplot by Well

Arsenic, MW-11B & MW-12B (mg/L)



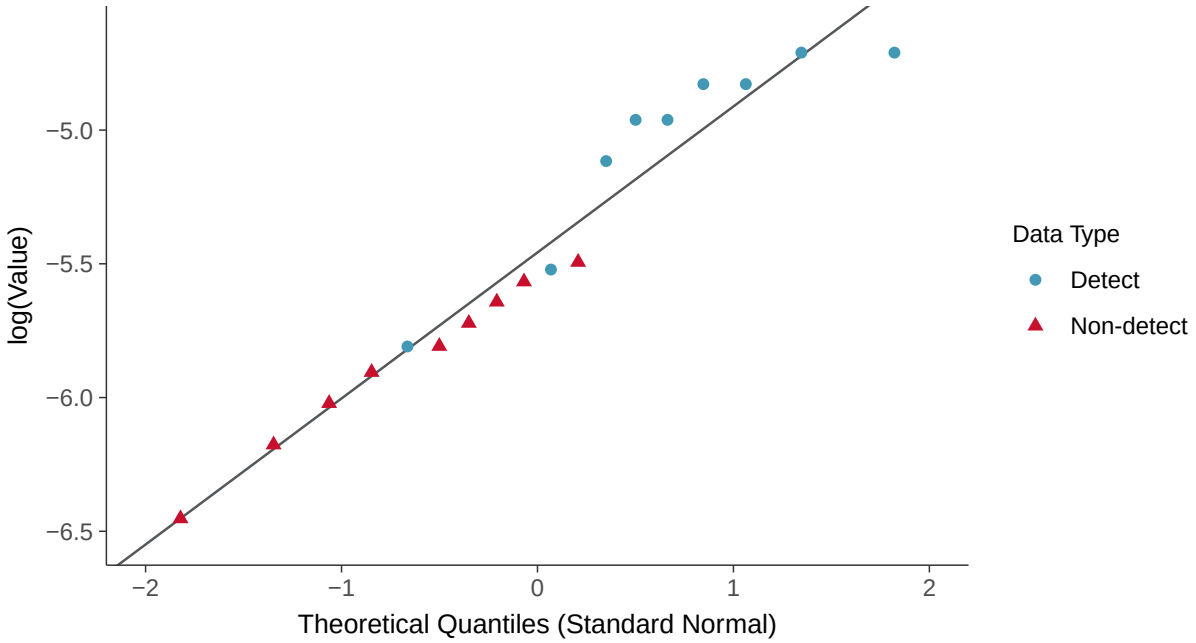
Normal Q-Q plot using ROS Imputed Estimates

Arsenic, MW-11B & MW-12B (mg/L)



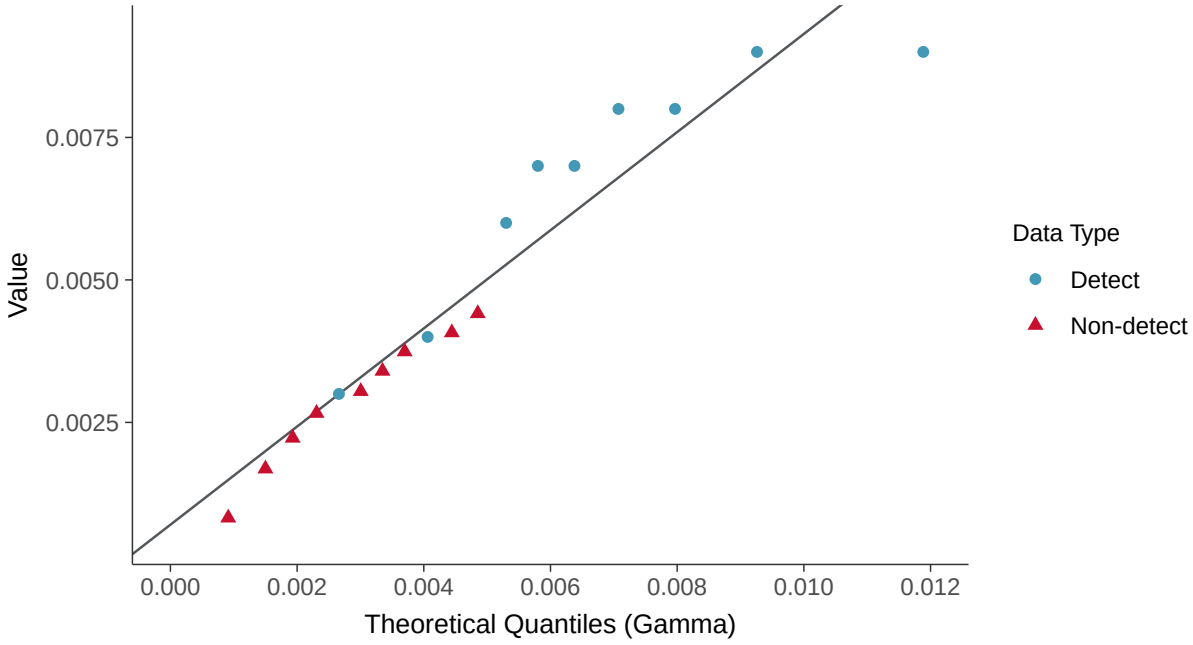
Lognormal Q-Q plot using ROS Imputed Estimates

Arsenic, MW-11B & MW-12B (mg/L)



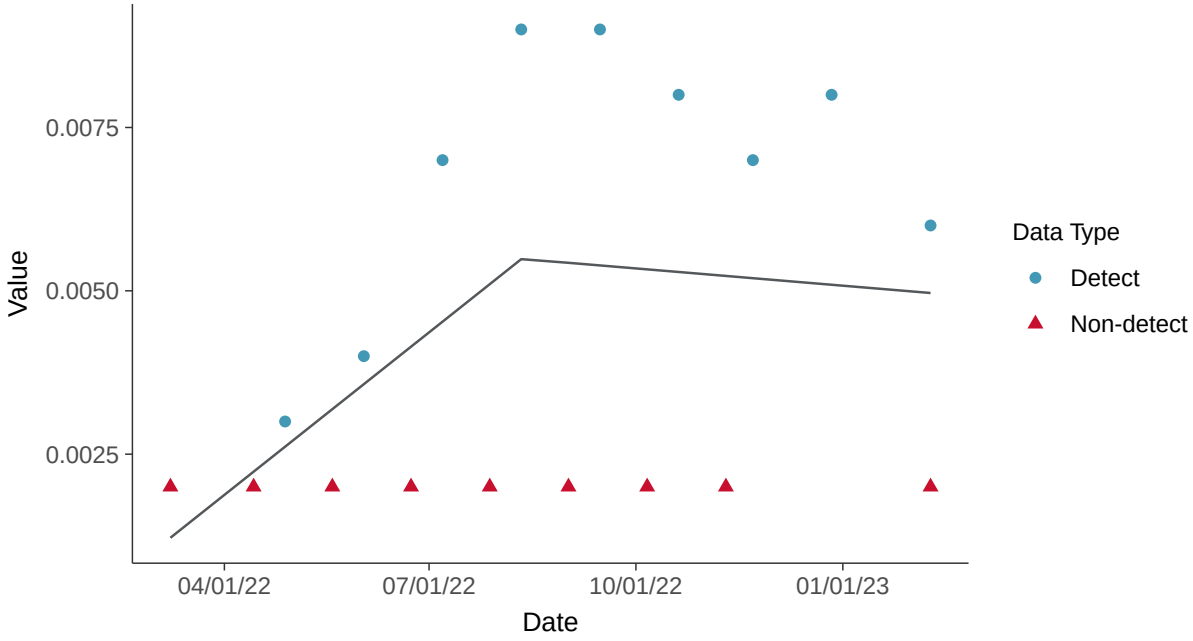
Gamma Q-Q plot using ROS Imputed Estimates

Arsenic, MW-11B & MW-12B (mg/L)



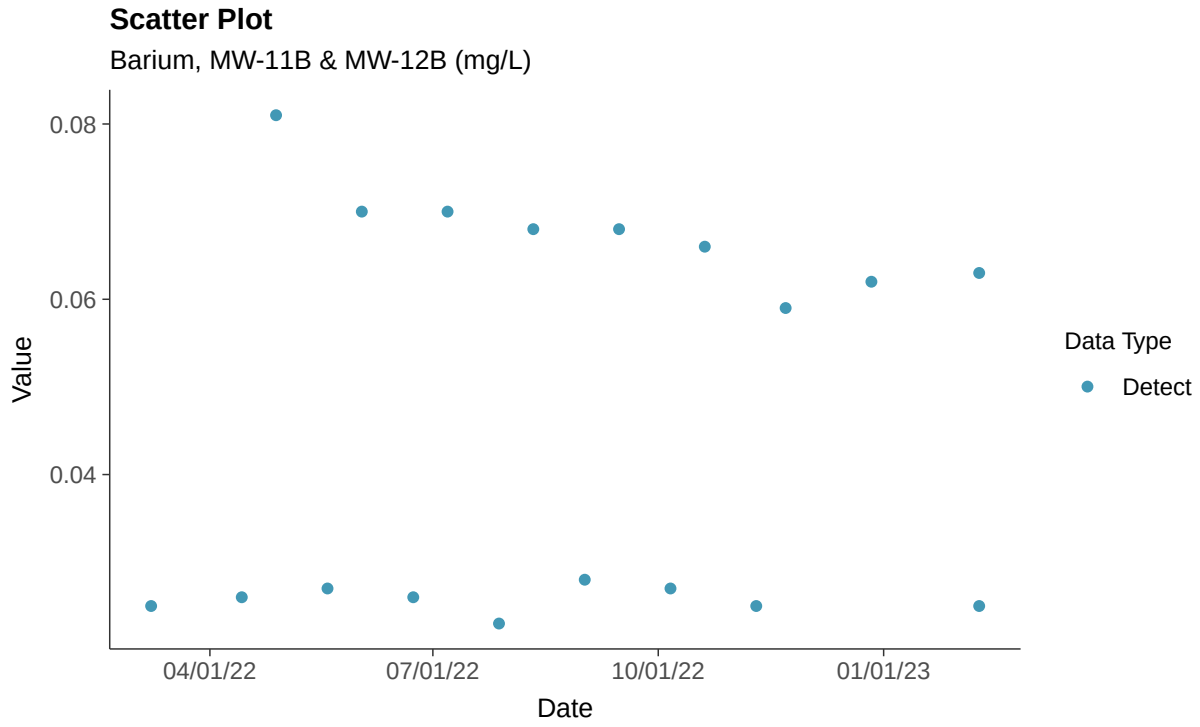
Trend Regression: Piecewise Linear-Linear

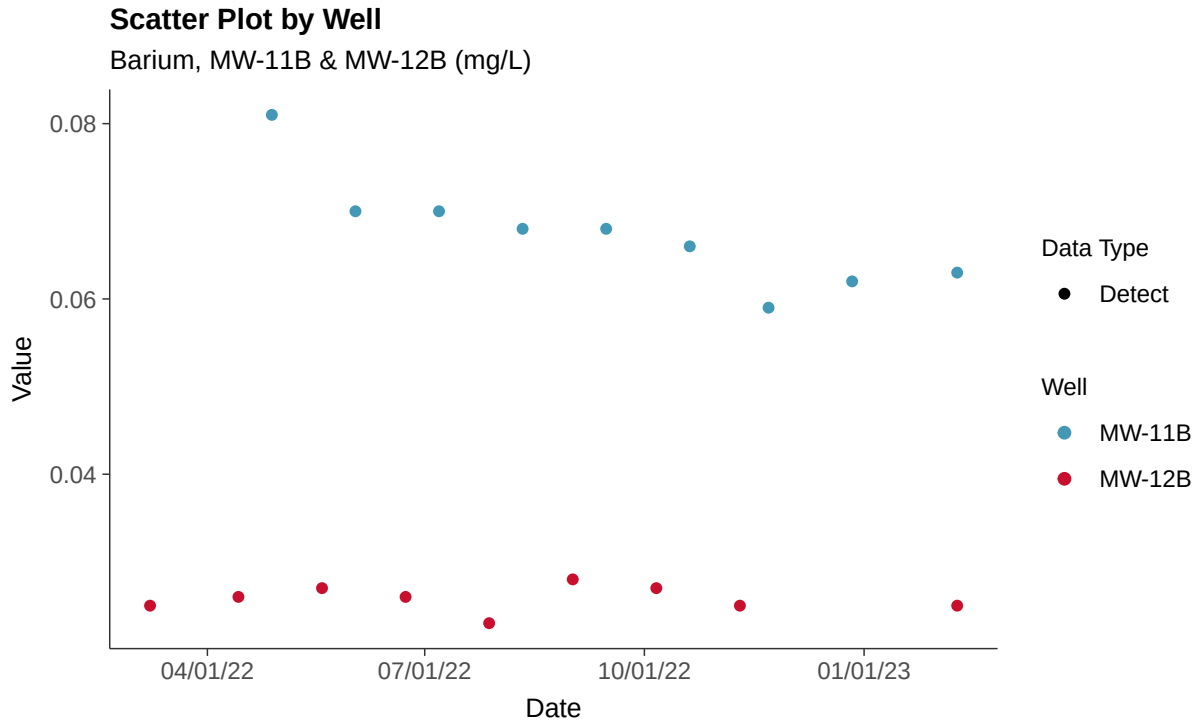
Arsenic, MW-11B & MW-12B (mg/L)



Appendix IV: Barium, MW-11B & MW-12B

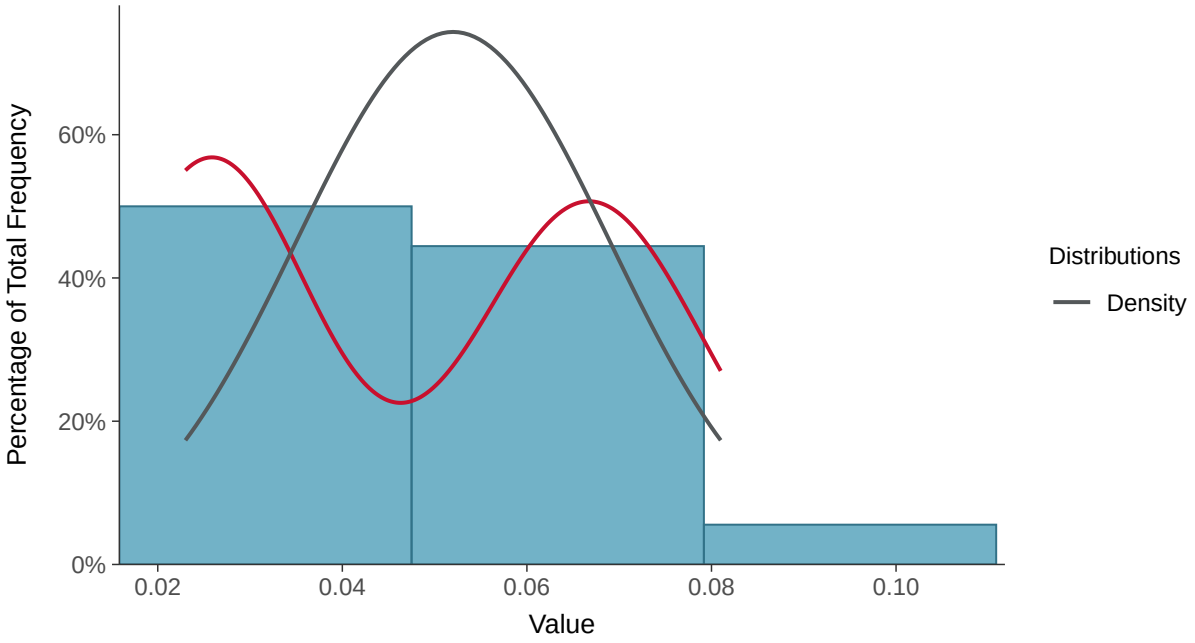
ID: 2_10





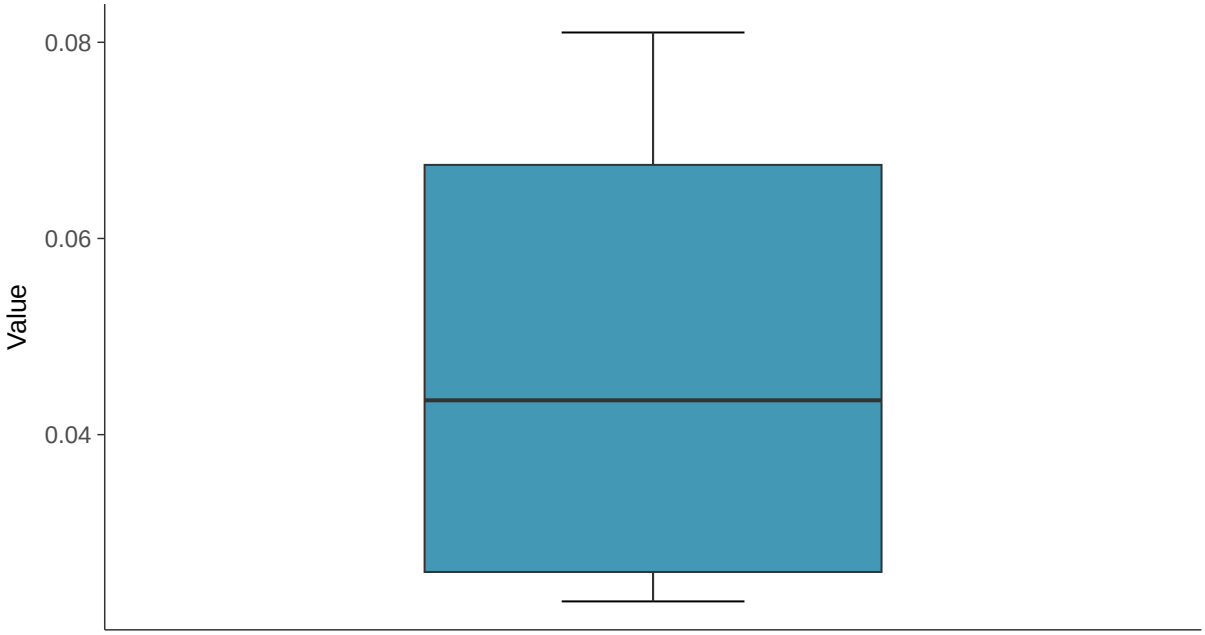
Histogram

Barium, MW-11B & MW-12B (mg/L)



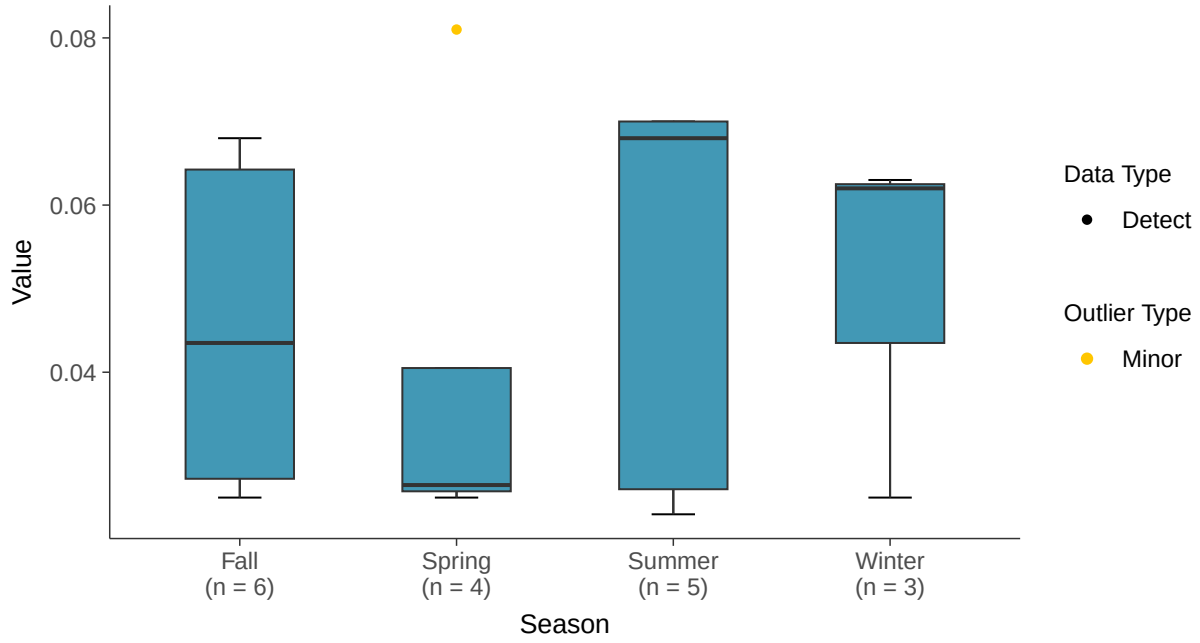
Boxplot

Barium, MW-11B & MW-12B (mg/L)



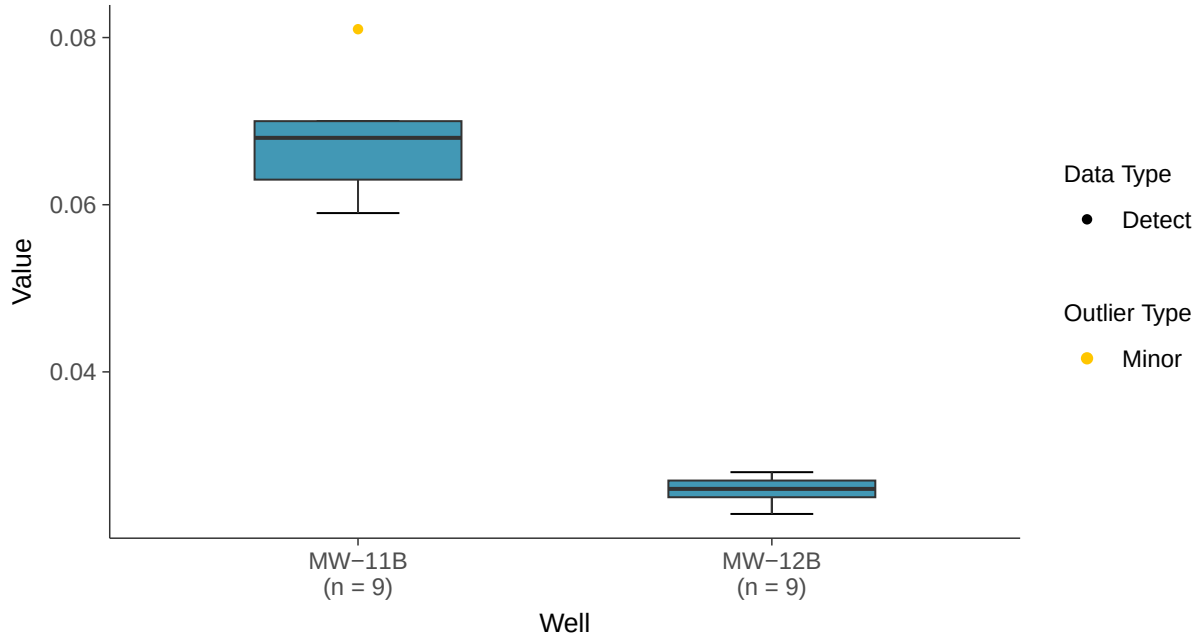
Boxplot by Season

Barium, MW-11B & MW-12B (mg/L)



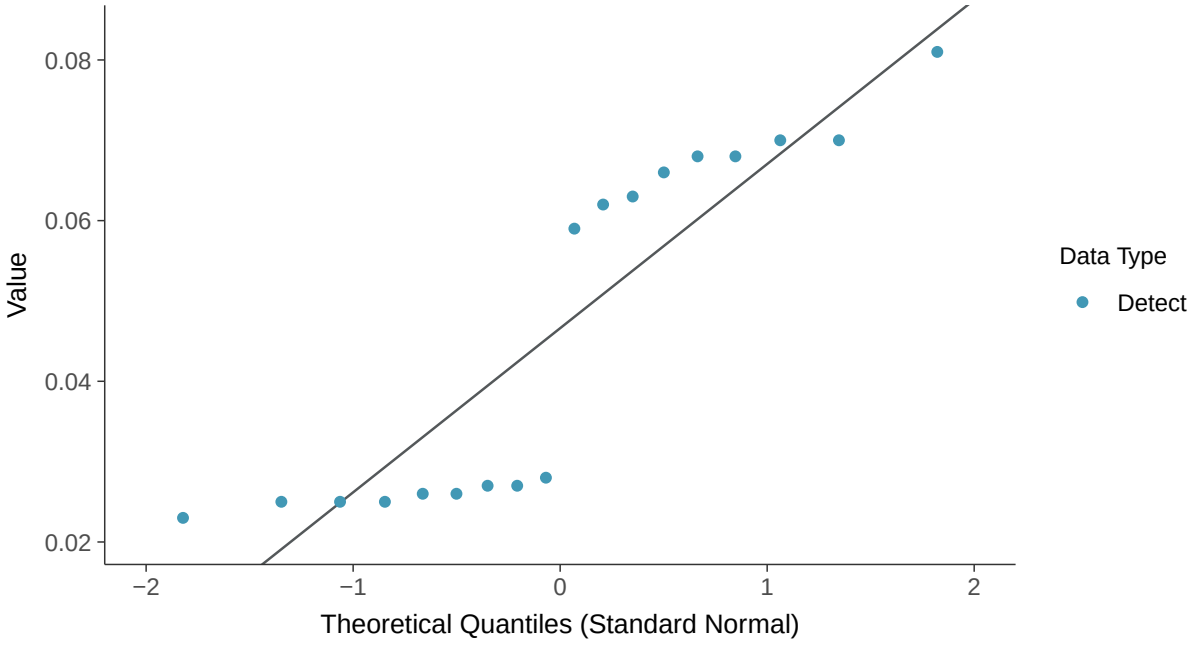
Boxplot by Well

Barium, MW-11B & MW-12B (mg/L)



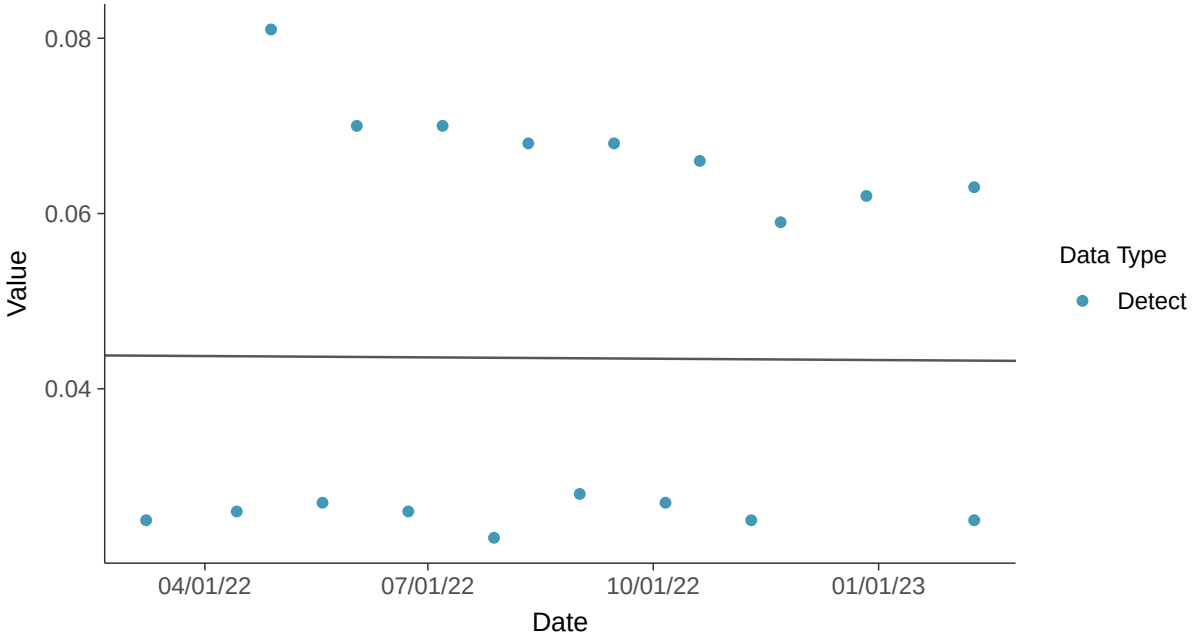
Normal Q-Q plot

Barium, MW-11B & MW-12B (mg/L)



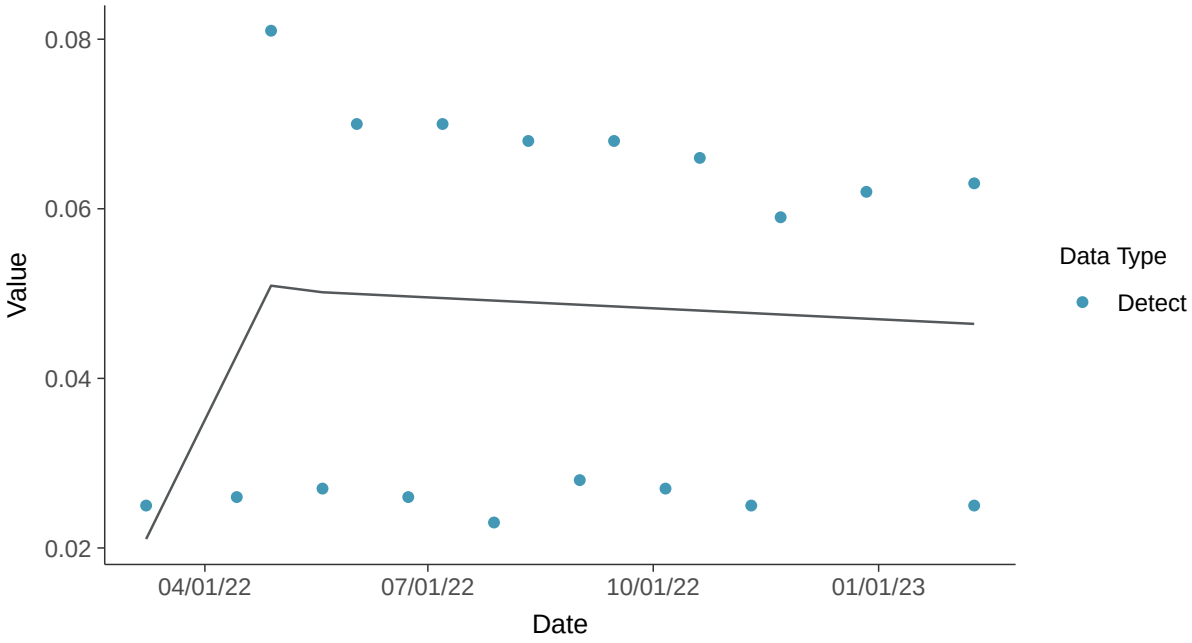
Trend Regression: Mann-Kendall/Theil-Sen Estimate

Barium, MW-11B & MW-12B (mg/L)



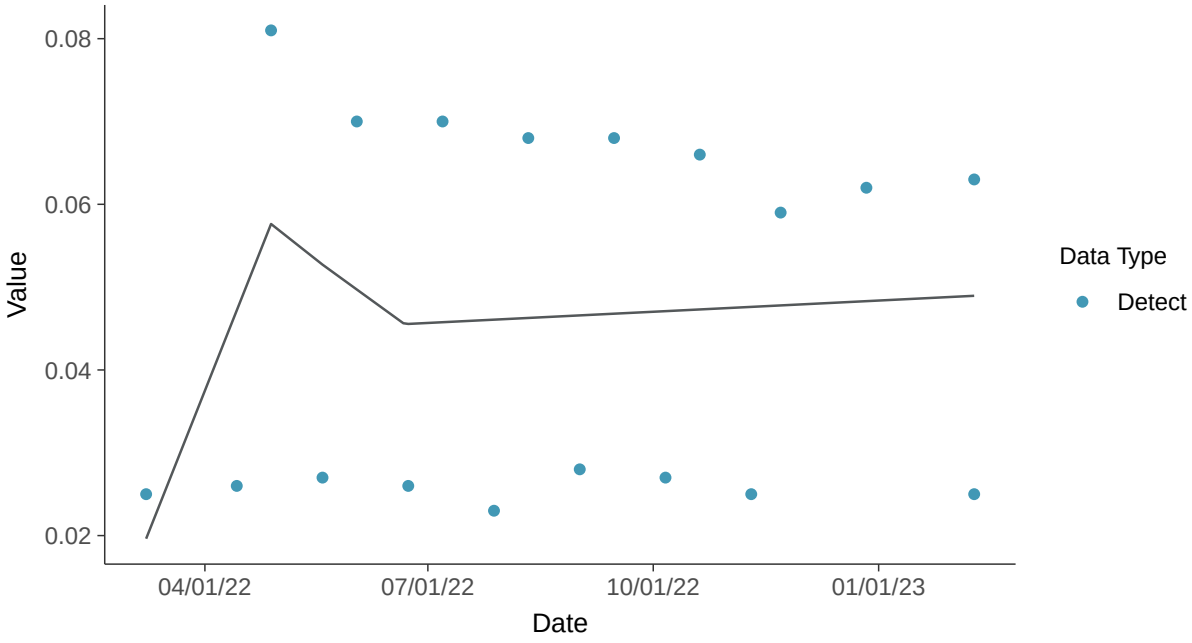
Trend Regression: Piecewise Linear-Linear

Barium, MW-11B & MW-12B (mg/L)



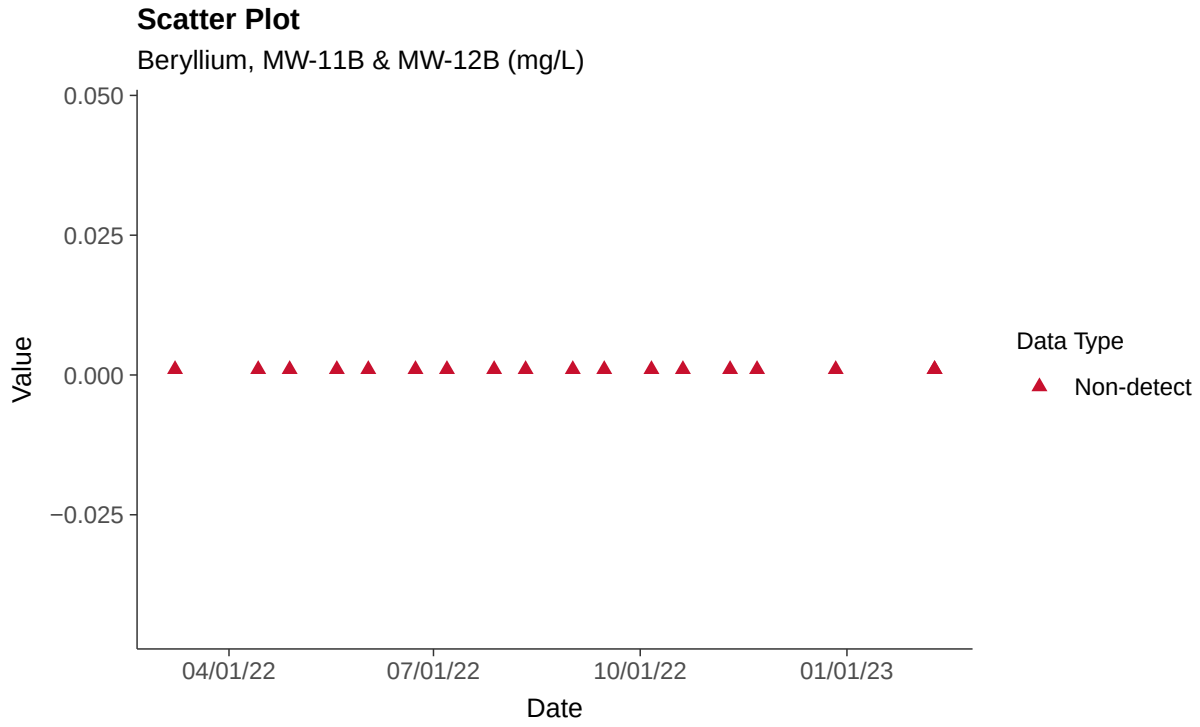
Trend Regression: Piecewise Linear-Linear-Linear

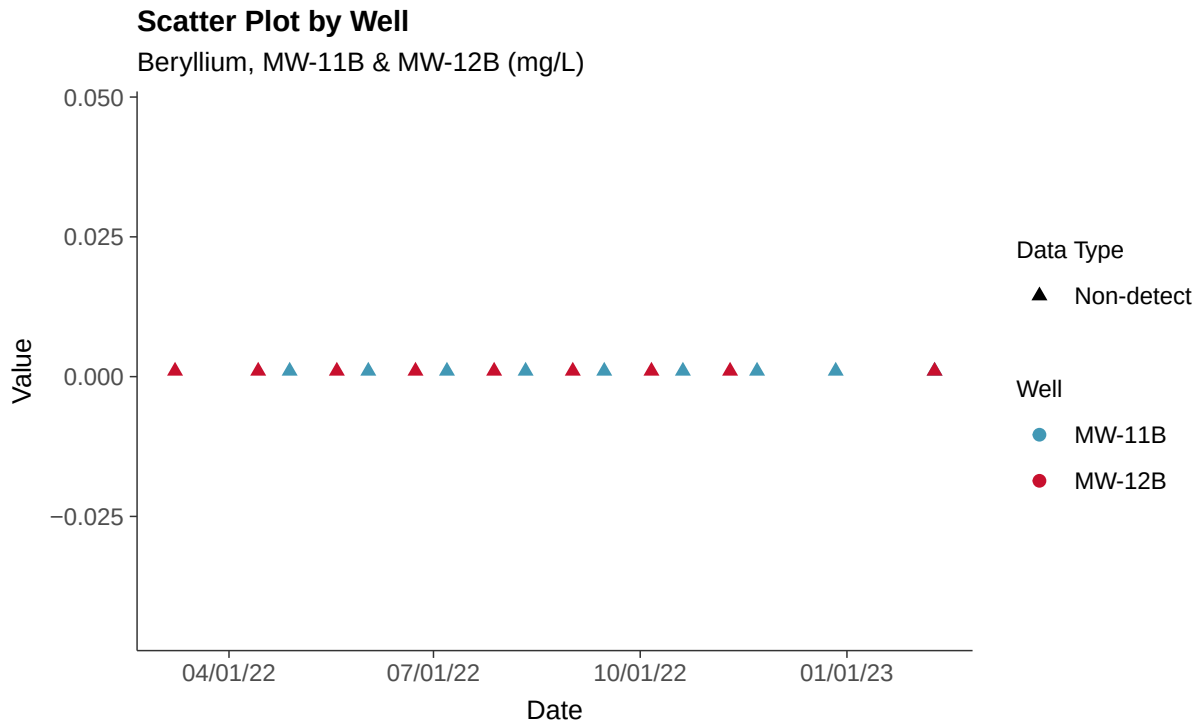
Barium, MW-11B & MW-12B (mg/L)



Appendix IV: Beryllium, MW-11B & MW-12B

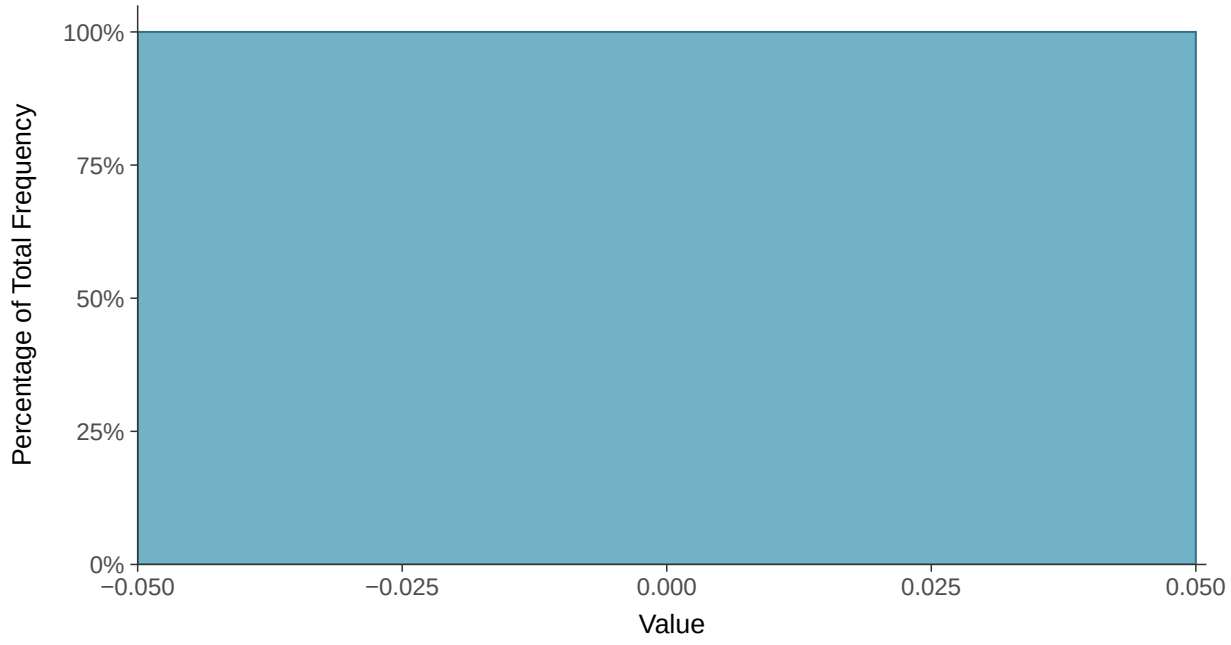
ID: 2_11





Histogram

Beryllium, MW-11B & MW-12B (mg/L)

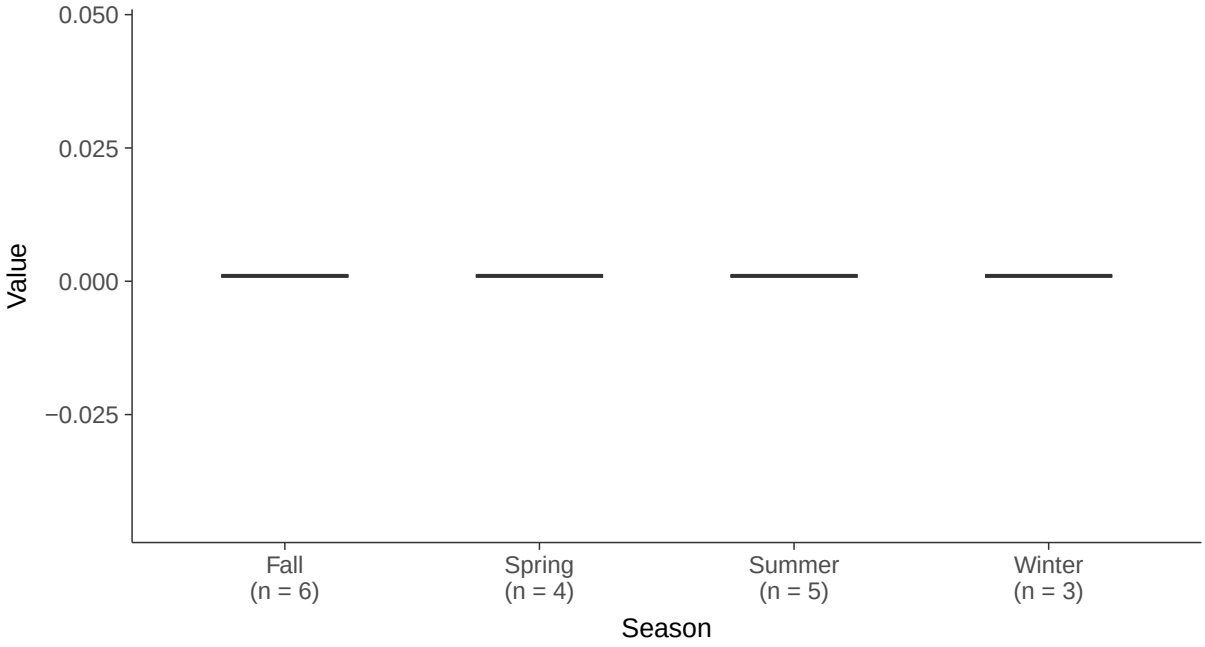


Boxplot

Beryllium, MW-11B & MW-12B (mg/L)

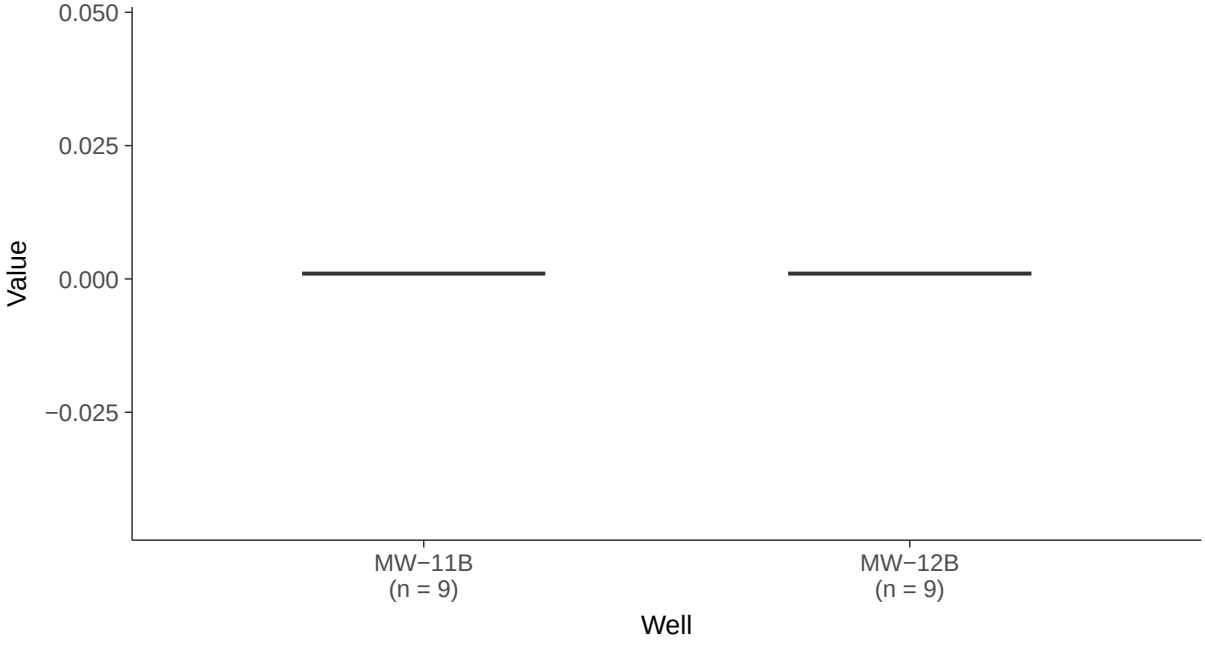
Boxplot by Season

Beryllium, MW-11B & MW-12B (mg/L)



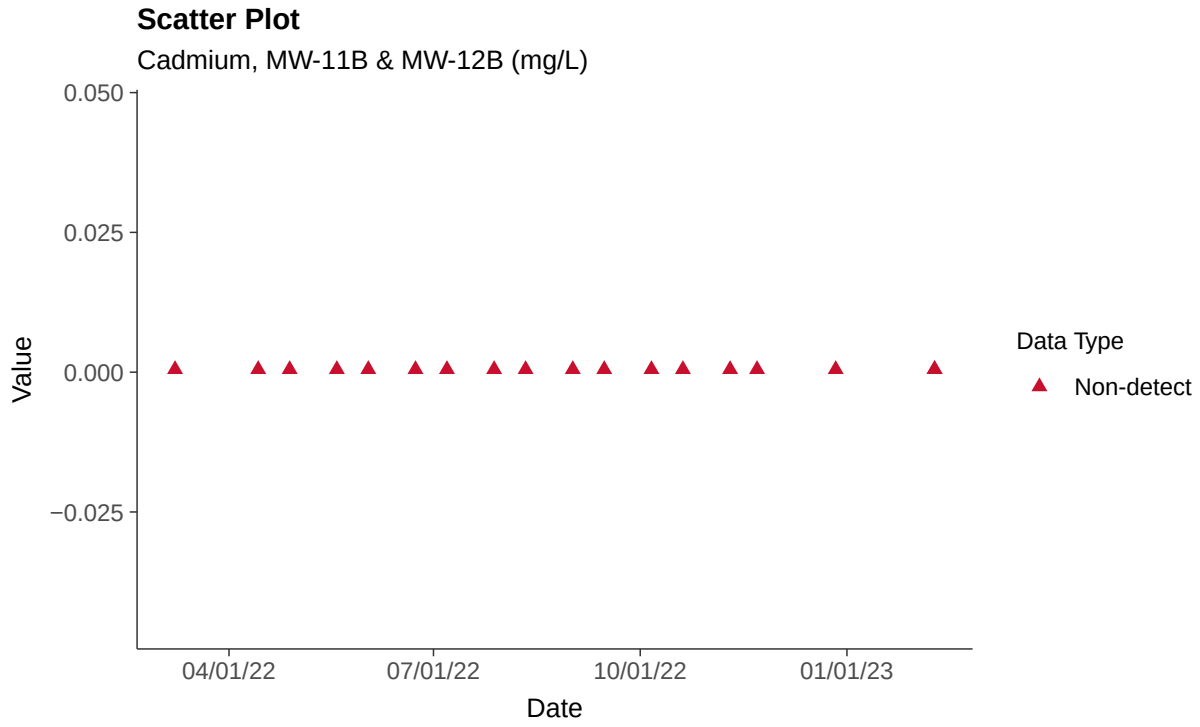
Boxplot by Well

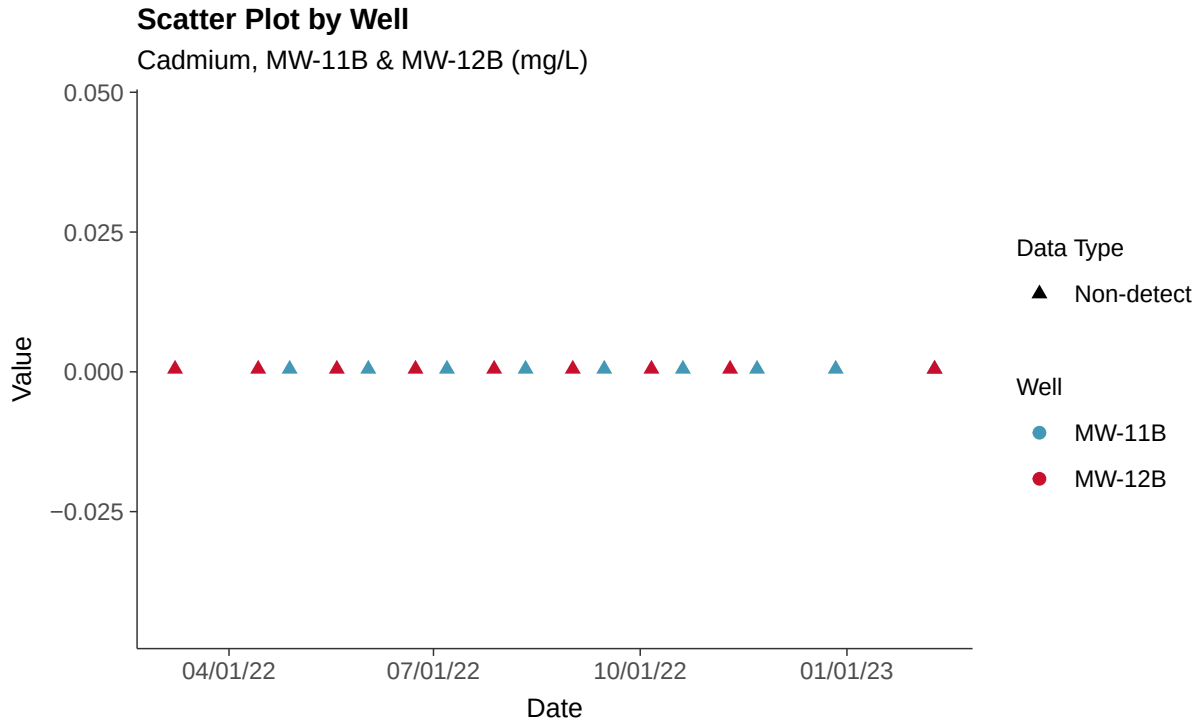
Beryllium, MW-11B & MW-12B (mg/L)



Appendix IV: Cadmium, MW-11B & MW-12B

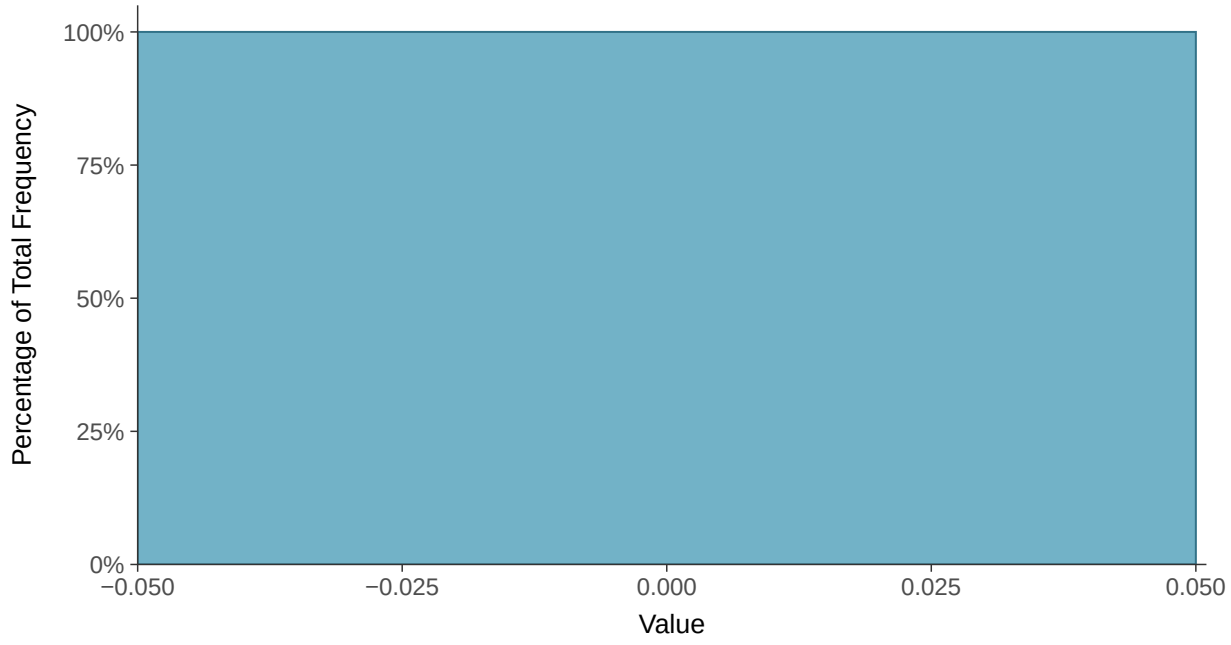
ID: 2_12





Histogram

Cadmium, MW-11B & MW-12B (mg/L)

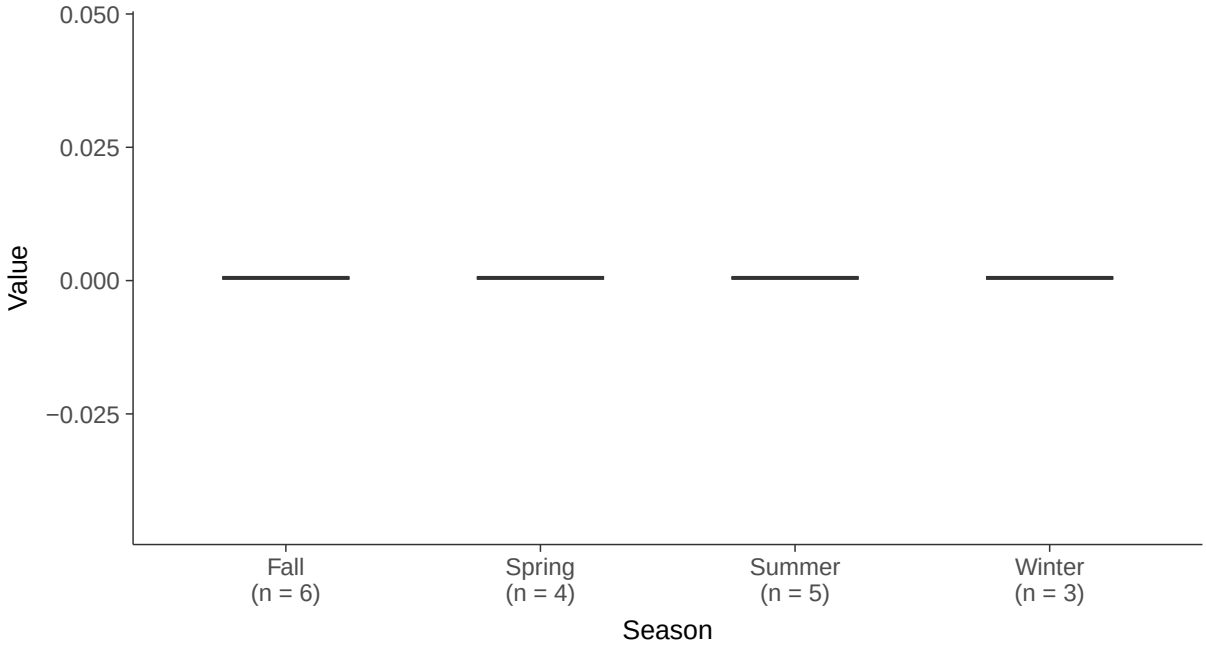


Boxplot

Cadmium, MW-11B & MW-12B (mg/L)

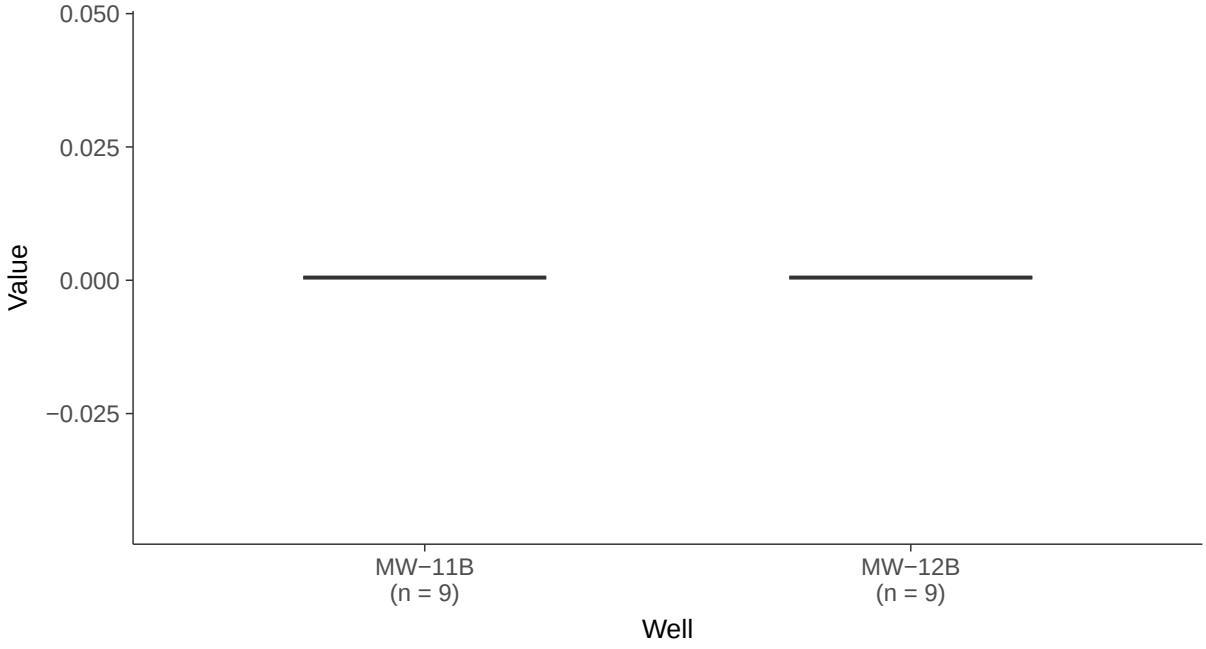
Boxplot by Season

Cadmium, MW-11B & MW-12B (mg/L)



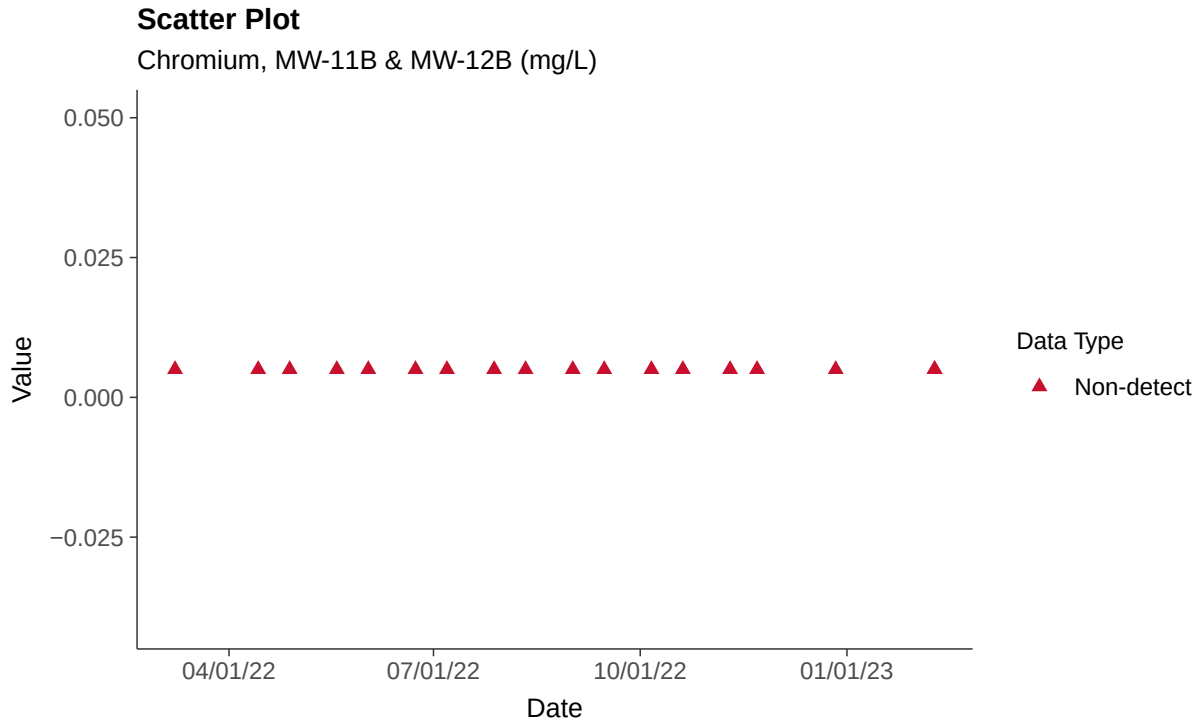
Boxplot by Well

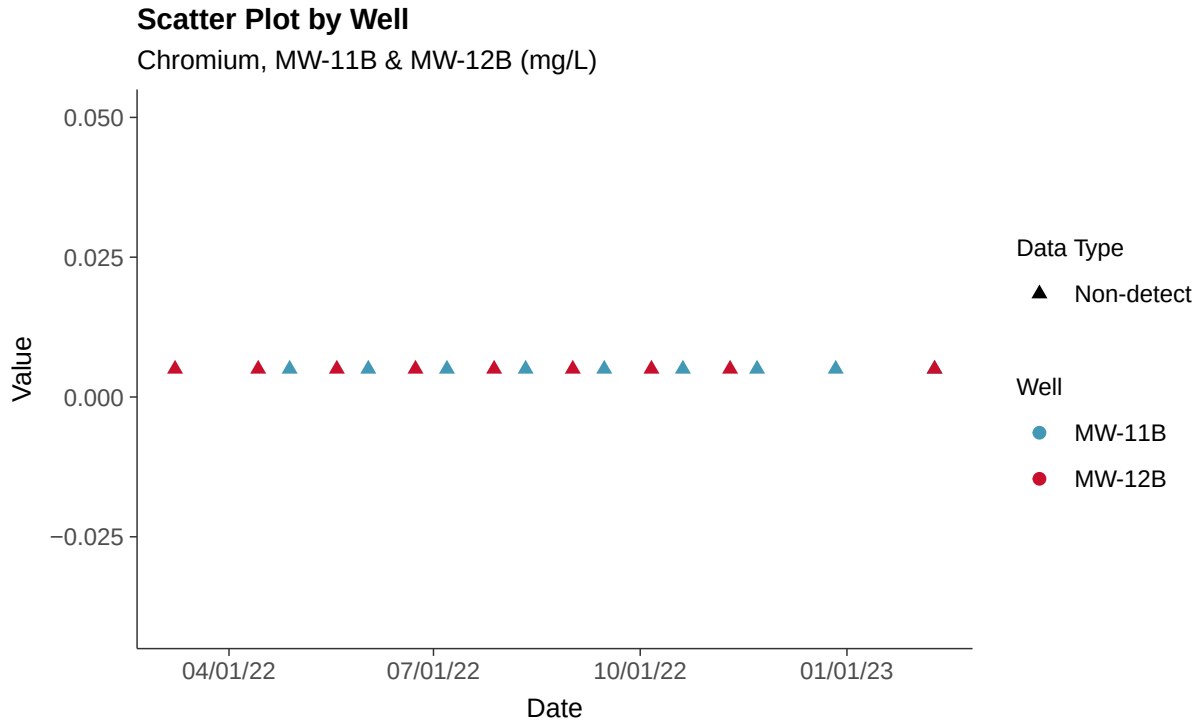
Cadmium, MW-11B & MW-12B (mg/L)



Appendix IV: Chromium, MW-11B & MW-12B

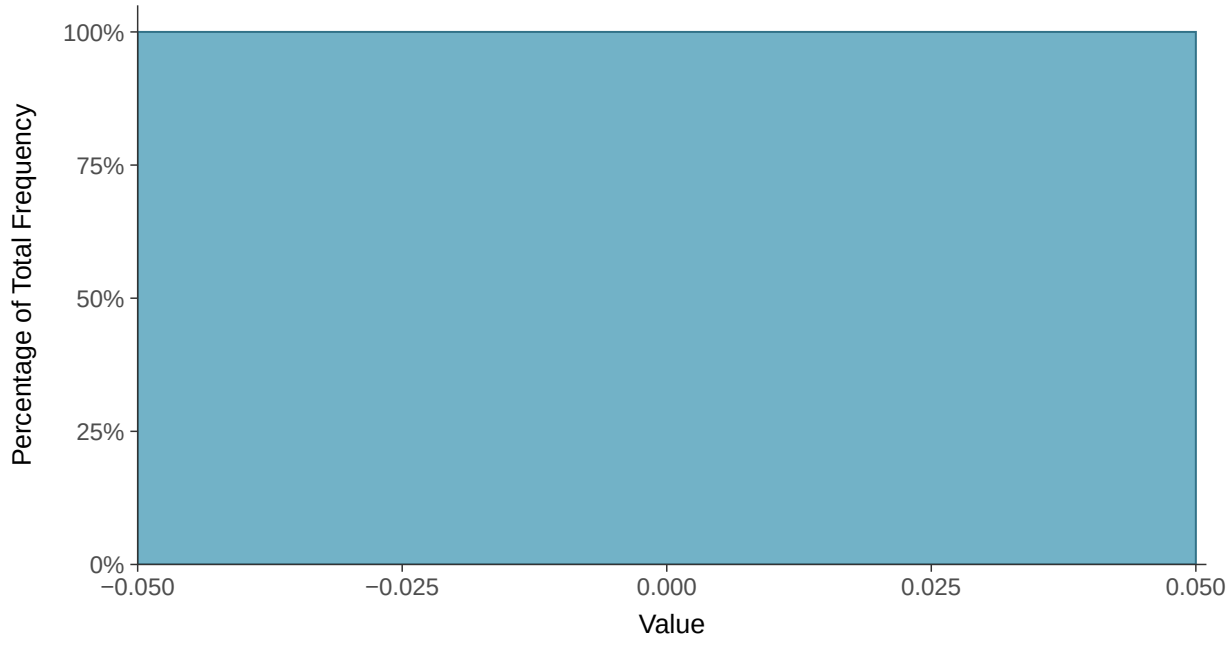
ID: 2_13





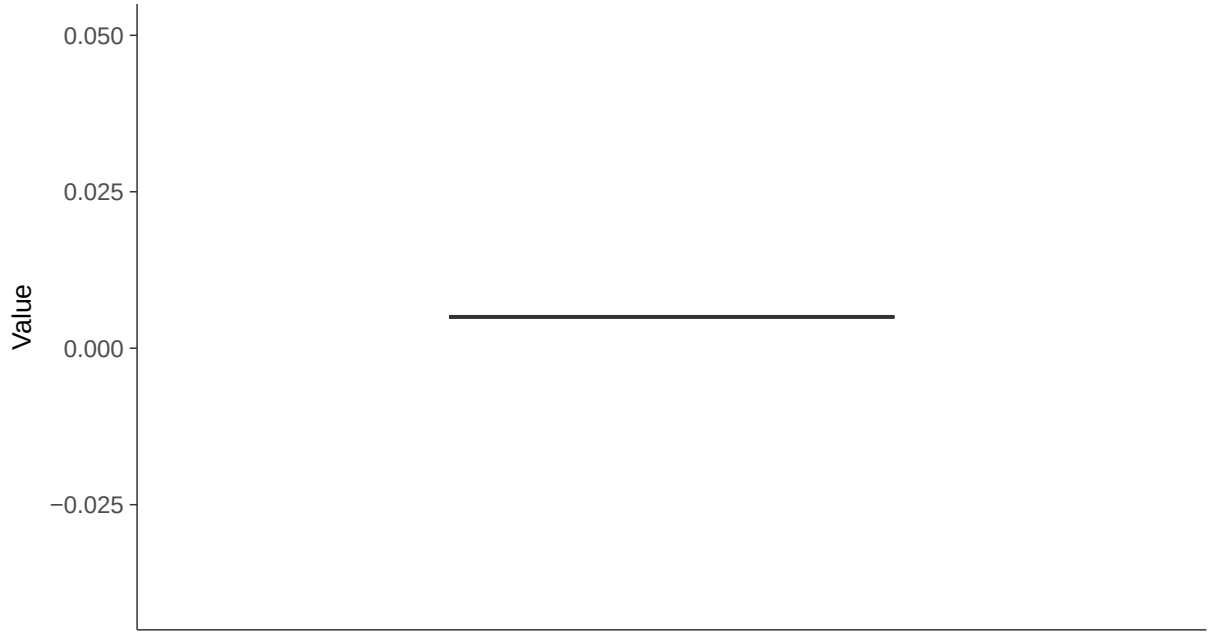
Histogram

Chromium, MW-11B & MW-12B (mg/L)



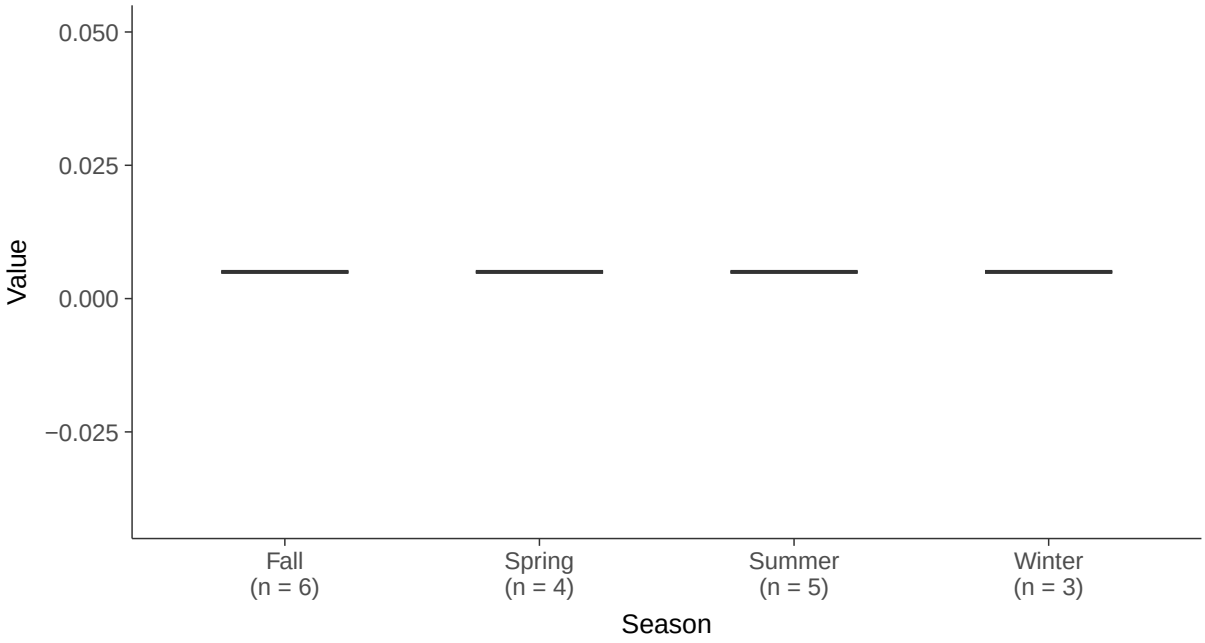
Boxplot

Chromium, MW-11B & MW-12B (mg/L)



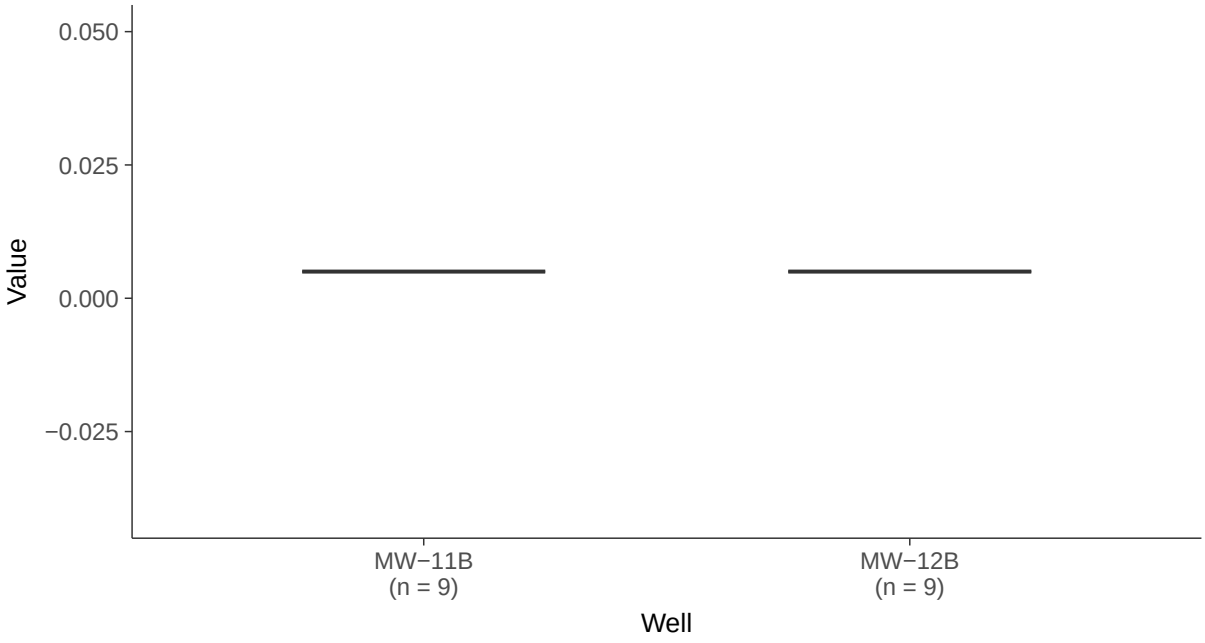
Boxplot by Season

Chromium, MW-11B & MW-12B (mg/L)



Boxplot by Well

Chromium, MW-11B & MW-12B (mg/L)

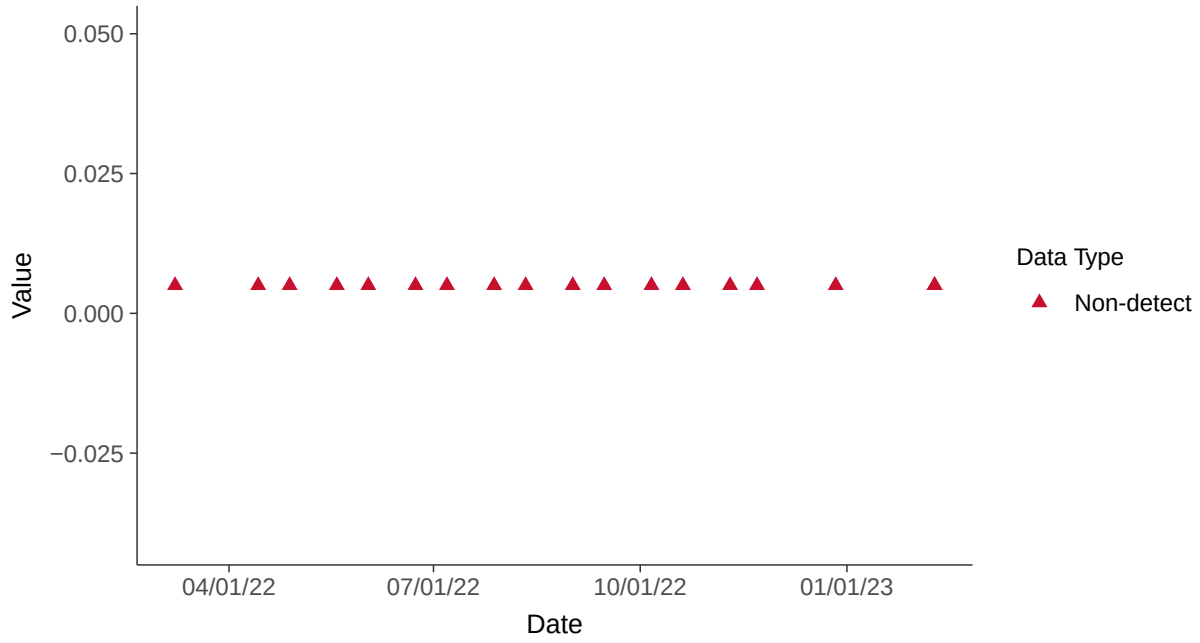


Appendix IV: Cobalt, MW-11B & MW-12B

ID: 2_14

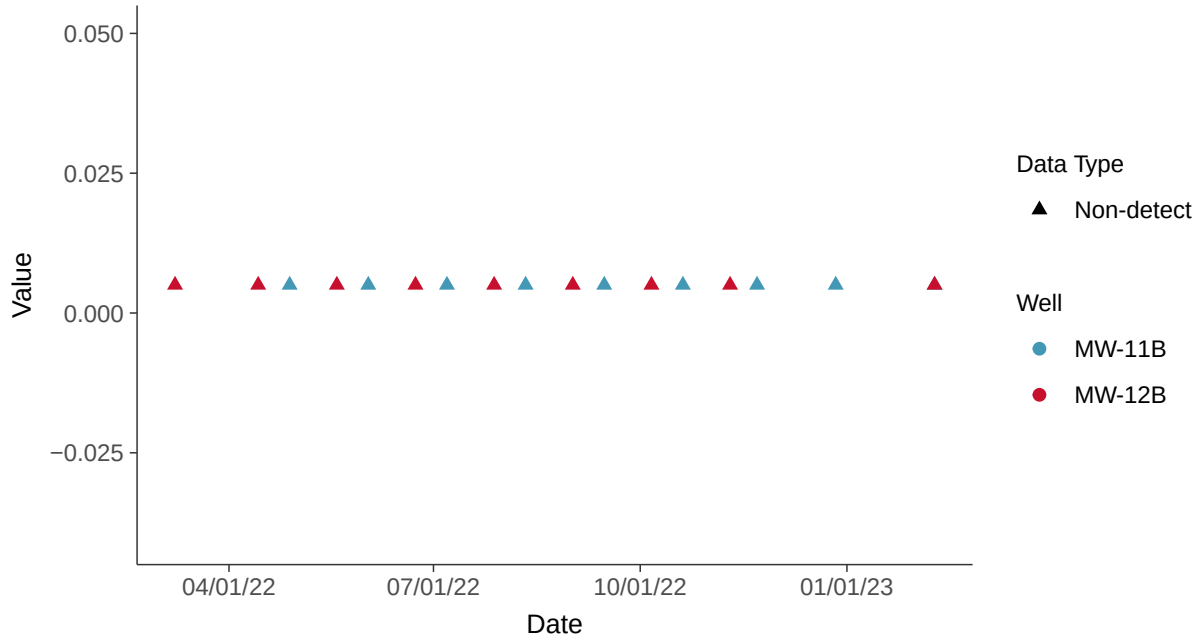
Scatter Plot

Cobalt, MW-11B & MW-12B (mg/L)



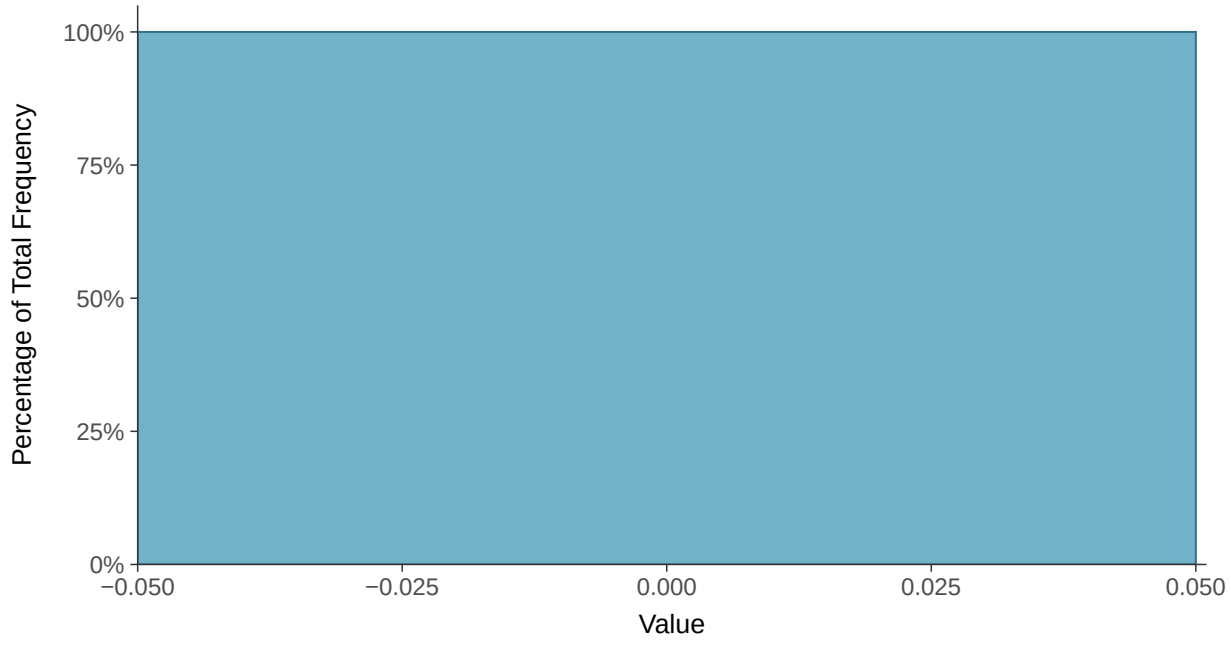
Scatter Plot by Well

Cobalt, MW-11B & MW-12B (mg/L)



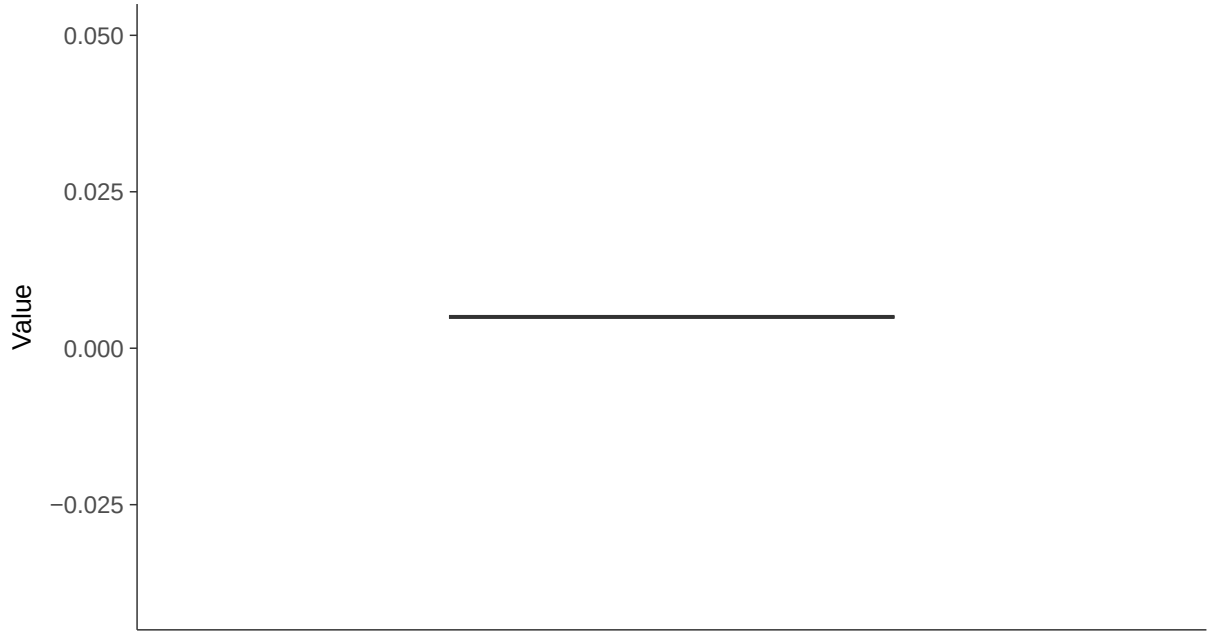
Histogram

Cobalt, MW-11B & MW-12B (mg/L)



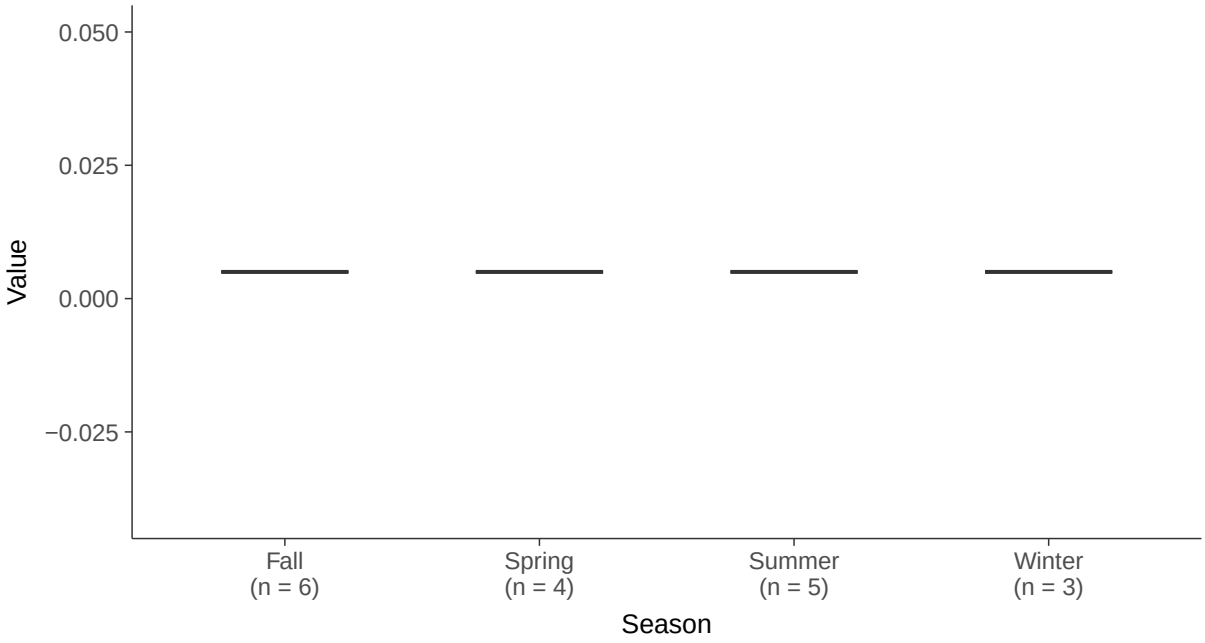
Boxplot

Cobalt, MW-11B & MW-12B (mg/L)



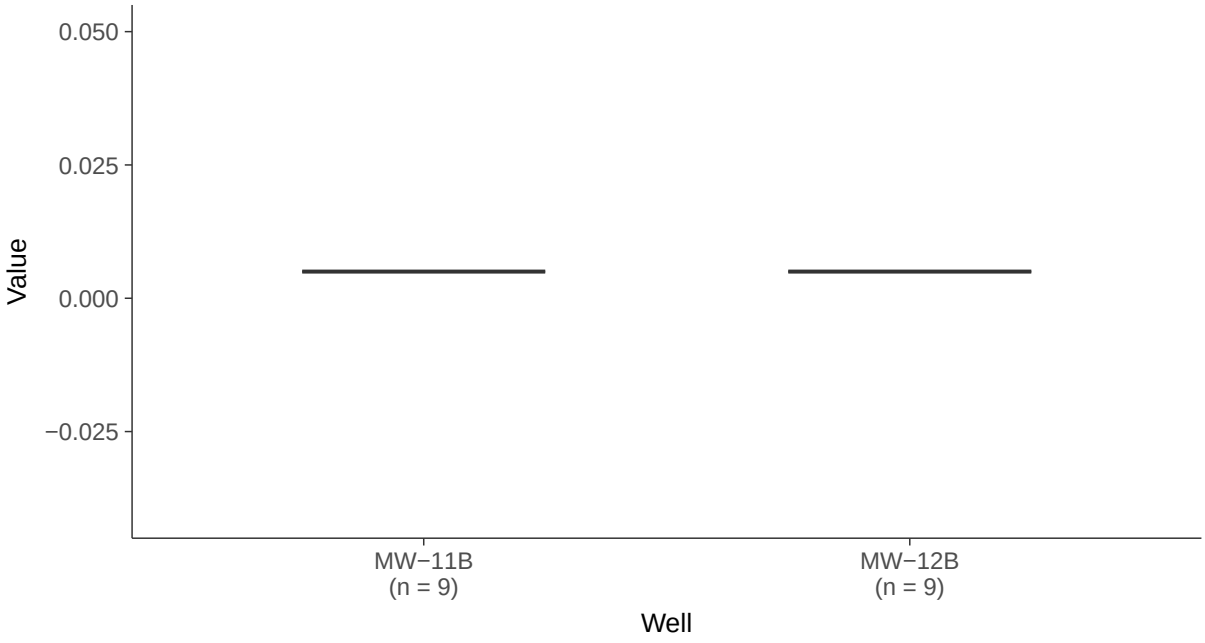
Boxplot by Season

Cobalt, MW-11B & MW-12B (mg/L)



Boxplot by Well

Cobalt, MW-11B & MW-12B (mg/L)

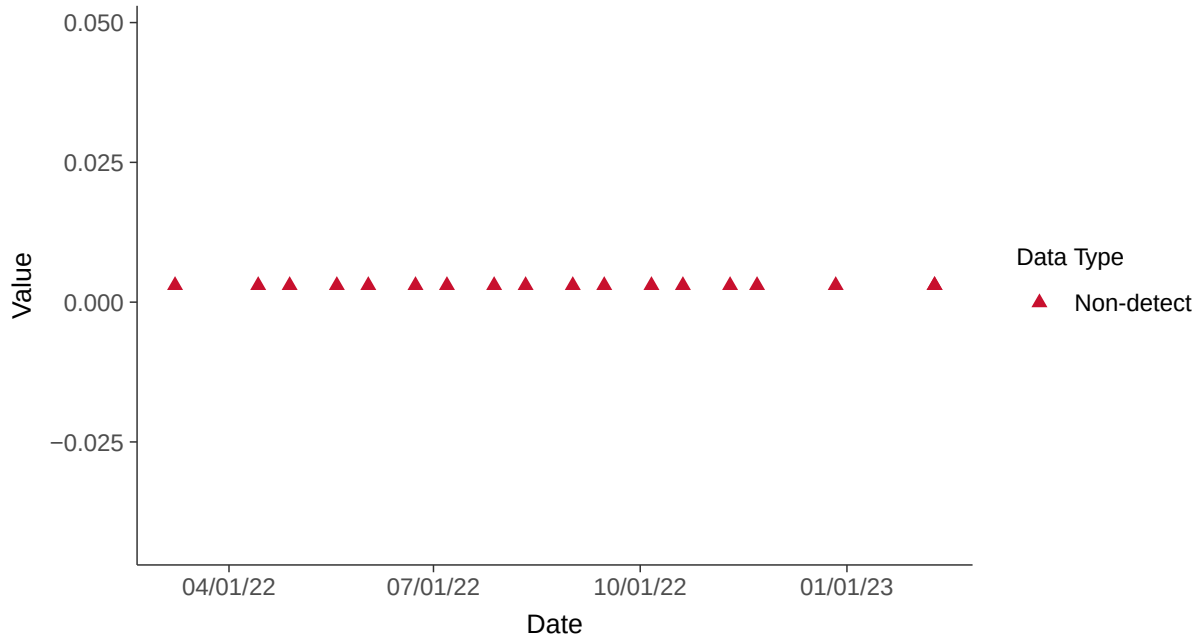


Appendix IV: Lead, MW-11B & MW-12B

ID: 2_15

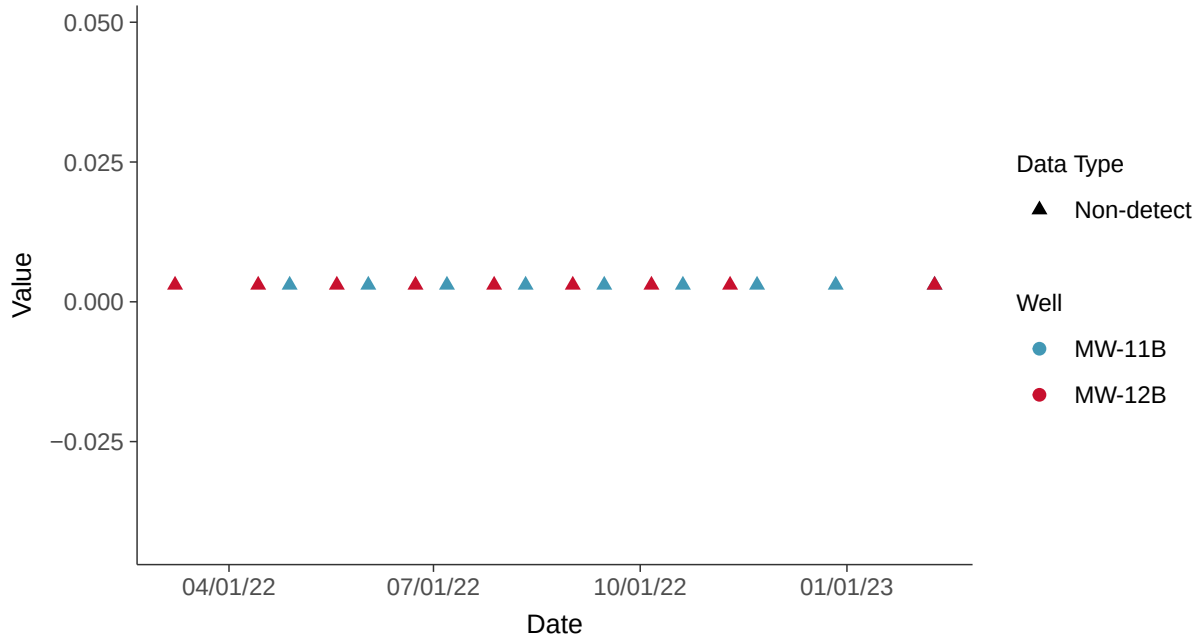
Scatter Plot

Lead, MW-11B & MW-12B (mg/L)



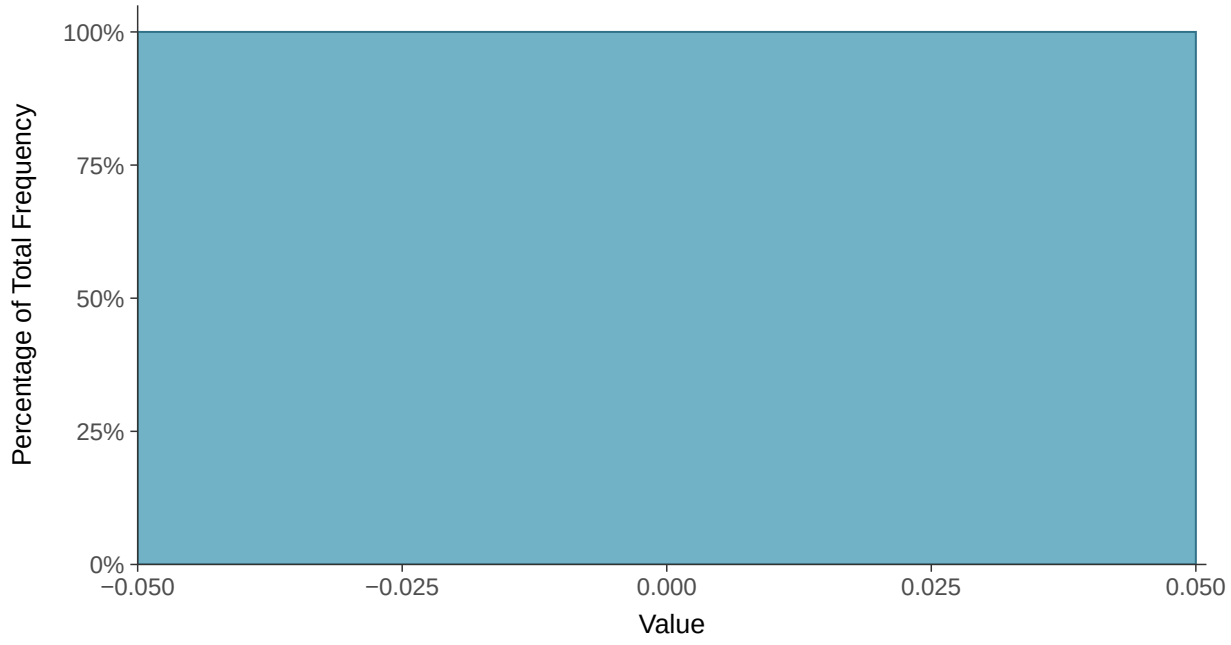
Scatter Plot by Well

Lead, MW-11B & MW-12B (mg/L)



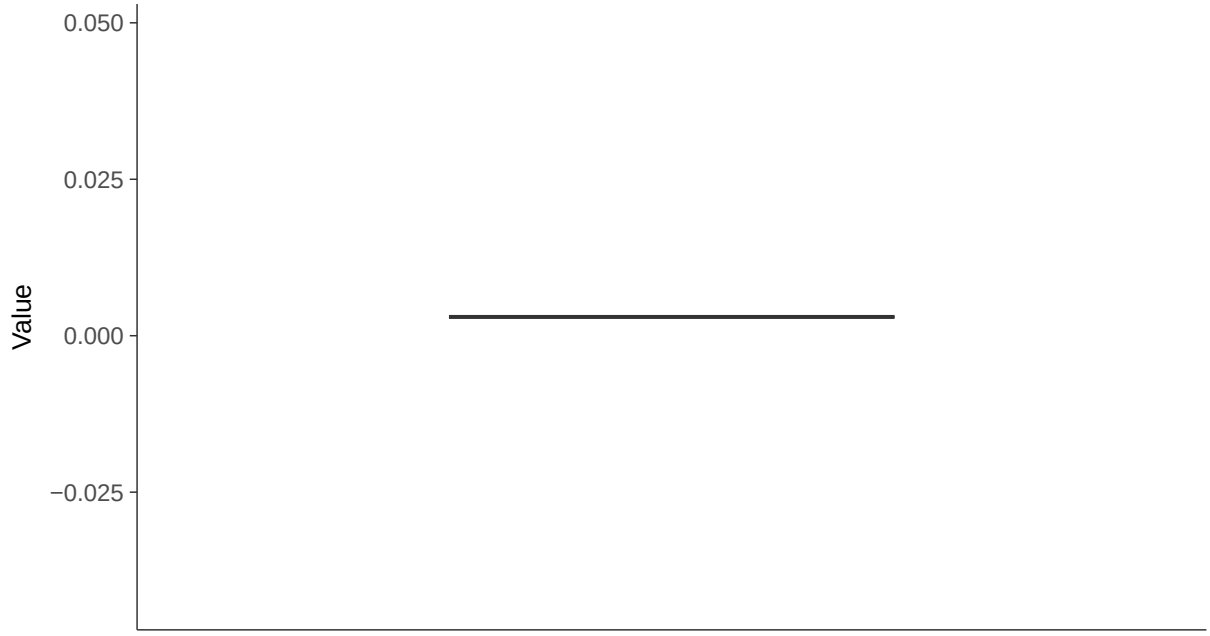
Histogram

Lead, MW-11B & MW-12B (mg/L)



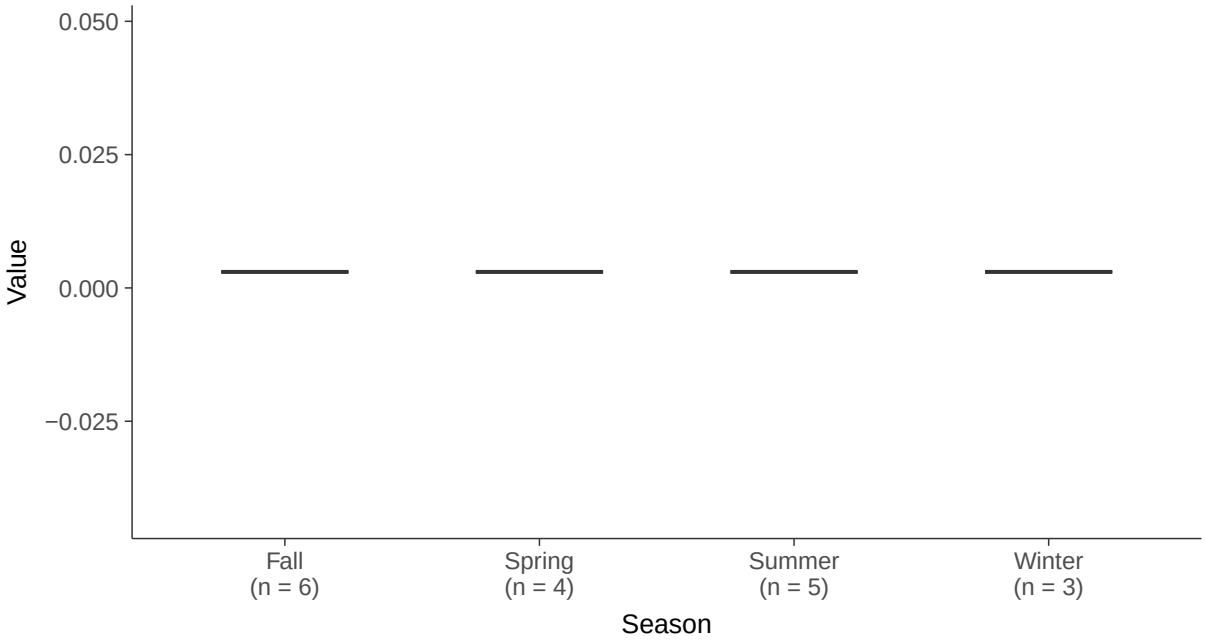
Boxplot

Lead, MW-11B & MW-12B (mg/L)



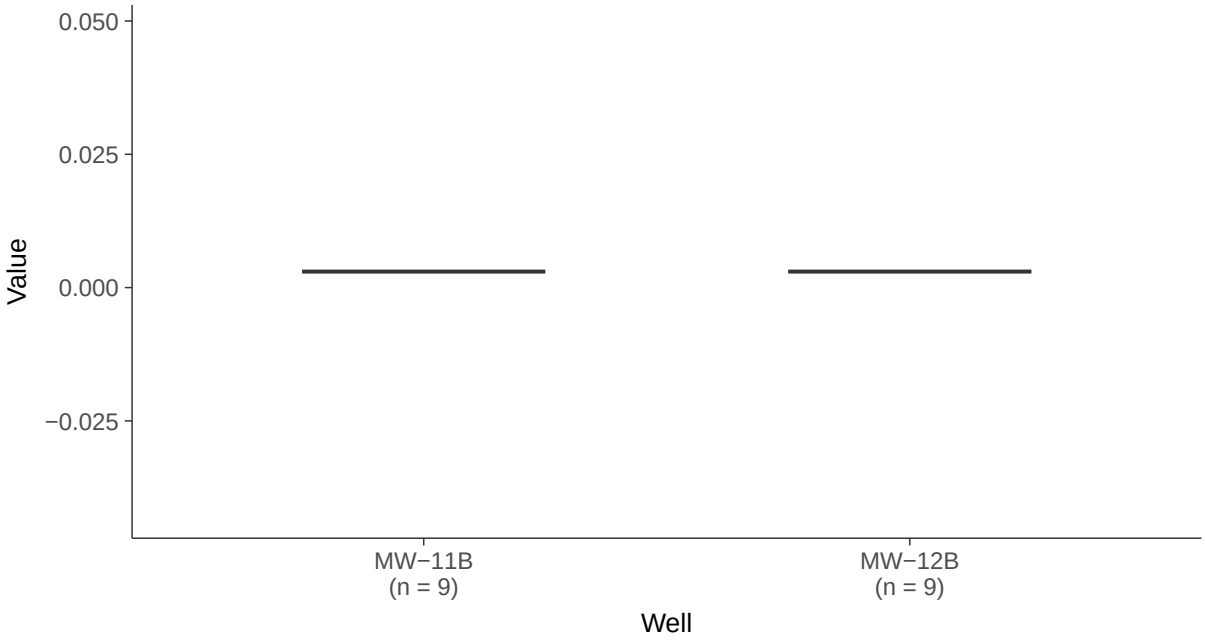
Boxplot by Season

Lead, MW-11B & MW-12B (mg/L)



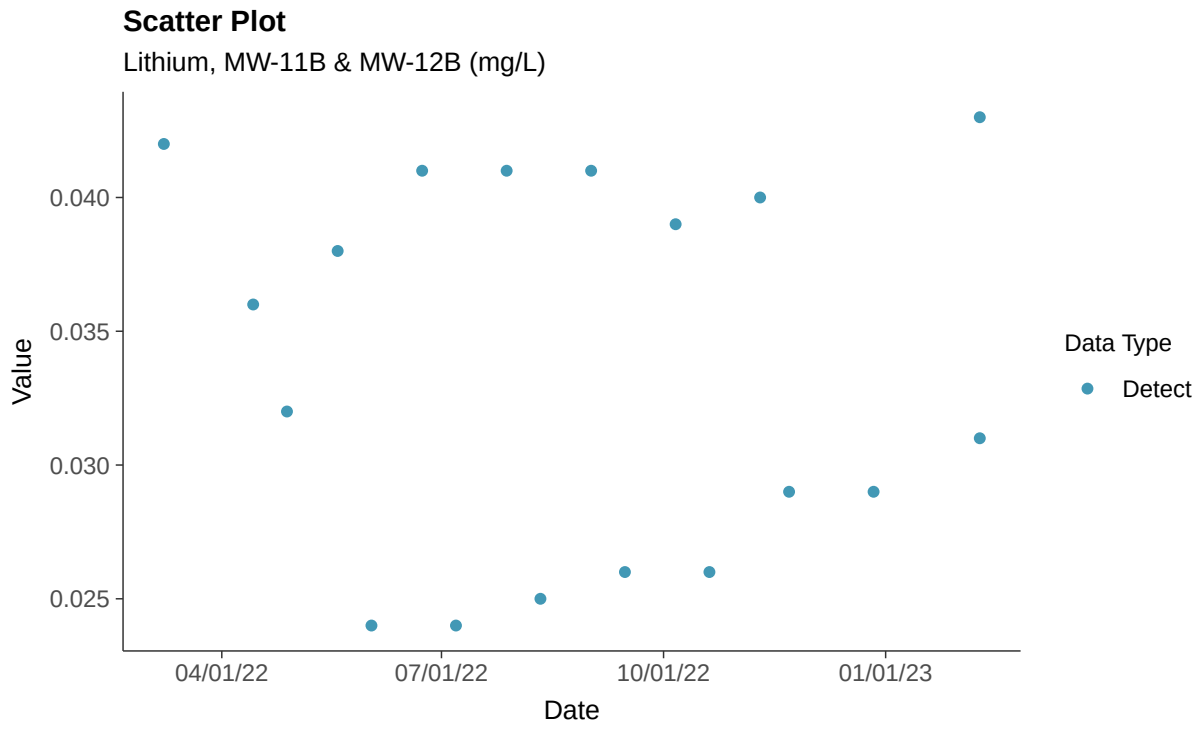
Boxplot by Well

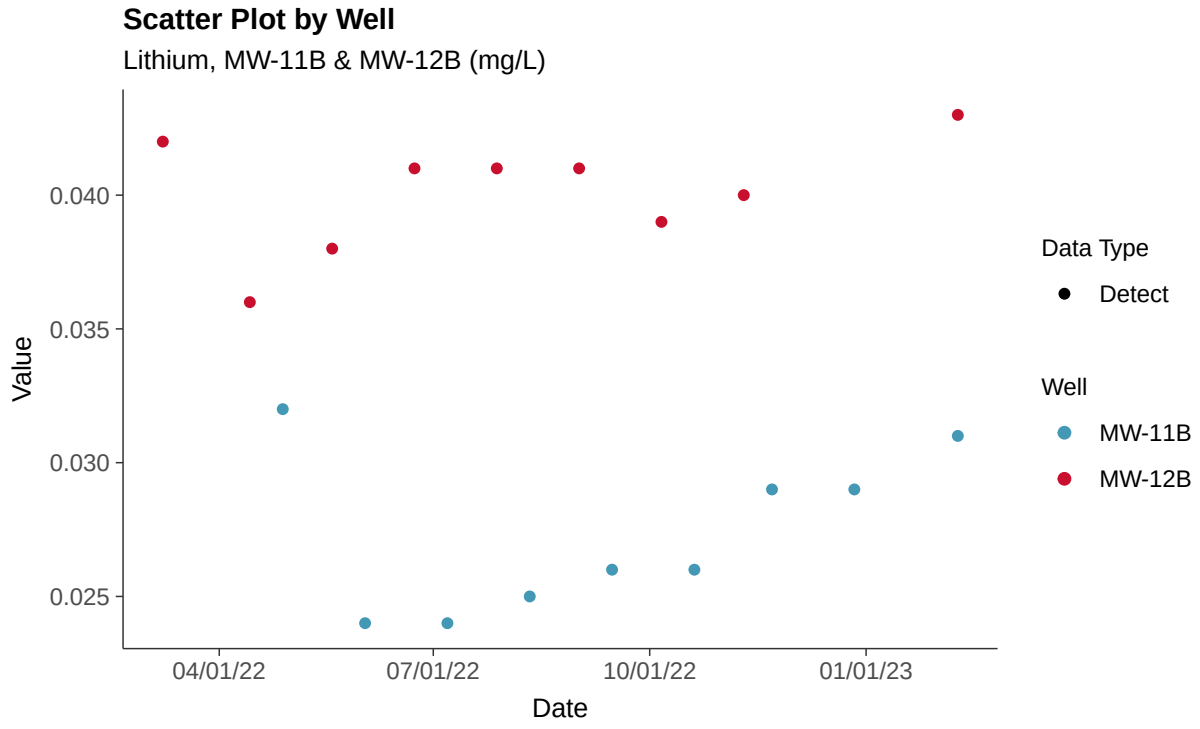
Lead, MW-11B & MW-12B (mg/L)



Appendix IV: Lithium, MW-11B & MW-12B

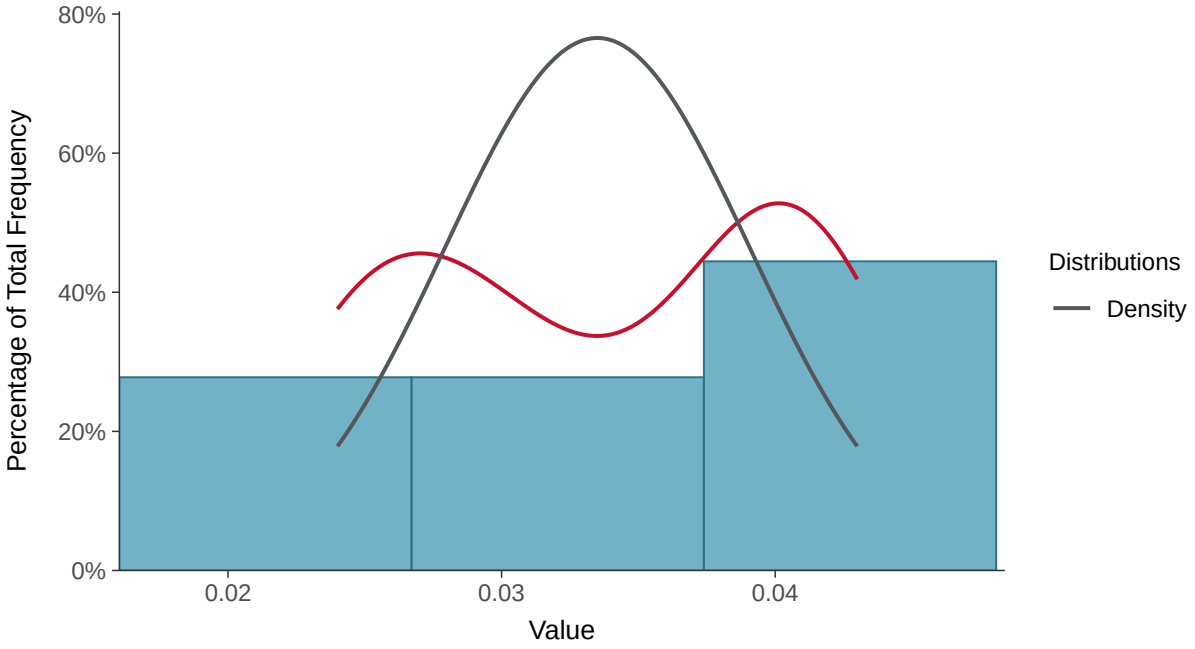
ID: 2_16





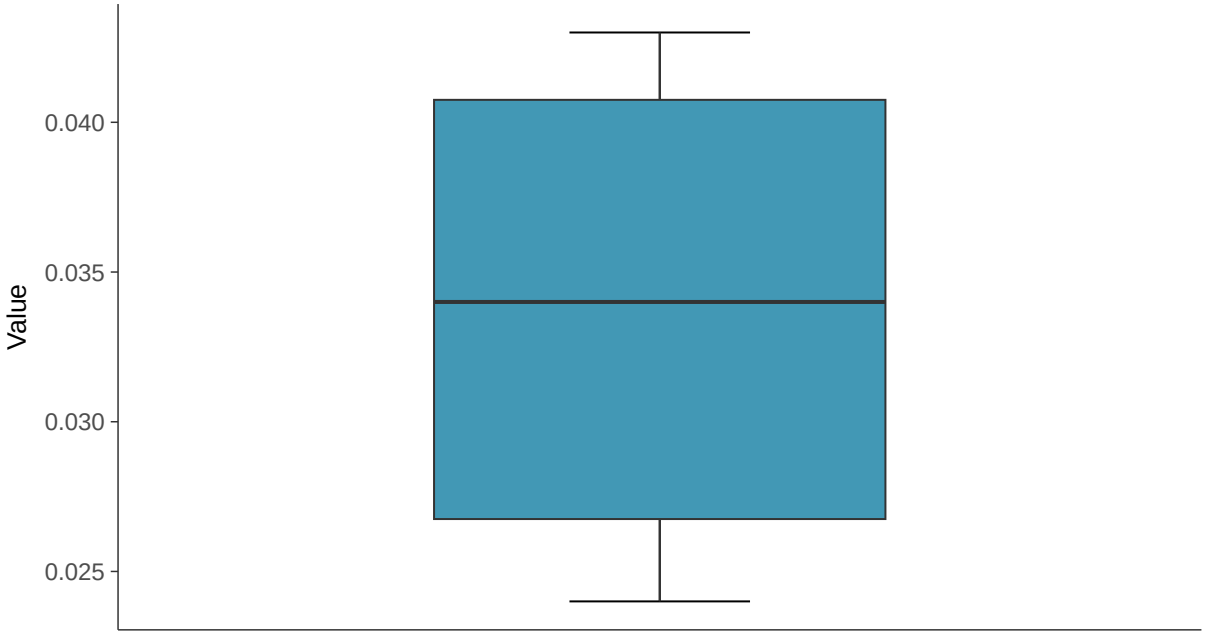
Histogram

Lithium, MW-11B & MW-12B (mg/L)



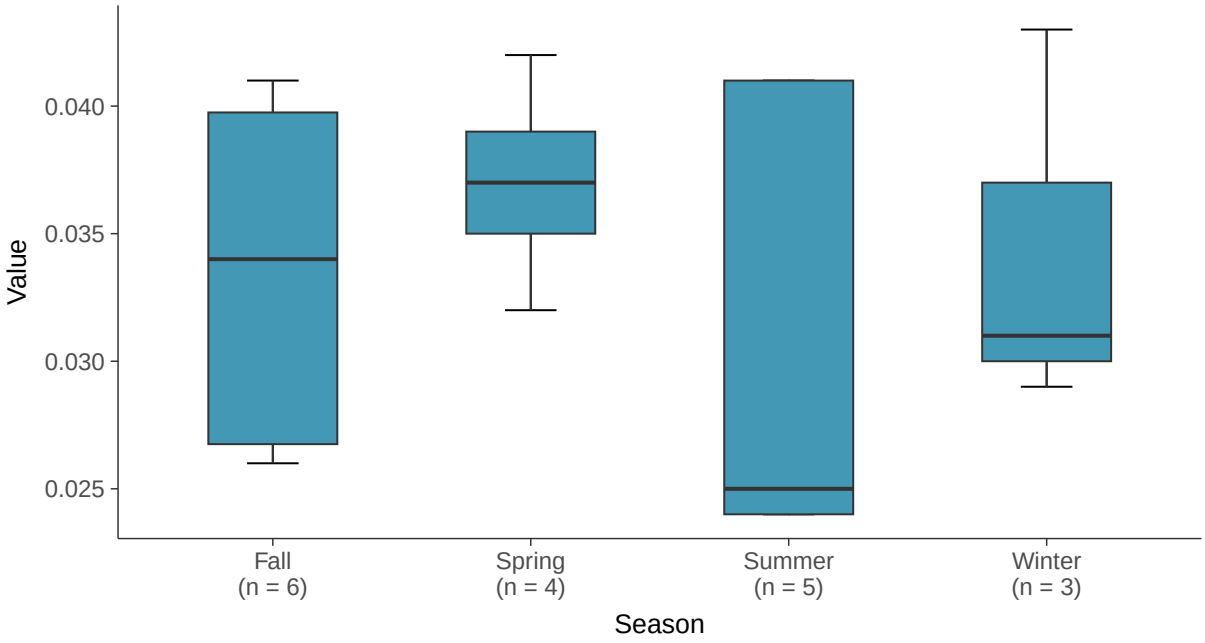
Boxplot

Lithium, MW-11B & MW-12B (mg/L)



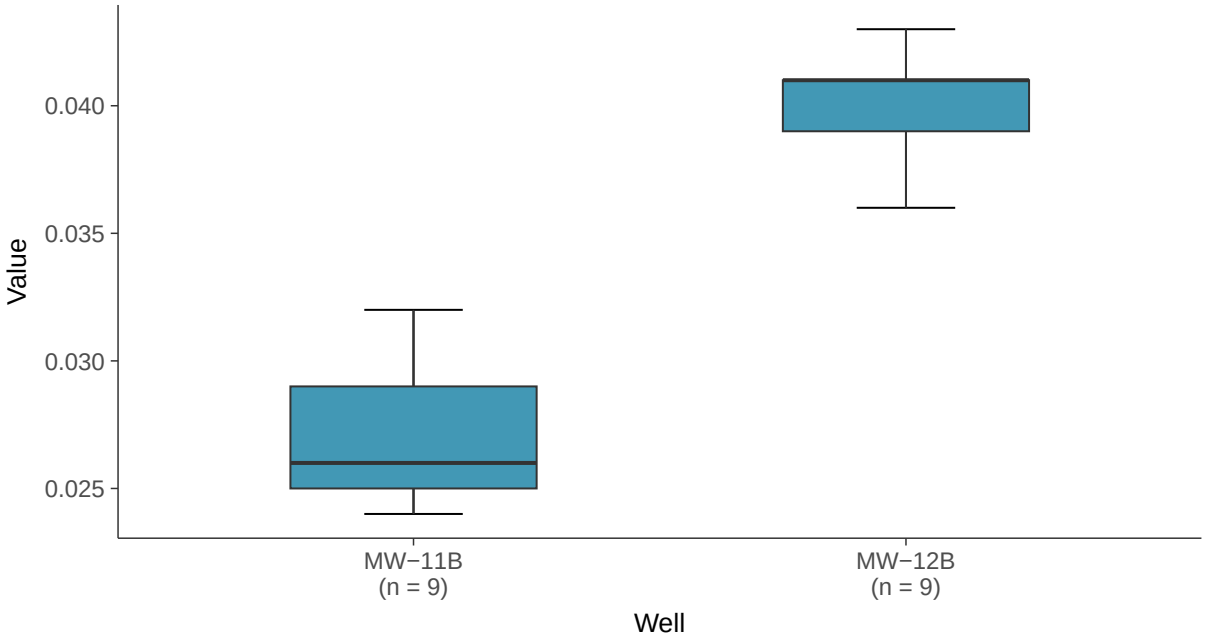
Boxplot by Season

Lithium, MW-11B & MW-12B (mg/L)



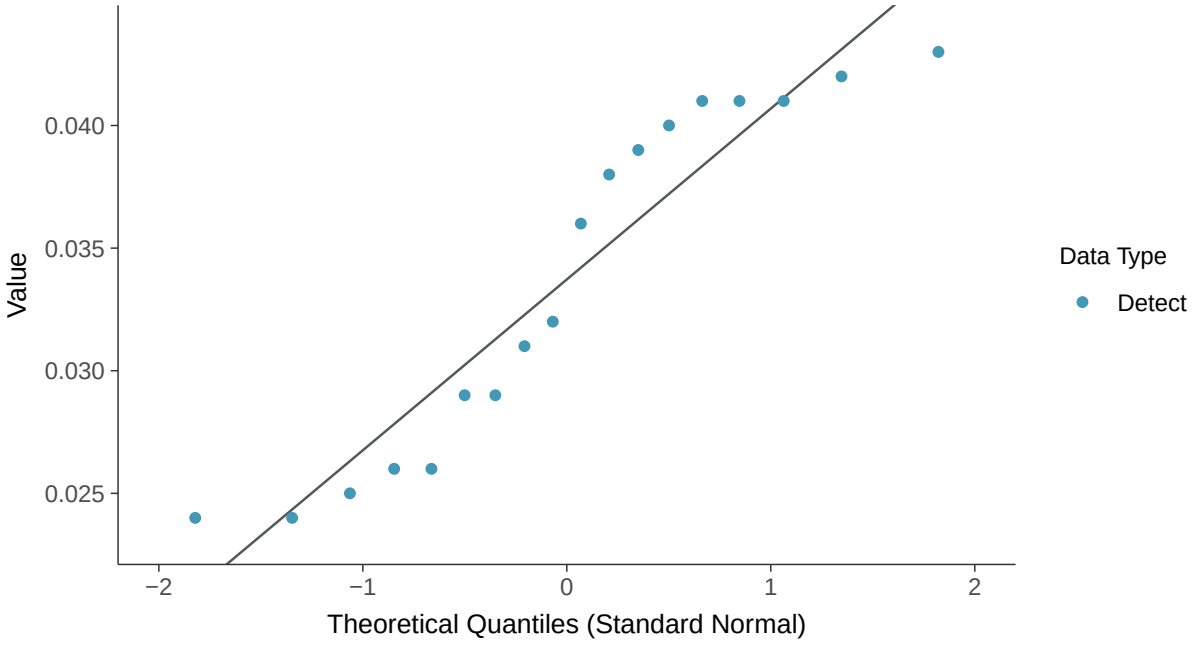
Boxplot by Well

Lithium, MW-11B & MW-12B (mg/L)



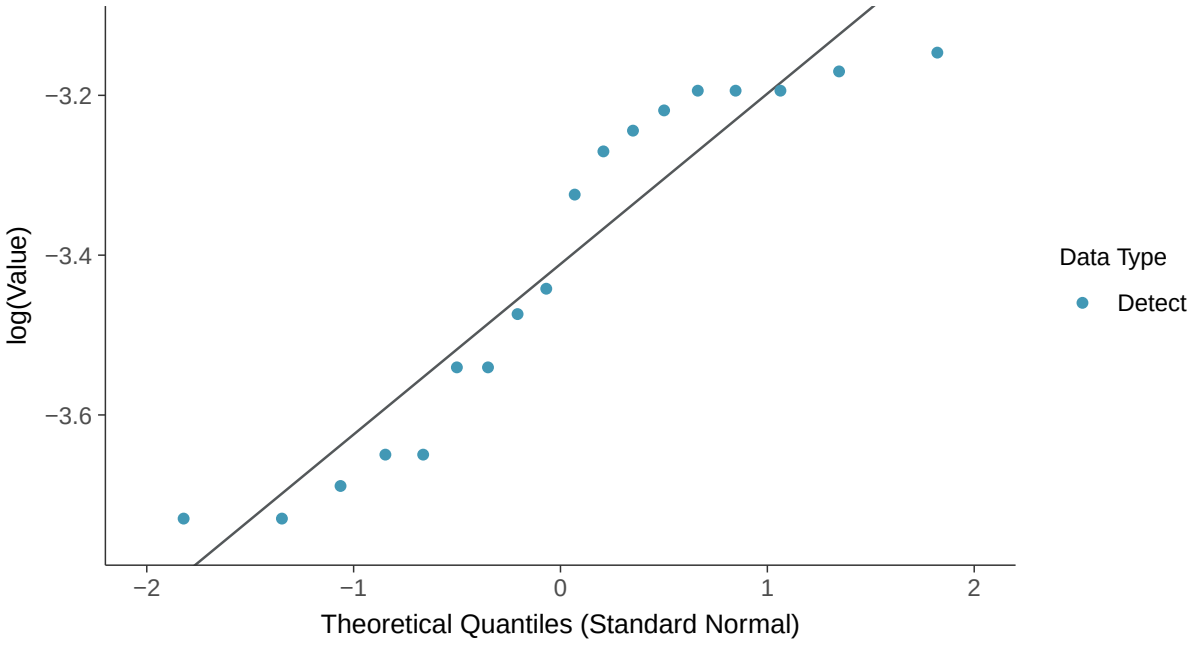
Normal Q-Q plot

Lithium, MW-11B & MW-12B (mg/L)



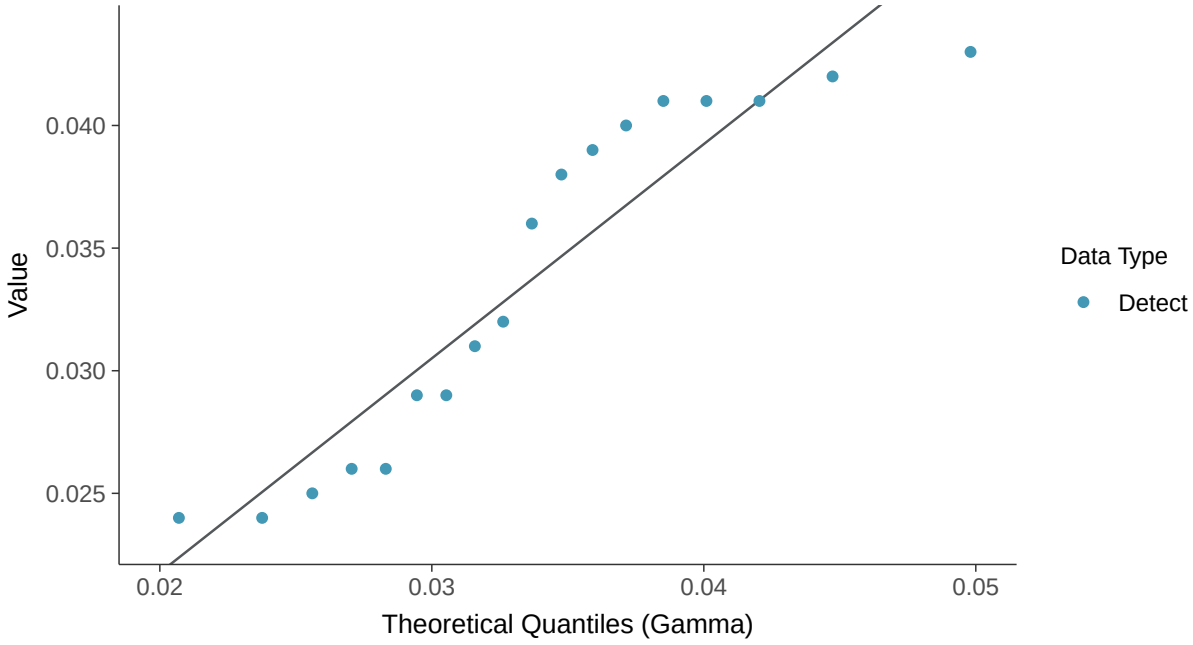
Lognormal Q-Q plot

Lithium, MW-11B & MW-12B (mg/L)



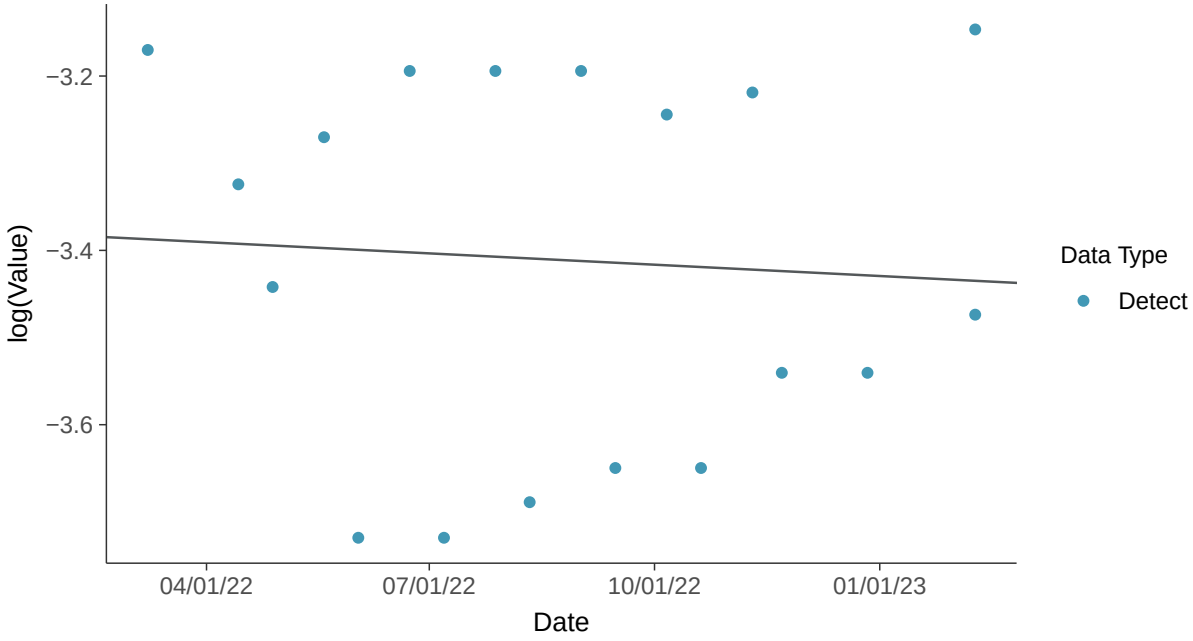
Gamma Q-Q plot

Lithium, MW-11B & MW-12B (mg/L)



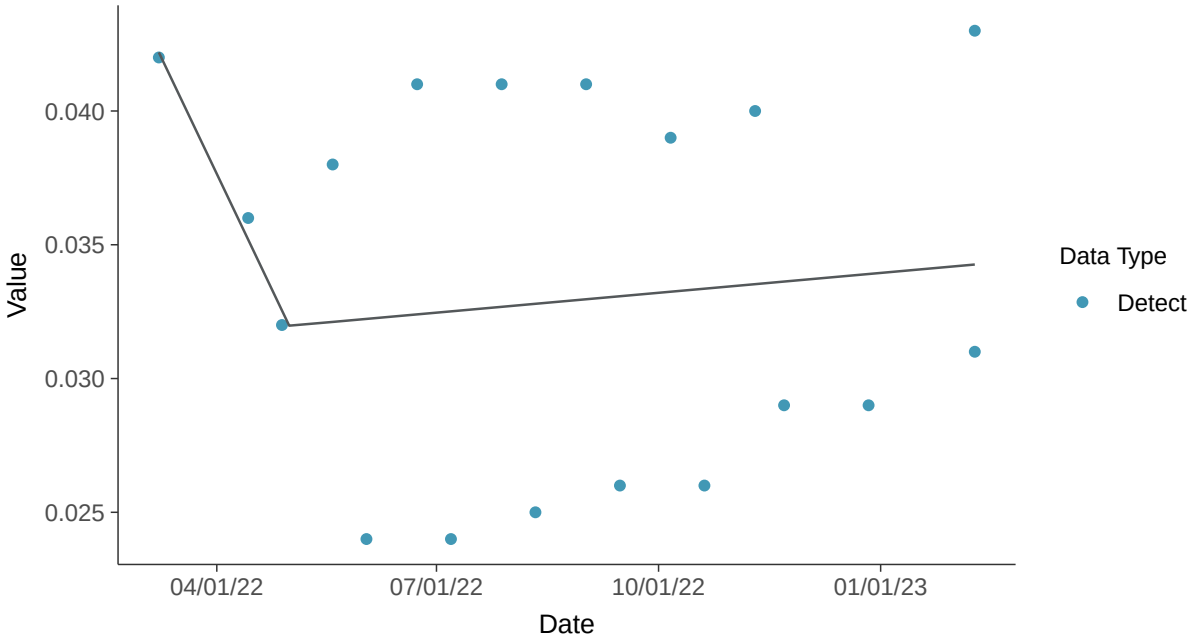
Trend Regression: Lognormal MLE

Lithium, MW-11B & MW-12B (mg/L)



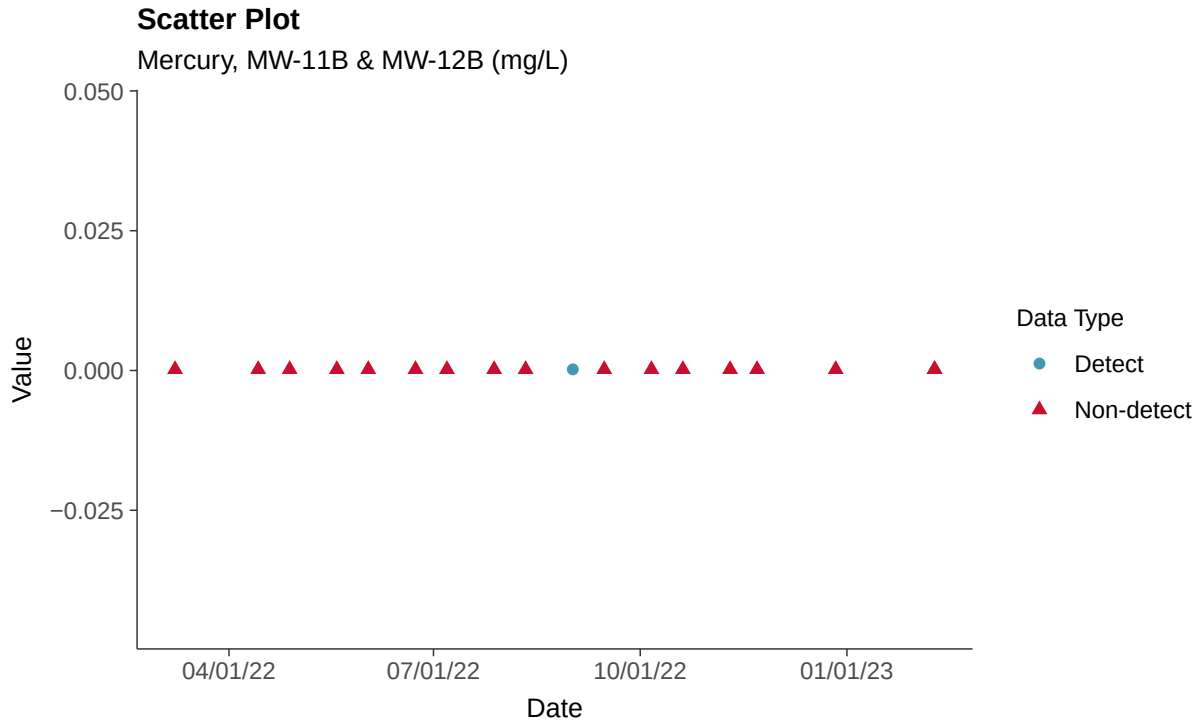
Trend Regression: Piecewise Linear-Linear

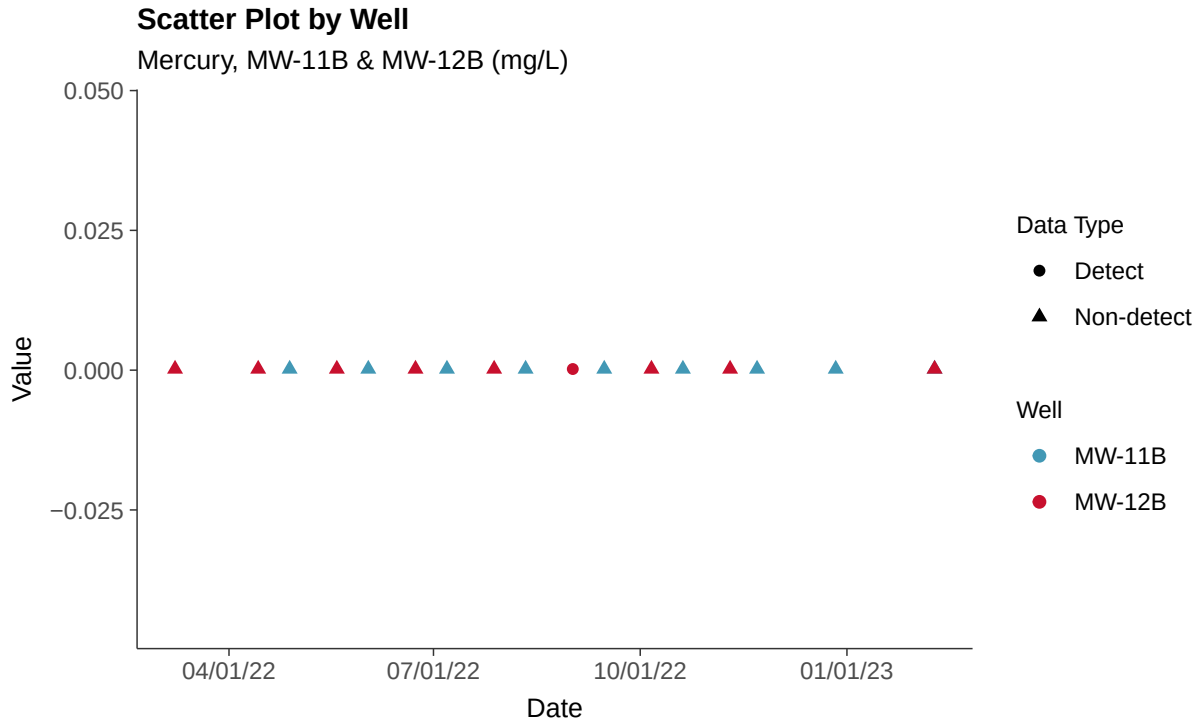
Lithium, MW-11B & MW-12B (mg/L)



Appendix IV: Mercury, MW-11B & MW-12B

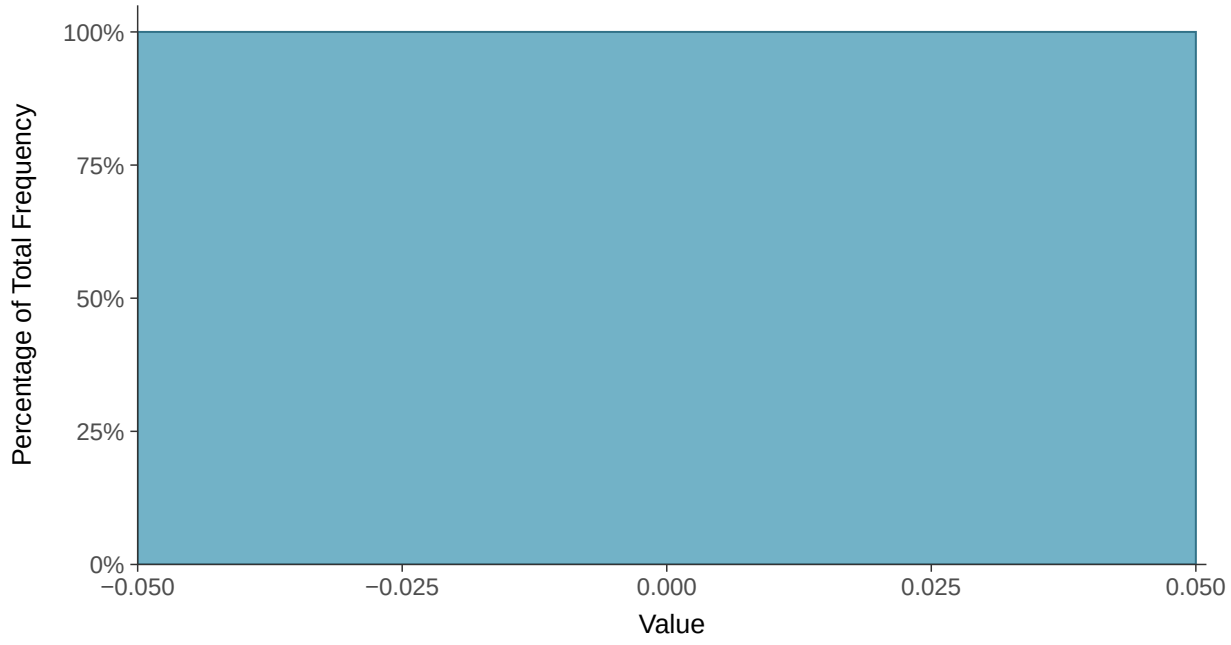
ID: 2_17





Histogram

Mercury, MW-11B & MW-12B (mg/L)

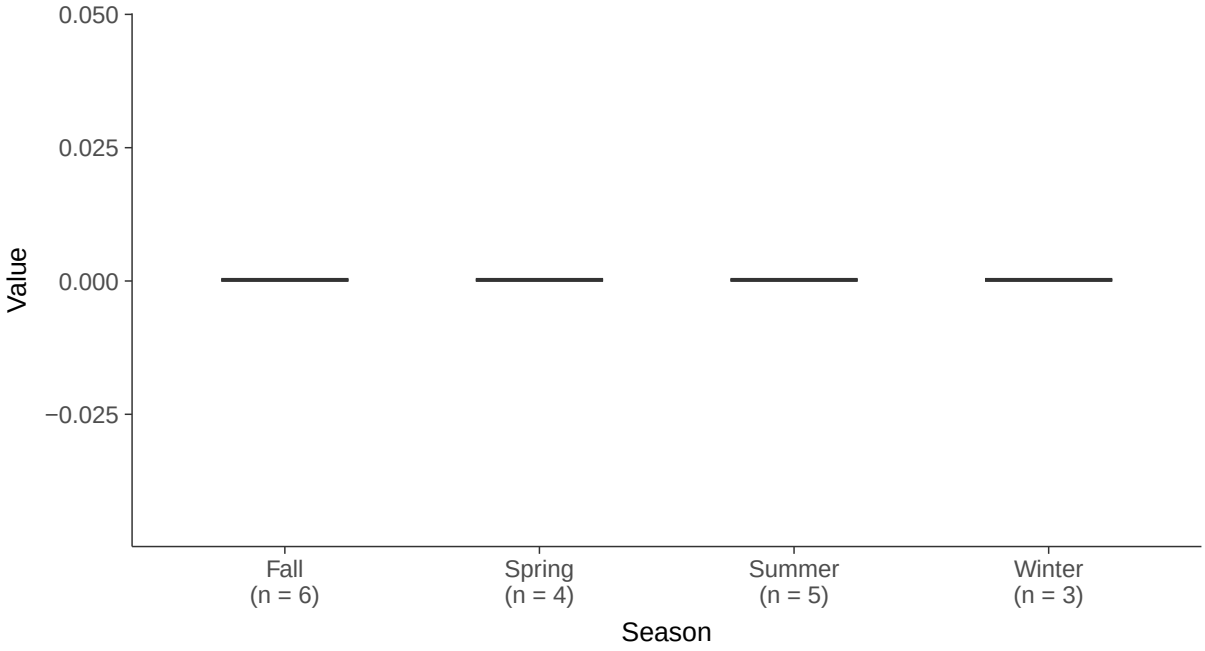


Boxplot

Mercury, MW-11B & MW-12B (mg/L)

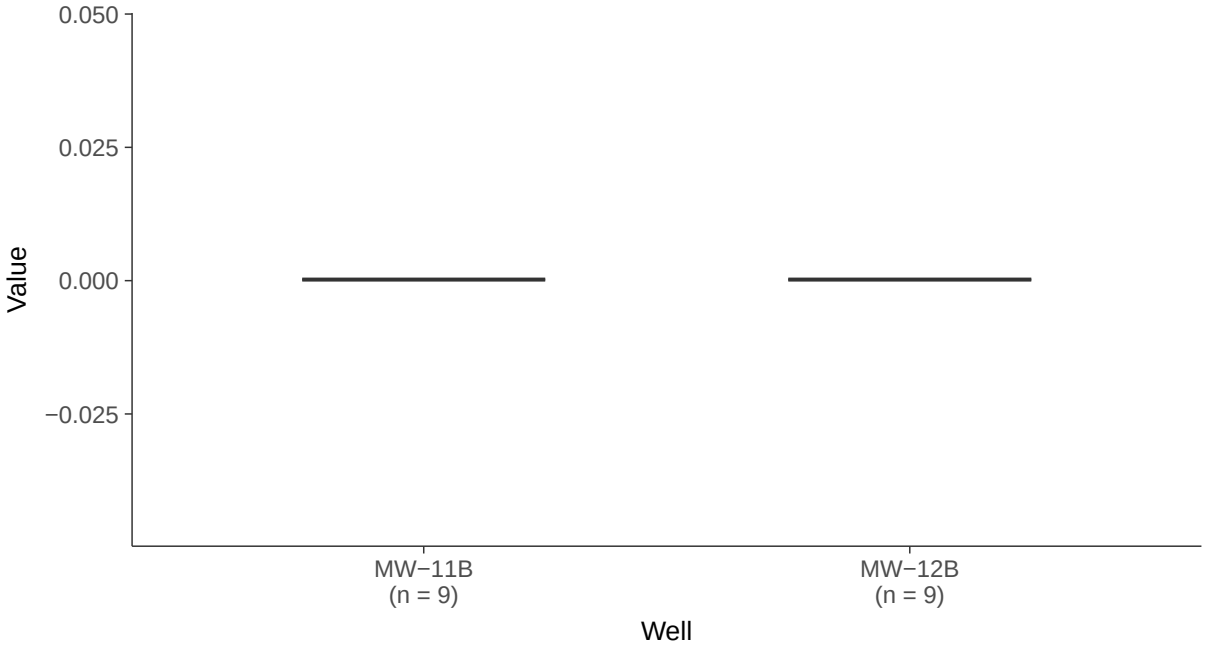
Boxplot by Season

Mercury, MW-11B & MW-12B (mg/L)



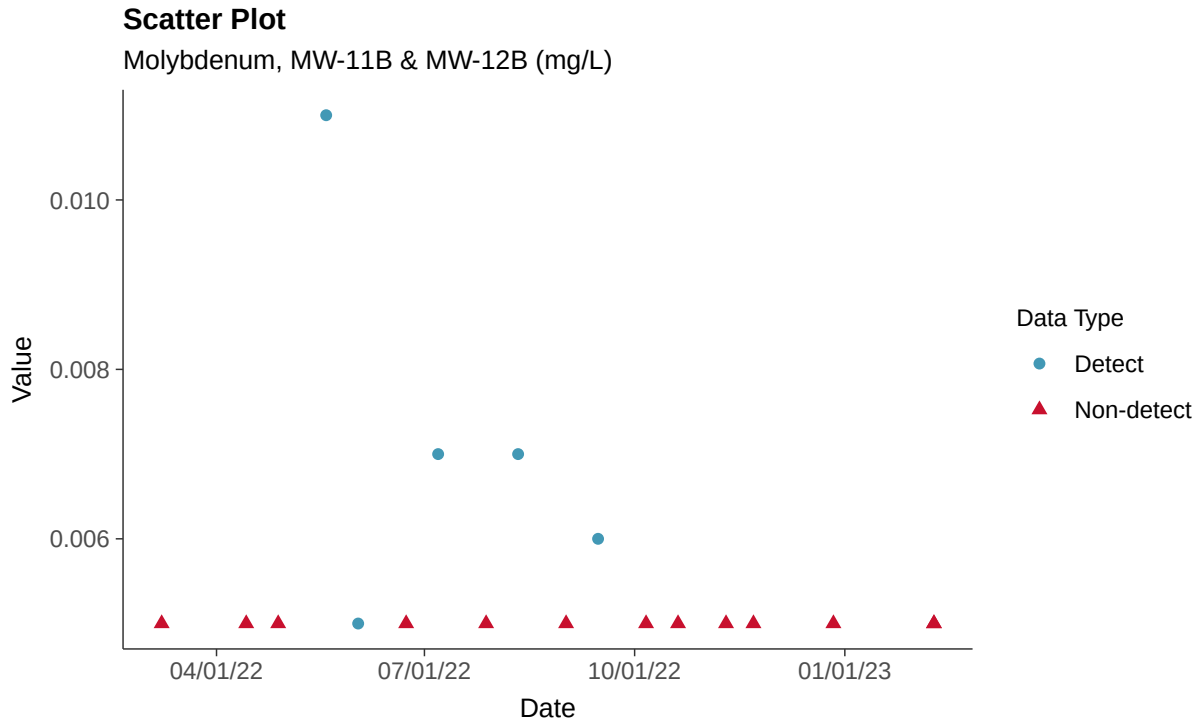
Boxplot by Well

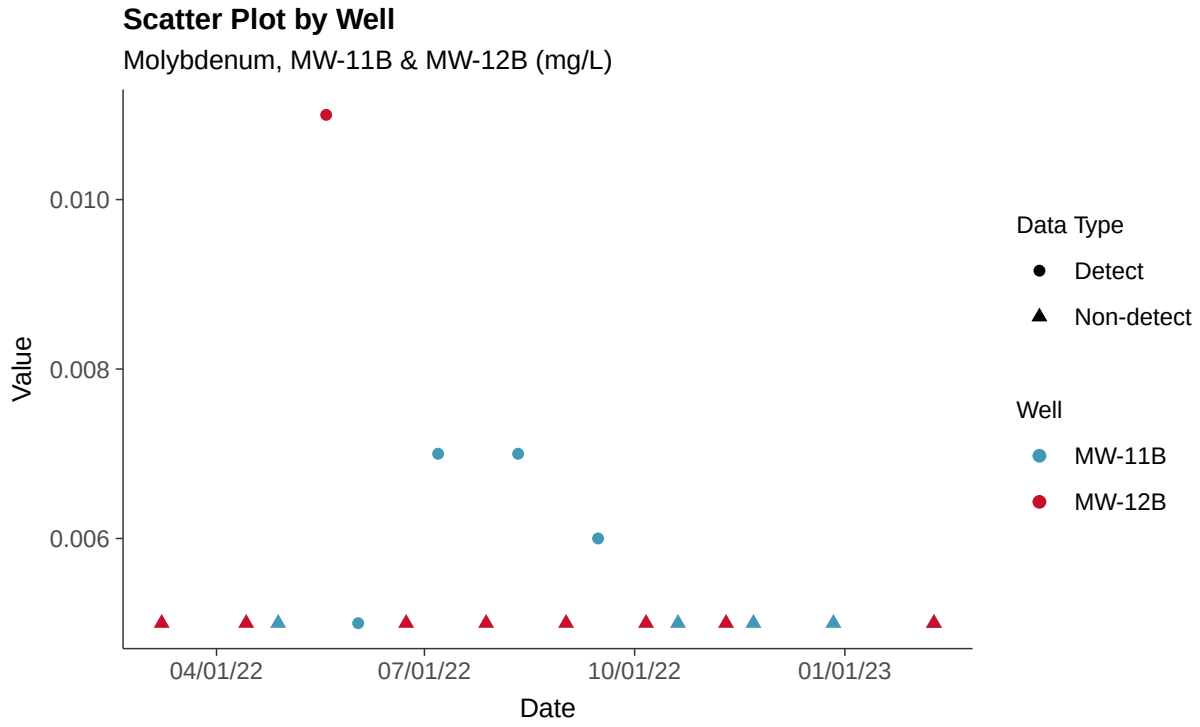
Mercury, MW-11B & MW-12B (mg/L)



Appendix IV: Molybdenum, MW-11B & MW-12B

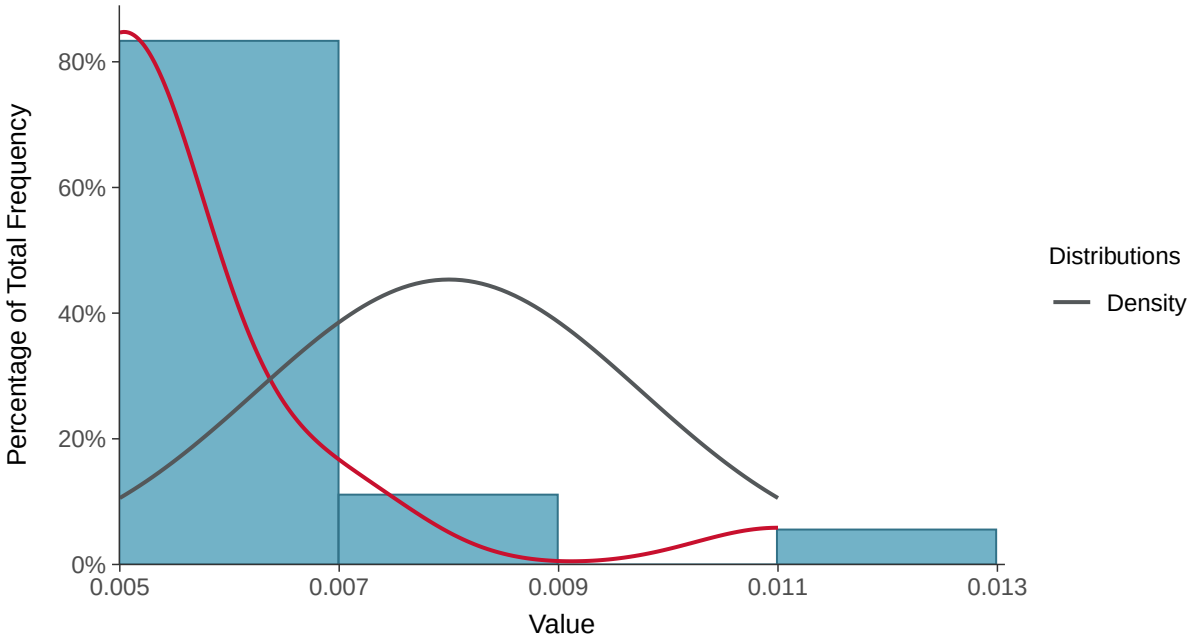
ID: 2_18





Histogram

Molybdenum, MW-11B & MW-12B (mg/L)

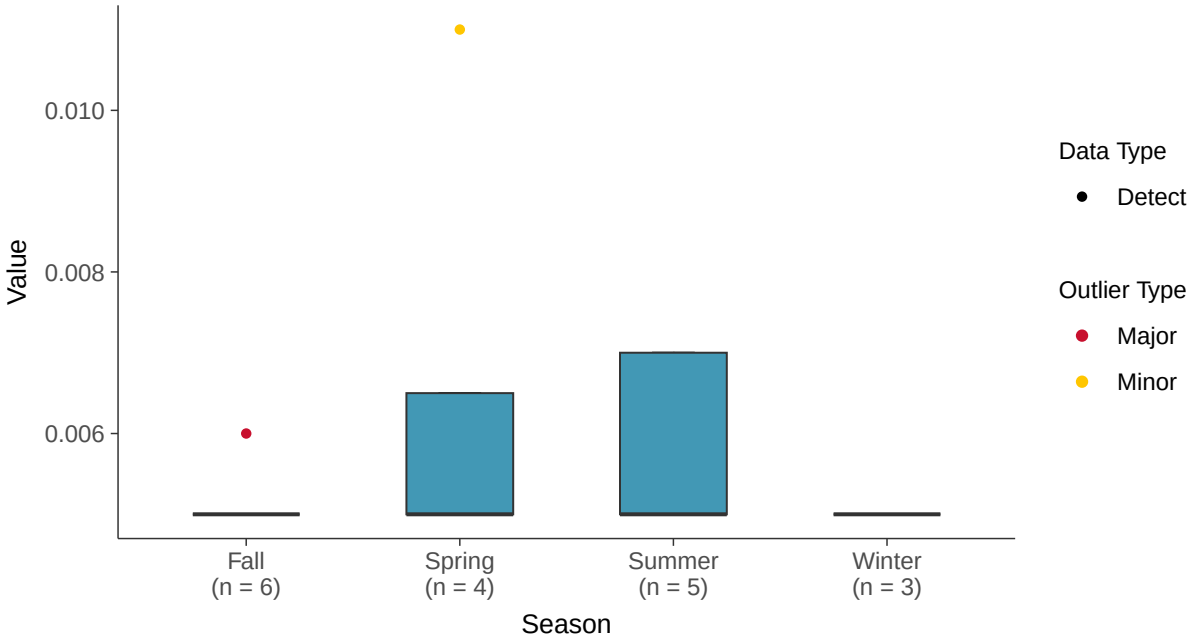


Boxplot

Molybdenum, MW-11B & MW-12B (mg/L)

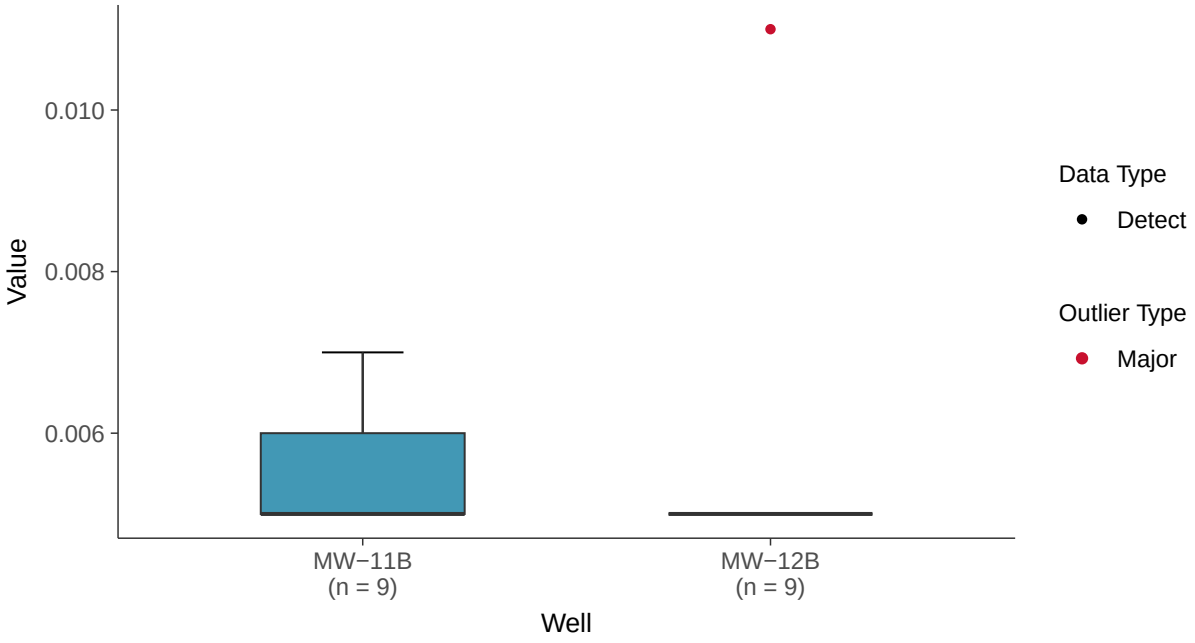
Boxplot by Season

Molybdenum, MW-11B & MW-12B (mg/L)



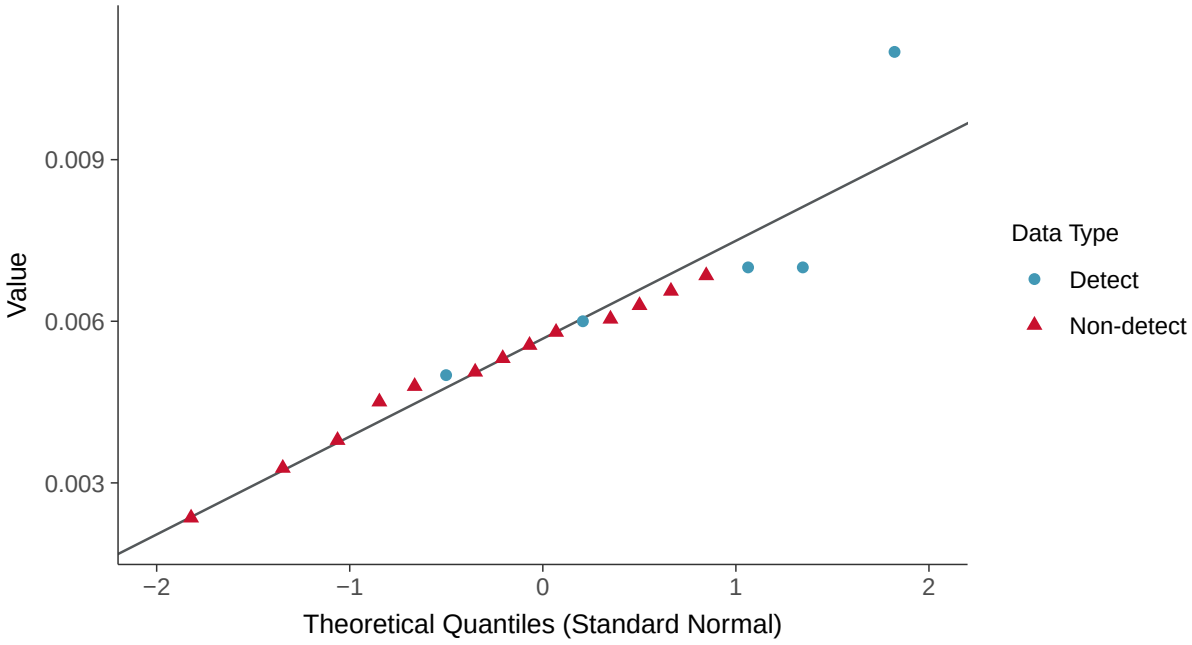
Boxplot by Well

Molybdenum, MW-11B & MW-12B (mg/L)



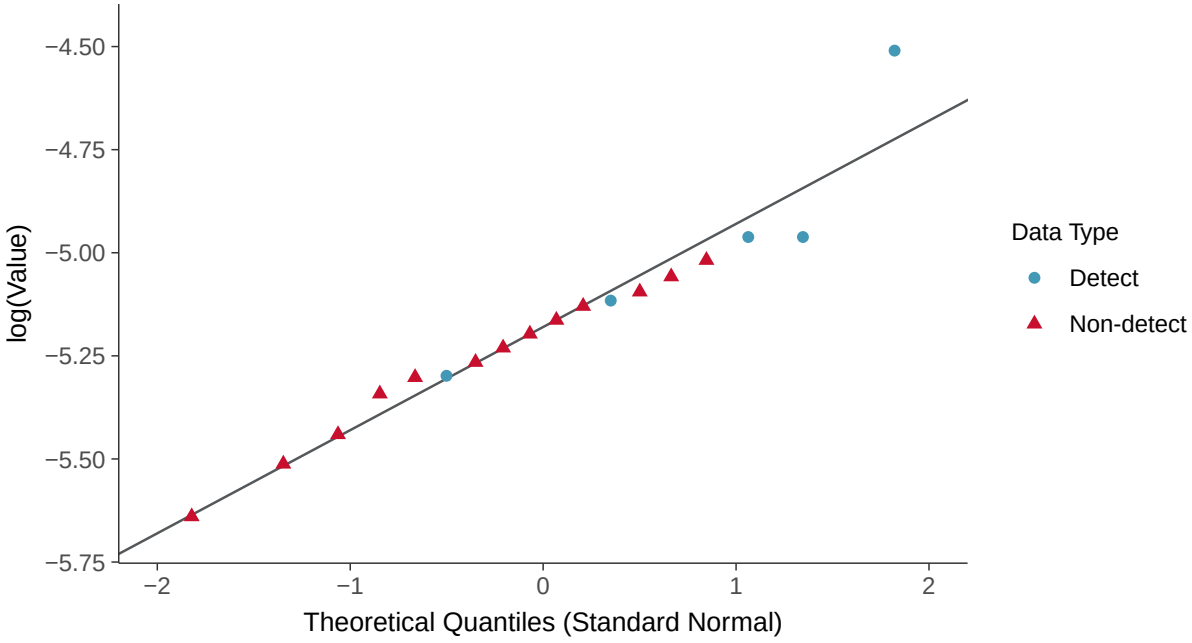
Normal Q-Q plot using ROS Imputed Estimates

Molybdenum, MW-11B & MW-12B (mg/L)



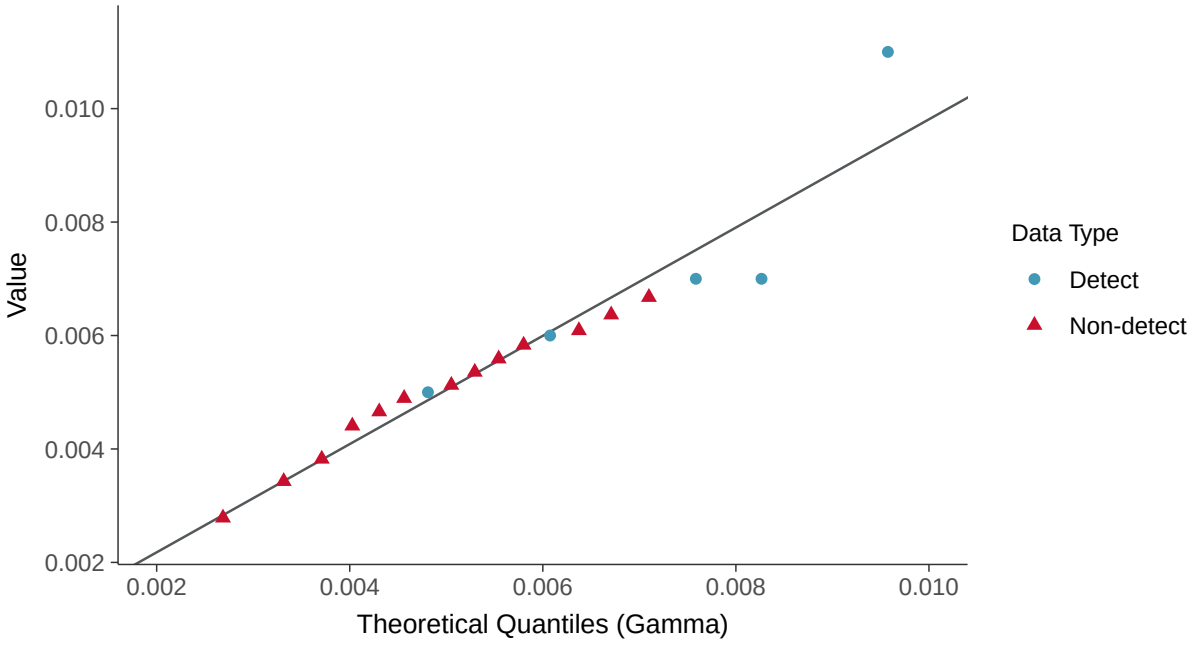
Lognormal Q-Q plot using ROS Imputed Estimates

Molybdenum, MW-11B & MW-12B (mg/L)



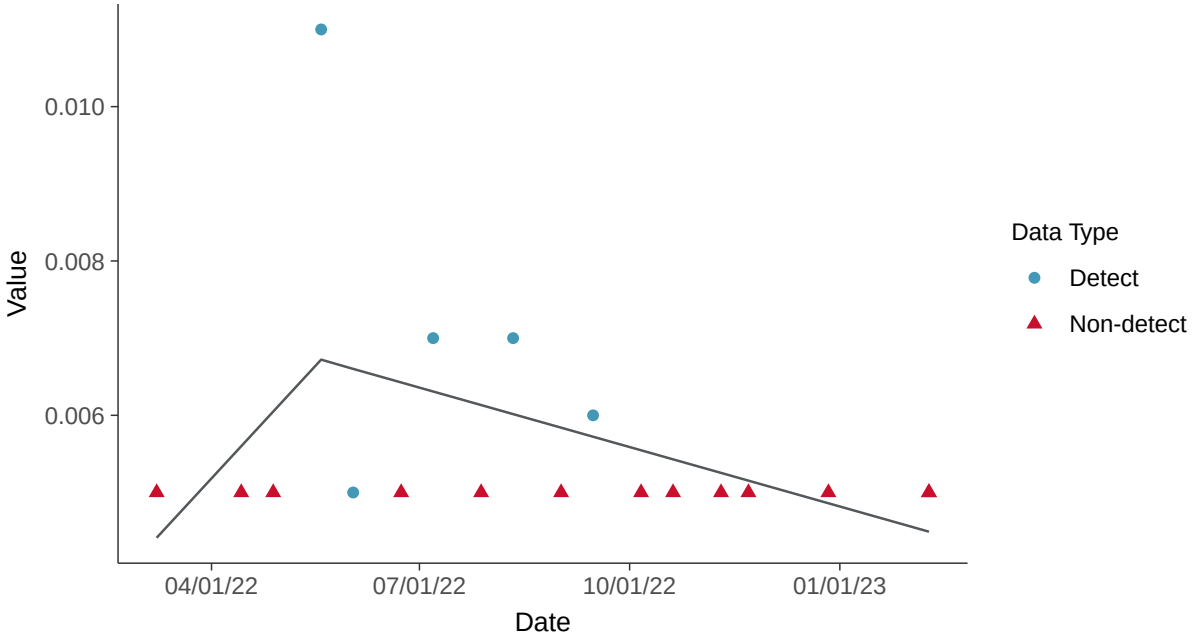
Gamma Q-Q plot using ROS Imputed Estimates

Molybdenum, MW-11B & MW-12B (mg/L)



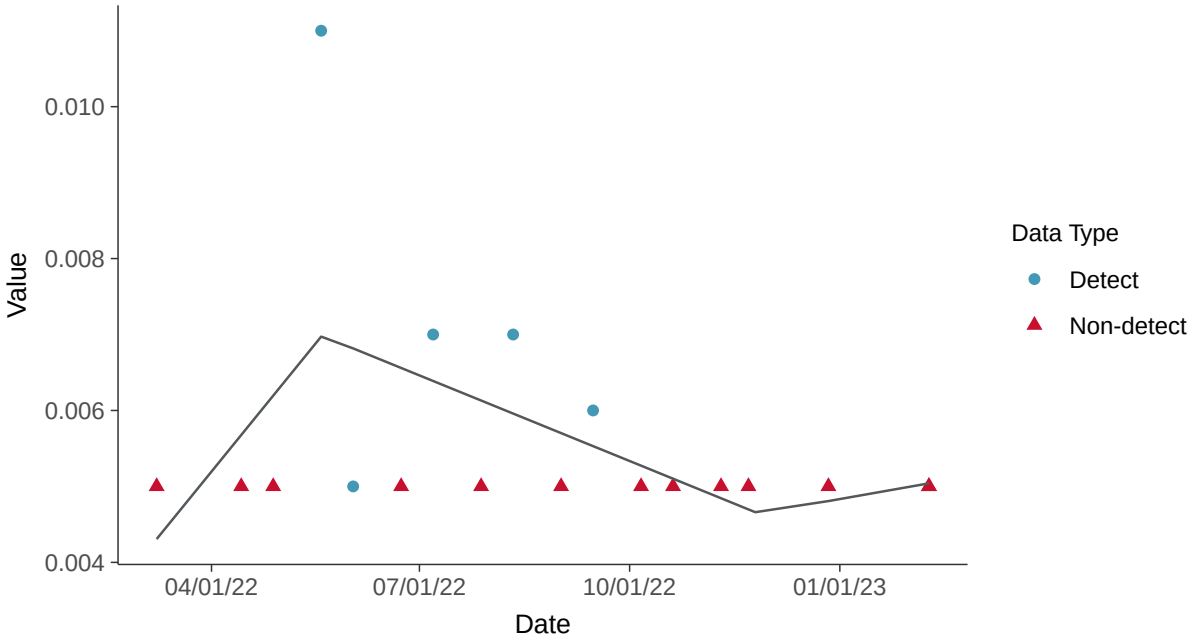
Trend Regression: Piecewise Linear-Linear

Molybdenum, MW-11B & MW-12B (mg/L)



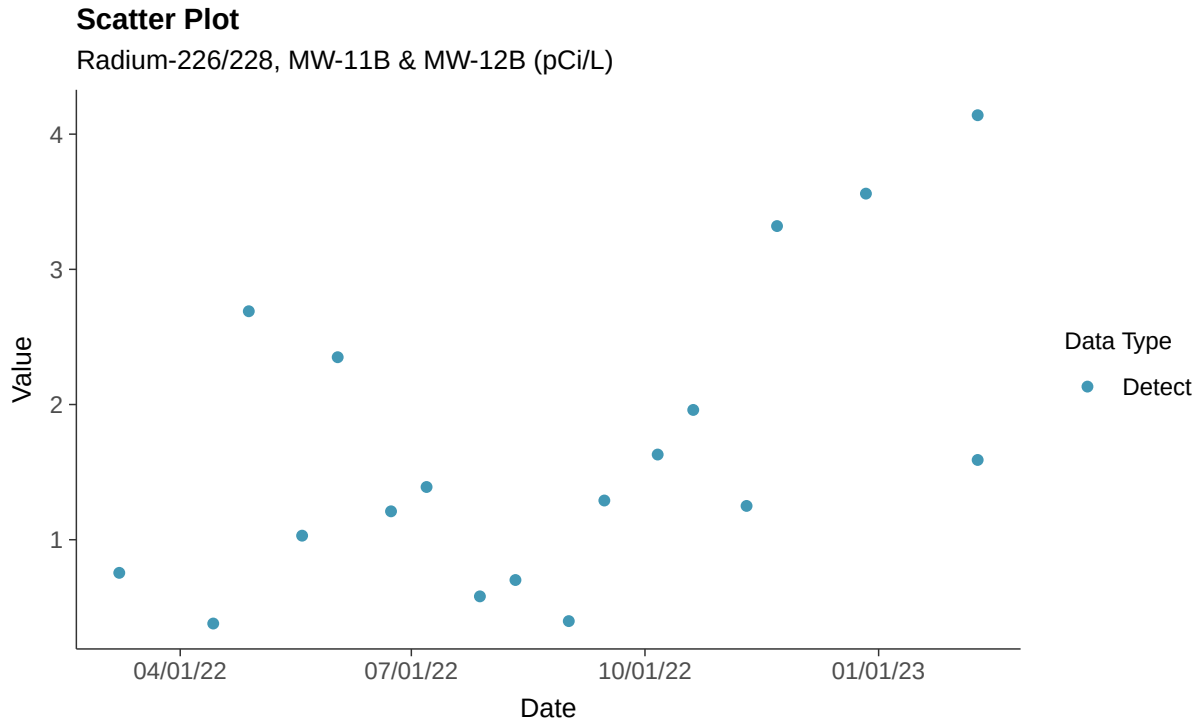
Trend Regression: Piecewise Linear-Linear-Linear

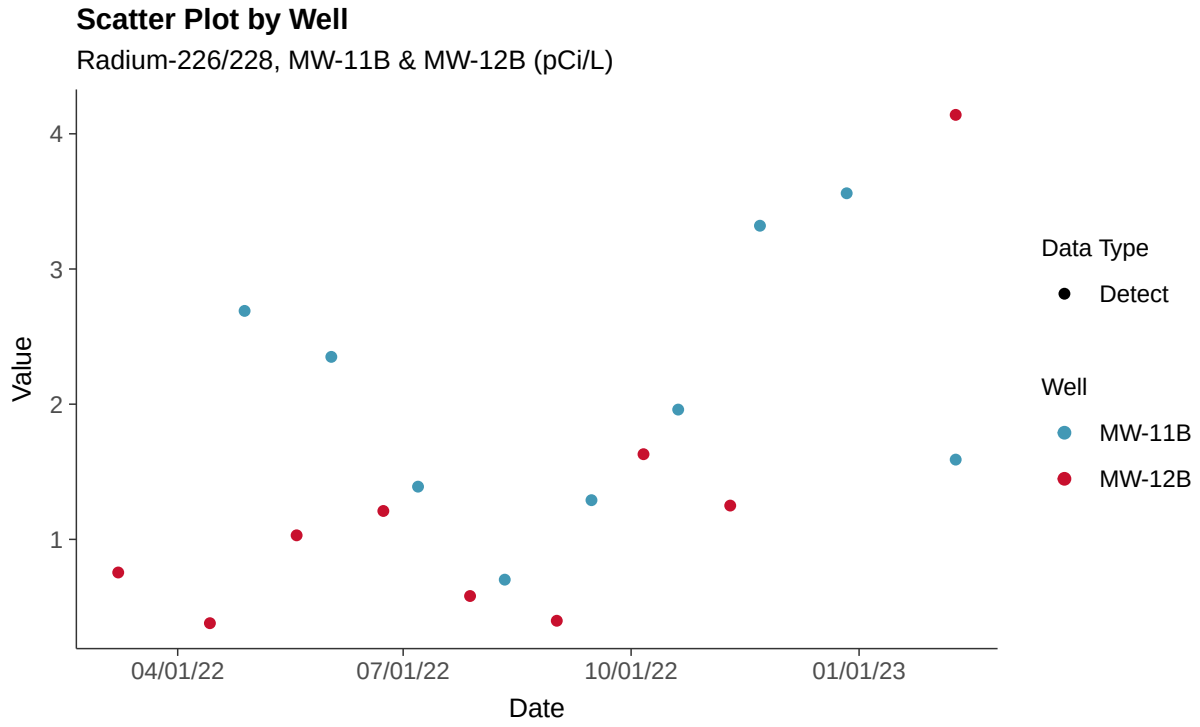
Molybdenum, MW-11B & MW-12B (mg/L)



Appendix IV: Radium-226/228, MW-11B & MW-12B

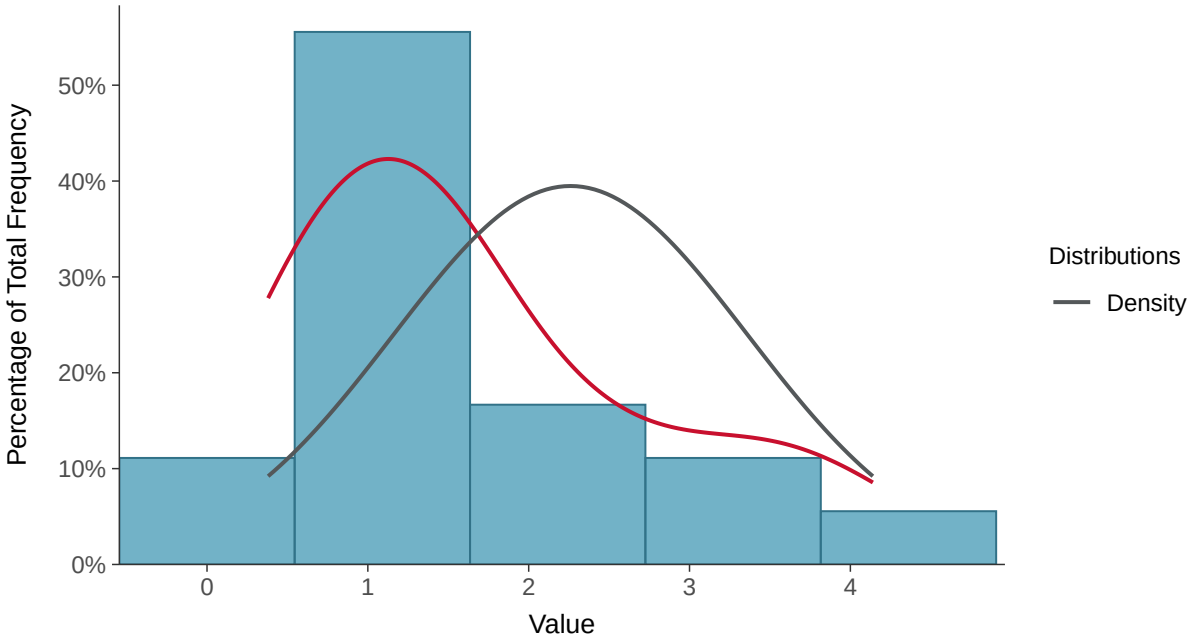
ID: 2_20





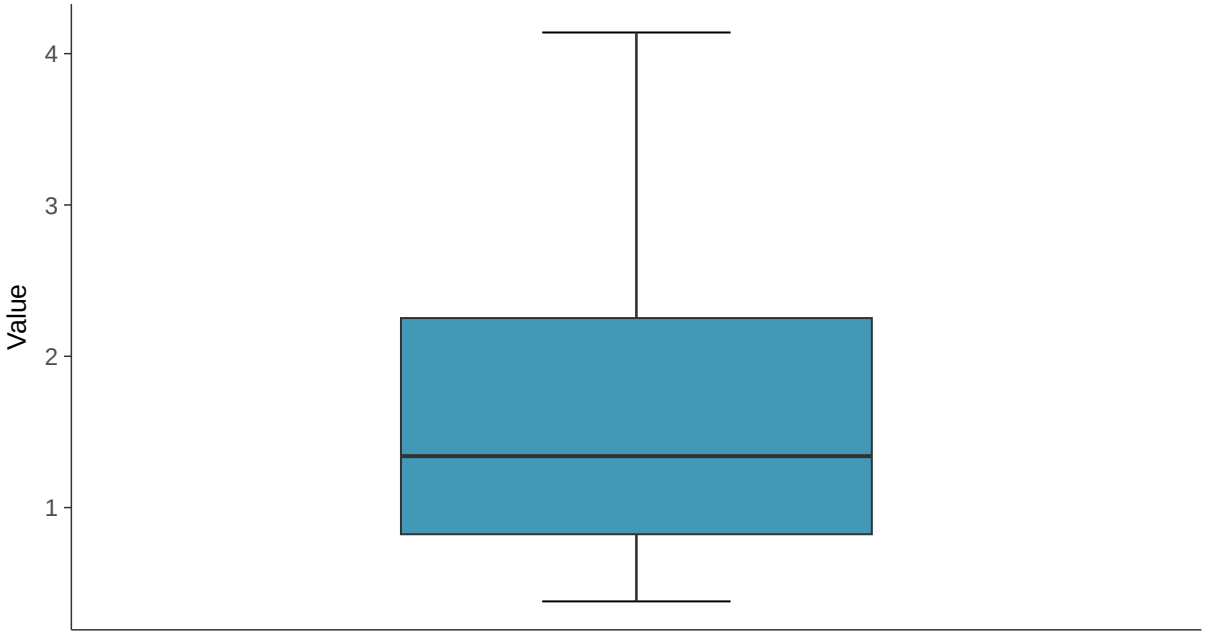
Histogram

Radium-226/228, MW-11B & MW-12B (pCi/L)



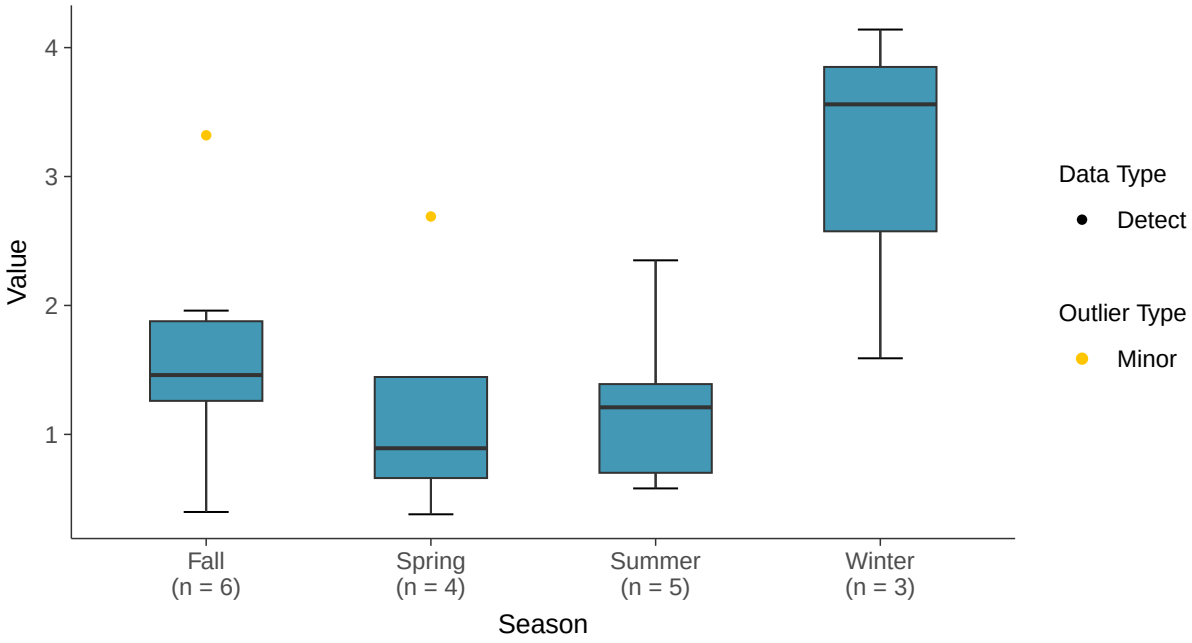
Boxplot

Radium-226/228, MW-11B & MW-12B (pCi/L)



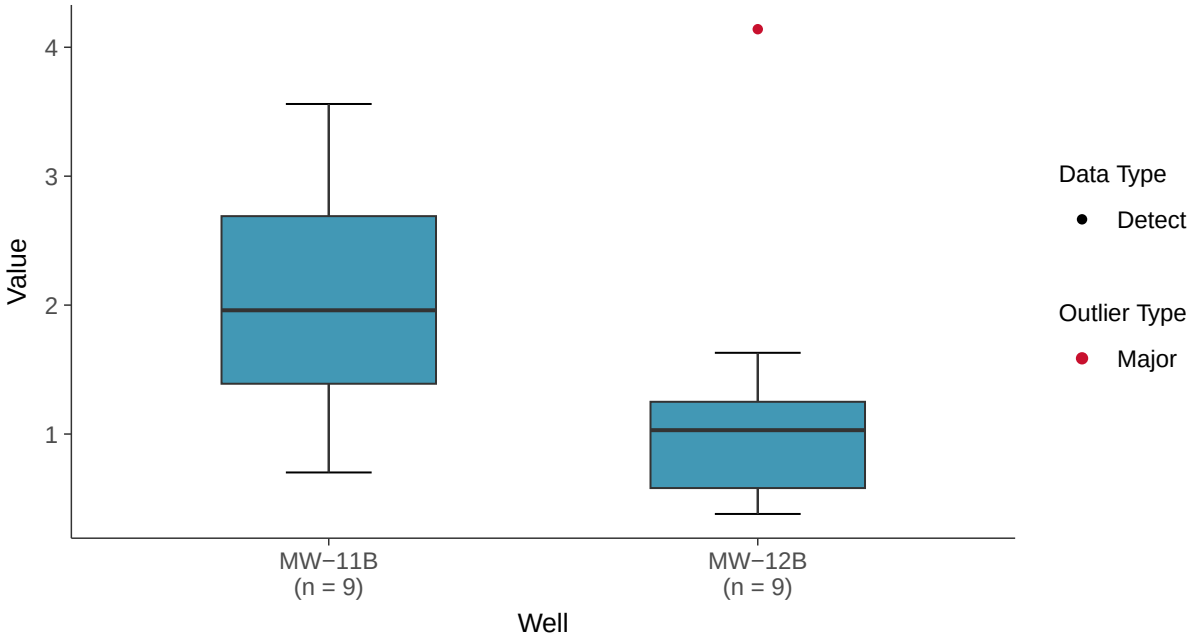
Boxplot by Season

Radium-226/228, MW-11B & MW-12B (pCi/L)



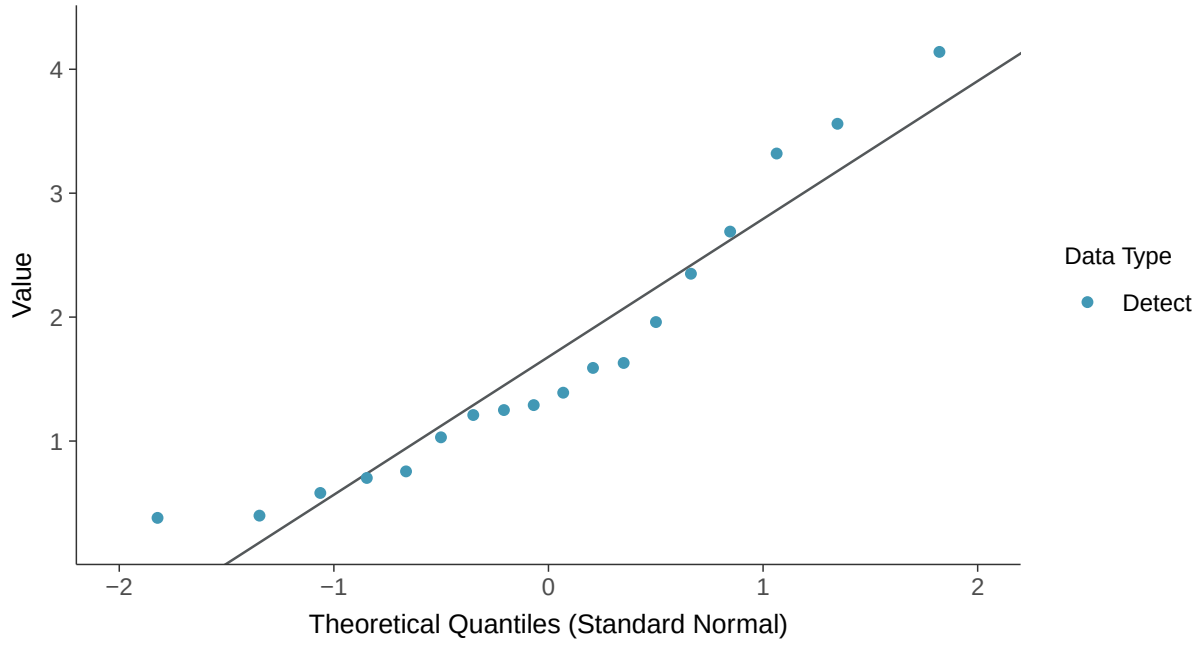
Boxplot by Well

Radium-226/228, MW-11B & MW-12B (pCi/L)



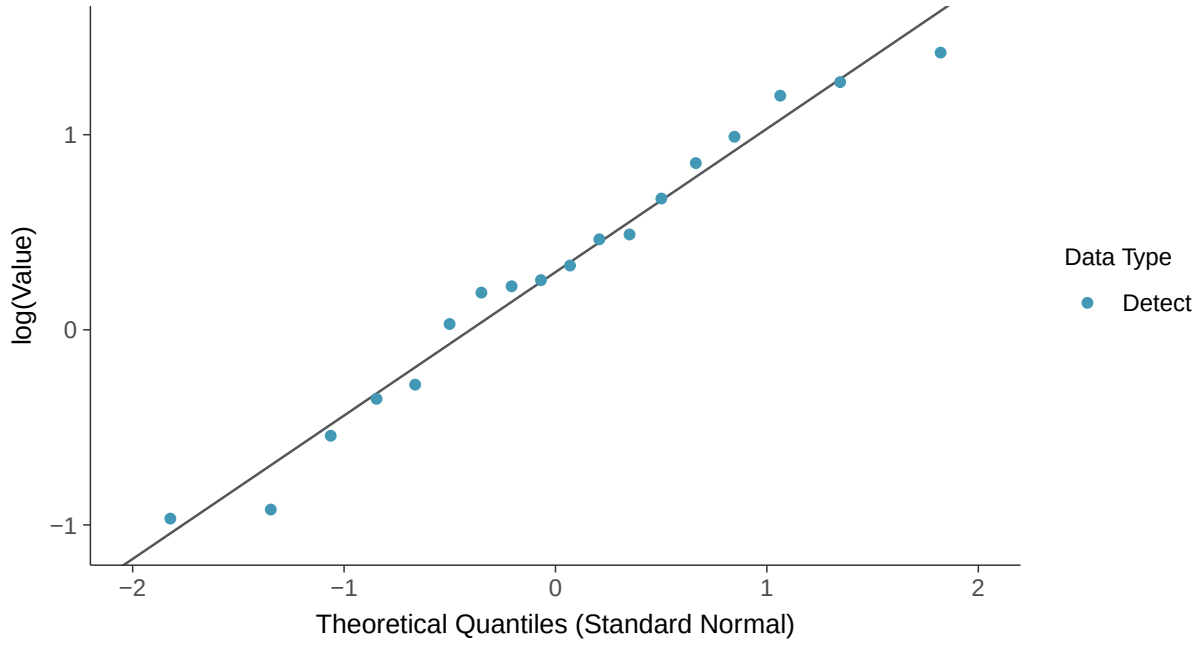
Normal Q-Q plot

Radium-226/228, MW-11B & MW-12B (pCi/L)



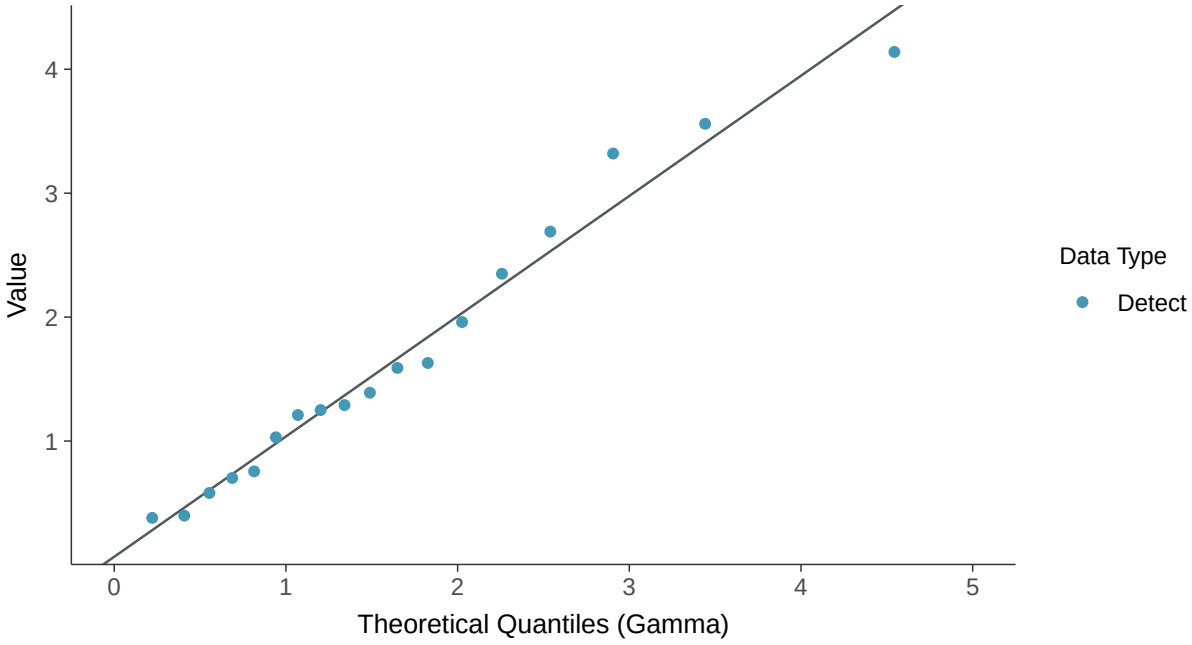
Lognormal Q-Q plot

Radium-226/228, MW-11B & MW-12B (pCi/L)



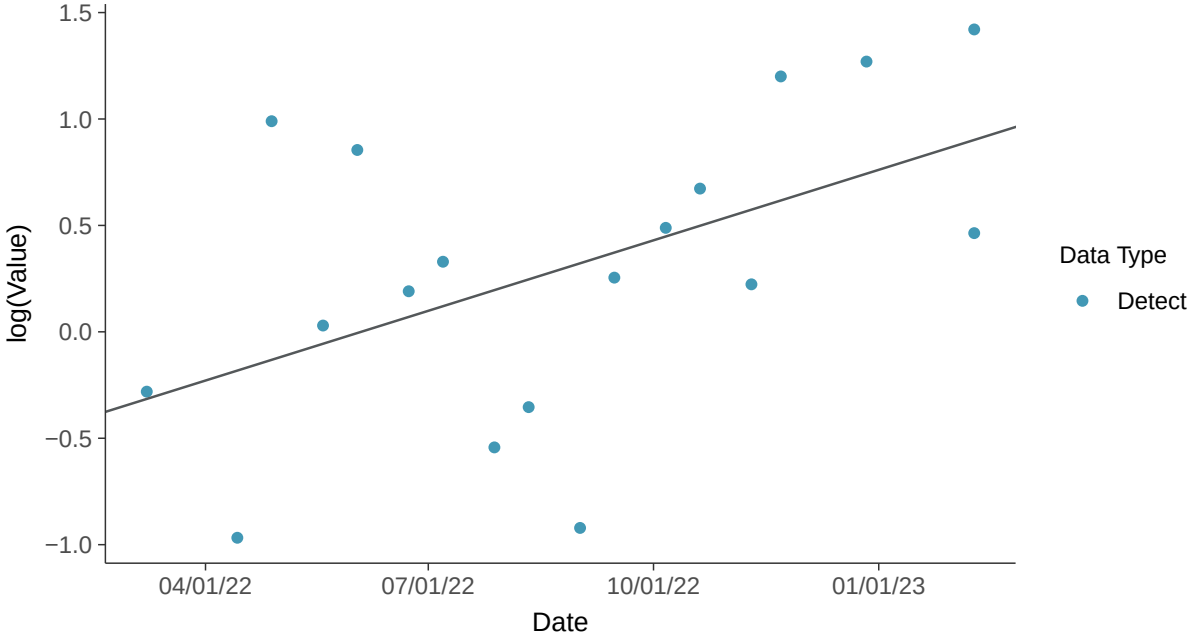
Gamma Q-Q plot

Radium-226/228, MW-11B & MW-12B (pCi/L)



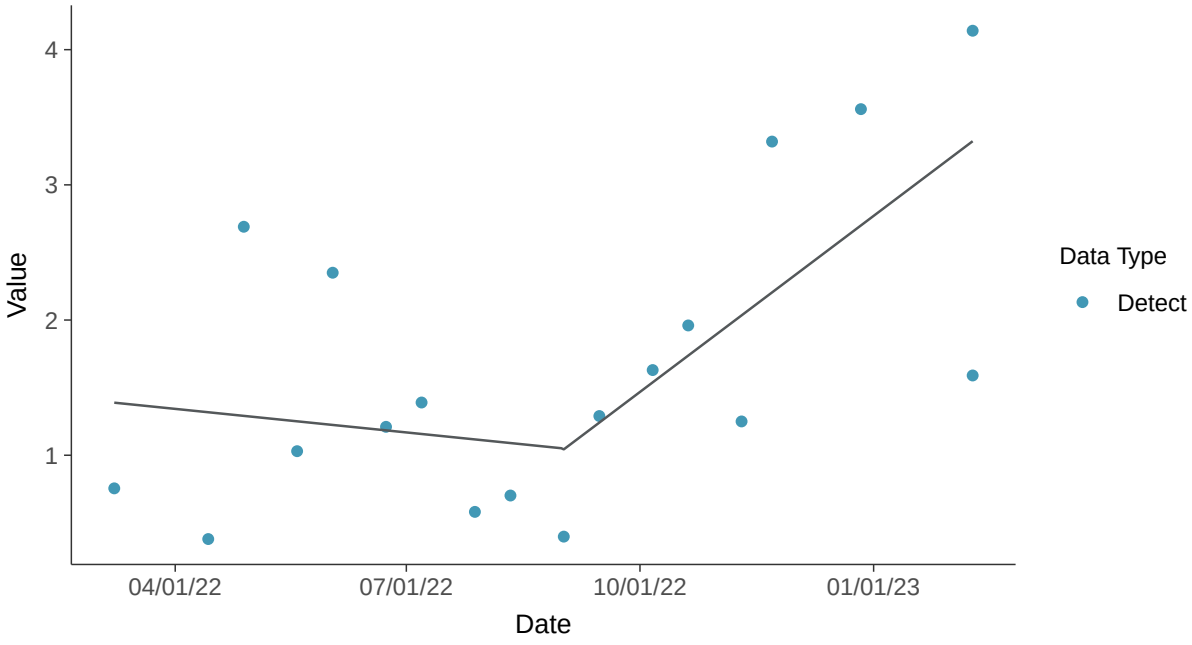
Trend Regression: Lognormal MLE

Radium-226/228, MW-11B & MW-12B (pCi/L)



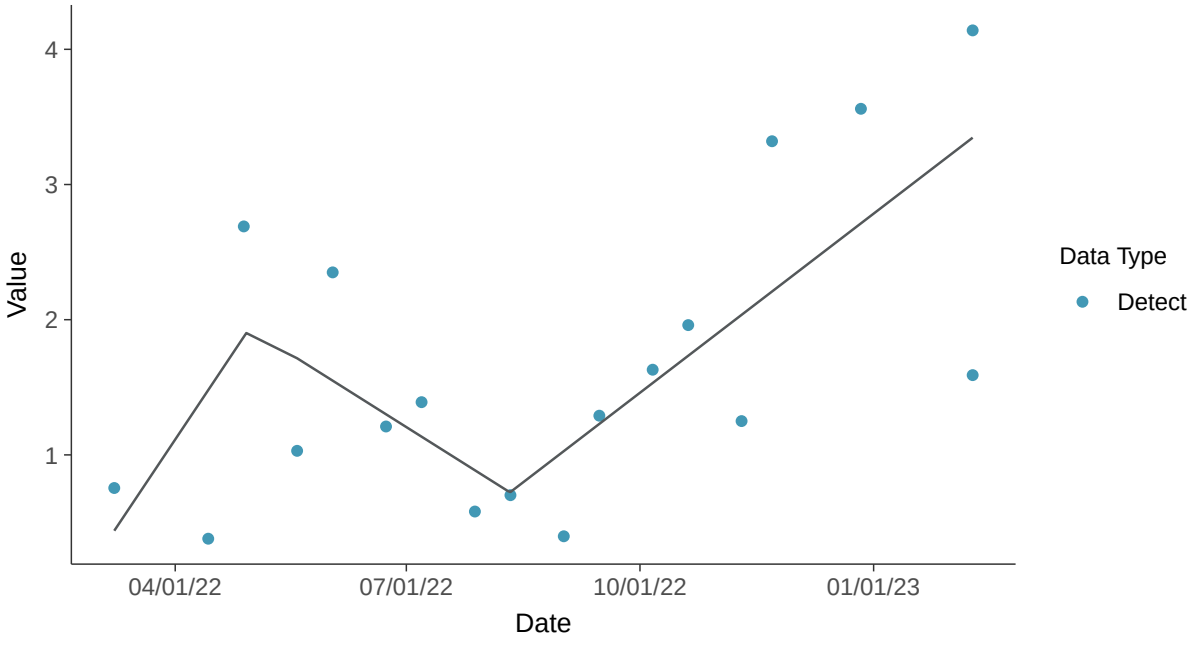
Trend Regression: Piecewise Linear-Linear

Radium-226/228, MW-11B & MW-12B (pCi/L)



Trend Regression: Piecewise Linear-Linear-Linear

Radium-226/228, MW-11B & MW-12B (pCi/L)

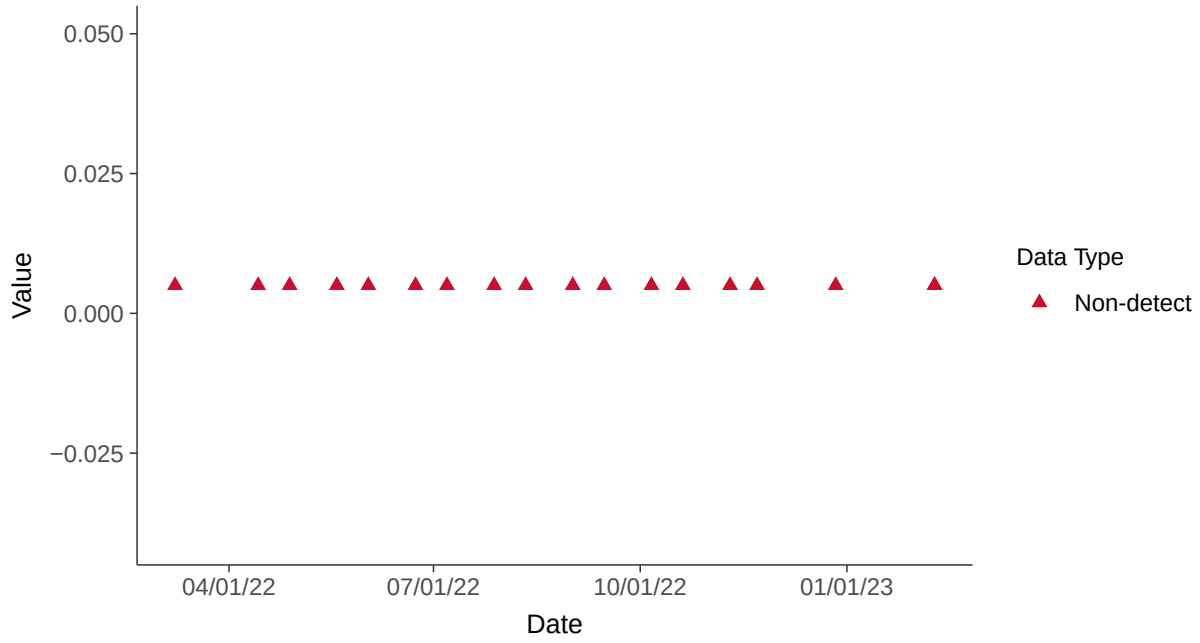


Appendix IV: Selenium, MW-11B & MW-12B

ID: 2_22

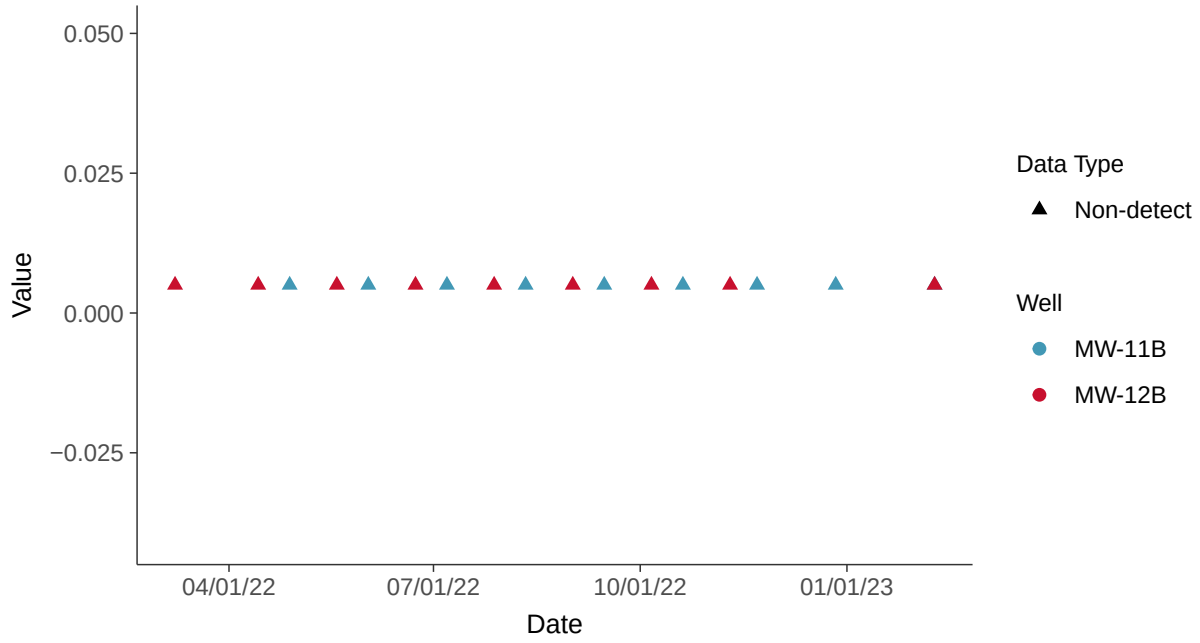
Scatter Plot

Selenium, MW-11B & MW-12B (mg/L)



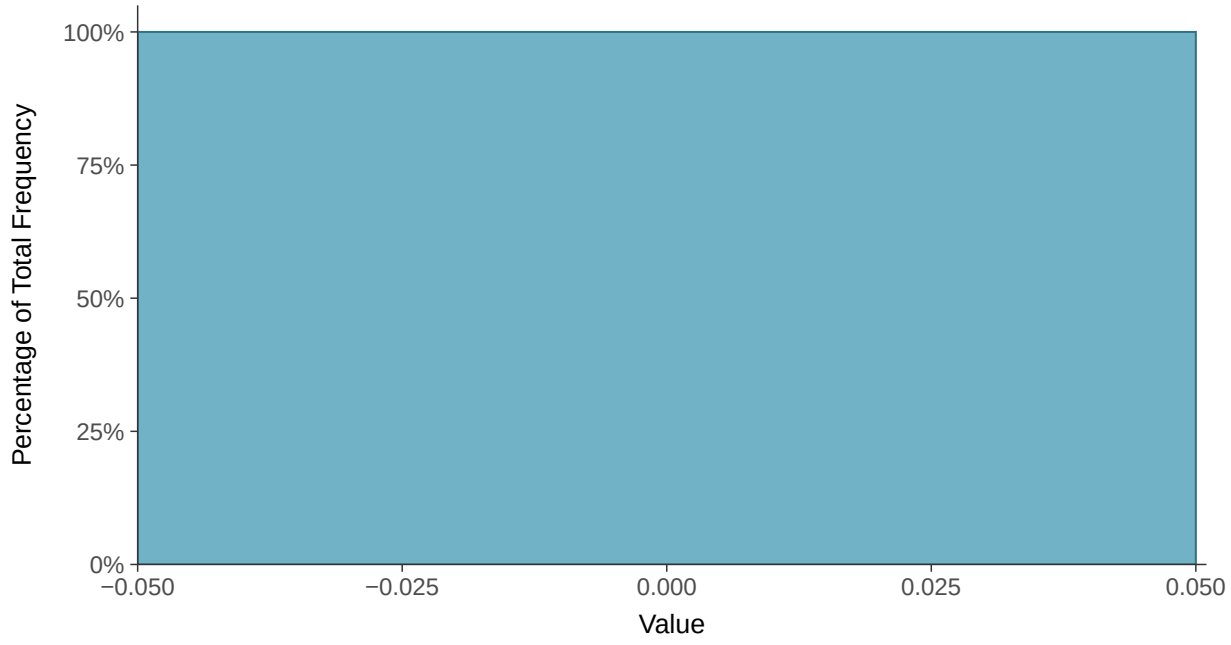
Scatter Plot by Well

Selenium, MW-11B & MW-12B (mg/L)



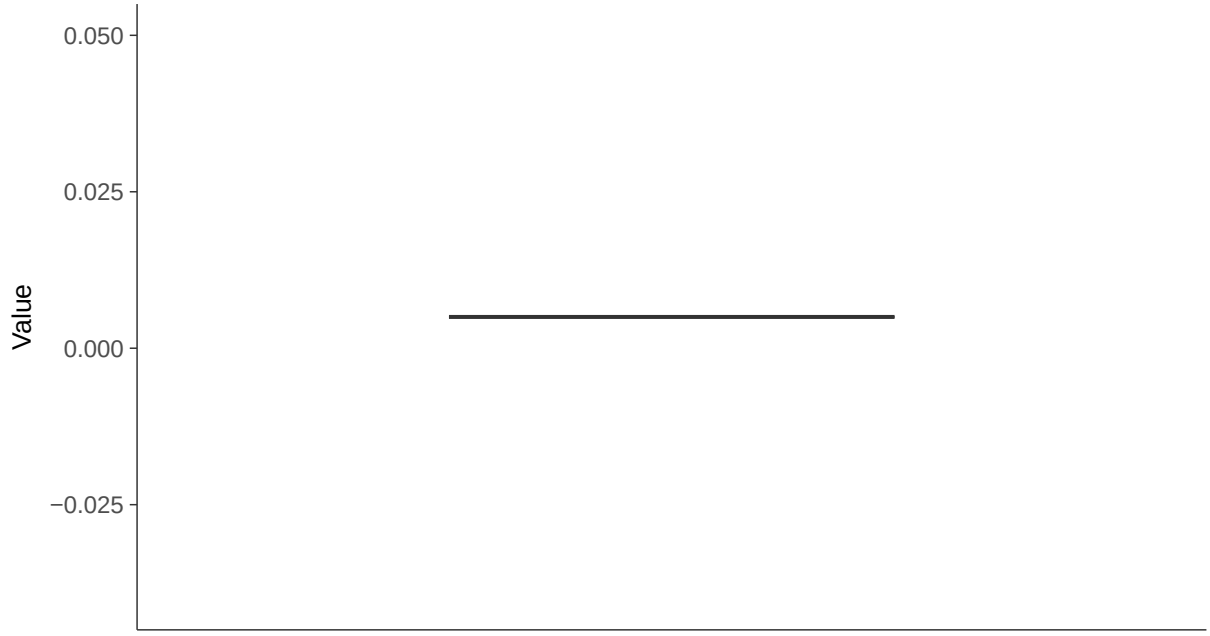
Histogram

Selenium, MW-11B & MW-12B (mg/L)



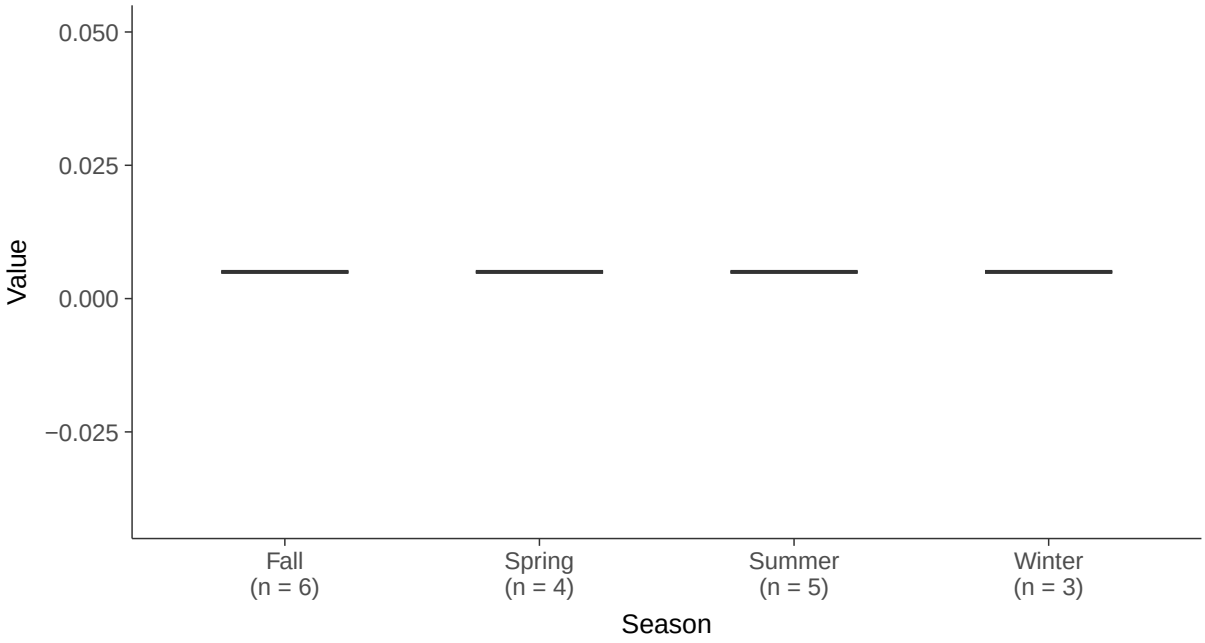
Boxplot

Selenium, MW-11B & MW-12B (mg/L)



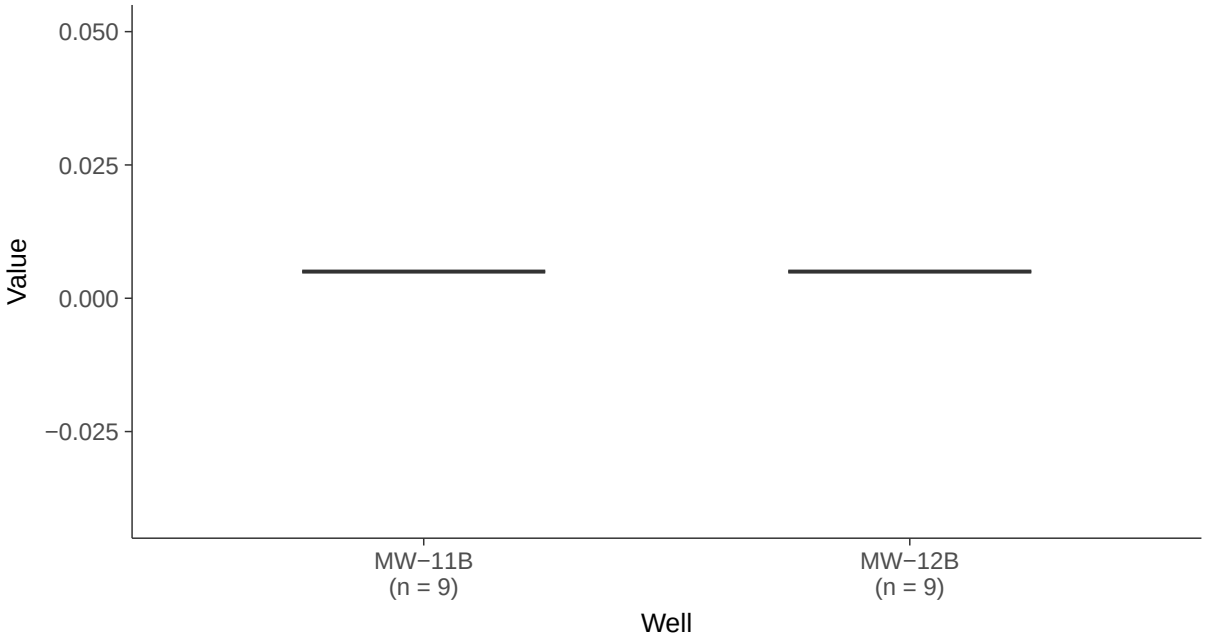
Boxplot by Season

Selenium, MW-11B & MW-12B (mg/L)



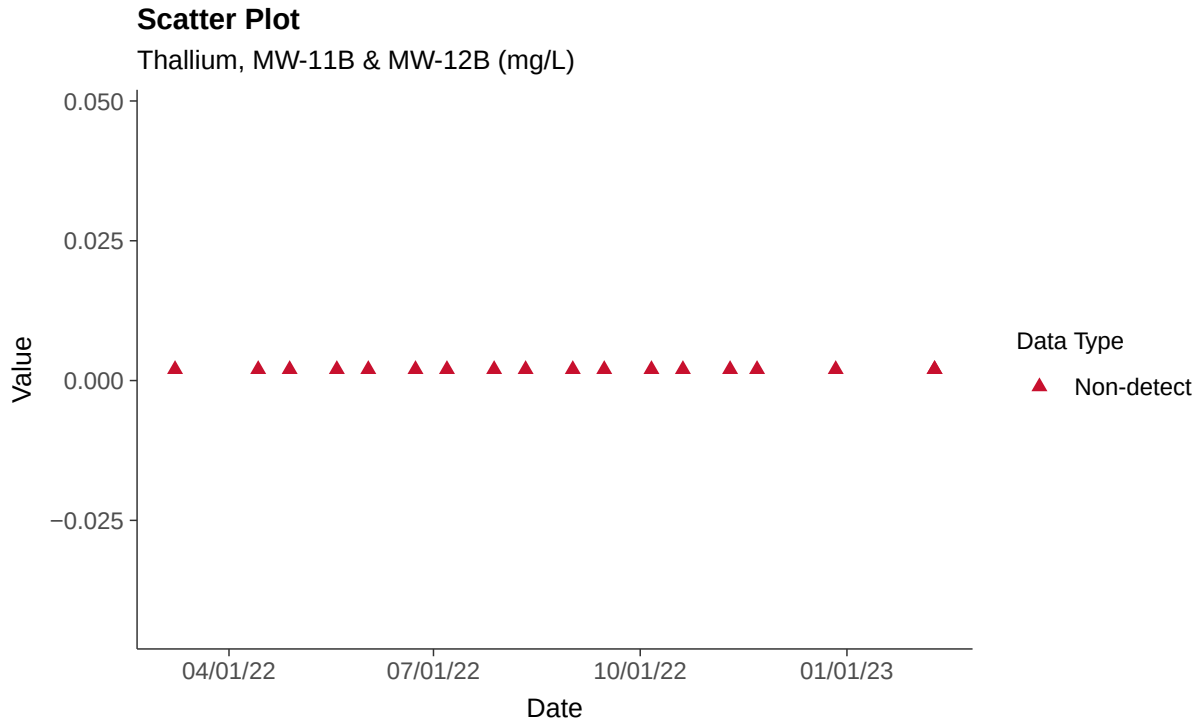
Boxplot by Well

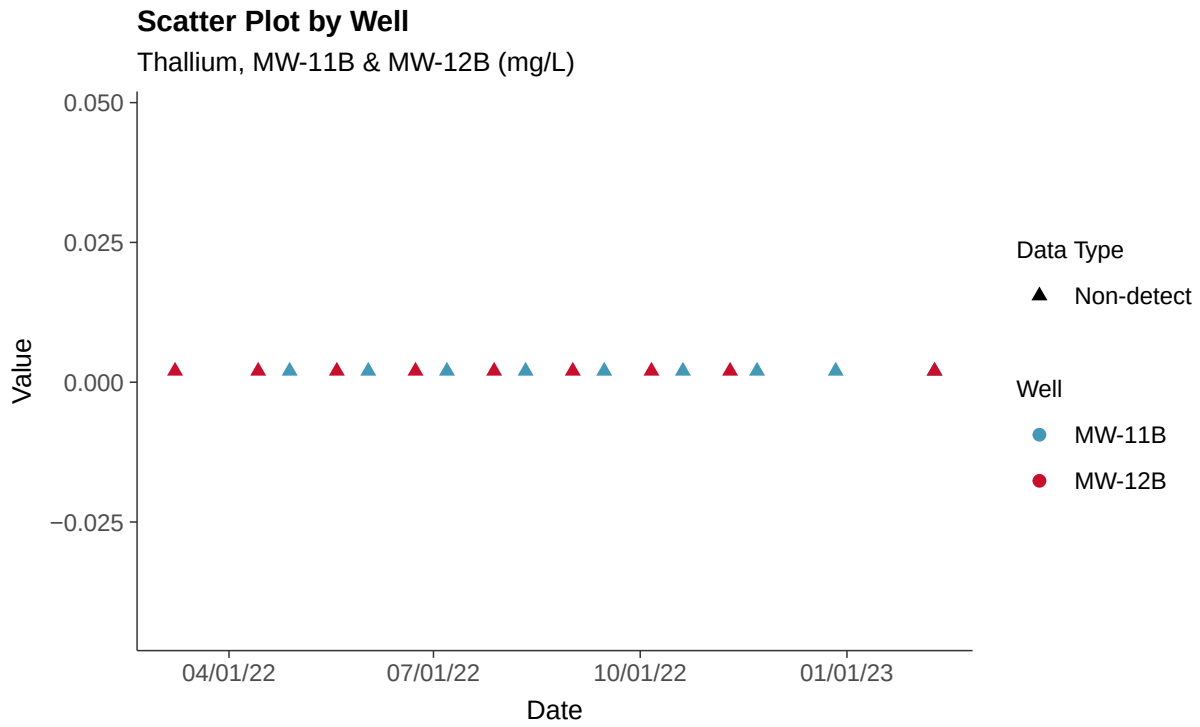
Selenium, MW-11B & MW-12B (mg/L)



Appendix IV: Thallium, MW-11B & MW-12B

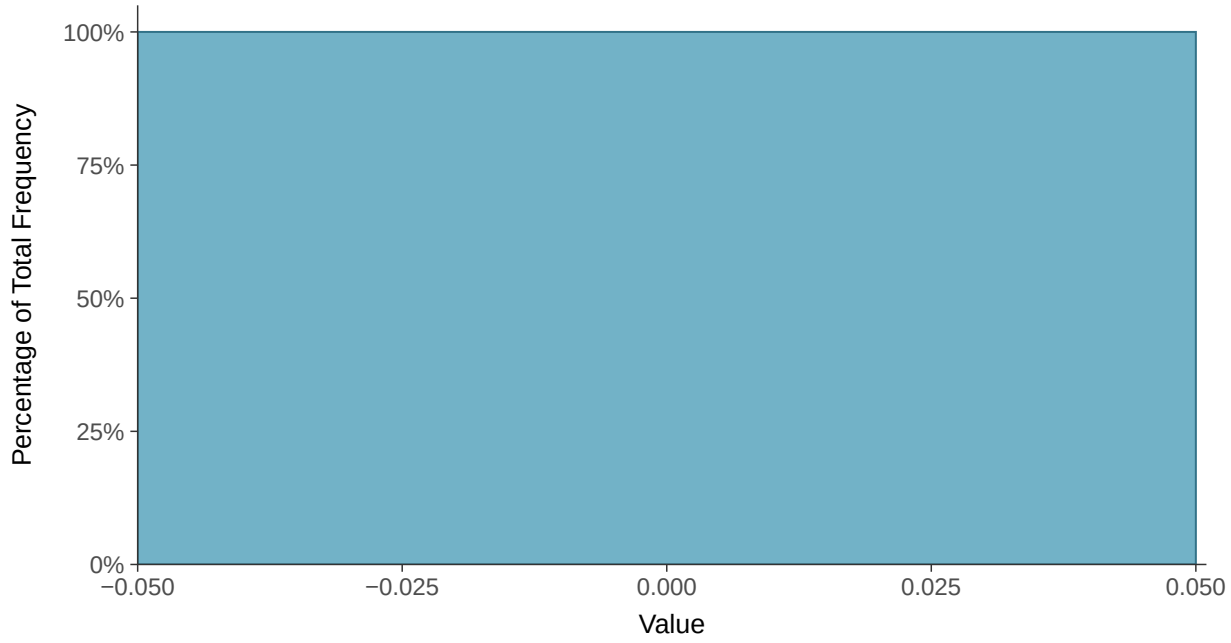
ID: 2_23





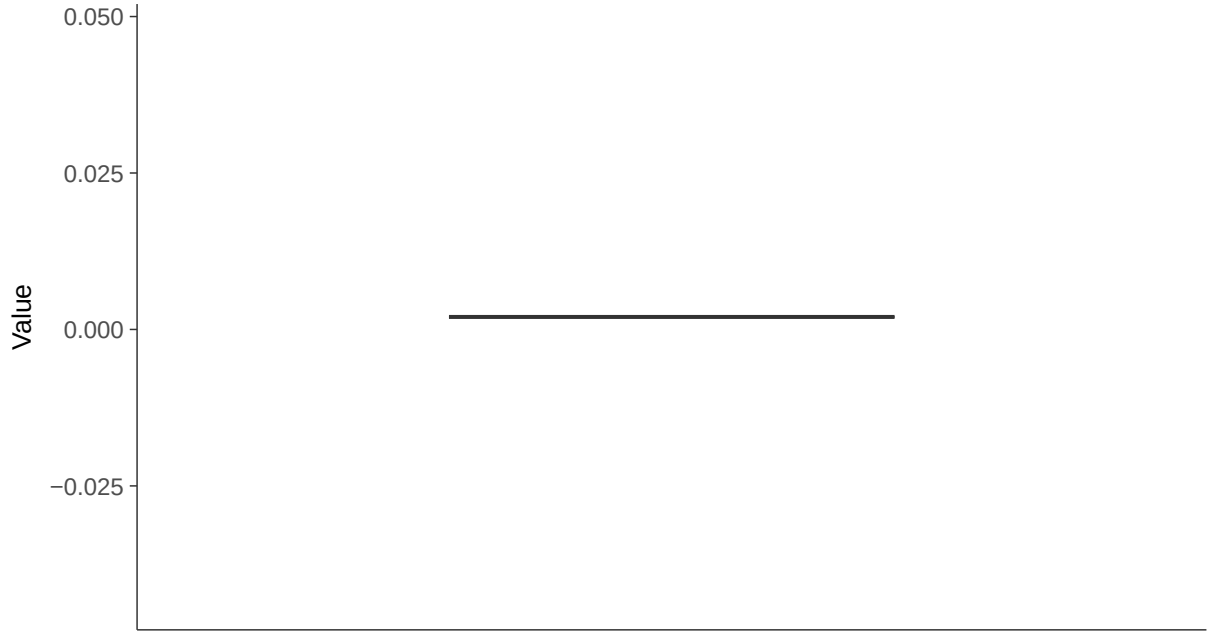
Histogram

Thallium, MW-11B & MW-12B (mg/L)



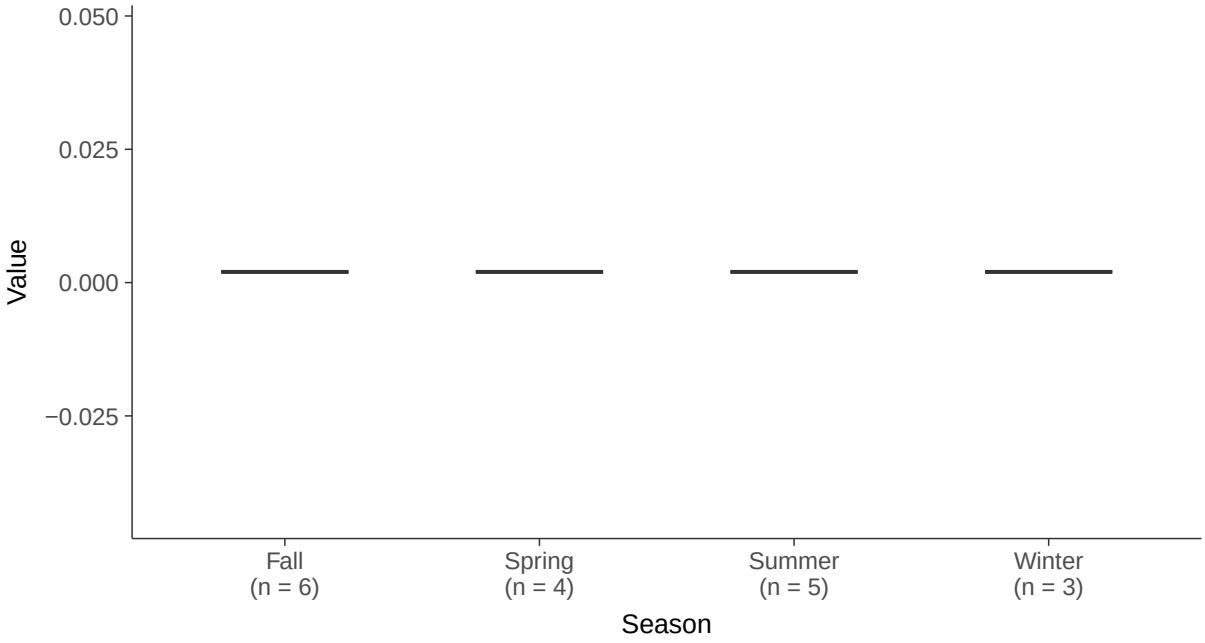
Boxplot

Thallium, MW-11B & MW-12B (mg/L)



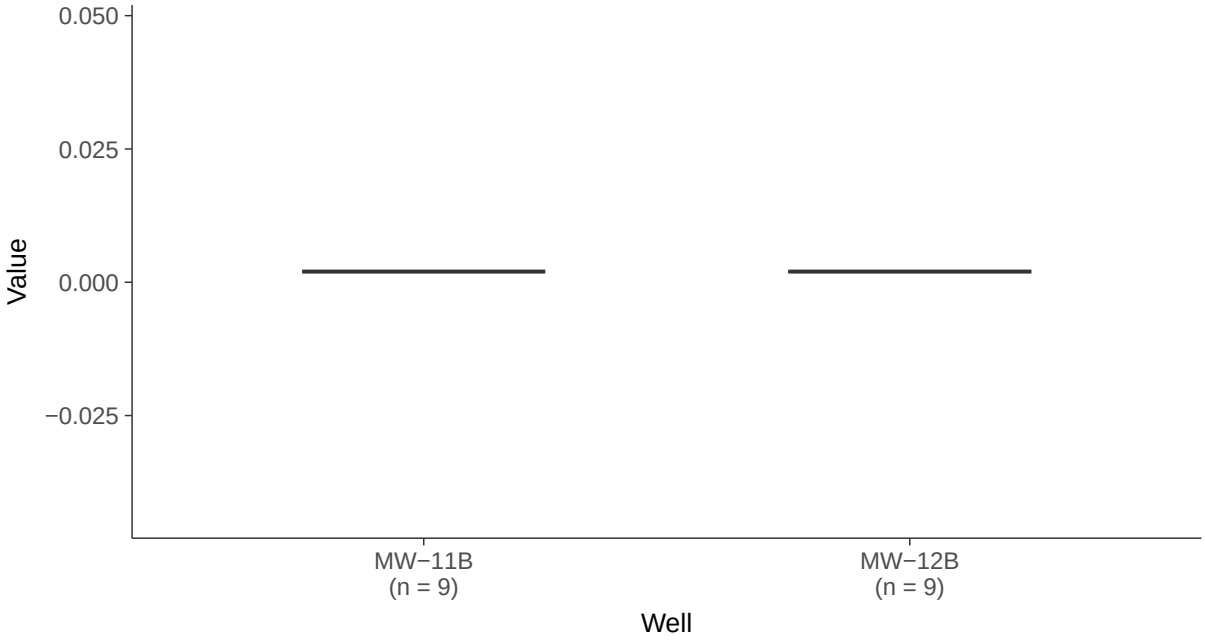
Boxplot by Season

Thallium, MW-11B & MW-12B (mg/L)



Boxplot by Well

Thallium, MW-11B & MW-12B (mg/L)

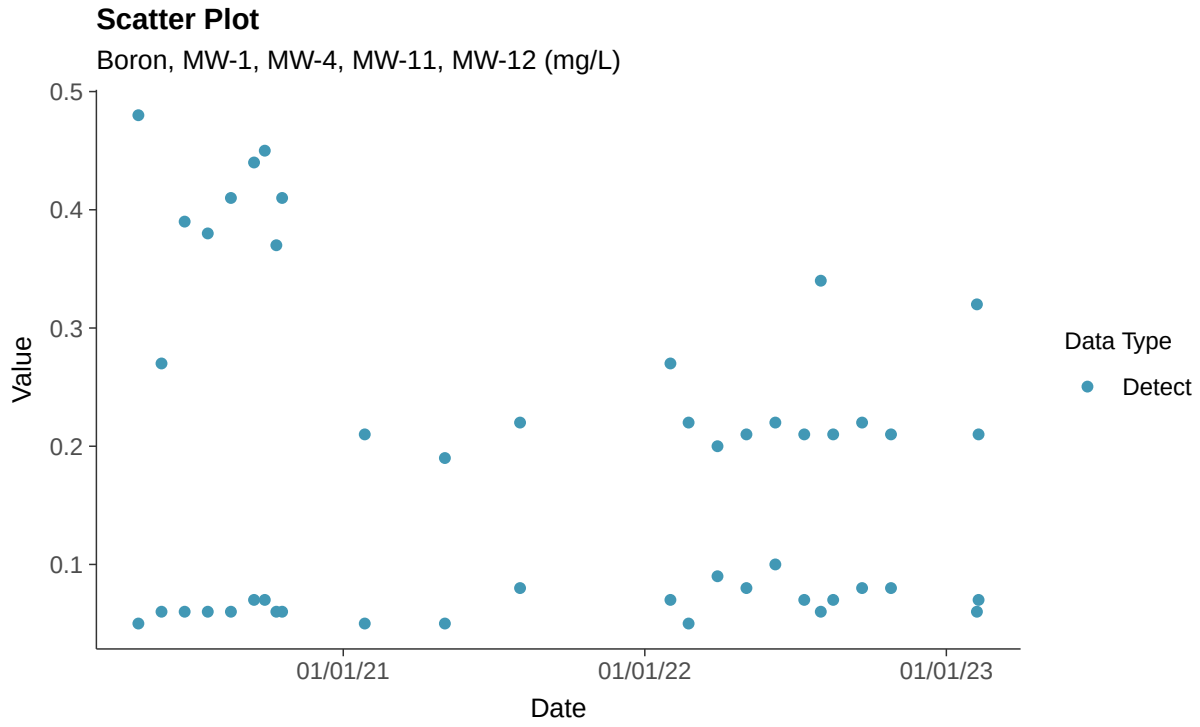


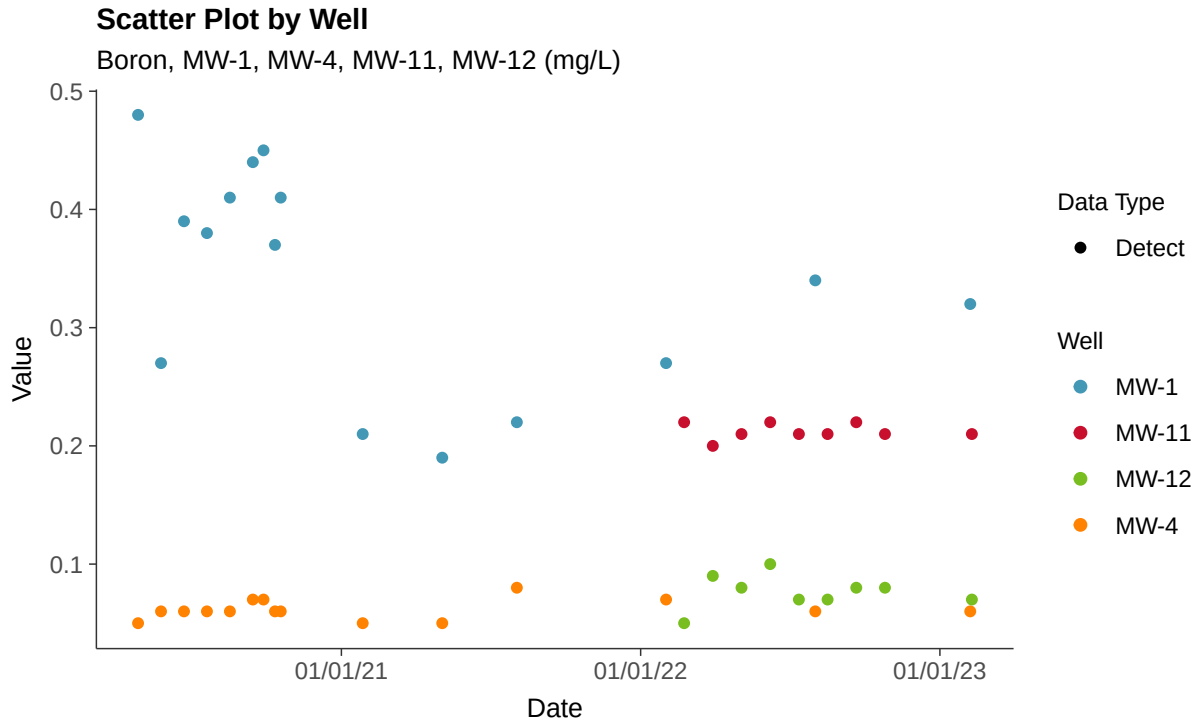
E

Erickson BWL Glacial Background Plots

Appendix III: Boron, MW-1, MW-4, MW-11, MW-12

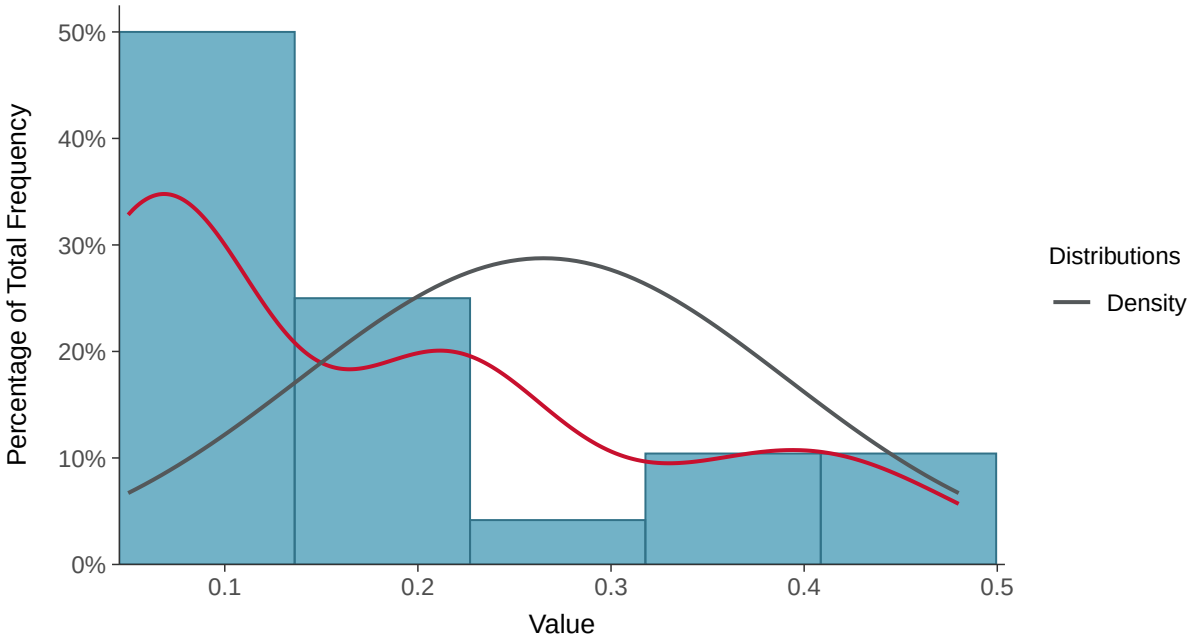
ID: 1_01





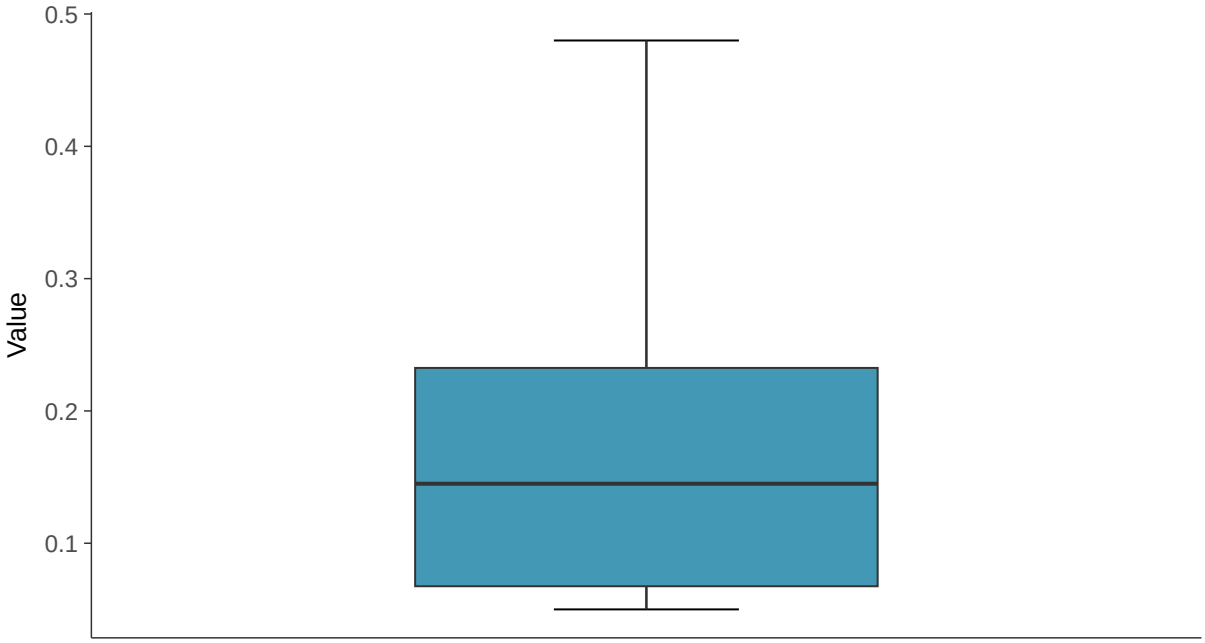
Histogram

Boron, MW-1, MW-4, MW-11, MW-12 (mg/L)



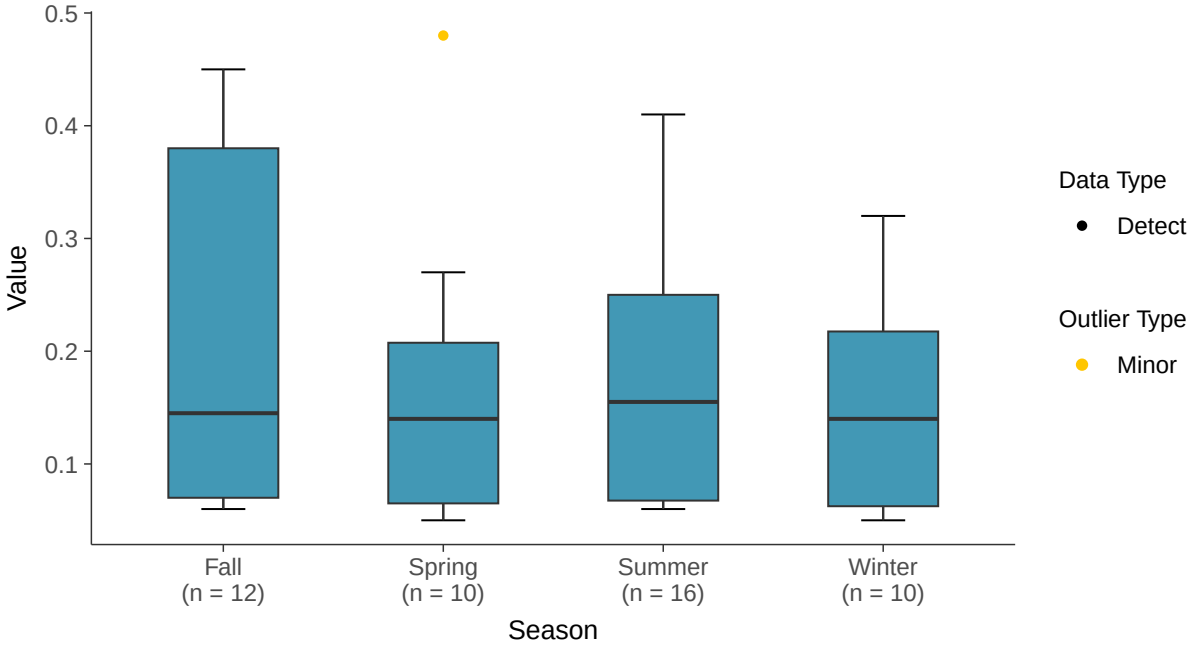
Boxplot

Boron, MW-1, MW-4, MW-11, MW-12 (mg/L)



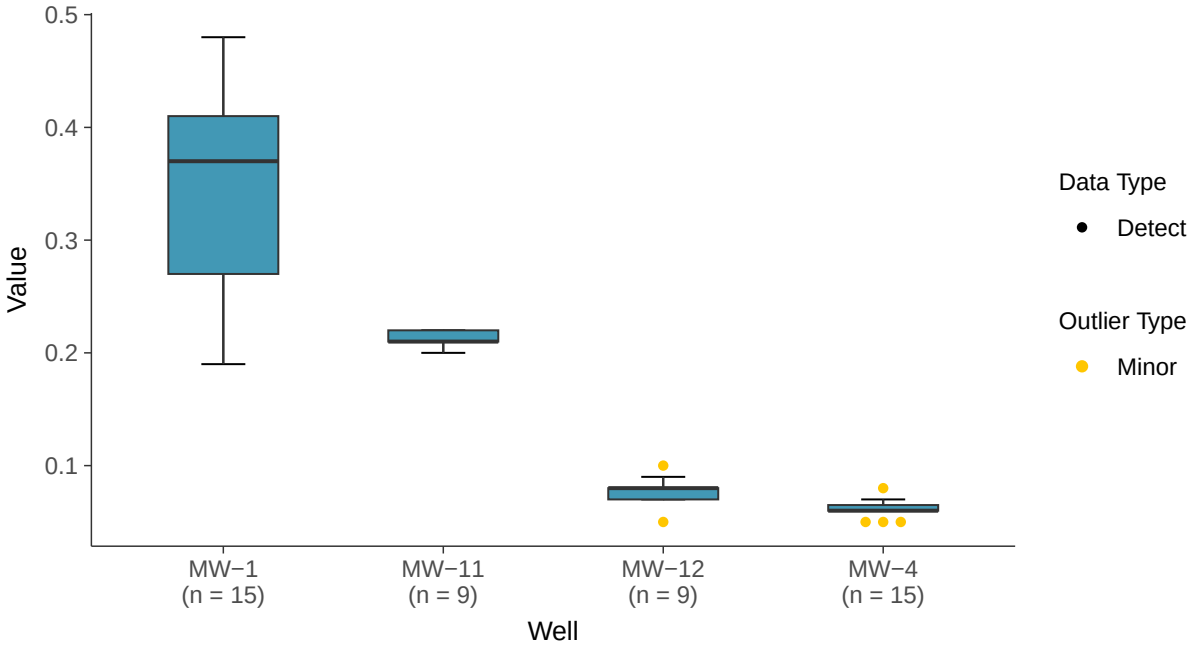
Boxplot by Season

Boron, MW-1, MW-4, MW-11, MW-12 (mg/L)



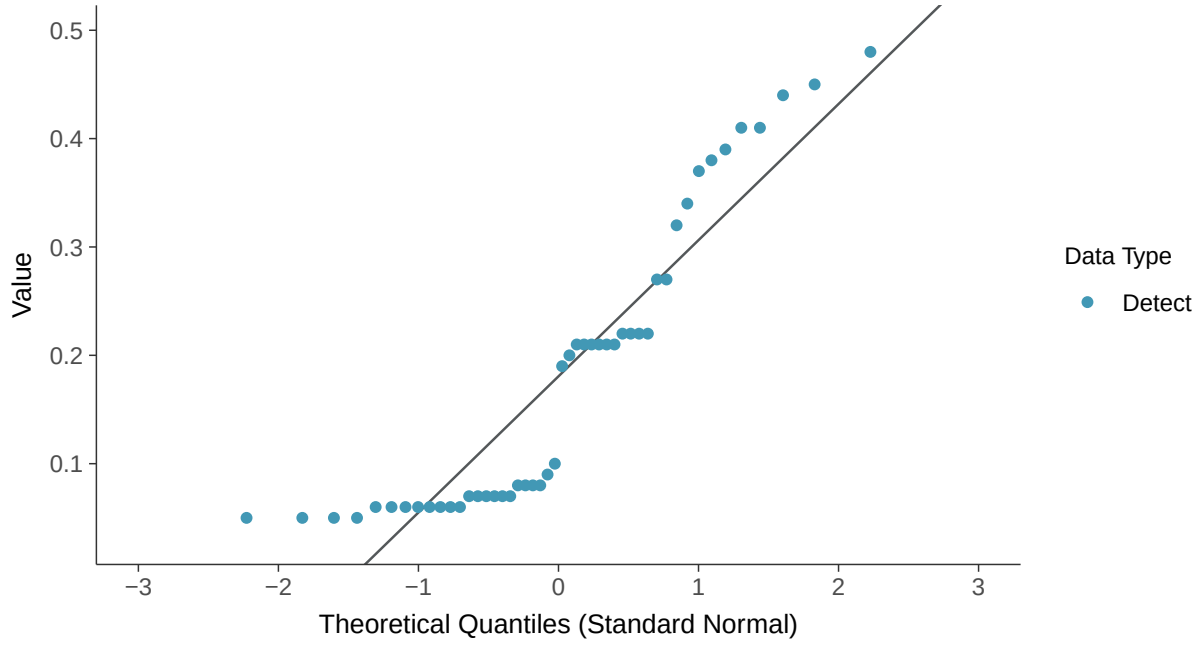
Boxplot by Well

Boron, MW-1, MW-4, MW-11, MW-12 (mg/L)



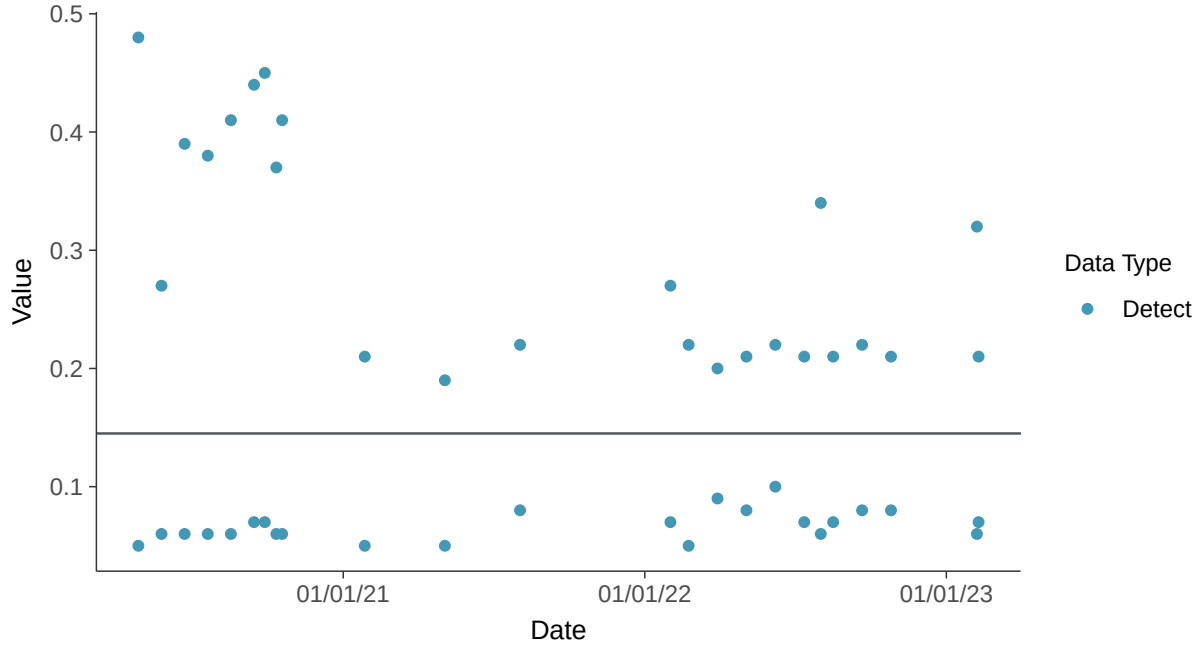
Normal Q-Q plot

Boron, MW-1, MW-4, MW-11, MW-12 (mg/L)



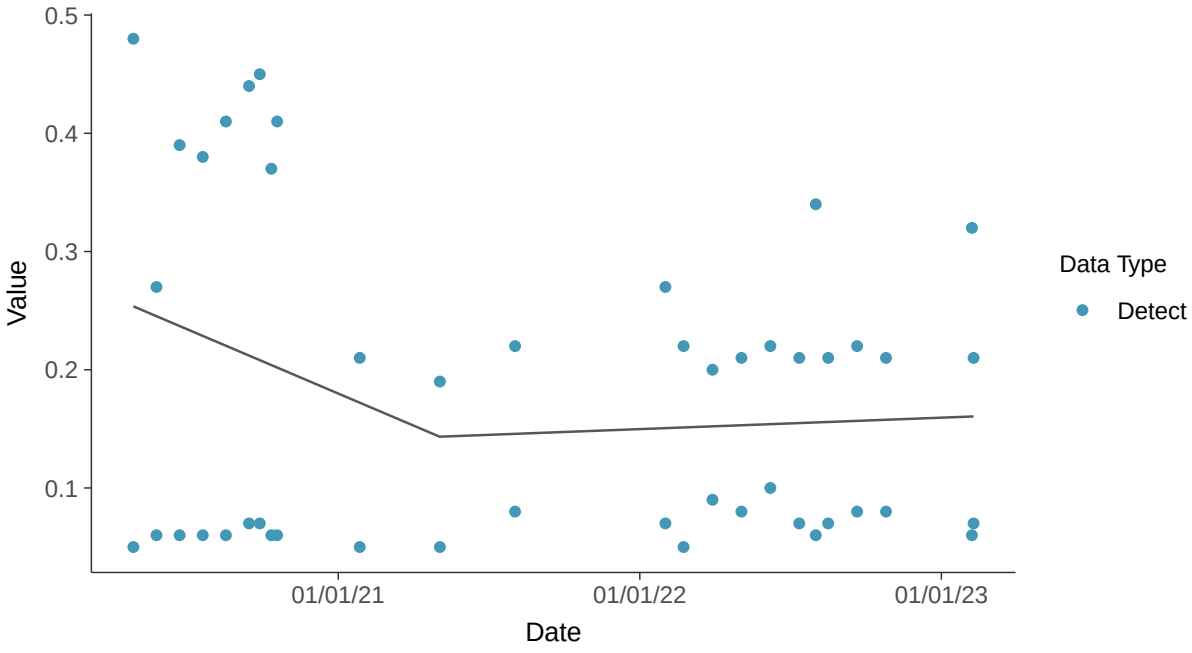
Trend Regression: Mann-Kendall/Theil-Sen Estimate

Boron, MW-1, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Piecewise Linear-Linear

Boron, MW-1, MW-4, MW-11, MW-12 (mg/L)

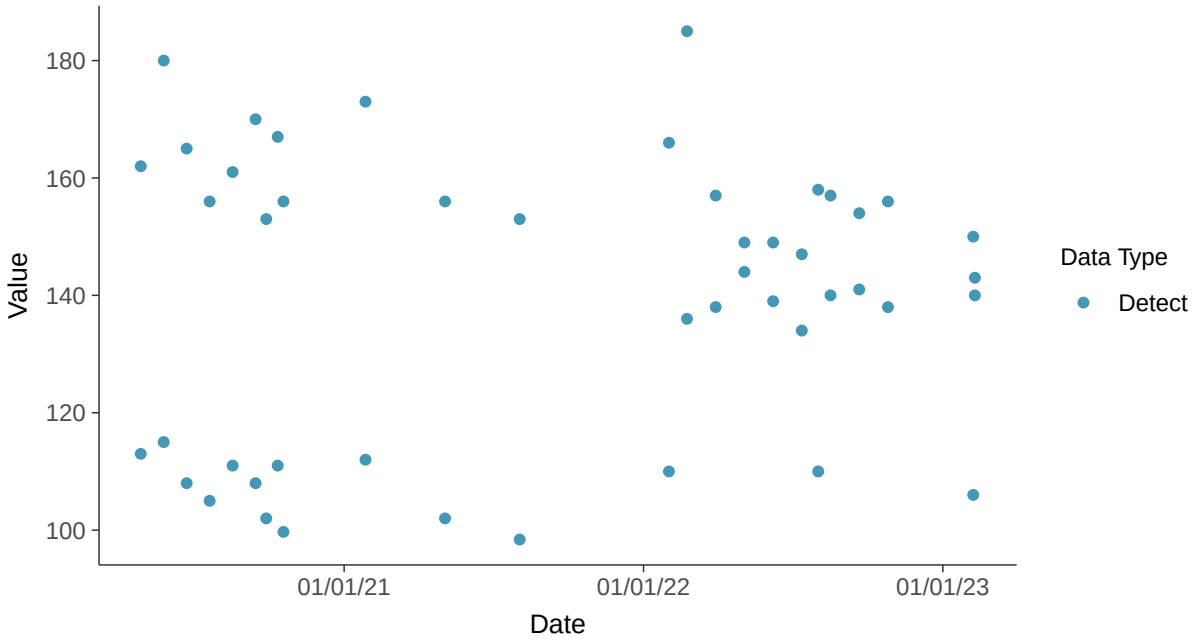


Appendix III: Calcium, MW-1, MW-4, MW-11, MW-12

ID: 1_02

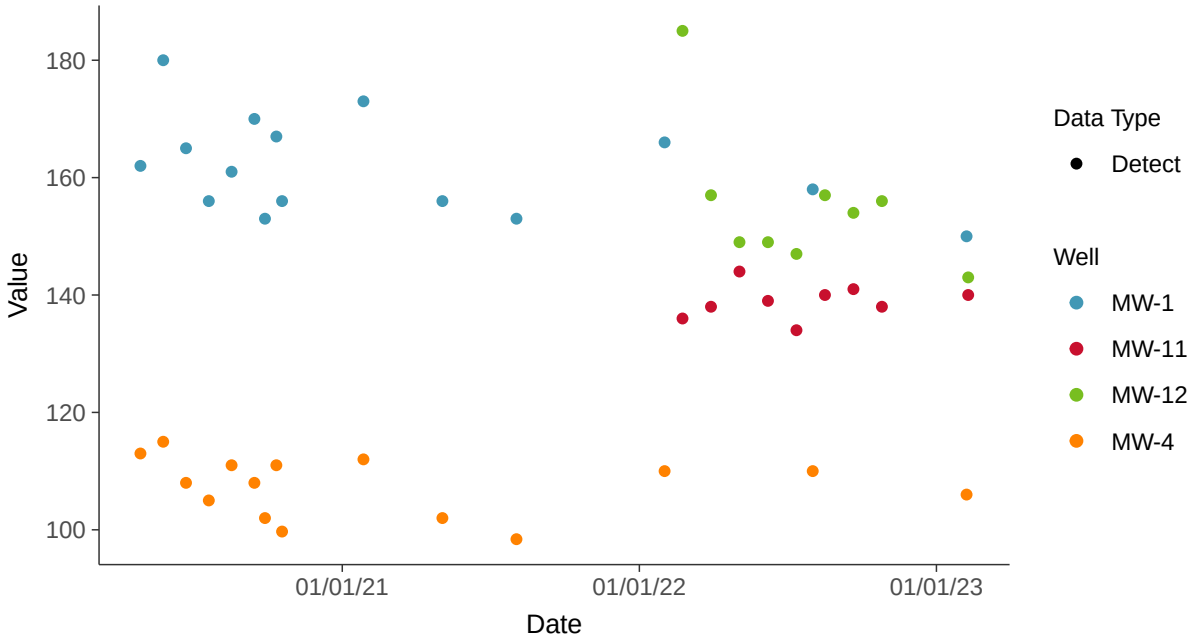
Scatter Plot

Calcium, MW-1, MW-4, MW-11, MW-12 (mg/L)



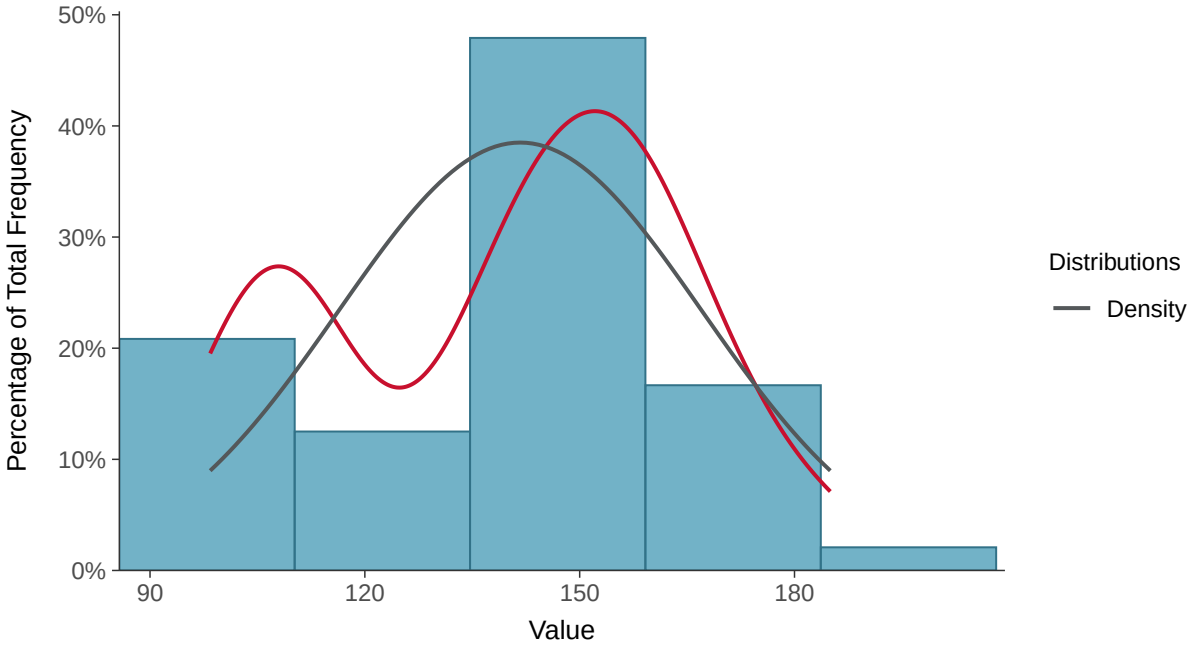
Scatter Plot by Well

Calcium, MW-1, MW-4, MW-11, MW-12 (mg/L)



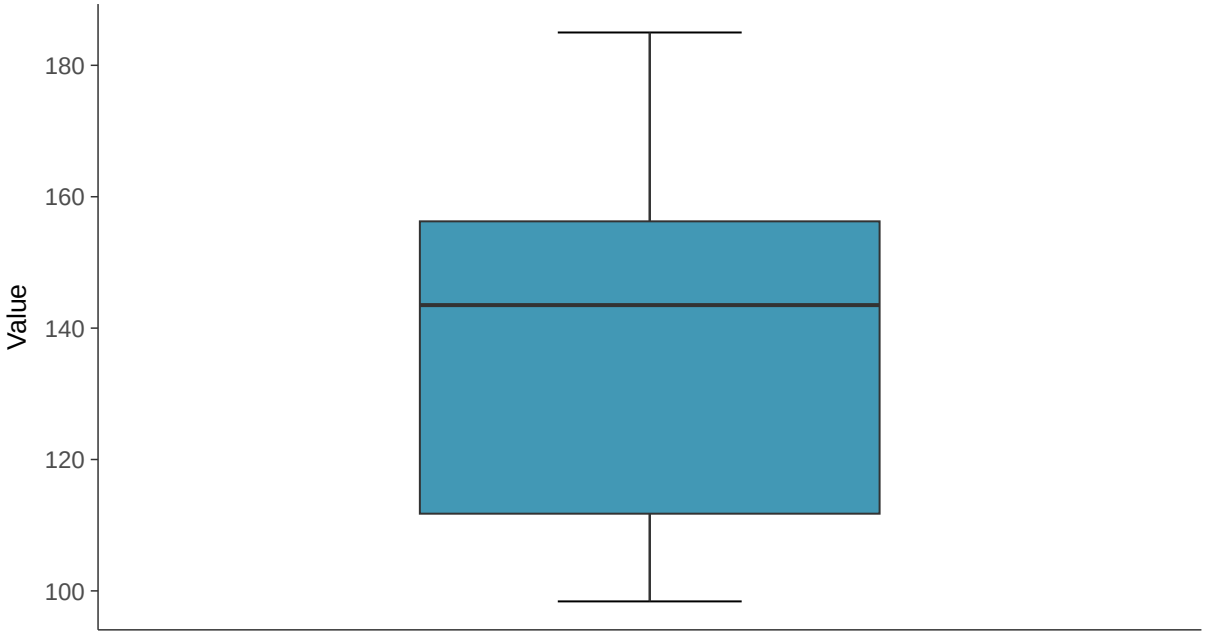
Histogram

Calcium, MW-1, MW-4, MW-11, MW-12 (mg/L)



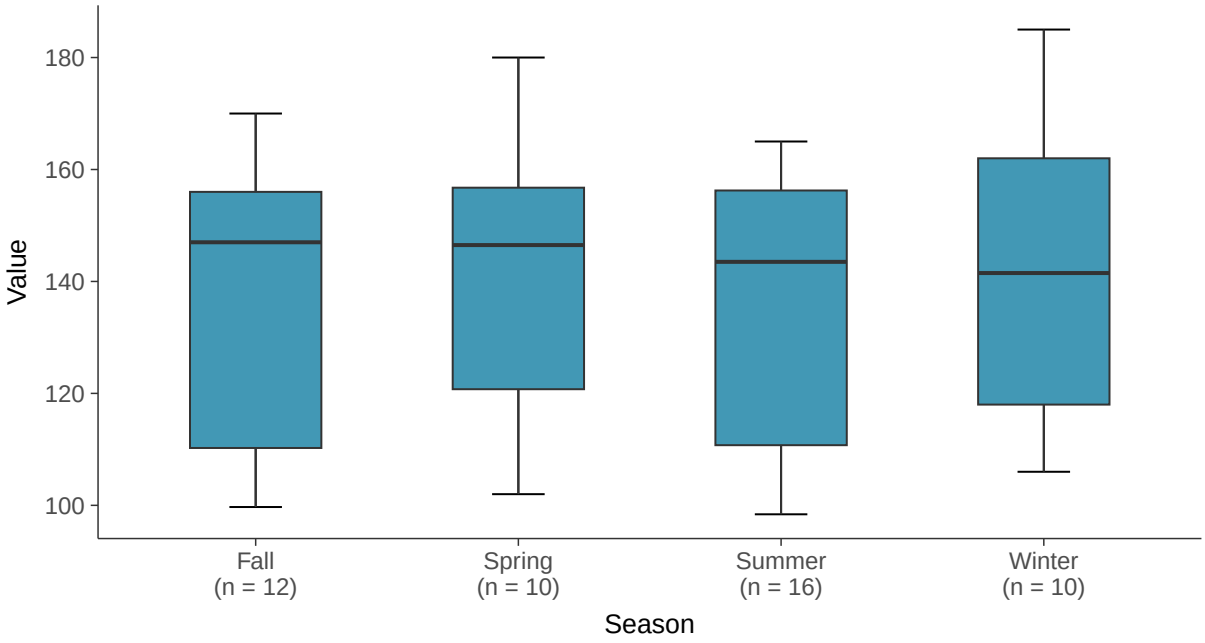
Boxplot

Calcium, MW-1, MW-4, MW-11, MW-12 (mg/L)



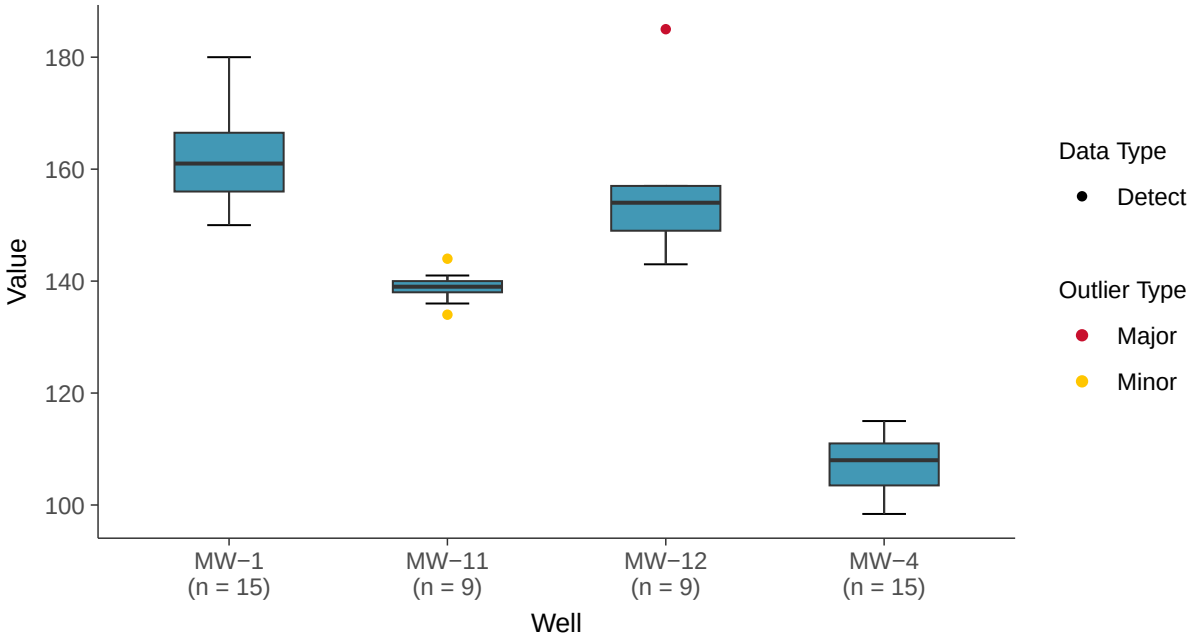
Boxplot by Season

Calcium, MW-1, MW-4, MW-11, MW-12 (mg/L)



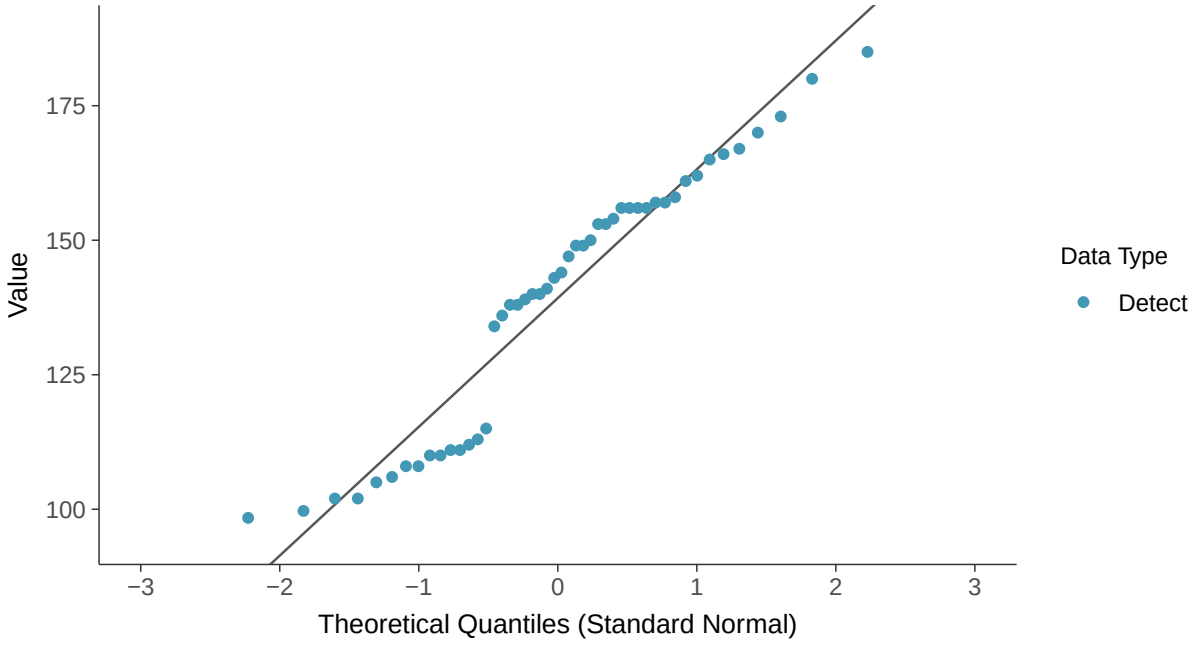
Boxplot by Well

Calcium, MW-1, MW-4, MW-11, MW-12 (mg/L)



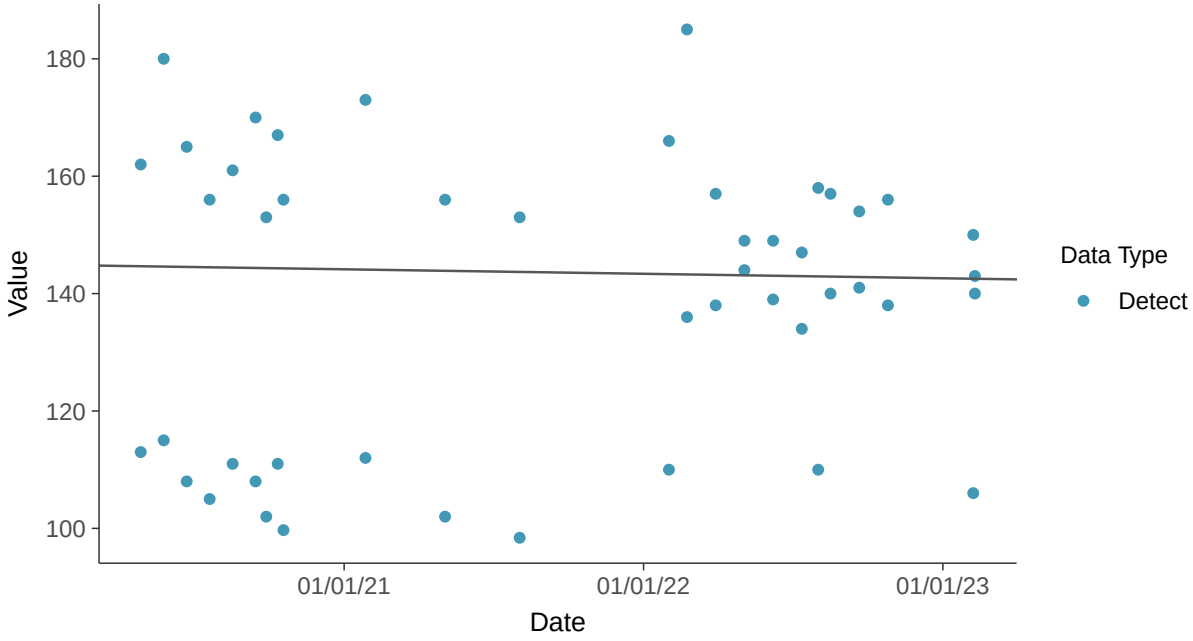
Normal Q-Q plot

Calcium, MW-1, MW-4, MW-11, MW-12 (mg/L)



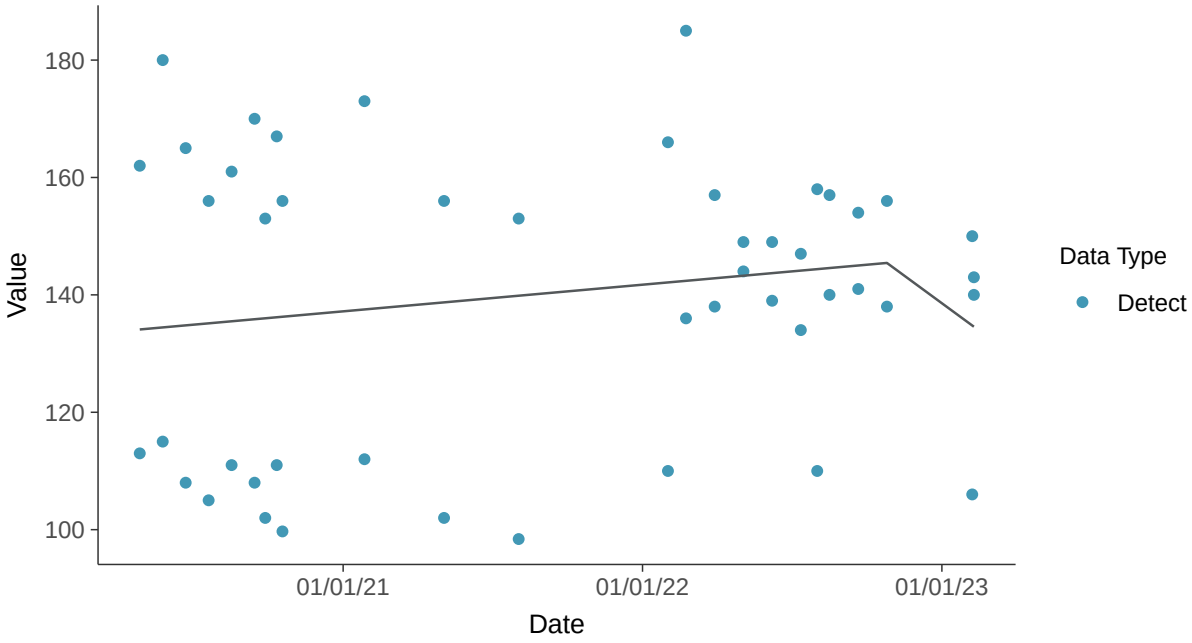
Trend Regression: Mann-Kendall/Theil-Sen Estimate

Calcium, MW-1, MW-4, MW-11, MW-12 (mg/L)



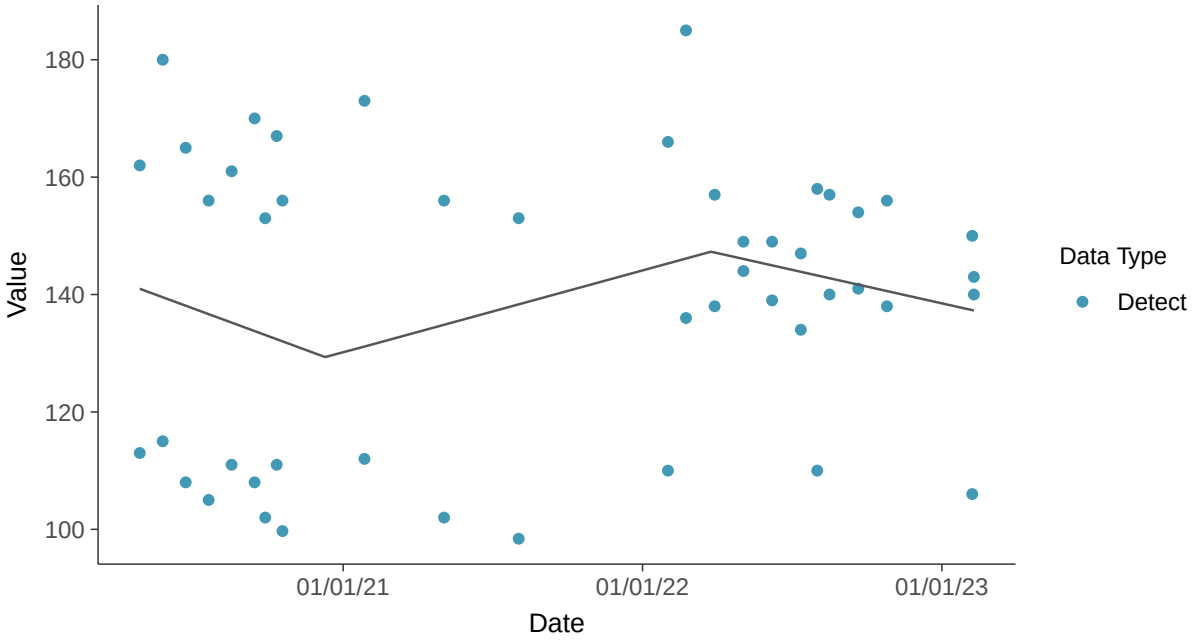
Trend Regression: Piecewise Linear-Linear

Calcium, MW-1, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Calcium, MW-1, MW-4, MW-11, MW-12 (mg/L)

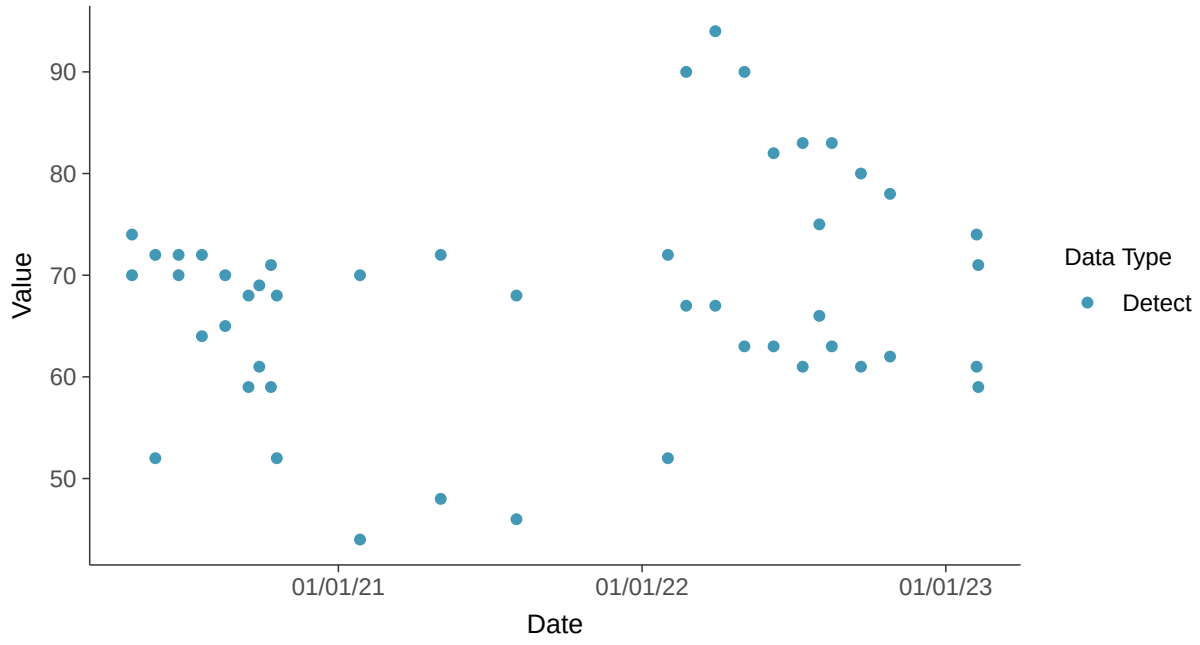


Appendix III: Chloride, MW-1, MW-4, MW-11, MW-12

ID: 1_03

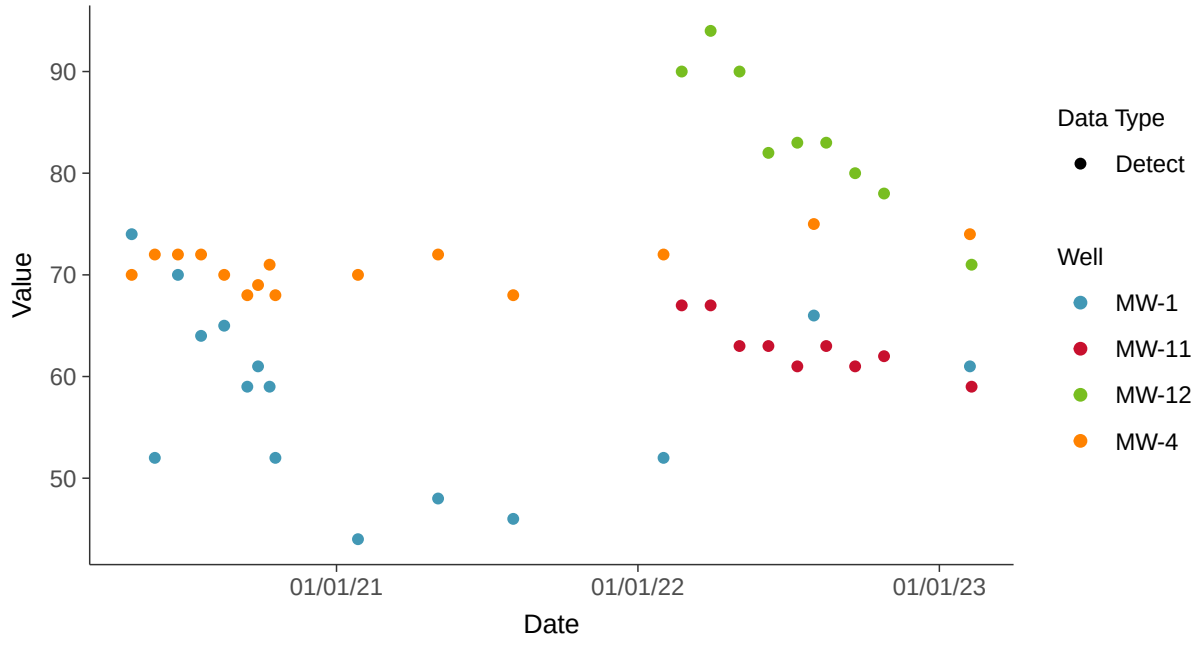
Scatter Plot

Chloride, MW-1, MW-4, MW-11, MW-12 (mg/L)



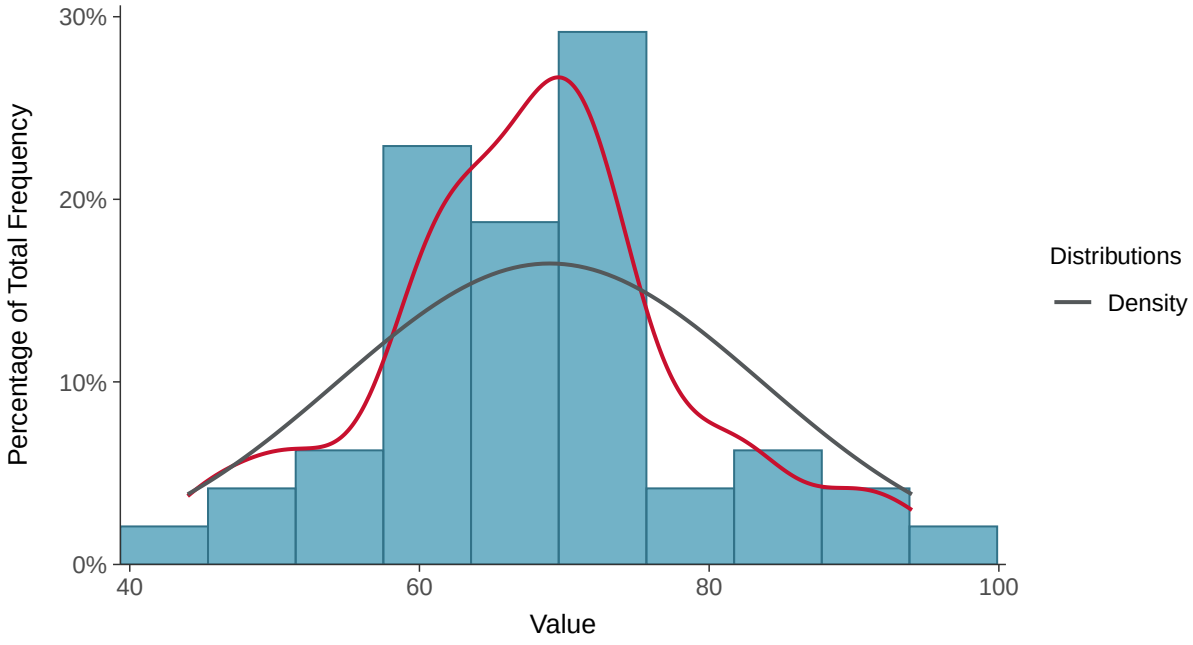
Scatter Plot by Well

Chloride, MW-1, MW-4, MW-11, MW-12 (mg/L)



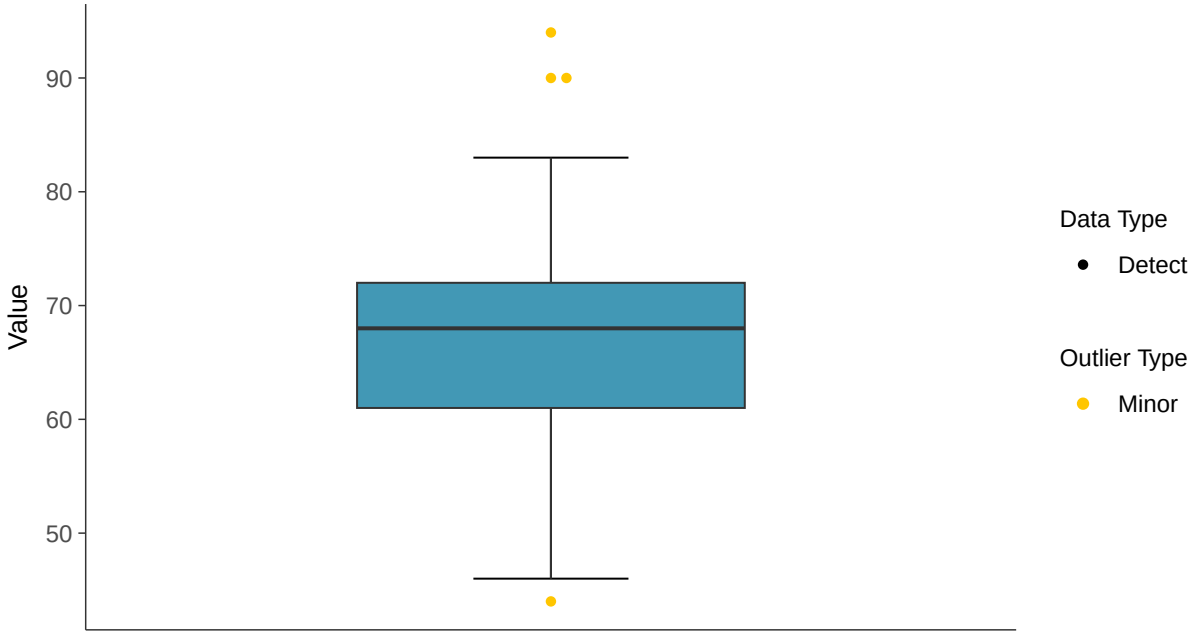
Histogram

Chloride, MW-1, MW-4, MW-11, MW-12 (mg/L)



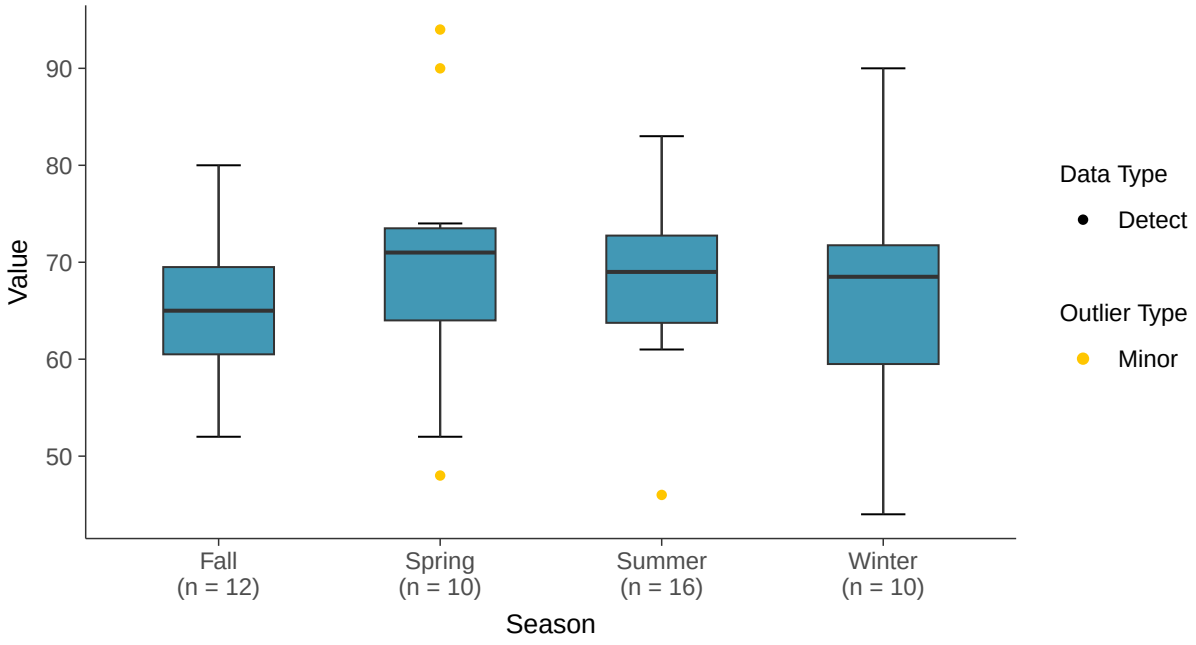
Boxplot

Chloride, MW-1, MW-4, MW-11, MW-12 (mg/L)



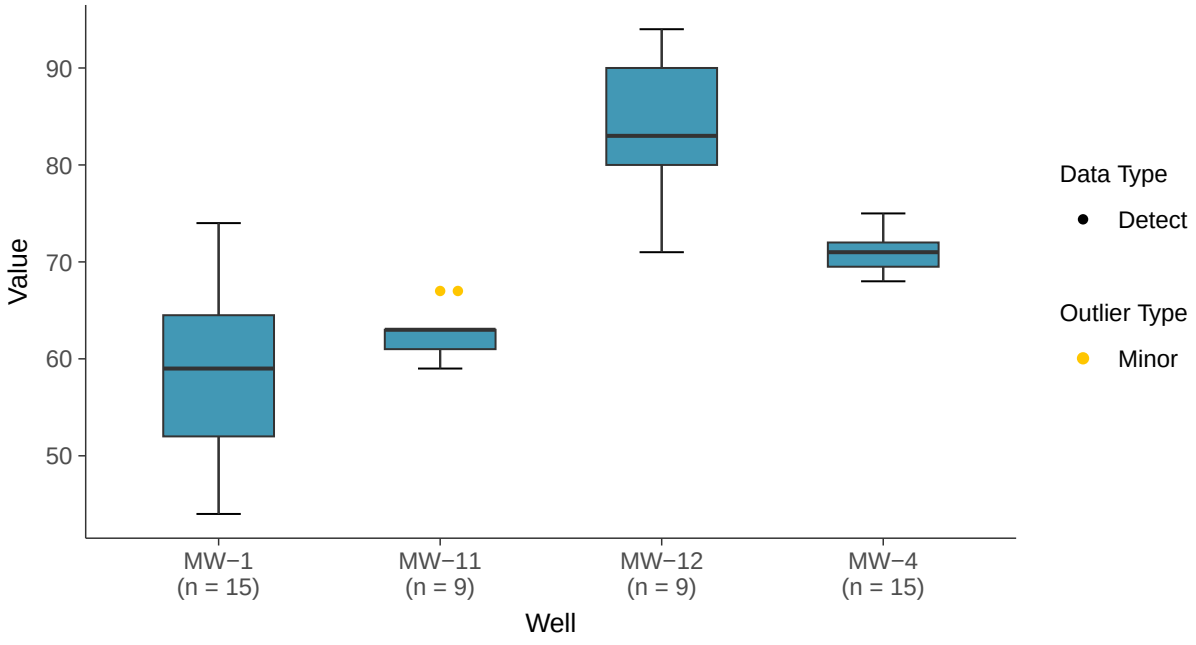
Boxplot by Season

Chloride, MW-1, MW-4, MW-11, MW-12 (mg/L)



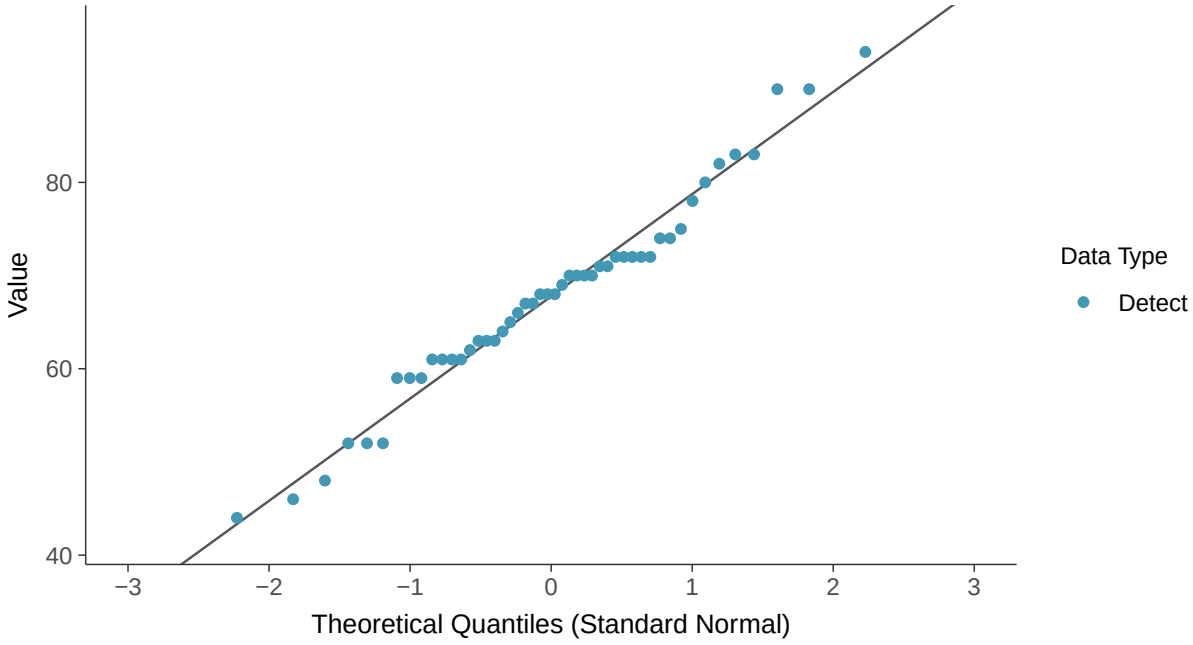
Boxplot by Well

Chloride, MW-1, MW-4, MW-11, MW-12 (mg/L)



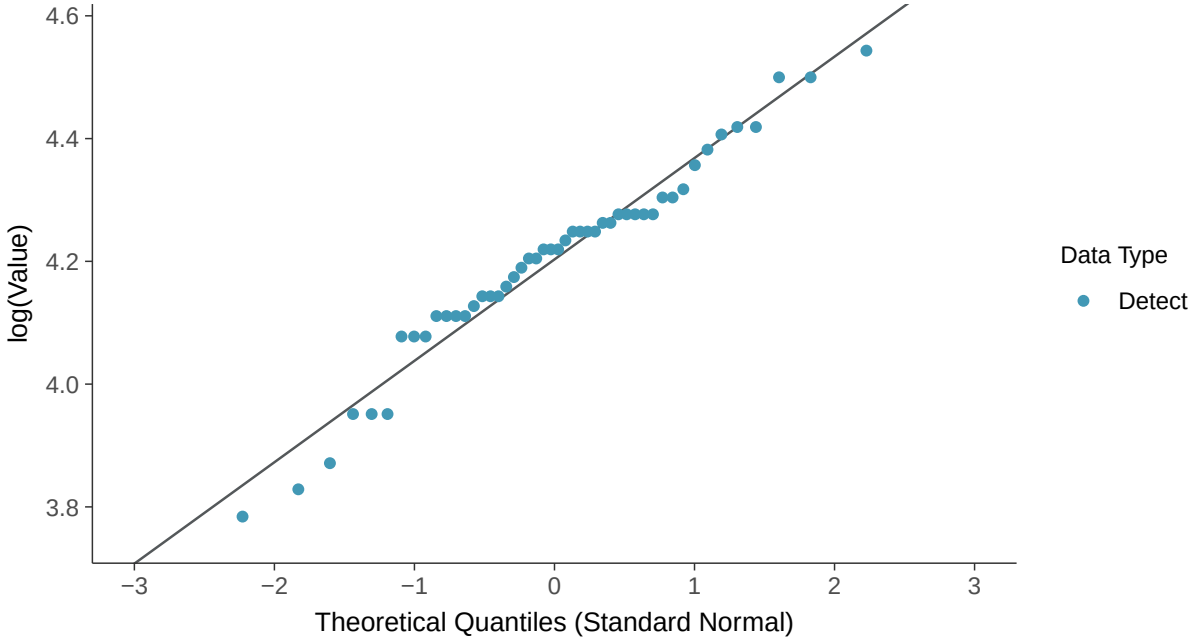
Normal Q-Q plot

Chloride, MW-1, MW-4, MW-11, MW-12 (mg/L)



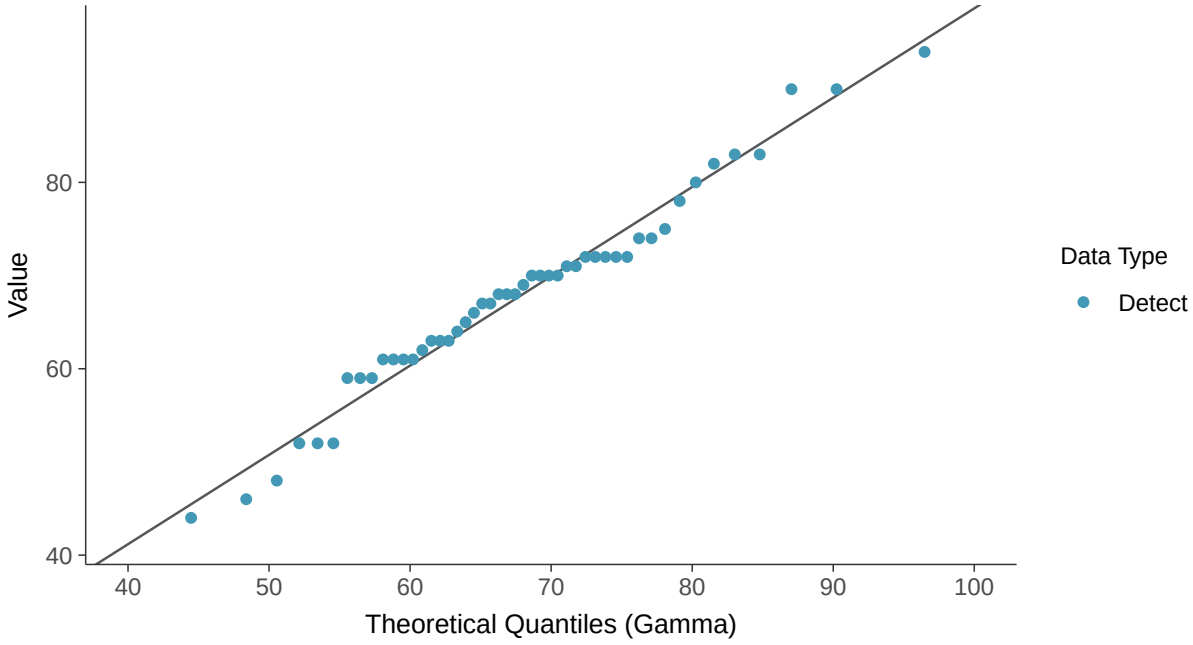
Lognormal Q-Q plot

Chloride, MW-1, MW-4, MW-11, MW-12 (mg/L)



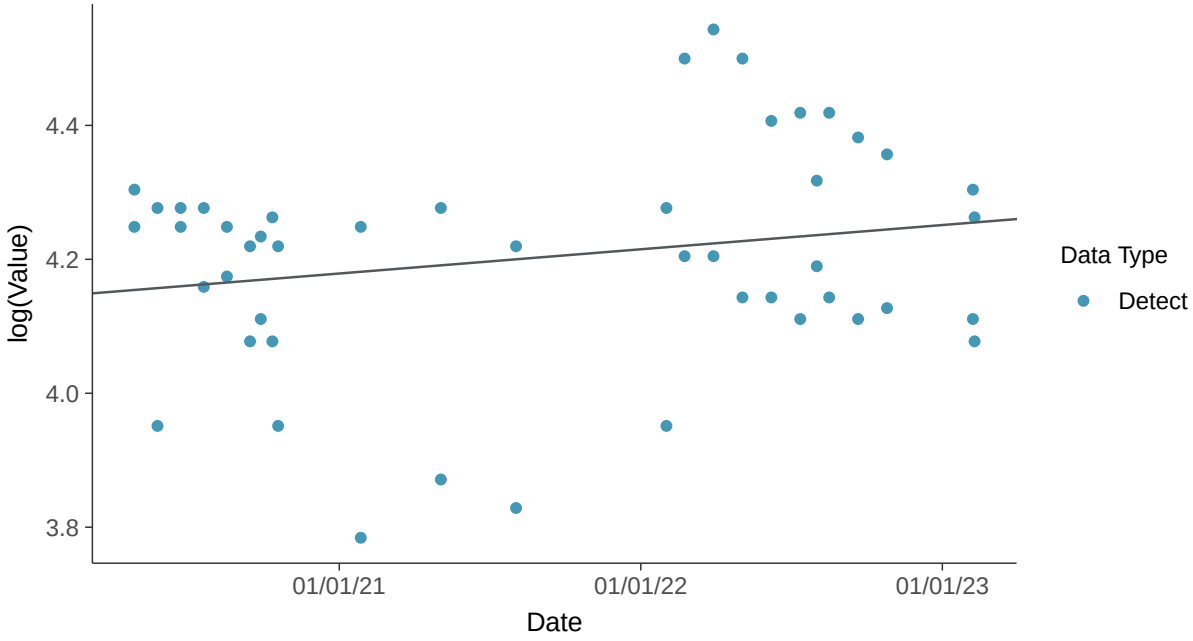
Gamma Q-Q plot

Chloride, MW-1, MW-4, MW-11, MW-12 (mg/L)



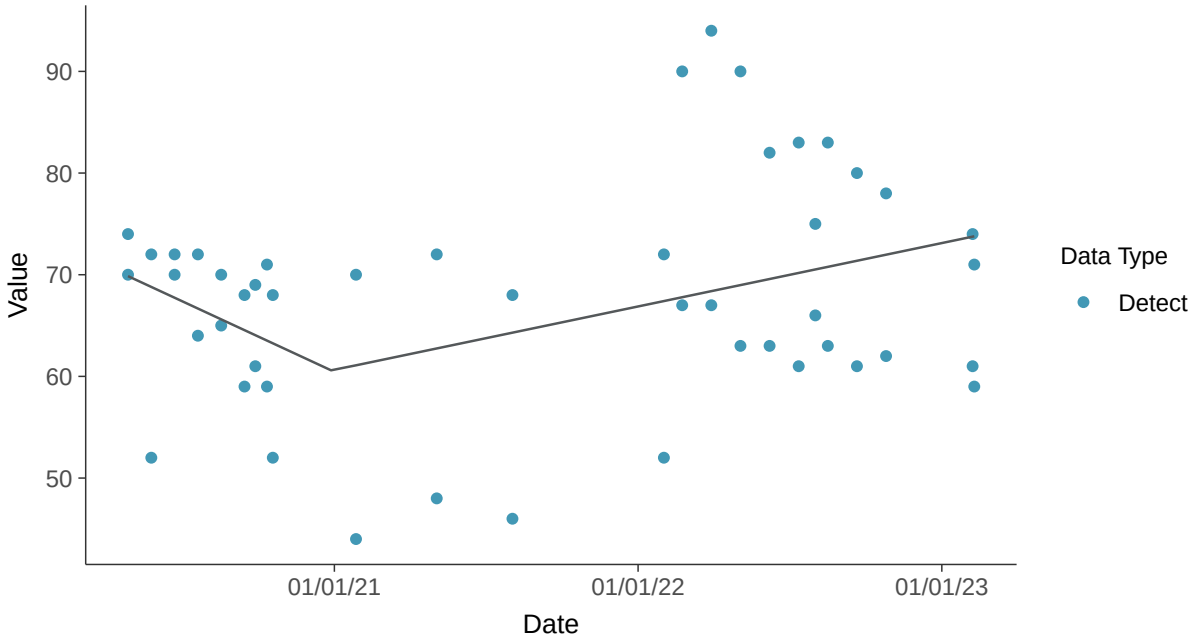
Trend Regression: Lognormal MLE

Chloride, MW-1, MW-4, MW-11, MW-12 (mg/L)



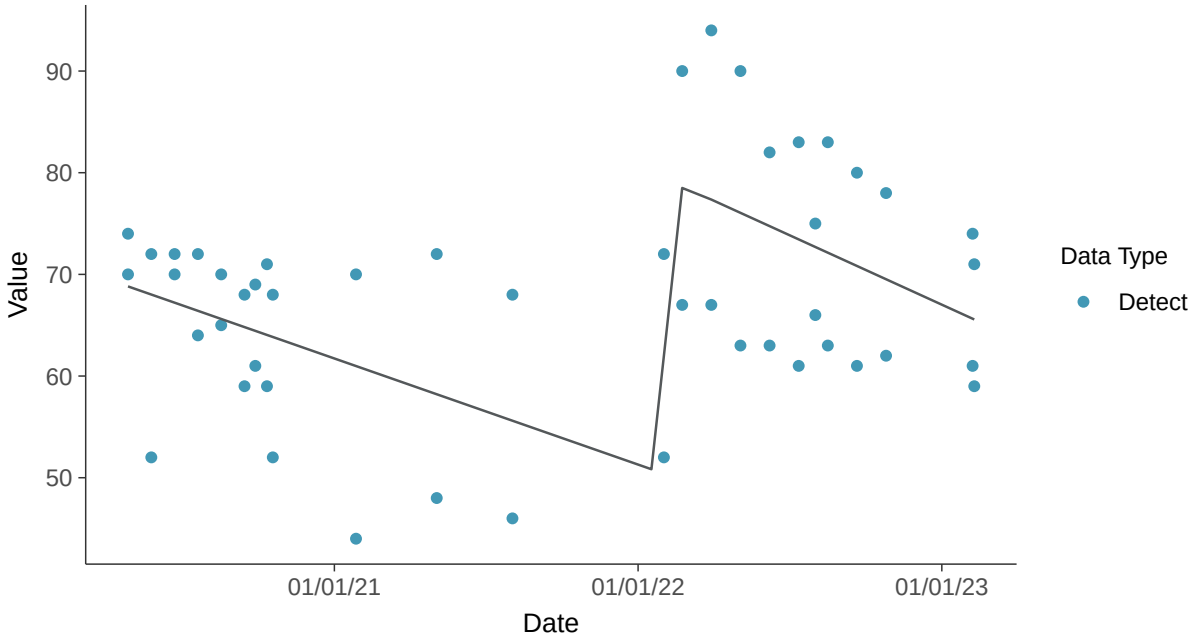
Trend Regression: Piecewise Linear-Linear

Chloride, MW-1, MW-4, MW-11, MW-12 (mg/L)



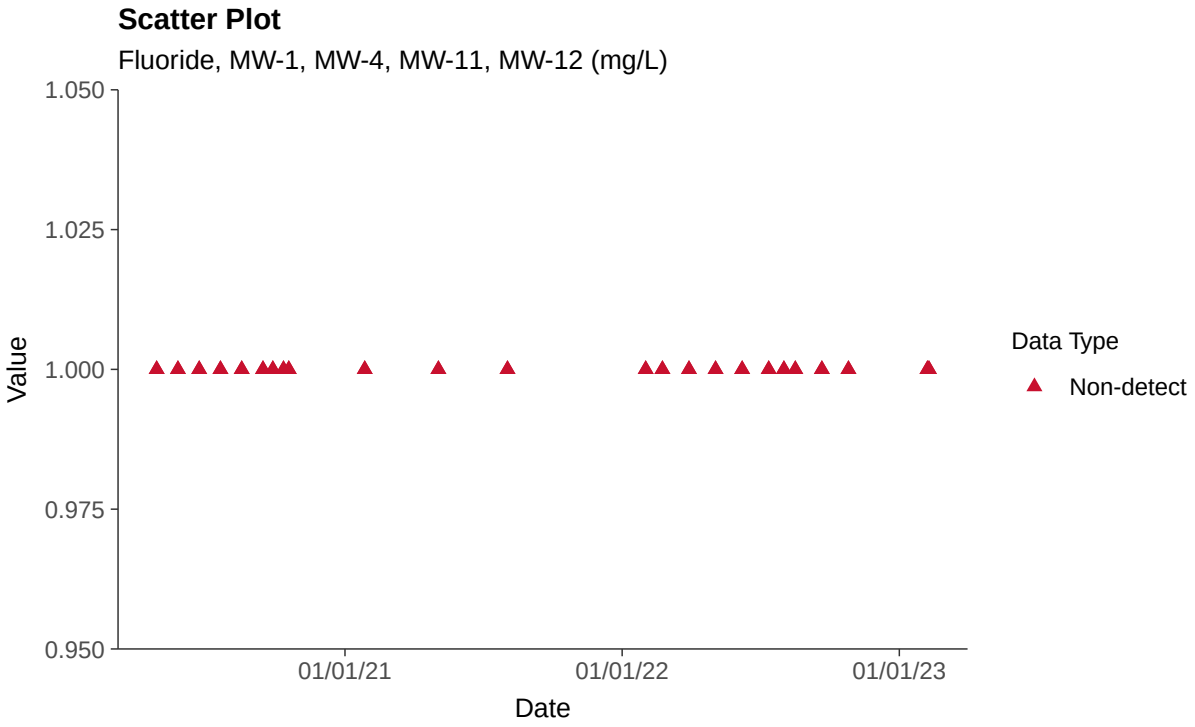
Trend Regression: Piecewise Linear-Linear-Linear

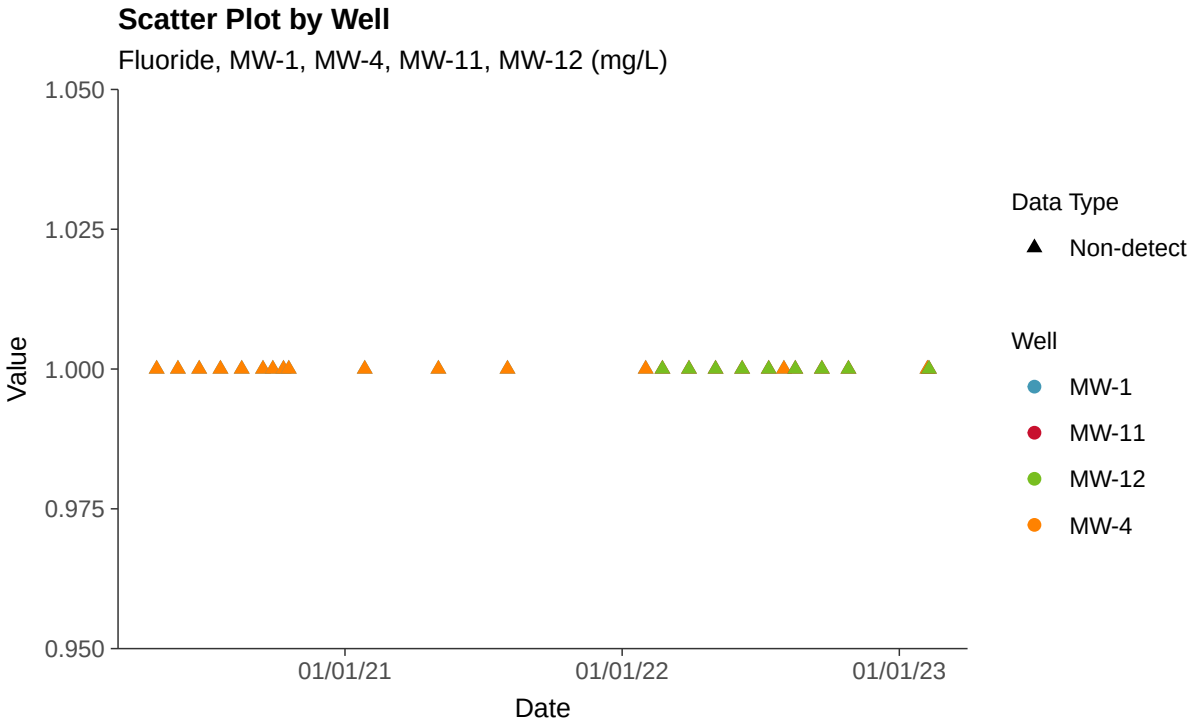
Chloride, MW-1, MW-4, MW-11, MW-12 (mg/L)



Appendix III: Fluoride, MW-1, MW-4, MW-11, MW-12

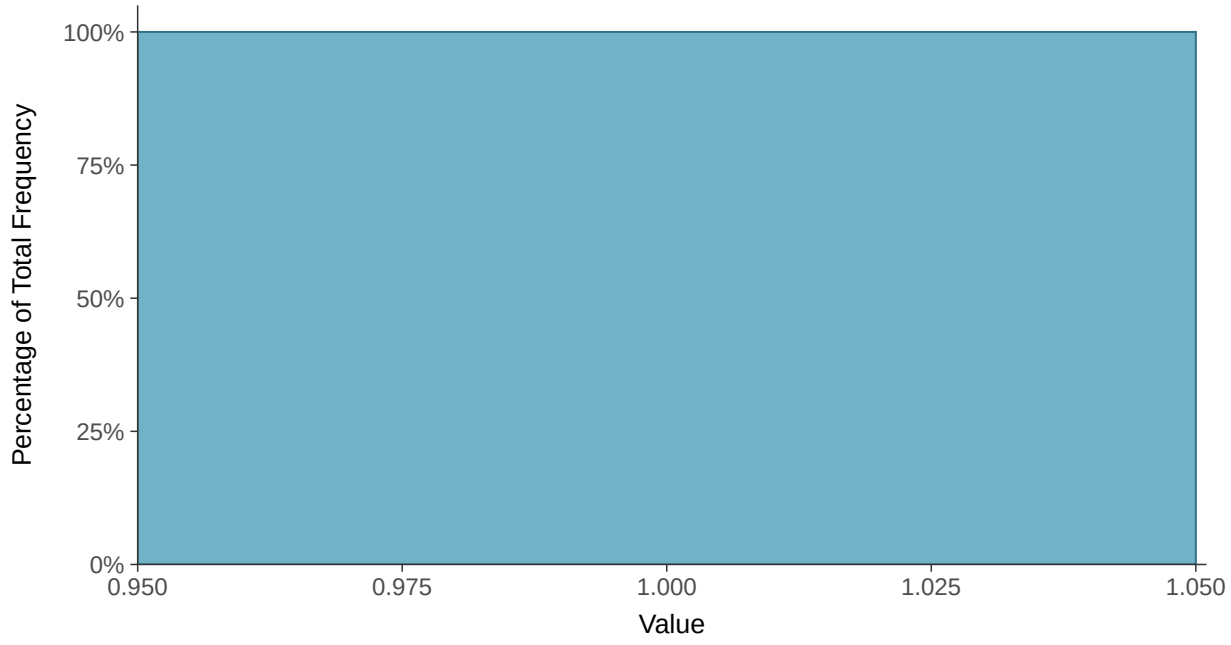
ID: 1_04





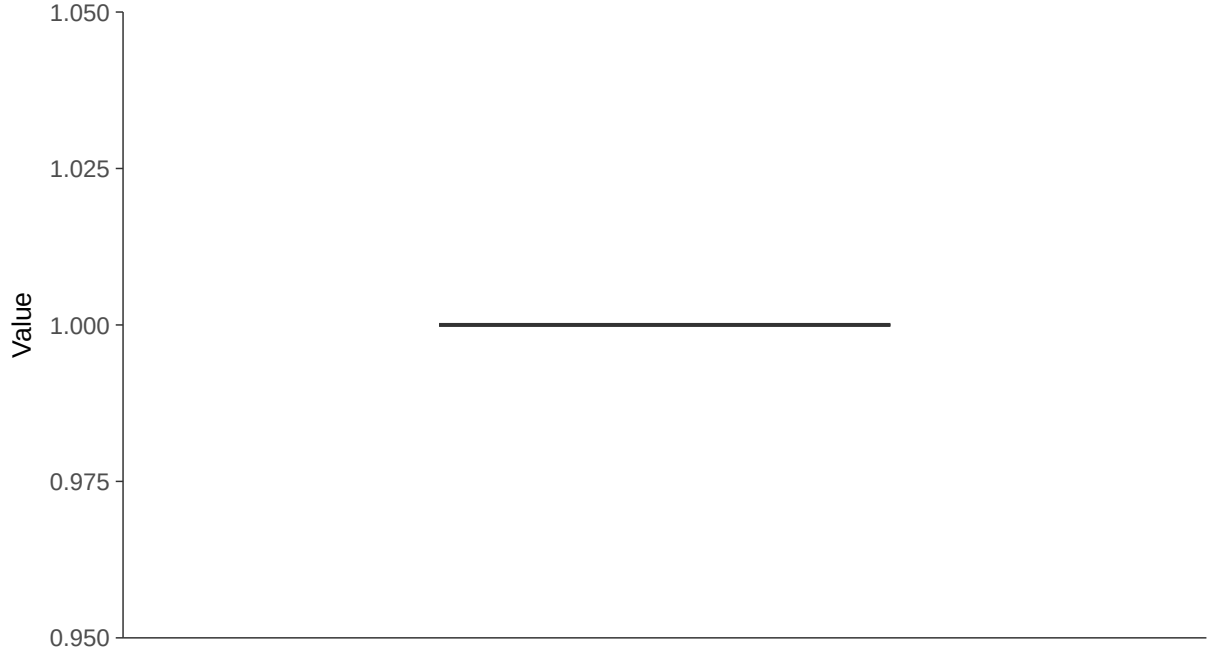
Histogram

Fluoride, MW-1, MW-4, MW-11, MW-12 (mg/L)



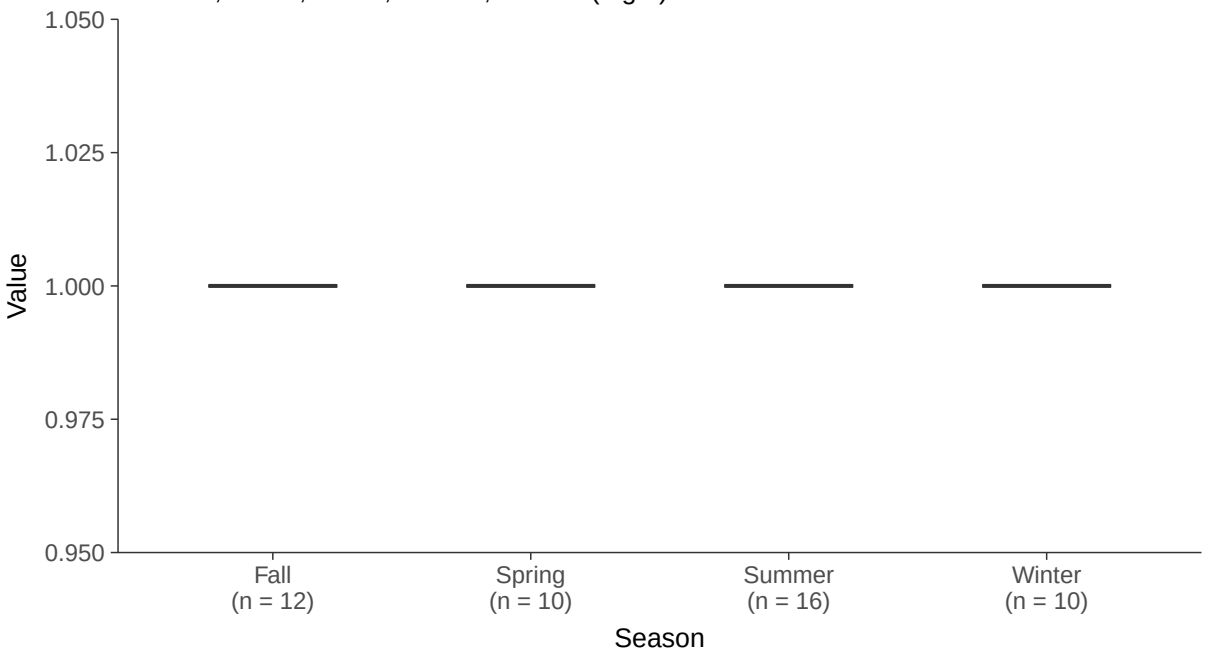
Boxplot

Fluoride, MW-1, MW-4, MW-11, MW-12 (mg/L)



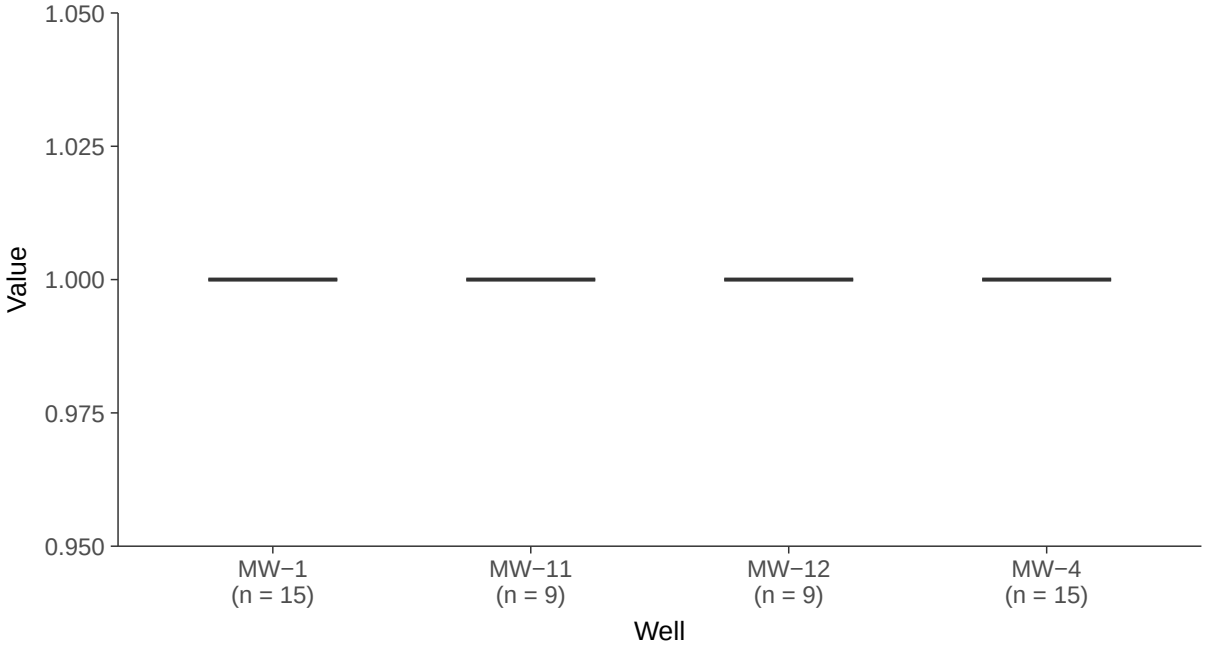
Boxplot by Season

Fluoride, MW-1, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Fluoride, MW-1, MW-4, MW-11, MW-12 (mg/L)

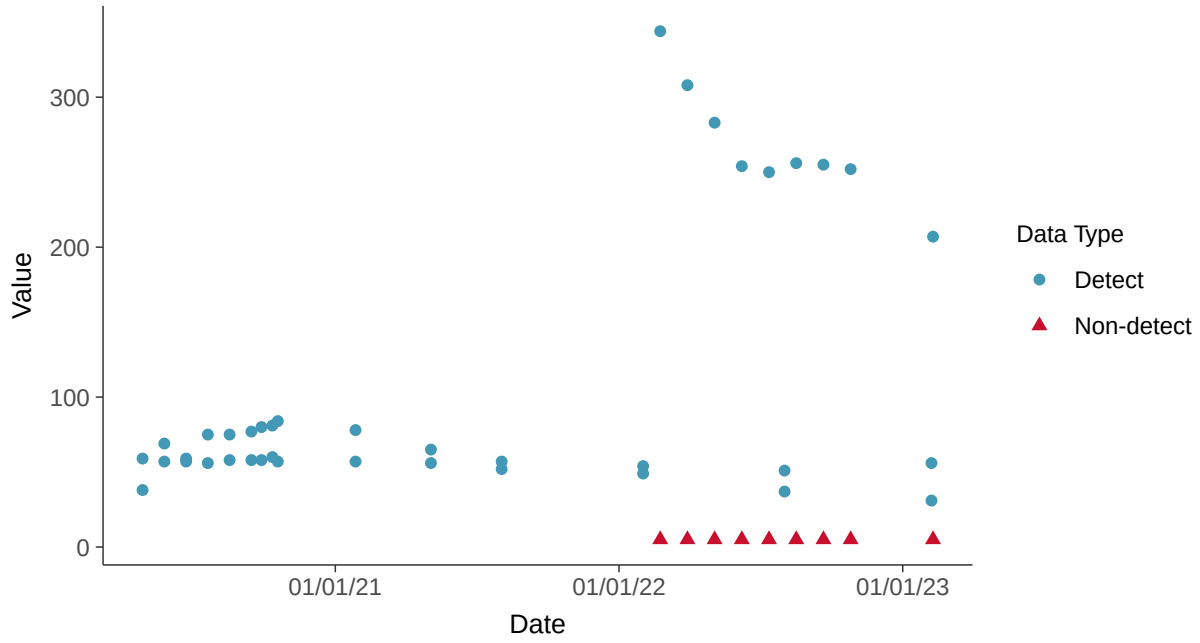


Appendix III: Sulfate, MW-1, MW-4, MW-11, MW-12

ID: 1_05

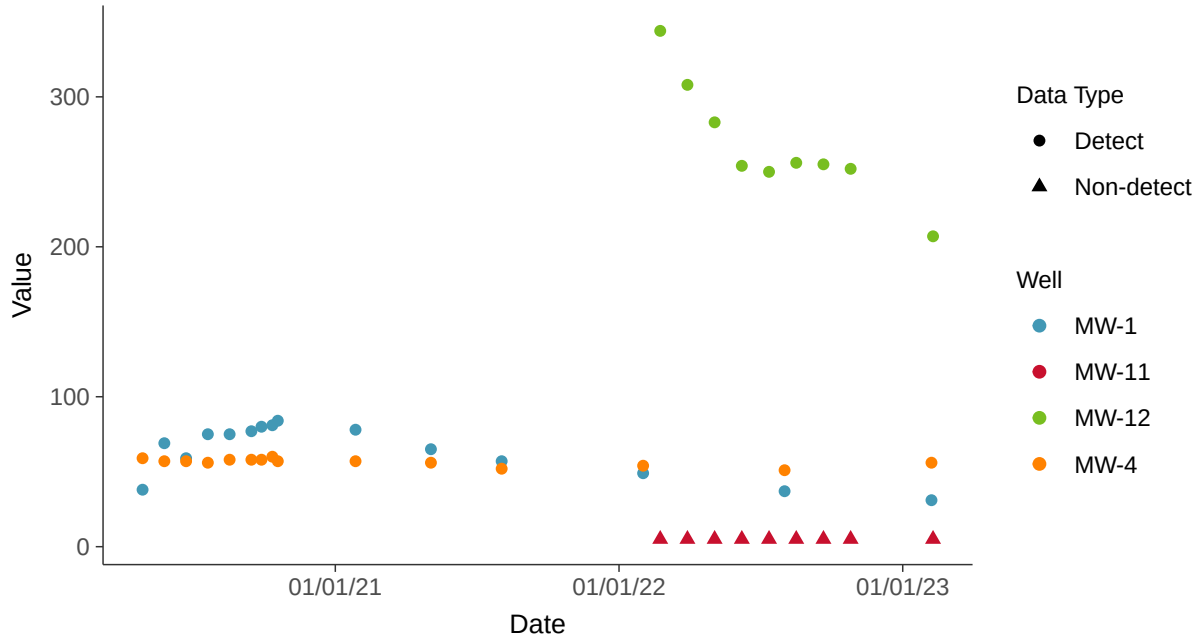
Scatter Plot

Sulfate, MW-1, MW-4, MW-11, MW-12 (mg/L)



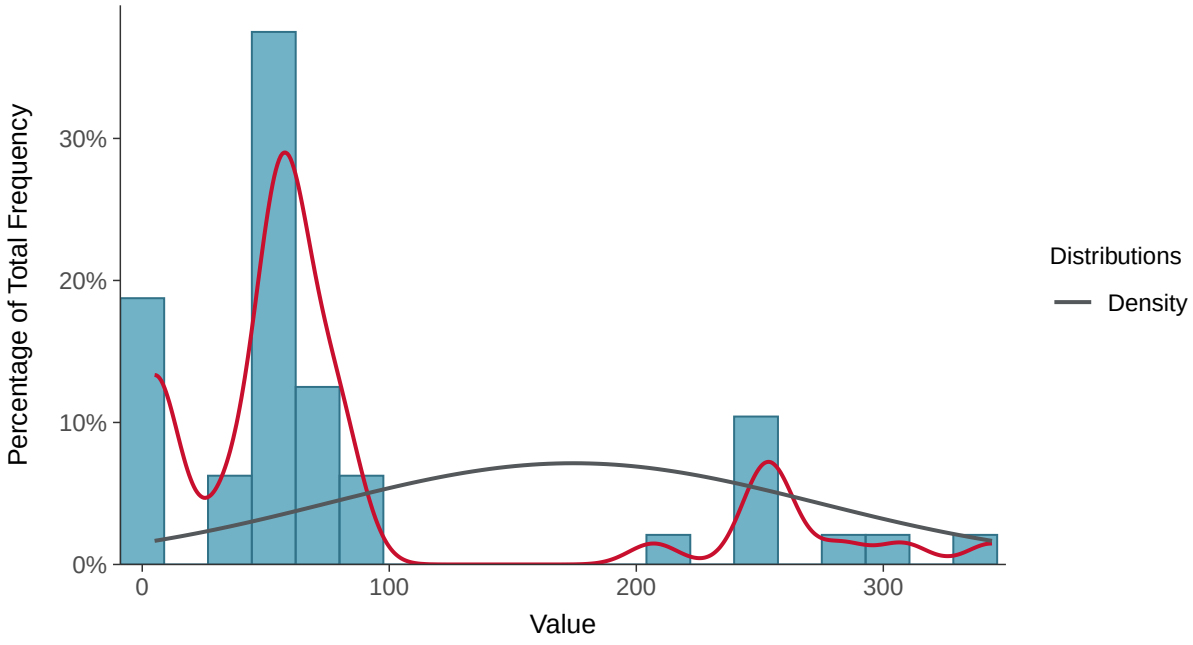
Scatter Plot by Well

Sulfate, MW-1, MW-4, MW-11, MW-12 (mg/L)



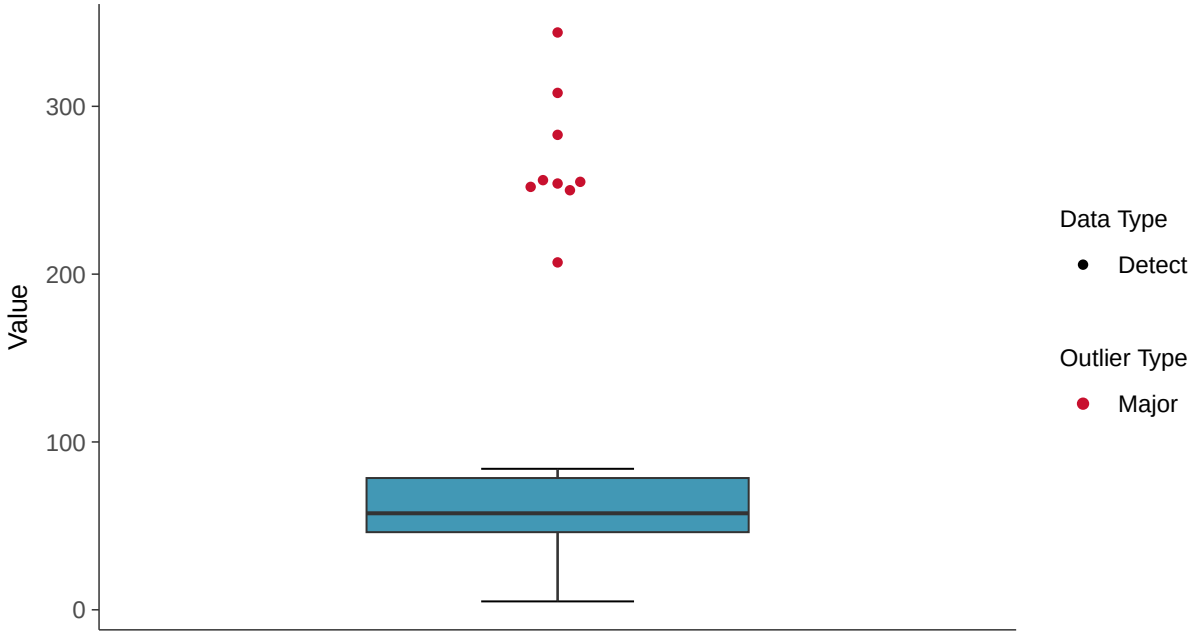
Histogram

Sulfate, MW-1, MW-4, MW-11, MW-12 (mg/L)



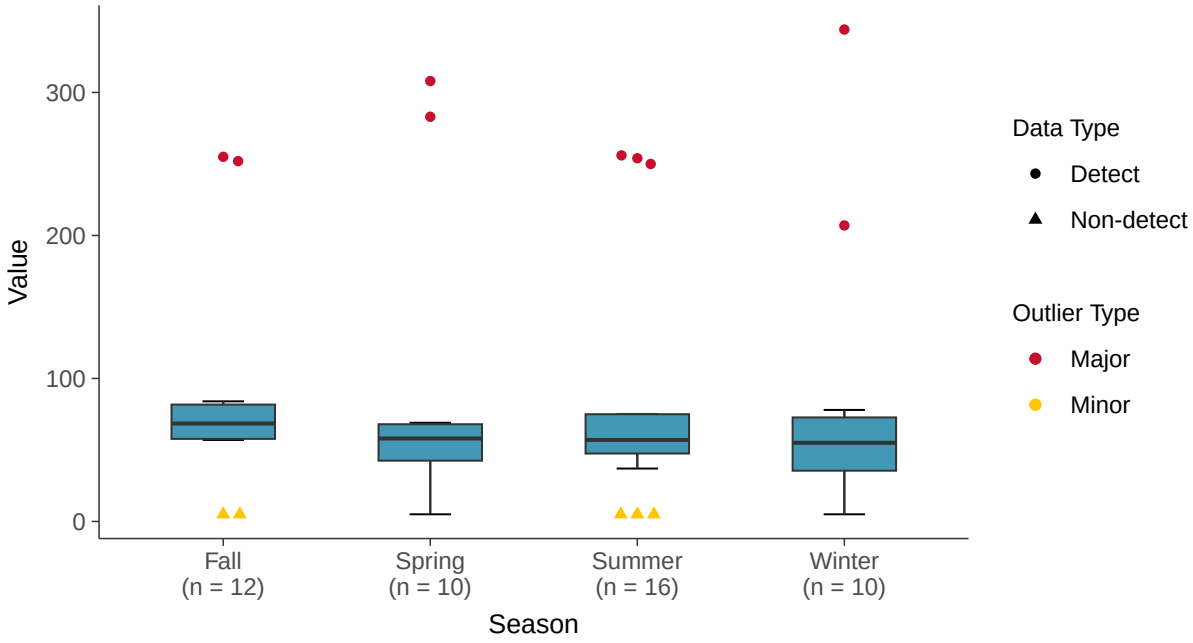
Boxplot

Sulfate, MW-1, MW-4, MW-11, MW-12 (mg/L)



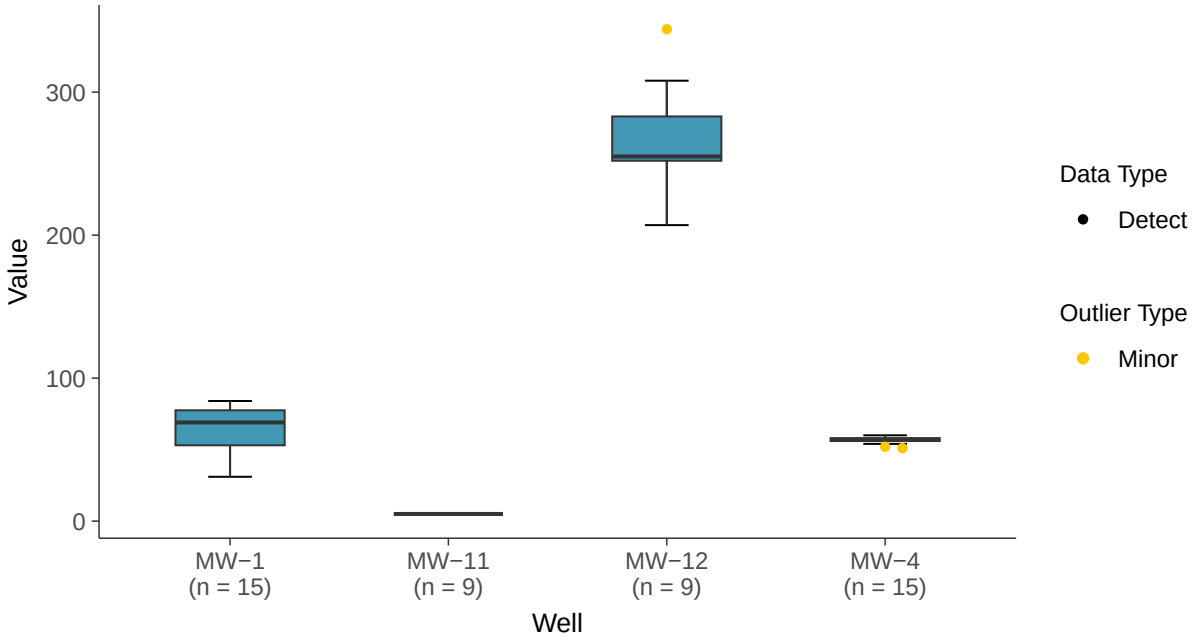
Boxplot by Season

Sulfate, MW-1, MW-4, MW-11, MW-12 (mg/L)



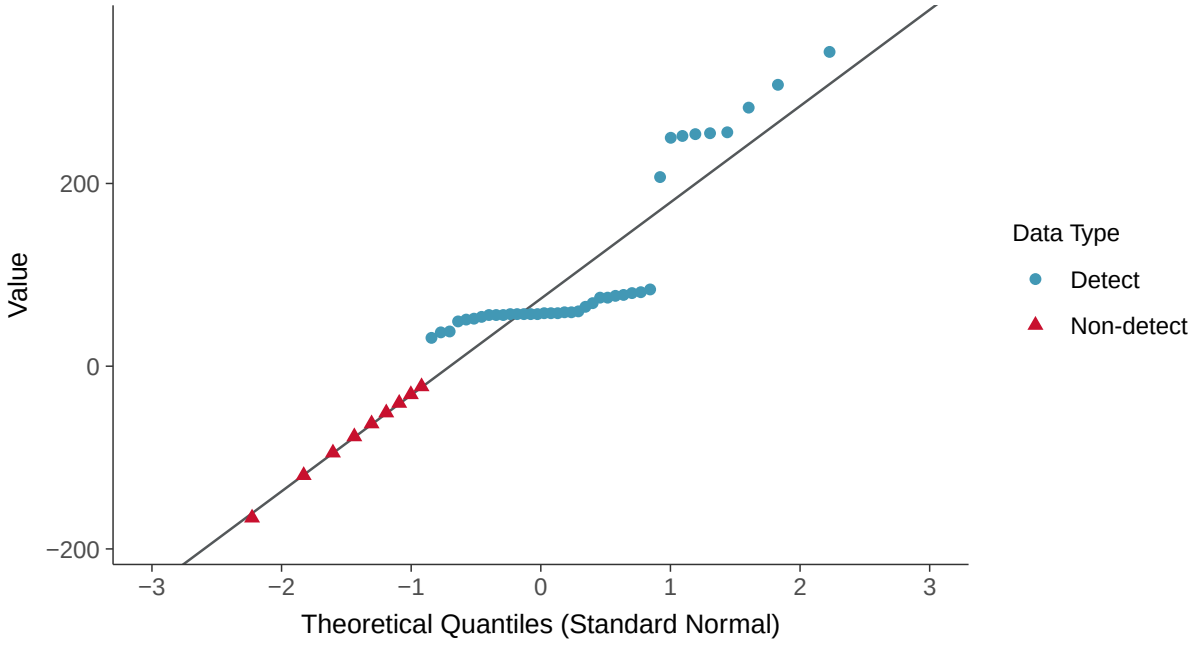
Boxplot by Well

Sulfate, MW-1, MW-4, MW-11, MW-12 (mg/L)



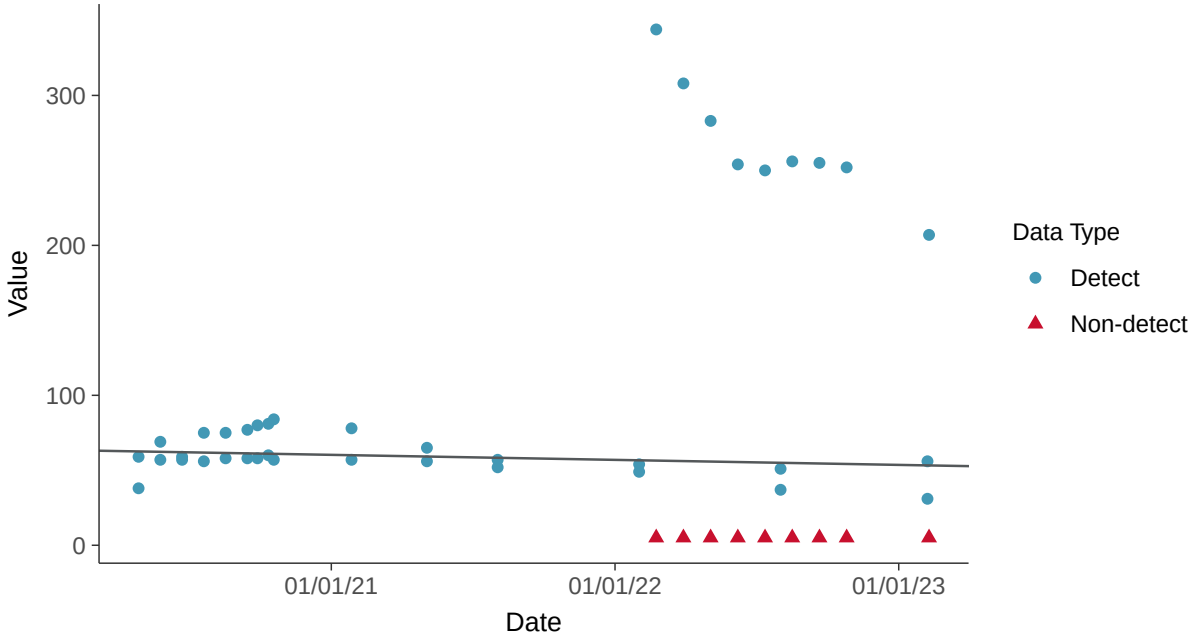
Normal Q-Q plot using ROS Imputed Estimates

Sulfate, MW-1, MW-4, MW-11, MW-12 (mg/L)



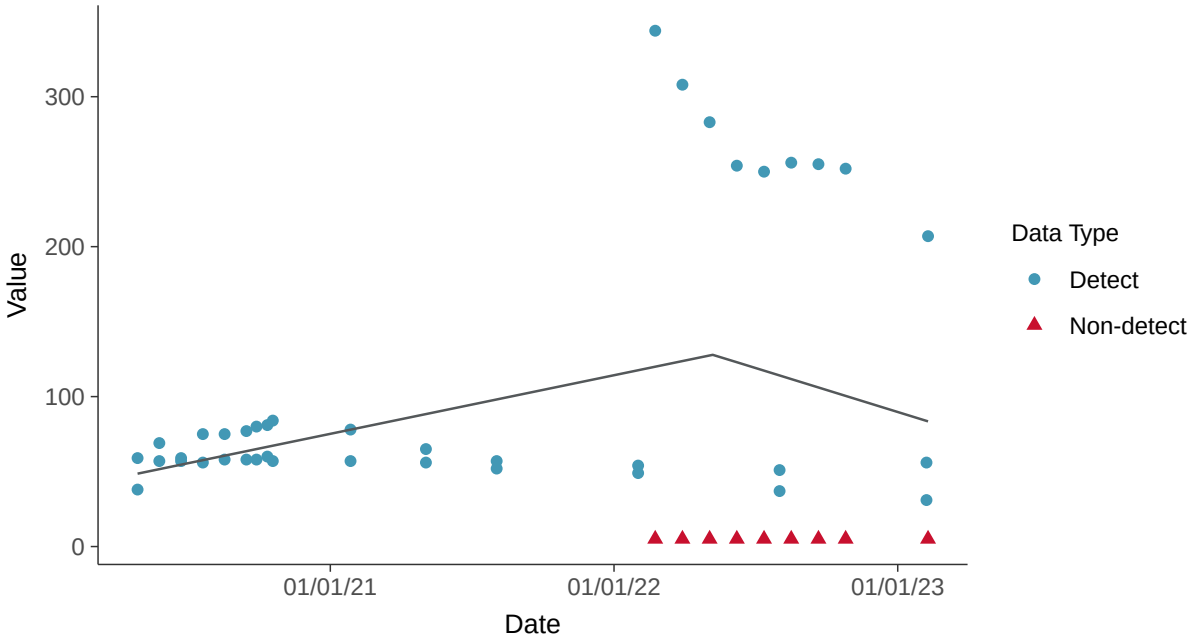
Trend Regression: Mann-Kendall/Theil-Sen Estimate

Sulfate, MW-1, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Piecewise Linear-Linear

Sulfate, MW-1, MW-4, MW-11, MW-12 (mg/L)

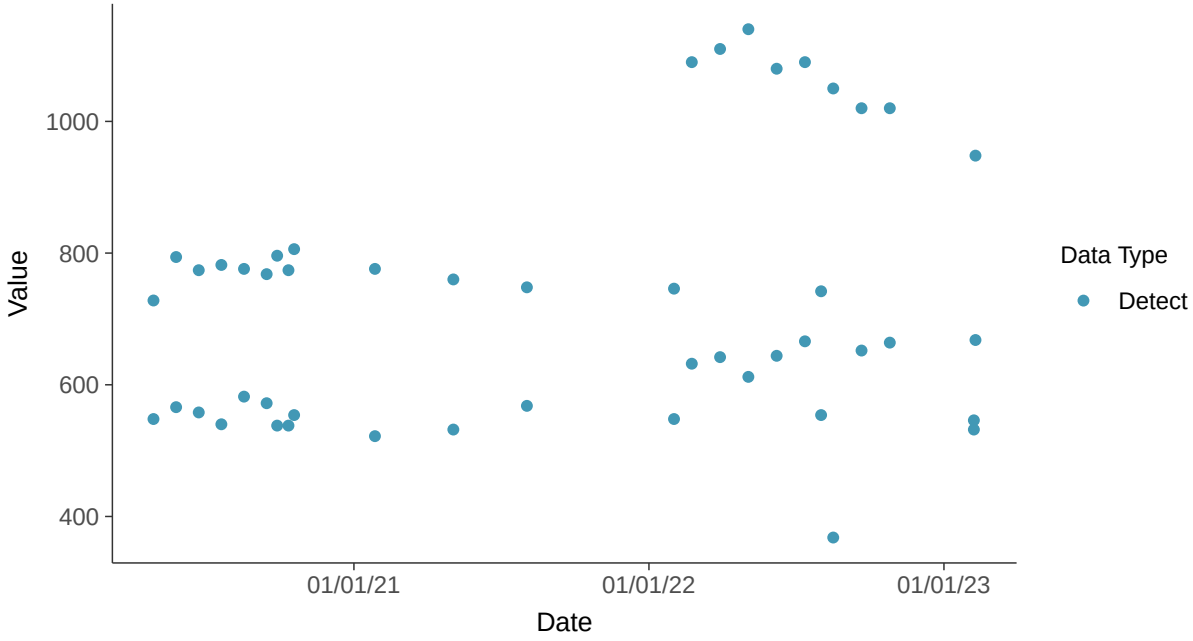


Appendix III: Total Dissolved Solids, MW-1, MW-4, MW-11, MW-12

ID: 1_06

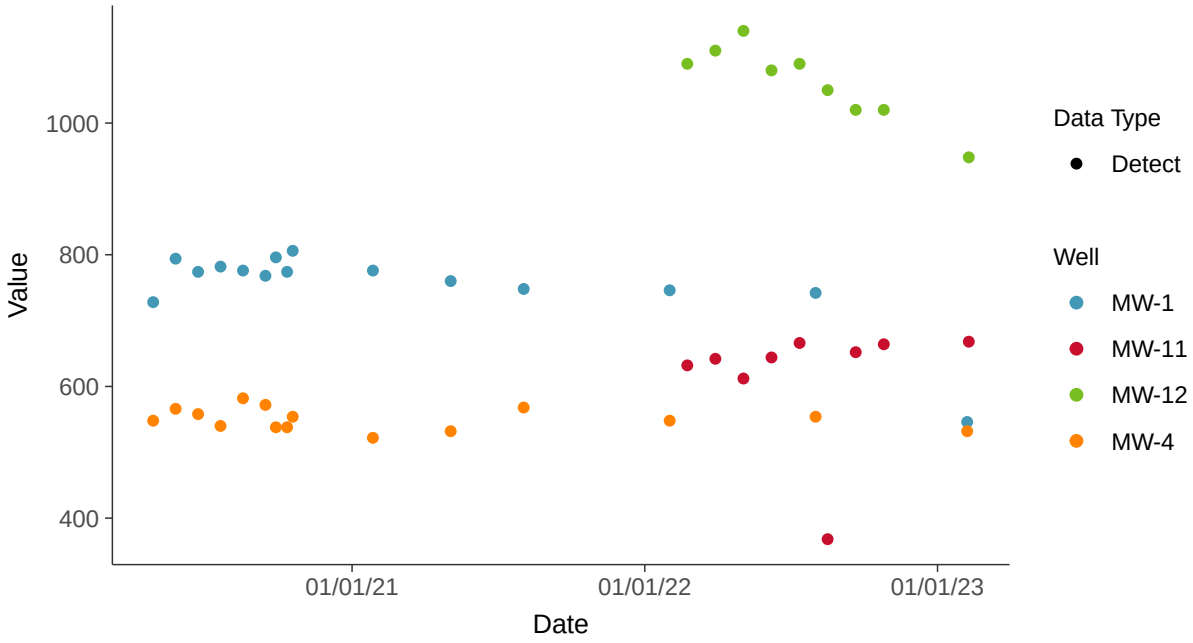
Scatter Plot

Total Dissolved Solids, MW-1, MW-4, MW-11, MW-12 (mg/L)



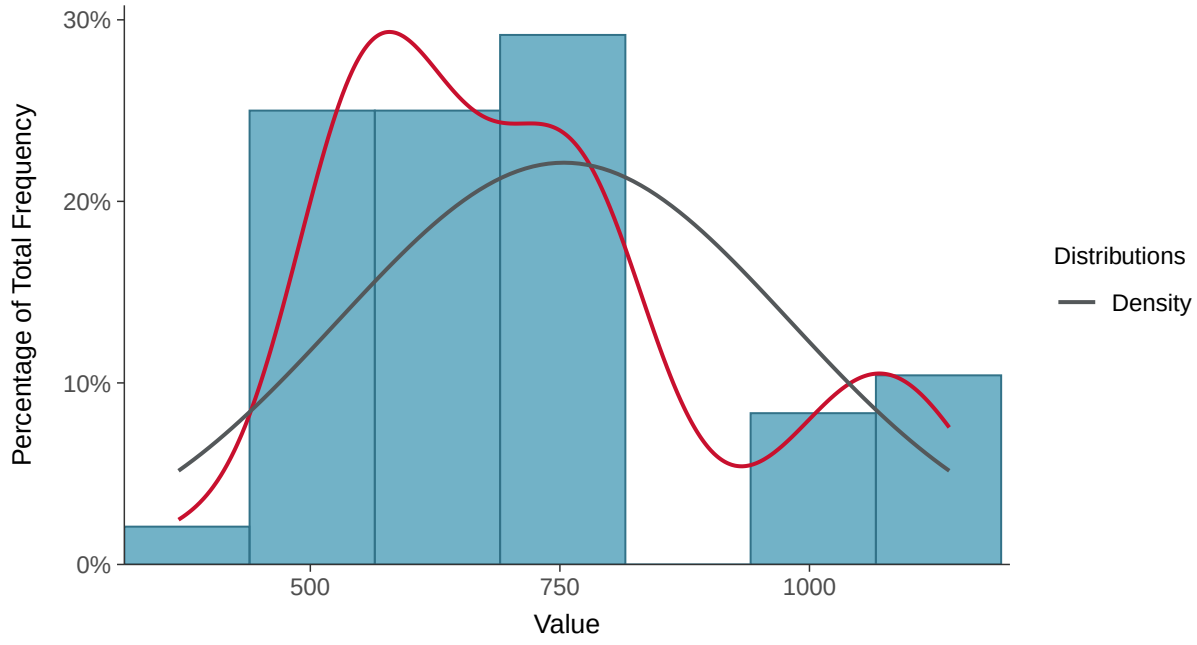
Scatter Plot by Well

Total Dissolved Solids, MW-1, MW-4, MW-11, MW-12 (mg/L)



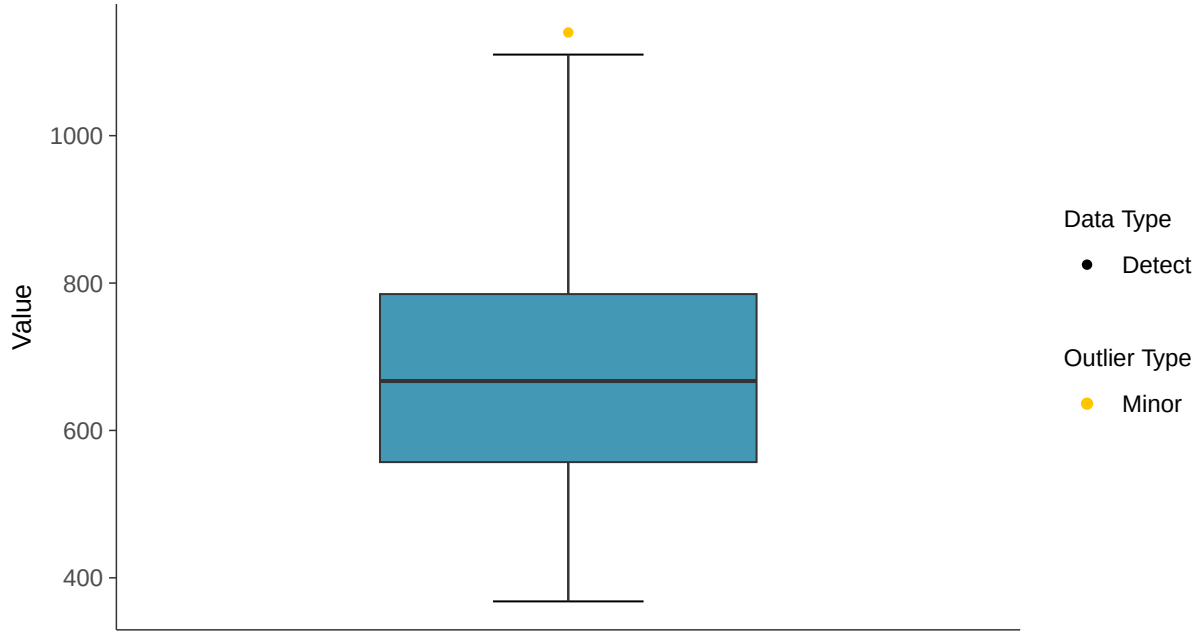
Histogram

Total Dissolved Solids, MW-1, MW-4, MW-11, MW-12 (mg/L)



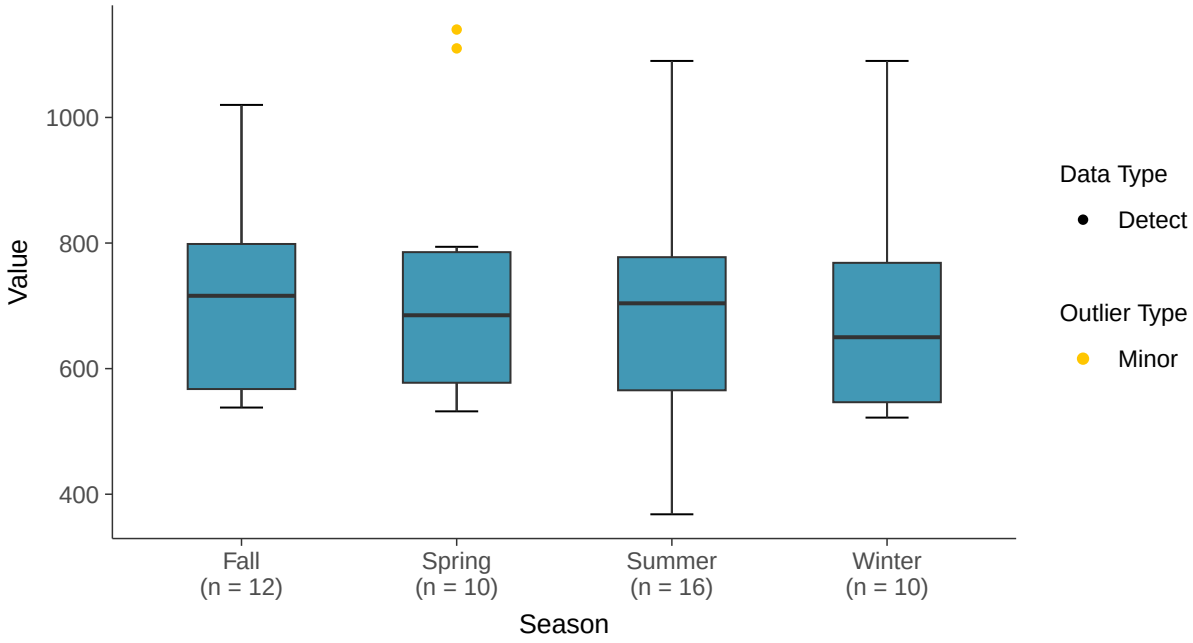
Boxplot

Total Dissolved Solids, MW-1, MW-4, MW-11, MW-12 (mg/L)



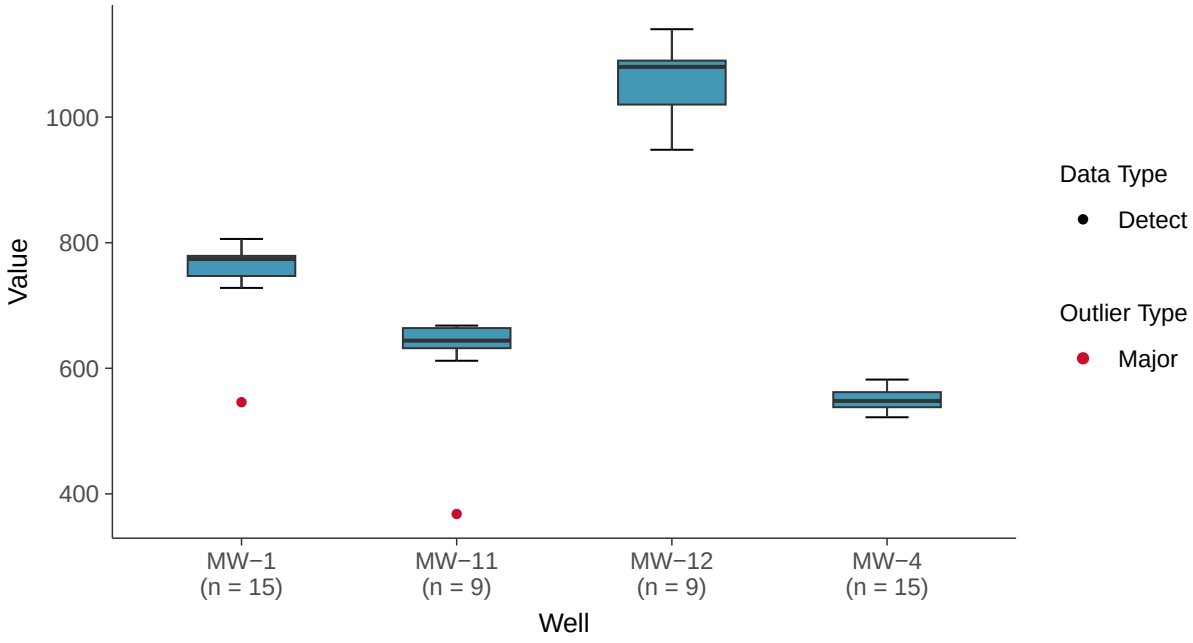
Boxplot by Season

Total Dissolved Solids, MW-1, MW-4, MW-11, MW-12 (mg/L)



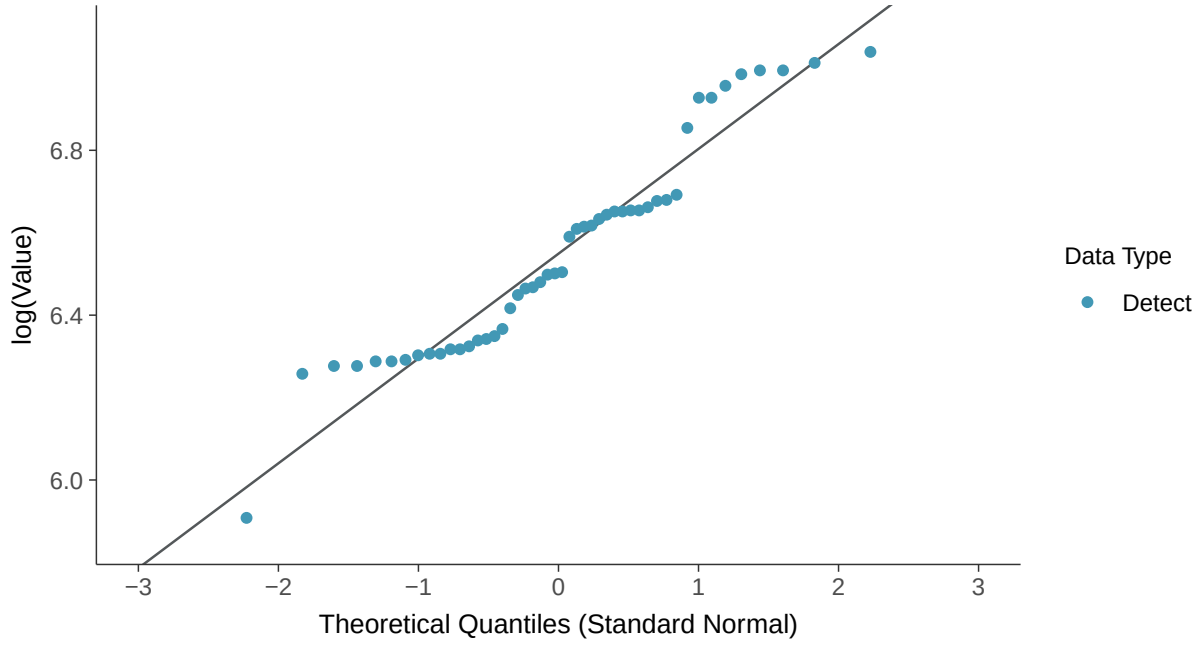
Boxplot by Well

Total Dissolved Solids, MW-1, MW-4, MW-11, MW-12 (mg/L)



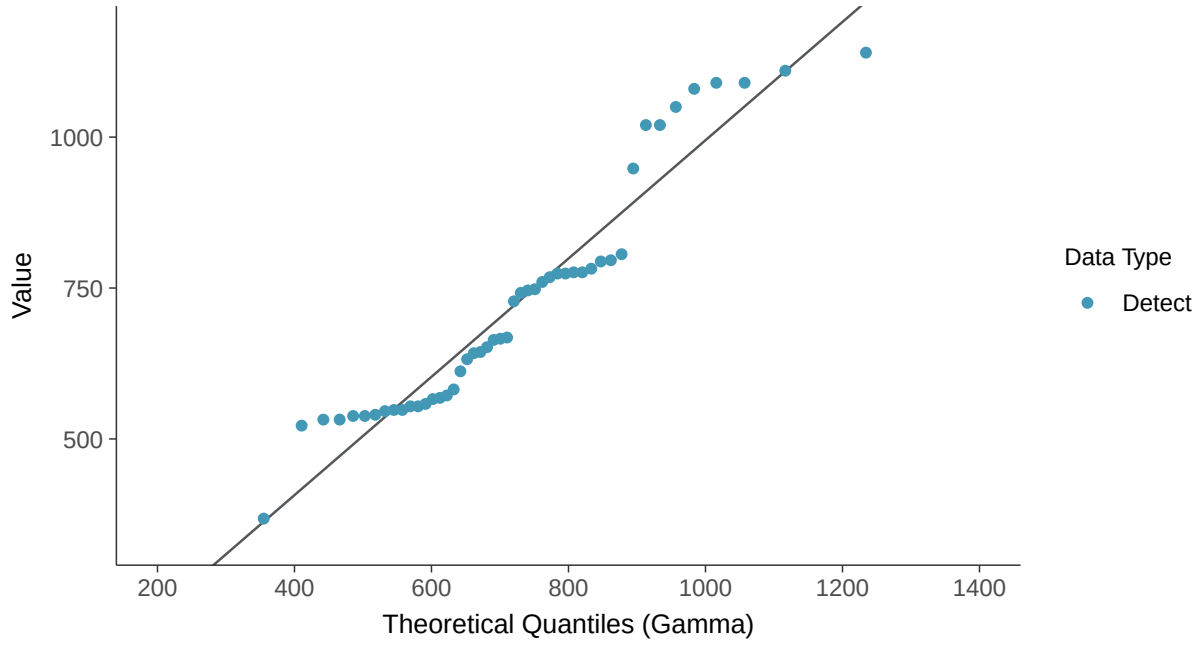
Lognormal Q-Q plot

Total Dissolved Solids, MW-1, MW-4, MW-11, MW-12 (mg/L)



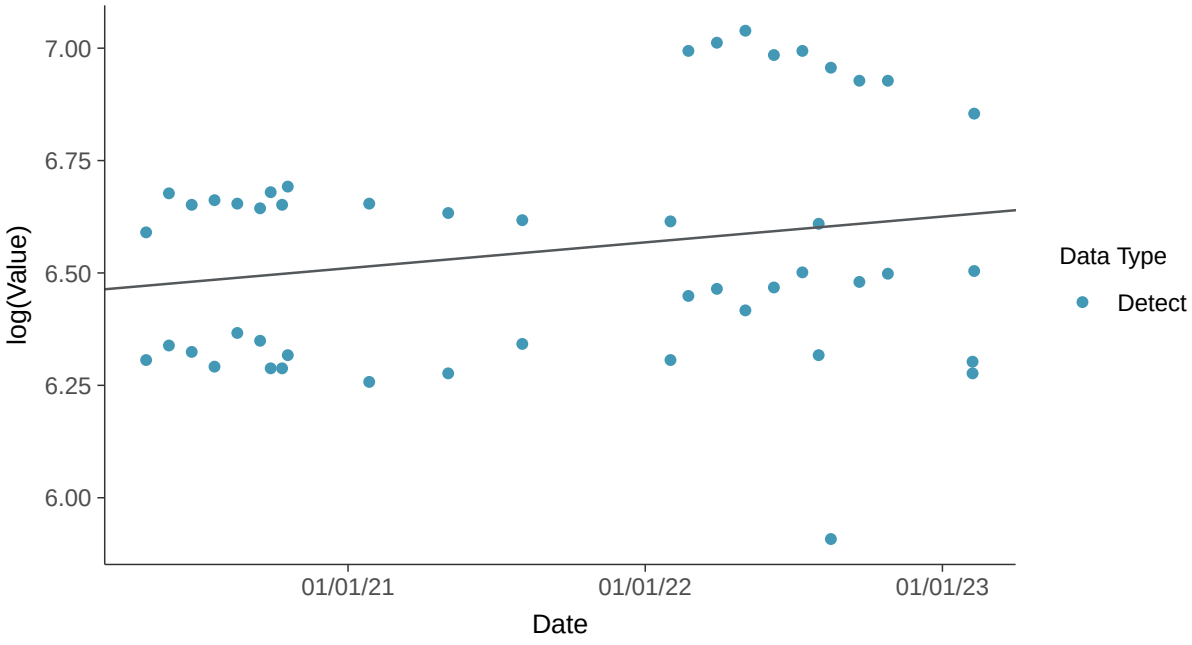
Gamma Q-Q plot

Total Dissolved Solids, MW-1, MW-4, MW-11, MW-12 (mg/L)



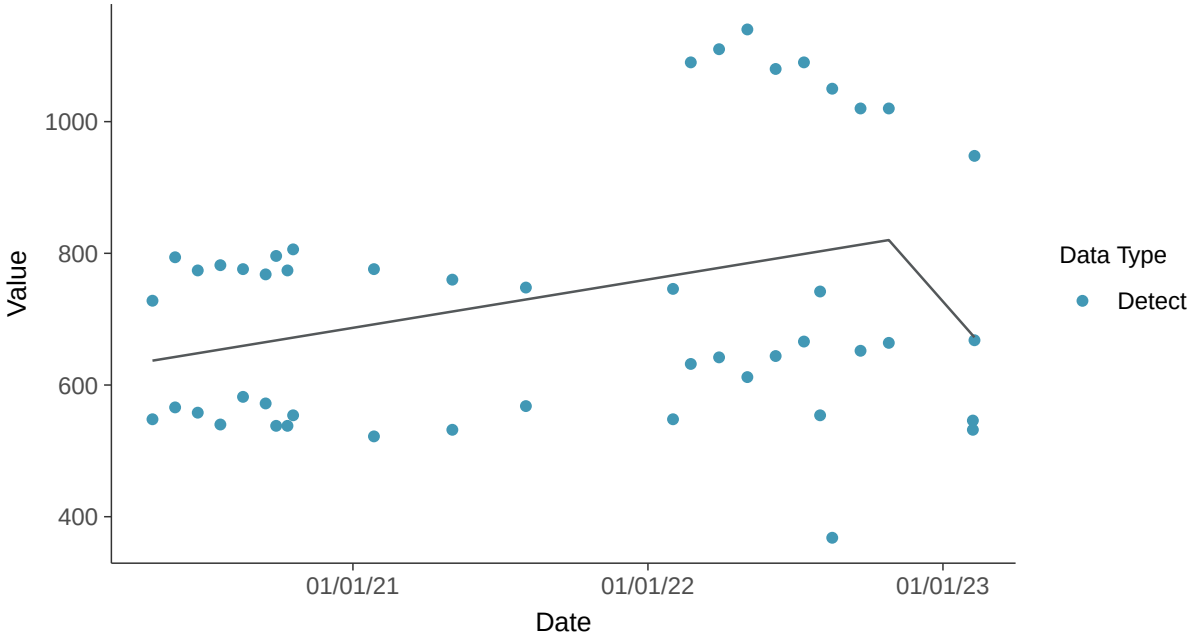
Trend Regression: Lognormal MLE

Total Dissolved Solids, MW-1, MW-4, MW-11, MW-12 (mg/L)



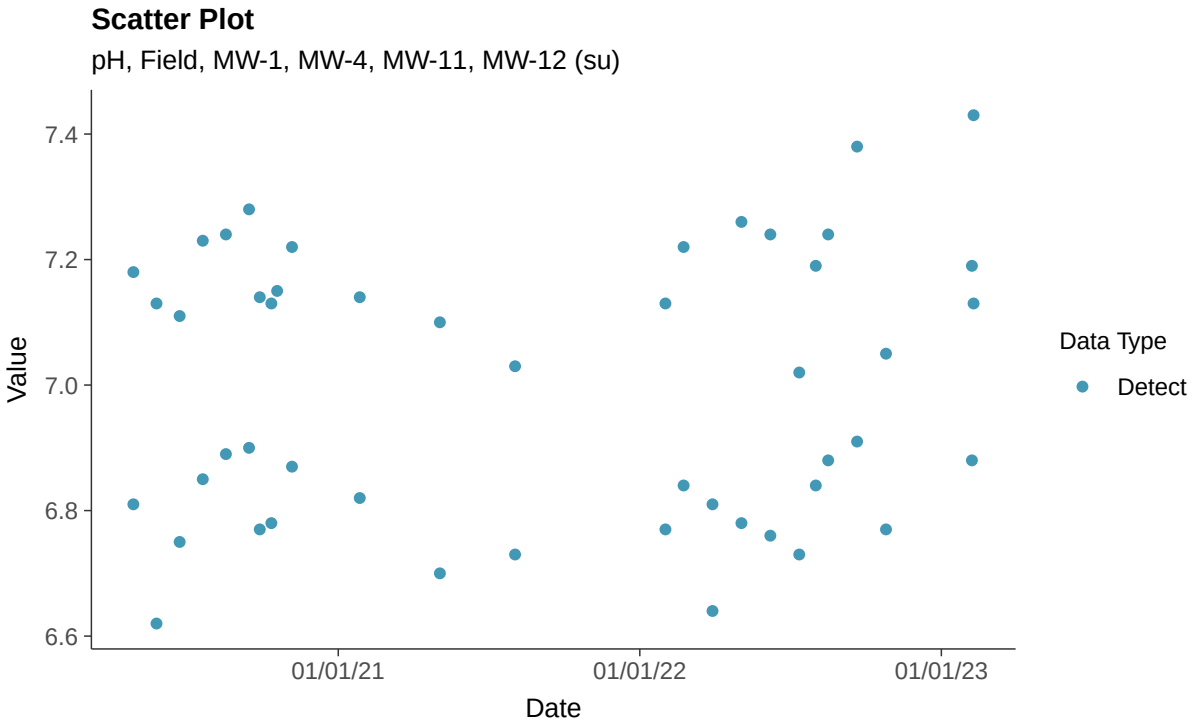
Trend Regression: Piecewise Linear-Linear

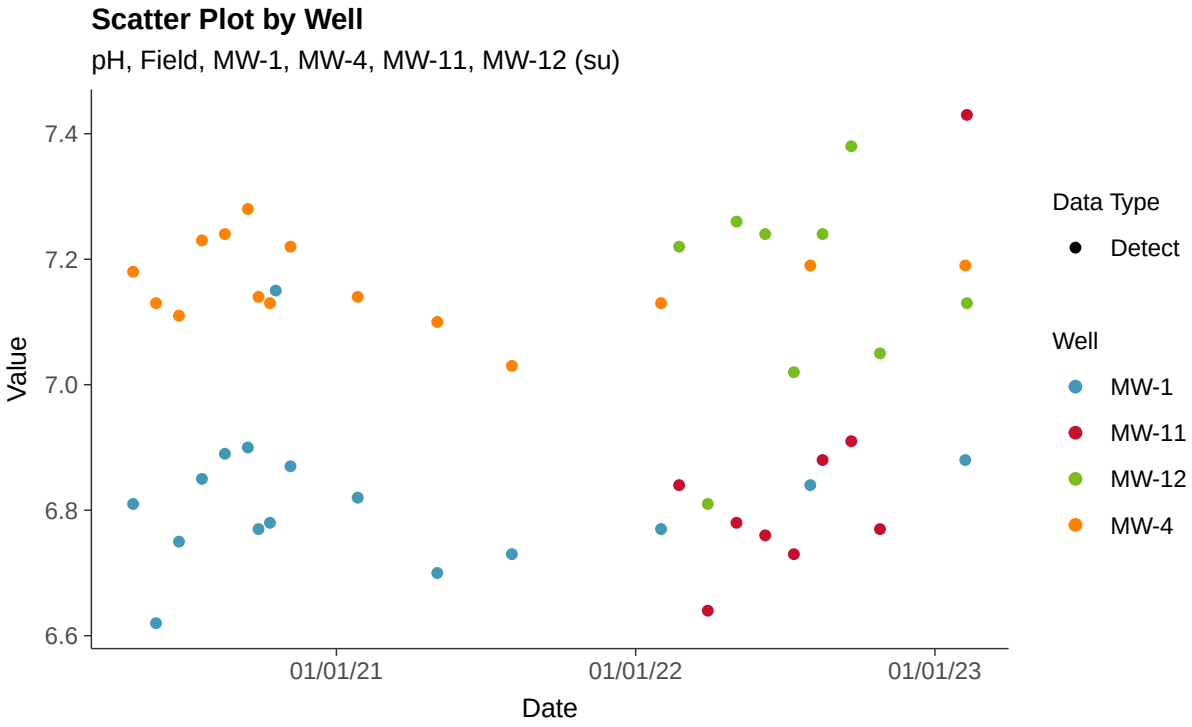
Total Dissolved Solids, MW-1, MW-4, MW-11, MW-12 (mg/L)



Appendix III: pH, Field, MW-1, MW-4, MW-11, MW-12

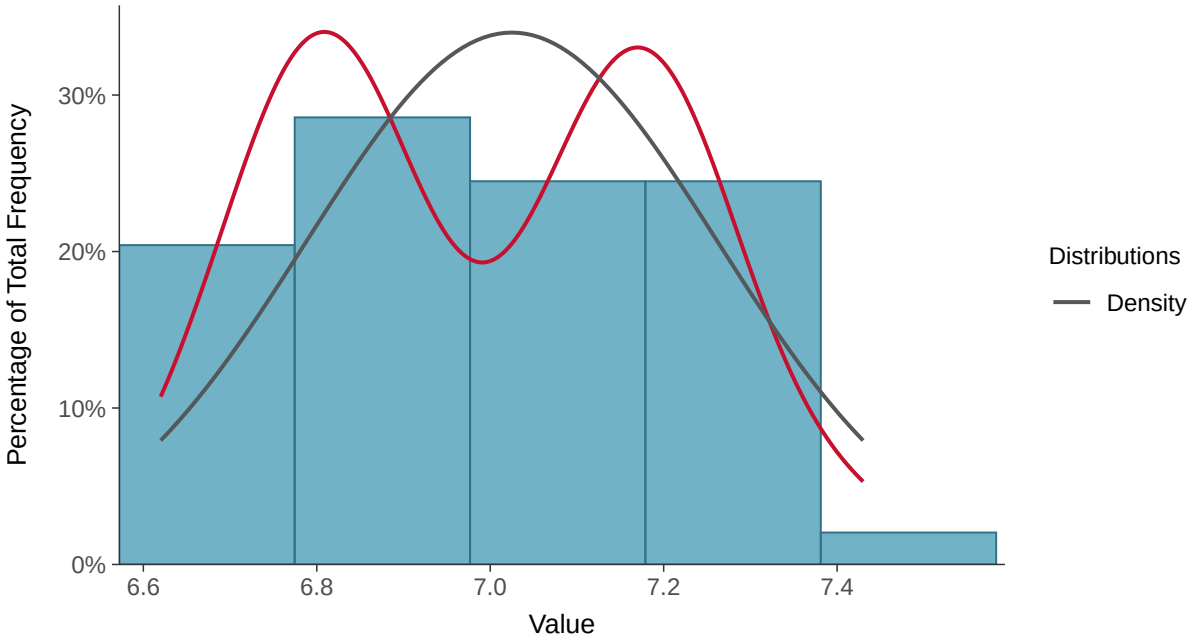
ID: 1_07





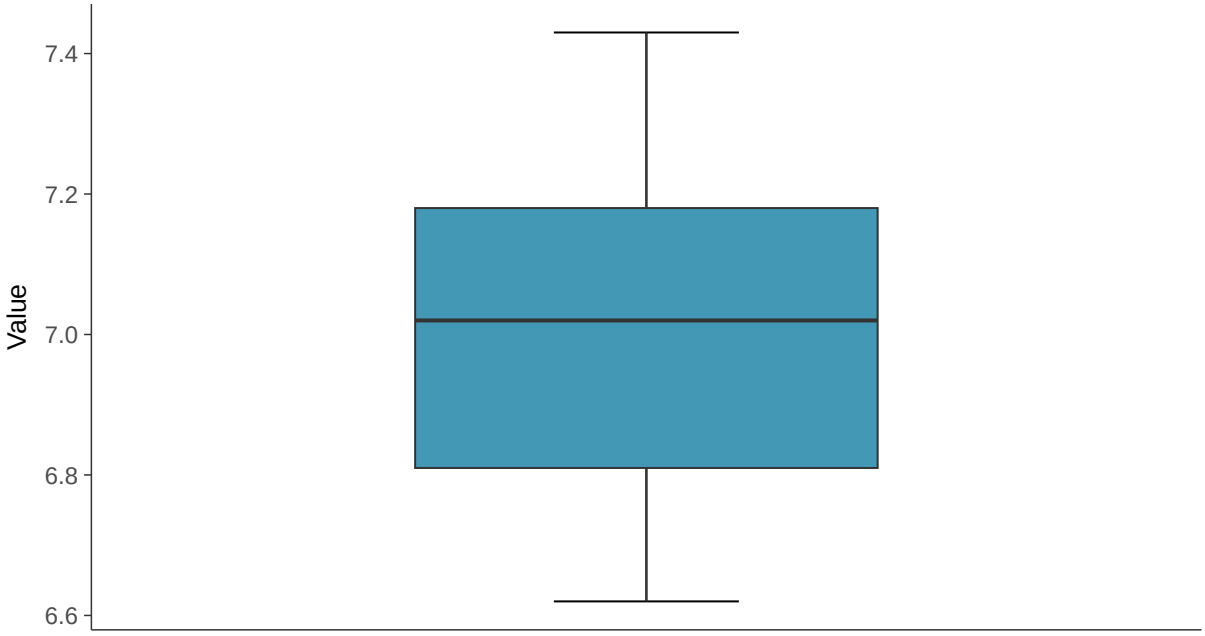
Histogram

pH, Field, MW-1, MW-4, MW-11, MW-12 (su)



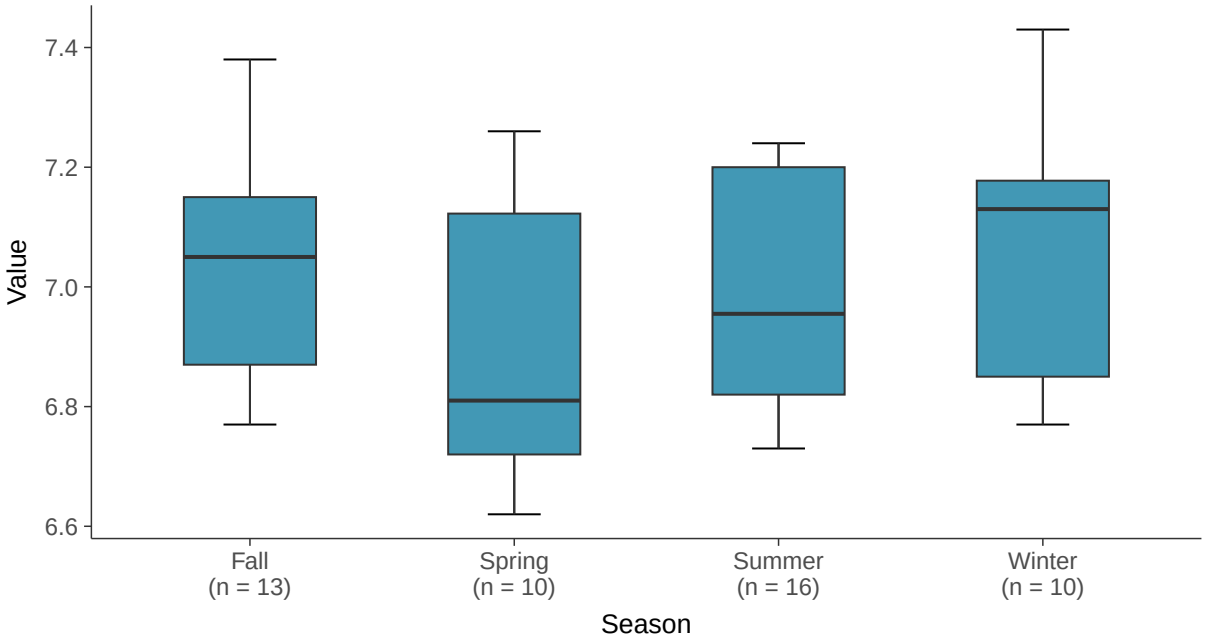
Boxplot

pH, Field, MW-1, MW-4, MW-11, MW-12 (su)



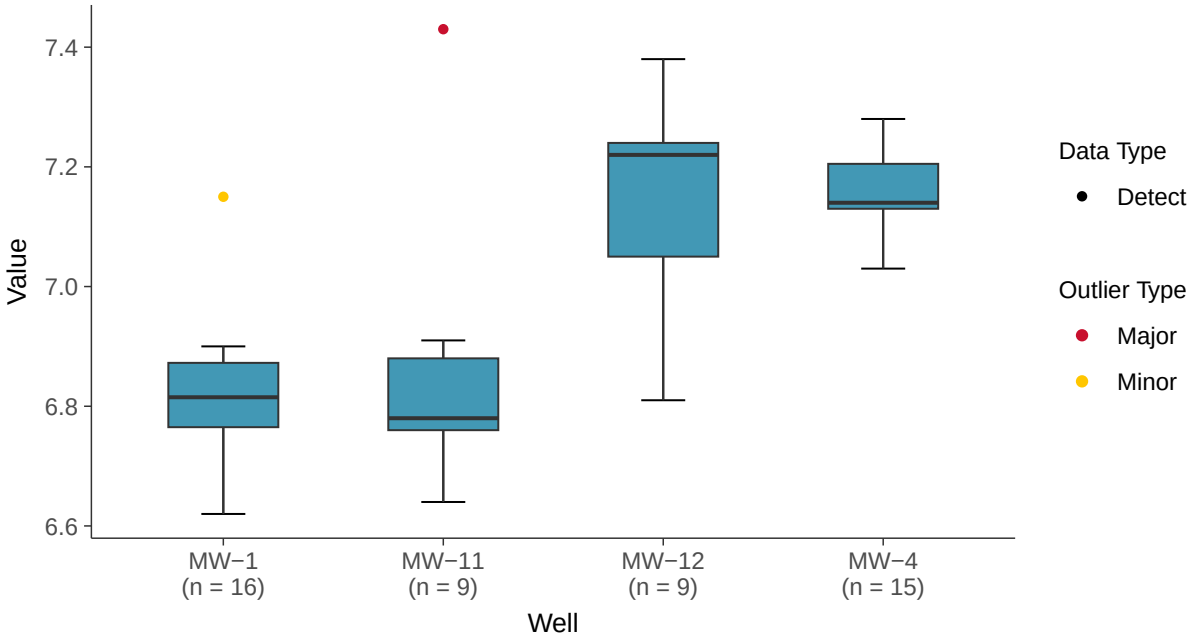
Boxplot by Season

pH, Field, MW-1, MW-4, MW-11, MW-12 (su)



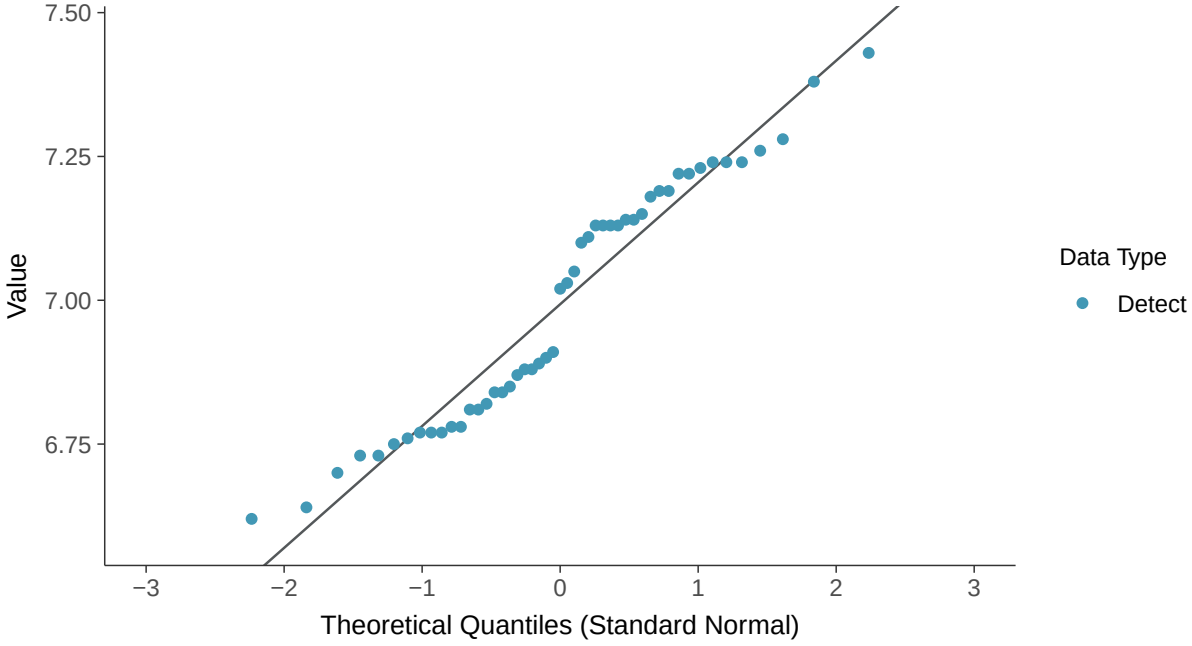
Boxplot by Well

pH, Field, MW-1, MW-4, MW-11, MW-12 (su)



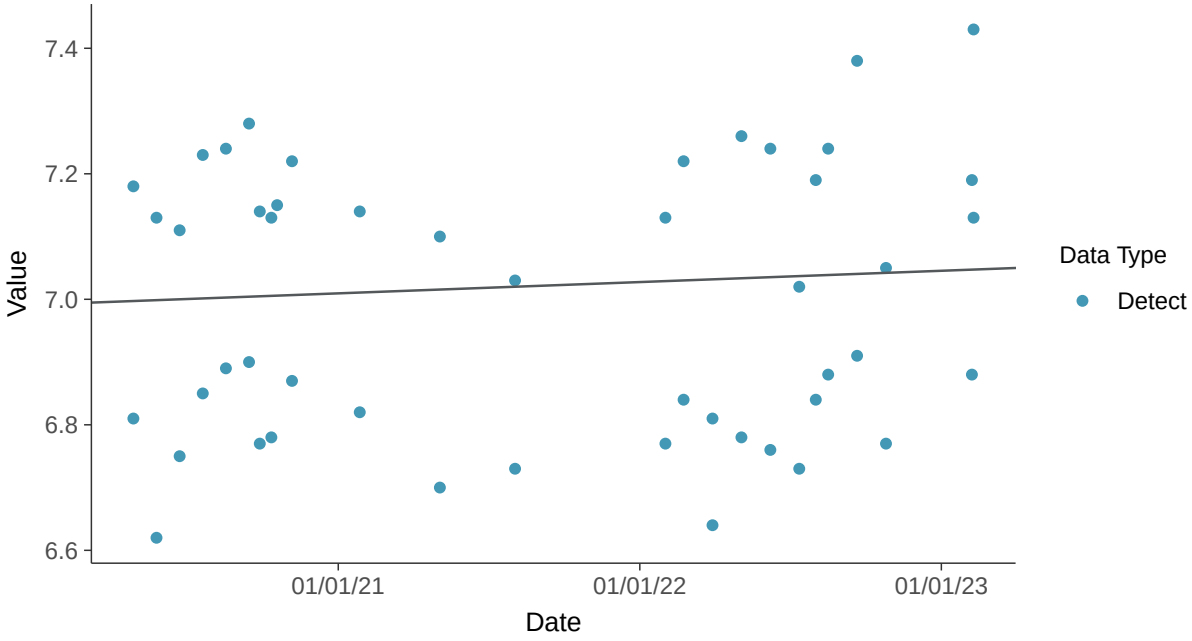
Normal Q-Q plot

pH, Field, MW-1, MW-4, MW-11, MW-12 (su)



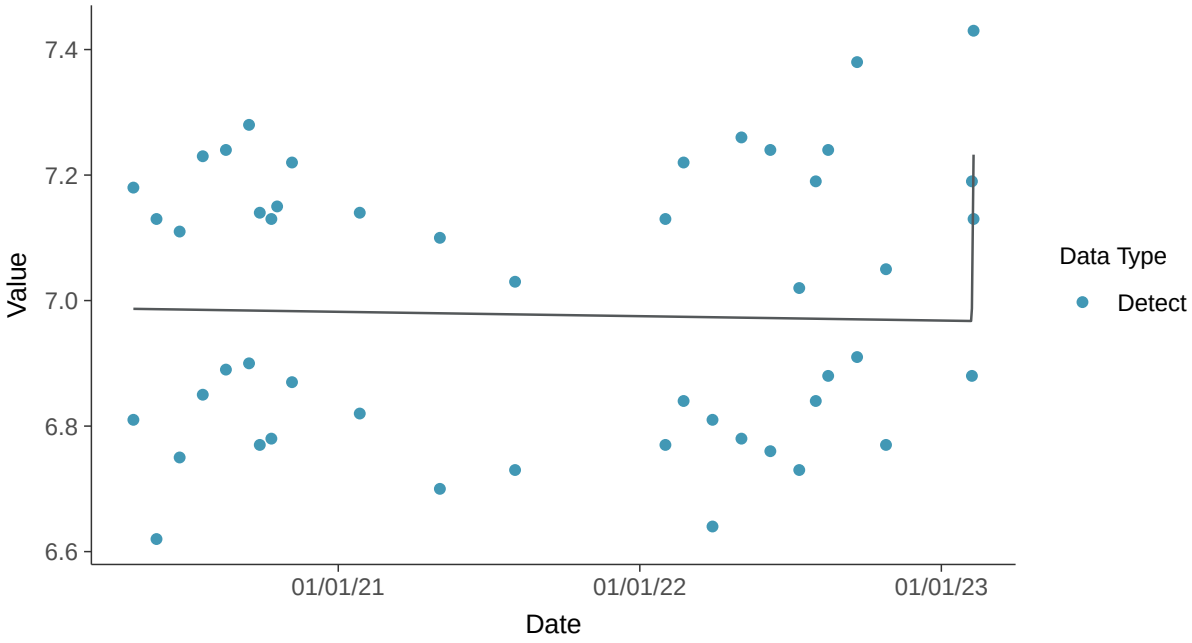
Trend Regression: Mann-Kendall/Theil-Sen Estimate

pH, Field, MW-1, MW-4, MW-11, MW-12 (su)



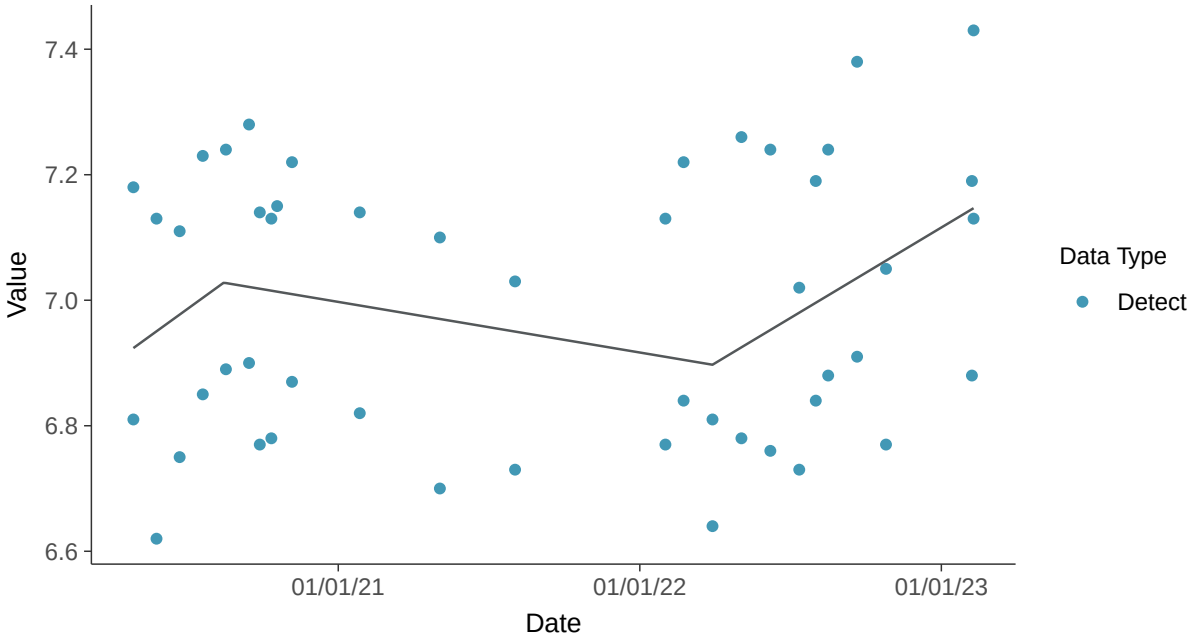
Trend Regression: Piecewise Linear-Linear

pH, Field, MW-1, MW-4, MW-11, MW-12 (su)



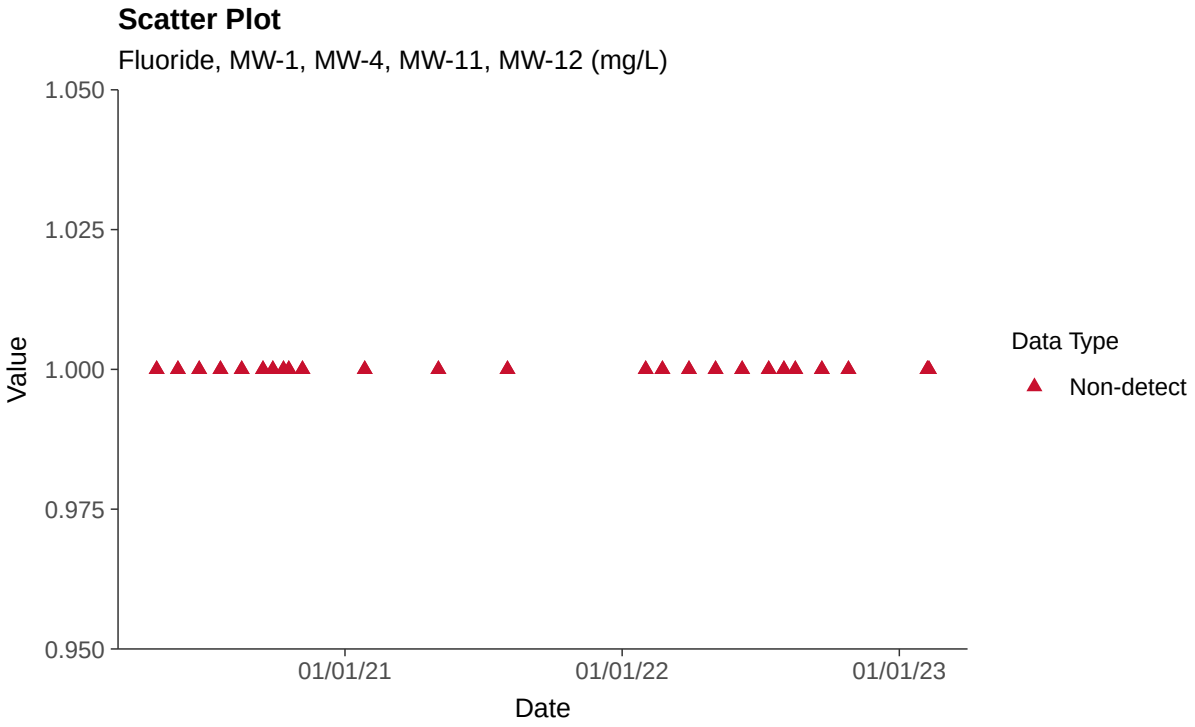
Trend Regression: Piecewise Linear-Linear-Linear

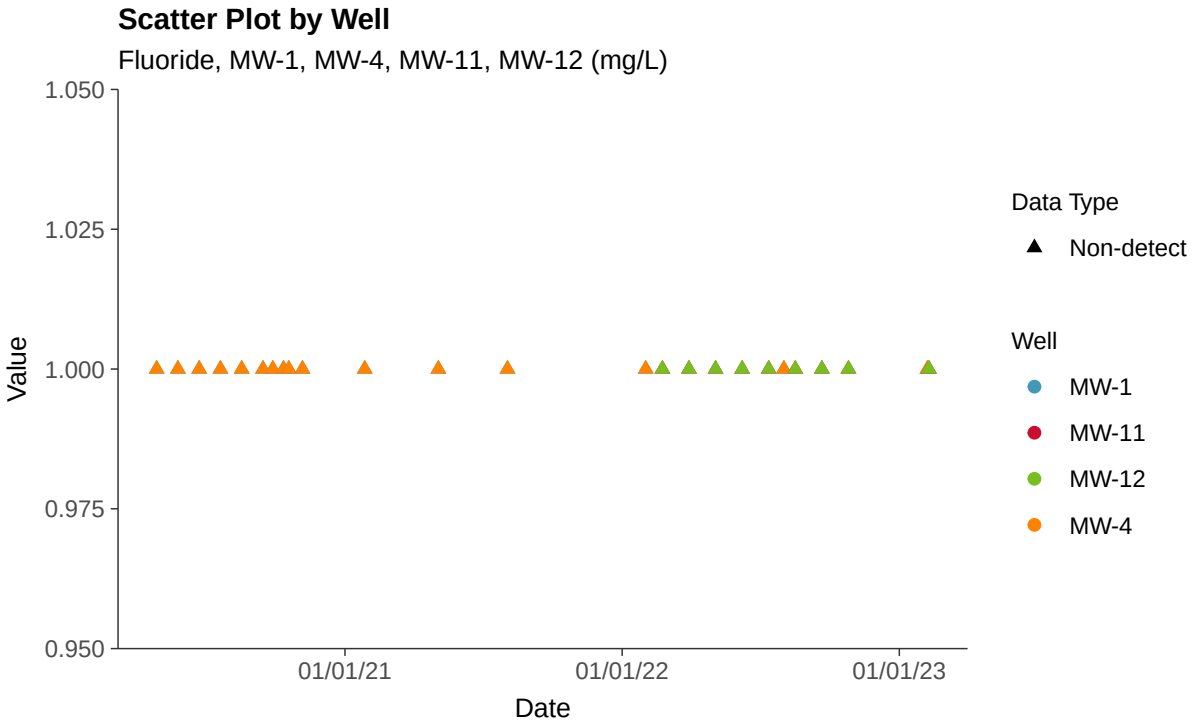
pH, Field, MW-1, MW-4, MW-11, MW-12 (su)



Appendix IV: Fluoride, MW-1, MW-4, MW-11, MW-12

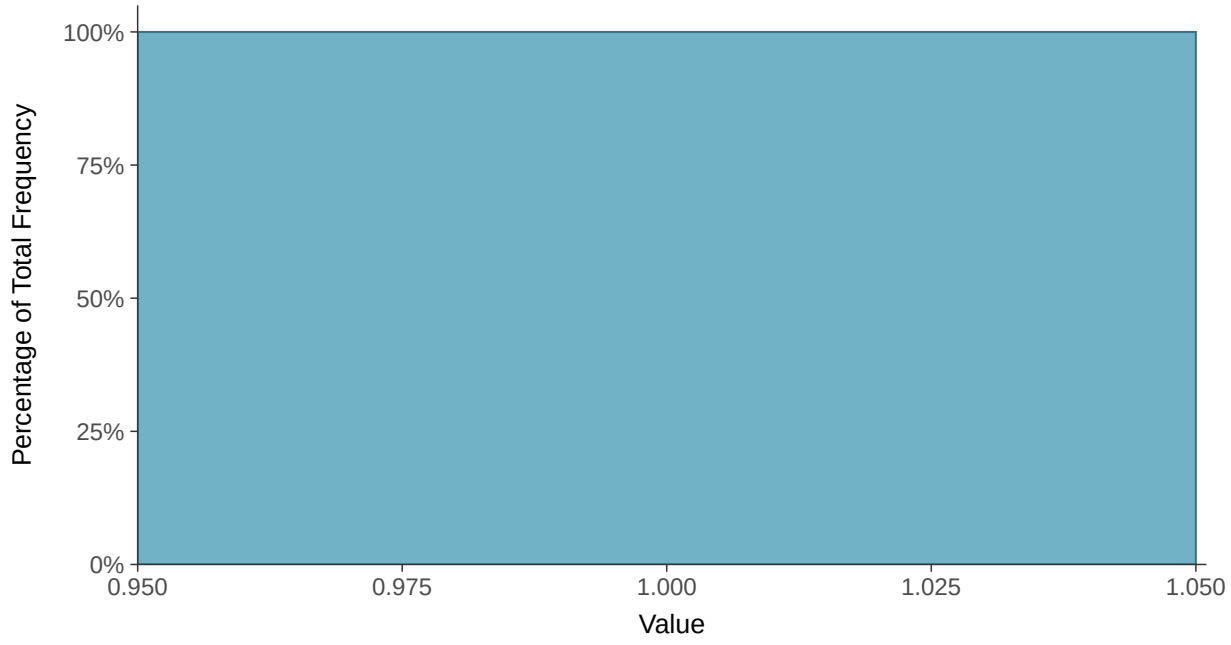
ID: 2_04





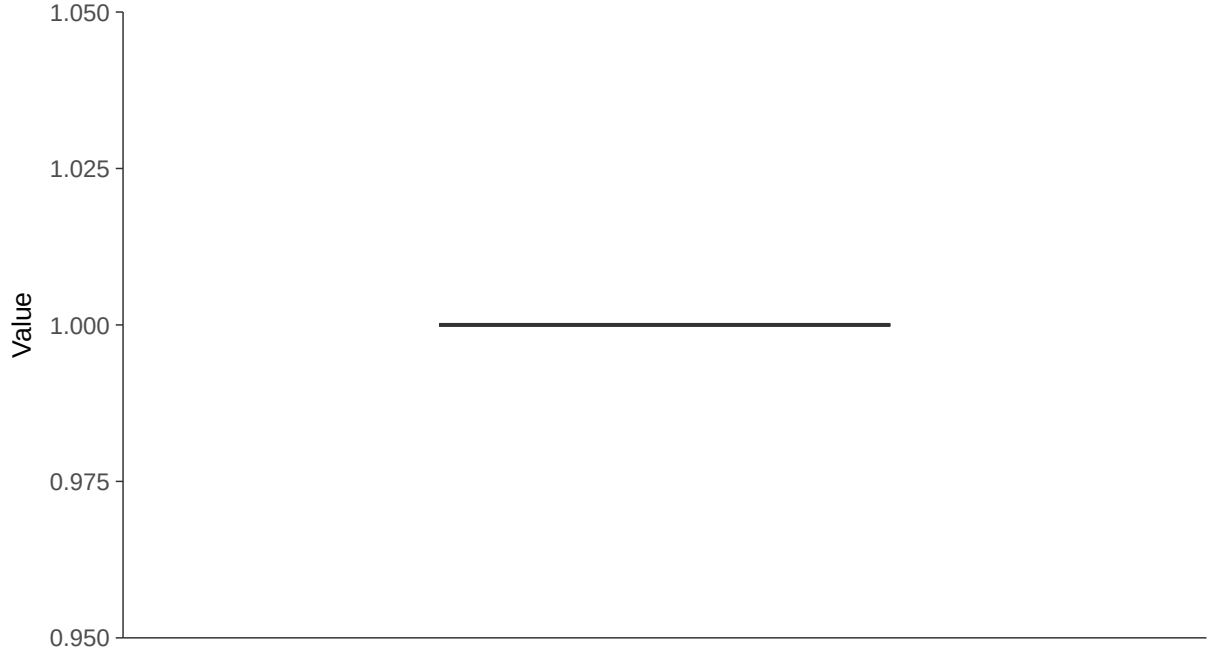
Histogram

Fluoride, MW-1, MW-4, MW-11, MW-12 (mg/L)



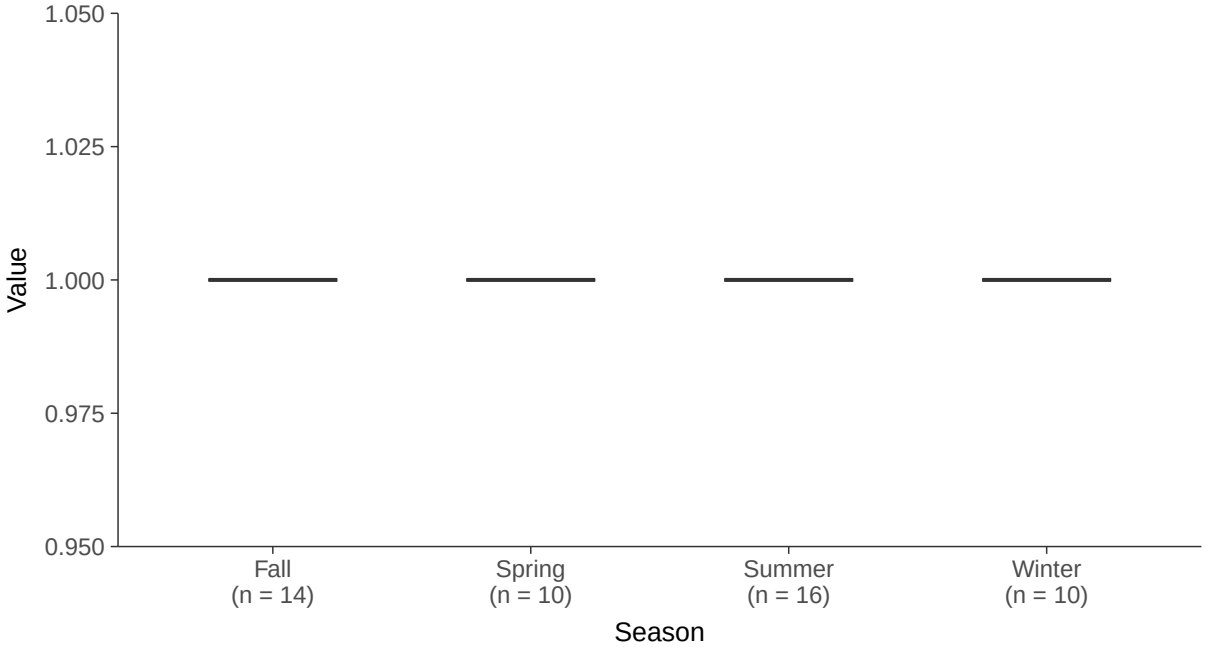
Boxplot

Fluoride, MW-1, MW-4, MW-11, MW-12 (mg/L)



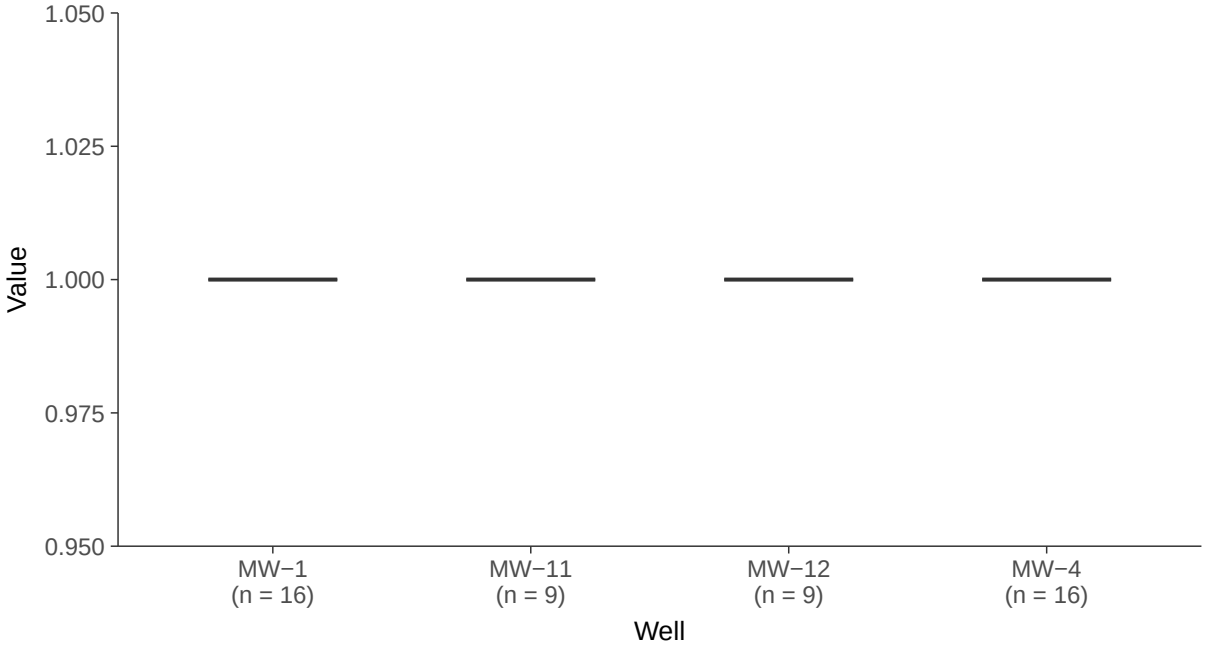
Boxplot by Season

Fluoride, MW-1, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Fluoride, MW-1, MW-4, MW-11, MW-12 (mg/L)

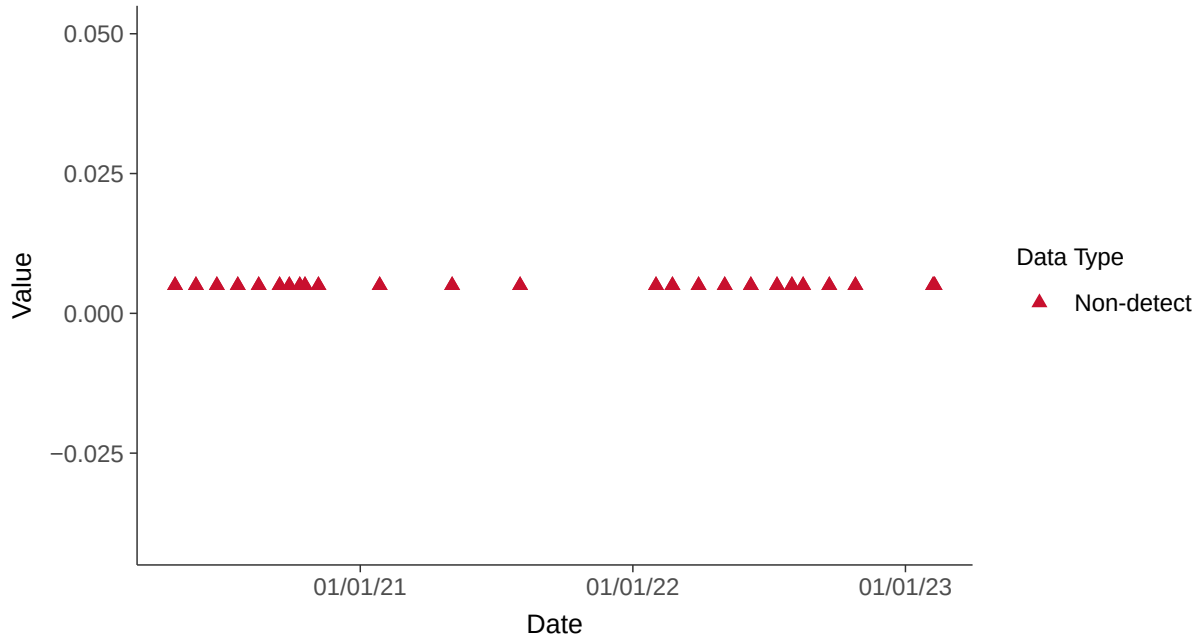


Appendix IV: Antimony, MW-1, MW-4, MW-11, MW-12

ID: 2_08

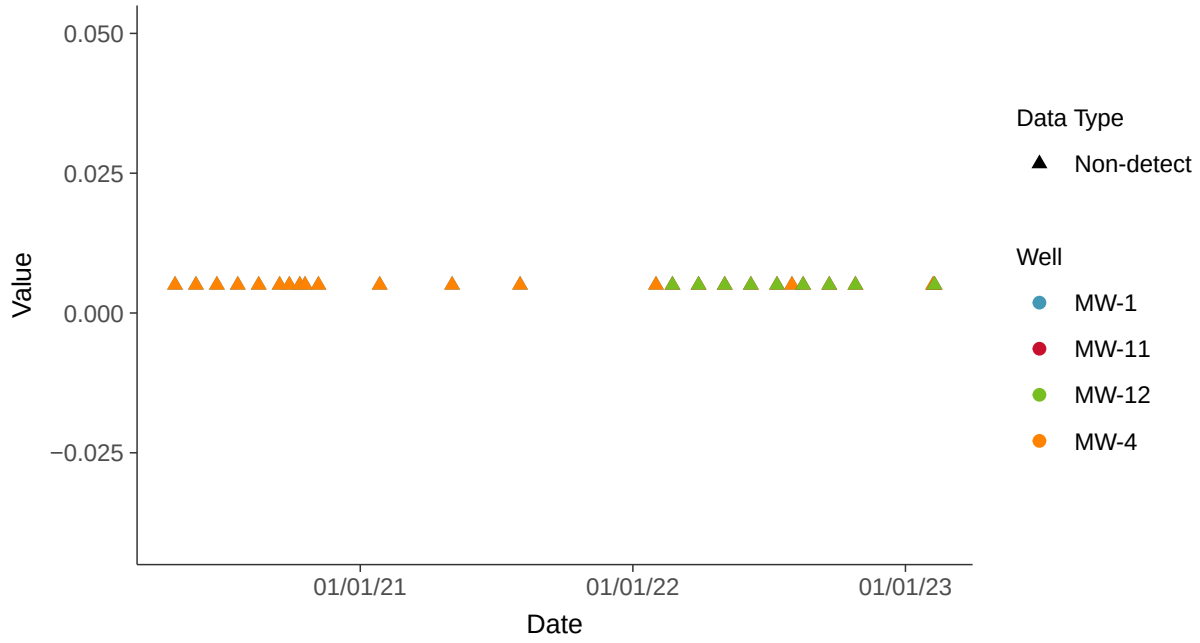
Scatter Plot

Antimony, MW-1, MW-4, MW-11, MW-12 (mg/L)



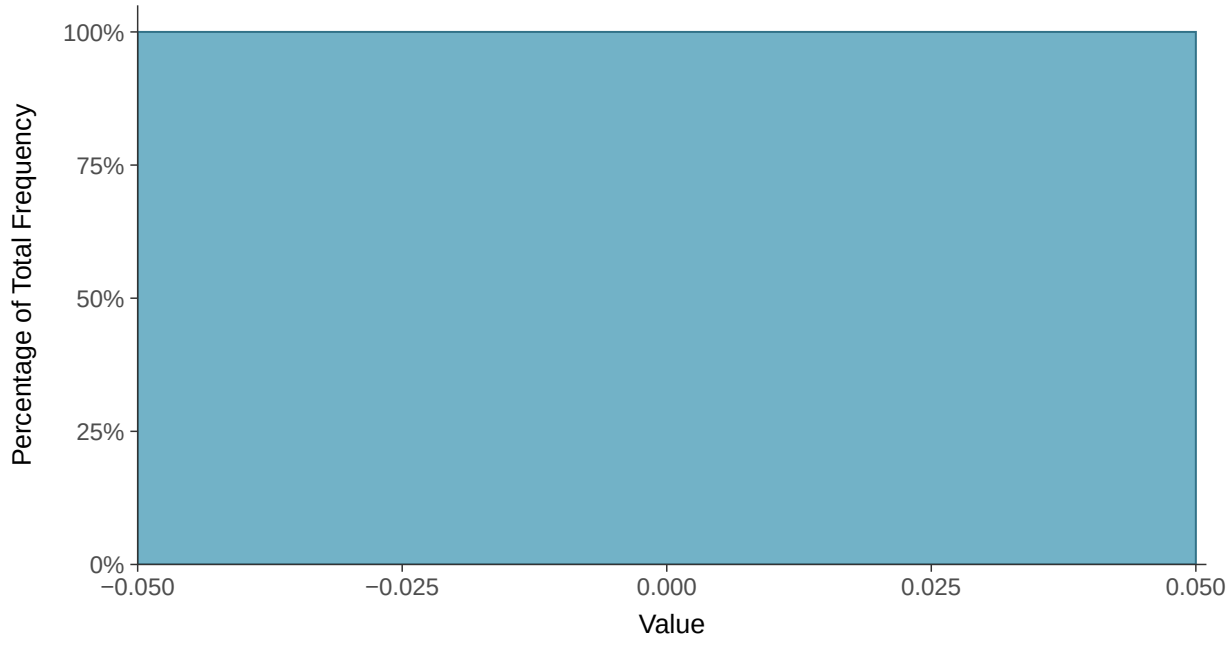
Scatter Plot by Well

Antimony, MW-1, MW-4, MW-11, MW-12 (mg/L)



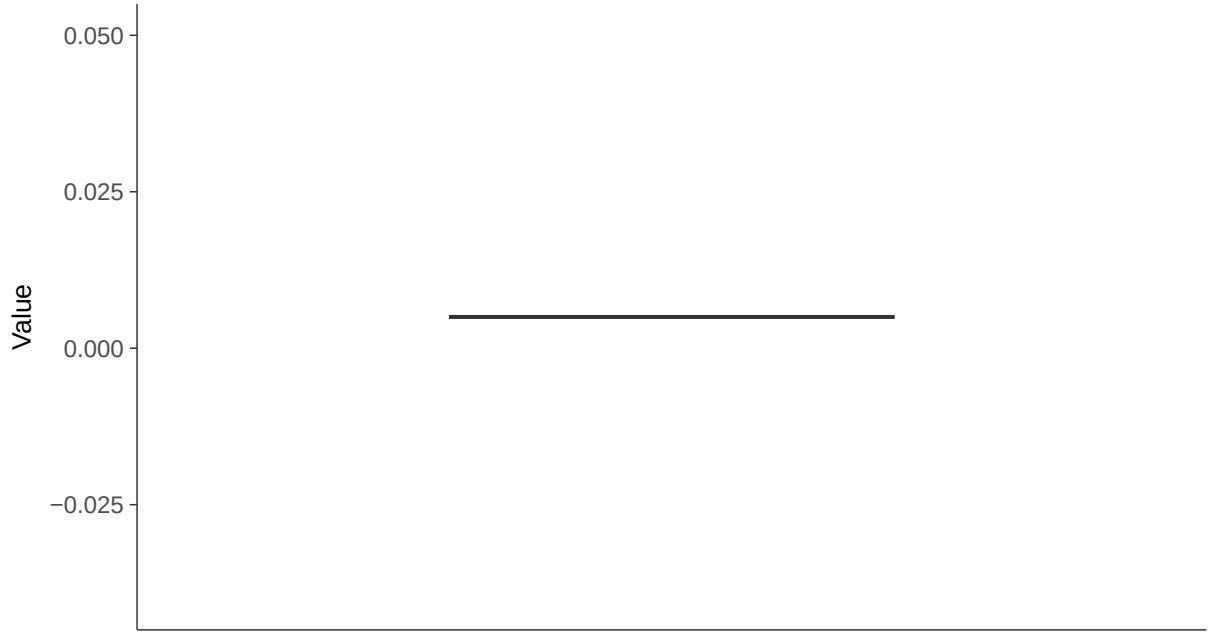
Histogram

Antimony, MW-1, MW-4, MW-11, MW-12 (mg/L)



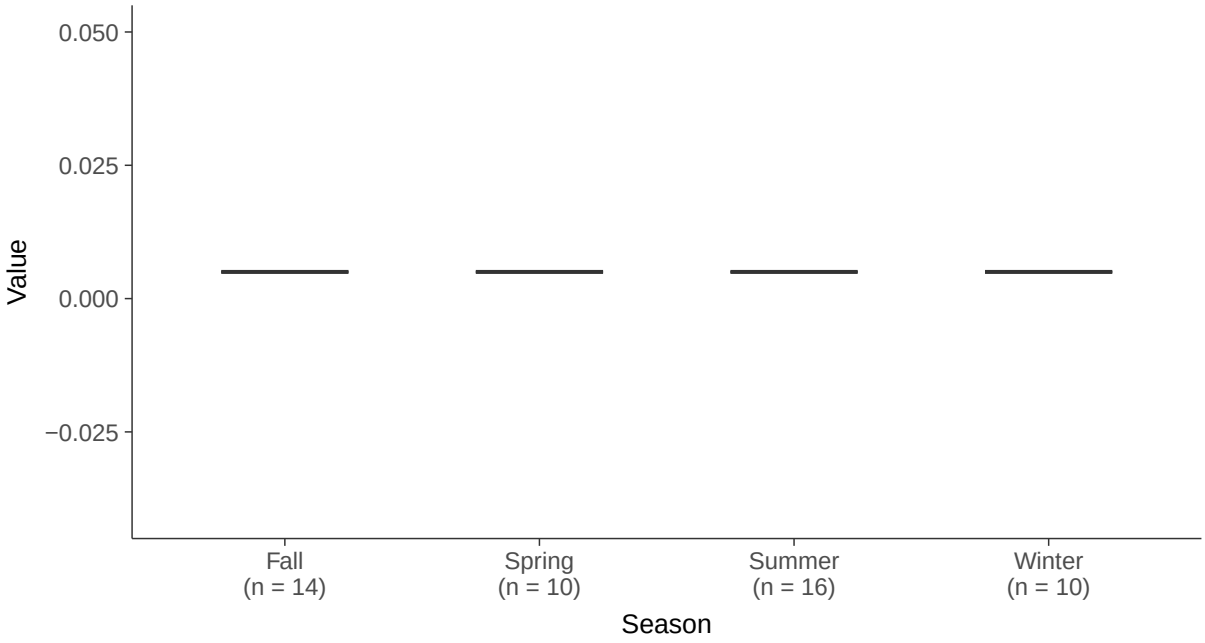
Boxplot

Antimony, MW-1, MW-4, MW-11, MW-12 (mg/L)



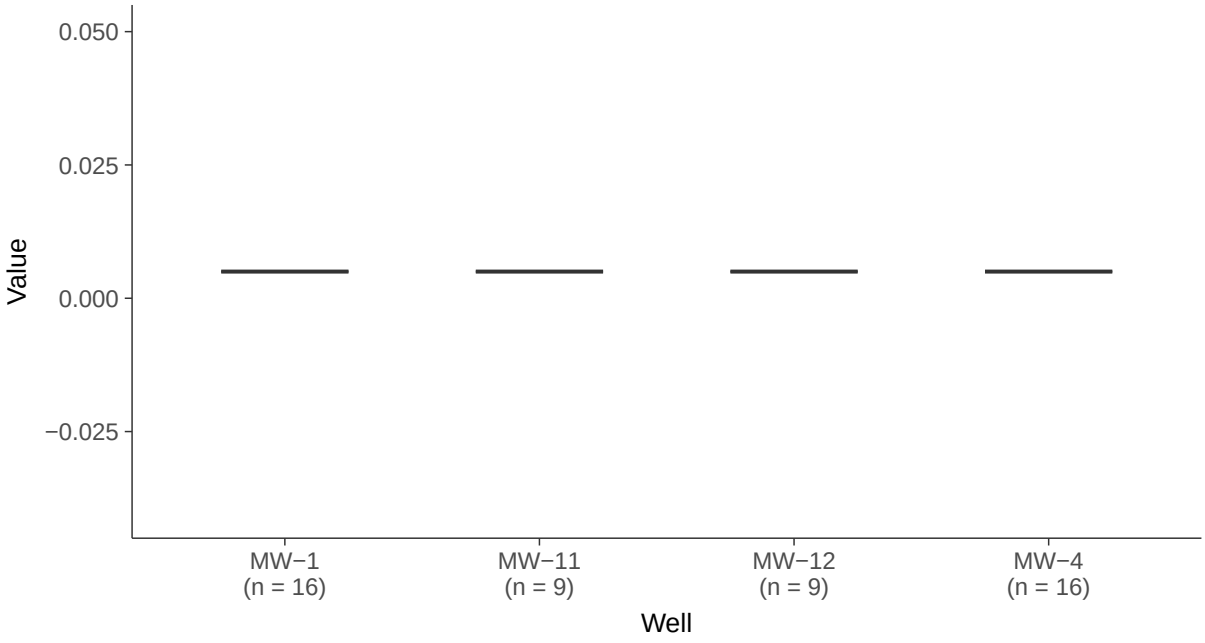
Boxplot by Season

Antimony, MW-1, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Antimony, MW-1, MW-4, MW-11, MW-12 (mg/L)

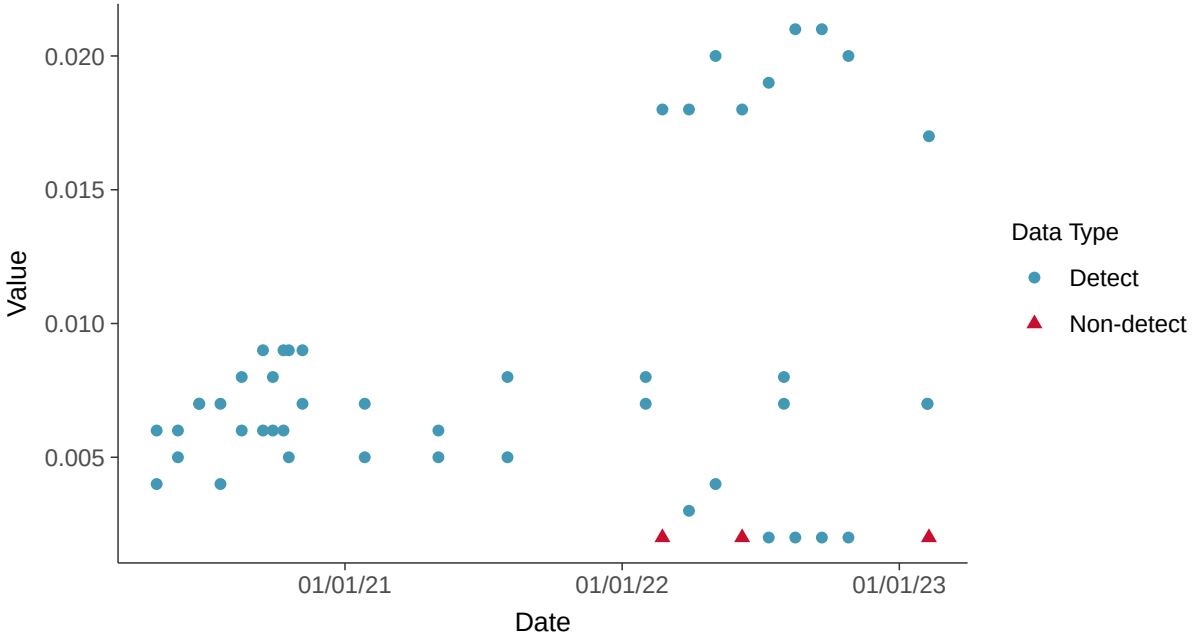


Appendix IV: Arsenic, MW-1, MW-4, MW-11, MW-12

ID: 2_09

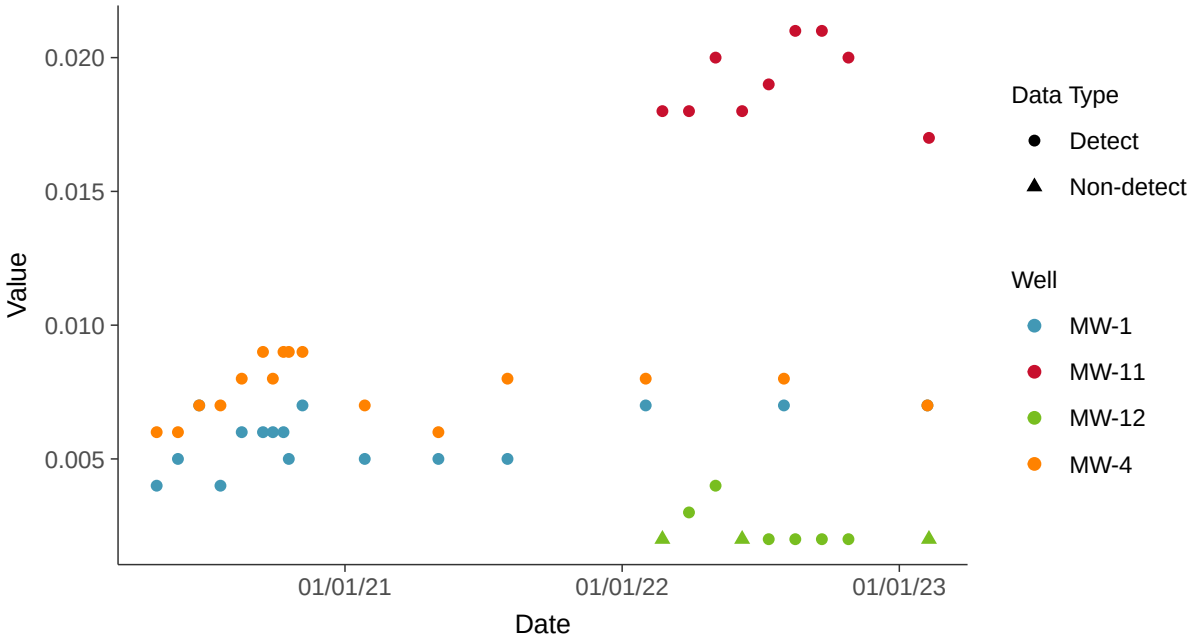
Scatter Plot

Arsenic, MW-1, MW-4, MW-11, MW-12 (mg/L)



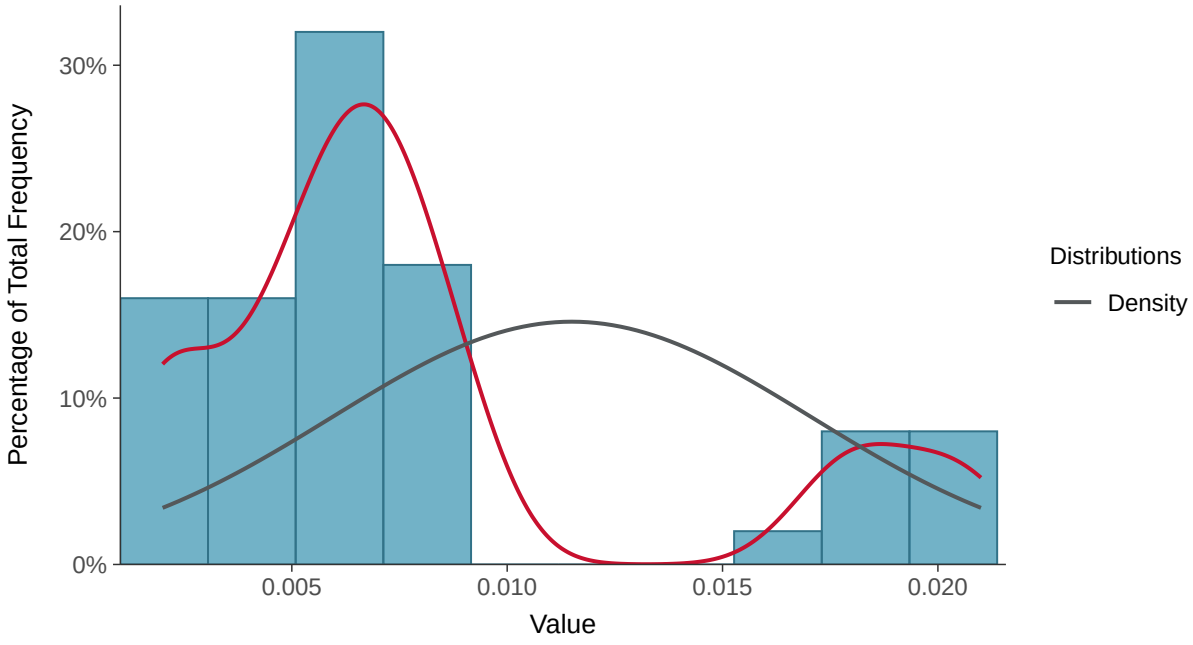
Scatter Plot by Well

Arsenic, MW-1, MW-4, MW-11, MW-12 (mg/L)



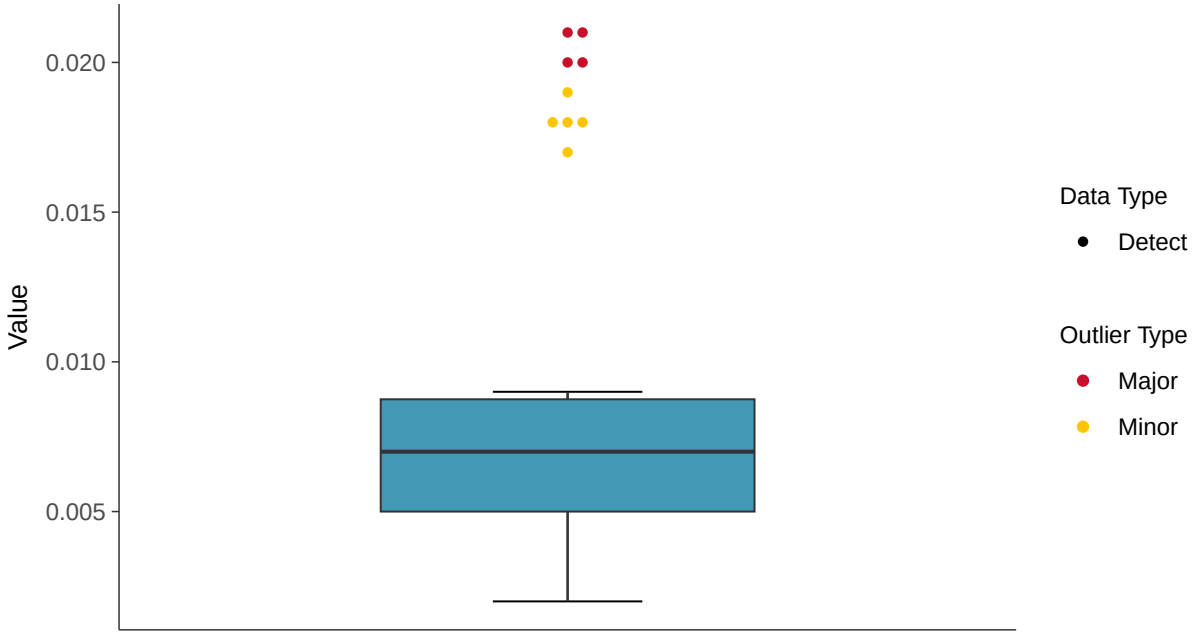
Histogram

Arsenic, MW-1, MW-4, MW-11, MW-12 (mg/L)



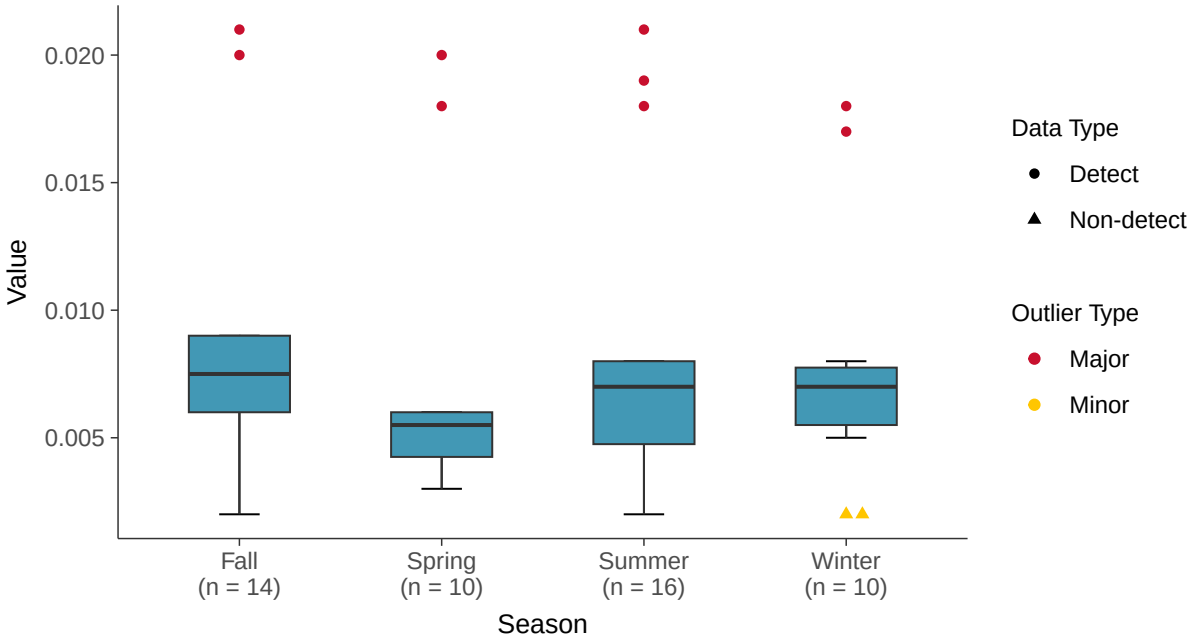
Boxplot

Arsenic, MW-1, MW-4, MW-11, MW-12 (mg/L)



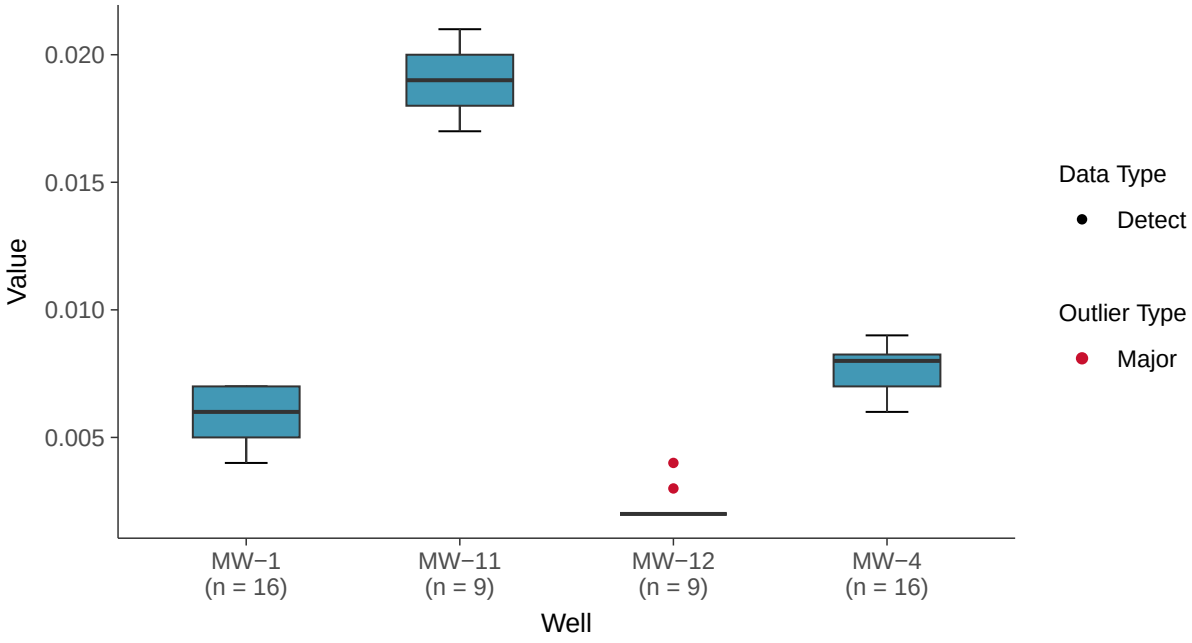
Boxplot by Season

Arsenic, MW-1, MW-4, MW-11, MW-12 (mg/L)



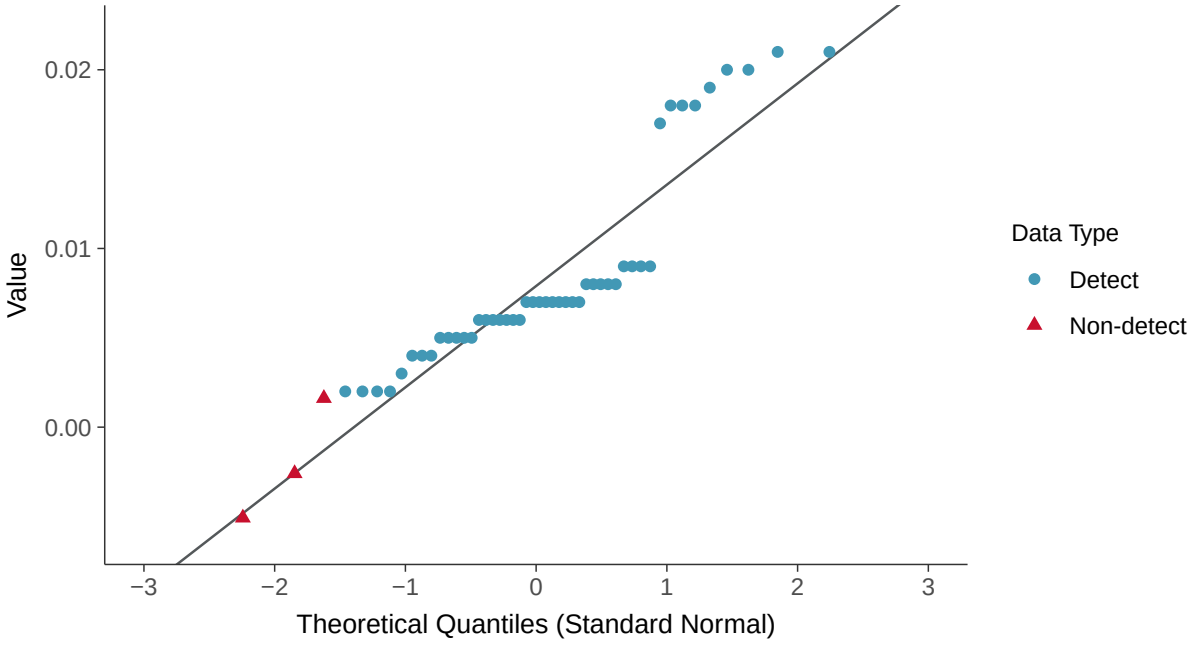
Boxplot by Well

Arsenic, MW-1, MW-4, MW-11, MW-12 (mg/L)



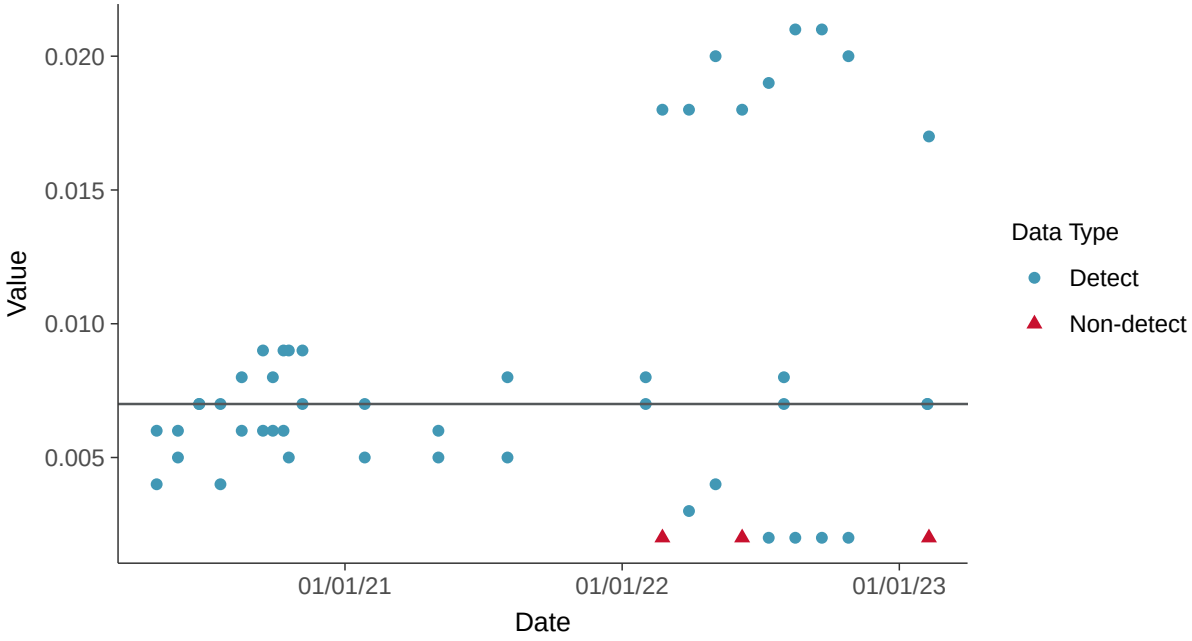
Normal Q-Q plot using ROS Imputed Estimates

Arsenic, MW-1, MW-4, MW-11, MW-12 (mg/L)



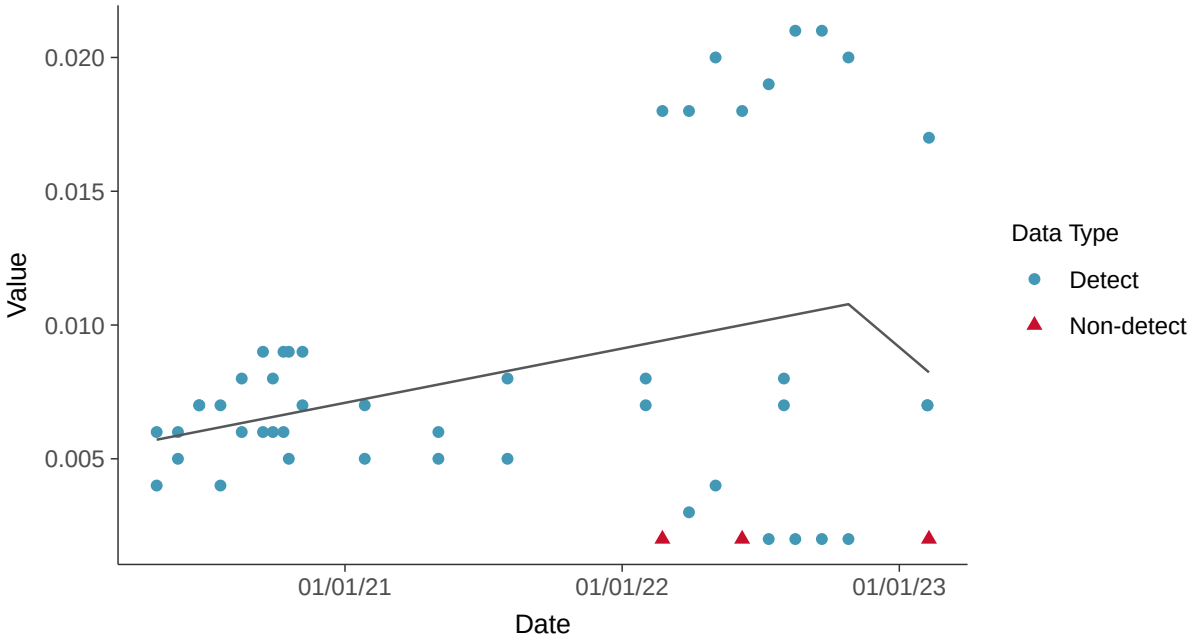
Trend Regression: Mann-Kendall/Theil-Sen Estimate

Arsenic, MW-1, MW-4, MW-11, MW-12 (mg/L)



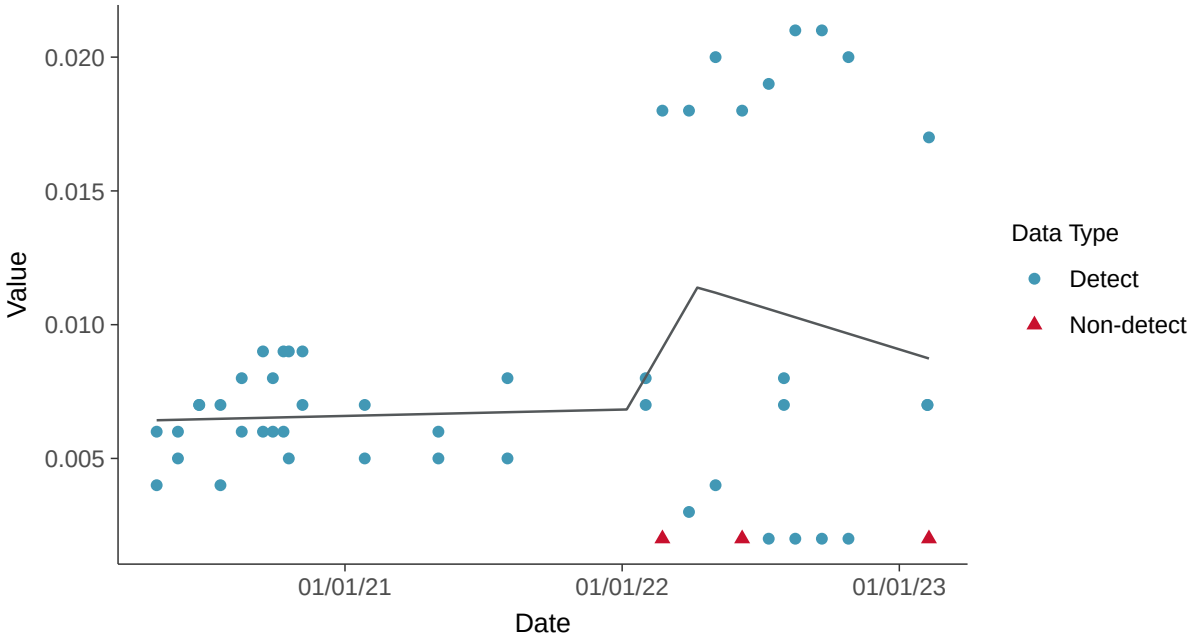
Trend Regression: Piecewise Linear-Linear

Arsenic, MW-1, MW-4, MW-11, MW-12 (mg/L)



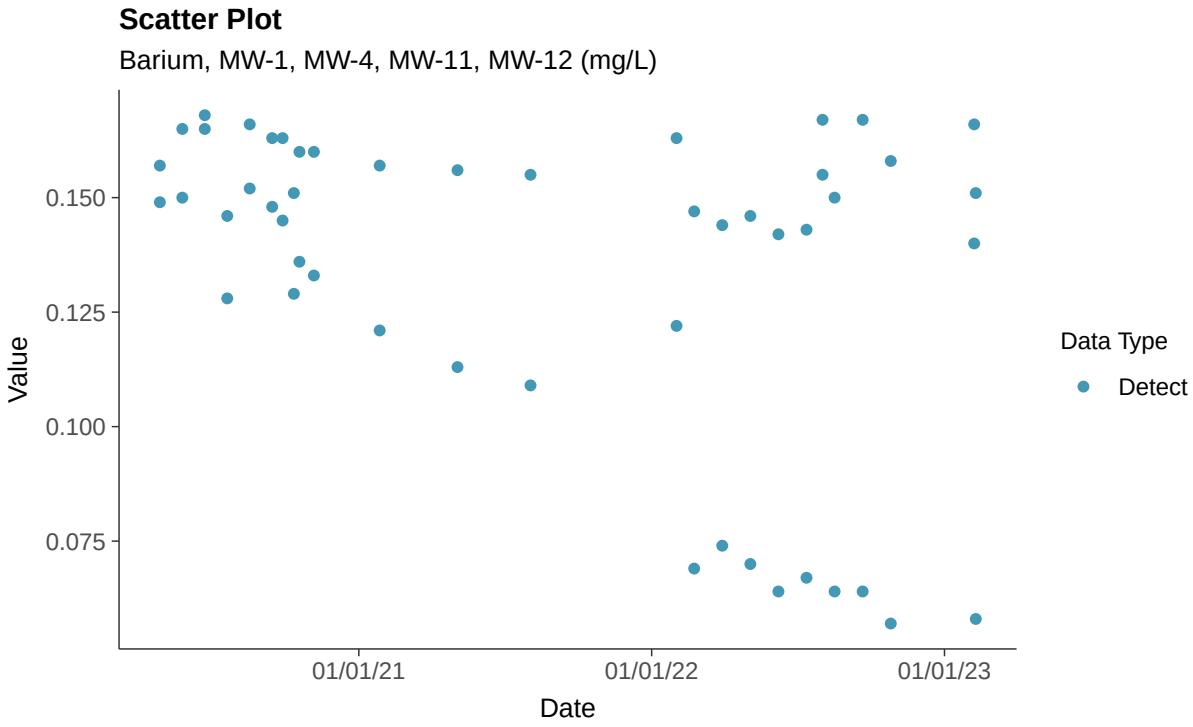
Trend Regression: Piecewise Linear-Linear-Linear

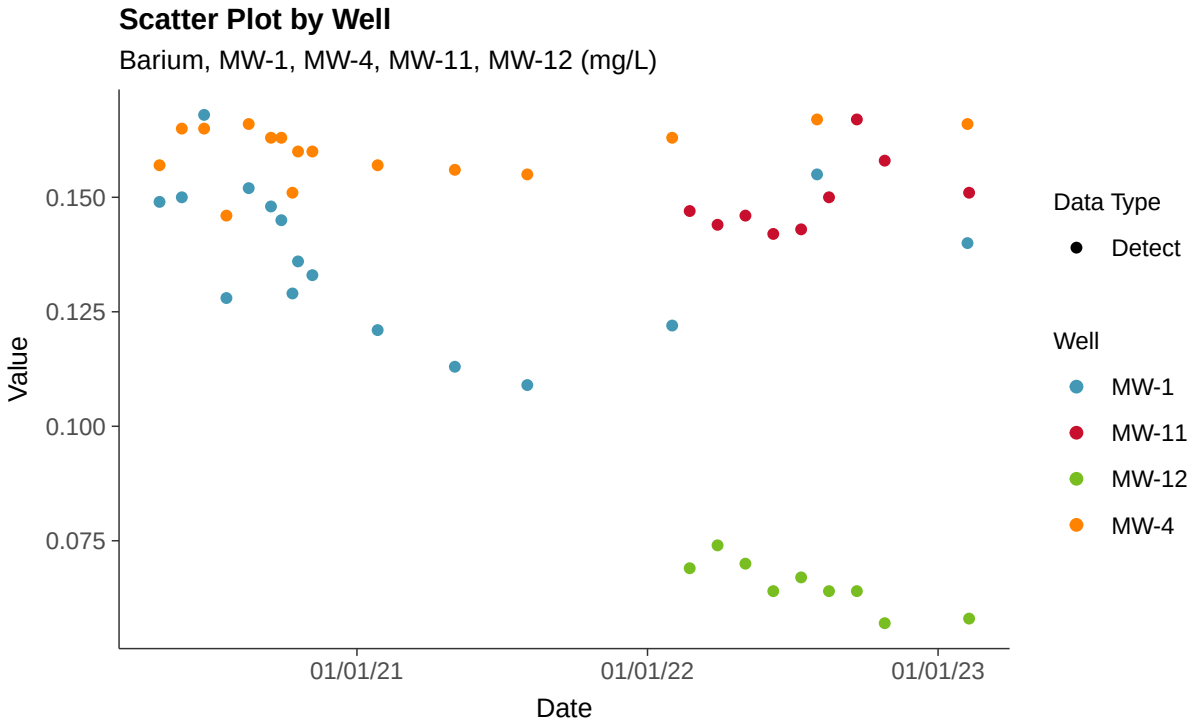
Arsenic, MW-1, MW-4, MW-11, MW-12 (mg/L)



Appendix IV: Barium, MW-1, MW-4, MW-11, MW-12

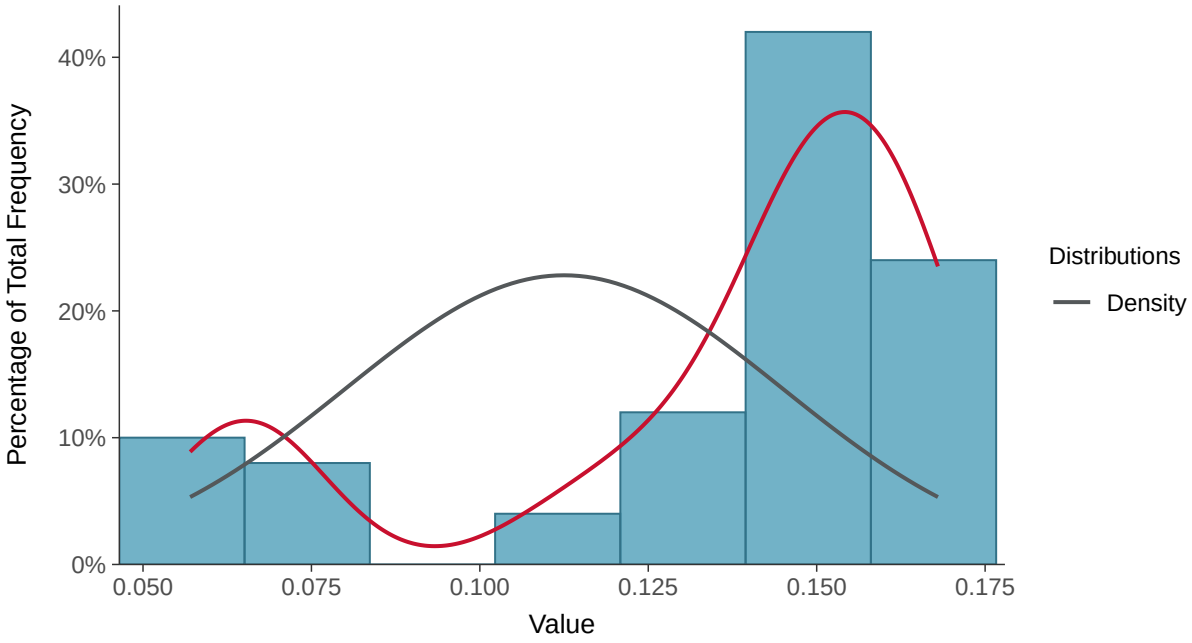
ID: 2_10





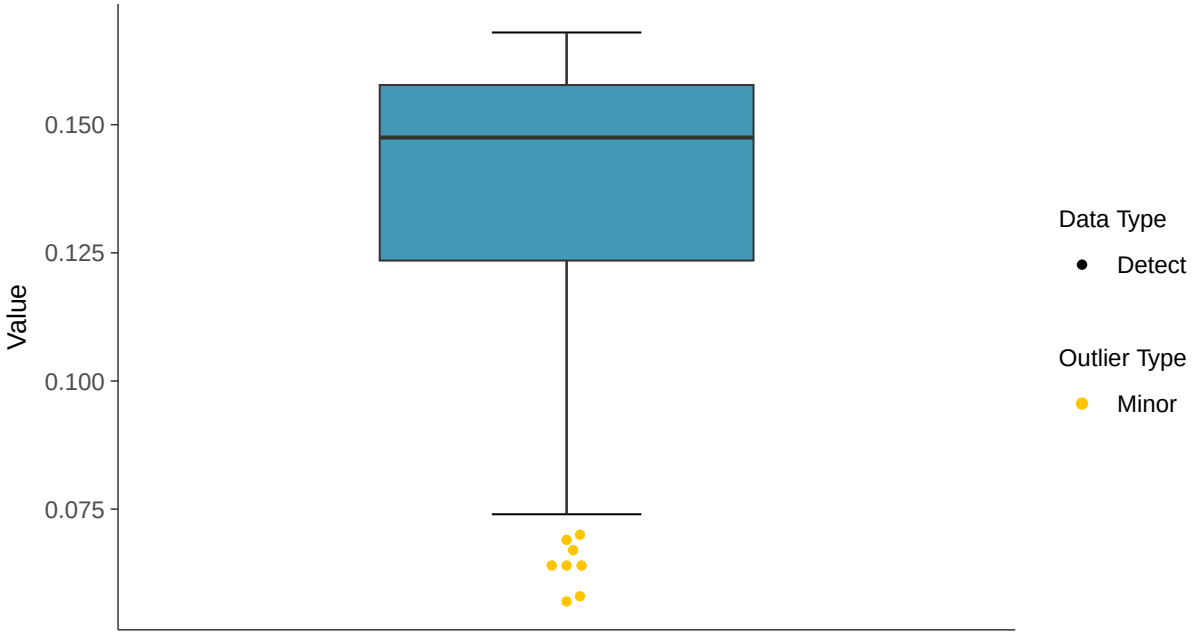
Histogram

Barium, MW-1, MW-4, MW-11, MW-12 (mg/L)



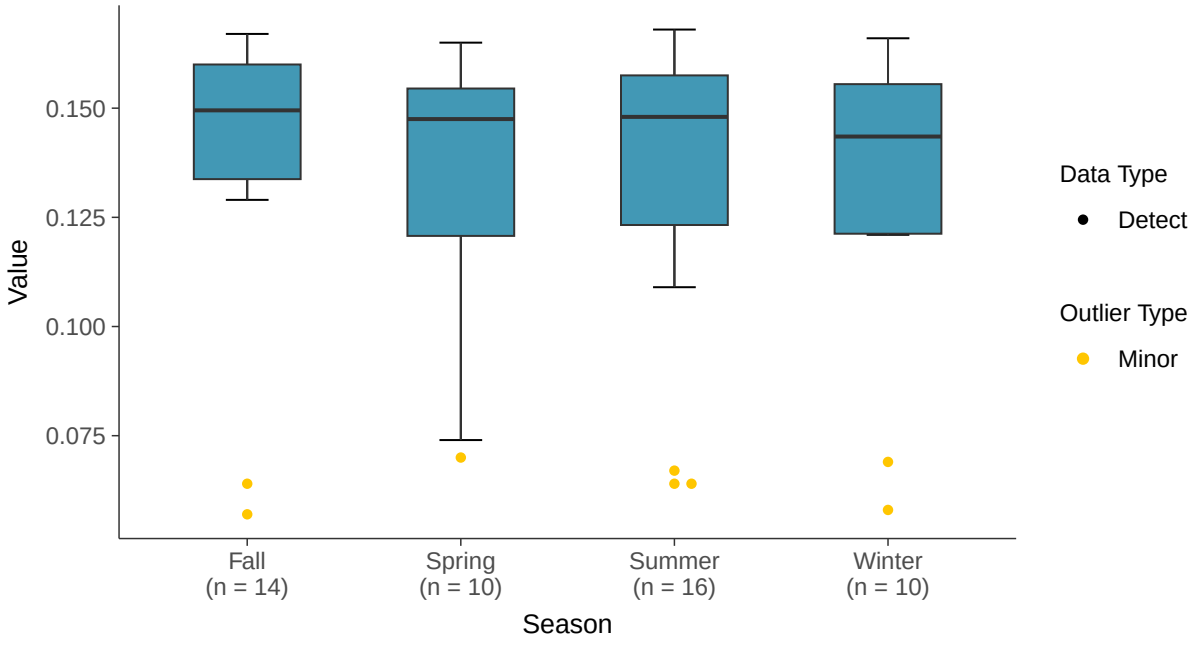
Boxplot

Barium, MW-1, MW-4, MW-11, MW-12 (mg/L)



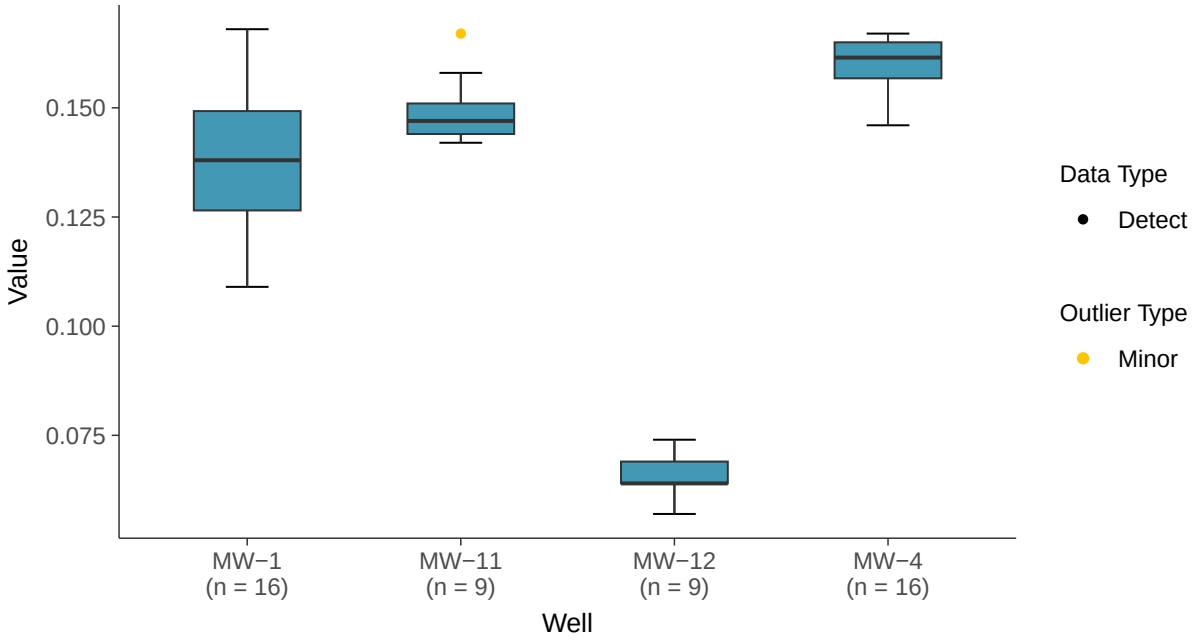
Boxplot by Season

Barium, MW-1, MW-4, MW-11, MW-12 (mg/L)



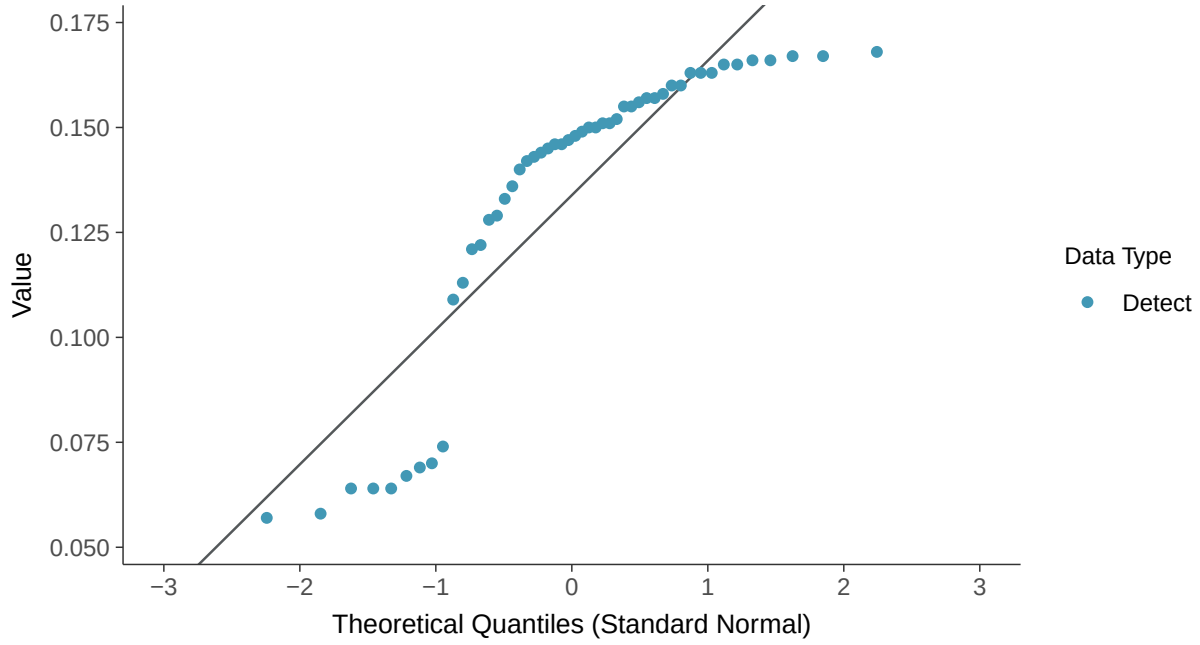
Boxplot by Well

Barium, MW-1, MW-4, MW-11, MW-12 (mg/L)



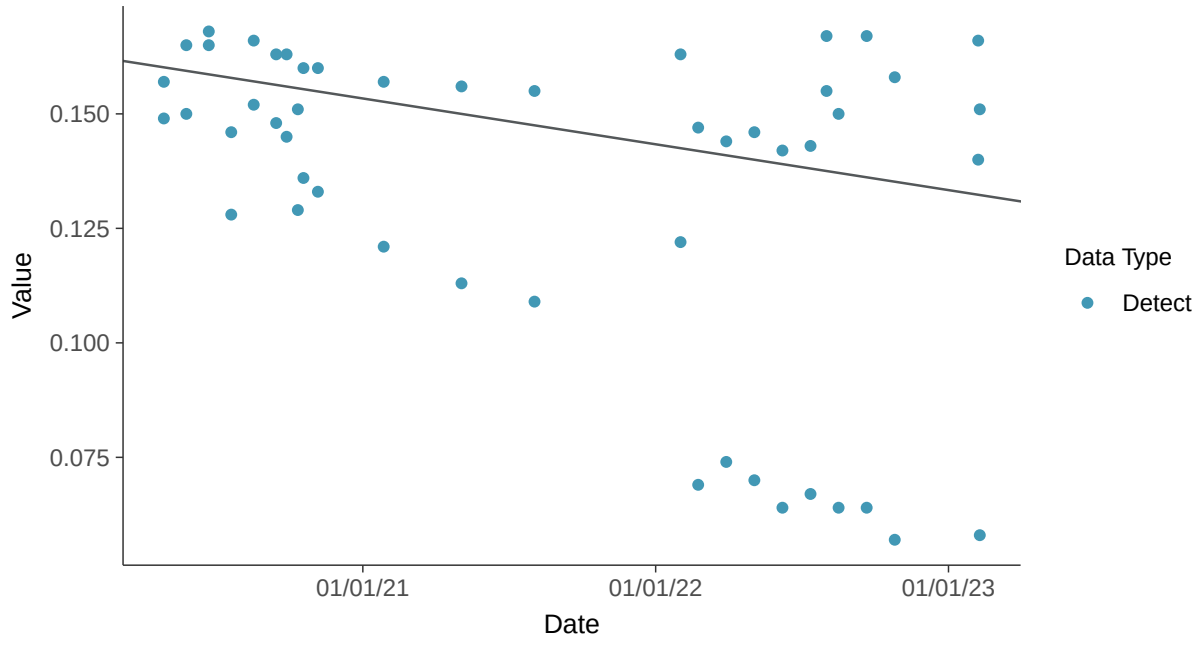
Normal Q-Q plot

Barium, MW-1, MW-4, MW-11, MW-12 (mg/L)



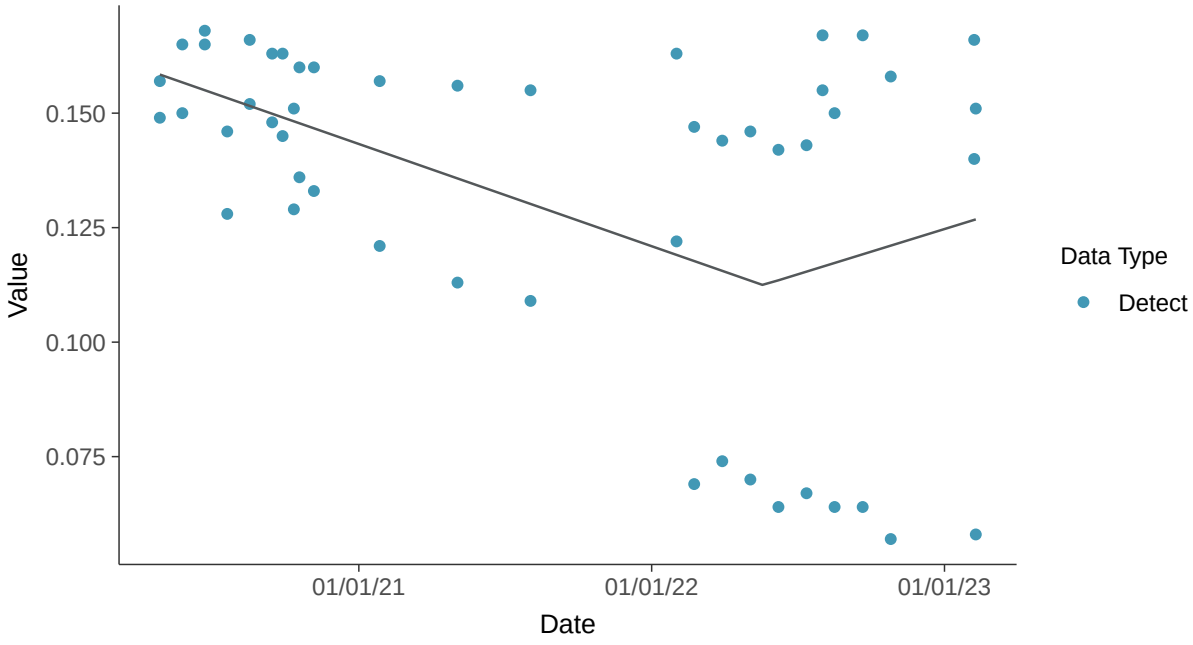
Trend Regression: Mann-Kendall/Theil-Sen Estimate

Barium, MW-1, MW-4, MW-11, MW-12 (mg/L)



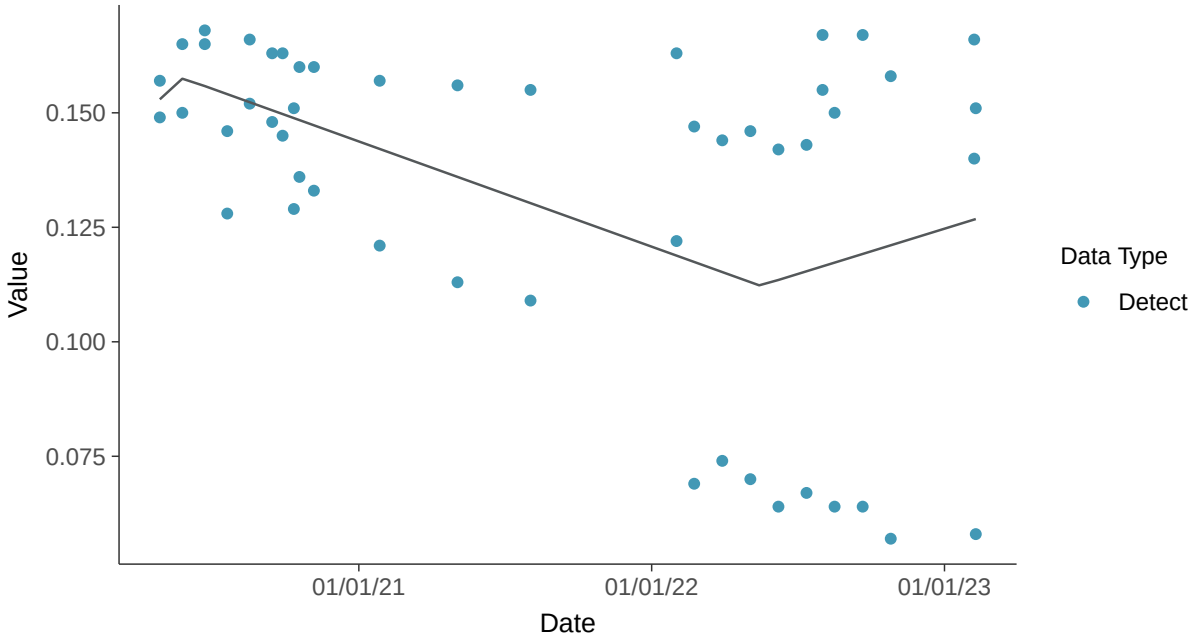
Trend Regression: Piecewise Linear-Linear

Barium, MW-1, MW-4, MW-11, MW-12 (mg/L)



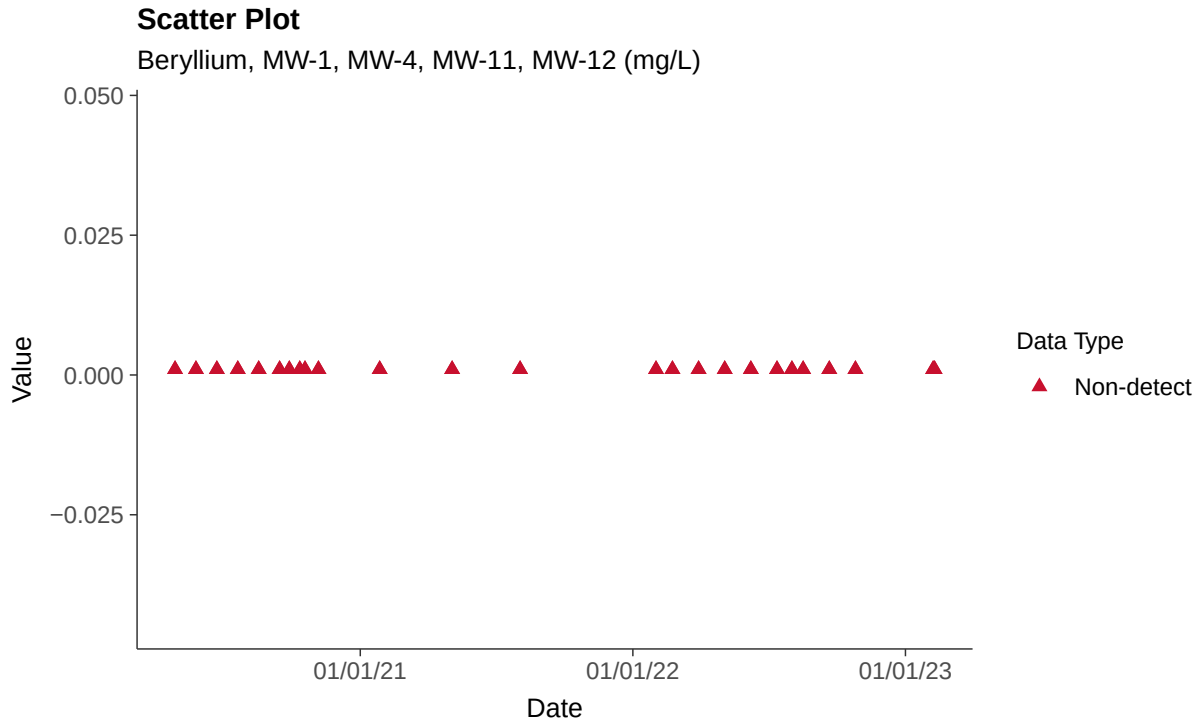
Trend Regression: Piecewise Linear-Linear-Linear

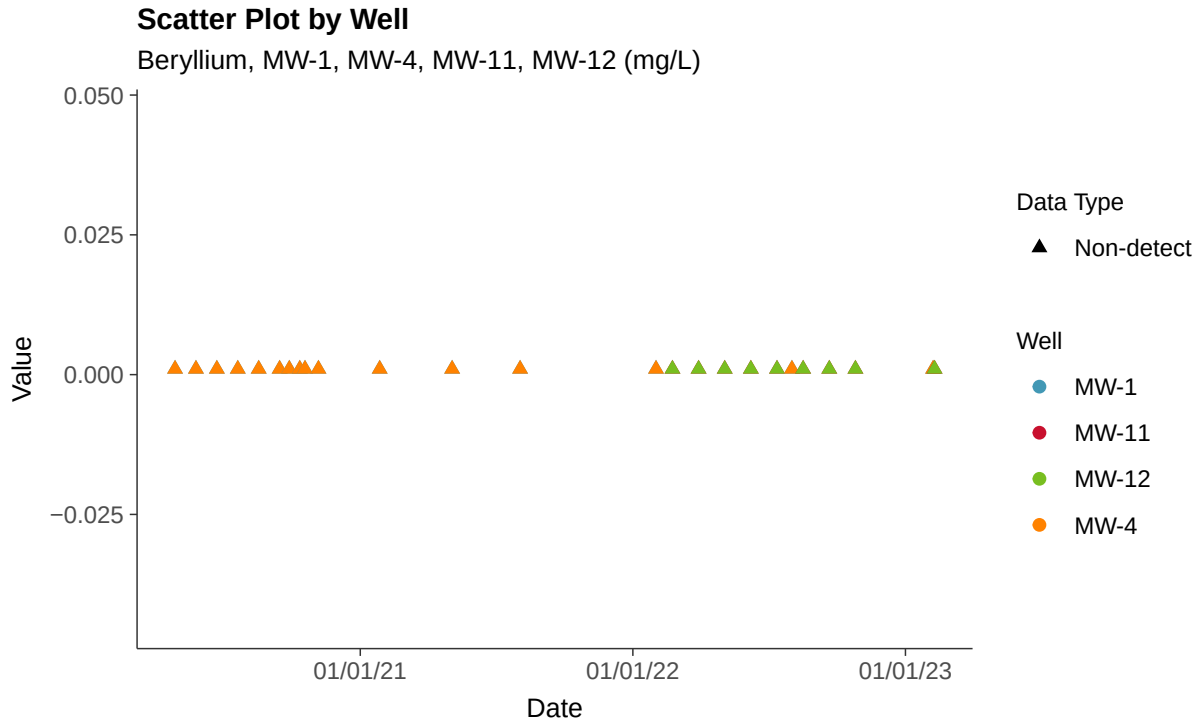
Barium, MW-1, MW-4, MW-11, MW-12 (mg/L)



Appendix IV: Beryllium, MW-1, MW-4, MW-11, MW-12

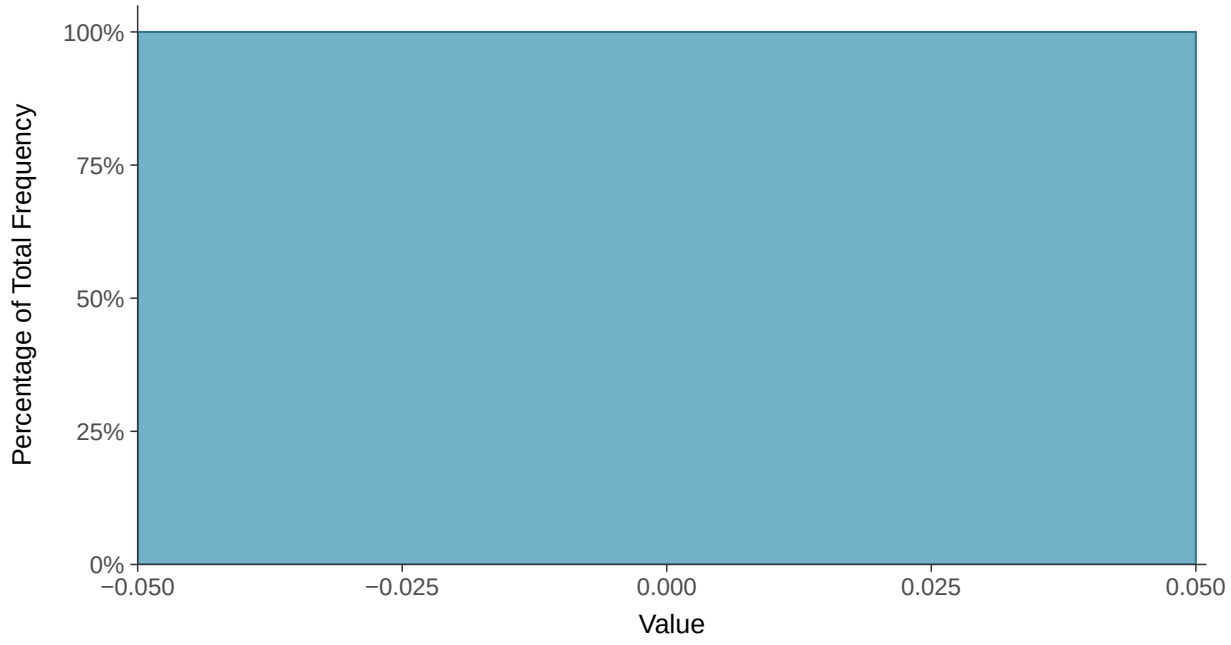
ID: 2_11





Histogram

Beryllium, MW-1, MW-4, MW-11, MW-12 (mg/L)

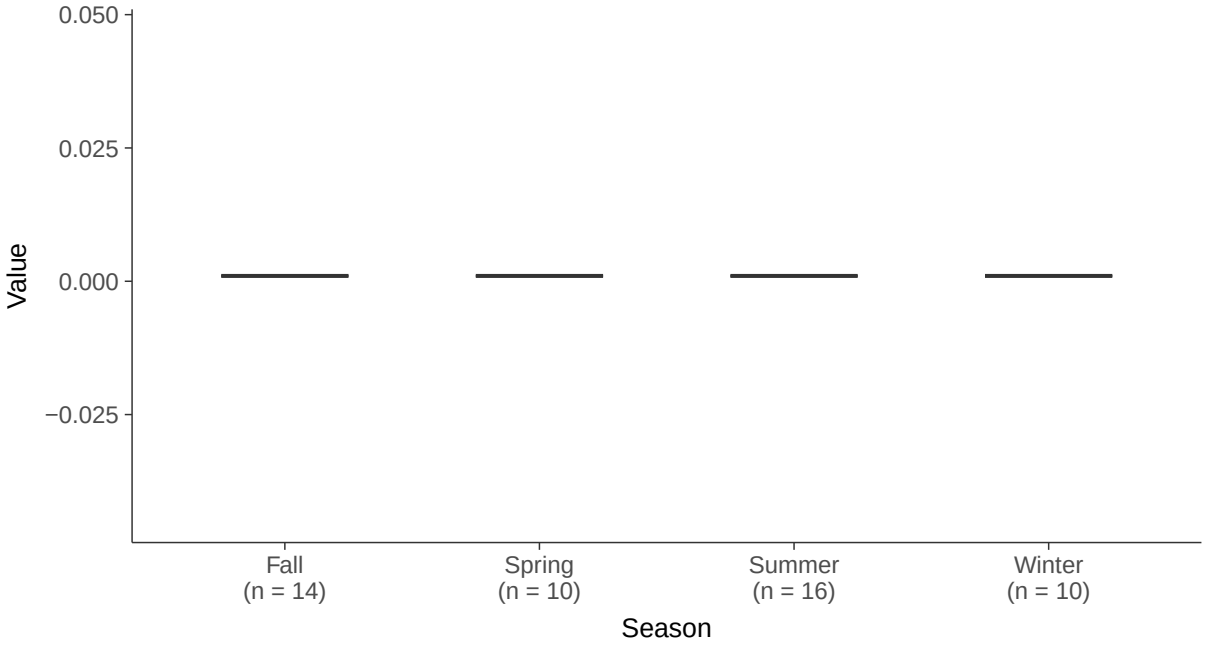


Boxplot

Beryllium, MW-1, MW-4, MW-11, MW-12 (mg/L)

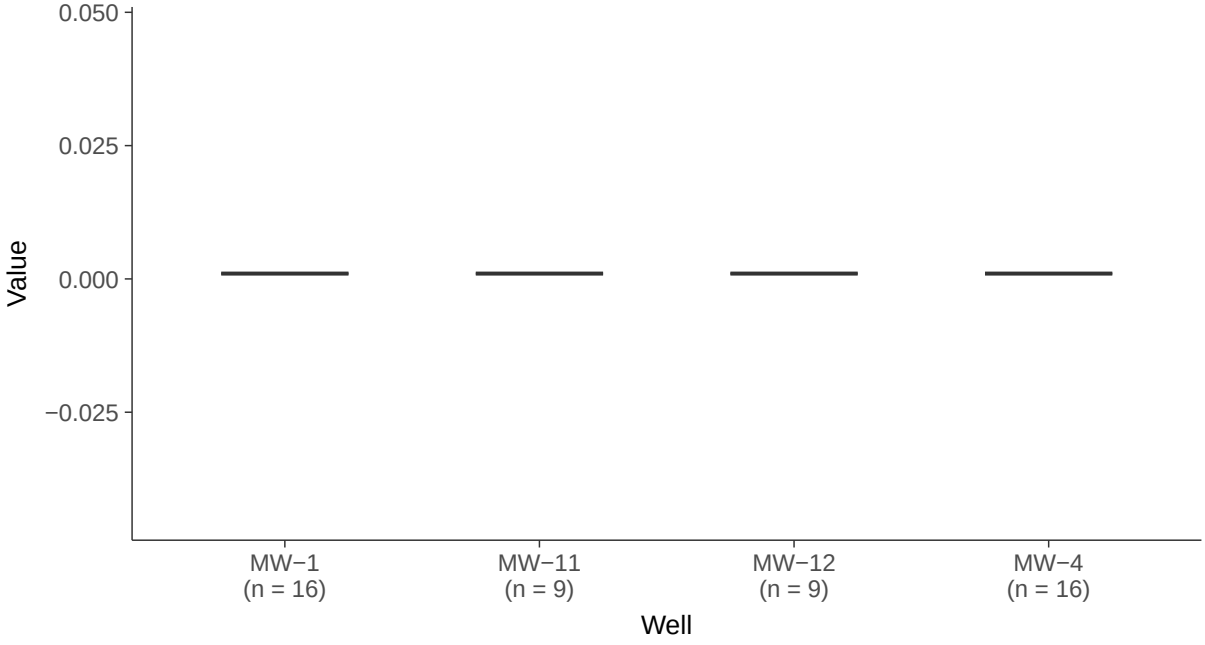
Boxplot by Season

Beryllium, MW-1, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Beryllium, MW-1, MW-4, MW-11, MW-12 (mg/L)

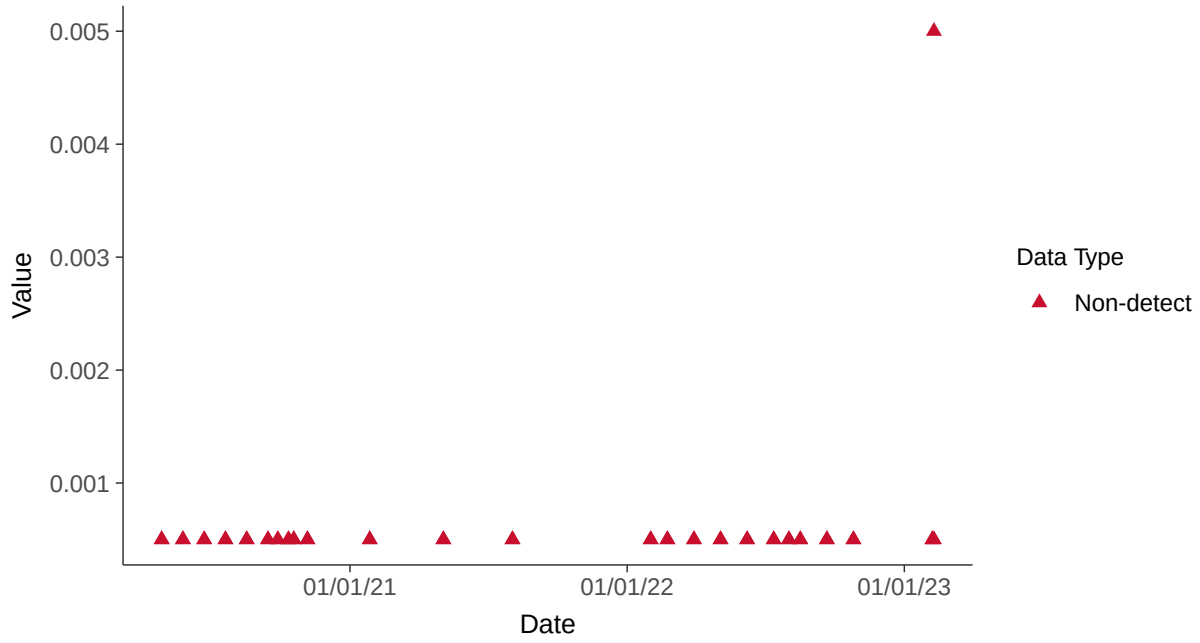


Appendix IV: Cadmium, MW-1, MW-4, MW-11, MW-12

ID: 2_13

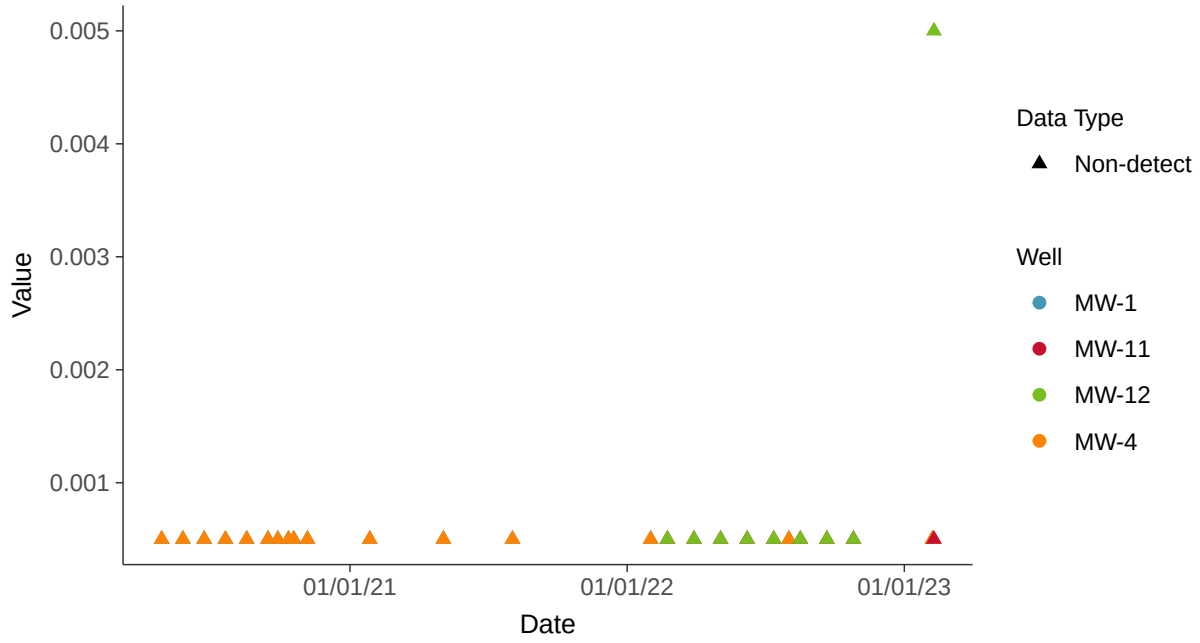
Scatter Plot

Cadmium, MW-1, MW-4, MW-11, MW-12 (mg/L)



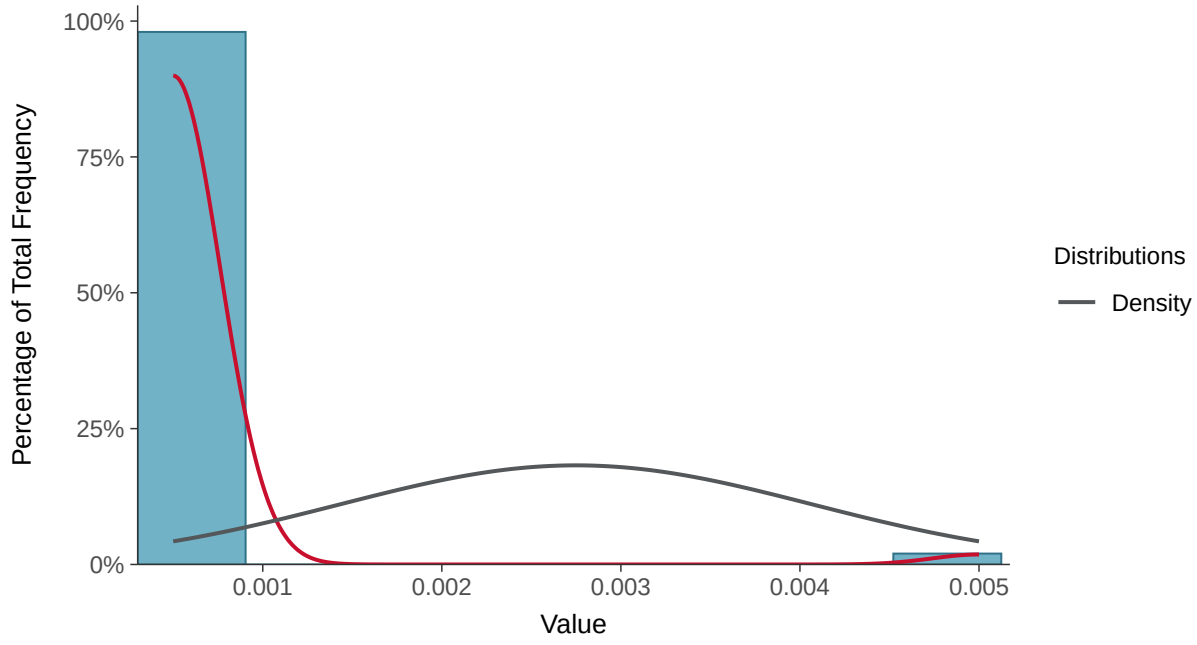
Scatter Plot by Well

Cadmium, MW-1, MW-4, MW-11, MW-12 (mg/L)



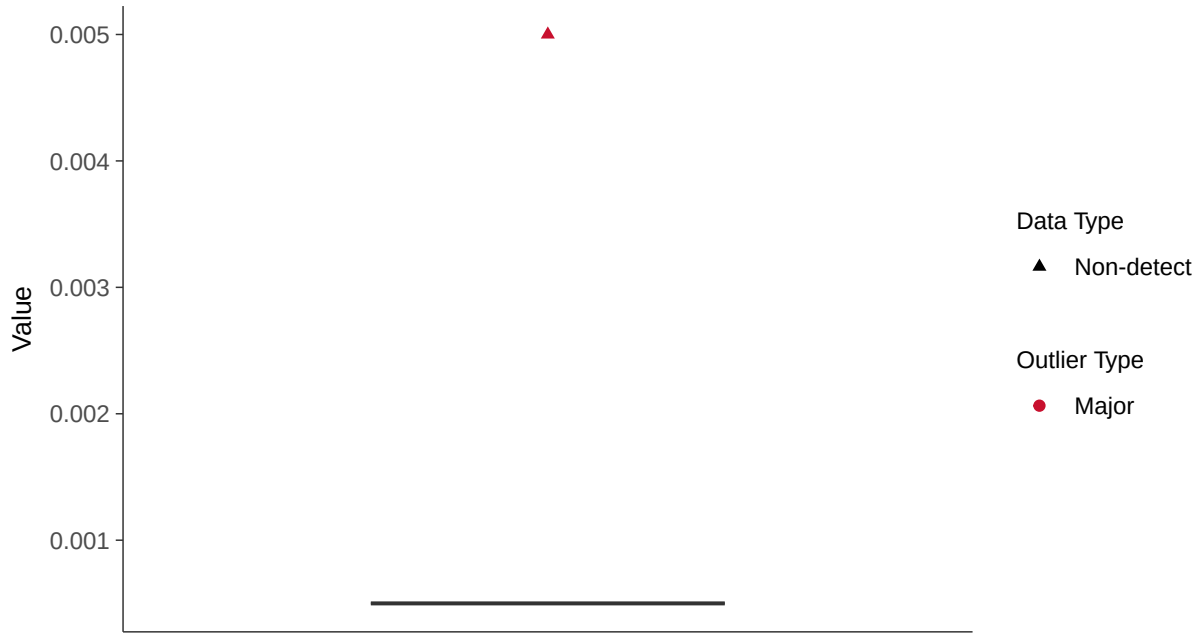
Histogram

Cadmium, MW-1, MW-4, MW-11, MW-12 (mg/L)



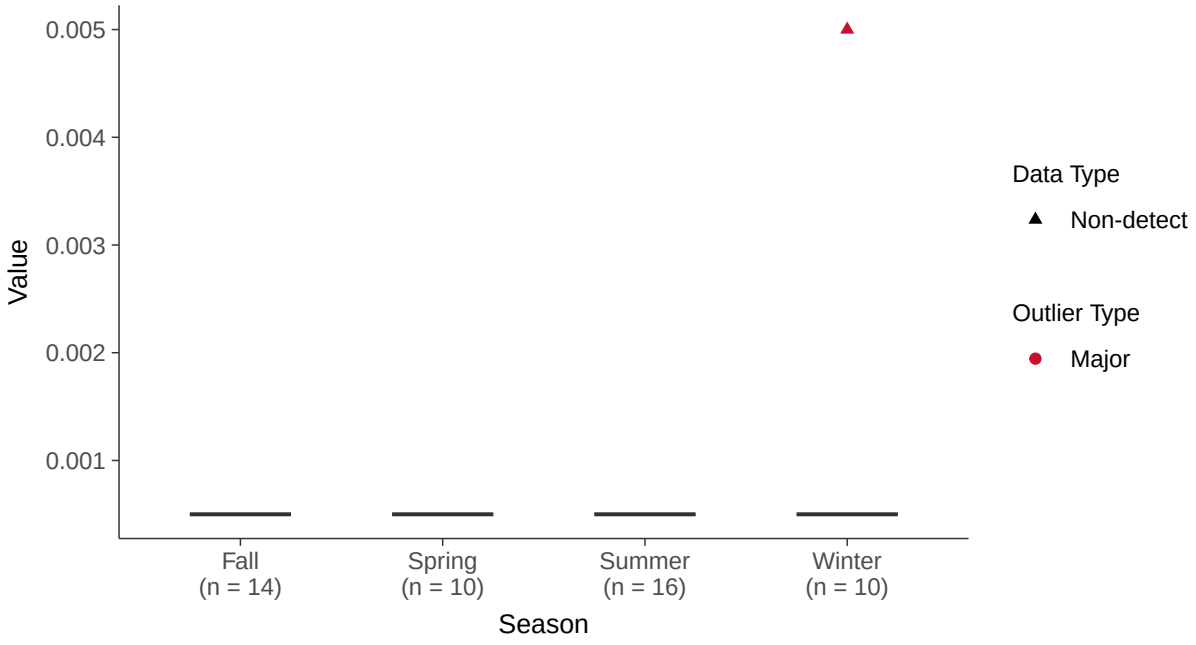
Boxplot

Cadmium, MW-1, MW-4, MW-11, MW-12 (mg/L)



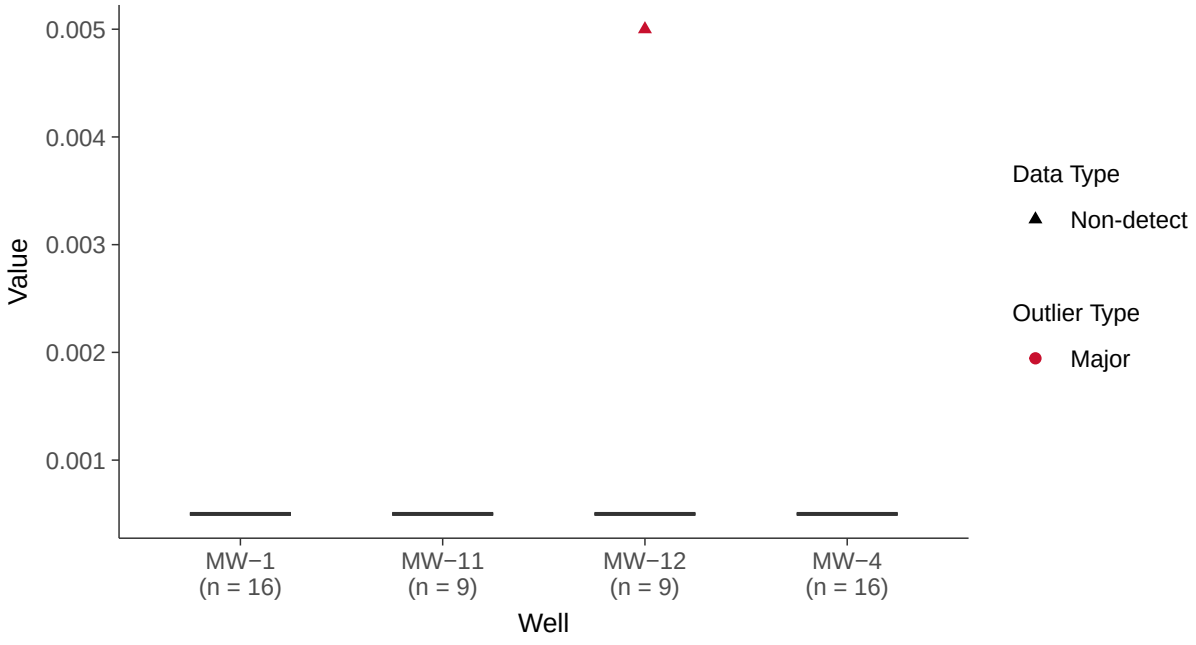
Boxplot by Season

Cadmium, MW-1, MW-4, MW-11, MW-12 (mg/L)



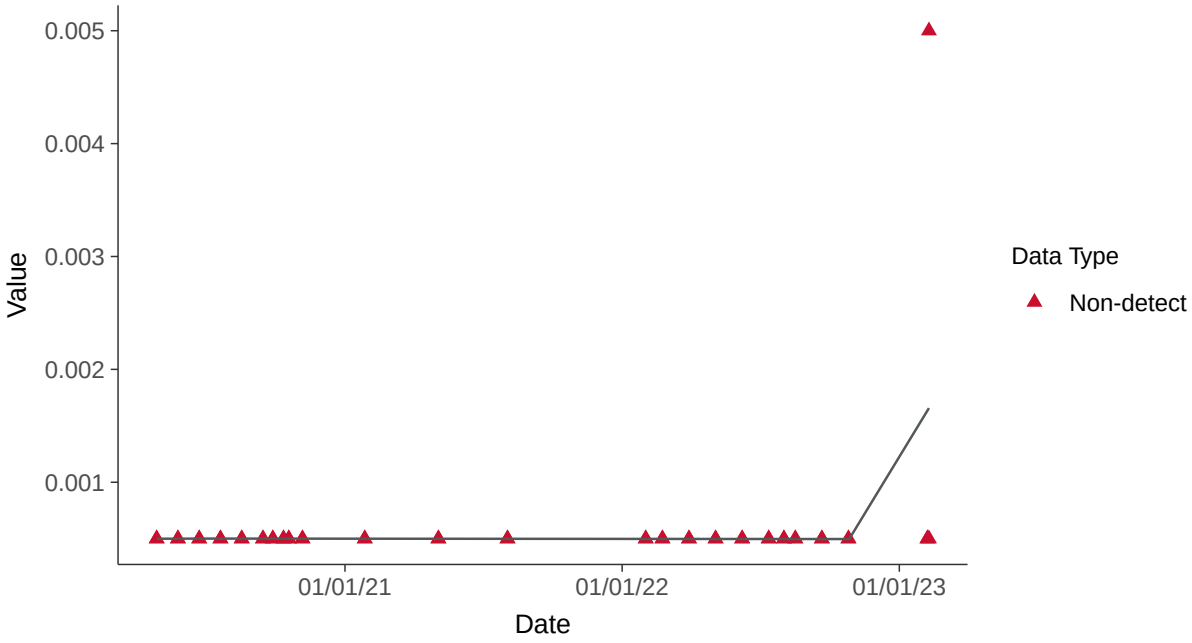
Boxplot by Well

Cadmium, MW-1, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Piecewise Linear-Linear-Linear

Cadmium, MW-1, MW-4, MW-11, MW-12 (mg/L)

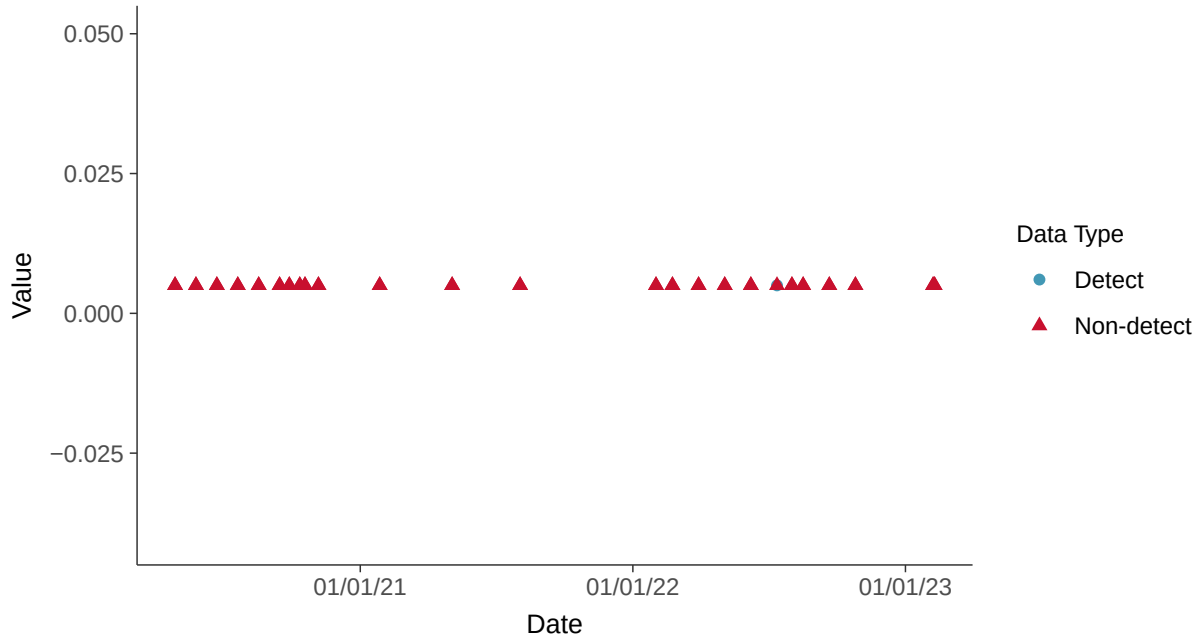


Appendix IV: Chromium, MW-1, MW-4, MW-11, MW-12

ID: 2_15

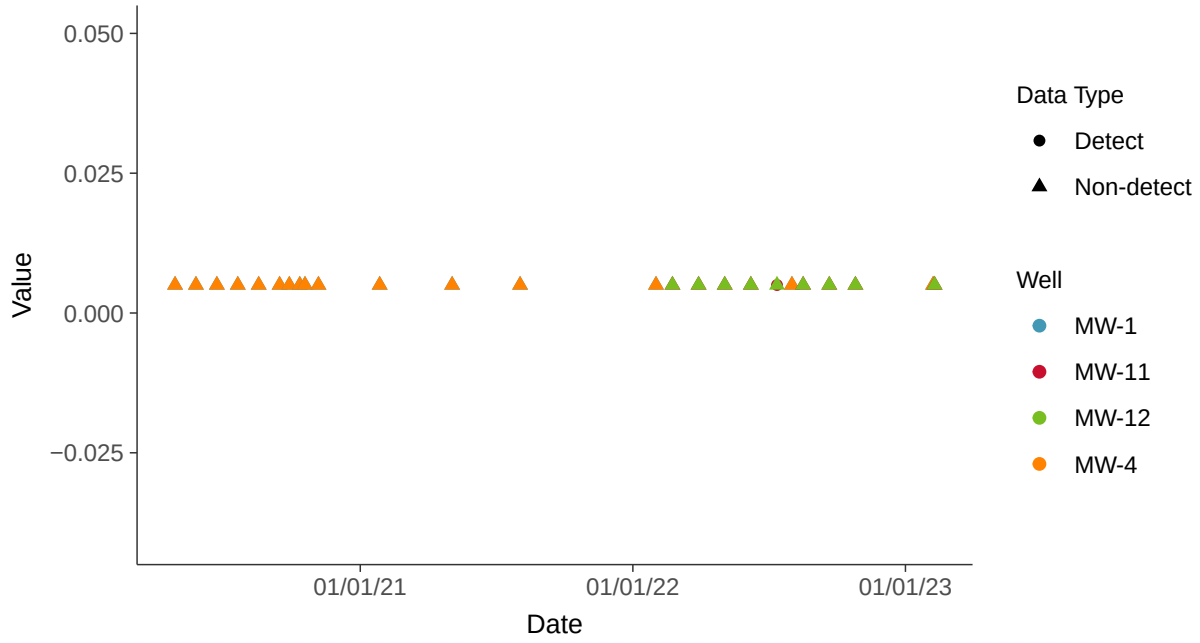
Scatter Plot

Chromium, MW-1, MW-4, MW-11, MW-12 (mg/L)



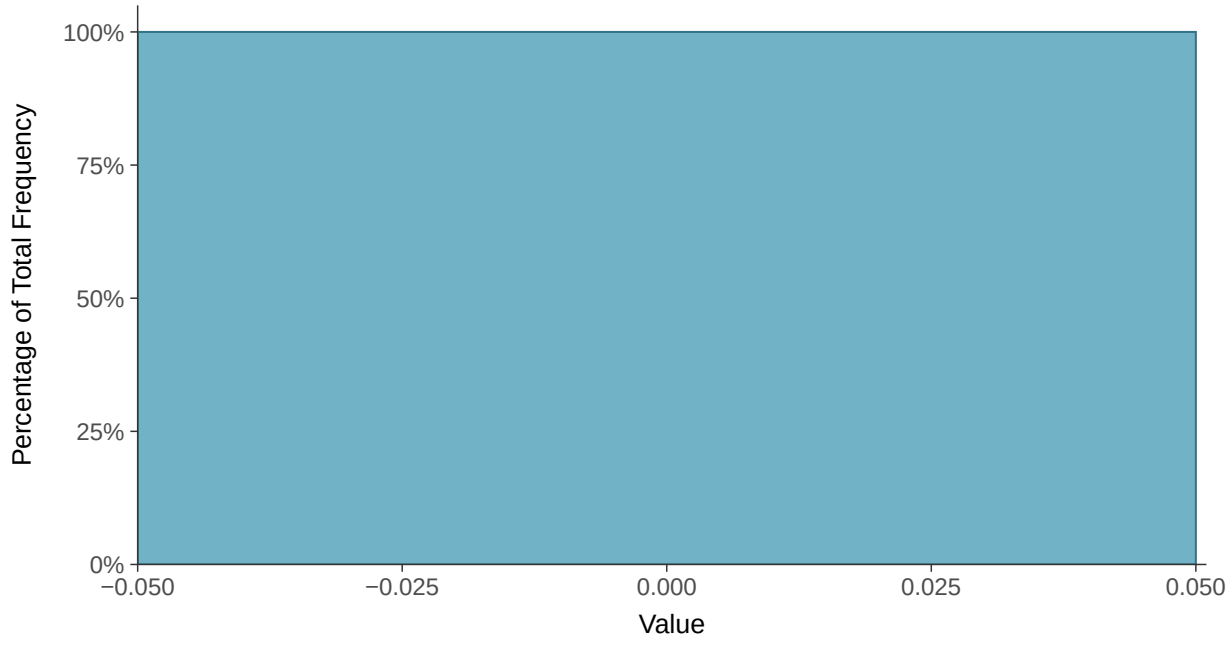
Scatter Plot by Well

Chromium, MW-1, MW-4, MW-11, MW-12 (mg/L)



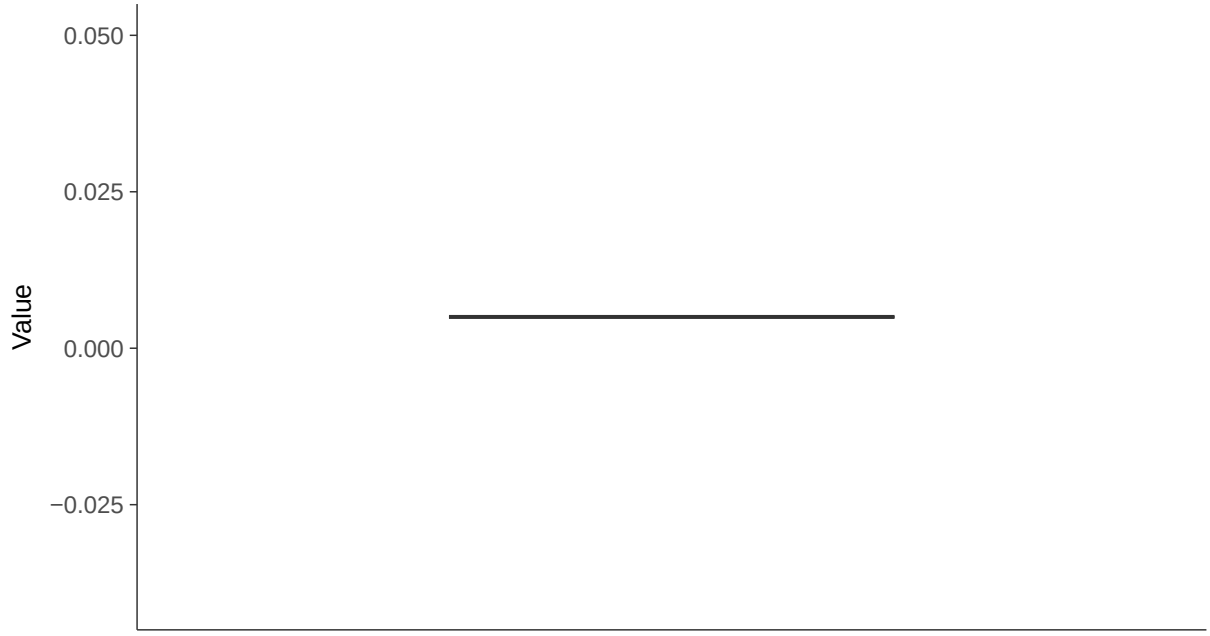
Histogram

Chromium, MW-1, MW-4, MW-11, MW-12 (mg/L)



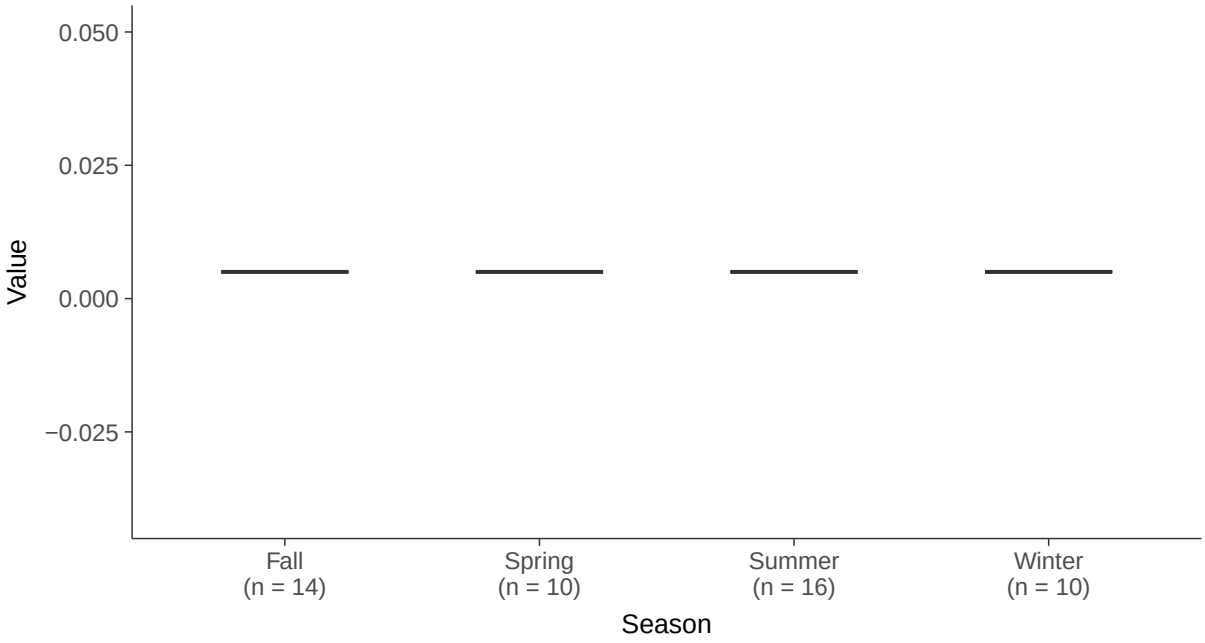
Boxplot

Chromium, MW-1, MW-4, MW-11, MW-12 (mg/L)



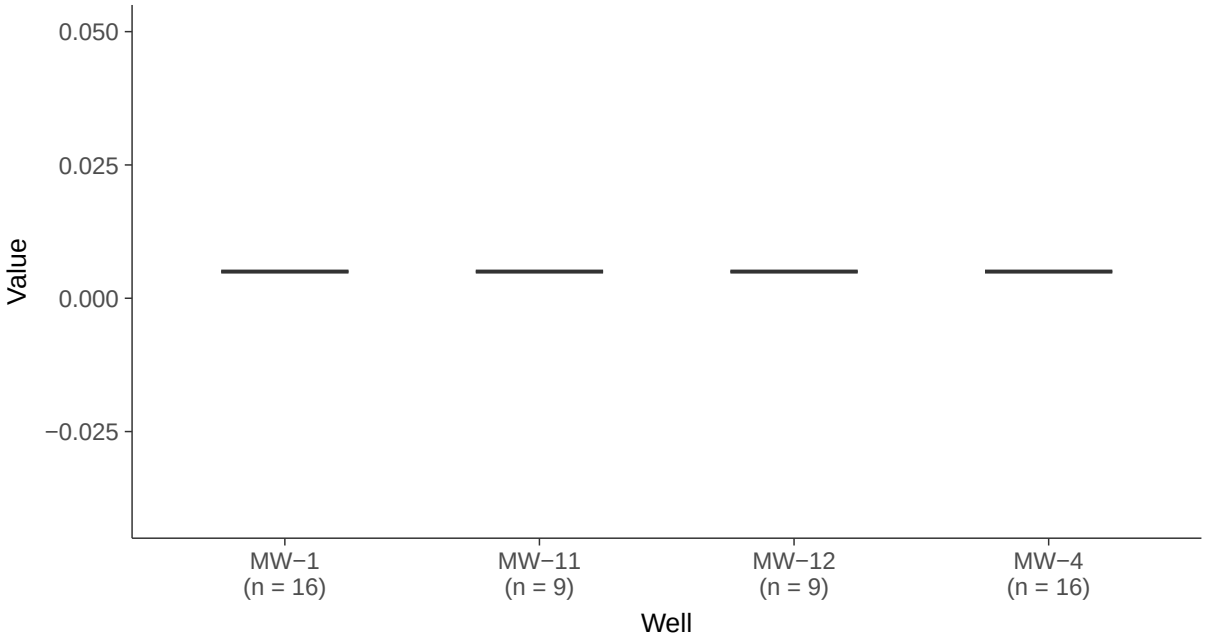
Boxplot by Season

Chromium, MW-1, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Chromium, MW-1, MW-4, MW-11, MW-12 (mg/L)

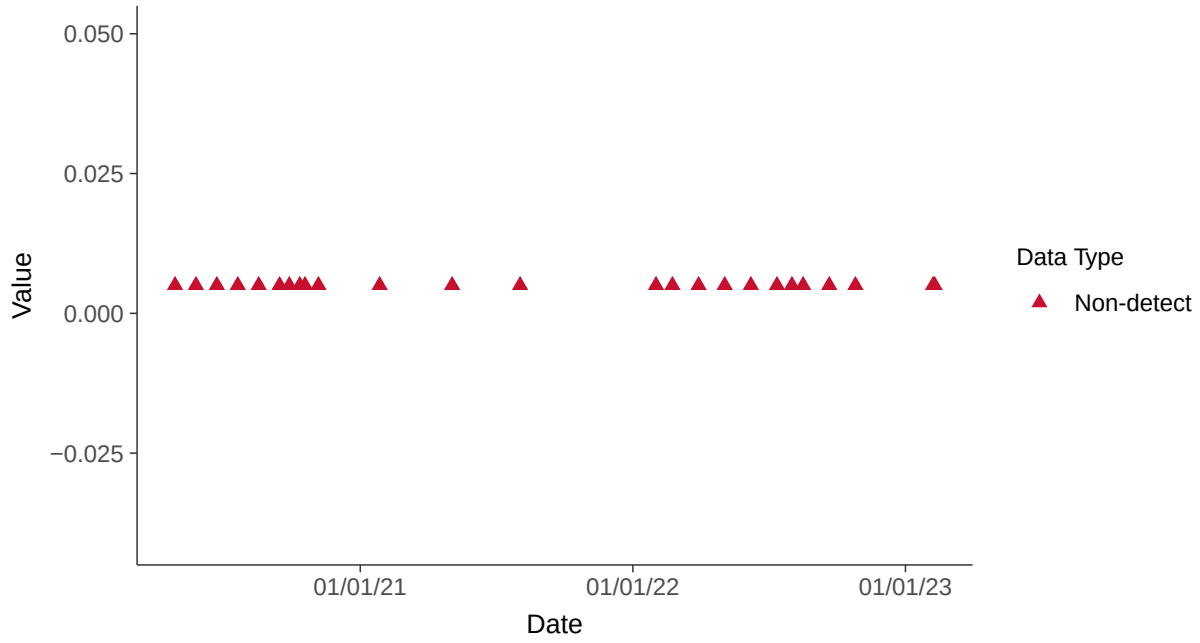


Appendix IV: Cobalt, MW-1, MW-4, MW-11, MW-12

ID: 2_16

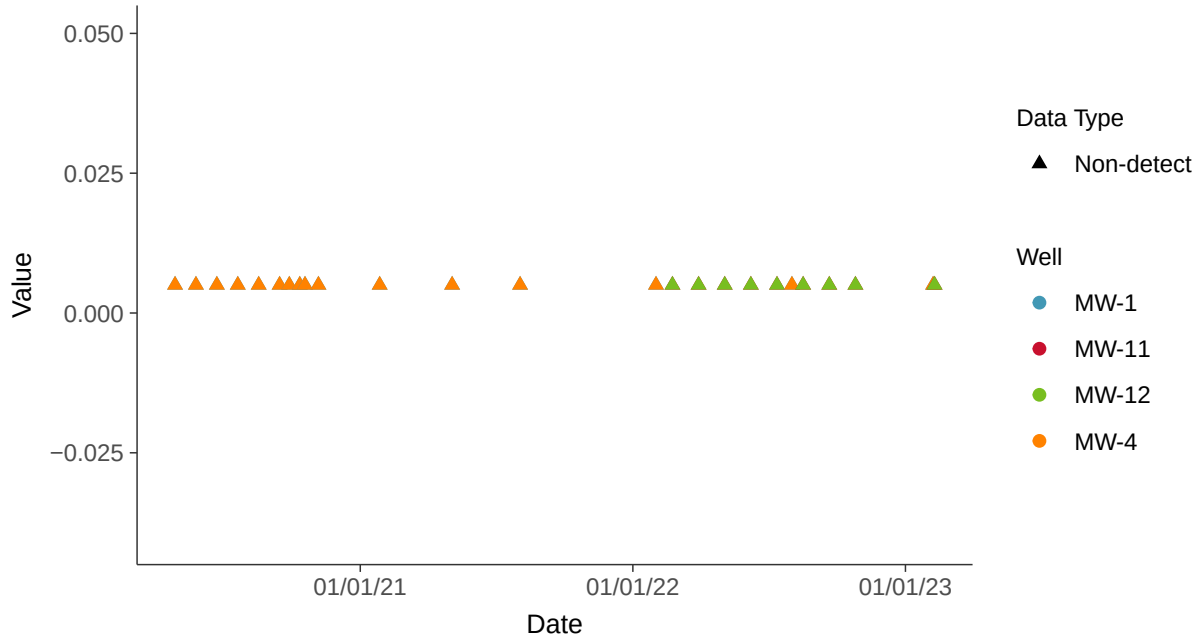
Scatter Plot

Cobalt, MW-1, MW-4, MW-11, MW-12 (mg/L)



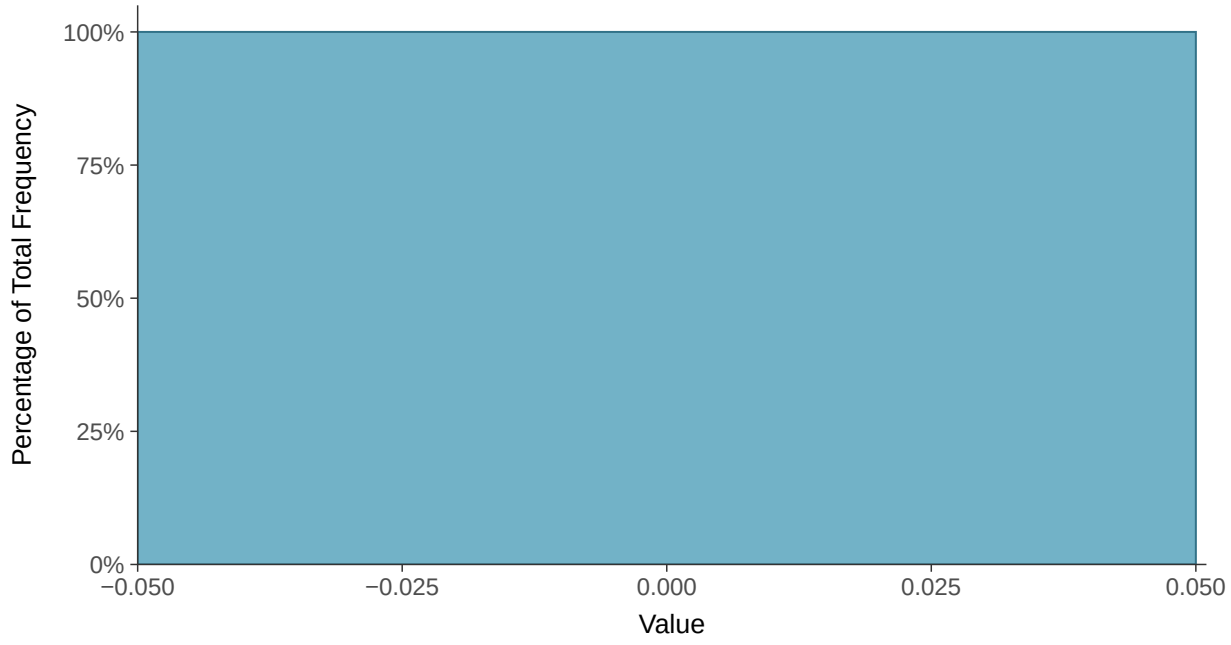
Scatter Plot by Well

Cobalt, MW-1, MW-4, MW-11, MW-12 (mg/L)



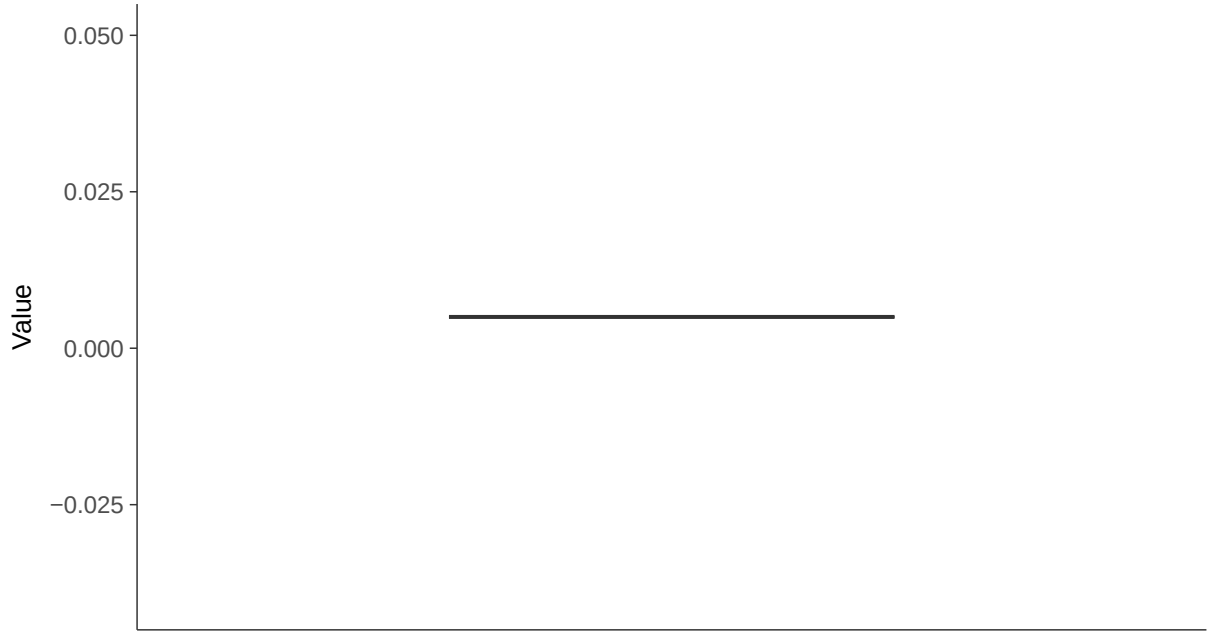
Histogram

Cobalt, MW-1, MW-4, MW-11, MW-12 (mg/L)



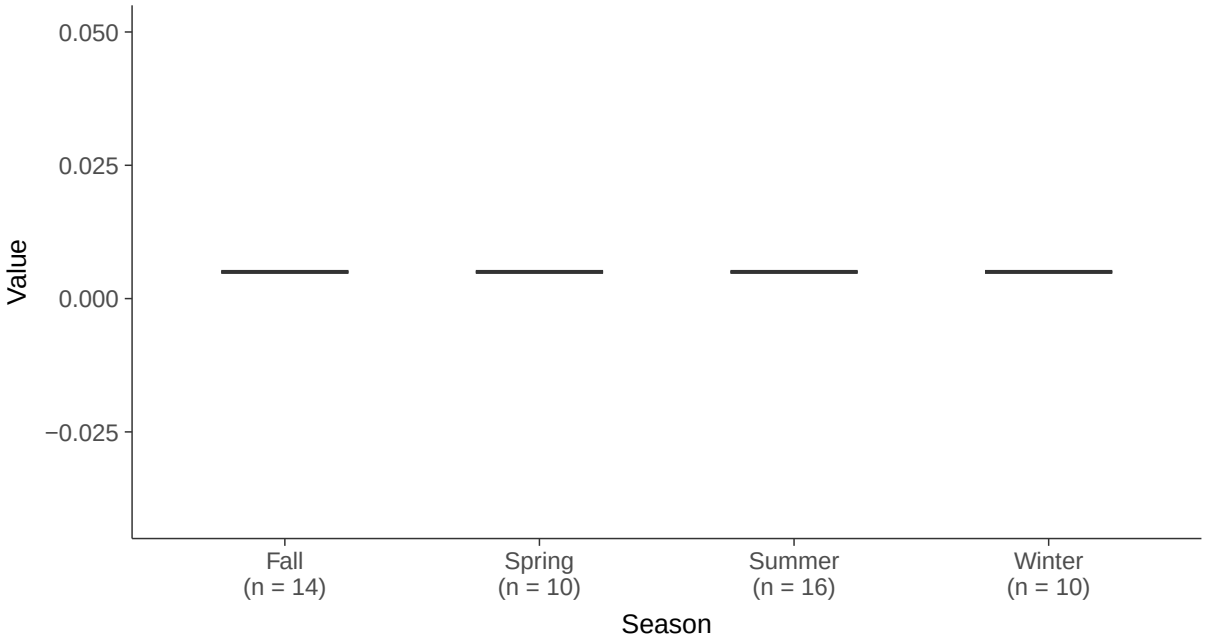
Boxplot

Cobalt, MW-1, MW-4, MW-11, MW-12 (mg/L)



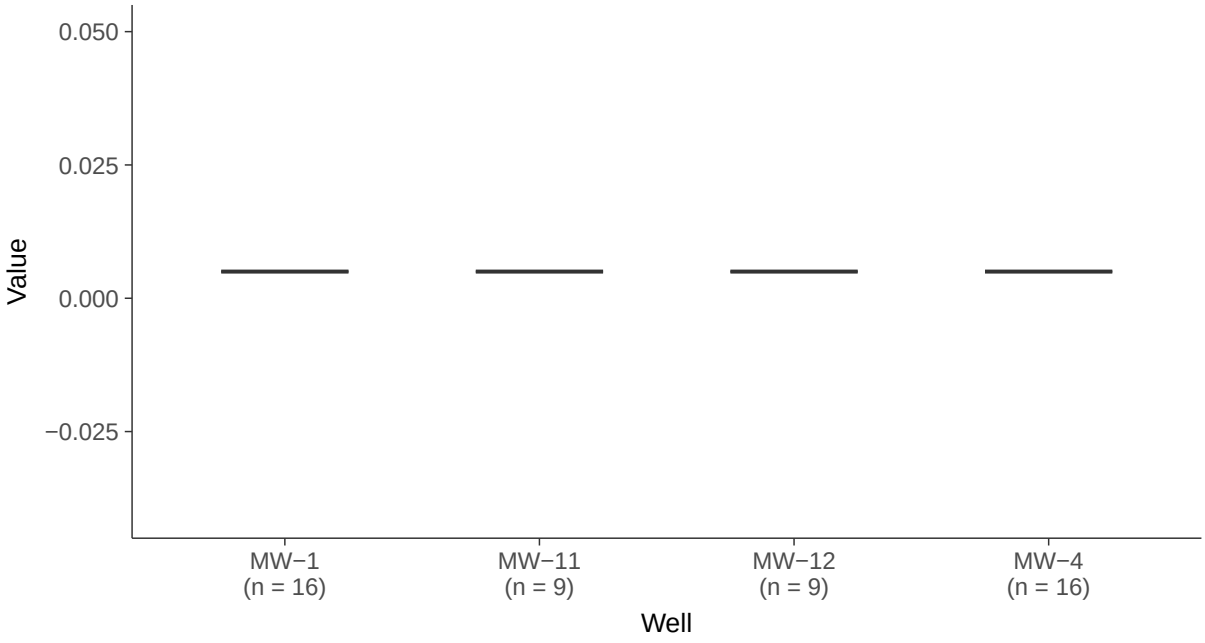
Boxplot by Season

Cobalt, MW-1, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Cobalt, MW-1, MW-4, MW-11, MW-12 (mg/L)

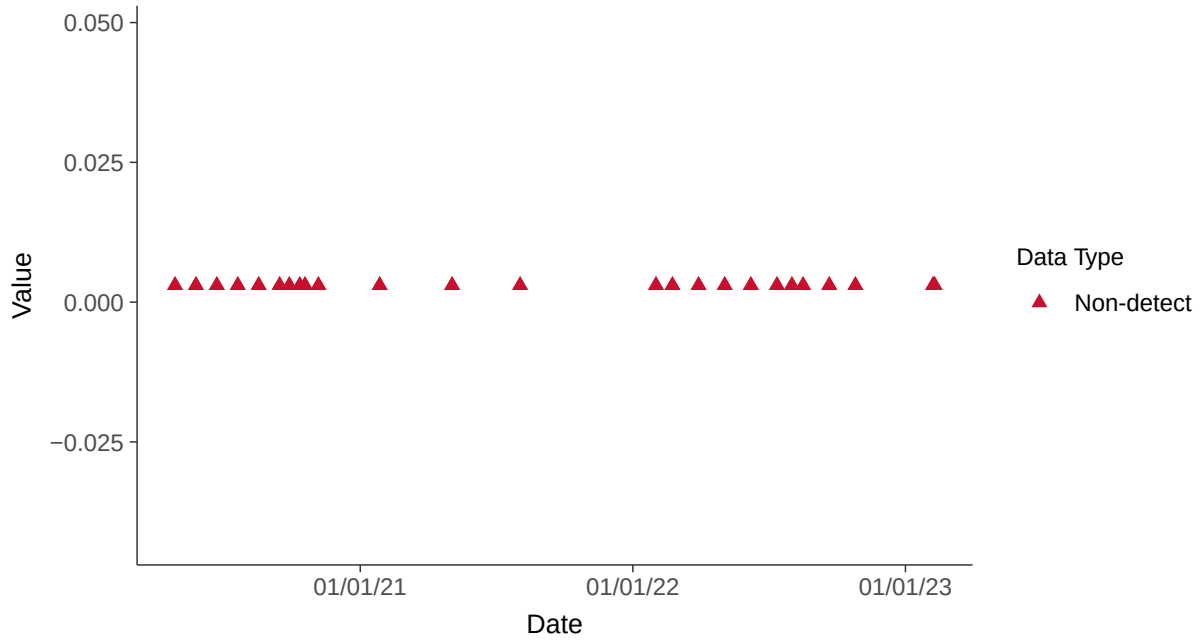


Appendix IV: Lead, MW-1, MW-4, MW-11, MW-12

ID: 2_18

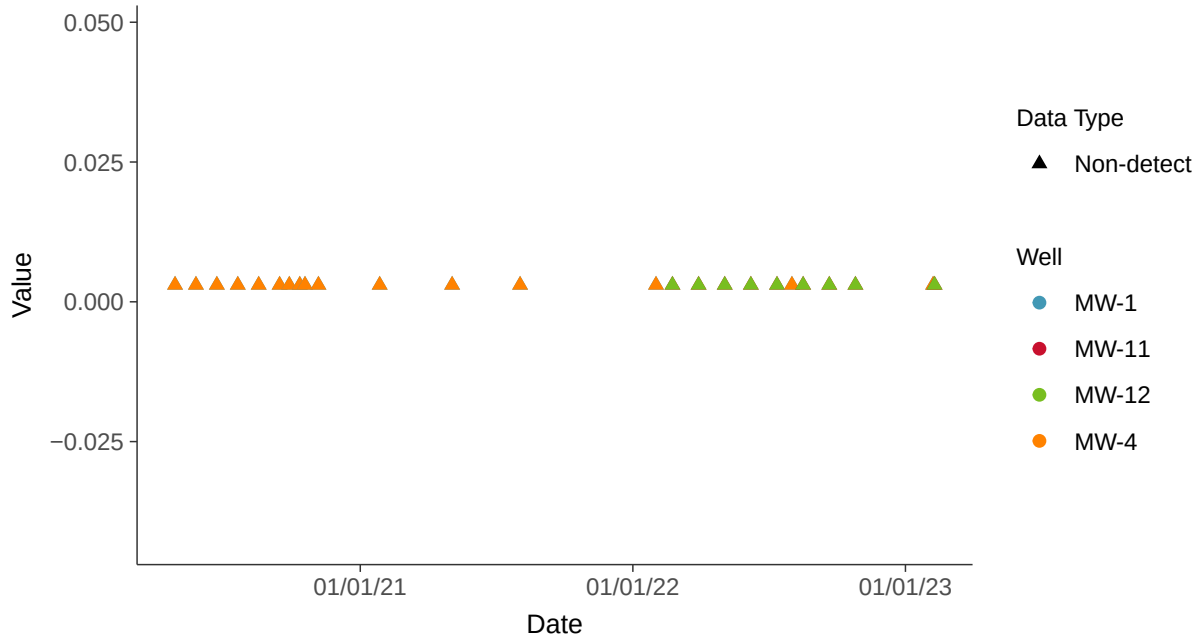
Scatter Plot

Lead, MW-1, MW-4, MW-11, MW-12 (mg/L)



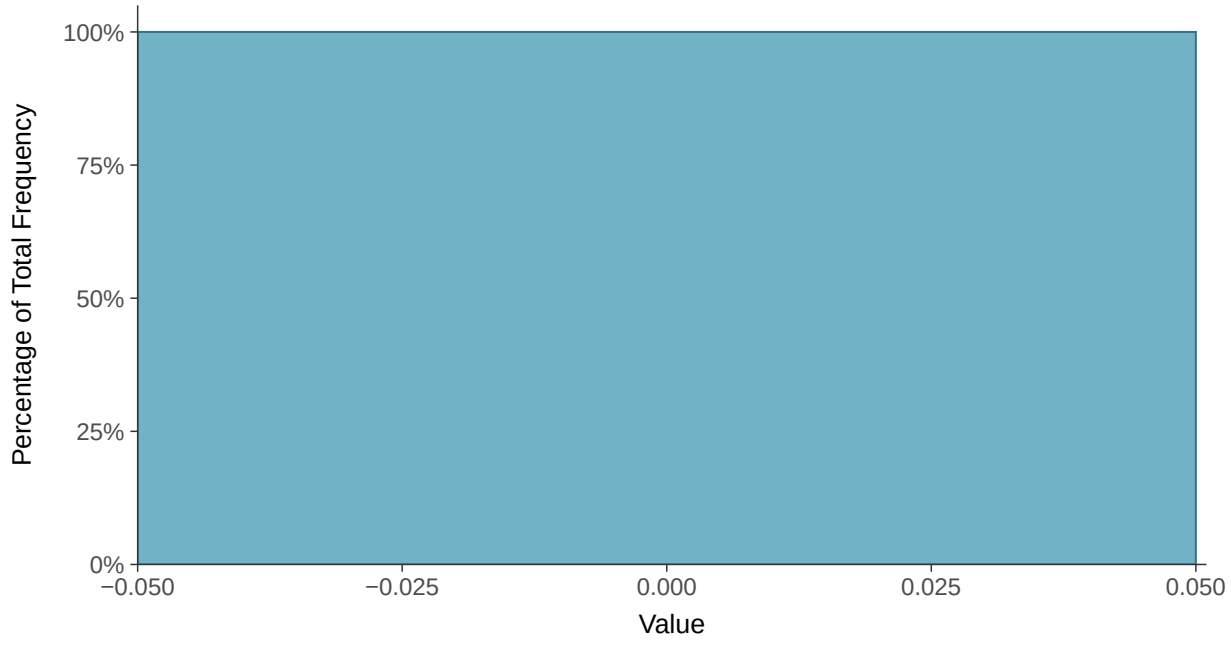
Scatter Plot by Well

Lead, MW-1, MW-4, MW-11, MW-12 (mg/L)



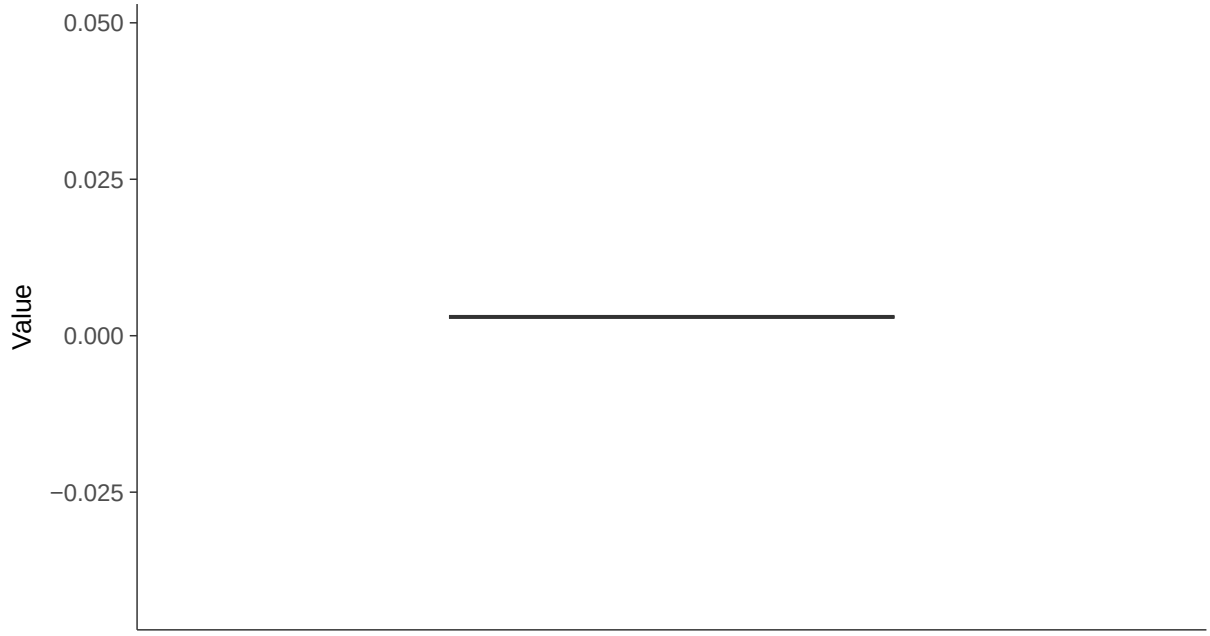
Histogram

Lead, MW-1, MW-4, MW-11, MW-12 (mg/L)



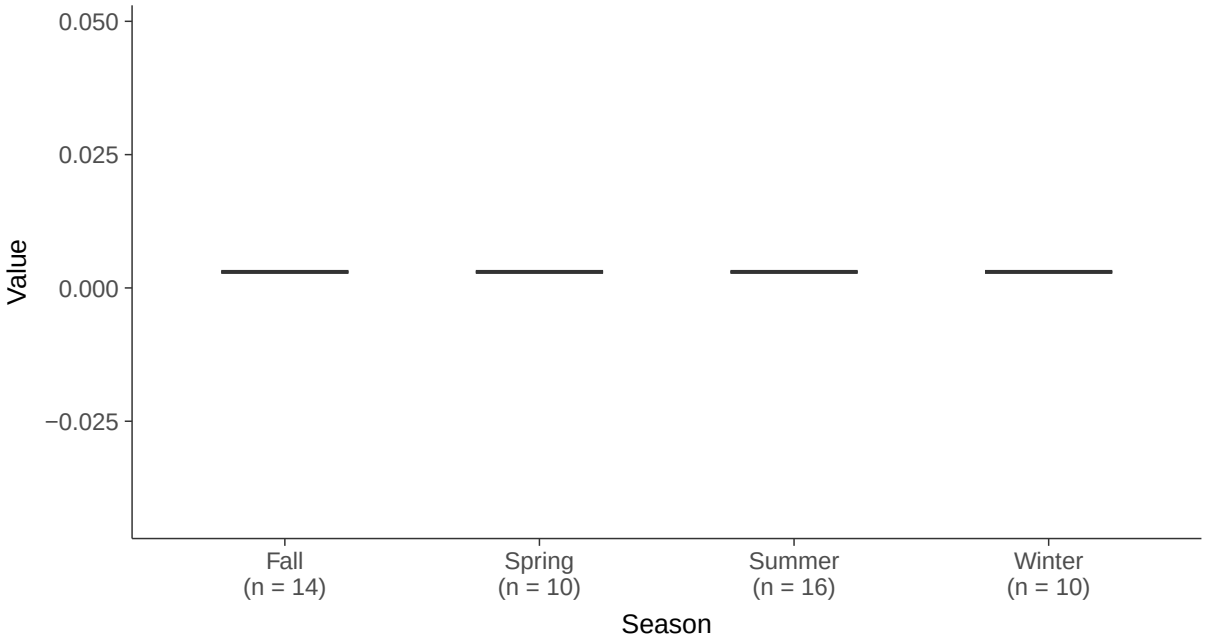
Boxplot

Lead, MW-1, MW-4, MW-11, MW-12 (mg/L)



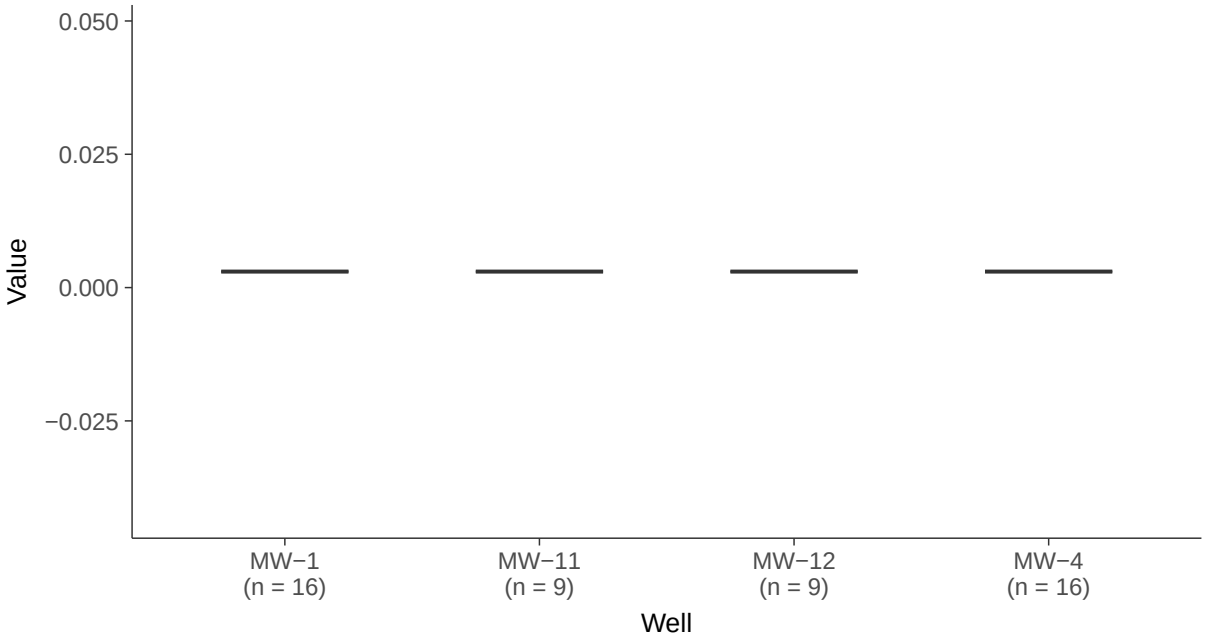
Boxplot by Season

Lead, MW-1, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Lead, MW-1, MW-4, MW-11, MW-12 (mg/L)

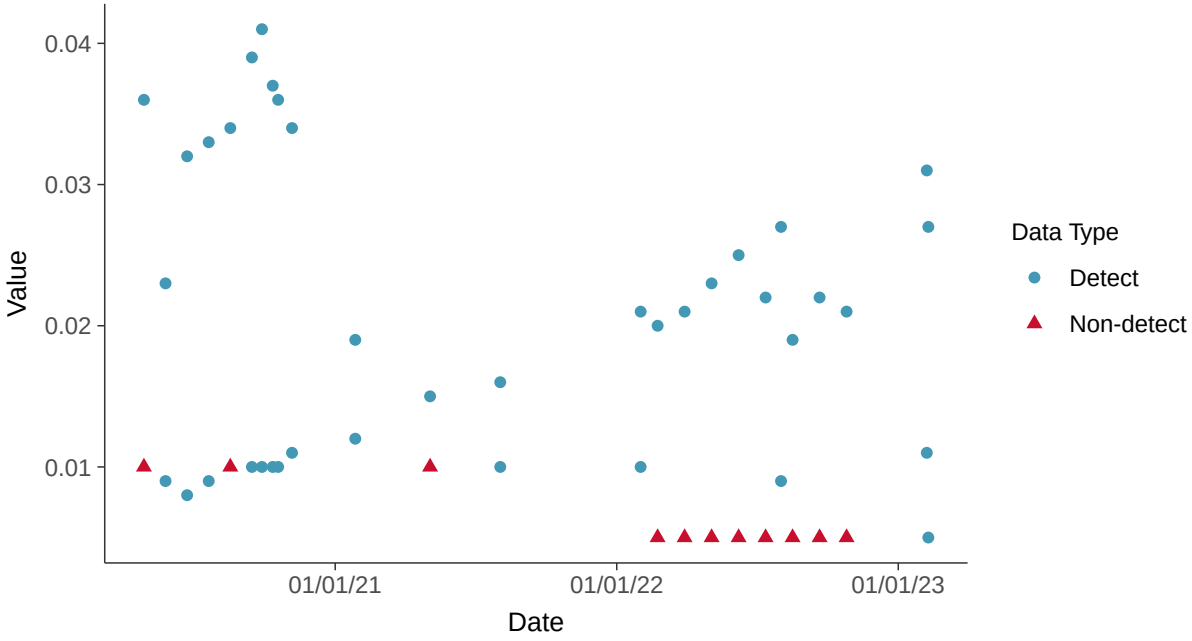


Appendix IV: Lithium, MW-1, MW-4, MW-11, MW-12

ID: 2_19

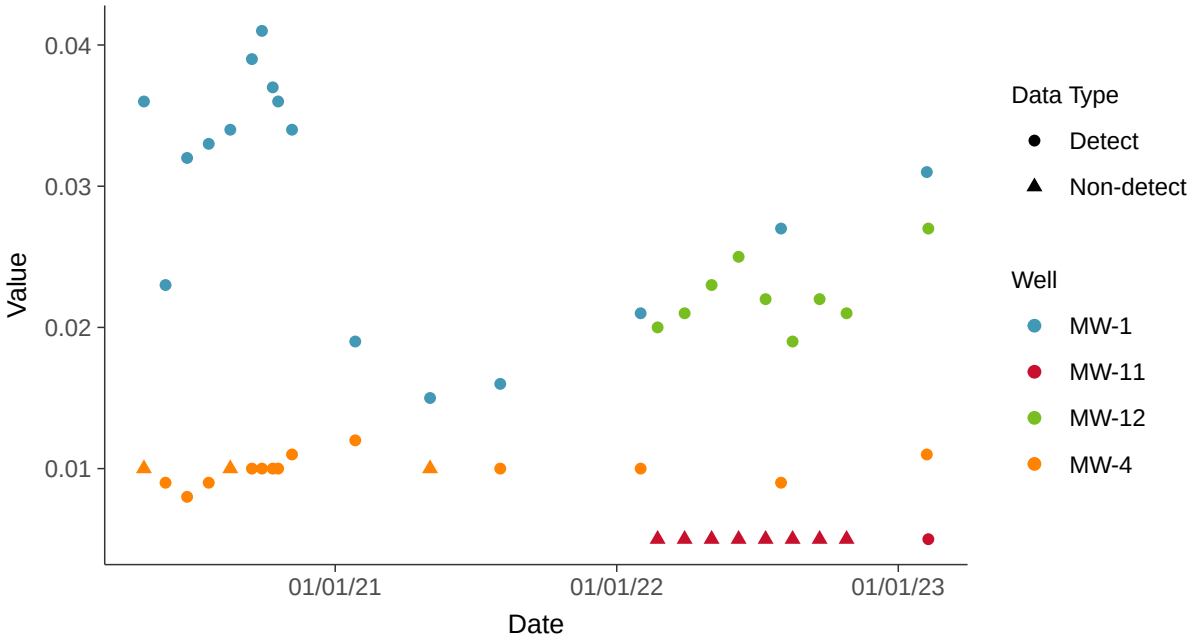
Scatter Plot

Lithium, MW-1, MW-4, MW-11, MW-12 (mg/L)



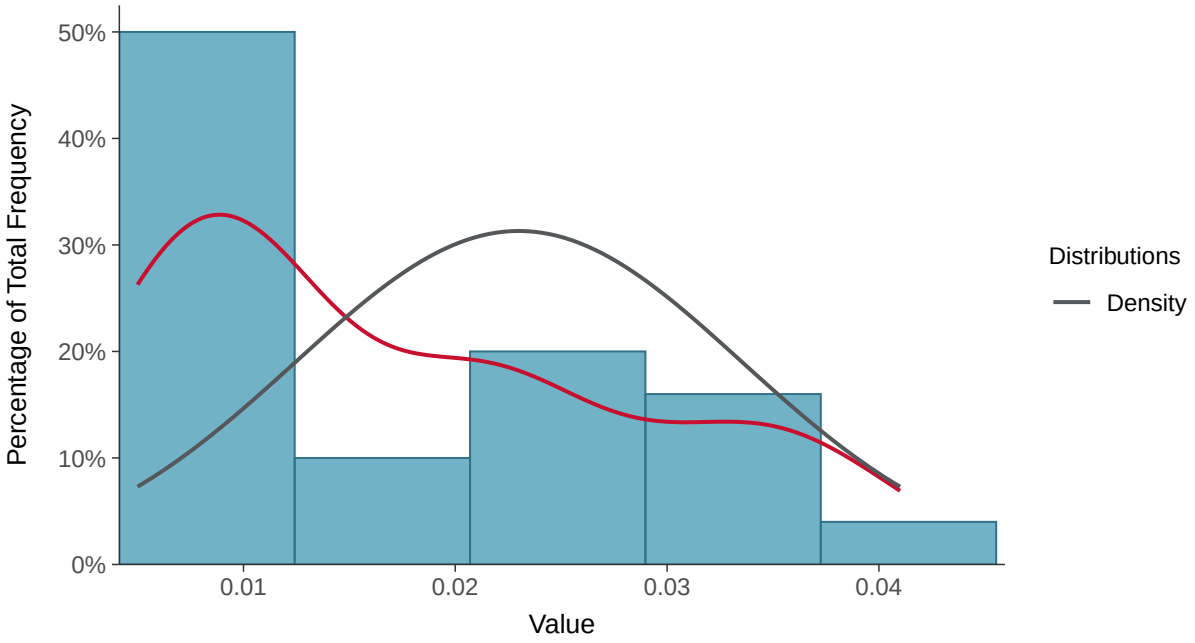
Scatter Plot by Well

Lithium, MW-1, MW-4, MW-11, MW-12 (mg/L)



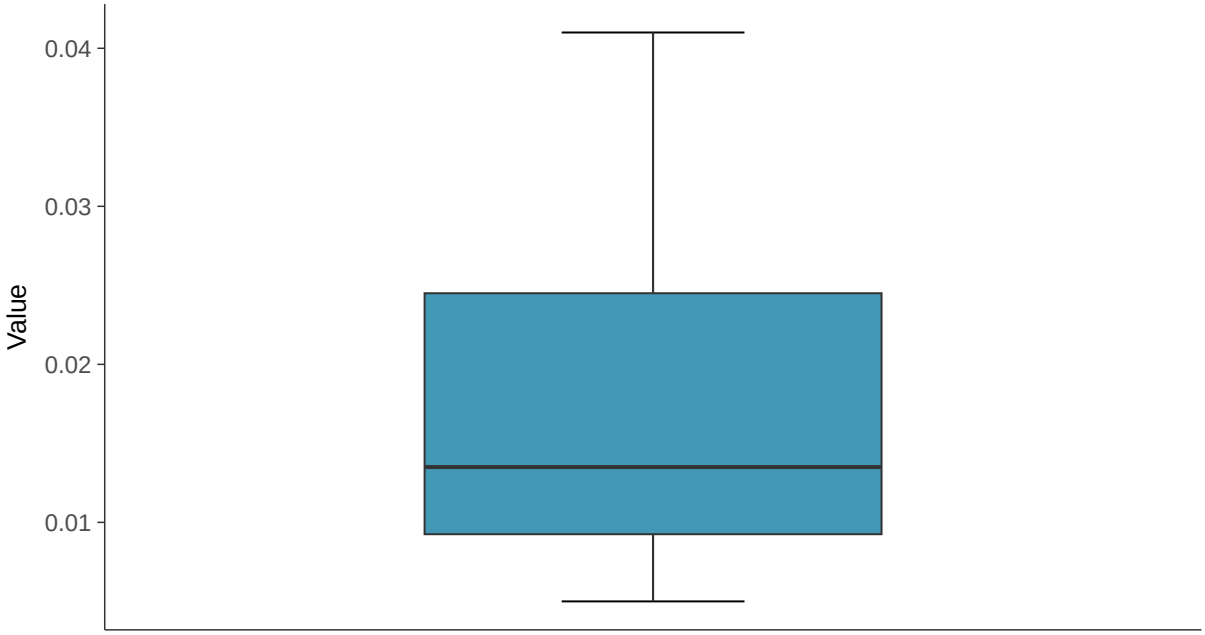
Histogram

Lithium, MW-1, MW-4, MW-11, MW-12 (mg/L)



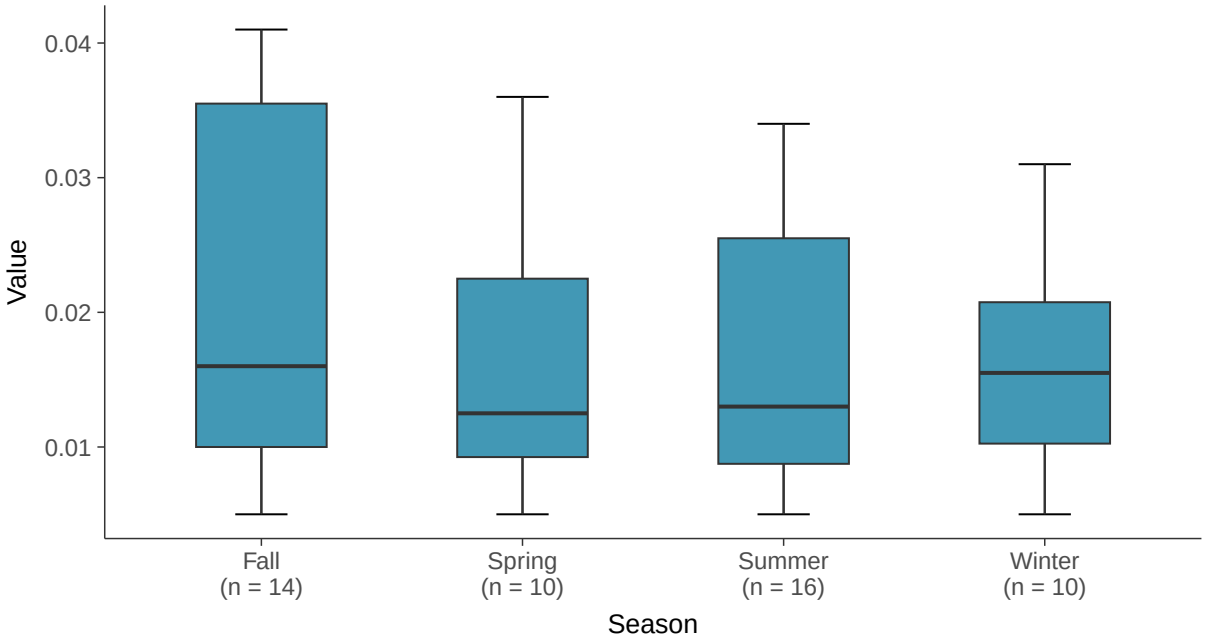
Boxplot

Lithium, MW-1, MW-4, MW-11, MW-12 (mg/L)



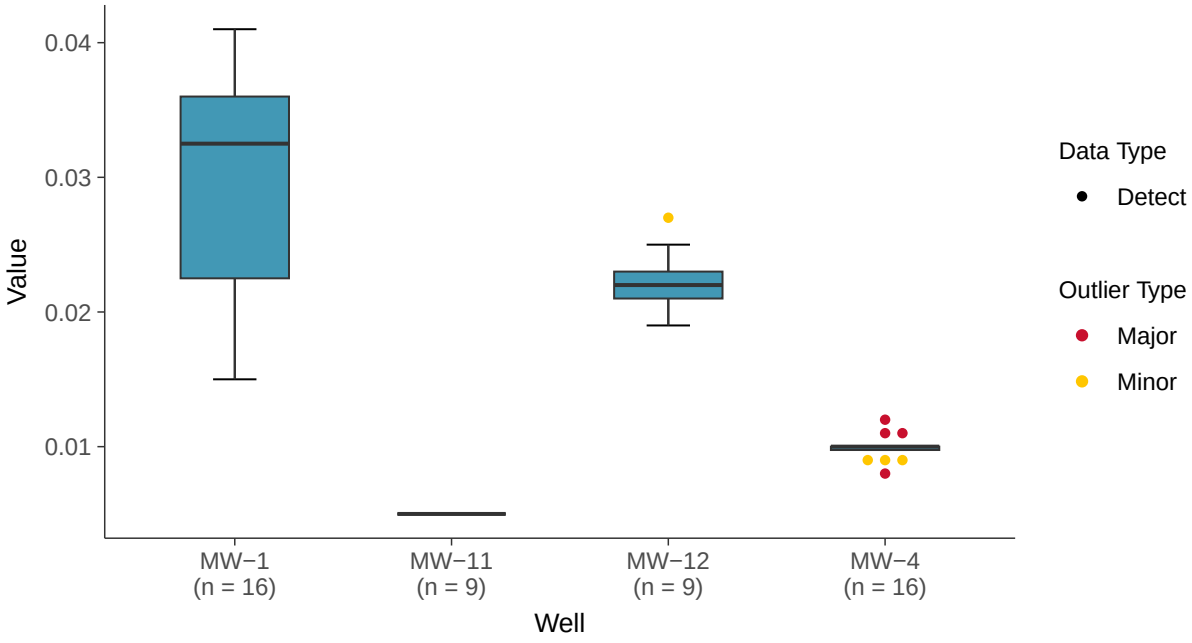
Boxplot by Season

Lithium, MW-1, MW-4, MW-11, MW-12 (mg/L)



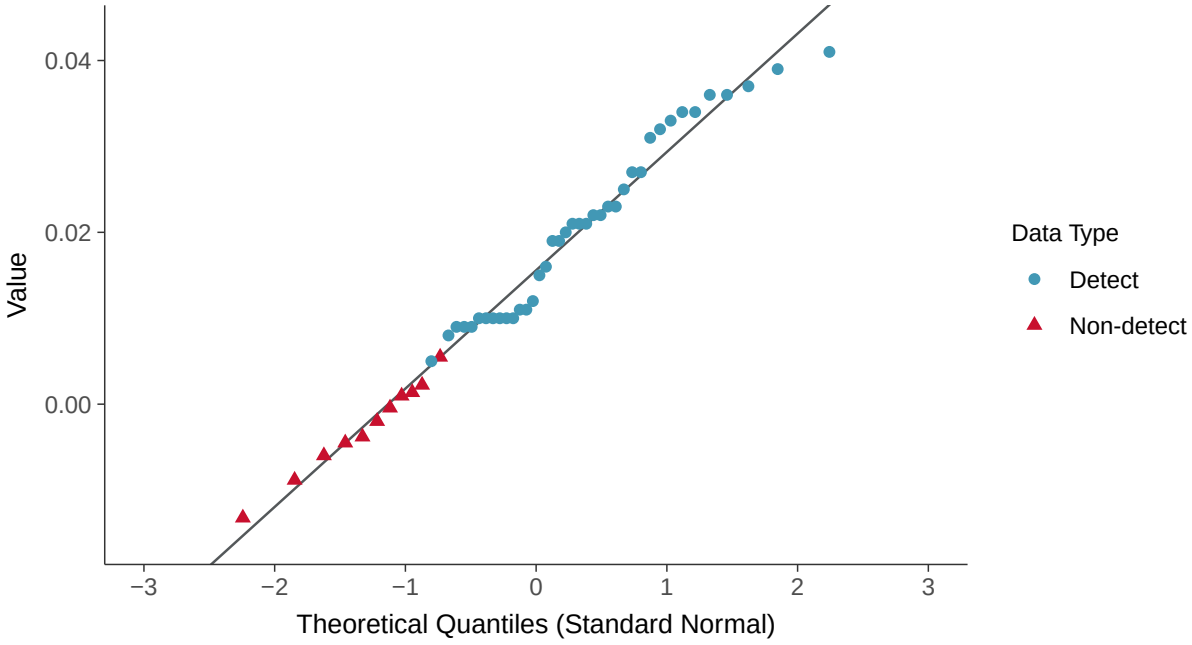
Boxplot by Well

Lithium, MW-1, MW-4, MW-11, MW-12 (mg/L)



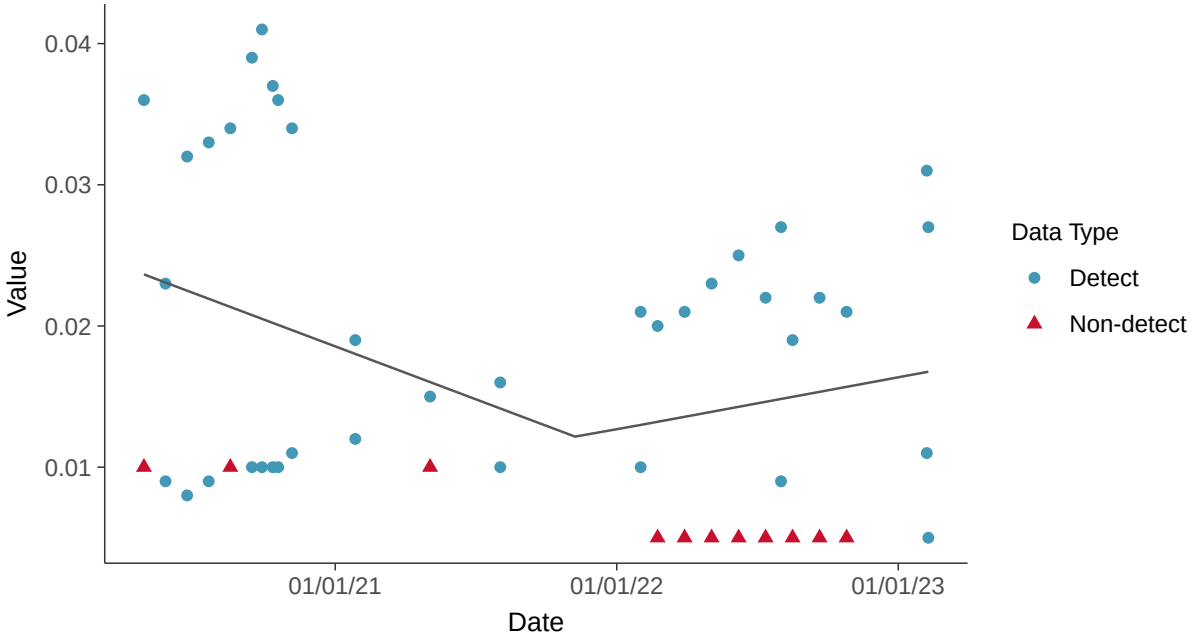
Normal Q-Q plot using ROS Imputed Estimates

Lithium, MW-1, MW-4, MW-11, MW-12 (mg/L)



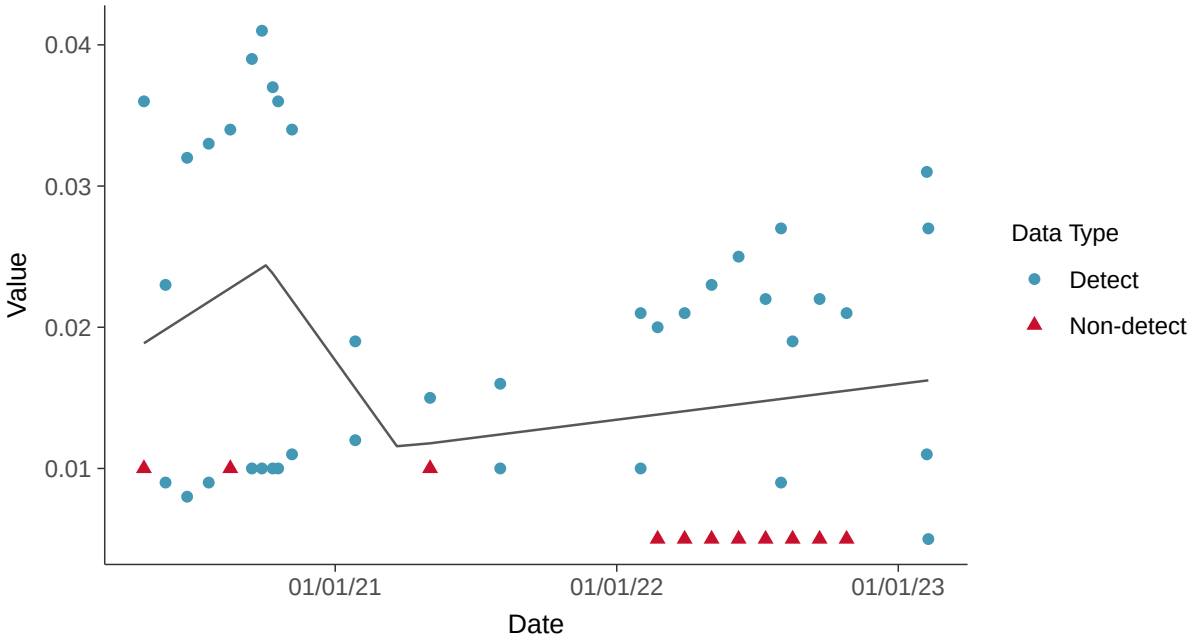
Trend Regression: Piecewise Linear-Linear

Lithium, MW-1, MW-4, MW-11, MW-12 (mg/L)



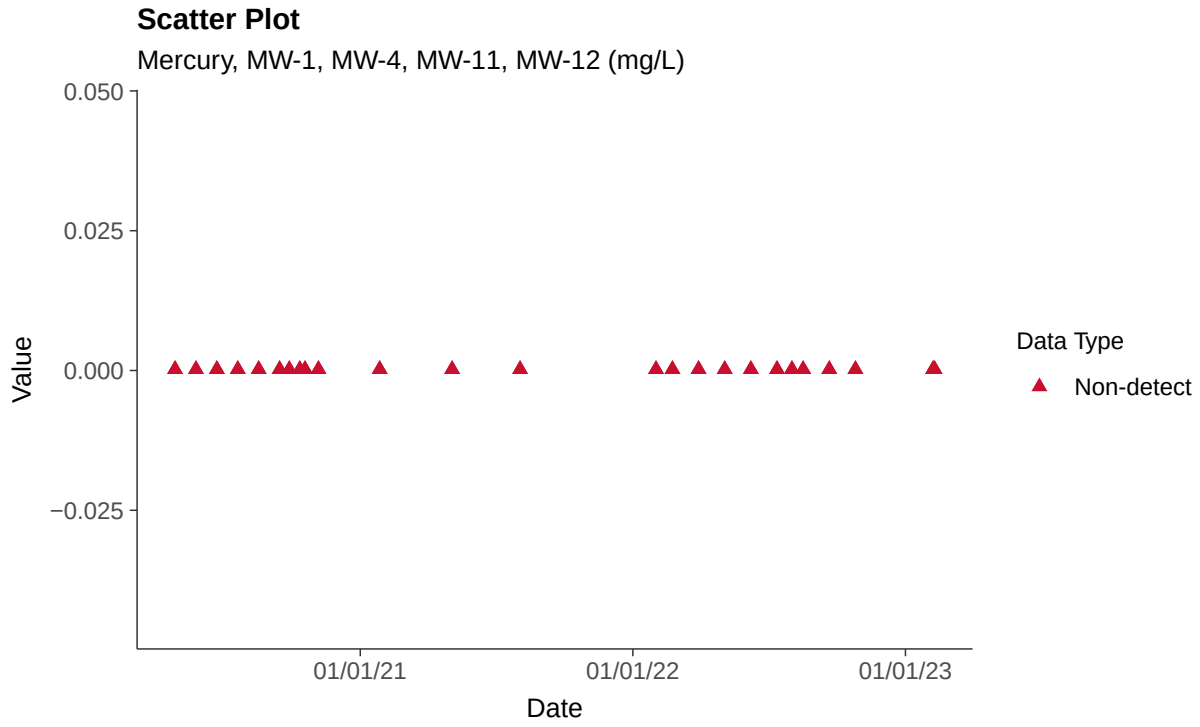
Trend Regression: Piecewise Linear-Linear-Linear

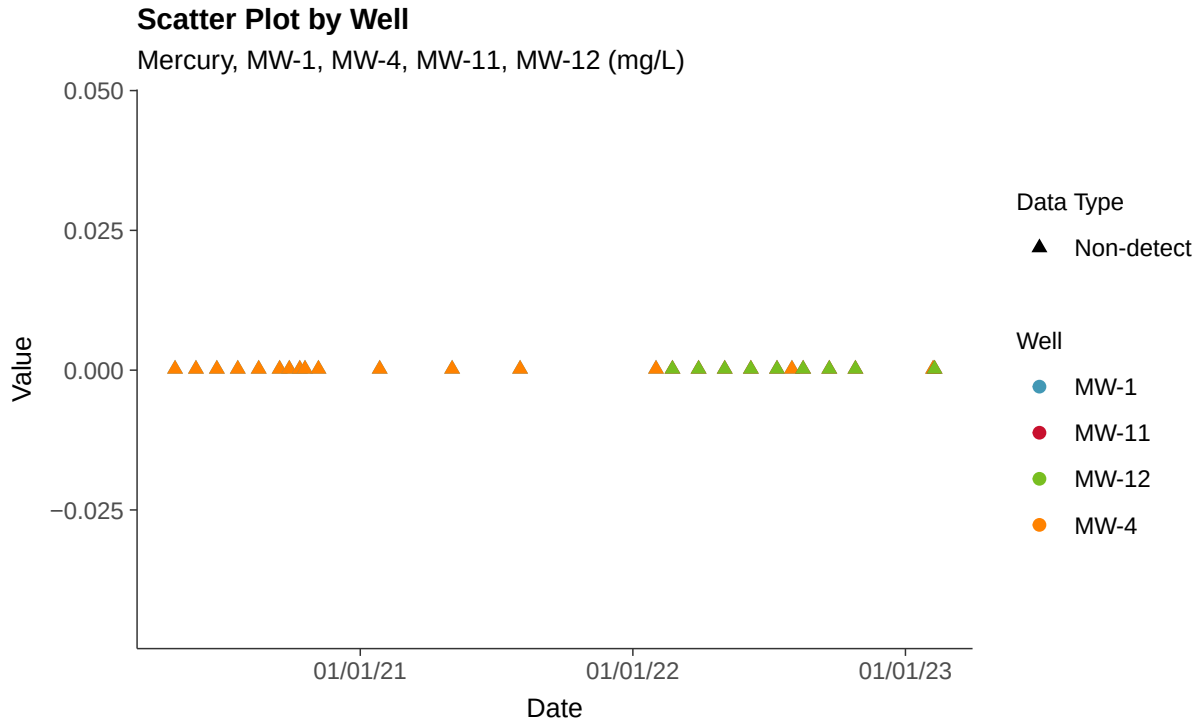
Lithium, MW-1, MW-4, MW-11, MW-12 (mg/L)



Appendix IV: Mercury, MW-1, MW-4, MW-11, MW-12

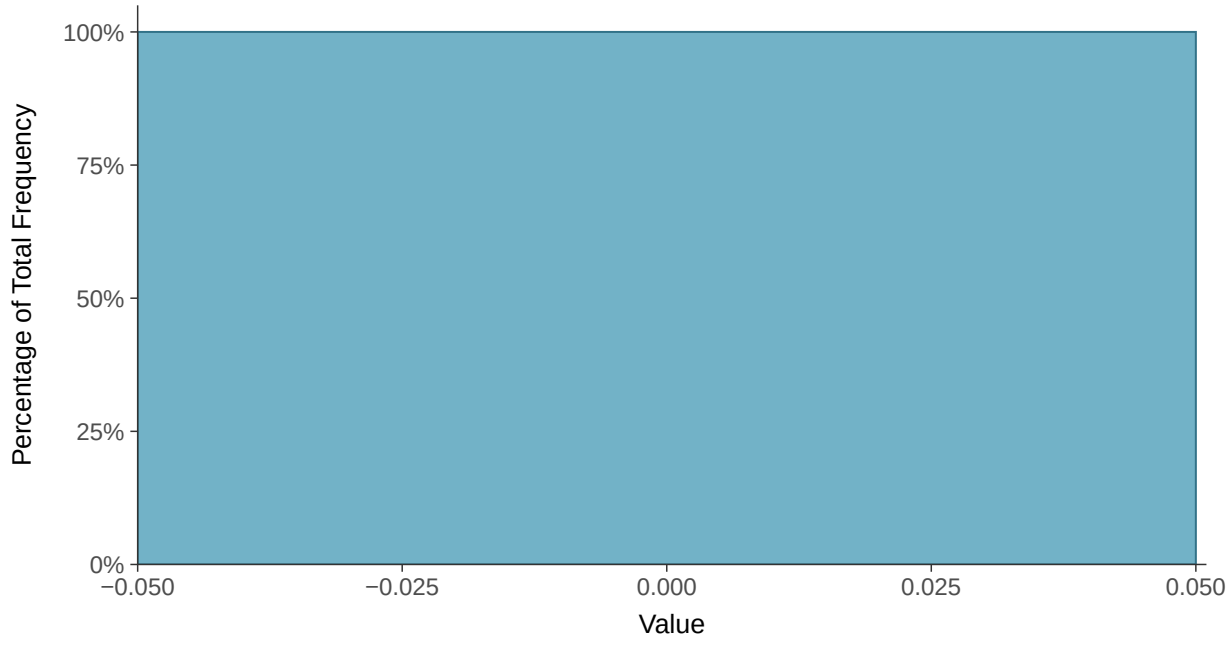
ID: 2_21





Histogram

Mercury, MW-1, MW-4, MW-11, MW-12 (mg/L)

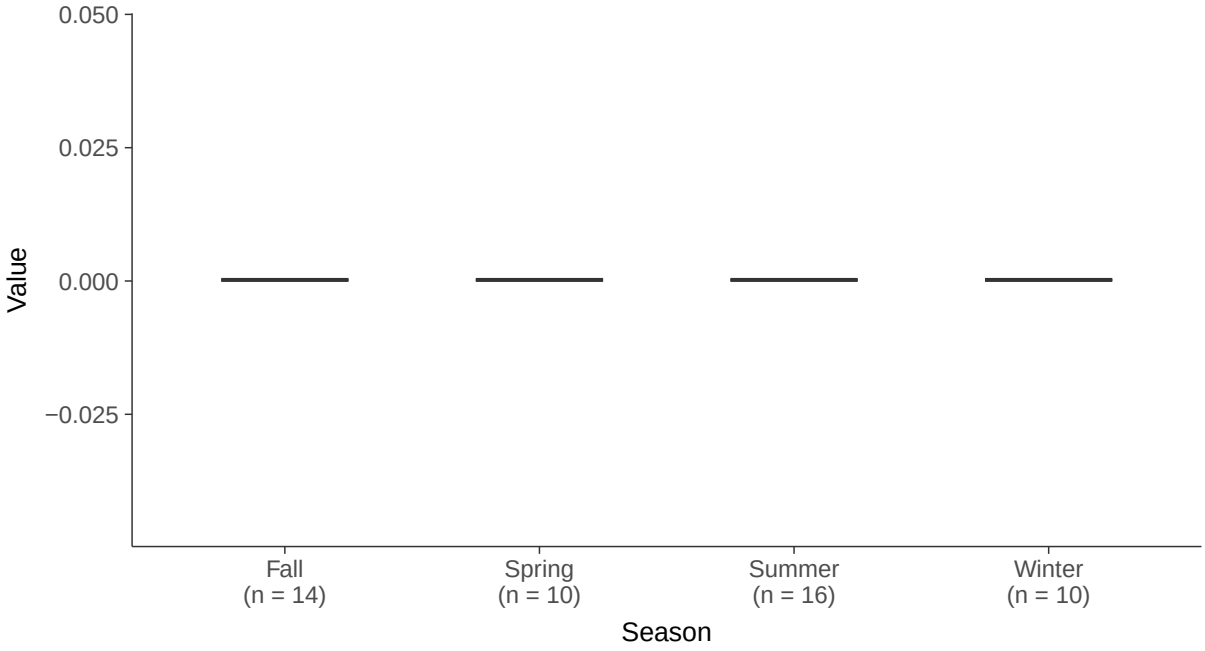


Boxplot

Mercury, MW-1, MW-4, MW-11, MW-12 (mg/L)

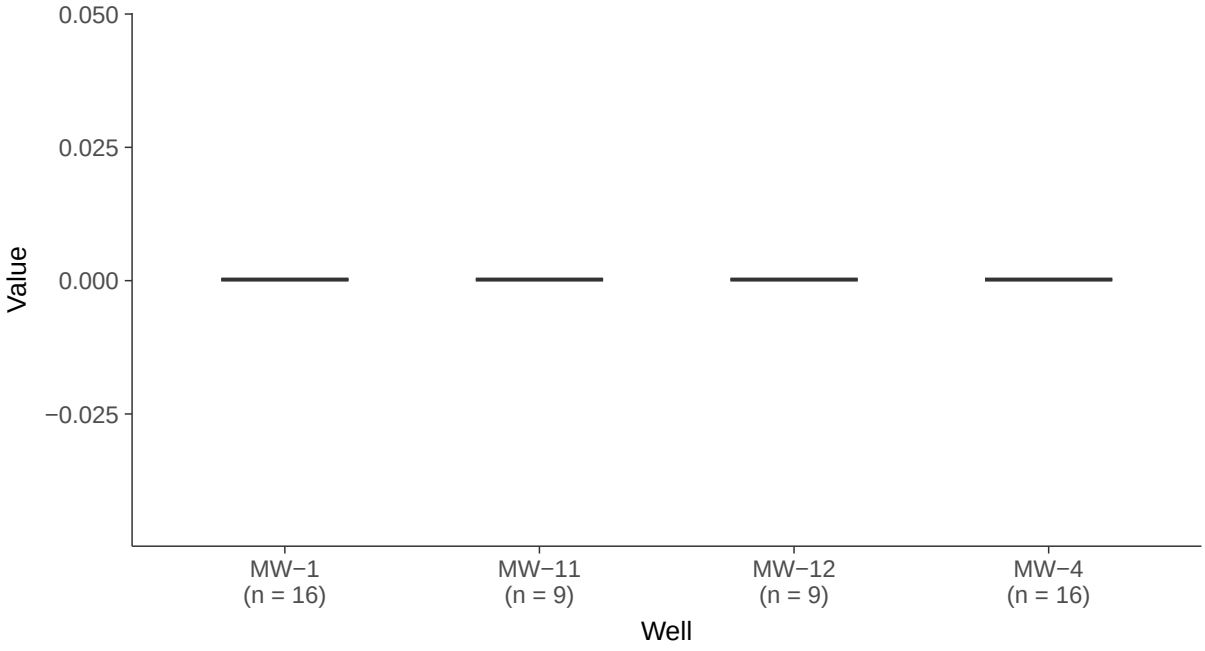
Boxplot by Season

Mercury, MW-1, MW-4, MW-11, MW-12 (mg/L)



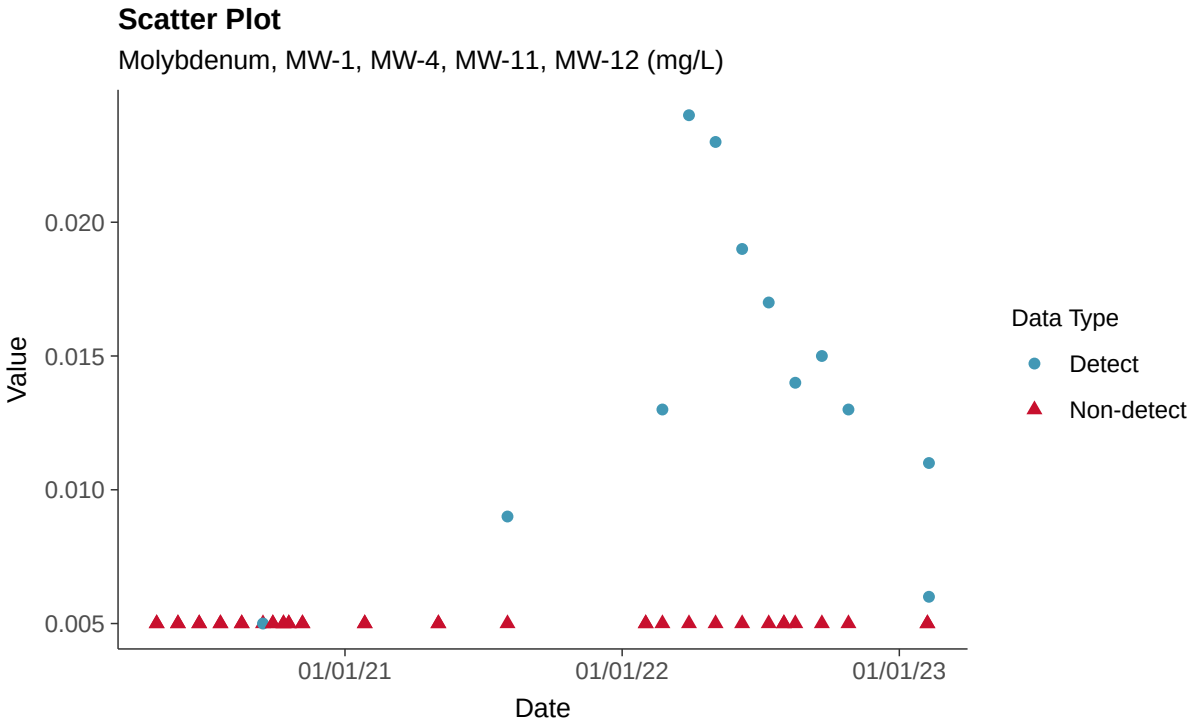
Boxplot by Well

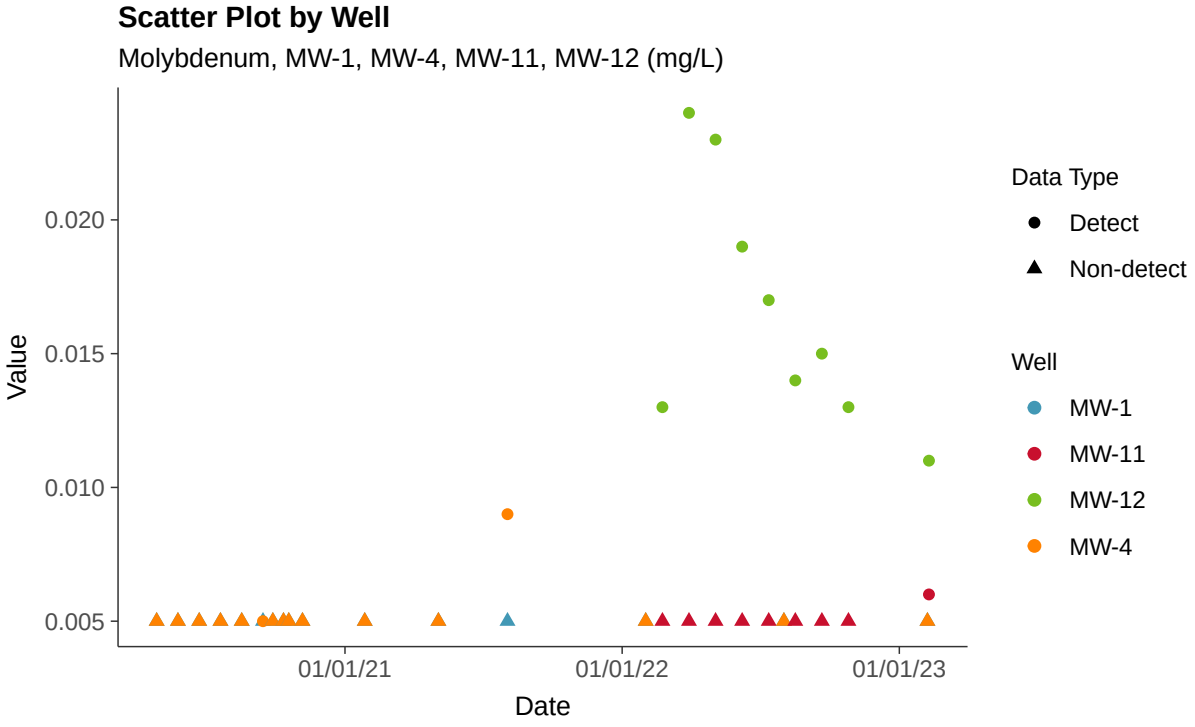
Mercury, MW-1, MW-4, MW-11, MW-12 (mg/L)



Appendix IV: Molybdenum, MW-1, MW-4, MW-11, MW-12

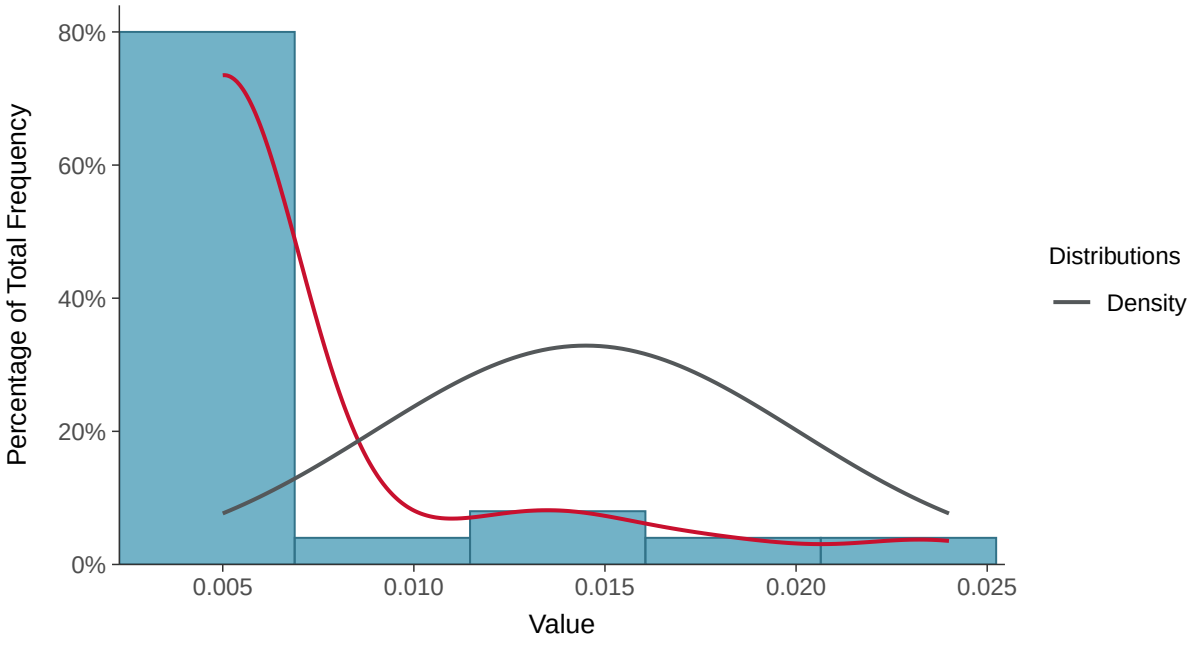
ID: 2_22





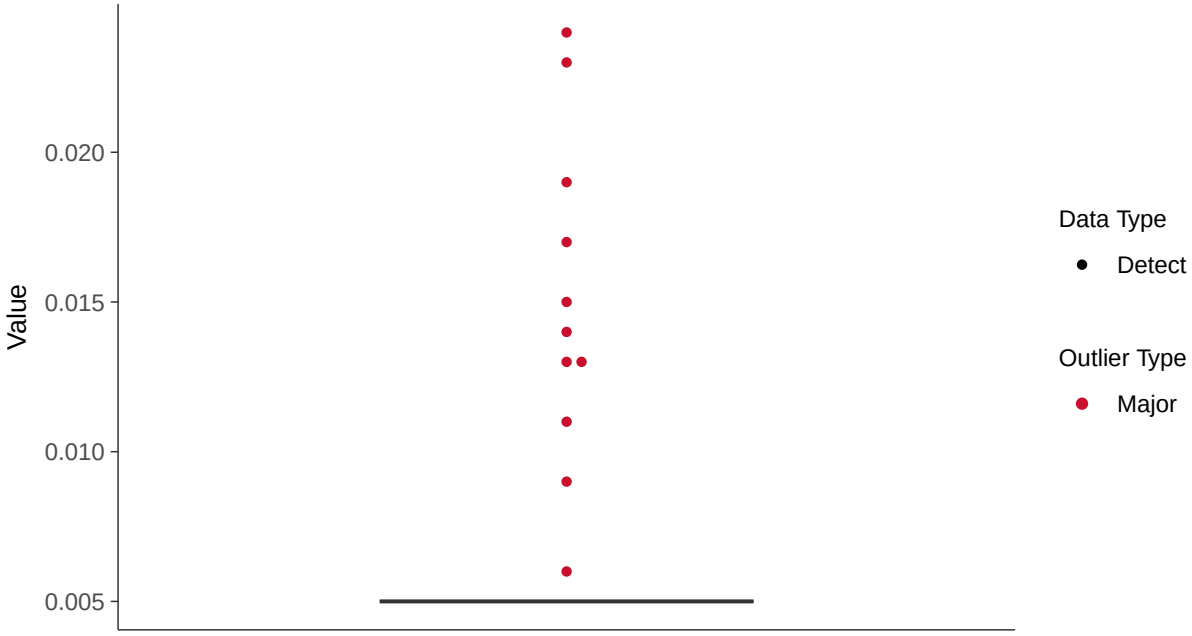
Histogram

Molybdenum, MW-1, MW-4, MW-11, MW-12 (mg/L)



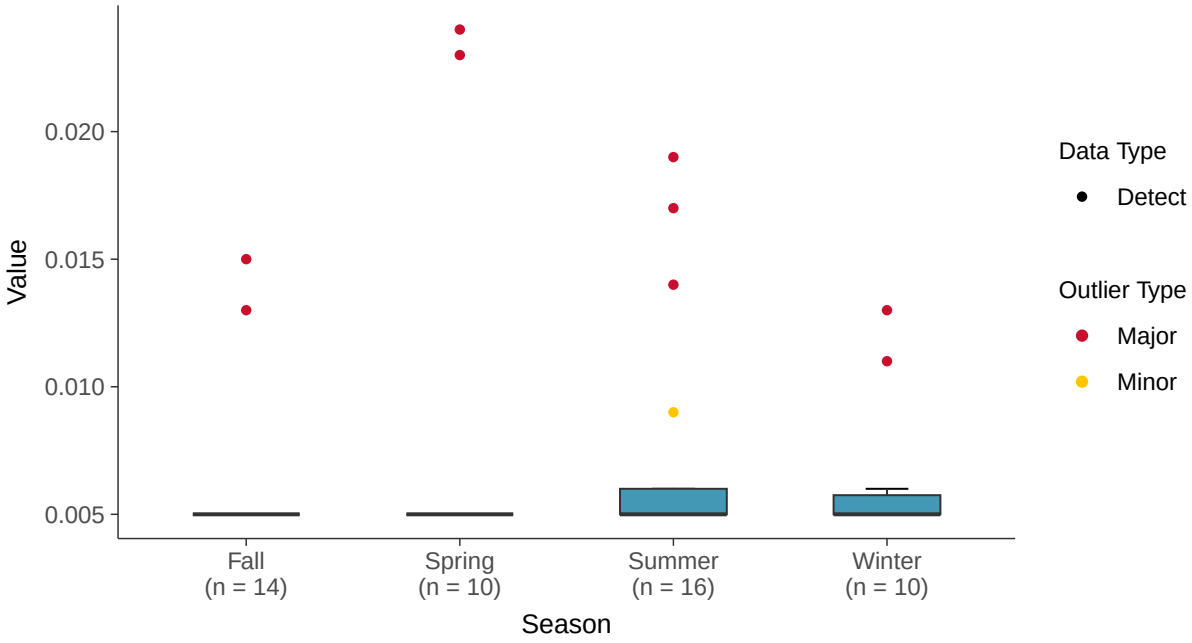
Boxplot

Molybdenum, MW-1, MW-4, MW-11, MW-12 (mg/L)



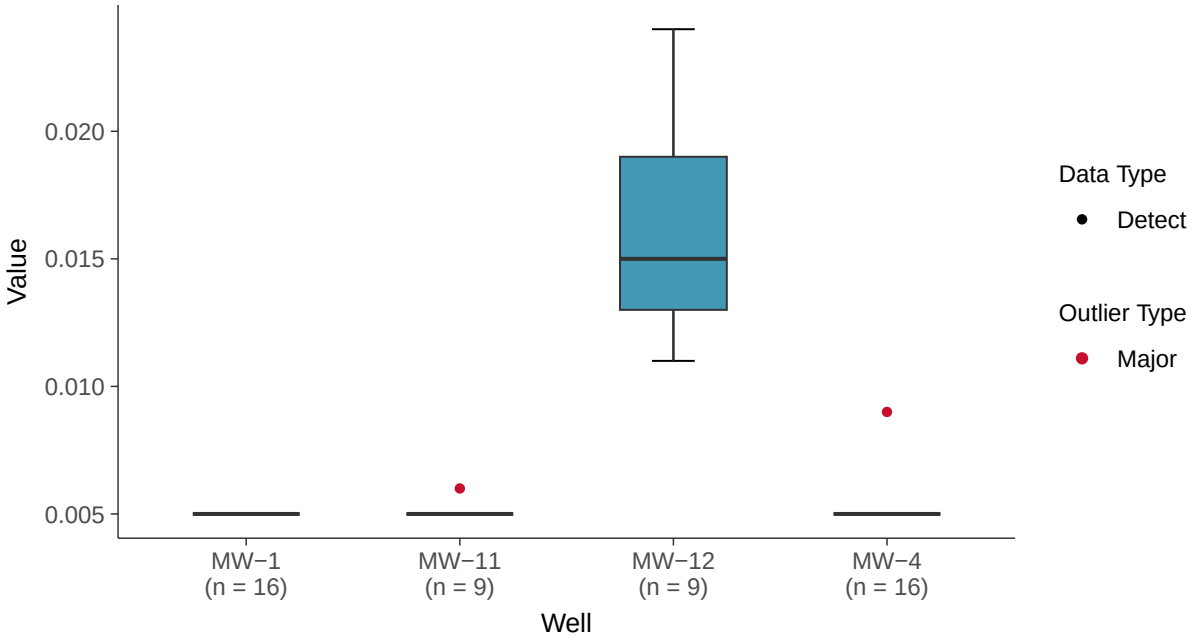
Boxplot by Season

Molybdenum, MW-1, MW-4, MW-11, MW-12 (mg/L)



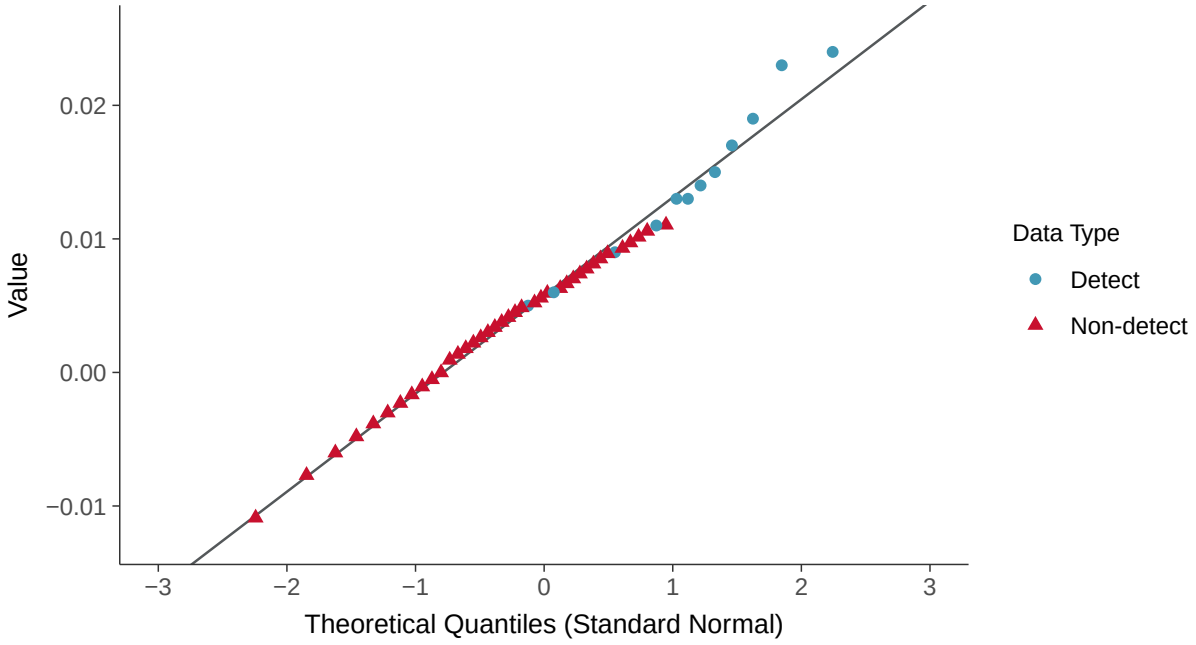
Boxplot by Well

Molybdenum, MW-1, MW-4, MW-11, MW-12 (mg/L)



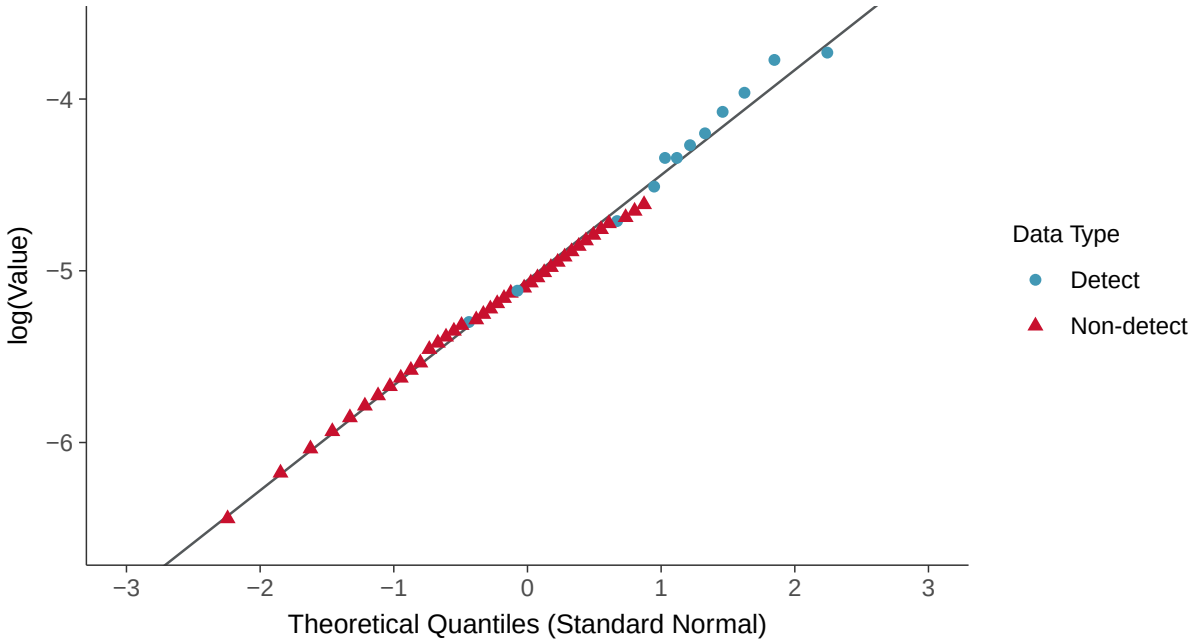
Normal Q-Q plot using ROS Imputed Estimates

Molybdenum, MW-1, MW-4, MW-11, MW-12 (mg/L)



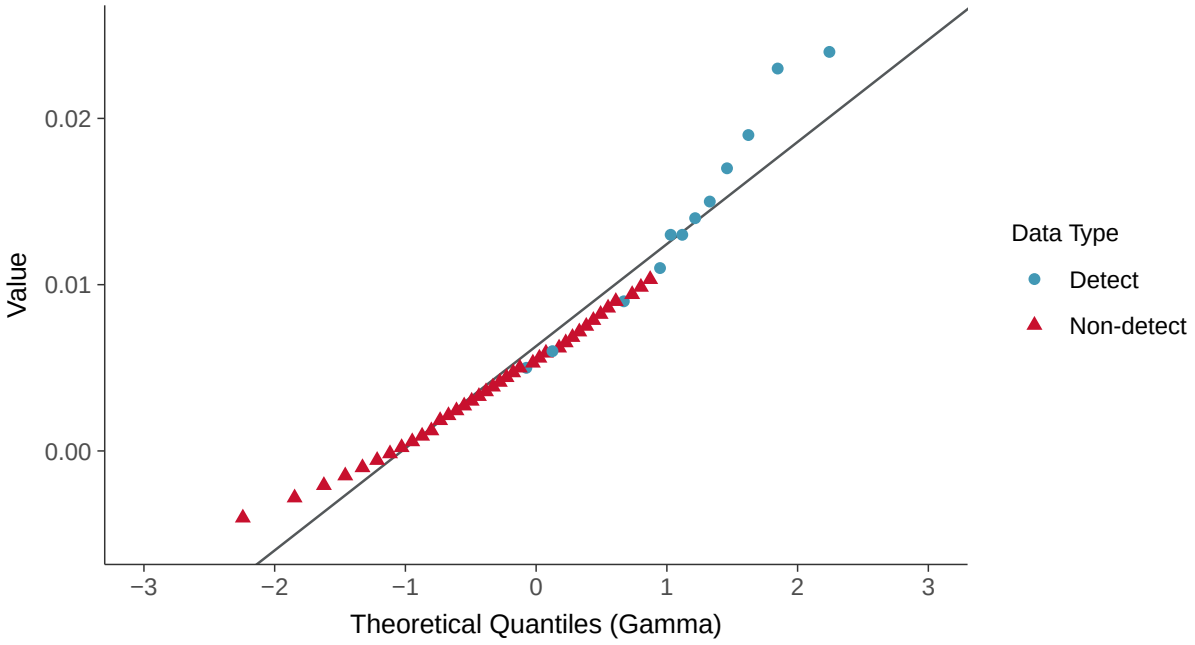
Lognormal Q-Q plot using ROS Imputed Estimates

Molybdenum, MW-1, MW-4, MW-11, MW-12 (mg/L)



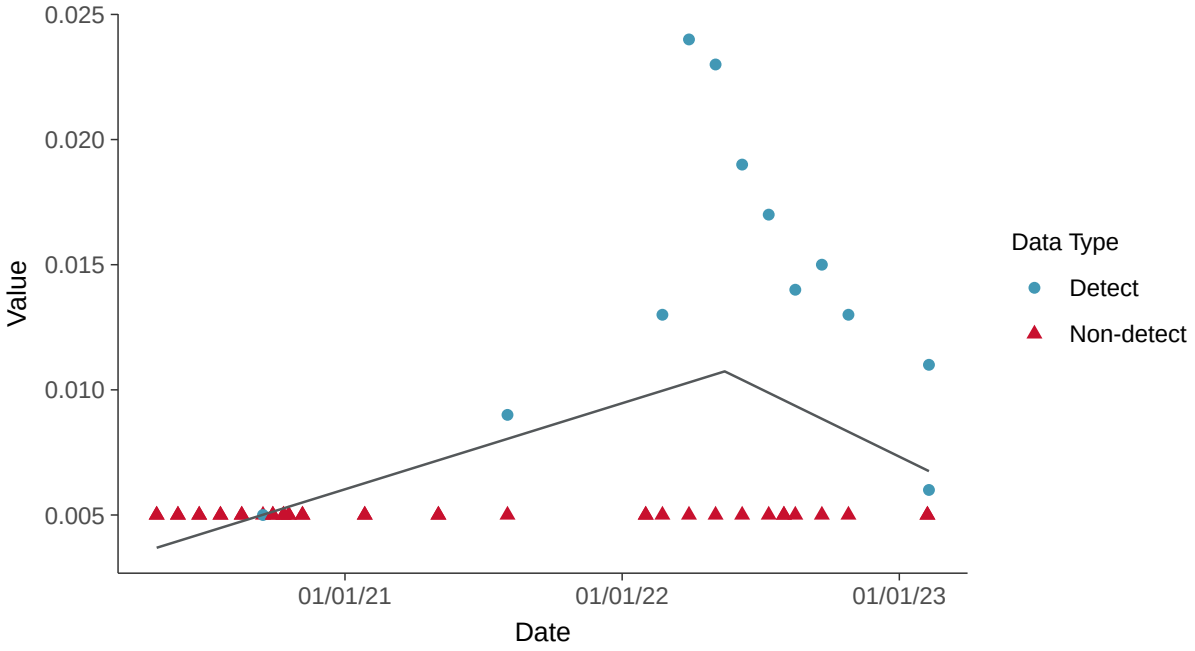
Gamma Q-Q plot using ROS Imputed Estimates

Molybdenum, MW-1, MW-4, MW-11, MW-12 (mg/L)



Trend Regression: Piecewise Linear-Linear

Molybdenum, MW-1, MW-4, MW-11, MW-12 (mg/L)

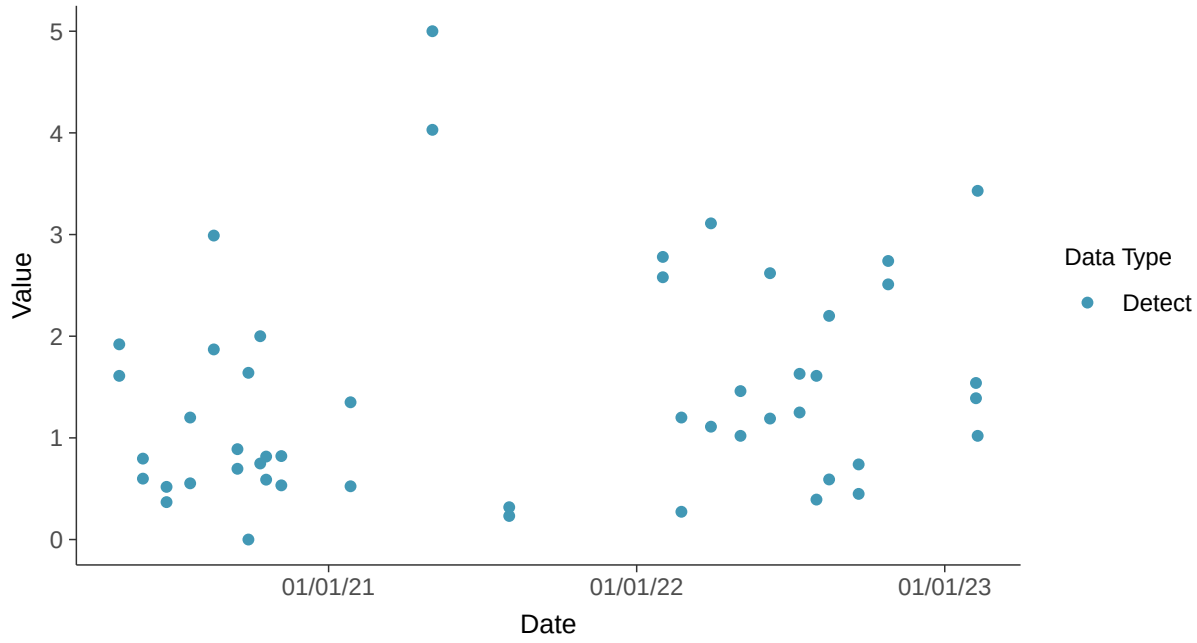


Appendix IV: Radium-226/228, MW-1, MW-4, MW-11, MW-12

ID: 2_25

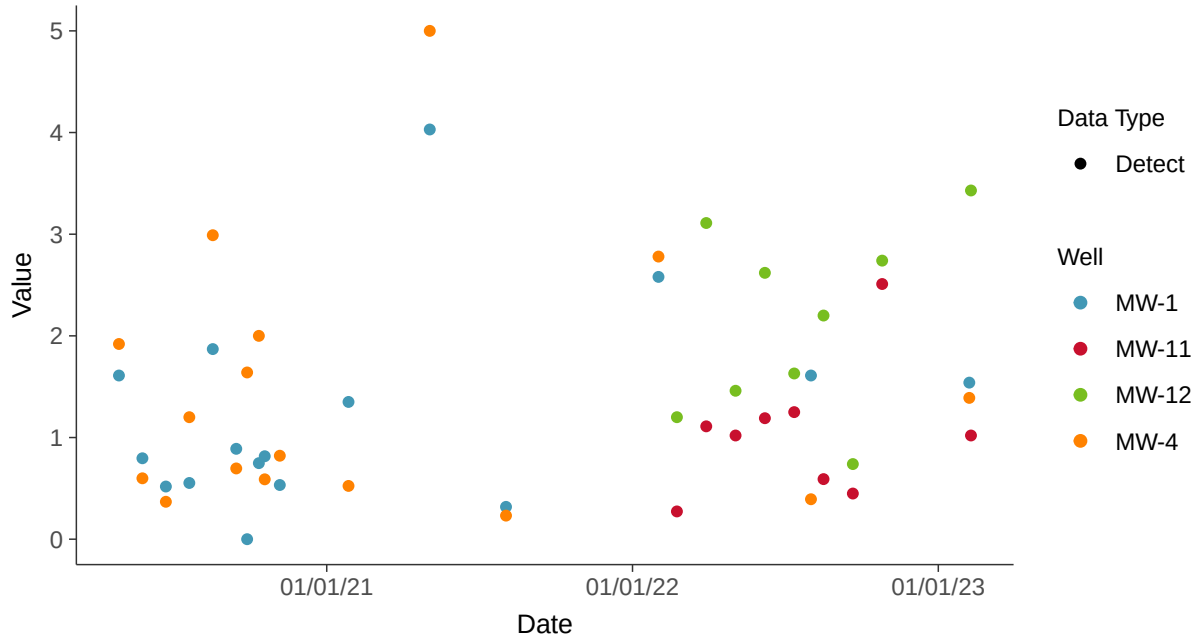
Scatter Plot

Radium-226/228, MW-1, MW-4, MW-11, MW-12 (pCi/L)



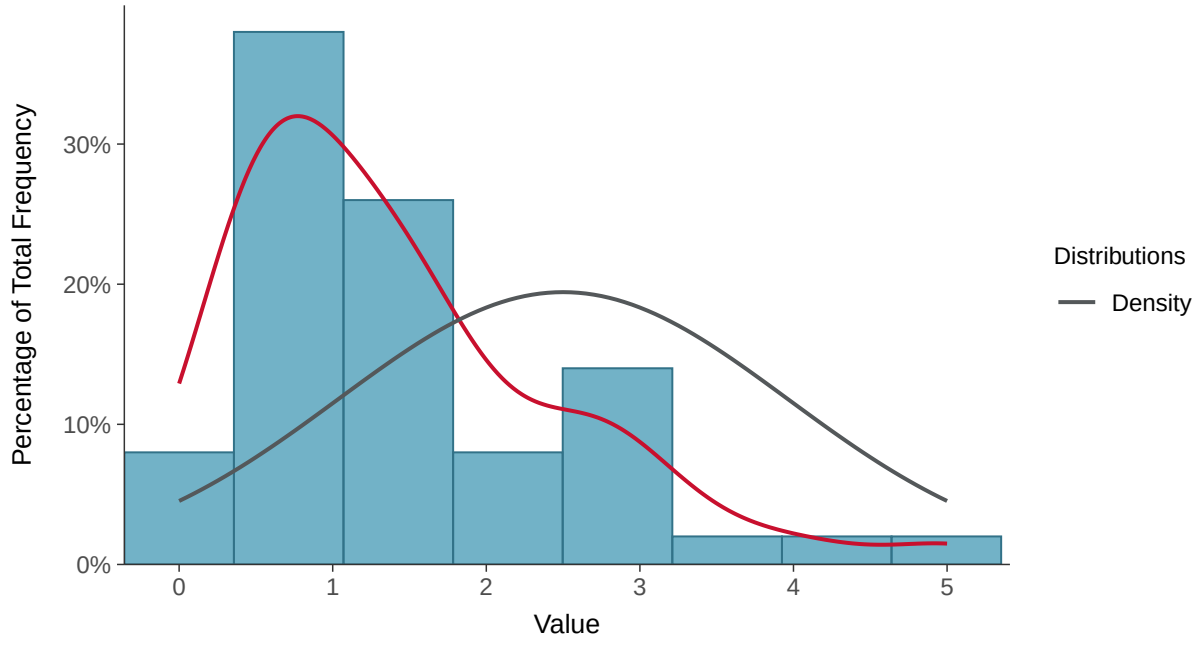
Scatter Plot by Well

Radium-226/228, MW-1, MW-4, MW-11, MW-12 (pCi/L)



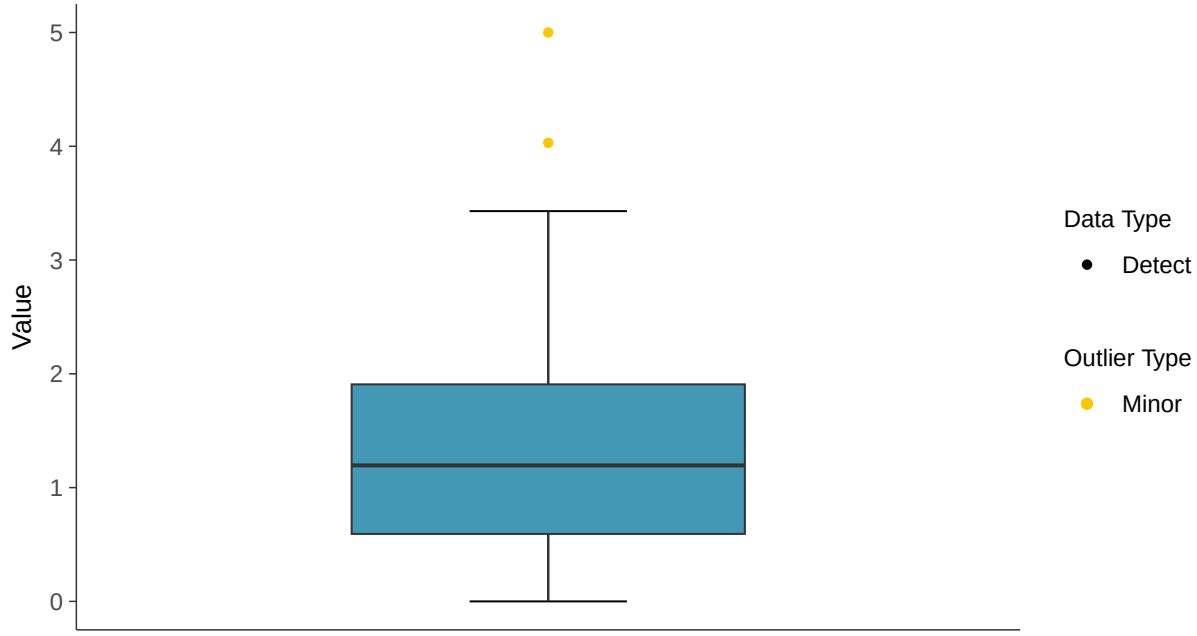
Histogram

Radium-226/228, MW-1, MW-4, MW-11, MW-12 (pCi/L)



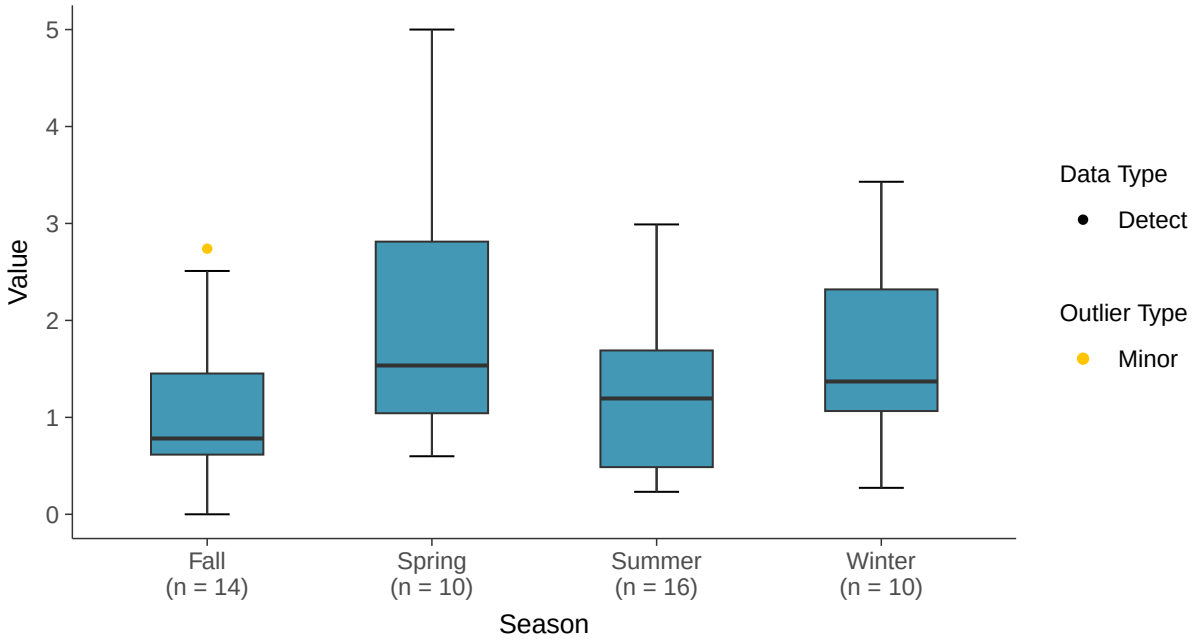
Boxplot

Radium-226/228, MW-1, MW-4, MW-11, MW-12 (pCi/L)



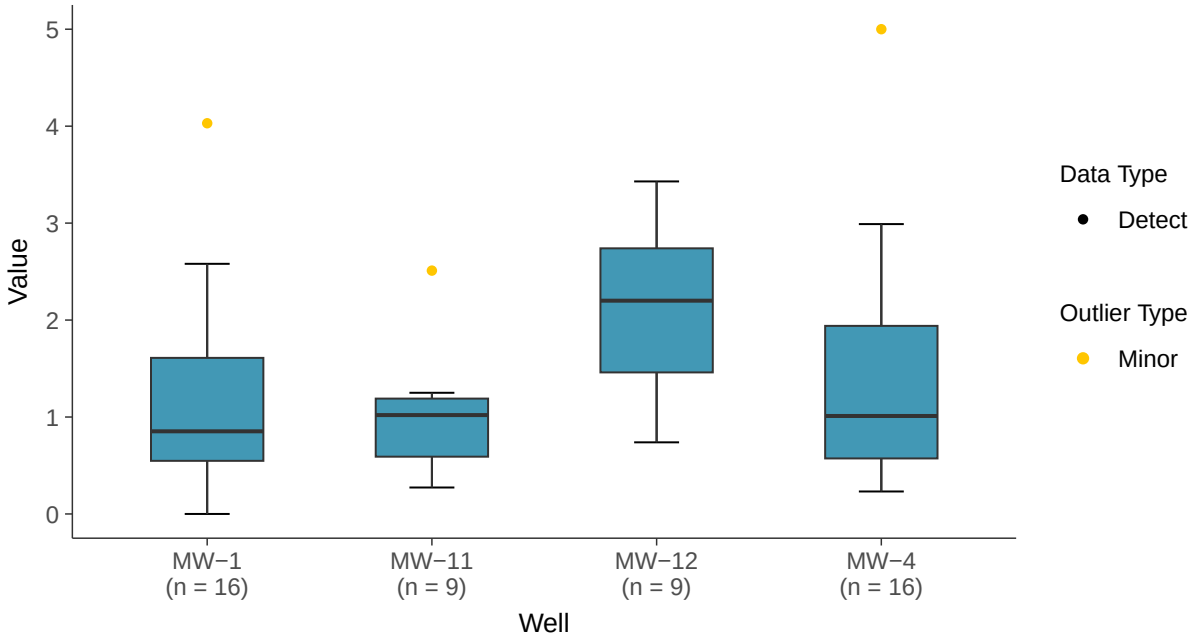
Boxplot by Season

Radium-226/228, MW-1, MW-4, MW-11, MW-12 (pCi/L)



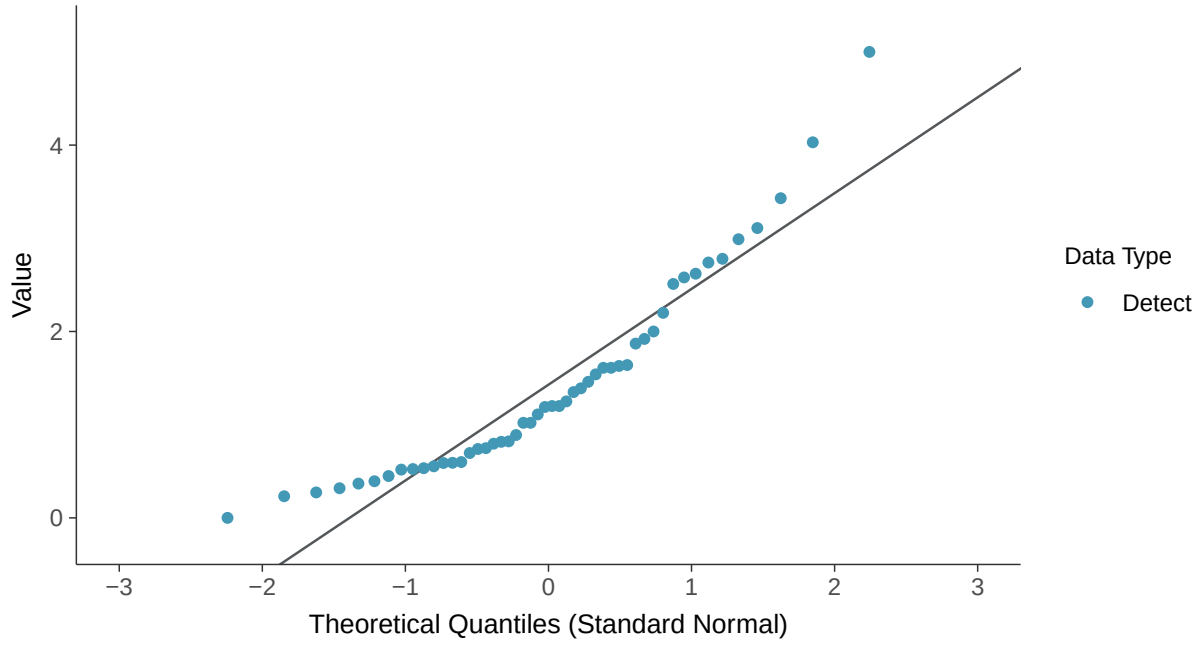
Boxplot by Well

Radium-226/228, MW-1, MW-4, MW-11, MW-12 (pCi/L)



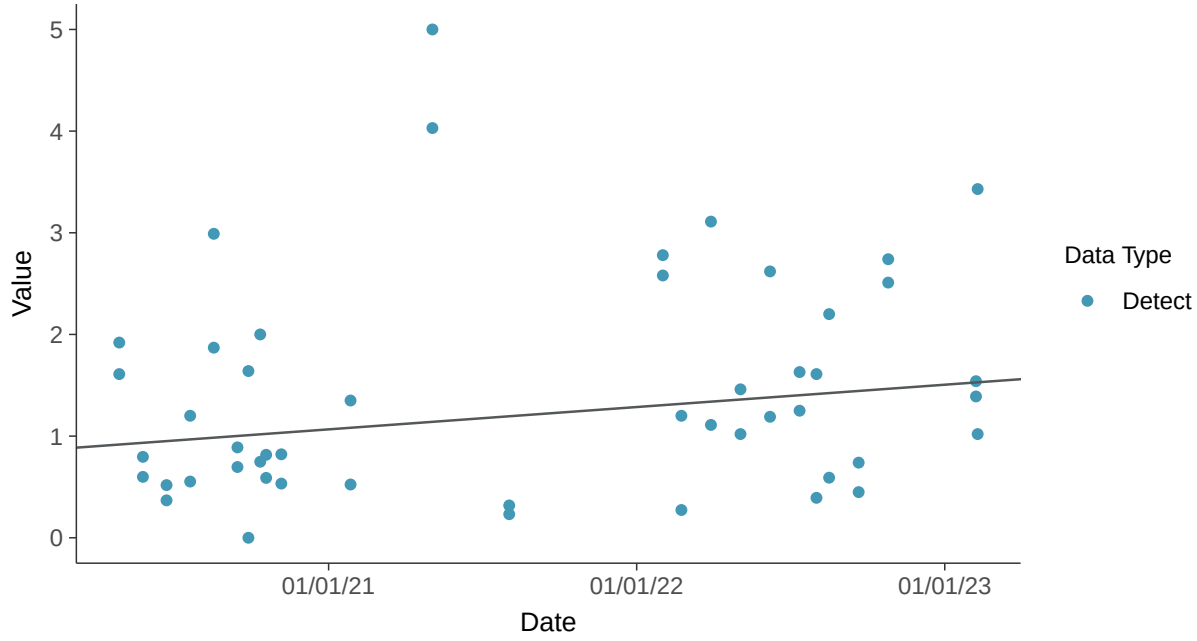
Normal Q-Q plot

Radium-226/228, MW-1, MW-4, MW-11, MW-12 (pCi/L)



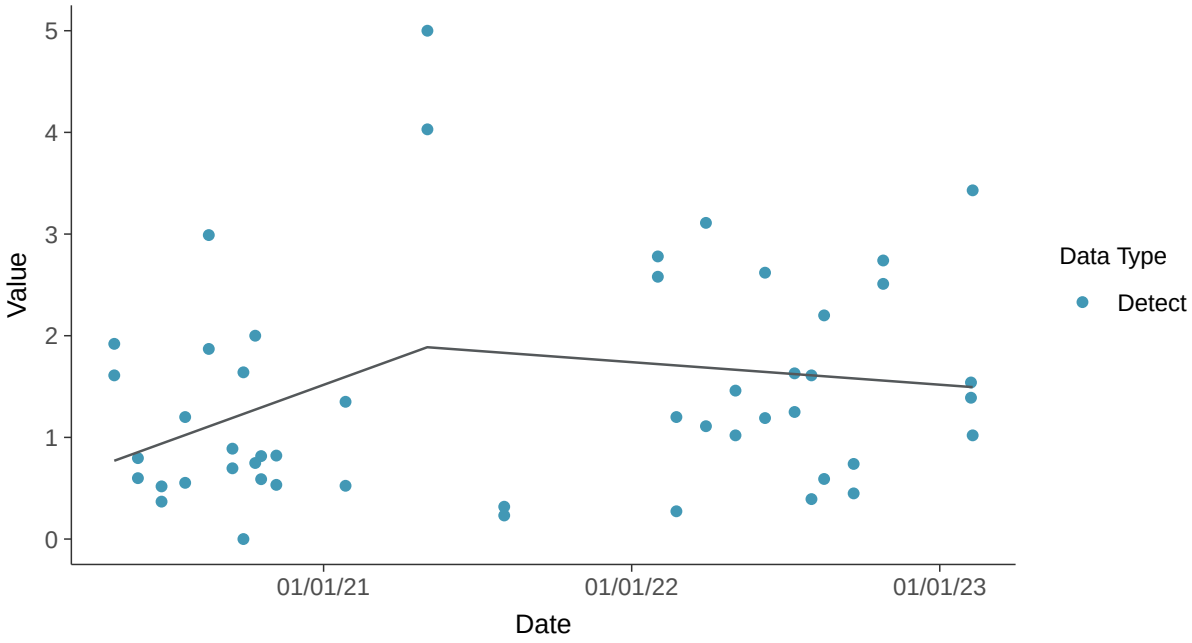
Trend Regression: Mann-Kendall/Theil-Sen Estimate

Radium-226/228, MW-1, MW-4, MW-11, MW-12 (pCi/L)



Trend Regression: Piecewise Linear-Linear

Radium-226/228, MW-1, MW-4, MW-11, MW-12 (pCi/L)

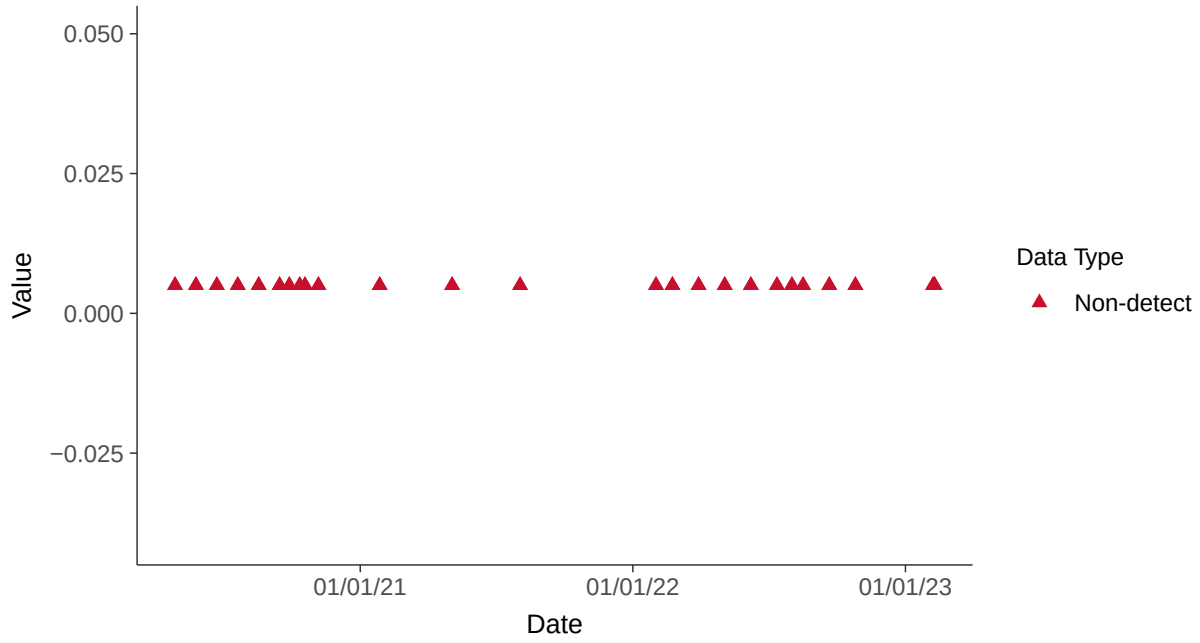


Appendix IV: Selenium, MW-1, MW-4, MW-11, MW-12

ID: 2_27

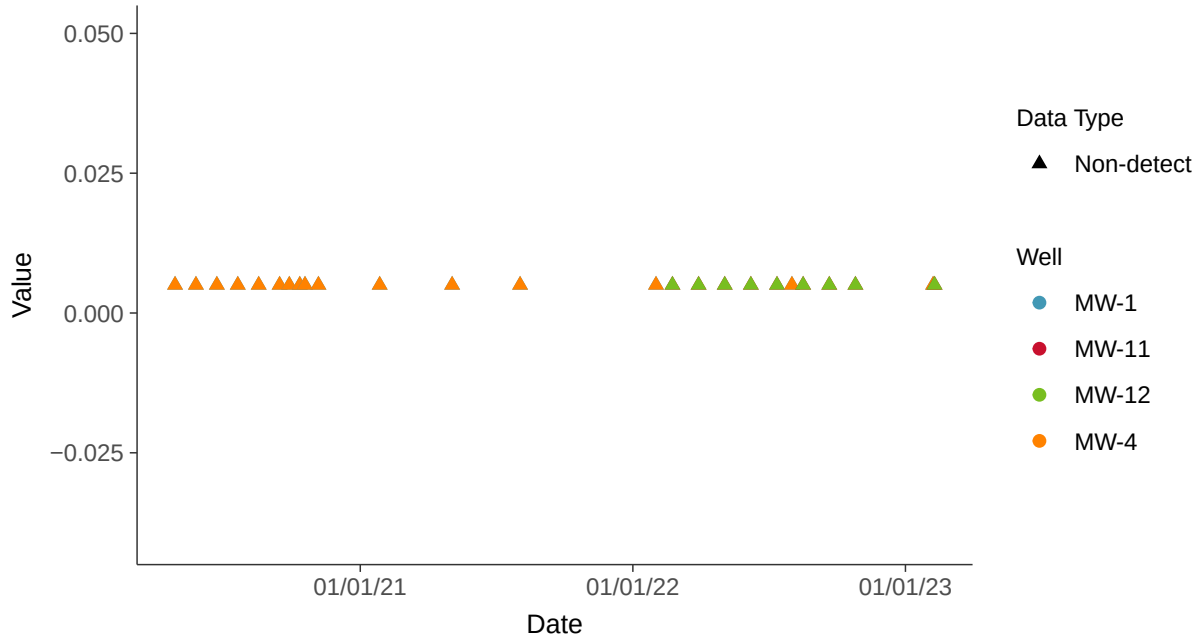
Scatter Plot

Selenium, MW-1, MW-4, MW-11, MW-12 (mg/L)



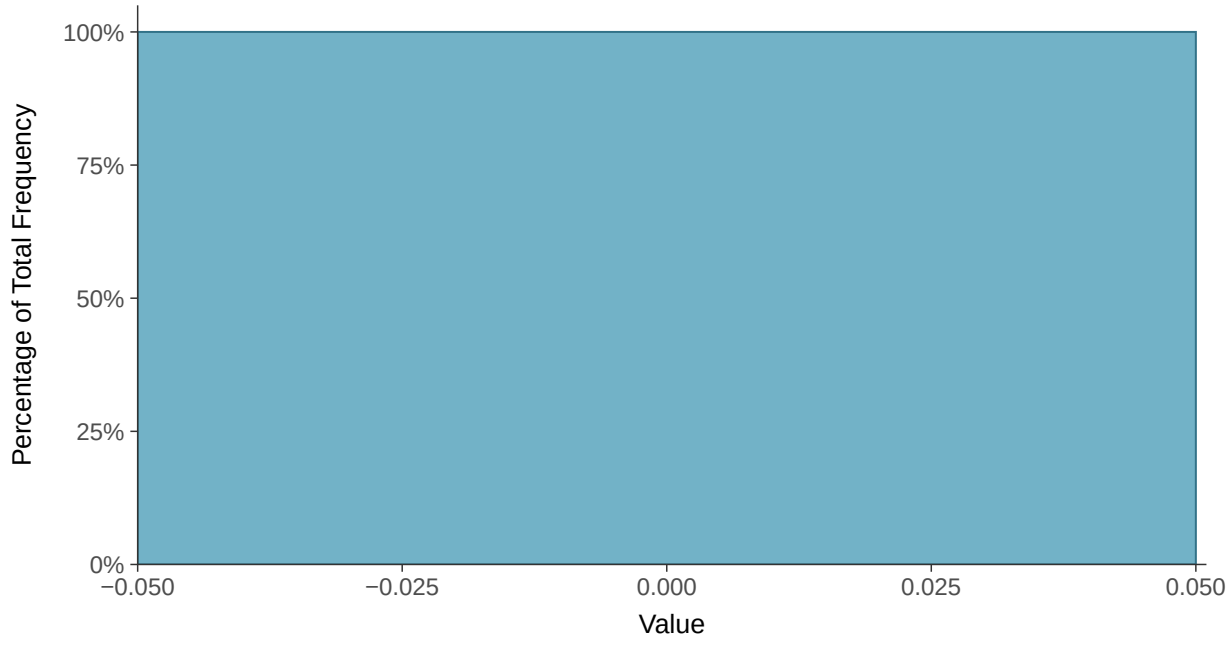
Scatter Plot by Well

Selenium, MW-1, MW-4, MW-11, MW-12 (mg/L)



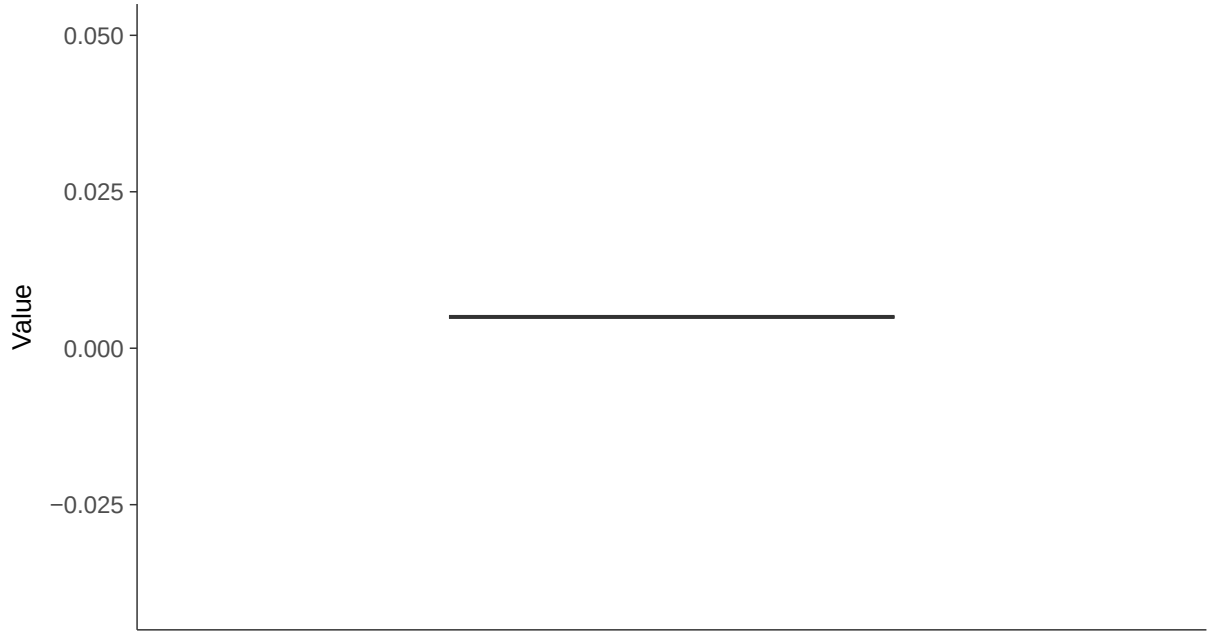
Histogram

Selenium, MW-1, MW-4, MW-11, MW-12 (mg/L)



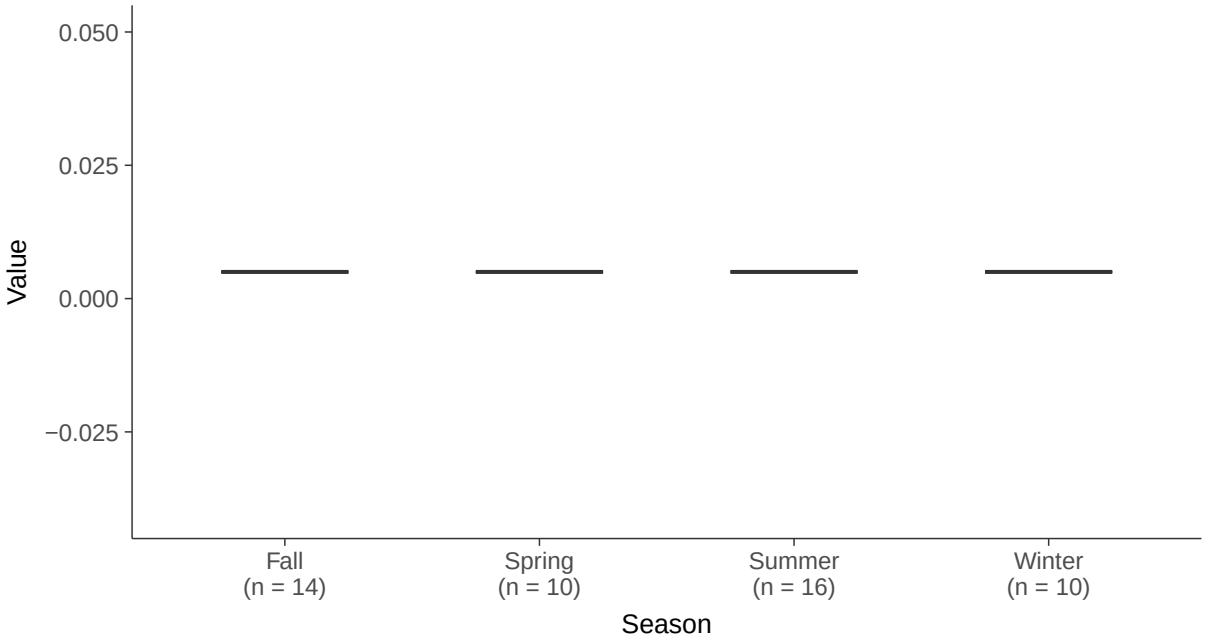
Boxplot

Selenium, MW-1, MW-4, MW-11, MW-12 (mg/L)



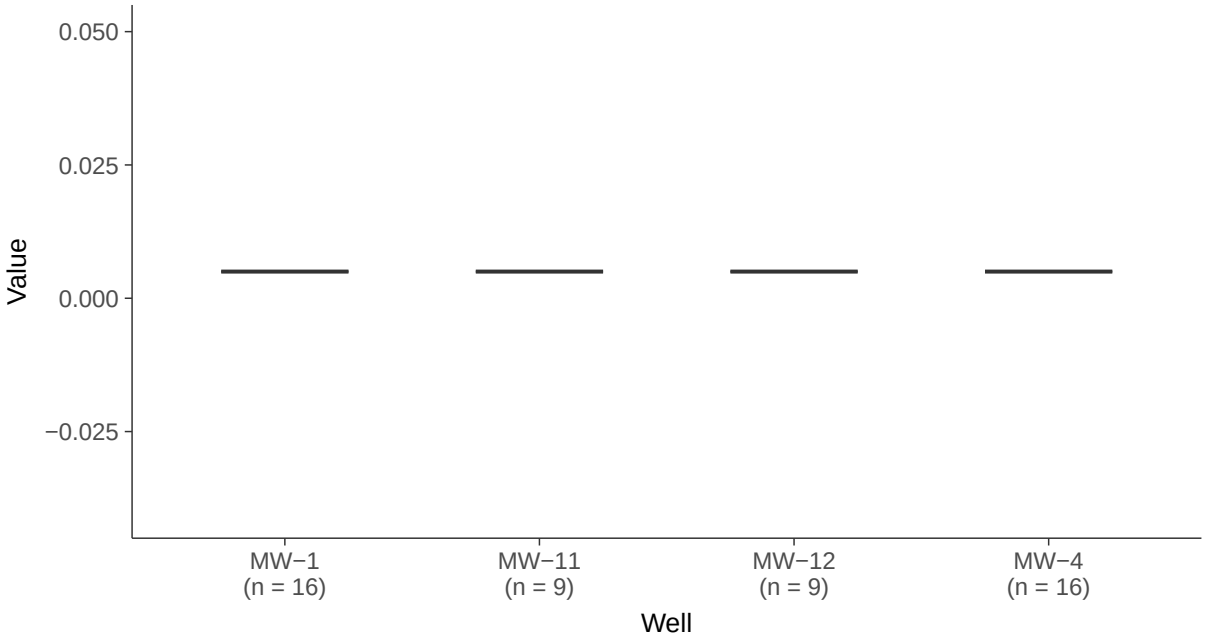
Boxplot by Season

Selenium, MW-1, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Selenium, MW-1, MW-4, MW-11, MW-12 (mg/L)

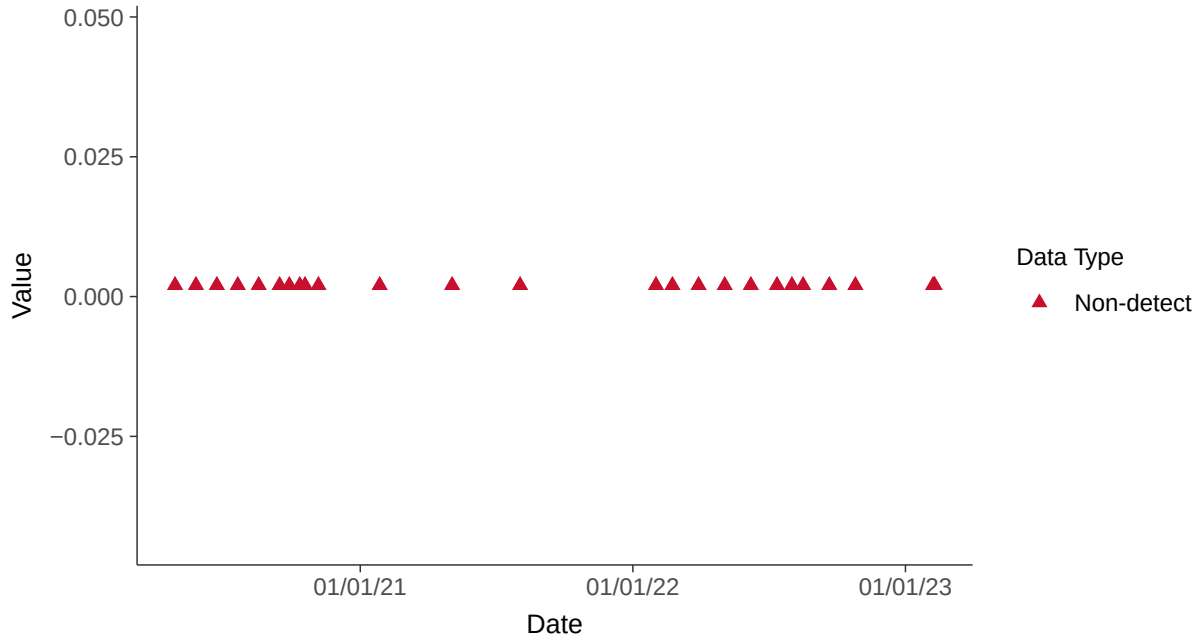


Appendix IV: Thallium, MW-1, MW-4, MW-11, MW-12

ID: 2_29

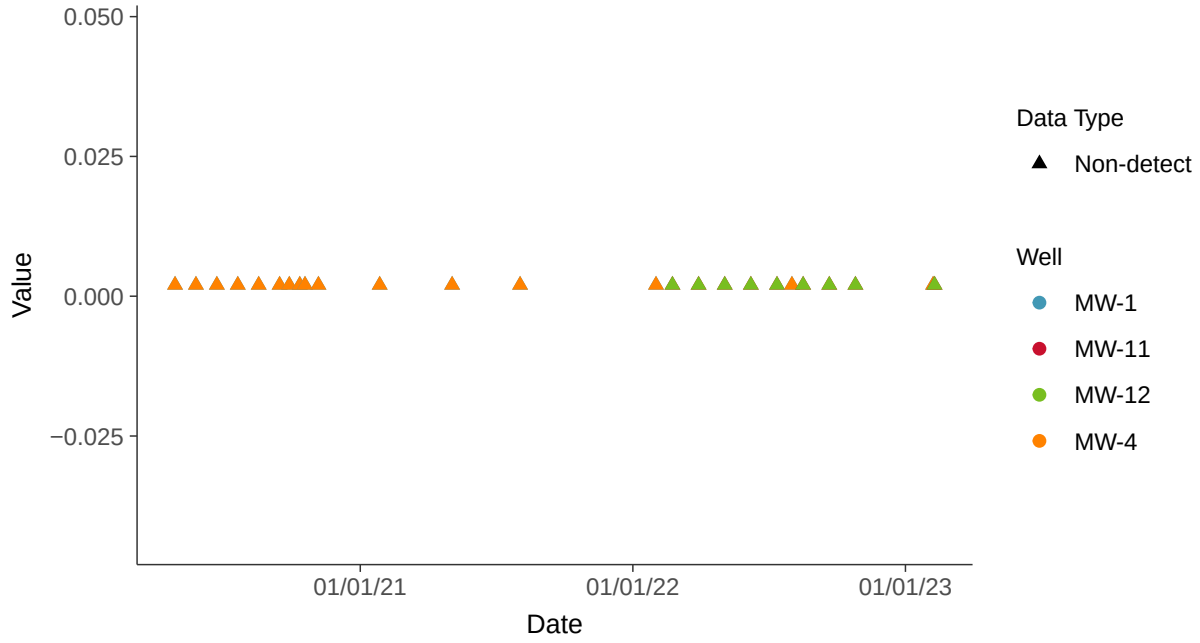
Scatter Plot

Thallium, MW-1, MW-4, MW-11, MW-12 (mg/L)



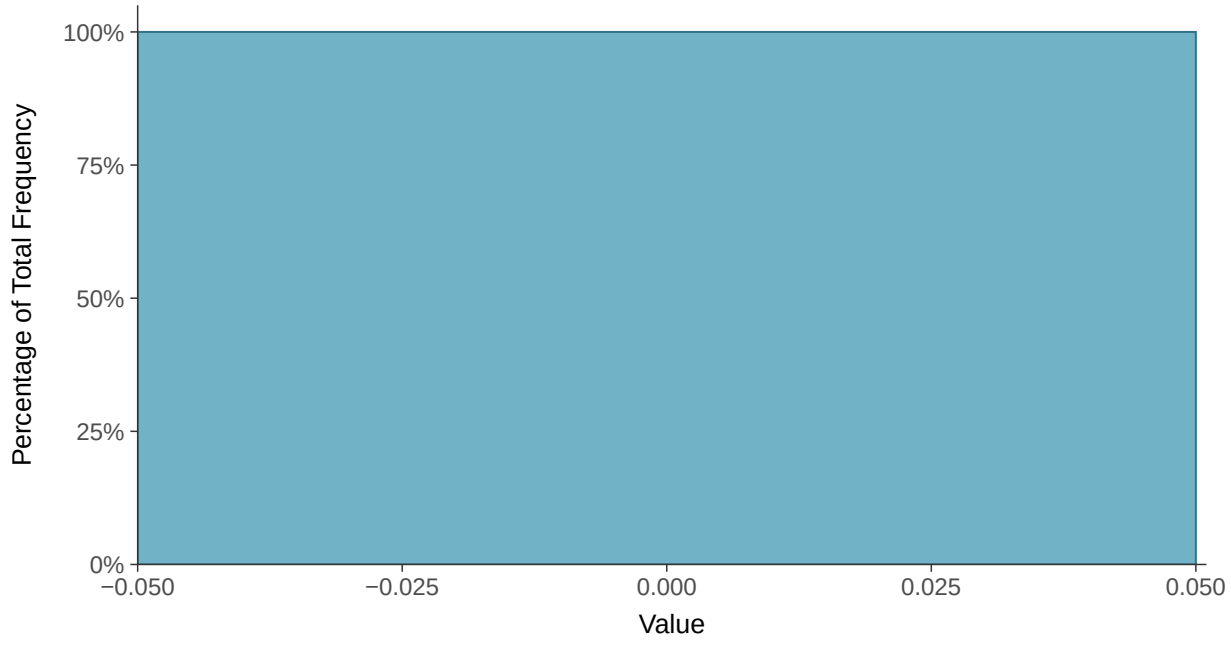
Scatter Plot by Well

Thallium, MW-1, MW-4, MW-11, MW-12 (mg/L)



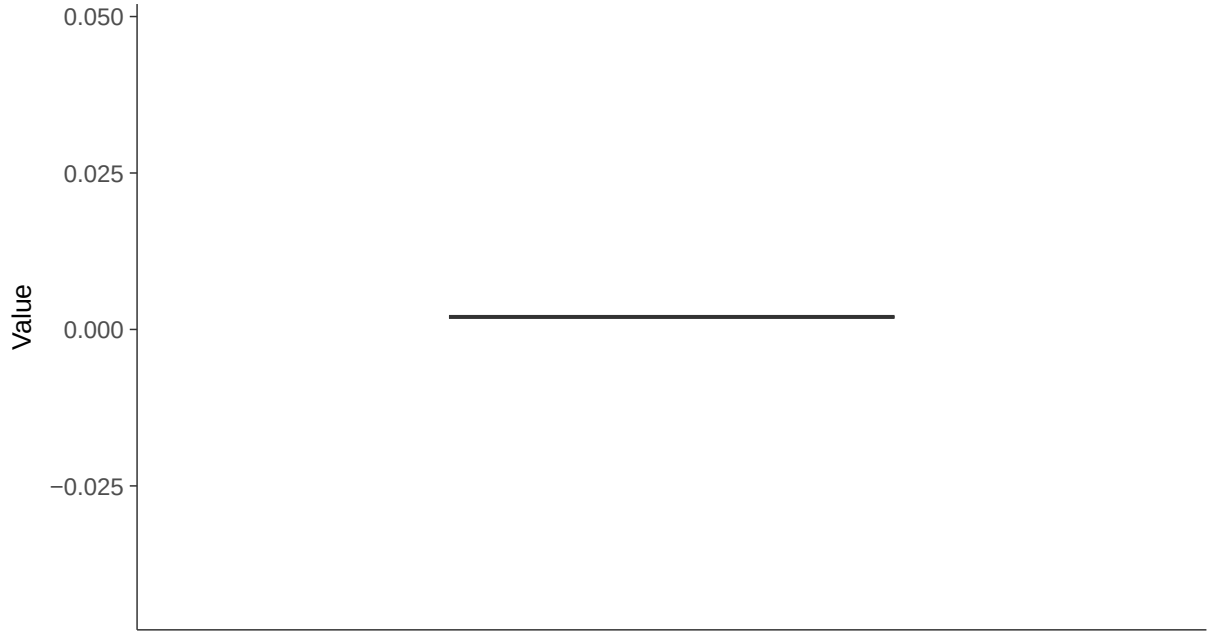
Histogram

Thallium, MW-1, MW-4, MW-11, MW-12 (mg/L)



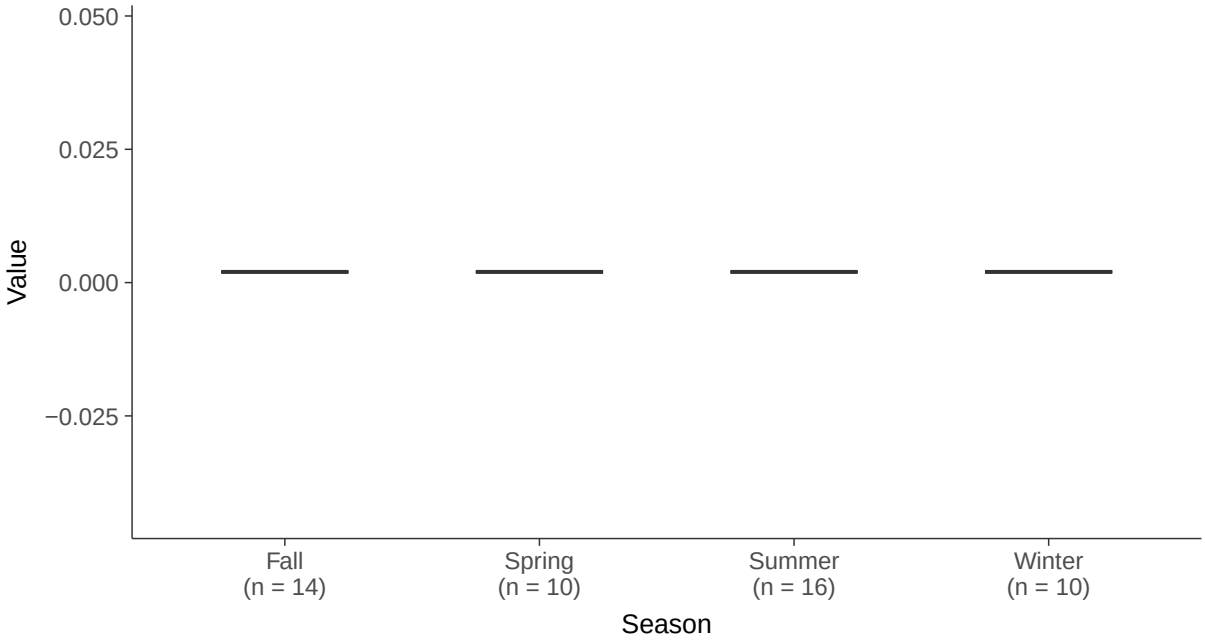
Boxplot

Thallium, MW-1, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Season

Thallium, MW-1, MW-4, MW-11, MW-12 (mg/L)



Boxplot by Well

Thallium, MW-1, MW-4, MW-11, MW-12 (mg/L)