Memo

Date	November 23, 2020
To:	Lori Myott, Lansing Board of Water & Light
From:	Lara Syrocki, HDR, Inc.
Subject:	Erickson Power Station CCR Unit Groundwater Protection Standards and Determination of SSLs per §257.95(g)

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. Erickson Power Station, owned by Lansing Board of Water & Light (BWL) and located in Delta Township, Michigan has one CCR unit subject to the CCR Rule composed of three surface impoundments: the Forebay, Retention Basin, and Clear Water Pond. The CCR unit operation and groundwater monitoring are described further in the Erickson Station Groundwater Monitoring System Certification (HDR 2020).

The objective of this memorandum is to document the groundwater protection standard (GPS) concentrations for each constituent of interest (COI) for the CCR facilities and evaluate if the concentration of detected Appendix IV constituents in groundwater from assessment monitoring were present at statistically significant levels (SSLs) over the GPS. 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 monitoring wells located upgradient of the CCR unit has been compiled and statistically analyzed to develop background values for each COI at each CCR facility. In addition, assessment monitoring has been initiated at the impoundments.

CCR Rule §257.95(d)(2) requires that after results have been obtained from the initial and subsequent assessment monitoring sampling events, the owner must establish groundwater protection standards for all constituents detected during those events and that the groundwater protection standards must be established in accordance with paragraph (h) of the CCR Rule §257.95.

CCR Rule §257.95(h) describes that a groundwater protection standard must be established for each constituent in Appendix IV detected in the groundwater. The groundwater protection standard shall be:

(1) the maximum contaminant level (MCL) for that constituent;
(2) for constituents for which an MCL has not been established, the background concentration for the constituent established from background wells; or,
(3) for constituents for which the background level is higher than the MCL, the background concentration.

2.0 Groundwater Protection Standards

As stipulated in CCR Rule §257.95(b), an initial assessment monitoring event was completed November 6, 2020 to sample all of the monitoring wells around the CCR facility for Appendix III and IV constituents. **Table 1** lists the constituents in Appendices III and IV of CCR Rule Part §257.

Table 1. Groundwater quality constituents

Appendix III Constituents for Detection Monitoring	Appendix IV Constituents for Assessment Monitoring
Boron	Antimony
Calcium	Arsenic
Chloride	Barium
Fluoride	Beryllium
pH	Cadmium
Sulfate	Chromium
Total Dissolved Solids (TDS)	Cobalt
Additional Constituents	Fluoride
Total Suspended Solids (TSS)	Lead
	Lithium
	Mercury
	Molybdenum
	Selenium
	Thallium
	Radium-226 and -228 combined

EPA's Unified Guidance has recommended that the upper tolerance limits (UTLs) be used as a fixed value similar to a groundwater protection standard where an MCL does not exist for the constituent at the location (USEPA, 2009). The UTLs for Appendix IV constituents are displayed in **Table 2**.The UTL for each constituent was established based on the eight background sample events at the upgradient monitoring wells (MW-1 and MW-4). The UTLs serve as the background values for assessment monitoring.

Table 2. Upper Tolerance Limits (UTL) with 95% coverage and 95% confidence for Appendix IV constituents for Erickson (Assessment Monitoring Background Value)							
Constituent	**Unit**	**N**	**No BDL**	**% BDL**	**Statistical Method[1]**	**UTL**	**Notes**
Appendix IV Constituents							
Antimony	mg/l	16	16	100%	Nonparametric	0.00260	***
Arsenic	mg/l	16	0	0%	Gamma	0.0112	
Barium	mg/l	16	0	0%	Gamma	0.187	
Beryllium	mg/l	16	16	100%	Nonparametric	0.000220	***
Cadmium	mg/l	16	16	100%	Nonparametric	0.000190	***
Chromium, Total	mg/l	16	16	100%	Nonparametric	0.000750	***
Cobalt	mg/l	16	16	100%	Nonparametric	0.000150	***
Lead	mg/l	16	16	100%	Nonparametric	0.000190	***
Lithium	mg/l	16	2	13%	Nonparametric	0.0390	****
Mercury	mg/l	16	16	100%	Nonparametric	0.0000160	***
Molybdenum	mg/l	16	15	94%	Nonparametric	0.00500	**
Selenium	mg/l	16	16	100%	Nonparametric	0.00210	***
Thallium	mg/l	16	16	100%	Nonparametric	0.000100	***
Radium-226/228	pci/l	12	0	0%	Gamma	4.31	

Notes: **Data set has less than 4 detects and is too small to compute reliable and meaningful statistics and estimates! Recommend maximum detected value as the upper tolerance limit until more samples can be calculated. ***All observations are NDs. Recommend the maximum method detection limit as a placeholder. ****Upper tolerance limits with 85% coverage and 95% confidence because the data is nonparametric data with sample size < 59 or because the percent of non-detects is > 50%, provided sample has at least 4 detects.

Results from the initial assessment monitoring sample event identified the detected Appendix IV constituents. The Appendix IV constituents that were not detected in at least one well were antimony, beryllium, cadmium, chromium, cobalt, fluoride, lead, mercury, selenium, and thallium. Therefore, GPS are established for the detected Appendix IV COIs including arsenic, barium, lithium, and molybdenum.

In accordance with CCR Rule §257.95(h), GPS were established for each detected Appendix IV COI. For each detected COI, **Table 3** lists the EPA established MCL from 40 CFR 141.62 and 141.66, the assessment monitoring background values for the site, and the GPS. The GPS for each COI is the higher of the two: MCL or background value. There are two COIs that do not have established MCLs (lithium and molybdenum); however, in the July 17, 2018 CCR Rule Amendment EPA adopted health-based concentrations as the GPS for the four Appendix IV constituents without a designated MCL. These concentrations are listed in the MCL column of **Table 3**.

Table 3. Groundwater Protection Standards for Detected Appendix IV constituents for Erickson				
Constituent	**Unit**	**MCL**	**Background Value (UTL)**	**GPS**
Arsenic	mg/l	0.0100	0.0112	0.0112
Barium	mg/l	2.00	0.187	2.00
Lithium	mg/l	0.040*	0.0390	0.040
Molybdenum	mg/l	0.100*	0.005	0.100
Radium-226-228	pci/l	5.0	NV	5.0

*EPA adopted health-based value for constituents with no MCL. Radium concentrations were not received back from the lab at the time of this posting. This memo will be updated when radium results are received.

In accordance with CCR Rule §257.95(e), downgradient well concentrations from the November 6, 2020 assessment monitoring sample event were compared against background values, and some concentrations were found to be above background values. In accordance with CCR Rule §257.95(f), detected Appendix IV COI concentrations in downgradient wells were compared against GPS and were found to exceed GPS. Therefore, following CCR Rule §257.95(g), downgradient well concentrations were statistically evaluated to determine "if one or more constituents in [A]ppendix IV to this part are detected at statistically significant levels above the groundwater protection standard."

To determine if an exceedance of a GPS was statistically significant, the 95% lower confidence limit (95LCL) was calculated for each of the downgradient wells (MW-2, MW-5, and MW-6) for each of the detected Appendix IV COIs. The data set used to calculate the lower confidence limit (LCL) included all Appendix IV results from samples collected at these wells since the establishment of the groundwater monitoring system. Therefore, most wells had 10 sample events that were used to calculate the LCL. The LCL results that exceeded their respective GPS are provided in Table 4. Downgradient wells MW-2, MW-5, and MW-6 have LCLs for lithium that exceed the GPS.

Table 4. Lower Confidence Limits for Appendix IV Constituents for Erickson Surface Impoundment Wells Exceeding Groundwater Protection Standards

	Appendix IV Constituent	Lithium
	Units	mg/l
	GPS	0.040
Monitoring Well	MW-2	0.0549*
	MW-5	0.0578*
	MW-6	0.0418*

*95% Adjusted Gamma LCL

4.0 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