Hayden Station CCR Landfill

Notification of Statistically Significant Levels over Groundwater Protections Standards and Initiation of Assessment of Corrective Measures

Public Service Company of Colorado (PSCo), an Xcel Energy Company, is the operator of Hayden Station, a coal-fired, steam turbine electric generating station. Hayden currently operates one CCR unit on site, a landfill that is used for final disposal of CCRs generated at Hayden Station, that is subject to requirements of the Disposal of Coal Combustion Residuals from Electrical Utilities Rule (Federal CCR Rule), finalized on April 17, 2015. The CCR landfill has sufficient capacity for CCR disposal through the operating life of the station, after which it will be closed with installation of a final cover that is compliant with 257.102(d) and State of Colorado solid waste regulations, as described in the Written Closure Plan (Burns & McDonnell, 2018).

Protecting the environment is a priority for Xcel Energy

PSCo conducts all of its business in an environmentally responsible manner and that includes regularly monitoring our operations and taking steps to protect our air, water and other natural resources. PSCo has made a determination that one or more constituents listed in Appendix IV have been detected at Statistically Significant Levels (SSLs) above the Groundwater Protection Standards (GPS) established for the site pursuant to 257.95(h). The attached memo, Hayden Station Groundwater Protection Standards, establishes the GPS for each Appendix IV constituent that was detected in groundwater at the site and identifies those constituents for which SSLs above the GPS have been determined. These test results do not indicate there is any impact on local drinking water. The downgradient monitoring wells evaluate groundwater in the alluvial aquifer adjacent to the CCR landfill, and measure groundwater conditions within the Hayden Station property boundary

PSCo will continue to monitor groundwater at the site in accordance with the assessment monitoring program as specified in 257.95 and on July 16, 2021 initiated an Assessment of Corrective Measures pursuant to 257.95(g)(3)(i) to identify and evaluate potential corrective measures to address these SSLs over GPS. Under state regulations, PSCo identified landfill leachate water perched within the landfill and in May 2020 began a dewatering program under the state corrective action regulation. This corrective measure is consistent with the CCR source control requirement, and the Assessment of Corrective Measures to be performed will evaluate if any other corrective measures are necessary.

Note: Xcel has made this determination, even though EPA's Water Supply Guidance Manual, (January 11, 2000, WSG No. 21, April 6, 1981, Procedures for Rounding-Off Analytical Data to Determine Compliance with Maximum Contaminant Levels Present in NIPDWR) states that reported data should be rounded to the number of significant figures in each constituent Maximum Contaminant Level (MCL). In this case, if the data establishing the GPS (in this case, the BTV) as well as the monitoring results were rounded to the same number of significant figures as the MCL, there would be no exceedance of the GPS.

Memo

Date:	Friday, July 16, 2021
	Updated August 11, 2021
To:	Jennifer McCarter, Xcel Energy
From:	Matt Rohr, HDR, Inc.
Subject:	Hayden Station Groundwater Protection Standards

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. Hayden Station, located in Routt County, Colorado, has one CCR unit subject to the CCR Rule, the ash landfill.

The objective of this memorandum is to document the groundwater protection standard (GPS) concentrations for each constituent of interest (COI) for the CCR facility and evaluate if groundwater assessment monitoring results had statistically significant exceedances over the GPS. At Hayden, groundwater monitoring has been conducted to collect eight rounds of background sampling plus detection monitoring as specified under CCR Rule Part 257.94. The water quality data collected from monitoring wells located upgradient of the CCR facility has been compiled and statistically analyzed to develop background threshold values (BTV) for each COI. In addition, assessment monitoring has been initiated at the landfill.

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.

2.0 GPS for the Landfill

As stipulated in CCR Rule 257.95(b), an annual assessment monitoring event was completed in June 2020 for all Appendix III and IV parameters. **Table 1** lists the parameters in Appendices III and IV of CCR Rule Part 257.

Table 1. Groundwater quality parameters	
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 Parameters	Fluoride
Total Suspended Solids (TSS)	Lead
	Lithium
	Mercury
	Molybdenum
	Selenium
	Thallium
	Radium-226 and -228 combined

CCR Rule 257.95(h) describes that GPS must be established for each constituent in appendix IV detected in the groundwater. Results from the June 2020 sample event identified the detected Appendix IV parameters. All Appendix IV parameters were detected in at least one well with the exception of antimony, arsenic, beryllium, chromium, lead, mercury, and thallium. Therefore, GPS are established for all Appendix IV COIs except antimony, arsenic, beryllium, chromium, lead, mercury, and thallium. CCR Rule 257.95(h) describes that GPS 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.

The upper tolerance limits (UTLs) for the detected Appendix IV constituents serve as the background threshold values (BTV) for assessment monitoring and are displayed in **Table 2**. The Unified Guidance has recommended that the UTL 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 UTL was established based on the eight background sample events at the upgradient alluvial monitoring well (W-3).

Table 2. Upper Tolerance Limits with 95% coverage and 95% confidence for each detected Appendix IV constituent at Hayden Landfill						
Constituent	**Unit**	**N**	**No BDL**	**% BDL**	**Statistical Method[1]**	**UTL**
Detected Appendix IV Constituents						
Barium	mg/l	11	0	0%	Parametric	0.00918
Cadmium	mg/l	11	0	0%	Nonparametric	0.00120
Cobalt	mg/l	11	1	9%	Parametric	0.00616
Fluoride	mg/l	10	1	10%	Parametric	0.862
Lithium	mg/l	11	0	0%	Nonparametric	1.80
Molybdenum	mg/l	10	0	0%	Parametric	0.00402
Selenium	mg/l	11	0	0%	Parametric	0.0246
Radium-226/228	pci/l	11	1	9%	Parametric	1.01

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 BTV for the Hayden landfill, and the GPS. The GPS for each COI is the higher of the two: MCL or BTV. It should be noted that the CCR Rule requires that groundwater sampling and analysis be completed for total concentrations of metals, while MCL values are established for dissolved concentrations of metals. Typically, dissolved and total concentrations are not compared to each other. However, to comply with the CCR Rule, and for the purposes of the establishment of the GPS, it is assumed that if the total concentration of the COI is higher than the dissolved concentration at the site, the BTV (total concentration) would be the highest value and thus be established as the GPS. There are three COIs in Table 3 that do not have established MCLs (cobalt, lithium, and molybdenum); however, the July 17, 2018 CCR Rule Amendment stated that the EPA is adopting 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 COIs for the Landfill				
Constituent	**Unit**	**MCL (dissolved metals concentration)**	**BTV (UTL) (total metals concentration)**	**GPS (total metals concentration)**
Barium	mg/l	2	0.00918	2
Cadmium	mg/l	0.005	0.00120	0.005
Cobalt	mg/l	0.006*	0.00616	0.00616 **
Fluoride	mg/l	4.0	0.862	4.0
Lithium	mg/l	0.040*	1.80	1.80
Molybdenum	mg/l	0.100*	0.00402	0.100
Radium-226-228	pci/l	5^	1.01	5
Selenium	mg/l	0.05	0.0246	0.05

* EPA adopted health-based value in place of MCL

** Note EPA WSG-21 states reported data should be rounded to significant figures in the MCL; this may also apply to rounding BTV and LCL values

^Colorado Water Quality Regulation

On December 15-16, 2020, a semi-annual assessment monitoring event collected groundwater samples were collected from all of the landfill wells. Samples were analyzed for Appendix III and detected Appendix IV COIs. In accordance with CCR Rule 257.95(e), downgradient well concentrations were compared against background threshold values. Some COIs were found to be above BTVs. In accordance with CCR Rule 257.95(f), downgradient well concentrations were compared against GPS and were found to exceed GPS. Therefore, following CCR Rule 257.95(g), downgradient well concentrations were compared against GPS to determine "if one or more constituents in appendix 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 at the landfill (W-1, W-2, and W-4) for each of the detected Appendix IV COIs. The data used to calculate the lower confidence limit (LCL) was an accumulation of all samples collected at these wells since the establishment of the groundwater monitoring system. The results of the LCL comparison against GPS are provided in Table 4. Downgradient well W-4 has a 95LCL for cobalt that exceed the GPS.

Table 4. Lower Confidence Limit Compared to Groundwater Protection Standard for the only Detected Appendix IV COI that Exceeds GPS

Monitoring **Well**	Appendix IV Constituent	Cobalt
	Unit	mg/l
	GPS	0.006
W-4	**95% LCL***	0.00646**

* 95% Adjusted Gamma LCL

** Note EPA WSG-21 states reported data should be rounded to significant figures in the MCL; this may also apply to rounding BTV and LCL values

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