

Semi-Annual Remedy Selection Progress Report

for Compliance with the Coal Combustion
Residuals (CCR) Rule

Hayden Station

Public Service Company of Colorado

July 31, 2023



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Certification

Semiannual Remedy Selection Progress Report for Hayden Station

I hereby certify to the best of my knowledge that this Semiannual Remedy Selection Progress Report is designed to meet the performance standard in 40 CFR Part 257 of the Federal Coal Combustion Residuals (CCR) Rule.

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



28-JUL-2023

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License renewal date October 31, 2023

1 Introduction

Hayden Station, located near Hayden, Colorado is owned and operated by Public Service Company of Colorado (PSCo), an Xcel Energy Company (**Figure 1**). Hayden Station has one Coal Combustion Residuals (CCR) unit subject to the U.S. Environmental Protection Agency's (EPA's) CCR Rule specified in 40 CFR 257: the ash disposal facility (ADF) (**Figure 2**). The ADF is an active landfill currently being monitored under the assessment monitoring program and has triggered assessment of corrective measures.

In July 2021, PSCo first reported that the concentration of one Appendix IV constituent, cobalt, in one monitoring well at the ADF was observed at a statistically significant level (SSL) above the Groundwater Protection Standard (GPS) (HDR, 2021a). Subsequently, PSCo completed the *Conceptual Site Model and Assessment of Corrective Measures (ACM) Report* in October 2021 and posted it to PSCo's public website (HDR, 2021b). Since that time, semiannual progress reports have been prepared and posted to the CCR website. The ACM includes ash landfill dewatering/source control that was initiated in 2020 under state regulations. The semiannual progress reports will continue, providing updates on dewatering and evaluation of the potential need for additional alternatives, until the selected remedy/remedies are documented in a final report.

The purpose of this technical memorandum is to provide an update describing progress toward selecting a remedy for corrective action at the Hayden ADF as required by 40 CFR 257.97(a) of the CCR Rule.

Power Plant Location

Ash Disposal Facility Location

Area Enlarged

DATA SOURCE: ESRI National Geography Layer

MAP FEATURES ARE DIGITIZED AND FOR REFERENCE ONLY.

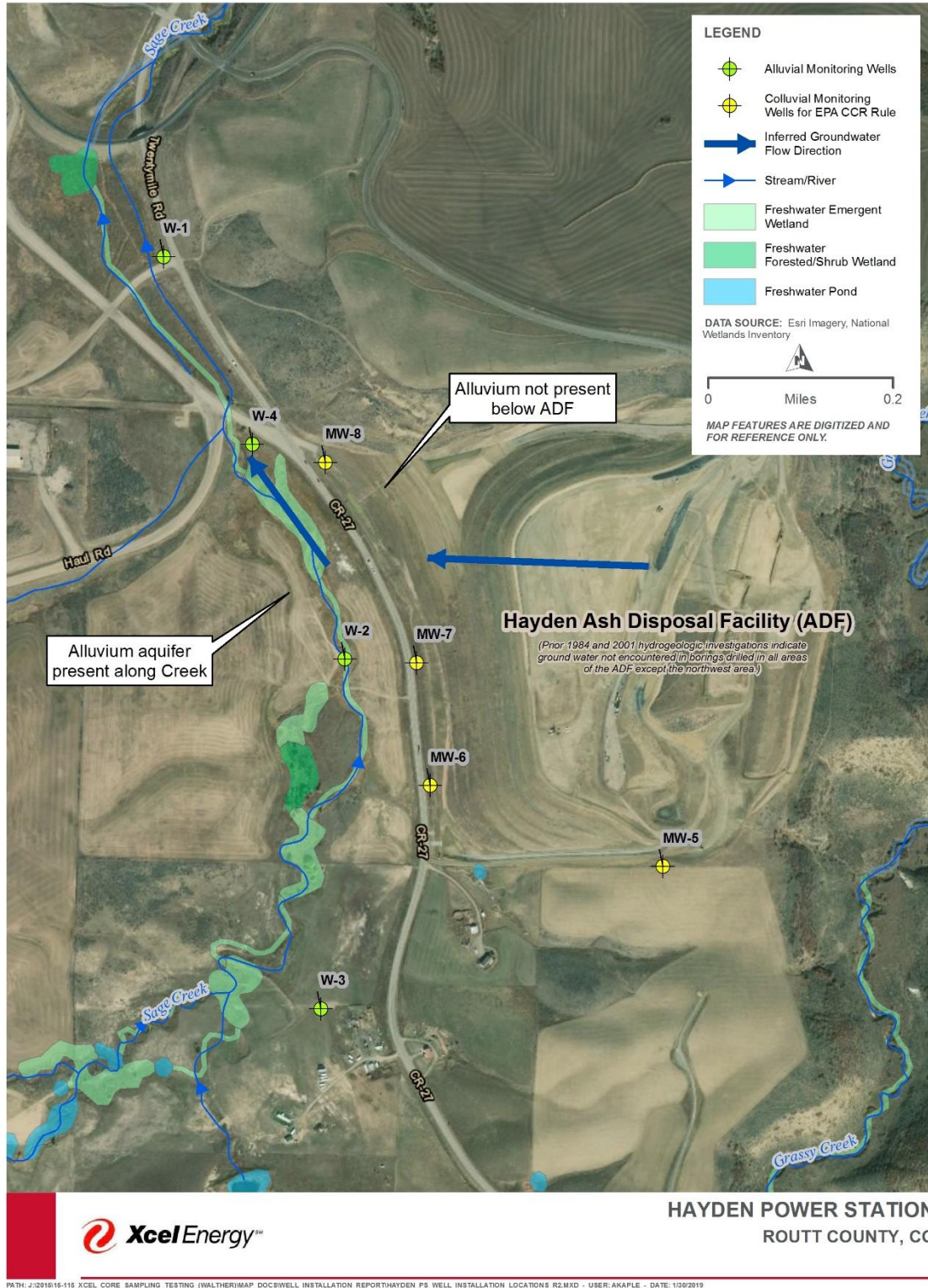
HAYDEN POWER STATION
ROUTT COUNTY, CO

HDR **XcelEnergy**

PATH: J:\385145\155_XCEL_CORP_SAMPLING_TESTING_000\BATHMAP_DOC\SDRI1_PLAN\HAYDEN_P2008_STATION_LOCATION_PORTRAIT.MXD USER: KLOEGRN DATE: 10/21/2015

HAYDEN ASH DISPOSAL FACILITY

Figure 2. Hayden Station—CCR Units



2 Background

The original certified CCR monitoring well network for the Hayden CCR landfill consisted of four wells completed in the colluvium that underlies the landfill. In accordance with the CCR Rule, PSCo initiated background groundwater monitoring at the ADF in 2015. The Conceptual Site Model (CSM) developed based upon multiple site specific hydrogeologic investigations demonstrates that the colluvium is dry, except for in the three monitoring wells at the downgradient waste boundary, and the water in these wells appears to be leachate that historically accumulated within the landfilled ash from infiltration of precipitation. The upgradient well in the colluvium has been dry since it was installed, consistent with the CSM. The three downgradient colluvial wells were sampled for CCR constituents of interest (COIs) background water quality between December 2, 2015 and July 11, 2017 per 40 CFR 257.94(b). The water observed in the downgradient colluvial wells discharges to the adjacent alluvial aquifer of Sage Creek. Therefore, four existing monitoring wells previously installed in the adjacent alluvial aquifer for monitoring per State regulations were added to the certified CCR monitoring network for the landfill. These four alluvial wells, including one well upgradient and three wells downgradient of the CCR landfill, are used to supplement the colluvial landfill waste boundary monitoring wells. The alluvial wells were sampled for background water quality between April 11, 2018 and November 13, 2018 and background threshold values (BTVs) were developed from the upgradient well (W-3). Detection monitoring samples were collected in April 2019 and compared against the BTVs, as specified under CCR Rule Part 257.94, and assessment monitoring was initiated as specified under Part 257.95. The initial assessment monitoring event was in September 2019, and assessment monitoring has continued to date.

As described in the *Groundwater Protection Standards and Determination of SSLs per 257.95(g)*, one downgradient alluvial well (W-4) was first found to have concentrations of cobalt at an SSL above the GPS in December 2020 (HDR, 2021a). Therefore, PSCo completed the ACM Report on October 14, 2021, in accordance with CCR Rule 257.96. The ACM included a preliminary analysis of the feasibility of potential corrective measures in meeting the requirements and objectives of the remedy as described under CCR Rule 257.97. At the time of the assessment and currently, other than the cobalt SSL in downgradient well W-4, all other detected Appendix IV COIs are below the GPS. Therefore, the constituent that was evaluated for assessment of corrective measures was cobalt. Additionally, the absence of GPS exceedances in past and current data in the farthest downgradient monitoring well, W-1, demonstrates that the extent of groundwater impacts is limited and within the Hayden Station property.

A site specific hydrogeologic field investigation of the landfill performed by Burns & McDonnell in 2017-2019 identified saturated ash within the landfill footprint related to a former unlined stormwater pond previously located on top of the landfill. A new lined stormwater pond was constructed in 2018 to replace the former pond and additional stormwater controls were implemented to prevent stormwater from ponding on the ash. The investigation confirmed the presence of unsaturated consolidated bedrock (Lewis Shale) immediately beneath the landfill

which acts as a confining layer and concluded that the Lewis Shale is not a water bearing unit beneath the landfill and is not the source of the water observed in the ash fill. The investigation delineated the saturated ash zone, estimated the volume, and evaluated potential ash dewatering rates. After the field investigation, PSCo developed a Dewatering Plan (Burns & McDonnell, 2019a), which was approved by the Colorado Department of Public Health and Environment (CDPHE) and is currently being implemented to eliminate the impact to the alluvial aquifer adjacent to the landfill.

3 Evaluation of Potential Remedies

Since the last semiannual selection of remedy update in January 2023, one round of groundwater sampling for assessment monitoring has been completed in May 2023 and source control progress has continued through ongoing dewatering.

PSCo has identified that leachate from the saturated ash is discharging to the alluvial aquifer, which could potentially be the source of the cobalt exceedance; however, concentrations of cobalt are lower at the downgradient waste boundary wells located between the saturated zone of the landfill and the alluvial aquifer, which seems to indicate that the landfill is not the source of the elevated cobalt in well W-4. While PSCo conducts an alternative source determination, PSCo as a precaution is proceeding as if the cobalt SSL in W-4 is related to the landfill and undertaking assessment monitoring while also assessing corrective measures.

PSCo continues to implement the dewatering plan approved by the Colorado Department of Public Health and Environment (CDPHE) to remove leachate from the landfill as source control. Dewatering at the landfill is accomplished using two submersible solar pumps with associated piping, flow totalizers, sensors, and controllers integral to two dedicated dewatering wells installed within the saturated ash at the landfill. Pumping at each location is accomplished using an array of photovoltaic solar panels and a battery bank to allow for pumping outside of daylight hours. Both pumps are equipped with flow totalizers and were run between May and October beginning in 2020 through June 2023 due to freezing conditions in winter. Dewatering activities this year began on May 8, 2023. A new flow totalizer was installed in one of the wells on May 15, 2023. Produced water is transferred to a lined contact water pond and used as needed for dust suppression within the active area of the landfill. Water not used for dust suppression evaporates within the lined pond. Approximately 1,191,500 gallons have been removed through June 2023 since dewatering was initiated in 2020. Both pumps continue to function properly on the new solar system and an operator is actively working to optimize pump speeds.

PSCo also intends to install additional dewatering wells in 2023 with larger diameter borings and longer screened intervals to attempt to increase the pumping rate and leachate recovery. In the meantime, PSCo will continue to implement improvements wherever possible to work towards achieving maximum pump rates and durations. PSCo will consider alternative measures outlined in the ACM if dewatering under the state program is found to be insufficient as the sole remedy.

The groundwater quality would be expected to improve over time as the source is controlled through ash dewatering if the landfill is the source of the cobalt observed at W-4. The latest assessment monitoring event, conducted in May 2023, demonstrated a similar concentration in May 2023 as in November 2022 (0.0065 and 0.0062 mg/L, respectively), both of which are just over the GPS (0.00616 mg/L). The cobalt at W-4 is not increasing and has remained relatively stable between 0.006 and 0.008 since monitoring for the CCR program began at this well in 2018.

Concentrations of cobalt at the landfill colluvial waste boundary wells (MW-6, MW-7, and MW-8) have maintained concentrations of cobalt below the EPA adopted health-based value in place of MCL for cobalt (0.006 mg/L). The concentrations in these three wells should be more representative of the landfill leachate discharging to groundwater and therefore the lack of cobalt in these wells is an indication that the landfill is not the source of the elevated cobalt in well W-4. Additionally, well W-2, which is the closest downgradient alluvial well to the landfill, does not have cobalt above the GPS. The concentration of cobalt in the alluvial groundwater increases between W-2 and W-4, which implies a potential alternate source in this area, possibly sediments, natural coal seams or an upgradient surface water or groundwater source between the two wells. Between January and June 2023, PSCo developed an Alternative Source Demonstration (ASD) Work Plan to perform data collection and analysis to evaluate the potential alternative source. The Work Plan has sampling and analysis protocols including:

- Ash leachate sampling from the dewatering
- Ash sample collection
- Sage Creek surface water sample collection
- Soil sample collection at approximately 13 borings in and around the alluvial sediments
- Groundwater samples at existing wells and approximately 4 new temporary wells

The field data collection is anticipated in August 2023, the timing of which has been dependent upon snowmelt and driller availability.

PSCo will continue assessment monitoring at the landfill to evaluate concentration trends of cobalt and to assess if the corrective measures implemented to date (stormwater management and ash leachate dewatering, combined with monitoring of natural attenuation) and the additional wells being installed this year appear to be effective remedies. Data in farthest downgradient monitoring well, W-1, demonstrates the limited extent of groundwater impacts. Based upon the limited extent of groundwater impacts downgradient of the landfill which are within the Hayden Station property, interim measures (per 40 CFR 257.98(a)(3)) are not considered to be necessary at this time.

4 Next Steps

The following activities are anticipated to be completed or initiated in the next 6-month period for the landfill but are subject to change based upon the iterative nature of the process, uncertainty about the results of each step, and interim findings. PSCo continues to proceed diligently through the process of further evaluating potential remedies, consistent with best practices and professional judgment.

- Alternative Source Demonstration for the cobalt concentrations at well W-4.
- Installation and operation of additional dewatering wells with larger diameter borings and longer screened intervals to attempt to increase the pumping rate and leachate recovery.
- Continued ash dewatering, including optimized dewatering run-time and increased solar generation and battery capacity, from all dewatering wells described above.
- Continued semi-annual groundwater assessment monitoring.
- Continued evaluation of cobalt concentration trends in all CCR monitoring wells.

5 References

HDR, 2021a. Groundwater Protection Standards and Determination of SSLs per 257.95(g). July 16, 2021.

HDR, 2021b. Conceptual Site Model and Assessment of Corrective Measures - Compliance with the Coal Combustion Residuals Rule Hayden Station. October 14, 2021.

HDR, 2022. Annual Groundwater Monitoring and Corrective Action Annual Report and Semi-Annual Remedy Selection and Design Progress Report - Compliance with the Coal Combustion Residuals Rule. January 31, 2022.

Burns & McDonnell, 2019a. Hayden Ash Disposal Facility Field Investigation Report and Dewatering Plan, Hayden, Colorado, September 25, 2019.