

Semiannual Remedy Selection Progress Report

for Compliance with the Coal Combustion
Residuals (CCR) Rule

Hayden Station

Public Service Company of Colorado

July 30, 2022



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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.



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License renewal date October 31, 2023

30-JUL-2022

1 Introduction

Hayden Station, located in 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.

Figure 1. Hayden Station Vicinity Map

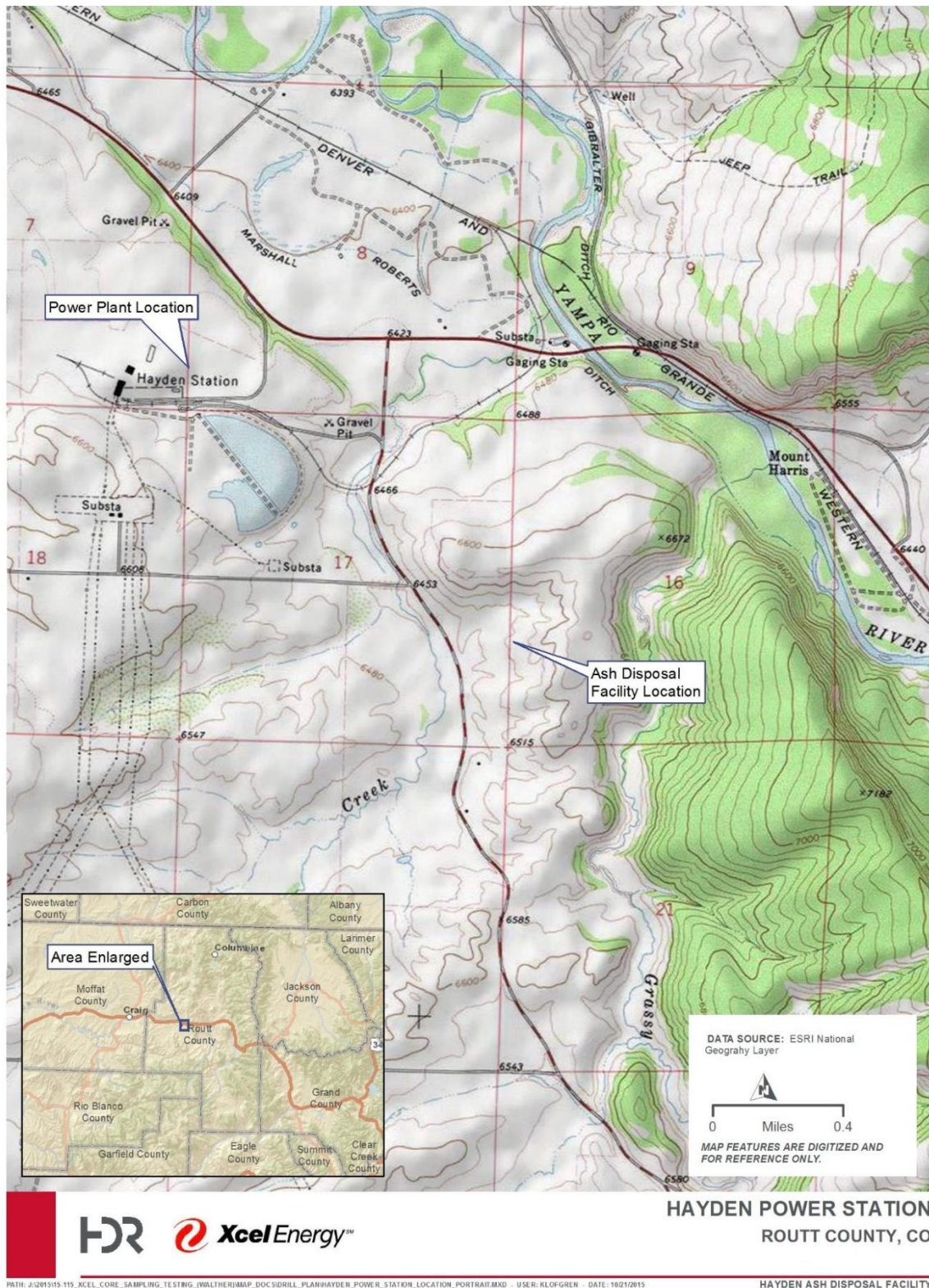
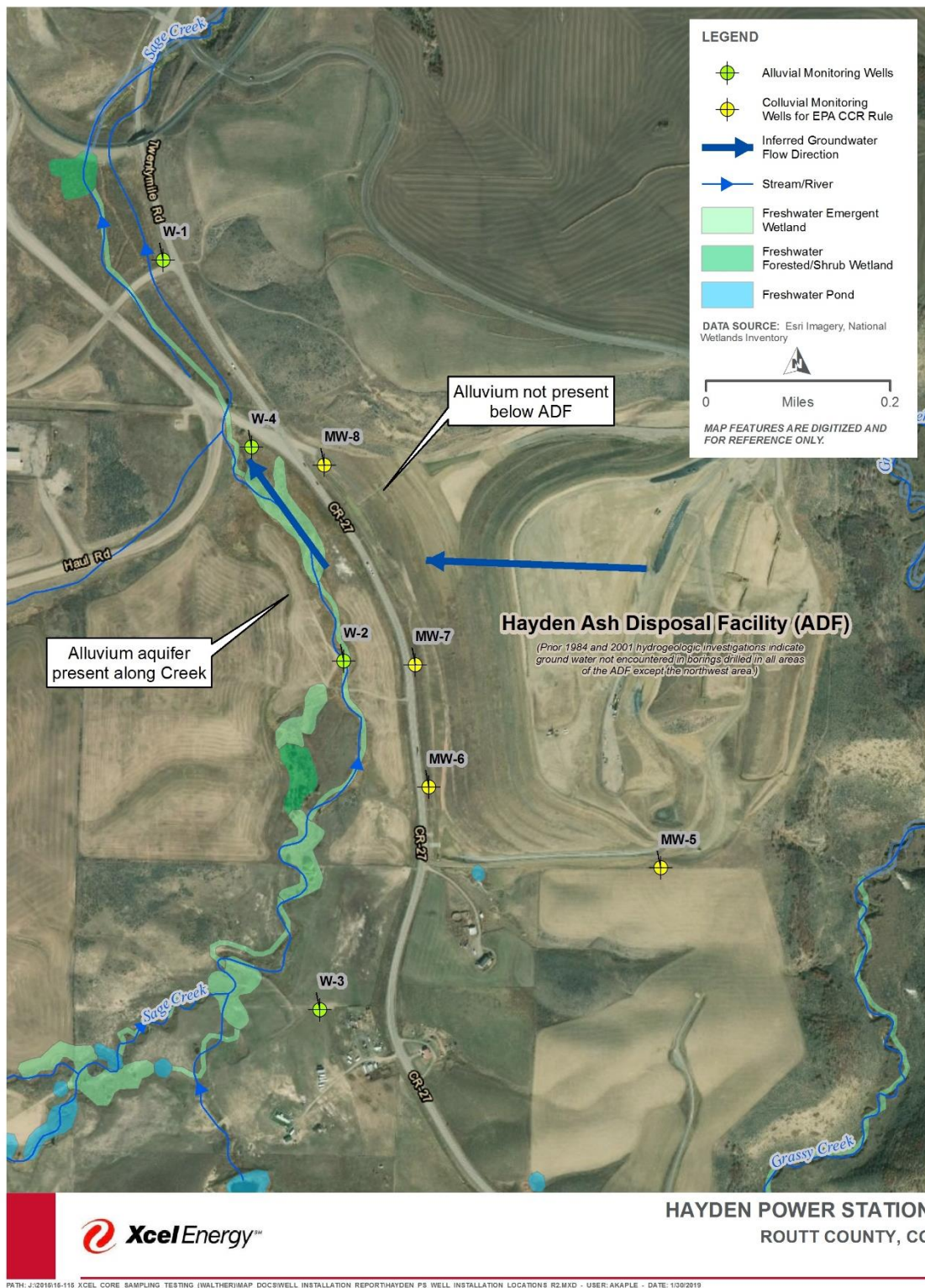


Figure 2. Hayden Station—CCR Units



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) at the ADF 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 encountered saturated ash within the landfill footprint and resulted in saturated ash zone delineation, volume estimation, and evaluation of 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 2022, one round of groundwater sampling for assessment monitoring has been completed 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 may be the source of the cobalt exceedance; however, concentrations of cobalt are lower at the 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. However, because another source has not yet been identified, PSCo is proceeding as if the cobalt SSL in W-4 is related to the landfill.

Dewatering at the landfill is accomplished using two RPS-400 submersible solar pumps with associated piping, flow totalizers, sensors, and controllers installed in two dedicated dewatering wells installed within the saturated ash at the landfill. Pumping at each location is powered 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 to date have run mainly between May and October each year due to freezing conditions in winter. Produced water is transferred to a lined contact water pond and used as needed for dust suppression within the active area of the landfill. Produced water not used for dust suppression evaporates within the lined pond. Dewatering was initiated in 2020 and approximately 807,000 gallons have been removed through June 30, 2022.

Additional solar arrays and battery system were installed in late June/early July which provide enough power to run one of the dewatering wells 24/7. PSCo is evaluating whether both wells can be run 24/7 from the expanded power system. PSCo is also evaluating improvements that would allow the dewatering wells to pump 24/7 year-round, and if feasible, this would decrease the time it will take to complete dewatering of the saturated ash.

Additionally, measures are also being evaluated to determine if additional pumping capacity can be implemented to increase the dewatering rate. Specifically, PSCo is evaluating installation of one or more larger diameter wells with extended screen lengths to determine if pumping can be optimized to capture more leachate from the landfill. This evaluation is ongoing in parallel with an evaluation of potential dewatering volume increases via continuous, year-round, pumping of the existing two wells.

The groundwater quality is expected to improve over time as the source is controlled through ash dewatering. The latest assessment monitoring event, conducted in June 2022, demonstrated a decrease in Cobalt concentration below GPS in well W-4. Additional data points

are needed to confirm consistently decreasing trends. PSCo will consider alternative measures outlined in the ACM if dewatering is found to be insufficient as the sole remedy.

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 planned improvements appear to be an effective remedy. Current data in farthest downgradient monitoring well, W-1, demonstrates the limited extent of groundwater impacts and that monitored natural attenuation (MNA) combined with source control/dewatering may be effective in meeting the remedy objectives. 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.

- Continued ash dewatering, including optimized dewatering run-time and capacity as 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.