

# Semiannual Progress Report Selection of Remedy

for Compliance with the Coal Combustion  
Residuals (CCR) Rule

## **Valmont Station**

Public Service Company of Colorado

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## Contents

	Page No.
1 Introduction .....	2
2 Background .....	5
3 Evaluation of Potential Remedies .....	5
3.1 Landfill .....	5
3.2 Bottom Ash Impoundments .....	6
4 Next Steps.....	7
5 References.....	8

## Figures

	Page No.
Figure 1-1. Valmont Station Vicinity Map.....	3
Figure 1-2. Valmont Station — CCR Units .....	4



# 1 Introduction

Valmont Station, located in Boulder County, Colorado is owned and operated by Public Service Company of Colorado (PSCo), an Xcel Energy Company (Figure 1-1). Valmont Station has four CCR units subject to the U.S. Environmental Protection Agency's (EPA's) Coal Combustion Residuals (CCR) Rule specified in 40 CFR 257: the ash landfill, two former incised bottom ash impoundments, and a former ash settling pond. Three of these CCR units have triggered assessment of corrective measures and therefore are the subject of this update on remedy selection: the ash landfill and two incised bottom ash impoundments. The bottom ash impoundments were physically closed by removal of CCR in 2018, with ongoing groundwater monitoring. The landfill is substantially closed; one cell is in an interim closed condition in anticipation of receiving additional waste.

In accordance with the CCR Rule, PSCo initiated groundwater monitoring in the certified network around the CCR units in 2015. In October 2018, PSCo first reported that concentrations of Appendix IV constituents in monitoring wells at the landfill and at the bottom ash impoundments were observed at statistically significant levels (SSLs) above Groundwater Protection Standards (GPS) (HDR, 2019a). Subsequently, PSCo drilled additional wells, completed additional hydrogeologic investigation, and completed the *Conceptual Site Model and Assessment of Corrective Measures* (ACM) Report in June 2019 and posted to PSCo's public website (HDR, 2019b).

The purpose of this report is to provide an update describing progress toward selecting a remedy for corrective action at the Valmont ash landfill and bottom ash impoundments, as required by 40 CFR 257.97(a) of the CCR Rule.



Figure 1-1. Valmont Station Vicinity Map

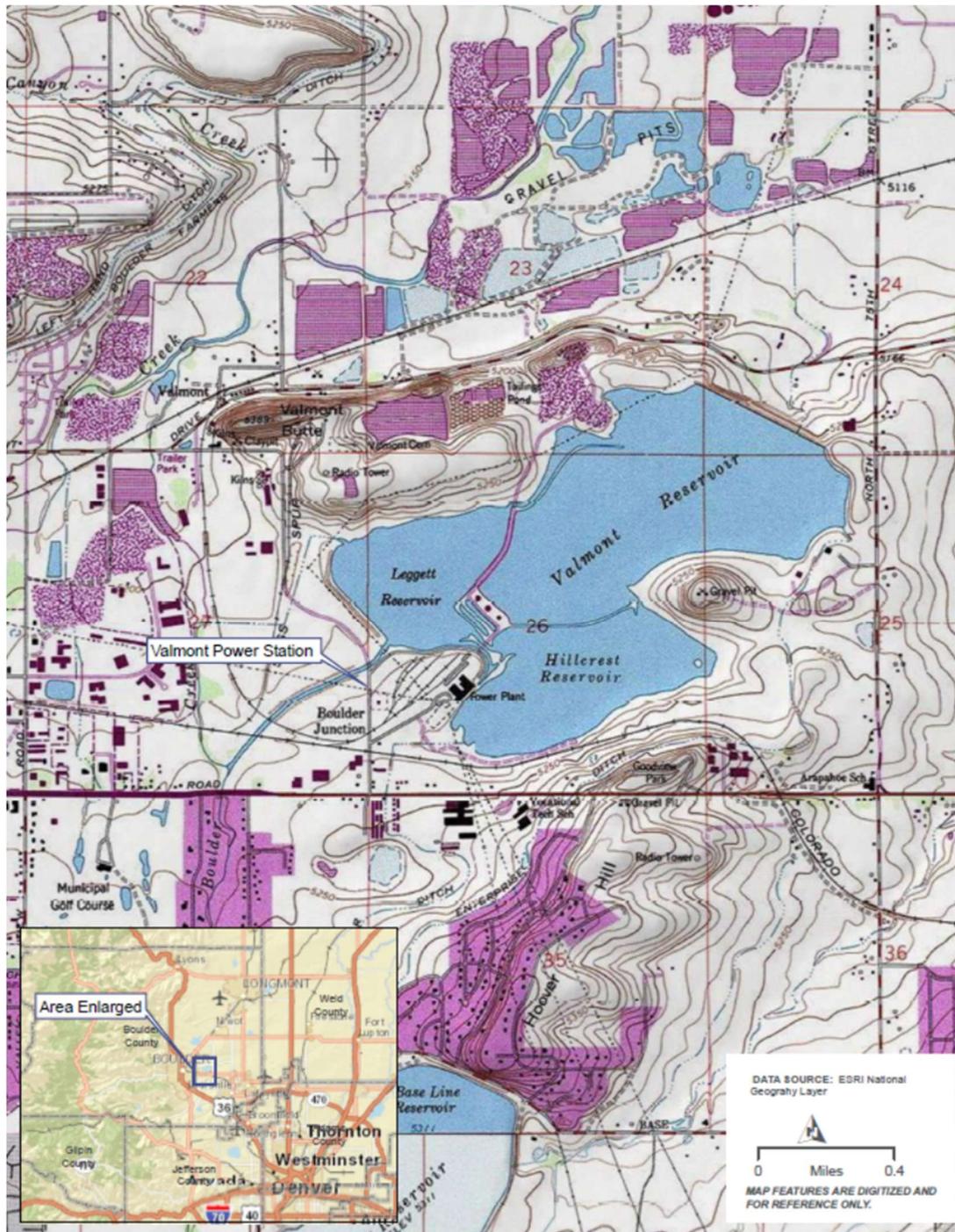
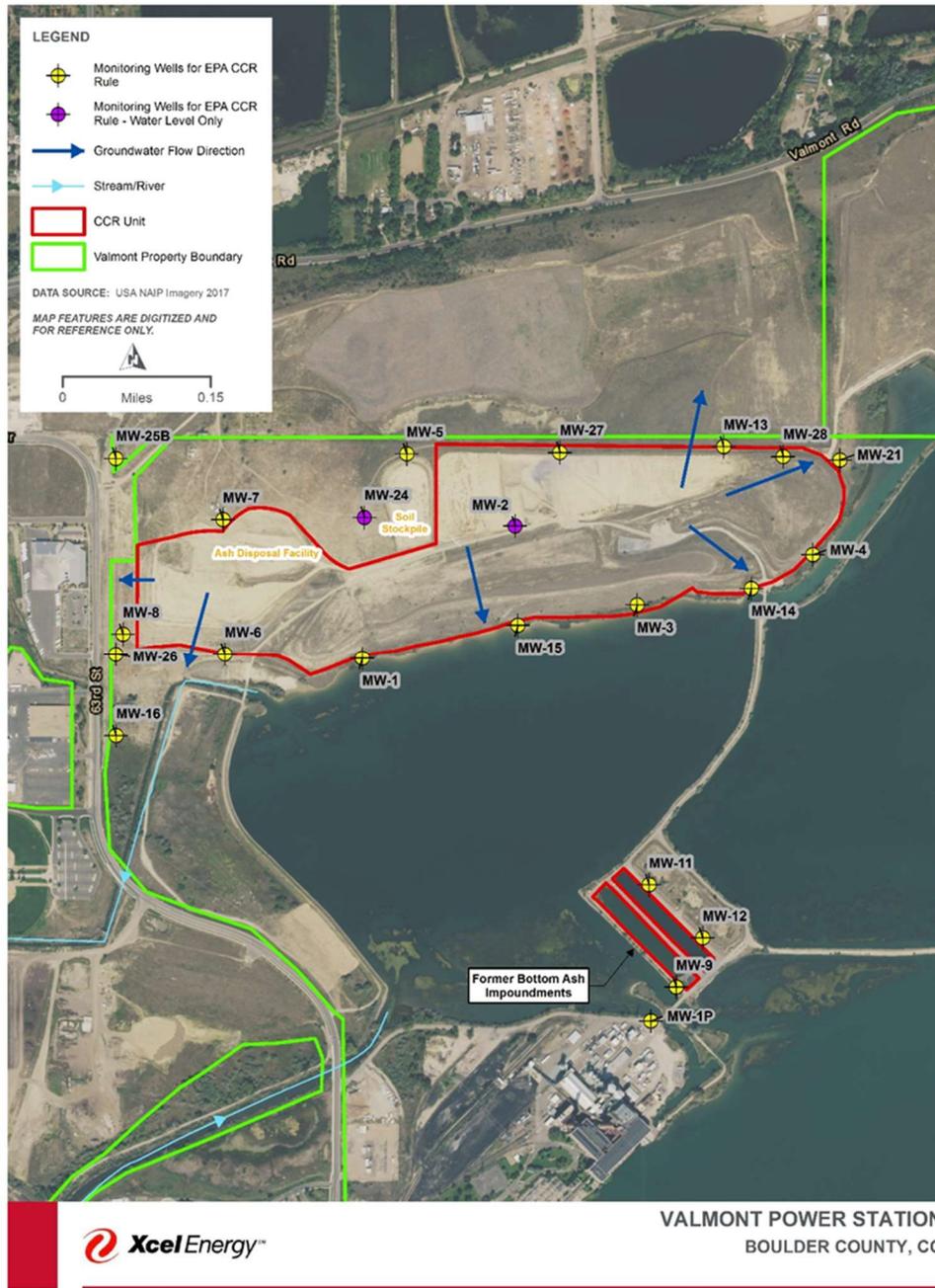


Figure 1-2. Valmont Station — CCR Units





## 2 Background

In accordance with the CCR Rule, PSCo initiated background groundwater monitoring around the landfill in 2015, conducted detection monitoring at the landfill in 2017, and has been performing assessment monitoring continually since 2018. As described in the October 10, 2018 memorandum Groundwater Protection Standards and Determination of SSLs per 257.95(g), GPS were established for each detected Appendix IV constituent of interest (COI). Downgradient wells at the landfill were first found to have concentrations of constituents at SSLs above the GPS in October 2018 (HDR, 2019c). Concentrations of arsenic, lithium and selenium have been observed at SSLs above the GPS in several downgradient landfill monitoring wells. Therefore, PSCo completed the *Conceptual Site Model and Assessment of Corrective Measures* on June 6, 2019 in accordance with CCR Rule 257.96. A groundwater flow and transport model was developed for the Valmont Landfill in 2019 to support the corrective measures assessment. The groundwater model is described in the *Conceptual Site Model and Assessment of Corrective Measures Report*.

For the two bottom ash impoundments, detection monitoring water quality data collected in 2017 were compared against the background threshold values (BTVs) as specified under CCR Rule Part 257.94, and SSIs were identified. Groundwater monitoring was subsequently conducted for assessment monitoring per 257.95. In accordance with CCR Rule 257.95(h), GPS were established for each detected Appendix IV COI and documented in the October 10, 2018 memorandum Groundwater Protection Standards and Determination of SSLs per 257.95(g). Downgradient wells were found to have concentrations of cobalt and molybdenum at SSLs above the GPS. Closure of the two CCR impoundments was initiated in April 2018 prior to determining that there were any SSLs and the need for development of the Assessment of Corrective Measures. Removal of CCR, and all areas affected by releases of CCR was completed in September 2018, thus effectively implementing source control corrective action. The CCR material has been completely removed from the former impoundments, and concentrations of CCR constituents are expected to decrease through natural attenuation. All groundwater monitoring at the impoundments since September 2018 reflects post source removal conditions, and recent events reflect declining concentrations.

## 3 Evaluation of Potential Remedies

### 3.1 Landfill

Since the last semiannual selection of remedy update in January 2021, one round of groundwater sampling has been completed, progress has been made in the engineering and geochemical feasibility study for the Permeable Reactive Barrier (PRB) potential remedy, borings were drilled in landfill Cell D to verify ash depth and bedrock elevation for improved model resolution, and the access agreement was executed with the adjacent property owner to the north of the landfill (Valmont Butte) for future work to be completed on this property.



PSCo advanced the engineering and geochemical feasibility study of the PRB as a potential remedy to address groundwater conditions at the landfill. PSCo developed a PRB study designed to evaluate the feasibility of a PRB via conventional trench, via injection wells, and via funnel and gate. The study uses a phased approach designed to evaluate geochemical bench testing of reagents with site-specific substrate and groundwater followed by the geotechnical characteristics of the substrate for hydraulic and construction feasibility. In second quarter 2021 PSCo drilled three boreholes using sonic drilling technique to collect subsurface material samples from the proposed PRB trench location. Groundwater was not encountered in the three boreholes. In the absence of groundwater from the boreholes, groundwater was collected from monitoring well MW-28 which is in the direct vicinity. Well MW-28 is the well with the highest observed concentrations exceeding the groundwater protection standards. The groundwater and sediment samples were submitted for bench testing. The bench test program is evaluating the geochemical feasibility of treating lithium, selenium, and arsenic via PRB reagent alternatives. The results of the preliminary feasibility bench test results are anticipated in late 3rd quarter or early 4th quarter 2021.

PSCo also completed drilling work in Landfill Cell D to more fully define the depth of the ash and underlying bedrock in the landfill cell. A total of six boreholes were drilled and logged and the data will be integrated into the previously developed groundwater flow model for the landfill to improve groundwater flow and transport model resolution.

Additionally, PSCo completed negotiations with the City of Boulder to develop an access agreement for the Valmont Butte property. The agreement was executed in June 2021 and allows for the placement of wells on the City's adjacent property to further characterize the nature and extent of GPS exceedances beyond the Valmont Station property boundary. The data collected from these wells will be incorporated into the groundwater flow and transport model.

## 3.2 Bottom Ash Impoundments

As discussed in the Conceptual Site Model and Assessment of Corrective Measures report, concentrations of CCR constituents that exceeded GPS (cobalt and molybdenum) are relatively low at the impoundment monitoring wells, and the extent of impacts to groundwater is confined to the area of the former impoundments, which are completely surrounded by the Leggett, Valmont, and Hillcrest reservoirs. PSCo continues assessment monitoring at the former impoundments to evaluate concentration trends of these constituents of concern (COC) since source removal was completed in 2018, and whether natural attenuation is an effective remedy, in combination with the previous source removal, to address groundwater conditions. The groundwater chemistry from 2019, 2020, and first half of 2021 has shown decreasing concentrations of both cobalt and molybdenum in all three downgradient wells. Concentrations of molybdenum are now below the GPS concentration in all downgradient wells, and the concentrations of cobalt are below the GPS in two of the three downgradient wells. It is anticipated that all Appendix IV constituent concentrations will be below GPS within a few years.



## 4 Next Steps

The following activities are anticipated to be completed or initiated in the next 6-month period for each CCR unit 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 profession judgment.

- Evaluation of the PRB feasibility study bench test results at the landfill for effectiveness of reagent treatment of lithium, selenium, and arsenic in groundwater. If the findings of the bench testing show a PRB reagent to be a viable groundwater treatment, PSCo will move into the next stages of the feasibility study:
  - Geotechnical feasibility to evaluate whether or not the hydraulic properties will be conducive to groundwater flow through the PRB and evaluate construction feasibility for the PRB alternatives.
  - Update the groundwater flow and transport model predictive simulations associated with the PRB remedy to reflect measured treatment effectiveness.
- Update the groundwater flow and transport model using the data collected from the ash borings in Cell D.
- Continue semi-annual groundwater assessment monitoring at each CCR unit.
- Expansion of the groundwater monitoring network and groundwater flow and transport model using data collected from the adjacent property through the installation and sampling of additional monitoring wells.
- Continued feasibility evaluation of ash removal for beneficial use as a viable source removal component of the landfill remedy.
- Continued evaluation of COC concentrations relative to GPS and background and general trends.
- In accordance with 257.97(a), PSCo will complete semi-annual progress reporting to document additional work completed towards remedy selection and design.



## 5 References

HDR, 2019a. Conceptual Site Model and Assessment of Corrective Measures - Compliance with the Coal Combustion Residuals Rule Valmont Station. June 6, 2019.

HDR, 2019b. Groundwater Protection Standards and Determination of SSLs per 257.95(g). June 7, 2019.

HDR, 2020. 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, 2020.