# FALL 2022 SEMI-ANNUAL PROGRESS REPORT
# SELECTION OF REMEDY AT COLSTRIP 1&2 STAGE II EVAPORATION POND E CELL AND OLD CLEARWELL
# COLSTRIP STEAM ELECTRIC STATION
# TALEN MONTANA, LLC

**Per Requirements of 40 CFR §§ 257.97(a)**

**Prepared for:**
**Talen Montana, LLC**
**P.O. Box 38**
**Colstrip, Montana 59323**

**Prepared by:**
**Hydrometrics, Inc.**
**5602 Hesper Rd.**
**Billings, MT 59106**

**October 2022**

## TABLE OF CONTENTS

1.0 INTRODUCTION ..... 1-1
1.1 PURPOSE ..... 1-1
1.2 BACKGROUND ..... 1-2
1.2.1 CCR Rule ..... 1-2
1.2.2 Assessment of Corrective Measures §257.96 ..... 1-2
1.3 RECORDKEEPING AND NOTIFICATION REQUIREMENTS ..... 1-3
2.0 COLSTRIP 1&2 STEP AREA CCR UNITS REMEDY SELECTION AND DESIGN PROGRESS ..... 2-1
3.0 REFERENCES ..... 3-1

## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| 1&2 BAP | Colstrip 1&2 Bottom Ash Pond |
| 1&2 B Pond | Colstrip 1&2 B Flyash Pond |
| 3&4 BAP | Colstrip 3&4 Bottom Ash Pond |
| 3&4 EHP | Units 3 & 4 Effluent Holding Pond |
| ACM | Assessment of Corrective Measures |
| AOC | Administrative Order on Consent |
| Appendix IV | Appendix IV to 40 CFR Part 257—Constituents for Assessment Monitoring |
| ASD | Alternative Source Demonstration |
| BAP | Bottom Ash Pond |
| CCR | Coal Combustion Residuals |
| CCR Rule | 2015 EPA Coal Combustion Residuals Rule |
| CCR units | All active CCR landfills, surface impoundments, and lateral expansions |
| CFR | Code of Federal Regulations |
| Colstrip SES | Colstrip Steam Electric Station |
| FOR | Facility Operating Record |
| GWPS | Groundwater Protection Standard |
| IC | Institutional Controls |
| MDEQ | Montana Department of Environmental Quality |
| MNA | Monitored Natural Attenuation |
| PPLMT | PPL Montana, LLC |
| PRB | Permeable Reactive Barrier |
| RAA | Remedial Alternative Assembly |
| RCRA | Resource Conservation and Recovery Act |
| SSL | Statistically Significant Level |
| STEP | Units 1&2 Stage II Evaporation Pond |
| STEP E Cell | Colstrip 1&2 STEP E Cell |
| Old Clearwell | Colstrip 1&2 STEP Old Clearwell |
| Talen | Talen Montana, LLC |
| US EPA | U.S. Environmental Protection Agency |

# FALL 2022 SEMI-ANNUAL PROGRESS REPORT
# SELECTION OF REMEDY AT COLSTRIP 1&2 STAGE II EVAPORATION POND
# E CELL AND OLD CLEARWELL
# COLSTRIP STEAM ELECTRIC STATION
# TALEN MONTANA, LLC

## 1.0 INTRODUCTION

### 1.1 PURPOSE

The purpose of this report is to provide a description of the progress of selecting and designing a remedy for each of the Colstrip Steam Electric Station (Colstrip SES) CCR units with a statistically significant level (SSL) above the groundwater protection standard (GWPS) of an Appendix IV Assessment Monitoring Constituent in accordance with §257.97(a). By rule, progress reports are required semi-annually until a final remedy is selected. A remedy has been selected in accordance with §257.97 for each of the CCR units with an SSL above the GWPS on the Plant Site (Colstrip 1&2 B Flyash Pond, 1&2 Bottom Ash Pond, and 3&4 Bottom Ash Pond) and at the Units 3&4 Effluent Holding Pond (Colstrip 3&4 EHP A Cell, B Cell, C Cell, D/E Cell, G Cell, J Cell, and J-1 Cell). As required in §257.97(a), the Plant Site CCR unit remedies were identified and certified by a qualified professional engineer in the Selection of Remedy Report in February 2020 (Hydrometrics, Inc. 2020b). The Units 3&4 EHP CCR unit remedy was identified in a Selection of Remedy Report in February 2021 (Hydrometrics, Inc. 2021). Remedial activities were initiated at those CCR units within 90 days of remedy selection in accordance with §257.98. Therefore, progress made in selecting and designing the remedies for the Colstrip 1&2 Stage II Evaporation Pond (STEP) E Cell and Old Clearwell is the focus of this report. Progress related to design and selection of a remedy for STEP E Cell and Old Clearwell is discussed in Section 2.0.

## 1.2 BACKGROUND

### 1.2.1 CCR Rule

On April 17, 2015, the United States Environmental Protection Agency (US EPA) published the final rule to regulate the disposal of Coal Combustion Residuals (CCR) as solid waste under subtitle D of the Resource Conservation and Recovery Act (RCRA). The "CCR Rule" sets minimum criteria for existing and new CCR landfills and existing and new CCR surface impoundments (US EPA 2015). All active CCR landfills, surface impoundments, and lateral expansions (CCR units) are subject to groundwater monitoring and corrective action under Code of Federal Regulations (CFR) Title 40 Parts 257.90 through 257.98, effective October 19, 2015.

### 1.2.2 Assessment of Corrective Measures §257.96

In accordance with §257.95(g)(3), within 90 days of finding that any of the constituents listed in Appendix IV (to Part 257) were detected at an SSL exceeding the GWP), the owner or operator must either (i) initiate an assessment of corrective measures (ACM), as required by §257.96; or (ii) demonstrate that a source other than the CCR unit caused the SSL. Talen initiated an ACM for the following Colstrip Steam Electric Station (Colstrip SES) CCR units and Appendix IV constituents by January 15, 2019 to address the SSLs.

- Plant Site
    - Colstrip 1&2 B Flyash Pond (1&2 B Pond) – lithium and cobalt
    - Colstrip 1&2 Bottom Ash Pond (1&2 BAP) – lithium and cobalt
    - Colstrip 3&4 Bottom Ash Pond (3&4 BAP) – lithium, cobalt, and molybdenum
- Units 1&2 Stage Two Evaporation Pond (STEP) Area
    - Colstrip 1&2 STEP E Cell and Old Clearwell – lithium
- Units 3&4 Effluent Holding Pond (3&4 EHP) Area
    - 3&4 EHP A, B, C, D/E, G, J, J-1 Cells – lithium and cobalt.

A successful alternative source demonstration (ASD) was subsequently conducted for cobalt at 3&4 BAP (Hydrometrics, Inc., 2019d). The ASD was included in the 2019 Annual

Groundwater Monitoring and Corrective Action Report for the Colstrip SES (Hydrometrics, Inc., 2020a).

Separate ACM reports pursuant to §257.96 were completed for CCR units at the Plant Site, STEP area, and 3&4 EHP area (Hydrometrics, Inc. 2019a, 2019b, and 2019c). As detailed throughout the three ACM reports, applicable ACM requirements were achieved largely by remedial evaluation activities conducted at the Colstrip SES under an Administrative Order on Consent (AOC) between the Montana Department of Environmental Quality (MDEQ) and PPL Montana, LLC (Talen's predecessor) (PPLMT/MDEQ 2012). Each ACM includes evaluation of federal criteria under 40 C.F.R. §257.96 and §257.97. As noted above, a Selection of Remedy Report under §257.97(a) was subsequently prepared for the Plant Site in February 2020 (Hydrometrics, Inc. 2020b), and a Selection of Remedy Report was likewise prepared for the Units 3&4 EHP in February 2021 (Hydrometrics, Inc. 2021).

### 1.3 RECORDKEEPING AND NOTIFICATION REQUIREMENTS

This progress report has been completed when it is placed in the Colstrip SES Facility Operating Record (FOR), as required by §257.105(h)(12). Per §257.106(9) and §257.107(h)(9), Colstrip SES operators will notify MDEQ and place this report on the public website within 30 days of posting it to the FOR.

## 2.0 COLSTRIP 1&2 STEP AREA CCR UNITS REMEDY SELECTION AND DESIGN PROGRESS

The process of selecting and designing corrective measures for lithium at SSL above the GWPS at the Colstrip 1&2 STEP E Cell and Old Clearwell is ongoing, and a final remedy has yet to be selected for those CCR units. However, based on the ACM conducted per §257.96 (Hydrometrics, Inc. 2019b) and the parallel Remedy Evaluation conducted under the AOC (Geosyntec 2019a, 2019b), a remedial alternative assembly (RAA) including freshwater flushing, expanded groundwater capture, and source reduction appears to be effective at mitigating constituents in groundwater downgradient of the CCR units. Institutional controls (IC), monitored natural attenuation (MNA), and a contingency permeable reactive barrier (PRB) are also included in the RAA.

Under the AOC, facility operators submitted an Interim Report regarding aspects of a final remedy that would be implemented regardless of final source control options (i.e. freshwater flushing and groundwater capture) (Geosyntec 2020a). MDEQ provided conditional approval of the remedial components in the Interim Report (MDEQ 2020). Evaluation of additional source control alternatives was conducted in 2020 and a Revised Remedy Evaluation – Integrated Report (Geosyntec 2020b) was submitted to MDEQ in September 2020. In light of MDEQ's conditional approval, a pilot test of flushing and capture systems was conducted in 2021 and construction of a small-scale flushing system began in 2022. Discussions with MDEQ regarding final remedy selection under the AOC is ongoing and source control options remain under evaluation. The two primary source control options that remain under evaluation are discussed below.

In accordance with §257.97(a), the final remedy will be selected as soon as feasible. However, the process of selecting the final remedy for STEP E Cell and Old Clearwell will closely follow the timeline of remedial activities required by the AOC with MDEQ for the entire 1&2 STEP, which includes remedial actions for facilities other than the two CCR units. It is important to note that, as delineated in the 1&2 STEP ACM (Hydrometrics, Inc. 2019b) and subsequent

groundwater monitoring reports (Hydrometrics, Inc. 2022), lithium SSLs are constrained to property owned by the Colstrip SES. Hydraulic control and effective capture of impacted groundwater in alluvium downgradient of the 1&2 STEP E Cell and Old Clearwell is maintained by a system of groundwater capture wells that will continue to operate during the remedy selection process and as part of the final remedy.

Completed or upcoming work focused on selecting a remedy and addressing lithium SSLs in alluvium downgradient of STEP E Cell/Old Clearwell includes the following.

- A pilot test of MDEQ conditionally approved remedial components (i.e., freshwater flushing and groundwater capture) was conducted in fall 2021 (Geosyntec 2022). Results indicate that freshwater flushing and capture in alluvium performed, or outperformed, groundwater modeling predictions based on design parameters; and that flushing rates at individual wells may need to be refined during implementation.
- Construction of a small-scale flushing system east of STEP E Cell/Old Clearwell began in summer 2022. The flushing system is expected to become operational in December 2022 as part of the MDEQ conditionally approved remedy.
- A groundwater capture system is operated for source control downgradient of the STEP E Cell/Old Clearwell CCR unit boundary. The capture system will continue to operate as a component of the MDEQ conditionally approved remedy in concert with the flushing system to reduce local constituent concentrations to below the GWPS.
- Groundwater monitoring has been conducted according to CCR Rule at additional wells beyond the STEP E Cell/Old Clearwell CCR unit boundaries since 2018. Data from the additional wells are used to satisfy requirements of §257.95(g)(1) to characterize the nature and extent of releases of Appendix IV constituents at CCR units with an SSL. Samples will continue to be collected at downgradient characterization wells; and evaluation of these data will be conducted to monitor spatiotemporal trends and document the effectiveness of corrective actions at the Colstrip SES CCR units in complying with GWPS as required by §257.98(c)(2). Lithium concentrations decline in a downgradient direction from the CCR unit and are below the GWPS for alluvium at

the Colstrip SES property boundary (Hydrometrics, Inc. 2022).

- The effectiveness of MNA, in concert with active flushing and capture components of the remedy that have been conditionally approved by MDEQ, is being evaluated in alluvium downgradient of STEP E Cell/Old Clearwell. Additional aquifer solids samples were collected to support the MNA evaluation in summer 2021. Results of the MNA evaluation will be used to support final remedy selection for STEP E Cell/Old Clearwell.
- Parallel evaluations of two source control options for STEP (including STEP E Cell and Old Clearwell), are being evaluated: (1) removal of all ash to a new CCR Rule compliant landfill or (2) excavation of deeper ash within five feet of the projected maximum future groundwater elevation, consolidation of the ash, and closure in place of the units with a CCR Rule compliant cap.
- Hydrogeologic and geotechnical evaluation of a potential new landfill site began in 2022. Results of these ongoing studies will inform the adequacy of the landfill site that is proposed under the closure by removal alternative, including conformance with CCR Landfill Location Restrictions in §257.60 through §257.64.
- An ash excavation pilot test was initiated in 2022. Data related to physical properties of the ash will be gathered during the pilot study to parameterize ash handling, consolidation, and final disposition activities proposed in either of the source control alternatives.
- The Selection of Remedy Report for STEP E Cell and Old Clearwell will be prepared as soon as feasible, in accordance with §257.97, while allowing for subsequent remedy evaluation and design and a period of at least 30 days from a public meeting with interested and affected parties to discuss results of the ACM.

## 3.0 REFERENCES


Geosyntec, 2019a. Revised Remedy Evaluation Report, Units 1&2 Stage I and II Evaporation Ponds, Colstrip Steam Electric Station, Colstrip, Montana. Geosyntec Consultants, Inc., Columbia, Maryland. January 2019.

Geosyntec, 2019b. Revised Remedy Evaluation Report – Part One, Units 1&2 Stage I and II Evaporation Ponds, Colstrip Steam Electric Station, Colstrip, Montana. Geosyntec Consultants, Inc., Columbia, Maryland. October 2019.

Geosyntec, 2020a. Revised Remedy Evaluation Report – Part One, Units 1&2 Stage I and II Evaporation Ponds, Colstrip Steam Electric Station, Colstrip, Montana. Geosyntec Consultants, Inc., Columbia, Maryland. June 2020.

Geosyntec, 2020b. Revised Remedy Evaluation – Integrated Report Units 1&2 Stage I and II Evaporation Ponds, Colstrip Steam Electric Station, Colstrip, Montana. Geosyntec Consultants, Inc., Columbia, Maryland. September 2020.

Geosyntec, 2022. Small Scale Flushing Pilot Test Report Units 1&2 Stage I and II Evaporation Ponds Colstrip Steam Electric Station, Colstrip, Montana.

Hydrometrics, Inc. 2019a, Assessment of Corrective Measures Plant Site CCR Units Colstrip Steam Electric Station, Talen MT LLC. April 2019.

Hydrometrics, Inc. 2019b, Assessment of Corrective Measures Colstrip 1&2 STEP E Cell and Old Clearwell, Colstrip Steam Electric Station, Talen MT LLC. April 2019.

Hydrometrics, Inc. 2019c, Assessment of Corrective Measures Colstrip 3&4 EHP CCR Units, Colstrip Steam Electric Station, Talen MT LLC. April 2019.

Hydrometrics, Inc. 2019d, Alternative Source Demonstration for Cobalt in Groundwater Colstrip Units 3&4 Bottom Ash Pond Colstrip Steam Electric Station, Talen MT LLC. July 2019.

Hydrometrics, Inc. 2020a, 2019 Annual Groundwater Monitoring and Corrective Action Report Colstrip Steam Electric Station Talen Montana, LLC. January 2020.

Hydrometrics, Inc. 2020b, Selection of Remedy Report Plant Site CCR Units Colstrip Steam Electric Station Talen Montana, LLC. February 2020.

Hydrometrics, 2021, Selection of Remedy Report Units 3&4 EHP CCR Units Colstrip Steam Electric Station Talen Montana, LLC, February 2021.

Hydrometrics, Inc. 2022, 2021 Annual Groundwater Monitoring and Corrective Action Report Colstrip Steam Electric Station Talen Montana, LLC. January 2022.

Montana Department of Environmental Quality (MDEQ). 2020. Letter from Sara Edinberg to Gordon Criswell RE: Comments on *Revised Remedy Evaluation Report – Part One, Units 1&2 stage I and II Evaporation Ponds*. Dated June 8, 2020.

PPLMT/Montana Department of Environmental Quality, 2012. Administrative Order on Consent Regarding Impacts Related to Wastewater Facilities Comprising the Closed-Loop System at the Colstrip Steam Electric Station, Colstrip Montana between PPL Montana, LLC as Operator of the Colstrip Steam Electric Station and Montana Department of Environmental Quality.

US EPA, 2015. 40 CFR Parts 257 and 261. Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule. Vol. 80, No. 74. April 17, 2015.