DEQ's Preliminary Decision on Talen Montana LLC's *Plant Site Request to Amend the Remedy for the A Pond, B Pond and Bottom Ash/Clearwell Pond, Addendum to the Remedial Design/Remedial Action Workplan and Remedy Evaluation Report:* Preliminary Selection of Remedial Alternative 4B for the Plant Site A Pond, B Pond, and Bottom Ash/Former Clearwell Pond Closure

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Section 1 – Background

1.1 – Introduction and Colstrip Operations Description

The Colstrip Administrative Order on Consent (AOC) is an enforcement action taken by DEQ that requires Talen Montana, LLC (Talen; formerly PPL Montana, LLC) to address groundwater contamination resulting from seepage from coal ash disposal ponds associated with the Colstrip Steam Electric Station (Colstrip SES). Six parties (Talen, PacifiCorp, Puget Sound Energy, Portland General Electric Company, Avista Corporation, and NorthWestern Energy) have split ownership of the Colstrip SES. However, Talen is responsible for operation of the plant and is, therefore, responsible for the remediation of the coal ash ponds under the AOC. DEQ and Talen executed the AOC in 2012. It provides a sequential process for site characterization, identification of clean-up criteria, remedy selection, and remedy implementation, and progress review.

The Colstrip SES were built in the 1970's and early 1980's and consists of four coal-fired power plant units. The total generating capacity of all four Units was 2276-megawatts. Units 1&2 began operation in 1975 and 1976, respectively, and ceased operation permanently on January 2nd and 3rd, 2020. Units 3&4 came online in 1984 and 1985, respectively, and both are still in operation. Units 3&4 continue to operate and are capable of producing up to 1,480 MW of generating capacity.

1.2 – Project Area Description – Plant Site A Pond, B Pond, and Units 1&2 Bottom Ash/Clearwell

Under Talen's Major Facility Siting Act (MFSA) Certificate of Compatibility issued by DEQ in 1976, the Colstrip SES uses a closed-loop system for water and scrubber processes, which results in reuse of the water introduced into the process. Therefore, the main waste products from the Colstrip SES operations are coal ash waste and water treatment brine salts. Freshwater used in the system is obtained from the Yellowstone River through two approximately 30-mile pipelines to Castle Rock Lake (also known as the Colstrip SES Surge Pond). From the Surge Pond, freshwater is piped to holding tanks at the Plant Site for use in the boilers, cooling towers, and scrubber systems. Coal is brought in from the adjacent Rosebud Mine. The boilers burn the coal to produce energy that is delivered as electricity through the power line distribution system. The power production process results in the coal ash waste products of bottom ash and fly ash. Bottom ash is a larger particle coal ash that settles out at the bottom of the boiler system. Units 3&4 bottom ash is mixed with water and piped as a slurry to dewatering tanks on the Plant Site to be dewatered, and then transported by truck to the Units 3&4 Effluent Holding Ponds (EHP) for disposal. Clearwater from bottom ash dewatering is reused in the Units 3&4 bottom ash systems. Fly ash includes small, air borne particles that are captured in the air emissions scrubber system. The fly ash at Units 3&4 is mixed with water as a slurry and piped to the Units 3&4 EHP area to be processed at the paste plant and a sequential dry disposal filter press plant, which removes water prior to depositing the ash in the disposal cells. Clearwater from the paste and dry disposal plants are recirculated back to the Plant Site for use in the scrubbers.

Prior to 2020 coal ash waste from all four operational units was distributed to three areas across the property. The AOC divides the site into these three distinct areas in accordance with the configuration of the coal ash waste ponds: Plant Site Area, Units 1&2 Area, and Units 3&4 EHP Area.

There are three general areas where ash/paste and wastewater are stored at the Colstrip SES (**Figure 1**):

- The Plant Site, containing the infrastructure for Units 1 through 4 and several ponds associated with all four units;
- The Units 1&2 Stage One Evaporation/Stage Two Evaporation Ponds (SOEP/STEP), which contain several ponds used for ash/paste disposal from Units 1&2 operations. The SOEP operated from 1975 until 1995 and was closed with an evapotranspiration cap in 2002. The STEP operated from 1993 until Units 1&2 closure in January 2020. These ponds are located approximately 2 miles northwest of the Plant Site; and
- The Units 3&4 EHP are located approximately 2.5 miles southeast of the Plant Site and are currently used for disposal of fly and bottom ash from Units 3&4 and previously received bottom ash from Units 1 through 4. The ponds began operating in 1983 and will continue operating until closure of Units 3&4.

DEQ approved the remedy for the Plant Site area in October 2018, which included closure-in-place and capping of these ponds. Remedy implementation and pond closures started shortly thereafter. During interim remedial progress reviews in 2022, Talen and DEQ identified concerns with the closure-in-place remedy for the Plant Site A Pond, B Pond, and Bottom Ash/Clearwell Pond. On July 17, 2023, Talen submitted a request to modify the approved Plant Site remedy for three of the coal ash disposal ponds in the Plant Site Area. **Attachment C Figure 1 and Figure 2** includes the Plant Site Layout and the three ponds that are affected by the decision: A Pond, B Pond, and Bottom Ash/Clearwell Pond.

This document addresses DEQ's preliminary decision on Talen's request to modify the Plant Site remedy.

1.3 – Administrative Order on Consent

The AOC is an enforcement action administered by DEQ in 2012 to enforce the Montana Water Quality Act and the Montana Major Facility Siting Act. It requires Talen to address groundwater contamination resulting from seepage from the coal ash disposal ponds. The AOC divides the site into three areas: the Plant Site, the Units 1&2 Ponds, and the Units 3&4 Ponds. The AOC lays out a sequential process for each of the three areas. Public involvement criteria are also outlined in the AOC with specifics on public comment periods and public meetings. The remedy decision component of the AOC requires a 30-day public comment period.

Talen, the Colstrip SES operator and one of the six owners, prepares and submits reports and workplans required under the AOC to DEQ. DEQ has 75 days to review and either approve, conditionally approve, or disapprove of the reports. The process began with a Site Characterization Report, which characterized conditions at the plant site and was approved in 2015. A Cleanup Criteria and Risk Assessment Report was then prepared, which identified constituents of interest, risk for exposure, and numerical cleanup criteria was approved in 2018. After determining cleanup criteria, Talen submitted a Remedy Evaluation Report in 2018 evaluating remediation alternatives and identifying Talen's preferred alternative. DEQ had the authority to select the remedy, or a modified remedy. The Plant Site remedy (Alternative 4) was approved and included groundwater flushing and capture, closure in place and dewatering of coal ash

ponds on the Plant Site Area, and pilot study for monitored natural attenuation. Talen was required to submit financial assurance for the selected remedy within 60 days of DEQ's approval or conditional approval of the Remedy Evaluation Report. Talen then submitted a Remedial Design/Remedial Action Workplan that was approved in 2019, and then started implementation of the remedy in 2020.

During interim remedial progress reviews in 2022, Talen and DEQ identified concerns with the closure-in-place remedy for the Plant Site A Pond, B Pond, and Bottom Ash/Clearwell Pond. Under the AOC, DEQ and Talen are working through modification of the remedy for these three ponds. This modification to the remedy is an addendum to the Remedy Evaluation Report, and therefore, will proceed through the AOC process for DEQ's review and preliminary decision on the modified alternatives as presented in this Decision Document followed by a 30-day public comment period of the decision on the modified remedy selected. Once DEQ has reviewed public comment and made a final decision, Talen will be required to submit updated financial assurance for the modified remedy within 60-days of DEQ's approval or conditional approval. Talen will also need to provide addendums to the Remedial Design/Remedial Action Workplan for DEQ review and approval prior to implementation of the modified remedy.

1.4 – DEQ's Role and Reason for Decision Document

The reason for this decision document is to set forth DEQ's action, as set forth in Article XII of the AOC, on the request to modify the remedy for the Plant Site A Pond, B Pond, and Bottom Ash/Clearwell Pond and to preliminarily select modified remedial alternative 4B for these Plant Site ponds from the remedial alternatives identified and analyzed. This decision document serves as public notice of DEQ's preliminary decision, the reasons for the decision, and any special considerations surrounding the decision or its implementation.

Section 2 – Development of Alternatives Considered for Plant Site A Pond, B Pond and Bottom Ash/Clearwell Pond Remedy Modification

This preliminary decision document addresses DEQ's review of Talen's request to modify the approved remedy for three of the coal ash disposal ponds located in the Plant Site Area. **Attachment C Figure 1 and Figure 2** includes the Plant Site Layout and the three ponds that are affected by the decision: A Pond, B Pond, and Bottom Ash/Clearwell Pond.

DEQ approved the remedy strategy for the Plant Site area in October 2018 after review of the Revised Remedy Evaluation Report for the Plant Site area (June 2018). The Revised Remedy Evaluation Report included evaluation of four remedial alternatives: Alternative 1 No further action; Alternative 2 Source Control upgrades; Alternative 3 Capture System upgrades and Alternative 4 In situ flushing with increased capture and Talen identified Alternative 4 as its preferred alternative. Alternative 4 included source control activities such as pond upgrades, dewatering activities, and increased groundwater capture, along with the installation of an extensive freshwater flushing injection system to clean groundwater more aggressively, and increased capture of groundwater. Alternative 4 also included the evaluation of monitored natural attenuation (MNA) and permeable reactive barrier (PRB) technologies as potential additional remedy measures to employ during remedial implementation, as necessary.

Beginning in February 2019, Talen prepared a series of Remedial Design/Remedial Action (RD/RA) Workplans for the Plant Site area to outline the implementation of the remedy. In October 2019, DEQ approved the RD/RA Workplan, and Talen began implementation of the remedy components in 2019 with pond closures and source control activities. In 2020 the full-scale freshwater flushing and groundwater capture system was implemented. As part of the reporting activities, Talen reports remedy progress to DEQ annually. Starting in 2021, DEQ and Talen evaluated both the remedy progress for the flushing/capture systems and the hydrologic groundwater data and occurrence. The evaluation of 2021 remedial progress and hydrologic data, which occurred in 2022, coincided with the Federal EPA review of Part A [] coal combustion residual (CCR) rules and determinations for other CCR facilities. In review of those CCR Part A determinations from the EPA and with increased years of data on the groundwater occurrence and elevation at the Plant Site after initial source control measures, Talen and DEQ noted they would like to evaluate closer the potential for groundwater to come in contact with Plant Site coal ash ponds.

During DEQ's evaluation of remedy progress data in 2022, DEQ and Talen identified that there may be additional data suggesting that the coal ash waste in Plant Site ponds may be in contact with or become in contact with groundwater in the future. This was counter to data presented in the 2018 Remedy Evaluation Report (Talen, 2018) that modeled separation between the bottom or the coal ash ponds, and groundwater based on available data at the time.

In addition, Talen closed-in-place the Plant Site A Pond in 2019, including capping and revegetation over that cap. Ponds B and Bottom Ash/Clearwell Pond were scheduled to be closed-in-place and capped in 2022. Based on an observation of higher groundwater data at the Plant Site, Talen requested to delay closure of Plant Site B Pond and the Bottom Ash/Clearwell Pond to further

evaluate groundwater occurrence data and update the groundwater model for the Plant Site. DEQ agreed to the delayed closure of B Pond, and the Units 1&2 Bottom Ash Pond in 2022 and requested that Talen review and submit a modified remedy request if the evaluation indicated there was potential for groundwater or infiltration to be in contact with the coal ash waste.

Based on the noted groundwater occurrence observations, Talen performed a three-part evaluation related to a potential modification of the approved remedy for the Plant Site A Pond, B Pond, and Units 1&2 Bottom Ash/Clearwater Pond:

1. Plant Site Pond Closure Evaluation Interim Update (Talen, January 2023) – Provided in ***Attachment A***
    a. The Closure Evaluation Interim Update evaluated the EPA coal ash determinations from 2021 and proposed new rules or interpretations on groundwater separation and infiltration along with a review of site cross-sections overlaying the groundwater depth or projected groundwater depth with the depth profiles of the coal ash ponds to evaluate potential for contact between the coal ash and groundwater. This evaluation indicated that the A Pond, B Pond, and Bottom Ash/Clearwell Pond were all potentially in contact with groundwater at this time and would have contact with groundwater at simulated 2050- and 2070-year time periods.
    b. Based on Plant Site Pond Closure Evaluation Interim Update, DEQ agreed that there were concerns about groundwater in contact with coal ash based on the approved closure-in-place remedy for A Pond, B Pond, and Bottom Ash/Clearwell Pond. DEQ responded to Talen (***Attachment B***), requesting that Talen provide an updated evaluation of the existing closure source control plan and proposed modifications to the remedy, if necessary, for A Pond, B Pond, and Bottom Ash/Clearwell Pond.
2. Alternatives Assessment Report – Plant Site Units 1&2 Impoundments (Geosyntec/Talen, May 2023) – Provided in ***Attachment C***
    a. The Plant Site Units 1&2 Impoundments Alternatives Assessment Report evaluated six different closure alternatives for A Pond, B Pond, and the Bottom Ash/Clearwell Pond. The following alternatives were considered:
        i. Alternative A – Closure-in-Place (no change from the current DEQ-approved remedy for these ponds)
        ii. Alternative B – Closure-by-Removal to New Plant Site Disposal Units (landfills)
        iii. Alternative C – Closure-in-Place with Select In-Situ Stabilization
        iv. Alternative D – Closure-by-Removal to Proposed Alternative 10 Units 1&2 SOEP/STEP Area CCR Landfill
        v. Alternative E – Closure-by-Removal to the City of Hardin Landfill
        vi. Alternative F – Closure-in-Place with Construction of Subsurface Vertical Barrier Walls

    Talen evaluated each alternative on attainment of cleanup criteria, performance, reliability, ease of implementation, potential impacts, schedule and time to

complete, and cost. Talen determined that Alternative A, Alternative B, and Alternative F remained viable based on the evaluation factors.

b. DEQ reviewed the Alternatives Assessment Report for the Plant Site Units 1&2 Impoundments for the A Pond, B Pond, and Bottom Ash/Clearwell Pond along with the associated 2023 model simulations in Appendix A to the report. DEQ responded to Talen and noted that the updated model simulations for the Plant Site area showed constituent of interest (COI) boron concentrations above the cleanup criteria outside the point of compliance in both the year 2050 and with higher rebound concentrations of boron above the cleanup criteria in the year 2150. These were model simulations using recent site-specific groundwater data that were significantly higher and more spatially extensive than the results provided in the 2018 Remedy Evaluation Report.

c. On May 18, 2023, DEQ requested that Talen evaluate Alternative A, B, and F with respect to the cleanup criteria and remedial action objectives (RAOs) from the Remedy Evaluation Report for the Plant Site area, as well as separation criteria of greater than 5-feet between the groundwater and the coal ash waste material and pond liners. (***Attachment D***) DEQ directed Talen to submit an updated Alternatives Assessment addressing the ability for each alternative to meet RAOs and separation between groundwater and the bottom of the waste/pond liners or request to modify the remedy within 60-days, by July 17, 2023.

3. Request for Modification of the Approved Groundwater Remedy for the Plant Site at the Colstrip Steam Electric Station in Colstrip, Montana (Geosyntec/Talen, July 2023) – Provided in ***Attachment E***

    a. On July 17, 2023, Talen requested to modify the remedy for source control closure for A Pond, B Pond and the Bottom Ash/Clearwell Pond to Alternative B, which is closure-by-removal from the current pond locations into newly designed Plant Site CCR-compliant landfills within or near the current footprint of the existing ponds. Talen described this modification to the previously DEQ-approved remedy that included closure of Plant Site Ponds by closure-in-place with additional groundwater remedy through a flushing/capture system and potential monitored natural attenuation (Alternative 4 in the 2018 Remedy Evaluation Report) as “Alternative 4B” which will change the closure plan for the A Pond, B Pond, and Bottom Ash/Clearwell Pond to closure-by-removal to new on-site landfills with slight modifications to the existing full-scale flushing/capture system to accommodate the landfill locations and maintaining closure-in-place for the other Plant Site ponds, which have been previously closed.

Talen provided an assessment of Alternative 4B that included the rationale for the remedy modification, a description of Alternative 4B, a comparison of the performance of the Alternative 4B remedy to the closure-in-place remedy, and a demonstration that the Alternative 4B remedy can meet the previously approved cleanup criteria and RAOs.

Section 3 – Public Involvement Process

The AOC provides for public involvement through public comment periods and public meetings. Remedy selection and major modification is part of the required public comment activities identified in the AOC. On October 2, 2023, DEQ issued a press release and legal notice stating that it will accept public comment on DEQ's preliminary decision on Talen's request to modify the Plant Site remedy to change the closure plan for the Plant Site A Pond, B Pond, and Bottom Ash/Clearwell Pond to closure by removal to new Plant Site landfills.

The public comment period will run October 2, 2023 through November 2, 2023. Public comments can be submitted through two methods:

1. Email to the DEQ Colstrip Remediation Project Officer, Sarah Seitz or the DEQ Colstrip email list: sarah.seitz@mt.gov or DEQcolstrip@mt.gov with the subject line "Public Comment on Colstrip Plant Site Remedy Modification."
2. Written Comments post marked by November 2, 2023, can be sent to the attention of the DEQ Colstrip Remediation Project Officer, Sarah Seitz:

   Sarah Seitz – Public Comment on Colstrip Plant Site Remedy Modification
   c/o Department of Environmental Quality
   P.O. Box 200901
   Helena MT 59620-0901

During the public comment period, DEQ will accept written public comments, questions, and concerns regarding DEQ's preliminary decision on Talen's request to modify the Plant Site remedy. These comments will be entered into the administrative record, and DEQ will provide a responsiveness summary for the comments with its final decision.

Section 4 – Legal Requirements

4.1 – Montana Water Quality Act

Under § 75-5-605(1)(a), MCA, it is unlawful to cause pollution, as defined in 75-5-103, of any state waters or to place or cause to be placed any wastes where they will cause pollution of state waters. “Pollution” is defined in § 75-5-103(28)(a), MCA, to mean contamination or other alteration of the physical, chemical, or biological properties of state waters that exceeds that permitted by Montana water quality standards, including but not limited to standards relating to change in temperature, taste, color, turbidity, or odor; or the discharge, seepage, drainage, infiltration, or flow of liquid, gaseous, solid, radioactive, or other substance into state water that will or is likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, or welfare, to livestock, or to wild animals, birds, fish, or other wildlife. “State waters” is defined in § 75-5-103(32)(a), MCA, to mean a body of water, irrigation system, or drainage system, either surface or underground.

4.2 – Montana Major Facility Siting Act

On July 22, 1976, the Montana Board of Natural Resources and Conservation ordered the issuance of a Certificate of Environmental Compatibility and Public Need ("Certificate") under the Major Facility Siting Act for Colstrip Units 3 and 4. In making the order, the Montana Board of Natural Resources and Conservation made 97 findings of fact including the following:

1. That the Board of Health and Environmental Sciences, (BHES) has, after a hearing held pursuant to notice, certified to the Board of Natural Resources and Conservation that the facilities as proposed will not violate state and federally established air and water quality standards and implementation plans, a duly certified copy of the Board of Health's Findings of Fact, Conclusion of Law and hereto, marked as Exhibit "A" for identification, and by this reference fully and completely incorporated herein and made a part hereof. (Finding of Fact, No. 8).

2. That the Board of Health and Environmental Sciences, the duly authorized agency empowered to determine whether or not the proposed facility will violate state and federally established standards and implementation plans insofar as air and water quality are concerned, has, after hearing duly noted and held, issued twenty-one (21) pages of Findings of Fact regarding air and water resources and impacts which Findings of Fact and Conclusions of Law are fully and completely incorporated and adopted herein. (Finding of Fact, No. 60).

3. Seepage from the wastewater ponds will be minimal and will be collected by wells and returned to the ponds (Finding of Fact, No. 61).

4. Effluents emanating from Colstrip 1-4 are not anticipated to impair the quality of the ground and surface water of the area and will not violate applicable standards, however, careful monitoring of seepage and complete sealing of sludge ponds will ensure that water quality of the area is not degraded. (Finding of Fact, No. 64).

5. The units as proposed will use a closed loop water system which does not discharge effluents from the plants into ground water or surface water or large evaporation ponds and therefore will have no effect on the ground or surface water in the area (Finding of Fact, No. 65).

6. The facility as proposed will not violate any applicable water quality standards. (Finding of Fact, No. 66).

7. That neither withdrawal of the water from the Yellowstone River under the conditions prescribed by the BHES, nor the minimum seepage from the ponds will have any effect on the plants, animals, wildlife, fish or vegetation in the areas directly and indirectly effected (sic) by such withdrawal. (Finding of Fact, No. 68).

8. Seepage from the surge ponds will be monitored by observation wells constructed at appropriate sites to ensure that any seepage will not exceed the estimated minimum amounts around the rim and through the foundation of the dam (Finding of Fact, Nos. 70 and 71).

9. That waste materials from scrubber units and boilers will be conveyed to sealed ash disposal ponds and eventually dried and the disposal ponds reclaimed. (Finding of Fact, No. 88).

10. That all effluents from seepage from the waste disposal ponds have been analyzed, and to insure no adverse effects on the area the waste disposal ponds will be sealed and monitoring wells installed. (Finding of Fact, No. 89).

11. That the ash and sludge disposal program projects temporary retention ponds located in a 40-acre area south of the plants and then the wastes are slurred (sic) to permanent disposal ponds. The first two permanent disposal areas developed (112 and 147 acres each) will be located 10,000 feet northwest of the plants in Section 20, 21, 28 and 29, T2N, R41E. A third pond is proposed in Sections 5, 6, 7 and 8, T1 N, R42VV. When these ponds are filled, they will be dried up, covered with soil and reclaimed. (Finding of Fact, No. 90).

12. That the disposal ponds will not impair the quality of the ground or surface water of the area or violate any applicable standards. (Finding of Fact, No. 91).

13. That all three permanent ponds will service the 37-year life of the plant. (Finding of Fact, No, 92).

Based on the foregoing Findings of Fact, the Board of Natural Resources and Conservation reached 18 Conclusions of Law, including the following:

1. The only authorized state air and water quality agency, the Board of Health and Environmental Sciences, has certified that the proposed facility, Colstrip Units #3 and #4 and associated facilities will not violate state and federally established standards and implementation plans. (Conclusion of Law, No. 10).

2. That the seepage from the existing surge A Pond and any enlarged or additional surge ponds be monitored, as specified by the State Board of Health and Environmental Sciences, and that every feasible engineering means be taken by the Applicants to minimize such seepage. (Conclusion of Law, No. 12(c)).

3. The sludge pond or ponds shall be completely sealed. If the conventional means such as compaction and bentonite application do not seal the pond(s), as indicated by monitoring wells the Applicants shall install and operate, then extreme measures even up to complete sealing by a plastic membrane 5 shall be taken (Conclusion of Law 12(d) "later modified by stipulation" as further explained below).

4. The reclamation of the sludge ponds, when they are filled and dried out, shall follow the basic reclamation requirements and standards applicable to the proper covering of highly saline backfill in coal areas (Conclusion of Law 12(e)).

5. That all monitoring programs heretofore instituted in regard to Colstrip Units 1 and 2, and in the Application proposed, be implemented and instituted so as to provide a continual flow of factual data insofar as air, surface and ground water are concerned. (Conclusion of Law, No. 12(h)).

6. That the Applicants enter into a written agreement with the Board of Health and Environmental Sciences for the payment of the monitoring facilities and operation thereof required by said Board in their certification heretofore issued, and for any further monitoring required in the conditions set forth herein by the State Board of Natural Resources and Conservation. (Conclusion of Law, No. 12(i)).

Conclusion of Law 12(d) states that the sludge ponds will be sealed. However, under Finding of Fact 61, seepage from wastewater ponds was anticipated and would be collected and returned to the ponds. Conclusion of Law 12(d) was subsequently interpreted in litigation between the Board of Natural Resources and Conservation and the prior operator of 6 Colstrip Units 3&4. The Montana First Judicial District Court interpreted Conclusion of Law 12(d) as follows: "The clear meaning of condition 12(d), taken in the context of the Board's findings that some seepage was expected (see BNR findings numbers 61 64, 68, 71 and 89 and BHES finding XXXIX), is that the A Ponds constructed for Relators may leak in small amounts but if the leakage is detected by the monitoring wells, the Relators will have to resort to more stringent measures, up to and including the installation of a plastic liner." (Findings of Fact and Conclusions of Law, p. 8,¶ 3 (June 29, 1983)), State of Montana v. Board of Natural Resources and Conservation, Cause No. 49348, District Court of the First Judicial District of the State of Montana, in and for the County of Lewis and Clark).

On July 23, 1976, the Montana Board of Health and Environmental Sciences issued a conditional approval of Colstrip Units 3&4, including the following findings of fact and conclusions of law:

1. A closed loop water system (a system which does not discharge effluents from the plants downstream or into other waters) was adopted for Colstrip Units 1-4 so that there would be no discharge from the plants into the Yellowstone River or other state waters. (Finding of Fact XXIX)
2. Much of the waste matter from the four units, such as ash from the scrubber and boiler systems, suspended solids, sediment, and other matter, will be disposed of by using water to convey them to their eventual destinations, the disposal ponds. In some instances the wastes will be further processed and clean water will be returned into the system in order to reduce the amount of water used. Waste ash from various systems and some other waste will be first sluiced to temporary retention ponds located in a 40-acre area just south of the plants. These wastes will eventually be

moved to the ultimate disposal ponds by slurry pipeline. The first two permanent disposal areas developed will be located approximately 10,000 feet northwest from the plants in Sections 20, 21, 28, and 29, Township 2 North, Range 41 East. During the life of Units 3 and 4, it will be necessary to develop further disposal ponds to be located in Sections 5, 6, 7, and 8, Township 1 North, Range 42 East. After these ponds are filled with waste they will be dried up, covered with dirt and reclaimed. The first permanent retention pond will contain a surface acreage of approximately 112 acres and it, like all the other retention ponds, will be sealed, using normal construction methods. The first permanent retention pond will have a useful life of approximately six years if the pond is utilized for all four units. Its useful life will be approximately 12 years in the event that it is utilized for the wastes from Units 1 and 2 only. (Finding of Fact XXXI)

3. The various ponds which will be used for storage of water in the evaporation and disposal of water and waste materials emanating from Colstrip Units 1-4 will have seepage not anticipated to impair the quality of the groundwater in the area. (Finding of Fact XXXIX)

4. All ponds, surge ponds, settling ponds and impoundments shall be properly sealed. They shall be monitored for seepage, including the installation of test wells to determine the extent of ground water pollution, and the necessities of correction thereof. (Conclusion of Law 6).

4.3 – Administrative Order on Consent

DEQ entered into the Administrative Order on Consent (AOC) with PPL Montana, LLC, Talen's predecessor in interest, pursuant to DEQ's enforcement authority under § 75-5-612, MCA, of the Montana Water Quality Act and DEQ's general enforcement authority under the Montana Major Facility Siting Act. In addition to remedies created under the Montana Water Quality Act, § 75-5-612, MCA, broadly authorizes DEQ to take appropriate enforcement action on its own initiative to prevent, abate, and control the pollution of state waters.

Attachment A to the AOC provides a description of each of the ponds comprising the closed-loop system at the Colstrip SES. While all of the ponds listed on Attachment A may not be subject to the Certificate, DEQ and Talen agreed that all ponds listed in Attachment A would be subject to the provisions of the AOC.

In the AOC, DEQ and PPL Montana acknowledged that while many of the systems and actions discussed in Attachment A were effective in stopping the migration of seepage, the migration of seepage continued beyond these initial recovery systems in certain areas. DEQ and PPL Montana concluded in the AOC that a comprehensive, risk-based approach incorporating all tools and requirements applicable under Montana's generally applicable environmental laws, including adaptive management practices available thereunder, is needed to address ground water contamination from seepage.

This comprehensive approach identified areas of groundwater contamination from seepage including the Plant Site, areas at or downgradient of Units 1&2 Stage 1 and Stage II evaporation ponds northwest of the main plant site, and areas at or downgradient of Units 3&4 Effluent Holding Ponds southeast of the main plant site. For each of these areas, Talen was required to submit reports to DEQ approval that 1) identified constituents of concern; 2) identified cleanup criteria and risk assessment relative to the constituents of concern; and 3) identified and evaluated the effectiveness of remedial alternatives, including an identification of Talen's preferred remedial alternative.

Finally, Section XV of the AOC provides that compliance with the AOC constitutes the means, as between the parties, for attaining and assuring compliance with PPLM's obligation under its Certificate and water quality laws and rules within the scope of the AOC.

1. Constituents of Interest
   The AOC defines Constituents of Interest (COIs) as "those parameters found in soil, groundwater or surface water that (1) result from Site operations and the wastewater facilities and (2) exceed background or unaffected reference areas concentrations." Constituents of Interest were determined in the Cleanup Criteria and Risk Assessment Report required under Section VI.B of the AOC.
2. Identification of Cleanup Criteria
   As required in the AOC, a list of Constituents of Interest (COIs; also referred to as Contaminants of Concern or COCs) and the respective cleanup criteria for these COIs, was determined in the Cleanup Criteria and Risk Assessment Report. Cleanup criteria are based on DEQ-7 numerical groundwater standards; EPA Maximum Contaminant Levels (MCLs), DEQ Risk-Based Corrective Action Levels, EPA Regional Screening Levels (RSLs), and background concentrations based on the Background Screening Levels Report (Neptune, 2016). Exposure pathways and risks to human health and the environment were also required to be identified in the Report. For the Plant Site, Talen determined the following list of COIs and corresponding cleanup criteria (ranges are given for COIs with cleanup criteria that varies based on individual aquifers) (Marietta Canty & Neptune, 2018):
   Boron: 4 mg/L
   Sulfate: 3,000 – 3,160 mg/L
   Cobalt: 0.006 – 0.0232 mg/L
   Lithium: 0.072 – 0.092 mg/L
   Molybdenum: 0.1 mg/L
   Selenium: 0.05 mg/L
   Manganese: 0.43 – 2.79 mg/L
3. Point of Compliance
   The Point of Compliance (POC) is the boundary where the groundwater must meet cleanup criteria. The POC was determined by DEQ to be the downgradient edge of the ponds, in accordance with CCR Rule requirements.

4.4 – Federal Coal Combustion Residuals Rule

The Federal Coal Combustion Residuals Rule, 40 C.F.R. Part 257, Subpart D (CCR Rule), establishes minimum national criteria for the disposal of CCR in landfills and surface impoundments. The CCR Rule applies to new and existing landfills and surface impoundments, including any lateral expansions of such units that dispose or otherwise engage in solid waste management of CCR generated from the combustion of coal at electric utilities and independent power producers. 40 C.F.R. § 257.50(a), (b). The CCR Rule establishes location restrictions, design criteria, operating criteria, standards for groundwater management and corrective action, closure and post-closure care requirements, and recordkeeping and notification requirements.

When originally promulgated in 2015, the provisions in the CCR Rule were self-implementing—that is, there were no state or federal permitting procedures to enforce the provisions of the CCR Rule. Subsequent action by the U.S. Congress has provided the U.S. Environmental Protection Agency (EPA) with the authority to implement a federal permitting program, as well as authority for states to operate permit programs, provided EPA determines that the state's requirements are as protective as the federal standards. To date, DEQ has not sought EPA authorization to run a state CCR permitting program in Montana.

. DEQ does not distinguish between legacy and CCR coal-ash ponds and regulates them without differentiation. While DEQ does not directly enforce the CCR Rule, DEQ has stated repeatedly throughout the AOC process that it would not accept a remedy that violates provisions of the CCR Rule.

4.5 – Coal-Fired Generating Unit Remediation Act

In 2017, the Montana Legislature enacted the Coal-Fired Generating Unit Remediation Act. (Title 75, chapter 8, part 1, MCA.) This Act requires the owner(s) of a coal-fired generating unit to submit to DEQ a proposed remediation plan that includes information such as the current and reasonably anticipated future uses of affected property and information related to remediation, including specific remediation measures already completed or under way pursuant to any applicable legal obligation. Under § 75-8-107(1), MCA, the remediation plan must "attain a degree of cleanup of the affected property consistent with, but no more stringent than, applicable legal obligations, giving consideration to reasonably anticipated future uses of affected property."

In January 2020, Talen ceased operation of the Units 1&2 power plant operations and in August 2020, Talen submitted a revised proposed remediation plan under the Act for the Colstrip SES Units 1&2 shutdown, which includes parts of the AOC Plant Site area. This remediation plan was approved by DEQ in accordance with § 75-8-106, MCA. Talen's proposed remediation plan incorporates the remediation activities required under the AOC as part of its remediation obligations under the Act, as well as other remediation activities associated with the shutdown of the operations of Units 1&2 boilers and associated infrastructure.

Section 5 – DEQ Decision and Rationale

Pursuant to DEQ's authority under Article VI.C.3 of the AOC, DEQ is selecting Alternative 4B as the preliminary decision on Talen's request to modify the remedy for the Colstrip SES Plant Site area, which modifies the remedy of the Plant Site A Pond, B Pond and Bottom Ash/Former Clearwell Pond. Alternative 4B would maintain the closure-in-place of already closed Plant Site ponds and continue operation of the current full-scale freshwater flushing and groundwater capture system; however, Alternative 4B would change the closure-in-place decision for A Pond, B Pond, and the Bottom Ash/Former Clearwell pond to removal of the coal ash material into two lined, onsite landfills. DEQ's preliminary decision is in agreement with Talen's request to modify the remedy to Alternative 4B submitted on July 17, 2023 (*Attachment 3*). This Section of the preliminary decision document will outline the basis and rationale for DEQ's preliminary decision of modifying the remedy to Alternative 4B.

5.1 – Preferred Alternative Considerations

DEQ believes that Alternative 4B is the most protective to human health and the environment in the long-term for the Plant Site A Pond, B Pond, and Bottom Ash/Former Clearwell Pond. **Alternative 4B (Closure by removal to onsite landfills) removes ash from contact with groundwater permanently and meets remedial action objectives (RAOs), resulting in a long-term elimination of source of COIs to the groundwater, and places the ash in DEQ-approved, CCR-compliant, lined landfills.**

Alternative 4B is one of three alternatives that permanently eliminates mass discharge of COIs from the ash to the groundwater by moving coal ash waste material in contact with groundwater from the current Plant Site area ponds to onsite, DEQ-approved and CCR-compliant lined landfills in the footprint of the current Plant Site area and does not transport the waste material across other public or private entities' properties. Alternative 4B also maintains a rigorous freshwater flushing and groundwater capture system for the affected groundwater beneath the Plant Site area. Implementation of alternative 4B also will not disrupt the operation of the freshwater flushing and groundwater capture system to the west and north of the Plant Site area where the groundwater contamination has migrated closest to receptors. Alternative 4B will result in a permanent achievement of cleanup criteria at the point of compliance and provides the most effective source control management through construction of two new DEQ-approved and CCR-compliant Plant Site landfills to accommodate approximately 1.35 million cubic yards of coal ash from the A Pond, B Pond, and Bottom Ash/Former Clearwell Pond.

5.2 – Other Alternatives Considered

Alternative 4D (Closure by removal to Alternative 10 Landfill) and Alternative 4E (Closure-by-removal to Hardin Landfill) removes ash from contact with groundwater permanently, resulting in a long-term elimination of source of COIs to the groundwater, and places the ash in DEQ-approved, CCR-compliant, lined landfills. DEQ believes these are viable remedies to meet RAOs but hold more potential risk to human health and the environment during transport of the approximately 1.35 million cubic yards of coal ash through the City of Colstrip and into other communities in Montana.

From the technical discussion set forth in Talon's three-part remedy modification assessment (Attachment A, B, and C), DEQ believes that Alternatives 4D (Closure-by-removal to Proposed

Alternative 10 CCR Landfill) and 4E (Closure-by-removal to the City of Hardin Landfill) are as protective of human health and the environment once the coal ash material is disposed of in the offsite DEQ approved and CCR-compliant landfills and that the cleanup criteria for COIs can be met at the point of compliance similar to Alternative 4B while maintaining the operation of the flushing/capture system. DEQ believes that both Alternatives 4D and 4E are viable remedies. However, DEQ has greater concerns about the transport of coal ash materials to other areas through the City of Colstrip or longer distances through, and into, other communities in Montana. Alternatives 4D and 4E have potential for higher risk exposure to the public during transport of the 1.35 million cubic yards of coal ash waste on public right of ways. This potential exposure risk could be mitigated; however, it is an additional risk consideration that is not part of Alternative 4B.

Alternative 4A (Closure-in-place) leaves ash in contact with groundwater permanently, resulting in a long-term source of COIs to the aquifers. In 2018 when DEQ and Talen selected Alternative 4, which included closure-in-place for A Pond, B Pond, and the Botton Ash/Former Clearwell Pond, model-simulated groundwater levels presented in cross-sections indicated that there would be separation between the bottom of the coal ash and the groundwater, and more specifically that cleanup criteria could be met at the point of compliance by 2049. However, as part of the annual remedy evaluation and in review of groundwater potentiometric surface data from 2021, DEQ and Talen discussed the need to update the model to include more recent data and more detailed model parameters. Talen updated the model evaluations in early 2023 to include the recent groundwater data along with more details and data from leaching tests performed on CCR material collected from the Units 1&2 Bottom Ash/Former Clearwell Ponds in March 2022, that provided more accurate concentrations to employ in the model seepage rates when closed in place. Preliminary model results from that updated 2023 model (Attachment A, Figures 1 and 2) indicated that groundwater separation and increased groundwater contact with coal ash closed-in-place in A Pond, B Pond and the Bottom Ash/Former Clearwell Pond may occur before year 2050 and continue through year 2170. Under § 75-5-605(1)(a), MCA, waste may not be placed where it will cause pollution to state waters, with pollution being defined in § 75-5-103(30)(ii), MCA, as the discharge, seepage, drainage, infiltration, or flow of liquid,... or other substance into state water that will or is likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, or welfare, to livestock, or to wild animals, birds, fish, or other wildlife. The placement of this waste has been demonstrated to cause pollution to groundwater above risk-based criteria, as documented in the *Cleanup Criteria and Risk Assessment*, and recent leaching studies (Geosyntec, 2020) have shown the ash is and will continue to act as a source when it comes into contact with groundwater.

Additionally, the Alternatives Assessment model evaluation output (Attachment C, Appendix A, Figures -2-6) confirmed that COI rebound after the flushing/capture system is shutdown would result in reemergence of COI plume(s) beyond the point of compliance areas from 2050 through year 2170. Although Talen noted in the Alternative Assessments report that Alternative 4A was a viable alternative since it can meet the cleanup criteria at the point of compliance by the end of the flushing/capture system operation in 2049, DEQ disagrees since rebound concentrations would exceed cleanup criteria beyond the point of compliance and negate the ability to shutdown the flushing/capture system as planned.

Alternatives 4C (Closure-in-place with select in-situ stabilization) would rely heavily on modeled groundwater level predictions including site-specific seepage rates beneath the stabilized area, and long-term reliability/efficiency of stabilization. Alternative 4C does not allow for separation of stabilized coal ash from natural groundwater flow and would be difficult to implement at depth, which may not uniformly stop seepage from the existing stabilized ash left-in-place and allows for potential groundwater contamination rebound after flushing/capture shutdown.

Talen evaluated Alternative 4C in the Alternatives Assessment Report and assessed this alternative as reliable remedial technology. However, Talen notes that Alternative 4C is not viable, due to implmentability concerns and excessive costs and Talen chose not to model and determine if in-situ stabilization would help obtain or maintain cleanup criteria. Talen also indicates that impenetrability at the deepest ash locations would be "complex" to implement (Attachment B), and DEQ would need additional site-specific analytical data to support that the stabilization could be effective and that long-term leaching was not a concern. Additionally, while the coal ash would be stabilized; the material would likely still be in contact with groundwater based on groundwater simulations for Alternative 4A, which is a concern for DEQ's Water Quality Act and compliance with CCR rules. Please also refer to comments above in discussion of Alternative A regarding waste placement and groundwater contamination under § 75-5-605(1)(a), MCA.

Therefore, based on the evaluation of the following parameters:

- Talen's assessment on the remedy not being viable based on implmentability and costs,
- lack of model simulations for the COI concentrations at the point of compliance,
- concerns on separation between the stabilized coal ash waste and groundwater,
- lack of site-specific leaching data supporting that in-situ stabilization results in long-term effectiveness for Colstrip's coal ash, and
- the complexity of impenetrability at depth, which is the area of highest risk of contact with groundwater and/or leaching to groundwater as noted by Talen in the alternatives assessment,

DEQ does not consider in-situ stabilization for Alternative 4C as viable.

Please also refer to comments above regarding ash as a source and leaching potential/seepage in discussion of Alternative 4A.

Alternative 4F (Closure-in-place with construction of subsurface vertical barrier walls) relies heavily on modeled groundwater predictions and long-term efficiency of barriers against natural groundwater flow to maintain separation of source material in contact with groundwater and does not control seepage of COIs to underlying groundwater or possible groundwater infiltration within the barrier. Alternative 4F also leaves ash in place in the bottom of the barrier walls, which does not stop seepage from the existing ash left-in-place and potentially allows for groundwater rebound within the barrier wall system after flushing/capture shutdown.

Talen evaluated Alternative 4F in the Alternatives Assessment Report and assessed the closure of the coal ash ponds in place in addition to a 2.5-ft wide slurry wall keyed into bedrock, Alternative 4F, as viable. Talen notes in the Alternatives Assessment report that the cleanup criteria for boron will not be

met at the point of compliance by 2050; however, the use of MNA would be necessary for boron and other low mobility COIs to meet RAOs. This is similar and in agreement with the current remedy for the Plant Site that allows for use of MNA as in part to help lower mobility COIs meet cleanup criteria. MNA is currently being studied at the Plant Site through a site-specific bench-scale study that will be completed in 2024.

Modeling results for Alternative 4F is less conservative since it includes the current configuration of the flushing/capture system that has flushing in the horizontal wells beneath the ponds that would need to be removed or reconfigured during installation of the vertical barrier/slurry wall. Despite the modeling being less conservative, Talen indicated that the model results showed "rebounding of the water table within the boundary of the subsurface barrier wall after the flushing/capture system is shutdown", which would cause a reemergence of the boron plume (and other similar low mobility COIs). Talen's modeling effort indicated that there would still be greater mass removal than Alternative 4A, the current approved remedy; however, the cleanup criteria will not be met within the same time period as expected during the 2018 decision process. Additionally, without the completed MNA bench-scale study tests for the area, it is not clear if the higher concentrations and mass of boron (and other similar low mobility COIs) will be able to be addressed through MNA. Additionally, while the coal ash would be isolated behind the vertical barrier/slurry wall; the material would likely still be in contact with groundwater after the shutdown of the flushing/capture system, which is a concern for DEQ's Water Quality Act and compliance with CCR rules. Please also refer to the comments above in discussion of Alternative 4A regarding waste placement and groundwater contamination under § 75-5-605(1)(a), MCA.

Therefore, based on the evaluation of the following parameters:

- reliance on barrier technology employed to disrupt natural groundwater flow,
- higher concentrations and mass of lower mobility COIs left in place without assurance that MNA can address these issues in a timely manner, and
- concerns on separation between the stabilized coal ash waste and groundwater after flushing/capture shutdown,

DEQ is considers that vertical barrier walls technologies are viable for Alternative 4F; however, this alternative requires more studies to ensure that ROAs and remedial timelines could be met as expected. Alternative 4F is also not as protective as Alternatives 4B, 4D, 4E, since it potentially allows groundwater to be in contact with the coal ash after the flushing/capture system is shutdown. And if the groundwater was in contact with the coal ash, DEQ would not be able to approve if the alternative does not meet Federal CCR rules (see Section 5.3). Please also refer to comments above regarding ash as a source and leaching potential/seepage in discussion of Alternative 4A. Therefore, while the technology is viable, DEQ does not consider Alternative 4F as a viable alternative without further research and model simulations.

5.3 Decision and Agreement with Talen's Proposed Remedy

Based on the rationale and criteria discussed in this Section 5 of the Decision Document, DEQ preliminarily agrees with Talen that the preferred remedy modification is Alternative 4B, closure of A Pond, B Pond, and Bottom Ash/Former Clearwell Pond by removal of the ash to new Plant Site landfills.

DEQ is providing this Decision Document to the public for a 30-day comment period from October 2, 2023, through November 2, 2023. DEQ will receive written comments (see Section 4) and provide a comment response document with the final decision document.

After DEQ has completed the final decision document and sent to Talen, DEQ will work with Talen to get an updated RD/RA Workplan Addendum to address the design changes and updates, along with any associated workplans and reports. DEQ will also request Talen to update the Plant Site Closure Plan and provide the appropriate Financial Assurance (see Section 6) at that time.

Section 6 – Financial Assurance

Talen is required to submit financial assurance for the selected remedy within 60 days of DEQ's final approval or conditional approval of the modified Remedy. The amount of required financial assurance reflects the estimated cost to the State to implement and maintain the selected remedy in the event that Talen were unable to perform the work and remedy completion was left to the DEQ. The final financial assurance that DEQ receives in surety bonds for the Colstrip SES remedial and closure activities includes a 3% discount rate that was agreed by DEQ and Talen in 2018.

Talen submitted an initial financial assurance cost estimate with its May 2023 Alternatives Assessment Report for Alternative 4B, estimating a cost of approximately $20 Million to remove the coal ash from A Pond, B Pond, and the Bottom Ash/Clearwell Pond to two new lined, onsite landfills and modification of the existing freshwater flushing/groundwater capture system. Alternative 4B is only a portion of the remediation activities employed at the Plant Site. Currently DEQ has undiscounted financial assurance in place at a total of $82,738,450 (discounted total of $56,421,226) for the Plant Site remedial and closure activities under the AOC that includes closure in place as the remedial option for A Pond, B Pond, and the Bottom Ash/Former Clearwell Pond. DEQ anticipates that the Plant Site financial assurance amount will increase with the preliminary decision to modify the remedy for the A Pond, B Pond, and Bottom Ash/Former Clearwell Pond to landfill disposal, and may increase by the full estimated Alternatives Assessment cost of $20 Million. DEQ has requested detailed financial assurance calculations from Talen for Alternative 4B, which it anticipates receiving from Talen on October 15, 2023. DEQ will make a final determination as to the amount of financial assurance required as part of its final decision on Talen's request to modify the Plant Site Remedy.

Section 7 – Dispute Resolution

Talen may invoke the dispute resolution provisions set forth in Article XIII of the AOC by sending written notice of its election to invoke the dispute resolution provisions to DEQ no later than 30 days after receiving the final DEQ decision document. This preliminary decision does not constitute a final decision by DEQ.

Attachments:

Attachment A: Colstrip Units 1&2 Plantsite Ponds Closure Evaluation Interim Update (Talen, January 2023)

Attachment B: Alternatives Assessment Report – Plant Site Units 1&2 Impoundments, Colstrip Power Plant, Colstrip Montana (Geosyntec on behalf of Talen, May 2023)

Attachment C: Modification of the Approved Groundwater Remedy for the Plant Site at the Colstrip Steam Electric Station in Colstrip, MT (Geosyntec on behalf of Talen, July 2023)

References:

Administrative Order on Consent (AOC) Regarding Impacts Related to Wastewater Facilities Comprising the Closed-Loop System at Colstrip Steam Electric Station, Colstrip, MT (DEQ and Talen LLC [Formerly PPL Montana LLC], 2012, amended 2017, 2021); https://deq.mt.gov/Files/DEQAdmin/MFS/Colstrip/COLSTRIPAOCFINALOFFICIALRECORD.pdf

Revised Cleanup Criteria and Risk Assessment Report for Wastewater Facilities Comprising the Closed-Loop System, Plant Site Area, Colstrip Steam Electric Station (Marietta Canty & Neptune and Company, December 2018); https://deq.mt.gov/Files/DEQAdmin/MFS/Colstrip/Colstrip/Final%20CCRA%20Report%20Dec%202018.pdf

Revised Remedy Evaluation Report, Plant Site, Colstrip Steam Electric Station, Colstrip, MT (Geosyntec, August 2018); https://deq.mt.gov/Files/DEQAdmin/MFS/Colstrip/1&2RemEvalReport_5-21-2018.zip