ADMINISTRATIVE ORDER ON CONSENT
2022 ANNUAL PUBLIC MEETING
COLSTRIP STEAM ELECTRIC STATION

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Colstrip Environmental Project Officer
Waste Management & Remediation Division
• Colstrip Steam Electric Station (SES) Plant
  • Background & Location
• Network of Remediation Laws/Agreements
  • MT Major Facility Siting Act/Water Quality Act
    • Administrative Order on Consent (AOC)
  • MT Coal-Fired Generating Unit Remediation Act
  • Federal EPA Coal Combustion Residuals (CCR) Rules
• Annual Update on AOC Remediation Progress
  • Plant Site: Remedy Implementation
  • Units 1&2: Settlement to Remedy Design
  • Units 3&4: Remedy Design Progress & Dry Disposal
• What’s Next & Public Participation in Future
• Questions/Comments
Northern Pacific Railway Mine and Company
Town: 1924 - 1958

Colstrip
Generating Station for NW US and MT:
1970’s - Now
Colstrip Plant Operations Diagram

- Coal supply
- Conveyor
- Pulverizer
- Boiler
- Scrubber
- Stack
- Electricity
- Stage 1 Evaporation Pond
- Stage 2 Evaporation Ponds
- Castle Rock Lake (Surge Pond)
- Steam turbine
- Condenser
- Transformer
- Coal Ash System (Coal Combustion Residual - CCR)
- Bottom Ash (Boiler) & Fly Ash (Scrubber)
- Plant Site Ash Ponds
- Units 3&4 Effluent Holding Ponds
- Yellowstone River

*Adapted from 2017 PSE Resource Plan*
What is Coal Ash?

• Coal Ash = Coal Combustion Residual (CCR)
  • Byproduct of burned coal
  • May contain traces of contaminants, typically metals naturally present in the coal
  • Regulated by Federal CCR Rule

Fly ash (magnified 2000x)

Bottom ash (magnified 6000x)
Major Facility Siting Act

- Provides for DEQ review of a facility engaged in the generation, conversion, or distribution of energy.
  - The need to meet energy demands
  - The constitutional objective of maintaining a clean and healthful environment
- MCA §75-20-102
- MFSA Certificate outlines operation and waste management, including the management of seepage from coal ash ponds and control of the seepage
MT Water Quality Act

- Provides for DEQ to regulate state waters in order to (MCA §75-5-101):
  - Conserve water by protecting, maintaining, and improving the quality and potability of water for public water supplies, wildlife, fish and aquatic life, agriculture, industry, recreation, and other beneficial uses;
  - Provide a comprehensive program for the prevention, abatement, and control of water pollution; and
  - Balance the inalienable rights to pursue life's basic necessities and possess and use property in lawful ways with the policy of preventing, abating, and controlling water pollution in implementing the program referred to in subsection
- Colstrip SES groundwater contamination resulted from seepage from the coal ash ponds and operations beyond the pond/cell engineering controls
Process from MFSA/WQA to AOC

• Water seeped out of coal ash storage ponds beyond engineered controls to affect groundwater
• Groundwater Constituents of Concern or Interest (COCs or COIs)
  • Boron, Sulfate, Cobalt, Lithium, Selenium, Molybdenum (Plant Site)
  • Other COIs: Manganese
• August 2012: DEQ and PPL Montana, subsequently Talen Energy MT (Talen MT), entered into an enforcement action and agreed to an Administrative Order on Consent (AOC) to address the pond seepage.
Administrative Order on Consent (AOC)

- AOC 2012 – DEQ and Talen MT (formerly PPL Montana)
  - Amendments in 2017 & 2021
- Addresses groundwater contamination from coal ash disposal ponds and operations
- Divides site into 3 AOC areas:
  - Plant Site
  - Units 1&2 Evaporation Ponds
  - Units 3&4 Effluent Holding Ponds
- Outlines Process and Deadlines to investigate and remedy contamination
AOC Process

Site Characterization Report (describes the current condition of each area)

Cleanup Criteria & Risk Assessment Report (identifies constituents of interest, risk for exposure to contaminants, and cleanup criteria for contaminants)

Remedy Evaluation Report (evaluates remediation alternatives)

DEQ selects remedy
AOC Process (continued)

DEQ selects remedy

Remedial Design/Remedial Action Work Plan (implementing selected remedy)

Final Remedial Action Report (describes completed remedy)

Facility Closure Plan (long-term maintenance and monitoring)
<table>
<thead>
<tr>
<th>Report Name</th>
<th>Plant Site</th>
<th>Units 1&amp;2</th>
<th>Units 3&amp;4</th>
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<tr>
<td>Site Characterization Report</td>
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<td>Background Screening Level Report</td>
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<td>Cleanup Criteria &amp; Risk Assessment Report</td>
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<td>Remedy Evaluation Report</td>
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<td>Annual Remedy Progress Report</td>
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<td>Final Remedial Action Report</td>
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<tr>
<td>Closure Plans</td>
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</table>

✓ = Approved by DEQ  
-- = Not yet submitted
# AOC Financial Assurance

<table>
<thead>
<tr>
<th>Colstrip Owners</th>
<th>Financial Assurance (FA) Provided as of Jan. 2022¹</th>
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</thead>
<tbody>
<tr>
<td>Talen</td>
<td>$112.7 million</td>
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<tr>
<td>Puget Sound Energy</td>
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<tr>
<td>Northwestern Energy</td>
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<td>Portland General Electric</td>
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<tr>
<td>Avista</td>
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<tr>
<td>PacifiCorp</td>
<td>$11.5 million</td>
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<td><strong>Total</strong></td>
<td><strong>$306.3 million</strong></td>
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</table>

¹: DEQ revisits and reviews FA annually, every 5-years DEQ does a comprehensive review (2022)
Coal-Fired Generating Unit Remediation Act

- MCA §75-8-101 through 110 (2017 Legislative Session)
  - Requires Colstrip owners to submit a remediation plan within 90 days of shutdown
  - The purpose of this plan was to provide remediation information for items not covered under the AOC – primarily in operations areas

- MCA §75-8-110 Water Feasibility Study (2021 Legislative Session)
Units 1&2 Remediation Act - Plan

• Universal Wastes, Polychlorinated biphenyl (PCB) Materials, Asbestos, Petroleum waste (lubricating oils, hydraulic oils, etc.), other wastes (i.e. mercury containing devices, fire extinguishers, etc.), petroleum releases

• Due to safety and other considerations related to operation of Units 3&4, demolition and removal will be deferred until after Units 3&4 are retired
  • Periodic inspections of “moth baled” Units 1&2 buildings

• Future use of land = industrial (primarily), some stock
Water Feasibility Study

• 2021 Legislative Action to modify MCA – Coal-Fired Generating Unit Remediation Act
  • Requires water feasibility study to be completed by operator by Nov. 1, 2022 to evaluate water resources and costs associated with those resources for local government (City of Colstrip)
Water Feasibility Study

- DEQ Initiated Stakeholder Group – Meetings Dec ‘21 through Oct 22
  - Colstrip SES Owners and DOWL (Consultant)
  - Local City Officials/Consultants
  - State Representatives & Senators
  - Local Development Corp.
  - City/County Commissioners
  - DNRC, FWP, DEQ

- **November 1, 2022** – Water Feasibility Study to DEQ
ALTERNATIVES CONSIDERED (BOLDED RETAINED FOR COST EVALUATION):

Alt PMP 1: Operate Pump Station “As Is”, Budget for Equipment Replacement
Alt PMP 2: Operate Pump Station “As Is”, Replace Mechanical Equipment Up Front
Alt PMP 3: Convert Pump Station, Install Two Smaller Pumps and Keep One Large Pump
Alt PMP 4: Convert Pump Station; Install Three Smaller Pumps
Alternative 5: Install New Surface Water Intake, Pump Station
Alternative 6: Retrofit Pump Station and Install New Booster Station and Pipeline Directly to Colstrip Water Treatment Plant
Alternative 7: Pursue Groundwater Source Using Wells and New Water Treatment Plant
Alternative 8: Pursue Alternative Surface Water Sources
Alternative 9: Replace Existing Pipeline & Appurtenances
Plant Site Remedy

- Approved remedy addresses groundwater contamination from coal ash process/disposal ponds
  - Closure of ponds and ash dewatering
  - Freshwater flushing and groundwater capture system
- Additional Measures:
  - Monitored Natural Attenuation (MNA)
  - Permeable Reactive Barriers (PRB)
Plant Site

- Remedy addresses groundwater contamination from coal ash process/disposal ponds
- 2022 Activities
  - B Cell - out of use as pass through
  - Biannual groundwater monitoring
  - Operation of flushing/capture system
- Groundwater Capture Pond and Treatment System
- Brine Disposal
Plant Site Ponds

- Pond closures and planned closures - recent
  - **Units 1&2 A Pond** – Closed in place/cover added 2020-2021
    - Dewatering active
  - **Units 1&2 B Pond** – design phase for closure
    - Units 1&2 B Pond stopped receiving water from Units 1&2 SOEP/STEP in Q2 2022
    - Continue dewatering and reusing water from Units 1&2 B Pond
  - **Units 1&2 Bottom Ash and Clearwell** – moving forward in design phase, design completing in 2022
Groundwater Capture Pond
Groundwater Capture Treatment System
Approved remedy addresses groundwater contamination from coal ash process/disposal ponds and cells
- Ash dewatering
- Ash removal to a new landfill
- Freshwater flushing and groundwater capture system

Additional Measures:
- Monitored Natural Attenuation (MNA)
- Permeable Reactive Barriers (PRB)
Units 1&2 – SOEP/STEP

- Update on Units 1&2 –
  - Dewatering STEP – On-going
    - Interim dewatering and water reuse at Units 3&4
  - Remedial Design/Remedial Action (RD/RA) Work Plan
    - Proposal in revisions, incorporates remedy components
    - Quarterly Discussions – September 29th (most recent)
    - RD/RA Workplan – April 2023
  - Remedial Design Ongoing
    - Flushing/Capture system pilot study to interim operation – Start-up scheduled December 2021
    - Landfill design – Geotechnical and Hydrogeological, general layout (multiple cells not designed yet)
    - Ash Excavation/Drying Pilot Study
  - Alternative 11A
Ash Excavation Drying
Pilot Test

Site Map

STAGE TWO
EVAPORATION
POND (STEP)

STAGE ONE
EVAPORATION
POND (SOP)

STEP A Cell

STAGE I DAM

Photo of excavation

DRAFT

s: Top of trenches are about 8 feet below ground surface.
Units 1&2: Small-Scale Freshwater Flushing Pilot Test Area
Units 1&2: Small-Scale Freshwater Flushing Pilot Test Area

- **Albion:** Generally consists of various mixtures of clay, silt, sand, and gravel. Basal alluvial gravels typically overlie Sub-McKay in Surficial alluvial sediments tend to be finer-grained.
- **Siltsite/Claystone:** Sub-McKay bedrock consisting of interbedded claystone, siltstone and sandstone with thin coal seams. Larger sandstone seams (generally greater than one foot thick) are illustrated on this cross section. Smaller stringers of sandstone and coal (less than one foot thick) are also present in the Sub-McKay bedrock but are not illustrated due to the scale of this cross section.
- **Coal:** Thin seams of cleated coal present within Sub-McKay bedrock.
- **Sandstone:** Lenses of fine-grained sandstone present within Sub-McKay bedrock.

**Baseline specific conductivity (microsiemens per centimeter) (not measured [NM]) in injection wells due to pilot test plumbing**

**Baseline groundwater elevation**

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**Northwest-Southwest Cross Section through 2070-EW Pilot Test Area**

Columbia, MD  
July 2022
Remedy Design: Landfill Investigation & Design
- Water levels and lithology data from new landfill wells included in the ongoing updated model calibration.

- Updated flow and fate and transport model will be used to simulate Alternative 10. CCR source material will be simulated using water quality from SOEP LEAF testing.
Notes:
1. Base map is an aerial image dated May 21, 2014 from GoogleEarth.
2. Test pit locations will include excavation with excavator to bedrock or 10 feet below the site grades, whichever is shallower.
3. All test pit locations can be adjusted in the field at the discretion of Geosyntec’s Field Engineer. Locations will remain within areas cleared by the utility locator.
4. As-built locations will be surveyed after completion of field investigation.

Legend:
- Proposed Test Pit Location
- Approximate Proposed Landfill Perimeter Bore Centerline
- Boring Location
- Monitoring Well Location (from Hydrometrics)
Units 1&2 SOEP/STEP: Alt 11A
Substantive Factors

• The comparative effectiveness and reliability of both alternatives in meeting groundwater cleanup criteria in the short and long term [etc.]
• Compliance of the alternatives with the 2012 AOC, Montana Water Quality Act, Montana Major Facility Siting Act, and Federal CCR Rule
• The extent to which each alternative is expected to achieve permanent separation of ash and the groundwater table
• The technical practicability and implementability of the Alternatives
• The cost effectiveness of the alternatives
• Proposed institutional controls
Units 3&4 EHP Remedy

- Approved remedy addresses groundwater contamination from coal ash process/disposal ponds and cells
  - Cell Closures & Ash dewatering
  - Freshwater flushing and groundwater capture system
- Additional Measures:
  - Monitored Natural Attenuation (MNA)
  - Permeable Reactive Barriers (PRB)
Units 3&4

- Remedial Design
  - Install horizontal capture wells (summer 2021-2022)
  - MNA and PRB Studies (Started Summer 2022)
  - Closure/capping of ponds – B Cell July 2022
- Dry disposal installation progress
  - DEQ toured dry disposal July 2022
  - Weekly Progress Reports to DEQ – Late Sept. through end of Oct 2022
- Revised Remedy Evaluation Report 2021 – Approved
- Move toward revised RD/RA Work Plan – 2023
Flushing Pilot Test Area - EHP
Horizontal Drilling
Monitored Natural Attenuation (MNA) Drilling/Study
Units 3&4 Dry Disposal System
Units 3&4 Dry Disposal System
Bankruptcy & Financial Assurance

- DEQ is monitoring bankruptcy
  - Talen Montana has continued operating/communicating with DEQ concerning permits and remediation activities
- DEQ holds over $306M in surety bonds for remediation, if needed
  - Covers Plant Site, Units 1&2 and Units 3&4 design and clean-up
- As of Jan 2022:
  - Talen 36-37% ($112,742,862)
  - Other owners ($193,553,163)
- DEQ Financial Assurance Comprehensive Review – Started July 2022 and will continue through late fall
CCR Rules – Federal EPA

• Talen Montana responsible for self-implementing and reporting for CCR Rule Compliance - website

• DEQ involved in on-going discussions with EPA and Talen Montana – Q4 2022 Meeting Planned
Next Steps

AOC Plant Site:
- Continued remedy implementation and pond closures
- Annual report – April 2023

AOC Units 1&2 SOEP/STEP:
- Continued design for RD/RA Work Plan and Landfill Design Package
- RD/RA Workplan – April 2023
- Landfill Design Package – Oct 2023
- Potential Request to Amend Remedy – Oct 2023

AOC Units 3&4 EHP:
- Dry Disposal Operation
- Continued design for revised RD/RA Work Plan
- RD/RA Workplan – Early 2023

Remediation Act – Water Feasibility Study – Nov 2022
Montana DEQ’s mission is to champion a healthy environment for a thriving Montana.

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Ph: 406.444.6797
References

DEQ Colstrip Coal Ash Pond Cleanup Website:
https://deq.mt.gov/cleanupandrec/Programs/colstrip

MCA Title 75 Chpt 8 – Coal Fired Generating Unit Remediation Act:
https://leg.mt.gov/bills/mca/title_0750/chapter_0080/part_0010/sections_index.html

Talen CCR Rule Website:
https://www.talenenergy.com/ccr-colstrip/

EPA Federal CCR Rule Website: https://www.epa.gov/coalash