



ADMINISTRATIVE ORDER ON CONSENT 2022 ANNUAL PUBLIC MEETING

COLSTRIP STEAM ELECTRIC STATION



Sarah Seitz – Sarah.Seitz@mt.gov
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

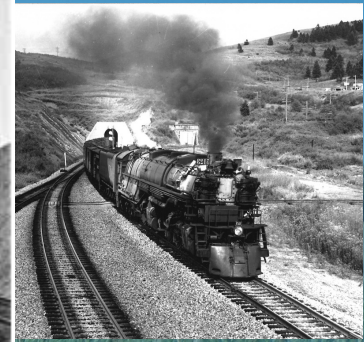


MONTANA

Helena

**Colstrip
Power Plant**

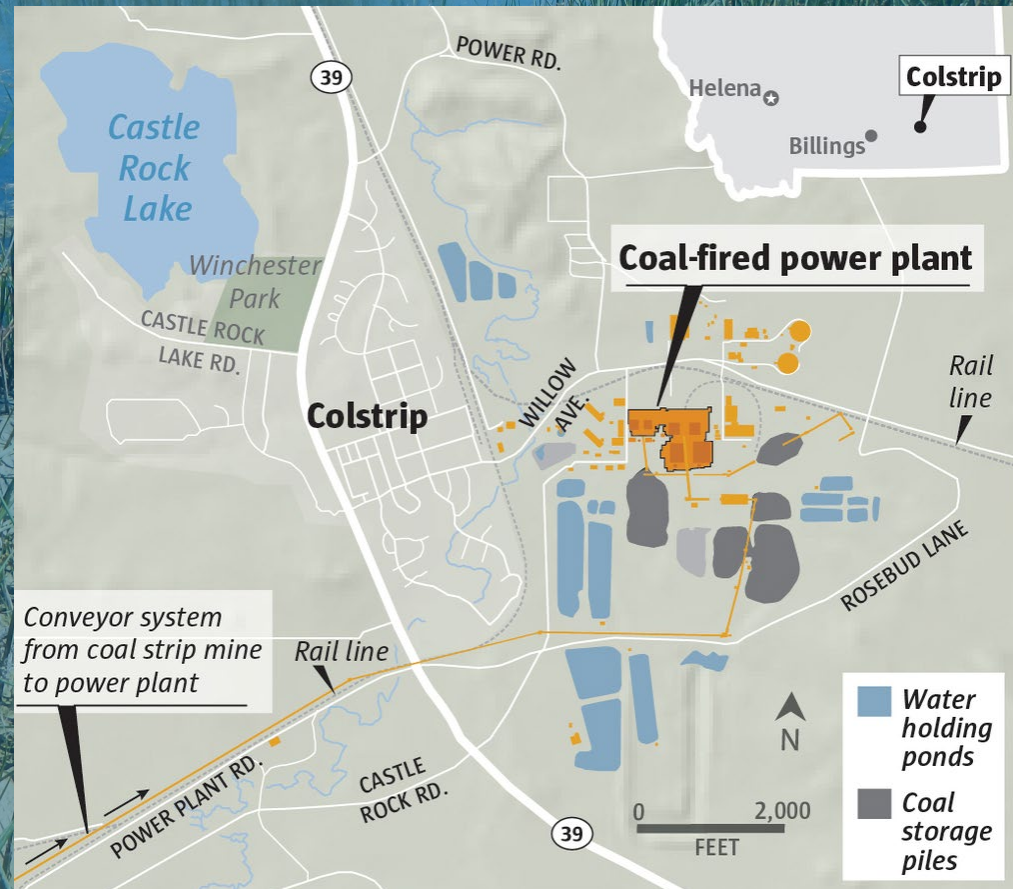
*Powder
River Basin*



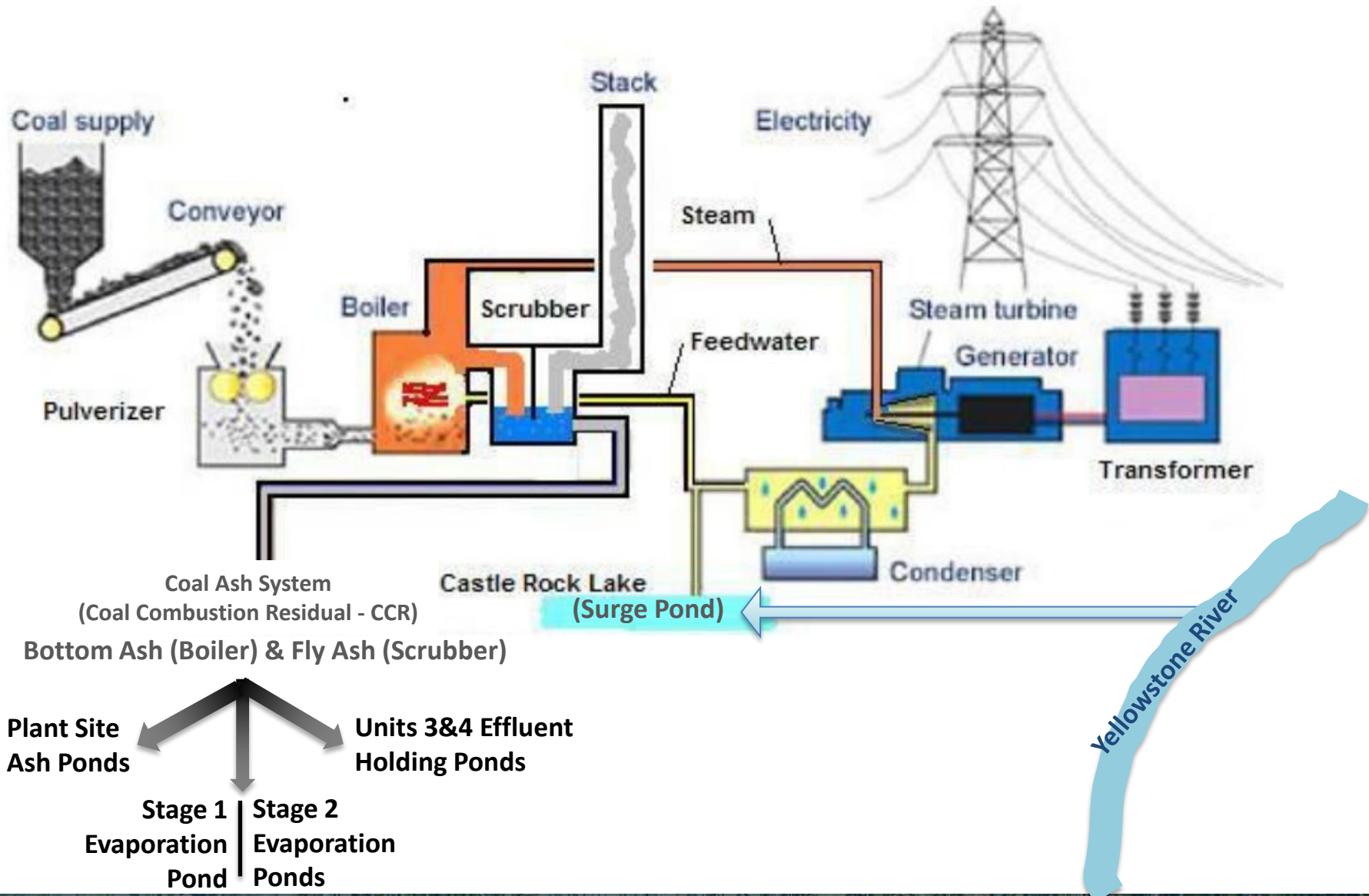
**Northern Pacific Railway Mine and Company
Town: 1924 - 1958**



**Colstrip
Generating
Station for NW
US and MT:
1970's - Now**

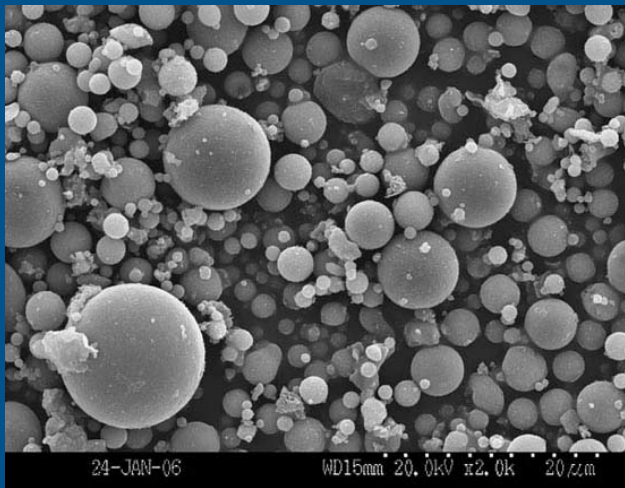


Colstrip Plant Operations Diagram

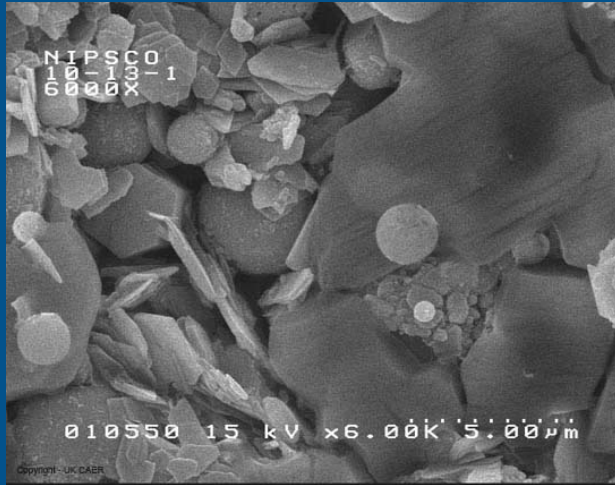


What is Coal Ash?

- 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)

Stage 1 Evaporation
Pond (SOEP)



Stage 2 Evaporation
Ponds (STEP)



Plant Site Ponds – Units 1-4



Units 3&4 Effluent
Holding Pond (EHP)





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

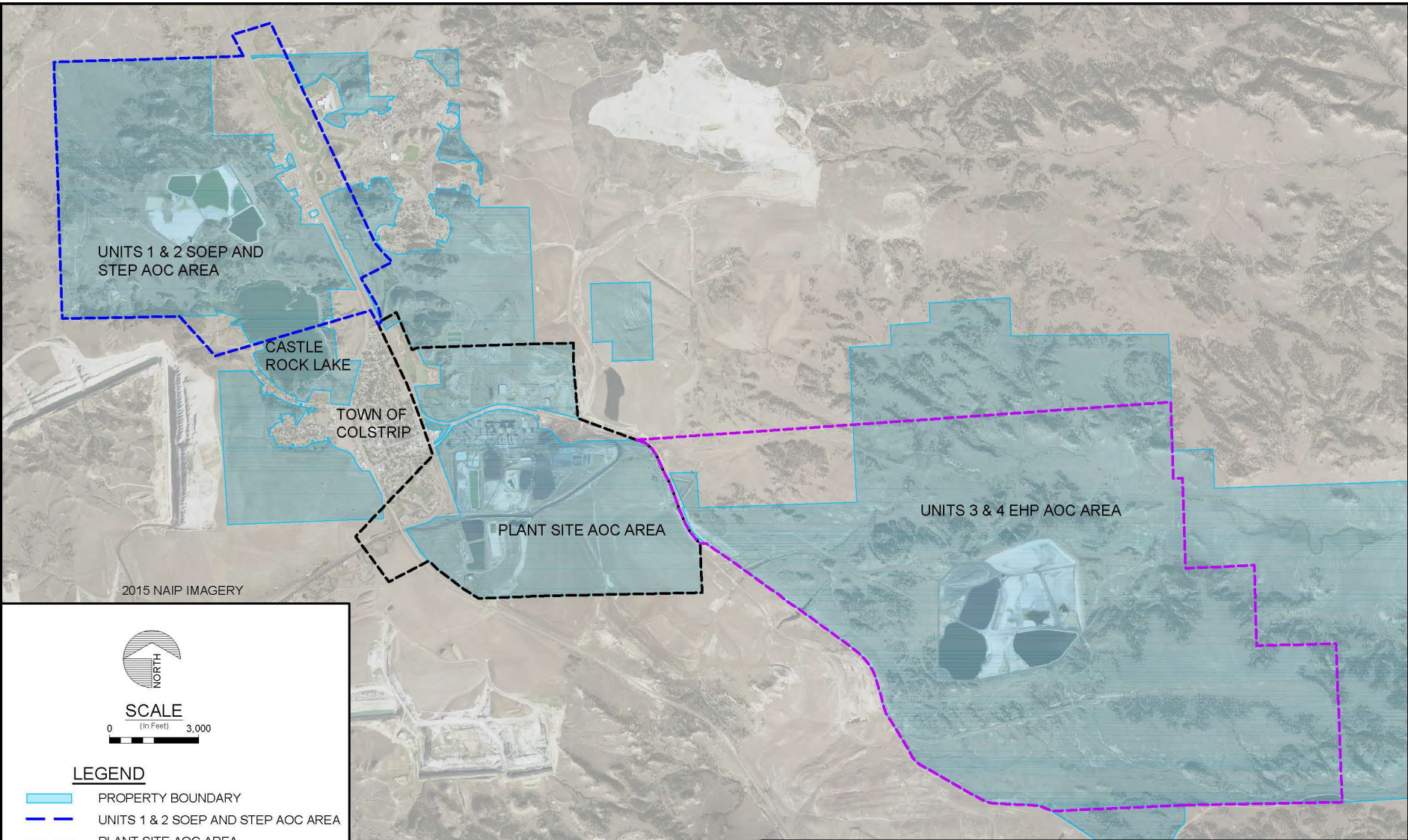
- Water seeped out of coal ash storage ponds beyond engineered controls to affect groundwater
- Groundwater Constituents of Concern or Interest (COCs or COIs)
 - Boron, Sulfate, Cobalt, Lithium, Selenium, Molybdenum (Plant Site)
 - Other COIs: Manganese
- August 2012: DEQ and PPL Montana, subsequently 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



COLSTRIP WASTEWATER AOC AREAS

FIGURE

AOC Process

A vertical flowchart titled 'AOC Process' is overlaid on a background image of a desert landscape with a red rock cliff and sparse vegetation. The flowchart consists of four blue rectangular boxes connected by downward-pointing arrows. The first box at the top contains the text 'Site Characterization Report (describes the current condition of each area)'. An arrow points down to the second box, which contains 'Cleanup Criteria & Risk Assessment Report (identifies constituents of interest, risk for exposure to contaminants, and cleanup criteria for contaminants)'. Another arrow points down to the third box, which contains 'Remedy Evaluation Report (evaluates remediation alternatives)'. A final arrow points down to the fourth box at the bottom, which contains 'DEQ selects remedy'.

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)

AOC Status

Report Name	Plant Site	Units 1&2	Units 3&4
Site Characterization Report	✓	✓	✓
Background Screening Level Report	✓	✓	✓
Cleanup Criteria & Risk Assessment Report	✓	✓	✓
Remedy Evaluation Report	✓	✓	✓
Remedial Design/Remedial Action Report	✓	--	✓
Annual Remedy Progress Report	✓	--	--
Final Remedial Action Report	--	--	--
Closure Plans	✓	✓	✓

✓ = Approved by DEQ

-- = Not yet submitted

AOC Financial Assurance

Colstrip Owners	Financial Assurance (FA) Provided as of Jan. 2022 ¹
Talen	\$112.7 million
Puget Sound Energy	\$124.3 million
Northwestern Energy	\$17.3 million
Portland General Electric	\$23.1 million
Avista	\$17.3 million
PacifiCorp	\$11.5 million
Total	\$306.3 million

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)



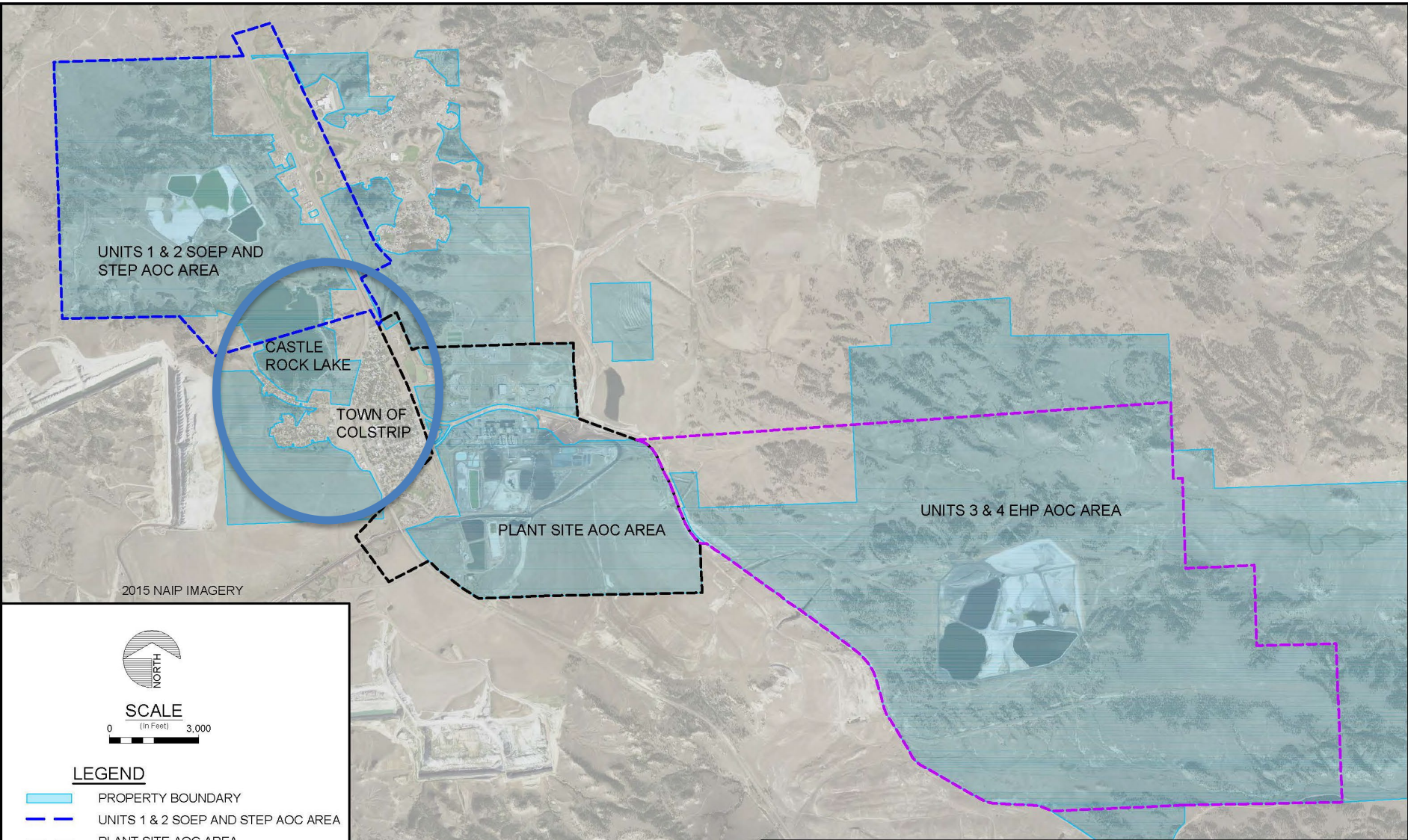
Units 1&2 Remediation Act - Plan

- 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 balled” 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)





SCALE

0 (In Feet) 3,000

LEGEND

- PROPERTY BOUNDARY
- - - UNITS 1 & 2 SOEP AND STEP AOC AREA
- - - PLANT SITE AOC AREA
- - - UNITS 3 & 4 EHP AOC AREA

Revised May 8, 2017

COLSTRIP WASTEWATER AOC AREAS

FIGURE

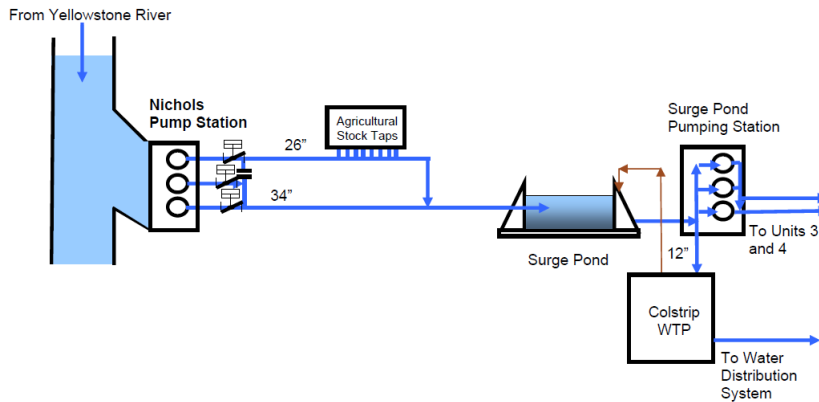


Figure 2-3: Process Flow Schematic

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**

Water Feasibility Study - Draft

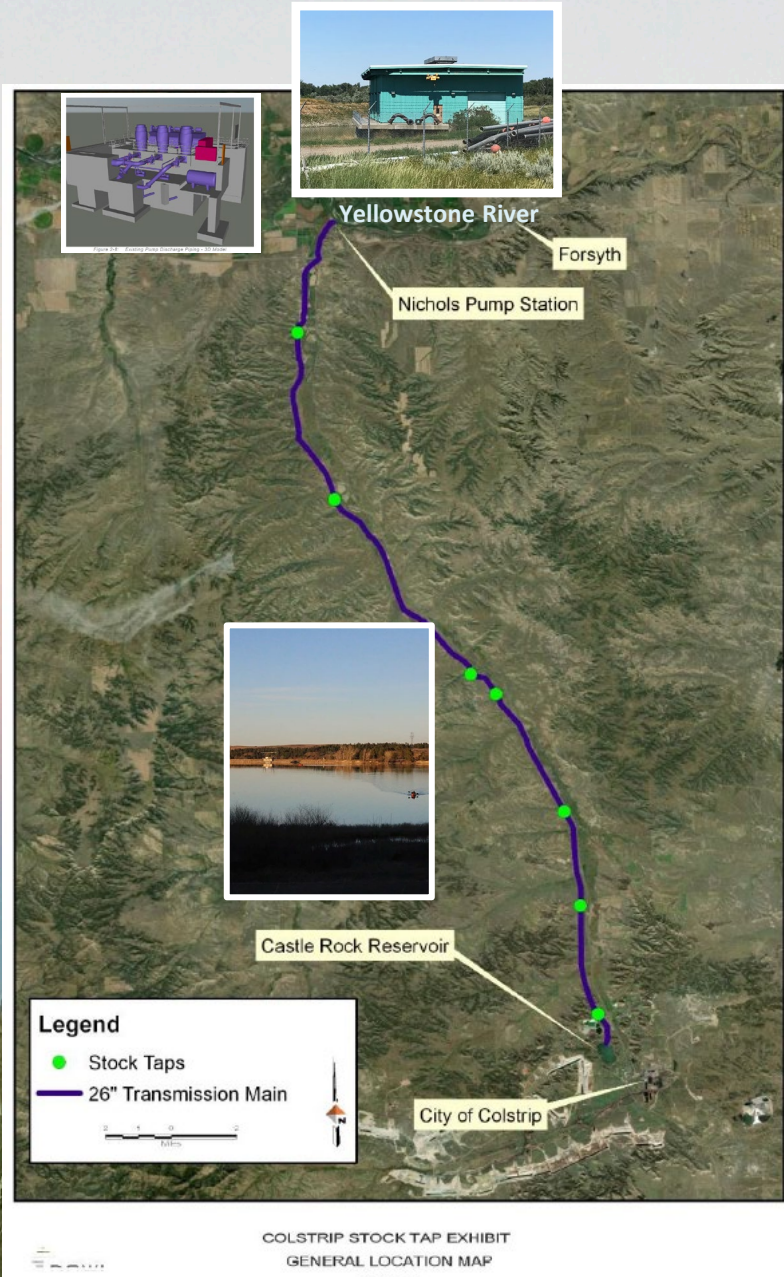


Table 2-21: Projected 2049 Water Demands

Projected 2049 Water Demand									
Month	City of Colstrip (MGD)	Power Plant Remediation (MGD)	Castle Rock Lake E&L (MGD)	Miscellaneous Agricultural Users (MGD)	Combined Average Daily (MGD)	Total Monthly Use (MG)	New Pump Rate Required* (cfs)	Approx. Existing Pump Runtime Hours Required per month (Single Pump)	Spray Wash (MGD)
Jan	0.412	0.965	0.162	0.060	1.60	49.57	3.09	97.2	0.0493
Feb	0.427	0.965	0.164	0.060	1.62	45.24	3.13	88.7	0.0498
Mar	0.438	0.965	0.166	0.060	1.63	50.49	3.15	99.0	0.0502
Apr	0.437	0.965	0.588	0.060	2.05	61.48	3.96	120.5	0.0632
May	0.508	0.965	0.770	0.060	2.30	71.39	4.45	140.0	0.0710
Jun	1.047	0.965	0.826	0.060	2.90	86.95	5.61	170.5	0.0893
Jul	1.398	0.965	0.857	0.060	3.28	101.67	6.34	199.4	0.1011
Aug	1.388	0.965	0.785	0.060	3.20	99.15	6.19	194.4	0.0986
Sep	0.940	0.965	0.606	0.060	2.57	77.13	4.97	151.2	0.0792
Oct	0.528	0.965	0.164	0.060	1.72	53.23	3.32	104.4	0.0529
Nov	0.473	0.965	0.163	0.060	1.66	49.83	3.21	97.7	0.0512
Dec	0.420	0.965	0.259	0.060	1.70	52.81	3.29	103.5	0.0525
Average	0.701	0.965	0.459	0.060	2.19	66.58	4.23	130.5	0.1

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

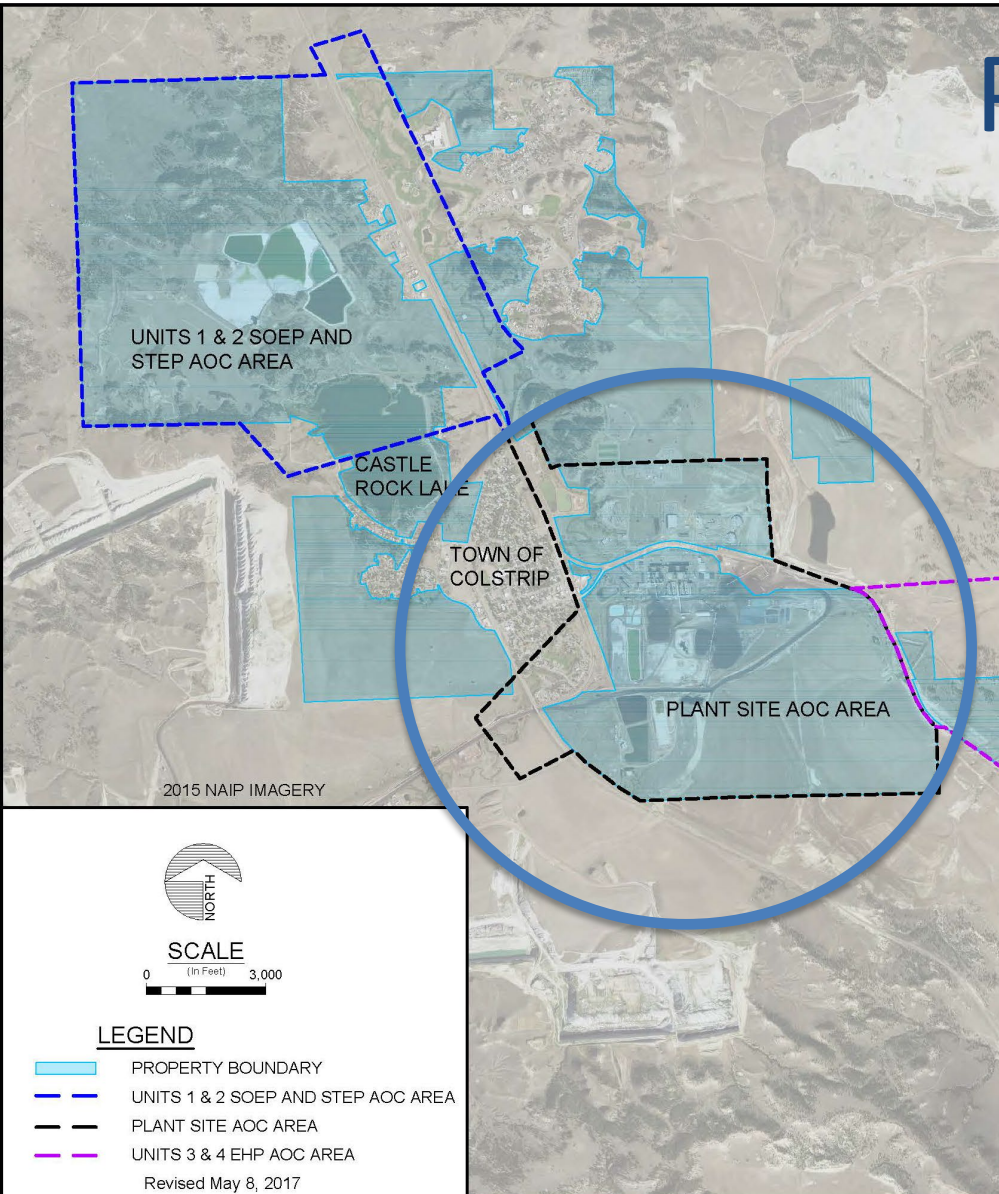
Alternative 7: Pursue Groundwater Source Using Wells and New Water Treatment Plant

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)



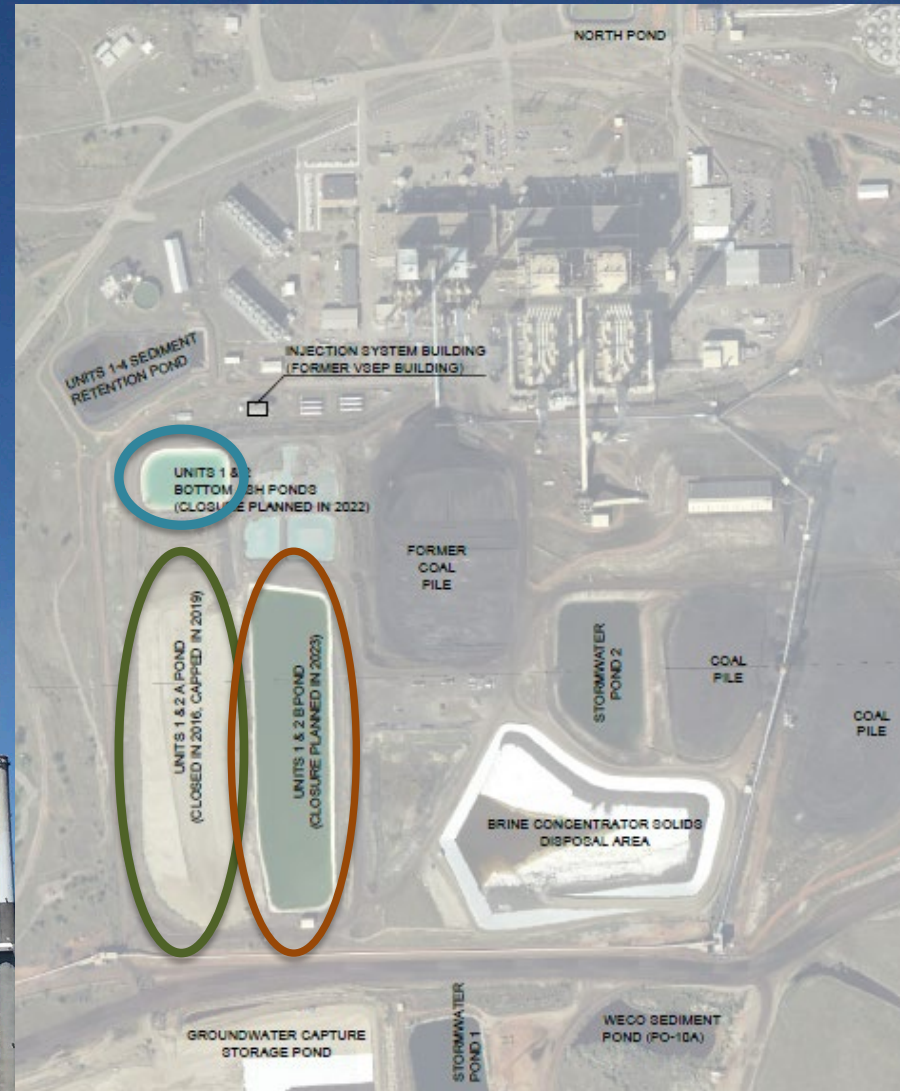


Plant Site

- 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

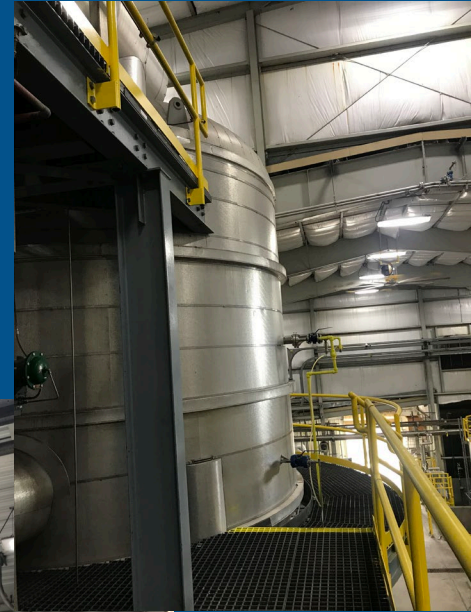
- Pond closures and planned closures - recent
 - **Units 1&2 A Pond** – Closed in place/cover added 2020-2021
 - Dewatering active
 - **Units 1&2 B Pond** – design phase for closure
 - Units 1&2 B Pond stopped receiving water from Units 1&2 SOEP/STEP in Q2 2022
 - Continue dewatering and reusing water from Units 1&2 B Pond
 - **Units 1&2 Bottom Ash and Clearwell** – moving forward in design phase, design completing in 2022

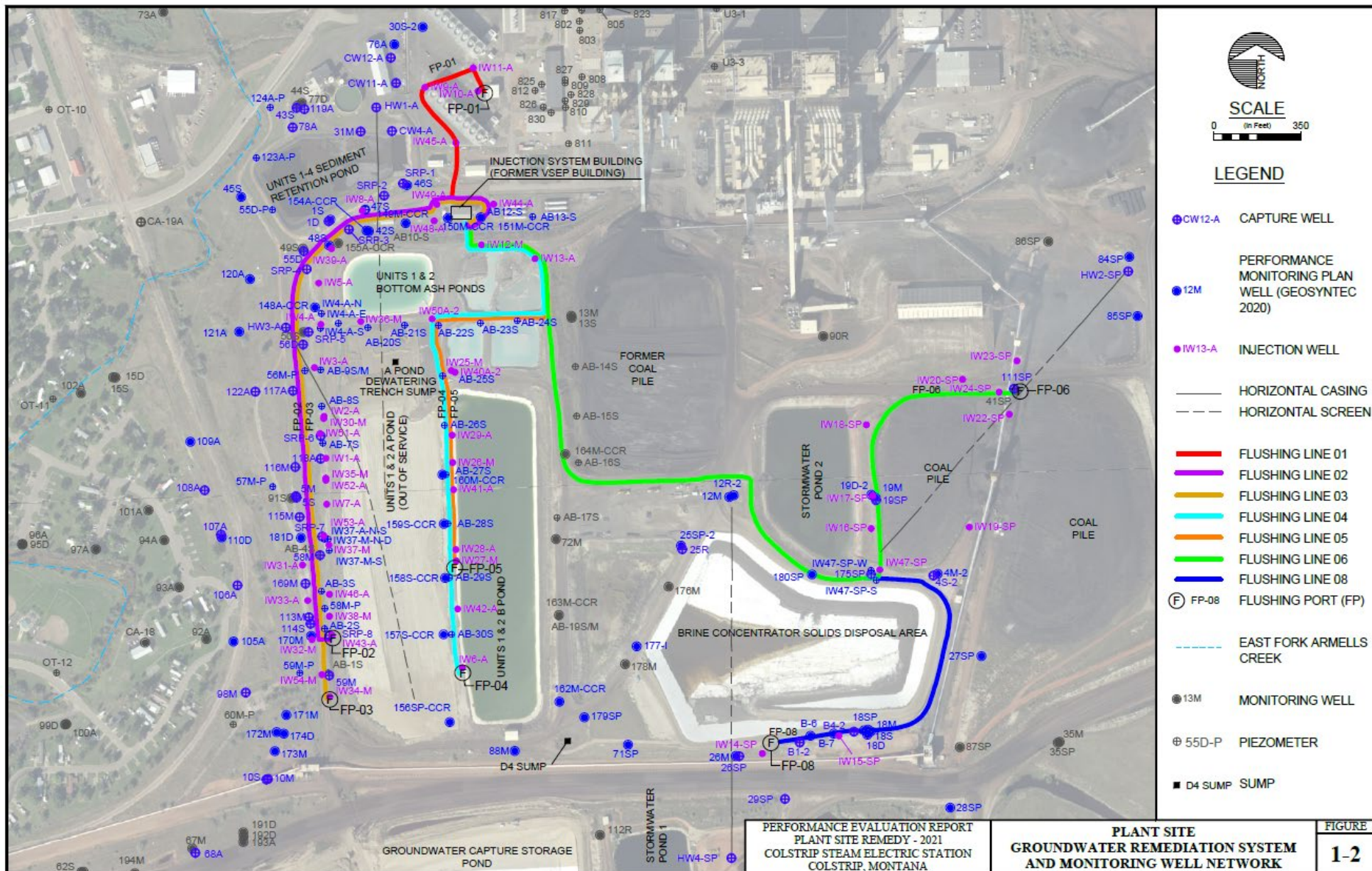


A tall, grey industrial smokestack stands prominently in the foreground, extending from the bottom of the frame towards the top. A large, blue arrow is superimposed on the image, pointing downwards from the text 'Groundwater Capture Pond' towards a large, rectangular pond in the middle ground. The pond is surrounded by a dirt embankment and some industrial equipment. In the background, there are rolling hills, a small town, and a clear blue sky with some clouds.

Groundwater
Capture Pond

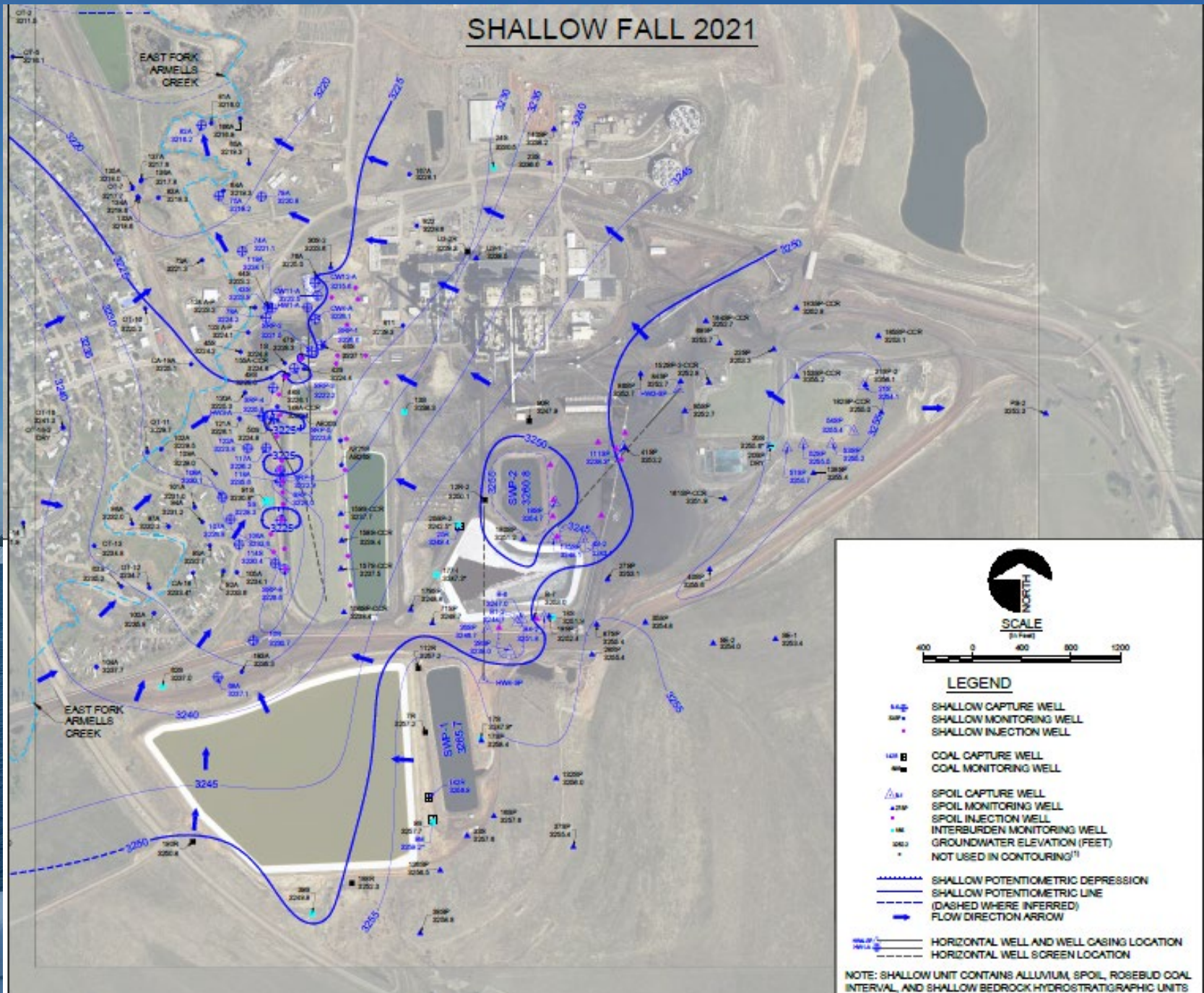
Groundwater Capture Treatment System



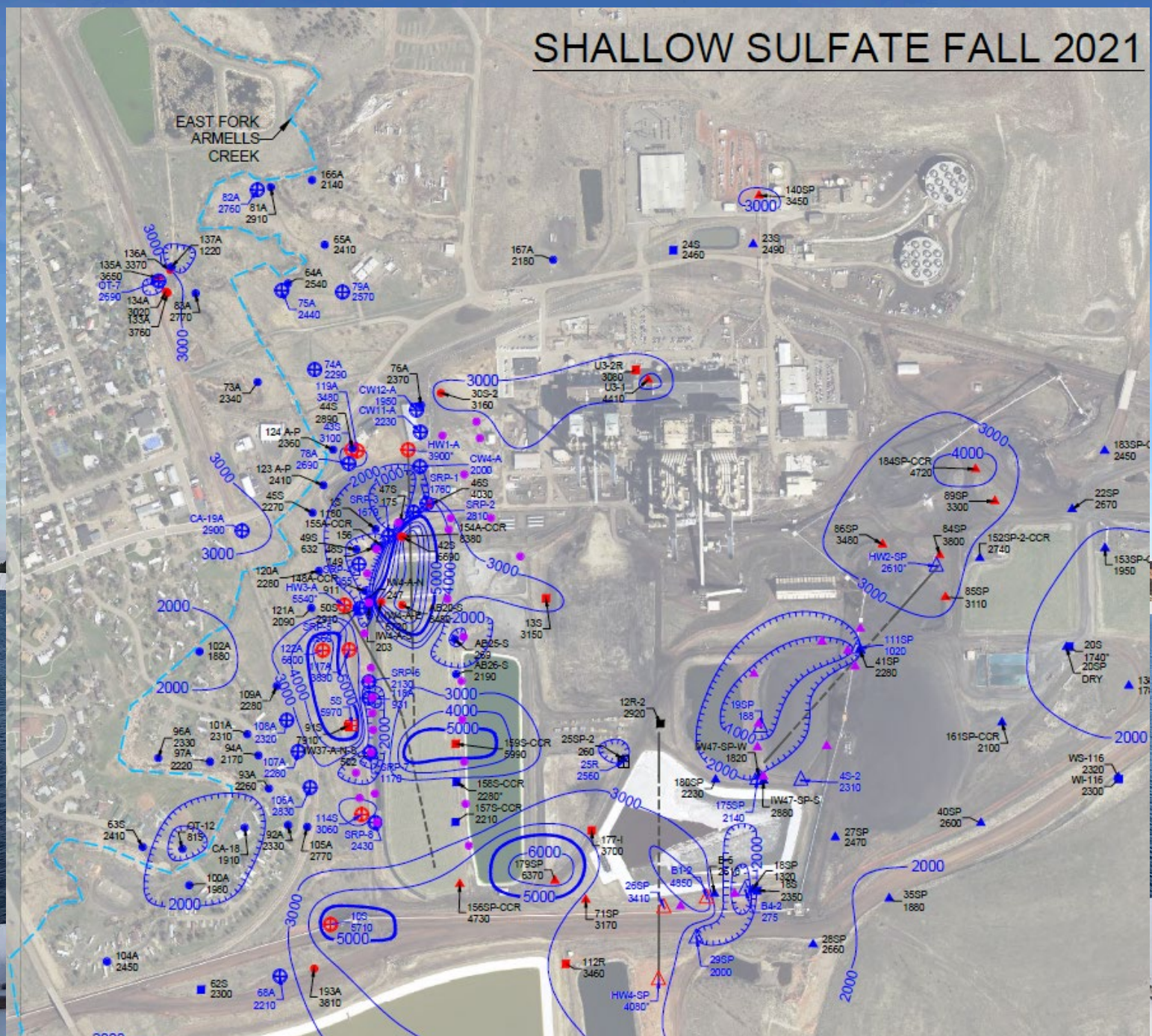




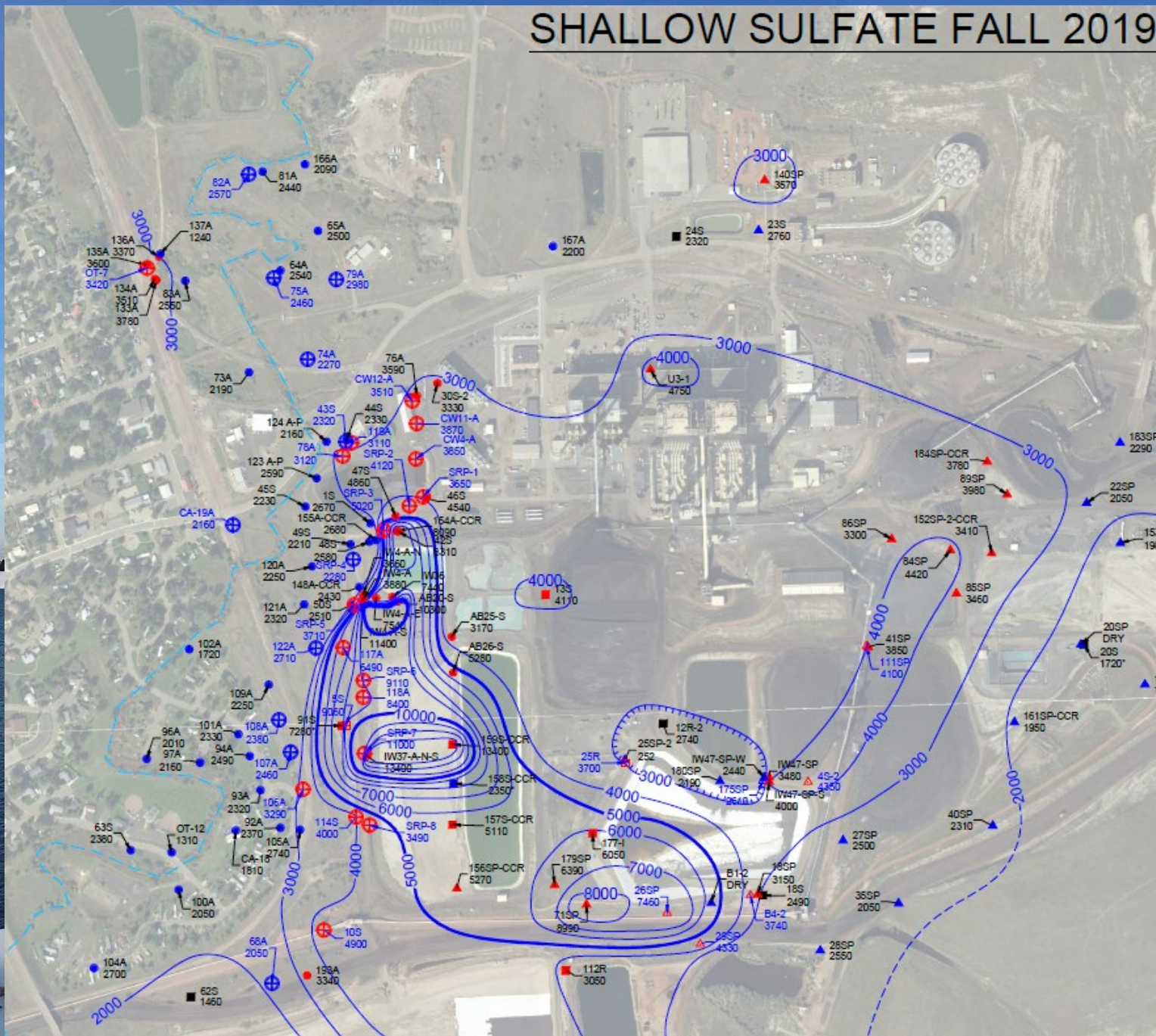
SHALLOW FALL 2021



SHALLOW SULFATE FALL 2021



SHALLOW SULFATE FALL 2019



Units 1&2 SOEP/STEP Remedy

- 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 AND
STEP AOC AREA

CASTLE
ROCK LAKE

TOWN OF
COLSTRIP

PLANT SITE AOC AREA

2015 NAIP IMAGERY



SCALE

0 (In Feet) 3,000



LEGEND

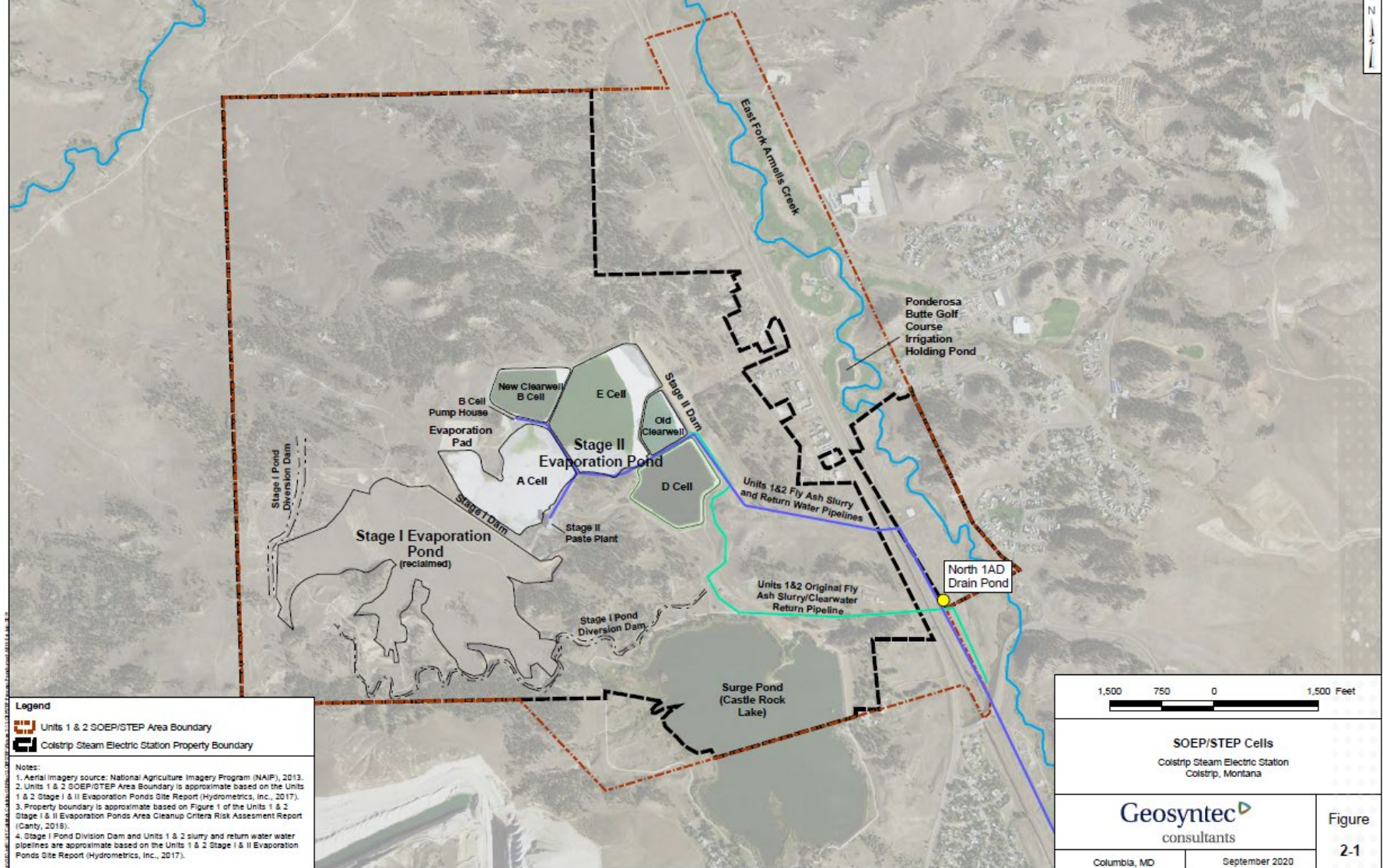
- PROPERTY BOUNDARY
- - - UNITS 1 & 2 SOEP AND STEP AOC AREA
- - - PLANT SITE AOC AREA
- - - UNITS 3 & 4 EHP AOC AREA

Revised May 8, 2017

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



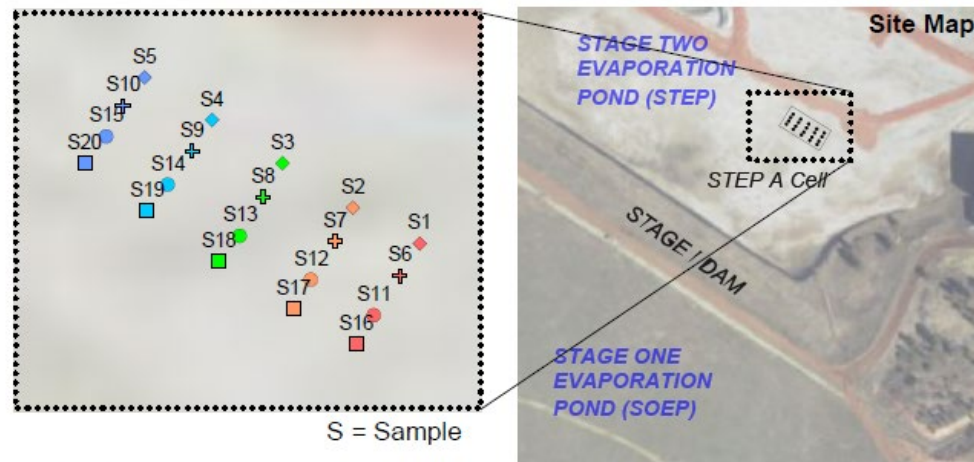


Dewatering – STEP E Cell



Ash Excavation Drying Pilot Test

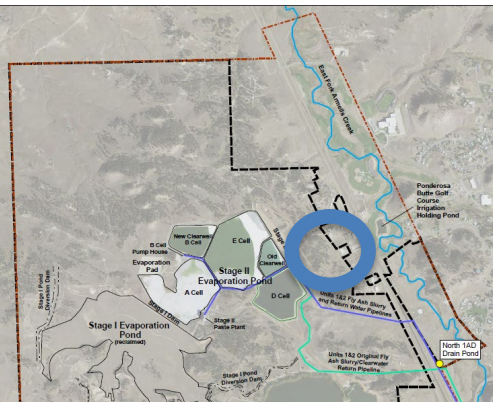
Geosyntec
consultants



s: Top of trenches are about 8 feet below ground surface.

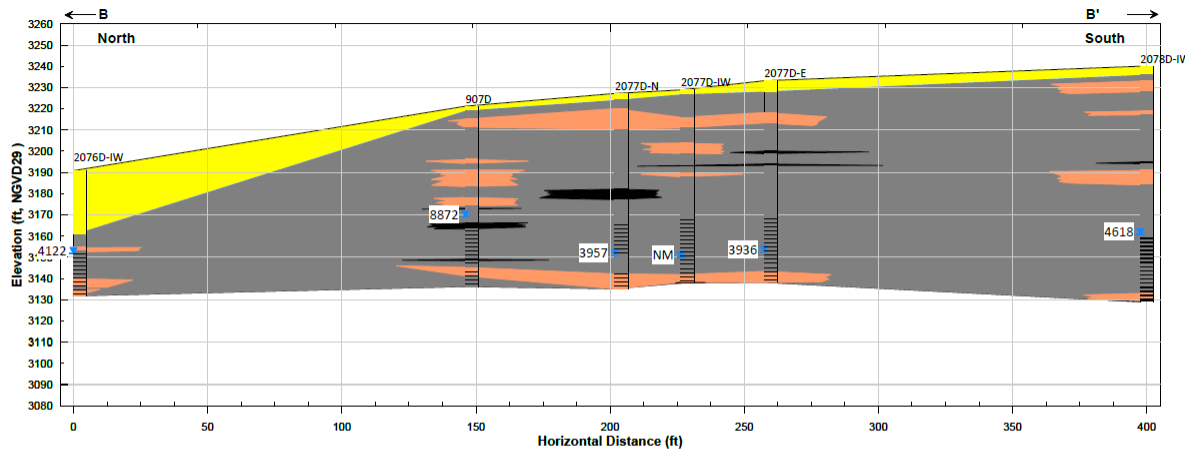


Units 1&2: Small-Scale Freshwater Flushing Pilot Test Area

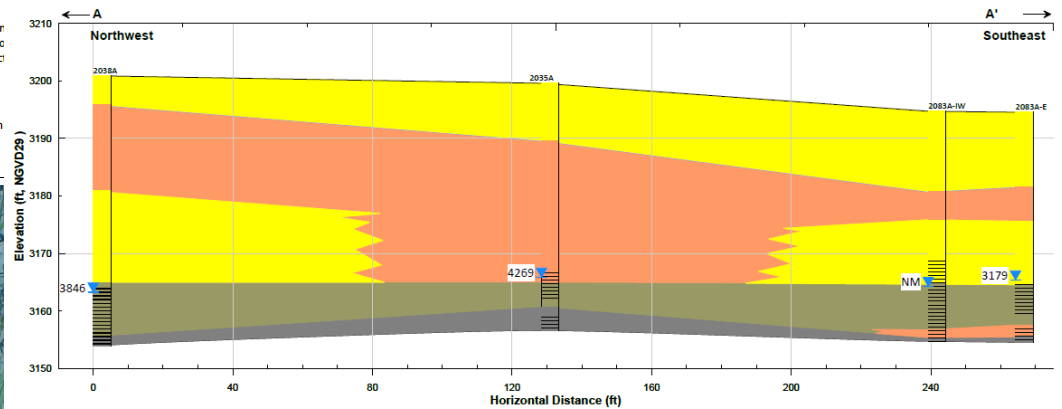


LEGEND	
◆ WELL NAME	NEW PILOT TEST VERTICAL INJECTION WELL
◆ WELL NAME	NEW PILOT TEST MONITORING WELL
◆ WELL NAME	EXISTING CAPTURE OR MONITORING WELL
◆ WELL NAME	NEW VERTICAL INJECTION WELL FOR SMALL FLUSHING SYSTEM
---	TALEN MONTANA PROPERTY BOUNDARY

Units 1&2: Small-Scale Freshwater Flushing Pilot Test Area



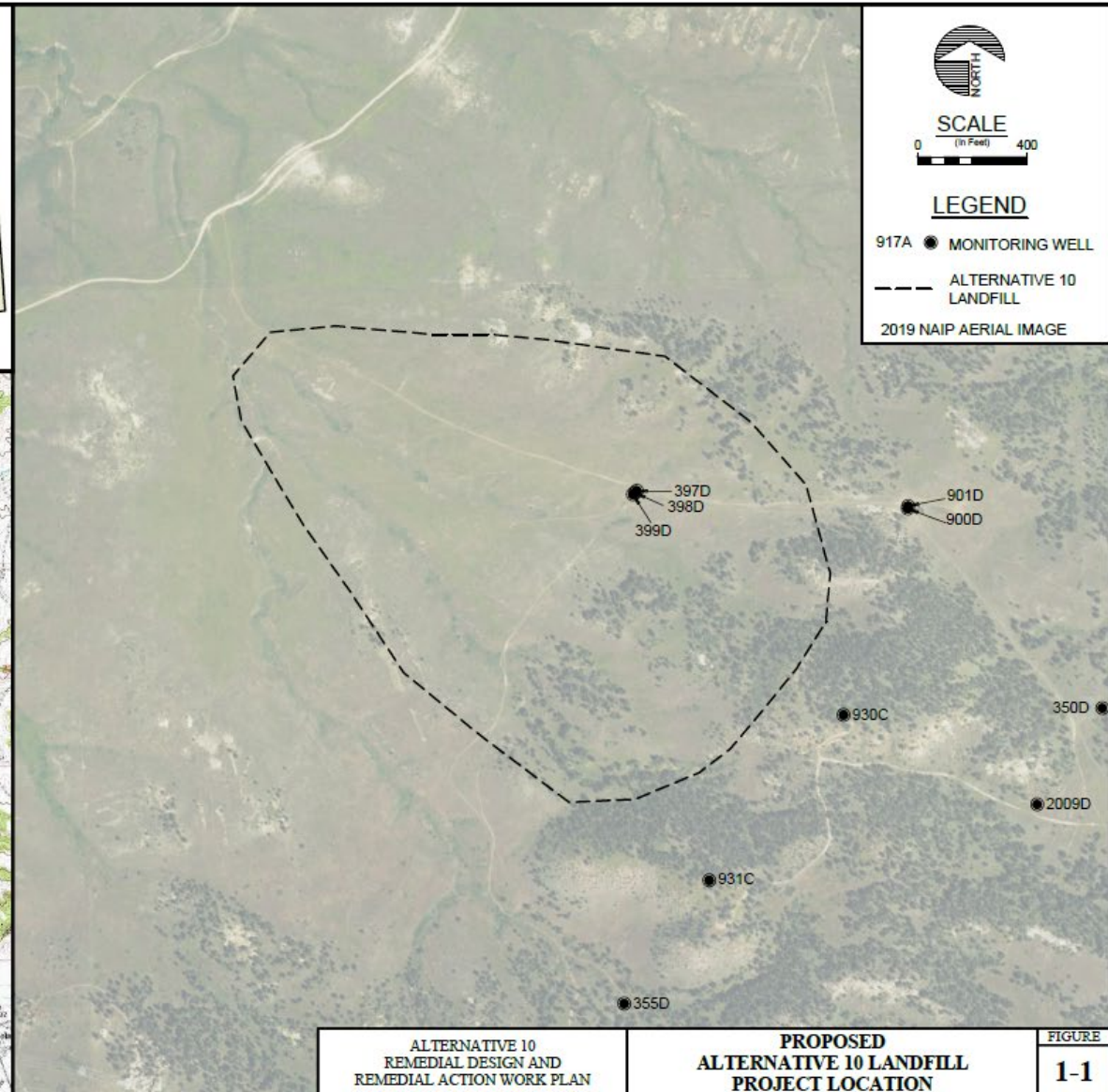
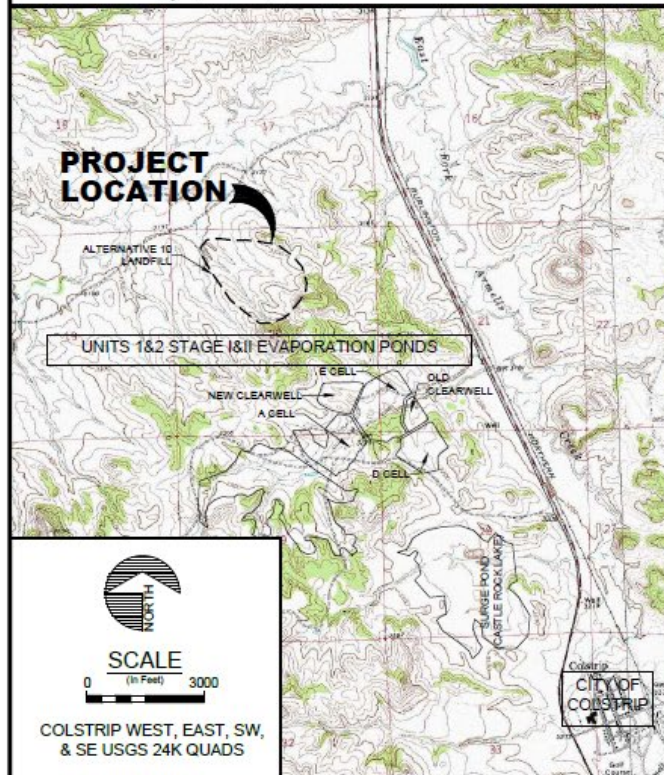
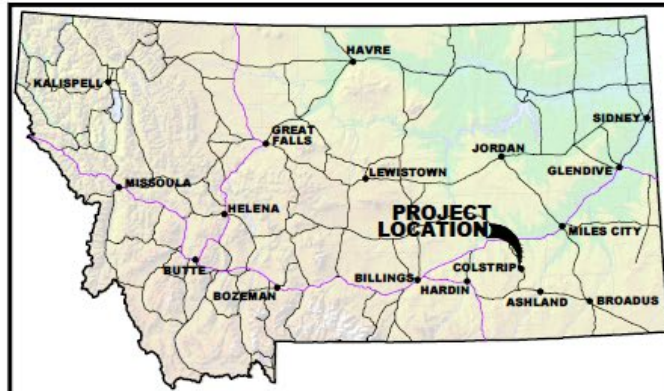
- Alluvium
Generally consists of various mixtures of clay, silt, sand, and gravel. Basal alluvial gravels typically overlie Sub-McKay be Surficial alluvial sediments tend to be finer-grained.
- Siltstone/Claystone
Sub-McKay bedrock consisting of interbedded claystone, siltstone and sandstone with thin coal seams. Larger sandstone seams (generally greater than one foot thick) are illustrated on this cross section. Smaller stringers of sandstone and co 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.
- 4122
Baseline specific conductivity (micromhos per centimeter) (not measured [NM] in injection wells due to pilot test plumb)
- v
Baseline groundwater elevation



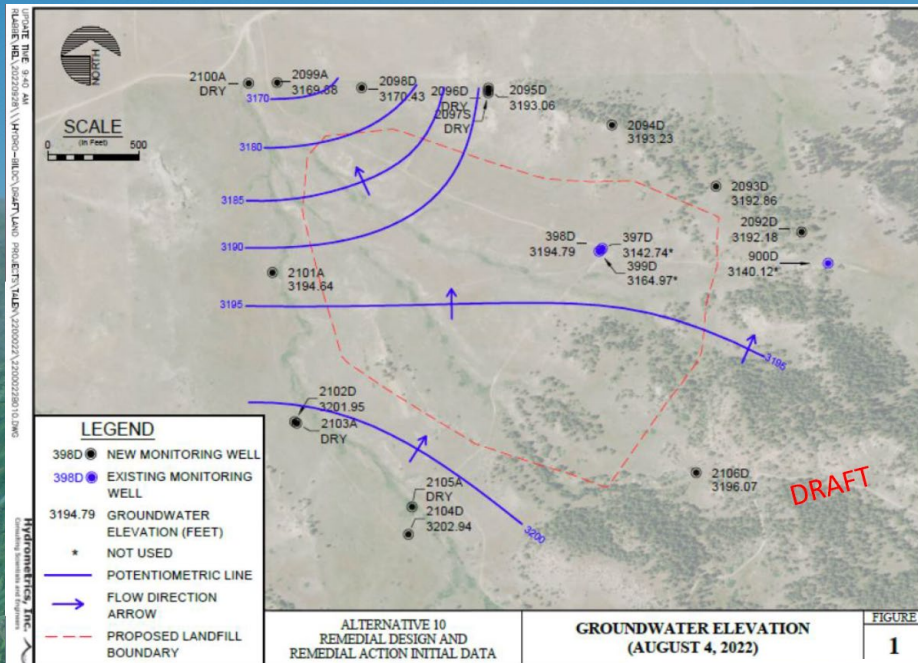
- Alluvium
Surficial fine-grained alluvium consisting of various mixtures of clay, silt, sand, and gravel.
- Sand
Generally fine to medium grained sand lenses with some silt and gravel.
- Gravel
Basal alluvial gravels mixed with some silt, sand, and clay.
- Siltstone/Claystone
Sub-McKay bedrock consisting of interbedded claystone, siltstone and sandstone with thin coal seams.
- 4122
Baseline specific conductivity (micromhos per centimeter) (not measured [NM] in injection wells due to pilot test plumbing)
- v
Baseline groundwater elevation



Remedy Design: Landfill Investigation & Design

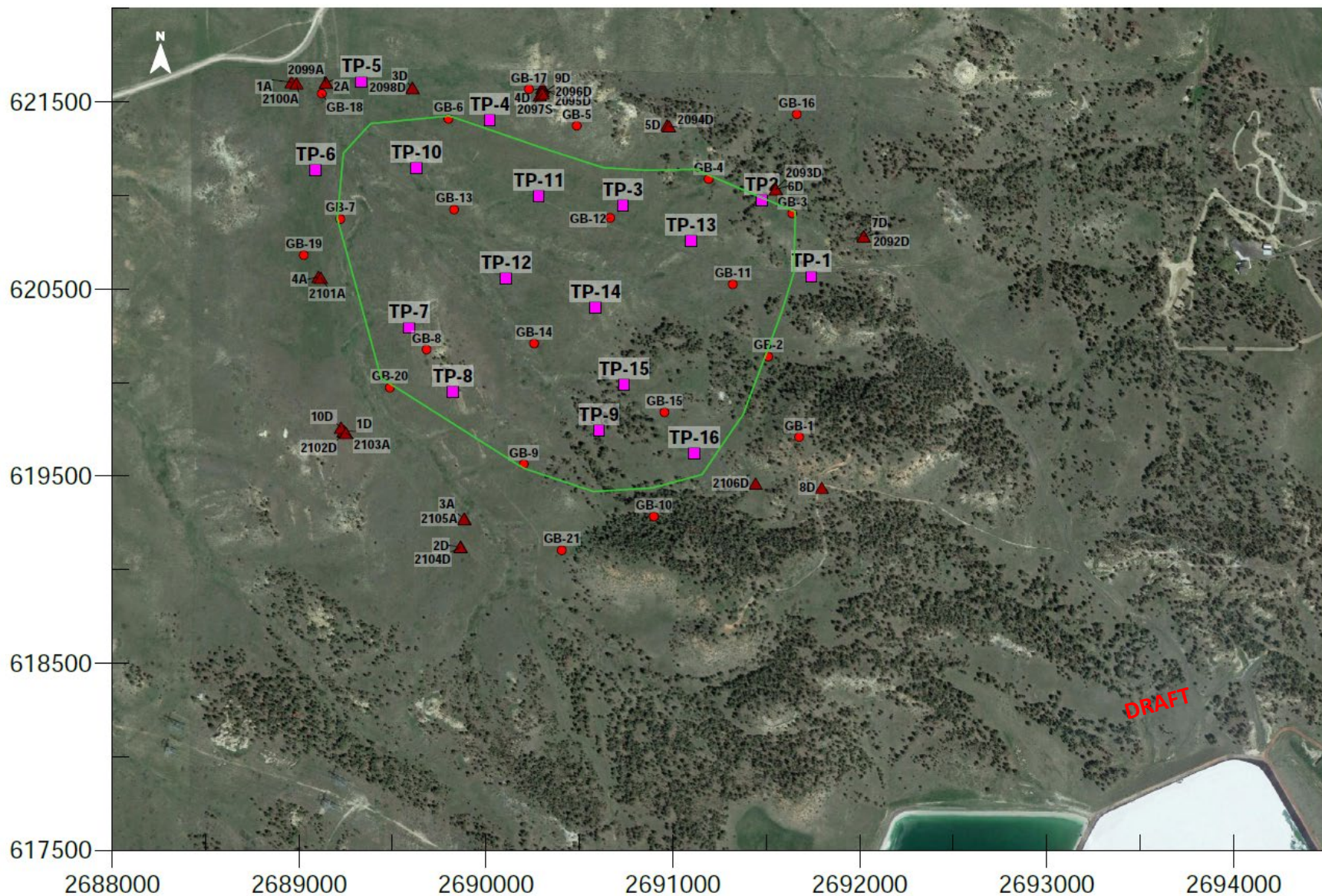






- Water levels and lithology data from new landfill wells included in the ongoing updated model calibration
- Updated flow and fate and transport model will be used to simulate Alternative 10.CCR source material will be simulated using water quality from SOEP LEAF testing.

North, NAD83, Montana South State Plane (ft)



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 Berm Centerline
- Boring Location
- Monitoring Well Location (from Hyrdometrics)

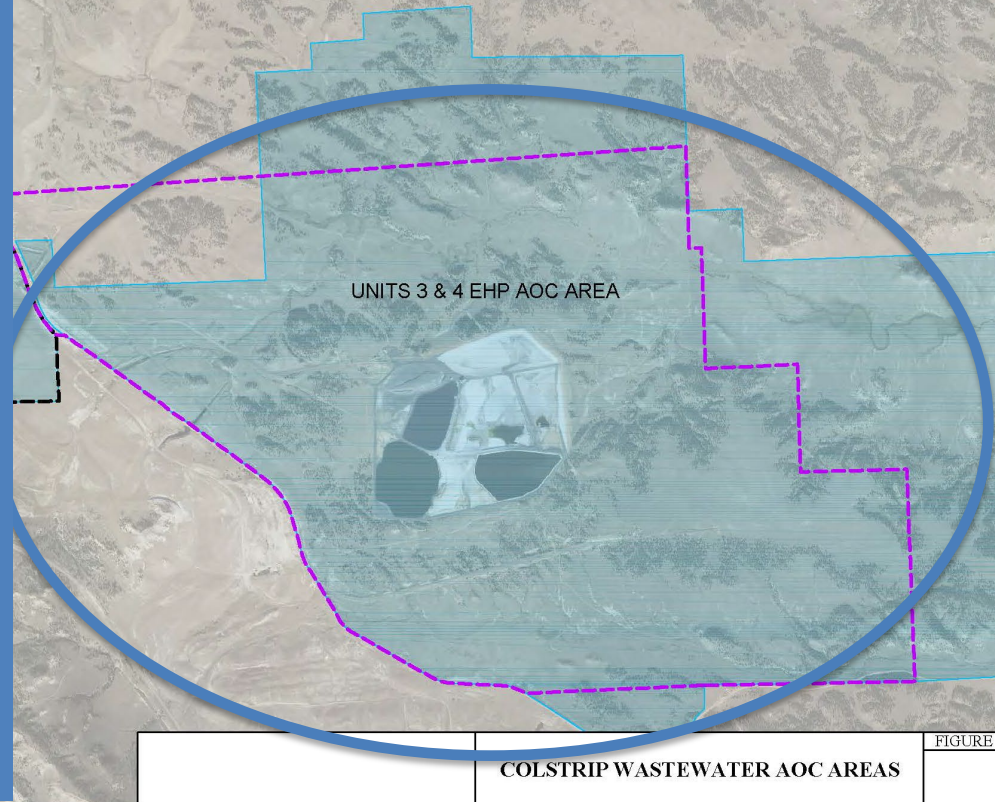
Units 1&2 SOEP/STEP: Alt 11A

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

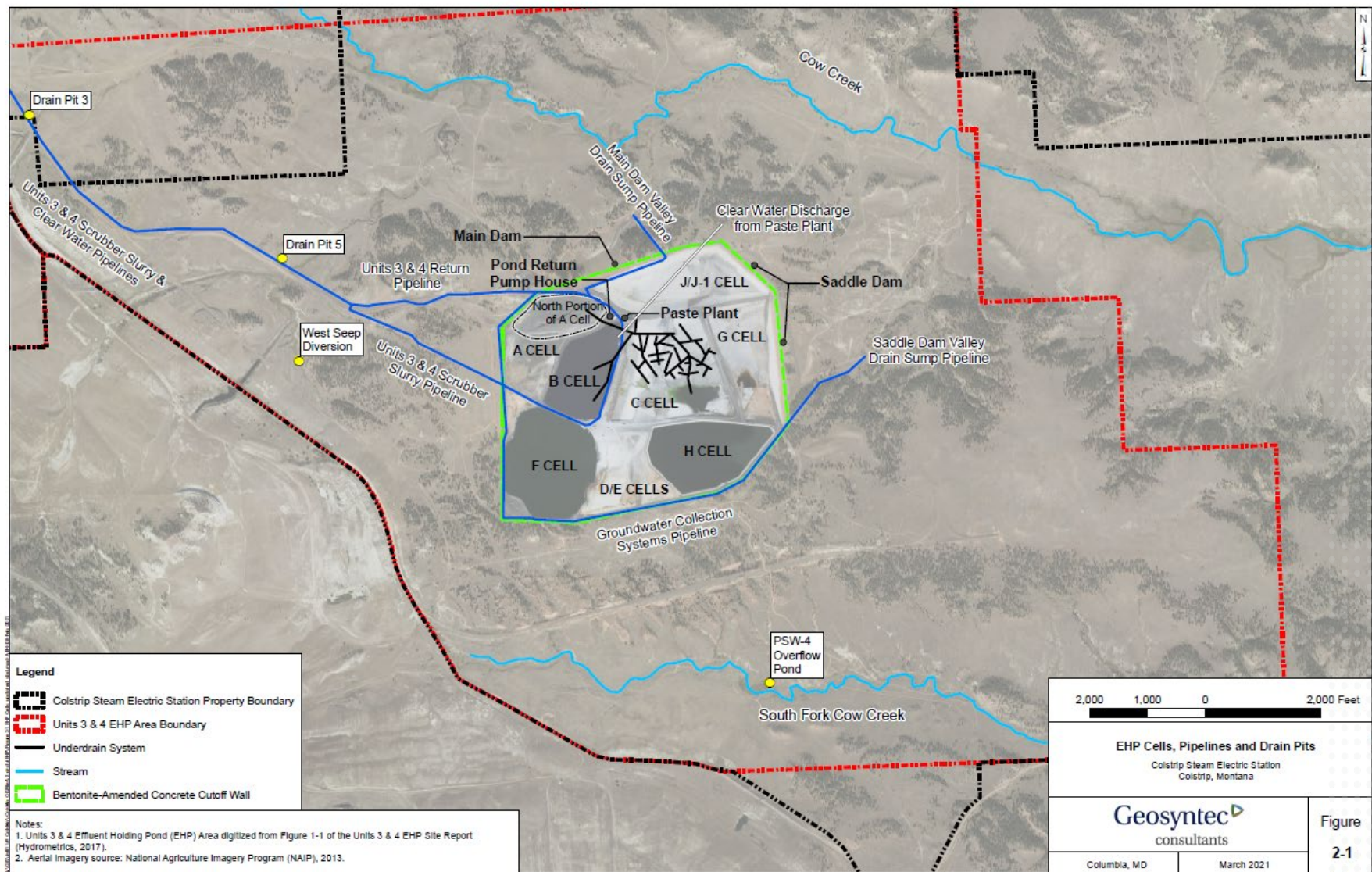
Units 3&4 EHP Remedy

- 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)

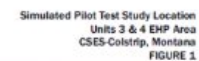


Units 3&4

- 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



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consultants



Horizontal Drilling



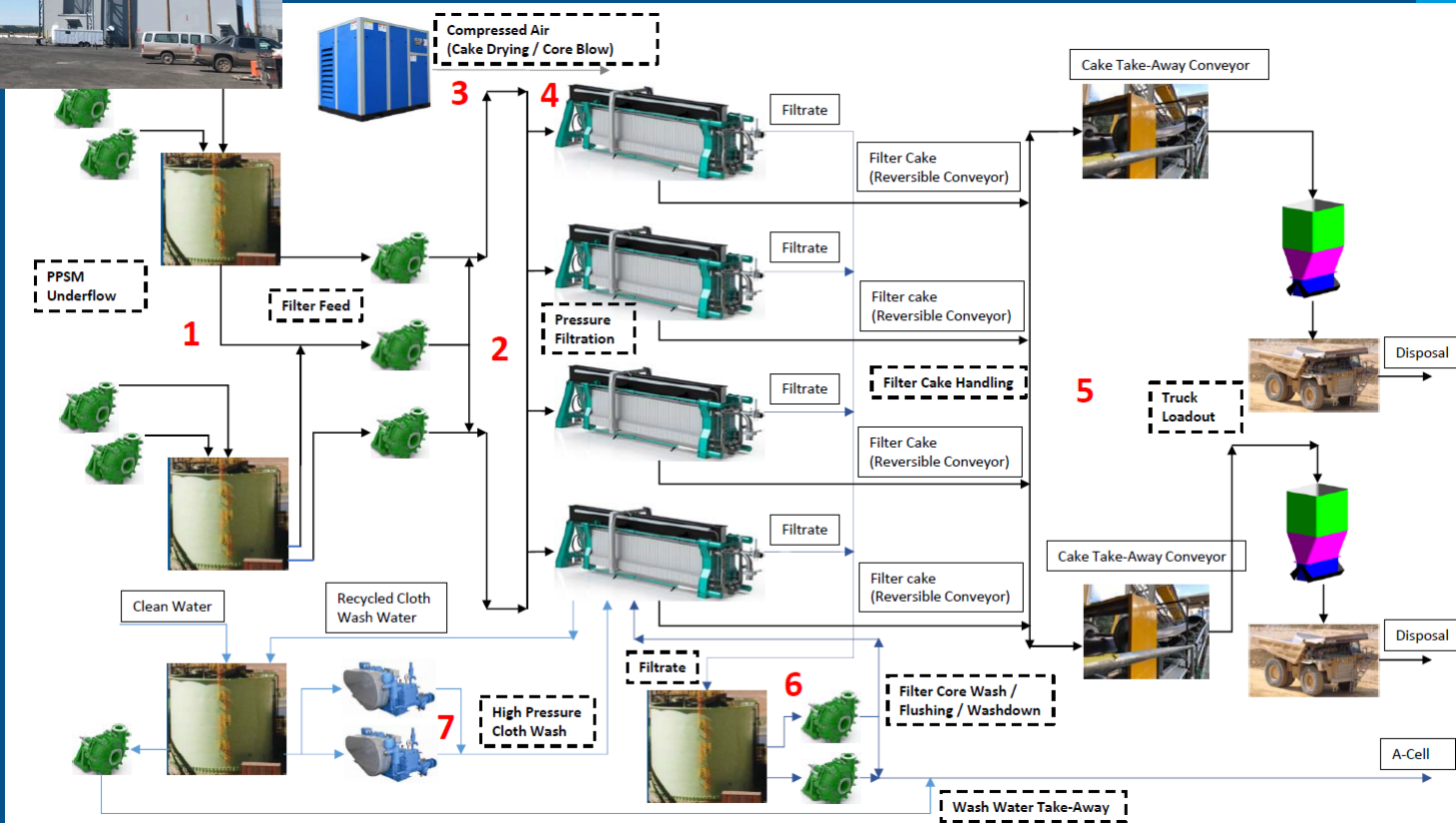
Monitored Natural Attenuation (MNA) Drilling/Study



Pond Closure Cap – Units 3&4 B Cell



Units 3&4 Dry Disposal System

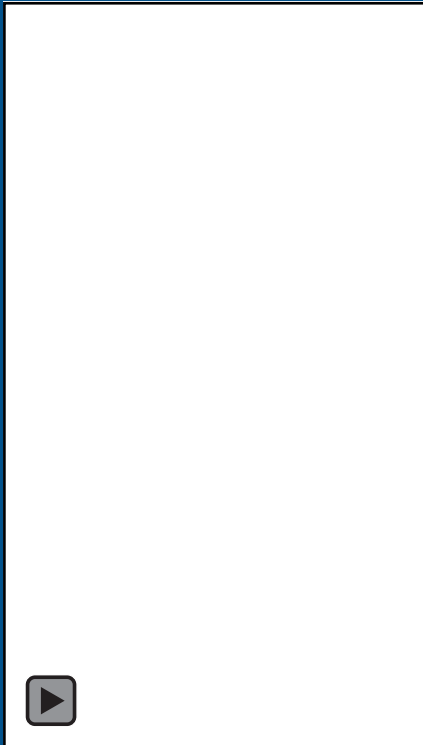


Units 3&4 Dry Disposal System



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

Questions/Comments

Montana DEQ's mission
is **to champion a healthy
environment for a
thriving Montana.**

DEQ Project Officer: Sarah Seitz
Email: sarah.seitz@mt.gov
Ph: 406.444.6797



References

DEQ Colstrip Coal Ash Pond Cleanup Website:
<https://deg.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>