

**42nd West Virginia Mine Drainage Task Force Symposium &
15th International Mine Water Association Congress**



The Banning/West Newton Coal Logistics Coal Refuse Pile Reclamation Project, Rostraver Township, Westmoreland County, Pennsylvania

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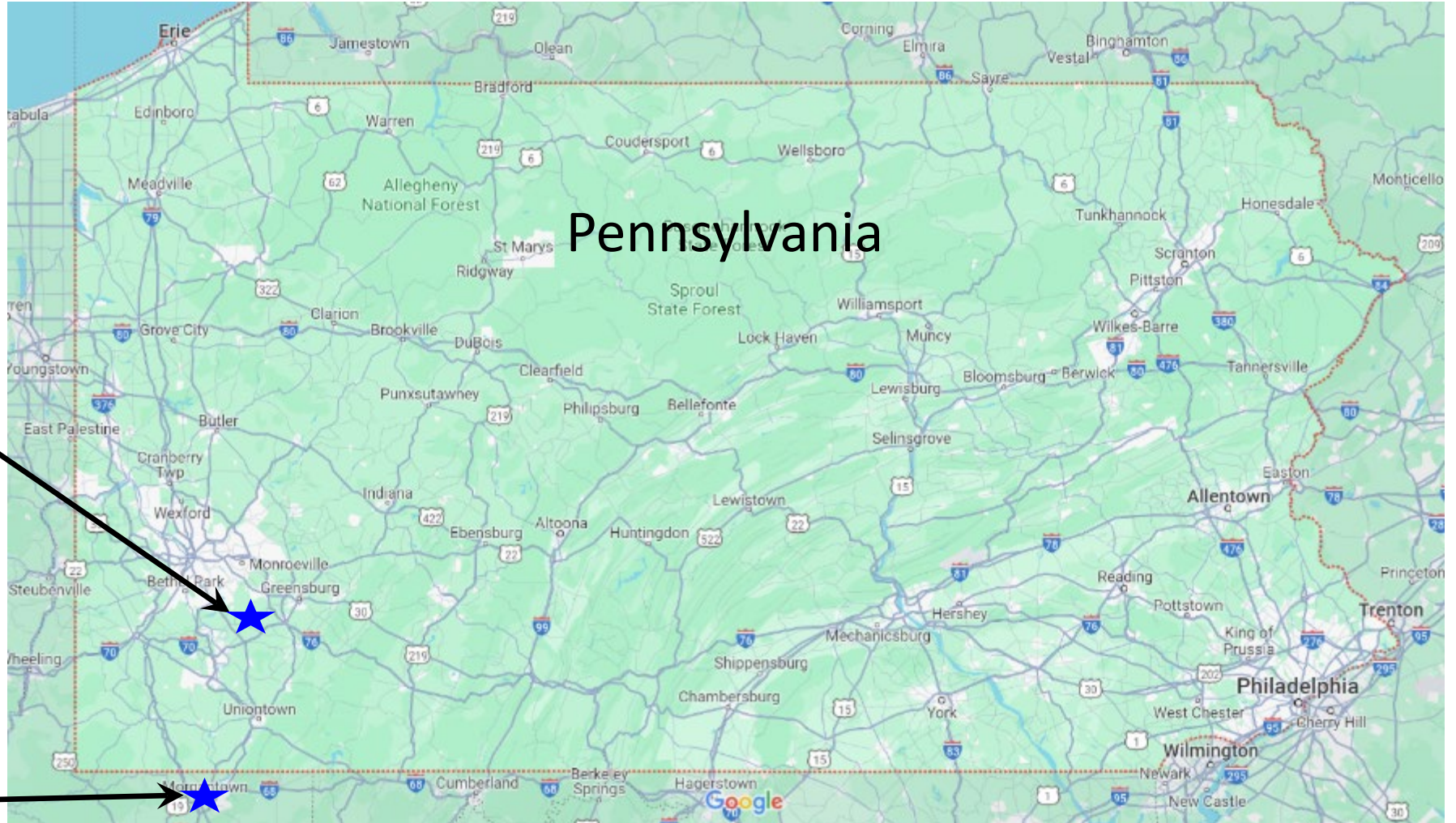


Items to be Covered

- Location and Mining History of the Site
- Background and Goals of the Project
- Review of the Alternatives Analysis and Recommended Reclamation Plan
- Current Design and Permitting Status
- Estimated Project Construction Cost and Anticipated Project Construction Schedule

Project Location

Banning/WNCL
Coal Refuse Pile
Reclamation
Project Location



Morgantown, WV

Source: Google Maps

Mining History

Banning No. 4 Coal Cleaning Plant and Tipple



Banning No. 4 Mine of Republic Steel Corporation, near West Newton, PA.
From original painting by Howard Fogg.

Mine: **Banning No. 4**

Company: **Republic Steel Corp**

Years Operated: **1961-1982**

Location: **West Newton,
Westmoreland County, PA**

Daily Production: **3,000 tons**

Surface Employment: **59**

Underground Employment: **253**

No. of active sections: **6**

Type of Mine: **1 Slope, 3 Shafts**

Name of Coalbed: **Pittsburgh**

Thickness of Coalbed: **84 inches**

No. of Production Shifts: **3**

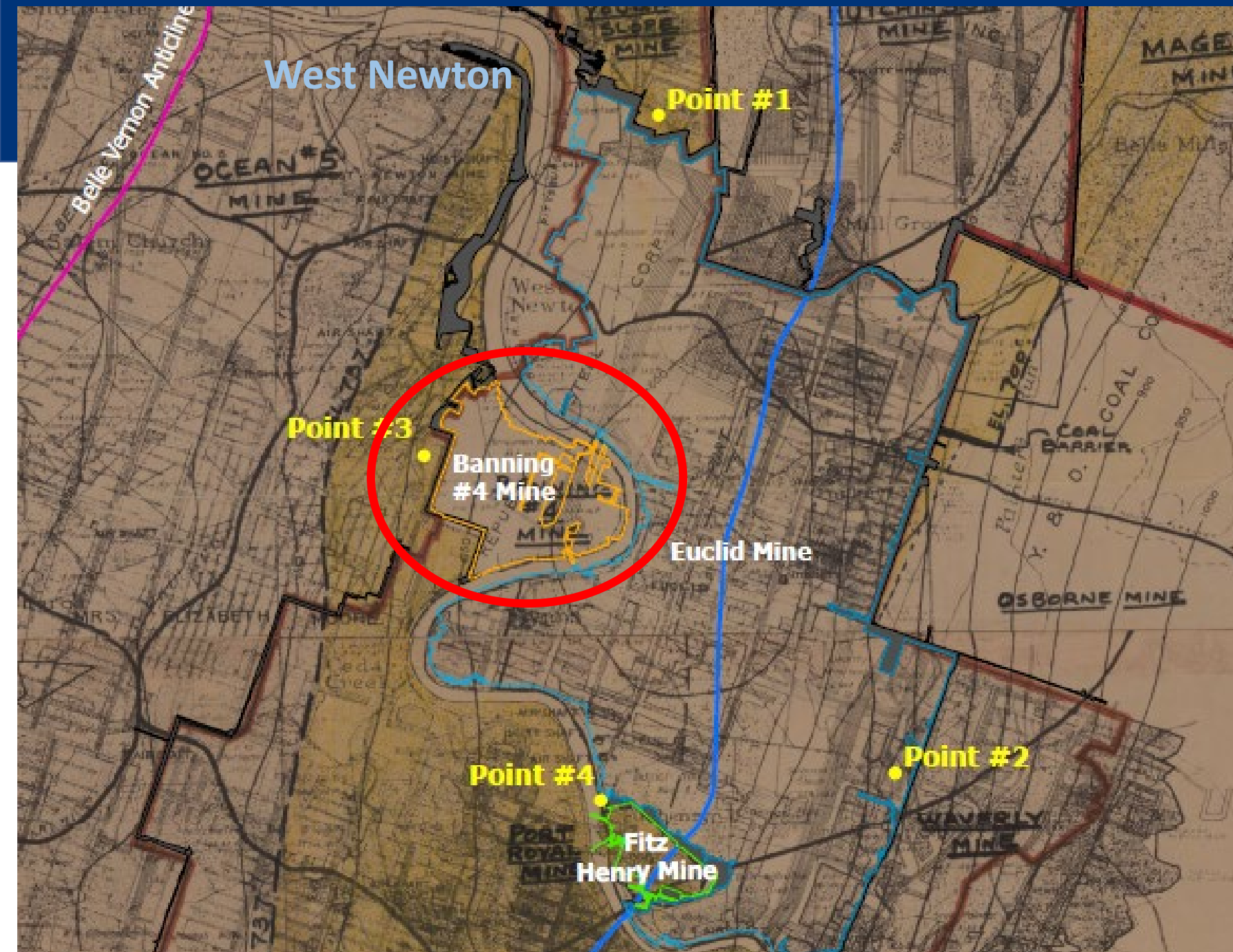
Mine Map

Banning No 4 Mine

The Banning No. 4 Mine is located within a totally mined-out coal basin on the Port Royal Syncline in an area that spans parts of Allegheny, Fayette, and Westmoreland counties.

Mining in the basin originally started pre 1870 and ended with the closure of the Banning No. 4 mine in 1982.

Source: OSM 2020 Banning Report



Banning/WNCL Project Site



Low Altitude Oblique Aerial Photos from 2001 *(Source: PA DEP)*

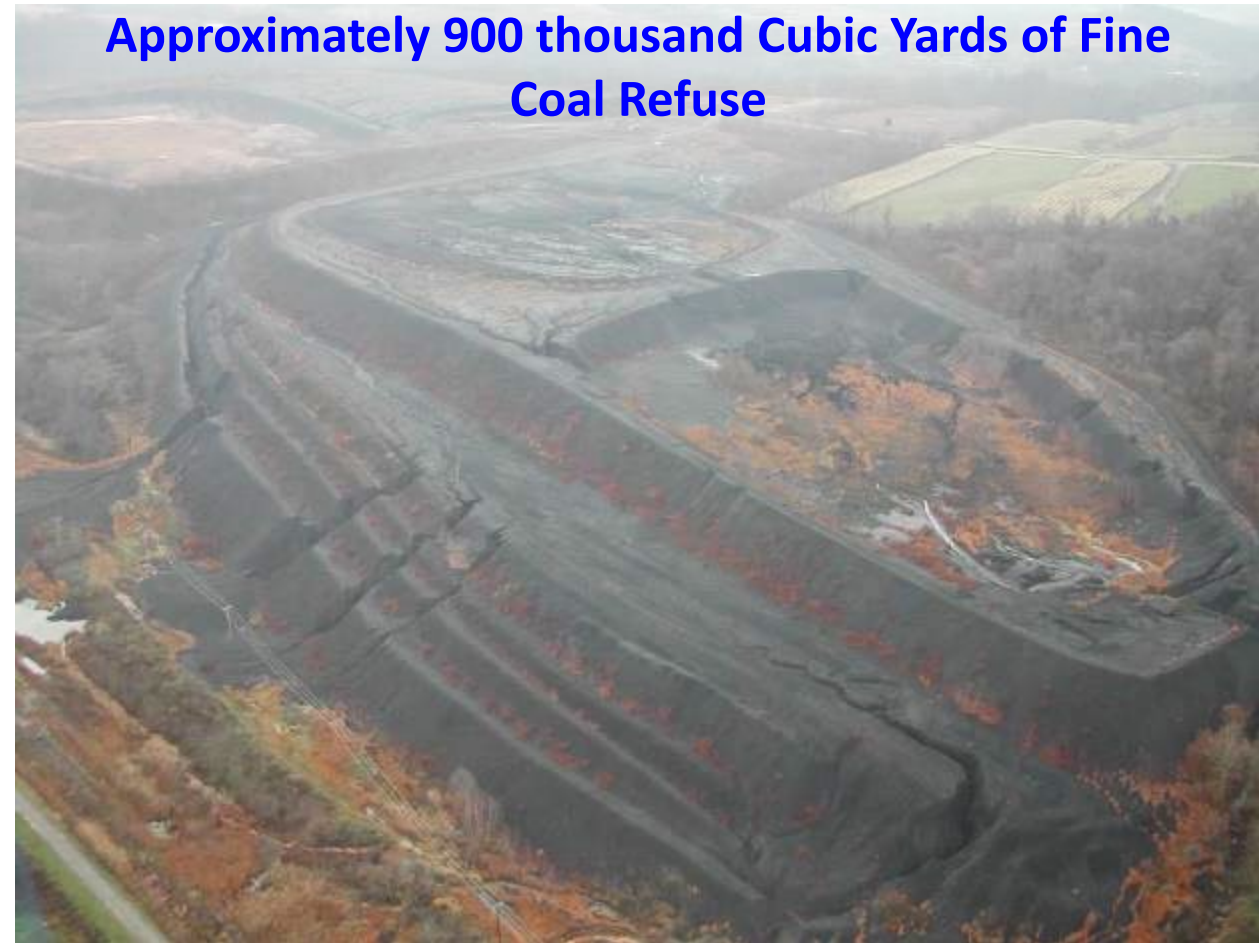
Banning/WNCL Project Site

Approximately 4 million Cubic Yards of Refuse Material



Approximately 80-100 thousand Cubic Yards of AMD Treatment Sludge

Approximately 900 thousand Cubic Yards of Fine Coal Refuse



Low Altitude Oblique Aerial Photos from 2001 (Source: PA DEP)

Banning/WNCL Project Site

1986 Aerial
View of the
Banning/WNCL
Coal Refuse
Pile

Source: PASDA



Background

- The 99-acre Banning/WNCL site in Westmoreland County, PA served as a disposal area beginning in the 1960s for coarse coal refuse from the adjacent coal preparation plant, where Pittsburgh Coal from the Republic Steel Corporation's Banning No. 4 mine was processed for transport.
- This coarse refuse was used to form the embankments for the three ponds (Pond 1, 2 and 3) at the Banning/WNCL site.
- Pond 1 accepted sludge from the Banning No. 4 mine abandoned mine drainage treatment plant in addition to coal refuse slurry, and Ponds 2 and 3 accepted coal refuse slurry from the preparation plant.
- Two of these ponds are permitted as dams and are classified as low-hazard dams.

Background

- While the Banning No. 4 mine discontinued disposal to the site in 1982 when the mine was closed and sealed, the preparation plant continued to process offsite coal and dispose of refuse to the WNCL site until 1984.
- From 1984 until 1990 LTV Steel, continued to dispose sludge into Pond 1.
- Over time, the steep outslopes of Ponds 2 and 3 have eroded, causing deposition of refuse onto the northern section of The Greater Allegheny Passage Trail (a.k.a The Youghiogheny River Trail).
- BAMR recognizes the erosion of the embankments, the very steep slopes, and the low hazard dams as a safety concern and therefore desires to reclaim and decertify the dams, address the erosion and instability of the slopes and to restore the site to productive use.

Current Conditions at the Site



Current Conditions at the Site



Goals of the Project

The primary goals of the project are to:

- Eliminate or abate public health and safety issues associated with this site
- Regrade and stabilize the refuse embankments and three fine coal refuse slurry impoundments
- Allow for the decertification of the slurry impoundments (dams) on the site
- Provide adequate soil cover, conditioning and revegetation
- Incorporate necessary stormwater management features
- Address or minimize impacts to wetland and water resources on the site
- Incorporate features that minimize or neutralize the production of AMD
- Provide bid-ready drawings and specifications (and permits) for the project
- Facilitate the redevelopment of the site for solar development

2022 Alternatives Analysis

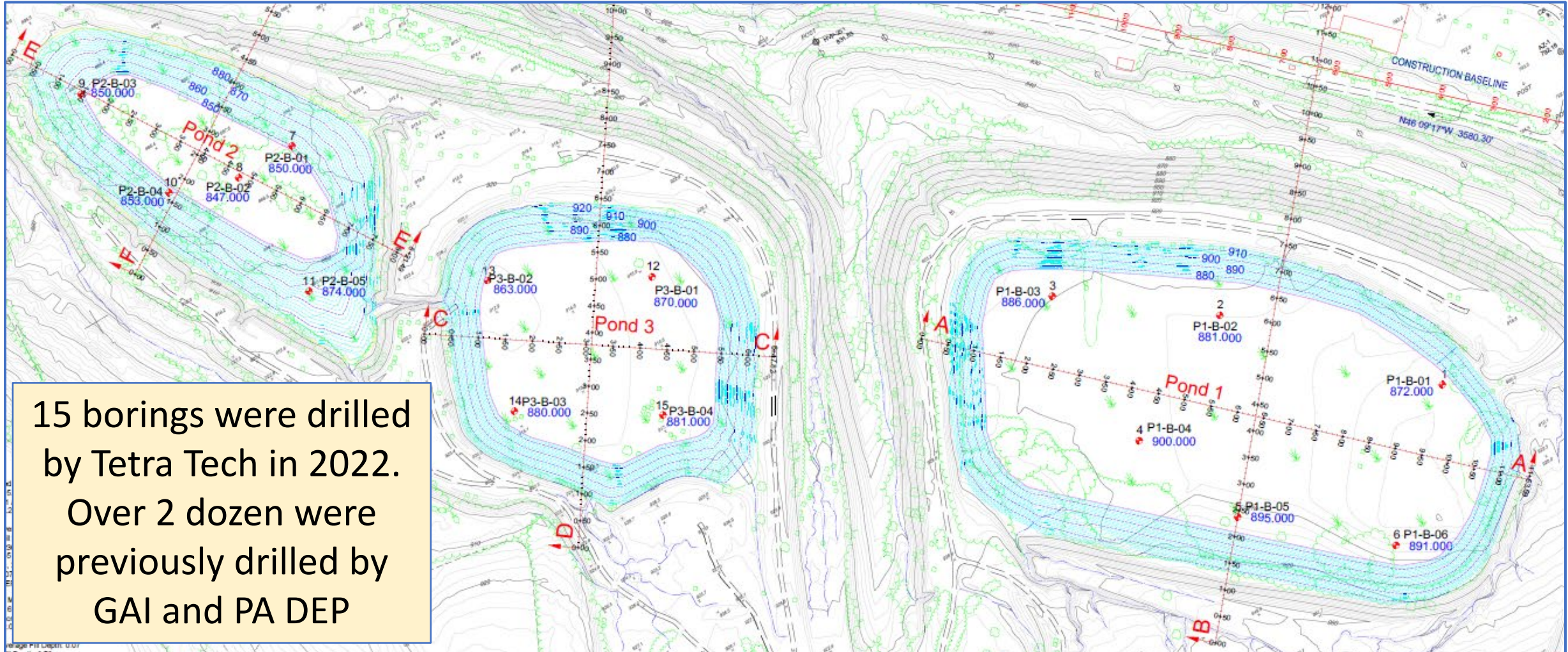
Tetra Tech completed an alternatives analysis for PA DEP BAMR for the Banning/WNCL site in November 2022. The analysis included the evaluation of three reclamation alternatives.

1. The potential for removal of the fine coal refuse (FCR) from the site by trucking the material to a cogeneration facility for use as fuel.
2. Evaluation of several materials to stabilize and reduce the moisture content of the FCR on the site to improve the mechanical stability of the material to allow for incorporation of the material into the final grading plan for the site.
3. Evaluation of the removal of the FCR from the site by slurring the FCR before pumping it to an adjacent abandoned underground mine for injection through boreholes.

Alternative 1

Removal of the Fine Coal
Refuse from the Site for use
as a Fuel

Drilling and Sampling of the Slurry Material



15 borings were drilled by Tetra Tech in 2022. Over 2 dozen were previously drilled by GAI and PA DEP

Drilling and Sampling of the Slurry Material



Drilling and Sampling of the Slurry Material



B2-1
0-54
54

Source of Photos: PA DEP

Sampling Results

- The slurry samples were analyzed using 2-ft composite samples for Total Moisture, Ash, Total Sulfur, BTU/LB, and Oxidation
- The BTUs ranged from approximately 1,200 to 7,000 (Average was 3,800)
- The Sulfur ranged from approximately 0.4 to 2.8 (Average was 1.2)
- Only 34% of the samples averaged over 5,000 BTUs (Minimum fuel value necessary for feedstock to the Seward Cogeneration Plant)
- The material that could meet fuel quality criteria was distributed throughout the slurry impoundments and not consolidated
- The results were sent to and reviewed by several waste coal brokers

Pros and Cons of Removal as Fuel

Subsurface Exploration and Testing of the (FCR) for Fuel Value (Alternative 1)	Pros and Cons
<p>This alternative includes removing the FCR which has adequate BTU values to be utilized as a fuel source for one of the region's waste coal to energy cogeneration facilities.</p>	<p>Con: Only about 1/3 of the slurry is viable as a fuel source</p> <p>Con: It would be difficult to mine and segregate the good material</p> <p>Con: The material is distant from the regions' waste coal cogeneration facilities, so trucking costs make use of the material uneconomical as a standalone solution</p> <p>Con: Likely a long timeline to complete reclamation</p> <p>Con: Would require subsidized trucking</p> <p>Pro: If feasible, taking the material with fuel value out and bringing flyash back would help lower cost</p>

Alternative 2

Excavating the Fine Coal
Refuse Material and
Stabilizing it with Imported
Material

Material Testing and Results

- Tetra Tech identified several materials that had physical properties or a history of similar uses to evaluate their potential to reduce moisture and stabilize the fine coal refuse and sludge in the impoundments.
- Materials used in the test mixes include:
 - **Calciment**[®] (*Developed by Mintek-Resources as a hybrid between quicklime and cement*)
 - **NIDS** - Novel Integrated Desulfurization System produced at the Homer City Generating Station Units 1 and 2. (*NIDS is a flue gas desulfurization process which produces a dry, alkaline ash product*)
 - **Cogen Ash** - Both flyash and bottom ash (or red ash) produced at the Seward Waste Coal Generating Station
 - **Quicklime**
 - **Portland Cement**
 - **Flyash** – Flyash from the Homer City Generating Station

Material Testing and Results

- Numerous trial mixes were lab tested to evaluate cost-effective mechanically stable mixes.
- Stability of the mixtures was evaluated based on undrained shear strength, compacted density, and moisture content.
- Based on the post-reclamation plan for a solar development at the site, a minimum undrained shear strength of 15 psi or approximately 1 ton/square foot would be adequate.
- Admixtures consisting of slurry samples mixed with 10% Calciment, 10% Cogen Flyash, and 15% Flyash + 5% Portland Cement had promising test results.
- Calciment is produced in relatively small quantities – 300 tons/wk.

Material Testing and Results

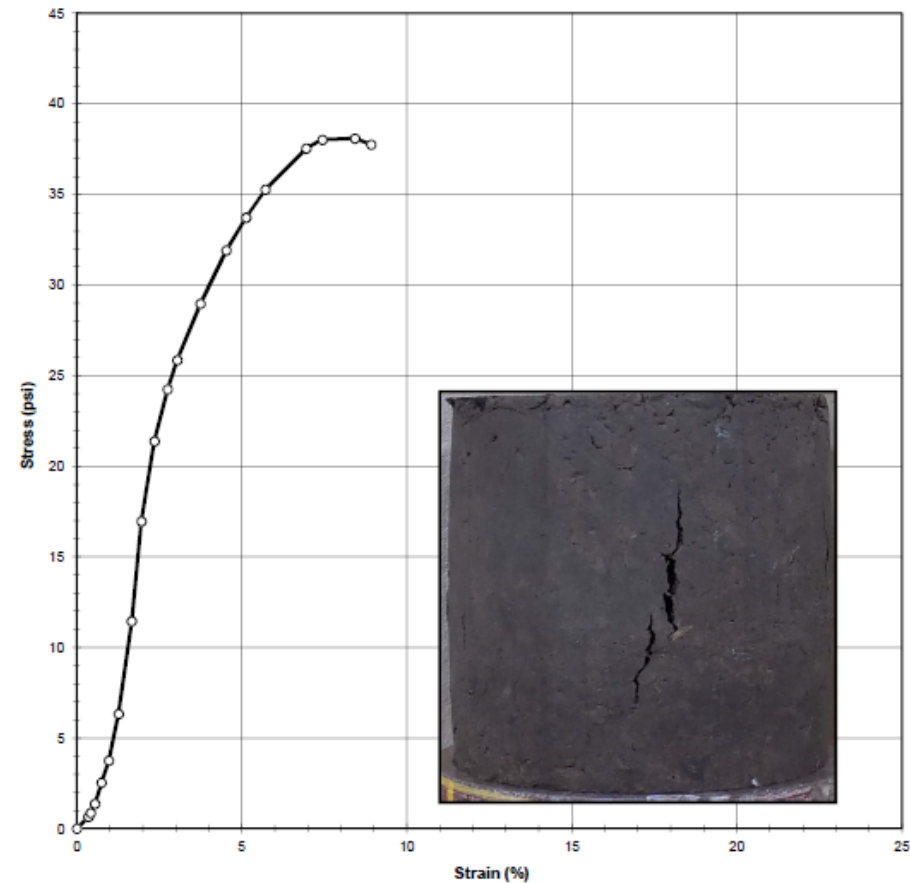
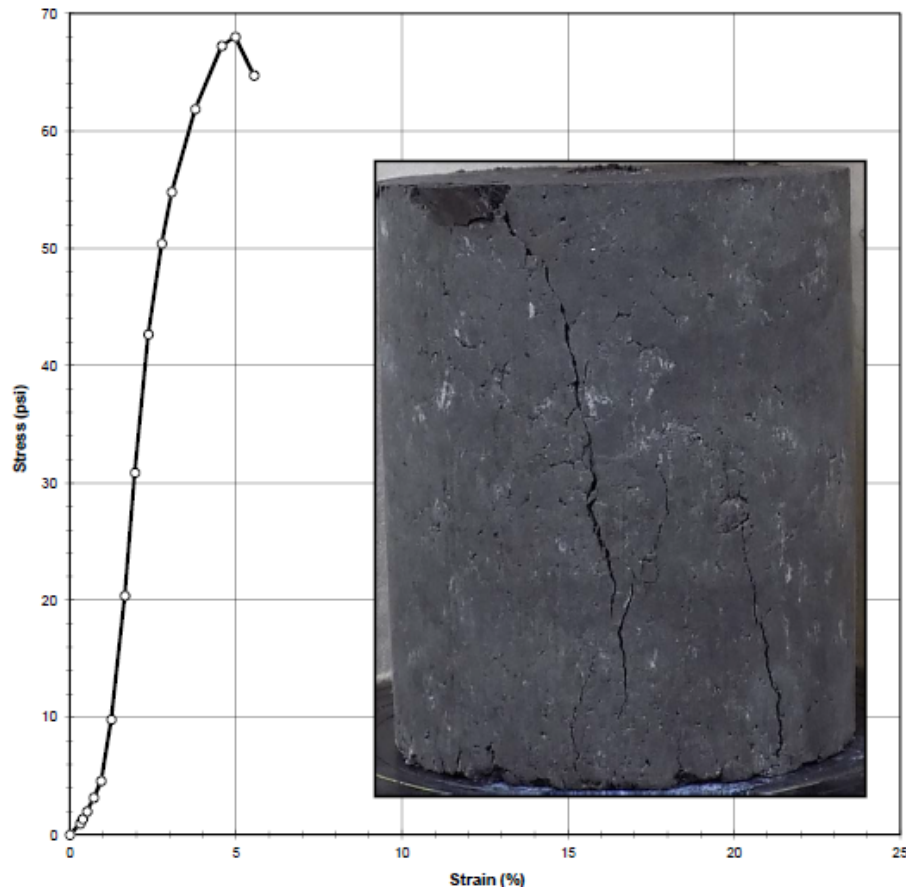
Admixture	Undrained Shear Strength (S_u)	
	(psi)	(psf)
5% Calciment	1.65	238
5% Fly Ash + Cement	10.80	1,555
10% Calciment	34.01	4,897
10% NIDS-7day	15.47	2,228
10% NIDS-14 day	15.55	2,239
10% Cogen Ash	19.05	2,743
10% Fly Ash + Cement	14.50	2,088
15% Calciment	7.47	1,076
15% NIDS-14 day	1.11	160
15% Cogen Ash-7day	5.28	760
15% Cogen Ash-14day	7.10	1,022
15% Fly Ash+Cement	19.55	2,815
20% Calciment	33.21	4,782

Material Testing and Results

UNCONFINED COMPRESSIVE STRENGTH
ASTM D2166-16 / AASHTO T208-15 (SOP S-30)

UNCONFINED COMPRESSIVE STRENGTH
ASTM D2166-16 / AASHTO T208-15 (SOP S-30)

Examples of the molded samples and the graph of the unconfined Compressive Strength



Pros and Cons of Each Alternative Evaluated

Laboratory Analysis with Various Materials to Stabilize the FCR (Alternative 2)

This alternative includes excavating the FCR and stabilizing it with an imported material. A variety of materials were evaluated including Calciment[®], NIDS (Novel Integrated Desulfurization System), Cogen Ash, Fly Ash, and Fly Ash + Portland Cement.

Pros and Cons

Pro: Certain to allow for the deregulation and decertification of the permitted slurry dams (impoundments)

Pro: Would allow for the property owners wishes to be able to develop the site following reclamation

Con: Best material tested is limited in quantity available to support the project

Pro: With some additional testing, adequate quantities of an acceptable material is likely

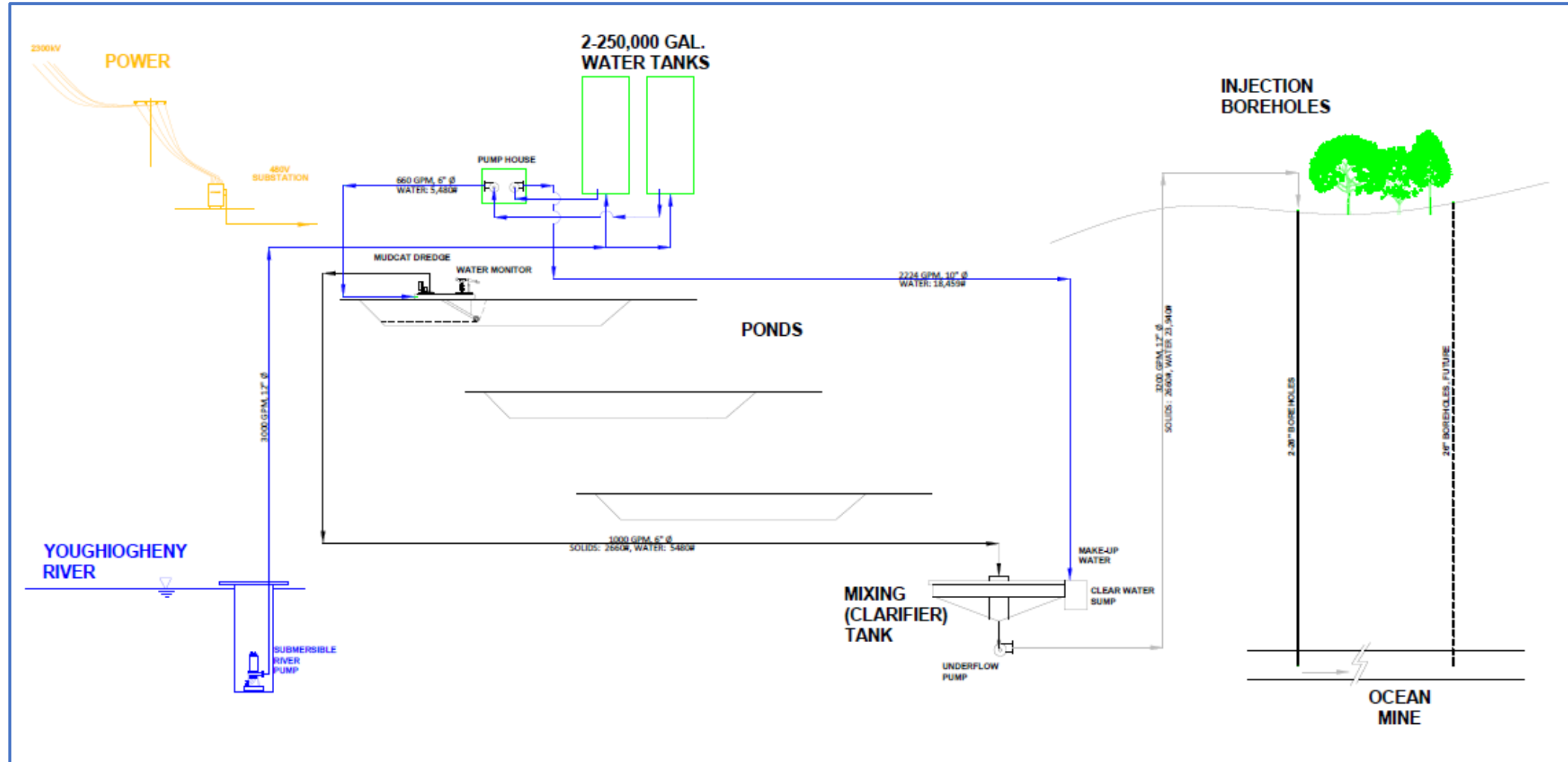
Con: The construction time would likely be 2-4 years.

Con: The project would be more costly than Alternative 3 due to the cost and amount of material that needs to be imported to the project site (~\$25.1 million estimate in 2022)

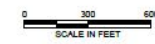
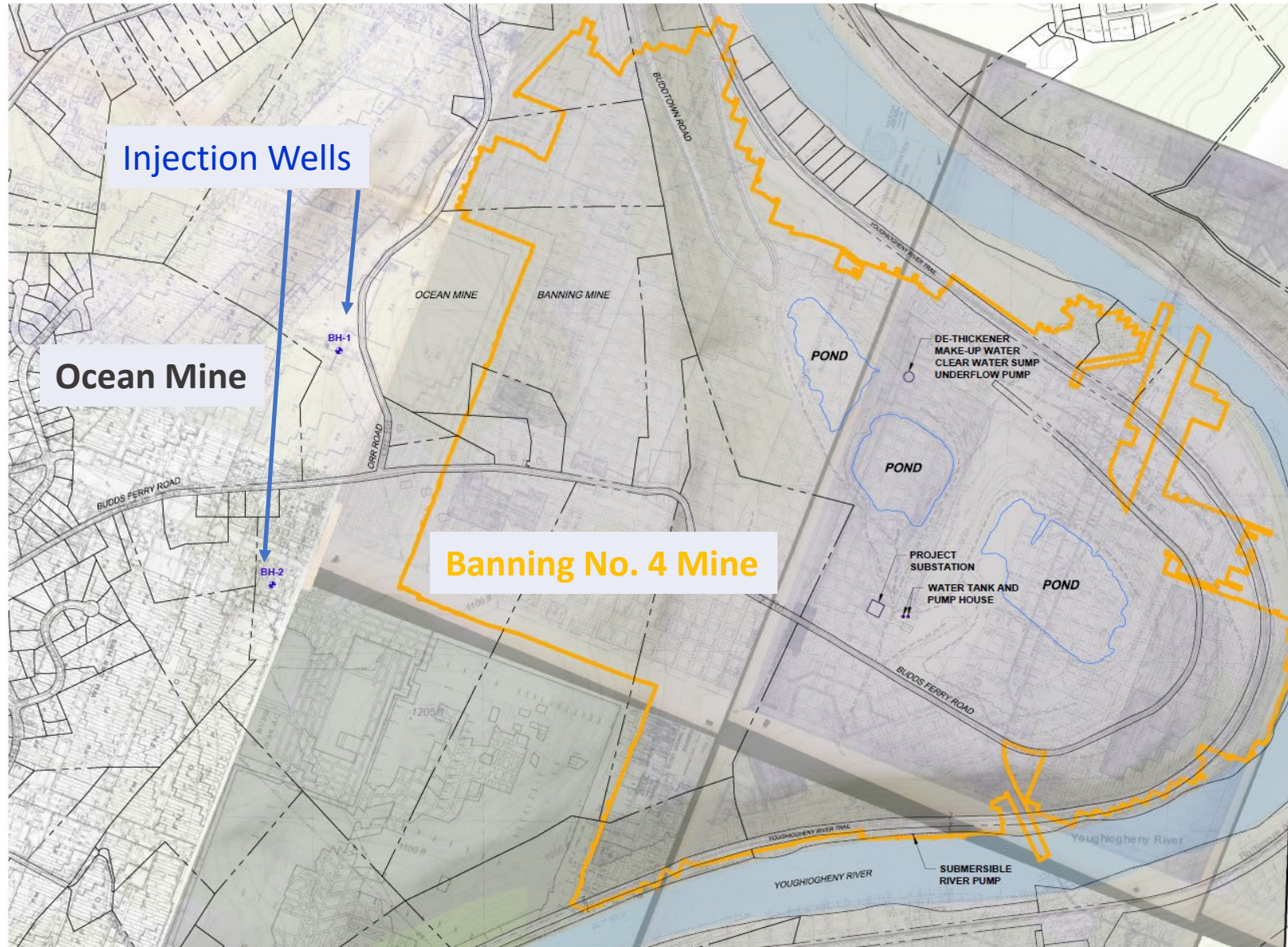
Alternative 3

Slurrying the fine coal refuse
and pumping the material
through injection wells into
the adjacent abandoned
Ocean No. 5 Mine

Slurrying and Injection of the FCR



Slurrying and Injection of the FCR



NOTE:
MINE MAPPING WAS COMPILED AND PROVIDED TO TETRA TECH BY THE
FEDERAL OFFICE OF SURFACE MINING RECLAMATION AND ENFORCEMENT,
GREENTREE, PA.

Pros and Cons of Each Alternative Evaluated

Evaluation of Slurrying of the FCR and Injecting it into an Adjacent Abandoned Mine (Alternative 3)

This alternative includes dredging the FCR from the three slurry impoundments, slurrying the material to approximately 10% solids, pumping the material to injection wells, and injecting the material into the adjacent abandoned Ocean No. 5 Mine.



Pros and Cons

- Pro:** Least costly alternative evaluated (~\$16 million)
- Pro:** Should allow for the deregulation and decertification of the permitted slurry dams (impoundments)
- Pro:** Would allow for the property owners wishes to be able to develop the site following reclamation
- Con:** Requires injection wells and pipelines to be developed on adjacent properties
- Con:** There is some uncertainty that the adjacent flooded Ocean No 5 Mine would be able to accept all of the FCR in the areas identified for the injection wells. Additional injection wells may need to be drilled.
- Con:** Long construction timeframe: 4-5 years

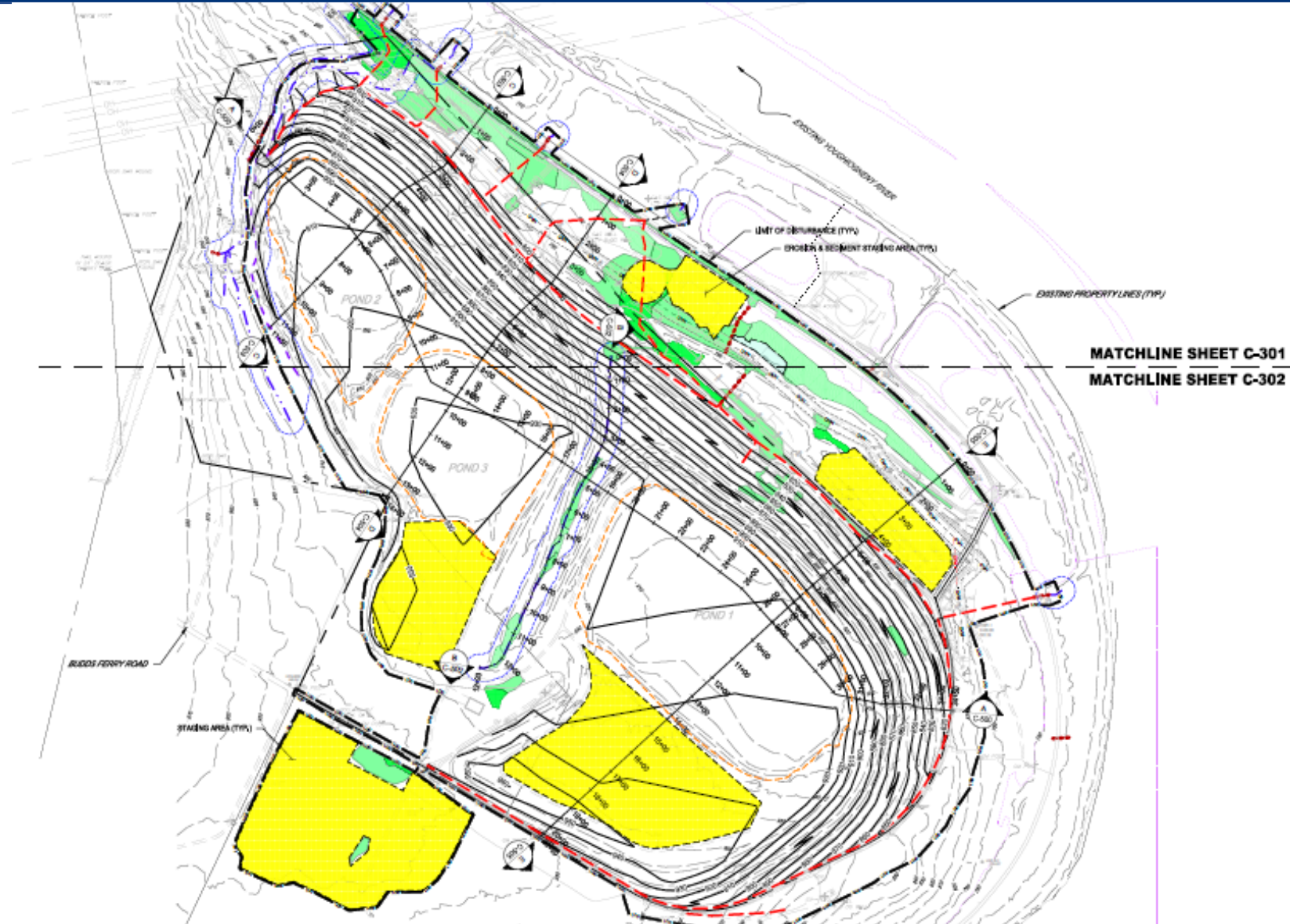
Current Project Status

- Tetra Tech was awarded a contract from PA DEP BAMR in August 2023 to complete the final design and permitting for the reclamation of the Banning/WNCL Coal Refuse Pile.
- Project will remove the fine coal refuse (slurry) and sludge, mix with coarse coal refuse and imported additives, and incorporate into final site grading plan. *(Alternative 2 from earlier project)*
- Completed the Reclamation Concept (10% Design Submittal) and submitted to BAMR on October 2, 2023
- Completed the Preliminary Design (35% Design Submittal) and submitted to BAMR on February 14, 2024

Current Project Status

- Currently working on the Prefinal Design (65% Design Submittal)
 - Project Permitting (Wetlands, E&S, Dam Decertification, and Local Permits)
 - Coordinating with Utilities for Relocation of Facilities
 - Overhead Electric Lines
 - Overhead Telephone/Communications Lines
 - Gathering Lines from Gas Wells Located on the Site
 - Coordinating with the Rail Trail for conveying stormwater/runoff under the trail
 - Finalizing additional admixture testing focused on mixes using Calciment and Cogen Flyash with a 50/50 mix of fine coal refuse/sludge plus coarse coal refuse
 - Finalizing the design plan to stage the project and stabilize the slurry (FCR)
 - Finalizing the Site Grading Plan
 - Finalizing the Site Revegetation Plan
 - Developing Prefinal Drawings and Draft Technical Specifications

Preliminary Grading Plan



Current Project Cost Estimate and Schedule

- Based on the 35% Design Submittal, the project cost estimate was \$29.3 million (2024 Cost Estimate).
- The cost estimate will be further refined for the 65% Design Submittal and will change as admixture testing is completed and material quantities are finalized.
- PA DEP BAMR recently indicated that one foot of A & B horizon topsoil will need to be included in the reclamation plan which will increase the cost.
- Anticipate submitting the Prefinal Design (65% Design Submittal) to BAMR in the next month or so.
- The 100% Final Design submittal along with all permits or permit waivers is anticipated later this summer or fall.
- PA DEP BAMR plans to bid and award the project in early 2025.

Planned Use of the Site Post-Reclamation



Based on the current grading plan and this conceptual layout, the solar array would consist of 29,042 modules (or Panels) and could produce approximately 15.8 MWdc (11.2 MWac) with an approximate 30-year life span.

Thank You!



Questions?



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