PA DEP-BAMR Planned Active Mine Drainage Treatment Projects

Cresson
Blacklick Creek
Little Conemaugh
Quakake
Gladden
Tioga / Morris Run
Audenried / Green Mt.
Dark Shade Creek
<table>
<thead>
<tr>
<th>Facility</th>
<th>Design or Construction Status</th>
<th>Treatment Process</th>
<th>Receiving Stream / Watershed</th>
<th>Anticipated Average Annual Flow</th>
<th>Projected Stream Miles Recovered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cresson</td>
<td>Construction to be Completed Dec. 2018</td>
<td>Decarbonation &amp; Hydrogen Peroxide Pretreatment _ Lime (CaOH²) _ Solids Contact Clarifier _ Polishing Wetlands</td>
<td>Clearfield Creek _ West Branch Susquehanna River</td>
<td>2,200 gpm (3.2 mgd)</td>
<td>22</td>
</tr>
<tr>
<td>Blacklick Creek</td>
<td>Design Completion 2019</td>
<td>Decarbonation _ Lime (CaOH²) _ HDS Clarifier _ Polishing Wetlands</td>
<td>Blacklick Creek _ Conemaugh River</td>
<td>2,800 gpm (4.0 mgd)</td>
<td>22</td>
</tr>
<tr>
<td>Little Conemaugh</td>
<td>Conceptual Design - Development</td>
<td>Lime (CaOH²) _ Clarifier *</td>
<td>Little Conemaugh _ Conemaugh River</td>
<td>5,000 gpm (7.2 mgd)</td>
<td>22</td>
</tr>
<tr>
<td>Quakake</td>
<td>Design Completion 2019</td>
<td>Lime (CaOH²) _ Clarifier*</td>
<td>Wetzel Run _ Black Creek _ Lehigh River</td>
<td>6,000 gpm (8.6 mgd)</td>
<td>8</td>
</tr>
<tr>
<td>Gladden</td>
<td>Design Completion 2019</td>
<td>Hydrogen Peroxide _ Sodium Hydroxide _ Inclined Plate Clarifier *</td>
<td>Millers Run _ Chartiers Creek _ Ohio River</td>
<td>700 gpm (1.0 mgd)</td>
<td>8</td>
</tr>
<tr>
<td>Tioga / Morris Run</td>
<td>Conceptual Design - Development</td>
<td>Lime (CaOH²) _ Clarifier*</td>
<td>Morris Run _ Tioga River</td>
<td>4,000 gpm (5.8 mgd)</td>
<td>20</td>
</tr>
<tr>
<td>Audenried / Green Mt.</td>
<td>Conceptual Design - Development</td>
<td>Lime (CaOH²) _ Clarifier*</td>
<td>Catawissa Creek _ Susquehanna River</td>
<td>15,000 gpm (21.6 mgd)</td>
<td>40</td>
</tr>
<tr>
<td>Dark Shade Creek</td>
<td>Conceptual Design - Development</td>
<td>Lime (CaOH²) _ Clarifier*</td>
<td>Shade Creek _ Stonycreek River</td>
<td>2,300 gpm (3.3 mgd)</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>54.7</strong></td>
<td><strong>155</strong></td>
</tr>
</tbody>
</table>

* Subject to final design evaluation
• Located in Cresson Township, Cambria County (AML Problem Area, PA 2724)

• Facility construction began July 10, 2017. Planned completion date January 2019
  • Project Number AMD 11(2724)102.1
  • Contractor: HRI, Inc.
  • Bid Amount: $12,671,212

• Receiving Stream Sequence:
  • Trapp Run _ Clearfield Creek _ West Branch Susquehanna River
  • AMD discharges in Sugar Run and Bradley Run will be eliminated by plant and mine pool management operations
Cresson AMD Treatment Plant Project

Restoration Goals:

- Treatment of AMD to eliminate three discharges from the Cresson No. 9, Gallitzin Shaft, and Argyle Stone Bridge Mine Pools
- Supply supplemental treated water to the Susquehanna River Basin during conditions of low flow

Funding Sources:

- Construction
  - Capital Budget Funding - $10 Million
  - 2016 AML Pilot Funding - $2 Million
  - AMD Set-Aside Program (As Needed)
- Operation and Maintenance
  - SRBC Consumptive Use Legislation ($2.4 Million)
  - AMD Set-Aside Program
Cresson AMD Treatment Plant Project

Location of Plant Facilities and Discharges to be Abated
Cresson AMD Treatment Plant Project

• Treatment Capacity
  • 4,400 Gallons per Minute (gpm) or 6.3 Million Gallons per Day (mgd)

• Mine Pool Management
  • Lower the three Mine Pools to Eliminate Discharges
  • Maintain Mine Pool Operating Level
    • Provide 30 days of Emergency Storage
    • Maintain Mine Pool Capacity to supply water for SRBC

July 2018
Cresson AMD Treatment Plant Project

TREATMENT PLANT COMPONENTS

• Extraction Wells
  • Four (4) Extraction Well Submersible Pumps
  • Vertical Turbine Pumps Convey Mine Water to Plant through Pipelines

• De-Carbonation System
  • Blowers Inject Air into mine water to remove CO₂

• Chemical Oxidation with Hydrogen Peroxide
  • 50% Hydrogen Peroxide System
  • Spill/Leak Containment and Safety Eyewash/Shower Station
TREATMENT PLANT COMPONENTS

• High-Density Hydrated Lime System (37%) – pH Adjustment
  • Hydrated Lime Silo, High-Density Lime Slurry Mix Tank
  • Mixed with Plant Treated Mine Water

• Solids Contact Clarifier – Recirculated Flow at 10 times the Influent flow Rate

• Polishing Wetland – To Remove Remaining Low Levels of Iron
MINE DISCHARGES

• Argyle Stone Bridge
  • Average Flow of 860 gpm
  • Impacts Sugar Run – Tributary of the Juniata River

• Gallitzin Shaft
  • Average Flow of 760 gpm
  • Impacts Bradley Run – Tributary of Clearfield Creek

• Cresson No. 9
  • Average Flow of 500 gpm
  • Impacts Trapp Run – Tributary of Clearfield Creek
## Cresson AMD Treatment Plant Project

### Pollution Loading To Be Removed

<table>
<thead>
<tr>
<th>Mine Discharge</th>
<th>Acid (lbs/day)</th>
<th>Iron (lbs/day)</th>
<th>Aluminum (lbs/day)</th>
<th>Manganese (lbs/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argyle Stone Bridge</td>
<td>560</td>
<td>48</td>
<td>46</td>
<td>10</td>
</tr>
<tr>
<td>Cresson No.9</td>
<td>685</td>
<td>235</td>
<td>32</td>
<td>7</td>
</tr>
<tr>
<td>Gallitzin Shaft</td>
<td>185</td>
<td>7</td>
<td>27</td>
<td>6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>1,430</strong></td>
<td><strong>290</strong></td>
<td><strong>105</strong></td>
<td><strong>23</strong></td>
</tr>
</tbody>
</table>
21.5 Miles of Expected Stream Restoration

- 15 Miles of Clearfield Creek from Treatment Plant Effluent to Brubaker Run

- 6.5 Miles of Sugar Run – Removing the largest source of AMD to Sugar Run
Cresson AMD Treatment Plant Project
Blacklick Creek Treatment Facility

- Located in Buffington Township, Indiana County (AML Problem Area, PA 2722)

- Facility Design Initiated in May 2017
  Planned completion date Spring 2019
  - Project Number AMD 11(2722)102.1
  - Design Firm: Tetra Tech

- Receiving Stream Sequence:
  - North Branch Blacklick Creek _ Blacklick Creek _ Conemaugh River
Restoration Goals:

- Treatment of AMD to eliminate three major AMD discharges to Blacklick Creek and restore approximately 22 miles of the North Branch and main stem of Blacklick Creek to a Trout Stocked fishery

Funding Sources:

- Construction
  - Capital Budget Funding - $14 Million
  - AMD Set-Aside Program (As Needed)

- Operation and Maintenance
  - AMD Set-Aside Program
Blacklick Creek Treatment Plant Project

- **Red Mill (Commercial No. 16)** — 744 gpm average flow into the North Branch of Blacklick Creek

- **Vinton No. 6 Boreholes**
  — 1,080 gpm average flow into the North Branch of Blacklick Creek

- **Wehrum Shaft** — 711 gpm average flow into the main stem of Blacklick Creek
Wehrum Shaft discharge entering Blacklick Creek
Blacklick Creek five miles downstream near Dilltown, PA
Blacklick Creek downstream – re-suspended iron precipitate following rain event
### Blacklick Creek Treatment Plant Project

<table>
<thead>
<tr>
<th>Location</th>
<th>Acidity</th>
<th>Aluminum</th>
<th>Iron</th>
<th>Manganese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Mill</td>
<td>1,532</td>
<td>72</td>
<td>484</td>
<td>17</td>
</tr>
<tr>
<td>Vinton No. 6</td>
<td>5,423</td>
<td>42</td>
<td>3,098</td>
<td>30</td>
</tr>
<tr>
<td>Wehrum Shaft</td>
<td>1,832</td>
<td>146</td>
<td>416</td>
<td>13</td>
</tr>
</tbody>
</table>
• Located in Portage Township, Cambria County (AML Problem Area Nos. PA 0623 and PA 2473)

• Facility Development Initiated in 2016
  • Project Number: AMD 11(0623,2473)101.1

• Receiving Stream Sequence:
  • Little Conemaugh River

• Restoration of 20 miles of the Little Conemaugh River is anticipated
Little Conemaugh Treatment Plant Project
Little Conemaugh Treatment Plant Project

Hughes Borehole

Miller Shaft

Sonman Boreholes
### Little Conemaugh Discharge Flow Analysis

<table>
<thead>
<tr>
<th>Flow Summary (gpm)</th>
<th>Sonman D11 and D12</th>
<th>Sonman D13</th>
<th>Miller Shaft</th>
<th>Hughes Borehole</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>10th percentile</td>
<td>459</td>
<td>901</td>
<td>456</td>
<td>410</td>
<td>2,226</td>
</tr>
<tr>
<td>25th percentile</td>
<td>707</td>
<td>1,367</td>
<td>755</td>
<td>620</td>
<td>3,449</td>
</tr>
<tr>
<td>Median</td>
<td>950</td>
<td>1,934</td>
<td>998</td>
<td>840</td>
<td>4,722</td>
</tr>
<tr>
<td>Mean</td>
<td>910</td>
<td>1,816</td>
<td>1,099</td>
<td>944</td>
<td>4,769</td>
</tr>
<tr>
<td>75th percentile</td>
<td>1,154</td>
<td>2,288</td>
<td>1,304</td>
<td>1,120</td>
<td>5,866</td>
</tr>
<tr>
<td>90th percentile</td>
<td>1,265</td>
<td>2,528</td>
<td>1,759</td>
<td>1,840</td>
<td>7,392</td>
</tr>
</tbody>
</table>

**Flow Summary (gpm)**: The table above provides a comprehensive summary of discharge flow analysis for different locations and percentiles.

**Sonman D11 and D12**: Data for flows at Sonman D11 and D12 locations.

**Sonman D13**: Data for flows at Sonman D13 location.

**Miller Shaft**: Data for flows at the Miller Shaft location.

**Hughes Borehole**: Data for flows at the Hughes Borehole location.

**Total**: The sum of flows from all locations.
## Discharge Raw Water Quality Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Sonman D11</th>
<th>Sonman D12</th>
<th>Sonman D13</th>
<th>Miller Shaft</th>
<th>Hughes Borehole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acid Load (lb/day)</td>
<td>3.8</td>
<td>0</td>
<td>1,872</td>
<td>468</td>
<td>2,040</td>
</tr>
<tr>
<td>pH</td>
<td>6.1</td>
<td>6.3</td>
<td>5.2</td>
<td>6.0</td>
<td>4.1</td>
</tr>
<tr>
<td>Acidity (mg/L)</td>
<td>4</td>
<td>0</td>
<td>80</td>
<td>39</td>
<td>200</td>
</tr>
<tr>
<td>Alkalinity (mg/L)</td>
<td>58</td>
<td>80</td>
<td>10</td>
<td>39</td>
<td>0</td>
</tr>
<tr>
<td>Dis. Iron (mg/L)</td>
<td>28.5</td>
<td>29.3</td>
<td>40.4</td>
<td>30.8</td>
<td>77.6</td>
</tr>
<tr>
<td>Dis. Al (mg/L)</td>
<td>0.29</td>
<td>0.28</td>
<td>4.23</td>
<td>1.2</td>
<td>8.6</td>
</tr>
<tr>
<td>Sulfate (mg/L)</td>
<td>558</td>
<td>592</td>
<td>623</td>
<td>460</td>
<td>570</td>
</tr>
</tbody>
</table>
Lower Tier Restoration Goal

* Biological Recovery with a Recreational Fishery

* Water Quality Goals:
  - pH between 6.0 and 9.0
  - Alkalinity greater than acidity
  - Total Iron less than 1.5 mg/L
  - Total Aluminum less than 0.5 mg/L
  - TDS less than 1,500 mg/L during normal stream flow
Significant Accomplishments to Date:

• Exploratory drilling completed in October 2017 with five new monitoring wells installed

• Pump down/draw down test of Sonman D13 borehole discharge confirmed that “B” and “E” seams are communicating

• Purchase option agreement for one potential plant location secured and geotechnical drilling of the potential plant location completed

• Scope of work completed for the geotechnical investigation of second potential plant location

Funding for the Little Conemaugh Project

• Capital Budget – 19.5 million for construction
• GenOn Settlement – 2.2 million for development
• Set-Aside Funding (QHU) – operation and maintenance
Little Conemaugh Treatment Plant Project

Restoration of the Little Conemaugh River by a Collaborative Effort of Community Organizations, Local Government, State and Federal Agencies, Non-Profit Organizations, and Mining Companies

• Cambria County Conservation District
• Cambria County Recreation Authority
• Portage Borough
• Portage Township
• Summerhill Township
• Western PA Coalition for Abandoned Mine Reclamation
• Community Foundation for the Alleghenies
• Foundation for PA Watersheds
• Richard King Mellon Foundation
• St. Francis University

• Stonycreek-Conemaugh River Improvement Project (SCRIP)
• Kiski Conemaugh Stream Team
• Rosebud Mining Company
• Arcelormittal Pristine Resources
• PA Fish and Boat Commission
• Office of Surface Mining, Reclamation and Enforcement
• PA DEP- Bureau of Abandoned Mine Reclamation
• US Environmental Protection Agency
Quakake Tunnel Treatment Facility

- Located in Packer and Lehigh Townships, Carbon County (AML Problem Area, PA 3700)

- Facility Design Initiated in 2018
  - Project Number AMD 13(3700)101.1
  - Design Firm: Tetra Tech

- Receiving Stream Sequence:
  - Wetzel Run _ Quakake Creek _ Black Creek _ Lehigh River

- Black Creek flows into the Lehigh Gorge State Park Recreation Area

- Approximately eight miles of stream would be restored as a trout fishery
• AML Pilot funding, in combination with other funding, will design and construct an active treatment system to treat the Quakake Tunnel discharge

• Funding will also be used to create approximately five miles of new trail beginning at the existing Weatherly Borough building and extending into the Lehigh Gorge State Park

• The new trail will traverse the restored stream
Quakake Tunnel & Weatherly Borough Trail

Typical flow: 13 CFS (6,000 gpm)
Low pH and Elevated Metals
– Primarily Aluminum
Black Creek Downstream of Quakake and Hazel Creeks
The Quakake Tunnel and Weatherly Borough Trail will have significant benefits, including:

- Eight miles of wild trout stream restored
- Improved water quality within the Black Creek Watershed
- Newly created trail will connect Weatherly Borough to the Lehigh Gorge State Park
- Increased tourism to the area
- Improved opportunities for fishing, hiking, and sightseeing
Project Partners

- Weatherly Borough
- Carbon County Commissioners
- Wildlands Conservancy
- United States Geological Survey (USGS)
- Department of Community and Economic Development (DCED)
- Pennsylvania Department of Conservation and Natural Resources (DCNR)
• Located in South Fayette Township, Allegheny County (AML Problem Area, PA 0441)

• Facility Design Initiated in 2018
  • Project Number AMD 02(0441)101.1
  • Design Firm: Tetra Tech

• Receiving Stream Sequence:
  • Millers Run _ Chartiers Creek_ Ohio River

• Upstream of the Gladden Discharge Millers Run is a Trout Stocked Fishery

• The discharge impacts four miles of Millers Run, as well as 4.2 miles of Chartiers Creek

Treatment Capacity

1,500 Gallons per Minute (gpm)
or 2.2 Million Gallons per Day (mgd)
• The discharge originates from an abandoned Pittsburgh Seam underground mine

• It is net alkaline (pH ~ 6.4) exhibiting an average flow rate of 700 gallons per minute and a dissolved iron concentration of 90 mg/l

• It is one of the largest discharges in the Chartiers Creek Watershed accounting for 40 percent of the iron load
• The Gladden AMD Treatment Plant will restore four miles of Millers Run and be instrumental in restoring 4.2 miles of Chartiers Creek to the confluence with the Ohio River.

• The facility will employ active treatment technology and utilize a chemical oxidizer, 50 percent hydrogen peroxide, to achieve treatment of the iron laden net alkaline mine water. This facility will be the first plant in Pennsylvania designed from inception to utilize this technology.
• The Gladden AMD Treatment Plant will restore four miles of Millers Run and be instrumental in restoring 4.2 miles of Chartiers Creek to the confluence with Robinson Run

• Millers Run is on the PA Fish and Boat Commission’s trout stocking list upstream of the Gladden Discharge, and the plant will enable the remaining four miles of Millers Run to also be stocked with trout
Significant Benefits

• This section of Millers Run flows past Morgan Park and through the Newberry Market development, both of which would provide good access points for fishing

• Chartiers Creek flows past Meyer and Middleton Park, which also could serve as a fishing/recreational access for the stream
• Chartiers Creek is also a common place for canoes and kayaks, with seven boat launches along its banks between Canonsburg Lake and the Ohio River.

• Restoring this section of Millers Run would provide an aesthetically pleasing stream for this development and existing residential areas and provide a stream with a high potential for recreational visitation.
The Gladden AMD treatment plant will be utilized as an educational tool for local schools and universities.

DEP-BAMR routinely receives and accommodates requests from high schools and colleges to tour existing AMD treatment facilities.

Chartiers Valley High School is located along Chartiers Creek, South Fayette High School is located within five miles of the proposed Gladden Treatment Plant, and Robert Morris University is located within 20 miles of the plant site.

Tours of the plant and the improved water quality of the streams will provide these schools with excellent educational opportunities.
Project Partners

• South Fayette Conservation Group (SFCG)

• Tetra Tech Consultants

• John Kotsky (Primary Landowner)

• Pennsylvania Department of Environmental Protection

• Office of Surface Mining Reclamation and Enforcement

• Pennsylvania Turnpike Commission
• Located in Hamilton and Ward Townships, Tioga County (AML Problem Area Nos. PA 1906 and PA 6661)

• Facility Development Initiated in 2018
  • Project No. AMD 59(1906,6661)101.1

• Receiving Stream Sequence:
  • Morris Run and Coal Creek _ Tioga River

• AMD will be collected from discharges along Morris Run, Coal Creek and adjacent mine pools via directional-drilled bores, then conveyed to a centralized treatment plant near Morris Run
• Tioga River is severely impacted from acid mine drainage, and there is little to no aquatic life in the river

• AML Pilot funding will be used to design and construct an active AMD treatment system with the intent of restoring the Tioga River

• Along with improved water quality at the Tioga/Hammond Dam Complex, approximately $875,000 per year in revenue will be generated for the local economy
20 miles of streams will be restored, along with improved water quality at the Tioga/Hammond Dam Complex
AMLF No. 1906-01 (WA): This feature in Morris Run identified as the East Mine Discharge is a continuous AMD discharge from mine opening AMLF No. 1906-02 (MO). Average flow is 300 gpm. Average water chemistry values: pH=2.9, Al=40 mg/l, Fe=10 mg/l, Mn=30 mg/l, acidity=400 mg/l, alkalinity=0 mg/l.
AMLF No. 1906-07 (WA): This feature near Morris Run is a continuous AMD discharge from the Lake Mine Complex. Average flow is 1,300 gpm. Average water chemistry values: pH=3.2, Al=20 mg/l, Fe=8 mg/l, Mn=25 mg/l, acidity=230 mg/l, alkalinity=0 mg/l.
AMLF No. 6661-06 (WA): The Coal Creek acid mine discharge is the largest volume discharge within the Tioga River Watershed. It has the most degraded water quality and is responsible for 45 percent of the total acidity load to the Tioga River. Average flow is 2,500. Average water chemistry values: pH=2.8, Al=33 mg/l, Fe=43 mg/l, Mn=10 mg/l, acidity=440 mg/l, alkalinity=0 mg/l.
Tioga River meets the Tioga/Hammond Dam Complex: As the acid mine drainage from the Tioga River is mixed with the alkaline water of the lakes, it slowly becomes neutralized and the high levels of dissolved metals begin to precipitate. The unnatural blue-green color that is visible in Tioga Lake is due to precipitation of these metals, such as aluminum.
Significant Benefits

• Restore a total of 20 miles of streams back to a natural state as a wild trout and stocked trout fishery
• Improve water quality within 500-acre Tioga Lake and ultimately the entire 1,200-acre Tioga/Hammond Dam Complex; only half of the complex is good water quality
• Produce positive economic benefits to the Tioga/Hammond Dam Complex recreation area
• Increase the number of visitors to this rural area in the form of fishing, boating, camping, tourism, and sightseeing
• Establish new businesses in the area, create jobs and fuel economic growth
• Generate approximately $875,000 per year in revenue for the local economy
• Pennsylvania Department of Conservation and Natural Resources

• Susquehanna River Basin Commission

• Tioga County Conservation District

• Tioga County Concerned Citizens Committee

• Office of Surface Mining Reclamation and Enforcement

• Pennsylvania Department of Environmental Protection
• Located in Central City Borough and Shade Township, Somerset County (AML Problem Area Nos. PA 0240 and PA 2520)

• Facility Development Initiated in 2018

• Receiving Stream Sequence:
  • Dark Shade Creek _ Shade Creek _ Stonycreek River

• Four underground mine discharges with a combined average flow of 2,300 gpm will be routed to a centralized treatment facility
Dark Shade Treatment Plant Project

13 Miles of Impacted Streams
Project Objectives:

- **Lower Tier Restoration (Recreational Fishery) of approximately 13.1 miles of Shade Creek from Central City to junction with Stonycreek River below Seanor**

  - Lower Tier Definition – Provide for biological restoration, including, where applicable, a recreational fishery. In-stream contaminant concentrations must be met during normal stream flow conditions: pH > 6.0, hot peroxide acidity < 0, total Fe < 1.5 mg/L, total Al < 0.5 mg/L and TDS < 1,500 mg/L.

- **Decreased pollution load expected to benefit the overall health of the Stonycreek River downstream of Shade Creek**
## Big 4 Discharges – Pollution Loading

<table>
<thead>
<tr>
<th>Discharge</th>
<th>Acidity Loading lbs/day</th>
<th>Iron Loading lbs/day</th>
<th>Manganese Loading lbs/day</th>
<th>Aluminum Loading lbs/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reitz No. 4 Discharge</td>
<td>3032</td>
<td>958</td>
<td>89</td>
<td>127</td>
</tr>
<tr>
<td>Loyalhanna Discharge</td>
<td>1823</td>
<td>790</td>
<td>78</td>
<td>38</td>
</tr>
<tr>
<td>Reitz #2 Large</td>
<td>961</td>
<td>12</td>
<td>42</td>
<td>85</td>
</tr>
<tr>
<td>Reitz #2 Small</td>
<td>76</td>
<td>1</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Totals</td>
<td>5893</td>
<td>1761</td>
<td>212</td>
<td>258</td>
</tr>
</tbody>
</table>

### Shade Creek Discharge Daily Loadings

- **Acidity Loading lbs/day**
- **Iron Loading lbs/day**
- **Manganese Loading lbs/day**
- **Aluminum Loading lbs/day**
Current Tasks:
• Geochemist Workbench Modeling
• Monitoring of Discharges (Flows and Quality)
• Geo-referencing of Mine Maps

Future Tasks:
• Prepare Scope of Work for Drilling of Monitoring Wells
• Prepare Task Implementation Plan
Green Mountain /Audenried Treatment Facility

- Located in East Union Township, Schuylkill County (AML Problem Area, PA 3701)
- Facility Development Initiated in 2018
- Receiving Stream Sequence:
  - Catawissa Creek _ Susquehanna River
- Both discharges result from turn of the 20th century mine drainage tunnels
- The resultant high volume discharges impair over 40 miles of Catawissa Creek
Green Mountain Discharge/Audenried Discharge

Median Flow  15 CFS  
Max Flow > 30 CFS  
Aluminum 4 – 10 mg/L  
Acidity 40 – 90 mg/L  
pH ~ 4.0
Green Mountain Discharge/Audenried Discharge

Median Flow 3 CFS
Aluminum 2-5 mg/L
Acidity 20 – 50 mg/L
pH ~ 4.2

Green Mt. Tunnel Discharge
Green Mountain Discharge/Audunried Discharge

Catawissa Creek 17 miles downstream

pH ~4.6
Total Aluminum > 0.5 mg/l
Significant Benefits

• Treat the Green Mountain Tunnel discharge
• Upgrade the treatment of the Audenreid Tunnel discharge to an active system utilizing some of the existing infrastructure from the existing failed passive system
• Facilitate the sustainable recovery of the upper Catawissa Creek Watershed while developing the water and energy assets to provide a source of revenue to fund the ongoing AMD treatment cost
• Deploy Microhydro technology for electricity generation
• Restore approximately 40 miles of Catawissa Creek to a Wild Trout or Stocked Trout fishery
• With a restored Catawissa Creek, it is estimated $2,500,000 can be contributed to the local economy per year
Project Partners

• Eastern Middle Anthracite Regional Recovery (EMARR)
• Natural Lands Trust (NLT)
• Eastern PA Coalition for Abandoned Mine Reclamation (EPCAMR)
• Schuylkill/Columbia County Conservation Districts
• Catawissa Creek Restoration Association
• Pennsylvania Department of Environmental Protection
• Pennsylvania Department of Conservation and Natural Resources
• Office of Surface Mining Reclamation and Enforcement
• Hazleton Environmental
• Schumacher Engineering