


OVERVIEW OF ACTIVE MINE DRAINAGE TREATMENT FACILITIES CURRENTLY OPERATED BY THE PA-DEP-BUREAU OF ABANDONED MINE RECLAMATION

Rich Beam P.G.

40th Annual West Virginia Mine Drainage Task Force Symposium
Morgantown, WV
March 26-27, 2019

PA DEP-BAMR Active Mine Drainage Treatment Facilities

- **The Commonwealth of Pennsylvania, Department of Environmental Protection, and its predecessor agencies, the Department of Environmental Resources and the Department of Mines & Mineral Industries have constructed and operated active mine drainage (AMD) treatment facilities in the Anthracite and Bituminous Regions of PA since 1968.**

- **The initial sources of funding for the construction, operation and maintenance of these facilities was the Scarlift Bond Issue (Project 500 or Operation Scarlift). The Scarlift Program was implemented through bond issue funding and authorized by legislation enacted as part of the "Land and Water Conservation Act" of 1968. In recent years funding for ongoing operation and maintenance is provided from both the PA Capital Budget and Title IV of the Surface Mining Control and Reclamation Act of 1977 through the AMD Set-Aside Program.**

- **PA DEP BAMR currently operates and maintains four (4) of those original treatment facilities. In addition four (4) more facilities have been added. An additional eight (8) new active treatment facilities are in either the planning, design or construction phase.**

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PA DEP-BAMR Scarlift Era Mine Drainage Treatment Facilities

Facility	County	Project ID	Avg Flow (MGD)	Plant Cap. (MGD)	Treatment Process	Capital Cost	Operational Period
Slippery Rock Creek	Butler	SL 104	3.6	12 - 15	Lime ($CaOH_2$), Clarifier, Ponds	$804,845	1970 to 1990
Sandy Run	Luzerne	SL 106-1	5	15	Lime Doser	$48,516	1970 to 1990
Buck Mt. Tunnel	Carbon	SL 106-2	2	5	Lime Doser	$40,025	1970 to 1990
Swamp Creek	Elk	SL 106-3	3.9	10	Lime Doser	$70,730	1970 to present
Ernest / Creekside	Indiana	SL 107-5-3	4.5	4.5	Lime ($CaOH_2$), Clarifier	$4,327,797	1982 to 1984
Rausch Creek	Schuylkill	SL 112-1	8.8	16	Lime (CaO), Clarifier, Ponds	$3,555,297	1974 to present
Altoona Water Auth.	Blair	SL 116-3	12.5	15	Lime ($CaOH_2$), Clarifier	$5,074,529	1975 to present
Hawk Run	Clearfield	SL 117-1	0.5	0.5	Ion Exchange, Filtration	$2,713,236	1972 to 1974
Toby Ck / Coal Hollow	Elk	SL 132-5	1.44	1.44	Limestone drums, siphons	$2,735,374	1992 to present
Quakake Demo	Carbon	SL 135-10		3	Limestone drums, barriers	$331,185	1979 to 1981
Aylesworth Creek	Lackawanna	SL 139-1-5	1.2	11	Limestone drums / doser	$344,519	1983 to 1986
Pigeon Creek	Washington	SL 142-1	0.43	1.15	Passive aeriation, Pond	$53,187	1970 to present
Wildwood	Allegheny	SL 198-2	1.0	1.15	Chem. Oxidation (H_2O_2), ponds	$214,884	1974 to present
Little Scrubgrass	Butler	BM 113	?	?	Lime Doser	?	? To 1980
Smith Township	Washington	SL 114-1	?	0.5	Ion Exchange, Filtration	$576,993	1974 to ?

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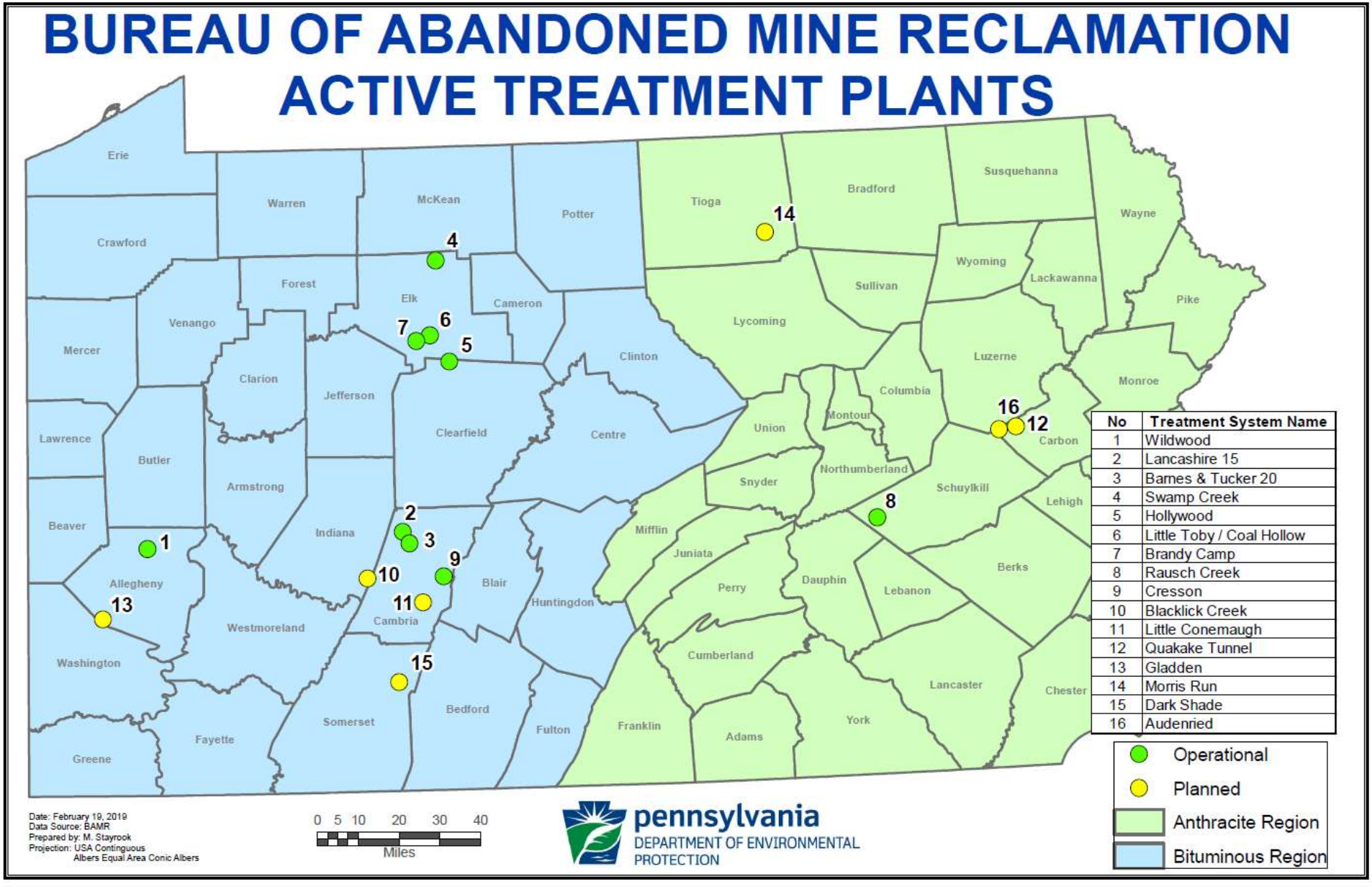
PA DEP-BAMR Active Mine Drainage Treatment Facilities



PA DEP-BAMR Active Mine Drainage Treatment Facilities

Wildwood

Lancashire 15

Brandy Camp

Swamp Creek

B & T Mine 20

Hollywood

Little Toby and Coal Hollow

Rausch Creek

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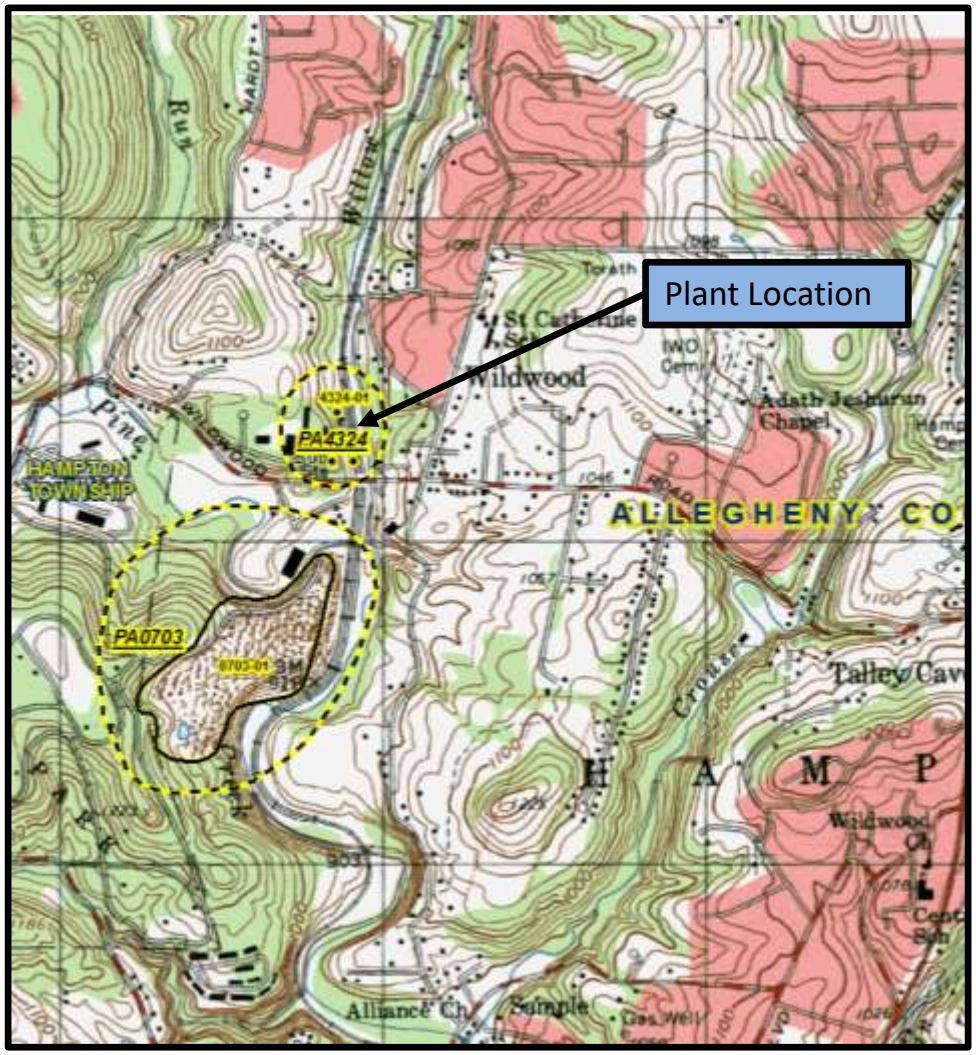
Wildwood Treatment Facility

- **Located in Harmar Township, Allegheny County (AML Problem Area, PA 4324)**
- **Facility constructed in 1974 by the Commonwealth under Operation Scarlift**
  - **Project Number SL 192-2**
  - **Capital Cost: $214,884**
- **Receiving Stream Sequence:**
  - **Willow Run to Pine Creek to Allegheny River**
- **Pine Creek is one of the few remaining Trout Stocked Fisheries in Allegheny County.**



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Wildwood Treatment Facility

- **Upper Freeport Underground Mine operated by the Rochester and Pittsburgh Coal Company (R&P) - Abandoned in 1972**

- **Artesian alkaline - Iron discharge degraded ~ 8 miles of the receiving stream, Pine Run, a trout stocked fishery**

Original system design:

- Atmospheric aeration using aeration trays
- 256’(l)x46’(w)x10’(d) sedimentation basin
- Design flow – 800 gpm

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Wildwood Treatment Facility

Initial system performance

Date: 1/16/1976	Influent	Effluent
pH	6.40	7.10
Alkalinity (mg/l)	460	460
Total Iron (mg/l)	37.4	29.5
Dissolved Iron (mg/l)	35.8	22.6
Sulfate (mg/l)	619	619

- **In 1977 the system was retrofitted to include a chemical oxidant.**
- **50% hydrogen peroxide has been used at the site since that time.**

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Wildwood Treatment Facility

Results of the peroxide addition redesign were published in July 1977 in WPCF Journal:

Peroxide oxidation of iron in coal mine drainage

C. A. Cole
The Pennsylvania State University, Middletown

A. E. Molinski, N. Rieg
Pennsylvania Department of Environmental Resources, Harrisburg

F. Backus
E. I. DuPont DeNemours & Co., Wilmington, Del.

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Wildwood Treatment Facility

Current system performance

Date 8/11/2012	Influent	Effluent
pH	7.3	7.5
Alkalinity (mg/l)	390	371
Total Iron (mg/l)	9.9	1.52
Dissolved Iron (mg/l)	9.8	0.04
Sulfate (mg/l)	159	158
Flow Rate (gpm)	1,200	

- **Peroxide addition rate = 8.5 gal/day**
- **Annual cost @ $2.85/gal = $8,850**
- **Electrical cost 110v Peroxide pump = ~ $500/year**

- **The treated mine discharge provides an additional benefit in that the constant temperature of the mine discharge (52^0 F) has allowed for the establishment of a 1.4 mile section of delayed harvest trout fishery on Pine Creek.**

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Wildwood Treatment Facility

Cost Benefit Analysis

Receiving Stream	Miles Improved	Use Rate (1) Trips/mile /year	Value (2) $/trip	Economic (3) Benefit	Annual (4) Operation Cost	Benefit Cost Ratio
Willow Run/ Pine Creek	8	1,100	$78.02	$686,576	$10,848	63 : 1

(1) Source: PA Fish & Boat Commission (PAFBC) internal Biologist interviews
(2) Source: Recreational Use Loss Estimates for Pennsylvania Streams Degraded by AMD 2006 (PAFBC)
(3) Economic Benefit = miles improved x use rate x valuation
(4) 2017 Cost (Includes treatment chemical, electric, labor and sludge disposal costs)

- **The stream flows through North Park, a heavily visited Allegheny County recreational facility. Encompassing 3,075 acres in Hampton, McCandless and Pine townships, North Park features a 65-acre lake with fishing and kayaking. Additional amenities include a golf course, pool, ice rink, ballfields, nature center, shelters, off-leash areas, deck hockey rink, and trails.**

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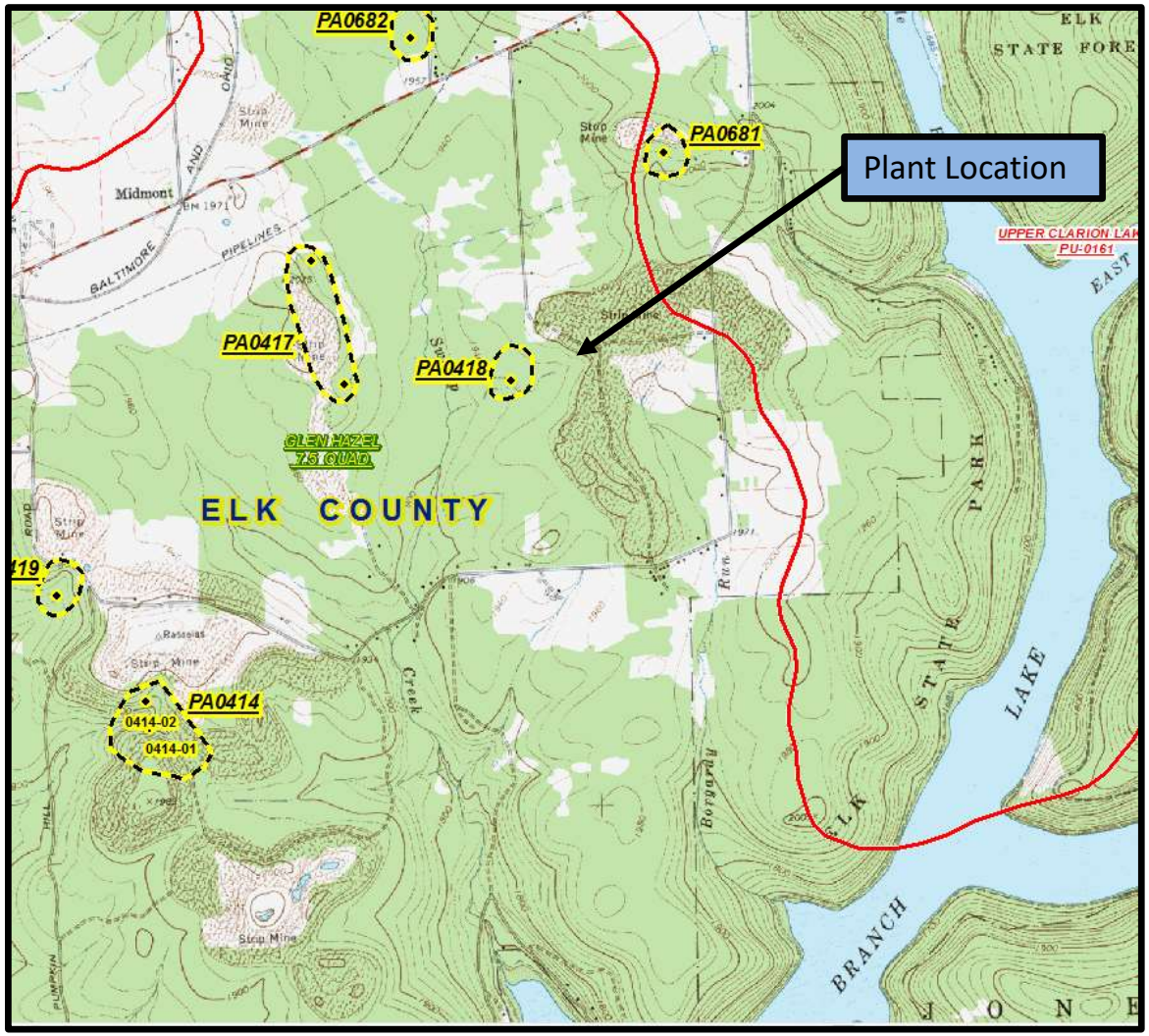
Swamp Creek Treatment Facility

- **Located in Jones Township, Elk County (AML Problem Area, PA 0418)**
- **Facility constructed by the Commonwealth of PA under Operation Scarlift in 1970**
  - **Project No. SL 106-3**
  - **Capital Cost: $70,729.50**
- **Treating AMD from several AML problem areas in the headwaters of Swamp Creek, which then flows directly to the USACOE East Branch Flood Control Dam and the East Branch of the Clarion River**



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Swamp Creek Treatment Facility

- **The Swamp Creek Treatment Facility consists of a hydrated lime silo with an automatic feed control. The Plant doses Swamp Creek with hydrated lime.**
- **The lime silo was updated with a new electrical unit, auger and automation in 2007.**
- **Designed to treat an average flow rate of up to 2,000 gallons per minute (gpm) and a maximum flow of 7,000 gpm.**

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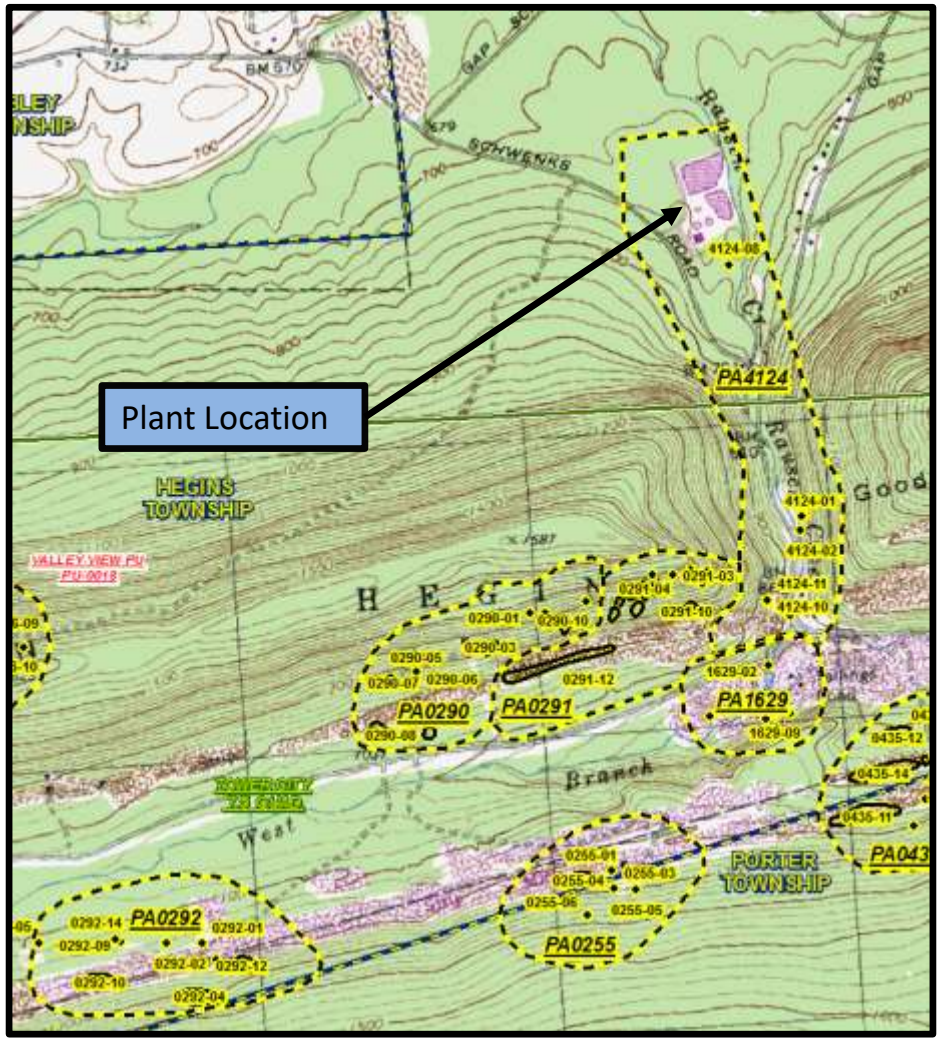
Rausch Creek Treatment Facility

- **Located in Hegins Township, Schuylkill County (AML Problem Area, PA 4124)**
- **Facility constructed by the Commonwealth of PA in 1974**
  - **Project No. SL 112-1**
  - **Capital Cost: $3,555,297.63**
- **Receiving Stream Sequence:**
  - **Rausch Creek**
  - **Pine Creek**
  - **Mahantango Creek**
  - **Susquehanna River**
- **The Rausch Creek facility is an on-stream plant. Rausch Creek is intercepted and diverted into the treatment plant.**



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Rausch Creek Treatment Facility

- **There are large abandoned mine pools in the Watershed of Rausch Creek. They are known as Brookside, Good Spring No. 1, Good Spring No. 3, Markson and Williamstown-Lykens. Abandoned mine drainage discharges provide the bulk of the base flow in the headwaters of Rausch Creek.**

- **The Rausch Creek Treatment Facility was placed in operation during April 1974 and has been in continuous operation since that time.**

- **The Facility is capable of treating a maximum flow of 16 million gallons per day. Excess streamflow is by-passed around the plant and neutralized with lime slurry.**

Rausch Creek Treatment Facility

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Rausch Creek Treatment Facility

- **The acidic waters taken into the plant flow into a 17 x 17 foot flash mixer where the water is mixed with lime slurry made from calcium oxide (CaO).**

- **The neutralized water then flows into two aeration tanks where it is aerated for 30 minutes in order to oxidize the iron. At the effluent of the aeration tanks, a polymer is added.**

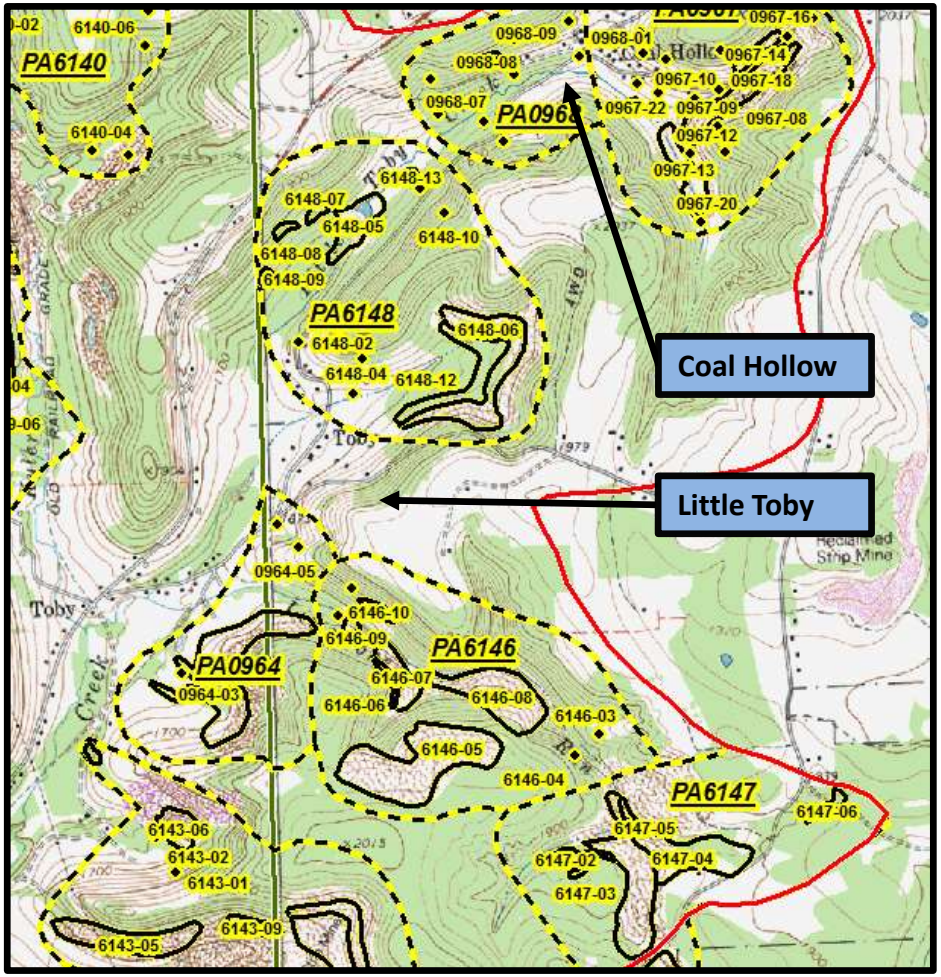
- **The aerated water then passes into two 90-foot diameter clarifiers where the solids settle out.**

Little Toby/Coal Hollow Treatment Facilities

- **Located in Fox Township, Elk County** (Little Toby AML Problem Area, PA 0964, Coal Hollow AML Problem Area, PA 0968)

- **Both facilities constructed by the Commonwealth in 1996**
  - Project Nos. SL 132-5-106.11,12,13,14, 107.1 and 108.1
  - Capital Cost: $2,735,374.24

- **Receiving Stream Sequence:**
  - Little Toby Creek
  - Clarion River



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Little Toby/Coal Hollow Treatment Facilities

Little Toby Plant

- **Both facilities originally employed a treatment approach that utilized high calcium limestone fines.**

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Little Toby/Coal Hollow Treatment Facilities

- **At Toby an average of 500 gallons per minute (gpm) of mine drainage from three separate source locations is treated. The Coal Hollow facility treats an additional average 500 gpm flow from an upstream AMD source.**

- **The initial design involved the use of water-powered rotating drums to pulverize limestone fines and mix with the mine water influent. In addition flushable beds of limestone fines were also used at the Toby Plant.**

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Little Toby/Coal Hollow Treatment Facilities

- **A trial study had been conducted at the Plant using a calcium hydroxide premix slurry product from December 11, 2009, through January 28, 2010.**

- **The trial results have shown several advantages over bagged lime:**
  - **A more consistent slurry feed rate resulted in improved water quality results.**
  - **The premixed lime slurry proved to be 25 percent more efficient than the existing bagged lime.**

- **A 7,000 gallon slurry tank equipped with mixer and pump was installed at the Plant.**

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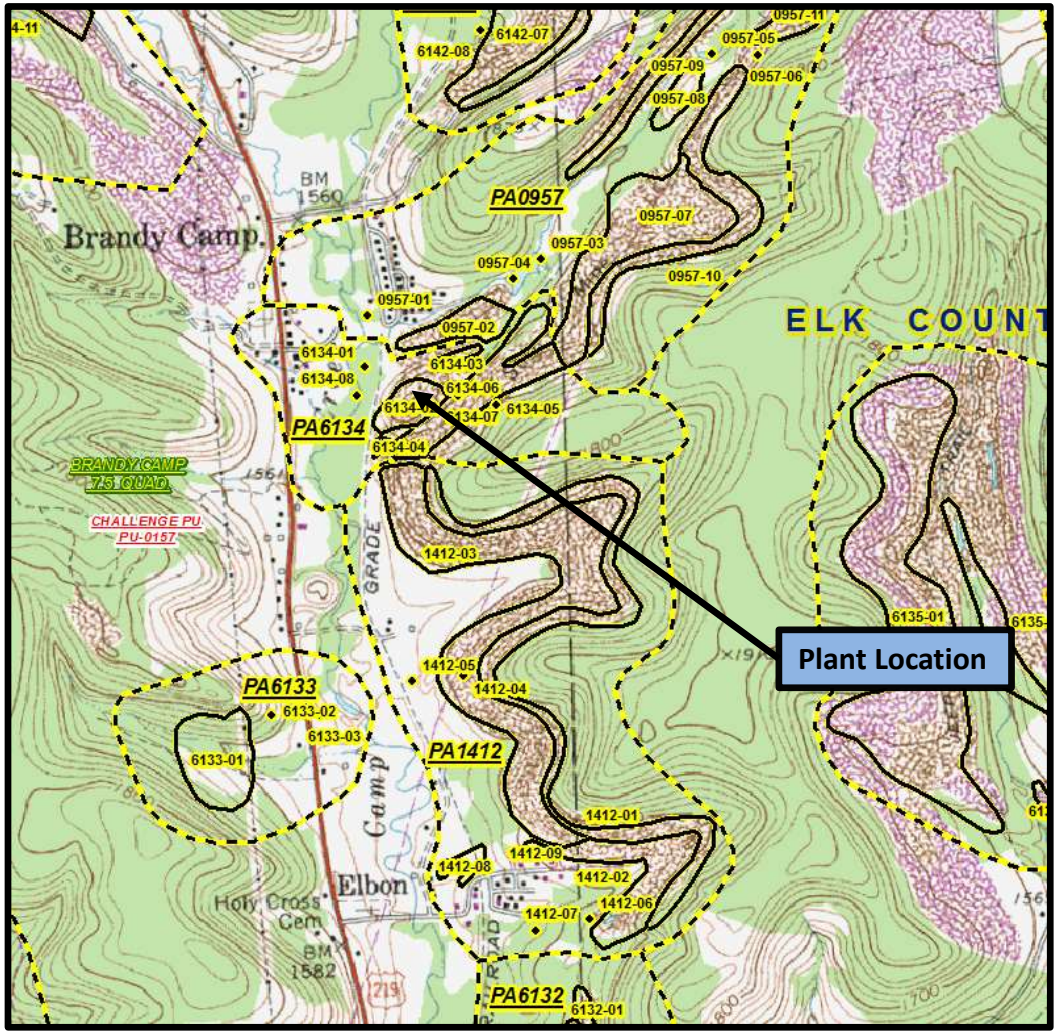
Brandy Camp Treatment Facility

- **Located in Horton Township, Elk County** (AML Problem Area, PA 6134)

- **Constructed by the Commonwealth in 2001**
  - Project Nos. OSM 24(6134)101.1 thru 104.1
  - Capital Cost: $2,481,339.98

- **Receiving Stream Sequence:**
  - Brandy Camp Creek
  - Little Toby Creek
  - Clarion River



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Brandy Camp Treatment Facility

- **Brandy Camp's original configuration was a lime silo, settling pond and polishing wetland. It was designed to treat up to 700 gallons per minute.**

Brandy Camp Treatment Facility

- **In 2008 and 2009 BAMR and OSM conducted hydrogeologic investigations of underground and surface mines that are hydrologically connected to the Brandy Camp Facility.**

- **Both objectives were realized and recommendations that were provided have resulted in significant improvement in Plant performance that have lowered operational costs.**

Brandy Camp Treatment Facility

- **In 2012 a trial study was conducted using a combination of bulk hydrated lime, hydrogen peroxide and hydrated lime slurry in order to help determine the most efficient and cost effective mode of operation.**

- **In 2015 Brandy Camp was upgraded to include hydrogen peroxide pretreatment and premanufactured lime slurry systems.**

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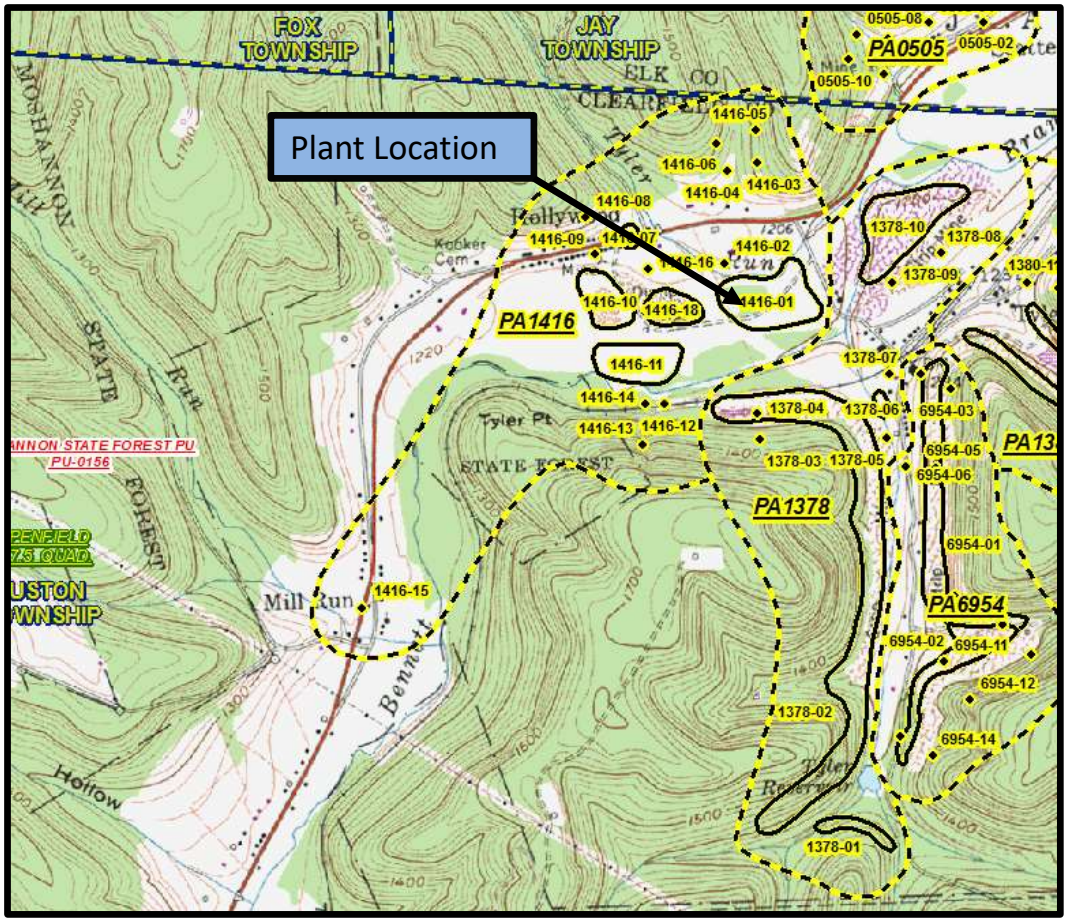
Hollywood Treatment Facility

- **Located in Huston Township, Clearfield County and Jay Township, Elk County (Main AML Problem Area, PA 1416)**

- **Facility constructed by the Commonwealth of PA in 2013**
  - **Project No. AMD 17(1416)202.1**
  - **Capital Cost: $14,608,912.68**

- **Receiving Stream Sequence:**
  - **Bennett Branch Sinnemahoning Creek**
  - **Sinnemahoning Creek**
  - **West Branch Susquehanna River**

- **Treating AMD from 20 mine seals, 2 seeps and 2 horizontal boreholes**



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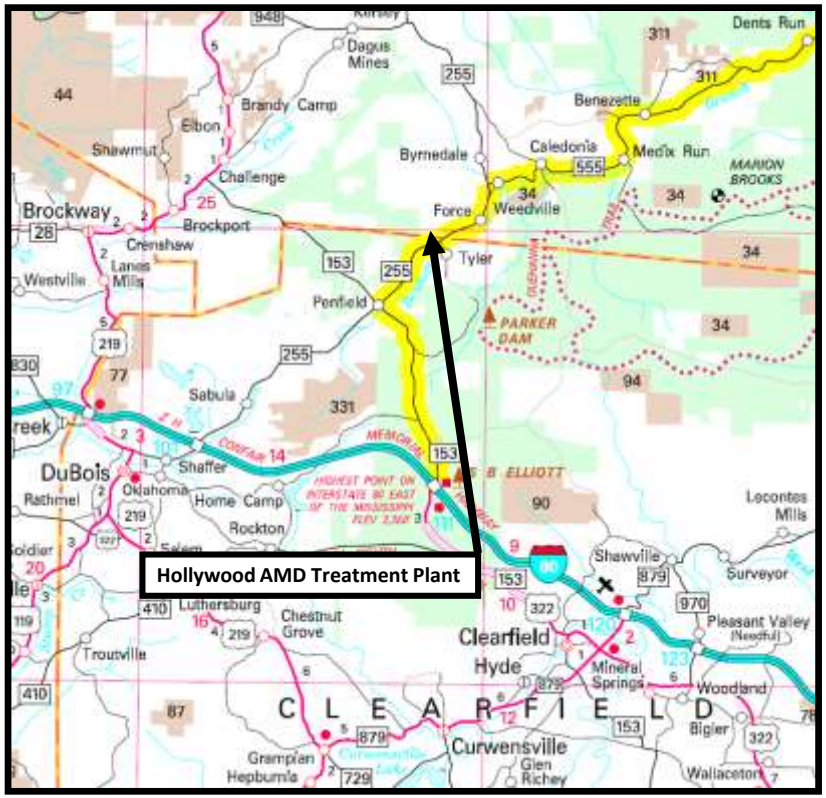
Hollywood Treatment Facility

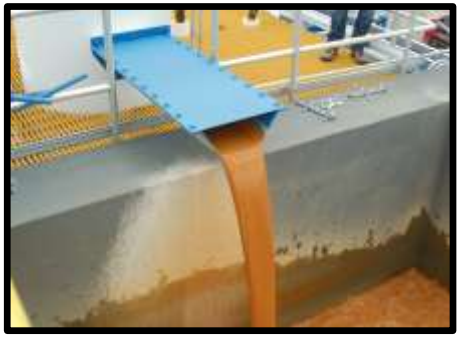
Location:	**Village of Hollywood, Huston Township, Clearfield County and Jay Township, Elk County (South side of State Route 255)**
Official Start Date:	**July 1, 2010**
Completion Date:	**August 27, 2013**
Treatment Start Date:	**March 2013**
Contractor:	**Kukurin Contracting, Inc.**
Project Cost	**$14,608,912.68**
Project Area:	**41 Acres**



Hollywood Treatment Facility

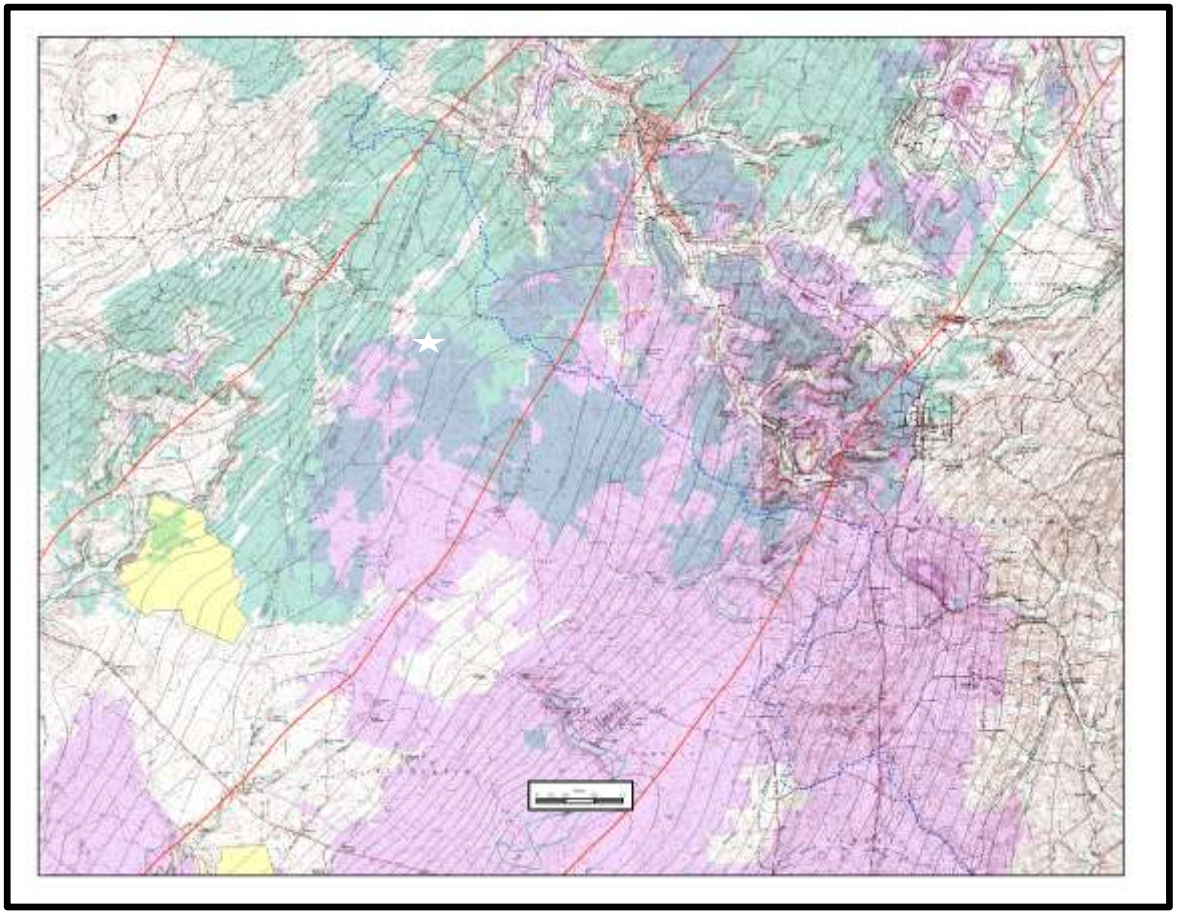
- **The facility has a treatment capacity of up to 10 million gallons per day (7,000 gallons per minute) utilizing a hydrated lime high density slurry system that includes sludge recirculation technology (HDS)**

- **Major Treatment Components**
  - **2 Ferrous oxidation reactors**
  - **180-foot diameter clarifier**
  - **2 Sludge conditioning reactors**
  - **4.5-Acre polishing pond**



Lancashire 15 Site Background

- **Located in Barr and West Carroll Townships, Cambria County and Pine Township, Indiana County.**
- **Surface and Underground Mining primarily on two coal seams – the Lower Kittanning "B" seam and the Lower Freeport "D" seam.**
- **Underground mining has been ongoing in the area for the past 100+ years.**



- **The shaded outlines on the map indicate "B" and "D" seam underground mines in the area.**

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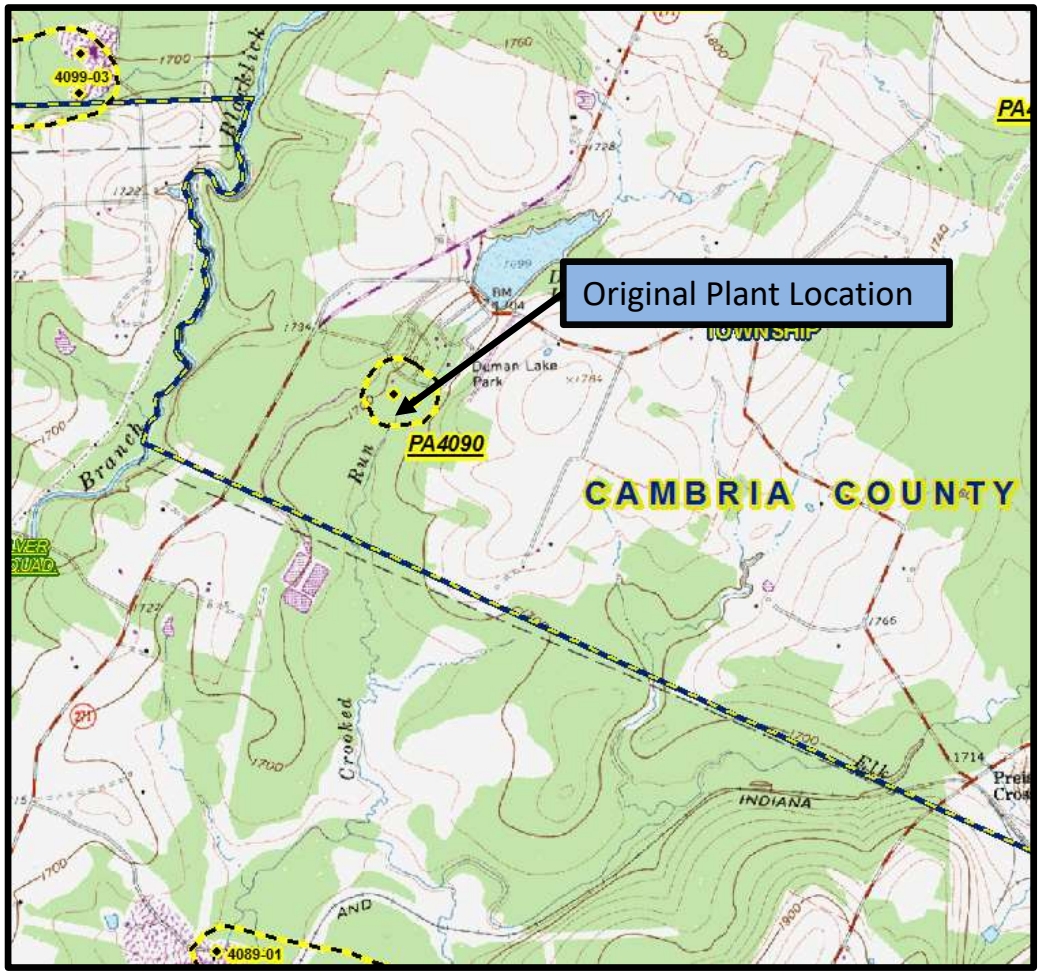
Lancashire 15 Site Background

- **Original treatment facility, known as the Duman Plant, was located in Barr Township, Cambria County (AML Problem Area, PA 4090).**

- **Facility constructed by Barnes and Tucker Coal Company (B&T) in 1966.**

- **B&T pumped and treated the mine water until bankruptcy (September 2001). The Commonwealth then took over treatment.**



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Lancashire 15 Site Background

- **Barnes & Tucker closed Lancashire 15 on July 14, 1969, (pumps shut off) and it began to flood.**

- **A mine pool blowout occurred in late June 1970. The mine water breakout originated near the sealed entries of the Lancashire 15 mine and resulted in a major pollution event and fish kill on the West Branch Susquehanna River.**

- **During the summer of 1970 the Commonwealth conducted emergency treatment operations.**
  - **The upper right photo shows lime being end dumped into the West Branch to raise pH and neutralize acidity in the river.**
  - **The lower right photo indicates tank trucks delivering sodium hydroxide (NaOH) which was used to adjust pH at the outlet of the Curwensville USACOE dam.**

Lancashire 15 Site Background

Commonwealth v. Barnes & Tucker Co.
472 Pa. 115 (1977)
371 A.2d 461
COMMONWEALTH of Pennsylvania v. BARNES & TUCKER COMPANY, Appellant.
Supreme Court of Pennsylvania.
Argued November 15, 1976.
Decided February 28, 1977.

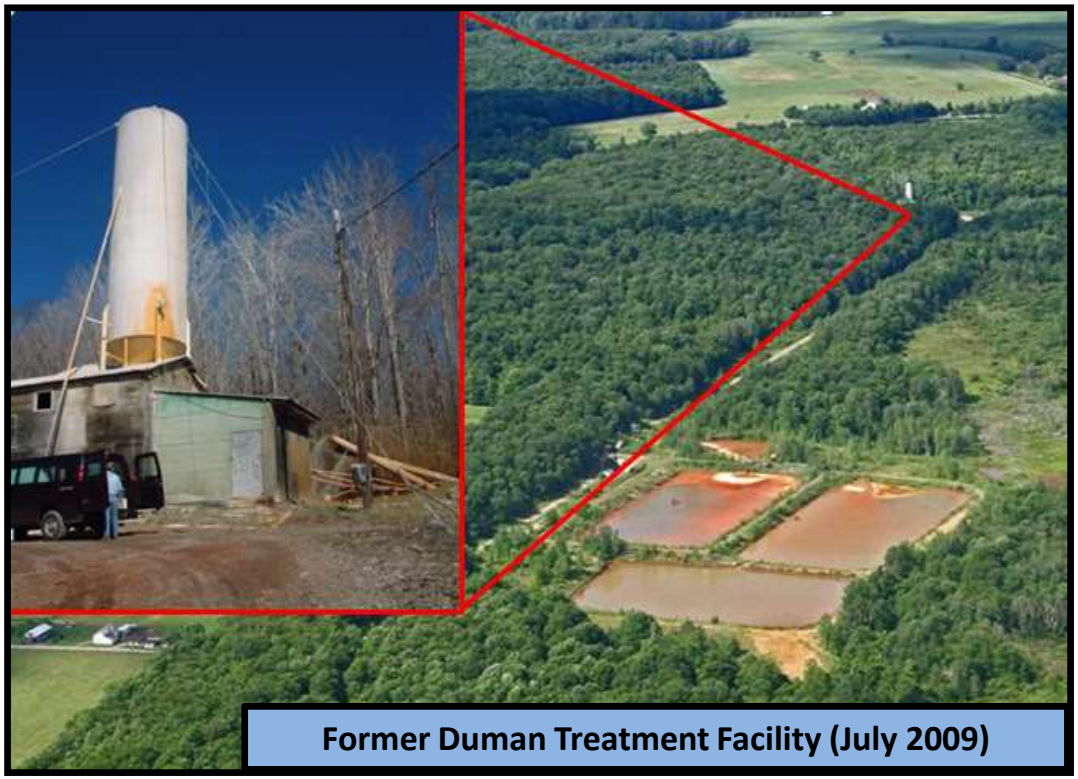
Upon remand from this Court, the Commonwealth Court made additional findings of fact and entered a final decree, which reads in pertinent part:
"2. For the purpose of avoiding repetition of such a breakout or the discharge of untreated acid mine water *122 from Mine No. 15 into the waters of the Commonwealth, a public nuisance; and until such time as the likelihood of a reoccurrence of another breakout is past, Barnes & Tucker Company shall cause to be pumped from Mine No. 15 sufficient quantities of mine water to avoid any such breakout and shall maintain a treatment program of the mine water discharge to achieve minimum water quality standards as prescribed by law pertaining to the discharge of acid mine water into the waters of the Commonwealth. 3. Expenses incurred by the Commonwealth in the operation and maintenance of the Duman Dam pumping and treatment facility or sums paid by the Commonwealth to Barnes & Tucker incident to the operation of said pumping and treatment facility by Barnes & Tucker during the course of this litigation as prescribed in our prior Orders of April 13, 1971, June 7, 1973 and September 20, 1974, shall be entered as a money judgment in favor of the Commonwealth and against Barnes & Tucker Company."

Lancashire 15 Site Background

- **The Duman Facility was located in the deepest portion of the Lancashire 15 Mine. Very high pumping and electrical costs.**

- **Pumped and treated about 9.4 million gallons per day (mgd) (6,500 gallons per minute) in order to control the mine pool.**

- **Discharged water (7 - 8 mgd) to tributaries of Blacklick Creek (Elk Creek).**



Former Duman Treatment Facility (July 2009)

Water quality:
pH ~ 6.5
Alkalinity ~ 130 mg/L
Dissolved Iron ~ 40 mg/L
(mainly ferrous)
Manganese < 1.0 mg/L
Sulfate ~ 378 mg/L

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Lancashire 15 Site Background

Rationale for moving the Treatment Plant

- **The pumps, Plant and entire system were ~ 40 years old and antiquated.**
- **A new plant at the selected location would not have to pump from such a great depth (capital cost and energy savings) and would employ newer more efficient technology (VFDs, HDS design, etc.).**
- **The Susquehanna River Basin Commission (SRBC) expressed interest in having the treated effluent discharged to the West Branch for flow augmentation and consumptive use needs and provided funding which would provide partial coverage of the treatment costs.**

Lancashire 15 Treatment Facility

- **In 2011 a new hydrated lime treatment facility was constructed to replace the original Barnes and Tucker system.**
- **The treatment process includes:**
  - **Pre-aeration to exsolve $CO_{2(aq)}$ from raw mine water**
  - **Dense sludge recirculation**
  - **Polymer addition**
- **Tradeoff was that net acidic water would be encountered for at least a period of time at the new plant location given that pumping would occur in more shallow portions of the mine pool.**

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Lancashire 15 Treatment Facility

Location: **Barr Township, Cambria County**

Official Start Date: **October 30, 2009**

Completion Date: **June 17, 2012**

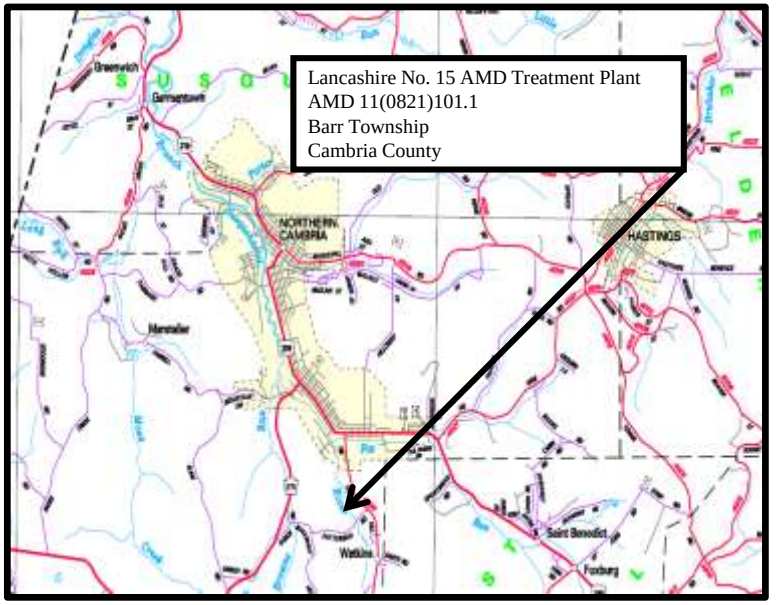
Treatment Start Date :**November 2011**

Contractor: **HRI, Inc.**

Property Owner: **Clean Streams Foundation, Inc.**

Project Cost: **$12,887,517.42**

Project Area: **22.4 Acres**



Lancashire 15 Original Treatment Strategy

By the summer of 2013, the initial net acidic influent became net alkaline. The hydrated lime ($Ca(OH)_2$) treatment process was still effective at meeting effluent goals. However;

- **Under normal flow conditions (4,000 to 5,000 gallons per minute)**
  - **5 tons/day of $Ca(OH)_2$ were needed to meet plant effluent goals**
  - **Current hydrated lime cost is $160/ton**
  - **Lime product costs have risen significantly over the past 5 years and are likely to continue to do so**

- **Evaluation showed that only 36% of the lime added was being consumed by pH and mineral (iron) acidity reactions**

- **Remaining lime consumed by nuisance reactions**
  - **Calcite formation – 29%**
  - **CO2 and hydroxylation acidity – 35%**

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Lancashire 15 Site Effluent

$CaOH_2$	H_2O_2
pH 8.1 – 8.5	pH 7.0 – 7.6
Total Fe 1.0 – 1.6 mg/l	Total Fe 0.3 – 1.5 mg/l
TDS 650 – 700 mg/l	TDS 600 – 640 mg/l

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Lancashire 15 Site Summary

Hydrogen peroxide re-design

- **Superior performance under all tested conditions**
- **Reduced plant maintenance**
- **Significant sludge volume reduction**

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Lancashire 15 Treatment Facility

Downstream Impact

- **PA Fish and Boat Commission 2014 Survey West Branch Susquehanna River**
  - **Shyrock Run is 12 miles downstream of the Lancashire 15 Facility**

Steve et al.,
We conducted fish surveys on the upper West Branch Susquehanna River as well as on several tributaries over the past week. **We documented considerably more wild trout in the West Branch as compared to our 2012 surveys, including both wild brook and brown trout populations. The extent of the wild trout appear to be from the Lancashire 15 AMD treatment plant outflow downstream to Shryock Run.** This represents a significant increase in length as compared to our 2012 surveys. No trout were collected above the treatment plant; we did pick up a couple white suckers and creek chubs which was similar to 2012. We also sampled several tributaries to the West Branch, three of which exceeded Class A biomass criteria. Pretty amazing given the historic land use and impacts these streams have endured. We have several more tributaries to sample this year and will provide an update upon completion. Please extend my thanks to BAMR staff as **the AMD treatment plant has successfully improved water quality in the West Branch to the point that it is supporting wild brook and brown trout. Of particular note is the cold water temperatures the plant is providing.** Our sample site located about one mile downstream of the treatment plant had a water temperature of 59F yesterday; this cold water is undoubtedly responsible for the river's ability to support wild trout downstream to the Shryok Run area.
Thanks,
Jason

Jason Detar
Area 3 Fisheries Manager
Pennsylvania Fish and Boat Commission

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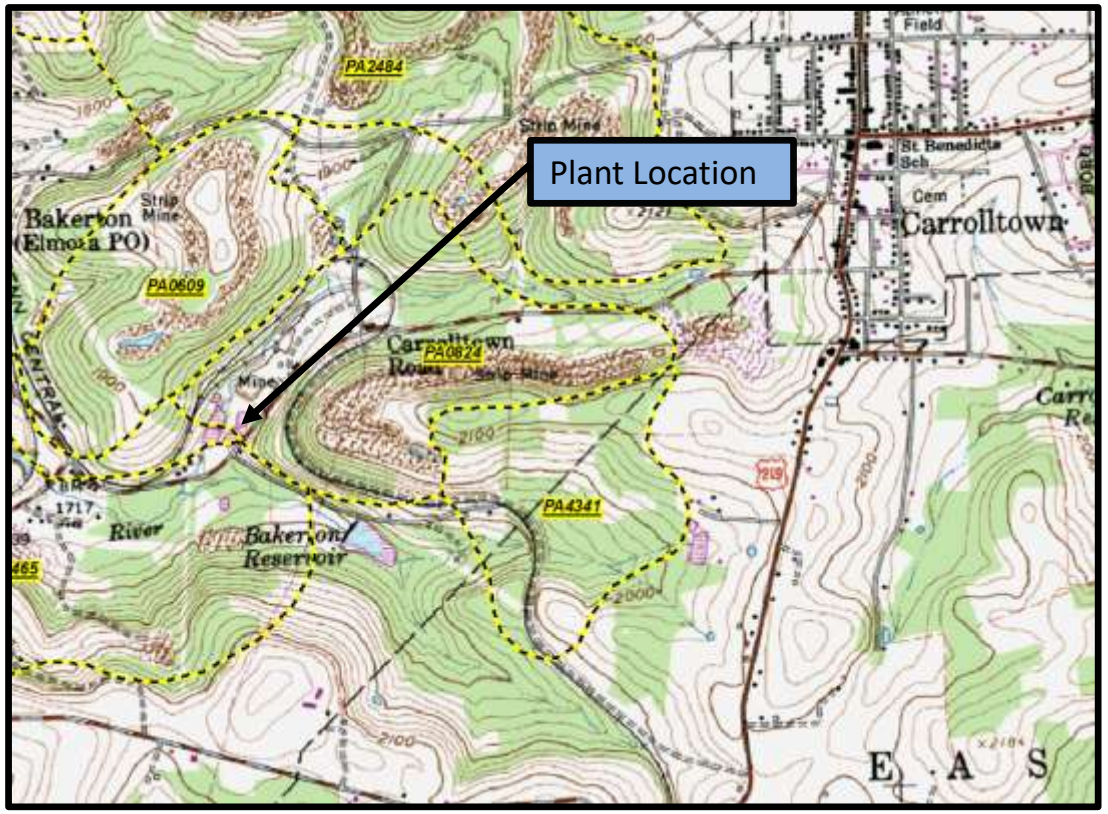
Barnes & Tucker Mine 20 Treatment Facility

- **Located in West Carroll Township Cambria County (AML Problem Area, PA 0824)**

- **Facility constructed by Barnes and Tucker Coal Company in 1966 in response to amendments to PA Clean Streams Law**

- **Receiving Stream Sequence:**
  - **Headwaters West Branch Susquehanna River**



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Barnes & Tucker Mine 20 Treatment Plant

- **DEP assumed treatment obligation as part of the Barnes & Tucker Coal Co. Bankruptcy (2001)**

- **Plant influent quality and quantity varies seasonally; 30 to 250 gpm; net acidic at low flow, net alkaline at normal and high flow conditions**

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Barnes & Tucker Mine 20 Treatment Plant

- **Current treatment system uses calcium oxide (quicklime CaO) in an antiquated silo mix tank configuration**

- **System upgrades are currently being implemented to increase retention time and treat the discharge passively during the periods of the year that the influent is net alkaline**

PA DEP-BAMR Active Mine Drainage Treatment Facilities

Facility	Stream Miles improved	Avg. Flow Treated (MGD)	Operation & Maintenance Cost 2017	Benefit Cost Raito	Cost per 1000 gallons treated 2017
Wildwood	8	1.44	$10,848	63:1	$0.021
Lancashire	30	6.48	$468,400	2.9:1	$0.198
Swamp Creek	na*	2.88	$8,675	87:1	$0.008
Hollywood	33	2.88	$670,248	4.2:1	$0.637
Little Toby	6	1.44	$265,060	1.9:1	$0.504
Brandy Camp	3.5	1.44	$263,499	1.1:1	$0.501
Rausch Creek	31	8.64	$420,204	6.3:1	$0.133
Total	**111.5**	**24.7**	**$2,106,934**		**$0.234**

*** Treated effluent discharges to East Branch Clarion River ACOE Dam**

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PA DEP-BAMR Active Mine Drainage Treatment Facilities

Facility	Year Constructed	Treatment Process	Capital Construction Cost	Capital Cost Adjusted to 2017 Cost*
Wildwood	1974	Hydrogen Peroxide / Pond Clarification	$214,884	$1,108,677
Lancashire	2011	Hydrogen Peroxide / HDS Clarifier	$12,887,512	$14,397,346
Swamp Creek	1970	Lime ($CaOH^2$) Doser	$70,729	$526,401
Hollywood	2013	Lime ($CaOH^2$) / HDS Clarifier	$14,608,912	$15,509,262
Little Toby	1996	Lime Slurry / Pond Clarification	$2,735,374	$5,301,959
Brandy Camp	2001	Hydrogen Peroxide, Lime Slurry / Pond Clarification	$2,481,339	$4,236,722
Rausch Creek	1974	Lime (CaO) / Clarifier	$3,555,297	$18,343,274
Total			**$36,554,047**	**$59,423,641**

*** Capital cost adjusted to 2017 dollars using R.S. Means Construction cost index**

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PA DEP-BAMR Planned Active Mine Drainage Treatment Projects

Cresson

Blacklick Creek

Little Conemaugh

Quakake

Gladden

Tioga / Morris Run

Audenried / Green Mt.

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PA DEP-BAMR Planned Active Mine Drainage Treatment Facilities

Facility	Design or Construction Status	Treatment Process	Receiving Stream / Watershed	Anticipated Average Annual Flow	Projected Stream Miles Recovered
Cresson	Construction to be Completed Apr. 2019	Decarbonation & Hydrogen Peroxide Pretreatment _ Lime ($CaOH^2$) _ Solids Contact Clarifier _ Polishing Wetlands	Clearfield Creek - WB Susquehanna	2200 gpm (3.2 MGD)	21
Blacklick	Design Completion 2019	Decarbonation _ Lime ($CaOH^2$) _ HDS Clarifier _ Polishing Wetlands *	Blacklick Creek _ Conemaugh River	2800 gpm (4.0 MGD)	25
Little Conemaugh	Conceptual Design - Development	Lime ($CaOH^2$) _Clarifier *	Little Conemaugh _ Conemaugh River	5000 gpm (7.2 MGD)	20
Quakake	Design Completion 2019	Lime ($CaOH^2$) _ Clarifier*	Wetzel Run _ Black Creek _ Lehigh River	6000 gpm (8.6 MGD)	11
Gladden	Design Completion 2019	Hydrogen Peroxide _Clarifier *	Millers Run _ Chartiers Creek	700 gpm (1.0 MGD)	7
Tioga / Morris Run	Conceptual Design - Development	Lime ($CaOH^2$) _ Clarifier*	Morris Run_ Tioga River	4000 gpm (5.8 MGD)	20
Audenried / Green Mt.	Conceptual Design - Development	Lime ($CaOH^2$) _ Clarifier*	Catawissa Creek _ Susquehanna River	15,000 gpm (21.6 MGD)	44
			Total	**51.4**	**148**

*** Subject to final design evaluation**

PA DEP-BAMR Active Mine Drainage Treatment Facilities

https://www.dep.pa.gov/Business/Land/Mining/AbandonedMineReclamation/Pages/AMD-Set-Aside-Program.aspx

Department of Environmental Protection

About DEP

AMD Treatment Information and Resources

The Bureau of Abandoned Mine Reclamation (BAMR) operates and maintains many large active mine drainage treatment plants and numerous passive treatment systems which are improving or restoring water quality in the receiving streams on which they are located. Currently, BAMR operates eight (8) treatment plants and has another eight (8) under development, design or construction. Additionally, BAMR provides O&M directly for 46 passive mine drainage treatment systems located across the Commonwealth. All of these mine drainage treatment facilities are being operated and maintained with AMD Set-Aside funding, mine drainage treatment trusts, or other funding earmarked for AMD treatment. The following resources will provide more information about BAMR's AMD treatment facilities:

- Summary of BAMR's Active Mine Drainage Treatment Plants (PDF)
- Summary of BAMR's Planned Mine Drainage Treatment Plants (PDF)
- Operating and Planned Mine Drainage Treatment Plants Map (PDF)
- Summary of Passive Mine Drainage Systems Constructed by BAMR (PDF)
- BAMR Passive Treatment System Location Map (PDF)
- Bennett Branch Restoration Video
- Lancashire No. 15 AMD Treatment Plant Video (MP4)


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Bureau of Abandoned Mine Reclamation


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