

PENNSYLVANIA'S ABANDONED MINE LAND (AML) EMERGENCY PROGRAM¹

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Abstract. The Pennsylvania Department of Environmental Protection's Bureau of Abandoned Mine Reclamation (BAMR) implements an Abandoned Mine Land (AML) Emergency Program to address high-priority, abandoned mine land (AML) problems that suddenly occur throughout Pennsylvania's coal fields. BAMR maintains two field offices: one in eastern Pennsylvania (Anthracite Region) in Wilkes-Barre and one in western Pennsylvania (Bituminous Region) in Ebensburg. Both field offices maintain in-house construction crews with significant equipment available to respond to and address many small AML Emergencies (hazards) such as pothole (or cavehole), subsidences, and mine drainage breakouts. For larger AML Emergencies such as subsidence events causing structural damage to homes, businesses, and roads; mine fires; coal refuse fires; landslides; or other large-scale or complex AML problems, projects are completed by outside contractors. Project designs are completed by BAMR engineering staff. The contractors are then hired through solicitation of bids or proposals with very short timeframes between bid issue and bid opening. Since October of 2010, BAMR has addressed nearly 800 AML Emergencies which equates to approximately 80 AML Emergency projects each calendar year. The average construction cost to address those emergencies was just over \$3.25 million per year. Due to the increased precipitation over the Commonwealth the last several years, that number has increased to an average of 86 AML Emergency projects over the last five (5) years (2015–2019) with a record number of 127 addressed in calendar year 2018. The average cost to address those AML Emergency projects over that five-year period was \$4.66 million per year. This paper will provide some background on Pennsylvania's AML Emergency Program, some summary statistics including the annual number and types of projects completed including costs, and also highlight through both photos and video links some typical projects recently completed by the program.

Additional Key Words: Mine Subsidence

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Introduction

The Commonwealth of Pennsylvania, Department of Environmental Protection (PA-DEP), and its predecessor agencies, the Department of Environmental Resources and the Department of Mines and Mineral Industries, conducted a state funded Abandoned Mine Reclamation Program decades prior to the passage of the 1977 federal Surface Mining Control and Reclamation Act (SMCRA). Due to limited funding, the early program addressed primarily only Abandoned Mine Land (AML) problems that directly impacted public health and safety – that is problems that in most cases today would be considered AML Emergencies.

In the late 1960s, the program became well-funded as Pennsylvania voters approved a \$500 million environmental bond issue. A portion of this funding was to be expended for the elimination of abandoned mine land problems through a program known as Project 500 or more commonly referred to as “Operation Scarlift.” The Land and Water Conservation Act of 1968 directed \$200 million (Using the 2020 RS Means Construction Cost Index, that would equate to \$1.7 billion in today’s dollars) of that bond issue toward abandoned mine reclamation and mine drainage abatement within the Commonwealth. Under the Operation Scarlift Program \$78 million was spent for pollution abatement projects, and an additional \$64 million was expended to address 76 underground mine fire projects, 156 mine subsidence projects and 28 burning coal refuse project sites. The passage of the federal SMCRA in 1977 (in particular Title IV of SMCRA) provided the opportunity for qualified states to obtain grant funding for AML reclamation from fees placed on active coal mining. In 1978 the governor of Pennsylvania designated the Department of Environmental Resources (DER) as the state agency authorized to administer federal AML grants pursuant to Title IV of SMRCA. SMCRA can be viewed on OSMRE’s website at: <https://www.osmre.gov/lrg/docs/SMCRA.pdf>.

This paper is a case study which will describe Pennsylvania’s AML Emergency Program including AML emergency project criteria, AML emergency procedures and protocol, the Pennsylvania AML emergency program project attributes, and Pennsylvania AML emergency program statistics.

Discussion

At the inception of the federally funded AML Program in Pennsylvania, the federal Office of Surface Mining Reclamation and Enforcement (OSMRE) conducted the emergency program.

OSMRE managed the AML Emergency Program in Pennsylvania from its Appalachian Regional Office in Pittsburgh (Bituminous Region) and its satellite Office in Wilkes-Barre (Anthracite Region). Figure 1 is a map of Pennsylvania depicting the location of the bituminous (western PA) and anthracite (northeast PA) coal fields. Anthracite coal is a hard, compact variety of coal that has a high luster. It has the highest carbon content, the fewest impurities, and the highest calorific content of all types of coal. Bituminous coal is a relatively soft coal containing a tarlike substance called bitumen. It is of higher quality than lignite coal but of poorer quality than anthracite.

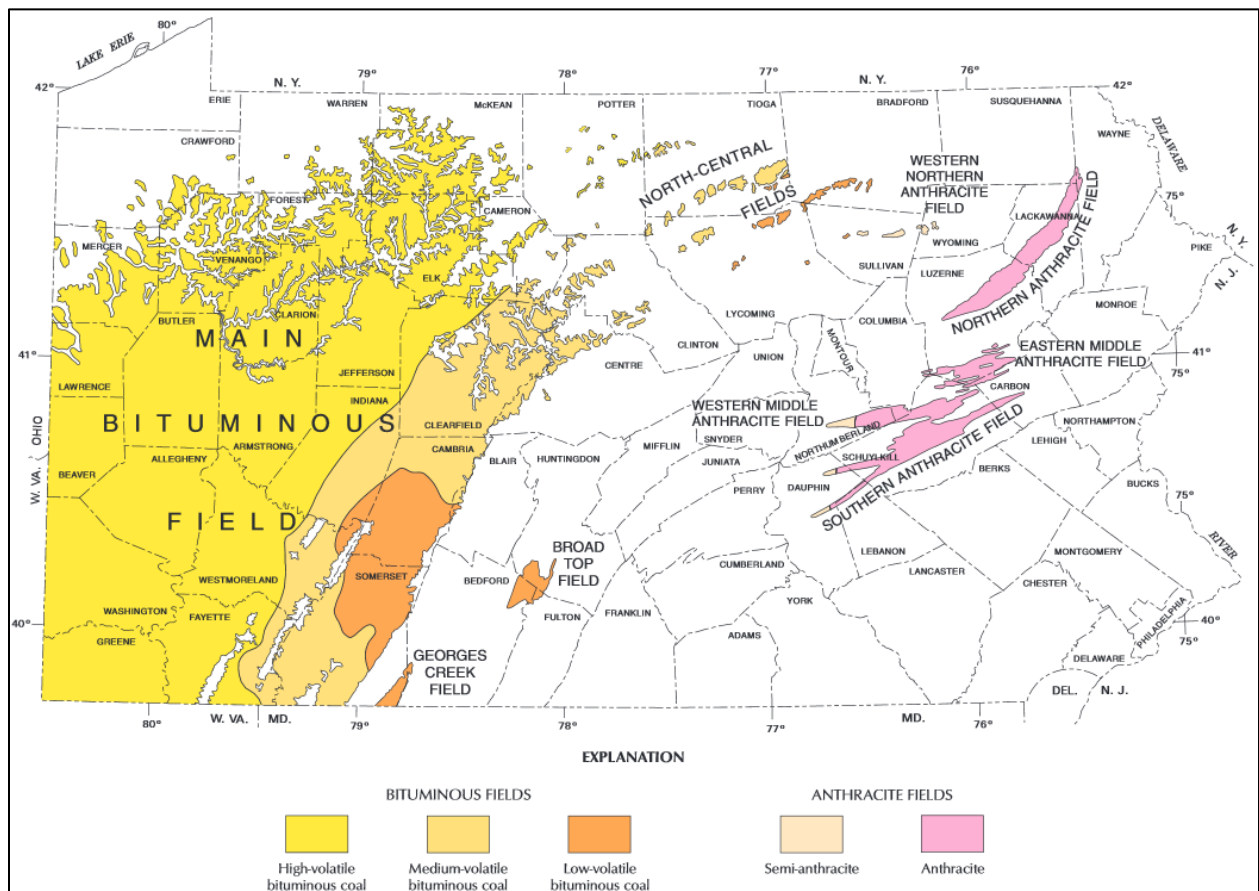


Figure 1. Bituminous and Anthracite Coal Fields of Pennsylvania.

Between 1978 and 2010, OSMRE addressed 3,074 AML Emergencies in Pennsylvania. In October of 2010, OSMRE ceased implementing the federal emergency program to address these suddenly occurring, high-priority, abandoned mine land (AML) problems in Pennsylvania. The state initially chose not to request delegation of the AML Emergency Program from OSMRE but rather chose to set up an Accelerated Response Program (ARP) to address the AML problems traditionally dealt with by OSMRE. In November of 2016, Pennsylvania submitted a Reclamation

Plan Amendment seeking approval from OSMRE to establish an AML Emergency Program. That Reclamation Plan amendment is still under consideration by OSMRE and is available on PA-DEP's website at:

<https://www.dep.pa.gov/Business/Land/Mining/AbandonedMineReclamation/Publications-Links-Other-Resources/Pages/PA's-Reclamation-Plan.aspx>.

Since 2010, the PA-DEP's Bureau of Abandoned Mine Reclamation (BAMR) has implemented a program to address AML Emergencies that have occurred throughout Pennsylvania's coal fields. BAMR maintains two field offices: one in eastern Pennsylvania (Anthracite Region) in Wilkes-Barre and one in western Pennsylvania (Bituminous Region) in Ebensburg. Figure 2 shows a state map with BAMR's field office locations and the counties covered by each. Both field offices maintain in-house construction crews with significant equipment available to respond to and address many small AML Emergencies (hazards) such as pothole (or cavehole), subsidences, and mine drainage breakouts. For larger AML emergencies such as subsidence events causing structural damage to homes, businesses, and roads; mine fires; coal refuse fires; landslides; or other large-scale or complex AML problems, projects are completed by outside contractors awarded contracts using the Commonwealth's emergency contracting procedures.

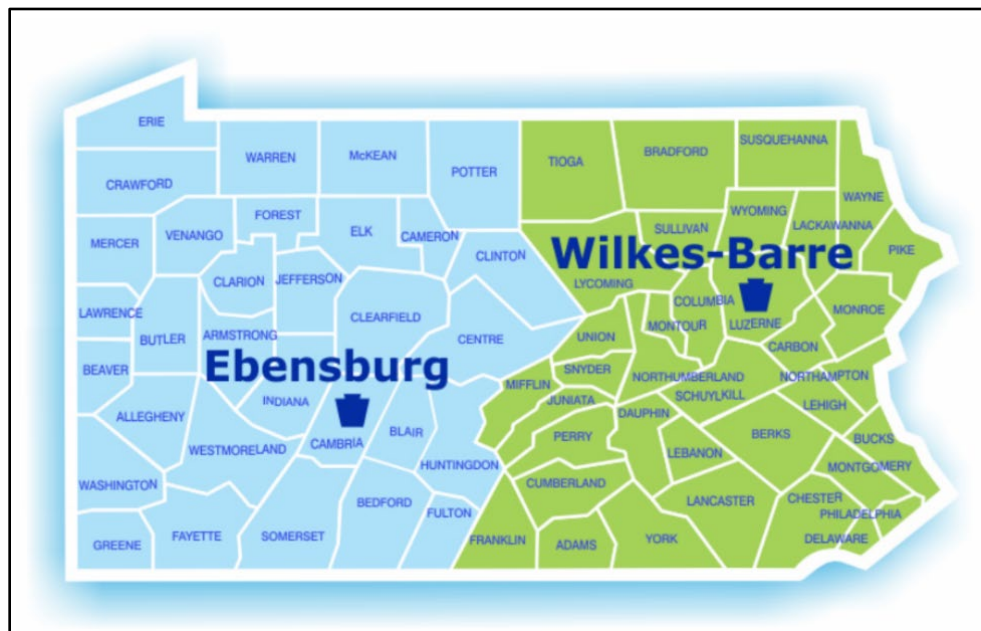


Figure 2. PA-DEP BAMR District Field Offices and District Boundaries.

Emergency Project Criteria

SMCRA subdivides AML hazards into two main categories: Emergencies and Priorities. An emergency AML problem is defined as a sudden danger or impairment that presents a high probability of substantial physical harm to health or safety before the danger can be abated under normal AML Program operation procedures. A priority AML problem is defined as a threat to the public health, safety, general welfare, land, water resources, or the environment but is not sudden and could be abated under normal program operations. Priority hazards are divided into three categories based on impacts and severity (P1, P2, P3). Priority 1 and 2 are the safety priorities, with P1 as the highest priority designating extreme danger to health and safety, while Priority 3 deals with land and water resource impacts.

The purpose of the emergency response reclamation activities that PA-DEP BAMR undertakes is to enter upon any land where an eligible abandoned coal mine related emergency exists and to restore, reclaim, abate, control, or prevent the adverse effects of legacy coal mining practices, and to do all things necessary or expedient to protect the public health, safety, or general welfare.

These emergency powers defined in Section 410 of SMCRA are echoed in Pennsylvania's Act 443 (Land and Water Conservation and Reclamation Act). They provide identical powers under the State's Program. The specific procedures used are outlined in OSMRE's Federal Assistance Manual (FAM) Chapter 4-120 entitled "State Emergency AML Reclamation Program" which are available on OSMRE's website at: <https://www.osmre.gov/lrg/fam/toc.shtm>.

For the AML Emergency Program, an emergency means a sudden danger or impairment or previously unknown condition, related to legacy coal mining (abandoned prior to August 3, 1977), which represents a high probability of substantial physical harm to the health, safety or general welfare of people before the danger can be abated under normal AML program operation procedures. As in the non-emergency AML program, the problem must also be:

- Determined to be caused by abandoned coal mine conditions.
- Found that the abandoned mine problem is hazardous to people or the environment.
- Determined that reclamation is technologically and economically feasible.
- Determined that no one else has reclamation responsibility under state or federal laws.

AML Emergency Procedures and Protocol

The coordination and approval of emergency reclamation work between the State and OSMRE is accomplished by PA-DEP BAMR as outlined in the Pittsburgh Field Division (PFD) of the Appalachian Region OSMRE emergency response protocol. Coordination with other agencies for environmental clearance is performed on a project specific basis in accordance with the National Environmental Policy Act (NEPA).

Emergency projects are conducted in compliance with the federal Clean Water Act and all applicable federal, state, and local laws and regulations. Certain approvals, permit waivers and exemptions may be applicable due to the need to act rapidly to protect the public's health or safety. State Historic Preservation Office (SHPO), Pennsylvania Department of Conservation and Natural Resources (DCNR), and U.S. Fish and Wildlife Service (USFWS) clearances are obtained in writing as soon as possible. However, a project requiring immediate response may necessitate having written approvals obtained after the project is completed. In cases where sufficient time is not available to obtain the typical clearances, DEP personnel use their expertise to determine if the project is likely to adversely affect SHPO, DCNR, and USFWS concerns and implement appropriate mitigation measures. When necessary, BAMR also coordinates with the Pennsylvania Fish and Boat Commission (PFBC) and the Pennsylvania Game Commission (PGC).

Where needed, assistance is available from the Pennsylvania State Police, Pennsylvania Department of Transportation, and the Pennsylvania Emergency Management Agency. The Emergency Program is coordinated from BAMR's field offices. The emergency reclamation work is coordinated with OSMRE and the approved procedures contained in OSMRE FAM Chapter 4-120 are followed.

The AML problems and proposed reclamation projects that meet all the following conditions are submitted to OSMRE by BAMR under a "Finding of Fact (FoF) and Authorization to Proceed (ATP), Small AML Emergencies in Pennsylvania" document originally approved by the Pittsburgh Field Division (PFD) OSMRE on June 24, 2015, and renewed on January 24, 2020. AML hazards that meet all of the following criteria are pre-approved for remedial action by BAMR:

- Sudden occurrence or newly discovered.
- High probability of substantial physical harm.

- No other response capability exists.
- Project completion time is estimated less than 30 days.
- Estimated project cost under \$20,000.
- OSM Eligibility Determination has been prepared (includes determination of date of last mining).
- Meets National Environmental Policy Act (NEPA) Categorical Exclusion (CE) criteria.
- Meets State Historic Preservation Officer (SHPO) clearance criteria.
- Pennsylvania Natural Diversity Inventory (PNDI) clearance has been obtained.

AML hazards or problems proposed as AML Emergencies not meeting the above bulleted criteria are submitted for individual FoF/ATP. Following approval of the project, including the determination of the FoF and granting the ATP by OSMRE, BAMR will undertake specific efforts to abate the emergency condition. Normally OSMRE provides approval within 24 to 48 hours of the request. When emergency conditions warrant an immediate response, appropriate actions are initiated upon receipt of an approval, for a “Limited Emergency Response,” or a verbal approval from OSMRE.

PA AML Emergency Program Project Attributes

Emergency project development, design, realty, construction inspection and administration are performed by BAMR staff. Provisions exist for the use of consultant design and inspection services if needed. Accelerated contracting procedures provided within the Pennsylvania Procurement Code are utilized for projects requiring external contractors and or materials purchase.

BAMR has two in-house construction crews consisting of 12 staff and equipment that are capable of responding and completing necessary reclamation for smaller emergency projects. One crew is in each BAMR District Office: Anthracite Region or District (AD Crew) and the Bituminous Region or District (BD Crew). Figures 3 through 6 provide typical examples of in-house constructed projects. Approximately eighty percent (80%) of the projects over the last four (4) years have been internally constructed AD/BD projects. Having the in-house construction crews affords the Commonwealth a major time and cost saving advantage. In-house constructed projects require minimal design or construction management resources because the construction staff is very proficient and experienced. Normally no detailed design or contract specifications are

needed. Most project construction materials such as pipe, stone, mulch, seed, and temporary E&S control material are purchased in bulk and stockpiled at BAMR facilities thus minimizing the need for project specific purchases and subsequent time delays. Very little if any construction inspection or oversight is required.



Figure 3. AD Crew in-house project backfilling a pothole subsidence in a parking lot in Luzerne County, Pennsylvania. Total construction cost was \$3,190.



Figure 4. BD Crew in-house project installing a bat gate on an open mine portal in Armstrong County, Pennsylvania. Total construction cost was \$2,799.



Figure 5. BD Crew in-house project backfilling a pothole subsidence in a residential yard in Allegheny County, Pennsylvania. Total construction cost was \$3,112.



Figure 6. BD Crew in-house project installing a mine drain to prevent mine water from impacting a residential neighborhood in Washington County, Pennsylvania. Total construction cost was \$65,000.

For larger AML Emergencies such as: subsidence events causing structural damage to homes, businesses, and roads; mine fires; coal refuse fires; landslides; or other large-scale or complex AML problems, projects are completed by external contractors. The contractors are hired through solicitation of bids or proposals with very short timeframes between bid issue and bid opening. Figure 7 shows a contractor working to extinguish a large coal refuse pile fire in Lackawanna County, and Figure 8 shows a typical contracted AML Emergency and the project sequence. Figures 9 through 15 show photographs of typical AML Emergencies in Pennsylvania. And the following listed YouTube videos provide additional examples of typical AML Emergency projects in Pennsylvania:

- Mine Subsidence with Structural Home Damage (Belle Vernon, Westmoreland County).
<https://www.youtube.com/watch?v=pIJPrXPQBIE>
- Pothole Mine Subsidence (Monroeville, Allegheny County and Centralia, Columbia County).
<https://www.youtube.com/watch?v=EPDOyq6TdFs>
- AML/AMD Induced Landslide (Old Pittsburgh Road, Shenango Township, Lawrence County).
https://www.youtube.com/watch?v=s_T-3Y4uJxs



Figure 7. Contracted AML Emergency project to extinguish a coal refuse pile fire in Lackawanna County, Pennsylvania. Total construction cost was \$2,213,478.

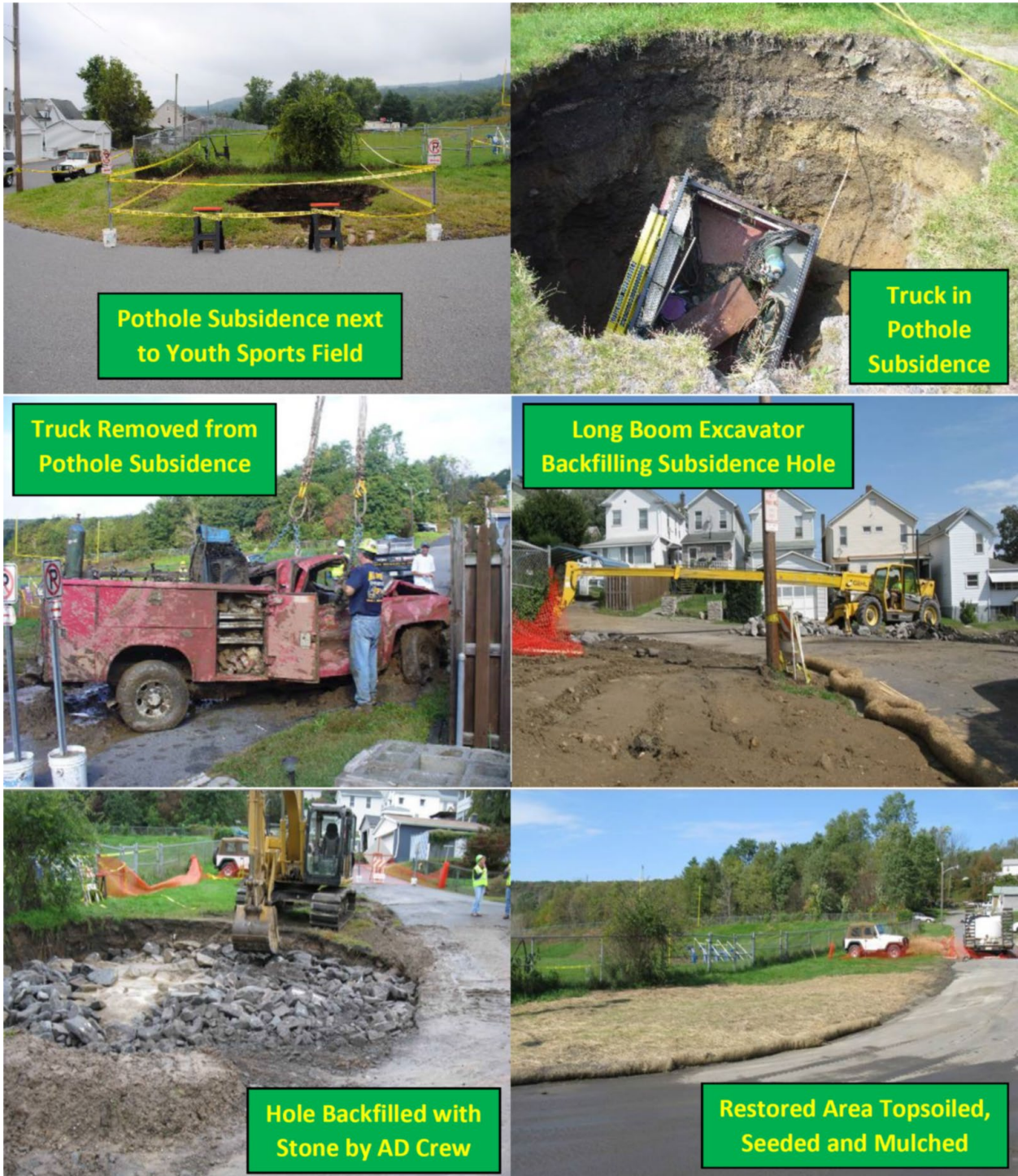


Figure 8. Contracted AML Emergency project to backfill and restore a pothole mine subsidence which swallowed a truck in a residential neighborhood next to a youth sports complex in Luzerne County, Pennsylvania. Total construction cost was \$85,812.



Figure 9. Mine subsidence severely impacting a residence, Allegheny County, Pennsylvania.



Figure 10. ATV rider being rescued from a crop fall mine subsidence, Schuylkill County, Pennsylvania.



Figure 11. Vertical water-filled mine shaft measuring 12 feet by 16 feet by >60 feet deep, Washington County, Pennsylvania.



Figure 12. Underground mine fire venting smoke and steam, Fayette County, Pennsylvania.



Figure 13. Pothole subsidence threatening a home, Schuylkill County, Pennsylvania



Figure 14. Abandoned mine drainage impacting a residential basement, Fayette County, Pennsylvania.



Figure 15. Mine blowout impacting homes and roadways, Allegheny County, Pennsylvania.

Pennsylvania AML Emergency Program Statistics

During the ten-year period beginning October 1, 2010, through September 30, 2020, PA-DEP BAMR has addressed 787 AML Emergencies in Pennsylvania. The total construction cost to address those AML Emergencies was approximately \$34.3 million. Table 1 shows the breakdown of AML Emergencies and costs by year and also the costs spent for the projects completed by PA-DEP BAMR's in-house construction crews as well as the projects completed by outside contractors.

Over the history of addressing AML Emergencies in Pennsylvania, one problem type has dominated – mine subsidence. Nearly ten percent (10%) of the total land area of the Commonwealth of Pennsylvania is underlain by abandoned underground coal mines. During the ten-year period beginning October 1, 2010, through September 30, 2020, eighty-seven percent (87%) of the AML Emergencies addressed were the result of mine subsidence. Mine drainage, mine gas, underground mine fires, mine refuse fires, AML-related landslides, and mine openings all combined account for the remaining thirteen percent (13%) of the AML Emergencies that occurred in Pennsylvania. Table 2 shows a breakdown of the AML Emergencies by type, and Figure 16 shows a map of Pennsylvania with the areas underlain by abandoned underground coal mines. It is clear to surmise that mine subsidence will be a significant problem for Pennsylvania

to deal with for many years to come. And currently, the annual AML grants Pennsylvania receives from OSMRE provide the only source of funding to address those issues.

Table 1. AML Emergency Project Numbers and Costs by Year.

PA AML Emergency Statistics (2010-2020)				
Calendar Year	AML Emergencies	Total Cost ¹	ADs/BDs (In-House Construction)	Contracted Projects
2010 ²	12	\$ 127,381	\$ 11,694	\$ 115,687
2011	95	\$ 1,604,263	\$ 159,100	\$ 1,445,163
2012	46	\$ 957,179	\$ 70,254	\$ 886,925
2013	62	\$ 2,167,588	\$ 126,827	\$ 2,040,761
2014	87	\$ 3,482,323	\$ 164,571	\$ 3,317,752
2015	66	\$ 10,936,246	\$ 97,758	\$ 10,838,488
2016	67	\$ 3,711,409	\$ 161,597	\$ 3,549,812
2017	86	\$ 1,715,490	\$ 159,152	\$ 1,556,338
2018	127	\$ 4,423,860	\$ 345,860	\$ 4,078,000
2019	86	\$ 2,509,060	\$ 239,560	\$ 2,269,500
2020 ³	53	\$ 2,643,840	\$ 173,840	\$ 2,470,000
Totals	787	\$ 34,278,639	\$ 1,710,213	\$ 32,568,426
Avg/Yr	78.7	\$ 3,427,864	\$ 171,021	\$ 3,256,843

¹ - Total Cost reflects the initial project/contract amounts.

² - 2010 numbers are for the period October 1, 2010, through December 31, 2010. (OSMRE ceased administering the AML Emergency Program in PA on October 1, 2010.)

³ - 2020 numbers are for the period January 1, 2020, through October 1, 2020.

Table 2. AML Emergency Projects in Pennsylvania by Problem Type.

AML Emergency Type	Percent (%)
Mine Subsidence	87
Mine Drainage	4
Mine Gas	1
Mine or Refuse Fire	1
AML-Related Landslide	3
Mine Opening	4

Finally, during the same ten-year period, just over eighty percent (80%) of the AML Emergencies projects completed in Pennsylvania were undertaken by PA-DEP BAMR’s two in-house construction crews. Table 3 shows the breakdown of the numbers AML Emergencies completed by BAMR’s in-house construction crews versus outside contractors by calendar year.

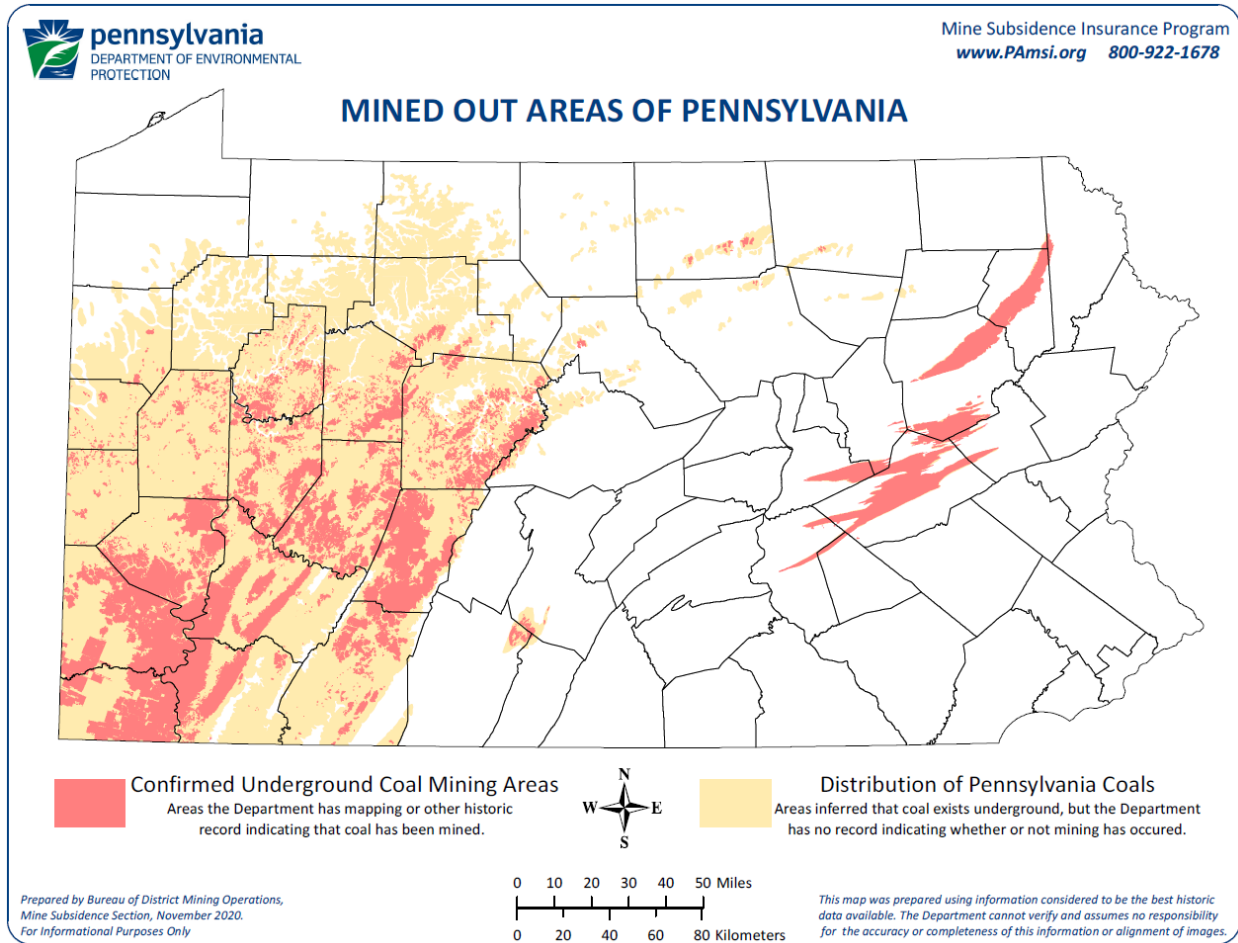


Figure 16. Areas of Pennsylvania Underlain by Abandoned Underground Coal Mines.

Table 3. AML Emergencies addressed using BAMR in-house construction crews versus contracted AML Emergency projects

Calendar Year	In-House (AD/BD) Projects	Contracted Projects
2010 ¹	10	2
2011	67	29
2012	31	15
2013	48	14
2014	74	13
2015	56	10
2016	62	5
2017	72	14
2018	93	30
2019	66	20
2020 ²	40	13
Averages	61.9	16.5

¹ - 2010 numbers are for the period October 1, 2010, through December 31, 2010.

(OSMRE ceased administering the AML Emergency Program in PA on October 1, 2010.)

² - 2020 numbers are for the period January 1, 2020, through October 1, 2020.

Summary

Prior to and continuing through the inception of the federally funded AML program in Pennsylvania, AML Emergency projects have had, and continue to have, one of the most profound positive effects upon the Commonwealth’s citizens, homeowners, communities, and businesses. Pennsylvania’s AML funding is reinvested into Pennsylvania’s economy through jobs, construction, and purchasing materials, equipment, and supplies. In addition, for every federal dollar spent for construction, \$1.59 in the form of labor income, state and local tax revenue, and construction value improvements are returned to the economy. AML sites impact 43 of Pennsylvania’s 67 counties and even more downstream. Eliminating AML hazards and treating AMD has positive impacts on millions of Pennsylvanians. The AML Program provides significant economic, environmental, and public safety benefits to the citizens of Pennsylvania. The loss of the federal AML program will have significant negative impacts on Pennsylvania including:

- Loss of \$750 million in future federal funding.

- Loss of approximately \$80 million annually contributed to Pennsylvania's economy through construction contracts, service contracts, salaries, and state and local tax revenues.
- Over 75 AML Emergencies costing approximately \$4 million annually to address will continue to occur with no source of funding.
- Discontinuation of approximately 40 contracted AML projects annually resulting in the loss of 1,000s of full and part time jobs directly and indirectly supported by the federal AML grant funding.
- Approximately 270 miles of restored streams in Pennsylvania could revert to degraded conditions.
- Loss of an estimated \$28.6 million in economic benefits each year to local communities due to degraded water quality as well as reduction in fishing and boating use.

Throughout the years, PA-DEP's BAMR, through its partnership with the federal OSMRE, has assembled the necessary funding, staff resources, expertise, and implementation measures to effectively address and mitigate suddenly occurring, dangerous abandoned mine land problems that are affecting Pennsylvania's citizens and communities. Since 2010, PA-DEP BAMR has become the lead agency in this effort and has done so without adding additional program staff. During this period, project costs have been absorbed into Pennsylvania's annual SMCRA Title IV AML grants. The use of the program's existing in-house construction capabilities coupled with the development of accelerated contracting procedures and streamlined construction management protocols has enabled this transition. However, it should be noted that coal production is dramatically decreasing nationally, and as a result, it is anticipated that future AML grants for Pennsylvania are going to be significantly reduced. This will cause Pennsylvania to either reduce or delay responses to AML reclamation projects or commit state funding sources to augment federal funds in a manner similar to conditions that existed prior to the federally funded program. If Pennsylvania has to commit a larger percentage of its annual AML grant funding to address AML Emergencies, that will result in less funding being available to address the state's remaining inventory of high-priority AML sites as well as its over 5,500 miles of streams impaired by abandoned coal mine drainage. Additionally, the authority within SMCRA to collect the AML fee from the active coal mining industry is set to expire on September 30, 2021. The future necessity of the AML emergency program is clearly illustrated by looking at the historic need and the current beneficial impacts the program has had and will continue to provide.

References

Pennsylvania Abandoned Mine Reclamation Plan Amendment No. 3

<https://www.dep.pa.gov/Business/Land/Mining/AbandonedMineReclamation/Publications-Links-Other-Resources/Pages/PA%27s-Reclamation-Plan.aspx>

Surface Mining Control and Reclamation Act of 1977 (SMCRA), P.L. 95-87, as amended, 30 U.S.C. §§ 1231-1244. <https://www.osmre.gov/programs/aml.shtm>

U.S. Office of Surface Mining Reclamation and Enforcement (OSMRE)'s Federal Assistance Manual (FAM) Chapter 4-120 entitled "State Emergency AML Reclamation Program". <https://www.osmre.gov/lrg/fam/4-120.pdf>

Pennsylvania's Abandoned Mine Land (AML) Program Fact Sheet "Past, Present and Future" http://files.dep.state.pa.us/Mining/Abandoned%20Mine%20Reclamation/AbandonedMinePortalFiles/AML_Fact_Sheet_Final_2019_03_11.pdf