

## **APPENDIX 1: PENNSYLVANIA LAW GOVERNING THE PLACEMENT OF COAL COMBUSTION WASTE IN ACTIVE AND ABANDONED MINES**

### **1.1 Introduction**

Pennsylvania law permits the beneficial use of coal ash in active and abandoned mines. Mine sites where coal ash is beneficially used have to comply with the provisions of four Pennsylvania laws: the Solid Waste Management Act (P.L. 380, No. 97, 35 P.S. § 6018.101 et seq.), the Surface Mining Conservation and Reclamation Act (P.L. 1198, 52 P.S. § 1396.1 et seq.), the Clean Streams Law (P.L. 1987, 35 P.S. § 691.1 et seq.) and the Coal Refuse Disposal Act (P.L. 1040, 52 P.S. §30.51 et seq).

Pursuant to these laws, the Pennsylvania Environmental Quality Board promulgated numerous chapters of regulations contained in Title 25 of the Pennsylvania Code. The regulations most relevant to the use of coal ash in mines are in 25 PA Code Chapter 287 (specifically, Subchapter H, Beneficial Use, 25 PA Code 287.661 through 287.666). Subchapter H gives the Pennsylvania Bureau of Mining and Reclamation (BMR) authority to approve beneficial uses of coal ash in four categories: ash placement, ash placement as an alkaline addition, as low permeability material, as a soil amendment or soil substitute.<sup>1</sup> In addition, sections of the coal mining regulations in 25 PA Code, Chapters 86 to 90, are applicable. Two mining permit modules are specifically applicable to mine placement, Module 25 for the placement of coal ash at surface mine sites (including placement, alkaline addition and use of ash as low-permeability material) and Module 27 for coal ash is used as a soil substitute or additive. In addition, Subchapter F of 25 PA Code Chapter 87 (25 PA Code 87.201 to 209) applies to coal ash placement at remined sites. Lastly, sections of PADEP's water quality and air quality regulations apply to ash placement, as well.

In 1997, Pennsylvania made significant revisions to the residual waste regulations applying to coal ash placement (25 PA Code 287.661-666). These revisions relaxed the standards applicable to coal ash placement and removed from the regulations many important requirements concerning waste analysis, groundwater monitoring, isolation and corrective action. The more stringent regulatory requirements had been in place only five years, from 1992 to 1997.<sup>2</sup> In place of these regulatory requirements, PADEP issued numerous guidance documents, described below, pertaining to the placement of coal ash. The 1997 amendments to the regulations and the accompanying guidance documents give PADEP much more discretion in the operation of coal ash placement/disposal projects.

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<sup>1</sup> The Pennsylvania Solid Waste Management Act (SWMA) defines coal ash as fly ash, bottom ash, or boiler slag resulting from the combustion of coal. Waste from emission control devices, such as flue gas desulfurization sludge is excluded from the definition of coal ash. Waste from the burning of waste coal, however, is included.

<sup>2</sup> See Pennsylvania Bulletin, Vol. 22, No. 27, July 4, 1992.

## 1.2 Technical Guidance Documents Applicable to Coal Ash Mine Placement

PADEP developed in 1997 four guidance documents that attempt to define and clarify the overlapping requirements of the regulations and permits noted above. These guidance documents are (1) *Certification Guidelines for Beneficial Uses of Coal Ash*, 563-2112-224, BMR PGM Section II, Part 2, Subpart 24; (2) *Beneficial Use of Coal Ash at Active Coal Mine Sites*, 563-2112-206, BMR PGM Section II, Part 2, Subpart 6; (3) *Technical Guidance Document for Beneficial Uses of Coal Ash*, 563-2112-225 BMR/PGM Section II, Part 2, Subpart 25; and (4) *Alkaline Addition for Surface Coal Mines*, 563-2112-217, BMR PGM Section II, Part 2, Subpart 17.<sup>3</sup>

Two of the guidance documents, *Certification Guidelines for Beneficial Uses of Coal Ash* and *Technical Guidance Document for Beneficial Uses of Coal Ash*, were required by the coal ash regulations (25 PA Code 287.663- 287.664) when they were promulgated in 1997. These two guidances are central to PADEP's implementation of the beneficial use program. They guide PADEP's review of proposals for coal ash use at active coal mine sites, abandoned coal mine sites and abandoned noncoal mine sites. For active mine sites, one has to also consult an additional guidance document entitled *Beneficial Use of Coal Ash at Active Coal Mine Sites*, as well as Modules 25 and/or 27 of the coal surface mine applications.

The purpose and contents of each guidance document is briefly summarized.

### (1) *Beneficial Use of Coal Ash at Active Coal Mine Sites*

The purpose of this guidance is to describe the procedure that the District Mining Offices should use to review requests for the use of coal ash at active mine sites. The guidance covers issues such as permitting (major or minor), public notice, contents of applications for use, and review of groundwater monitoring plans.

### (2) *Certification Guidelines for Beneficial Uses of Coal Ash*

The purpose of this document is to set out the guidelines for certifying coal ash for beneficial uses. The guidance provides detailed instructions for certification by PADEP for the four different beneficial uses of coal ash at mine sites (coal ash placement, alkaline addition, soil additive or substitute and coal ash as low permeability material). The document contains the standards set for maximum acceptable leachate concentrations as well as additional requirements.

### (3) *Technical Guidance Document for Beneficial Uses of Coal Ash*

The purpose of this guidance is to set parameters for the four beneficial uses of coal ash that can be approved in active mine permits, as part of PADEP's mine reclamation contracts, or as PA DEP-approved mine reclamation projects. The guidance describes requirements for groundwater monitoring, isolation distance from groundwater, coal ash placement method, application method for coal ash alkaline addition, and method of installation of low-permeability material.

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<sup>3</sup> These guidance documents can be found on the PA DEP website at [www.dep.state.pa.us](http://www.dep.state.pa.us).

#### *(4) Alkaline Addition for Surface Coal Mines*

This guidance defines where PADEP will consider the use of alkaline addition and “assists mine operators in maintaining and achieving compliance with environmental protection standards.” It is applicable to mine operators who wish to use alkaline addition as a mine drainage pollution prevention method. The guidance also provides guidance to PADEP staff who review such proposals. It contains information on how to calculate alkaline addition rates, determine placement and design a groundwater monitoring program.

### **1.3 Placement of Coal Ash in Active Mines**

Coal ash may be beneficially used in four mine settings relevant to this report: (1) in an active mine; (2) in an abandoned mine; (3) for alkaline addition in a mine permitted for remining; and (4) at a coal refuse reprocessing site. Different requirements apply to each type of mine site, as well as to each of the four approved uses. It is beyond the scope of this report to describe in detail the regulatory requirements applicable to ash placement at each mine setting. For ease of explanation, this chapter explains first the general requirements applicable to all four beneficial uses at all active mine sites.<sup>4</sup> Second, the chapter separately addresses the specific requirements applying to coal ash placement at remining sites with preexisting pollutional discharges.

#### 1.3.1 Required certification of ash

According to 25 Pa Code 287.663, coal ash placed in mines must comply with PADEP’s *Certification Guidelines for Beneficial Uses of Coal Ash* (“Certificate Guidelines”). (25 PA Code 287.663(a)(1)) The generator of coal ash must demonstrate that the coal ash meets the chemical and physical characteristics set out in the Certification Guidelines before placement in a mine. PADEP must review and approve the demonstration prior to use of the ash. (25 PA Code 287.663(a)(2))

The Certification Guidelines set out the criteria for certifying coal ash for beneficial use. The guidance contains the standards set for maximum acceptable leachate concentrations for all uses of ash as well as specific requirements for the four different beneficial uses of coal ash at mines. If the coal ash of a generator is certified for one or more beneficial uses by PADEP, the ash can be used for those purposes on a statewide basis. The generator must submit constituent results of ash and leachate analyses every six months to maintain certification for the ash.

The following specifications apply to all four beneficial uses:

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<sup>4</sup> Pennsylvania regulates the placement of ash into active mines slightly differently than the placement of ash into abandoned mines. 25 Pa Code 287.663 governs “beneficial use” of ash in active mines while 25 Pa Code 287.664 controls use of ash in abandoned mines. Since all minesites examined in this report were active mines. This chapter primarily focuses on guidance and regulations applicable to active mines.

- (1) PADEP set “maximum acceptable leachate concentrations” for ash at 25 times the groundwater parameters (MCLs) for metals and other cations and at 10 times the groundwater parameters for nonmetals. Ash exceeding these limits cannot be certified for beneficial use.
- (2) The above restriction applies *only* to constituents that have primary MCLs. For constituents whose groundwater parameter is based on a secondary MCL (e.g., iron, zinc, boron, manganese, aluminum, chloride, sulfate, sodium) and whose leachate exceeds the “maximum acceptable leachate concentrations” noted above, PADEP has the discretion to grant a “contingent certificate” for use, if the applicant can demonstrate that the use of the ash will not impact surface or groundwater quality.

In addition, for most beneficial uses of ash, the pH of the ash must be in the range of 7.0 to 12.5, measured at the coal ash generator’s site. For use of coal ash as an alkaline addition or liming agent, the equivalent calcium carbonate equivalent must be at least 100 parts per thousand or 10% by dry weight.

For certification purposes, the Guidelines require that the ash be tested using an index leaching test, the Synthetic Precipitation Leaching Procedure (SPLP). This test runs water, simulating natural rainfall, through a small sample of ash in a laboratory for 18 hours to determine what elements of the ash dissolve into the water during the 18-hour test.

### 1.3.2 Submission of plan for coal ash use

The request to use coal ash at an active mine site requires a new permit application or a major permit revision. Module 25, *Coal Ash Beneficial Use*, is used for proposals involving coal ash placement, coal ash alkaline addition and coal ash as low-permeability material. Module 27, *Sewage Sludge/Coal Ash Beneficial Use*, is used for proposals involving coal ash as a soil substitute.

Pursuant to 25 PA Code 287.663, a mine operator wanting to use coal ash must formally request the use of coal ash in the reclamation plan of the mining activities permit, and this request must be approved by PADEP before placement. The request shall contain a narrative description including: (1) an explanation of how coal ash will be placed; (2) where and how coal ash will be stored; (3) identification of the sources of coal ash and an estimate of the quantity to be used; (4) for the beneficial use of coal ash as a soil substitute or additive, the proposed application rate and justification for the rate; and (5) proof that the coal ash meets the certification guidelines.

### 1.3.3 Operating requirements

#### 1.3.3.i. Performance standards and design requirements

According to 25 PA Code 287.663(c), the use of coal ash at active mines shall be designed to achieve an overall improvement in water quality *or* shall be designed to

prevent the degradation of water quality. Thus an operator need not design coal ash placement to improve water quality, the use must simply be designed to prevent degradation. The only exception is for multiple refuse pile reprocessing projects at which AMD is evident where there is a requirement to design the integrated project (involving the coordinated use of multiple coal refuse sites) to achieve an overall improvement of surface water or groundwater. 25 PA Code 287.663(d)(5) However, if AMD is not evident at the site, the project is to be designed to achieve no degradation.

#### 1.3.3.ii. Placement criteria- location

Generally, PADEP guidance indicates that coal ash must not be placed within eight feet of the regional water table, unless PADEP approves placement within eight feet based upon a demonstration that groundwater contamination will not occur. This prohibition, however, is not applied uniformly for all coal ash placement. A regulatory prohibition against placement in groundwater applies to use of coal ash at coal refuse disposal sites (25 PA Code 287.663(f)(1)(v), use of coal ash as a soil substitute or additive (25 PA Code 287.662(d)(7) and use of coal ash in abandoned mines (25 PA Code 287.664(c)(3)). Yet the regulations also provide a widely applicable exception to this prohibition. According to 25 PA Code 287.663(d)(6), the prohibition against placement in groundwater does *not* apply when PADEP approves the use of coal ash “as part of a mine drainage project” at active mine sites and coal refuse reprocessing sites.

In addition, Section 25 PA Code 287.1 defines *regional groundwater table* as “the fluctuating upper water level surface of an unconfined or confined aquifer, where the hydrostatic pressure is equal to the ambient atmospheric pressure. The term does not include the perched water table or the seasonal high water table.” The *seasonal high water table* is defined as the minimum depth from the soil surface at which redoximorphic features are present in the soil.

Lastly, PADEP does permit placement of coal ash in groundwater at selected “demonstration projects” permitted pursuant the residual waste regulations. See 25 PA Code 287.501-506. These sites are permitted on the basis that they demonstrate a “new or unique technology for the processing or disposal of residual waste.” 25 PA Code 287.501.<sup>5</sup> If the ash is to be placed within eight feet of the regional groundwater table, a study must be submitted to the Department that demonstrates that there will be an improvement to water quality or at least demonstrates that there will be no groundwater pollution.

#### 1.3.3.iii. Groundwater monitoring requirements

Groundwater monitoring is required for coal ash placement, coal ash alkaline addition and coal ash as low permeability material at active mines and coal ash refuse reprocessing sites in accordance with the applicable provisions of 25 PA Code Chapters

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<sup>5</sup> The Big Gorilla Pit Site, described in this report, was permitted as a residual waste demonstration project.

86-90. The regulations do *not* require groundwater monitoring when coal ash is placed in abandoned mines, although PADEP can use its discretion to request it.<sup>6</sup>

Guidance, and not regulations, sets forth the parameters for conducting groundwater monitoring at ash placement sites. The guidance indicates that monitoring points at placement sites can be wells, springs, seeps or mine discharges. A monitoring point upgradient from the area where coal ash is being used is *not* required.<sup>7</sup> The set number of monitoring points downgradient is not specified, although guidance states that it is to be “the minimum needed to assess the coal ash impact on groundwater.”<sup>8</sup>

According to the technical guidance pertaining to coal ash placement at active mine sites, background groundwater quality monitoring should characterize the groundwater quality before ash placement. Six samples, taken at monthly or six-week intervals, is generally recommended, but can be reduced at the discretion of PADEP. Operators must test for the constituents identified in Module 25B, *Coal Ash Groundwater Quality Parameters, Background and Quarterly Report*<sup>9</sup> and in Module 25B, *Coal Ash Groundwater Quality Parameters, Background and Annual Report*.<sup>10</sup>

After coal ash placement begins, quarterly monitoring is required for the constituents identified in the Module 25B, *Coal Ash Groundwater Quality Parameter, Quarterly Report* and annually for those constituents identified in Module 25B, *Coal Ash Groundwater Quality Parameters, Background and Annual Report*. Coal ash as a soil substitute or additive does not require groundwater monitoring. Coal ash alkaline addition may require additional groundwater monitoring (see below, section 1.4).

#### 1.3.3.iv. Bonding Requirements at Coal Ash Placement sites

The beneficial use of coal ash requires no additional bonding associated with the placement of the ash. The standard procedures for release of bonds, 25 PA Code 86.172, applies to active coal mine sites using coal ash beneficially. Pursuant to 26 PA Code 86.174 and 86.175, the majority of the bond is released when revegetation of the site is completed (Stage 2 bond release). This release occurs at a time (often 1-3 years after ash

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<sup>6</sup> The water quality monitoring may be required by PADEP where information is needed to evaluate the success of the reclamation project. 25 PA Code 287.644(c)(2).

<sup>7</sup> Upgradient groundwater monitoring points are not required unless there is a need to characterize the groundwater coming onto the placement sites because of concerns unrelated to the mine sites being monitored. *Beneficial Use of Coal Ash at Active Coal Mine Sites*, Document Number 563-2112-206, BMR PGM Section II, Part 2, Subpart 6.

<sup>8</sup> *Ibid.*

<sup>9</sup> Module 25B, *Coal Ash Groundwater Quality Parameters, Background and Quarterly Report* requires monitoring for static water elevation (for monitoring wells), flow (for springs, seeps or mine discharges), pH (field and laboratory), specific conductance, alkalinity, acidity, iron, manganese, sulfate, total dissolved solids, and total suspended solids.

<sup>10</sup> Module 25B, *Coal Ash Groundwater Quality Parameters, Background and Annual Report* requires monitoring for aluminum, arsenic, cadmium, calcium, chloride, chromium, copper, lead, magnesium, mercury, nickel, potassium, selenium, sodium and zinc.

placement) when the impacts on water quality from coal ash placement water quality may not yet be detected by the monitoring program.

#### 1.3.3.v. Closure

Closure for coal ash used as placement, alkaline addition and low-permeability material is considered to occur upon the completion of backfilling and establishment of vegetation. Groundwater monitoring is discontinued at this time, although PADEP has the ability to extend groundwater monitoring, if there is an indication of groundwater degradation. The decision to terminate groundwater monitoring is often made soon after ash placement (1-3 years), an insufficient amount of time in which to determine whether degradation will occur.

#### 1.3.3.vi Permit Special Conditions

According to PADEP guidance, all permits issued for coal ash placement at active mine sites should contain special conditions requiring the identification of the facility or facilities that generated the coal ash, an annual estimate of the volume of ash placed, and a map of the location of coal ash placement.

### **1.4 Regulations pertaining to coal ash used as alkaline addition at remining sites**

#### 1.4.1. Purpose of Title 25, Chapter 87, Subchapter F permits

Pennsylvania encourages remining through Subchapter F permits. Subchapter F permits apply to operations where ash is placed in surface mines where remining is taking place and where previous mining has resulted in continuing water pollution. The purpose of the program is enhanced coal recovery, reclamation of abandoned mine lands, and the reduction of (or no net increase in) degraded mine drainage. Mine operators are more inclined to enter into a remining project when the potential of incurring liability for long-term treatment of mine waters from prior mining activities is low. Under a Subchapter F permit, an operator can legally mine sites that created and continue to discharge effluent water that fails to meet applicable standards for acidity and iron. Operators can legally mine such sites without assuming responsibility for treatment of the previously degraded water, as long as the discharged waters are not further degraded by the operation. If the water is additionally degraded because of the remining operation, the level of treatment required is based on pre-remining contaminant load levels and not on the legislatively promulgated effluent standards applicable to non-Subchapter F mine sites.<sup>11</sup>

In Pennsylvania, coal ash is frequently used at remining sites as an alkaline addition. Subchapter F of Chapter 87 (25 PA Code 87.201 through 87.209) sets forth the requirements for these sites. Several PADEP guidance documents also apply, including *Alkaline Addition for Surface Coal Mines*, (Document No. 563-2112-217), BMR PGM Section II, Part 2, Subpart 17; *Permitting Pre-existing Pollutational Discharges under Subchapter F of 25 PA Code Chapter 87, Subchapter G of 25 PA Code Chapter 88*

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<sup>11</sup> Set forth in 25 PA Code 87.102.

(Document No. 563-2112-611; *Determining Eligibility of Pre-existing Pollutational Discharges under Subchapter F of 25 PA Code Chapter 87, Subchapter G of 25 PA Code 88*, (Document No. 563-2112-610).

#### 1.4.2. Subchapter F authorization

Receipt of authorization under Subchapter F to remine entitles an operator to later request bond release for areas that continue to discharge pollutational material. According to 87.205, authorization under Subchapter F may not be granted unless the operator seeking the authorization demonstrates to the satisfaction of PADEP that, among other requirements: (1) the operator's proposed abatement plan will result in significant reduction of the baseline pollution load and represents best technology and (2) the surface mining operation on the proposed pollution abatement area will not cause additional ground water degradation. 25 PA Code 87.205(a)(2) and (6). *Baseline pollution load* is defined as "the characterization of the pollution material being discharged from or on the pollution abatement area, described in terms of mass discharge for each parameter, including seasonal variations and variations in response to precipitation events. The Department will establish in each authorization the specific parameters, including, at a minimum, iron and acid loadings, it deems relevant for the baseline pollution load." 87 PA Code 87.202.

#### 1.4.3 Water quality standards

The effluent standards for preexisting mine discharges on remining sites are based on the pre-remining water quality and flow rates. Remining effluent standards are set as baseline contaminant loading rates calculated by multiplying contaminant concentration by flow rate, which are reported in units of pounds of contaminant per day. This is in contrast to the contaminant effluent limits applicable to mine sites that are not remining sites, which are in units of contaminant concentration (e.g., mg/L) as set by EPA regulation in 40 CFR part 432.30 and by state regulation in 25 PA Code 87.102. At a minimum the samples must be analyzed for alkalinity, total manganese, total iron, aluminum, sulfate, total suspended solids and pH.

There are also no explicit objectives for water quality improvement that AMD abatement projects using alkaline coal ashes must achieve at Subchapter F sites. A remining project justified by on the basis of abatement of acid mine drainage does not have to abate any acid drainage, it is enough that it not cause additional degradation. See 25 Pa Code 87.209(b)(3)(ii). Yet the non-degradation requirement applies only to four major constituents; acidity, iron, manganese and aluminum, and the measurement is based on contaminant loading and not contaminant concentration. Also non-degradation applies only to surface water discharges and not to site groundwater.

Accordingly, Subchapter F permits usually do not set any numerical or descriptive objective for improving water quality by placing coal ash in the mines. Examples of such objectives could include the lowering of average acidity over five years by a certain number of milligrams per liter in waters draining the placement sites, the sustained

raising of pH by a certain number of units in those waters, a reduction in aluminum, iron or manganese in those waters to the average level for these constituents measured in nearby waters that are not affected by acid mine drainage, the avoidance of any new pollutants not detected in baseline monitoring, and the strict avoidance of increases in any pollutant levels beyond levels detected in baseline monitoring.

#### 1.4.4 Bond release at Subchapter F sites

Section 87.209 sets forth the criteria and schedule for the release of bonds where coal ash has been placed on remined sites. PADEP will release up to 60% of the amount of the bond for the authorized pollution abatement area if the applicant has complied with the permit, completed backfilling and drainage control under the approved reclamation plan and the Department finds that, among other requirements: (1) the operator has not caused degradation of the baseline pollution load at any time during the 6 months prior to the submittal of the request for bond release and until the bond release is approved as shown by all ground and surface water monitoring conducted by the permittee and (2) the operator has not caused or contributed to surface water pollution or groundwater degradation by reaffected or mining the pollution abatement area. 25 PA Code 87.209(a)(4) and (5) Despite the general requirement above that the operation not cause pollution of groundwater and surface water, PADEP routinely permits the release of bonds considering only the assessment of the more narrowly defined baseline pollution load.

PADEP will release the remainder of the bond, save an amount sufficient to cover the cost of revegetating the site, if the Department finds, again among other requirements, that (1) the operator has not caused or contributed to surface water pollution or groundwater degradation by reaffected or mining the pollution abatement area, and (2) the operator has either achieved the actual improvement of the baseline pollution load *or* has not caused degradation of the baseline pollution load and has caused aesthetic or other environmental improvements or the elimination of public health and safety problems. In other words, bond release will occur when the operator can show that there is no degradation of the baseline pollution load and that there is either an aesthetic, environmental or safety improvement at the site. Improvement of the baseline load (i.e., successful treatment of AMD) is not required for bond release. The absence of degradation (as defined by the loads of acid, aluminum, iron and manganese) and physical site improvements are generally sufficient. 25 Pa Code 87.209(b).

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