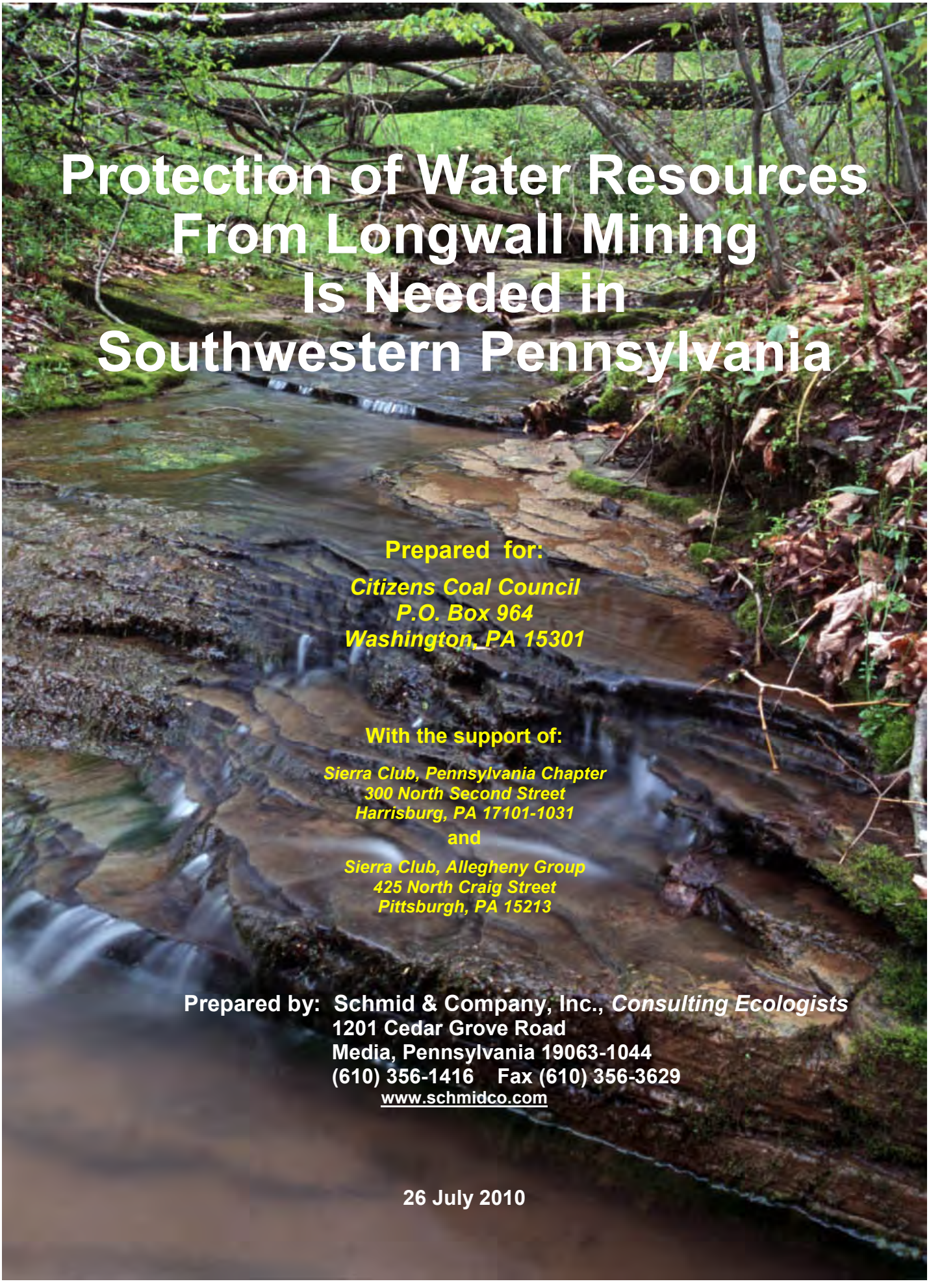

Protection of Water Resources From Longwall Mining Is Needed in Southwestern Pennsylvania

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26 July 2010

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Cover photo credit: Mark Schmerling

When the well's dry, we know the worth of water.
(Benjamin Franklin, *Poor Richard's Almanac*, 1746)

I EXECUTIVE SUMMARY

Sponsored by the Citizens Coal Council based in Washington, Pennsylvania, this report summarizes current regulatory practices affecting water resources with respect to high-extraction (longwall) underground mining of coal in Washington and Greene Counties, Pennsylvania. Using current examples from State files, it strives to show what is actually happening in water resource protection when longwall mining permits are issued and enforced.

For more than a decade, Schmid & Company staff have been observing the results of efforts to regulate the impacts of longwall mining on the people and environment of southwestern Pennsylvania. Longwall technology has been widely employed in Pennsylvania since 1994, when the industry was allowed by Act 54 to extend this practice beneath features previously protected from the resulting subsidence of the land surface. That relaxation of prior geographical restrictions on use of longwall technology led to a tremendous expansion of high-extraction mining into previously unmined lands as large underground mines embraced the new mining method.

Mining coal for private economic gain has left a record of permanent environmental devastation in Pennsylvania, especially to our water resources.

Regulation of some of the environmental and social impacts of coal mining has been underway in Pennsylvania for more than half a century in response to the unmitigated devastation long tolerated by previous generations. State regulatory practices established to deal with traditional "room and pillar" underground mining, however, have proven to be inadequate since 1994 to address the widespread impacts of the intentional and more or less "planned" subsidence associated with the longwall mining method. During the past decade the Pennsylvania Department of Environmental Protection (PADEP) has begun to adjust its regulatory requirements to increase protection of water resources from longwall mining. It still has far to go.

Our findings ten years ago were presented in a major report that focused on the hydrologic system in southwestern Pennsylvania (Schmid & Company, Inc. 2000), and we have commented at length on subsequent proposed revisions of State regulations and technical requirements. Two 5-year reports to the General Assembly commissioned by PADEP, as required by Act 54, confirmed the persistence of the problems we highlighted in 2000 regarding the lack of data being compiled in permit applications on the water resources at risk from undermining when coal is extracted.

PADEP's amended regulatory requirements during the past decade have begun to address some of the concerns for water resource protection raised by longwall mining. The *collection* of baseline data on water resources at risk from longwall mining has

greatly improved. The *use* of those data to protect water resources, to inform decisionmaking, and to assess postmining efforts at restoration, unfortunately, is woefully inadequate.

This report focuses on current PADEP practices, based on a review of regulatory files covering the 2007-2009 period for three major longwall mines in Washington and Greene Counties. A principal objective of this report is to ascertain the effectiveness of the regulatory changes instituted since our previous report in protecting streams and wetlands in southwestern Pennsylvania. This report highlights what information now is being collected for permit applications, what monitoring is required of hydrology and of mine discharges during mine operations, how the monitoring data are being used, and what the results of recent mining have been on streams and wetlands to the extent ascertainable from PADEP files.

Longwall mines are the largest individual industrial enterprises in the Commonwealth of Pennsylvania in terms of affected land area. Permit areas for the three longwall mines addressed here, together, at present encompass 137 square miles in southwestern Pennsylvania. Each of these operations (Bailey Mine, Emerald Mine, and Enlow Fork Mine) recently has proposed major expansion of its longwall operations as well as numerous surface activities and other revisions to its mine. The locations of these three mines and their recently approved or currently pending expansion areas are shown on Figure 1. Streams in the vicinity of the mines, and their designated uses, are identified on Figure 1A. Hundreds of surface landowners have been, and continue to be, affected for years by the removal of coal underlying their properties.

Longwall mining equipment at the coal face

Bailey Mine (Consol Pennsylvania Coal Company; Mining Permit # 30841316; NPDES # PA0213535). The original PADEP permit for this mine was issued on 28 August 1985. At the time of our 2000 report, Bailey Mine was up to its 71st revision; it now is up to Revision 134. As of October 2009, the approved sections of Bailey Mine encompassed 31,491 acres (49 square miles). During July 2007, Consol proposed an eastward expansion of this mine encompassing 3,135 acres (nearly 5 square miles). That application is still under review.

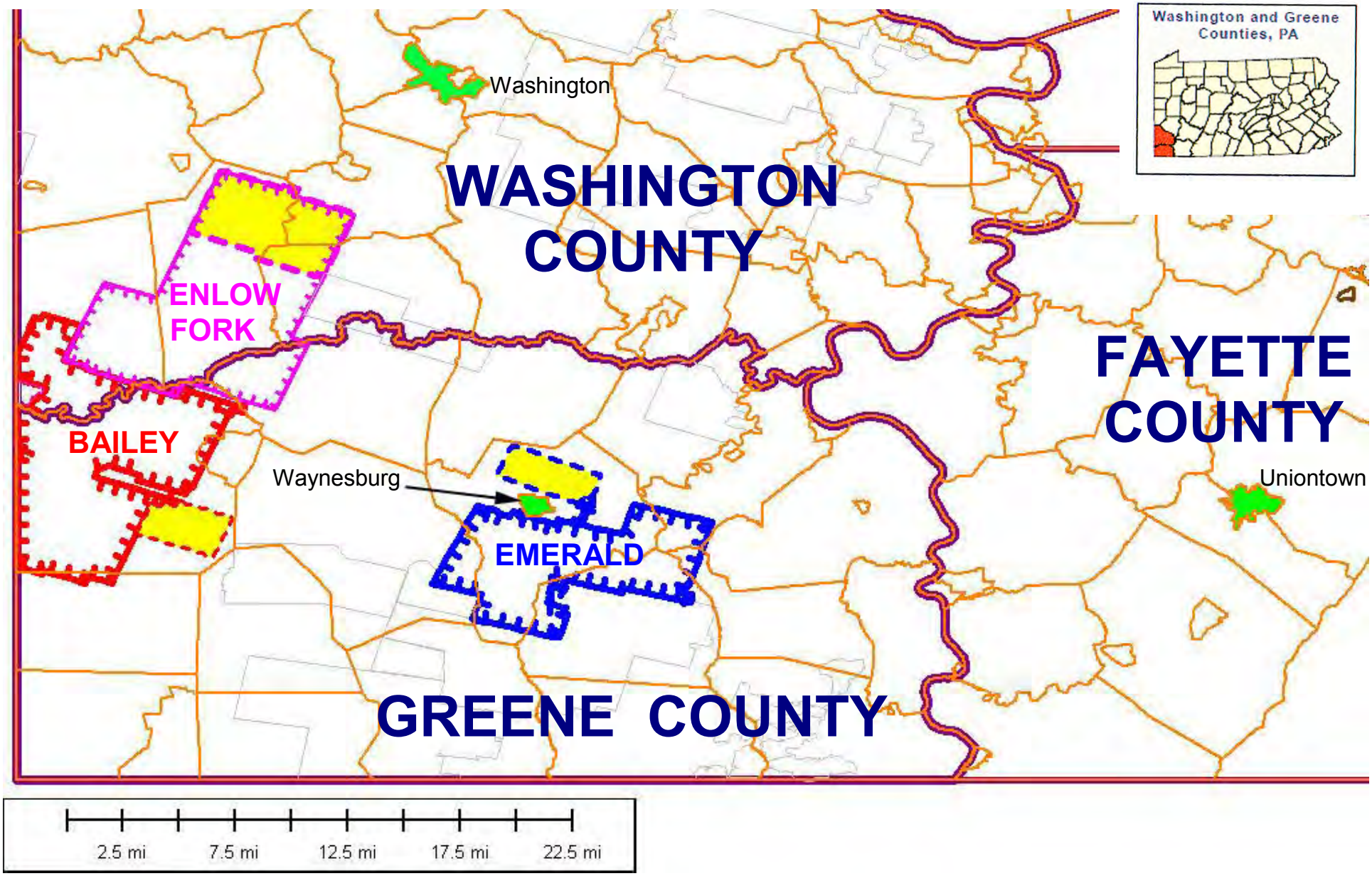


FIGURE 1. Location of the three longwall mines discussed herein (Bailey, Emerald, and Enlow Fork) in Greene and Washington counties in southwestern Pennsylvania. Yellow indicates expansion areas. Municipalities are outlined in orange. Other nearby mines are outlined in gray.

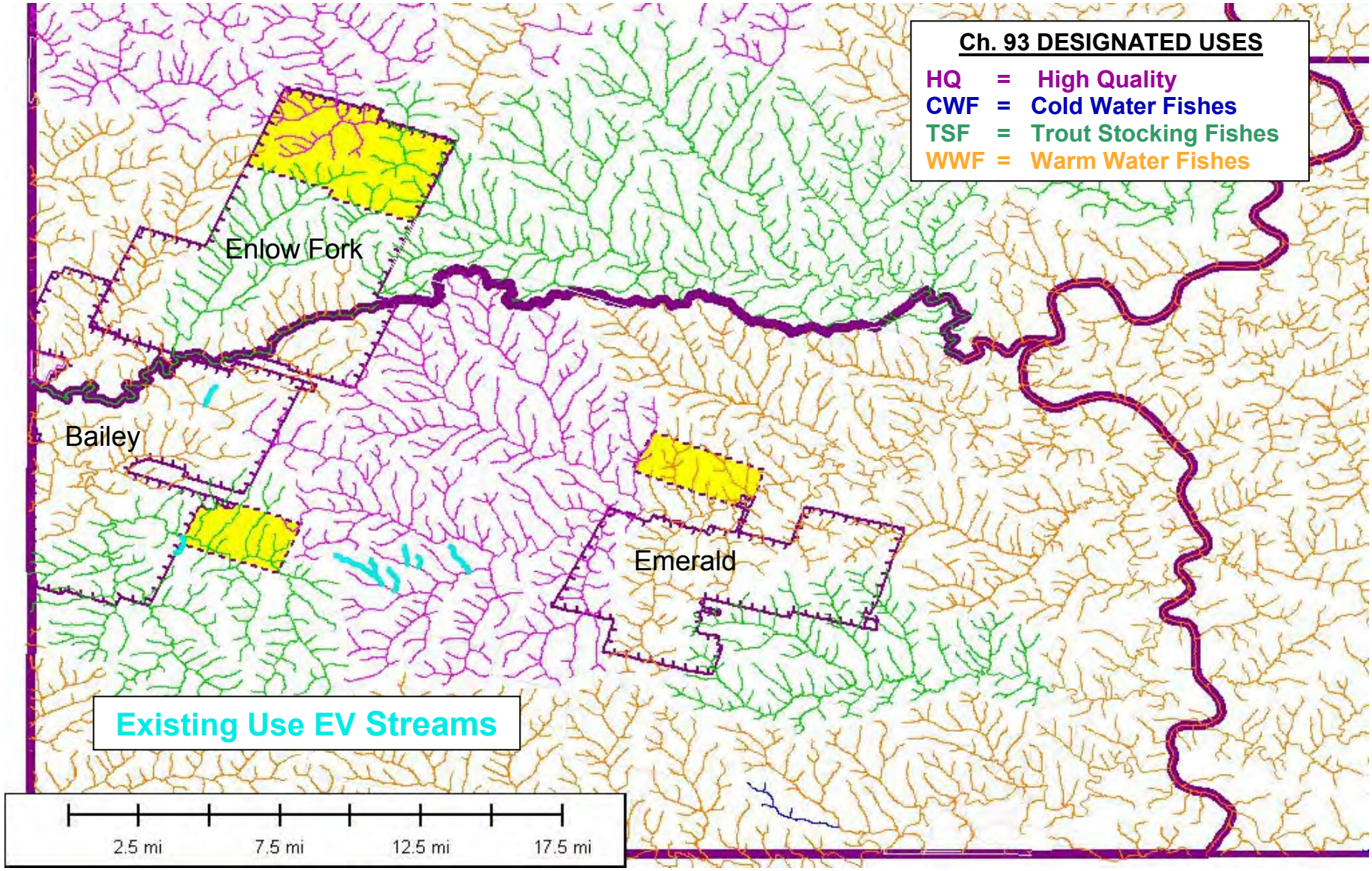


FIGURE 1A. Identification of Chapter 93 "designated uses" of streams in southwestern Pennsylvania in the vicinity of the three longwall mines discussed in this report. Expansion areas of the three mines are highlighted in yellow. The few streams in Greene County which have been formally identified as having "existing uses" better than their designated uses (all "EV") are shown in thick light blue. Other streams have attained EV and HQ existing uses, but have yet to be formally recognized as such.

Emerald Mine (Emerald Coal Resources, LP; Mining Permit # 30841307; NPDES # PA0213438). The original PADEP permit for this mine was issued on 9 July 1986 (although one file record identified its original NPDES permit as being issued in 1974). In 2000, Emerald Mine was up to its 31st revision; it now is up to Revision 94. As of August 2009, the approved sections of Emerald Mine encompassed 21,047 acres (33 square miles). During November 2006, Emerald Coal proposed a northward expansion of this mine encompassing 3,071 acres. That application is still under review.

Enlow Fork Mine (Consol Pennsylvania Coal Company; Mining Permit # 30841317; NPDES # PA0213527; originally called Bailey No. 2 Mine). The original PADEP permit for this mine was issued on 9 May 1986. When we did the review for our 2000 report, Enlow Fork Mine was up to its 40th revision; it now is up to Revision 80. In 2006, Consol proposed a 7,050 acre (11 square mile) expansion to the north of the existing mine (as well as a change from development room-and-pillar mining to full-extraction longwall mining for an additional 2,638 acres). This longwall expansion of 9,688 acres was approved during January 2008. As of November 2009, Enlow Fork Mine encompassed 35,215 acres (55 square miles).

The geographical areas affected by longwall mines continue to increase. The size of individual longwall panels also has increased over time, from about 500 feet in width in the early 1980s to 1,500 feet in width today. Likewise, the share of coal produced by longwall mines in Pennsylvania continues to increase as compared with tonnage from surface mines and from those underground mines using traditional room-and-pillar mining.

Coal for centuries was a key resource for industrial development in this nation and in this Commonwealth. Coal continues to provide a major share of the electrical energy used in Pennsylvania and the rest of the United States, and is likely to do so for years into the future, given the absence of political will to enforce existing laws and regulations, much less enact new ones, that would reduce historical subsidies to the mining industry at the expense of the environment and the public (Hendryx & Ahearn 2009; Konty 2009). Pennsylvania employment in coal mining today is about 2% of what it was in 1918, even as the extent of affected landscape continues to grow.

Mining coal for private economic gain has left a legacy of permanent environmental devastation in Pennsylvania, especially to our water resources. Acid mine drainage already has destroyed more than 2,400 miles of Pennsylvania streams---counting only the larger streams tallied by State agencies. Very slow progress is being made at stream restoration, at high cost per mile to taxpayers. Meanwhile, ongoing coal mining continues to destroy streams, water supplies, wetlands, roads, homes, and other surface features and public resources, despite limited efforts to predict impacts and only partial compensation for some of its damages to environmental resources and to residents' wellbeing. Section VIII of this report presents a number of specific recommendations which, if adopted and implemented by PADEP, would strengthen water resource protection in this Commonwealth.

II INTRODUCTION

This report focuses on information in PADEP regulatory files relevant to the understanding of water resource protection as coal is mined by longwall methods. Such information is kept in several PADEP offices, and its volume is quite extensive for large mines. Thus our first challenge was to gain access to and copy the records (see box).

As our review proceeded, we continued to request information from the several PADEP offices when we found gaps in data that we expected to exist, to the extent feasible within the time and resources available to us. PADEP staff kindly furnished file data to us, along with technical background on the regulatory program.

Our previous report (Schmid & Company, Inc. 2000) covered permit application and enforcement files. Similarly, this report focuses on data in permit applications, in monitoring reports from permittees and from the PADEP, and in PADEP correspondence files.

PADEP File Review

During August 2009, we submitted three separate Right-to-Know Law (RTKL) requests to the PADEP Central Records Officer in Harrisburg, requesting all file records associated with Emerald Mine (October 2007 - Present), Enlow Fork Mine (June 2005 - Present), and Bailey Mine/Prep Plant (October 2007 - Present). We were advised by the California District Mining Office (DMO) on 1 October 2009 that the requested files totaled approximately 75,000 pages of text and 899 maps, and would require payment of $28,513 for copying and mailing. We were further advised that it would take 11 months for PADEP to complete all of the copying for us, beginning when the State budget was passed (at that time, the budget was behind schedule, but it was finally approved on 9 October after a 101-day delay.). We were offered the alternative of visiting the California DMO and copying the files ourselves. We chose to visit the office and review the files. Instead of making paper copies, we purchased a portable desktop scanner and scanned the text files directly to portable document format (pdf) electronic files. We spent about 4 full days during the period 16 to 20 November 2009 scanning the files made available to us. We also reviewed drawings and selected several hundred for copying by PADEP.

After reviewing the files scanned in November 2009, we identified certain obvious omissions. During a several month period, we requested copies of missing files, some of which were provided to us by staff in the California DMO. Some additional files related to the mine applications needed to be obtained from other offices, including the DMO in Greensburg and the Southwest Regional Office (SWRO) in Pittsburgh. A significant number of relevant files from the 2007-2009 period of concern, found to be missing from the original records, could not be obtained subsequently because of timing and budgetary constraints. Why all of the records were not made available as part of the original RTKL requests is unclear.

Additional records relating to these three mine operations were obtained under separate Freedom of Information Act (FOIA) requests submitted during August 2009 to the Pittsburgh District of the Army Corps of Engineers. Some 500 pages of files were obtained under the FOIA requests, relating to federal involvement with proposed stream and wetland impacts regulated under Section 404 of the Clean Water Act. Although these activities often overlapped with PADEP-regulated activities, none of the files provided by the Corps were duplicative of files provided in response to the State RTKL requests. This report does not focus on the Corps files.

Conceptually, Pennsylvania underground mine permit applications contain three parts: (1) environmental inventory, (2) coal mining project description, and (3) impact assessment including planned compensation for expected damages. These three parts are spread over dozens of Modules. When we conducted our longwall mine review in 2000 there were 24 Modules associated with the PADEP underground coal mine permit application (not every module is relevant to every mining activity). Currently, there are 32 Modules, four of which are discussed at length in later sections of this report.

Modules for Underground Bituminous Coal Mining Application in Pennsylvania, 2010

1	Application	17	Soils/Prime Farmland
2	General Information	18	Land Use/Reclamation
3	Ownership/Compliance Information	19	Reclamation Schedule and Cost Information
4	Areas Where Mining is Prohibited or Restricted	20	Coal Refuse/Coal Ash – Sources and Properties
5	Property Interests/Right of Entry	21	Coal Refuse Construction Plans
6	Environmental Resource Maps	**22**	**Subsidence Control and Underground Mine Maps**
7	Geologic Information	23	Mine Openings
8	**Hydrology/Baseline Biology**	**24**	**Special Protection Waters**
9	Operations Maps - Surface Activity Sites	25	Coal Ash Beneficial Use
10	Operation Plan	26	Remining Areas with Preexisting Pollution
11	Erosion and Sedimentation Controls	27	Biosolids/Coal As Beneficial Use
12	Treatment Systems	28	Blasting Plan
13	Impoundments	29	Disposal of Excess Spoil
14	Liners and Caps	30	Underground Disposal/Backstowing
15	**Streams/Wetlands**	31	In Situ Processing
16	Air Quality and Noise Control	32	Surface Site Stability

Highlighted modules are the primary focus of this report.

The permit applicant's inventory of environmental resources today involves not only premining data collection, but also data collection during mining and after mining ceases. Accurate, comprehensive inventory is crucial to the permit review process, because unless all of the resources at risk are identified and properly quantified in the application, it is impossible (1) to evaluate whether or where any effects (either positive or negative) are likely to occur, (2) to determine afterwards what effects have occurred as a result of implementing the mine plan, or (3) to evaluate any related efforts to mitigate damage. Monitoring during mining, at least in theory, could allow modification of approved practices when unexpected adverse impacts on surface resources first are encountered. Postmining inventory is crucial because it could allow a reviewer to determine whether the bases for approval were justified and could support an applicant seeking to demonstrate the accuracy of its past predictive methodologies when requesting future approvals.

When changes are made in regulatory requirements, a period of years elapses before the results of the changes can be seen, first in the application paperwork and eventually on the ground. This report specifically attempts to ascertain how the regulatory process has been changing during the past several years.

The disjointed format of PADEP's underground mine application Modules, review process, and recordkeeping does not allow the immense quantity of information now being generated in the context of longwall mining activities to be organized neatly into the three components of site inventory, project description, and impact assessment. Data from "required" monitoring, when collected, appear mostly to gather dust in agency files. The Modules are internally inconsistent and at odds with each other regarding information solicited and cross-referenced. The Modules do not closely track with the regulatory requirements that they are meant to implement. As a result, confusion and omission of data are apparent in the actual applications.

Through its laws and regulations, even the Constitution itself, Pennsylvania has a strong framework for protecting water resources from the damages that can result from longwall mining. It is the administration and implementation of those laws and regulations that continues to be weak and is resulting in the loss or degradation of important surface waters and ground waters. Unfortunately, the health and wellbeing of coalfield residents suffer as a result.

Photo credit: Mark Schmerling

III FRAMEWORK FOR WATER RESOURCE PROTECTION

Environmental requirements in general, and the protection of water resources in particular, apply to underground coal mining activities just as they do to other types of development in Pennsylvania. Various Commonwealth laws and regulations relevant to mining and environmental protection include The Clean Streams Law, 25 *Pa. Code* Chapter 86 (Surface and Underground Coal Mining: General) and Chapter 89 (Underground Mining of Coal and Coal Preparation Facilities), Chapter 93 (Water Quality Standards), Chapter 102 (Erosion and Sediment Control), and Chapter 105 (Dam Safety and Waterway Management). The ultimate legal authority for water resource protection in the context of mining extends to the Constitution.

State Capitol Building
Harrisburg PA

Pennsylvania Constitution

The public trust doctrine is the principle that certain common resources are preserved for public use and enjoyment. The concept of the public trust doctrine is embedded in Article 1, Section 27 (Declaration of Rights) of the Pennsylvania Constitution:

> ***The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.***

Thus, clean water, clean air, and other natural amenities are among the basic Constitutional rights of all Pennsylvania residents. The government of Pennsylvania is required to preserve and protect those resources on behalf of all the people, not merely the current generation. There is no exception for coal mining operations.

Clean Streams Law

The requirements of the Clean Streams Law[1] (CSL) are relevant to underground mining activities. The Clean Streams Law was established in 1937 to protect the waters of the Commonwealth from adverse impacts to water quality and water quantity, including from mining impacts which are mentioned specifically. Some of its stated objectives, taken directly from the CSL preamble, include the following:

- Preserve and improve the purity of the waters of the Commonwealth for the protection of public health, animal and aquatic life, and for industrial consumption, and recreation
- Provide protection of water supply and water quality
- Provide additional remedies for abating pollution of waters
- Regulate the impact of mining upon water quality, supply, and quantity
- Place responsibilities upon landowners and land occupiers.

The CSL Declaration of Policy (Article I, Section 4) makes the following relevant points [bold emphasis added]:

> (1) **Clean, unpolluted streams are absolutely essential** if Pennsylvania is to attract new manufacturing industries and to develop Pennsylvania's full share of the tourist industry;
>
> (2) **Clean, unpolluted water is absolutely essential** if Pennsylvanians are to have adequate out of door recreational facilities in the decades ahead;
>
> (3) It is the **objective** of the Clean Streams Law not only **to prevent further pollution of the waters** of the Commonwealth, but also **to reclaim and restore to a clean, unpolluted condition every stream** in Pennsylvania that is presently polluted;
>
> (4) The **prevention and elimination of water pollution** is recognized as being directly related to the economic future of the Commonwealth.

The Clean Streams Law specifically discusses mines and mining activities. According to CSL Article III, Section 315. *Operation of Mines*:

> (a) No person or municipality shall operate a mine or allow a discharge from a mine into the waters of the Commonwealth unless such operation or discharge is authorized by the rules and regulations of the department or such person or municipality has first obtained a permit from the department. **Operation of the mine shall include** preparatory work in connection with the opening or reopening of a mine, refuse disposal, **backfilling**, sealing, and other closing procedures, and **any other work done on land or water in connection with the mine**.
>
> (c) **The application for a permit to operate a mine shall include a determination of the probable hydrologic consequences of the operation**, both on and off the site of the operation, with respect to the hydrologic regime, quantity and quality of water in surface and ground water systems including the dissolved and suspended solids under seasonal flow conditions and the collection of sufficient data for the site of the operations and surrounding areas so that an

[1] Act of 1937, P.L. 1987, No. 394, as amended

assessment can be made by the department of the probable cumulative impacts of all anticipated mining in the area upon the hydrology of the area and particularly upon water availability.

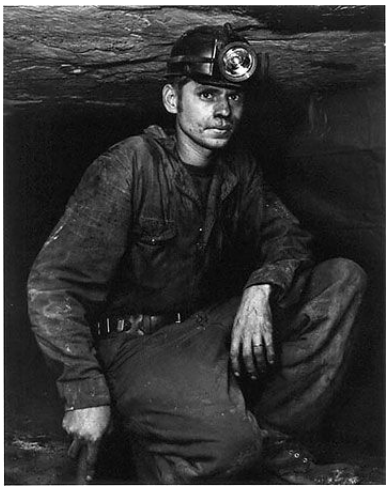
(d) The **operator** of a mine **shall restore the recharge capacity of the area of the operation to approximate premining conditions**.

In theory, this last requirement should result in the restoration to premining conditions of the natural supplies of water of all landowners above longwall mines, as well as all contributing wetlands, springs, and seeps. Yet thousands of square miles of stream networks have been disrupted or destroyed, and the destruction continues today. The typical "restoration" is not all-encompassing, and usually is confined to specific landowners who can show (typically via regulatory presumption) that they have suffered a water loss directly related to mining. According to the second Act 54 review report (California University of Pennsylvania 2005), mining was determined not to be liable in 40% of the claims filed for water supply losses early in this decade, and where longwall mining was found to be liable, resolution of the water supply issue required an average of 441 days (1.2 years). The coal companies would point out that the actual restoration of most water supplies proceeded much more rapidly than the PADEP paperwork to close out cases. Nevertheless, in most cases, the "*recharge capacity of the area*" was never restored; rather, individual homes simply were connected to a public water system.

The Clean Streams Law also specifically ties into any mine application the need to comply with the requirements of other laws:

(f) The [mine] **application** shall also **set forth the manner** in which the operator **plans to comply with the requirements of** the act of November 26, 1978 (P.L.1375, No.325), known as **the "Dam Safety and Encroachments Act**," the act of May 31, 1945 (P.L. 1198, No.418), known as **the "Surface Mining Conservation and Reclamation Act**," the act of January 8, 1960 (1959 P.L.2119, No.787), known as the "Air Pollution Control Act," the act of September 24, 1968 (P.L.1040, No.318), known as the "Coal Refuse Disposal Control Act," and where applicable the act of July 31, 1968 (P.L.788, No.241), known as the "Pennsylvania Solid Waste Management Act" or the act of July 7, 1980 (No.97), known as the "Solid Waste Management Act." **No approval shall be granted unless the plan provides for compliance with the statutes hereinabove enumerated**.

Mine Subsidence Act of 1966 and Act 54 Amendments



In 1966, the Pennsylvania Bituminous Mine Subsidence and Land Conservation Act (BMSLCA, or Mine Subsidence Act[2]) was passed. For the first time, structures built before April 1966 had to be protected from subsidence from underground coal mines regardless of whether or not the landowner owned the rights to coal beneath the structure. Like the Clean Streams Law, the BMSLCA clearly was meant to provide environmental protection when allowing underground coal mining.

[2] Act of April 27, 1966, P.L. 31, a*s amended*, 52 P.S. §§1406.1 - 1406.21

Several of the original "purposes" in Section 2 of the BMSLCA include:

" ... protection of the health, safety, and general welfare of the people of the Commonwealth

... providing for the conservation of surface land areas

... aid in the preservation of surface water drainage

... and generally to improve the use and enjoyment of such lands"

[emphasis added]

Thus, the Mine Subsidence Act of 1966 was intended to serve vital *public* interests by protecting the health, environment, and integrity of an area and by the preservation of surface land areas. Importantly, it was meant to prevent damage from occurring in the first place. Furthermore, the Mine Subsidence Act was meant to work in conjunction with federal and state environmental protection laws. Section 9.1(d) of the BMSLCA states:

> ***Nothing in this act shall be construed to amend, modify or otherwise supersede*** *standards related to prevailing hydrologic balance contained in* [the federal Surface Mining Control and Reclamation Act of 1977]*…… nor* ***any standard contained in*** *the act of June 22, 1937 (P.L. 1987, No. 394), known as "****The Clean Streams Law," or any regulation promulgated thereunder*** *by the Environmental Quality Board.*

On 21 August 1994, the Pennsylvania General Assembly passed Amendments to the BMSLCA known as Act 54. The Act 54 Amendments essentially changed the focus of underground mining regulation from one of *preventing* damage to one of *compensating* for some (but not all) damages. Under Act 54, damage to homes and water supplies now was allowed, provided the mine companies agreed to fix the damage or replace it in some way.

A provision was inserted in the new law to require followup reporting on its effectiveness every five years[3]. Neither of the two five-year review reports completed to date has yet been able to assess clearly the effectiveness of Act 54, because much of the PADEP file information which is supposed to be reviewed and analyzed in those reports was found to be "…*unavailable, incomplete, or inconsistent, making a thorough, quantified assessment of the effects of subsidence …. impossible to achieve*." (California University of Pennsylvania 2005, Executive Summary). The third five-year report, being prepared for PADEP by the University of Pittsburgh (Department of Civil & Environmental Engineering), is due to be released during the summer of 2010. It is to cover the period from August 2003 through August 2008.

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[3] Section 18.1. Compilation and analysis of data.

a. The department shall compile, on an ongoing basis, the information contained in deep mine permit applications, in monitoring reports and other data submitted by operators, from enforcement actions and from any other appropriate source for the purposes set forth below.

b. Such data shall be analyzed by the department, utilizing the services of professionals or institutions recognized in the field, for the purpose of determining, to the extent possible, the effects of deep mining on subsidence of surface structures and features and on water resources, including sources of public and private water supplies.

Chapter 89 Regulations

Title 25 *Pa. Code* Chapter 89 (Underground Mining of Coal and Coal Preparation Facilities) is the primary set of regulations which apply to underground coal mining operations. The following sections, excerpted directly from Chapter 89, are among those which most directly relate to mine-related requirements for protection of groundwater, surface water, and the hydrologic balance.

§ 89.34. Hydrology.

(a) The operation plan shall contain premining or baseline hydrologic information representative of the proposed permit, adjacent and general areas.

(1) Groundwater information shall include:

(i) The results of a groundwater inventory of existing wells, springs and other groundwater resources, providing information on location, ownership, quality, quantity, depth to water and usage for the proposed permit area and adjacent area.

(ii) Other information on the baseline hydraulic and hydrogeologic properties of the groundwater system shall be included with the application.

(iii) A groundwater monitoring plan under § 89.59 (relating to surface water and groundwater monitoring). The plan shall logically relate to the analysis of the baseline information and the prediction of the probable hydrologic consequences of mining and reclamation required by § 89.35 (relating to prediction of the hydrologic consequences). The plan shall identify monitoring locations and sampling frequency.

(2) Surface water information shall include:

(i) A description of streams, valuable impoundments and alternative water supplies. The information shall include the name, location and qualitative and quantitative seasonal flow conditions. Water-quality descriptions, at a minimum, shall include base-line information on total suspended solids, total dissolved solids or specific conductance corrected to 25°C, pH, acidity, alkalinity, sulfates, total iron, total manganese and other locally significant water-quality characteristics.

(ii) A surface water monitoring plan under § 89.59. The plan shall logically relate to the analysis of baseline information and the prediction of the probable hydrologic consequences of mining and reclamation required by § 89.35. The plan shall identify monitoring locations and monitoring frequency. The plan shall emphasize low flows and high flows and their variable quality.

§ 89.35. Prediction of the hydrologic consequences.

The operation plan shall include a prediction of the probable hydrologic consequences of the proposed underground mining activities upon the quantity and quality of groundwater and surface water within the proposed permit, adjacent and general areas under seasonal flow conditions, and whether underground mining activities may result in contamination, diminution or interruption of any water supplies within the permit or adjacent area. The prediction shall be based on baseline data collected at the proposed mine site or data statistically representative of the site or a combination of both. The prediction required by this section may be developed using modeling techniques, but the Department may require verification of any models.

§ 89.36. Protection of the hydrologic balance.

Definition: *Hydrologic balance*—The relationship between the quality and quantity of water inflow to, water outflow from, and water storage in a hydrologic unit such as a drainage basin, aquifer, soil zone, lake, or reservoir. It encompasses the dynamic relationships among precipitation, runoff, evaporation and changes in groundwater and surface water storage. [§89.5]

(a) The operation plan shall describe, with appropriate maps and cross sections, the measures to be taken to ensure the protection of the hydrologic balance and to prevent adverse hydrologic consequences. The measures shall address:

(1) The quality and quantity of surface and groundwater within the proposed permit and adjacent areas.

(2) The rights of present users to surface and groundwater.

(3) The control of surface and groundwater drainage into, through and out of the permit area.

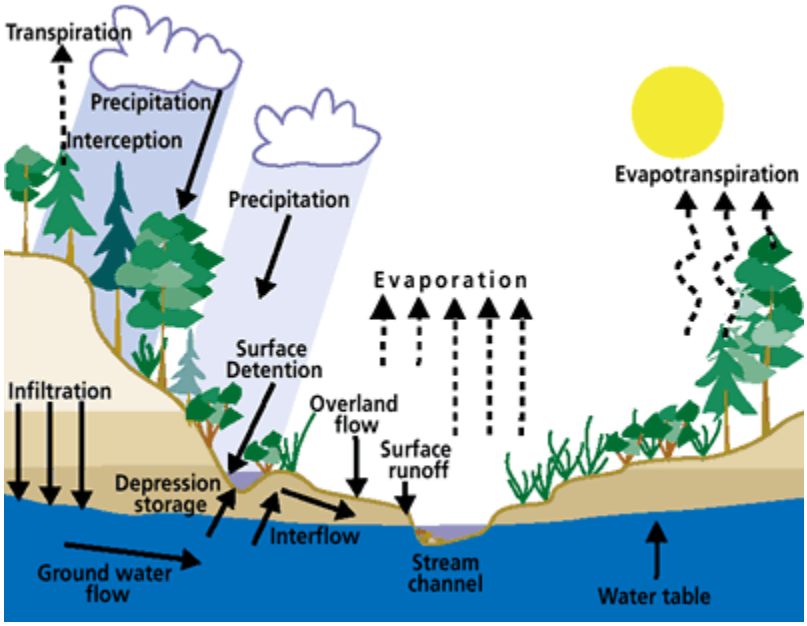
(4) The treatment, when required, of surface and groundwater drainage from the permit area, and proposed quantitative limits on pollutants in discharges as provided in § 89.52 (relating to water quality standards, effluent limitations and best management practices).

(b) The operation plan shall also describe how the proposed mine development plan will prevent or minimize adverse hydrologic consequences. The plan shall consider:

(1) The location of mine openings to prevent postmining discharges as required by § 89.54 (relating to preventing discharges from underground mines).

(2) Possible alterations in the mine development plan or method of mining in response to adverse impacts on the hydrologic balance as indicated by the groundwater monitoring system.

(c) The operation plan shall include a description of the measures which will be taken to replace water supplies which are contaminated, diminished or interrupted by underground mining activities. An operator is not required to provide a replacement water supply prior to mining as a condition for securing a permit.



§ 89.59. Surface water and groundwater monitoring.

(a) Surface water and groundwater monitoring shall be conducted under § 89.34 (relating to hydrology) and with the monitoring plan contained in the permit. At a minimum, surface water and groundwater monitoring shall include the following conditions:

(3) In addition to the monitoring and reporting requirements in Chapter 92 (relating to National Pollutant Discharge Elimination System permitting, monitoring and compliance), surface water shall be monitored accurately to measure and record the water quantity and quality of discharges from the permit area and the effect of the discharges on the receiving waters. Surface water shall be monitored for parameters that relate to the suitability of the surface water for current and approved postmining land uses and to the objectives for protection of the hydrologic balance as set forth in § 89.36 (relating to protection of hydrologic balance).

In addition to the above, the following sections of Chapter 89 also apply to environmental protection:

§ 89.56: streamflow may be diverted if it will not adversely affect water quantity and quality, and will comply with Chapter 105 requirements.

§ 89.65, § 89.67, § 89.74, and § 89.82: minimize disturbances and adverse impacts on fish, wildlife, and related environmental values

§ 89.81: minimize changes in water quality and quantity, depth to groundwater, and location of surface water drainage channels

§ 89.141: identify all perennial streams that flow continuously and describe the measures that will be taken to protect those streams [4]

§ 89.142a(h): mine in a manner that maintains the value and reasonably foreseeable uses of perennial streams as they existed prior to coal extraction

§ 89.142a(h): mitigate any adverse effects on perennial streams to the extent technologically and economically feasible.

There is a strong basis for the protection of water resources in Pennsylvania, from the Constitution down through laws enacted by the General Assembly and implemented by PADEP through its regulations, application forms, technical guidance, and enforcement activities. The PADEP should apply and enforce the laws and regulations as they were intended to apply to coal extraction activities. If water resources are fully protected in the context of longwall mining, many related environmental, social, and economic concerns also will benefit.

[4] This "alternate" definition of perennial streams, based solely on continuous flow, has not been deleted or corrected despite the fact that it conflicts with the definition at §89.5 which is based on substrate and macroinvertebrates. The latter definition currently is used in applying TGD 563-2000-655.

IV TECHNICAL GUIDANCE DOCUMENT ON SURFACE WATER PROTECTION

Significant changes in the technical requirements for identifying and protecting streams and wetlands in the context of underground coal mine applications were instituted by the PADEP approximately five years ago. Those requirements pertain to the type of information that is required to be submitted in mining applications when new permits or permit revisions are sought. One of the main objectives of this report was to ascertain whether those changes have produced intended improvements in the inventory, assessment, and protection of water resources. Hence this section reviews and evaluates historical changes in the technical guidance requirements during the past dozen years.

During November 1997, Technical Guidance Document (TGD) 563-2000-655 ("*Perennial Stream Protection*") first went into effect. As its name implies, it primarily focused on perennial streams, which previously were narrowly defined as streams having continuous flow year-round, based on the definition in 25 *Pa. Code* 89.141(b), rather than the more expansive definition in §89.5 which defines perennial streams on the basis of the aquatic macroinvertebrate organisms found there. It is unclear why there were, and continue to be, two separate definitions at odds with one another in the Chapter 89 regulations. The hydrologic (continuous flow) definition appears only in the context of documentation of average annual flow when interpreting potential impacts of surface subsidence.

During April 2002, revisions to this TGD first were proposed, including its title, which was to be changed to "*Surface Water Protection*". Added protections for streams and wetlands, including mitigation requirements, were included. The proposed revisions received public review and comments (Kunz 2002), but never took effect. During March 2004, revisions to this TGD again were proposed but never adopted.

A revised Technical Guidance Document ("*Surface Water Protection - Underground Bituminous Coal Mining Operations*"; PADEP 2005) took effect on 8 October 2005.

In 2005, revisions once again were circulated for public review and comment (Kunz 2005a, 2005b). A revised TGD ("*Surface Water Protection - Underground Bituminous Coal Mining Operations*"; PADEP 2005) finally took effect on 8 October 2005. This final TGD incorporated some of the recommendations contained in the "Second Act 54 Five-Year Report" (California University of Pennsylvania 2005) which had recently been completed. The 2005 surface waters TGD has not been revised further and remains in effect today.

One of the more significant changes in the 2005 TGD is a new protocol which is to be used for delineating and characterizing "protected" stream segments that are

subject to the new guidance. In particular, a perennial stream specifically is defined by its capacity to support aquatic macroinvertebrates (per §89.5) rather than just by its continuous year-round flow. This definition effectively includes and protects as "perennial" those intermittent streams which have been found to support an aquatic community of benthic streambed invertebrate animals.

Two types of perennial stream segments are to be identified for protection per the TGD: "biologically diverse" (diverse communities of long-lived aquatic macro-invertebrates) and "biologically variable" (any two or more taxa of macro-invertebrates that live part of their life cycle on or within stream substrates). Biologically variable segments typically are found upstream from biologically diverse sections, but the two kinds of stream habitats may alternate along a watercourse. The upstream limit of the biologically variable stream segment marks the "point of first surface water use" (PADEP 2008b), *i.e.*, the point on a stream at which the protections of the 25 *Pa. Code* Chapter 93 water quality standards first apply. Figure 2 is an example of a recent mine application map with these stream segments identified. The stream documentation shown in Figure 2 is much more detailed than comparable submissions prior to the 2005 version of TGD 563-2000-655.

Another useful change associated with the current TGD 563-2000-655 is the provision of a more detailed and specific definition of "adverse effect" (see box).

Adverse effect -

Means mining induced changes that may impair surface water quality.

(i) In regard to streams, these may include:

(A) A flow loss.

(B) A greater than 12% reduction in the mean total biological score of a stream reach based on a comparison of pre- and post-mining scores.

(C) A reduction in the length of intermittent or perennial stream wherein are found at least two recognizable taxonomic groups of benthic macroinvertebrate organisms which are large enough to be seen by the unaided eye and can be retained by a United States Standard No. 30 sieve (28 meshes per inch, 0.595 millimeter openings) and live at least part of their life cycles within or upon available substrates in a body of water or water transport system.

(ii) In regard to wetlands, these may include:

(A) A loss of hydrology such that wetland conditions cease to exist. This occurs when wetland soils are no longer saturated at a depth equal to or less than 12 inches from the soil surface during at least 5% of the growing season. (1987 Army Corps of Engineers Wetland Delineation Manual [a document now largely superseded by regional Supplements]);

(B) A loss of an essential habitat function, including those necessary for breeding, nesting, hibernating and feeding;

(C) An inundation to the extent that an existing vegetative community ceases to exist; or

(D) The diminution of groundwater or surface water resources sufficient to interfere with the functions and values of a wetland, or that impacts the function that is the basis for the classification.

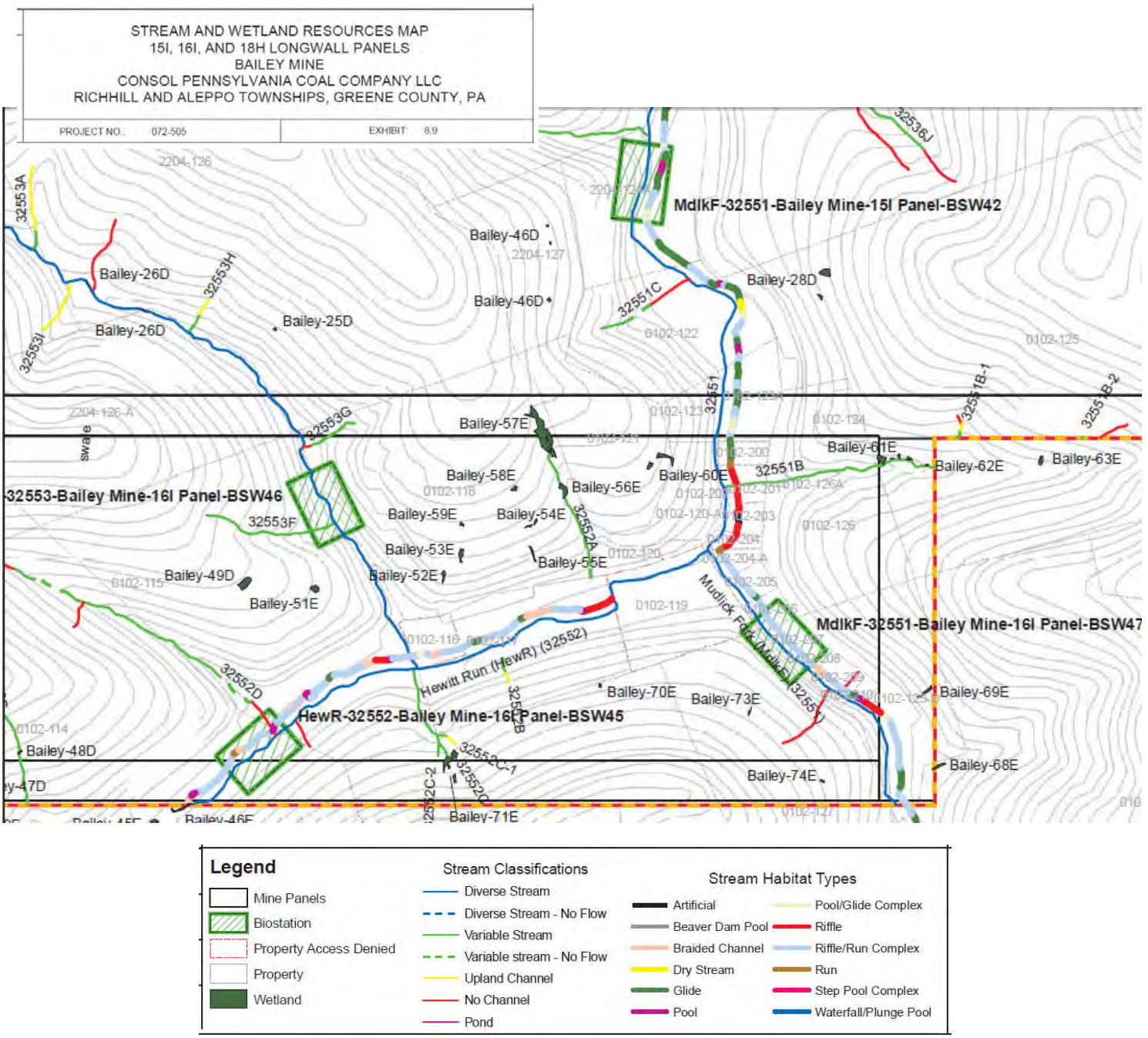


FIGURE 2. Section of biological inventory map from a proposed revision of the Bailey Mine (Consol) underground coal mine permit. Streams are classified as biologically diverse (blue), biologically variable (green), or upland channel (yellow). Segments of biologically diverse streams where habitat assessments and fish and macroinvertebrate surveys were performed are identified by cross-hatched rectangles (each such "biostation" is 100 meters in length). Field-located wetlands (dark green) also are identified. PADEP and USGS historical stream maps and codes need extensive supplementation to take into account the additional lengths of waterways identified in these more detailed permit application surveys.

Although this definition appears to be appropriately encompassing, it has several significant loopholes. For example, "a flow loss" (defined as an "absence of water") is considered an adverse effect on a stream if it impairs water quality, but what qualifies as "impairment" is not made clear. Based on recent experience, PADEP apparently is willing to allow the total loss of streamflow for a considerable number of years before it is considered an "adverse effect".

Although well-intentioned, the practicality of demonstrating an "adverse effect" on a *wetland* soon after mining-induced hydrologic changes is exceptionally difficult. Many wetlands exhibit ponding or surface saturation only seasonally, and can continue to function as wetlands without receiving their normal quantity of water for prolonged periods (although not indefinitely). Even if its hydrology were to be removed sufficiently to disqualify a parcel of land as wetland, its hydric soils and hydrophytic vegetation can persist for many years, making it difficult to determine from simple field inspection that any impact had occurred. To make such a determination, careful hydrological monitoring of a wetland would be necessary both prior to and subsequent to mining. Thus, the simple, one-time follow-up assessment of wetlands 12 months after undermining, as required by the TGD, is unlikely to provide useful insight into whether any wetland has suffered an adverse effect. Not one such follow-up assessment was found among the files provided by PADEP, although many wetlands have been inventoried and subsequently undermined since this requirement became effective nearly 5 years ago. Thus, it is not possible to evaluate any real-world attempts to meet this requirement.

Not only is detailed premining information on streams and wetlands now being required, it actually is being *provided* by mine applicants. This is a great improvement from a decade ago.

Another major change associated with the 2005 version of TGD 563-2000-655 involves the amount and type of premining and postmining data to be collected and evaluated with respect to both streams and wetlands. Two years of premining measurements and observations of flow for streams are required prior to the beginning of full extraction mining at a panel, as well (theoretically) as weekly and daily measurements at representative monitoring locations when mining approaches streams. New baseline premining data on in-stream habitats and on fish and macroinvertebrate communities also are required, with additional bioassessment details to be provided to document the condition of those stream segments identified as "biologically diverse" and therefore most susceptible to significant damage. Stream mitigation/restoration plans (and appropriate bonding) also must be developed for segments where pooling or flow loss is predicted. All wetlands to be undermined by longwall mine operations are to be field-delineated, with detailed inventory information to be provided on data sheets and photographs. For applications submitted subsequent to October 2005 but prior to October 2007, a permit could be issued with incomplete information, but actual mining apparently was not allowed to proceed until complete sets of premining data for streams and wetlands had been submitted to PADEP.

At first glance, these new requirements appear to be comprehensive and protective of streams, wetlands, and aquatic habitats. Indeed, they require a considerable amount of inventory and monitoring effort on the part of mine applicants, much more than were required under the former TGD or found in permit files a decade ago. Not only is this detailed premining information now being *required*, it actually is being *provided* by mine applicants. That is a very positive change from a decade ago. Nevertheless, major deficiencies remain associated with these requirements that detract from their effectiveness for actual environmental protection.

The major shortcoming of the TGD is the false sense of regulatory muscle it projects. A casual reading of the guidance document could lead one to conclude that PADEP intends to make protection of surface water resources a top priority in its review of underground coal mine applications. One gets the same impression when reading relevant sections of the underlying laws and regulations (see Section III, Framework for Water Resource Protection, above). The current review of more than 75,000 pages of permit application files, following a similar review ten years ago (Schmid & Company, Inc. 2000), reveals a very different picture of the actual water resource protection afforded by the longwall mine regulatory process in Pennsylvania.

The current version of TGD 563-2000-655 provides many loopholes, which this review has found are amply utilized by regulated coal mining companies. For example, two years of quarterly premining streamflow data are required to be collected on streams above a proposed underground mine permit area. Ostensibly, the monitoring is intended to document actual streamflow levels for a long enough period of time to demonstrate a normal range of background conditions, so that any mining-induced deviation from this baseline can be detected, and then either corrected or mitigated as quickly as possible. In practice, this does not work very well, when actual HMRs (hydrologic monitoring reports) are evaluated. Crafts Creek provides a troubling example (see box below).

On a positive note, the additional premining bioassessment studies now required to be conducted per the 2005 surface water TGD have resulted in the collection of a significant amount of useful information about the physical, chemical, and biological condition of many streams whose attributes previously were unknown. The main purpose of these data appears to be to provide a basis against which to evaluate whether any adverse impacts have occurred as a result of undermining, and if so, to provide a yardstick by which to measure the success or failure of any attempted restoration.

No actual postmining bioassessment studies were found among the files provided by PADEP, however, despite the fact that many streams on which premining studies had been conducted subsequently have been undermined. Unlike the wetland “requirement” in the TGD (whereby a followup assessment of all inventoried wetlands ostensibly is to be conducted 12 months after completion of full extraction mining), there is no stated timeframe in the TGD for any routine

followup bioassessment of undermined streams. Instead, a postmining bioassessment apparently is being required only in a stream that has been determined to be adversely affected, and then only to demonstrate that the stream has "*fully recovered or* [has been] *fully restored*" within no specified timeframe.

Crafts Creek Dewatering

Hydrologic monitoring data for streamflow in Crafts Creek (Tenmile Creek basin) within the Enlow Fork Mine were among the files provided by PADEP. The data had been compiled by the consultant for Consol for 5 full years before, during, and 2+ years after the undermining of Crafts Creek began in 2007. In November 2008, a loss of flow in a 1,400 foot section of Crafts Creek occurred and caused a fish kill of 200 fish. A year later a second flow loss incident occurred, and two months after that, a third was discovered. Based on the quarterly monitoring data provided, however, it is impossible to determine that *any* flow loss actually occurred during that 14-month period.

This loss of flow in Crafts Creek was serious enough to warrant formal enforcement action by PADEP, apparently triggered by public complaints rather than hydrologic monitoring. No streamflow data per the PADEP files were reported more frequently than quarterly. The quarterly background monitoring data suggested a wide range of flow in Crafts Creek, from a low of 0.01 cfs in September 2005 to a high of 5.26 cfs in December 2003. None of the reported monitoring results indicated a lack of flow at any time. Indeed, the two measurements recorded immediately following the November 2008 flow loss and associated fishkill were in February 2009 (3.2 cfs) and May 2009 (1.7 cfs). It is not known whether those measurements reflect artificial flow augmentation efforts which apparently were underway at the time. If the "required" monitoring fails to provide any indication of a *known* incident of flow loss, it raises questions as to whether other flow loss incidents have gone undetected by the similar quarterly monitoring routinely deemed acceptable by PADEP.

For "biologically diverse" streams, the standard for full recovery or full restoration is not 100% of the premining condition; rather, degradation up to 12% of the premining biological score is deemed acceptable. In practice, the restored stream must have a mean postmining total biological score that is at least 88% of the mean premining biological score. This standard is the same whether or not the adversely affected waterway is a "special protection" stream. Thus, an EV stream would be permitted to be degraded, so long as its postmining biological score is lowered no more than 12% from its premining quality score. This provision conflicts with the Chapter 93 antidegradation requirement that the water quality of EV waters "shall be maintained" without exception. It also appears to conflict with the opening statement in the TGD, which is repeated here in all uppercase letters just as it appears in the document itself:

> ***THE FUNDAMENTAL PRINCIPLE GOVERNING THE INTERPRETATION AND APPLICATION OF THIS GUIDANCE IS*** [THAT] ***UNDERGROUND MINING SHALL NOT RESULT IN THE DESTRUCTION OF A STREAM USE.***

It could be argued that "destruction" and "degradation" of a stream are different matters, but neither should be acceptable if the objectives of the Clean Streams Law and the antidegradation requirements of the State water quality standards are to be taken seriously.

Despite all of the detailed bioassessment information now being collected in premining inventories, no attempt is being made by the District Mining Office to use those data to identify streams that may be attaining uses higher than their designated uses, or to require further evaluations to determine those streams' existing uses (Schmid & Company, Inc. 2010). This is especially troubling in light of the fact that both Chapter 93[1] and Chapter 89[2] of 25 *Pa. Code* require the protection of existing uses for all streams. Furthermore, a determination of existing use" is required by regulation to be made as part of the review and approval of every DEP permit application[3], but that appears not to be done for longwall mine permits.

Although PADEP has used the TGD to compel the *collection* of premining inventories and assessments of streams and wetlands, PADEP's failure to compel similar postmining assessments, as well as certain aspects of the TGD requirements themselves, have resulted in less protection of surface water resources than intended.

A troubling aspect of the TGD that is pervasive throughout its text is its use of phrases which are qualified to such an extent that the "requirement" sounds more like an offhand suggestion. Some typical examples (emphasis added):

> In the context of streams and wetlands, the term mitigation means, among other things: "*Performing enhancement measures, where practicable, that address or offset the effects of mining*."
>
> "*If the guidelines in Section IV.1.a)(viii) are not met within five years and the district mining office determines that the mine operator has done what is technologically and economically feasible to restore the affected stream, it may allow the operator to compensate for the impairment of the affected stream by restoring or enhancing an equivalent length of stream in the same watershed or a nearby watershed in lieu of continuing to perform mitigation measures*."
>
> "*All mitigation plans should provide for surveys of the macroinvertebrate community as outlined in Section IV.1.a)(viii)(B) as soon as practicable after flow has recovered or been restored*."
>
> "*Mining operations should be planned to avoid or minimize adverse effects on wetlands to the extent feasible.*"

---

[1] §93.4a(b) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

[2] §89.142a.(h)(1) Underground mining operations shall be planned and conducted in a manner which maintains the value and reasonably foreseeable uses of perennial streams, such as aquatic life; water supply; and recreation, as they existed prior to coal extraction beneath streams.

3 §93.4c(a)(1)(i) Existing use protection shall be provided when the Department's evaluation of information (including … data considered in the context of a Department permit or approval action) indicates that a surface water attains or has attained an existing use.

Indeed, the entire 2005 surface water TGD itself (like all TGDs) is qualified by the following disclaimer:

> *Nothing in the policies or procedures* [outlined in this guidance] *shall affect regulatory requirements. The policies and procedures herein are not an adjudication or a regulation. There is no intent on the part of DEP to give the rules in these policies that weight or deference.*

There is no continuity between the TGD and the Modules used for underground mine permit applications. Nowhere in the TGD is there any reference to Module 8 (Hydrology) or Module 15 (Streams/Wetlands). In September 2008, changes in the permit application Modules eventually began to reflect the changes associated with the 2005 TGD, but that was nearly three full years after the TGD became effective. Even then, the Module requirements remained inconsistent with one another and they do not track well with the TGD requirements (see Section V, Mine Permit Application Modules, below).

Photo credit: Mark Schmerling

V UNDERGROUND COAL MINE PERMIT APPLICATION MODULES

During the past decade, the number of Modules associated with a PADEP underground bituminous coal mine permit application has increased from 24 to 32 (see below). Not every module is required for every proposed activity. This section focuses on four of the modules (Numbers 8, 15, 22, and 24) which are of particular relevance to the identification and protection of water resources.

Module	Date Last Revised	Name
1	4/2009	Application
2	2/2009	General Information
3	9/2008	Ownership/Compliance Information
4	9/2008	Areas Where Mining is Prohibited or Restricted
5	9/2008	Property Interests/Right of Entry
6	2/2009	Environmental Resource Maps
7	10/2008	Geologic Information
8	**9/2008**	**Hydrology/Baseline Biology**
9	9/2008	Operations Maps - Surface Activity Sites
10	9/2008	Operation Plan
11	9/2008	Erosion and Sedimentation Controls
12	9/2008	Treatment Systems
13	10/2008	Impoundments
14	9/2008	Liners and Caps
15	**9/2008**	**Streams/Wetlands**
16	9/2008	Air Quality and Noise Control
17	9/2008	Soils/Prime Farmland
18	9/2008	Land Use/Reclamation
19	9/2008	Reclamation Schedule and Cost Information
20	9/2008	Coal Refuse/Coal Ash - Sources and Properties
21	9/2008	Coal Refuse Construction Plans
22	**9/2008**	**Subsidence Control and Underground Mine Maps**
23	9/2008	Mine Openings
24	**9/2008**	**Special Protection Waters**
25	12/2008	Coal Ash Beneficial Use
26	9/2008	Remining of Areas with Preexisting Pollutional Discharges
27	9/2008	Biosolids/Coal Ash Beneficial Use
28	9/2008	Blasting Plan
29	9/2008	Disposal of Excess Spoil
30	9/2008	Underground Disposal/Backstowing
31	9/2008	In Situ Processing
32	10/2008	Surface Site Stability

V-I HYDROLOGY (MODULE 8)

HYDROLOGIC SYSTEMS

A stream is much more than simply a conduit for water. A stream is a complex, interconnected system of living and non-living things. A stream has both structural elements and functional elements. Structurally, a stream consists of a bed, banks, channel, and floodplain area. Streams are three-dimensional features which both affect, and are affected by, their surrounding areas. Fish and other aquatic organisms live in the stream and depend on adjacent areas for inputs of organic matter and energy. A stream is a dynamic system, with sections of slower flow (pools) and sections of faster flow (riffles). Sediment, pebbles, rocks, tree branches, and other organic and inorganic matter are transported by the stream, which themselves cause changes in the shape, flow, and meander pattern of the stream and greatly affect the kinds of aquatic organisms that inhabit the system. Because of this complex and interrelated nature of streams, PADEP regulations typically discourage proposals to change the channel of a stream or to pipe a stream, even where those activities may result in the same amount of water flowing from Point A to Point B

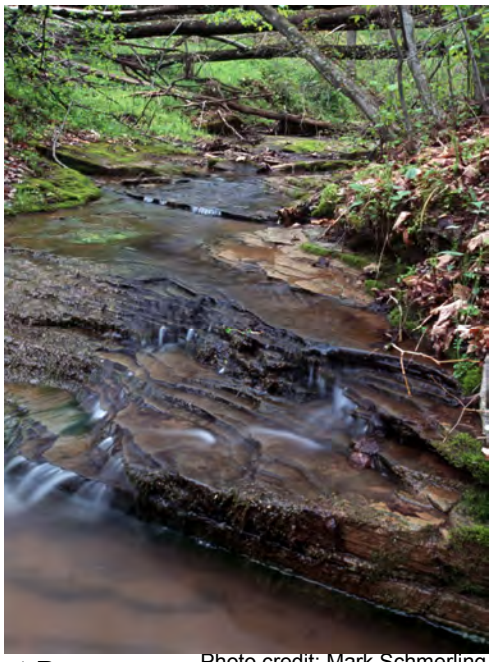


Photo credit: Mark Schmerling

In the context of underground mining, the protection of Pennsylvania streams is less stringent than in other industrial or development situations. Coal companies and the PADEP Bureau of Mining and Reclamation appear to view changes to the hydrologic balance from an inappropriately distant perspective. They concede that a headwater stream may dry up, that streams may suffer pooling and sediment accumulation where previously they were free-flowing, and that the wells of some people may go dry as a result of longwall mining. They rationalize, however, that farther down in the watershed the wells of other landowners may increase in yield, and that there should be no net change in streamflow at the bottom of the watershed from conditions that prevailed before undermining. In effect, the logic goes, some water may have gotten relocated, but overall there is no net change and thus there is no problem. This ignores the reality that specific changes in hydrology---whether the drying up of a stream or a spring or a well---are being experienced as adverse local impacts which cumulatively are very real, even if the overall quantity of water leaving the watershed as a whole, as measured at some downstream point, might be unchanged. Furthermore, the localized changes include not only changes in water flow, but changes in the physical and morphological character of the surface and groundwater systems. Steady overland flow may be replaced by rapid, flashy runoff following storms. Runoff may be expedited, the water temperature may be increased, and the quality of habitat for aquatic organisms may be reduced by increased sediment and pollutant concentrations.

Hydrologic impacts at and near the ground surface due to longwall mining are described thus by Callaghan, Brady, Chisholm, and Sames (2000):

> One important aspect of overburden movement, relative to the potential of high-extraction mining to impact surface waters, is the formation of surface extension zone fractures. An extension zone forms at panel edges and at the traveling panel face and is most pronounced near the surface. Surface extension zone fractures are typically 50 to 100 feet deep. This near-surface zone of increased permeability and storativity can result in shallow aquifer and surface water impacts even where overburden to seam ratios are considerable and there is no direct avenue for drainage to the mine.

According to a US Fish and Wildlife Service report on longwall mining impacts in southwestern Pennsylvania (2004), the following types of hydrologic effects can be expected from longwall mining subsidence:

> Subsidence often fractures overlying rock strata and can translate into varying effects at the earth's surface depending on the depth and width of the panel, geology of the overburden, mining height, number of panels, and mining face location (Shultz 1988). At the surface, subsidence may fracture relatively impermeable layers of rock or clay that previously diverted groundwater to hillside seeps, and first and second order stream channels. Springs may go dry; stream bottoms may fracture, thereby causing the stream to go dry; or the stream bottom may sink relative to unsubsided reaches (Northwestern University 1997; Booth *et al.* 1998; Hobba 1981).

Photo credit: Raymond Proffitt Foundation

Heaved and cracked streambed from longwall-induced subsidence

Wherever mining adversely upsets the hydrologic balance, all of the associated features that are affected should be restored, not merely selected ones. Nothing in the Clean Streams Law or the Chapter 89 regulations suggests otherwise. When longwall mining causes subsurface strata to become cracked and distorted, thereby changing groundwater patterns such that the well water supply of a landowner is diminished, the typical "fix" is to replace the landowner's water supply in some way, either by drilling a deeper well, supplying a temporary "water buffalo" (aboveground tank) for months or years, or connecting the landowner to a public water system. But this addresses only one symptom of the broader hydrologic impact which has occurred, leaving unaddressed such things as the permanent disruption of the shallow aquifer system and the related effects on the baseflow of nearby streams due to the loss of feeder springs and seeps.

Although it may be true, from the perspective of the permittee, that surface waters are not being siphoned off into the longwall mine workings, that is not proof that other hydrologic effects are not occurring. A recent Emerald application states:

Discharge records for the Emerald Mine indicate that water inflow to the mine is negligible, approximately 187 gallons per day per acre or 0.13 gpm per acre.

Nevertheless, the sudden appearance of faults and fractures extending from the coal seam up to the surface represents a drastic change in hydrology of immense consequence to surface landowners, to streams, seeps, springs, and wetlands, and to the organisms dependent on water resources.

Similarly, when pooling occurs in a formerly free-flowing section of a stream that is subsided by longwall mining, it typically is "repaired" by gate cutting. However, that seldom restores the affected floodplain and other vital functions and features of the stream. In discussing hydrologic restoration, the USFWS (2004) offers this caution:

> … properly restoring a stream after it has been subsided by longwall coal mining requires more vision and foresight than by simply cutting the unsubsided gate areas. Because the entire slope of the landscape has been altered, the holistic approach to restoration is certainly appropriate.

Writer and sportsman Ted Williams (2005) succinctly described stream restoration in the context of longwall mining:

A condition of mining permits issued by the Pennsylvania Department of Environmental Protection (DEP) is that longwallers "restore" streams they destroy. One prescribed method is "gate cutting" -- that is, removing dams created by the sagging watershed. At Roberts Run near Spraggs I inspected old and new gate cuts. In some places the meandering stream had been straightened for hundreds of feet; and where once Roberts Run renewed a rich floodplain, there are now five-foot-high banks of raw dirt over a layer of sheared shale. Now there is no place for floodwater to go except downstream, where it becomes someone else's problem. Springs that fed and cooled the flow have dried up, so the "restored" Roberts Run alternates between a raging torrent and a largely dry streambed. Basically, a healthy, biologically diverse stream has been converted to a storm-water ditch.

Writing for the majority of the U.S. Supreme Court in *Jefferson City Public Utility District v. Washington Dept. of Ecology*[1], Justice Sandra Day O'Connor noted that the separation of water quality from water quantity (or flow) was an artificial distinction that had no place in a law intended to give broad protection to the physical and biological integrity of water. Further, she declared that reducing water quantity or flow was capable of destroying all designated uses for a given body of water, and that the federal Clean Water Act's definition of pollution was broad enough to encompass the effects of reduced water flow, not merely the release of polluting substances. The Pennsylvania Environmental Hearing Board (EHB) made a similar determination[2] when it found that PADEP has an affirmative obligation to make a determination concerning the effect, if

[1] PUD No. 1 of Jefferson County v. Washington Dep't of Ecology (92-1911), 511 U.S. 700 (31 May 1994)

[2] Oley Township v. DEP and Wissahickon Spring Water, Inc., 1996 EHB 1098.

any, on adjacent water resources of projects involving water withdrawals under the Pennsylvania Clean Streams Law.

Even the myopic approach of addressing only specific water supply damages can have unintended consequences. According to the second Act 54 review report (California University of Pennsylvania 2005, pg. IV-27):

> "*as a result of public water supply replacement, the area of Washington and Greene counties served by public water has increased more rapidly than it would have without mining*."

That report also notes that public water is generally more available in longwall (vs. room-and-pillar) mining areas. Chlorinated drinking water can adversely affect livestock on dairy farms (Lombardi 2009a) and can cause fish kills when released into Pennsylvania streams (Heffron 2010). Additionally, the extension of public utilities, such as water and sewer, into areas previously not served by those services can have the effect of inducing residential or other development into areas where it is not planned or desired according to local land use controls. These all are indirect cumulative hydrologic consequences of longwall mining that are not being addressed in the PADEP review process in any manner.

MODULE 8

Module 8 elicits information about the hydrology of a mine permit area, including both surface water hydrology and groundwater patterns and movement. It appears to track most closely with the regulatory requirements set forth in 25 *Pa. Code* Chapter 89 at §89.34, 89.35, §89.36, §89.52(a), and §89.59. Module 8 solicits information about existing conditions and requires predictions of hydrologic consequences from proposed mining activities. It also requires that a monitoring program be established to identify hydrologic changes as a result of mining. This is potentially one of the most important modules in the underground mine application in terms of water resource protection.

In the April 2001 version of Module 8, its title was simply "Hydrology". In September 2008, the title was changed to "Hydrology/Baseline Biology", and the length of the module expanded from 13 to 25 pages.

Section 8.1 elicits information about existing groundwater and surface water resources to be affected by the proposed mining. For underground mines, separate site-specific (not generalized) descriptions are required for surface activity sites and for the underground permit area. Among the items to be addressed is "*the impact of past mining activities on the quantity and quality of local water resources.*" There were no changes to this section between 2001 and 2008.

Section 8.2 lists hydrologic and geologic information to be shown on a 7.5-minute USGS topographic map base for the mine. There were no changes to this section between 2001 and 2008.

Section 8.3 was called "Inventory Information" in 2001. It elicited data for various resources including: wells and springs, streams, adjacent mine discharges,

lakes/ponds/dams/ impoundments, and public water supplies. In the 2008 version, each of these inventory resource items was split out into its own separate section, numbered Sections 8.3 to 8.7. Wetlands are not addressed in these sections.

Section 8.4 in 2001 was titled "Background Sampling and Measurements". It elicited information to address: *"streams, springs, and wetlands that are representative of the surface and groundwater systems in the general area* [undefined]*, as well as all streams, springs, and wetlands within 1000 feet of a surface mine activity site."* [emphasis added] Unfortunately, these inventoried resources were not required to be cross-referenced to any map (it would have been proper to show them on Exhibit 6.2/6.3 Environmental Resource Maps). A minimum stream sampling frequency of 6 successive monthly samples was specified (including at least one from the low-flow period August to October). Although it mentions "wetlands", the blank sampling and monitoring forms accompanying Module 8 in 2001 provided no place for wetland information of any kind, which leads to a presumption that the applicant was not expected to do any monitoring of wetland resources. In 2008, Section 8.4 was replaced by Section 8.13 "Background Sampling Requirements". The revised section was similar to the previous section, except that all references to "wetlands" were removed and relocated into a new Section 8.12 devoted specifically to wetlands. Also, *monthly* streamflow monitoring was now required over a 24-month period, which is an improvement over the previous requirement of 6 months of monthly monitoring, even if it fails to address the variability of many coalfield streams.

Section 8.5 in 2001 was titled "Prediction of Hydrological Consequences/Protection of Hydrological Balance". It elicited mainly a narrative description of the "potential" for postmining discharges, and the "potential" for altering the hydrology of dams, ponds, impoundments, and wetlands which overlie the underground mine permit area. (This, of course, presupposes that all of these features have been accurately identified and located on an exhibit.) In the 2008 version, this section was renumbered as Section 8.14.

In both Section 8.5 (2001) and Section 8.14 (2008), there is the same troubling pair of statements:

> Address the potential for mining-induced material damage to public water supply aquifers and bodies of water, which are sources for public water supplies. If there is a significant potential for damage, describe the measures which will be employed to minimize the potential impacts.

These statements are troubling because they suggest that significant material damage to public water supplies or their sources of water *will be allowed* so long as measures will be taken to predict and *minimize* (that is, compensate for but not avoid) the impacts. It is difficult to understand any rationale whereby PADEP would permit intentional significant damage to a public water supply. A better approach would be to deny any application where significant material damage to public water supplies is anticipated and the mining plan is not revised to avoid the damage.

As mentioned above, all wetland information was consolidated into Section 8.12 in the 2008 version of Module 8. There also is a blank wetland inventory form (Form 8.12A) attached to Module 8. Significantly, Section 8.12 notes:

> Plans that involve full-extraction mining should include a complete inventory of wetlands located in areas of planned subsidence and provisions for monitoring and assessing subsidence related impacts.

PADEP directs applicants to field-delineate *all* wetlands before mining occurs, describe their characteristics and functions, and perform a post-mining analysis of changes. While it sounds good to say "*If predictions show that one or more wetlands are likely to experience adverse effects, provide an alternatives analysis…and detailed mitigation…*" no computer model or other method currently is claimed as capable to actually predict such impacts to wetlands, such as the model employed to estimate stream pooling. All wetlands above longwall mine panels are likely to experience adverse effects. This directive is being interpreted to address only those wetlands expected to be damaged by post-mining efforts to restore stream flow. We found no example in all of the files reviewed, that any wetland ever has been reevaluated post-mining to determine whether any adverse effects had occurred.

There are very few references in Module 8 to Module 15 (Streams/Wetlands), and vice versa. The relationship between information in the two modules is not always clear. Predictions of flow loss or pooling (hydrologic changes) are made in Module 8, and restoration/mitigation plans are provided in Module 15. Module 8 appears to require the identification of all streams, springs, and wetlands over an underground mine permit area. Module 15, by contrast, seems to focus solely on water resources that may be affected by stream restoration activities. Most cross-references relate to the identification of areas where stream restoration activities are proposed as a result of longwall-induced pooling or flow loss.

Hydrologic impacts on identified wetlands are never predicted, and a concern for nearby wetlands is raised only when post-mining stream restoration is planned. Modules 8 and 15 are not integrated or adequately cross-referenced.

The 2008 revision of Module 8 directly incorporates the background inventory and assessment requirements of Technical Guidance Document 563-2000-655 (*Surface Water Protection*) which took effect during October 2005 (as discussed in Section III). It is unclear, however, why it took three years for those requirements to be inserted into Module 8 of the application form so that the concerns might begin to be addressed. In the 2008 version, direct reference to the TGD is made in Section 8.8 (Control Stream Inventory), Section 8.9 (Potential Areas of Flow Loss within the Stream), and Section 8.10 (Potential Areas of Pooling within the Stream).

Detailed baseline information on in-stream habitats, macroinvertebrate communities, and fish now is being compiled and analyzed in Module 8 submissions. This information is being used to delineate biologically diverse streams, biologically variable streams, and points of first use (where stream protection and water quality standards may first apply in headwater channels). These data also (presumably) are being used to determine whether any adverse impacts have occurred to undermined streams after mining, and as a standard against which to evaluate the success of any restoration

efforts. None of the files provided for review, however, confirm that any of these latter evaluations actually is being conducted.

The premining data compilation effort currently being performed is a good news - bad news situation. The good news is that applicants appear to be providing the baseline data that they are required to provide in terms of habitat assessments and macroinvertebrate and fish surveys. This is a striking change from applications submitted a decade ago. The bad news is that PADEP is not using those data to provide the intended protection of water resources. Those data *should* be used by PADEP to draw conclusions regarding the attained (*existing*) uses of streams, instead of merely relying upon the Chapter 93 *designated* uses of those streams. Applicants are required to provide the data, but are not required to draw any conclusions regarding their implications for identifying special protection waters (Schmid & Co. 2010). Clearly, it is not in an applicant's interest to offer observations that may conflict with its objective of maximum coal extraction. PADEP, on the other hand, should have a different focus than permit applicants. PADEP should be seeking to protect the quantity and quality of waters of the Commonwealth in the public interest. Under Chapter 93, PADEP is supposed to make a final determination of existing use protection for surface waters as part of every mine permit approval (indeed, for any PADEP approval). Thus, PADEP should be seeking to determine, from the data provided to it, which streams may be attaining uses higher than their designated uses, and to impose a higher level of protection where waters qualify for Special Protection (see Figure 1A, page 3A).

Massive amounts of stream inventory data are being compiled by mining permit applicants, but PADEP fails to use these data to make required assessments of existing uses. Thus, streams are not being fully protected against degradation.

Certain modules in the underground mine permit application appear to track more closely with the mining regulations than others. As noted above, Module 8 appears to track rather well with the Chapter 89 regulatory requirements. But none of the application modules seems to track well with the Chapter 93 requirements. The only mention in Module 8 of existing or designated uses per Chapter 93 is in the context of coal refuse disposal facilities [mentioned in the 2001 version in Section 8.4(d)(2). and in the 2008 version, in Section 8.13(b)(4)]. In both cases, the applicant is asked to document whether a stream is capable of supporting its *designated* uses per Chapter 93 if a surface coal refuse disposal area is proposed near a stream. It is not clear why this demonstration is required of coal refuse disposal areas but not any other type of surface or underground coal mining activity. No mention is made of *existing* uses; only designated uses are afforded this consideration in Module 8.

In sum, responses to Module 8 to date have not succeeded in providing a clear and comprehensive description of the hydrology of areas proposed for mining, nor one that is capable of being updated during and after longwall mining. PADEP is failing to use the information provided in this Module to make a final determination of existing use protection for surface waters.

V-II WETLAND PROTECTION (MODULE 15)

Wetlands are important natural resources that are protected under both federal (Clean Water Act) and State (Clean Streams Law, Dam Safety and Encroachments Act) legislation. In Pennsylvania, regulatory protection for wetlands primarily is prescribed at 25 *Pa. Code* Chapter 105. Yet wetlands, just as much as streams, rivers, lakes, or ponds, are among the regulated waters of the Commonwealth addressed in Chapter 93. In the context of mining, wetland protection is directly incorporated in the Chapter 89 regulations, as well as indirectly through reference to, and the applicability of, the requirements of Chapter 93 and Chapter 105.

The identification of wetlands in current longwall mine applications is much more thorough than it was a decade ago. Mine application maps formerly at most showed only the wetlands depicted on National Wetland Inventory (NWI) maps; even some of those were omitted. Now, wetlands are being delineated in the field and documentation regarding the extent and nature of each wetland is being provided. Enhanced PADEP scrutiny also is evident. In its review of the Enlow Fork expansion application, PADEP noted that the NWI map showed a 2.95-acre emergent wetland in a specific location where none had been identified by the applicant. The applicant's response (below) is correct, but ironically it echoes sentiments expressed a decade ago complaining about the coal industry's unwarranted sole reliance on NWI maps:

> ***... the NWI map appears to be in error compared with the on-site field inspection and determination. This not* [sic] *an unusual occurrence. NWI maps have been prepared by the USF&WS based on high altitude infrared aerial photography and limited ground truthing. As such, these maps are often inaccurate, especially in piedmont and mountainous areas with extensive tree cover, like portions of southwestern Pennsylvania.***

MODULE 15

Module 15 elicits much of the wetland-related information in an underground coal mine permit application. Additional information regarding wetlands is required in Section 8.12 of the current (2008) Module 8. Module 15 has undergone significant changes over the past decade. This section highlights the substantive changes that have occurred in Module 15, particularly as they relate to wetlands. In 2001, the module appeared to relate only to surface mining activities, but its focus has shifted over time. Specific examples taken from mine permit files are used to illustrate what had been required in the past, what now is being required, and what actually is being provided.

Title. In April 2001, Module 15 was entitled "Streams/Wetlands". That title has remained the same through the various revisions to date (primarily 2003, 2006, and 2008).

Section 15.2. In 2001, Section 15.2 was entitled Stream Relocation and Channel Changes, and applied only to proposed surface activities that would affect streams (not wetlands). It is interesting to note that much of Section 15.2 related to characterizing and evaluating stream channel conditions before and after a proposed disturbance, and was taken from (or at minimum, was based upon) Title 25 *Pa. Code* Chapter 105 requirements. Under Chapter 105, any activity which changes, expands, or diminishes the course, current or cross section of a stream or other body of water would be defined as a regulated encroachment. In the context of mining, however, the intentional subsidence of sections of a stream channel by several feet is not considered a "channel change" or an impact of any kind, and thus PADEP does not require it to be authorized by Chapter 105 permit or otherwise evaluated. Changes proposed to a stream channel in order to attempt to restore flow *after* it has been subsided, however, *are* supposed to be evaluated in the mine application and may require a Chapter 105 permit. More regulatory paperwork consequently is required to restore than to destroy a Pennsylvania stream.

In September 2003 (and still in 2006), Section 15.2 of Module 15 was named Chapter 105 Activities, and it applied

> *where a stream relocation, channel change, or any other Chapter 105 activity is proposed.*

This language might appear to have applied the Chapter 105 requirements to the channel changes caused by longwall mine subsidence, but that was not the case. PADEP maintains that subsidence itself is not a "surface activity", it is merely a *consequence* of the underground mining activity. PADEP contends that it may have no authority to regulate consequences of an activity, only the activity itself (Figure 3).

Chapter 105, of course, regulates activities that affect both streams ***and*** wetlands[1]. Chapter 93 likewise applies to both streams and wetlands. Consequently, one would expect Section 15.2 in 2003 and 2006 to have applied equally to streams and wetlands. Yet Section 15.2(a) and parts of Section 15.2 (d, e, f, and h) only elicited information about activities affecting streams.

New subsections (l) through (r) were added to Section 15.2 in 2008. Although Section 15.2(m) specifically elicits information about both streams and wetlands, it cross-references 15.2(a), which does not apply to wetlands. Such internal discrepancies within and among the PADEP mine application modules, unfortunately, are not uncommon. They usually result in incomplete permit applications that fail to address environmental impacts.

Section 15.2 in 2003 and 2006 was stated to apply to

> *any Chapter 105 activity (including in-stream restoration activities for mitigation of subsidence impacts).*

[1] The actual wording in Chapter 105.3(a)(4) is: "*a watercourse, floodway, or body of water, whether temporary or permanent.*" Wetlands are specifically included in the Chapter 105 definition of "body of water".

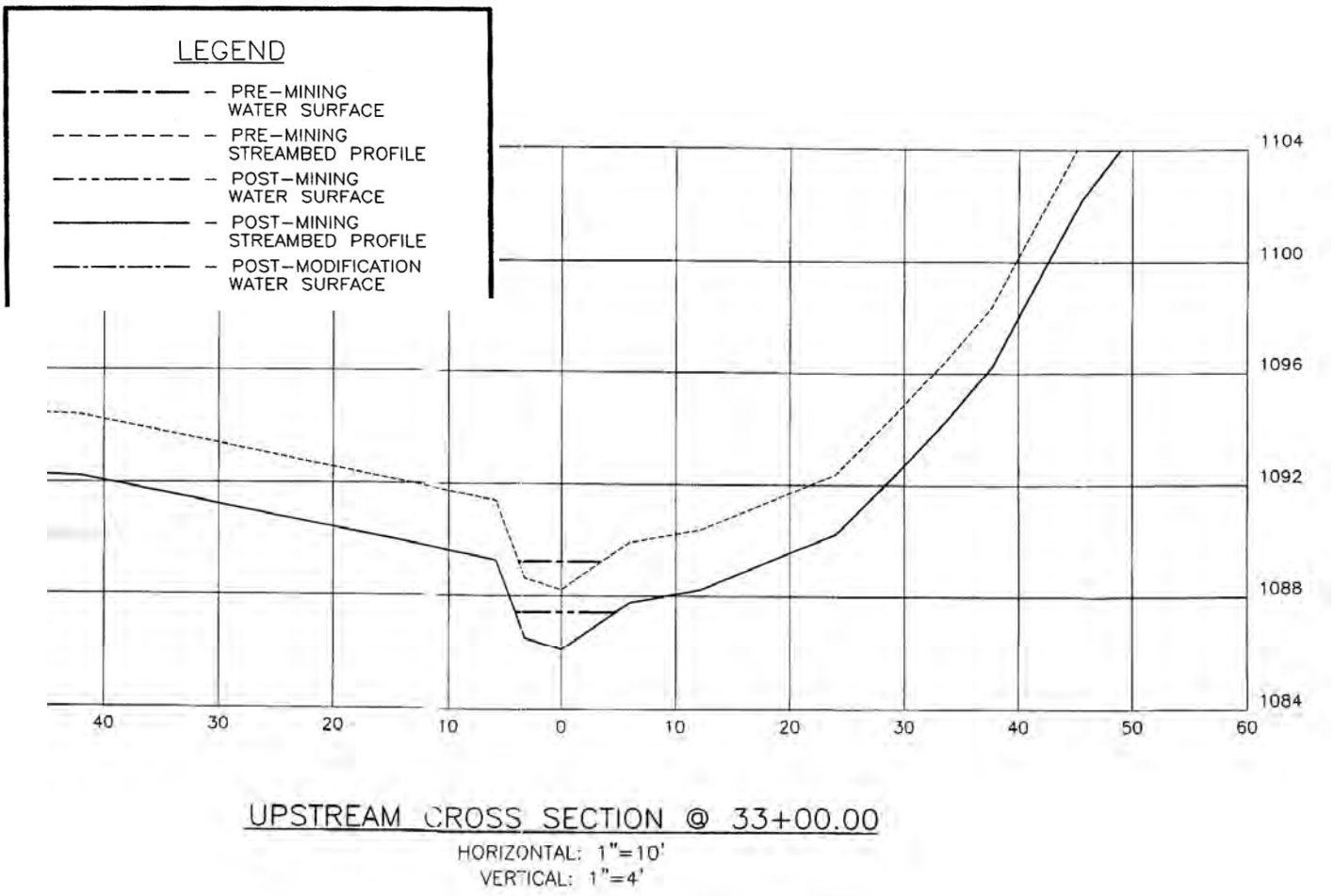


FIGURE 3. Proposed changes in cross-section of the streambed and water elevation of Crafts Creek as a result of anticipated longwall mining at the Enlow Fork Mine North Expansion (Blue Mountain Engineering, Drawing # CCSEP-05-4, Sheet 4 of 7, dated 22 March 2005, last revised 26 December 2007). The streambed and banks are projected to subside approximately two feet, and the width of the channel will increase by approximately 29 percent, yet these changes are not subject to the Chapter 105 requirements for “channel changes” or “encroachments”.

It is ironic that this section now is being read as requiring that an applicant must evaluate only those effects on wetlands associated with repairing a stream damaged by subsidence (presumably because that restoration work is a surface activity), while the applicant need not evaluate or secure approval for any damage directly caused to a wetland by longwall-induced subsidence itself.

In September 2008, Section 15.2 was renamed once again, this time to Surface Activities Involving Stream Encroachments and Water Obstructions. The revised Section title appears to have been a subtle way of restricting the scope of analysis from what previously was "any Chapter 105 activity" to those specific Chapter 105 activities that are "*stream* encroachments", and thus to eliminate its applicability to both *wetland* encroachments and to encroachments or obstructions in bodies of water other than streams. The next sentence clearly stated that this section applies only to "surface mining activities", thus further limiting the scope of any required analysis.

As in the 2003/2006 versions, Section 15.2(m) in the 2008 version could be read as eliciting premining information on streams AND wetlands, because it refers to Section 15.3(a) which is entirely about wetlands. The 2008 version, however, deleted the phrase "or wetland" (which had been included in the 2003/2006 versions: *"For each stream, stream segment, or wetland identified in Module 15.2.a, provide the following premining water resource information…"*) and it specified instead only "*each stream or stream segment*" in that opening sentence. Thus, the premining data required here appears not to apply to wetlands, although the California DMO staff told us that all wetlands above a mine permit area are supposed to be inventoried (telephone communication, J. Koricich, 24 March 2010).

It is ironic that an applicant must evaluate the effect on a wetland associated with *repairing* a stream damaged by mine subsidence, but not any damage *caused to* a wetland directly by subsidence.

In the 2003/2006 versions of Module 15, the new Section 15.2(r) [relating to Chapter 105 Stream Restoration Plans] elicited considerable important information when

> *underground mining is planned beneath intermittent streams, perennial streams, or wetlands,*

noting that

> *restoration activities may be necessary to avoid impacts to water uses and rectify subsidence-related effects of underground mining beneath streams and wetlands*. [underline added for emphasis]

Although this would seem to apply to subsidence-related effects to streams and wetlands, such information apparently was required only if it was anticipated that *stream* damage would occur that would require restoration and that the ensuing restoration work would disturb wetlands. In the proposed Enlow Fork 9,688-acre longwall expansion application, information is provided only for those eight sections of streams where potential *stream restoration* is expected to be necessary. No potential *wetland*

restoration is identified anywhere within the proposed expansion area. No model exists for identifying wetlands potentially affected by longwall subsidence, although potential areas of stream pooling routinely are predicted using a model first developed by Syd S. Peng of West Virginia University.

In 2008, Section 15.2(r) was deleted and was moved into a new (and expanded) Section 15.6 (Stream Impact Evaluation/ Restoration).

Section 15.3. In 2001, Section 15.3 was entitled "Wetland Related Information". It directed applicants to complete the Wetland Inventory (Form 15A of Module 15) for

> *all wetlands which occur on or within the permit area of surface mining activity sites.*

In 2008, the title of Section 15.3 was renamed "Surface Activities Affecting Wetlands", and its applicability was expanded specifically also to include wetlands "*within stream restoration sites*".

Exceptional Value Wetlands

Two types of wetlands are recognized in Pennsylvania: (1) Exceptional Value wetlands and (2) Other wetlands. Most of the wetlands found throughout the Commonwealth fit into the "Other wetlands" category, but even those are considered important resources worthy of protection. There is nothing in any of the mining laws or regulations that says that protection should be afforded only to "Exceptional Value wetlands", and not to "Other wetlands".

There are two principal ways that a wetland in southwestern Pennsylvania could qualify as "Exceptional Value": either it would be a documented habitat for a threatened or endangered species of plant or animal, or it would be located along or within the floodplain of an EV water. Rarely, if ever, has any wetland been determined to be an "Exceptional Value wetland" during the course of underground mine permitting. Yet, this now is a very real possibility, as highlighted by the fact that several streams in the region now are recognized as having attained existing aquatic life uses of "EV" (see Figure 1A; see also Special Protection Waters). All wetlands along those streams, and along other streams that have "EV" existing uses but have yet to be formally recognized, would be "Exceptional Value wetlands". Protection cannot be afforded to these important resources, of course, if they are not recognized and assessed in mining permit applications.

In the 2001 version of Module 15, and all subsequent versions, Section 15.3 includes 17 questions which elicit information about two wetland-related matters: "Exceptional Value wetland characteristics" (questions 1-9) and "wetland functions" (questions 10-17). The first set of questions applies only to Exceptional Value wetlands, leaving the distinct impression that those are the *only* wetlands of concern to PADEP. The second set of questions applies to *all* wetlands identified at a mine site, but that is not clearly stated. All versions of Module 15 until 2008 also included a page-long excerpt taken directly from the section of 25 *Pa. Code* Chapter 105 [§105.18a] which describes the standards for

issuing a permit for work proposed in wetlands. The excerpt included in Module 15, however, was only the first part of that section [§105.18a(a)], the part that pertains specifically to Exceptional Value wetlands. The second part of the Chapter 105 section [§105.18a(b)] pertains to "Other" wetlands. No reference is made in Module 15 to that second part, and it is omitted from the excerpt. This is a major oversight which should be corrected.

Because of the unwarranted emphasis on Exceptional Value wetlands, the second half of the Module 15 wetland inventory section (questions 10-17) sometimes has been misinterpreted by applicants as applying only to Exceptional Value wetlands, in which case these questions have been ignored. It is ironic that PADEP has largely neglected protection of Special Protection *streams* from longwall mining, but with regards to wetlands, has focused most of its attention on Exceptional Value wetlands, a virtually empty category in southwestern Pennsylvania until very recently.

Wetland Inventory (Form 15A) was unchanged in 2003/2006, but in 2008 was renamed "Wetland Inventory Summary (Form 15.3A)". This is a helpful change because it allows an applicant to understand that it tracks with Section 15.3.

Section 15.4. The directives in Section 15.4 (Wetland Impact Analysis/Assessment) are quite unclear and inconsistent, and consequently appear to confuse applicants regarding what information is required. This section begins by requesting information about alternatives to proposed "surface mining activities" and any direct or indirect wetland impacts from such activities. By contrast, Section 15.4(f) does not state that it is limited to "surface mining activities" [unlike Sections 15.4 (a) through (e)]. Indeed, Section 15.4(f) specifically asks about the risk of altering a wetland's hydrology due to underground coal extraction. Because the previous parts of Section 15.4 relate only to "surface activities", however, applicants for major expansions of underground mining usually ignore Section 15.4(f), as was the case with the 9,688-acre longwall expansion of Enlow Fork proposed in 2007; in that application, Section 15.4(f) was left unanswered.

Section 15.4(f) could and should be one of the most significant sections in Module 15 with respect to wetland impact assessment. It refers the applicant back to the assessment made for Module 8.5, where in 8.5(a)(4)(vi) each applicant is to provide a narrative description addressing the potential for altering the hydrology of wetlands (and other water resources) which overlie the underground permit area, and addressing how impacts will be prevented or mitigated. While Section 15.4(f) *appears* to apply to underground mining activities, however, it says to provide the information elicited in Sections 15.3 and 15.4, which are limited to *surface* mining activities. Since the Module 15 Inventory Form applies only to wetlands associated with "surface mining activities", it is unclear how or whether the Module 8.5 assessment actually is to apply to ALL wetlands. **Section 15.4(f) was deleted in the 2008 version of Module 15**, presumably to reinforce the idea that Section 15.4 applies only to surface mining activities. Its deletion (without replacement elsewhere) is most unfortunate for practical wetland protection.

Section 15.5 (Wetland Mitigation/Replacement) discusses compensating for unavoidable impacts to wetlands, presumably only from surface activities. This section has not changed since 2001.

Section 15.6. A lengthy new Section 15.6 (Underground Mining Stream Impact Evaluation/Restoration) was added in 2008. It does not address wetlands, but it discusses in part, situations "*where mining plans have the potential to cause mining induced flow loss*", which would apply equally to wetlands if PADEP were inclined to read it as applying to all waters of the Commonwealth including wetlands.

ACTUAL EXAMPLES

One generalized source of information on wetland resources is the National Wetland Inventory (NWI) maps prepared by the US Fish & Wildlife Service in the 1970s and 1980s for national and state-level wildlife management and planning purposes. The NWI maps are not, and never were intended to be, accurate for site-specific regulatory purposes. The NWI mapping in southwestern Pennsylvania was compiled from photo-interpretation of high-altitude color infrared aerial photography taken during March 1985 and displayed on overlays to 7-5 minute USGS topographic quadrangles (scale, 1:24,000; 1" = 2,000'). In very few spots was NWI mapping field-verified. As a result, NWI maps significantly under-report the actual extent of wetlands on any given forested site in Pennsylvania. Farm ponds and herbaceous wetlands, in contrast, are reasonably well represented on many NWI maps.

Applications for longwall mine revisions currently contain a significant amount of detailed information about wetlands, much more so than they did a decade ago. In the early 2000s, any wetlands identified on mine maps typically were limited to those mapped by NWI, and in many cases, even those were not consistently or completely shown. Currently, actual field delineations of wetlands are being performed in accordance with the 2005 TGD, and it is not uncommon for both the NWI-mapped wetlands and actual field-delineated wetlands to be shown together on inventory maps. This is a positive change.

The **Bailey Mine** application for a 3,135-acre expansion, submitted in March 2007, included wetlands delineated in accordance with the new TGD. The expansion application identified 87 separate wetlands. (This contrasts with 7 wetlands identified in the same area by NWI.) The applicant-identified wetlands ranged in size from 0.003 acre to 1.77 acres. All were classified as emergent herbaceous palustrine systems (PEM), which leads one to question whether, indeed, there are no forested or shrub-scrub wetlands anywhere in the 3,000+ acre study area. One Corps of Engineers field data sheet was completed for each wetland (although data were provided only *in* each wetland, none in the nearby uplands), the presumed boundary of each wetland was sketched, the GPS coordinates were collected for boundary points, and a photo of each wetland was recorded. Each wetland was evaluated for a list of potential functions, and was assigned a checkmark for low, medium, or high performance on each function. This is a notable positive change for baseline resource documentation regarding wetlands. There is no indication in the files that Corps jurisdictional determinations routinely are being secured for the stream and wetland mapping of the mine expansion areas.

For its **Enlow Fork Mine** longwall expansion of 9,688 acres, Consol provided a Biological Monitoring Report (CEC 2005) which conveyed the results of a year-long wetland investigation. A total of 215 separate wetlands were identified, with a combined wetland acreage of 86.5 acres. This compares with 16 wetlands (11.5 acres) reported in the same area by NWI. The wetlands identified by CEC ranged in size from 0.001 acre to 5.4 acres; the average size was 0.4 acre. Each wetland was identified by latitude/longitude, and was described using a field data sheet, sketch, and photograph. In its June 2006 comments, PADEP requested of Consol: "*Please provide a map showing the location and limits of all wetlands*" (per Module 15.2). This is a commendable display of regulatory vigilance on the part of PADEP to ensure that applicants comply fully with the TGD requirements where those requirements differ from the Module 15 requirements.

WETLAND IMPACTS

Efforts currently being directed at delineating wetlands, describing and assessing their functions and values, and creating and monitoring replacement wetlands, are light years ahead of what was being done ten years ago by the consultants for underground coal mine permit applicants. PADEP and the mine companies both should be commended for the improvements in premining wetland inventory that have occurred. Actual wetland *protection*, on the other hand, continues to be lacking.

Regarding impacts to wetlands, the following descriptions were provided by Consol in its Enlow Fork Mine Expansion application (Revision # 70):

Potential impacts to wetlands from longwall mining include (1) subsidence induced pooling along low gradient streams and floodplains resulting in over-inundation of riparian wetlands; (2) down-slope spring migration resulting in relocation of seepage slope wetlands associated with springs and seeps; and (3) loss of hydrology in riparian wetlands located along higher gradient streams prone to flow loss. All of these potential effects on wetlands are difficult to predict, except for subsldence-induced [stream] *pooling, which has been modeled as part of the mine permit application.*

Wetlands overlying longwall panels are being identified prior to mining and one year following mining to determine whether wetlands have been impacted by mining. Because of the uncertainty in predicting some impacts to wetlands, pre- and post-mining wetland surveys and an assessment of wetland impact are provided. If impacts to wetlands are observed following mining, the affected wetlands will be restored or compensatory mitigation will be provided for the affected wetlands. [There were no post-mining wetland surveys in any files provided by PADEP for the 2007-2009 review period.]

Loss of wetland hydrology would be expected in riparian wetlands adjacent to streams undergoing dewatering, since the source of hydrology in these wetlands is likely provided by a combination of groundwater seepage (baseflow) and/or overbank flooding from the stream. Based on the hydrologic and geologic assessment of streams in the mine permit area, stream dewatering is not anticipated. [Yet it did happen in Crafts Creek.] *In the event that dewatering occurs in some stream reaches, CPCC* [Consol] *has stated its commitment to mitigate flow impacts, which should also restore wetland hydrology to any adjacent riparian wetlands.*

In the quotation above, the prediction is made that if stream dewatering occurs, dewatering of wetlands adjacent to that stream is likely to occur as well. This is a reasonable assumption. Consol then goes on to say that by mitigation of streamflow, wetland hydrology also will be restored. This, however, is not necessarily the case, and documentation of examples is lacking. If a wetland adjacent to a longwall-impacted stream previously received its hydrology primarily from streambank overflow, then when streamflow is fully restored, periodic overflow of the banks during storm events might "feed" the adjacent wetland also. If a wetland adjacent to a stream previously received its hydrology primarily from upslope seeps, springs, or runoff, however, then postmining augmentation of flow within the stream itself may have no effect on the adjacent wetland, in which case that wetland likely would be permanently diminished unless intentional augmentation of its water source also was provided directly. The springs, seeps, and wetlands may or may not migrate downslope and become reestablished naturally. No examples of such reestablishment have been provided.

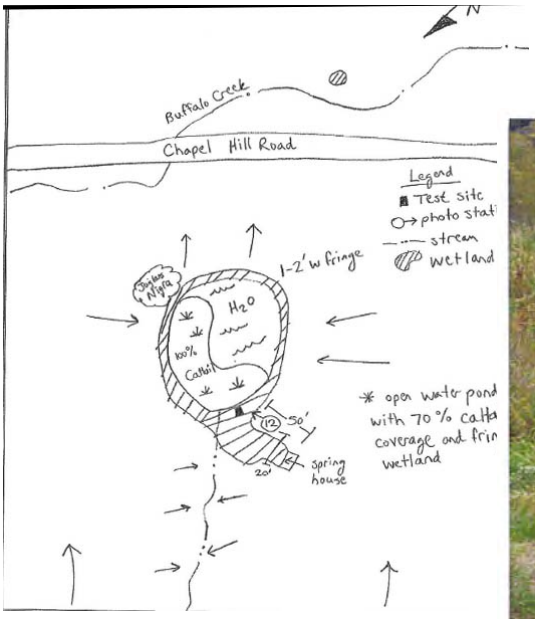
All wetlands which are undermined by longwall (full-extraction) mining are at risk of having their hydrology altered. Hydrologic change then necessarily will result in a change in their functions and values. If the water which supports a wetland is diminished as a result of mining (either directly by substrate fracture and drainage, or indirectly by effects on the springs, seeps, or other surface or groundwater sources of its hydrology), the alteration represents an adverse impact which is regulated under State laws. Likewise, if the hydrology supporting a wetland is significantly increased as a result of mining, the resultant inundation or pooling may result in a regulated adverse impact to the wetland.

It is notable that Consol acknowledges (box, above) that wetlands can be affected by longwall mining. A decade ago, it was generally asserted, at least by some representatives of the coal mining community and PADEP, that longwall mining actually *created* more wetlands than it destroyed, and so there would be a net increase in wetland acreage expected from longwall mining. There was no formal documentation that this ever was the case, however. It was based primarily on anecdotal "evidence" where wetlands have been thought to increase in valley troughs after subsidence. While there may be isolated instances where longwall-induced subsidence has unexpectedly caused a field to develop a water-filled depression, which over time could become a wetland, it is just as likely that the owner of that field subsequently took steps (or got the mine company to take appropriate measures) to fill or drain that depression and restore the field to its previous nonwetland condition. Unless a "created" wetland is on land belonging to the mine company, and is afforded some sort of formal protection (a restrictive easement, for example), it can not legitimately be regarded as compensation for a wetland destroyed elsewhere.

Given the historical lack of premining wetland inventory, there formerly would have been no documentation that a postmining depression in a field had not been a wetland *before* it was undermined, and merely got wetter as a result. Hence, the current premining inventories are beneficial, because they provide a basis for documenting future wetland gains as well as losses. During preparation of this report there was no opportunity to evaluate the accuracy of any mine application's proffered wetland mapping in the field.

Wetlands receiving the greatest attention in mine applications are those located in the vicinity of restoration work being undertaken to restore flow in streams pooled by longwall subsidence. If those wetlands need to be impacted by stream restoration activities, their impacts are being reviewed and evaluated by PADEP, and mitigation is being proposed and implemented. The Army Corps of Engineers and other federal agencies also may become involved in the assessment of stream and wetland impacts and in the planning for appropriate mitigation. For example, some bank restoration was required as mitigation for certain surface activities at Bailey Mine. The US Fish and Wildlife Service objected to the destruction of 5,003 feet of perennial stream and 2,153 feet of intermittent streams for the Emerald Mine Coal Refuse Disposal Area No. 2. Streambank improvements were proposed in the Whiteley Creek drainage as mitigation. No comparable postmining evaluation is being made of wetlands remote from streams that require restoration due to longwall-induced pooling.

According to the TGD, postmining redelineation and assessment of wetlands that have been undermined is required 12 months following mining to determine whether there have been any adverse effects. The postmining wetland assessment is to be compared with the premining conditions, and any changes in the size, structure, or function of the wetlands is to be identified. No evidence could be found in any of the mine application files provided for review by PADEP that Consol, or any other mine company, has conducted any followup assessments of any wetlands after undermining an area. As noted in Section IV (Technical Guidance Document), even if all of its hydrology was removed, a wetland's hydric soils and hydrophytic vegetation would persist for many years, likely making it difficult to determine from field inspection only 12 months after mining whether any adverse impact had occurred.



Example of field sketch and photograph of a wetland identified for Consol by CEC during September 2004 in Washington County, PA, for the Enlow Fork Mine expansion application.

Wetland-Enlow Fork-29F/30F Gate-55B

V-III SUBSIDENCE CONTROL (MODULE 22)

Subsidence occurs when the land above an underground mine caves into the void created by the full extraction of coal. Typically the subsidence is transferred upward all the way to the land surface when the thick Pittsburgh seam is longwall mined. Control of subsidence is deemed important enough to warrant its own Module in the underground coal mine application. Subsidence control in Pennsylvania consists of efforts to predict the extent of subsidence damages and planning to mitigate some of those damages. Virtually no attention is given to avoiding or minimizing subsidence.

Historically, for more than 150 years, coal was mined underground in Pennsylvania by the room-and-pillar method. In theory, there is not supposed to be any subsidence from room-and-pillar mining if it has been properly designed, because large pillars of coal are left in place sufficient to provide permanent support for the mine roof. Room-and-pillar mining still is widely used in underground mines in Pennsylvania. Room-and-pillar development mining is an initial stage of every longwall mine, and coal pillars remain to protect the gates and entries between longwall panels as each panel is mined. As reported in the second Act 54 Review Report, there were 72 room-and-pillar mines and 9 longwall mines active during the 1998 to 2003 period (California University of Pennsylvania 2005). According to that report, most of the documented problems associated with subsidence (to structures, land, roads, etc.) were the result of longwall mining, not room-and-pillar mining, in southwestern Pennsylvania.

In the past, subsidence *did* occur sporadically from room-and-pillar mines, often many years after mining was completed. It typically happened because shortcuts had been taken in setting up the original room-and-pillar mine, or because some of the coal pillars later were “robbed” and replaced with wooden supports that later rotted, or "retreat" mining was performed to systematically clear the pillars from a large area (which is considered a type of longwall mining). For this reason, the Commonwealth has long subsidized insurance for surface landowners in coal mining areas.

In terms of their impacts on the overlying land, room-and-pillar and longwall mining are two very different methods of extracting coal underground. Promoters of the longwall method claim that it is more efficient because it extracts essentially all of the available coal. Longwall mining is often referred to as “full-extraction” or “total-extraction” mining, but that is a misnomer. All longwall mines have gates and entries through which miners and equipment must pass en route to the main workings of the mine. Those passageways along the edges of each longwall panel, as noted above, are created by room-and-pillar mining during the development phase and remain in place after mining ceases (unless retreat mining then is employed).

The net recovery of coal in a longwall mine is about 70% to 80%, versus 50% or less for room-and-pillar mines. Yet, these percentages are not absolute --- nowhere is it written that “coal” must be left in place to support the roof of a room-and-pillar mine, or that a void must be left when removing coal by any mining method. To date most research and development for underground mines have focused on developing and improving the longwall mining equipment and related technology for extracting coal and moving it to

the surface. If the same level of effort and resources had been devoted to improving room-and-pillar technologies, it is quite likely that cheap, high-strength supports would have been developed to permanently replace the pillars of coal historically left to support the mine roof. Likewise, if the waste rock extracted from a mine were backstowed underground, the potential for subsidence from longwall mining could be significantly reduced while eliminating surface refuse piles. Backstowing has been found effective in reducing the impacts of subsidence in Europe. There simply has never been any regulatory or other impetus to pursue such options in Pennsylvania, so the costs of subsidence are passed along to surface owners or the general public.

Because it causes fewer impacts, use of the room-and-pillar mining method is a way to prevent damage wherever a mine passes beneath a sensitive feature (stream, pond, wetland, house or other structure, farm, cemetery, or highway). Indeed, room-and-pillar mining has been noted by mine applicants as one method of preventing subsidence impacts, and it was specifically required by PADEP at UMCO's High Quality Mine in Washington County after longwall mining in 2004 had permanently dewatered a section of Maple Creek and the permittee's repeated efforts at mitigation proved unsuccessful. If surface support were being consistently required by the regulatory agencies, there no doubt would be technological advances in the methods used (including both for practical backstowing and for replacing some pillars of coal with stronger, artificial supports) that would lead to a higher percentage of extraction along with greatly reduced damages to surface resources.

MODULE 22: SUBSIDENCE CONTROL AND UNDERGROUND MINE MAPS

Module 22 has been changed twice since 2001. A minor revision in February 2004 added a new section 22.9 entitled "Mine Map Standards" to provide minimum standards for mapping to ensure compatibility with the State grid system. In September 2008, there were several major and significant changes to this Module. Section 22.1(j) [see below], which had addressed subsidence in terms of "*the value and reasonably foreseeable uses of perennial streams,*" was deleted. Its associated Form 22.1 also was deleted, as was the requirement at 22.4(d)(17) to show, on the Subsidence Control Plan Map, *"areas along perennial streams where underground mining will occur within the zone of potential influence*."

j) Address the following items as they pertain to maintaining the value and reasonably foreseeable uses of perennial streams which may be impacted by underground mining:

1) If the mine is existing, indicate whether any monitoring data exist to determine whether mining has caused stream flow reductions sufficient to adversely affect stream uses. If the monitoring data indicates impacts, describe the percent extraction and how close mining was to the stream when the effects occurred. Also indicate if the stream has recovered or was successfully repaired, and provide documentation.

2) If no monitoring data of adverse impacts on streams exists, indicate whether proposed mining at any location will encroach nearer than 200 feet to any stream where cover is less than 400 feet.

3) If mining will encroach nearer than 200 feet to any stream in any location where cover is less than 400 feet, complete Form 22.1 for each location.

4) For each site where mining will occur within the "zone of potential influence" as defined in (3) above, describe the measures which will be taken to reduce the probability of adverse impacts, or the natural features which will serve to prevent such impacts. Describe measures to be taken to mitigate damages to streams.

5) For each site where mining will occur within the zone of potential influence, and: the cover is less than 100 feet; the stream channel will be subsided, or more than 1000 feet of valley floor will be subsided; provide information on a comparison site to document that such mining can be conducted without resulting in adverse impacts, including a monitoring plan. Attach maps, geologic information, and flow measurements for the comparison site.

These deletions stripped away the only part of this module that formerly had made the connection between potential subsidence and stream protection. Although this issue is addressed to some extent in Modules 8 and 15, it would be both appropriate and useful to have it addressed here as well (as it was prior to 2008), if only to cross-reference the similar requirements in the other Modules. This is one more example of how the disjointed nature of the underground mine application leads to lessened protection for water resources.

Another 2008 change in Module 22 was the deletion of references to water supplies in Section 22.1(k) [which had been Section 22.1(m) in 2004]. As of 2008, no longer was a statement required that water supplies would be restored or replaced, or an indication of the type of water supply replacement.

Two new sections were added to Module 22 in 2008 which distinguish between longwall mining (euphemistically described as "planned subsidence in a predictable and controlled manner") and non-longwall underground mining, Sections 22.1(l) and 22.1 (m):

> *l. If an operator employs a mining technology that provides for planned subsidence in a predictable and controlled manner, describe the necessary and prudent measures that will be used to minimize material damage to the extent technologically and economically feasible to the structure(s).*
>
> *m. If an operator employs a mining technology that does not result in planned subsidence in a predictable and controlled manner, describe the necessary and prudent measures that will be used to prevent subsidence and subsidence-related damage to the extent technologically and economically feasible to the structure(s), describe the measures that will be taken to prevent subsidence-related adverse impacts to places listed or eligible for listing, on the National Register of Historic Places and archaeological resources.*

These sections illustrate wording that has been so qualified as to dilute any real protection, phrases such as "*necessary and prudent measures*" and "*to the extent technologically and economically feasible*". In neither of these two sections is it clear what "*structure(s)*" are to be addressed. The latter section is a grammatically-challenged revision of former Section 22.1(n), but it now appears to limit any protection afforded to National Register of Historic Places sites and to archaeological resources only to damage from non-longwall mines, which is illogical.

ACTUAL EXAMPLE: ENLOW FORK MINE

The Consol application (Revision 70) for a 9,688-acre expansion of longwall mining at its Enlow Fork Mine illustrates how a coal company responds to PADEP requirements for predicting and dealing with subsidence. This application was submitted and revised during 2007 and early 2008, so it used the February 2004 version of Module 22.

No significant damages were anticipated by the permittee. Subsidence was described

as planned and predictable. Indeed, seeking to place a favorable spin on the matter, the planned subsidence of longwall mining was characterized by Consol as a best management practice for reducing surface damage. Actual experience, however, regularly contradicts these optimistic forecasts, with unpredicted damages popping up all over the surface above longwall mines.

> ***Longwall mining causes subsidence to occur at a predictable time and in a relatively uniform manner, consequently, it is an underground mining method used to control subsidence.***
>
> **Excerpt from Consol application Module 22 for Enlow Fork Mine expansion**
>
> **Controlling subsidence, however, is not the ultimate goal --- rather, preventing material damage to surface features is the regulatory objective described at §89.142a. To truly avoid and minimize damage to surface structures and features requires the use of a non-longwall mining method, or some innovative method that can employ backstowing or surface support in conjunction with longwall mining, something never tried to date in Pennsylvania.**

In its responses to Module 22, Sections 22.1(f) and 22.1(p), Consol concedes the potential for material damages from longwall mining:

> ***The immediate impact of full extraction mining techniques is surface subsidence…. The observations at the Enlow Fork Mine indicate that the maximum subsidence will be approximately 60% of the mining height. Subsidence effects due to the full recovery of the coal to the full seam may include some surface cracking and the development of subsidence "troughing" in the middle of the longwall panel that creates a swale effect over each panel.***
>
> and
>
> ***….. subsidence from longwall mining can sometimes result in material damage to structures and can sometimes cause adverse effects to water supplies….***
>
> and
>
> ***As subsidence occurs, water tables may be temporarily or permanently lowered…..***

It goes on to try to justify use of the longwall method by putting it in a favorable light, saying that:

> ***….. longwall mining assures that unplanned subsidence does not occur and that the overlying strata are stable after completion of the coal extraction. Longwall mining causes subsidence to occur at a predictable time and in a relatively uniform manner, consequently, it is an underground mining method used to control subsidence.***

This logic is twisted. It states that longwall mining is a method used "to control" subsidence, when in fact, it is the only method that intentionally causes subsidence. The twisted logic is based on the incorrect assumption that "unplanned subsidence" and unstable ground above mines are significant problems associated with all present-day mining techniques. They are not. Indeed, the most reliable method for controlling subsidence, and the damage associated with it, is room-and-pillar mining. Consol itself concedes this, in response to Module 22.1(g):

> ***For those features... which require protection… the measures that will be used to prevent or mitigate the impacts of underground mining on such features are either (1) by providing permanent coal support beneath the structure ….***

The other two measures listed were (2) by employing longwall mining and (3) by consent agreements with the owners. Neither of the latter two "measures", however, can prevent subsidence at all. Thus, the following statement is disingenuous:

> ***Mining to cause planned and controlled subsidence is a measure that prevents, avoids, and/or minimizes material damage to structures lying over the subsidence control plan area.***

An underground mining method (*i.e.*, longwall high extraction) that causes subsidence cannot be claimed to prevent, avoid, or minimize damage, given that there is an alternative method (room-and-pillar) that does not cause subsidence or the associated damage.

Consol claims:

> ***The immediate and predictable nature of longwall subsidence allows CPCC the opportunity to monitor and address the impacts of subsidence.***

This clearly means that after damage has been done, efforts can be made to address the damage. Yet, not all impacts are predicted accurately, and some are not predicted at all. Stream pooling is one impact for which predictions have been made. Consol and other mine operators rely on a model initially developed by Syd S. Peng of West Virginia University to predict those gates behind which streams are most likely to experience pooling. There is no comparable model, however, to predict where streams in general or wetlands may experience flow loss. Consequently, flow loss is never anticipated or predicted, but it has happened nevertheless. Minimal effort is put into predicting which structures may experience material damage; instead, certain at-risk properties are simply purchased by the mine company, while owners of other properties are offered confidential agreements regarding the types or amount of compensation to be provided for repairs.

Consol cites a 17 May 1994 brochure prepared by the Washington County Commissioners in support of its contention that longwall mining has minimal impact on groundwater, and may even have beneficial effects.

> ***The brochure states that mining may also result in an improved aquifer, due to increased fracturing which provides more spaces to hold water. These***

> ***fractures can allow groundwater to flow more freely into wells, thus increasing well yields.***

Yet, Consol fails to quote other parts of the same brochure which raise questions about the predictability and the full extent of damage due to longwall mining:

> ***"In Washington County, most changes in aquifer structure can be traced to coal mining…*** [including] ***from current underground mining. … Just how much damage*** [will occur from subsidence] ***depends on a variety of factors…. It is difficult to tell in advance of longwall mining what the long-term impact on groundwater sources will be."***

Before the requirement was deleted from Module 22 [Section 22.1(j)], applicants were asked to indicate whether any monitoring data exist to show whether mining has caused stream flow reductions sufficient to affect stream uses adversely. Consol's response is typical:

> ***C***[onsol] ***is not aware of any monitoring data for the Enlow Fork Mine that indicates that mining has caused stream flow reductions sufficient to adversely affect stream uses. Monitoring is being conducted on an ongoing basis to determine the affect*** *[sic]****, if any, of mining in respect to stream uses. Additional stream monitoring is planned for the proposed addition to the subsidence control plan to continue to evaluate the effects, if any, of mining in respect to stream uses.***
>
> ***No permanent adverse effects are anticipated for the streams associated with this application due the favorable geologic conditions beneath the streams and the planned longwall subsidence.***

Shortly after approval of the Enlow Fork Mine expansion, sections of Crafts Creek unexpectedly dried up in three separate incidents. PADEP issued notices of violation, and efforts to restore flow required more than a year. Monitoring data provided by PADEP for this review does not identify either the impending, or the actual, flow loss. It is doubtful whether the monitoring data presumably compiled by Consol from this experience have resulted in a new approach for predicting such impacts.

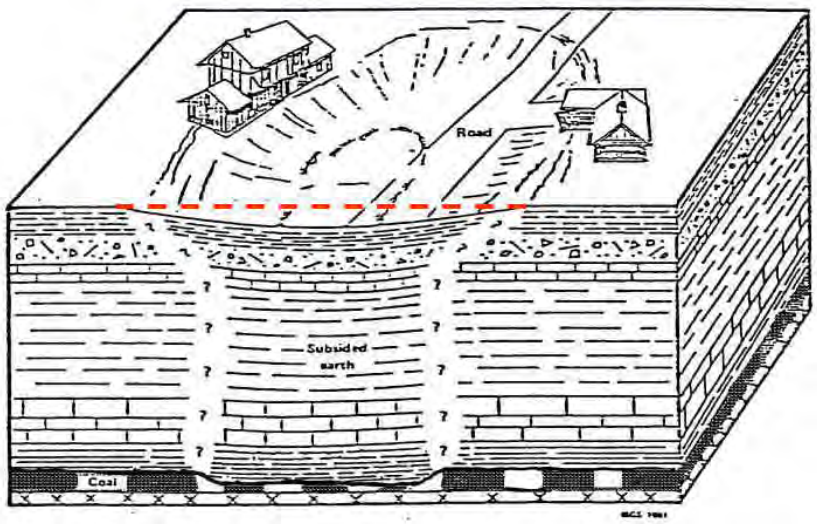
The accuracy of predictions regarding the adverse impacts associated with longwall mining must be questioned when, in response to Section 22.1(m), Consol concedes that certain actions will be taken "***to restore or replace a water supply that does not recover***" [emphasis added]. It is a fact that some water supplies never recover after being undermined by the longwall method, although exactly where and in how many instances that may happen is unknown at the time of permit approval. The recourse in many cases is for the mine operator either to provide and refill water buffaloes or to connect the homeowner to public water service. Streams and their feeder springs and seeps are not rewatered so swiftly or easily.

Coal companies often resort to legal remedies when damaged features cannot be repaired or restored.

> ***In areas where CPCC intends to utilize mining techniques which result in planned and predictable subsidence pursuant to the Coal Mining Activities Permit for the Enlow Fork Mine, it has acquired title to and/or the full right to extract all of the Pittsburgh Coal Seam without obligation to leave coal in place and without liability by common law for damage resulting from the removal of the coal, including subsidence damage, or resulting from other activities with the mining and removal of coal. The title to and right to mine the coal, together with the common law right to do so without liability for resulting damage (including subsidence damage), were obtained by CPCC or its predecessors in title or interest pursuant to the instruments described in Module 5 of this application and/or as supplemented by private agreements as described herein.***

Common law may offer protection to Consol from responsibility for damages to roads, homes, barns, etc. Damages to public resources such as streams and wetlands, however, often are never fully restored.

Two examples of trough subsidence



V-IV SPECIAL PROTECTION WATERS (MODULE 24)

BACKGROUND ON WATER QUALITY STANDARDS

Under the federal Clean Water Act, States are required to adopt an antidegradation policy that meets minimum federal requirements. Each State must include the antidegradation policy as an element of its surface water quality standards program in order to gain federal approval. The Pennsylvania program, as reflected in 25 *Pa. Code* Chapter 93 (Water Quality Standards[1]), acknowledges that existing water quality and uses have inherent values worthy of protection and preservation. Furthermore, it recognizes Exceptional Value (EV) and High Quality (HQ) waters as "Special Protection" waters, for which §93.4a provides additional levels of protection, at least on paper, over and above what is afforded waters not identified as EV or HQ. The basic concept of Pennsylvania's antidegradation program is to promote the maintenance and protection of water quality for EV and HQ waters, as well as to protect and maintain existing uses for all surface waters of the Commonwealth.

An "existing use" is defined at §93.1 as

> ***Those uses actually attained in the water body on or after Nov. 28, 1975, whether or not they are included in the water quality standards*** [designated in Chapter 93].

The same definition appears in the federal regulations at 40 CFR §131.3(e), so Pennsylvania protection of water quality is no more stringent than the national minimum. An "existing use" is different from a "designated use."

A "designated use[2]" is defined in §93.1 as those uses specified in the regulations at §§93.9a-93.9z for each Pennsylvania waterbody or segment, whether or not the use is currently being attained. As described in the Water Quality Antidegradation Implementation Guidance (PADEP 2003:6):

> ....while a designated use is a regulation that is the product of a rulemaking process, an existing use is a DEP classification for a stream based on valid technical information for a surface water that DEP has reviewed. Existing uses are generally the same as, but in some situations may be more or less protective than, designated uses.

Existing use protection is required by regulation to be provided for a waterbody segment whenever PADEP takes a final action on a permit application. Anyone seeking a permit or approval from PADEP to conduct an activity that may impact a surface water must demonstrate to PADEP that its activity will protect and maintain the more protective of the designated use or the existing use for the waterway. This typically is done in the context of NPDES permit reviews, but it applies equally to all

[1] http://www.pacode.com/secure/data/025/chapter93/chap93toc.html
see also *Raymond Proffitt Foundation v. U.S.E.P.A.*, 930 F. Supp. 1088 (E. D. Pa. 1996).

[2] The designated uses of streams within the subject area reviewed are shown on Figure 1A (page 3A).

other PADEP permits or approvals, including coal mining permits (PADEP 2003:12):

> ***Interested persons and applicants are encouraged to submit existing use information on other applications*** [other than NPDES] ***and requests for DEP approval that may impact a surface water. In addition to NPDES discharges, these activities may include the sewage facilities planning (Act 537) process; resource extraction activities such as surface and underground mining and oil and gas extraction; landfills; requests for approval of water obstructions, encroachments, and dams; stormwater management planning (Act 167) activities; water withdrawal requests; and other activities which require a DEP permit or approval and may impact a surface water.*** [emphasis added]

The standard for existing use protection is described in §93.4a(b):

> ***Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.***

This directive is mandatory, not discretionary. §93.4c(a)(1) further provides that:

> ***(i) Existing use protection shall be provided when the Department's evaluation of information (including data gathered at the Department's own initiative, data contained in a petition to change a designated use submitted to the Environmental Quality Board pursuant to §93.4d(a), or data considered in the context of a Department permit or approval action) indicates that a surface water has attained an existing use.***

and

> ***(iv) The Department will make a final determination of existing use protection for the surface water as part of the final approval action.***

Again, these provisions are mandatory, not discretionary. In the context of coal mining, these provisions are repeated in PADEP's guidance "*Surface Water Protection - Underground Bituminous Coal Mining Operations*" (PADEP 2005).

MINE APPLICATION DATA REGARDING EXISTING STREAM USES AND WATER QUALITY

The bituminous coal mining regulations in 25 *Pa. Code* Chapter 89 establish permit application requirements and performance standards for underground coal mining activities. The operation plan for an underground mine requires both the evaluation and the protection of overlying streams and other waters. Currently Chapter 89 also requires permit applicants to collect baseline hydrologic information on surface and ground waters above the mine area.

Prior to the significant revisions of Technical Guidance Document 563-2000-655 which became effective in part on 8 October 2005 (and fully effective on 8 October

2007), minimal information was being collected on the premining condition of streams. In accordance with the current TGD, however, mine applicants now specifically are required to collect and monitor detailed information on wetlands and streams, including their physical characteristics, their water quality, and their uses.

The data being collected in accordance with the TGD include: (1) quarterly baseline monitoring of stream flow for at least two years prior to mining, (2) detailed baseline information on wetlands, fish, and macroinvertebrate communities, and (3) physical and chemical characterization of streams. The benthic macroinvertebrate surveys are particularly useful in determining the existing water quality of the streams. Aquatic insects have limited mobility, relatively long residence times, and varying degrees of sensitivity to pollutants. Just as coal miners once used canaries as indicators of the quality of the air in a mine, macroinvertebrates today are used to indicate the quality of the water in a stream. The premining macroinvertebrate data being collected in accordance with the TGD requirements allow effective screening of relative values among streams slated for undermining. The premining data by themselves are not sufficient to make an existing use determination. To do that requires comparison of the macroinvertebrate data from a subject stream with contemporaneous data from an EV reference stream using PADEP-prescribed metrics.

Just as coal miners once used canaries as indicators of the quality of the air in a mine, macroinvertebrates today are used to indicate the quality of the water in a stream.

The macroinvertebrate data being collected in current mine applications can help identify streams which are attaining uses higher than their designated uses. In order to invoke additional consideration by PADEP, these data need only be adequate to establish that a waterbody *warrants* a formal existing use evaluation. The premining inventory data being collected in recent mine applications clearly do that (Schmid & Company, Inc. 2010).

Recent Use Upgrading in Southwestern Pennsylvania. Primarily because so few streams in southwestern Pennsylvania have been recognized by PADEP or designated as having attained EV use, potential impacts to EV streams have never been addressed in the course of longwall mine applications. Indeed, there are no recognized EV streams anywhere in Washington County, and until 2008, there was none in Greene County, either. That year, at the behest of the US Fish and Wildlife Service, PADEP aquatic biologists evaluated several streams in Richhill Township (Greene County) and determined that two of them were attaining EV uses. UNT North Fork Dunkard Fork (Stream Code 32599), which previously had been designated TSF, was found to qualify as EV. UNT Owens Run (Stream Code 32704), which previously had been designated WWF, also was found to be attaining EV uses. Notably, UNT North Fork Dunkard Fork was found to be among the best of all EV streams in Pennsylvania, and thus qualified as a “reference EV” stream.

Proposed Use Downgrading in Southwestern Pennsylvania. During June 2008, a formal petition was submitted to the Pennsylvania EQB (Environmental Quality

Board) by Foundation Mining, L.P., to redesignate to WWF several streams that for many years had been designated HQ-WWF in the upper South Fork Tenmile Creek basin in Greene County. Foundation Mining planned to conduct longwall mining activities in the vicinity of the subject streams and expected that it would have to comply with more stringent discharge requirements if the streams maintained their "special protection" designation as HQ than if they were redesignated WWF. In conjunction with the petition, Foundation Mining submitted stream assessment and macroinvertebrate data from its consultant documenting relatively poor water quality conditions in the streams for which it was seeking a downgrade in designation.

In response to the petition, and on behalf of PennFuture and local environmental protection groups, Dr. Ben Stout of Wheeling Jesuit University conducted independent bioassessment studies on the streams (Stout 2009; Schmid and Company, Inc. 2009). Dr. Stout's investigations demonstrated that several of the subject streams actually were attaining EV uses. Aquatic biologists from PADEP's Harrisburg office conducted their own studies and confirmed Dr. Stout's findings. As a result, instead of reducing the regulatory protections afforded to them, five HQ-designated waterways[3] were immediately reassigned in 2009 to the most protective classification of all - *Exceptional Value* - on the PADEP statewide list of attained uses.

UNT North Fork Dunkard Fork (EV Reference Stream)
Photo credit: Mark Schmerling

That the coal company consultants' data on stream conditions and water quality differed so sharply from what Dr. Stout and PADEP staff actually documented in their independent investigations must be kept in mind when reviewing the premining bioassessment data provided in coal mine permit applications. Stream quality data from proposed mine applicants must be viewed skeptically as minimum indicators of the aquatic uses and conditions of streams in the areas where coal extraction is intended.

Using Premining Data to Make Existing Use Determinations. More streams have been designated HQ than EV in southwestern Pennsylvania, as is the case generally throughout the Commonwealth (see Figure 1A). Yet most of the streams designated HQ or lower did not receive that designation as a result of recent, in-stream assessments. In undisturbed forested watersheds many headwater streams designated as TSF or WWF actually are attaining EV or HQ uses, but because most streams have never been assessed in the field, they have not yet been recognized as such. A recent field investigation (Stout 2010) concluded that two streams in the North Fork Dunkard Fork watershed, which currently are designated TSF, actually qualify as "EV". One of the two was judged to be better even than the EV reference stream, and was described by Dr. Stout as "probably the best quality stream I have sampled in the region" (Stout 2010).

[3] UNT #40637 House Run, UNT #40638 House Run, UNT#40629 McCourtney Run, UNT #40634 Hoge Run, and UNT #40633 Hoge Run.

This stream evaluation was prompted by premining bioassessment data compiled in permit applications for the Enlow Fork Mine and Bailey Mine expansions. Those premining data identified numerous streams in each expansion area which appeared to be attaining uses better than their designated uses (Schmid & Company, Inc. 2010).

One of the highest "total biological scores" was reported for a tributary of Crafts Creek above longwall Panel E18, but unfortunately, subsequent undermining of that panel caused dewatering and a fish kill in that area of the Creek. It is critically important, therefore, that the premining data now being collected with underground coal mine permit applications be used to identify streams which may be better than their "designated" uses, and that it be done *before* PADEP approves a permit to mine.

Where existing data suggest that further evaluation is warranted, PADEP should be making appropriate "use" determinations consistent with 25 *Pa. Code* Chapter 93, so that the streams can be afforded the required level of protection before being impacted by undermining or other activities. In the TGD (PADEP 2005:24), however, PADEP alludes to the fact that it does not intend to make the legally-required "existing use" determinations based on the premining data provided to it:

> Permits that are issued with incomplete sets of pre-mining data pursuant to paragraph (c)(i) of this section will normally include conditions requiring permittees to complete data collection prior to the time a stream or wetland is susceptible to mining induced changes.

In other words, PADEP is prepared to issue mining permits even before it has all of the premining data, and so it will not (cannot) use the data to confirm the existing use of a stream and adjust the level of protection, including numerical permit limitations for discharged wastewater, accordingly. To the extent that PADEP is unaware of the existence of Special Protection waters, of course, it is precluded from taking any steps to afford any special protection to them.

Prior to 2008, there were no EV streams recognized anywhere in Washington or Greene counties. Since 2008, seven streams in Greene County that previously had lesser designated uses have formally been recognized as having attained (existing) EV uses.

In theory, PADEP at present uses the premining stream data to compare with postmining data, in order to determine after the fact whether an adverse impact has occurred, whether to "special protection" waters or any other waters. In practice, undermined streams often are dewatered, sometimes for several years and sometimes permanently, and they may experience significant physical changes such as pooling, sedimentation, and cracking of the streambed, which in turn drastically impact their instream habitat. The diverse communities of organisms characteristic of Special Protection waters in Appalachia seldom have been found capable of full recovery following longwall mining, even over a period of many years (Stout 2004).

Every time the California District Mining Office receives stream habitat assessment and water quality data, it should coordinate with the aquatic biologists in PADEP's

Southwest Regional Office and in Harrisburg's Bureau of Water Quality Standards, so that any stream which appears likely to have higher existing uses than its designated uses can be investigated in a timely manner, and so an existing use determination can be made prior to permit issuance. Only in that way can the proper level of protection be incorporated into the permit conditions, as appropriate, especially in Special Protection waters.

MODULE 24

Although Special Protection waters are supposed to receive a higher level of protection than other waters, no practical difference can be discerned in the PADEP review of longwall mines that are proposed beneath EV or HQ streams and streams having other use classifications. This is so despite the directives of the PADEP's Water Quality Antidegradation Implementation Guidance (TGD #391-0300-002), which address activities (such as longwall mining) that may have impacts not associated with a specific discharge:

> ***For projects subject to a DEP permit or approval that may affect an EV or HQ surface water but do not involve a discharge***, [the antidegradation] ***review process ..... evaluates the effect of the proposed activity on surface water and requires that the use of the surface water be maintained and protected.***

The only part of the underground mine permit application that specifically addresses "Special Protection" waters is Module 24[4]. This Module is required only where there is a proposed *discharge* to a Chapter 93-designated "EV" or "HQ" water. Most underground mining to date has occurred beneath streams that are not recognized Special Protection waters. Consequently, Module 24 has been used rarely. In instances where undermining of Special Protection waters has occurred, it primarily has been near the periphery of the mine, so that any associated discharge (*e.g.*, from a treatment plant or a sediment basin) could be directed to a non-special protection water.

One recent revision of the Enlow Fork Mine (Revision #71), involving a major new airshaft/portal facility, however, proposed a discharge to an unnamed tributary to Buffalo Creek (HQ-WWF). Thus, completion of Module 24 was required. The following is a summary of the information from Module 24 of that application.

The Revision #71 application was filed during September 2006 and was approved by PADEP on 23 April 2008. This revision of the Enlow Fork Mine involved the proposed construction of the 3 North #5 Airshaft and Portal Facility. It includes a

[4] A new form (#5600-PM-MR0007, "Anti-Degradation Supplement for Mining Projects") was published by PADEP during November 2009. It is to be submitted before formal submission of a mining permit application for any new, additional, or increased discharge to a Special Protection water. Like Module 24, this form does not address non-discharge disturbances to Special Protection waters. No examples of this anti-degradation supplement being used were available from PADEP as of March 2010.

warehouse, office, bathhouse, substation, guardhouse, helipad, sewage treatment plant, water tank, six borehole openings, a 2,100 foot-long access road, and an employee parking area (approx. 300 spaces). The project site encompasses 57.9 surface acres. Diversion and collection ditches were designed for the 5-year 24-hour storm event. A permanent sediment basin was proposed to accommodate runoff from a 10-year 24-hour storm event, and to discharge (Outfall 025) to an UNT to Buffalo Creek (HQ-WWF). One blank DMR and 12 blank HMRs were included with the approved permit for monitoring purposes.

The "need" for this airshaft/portal was discussed in Module 24 (Section 24.8 "Impact Summary"). The "need", curiously, was expressed in terms of the need to continue operation of the entire Enlow Fork Mine, which included

> *580 direct employees and 1,620 indirect employees, and contributed nearly $25 million annually in the form of federal, state, and local income taxes, sales taxes, property and production taxes, and payroll taxes. Approximately $1.35 million of this amount is for local real estate and other local taxes. Almost 90% (519 of 580) of the workers reportedly live within a 30-mile radius of the mine operation.*

It is noteworthy that the entire mine was used as the basis for discussing socio-economic benefits of this portal facility, and that the location of this airshaft was said to have been "fixed" when the mine was conceived nearly 25 years ago. Yet the cumulative impacts of the entire mine (including discharges to HQ waters, and all of the wetland and stream impacts of not only this facility but every other surface and underground facility associated with the entire mine), were not considered, divulged, or assessed back in the 1980s when operations first were proposed --- nor were they discussed or reviewed at the time of this application for Revision #71.

Five alternatives (including "no action") were "evaluated," but none was considered "viable" primarily due to higher costs, additional earth disturbances, and increased impacts to aquatic resources. The arguments were mostly self-serving (as was the fact that for the most part the general analysis was not focused on the airshaft, but on the entire Enlow Fork Mine). PADEP provided written acceptance of the applicant's Social and Economic Justification evaluation and alternatives analysis.

One rejected alternative was to pump the discharge water more than 1 mile offsite to a suitably-sized non-HQ receiving stream. The estimated cost of doing this ($928,000) was the primary reason for dismissing this alternative, although that cost presumably would be small if compared with the cost to close down the Enlow Fork Mine. (If PADEP had rejected this argument and *required* the applicant to do something other than discharge to this HQ stream, Consol might have been able to justify this cost or devise a more cost-effective alternative.)

The alternative of pumping the stormwater to a non-HQ stream mentioned the need for the receiving stream to be large enough to accommodate the estimated 200 gpm to be pumped/discharged. The closest such stream was said to be in the Templeton Fork watershed more than a mile away, and the construction of the pump station and

conveyance pipes were said to entail considerable additional environmental impacts. The proposed sewage treatment plant for this facility, however, was designed to pump a significant volume of wastewater (0.024 mgd) approximately 1,000 feet south of the southern boundary of the 58-acre airshaft/portal site to an UNT of Templeton Fork, a TSF stream (*PA Bulletin*, 13 February 2010). If this shorter pumping alternative was viable for the *sewerage* discharge without damaging the designated uses of the stream, it is not clear why it could not also have been considered a viable alternative for the sediment basin discharge of stormwater.

Another alternative to the proposed discharge to an HQ water --- pumping the wastewater to the underground workings of the Enlow Fork mine --- was rejected because it would take 18 months for the mine to advance to this location, since the existing mine was more than 1.5 miles away at the time. Given the argument that this airshaft must be sited where it is proposed because this is where it was conceived to be 20+ years ago, one would think that provisions for its discharge to a non-HQ stream might similarly have been part of the original planning and design for the mine back in the 1980s. PADEP apparently did not consider this weakness in the alternatives analysis. Furthermore, the mine workings had advanced much closer than 1.5 miles. As of April 2010, this airshaft facility was still under construction, and the active underground workings of the mining had advanced to within 0.5 mile.

The proposed sediment basin is designed to accommodate up to the 10-year, 24-hour storm "without any discharge," yet the collected water is to be discharged at a controlled rate over a period of 4 days. Moreover, any storm exceeding the 10-year event would entail an immediate, direct discharge to the HQ stream via the overflow channel. Those direct discharges to an HQ stream were not discussed or evaluated in the Module 24 for this project. Given the many deficiencies in the alternatives analysis, and the potential for untreated stormwater to be discharged to a HQ stream during major storm events, the level of protection embodied in Chapter 93 for Special Protection waters clearly was not realized in Revision #71 at Enlow Fork Mine during 2008.

***Special Protection* waters fail to be protected in the context of longwall mining in two important ways:**

- **Although most of the necessary information needed to identify EV and HQ streams is being compiled in premining bioassessments, that information is not being used by PADEP to elicit existing use determinations. As a result, streams which are attaining EV or HQ, but which have lesser *designated* uses, are not being afforded the full protection they should receive by law. Any wetlands along EV streams, which qualify as both "exceptional value wetlands" per Chapter 105 and EV waters per Chapter 93, are not being afforded the high level of protection that is required of them.**
- **No special consideration is being given to EV and HQ waters when plans to longwall mine beneath them are being reviewed, and the resultant damage from subsidence-induced pooling or water loss, and efforts taken to correct that damage, are causing unlawful degradation of those special protection waters.**

VI MINE PERMIT APPLICATION EXAMPLES

The previous sections reviewed the technical requirements that PADEP applies to mine applications and examined the information solicited by several of the application Modules relevant to water resources. This section uses specific examples extracted from the files reviewed to highlight how the information provided in actual mine applications conforms to what the regulations and application forms suggest should be provided, and how PADEP processes that information during its review of applications and eventual approval and enforcement of longwall coal mine permits.

Every longwall mine operation generates wastewater which must be handled in some fashion, and which often must be discharged to a surface waterway. Surface activity sites which support the underground mine operation, like any surface development in Pennsylvania, must control the rate, quantity, and quality of runoff from impervious surfaces. Typically, stormwater runoff from surface areas is directed to a sedimentation basin or pond, where sediment and other pollutants can settle out of suspension prior to discharge. Water pumped from belowground to facilitate mining may contain contaminants if it comes in contact with coal or other pollutants in the mine, and may require special treatment prior to discharge. Mine drainage and ringwater may require treatment prior to discharge. Occasionally, a surface support facility, such as a portal, will be large enough to require its own sewage treatment plant. The treatment of sewage and the discharge of treated effluent are subject to additional requirements.

During the permit application review process PADEP establishes numerical limits on the concentration of various pollutants allowed for discharge into streams. The limits are set so as to protect the uses of the receiving stream. Discharges of wastewater to streams are supposed to be monitored to ensure that the quantity and quality of the discharge does not exceed the amount calculated as appropriate to protect the stream uses. Discharge Monitoring Reports (DMRs) are compiled for that purpose by permittees and submitted to PADEP. This section reviews the monthly DMRs provided by PADEP for Emerald Mine, Bailey Mine, and Enlow Fork Mine for the period 2007 through 2009 or early 2010. Each mine is discussed separately.

Following the analyses of DMRs, two separate incidents of water loss are discussed. In each case, the dewatering of the stream had not been predicted to occur in the permit application. In late 2008, a section of Crafts Creek above the recently-approved expansion area for Enlow Fork Mine unexpectedly dried up. Relevant sections of that application and its review by PADEP are examined to determine what had been anticipated with respect to Crafts Creek. Another recorded incident regarding flow loss and eventual restoration, in Laurel Run at the Emerald Mine, also is reviewed and discussed.

All of these examples highlight deficiencies in the permit review and compliance processes which have resulted in adverse impacts to streams. In some cases, the impacts were not anticipated; in others, the impacts were not even acknowledged, much less corrected.

VI-I EMERALD MINE DMRs

When an underground mine permit is issued for an activity that involves a discharge, the permit includes a "Part A" (numerical "Effluent Limitations and Monitoring Requirements") for each outfall. In addition, a blank Discharge Monitoring Report (DMR) form is provided to the permittee by PADEP for reporting the discharge at each outfall. Each blank DMR is supposed to correspond precisely with the Part A limitations for the corresponding outfall (oral communication, J. Koricich, California District Mining Office, 7 April 2010).

The Part A limits and the DMRs are intended to ensure that the pollutants in the wastewater do not adversely affect water uses in the receiving stream. The required self-sampling of effluent and associated laboratory analyses and reports are supposed to provide assurance that the effluent limitations are being observed by the permittee when wastewater is discharged to waters of the Commonwealth.

For recent discharges of wastewater at the Emerald Mine the following paragraphs first summarize general background information. Then, apparent problems with the PADEP permit requirements are discussed. Next, problems in the monitoring information self-reported by the permittee are summarized. The permittee's self-acknowledged violations of discharge standards at Emerald Mine and their implications for water quality are reviewed, followed by a summary of the permittee's actual self-reported (even if not acknowledged) exceedances of permit limitations. The data on exceedance of permit limitations available from reportedly random monthly PADEP inspections of a few outfalls also are noted. This section closes with a discussion of apparent lapses in PADEP enforcement of effluent limitations that ostensibly protect local streams but in fact do not.

GENERAL INFORMATION

The original Emerald longwall mine permit was approved in July 1986; 94 revisions had been approved as of August 2009, and additional requested revisions are pending. NPDES[1] permit numbers have been assigned to seventeen outfalls discharging wastewater to streams (Figure 4 and Appendix Table 1).[2] Appendix Table 2 summarizes data from 306 DMRs for the fourteen outfalls where data were reported over a 27-month period during 2007-2009. Ten of the fourteen outfalls each had complete sets of 27 DMRs, counting both DMRs with measurable data and those found to be dry at the time of monitoring.

[1] One record we were provided says the original NPDES permit was issued on 7 November 1974.
[2] The cited tables can be found in the Appendix of this report. No data were provided for three of the seventeen outfalls approved under NPDES Permit # PA 0213438. Outfall 005 apparently is for a sewage treatment plant; Outfalls 008 and 010 were transferred to the adjacent Cumberland Mine prior to the period under review and no data were retained in the Emerald Mine files. Those outfalls may or may not be active.

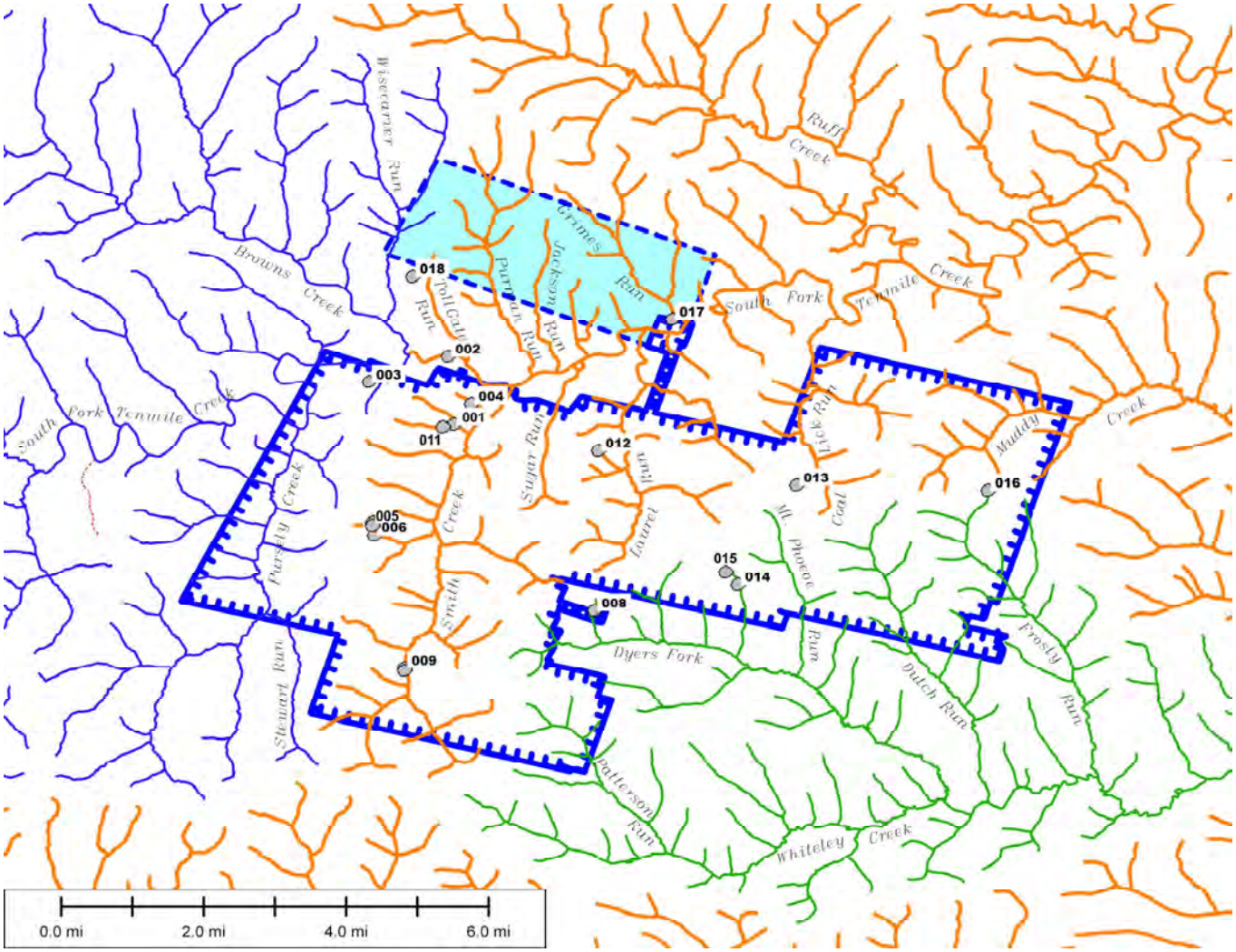


FIGURE 4. Emerald Mine (dark blue outline) and proposed expansion (dashed outline, light blue shading), Greene County, Pennsylvania. Designated uses of streams as shown on PASDA database are Trout Stocking Fishery (TSF) in green, Warm Water Fishery (WWF) in orange, and High Quality-Warm Water Fishery (HQ-WWF) in blue. **Outfall numbers** are shown for mine wastewater discharges with identifiable locations where samples for **Discharge Monitoring Reports** are collected. General drainage is eastward toward the Monongahela River.

Emerald Mine is now operated for Foundation Coal by Emerald Coal Resources, LP.

Fifteen of the 17 permitted discharge outfalls (including 005 for sewage effluent) are shown on "Exhibit 6.1 Location Map, Revision to Change Post-Mining Land Use, No. 5 Air Shaft Site, Emerald Coal Resources L.P., Center Twp., Greene Co., PA" by Penn E&R dated 25 June 2008. (The two "Cumberland Mine outfalls" 008 and 010 are not plotted.) The locations for outfalls plotted on the permittee's drawings such as this one appear to be more credible than the latitude and longitude (to the nearest second) of affected streams listed for some of those outfalls in Part A of the NPDES permit (Figure 5) and in blank (Figure 6) or completed (Figure 7) DMR forms.

Designated uses of streams as set forth in 25 *Pa. Code* Chapter 93 are reported in the Emerald mining applications. No data could be found in any of the Emerald files bearing on the question of the actual attained ("existing") use of any stream within the mine at the time of review of planned undermining or proposed discharge; designated uses as published in Chapter 93 were employed consistently. The actual premining condition of no stream appears to have been addressed by PADEP in accordance with 25 *Pa. Code* 93.4c(a)(1)(iv) at the time of any Emerald Mine permit review or approval. Stream classifications are not linked with outfalls anywhere in the post-permit monitoring files or mentioned on DMRs for any Emerald outfall. Designated uses are noted in the water quality pollution reports prepared when getting numerical effluent limitations.

The California District Mining Office apparently files DMRs by mine permit (CMAP or CRDP) number, rather than by NPDES permit number. Quarterly Hydrologic Monitoring Reports (HMRs) are filed along with the DMRs. Copies of *blank* DMRs and HMRs issued by PADEP along with the permit are not required to be submitted by the permittee with its *completed* DMRs and HMRs, and in practice they are not.

PROBLEMS IN PADEP'S EMERALD MINE NPDES PERMIT # PA 0213438

As noted above, the information on blank and completed DMRs is supposed to correspond exactly with the Part A limitations and requirements. The Emerald Mine Part A numerical limits, however, are inconsistently transferred to blank DMRs, rendering impossible a conclusion as to what monitoring PADEP actually is requesting from the permittee (Figures 5 and 6).

Part A limitations pages are not dated, so it is not evident whether they have changed over time. Some of the Part A limitations pages place the outfall on the wrong stream (012 actually is on an UNT of Laurel Run, not on Smith Creek; 013 is on an UNT of Coal Lick Run, not on Smith Creek). Whether the location of an

FIGURE 5. Typical PADEP Part A effluent limitations and monitoring page from NPDES Permit No. PA 0213438, Emerald Mine, Franklin Township, Greene County PA. The designated receiving stream for Outfall 013 is in error (should be UNT to Coal Lick Run), latitude and longitude are in error (should be 39°52'15" N and 80°07'35" W), and monitoring frequency is not specified for osmotic pressure, pH, or alkalinity/acidity. No limitations are presented for osmotic pressure. A flow of mine drainage and/or surface runoff from this outfall was reported in 67% of the 27 months during the 2007-2009 period of review.

PART A

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

CMAP #30841307 NPDES #PA0213438

2. EROSION AND SEDIMENT CONTROL FACILITIES

a. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR OUTFALL 013.

DISCHARGE TO: Smith Creek, a tributary of South Fork Tenmile Creek.

FROM: sediment pond 5 at No. 6 Intake & No. 6 Return Shafts.

LAT: 39° 50' 04" LONG: 81° 12' 19"

Based on the hydrologic data and anticipated wastewater characteristics and flows described in the permit application and its supporting document and/or revisions, the following effluent limitations and monitoring requirements apply to the subject outfall:

	DISCHARGE LIMITATIONS[1,2]	MONITORING REQUIREMENTS	
Discharge Parameter	Instant Maximum	Measurement Frequency	Sample Type
Flow (mgd)		1/month	estimated
Iron	7.0	1/month	grab
Settleable Solids (ml/l)	0.5	1/month	grab
Manganese	5.0	1/month	grab
Aluminum		1/quarter	grab
Sulfates		1/quarter	grab
Specific Conductance (mho)		1/quarter	grab
Osmotic Pressure (mos/kg)			grab

pH not less than 6.0 nor greater than 9.0 standard units at all times.

Alkalinity must exceed acidity at all times.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

b. PARAMATERS SUBJECT TO 24-HOUR, NON-COMPLIANCE REPORTING FOR LIMITATIONS UNDER B.3.c(1)(b) OF THIS PERMIT ARE: NA

c. SAMPLES TAKEN IN COMPLIANCE WITH THE MONITORING REQUIREMENTS SPECIFIED ABOVE SHALL BE TAKEN AT THE FOLLOWING LOCATION(S): at the end of the discharge pipe for sediment pond 5

Notes: [1]Unless otherwise indicated, discharge limitations are concentrations expressed in mg/l, and the total (dissolved plus suspended fractions) is applicable for each parameter.

[2]The above discharge limitations and monitoring requirements are based upon the presumption that the erosion and sedimentation control facilities will only discharge as a result of a "precipitation event". If the discharge occurs during "dry weather flow" conditions, then Group A limitations will apply (as defined in 25 Pa. Code, Chapters 86-90).

A-2-013

FIGURE 6. Typical PADEP blank (sample) Discharge Monitoring Report from NPDES Permit No. PA 0213438, Emerald Mine, Franklin Township, Greene County PA. Latitude and longitude for Outfall 013 contradict Part A of the permit, as do numerical values for iron and manganese limits (Figure 5). DMR limits for aluminum and osmotic pressure are not contained in Part A. Suspended solids (mg/l) requirement contradicts Part A specification of settleable solids (ml/l), and perhaps was taken from Part B "Group A" dry weather flow limits. Monitoring frequency and sample type are not specified for any parameter. There is no provision for indicating weather conditions or mention of limitations on dry-weather effluent. No provision is made to record floating solids or visible foam.

DISCHARGE MONITORING REPORT
DMR

Emerald Coal Resources, L.P.
Emerald Mine No. 1
Franklin Township
Greene County

COAL MINING ACTIVITY PERMIT 30841307
OUTFALL 013
MONITORING MONTH ____/____
MO YR
LAT: 39° 52' 15" LONG: 80° 07' 35"

NOTE: READ DMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	PERMIT REQUIREMENT	UNITS	MONITORING RESULTS			MONITORING	
			MINIMUM	AVERAGE	MAXIMUM	FREQ	TYPE
Flow	*	MGD	*				
Iron	1.5/3.0	MG/L	*				
Suspended Solids	35/70	MG/L	*				
Manganese	1.0/2.0	MG/L	*				
Aluminum	0.5/1.0	MG/L	*				
Sulfates	*	MG/L	*				
Specific Conductance	*	UMHO	*				
Osmotic Pressure	50/100	MOS/KG	*				
Alkalinity Violations	ALK>ACID	*	*	*			
pH	6.0-9.0	S.U.		*			

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. Explanations are attached if discharge violations occurred during the monitoring month.

TYPED OR PRINTED NAME AND TITLE SIGNATURE DATE

FIGURE 7. Typical completed Discharge Monitoring Report (DMR) for May 2009 at Outfall 013 for NPDES Permit No. PA 0213438, Emerald Mine, Franklin Township, Greene County PA. Permittee chooses some Part A limitations, picks sampling frequencies, follows some blank DMR guidance, rearranges the order of parameters, and adds (but not does not report) temperature. Reported limits for iron comport with neither Part A nor the blank DMR. The permittee's entire explanation of the acknowledged exceedance of osmotic pressure is attached.

DISCHARGE MONITORING REPORT
DMR

Emerald Coal Resources,LP
Emerald Mine No. 1
158 Portal Rd
Waynesburg, PA 15370

Mine Operating Permit
PERMIT # 30841307
OUTFALL 013
MONITORING MONTH 05 (MO) / 09 (YR)
LATITUDE 39-52-15 LONG. 80-07-35

NOTE: READ DMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	Permit Req. Average	Maximum	UNITS	MONITORING RESULTS MINIMUM	AVERAGE	MAXIMUM	MONITORING FREQ.	TYPE
Aluminum	0.5	1	MG/L	******	.1	.1	2 / 31	GRAB
Alkalinity Violations	******	ALK > ACID	CNT	******	******	0	2 / 31	GRAB
Flow			MGD	******	.223	.266	2 / 31	ESTIMATED
Iron (Total)	2	4	MG/L	******	.4	.6	2 / 31	GRAB
Manganese	1	2	MG/L	******	.0	.0	2 / 31	GRAB
Osmotic Pressure	50	100	MOS/KG	******	125.5	170.0	2 / 31	GRAB
pH	******	6 - 9	SU	8.4	******	8.8	2 / 31	GRAB
Specific Conductance		*	UMHO	******	7415	7600	2 / 31	GRAB
Suspended Solids	35	70	MG/L	******	6	8	2 / 31	GRAB
Sulfates		*	MG/L	******	962	1093	2 / 31	GRAB
Temperature	******		DEG/C		******		0 / 31	INSTANT

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. Explanations are attached if discharge violations occurred during the monitoring month.

Kevin Moore/Environmental Engineer
TYPED OR PRINTED NAME AND TITLE

Ken S Moore
SIGNATURE

07 | 27 | 2009
DATE

Non-Compliance

Emerald Outfall 013

Outfall 016 from the No. 8 Air Shaft pond exceeded permit conditions for samples in January for Osmotic pressure. The first non-compliant discharge of the quarter was taken April 9, 2009 and the last was taken June 25, 2009. It is assumed that the pond was out of compliance for this period. The discharge is expected to be in compliance in July 2009. Emerald is currently investigating the cause of high osmotic pressure levels in this discharge as well as a method to reduce these levels.

Note: Neither the high (but unregulated) specific conductance nor sulfate values in excess of Part B Permit limits were mentioned in the DMR. The permittee's expectation of compliance with osmotic pressure limits by July 2009 was not realized at Outfall 013. The relevance of the mention of *Outfall 016* is unclear; the No. 8 airshaft is served by Outfall 013.

outfall affects its numerical limitations for pollutants in effluent discharged cannot be determined from the DMR file information reviewed to date.

To date PADEP has been able to supply the "water quality pollution reports" that provide the technical basis for permit Part A numerical limitations for eight (47%) of the 17 Emerald Mine outfalls. No basis was provided for limitations at Outfalls 001, 004, 005, 007, 012, 013, 014, 015, and 017. For six (75%) of the eight documented outfalls (002, 006, 008, 009, 010, 011) the Part A limitations are substantially different from the recommendations of the Bureau of Water Quality Management (PADEP-BWQM). Sample type and frequency requirements listed in Part A often are not appropriate for comparison with the recommended limitations. Water quality pollution reports apparently are not updated over the decades.

Many Part A pages are obviously *incomplete* regarding the sample type and frequency expected by PADEP for permittee self-monitoring of various parameters at Emerald Mine (Appendix Table 3, Figure 5). It is not clear whether any discharge limitations or monitoring requirements *not* listed in Part A pages for each outfall are enforceable (unless they were also included in the standard NPDES Permit Part B general directives that apply to every outfall).

Permittees are entitled to sample more often than the minimum specified in an NPDES permit. If additional samples are analyzed for any regulated parameters, the results are required to be reported in the DMRs. According to the California District Mining Office, PADEP can increase the frequency of required monitoring in DMRs and HMRs (by telephone, J. Koricich, 24 March 2010), but no examples of increased monitoring were observed in the files provided for review for this report.

The Emerald Mine Part A limitations for an outfall differ significantly from the directives provided by PADEP to the permittee in nine (82%) of the eleven blank DMRs made available for review. Thus, what is to be measured, how often, and what limitations distinguish allowable from excessive concentrations of many pollutants cannot be determined logically by the permittee or by anyone else for the Emerald Mine.

The Emerald Mine Part A limitations for an outfall differ significantly from the directives provided by PADEP to the permittee in nine (82%) of the eleven blank DMRs made available for review. Thus, what is to be measured, how often, and what limitations distinguish allowable from excessive concentrations of many pollutants cannot be determined logically by the permittee or by anyone else for the Emerald Mine.

Like the Part A limitation pages, blank DMRs are not dated, so there is no way to determine whether any changes in blank DMRs have been made over time. The blank DMR forms include no information whatsoever on the frequency or type of monitoring required for each parameter relating to the corresponding limitations/

monitoring pages for each outfall in the permit's Part A---the permittee apparently is expected to supply these directives based on Part A or make up frequencies that it prefers (Figure 7). In Appendix Table 3, those Part A-listed parameters whose sampling type and frequency are left up to the discretion of the permittee are indicated by question marks for each outfall. There are more than 100 question marks in that tabulation for the 16 Emerald Mine outfalls for which Part A limitations were provided by PADEP.

Many of the Part A monitoring frequencies are not capable of generating data appropriate for comparison with the corresponding Part A or blank DMR discharge limitations, rendering some of those numerical limitations apparently superfluous. For example, it is not possible to compare measured data on the concentration of a pollutant with a specified *average monthly* numerical limitation, if the sampling frequency is grab-sampled only once per month or once per quarter! For some parameters in all Part A pages (such as visible foam and floating solids), sampling frequency is left entirely to the discretion of the permittee, not specified by PADEP, and in fact never reported in any DMRs. For eight Emerald Mine outfalls (010, 011, 012, 013, 014, 015, 016, and 017) the frequency of measurements for alkalinity versus acidity is not specified, and for four outfalls (010, 011, 012, and 013) the frequency of measuring osmotic pressure also is not specified.

Unless the sampling frequencies are sufficient to generate appropriate data, many of PADEP's purported numerical limits on pollutant concentrations in practice cannot be applied. In the apparent absence of PADEP guidance, sometimes single quarterly or monthly data are compared by the permittee with instantaneous maximum limits; sometimes, with maximum daily limits. No explanation is given for the use of one or the other limitation, but instantaneous maximum limits typically are less restrictive and thus presumably would be preferred by any permittee.

Unless the sampling frequencies are sufficient to generate appropriate data, many of PADEP's purported numerical limits on pollutant concentrations in practice cannot be applied.

Some of the Emerald Mine Part A effluent limitations pages provide latitude and longitude (to the nearest whole second) for the subject outfall, but five do not. At least six of the Part A pages give *erroneous* latitude and longitude for their outfalls, yielding several bizarre locations sharply at odds with the permittee's mine map information and common sense (Figure 5). Some (but not all) of these errors were rectified by the permittee on its completed DMRs, where the latitude and longitude data appear to be more reliable than those set forth by PADEP on the Part A pages of the NPDES permit. For some outfalls latitude and longitude are wrong on both the Part A permit pages and the corresponding DMR forms.

PADEP apparently does not require latitude and longitude for outfalls to be specified to two decimal places (hundredths of seconds), as would be appropriate for accurate

location on maps and georectified photographs using computerized geographical information system (GIS) technology that now is widely available. Such detail would be the minimum necessary if outfalls are to be associated with their correct receiving streams. Permittee consultants could easily provide such information if requested.

The parameters to be measured, quantitative effluent limitations for specific parameters, and sampling frequencies specified by PADEP in Part A vary significantly among outfalls at the Emerald Mine (Appendix Table 3). For example, the allowable maximum pH limit is set at 9.0 for ten Emerald outfalls but 9.5 for six outfalls. (Allowable pH limits are 6 to 9 standard units for all Bailey and Enlow Fork mining outfalls and for all Pennsylvania waters in general.) Yet all the available blank Emerald Mine DMRs specify maximum pH as 9.0, whatever the corresponding Part A value for that outfall may be in the Emerald permit. Such occurrences undermine the credibility of all PADEP numerical limits. After a while the reviewer may wonder whether PADEP numbers have any meaning.

Part A numeric limitations allow osmotic pressure and concentrations of solids and metals that vary considerably from one Emerald Mine outfall to the next. For example, seven (44%) of the Emerald Mine outfalls lack any Part A numerical limits for aluminum; the numerical limits for Al vary considerably among the other outfalls (Appendix Table 3). Why this should be is not obvious. One could speculate that the varying limits might be assigned based on the nature of the effluent expected at each outfall (for example, surface runoff versus mine drainage), its volume, or the constancy of its flow. Similarly, different numerical limits might be expected in order to protect the differing designated uses of the receiving streams (WWF, HQ-WWF, or TSF). Or limits may simply have been transcribed inaccurately from one outfall page to another.

The basis for assignment of numerical limits for parameters is not explained in any of the various Emerald Mine files provided for this report by PADEP, although examples of analyses that set limits for the Bailey Mine sewage treatment plant outfalls were provided and are discussed subsequently. No relationships between numerical limits and either stream quality, designated uses, or effluent source or quantity are evident from inspection of the tables compiled for mine outfalls examined in this report and presented in the Appendix.

The NPDES permit Part A pages for five Emerald Mine outfalls (010, 011, 012, 013, and 017) specify monitoring of total settleable solids (ml/l), whereas the Part A pages for all other Emerald Mine outfalls specify monitoring of total suspended solids (mg/l). The numerical limits, the units, and the analytical procedures for these two measurements of solids in discharge water are quite different. But PADEP fails to provide consistent directives to the permittee that might enable compliance with the permit. In Part A permit limitations for Emerald Mine Outfall 013, for example, PADEP directed that <u>settleable</u> solids be reported in ml/l (Figure 5); for the same outfall, the blank DMR from PADEP specified <u>suspended</u> solids in mg/l (Figure 6) with a different set of numerical limits. The result is utter chaos in solids reporting from the Emerald Mine outfalls, as discussed below.

A DMR is most meaningful when a discharge is actually monitored. For outfalls that do not discharge continuously, it is not clear whether PADEP expects the permittee to attempt to monitor during times when there is a discharge and thereby provide actual measurements. There appears to be no protocol mandated by PADEP for when once- or twice-monthly sampling or quarterly sampling is to be performed. It appears likely that the permittee's and/or labs' sampling dates are scheduled in advance and are not timed intentionally to follow precipitation events when a discharge would be most likely. There is no place on the blank sample or the completed DMRs to indicate weather conditions relevant to data collection or interpretation, so weather data are never reported. Some outfalls were reported as "dry" some or all of the times that they were sampled in 2007-2009, and an outfall found to be dry on the (unreported) sampling date(s) during the month or quarter will have no data reported for 1 of 1, 1 of 2, or 2 of 2 of its sampling events.

There is no indication in the PADEP files that PADEP staff ever review any mining outfall DMRs for completeness or compliance with permit requirements.

Flexible scheduling might assure that sampling of an intermittently flowing outfall actually takes place, thereby achieving more meaningful monitoring and enabling comparison of results with applicable limits at outfalls that actually experience discharge events. PADEP staff claim to sometimes urge permittees to adjust their sampling to capture stormwater events at outfalls expected to discharge only in response to rainfall events (oral communication, J. Koricich, California District Mining Office, 24 March 2010), but many Emerald Mine outfalls were reported as "dry" at the time of sampling within the period under review. (For consequences, see the discussion below of the August 2008 fish kill in Tenmile Creek just downstream from Emerald Outfall 017, which was self-reported by the permittee as "dry" (if reported at all) prior to and following a fish kill episode that presumably was related to water pollution.)

Two sets of numerical standards and different sampling parameters explicitly are established in Part A for five Emerald Mine outfalls (010, 011, 012, 013, and 017), depending on whether the flow at the time of sampling is considered to be precipitation runoff (defined as flow during the 24 hours immediately following a rain event) or dry-weather flow (outside the specified 24-hour window). It is impossible to discern from any blank or completed DMRs which set of limits might pertain to any given sample that is being reported from these five outfalls. A permittee could conclude that PADEP intended the permittee to ignore dry-weather flow requirements entirely, inasmuch as no provision was made for reporting on the blank DMRs any data related to the nature of sampled flow, recent weather conditions, or even the date of sampling during the month or quarter. The PADEP's blank DMRs for these five outfalls set forth only the Part A wet-weather limitations, with no mention of the Part A dry-weather limitations. Hence the purpose of the dry-weather limitations is not clear. PADEP staff advised that Outfall 012 was expected to have

flow only from stormwater events and not any dry-weather flow (by letter, J. Folman, California DMO, 24 May 2010). The predicted flow from outfalls submitted in mining permit applications may or may not be borne out in DMR records.

There is nothing in the Emerald Mine NPDES permit about how or when any outfall is to be abandoned or its monitoring terminated. In the application and correspondence files for Permit Revision #93 there is no mention of the incomplete monitoring results or reasons for self-reported exceedances just prior to discontinuance of monitoring at Outfall 007. The associated No. 4 air shaft was abandoned, and the surrounding 4.5 acres were changed to a non-mining industrial (electric substation) post-mining land use. During review of Revision #93 PADEP staff appropriately questioned whether the Outfall 007 sediment control pond would be adequate for surface runoff discharged into the High Quality-Warm Water Fishery receiving stream from the new industrial land use on land leased from the mining company. It is not clear why the monitoring here was discontinued, but the permittee was released from all analytical requirements (with some of which it had never complied while its mine discharge to this Special Protection stream was active). The procedure followed by PADEP when terminating NPDES monitoring at Emerald Outfall 007 deserves further scrutiny. Ongoing monitoring for Outfall 007 might have been transferred to the new manager of the land draining into it, but that cannot be determined from the Emerald Mine permit files.

There is no mention of missing DMRs in the PADEP files examined, and no explanation for gaps that appear in the record.

One historic change was made to the Emerald Mine permit discharge limitations; none, within the period under review. Revision #63 in March 2003 (four years before these DMRs begin) removed the Part A permit numerical limitations on sulfates in discharges from Outfalls 014, 015, and 016 after PADEP changed its water quality standards statewide [32 *Pa. Bulletin* 428 and 32 *Pa. Bulletin* 6101]. Monitoring and reporting of sulfates are still required by Part A for twelve Emerald Mine outfalls, and notification to PADEP of high concentrations of sulfates and all other pollutants lacking stated numerical limits is still required for all outfalls by Part B of the NPDES permit.

In 2002 PADEP concluded that its statewide osmotic pressure limitation was sufficient to protect against potential stream pollution by discharges containing chloride and sulfate. Consequently, the State removed the requirement that dischargers treat wastewater for sulfates and chloride, which PADEP says were initially regulated only to protect potable water supplies. PADEP took credit for reducing monitoring costs for permittees. A few months later, Emerald's numerical limits for sulfates at three outfalls (800/1600 mg/l at Outfall 014 and 250/500 mg/l limitations at Outfalls 015 and 016) were dropped by formal permit revision. At the other Emerald Mine outfalls sulfates apparently already were to be monitored and reported, but were not limited numerically, and thus no changes were needed to

their Part A limitations. The old limitations on sulfates occasionally reappear on permittee-completed DMRs from Emerald Mine. Sulfates remain a diagnostic parameter important for determining potential impacts on stream quality and biota from coal mine wastewater discharges.

Osmotic pressure is one of the most frequently exceeded discharge limitations at Emerald Mine outfalls, and its exceedances usually are accompanied by high concentrations of sulfates [often >1000 mg/l, no applicable numerical limit] reported at the same time. Nearly 150 Part B-reportable high sulfates concentrations recorded at Emerald Mine outfalls during the 27-month review period were never called to the attention of PADEP by the permittee (Appendix Table 2).

There is a great concern at present for total dissolved solids in streams Statewide, especially chlorides and sulfates, in discussions of potential impact from Marcellus Shale brines. Total dissolved solids (TDS) data were "required" by the NPDES permit to be analyzed and reported in Emerald Mine discharges only at now-abandoned (?) Outfall 007. In fact, however, TDS never were monitored at 007, presumably by directive of the permittee. There is no indication in the PADEP files that PADEP staff ever review any mining outfall DMRs for completeness or compliance with permit requirements.

PROBLEMS AND OMISSIONS IN PERMITTEE'S MONITORING RESULTS

There are numerous problems with the data presented in the completed DMRs for Emerald Mine, some apparently attributable to PADEP's conflicting directives as discussed above; some, to the permittee. Internal data inconsistencies on individual DMRs abound. The haphazard compliance with mining permit discharge monitoring "requirements" appears to be purely at the whim of the permittee and of no concern to PADEP. These problems contribute to a likely under-reporting of exceedances of permit limitations at the various outfalls during the period of review at Emerald and other mines.

As noted above, the numerical limitations provided on the blank "sample" DMR forms do not always correspond with the Part A discharge limitations and monitoring frequencies. Some, but not all, Part A discharge limitations and virtually no sample types and frequencies were entered onto blank DMRs by PADEP for Emerald Mine outfalls.

Permittees are allowed to use any format they choose for DMRs, but are expected to provide all of the monitoring data mandated by the NPDES permit (oral communication, J. Koricich, California District Mining Office, 7 April 2010). This permittee does not always follow the sequence of parameters set forth by PADEP in its blank DMRs (Figures 5 and 6). More troubling, however, is that limitations recorded in the DMRs completed by a permittee sometimes match neither the blank DMRs nor the Part A limitations (Figure 7). Emerald Mine DMR formats are revised from time to time by this permittee without any apparent guidance from PADEP.

Some of these revisions eliminate "permit-required" parameters. No discussion of changed DMR formats appears in the permit files around the times when formats change.

Twelve of the Emerald Mine monthly DMRs examined here were not signed on behalf of the permittee, as required by Part B of the permit.

There is no mention of missing DMRs in the PADEP files examined, and no explanation for gaps that appear in the record. DMRs from permittees are not logged in (a consistent, but uncharacteristic breach of the protocol in the California District Mining Office, in which all correspondence and virtually every page of all other documents received from permit applicants is date-stamped), much less checked for completeness of required minimum sampling. No documents indicate any PADEP effort to note either compliance or failure to comply with permit limits, to request supplemental or corrected data, or to inquire regarding the effectiveness of steps taken to remedy exceedances that were self-acknowledged.

Emerald Mine DMR formats are revised from time to time by the permittee without any apparent guidance from PADEP. Some of these revisions eliminate "permit-required" parameters. No discussion of changed DMR formats appears in the permit files around the times when formats change.

When requested in March 2010, neither the California nor the Greensburg District Mining Office was able to provide copies of nine missing Emerald Mine DMRs (six from Outfall 007 in 2009 and three from Outfall 017 in 2008). These missing DMRs apparently were never filed, but there is no indication in the files that PADEP ever noticed they were missing.

Asterisks and blanks are sprinkled liberally through the permittee's completed DMRs with no explanation---for example, temperature was not recorded at all during 2009 for any Emerald Mine outfall, but had been recorded previously in each DMR. There is no mention of temperature monitoring requirements in the permit Part A or blank DMR for any Emerald outfall. Maybe Emerald staff discovered at the end of 2008 that temperature was not required and therefore had their lab discontinue measuring field temperature at that time. They did not remove the empty temperature blanks, however, from their completed 2009 DMRs, instead merely sprinkling more unexplained asterisks in boxes on the forms.

The permittee's acknowledgments of exceedances are not always consistent with its DMR data. For example, in April 2008 the preceding exceedances at Emerald Mine Outfall 002 were explained thus (the permittee's entire notation is quoted):

> *Exceedances are MAX Iron, AVG Iron, and MAX TSS for January. For February they were AVG TSS, AVG Osm. Press., MAX OP. These parameters will be monitored closely to determine if corrective action is needed. This pond is cleaned*

on a regular basis. This outfall was back in compliance the remainder of the quarter.

In fact, the DMRs show exceedance of maximum iron, average iron, and average total suspended solids limits at Outfall 002 in January 2008, followed by average total suspended solids and average osmotic pressure limit exceedances in February. The maximum TSS limit was not exceeded in January, and the maximum osmotic pressure limit was not exceeded in February, if the reported numbers are correct on the DMRs. No averages for any parameters were presented from the two samples allegedly collected at Outfall 002 in March 2008, so compliance during March cannot be demonstrated from the March DMR. Such imprecise commentaries are not uncommon among the Emerald DMRs.

If PADEP is authorizing departures from what its permit says is required, that authorization should be reflected somewhere in writing, but it does not exist in any files examined for this report. For example, most of the recent Emerald DMRs measure sulfates and leave a blank for sulfates limitation, but a few (generally no-discharge DMRs) revive "old" limits for sulfates such as 250/500 mg/l or 800/1600 mg/l, without explanation. Many of the sulfates values in the DMRs exceed the pre-2003 sulfates limits, but (correctly) were never described as exceedances by the permittee during the 2007-2009 period under review.

If PADEP is authorizing departures from what its NPDES permit says is required, that should be reflected somewhere in writing, but it does not exist in any files examined for this report. Yet Emerald Mine DMRs depart significantly from the mandates of the NPDES permit.

Eleven outfalls at Emerald Mine were supposed to be grab-sampled for some parameters at least *once monthly*; four, at least *twice per month*. Some parameters were to be sampled at least *quarterly* at each of the fourteen outfalls for which data were provided. Average and maximum values for parameters usually (but not always) were reported in the DMRs for the parameters sampled semi-monthly. Sometimes average values were simply omitted from a DMR, even though samples allegedly had been taken twice during that month, according to the permittee's frequency notation. No explanation was provided, except for the permittee's cryptic comment in each quarterly transmittal letter for DMRs:

Please note, the compliance for DMR's where only one sample was collected is reported as MAX only due to the fact that an actual average is not obtained.

Conversely, there are several DMRs where the results of analyzing a single monthly grab sample were reported as average monthly rather than maximum daily or instant maximum values. It does not help that Emerald's modified DMR forms (whose formats are different for *once* monthly and *twice* monthly sampling in order to reflect either maximum parameter values alone or both maximum and average parameter values, respectively) appear sometimes interchanged among once-monthly and twice-monthly outfalls, especially if there was no discharge for the month.

Permittee practice is not consistent regarding which Emerald Mine outfalls are sampled (or how often) and which not sampled for any given month. Some parameters are required to be reported at least quarterly, but seem either a) to have been measured by Emerald at least monthly or b) to have been measured not at all. When there was no flow, usually no samples were taken or data reported. Apparently it is easy to overlook quarterly monitoring "requirements," and there seems to be no incentive for the permittee to achieve full compliance. Questions apparently never are raised by PADEP when "required" data are missing from DMRs.

The listed order of Emerald's parameters varies from DMR to DMR and from month to month, adding to the difficulty of efficient interpretation. For this report, we have interpreted the monitoring frequency reported in this permittee's self-completed DMRs to be the frequency that the permittee actually attempted sampling/analysis during the month at that outfall, not what the Part A directives require (and which often is different from what is reported in this permittee's DMRs). PADEP's blank DMRs for mine sewage treatment effluent go far toward eliminating such ambiguities, as discussed subsequently for Bailey Mine. No DMRs were provided for the only sewage outfall (05) associated with Emerald Mine.

PADEP appears to accept whatever permittee data are submitted, however defective; there is no indication of any response to self-reported, much less unacknowledged, exceedances of permit limits or to sampling deficiencies in the permittee's DMRs over the period under review.

DMRs start and stop for various Emerald Mine outfalls without any explanation, while other outfalls have consistent monthly reports even when having had no reported discharge during any of the 27 months under review. DMRs showing "no discharge," typically reported as flow of 0.000 mgd, are what one would expect to find for all observed "dry" outfalls during any given month. Some, but not all, of the "0.000 flow" DMRs with no sampled chemical data have been stamped with a prominent "no discharge" stamp, as directed by the PADEP's "DMR Instructions" attached to this NPDES permit. All chemical data entries for DMRs when and where there was *no* observed flow *should* have been left blank; values for some entries, however, appear to have been pre-printed in advance of sampling.

Various Part A "required" parameters are not reported for many Emerald outfalls, usually without explanation. Emerald staff (or others?) have made notations on many DMRs to the effect that *the laboratory* did not analyze for one or more "required" parameters, and hence those data are not reported on the DMR, even though the lab usually had certified its ability to perform the relevant analysis. Perhaps the laboratories' staff are as confused as Emerald Mine staff regarding what PADEP wants measured and when; maybe they simply have not been asked by Emerald to perform the relevant chemical analyses; or perhaps they have been

instructed by Emerald not to report certain analyses. The permittee clearly is fully aware that "the lab" is not reporting analyses for settleable solids, for example, but years go by without correction of the deficiency. Apparently PADEP is content with whatever is submitted, however defective, because there is no indication of any response to self-reported, much less unacknowledged, exceedances or to sampling deficiencies in the permittee's DMRs over the period under review.

This problem recurs most often with settleable solids, as "the lab" tends to stop after measuring total suspended solids instead of proceeding with *Standard Methods* to determine total settleable solids or total dissolved solids for outfalls where reporting for one of the latter parameters is required by the Emerald Mine NPDES permit. (Emerald outfalls for *monthly* and for *quarterly* sampling tend to have settleable solids limits. For *twice-monthly* sampling and dry-weather flows, Emerald outfalls tend to have limits for total suspended solids. There are limits for total dissolved solids only at Outfall 007, which is [or was] to be sampled *twice-monthly*.) These three parameters all address the concentration of solids present in wastewater, but they have very different numerical limits and are not interchangeable.

When no measurements are made of a wastewater discharge, there is no possibility of exceeding permit limits, whatever the actual composition of the discharge. Water quality impacts in the receiving stream go undetected.

Outfall 007 is the only Emerald Mine outfall where the total dissolved solids parameter was to have been monitored and compared with average and daily maximum limitations. This parameter was never measured, however, even in months when two samples of discharge were collected at this outfall and analyzed for other parameters. The laboratory did not claim accreditation for analyzing this parameter or list any analytical method to be used. Clearly, it was not expected to do so by the permittee.

Conversely, what the *reported* chemical data are supposed to mean for *no-discharge* outfalls at Emerald Mine is not clear. There are some examples of these---usually alkalinity<acidity, which often is reported as complying (that is, as a count of zero) when there is 0.000 mgd reported flow and no sample collected for alkalinity or any other parameter. Such purported data based on no sampling clearly are fraudulent. The permittee might as well report *all* parameters as zero exceedance, when there are no data of any kind collected (and occasionally it actually does this). When no measurements are made, of course, there is no possibility of exceeding permit limits, whatever the composition of the discharge.

Sometimes this practice in the Emerald Mine DMRs yields amusing results. For example, in the third and fourth quarters of 2007 on 30 DMRs, and in the first quarter of 2008 on 9 DMRs, *all* parameters are reported with zeroes to several decimal places, although there was no discharge and no actual measurement of anything.

These blanks should have been left blank, not filled. Or perhaps, but less likely, the summer and autumn quarters of 2007 really were cold at Emerald Mine, producing temperatures of 0°C or 0.0°C at dozens of outfalls having no discharge! These are lower than typical *winter* water temperatures reported in the Emerald Mine DMRs. Or, perhaps the reported temperatures are for ambient air rather than water, inasmuch as the permittee claims there was no water to measure at the end of the outfall pipe---apparently frozen solid. We have not been able to confirm cold temperatures elsewhere in Greene County during summer and autumn 2007, although such weather might be expected to have been highly newsworthy. At Outfall 015, temperatures were reported for two samplings during each month in the period July through October 2007 when there was no discharge and no flow---yet another instance of bogus data.

Curiously, the level of claimed accuracy of measurements is sometimes greater for no-discharge outfalls than for outfalls with flow: All allegedly measured, flowing outfalls have alkalinity<acidity count data reported merely as 0, but for nearly three dozen no-discharge DMRs in 2007-2008 the alkalinity<acidity count data are entered as 0.00! The counts necessarily are integers (whole numbers), and any possible meaning for the two decimal places is unclear. The permittee evidently always assumes and reports zero violations of alkalinity<acidity at all of its outfalls, whether or not any sampling or laboratory analysis was performed during a given month to warrant such conclusions.

This permittee often reports the various permit parameters addressing solids in wastewater in a thoroughly confused manner. PADEP never seems to notice.

On at least four DMRs someone has written in by hand a zero for alkalinity<acidity violations, even though the lab sampling frequency column says *these data were not collected at all* during the month. The permittee's certifier who signed these DMRs appears to be liable for fraud. The DMR blanks should be left empty where no data were collected, not filled with a value of zero exceedance, as if there were a basis for such a conclusion when in fact no data exist. It is one thing to fail to sample as often as required by the permit; it is quite another thing to report the failure to sample as zero exceedance.

The permittee consistently reported total suspended solids in mg/l (Figure 6) when analyzing effluent from Emerald Mine Outfall 013. For Outfalls 003, 004, 012, and 017 the blank DMRs also specified total settleable solids---the first two contradicting, the second two congruent with their respective Part A permit directives. This permittee seldom reported results of analyses for settleable solids in Emerald Mine discharge water during the period under review, and its lab does not claim certification for analyzing settleable solids, so it appears that relatively little monitoring for this parameter has ever been attempted at the five outfalls where it is "required". Most of the few samples are reported as maximum concentrations; there are virtually no averages reported during the period under review. The

permittee sometimes reports settleable solids in ml/l (as at 017 in 08/09 and 09/09), but more often reports settleable solids in mg/l, whatever that unit might mean for this parameter. In 2009, the completed DMRs report settleable solids (and a purported limit of 0.5 mg/l [*sic*]) as a parameter for Outfalls 003, 004, 012, and 017. PADEP appears to be entirely unaware of such discrepancies in the permittee's reporting, because there is no mention of any such in the files.

No more temporal detail than *month* of collection is provided in any DMR, making interpretation of some results unclear. Actual sampling dates are reported to PADEP on Emerald Mine HMRs, so it is unclear why sampling dates are not reported on DMRs also. Indeed, sampling dates, times, and personnel, are required by Part B of the NPDES Permit to be recorded by the permittee or its laboratory. Hence it would not be difficult to put those actual sampling dates on DMRs. Such dates would allow comparison with rainfall data to check on dry weather flow. PADEP apparently has never raised this as an issue of concern to them, perhaps because they have never attempted to interpret these DMR data. If laboratory data are maintained by the permittee only for the required minimum of three years, it may be impossible to retrieve such data to clarify the meaning of reported conditions at Emerald Mine outfalls.

Settleable solids, total dissolved solids, and osmotic pressure are among the few parameters with PADEP numerical effluent limitations for some of the Emerald Mine outfalls. The few settleable solids data reported typically exceed permit limits for Emerald Mine outfalls, so they appear to be significant. Yet, who made these alleged measurements, and what methods were used, are not reported in the DMRs.

Flow volumes are authorized by NPDES Permit Part A to be "estimated" for each outfall "based on a technical evaluation of the sources contributing to the discharge including, but not limited to, pump capabilities, water meters and batch discharge volumes" (NPDES Permit Part B.2.I). Nowhere in the files under review was any explanation provided of how flow was estimated at Emerald Mine. Flow volumes were reported by the permittee as "measured" until April 2008; thereafter, as "estimated", but with no indication as to how or by whom (Emerald staff, laboratory consultants?) in either case. Whether the flow is determined for the same dates as the chemical sampling cannot be ascertained from the DMRs. Reported precision of flow estimates varies from DMR to DMR.

With each quarterly transmittal letter for Emerald Mine DMRs to PADEP, the permittee's attached Supplemental Laboratory Accreditation Forms list each parameter, analysis method employed, lab name, and lab registration number. These forms are always the same for the two labs used by Emerald over the 27-month period under review. One lab collected the field pH measurements and (until 2009) field temperature; the other analyzed the wastewater samples. Perhaps Emerald keeps file copies of the actual monthly laboratory results, at least for the

minimum of three years required by the permit. Perhaps the actual lab reports make more sense than the corresponding DMRs. The DMRs appear most likely to have been prepared by Emerald staff, who allegedly are the ones signing them, rather than by the laboratories' personnel.

Not all of the mandatory parameters for monitoring imposed on Emerald Mine by the NPDES permit are mentioned in the laboratory accreditation forms that accompany the quarterly transmittals of DMRs, so it is not possible to ascertain who was supposed to be responsible for determining total settleable solids, total dissolved solids, or osmotic pressure (or flow) or what methods anyone might have used to measure or estimate these parameters. It is reasonable to conclude that Emerald Mine never asked its labs to analyze for these permit-required parameters. Clearly, neither of the labs ever put all of the parameters required by this permit on its accreditation forms, as might be expected if its staff had planned to report such analyses. Settleable solids, total dissolved solids, and osmotic pressure are among the few parameters with PADEP numerical effluent limitations for some of the Emerald Mine outfalls. The few settleable solids data reported typically exceed permit limits for Emerald Mine outfalls, so they appear to be significant. Yet, who made these alleged measurements, and what methods were used, are not evident.

The permittee sometimes includes latitude and longitude for the discharge outfall on a completed DMR and sometimes not. Some of the permittee's listed latitude and longitude locations for outfalls are correct; some are not. There is no way to tell whether any of the DMR data actually pertain to the outfall or location for which they are presented.

SUBSTANTIVE DATA ON WATER POLLUTION

No Emerald Mine outfall was furnished with a complete set of credible DMR data for the period under review. Even Outfall 012, for which no flow was reported during any month of the 27-month period of review, has at least three completed DMRs with bogus data, and none of its DMRs was designed to display all of the data required by Part A of the NPDES permit. Discharges listed on mining application Form 12.1A in the Emerald application Module 12 as "continuous" actually are reported to be dry most of the time, according to the permittee's monthly DMR data. Nine [64%] of the 14 current Emerald Mine outfalls (including Coal Refuse Disposal Areas 1 and 2) under this permit with actual monitoring data have exceeded one or more of their Part A numerical permit discharge limitations at least once during the 1 to 27 months when their effluent was able to be sampled, according to the data on the permittee's DMRs supplied by PADEP (Appendix Table 1). A summary of the exceedances reported on the completed DMRs is presented in Appendix Table 2. Given the uncertainties surrounding the data as discussed above, this likely is a minimum tally of exceedances at Emerald Mine outfalls during the period. Presumably, the permit limitations were set by PADEP in order to protect receiving streams from high concentrations of pollutants. Receiving streams might be considered unprotected, therefore, when concentrations exceed the allowable limits

at the ends of the wastewater discharge pipes. There are no mentions of fish kills or other impacts in the 2007-2009 Emerald DMR files at the California District Mining Office, whether or not associated with permit exceedances.

Two "continuous flow" Emerald Mine discharge outfalls exceeded numerical limits for one or more parameters during 50% (002) and 71% (016) of their months with any sampled discharge. Discharges at Outfall 016 exceeded one or more numerical limits consistently for the *last twelve consecutive months* of monitoring, and Outfall 013 exceeded limits consistently for the *last six consecutive months* of monitoring during the period under review. There was no mention by PADEP of these exceedances in any file correspondence, despite the permittee's acknowledgements that accompanied the DMRs.

No Emerald Mine outfall was furnished with a complete set of credible DMR data for the period under review. Nine [64%] of the 14 current Emerald Mine permitted outfalls with actual monitoring data have exceeded one or more of their Part A numerical permit discharge limitations at least once during the 1 to 27 months when their effluent was able to be sampled.

Self-recorded exceedances of numerical limitations of aluminum at Emerald Mine were never acknowledged by this permittee. Some but not all exceedances of Fe, Mn, TSS, and osmotic pressure were acknowledged. Exceedances typically were not corrected promptly. PADEP's own sparse monitoring encountered one exceedance of the Part A limit for Al at Outfall 016 in March 2007. PADEP also recorded extremely high aluminum at the time of an August 2008 fish kill at Outfall 017, as discussed subsequently.

Sulfate concentrations often were high at many outfalls according to the permittee's DMRs and PADEP's own occasional sampling during monthly inspections. No numerical limit for SO4 is imposed by PADEP at present, but SO4 remains a pollutant required to be reported according to Part B of the NPDES Permit whenever greater than 500 mg/l and when routinely encountered greater than 100 mg/l. As discussed further below, the permittee's highest acknowledged SO4 concentration was 4458 mg/l at Outfall 016 in January 2009. Similarly, the highest PADEP SO4 random sampling value was 5439.8 mg/l at this outfall in February 2009. These values are orders of magnitude higher than typical background concentrations for SO4 in Appalachian streams and well above thresholds of observed toxicity to aquatic organisms (Pond *et al*. 2008).

Specific conductance values also often were elevated in discharges from Emerald Mine during 2007-2009. No numerical limits for specific conductance are included in this NPDES permit. Noteworthy impairment of aquatic organisms in Appalachian streams is associated with specific conductance greater than 1,000 µmhos/cm (Pond *et al*. 2008). USEPA (2010) is considering a benchmark limit on specific conductance of 300 µmhos/cm, which may be adequate to protect 95% of aquatic

organisms in Appalachian streams. That limit is not considered adequate for Special Protection waters.

Self-reported specific conductance values in Emerald Mine discharges typically were at least one order of magnitude higher than in local background data as reported in the Emerald HMRs, and often exceeded 2,000 µmhos/cm at eight outfalls. At Emerald Outfall 016 the highest maximum specific conductance value (16,300 µmhos/cm) was recorded by the permittee in January 2009, and the average at that outfall generally exceeded 11,750 µmhos/cm in 2008-2009 DMRs. Osmotic pressure at Outfall 016 also was often reported as exceeding permit limits.

In general the permittee appeared to be meeting permit limits on pH and alkalinity at the Emerald outfalls most of the time. Only one pH value lower than 6 was self-reported at one outfall during the 27 months under review. PADEP reported alkalinity<acidity in its random sampling at Outfall 002 on 30 January 2008, representing an exceedance of the Part A limit requiring alkalinity always to exceed acidity at every outfall. There was, however, no mention of this exceedance in the PADEP correspondence files.

Sulfate concentrations often were high at many outfalls according to the permittee's DMRs and PADEP's own occasional sampling during monthly inspections. Specific conductance values also often were elevated in discharges from Emerald Mine during 2007-2009. Values for these parameters were greatly in excess of background and within the range known to damage aquatic organisms in Appalachian streams.

Typically, no actual numbers are reported by the permittee for alkalinity or acidity, just the claim that the numerical value of the former (always) exceeds the latter. Yet there were hundreds of reported violations, if the permittee's submitted DMRs are to be believed literally, for December 2007 at Outfall 007 and for January 2008 at Outfall 014. The numbers on the DMRs for these dates appear to be raw alkalinity values (reported in mg/l as CaCO3), rather than *counts* of measured alkalinity<acidity limit *exceedances*, given the small number of samples allegedly made during these months. If gross negligence or incompetence on the part of the lab was occurring, it was not noticed by the permittee, whose staff should be reviewing and rejecting such bogus data routinely. The lab, however, may report only the actual alkalinity and acidity numbers to Emerald Mine, in which case it is the Emerald staff who cannot compare the two numbers and enter that comparison accurately on the DMRs for months with data. Actual concentrations for alkalinity and for acidity are to be reported in the quarterly HMRs (hydrologic monitoring reports) for Emerald Mine, but only exceedances (acidity > alkalinity) are to appear in monthly DMRs. PADEP apparently never notices or questions such incredible reporting; at least there is no indication of such in any of the PADEP files.

An August 2008 fish kill in South Fork Tenmile Creek just downstream from the Emerald Mine Outfall 017 into lower Grimes Run is discussed below. PADEP inspectors observed drilling effluent from the sediment pond at this outfall entering Grimes Run while investigating the reported fish kill. Aluminum was present in very high concentration, acidity was greater than alkalinity, sulfate was present in reportable amount, and nitrates/nitrites concentration was high in the PADEP sample from Outfall 017 effluent collected a few days following the fish kill. Nevertheless, the fish kill was deemed by the PADEP mine inspector as "unlikely" to have been caused by the Emerald Mine discharge, even though no other pollution source was identified. There are no permittee DMRs during this period for this outfall in PADEP files, a curious time for a break in reporting. It does not take much highly polluted water to kill fish.

PERMITTEE'S ACKNOWLEDGMENT OF EXCEEDANCES OF PERMIT LIMITATIONS

The bewildering variety of incomplete sampling frequencies, parameters, and effluent limitations summarized in Appendix Table 3 evidently is difficult for Emerald Mine staff (or anyone else) to comprehend, leading to frequent omissions and discrepancies in the DMR data for this mine (Appendix Table 2) and consequent permittee failures to acknowledge exceedance of limitations documented in the self-reported DMRs. This permittee's transmittal letters typically forward DMRs quarterly in batches to PADEP, apparently imposing on PADEP staff the task of sorting DMRs from various facilities into appropriate files for the separate mining activity permits. Emerald staff are not meticulous in their data presentation, sometimes producing contradictions within and among single DMRs and explanations of exceedances. When sampling at an outfall is initiated or discontinued, a note to that effect could easily be included, at least in the permittee's quarterly DMR transmittal letter, but there are no such notes in Emerald Mine files during the period under review. The transmittals are devoid of specific information summarizing the monthly findings, such as the locations, kinds, and numbers of exceedances recorded during the quarter. Obvious typographical errors are repeated quarter after quarter as transmittal letter text is copied without revision other than change of date.

Usually, but not always, the permittee discussed exceedances of numerical limitations (as required by the permit) in brief written comments interleaved with the Emerald DMRs summarized in Appendix Table 2. Sometimes the permittee discussed only one parameter's exceedance, even though several others were exceeded at the same time at that outfall. Usually exceedances of total suspended solids or settleable solids and of osmotic pressure were noted, but often there was no comment on exceedances of limits on iron, aluminum, and/or manganese. High sulfates concentrations in discharges were *never* mentioned. The impacts of exceedances on receiving streams and their aquatic biota or other protected uses were *never* addressed.

The permittee's exceedance explanations usually say Emerald Mine staff are going to clean the sediment basin and everything should be fine the next month or the next quarter, but that expectation rarely appears to have been borne out by sampling data in the subsequent monitoring record. There are no PADEP comments in the California District Mining Office files concerning any exceedance of permit limitations or any permittee efforts to eliminate the exceedances at the Emerald mine. Perhaps any such comments are filed elsewhere than in the permit or DMR folders, but access to any such records was not provided by PADEP.

About one dozen Emerald Mine DMRs from the period under review contain exceedances of numerical limitations not acknowledged at all by the permittee. Conversely, a few DMRs have an exceedance "acknowledged" by the permittee that appears not to be an exceedance of any applicable permit limitation.

No *permittee-acknowledged* occurrence of alkalinity<acidity violations appears in the entire set of Emerald DMRs. (As discussed above, the two obvious exceedances self-reported for this parameter are probably erroneously transcribed data entries, but the permittee failed to acknowledge or discuss those exceedances, merely recording them on its DMRs.)

About one dozen Emerald Mine DMRs from the period under review contain exceedances of numerical limitations not acknowledged at all by the permittee.

None of the DMRs ever addresses the presence or absence of "floating solids or visible foam in other than trace amounts" when reporting on site conditions, as directed by the Emerald NPDES Permit Part A requirements for every outfall (Figures 5 and 7). The permittee is not following the permit when it simply ignores these limitations rather than stating its claimed compliance with them (if that is the case) each month at each outfall. There is no indication why this Part A requirement is completely ignored by both the permittee and by PADEP in its blank (sample) DMRs (Figure 6).

That the frequent exceedance of Part B general limitations on sulfates at Emerald outfalls is supposed to trigger notification of PADEP, appears never to have been recognized by the permittee, and there is no mention of high sulfates concentrations either with the DMRs files or in the Emerald correspondence files at the California DMO. At least nine outfalls experienced reportable concentrations of sulfates during the period of interest. At least 86 records of sulfates in excess of 1000 mg/l were self-reported in the Emerald Mine DMRs during the period under review, with the highest value of 4458 mg/l recorded at Outfall 016 in January 2009 (Appendix Table 2). Similarly, sulfates exceeded 100 mg/l at all five of the outfalls sampled by PADEP inspectors during the 2007-2009 period (Appendix Table 4). Ten (26%) of the PADEP's 38 random samples showed sulfate concentrations greater than 1000 mg/l, with the highest being 5439.8 mg/l at Outfall 016 in February 2009. There is no comment from the permittee in the files regarding any of these exceedances, and

no suggestion that PADEP ever brought these exceedances to the permittee's attention or regarded them as a threat to water quality.

The incomplete DMRs for the Emerald Mine coal refuse disposal areas (Outfalls 001 and 011) also record some exceedances of the NPDES permit's numerical limits and/or reportable concentrations of pollutants, most often for sulfates. It is reasonable to expect that the actual number of exceedances is larger than the available data suggest, given the numerous gaps in sampling and analysis in the file material provided.

Most of the Emerald DMRs offer plausible monitoring data. Two, however, do not. Instead, these two DMRs (for Outfalls 002 and 014, see below), which claim to have been sampled twice monthly, report average values precisely one-half of their reported maximum results for all parameters:

Permit Parameter	(Unit of Measure)	Outfall 002 October 2007		Outfall 014 November 2007	
		Avg	Max	Avg	Max
Measured Flow	(mgd)	0.061	0.123	0.002	0.004
Total Iron	(mg/l)	0.25	0.50	0.25	0.49
Total Suspended Solids	(mg/l)	22.5	45.0	3.0	6.0
Total Manganese	(mg/l)	0.02	0.04	0.05	0.09
Total Aluminum	(mg/l)	0.20	0.40	0.27	0.54
Sulfates	(mg/l)	628.0	1256.0	167.5	335.0
Specific Conductance	(µmhos/cm)	3425.	6850.	581.	1161.
Temperature	(°C)	7.5	15.0	*	10.
Osmotic Pressure	(mos/kg)	55.	109.	*	*

* no data reported for this Emerald Mine outfall for this month

It is clear that someone took the single measured (maximum) values, divided by two, and fabricated an average. Such average values necessarily would require the second sample to have had zero values for all measured parameters, which occurrence is not credible and contradicts all of the remaining data available from Emerald Mine monitoring for the 2007-2009 period.

The underlying issue here appears to be that this permittee often fails to secure two measurable samples at outfalls where two monthly samples are "required". At least a dozen of the Emerald Mine DMRs where two samples per month are reported simply provide a string of asterisks in the "average" column. Occasionally there is a notation on one of these DMRs that there was no flow during one of the two sampling efforts.

There is no indication in PADEP files that PADEP's own monitoring results are provided to the permittee, or that the permittee would be able to acknowledge exceedances recorded only by PADEP. Thus, for example, there is no permittee comment regarding the exceedance (1.49 mg/l) of the NPDES Part A instantaneous

maximum limit (1.25 mg/l) for aluminum at Emerald Mine Outfall 016 which PADEP recorded in a wastewater sample it collected on 26 March 2007.

PADEP ENFORCEMENT

Nothing in the files suggests that PADEP has reviewed any of these Emerald Mine DMRs for completeness, or has objected to the permittee's exceedances of permit discharge limits, even when the exceedances at an outfall continue for months. Apparently there are no consequences either for isolated or for multiple or repeated exceedances of permit limits at any outfall, when the permittee elects to report self-monitoring data. The purpose of the monitoring, therefore, is not clear.

There are no mine inspector files at the California District Mining Office. The monthly inspection reports from the Greensburg District Mining Office for Emerald Mine during the review period almost never address pollutant data or suggest any awareness of DMR contents. The inspection reports never comment upon incomplete data in DMRs. No PADEP correspondence files provided for review contain any reference to incomplete DMRs or exceedance of limitations.

It is unclear whether permit discharge limitations issued for outfalls at the wrong latitude/longitude and/or on the wrong stream, or whose blank DMRs contradict the Part A permit limitations, can be enforced.

Whether permit discharge limitations issued for outfalls at the wrong latitude/longitude and/or on the wrong stream can be enforced is not clear. Data responding to PADEP blank DMRs that contradict the corresponding Part A limitations in the permit may not be enforceable as exceedances. In any case, there seems never to have been any PADEP recognition, much less enforcement, of exceedances of discharge requirements at the Emerald Mine during the period of review.

There is no evidence of awareness by PADEP either that substantial amounts of "required" data are missing from many of the Emerald Mine DMRs, or that some of the reported results could not have been derived from the reported sampling. The permittee's analytical laboratory did not even claim accreditation for ability to analyze all permit-required parameters. It seems most likely not to have been asked by the permittee to analyze any samples for parameters not mentioned. The permittee often tells PADEP on the DMRs that its lab is not analyzing for "required" parameters, and PADEP has offered no objection. PADEP had ample opportunity during the years of monitoring under review to point out the permittee's omission of required sampling, but apparently never did. The permittee never saw any need to instruct its laboratories to analyze the proper parameters in response to permit requirements.

It is not clear whether any discharge limitations or monitoring requirements *not* listed in the Part A pages for each outfall are enforceable (unless included in the standard Part B general directives that apply to every outfall). Given the incompleteness and frequent exceedances of permit limits during the 2007-2009 period, Emerald Mine DMRs prior to September 2007 warrant review. There is no perceptible trend toward data of higher credibility as time passes and Emerald staff members change within the 2007-2009 period.

Emerald Mine's owners and managers are being put at great risk by its staff. "Engineers in training" and "environmental specialists" should routinely correct and eliminate the myriad data mistakes that characterize these DMRs. Apparently their work is not supervised by competent professionals. The permittee should be held responsible for the unprofessional work displayed in the DMRs. The individuals who signed most of the DMRs may or may not qualify as the "responsible corporate officers" whose signature on every DMR is required by Part B.3.b(2) of the NPDES permit; perhaps there has been notification to PADEP of delegation by the permittee of DMR signatory authority to the various staff whose names appear over the period, but such documentation was not filed with the DMRs or in any of the other PADEP files examined for this report. Laboratory personnel also appear responsible for blunders, depending on what they were asked to do. But PADEP seems consistently to fail to look for or notice violations. Meanwhile, the water resources of the Commonwealth continue to be degraded by coal mining.

There is no indication in the files reviewed that the permittee or its consultants ever attempted to clarify the many inconsistencies between the forms and the monitoring requirements.

PADEP file information on the August 2008 fish kill in Grimes Run and South Fork Tenmile Creek at the Interstate 79 Bridge consists of an Emergency Response Incident Report, accompanying photographs, the analytical data from the Bureau of Laboratories in Harrisburg, and several short e-mails among Department staff. The "source of pollution" clearly was stated to be wastewater from Emerald Mine drilling and blasting at Airshaft 9, which material went to the sediment pond at Outfall 017 and thence to Grimes Run (Figure 8). Municipal sewage treatment plants, a gas compressor station, a highway supply yard, and a rail line gave the PADEP inspector no visible impression of spills or discharges. There is no mention in the file of exceedance of NPDES Permit PA 0213438 numerical limitations for Outfall 017 or of Statewide water quality standards. Aluminum, acidity, and nitrogen values were very high in the August 2008 results from the State laboratory, although the Outfall 017 sample was not analyzed for all Outfall 017 permit parameters or for typical sewage treatment plant monitoring parameters. Apparently there was no followup to assess a fine for the fish kill of more than 100 individuals including bass, suckers, drum, carp, trout, and sauger.

FIGURE 8. Black and white photo (above) provided by PADEP showing discharge into Grimes Run from Emerald Mine Outfall 017 on 8 August 2008. Stream flow is from right to left. Rock bed of Grimes Run can be seen through clear water in the right foreground. In right background turbid water flows downhill to enter stream over stones. Near the center of the view the turbid water is noticeable at the rocks. Grimes Run joins South Fork Tenmile Creek about 400 feet downstream. The turbid water collected here was found by PADEP to have high concentrations of aluminum, acidity, nitrogen compounds, specific conductance, and sulfate. The report of dead fish in the Creek beneath the I-79 Bridge triggered this inspection by PADEP. Other PADEP views of the Outfall 017 sediment pond and Grimes Run are below.

Fish Kill Incident - August 2008

According to the PADEP 13 August 2008 emergency incident response report on a reported kill of more than 100 fish in South Fork Tenmile Creek, a noticeable plume of white discoloration photographed in the lower reach of the Grimes Run tributary was traceable to the water from shaft drilling effluent discharged to a sediment pond via Emerald Mine Outfall 017. The report noted that the fish had been dead for several days and were decomposed. Emerald staff reportedly had not observed any fish kill during acknowledged discharges on 10 and 13 August. They agreed to stop the discharges from 017 (Figure 8).

On 13 August PADEP sampled the discharge from Outfall 017 during its investigation of the fish kill, which had been reported by the Pennsylvania Fish and Boat Commission. The wastewater sample was sent to Harrisburg for analysis of a more extensive list of parameters than those required for self-monitoring per the Emerald NPDES permit. The PADEP inspector saw live minnows and no dead fish in Grimes Run itself on 13 August, and reported live fish moving back into the "kill zone," a 600-yard long stretch extending upstream and downstream from the I-79 Bridge.

A PADEP mining inspection report dated 6 October 2008 suggests that Emerald Mine Outfall 017 probably was not meeting permit limits at the time of investigation of the fish kill during the preceding August. The PADEP Harrisburg laboratory report for 6 October 2008 sampling shows Outfall 017 total sulfates to be 113.4 mg/l (above the NPDES Part B reportable threshold of 100 mg/l), with no other analyzed parameters outside Part A permit limits for that outfall on that date. Total suspended solids (no permit limit) were 10 mg/l on 6 October.

The 13 August PADEP grab sample analyzed in Harrisburg showed acidity (293.60 mg/l as CaCO3) greater than alkalinity (178.4 mg/l as CaCO3) in exceedance of the permit limitations, as well as high aluminum (18.1 mg/l), a toxic parameter not specifically limited by the NPDES Permit Part A for Outfall 017. The highest instantaneous value allowed from any Emerald Mine outfall with Part A aluminum limits is 1.8 mg/l, and the PADEP's August 2008 measurement of Al from Outfall 017 was ten times that (highest allowable instantaneous) discharge limit. The maximum Al concentration in streams statewide acceptable to protect fish and wildlife is 0.75 mg/l (25 *Pa. Code* 16.102, Appendix A, Table 1); the observed concentration in the PADEP's August sample of discharge water was 25 times that level.

The State laboratory also reported total dissolved solids at 1948 mg/l and nitrate plus nitrite nitrogen at 123.52 mg/l in the 13 August sample from the Emerald Mine Outfall 017 discharge. Concentrations of both these pollutants far exceeded statewide drinking water criteria (25 *Pa. Code* 93.7). Apparently the inspector did not ask the PADEP laboratory to analyze his sample for iron or total settleable solids, parameters for which Part A numerical limits exist for this outfall. Total sulfate in the August sample was reported as 100.8 mg/l**;** specific conductance, as 2480.00 µmhos/cm.

The August 2008 exceedances of Pennsylvania water quality standards and Outfall 017 discharge limits were nowhere discussed by the permittee. Clearly, the simple sediment pond was incapable of treating toxic drilling mud. The only mentions in the mine inspection files are (1) the simple statement in the emergency response incident report for the fish kill that a water sample had been collected by PADEP and (2) a 10 September memo from Charles R. Greene to Inspector V. Yantko transmitting the 6 September Harrisburg laboratory results and stating that a civil penalty should be assessed by one PADEP bureau or the other in response to exceedances of permit limitations. The permittee's DMRs for Outfall 017 in April, May, June, October, and November 2008 indicated no flow and thus no discharge during those months. According to PADEP, there are no DMRs *at all* from Emerald Outfall 017 for July, August, or September 2008 in the agency's files in California, Greensburg, or Pittsburgh!

The August 2008 fish kill nevertheless was deemed by the mine inspector as "unlikely" to have been caused by the Emerald Mine discharge, according to the PADEP emergency response incident report, although no other potential pollution source was identified. There is no mention in the files of any civil penalty being imposed on Emerald Mine or any other potential source of pollution as a result of this fish kill.

VI-II BAILEY MINE DMRs

For recent discharges of wastewater at the Bailey Mine, the following paragraphs first introduce general background information. Then, apparent problems with the PADEP NPDES permit requirements are discussed. Next, problems in the monitoring information reported by the permittee are summarized. The reported violations of discharge standards at Bailey Mine and their implications for water quality are reviewed, followed by a summary of the permittee's self-reported exceedances. The section closes with a discussion of apparent lapses in PADEP enforcement.

GENERAL INFORMATION

The original Bailey Mine permit was approved during August 1985; 134 revisions had been approved as of 14 October 2009. Additional requested revisions are pending. Thirty-two wastewater discharges to streams have received NPDES permits. Monthly Discharge Monitoring Reports (DMRs) for the 32 outfalls were reviewed for the 25-month period from September 2007 through September 2009 (Appendix Table 5). Three of the 32 discharges (004, 001C, and 001WF) were for sanitary sewage effluent, and DMRs were provided for these by the PADEP Southwest Regional Office in Pittsburgh in June 2010.[1] Five outfalls (009, 010, 011, 015, and 001WF) were inactive during the period of interest, although formal DMRs were filed for them. The (generally blank) DMRs for those five outfalls indicate that the associated surface facilities either never were constructed (009, 011), or had been abandoned and reclaimed or closed and were no longer monitored (010, 015, 001WF). Outfall 019 monitoring was discontinued as of July 2009, apparently "replaced" by Outfall 026 which was monitored throughout the period under review. The West Finley Portal sewage treatment plant was shut down in November 2004, but monthly DMRs (reporting no discharge) still were being filed for it in March 2010.

Designated uses of streams as set forth in 25 *Pa. Code* Chapter 93 are reported in the Bailey mining applications. Stream classifications are not linked with outfalls anywhere in the post-permit monitoring files or mentioned on DMRs for any Bailey Mine outfall. The designated uses of the receiving streams were considered when PADEP engineers prepared the "Water Quality Pollution Report" for each Bailey Mine sewage treatment plant outfall setting the permit discharge limitations. No comparable documents were provided by PADEP for any mining outfall. The actual premining attained use condition of no stream appears to have been addressed by PADEP in accordance with 25 *Pa. Code* 93.4c(a)(1)(iv) at the time of any Bailey Mine permit review or approval.

Of the 15 Bailey Mine outfalls for which actual sampling data were available during the period of record, 12 (80%) discharge to streams designated WWF and 3 (20%), to TSF streams. There are no Bailey monitoring data for permitted (but apparently inactive) outfalls to 14 WWF streams (70%), 5 TSF streams (25%), or 1 HQ-WWF stream (5%). There are dramatic differences between DMRs for sewage effluent and DMRs for mining effluent at the Bailey Mine (see box, below).

[1] Part C of these permits specifically requires that a copy of each DMR be filed with the California DMO as well as the Pittsburgh SWRO, but the California DMO was unable to provide any of these DMRs.

Bailey Mine Sewage Treatment Plant Discharges

The SWRO in Pittsburgh provided DMRs for the three Bailey Mine sewage treatment plants for the 29 months October 2007 through February 2010. The format of these documents and the data provided are very different from the mining DMRs, although provided to PADEP by the same Consol staff. The engineering reports specifying numerical discharge limits were provided by PADEP, and the limits are summarized in Appendix Table 9.

The format of these DMRs tracks precisely the NPDES permit Part A numerical limitations, all of which are exactly reproduced in the PADEP's blank DMRs (Figures 9 and 10). There is no provision for recording compliance or non-compliance with the Part C (Section 4.) requirement that

> All discharges of floating materials, oil, grease, scum and substances which produce tastes, color, odors, turbidity or settle to form deposits shall be controlled at levels which will not be inimical or harmful to the water uses to be protected or to human, animal, plant or aquatic life.

All of the data are presented by this permittee in the same sequence at each outfall for each month. (There are no monitoring data on the DMRs for the West Finley Portal STP, which was closed throughout the period under review.) These DMRs include space for documenting sludge removed from the plant during the month, but no sludge was removed from either active sewer plant during the period under review. Laboratory accreditation reports were attached to the Main Portal and Crabapple Portal DMRs for November 2008 through April 2009, but not for other months.

Sampling twice monthly was required for all parameters (plus flow) except total residual chlorine, which was to be sampled at least four times per month (Appendix Table 9). During December 2007 the parameters were sampled only once rather than twice (except for chlorine, which was sampled four times). In most of these DMRs chlorine reportedly was sampled five times per month. At the Crabapple Portal chlorine was reported as 0.1 mg/l monthly average and 0.1 mg/l instantaneous maximum for each of the 29 months under review. At both portals measured flow was reported as 0.007 mgd (0.01 cfs) for both monthly average and maximum for each of the 29 months. The permit limitations were based on a flow of 0.05 cfs.

For both of the reporting sewage effluent outfalls there were no exceedances of permit limitations for any parameter reported during the 29 months under review (Figure 11)

PROBLEMS IN PADEP'S BAILEY MINE NPDES PERMIT PA # 0213535

As noted previously for Emerald Mine, blank DMRs provided to permittees for self-monitoring are supposed to conform to Part A limitations for each corresponding outfall (oral communication, J. Koricich, California District Mining Office, 7 April 2010). The Bailey Mine Permit Part A "Effluent Limitations and Monitoring Requirements" in general are in conflict with the results solicited on the blank DMRs provided by PADEP to the permittee for the corresponding (non-sewage) mine outfalls. Whether any monitoring requirements or numerical limitations left out of Part A for an outfall are meaningful or enforceable is not clear. Water Quality Pollution Reports were provided for 15 (47%) of the Bailey Mine outfalls (3 sewage outfalls and 12 mine outfalls). There are significant differences between Part A limits, sampling types, and sampling frequencies and the PADEP-BWQM recommendations for the 12 mine outfalls.

FIGURE 9. NPDES Permit Part A for Main Portal sewage Outfall 004, Bailey Mine, Greene County, Pennsylvania.

PART A

1. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR OUTFALL 004 WHICH RECEIVES WASTE FROM:
the sewage treatment plant
at Latitude 39° 58' 21" Longitude 80° 25' 25" Stream Code 32644 River Mile Index (RMI) 10.59

a. The permittee is authorized to discharge during the period from effective date through expiration date.

b. Based on the production data and/or anticipated wastewater characteristics and flows described in the permit application and its supporting documents and/or amendments, the following effluent limitations and monitoring requirements apply. Total (dissolved plus suspended fraction) is implied for each parameter unless otherwise indicated.

	DISCHARGE LIMITATIONS (gross unless otherwise indicated)							MONITORING REQUIREMENTS	
	Mass Units (lbs/day except flow)			Concentrations (mg/l unless otherwise indicated)					
Discharge Parameter	Average Monthly	Average Weekly	Max. Daily	Average Monthly	Average Weekly	Max. Daily	Instant. Max.	Measurement Frequency	Sample Type
Flow (mgd)	0.05							2/month	measured
CBOD-5 Day									
May 1 to Oct 31				20			40	2/month	grab
Nov 1 to Apr 30				25			50	2/month	grab
Suspended Solids				30			60	2/month	grab
Ammonia Nitrogen									
May 1 to Oct 31				4.0			8.0	2/month	grab
Nov 1 to Apr 30				12.0			24.0	2/month	grab
Total Residual Chlorine				1.4			3.3	4/month	grab
Dissolved Oxygen				3.0 mg/l minimum				2/month	grab
Fecal Coliform Organisms									
May 1 to Sept 30				200/100 ml Geometric Mean			1,000/100 ml	2/month	grab
Oct 1 to Apr 30				2,000/100 ml Geometric Mean			10,000/100 ml	2/month	grab
pH	not less than 6.0 nor greater than 9.0 standard units							2/month	grab

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: at the outfall pipe.

FIGURE 10. PADEP blank DMR (Page 1 of 2) for sewage Outfall 004, Bailey Mine Main Portal STP, Greene County, Pennsylvania.

PERMITTEE NAME ADDRESS *(Include Facility Name / Location)*

NAME: Consol Pennsylvania Coal Company LLC
ADDRESS: P. O. Box J
Claysville, PA 15323

FACILITY: Bailey Mine – Main Portal Sewage Treatment Plant
LOCATION: Richhill Township, Greene County

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16)	(17-19)
PA0092894	004
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

FROM YEAR	MO	DAY	TO YEAR	MO	DAY
(20-21)	(22-23)	(24-25)	(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form

Parameter (32-37)		(3 Card Only) QUANTITY OR LOADING (46--53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) INST. MAX.	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
	Sample Measurement				*	*	*				
Flowq	Permit Requirement	0.05	*	MGD	*	*	*	*	*	2/MONTH	MEASURED
CBOD-5 Day	Sample Measurement	*	*		*						
May 1 to Oct 31 Nov 1 to Apr 30	Permit Requirement	*	*	*	*	20 25	25 50	MG/L	*	2/MONTH	GRAB
	Sample Measurement	*	*		*						
Suspended Solids	Permit Requirement	*	*	*	*	30	60	MG/L	*	2/MONTH	GRAB
Ammonia Nitrogen	Sample Measurement	*	*		*						
May 1 to Oct 31 Nov 1 to Apr 30	Permit Requirement	*	*	*	*	4.0 12.0	8.0 24.0	MG/L	*	2/MONTH	GRAB
	Sample Measurement	*	*			*	*				
Dissolved Oxygen	Permit Requirement	*	*	*	3.0	*	*	MG/L	*	2/MONTH	GRAB
Fecal Coliform	Sample Measurement	*	*		*						
May 1 to Sep 30 Oct 1 to Apr 30	Permit Requirement	*	*	*	*	200 2,000	1,000 10,000	#/100ML	*	2/MONTH	GRAB
	Sample Measurement	*	*			*					
pH	Permit Requirement	*	*	*	6.0	*	9.0	S.U.	*	2/MONTH	GRAB

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

TYPE OR PRINT

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 U.S.C. §1001 AND 33 U.S.C. §1319. (Penalties under these statutes may includes fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE
AREA CODE NUMBER

DATE
YEAR MO DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

EPA FORM 3320-1 (Rev 8 - 95)(facsimile) Previous edition maybe used. (REPLACES EPA FORM T-40 WHICH MAY NOT BE USED) Page 1 of 2

NOTE: YOUR PERMIT WILL EXPIRE ON MAY 3 1 2014. PLEASE SUBMIT YOUR RENEWAL APPLICATION BY DEC - 1 2013.

FIGURE 10. concluded - blank DMR (Page 2 of 2) for Bailey Mine Main Portal STP Outfall 004.

PERMITTEE NAME ADDRESS *(Include Facility Name / Location)*

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

NAME: Consol Pennsylvania Coal Company LLC
ADDRESS: P. O. Box J
Claysville, PA 15323

FACILITY: Bailey Mine – Main Portal Sewage Treatment Plant
LOCATION: Richhill Township, Greene County

(2-16)	(17-19)
PA0092894	004
PERMIT NUMBER	DISCHARGE NUMBER

MONITORING PERIOD

	YEAR	MO	DAY		YEAR	MO	DAY
FROM				TO			
	(20-21)	(22-23)	(24-25)		(26-27)	(28-29)	(30-31)

NOTE: Read instructions before completing this form

Parameter (32-37)		(3 Card Only) QUANTITY OR LOADING (46--53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) INST. MAX	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
	Sample Measurement	*	*		*						
Total Residual Chlorine	Permit Requirement	*	*	*	*	1.4	3.3	MG/L	*	4/MONTH	GRAB
	Sample Measurement	*	*		*	*	*			*	*
	Permit Requirement	*	*	*	*	*	*	*	*	*	*
	Sample Measurement	*	*		*	*	*			*	*
	Permit Requirement	*	*	*	*	*	*	*	*	*	*
	Sample Measurement	*	*		*	*	*			*	*
	Permit Requirement	*	*	*	*	*	*	*	*	*	*
	Sample Measurement	*	*		*	*	*			*	*
	Permit Requirement	*	*	*	*	*	*	*	*	*	*
	Sample Measurement	*	*		*	*	*			*	*
	Permit Requirement	*	*	*	*	*	*	*	*	*	*
	Sample Measurement	*	*		*	*	*			*	*
	Permit Requirement	*	*	*	*	*	*	*	*	*	*

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION. I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 U.S.C. §1001 AND 33 U.S.C. §1319. (Penalties under these statutes may includes fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years)		TELEPHONE		DATE		
TYPE OR PRINT		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT	AREA CODE	NUMBER	YEAR	MO	DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

EPA FORM 3320-1 (Rev 8 - 95)(facsimile) Previous edition maybe used. (REPLACES EPA FORM T-40 WHICH MAY NOT BE USED) Page 2 of 2

NOTE: YOUR PERMIT WILL EXPIRE ON MAY 3 1 2014. PLEASE SUBMIT YOUR RENEWAL APPLICATION BY DEC - 1 2013.

FIGURE 11. Completed Bailey Mine STP DMR (Page 1 of 4) for January 2010 for sewage Outfall 004, NPDES Permit No. PA0092894, Main Portal STP, Richhill Township, Greene County, Pennsylvania. January 2010. Note dramatic difference in format compared with that used for mine discharges in Figure 6. Permittee has substituted NA for asterisks in PADEP blank sample DMR (Figure 10).

PERMITTEE NAME ADDRESS *(Include Facility Name / Location)*

NAME: Consol PA Coal Company, LLC
ADDRESS: Post Office Box J
Claysville, PA 15323

FACILITY: Bailey Portal STP
LOCATION: Richhill Township, Greene County

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

RECEIVED
FEB 22 2010
PADEP Southwest Regional Office

(2-16) PERMIT NUMBER	(17-19) DISCHARGE NUMBER
PA 0092894	004

MONITORING PERIOD	FROM YEAR (20-21)	MO (22-23)	DAY (24-25)	TO YEAR (26-27)	MO (28-29)	DAY (30-31)
	10	01	01	10	01	31

NOTE: Read instructions before completing this form

Parameter (32-37)		(3 Card Only) QUANTITY OR LOADING (46--53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
Flow	Sample Measurement	0.007	0.007	MGD	NA	NA	NA	NA	0	2/Month	Measured
	Permit Requirement	0.05	NA		NA	NA	NA			2/Month	Measured
CBOD-5 Day May 1st to October 31 November 1 to April 30	Sample Measurement	NA	NA	NA	NA	9.2	9.4	mg/L	0	2/Month	Grab
	Permit Requirement	NA	NA		NA	20.0 25.0	25.0 50.0			2Month	Grab
Total Suspended Solids	Sample Measurement	NA	NA	NA	NA	5.50	6.00	mg/L	0	2/Month	Grab
	Permit Requirement	NA	NA		NA	30.0	60.0			2/Month	Grab
Ammonia Nitrogen May 1st to October 31st Nov 1st to April 30th	Sample Measurement	NA	NA	NA	NA	3.40	3.70	mg/L	0	2/Month	Grab
	Permit Requirement	NA	NA		NA	4.0 12.0	8.0 24.0			2/Month	Grab
Dissolved Oxygen	Sample Measurement	NA	NA	NA	10.8	NA	NA	mg/L	0	2/Month	Grab
	Permit Requirement	NA	NA		3.0	NA	NA			2/Month	Grab
Fecal Coliform May 1st to September 30th October 1st to April 30th	Sample Measurement	NA	NA	NA	NA	14.00	24.00	#/100 ML	0	2/Month	Grab
	Permit Requirement	NA	NA		NA	200 2,000	1,000 10,000			2/Month	Grab
pH	Sample Measurement	NA	NA	NA	7.8	NA	8.1	Std. Units	0	2/Month	Grab
	Permit Requirement	NA	NA		6.0	NA	9.0			2/Month	Grab

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER

BRIAN A. BOGDEN
ENVIRONMENTAL ENGINEER

TYPE OR PRINT

I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 U.S.C. §1001 AND 33 U.S.C. §1319. (Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years)

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

TELEPHONE: AREA CODE 724 NUMBER 663-3065

DATE: YEAR 10 MO 02 DAY 18

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

EPA FORM 3320-1 (Rev 9 - 88) Previous edition maybe used. (REPLACES EPA FORM T-40 WHICH MAY NOT BE USED) Page 1 of 2

NOTE: YOUR PERMIT WILL EXPIRE ON **MAY 31, 2014**. PLEASE SUBMIT YOUR RENEWAL APPLICATION BY **DECEMBER 1, 2013**.

FIGURE 11 (continued). Completed DMR (Page 2 of 4) for Bailey Mine Main Portal STP Outfall 004.

PERMITTEE NAME ADDRESS *(Include Facility Name / Location)*

NAME: Consol PA Coal Company, LLC
ADDRESS: Post Office Box J
Claysville, PA 15323
FACILITY: Bailey Portal STP
LOCATION: Richhill Township, Greene County

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)

(2-16) PERMIT NUMBER: PA 0092894
(17-19) DISCHARGE NUMBER: 004

MONITORING PERIOD

FROM	YEAR (20-21)	MO (22-23)	DAY (24-25)	TO	YEAR (26-27)	MO (28-29)	DAY (30-31)
	10	01	01		10	01	31

NOTE: Read instructions before completing this form

Parameter (32-37)		(3 Card Only) QUANTITY OR LOADING (46--53) AVERAGE	(54-61) MAXIMUM	UNITS	(4 Card Only) QUALITY OR CONCENTRATION (38-45) MINIMUM	(46-53) AVERAGE	(54-61) MAXIMUM	UNITS	NO. EX (62-63)	FREQUENCY OF ANALYSIS (64-68)	SAMPLE TYPE (69-70)
Total Residual Chlorine	Sample Measurement	NA	NA	NA	NA	0.24	0.30	mg/L	0	5/Month	Grab
	Permit Requirement	NA	NA		NA	1.4	3.3			4/Month	Grab

NAME/TITLE PRINCIPAL EXECUTIVE OFFICER			TELEPHONE		DATE		
BRIAN A. BOGDEN ENVIRONMENTAL ENGINEER TYPE OR PRINT	I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION. I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT SEE 18 U.S.C. §1001 AND 33 U.S.C. §1319. (Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years)	B. A Bog	724 (AREA CODE)	663-3065 (NUMBER)	10 (YEAR)	02 (MO)	18 (DAY)
		SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT					

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

EPA FORM 3320-1 (Rev 9 - 88) Previous edition maybe used. (REPLACES EPA FORM T-40 WHICH MAY NOT BE USED) Page 2 of 2

NOTE: YOUR PERMIT WILL EXPIRE ON **MAY 31, 2014**. PLEASE SUBMIT YOUR RENEWAL APPLICATION BY **DECEMBER 1, 2013**.

FIGURE 11 (continued). Completed DMR (Page 3 of 4) for Bailey Mine Main Portal STP Outfall 004.

DISCHARGE MONITORING REPORT SUPPLEMENTAL SEWAGE SLUDGE REPORT

Instructions

1. Complete montly and submit with each DMR. Attach additional sheets and comments as needed for completeness and clarity.
2. Sludge production informatin will be used to evaluate plant performance. Report only sludge which has been removed from digesters and other solids which have been permanently removed from the treatment process. Do not include sludge from other plants which is processed at your facility.
3. In the disposal site section, report all sludge leaving your facility for disposal. If another plant processes and disposes of your sludge, just provide the name of that plant. If you dispose of sludge from other plants, include their tonnage in the disposal site section and provide their names and individual dry tonnage on the back of this form.
4. If no sludge was removed, note on form.

Month: January Year 2010

Permittee: Consol Pennsylvania Coal Company, LLC
Plant: Bailey Sewage Treatment Plant
NPDES: PA0092894
Municipality: Richhill Township
County: Greene

For sludge that is incinerated:

Pre-incineration weight = _____ dry tons
Post-incineration weight = _____ dry tons

SLUDGE PRODUCTION INFORMATION (prior to incineration)

HAULED AS LIQUID SLUDGE				HAULED AS DEWATERED SLUDGE			
(Gallons) x	(% Solids)	Conversion Factor	= Dry Tons	(Tons of Dewatered Sudge)	X (%Solids)	X (.01)	= Dry Tons
None Hauled		0.000417				0.01	
Total		=		Total		=	

DISPOSAL SITE INFORMATION: List all sites, even if not used this month.

Name:				
Permit No.:				
Dry Tons Disposed:				
Type: Land Fill				
Agr. Utilization				
Other (specify)				
County				

Signature

Environmental Engineer
Title

18-Feb-2010
Date

724-663-3065
Telephone

(SSR-1 3/21/91)

FIGURE 11 (concluded). Completed DMR (Page 4 of 4) for Bailey Mine Main Portal STP Outfall 004.

SLUDGE RECEIVED FROM OTHER SOURCES

Source Name (include specific plant)	Gallons Received	% Solids	Dry Tons

Comments:

The Part A limits specify the minimum frequency required for permittee self-monitoring for most parameters (Figure 5). Blank mine outfall DMRs do not specify any sample type or frequency for any parameter (Figure 6). The blank DMRs for 27 Bailey Mine outfalls[1], however, solicit data for average as well as daily or instantaneous maximum values of estimated flow and many other parameters, along with maximum and minimum pH values, none of which can be provided on the basis of the once-monthly or once-quarterly grab sampling specified in Part A. Whether PADEP wants averages reported is not clear. (The permittee understandably leaves blank all these boxes for averages.) There is no indication in the files reviewed that the permittee or its consultants ever attempted to clarify the many inconsistencies between the forms and the monitoring requirements.

None of the PADEP blank DMRs prompts recording of the presence or absence of "floating solids or visible foam in other than trace amounts" when reporting on site conditions, as directed by the Part A pages in the NPDES permit for each outfall. PADEP requests no attestation from the permittee regarding these parameters, so effectively these limits are meaningless in the context of Bailey Mine self-monitoring reports.

Some Part A parameters are left out altogether from the blank DMRs for the corresponding Bailey Mine outfall (for example, osmotic pressure at 024 and 025). It is not clear whether PADEP wants these parameters analyzed and reported or not. The permittee elected to ignore them throughout the period under review, and PADEP never asked about their absence.

Some Part A limitations are not associated with any specified monitoring frequency (for example, osmotic pressure at 020, 024, 025, 029, and 030; Appendix Table 7). As noted for the Emerald Mine, PADEP blank DMRs for mining outfalls do not specify the monitoring frequency for any parameter, leaving frequency entirely to the discretion of the permittee (Figure 6). The permittee elected not to sample osmotic pressure at any of these five Bailey Mine outfalls during the period under review. There is no indication in any files that PADEP disagreed with this election (or even noticed that it had been made).

Sixteen or seventeen Bailey Mine outfalls (010, 012, 013, 016, 017, 018, 019, 021, 022, 023, 024, 025, 026, 027, 028?[2], 029, and 030) have different sets of discharge limitations that apply during periods of (a) stormwater flow and (b) dry-weather flow. Nowhere on the blank DMRs, however, are dry-weather flow limits mentioned, dates of sampling to be provided, or weather conditions to be recorded. Thus, it is not possible to tell which set of limits is applicable or what the nature of the flow was during monthly,

[1] PADEP was unable to provide copies of blank DMRs for Bailey Mine Outfalls 029 and 030.

[2] NPDES permit Part A limitations are obviously incomplete for Outfall 028 (Permit Revision #125). Whether the Group A dry-weather flow limitations apply to Outfall 028 is not clear, but PADEP appears to have intended to apply them to this outfall.

twice monthly, and/or quarterly sampling events. In practice, the dry-weather flow limitations apparently are meaningless.

A DMR is meaningful only when a discharge is actually sampled and analyzed. For outfalls that do not discharge continuously, it is not clear whether PADEP wants the permittee to attempt to monitor when there is a discharge and provide actual measurements. This would require sampling at outfalls on an irregular schedule when there are flowing discharges, often in conjunction with precipitation events. Some provision presumably should have been made on the blank DMRs for recording relevant weather data at the time of each sampling event, if such data were to be considered when interpreting the data.

NPDES Part B general directives require that the date, time, and personnel responsible for all sampling be recorded, and that records be kept for at least three years. Sampling dates are required by PADEP on Bailey Mine HMRs (Hydrologic Monitoring Reports which provide pre-mining background, during-mining, and post-mining data). It would not be difficult to record such information on the DMRs also, if monitoring requirements were to be made meaningful, but PADEP has never requested them.

Part A limitations and blank DMR forms for mining outfalls are not dated, so changes are not readily identified. Monitoring apparently was underway at most of the Bailey Mine outfalls at the beginning of the period under review. Outfalls 027 and 028 were added by Revision #125 (10 December 2008); Outfalls 029 and 030, by Revision #131 (6 July 2009). DMRs for these four outfalls began in July 2009. Monitoring at Outfall 019 ended in June 2009. Monitoring for Outfall "301" at the Bailey Mine Coal Refuse Disposal Areas No. 3 and No. 4 apparently was ongoing as of February 2009, but no NPDES permit information or DMRs from it were provided by PADEP.

A DMR is most meaningful when a discharge actually is monitored. For outfalls that do not discharge continuously, it is not clear whether PADEP expects the permittee to attempt to monitor during times when there is a discharge and thereby provide actual measurements.

The parameters to be measured, quantitative effluent limitations for specific parameters, and sampling frequencies, as required by PADEP, vary significantly among outfalls within the Bailey Mine (Appendix Table 7). Numeric limitations on concentrations of solids and metals also vary considerably from one outfall to the next. Why this should be is not obvious. Some, but apparently not all, of the varying limits may be related to the nature of the effluent expected at each outfall (for example, surface runoff versus mine drainage). The basis for assignment of numerical limits for mine effluent parameters (other than sewage parameters) is not explained in any of the various permit files provided by PADEP.

PADEP specifies on each relevant outfall page in Part A of the Bailey Mine NPDES permit that [total] settleable solids be reported in ml/l (volume of solids per unit volume of water) for all outfalls where analysis for this parameter is required. Many other

parameters, including TSS (total suspended solids) are specified for reporting in mg/l (mass of solids per unit volume of water). Settleable solids can be reported in either unit, but there is no direct, standard conversion between these units of measurement. Instead, conversion depends of the composition of the effluent being analyzed.

For Bailey Mine Outfall 020 the Part A page specifies twice monthly sampling for TSS (total suspended solids, mg/l). The blank template DMR adds settleable solids (ml/l) as well, presumably also at least twice monthly if average values are to be reported. The permittee elected to ignore settleable solids entirely when monitoring at Outfall 020.

PROBLEMS AND OMISSIONS IN PERMITTEE'S MONITORING RESULTS

The data entered on completed DMRs for Bailey Mine outfalls are rife with gaps, inconsistencies with permit requirements, unannounced changes in units, and other problems that seriously undermine their credibility (Appendix Table 6). The great number and the kinds of errors noted in the DMRs strongly suggest an absence of professional review of the NPDES self-monitoring for Bailey Mine, despite an employee signature attesting to the veracity of each DMR on behalf of the permittee. Whether any accredited laboratory performed the reported analyses for Bailey Mine outfalls, and what laboratory methods were employed, remain a mystery onto which PADEP files shed no light, except for the sewage treatment outfall DMRs for a few months, as noted above, which do not include any mine discharge parameters.

The 2007-2009 Bailey Mine DMRs are supposed to provide monthly, twice monthly, and/or quarterly self-monitoring results for 29 outfalls (Appendix Table 5). Sampling when a discharge actually was flowing occurred at 13 outfalls (45% of the total permitted outfalls) on one or more occasions during the period under review.

The data entered on completed DMRs for the mine outfalls are rife with gaps, inconsistencies with permit requirements, unannounced changes in units, and other problems that seriously undermine their credibility.

At sixteen outfalls (006, 008, 009, 010, 011, 013, 014, 015, 016, 019, 023, 026, 027, 028, 029, and 030) the permittee's DMRs report no flow on any of the dates of sampling during the review period. These sixteen represent 55% of the 29 DMR-reported Bailey Mine outfalls. Monitoring at the last four outfalls first began in July 2009, but none of those outfalls had flow during any third quarter sampling in 2009.

All sixteen of these sediment ponds might be expected to have had discharges at some time during this period (25 months for most outfalls), particularly following precipitation events, even though no samples were analyzed from them. Sampling of outfalls at Bailey Mine apparently is not coordinated in any way with precipitation events. Such coordination could maximize the likelihood of meaningful data being gathered during future NPDES monitoring at this and other mines. If weather conditions were reported, that could enable a comparison of results with the relevant

discharge limitations at the sixteen or seventeen outfalls that are supposed to meet one of two applicable sets of permit limits, depending on the presence or absence of stormwater runoff at the time of sampling.

The permittee alleged in its DMR for September 2007 that the Outfall 013 pond had been reclaimed. All subsequent DMRs for this outfall, in contrast, record Outfall 013 as lacking flow. The other allegedly reclaimed outfalls at the Bailey mine were not sampled at all during the period, but simply were represented by blank DMRs.

On its initial DMRs for the new outfalls in July 2009 the permittee helpfully noted that Outfalls 027 and 028 had been approved during June 2009 and that Outfall 030 had been approved on 8 July 2009. The permittee's cited dates do not correspond with the Bailey permit revision dates listed above, but they do signal that self-monitoring began at these new outfalls as of third quarter 2009.

Thirteen DMRs scattered during the period were missing from the California District Mining Office files for monthly sample results from typically reported Bailey Mine outfalls. Eight monitored outfalls and one not-monitored outfall were affected. Copies of these missing DMRs were provided by the Greensburg District Mining Office in April 2010 and are included in these comments.

The required monthly or twice-monthly monitoring results were reported for Bailey Mine outfalls experiencing flow during the review period. Quarterly monitoring, however, was not consistently performed during one or more quarters at nine outfalls where flow was observed and easily could have been monitored for all the required parameters.

The "required" osmotic pressure was never measured at Bailey Mine Outfalls 020 or 024, although data on other parameters were reported from those usually dry outfalls.

A new format for its DMRs was adopted by the permittee in July 2009. There is nothing in the files to suggest that PADEP had requested a new format. A permittee is allowed to use any format it chooses, provided all NPDES monitoring data are included (oral communication, J. Koricich, California District Mining Office, 7 April 2010). The new Bailey format eliminates space for all quarterly monitoring of Al, SO4, and specific conductance, as well as for any monitoring of osmotic pressure (which formerly had sometimes been reported at Outfalls 008 and 009 as required). There is nothing in the record to suggest that such requirements were removed by PADEP from monitoring for ongoing outfalls at the Bailey Mine. To the contrary, similar quarterly requirements were imposed at the four new Bailey Mine outfalls approved in December 2008 and July 2009.

The permittee reports its results of analyses for settleable solids in ml/l until April 2008. Thereafter settleable solids data for all outfalls allegedly are reported as mg/l, not the units specified by PADEP. What was actually measured cannot be determined from

the DMRs, but would require review of the laboratory reports and the standard methods claimed to have been employed.

Conversely, the permittee claims to report TSS (total suspended solids) results for Outfall 020 incorrectly in ml/l from September 2007 through March 2008. If those data actually are ml/l, they cannot readily be compared with numerical permit limitations expressed in mg/l. It is unknown whether the DMRs correctly transcribe any original laboratory data for Bailey Mine outfalls or what laboratory may have produced the data. The PADEP-BWQM recommended analyzing both suspended solids and settleable solids at several Bailey Mine outfalls.

Gaps and errors in the monitoring data mean that the Bailey Mine discharges of pollution exceeding NPDES permit limitations discussed below are a minimum record for exceedances during the period of interest.

There are two letter reports by the permittee addressing discharges that are acknowledged as exceeding limits for one pollutant (Mn) at one outfall during the period under review. These reports were found in the PADEP correspondence files for Bailey Mine, not with the DMR files. Discussion of each exceedance of numerical limits is mandated by the NPDES permit, but only those two DMR exceedances were discussed by this permittee. Exceedances that actually appear in the numerical self-monitoring data are summarized in Appendix Table 6.

SUBSTANTIVE DATA ON WATER POLLUTION

According to data in the permittee's self-monitoring DMRs, two Bailey Mine outfalls experienced discharges in excess of their Part A numerical limitations during the period of interest: 001 and 002 (Appendix Table 6). At Outfall 001 average and maximum limits on Mn (total manganese) were exceeded in December 2007 and January 2008. Permittee-measured concentrations of Mn were as much as twice as great as the permit allowed in discharge from Outfall 001 (Sediment Pond #10). Acidity exceeded alkalinity (both measured as mg/l CaCO3) at Outfall 001 when sampled by the PADEP mine inspector on 15 November 2008 (Appendix Table 8).

At Outfall 002, average and maximum Mn and average Fe (total iron) concentrations were recorded in the DMRs during six months in 2008-2009. Eleven Mn measurements exceeded permit limits, and the highest exceedance was nearly six times (587% of) the allowable monthly average. Fe was recorded 19% higher than allowed from this outfall on one occasion. The permittee had acknowledged monthly average Mn exceedance at Bailey Mine Outfall 002 in March 2007 (prior to the period under review), from causes unknown. Individual sampling from inlets to the #2 pond were proposed to be taken in an effort to identify the source of the Mn, but no results of such sampling were encountered in the files. Fe was recorded in the PADEP sample from Outfall 021 at 14.30 mg/l on 15 November 2007, 204% of the instantaneous maximum allowed by the NPDES permit (Appendix Table 8).

At least eight Bailey Mine outfalls experienced reportable concentrations of sulfate during the period of interest according to the permittee's DMRs. At least 10 records of sulfates in excess of 1000 mg/l were entered into the DMRs, with the highest value of 2116 mg/l recorded at Outfall 002 in January 2008 (Appendix Table 6). Six outfalls showed reportable sulfate concentrations every time this parameter was measured by the permittee; two more outfalls showed reportable sulfate levels in 86% of their measurements. In PADEP's occasional sampling, nine outfalls showed reportable sulfate in 100% of their samples, with the highest value (1672.5 mg/l) recorded at Outfall 002 on 25 February 2008, consistent with the permittee's DMRs.

One exceedance of total suspended solids had been self-reported prior to the period of DMR review at Bailey Mine Outfall 020 in November 2005.[3] The maximum monthly TSS was measured as 76.0 mg/l, in excess of the Part A limit of 60 mg/l. No cause had been determined by the permittee for this exceedance.

REQUIRED REPORTING BY PERMITTEE

Exceedances of permit limitations at the Bailey Mine were acknowledged by the permittee at only one of the Bailey outfalls during the period of record. At Outfall 002, total manganese limitations, both average monthly and monthly maximum, were acknowledged by letter as having been exceeded during December 2008 and January 2009. The cause of the non-compliance was stated to be not determined. The permittee claimed to have taken unspecified "*measures to lower the manganese content with positive results*." The values of the exceedances stated in the 16 February explanatory letter (1.72 mg/l avg., 3.62 mg/l max.) differed from values (1.73 and 3.67) provided in the January 2009 DMR for Outfall 002, which reports three samples collected during that month. Other exceedances of limits for Mn and for other parameters during the period of interest were not acknowledged by the permittee (Appendix Table 6).

A letter dated 11 March 2009 informs PADEP of one other self-reported incident of non-compliance at Bailey Mine. It states that the monthly average for total manganese was 1.29 mg/l, and thus outside the authorized limit of 1.1 mg/l, at Outfall "301" [031?]. The permittee stated that its November 2008 sampling around the "new refuse disposal area" showed elevated Mn associated with underdrains. The permittee stated that runoff control facilities were being cleaned, flocculant was being dispensed into the settling pond, and other solutions were being evaluated. No DMRs or permit information for Outfall "301" or 031 have been made available for this review.

According to permittee-reported numerical data in the Bailey Mine DMRs, two outfalls experienced discharges that exceeded Part A numerical limits during the period of interest: 001 and 002 (Appendix Table 6). Outfall 001 discharge exceeded limits twice---during 12/07 and 01/08. Outfall 002 discharge exceeded limits seven times---in 01/08, 02/08, 03/08, 06/08, 07/08, 12/08, and 01/09. Except for Outfall 002 in

[3] The 7 December 2005 letter was included in the Bailey Mine general correspondence, not the DMR files.

December 2008 and January 2009, these exceedances were not acknowledged to PADEP, nor was there any mention of steps taken to correct them.

Were the missing and incomplete data available, there might have been additional exceedances of NPDES permit limitations during the period of interest. PADEP's occasional grab sampling at some Bailey Mine outfalls identified Part A exceedances at Outfalls 001 and 021, as noted above.

The exceedance of Part B general limitations on pollutants at Bailey Mine outfalls also is supposed to trigger notification of PADEP. No mention by the permittee of the high (>100 mg/l) concentrations of sulfate routinely identified during the period at eight outfalls (001, 002, 003, 005, 007, 017, 021, and 022) appears in the PADEP files. (Similar routinely high concentrations of SO4 were encountered during PADEP's occasional sampling of various Bailey outfalls, as noted above.)

None of the permittee's DMRs ever addresses the presence or absence of "floating solids or visible foam in other than trace amounts" when reporting on site conditions. This limitation was applied by the NPDES permit to each outfall but not mentioned by PADEP in the blank DMRs.

"Required" data from quarterly monitoring at twelve outfalls where discharges were analyzed for other parameters are missing, with no explanation offered for the omissions. Seventeen measurements that could have been provided from flowing outfalls are missing for each of the three quarterly parameters (Al, SO4, and specific conductance).

As noted above, no explanation appears in the PADEP files for the discontinuance, as of July 2009, of reporting for all parameters that were supposed to be monitored quarterly at all Bailey Mine outfalls. Presumably, no quarterly-monitored parameters or osmotic pressure will be measured henceforth at Bailey outfalls, and the permittee intends to remain out of compliance with permit Part A monitoring requirements.

Partial or bogus monitoring data were reported on many of the DMRs that address every sampled Bailey Mine outfall. On 311 DMRs the count of alkalinity < acidity is reported as zero, but each of these same DMRs indicates that no sampling was made for this (or any other) parameter. These boxes should have been left blank, because there is no basis whatsoever for the alleged values. Apparently many of the permittee's DMRs have pre-printed entries of alkalinity < acidity counts equal to zero, because that value is reported whether or not there was any flow to be sampled at the outfall for a given month.

Conversely, no data are reported for alkalinity < acidity on 44 DMRs where other parameters were measured and reported, with no explanation of the omission.

The permittee's new DMR format adopted in August 2009 purports to report alkalinity < acidity in mg/l units (as CaCO3). Such units routinely are employed to calculate both

alkalinity and acidity in mg/l calcium carbonate equivalent, but they bear no relation to the counts of alkalinity < acidity that are to be reported in the DMRs for this NPDES permit according to Part A. Permittee staff apparently have confused DMR data requirements with those of HMRs (hydrologic monitoring reports), in which PADEP seeks reporting of actual alkalinity and acidity concentration measurements on a quarterly schedule. Neither the permittee nor PADEP appears to have noticed the discrepancy. Such technical blunders typically continue for months and never are pointed out to the permittee by PADEP.

The Daily Maximum limit for settleable solids for Bailey Mine outfalls sampled monthly is 0.5 ml/l. Every reported value of settleable solids on these DMRs is 0.5 or 0.50 ml/l, or 0.5 mg/l, never less and never more. The same coincidence is observed in Consol's contemporaneous Enlow Fork mine discharge data. Perhaps this result was pre-printed on the DMRs, rather than determined by laboratory analysis during the period of review.

No supplemental laboratory accreditation forms were included with the Bailey Mine DMRs or correspondence in PADEP files, so it is not possible to determine who performed analyses, what methods were used by the permittee and/or its contractor(s), or whether the lab was qualified to perform the analyses (other than for sewage outfalls).

PADEP ENFORCEMENT

It is not clear what monitoring data PADEP expects to receive from this permittee, inasmuch as the monitoring requirements of Part A of the Bailey Mine NPDES permit conflict with the PADEP sample blank DMR for several mine outfalls, and sampling frequencies are not specified for all mine effluent parameters. It is not clear whether any discharge limitations or monitoring requirements *not* listed in Part A pages for each outfall (unless included in the standard Part B general directives that also apply to every outfall) are enforceable.

The variety of incomplete sampling frequencies, parameters, and effluent limitations summarized in Appendix Table 7 evidently is difficult for this permittee (or anyone else) to comprehend, leading to frequent omissions and discrepancies in the permittee's DMR data for the Bailey Mine (Appendix Table 6).

There is no indication in PADEP California District Mining Office files that PADEP has ever logged in the Bailey Mine DMRs, noted the omission of entire DMRs or of required data within an individual DMR, noted exceedances of permit limitations documented by the DMRs, noted the lacking permittee discussions of exceedances recorded in the data, or directed the permittee to correct either the physical exceedances of permit limitations or ongoing errors in monitoring and reporting at odds with permit requirements. PADEP had plenty of opportunity during the years of monitoring under review to point out the permittee's many omissions of analyses required by this NPDES permit, but apparently never did. Apparently there are no consequences either for

isolated or for multiple or for repeated releases of wastewater in exceedance of permit limits at any Bailey Mine outfall. The purpose of the monitoring is not clear.

Unlike correspondence and virtually every page of permit application data, DMRs are not date-stamped when received by the California District Mining Office. Timely filing of submitted DMRs is thus not readily determined (except for the sewage DMRs which are date-stamped upon receipt; Figure 11).

It is not clear what monitoring data PADEP expects to receive from this permittee, inasmuch as the monitoring requirements of Part A of the NPDES permit conflict with the PADEP sample blank DMR for several mine outfalls, and sampling frequencies are not specified for all mine effluent parameters.

Bailey Mine DMRs prior to September 2007 should be reviewed. There is no perceptible trend toward data of higher credibility as time passes and Bailey Mine staff members change within the period under review.

A PADEP mine inspector typically visits the Bailey Mine once per month and may examine several outfalls. Occasionally mining effluent outfall grab samples are collected and sent to Harrisburg for analysis in the PADEP laboratory. Exceedances of permit limitations in samples collected by PADEP may or may not be noted in the files, but in any case the documented discharges of pollutants are never followed up by PADEP.

According to the paperwork regarding Bailey Mine NPDES permit reissuance in 2009, the Main Portal sewage treatment plant and its Outfall 004 were most recently inspected by PADEP in 1999. Apparently the Crabapple Portal sewage treatment is inspected more frequently, but no inspection reports were made available for review. No exceedance of permit limits at the time of PADEP inspections was mentioned for Crabapple Portal; whether PADEP grab samples were collected at Crabapple Portal and analyzed in Harrisburg is unclear.

Photo credit: Mark Schmerling

VI-III ENLOW FORK MINE DMRs

Monthly discharge monitoring reports (DMRs) made available by PADEP for the Enlow Fork mine were reviewed for the period January 2008 through January 2010. These DMRs follow the same format as those discussed previously for the Bailey Mine (non-sewage) outfalls; both Bailey Mine and Enlow Fork Mine are operated by Consol. Outfall characteristics, exceedances of permit limits, permit limitations, and results of PADEP occasional grab sampling are summarized in Appendix Tables 10, 11, 12, and 13.

Highlights of the review of these DMRs are provided briefly here. Most of the kinds of observations made regarding DMRs from Bailey Mine also apply to DMRs from Enlow Fork Mine. Both Enlow Fork Mine and Bailey Mine are operated by Consol.

Unlike all of the other blank DMRs for Emerald and Bailey Mines, the single blank DMR provided for an Enlow Fork Mine outfall (025) did contain sample type and frequency directives consistent with Part A of the NPDES permit. Instant maximum limits from Part A are omitted from the blank DMR by PADEP, however, so the numerical values to be used to determine exceedances are not clear. As is the case for the other mines, there are significant differences between the numerical limits recommended by the PADEP-BWQM and those presented in Part A of the NPDES permits for outfalls when Water Quality Pollution Reports are provided (Appendix Table 14).

The twelve completed DMRs provided for Enlow Fork Outfall 025 showed this outfall as always dry during 2009. For Outfall 025 the permit requires weekly flow measurement, but its completed DMRs vacillate between “measured” and “estimated” flow (always reporting zero). Maximum and average values are solicited from weekly monitoring of six parameters (together with minimum pH), based on once per week monitoring. Maximum and average values also are solicited from once per quarter grab samples for two parameters. How averages are to be extracted from once per week or once per quarter grab samples is not clear. All of the Outfall 025 DMRs are preprinted to show alkalinity<acidity values as zero, although no samples were analyzed.

Enlow Fork Mine reported by letter dated 21 October 2009 that its discharge (45 mg/l) exceeded Part A permit limits (35 mg/l) for monthly average **total suspended solids** at Outfall 012 in August 2009. The exceedance was attributed to unknown causes.

The permittee also reported by letter dated 8 April 2009 an exceedance (3.08 mg/l) of Part A permit limits (2.5 mg/l) for **aluminum** at Outfall 014 in March 2009. The “exceedance” was attributed to unknown causes. This may not have been an exceedance, depending on whether average and maximum measurements are to be equated.

On completed Enlow Fork Mine DMRs the permittee consistently misreports the frequency of permit-required monitoring for **aluminum** at Outfall 017 as quarterly, but usually samples **Al** at 017 monthly, as directed by Part A of the Enlow Fork NPDES permit for this outfall.

It is noteworthy that for Enlow Fork Mine, as for Bailey Mine, all DMRs with data for **settleable solids** report precisely the amount set as the Part A permit limitation (0.5 ml/l), never more, never less, during the entire period under review. One "exceedance" of this parameter (0.9 mg/l [*sic*]) at Outfall 009 during May 2007 was attributed to unknown causes and reported in a letter dated 17 July 2007. Any Enlow Fork Mine DMR for this date was outside the period of files scanned and thus was not examined. This parameter should have been reported in ml/l according to the NPDES Permit Part A.

Nine Enlow Fork Mine outfalls were reported as "dry" at time of sampling in <u>all</u> months for which PADEP provided completed DMRs during the review period: 003, 004, 005, 006, 007, 009, 011, 015, and 025. Outfalls 005, 007, 009, 011, 015, and 025 also were dry every time they were inspected by PADEP during the period, but Outfall 006 was flowing on the one occasion (16 April 2008) when it was inspected by PADEP.

No laboratory accreditation or methods used are included with the Enlow Fork Mine or Bailey Mine DMRs for non-sewage mine outfalls.

VI-IV CRAFTS CREEK DEWATERING

During November 2008, at least 1,400 feet of a perennial section of Crafts Creek unexpectedly went dry as the result of being undermined by a section of Consol's Enlow Fork longwall mine. This loss of water above the E18 longwall panel also caused a fish kill of about 200 fish. One year later, undermining of the E20 panel caused water loss in an additional 360-foot section of Crafts Creek, which was found by PADEP in January 2010 to have expanded to two sections totaling 806 feet and included a fish kill of 150 fish. No losses of water had been predicted in the permit application, yet over a 14-month period, Crafts Creek and three of its unnamed tributaries were impacted. The monitoring data which PADEP required the applicant to collect and analyze before, during, and after mining was inadequate to predict, or even to document, the loss of water that actually occurred in Crafts Creek. There is no indication that the premining bioassessment data collected for Crafts Creek was used as a basis for restoration activities. Furthermore, there is no indication that any postmining bioassessment survey of Crafts Creek ever has been done by Consol or required by PADEP.

MINE PERMIT APPLICATION

The application for a 9,688-acre expansion of longwall mining associated with the Enlow Fork Mine was received by PADEP on 1 July 2005. It was acknowledged by PADEP as complete for review on 1 May 2006, and was approved as Revision # 70 on 18 January 2008. In light of the incident of flow loss now known to have taken place less than a year after approval was issued, it is of interest to review the historical assumptions and predictions. The following sections provide excerpts from the permit application relevant to the applicant's predictions of hydrological changes and proposed monitoring. Also provided are excerpts from PADEP's review of the application.

Module 8 (July 2005)

Section 8.1 (Hydrologic Description) discussed the general hydrology of the proposed expansion area, and how the groundwater and surface water systems interact. It noted that Crafts Creek was a "gaining" stream throughout the mine expansion area (*i.e.*, groundwater was contributing to baseflow), based on the results of long-term monitoring of nested piezometers and surface waters.

In its original submission in July 2005, in response to Section 8.1.d. ("The impact of past mining activities on the quality and quantity of local water resources"), Consol stated:

> No impacts on the quality and quantity of local resources have been noted as a result of past mining activities.

That response presumably was limited to Enlow Fork mine or perhaps to all of Consol's mines, and it may or may not be accurate. In a slightly larger context,

however, notable examples of flow loss had been well documented in southwestern Pennsylvania, including at Emerald Mine (Laurel Run, 1999-2007) and at High Quality Mine (Maple Creek, 2004-2005). Nevertheless, it is noteworthy that, even after decades of longwall mining and several cases of litigation, Consol claimed it had encountered no impacts on the quality or quantity of local water resources from mining activities. As is typical, PADEP did not challenge this assertion.

In Section 8.5 ("Prediction of Hydrologic Consequences"), Consol noted that:

> Underground mining activities at CPCC shall be planned and conducted in a manner which maintains the value and reasonably foreseeable uses of perennial and intermittent streams, such as aquatic life, water supply and recreation as they existed prior to mining. No permanent adverse effects are anticipated for the streams associated with this application due to the favorable conditions (discussed below) beneath the streams.

It then provided the qualified statement that

> In the unlikely event that the uses of streams are adversely affected by the underground mining operations of CPCC and a natural recovery of the condition does not occur, CPCC will cause restoration measures to be taken, to the extent that is economically and technologically feasible, to correct the adverse condition to maintain the value and reasonably foreseeable use which it was capable of supporting before subsidence to the extent required by applicable laws and regulations.

The existing uses of these streams were not adequately identified. The bioassessment data compiled for these streams in accordance with TGD 563-2000-655 suggest that some of them may have been attaining uses higher than their designated uses (see Section V-IV above). Because the premining data were largely ignored, however, these streams were undermined before they could be afforded their legally-required level of protection. The data may yet prove useful, however, in ascertaining the success or failure of stream restoration efforts.

The applicant's discussion in Section 8.5 went on to mention five hydrogeologic variables (overburden thickness, geology, drainage area, stream gradient, and earth fractures) which Consol "considered important to predicting potential impacts to stream flow". Each stream proposed to be undermined at Enlow Fork Mine (including Crafts Creek) then was discussed separately.

In every case, reasons were given why flow loss was not expected to be a problem. For example, in discussing Buffalo Creek, it was noted that sandstone outcrops were present in the streambed (identified by Consol's consultant CEC as a "contributing factor" associated with streamflow loss), but the existence of sandstone was said to be cancelled out by a relatively thick overburden (with thinner overburden identified by CEC as "an important factor" for water loss) and a "large" watershed drainage area.

In Section 8.5 (Prediction of Hydrologic Consequences), Consol optimistically predicted no flow losses:

> Within the permit expansion area, sections of Buffalo Creek, Tenmile Creek, Sawhill Run and Crafts Creek are generally similar to sections of Templeton Fork and Rocky Run that have already been undermined without a loss of flow due to longwall mining. These streams have similar valley width, geology and large drainage areas with several subwatersheds.

Overlooked in this response is the fact that most of the streams in the existing Enlow Fork Mine (including Templeton Fork and Rocky Run) had been undermined in a general direction proceeding upstream from near their mouths toward their headwaters. Undermining in the Enlow Fork expansion area, by contrast, was to begin in the headwaters of Crafts Creek and proceed downstream. Buffalo Creek and Sawhill Run (both "special protection" waters) will be similarly undermined beginning in their headwater areas (Figure 12).

The applicant proposed to monitor hydrology quarterly until the longwall face was within 1,000 feet of the monitoring point, then increase that to twice weekly until the face was more than 1,000 feet from the monitoring point. This increase, which is less than recommended by the TGD, was not required by permit condition. There is no evidence in PADEP files that it was ever done.

In Section 8.6 (Hydrologic Monitoring Plan), Consol proposed to monitor stream flows and water quality at twelve surface water sites (only 11 were actually established) within the 9,688-acre expansion area to ascertain whether the longwall mining has an impact on the flow characteristics. Consol proposed to monitor on a quarterly basis from the time the permit was issued until longwall mining was 1,000 feet from a monitoring point, at which time the monitoring frequency would be increased to twice a week until the longwall face was 1,000 feet beyond the monitoring point. This is less frequently than recommended in TGD 563-2000-655, which seeks "weekly measurements commencing six months prior to undermining the area of concern" and "daily measurements commencing two weeks prior to undermining the area of concern and continuing ... until the longwall face has progressed a distance equal to the cover thickness beyond the area of concern." Two of the eleven stream monitoring stations were on Crafts Creek. Until March 2007, Consol's quarterly HMR monitoring consisted only of flow measurements; thereafter, eleven other parameters were reported in addition to flow. More than a dozen piezometers, many in groups of two or three, also were established to measure groundwater flow and the relationships with surface water conditions.

The objectives of this Enlow Fork mine expansion Monitoring Plan were described by Consol as follows:

> This monitoring program will allow for a specific assessment of pre-mining conditions that provides for the determination if the potential for an adverse impact

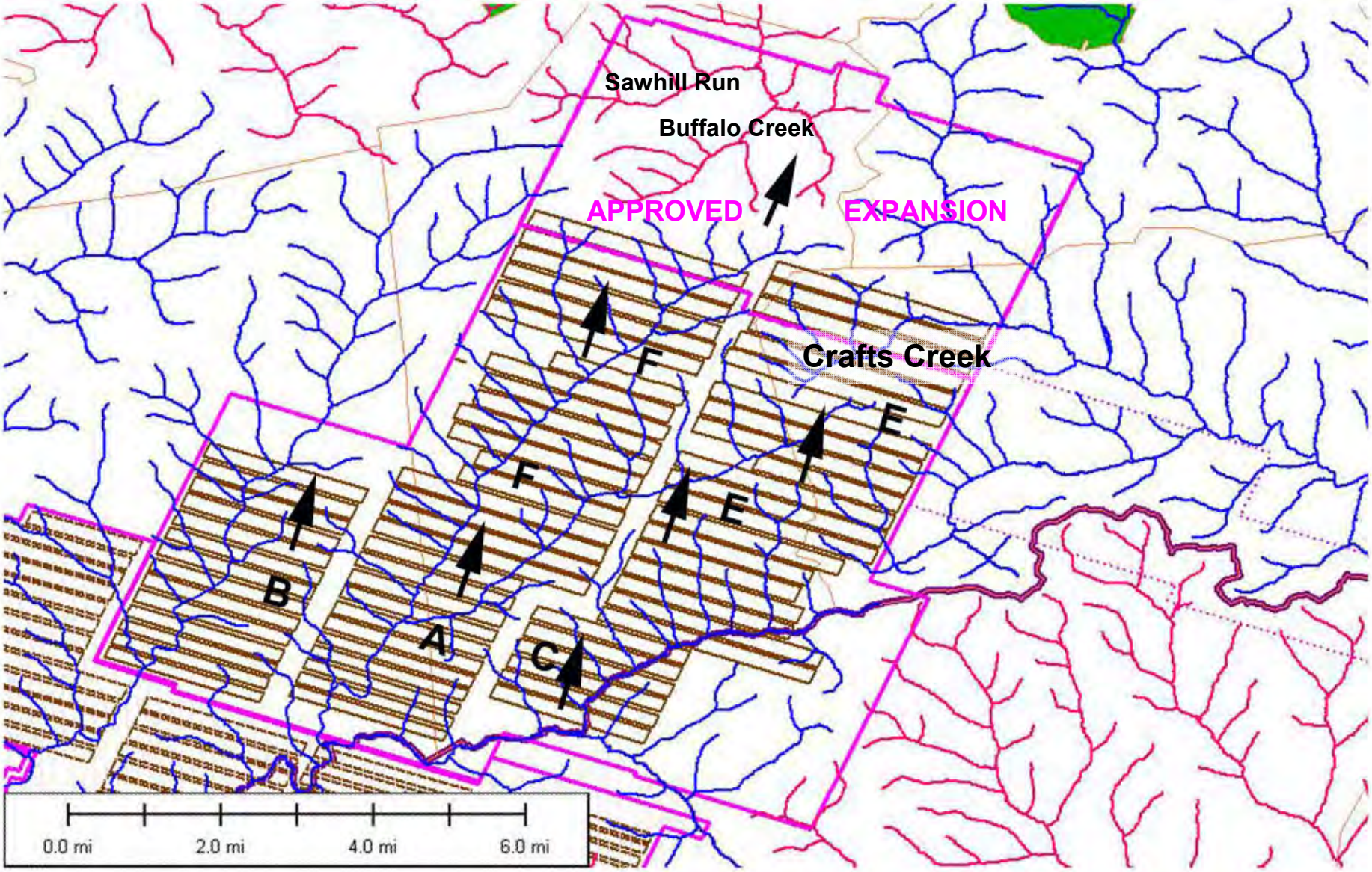


FIGURE 12. Enlow Fork Mine (purple outline) showing longwall panels already mined (A through F) outlined in brown. Direction of mining (arrows) has been to the northeast, beginning near Enlow Fork mainstem and proceeding up its tributary watersheds. Undermining in the Crafts Creek watershed began in its headwaters. Crafts Creek and three of its tributaries suffered water loss at least 3 times between November 2008 and January 2010. The headwater watersheds of Buffalo Creek and Sawhill Run, both designated HQ, will be undermined in the next few panels.

> exists and/or the nature of such an impact. The monitoring program will also allow for an accelerated detection of a stream impact and the opportunity to implement mitigation measures, if necessary. Such rapid mitigation response to a flow loss will prevent an adverse long-term impact to the stream and serve to protect the value and reasonably foreseeable use of the stream.

Specifically with respect to Crafts Creek, Consol proposed:

> Surface water points SW35 and SW36 are on upstream and downstream sections of Crafts Creek. There are also two sites with piezometers located in this stream valley (45-1-11 PZ-JS and PZ-JD and 45-2-8.06 PZ-KS, PZ-KI and PZ-KD) that will monitor the relationship between ground and surface water.

According to the data provided by PADEP, sampling frequency was not increased as Crafts Creek was undermined. In fact, none of the monitoring points within the 9,688-acre expansion area was ever monitored more frequently than quarterly, according to the filed HMRs. There is no indication in the PADEP HMR files that PADEP staff ever review HMR information or have any idea of how often the HMRs are supposed to be filed or actually are filed. No discussion of relationships between mining and groundwater levels, between mining and surface water flows, or between groundwater levels and surface water flows was ever included along with the quarterly monitoring HMRs provided to PADEP. Quarterly monitoring at best provides minimal insight into the conditions of local streams. The quarterly monitoring of Crafts Creek provided no indication that a flow loss was about to occur, and it did not even document the fact that the flow loss (which also resulted in a fish kill and an enforcement action by PADEP) actually occurred.

Module 15

Consol reported the results of premining wetland and stream investigations conducted during 2004 within the 9,688-acre expansion area in the Biological Monitoring Report (CEC 2005) it submitted with its 2005 application. To its credit, PADEP determined that the background data compiled for these streams were inadequate, and refused to accept Consol's 2004 monitoring and assessment data because they did not incorporate the new TGD 563-2000-655 requirements. PADEP asserted that the old data collection procedures were not consistent with the new procedures outlined in the TGD, and thus would not allow PADEP to make a proper evaluation. [Presumably, Consol and other mine companies had been using the old data/procedures for many years for each of its mines, if they had done anything at all, and such work had previously been acceptable to PADEP. Inasmuch as nothing had changed in the laws or the regulations, this new PADEP position would seem to suggest that all stream data collected by longwall mine applicants and submitted to PADEP prior to the new TGD in Oct 2005 also had been inadequate, but that PADEP either didn't notice or didn't care and issued permits anyway.]

On behalf of Consol, CEC then performed considerable additional background monitoring on the streams and their habitat within the permit expansion area, including

physical, chemical, and biological monitoring. Much of this information was provided to PADEP in late 2007, just prior to permit approval, with supplements provided through 2009.

During 2007 Consol submitted a Biological Monitoring Report which described the results of data collected and analyzed at 60 monitoring stations throughout the watersheds of the proposed expansion area, including 7 stations along Crafts Creek and its tributaries. Overall, the biological metrics assembled for Crafts Creek and its several tributaries suggest that the benthic macroinvertebrate community prior to mining was quite diverse, and that sections had very high numbers of benthic organisms known to be intolerant of polluted waters.

During 2007, Consol also prepared a separate Module 15 for each stream to be undermined in its proposed 9,688-acre expansion of the Enlow Fork Mine. Section 15.1 for Crafts Creek identified stream segments where *potential pooling* was anticipated. The narrative stated that "CPCC [Consol] has developed a model to determine the potential effect of longwall mining on streams within the permit boundary." Those "potential effects", however, were limited to stream pooling. No stream flow losses were predicted. No model was used to determine any potential effects on *wetlands,* and no adverse impacts were identified. Section 15.2 provided information relating to eight sections of streams where potential stream restoration was expected to be necessary to alleviate predicted pooling. This work would consist primarily of regrading the in-stream dams formed above the gates when the longwall panels subsided. No potential *wetland* impacts were identified, or restoration proposed, anywhere within the proposed 9,688-acre expansion area.

The applicant predicted no stream diminution anywhere within the 9,688-acre Enlow Fork Mine expansion. PADEP told the public that no long-term impacts from dewatering were expected. Yet 3 incidents of flow loss over a 14-month period affected more than 2,200 feet of Crafts Creek and three of its unnamed tributaries.

There was no identification in Module 15 of any areas of *potential flow loss* within this Enlow Fork Mine expansion. At an informal public meeting held on 18 July 2006 to discuss the proposed 9,688-acre expansion, local residents asked about possible stream dewatering and were told by PADEP that "no long term impacts from dewatering are expected" due to the amount of overburden and based on past experience. Overburden thickness in the expansion area reportedly ranged from 420 to 1,000 feet; beneath streams, it ranged from 420 to 780 feet. It was explained that, if any stream dewatering happens, the identified stream mitigation methods would be used to reduce pooling.

CHIA

A CHIA (Cumulative Hydrologic Impact Assessment) was prepared for this Enlow Fork expansion by PADEP using the CHIA form dated February 2003. The CHIA noted that

there are two “Special Protection” waters in the permit area: Buffalo Creek and Sawhill Run (both HQ-WWF), and that no new discharges were proposed to those streams. The CHIA noted that there are approximately 750 to 800 wells and developed springs in the CIA (Cumulative Impact Area). This is a significant, if not very exact, number.

The section of the CHIA entitled Underground Mining Effects on Groundwater does not address groundwater in general, but instead directs PADEP to “Describe generally the areas or circumstances where water supply springs and wells are likely to be” affected by the proposed activities. However, “water supply springs and wells” are not the same as “groundwater”; they are just one small subset of the larger groundwater system. In reply to this question for the Consol application, PADEP simply stated that “Wells and springs located over or adjacent to longwall panels may be impacted quantitatively” with no further explanation. [This unspecified quantitative effect presumably would apply to wetlands and streams as well, indeed to the entire hydrologic system, but that is not mentioned here or in the section on “Surface Waters”.]

The Consol-proposed “solutions” acknowledged by PADEP included “drilling existing wells deeper, drilling new water wells or hooking up users to public water” --- all measures directed at restoring the water supply to affected surface landowners. PADEP failed to note that none of those proposed solutions would resolve the larger problem (impacts to groundwater as a natural resource or impacts to the natural hydrologic system), but would only address specific *symptoms* of the problem (individual homeowners’ loss of water), and even then, the accepted “solution” might not prove satisfactory for an individual landowner.

Fixing only some of the damages that result from longwall mining is like leaving out some of the pieces from a jigsaw puzzle.

The section of the CHIA entitled Underground Mining Effects on Surface Waters asks PADEP to “Identify all perennial and intermittent streams that will have mining within their "zones of potential influence" and describe the conditions or measures that will serve to prevent their diminution”. The PADEP response was that flow loss is *“NA* [not applicable] *based on amount of cover present beneath all streams*”; only pooling was expected to occur. That is, no flow losses were anticipated.

Clearly, this PADEP expectation was NOT borne out in reality, because 1,400 feet of Crafts Creek went dry. This same section of the CHIA asks PADEP to “Identify all

wetlands that will be subsided and describe the conditions or measures that will serve to protect them from diminution." The PADEP response was: "The same measures used to protect streams will be employed to protect wetlands". In light of what happened to Crafts Creek, this response offers little assurance. Presumably, this response means that only those wetlands affected by stream pooling would be considered for restoration in some manner, and that no loss of water from wetlands was expected anywhere in the Enlow Fork Mine expansion area.

The entire section of the CHIA form entitled Material Damage to the Hydrologic Balance reads as follows:

> Discuss the potential for mining-related damage to the hydrologic balance during and after mining. The focus should be on material damage outside the permit area with emphasis on resources of concern to assess whether there is a likelihood of material damage to those resources. Examples of material damage to the hydrologic balance include but are not limited to:
>
> - Permanent destruction of a significant regional aquifer. [not defined]
> - Dewatering of multiple domestic well supplies with no replacement available.
> - Dewatering of stream segment and/or wetlands that results in impacts to existing uses.
> - Adverse water quantity or quality impacts to a public water supply aquifer.
> - Development of postmining pollutional discharges through shallow overburden and/or outcrop barriers
>
> For instances where adverse impacts are expected to fall below the threshold of off-permit material damage, describe the expected adverse impacts and any measures proposed to mitigate the impacts.

In response to all of this, PADEP merely says: "Refer to Module 8 and 15" of the Consol Enlow Fork expansion application. But those modules only discuss specific aspects of hydrology, such as streams where pooling is anticipated, and not the entire hydrologic balance of 9,688 acres of land.

The section of the CHIA form entitled Restoration of the Hydrologic Balance directs PADEP to

> Indicate which of the following design elements will be used to promote the recovery of groundwater levels and prevent the emergence of pollutional discharges following mine closure.

Several boxes are checked. Then it asks:

> Describe what information is available to support the effectiveness of measures checked above.

No descriptions are provided.

The last section of the CHIA directs PADEP to:

> Attach, as an addendum to this form, a discussion regarding the potential for adverse hydrologic impacts associated with each permit action. Include other information as deemed necessary to support each hydrologic impact assessment.

No such information is attached or discussed.

In summary, this CHIA is deficient in many ways: it provides little information, it makes broad generalizations and provides few specifics, and it neglects to address many of the important questions raised. As a basis for decisionmaking, or as documentation of a careful and thorough review, it fails miserably.

PADEP CHAPTER 105 ENVIRONMENTAL REVIEW AND RECORD OF DECISION

PADEP's Chapter 105 Environmental Review was not completed/signed until 12 February 2008, almost a full month after the Enlow Fork Mine expansion permit had been issued (on 18 January 2008).

Primary anticipated stream impacts are listed in the Environmental Review by stream and panel numbers. Impacts to *"Crafts Creek and its tributaries (panels E27-E24)* [and other streams] *include deformation (fracturing and heaving) and stream pooling in relation to the gate areas."* No mention is made of Crafts Creek panel E-18, where flow loss would eventually be experienced. No mention is made of any anticipated flow loss impacts to Crafts Creek or to any other stream within the 9,688-acre expansion area.

The Environmental Review notes that this is a non-water dependent project, and includes work in a "high quality" watershed. It also notes that two of the streams are designated as HQ (Buffalo Creek and Sawhill Run), but it does not say whether the existing (attained) uses of these or any other streams were analyzed to determine whether they may be better than their Chapter 93-designated/listed use. (It also incorrectly identifies these HQ streams as being tributaries to the Monongahela River, when in fact they are not; Buffalo Creek is a direct tributary to the Ohio River.)

In the Record of Decision (ROD), Section C.1. (which applies generally to "Exceptional Value wetlands"), each question is answered "*N/A --- No Exceptional Value wetlands were identified on site.*" However, in subsection "b", when asked "Has applicant demonstrated that requirements of Section 105.18a(b)(2)-(7) are met?", neither "yes" nor "no" is checked off. Section 105.18a(b)(2)-(7), of course, specifically refers to "Other wetlands" and not to Exceptional Value wetlands.

In the ROD, Section C.2. (which also applies generally to "Other wetlands"), every question is answered "N/A --- No wetlands identified in the area of potential mitigation." This implies that wetlands of concern are only those where stream restoration

activities were proposed, not everywhere throughout the 9,688-acre permit area. Thus, the ROD seems to completely ignore requirements of §105.18a(b).

In the ROD, Section C.2.e. (for wetlands) and Section C.3.d. (for watercourses), alternatives are supposed to be listed, along with a rationale justifying that the selected project is the least damaging alternative. No specific alternatives or rationales are provided, just an unsupported, sweeping PADEP conclusion that "*alternative locations, routings, or designs are not practicable*."

In the ROD, Section C.2.f. asks whether the project will violate a State water quality standard. Answer: *"Impacts are expected to be minimal and temporary. Water quality standards should not be violated. Existing uses* [it is doubtful that attained uses were identified by PADEP, despite the fact that the applicant had provided ample stream data to assist in making such a determination] *will be maintained and protected. Any impacts will be addressed through mitigation."* It is unclear how or when any actual impacts warranting mitigation might be recognized, identified, or discovered.

In the ROD, Section C.2.g. asks whether "the project will contribute to diminution of resources sufficient to interfere with their uses?" The PADEP answer is "no" for the entire 9,688-acre expansion area. In the ROD, Section C.3.b. asks whether the project will have an impact on the natural, scenic, historic, or aesthetic values of the environment. The PADEP's answer to each question is "no".

PERMIT VIOLATIONS

A violation was discovered by PADEP in Crafts Creek on 12 November 2008, for which a penalty of $7,400 was assessed. In the consent assessment, PADEP determined that (unpredicted) "*mining induced changes to the streambed*" had occurred in Crafts Creek above the E-18 panel, resulting in 1,400 feet of Crafts Creek going dry and a fish kill of about 200 fish. The loss of invertebrate organisms was not mentioned or quantified. The choice of words: **mining induced changes to the streambed** instead of "subsidence induced changes to the streambed" is significant. Mining that causes streambed changes clearly must be regulated by PADEP pursuant to Chapter 105. A second violation occurred during February 2009, when an augmentation well dug by Consol to restore flow associated with the November 2008 incident caused an unauthorized discharge of drill mud and water into Crafts Creek, with a TSS of 2,896 mg/l (the instantaneous maximum allowable is 90 mg/l). The penalty assessed to Consol for this violation was $5,442. A third violation occurred during November 2009 when flow loss in 360 feet of Crafts Creek and a fish kill of 30 fish were discovered above the E-20 panel. The penalty for this incident was $4,895. In its December 2009 followup discussion of this latest incident, Consol summarized the efforts it had made to restore flow, which it judged to have been successful, and it recommended to PADEP that "*the streamflow disruption be accepted as an isolated, catastrophic event*". Consol further recommended that no additional restoration plan or implementation schedule was necessary. One month later, during January 2010, however, PADEP discovered that flow loss above the E-20 panel was ongoing, involved two sections of Crafts Creek

totaling 806 feet, and caused a fish kill of 150 fish. A new Compliance Order and penalty assessment (of $4,565) was issued for this fourth incident.

In all, PADEP determined that Crafts Creek and three of its unnamed tributaries had been impacted by longwall mining between November 2008 and January 2010. Efforts to mitigate the damage focused on flow augmentation by groundwater obtained from several new wells drilled nearby, as well as by surface water taken from Tenmile Creek and Rocky Run. There was no evidence in the files that any postmining bioassessment was performed or required in conjunction with the stream restoration. Given the extensive premining inventory data available from Crafts Creek, it should be possible to document fully the recovery of this stream's ecosystem or its failure to recover, should PADEP seek to enforce those requirements.

MONITORING

The upstream HMR monitoring station on Crafts Creek (SW-35) has a watershed of about 1,265 acres. Streamflow (and no other parameter) was monitored quarterly at SW-35 from November 2002 through January 2007, with two additional measurements during June and September 2007 (apparently misreported as 2008). Monitoring station SW-35 (revised) replaced the original SW-35 in 2007 (it has the same latitude/longitude coordinates as SW-35), and quarterly monitoring of flow plus eleven other parameters at the revised station began in March 2007. Station SW-35 is located in the gate between panels E17 and E18. Gate area streambeds typically are not impacted directly by longwall subsidence.

Nothing in the quarterly monitoring suggests that Crafts Creek was ever dry or would experience fish kills. Whether daily hydrologic mining as advocated by TGD 563-2000-655 might have signaled dewatering, and what measures might have been adopted by the permittee if dewatering had been detected, remain unknown.

Prior to Consol's undermining, flow in Crafts Creek varied considerably, as recorded in HMRs between November 2002 and March 2007, with a high flow of 5.26 cfs reported in December 2003 and a low flow of 0.01 cfs reported in September 2005. Following relatively high flows early in 2007 (1.9 cfs in January and 3.0 cfs in March), measured streamflow dropped significantly during the remainder of the year (0.2 cfs in May and June, and 0.02 cfs in July, September, and November). During 2008, flow recovered somewhat (2.2 cfs in February and 1.7 cfs in May), but a low of 0.07 cfs was recorded on 30 October 2008. Reported flow again recovered somewhat in 2009. In February 2009, flow at SW-35 (revised) was as high as it had ever been in that month (3.2 cfs, vs. 2.66 cfs in February 2004 and only 0.91 cfs in February 2005.) It is not known whether the flows recorded during 2009 are partly or wholly the result of nearby groundwater and/or treated surface water being pumped into Crafts Creek as part of Consol's efforts to augment flow in the Creek. Nothing in the quarterly monitoring results of the HMRs suggests that the stream was ever dry or would experience fish kills. In a telephone interview, PADEP reported that flow measurements taken during

2010 indicate that natural flow now seems to have been restored in Crafts Creek (J. Koricich, California DMO, 24 March 2010).

There is no obvious pattern to the quarterly monitoring data, and the lack of reported contemporaneous climatic data makes interpretations that much more difficult. Significantly, however, the quarterly monitoring reports never once identified the total lack of flow which actually occurred in Crafts Creek. Furthermore, the quarterly monitoring prior to undermining provided no indication that flow loss was imminent.

The HMR data suggest that Consol did not follow the monitoring plan it had proposed in its permit application (to monitor twice per week while mining was underway within 1,000 feet of any monitoring location, rather than quarterly), presumably because PADEP did not require any more frequent monitoring than quarterly (despite the TGD guidance that *daily* monitoring should be conducted beginning two weeks prior to undermining any area of concern). If Consol did monitor more frequently, either it did not transmit such data to PADEP or PADEP did not provide those records for this review. Had more frequent monitoring been in place, the actual response of Crafts Creek to being undermined could have been documented, perhaps sooner than it actually was discovered, and measures might have been implemented sooner to avoid or lessen the eventual damage to the stream and its ecosystem.

IMPLICATIONS

More than 90% of the Crafts Creek watershed is within the 9,688-acre Enlow Fork Mine expansion area. Longwall panels E15-E18 are located beneath the headwaters of Crafts Creek, which flows northeastward to its confluence with Tenmile Creek about one-half mile beyond the eastern edge of the mine permit area. The Enlow Fork Mine (originally known as Bailey No. 2 Mine) began operations in the 1980s near Enlow Fork and proceeded northward, generally progressing upstream along major tributaries including Robinson Fork, Templeton Run, and Rocky Fork. The current 9,688-acre expansion, by contrast, begins in the headwaters of two major stream systems (first Crafts Creek, and soon in Buffalo Creek) and proceeds downstream.

In its 2008 application for a separate (Bailey Mine) expansion, Consol conceded:

> Percent of watershed mined is a primary factor in evaluating the potential for mining induced flow loss. The increase in the percentage of watershed mined directly increases the influence of other primary parameters and incorporates the secondary supplemental variables of mining beneath headwaters/feeder springs and cumulative impacts. The percent of watershed mined influences at least two elements of flow maintenance: contributory flow sources and surface flow dewatering. As the percent of watershed mined increases, one or both of these elements may be affected leading to an impact or increased impact. .... As more of the watershed is mined, the potential for a change in the hydrologic system is increased and the potential for a flow loss impact in a section of

> stream is increased. **Particularly is this so under conditions where the contribution from flow sources is limited, as is the case with headwater type streams that are supported by small feeder springs and surface runoff only, the potential for dewatering is significantly higher.** ... Based on observations at some undermined streams, it appears the impacts to stream flow by longwall mining are influenced by the number of times the streambed is undermined. In general, the more times the stream is undermined, the greater the potential overall cumulative impact will be to the stream.

In light of these factors known by Consol to contribute to flow loss, it is hard to understand why the dewatering of Crafts Creek was not expected by either the permit applicant or PADEP. As this expansion of the Enlow Fork Mine proceeds, it will cross into the headwaters of Buffalo Creek and Sawhill Run (both HQ-WWF), and will repeatedly undermine all of the headwater tributaries in their local watersheds. Diminution or total loss of flow in those waterways is highly likely. No revision of the predictions of hydrological consequences has yet been forthcoming as a result of the unexpected loss of flow incidents in Crafts Creek. There is no assurance that the same adverse consequences will not occur in the Special Protection ("HQ") waters of Buffalo Creek and Sawhill Run. Clearly, these two streams are not being afforded any special protection by PADEP.

In its 27 January 2010 review of the Crafts Creek incidents, Consol concluded:

> Upon review of the three streamflow disruption events within Crafts Creek, there does not appear to be a correlation between the streamflow disruption events and the pre-mining data available - streambed geology (exposed hard rock units) and/or mapped fracture traces. Of the eight streamflow loss locations evaluated, one location (Docket #096002 above the E20 panel) met the assumed conditions of streambed failure.
>
> The results of this technical review indicate that the evaluation of pre-mining data, either during the permit review or more recently, including geologic and fracture trace interpretation, would not have provided a prediction of flow loss for the three Dockets referenced above. Additionally, the incorporation of post-mining AOIs [areas of interest] (heaves, fractures) did not further support subsidence prediction, as it relates to streamflow disruption.

Presumably, the contention that these incidents could not have been predicted is supposed to exonerate Consol. Instead, it belies the assumption that the impacts of longwall mining are planned and predictable.

Dewatering severely impacted sections of Crafts Creek, and the full extent of the damage has yet to be documented. There is no assurance that the same adverse consequences will not occur in the Special Protection ("HQ") waters of Buffalo Creek and Sawhill Run as the longwall panels of the approved Enlow Fork Mine expansion are extended beneath them. Clearly, these HQ watersheds are not being afforded any special protection by PADEP.

VI-V LAUREL RUN DEWATERING

Laurel Run drains a watershed of about 5 square miles just southeast of Waynesburg and south of Morrisville in Franklin Township, central Greene County. Its designated use in Chapter 93 is Warm Water Fishery. The watershed is rural in its land uses, with farmland and forest cover occupying more than 94% of the watershed. The stream flows northward to join South Fork Tenmile Creek at Morrisville.

All but the northern, lowermost segment of Laurel Run flows within the permit area of Emerald underground coal mine. (There are multiple owners of the land surface.) For five years beginning with permit approval in 1998 through 2003, most of the Laurel Run watershed was undermined by longwall panels intended to maximize coal removal. As was typical during the 1990s, minimal information on the hydrology and biology of Laurel Run and its tributaries prior to mining had been collected as part of the Emerald Mine permit application for this area.

Prior to mining beneath Laurel Run, Emerald had mined beneath Smith Creek, a similar (but twice as large) watershed just to the west. During 1998 sections of Smith Creek experienced flow reduction following longwall extraction of coal from the underlying Pittsburgh seam, about 440 feet below the surface of the Smith Creek watershed. The permittee maintained that the observed flow loss in Smith Creek was due to drought conditions, and recorded the resumption of “normal“ flow beginning during the autumn of 1998.

The depth of cover above the Pittsburgh seam beneath Laurel Run ranged from 385 to 500 feet. The permittee did not predict any significant loss of flow in Laurel Run or tributaries when preparing its 1997 permit application. Thus Emerald’s application did not describe how the permittee would protect the hydrologic balance, how it would minimize or prevent hydrologic consequences, or how it would alter its mining operation in response to adverse impact if any should occur. Unfortunately, the permittee’s optimistic expectations were not realized, and its predictions of no adverse hydrologic consequences were not accurate.

Groundwater levels as monitored by piezometers decreased significantly before and during the initial undermining of Laurel Run by Emerald longwall Panels 2 North and 4 North (Figure 13). Between October 1999 and November 2001 the flow in most of Laurel Run (more than 9,000 feet) was severely diminished after mining in Panels 2 North, 3 North, 4 North, 5 North, and 6 North, with surface flow possible only briefly after heavy precipitation and surface runoff. In response, the permittee undertook a geophysical study and began injecting grout into the subsurface of the streambed. PADEP granted an emergency Chapter 105 approval for these remedial activities in the streambed. Yet, as additional panels were mined, Laurel Run continued to experience severely diminished flow. Numerous springs and seeps and private wells in the watershed were eliminated, including the water supply of the Kent Farm, a National Register Historic Site atop Panel 2 North. The water loss to Laurel Run was

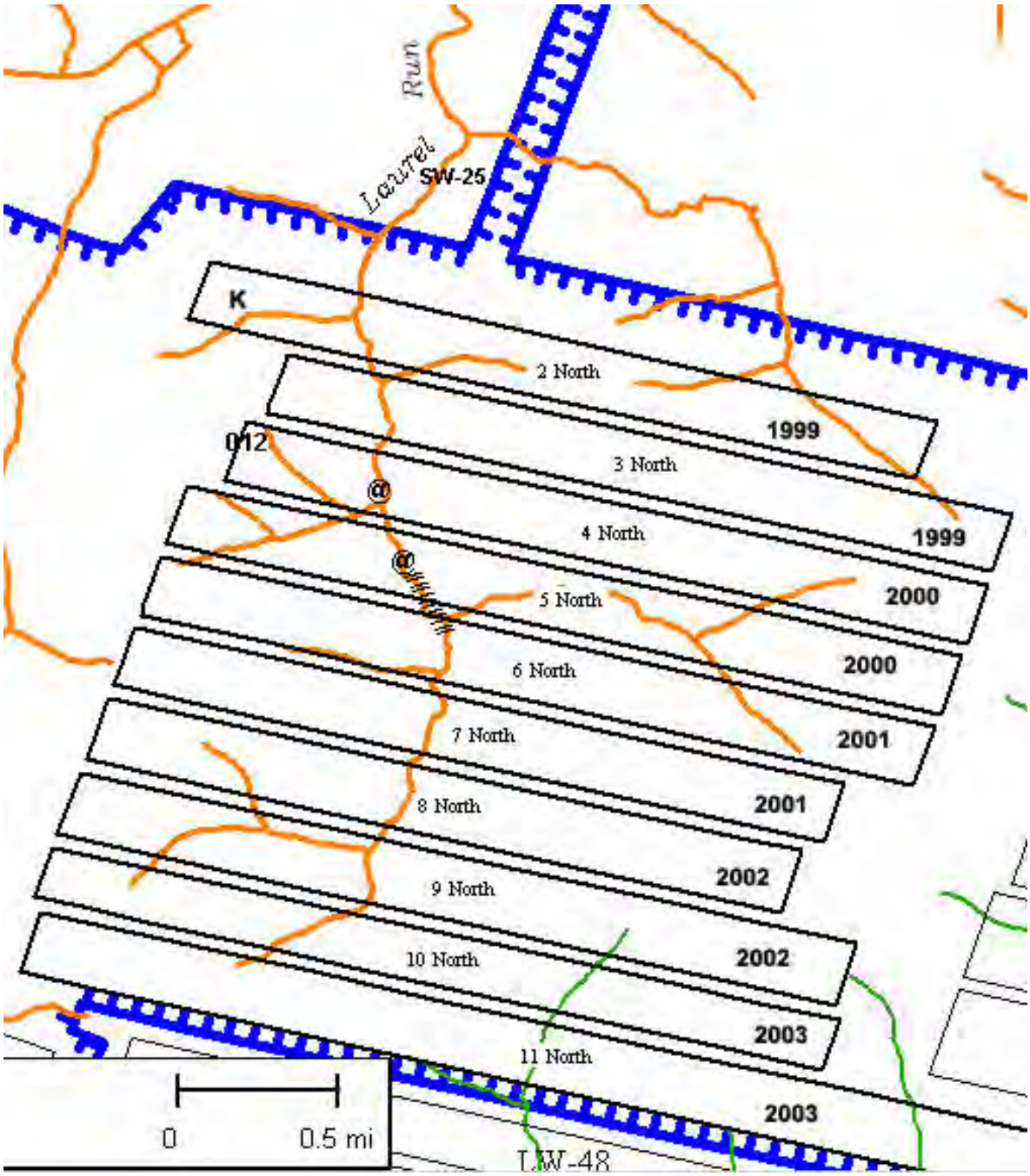


FIGURE 13. Laurel Run watershed in the Emerald Mine, Greene County, Pennsylvania. Longwall mining here proceeded from north (top) to south (bottom) of figure. Completion date for mining in each panel is indicated at right. Outfall **012** is the site of DMR monitoring, and **SW-25** is the site of HMR stream monitoring. Laurel Run is designated as a Warm Water Fishery. **K** denotes the location of the Kent House, a National Register Historic Site, where water supplies were destroyed by mining. Stripes across Laurel Run at Panels 5 North and 6 North indicate the approximate location of 2007 stream restoration. Permittee's biological sampling stations for evaluating mitigation are indicated by **@** symbols (Wallace & Pancher 2010).

deemed pollution as defined in Section 1 of the Clean Streams Law. Stream uses in Laurel Run and tributaries also were lost. In Pennsylvania this is unlawful conduct.

PADEP elected not to order the immediate cessation of mining at Emerald Mine in the interest of "miner safety and protection of mining equipment." Instead, in November 2001 the State entered into a consent order accepting a civil penalty payment of $225,000 for Emerald's stream dewatering and noncompliance with approved mining maps, along with a stream restoration performance bond of $351,900, which amount Emerald deemed sufficient for restoring Laurel Run. This agreement allowed the timely renewal of the overall Emerald Mine permit by PADEP, which approval large mines must secure every five years to remain in operation. Mining proceeded southward (upstream) into the headwaters of Laurel Run through 2003.

The Consent Order required a promise of detailed planning for stream restoration, implementation of PADEP-approved plans, and monitoring. These requirements were spelled out further in the special conditions of a Chapter 105 permit approved on 6 March 2002, which conditions were also incorporated into various later Emerald Mine permit revisions. As of 2007 the remedial measures undertaken in the watershed, according to the permittee's consultant, had not been fully effective at restoring flow and stream uses in the Laurel Run watershed (Wallace and Pancher 2010). Water loss and stream damage had persisted in Laurel Run for nine years.

During the period 2002 through 2006, PADEP approved three permit revisions for Emerald's efforts at stream restoration. Four streambed grouting attempts were initiated in Panels 4 North through 9 North. Efforts then focused for the third time on a 680-foot long section of Laurel Run at Panel 5 and a 50-foot long section of unnamed tributary at Panel 6. In mid 2007 a geomembrane liner was installed, and efforts were made to achieve a quasi-natural stream design with sorted cobble and gravel substrate and cross vane structures. During 2009 the permittee submitted information to PADEP in an effort to demonstrate that Laurel Run had recovered, with a request that its performance bond be released.

Water loss and associated stream damage had persisted in Laurel Run for nine years.

Hydrologic monitoring report (HMR) data from the Laurel Run watershed were presented during the 2007-2009 period under review. Only one quarterly surface water monitoring station was sampled. Emerald Mine HMR Monitoring Station SW-25 is situated in the lower section of Laurel Run just downstream from the mine property and less than a mile from the Run's confluence with South Fork Tenmile Creek. Laurel Run at this station was reported to be dry during August and September 1999, prior to mining. On six of the ten monitoring occasions from July 2007 through September 2009, there was insufficient water for quarterly sampling, with "dry" recorded four times, "no flow" once, and "puddles" once. On the other four occasions (March and June, 2008 and 2009) there was flow ranging from 0.0558 to 924.6200 cfs, and chemical parameters were reported and sampled. The most

recent HMR available to us for SW-25 with flow, as sampled on 17 June 2009, is shown in Figure 14.

At various times during the period under review, static water elevations in some wells and piezometers were monitored more or less at monthly intervals in the Laurel Run watershed. The numbers of wells and piezometers sampled fluctuates considerably from quarter to quarter, but no explanation is provided. The wells range in depth from 20 to 270 feet. Monitoring stations sampled change from month to month and quarter to quarter without comment. Typical HMR data available from Laurel Run wells and piezometers for late 2008 and early 2009 are shown in Figures 15 and 16, respectively.

Stream biological inventory data, of course, had not been collected prior to mining beneath Laurel Run, which was authorized prior to adoption of TGD 563-2000-655. No attempt has been made to identify any nearby unmined reference streams with which to compare the success of efforts to restore biota in Laurel Run. Instead, the permittee collected data on surviving benthic macroinvertebrates from two stations just downstream from the repaired section of Laurel Run in spring 2005 and spring 2006 (prior to the third restoration effort) and, after that restoration, in spring 2008 and spring 2009. The sampling stations were dry and could not be sampled biologically in spring 2007, fall 2007, and fall 2008, reported as periods of local drought. (The hydrologic data from the downstream Laurel Run surface HMR Monitoring Station SW-25 also showed that no water was available for sampling in July and October 2007, August and October 2008, and July and September 2009.)

Results of the invertebrate sampling showed an improvement in springtime stream biota from 2005/2006/2008 to 2009 at the two monitoring stations just downstream from the restored section of Laurel Run. Short-lived midges (Chironomidae, 11% in 2005) were the dominant family in 2006 (62%) and 2008 (88%). At the same time long-lived mayflies (Ephmeroptera), stoneflies (Plecoptera), and caddisflies (Trichoptera) collectively were relatively sparse (these EPT taxa jointly accounting for 13%, 4%, and 6% of the invertebrates in the first three sampling seasons) in the impacted downstream streambed. By spring 2009, however, EPT taxa had colonized and recovered sufficiently to make up 63% of the organisms, while midges accounted for only 1% in the sampling stations downstream from the restored stream section. This change in streambed fauna was deemed beneficial by PADEP, and Laurel Run was declared to have achieved perennial status. It remains to be seen whether the improvement persists for more than one year.

PADEP obligingly released the entire performance bond for Laurel Run on 31 March 2010 (by letter, Joel Folman, PADEP California DMO, 24 May 2010). It is not clear whether monitoring showing post-restoration macroinvertebrate data will be required by PADEP from Laurel Run, or what recourse PADEP might have, if subsequent monitoring results were to show loss of biota. Macroinvertebrates apparently have not been monitored throughout the damaged Laurel Run watershed, because only data from sampling at Panels 5 North and 6 North were provided by PADEP. There is one

FIGURE 14. Hydrologic Monitoring Report (HMR) page from Emerald Mine sampling during June 2009. Station SW-25 is in the lower section of Laurel Run about 1 mile south of its confluence with South Fork Tenmile Creek. The row after "Longitude" should be labeled "Monitoring Station," and the row after "Date Sampled" should be labeled "Stream Flow (cfs)"

HYDROLOGIC MONITORING REPORT (HMR)

Emerald Coal Resources, LP
Emerald Mine
Franklin Township
Greene County

MINING ACTIVITY PERMIT **30841307**

Monitoring Quarter: **04/05/06-09**
MO/MO/MO-YR

READ ALL DMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING RESULTS						
Latitude	39° 53' 49"	39° 53' 57"	39° 50' 12"	39° 53' 25"			
Longitude	80° 11' 52"	80° 12' 21"	80° 12' 22"	80° 09' 32"			
	SW-15	**SW-16**	**SW-17**	**SW-25**			
Date Sampled (MO/DA/YR)	06/03/09	06/03/09	06/03/09	06/17/09			
		0.6820	0.6975	0.0558			
Static Water Elev. (MSL-ft)	NA						
Iron (mg/l)	0.84	0.27	0.25	0.60			
Suspended Solids (mg/l)	17.0	6.0	5.0	16.0			
Manganese (mg/l)	0.12	0.11	0.10	0.20			
Aluminum (mg/l)	0.53	0.14	0.14	0.30			
Sulfate (mg/l)	34.0	55.0	55.0	67.0			
Spec. Conductance (umho/cm)	335	469	468	545			
Osmotic Pressure (mos/kg)	1	4	3	-			
Alkalinity (mg/l)	102.72	155.19	156.01	181.28			
Acidity (mg/l)	-221.74	-145.54	-131.03	-156.96			
Field pH (S.U.)	8.2	8.1	8.0	7.4			
Laboratory pH (S.U.)	7.64	8.22	8.27	7.77			
Temp. °C	20.6	21.2	21.2	18.9			

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals responsible for obtaining the information, I believe the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisionment. Explanations are attached if discharge violations occurred during the month.

Kevin Moore Environmental Engineer
Typed or Printed Name and Title

K. D. Moore
Signature

JUL 24 2009
Date

FIGURE 15. Hydrologic Monitoring Report (HMR) dated 29 January 2009 for wells and piezometers in the Laurel Run watershed sampled in October, November, and December 2008, Emerald Mine, Greene County, Pennsylvania.

Laurel Run
Hydrologic Data

Emerald Mine

DATE	PZ-1	PZ-2	PZ-3	PZ-4	PZ-5	PZ-5A	PZ-6	PZ-7	PZ-8	Comments
Panel	3 North	3 North	3 North	4 North	4 North	4 North	4 North	4 North	4 North	
Surface Elevation	985'	985'	985'	999'	999'	999'	999'	1050'	1050'	
Well Depth	19.5'	139.6	269.6'	22.5'	142.4	60'	269.5	20'	70'	
10/24/2008	obstruc	obstruc	obstruc	7.82		29.20		dry	47.00	

DATE	531-S5	531-S6	531-S7	M4C	M4B	M4A	M4	M5	M5-1	SW-37	
Panel				9 North	9 North	9 North	9 North	6 N Gate Rd		8 North	7 I
Surface Elevation				1088'	1083'	1070'	1075'	1065'		1055'	
10/24/2008			dry	dry	dry	dry	dry	dry	dry	DRY	
11/13/2008										dry	
12/16/2008										97.4	

Laurel Run
Hydrologic Data

SW-37	M6	M-4A	M7	M8	SW-24	SW-34	M3	M2	M1	
8 North	7 N gate Rd		6 N Gate Rd	6 N Gate Rd	6 North	4 North	3 North	3 North	1 North	
1055'	1065'		1049'	1079'	1025'	1005'	1035'	950'	985'	
DRY	dry	dry	dry	dry	dry	dry	DRY	DRY	DRY	
dry						dry				
97.4						115.33				

Emerald Mine

M1	SW-33	SW-36	LA-1	LA-2	LA-3	SW-23	LA-T1	LA-Floater	Comments
North	3 North	North of 1 North				6 North			
985'	985'	995'				1025'			
DRY	DRY	puddles	dry	dry	dry	dry			
	dry								
	96.08								

FIGURE 15. Laurel Run wells hydrology, fourth quarter 2008 (concluded).

DATE	PZ-9S	PZ-9D	PZ-10	PZ-11	PZ-12	PZ-13	PZ-13R
Panel	6 North	6 North	6 North	6 North	7 North	7 North	7 North
Surface Elevation	1027'	1029'	1051'	1052'	1038'	1038'	
Well Depth	20'	60'	20'	63'	20'	60'	
10/24/2008	7.35	8.90	5.13	33.80	21.40		30.15

Laurel Run
Hydrologic Data

13R	PZ-14S	PZ-15M	PZ-16D	PZ-17S	PZ-18M	PZ-19D	PZ-20	
orth	8 North	8 North	8 North	8 North	8 North	8 North	9 North	9
	1054'	1055'	1056'	1127'	1128'	1128'	1130'	
	20'	33'	60'	20'	34'	69'	86'	
.15	2.00	15.30	58.00	Dry	obstructed	53.50		

Emerald Mine

)	PZ-21	PZ-22	PZ-23	PZ-24	PZ-25	PZ-26	PZ-27	PZ-28	PZ-29	PZ-30	PZ-31	PZ-32
h	9 North	9 North	9 North	7N	7N	5N	5N	5N	5N	5N	3 N Gate	3 N Gate
'	1130'	1080'	1080'	1150'	1150'	1050'	1050'	1025'	1025'	1025'	1000'	1000'
	20'	81'	20'									
		3.00	5.20			29.10	30.00	28.40		11.50	2.40	4.73

Note: Flow Measurements are reported in gpm
Ob = Obstruction
*Probe encountered obstruction in pipe
** Unable to measure due to obstruction in pipe
Note: Piezometer Measurements are from the top of the PVC pipe and are reported in feet
*** For the months of Oct., Nov., and Dec. the wrong Piezometer was listed as PZ-16 and PZ-14 had not been measured.
There are four piezometers in the area and the sampler was actually measuring PZ-15 and PZ-16 and the cap was stuck on a piezometer that is not checked.

FIGURE 16. Hydrologic Monitoring Report (HMR) page dated 27 July 2009 showing results from Emerald Mine sampling on 26 February and 13 May 2009. Static water elevations are reported for certain wells and piezometers in the Laurel Run watershed. Why there are fewer stations sampled than in the prior quarter's HMR (Figure 15) is not explained.

Laurel Run
Hydrologic Data

Emerald Mine

DATE	PZ-1	PZ-2	PZ-3	PZ-4	PZ-5	PZ-5A	PZ-6	PZ-7	PZ-8
Panel	3 North	3 North	3 North	4 North	4 North	4 North	4 North	4 North	4 North
Surface Elevation	985'	985'	985'	999'	999'	999'	999'	1050'	1050'
Well Depth	19.5'	139.6	269.6'	22.5'	142.4	60'	269.5	20'	70'
2/26/2009	2.10	4.30	12.60	4.00		4.90		dry	46.70
5/13/2009	1.40	2.50	8.40	3.10		5.80		dry	45.20

Laurel Run
Hydrologic Data

Emerald Mine

DATE	PZ-9S	PZ-9D	PZ-10	PZ-11	PZ-12	PZ-13	PZ-13R	PZ-14S	PZ-15M	PZ-16D	PZ-17S	PZ-18M	PZ-19D	PZ-20	PZ-21	PZ-22	PZ-23	PZ-24	PZ-25	PZ-26	PZ-27	PZ-28	PZ-29	PZ-30	PZ-31	PZ-32
Panel	6 North	6 North	6 North	6 North	7 North	7 North	7 North	8 North	8 North	8 North	8 North	8 North	8 North	9 North	9 North	9 North	9 North	7N	7N	5N	5N	5N	5N	5N	3 N Gate	3 N Gate
Surface Elevation	1027'	1025'	1051'	1052'	1038'	1038'		1065'	1055'	1055'	1137'	1128'	1128'	1130'	1130'	1080'	1080'	1150'	1150'	1050'	1050'	1025'	1025'	1025'	1000'	1000'
Well Depth	20'	60'	20'	63'	20'	60'		20'	33'	60'	20'	34'	69'	86'	20'	81'	20'									
2/26/2009	8.20	7.90	31.80	8.00	18.50		25.00	2.50	13.10	54.70	Dry	obstructed	60.20													
5/13/2009	5.60	7.10	34.20	4.80	18.10		24.60	5.50	12.80	55.60	Dry	obstructed	57.80													

Note: Flow Measurements are reported in gpm
Ob = Obstruction
*Probe encountered obstruction in pipe
** Unable to measure due to obstruction in pipe
Note: Piezometer Measurements are from the top of the PVC pipe and are reported in feet
*** For the months of Oct., Nov., and Dec. the wrong Piezometer was listed as PZ-16 and PZ-14 had not been measured.

permitted discharge of surface runoff from Emerald Mine Shaft #7 to a tributary of Laurel Run (NPDES Outfall 012), but this discharge has not provided sufficient volume for any sampling of its quality in recent years according to the Emerald Mine DMRs.

Damage to the springs that had supplied domestic and livestock water at the Kent Farm was offset to some extent, initially using water buffaloes and subsequently by pipe connection with the local water provider. The permittee calculated the cost of municipal water using the PADEP formula and offered the Williams family $10,694 as one-time compensation in 2004. Meanwhile, the historic farmhouse, springs, and pond had undergone years of significant damage as a result of subsidence in Panel 5.

At least 30 other landowners experienced destruction of their water supplies above the Emerald mine, according to the PADEP 2007-2009 files. There is extensive correspondence in the files concerning replacement of water supplies.

The water loss experienced in Laurel Run was more significant and widespread than that experienced in Crafts Creek. Unfortunately, the incident at Laurel Run predated the newer requirements for applicants to collect two years of premining streamflow data and to conduct detailed macroinvertebrate and instream habitat assessments, against which efforts at restoration can be measured.

Photo credit: Center for Coalfield Justice

FIGURE 17: A "water buffalo" in southwestern Pennsylvania. Plastic covered water tanks like this one often are provided by mining companies to serve as a temporary water supply after undermining has dried up the landowner's well or spring.

VII SUMMARY AND CONCLUSIONS

PADEP regulatory files from 2007 through 2009 associated with Bailey Mine, Emerald Mine, and Enlow Fork Mine were examined. During the period under review, the operators of each of these longwall mines proposed at least one major expansion, as well as numerous additional activities associated with its surface and underground operations. The files reviewed contain a tremendous amount of information, including the applications themselves, back and forth correspondence with agency reviewers, background and ongoing monitoring data, public comments, etc. The purpose of this review was to determine the effectiveness of the current permit application, review, and monitoring process in providing protection for water resources from the impacts of longwall mining operations.

Ten years ago, a major deficiency in the process of reviewing and approving longwall mines was the lack of accurate and comprehensive premining (baseline) information regarding streams, wetlands, and other water resources. That absence of data has been remedied to a large extent through the conscientious implementation of new requirements associated with Technical Guidance Document 563-2000-655. A significant amount of useful information regarding streams and wetlands now is being compiled in premining inventories. While that is a noteworthy improvement, however, the primary objective --- protection of water resources --- has not benefited appreciably because most of the information being compiled is not being incorporated into the permit decisionmaking process.

The most troubling aspect that we found regarding the regulatory review process is what is (or is not) being done with the data which now are being collected. The California DMO has thick files of DMRs (Discharge Monitoring Reports) and HMRs (Hydrologic Monitoring Reports), but those monitoring data appear not to inform permit decisions or compel permit compliance. We found many instances of reported exceedances of permit limitations or conditions -- some acknowledged by the permittee, some not -- and no indication in the files that PADEP was aware of them or had sought compliance. There also are many inconsistencies between “required” monitoring parameters and the data actually reported, but no indication that PADEP staff ever review any mining outfall DMRs for completeness or conformance with permit requirements. We found many instances of DMRs which reported, month after month or quarter after quarter, that there was no discharge at a given outfall. A DMR is not useful if the discharge is not being monitored.

Likewise, there are huge files of premining bioassessment inventories, encompassing 800 or 900 pages each, with documentation regarding wetlands, streams, water quality, and macroinvertebrate communities. Yet, there is no indication that those data have been reviewed, much less used to make permit decisions. The increased diligence we have seen on the part of PADEP to ensure that mine applications include detailed premining data on the quality and quantity of streams and wetlands points out a very important fact: when the regulatory agencies are steadfast in applying their requirements, the permit applicants will comply. This really is just common sense: the applicants need a permit to mine, and are willing to do what is

required to get that permit, so long as they know that the agency is serious about applying and enforcing the requirements and will do so consistently and fairly.

The disjointed format of PADEP's underground mine application Modules, review process, and recordkeeping does not allow the information to be organized neatly into the three components of site inventory, project description, and impact assessment. Instead, the Modules are internally inconsistent and at odds with each other regarding information solicited and cross-referenced. The Modules also do not closely track with the requirements of the regulations and the technical guidance that they are meant to implement. As a result, confusion and omission of crucial data are apparent in the actual applications.

Each unenforced regulation on the books serves simply to deceive the public into believing that protection is being provided.

The existence of a requirement that certain data be collected does not necessarily mean that those data are A) being reviewed by PADEP to inform decisionmaking, or B) being made available to the public or even to PADEP. We began this effort with formal RTKL requests for all files and records associated with three major longwall mines, covering the period from 2007 through 2009. A multitude of files was made available to us, but closer inspection revealed that data were missing. In many cases, such missing data as we could specifically identify subsequently were provided to us, either from the files of the California DMO or from other PADEP offices. In some cases, however, the missing data could not be located by PADEP. In other cases, data that are required to be *collected* apparently are not required to be *reported* or *provided* to PADEP.

The same regulatory diligence that PADEP has applied to data collection is not being applied to other parts of the mining review process. Premining data on streams could and should be used to identify "special protection" waters (or any waters that have existing uses better than their designated uses), and the appropriate increased level of protection should be provided to those streams. "Required" postmining bioassessments should be routinely conducted and reported to determine whether and what impacts have occurred. Increased scrutiny of HMRs and DMRs should be implemented to identify and correct problems as soon as they occur.

There is a strong framework for water resource protection in Pennsylvania. The mining regulations, like all regulations, are only effective if they are applied and enforced. If not enforced, having a regulation is worse than having no regulation at all, because each unenforced regulation on the books serves simply to deceive the public into believing that protection is being provided. Furthermore, environmental protection is weakened when decisions are based on incomplete or inaccurate data. Unfortunately, the health and wellbeing of coalfield residents and their communities are undermined in the process.

VIII RECOMMENDATIONS FOR IMPROVEMENT

With the benefit of having reviewed thousands of pages of recent files, and with the intent of being a positive force for change, we offer the following recommendations for improving the application review process and procedures used by PADEP so that a greater level of protection can be afforded to water resources.

- The baseline inventory data now being collected on the quality of streams and their physical and biological characteristics prior to undermining, should be used to their fullest potential to inform PADEP decisionmaking. A tremendous quantity of data now is being compiled pursuant to TGD 563-2000-655, but it is little used. The data should be provided in a digital format that provides maximum utility to PADEP decisionmaking. The current TGD protocols and metrics are helpful for making, or allowing to be made, determinations regarding "existing uses" of coalfield streams. Where those existing uses are determined to be better than the "designated uses", and particularly where the existing uses potentially are EV or HQ, a procedure should be established during the permit review process to allow additional stream assessment by qualified PADEP personnel. Only if wetlands and streams (particularly "special protection" waters) are properly characterized prior to permit issuance can the appropriate conditions be specified and the necessary measures adopted to either prevent their degradation or to evaluate the success of their attempted restoration.

- In particular, PADEP should immediately reexamine the premining bio-assessment data provided to it for streams above the as-yet unmined sections of the Enlow Fork Mine expansion area, and above the proposed Bailey Mine and Emerald Mine expansion areas, and identify those streams which potentially qualify as "special protection" waters. It then should conduct the appropriate antidegradation assessments for those streams. Based on the results of those assessments, the Enlow Fork Mine permit conditions should be revised accordingly. Approval of the Bailey Mine and Emerald Mine expansion applications should not be issued until after those assessments have been conducted and the appropriate protections have been incorporated for any special protection waters identified.

- PADEP should require that all application materials be provided in electronic format. We found that many of the more recent submissions by permit applicants are being provided electronically, but this should be established as a standard condition. Use and management of electronic data can lead to more efficient and effective reviews.

- PADEP must ensure that permittees consistently collect **and report** the during-mining and postmining data on streamflow, water quality, and instream habitats and organisms, just as they do for premining data. According to the TGD, water monitoring is supposed to be performed weekly from 6 months before undermining until 6 months after undermining, and daily from 2 weeks before until

2 weeks after undermining. Surface and subsurface water monitoring is being conducted prior to mining, but comparable data during and after mining appear to be lacking. Postmining bioassessments must be routinely compared with the premining bioassessments on all streams where longwall mining has occurred.

- Information on streams, springs, seeps, wetlands, and groundwater patterns should be collected and presented in a comprehensive and coordinated way in every permit application so that the *entire* hydrologic system is characterized, both premining and postmining. It is especially important that postmining conditions be accurately identified for *all* groundwater and surface water resources, and not just selected ones such as water supplies and stream flow.

- All premining and postmining monitoring data from wells, piezometers, and along streams should be used to prepare a mine-specific database or model of local surface water and groundwater flow patterns, which can be used to compare pre- and postmining conditions and to determine what specific changes (if any) occurred as a result of longwall mining. As more and more data are developed from each mine experience, a regional model can be developed which will provide a more powerful and accurate tool for predicting changes to the hydrologic balance. Every new application will benefit from the cumulative experiences of all prior mining data.

- Mining inventory and discharge data should be made available to all State and federal agencies having potential use for them. In particular, the location and extent of biologically diverse and biologically variable streams, both of which constitute regulated waters of the Commonwealth as well as waters of the United States, should be provided to other agencies to which this information would be of use (USGS for updating topographic quadrangles, PASDA for updating computerized maps of Pennsylvania streams, USEPA and the Corps of Engineers for Clean Water Act purposes, etc.). The detailed wetland delineations being conducted as part of underground mine applications, and (presumably) being reviewed and approved by PADEP, should be provided to the US Fish & Wildlife Service in digital form for inclusion on revised National Wetland Inventory maps. NPDES discharge data should be provided to USEPA for inclusion in its nationwide database. HMR data would be of use to the federal and State Geological Survey offices in their monitoring and assessment of hydrological conditions on a wider area.

- The definition of perennial streams found at §89.141, which is based solely on continuous flow, conflicts with the definition at §89.5 which is based on substrate and macroinvertebrates. The former definition should be deleted or corrected to conform with the definition at §89.5.

- Because it would minimize, if not eliminate, subsidence, use of the room-and-pillar mining method should be required wherever a mine passes beneath a sensitive feature (stream, pond, wetland, house or other structure, farm, cemetery, or highway) and there is a reasonable chance of damage.

- Backstowing technology should be optimized and should routinely be seriously considered as a component of longwall mines to reduce subsidence damages to surface resources.

- The location of every NPDES discharge outfall should be identified accurately by receiving stream and by latitude and longitude (to hundredths of decimal degrees) on all outfall-specific paperwork such as DMRs.

- PADEP should review all NPDES permits to ascertain what numerical limitations are supposed to apply to each outfall. Irrelevant and inconsistent limitations and directives should be removed or corrected as appropriate. Particular attention should be paid to specifying the correct units of measurement for parameters to be analyzed. Confusion between requirements of HMRs and requirements of DMRs should be avoided by PADEP when specifying permittee self-monitoring. Recommendations from the Bureau of Water Quality Management should be followed when assigning numerical limits, sample types, and sampling frequency for all parameters.

- The pertinent limitations, sample type, and sampling frequency for each outfall should be transferred accurately to a blank DMR for each outfall. All blank DMRs provided by PADEP should identify all of the relevant parameters and sampling directives as listed in specific Part A, Part B, and Part C permit requirements, as appropriate, for the subject outfall. At present this is done more effectively in the DMRs for mine sewage treatment plant discharges than for comparable DMRs for mine discharges.

- Permittees should be required to provide complete monitoring data on wastewater discharges. When examined in detail, mining outfall DMRs often are found to be incomplete or out of compliance with permit requirements. Admittedly, the data being requested, collected, and provided are somewhat confusing and complex. That is in large part a reflection of the reporting system PADEP has established. One solution would be to set up a computerized electronic database system which could be used:

  a) to remind permittees and their contracting laboratories what parameters need to be sampled at what intervals and flow conditions at each outfall,

  b) to help all personnel identify what parameters need to be analyzed, what methods and units used, and the limits imposed on those parameters, and

  c) to help PADEP quickly and easily identify when a permit-required datum has been omitted, exceeded, or otherwise is at odds with other data being provided, so that some action can be taken in a timely manner to correct the issue. USEPA currently is planning to mandate electronic reporting of discharge monitoring data, but there is no reason to wait until that happens.

- PADEP should initiate a practice of acknowledging self-reported exceedances and identifying unacknowledged exceedances, with followup to ascertain the success of measures to prevent future exceedances. At present there is no indication that PADEP is aware of the numerous exceedances of permit limitations at these mines or is taking any steps to protect water quality based on discharge monitoring.

- Sampling frequencies should be specified to enable comparison of data with numerical limits. At present many numerical limitations in NPDES permits for mine outfalls cannot be used to evaluate monitoring data. Averages cannot be drawn from single samples. Composite samples and more frequent sampling should be required as necessary to implement discharge limitations.

- PADEP should consider reinstituting numerical sulfate limits and establishing specific conductance limits in all NPDES permits for mine discharges. The high values of these parameters currently being reported in routine discharges pose an ongoing threat to aquatic biota in Pennsylvania streams.

- Provision for reporting actual sampling dates should be made on all DMRs to make them more meaningful and to make comparison possible with all applicable NPDES permit requirements. Actual sampling dates currently are reported to PADEP on HMRs, but not on DMRs.

- Provision for reporting weather conditions should be made on DMRs to make possible the selection of applicable numerical limitations for all outfalls with different limits for wet-weather and dry-weather discharges.

- PADEP should explicitly require that permittees adjust their sampling calendars for NPDES discharges to attempt to obtain a measurable flow to be reported on DMRs for each outfall. When a permittee repeatedly reports “no flow” at an outfall, that defeats the purpose of meaningful discharge monitoring which could allow comparison of results with applicable limits. “No-flow” outfalls actually experience discharge events, but are not being monitored by permittees. Several examples of self-reported no-flow outfalls were sampled by PADEP when observed flowing during random mine inspections within the period of review.

- PADEP should return unsigned DMRs to the permittee.

- PADEP should date-stamp all DMRs and HMRs it receives from applicants/ permittees.

- When PADEP samples mine effluent, its analyses at minimum should include all parameters for which numerical limits have been established for the outfall. At present mine inspectors appear unaware of permit requirements and do not request the State laboratory to analyze for all of the regulated parameters that apply to a specific outfall.

- In order to provide continuity, TGD 563-2000-655 should be revised to make references, where appropriate, to the permit application Modules, particularly Module 8 (Hydrology) and Module 15 (Streams/Wetlands). This would enable applicants to provide the requested information in the relevant part(s) of the application.

- Modules 8 and 15 should be combined into one, or at least better cross-referenced. Much of the information on wetlands and streams in Module 15 is relevant to the Module 8 hydrology and biology assessments.

- Module 15 (in particular, Section 15.3) should clearly indicate that the functions and characteristics of *all* wetlands, not only "exceptional value" wetlands, are to be identified and evaluated.

- The focus of Module 24 (Special Protection Waters) should be expanded to encompass *any* disturbance to an EV or HQ water, not just discharges. If an EV stream, for example, will have its streambed dropped by several feet as a result of longwall-induced subsidence, and then either be dewatered or ponded, and if the subsequent efforts to restore normal flow and biological conditions in that stream require several years of physical disturbances, it can hardly be considered "special protection".

- The TGD 563-2000-655 hydrologic monitoring schedules, with frequency increasing to daily in proximity to the longwall mine working face, should be required by special condition in every permit. Hydrologic monitoring during active mining apparently is not being performed (or if it is, it is not being reported) in accordance with the TGD recommendations. PADEP has failed to require the reporting of monitoring more frequently than quarterly. Without more frequent monitoring as the longwall face approaches a monitoring station, there is no opportunity for mining plan modification to avoid or reduce water resource impacts as mining progresses.

- Determinations regarding "success" of stream restoration should be based on streamflow, water quality, and instream biota. Comprehensive monitoring of stream quantity, quality, and biota should be required for a five-year period following PADEP acceptance of an adversely affected stream as successfully restored. If the restoration fails within the monitoring period, additional restoration should be required and the five-year monitoring requirement should then be reset.

- Closer coordination should be established between the California DMO and other offices of PADEP, in particular the Southwest Regional Office in Pittsburgh and the Bureau of Water Quality Management in Harrisburg.

IX AUTHORSHIP AND ACKNOWLEDGMENTS

This report was prepared by Stephen P. Kunz and James A. Schmid, senior ecologists with Schmid & Company, Inc. Mr. Kunz has been a consulting ecologist since receiving a degree in human ecology from Rutgers University in 1977. Dr. Schmid is a biogeographer with 40 years of experience in ecological consulting. Both Mr. Kunz and Dr. Schmid are certified as *Senior Ecologists* by the Ecological Society of America and as *Professional Wetland Scientists* by the Society of Wetland Scientists.

Mr. Kunz and Dr. Schmid offer outstanding credentials as experts in ecology, wetlands, environmental regulation, and impact assessment. They have analyzed the environmental impacts of many kinds of proposed development activities in 10 states, including coal mining facilities, industrial facilities, transportation facilities, commercial developments, and residential developments. They have written Environmental Impact Statements under contract to the US Environmental Protection Agency, Army Corps of Engineers, Interstate Commerce Commission, various agencies of state and local governments, and a diverse array of private sector entities. They have prepared comprehensive analyses of environmental regulations of nationwide scope.

The authors sincerely appreciate the cooperation of the Pennsylvania Department of Environmental Protection, and in particular the assistance of Bill Plassio and his staff at the California District Mining Office in Coal Center, PA. They also acknowledge the assistance of staff in the Greensburg DMO and the Southwestern Regional Office in Pittsburgh. Thanks to Mark Schmerling, the Raymond Proffitt Foundation, and the Center for Coalfield Justice for permission to use their photographs.

Funding for this study was provided by the Citizens Coal Council with grants obtained from the Pennsylvania Chapter of the Sierra Club (Bernheim Fund) and the Allegheny Group of the Pennsylvania Chapter of the Sierra Club (Huplits Wildlife Fund).

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APPENDIX

TABLES

TABLE 1. MONTHLY *DISCHARGE MONITORING REPORTS* during the period JULY 2007 through SEPTEMBER 2009 (27 months), EMERALD No. 1 MINE, Greene County, Pennsylvania.

NPDES # PA0213438 CMAP # 30841307 CRDP #30753712 CRDP #30960701

Permit Outfall #	Discharge Source	Drainage Area acres	Flow Average gpm	Flow Expected Frequency	Receiving Stream Name	# DMRs	# Months with chem. data	# Months reported dry 1/1 or 2/2	# Months ½ dry	# and % of data-months w/ exceedance of Part A limit		Designated Use of Stream
001	#1 Refuse leachate/runoff	200	contin.		UNT Smith Ck.	9	9	0	0	2	22%	WWF
002	MD/Prep plant runoff	350	1/week		S.F.TenmileCk.	27	22	5	7	12	55%	WWF
003	Prep plant runoff	10	continuous		"	27	1	26	0	0		HQ-WWF
004	#1 Shaft runoff	10	"		UNT Smith Ck.	27	13	14	0	1	8%	WWF
005	#4 Shaft [never permitted or built?]				UNT Smith Ck.	0						WWF
006	MD/#4 Shaft runoff	25	"		UNT Smith Ck.	27	5	22	2	0		WWF
007	#5 Shaft [Discontinued March 2009]				Stewart Run	22	6	16	2	2	33%	HQ-WWF
008	#2 Bleeder Shaft [Transferred from Emerald to Cumberland 1999]					0						TSF
009	MD #6 Shaft	27	1/week		Smith Ck.	27	7	19	5	0		WWF
010	#3 Bleeder Shaft [Transferred from Emerald to Cumberland 1999]					0						WWF
011	#2 Refuse leachate/runoff				UNT Smith Ck.	10	10	0	1	0		WWF
012	#7 Shaft surface runoff	256	inter-		UNT Laurel Run	27	0	27	0	0		WWF
013	MD/#8 Shaft surf.runoff	250	mittent		UNT Coal Lk.Run	27	18	9	0	6	33%	WWF
014	#6 Bleeder Shaft	250	"		UNT Dyers Fk.	27	6	21	0	1	17%	TSF
015	MD#6 Bleeder Shaft	400	"		UNT Dyers Fk.	27	17	10	1	0		TSF
016	#5 Bl. Shaft MD/surf. rnf.	200	contin.		UNT Frosty Run	27	17	13	2	12	71%	TSF
017	#9 Air Shaft surf.runoff 4.6	250	interm.		Grimes Run	15	7	8	0	2	29%	WWF

The farthest right numerical columns count monthly DMRs with one or more recorded exceedances of applicable permit Part A numerical limits and the percentage they represent of DMRs with chemical data for that outfall (excluding "dry" months with no reported discharge).

MD = mine drainage

Outfalls 001, 002, 003, 004, 006, 007, 008, 009, 010, 011, 012, 013, 014, 015, 016, and 017 are said to be controlled by sedimentation ponds.

Designated uses of these receiving streams are WWF (warm water fishery), HQ-WWF (high-quality warm water fishery), or TSF (trout-stocking fishery) according to 25 *Pa. Code* Chapter 93.

No DMRs exist in the Emerald files for Outfalls 005, 008, or 010 for the 2007-2009 period under review. DMRs for Outfalls 008 and 010 presumably are filed with Cumberland Mine (CMAP # 30831303).

Descriptive data on outfalls were compiled from various Emerald Mine pending applications, corrected by reference to permit documents.

Outfall 008 is to UNT to Dyers Fork (apparently now monitored by Cumberland Mine).

TABLE 2. Exceedances of Permit Limitations, Missing Required Results, and Impossible Data Per Discharge Monitoring Reports (DMRs), July 2007 through September 2009 (27 Months; 12 outfalls with partial data reported), Emerald Mine, Greene County, Pennsylvania. NPDES # PA0213438, CMAP # 30841307, CRDP #30753712, CRDP #30960701.

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	Permittee Explanation / Comments
001	04/08	SO4	[report >100 mg/l]	1261 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	687 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
001	05/08	SO4	[report >100 mg/l]	1135 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	1072 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
001	06/08	Fe (total)	3.0 mg/l Avg	10.6 mg/l Avg	Wet weather, pond cleaned regularly; expect)
		Fe (total)	6.0 mg/l Max	20.6 mg/l Max	no future problems from refuse runoff)
		Mn (total)	2.0 mg/l Avg	2.3 mg/l Avg	"
		Mn (total)	4.0 mg/l Max	4.6 mg/l Max	"
		pH	6 SU Min	5.2 SU Min	"
		SO4	[report >100 mg/l]	1335 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	1262 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
001	01/09	TSS	35 mg/l Avg	3 mg/l Avg	Permittee says Exceedance??; explanation concerns)
		TSS	70 mg/l Max	3 mg/l Max	Cumberland Mine 001 ??)
		SO4	[report >100 mg/l]	1734 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	1524 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
		Temperature		not measured	
001	02/09	Temperature		not measured	
		TSS	35 mg/l Avg	57 mg/l Avg	PERMITTEE FAILED TO ACKNOWLEDGE
		TSS	70 mg/l Max	90 mg/l Max	PERMITTEE FAILED TO ACKNOWLEDGE
		SO4	[report >100 mg/l]	1314 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	1125 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
001	03/09	Temperature		not measured	
		SO4	[report >100 mg/l]	1366 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	1350 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
001	04/09	Alkal.<Acid	0 Count	not measured	
		Temperature		not measured	
		SO4	[report >100 mg/l]	999 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	978 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
001	05/09	Temperature		not measured	
		SO4	[report >100 mg/l]	1198 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	1130 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
001	06/09	Temperature		not measured	
		SO4	[report >100 mg/l]	1311 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	1296 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
002	07/07	TSS	70 mg/l Max	59 mg/l Max	Permittee says exceedance ?? – no avg. provided
		8 parameters		reportedly	No avg. results reported from alleged two samples
		SO4	[report >100 mg/l]	976.0 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
002	08/07	Osmotic Press.	70 mos/kg Avg	82 mos/kg Avg	PERMITTEE FAILED TO ACKNOWLEDGE
		SO4	[report >100 mg/l]	1366.0 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	1236.0 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
002	09/07	Osmotic Press.	70 mos/kg Avg	99 mos/kg Avg	Pond continually cleaned, will be monitored
		TSS	35 mg/l Avg	64.5 mg/l Avg	Pond continually cleaned, will be monitored
		Al (total)	0.7 mg/l Avg	0.74 mg/l Avg	PERMITTEE FAILED TO ACKNOWLEDGE
		SO4	[report >100 mg/l]	1226.0 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	1156.0 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
002	10/07	Osmotic Press.	70/140 mos/kg	55/109 mos/kg	Permittee says exceedance ??
		SO4	[report >100 mg/l]	1256.0 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	628.0 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
002	11/07	SO4	[report >100 mg/l]	1812.0 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	1134.0 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
002	12/07	TSS	35 mg/l Avg	44 mg/l Avg	Will clean pond in January 2008
		TSS	70 mg/l Max	91.0 mg/l Max	Pond continually cleaned, will be monitored
		SO4	[report >100 mg/l]	1336.0 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	1291.0 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
002	01/08	TSS	35 mg/l Avg	63.5 mg/l Avg	PERMITTEE FAILED TO ACKNOWLEDGE
		TSS	70 mg/l Max	64 mg/l Max	Permittee says exceedance ??
		Fe (total)	2.0 mg/l Avg	2.53 mg/l Avg	Pond cleaned regularly, will be monitored

TABLE 2. Exceedances of Emerald Permit Limitations, Missing Results, and Impossible Data (continued).

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	Permittee Explanation / Comments
		Fe (total)	**4.0 mg/l Max**	**4.73 mg/l Max**	**Pond cleaned regularly, will be monitored**
		Al (total)	**0.7 mg/l Avg**	**1.17 mg/l Avg**	**PERMITTEE FAILED TO ACKNOWLEDGE**
		Al (total)	**1.4 mg/l Avg**	**2.16 mg/l Avg**	**PERMITTEE FAILED TO ACKNOWLEDGE**
		SO4	**[report >100 mg/l]**	**1506.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**1362.0 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
002	**02/08**	**TSS**	**35 mg/l Avg**	**56.0 mg/l Avg**	**Pond cleaned regularly, will be monitored**
		Osmotic Press.	**70 mos/kg Avg**	**114 mos/kg Avg**	**Pond cleaned regularly, will be monitored**
		SO4	**[report >100 mg/l]**	**1535.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**1529.5.0 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
		Osmotic Press.	**140 mos/kg Max**	**126 mos/kg Max**	**Permittee says exceedance ??**
002	**03/08**	**SO4**	**[report >100 mg/l]**	**1062.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
002	**04/08**	**Osmotic Press.**	**70 mos/kg Avg**	**73.5 mos/kg Avg**	**PERMITTEE FALSELY SAYS COMPLIANCE in 05/08**
		SO4	**[report >100 mg/l]**	**873 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**447 mg/lAvg**	**PERMITTEE FAILED TO REPORT (Part B)**
002	**05/08**	**Osmotic Press.**	**70 mos/kg Avg**	**73.5 mos/kg Avg**	**Pond is cleaned routinely; back in compliance 06/08**
		SO4	**[report >100 mg/l]**	**862 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**820 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
002	**06/08**	**SO4**	**[report >100 mg/l]**	**810 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**804 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
002	**07/08**	**SO4**	**[report >100 mg/l]**	**1051 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**854 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
002	**08/08**	**Osmotic Press.**	**70 mos/kg Avg**	**79.5 mos/kg Avg**	**Studying; expect compliance in 10/08 [**didn't**]**
		SO4	**[report >100 mg/l]**	**1072 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**920 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
002	**09/08**	**Osmotic Press.**	**70 mos/kg Avg**	**84.5 mos/kg Avg**	**Studying; expect compliance in 10/08 [**didn't**]**
		SO4	**[report >100 mg/l]**	**1041 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**868 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
002	**10/08**	**Osmotic Press.**	**70 mos/kg Avg**	**91.5 mos/kg Avg**	**PERMITTEE FAILED TO ACKNOWLEDGE**
		SO4	**[report >100 mg/l]**	**1340 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**1206 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
002	**11/08**	**7 parameters**			Max reported as Avg (except flow x ½)
		SO4	**[report >100 mg/l]**	**1398 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
002	**02/09**	**Alkal.<Acid**	**0 Count**	**0 Count**	How measured once when no flow existed (1/2) ??
		Temperature		**not measured**	
		SO4	**[report >100 mg/l]**	**1041 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)** **03/09**
	Temperature		**not measured**		
		8 Parameters	**Avg**	**not reported**	Why only Alk<Acid measured twice this month?
		SO4	**[report >100 mg/l]**	**1041 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
002	**05/09**	**9 Parameters**	**Avg**	**not reported**	Why only measured once this month?
		Temperature		**not measured**	
		SO4	**[report >100 mg/l]**	**778 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
002	**07/09**	**9 Parameters**	**Avg**	**not reported**	Why only measured once this month?
		Temperature		**not measured**	
		SO4	**[report >100 mg/l]**	**465 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
002	**08/09**	**Flow**	**Avg**	**not reported**	Measured twice, why not reported ?
		8 Parameters	**Avg**	**not reported**	**Only 1 sample collected** [why? sampled Alk<Acid twice]
		Temperature		**not measured**	
		SO4	**[report >100 mg/l]**	**932 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
003	**04/08**	**Settleable Solids**	**0.5 mg/l Max**	**not measured**	**Lab did not measure**
		Flow		**reported zero**	What was sampled?
003	**10/08**	**Flow Avg**		**reported zero**	How to calculate Avg from 1 grab sample?
003	**11/08**	**Flow Avg**		**reported zero**	How to calculate Avg from 1 grab sample?
003	**12/08**	**Flow Avg**		**reported zero**	How to calculate Avg from 1 grab sample?
003	**01/09**	**Settleable Solids**	**0.5 mg/l Max**	**not measured**	
		Temperature		**not measured**	
		8 Parameters	**Avg**	**not reported**	Why only Alk>Acid measured twice this month?
		SO4	**[report >100 mg/l]**	**1314.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
003	**02/09**	**Alkal.<Acid**	**0 Count**	**0 Count**	How measured twice when no flow existed??
003	**03/09**	**Alkal.<Acid**	**0 Count**	**0 Count**	How measured twice when no flow existed??
004	**12/07**	**SO4**	**[report >100 mg/l]**	**131.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
004	**01/08**	**SO4**	**[report >100 mg/l]**	**175.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**

TABLE 2. Exceedances of Emerald Permit Limitations, Missing Results, and Impossible Data (continued).

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	**Permittee Explanation /** Comments
004	**02/08**	**SO4**	**[report >100 mg/l]**	**147.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
004	**03/08**	**SO4**	**[report >100 mg/l]**	**107.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
004	**04/08**	**Flow**		**reported zero**	What was sampled?
		Settleable Solids	**0.5 mg/l Max**	**not reported**	**Lab measured suspended solids (**no limit**)**
		SO4	**[report >100 mg/l]**	**925.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
004	**06/08**	**7 parameters**			How to calculate Avg from 1 grab sample?
		SO4	**[report >100 mg/l]**	**108.0 mg/l Max**	**PERMITTEE FAILED TO REPORT**
004	**10/08**	**Flow Avg**		**reported zero**	How to calculate Avg from 1 grab sample?
004	**11/08**	**Flow Avg**		**reported zero**	How to calculate Avg from 1 grab sample?
004	**12/08**	**Settleable Solids**	**0.5 mg/l Max**	**5.0 mg/l Max**	**Ice and snow melt; expect compliance 01/09**
		Flow Avg		**reported zero**	How to calculate Avg from 1 grab sample?
		SO4	**[report >100 mg/l]**	**187.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
004	**01/09**	**Temperature**		**not measured**	
		Settleable Solids	**0.5 mg/l Max**	**not reported**	**Lab did not sample**
		SO4	**[report >100 mg/l]**	**143.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
004	**02/09**	**Temperature**		**not measured**	
		Settleable Solids	**0.5 mg/l Max**	**not measured**	**Lab did not sample**
		SO4	**[report >100 mg/l]**	**133.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
004	**03/09**	**Temperature**		**not measured**	
		Settleable Solids	**0.5 mg/l Max**	**not measured**	**Lab did not sample**
		SO4	**[report >100 mg/l]**	**164.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
004	**04/09**	**Alkal.<Acid**	**0 Count**	**not measured**	
		Temperature		**not measured**	
		Settleable Solids	**0.5 mg/l Max**	**not reported**	**Lab did not sample**
		SO4	**[report >100 mg/l]**	**119.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
004	**08/09**	**Settleable Solids**	**0.5 mg/l Max**	**<0.5 mg/l Avg**	How to calculate Avg from 1 grab sample?
		Temperature		**not measured**	
		7 Parameters	**Avg**	**not reported**	Why sampled only once ?
		SO4	**[report >100 mg/l]**	**118.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
004	**09/09**	**Temperature**		**not measured**	
		SO4	**[report >100 mg/l]**	**173.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
006	**11/07**	**8 parameters**		**reportedly**	No avg. results reported
006	**01/08**	**Osmotic Press.**	**140 mos/kg Max**		**Lab did not measure**
006	**02/09**	**Temperature**		**not measured**	
		Alkal.<Acid	**0 Count**	**0 Count**	Why only Alk<Acid measured twice this month?
006	**3/09**	**Alkal.<Acid**	**0 Count**	**0 Count**	How measured once when no flow existed (2/2 dry) ??
007	**11/07**	**8 parameters**		**reportedly**	No avg. results reported; **lab didn't sample TSS**
007	**12/07**	**Al (total)**	**0.5 mg/l Avg**	**0.57 mg/l Avg**	**PERMITTEE FAILED TO ACKNOWLEDGE**
		TDS	**500/750 mg/l**	**not measured**	Sampled twice; **lab didn't analyze TSS**
		Alkal.<Acid	**0 Count**	**104.43 Count (?)**	**PERMITTEE FAILED TO ACKNOWLEDGE**
007	**01/08**	**TDS**	**500/750 mg/l**	**not measured**	Sampled twice; **lab didn't analyze TSS**
007	**02/08**	**"**	**"**	**"**	**"**
		Alkal.<Acid	**0 Count**	**124.61 Count (?)**	**PERMITTEE FAILED TO ACKNOWLEDGE**
007	**03/08**	**TDS**	**750 mg/l Max**	**not measured**	Outfall dry, ½ samplings; no lab measurement of TSS
007	**02/09**	**TDS**	**500/750 mg/l**	**not measured**	Sampled twice but these not measured
		Temperature		**not measured**	**"**
007	**03/09**	**Alkal.<Acid**	**0 Count**	**0 Count**	How measured twice when no flow existed??
009	**02/09**	**Temperature**		**not measured**	
009	**03/09**	**Alkal.<Acid**	**0 Count**	**0 Count**	How measured twice when no flow existed??
009	**04/09**	**Alkal.<Acid**	**0 Count**	**0 Count**	How reported when not sampled ??
		Temperature		**not measured**	
		8 Parameters	**Avg**	**not measured**	Why sampled only once?
009	**08/09**	**9 Parameters**	**Avg**	**not reported**	Why sampled only once?
		9 Parameters	**Max**	**reported**	How sampled if no discharge ??
		Temperature		**not measured**	
009	**09/09**	**Osmotic Pressure**	**55 mos/kg Avg**	**3.0 mos/kg Avg**	How was Avg calculated from one grab sample?

TABLE 2. Exceedances of Emerald Permit Limitations, Missing Results, and Impossible Data (continued).

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	Permittee Explanation / Comments
		Temperature		**not measured**	
011	**04/08**	**SO4**	**[report >100 mg/l]**	**1335.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**1261.5 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
011	**05/08**	**SO4**	**[report >100 mg/l]**	**1290.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**1254.5 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
011	**06/08**	**SO4**	**[report >100 mg/l]**	**1219.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**627.5 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
011	**07/08**	**SO4**	**[report >100 mg/l]**	**1125.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**1114.5 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
011	**01/09**	**SO4**	**[report >100 mg/l]**	**1766.0 mg/l Max**	**PERMITTEE FAILED TO REPORT**
		SO4	**[report >100 mg/l]**	**1640.0 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
		Temperature		**not measured**	
011	**02/09**	**Temperature**		**not measured**	
		SO4	**[report >100 mg/l]**	**1440.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**1424.0 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
011	**03/09**	**Temperature**		**not measured**	
		SO4	**[report >100 mg/l]**	**1535.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**1351.0 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
011	**04/09**	**Alkal.<Acid**	**0 Count**	**0 Count**	How reported when not sampled??
		Temperature		**not measured**	
		SO4	**[report >100 mg/l]**	**1251.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**1209.0 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
011	**05/09**	**Temperature**		**not measured**	
		SO4	**[report >100 mg/l]**	**1345.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**1271.5 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
011	**06/09**	**8 Parameters**	**Avg**	**not measured**	**Only one sample collected** [why??]
		Temperature		**not measured**	
		SO4	**[report >100 mg/l]**	**1269.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
012	**01/09**	**Alkal.<Acid**	**0 Count**	**0 Count**	How measured twice when no flow existed (2/2 dry)??
012	**02/09**	**Alkal.<Acid**	**0 Count**	**0 Count**	How measured when no flow existed (1/1 dry)??
012	**03/09**	**Alkal.<Acid**	**0 Count**	**0 Count**	How measured when no flow existed (1/1 dry)??
013	**11/07**	**8 parameters**		**7 reportedly**	No avg. results reported
013	**12/07**	**SO4**	**[report >100 mg/l]**	**102.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
013	**01/08**	**SO4**	**[report >100 mg/l]**	**160 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**129.5 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
013	**04/08**	**Flow**		**reported zero**	What was sampled?
013	**12/08**	**Flow**		**reported zero**	What was sampled?
		SO4	**[report >100 mg/l]**	**105 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
013	**01/09**	**Temperature**		**not measured**	**Permittee says exceedance??** (w/013 for 04/09)
		SO4	**[report >100 mg/l]**	**191 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**151 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
013	**02/09**	**Temperature**		**not measured**	
		SO4	**[report >100 mg/l]**	**105 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
013	**03/09**	**Temperature**		**not measured**	
		SO4	**[report >100 mg/l]**	**736 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**633 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
013	**04/09**	**Osmotic Press.**	**50 mos/kg Avg**	**79.5 mos/kg Avg**	**Permittee studying; expect compliance in 06/08 [**didn't**]**
		Osmotic Press.	**100 mos/kg Max**	**118 mos/kg Max**	**Permittee studying; expect compliance in 06/08 [**didn't**]**
		Alkal.<Acid	**0 Count**	**0 Count**	How reported when not sampled ??
		Temperature		**not measured**	
		SO4	**[report >100 mg/l]**	**1062 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**1030 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
013	**05/09**	**Osmotic Press.**	**50 mos/kg Avg**	**125.5 mos/kg Avg**	**Permittee studying; expect compliance in 07/09 [**didn't**]**
		Osmotic Press.	**100 mos/kg Max**	**170.0 mos/kg Max**	**Permittee studying; expect compliance in 07/09 [**didn't**]**
		SO4	**[report >100 mg/l]**	**1093 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**962 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
013	**06/09**	**Osmotic Press.**	**50 mos/kg Avg**	**121 mos/kg Avg**	**Permittee studying; expect compliance in 07/09 [**didn't**]**
		Osmotic Press.	**100 mos/kg Max**	**124 mos/kg Max**	**Permittee studying; expect compliance in 07/09 [**didn't**]**

TABLE 2. Exceedances of Emerald Permit Limitations, Missing Results, and Impossible Data (continued).

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	**Permittee Explanation /** Comments
		Temperature		**not measured**	
		SO4	**[report >100 mg/l]**	**943 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**885 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
013	**07/09**	**Osmotic Press.**	**50 mos/kg Avg**	**128.5 mos/kg Avg**	**Permittee studying; expect compliance in 10/09**
		Osmotic Press.	**100 mos/kg Max**	**133.0 mos/kg Max**	**Permittee studying; expect compliance in 10/09**
		Temperature		**not measured**	
		SO4	**[report >100 mg/l]**	**880 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**843 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
013	**08/09**	**Osmotic Press.**	**50 mos/kg Avg**	**114.0 mos/kg Avg**	**Permittee studying; expect compliance in 10/09**
		Osmotic Press.	**100 mos/kg Max**	**118.0 mos/kg Max**	**Permittee studying; expect compliance in 10/09;** false)
		Temperature		**not measured**	claim of compliance in 07/09 **)**
		SO4	**[report >100 mg/l]**	**816 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**811 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
013	**09/09**	**Osmotic Press.**	**50 mos/kg Avg**	**112.5 mos/kg Avg**	**Permittee studying; expect compliance in 10/09**
		Osmotic Press.	**100 mos/kg Max**	**119.0 mos/kg Max**	**Permittee studying; expect compliance in 10/09;** false)
		Temperature		**not measured**	claim of compliance in 07/09 and 08/09**)**
		SO4	**[report >100 mg/l]**	**837 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**769 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
014	**11/07**	**Osmotic Press.**		**Not measured**	**PERMITTEE FAILED TO ACKNOWLEDGE**
		SO4	**[report >100 mg/l]**	**335.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**167.5 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
014	**12/07**	**Osmotic Press.**		**Not measured**	**PERMITTEE FAILED TO ACKNOWLEDGE**
		SO4	**[report >100 mg/l]**	**110.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
014	**01/08**	**TSS**	**35 mg/l Avg**	**41 mg/l Avg**	**Only 1 high reading, will continue to monitor**
		TSS	**70 mg/l Max**	**81 mg/l Max**	**Only 1 high reading, will continue to monitor**
		Alkal.<Acid	**0 Count**	**162 Count (?)**	**PERMITTEE FAILED TO ACKNOWLEDGE**
		Al (total)	**1.7 mg/l Avg**	**1.91 mg/l Avg**	**PERMITTEE FAILED TO ACKNOWLEDGE**
		SO4	**[report >100 mg/l]**	**2982.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**1548.0 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
		Osmotic Press.	**100 mos/kg Max**	**Not sampled)**	**PERMITTEE FAILED TO ACKNOWLEDGE**
014	**02/08**	**Osmotic Press.**	**100 mos/kg Max**	**in this)**	**PERMITTEE FAILED TO ACKNOWLEDGE**
014	**03/08**	**Osmotic Press.**	**100 mos/kg Max**	**quarter)**	**PERMITTEE FAILED TO ACKNOWLEDGE**
014	**02/09**	**Alkal.<Acid**	**0 Count**	**0 Count**	How measured twice when no flow existed (2/2 dry) ??
014	**03/09**	**Alkal.<Acid**	**0 Count**	**0 Count**	How measured twice when no flow existed (2/2 dry) ??
015	**11/07**	**8 parameters**		**7 reportedly**	No avg. results reported
015	**04/08**	**SO4**	**[report >100 mg/l]**	**1303 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**678 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
015	**06/08**	**SO4**	**[report >100 mg/l]**	**1219 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**627 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
015	**01/09**	**Temperature**		**not measured**	[Note: SO4 values extraordinarily
015	**02/09**	**Temperature**		**not measured**	similar to 011 in 06/08.]
015	**03/09**	**Temperature**		**not measured**	
015	**04/09**	**Alkal.< Acid**	**0 Count**	**0 Count**	How reported when not sampled ??
		Temperature		**not measured**	
015	**05/09**	**Temperature**		**not measured**	
015	**06/09**	**9 Parameters**	**Avg**	**not reported**	Why sampled only once ?
		Temperature		**not measured**	
016	**12/07**	**Osmotic Press.**	**50 mos/kg Avg**	**51.5 mos/kg Avg**	**Permittee says "not typical" of this pond**
		SO4	**[report >100 mg/l]**	**135.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		SO4	**[report >100 mg/l]**	**126.0 mg/l Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
016	**01/08**	**SO4**	**[report >100 mg/l]**	**247.0 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
		Osmotic Press.		**0.0 mos/kg**	Dubious value --- actually analyzed?
016	**10/08**	**7 parameters**			Max reported as Avg (except flow x ½)
		SO4	**[report >100 mg/l]**	**4294 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**
016	**11/08**	**Osmotic Press.**	**50 mos/kg Avg**	**147.5 mos/kg Avg**	**Permittee studying; expect compliance 1st Q 09** [didn't]
		Osmotic Press.	**100 mos/kg Max**	**185 mos/kg Max**	**Permittee studying; expect compliance 1st Q 09** [didn't]
		SO4	**[report >100 mg/l]**	**3323 mg/l Max**	**PERMITTEE FAILED TO REPORT (Part B)**

TABLE 2. Exceedances of Emerald Permit Limitations, Missing Results, and Impossible Data (continued).

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	Permittee Explanation / Comments
		SO4	[report >100 mg/l]	3197 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
016	12/08	Osmotic Press.	50 mos/kg Avg	170.5 mos/kg Avg	Permittee studying; expect compliance 1st Q 09 [didn't]
		Osmotic Press.	100 mos/kg Max	220.0 mos/kg Max	Permittee studying; expect compliance 1st Q 09 [didn't]
		SO4	[report >100 mg/l]	4458 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	4206 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
016	01/09	Osmotic Press.	50 mos/kg Avg	225.0 mos/kg Avg	Permittee studying; expect compliance 04/09 [didn't]
		Osmotic Press.	100 mos/kg Max	240.0 mos/kg Max	Permittee studying; expect compliance 04/ 09 [didn't]
		Fe (total)	1.5 mg/l Avg	1.8 mg/l Avg	PERMITTEE FAILED TO ACKNOWLEDGE
		Mn (total)	2.0 mg/l Avg	2.3 mg/l Avg	PERMITTEE FAILED TO ACKNOWLEDGE
		Mn (total)	4.0 mg/l Max	4.6 mg/l Max	PERMITTEE FAILED TO ACKNOWLEDGE
		Temperature		not measured	
		SO4	[report >100 mg/l]	4458 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	4184 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
016	02/09	Osmotic Press.	50 mos/kg Avg	112.5 mos/kg Avg	Permittee studying; expect compliance 04/09 [didn't]
		Osmotic Press.	100 mos/kg Max	120.0 mos/kg Max	Permittee studying; expect compliance 04/09 [didn't]
		Temperature		not measured	
		SO4	[report >100 mg/l]	2733 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	2712 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
016	03/09	Osmotic Press.	50 mos/kg Avg	70.0 mos/kg Avg	Permittee studying; expect compliance 04/09 [didn't]
		Temperature		not measured	
		SO4	[report >100 mg/l]	2838 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	2828 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
016	04/09	Osmotic Press.	50 mos/kg Avg	112.5 mos/kg Avg	Permittee studying; expect compliance 07/09 [didn't]
		Osmotic Press.	100 mos/kg Max	120.0 mos/kg Max	Permittee studying; expect compliance 07/09 [didn't]
		Alkal.<Acid	0 Count	not measured	
		Temperature		not measured	
		SO4	[report >100 mg/l]	3743 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	3427 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
016	05/09	Temperature		not measured	
		Osmotic Press.	50 mos/kg Avg	145 mos/kg Avg	Permittee studying; expect compliance 07/09 [didn't]
		Osmotic Press.	100 mos/kg Max	197 mos/kg Max	Permittee studying; expect compliance 07/09 [didn't]
		SO4	[report >100 mg/l]	3615 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	2354 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
016	06/09	Osmotic Press.	50 mos/kg Avg	209.0 mos/kg Avg	Permittee studying; expect compliance 07/09 [didn't]
		Osmotic Press.	100 mos/kg Max	227.0 mos/kg Max	Permittee studying; expect compliance 07/09 [didn't]
		Temperature		not measured	
		SO4	[report >100 mg/l]	3602 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	1826 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
016	07/09	Osmotic Press.	50 mos/kg Avg	214.5 mos/kg Avg	Permittee studying; expect compliance 10/09
		Osmotic Press.	100 mos/kg Max	215 mos/kg Max	Permittee studying; expect compliance 10/09
		SO4	[report >100 mg/l]	3265 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	3160 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
016	08/09	Osmotic Press.	50 mos/kg Avg	209.5 mos/kg Avg	Permittee studying; expect compliance 10/09
		Osmotic Press.	100 mos/kg Max	223.0 mos/kg Max	Permittee studying; expect compliance 10/09; false claim of compliance in 07/09)
		Temperature		not measured	
		SO4	[report >100 mg/l]	2917 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	2812 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
016	09/09	Osmotic Press.	50 mos/kg Avg	185.5 mos/kg Avg	Permittee studying; expect compliance 10/09
		Osmotic Press.	100 mos/kg Max	190.0 mos/kg Max	Permittee studying; expect compliance 10/09; false claim of compliance in 07/09 and 08/09)
		Temperature		not measured	
		SO4	[report >100 mg/l]	2517 mg/l Max	PERMITTEE FAILED TO REPORT (Part B)
		SO4	[report >100 mg/l]	2380 mg/l Avg	PERMITTEE FAILED TO REPORT (Part B)
017	07/08	All		no DMR	
	08/08	All		no DMR	
	09/08	All		no DMR	
017	12/08	Settleable Solids	0.5 mg/l Max	not measured	Lab did not sample
017	01/09	Fe (total)	7.0 mg/l Max	8.4 mg/l Max	PERMITTEE FAILED TO ACKNOWLEDGE
		Settleable Solids	0.5 mg/l Max	not measured	Lab did not sample
		Temperature		not measured	
		7 Parameters	Avg	not reported	No averages reported from two alleged grab samples?
017	02/09	Fe (total)	7.0 mg/l Max	18.6 mg/l Max	Permittee investigating, ok 03/09

TABLE 2. **Exceedances of Emerald Permit Limitations, Missing Results, and Impossible Data** (concluded).

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	**Permittee Explanation /** Comments
		Temperature		**not measured**	
		Alkal.<Acid	**0 Count**	**0 Count**	Why measured twice when 6 measured only once?
		Settleable Solids	**0.5 mg/l Max**	**not measured**	**Lab did not sample**
017	**03/09**	**Alkal.<Acid**	**0 Count**	**0 Count**	How sampled twice if outfall always dry ??
017	**04/09**	**Alkal.<Acid**	**0 Count**	**0 Count**	How reported when not measured ??
		Temperature		**not measured**	
		Settleable Solids	**0.5 mg/l Max**	**not reported**	**Lab did not sample**
017	**05/09**	**Temperature**		**not measured**	
017	**08/09**	**6 Parameters**	**Avg**	**not reported**	Allegedly sampled twice, but no data
		Temperature		**not measured**	
017	**09/09**	**Temperature**		**not measured**	

No completed DMR for any outfall addresses the Part A permit limitations on floating solids or visible foam.

No comparison with numerical limits is possible when outfall is reported dry and no effluent exists for sampling and analysis.

No third quarter 2008 DMRs were found for Outfall 017: 07/08-09/08. No explanation was offered for these missing data.

No DMR for Outfalls 011, 013, or 017 addresses Group A limitations on dry weather flow, which would add total suspended solids **to the list of Part A analyses required for stormwater flow. No flow was ever acknowledged at Outfall 012, and no results of actual analyses were presented for that outfall. No DMRs were seen for Outfall 010, which also has dry-weather flow limits.**

Numerical permit limitations are expressed primarily as Average Monthly (Avg) or Maximum Daily (Max) values in permit Part A for each outfall. Few numerical limitations apply to quarterly grab samples. Instantaneous Maximum limits apparently are expected to apply primarily to random inspections by PADEP rather than to sampling at times selected by the permittee.

If temperature **is not required by permit for discharge monitoring, the** temperature**-related lines in this table can be removed (2009 entries). It is unclear why** field temperature **was reported routinely prior to 2009. It was not requested in the PADEP "blank DMR forms" for each outfall, and it clearly was not mandated by Part A of the permit. Temperature possibly was considered useful by the permittee when interpreting other parameters, but no text conveying conclusions was included with any DMR.**

Reportable concentrations of SO4 in DMRs: at least 142 records > 100 mg/l at 9 outfalls; 86 records >1000 mg/l; highest = 4458 mg/l (Outfall 016, January 2009).

For purposes of this table, no effort was made to compare Part A limitations or blank DMR requirements with what was reported on the permittee's completed DMRs. Exceedances are based on what the permittee's DMRs say, not what the Part A limitations or PADEP blank DMRs say (which sources may contradict each other). The PADEP Part A limitations are summarized in Table 3.

TABLE 3. Emerald Mine, Greene County, Pennsylvania, NPDES Permit Limitations. Exceedances are to be reported to PADEP with explanation per DMR Instructions, Permit Part A Requirements, and Permit Part B Mandated National Pollutant Discharge Elimination System Permit Conditions. NPDES # PA0213438, CMAP # 30841307, CRDP #30753712, and CRDP #30960701.

End of Pipe from Sediment Pond

Outfall / Designated Use	Discharge Parameter (symbol)	(units)	Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
001#	Flow	(mgd)				2/month	estimated
WWF	Total Iron (Fe)	(mg/l)	3.0	6.0		"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.		"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)	2.0	4.0		"	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			>6.0 [Min.]	"	"
	pH	(standard units)			<9.0	"	"
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Temperature	(°C)				2/month	grab
002	Flow	(mgd)				1/month	estimated
WWF	Total Iron (Fe)	(mg/l)	2.0	4.0	5.0	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.3	2.6	3.3	"	"
	Total Aluminum (Al)	(mg/l)	0.7	1.4	1.8	"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)	70.	140.	175.	1/month	"
	pH	(standard units)			>6.0 [Min.]	"	"
	pH	(standard units)			<9.5	"	"
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
003	Flow	(mgd)				1/month	estimated
HQ-WWF	Total Iron (Fe)	(mg/l)	3.0	6.0	7.0	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	2.0	4.0	5.0	"	"
	Total Aluminum (Al)	(mg/l)				"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			>6.0 [Min.]	1/month	"
	pH	(standard units)			<9.5	"	"
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
004	Flow	(mgd)				1/quarter	estimated
WWF	Total Iron (Fe)	(mg/l)	3.0	6.0	7.0	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	2.0	4.0	5.0	"	"
	Total Aluminum (Al)	(mg/l)				"	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			>6.0 [Min.]	1/month	"
	pH	(standard units)			<9.5	"	"
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?

Permit limits inferred from permittee's completed DMRs; no Part A examined for Outfall 001, and its limits may be different from the numbers reported here. No DMRs or Part A available for Outfall 005, so no limitations are reported for that outfall.

TABLE 3. Emerald Mine, Greene County, Pennsylvania, NPDES Permit Limitations (continued).

Outfall/ Designated Use	Discharge Parameter (symbol)	(units)	End of Pipe from Pond Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
006	Flow	(mgd)				1/month	estimated
WWF	Total Iron (Fe)	(mg/l)	2.1	4.2	5.3	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.5	3.0	3.8	"	"
	Total Aluminum (Al)	(mg/l)	0.8	1.6	2.0	"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)	70.	140.	175.	"	"
	pH	(standard units)			>6.0 [Min.]	1/month	"
	pH	(standard units)			<9.5	"	"
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
007	Flow	(mgd)				1/month	estimated
HQ-WWF	Total Iron (Fe)	(mg/l)	1.5	3.0	3.8	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.0	2.0	2.5	"	"
	Total Aluminum (Al)	(mg/l)	0.5	1.0	1.3	"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)	50.	100.	125.	"	"
	Total Dissolved Solids	(mg/l)	500.	750.	750.	1/quarter	"
	pH	(standard units)			>6.0 [Min.]	1/month	"
	pH	(standard units)			<9.5	"	"
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
008	Flow	(mgd)				1/month	estimated
TSF	Total Iron (Fe)	(mg/l)	1.6	3.2	8.0	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.0	2.0	2.5	"	"
	Total Aluminum (Al)	(mg/l)	0.5	1.0	1.3	"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)	54.	108.	135.	1/month	"
	pH	(standard units)			>6.0 [Min.]	1/month	"
	pH	(standard units)			<9.5	"	"
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
009	Flow	(mgd)				2/month	estimated
WWF	Total Iron (Fe)	(mg/l)	1.6	3.2	4.0	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.0	2.0	2.5	"	"
	Total Aluminum (Al)	(mg/l)	0.5	1.0	1.25	"	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				1/quarter	"
	Osmotic Pressure	(mos/kg)	55.	110.	138.	"	"
	pH	(standard units)			>6.0 [Min.]	1/month	"
	pH	(standard units)			<9.0	"	"
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	1/quarter	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?

TABLE 3. Emerald Mine, Greene County, Pennsylvania, NPDES Permit Limitations (continued).

Outfall/ Designated Use	Discharge Parameter (symbol)	(units)	End of Pipe from Pond Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
010	Flow	(mgd)				1/month	estimated
WWF	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)			5.0	"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)				?	"
	pH	(standard units)			>6.0 [Min.]	?	?
	pH	(standard units)			<9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
011	Flow	(mgd)				1/month	estimated
WWF	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)			5.0	"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)				?	"
	pH	(standard units)			>6.0 [Min.]	?	?
	pH	(standard units)			<9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
012	Flow	(mgd)				1/month	estimated
WWF	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(ml/l)[*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)			5.0	"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)				?	"
	pH	(standard units)			>6.0 [Min.]	?	?
	pH	(standard units)			<9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
013	Flow	(mgd)				1/month	estimated
WWF	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)			5.0	"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)				?	"
	pH	(standard units)			>6.0 [Min.]	?	?
	pH	(standard units)			<9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						

TABLE 3. Emerald Mine, Greene County, Pennsylvania, NPDES Permit Limitations (continued).

Outfall/ Designated Use	Discharge Parameter (symbol)	(units)	End of Pipe from Pond Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
014	Flow	(mgd)				2/month	estimated
TSF	Total Iron (Fe)	(mg/l)	3.0	6.0	7.0	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	2.0	4.0	5.0	"	"
	Total Aluminum (Al)	(mg/l)	1.7	3.4	4.3	"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)	50.	100.	125.	"	"
	pH	(standard units)			>6.0 [Min.]	?	?
	pH	(standard units)			<9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
015	Flow	(mgd)				2/month	estimated
TSF	Total Iron (Fe)	(mg/l)	1.5	3.0	4.0	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.0	2.0	2.5	"	"
	Total Aluminum (Al)	(mg/l)	0.5	1.0	1.3	"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)	50.	100.	125.	"	"
	pH	(standard units)			>6.0 [Min.]	?	?
	pH	(standard units)			<9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
016	Flow	(mgd)				2/month	estimated
TSF	Total Iron (Fe)	(mg/l)	1.5	3.0	3.75	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.0	2.0	2.5	"	"
	Total Aluminum (Al)	(mg/l)	0.5	1.0	1.25	"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)	50.	100.	125.	1/month	"
	pH	(standard units)			>6.0 [Min.]	?	?
	pH	(standard units)			<9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
017	Flow	(mgd)				1/month	estimated
WWF	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(mg/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			>6.0 [Min.]	?	?
	pH	(standard units)			<9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?

Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.

TABLE 3. Emerald Mine, Greene County, Pennsylvania, NPDES Permit Limitations (concluded).

Discharge Parameter (symbol)	(units)	Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
†Group A Effluent Limitations on Dry Weather Flow [25 *Pa. Code* 89.52(c)]						
Total Iron (Fe)	(mg/l)	3.0	6.0	7.0	?	?
Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	?	?
Total Manganese (Mn)	(mg/l)	2.0	4.0	5.0	?	?
pH	(standard units)			>6.0 [Min.]	?	?
pH	(standard units)			<9.0	?	?
Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?

Dry weather flow: the base flow or surface discharge from an area or treatment facility which occurs immediately prior to a precipitation event and which resumes 24 hours after the precipitation event ends [25 *Pa. Code* 89.5].

Other Exceedances To Be Reported to PADEP in Discharge Monitoring Reports (DMRs)

All **Any routine or frequent discharge** of a toxic pollutant lacking numerical limits in the permit: **100 mg/l** [Permit Section B.3.d (1)(a)].
All **Any non-routine discharge** of a toxic pollutant lacking numerical limits in the permit: **500 mg/l** [Permit Section B.3.d (2)(a)].

TABLE 4. Reportable Exceedances of NPDES Permit Limitations in Grab Samples Analyzed by PADEP Bureau of Laboratories, Harrisburg, 2007 through 2009, from Emerald Mine, Greene County, Pennsylvania. NPDES # PA0213438, CMAP # 30841307, CRDP #30753712, CRDP #30960701. Samples were collected by mining inspectors from 10 outfalls in 13 separate months during the 31-month period, one of which (017 in 8/08) was occasioned by a fish kill reported by Pennsylvania Fish & Boat Commission.

Total Sulfates (SO4 > 100 mg/l) (Above NPDES Part B Reportable Threshold)

Outfall No.	% Over Limit	Total Months With Data	3/07	4/07	8/07	11/07	1/08	2/08	5/08	8/08	10/08	2/09	5/09	07/09	10/09	3/10
002	100	8	-----	1324.2	438.6	1083.1	1190.5	1479.7	733.4	X	1162.8	-----	920.9	-----	-----	-----
003		0	X	X	X	X	X	X	X	X	X	X	-----	-----	-----	X
004		0	X	X	X	X	X	X	X	X	-----	X	X	X	X	X
006		0	X	X	X	X	X	X	X	X	-----	X	X	X	X	X
009		0	X	X	X	X	X	X	X	X	-----	X	-----	X	X	X
012		0	X	X	X	X	X	X	X	X	-----	X	-----	X	X	X
013	30	10	<	<	<	<	X	<	<	X	-----	<	920.9	993.2	595.0	?
015	14	7	<	<	X	<	X	1258.8	<	X	X	<	<	X	------	X
016	82	11	<	<	318.1	196.3	X	176.4	152.8	X	5196.2	5439.8	4408.6	4108. 2	2396.7	?
017	100	2	X	X	X	X	X	X	X	100.8	113.4	X	-----	X	-----	----

Total Aluminum (Al) (Above 1.25 mg/l Instantaneous Maximum NPDES Part A Limit for 016)

016	9	11	1.49	<	<	<	X	<	<	X	<	<	<	<	<	?
017	50	2	X	X	X	X	X	X	X	18.1	<0.5	X	-----	X	-----	------

Symbols

X = not sampled, no information recorded by inspector
----- = no flow at time of sampling, so no sample collected by inspector
? = no results available (yet) from sampling in 2010
< = reported SO4 concentration less than 100 mg/l at any outfall or Al concentration less than 1.25 mg/l at Outfall 016

Alkalinity < Acidity (Disallowed at every Emerald Mine outfall by NPDES Permit Part A)

Recorded by PADEP sample at Outfall 002 on 30 January 2008 and again at Outfall 017 on 13 August 2008 (the time of a fish kill in Tenmile Creek near the mouth of Grimes Run just downstream from Outfall 017 at I-79 Bridge).

TABLE 5. Permittee's *MONTHLY DISCHARGE MONITORING REPORTS* during the period September 2007 through September 2009 (25 months).

CMAP # 30841316 NPDES # PA0213535 Bailey Mine and Coal Preparation Plant, Greene County PA

NPDES Outfall #	Discharge Source	Control Provided	Discharge Flow Frequency or Average Rate	Receiving Stream Name	Desig-nated Use	# Months With a DMR	# Months With No Flow	# Months With Permit Exceedances Part A	Part B
001	Surf. Runoff	Sed. Pond #10	Rain Event	Talley Run	WWF	25	0	2	7
002	"	" #2	"	"	"	25	0	7	6
003	"	" #8	"	"	"	25	0	0	7
004	Sewage	Main STP	0.05 mgd design	Enlow Fork	TSF	[29]	[0]	[0]	[0]
005	Surf. Runoff	Sed. Pond #5	Rain Event	Talley Run	WWF	25	0	0	7
006	Prep. Slurry	Impoundment	"	"	"	25	25		
007	Surf. Runoff	Sed. Pond #6	"	"	"	25	0	0	6
008	"	" 1-South Airshaft	"	UNT Owens Run	"	25	0	0	0
009	Mine Water	West Bleeders Pond NOT BUILT		Enlow Fork	TSF	25	25		
010	Surf. Runoff	Sed.Pond 5A Bleeder RECLAIMED (?)		Grinnage Run	HQ-WWF	25	25		
011	"	" #9	NOT BUILT	Talley Run	WWF	25	25		
012	"	" Windy Gap Airs.	Rain Event	UNT Crabapple Ck.	"	25	17	0	0
013	"	" 7B Bleeder Airs.	"	UNT Enlow Fk.	"	25	25		
014	"	" W.Finley Airs.	"	UNT Robinson Fk.	"	25	25		
015	"	" 4 Seasons Airs.	RECLAIMED	UNT Enlow Fk.	"	25	25		
016	"	" E.Tailgate Airs.	Rain Event	UNT Spottedtail Run	"	25	25		
017	"	" Crabapple Port.	"	Crabapple Creek	"	25	11	0	7
018	"	" South #2	"	Dunkard Fork	"	25	8	0	0
019	"	Sed.Trap 1I Airshaft REPLACED by 026		Kent Run	TSF	25	25		
020	"	Sed. Pond 4 So.#3	Rain Event	UNT SF Dunkard	"	25	22	0	0
021	"	" Crabapple Slope	"	Crabapple Creek	WWF	25	23	0	1
022	"	" " "	"	"	"	23	2	0	6
023	"	Sed. Trap 9I	"	UNT SF Dunkard	TSF	25	25	0	
024	"	" South #4	"	Barney Run	"	25	23	0	1
025	"	" " "	"	UNT Barney Run	"	25	25		
026	"	Sed. Pond So.#1 Airs.	"	Crabapple Creek	WWF	25	25		
027	"	Sed.Pond A Overl.Blt."		UNT #23 Crabap. Ck.	"	3	3		
028	"	Sed.Pond B Overl.Blt."		UNT #30 Enlow Fk.	"	3	3		
029	"	Sed.Trap 1	"	UNT #4 Crabap. Ck.	"	3	3		
030	"	Sed. Trap 3	"	"	"	3	3		
001C	Sewage	Crab. Port. STP	0.025 mgd design	Crabapple Creek	"	[29]	[0]	[0]	[0]
001WF	"	W.Finley Port.STP	"	UNT Robinson Fk	"	0	-	-	-

This information was obtained primarily from Module 12 in pending applications for Bailey mine expansions necessitating mining permit revisions, especially Form 12.1A.

The main Bailey Mine sewage treatment plant (Outfall 004 in the list above) apparently is filed under NPDES Permit # PA 0092894 and is not discussed here. Crabapple Portal STP is NPDES Permit # PA 0217620, and West Finley Portal STP is NPDES Permit # PA 0216747.

Bailey Mine CRDA (Coal Refuse Disposal Areas) No. 1 and No. 2 are filed as CMAP # 30810703, NPDES # PA 0091894 and not discussed here.

Bailey Mine CRDA No. 3 and No. 4 are filed as CMAP # 30020701, NPDES # PA 0235482 and not discussed here.

Exceedances of **Mn** were acknowledged by the permittee at Outfall 002 during December 2008 and January 2009.

- means no data collected. Blank means no data provided by PADEP for analysis.

TABLE 6. Exceedances of Permit Limitations, Missing Required Results, and Impossible Data

According to Discharge Monitoring Reports (DMRs), September 2007 through September 2009 (25 months; 29 outfalls with at least partial data reported).

NPDES # PA0213535 CMAP # 30841316 Bailey Mine and Preparation Plant, Greene County PA

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	Comments
001	**09/07**	**Alkalinity>Acidity**	**Always**	**none**	Allegedly sampled but results not reported
	10/07	"	"	"	"
	11/07	"	"	"	"
	12/07	"	"	"	"
		Mn (total)	**1.5 mg/l Avg**	**2.88 mg/l Avg**	No acknowledgement or explanation
		"	**3.0 mg/l Max**	**3.15 mg/l Max**	"
	01/08	"	**1.5 mg/l Avg**	**3.0 mg/l Avg**	"
		"	**3.0 mg/l Max**	**4.5 mg/l Max**	"
		Alkalinity>Acidity	**Always**	**none**	Allegedly sampled but results not reported
	02/08	"	"	"	"
	03/08	"	"	"	"
	05/08	"	"	"	"
	06/08	"	"	"	"
	01/09	**SO4, Specific Conductance**			Not sampled or reported for quarter
	07/09	"			"
	08/09	"			"
	09/09	"			"
002	**09/07**	**Alkalinity>Acidity**	**Always**	**none**	"
	10/07	"	"	"	"
	11/07	"	"	"	"
	12/07	"	"	"	"
		Mn (total)	**1.5 mg/l Avg**	"	No acknowledgement or explanation
		Fe (total)	**1.5 mg/l Avg**	"	"
		TSS	**35 mg/l Avg**	"	"
	01/08	**Mn (total)**	**1.5 mg/l Avg**	**8.80 mg/l Avg**	"
		"	**3.0 mg/l Max**	**8.90 mg/l Max**	"
		Fe (total)	**1.5 mg/l Avg**	**1.79 mg/l Avg**	"
		Alkalinity>Acidity	**Always**	**none**	Allegedly sampled but results not reported
	02/08	"	"	"	"
		Mn (total)	**1.5 mg/l Avg**	**1.63 mg/l Avg**	No acknowledgement or explanation
	03/08	"	**3.0 mg/l Max**	**6.16 mg/l Max**	"
		Alkalinity>Acidity	**Always**	**none**	Allegedly sampled but results not reported
	05/08	"	"	"	"
	06/08	**Mn (total)**	**1.5 mg/l Avg**	**2.22 mg/l Avg**	No acknowledgement or explanation
	07/08	"	**1.5 mg/l Avg**	**1.75 mg/l Avg**	"
		"	**3.0 mg/l Max**	**3.06 mg/l Max**	"
	12/08	"	**1.5 mg/l Avg**	**3.94 mg/l Avg**	**Acknowledged by letter 27 January 2009; cause of non-)**
		"	**3.0 mg/l Max**	**6.10 mg/l Max**	**compliance unknown, but "measures" taken to lower Mn)**
	01/09	"	**1.5 mg/l Avg**	**1.73 mg/l Avg**	**Acknowledged by letter 16 February 2009; cause of non-)**
		"	**3.0 mg/l Max**	**3.67 mg/l Max**	**compliance unknown, but "measures" taken to lower Mn)**
		SO4, Specific Conductance			Not sampled or reported for quarter
	07/09	"			"
	08/09	"			"
	09/09	"			"
003	**09/07**	**Alkalinity>Acidity**	**Always**	**none**	Allegedly sampled but results not reported
	10/07	"	"	"	"
	11/07	"	"	"	"
	12/07	"	"	"	"
	01/08	"	"	"	"
	02/08	"	"	"	"
	03/08	"	"	"	"
	05/08	"	"	"	"
	06/08	"	"	"	"
	01/09	**SO4, Specific Conductance**			Not sampled or reported for quarter
	07/09	"			"
	08/09	"			"
	09/09	"			"

TABLE 6. Exceedances of Permit Limitations, Missing Results, and Impossible Data, Bailey Mine, 2007-2009 (continued).

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	Comments
004	**All**				DMRs missing (NPDES # PA 0092894; but see Table 8)
005	**09/07**	**Alkalinity>Acidity**	**Always**	**none**	Allegedly sampled but results not reported
	10/07	"	"	"	"
	11/07	"	"	"	"
	12/07	"	"	"	"
	01/08	"	"	"	"
	02/08	"	"	"	"
	03/08	"	"	"	"
	05/08	"	"	"	"
	06/08	"	"	"	"
	01/09	**SO4, Specific Conductance**			Not sampled or reported for quarter
	07/09	"			"
	08/09	"			"
	09/09	"			"
007	**09/07**	**Alkalinity<Acidity**	**Always**	**none**	Allegedly sampled but results not reported
	10/07	"	"	"	"
	11/07	"	"	"	"
	01/08	"	"	"	"
		Al, SO4, Specific Conductance			No quarterly data collected
	02/08	"			"
		Alkalinity>Acidity	**Always**	**none**	Allegedly sampled but results not reported
	03/08	"	"	"	"
		Al, SO4, Specific Conductance			No quarterly data collected
	05/08	**Alkalinity>Acidity**	**Always**	**none**	Allegedly sampled but results not reported
	06/08	"	"	"	"
	01/09	**SO4, Specific Conductance**			Not sampled or reported for quarter
	07/09	"			"
	08/09	"			"
	09/09	"			"
		Fe, TSS, Mn, pH, Alk>Acidity			Only one sample, two required, yet 'averages' reported
012	**03/08**	**Al, SO4, Specific Conductance**			No quarterly sample data reported
	04/08	**Settleable Solids**		**permit: ml/l**	Permittee furnished mg/l
	12/08	"		"	"
	01/09	"		"	"
	04/09	"		"	"
	05/09	"		"	"
017	**04/08**	**Settleable Solids**		**permit: ml/l**	Permittee furnished mg/l
	07/08	"		"	"
	12/08	"		"	"
	01/09	"		"	"
	05/09	"		"	"
	08/09	**Al, SO4, Specific Conductance**			Not sampled or reported for quarter
018	**04/08**	**Settleable Solids**		**permit: ml/l**	Permittee furnished mg/l
	07/08	"		"	"
	11/08	"		"	"
	01/09	"		"	"
		Al, SO4, Specific Conductance			Not sampled or reported for quarter
	04/09	**Settleable Solids**		**permit: ml/l**	Permittee furnished mg/l
	05/09	"		"	"

TABLE 6. Exceedances of Permit Limitations, Missing Results, and Impossible Data, Bailey Mine, 2007-2009 (concluded).

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	Comments	
020	**09/07**	**TSS**		**permit: mg/l**	Permittee furnished ml/l	
	10/07	**“**		**“**	**“**	
	11/07	**“**		**“**	**“**	
	12/07	**“**		**“**	**“**	
	01/08	**“**		**“**	**“**	
	02/08	**“**		**“**	**“**	
	03/08	**“**		**“**	**“**	
		Fe, TSS, Mn, pH, Al, Alk>Ac			Only one sample, two required, no averages reported	
		SO4, Specific Conductance			No quarterly data collected	
	12/08	**Fe, TSS, Mn, Al**			Only one sample, two required, no averages reported	
	01/09	**“**			**“**	
	All	**Osmotic Pressure**			Not included on completed DMRs	
021	**03/08**	**Al, SO4, Specific Conductance**			No quarterly data collected (?)	
022	**04/08**	**Settleable Solids**		**permit: ml/l**	Permittee furnished mg/l	
	05/08	**Fe, TSS, Mn**			Sampled twice but no averages reported	
	07/08	**Settleable Solids**		**permit: ml/l**	Permittee furnished mg/l	
	11/08	**“**		**“**	**“**	
	01/09	**“**		**“**	**“**	
	03/09	**“**		**“**	**“**	
	04/09	**Settleable Solids**		**permit: ml/l**	Permittee furnished mg/l	
	07/09	**SO4, Specific Conductance**			Not sampled or reported for quarter	
	08/09	**Al, SO4, Specific Conductance**			**“**	
	09/09	**“**			**“**	
024	**12/08**	**Settleable Solids**		**permit: ml/l**	Permittee furnished mg/l	
	05/09	**Settleable Solids**		**permit: ml/l**	Permittee furnished mg/l	
		SO4	**100 mg/l**	**107 mg/l**	Reportable per NPDES Part B; not reported	**All**
		Osmotic Pressure			Not included on completed DMRs	
025	**03/08**	**Al, SO4, Specific Conductance**			No quarterly data collected	
	All	**Osmotic Pressure**			Not included on completed DMRs	
029	**All**	**“**			**“**	
030	**All**	**“**			**“**	

In addition to the Alkalinity > Acidity <u>data not reported</u> when there apparently was sampling, as shown above, 311 of these DMRs show the converse, *viz.*, Alkalinity > Acidity <u>results based on no sampling</u> for that parameter during the month (bogus data).

No Supplemental Laboratory Accreditation Forms were included with the DMRs showing who did analyses or what methods were used.

Two letter reports acknowledging Mn exceedances at Outfall 002 in December 2008 and January 2009 are the only exceedances acknowledged by the permittee. No explanations were provided for missing data during the period under review.

Outfall 004 is main sewage treatment plant NPDES Permit # PA 0092894. Zero exceedances reported during the review period.

Outfall 001C Crabapple Portal sewage treatment plant is NPDES Permit # PA 0217620. Zero exceedances reported during the review period.

Outfall 001WF West Finley Portal sewage treatment plant is NPDES Permit # PA 0216747. No data collected during review period.

TABLE 7. Bailey Mine, Greene County, Pennsylvania, NPDES Permit Part A Limitations.

Exceedances are to be reported to PADEP with explanation per DMR Instructions and Permit Part B.

Mandated National Pollutant Discharge Elimination System Permit Conditions and Requirements

NPDES # PA0213535 **CMAP # 30841316**

Outfall/ Designated Use	Discharge Parameter (symbol)	(units)	End of Pipe from Pond Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
001	Flow	(mgd)				2/month	estimated
WWF	Total Iron (Fe)	(mg/l)	1.5	3.0	4.0	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.5	3.0	4.0	"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	"	"
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
002	Flow	(mgd)				2/month	estimated
WWF	Total Iron (Fe)	(mg/l)	1.5	3.0	3.8	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.5	3.0	3.8	"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	"	"
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
003	Flow	(mgd)				2/month	estimated
WWF	Total Iron (Fe)	(mg/l)	1.5	3.0	3.8	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.5	3.0	3.8	"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	"	"
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
004 TSF	none [Sewage treatment plant NPDES Permit # PA 0092894. Why also assigned an outfall number under this NPDES permit? See Table 9.]						
005	Flow	(mgd)				2/month	estimated
WWF	Total Iron (Fe)	(mg/l)	1.5	3.0	3.8	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.5	3.0	3.8	"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	"	"
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?

TABLE 7. Bailey Mine, Greene County, Pennsylvania, NPDES Permit Limitations (continued).

NPDES # PA0213535 **CMAP # 30841316**

End of Pipe from Pond

Outfall/ Designated Use	Discharge Parameter (symbol)	(units)	Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
006	Flow	(mgd)				2/month	estimated
WWF	Total Iron (Fe)	(mg/l)	1.5	3.0	3.8	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.5	3.0	3.8	"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	"	"
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3)	count		0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
007	Flow	(mgd)				2/month	estimated
WWF	Total Iron (Fe)	(mg/l)	1.5	3.0	3.8	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.5	3.0	3.8	"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	"	"
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3)	count		0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
008	Flow	(mgd)				2/month	estimated
WWF	Total Iron (Fe)	(mg/l)	1.5	3.0	3.8	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.0	2.0	2.5	"	"
	Total Aluminum (Al)	(mg/l)	0.5	1.0	1.3	"	"
	*Total Sulfates (SO4)	(mg/l)				1/quarter	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	*Osmotic Pressure	(mos/kg)	50.	100.	125.	1/month	"
	pH	(standard units)			≥6.0 [Min.]	1/month	"
	pH	(standard units)			≤9.0	"	"
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3)	count		0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
009	Flow	(mgd)				2/month	estimated
TSF	Total Iron (Fe)	(mg/l)	1.7	3.4	4.3	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.2	2.4	3.0	"	"
	Total Aluminum (Al)	(mg/l)	0.6	1.2	1.5	"	"
	*Total Sulfates (SO4)	(mg/l)				1/quarter	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	*Osmotic Pressure	(mos/kg)	60.	120.	150.	"	"
	pH	(standard units)			≥6.0 [Min.]	1/month	"
	pH	(standard units)			≤9.0	"	"
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3)	count		0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?

TABLE 7. Bailey Mine, Greene County, Pennsylvania, NPDES Permit Limitations (continued).
NPDES # PA0213535 CMAP # 30841316

Outfall/ Designated Use	Discharge Parameter (symbol)	(units)	End of Pipe from Pond Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
010	*Flow	(mgd)				1/month	estimated
HQ-WWF	*Total Iron (Fe)	(mg/l)			7.0	"	grab
	*Total Settleable Solids	(ml/l) [*sic*]			0.5	"	
	*Total Manganese (Mn)	(mg/l)				"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
011	Flow	(mgd)				2/month	estimated
WWF	Total Iron (Fe)	(mg/l)	1.5	3.0	3.8	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.5	3.0	3.8	"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	1/month	"
	pH	(standard units)			≤9.0	"	"
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
012	*Flow	(mgd)				1/month	estimated
WWF	*Total Iron (Fe)	(mg/l)			7.0	"	grab
	*Total Settleable Solids	(ml/l)[*sic*]			0.5	"	"
	*Total Manganese (Mn)	(mg/l)				"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
013	*Flow	(mgd)				1/month	estimated
WWF	*Total Iron (Fe)	(mg/l)			7.0	"	grab
	*Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	*Total Manganese (Mn)	(mg/l)				"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						

TABLE 7. Bailey Mine, Greene County, Pennsylvania, NPDES Permit Limitations (continued).
NPDES # PA0213535 CMAP # 30841316

Outfall/ Designated Use	Discharge Parameter (symbol)	(units)	End of Pipe from Pond Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
014	Flow	(mgd)				2/month	estimated
WWF	Total Iron (Fe)	(mg/l)	2.5	5.0	6.3	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.7	3.4	4.3	"	"
	Total Aluminum (Al)	(mg/l)	0.8	1.6	2.0	"	"
	*Total Sulfates (SO4)	(mg/l)				1/quarter	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
015	Flow	(mgd)				2/month	estimated
WWF	Total Iron (Fe)	(mg/l)	3.0	6.0	7.0	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	2.0	4.0	5.0	"	"
	Total Aluminum (Al)	(mg/l)	0.9	1.8	2.2	"	"
	*Total Sulfates (SO4)	(mg/l)				1/quarter	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
016	*Flow	(mgd)				1/month	estimated
WWF	*Total Iron (Fe)	(mg/l)			7.0	"	grab
	*Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	*Total Manganese (Mn)	(mg/l)				"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
017	*Flow	(mgd)				1/month	estimated
WWF	*Total Iron (Fe)	(mg/l)			7.0	"	grab
	*Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	*Total Manganese (Mn)	(mg/l)				"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						

TABLE 7. Bailey Mine, Greene County, Pennsylvania, NPDES Permit Limitations (continued).

NPDES # PA0213535 **CMAP # 30841316**

Outfall/ Designated Use	Discharge Parameter (symbol)	(units)	End of Pipe from Pond Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
018	*Flow	(mgd)				1/month	estimated
WWF	*Total Iron (Fe)	(mg/l)			7.0	"	grab
	*Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	*Total Manganese (Mn)	(mg/l)				"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
019	*Flow	(mgd) [replaced by Outfall 026 in July 2009]				1/month	estimated
TSF	*Total Iron (Fe)	(mg/l)			7.0	"	grab
	*Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	*Total Manganese (Mn)	(mg/l)				"	"
	*Total Aluminum (Al)	(mg/l)			6.8	1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
020	Flow	(mgd)				2/month	estimated
TSF	Total Iron (Fe)	(mg/l)	3.0	6.0	7.0	"	grab
	Total Suspended Solids (TSS)	(mg/l)	30.	60.	75.	"	"
	Total Manganese (Mn)	(mg/l)	2.0	4.0	5.0	"	"
	Total Aluminum (Al)	(mg/l)				"	"
	*Total Sulfates (SO4)	(mg/l)				1/quarter	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	*Osmotic Pressure	(mos/kg)				?	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
021	*Flow	(mgd)				1/month	estimated
WWF	*Total Iron (Fe)	(mg/l)			7.0	"	grab
	*Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	*Total Manganese (Mn)	(mg/l)				"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						

TABLE 7. Bailey Mine, Greene County, Pennsylvania, NPDES Permit Limitations (continued).
NPDES # PA0213535 CMAP # 30841316

Outfall/ Designated Use	Discharge Parameter (symbol)	(units)	End of Pipe from Pond Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
022	*Flow	(mgd)				1/month	estimated
WWF	*Total Iron (Fe)	(mg/l)			7.0	"	grab
	*Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	*Total Manganese (Mn)	(mg/l)				"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
023	*Flow	(mgd)				1/month	estimated
WWF	*Total Iron (Fe)	(mg/l)			7.0	"	grab
	*Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	*Total Manganese (Mn)	(mg/l)				"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
024	*Flow	(mgd)				1/month	estimated
TSF	*Total Iron (Fe)	(mg/l)			7.0	"	grab
	*Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	*Total Manganese (Mn)	(mg/l)				"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)			.	?	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
025	*Flow	(mgd)				1/month	estimated
TSF	*Total Iron (Fe)	(mg/l)			7.0	"	grab
	*Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	*Total Manganese (Mn)	(mg/l)				"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)			.	?	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						

TABLE 7. Bailey Mine, Greene County, Pennsylvania, NPDES Permit Limitations (continued).

NPDES # PA0213535 **CMAP # 30841316**

Outfall/ Designated Use	Discharge Parameter (symbol)	(units)	End of Pipe from Pond — Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
026	*Flow	(mgd)				1/month	estimated
WWF	*Total Iron (Fe)	(mg/l)			7.0	"	grab
	*Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	*Total Manganese (Mn)	(mg/l)				"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
027	*Flow	(mgd)				1/month	estimated
WWF	*Total Iron (Fe)	(mg/l)			7.0	"	grab
	*Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	*Total Manganese (Mn)	(mg/l)				"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
028	*Flow	(mgd)				1/month	estimated
WWF	*Total Iron (Fe)	(mg/l)			7.0	"	grab
	*Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	*Total Manganese (Mn)	(mg/l)				"	"
	*Total Aluminum (Al)	(mg/l)				1/quarter	"
	*Total Sulfates (SO4)	(mg/l)				"	"
	*Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	[??Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.??]						
029	Flow	(mgd)				1/month	estimated
WWF	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)				?	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						

TABLE 7. Bailey Mine, Greene County, Pennsylvania, NPDES Permit Limitations (concluded).
NPDES # PA0213535 CMAP # 30841316

End of Pipe from Pond

Outfall/ Designated Use	Discharge Parameter (symbol)	(units)	Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
030	Flow	(mgd)				1/month	estimated
WWF	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)				?	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?

Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.

†Group A Effluent Limitations on Dry Weather Flow [25 *Pa. Code* 89.52(c)]

Total Iron (Fe)	(mg/l)	3.0	6.0	7.0	?	?
Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	?	?
Total Manganese (Mn)	(mg/l)	2.0	4.0	5.0	?	?
pH	(standard units)			≥6.0 [Min.]	?	?
pH	(standard units)			≤9.0	?	?
Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?

Dry weather flow: the base flow or surface discharge from an area or treatment facility which occurs immediately prior to a precipitation event and which resumes 24 hours after the precipitation event ends [25 *Pa. Code* 89.5]

*Minimum sampling frequency specified in Part A does not allow computation of average specified by Part B blank DMR.

Other Exceedances To Be Reported to PADEP in Discharge Monitoring Reports (DMRs)

All **Any routine or frequent discharge** of a toxic pollutant lacking numerical limits in the permit: **100 mg/l** [Permit Section B.3.d (1)(a)].
All **Any non-routine discharge** of a toxic pollutant lacking numerical limits in the permit: **500 mg/l** [Permit Section B.3.d (2)(a)].

TABLE 8. PADEP Sampling Results from about 70 Grab Samples Collected at Bailey Mine, Greene County, Pennsylvania, and Analyzed by Bureau of Laboratories, Harrisburg. Thirty three outfalls were recorded as having no flow when inspected during the period under review (2007-2010).

Total Sulfates (SO4) NPDES Part B Requires Reporting if >100 mg/l (no numerical limit in Part A)

Outfall	2007				2008					2009				2010	% of Samples
	03/05	05/14	07/24	11/15	02/25	04/17	07/28	08/12	11/18	02/17	04/15	08/05	10/14	01/19	> 100 mg/l
001	460.5	381.1	281.1	240.8	554.7	461.6	NS	298.0	227.0	514.4	NS	NS	624.2	480.9	100
002	1065.6	1385.1	1143.8	1185.9	1672.5	1373.5	NS	1200.9	1346.5	1032.6	NS	NS	D	1175.2	100
003	656.2	1055.9	837.5	NS	779.8	724.4	NS	NR	1258.6	217.9	NS	NS	1112.0	883.1	100
005	160.6	153.4	276.9	246.4	120.0	157.8	NS	225.1	500.7	255.4	NS	NS	286.6	217.0	100
007	289.6	339.8	424.1	283.8	200.8	185.5	NS	266.6	442.4	204.6	NS	NS	461.3	NS	100
008	NS	NS	NS	1195.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	100
012	NA	NS	NS	NS	NS	NS	NS	NR	NR	NS	<	NS	NS	NA	0
013	NS	NS	NS	NS	NS	D	D	NS	NS	NS	D	NS	NS	NS	
014	NS	NS	NS	NS	NS	D	NS	NS	NS	NS	<	D	NS	NS	0
016	NS	NS	NS	NS	NS	D	NS	NS	NS	NS	<	D	NS	NA	0
017	NA	NS	NS	NS	120.9	NS	NS	NS	NS	NS	NS	D	NS	NS	100
018	NS	NS	NS	D	NS	NR	NS	NS	NS	NS	<	D	NS	NA	0
020	NS	NS	NS	NS	NS	D	D	NS	NS	NS	D	D	NS	NS	
021	NA	NS	NS	D	208.9	NS	NR	NS	NS	NS	NS	NS	NS	NS	100
022	NA	NS	NS	D	486.2	NS	NR	NS	NS	598.8	NS	NS	NS	NS	100
023	NA	NS	NS	NS	NS	D	D	NS	NS	NS	D	NS	NS	D	
024	NS	NS	NS	NS	NS	D	D	NS	NS	NS	D	D	NS	D	
025	NS	NS	NS	NS	NS	D	D	NS	NS	NS	D	NS	NS	D	
026	NS	NS	NS	NS	NS	D	D	NS	NS	NS	D	NS	NS	D	

D = No flow on inspection date, so no sample collected.
NA = Sample collected on this date was not analyzed for this parameter.
NR = Results not provided by PADEP, but expected from inspector's sample submission.
NS = Outfall not sampled on this date; no record as to dry or flowing.
< = SO4 < 100 mg/l
There is no longer any NPDES permit limit for SO4.

Total Iron (Fe)

Outfall 021 15 November 2007 14.30 mg/l (exceeds NPDES Part A 7.0 mg/l Instantaneous Maximum Limit)

Acidity > Alkalinity

Outfall 001 15 November 2008 375.20 mg/l CaCO3 Acidity > 370.4 mg/l CaCO3 Alkalinity (outside NPDES Part A Limit)

TABLE 9. Bailey Mine, Greene County, Pennsylvania, NPDES Permit Limitations for Sanitary Sewage Outfalls.

Mandated National Pollutant Discharge Elimination System Permit Conditions and Requirements.

Permit No.	Outfall No.	Avg. Mo. Discharge (mgd)	CBOD-5 (mg/l) Avg. Mo. / Inst. Max. 5/1-10/31	11/1-4/30	TSS (mg/l) Avg.Mo. / Inst. Max	NH3-N (mg/l) Avg.Mo. / Inst. Max. 5/1-10/31	11/1-4/30	Tot. Resid. Chlorine (mg/l) Avg.Mo ./ Inst.Max.
PA0092894 formerly PA213535	004	0.05	20 / 40	25 / 50	30 / 60	4.0 / 8.0	12.0 / 24.0	1.4 / 3.3
PA0217620	001(C)	0.025	25 / 50	25 / 50	30 / 60	3.0 / 6.0	9.0 / 18.0	0.4 / 1.0
PA0216747	001(WF)	0.025	25 / 50	25 / 50	30 / 60	5.0 / 10.0	15.0 / 30.0	0.5 / 1.0

Permit No.	Outfall No.	Min. DO (mg/l)	Fecal Coliforms (Geom. Mean / 100 ml) Avg. Mo. / Inst. Max. 5/1-10/31	11/1-4/30	pH (std. units) Min.	Max.	Receiving Stream Designated Use	Avg.Flow (cfs)
PA0092894	004	3.0	200 / 1,000	2,000 / 10,000	6.0	9.0	TSF	0.1270
PA0217620	001(C)	4.0	200 / 1,000	2,000 / 10,000	6.0	9.0	WWF	0.1814
PA0216747	001(WF)	3.0	200 / 1,000	2,000 / 10,000	6.0	9.0	WWF	0.0000

For these outfalls no monitoring is required for parameters for which numerical limits were not specified.

All parameters are to be measured (flow) or grab-sampled (others) at least twice per month, except for total residual chlorine, which is to be grab-sampled 4 times per month. All samples to be taken at the outfall pipe.

The Bailey Mine Main Portal STP discharges to Enlow Fork (24 sq. mi. upstream drainage), through which the water flows to Wheeling Creek and the Ohio River.

The Crabapple Portal STP discharges to Crabapple Creek (5.67 sq. mi. upstream drainage), thence to Dunkard Fork, Wheeling Creek, and the Ohio River.

When operational, the West Finley Portal STP discharges to a dry swale (0.1 sq. mi. upstream drainage), thence to Robinson Fork, Enlow Fork, Wheeling Creek, and the Ohio River.

TABLE 10. Monthly DISCHARGE MONITORING REPORTS during the period January 2008 through January 2010. PADEP provided as many as 19 months of completed DMRs for this 25-month period.

CMAP #30841317 NPDES # PA0213527 Enlow Fork Mine, Greene and Washington Counties PA

NPDES Outfall #	Discharge Source (acres)	Control Provided and Location	Design Flow	Receiving Stream Name	Designated Use (Ch. 93)	Months With Some DMR Data	Months With No Flow
001	Runoff, ringwater	Sed.Pond 2Nor.#1 Airsh.		UNT Templeton Fk.	TSF	0	(RECLAIMED)
002		" B1 Bleeder Airshaft		UNT Beham Run	WWF	0	"
003	Ringwater	Ringwater Pond Newland Airshaft		UNT Enlow Fork	TSF	0	18
004		Sed.Pond Sugar Camp 1E. Airsh.		"	"	0	18
005		" Sugar Camp 1W.		"	"	0	18
006	Runoff	" B6 Bleeder Airshaft		UNT Robinson Fork	WWF	0	18
007		" C5 Bleeder Airshaft		UNT Boothe Run	WWF	0	18
008		" 3Nor.#1 Airshaft		UNT Long Run	TSF	16	3
009		" E1 Bleeder Airshaft		UNT Enlow Fork	WWF (?)	0	18
010		" 3Nor.#2 Airshaft		Rocky Run	TSF	18	1
011		" F7 Airshaft		UNT Templeton Fk.	"	0	18
012		" 1 3Nor.#3 Airshaft, OakSpring Slope		UNT Rocky Run	"	16	2
013		Sed.Trap E9 Airshaft		UNT Short Creek	"	19	0
014	Runoff, ringwater	Sed.Pond 3Nor.#4 Airshaft		UNT Templeton Fk.	"	6	12
015		" F14 Airshaft		"	"	0	18
016	Runoff	" 4Nor.#1E15 Airshafts		UNT Short Creek	"	1	17
017	"	"		"		17	2
018		" 1 Archer Run/Slope, Prosperity Portal				PERMIT WITHDRAWN	
019		" 2 " " " "					"
020		" 3 " " " "					"
021		" Temp. Archer Run Water Supply					"
022		?					
023		?					
024		?					
025	Runoff (15.6)	" 3Nor.#5 Airshaft/Portal	31.2 cfs (max)	UNT32991 BuffaloCk.	HQ-WWF	0	12
026		" F20 Bleeder Airshaft				0	
027		" 2 OakSpring Slope				PERMIT PENDING	
028		" E22 Bleeder					"
029	Surf. Runoff (8.2)	" 79R Phase 1 Overland Conveyor	29.3 cfs (10y/24h)	Long Run	TSF		"

No Supplemental Laboratory Accreditation Forms were included with the DMRs.
Information on outfalls compiled from Enlow Fork Mine Forms 12.A.1.
Ringwater includes both mine drainage and surface runoff.

TABLE 11. Exceedances of Permit Limitations, Missing Required Results, and Impossible Data
According to Discharge Monitoring Reports (DMRs) Provided by PADEP
January 2008 through January 2010

NPDES # PA0213527 CMAP # 3084131 Enlow Fork Mine, Washington and Greene Counties PA

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	Comments
001	**07/09**	**Alkalinity<Acidity**	**0**	**0**	**Not sampled but data reported** (as mg/l CaCO3)
	08/09	"	"	"	(should be count)
	09/09	"	"	"	"
	10/09	"	"	"	"
	11/09	"	"	"	"
	12/09	"	"	"	"
	01/10	"	"	"	"
002	**07/09**	**Alkalinity<Acidity**	**0**	**0**	**Not sampled but data reported** (as mg/l CaCO3)
	08/09	"	"	"	(should be count)
	09/09	"	"	"	"
	10/09	"	"	"	"
	11/09	"	"	"	"
	12/09	"	"	"	"
	01/10	"	"	"	"
003	**01/08**	**Alkalinity<Acidity**	**0**	**0**	**Not sampled but data reported** (as mg/l CaCO3)
	02/08	"	"	"	(should be count)
	06/08	"	"	"	"
	11/08	"	"	"	"
	12/08	"	"	"	"
	01/09	"	"	"	"
	02/09	"	"	"	"
	03/09	"	"	"	"
	04/09	"	"	"	"
	05/09	"	"	"	"
	06/09	"	"	"	"
	07/09	"	"	"	"
	08/09	"	"	"	"
	09/09	"	"	"	"
	10/09	"	"	"	"
	11/09	"	"	"	"
	12/09	"	"	"	"
	01/10	"	"	"	"

TABLE 11. Exceedances of Permit Limitations, Missing Required Results, and Impossible Data, Enlow Fork (continued).

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	Comments
004	**01/08**	**Alkalinity<Acidity**	**0**	**0**	**Not sampled but data reported** (as mg/l CaCO3)
	02/08	**“**	**“**	**“**	**“** (should be count)
	06/08	**“**	**“**	**“**	**“**
	11/08	**“**	**“**	**“**	**“**
	12/08	**“**	**“**	**“**	**“**
	01/09	**“**	**“**	**“**	**“**
	02/09	**“**	**“**	**“**	**“**
	03/09	**“**	**“**	**“**	**“**
	04/09	**“**	**“**	**“**	**“**
	05/09	**“**	**“**	**“**	**“**
	06/09	**“**	**“**	**“**	**“**
	07/09	**“**	**“**	**“**	**“**
	08/09	**“**	**“**	**“**	**“**
	09/09	**“**	**“**	**“**	**“**
	10/09	**“**	**“**	**“**	**“**
	11/09	**“**	**“**	**“**	**“**
	12/09	**“**	**“**	**“**	**“**
	01/10	**“**	**“**	**“**	**“**
005	**01/08**	**Alkalinity<Acidity**	**0**	**0**	**Not sampled but data reported** (as mg/l CaCO3)
	02/08	**“**	**“**	**“**	**“** (should be count)
	06/08	**“**	**“**	**“**	**“**
	11/08	**“**	**“**	**“**	**“**
	12/08	**“**	**“**	**“**	**“**
	01/09	**“**	**“**	**“**	**“**
	02/09	**“**	**“**	**“**	**“**
	03/09	**“**	**“**	**“**	**“**
	04/09	**“**	**“**	**“**	**“**
	05/09	**“**	**“**	**“**	**“**
	06/09	**“**	**“**	**“**	**“**
	07/09	**“**	**“**	**“**	**“**
	08/09	**“**	**“**	**“**	**“**
	09/09	**“**	**“**	**“**	**“**
	10/09	**“**	**“**	**“**	**“**
	11/09	**“**	**“**	**“**	**“**
	12/09	**“**	**“**	**“**	**“**
	01/10	**“**	**“**	**“**	**“**
006	**01/08**	**Alkalinity<Acidity**	**0**	**0**	**Not sampled but data reported** (as mg/l CaCO3)
	02/08	**“**	**“**	**“**	**“** (should be count)
	06/08	**“**	**“**	**“**	**“**
	11/08	**“**	**“**	**“**	**“**
	12/08	**“**	**“**	**“**	**“**
	01/09	**“**	**“**	**“**	**“**
	02/09	**“**	**“**	**“**	**“**
	03/09	**“**	**“**	**“**	**“**
	04/09	**“**	**“**	**“**	**“**
	05/09	**“**	**“**	**“**	**“**
	06/09	**“**	**“**	**“**	**“**
	07/09	**“**	**“**	**“**	**“**
	08/09	**“**	**“**	**“**	**“**
	09/09	**“**	**“**	**“**	**“**
	10/09	**“**	**“**	**“**	**“**
	11/09	**“**	**“**	**“**	**“**
	12/09	**“**	**“**	**“**	**“**
	01/10	**“**	**“**	**“**	**“**

TABLE 11. Exceedances of Permit Limitations, Missing Required Results, and Impossible Data, Enlow Fork (continued).

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	Comments
007	**01/08**	**Alkalinity<Acidity**	**0**	**0**	**Not sampled but data reported** (as mg/l CaCO3)
	02/08	**“**	**“**	**“**	**“** (should be count)
	06/08	**“**	**“**	**“**	**“**
	11/08	**“**	**“**	**“**	**“**
	12/08	**“**	**“**	**“**	**“**
	01/09	**“**	**“**	**“**	**“**
	02/09	**“**	**“**	**“**	**“**
	03/09	**“**	**“**	**“**	**“**
	04/09	**“**	**“**	**“**	**“**
	05/09	**“**	**“**	**“**	**“**
	06/09	**“**	**“**	**“**	**“**
	07/09	**“**	**“**	**“**	**“**
	08/09	**“**	**“**	**“**	**“**
	09/09	**“**	**“**	**“**	**“**
	10/09	**“**	**“**	**“**	**“**
	11/09	**“**	**“**	**“**	**“**
	12/09	**“**	**“**	**“**	**“**
	01/10	**“**	**“**	**“**	**“**
008	**01/08**	**Six parameters**			Single sampling, twice monthly required (1/2 dry?)
		SO4	**[report >100 mg/l]**	**141 mg/l Q “Max”**	**PERMITTEE FAILED TO REPORT (Part B)**
		pH	**6.0 Min**		Not reported
	06/08	**SO4, Specific Conductance**			Not sampled or reported for quarter (?)
	10/08	**Six parameters**			Single sampling, twice monthly required (1/2 dry?)
	11/08	**Alkalinity<Acidity**	**0**	**0**	**Not sampled but data reported**
	12/08	**SO4, Specific Conductance**			Not sampled or reported for quarter (?)
	03/09	**Six parameters**			Single sampling, twice monthly required (1/2 dry?)
	07/09	**“**			**“**
		Alkalinity<Acidity	**0**	**0**	Reported as mg/l CaCO3 (should be count)
	08/09	**“**	**“**	**“**	**“**
	09/09	**“**	**“**	**“**	**“**
		Six parameters			Single sampling, twice monthly required (1/2 dry?)
		SO4, Specific Conductance			Quarterly parameters dropped from DMR format
	10/09	**SO4**	**[report >100 mg/l]**	**115 mg/l Q Max & Avg**	**PERMITTEE FAILED TO REPORT (Part B)**
	11/09	**Six parameters**			Not sampled (2/2 dry?)
		Alkalinity<Acidity	**0**	**0**	**No sample made, but data reported** (as mg/l CaCO3)
		SO4, Specific Conductance			**Quarterly parameters dropped from DMR format**
	12/09	**“**			**PERMITTEE FAILED TO SAMPLE OR REPORT**
	01/10	**pH**			Single sampling, twice monthly required (?)
009	**01/08**	**Alkalinity<Acidity**	**0**	**0**	**Not sampled but data reported** (as mg/l CaCO3)
	02/08	**“**	**“**	**“**	**“** (should be count)
	06/08	**“**	**“**	**“**	**“**
	11/08	**“**	**“**	**“**	**“**
	12/08	**“**	**“**	**“**	**“**
	01/09	**“**	**“**	**“**	**“**
	02/09	**“**	**“**	**“**	**“**
	03/09	**“**	**“**	**“**	**“**
	04/09	**“**	**“**	**“**	**“**
	05/09	**“**	**“**	**“**	**“**
	06/09	**“**	**“**	**“**	**“**
	07/09	**“**	**“**	**“**	**“**
	08/09	**“**	**“**	**“**	**“**
	09/09	**“**	**“**	**“**	**“**
	10/09	**“**	**“**	**“**	**“**
	11/09	**“**	**“**	**“**	**“**
	12/09	**“**	**“**	**“**	**“**
	01/10	**“**	**“**	**“**	**“**

TABLE 11. Exceedances of Permit Limitations, Missing Required Results, and Impossible Data, Enlow Fork (continued).

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	Comments
010	**01/08**	**SO4**	**[report >100 mg/l]**	**284 mg/l Q "Max"**	**PERMITTEE FAILED TO REPORT (Part B)**
	04/08	**SO4**	**[report >100 mg/l]**	**141 mg/l Q "Max"**	**PERMITTEE FAILED TO REPORT (Part B)**
	11/08	**Five parameters**			Not sampled (1/1 dry?)
		Alkalinity<Acidity	**0**	**0**	**No sample made, but data reported**
	12/08	**SO4**	**[report >100 mg/l]**	**169 mg/l Q "Max"**	**PERMITTEE FAILED TO REPORT (Part B)**
	01/09	**"**	**"**	**146 mg/l Q "Max"**	**"**
	04/09	**"**	**"**	**120 mg/l Q "Max"**	**"**
	07/09	**Alkalinity<Acidity**	**0**	**0**	Reported as mg/l CaCO3 (should be count)
	08/09	**"**	**"**	**"**	**"**
	09/09	**"**	**"**	**"**	**"**
		Al, SO4, Specific Conductance			Quarterly parameters dropped from DMR format
	10/09	**Alkalinity<Acidity**	**0**	**0**	Reported as mg/l CaCO3 (should be count)
	12/09	**"**	**"**	**"**	**"**
		Settleable solids	**0.5 ml/l [*sic*]**		**Not sampled during month** (water present)
	01/10	**SO4**	**[report >100 mg/l]**	**360 mg/l Q "Max"**	**PERMITTEE FAILED TO REPORT (Part B)**
		Alkalinity<Acidity	**0**	**0**	Reported as mg/l CaCO3 (should be count)
011	**01/08**	**Alkalinity<Acidity**	**0**	**0**	**Not sampled but data reported** (as mg/l CaCO3)
	02/08	**"**	**"**	**"**	**"** (should be count)
	06/08	**"**	**"**	**"**	**"**
	11/08	**"**	**"**	**"**	**"**
	12/08	**"**	**"**	**"**	**"**
	01/09	**"**	**"**	**"**	**"**
	02/09	**"**	**"**	**"**	**"**
	03/09	**"**	**"**	**"**	**"**
	04/09	**"**	**"**	**"**	**"**
	05/09	**"**	**"**	**"**	**"**
	06/09	**"**	**"**	**"**	**"**
	07/09	**"**	**"**	**"**	**"**
	08/09	**"**	**"**	**"**	**"**
	09/09	**"**	**"**	**"**	**"**
	10/09	**"**	**"**	**"**	**"**
	11/09	**"**	**"**	**"**	**"**
	12/09	**"**	**"**	**"**	**"**
	01/10	**"**	**"**	**"**	**"**
012	**01/08**	**Six parameters**			Single sampling, twice monthly required (1/2 dry?)
	11/08	**Six parameters**			**"**
	07/08	**Six parameters**			**"**
	08/09	**Total Susp. Solids**	**35 mg/l Avg.**	**45 mg/l Avg.**	**Permittee says cause undetermined but under study**
		Alkalinity<Acidity	**0**	**0**	Reported as mg/l CaCO3 (should be count)
	09/09	**"**	**"**	**"**	**"**
	10/09	**"**	**"**	**"**	**No sample made, but data reported** (as mg/l CaCO3)
		Six parameters			Single sampling, twice monthly required (1/2 dry?)
		Al, SO4, Specific Conductance			Quarterly parameters dropped from DMR format
	11/09	**Six parameters**			Twice monthly sampling required, none done (2/2 dry?)
		Alkalinity<Acidity	**0**	**0**	No sample made, but data reported (as mg/l CaCO3)
		Al, SO4, Specific Conductance			Quarterly parameters dropped from DMR format
	12/09	**Six parameters**			Single sampling, twice monthly required (1/2 dry?)
		Alkalinity<Acidity	**0**	**0**	Reported as mg/l CaCO3 (should be count)
		Al, SO4, Specific Conductance			Quarterly parameters dropped from DMR format
		"			**NOT SAMPLED DURING QUARTER AS REQUIRED**
	01/10	**Six parameters**			Twice monthly sampling required, none done (2/2 dry?)
		Alkalinity<Acidity	**"**	**"**	**No sample made, but data reported** (as mg/l CaCO3)
		Al, SO4, Specific Conductance			Quarterly parameters dropped from DMR format, not sampled

TABLE 11. Exceedances of Permit Limitations, Missing Required Results, and Impossible Data, Enlow Fork (continued).

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	Comments
013	**06/08**	**SO4, Specific Conductance**			Not sampled or reported for quarter (?)
	10/08	**SO4**	**[report >100 mg/l]**	**2301 mg/l Q "Max"**	**PERMITTEE FAILED TO REPORT (Part B)**
	07/09	**Alkalinity<Acidity**	**0**	**0**	Reported as mg/l CaCO3 (should be count)
	08/09	**Alkalinity<Acidity**	**0**	**0**	Reported as mg/l CaCO3 (should be count)
	09/09	"	"	"	"
		Al, SO4, Specific Conductance			Quarterly parameters dropped from DMR format
	10/09	**Alkalinity<Acidity**	**0**	**0**	Reported as mg/l CaCO3 (should be count)
	11/09	"	"	"	"
		Al, SO4, Specific Conductance			Quarterly parameters dropped from DMR format
	12/09	"	"	"	"
		Settleable solids	**0.5 ml/l**		**Not sampled during month** (water present)
	01/10	**Alkalinity<Acidity**	**0**	**0**	Reported as mg/l CaCO3 (should be count)
		SO4	**[report >100 mg/l]**	**287 mg/l Q "Max"**	**PERMITTEE FAILED TO REPORT (Part B)**
014	**01/08**	**Six parameters**			Twice monthly sampling required, none done (2/2 dry?)
		Osmotic Pressure			**Part A parameter dropped from DMR**
	02/08	**Six parameters**			Twice monthly sampling required, none done (2/2 dry?)
		Alkalinity<Acidity	**0**	**0**	**No sample made, but data reported**
		Osmotic Pressure			**Part A parameter dropped from DMR**
	04/08	**SO4**	**[report >100 mg/l]**	**158 mg/l Q "Max"**	**PERMITTEE FAILED TO REPORT (Part B)**
		Osmotic Pressure			**Part A parameter dropped from DMR, not measured**
	06/08	**Alkalinity<Acidity**	**0**	**0**	**No sample made, but data reported**
		Osmotic Pressure			**Part A parameter dropped from DMR**
	11/08	"	"	"	"
		Six parameters			Twice monthly sampling required, none done (2/2 dry?)
		Alkalinity<Acidity	**0**	**0**	**No sample made, but data reported**
	12/08	**Osmotic Pressure**			**Part A parameter dropped from DMR, not measured**
		SO4	**[report >100 mg/l]**	**215 mg/l Q "Max"**	**PERMITTEE FAILED TO REPORT (Part B)**
	01/09	"	"	**1044 mg/l Q "Max"**	"
		Six parameters			Twice monthly sampling required, none done (2/2 dry?)
		Osmotic Pressure			**Part A parameter dropped from DMR, not measured**
	02/09	**Six parameters**			Twice monthly sampling required, none done (2/2 dry?)
		Osmotic Pressure			**Part A parameter dropped from DMR**
	03/09	"			"
		Aluminum	**2.5 mg/l Avg.**	**3.08 mg/l Avg.**	Single monthly sample reported as average (not over Max. 5.0))
					Permittee reported as exceedance of unknown cause)
		Alkalinity<Acidity	**0**	**0**	**No sample made, but data reported**
	04/09	**SO4**	**[report >100 mg/l]**	**1169 mg/l Q "Max"**	**PERMITTEE FAILED TO REPORT (Part B)**
		Six parameters			Single sampling, twice monthly required (1/2 dry?)
		Osmotic Pressure			**Part A parameter dropped from DMR, not measured**
	05/09	"			"
	06/09	**Six parameters**			Twice monthly sampling required, none done (2/2 dry?)
		Alkalinity<Acidity	**0**	**0**	**No sample made, but data reported**
		Osmotic Pressure			**Part A parameter dropped from DMR**
	07/09	"			"
		Six parameters			Twice monthly sampling required, none done (2/2 dry?)
		Alkalinity<Acidity	**0**	**0**	**No sample made, but data reported** (as mg/l CaCO3)
	08/09	"	"	"	"
		Osmotic Pressure			**Part A parameter dropped from DMR**
		Six parameters			Twice monthly sampling required, none done (2/2 dry?)
	09/09	**SO4, Specific Conductance**			**Not sampled or reported for quarter** (6/6 dry?)
		Alkalinity<Acidity	**0**	**0**	**No sample made, but data reported** (as mg/l CaCO3)
		Osmotic Pressure			**Part A parameter dropped from DMR**
	10/09	"			"
		Six parameters			Twice monthly sampling required, none done (2/2 dry?)
		Alkalinity<Acidity	**0**	**0**	**No sample made, but data reported** (as mg/l CaCO3)
	11/09	"	"	"	"
		Six parameters			Twice monthly sampling required, none done (2/2 dry?)
		Osmotic Pressure			**Part A parameter dropped from DMR**
	12/09	"			"

TABLE 11. Exceedances of Permit Limitations, Missing Required Results, and Impossible Data, Enlow Fork (continued).

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	Comments
014	**12/09**	**Six parameters**			Twice monthly sampling required, none done (2/2 dry?)
		SO4, Specific Conductance			**Not sampled or reported for quarter**
		Alkalinity<Acidity	**0**	**0**	**No sample made, but data reported** (as mg/l CaCO3)
	01/10	**“**	**“**	**“**	**“**
		Six parameters			Twice monthly sampling required, none done (2/2 dry?)
		Osmotic Pressure			**Part A parameter dropped from DMR**
015	**01/08**	**Alkalinity<Acidity**	**0**	**0**	**Not sampled but data reported** (as mg/l CaCO3)
	02/08	**“**	**“**	**“**	**“** (should be count)
	06/08	**“**	**“**	**“**	**“**
	11/08	**“**	**“**	**“**	**“**
	12/08	**“**	**“**	**“**	**“**
	01/09	**“**	**“**	**“**	**“**
	02/09	**“**	**“**	**“**	**“**
	03/09	**“**	**“**	**“**	**“**
	04/09	**“**	**“**	**“**	**“**
	05/09	**“**	**“**	**“**	**“**
	06/09	**“**	**“**	**“**	**“**
	07/09	**“**	**“**	**“**	**“**
	08/09	**“**	**“**	**“**	**“**
	09/09	**“**	**“**	**“**	**“**
	10/09	**“**	**“**	**“**	**“**
	11/09	**“**	**“**	**“**	**“**
	12/09	**“**	**“**	**“**	**“**
	01/10	**“**	**“**	**“**	**“**
016	**01/08**	**Alkalinity<Acidity**	**0**	**0**	**Not sampled but data reported** (as mg/l CaCO3)
	02/08	**“**	**“**	**“**	**“** (should be count)
	06/08	**“**	**“**	**“**	**“**
	11/08	**“**	**“**	**“**	**“**
	12/08	**“**	**“**	**“**	**“**
	01/09	**“**	**“**	**“**	**“**
	02/09	**“**	**“**	**“**	**“**
	03/09	**“**	**“**	**“**	**“**
	04/09	**“**	**“**	**“**	**“**
	05/09	**“**	**“**	**“**	**“**
	06/09	**“**	**“**	**“**	**“**
	07/09	**“**	**“**	**“**	**“**
	08/09	**“**	**“**	**“**	**“**
	09/09	**“**	**“**	**“**	**“**
	10/09	**“**	**“**	**“**	**“**
	11/09	**“**	**“**	**“**	**“**
	12/09	**“**	**“**	**“**	**“**
	01/10	**“**	**“**	**“**	**“**
017	**06/08**	**SO4, Specific Conductance**			Not sampled or reported for quarter (?)
	11/08	**“**			**“**
	12/08	**“**			**“** (water present)
	07/09	**Alkalinity<Acidity**	**0**	**0**	Reported as mg/l CaCO3 (should be count)
	08/09	**“**	**“**	**“**	**“**
	09/09	**Alkalinity<Acidity**	**0**	**0**	**No sample made, but data reported** (as mg/l CaCO3)
		SO4, Specific Conductance			Quarterly parameters dropped from DMR format
		Five parameters			No monthly sample (1/1 dry?)
		Al			**Part A monthly parameter dropped from DMR**
	10/09	**Alkalinity<Acidity**	**0**	**0**	Reported as mg/l CaCO3 (should be count)

TABLE 11. Exceedances of Permit Limitations, Missing Required Results, and Impossible Data, Enlow Fork (concluded).

Outfall #	Month	Parameter	Permit Limit per DMR	Measured Value	Comments
017	**11/09**	**Al**			**Part A monthly parameter dropped from DMR**
		Five parameters			No monthly sample (1/1 dry?)
		Alkalinity<Acidity	**0**	**0**	**No sample made, but data reported** (as mg/l CaCO3)
	12/09	**Al**			**Part A monthly parameter dropped from DMR (not measured)**
		Settleable solids	**0.5 mg/l [*sic*]**		**Not measured (water present)**
		Alkalinity<Acidity	**0**	**0**	Reported as mg/l CaCO3 (should be count)
		SO4, Specific Conductance			Quarterly parameters dropped from DMR format
	01/10	**Alkalinity<Acidity**	**0**	**0**	Reported as mg/l CaCO3 (should be count)
025	**01/09**	**Alkalinity<Acidity**	**0**	**0**	**No sample made, but data reported**
	02/09	**“**	**“**	**“**	**“**
	03/09	**“**	**“**	**“**	**“**
	04/09	**“**	**“**	**“**	**“**
	05/09	**“**	**“**	**“**	**“**
	06/09	**“**	**“**	**“**	**“**
	07/09	**“**	**“**	**“**	**No sample made, but data reported** (as mg/l CaCO3)
	08/09	**“**	**“**	**“**	**“** (should be count)
	09/09	**“**	**“**	**“**	**“**
	10/09	**“**	**“**	**“**	**“**
	11/09	**“**	**“**	**“**	**“**
	12/09	**“**	**“**	**“**	**“**

The permittee reported its discharge exceedance (45 mg/l) of Part A permit limits (35 mg/l) for monthly average **total suspended solids** at Outfall 012 in August 2009 by letter dated 21 October 2009. The exceedance was attributed to unknown causes.

The permittee reported an exceedance (3.08 mg/l) of Part A permit limits (2.5 mg/l) for **aluminum** at Outfall 014 in March 2009 by letter dated 8 April 2009. The “exceedance” was attributed to unknown causes. As noted above, this may not have been an exceedance.

On completed DMRs the permittee consistently misreports the frequency of required monitoring for **aluminum** at Outfall 017 as quarterly, but usually samples **Al** at 017 monthly, as directed by Part A of the Enlow Fork NPDES permit for this outfall.

It is noteworthy that for Enlow Fork, as for Bailey, all DMRs with data for **settleable solids** report precisely the amount set as the Part A permit limitation (0.5 ml/l), never more, never less, during the period under review. One “exceedance” of this parameter (0.9 mg/l [*sic*]) at Outfall 009 during May 2007 was reported in a letter dated 17 July 2007and attributed to unknown causes. Any DMR for this date was outside the period of files scanned and thus not examined. This parameter should have been reported in ml/l according to the NPDES Permit Part A.

Outfalls “dry” at time of sampling in <u>all</u> months for which PADEP provided completed DMRs: 003, 004, 005, 006, 007, 009, 011, 015, and 025. Outfalls 005, 007, 009, 011, 015, and 025 also were dry every time they were inspected by PADEP during the period, but Outfall 006 was flowing on the one occasion (16 April 2008) when it was inspected by PADEP.

No laboratory accreditation or methods used are included with the Enlow Fork or Bailey DMRs.

TABLE 12. Enlow Fork Mine, Washington and Greene Counties, Pennsylvania, NPDES Permit Part A Limits. Exceedances are to be reported to PADEP with explanation per DMR Instructions and Permit Part B. Mandated National Pollutant Discharge Elimination System Permit Conditions and Requirements.

NPDES # PA0213527 **CMAP # 30841317**

Outfall	Discharge Parameter (symbol)	(units)	End of Pipe from Pond Δ Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
001	Flow	(mgd)				1/month	estimated
	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(mg/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm)				"	"
	Osmotic Pressure	(mos/kg)				?	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
002	Flow	(mgd)				1/month	estimated
	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm)				"	"
	Osmotic Pressure	(mos/kg)				?	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
003	Flow	(mgd)				2/month	estimated
	Total Iron (Fe)	(mg/l)	1.5	3.0	3.8	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.0	2.0	2.5	"	"
	Total Aluminum (Al)	(mg/l)	0.5	1.0	1.3	"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm)				"	"
	Osmotic Pressure	(mos/kg)	50.	100.	125.	"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
004	Flow	(mgd)				1/month	estimated
	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						

TABLE 12. Enlow Fork Mine, Washington and Greene Counties, Pennsylvania, NPDES Permit Limits (continued).

Outfall	Discharge Parameter (symbol)	(units)	End of Pipe from Pond Δ Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
005	Flow	(mgd)				1/month	estimated
	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
006	Flow	(mgd)				1/month	estimated
	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(mg/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
007	Flow	(mgd)				1/month	estimated
	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
008	Flow	(mgd)				2/month	estimated
	Total Iron (Fe)	(mg/l)	3.0	6.0	7.0	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	2.0	4.0	5.0	"	"
	Total Aluminum (Al)	(mg/l)	2.0	4.0	5.0	"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?

TABLE 12. Enlow Fork Mine, Washington and Greene Counties, Pennsylvania, NPDES Permit Limits (continued).

Outfall	Discharge Parameter (symbol)	(units)	End of Pipe from Pond Δ Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
009	Flow	(mgd)				1/month	estimated
	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm)				"	"
	Osmotic Pressure	(mos/kg)				?	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
010	Flow	(mgd)				1/month	estimated
	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
011	Flow	(mgd)				1/month	estimated
	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
012	Flow	(mgd)				2/month	estimated
	Total Iron (Fe)	(mg/l)	3.0	6.0	7.0	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	2.0	4.0	5.0	"	"
	Total Aluminum (Al)	(mg/l)	2.5	5.0	6.0	"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?

TABLE 12. Enlow Fork Mine, Washington and Greene Counties, Pennsylvania, NPDES Permit Limits (continued).

Outfall	Discharge Parameter (symbol)	(units)	End of Pipe from Pond Δ Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
013	Flow	(mgd)				1/month	estimated
	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
014	Flow	(mgd)				2/month	estimated
	Total Iron (Fe)	(mg/l)	3.0	6.0	7.0	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	2.0	4.0	5.0	"	"
	Total Aluminum (Al)	(mg/l)				"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm)				"	"
	Osmotic Pressure	(mos/kg)				?	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts						
015	Flow	(mgd)				2/month	estimated
	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				1/month	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						
016	Flow	(mgd)				1/month	estimated
	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(mg/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						

TABLE 12. Enlow Fork Mine, Washington and Greene Counties, Pennsylvania, NPDES Permit Limits (continued).

Outfall	Discharge Parameter (symbol)	(units)	End of Pipe from Pond Δ Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
017	Flow	(mgd)				1/month	estimated
	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(mg/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
025	Flow	(mgd)				1/week	measured
	Total Iron (Fe)	(mg/l)	2.7	5.4	6.75	"	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	1.79	3.58	4.48	"	"
	Total Aluminum (Al)	(mg/l)	1.33	2.66	3.33	"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm)				"	"
	Osmotic Pressure	(mos/kg)	50.	100.	125.	1/week	"
	pH	(standard units)			≥6.0 [Min.]	1/week Σ	grab Σ
	pH	(standard units)			≤9.0	" Σ	" Σ
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	" Σ	" Σ
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
026	Flow	(mgd)				1/month	estimated
	Total Iron (Fe)	(mg/l)			7.0	"	grab
	Total Settleable Solids	(mg/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	Limits apply to precipitation event flow. Dry weather flow limits† apply per Group A, 25 *Pa. Code* 86-90.						

Σ Sample frequency and type provided by PADEP in blank DMR, not in Part A of NPDES permit.

Δ Twelve outfalls are to be sampled at the end of the discharge pipe from the sediment pond; Outfall 013, at the principal spillway of the sediment trap/pond; Outfalls 003, 004, and 026, at the end of the ringwater or discharge pond; and Outfalls 009, 015, and 025, somewhere at or in the pond at the discretion of the permittee.

Outfalls 018, 019, 020, 021, 022, 023, and 024 apparently were never approved, constructed, or monitored.

†Group A Effluent Limitations on Dry Weather Flow [25 *Pa. Code* 89.52(c)]

Total Iron (Fe)	(mg/l)	3.0	6.0	7.0	?	?
Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	?	?
Total Manganese (Mn)	(mg/l)	2.0	4.0	5.0	?	?
pH	(standard units)			>6.0 [Min.]	?	?
pH	(standard units)			<9.0	?	?
Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?

TABLE 12. Enlow Fork Mine, Washington and Greene Counties, Pennsylvania, NPDES Permit Limits (concluded).

Dry weather flow: the base flow or surface discharge from an area or treatment facility which occurs immediately prior to a precipitation event and which resumes 24 hours after the precipitation event ends [25 *Pa. Code* 89.5].

Other Exceedances To Be Reported to PADEP in Discharge Monitoring Reports (DMRs)

All **Any routine or frequent discharge** of a toxic pollutant lacking numerical limits in the permit: **100 mg/l** [Permit Section B.3.d (1)].
All **Any non-routine discharge** of a toxic pollutant lacking numerical limits in the permit: **500 mg/l** [Permit Section B.3.d (2)].

TABLE 13. PADEP Sampling Results from Grab Samples Collected at Enlow Fork Mine, Greene and Washington Counties, Pennsylvania, and Analyzed by Bureau of Laboratories, Harrisburg, 2007-2009.

- 15 outfalls were inspected one to nine times during 12 inspections from 4/12/2007 through 1/14/2010.
- 72 outfall inspections with any data were recorded, of which 55 (76%) reported no flow or discharge.
- 7 outfalls always were dry (1 to 6 samples at each).
- 2 outfalls (each sampled once) “never” were dry.
- One NPDES Permit Part B reportable SO4 concentration (130.7 mg/l) was recorded at Outfall 010 on 16 April 2008, consistent with the permittee’s DMR for that outfall during that month.

TABLE 14. Discharge limit anomalies, including recommended provisions of Water Quality Pollution Reports from Planning Section, Southwest Regional Office, that WERE NOT included in NPDES Permit Part A numerical limitations [in square brackets] for Emerald, Bailey, and Enlow Fork Mines by McMurray or California District Mining Offices, and provisions that WERE included in the NPDES Permit Part A but not addressed by the Water Quality Pollution Report. No WQPR addresses the standard prohibitions on floating solids and on visible foam "in other than trace amounts." No WQPR was provided for other outfalls at these mines by the California DMO.

Outfall (Date) Discharge Designated Use	Parameter (symbol)	(units)	Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
EMERALD MINE 30841307							
002 (1986)							Not addressed
WWF	Total Iron (Fe)	(mg/l)			5.0		in WQPR
	Total Suspended Solids (TSS)	(mg/l)			90.		
	Total Manganese (Mn)	(mg/l)			3.3		
	Total Aluminum (Al)	(mg/l)			1.8		
	Specific Conductance	(µmhos/cm 25° C)					
	Osmotic Pressure	(mos/kg)			175.		
	pH	(standard units)			<9.5		
003 (1986)							
HQ-WWF	Total Iron (Fe)	(mg/l)	3.0	6.0	7.0	1/month	grab
	Total Suspended Solids (TSS)	(mg/l)	35.	70.	90.	"	"
	Total Manganese (Mn)	(mg/l)	2.0	4.0	5.0	"	"
	Total Aluminum (Al)	(mg/l)				"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			>6.0 [Min.]	1/month	"
	pH	(standard units)			<9.5	"	"
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	"	"
	Floating solids	(mg/l)			0	?	?
	Visible foam other than trace amounts				0	?	?
	WQPR says "apply BAT limitations"						Not addressed in WQPR
006 (1986)							Not addressed
WWF	Total Iron (Fe)	(mg/l)			5.3		in WQPR
	Total Suspended Solids (TSS)	(mg/l)			90.		
	Total Manganese (Mn)	(mg/l)			3.8		
	Total Aluminum (Al)	(mg/l)	0.8	1.6	2.0		
	Total Sulfates (SO4)	(mg/l)					
	Specific Conductance	(µmhos/cm 25° C)					
	Osmotic Pressure	(mos/kg)			175.		
	pH	(standard units)			<9.5		
008 (1992)							
TSF	Total Iron (Fe)	(mg/l)			8.0		Not addressed
	Total Suspended Solids (TSS)	(mg/l)			90.		in WQPR
	Total Manganese (Mn)	(mg/l)			2.5		
	Total Aluminum (Al)	(mg/l)	0.5	1.0	1.3		
	Total Sulfates (SO4)	(mg/l)					
	Specific Conductance	(µmhos/cm 25° C)					
	Osmotic Pressure	(mos/kg)			135.		
	pH	(standard units)			<9.5		

TABLE 14. NPDES Permit Limitation Anomalies (continued).

Outfall (Date)/ Designated Use	Discharge Parameter (symbol)	(units)	Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
EMERALD MINE 30841307							
009 (1993)							
WWF	Total Iron (Fe)	(mg/l)			4.0	Not addressed	
	Total Suspended Solids (TSS)	(mg/l)			90.	in WQPR	
	Total Manganese (Mn)	(mg/l)			2.5		
	Total Aluminum (Al)	(mg/l)			1.25		
	Total Sulfates (SO4)	(mg/l)					
	Specific Conductance	(µmhos/cm 25° C)					
	Osmotic Pressure	(mos/kg)		.	138.		
010 (1995)							
WWF	Total Iron (Fe)	(mg/l)	[1.5]	[3.0]	7.0	Not addressed	
	Total Settleable Solids	(ml/l) [*sic*]			0.5	in WQPR	
	Total Suspended Solids (TSS)	(mg/l)	[35.]	[70.]			
	Total Manganese (Mn)	(mg/l)	[1.0]	[2.0]	5.0		
	Total Aluminum (Al)	(mg/l)	[0.5]	[1.0]			
	Total Sulfates (SO4)	(mg/l)					
	Specific Conductance	(µmhos/cm 25° C)					
	Osmotic Pressure	(mos/kg)					
011 (1997)							
WWF	Total Iron (Fe)	(mg/l)	[3.0]	[6.0]	7.0	1/month	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Suspended Solids (TSS)	(mg/l)	[35.]	[70.]		[2/month]	[8-hr composite]
	Total Manganese (Mn)	(mg/l)	[2.0]	[4.0]	5.0	1/month	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)				?	"
	pH	(standard units)			>6.0 [Min.]	?	?
	pH	(standard units)			<9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
						WQPR recommends 2/month 8-hr composite samples for <u>all</u> parameters	
016 (2002)							
TSF	Total Iron (Fe)	(mg/l)			3.75	Not addressed	
	Total Suspended Solids (TSS)	(mg/l)			90.	in WQPR	
	Total Manganese (Mn)	(mg/l)			2.5		
	Total Aluminum (Al)	(mg/l)			1.25		
	Total Sulfates (SO4)	(mg/l)	[250.]	[500.]			
	Specific Conductance	(µmhos/cm 25° C)					
	Osmotic Pressure	(mos/kg)			125.		
BAILEY MINE 3081302							
008 (1986)							
WWF	Total Iron (Fe)	(mg/l)			3.8	Not addressed	
	Total Suspended Solids (TSS)	(mg/l) [BAT]	35.	70.	90.	in WPQR	
	Total Manganese (Mn)	(mg/l)	1.0	2.0	2.5		
	Total Aluminum (Al)	(mg/l)	0.5	1.0	1.3		
	Total Sulfates (SO4)	(mg/l)					
	Specific Conductance	(µmhos/cm 25° C)					
	Osmotic Pressure	(mos/kg)			125.		

TABLE 14. NPDES Permit Limitation Anomalies (continued).

Outfall (Date) / Designated Use	Discharge Parameter (symbol)	(units)		Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
BAILEY MINE 3081302								
009 (1986)								
TSF	Total Iron (Fe)	(mg/l)				4.3	Not addressed	
	Total Suspended Solids (TSS)	(mg/l)	[BAT]	35.	70.	90.	in WQPR	
	Total Manganese (Mn)	(mg/l)				3.0		
	Total Aluminum (Al)	(mg/l)				1.5		
	Total Sulfates (SO4)	(mg/l)						
	Specific Conductance	(µmhos/cm 25° C)						
	Osmotic Pressure	(mos/kg)			.	150.		
014 (1991)							Not addressed	
WWF	Total Iron (Fe)	(mg/l)				6.3	in WQPR	
	Total Suspended Solids (TSS)	(mg/l)				90.		
	Total Manganese (Mn)	(mg/l)				4.3		
	Total Aluminum (Al)	(mg/l)		0.8	1.6	2.0		
	Total Sulfates (SO4)	(mg/l)						
	Specific Conductance	(µmhos/cm 25° C)						
015 (1994)								
WWF	Total Iron (Fe)	(mg/l)				7.0	Not addressed	
	Total Suspended Solids (TSS)	(mg/l)				90.	in WQPR	
	Total Manganese (Mn)	(mg/l)				5.0		
	Total Aluminum (Al)	(mg/l)				2.2		
	Total Sulfates (SO4)	(mg/l)						
	Specific Conductance	(µmhos/cm 25° C)						
017 (1996)								
WWF	Total Iron (Fe)	(mg/l)		[3.0]	[6.0]	7.0	Not addressed	
	Total Settleable Solids	(ml/l) [*sic*]				0.5	in WQPR	
	Total Suspended Solids (TSS)	(mg/l)		[35.]	[70.]			
	Total Manganese (Mn)	(mg/l)		[2.0]	[4.0]			
	Total Aluminum (Al)	(mg/l)						
	Total Sulfates (SO4)	(mg/l)						
	Specific Conductance	(µmhos/cm 25° C)						
019 (2002)			[apparently replaced by Outfall 026 in July 2009]					
TSF	Total Iron (Fe)	(mg/l)		[3.0]	[6.0]	7.0	Not addressed	
	Total Settleable Solids	(ml/l) [*sic*]				0.5	in WQPR	
	Total Suspended Solids (TSS)	(mg/l)		[35.]	[70.]			
	Total Manganese (Mn)	(mg/l)		[2.0]	[4.0]			
	Total Aluminum (Al)	(mg/l)		[2.7]	[5.4]	6.8		
	Total Sulfates (SO4)	(mg/l)						
	Specific Conductance	(µmhos/cm 25° C)						

TABLE 14. NPDES Permit Limitation Anomalies (continued).

Outfall (Date)/ Designated Use	Discharge Parameter (symbol)	(units)	Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
BAILEY MINE 3081302							
020 (2004)							
TSF	Total Iron (Fe)	(mg/l)			7.0	2/month	grab
	Total Suspended Solids (TSS)	(mg/l)			75.	"	"
	Total Manganese (Mn)	(mg/l)			5.0	"	"
	Total Aluminum (Al)	(mg/l)				"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)				?	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3)	count		0	?	?
						WQPR recommends 1/week composite sampling for <u>all</u> parameters	
021 (2005)							
WWF	Total Iron (Fe)	(mg/l)			7.0	1/month	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Suspended Solids (TSS)	(mg/l)	[35.]	[70.0]		[2/month]	[composite]
	Total Manganese (Mn)	(mg/l)				1/month	grab
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3)	count		0	?	?
						WQPR recommends 2/month composite sampling for <u>all</u> parameters	
022 (2005)							
WWF	Total Iron (Fe)	(mg/l)			7.0	1/month	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Suspended Solids (TSS)	(mg/l)	[35.]	[70.0]		[2/month]	[composite]
	Total Manganese (Mn)	(mg/l)				1/month	grab
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3)	count		0	?	?
						WQPR recommends 2/month composite sampling for <u>all</u> parameters	

TABLE 14. NPDES Permit Limitation Anomalies (continued).

Outfall (Date)/ Designated Use	Discharge Parameter (symbol)	(units)	Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
BAILEY MINE 3081302							
023 (2005)							
WWF	Total Iron (Fe)	(mg/l)	[3.0]	[6.0]	7.0	1/month	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Suspended Solids (TSS)	(mg/l)	[35.]	[70.]		[2/month]	[composite]
	Total Manganese (Mn)	(mg/l)				1/month	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
						WQPR recommends 2/month composite sampling for all parameters	
024 (2005)							
TSF	Total Iron (Fe)	(mg/l)			7.0	1/month	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Suspended Solids (TSS)	(mg/l)	[35.]	[70.]		[2/month]	[composite]
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)			.	?	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
						WQPR recommends 2/month composite sampling for all parameters	
025 (2005)							
TSF	Total Iron (Fe)	(mg/l)			7.0	1/month	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Suspended Solids (TSS)	(mg/l)	[35.]	[70.]		[2/month]	[composite]
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm 25° C)				"	"
	Osmotic Pressure	(mos/kg)			.	?	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3) < (Acidity mg/l as CaCO3) count			0	?	?
						WQPR recommends 2/month composite sampling for all parameters	

TABLE 14. NPDES Permit Limitation Anomalies (continued).

Outfall (Date)/ Designated Use	Discharge Parameter (symbol)	(units)	Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
ENLOW FORK MINE 30841317							
003 (1991)							
TSF	Total Iron (Fe)	(mg/l)			3.8	Not addressed	
	Total Suspended Solids (TSS)	(mg/l)			90.	in WQPR	
	Total Manganese (Mn)	(mg/l)			2.5		
	Total Aluminum (Al)	(mg/l)			1.3		
	Total Sulfates (SO4)	(mg/l)					
	Specific Conductance	(µmhos/cm)					
	Osmotic Pressure	(mos/kg)			125.		
006 (1993)							
WWF	Total Iron (Fe)	(mg/l)	[3.0]	[6.0]	7.0	Not addressed	
	Total Settleable Solids	(mg/l) [*sic*]			0.5	in WQPR	
	Total Suspended Solids (TSS)	(mg/l)	[35.]	[70.]			
	Total Manganese (Mn)	(mg/l)	[2.0]	[4.0]			
	Total Aluminum (Al)	(mg/l)	[2.0]	[4.0]			
	Total Sulfates (SO4)	(mg/l)					
	Specific Conductance	(µmhos/cm)					
007 (1994)	(for discharges affecting surface waters)						
WWF	Total Iron (Fe)	(mg/l)	[3.0]	[6.0]	7.0	Not addressed	
	Total Settleable Solids	(ml/l) [*sic*]			0.5	in WQPR	
	Total Suspended Solids (TSS)	(mg/l)	[35.]	[70.]			
	Total Manganese (Mn)	(mg/l)	[2.0]	[4.0]			
	Total Aluminum (Al)	(mg/l)					
	Total Sulfates (SO4)	(mg/l)					
	Specific Conductance	(µmhos/cm)					
	If groundwater used for drinking would be affected, certain parameters should have lower limits:						
	Total Iron (Fe)	(mg/l)	[0.3]	[0.6]		Not addressed	
	Total Manganese (Mn)	(mg/l)	[0.05]	[0.1]		in WQPR	
	Total Aluminum (Al)	(mg/l)	[0.2]	[0.4]			
008 (1996)							
TSF	Total Iron (Fe)	(mg/l)			7.0	Not addressed	
	Total Suspended Solids (TSS)	(mg/l)			90.	in WQPR	
	Total Manganese (Mn)	(mg/l)			5.0		
	Total Aluminum (Al)	(mg/l)			5.0		
	Total Sulfates (SO4)	(mg/l)					
	Specific Conductance	(µmhos/cm)					
	If groundwater used for drinking would be affected, certain parameters should have lower limits:						
	Total Iron (Fe)	(mg/l)	[0.3]	[0.6]		Not addressed	
	Total Manganese (Mn)	(mg/l)	[0.05]	[0.1]		in WQPR	
	Total Aluminum (Al)	(mg/l)	[0.2]	[0.4]			

TABLE 14. NPDES Permit Limitation Anomalies (continued).

Outfall (Date)/ Designated Use	Discharge Parameter (symbol)	(units)	Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
ENLOW FORK MINE 30841317							
009 (1997)							
WWF	Total Iron (Fe)	(mg/l)	[3.0]	[6.0]	7.0	Not addressed	
	Total Settleable Solids	(ml/l) [*sic*]			0.5	in WQPR	
	Total Suspended Solids (TSS)	(mg/l)	[35.]	[70.]			
	Total Manganese (Mn)	(mg/l)	[2.0]	[4.0]			
	Total Aluminum (Al)	(mg/l)	[1.0]	[2.0]			
	Total Sulfates (SO4)	(mg/l)					
	Specific Conductance	(µmhos/cm)					
	Osmotic Pressure	(mos/kg)					
	WQPR states that a minimum 1.5 to 1 instream flow to waste flow dilution ratio must be maintained at Outfall 009.						
	If groundwater used for drinking would be affected, certain parameters should have lower limits:						
	Total Iron (Fe)	(mg/l)	[0.3]	[0.6]		Not addressed	
	Total Manganese (Mn)	(mg/l)	[0.05]	[0.1]		in WQPR	
	Total Aluminum (Al)	(mg/l)	[0.2]	[0.4]			
010 (1999)							
TSF	Total Iron (Fe)	(mg/l)	[3.0]	[6.0]	7.0	Not addressed	
	Total Settleable Solids	(ml/l) [*sic*]			0.5	in WQPR	
	Total Suspended Solids (TSS)	(mg/l)	[35.]	[70.]			
	Total Manganese (Mn)	(mg/l)	[2.0]	[4.0]			
	Total Aluminum (Al)	(mg/l)					
	Total Sulfates (SO4)	(mg/l)					
	Specific Conductance	(µmhos/cm)					
	If groundwater used for drinking would be affected, the following parameters should have lower limits:						
	Total Iron (Fe)	(mg/l)	[0.3]	[0.6]		Not addressed	
	Total Manganese (Mn)	(mg/l)	[0.05]	[0.1]		in WQPR	
	Total Aluminum (Al)	(mg/l)	[0.2]	[0.4]			
011 (2001)							
TSF	Total Iron (Fe)	(mg/l)	[3.0]	[6.0]	7.0	Not addressed	
	Total Settleable Solids	(ml/l) [*sic*]			0.5	in WQPR	
	Total Suspended Solids (TSS)	(mg/l)	[35.]	[70.]			
	Total Manganese (Mn)	(mg/l)	[2.0]	[4.0]			
	Total Aluminum (Al)	(mg/l)					
	Total Sulfates (SO4)	(mg/l)					
	Specific Conductance	(µmhos/cm)					
	If groundwater used for drinking would be affected, the following parameters should have lower limits:						
	Total Iron (Fe)	(mg/l)	[0.3]	[0.6]		Not addressed	
	Total Manganese (Mn)	(mg/l)	[0.05]	[0.1]		in WQPR	
	Total Aluminum (Al)	(mg/l)	[0.2]	[0.4]			

TABLE 14. NPDES Permit Limitation Anomalies (continued).

Outfall (Date)/ Designated Use	Discharge Parameter (symbol)	(units)	Part A Discharge Limitations Avg. Monthly	Max. Daily	Inst. Max.	Monitoring Requirements Measurement Frequency	Sample Type
ENLOW FORK MINE 30841317							
012 (2002)							
TSF	Total Iron (Fe)	(mg/l)	[3.0]	[6.0]	7.0	Not addressed	
	Total Settleable Solids	(ml/l) [*sic*]			0.5	in WQPR	
	Total Suspended Solids (TSS)	(mg/l)	[35.]	[70.]			
	Total Manganese (Mn)	(mg/l)	[2.0]	[4.0]			
	Total Aluminum (Al)	(mg/l)	[2.5]	[5.0]			
	Total Sulfates (SO4)	(mg/l)					
	Specific Conductance	(µmhos/cm)					
	If groundwater used for drinking would be affected, the following parameters should have lower limits:						
	Total Iron (Fe)	(mg/l)	[0.3]	[0.6]		Not addressed	
	Total Manganese (Mn)	(mg/l)	[0.05]	[0.1]		in WQPR	
	Total Aluminum (Al)	(mg/l)	[0.2]	[0.4]			
015 (2004)							
TSF	Total Iron (Fe)	(mg/l)	[3.0]	[6.0]	7.0	2/month	grab
	Total Settleable Solids	(ml/l) [*sic*]			0.5	"	"
	Total Suspended Solids (TSS)	(mg/l)	[35.]	[70.]		[2/month]	[composite]
	Total Manganese (Mn)	(mg/l)				1/month	"
	Total Aluminum (Al)	(mg/l)				1/quarter	"
	Total Sulfates (SO4)	(mg/l)				"	"
	Specific Conductance	(µmhos/cm)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
017 (2005)							
	Total Iron (Fe)	(mg/l)			7.0	1/month	grab
	Total Settleable Solids	(mg/l) [*sic*]			0.5	"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm)				"	"
	pH	(standard units)			≥6.0 [Min.]	?	?
	pH	(standard units)			≤9.0	?	?
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	?	?
	Lacking any response from Bureau of Water Quality Management, California DMO applied BAT limits to Outfall 017.						
025 (2008)							
HQ-WWF	Total Iron (Fe)	(mg/l)				1/week	grab
	Total Suspended Solids (TSS)	(mg/l)				"	"
	Total Manganese (Mn)	(mg/l)				"	"
	Total Aluminum (Al)	(mg/l)				"	"
	Total Sulfates (SO4)	(mg/l)				1/quarter	"
	Specific Conductance	(µmhos/cm)				"	"
	Osmotic Pressure	(mos/kg)			125.	1/week	"
	pH	(standard units)			≥6.0 [Min.]	1/week Σ	grab Σ
	pH	(standard units)			≤9.0	" Σ	" Σ
	Alkalinity	(mg/l as CaCO3; count < Acidity mg/l as CaCO3)			0	" Σ	" Σ
						WQPR recommends 2/month composite sampling for all parameters	

Σ indicates sample frequency and type specified only in blank DMR, not in NPDES Permit Part A.

There is no indication in any California DMO file stating the reason for non-acceptance of recommendations for discharge limits, sampling frequencies, or sample types provided by the Bureau of Water Quality Management. The basis for substituting other numerical limits and sampling frequencies is unknown.

No WQPR discusses the basis for dry-weather versus wet-weather effluent limitations.