Final ROCK RUN WATERSHED TMDL
Cambria County

For Acid Mine Drainage Affected Segments

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Introduction

This report presents the Total Maximum Daily Loads (TMDLs) developed for segments in the Rock Run Watershed (Attachment A). These were done to address the impairments noted on the 1996 Pennsylvania Section 303(d) list of impaired waters, required under the Clean Water Act, and covers one segment on that list and additional segments on later lists/reports. Rock Run was listed as impaired for metals. All impairments resulted from acid drainage from abandoned coalmines. The TMDL addresses the three primary metals associated with acid mine drainage (iron, manganese, aluminum) and pH.

Table 1. 303(d) Listed Segments										
State Water Plan (SWP) Subbasin: 08B										
HUC: 02050201 Upper West Branch Susquehanna River										
Year	Miles	Use Designation	Assessment ID	Segment ID	DEP Stream Code	Stream Name	Desig-nated Use	Data Source	Source	EPA 305(b) Cause Code
1996	3	*	*	7199	26872	Rock Run	CWF	305(b) Report	RE	Metals
1998	2.92	*	*	7199	26872	Rock Run	CWF	SWMP	AMD	Metals
2002	5.1	*	*	990923-1319-BPG	26872	Rock Run	CWF	SWMP	AMD	Other Habitat Alterations
2004	0.4	*	*	990923-1320-BPG	26873	Rock Run, Unt	CWF	SWMP	AMD	Metals
2004	0.8	*	*	990923-1320-BPG	26874	Rock Run, Unt	CWF	SWMP	AMD	Metals
2004	1	*	*	990923-1320-BPG	26875	Rock Run, Unt	CWF	SWMP	AMD	Metals
2006	Mistakenly listed in Section 4a – TMDL completed.									

Resource Extraction=RE
Warm Water Fish = WWF
Surface Water Monitoring Program = SWMP
Abandoned Mine Drainage = AMD
See Attachment D, *Excerpts Justifying Changes Between the 1996, 1998, and 2002 Section 303(d) Lists and the 2004 and 2006 Integrated Water Quality Report.* The use designations for the stream segments in this TMDL can be found in PA Title 25 Chapter 93.

Directions to the Rock Run Watershed

Rock Run, a 3.1 square mile watershed, is located in northeastern Cambria County approximately 0.5 mile from the Clearfield County line. The nearest village of St. Lawrence, Pennsylvania, lies approximately 0.5 mile to the east of the watershed. The borough of Patton

[1] Pennsylvania's 1996, 1998, and 2002 Section 303(d) lists and the 2004 and 2006 Integrated Water Quality Report were approved by the Environmental Protection Agency (EPA). The 1996 Section 303(d) list provides the basis for measuring progress under the 1997 lawsuit settlement of *American Littoral Society and Public Interest Group of Pennsylvania v. EPA.*

lies approximately 3 miles south of the watershed. Hastings Borough is southwest of the watershed. Rock Run can be accessed from State Route 4017. The only direct access to the watershed requires traveling on access roads maintained by the now bankrupt Kristanson and Johnson (K & J) Coal Company, Inc.

Watershed History

The Rock Run Watershed lies within Allegheny Mountain Section of the Appalachian Plateau Province. The landscape is characterized as narrow stream valleys that are lined by steep hills. There is a vertical drop in the watershed from 2,260 feet in its headwaters to 1,440 feet at its mouth. The average annual precipitation is 43 inches (Ackenheil 1975). The region is characterized by warm summers and long, cold winters. Temperatures change frequently and sometimes rapidly.

Coal mining was the primary land use during the first half of the 20^{th} century. Forested land now makes up 75.5 percent of the watershed. Disturbed land (abandoned coal mines, quarries, etc.) makes up 23.2 percent of the watershed. The watershed is relatively uninhabited, only 0.2 percent is developed. The remaining 1 percent is used for agriculture.

Rock Run Watershed is made up of interbedded sedimentary rock and sandstone (99.2 percent and 0.8 percent, respectively). The mineable coal seams in the watershed are the Upper Freeport and the Upper and Lower Kittanning. The soil associations within the watershed are the Hazelton-Dekalb-Buchanan series, the Gilpin-Wharton-Ernest series, and the Monongahela-Philo-Atkins series. The Gilpin-Wharton-Ernest series makes up 80.6 percent of the watershed. This association is moderately well drained with moderate to low permeability, having formed from inter-bedded shale, siltstone, and sandstone. The Hazelton-Dekalb-Buchanan series accounts for 12.1 percent of the soil coverage. This soil association is characterized by highly permeable, well-drained soils derived from the weathering of sandstone and shale. The Monongahela-Philo-Atkins series accounts for 7.3 percent of the soil coverage. This association is characterized by moderately well drained soils with moderate to low permeable, derived from alluvium deposits of shale and sandstone (USDA-NRCS 2001).

The Rock Run Watershed has been designated by the PA Code, Title 25 Chapter 93 Water Quality Standards as Cold Water Fishes (CWF). Historical records from the Pennsylvania Fish and Boat Commission indicate that Rock Run was a good fishery with plenty of forage for a wild brook trout population. From 1947 to 1961 the headwaters were stocked with fingerling brook, brown, and rainbow trout (Pa. Fish and Boat Commission). In 1969 and 1970, the Pa. DER Division of Water Quality performed two surveys on Rock Run to determine the effects of the on-going stripping operations. They found moderate siltation downstream of the operations but it had little effect on the macroinvertebrate community (Ackenheil 1975). A survey by the Pa. Fish and Boat Commission completed in June of 1980 found the stream degraded by AMD with a lowered pH and iron and aluminum precipitates in the substrate. Electrofishing at four stations failed to yield any fish species.

Historical records show that mining began in this area in the early 20^{th} century. The Cambria and Clearfield Railroad finished its first tracks in the area in 1888, thus removing the largest obstacle to mining. The United States Geological Society documented 150 underground mines on the Curwensville and Patton quadrangles in their field surveys in 1902 and 1903 (Ackenheil 1975). The Patton Clay Mine extracted the Upper Kittanning coal seam, as well as its associated fireclay, that was used to produce bricks at the Patton Clay Works. The deep mine was abandoned in 1933. A portion of the downstream watershed was owned by the Clearfield Bituminous Coal Company in the early 1960's. Barnhart Coal Company had an active deep mine, the Becker operation, in the watershed in 1968. Hepburnia Coal Company surface mined the area for Freeport and Kittanning coals in the late 1960s and 1970s; they reported intercepting an abandoned deep mine and continuing an abandoned strip pit, origins of which are unknown. The Lechene Coal Company also operated a mine in the watershed in the 1970's. The K & J Coal Company, Inc. received their first permit in the watershed in 1969. Since 1969 large tracts of the watershed have been strip mined. Active mining operations ceased in the watershed in 2000. In early 2002, K & J Coal Company, Inc. filed for bankruptcy and reclamation of its workings since has been completed by Seabond Surety.

The major sources of AMD are from seeps originating from the Upper and Lower Kittanning seams that were stripped by Hepburnia Coal Company and discharges from previous K & J Coal Company, Inc. operations. One of the discharges flows directly into Rock Run. The other two treated discharges enter the Gaber tributary and are high in manganese and aluminum. The Gaber tributary enters Rock Run from the northeast just upstream of the confluence of the Somics tributary. There is also a small seep zone that enters the tributary before its confluence with Rock Run. Bottom sediments in the Gaber tributary are covered with aluminum precipitates. Aluminum precipitates also are found on the bottom of Rock Run after the Gaber tributary enters. The Somics tributary is affected by a few diffuse seeps that add significant amounts of manganese and aluminum to the stream. A field inspection in February of 2002 confirmed that the headwaters of Rock Run are intermittent and are usually dry except for storm runoff. The Lechene seep constitutes the main flow in Rock Run before the Somics tributary enters from the east.

Segments addressed in this TMDL

The Rock Run Watershed is affected by pollution from AMD. This pollution has caused high levels of metals in the mainstem of Rock Run and in its unnamed tributaries, locally known as Somics, Gaber, and Fox (Attachment A). The AMD degradation is caused by discharges from mined areas of the Upper and Lower Kittanning coal seams. The TMDLs will be expressed as long-term, average loadings. Due to the nature and complexity of mining effects on the watershed, expressing the TMDL as a long-term average gives a better representation of the data used for the calculations. See Table 3 for TMDL calculations and Attachment D for TMDL explanations.

Clean Water Act Requirements

Section 303(d) of the 1972 Clean Water Act requires states, territories, and authorized tribes to establish water quality standards. The water quality standards identify the uses for each waterbody and the scientific criteria needed to support that use. Uses can include designations for drinking water supply, contact recreation (swimming), and aquatic life support. Minimum goals set by the Clean Water Act require that all waters be "fishable" and "swimmable."

Additionally, the federal Clean Water Act and the Environmental Protection Agency's (EPA) implementing regulations (40 CFR Part 130) require:

- States to develop lists of impaired waters for which current pollution controls are not stringent enough to meet water quality standards (the list is used to determine which streams need TMDLs);

- States to establish priority rankings for waters on the lists based on severity of pollution and the designated use of the waterbody; states must also identify those waters for which TMDLs will be developed and a schedule for development;

- States to submit the list of waters to EPA every two years (April 1 of the even numbered years);

- States to develop TMDLs, specifying a pollutant budget that meets state water quality standards and allocate pollutant loads among pollution sources in a watershed, e.g., point and nonpoint sources; and

- EPA to approve or disapprove state lists and TMDLs within 30 days of final submission.

Despite these requirements, states, territories, authorized tribes, and EPA had not developed many TMDLs. Beginning in 1986, organizations in many states filed lawsuits against the EPA for failing to meet the TMDL requirements contained in the federal Clean Water Act and its implementing regulations. While EPA has entered into consent agreements with the plaintiffs in several states, other lawsuits still are pending across the country.

In the cases that have been settled to date, the consent agreements require EPA to backstop TMDL development, track TMDL development, review state monitoring programs, and fund studies on issues of concern (e.g., AMD, implementation of nonpoint source Best Management Practices (BMPs), etc.).

These TMDLs were developed in partial fulfillment of the 1997 lawsuit settlement of *American Littoral Society and Public Interest Group of Pennsylvania v. EPA.*

Section 303(d) Listing Process

Prior to developing TMDLs for specific waterbodies, there must be sufficient data available to assess which streams are impaired and should be on the Section 303(d) list. With guidance from the EPA, the states have developed methods for assessing the waters within their respective jurisdictions.

The primary method adopted by the Pennsylvania Department of Environmental Protection (DEP) for evaluating waters changed between the publication of the 1996 and 1998 Section

303(d) lists. Prior to 1998, data used to list streams were in a variety of formats, collected under differing protocols. Information also was gathered through the Section 305(b)[2] reporting process. DEP is now using the Statewide Surface Waters Assessment Protocol (SSWAP), a modification of the EPA's 1989 Rapid Bioassessment Protocol II (RBP-II), as the primary mechanism to assess Pennsylvania's waters. The SSWAP provides a more consistent approach to assessing Pennsylvania's streams.

The assessment method requires selecting representative stream segments based on factors such as surrounding land uses, stream characteristics, surface geology, and point source discharge locations. The biologist selects as many sites as necessary to establish an accurate assessment for a stream segment; the length of the assessed stream segment can vary between sites. All the biological surveys included kick-screen sampling of benthic macroinvertebrates and habitat evaluations. Benthic macroinvertebrates are identified to the family level in the field.

After the survey is completed, the biologist determines the status of the stream segment. The decision is based on habitat scores and a series of narrative biological statements used to evaluate the benthic macroinvertebrate community. If the stream is determined to be impaired, the source and cause of the impairment is documented. An impaired stream must be listed on the state's Section 303(d) list with the source and cause. A TMDL must be developed for the stream segment and each pollutant. In order for the process to be more effective, adjoining stream segments with the same source and cause listing are addressed collectively, and on a watershed basis.

Basic Steps for Determining a TMDL

Although all watersheds must be handled on a case-by-case basis when developing TMDLs, there are basic processes or steps that apply to all cases. They include:

1. Collection and summarization of pre-existing data (watershed characterization, inventory contaminant sources, determination of pollutant loads, etc.);
2. Calculating the TMDL for the waterbody using EPA approved methods and computer models;
3. Allocating pollutant loads to various sources;
4. Determining critical and seasonal conditions;
5. Public review and comment and comment period on draft TMDL;
6. Submittal of final TMDL; and
7. EPA approval of the TMDL.

AMD Methodology

A two-step approach is used for the TMDL analysis of AMD impaired stream segments. The first step uses a statistical method for determining the allowable instream concentration at the point of interest necessary to meet water quality standards. This is done at each point of interest

[2] Section 305(b) of the Clean Water Act requires a biannual description of the water quality of the waters of the state.

(sample point) in the watershed. The second step is a mass balance of the loads as they pass through the watershed. Loads at these points will be computed based on average annual flow.

The statistical analysis described below can be applied to situations where all of the pollutant loading is from non-point sources as well as those where there are both point and non-point sources. The following defines what are considered point sources and non-point sources for the purposes of our evaluation; point sources are defined as permitted discharges or a discharge that has a responsible party, non-point sources are then any pollution sources that are not point sources. For situations where all of the impact is due to non-point sources, the equations shown below are applied using data for a point in the stream. The load allocation made at that point will be for all of the watershed area that is above that point. For situations where there are point-source impacts alone, or in combination with non-point sources, the evaluation will use the point-source data and perform a mass balance with the receiving water to determine the impact of the point source.

Allowable loads are determined for each point of interest using Monte Carlo simulation. Monte Carlo simulation is an analytical method meant to imitate real-life systems, especially when other analyses are too mathematically complex or too difficult to reproduce. Monte Carlo simulation calculates multiple scenarios of a model by repeatedly sampling values from the probability distribution of the uncertain variables and using those values to populate a larger data set. Allocations were applied uniformly for the watershed area specified for each allocation point. For each source and pollutant, it was assumed that the observed data were log-normally distributed. Each pollutant source was evaluated separately using @Risk[3] by performing 5,000 iterations to determine the required percent reduction so that the water quality criteria, as defined in the *Pennsylvania Code. Title 25 Environmental Protection, Department of Environmental Protection, Chapter 93, Water Quality Standards,* will be met instream at least 99 percent of the time. For each iteration, the required percent reduction is:

PR = maximum {0, (1-Cc/Cd)} where (1)

PR = required percent reduction for the current iteration

Cc = criterion in mg/l

Cd = randomly generated pollutant source concentration in mg/l based on the observed data

Cd = RiskLognorm(Mean, Standard Deviation) where (1a)

Mean = average observed concentration

Standard Deviation = standard deviation of observed data

[3] @Risk – Risk Analysis and Simulation Add-in for Microsoft Excel, Palisade Corporation, Newfield, NY, 1990-1997.

The overall percent reduction required is the 99th percentile value of the probability distribution generated by the 5,000 iterations, so that the allowable long-term average (LTA) concentration is:

$$LTA = Mean * (1 - PR99) \text{ where} \quad (2)$$

LTA = allowable LTA source concentration in mg/l

Once the allowable concentration and load for each pollutant is determined, mass-balance accounting is performed starting at the top of the watershed and working down in sequence. This mass-balance or load tracking is explained below.

Load tracking through the watershed utilizes the change in measured loads from sample location to sample location, as well as the allowable load that was determined at each point using the @Risk program.

There are two basic rules that are applied in load tracking; rule one is that if the sum of the measured loads that directly affect the downstream sample point is less than the measured load at the downstream sample point it is indicative that there is an increase in load between the points being evaluated, and this amount (the difference between the sum of the upstream and downstream loads) shall be added to the allowable load(s) coming from the upstream points to give a total load that is coming into the downstream point from all sources. The second rule is that if the sum of the measured loads from the upstream points is greater than the measured load at the downstream point this is indicative that there is a loss of instream load between the evaluation points, and the ratio of the decrease shall be applied to the load that is being tracked (allowable load(s)) from the upstream point.

Tracking loads through the watershed gives the best picture of how the pollutants are affecting the watershed based on the information that is available. The analysis is done to insure that water quality standards will be met at all points in the stream. The TMDL must be designed to meet standards at all points in the stream, and in completing the analysis, reductions that must be made to upstream points are considered to be accomplished when evaluating points that are lower in the watershed. Another key point is that the loads are being computed based on average annual flow and should not be taken out of the context for which they are intended, which is to depict how the pollutants affect the watershed and where the sources and sinks are located spatially in the watershed.

For pH TMDLs, acidity is compared to alkalinity as described in Attachment B. Each sample point used in the analysis of pH by this method must have measurements for total alkalinity and hot acidity. Statistical procedures are applied, using the average value for total alkalinity at that point as the target to specify a reduction in the acid concentration. By maintaining a net alkaline stream, the pH value will be in the range between six and eight. This method negates the need to specifically compute the pH value, which for streams affected by low pH from AMD may not be a true reflection of acidity. This method assures that Pennsylvania’s standard for pH is met when the acid concentration reduction is met.

Information for the TMDL analysis performed using the methodology described above is contained in the "TMDLs by Segment" section of this report.

TMDL Endpoints

One of the major components of a TMDL is the establishment of an instream numeric endpoint, which is used to evaluate the attainment of applicable water quality. An instream numeric endpoint, therefore, represents the water quality goal that is to be achieved by implementing the load reductions specified in the TMDL. The endpoint allows for a comparison between observed instream conditions and conditions that are expected to restore designated uses. The endpoint is based on either the narrative or numeric criteria available in water quality standards.

Because most of the pollution sources in the watershed are nonpoint sources, the TMDLs' component makeup will be load allocations (LAs) with waste load allocations (WLAs) for permitted discharges. All allocations will be specified as long-term average daily concentrations. These long-term average concentrations are expected to meet water-quality criteria 99% of the time as required in PA Title 25 Chapter 96.3(c). The following table shows the applicable water-quality criteria for the selected parameters.

Table 2. Applicable Water Quality Criteria

Parameter	***Criterion Value (mg/l)***	***Total Recoverable/Dissolved***
Aluminum (Al)	0.75	Total Recoverable
Iron (Fe)	1.50	30 day average; Total Recoverable
Manganese (Mn)	1.00	Total Recoverable
pH *	6.0-9.0	N/A

*The pH values shown will be used when applicable. In the case of freestone streams with little or no buffering capacity, the TMDL endpoint for pH will be the natural background water quality.

TMDL Elements (WLA, LA, MOS)

$$TMDL = WLA + LA + MOS$$

A TMDL equation consists of a waste load allocation (WLA), load allocation (LA), and a margin of safety (MOS). The waste load allocation is the portion of the load assigned to point sources. The load allocation is the portion of the load assigned to non-point sources. The margin of safety is applied to account for uncertainties in the computational process. The margin of safety may be expressed implicitly (documenting conservative processes in the computations) or explicitly (setting aside a portion of the allowable load). The TMDL allocations in this report are based on available data. Other allocation schemes could also meet the TMDL.

Allocation Summary

These TMDLs will focus remediation efforts on the identified numerical reduction targets for each watershed. The reduction schemes in Table 3 for each segment are based on the assumption that all upstream allocations are implemented and take into account all upstream reductions. Attachment D contains the TMDLs by segment analysis for each allocation point in a detailed discussion. As changes occur in the watershed, the TMDLs may be re-evaluated to reflect current conditions. An implicit MOS based on conservative assumptions in the analysis is included in the TMDL calculations.

The allowable LTA concentration in each segment is calculated using Monte Carlo Simulation as described previously. The allowable load is then determined by multiplying the allowable concentration by the average flow and a conversion factor at each sample point. The allowable load is the TMDL at that point.

The load allocation at each point includes all loads entering the segment, including those from upstream allocation points. The percent reduction is calculated to show the amount of load that needs to be reduced from nonpoint sources within a segment in order for water quality standards to be met at the point.

In some instances, instream processes, such as settling, are taking place within a stream segment. These processes are evidenced by a decrease in measured loading between consecutive sample points. It is appropriate to account for these losses when tracking upstream loading through a segment. The calculated upstream load lost within a segment is proportional to the difference in the measured loading between the sampling points.

Table 3. Rock Run Watershed Summary Table

Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	NPS Load Reduction (lbs/day)	NPS % Reduction
RR4 - Headwaters of Rock Run						
Aluminum (lbs/day)	0.96	0.69	-	0.69	0.27	28%
Iron (lbs/day)	0.66	0.53	-	0.53	0.13	19%
Manganese(lbs/day)	0.68	0.60	-	0.60	0.08	12%
Acidity (lbs/day)	12.33	1.48	-	1.48	10.85	88%
RR3 - Rock Run upstream of Somics Tributaries						
Aluminum (lbs/day)	4.92	0.89	-	0.89	3.76*	81%*
Iron (lbs/day)	0.79	0.79	-	0.79	NA	NA
Manganese(lbs/day)	11.82	1.06	-	1.06	10.68*	91%*
Acidity (lbs/day)	46.57	1.86	-	1.86	33.86*	95%*
ST2 – “Somics” Unnamed Tributary to Rock Run						
Aluminum (lbs/day)	0.09	0.09	-	0.09	NA	NA
Iron (lbs/day)	0.05	0.05	-	0.05	NA	NA
Manganese(lbs/day)	0.12	0.12	-	0.12	NA	NA
Acidity (lbs/day)	-47.07	-47.07	-	-47.07	NA	NA
ST1 – “Somics” Unnamed Tributary to Rock Run						
Aluminum (lbs/day)	0.55	0.29	-	0.29	0.26	47%
Iron (lbs/day)	0.17	0.17	-	0.17	NA	NA
Manganese(lbs/day)	1.16	0.38	-	0.38	0.78	67%
Acidity (lbs/day)	-16.35	-16.35	-	-16.35	NA	NA
GT1 – “Gaber” Unnamed Tributary to Rock Run						
Aluminum (lbs/day)	0.09	0.09	-	0.09	NA	NA

Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	NPS Load Reduction (lbs/day)	NPS % Reduction
Iron (lbs/day)	0.04	0.04	-	0.04	NA	NA
Manganese(lbs/day)	0.21	0.21	-	0.21	NA	NA
Acidity (lbs/day)	-7.90	-7.90	-	-7.90	NA	NA
RR2 - Rock Run upstream of RT1 & RT2						
Aluminum (lbs/day)	3.95	0.71	-	0.71	0.24*	26%*
Iron (lbs/day)	3.45	0.76	-	0.76	2.69*	78%*
Manganese(lbs/day)	7.82	2.11	-	2.11	0*	0%*
Acidity (lbs/day)	-39.91	-39.91	-	-39.91	NA	NA
RT1- Unnamed Tributary to Rock Run						
Aluminum (lbs/day)	0.14	0.14	-	0.14	NA	NA
Iron (lbs/day)	0.21	0.21	-	0.21	NA	NA
Manganese(lbs/day)	0.06	0.06	-	0.06	NA	NA
Acidity (lbs/day)	-14.60	-14.60	-	-14.60	NA	NA
RT2 – Unnamed Tributary to Rock Run						
Aluminum (lbs/day)	0.77	0.16	-	0.16	0.61	79%
Iron (lbs/day)	1.31	0.21	-	0.21	1.10	84%
Manganese(lbs/day)	2.18	0.22	-	0.22	1.96	90%
Acidity (lbs/day)	-26.73	-26.73	-	-26.73	NA	NA
RR1 – Rock Run at Mouth						
Aluminum (lbs/day)	2.72	1.06	-	1.06	0*	0%*
Iron (lbs/day)	1.16	1.16	-	1.16	NA	NA
Manganese(lbs/day)	7.52	2.71	-	2.71	0*	0%*
Acidity (lbs/day)	-64.62	-64.62	-	-64.62	NA	NA

NA = not applicable
* Takes into account load reductions from upstream sources.

In the instance that the allowable load is equal to the existing load (e.g. iron point RR1, Table 3), the simulation determined that water quality standards are being met instream 99% of the time and no TMDL is necessary for the parameter at that point. Although no TMDL is necessary, the loading at the point is considered at the next downstream point. This is denoted as "NA" in the above table.

Following is an example of how the allocations, presented in Table 3, for a stream segment are calculated. For this example, aluminum allocations for RR2 of Rock Run are shown. As demonstrated in the example, all upstream contributing loads are accounted for at each point. Attachment D contains the TMDLs by segment analysis for each allocation point in a detailed discussion. These analyses follow the example. Attachment A contains maps of the sampling point locations for reference.

Allocations RR3/ST1/ST2/GT1	
RR3/ST1/ST2/GT1	Al (Lbs/day)
Existing Load @ RR3/ST1/ST2/GT1	5.65
Allowable Load @ RR3/ST1/ST2/GT1	1.36

Rock Run

Allowable Load = 1.36 lbs/day

Load output = 1.70 lbs/day
(Difference between existing loads at RR2 and upstream)

	Al (Lbs/day)
Existing Load @ RR2	3.95
Difference in measured Loads between the loads that enter and RR2	-1.70
Additional load tracked from above samples	1.36
Total load tracked between upstream and RR2	0.95
Allowable Load @ RR2	0.71
Load Reduction @ RR2	0.24
% Reduction required at RR2	26%

Allowable Load = 0.71 lbs/day

The allowable aluminum load tracked from RR3/ST1/ST2/GT1 was 1.36 lbs/day. The existing load from upstream was subtracted from the existing load at RR2 to show the actual measured decrease of aluminum load that has precipitated onto the stream bottom between these upstream sites and RR2 (1.70 lbs/day). This decreased value was used as a ratio multiplied by the calculated allowable load from upstream points to calculate the total load that was tracked between upstream points and RR2 (allowable loads from upstream points * percentage that was not lost to precipitation in the stream segment). This total load tracked was subtracted from the calculated allowable load at RR2 to determine the amount of load to be reduced at RR2. This total load value was found to be 0.95 lbs/day; it was 0.24 lbs/day greater than the RR2 allowable load of 0.71 lbs/day. Therefore, a 26% aluminum reduction at RR2 is necessary.

Recommendations

The Chest Creek Watershed Association was very active in the late 1960's. However the organization disbanded prior to 1975 because of a lack of influence on the activities in the watershed. The association was very vocal in its disapproval of new coal mining permits and lost interest when their concerns were not heeded. Currently, there is no a watershed association in the Rock Run Watershed. It is recommended that agencies work with local interests to reintroduce a watershed organization within the larger watershed of Chest Creek, of which Rock Run is a tributary. This watershed organization could then work to implement projects to achieve the reductions recommended in this TMDL document.

A reclamation project for the Lechene Seep is strongly recommended, since there is ample space and the water chemistry is conducive of passive treatment. Rock Run was once a viable trout stream and can return to that state if the metal pollution is controlled.

Various methods to eliminate or treat pollutant sources and to provide a reasonable assurance that the proposed TMDLs can be met exist in Pennsylvania. These methods include PADEP's primary efforts to improve water quality through reclamation of abandoned mine lands (for abandoned mining) and through the National Pollution Discharge Elimination System (NPDES) permit program (for active mining). Funding sources available that are currently being used for projects designed to achieve TMDL reductions include the Environmental Protection Agency (EPA) 319 grant program and Pennsylvania's Growing Greener Program. Federal funding is through the Department the Interior, Office of Surface Mining (OSM), for reclamation and mine drainage treatment through the Appalachian Clean Streams Initiative and through Watershed Cooperative Agreements.

OSM reports that nationally, of the $8.5 billion of high priority (defined as priority 1&2 features or those that threaten public health and safety) coal related AML problems in the AML inventory, $6.6 billion (78%) have yet to be reclaimed; $3.6 billion of this total is attributable to Pennsylvania watershed costs. Almost 83 percent of the $2.3 billion of coal related environmental problems (priority 3) in the AML inventory are not reclaimed.

The Bureau of Abandoned Mine Reclamation, Pennsylvania's primary bureau in dealing with abandoned mine reclamation (AMR) issues, has established a comprehensive plan for abandoned mine reclamation throughout the Commonwealth to prioritize and guide reclamation efforts for throughout the state to make the best use of valuable funds (www.dep.state.pa.us/dep/deputate/minres/bamr/complan1.htm). In developing and implementing a comprehensive plan for abandoned mine reclamation, the resources (both human and financial) of the participants must be coordinated to insure cost-effective results. The following set of principles is intended to guide this decision making process:

- Partnerships between the DEP, watershed associations, local governments, environmental groups, other state agencies, federal agencies and other groups organized to reclaim abandoned mine lands are essential to achieving reclamation and abating acid mine drainage in an efficient and effective manner.

- Partnerships between AML interests and active mine operators are important and essential in reclaiming abandoned mine lands.

- Preferential consideration for the development of AML reclamation or AMD abatement projects will be given to watersheds or areas for which there is an approved rehabilitation plan. (guidance is given in Appendix B to the Comprehensive Plan).

- Preferential consideration for the use of designated reclamation moneys will be given to projects that have obtained other sources or means to partially fund the project or to projects that need the funds to match other sources of funds.

- Preferential consideration for the use of available moneys from federal and other sources will be given to projects where there are institutional arrangements for any necessary long-term operation and maintenance costs.

- Preferential consideration for the use of available moneys from federal and other sources will be given to projects that have the greatest worth.

- Preferential consideration for the development of AML projects will be given to AML problems that impact people over those that impact property.

- No plan is an absolute; occasional deviations are to be expected.

A detailed decision framework is included in the plan that outlines the basis for judging projects for funding, giving high priority to those projects whose cost/benefit ratios are most favorable and those in which stakeholder and landowner involvement is high and secure.

In addition to the abandoned mine reclamation program, regulatory programs also are assisting in the reclamation and restoration of Pennsylvania's land and water. PADEP has been effective in implementing the NPDES program for mining operations throughout the Commonwealth. This reclamation was done through the use of remining permits that have the potential for reclaiming abandoned mine lands, at no cost to the Commonwealth or the federal government. Long-term treatment agreements were initialized for facilities/operators who need to assure treatment of post-mining discharges or discharges they degraded which will provide for long-term treatment of discharges. According to OSM, "PADEP is conducting a program where active mining sites are, with very few exceptions, in compliance with the approved regulatory program".

The Commonwealth is exploring all options to address its abandoned mine problem. During 2000-2006, many new approaches to mine reclamation and mine drainage remediation have been explored and projects funded to address problems in innovative ways. These include:

- Project XL - The Pennsylvania Department of Environmental Protection ("PADEP"), has proposed this XL Project to explore a new approach to encourage the remining and reclamation of abandoned coal mine sites. The approach would be based on compliance with in-stream pollutant concentration limits and implementation of best management practices ("BMPs"), instead of National Pollutant Discharge Elimination System ("NPDES") numeric effluent limitations measured at individual discharge points. This XL project would provide for a test of this approach in up to eight watersheds with significant acid mine drainage ("AMD") pollution. The project will collect data to compare in-stream pollutant concentrations versus the loading from individual discharge points and provide for the evaluation of the performance of BMPs and this alternate strategy in PADEP's efforts to address AMD.
- Awards of grants for 1) proposals with economic development or industrial application as their primary goal and which rely on recycled mine water and/or a site that has been made suitable for the location of a facility through the elimination of existing Priority 1 or 2 hazards, and 2) new and innovative mine drainage treatment technologies that will provide waters of higher purity that may be needed by a particular industry at costs below conventional treatment costs as in common use today or reduce the costs of water treatment below those of conventional lime treatment plants. Eight contracts totaling $4.075 M were awarded in 2006 under this program.
- Projects using water from mine pools in an innovative fashion, such as the Shannopin Deep Mine Pool (in southwestern Pennsylvania), the Barnes & Tucker Deep Mine Pool (the Susquehanna River Basin Commission into the Upper West Branch Susquehanna River), and the Wadesville Deep Mine Pool (Excelon Generation in Schuylkill County).

Candidate or federally-listed threatened and endangered species may occur in or near the watershed. While implementation of the TMDL should result in improvements to water quality, they could inadvertently destroy habitat for candidate or federally-listed species. TMDL implementation projects should be screened through the Pennsylvania Natural Diversity Inventory (PNDI) early in their planning process, in accordance with the Department's policy titled Policy for Pennsylvania Natural Diversity Inventory (PNDI) Coordination During Permit Review and Evaluation (Document ID# 400-0200-001).

Public Participation

Public notice of the original draft TMDL was published in the *Pennsylvania Bulletin* on December 14, 2002 and *The Barnesboro Star* on January 8, 2003 to foster public comment on the allowable loads calculated. A public meeting was held on the original draft TMDL on January 15, 2003 at the Patton Ambulance Service Building, in Patton, PA. The public comment period on this revised draft TMDL was open September 27, 2008 to November 27, 2008.

Future TMDL Modifications

In the future, the Department may adjust the load and/or wasteload allocations in this TMDL to account for new information or circumstances that are developed or discovered during the implementation of the TMDL when a review of the new information or circumstances indicate that such adjustments are appropriate. Adjustment between the load and wasteload allocation will only be made following an opportunity for public participation. A wasteload allocation adjustment will be made consistent and simultaneous with associated permit(s) revision(s)/reissuances (i.e., permits for revision/reissuance in association with a TMDL revision will be made available for public comment concurrent with the related TMDLs availability for public comment). New information generated during TMDL implementation may include, among other things, monitoring data, BMP effectiveness information, and land use information. All changes in the TMDL will be tallied and once the total changes exceed 1% of the total original TMDL allowable load, the TMDL will be revised. The adjusted TMDL, including its LAs and WLAs, will be set at a level necessary to implement the applicable WQS and any adjustment increasing a WLA will be supported by reasonable assurance demonstration that load allocations will be met. The Department will notify EPA of any adjustments to the TMDL within 30 days of its adoption and will maintain current tracking mechanisms that contain accurate loading information for TMDL waters.

Changes in TMDLs That May Require EPA Approval

- Increase in total load capacity.
- Transfer of load between point (WLA) and nonpoint (LA) sources.
- Modification of the margin of safety (MOS).
- Change in water quality standards (WQS).
- Non-attainment of WQS with implementation of the TMDL.
- Allocations in trading programs.

Changes in TMDLs That May Not Require EPA Approval

- Total loading shift less than or equal to 1% of the total load.
- Increase of WLA results in greater LA reductions provided reasonable assurance of implementation is demonstrated (a compliance/implementation plan and schedule).
- Changes among WLAs with no other changes; TMDL public notice concurrent with permit public notice.
- Removal of a pollutant source that will not be reallocated.
- Reallocation between LAs.
- Changes in land use.

References

Ackenheil and Associates Geo Systems, Inc. 1975. Chest Creek Watershed Mine Drainage Investigation Survey, Clearfield and Cambria Counties.

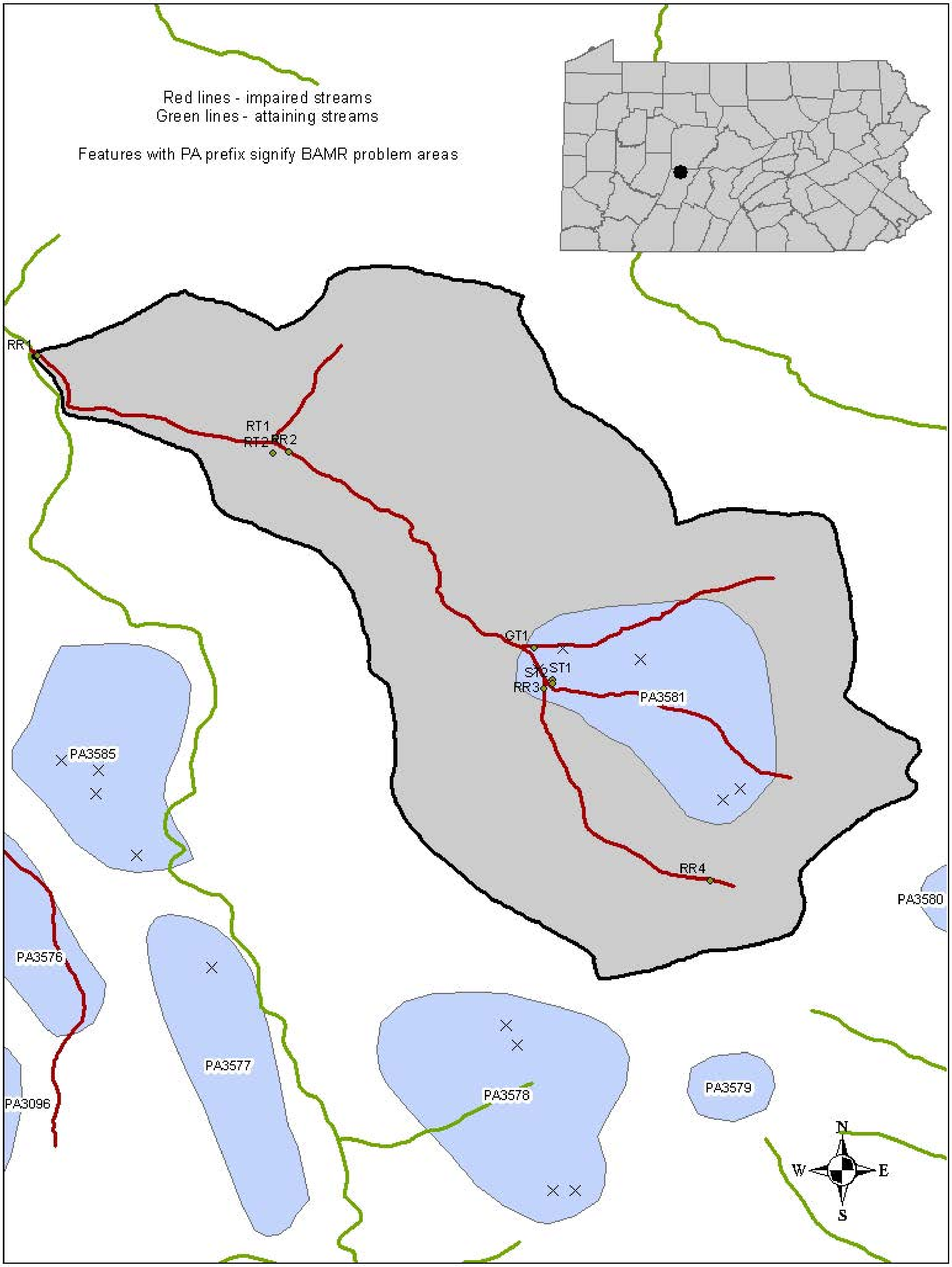
Commonwealth of Pennsylvania. 2001. Pennsylvania Code. Title 25 Environmental Protection. Department of Environmental Protection. Chapter 93. Water Quality Standards. Harrisburg, PA.

Pennsylvania Fish and Boat Commission. Rock Run, Cambria County (308B), to Chest Creek, A Review and Summary of Historical Information.

USDA-NRCS Soil Survey Division. 2001. Official Soil Series Descriptions webpage. http://www.statlab.iastate.edu/cgi-bin/osd/osdname.cgi

Attachment A

Rock Run Watershed Maps


Red lines - impaired streams
Green lines - attaining streams
Features with PA prefix signify BAMR problem areas
RR1
RT1
RT2
RR2
GT1
ST1
RR3
PA3581
RR4
PA3585
PA3580
PA3576
PA3577
PA3578
PA3579
PA3096
N
W
E
S

Attachment B
Method for Addressing Section 303(d) Listings for pH

Method for Addressing Section 303(d) Listings for pH

There has been a great deal of research conducted on the relationship between alkalinity, acidity, and pH. Research published by the Pa. Department of Environmental Protection demonstrates that by plotting net alkalinity (alkalinity-acidity) vs. pH for 794 mine sample points, the resulting pH value from a sample possessing a net alkalinity of zero is approximately equal to six (Figure 1). Where net alkalinity is positive (greater than or equal to zero), the pH range is most commonly six to eight, which is within the USEPA's acceptable range of six to nine and meets Pennsylvania water quality criteria in Chapter 93.

The pH, a measurement of hydrogen ion acidity presented as a negative logarithm, is not conducive to standard statistics. Additionally, pH does not measure latent acidity. For this reason, and based on the above information, Pennsylvania is using the following approach to address the stream impairments noted on the 303(d) list due to pH. The concentration of acidity in a stream is at least partially chemically dependent upon metals. For this reason, it is extremely difficult to predict the exact pH values, which would result from treatment of abandoned mine drainage. When acidity in a stream is neutralized or is restored to natural levels, pH will be acceptable. Therefore, the measured instream alkalinity at the point of evaluation in the stream will serve as the goal for reducing total acidity at that point. The methodology that is applied for alkalinity (and therefore pH) is the same as that used for other parameters such as iron, aluminum, and manganese that have numeric water quality criteria.

Each sample point used in the analysis of pH by this method must have measurements for total alkalinity and total acidity. The same statistical procedures that have been described for use in the evaluation of the metals is applied, using the average value for total alkalinity at that point as the target to specify a reduction in the acid concentration. By maintaining a net alkaline stream, the pH value will be in the range between six and eight. This method negates the need to specifically compute the pH value, which for mine waters is not a true reflection of acidity. This method assures that Pennsylvania's standard for pH is met when the acid concentration reduction is met.

Reference: *Rose, Arthur W. and Charles A. Cravotta, III 1998. Geochemistry of Coal Mine Drainage. Chapter 1 in Coal Mine Drainage Prediction and Pollution Prevention in Pennsylvania. Pa. Dept. of Environmental Protection, Harrisburg, Pa.*

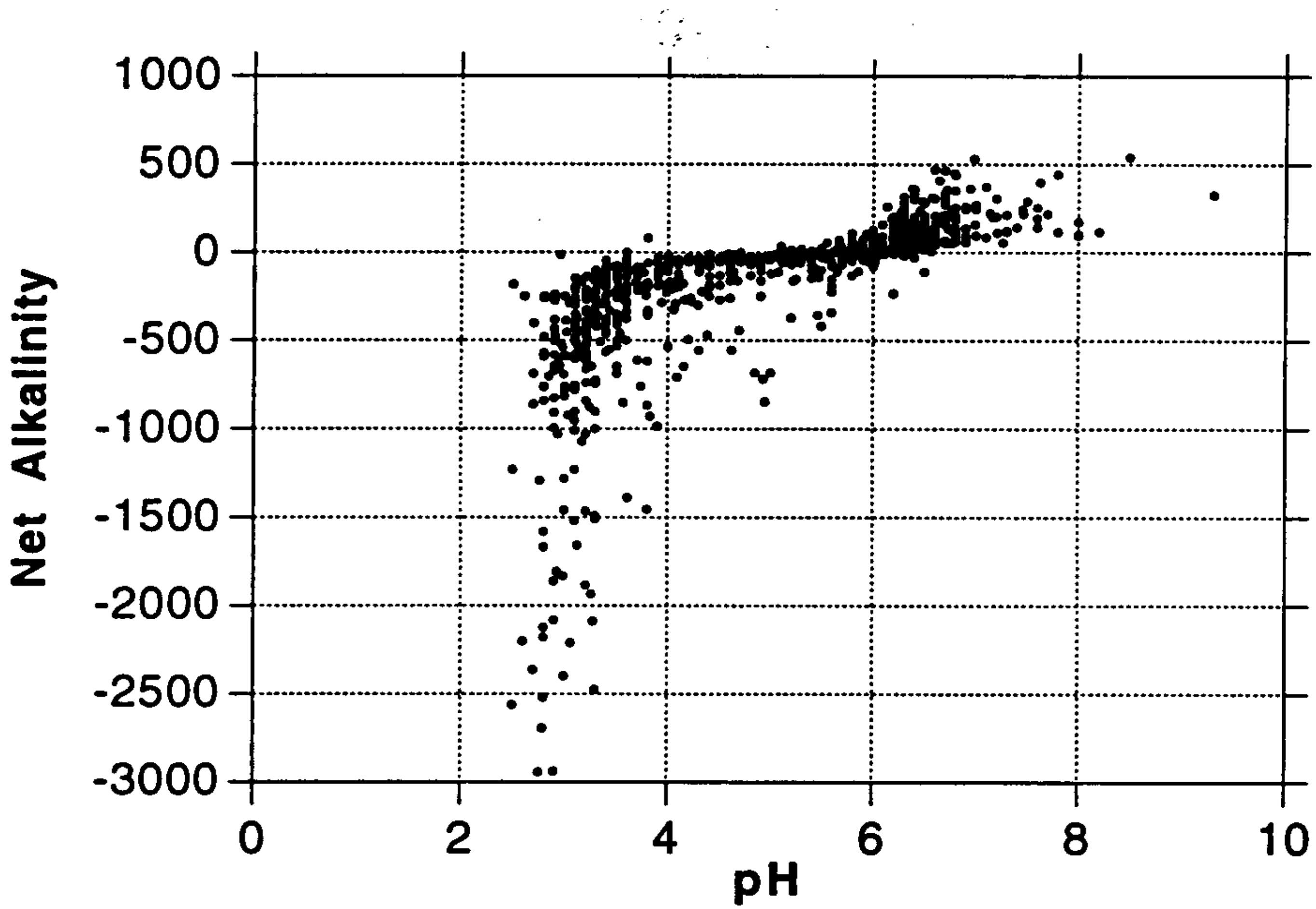


Figure 1. Net Alkalinity vs. pH. Taken from Figure 1.2 Graph C, pages 1-5, of Coal Mine Drainage Prediction and Pollution Prevention in Pennsylvania

Attachment C

Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines

Method to Quantify Treatment Pond Pollutant Load

Calculating Waste Load Allocations for Active Mining in the TMDL Stream Segment.

The end product of the TMDL report is to develop Waste Load Allocations (WLA) and Load Allocations (LA) that represent the amount of pollution the stream can assimilate while still achieving in-stream limits. The LA is the load from abandoned mine lands where there is no NPDES permit or responsible party. The WLA is the pollution load from active mining that is permitted through NPDES.

In preparing the TMDL, calculations are done to determine the allowable load. The actual load measured in the stream is equal to the allowable load plus the reduced load.

Total Measured Load = Allowed Load + Reduced Load

If there is active mining or anticipated mining in the near future in the watershed, the allowed load must include both a WLA and a LA component.

Allowed Load (lbs/day) = WLA (lbs/day) + LA (lbs/day)

The following is an explanation of the quantification of the potential pollution load reporting to the stream from permitted pit water treatment ponds that discharge water at established effluent limits.

Surface coalmines remove soil and overburden materials to expose the underground coal seams for removal. After removal of the coal the overburden is replaced as mine spoil and the soil is replaced for revegetation. In a typical surface mining operation the overburden materials is removed and placed in the previous cut where the coal has been removed. In this fashion, an active mining operation has a pit that progresses through the mining site during the life of the mine. The pit may have water reporting to it, as it is a low spot in the local area. Pit water can be the result of limited shallow groundwater seepage, direct precipitation into the pit, and surface runoff from partially regarded areas that have been backfilled but not yet revegetated. Pit water is pumped to nearby treatment ponds where it is treated to the required treatment pond effluent limits. The standard effluent limits are as follows, although stricter effluent limits may be applied to a mining permit's effluent limits to insure that the discharge of treated water does not cause in-stream limits to be exceeded.

Standard Treatment Pond Effluent Limits:
Alkalinity > Acidity
6.0 <= pH <= 9.0
Fe < 3.0 mg/l
Mn < 2.0 mg/l

Discharge from treatment ponds on a mine site is intermittent and often varies as a result of precipitation events. Measured flow rates are almost never available. If accurate flow data are available, they can be used to quantify the WLA. The following is an approach that can be used to determine a waste load allocation for an active mining operation when treatment pond flow rates are not available. The methodology involves quantifying the hydrology of the portion of a surface mine site that contributes flow to the pit and then calculating waste load allocation using NPDES treatment pond effluent limits.

The total water volume reporting to ponds for treatment can come from two primary sources: direct precipitation to the pit and runoff from the unregraded area following the pit's progression through the site. Groundwater seepage reporting to the pit is considered negligible compared to the flow rates resulting from precipitation.

In an active mining scenario, a mine operator pumps pit water to the ponds for chemical treatment. Pit water is often acidic with dissolved metals in nature. At the treatment ponds, alkaline chemicals are added to increase the pH and encourage dissolved metals to precipitate and settle. Pennsylvania averages 41.4 inches of precipitation per year (Mid-Atlantic River Forecast Center, National Weather Service, State College, PA, 1961-1990, http://www.dep.state.pa.us/dep/subject/hotopics/drought/PrecipNorm.htm). A maximum pit dimension without special permit approval is 1500 feet long by 300 feet wide. Assuming that 5 percent of the precipitation evaporates and the remaining 95 percent flows to the low spot in the active pit to be pumped to the treatment ponds, results in the following equation and average flow rates for the pit area.

41.4 in. precip./yr x 0.95 x 1 ft./12/in. x 1500'x300'/pit x 7.48 gal/ft^3 x 1yr/365days x 1day/24hr. x 1hr./60 min. =

= 21.0 gal/min average discharge from direct precipitation into the open mining pit area.

Pit water can also result from runoff from the unregraded and revegetated area following the pit. In the case of roughly backfilled and highly porous spoil, there is very little surface runoff. It is estimated that 80 percent of precipitation on the roughly regarded mine spoil infiltrates, 5 percent evaporates, and 15 percent may run off to the pit for pumping and potential treatment (Jay Hawkins, Office of Surface Mining, Department of the Interior, Personal Communications 2003). Regrading and revegetation of the mine spoil is conducted as the mining progresses. DEP encourages concurrent backfilling and revegetation through its compliance efforts and it is in the interest of the mining operator to minimize the company's reclamation bond liability by keeping the site reclaimed and revegetated. Experience has shown that reclamation and revegetation is accomplished two to three pit widths behind the active mining pit area. DEP uses three pit widths as an area representing potential flow to the pit when reviewing the NPDES permit application and calculating effluent limits based on best available treatment technology and insuring that in-stream limits are met. The same approach is used in the following equation, which represents the average flow reporting to the pit from the unregraded and unrevegetated spoil area.

41.4 in. precip./yr x 3 pit areas x 1 ft./12/in. x 1500'x300'/pit x 7.48 gal/ft^3 x 1yr/365days x 1day/24hr. x 1hr./60 min. x 15 in. runoff/100 in. precipitation =

= 9.9 gal./min. average discharge from spoil runoff into the pit area.

The total average flow to the pit is represented by the sum of the direct pit precipitation and the water flowing to the pit from the spoil area as follows:

Total Average Flow = Direct Pit Precipitation + Spoil Runoff

Total Average Flow = 21.0 gal./min + 9.9 gal./min. = 30.9 gal./min.

The resulting average waste load from a permitted treatment pond area is as follows.

Allowable Iron Waste Load Allocation:
30.9 gal./min. x 3 mg/l x 0.01202 = 1.1 lbs./day

Allowable Manganese Waste Load Allocation:
30.9 gal./min. x 2 mg/l x 0.01202 = 0.7 lbs./day

Allowable Aluminum Waste Load Allocation:
30.9 gal./min. x 0.75 mg/l x 0.01202 = 0.3 lbs./day

(Note: 0.01202 is a conversion factor to convert from a flow rate in gal/min. and a concentration in mg/l to a load in units of lbs./day.)

There is little or no documentation available to quantify the actual amount of water that is typically pumped from active pits to treatment ponds. Experience and observations suggest that the above approach is very conservative and overestimates the quantity of water, creating a large margin of safety in the methodology. County specific precipitation rates can be used in place of the long-term state average rate, although the margin of safety is greater than differences from individual counties. It is common for many mining sites to have very “dry” pits that rarely accumulate water that would require pumping and treatment.

Also, it is the goal of DEP’s permit review process to not issue mining permits that would cause negative impacts to the environment. As a step to insure that a mine site does not produce acid mine drainage, it is common to require the addition of alkaline materials (waste lime, baghouse lime, limestone, etc.) to the backfill spoil materials to neutralize any acid-forming materials that may be present. This practice of ‘alkaline addition’ or the incorporation of naturally occurring alkaline spoil materials (limestone, alkaline shale or other rocks) may produce alkaline pit water with very low metals concentrations that does not require treatment. A comprehensive study in 1999 evaluated mining permits issued since 1987 and found that only 2.2 percent resulted in a post-mining pollution discharge (Evaluation of Mining Permits Resulting in Acid Mine Drainage 1987-1996: A Post Mortem Study, March 1999). As a result of efforts to insure that acid mine drainage is prevented, most mining operations have alkaline pit water that often meets effluent limits and requires little or no treatment.

While most mining operations are permitted and allowed to have a standard, 1500’ x 300’ pit, most are well below that size and have a corresponding decreased flow and load. Where pit dimensions are greater than the standard size or multiple pits are present, the calculations to define the potential pollution load can be adjusted accordingly. Hence, the above calculated

Waste Load Allocation is very generous and likely high compared to actual conditions that are generally encountered. A large margin of safety is included in the WLA calculations.

The allowable load for the stream segment is determined by modeling of flow and water quality data. The allowable load has a potential Waste Load Allocation (WLA) component if there is active mining or anticipated future mining and a Load Allocation (LA). So, the sum of the Load Allocation and the Waste Load Allocation is equal to the allowed load. The WLA is determined by the above calculations and the LA is determined by the difference between the allowed load and the WLA.

Allowed Load = Waste Load Allocation + Load Allocation
Or
Load Allocation = Allowed Load – Waste Load Allocation

This is an explanation of the quantification of the potential pollution load reporting to the stream from permitted pit water treatment ponds that discharge water at established effluent limits. This allows for including active mining activities and their associated Waste Load in the TMDL calculations to more accurately represent the watershed pollution sources and the reductions necessary to achieve in-stream limits. When a mining operation is concluded its WLA is available for a different operation. Where there are indications that future mining in a watershed may be greater than the current level of mining activity, an additional WLA amount may be included in the allowed load to allow for future mining.

Attachment D

TMDLs By Segment

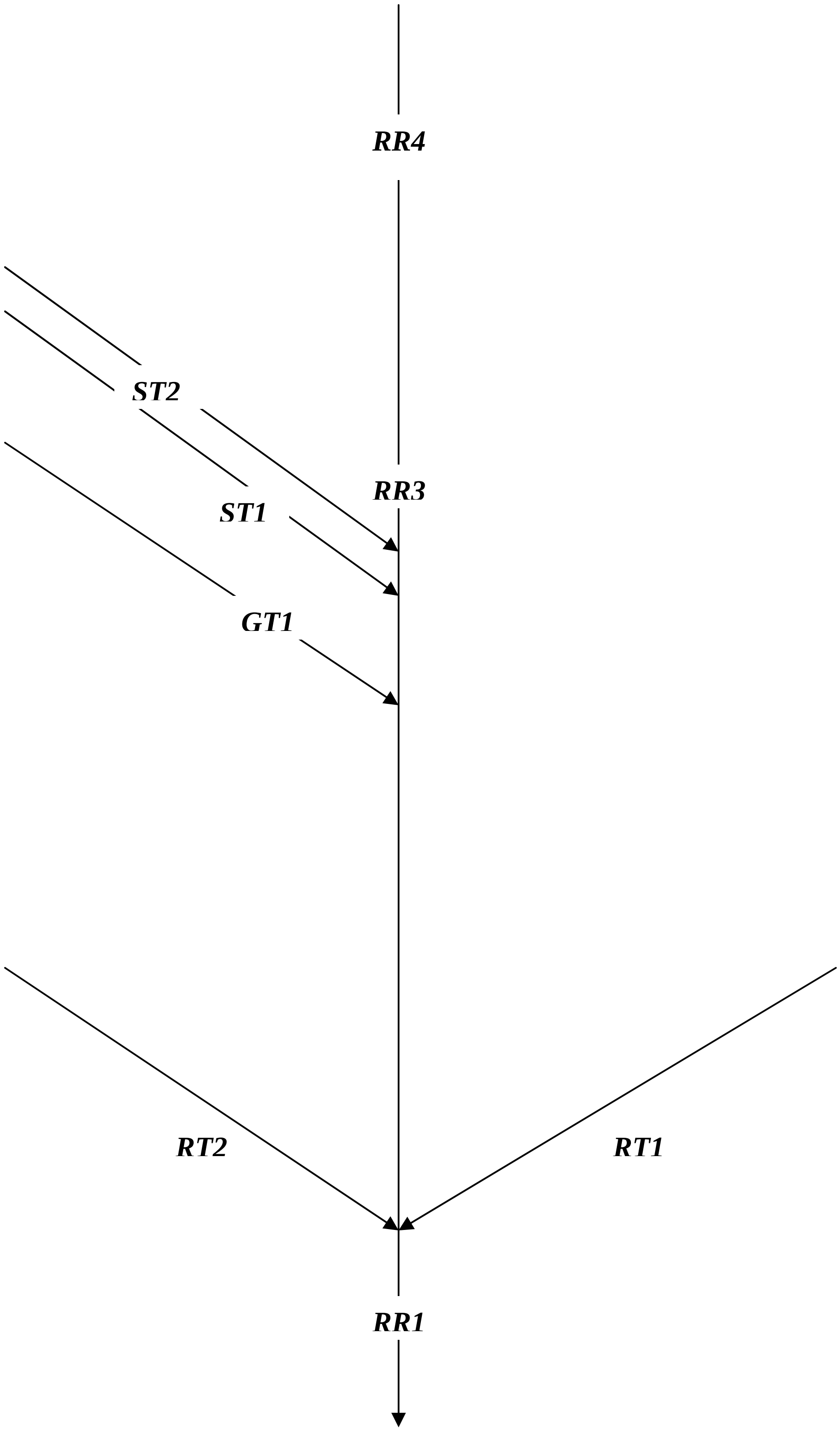
Rock Run

The TMDL for Rock Run consists of load allocations to four sampling sites on Rock Run (RR4, RR3, RR2, and RR1) and five sites on unnamed tributaries of Rock Run (ST1, ST2, GT1, RT1 and RT2). Sample data sets were collected in 2006. All sample points are shown on the maps included in Attachment A as well as on the loading schematic presented on the following page.

Rock Run is listed on the 1996 PA Section 303(d) list for metals from AMD as being the cause of the degradation to this stream. Although this TMDL will focus primarily on metal loading to the Rock Run Watershed, acid loading analysis will be performed. The objective is to reduce acid loading to the stream, which will in turn raise the pH to the desired range (between 6 & 9) 99% of the time. The result of this analysis is an acid loading reduction that equates to meeting standards for pH (see TMDL Endpoint section in the report, Table 2). The method and rationale for addressing pH is contained in Attachment B.

An allowable long-term average in-stream concentration was determined at each sample point for metals and acidity. The analysis is designed to produce an average value that, when met, will be protective of the water-quality criterion for that parameter 99% of the time. An analysis was performed using Monte Carlo simulation to determine the necessary long-term average concentration needed to attain water-quality criteria 99% of the time. The simulation was run assuming the data set was log normally distributed. Using the mean and standard deviation of the data set, 5000 iterations of sampling were completed, and compared against the water-quality criterion for that parameter. For each sampling event a percent reduction was calculated, if necessary, to meet water-quality criteria. A second simulation that multiplied the percent reduction times the sampled value was run to insure that criteria were met 99% of the time. The mean value from this data set represents the long-term average concentration that needs to be met to achieve water-quality standards. Following is an explanation of the TMDL for each allocation point.

Rock Run Sampling Station Diagram
Arrows represent direction of flow
Diagram not to scale



TMDL calculations- RR4- Headwaters of Rock Run

The TMDL for sample point RR4 consists of a load allocation to all of the area at and above this point shown in Attachment A. The load allocation for the headwaters of Rock Run was computed using water-quality sample data collected at point RR4. The average flow, measured at the sampling point RR4 (0.229 MGD), is used for these computations. The allowable load allocations calculated at RR4 will directly affect the downstream point RR3.

Sample data at point RR3 shows that the Rock Run headwaters segment has a pH ranging between 4.48 and 6.10. There currently is not an entry for this segment on the Pa Section 303(d) list for impairment due to pH.

A TMDL for aluminum, iron and manganese has been calculated at this site. There was no acidity in present in the water collected during water quality sampling at RR4. Because water quality standards are met, a TMDL for this parameter isn't necessary and is not calculated.

Table D1 shows the measured and allowable concentrations and loads at RR4. Table D2 shows the percent reductions for aluminum, iron and manganese.

Table D1		Measured		Allowable	
Flow (gpm)=	159.25	Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.50	0.96	0.36	0.69
	Iron	0.34	0.66	0.28	0.53
	Manganese	0.35	0.68	0.31	0.60
	Acidity	6.44	12.33	0.77	1.48
	Alkalinity	1.91	3.66		

Table D2. Allocations RR4				
RR4	Al (Lbs/day)	Fe (Lbs/day)	Mn (Lbs/day)	Acidity (Lbs/day)
Existing Load @ RR4	0.96	0.66	0.68	12.33
Allowable Load @ RR4	0.69	0.53	0.60	1.48
Load Reduction @ RR4	0.27	0.13	0.08	10.85
% Reduction required @ RR4	28%	19%	12%	88%

TMDL calculations- RR3 - Rock Run

The TMDL for sampling point RR3 consists of a load allocation to all of the area between RR4 and RR3 shown in Attachment A. The load allocation for this segment of Rock Run was computed using water-quality sample data collected at point RR3. The average flow, measured at the sampling point RR3 (0.306 MGD), is used for these computations.

Sample data at point RR3 shows pH ranging between 3.89 and 5.10; pH will be addressed as part of this TMDL. There currently is not an entry for this segment on the Section Pa 303(d) list for impairment due to pH.

A TMDL for aluminum, iron, and manganese at RR3 has been calculated. Table D3 shows the measured and allowable concentrations and loads at RR3. Table D4 shows the percent reduction for aluminum, manganese and acidity needed at RR3.

Table D3		Measured		Allowable	
Flow (gpm)=	212.50	Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	1.93	4.92	0.35	0.89
	Iron	0.31	0.79	0.31	0.79
	Manganese	4.63	11.82	0.42	1.06
	Acidity	18.25	46.57	0.73	1.86
	Alkalinity	1.50	3.83		

The measured and allowable loading for point RR3 for aluminum, manganese and acidity was computed using water-quality sample data collected at the point. This was based on the sample data for the point and did not account for any loads already specified from upstream sources. The additional load from points RR4 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points RR4 and RR3 to determine a total load tracked for the segment of stream between RR3 and RR4. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at RR3.

Table D4. Allocations RR3			
RR3	Al (Lbs/day)	Mn (Lbs/day)	Acidity (Lbs/day)
Existing Load @ RR3	4.92	11.82	46.57
Difference in measured Loads between the loads that enter and existing RR3	3.96	11.14	34.24
Percent loss due calculated at RR3	0	0	0
Additional load tracked from above samples	0.69	0.60	1.48
Percentage of upstream loads that reach the RR3	100	100	100
Total load tracked between RR4 and RR3	4.65	11.74	35.72
Allowable Load @ RR3	0.89	1.06	1.86
Load Reduction @ RR3	3.76	10.68	33.86
% Reduction required @ RR3	81%	91%	95%

TMDL calculations- ST1- Unnamed tributary to Rock Run (Somics Trib)

The TMDL for sampling point ST1 consists of a load allocation to all of the area upstream of ST1 shown in Attachment A. The load allocation for this segment of the Somics tributary was computed using water-quality sample data collected at point ST1. The average flow, measured at the sampling point ST1 (0.083 MGD), is used for these computations.

Sample data at point ST1 shows pH ranging between 6.47 and 7.51; pH will not be addressed as part of this TMDL. There currently is not an entry for this segment on the Section Pa 303(d) list for impairment due to pH.

A TMDL for aluminum, iron, and manganese at ST1 has been calculated. Table D5 shows the measured and allowable concentrations and loads at ST1. Table D6 shows the percent reduction for aluminum, iron, and manganese needed at ST1.

Table D5		Measured		Allowable	
Flow (gpm)=	57.28	Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.80	0.55	0.42	0.29
	Iron	0.25	0.17	0.25	0.17
	Manganese	1.68	1.16	0.56	0.38
	Acidity	-23.77	-16.35	-23.77	-16.35
	Alkalinity	26.65	18.33		

Table D6. Allocations ST1		
ST1	Al (Lbs/day)	Mn (Lbs/day)
Existing Load @ ST1	0.55	1.16
Allowable Load @ ST1	0.29	0.38
Load Reduction @ ST1	0.26	0.78
% Reduction required @ ST1	47%	67%

TMDL calculations- ST2- Unnamed tributary to Rock Run (Somics Trib)

The TMDL for sample point ST2 consists of a load allocation to all of the area at and above this point shown in Attachment A. The load allocation for this unnamed tributary of Rock Run was computed using water-quality sample data collected at point ST2. The average flow, measured at the sampling point ST2 (0.077 MGD), is used for these computations.

Sample data at point ST2 shows that this unnamed tributary of Rock Run segment has a pH ranging between 7.48 and 7.98. There currently is not an entry for this segment on the Pa. Section 303(d) list for impairment due to pH. Water quality standards are being met for aluminum, iron, and manganese; therefore, no TMDLs are necessary. Table D7 shows the measured and allowable concentrations and loads at ST2.

Table D7		Measured		Allowable	
Flow (gpm)=	53.38	Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.14	0.09	0.14	0.09
	Iron	0.08	0.05	0.08	0.05
	Manganese	0.20	0.12	0.20	0.12
	Acidity	-73.43	-47.07	-73.43	-47.07
	Alkalinity	79.64	51.05		

TMDL calculations- GT1 – Unnamed tributary to Rock Run (Gaber Trib)

The TMDL for sampling point GT1 consists of a load allocation to all of the area upstream of GT1 shown in Attachment A. The load allocation for this unnamed tributary to Rock Run was computed using water-quality sample data collected at point GT1. The average flow, measured at the sampling point GT1 (0.055 MGD), is used for these computations.

Sample data at point GT1 shows pH ranging between 5.85 and 7.61; pH will be addressed as part of this TMDL. There currently is not an entry for this segment on the Section Pa 303(d) list for impairment due to pH. Water quality standards are being met for aluminum, iron, and manganese; therefore, no TMDLs are necessary. Table D8 shows the measured and allowable concentrations and loads at GT1.

Table D8		Measured		Allowable	
Flow (gpm)=	38.26	Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.19	0.09	0.19	0.09
	Iron	0.09	0.04	0.09	0.04
	Manganese	0.45	0.21	0.45	0.21
	Acidity	-17.19	-7.90	-17.19	-7.90
	Alkalinity	20.49	9.42		

TMDL calculations- RR2- Rock Run upstream of two unnamed tributaries

The TMDL for sampling point RR2 consists of a load allocation to all of the area between RR3 and RR2 shown in Attachment A. The load allocation for this segment of Rock Run was computed using water-quality sample data collected at point RR2. The average flow, measured at the sampling point RR2 (0.496 MGD), is used for these computations.

Sample data at point RR2 shows pH ranging between 6.20 and 7.33; pH will not be addressed as part of this TMDL. There currently is not an entry for this segment on the Section Pa 303(d) list for impairment due to pH.

A TMDL for aluminum, iron, and manganese at RR2 has been calculated. Table D9 shows the measured and allowable concentrations and loads at RR2. Table D10 shows the percent reduction for aluminum, iron, and manganese needed at RR2.

Table D9		Measured		Allowable	
Flow (gpm)=	344.67	Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.96	3.95	0.17	0.71
	Iron	0.83	3.45	0.18	0.76
	Manganese	1.89	7.82	0.51	2.11
	Acidity	-9.64	-39.91	-9.64	-39.91
	Alkalinity	14.79	61.23		

The measured and allowable loading for point RR2 for aluminum, iron, and manganese was computed using water-quality sample data collected at the point. This was based on the sample data for the point and did not account for any loads already specified from upstream sources. The additional load from points RR2 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points RR3/ST1/ST2/GT1 and RR2 to determine a total load tracked for the segment of stream between RR2 and RR3/ST1/ST2/GT1. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at RR2.

Table D10. Allocations RR2			
RR2	Al (Lbs/day)	Fe (Lbs/day)	Mn (Lbs/day)
Existing Load @ RR2	3.95	3.45	7.82
Difference in measured loads between the loads that enter and existing RR2	-1.70	2.40	-5.49
Additional load tracked from above samples	1.36	1.05	1.77
Total load tracked between RR3/ST1/ST2/GT1 & RR2	0.95	3.45	1.04
Allowable Load @ RR2	0.71	0.76	2.11
Load Reduction @ RR2	0.24	2.69	0
% Reduction required at RR2	26%	78%	0%

TMDL calculations- RT1- Unnamed tributary to Rock Run

The TMDL for sample point RT1 consists of a load allocation to all of the area at and above this point shown in Attachment A. The load allocation for this tributary of Rock Run was computed using water-quality sample data collected at point RT1. The average flow, measured at the sampling point RT1 (0.104 MGD), is used for these computations.

Sample data at point RT1 shows that this unnamed tributary of Rock Run segment has a pH ranging between 6.51 and 7.67. There currently is not an entry for this segment on the Pa. Section 303(d) list for impairment due to pH. Water quality standards are being met for aluminum, iron, and manganese; therefore, no TMDLs are necessary. Table D11 shows the measured and allowable concentrations and loads at RT1.

Table D11		Measured		Allowable	
Flow (gpm)=	71.85	Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.16	0.14	0.16	0.14
	Iron	0.24	0.21	0.24	0.21
	Manganese	0.07	0.06	0.07	0.06
	Acidity	-16.92	-14.60	-16.92	-14.60
	Alkalinity	20.39	17.60		

TMDL calculations- RT2- Unnamed tributary to Rock Run

The TMDL for sampling point RT2 consists of a load allocation to all of the area upstream of RT2 shown in Attachment A. The load allocation for this segment of the unnamed tributary of Rock Run was computed using water-quality sample data collected at point RT2. The average flow, measured at the sampling point RT2 (0.108 MGD), is used for these computations.

Sample data at point RT2 shows pH ranging between 5.50 and 7.18; pH will be addressed as part of this TMDL. There currently is not an entry for this segment on the Section Pa 303(d) list for impairment due to pH.

A TMDL for aluminum, iron, and manganese at RT2 has been calculated. Table D12 shows the measured and allowable concentrations and loads at RT2. Table D13 shows the percent reduction for aluminum, iron, and manganese needed at RT2.

Table D12		Measured		Allowable	
Flow (gpm)=	74.67	Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.86	0.77	0.18	0.16
	Iron	1.46	1.31	0.23	0.21
	Manganese	2.43	2.18	0.24	0.22
	Acidity	-29.81	-26.73	-29.81	-26.73
	Alkalinity	37.13	33.29		

Table D13. Allocations RT2			
RT2	Al (Lbs/day)	Fe (Lbs/day)	Mn (Lbs/day)
Existing Load @ RT2	0.77	1.31	2.18
Allowable Load @ RT2	0.16	0.21	0.22
Load Reduction @ RT2	0.61	1.10	1.96
% Reduction required @ RT2	79%	84%	90%

TMDL calculations- RR1- Rock Run at the mouth

The TMDL for sample point RR1 consists of a load allocation to all of the area between points RR2 and RR1 shown in Attachment A. The load allocation for this tributary of Rock Run was computed using water-quality sample data collected at point RR1. The average flow, measured at the sampling point RR1 (0.741 MGD), is used for these computations.

Sample data at point RR1 shows that this segment of Rock Run has a pH ranging between 6.03 and 7.42; pH will not be addressed because water quality standards are being met. There currently is not an entry for this segment on the Pa Section 303(d) list for impairment due to pH.

A TMDL for aluminum and manganese has been calculated at this site. Table D14 shows the measured and allowable concentrations and loads at RR1. Table D15 shows the percent reductions for aluminum and manganese.

Table D14		Measured		Allowable	
Flow (gpm)=	514.33	Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.44	2.72	0.17	1.06
	Iron	0.19	1.16	0.19	1.16
	Manganese	1.22	7.52	0.44	2.71
	Acidity	-10.46	-64.62	-10.46	-64.62
	Alkalinity	17.38	107.38		

The measured and allowable loading for point RR1 for aluminum and manganese was computed using water-quality sample data collected at the point. This was based on the sample data for the point and did not account for any loads already specified from upstream sources. The additional load from points RT1/RT2/RR2 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points RT1/RT2/RR2 and RR1 to determine a total load tracked for the segment of stream between RR1 and RT1/RT2/RR2. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at RR1.

Table D15. Allocations RR1		
RR1	Al (Lbs/day)	Mn (Lbs/day)
Existing Load @ RR1	2.72	7.52
Difference in measured Loads between the loads that enter and existing RR1	-2.14	-2.54
Percent loss due calculated at RR1	44%	26%
Additional load tracked from above samples	1.01	2.39
Percentage of upstream loads that reach RR1	56%	74%
Total load tracked between RT1/RT2/RR2 and RR1	0.57	1.77
Allowable Load @ RR1	1.06	2.71
Load Reduction @ RR1	0	0
% Reduction required @ RR1	0%	0%

Margin of Safety

For this study the margin of safety is applied implicitly. A MOS is implicit because the allowable concentrations and loadings were simulated using Monte Carlo techniques and employing the @Risk software. Other margins of safety used for this TMDL analysis include the following:

- An additional MOS is provided because that the calculations were done with a daily Fe average instead of the 30-day average.

Seasonal Variation

Seasonal variation is implicitly accounted for in these TMDLs because the data used represents all seasons.

Critical Conditions

The reductions specified in this TMDL apply at all flow conditions. A critical flow condition could not be identified from the data used for this analysis.

Attachment E

Excerpts Justifying Changes Between the 1996, 1998, and 2002 Section 303(d) Lists and Integrated Report/List (2004, 2006)

The following are excerpts from the Pennsylvania DEP Section 303(d) narratives that justify changes in listings between the 1996, 1998, 2002, 2004 and 2006 303(d) Lists and Integrated Report/List (2006). The Section 303(d) listing process has undergone an evolution in Pennsylvania since the development of the 1996 list.

In the 1996 Section 303(d) narrative, strategies were outlined for changes to the listing process. Suggestions included, but were not limited to, a migration to a Global Information System (GIS), improved monitoring and assessment, and greater public input.

The migration to a GIS was implemented prior to the development of the 1998 Section 303(d) list. As a result of additional sampling and the migration to the GIS some of the information appearing on the 1996 list differed from the 1998 list. Most common changes included:

1. mileage differences due to recalculation of segment length by the GIS;
2. slight changes in source(s)/cause(s) due to new EPA codes;
3. changes to source(s)/cause(s), and/or miles due to revised assessments;
4. corrections of misnamed streams or streams placed in inappropriate SWP subbasins; and
5. unnamed tributaries no longer identified as such and placed under the named watershed listing.

Prior to 1998, segment lengths were computed using a map wheel and calculator. The segment lengths listed on the 1998 Section 303(d) list were calculated automatically by the GIS (ArcInfo) using a constant projection and map units (meters) for each watershed. Segment lengths originally calculated by using a map wheel and those calculated by the GIS did not always match closely. This was the case even when physical identifiers (e.g., tributary confluence and road crossings) matching the original segment descriptions were used to define segments on digital quad maps. This occurred to some extent with all segments, but was most noticeable in segments with the greatest potential for human errors using a map wheel for calculating the original segment lengths (e.g., long stream segments or entire basins).

<u>Migration to National Hydrography Data (NHD)</u>

New to the 2006 report is use of the 1/24,000 National Hydrography Data (NHD) streams GIS layer. Up until 2006 the Department relied upon its own internally developed stream layer. Subsequently, the United States Geologic Survey (USGS) developed 1/24,000 NHD streams layer for the Commonwealth based upon national geodatabase standards. In 2005, DEP contracted with USGS to add missing streams and correct any errors in the NHD. A GIS contractor transferred the old DEP stream assessment information to the improved NHD and the old DEP streams layer was archived. Overall, this marked an improvement in the quality of the streams layer and made the stream assessment data compatible with national standards but it necessitated a change in the Integrated Listing format. The NHD is not attributed with the old DEP five digit stream codes so segments can no longer be listed by stream code but rather only by stream name or a fixed combination of NHD fields known as reachcode and ComID. The NHD is aggregated by Hydrologic Unit Code (HUC) watersheds so HUCs rather than the old State Water Plan (SWP) watersheds are now used to group streams together. The map in

Appendix E illustrates the relationship between the old SWP and new HUC watershed delineations. A more basic change was the shift in data management philosophy from one of “dynamic segmentation” to “fixed segments”. The dynamic segmentation records were proving too difficult to mange from an historical tracking perspective. The fixed segment methods will remedy that problem. The stream assessment data management has gone through many changes over the years as system requirements and software changed. It is hoped that with the shift to the NHD and OIT’s (Office of Information Technology) fulltime staff to manage and maintain SLIMS the systems and formats will now remain stable over many Integrated Listing cycles.

Attachment F

Water Quality Data Used In TMDL Calculations

Site	Date	Flow (gpm)	pH	Acidity (mg/L)	Alkalinity (mg/L)	Al (mg/L)	Fe (mg/L)	Mn (mg/L)
GT1	1/20/2006	134	6.50	-	12.19	0.27	0.04	0.4
GT1	2/26/2006	-	6.84	-11.45	14.50	0.42	0.12	0.65
GT1	4/7/2006	-	6.91	-10.00	14.62	0.20	0.12	0.45
GT1	6/2/2006	7.94	5.85	-9.54	15.38	0.19	0.1	0.35
GT1	8/1/2006	6.31	7.50	-27.29	32.40	0.025	0.07	0.54
GT1	9/22/2006	4.8	7.61	-27.69	33.85	0.06	0.06	0.31
	Average	*38.26*	*6.87*	*-17.19*	*20.49*	*0.19*	*0.09*	*0.45*
	StDev	*63.84*	*0.65*	*9.43*	*9.85*	*0.14*	*0.03*	*0.13*

Site	Date	Flow (gpm)	pH	Acidity (mg/L)	Alkalinity (mg/L)	Al (mg/L)	Fe (mg/L)	Mn (mg/L)
RR1	1/20/2006	134	6.03	5.78	7.70	0.90	0.60	1.4
RR1	2/24/2006	941	6.74	-9.92	14.50	0.85	0.09	1.8
RR1	4/7/2006	944	6.96	-4.77	13.08	0.57	0.16	1.6
RR1	6/2/2006	736	6.86	-14.00	16.15	0.21	0.13	1.1
RR1	8/1/2006	128	7.41	-19.54	26.31	0.03	0.09	0.50
RR1	9/22/2006	203	7.42	-20.31	26.56	0.09	0.06	0.90
	Average	*514.33*	*6.90*	*-10.46*	*17.38*	*0.44*	*0.19*	*1.22*
	StDev	*401.65*	*0.51*	*9.88*	*7.56*	*0.39*	*0.20*	*0.48*

Site	Date	Flow (gpm)	pH	Acidity (mg/L)	Alkalinity (mg/L)	Al (mg/L)	Fe (mg/L)	Mn (mg/L)
RR2	1/20/2006	154	6.46	3.82	9.22	0.97	0.12	1.8
RR2	2/24/2006	686	6.78	-4.50	12.76	2.30	0.22	2.6
RR2	4/7/2006	440	7.03	-14.35	10.53	1.40	0.32	2.2
RR2	6/2/2006	507	6.20	-10.46	12.31	0.51	0.16	1.8
RR2	8/1/2006	188	7.33	-12.35	20.09	0.5	3.9	0.83
RR2	9/22/2006	93	7.25	-20.00	23.85	0.05	0.28	2.1
	Average	*344.67*	*6.84*	*-9.64*	*14.79*	*0.96*	*0.83*	*1.89*
	StDev	*235.02*	*0.45*	*8.31*	*5.82*	*0.80*	*1.50*	*0.60*

Site	Date	Flow (gpm)	pH	Acidity (mg/L)	Alkalinity (mg/L)	Al (mg/L)	Fe (mg/L)	Mn (mg/L)
RR3	1/20/2006	173.0	4.32	22.42	0.00	1.9	0.14	2.8
RR3	2/24/2006	177	4.80	19.97	1.54	2.90	0.09	3.6
RR3	4/7/2006	670	4.95	16.92	2.31	2.2	0.43	3.2
RR3	6/2/2006	230	3.89	25.00	0.00	2.21	0.23	5.00
RR3	8/1/2006	4	4.85	16.06	1.36	1.39	0.48	6.0
RR3	9/22/2006	21	5.10	9.12	3.80	0.96	0.48	7.2
	Average	*212.50*	*4.65*	*18.25*	*1.50*	*1.93*	*0.31*	*4.63*
	StDev	*241.90*	*0.46*	*5.58*	*1.45*	*0.68*	*0.18*	*1.74*

Site	Date	Flow (gpm)	pH	Acidity (mg/L)	Alkalinity (mg/L)	Al (mg/L)	Fe (mg/L)	Mn (mg/L)
RR4	1/20/2006	126	4.48	10.00	0.00	0.60	0.08	0.3
RR4	2/24/2006	65	5.34	4.95	1.55	0.59	0.04	0.2
RR4	4/7/2006	398	5.15	3.85	2.31	0.60	0.64	0.26
RR4	6/2/2006	48	6.10	8.46	4.62	0.20	0.1	0.27
RR4	8/1/2006	-	5.33	4.96	1.09	0.51	0.86	0.74
	Average	*159.25*	*5.28*	*6.44*	*1.91*	*0.50*	*0.34*	*0.35*
	StDev	*162.65*	*0.58*	*2.64*	*1.73*	*0.17*	*0.38*	*0.22*

Site	Date	Flow (gpm)	pH	Acidity (mg/L)	Alkalinity (mg/L)	Al (mg/L)	Fe (mg/L)	Mn (mg/L)

ST1	1/20/2006	-	6.47	-22.80	13.13	0.98	0.27	1.4
ST1	2/24/2006	-	7.26	-27.62	35.66	0.84	0.05	1.6
ST1	4/7/2006	124	7.22	-13.18	19.70	0.92	0.39	1.5
ST1	6/2/2006	62.7	6.86	-19.08	23.08	0.4	0.11	1.2
ST1	8/1/2006	20.2	7.51	-42.20	44.43	0.71	0.33	2.0
ST1	9/22/2006	22.2	6.94	-17.73	23.94	0.93	0.36	2.4
	Average	*57.28*	*7.04*	*-23.77*	*26.65*	*0.80*	*0.25*	*1.68*
	StDev	*48.60*	*0.37*	*10.26*	*11.39*	*0.21*	*0.14*	*0.44*

Site	**Date**	**Flow (gpm)**	**pH**	**Acidity (mg/L)**	**Alkalinity (mg/L)**	**Al (mg/L)**	**Fe (mg/L)**	**Mn (mg/L)**
ST2	4/7/2006	115	7.98	-61.65	69.92	0.25	0.14	0.09
ST2	6/2/2006	83.5	7.48	-72.15	72.92	0.1	0.06	0.26
ST2	8/1/2006	10	7.94	-78.08	87.82	0.025	0.04	0.25
ST2	9/22/2006	5	7.92	-81.82	87.88	0.15	0.08	0.18
	Average	*53.38*	*7.83*	*-73.43*	*79.64*	*0.14*	*0.08*	*0.20*
	StDev	*54.55*	*0.23*	*8.80*	*9.56*	*0.09*	*0.04*	*0.08*

Site	**Date**	**Flow (gpm)**	**pH**	**Acidity (mg/L)**	**Alkalinity (mg/L)**	**Al (mg/L)**	**Fe (mg/L)**	**Mn (mg/L)**
RT1	1/20/2006	115	6.51	-1.97	12.33	0.34	0.09	0
RT1	2/24/2006	80.8	6.79	-9.92	13.74	0.22	0.03	0.01
RT1	4/7/2006	73.3	7.15	-9.02	15.04	0.10	0.15	0.03
RT1	6/2/2006	92.7	6.61	-17.69	12.31	-	-	-
RT1	8/1/2006	33.4	7.51	-30.96	35.45	0.13	0.68	0.21
RT1	9/22/2006	35.9	7.67	-31.96	33.49	0.025	0.25	0.11
	Average	*71.85*	*7.04*	*-16.92*	*20.39*	*0.16*	*0.24*	*0.07*
	StDev	*32.09*	*0.48*	*12.32*	*10.97*	*0.12*	*0.26*	*0.09*

Site	**Date**	**Flow (gpm)**	**pH**	**Acidity (mg/L)**	**Alkalinity (mg/L)**	**Al (mg/L)**	**Fe (mg/L)**	**Mn (mg/L)**
RT2	1/20/2006	137	5.50	13.38	4.50	1.3	1.43	1.7
RT2	2/24/2006	110	6.68	-4.89	12.21	1.60	0.27	2.5
RT2	4/7/2006	149	7.10	-7.33	14.20	1.5	0.37	2.0
RT2	6/2/2006	0.0	6.70	-50.92	52.46	0.6	1.3	0.76
RT2	8/1/2006	0.0	7.18	-115.45	119.70	0.025	5.1	6.0
RT2	9/22/2006	45	7.17	-13.64	19.70	0.11	0.29	1.6
	Average	*73.50*	*6.72*	*-29.81*	*37.13*	*0.86*	*1.46*	*2.43*
	StDev	*67.35*	*0.64*	*46.98*	*43.74*	*0.70*	*1.86*	*1.84*

Attachment G

TMDLs and NPDES Permitting Coordination

NPDES permitting is unavoidably linked to TMDLs through waste load allocations and their translation, through the permitting program, to effluent limits. Primary responsibility for NPDES permitting rests with the District Mining Offices (for mining NPDES permits) and the Regional Offices (for industrial NPDES permits). Therefore, the DMOs and Regions will maintain tracking mechanisms of available waste load allocations, etc. in their respective offices. The TMDL program will assist in this effort. However, the primary role of the of the TMDL program is TMDL development and revision/amendment (the necessity for which is as defined in the Future Modifications section) at the request of the respective office. All efforts will be made to coordinate public notice periods for TMDL revisions and permit renewals/reissuances.

Load Tracking Mechanisms

The Department has developed tracking mechanisms that will allow for accounting of pollution loads in TMDL watersheds. This will allow permit writers to have information on how allocations have been distributed throughout the watershed in the watershed of interest while making permitting decisions. These tracking mechanisms will allow the Department to make minor changes in WLAs without the need for EPA to review and approve a revised TMDL. Tracking will also allow for the evaluation of loads at downstream points throughout a watershed to ensure no downstream impairments will result from the addition, modification or movement of a permit.

Options for Permittees in TMDL Watersheds

The Department is working to develop options for mining permits in watersheds with approved TMDLs.

Options identified

- Build excess WLA into the TMDL for anticipated future mining. This could then be used for a new permit. Permittee must show that there has been actual load reduction in the amount of the proposed permit or must include a schedule to guarantee the reductions using current data referenced to the TMDL prior to permit issuance.
- Use WLA that is freed up from another permit in the watershed when that site is reclaimed. If no permits have been recently reclaimed, it may be necessary to delay permit issuance until additional WLA becomes available.
- Re-allocate the WLA(s) of existing permits. WLAs could be reallocated based on actual flows (as opposed to design flows) or smaller than approved pit/spoil areas (as opposed to default areas). The "freed-up" WLA could be applied to the new permit. This option would require the simultaneous amendment of the permits involved in the reallocation.
- Non-discharge alternative.

Other possible options

The following two options have also been identified for use in TMDL watersheds. However, before recommendation for use as viable implementation options, a thorough regulatory (both state and federal) review must be completed. These options should not be implemented until the completion of the regulatory review and development of any applicable administrative mechanisms.

- Issue the permit with in-stream water quality criteria values as the effluent limits. The in-stream criteria value would represent the monthly average, with the other limits adjusted accordingly (e.g., for Fe, the limits would be 1.5 mg/L monthly average, 3.0 mg/L daily average and 4.0 instantaneous max mg/L).

- The applicant would agree to treat an existing source (point or non-point) where there is no responsible party and receive a WLA based on a portion of the load reduction to be achieved. The result of using these types of offsets in permitting is a net improvement in long-term water quality through the reclamation or treatment of an abandoned source.

Attachment H
Comment and Response

Comments were received on the original Rock Run TMDL (participated in 2002-2003) from U.S. EPA Region III, Pa. DEP Hawk Run District Mining Office, and Joseph K. Reinhardt, Esquire, of the firm of Babst, Calland, Clements, and Zomnir of Pittsburgh, PA on behalf of its client, Seabord Surety. With the exception of minor editorial comments, the comments were regarding the treatment of the discharges from K&J Coal Company Westover Mine. K&J, for whom Seabord Surety held bonds, became bankrupt in 2002. Pa. DEP negotiated a consent order and agreement with Surety to assure reclamation of K&Js remaining features connected to the Westover Mine. As a result, comments regarding this issue are now outdated and irrelevant. As such, no formal response has been included in this TMDL document. Comments have been archived at the TMDL Program office and can be viewed upon request by contacting Mr. Will Brown at (717)783-2951 or willbrown@state.pa.us.

No public comments were received on the revised Rock Run TMDL (this document) public noticed in 2008.