Amended WALLACE RUN WATERSHED TMDL
Fayette County

For Mine Drainage Affected Segments

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Pennsylvania Department of Environmental Protection

March 26, 2010

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Introduction

This report presents the Total Maximum Daily Loads (TMDLs) developed for segments in the Wallace 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. Wallace Run was listed as impaired for metals and other inorganics. All impairments resulted from drainage from abandoned coalmines. The TMDL addresses the three primary metals associated with mine drainage (iron, manganese, aluminum) and pH.

Table 1. 303(d) Listed Segments

State Water Plan (SWP) Subbasin: 19C

HUC: 05020005 Lower Monogahela 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	0.8	*	*	4913	41088	Wallace Run	WWF	305(b) Report	RE	Metals
1996	0.5	*	*	4913	41088	Wallace Run	WWF	305(b) Report	RE	Other Inorganics*
1998	1.29	*	*	4913	41088	Wallace Run	WWF	SWMP	AMD	Metals Other Inorganics*
2002	1.3	*	*	4913	41088	Wallace Run	WWF	SWMP	AMD	Metals Other Inorganics*
2004	1.3	*	*	4913	41088	Wallace Run	WWF	SWMP	AMD	Metals Other Inorganics*
2006	1.33 0.27	Aquatic Life Aquatic Life	7617 13195	* *	41088 41088	Wallace Run	WWF	SWMP	AMD	Metals Metals
2006	0.71	Aquatic Life	13195	*	41089	Wallace Run, Unt	WWF	SWMP	AMD	Metals
2006	0.38	Aquatic Life	13195	*	41090	Wallace Run, Unt	WWF	SWMP	AMD	Metals
2006	0.67	Aquatic Life	13195	*	41093	Wallace Run, Unt	WWF	SWMP	AMD	Metals

[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.*

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.
* Other Inorganics have been removed as a source of impairment.

Directions to the Wallace Run Watershed

The Wallace Run Watershed is located in southwestern Pennsylvania, occupying the western central portions of Fayette County. The watershed is located on the Carmichaels 7.5' quadrangle U.S. Geologic Survey map. The area within the watershed is approximately 4.2 square miles. Wallace Run can be accessed by taking U.S. Route 40 west from Uniontown, PA, turning left onto State Route 4006, then left onto Township Road 305, then making the first left turn onto a local road. Sampling locations can be accessed off of this road.

Hydrology and Geology

Wallace Run is part of the Monogahela River Basin in Fayette County and drains directly into the Monongahela River. The watershed area is located west of Chestnut Ridge and is characterized by a rolling and hilly plateau.[2] The watershed area is located in the Waynesburg Hills section of the Appalachian Plateaus Physiographic Providence. This section consists of very hilly terrain with narrow hilltops and steep-sloped, narrow valleys. The local relief is typically 600 to 1000 feet. Elevations range from 848 to 1638 feet. Some of the land surface of the section is very susceptible to landslides.[3]

The watershed is located on an elongated hilltop with the Waynesburg coal seam outcropping at an approximate elevation of 1040 feet. The watershed lies on the eastern flank of the Brownsville Anticline. The general strike of the area is approximately 70 degrees northwest and the dip is approximately 1 degree southeast.[4]

Small patch towns, such as Penncraft, Thompson No. 2, and Ralph, are located in the headwaters of Wallace Run. Land uses within the watershed include agriculture, abandoned mine lands, and rural residential properties, with small communities scattered throughout the area. Wallace Run flows beneath the Monogahela Railroad tracks just before it empties into the Monongahela River. Much of this area has been disturbed by strip mining and coal refuse disposal. There are also several gas wells within the watershed.

Abandoned Pittsburgh and Waynesburg coal seam deep mines underlie and discharge to the watershed area. The Waynesburg deep mining was conducted by the National Mines Corporation's Crucible and Isabella Mines (Permit Numbers 466M058, 466M059, and 467M059). The aerial extent of the Waynesburg deep mine is unknown; however, it appears to be of limited extent with the opening located at the crop line. Surface mining of the Waynesburg

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[2] Soil Survey of Fayette County, Pennsylvania: United States Department of Agriculture, Soil Conservation Service, et al.; March 1973.
[3] Taken from http://www.dcnr.state.pa.us/topogeo/map13/13whs.aspx.
[4] Luzerne Coal Corporation, Application No. 26810123, Luzerne Township, Fayette County, prepared by Penn Environmental Consultants, Inc., 1983.

coal seam has occurred in the watershed since 1959. Luzerne Coal Corporation strip-mined the Waynesburg coal seam on their pre-primacy Mine Drainage Permit 3371BSM27, the Collins Young sites. The site was re-permitted under SMP 26810123. Luzerne Coal Corporation also strip-mined the Waynesburg coal seam on the SMP 26713049, the New Broadwater site. Luzerne Coal Corporation did not daylight the abandoned Waynesburg deep mines. Both types of mining have affected ground and surface water in the area and refuse piles have scarred the land within the watershed.[5] The Wallace Run Watershed contains one abandoned mine lands feature that has been identified by the BAMR AML database. This feature was an abandoned strip mine, called Ralph-West, which has been reclaimed.[6]

Regional water flow is controlled by the extensive deep mines in the Pittsburgh coal seam. Local water flow is controlled by the local dip of the strata and the topography of the area.

Segments addressed in this TMDL

Wallace Run is affected by pollution from AMD. This pollution has caused high levels of metals, and in some cases low pH, in the watershed. Most of the discharges in the watershed are from abandoned mines and will be treated as non-point sources. The remaining discharges ares from permitted mining operations and will be treated as point sources. The distinction between non-point and point sources in this case is determined on the basis of whether or not there is a responsible party for the discharge. 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 Attachment D for TMDL calculations.

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;

[5] Report by Nancy Dimeolo, Addendum to Mine Drainage Permit NO. 3373BSM27, July 1, 1983.

[6] EMapPa, Geospatial Data Center, Pennsylvania Department of Environmental Protection.

- 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)[7] 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

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

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 (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[8] 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

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) where (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.

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

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.

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 LA 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. Wallace 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
WALL06 – Unnamed tributary to Wallace Run at mouth						
Aluminum (lbs/day)	0.75	NA	-	NA	NA	NA
Iron (lbs/day)	2.28	1.78	-	1.78	0.50	22%
Manganese(lbs/day)	1.80	0.74	-	0.74	1.06	59%
Acidity (lbs/day)	-517.71	NA	-	NA	NA	NA
WALL05 – Wallace Run upstream of confluence with WALL06 unnamed tributary						
Aluminum (lbs/day)	7.83	0.71	-	0.71	7.12	91%
Iron (lbs/day)	7.09	0.99	-	0.99	6.10	86%
Manganese(lbs/day)	12.13	0.61	-	0.61	11.52	95%
Acidity (lbs/day)	13.27	6.90	-	6.90	6.37	48%
WALL03 – Unnamed tributary to Wallace Run at mouth						
Aluminum (lbs/day)	0.44	NA	-	NA	NA	NA
Iron (lbs/day)	5.92	1.24	-	1.24	4.68	79%
Manganese(lbs/day)	8.38	1.09	-	1.09	7.29	87%
Acidity (lbs/day)	-543.16	NA	-	NA	NA	NA
WALL02 - Unnamed tributary to Wallace Run at mouth						
Aluminum (lbs/day)	0.91	0.32	-	0.32	0.59	65%
Iron (lbs/day)	0.94	0.65	-	0.65	0.29	31%
Manganese(lbs/day)	0.11	NA	-	NA	NA	NA
Acidity (lbs/day)	-292.83	NA	-	NA	NA	NA
WALL01 – Wallace Run at mouth						
Aluminum (lbs/day)	27.66	1.66	0.77	0.89	18.29	92%*
Iron (lbs/day)	31.06	3.11	3.07	0.04	16.38	84%*
Manganese(lbs/day)	17.29	2.25	2.06	0.19	0	0%*
Acidity (lbs/day)	-3245.76	NA	-	NA	NA	NA

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

In the instance that the allowable load is equal to the existing load (e.g. aluminum WALL01, 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 WALL01 of Wallace Run are shown. As demonstrated in the example, all upstream contributing loads are accounted for at each point. Attachment C 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.

Wallace Run

Allocations WALL06-02	
	Al (Lbs/day)
Existing Load WALL06-02	9.93
Allowable Load WALL06-02	2.22

Allowable Load = 2.22 lbs/day

Load input = 17.73 lbs/day
(Difference between existing loads upstream and WALL01)

ALLOCATIONS WALL01	
	Al (Lbs/day)
Existing Load @ WALL01	27.66
Difference in measured Loads between the loads that enter and existing WALL01 (WALL06-02)	17.73
Additional load tracked from above samples	2.22
Total load tracked between upstream and WALL01	19.95
Allowable Load @ WALL01	1.66
Load Reduction @ WALL01	18.29
% Reduction required at WALL01	92%

Allowable Load = 1.66 lbs/day

The allowable aluminum load tracked from upstream was 2.22 lbs/day. The existing load upstream was subtracted from the existing load at WALL01 to show the actual measured increase of aluminum load that has entered the stream between these upstream sites and WALL01 (17.73 lbs/day). This increased value was then added to the calculated allowable load from upstream to calculate the total load that was tracked between upstream and WALL01 (allowable loads upstream + the difference in existing load between upstream and WALL01). This total load tracked was then subtracted from the calculated allowable load at WALL01 to determine the amount of load to be reduced at WALL01. This total load value was found to be 19.95 lbs/day; it was 18.29 lbs/day greater than the WALL01 allowable load of 1.66 lbs/day. Therefore, a 92% aluminum reduction at WALL01 is necessary.

Recommendations

Statewide Reclamation Efforts

Since the 1960s, Pennsylvania has been a national leader in establishing laws and regulations to ensure mine reclamation and well plugging occur after active operation is completed. Mine reclamation and well plugging refer to the process of cleaning up environmental pollutants and safety hazards associated with a site and returning the land to a productive condition, similar to PADEP's Brownfields Program. Pennsylvania is striving for complete reclamation of its abandoned mines and plugging of its orphan wells. These concepts include legislative, policy, and land management initiatives designed to enhance mine operator/volunteer/PADEP reclamation efforts.

Various methods to eliminate or treat pollutant sources provide a reasonable assurance that the proposed TMDLs can be met. 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 that are currently being used for projects designed to achieve TMDL reductions include the USEPA 319 grant program and Pennsylvania's Growing Greener Program. Federal funding is through the Department of the Interior's Office of Surface Mining (OSM) for reclamation and mine drainage treatment through the Appalachian Clean Streams Initiative and through Watershed Cooperative Agreements.

The PADEP Bureau of District Mining Operations (DMO) administers an environmental regulatory program for all mining activities, including mine subsidence regulation, mine subsidence insurance, and coal refuse disposal. PADEP DMO also conducts a program to ensure safe underground bituminous mining and protect certain structures from subsidence; administers a mining license and permit program; administers a regulatory program for the use, storage, and handling of explosives; and provides for training, examination, and certification of applicants' blaster's licenses. In addition, PADEP Bureau of Mining & Reclamation administers a loan program for bonding anthracite underground mines and for mine subsidence, the Small Operator's Assistance Program (SOAP), and the Remining Operator's Assistance Program (ROAP).

Regulatory programs 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 agreements were initialized for facilities/operators that need to assure treatment of post-mining discharges or discharges they degraded. These agreements 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." Acidity loads from abandoned discharges have been observed to decrease by an average of 61 percent when remined (Smith, Brady, and Hawkins, 2002. "Effectiveness of Pennsylvania's remining program in abating abandoned mine drainage: water quality impacts" in Transactions of the Society for Mining, Metallurgy, and Exploration, Volume 312, p. 166-170).

PADEP BAMR, which administers the program to address the Commonwealth's abandoned mine reclamation program, 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 PADEP, 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 Attachment G).

- 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.

The Commonwealth is exploring all identified 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:

- 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 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 into the Upper West Branch Susquehanna River), and the Wadesville Deep Mine Pool (Exelon Generation in Schuylkill County).

Watershed-Specific Reclamation Efforts

There currently isn't a watershed organization interested in the Wallace Run Watershed. It is recommended that agencies work with local interests to form a watershed group that will be dedicated to the remediation and preservation of these watersheds through public education, monitoring and assessment, and improvement projects. Information on formation of a watershed group is available through websites for the PADEP (www.dep.state.pa.us), the AMR Clearinghouse (www.amrclearinghouse.com), the EPA (www.epa.gov), the Susquehanna River Basin Commission (www.srbc.net) and others. In addition, each DEP Regional Office (6) and each District Mining Office (5) have watershed managers to assist stakeholder groups interested in restoration in their watershed. Most Pennsylvania county conservation districts have a watershed specialist who can also provide assistance to stakeholders (www.pacd.org). Potential funding sources for AMR projects can be found at www.dep.state.pa.us/dep/subject/pubs/water/wc/FS2205.pdf.

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 first draft TMDL was published in the *Pennsylvania Bulletin* and the *Herald Standard* on January 22, 2008 to foster public comment on the allowable loads calculated. The public comment period on this TMDL was open January 19, 2008 to March 19, 2008. A public meeting was held on February 5, 2008 at the Greensburg District Mining Office to discuss the proposed TMDL.

Public notice of the amended TMDL was published in the *NEWSPAPER* and the *Pennsylvania Bulletin* on March 27, 2010 to foster public comments on the allowable loads calculated. The public comment period on this TMDL was open March 27, 2010 to May 25, 2010.

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

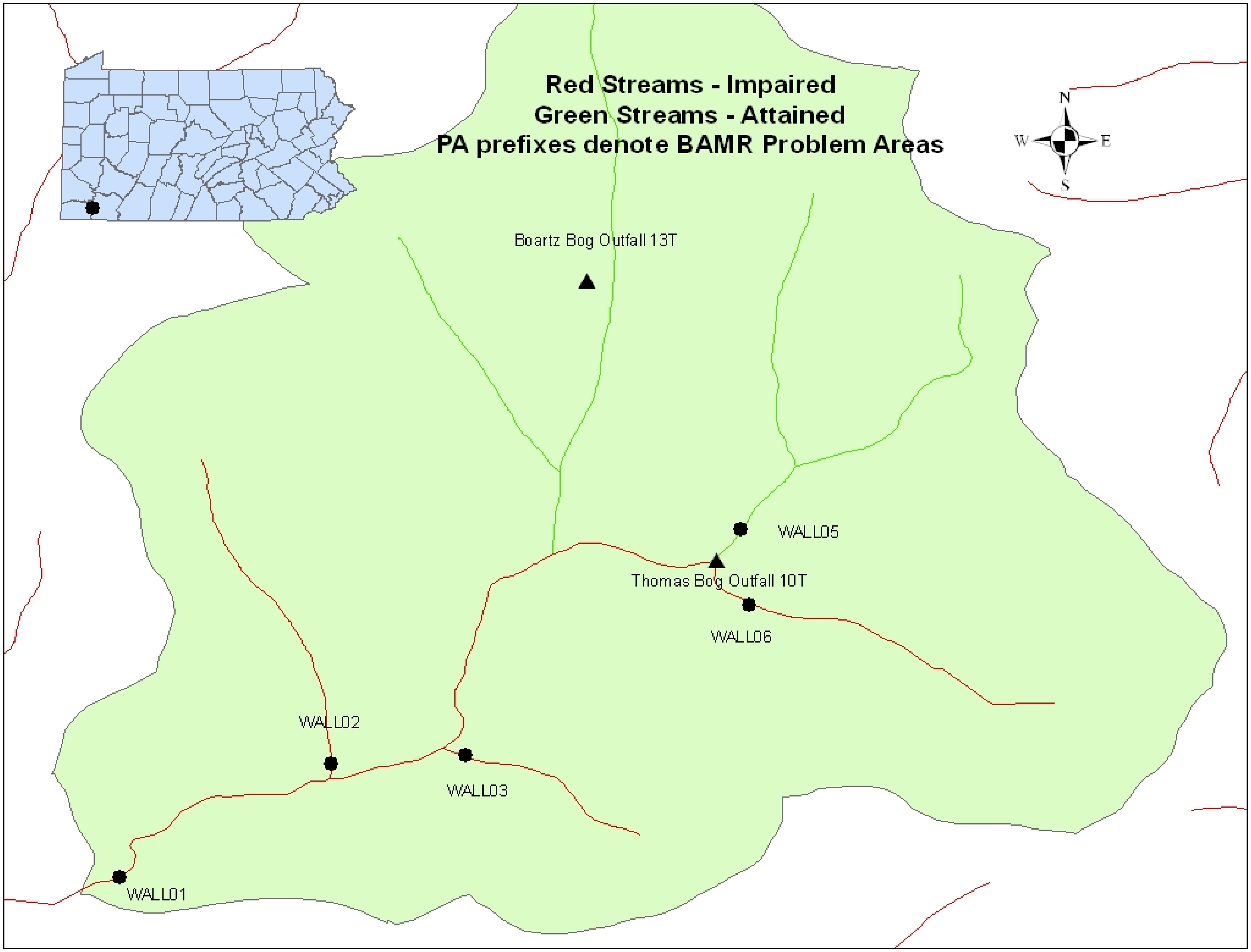
- Increase in total load capacity.
- Transfer of load between point (WLA) and nonpoint (LA) sources.
- Modification of the margin of safety (MOS).
- Change in water quality standards (WQS).
- Non-attainment of WQS with implementation of the TMDL.
- Allocations in trading programs.

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.

Attachment A

Wallace Run Watershed Maps


Red Streams - Impaired
Green Streams - Attained
PA prefixes denote BAMR Problem Areas
N
W
E
S
Boartz Bog Outfall 13T
WALL05
Thomas Bog Outfall 10T
WALL06
WALL02
WALL03
WALL01

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.*

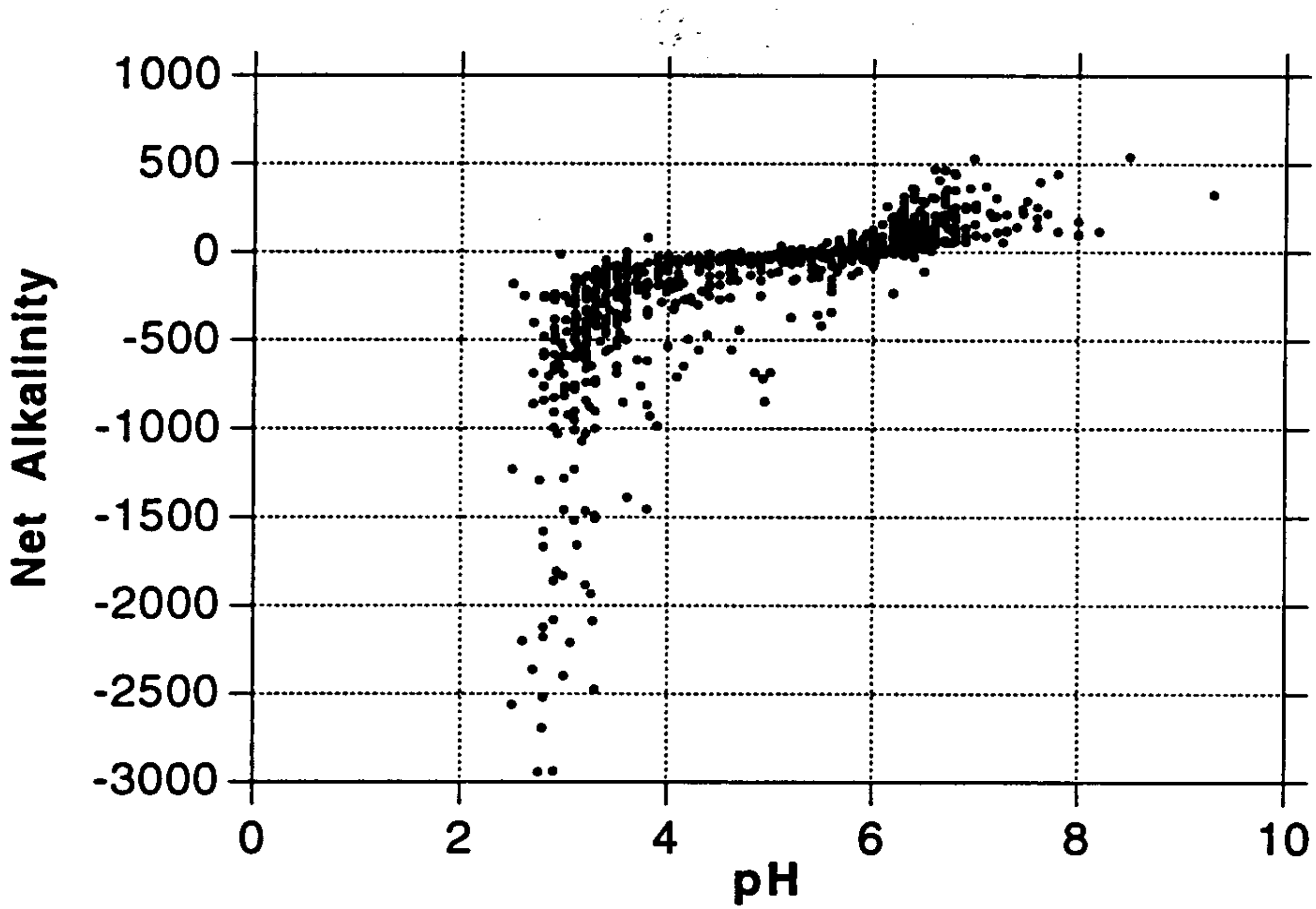


Figure 1. Net Alkalinity vs. pH. Taken from Figure 1.2 Graph C, pages 1-5, of Coal Mine Drainage Prediction and Pollution Prevention in Pennsylvania

Attachment D

TMDLs By Segment

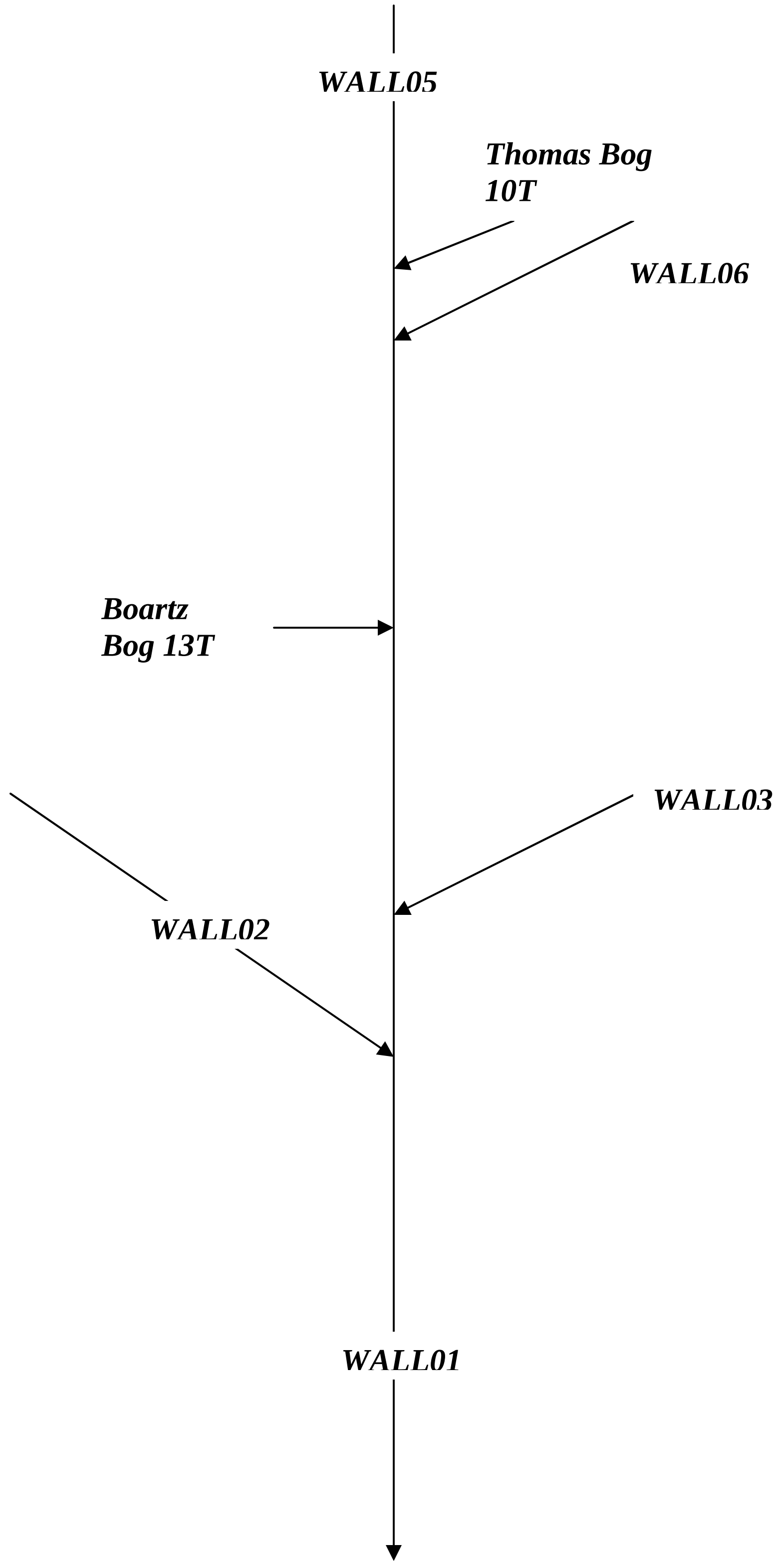
Wallace Run

The TMDL for Wallace Run consists of load allocations to two sampling sites on Wallace Run (WALL05 and WALL01) and three sites on unnamed tributaries of Wallace Run (WALL02, WALL03, and WALL06). 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.

Wallace 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 Wallace 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.

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



TMDL calculations- WALL06 – Unnamed tributary to Wallace Run

The TMDL for sample point WALL06 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 the unnamed tributary to Wallace Run was computed using water-quality sample data collected at point WALL06. The average flow, calculated using Streamstats (http://water.usgs.gov/osw/streamstats/pennsylvania.html) (0.36 MGD), is used for these computations. The allowable load allocations calculated at WALL06 will directly affect the downstream point WALL01.

Sample data at point WALL06 shows that the Wallace Run headwaters segment has a pH ranging between 7.9 and 8.0. There currently is not an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Because water quality standards are met, a TMDL for this parameter isn't necessary and is not calculated. A TMDL for aluminum, iron and manganese has been calculated at this site.

Table D1 shows the measured and allowable concentrations and loads at WALL06. Table D2 shows the percent reductions for iron and manganese.

Table D1		Measured		Allowable	
		Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.25	0.75	0.25	0.75
	Iron	0.76	2.28	0.59	1.78
	Manganese	0.60	1.80	0.24	0.74
	Acidity	-171.48	-517.71	-171.48	-517.71
	Alkalinity	208.80	630.38		

Table D2. Allocations WALL06		
WALL06	Fe (Lbs/day)	Mn (Lbs/day)
Existing Load @ WALL06	2.28	1.80
Allowable Load @ WALL06	1.78	0.74
Load Reduction @ WALL06	0.50	1.06
% Reduction required @ WALL06	22%	59%

TMDL calculations- WALL05 - Wallace Run upstream of confluence with WALL06 tributary

The TMDL for sampling point WALL05 consists of a load allocation to all of the area upstream of this point shown in Attachment A. The load allocation for this segment of Wallace Run was computed using water-quality sample data collected at point WALL05. The average flow, calculated using Streamstats (http://water.usgs.gov/osw/streamstats/pennsylvania.html) (0.35 MGD), is used for these computations.

Sample data at point WALL05 shows pH ranging between 4.7 and 6.2; 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 WALL05 has been calculated.

Table D3 shows the measured and allowable concentrations and loads at WALL05. Table D4 shows the percent reduction for aluminum, iron, and manganese needed at WALL05.

Table D3		Measured		Allowable	
		Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	2.69	7.83	0.24	0.71
	Iron	2.44	7.09	0.34	0.99
	Manganese	4.17	12.13	0.21	0.61
	Acidity	4.56	13.27	2.37	6.90
	Alkalinity	33.08	96.28		

Table D4. Allocations WALL05				
WALL05	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load @ WALL05	7.83	7.09	12.13	13.27
Allowable Load @ WALL05	0.71	0.99	0.61	6.90
Load Reduction @ WALL05	7.12	6.10	11.52	6.37
% Reduction required @ WALL05	91%	86%	95%	48%

TMDL calculations- WALL03 – Unnamed tributary to Wallace Run at mouth

The TMDL for sample point WALL03 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 Wallace Run was computed using water-quality sample data collected at point WALL03. The average flow, calculated using Streamstats (http://water.usgs.gov/osw/streamstats/pennsylvania.html) (0.21 MGD), is used for these computations. The allowable load allocations calculated at WALL03 will directly affect the downstream point WALL01.

Sample data at point WALL03 shows that this unnamed tributary of Wallace Run segment has a pH ranging between 7.9 and 8.0. There currently is not an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Because water quality standards are met, a TMDL for this parameter isn't necessary and is not calculated. A TMDL for aluminum, iron, manganese and acidity has been calculated at this site

Table D6 shows the measured and allowable concentrations and loads at WALL03. Table D7 shows the percent reductions for iron and manganese.

Table D6		Measured		Allowable	
		Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.25	0.44	0.25	0.44
	Iron	3.33	5.92	0.70	1.24
	Manganese	4.72	8.38	0.61	1.09
	Acidity	-305.76	-543.16	-305.76	-543.16
	Alkalinity	342.96	609.24		

Table D7. Allocations WALL03		
WALL03	Fe (Lbs/day)	Mn (Lbs/day)
Existing Load @ WALL03	5.92	8.38
Allowable Load @ WALL03	1.24	1.09
Load Reduction @ WALL03	4.68	7.29
% Reduction required @ WALL03	79%	87%

TMDL calculations- WALL02 – Unnamed tributary to Wallace Run at mouth

The TMDL for sampling point WALL02 consists of a load allocation to all of the area upstream of this point shown in Attachment A. The load allocation for this segment of the unnamed tributary to Wallace Run was computed using water-quality sample data collected at point WALL02. The average flow, calculated using Streamstats (http://water.usgs.gov/osw/streamstats/pennsylvania.html) (0.20 MGD), is used for these computations.

Sample data at point WALL02 shows pH ranging between 8.2 and 8.3; 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 WALL02 has been calculated.

Table D8 shows the measured and allowable concentrations and loads at WALL02. Table D9 shows the percent reduction for aluminum, iron, manganese and acidity needed at WALL02.

Table D8		Measured		Allowable	
		Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.55	0.91	0.19	0.32
	Iron	0.56	0.94	0.39	0.65
	Manganese	0.07	0.11	0.07	0.11
	Acidity	-175.56	-292.83	-175.56	-292.83
	Alkalinity	211.00	351.95		

Table D9. Allocations WALL02		
WALL02	Al (Lbs/day)	Fe (Lbs/day)
Existing Load @ WALL02	0.91	0.94
Allowable Load @ WALL02	0.32	0.65
Load Reduction @ WALL02	0.59	0.29
% Reduction required @ WALL02	65%	31%

A waste load allocation for the Chenango New Broadwater Mine (SMP26713049; NPDES PA119172) was included at WALL01 allowing for the 10M (Thomas Bog) and 13M (Boartz Bog) outfalls permitted on this segment.

Table D13. Waste load allocations for Chenango New Broadwater Mine			
Parameter	Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
13M Boartz Bog			
Al	0.75	0.1017	0.64
Fe	3.0	0.1017	2.54
Mn	2.0	0.1017	1.70
10M Thomas Bog			
Al	0.75	0.0213	0.13
Fe	3.0	0.0213	0.53
Mn	2.0	0.0213	0.36

TMDL calculations- WALL01- Wallace Run at mouth

The TMDL for sampling point WALL01 consists of a load allocation to all of the area between WALL05 and WALL01 shown in Attachment A. The load allocation for this segment of Wallace Run was computed using water-quality sample data collected at point WALL01. The average flow, calculated using Streamstats (http://water.usgs.gov/osw/streamstats/pennsylvania.html) (2.17 MGD), is used for these computations.

Sample data at point WALL01 shows pH ranging between 8.1 and 8.3; 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 WALL01 has been calculated.

Table D10 shows the measured and allowable concentrations and loads at WALL01. Table D11 shows the percent reduction for aluminum, iron, manganese and acidity needed at WALL01.

Table D10		Measured		Allowable	
		Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	1.53	27.66	0.09	1.66
	Iron	1.72	31.06	0.17	3.11
	Manganese	0.96	17.29	0.13	2.25
	Acidity	-179.76	-3245.76	-179.76	-3245.76
	Alkalinity	211.92	3826.49		

The measured and allowable loading for point WALL01 for aluminum, iron, 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 WALL01 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points WALL06-02 and WALL01 to determine a total load tracked for the segment of stream between WALL01 and WALL06-02. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at WALL01.

Table D11. Allocations WALL01			
WALL01	Al (Lbs/day)	Fe (Lbs/day)	Mn (Lbs/day)
Existing Load @ WALL01	27.66	31.06	17.29
Difference in measured Loads between the loads that enter and existing WALL01	17.73	14.83	-5.13
Additional load tracked from above samples	2.22	4.66	2.55
Total load tracked between WALL06-02 and WALL01	19.95	19.49	1.96
Allowable Load @ WALL01	1.66	3.11	2.25
Load Reduction @ WALL01	18.29	16.38	0
% Reduction required at WALL01	92%	84%	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:

- Effluent variability plays a major role in determining the average value that will meet water-quality criteria over the long-term. The value that provides this variability in our analysis is the standard deviation of the dataset. The simulation results are based on this variability and the existing stream conditions (an uncontrolled system). The general assumption can be made that a controlled system (one that is controlling and stabilizing the pollution load) would be less variable than an uncontrolled system. This implicitly builds in a margin of safety.
- 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).

Migration to National Hydrography Data (NHD)

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

MP	Date	pH	Alkalinity, mg/L	Hot Acidity, mg/L	Total Iron, mg/L	Total Manganese, mg/L	Total Aluminum, mg/L	TSS, mg/L
1	4/18/2006	8.3	192.2	-145	0.15	0.293	0.25	1.5
1	5/9/2006	8.1	205.2	-173.6	0.15	0.139	0.25	6
1	6/13/2006	8.2	217.2	-186	0.15	0.224	0.25	6
1	7/11/2006	8.1	220.8	-185.8	8	4.01	6.66	18
1	8/9/2006	8.2	224.2	-208.4	0.15	0.121	0.25	8
	Average	***8.18***	***211.92***	***-179.76***	***1.72***	***0.96***	***1.53***	***7.90***
	StDev	***0.08***	***13.15***	***23.14***	***3.51***	***1.71***	***2.87***	***6.13***
2	4/18/2006	8.2	186.8	-159.4	0.15	0.025	0.25	1.5
2	5/9/2006	8.2	205	-179.6	0.493	0.071	0.25	12
2	6/13/2006	8.3	216.4	-173.4	1.02	0.082	1.12	40
2	7/11/2006	8.2	223	-162.8	0.992	0.127	0.872	54
2	8/9/2006	8.2	223.8	-202.6	0.15	0.025	0.25	26
	Average	***8.22***	***211.00***	***-175.56***	***0.56***	***0.07***	***0.55***	***26.70***
	StDev	***0.04***	***15.48***	***17.15***	***0.43***	***0.04***	***0.42***	***21.06***
3	4/18/2006	8	323.2	-276	3.74	4.18	0.25	1.5
3	5/9/2006	7.9	338	-297	3.42	3.95	0.25	20
3	6/13/2006	8	344.8	-309	3.76	3.97	0.25	10
3	7/11/2006	7.9	347.8	-323.6	4.38	5.11	0.25	14
3	8/9/2006	8	361	-323.2	1.37	6.37	0.25	22
	Average	***7.96***	***342.96***	***-305.76***	***3.33***	***4.72***	***0.25***	***13.50***
	StDev	***0.05***	***13.85***	***19.97***	***1.15***	***1.04***	***0.00***	***8.23***
5	4/18/2006	6.7	69	-27	1.23	2.49	2.19	1.5
5	5/9/2006	6.3	38.6	-1.4	1.87	3.77	2.95	22
5	6/13/2006	6.2	29.2	-8.8	2.9	4.44	3.87	22
5	7/11/2006	6.2	17.8	8	0.474	0.144	0.25	40
5	8/9/2006	4.7	10.8	52	5.7	10	4.19	16
	Average	***6.02***	***33.08***	***4.56***	***2.43***	***4.17***	***2.69***	***20.30***
	StDev	***0.77***	***22.72***	***29.46***	***2.03***	***3.65***	***1.57***	***13.84***
6	4/18/2006	8	181.6	-131	0.451	0.224	0.25	1.5
6	5/9/2006	7.9	203.6	-170.8	0.638	0.328	0.25	8
6	6/13/2006	8	217.6	-170.4	0.987	0.313	0.25	20
6	7/11/2006	7.9	224.6	-192.8	0.458	1.38	0.25	16
6	8/9/2006	7.9	216.6	-192.4	1.24	0.729	0.25	18
	Average	***7.94***	***208.80***	***-171.48***	***0.75***	***0.59***	***0.25***	***12.70***
	StDev	***0.05***	***16.99***	***25.16***	***0.35***	***0.48***	***0.00***	***7.74***

Underlined values are included at half the detection limit.

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 Received from Babst, Calland, Clements, and Zomnir dated May 25, 2010

1. *Comment*: **Amendment of the Proposed TMDL is not required because the New Broadwater discharges have existed for many years, and the Department is not relying on any additional data to amend the TMDL.**

   The Public Notice states that "the Wallace Run TMDL, originally approved by USEPA in 2008, has been revised to reflect scenarios based on the addition of the discharge from the NPDES discharge associated with the Shenango [New Broadwater] permit" (emphasis added). As noted above, the New Broadwater Mine was reclaimed in the 1980s. The designs of the Boartz Bog and Thomas Bog treatment systems were approved by the Department many years ago and the treatment systems have been operating as designed for almost a decade. There has been no "additional" discharge from the New Broadwater Mine since the June 7, 2008 TMDL ("Original TMDL") was issued. In fact, the Original TMDL was issued six (6) months after the execution of the CO&A between the Department and Shenango that provided for the creation of a trust fund to ensure long-term operation and maintenance of the Boartz Bog and Thomas Bog. The quality and quantity of the discharge from Boartz Bog and Thomas Bog have not changed significantly since the systems were established. Therefore, it is not appropriate to suggest that the Original TMDL should be modified based upon an additional discharge.

   Further, based on a review of Attachment F (Water Quality Data Used in TMDL Calculations) included with the Original TMDL and Attachment F of the Proposed TMDL, the Department has relied on the *same set of water quality data from 2006* to perform the calculations for both the original TMDL and the Proposed TMDL.

   Response: The statement that the TMDL needed to be revised based on the addition of a discharge was not meant to be construed as the discharge not being in existence at the time of the original TMDL. Rather, the statement was meant to be read that the discharges from Shenango's facilities were not included in the original TMDL and therefore were additional discharges that needed to be addressed. By regulation, TMDLs must address all NPDES discharges to a water as wasteload allocations. By including wasteload allocations for the Shenango discharges, the Department corrected the TMDL to make it reflect current watershed conditions.

   The Department is justified in using the same set of water quality data for the amended TMDL as was used for the original TMDL. Because the discharges have been in existence for many years, it is appropriate to use the data set being used to determine the effect of the discharges on downstream water quality.

2. *Comment*: **The data and calculations in the Proposed TMDL are inconsistent with those set forth in the Original TMDL and appear to overstate the need for wasteload allocations at monitoring point WALL01.**

   Based on our review of data and information provided in the Proposed TMDL and Original TMDL regarding WALL01 (identified as "MP1" in Attachment F of the

Proposed TMDL), Shenango has identified significant discrepancies and potential errors that call into question the Department's conclusions in the Proposed TMDL. By way of example, these discrepancies and errors include the following:

a. The Original TMDL proposed measured existing loads for aluminum, iron and manganese that are significantly different than those set forth in the Proposed TMDL. The Original TMDL proposed existing loads for aluminum of 6.70 lbs/day, 7.52 lbs/day for iron, and 4.19 lbs/day for manganese. By comparison, the Proposed TMDL proposes that the existing load for aluminum is 27.66 lbs/day, the iron load as 31.06 lbs/day, and the existing load for manganese of 17.29 lbs/day. As noted above, both the Original TMDL and the Proposed TMDL purport to analyze the same data collected in 2006. Based upon the information provided, Shenango is unable to determine whether existing loads in the Original TMDL or Proposed TMDL are correct, but both cannot be correct. If the existing loads set forth in the Original TMDL are correct, it is likely that the Proposed TMDL has significantly overstated the need for wasteload reductions at monitoring point WALL01. If so, this could have a significant impact on Shenango, to the extent that the New Broadwater Mine passive treatment systems are located upstream of WALL01 and downstream of WALL06, and the Department or third parties could rely upon the Proposed TMDL to request reductions in the effluent limits for the Boartz and Thomas Bog.
b. On page 28 of the Original TMDL, the average flow at WALL01 is identified as 0.5241 MGD. In contrast, page 28 of the Proposed TMDL identifies the average flow for the same monitoring point as 2.17 MGD. The Proposed TMDL does not explain how the Department arrived at a flow that is over four (4) times greater than the flow set forth for the same location in the Original TMDL. Furthermore, Attachment F of the Proposed TMDL does not include flow data. However, it is notable that the average flow calculated by using the data presented for MP1 in Attachment F of the Original TMDL is 363.96 gpm which corresponds to 0.5241 MGD.
c. Attachment F of the Proposed TMDL, which sets forth the water quality data collected in 2006 and used in the TMDL calculations, relies upon only 5 monthly sampling events that includes data of questionable validity. The July 11, 2006 water quality sample at MPR1 reports concentrations of iron, manganese, and aluminum orders of magnitude higher than the non-detect values reported at the same location for the other four samples collected that year for the same parameters. In the case of aluminum, four of the sample results are reported as 0.25 mg/l, which is half the detection limit for this metal. Consequently, aluminum may or may not have been present on these four dates. By comparison, the July 2006 sample is reported at 6.66 mg/l. These data appear to be outliers and could significantly impact the calculated load of Wallace Run for aluminum and other parameters. If these potential outliers were removed from the dataset, all measured concentrations at WALL01 would be below detection limits for aluminum and iron (assumed to be 0.50 mg/l and 0.30 mg/L, respectively), and the average manganese concentration would be 0.19 mg/L. The manganese value

of 0.19 mg/L is well below the 1.00 mg/L Applicable Water Quality Criteria included in Table 2 of the Proposed TMDL.

In light of these data quality concerns, the Department should reevaluated the water quality information and reassess the need for wasteload allocations at WALL01.

Response: In response to sections a. and b., the reason for the difference in the flow and load values was a change from the original TMDL to the amended TMDL having to do with the flow values. The Department made a change in the way it uses flow data between the original TMDL and the amended TMDL. The old method was to use monitored flow data to calculate loads for the TMDL. However, the data used for the original TMDL calculations were collected only during the period of April through August. Due to the limited data availability, the Department decided to revise the flow values used in the amended TMDL to use those available through the US Geological Survey StreamStats website (www.streamstats.com). This website provides a long-term average flow for all the monitoring points in the amended TMDL. The data from the Streamstats website provided a more accurate reflection of actual flows in at the monitoring points on average as compared to the limited measured data. Therefore, the Streamstats flows were used in the recalculation of the loads and allocations at the monitoring points. However, this change was not explained in the document. Therefore, language has been added to the amended TMDL that explains the method used to characterize the flows.

In response to section c., it is not the policy of the Department to remove outliers from water quality datasets used in TMDL modeling.

3. ***Comment***: **The proposed TMDL fails to acknowledge Monitoring Point WALL04.**

The Original TMDL includes information for Monitoring Point WALL04, which is located on an unnamed tributary of Wallace Run upstream of WALL01 and downstream of WALL06. Attachment A of the Original TMDL (Wallace Run Watershed Maps) shows the locations of Monitoring Point WALL04. The Original TMDL acknowledges that water quality standards are being met for this unnamed tributary of Wallace Run. Consequently, the Original TMDL proposes no reductions in mine drainage parameters for discharges to this stream. By comparison, the Proposed TMDL eliminates all references to Monitoring Point WALL04, including those on Attachment A. Significantly, the Proposed TMDL adds to Attachment A references to the located of the Boartz Bog. A review of the watershed maps from the Original TMDL and Proposed TMDL shows that the Boartz Bog is upstream of the Monitoring Point WALL04.

By eliminating Monitoring Point WALL04, the proposed TMDL suggests that the closest downstream monitoring point to the Boartz Bog is WALL01. As noted above, the Proposed TMDL asserts that reductions in metals concentrations in discharges upstream of WALL01 are necessary in order to meet water quality standards in Wallace Run. However, to the extent that the Department is evaluating the water quality impacts of the Boartz Bog, the most meaningful monitoring locating is WALL04 as it is the closest downstream location to this discharge. Because the unnamed tributary of Wallace Run downstream of the Boartz Bog meets all water quality standards, there is no reason to impose reductions in the metal concentrations for this discharge. Shenango respectfully requests that the Department include references in the final TMDL to Monitoring Point WALL04 and acknowledge that no effluent reductions are necessary for the Boartz Bog.

Response: Point WALL04 was eliminated from the amended TMDL because no reductions were necessary at the monitoring point. Any metals reductions that are called for in the NPDES permit for the Boartz Bog are the result of having no wasteload allocation in the original TMDL to account for the load from permitted sources. The removal of point WALL04 should have no bearing on any metals reductions from the Boartz Bog discharges.

4. ***Comment***: **Shenango requests clarification that the waste load allocations in the Proposed TMDL for the New Broadwater Mine outfalls are intended to be monthly average values and comparable to the instantaneous maximum values set forth in the New Broadwater Permit.**

The Public Notice for the New Broadwater Permit sets forth instantaneous maximum discharge limitations for the Boartz Bog and Thomas Bog. Table D13 of the Proposed TMDL (page 28) identifies the "allowable concentrations" associated with the wasteload allocations for Outfalls 13M and 10M, but does not specify whether the concentrations are intended to be instantaneous maximum, daily maximum, or monthly average values. While the "allowable concentrations" are not exactly the same as the discharge limitations set forth for the New Broadwater Permit, Shenango understands that the values are comparable, with the discharge limitations being expressed as instantaneous maximum values and the "allowable concentrations" being expressed as monthly average values. Shenango requests the Department clarify that this is correct and that the allowable concentrations set forth in Table D13 of the Proposed TMDL are intended to be monthly average values.

Response: The allowable concentrations set forth in Table D13 are intended to be monthly average values.