STREETS RUN
WATERSHED TMDL
Allegheny County

For Abandoned Mine Drainage Affected Segments

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Pennsylvania Department of Environmental Protection

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Introduction

This report presents the Total Maximum Daily Loads (TMDLs) developed for segments in the Streets 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. Streets Run was listed as impaired for metals. All impairments resulted from drainage from abandoned coalmines. The TMDL addresses two primary metals associated with acid mine drainage (iron and aluminum) and pH. Manganese, while a metal associated with mine drainage, is not included in this TMDL document[2].

Table 1. 303(d) Listed Segments										
State Water Plan (SWP) Subbasin: 19A										
HUC: 05020005										
Year	Miles	Use Designation	Assessment ID	Segment ID	DEP Stream Code	Stream Name	Designated Use	Data Source	Source	EPA 305(b) Cause Code
1996	0.7	*	*	4701	37189	Streets Run	WWF	305(b) Report	RE	Metals
1998	0.81	*	*	4701	37189	Streets Run	WWF	SWMP	AMD	Metals
2002	0.81	*	*	4701	37189	Streets Run	WWF	SWMP	AMD	Metals
2004	0.8	*	*	4701	37189	Streets Run	WWF	SWMP	AMD	Metals
2006	1.21	Aquatic Life	7269	*	37189	Streets Run	WWF	SWMP	AMD	Metals
	1.13	Aquatic Life	7271	*	37189	Streets Run				Metals
	2.08	Aquatic Life	7272	*	37189	Streets Run				Metals
	0.97	Aquatic Life	7589	*	37189	Streets Run				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.*

[2] Pennsylvania Code 25 § 93.9v deletes the potable water supply designation from all waters contained in this watershed. The critical use for the total manganese criterion is potable water supply; Pennsylvania does not have total manganese criteria for aquatic life uses. Therefore, because the potable water supply use has been deleted, the criterion does not apply to the watershed and, thus, no TMDLs are necessary for total manganese.

2006	1.57	Aquatic Life	7273	*	37191	Streets Run, Unt	WWF	SWMP	AMD	Metals
2006	0.6	Aquatic Life	7273	*	37192	Streets Run, Unt	WWF	SWMP	AMD	Metals
2006	1.24	Aquatic Life	7273	*	37193	Streets Run, Unt	WWF	SWMP	AMD	Metals
2006	1.72	Aquatic Life	7270	*	37194	Streets Run, Unt	WWF	SWMP	AMD	Metals
2006	0.54	Aquatic Life	7270	*	37195	Streets Run, Unt	WWF	SWMP	AMD	Metals
2006	0.49	Aquatic Life	7270	*	37196	Streets Run, Unt	WWF	SWMP	AMD	Metals
2006	0.53	Aquatic Life	7270	*	37197	Streets Run, Unt	WWF	SWMP	AMD	Metals
2006	0.71	Aquatic Life	7269	*	37198	Streets Run, Unt	WWF	SWMP	AMD	Metals
2006	0.52	Aquatic Life	7270	*	64937	Streets Run, Unt	WWF	SWMP	AMD	Metals
2006	1.87	Aquatic Life	14612	*		Glass Run	WWF	SWMP	AMD	Metals

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 Streets Run Watershed

The Streets Run Watershed is located in southwestern Pennsylvania, occupying the southcentral portion of Allegheny County. The watershed is found on the United States Geological Survey Glassport and Pittsburgh East 7.5 minute Quadrangle. The area within the watershed consists of 9.8 miles^2. Streets Run can be accessed by taking Parkway east from Monroeville towards Pittsburgh and taking the Homestead Exit after the Squirrel Hill Tunnel. After crossing the Homestead Bridge, turn right onto Route 837, then left onto Route 885. The sampling locations are accessible from this and several local roads.

Hydrology and Geology

Streets Run is part of the Monongahela River Basin in Allegheny County. Streets Run drains to the Monongahela River. The watershed area is locations in the Waynesburg Hills section of the Appalachian Plateaus Physiographic Province. This section consists of very hilly 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.

The majority of the Streets Run Watershed lies on the western flank of the Amity Anticline. A small portion of the watershed is situated along the apex of this anticline, which trends from northeast to southwest and plunges to the southwest. The watershed is located in a hilly area with the Pittsburgh and Redstone coal seams outcropping at several locations. The general strike of the area is approximately 10 degrees northeast and the dip is approximately 1 degree northwest.

Streets Run is surrounded by heavily populated areas. Through urban encroachment and the natural terrain of the area, the main stream channels of Streets Run and its tributaries have been confined to narrow areas wedged between roads, railroad tracks, floodplain fills, commercial buildings, and houses. Land uses within the watershed include mostly residential properties, industry, and abandoned mine lands. Some of this area has been disturbed by strip mining and slag dumps, as labeled and shown on the map in a purple stipple pattern.

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

Streets Run is affected by pollution from AMD. This pollution has caused high levels of metals, and, in some cases, low pH in the watershed. Currently there are a number of operations that have NPDES discharge points in the Streets Run Watershed. However, the discharges that are contributing to the degradation in the Streets Run water quality are associated with either long abandoned deep or surface mines and are not being treated. The TMDLs will be expressed as long-term averages. 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 see Attachment C for TMDL explanations.

This AMD TMDL document contains one or more future mining Waste Load Allocations (WLA). These WLAs were requested by the Greensburg District Mining Office (DMO) to accommodate one or more future mining operations. The District Mining Office determined the number of and location of the future mining WLAs. This will allow speedier approval of future mining permits without the time consuming process of amending this TMDL document. All comments and questions concerning the future mining WLAs in this TMDL are to be directed to the appropriate DMO. Future wasteload allocations are calculated using the method described for quantifying pollutant load in Attachment C.

The following are examples of what is or is not intended by the inclusion of future mining WLAs. This list is by way of example and is not intended to be exhaustive or exclusive:

1. The inclusion of one or more future mining WLAs is not intended to exclude the issuance of future non-mining NPDES permits in this watershed or any waters of the Commonwealth.
2. The inclusion of one or more future mining WLAs in specific segments of this watershed is not intended to exclude future mining in any segments of this watershed that does not have a future mining WLA.
3. Each future mining WLA is intended to accommodate one future mining NPDES permit.
4. The inclusion of future mining WLAs does not preclude the amending of this AMD TMDL to accommodate additional NPDES permits.

All of the remaining discharges in the watershed are from abandoned mines and will be treated as non-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 C 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;

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

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.

Watershed Background

Abandoned Pittsburgh coal seam deep mines underlie and discharge to the watershed area. The Pittsburgh deep mining was conducted by unknown operators using the room and pillar method in the early 1900s. The Pittsburgh deep mines are extensive and underlie most of the watershed area. Surface mining of the Pittsburgh and Redstone coal seams has occurred within the watershed. Fleck Coal Company surface mined the Pittsburgh coal seam on their permits 3474SM3 and 19570. J.J. Coal Company surface mined the Pittsburgh coal seam on their permit 11397. Fred Fiore surface mined the Pittsburgh coal seam on their permit 2666BSM23 and 2666BSM7. Twilight Industries, Inc. surface mined the Pittsburgh coal seam on their permits 2669BSM13 and 2666BSM17. LaPaglia Contractors, Inc. surface mined the Pittsburgh coal seam on the permit 14315. Both types of mining have affected ground and surface water in the area and refuse piles scar the land within the watershed. There is currently no active mining in the watershed.

Collective Efforts, LLC, an engineering and consulting firm, was hired by the Streets Run Watershed Association (SRWA) to complete a watershed assessment and restoration plan in 2001[4]. The assessment found that of the 49 sites located at various locations throughout the watershed, 30 were impacted to some degree by metal drainage from seeps in seam outcrops, mine discharges, or refuse piles. Areas of impact identified included the OAR South Taylor tributary (WA43 in report and STREET08 in this report); the Brentwood tributary (WA13 and STREET07); the Lutz Hollow tributary (WA42 and STREET06); the Elm Leaf tributary (WA4 and STREET04); the Hays tributary (WA28 and STREET03); Glass Run (WA6 and STREET02); as well as impacts to the mainstem of Streets Run.

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

[4] Collective Efforts, LLC and the Streets Run Watershed Association. August 2005. *Watershed Assessment and Restoration Plan for the Streets Run Watershed*. Pennsylvania Department of Environmental Protection Growing Greener Program Project 01-2901. Useful figures include Figure 13 – Sampling Stations and Figure 23 – AMD Segment Impacts.

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[5] 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)

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

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
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.

Each permitted discharge in a segment is assigned a waste load allocation and the total waste load allocation for each segment is included in this table. Waste load allocations have also been included at some points for future mining operations. The difference between the TMDL and the WLA at each point is the load allocation (LA) at the 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. Streets 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
STREETS09 – Streets Run upstream of STREETS08 unnamed tributary						
Aluminum (lbs/day)	16.62	1.66	0.04	1.62	14.96	90%
Iron (lbs/day)	7.12	3.92	0.10	3.82	3.20	45%
Acidity (lbs/day)	-2054.77	NA	-	NA	NA	NA
STREETS08 – Unnamed tributary to Streets Run at mouth						
Aluminum (lbs/day)	33.18	1.33	-	1.33	31.85	96%
Iron (lbs/day)	10.20	2.35	-	2.35	7.85	77%
Acidity (lbs/day)	197.36	23.68	-	23.68	173.68	88%
STREETS07 – Unnamed tributary to Streets Run at mouth						
Aluminum (lbs/day)	21.30	1.49	1.04	0.48	4.74	93%
Iron (lbs/day)	1.77	NA	1.04	NA	NA	NA
Acidity (lbs/day)	17.31	NA	-	NA	NA	NA
STREETS06 – Unnamed tributary to Streets Run at mouth						
Aluminum (lbs/day)	6.28	0.69	-	0.69	5.59	89%
Iron (lbs/day)	0.41	NA	-	NA	NA	NA
Acidity (lbs/day)	57.34	16.63	-	16.63	40.71	71%
STREETS05 – Streets Run upstream of STREETS04 unnamed tributary						
Aluminum (lbs/day)	92.33	4.62	*0.56*	4.06	15.50	78%*
Iron (lbs/day)	12.95	NA	*2.25*	NA	NA	NA
Acidity (lbs/day)	-1435.98	NA	-	NA	NA	NA
STREETS04 – Unnamed tributary to Streets Run at mouth						
Aluminum (lbs/day)	10.59	0.64	-	0.64	10.05	94%

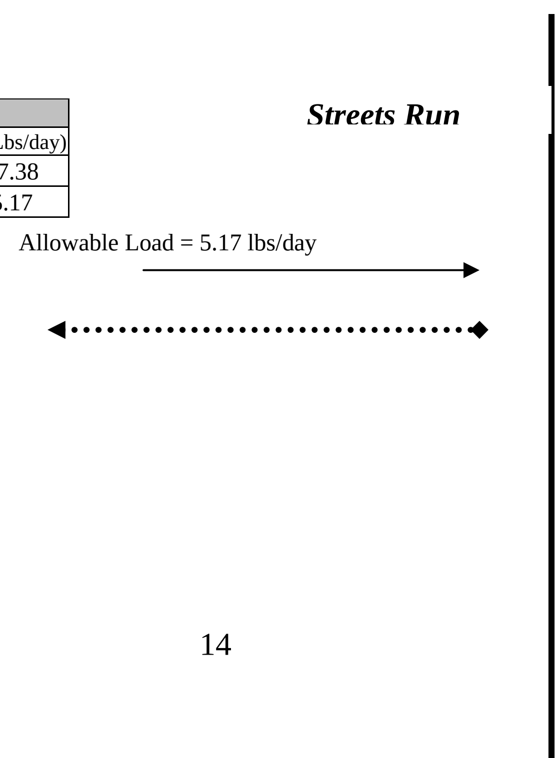
Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	NPS Load Reduction (lbs/day)	NPS % Reduction
Iron (lbs/day)	1.41	NA	-	NA	NA	NA
Acidity (lbs/day)	-128.06	NA	-	NA	NA	NA
STREETS03 – Unnamed tributary to Streets Run at mouth						
Aluminum (lbs/day)	11.86	0.95	*0.28*	0.63	10.91	92%
Iron (lbs/day)	1.94	NA	*1.13*	NA	NA	NA
Acidity (lbs/day)	-328.97	NA	-	NA	NA	NA
STREETS02 – Glass Run at mouth						
Aluminum (lbs/day)	4.60	1.38	*0.28*	1.10	3.22	70%
Iron (lbs/day)	1.51	NA	*1.13*	NA	NA	NA
Acidity (lbs/day)	-989.15	NA	-	NA	NA	NA
STREETS01 – Streets Run upstream of confluence with the Monongahela River						
Aluminum (lbs/day)	51.72	12.93	*0.56*	12.37	0*	0%*
Iron (lbs/day)	10.83	NA	3.42*(2.25)*	NA	NA	NA
Acidity (lbs/day)	-3615.25	NA	-	NA	NA	NA

NA = not applicable ND = not detected
* Takes into account load reductions from upstream sources.
Numbers in italics are set aside for future mining operations.

In the instance that the allowable load is equal to the existing load (e.g. iron point STREETS07, 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 STREETS05 of Streets 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.

Allocations STREETS06/07/08/09	
STREETS06/07/08/09	Al (Lbs/day)
Existing Load @ STREETS06/07/08/09	77.38
Allowable Load @ STREETS06/07/08/09	5.17



Load increase = 5.17 lbs/day
(Difference between existing loads upstream
and STREETS05)

ALLOCATIONS STREETS05	
STREETS05	Al (Lbs/day)
Existing Load @ STREETS05	92.33
Difference in measured Loads between the loads that enter and existing STREETS05 (STREETS05– STREETS06/07/08/09)	14.95
Additional load tracked from above samples	5.17
Total load tracked between STREETS06/07/08/09 and STREETS05	20.12
Allowable Load @ STREETS05	4.62
Load Reduction @ STREETS05	15.50
% Reduction required at STREETS05	78%

Allowable Load = 4.62 lbs/day

The allowable aluminum load tracked from upstream was 5.17 lbs/day. The existing load from upstream was subtracted from the existing load at STREETS05 to show the increase of aluminum load that the stream had gained between these upstream sites and STREETS05 (14.95 lbs/day). This increased value was added to the calculated allowable load from upstream to calculate the total load that was tracked between upstream and STREETS05 (allowable loads from STREETS05 + the difference in existing load between STREETS06/07/08/09 and STREETS05). This total load tracked was subtracted from the calculated allowable load at STREETS05 to determine the amount of load to be reduced at STREETS05. This total load value was found to be 20.12 lbs/day; it was 15.50 lbs/day greater than the STREETS05 allowable load of 4.62 lbs/day. Therefore, a 78% aluminum reduction at STREETS05 is necessary.

Recommendations

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 that 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).

There is an active watershed organization that works in the Streets Run Watershed. The Streets Run Watershed Association (SRWA) has been in existence since 2001 as a 501©3 entity. Active participants include Baldwin Borough, Brentwood Borough, the City of Pittsburgh, West Mifflin Borough, Whitehall Borough, and interested citizens. In addition, the SRWA retains the professional engineering services of Ms. Coreen Casadei of Collective Efforts, LLC and receives technical Assistance from Pa. DEP (Greg Holesh, Watershed Manager) and the Allegheny County Conservation District (Rich Kowalski). Recent events in which the SRWA has been involved include EASI water quality sampling efforts; obtaining Streets Run Watershed signage; public education/outreach events; annual River Sweep events; and conducting watershed assessment and restoration plan. Other watershed activities include AMD sampling by Bob Hedin through BTAG and 3Rivers 2nd Nature sampling.

Public Participation

Public notice of the draft TMDL was published in the *Pennsylvania Bulletin* on January 12, 2008, to foster public comment on the allowable loads calculated. The public comment period on this TMDL was open from January 12, 2008 to March 19, 2008. A public meeting was held on January 22, 2008 at the Greensburg District Mining Office to discuss the proposed TMDL. A second meeting to the discuss the proposed TMDL was held at the request of the Streets Run Watershed Association in their monthly meeting on February 7, 2008 at the Whitehall Borough Building in Pittsburgh, PA.

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.

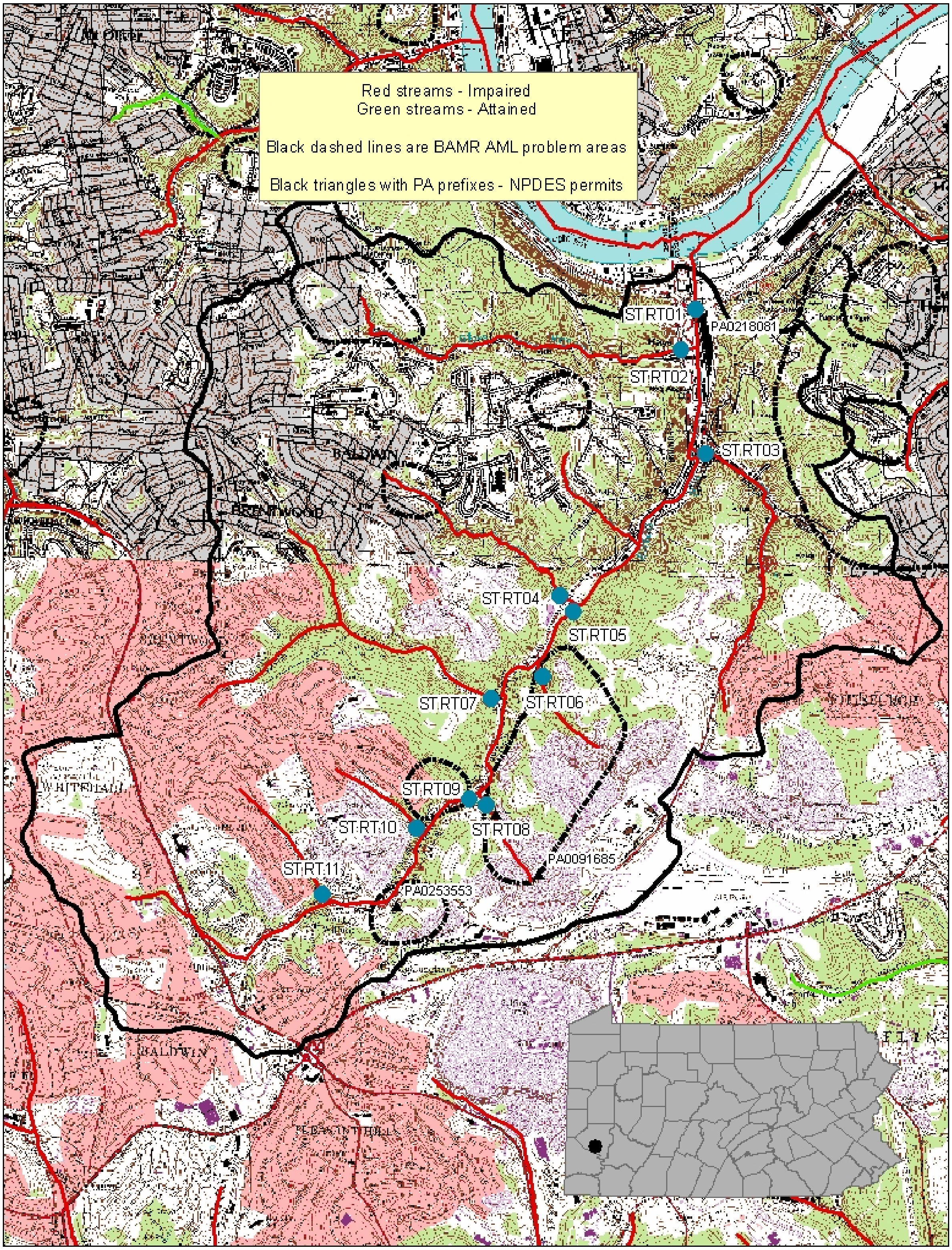
Changes in TMDLs That May Not Require EPA Approval

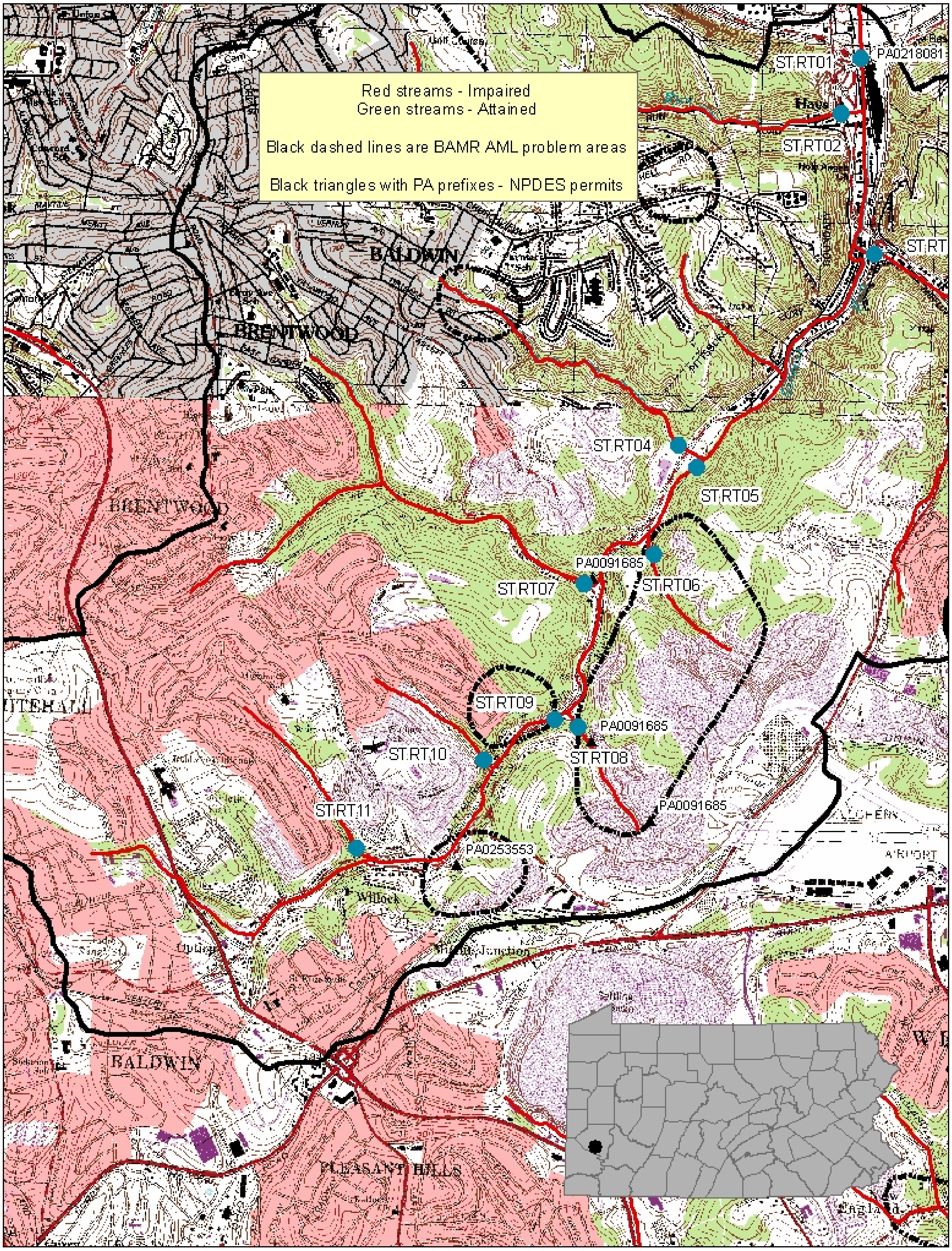
- Total loading shift less than or equal to 1% of the total load.
- Increase of WLA results in greater LA reductions provided reasonable assurance of implementation is demonstrated (a compliance/implementation plan and schedule).
- Changes among WLAs with no other changes; TMDL public notice concurrent with permit public notice.

- Removal of a pollutant source that will not be reallocated.
- Reallocation between LAs.
- Changes in land use.

Attachment A

Streets Run Watershed Maps


Red streams - Impaired
Green streams - Attained
Black dashed lines are BAMR AML problem areas
Black triangles with PA prefixes - NPDES permits
ST.RT01
PA0218081
ST.RT02
ST.RT03
BALDWIN
ST.RT04
ST.RT05
ST.RT06
ST.RT07
ST.RT09
ST.RT10
ST.RT08
PA0091685
ST.RT.11
PA0253553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ST.RT07
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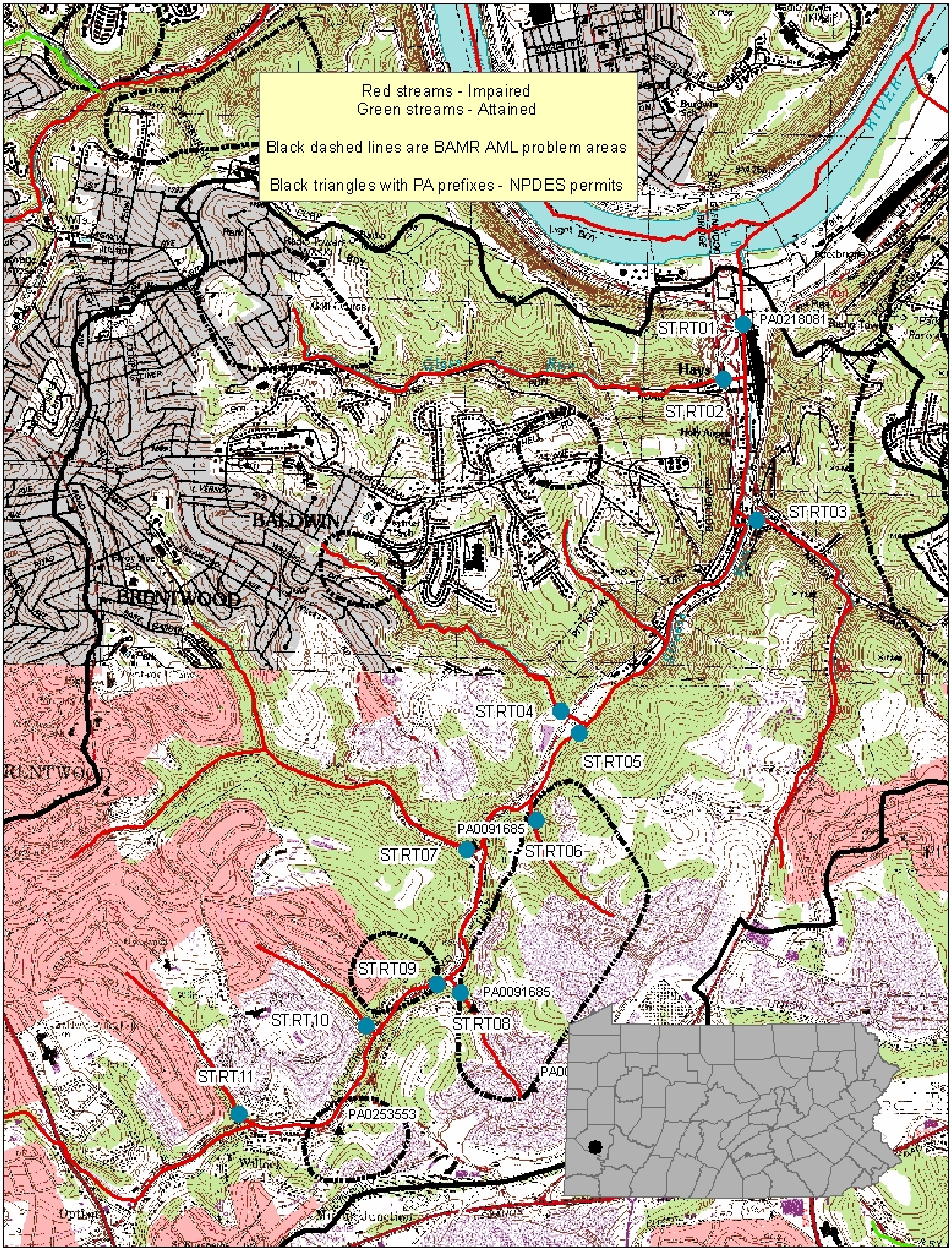
ST.RT11
PA0253553
BALDWIN
BRENTWOOD
PLEASANT HILLS


Red streams - Impaired
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Black triangles with PA prefixes - NPDES permits
ST.RT01
PA0218081
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ST.RT03
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ST.RT05
PA0091685
ST.RT06
ST.RT07
ST.RT09
PA0091685
ST.RT08
ST.RT10
ST.RT11
PA0253553
BALDWIN
BRENTWOOD
Hays

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.*

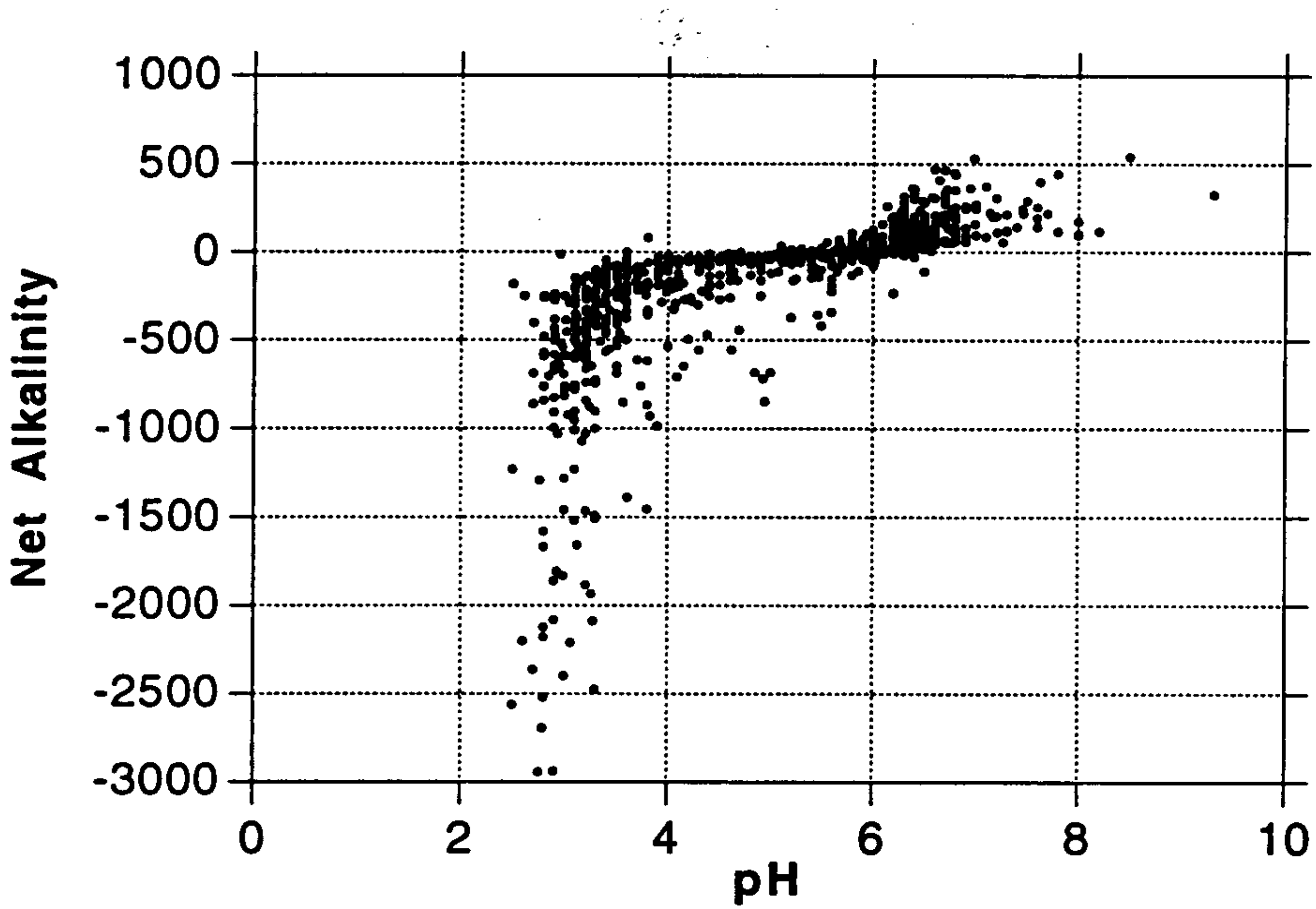


Figure 1. Net Alkalinity vs. pH. Taken from Figure 1.2 Graph C, pages 1-5, of Coal Mine Drainage Prediction and Pollution Prevention in Pennsylvania

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
$6.0 \le pH \le 9.0$
$Fe < 3.0$ 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 2 mg/l x 0.01202 = 0.7 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 is 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

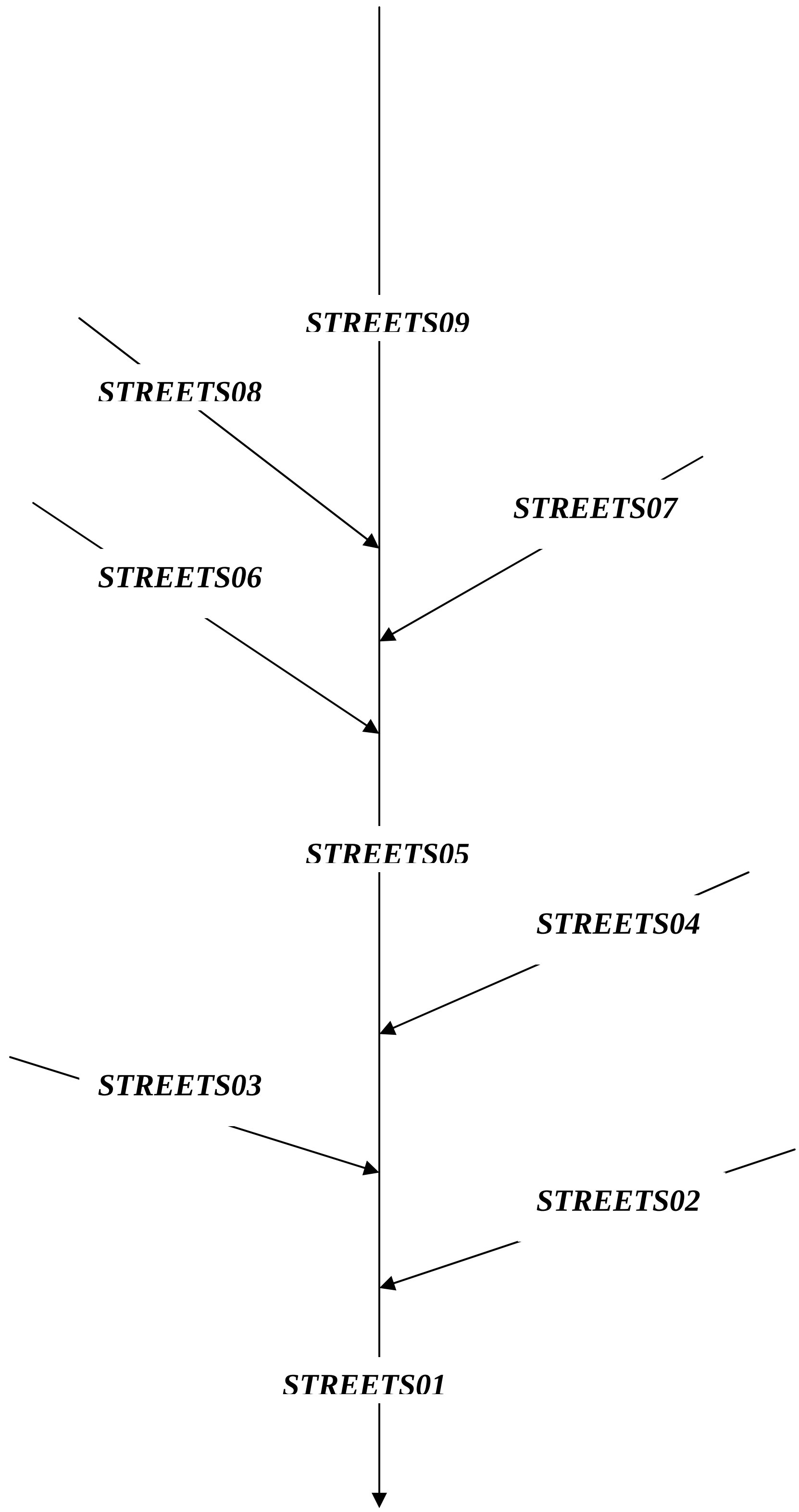
Streets Run

The TMDL for Streets Run consists of load allocations to three sampling sites on Streets Run (STREETS09, STREETS05, STREETS01) and six sites on unnamed tributaries of Streets Run (STREETS08-06 and STREETS04-02). Sample data sets were collected in 2004 and 2005. All sample points are shown on the maps included in Attachment A as well as on the loading schematic presented on the following page.

Streets 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 Streets 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 and 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.

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



Waste Load Allocation – Tube City LLC Tube City IMS

Tube City LLC (NPDES PA0253553) Tube City IMS facility has a discharge from a treatment facility. The following table shows the waste load allocation for this discharge.

Table D1. Waste Load Allocations at Tube City IMS			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
001			
Fe	0.551	0.0216	0.10
Al	0.198	0.0216	0.04

TMDL calculations- STREETS09 – Streets Run upstream of unnamed tributary STREETS08 (corresponds to WA36 in the Streets Run Watershed Assessment Report)

The TMDL for sample point STREETS09 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 Streets Run was computed using water-quality sample data collected at point STREETS09. The average flow, computed using the U.S. Geological Survey StreamStats program at STREETS09 (2.19 MGD), is used for these computations. The allowable load allocations calculated at STREETS09 will directly affect the downstream point STREETS05.

Sample data at point STREETS09 shows that the Streets Run headwaters segment has a pH ranging between 7.2 and 8.3. There currently is not an entry for this segment on the Pa Section 303(d) list for impairment due to pH. However, because water quality standards for pH are being met, a TMDL for acidity will not be necessary. A TMDL for aluminum and iron has been calculated at this site.

Table D2 shows the measured and allowable concentrations and loads at STREETS09. Table D3 shows the percent reductions for aluminum and iron.

Table D2		Measured		Allowable	
		Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.91	16.62	0.09	1.66
	Iron	0.39	7.12	0.21	3.92
	Acidity	-112.50	-2054.77	-112.50	-2054.77
	Alkalinity	153.33	2800.51		

Table D3. Allocations STREETS09		
STREETS09	Al (Lbs/day)	Fe (Lbs/day)
Existing Load @ STREETS09	16.62	7.12
Allowable Load @ STREETS09	1.66	3.92
Load Reduction @ STREETS09	14.96	3.20
% Reduction required @ STREETS09	90%	45%

TMDL calculations- STREETS08 – Unnamed tributary to Streets Run at mouth (corresponds to WA43 OAR South Taylor tributary in the Streets Run Watershed Assessment report)

The TMDL for sampling point STREETS08 consists of a load allocation to all of the area at and above this point shown in Attachment A. The load allocation for this segment of the unnamed tributary to Streets Run was computed using water-quality sample data collected at point STREETS08. The average flow, computed using the U.S. Geological Survey StreamStats program at STREETS08 (0.43 MGD), is used for these computations.

Sample data at point STREETS08 shows pH ranging between 4.6 and 5.0; 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 acidity at STREETS08 has been calculated.

Table D4 shows the measured and allowable concentrations and loads at STREETS08. Table D5 shows the percent reduction for aluminum and iron needed at STREETS08.

Table D4		Measured		Allowable	
		Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	9.25	33.18	0.37	1.33
	Iron	2.85	10.20	0.65	2.35
	Acidity	55.03	197.36	6.60	23.68
	Alkalinity	10.60	38.01		

Table D5. Allocations STREETS08			
STREETS08	Al (Lbs/day)	Fe (Lbs/day)	Acidity (Lbs/day)
Existing Load @ STREETS08	33.18	10.20	197.36
Allowable Load @ STREETS08	1.33	2.35	23.68
Load Reduction @ STREETS08	31.85	7.85	173.68
% Reduction required @ STREETS08	96%	77%	88%

Waste Load Allocation – U.S. Steel, LLC South Taylor Environmental Park

U.S. Steel, LLC (NPDES PA0091685) South Taylor Environmental Park facility has a discharge from a treatment facility. The following table shows the waste load allocation for this discharge.

Table D6. Waste Load Allocations at South Taylor Environmental Park			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
002			
Fe	0.5	0.2488	1.04
Al	0.5	0.2488	1.04

TMDL calculations- STREETS07 – Unnamed tributary to Streets Run at mouth (corresponds to WA13 Brentwood tributary in the Streets Run Watershed Assessment report)

The TMDL for sampling point STREETS07 consists of a load allocation to all of the area at and above this point shown in Attachment A. The load allocation for this segment of the unnamed tributary to Streets Run was computed using water-quality sample data collected at point STREETS07. The average flow, computed using the U.S. Geological Survey StreamStats program at STREETS07 (1.42 MGD), is used for these computations.

Sample data at point STREETS07 shows pH ranging between 5.2 and 7.8; 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 acidity at STREETS07 has been calculated.

Table D7 shows the measured and allowable concentrations and loads at STREETS07. Table D8 shows the percent reduction for aluminum and iron needed at STREETS07.

Table D7		Measured		Allowable	
		Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	1.81	21.30	0.13	1.49
	Iron	0.15	1.77	0.15	1.77
	Acidity	1.47	17.31	1.47	17.31
	Alkalinity	28.03	330.82		

Table D8. Allocations STREETS07	
STREETS07	Al (Lbs/day)
Existing Load @ STREETS07	21.30
Allowable Load @ STREETS07	1.49
Load Reduction @ STREETS07	19.81
% Reduction required @ STREETS07	93%

TMDL calculations- STREETS06 – Unnamed tributary to Streets Run at mouth (corresponds to WA42 Lutz Hollow tributary in the Streets Run Watershed Assessment report)

The TMDL for sampling point STREETS06 consists of a load allocation to all of the area at and above this point shown in Attachment A. The load allocation for this segment of the unnamed tributary to

Streets Run was computed using water-quality sample data collected at point STREETS06. The average flow, computed using the U.S. Geological Survey StreamStats program at STREETS06 (0.33 MGD), is used for these computations.

Sample data at point STREETS06 shows pH ranging between 5.2 and 7.4; 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 acidity at STREETS06 has been calculated.

Table D9 shows the measured and allowable concentrations and loads at STREETS06. Table D10 shows the percent reduction for aluminum and iron needed at STREETS06.

Table D9		Measured		Allowable	
		Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	2.28	6.28	0.25	0.69
	Iron	0.15	0.41	0.15	0.41
	Acidity	20.83	57.34	6.04	16.63
	Alkalinity	25.10	69.08		

Table D10. Allocations STREETS06		
STREETS06	Al (Lbs/day)	Acidity (Lbs/day)
Existing Load @ STREETS06	6.28	57.34
Allowable Load @ STREETS06	0.69	16.63
Load Reduction @ STREETS06	5.59	40.71
% Reduction required @ STREETS06	89%	71%

A waste load allocation for future mining was included for this segment of Streets Run allowing for one operation with two active pits (1500’ x 300’) to be permitted in the future on this segment (see Attachment C for the method used to quantify treatment pond load).

Table D11. Waste load allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25

TMDL calculations- STREETS05- Streets Run upstream of STREETS04 unnamed tributary (corresponds to WA47 in the Streets Run Watershed Assessment report)

The TMDL for sampling point STREETS05 consists of a load allocation to all of the area between STREETS09 and this point shown in Attachment A. The load allocation for this segment of Streets

Run was computed using water-quality sample data collected at point STREETS05. The average flow, computed using the U.S. Geological Survey StreamStats program at STREETS05 (4.87 MGD), is used for these computations.

Sample data at point STREETS05 shows pH ranging between 7.3 and 8.0. There currently is not an entry for this segment on the Section Pa 303(d) list for impairment due to pH; however, because water quality standards for pH are being met, a TMDL for acidity is not necessary. A TMDL for aluminum and iron at STREETS05 has been calculated.

Table D12 shows the measured and allowable concentrations and loads at STREETS05. Table D13 shows the percent reduction for aluminum and iron needed at STREETS05.

Table D12		Measured		Allowable	
		Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	2.27	92.33	0.11	4.62
	Iron	0.32	12.95	0.32	12.95
	Acidity	-35.33	-1435.98	-35.33	-1435.98
	Alkalinity	71.63	2911.24		

The measured and allowable loading for point STREETS05 for aluminum, iron, 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 STREETS09/08/07/06 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points STREETS09/08/07/06 and STREETS05 to determine a total load tracked for the segment of stream between STREETS09/08/07/06 and STREETS05. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at STREETS05.

Table D13. Allocations STREETS05	
STREETS05	Al (Lbs/day)
Existing Load @ STREETS05	92.33
Difference in measured loads between the loads that enter and existing STREETS05	14.95
Additional load tracked from above samples	5.17
Total load tracked between STREETS09/08/07/06 and STREETS05	20.12
Allowable Load @ STREETS05	4.62
Load Reduction @ STREETS05	15.50
% Reduction required at STREETS05	78%

TMDL calculations- STREETS04 - Unnamed tributary to Streets Run at mouth (corresponds to WA4 Elm Leaf tributary in the Streets Run Watershed Assessment report)

The TMDL for sampling point STREETS04 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 Streets Run was computed using water-quality sample data collected at point STREETS04. The average flow, computed using the U.S. Geological Survey StreamStats program at STREETS04 (0.66 MGD), is used for these computations.

Sample data at point STREETS04 shows pH ranging between 6.8 and 7.9. There currently is not an entry for this segment on the Section Pa 303(d) list for impairment due to pH; however, because water quality standards are being met for pH, a TMDL for acidity is not necessary. A TMDL for aluminum and iron at STREETS04 has been calculated.

Table D14 shows the measured and allowable concentrations and loads at STREETS04. Table D15 shows the percent reduction for aluminum and iron needed at STREETS04.

Table D14		Measured		Allowable	
		Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	1.93	10.59	0.12	0.64
	Iron	0.26	1.41	0.26	1.41
	Acidity	-23.30	-128.06	-23.30	-128.06
	Alkalinity	55.17	303.20		

Table D15. Allocations STREETS04	
STREETS04	Al (Lbs/day)
Existing Load @ STREETS04	10.69
Allowable Load @ STREETS04	0.64
Load Reduction @ STREETS04	10.05
% Reduction required @ STREETS04	94%

A waste load allocation for future mining was included for this segment of Streets Run allowing for one operation with one active pits (1500’ x 300’) to be permitted in the future on this segment (see Attachment C for the method used to quantify treatment pond load).

Table D16. Waste load allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.045	0.28
Fe	3.0	0.045	1.13

TMDL calculations- STREETS03 - Unnamed tributary to Streets Run at mouth (corresponds to WA28 Hays tributary in the Streets Run Watershed Assessment report)

The TMDL for sampling point STREETS03 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 Streets Run was computed using water-quality sample data collected at point STREETS03. The average flow, computed using the U.S. Geological Survey StreamStats program at STREETS03 (1.0 MGD), is used for these computations.

Sample data at point STREETS03 shows pH ranging between 7.6 and 8.1. There currently is not an entry for this segment on the Section Pa 303(d) list for impairment due to pH; however, because water quality standards are being met for pH, a TMDL for acidity is not necessary. A TMDL for aluminum and iron at STREETS03 has been calculated.

Table D17 shows the measured and allowable concentrations and loads at STREETS03. Table D18 shows the percent reduction for aluminum and iron needed at STREETS03.

Table D17		Measured		Allowable	
		Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	1.42	11.86	0.11	0.95
	Iron	0.23	1.94	0.23	1.94
	Acidity	-39.37	-328.97	-39.37	-328.97
	Alkalinity	66.60	556.55		

Table D18. Allocations STREETS03	
STREETS03	Al (Lbs/day)
Existing Load @ STREETS03	11.86
Allowable Load @ STREETS03	0.95
Load Reduction @ STREETS03	10.91
% Reduction required @ STREETS03	92%

A waste load allocation for future mining was included for this segment of Streets Run allowing for one operation with one active pits (1500' x 300') to be permitted in the future on this segment (see Attachment C for the method used to quantify treatment pond load).

Table D11. Waste load allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.045	0.28
Fe	3.0	0.045	1.13

TMDL calculations- STREETS02 – Glass Run at mouth (corresponds to WA6 in the Streets Run Watershed Assessment report)

The TMDL for sampling point STREETS02 consists of a load allocation to all of the area upstream of this point shown in Attachment A. The load allocation for Glass Run was computed using water-quality sample data collected at point STREETS02. The average flow, computed using the U.S. Geological Survey StreamStats program at STREETS02 (1.21 MGD), is used for these computations.

Sample data at point STREETS02 shows pH ranging between 7.8 and 8.1. There currently is not an entry for this segment on the Section Pa 303(d) list for impairment due to pH; however, because water quality standards are being met for pH, a TMDL for acidity is not necessary. A TMDL for aluminum and iron at STREETS02 has been calculated.

Table D20 shows the measured and allowable concentrations and loads at STREETS02. Table D21 shows the percent reduction for aluminum and iron needed at STREETS02.

Table D20		Measured		Allowable	
		Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.46	4.60	0.14	1.38
	Iron	0.15	1.51	0.15	1.51
	Acidity	-98.10	-989.15	-98.10	-989.15
	Alkalinity	121.27	1222.74		

Table D21. Allocations STREETS02	
STREETS02	Al (Lbs/day)
Existing Load @ STREETS02	4.60
Allowable Load @ STREETS02	1.38
Load Reduction @ STREETS02	3.22
% Reduction required @ STREETS02	70%

Waste Load Allocation – WHEMCO West Homestead Plant

WHEMCO (NPDES PA0218081) West Homestead Plant facility has a discharge from a treatment facility. Outfall 106 consists of treated quench contact water and incidental bearing waters. The following table shows the waste load allocation for this discharge.

Table D22. Waste Load Allocations at West Homestead Plant			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
106			
Fe	3.4	0.0412	1.17

A waste load allocation for future mining was included for this segment of Streets Run allowing for one operation with two active pits (1500’ x 300’) to be permitted in the future on this segment (see Attachment C for the method used to quantify treatment pond load).

Table D23. Waste load allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25

TMDL calculations- STREETS01 – Streets Run upstream confluence with Monongahela River (corresponds to WA7 in the Streets Run Watershed Assessment report)

The TMDL for sample point STREETS01 consists of a load allocation to all of the area between STREETS05 and this point shown in Attachment A. The load allocation for Streets Run was computed using water-quality sample data collected at point STREETS01. The average flow, computed using the U.S. Geological Survey StreamStats program at STREETS01 (8.66 MGD), is used for these computations.

Sample data at point STREETS01 shows that this Streets Run segment has a pH ranging between 7.7 and 7.8. There currently is not an entry for this segment on the Pa Section 303(d) list for impairment due to pH; however, because water quality standards are being met for pH, a TMDL for acidity is not necessary. A TMDL for aluminum, iron, and acidity has been calculated at this site.

Table D24 shows the measured and allowable concentrations and loads at STREETS01. Table D25 shows the percent reductions for aluminum, iron, and acidity.

Table D24		Measured		Allowable	
		Concentration	Load	Concentration	Load
		Mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.72	51.72	0.18	12.93
	Iron	0.15	10.83	0.15	10.83
	Acidity	-50.05	-3615.25	-50.05	-3615.25
	Alkalinity	82.30	5944.75		

The measured and allowable loading for point STREETS01 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 STREETS05/04/03/02 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points STREETS05/04/03/02 and STREETS01 to determine a total load tracked for the segment of stream between STREETS05/04/03/02 and STREETS01. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at STREETS01.

Table D25. Allocations STREETS01	
STREETS01	Al (Lbs/day)
Existing Load @ STREETS01	51.72
Difference in measured loads between the loads that enter and existing STREETS01	-67.66
Additional load tracked from above samples	7.59
Total load tracked between STREETS05/04/03/02 and STREETS01	3.26
Allowable Load @ STREETS01	12.93
Load Reduction @ STREETS01	0
% Reduction required at STREETS01	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).

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

Point	Date	pH	Total alkalinity mg/L	Hot acidity mg/L	Total iron mg/L	Total manganese mg/L	Total aluminum mg/L
1	5/10/2004	7.7	64.4	-14.8	0.15	0.161	1.47
1	6/30/2004	7.8	76.2	-45.2	0.15	0.101	0.894
1	7/29/2004	7.8	91.8	-69.6	0.15	0.066	0.25
1	7/8/2005	7.8	96.8	-70.6	0.15	0.13	0.25
	Average	***7.78***	***82.30***	***-50.05***	***0.15***	***0.11***	***0.72***
	StDev	***0.05***	***14.81***	***26.27***	***0.00***	***0.04***	***0.59***
2	3/30/2004	8	97.2	-78.2	0.15	0.081	1.49
2	5/10/2004	8	102.4	-80.4	0.15	0.025	0.25
2	6/30/2004	8	144.2	-124.6	0.15	0.025	0.25
2	7/29/2004	7.8	178.2	-141	0.15	0.025	0.25
2	7/8/2005	8.1	113	-89.6	0.15	0.025	0.25
2	10/31/2005	8.1	92.6	-74.8	0.15	0.025	0.25
	Average	***8.00***	***121.27***	***-98.10***	***0.15***	***0.03***	***0.46***
	StDev	***0.11***	***33.44***	***27.81***	***0.00***	***0.02***	***0.51***
3	3/30/2004	7.6	53.4	-13.4	0.644	0.229	5.07
3	5/10/2004	7.6	57.2	-15.4	0.15	0.108	2
3	6/30/2004	7.9	71.2	-49.6	0.15	0.025	0.692
3	7/29/2004	7.8	77	-57.4	0.15	0.025	0.25
3	7/8/2005	8.1	67.8	-47.4	0.15	0.025	0.25
3	10/31/2005	8	73	-53	0.15	0.025	0.25
	Average	***7.83***	***66.60***	***-39.37***	***0.23***	***0.07***	***1.42***
	StDev	***0.21***	***9.32***	***19.64***	***0.20***	***0.08***	***1.91***
4	3/30/2004	7.6	76.8	-37.8	0.786	0.448	6.64
4	5/10/2004	6.8	26	12.8	0.15	0.302	2.78
4	6/30/2004	7.1	33.8	-4	0.15	0.124	1.39
4	7/29/2004	7.4	56.2	-25.8	0.15	0.074	0.25
4	7/8/2005	7.9	65	-37.4	0.15	0.082	0.25
4	10/31/2005	7.8	73.2	-47.6	0.15	0.091	0.25
	Average	***7.43***	***55.17***	***-23.30***	***0.26***	***0.19***	***1.93***
	StDev	***0.42***	***20.97***	***23.16***	***0.26***	***0.15***	***2.52***
5	3/30/2004	7.3	50.8	-15.2	0.361	0.34	7.55
5	5/10/2004	7.5	61.8	-0.8	0.464	0.311	2.55
5	6/30/2004	7.7	70.8	-34.4	0.355	0.259	2.16
5	7/29/2004	7.8	82.4	-52.6	0.15	0.158	0.871
5	7/8/2005	7.9	67.4	-41.2	0.15	0.1	0.25
5	10/31/2005	8	96.6	-67.8	0.432	0.373	0.25
	Average	***7.70***	***71.63***	***-35.33***	***0.32***	***0.26***	***2.27***
	StDev	***0.26***	***16.05***	***24.44***	***0.14***	***0.11***	***2.76***
6	3/30/2004	5.2	9.6	38.2	0.15	0.025	0.25
6	5/10/2004	6.5	20.2	40.4	0.15	0.672	3.02
6	6/30/2004	6.7	27.8	16.4	0.15	0.451	3.46

6	7/29/2004	6.7	25.2	9.8	0.15	0.596	2.88
6	7/8/2005	6.8	22.2	23.4	0.15	0.631	2.56
6	10/31/2005	7.4	45.6	-3.2	0.15	0.7	1.53
	Average	***6.55***	***25.10***	***20.83***	***0.15***	***0.51***	***2.28***
	StDev	***0.73***	***11.83***	***16.79***	***0.00***	***0.25***	***1.19***
7	3/30/2004	6.4	14.4	24.2	0.15	0.025	0.25
7	5/10/2004	5.2	9.4	37.8	0.15	0.302	5.12
7	6/30/2004	6.6	18	13.6	0.15	0.223	4.03
7	7/29/2004	7.3	37.8	-15	0.15	0.054	0.932
7	7/8/2005	7.8	49	-28.6	0.15	0.025	0.25
7	10/31/2005	7.6	39.6	-23.2	0.15	0.025	0.25
	Average	***6.82***	***28.03***	***1.47***	***0.15***	***0.11***	***1.81***
	StDev	***0.96***	***16.14***	***27.45***	***0.00***	***0.12***	***2.19***
8	3/30/2004	4.7	10	61.6	4.12	1.43	11.4
8	5/10/2004	4.6	10.8	72	3.39	1.38	10.3
8	6/30/2004	4.8	10	56	3.74	1.44	9.77
8	7/29/2004	4.7	12.2	53.2	2.59	1.69	10.6
8	7/8/2005	5	10	39.2	2.21	1.34	7.27
8	10/31/2005	4.9	10.6	48.2	1.02	1.48	6.17
	Average	***4.78***	***10.60***	***55.03***	***2.85***	***1.46***	***9.25***
	StDev	***0.15***	***0.86***	***11.25***	***1.14***	***0.12***	***2.06***
9	3/30/2004	7.8	138	-93.6	0.15	0.025	0.25
9	5/10/2004	8.3	155.4	-92	0.15	0.025	0.25
9	6/30/2004	7.2	97.8	-59.4	1.59	0.613	4.21
9	7/29/2004	8.2	179.6	-136.6	0.15	0.025	0.25
9	7/8/2005	8.1	170	-146.8	0.15	0.025	0.25
9	10/31/2005	8.2	179.2	-146.6	0.15	0.025	0.25
	Average	***7.97***	***153.33***	***-112.50***	***0.39***	***0.12***	***0.91***
	StDev	***0.41***	***31.50***	***36.10***	***0.59***	***0.24***	***1.62***
10	3/30/2004	8.2	194.4	-93.4	0.15	0.025	0.886
10	6/30/2004						
	Average	***8.20***	***194.40***	***-93.40***	***0.15***	***0.03***	***0.89***
	StDev						
11	3/30/2004	7.7	220.8	-95	0.15	0.025	0.883
11	6/30/2004						
	Average	***7.70***	***220.80***	***-95.00***	***0.15***	***0.03***	***0.88***
	StDev						

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 were received on the Streets Run Draft TMDL dated December 27, 2007 by Collective Efforts, LLC[6] on January 24, 2008. Pa. DEP also presented the TMDL at the monthly meeting of the Streets Run Watershed Association (SRWA) meeting on February 7, 2008 at the Whitehall Borough Municipal Building, 100 Borough Park Drive, Pittsburgh, PA 15236. The comments and responses are included below.

Comment No. 1:
Page 16: The first sentence of first full non-bulleted paragraph states that there is no watershed organization in the Streets Run Watershed. This is incorrect. There is a watershed group established for Streets Run. A few facts about the watershed group are listed below:

Streets Run Watershed Association (SRWA):

- In existence since 2001
- SWRA has 501©3 status
- SRWA Engineer – Ms. Coreen Casadei of Collective Efforts, LLC
- ACCD Watershed Coordinator – Rich Kowalski
- PADEP Watershed Manager – Greg Holesh
- Active participants include: Baldwin Borough; Brentwood Borough; City of Pittsburgh; West Mifflin Borough; Whitehall Borough; interested citizens
- SWRA activities include: EASI water quality sampling efforts; obtaining Streets Run Watershed signage; public education/outreach events; annual River Sweep events; conducting watershed assessment and restoration plan
- Other studies in the watershed include: AMD sampling by Bob Hedin through BTAG; 3Rivers 2nd Nature sampling.

Please incorporate this information into the document.

Response: The information provided regarding the Streets Run Watershed Association and its activities has been incorporated into the document.

Comment No. 2:
Please provide an explanation as to why the PADEP did not coordinate with the SWRA at the beginning of the TMDL process for Streets Run.

Response: The program within Pa. DEP working on the TMDL was not aware of the SRWA at the onset of the TMDL process.

Comment No. 3:
Please provide an explanation as to why the only scheduled public meeting (January 22, 2008) for the Streets Run Watershed TMDL is not being held within the Streets Run Watershed. The meeting was held in Greensburg which is more than 30 miles away from the watershed. In addition, we believe that the public meeting was not well advertised.

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[6] Collective Efforts, LLC. Civil and Environmental Engineers. 462 Perry Highway, 2nd Floor, Pittsburgh, PA 15229.

However, at the January 22 meeting, PADEP agreed to have an additional public meeting(s) about the TMDLs with the public and SRWA at their convenience. In addition, PADEP agreed to meet separately with Collective Efforts to review data that was obtained through preparing the watershed assessment and through other SWRA activities. PADEP also agreed to prepare a presentation about TMDLs for the public meeting in the Streets Run Watershed if requested. Collective Efforts will provide PADEP with the date of the next SWRA meeting (during the day) and an additional evening meeting if deemed necessary. In addition, we request that PADEP accompany Collective Efforts on a tour of the watershed prior to the meeting. Collective Efforts requests that a formal presentation be prepared for the SWRA meeting that will inform the SWRA members what TMDLs are, how TMDLs are calculated, what type of TMDLs are scheduled to be developed for Streets Run, and who is responsible for complying with the TMDLs, and how they are enforced.

Response: The initial public meeting held at the Greensburg District Mining Office was advertised in the Pennsylvania Bulletin and the local newspaper to allow public participation in the meeting and input into the TMDL process. At the request of Collective Efforts, on behalf of the SWRA, PADEP made a second presentation to the Streets Run Watershed Association at their monthly meeting on February 7, 2008 at the Whitehall Borough Building (within the watershed area). This presentation was addressed specifically to the SWRA and addressed their questions and concerns. PADEP participated on a tour of the watershed February 7, 2008, and reviewed technical data for areas in the watershed.

Comment No. 4:
At the January 22 public meeting, PADEP said that they would provide weblinks to the results of the bio habitat assessment data that was conducted in Streets Run by PADEP as part of the TMDL development process, and to a listing of all the TMDLs that are scheduled to be developed for Streets Run. Please provide these links as soon as possible. In addition, please provide the names of the PADEP personnel who will be responsible for developing the TMDLs other than for AMD so that SWRA can coordinate with them before TMDLs are developed.

Response: PADEP provided the link to the 2006 Integrated Water Quality Report which contains lists of all water quality limited segments within the Streets Run Watershed that will be addressed at a future date. In addition, PADEP provided the name of the TMDL program coordinator in the Southwest Regional office in an effort to facilitate increased coordination on future TMDLs in the Streets Run Watershed.

Comment No. 5:
Attachment A: All of the tributaries to Streets Run are not shown on the topographic map, including segments of the watershed that are visually impacted by AMD. As you noted at the January 22 public meeting, in cases such as this, you do not do additional sampling, but rather acknowledge the impacts to the additional areas verbally. However, we do not believe that this will adequately characterize the sources of AMD in our watershed, or provide enough information on which to base an AMD remediation plan. It is our recommendation that additional sampling be conducted at the mouth of each of these tributaries that are not accounted for in the current TMDL calculations.

Response: The water quality data collected on which this TMDL was based was collected throughout the watershed and accounted for changes in watershed conditions. The sampling program was not designed to sample all sources of AMD into the watershed, but rather to account for changing conditions in instream water quality as various sources of AMD were introduced into the watershed. However, additional data were incorporated into the Streets Run TMDL from the watershed assessment completed by Collective Efforts, LLC. TMDLs are dynamic plans and are able to undergo revision. Should better water quality data that meet TMDL program standards be made available in the future, the Streets Run Watershed TMDL can be revised to more accurately reflect watershed conditions.

Comment No. 6:
Page 5: The second sentence of first paragraph under "Segments addressed in this TMDL" states that "there are no known operations that have NPDES discharge points in the Streets Run Watershed." This sentence should be clarified by revising it to say "there are no known mining operations that have NPDES discharge points in the Streets Run Watershed." However, there are NPDES discharge points in the Streets Run Watershed not related to mining operations, but that regulate metals discharges. At the January 22 meeting, PADEP stated they are interested in any permitted discharges that regulate metals. There is a permit related to an AMD treatment wetland in the upper reaches of the watershed on an industrial property that is not engaged in mining operations but is affected by past mining operations (U.S. Steel Taylor Landfill). The WHEMCO plant in the lower portion of the watershed has an NPDES discharge that may be regulated for metals. Please include these, and any other NPDES permitted metal discharges in the TMDL calculations.

Response: All NPDES permits with discharges into the Streets Run Watershed have been incorporated into the final TMDL. These permits were addressed by the assignment of waste load allocations for each pollutant of concern (metals) in their discharge streams.

Comment No. 7:
Sediment from overland stormwater runoff and from scouring of streambanks is another significant problem in the Streets Run Watershed. At the January 22 meeting, Ms. Orr stated that she believed that will be addressed by a TMDL to be developed in the future for Streets Run. Collective Efforts believes that a TMDL should be developed for Streets Run. In 2004, Ms. Hanna spoke with Mr. Richard Spear of PADEP regarding benthic sampling associated with sediment TMDL development. Please provide a copy of these results to Collective Efforts. These results should be summarized and included in an Appendix of a TMDL that addressed sediment for Streets Run.

Response: PADEP Southwest Regional Office performed some follow-up biological surveys in the Streets Run Watershed at the request of the SWRA and Collective Efforts, LLC. As a result, a number of additional stream miles were documented as being impaired by sediment due to urban runoff and have been included in the 2008 Integrated Water Quality Report. TMDLs to address sedimentation impacts in the Streets Run Watershed will be developed in the future by the Southwest Regional Office.

Comment No. 8:
Combined sewer overflows (CSOs) from permitted overflow structures, as well as popping manholes, occur in the Streets Run Watershed. In addition, multiple residences discharge raw sewage directly to the stream. Collective Efforts believes that a TMDL addressing CSOs should be developed. At the January 22 meeting, Ms. Orr stated that she believed that CSOs would be addressed by a TMDL to be developed in the future for Streets Run. Collective Efforts believes that a TMDL that, if such a TMDLS is not scheduled for Streets Run, one should be developed for Streets Run.

Response: Impacts to the Streets Run Watershed from CSOs, popping manholes, and raw sewage discharges need to be documented and included as reason for impairment on the Integrated Waters Report to be addressed in a TMDL document. In addition, municipalities/entities that have legal responsibility for CSO structures generally have entered into a remediation agreement with EPA/DEP to address the CSOs and issues surrounding illegal discharges of raw sewage to waterways. Therefore, CSOs and their possible impacts will not be addressed in this TMDL document.

Comment No. 9:
The Introduction states that all impairments to Streets Run results from "acid mine drainage". The majority of our streams are not acidic and there are other pollutants and problems that need to addressed in the watershed. The majority of the watershed is not acidic.

Response: The introduction and other references to "acid" mine drainage have been changed.

Comment No. 10:
Page 5. Why is PADEP considering Waste Load Allocations for future mining? It may not be in the best interest of the public or the watershed to facilitate future mining operations. Rather, the public and the watershed may benefit if adequate time is allowed for a thorough evaluation of the impacts mining may present to the watershed.

Response: The inclusion of future waste load allocations is to allow for facilities to be permitted in the future without revision and re-approval of the TMDL by the U.S. EPA. These future waste allocations may be used by either mining operations or industrial operations, both of which discharge metals in their waste streams. A full analysis of impacts to the watershed from permitting any facility in the future is completed by the NPDES program when applications are received.

Comment No. 11:
Page 7. The document states that the first step in determining a TMDL is to collect and summarize pre-existing data. However, the SRWA data was never requested or evaluated in the development of the AMD TMDL. As stated above, we requested that the data collected by Collective Efforts be included in the development of the AMD TMDLs as well as future TMDLs for other pollutants. Ms. Orr said that she could obtain the Streets Run Watershed Assessment, prepared by Collective Efforts, from the Growing Greener Office. However, Collective Efforts will provide a copy of the Watershed Assessment to Ms. Orr and others developing Streets Run TMDLs if requested.

Response: While the Department makes every effort to be exhaustive in its search for data to included in all TMDLs, it sometimes does not discover all available sources of data. The data provided to PADEP by Collective Efforts was incorporated into the revised TMDL document.

Comment No. 12:
Watershed Background. Please provide the dates and locations (with a legible map) of the surface mining activities.

Response: The TMDL includes a map of the current NPDES permitted activities occurring in the watershed. This does not include locations of all mining operations that have occurred in the past in the watershed. These data are outside of the scope of the TMDL and were therefore not included. These data are available from the Greensburg and/or California District Mining Offices.

Comment No. 13:
Please provide a larger, more legible map of the watershed in Attachment A.

Response: Two additional maps have been included in Attachment A to provide more detail of the watershed sampling points, tributaries, and NDPES points.

Comment No. 14:
Attachment D.

<u>Streets08</u>. This watershed most likely has contributions from two landfills operated by U.S. Steel (one hazardous, one not) and the potential contamination from Tube City. The potential contaminants from these sites should be included in the allocation calculations for this portion of the stream.

<u>Streets07</u>. The tributary has two large mine portals, is stained bright orange, part of the stream is a losing stream, and part of the stream bottom is on the coal seam. There is an iron problem with this stream, however only an aluminum allocation was developed. Please reassess the need for an iron allocation for this portion of the stream.

<u>Streets06</u>. This tributary usually runs “white” with aluminum. Portions of the tributary are also bright orange. U.S. Steel’s landfills are in the headwaters of this stream. U.S. Steel currently has treatment wetlands to treat “orange” AMD. Were the NPDES discharges of the landfills considered in the TMDL limits? There is also an iron problem with this tributary; however allocations were developed for only aluminum and manganese. Please reassess the need for an iron allocation for this portion of the stream.

Response: Waste load allocations have been assigned to all NPDES permitted facilities in the watershed including U.S. Steel and Tube City.

Allocations for metals were based on the concentrations of the parameters of concern in the sample when taken. If there are water quality problems upstream of these points, it is possible that instream chemical processing is occurring, causing precipitation of metals and reduction in the pollutant concentrations in the water quality sample taken downstream. The sampling program was not designed to sample all sources of AMD into the watershed, but rather to account for changing conditions in instream water quality as various sources of AMD were introduced into the watershed. TMDLs are dynamic plans and are able to undergo revision. Should better water quality data that meet TMDL program standards be made available in the future, the Streets Run Watershed TMDL can be revised to more accurately reflect watershed conditions.

Comment No. 15:
Page 36. There are seeps that contribute flow to Glass Run that have a pH of 3.0. More samples should be collected along Glass Run because it is a major tributary to Streets Run.

Response: The water quality data collected on which this TMDL was based was collected throughout the watershed and accounted for changes in watershed conditions. The sampling program was not designed to sample all sources of AMD into the watershed, but rather to account for changing conditions in instream water quality as various sources of AMD were introduced into the watershed. TMDLs are dynamic plans and are able to undergo revision. Should better water quality data that meet TMDL program standards be made available in the future, the Streets Run Watershed TMDL can be revised to more accurately reflect watershed conditions.

Comment No. 16:
Page 39. No sampling was done in November, December, January, or February when aluminum typically spikes (at least visually) in the stream. It may not be true that there is no seasonal variation. Please consider additional sampling during these months, or justify why sampling was not done during these months.

Response: The water quality data collected on which this TMDL was based were collected throughout the watershed and accounted for changes in seasonal conditions. TMDLs are dynamic plans and are able to undergo revision. Should better water quality data that meet TMDL program standards be made available in the future, the Streets Run Watershed TMDL can be revised to more accurately reflect watershed conditions.

Comment No. 17:
AMD TMDLs are developed from water chemistry data. However, the iron and aluminum precipitates also impact the quality of the stream, even if the water column at the same location is no longer contaminated with AMD pollutants. How can this be addressed through TMDLs?

Response: Metals do precipitate from the water column with increasing pH or reduced velocity. TMDLs are, by law, required to address pollutants that exceed water quality criteria. Water quality samples that are taken from these areas of the watershed do not show exceedances of water quality standards and, thus, should not have TMDLs as the impairing factor in the watershed is no longer a pollutant (metals in the water column) but pollution (sedimentation of the bottom substrate). These waters would still appear as impaired in the Integrated Water Quality Report; however, TMDLs would not be necessary for these waters.