

FALLEN TIMBER RUN WATERSHED TMDL Allegheny County

For Acid Mine Drainage Affected Segments



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TMDL¹
Fallen Timber Run Watershed
Allegheny County, Pennsylvania

Introduction

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

Table 1. 303(d) Listed Segments										
State Water Plan (SWP) Subbasin: 19C										
HUC: 05020005 Lower Monogahela River										
Year	Miles	Use Designation	Assessment ID	Segment ID	DEP Stream Code	Stream Name	Designated Use	Data Source	Source	EPA 305(b) Cause Code
1996	2.7	*	*	Not in GIS.	39537	Fallen Timber Run	WWF	305(b) Report	RE	Metals
	1									
1998	2.7	*	*	Not in GIS.	39537	Fallen Timber Run	WWF	SWMP	AMD	Metals
	1									
2002	3.7	*	*	Not in GIS.	39537	Fallen Timber Run	WWF	SWMP	AMD	Metals
2004	2.2	*	*	20020620-1230-GJK	39537	Fallen Timber Run	WWF	SWMP	AMD	Metals
	4.41			20020620-1530-GJK						Metals
2004	0.3	*	*	20020620-1231-GJK	39538	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2004	1.3	*	*	20020620-1231-GJK	39539	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2004	0.9	*	*	20020620-1231-GJK	39540	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals

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

2004	0.9	*	*	20020620-1231-GJK	39541	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2004	1.3	*	*	20020620-1231-GJK	39542	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2004	0.4	*	*	20020620-1231-GJK	39543	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2004	0.6	*	*	20020620-1530-GJK	39544	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2004	0.6	*	*	20020620-1530-GJK	39545	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2004	0.2	*	*	20020620-1530-GJK	39546	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2004	0.02	*	*	20020620-1530-GJK	39547	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2006	2.26	Aquatic Life	3915	*	39537	Fallen Timber Run	WWF	SWMP	AMD	Metals
	2.2		3923	*						Metals
2006	0.33	Aquatic Life	3916	*	39538	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2006	1.27	Aquatic Life	3916	*	39539	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2006	0.91	Aquatic Life	3916	*	39540	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2006	0.92	Aquatic Life	3916	*	39541	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2006	1.35	Aquatic Life	3916	*	39542	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2006	0.38	Aquatic Life	3916	*	39543	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2006	0.57	Aquatic Life	3923	*	39544	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2006	0.55	Aquatic Life	3923	*	39545	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
2006	0.24	Aquatic Life	3923	*	39546	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals

2006	0.04	Aquatic Life	3923	*	39547	Fallen Timber Run, Unt	WWF	SWMP	AMD	Metals
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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 Fallen Timber Run Watershed

The Fallen Timber Run Watershed is located in southwestern Pennsylvania approximately 10 miles south of the city of Pittsburgh. The watershed is located within Forward Township, Allegheny County. Fallen Timber Run flows from south to north to the town of Elizabeth where it meets the Monongahela River. Elizabeth is located at 40 degrees 16' and 16" N and 79 degrees 53' 11" W. The Monongahela River flows to meet the Allegheny River at Pittsburgh, to form the Ohio River.

Much of Fallen Timber Run is accessible from U.S. Route 51 which roughly bisects the watershed. U.S. Route 51 can be accessed at Interstate 70 approximately 10 miles to the south or by Interstate 376 approximately 10 miles to the north at Pittsburgh.

Watershed History

Settling of the watershed by Europeans started in the late eighteenth century. Initially the land was used for farming and timbering. The town of Elizabeth was founded in 1787. Among the earliest industries of Elizabeth were glass making, safe making, and ship building. In 1803, the keelboat used for the first stages of the Lewis and Clark Expedition was built in Elizabeth.

Coal mining was also important in the history of the watershed. The majority of the area is underlain by the Pittsburgh Coal, the most valuable and expansive coal seam in the Appalachian Coal Basin. Underground coal mining began approximately in the 1870s and continued through the first half of the 20th century. Currently, the mines are abandoned and discharge mine drainage to the watershed.

Hydrology and Geology

The Fallen Timber Run Watershed is situated on an upland area a few hundred feet in elevation above the Monongahela River. The main stream and its tributaries have eroded the land surface into gently sloping hills and adjoining valleys. The highest elevation in the watershed is 1324 feet above MSL. The elevation at Fallen Timber Run's confluence with the Monongahela is 727 feet. The relief throughout the watershed is generally around 200-300 feet.

The stratigraphy consists of sandstones, shales, and limestone. As noted, the area contains the Pittsburgh and other coal seams of the Monongahela geologic series. Structurally, the watershed is just to the south of the top of the Roaring Run – Murrysville anticline. The strata here dip generally to the south/southeast at an angle of 1 degree or less.

Current land use in the watershed is split almost evenly between farmland and forestland. The town of Elizabeth makes up a small portion of the watershed, along with limited residential and commercial areas.

Segments addressed in this TMDL

Fallen Timber Run is affected by pollution from AMD. This pollution has caused high levels of metals in the watershed. The TMDLs will be expressed as long-term, average loadings. Due to the nature and complexity of mining effects on the watershed, expressing the TMDL as a long-term average gives a better representation of the data used for the calculations. See Table 3 for TMDL calculations and see Attachment C for TMDL explanations.

Clean Water Act Requirements

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

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

- States to develop lists of impaired waters for which current pollution controls are not stringent enough to meet water quality standards (the list is used to determine which streams need TMDLs);
- States to establish priority rankings for waters on the lists based on severity of pollution and the designated use of the waterbody; states must also identify those waters for which TMDLs will be developed and a schedule for development;
- States to submit the list of waters to EPA every two years (April 1 of the even numbered years);
- States to develop TMDLs, specifying a pollutant budget that meets state water quality standards and allocate pollutant loads among pollution sources in a watershed, e.g., point and nonpoint sources; and
- EPA to approve or disapprove state lists and TMDLs within 30 days of final submission.

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

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

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

Section 303(d) Listing Process

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

The primary method adopted by the Pennsylvania Department of Environmental Protection (DEP) for evaluating waters changed between the publication of the 1996 and 1998 Section 303(d) lists. Prior to 1998, data used to list streams were in a variety of formats, collected under differing protocols. Information also was gathered through the Section 305(b)² reporting process. DEP is now using the Statewide Surface Waters Assessment Protocol (SSWAP), a modification of the EPA's 1989 Rapid Bioassessment Protocol II (RBP-II), as the primary mechanism to assess Pennsylvania's waters. The SSWAP provides a more consistent approach to assessing Pennsylvania's streams.

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

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

Basic Steps for Determining a TMDL

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

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

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

AMD Methodology

A two-step approach is used for the TMDL analysis of AMD impaired stream segments. The first step uses a statistical method for determining the allowable instream concentration at the point of interest necessary to meet water quality standards. This is done at each point of interest (sample point) in the watershed. The second step is a mass balance of the loads as they pass through the watershed. Loads at these points will be computed based on average annual flow.

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

Allowable loads are determined for each point of interest using Monte Carlo simulation. Monte Carlo simulation is an analytical method meant to imitate real-life systems, especially when other analyses are too mathematically complex or too difficult to reproduce. Monte Carlo simulation calculates multiple scenarios of a model by repeatedly sampling values from the probability distribution of the uncertain variables and using those values to populate a larger data set. Allocations were applied uniformly for the watershed area specified for each allocation point. For each source and pollutant, it was assumed that the observed data were log-normally distributed. Each pollutant source was evaluated separately using @Risk³ 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:

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

$$PR = \text{maximum } \{0, (1-Cc/Cd)\} \text{ where} \quad (1)$$

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

$$Cd = \text{RiskLognorm}(\text{Mean}, \text{Standard Deviation}) \text{ where} \quad (1a)$$

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:

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

LTA = allowable LTA source concentration in mg/l

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

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

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

Tracking loads through the watershed gives the best picture of how the pollutants are affecting the watershed based on the information that is available. The analysis is done to insure that water quality standards will be met at all points in the stream. The TMDL must be designed to

meet standards at all points in the stream, and in completing the analysis, reductions that must be made to upstream points are considered to be accomplished when evaluating points that are lower in the watershed. Another key point is that the loads are being computed based on average annual flow and should not be taken out of the context for which they are intended, which is to depict how the pollutants affect the watershed and where the sources and sinks are located spatially in the watershed.

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

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

TMDL Endpoints

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

Because 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

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

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

TMDL Elements (WLA, LA, MOS)

$$\text{TMDL} = \text{WLA} + \text{LA} + \text{MOS}$$

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.

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. Fallen Timber 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
TIMB05 – Fallen Timber Run upstream of confluence with WALL06 unnamed tributary						
Aluminum (lbs/day)	0.62	0.44	-	0.44	0.18	29%
Iron (lbs/day)	0.86	0.80	-	0.80	0.06	7%
Manganese(lbs/day)	0.06	0.06	-	-	NA	NA
Acidity (lbs/day)	-393.08	-393.08	-	-	NA	NA
TIMB04 – Unnamed tributary to Fallen Timber Run at mouth						
Aluminum (lbs/day)	0.33	0.33	-	-	NA	NA
Iron (lbs/day)	0.25	0.25	-	-	NA	NA
Manganese(lbs/day)	0.03	0.03	-	-	NA	NA
Acidity (lbs/day)	-286.47	-286.47	-	-	NA	NA
TIMB03 – Unnamed tributary to Fallen Timber Run at mouth						
Aluminum (lbs/day)	5.35	0.80	-	0.80	4.37	85%*
Iron (lbs/day)	15.73	1.26	-	1.26	12.81	91%*
Manganese(lbs/day)	0.75	0.75	-	-	NA	NA
Acidity (lbs/day)	-569.59	-569.59	-	-	NA	NA
TIMB02 - Unnamed tributary to Fallen Timber Run at mouth						
Aluminum (lbs/day)	0.26	0.21	-	0.21	0.05	18%
Iron (lbs/day)	0.29	0.29	-	-	NA	NA
Manganese(lbs/day)	0.03	0.03	-	-	NA	NA
Acidity (lbs/day)	-109.05	-109.05	-	-	NA	NA
TIMB01 – Fallen Timber Run at mouth						
Aluminum (lbs/day)	3.68	0.85	-	0.85	0	0%*
Iron (lbs/day)	4.14	1.53	-	1.53	0	0%*
Manganese(lbs/day)	0.43	0.43	-	-	NA	NA
Acidity (lbs/day)	-1095.06	-1095.06	-	-	NA	NA

NA = not applicable ND = not detected

* Takes into account load reductions from upstream sources.

In the instance that the allowable load is equal to the existing load (e.g. manganese TIMB05, 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 TIMB03 of Fallen Timber 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 TIMB05/04	
	Al (Lbs/day)
Existing Load TIMB05/04	0.95
Allowable Load TIMB05/04	0.77

Allowable Load = 0.77 lbs/day

Load input = 4.73 lbs/day
 (Difference between existing loads upstream and
 TIMB03)

ALLOCATIONS TIMB03	
	Al (Lbs/day)
Existing Load @ TIMB03	5.35
Difference in measured Loads between the loads that enter and existing TIMB03 (TIMB05/04)	4.73
Additional load tracked from above samples	0.44
Total load tracked between upstream and TIMB03	5.17
Allowable Load @ TIMB03	0.80
Load Reduction @ TIMB03	4.37
% Reduction required at TIMB03	85%

Allowable Load = 0.80 lbs/day

***Fallen Timber
Run***

The allowable aluminum load tracked from upstream was 0.77 lbs/day. The existing load upstream was subtracted from the existing load at TIMB03 to show the actual measured increase of aluminum load that has entered the stream between these upstream sites and TIMB03 (4.73 lbs/day). This increased value was then added to the calculated allowable load from upstream to calculate the total load that was tracked between upstream and TIMB03 (allowable loads upstream + the difference in existing load between upstream and TIMB03). This total load tracked was then subtracted from the calculated allowable load at TIMB03 to determine the amount of load to be reduced at TIMB03. This total load value was found to be 5.17 lbs/day; it was 4.37 lbs/day greater than the TIMB03 allowable load of 0.80 lbs/day. Therefore, an 85% aluminum reduction at TIMB03 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 who need to assure treatment of post-mining discharges or discharges they degraded which will provide for long-term treatment of discharges. According to OSM, "PADEP is conducting a program where active mining sites are, with very few exceptions, in compliance with the approved regulatory program".

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

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

There currently isn't a watershed organization interested in the Fallen Timber Run Watershed. It is recommended that agencies work with local interests to form a watershed group that will be dedicated to the remediation and preservation of these watersheds through public education, monitoring and assessment, and improvement projects. Information on formation of a watershed group is available through websites for the PADEP (www.dep.state.pa.us), the AMR Clearinghouse (www.amrclearinghouse.com), the EPA (www.epa.gov), the Susquehanna River Basin Commission (www.srbc.net) and others. In addition, each DEP Regional Office (6) and each District Mining Office (5) have watershed managers to assist stakeholder groups interested

in restoration in their watershed. Most Pennsylvania county conservation districts have a watershed specialist who can also provide assistance to stakeholders (www.pacd.org). Potential funding sources for AMR projects can be found at www.dep.state.pa.us/dep/subject/pubs/water/wc/FS2205.pdf.

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

Public Participation

Public notice of the draft TMDL was published in the *Pennsylvania Bulletin* on April 26, 2008 to foster public comment on the allowable loads calculated. The public comment period on this TMDL was open from April 26 to June 26, 2008. A public meeting was held on May 28, 2008 at the Greensburg District Mining Office in Armburst, Pennsylvania to discuss the proposed TMDL.

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).

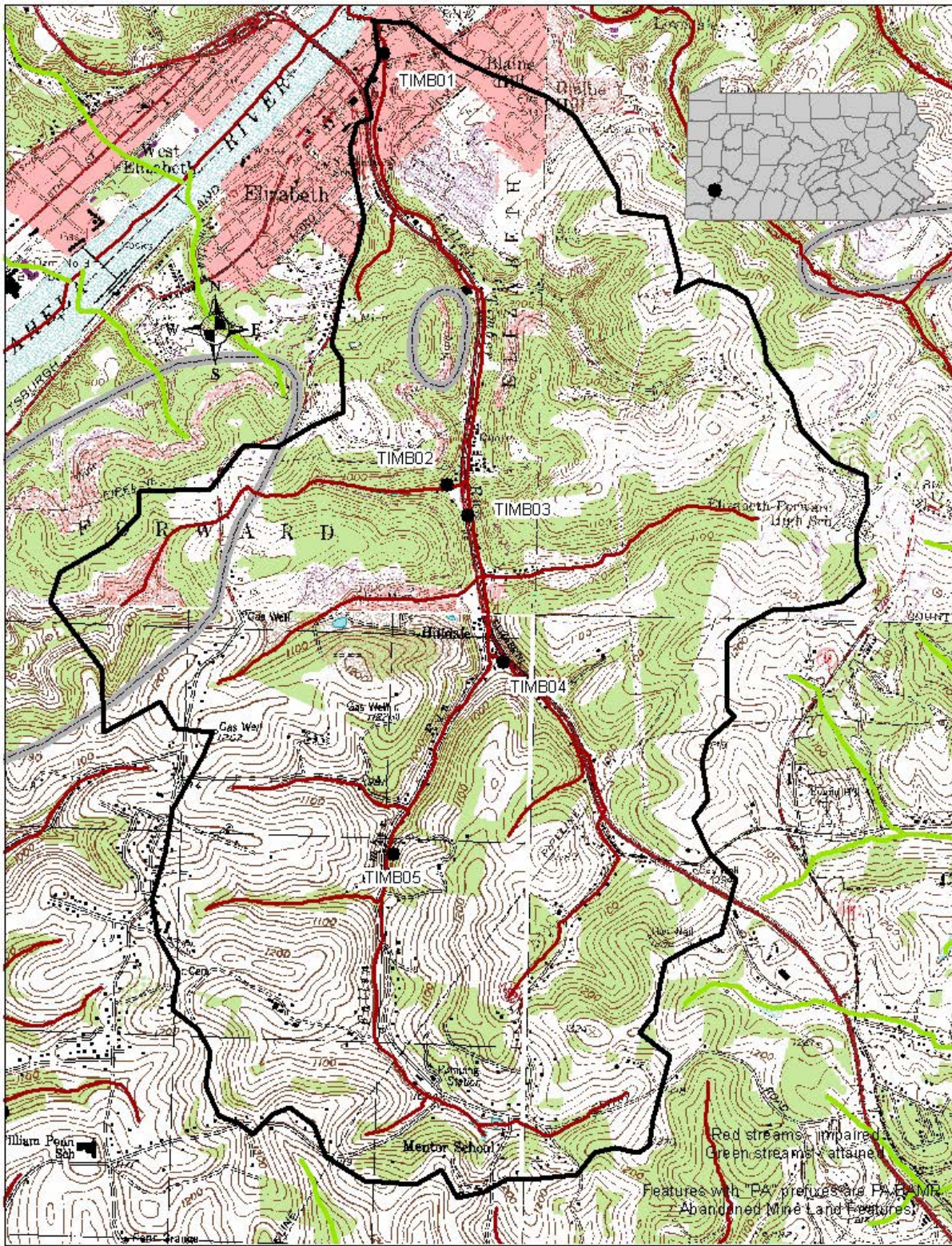
- Change in water quality standards (WQS).
- Non-attainment of WQS with implementation of the TMDL.
- Allocations in trading programs.

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

Fallen Timber Run Watershed Maps



Attachment B

Method for Addressing Section 303(d) Listings for pH

Method for Addressing Section 303(d) Listings for pH

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

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

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

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

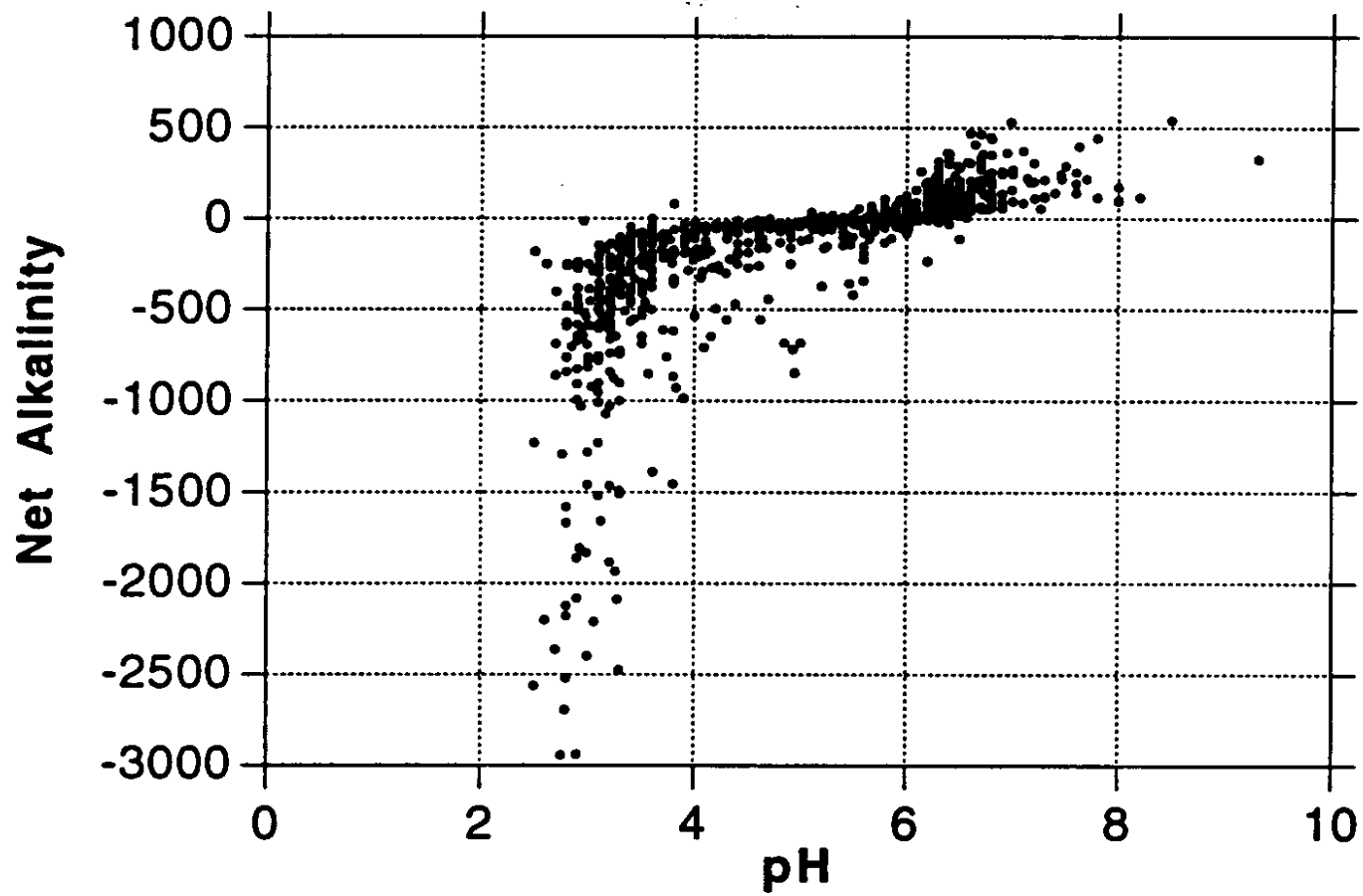


Figure 1. Net Alkalinity vs. pH. Taken from Figure 1.2 Graph C, pages 1-5, of Coal Mine Drainage Prediction and Pollution Prevention in Pennsylvania

Attachment D

TMDLs By Segment

Fallen Timber Run

The TMDL for Fallen Timber Run consists of load allocations to three sampling sites on Fallen Timber Run (TIMB05, TIMB03 and TIMB01) and two sites on unnamed tributaries of Fallen Timber Run (TIMB02 and TIMB04). Sample data sets were collected in 2006 and 2007. All sample points are shown on the maps included in Attachment A as well as on the loading schematic presented on the following page.

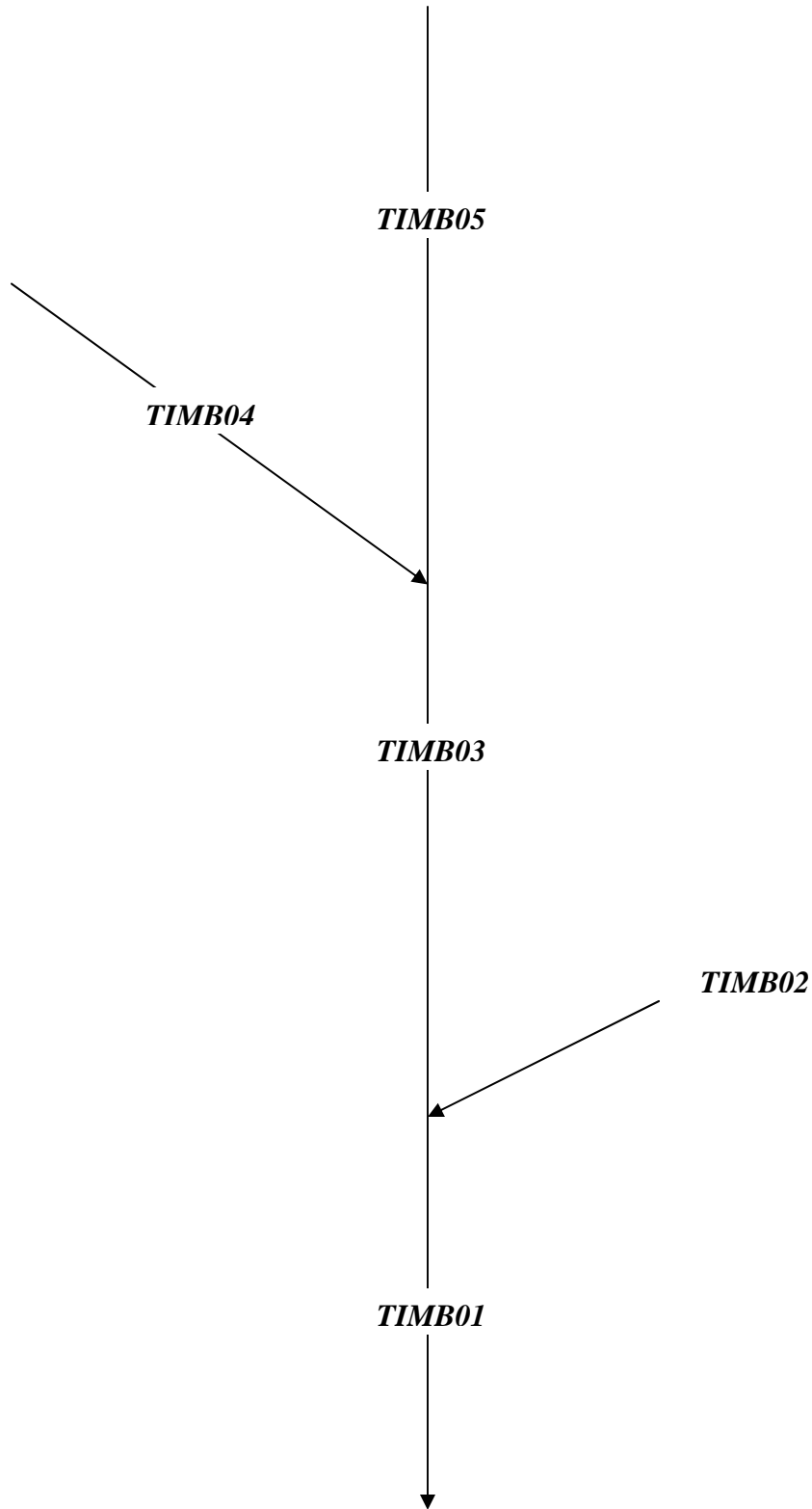
Fallen Timber Run is listed on the 1996 PA Section 303(d) list for metals from AMD as being the cause of the degradation to this stream. Although this TMDL will focus primarily on metal loading to the Fallen Timber Run Watershed, acid loading analysis will be performed. The objective is to reduce acid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

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

Fallen Timber Run Sampling Station Diagram

Arrows represent direction of flow

Diagram not to scale



TMDL calculations- TIMB05 - Fallen Timber Run in headwaters

The TMDL for sampling point TIMB05 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 Fallen Timber Run was computed using water-quality sample data collected at point TIMB05. The average flow, measured at the sampling point TIMB05 (0.217591 MGD), is used for these computations. The allowable load allocations calculated at TIMB05 will directly affect the downstream point TIMB03.

Sample data at point TIMB05 shows pH ranging between 8.2 and 8.5; pH not will be addressed because water quality standards are being met. A TMDL for aluminum, iron, and manganese at TIMB05 has been calculated.

Table D1 shows the measured and allowable concentrations and loads at TIMB05. Table D2 shows the percent reduction for aluminum, iron, and manganese needed at TIMB05.

Table D1		Measured		Allowable	
Flow (gpm)=	151.0	Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.34	0.62	0.24	0.44
	Iron	0.48	0.86	0.44	0.80
	Manganese	0.03	0.06	0.03	0.06
	Acidity	-216.76	-393.08	-216.76	-393.08
	Alkalinity	248.76	451.11		

Table D2. Allocations TIMB05		
TIMB05	Al (lbs/day)	Fe (lbs/day)
Existing Load @ TIMB05	0.62	0.86
Allowable Load @ TIMB05	0.44	0.80
Load Reduction @ TIMB05	0.18	0.06
% Reduction required @ TIMB05	29%	7%

TMDL calculations- TIMB04- Unnamed tributary to Fallen Timber Run near mouth

The TMDL for sampling point TIMB04 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 Fallen Timber Run was computed using water-quality sample data collected at point TIMB04. The average flow, measured at the sampling point TIMB04 (0.157069 MGD), is used for these computations.

Sample data at point TIMB04 shows pH ranging between 8.0 and 8.5; pH will not be addressed because water quality standards are being met. Table D3 shows the measured and allowable concentrations and loads at TIMB04. TMDLs are not necessary at point TIMB04 because water quality standards are being met.

Table D3		Measured		Allowable	
Flow (gpm)=	109.00	Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.25	0.33	0.25	0.33
	Iron	0.19	0.25	0.19	0.25
	Manganese	0.03	0.03	0.03	0.03
	Acidity	-218.84	-286.47	-218.84	-286.47
	Alkalinity	254.16	332.71		

TMDL calculations- TIMB03 –Fallen Timber Run between TIMB04 and TIMB02

The TMDL for sample point TIMB03 consists of a load allocation to all of the area between unnamed tributaries TIMB04 and TIMB02 shown in Attachment A. The load allocation for this segment of Fallen Timber Run was computed using water-quality sample data collected at point TIMB03. The average flow, measured at the sampling point TIMB03 (0.397716 MGD), is used for these computations. The allowable load allocations calculated at TIMB03 will directly affect the downstream point TIMB01.

Sample data at point TIMB03 shows that this segment has a pH ranging between 7.4 and 8.2; pH will not be addressed because water quality standards are being met. A TMDL for aluminum and iron has been calculated at this site

Table D4 shows the measured and allowable concentrations and loads at TIMB03. Table D5 shows the percent reductions for aluminum and iron.

Table D4		Measured		Allowable	
Flow (gpm)=	276.00	Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	1.61	5.35	0.24	0.80
	Iron	4.75	15.73	0.38	1.26
	Manganese	0.23	0.75	0.23	0.75
	Acidity	-171.84	-569.59	-171.84	-569.59
	Alkalinity	209.04	692.89		

The measured and allowable loading for point TIMB03 for aluminum and iron 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 TIMB03 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points TIMB05/04 and TIMB03 to determine a total load tracked for the segment of stream between TIMB03 and TIMB05/04. This

load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at TIMB03.

Table D5. Allocations TIMB03		
TIMB03	Al (Lbs/day)	Fe (Lbs/day)
Existing Load @ TIMB03	5.35	15.73
Difference in measured Loads between the loads that enter and existing TIMB03	4.73	14.87
Additional load tracked from above samples	0.44	0.80
Total load tracked between TIMB05/04 and TIMB03	5.17	14.07
Allowable Load @ TIMB03	0.80	1.26
Load Reduction @ TIMB03	4.37	12.81
% Reduction required at TIMB03	85%	91%

TMDL calculations- TIMB02 – Unnamed tributary to Fallen Timber Run at mouth

The TMDL for sampling point TIMB02 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 Fallen Timber Run was computed using water-quality sample data collected at point TIMB02. The average flow, measured at the sampling point TIMB02 (0.083002 MGD), is used for these computations.

Sample data at point TIMB02 shows pH ranging between 7.8 and 8.3; pH will not be addressed because water quality standards are being met. A TMDL for aluminum at TIMB02 has been calculated.

Table D6 shows the measured and allowable concentrations and loads at TIMB02. Table D7 shows the percent reduction for aluminum needed at TIMB02.

Table D6		Measured		Allowable	
Flow (gpm)=	57.60	Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.37	0.26	0.30	0.21
	Iron	0.42	0.29	0.42	0.29
	Manganese	0.05	0.03	0.05	0.03
	Acidity	-157.64	-109.05	-157.64	-109.05
	Alkalinity	180.40	124.79		

Table D7. Allocations TIMB02	
TIMB02	Al (Lbs/day)
Existing Load @ TIMB02	0.26
Allowable Load @ TIMB02	0.21
Load Reduction @ TIMB02	0.05
% Reduction required @ TIMB02	18%

TMDL calculations- TIMB01- Fallen Timber Run at mouth

The TMDL for sampling point TIMB01 consists of a load allocation to all of the area between TIMB03 and TIMB01 shown in Attachment A. The load allocation for this segment of Fallen Timber Run was computed using water-quality sample data collected at point TIMB01. The average flow, measured at the sampling point TIMB01 (0.8060954 MGD), is used for these computations.

Sample data at point TIMB01 shows pH ranging between 8.0 and 8.3; pH will not be addressed because water quality standards are being met. A TMDL for aluminum and iron at TIMB01 has been calculated.

Table D8 shows the measured and allowable concentrations and loads at TIMB01. Table D9 shows the percent reduction for aluminum and iron needed at TIMB01.

Table D8		Measured		Allowable	
Flow (gpm)=	559.40	Concentration	Load	Concentration	Load
		mg/L	lbs/day	mg/L	lbs/day
	Aluminum	0.55	3.68	0.13	0.85
	Iron	0.62	4.14	0.23	1.53
	Manganese	0.06	0.43	0.06	0.43
	Acidity	-163.00	-1095.06	-163.00	-1095.06
	Alkalinity	185.20	1244.21		

The measured and allowable loading for point TIMB01 for aluminum and iron 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 TIMB01 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points TIMB03/02 and TIMB01 to determine a total load tracked for the segment of stream between TIMB01 and TIMB03/02. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at TIMB01.

Table D9. Allocations TIMB01		
TIMB01	Al (Lbs/day)	Fe (Lbs/day)
Existing Load @ TIMB01	3.68	4.14
Difference in measured Loads between the loads that enter and existing TIMB01	-1.93	-11.88
Additional load tracked from above samples	1.01	1.55
Total load tracked between TIMB03/02 and TIMB01	0.35	0.40
Allowable Load @ TIMB01	0.85	1.53
Load Reduction @ TIMB01	0	0
% Reduction required at TIMB01	0%	0%

Margin of Safety

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

- Effluent variability plays a major role in determining the average value that will meet water-quality criteria over the long-term. The value that provides this variability in our analysis is the standard deviation of the dataset. The simulation results are based on this variability and the existing stream conditions (an uncontrolled system). The general assumption can be made that a controlled system (one that is controlling and stabilizing the pollution load) would be less variable than an uncontrolled system. This implicitly builds in a margin of safety.
- An additional MOS is provided because that the calculations were done with a daily Fe average instead of the 30-day average.

Seasonal Variation

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

Critical Conditions

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

Attachment E

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

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

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

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

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

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

Migration to National Hydrography Data (NHD)

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

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

Attachment F

Water Quality Data Used In TMDL Calculations

MP	Date	Flow, gpm	pH	Alkalinity, mg/L	Hot Acidity, mg/L	Total Iron, mg/L	Total Manganese, mg/L	Total Aluminum, mg/L	Sulfate, mg/L	TSS, mg/L
1	5/12/2006	702	8.2	187.4	-172.8	<u>0.15</u>	<u>0.025</u>	<u>0.25</u>	242.8	4
1	6/16/2006	489	8	186.8	-165	2.12	0.157	1.74	*	26
1	8/18/2006	560	8	197.6	-180.4	<u>0.15</u>	<u>0.025</u>	<u>0.25</u>	380.9	<u>8</u>
1	2/28/2007	648	8.3	195.2	-175.6	0.509	0.085	<u>0.25</u>	166.2	16
1	7/26/2007	398	8.2	159	-121.2	<u>0.15</u>	<u>0.025</u>	<u>0.25</u>	504.5	<u>1.5</u>
	Average	559.40	8.14	185.20	-163.00	0.62	0.06	0.55	323.60	11.10
	StDev	121.65	0.13	15.39	24.02	0.86	0.06	0.67	149.79	9.98
2	5/12/2006	84	8.1	172.2	-140	<u>0.15</u>	<u>0.025</u>	<u>0.25</u>	485.9	16
2	6/16/2006	53	8	185.8	-165.8	0.456	0.061	0.573	294.9	12
2	8/18/2006	68	7.8	184	-168.4	0.395	<u>0.061</u>	<u>0.25</u>	491.4	28
2	2/28/2007	41	8.3	179.2	-162.8	0.735	0.074	0.524	370.7	20
2	7/26/2007	42	8	180.8	-151.2	0.379	<u>0.025</u>	<u>0.25</u>	491	8
	Average	57.60	8.04	180.40	-157.64	0.42	0.05	0.37	426.78	16.80
	StDev	18.34	0.18	5.27	11.85	0.21	0.02	0.16	89.91	7.69
3	5/12/2006	390	7.7	219	-193.6	2.66	0.136	1.35	236.8	18
3	6/16/2006	208	7.5	215.2	-196.2	5.09	0.264	2.34	274.8	34
3	8/18/2006	275	7.5	215.6	-167.4	4.54	0.198	1.43	407	26
3	2/28/2007	317	8.2	213	-191	1.04	0.061	<u>0.25</u>	137.2	14
3	7/26/2007	190	7.4	182.4	-111	10.4	0.471	2.7	569.9	34
	Average	276.00	7.66	209.04	-171.84	4.75	0.23	1.61	325.14	25.20
	StDev	81.70	0.32	15.05	35.90	3.54	0.16	0.96	167.53	9.12
4	5/12/2006	180	8.4	247.8	-211	<u>0.15</u>	0.025	<u>0.25</u>	85.4	<u>1.5</u>
4	6/16/2006	76	8	254.8	-225.6	<u>0.15</u>	<u>0.025</u>	<u>0.25</u>	104.5	<u>8</u>
4	8/18/2006	98	8.2	272.6	-237.6	<u>0.15</u>	<u>0.025</u>	<u>0.25</u>	100.2	<u>4</u>
4	2/28/2007	121	8.5	229	-192.4	<u>0.15</u>	<u>0.025</u>	<u>0.25</u>	78.4	12
4	7/26/2007	70	8.1	266.6	-227.6	0.346	<u>0.025</u>	<u>0.25</u>	93.6	<u>1.5</u>
	Average	109.00	8.24	254.16	-218.84	0.19	0.03	0.25	92.42	5.40
	StDev	44.49	0.21	17.09	17.57	0.09	0.00	0.00	10.65	4.55
5	5/12/2006	159	8.3	238.2	-201.8	0.543	<u>0.025</u>	<u>0.25</u>	77.8	22
5	6/16/2006	113	8.3	264	-238	0.717	0.063	0.703	99.8	28
5	8/18/2006	143	8.2	267.6	-240	<u>0.15</u>	<u>0.025</u>	<u>0.25</u>	66	10
5	2/28/2007	150	8.5	208.4	-189.8	<u>0.15</u>	<u>0.025</u>	<u>0.25</u>	48.2	10
5	7/26/2007	190	8.3	265.6	-214.2	0.817	<u>0.025</u>	<u>0.25</u>	60.1	<u>1.5</u>
	Average	151.00	8.32	248.76	-216.76	0.48	0.03	0.34	70.38	14.30
	StDev	27.81	0.11	25.55	22.07	0.31	0.02	0.20	19.60	10.58

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 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

No comments were received on the Fallen Timber Run TMDL.