DRAFT

# SEWICKLEY CREEK
# TMDL
## Westmoreland County

For Mine Drainage Affected Segments

<u>Prepared by</u>:

Pennsylvania Department of Environmental Protection

December 31, 2008

# DRAFT

## TABLE OF CONTENTS



## TABLES



## ATTACHMENTS

# DRAFT

**TMDL[1]**
**Sewickley Creek**
**Westmoreland County, Pennsylvania**

## Introduction

This report presents the Total Maximum Daily Loads (TMDLs) developed for a segment of the Sewickley Creek (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 (Attachment B). Sewickley Creek 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.

## Directions to the Sewickley Creek

Sewickley Creek is located in southwestern Pennsylvania. The watershed can be accessed by traveling the Pennsylvania Turnpike (Route 76) until reaching the New Stanton exit from where the watershed can be easily accessed. A number of interstates provide access to the segment, including Route 819 and a large number of state and township roads.

## Watershed Characteristics

The Sewickley Creek segment addressed in this TMDL document is located in Westmoreland County in southwestern Pennsylvania. The watershed contains the towns of Greensburg and a number of smaller towns, such as New Stanton, Hunker, and Welty Run. The watershed area draining is 168 $miles^2$. Land use in the watershed includes multiple land uses, including forestland (43%), cropland, and urban (14.3%) uses.

Mining started in the area over two centuries ago and continues through the present. Mining was primarily conducted via the deep mining method for much of the first 150 years of its extraction, with surface removal of coal becoming the more predominant form from the time of WWII to the present. Mined coal seams include the Pittsburgh and Redstone Seams. Underground mine pools have developed throughout the watershed area as deep mines have filled with water after being abandoned.

A number of deep mine discharges emanate from these abandoned mines, creating large sources of pollution in tributary watersheds. Among the watersheds impacted by AMD are Welty Run, Jacks Run, Buffalo Run, Wilson Run, and others. There are also sources directly into the Sewickley Creek, such as the Lowber Mine Discharge in the lower reaches.

---

[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.*

**Segments addressed in this TMDL**

Sewickley Creek 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.

This AMD TMDL document contains one or more future mining Waste Load Allocations (WLA). This (these) WLA(s) were requested by the Pottsville 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. 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 D for TMDL calculations.

**Clean Water Act Requirements**

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

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

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

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

- 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

---

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

modification of the EPA's 1989 Rapid Bioassessment Protocol II (RBP-II), as the primary mechanism to assess Pennsylvania's waters. The SSWAP provides a more consistent approach to assessing Pennsylvania's streams.

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

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

**Basic Steps for Determining a TMDL**

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

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

**AMD Methodology**

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

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

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

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

PR = required percent reduction for the current iteration

Cc = criterion in mg/l

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

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

Mean = average observed concentration

Standard Deviation = standard deviation of observed data

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

LTA = Mean * (1 – PR99) where (2)

LTA = allowable LTA source concentration in mg/l

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

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 1. Applicable Water Quality Criteria**

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

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

**TMDL Elements (WLA, LA, MOS)**

TMDL = WLA + LA + MOS

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

**Allocation Summary**

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

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

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 2. Sewickley Creek 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 |
|---|---|---|---|---|---|---|
| **WELTY8 – Welty Run near headwaters** | | | | | | |
| **Aluminum (lbs/day)** | 3.47 | 1.56 | - | 1.56 | 1.91 | 55% |
| **Iron (lbs/day)** | 1.35 | 7.02 | - | NA | NA | NA |
| **Manganese(lbs/day)** | 0.23 | 0.72 | - | NA | NA | NA |
| **Acidity (lbs/day)** | -74.41 | -74.41 | - | NA | NA | NA |
| **WELTY7 – Welty Run ½ mile east of Weltytown** | | | | | | |
| **Aluminum (lbs/day)** | 14.98 | 11.98 | *1.13* | 10.85 | 1.09* | 9%* |
| **Iron (lbs/day)** | 11.68 | 56.29 | NA | NA | NA | NA |
| **Manganese(lbs/day)** | 3.22 | 12.09 | NA | NA | NA | NA |
| **Acidity (lbs/day)** | -1143.39 | -1143.39 | - | NA | NA | NA |
| **WELTY6 – Welty Run upstream of Mammoth Lake** | | | | | | |
| **Aluminum (lbs/day)** | 18.19 | 34.20 | NA | NA | NA | NA |
| **Iron (lbs/day)** | 10.92 | 56.76 | NA | NA | NA | NA |
| **Manganese(lbs/day)** | 2.67 | 7.28 | NA | NA | NA | NA |
| **Acidity (lbs/day)** | -3917.39 | -3917.39 | - | NA | NA | NA |
| **WELTY5 – Welty Run ½ mile downstream of Mammoth Lake** | | | | | | |
| **Aluminum (lbs/day)** | 19.27 | 36.23 | NA | NA | NA | NA |
| **Iron (lbs/day)** | 11.56 | 60.12 | NA | NA | NA | NA |
| **Manganese(lbs/day)** | 6.94 | 31.60 | NA | NA | NA | NA |
| **Acidity (lbs/day)** | -1753.59 | -1753.59 | - | NA | NA | NA |
| **WELTY4 – Unnamed tributary to Welty Run ½ mile northeast of village of Mammoth** | | | | | | |
| **Aluminum (lbs/day)** | 1.15 | 2.15 | NA | NA | NA | NA |
| **Iron (lbs/day)** | 0.69 | 3.57 | NA | NA | NA | NA |
| **Manganese(lbs/day)** | 0.91 | 3.99 | NA | NA | NA | NA |
| **Acidity (lbs/day)** | -655.80 | -655.80 | - | NA | NA | NA |
| **WELTY1 – Welty Run at bridge in Calumet** | | | | | | |
| **Aluminum (lbs/day)** | 25.06 | 47.12 | NA (1.13) | NA | NA | NA |

| Parameter | Existing Load (lbs/day) | TMDL Allowable Load (lbs/day) | WLA (lbs/day) | LA (lbs/day) | NPS Load Reduction (lbs/day) | NPS % Reduction |
|---|---|---|---|---|---|---|
| **Iron (lbs/day)** | 48.06 | 41.81 | *4.50* (1.13) | 36.18 | 6.25* | 13%* |
| **Manganese(lbs/day)** | 65.29 | 16.32 | *3.00* (0.75) | 12.57 | 48.97* | 75%* |
| **Acidity (lbs/day)** | -7198.62 | -7198.62 | - | NA | NA | NA |
| **JACK10 – Unnamed tributary to Jacks Run upstream of Greensburg** | | | | | | |
| **Aluminum (lbs/day)** | 7.90 | 3.87 | *0.28* | 3.59 | 4.03 | 51% |
| **Iron (lbs/day)** | 6.79 | 5.64 | *1.13* | 4.51 | 1.15 | 17% |
| **Manganese(lbs/day)** | 1.03 | 2.65 | *NA* | NA | NA | NA |
| **Acidity (lbs/day)** | -2888.05 | -2888.05 | - | NA | NA | NA |
| **JACK9 – Unnamed tributary to Jacks Run upstream of Greensburg** | | | | | | |
| **Aluminum (lbs/day)** | 43.11 | 2.59 | *0.28* | 2.31 | 40.52 | 94% |
| **Iron (lbs/day)** | 47.70 | 6.20 | *1.13* | 5.07 | 41.50 | 87% |
| **Manganese(lbs/day)** | 25.22 | 3.03 | *0.75* | 2.28 | 22.19 | 88% |
| **Acidity (lbs/day)** | -112.83 | -112.83 | - | NA | NA | NA |
| **JACK8 – Jacks Run upstream of Greensburg** | | | | | | |
| **Aluminum (lbs/day)** | 29.60 | 7.70 | *0.56* | 7.14 | 0* | 0%* |
| **Iron (lbs/day)** | 29.73 | 22.30 | *2.26* | 20.04 | 0* | 0%* |
| **Manganese(lbs/day)** | 27.29 | 10.10 | *1.50* | 8.60 | 0* | 0%* |
| **Acidity (lbs/day)** | -5517.97 | -5517.97 | - | NA | NA | NA |
| **JACK7 – Jacks Run downstream of Coal Tar Run** | | | | | | |
| **Aluminum (lbs/day)** | 53.17 | 15.95 | *1.13* | 14.82 | 15.32* | 49%* |
| **Iron (lbs/day)** | 42.24 | 24.08 | *4.50* | 19.58 | 10.73* | 31%* |
| **Manganese(lbs/day)** | 15.09 | 34.76 | NA | NA | NA | NA |
| **Acidity (lbs/day)** | -8588.88 | -8588.88 | - | NA | NA | NA |
| **JACK6 – Zellers Run near mouth** | | | | | | |
| **Aluminum (lbs/day)** | 4.45 | 2.54 | - | 2.26 | 1.91 | 43% |
| **Iron (lbs/day)** | 2.17 | 7.39 | 0.75 | NA | NA | NA |
| **Manganese(lbs/day)** | 0.42 | 1.15 | 0.38 | NA | NA | NA |
| **Acidity (lbs/day)** | -1359.57 | -1359.57 | - | NA | NA | NA |
| **JACK5 – Jacks Run downstream of Zellers Run** | | | | | | |
| **Aluminum (lbs/day)** | 56.87 | 26.73 | *1.13* | 25.60 | 0* | 0%* |
| **Iron (lbs/day)** | 37.08 | 94.01 | NA | NA | NA | NA |
| **Manganese(lbs/day)** | 13.14 | 39.54 | NA | NA | NA | NA |
| **Acidity (lbs/day)** | -11101.31 | -11101.31 | - | NA | NA | NA |
| **JACK4 – Jacks Run upstream of Slate Creek** | | | | | | |
| **Aluminum (lbs/day)** | 103.88 | 44.67 | *1.13* | 43.54 | 29.07* | 40%* |
| **Iron (lbs/day)** | 1715.67 | 85.78 | *4.50* | 81.28 | 1629.89* | 95%* |
| **Manganese(lbs/day)** | 97.62 | 71.26 | *3.00* | 68.26 | 26.36* | 27%* |
| **Acidity (lbs/day)** | -6809.46 | -6809.46 | - | NA | NA | NA |
| **JACK3 – Unnamed tributary to Jacks Run in South Greensburg** | | | | | | |
| **Aluminum (lbs/day)** | 2.28 | 1.21 | - | 1.21 | 1.07 | 47% |
| **Iron (lbs/day)** | 1.71 | 3.20 | NA | NA | NA | NA |
| **Manganese(lbs/day)** | 2.08 | 1.27 | - | 1.27 | 0.81 | 39% |
| **Acidity (lbs/day)** | -211.07 | -211.07 | - | NA | NA | NA |

# DRAFT

| Parameter | Existing Load (lbs/day) | TMDL Allowable Load (lbs/day) | WLA (lbs/day) | LA (lbs/day) | NPS Load Reduction (lbs/day) | NPS % Reduction |
|---|---|---|---|---|---|---|
| **JACK2 – Jacks Run in Youngwood** | | | | | | |
| **Aluminum (lbs/day)** | 153.08 | 64.29 | *1.13* | 63.16 | 28.51* | 31%* |
| **Iron (lbs/day)** | 811.75 | 259.76 | *4.50* | 255.26 | 0* | 0%* |
| **Manganese(lbs/day)** | 96.67 | 168.51 | NA | NA | NA | NA |
| **Acidity (lbs/day)** | -14214.01 | -14214.01 | - | NA | NA | NA |
| **JACK1 – Jacks Run at mouth** | | | | | | |
| **Aluminum (lbs/day)** | 107.27 | 59.00 | *1.13* | 57.87 | 0* | 0%* |
| **Iron (lbs/day)** | 320.49 | 185.89 | *4.50* | 181.39 | 0* | 0%* |
| **Manganese(lbs/day)** | 78.06 | 142.03 | NA | NA | NA | NA |
| **Acidity (lbs/day)** | -15394.56 | -15394.56 | - | NA | NA | NA |
| **SC3 – Sewickley Creek downstream of Jacks Run** | | | | | | |
| **Aluminum (lbs/day)** | 317.07 | 155.36 | *1.13* | 154.23 | 113.44 | 43% |
| **Iron (lbs/day)** | 255.73 | 706.34 | NA | NA | NA | NA |
| **Manganese(lbs/day)** | 57.71 | 214.43 | NA | NA | NA | NA |
| **Acidity (lbs/day)** | -74418.25 | -74418.25 | - | NA | NA | NA |
| **BUFF10** | | | | | | |
| **Aluminum (lbs/day)** | 133.55 | 5.34 | *0.56* | 4.78 | 128.16 | 96% |
| **Iron (lbs/day)** | 93.89 | 8.45 | *2.26* | 6.19 | 85.44 | 91% |
| **Manganese(lbs/day)** | 18.71 | 8.42 | *1.50* | 6.92 | 10.29 | 55% |
| **Acidity (lbs/day)** | 1276.84 | 6.38 | - | 6.38 | 1270.46 | 99.5% |
| **BUFF9** | | | | | | |
| **Aluminum (lbs/day)** | 71.98 | 0.72 | - | 0.72 | 71.26 | 99% |
| **Iron (lbs/day)** | 17.49 | 1.40 | - | 1.40 | 16.09 | 92% |
| **Manganese(lbs/day)** | 27.26 | 0.82 | - | 0.82 | 26.44 | 97% |
| **Acidity (lbs/day)** | -625.27 | -625.27 | - | NA | NA | NA |
| **BUFF8** | | | | | | |
| **Aluminum (lbs/day)** | 7.13 | 5.99 | *0.28* | 5.71 | 1.14 | 16% |
| **Iron (lbs/day)** | 14.17 | 13.32 | *1.13* | 12.19 | 0.85 | 6% |
| **Manganese(lbs/day)** | 2.95 | 6.10 | *0.75* | NA | NA | NA |
| **Acidity (lbs/day)** | -1693.56 | -1693.56 | - | NA | NA | NA |
| **BUFF7** | | | | | | |
| **Aluminum (lbs/day)** | 142.48 | 7.12 | *0.56* | 6.56 | 0* | 0%* |
| **Iron (lbs/day)** | 65.08 | 12.36 | *2.26* | 10.10 | 0* | 0%* |
| **Manganese(lbs/day)** | 27.61 | 12.97 | *1.50* | 11.82 | 0* | 0%* |
| **Acidity (lbs/day)** | 717.37 | 78.91 | - | 78.91 | 0* | 0%* |
| **BUFF6** | | | | | | |
| **Aluminum (lbs/day)** | 116.44 | 13.97 | *1.13* | 12.84 | 0* | 0%* |
| **Iron (lbs/day)** | 67.43 | 24.95 | *4.50* | 20.45 | 0* | 0%* |
| **Manganese(lbs/day)** | 38.85 | 24.48 | *3.00* | 21.48 | 0* | 0%* |
| **Acidity (lbs/day)** | -933.00 | -933.00 | - | NA | NA | NA |
| **BUFF3** | | | | | | |
| **Aluminum (lbs/day)** | 43.95 | 2.20 | *0.28* | 1.92 | 41.75 | 95% |
| **Iron (lbs/day)** | 10.27 | 5.34 | *1.13* | 4.21 | 4.93 | 48% |

| Parameter | Existing Load (lbs/day) | TMDL Allowable Load (lbs/day) | WLA (lbs/day) | LA (lbs/day) | NPS Load Reduction (lbs/day) | NPS % Reduction |
|---|---|---|---|---|---|---|
| **Manganese(lbs/day)** | 24.48 | 3.52 | *0.75* | 2.77 | 19.96 | 85% |
| **Acidity (lbs/day)** | 459.87 | 32.19 | - | NA | NA | NA |
| **BUFF2** | | | | | | |
| **Aluminum (lbs/day)** | 65.19 | 13.04 | *1.13* | 11.91 | 0* | 0%* |
| **Iron (lbs/day)** | 704.88 | 35.24 | *4.50* | 30.74 | 627.16* | 95%* |
| **Manganese(lbs/day)** | 58.49 | 26.90 | *3.00* | 23.90 | 17.22* | 39%* |
| **Acidity (lbs/day)** | -249.73 | -249.73 | - | NA | NA | NA |
| **BUFF1** | | | | | | |
| **Aluminum (lbs/day)** | 70.62 | 19.77 | *1.13* | 18.64 | 0* | 0%* |
| **Iron (lbs/day)** | 626.29 | 50.10 | *4.50* | 45.60 | 0* | 0%* |
| **Manganese(lbs/day)** | 72.88 | 33.52 | *3.00* | 30.52 | 0* | 0%* |
| **Acidity (lbs/day)** | -856.52 | -856.52 | - | NA | NA | NA |
| **SC2 – Sewickley Creek downstream of Buffalo Run** | | | | | | |
| **Aluminum (lbs/day)** | 639.93 | 364.76 | 6.26 (*1.13*) | 357.37 | 62.61* | 15%* |
| **Iron (lbs/day)** | 1370.64 | 712.73 | 29.19 (*4.50*) | 679.04 | 72.72* | 10%* |
| **Manganese(lbs/day)** | 393.28 | 543.34 | 16.68 (NA) | NA | NA | NA |
| **Acidity (lbs/day)** | -74055.30 | -74055.30 | - | NA | NA | NA |
| **SC1 – Sewickley Creek at confluence with Youghigheny River** | | | | | | |
| **Aluminum (lbs/day)** | 643.49 | 456.88 | 2.62 (*1.13*) | 453.13 | 0* | 0%* |
| **Iron (lbs/day)** | 1669.61 | 500.88 | 9.30 (*4.50*) | 487.08 | 510.82* | 49%* |
| **Manganese(lbs/day)** | 576.83 | 927.56 | 0.75 (*3.00*) | NA | NA | NA |
| **Acidity (lbs/day)** | -125285.00 | -125285.00 | - | NA | NA | NA |

NA = not applicable ND = not detected
* Takes into account load reductions from upstream sources.
*Waste loads in italics are reserved for future mining operations.*

## Recommendations

There is an active watershed group in the Sewickley Creek Watershed. They have implemented many projects to remediate AMD pollution to Sewickley Creek. These projects and more information on the Sewickley Creek Watershed Association can be found on the organization website at www.sewickleycreek.com. It is recommended that agencies work with these local stakeholder groups to implement best management practices to achieve the reductions called for in this TMDL.

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 Sewickley Creek Basin Commission into the Upper West Branch Sewickley Creek), and the Wadesville Deep Mine Pool (Excelon Generation in Schuylkill County).

Candidate or federally-listed threatened and endangered species may occur in or near the watershed. While implementation of the TMDL should result in improvements to water quality, they could inadvertently destroy habitat for candidate or federally-listed species. TMDL implementation projects should be screened through the Pennsylvania Natural Diversity

Inventory (PNDI) early in their planning process, in accordance with the Department's policy titled Policy for Pennsylvania Natural Diversity Inventory (PNDI) Coordination During Permit Review and Evaluation (Document ID# 400-0200-001).

**Public Participation**

Public notice of the draft TMDL was published in the *Pennsylvania Bulletin* on January 3, 2009 to foster public comment on the allowable loads calculated. The public comment period on this TMDL was open from January 3, 2009 to February 4, 2009. A public meeting was held on January 22, 2009 at the Greensburg District Mining Office 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**

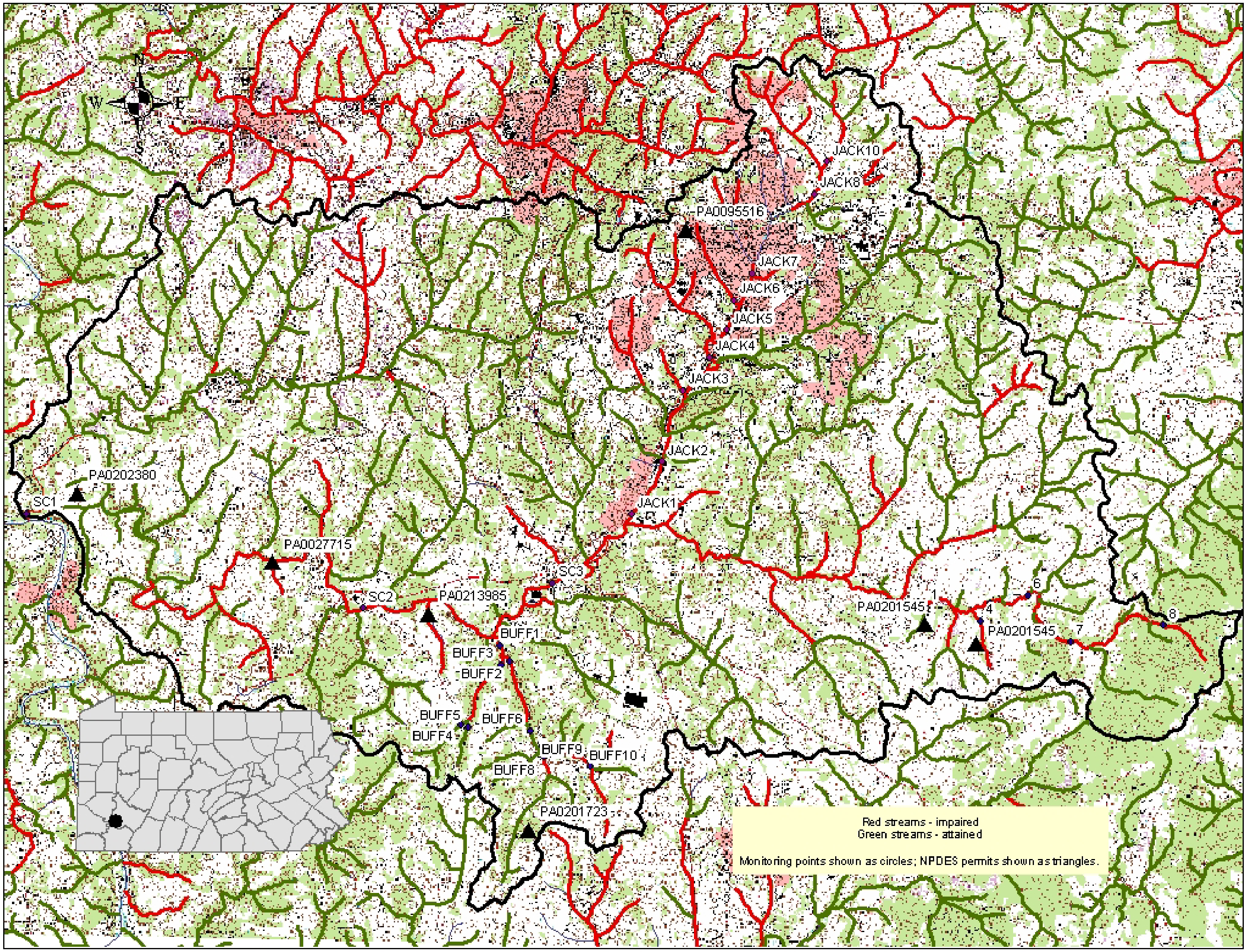
- Total loading shift less than or equal to 1% of the total load.
- Increase of WLA results in greater LA reductions provided reasonable assurance of implementation is demonstrated (a compliance/implementation plan and schedule).

- 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.

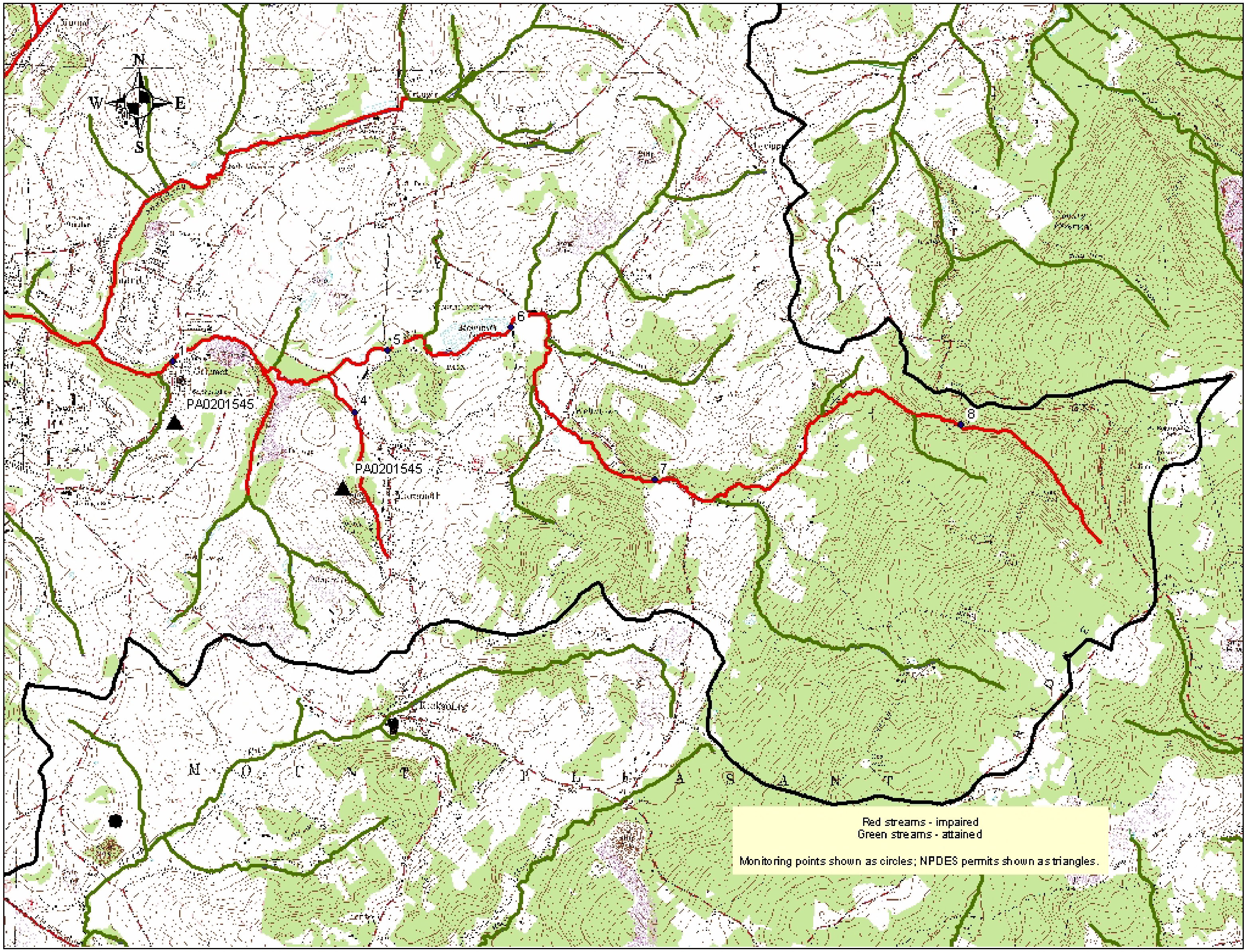
# Attachment A

## Sewickley Creek Watershed Maps

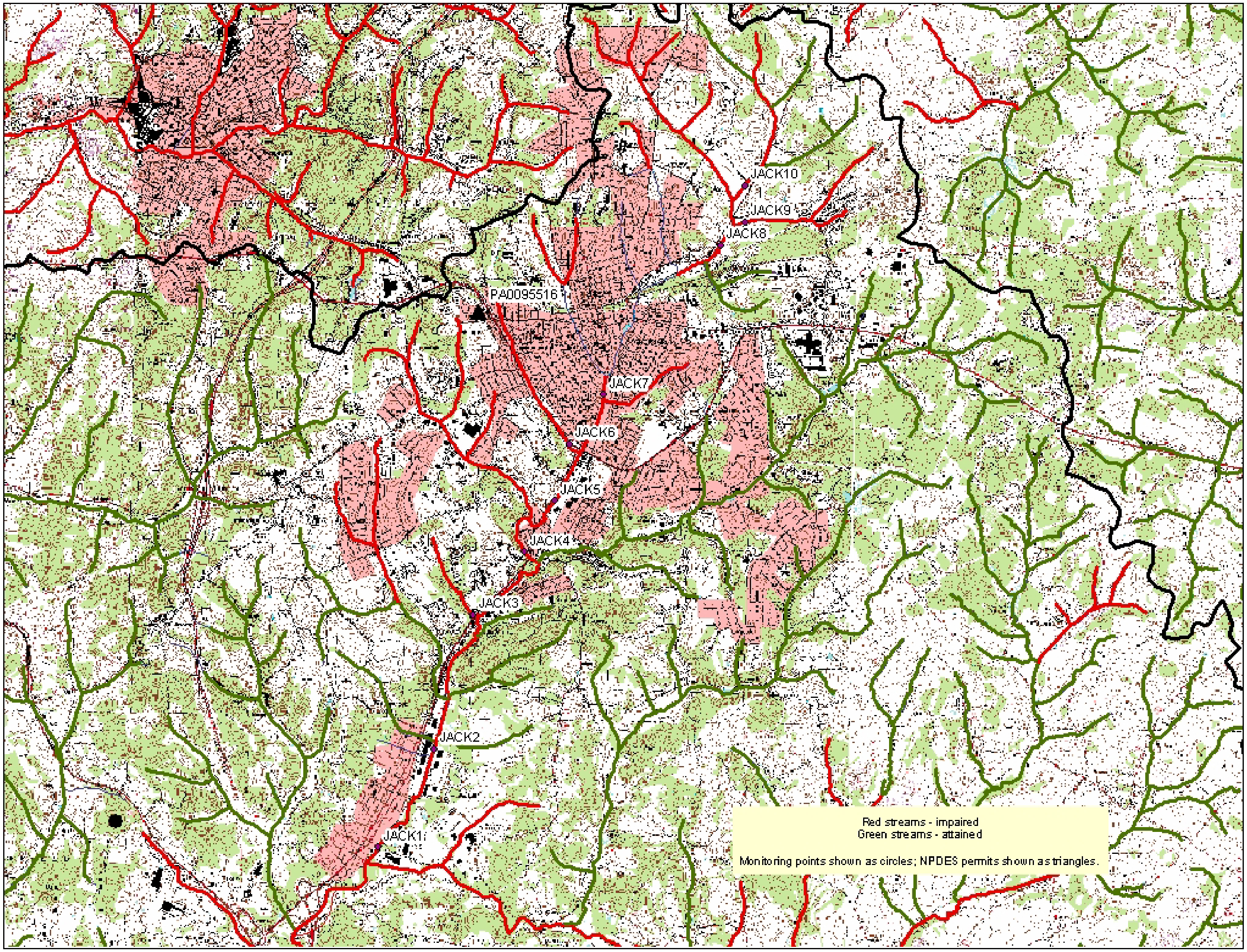
# DRAFT


N
W
E
S
JACK10
JACK8
PA0095516
JACK7
JACK6
JACK5
JACK4
JACK3
JACK2
JACK1
PA0202380
SC1
PA0027715
SC3
SC2
PA0213985
BUFF1
BUFF3
BUFF2
BUFF5
BUFF4
BUFF6
BUFF9
BUFF10
BUFF8
PA0201723
PA0201545
PA0201545
1
4
6
7
8
Red streams - impaired
Green streams - attained
Monitoring points shown as circles; NPDES permits shown as triangles.

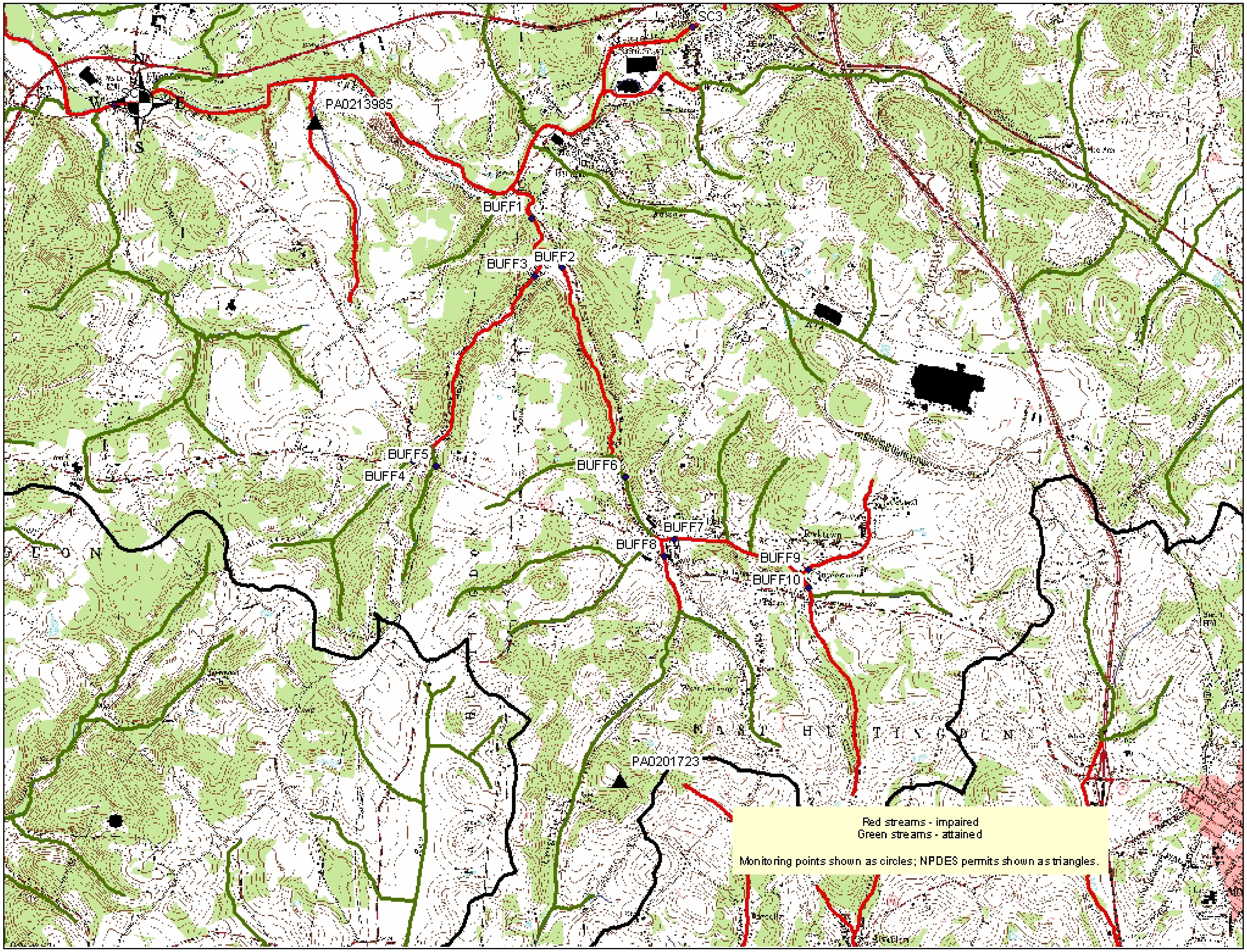
# DRAFT


N
S
W
E
PA0201545
PA0201545
1
4
5
6
7
8
Red streams - impaired
Green streams - attained
Monitoring points shown as circles; NPDES permits shown as triangles.

# DRAFT


JACK10
JACK9
JACK8
PA0095516
JACK7
JACK6
JACK5
JACK4
JACK3
JACK2
JACK1
Red streams - impaired
Green streams - attained
Monitoring points shown as circles; NPDES permits shown as triangles.

DRAFT


SC3
PA0213985
BUFF1
BUFF2
BUFF3
BUFF5
BUFF4
BUFF6
BUFF7
BUFF8
BUFF9
BUFF10
PA0201723
Red streams - impaired
Green streams - attained
Monitoring points shown as circles; NPDES permits shown as triangles.

# Attachment B

## Glade Run Integrated List Category 5 Report

| Stream Name / Use Designation (Assessment ID) / Source | Cause | Date Listed | TMDL Date |
|---|---|---|---|
| **Buffalo Run (Unt 37673)** HUC: 05020006 | | | |
| Aquatic Life (14058) - 0.82 miles; 1 Segment(s)* | | | |
| Urban Runoff/Storm Sewers | Siltation | 2008 | 2021 |
| **Coal Tar Run** HUC: 05020006 | | | |
| Aquatic Life (6508) - 0.71 miles; 1 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 2006 | 2019 |
| Urban Runoff/Storm Sewers | Cause Unknown | 2006 | 2019 |
| **Coal Tar Run (Unt 37735)** HUC: 05020006 | | | |
| Aquatic Life (6519) - 0.63 miles; 1 Segment(s)* | | | |
| Road Runoff | Cause Unknown | 2006 | 2019 |
| **Hunters Run** HUC: 05020006 | | | |
| Aquatic Life (6080) - 0.23 miles; 1 Segment(s)* | | | |
| Abandoned Mine Drainage | Siltation | 2006 | 2019 |
| On site Wastewater | Organic Enrichment/Low D.O. | 2006 | 2019 |
| Aquatic Life (6202) - 0.89 miles; 1 Segment(s)* | | | |
| Abandoned Mine Drainage | Siltation | 2006 | 2019 |
| On site Wastewater | Organic Enrichment/Low D.O. | 2006 | 2019 |
| Aquatic Life (6204) - 0.59 miles; 1 Segment(s)* | | | |
| Abandoned Mine Drainage | Siltation | 2006 | 2019 |
| On site Wastewater | Organic Enrichment/Low D.O. | 2006 | 2019 |
| **Hunters Run (Unt 37630)** HUC: 05020006 | | | |
| Aquatic Life (6203) - 0.62 miles; 1 Segment(s)* | | | |
| Abandoned Mine Drainage | Siltation | 2006 | 2019 |
| On site Wastewater | Organic Enrichment/Low D.O. | 2006 | 2019 |
| **Jacks Run** HUC: 05020006 | | | |
| Aquatic Life (7455) - 8.51 miles; 20 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 1996 | 2009 |
| Abandoned Mine Drainage | Salinity/TDS/Chlorides | 1996 | 2009 |
| **Jacks Run (Unt 37706)** HUC: 05020006 | | | |
| Aquatic Life (6431) - 0.56 miles; 1 Segment(s)* | | | |
| Road Runoff | Siltation | 2006 | 2019 |
| Small Residential Runoff | Siltation | 2006 | 2019 |

*Segments are defined as individual COM IDs.

DRAFT

| Stream Name<br>Use Designation (Assessment ID)<br>Source | Cause | Date Listed | TMDL Date |
|---|---|---|---|
| **Jacks Run (Unt 37706)**<br>HUC: 05020006 | | | |
| Aquatic Life (6433) - 0.78 miles; 1 Segment(s)* | | | |
| Small Residential Runoff | Siltation | 2006 | 2019 |
| Aquatic Life (6436) - 1.02 miles; 1 Segment(s)* | | | |
| Road Runoff | Siltation | 2006 | 2019 |
| Small Residential Runoff | Siltation | 2006 | 2019 |
| **Jacks Run (Unt 37713)**<br>HUC: 05020006 | | | |
| Aquatic Life (6438) - 0.88 miles; 1 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 2006 | 2019 |
| **Jacks Run (Unt 37728)**<br>HUC: 05020006 | | | |
| Aquatic Life (6499) - 0.89 miles; 1 Segment(s)* | | | |
| Small Residential Runoff | Siltation | 2006 | 2019 |
| Aquatic Life (6501) - 2.31 miles; 5 Segment(s)* | | | |
| Removal of Vegetation | Siltation | 2006 | 2019 |
| Small Residential Runoff | Siltation | 2006 | 2019 |
| **Jacks Run (Unt 37730)**<br>HUC: 05020006 | | | |
| Aquatic Life (6501) - 1.04 miles; 1 Segment(s)* | | | |
| Removal of Vegetation | Siltation | 2006 | 2019 |
| Small Residential Runoff | Siltation | 2006 | 2019 |
| **Jacks Run (Unt 37731)**<br>HUC: 05020006 | | | |
| Aquatic Life (6501) - 0.41 miles; 1 Segment(s)* | | | |
| Removal of Vegetation | Siltation | 2006 | 2019 |
| Small Residential Runoff | Siltation | 2006 | 2019 |
| **Jacks Run (Unt 37733)**<br>HUC: 05020006 | | | |
| Aquatic Life (6526) - 0.93 miles; 1 Segment(s)* | | | |
| Urban Runoff/Storm Sewers | Siltation | 2006 | 2019 |
| **Jacks Run (Unt 37741)**<br>HUC: 05020006 | | | |
| Aquatic Life (6531) - 1.64 miles; 3 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 2006 | 2019 |
| **Jacks Run (Unt 37742)**<br>HUC: 05020006 | | | |

*Segments are defined as individual COM IDs.

DRAFT

| Stream Name<br>Use Designation (Assessment ID)<br>Source | Cause | Date Listed | TMDL Date |
|---|---|---|---|
| **Jacks Run (Unt 37742)**<br>HUC: 05020006 | | | |
| Aquatic Life (6531) - 0.40 miles; 1 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 2006 | 2019 |
| **Kelly Run**<br>HUC: 05020006 | | | |
| Aquatic Life (14096) - 2.85 miles; 2 Segment(s)* | | | |
| Agriculture | Siltation | 2007 | 2020 |
| **Kelly Run (Unt 37621)**<br>HUC: 05020006 | | | |
| Aquatic Life (14096) - 0.95 miles; 3 Segment(s)* | | | |
| Agriculture | Siltation | 2007 | 2020 |
| **Little Sewickley Creek**<br>HUC: 05020006 | | | |
| Aquatic Life (14090) - 0.22 miles; 1 Segment(s)* | | | |
| Road Runoff | Siltation | 2007 | 2020 |
| **Little Sewickley Creek (Unt 37569)**<br>HUC: 05020006 | | | |
| Aquatic Life (5627) - 0.26 miles; 1 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 2004 | 2017 |
| **Little Sewickley Creek (Unt 37589)**<br>HUC: 05020006 | | | |
| Aquatic Life (5636) - 1.56 miles; 1 Segment(s)* | | | |
| Grazing Related Agric | Siltation | 2004 | 2017 |
| Aquatic Life (5686) - 1.31 miles; 3 Segment(s)* | | | |
| Habitat Modification | Siltation | 2004 | 2017 |
| **Little Sewickley Creek (Unt 37590)**<br>HUC: 05020006 | | | |
| Aquatic Life (13717) - 0.65 miles; 1 Segment(s)* | | | |
| Grazing Related Agric | Siltation | 2006 | 2019 |
| **Little Sewickley Creek (Unt 37591)**<br>HUC: 05020006 | | | |
| Aquatic Life (13717) - 0.79 miles; 1 Segment(s)* | | | |
| Grazing Related Agric | Siltation | 2006 | 2019 |
| **Little Sewickley Creek (Unt 37592)**<br>HUC: 05020006 | | | |
| Aquatic Life (6318) - 0.63 miles; 3 Segment(s)* | | | |

*Segments are defined as individual COM IDs.

| Stream Name / Use Designation (Assessment ID) / Source | Cause | Date Listed | TMDL Date |
|---|---|---|---|
| **Little Sewickley Creek (Unt 37592)** | | | |
| HUC: 05020006 | | | |
| Aquatic Life (6318) - 0.63 miles; 3 Segment(s)* | | | |
| Road Runoff | Siltation | 2006 | 2019 |
| **Little Sewickley Creek (Unt 37593)** | | | |
| HUC: 05020006 | | | |
| Aquatic Life (5643) - 0.27 miles; 1 Segment(s)* | | | |
| On site Wastewater | Organic Enrichment/Low D.O. | 2004 | 2017 |
| **Little Sewickley Creek (Unt 37597)** | | | |
| HUC: 05020006 | | | |
| Aquatic Life (14090) - 1.04 miles; 4 Segment(s)* | | | |
| Road Runoff | Siltation | 2007 | 2020 |
| **Sewickley Creek** | | | |
| HUC: 05020006 | | | |
| Aquatic Life (6682) - 4.52 miles; 8 Segment(s)* | | | |
| Abandoned Mine Drainage | pH | 2002 | 2015 |
| Agriculture | Siltation | 2006 | 2019 |
| Aquatic Life (7592) - 0.07 miles; 1 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 1996 | 2009 |
| Aquatic Life (10053) - 16.87 miles; 25 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 1996 | 2009 |
| Abandoned Mine Drainage | pH | 2002 | 2015 |
| **Sewickley Creek (Unt 37635)** | | | |
| HUC: 05020006 | | | |
| Aquatic Life (6261) - 0.58 miles; 2 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 2006 | 2019 |
| Abandoned Mine Drainage | pH | 2006 | 2019 |
| Aquatic Life (6271) - 1.12 miles; 2 Segment(s)* | | | |
| Removal of Vegetation | Siltation | 2006 | 2019 |
| **Sewickley Creek (Unt 37648)** | | | |
| HUC: 05020006 | | | |
| Aquatic Life (14043) - 3.36 miles; 5 Segment(s)* | | | |
| Road Runoff | Siltation | 2007 | 2020 |
| **Sewickley Creek (Unt 37655)** | | | |
| HUC: 05020006 | | | |
| Aquatic Life (14043) - 1.02 miles; 2 Segment(s)* | | | |
| Road Runoff | Siltation | 2007 | 2020 |

*Segments are defined as individual COM IDs.

| Stream Name / Use Designation (Assessment ID) / Source | Cause | Date Listed | TMDL Date |
|---|---|---|---|
| **Sewickley Creek (Unt 37656)** HUC: 05020006 | | | |
| Aquatic Life (14043) - 0.47 miles; 1 Segment(s)* | | | |
| Road Runoff | Siltation | 2007 | 2020 |
| **Sewickley Creek (Unt 37657)** HUC: 05020006 | | | |
| Aquatic Life (14043) - 1.16 miles; 4 Segment(s)* | | | |
| Road Runoff | Siltation | 2007 | 2020 |
| **Sewickley Creek (Unt 37658)** HUC: 05020006 | | | |
| Aquatic Life (14043) - 0.11 miles; 1 Segment(s)* | | | |
| Road Runoff | Siltation | 2007 | 2020 |
| **Sewickley Creek (Unt 37660)** HUC: 05020006 | | | |
| Aquatic Life (6240) - 1.38 miles; 1 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 2006 | 2019 |
| **Sewickley Creek (Unt 37691)** HUC: 05020006 | | | |
| Aquatic Life (6427) - 1.58 miles; 2 Segment(s)* | | | |
| Road Runoff | Nutrients | 2006 | 2019 |
| **Sewickley Creek (Unt 37751)** HUC: 05020006 | | | |
| Aquatic Life (6562) - 1.17 miles; 2 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 2006 | 2019 |
| **Sewickley Creek (Unt 37768)** HUC: 05020006 | | | |
| Aquatic Life (6569) - 0.91 miles; 3 Segment(s)* | | | |
| Abandoned Mine Drainage | pH | 2006 | 2019 |
| On site Wastewater | Organic Enrichment/Low D.O. | 2006 | 2019 |
| **Sewickley Creek (Unt 37796)** HUC: 05020006 | | | |
| Aquatic Life (6628) - 1.23 miles; 5 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 2006 | 2019 |
| Abandoned Mine Drainage | Siltation | 2006 | 2019 |
| On site Wastewater | Organic Enrichment/Low D.O. | 2006 | 2019 |
| Aquatic Life (14047) - 0.39 miles; 1 Segment(s)* | | | |
| Erosion from Derelict Land | Siltation | 2007 | 2020 |
| Aquatic Life (14078) - 1.23 miles; 5 Segment(s)* | | | |

*Segments are defined as individual COM IDs.

| Stream Name<br>Use Designation (Assessment ID)<br>Source | Cause | Date Listed | TMDL Date |
|---|---|---|---|
| **Sewickley Creek (Unt 37796)**<br>HUC: 05020006 | | | |
| Aquatic Life (14078) - 1.23 miles; 5 Segment(s)* | | | |
| Erosion from Derelict Land | Siltation | 2007 | 2020 |
| **Sewickley Creek (Unt 37815)**<br>HUC: 05020006 | | | |
| Aquatic Life (6628) - 0.25 miles; 1 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 2006 | 2019 |
| Abandoned Mine Drainage | Siltation | 2006 | 2019 |
| On site Wastewater | Organic Enrichment/Low D.O. | 2006 | 2019 |
| Aquatic Life (14078) - 0.25 miles; 1 Segment(s)* | | | |
| Erosion from Derelict Land | Siltation | 2007 | 2020 |
| **Sewickley Creek (Unt 37816)**<br>HUC: 05020006 | | | |
| Aquatic Life (6628) - 0.40 miles; 3 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 2006 | 2019 |
| Abandoned Mine Drainage | Siltation | 2006 | 2019 |
| On site Wastewater | Organic Enrichment/Low D.O. | 2006 | 2019 |
| Aquatic Life (14078) - 0.40 miles; 3 Segment(s)* | | | |
| Erosion from Derelict Land | Siltation | 2007 | 2020 |
| **Sewickley Creek (Unt 37817)**<br>HUC: 05020006 | | | |
| Aquatic Life (6628) - 0.45 miles; 2 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 2006 | 2019 |
| Abandoned Mine Drainage | Siltation | 2006 | 2019 |
| On site Wastewater | Organic Enrichment/Low D.O. | 2006 | 2019 |
| Aquatic Life (14078) - 0.45 miles; 2 Segment(s)* | | | |
| Erosion from Derelict Land | Siltation | 2007 | 2020 |
| **Welty Run**<br>HUC: 05020006 | | | |
| Aquatic Life (7594) - 7.34 miles; 21 Segment(s)* | | | |
| Abandoned Mine Drainage | pH | 1996 | 2009 |
| **Welty Run (Unt 37777)**<br>HUC: 05020006 | | | |
| Aquatic Life (6649) - 0.70 miles; 1 Segment(s)* | | | |
| Abandoned Mine Drainage | Siltation | 2006 | 2019 |
| **Welty Run (Unt 37783)**<br>HUC: 05020006 | | | |
| Aquatic Life (6650) - 1.06 miles; 1 Segment(s)* | | | |

*Segments are defined as individual COM IDs.

| Stream Name / Use Designation (Assessment ID) / Source | Cause | Date Listed | TMDL Date |
|---|---|---|---|
| **Welty Run (Unt 37783)** HUC: 05020006 | | | |
| Aquatic Life (6650) - 1.06 miles; 1 Segment(s)* | | | |
| Abandoned Mine Drainage | Siltation | 2006 | 2019 |
| **Wilson Run** HUC: 05020006 | | | |
| Aquatic Life (6340) - 0.65 miles; 2 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 2006 | 2019 |
| Aquatic Life (14687) - 4.00 miles; 7 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 2010 | 2023 |
| **Zellers Run** HUC: 05020006 | | | |
| Aquatic Life (6504) - 1.63 miles; 2 Segment(s)* | | | |
| Abandoned Mine Drainage | Metals | 2006 | 2019 |

## Report Summary

### Watershed Summary

| | Stream Miles | Assessment Units | Segments (COMIDs) |
|---|---|---|---|
| Watershed Characteristics | 338.50 | 50 | 766 |

### Impairment Summary

| Source | Cause | Miles | Assessment Units | Segments (COMIDs) |
|---|---|---|---|---|
| Abandoned Mine Drainage | Metals | 50.97 | 19 | 94 |
| Abandoned Mine Drainage | Salinity/TDS/Chlorides | 8.51 | 1 | 20 |
| Abandoned Mine Drainage | Siltation | 6.41 | 7 | 17 |
| Abandoned Mine Drainage | pH | 35.06 | 7 | 68 |
| Agriculture | Siltation | 8.31 | 2 | 13 |
| Erosion from Derelict Land | Siltation | 2.72 | 2 | 12 |
| Grazing Related Agric | Siltation | 3.00 | 2 | 3 |
| Habitat Modification | Siltation | 1.31 | 1 | 3 |
| On site Wastewater | Organic Enrichment/Low D.O. | 7.23 | 9 | 24 |
| Removal of Vegetation | Siltation | 4.88 | 2 | 9 |
| Road Runoff | Cause Unknown | .63 | 1 | 1 |
| Road Runoff | Nutrients | 1.58 | 1 | 2 |
| Road Runoff | Siltation | 9.57 | 5 | 23 |
| Small Residential Runoff | Siltation | 7.01 | 5 | 11 |
| Urban Runoff/Storm Sewers | Cause Unknown | .71 | 1 | 1 |
| Urban Runoff/Storm Sewers | Siltation | 4.94 | 2 | 10 |

*Segments are defined as individual COM IDs.

DRAFT

| Stream Name<br>Use Designation (Assessment ID)<br>Source | Cause | Date Listed | TMDL Date |
|---|---|---|---|
| | **97.78** ** | **50** ** | **189** ** |

**Totals reflect actual miles of impaired stream. Each stream segment may have multiple impairments (different sources or causes contributing to the impairment), so the sum of individual impairment numbers may not add up to the totals shown.

**Use Designation Summary**

| | Miles | Assessment Units | Segments (COMIDs) |
|---|---|---|---|
| Aquatic Life | 103.58 | 50 | 208 |

*Segments are defined as individual COM IDs.

# Attachment C

## 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.*

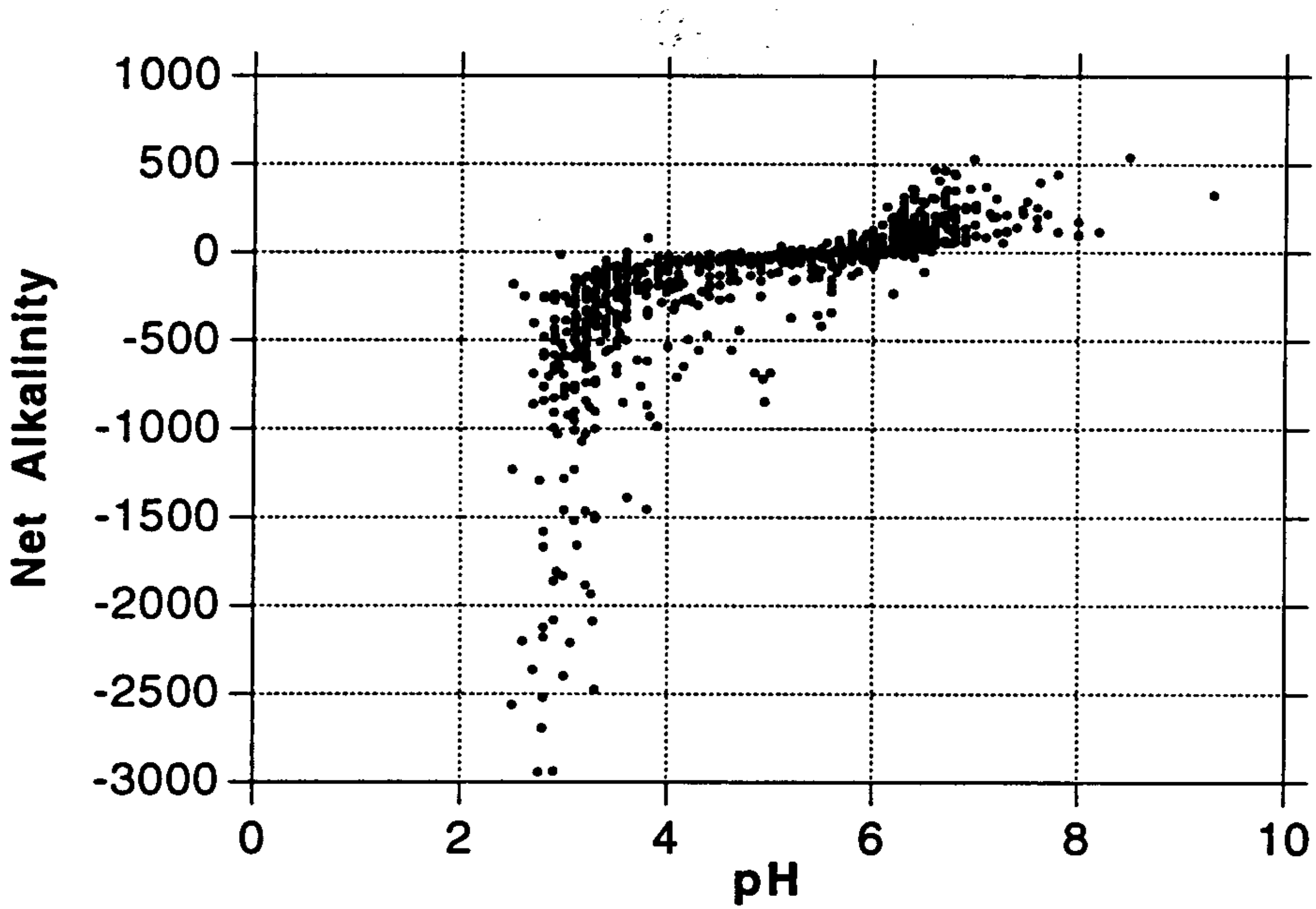



**Figure 1**. Net Alkalinity vs. pH. Taken from Figure 1.2 Graph C, pages 1-5, of Coal Mine Drainage Prediction and Pollution Prevention in Pennsylvania

# Attachment D

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

**Method to Quantify Treatment Pond Pollutant Load**

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

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

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

Total Measured Load = Allowed Load + Reduced Load

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Total Average Flow = Direct Pit Precipitation + Spoil Runoff

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

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

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

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

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

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

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

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

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

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

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

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

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

# Attachment E

## TMDLs By Segment

## Sewickley Creek

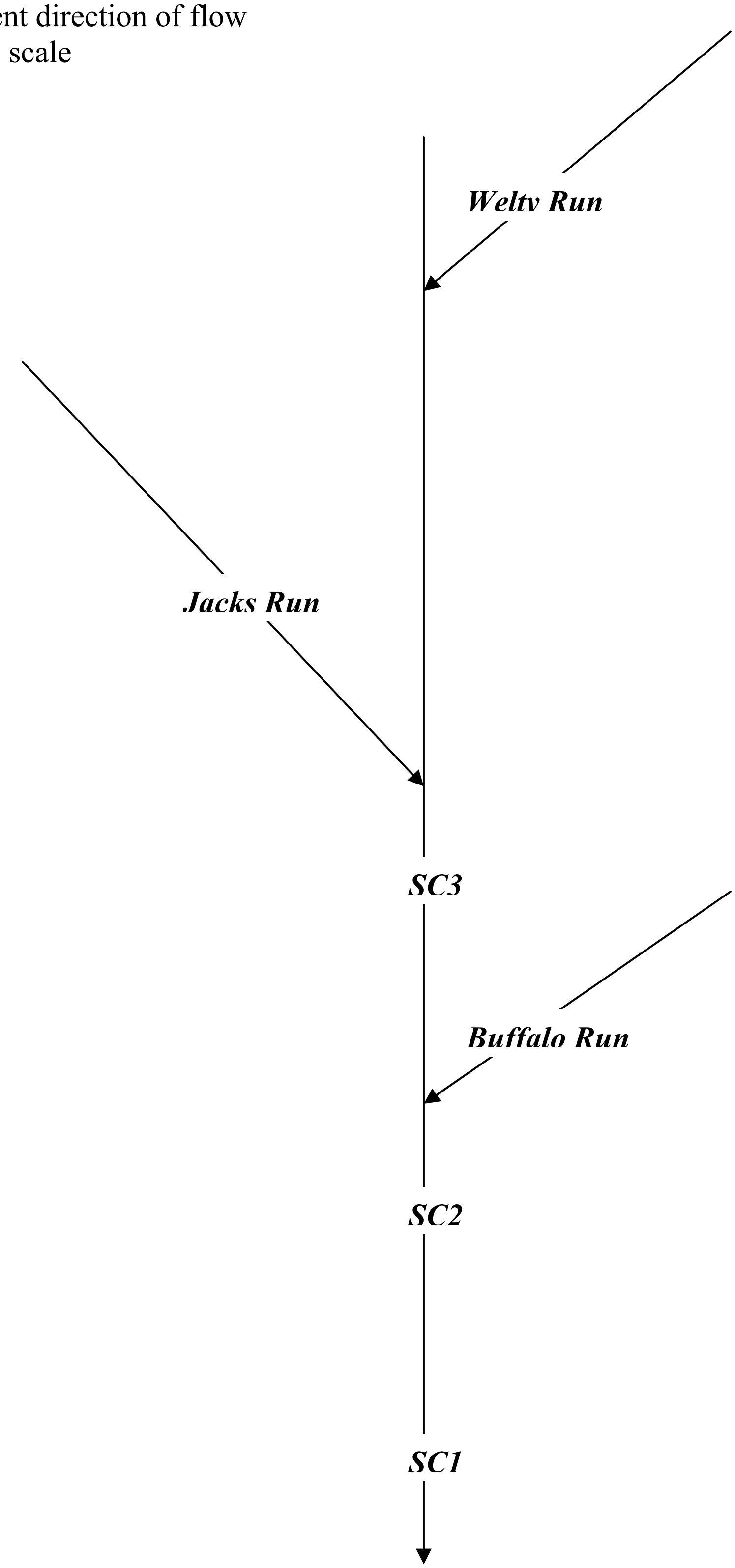
The TMDL for Sewickley Creek consists of load allocations to three sampling sites on the Sewickley Creek (SC1-3), six sites in the Welty Run Watershed (WELTY1, 4-8), eight sites in the Buffalo Run Watershed (BUFF1-3, BUFF6-10), and ten sites in the Jacks Run Watershed (JACK1-10). Sample data sets were collected in 2006 through 2008. All sample points are shown on the maps included in Attachment A as well as on the loading schematic presented on the following page.

Sewickley Creek 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 Sewickley Creek, 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.

DRAFT

**Sewickley Creek Sampling Station Diagram**
Arrows represent direction of flow
Diagram not to scale



*TMDL calculations – WELTY8 - Welty Run near headwaters*

The TMDL for sampling point WELTY8 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 Welty Run was computed using water-quality sample data collected at point WELTY8. The average flow, computed using the US Geological Survey (USGS) program StreamStats at WELTY8 (1.08 MGD), is used for these computations.

Sample data at point WELTY8 shows pH ranging between 6.5 and 7.1; pH will not be addressed because water quality standards area being met. Table E1 shows the measured and allowable concentrations and loads at WELTY8. Table E2 shows the load reductions necessary to meet water quality standards at WELTY8.

| Table E1 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.39 | 3.47 | 0.17 | 1.56 |
| | Iron | 0.15 | 1.35 | 0.78 | 7.02 |
| | Manganese | 0.03 | 0.23 | 0.08 | 0.72 |
| | Acidity | -8.27 | -74.41 | -8.27 | -74.41 |
| | Alkalinity | 22.77 | 204.94 | | |

| Table E2. Allocations WELTY8 | |
|---|---|
| WELTY8 | Al (Lbs/day) |
| Existing Load @ WELTY8 | 3.47 |
| Allowable Load @ WELTY8 | 1.56 |
| Load Reduction @ WELTY8 | 1.91 |
| % Reduction required @ WELTY8 | 55% |

A waste load allocation for future discharges was included at WELTY7 allowing for additional facilities to be permitted in the future on this segment.

| Table E3. Waste load allocations for future discharges | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Al | 0.75 | 0.180 | 1.13 |
| Fe | 3.0 | 0.180 | 4.50 |
| Mn | 2.0 | 0.180 | 3.00 |

*TMDL calculations – WELTY7 – Welty Run half mile east of Weltytown*

The TMDL for sampling point WELTY7 consists of a load allocation to all of the area between points WELTY8 and WELTY7 shown in Attachment A. The load allocation for this segment of

Welty Run was computed using water-quality sample data collected at point WELTY7. The average flow, computed using the USGS StreamStats program at WELTY7 (5.58 MGD), is used for these computations.

Sample data at point WELTY7 shows pH ranging between 6.5 and 7.4; pH will not be addressed because water quality standards are being met. Table E4 shows the measured and allowable concentrations and loads at WELTY7. Table E5 shows the load reductions necessary to meet water quality standards at WELTY7.

| Table E4 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.32 | 14.98 | 0.26 | 11.98 |
| | Iron | 0.25 | 11.68 | 1.21 | 56.29 |
| | Manganese | 0.07 | 3.22 | 0.26 | 12.09 |
| | Acidity | -37.03 | -1143.39 | -37.03 | -1143.39 |
| | Alkalinity | 50.90 | 1571.52 | | |

The measured and allowable loading for point WELTY7 for aluminum 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 WELTY7 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points WELTY8 and WELTY7 to determine a total load tracked for the segment of stream between WELTY7 and WELTY8. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at WELTY7.

| Table DE5. Allocations WELTY7 | |
|---|---|
| WELTY7 | Al (Lbs/day) |
| Existing Load @ WELTY7 | 14.98 |
| Difference in measured loads between the loads that enter and existing WELTY7 | 11.51 |
| Additional load tracked from above samples | 1.56 |
| Total load tracked between WELTY8 and WELTY7 | 13.07 |
| Allowable Load @ WELTY7 | 11.98 |
| Load Reduction @ WELTY7 | 1.09 |
| % Reduction required @ WELTY7 | 9% |

*TMDL calculations – WELTY6 – Welty Run upstream of Mammoth Lake*

The TMDL for sampling point WELTY6 consists of a load allocation to all of the area between points WELTY7 and WELTY6 shown in Attachment A. The load allocation for this segment of Welty Run was computed using water-quality sample data collected at point WELTY6. The average flow, computed using the USGS StreamStats program at WELTY6 (8.73 MGD), is used for these computations.

Sample data at point WELTY6 shows pH ranging between 6.9 and 7.5; pH will not be addressed because water quality standards are being met. Table E6 shows the measured and allowable concentrations and loads at WELTY6.

| Table E6 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.25 | 18.19 | 0.47 | 34.20 |
| | Iron | 0.15 | 10.92 | 0.78 | 56.76 |
| | Manganese | 0.04 | 2.67 | 0.10 | 7.28 |
| | Acidity | -53.83 | -3917.39 | -53.83 | -3917.39 |
| | Alkalinity | 70.07 | 5098.67 | | |

*TMDL calculations – WELTY5 – Welty Run ½ mile downstream of Mammoth Lake*

The TMDL for sampling point WELTY5 consists of a load allocation to all of the area between points WELTY6 and WELTY5 shown in Attachment A. The load allocation for this segment of Welty Run was computed using water-quality sample data collected at point WELTY5. The average flow, computed using the USGS StreamStats program at WELTY5 (9.24 MGD), is used for these computations.

Sample data at point WELTY5 shows pH ranging between 7.0 and 8.2; pH will not be addressed because water quality standards are being met. Table E7 shows the measured and allowable concentrations and loads at WELTY5.

| Table E7 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.25 | 19.27 | 0.47 | 36.23 |
| | Iron | 0.15 | 11.56 | 0.78 | 60.12 |
| | Manganese | 0.09 | 6.94 | 0.41 | 31.60 |
| | Acidity | -22.75 | -1753.59 | -22.75 | -1753.59 |
| | Alkalinity | 40.40 | 3114.07 | | |

*Waste Load Allocation – Albert F. Stiffler Klaka Strip*

Albert F. Stiffler (SMP65920104; NPDES PA0201545) Klaka Strip has a discharge from one mine drainage treatment facility. Treatment Pond 001 is a discharge from a treatment facility that discharges into an unnamed tributary to Welty Run. The following table shows the waste load allocation for this discharge.

| Table E8. Waste Load Allocations at Klaka Strip | | | |
|---|---|---|---|
| Parameter | Monthly Avg. Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| 001 | | | |
| Al | 3.0 | 0.045 | 1.13 |
| Fe | 3.0 | 0.045 | 1.13 |
| Mn | 2.0 | 0.045 | 0.75 |

*TMDL calculations- WELTY4 – Unnamed tributary to Welty Run ½ mile northeast of village of Mammoth*

The TMDL for sample point WELTY4 consists of a load allocation to all of the area upstream of WELTY4 shown in Attachment A. The load allocation for the unnamed tributary to Welty Run was computed using water-quality sample data collected at point WELTY4. The average flow, computed using the USGS StreamStats program at WELTY4 (0.55 MGD), is used for these computations.

Sample data at point WELTY4 shows that this segment has a pH ranging between 7.0 and 8.0; pH will not be addressed because water quality standards are being met. Table E9 shows the measured and allowable concentrations and loads at WELTY4.

| Table E9 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.25 | 1.15 | 0.47 | 2.15 |
| | Iron | 0.15 | 0.69 | 0.78 | 3.57 |
| | Manganese | 0.20 | 0.91 | 0.87 | 3.99 |
| | Acidity | -143.13 | -655.80 | -143.13 | -655.80 |
| | Alkalinity | 164.37 | 753.09 | | |

*Waste Load Allocation – Albert F. Stiffler Klaka Strip*

Albert F. Stiffler (SMP65920104; NPDES PA0201545) Klaka Strip has a discharge from one mine drainage treatment facility. Treatment Pond 002 is a discharge from a treatment facility that discharges into an unnamed tributary to Welty Run. The following table shows the waste load allocation for this discharge.

| Table E10. Waste Load Allocations at Klaka Strip | | | |
|---|---|---|---|
| Parameter | Monthly Avg. Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| 002 | | | |
| Al | 3.0 | 0.045 | 1.13 |
| Fe | 3.0 | 0.045 | 1.13 |
| Mn | 2.0 | 0.045 | 0.75 |

*TMDL calculations – WELTY1 – Welty Run at bridge in Calumet*

The TMDL for sampling point WELTY1 consists of a load allocation to all of the area between points WELTY5 and WELTY1 shown in Attachment A. The load allocation for this segment of Welty Run was computed using water-quality sample data collected at point WELTY1. The average flow, computed using the USGS StreamStats program at WELTY1 (12.02 MGD), is used for these computations.

Sample data at point WELTY1 shows pH ranging between 7.0 and 7.3; pH will not be addressed because water quality standards area being met. Table E11 shows the measured and allowable concentrations and loads at WELTY1. Table E12 shows the load reductions necessary to meet water quality standards at WELTY1.

| Table E11 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.25 | 25.06 | 0.47 | 47.12 |
| | Iron | 0.48 | 48.06 | 0.42 | 41.81 |
| | Manganese | 0.65 | 65.29 | 0.16 | 16.32 |
| | Acidity | -71.80 | -7198.62 | -71.80 | -7198.62 |
| | Alkalinity | 103.50 | 10376.83 | | |

The measured and allowable loading for point WELTY1 for iron and manganese was computed using water-quality sample data collected at the point. This was based on the sample data for the point and did not account for any loads already specified from upstream sources. The additional load from points WELTY4/WELTY5 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points WELTY4/WELTY5 and WELTY1 to determine a total load tracked for the segment of stream between WELTY1 and WELTY4/WELTY5. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at WELTY1.

| Table E12. Allocations WELTY1 | | |
|---|---|---|
| WELTY1 | Fe (Lbs/day) | Mn (Lbs/day) |
| Existing Load @ WELTY1 | 48.06 | 65.29 |
| Difference in measured loads between the loads that enter and existing WELTY1 | 48.06 | 65.29 |
| Additional load tracked from above samples | 0 | 0 |
| Total load tracked between WELTY4/WELTY5 and WELTY1 | 48.06 | 65.29 |
| Allowable Load @ WELTY1 | 41.81 | 16.32 |
| Load Reduction @ WELTY1 | 6.25 | 48.97 |
| % Reduction required @WELTY1 | 13% | 75% |

A waste load allocation for future mining was included at JACK10 allowing for two operations with two active pits (1500' x 300') to be permitted in the future on this segment.

| Table E13. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.180 | 1.13 |
| Fe | 3.0 | 0.180 | 4.50 |
| Mn | 2.0 | 0.180 | 3.00 |

*TMDL calculations – JACK10 –Unnamed tributary to Jacks Run upstream of Greensburg*

The TMDL for sampling point JACK10 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 Jacks Run was computed using water-quality sample data collected at point JACK10. The average flow, computed using the USGS StreamStats program at JACK10 (1.59 MGD), is used for these computations.

Sample data at point JACK10 shows pH ranging between 8.10 and 8.40; pH will not be addressed because water quality standards are being met. Table E14 shows the measured and allowable concentrations and loads at JACK10. Table E15 shows the load reductions necessary to meet water quality standards at JACK10.

| Table E14 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.60 | 7.90 | 0.29 | 3.87 |
| | Iron | 0.51 | 6.79 | 0.43 | 5.64 |
| | Manganese | 0.08 | 1.03 | 0.20 | 2.65 |
| | Acidity | -217.80 | -2888.05 | -217.80 | -2888.05 |
| | Alkalinity | 231.95 | 3075.68 | | |

| Table E15. Allocations JACK10 | | |
|---|---|---|
| JACK10 | Al (Lbs/day) | Fe (Lbs/day) |
| Existing Load @ JACK10 | 7.90 | 6.79 |
| Allowable Load @ JACK10 | 3.87 | 5.64 |
| Load Reduction @ JACK10 | 4.03 | 1.15 |
| % Reduction required @ JACK10 | 51% | 17% |

A waste load allocation for future mining was included at JACK9 allowing for one operation with one active pit (1500’ x 300’) to be permitted in the future on this segment.

| Table E16. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | 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 |
| Mn | 2.0 | 0.045 | 0.75 |

*TMDL calculations – JACK9 –Unnamed tributary to Jacks Run upstream of Greensburg*

The TMDL for sampling point JACK9 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 Jacks Run was computed using water-quality sample data collected at point JACK9. The average flow, computed using the USGS StreamStats program at JACK9 (1.12 MGD), is used for these computations.

Sample data at point JACK9 shows pH ranging between 4.80 and 7.90; pH will be addressed. Table E17 shows the measured and allowable concentrations and loads at JACK9. Table E18 shows the load reductions necessary to meet water quality standards at JACK9.

| Table E17 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 4.62 | 43.11 | 0.28 | 2.59 |
| | Iron | 5.12 | 47.70 | 0.66 | 6.20 |
| | Manganese | 2.70 | 25.22 | 0.32 | 3.03 |
| | Acidity | -12.10 | -112.83 | -12.10 | -112.83 |
| | Alkalinity | 41.35 | 385.60 | | |

| Table E18. Allocations JACK9 | | | |
|---|---|---|---|
| JACK9 | Al (Lbs/day) | Fe (Lbs/day) | Mn (Lbs/day) |
| Existing Load @ JACK9 | 43.11 | 47.70 | 25.22 |
| Allowable Load @ JACK9 | 2.59 | 6.20 | 3.03 |
| Load Reduction @ JACK9 | 40.52 | 41.50 | 22.19 |
| % Reduction required @ JACK9 | 94% | 87% | 88% |

A waste load allocation for future mining was included at JACK8 allowing for one operation with two active pits (1500' x 300') to be permitted in the future on this segment.

| Table E19. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | 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 | 2.26 |
| Mn | 2.0 | 0.090 | 1.50 |

*TMDL calculations – JACK8 –Jacks Run upstream of Greensburg*

The TMDL for sampling point JACK8 consists of a load allocation to all of the area between points JACK10/9 and JACK8 shown in Attachment A. The load allocation for this segment of Jacks Run was computed using water-quality sample data collected at point JACK8. The average flow, computed using the USGS StreamStats program at JACK8 (4.24 MGD), is used for these computations.

Sample data at point JACK8 shows pH ranging between 7.90 and 8.10; pH will not be addressed because water quality standards are being met. Table E20 shows the measured and allowable concentrations and loads at JACK8. Table E21 shows the load reductions necessary to meet water quality standards at JACK8.

| Table E20 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.84 | 29.60 | 0.22 | 7.70 |
| | Iron | 0.84 | 29.73 | 0.63 | 22.30 |
| | Manganese | 0.77 | 27.29 | 0.29 | 10.10 |
| | Acidity | -156.05 | -5517.97 | -156.05 | -5517.97 |
| | Alkalinity | 143.65 | 5079.50 | | |

The measured and allowable loading for point JACK8 for aluminum, iron and manganese was computed using water-quality sample data collected at the point. This was based on the sample data for the point and did not account for any loads already specified from upstream sources.

The additional load from points JACK10/9 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points JACK10/9 and JACK8 to determine a total load tracked for the segment of stream between JACK8 and JACK10/9. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at JACK8.

| Table E21. Allocations JACK8 | | | |
|---|---|---|---|
| JACK8 | Al (Lbs/day) | Fe (Lbs/day) | Mn (Lbs/day) |
| Existing Load @ JACK8 | 29.60 | 29.73 | 27.29 |
| Difference in measured loads between the loads that enter and existing JACK8 | -21.41 | -24.76 | 2.07 |
| Additional load tracked from above samples | 6.46 | 11.84 | 3.03 |
| Total load tracked between JACK10/9 and JACK8 | 3.75 | 6.39 | 5.10 |
| Allowable Load @ JACK8 | 7.70 | 22.30 | 10.10 |
| Load Reduction @ JACK8 | 0 | 0 | 0 |
| % Reduction required @ JACK8 | 0% | 0% | 0% |

A waste load allocation for future mining was included at JACK7 allowing for two operations with two active pits (1500' x 300') to be permitted in the future on this segment.

| Table E22. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.180 | 1.13 |
| Fe | 3.0 | 0.180 | 4.50 |
| Mn | 2.0 | 0.180 | 3.00 |

*TMDL calculations – JACK7 –Jacks Run downstream of Coal Tar Run*

The TMDL for sampling point JACK7 consists of a load allocation to all of the area between points JACK8 and JACK7 shown in Attachment A. The load allocation for this segment of Jacks Run was computed using water-quality sample data collected at point JACK7. The average flow, computed using the USGS StreamStats program at JACK7 (8.01 MGD), is used for these computations.

Sample data at point JACK7 shows pH ranging between 7.90 and 8.50; pH will not be addressed because water quality standards are being met. Table E23 shows the measured and allowable concentrations and loads at JACK7. Table E24 shows the load reductions necessary to meet water quality standards at JACK7.

| Table E23 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.80 | 53.17 | 0.24 | 15.95 |
| | Iron | 0.63 | 42.24 | 0.36 | 24.08 |
| | Manganese | 0.23 | 15.09 | 0.52 | 34.76 |
| | Acidity | -128.50 | -8588.88 | -128.50 | -8588.88 |
| | Alkalinity | 142.70 | 9538.00 | | |

The measured and allowable loading for point JACK7 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 JACK8 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points JACK8 and JACK7 to determine a total load tracked for the segment of stream between JACK7 and JACK8. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at JACK7.

| Table E24. Allocations JACK7 | | |
|---|---|---|
| JACK7 | Al (Lbs/day) | Fe (Lbs/day) |
| Existing Load @ JACK7 | 53.17 | 42.24 |
| Difference in measured loads between the loads that enter and existing JACK7 | 23.57 | 12.51 |
| Additional load tracked from above samples | 7.70 | 22.30 |
| Total load tracked between JACK8 and JACK7 | 31.27 | 34.81 |
| Allowable Load @ JACK7 | 15.95 | 24.08 |
| Load Reduction @ JACK7 | 15.32 | 10.73 |
| % Reduction required @ JACK7 | 49% | 31% |

*Waste Load Allocation – Culligan Water Conditioning Toll Gate Hill*

Culligan Water Conditioning (NPDES PA0095516) Toll Gate Hill Facility has a discharge from a treatment facility. Outfall 001 is a discharge from a treatment facility that discharges filter backwash water to Zellers Run. There currently is no effluent limit for aluminum from the facility. The following table shows the waste load allocation for this discharge.

| Table E25. Waste Load Allocations at Toll Gate Hill | | | |
|---|---|---|---|
| Parameter | Monthly Avg. Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| 001 | | | |
| Fe | 2.0 | 0.045 | 0.75 |
| Mn | 1.0 | 0.045 | 0.38 |

*TMDL calculations – JACK6 – Zellers Run near mouth*

The TMDL for sampling point JACK6 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 Zellers Run was computed using water-quality sample data collected at point JACK6. The average flow, computed using the USGS StreamStats program at JACK6 (1.15 MGD), is used for these computations.

Sample data at point JACK6 shows pH ranging between 8.10 and 8.40; pH will not be addressed because water quality standards are being met. Table E26 shows the measured and allowable concentrations and loads at JACK6. Table E27 shows the load reductions necessary to meet water quality standards at JACK6.

| Table E26 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.46 | 4.45 | 0.26 | 2.54 |
| | Iron | 0.23 | 2.17 | 0.77 | 7.39 |
| | Manganese | 0.04 | 0.42 | 0.12 | 1.15 |
| | Acidity | -141.70 | -1359.57 | -141.70 | -1359.57 |
| | Alkalinity | 155.55 | 1492.46 | | |

| Table E27. Allocations JACK6 | |
|---|---|
| JACK6 | Al (Lbs/day) |
| Existing Load @ JACK6 | 4.45 |
| Allowable Load @ JACK6 | 2.54 |
| Load Reduction @ JACK6 | 1.91 |
| % Reduction required @ JACK6 | 43% |

A waste load allocation for future mining was included at JACK5 allowing for two operations with two active pits (1500’ x 300’) to be permitted in the future on this segment.

| Table E28. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.180 | 1.13 |
| Fe | 3.0 | 0.180 | 4.50 |
| Mn | 2.0 | 0.180 | 3.00 |

*TMDL calculations – JACK5 – Jacks Run downstream of Zellers Run*

The TMDL for sampling point JACK5 consists of a load allocation to all of the area between points JACK6 and JACK5 shown in Attachment A. The load allocation for this segment of Jacks Run was computed using water-quality sample data collected at point JACK5. The average flow, computed using the USGS StreamStats program at JACK5 (10.53 MGD), is used for these computations.

Sample data at point JACK5 shows pH ranging between 8.00 and 8.50; pH will not be addressed because water quality standards are being met. Table E29 shows the measured and allowable concentrations and loads at JACK5. Table E30 shows the load reductions necessary to meet water quality standards at JACK5.

| Table E29 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.65 | 56.87 | 0.30 | 26.73 |
| | Iron | 0.42 | 37.08 | 1.07 | 94.01 |
| | Manganese | 0.15 | 13.14 | 0.45 | 39.54 |
| | Acidity | -126.35 | -11101.31 | -126.35 | -11101.31 |
| | Alkalinity | 161.80 | 14216.01 | | |

The measured and allowable loading for point JACK5 for aluminum 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 JACK7/6 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points JACK7/6 and JACK5 to determine a total load tracked for the segment of stream between JACK5 and JACK7/6. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at JACK5.

| Table E30. Allocations JACK5 | |
|---|---|
| JACK5 | Al (Lbs/day) |
| Existing Load @ JACK5 | 56.87 |
| Difference in measured loads between the loads that enter and existing JACK5 | -0.75 |
| Additional load tracked from above samples | 18.49 |
| Total load tracked between JACK7/6 and JACK5 | 18.12 |
| Allowable Load @ JACK5 | 26.73 |
| Load Reduction @ JACK5 | 0 |
| % Reduction required @ JACK5 | 0% |

A waste load allocation for future mining was included at JACK4 allowing for two operations with two active pits (1500' x 300') to be permitted in the future on this segment.

| Table E31. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.180 | 1.13 |
| Fe | 3.0 | 0.180 | 4.50 |
| Mn | 2.0 | 0.180 | 3.00 |

*TMDL calculations – JACK4 – Jacks Run upstream of Slate Creek*

The TMDL for sampling point JACK4 consists of a load allocation to all of the area between points JACK5 and JACK4 shown in Attachment A. The load allocation for this segment of Jacks Run was computed using water-quality sample data collected at point JACK4. The average flow, computed using the USGS StreamStats program at JACK4 (12.99 MGD), is used for these computations.

Sample data at point JACK4 shows pH ranging between 6.60 and 6.80; pH will not be addressed because water quality standards are being met. Table E32 shows the measured and allowable concentrations and loads at JACK4. Table E33 shows the load reductions necessary to meet water quality standards at JACK4.

| Table E32 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.96 | 103.88 | 0.41 | 44.67 |
| | Iron | 15.84 | 1715.67 | 0.79 | 85.78 |
| | Manganese | 0.90 | 97.62 | 0.66 | 71.26 |
| | Acidity | -62.85 | -6809.46 | -62.85 | -6809.46 |
| | Alkalinity | 82.00 | 8884.26 | | |

The measured and allowable loading for point JACK4 for aluminum, iron and manganese was computed using water-quality sample data collected at the point. This was based on the sample data for the point and did not account for any loads already specified from upstream sources. The additional load from points JACK5 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points JACK5 and JACK4 to determine a total load tracked for the segment of stream between JACK4 and JACK5. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at JACK4.

| Table E33. Allocations JACK4 | | | |
|---|---|---|---|
| JACK4 | Al (Lbs/day) | Fe (Lbs/day) | Mn (Lbs/day) |
| Existing Load @ JACK4 | 103.88 | 1715.67 | 97.62 |
| Difference in measured loads between the loads that enter and existing JACK4 | 47.01 | 1678.59 | 84.48 |
| Additional load tracked from above samples | 26.73 | 37.08 | 13.14 |
| Total load tracked between JACK5 and JACK4 | 73.74 | 1715.67 | 97.62 |
| Allowable Load @ JACK4 | 44.67 | 85.78 | 71.26 |
| Load Reduction @ JACK4 | 29.07 | 1629.89 | 26.36 |
| % Reduction required @ JACK4 | 40% | 95% | 27% |

*TMDL calculations – JACK3 – Unnamed tributary to Jacks Run at Kings Restaurant*

The TMDL for sampling point JACK3 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 Jacks Run was computed using water-quality sample data collected at point JACK3. The average flow, computed using the USGS StreamStats program at JACK3 (0.45 MGD), is used for these computations.

Sample data at point JACK3 shows pH ranging between 7.50 and 8.00; pH will not be addressed because water quality standards are being met. Table E34 shows the measured and allowable concentrations and loads at JACK3. Table E35 shows the load reductions necessary to meet water quality standards at JACK3.

| Table E34 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.61 | 2.28 | 0.32 | 1.21 |
| | Iron | 0.46 | 1.71 | 0.86 | 3.20 |
| | Manganese | 0.56 | 2.08 | 0.34 | 1.27 |
| | Acidity | -56.75 | -211.07 | -56.75 | -211.07 |
| | Alkalinity | 69.35 | 257.93 | | |

| Table E35. Allocations JACK3 | | |
|---|---|---|
| JACK3 | Al (Lbs/day) | Mn (Lbs/day) |
| Existing Load @ JACK3 | 2.28 | 2.08 |
| Allowable Load @ JACK3 | 1.21 | 1.27 |
| Load Reduction @ JACK3 | 1.07 | 0.81 |
| % Reduction required @ JACK3 | 47% | 39% |

A waste load allocation for future mining was included at JACK2 allowing for two operations with two active pits (1500’ x 300’) to be permitted in the future on this segment.

| Table E36. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.180 | 1.13 |
| Fe | 3.0 | 0.180 | 4.50 |
| Mn | 2.0 | 0.180 | 3.00 |

*TMDL calculations – JACK2 – Jacks Run in Youngwood*

The TMDL for sampling point JACK2 consists of a load allocation to all of the area between points JACK4/3 and JACK2 shown in Attachment A. The load allocation for this segment of Jacks Run was computed using water-quality sample data collected at point JACK2. The average flow, computed using the USGS StreamStats program at JACK2 (26.24 MGD), is used for these computations.

Sample data at point JACK2 shows pH ranging between 7.40 and 7.60; pH will not be addressed because water quality standards are being met. Table E37 shows the measured and allowable concentrations and loads at JACK2. Table E38 shows the load reductions necessary to meet water quality standards at JACK2.

| Table E37 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.70 | 153.08 | 0.29 | 64.29 |
| | Iron | 3.71 | 811.75 | 1.19 | 259.76 |
| | Manganese | 0.44 | 96.67 | 0.77 | 168.51 |
| | Acidity | -64.95 | -14214.01 | -64.95 | -14214.01 |
| | Alkalinity | 79.00 | 17288.79 | | |

The measured and allowable loading for point JACK2 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 JACK2 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points JACK4/3 and JACK2 to determine a total load tracked for the segment of stream between JACK2 and JACK4/3. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at JACK2.

| Table E38. Allocations JACK2 | | |
|---|---|---|
| JACK2 | Al (Lbs/day) | Fe (Lbs/day) |
| Existing Load @ JACK2 | 153.08 | 811.75 |
| Difference in measured loads between the loads that enter and existing JACK2 | 46.92 | -903.92 |
| Additional load tracked from above samples | 45.88 | 85.78 |
| Total load tracked between JACK4/3 and JACK2 | 92.80 | 40.32 |
| Allowable Load @ JACK2 | 64.29 | 259.76 |
| Load Reduction @ JACK2 | 28.51 | 0 |
| % Reduction required @ JACK2 | 31% | 0% |

A waste load allocation for future mining was included at JACK1 allowing for two operations with two active pits (1500’ x 300’) to be permitted in the future on this segment.

| Table E39. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.180 | 1.13 |
| Fe | 3.0 | 0.180 | 4.50 |
| Mn | 2.0 | 0.180 | 3.00 |

*TMDL calculations – JACK1 – Jacks Run at mouth*

The TMDL for sampling point JACK1 consists of a load allocation to all of the area between points JACK2 and JACK1 shown in Attachment A. The load allocation for this segment of Jacks Run was computed using water-quality sample data collected at point JACK1. The average flow, computed using the USGS StreamStats program at JACK1 (27.47 MGD), is used for these computations.

Sample data at point JACK1 shows pH ranging between 7.40 and 8.30; pH will not be addressed because water quality standards are being met. Table E40 shows the measured and allowable concentrations and loads at JACK1. Table E41 shows the load reductions necessary to meet water quality standards at JACK1.

| Table E40 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.47 | 107.27 | 0.26 | 59.00 |
| | Iron | 1.40 | 320.49 | 0.81 | 185.89 |
| | Manganese | 0.34 | 78.06 | 0.62 | 142.03 |
| | Acidity | -67.20 | -15394.65 | -67.20 | -15394.65 |
| | Alkalinity | 80.55 | 18452.96 | | |

The measured and allowable loading for point JACK1 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 JACK1 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points JACK2 and JACK1 to determine a total load tracked for the segment of stream between JACK1 and JACK2. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at JACK1.

| Table E41. Allocations JACK1 | | |
|---|---|---|
| JACK1 | Al (Lbs/day) | Fe (Lbs/day) |
| Existing Load @ JACK1 | 107.27 | 320.49 |
| Difference in measured loads between the loads that enter and existing JACK1 | -45.81 | -491.26 |
| Additional load tracked from above samples | 64.29 | 259.76 |
| Total load tracked between JACK2 and JACK1 | 45.00 | 101.31 |
| Allowable Load @ JACK1 | 59.00 | 185.89 |
| Load Reduction @ JACK1 | 0 | 0 |
| % Reduction required @ JACK1 | 0% | 0% |

A waste load allocation for future mining was included at SC3 allowing for two operations with two active pits (1500' x 300') to be permitted in the future on this segment.

| Table E42. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.180 | 1.13 |
| Fe | 3.0 | 0.180 | 4.50 |
| Mn | 2.0 | 0.180 | 3.00 |

*TMDL calculations – SC3 – Sewickley Creek downstream of Jacks Run*

The TMDL for sampling point SC3 consists of a load allocation to all of the area between points WELTY1/JACK1 and SC3 shown in Attachment A. The load allocation for this segment of Sewickley Creek was computed using water-quality sample data collected at point SC3. The average flow, computed using the USGS StreamStats program at SC3 (75.62 MGD), is used for these computations.

Sample data at point SC3 shows pH ranging between 8.2 and 8.4; pH will not be addressed because water quality standards area being met. Table E43 shows the measured and allowable concentrations and loads at SC3. Table E44 shows the load reductions necessary to meet water quality standards at SC3.

| Table E43 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.50 | 317.07 | 0.25 | 155.36 |
| | Iron | 0.41 | 255.73 | 1.12 | 706.34 |
| | Manganese | 0.09 | 57.71 | 0.34 | 214.43 |
| | Acidity | -118.00 | -74418.25 | -118.00 | -74418.25 |
| | Alkalinity | 131.45 | 82900.67 | | |

The measured and allowable loading for point SC3 for aluminum 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 WELTY1/JACK1 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points WELTY1/JACK1 and SC3 to determine a total load tracked for the segment of stream between SC3 and WELTY1/JACK1. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at SC3.

| Table E44. Allocations SC3 | |
|---|---|
| SC3 | Al (Lbs/day) |
| Existing Load @ SC3 | 317.07 |
| Difference in measured loads between the loads that enter and existing SC3 | 209.80 |
| Additional load tracked from above sample | 59.00 |
| Total load tracked between WELTY1/JACK1 and SC3 | 268.80 |
| Allowable Load @ SC3 | 155.36 |
| Load Reduction @ SC3 | 113.44 |
| % Reduction required @ SC3 | 43% |

A waste load allocation for future mining was included at BUFF10 allowing for one operation with two active pits (1500' x 300') to be permitted in the future on this segment.

| Table E45. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | 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 | 2.26 |
| Mn | 2.0 | 0.090 | 1.13 |

*TMDL calculations – BUFF10 -*

The TMDL for sampling point BUFF10 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 Buffalo Run was computed using water-quality sample data collected at point BUFF10. The average flow, computed using the USGS StreamStats program at BUFF10 (1.30 MGD), is used for these computations.

Sample data at point BUFF10 shows pH ranging between 3.50 and 4.40; pH will be addressed. Table E46 shows the measured and allowable concentrations and loads at BUFF10. Table E47 shows the load reductions necessary to meet water quality standards at BUFF10.

| Table E46 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 12.33 | 133.55 | 0.49 | 5.34 |
| | Iron | 8.67 | 93.89 | 0.78 | 8.45 |
| | Manganese | 1.73 | 18.71 | 0.78 | 8.42 |
| | Acidity | 117.85 | 1276.84 | 0.59 | 6.38 |
| | Alkalinity | 1.80 | 19.50 | | |

| Table E47. Allocations BUFF10 | | | | |
|---|---|---|---|---|
| BUFF10 | Al (Lbs/day) | Fe (Lbs/day) | Mn (Lbs/day) | Acid (Lbs/day) |
| Existing Load @ BUFF10 | 133.5 | 93.89 | 18.71 | 1276.84 |
| Allowable Load @ BUFF10 | 5.34 | 8.45 | 8.42 | 6.38 |
| Load Reduction @ BUFF10 | 128.16 | 85.44 | 10.29 | 1270.46 |
| % Reduction required @ BUFF10 | 96% | 91% | 55% | 99.5% |

*TMDL calculations- BUFF9*

The TMDL for sample point BUFF9 consists of a load allocation to all of the area upstream of BUFF9 shown in Attachment A. The load allocation for this segment of Buffalo Run was computed using water-quality sample data collected at point BUFF9. The average flow, computed using data collected at BUFF9 (0.75 MGD), is used for these computations.

Sample data at point BUFF9 shows that this segment has a pH ranging between 7.70 and 8.10; pH will not be addressed because water quality standards are being met. Table E48 shows the measured and allowable concentrations and loads at BUFF9. Table E49 shows the percent reductions for aluminum, iron and manganese.

| Table E48 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 11.51 | 71.98 | 0.12 | 0.72 |
| | Iron | 2.80 | 17.49 | 0.22 | 1.40 |
| | Manganese | 4.36 | 27.26 | 0.13 | 0.82 |
| | Acidity | -100.00 | -625.27 | -100.00 | -625.27 |
| | Alkalinity | 138.90 | 868.50 | | |

| Table E49. Allocations BUFF9 | | | |
|---|---|---|---|
| BUFF9 | Al (Lbs/day) | Fe (Lbs/day) | Mn (Lbs/day) |
| Existing Load @ BUFF9 | 71.98 | 17.49 | 27.26 |
| Allowable Load @ BUFF9 | 0.72 | 1.40 | 0.82 |
| Load Reduction @ BUFF9 | 71.26 | 16.09 | 26.44 |
| % Reduction required @ BUFF9 | 99% | 92% | 97% |

*Waste Load Allocation – Sosko Coal Co., Inc. Allegra Mine*

Sosko Coal Co., Inc. (SMP65960111; NPDES PA0201723) Allegra Mine has a discharge from a mine drainage treatment facility. Outfall 003 is a discharge from a treatment facility that discharges to an unnamed tributary to Buffalo Run. There is currently no effluent limit for aluminum for the facility; a limit of 0.75 mg/L has been assigned to the discharge. The following table shows the waste load allocation for this discharge.

| Table E50. Waste Load Allocations at Allegra Mine | | | |
|---|---|---|---|
| Parameter | Monthly Avg. Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| 003 | | | |
| Al | 0.75 | 0.045 | 0.28 |
| Fe | 3.0 | 0.045 | 1.13 |
| Mn | 2.0 | 0.045 | 0.75 |

*TMDL calculations – BUFF8*

The TMDL for sample point BUFF8 consists of a load allocation to all of the area upstream of BUFF8 shown in Attachment A. The load allocation for this segment of Buffalo Run was computed using water-quality sample data collected at point BUFF8. The average flow, computed using the USGS StreamStats program (2.22 MGD), is used for these computations.

Sample data at point BUFF8 shows that this segment has a pH ranging between 7.70 and 7.80; pH will not be addressed because water quality standards are being met. Table E51 shows the measured and allowable concentrations and loads at BUFF8. Table E52 shows the percent reductions for aluminum, iron, manganese and acidity.

| Table E51 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.39 | 7.13 | 0.32 | 5.99 |
| | Iron | 0.77 | 14.17 | 0.72 | 13.32 |
| | Manganese | 0.16 | 2.95 | 0.33 | 6.10 |
| | Acidity | -91.60 | -1693.56 | -91.60 | -1693.56 |
| | Alkalinity | 117.85 | 2178.89 | | |

| Table E52. Allocations BUFF8 | | |
|---|---|---|
| BUFF8 | Al (Lbs/day) | Fe (Lbs/day) |
| Existing Load @ BUFF8 | 7.13 | 14.17 |
| Allowable Load @ BUFF8 | 5.99 | 13.32 |
| Load Reduction @ BUFF8 | 1.14 | 0.85 |
| % Reduction required @ BUFF8 | 16% | 6% |

A waste load allocation for future mining was included at BUFF7 allowing for one operation with two active pits (1500' x 300') to be permitted in the future on this segment.

| Table E53. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | 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 | 2.26 |
| Mn | 2.0 | 0.090 | 1.13 |

*TMDL calculations – BUFF7*

The TMDL for sampling point BUFF7 consists of a load allocation to all of the area between points BUFF10/9 and BUFF7 shown in Attachment A. The load allocation for this segment of Buffalo Run was computed using water-quality sample data collected at point BUFF7. The average flow, computed using the USGS StreamStats program at BUFF7 (2.78 MGD), is used for these computations.

Sample data at point BUFF7 shows pH ranging between 4.50 and 8.80; pH will be addressed. Table E54 shows the measured and allowable concentrations and loads at BUFF7. Table E55 shows the load reductions necessary to meet water quality standards at BUFF7.

# DRAFT

| Table E54 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 6.15 | 142.48 | 0.31 | 7.12 |
| | Iron | 2.81 | 65.08 | 0.53 | 12.36 |
| | Manganese | 1.19 | 27.61 | 0.56 | 12.97 |
| | Acidity | 30.95 | 717.37 | 3.40 | 78.91 |
| | Alkalinity | 21.05 | 487.90 | | |

The measured and allowable loading for point BUFF7 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 BUFF10/BUFF9 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points BUFF10/BUFF9 and BUFF7 to determine a total load tracked for the segment of stream between BUFF7 and BUFF10/BUFF9. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at BUFF7.

| Table E55. Allocations BUFF7 | | | | |
|---|---|---|---|---|
| BUFF7 | Al (Lbs/day) | Fe (Lbs/day) | Mn (Lbs/day) | Acid (Lbs/day) |
| Existing Load @ BUFF7 | 142.48 | 65.08 | 27.61 | 717.37 |
| Difference in measured loads between the loads that enter and existing BUFF7 | -63.00 | -46.30 | -18.36 | -559.47 |
| Additional load tracked from above samples | 6.06 | 9.85 | 9.24 | 6.38 |
| Total load tracked between BUFF10/BUFF9 and BUFF7 | 4.18 | 5.71 | 5.54 | 3.57 |
| Allowable Load @ BUFF7 | 7.12 | 12.36 | 12.97 | 78.91 |
| Load Reduction @ BUFF7 | 0 | 0 | 0 | 0 |
| % Reduction required @ BUFF7 | 0% | 0% | 0% | 0% |

A waste load allocation for future mining was included at BUFF7 allowing for two operations with two active pits (1500’ x 300’) to be permitted in the future on this segment.

| Table E56. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.180 | 1.13 |
| Fe | 3.0 | 0.180 | 4.50 |
| Mn | 2.0 | 0.180 | 2.26 |

*TMDL calculations – BUFF6*

The TMDL for sampling point BUFF6 consists of a load allocation to all of the area between points BUFF7/8 and BUFF6 shown in Attachment A. The load allocation for this segment of Buffalo Run was computed using water-quality sample data collected at point BUFF6. The average flow, computed using the USGS StreamStats program at BUFF6 (5.89 MGD), is used for these computations.

Sample data at point BUFF6 shows pH ranging between 6.40 and 7.40; pH will not be addressed because water quality standards are being met. Table E57 shows the measured and allowable concentrations and loads at BUFF6. Table E58 shows the load reductions necessary to meet water quality standards at BUFF6.

| Table E57 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 2.37 | 116.44 | 0.28 | 13.97 |
| | Iron | 1.37 | 67.43 | 0.51 | 24.95 |
| | Manganese | 0.79 | 38.85 | 0.50 | 24.48 |
| | Acidity | -19.00 | -933.00 | -19.00 | -933.00 |
| | Alkalinity | 46.55 | 2285.86 | | |

The measured and allowable loading for point BUFF6 for aluminum, iron and manganese was computed using water-quality sample data collected at the point. This was based on the sample data for the point and did not account for any loads already specified from upstream sources. The additional load from points BUFF8/BUFF7 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points BUFF8/BUFF7 and BUFF6 to determine a total load tracked for the segment of stream between BUFF6 and BUFF7/BUFF8. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at BUFF6.

| Table E58. Allocations BUFF6 | | | |
|---|---|---|---|
| BUFF6 | Al (Lbs/day) | Fe (Lbs/day) | Mn (Lbs/day) |
| Existing Load @ BUFF6 | 116.44 | 67.43 | 38.85 |
| Difference in measured loads between the loads that enter and existing BUFF6 | -33.17 | -11.82 | 11.24 |
| Additional load tracked from above samples | 13.11 | 25.68 | 12.97 |
| Total load tracked between BUFF8/BUFF7 and BUFF6 | 10.10 | 21.83 | 24.21 |
| Allowable Load @ BUFF6 | 13.97 | 24.95 | 24.48 |
| Load Reduction @ BUFF6 | 0 | 0 | 0 |
| % Reduction required @ BUFF6 | 0% | 0% | 0% |

A waste load allocation for future mining was included at BUFF3 allowing for one operation with one active pit (1500' x 300') to be permitted in the future on this segment.

| Table E59. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.045 | 0.26 |
| Fe | 3.0 | 0.045 | 1.13 |
| Mn | 2.0 | 0.045 | 0.75 |

*TMDL calculations – BUFF3*

The TMDL for sample point BUFF3 consists of a load allocation to all of the area upstream of BUFF3 shown in Attachment A. The load allocation for this segment of Buffalo Run was computed using water-quality sample data collected at point BUFF3. The average flow, computed using the USGS StreamStats program (1.56 MGD), is used for these computations.

Sample data at point BUFF3 shows that this segment has a pH ranging between 4.30 and 7.30; pH will be addressed. Table E60 shows the measured and allowable concentrations and loads at BUFF3. Table E61 shows the percent reductions for aluminum, iron, manganese and acidity.

| Table E60 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 3.38 | 43.95 | 0.17 | 2.20 |
| | Iron | 0.79 | 10.27 | 0.41 | 5.34 |
| | Manganese | 1.81 | 23.48 | 0.27 | 3.52 |
| | Acidity | 35.40 | 459.87 | 2.48 | 32.19 |
| | Alkalinity | 15.10 | 196.16 | | |

| Table E61. Allocations BUFF3 | | | |
|---|---|---|---|
| BUFF3 | Al (Lbs/day) | Fe (Lbs/day) | Mn (Lbs/day) |
| Existing Load @ BUFF3 | 43.95 | 10.27 | 23.48 |
| Allowable Load @ BUFF3 | 2.20 | 5.34 | 3.52 |
| Load Reduction @ BUFF3 | 41.75 | 4.93 | 19.96 |
| % Reduction required @ BUFF3 | 95% | 48% | 85% |

A waste load allocation for future mining was included at BUFF2 allowing for two operations with two active pits (1500’ x 300’) to be permitted in the future on this segment.

| Table E62. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.180 | 1.13 |
| Fe | 3.0 | 0.180 | 4.50 |
| Mn | 2.0 | 0.180 | 3.00 |

*TMDL calculations – BUFF2*

The TMDL for sampling point BUFF2 consists of a load allocation to all of the area between points BUFF6 and BUFF2 shown in Attachment A. The load allocation for this segment of Buffalo Run was computed using water-quality sample data collected at point BUFF2. The average flow, computed using the USGS StreamStats program at BUFF2 (7.30 MGD), is used for these computations.

Sample data at point BUFF2 shows pH ranging between 6.50 and 7.00; pH will not be addressed because water quality standards are being met. Table E63 shows the measured and allowable concentrations and loads at BUFF2. Table E64 shows the load reductions necessary to meet water quality standards at BUFF2.

| Table E63 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 1.07 | 65.19 | 0.21 | 13.04 |
| | Iron | 11.57 | 704.88 | 0.58 | 35.24 |
| | Manganese | 0.96 | 58.49 | 0.44 | 26.90 |
| | Acidity | -4.10 | -249.73 | -4.10 | -249.73 |
| | Alkalinity | 40.10 | 2442.50 | | |

The measured and allowable loading for point BUFF2 for aluminum, iron and manganese was computed using water-quality sample data collected at the point. This was based on the sample data for the point and did not account for any loads already specified from upstream sources. The additional load from points BUFF6 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points BUFF6 and BUFF2 to determine a total load tracked for the segment of stream between BUFF2 and BUFF6. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at BUFF2.

| Table E64. Allocations BUFF2 | | | |
|---|---|---|---|
| BUFF2 | Al (Lbs/day) | Fe (Lbs/day) | Mn (Lbs/day) |
| Existing Load @ BUFF2 | 65.19 | 704.88 | 58.49 |
| Difference in measured loads between the loads that enter and existing BUFF2 | -51.25 | 637.45 | 19.64 |
| Additional load tracked from above samples | 13.97 | 24.95 | 24.48 |
| Total load tracked between BUFF6 and BUFF2 | 7.68 | 662.40 | 44.12 |
| Allowable Load @ BUFF2 | 13.04 | 35.24 | 26.90 |
| Load Reduction @ BUFF2 | 0 | 627.16 | 17.22 |
| % Reduction required @ BUFF2 | 0% | 95% | 39% |

A waste load allocation for future mining was included at BUFF1 allowing for two operations with two active pits (1500' x 300') to be permitted in the future on this segment.

| Table E65. Waste load allocations for future mining operations | | | |
|---|---|---|---|
| Parameter | Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| Future Operation 1 | | | |
| Al | 0.75 | 0.180 | 1.13 |
| Fe | 3.0 | 0.180 | 4.50 |
| Mn | 2.0 | 0.180 | 3.00 |

*TMDL calculations – BUFF1*

The TMDL for sampling point BUFF1 consists of a load allocation to all of the area between points BUFF3/2 and BUFF1 shown in Attachment A. The load allocation for this segment of Buffalo Run was computed using water-quality sample data collected at point BUFF1. The average flow, computed using the USGS StreamStats program at BUFF1 (9.05 MGD), is used for these computations.

Sample data at point BUFF1 shows pH ranging between 6.60 and 7.10; pH will not be addressed because water quality standards are being met. Table E66 shows the measured and allowable concentrations and loads at BUFF1. Table E67 shows the load reductions necessary to meet water quality standards at BUFF1.

| Table E66 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.94 | 70.62 | 0.26 | 19.77 |
| | Iron | 8.30 | 626.29 | 0.66 | 50.10 |
| | Manganese | 0.97 | 72.88 | 0.44 | 33.52 |
| | Acidity | -11.35 | -856.52 | -11.35 | -856.52 |
| | Alkalinity | 36.80 | 2777.07 | | |

The measured and allowable loading for point BUFF1 for aluminum, iron and manganese was computed using water-quality sample data collected at the point. This was based on the sample data for the point and did not account for any loads already specified from upstream sources. The additional load from points BUFF3/BUFF2 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points BUFF3/BUFF2 and BUFF1 to determine a total load tracked for the segment of stream between BUFF1 and BUFF3/BUFF2. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at BUFF1.

| Table E67. Allocations BUFF1 | | | |
|---|---|---|---|
| BUFF1 | Al (Lbs/day) | Fe (Lbs/day) | Mn (Lbs/day) |
| Existing Load @ BUFF1 | 70.62 | 626.29 | 72.88 |
| Difference in measured loads between the loads that enter and existing BUFF1 | -38.52 | -88.86 | -9.09 |
| Additional load tracked from above samples | 15.24 | 40.58 | 30.42 |
| Total load tracked between BUFF2/BUFF3 and BUFF1 | 9.75 | 35.31 | 26.77 |
| Allowable Load @ BUFF1 | 19.77 | 50.10 | 33.52 |
| Load Reduction @ BUFF1 | 0 | 0 | 0 |
| % Reduction required @ BUFF1 | 0% | 0% | 0% |

*Waste Load Allocation – Eastern Associated Coal Company Delmont Treatment Facility*

Eastern Associated Coal Company (PM65831701; NPDES PA0213985) Delmont Treatment Facility has a discharge from a mine drainage treatment facility. Treatment Pond 2 Outfall is a discharge from a treatment facility that discharges to an unnamed tributary to Sewickley Creek. There is currently no effluent limit for aluminum for the facility; a limit of 0.75 mg/L has been assigned to the discharge. The following table shows the waste load allocation for this discharge.

| Table E68. Waste Load Allocations at Delmont Treatment Facility | | | |
|---|---|---|---|
| Parameter | Monthly Avg. Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| TP2 | | | |
| Al | 0.75 | 1.0 | 6.26 |
| Fe | 3.0 | 1.0 | 29.19 |
| Mn | 2.0 | 1.0 | 16.68 |

*TMDL calculations – SC2 – Sewickley Creek downstream of Buffalo Run*

The TMDL for sampling point SC2 consists of a load allocation to all of the area between points SC3/BUFF1 and SC2 shown in Attachment A. The load allocation for this segment of Sewickley Creek was computed using water-quality sample data collected at point SC2. The average flow, computed using the USGS StreamStats program at SC2 (103.41 MGD), is used for these computations.

Sample data at point SC2 shows pH ranging between 7.60 and 7.70; pH will not be addressed because water quality standards are being met. Table E69 shows the measured and allowable concentrations and loads at SC2. Table E70 shows the load reductions necessary to meet water quality standards at SC2.

| Table E69 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.74 | 639.93 | 0.42 | 364.76 |
| | Iron | 1.59 | 1370.64 | 0.83 | 712.73 |
| | Manganese | 0.46 | 393.28 | 0.63 | 543.34 |
| | Acidity | -85.87 | -74055.30 | -85.87 | -74055.30 |
| | Alkalinity | 97.45 | 84045.29 | | |

The measured and allowable loading for point SC2 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 SC3/BUFF1 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points SC3/BUFF1 and SC2 to determine a total load tracked for the segment of stream between SC2 and SC3/BUFF1. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at SC2.

| Table E70. Allocations SC2 | | |
|---|---|---|
| SC2 | Al (Lbs/day) | Fe (Lbs/day) |
| Existing Load @ SC2 | 639.93 | 1370.64 |
| Difference in measured loads between the loads that enter and existing SC2 | 252.24 | 744.35 |
| Additional load tracked from above samples | 175.13 | 50.10 |
| Total load tracked between SC3/BUFF1 and SC2 | 427.37 | 794.45 |
| Allowable Load @ SC2 | 364.76 | 721.73 |
| Load Reduction @ SC2 | 62.61 | 72.72 |
| % Reduction required @ SC2 | 15% | 10% |

*Waste Load Allocation – MAX Environmental Technologies, Inc. Yukon Facility*

MAX Environmental Technologies, Inc. (NPDES PA0027715) Yukon Facility has a discharge from a treatment facility. Outfall 001 is a discharge from a treatment facility that treats leachate, storm water, and blanket drain water and discharges to an unnamed tributary to Sewickley Creek. There is currently no effluent limit for manganese for the facility. The following table shows the waste load allocation for this discharge.

| Table E71. Waste Load Allocations at Yukon Facility | | | |
|---|---|---|---|
| Parameter | Monthly Avg. Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| 001 | | | |
| Al | 1.0 | 0.28 | 2.34 |
| Fe | 3.5 | 0.28 | 8.17 |

*Waste Load Allocation – LMM, Inc. Billy Strip*

LMM, Inc. (SMP65980106; NPDES PA0202380) Billy Strip has a discharge from a mine drainage treatment facility. Outfall 003 is a discharge from a treatment facility that discharges to an unnamed tributary to Sewickley Creek. There is currently no effluent limit for aluminum for the facility; a limit of 0.75 mg/L has been assigned to the discharge. The following table shows the waste load allocation for this discharge.

| Table E72. Waste Load Allocations at Billy Strip | | | |
|---|---|---|---|
| Parameter | Monthly Avg. Allowable Conc. (mg/L) | Average Flow (MGD) | Allowable Load (lbs/day) |
| 003 | | | |
| Al | 0.75 | 0.045 | 0.28 |
| Fe | 3.0 | 0.045 | 1.13 |
| Mn | 2.0 | 0.045 | 0.75 |

*TMDL calculations – SC1 – Sewickley Creek near confluence with Youghigheny River*

The TMDL for sampling point SC1 consists of a load allocation to all of the area between points SC2 and SC1 shown in Attachment A. The load allocation for this segment of Sewickley Creek was computed using water-quality sample data collected at point SC1. The average flow, computed using the USGS StreamStats program at SC1 (154.47 MGD), is used for these computations.

Sample data at point SC1 shows pH ranging between 7.80 and 8.00; pH will not be addressed because water quality standards are being met. Table E73 shows the measured and allowable concentrations and loads at SC1. Table E74 shows the load reductions necessary to meet water quality standards at SC1.

| Table E73 | | Measured | | Allowable | |
|---|---|---|---|---|---|
| | | Concentration | Load | Concentration | Load |
| | | mg/L | lbs/day | mg/L | lbs/day |
| | Aluminum | 0.50 | 643.49 | 0.35 | 456.88 |
| | Iron | 1.30 | 1669.61 | 0.39 | 500.88 |
| | Manganese | 0.45 | 576.83 | 0.72 | 927.56 |
| | Acidity | -97.25 | -125285.00 | -97.25 | -125285.00 |
| | Alkalinity | 110.85 | 142805.57 | | |

The measured and allowable loading for point SC1 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 SC2 shows the total load that was permitted from upstream sources. This value was added to the difference in existing loads between points SC2 and SC1 to determine a total load tracked for the segment of stream between SC1 and SC2. This load will be compared to the allowable load to determine if further reductions are needed to meet the calculated TMDL at SC1.

| Table E74. Allocations SC1 | | |
|---|---|---|
| SC1 | Al (Lbs/day) | Fe (Lbs/day) |
| Existing Load @ SC1 | 643.49 | 1669.61 |
| Difference in measured loads between the loads that enter and existing SC1 | 3.56 | 298.97 |
| Additional load tracked from above samples | 364.76 | 712.73 |
| Total load tracked between SC2 and SC1 | 361.20 | 1011.70 |
| Allowable Load @ SC1 | 456.88 | 500.88 |
| Load Reduction @ SC1 | 0 | 510.82 |
| % Reduction required @ SC1 | 0% | 49% |

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

***Seasonal Variation***

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

***Critical Conditions***

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

# Attachment E

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

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

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

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

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

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

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

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

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

# Attachment F

***Water Quality Data Used In TMDL Calculations***

# DRAFT

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| WELTY1 | 8/2/2007 | 7.3 | 164 | -119.6 | 0.511 | 1.28 | 0.25 |
| WELTY1 | 9/18/2007 | 7.2 | 123.4 | -41.6 | 1.07 | 0.344 | 0.25 |
| WELTY1 | 3/14/2008 | 7 | 43.8 | -26 | 0.15 | 0.054 | 0.25 |
| WELTY1 | 5/14/2008 | 7 | 47.8 | -35 | 0.15 | 0.065 | 0.25 |
| WELTY1 | 6/25/2008 | 7 | 71.2 | -56.2 | 0.544 | 0.14 | 0.25 |
| WELTY1 | 9/4/2008 | 7.2 | 170.8 | -152.4 | 0.451 | 2.024 | 0.25 |
| | *Average* | *7.12* | *103.50* | *-71.80* | *0.48* | *0.65* | *0.25* |
| | *StDev* | *0.13* | *57.09* | *51.75* | *0.34* | *0.82* | *0.00* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| WELTY4 | 8/2/2007 | 8.0 | 226.2 | -181.2 | 0.15 | 0.113 | 0.25 |
| WELTY4 | 9/18/2007 | 7.0 | 187 | -142.4 | 0.15 | 0.322 | 0.25 |
| WELTY4 | 3/14/2008 | 7.6 | 110.8 | -90.8 | 0.15 | 0.068 | 0.25 |
| WELTY4 | 5/14/2008 | 7.6 | 125.6 | -114 | 0.15 | 0.094 | 0.25 |
| WELTY4 | 6/25/2008 | 7.3 | 114.2 | -123.8 | 0.15 | 0.097 | 0.25 |
| WELTY4 | 9/4/2008 | 7.4 | 222.4 | -206.6 | 0.15 | 0.501 | 0.25 |
| | *Average* | *7.48* | *164.37* | *-143.13* | *0.15* | *0.20* | *0.25* |
| | *StDev* | *0.34* | *54.02* | *43.45* | *0.00* | *0.17* | *0.00* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| WELTY5 | 9/18/2007 | 7.0 | 67.8 | -42 | 0.15 | 0.025 | 0.25 |
| WELTY5 | 3/14/2008 | 7.1 | 26.2 | -5.8 | 0.15 | 0.069 | 0.25 |
| WELTY5 | 5/14/2008 | 7.1 | 24.6 | -15 | 0.15 | 0.055 | 0.25 |
| WELTY5 | 6/25/2008 | 8.2 | 43 | -28.2 | 0.15 | 0.211 | 0.25 |
| | *Average* | *7.35* | *40.40* | *-22.75* | *0.15* | *0.09* | *0.25* |
| | *StDev* | *0.57* | *20.07* | *15.79* | *0.00* | *0.08* | *0.00* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| WELTY6 | 8/2/2007 | 7.5 | 125 | -97 | 0.15 | 0.025 | 0.25 |
| WELTY6 | 9/18/2007 | 7.5 | 80.6 | -62.2 | 0.15 | 0.025 | 0.25 |
| WELTY6 | 3/14/2008 | 6.9 | 23 | -4.8 | 0.15 | 0.066 | 0.25 |
| WELTY6 | 5/14/2008 | 6.9 | 23.8 | -13.6 | 0.15 | 0.054 | 0.25 |
| WELTY6 | 6/25/2008 | 7 | 45 | -32 | 0.15 | 0.025 | 0.25 |
| WELTY6 | 9/4/2008 | 7.5 | 123 | -113.4 | 0.15 | 0.025 | 0.25 |
| | *Average* | *7.22* | *70.07* | *-53.83* | *0.15* | *0.04* | *0.25* |
| | *StDev* | *0.31* | *46.72* | *44.68* | *0.00* | *0.02* | *0.00* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| WELTY7 | 8/2/2007 | 7.0 | 100.6 | -77.8 | 0.15 | 0.025 | 0.25 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| WELTY7 | 9/18/2007 | 7.0 | 61.4 | -47.6 | 0.15 | 0.025 | 0.25 |
| WELTY7 | 3/14/2008 | 6.5 | 12 | 4.2 | 0.15 | 0.098 | 0.25 |
| WELTY7 | 5/14/2008 | 6.5 | 11.8 | 0.2 | 0.15 | 0.092 | 0.25 |
| WELTY7 | 6/25/2008 | 6.8 | 21 | -9.8 | 0.15 | 0.025 | 0.25 |
| WELTY7 | 9/4/2008 | 7.4 | 98.6 | -91.4 | 0.757 | 0.15 | 0.682 |
| | *Average* | *6.87* | *50.90* | *-37.03* | *0.25* | *0.07* | *0.32* |
| | *StDev* | *0.34* | *41.93* | *41.37* | *0.25* | *0.05* | *0.18* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| WELTY8 | 8/2/2007 | 7.0 | 35.8 | -21.2 | 0.15 | 0.025 | 0.25 |
| WELTY8 | 9/18/2007 | 7.0 | 28.6 | -15 | 0.15 | 0.025 | 0.25 |
| WELTY8 | 3/14/2008 | 6.7 | 11.8 | 9.2 | 0.15 | 0.025 | 0.25 |
| WELTY8 | 5/14/2008 | 6.7 | 12.2 | 3.2 | 0.15 | 0.025 | 0.25 |
| WELTY8 | 6/25/2008 | 6.5 | 14.6 | -2.4 | 0.15 | 0.025 | 0.25 |
| WELTY8 | 9/4/2008 | 7.1 | 33.6 | -23.4 | 0.15 | 0.025 | 1.062 |
| | *Average* | *6.83* | *22.77* | *-8.27* | *0.15* | *0.03* | *0.39* |
| | *StDev* | *0.23* | *11.13* | *13.51* | *0.00* | *0.00* | *0.33* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| BR1 | 10/10/2007 | 6.60 | 21.4 | 32.8 | 12.7 | 1.500 | 0.653 |
| BR1 | 11/14/2007 | 7.00 | 47.4 | -22.2 | 8.440 | 0.997 | 0.250 |
| BR1 | 5/23/08 | 7.10 | 45.2 | -19.8 | 4.353 | 0.470 | 1.322 |
| BR1 | 6/11/08 | 6.90 | 33.2 | -36.2 | 7.704 | 0.896 | 1.518 |
| | *Average* | *6.90* | *36.80* | *-11.35* | *8.30* | *0.97* | *0.94* |
| | *StDev* | *0.22* | *12.01* | *30.31* | *3.43* | *0.42* | *0.59* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| BR2 | 10/10/2007 | 6.50 | 26.4 | 35.6 | 18.500 | 1.470 | 0.547 |
| BR2 | 11/14/2007 | 6.80 | 49.8 | -23.0 | 11.700 | 0.949 | 0.250 |
| BR2 | 5/23/08 | 7.00 | 49.0 | -16.6 | 5.006 | 0.469 | 1.268 |
| BR2 | 6/11/08 | 6.80 | 35.2 | -12.4 | 11.084 | 0.953 | 2.216 |
| | *Average* | *6.78* | *40.10* | *-4.10* | *11.57* | *0.96* | *1.07* |
| | *StDev* | *0.21* | *11.33* | *26.82* | *5.52* | *0.41* | *0.88* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| BR3 | 10/10/2007 | 4.30 | 6.6 | 119.2 | 0.455 | 3.830 | 9.420 |
| BR3 | 11/14/2007 | 4.80 | 7.8 | 27.2 | 0.150 | 2.200 | 2.160 |
| BR3 | 5/23/08 | 7.30 | 35.4 | -9.6 | 1.269 | 0.318 | 0.967 |
| BR3 | 6/11/08 | 6.30 | 10.6 | 4.8 | 1.287 | 0.881 | 0.987 |
| | *Average* | *5.68* | *15.10* | *35.40* | *0.79* | *1.81* | *3.38* |
| | *StDev* | *1.38* | *13.64* | *57.88* | *0.58* | *1.56* | *4.06* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| BR6 | 10/10/2007 | 6.40 | 16.2 | 31.8 | 0.150 | 1.140 | 2.560 |
| BR6 | 11/14/2007 | 7.40 | 67.6 | -44.0 | 1.310 | 0.738 | 0.801 |
| BR6 | 5/23/08 | 7.40 | 66.4 | -43.2 | 1.805 | 0.412 | 2.280 |
| BR6 | 6/11/08 | 6.80 | 36.0 | -20.6 | 2.228 | 0.875 | 3.844 |
| | *Average* | *7.00* | *46.55* | *-19.00* | *1.37* | *0.79* | *2.37* |
| | *StDev* | *0.49* | *24.96* | *35.56* | *0.90* | *0.30* | *1.25* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| BR7 | 10/10/2007 | 4.50 | 8.8 | 102.4 | 0.753 | 1.450 | 9.500 |
| BR7 | 11/14/2007 | 6.60 | 24.4 | 4.0 | 4.360 | 1.230 | 3.940 |
| BR7 | 5/23/08 | 6.90 | 42.2 | -12.4 | 2.046 | 0.708 | 3.671 |
| BR7 | 6/11/08 | 8.80 | 8.8 | 29.8 | 4.072 | 1.376 | 7.478 |
| | *Average* | *6.70* | *21.05* | *30.95* | *2.81* | *1.19* | *6.15* |
| | *StDev* | *1.76* | *15.90* | *50.70* | *1.71* | *0.33* | *2.83* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| BR8 | 10/10/2007 | 7.80 | 155.6 | -103.6 | 1.030 | 0.241 | 0.542 |
| BR8 | 11/14/2007 | 7.80 | 120.2 | -88.4 | 0.541 | 0.149 | 0.250 |
| BR8 | 5/23/08 | 7.70 | 82.8 | -160.4 | 0.542 | 0.135 | 0.250 |
| BR8 | 6/11/08 | 7.80 | 112.8 | -14.0 | 0.952 | 0.114 | 0.500 |
| | *Average* | *7.78* | *117.85* | *-91.60* | *0.77* | *0.16* | *0.39* |
| | *StDev* | *0.05* | *29.91* | *60.30* | *0.26* | *0.06* | *0.16* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| BR9 | 10/10/2007 | 8.10 | 148.2 | -102.4 | 10.100 | 17.000 | 45.300 |
| BR9 | 11/14/2007 | 7.80 | 145.2 | -119.4 | 0.301 | 0.150 | 0.250 |
| BR9 | 5/23/08 | 7.70 | 118.2 | 17.4 | 0.427 | 0.200 | 0.250 |
| BR9 | 6/11/08 | 7.80 | 144.0 | -195.6 | 0.361 | 0.090 | 0.250 |
| | *Average* | *7.85* | *138.90* | *-100.00* | *2.80* | *4.36* | *11.51* |
| | *StDev* | *0.17* | *13.91* | *88.14* | *4.87* | *8.43* | *22.53* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| BR10 | 10/10/2007 | 4.30 | 0.0 | 159.8 | 10.900 | 1.650 | 13.600 |
| BR10 | 11/14/2007 | 3.60 | 0.0 | 127.8 | 10.400 | 1.810 | 13.600 |
| BR10 | 5/23/08 | 4.40 | 7.2 | 74.0 | 4.774 | 1.513 | 9.250 |
| BR10 | 6/11/08 | 3.50 | 0.0 | 109.8 | 8.588 | 1.933 | 12.855 |
| | *Average* | *3.95* | *1.80* | *117.85* | *8.67* | *1.73* | *12.33* |
| | *StDev* | *0.47* | *3.60* | *35.81* | *2.78* | *0.18* | *2.08* |

# DRAFT

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| JACK10 | 6/26/2008 | 8.1 | 181.8 | -162.4 | 0.981 | 0.087 | 0.698 |
| JACK10 | 7/15/2008 | 8.3 | 248.6 | -225.8 | 0.15 | 0.086 | 0.528 |
| JACK10 | 8/6/2008 | 8.4 | 236.4 | -227.8 | 0.358 | 0.025 | 0.25 |
| JACK10 | 8/19/2008 | 8.1 | 261 | -255.2 | 0.56 | 0.112 | 0.908 |
| | *Average* | *8.23* | *231.95* | *-217.80* | *0.51* | *0.08* | *0.60* |
| | *StDev* | *0.15* | *34.91* | *39.29* | *0.35* | *0.04* | *0.28* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| JACK9 | 6/26/2008 | 7.9 | 136.4 | -115.6 | 2.401 | 0.511 | 2.192 |
| JACK9 | 7/15/2008 | 4.8 | 9.2 | 35.8 | 7.106 | 3.914 | 7.571 |
| JACK9 | 8/6/2008 | 5.4 | 9.4 | 17.4 | 6.004 | 3.426 | 4.524 |
| JACK9 | 8/19/2008 | 5.8 | 10.4 | 14 | 4.949 | 2.967 | 4.204 |
| | *Average* | *5.98* | *41.35* | *-12.10* | *5.12* | *2.70* | *4.62* |
| | *StDev* | *1.35* | *63.37* | *69.66* | *2.01* | *1.51* | *2.22* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| JACK8 | 6/26/2008 | 8 | 144.4 | -133.6 | 0.438 | 0.025 | 0.523 |
| JACK8 | 7/15/2008 | 8.1 | 177.4 | -262.4 | 1.301 | 0.879 | 1.491 |
| JACK8 | 8/6/2008 | 8 | 132.4 | -118.8 | 0.77 | 0.918 | 0.25 |
| JACK8 | 8/19/2008 | 7.9 | 120.4 | -109.4 | 0.854 | 1.265 | 1.084 |
| | *Average* | *8.00* | *143.65* | *-156.05* | *0.84* | *0.77* | *0.84* |
| | *StDev* | *0.08* | *24.54* | *71.60* | *0.36* | *0.53* | *0.56* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| JACK7 | 6/26/2008 | 7.9 | 123 | -104.2 | 1.365 | 0.363 | 1.382 |
| JACK7 | 7/15/2008 | 8.5 | 170.4 | -154.4 | 0.15 | 0.182 | 0.714 |
| JACK7 | 8/6/2008 | 8.1 | 149 | -137 | 0.564 | 0.188 | 0.25 |
| JACK7 | 8/19/2008 | 8.3 | 128.4 | -118.4 | 0.449 | 0.17 | 0.836 |
| | *Average* | *8.20* | *142.70* | *-128.50* | *0.63* | *0.23* | *0.80* |
| | *StDev* | *0.26* | *21.60* | *21.88* | *0.52* | *0.09* | *0.47* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| JACK6 | 6/26/2008 | 8.2 | 105.2 | -85.2 | 0.15 | 0.025 | 0.25 |
| JACK6 | 7/15/2008 | 8.4 | 167.2 | -148.4 | 0.15 | 0.025 | 0.687 |
| JACK6 | 8/6/2008 | 8.3 | 165.6 | -162.8 | 0.15 | 0.055 | 0.25 |
| JACK6 | 8/19/2008 | 8.1 | 184.2 | -170.4 | 0.453 | 0.069 | 0.67 |
| | *Average* | *8.25* | *155.55* | *-141.70* | *0.23* | *0.04* | *0.46* |
| | *StDev* | *0.13* | *34.61* | *38.76* | *0.15* | *0.02* | *0.25* |

# DRAFT

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| JACK5 | 6/26/2008 | 8 | 116.4 | -96 | 0.623 | 0.267 | 0.746 |
| JACK5 | 7/15/2008 | 8.5 | 248.6 | -150.2 | 0.466 | 0.115 | 0.93 |
| JACK5 | 8/6/2008 | 8.4 | 136 | -124.4 | 0.15 | 0.067 | 0.25 |
| JACK5 | 8/19/2008 | 8.1 | 146.2 | -134.8 | 0.449 | 0.149 | 0.663 |
| | *Average* | *8.25* | *161.80* | *-126.35* | *0.42* | *0.15* | *0.65* |
| | *StDev* | *0.24* | *59.17* | *22.84* | *0.20* | *0.09* | *0.29* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| JACK4 | 6/26/2008 | 6.8 | 89.6 | -62.4 | 9.085 | 0.673 | 0.793 |
| JACK4 | 7/16/2008 | 6.8 | 95.2 | -66.2 | 16.502 | 0.886 | 1.175 |
| JACK4 | 8/6/2008 | 6.7 | 74.2 | -74.4 | 19.088 | 1.041 | 0.676 |
| JACK4 | 8/20/2008 | 6.6 | 69 | -48.4 | 18.666 | 1.004 | 1.191 |
| | *Average* | *6.73* | *82.00* | *-62.85* | *15.84* | *0.90* | *0.96* |
| | *StDev* | *0.10* | *12.41* | *10.86* | *4.64* | *0.17* | *0.26* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| JACK3 | 6/26/2008 | 7.5 | 65.4 | -44.8 | 0.39 | 0.921 | 0.746 |
| JACK3 | 7/16/2008 | 8 | 67.8 | -55.4 | 0.455 | 0.531 | 0.781 |
| JACK3 | 8/6/2008 | 7.8 | 75.8 | -68.2 | 0.344 | 0.614 | 0.25 |
| JACK3 | 8/20/2008 | 7.9 | 68.4 | -58.6 | 0.651 | 0.173 | 0.671 |
| | *Average* | *7.80* | *69.35* | *-56.75* | *0.46* | *0.56* | *0.61* |
| | *StDev* | *0.22* | *4.49* | *9.65* | *0.14* | *0.31* | *0.25* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| JACK2 | 6/26/2008 | 7.4 | 93.4 | -76.2 | 3.951 | 0.327 | 0.903 |
| JACK2 | 7/16/2008 | 7.6 | 82.4 | -65.2 | 4.074 | 0.364 | 0.946 |
| JACK2 | 8/6/2008 | 7.4 | 73.2 | -63 | 3.383 | 0.526 | 0.25 |
| JACK2 | 8/20/2008 | 7.4 | 67 | -55.4 | 3.429 | 0.55 | 0.699 |
| | *Average* | *7.45* | *79.00* | *-64.95* | *3.71* | *0.44* | *0.70* |
| | *StDev* | *0.10* | *11.50* | *8.60* | *0.35* | *0.11* | *0.32* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| JACK1 | 6/26/2008 | 7.4 | 87 | -66.8 | 1.893 | 0.207 | 0.25 |
| JACK1 | 7/16/2008 | 8.3 | 87.8 | -72.6 | 1.523 | 0.351 | 0.749 |
| JACK1 | 8/6/2008 | 7.8 | 78 | -71.8 | 1.191 | 0.427 | 0.25 |
| JACK1 | 8/20/2008 | 7.7 | 69.4 | -57.6 | 0.989 | 0.378 | 0.624 |
| | *Average* | *7.80* | *80.55* | *-67.20* | *1.40* | *0.34* | *0.47* |
| | *StDev* | *0.37* | *8.66* | *6.90* | *0.40* | *0.09* | *0.26* |

# DRAFT

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| SC1 | 8/5/2008 | 7.8 | 114.8 | -106.2 | 2.72 | 0.552 | 0.523 |
| SC1 | 8/20/2008 | 8 | 107.2 | -98.6 | 1.117 | 0.483 | 0.665 |
| SC1 | 10/15/2008 | 8 | 110.2 | -93.4 | 0.45 | 0.32 | 0.25 |
| SC1 | 11/24/2008 | 7.9 | 111.2 | -90.8 | 0.897 | 0.436 | 0.56 |
| | *Average* | *7.93* | *110.85* | *-97.25* | *1.30* | *0.45* | *0.50* |
| | *StDev* | *0.10* | *3.13* | *6.79* | *0.99* | *0.10* | *0.18* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| SC2 | 8/5/2008 | 7.7 | 104.4 | -94.6 | 1.41 | 0.44 | 0.584 |
| SC2 | 8/20/2008 | 7.7 | 93.2 | -82.6 | 1.488 | 0.507 | 0.86 |
| SC2 | 10/15/2008 | 7.6 | 93.6 | * | 1.232 | 0.371 | 0.574 |
| SC2 | 11/24/2008 | 7.7 | 98.6 | -80.4 | 2.227 | 0.506 | 0.95 |
| | *Average* | *7.68* | *97.45* | *-85.87* | *1.59* | *0.46* | *0.74* |
| | *StDev* | *0.05* | *5.24* | *7.64* | *0.44* | *0.06* | *0.19* |

| MP ID | Date | pH | Alkalinity (mg/L) | Acidity (mg/L) | Iron (mg/L) | Manganese (mg/L) | Aluminum (mg/L) |
|---|---|---|---|---|---|---|---|
| SC3 | 8/5/2008 | 8.2 | 134.8 | -122 | 0.316 | 0.056 | 0.25 |
| SC3 | 8/20/2008 | 8.3 | 128.4 | -117.4 | 0.58 | 0.063 | 0.754 |
| SC3 | 10/15/2008 | 8.4 | 128.6 | -115.6 | 0.15 | 0.054 | 0.25 |
| SC3 | 11/24/2008 | 8.2 | 134 | -117 | 0.576 | 0.193 | 0.757 |
| | *Average* | *8.28* | *131.45* | *-118.00* | *0.41* | *0.09* | *0.50* |
| | *StDev* | *0.10* | *3.42* | *2.78* | *0.21* | *0.07* | *0.29* |

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