FINAL

OTTER RUN WATERSHED TMDL

Lycoming County

<u>Prepared by</u>:

Pennsylvania Department of Environmental Protection

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OTTER Run Watershed
Lycoming County, Pennsylvania

Introduction

This report presents the Total Maximum Daily Loads (TMDLs) developed for stream segments in the Otter Run Watershed (Attachment A). These were done to address the impairments noted on the 1996 Pennsylvania Section 303(d) list of impaired waters, required under the Clean Water Act, and covers three segments on this list (shown in Table 1). High levels of metals, and in some areas depressed pH, caused these impairments. All impairments resulted from acid drainage from abandoned coal mines. The TMDL addresses the three primary metals associated with acid mine drainage (iron, manganese, aluminum), and pH.

Table 1. Section 303 (d) Sub-List

State Water Plan (SWP) Subbasin: 09-A Otter Run

Year	Miles	Segment ID	DEP Stream Code	Stream Name	Designated Use	Data Source	Source	EPA 305(b) Cause Code
1996	3.8	7101	21249	Otter Run	CWF	305(b) Report	RE	Metals
1998	3.83	7101	21249	Otter Run	CWF	SWP	AMD	Metals
2002	1.21	980813-1330-GGM	21249	Otter Run	CWF	SWP	AMD	Metals
2002	0.3	980813-0930-GGM	21249	Otter Run	CWF	SWP	AMD	Metals
2004	1.2	980813-1330-GGM	21249	Otter Run	CWF	SWP	AMD	Metals
2004	0.3	980813-0930-GGM	21249	Otter Run	CWF	SWP	AMD	Metals
1996	1.5	7102	21262	Left Fork Otter Run	CWF	305(b) Report	RE	Metals
1998	1.47	7102	21262	Left Fork Otter Run	CWF	SWMP	AMD	Metals
2002				Left Fork Otter Run				
2004				Left Fork Otter Run				
1996	0.4	7103	21263	Right Fork Otter Run	CWF	305(b) Report	RE	Metals
1998	0.37	7103	21263	Right Fork Otter Run	CWF	SWMP	AMD	Metals
2002	1.8	980812-1400-GGM	21263	Right Fork Otter Run	CWF	SWMP	AMD	Metals & pH
2004	1.42	980812-1400-GGM	21263	Right Fork Otter Run	CWF	SWMP	AMD	Metals & pH

[1] Pennsylvania's 1996, 1998, 2002, and 2004 Section 303(d) lists were approved by the Environmental Protection Agency (EPA). The 2000 Section 303(d) list was not required by U. S. Environmental Protection Agency. 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.*

Table 1. Section 303(d) Sub-List								
State Water Plan (SWP) Subbasin: 09-A Otter Run								
Year	**Miles**	**Segment ID**	**DEP Stream Code**	**Stream Name**	**Designated Use**	**Data Source**	**Source**	**EPA 305(b) Cause Code**
1996	This segment not on 1996 section 303(d) list			UNT Right Fork Otter Run	CWF			
1998	This segment not on 1998 section 303(d) list			UNT Right Fork Otter Run	CWF			
2002	This segment not on 2002 section 303(d) list			UNT Right Fork Otter Run	CWF			
2004	0.4	980812-1400-GGM	21264	UNT Right Fork Otter Run	CWF	SWMP	AMD	Metals & pH
1996	This segment not on 1996 section 303(d) list			Buckeye Run	CWF			
1998	This segment not on 1998 section 303(d) list			Buckeye Run	CWF			
2002	2.1	980813-100-GGM	21260	Buckeye Run	CWF	SWMP	AMD	Metals
2004	2.1	980813-100-GGM	21260	Buckeye Run	CWF	SWMP	AMD	Metals

Cold Water Fishes=CWF
Surface Water Monitoring Program = SWMP
Abandoned Mine Drainage = AMD
See Attachment E, *Excerpts Justifying Changes Between the 1996, 1998 and 2002 Section 303(d) Lists.*
The use designations for the stream segments in this TMDL can be found in PA Title 25 Chapter 93.

Directions to the Otter Run Watershed

The Otter Run Watershed is located in North Central Pennsylvania, occupying the northwestern portion of Lycoming County. The watershed area is found on United States Geological Survey maps covering portions of the Cammal, Morris and English Center 7.5-Minute Quadrangles. The area within the entire watershed consists of 30.21 square miles.

The village of Carsontown is located at the confluence of Otter Run and Little Pine Creek. The village of Carsontown lies 3.5 miles west of English Center along State Route 4001. The village of English Center is easily reached by traveling north from Williamsport along state routes 220 and 287, a distance of 29 miles. Traveling south from Wellsboro the distance to English Center on Route 287 is 26 miles.

Land use within the watershed is dominated by forestland most of which is administered by the Tioga State Forest and the Pennsylvania Game Commission. Other land uses within the watershed include abandoned mine lands and rural residential properties with small communities scattered throughout the area. The village of Carsontown is located at the mouth of Otter Run. There are also several hunting camps located within the watershed that are used seasonally.

Hydrology of the Otter Run Watershed

The watershed area (see Attachment A) is located in the glaciated upland plateau section of the Appalachian Plateau Physiographic Province. The plateau is strongly dissected by stream valleys, which drain the area to the south and west. The area within the watersheds of the stream segments addressed in this report consists of 6.2 square miles. The area of the main branch of Otter Run consists of 2.4 square miles and the area of the Right Branch (2.0 square miles) and the Left Branch (1.8 square miles) make up the remaining 3.8 square miles of the watershed for the three segments. Elevations in the watershed basin range from a low at the confluence of Otter Run and Little Pine Creek of 786 feet above sea level to the valley ridges at over 2100 feet above sea level.

Geology of the Otter Run Watershed

The watershed area is comprised of Upper Devonian, Mississippian and Pennsylvanian aged rocks, which are divided into the Catskill Red Beds in the Upper Devonian System, the Pocono Sandstone Formation and Mauch Chunk Series in the Mississippian System and the Pottsville Series in the Pennsylvanian System. The English Center synclinal axis (N 69 E) transects the northern portion of the watershed. Strata north of the synclinal axis dip to the SE at 2.5%, whereas strata to the south of the synclinal axis tend to dip to the NW at less than 2%. The strata near the synclinal axis are flat lying.

Older Upper Devonian and Mississippian aged rocks of the Catskill Red Beds and Pocono Sandstone Formations are exposed from the mouth of Otter Run up into the lower sections of the watershed and younger Pennsylvanian aged rocks of the Pottsville Group are exposed in the upper sections of the watershed and on the hilltops surrounding the watershed.

The coal measures of the area are from the Pennsylvanian period and have been exposed through test-pits and drifts at many places on the Otter Run watershed, although few, if any, natural outcrops are visible. Five coal beds are found within the watershed area. These are locally known in the Pine Creek Basin as the Bear Creek, Bloss, Cushing, D and E coals. The Bloss, Cushing, D and E coals have been mined within the Otter Run Watershed. Based on stratigraphic interval these coals have the following equivalents in the main bituminous coal fields of Pennsylvania: the Bloss coal is equivalent to the Upper Mercer coal, the Cushing is equivalent to the splits of the Clarion coal, the D coal is equivalent to the Upper Clarion coal, and the E is equivalent to the Lower Kittanning leader coal (Dodge, 1995). Throughout the rest of this report the local letter designation will be used to designate the coal seams.

Segments addressed in this TMDL

There is one active mining operation in the watershed. This is the Fisher Mining Company Thomas Operation (SMP#419401010). The permit was issued under DEP's Subchapter F regulations. Waste load allocations have been assigned to the permitted NPDES discharge points for this active mine site. 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. Where there is no responsible party the discharge is considered to be a non-point source. Each segment on the Section 303(d) list will be addressed as a separate TMDL. These 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.

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 U.S. Environmental Protection Agency's (USEPA) 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 USEPA 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

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

Despite these requirements, states, territories, authorized tribes, and USEPA have not developed many TMDLs since 1972. Beginning in 1986, organizations in many states filed lawsuits against the USEPA for failing to meet the TMDL requirements contained in the federal Clean Water Act and its implementing regulations. While USEPA has entered into consent agreements with the plaintiffs in several states, many lawsuits still are pending across the country.

In the cases that have been settled to date, the consent agreements require USEPA 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 USEPA, the states have developed methods for assessing the waters within their respective jurisdictions.

The primary method adopted by the Pennsylvania Department of Environmental Protection (Pa. 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. Pa. DEP is now using the Unassessed Waters Protocol (UWP), a modification of the USEPA Rapid Bioassessment Protocol II (RPB-II), as the primary mechanism to assess Pennsylvania's waters. The UWP 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 stream segment can vary between sites. All the biological surveys included kick-screen sampling of benthic macroinvertebrates, habitat surveys, and measurements of pH, temperature, conductivity, dissolved oxygen, and alkalinity. 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 the performance of the segment using a series of biological metrics. 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 documented source and cause. A TMDL must be developed for the stream segment. A TMDL is for only one pollutant. If a stream segment is impaired by two pollutants, two TMDLs must be developed for that stream segment. 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.);

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

2. Calculate TMDL for the waterbody using USEPA approved methods and computer models;
3. Allocate pollutant loads to various sources;
4. Determine critical and seasonal conditions;
5. Submit draft report for public review and comments; and
6. USEPA approval of the TMDL.

Watershed History

The coal measures of the Otter Run Watershed have been mined sporadically by shallow drift (underground) mining techniques for more than a century. Later, strip-mining operations have left large scars on the surface. Most of the surface mining took place in the 1950's to 1960's prior to the passage of the Clean Stream and Surface Mining Statutes. Unreclaimed areas are common. Abandoned mine discharges are the major source of stream pollution in the Otter Run Watershed.

Previous mining on the Thomas Mine includes deep mining the Bloss (B) Coal (35 acres), deep mining the Cushing (C) Coal (19 acres) and strip-mining both the B and C coals (85 acres). Virtually all the area deep mined on the C coal drains downward into the B-coal deep mine. Since the B-coal deep mine straddles the synclinal axis, most of the drainage from the strip-mined areas accumulates in the deep mine pool. This AMD mixture from deep and strip mines on both the B and C coals accounts for discharges into Buckeye Run.

On the southwest side of the Thomas Mine, AMD from abandoned strip-mining on the B and C coals spills westward off the edge of the synclinal trough, giving rise to the three discharges that flow into Otter Run. These discharges include 102, 116A and NT-14.

Several deep mine entries are found along the northeastern side of the Thomas Mine. There are no records available for these mines and they are believed to be small. There are five entries into the B coal (NT-2, NT-3, NT-6, NT-7 and NT-8) and two entries into the C coal (NT-4 and NT-5). Water quality from all these stations is consistently excellent.

In January 1971, Fisher Mining Company (Fisher) began mining operations in the Otter Run Watershed. Operations in the watershed included the Fisher Mine (400 acres), Frazer Mine (100 acres) and the Thomas Mine (616 acres). The mining of the Fisher and Frazer sites is complete and currently the Thomas Mine is operational.

During mining over the past 30 years' Fisher has daylighted (mined out old mine shafts and backfilled) areas of deep mining and reclaimed the deep mined areas in addition to the previously strip-mined areas. These efforts along with alkaline addition (importation of alkaline material and adding it to the backfilled spoil) have helped reduce the amount of acidity discharging into the Otter Run Watershed.

Thomas Mine Permit

The Thomas Mine permit was issued to Fisher Mining Company in September of 1996. The total permit area is 640 acres with 640 total acres to be affected. The coal seams to be mined are the B coal (336 acres), C' coal (236 acres) and the D coal (28 acres).

The Fisher Mining, Thomas Mine is a remining operation that will reclaim abandoned mine lands and underground workings. The isolation of residual acidic materials in the reclaimed backfill along with alkaline addition at rates of 600 –2000 tons per acre are expected to produce a net reduction in acidity to the Otter Run watershed, although there may be relatively minor increases in manganese concentration.

There will be a total of twenty sedimentation basins and two treatment basins constructed, as needed, on the permit area of the Thomas Mine site. The approximate locations of these structures can be found in Attachment A. All of the structures will discharge either to Buckeye Run or Right Fork of Otter Run and then, eventually, to Otter Run. Discharge rate and frequency vary as a function of precipitation and runoff. The structures are permitted under NPDES No. PA 0219843.

The mine drainage treatment facilities for the permit area are assigned a waste load allocation. Discharge rate and frequency vary as a function of precipitation and runoff. The method to quantify the treatment facility discharges is explained in the Method to Quantify Treatment Pond Pollutant Load section of the report. It has been determined that effects from sedimentation ponds are negligible because their potential discharges are based on infrequent and temporary events and the ponds should rarely discharge if reclamation and revegetation is concurrent. In addition, sedimentation ponds are designed in accordance with PA Code Tile 25 Chapter 87.108.

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. 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 nonpoint 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 nonpoint 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

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

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

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

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

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

In low 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 total acidity. Net alkalinity is alkalinity minus acidity, both in units of milligrams per liter (mg/l) $CaCO_3$. 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 may not 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.

Method to Quantify Treatment Pond Pollutant Load

Surface Coal Mines 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 are 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 revegated. 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 instream 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
Al < 2.0

When a treatment plant has an NPDES permit a Waste Load Allocation (WLA) must be calculated. When there is flow data available this is used along with the permit Best Available Technology (BAT) limits for one or more of the following: aluminum, iron, and manganese. The following formula is used:

Flow (MGD) X BAT limit (mg/l) X 8.34 = lbs/day

When site specific flow data is unavailable to determine a waste load allocation for an active mining operation, an average flow rate must be determined. This is done by investigating and quantifying the hydrology of a surface mine site. 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 when site specific flow data is unavailable.

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 40 inches of precipitation per year. A maximum pit dimension without special permit approval is 1500 feet long by 300 feet wide. Assuming 100 percent runoff of the precipitation to be pumped to the treatment ponds results in the following equation and average flow rates for the pit area.

40 in. precip./yr x 1 ft/12/in. x 1500'x 300'/pit x 7.48 gal/ft3 x 1yr/365days x 1day/24hr. x 1hr/60mins. =

21.3 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. DEP compliance efforts encourage that backfilling, topsoiling, and revegetation be as prompt and concurrent as mining conditions and weather conditions allow. Generally the revegatation follows about three pit widths behind the active mining area.

In the case of roughly backfilled land highly porous spoil; there is very little surface runoff. It is estimated that 80 percent of precipitation on the roughly regraded mine spoil infiltrates, 5 percent evaporates, and 15 percent may run off to the pit for pumping and potential treatment. The following equation represents the average flow reporting to the pit from the unregraded and unrevegatated spoil area.

40 in. precip./yr x 3 pit areas x 1 ft/12/in. x 1500'x 300'/pit x 7.48 gal/ft3 x 1yr/365days x 1day/24hr. x 1hr/60mins. x 15 in. runoff/100 in. precipitation =

= 9.6 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 = 21.3 gal./min. + 9.6 gal./min. = 30.9 gal./min.

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

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

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

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

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

Field experience shows that the average flow rate of 30.9 gal./min. is excessively high. 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 enviroment. As a step to insure that a mine site does not produce acid drainage, it is common to require the addition of alkaline materials (limestone, alkaline shale or other rocks) may produce alkaline pit water with very low metals concentrations that does not require treatment. Also, while most mining operations are permitted 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 that the standard size is present, the calculations to define the potential pollution load are adjusted accordingly. Hence, the above calculated Waste Load Allocation is very generous and likely high compared to actual conditions that are generally encountered.

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 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 of the nature of the pollution sources in the watershed, the TMDLs component makeup will be load allocations that are specified above a point in the stream segment. All allocations will be specified as long-term average daily concentrations. These long-term average daily concentrations are expected to meet water quality criteria 99 percent of the time. Pennsylvania Title 25 Chapter 96.3(c) specifies that the water quality standards must be met 99% of the time. The iron TMDLs are expressed at total recoverable as the iron data used for this analysis was reported as total recoverable. The following table shows the water quality criteria for the selected parameters.

Table 2 Applicable Water Quality Criteria

Parameter	***Criterion Value (mg/l)***	***Total Recoverable/Dissolved***
Aluminum (Al)	0.75	Total Recoverable
Iron (Fe)	1.50 0.3	30-day average; Total Recoverable Dissolved
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. These values are typically as low as 5.4 (Pennsylvania Fish and Boat Commission).

TMDL Elements (WLA, LA, MOS)

A TMDL equation consists of a wasteload allocation, load allocation and a margin of safety. The wasteload allocation is the portion of the load assigned to point sources. The load allocation is the portion of the load assigned to nonpoint 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).

Correlations

Analyses of data for metals for sample points OR5 and OR14 indicated that there was no single critical flow condition for pollutant sources, and further, that there was no significant correlation between source flows and pollutant concentrations (Table 3). The other sample points in this TMDL did not have enough paired flow/parameter data to calculate correlations (fewer than 10 paired observations) or all or nearly all parameter data was less than detection.

Table 3 Correlation Between Metals and Flow for Selected Points

Point Identification	Flow vs.			Number of Samples
	Iron	Manganese	Aluminum	
OR5	--	0.069	--	30
OR14	0.069	0.13	0.001	Fe & Al 23; Mn 39

Allocation Summary

These TMDLs will focus remediation efforts on the identified numerical reduction targets for each watershed. As changes occur in the watershed, the TMDLs may be re-evaluated to reflect current conditions. Table 4 presents the estimated reductions identified for all points in the watershed. Attachment C gives detailed TMDLs by segment analysis for each allocation point.

Table 4. Summary Table–Otter Run Watershed

Station	Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	Load Reduction (lbs/day:	Percent Reduction %
Nt-16	Runoff upstream of NT-14						
	Al	ND	NA	-	-	0.0	0
	Fe	ND	NA	-	-	0.0	0
	Mn	ND	NA	-	-	0.0	0
	Acidity	0.49	0.14	0.0	0.14	0.35	72
Nt-14	Spring Run from 101 at confluence w/Otter Run						
	Al	ND	NA	-	-	0.0	0
	Fe	ND	NA	-	-	0.0	0
	Mn	ND	NA	-	-	0.0	0
	Acidity	5.8	2.0	0.0	2.0	3.8	65
OR05	Right Fork Otter Run before confluence with Left Fork Otter Run						
	Al	ND	NA	2.3	-	0.0	0
	Fe	ND	NA	3.5	-	0.0	0
	Mn	5.7	5.4	2.3	4.7	1.0	5
	Acidity	88.5	24.0	0.0	24.0	60.3	72
OR04	Left Fork Otter Run						
	Al	ND	NA	-	-	0.0	0
	Fe	ND	NA	-	-	0.0	0
	Mn	ND	NA	-	-	0.0	0
	Acidity	75.6	46.9	0.0	46.9	28.7	38
OR01	Otter Run at mouth before confluence with Buckeye Run						
	Al	ND	NA	-	-	0.0	0
	Fe	ND	NA	-	-	0.0	0
	Mn	4.3	4.3	0.0	4.3	0.0	0
	Acidity	132.1	72.6	0.0	72.6	0.0	0

Station	Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	Load Reduction (lbs/day:	Percent Reduction %
M3A	Buckeye Run upstream of confluence with Jack Cammels Run						
	Al	11.1	3.3	0.0	3.3	7.8	71
	Fe	4.0	4.0	0.0	4.0	0.0	0
	Mn	131.5	8.1	0.0	8.1	123.4	94
	Acidity	492.9	37.9	0.0	37.9	455.0	92
JC1	Jack Cammels Run before confluence with Buckeye Run						
	Al	ND	NA	-	-	0.0	0
	Fe	ND	NA	-	-	0.0	0
	Mn	ND	NA	-	-	0.0	0
	Acidity	15.0	10.5	0.0	10.5	4.5	30
BR01	Buckeye Run before confluence with Otter Run						
	Al	ND	NA	2.3	-	0.0	0
	Fe	ND	NA	3.5	-	0.0	0
	Mn	87.7	10.5	2.3	10.5	0.0	0
	Acidity	300.9	57.1	0.0	57.1	0.0	0
OR14	Otter Run upstream of confluence with Silver Branch						
	Al	7.8	4.0	0.0	4.0	3.7	48
	Fe	4.6	4.6	0.0	4.6	0.0	0
	Mn	104.0	12.2	0.0	12.2	14.6	54
	Acidity	97.6	59.3	0.0	59.3	0.0	0

All waste load allocations were calculated using the methodology explained previously in the Method to Quantify Treatment Pond Pollutant Load section of the report.

Waste allocations for the existing mining operation were incorporated into the calculations at OR05 and BR01. These are the first downstream monitoring points that receive all the potential flow of treated water from the two treatment sites TF2 and TF1. No required reductions of these permits are necessary at this time because there are upstream non-point sources that when reduced will met the TMDL or there is available assimilation capacity. All necessary reductions are assigned to non-point sources.

Although TMDLs for aluminum and iron are not necessary at OR05 and BR01 because the water quality standards are met, WLAs are assigned to the TR2 and TR1 discharges of the Fisher Mine permit. Because the standard is met for aluminum and iron at OR05 and BR01, the actual allowed load is the water quality standard times the flow and a conversion factor at the points. For OR05 this equals 12.0 lbs/day for aluminum, 24.0 lbs/day iron and 24.6 lbs/day for aluminum, 49.2 lbs/day for iron. The aluminum and iron WLAs of 1.1 lbs/day and 0.7 lbs/day for the above segments are acceptable and will not have a negative impact on water quality within the segments.

The Fisher Mining Company's Thomas Operation (SMP#419401010, Subchapter F NPDES No. PA 0219843) has a non-standard pit size of 7,000 feet in length and a width of 200 feet. This pit size was used in the Method to Quantify Treatment Pond Pollutant Load calculation as shown below:

40 in. precip./yr x 1 ft/12/in. x 7000'x 200'/pit x 7.48 gal/ft3 x 1yr/365days x 1day/24hr. x 1hr/60mins. = 66.41 gal/min average discharge from direct precipitation into the open mining pit area.

40 in. precip./yr x 3 pit areas x 1 ft/12/in. x 7000'x 200'/pit x 7.48 gal/ft3 x 1yr/365days x 1day/24hr. x 1hr/60mins. x 15 in. runoff/100 in. precipitation = 29.89 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 = 66.41 gal./min. + 29.89 gal./min. = 96.3 gal./min.

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

Allowable Iron Waste Load Allocation:
96.3 gal./min. x 3 mg/l x 0.01202 = 3.47 lbs./day

Allowable Manganese Waste Load Allocation:
96.3 gal./min. x 2 mg/l x 0.01202 = 2.32 lbs./day

Allowable Aluminum Waste Load Allocation:
96.3 gal./min. x 2 mg/l x 0.01202 = 2.32 lbs./day

Table 5 below contains the waste load allocations for the mining site.

Table 5. Waste Load Allocation of Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
TR2			
Fe	3.0	0.1386	3.5
Mn	2.0	0.1386	2.3
Al	2.0	0.1386	2.3
TR1			
Fe	3.0	0.1386	3.5
Mn	2.0	0.1386	2.3
Al	2.0	0.1386	2.3

Recommendations

Two primary programs that provide reasonable assurance for maintenance and improvement of water quality in the watershed are in effect. The PADEP's efforts to reclaim abandoned mine lands, coupled with its duties and responsibilities for issuing NPDES permits, will be the focal points in water quality improvement.

Additional opportunities for water quality improvement are both ongoing and anticipated. Historically, a great deal of research into mine drainage has been conducted by PADEP's Bureau of Abandoned Mine Reclamation, which administers and oversees the Abandoned Mine Reclamation Program in Pennsylvania, the United States Office of Surface Mining, the National Mine Land Reclamation Center, the National Environmental Training Laboratory, and many other agencies and individuals. Funding from EPA's 319 Grant program, and Pennsylvania's Growing Greener program have been used extensively to remedy mine drainage impacts. These many activities are expected to continue and result in water quality improvement.

The PA DEP Bureau of Mining and Reclamation administers an environmental regulatory program for all mining activities, mine subsidence regulation, mine subsidence insurance, and coal refuse disposal; conducts a program to ensure safe underground bituminous mining and protect certain structures form subsidence; administers a mining license and permit program; administers a regulatory program for the use, storage, and handling of explosives; provides for training, examination, and certification of applicants for blaster's licenses; and administers a loan program for bonding anthracite underground mines and for mine subsidence. Administers the EPA Watershed Assessment Grant Program, the Small Operator's Assistance Program (SOAP), and the Remining Operators Assistance Program (ROAP).

Reclaim PA is DEP's initiative designed to maximize reclamation of the state's quarter million acres of abandoned mineral extraction lands. Abandoned mineral extraction lands in Pennsylvania constituted a significant public liability – more than 250,000 acres of abandoned surface mines, 2,400 miles of streams polluted with mine drainage, over 7,000 orphaned and abandoned oil and gas wells, widespread subsidence problems, numerous hazardous mine openings, mine fires, abandoned structures and affected water supplies – representing as much as one third of the total problem nationally.

Mine reclamation and well plugging refers to the process of cleaning up environmental pollutants and safety hazards associated with a site and returning the land to a productive condition, similar to DEP's Brownfields program. Since the 1960's, Pennsylvania has been a national leader in establishing laws and regulations to ensure reclamation and plugging occur after active operation is completed.

Pennsylvania is striving for complete reclamation of its abandoned mines and plugging of its orphaned wells. Realizing this task is no small order, DEP has developed concepts to make abandoned mine reclamation easier. These concepts, collectively called Reclaim PA, include legislative, policy land management initiatives designed to enhance mine operator, volunteer land DEP reclamation efforts. Reclaim PA has the following four objectives.

- To encourage private and public participation in abandoned mine reclamation efforts
- To improve reclamation efficiency through better communication between reclamation partners
- To increase reclamation by reducing remining risks
- To maximize reclamation funding by expanding existing sources and exploring new sources.

There is currently no watershed group in the Otter Run Watershed area. However, the Otter Run Fish and Gun Club has been very active in issues concerning Otter Run. This organization could assist in the implementation of projects to achieve the reductions recommended in this TMDL document.

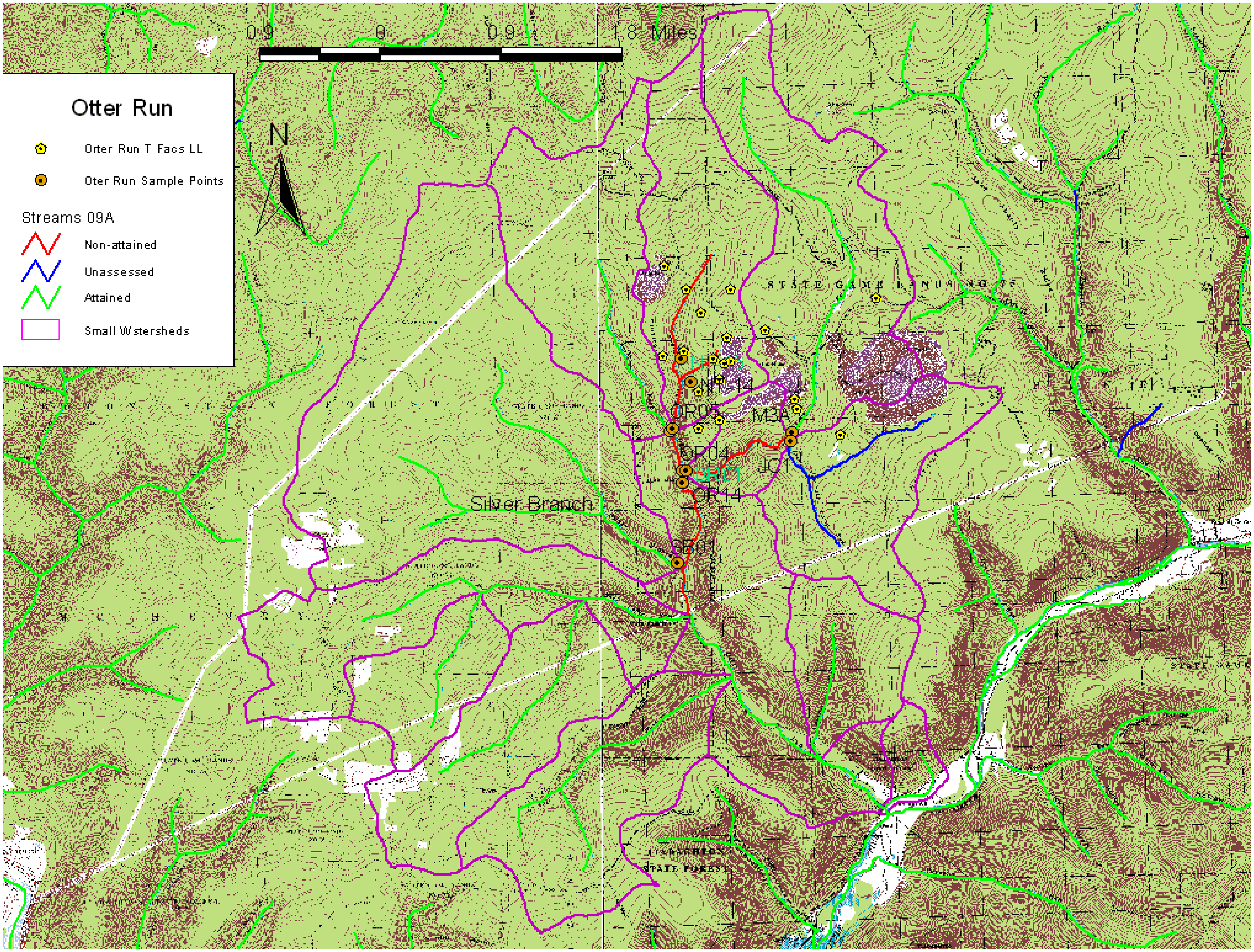
During mining over the past 30 years' Fisher has day lighted (mined out old mine shafts and backfilled) areas of deep mining and reclaimed the deep mined areas in addition to the previously strip-mined areas. These efforts along with alkaline addition (importation of alkaline material and adding it to the backfilled spoil) have helped reduce the amount of acidity discharging into the Otter Run Watershed. Recently Fisher has agreed to add limestone to the headwaters areas of the Right Fork and Left Fork Otter Run. The approximate locations are shone on map 4 on page 24 as semi-transparent green circles. Both forks of Otter Run extend north beyond that shown on the map and it is in these areas where the alkaline addition will occur.

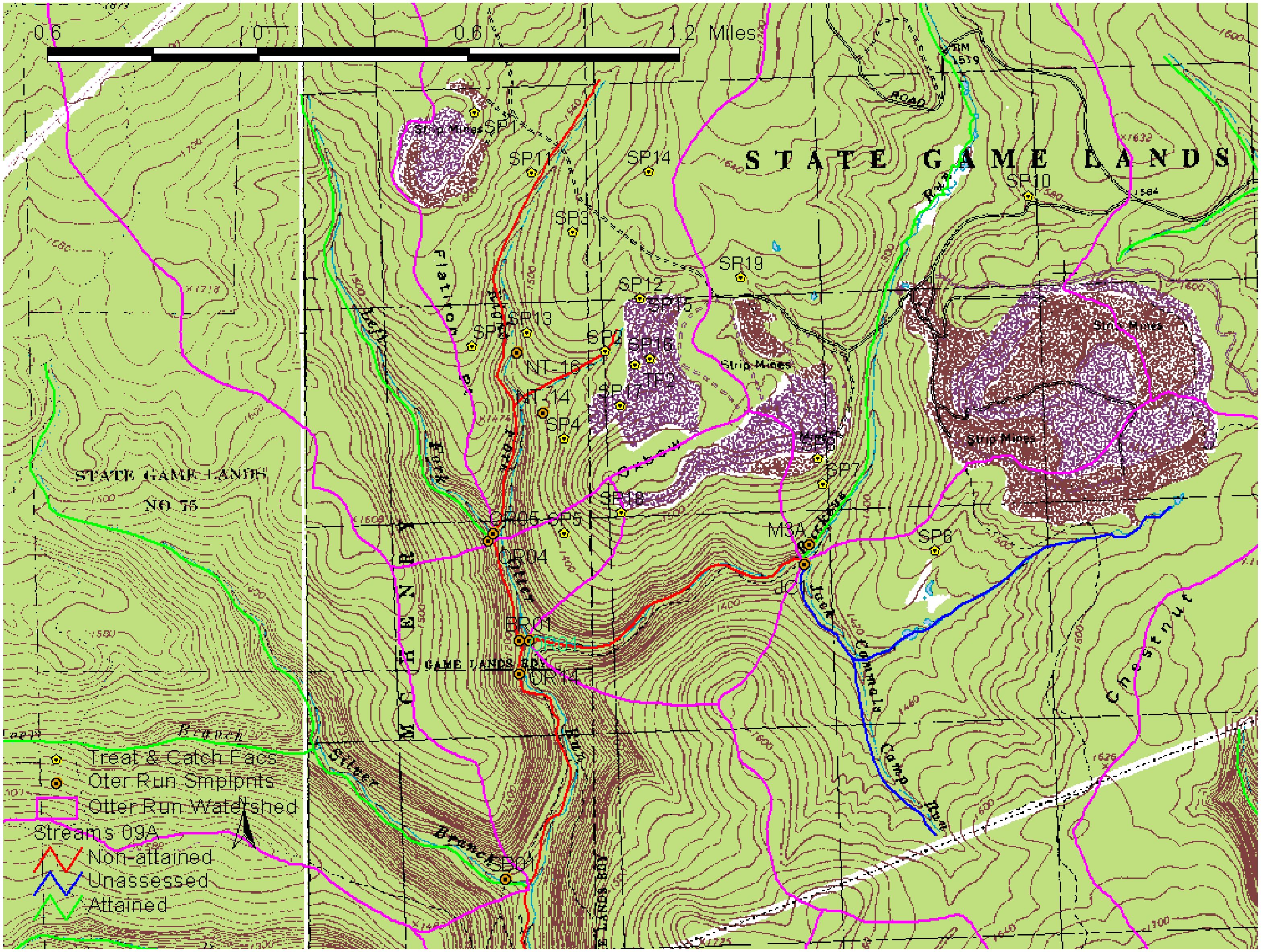
Public Participation

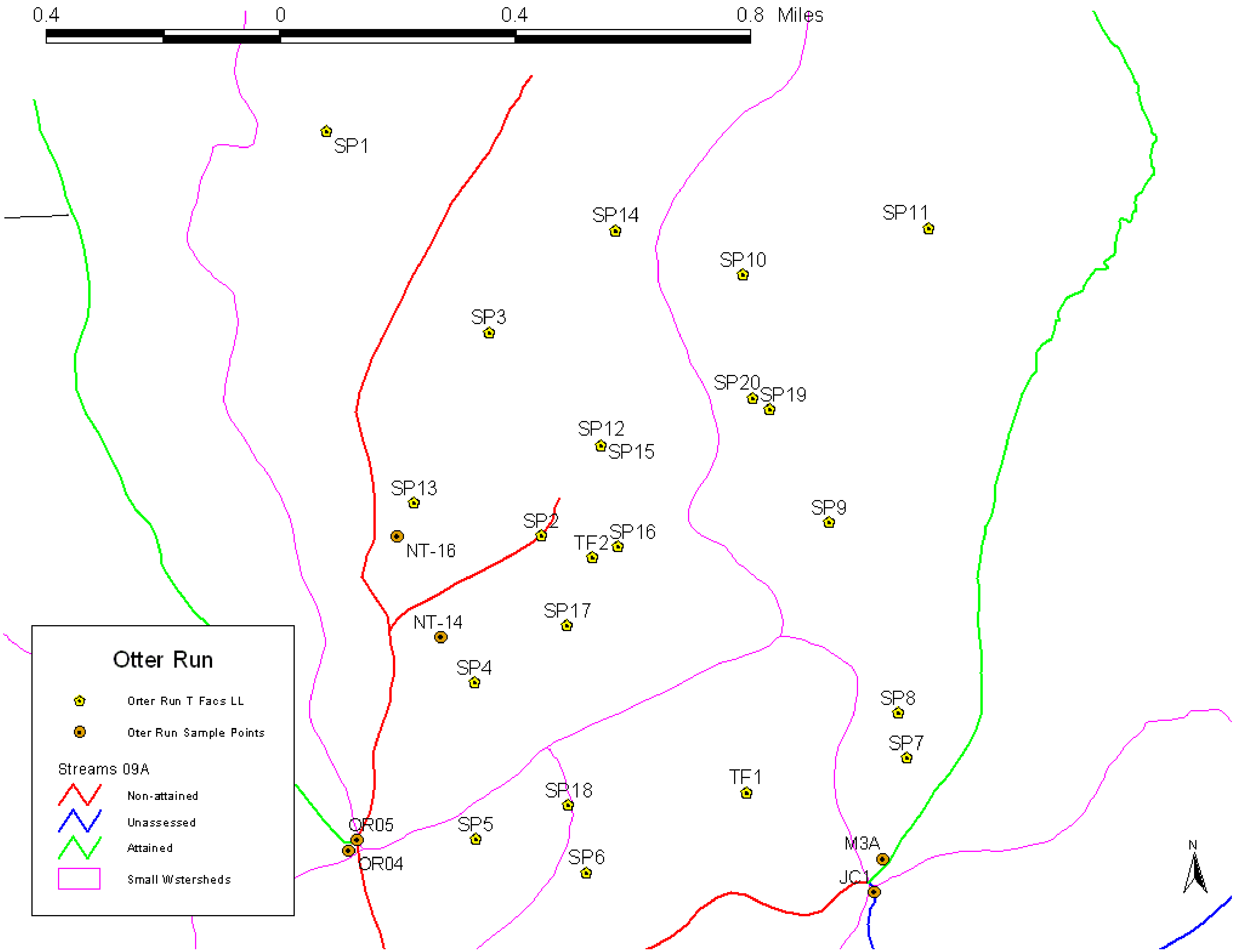
Public notice of the draft TMDL was published in the *Pennsylvania Bulletin* and the Williamsport Sun Gazette on December 1, and December 8, 2004 to foster public comment on the allowable loads calculated. A public meeting was held on December 15, 2004, at the Little Pine State Park Office Located in Waterville, Pennsylvania to discuss the proposed TMDL.

Attachment A

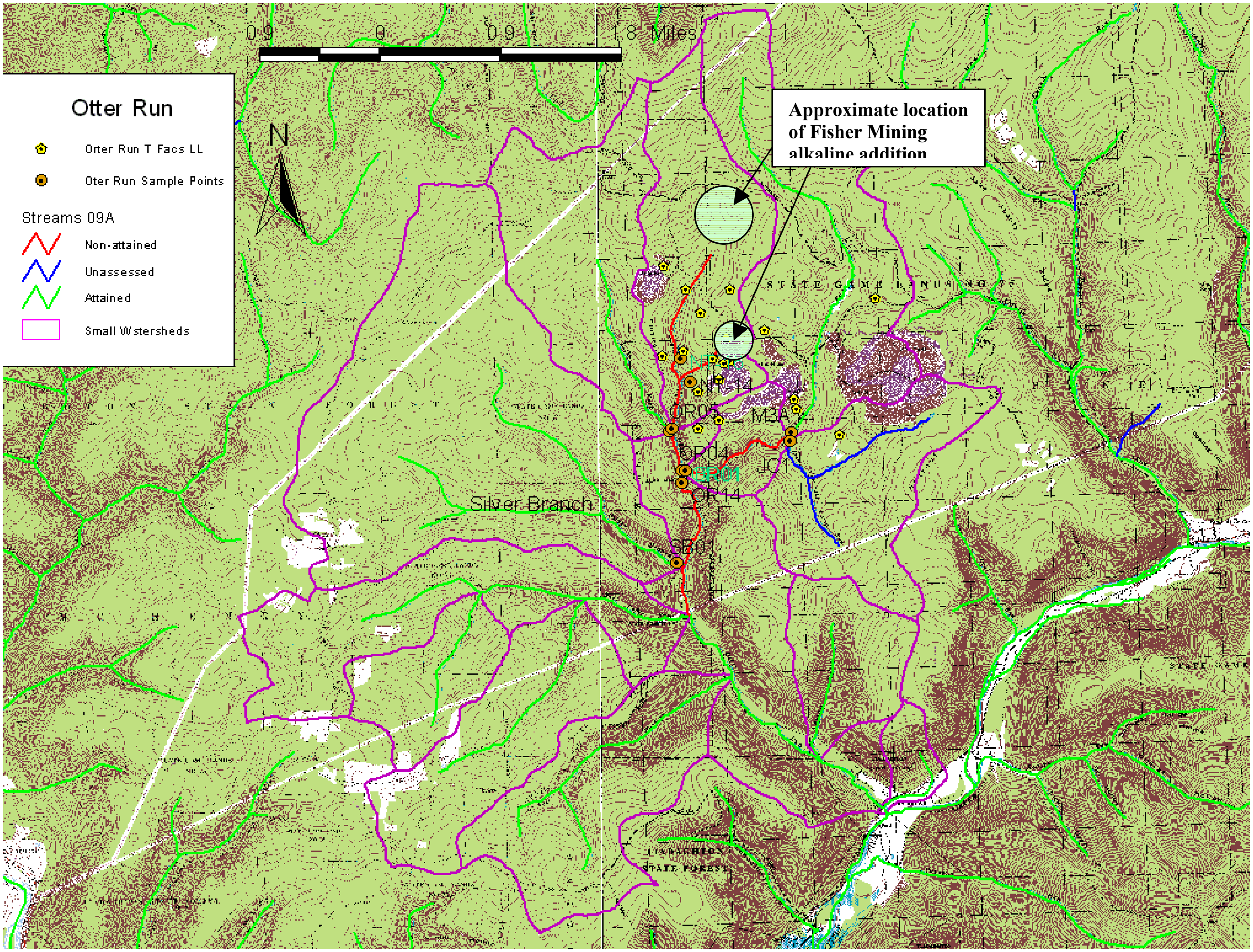
Otter Run Watershed Map


0.9
0
0.9
1.8 Miles
Otter Run
Orter Run T Facs LL
Oter Run Sample Points
Streams 09A
Non-attained
Unassessed
Attained
Small Wstersheds
N
Silver Branch
SB01
OR05
OR14
M3A
JC


0.6
0
0.6
1.2 Miles
STATE GAME LANDS
STATE GAME LANDS
NO 75
Strip Mines
SP1
SP11
SP14
SP3
SP10
SP19
SP12
SP15
SP13
SP9
SP16
NT-16
NT-14
SP17
SP4
SP7
SP18
SP5
SP8
M3A
OR04
JC1
OR14
SD01
Flatiron
Otter
Run
Silver
Branch
Beaver
Jack
Camp
Chestnut
GAME LANDS BDY
Treat & Catch Facs
Oter Run Smplpnts
Otter Run Watershed
Streams 09A
Non-attained
Unassessed
Attained

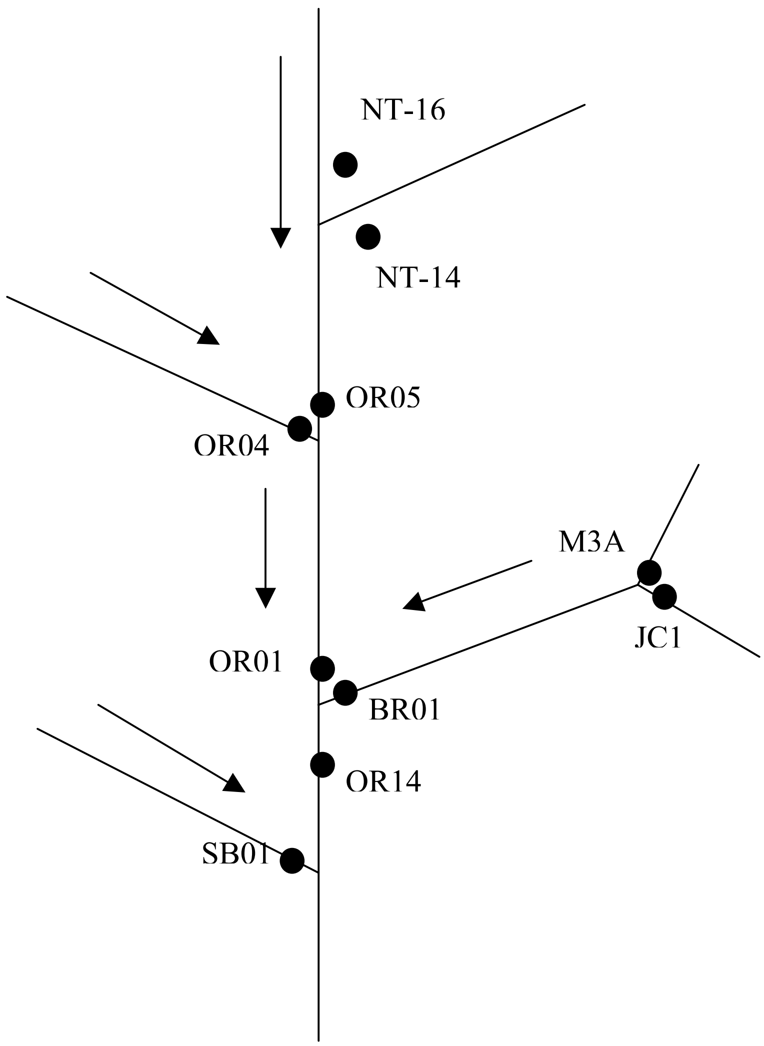


0.4 0 0.4 0.8 Miles
SP1
SP14
SP11
SP10
SP3
SP20
SP19
SP12
SP15
SP13
SP2
SP16
TF2
SP9
NT-16
NT-14
SP17
SP4
SP8
SP7
TF1
SP18
OR05
SP5
OR04
SP6
M3A
JC1
N
Otter Run
Orter Run T Facs LL
Oter Run Sample Points
Streams 09A
Non-attained
Unassessed
Attained
Small Wstersheds



0.9
0
0.9
1.8 Miles
Otter Run
Orter Run T Facs LL
Oter Run Sample Points
Streams 09A
Non-attained
Unassessed
Attained
Small Wstersheds
N
Approximate location of Fisher Mining alkaline addition
OR05
OR04
OR14
SB01
M3A
JC1
Silver Branch

Otter Run Sampling Station Diagram
Arrows indicates direction of flow.



Attachment B

Method For Addressing Section 303(d) Listings for pH

Method for Addressing Section 303(d) Listings for pH

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

The pH, a measurement of hydrogen ion acidity presented as a negative logarithm, is not conducive to standard statistics. Additionally, pH does not measure latent acidity. For this reason, and based on the above information, Pennsylvania is using the following approach to address the stream impairments noted on the Section 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. Therefore, net alkalinity will be used to evaluate pH in these TMDL calculations. This methodology assures that the standard for pH will be met because net alkalinity is a measure of the reduction of acidity. 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. Net alkalinity is alkalinity minus acidity, both being in units of milligrams per liter (mg/l) $CaCO_3$. 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.

There are several documented cases of streams in Pennsylvania having a natural background pH below six. If the natural pH of a stream on the Section 303(d) list can be established from its upper unaffected regions, then the pH standard will be expanded to include this natural range. The acceptable net alkalinity of the stream after treatment/abatement in its polluted segment will be the average net alkalinity established from the stream's upper, pristine reaches added to the acidity of the polluted portion in question. Summarized, if the pH in an unaffected portion of a stream is found to be naturally occurring below six, then the average net alkalinity for that portion (added to the acidity of the polluted portion) of the stream will become the criterion for the polluted portion. This "natural net alkalinity level" will be the criterion to which a 99 percent confidence level will be applied. The pH range will be varied only for streams in which a natural unaffected net alkalinity level can be established. This can only be done for streams that have upper segments that are not impacted by mining activity. All other streams will be required to reduce the acid load so the net alkalinity is greater than zero 99% of time.

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

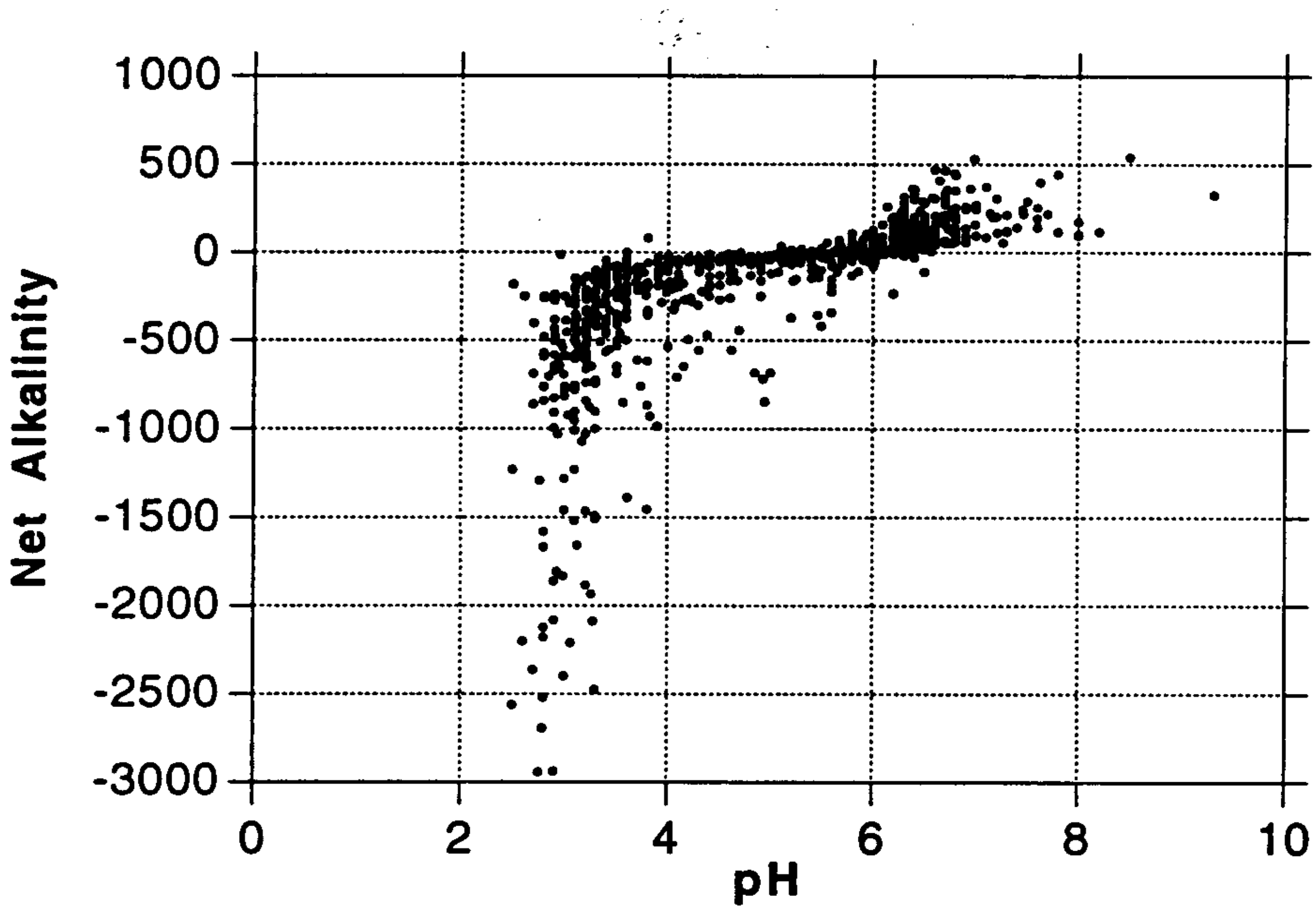


Figure 1. Net Alkalinity vs. pH. Taken from Figure 1.2 Graph C, pages 1-5, of Coal Mine Drainage Prediction and Pollution Prevention in Pennsylvania

Attachment C
TMDLs By Segment

Otter RUN

The TMDL for Otter Run consists of load allocations to two tributaries and nine sampling sites along the stream. Following is an explanation of the TMDL for each allocation point.

Otter Run is listed for metals from AMD as being the cause of the degradation to the stream. For pH, the objective is to reduce acid loading to the stream that will in turn raise the pH to the acceptable range. 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 the sample points below for acidity and the three metals. 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 lognormally 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.

<u>TMDL calculations- NT16 Discharge Monitoring Point located east of Right Fork Otter Run</u>

The TMDL for sample point NT16 consists of a load allocation to all of the area above the point shown in Attachment A. The load allocation for this tributary was computed using water-quality sample data collected at point NT16. The average flow, measured at the sampling point NT16 (0.023 MGD), is used for these computations.

There currently is no entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point NT16 shows pH ranging between 4.5 and 7.0, ph will be addressed in this TMDL.

Table C1. Load Allocations at Point NT16				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	LTA conc. (mg/l)	Load (lbs/day)
Al	ND	ND	NA	NA
Fe	ND	ND	NA	NA
Mn	ND	ND	NA	NA
Acidity	2.60	0.5	0.73	0.14
Alkalinity	4.73	0.9		

Table C2. Calculation of Load Reduction Necessary at Point NT-16				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	ND	ND	ND	0.5
Allowable Load = TMDL	NA	NA	NA	0.14
Load Reduction	0.0	0.0	0.0	0.36
Total % Reduction	0	0	0	72

TMDL Calculation –Sample Point NT14; Spring Run at confluence with Otter Run

The TMDL for sample point NT14 consists of a load allocation of the area upstream of sample point NT14. The load allocation for this tributary was computed using water-quality sample data collected at point NT14. The average flow, measured at the sampling point NT14 (0.20 MGD), is used for these computations.

There currently is no entry for this segment on the Section Pa 303(d) list for impairment due to pH. Sample data at point NT14 shows pH ranging between 4.5 and 5.9 pH will be addressed as part of this TMDL because of the mining impacts.

Table C3. Load Allocations at Point NT14				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	LTAConc. (mg/l)	Load (lbs/day)
Al	ND	ND	NA	NA
Fe	ND	ND	NA	NA
Mn	0.09	0.16	0.09	0.16
Acidity	3.42	5.8	1.20	2.0
Alkalinity	3.48	5.9		

Table C4. Calculation of Load Reduction necessary at Point NT-14				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	ND	ND	0.16	5.8
Allowable Load=TMDL	NA	NA	0.16	2.0
Load Reduction	0.0	0.0	0.000	3.8
Total % Reduction	0	0	0	65

Waste Load Allocation – Fisher Mining Company

The Fisher Mining Company's Thomas Mine Permit has two permitted treatment facilities. One TR2 is upstream of Sample Point OR05. The waste load allocation was calculated as described in the Method to Quantify Treatment Pond Pollutant Loading section of the report and is incorporated into the calculations at OR05. This is the first downstream monitoring point that receives all the potential flow of treated water. The following table shows the waste load allocation.

Table C5. Waste Load Allocation			
Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
TR2			
Fe	3.0	0.1386	3.5
Mn	2.0	0.1386	2.3
Al	2.0	0.1386	2.3

<u>TMDL Calculation – Sample Point OR05 Right Fork Otter Run Before confluence with Left Fork Otter Run</u>

The TMDL for sample point OR05 on the Right Fork Otter Run consists of a load allocation to the area above the point shown in Attachment A. The load allocation for this stream segment was computed using water-quality sample data collected at point OR05. The average flow, measured at the sampling point OR05 (2.49 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point OR05 shows pH ranging between 4.7 and 6.8; pH will be addressed as part of this TMDL because of the mining impacts.

All values for aluminum and iron are below the method detection limits. Because the WQS are met, a TMDL for aluminum and iron are not necessary. Although a TMDL is not necessary a WLA is assigned to the permitted discharge located on the segment. The acceptable aluminum load at this point is the flow of 1.92 mgd times the criterion or 0.75 mg/l times a conversion factor, or 12.0 lbs/day. The acceptable iron load at this point is the flow of 1.92 mgd times the criterion of 1.5 mg/l times a conversion factor, or 24.6 lbs/day. The WLAs of 3.5 lbs/day for iron and 2.3 lbs/day for aluminum are significantly less than these values and therefore are acceptable loading to the segment.

Table C6. Load Allocations at Point OR05

	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	LTAConc. (mg/l)	Load (lbs/day)
Al	ND	ND	NA	NA
Fe	ND	ND	NA	NA
Mn	0.28	5.7	0.26	5.4
Acidity	4.24	88.5	1.15	23.9
Alkalinity	4.68	97.6		

The calculated load reductions for all the loads that enter point OR05 must be accounted for in the calculated reductions at sample point OR05 shown in Table C7. A comparison of measured loads between points NT-16, NT-14 and OR05 shows that there is additional loading entering the segment for manganese and acidity. This indicates that instream processes, such as settling, are taking place within the segment. It also indicates that no additional aluminum and iron loading are directly entering the segment. To determine the total segment aluminum and iron loads, the percent decrease in existing loads between NT-16, NT-14 and OR05 is applied to the upstream loads entering the segment.

Table C7. Calculation of Load Reduction Necessary at Point OR05				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	ND	ND	5.7	88.4
Difference in Existing Load between NT-16, NT-14 & OR05	-	-	5.6	82.1
Load tracked from NT-16 & NT-14	-	-	0.2	2.2
Total Load tracked between points NT-16 & NT-14	-	-	5.7	84.3
Allowable Load at OR05	NA	NA	5.4	24.0
Load Reduction at OR05	0.0	0.0	0.3	60.3
% Reduction required at OR05	0	0	5	72

TMDL Calculation – Sample Point OR04; mouth of Left Fork Otter Run

The TMDL for sample point OR04 consists of a load allocation to all of the area above the point shown in Attachment A. The load allocation for this tributary was computed using water-quality sample data collected at point OR04. The average flow, measured at the sampling point OR04 (1.92 MGD), is used for these computations.

There currently is no entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point OR04 shows pH ranging between 5.5 and 6.4; pH will be analyzed. The method and rationale for addressing pH is contained in Attachment B.

Table C8. Load Allocations at Point OR04				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	LTA Conc. (mg/l)	Load (lbs/day)
Al	ND	ND	NA	NA
Fe	ND	ND	NA	NA
Mn	ND	ND	NA	NA
Acidity	4.73	75.7	2.93	46.9
Alkalinity	9.47	151.3		

Table C9. Calculation of Load Reduction Necessary at Point OR05				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	ND	ND	ND	75.6
Allowable Load=TMDL	NA	NA	NA	46.9
Load Reduction=	0.0	0.0	0.0	28.7
Total % Reduction	0	0	0	38

<u>TMDL Calculation – Sample Point OR01; Otter Run before confluence with Buckeye Run</u>

The TMDL for sampling point OR01 consists of a load allocation to Otter Run shown in Attachment A. The load allocation for this stream segment was computed using water-quality sample data collected at point OR01. The average flow, measured at the sampling point OR01 (4.19 MGD), is used for these computations.

There currently is no entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point OR01 shows pH ranging between 5.4 and 6.4; pH will be addressed as part of this TMDL because of the mining impacts.

Table C10. Load Allocation at Point OR01				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	LTAConc. (mg/l)	Load (lbs/day)
Al	ND	ND	NA	NA
Fe	ND	ND	NA	NA
Mn	0.12	4.3	0.12	4.3
Acidity	3.78	132.1	2.08	72.6
Alkalinity	9.48	331.4		

The calculated load reductions for all the loads that enter point OR01 must be accounted for in the calculated reductions at sample point OR01 shown in Table C10. A comparison of measured loads between points OR04, OR05 and OR01 shows that there is additional loading entering the segment for manganese and acidity. This indicates that instream processes, such as settling, are taking place within the segment. It also indicates that no additional aluminum and iron loading are directly entering the segment. To determine the total segment manganese and acidity loads, the percent decrease in existing loads between OR04, OR05 and OR01 is applied to the upstream loads entering the segment.

Table C11. Calculation of Load Reduction Necessary at Point OR01				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	ND0	0.0	4.3	132.1
Difference in Existing Load between OR05, OR04 & OR01	-	-	-1.5	-32.0
Load tracked from OR05 & OR04	-	-	5.4	70.9
Percent loss due to instream process	-	-	26	20
Percent load tracked from OR05 & OR04	-	-	74	80
Total Load tracked between points OR05 & OR04	-	-	4.0	57.1
Allowable Load at OR01	NA	NA	5.4	72.6
Load Reduction at OR01	0.0	0.0	0.0	0.0
% Reduction required at OR01	0	0	0	0

TMDL Calculation – Sample Point M3A; Buckeye Run upstream of confluence with Jack Cammels Run

The TMDL for sample point M3A consists of a load allocation for the area upstream of sample point M3A. The load allocation for this stream segment was computed using water-quality sample data collected at point M3A. The average flow (3.29 MGD) measured at the sampling point, is used for these computations.

There currently is an entry for this segment on the Pa 303(d) list for impairment due to pH. Sample data at point M3A shows pH ranging between 5.2 and 6.7; pH will be addressed as part of this TMDL because of the mining impacts.

Table C12. Load Allocations at Point M3A				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	LTA Conc. (mg/l)	Load (lbs/day)
Al	0.40	11.1	0.12	3.3
Fe	0.15	4.0	0.15	4.0
Mn	4.80	131.5	0.30	8.1
Acidity	17.98	492.9	1.39	37.9
Alkalinity	7.29	199.9		

Table C13. Calculation of Load Reduction Necessary at Point M3A				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	11.1	4.0	131.5	492.9
Allowable Load=TMDL	3.3	4.0	8.1	37.9
Load Reduction=	7.8	0.0	123.4	455.0
Total % Reduction	71	0	94	92

TMDL Calculation – Sample Point JC1; Jack Cammels Camp Run upstream of confluence with Buckeye Run

The TMDL for sample point JC1 consists of a load allocation to all of the area above the point shown in Attachment A. The load allocation for this tributary was computed using water-quality sample data collected at point JC1. The average flow, measured at the sampling point JC1 (0.67 MGD), is used for these computations.

There currently is no entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point JC1 shows pH ranging between 5.3 and 6.0.

Table C14. Load Allocations at Point JC1				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	LTA Conc. (mg/l)	Load (lbs/day)
Al	ND	ND	NA	NA
Fe	ND	ND	NA	NA
Mn	ND	ND	NA	NA
Acidity	2.70	15.0	1.89	10.5
Alkalinity	11.43	63.5		

Table C15. Calculation of Load Reduction Necessary at Point JC1				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	ND	ND	ND	15.0
Allowable Load=TMDL	NA	NA	NA	10.5
Load Reduction	0.0	0.0	0.0	4.5
Total % Reduction	0	0	0	30

Waste Load Allocation – Fisher Mining Company

The Fisher Mining Company's Thomas Mine Permit has two permitted treatment facilities. One TR1 is upstream of Sample Point BR01. The waste load allocation was calculated as described in the Method to Quantify Treatment Pond Pollutant Loading section of the report and is incorporated into the calculations at BR01. This is the first downstream monitoring point that receives all the potential flow of treated water. The following table shows the waste load allocation.

Table C16. Waste Load Allocation			
Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
TR1			
Fe	3.0	0.1386	3.5
Mn	2.0	0.1386	2.3
Al	2.0	0.1386	2.3

TMDL Calculation – Sample Point BR01; Buckeye Run upstream of confluence with Otter Run

The TMDL for sampling point BR01 shown in Attachment A consists of a load allocation for the area above sample point BR01. The load allocation for this tributary was computed using water-quality sample data collected at point BR01. The average flow (3.93 MGD) measured at the sampling point, is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point BR01 shows pH ranging between 5.9 and 6.7; pH will be addressed as part of this TMDL because of the mining impacts.

All values for aluminum and iron are below the method detection limits. Because the WQS are met, a TMDL for aluminum and iron are not necessary. Although a TMDL is not necessary a WLA is assigned to the permitted discharge located on the segment. The acceptable aluminum load at this point is the flow of 3.93 mgd times the criterion or 0.75 mg/l times a conversion factor, or 24.0 lbs/day. The acceptable iron load at this point is the flow of 3.93 mgd times the criterion of 1.5 mg/l times a conversion factor, or 49.6 lbs/day. The WLAs of 3.5 lbs/day for iron and 2.3 lbs/day for aluminum are significantly less than these values and therefore are acceptable loading to the segment.

Table C17. Load Allocations at Point BR01

	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	LTAConc. (mg/l)	Load (lbs/day)
Al	ND	ND	NA	NA
Fe	ND	ND	NA	NA
Mn	2.67	87.7	0.32	10.5
Acidity	9.17	300.9	1.74	57.1
Alkalinity	12.00	393.7		

The calculated load reductions for all the loads that enter point BR01 must be accounted for in the calculated reductions at sample point BR01 shown in Table D13. A comparison of measured loads between points OR04, M3A and JC1 shows that there is additional loading entering the segment. This indicates that instream processes, such as settling, are taking place within the segment. To determine the total segment aluminum, iron, manganese and acidity loads, the percent decrease in existing loads between M3A, JC1 and BR01 is applied to the upstream loads entering the segment.

Table C18. Calculation of Load Reduction Necessary at Point BR01				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	ND	ND	87.7	300.9
Difference in Existing Load between M3A, JC1 & BR01	-	-	-43.7	-207.0
Load tracked from M3A & JC1	-	-	8.1	48.5
Percent loss due to instream process	-	-	33	41
Percent load tracked from M3A & MC1	-	-	67	59
Total Load tracked between points M3A & JC1	-	-	5.4	28.7
Allowable Load at BR01	NA	NA	10.5	57.1
Load Reduction at BR01	0.0	0.0	0.0	0.0
% Reduction required at BR01	0	0	0	0

<u>TMDL Calculation – Sample Point OR14; Otter Run upstream of confluence with Silver Branch</u>

The TMDL for sample point OR14 consists of a load allocation of the area between sample points OR14, OR01 and OR04. The load allocation for this tributary was computed using water-quality sample data collected at point OR14. The average flow (6.82) MGD, measured at the sampling point, is used for these computations.

There currently is no entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point OR14 shows pH ranging between 5.5 and 6.9; pH will be addressed as part of this TMDL because of the mining impacts.

Table C19. Load Allocations at Point OR14				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	LTAConc. (mg/l)	Load (lbs/day)
Al	0.14	7.8	0.07	4.0
Fe	0.08	4.6	0.08	4.6
Mn	1.83	104.0	0.21	12.2
Acidity	1.71	97.6	1.04	59.3
Alkalinity	8.38	476.6		

The calculated load reductions for all the loads that enter point OR14 must be accounted for in the calculated reductions at sample point OR14 shown in Table D15. A comparison of measured loads between points OR01, BR01 and OR14 shows that there is additional loading entering the segment. This indicates that instream processes, such as settling, are taking place within the segment. It also indicates that no additional aluminum and iron loading are directly entering the segment. To determine the total segment manganese and acidity loads, the percent decrease in existing loads between OR01, BR01 and OR14 is applied to the upstream loads entering the segment.

Table C20. Calculation of Load Reduction Necessary at Point OR14				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	7.8	4.6	104.0	97.6
Difference in Existing Load between OR01, BR01 & OR14	7.8	4.6	12.0	-335.4
Load tracked from OR05 & OR04	0.0	0.0	14.8	129.8
Percent loss due to instream process	-	-	-	77
Percent load tracked from OR01 & BR01	-	-	-	23
Total Load tracked between points OR01 & BR01	7.8	4.6	26.8	29.2
Allowable Load at OR14	4.0	4.6	12.2	59.3
Load Reduction at OR14	3.7	0.0	14.6	0.0
% Reduction required at OR14	48	0	54	0

<u>TMDL Calculation – Silver Branch; Downstream of sample point OR14</u>

There were no allocations calculated for Silver Branch because it is attaining. Aluminum, manganese, and iron samples were all below detection and Silver Branch is an alkaline waterbody.

From sample point 0R14 to the mouth of Otter Run there are no abandoned mine discharges. Data for a sample point at the mouth of Otter Run is included in Attachment E, page 54; all of the metals data are well below criteria, the sample point is net alkaline, and the pH is 6.

Margin of Safety

PADEP used an implicit MOS in these TMDLs derived from the Monte Carlo statistical analysis. The Water Quality standard states that water quality criteria must be met at least 99%

of the time. All of the @Risk analyses results surpass the minimum 99% level of protection. Another margin of safety used for this TMDL analysis results from:

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

Excerpts Justifying Changes Between the 1996, 1998, 2002 and 2004 Section 303(d) Lists

The following are excerpts from the Pennsylvania DEP Section 303(d) narratives that justify changes in listings between the 1996, 1998, draft 2000, and draft 2002 list. 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).

The most notable difference between the 1998 and Draft 2000 Section 303(d) lists are the listing of unnamed tributaries in 2000. In 1998, the GIS stream layer was coded to the named stream level so there was no way to identify the unnamed tributary records. As a result, the unnamed tributaries were listed as part of the first downstream named stream. The GIS stream coverage used to generate the 2000 list had the unnamed tributaries coded with the DEP’s five-digit stream code. As a result, the unnamed tributary records are now split out as separate records on the 2000 Section 303(d) list. This is the reason for the change in the appearance of the list and the noticeable increase in the number of pages. After due consideration of comments from EPA and PADEP on the draft 2000 Section 303(d) list, the draft 2002 Pa Section 303(d) list was written in a manner similar to the 1998 Section 303(d) list.

Attachment E

Water Quality Data Used In TMDL Calculations

NT-16

	Flow	pH		Alkalinity	Acidity	Iron	Manganese	Aluminum
Date	gpm	Field	Lab	mg/l	mg/l	mg/l	mg/l	mg/l
1/11/1991	15.6	6.50	5.47	3.95	5.77	<.10	<.10	<.10
2/2/1991	12.0	7.00	5.45	4.45	3.77	<.10	<.10	<.10
3/9/1991	45.0	5.60	5.35	3.95	2.83	<.10	<.10	<.10
4/6/1991	18.0	5.68	5.44	4.24	4.41	<.10	<.10	<.10
5/4/1991	18.0	5.58	5.63	4.71	2.45	<.10	<.10	<.10
6/8/1991	DRY							
7/8/1991	DRY							
8/1/1991	DRY							
9/14/1991	DRY							
10/5/1991	DRY							
11/9/1991	DRY							
12/7/1991	2.0	5.94	5.27	4.94	2.51	<.10	<.10	<.10
1/5/1992	9.7	5.83	5.34	5.92	2.01	<.10	<.10	<.10
2/8/1992	6.6	5.71	5.39	4.44	2.01	<.10	<.10	<.10
3/7/1992	20.0	4.53	5.35	4.94	1.00	<.10	<.10	<.10
4/17/1992	45.0	5.83	5.34	4.94	1.51	<.10	<.10	<.10
5/2/1992	14.0	5.16	5.40	4.44	1.51	<.10	<.10	<.10
6/13/1992	6.6	5.08	5.37	4.44	3.02	<.10	<.10	<.10
7/14/1992	23.0	5.69	5.29	4.42	1.98	<.10	<.10	<.10
8/7/1992	3.0	5.34	5.53	5.40	1.49	<.10	<.10	<.10
9/19/1992	DRY							
10/10/1992	2.0	5.31	5.77	3.93	0.99	<.10	<.10	<.10
11/14/1992	37.0	5.68	5.44	3.93	0.99	<.10	<.10	<.10
12/14/1992	9.7	5.70	5.40	3.93	1.48	<.10	<.10	<.10
1/9/1993	30.0	5.80	5.35	4.42	1.48	<.10	<.10	<.10
2/27/1993	2.0	NA	5.71	6.06	1.00	<.10	<.10	<.10
3/20/1993	5.0	NA	5.69	4.55	1.50	<.10	<.10	<.10
4/17/1993	60.0	5.46	5.22	4.04	1.00	<.10	<.10	<.10
5/22/1993	15.0	5.59	5.44	4.04	0.50	<.10	<.10	<.10
6/21/1993	1.0	5.30	5.77	4.04	1.50	<.10	<.10	<.10
7/13/1993	DRY							
8/5/1993	DRY							
9/18/1993	DRY							
10/16/1993	DRY							
11/13/1993	5.0	4.72	5.63	4.04	1.50	<.10	<.10	<.10
12/12/1993	14.0	5.10	5.32	3.54	1.50	<.10	<.10	<.10
6/21/2001	DRY							
9/17/2001	DRY							
12/10/2001	1.0	5.69	5.48	4.88	0.47	<.10	<.10	<.10
4/29/2002	10		5.3	11.2	20.0	<.3	<.050	<.5

NT-14

	Flow	pH		Alkalinity	Acidity	Iron	Manganese	Aluminum
Date	gpm	Field	Lab	mg/l	mg/l	mg/l	mg/l	mg/l
1/11/1991	50	5.9	4.9	1.98	5.77	<.10	<.10	<.10
2/2/1991	25	5.8	5.01	3.95	3.77	<.10	<.10	<.10
3/9/1991	200	5.3	4.93	3.46	5.66	<.10	<.10	<.10
4/6/1991	50	5.01	4.86	3.77	4.41	<.10	<.10	<.10
5/4/1991	50	4.93	5.03	3.77	3.92	<.10	<.10	<.10
6/8/1991	DRY							
7/8/1991	DRY							
8/1/1991	DRY							
9/14/1991	DRY							
10/5/1991	DRY							
11/9/1991	DRY							
12/7/1991	5	5.05	4.96	3.95	4.02	<.10	<.10	<.10
1/5/1992	54	5.01	4.94	3.95	3.52	<.10	<.10	<.10
2/8/1992	10	5.31	5.01	3.95	3.02	<.10	<.10	<.10
3/7/1992	185	4.75	4.98	3.95	2.51	<.10	<.10	<.10
4/17/1992	204	5.42	4.97	3.95	3.02	<.10	<.10	<.10
5/2/1992	37	4.81	4.96	3.46	2.01	<.10	<.10	<.10
6/13/1992	18	4.64	4.82	3.46	5.03	<.10	<.10	<.10
7/14/1992	130	5.33	4.77	3.44	3.47	<.10	<.10	<.10
8/7/1992	DRY							
9/19/1992	DRY							
10/10/1992	DRY							
11/14/1992	165	5.54	4.92	2.46	2.48	<.10	<.10	<.10
12/14/1992	35	5.34	4.95	2.95	3.47	<.10	<.10	<.10
1/16/1993	130	5.41	4.87	3.44	1.98	<.10	<.10	<.10
2/27/1993	frozen							
3/20/1993	ND	NA	5.05	4.04	3.00	<.10	<.10	<.10
4/17/1993	2000	5.03	4.75	2.02	3.50	<.10	0.13	<.10
5/15/1993	37	4.99	4.82	3.53	3.00	<.10	<.10	<.10
6/21/1993	25	4.92	4.99	2.52	2.00	<.10	<.10	<.10
7/13/1993	Dry							
8/5/1993	Dry							
9/18/1993	Dry							
11/13/1993	15	5.67	5.15	2.52	2.00	<.10	<.10	<.10
12/12/1993	200	4.64	4.84	2.02	2.50	<.10	<.10	<.10
1/2/2001	5	4.59	5	2.82	1.32	<.10	<.10	<.10
2/5/2001	DRY							
3/7/2001	DRY							
4/3/2001	15	4.47	5	2.35	1.32	<.10	<.10	<.10
5/1/2001	DRY							
6/5/2001	DRY							
7/2/2001	25	4.94	4.87	2.73	2.65	0.12	<.10	<.10
8/13/2001	DRY							
9/4/2001	DRY							

10/8/2001	DRY							
11/12/2001	DRY							
12/10/2001	2	4.68	4.93	2.93	1.89	<.10	<.10	<.10
4/29/2002	8		4.8	10.6	11.0	<.3	0.05	<.5

OR05

	Flow	**pH**		**Alkalinity**	**Acidity**	**Iron**	**Manganese**	**Aluminum**
Date	**gpm**	**Field**	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
1/11/1991	NA	5.80	4.78	2.96	11.5	<.10	0.29	<.10
2/2/1991	NA	5.10	4.76	2.96	7.08	<.10	<.10	<.10
3/9/1991	NA	5.20	4.82	2.47	6.13	<.10	0.25	<.10
4/6/1991	NA	4.99	5.02	3.3	4.9	<.10	0.18	<.10
5/4/1991	NA	5.15	5.12	4.24	6.37	<.10	0.14	<.10
6/8/1991	NA	5.31	5.58	3.77	1.96	<.10	0.20	<.10
7/8/1991	70	5.69	5.82	6.6	0	<.10	<.10	<.10
8/1/1991	25	5.48	5.89	8.95	0	<.10	<.10	<.10
9/14/1991	15	5.75	6.00	8.48	0	<.10	<.10	<.10
10/5/1991	50	5.82	6.09	8.48	0	<.10	0.17	<.10
11/9/1991	30	5.74	6.05	7.9	0	<.10	<.10	<.10
12/7/1991	2000	4.68	4.90	3.46	6.03	<.10	0.43	<.10
1/5/1992	1000	5.46	5.01	3.95	3.02	<.10	0.27	<.10
2/8/1992	400	5.84	5.24	3.95	3.52	<.10	0.16	<.10
3/7/1992	2000	5.21	4.97	3.46	4.02	<.10	0.21	<.10
4/17/1992	5200	4.84	4.85	3.95	5.03	<.10	0.24	<.10
5/2/1992	3000	5.26	5.00	3.46	5.02	<.10	0.24	<.10
6/13/1992	2000	5.34	5.11	3.93	5.94	<.10	0.14	<.10
7/14/1992	NA	4.99	4.65	2.95	4.95	<.10	0.21	<.10
8/7/1992	1250	5.21	4.98	3.44	3.46	<.10	0.31	<.10
9/19/1992	800	NA	5.29	3.93	2.48	<.10	0.21	<.10
10/10/1992	1010	5.76	5.39	3.93	3.47	<.10	0.26	<.10
11/14/1992	7000	5.75	4.94	3.44	3.46	<.10	0.17	<.10
12/14/1992	5390	5.29	5.05	3.93	4.45	<.10	0.20	<.10
1/9/1993	5180	5.24	4.93	3.93	4.45	<.10	0.25	<.10
2/27/1993	500	NA	5.48	5.55	3.00	<.10	0.17	<.10
3/20/1993	2000	NA	5.34	3.54	3.50	<.10	0.13	<.10
4/17/1993	5000	4.67	4.55	2.02	5.00	<.10	0.25	<.10
5/22/1993	838	5.17	4.78	3.54	4.00	<.10	0.33	<.10
6/21/1993	299	4.95	5.25	3.03	3.50	<.10	0.30	<.10
7/13/1993	468	5.81	6.32	6.56	0.00	<.10	<.10	<.10
8/5/1993	312	5.89	6.11	8.59	0.00	<.10	<.10	<.10
9/18/1993	100	5.73	5.97	6.06	0.00	<.10	0.10	<.10
10/16/1993	307	5.32	5.77	6.06	0.00	<.10	0.12	<.10
11/13/1993	2860	5.49	5.29	3.03	2.50	<.10	0.20	<.10
12/12/1993	4560	4.48	4.92	2.52	4.50	<.10	0.25	<.10
1/15/2001	NA	6.00	5.44	5.17	2.21	<.10	0.34	<.10
2/19/2001	NA	5.49	5.25	3.29	1.77	<.10	0.17	<.10
3/21/2001	NA	4.88	4.85	2.35	3.09	<.10	0.23	<.10
4/16/2001	NA	5.17	4.81	1.88	3.53	<.10	0.22	<.10

5/7/2001	NA	6.55	5.27	2.82	3.09	<.10	0.28	<.10
6/18/2001	NA	6.79	5.54	3.64	2.63	<.10	0.29	<.10
7/9/2001	NA	5.40	5.38	3.64	2.21	<.10	0.36	<.10
8/20/2001	NA	5.39	5.23	3.64	4.39	<.10	0.69	<.10
9/17/2001	NA	5.48	5.33	3.18	6.14	<.10	0.56	<.10
10/1/2001	NA	5.59	5.20	2.73	4.39	<.10	0.77	<.10
11/6/2001	NA	5.57	5.30	3.9	3.78	<.10	0.59	<.10
12/3/2001	NA	5.30	5.24	2.93	3.78	<.10	0.49	<.10
4/23/2001			4.9	6.2	2.20	<.3	0.27	<.5
3/20/2002	1265		5.0	8.8	12.20	<.3	0.49	<.5
4/16/2002	4800		4.9	6.2	13.60	<.3	0.21	<.5
5/28/2002	1275		4.7	7.6	7.00	<.3	0.41	<.5
6/25/2002	920		5.0	5.8	9.80	<.3	0.75	<.5
8/12/2002	205		5.8	9.4	3.80	<.3	0.24	<.5
8/14/2002	205		5.6	8.4	7.60	<.3	0.64	<.5
10/2/2002	140		5.0	8.4	17.20	<.3	1.04	0.89

OR04

	pH	**Alkalinity**	**Acidity**	**Iron**	**Manganese**	**Aluminum**	**Flow**
Date	**Lab**	**mg/l**	**mg/l**	**ug/l**	**ug/l**	**ug/l**	**gpm**
3/20/2002	5.7	9.8	8.4	<300.00	<50.00	<500.00	500
4/16/2002	5.6	7.0	8.2	<300.00	<50.00	<500.00	5400
5/28/2002	5.5	8.8	2.6	<300.00	<50.00	<500.00	1170
6/25/2002	6.1	7.6	3.4	<300.00	<50.00	<500.00	795
8/14/2002	6.3	11.6	1.2	<300.00	<50.00	<500.00	95
10/2/2002	6.4	12.0	4.6	<300.00	<50.00	<500.00	25

OR01

	pH*	**Alkalinity^**	**Acidity**	**Iron**	**Manganese**	**Aluminum**	**Flow**
Date	**Lab**	**mg/l**	**mg/l**	**ug/l**	**ug/l**	**ug/l**	**gpm**
7/19/1999	6.2	12.2	0.0	<20.00	19.00	<200.00	
8/23/2000	6.1	11.8	0.0	39.00	72.00	<200.00	
11/16/2000	6.3	11.8	NA	<20.00	122.00	<200.00	
4/23/2001	5.6	7.2	0.0	<300.00	88.00	<500.00	
3/20/2002	6.2	8.4	7.0	<300.00	175.00	<500.00	2300
4/16/2002	5.4	6.8	8.8	<300.00	84.00	<500.00	9960
5/28/2002	5.6	8.4	4.0	<300.00	113.00	<500.00	3120
6/25/2002	6.2	7.2	4.2	<300.00	168.00	<500.00	1640
8/14/2002	6.4	11.0	2.0	<300.00	84.00	<500.00	290
10/2/2002	6.4	10.0	8.0	<300.00	296.00	<500.00	154

M3A

	Flow	pH		Alkalinity	Acidity	Iron	Manganese	Aluminum
Date	**gpm**	**Field**	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
1/10/2000	1225	6.69	6.61	7.39	0	0.2	2.17	<.10
4/6/2000	7180	NA	6.3	5.24	2.83	<.10	1.6	<.10
7/6/2000	NA	6.29	6.63	7.62	1.42	0.18	7.71	<.10
10/3/2000	NA	5.85	6.31	7.05	3.53	0.12	10.1	1
11/1/2000	200	7.06	6.19	6.58	5.74	0.25	8.91	1.67
1/2/2001	Frozen	5.56	5.57	4.23	8.83	0.33	3.48	<.10
4/3/2001	NA	5.46	6.03	4.23	3.97	0.12	1.97	<.10
7/2/2001	NA	5.48	5.58	3.64	6.18	0.18	2.24	<.10
10/8/2001	NA	5.22	6.12	4.88	8.33	0.23	5.71	0.43
3/23/2001			5.4	7.8	3.4	0.33	1.02	<.5
3/20/2002	1970		5.4	8.4	48.0	0.40	3.00	1.15
4/17/2002	6610		5.1	10.8	26.8	<.3	1.28	<.5
5/29/2002	1835		5.9	9.2	25.8	<.3	4.54	<.6
6/26/2002	985		5.5	9.6	41.4	<.3	5.57	0.56
8/14/2002	205		5.4	10.0	43.6	<.3	9.60	0.66
10/2/2002	336		5.1	10.0	57.8	<.3	7.83	0.99

JC1

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**ug/l**	**ug/l**	**ug/l**	**gpm**
3/20/2002	6.0	11.2	8.0	<300.00	<50.00	<500.00	670
4/17/2002	5.6	12.8	5.6	<300.00	<50.00	<500.00	1510
5/29/2002	6.3	10.4	2.6	<300.00	<50.00	<500.00	385
6/26/2002	6.8	11.6	0.0	<300.00	<50.00	<500.00	185
8/14/2002	6.5	11.6	0.0	<300.00	<50.00	<500.00	10
10/2/2002	6.5	11.0	0.0	<300.00	<50.00	<500.00	14

BR01

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
4/23/2001	6.1	9.4	0.0	<.3	0.90	<.5	
3/20/2002	6.4	10.0	32.8	<.3	1.55	<.5	2360
4/16/2002	5.9	7.8	23.6	<.3	0.80	<.5	8920
5/28/2002	6.0	12.4	7.8	<.3	3.03	<.5	2845
6/26/2002	6.6	9.8	0.0	<.3	3.86	<.5	1570
8/12/2002	6.7	19.0	0.0	<.3	4.46	<.5	360
10/2/2002	6.7	15.6	0.0	<.3	4.12	<.5	335

OR14

	Flow	pH		Alkalinity	Acidity	Iron	Manganese	Aluminum
Date	gpm	Field	Lab	mg/l	mg/l	mg/l	mg/l	mg/l
6/1/1994	NA	NA	6.57	5.69	0	0.10	1.06	0.10
12/5/1994	NA	6.57	6.06	5.88	2.03	0.56	0.40	0.10
1/4/1995	NA	6.86	6.77	7.35	0	0.10	1.91	0.10
2/11/1995	ICED	6.68	6.38	5.39	0.51	0.10	1.32	0.10
3/11/1995	NA	6.17	6.15	5.39	1.01	0.10	0.39	0.10
4/8/1995	4310	6.36	6.44	6.43	0.49	0.10	0.35	0.10
5/6/1995	9380	6.78	6.21	5.44	0.98	0.10	0.24	0.10
6/10/1995	8080	6.52	6.13	5.44	0.49	0.10	0.22	0.10
7/12/1995	NA	6.96	6.38	5.44	0.49	0.10	0.22	0.10
8/3/1995	1850	6.68	6.23	4.95	0.49	0.10	0.59	0.10
9/12/1995	598	5.65	5.59	4.75	9.09	0.10	4.66	0.10
10/3/1995	310	6.14	6.00	3.8	3.53	0.10	1.13	0.10
11/17/1995	18800	6.20	6.14	4	3	0.10	1.06	0.10
12/6/1995	14000	6.35	6.40	5	2	0.10	1.13	0.10
1/2/1996	3800	6.60	6.48	7	2	0.10	2.46	0.10
2/10/1996	7300	6.55	6.14	4	4	0.10	2.77	0.10
3/16/1996		5.94	6.37	4	2	0.10	0.84	0.10
4/13/1996		6.30	6.30	4	3	0.10	0.72	0.10
5/11/1996	16600	6.48	6.71	5	2	0.10	1.19	0.10
6/8/1996	5030	6.54	6.84	7	4	0.10	3.50	0.10
7/12/1996	2230	6.70	7.03	8	0	0.10	3.13	0.10
8/1/1996	1260	6.70	6.96	8	0	0.10	2.78	0.10
9/14/1996	5400	6.21	6.36	5	5	0.46	1.53	0.10
10/12/1996	4850		6.89	7	0	0.10	0.34	0.10
11/16/1996		6.66	6.45	5	1	0.10	2.30	0.10
12/14/1996		6.20	6.31	4	1	0.10	0.63	0.10
1/11/1997		6.87	6.92	6	0	0.10	2.33	0.10
2/8/1997		6.87	6.70	7	0	0.10	2.27	0.10
3/15/1997			6.76	5	0	0.10	1.09	0.10
4/5/1997		6.30	6.85	6	0	0.10	1.61	0.10
5/10/1997	6780		6.22	6	0	0.10	1.79	0.10
6/7/1997	6950		6.62	7	0	0.10	1.10	0.10
7/21/1997	1060	6.46	6.83	10	0	0.10	2.28	0.10
8/6/1997	673	5.85	6.75	12	0	0.10	2.74	0.10
9/8/1997		5.50	6.89	11	0	0.10	4.53	0.10
9/13/1997	2360	6.15	6.62	9	0	0.10	3.08	0.10
9/25/1997		5.50	6.86	10	0	0.10	4.48	0.10
10/11/1997	1350	6.47	6.80	10	2	0.10	3.95	0.10
11/3/1997		5.50	6.40	6	1	0.10	0.57	0.10
11/8/1997		6.31	6.12	6	4	0.50	1.10	1.50
11/17/1997			6.20	14	6	0.07	1.75	0.27
12/4/1997			6.10	12	6	0.07	1.67	0.29
12/6/1997		6.41	6.50	6	0	0.10	1.61	0.10
12/17/1997			6.10	15	2	0.08	2.56	0.33

1/6/1998			5.70	9	7	0.14	0.55	0.35
1/10/1998		6.05	6.01	4	2	<.10	0.77	0.10
1/20/1998			6.10	13	11	0.08	3.76	0.32
2/7/1998			6.78	7	0	<.10	2.81	<.10
2/9/1998			6.30	11		0.13	2.71	0.43
3/7/1998			6.30	6	0	<.10	2.15	<.10
3/17/1998			6.50	6	1	<.10	2.52	<.10
4/4/1998		6.40	6.48	7	0	<.10	2.37	<.10
4/14/1998			5.90	10		0.13	1.62	1.31
5/9/1998		5.69	6.13	44	1	<.10	0.65	<.10
6/13/1998			5.70	8	0	<.10	2.87	<.10
7/6/1998			6.40	16		0.09	5.18	0.70
7/14/1998		6.60	6.74	9	0	<.10	4.41	<.10
8/19/1998			6.33	7	2	<.10	4.70	<.10
9/12/1998			6.72	10	0	<.10	4.32	<.10
10/10/1998		5.95	6.02	5	4	0.13	3.45	<.10
10/31/1998		6.69	6.67	20	0	<.10	13.50	<.10
11/7/1998		6.72	6.68	10	0	<.10	4.56	<.10
12/5/1998	126	6.50	6.61	9	0	<.10	3.74	<.10
1/9/1999		6.37	6.55	10	0	<.10	3.45	<.10
2/13/1999		6.27	6.27	5	1	<.10	1.07	<.10
3/13/1999			6.50	5	0	<.10	1.16	<.10
3/30/1999			6.00	9	3	0.04	0.63	<.20
4/24/1999		6.35	6.36	5	1	<.10	1.11	<.10
5/15/1999		7.08	7.16	16	0	<.10	1.37	<.10
6/21/1999		6.40	6.67	9	0	<.10	1.14	<.10
7/8/1999		6.59	6.51	10	0	<.10	1.38	<.10
7/19/1999			6.20	15	0	0.04	1.32	<.20
8/9/1999			6.20	15	0	<.20	1.25	<.20
8/18/1999		6.28	6.56	9	0	<.10	0.70	<.10
9/13/1999		6.41	6.58	8	13	<.10	0.81	<.10
10/13/1999		6.37	6.47	8	0	<.10	0.14	<.10
11/15/1999		6.30	6.53	8	0	<.10	0.96	<.10
12/15/1999		6.05	6.11	5	2	<.10	0.42	<.10
1/15/2001	ICED	7.18	6.54	7.05	0	<.10	0.89	<.10
2/19/2001	6732	6.29	6.33	5.64	0	<.10	0.21	<.10
3/21/2001	8200	7.04	6.09	3.76	0.44	<.10	0.24	<.10
4/16/2001	NA	6.92	6.17	4.23	0	0.12	0.43	<.10
5/7/2001	6380	6.30	6.47	5.64	0	<.10	0.84	<.10
6/18/2001	3297	6.46	6.49	6.37	0	<.10	0.88	<.10
7/9/20001	3548	6.22	6.60	7.28	0	<.10	0.87	<.10
8/23/2001	1796	5.92	6.44	8.19	0	<.10	0.78	<.10
9/20/2001	1228	5.53	6.63	7.28	0	<.10	0.77	<.10
10/26/2001	2165	7.55	6.53	6.34	0	<.10	0.56	<.10
11/6/2001	1947	6.79	6.61	7.81	0	<.10	0.95	<.10
12/3/2001	7825	6.55	6.46	5.37	0	<.10	0.57	<.10
7/24/2000			6.3	12.6	0.0	<.3	2.07	<.5
8/23/2000			6.1	13.0	2.2	1.57	3.14	3.43

4/23/2001			6.2	8.2	0.0	0.05	0.43	0.20
9/26/2001			6.1	9.8	10.6	0.10	0.98	0.20
3/20/2002	4720.00		6.2	10.4	14.2	0.09	0.91	0.21
4/17/2002	5000.00		5.4	11.0	11.4	<.3	0.41	<.5
5/30/2002	6740		6.1	11.4	10.4	<.3	1.36	<.5
6/26/2002	1015		6.6	11.0	0.0	<.3	1.59	<.5
8/14/2002	350		6.6	13.6	0.0	<.3	1.50	<.5
10/2/2002	707		6.6	12.8	0.0	<.3	1.55	<.5

Silver Branch

	pH		Alkalinity	Acidity	Iron	Manganese	Aluminum
Date Sampled	**Field**	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
2/16/2000	6.33	6.66	7.15	0	<.10	<.10	<.10
3/13/2000	6.34	6.39	4.77	0	<.10	<.10	<.10
4/10/2000	6.41	6.25	5.72	1.89	<.10	<.10	<.10
5/10/2000	6.30	6.72	5.72	0	<.10	<.10	<.10
6/16/2000	6.22	6.34	6.19	0.47	<.10	<.10	<.10
7/11/2000	6.40	6.80	7.15	0	<.10	<.10	<.10
8/21/2000	6.75	6.72	8.58	0	<.10	<.10	<.10
9/13/2000	6.59	6.73	8.46	0	<.10	<.10	<.10
10/12/2000	6.15	6.84	8.93	0	<.10	<.10	<.10
11/1/2000	6.77	6.74	8.46	0	<.10	<.10	<.10
11/13/2000	7.86	6.84	8.46	0	<.10	<.10	<.10
12/13/2000	6.76	6.76	8.46	0	<.10	<.10	<.10
1/15/2001	6.51	6.76	9.41	0	<.10	<.10	<.10
2/19/2001	5.60	6.53	7.05	0	<.10	<.10	<.10
3/21/2001	7.54	6.25	3.29	0.22	<.10	<.10	<.10
4/16/2001	7.21	6.31	4.23	0.88	<.10	<.10	<.10
5/7/2001	6.35	6.69	4.70	0	<.10	<.10	<.10
6/18/2001	6.14	6.72	6.83	0	<.10	<.10	<.10
7/9/2001	5.72	6.62	6.37	0	<.10	<.10	<.10
8/20/2001	5.72	6.66	9.10	0	<.10	<.10	<.10
9/17/2001	7.05	6.70	7.73	0	<.10	<.10	<.10
10/1/2001	7.16	6.82	7.74	0	<.10	<.10	<.10
11/6/2001	6.87	6.83	9.76	0	<.10	<.10	<.10
12/3/2001	6.70	6.73	5.86	0	<.10	<.10	<.10
3/20/2002		6.6	11.2	0.0	<.02	<.01	<.02

Mouth of Otter Run							
DATE COLECTED	FLOW	ALK (MG/L)	HOT A (MG/L)	AL (MG/L)	FE (MG/L)	MN (MG/L)	pH (pH units)
28-Dec-04		9	2.6	0.5	0.3	0.247	6.3
24-Apr-03		10.4	5.4	0.5	0.3	0.574	6.4
26-Sep-01		11	3.2	0.5	0.3	0.115	6.1
04-Dec-01		10.2	0	0.5	0.3	0.077	5.9
20-Mar-02		9.6	6.6	0.5	0.3	0.18	6.4
23-Jul-02		8.8	0.8	0.5	0.3	0.05	6.3
23-Aug-00		10	1	0.2	0.02	0.057	6
28-Oct-02		9.8	8.2	0.5	0.3	0.103	6.4
26-Oct-00		12.6	0	0.5	0.3	0.05	6
16-Nov-00		12.4		0.2	0.072	0.014	6.3
23-Apr-01		8.6	0	0.5	0.3	0.122	6.1
19-Jul-99		10.2	0	0.2	0.02	0.01	6
avg=		10.22	2.53	0.43	0.23	0.13	6.18

Attachment F

Comment and Response

Comment by:

Hess & Fisher Engineers, Inc

1. Although the reference to the Clean Water Act at Section 303(d) by the Department's materials and information indicate that the Act was the basis for the proposed TMDL for the Otter Run Watershed, plus others, I have not been able to identify the language in the law that drives this effort. The preamble to the Clean Water Act proposes fishable, swimmable streams in the waters of the United States as a goal of the Clean Water Act, but I am having trouble finding linkage through the federal act to TMDL and/or the basis for computing same. Perhaps you can help me by providing me a copy of the specific language in the Act.

Response:

The Clean Water Act Requirements section, on page 6 of this report, and the USEPA's implementing regulations in 40 CFR Part 130 and explain the basis and requirements for TMDLs.

2. The applicable water quality criteria were identified, ostensibly by the Federal EPA, at a criterion value in mg/l for aluminum at 0.75, iron at 1.5, manganese at 1.0, and pH at 6.0-9.0 units. The metals are listed as Total Recoverable/Dissolved concentrations. It is important to note that dissolved metals are totally different from total metals in that dissolved metals are those which are in ionic solution within the aqueous media, whereas total recoverable or total includes the ionic form, plus the physically suspended partials that have aluminum, iron, or manganese (and others) as part of their mineralogical composition. The two parameters are distinctly and totally different from a chemical perspective. The total recoverable or total, is the analytical basis compelled by the mining regulations and is presumably the analytics that were used. Consequently, the Fisher Mining quarterly monitoring samples, which were used in this analysis, as well as those collected and analyzed by the State DEP Laboratory may be at odds with the criteria set by the Federal EPA.

Response:

The water quality criteria used is Pennsylvania's from Pennsylvania Code, Title 25 Chapter 96, Water Quality Standards. Look at Table 2. Applicable Water Quality Criteria on page 14 and you will see that only iron has criterion values of 1.5 mg/l as Total Recoverable and a second value of 0.3 mg/l Dissolved. None of the three listed metals are listed as Total Recoverable/Dissolved as stated in the comment. The concerns expressed in the comment are non-existent. The Total Recoverable was used in data gathering and in the TMDL.

Comment:

3. The statement is made in the documents that the chemical data was collected over the last two years in order to establish the TMDL's. I submit that two years is insufficient, and that a much longer period of time is appropriate. Indeed, Attachment E – Water Quality Data Used in TMDL Calculations shows that water quality samples from the early 1990's were used up to and including April of 2002, and in some cases, to October 2002. The majority of this data collection period was during drought years. In fact, it was extreme from 1999 to 2002. There were also significant periods of drought preceding 1998. The years of 2003 and 2004 were quite wet and represent the other end of the hydrologic spectrum. It is imperative that both portions of the spectrum, the low and the high hydrologic cycle, on and annualized basis be incorporated. Consequently, the data is skewed to drought conditions, which biases the statistical determinations.

Response:

More data is always desirable. The Department used the best information we had to compute the TMDLs.

Comment:

4. Selected data points, i.e. OR-14, JC-1, and BR-01, contain too few samples to be statistically meaningful. It is inappropriate to apply Monte Carlo technique with such slim data, i.e. 6 total determinations for the first two and only 7 for BR-01.

Response:

EPA has consistently approved AMD TMDLs with these numbers of samples. See also response to Comment 3.

Comment:

5. 25 PA Code, Chapter 93 regulations, regulates the instream water quality at any given point. This has been an understandable and acceptable methodology to relate to an instream water quality for High Quality Streams. The ability to discharge into Exceptional Value Streams is fundamentally prohibitive for any commercial activity. This methodology has been extremely workable, which begs the question of why TMDL is needed?

Response:

This stream has been determined to be impaired and requires that a TMDL be completed. See also the response to Comment 1.

Comment:

6. Additionally, water quality dischargers of all types are regulated by the NPDES program. The effluent standards are assigned based upon the activity. This Clean Water Act driven system has been and continues to be a universally accepted mean of controlling pollution. Why do we need an obtuse additional program?

Response:

You are referring to technology-based limits that may have been developed for specific industrial/ commercial activities. If these effluent limitations result in stream impairment, the water quality based effluent limits must be developed. This is what the TMDL does.

7. Clearly, the prohibitive bias of the TMDL determination is to the headwaters of the streams, which in this particular instance precludes future mining, timbering, road building and/or any earth disturbance activity at the headwaters of Otter Run Watershed, and its subordinate watershed, Buckeye Run. In this particular, this is a "taking" of a national resource – coal, without compensation to the owner. Not only that, but given our national dependency upon foreign oil, specifically that which comes from the Middle East, and the political, military and social negative impacts of our dependency on same, to restrict and/or limit the Commonwealth of Pennsylvania and/or Nation from extracting its own energy resources which can be done with constraints of the existing environmental laws (which are the strongest in the world) is not only illogical, but totally asinine.

Response:

The TMDL contains two WLAs for treatment facilities on the Thomas mine permit. After the remining is complete there will be two WLAs available for future mining. The Otter Run AMD TMDL does not preclude future mining.

Comments by:

Meiser and Earl, Inc.

Comment:

1. Background sampling for TMDL in Otter Run occurred during a period of time characterized by drought conditions, especially from 1997 through early 2002.

Response:

Typically if no data is available the Department collects six samples over approximately two years. If additional data is available we use it. EPA has approved this. Yes, precipitation is cyclical and abandoned mine discharges are, individually, variable and unique and both are difficult to account for in modeling. The Department does not have the luxury of unlimited resources. We are obligated to produce specific numbers of AMD TMDLs within specific time limits. For example: March 2003 to March 2005 we needed to produce 85 AMD TMDLs.

Comment:

2. Adopting the draft Waste Allocation (WLA) of permitted discharges (table 5, p. 17) in the Otter Run TMDL may create a problem for future discharges from mining operations. For example, a legal discharge from a mine having a concentration of 2 mg/l Mn will exceed the WLA for Mn of 0.7 lb/day when the flow of the discharge exceeds 29 gpm. This is a comparative low flow from a mining operation.

Response:

The flows calculated and used in the Method to Quantify Treatment Pond Pollutant Load are average flows and we recognize that the actual treatment pond flow may vary and, at times, exceed it.

Comment:

3. Adopting the draft TMDL for Otter Run may jeopardize the viability of issuing future mining permits.

The Otter Run TMDL specifically allows the present mining operation to continue in the headwaters of Otter Run and Buckeye Run. While the TMDL is a consideration in future mining permits; if Fisher has completed their activities there would be two WLAs available.

Comment:

4. Considering Fisher Mining's situation in Otter Rum watershed with their extensive remining program, pre-mining discharges regulated under Subchapter F, and Fisher's alkaline addition program, Fisher introduces far more alkalinity than is available on a natural basis. The concern for manganese is an artifact of the regulations. Biomonitoring since 1995 has proven that Mn in Otter Run is not harmful to the stream biota. Furthermore, there are no downstream public water supplies potentially impacted by manganese.

Response:

The Department is obligated to enforce and implement its regulations. We have a water quality criterion of 1 mg/l that applies to all points in the stream.