FINAL

Little Scrubgrass Creek Watershed TMDL
Venango and Butler Counties, Pennsylvania

Prepared by:

Pennsylvania Department of Environmental Protection

March 8, 2007

TABLE OF CONTENTS

TABLES

ATTACHMENTS

FINAL TMDL
Little Scrubgrass Creek Watershed
Venango and Butler Counties, Pennsylvania

Introduction

This Total Maximum Daily Load (TMDL) calculation has been prepared for segments in the Little Scrubgrass Creek Watershed (Attachment A). It was done to address the impairments noted on the 1996 Pennsylvania 303(d) list, required under the Clean Water Act, and covers the one listed segment shown in Table 1. Metals in acidic discharge water from abandoned coalmines causes the impairment. The TMDL addresses the three primary metals associated with acid mine drainage (iron, manganese, aluminum), and pH.

Table 1. 303(d) Sub-List Upper Allegheny River								
State Water Plan (SWP) Subbasin: 16G								
Year	Miles	Segment ID	DEP Stream Code	Stream Name	Desig-nated Use	Data Source	Source	EPA 305(b) Cause Code
1996	3.8	5455	51196	Little Scrubgrass Creek	CWF	303 (d) List	Resource Extraction	Metals
1998	7.89	5455	51196	Little Scrubgrass Creek	CWF	SWMP	AMD	Metals
2002	7.9	5455	51196	Little Scrubgrass Creek	CWF	SWMP	AMD	Metals
2004	7.9	5455	51196	Little Scrubgrass Creek	CWF	SWMP	AMD	Metals
1996	3.6		51202	South Fork Little Scrubgrass Creek	CSF	305(d) Report	Resource Extreaction	Metals
1998	3.6		51202	South Fork Little Scrubgrass Creek	CWF	1998 303(d) List Part C	AMD	Metals
2000	Delisted		51202	South Fork Little Scrubgrass Creek				
2004	2.23	20030516-0945-RLH	51217	Unt Little Scribgrass Creek	CWF	305(d) Report	AMD	Metals
2004	0.84	20030516-0945-RLH	51218	Unt Little Scribgrass Creek	CWF	305(d) Report	AMD	Metals
2004	1.98	20030414-1245-RLH	51219	Unt Little Scribgrass Creek	CWF	305(d) Report	AMD	Metals
2004	0.65	20030414-1245-RLH	51220	Unt Little Scribgrass Creek	CWF	305(d) Report	AMD	Metals
2004	0.14	20030414-1245-RLH	51221	Unt Little Scribgrass Creek	CWF	305(d) Report	AMD	Metals
2004	0.96	20030414-1245-RLH	51222	Unt Little Scribgrass Creek	CWF	305(d) Report	AMD	Metals

Cold Water Fishes=CWF
Surface Water Monitoring Program = SWMP
Abandoned Mine Drainage = AMD

Directions to the Little Scrubgrass Creek Watershed

The Little Scrubgrass Creek Watershed is approximately 25.8 square miles in area and is located in Scrubgrass and Clinton Townships, Venango County and Venango and Allegheny Townships, Butler County. The watershed can be located on the U. S. Geological Service (USGS) 7.5-minute quadrangles of Eau Claire and Emlenton. Little Scrubgrass Creek flows approximately 7.5 miles east/northeast from its headwaters near Smith Corners in Clinton Township, Venango County to its confluence with the Allegheny River. Major tributaries to Little Scrubgrass Creek include the North Fork Little Scrubgrass Creek, South Fork Little Scrubgrass Creek and Lockard Run.

To access Little Scrubgrass Creek take exit 42 from Interstate 80 (I-80). Take a right at the stop sign off the exit ramp and travel 100 feet to another stop sign. Take a left onto Route 208 West and travel approximately 2.5 miles to a bridge spanning across Little Scrubgrass Creek. Approximately 750 feet upstream from this bridge Little Scrubgrass Creek and the South Fork Little Scrubgrass Creek come together. The headwaters of Little Scrubgrass Creek can be accessed by continuing west on Route 208 for 1.3 miles to a traffic light. Take a left at the traffic light onto SR3007 and travel for approximately 0.6 miles and take a right onto Honeycomb Rock Road. Travel for 0.4 miles and Honeycomb Rock Road turns into Young Road. Continue on Young Road for 1.2 miles and take a left onto Moore Road at the stop sign. Travel 0.7 miles on Moore Road to a stop sign. Continue on Moore Road for 0.2 miles and the headwaters of Little Scrubgrass Creek flow under Moore Road at this point.

Segments addressed in this TMDL

The Little Scrubgrass Creek Watershed is affected by pollution from AMD. This pollution has caused high levels of metals in the mainstem of Little Scrubgrass above its confluence with the South Fork Little Scrubgrass Creek. The South Fork Little Scrubgrass Creek was listed on the 1996 303(d) list as being impaired by AMD, however, it was reassessed and delisted in 2000 and will not be addressed in this TMDL. A TMDL was completed for Lockard Run and approved by the Environmental Protection Agency (EPA) in April 2001. Table 1 and Map 1 give an explanation and locations of the AMD allocation points.

There are four issued surface mining permits in the Little Scrubgrass Creek Watershed. One of these permits (Amerikohl Mining Inc. SMP#10990101) is in the South Fork Little Scrubgrass Creek Watershed. Active mining has been completed on the Amerikohl Mining Inc, SMP#10990101 and no WLAs are required. Out of the remaining three permits in the Little Scrubgrass Creek Watershed, active mining has been completed on one of these permits (Ben Hal Mining Co. SMP#10970104). Ben Hal Mining Co SMP#10970104 is in Stage 1 bond release and was issued under DEP’s Subchapter-F regulations, which provide that the permittee’s effluent limits are based on baseline pollution conditions rather than standard coal mining BAT standards, due to the fact that the site had polluting discharges that pre-date the Ben Hal permit. The subchapter F discharges on these sites have been treated as nonpoint source for the purpose of doing this TMDL and since active mining has been completed, no WLAs will be assigned to this permit. There are two post-mining discharges, in the Little Scrubgrass Creek Watershed, that are being actively treated (Western Hickory Coal Co. SMP#10806018 and C&K Coal Co. SMP#61783001). Treated discharges from the Western Hickory Coal Co. SMP#10806018 site drain to Seaton Creek which is outside the Little Scrubgrass Creek watershed, therefore a WLA is not required for this site for this TMDL. C&K Coal Co. SMP#61783001 treated post mining discharge drains into an unnamed tributary to Little Scrubgrass Creek; this discharge is covered by a treatment trust agreement with Clean Streams Foundation Inc. and will not have a WLA assigned to it. 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. Each segment on the PA 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. See Attachment C for TMDL calculations.

The designation for this stream segment can be found in PA Title 25 Chapter 93.

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 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 four 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.).

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 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 305(b) 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 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.);
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.

This document will present the information used to develop the Daguscahonda Run Watershed TMDL.

Watershed History

Historical data shows that underground mining in the form of drift mines was being conducted from the early 1940s to the early 1970s in the Little Scrubgrass Creek Watershed. Surface mining has been documented throughout the watershed as early at the 1940s and continues on a small scale today. Surface mining has taken place on the Lower, Middle and Upper Kittanning, Lower and Upper Clarion and Brookville coal seams within the watershed.

A biological and chemical survey of the Little Scrubgrass Creek Watershed was conducted between May and June of 1986 by the Department of Environmental Resources, Bureau of Mining and Reclamation, Environmental Studies Section as requested by the Knox District Mining Office to assess in-stream effects of post-mining acidic discharges from several surface mining permits issued in the early 1970's. Water quality was analyzed at 32 stations, benthic macroinvertebrate populations were analyzed at 39 locations and fish populations were sampled at 19 locations throughout the watershed. This study found only four taxa and very low numbers of macroinvertebrates in the main stem of Little Scrubgrass Creek upstream of the South Fork along with limited populations of creek chubs, even though water quality had shown improvement compared to water quality data collected in the early 1970s. The South Fork did not appear to be severely affected by AMD but macroinvertebrate and fish populations were determined to be limited by lack of diversified habitat. Little Scrubgrass Creek downstream of the South Fork exhibited good water quality with an excellent assemblage of macroinvertebrates and naturally reproducing brown trout populations.

Utilizing forfeited bond money from abandoned mining operations the Bureau of Abandoned Mine Reclamation (BAMR) has constructed several passive treatment systems in the Little Scrubgrass Creek Watershed in order to remediate post-mining discharges. A passive treatment system consisting of a Successive Alkalinity Producing System (SAPS), pond and limestone channel was constructed on the Hortert (PCHo on page 20) site in 1999 on the South Fork Little Scrubgrass Creek. In 2003 a Vertical Flow Reactor (VFR), ponds and wetlands were installed to treat discharges on the abandoned Pengrove Coal Co. (Haney) (PCHa on page 22) site in 2003 funded by forfeited bond money. Settling ponds, Limestone Upflow Ponds (LUPs) and wetlands were installed on the B&D Coal Co. (B&D on page 22) site in 2003 funded by forfeited bond money and Growing Greener funds. A treatment system is currently being designed for the Pengrove Coal Co. (Eakin) (PCE on page 22) site and will consist of a stabilization pond, LUP, settling basin, two manganese removal beds and a limestone channel.

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 describes below can be applied to situations where all of the pollutant loading is from non-point sources as well as those where there are both point and non-point sources. The following defines what are considered point sources and non-point sources for the purposes of our evaluation; point sources are defined as permitted discharges, 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[1] 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

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

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.

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.

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 acceptable 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 a minimum 99 percent level of protection is required. All metals criteria evaluated in this TMDL are specified as total recoverable. Pennsylvania does have dissolved criteria for iron; however, the data used for this analysis report iron as total recoverable. Table 2 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	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).

TMDL Allocations Summary

There were not enough samples at any sample point to check for correlation between metals and flow for Little Scrubgrass Creek.

Allocation Summary

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

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

In some instances, instream processes, such as settling, are taking place within a stream segment. These processes are evidenced by a decrease in measured loading between consecutive sample points. It is appropriate to account for these losses when tracking upstream loading through a segment. The calculated upstream load lost within a segment is proportional to the difference in the measured loading between the sampling points.

Table 3. Summary Table–Little Scrubgrass Creek (*LSGC) Watershed

Station	Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	Load Reduction (lbs/day)	Percent Reduction %
1B	1B Northern Headwater Tributary of Little Scrubgrass Creek						
	Al	14.9	0.3	0.0	0.3	14.6	98
	Fe	2.0	0.7	0.0	0.7	1.3	66
	Mn	12.9	0.9	0.0	0.9	12.0	93
	Acidity	155.3	0.6	0.0	0.6	154.7	100
1	1 (51196) Halfway Between Headwaters of LSGC* and the Confluence with Unt 51219						
	Al	7.5	1.0	0.0	1.0	0.0	0
	Fe	3.2	1.2	0.0	1.2	0.7	36
	Mn	21.4	4.5	0.0	4.5	4.9	52
	Acidity	63.4	36.8	0.0	36.8	0.0	0
2	2 LSGC Before Confluence with Unt 51219						
	Al	6.6	0.7	0.0	0.7	0.2	20
	Fe	8.9	1.5	0.0	1.5	5.4	78
	Mn	14.1	2.3	0.0	2.3	0.7	24
	Acidity	18.7	18.7	0.0	18.7	0.0	0
4	4 Headwaters of Unt (51219)						
	Al	5.1	1.1	0.0	1.1	4.0	78
	Fe	4.6	1.6	0.0	1.6	3.0	64
	Mn	73.1	2.2	0.0	2.2	70.9	97
	Acidity	168.1	16.8	0.0	16.8	151.3	90
3	3 Unt (51222) Near Confluence with Unt (51219)						
	Al	3.1	0.4	0.0	0.4	2.7	87
	Fe	2.9	1.4	0.0	1.4	1.5	50
	Mn	16.4	1.5	0.0	1.5	14.9	91
	Acidity	ND	ND	NA	NA	0.0	0
5B	5B Unt (51221) to LSGC Upstream of Sample Point 5						
	Al	0.4	0.4	0.0	0.4	0.0	0
	Fe	0.1	0.1	0.0	0.1	0.0	0
	Mn	0.7	0.3	0.0	0.3	0.4	62
	Acidity	ND	ND	NA	NA	0.0	0
5	5 LSGC Downstream of Unt (21221)						
	Al	9.5	1.1	0.0	1.1	1.7	61
	Fe	13.5	2.0	0.0	2.0	7.1	78
	Mn	119.7	4.8	0.0	4.8	28.6	86
	Acidity	10.6	10.6	0.0	10.6	0.0	0
6	6 LSGC Downstream of Sample Points 2 and 5						
	Al	16.9	1.7	0.0	1.7	0.9	35
	Fe	22.2	3.3	0.0	3.3	0.2	5
	Mn	153.4	9.2	0.0	9.2	17.5	65
	Acidity	22.2	22.2	0.0	22.2	0.0	0
7	7 Unt (51217) Halfway Between Headwaters of 51217 and the Confluence with Unt 51218						
	Al	ND	ND	NA	NA	0.0	0
	Fe	1.23	1.2	0.0	1.2	0.03	3
	Mn	4.1	1.2	0.0	1.2	2.9	71
	Acidity	ND	ND	NA	NA	0.0	0
7B	7B Unt to Little Scrubgrass Creek @ 1300 feet south of 7						
	Al	2.5	0.5	0.0	0.5	2.0	80
	Fe	0.9	0.9	0.0	0.9	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 %
	Mn	2.9	2.6	0.0	2.6	0.3	12
	Acidity	ND	ND	NA	NA	0.0	0
8	8 Unt (51217) Upstream of the Confluence with Unt 51218						
	Al	0.9	0.5	0.0	0.5	0.0	0
	Fe	2.7	2.4	0.0	2.4	0.3	10
	Mn	2.8	1.1	0.0	1.1	0.4	24
	Acidity	ND	ND	NA	NA	0.0	0
10	10 Unt (51218) Upstream of the Confluence with Unt 51217						
	Al	2.1	0.4	0.0	0.4	1.7	81
	Fe	2.4	2.4	0.0	2.4	0.0	0
	Mn	5.8	1.5	0.0	1.5	4.3	74
	Acidity	1.6	1.6	0.0	1.6	0.0	0
11	11 Mouth of Unt (51217)Upstream of Confluence with LSGC						
	Al	4.8	0.6	0.0	0.6	2.1	78
	Fe	7.3	1.1	0.0	1.1	5.9	84
	Mn	11.4	1.8	0.0	1.8	3.6	66
	Acidity	ND	ND	NA	NA	0.0	0
12	12 LSGC Downstream of Sample Points 11 and 6						
	Al	22.6	2.7	0.0	2.7	0.5	16
	Fe	29.3	5.0	0.0	5.0	0.0	0
	Mn	153.4	16.9	0.0	16.9	0.0	0
	Acidity	7.0	5.5	0.0	5.5	1.5	22
15	15 LSGC Downstream of Unt 51216						
	Al	21.1	3.0	0.0	3.0	0.0	0
	Fe	27.4	6.0	0.0	6.0	0.0	0
	Mn	145.6	17.5	0.0	17.5	0.0	0
	Acidity	ND	ND	NA	NA	0.0	0
16	16 Most Upstream Sample Point on North Fork LSGC						
	Al	ND	ND	NA	NA	0.0	0
	Fe	4.3	2.2	0.0	2.2	2.1	49
	Mn	2.0	2.0	0.0	2.0	0.0	0
	Acidity	ND	ND	NA	NA	0.0	0
17	17 North Fork LSGC Upstream of Confluence with LSGC						
	Al	1.0	0.6	0.0	0.6	0.4	40
	Fe	2.2	1.5	0.0	1.5	0.0	0
	Mn	6.6	2.8	0.0	2.8	3.8	57
	Acidity	3.3	3.3	0.0	3.3	0.0	0
18	18 LSGC Downstream of the Confluence with North Fork LSGC						
	Al	22.4	3.4	0.0	3.4	0.5	13
	Fe	61.1	8.6	0.0	8.6	30.4	78
	Mn	97.3	19.5	0.0	19.5	0.0	0
	Acidity	ND	ND	NA	NA	0.0	0
26	26 LSGC Downstream of Sample Points 18 and 25 (South Fork LSGC						
	Al	50.6	7.1	0.0	7.1	24.5	78
	Fe	109.9	16.5	0.0	16.5	40.9	71
	Mn	172.8	29.4	0.0	29.4	65.5	69
	Acidity	ND	ND	NA	NA	0.0	0
27	27 Upstream Sample Point on Unt (51200) to LSGC						
	Al	1.1	0.3	0.0	0.3	0.8	73

Station	Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	Load Reduction (lbs/day)	Percent Reduction %
	Fe	2.6	0.8	0.0	0.8	1.8	69
	Mn	2.6	1.0	0.0	1.0	1.6	60
	Acidity	ND	ND	NA	NA	0.0	0
28	28 Unt (51200) upstream of Confluence with Unt 51201						
	Al	3.0	0.7	0.0	0.7	1.5	68
	Fe	10.6	1.9	0.0	1.9	6.9	78
	Mn	3.8	3.8	0.0	3.8	0.0	0
	Acidity	9.3	9.3	0.0	9.3	0.0	0
29	29 Last Sample Point on Little Scrubgrass Creek						
	Al	5.0	5.0	0.0	5.0	0.0	0
	Fe	37.9	37.9	0.0	37.9	0.0	0
	Mn	132.6	47.7	0.0	47.7	0.0	0
	Acidity	ND	ND	NA	NA	0.0	0

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).

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.

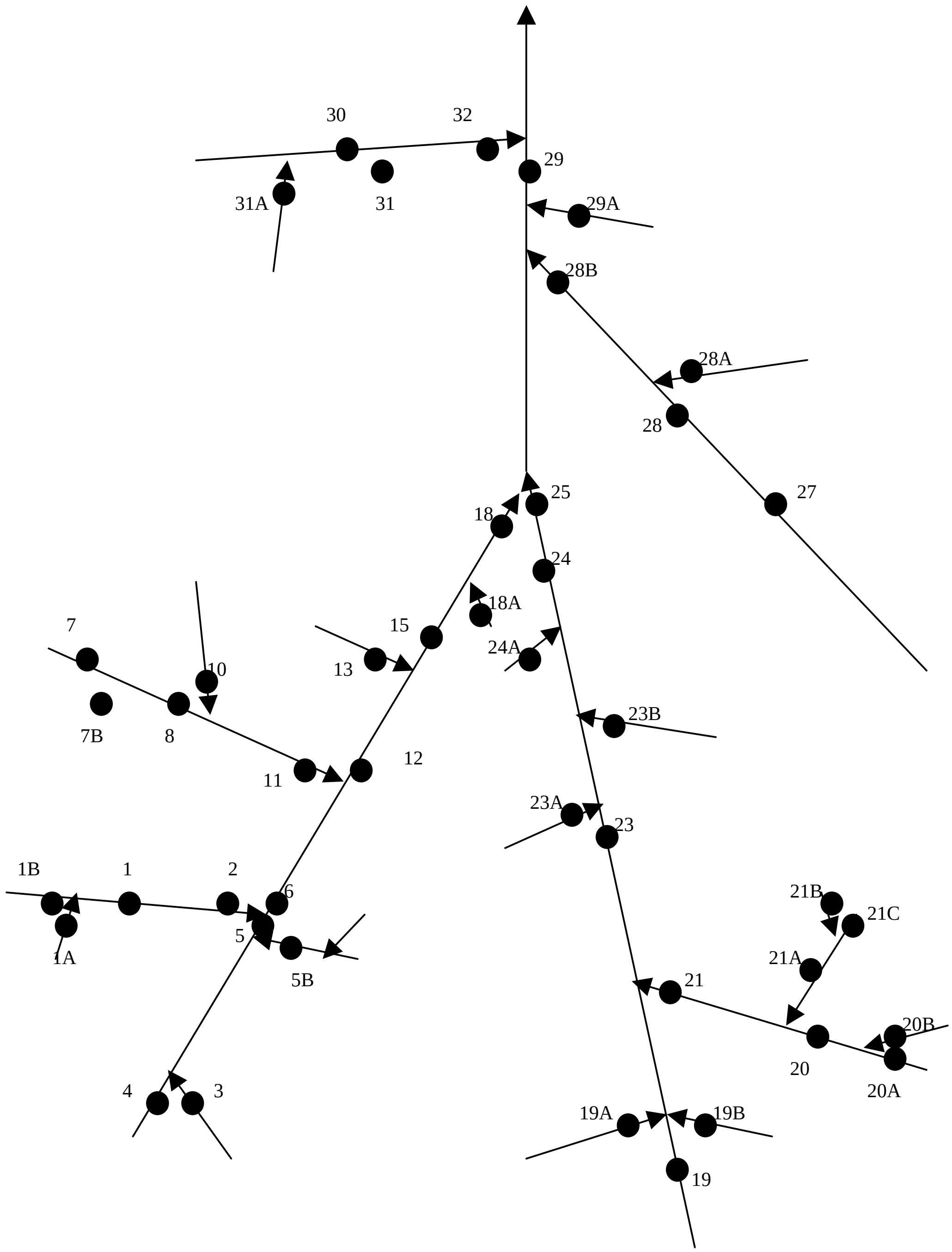
- To encourage private and public participation in abandoned mine reclamation efforts
- To improve reclamation efficiency through better communication between reclamation partners
- To increase reclamation by reducing remining risks
- To maximize reclamation funding by expanding existing sources and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

There is currently no watershed group in the Little Scrubgrass Creek Watershed area. It is recommended that agencies work with local interests to form a watershed organization. This watershed organization could then work to implement projects to achieve the reductions recommended in this TMDL document.

Utilizing forfeited bond money from abandoned mining operations the Bureau of Abandoned Mine Reclamation (BAMR) has constructed several passive treatment systems in the Little Scrubgrass Creek Watershed in order to remediate post-mining discharges. A passive treatment system consisting of a Successive Alkalinity Producing System (SAPS), pond and limestone channel was constructed on the Hortert site in 1999 on the South Fork Little Scrubgrass Creek. In 2003 a Vertical Flow Reactor (VFR), ponds and wetlands were installed to treat discharges on the abandoned Pengrove Coal Co. (Haney) site funded by forfeited bond money. Settling ponds, Limestone Upflow Ponds (LUPs) and wetlands were installed on the B&D Coal Co. site in 2003 funded by forfeited bond money and Growing Greener funds. A treatment system is currently being designed for the Pengrove Coal Co. (Eakin) site and will consist of a stabilization pond, LUP, settling basin, two manganese removal beds and a limestone channel. Three additional Pengrove Coal Co. sites (B&D, Ruth and Sterett) are currently being evaluated for passive treatment.

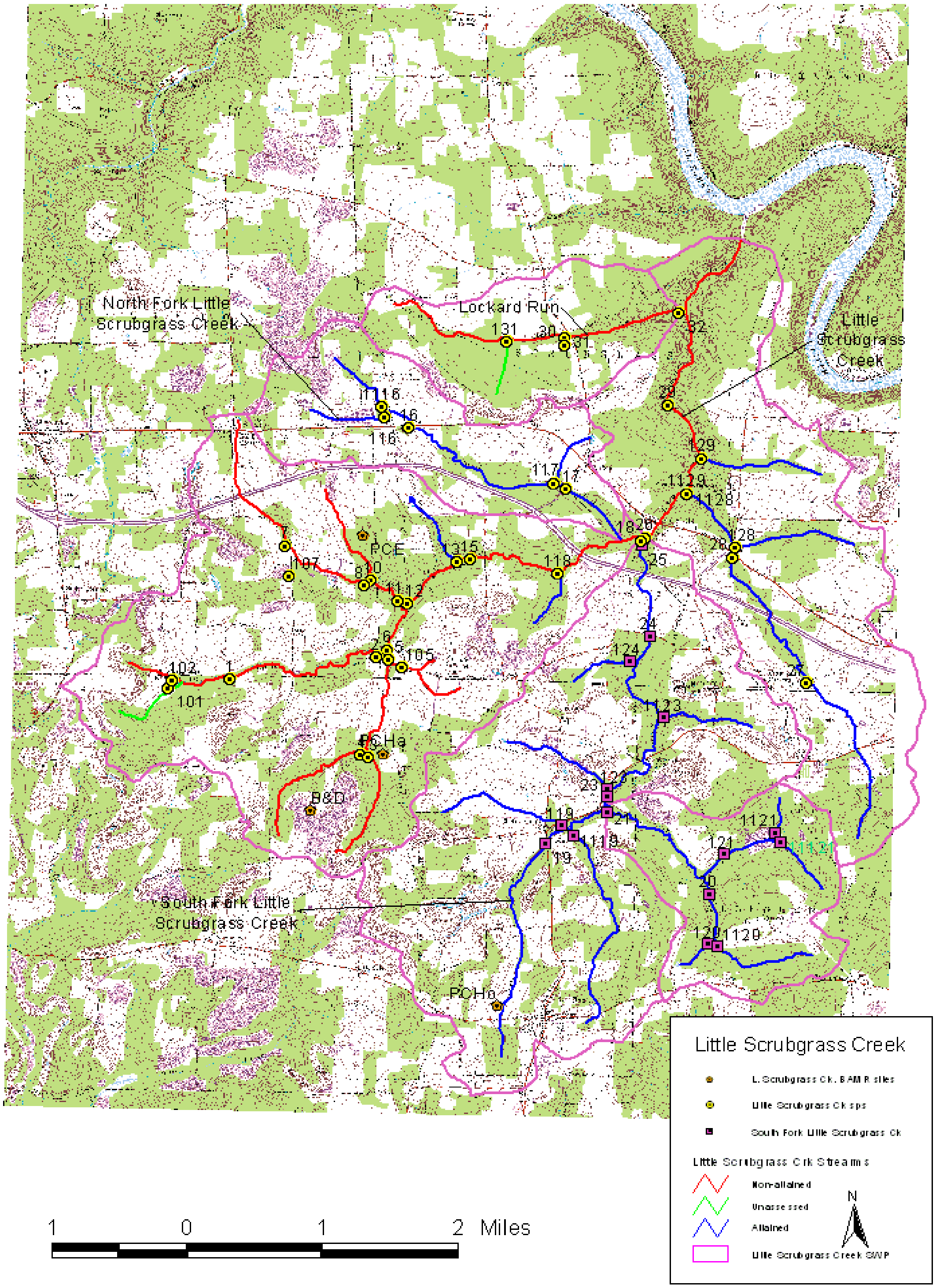
Public Participation

Public notice of the draft TMDL was published in the *Pennsylvania Bulletin* on September 30, 2006 and the Butler Eagle on September 28, 2006 to foster public comment on the allowable loads calculated. A public meeting was held on October 11, 2006 beginning at 2:00 p.m., at USDA Service Center Building in Butler, PA, to discuss the proposed TMDL.

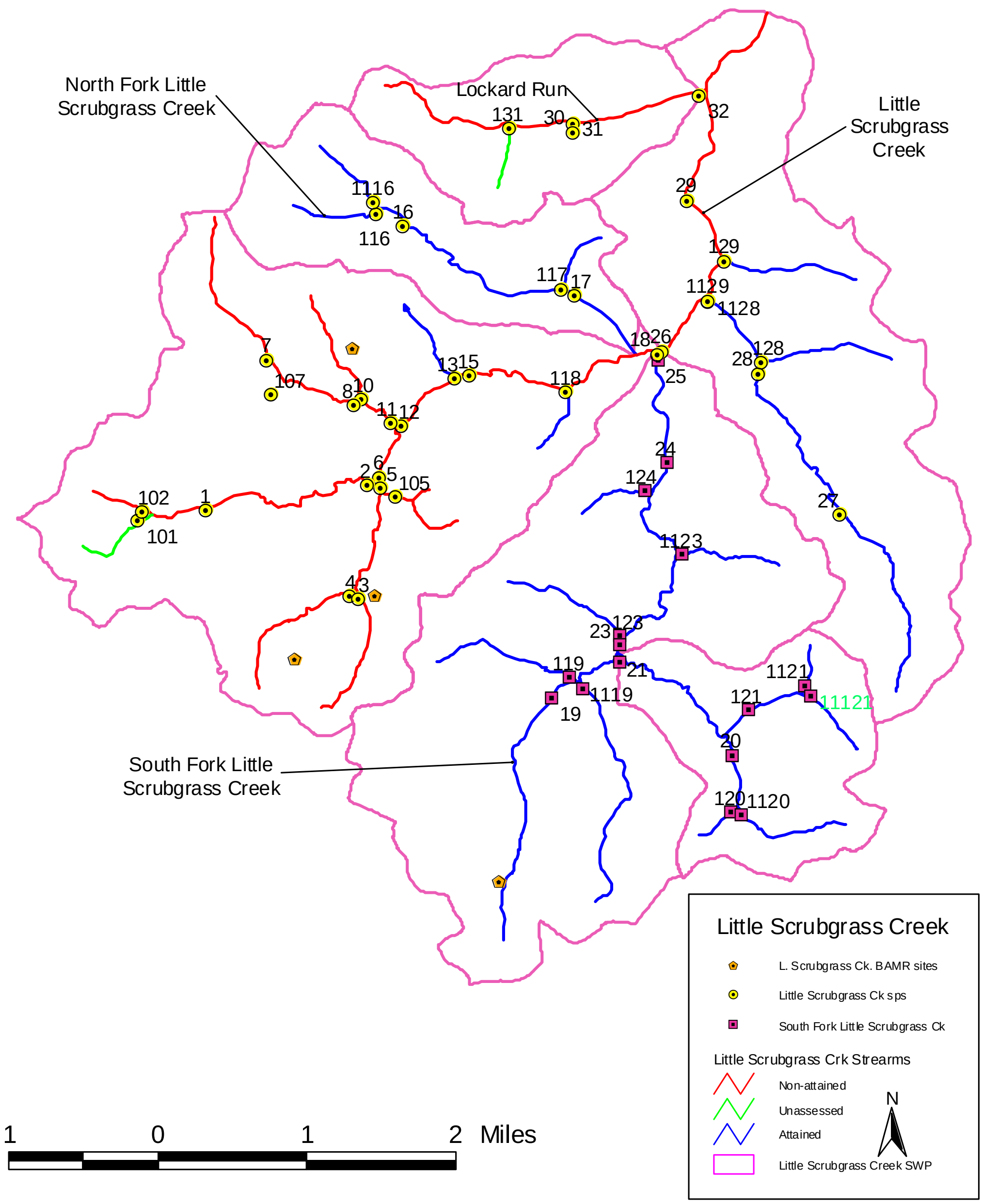

30
32
29
31A
31
29A
28B
28A
28
25
27
18
24
18A
15
24A
7
13
10
23B
7B
8
12
11
23A
23
1B
1
2
6
21B
21C
5
1A
5B
21A
21
20B
20
20A
4
3
19A
19B
19

Attachment A

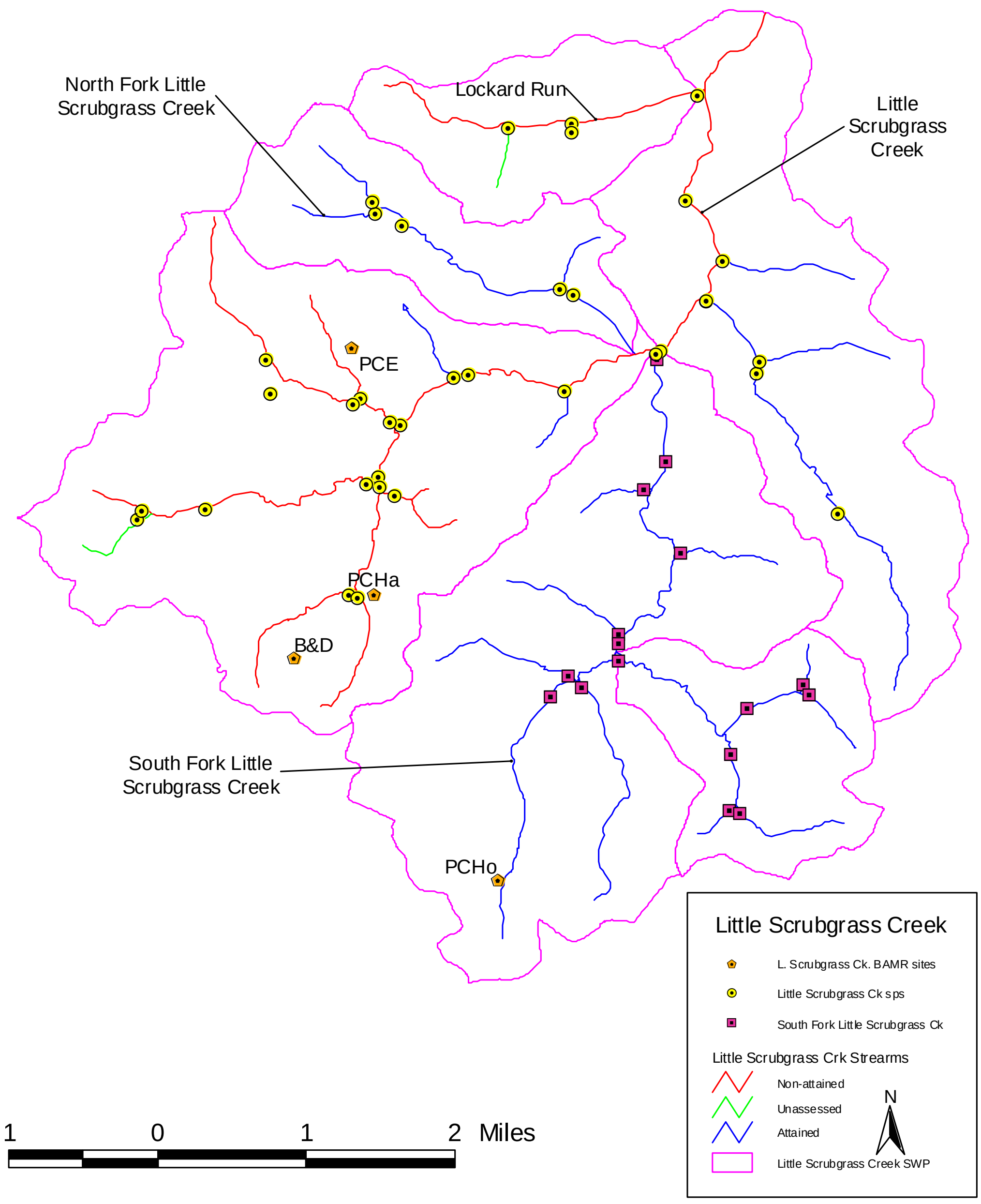
Little Scrubgrass Creek Watershed Maps



North Fork Little Scrubgrass Creek
Lockard Run
Little Scrubgrass Creek
South Fork Little Scrubgrass Creek
PCE
PCHa
B&D
PCHb
Little Scrubgrass Creek
L. Scrubgrass Ck. BAMR sites
Little Scrubgrass Ck sps
South Fork Little Scrubgrass Ck
Little Scrubgrass Crk Streams
Non-attained
Unassessed
Attained
Little Scrubgrass Creek SWP
N
1 0 1 2 Miles



North Fork Little Scrubgrass Creek
Lockard Run
Little Scrubgrass Creek
South Fork Little Scrubgrass Creek
Little Scrubgrass Creek
L. Scrubgrass Ck. BAMR sites
Little Scrubgrass Ck sps
South Fork Little Scrubgrass Ck
Little Scrubgrass Crk Streamrs
Non-attained
Unassessed
Attained
Little Scrubgrass Creek SWP
N
1 0 1 2 Miles



North Fork Little Scrubgrass Creek
Lockard Run
Little Scrubgrass Creek
PCE
PCHa
B&D
South Fork Little Scrubgrass Creek
PCHo
Little Scrubgrass Creek
L. Scrubgrass Ck. BAMR sites
Little Scrubgrass Ck sps
South Fork Little Scrubgrass Ck
Little Scrubgrass Crk Strearms
Non-attained
Unassessed
Attained
Little Scrubgrass Creek SWP
N
1 0 1 2 Miles

Attachment B

Method for Addressing Section 303(d) Listings for pH

Method for Addressing 303(d) Listings for pH

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

The pH, a measurement of hydrogen ion acidity presented as a negative logarithm, is not conducive to standard statistics. Additionally, pH does not measure latent acidity. For this reason, and based on the above information, Pennsylvania is using the following approach to address the stream impairments noted on the 303(d) list due to pH. The concentration of acidity in a stream is at least partially chemically dependent upon metals. For this reason, it is extremely difficult to predict the exact pH values, which would result from treatment of abandoned mine drainage. 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.

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.*

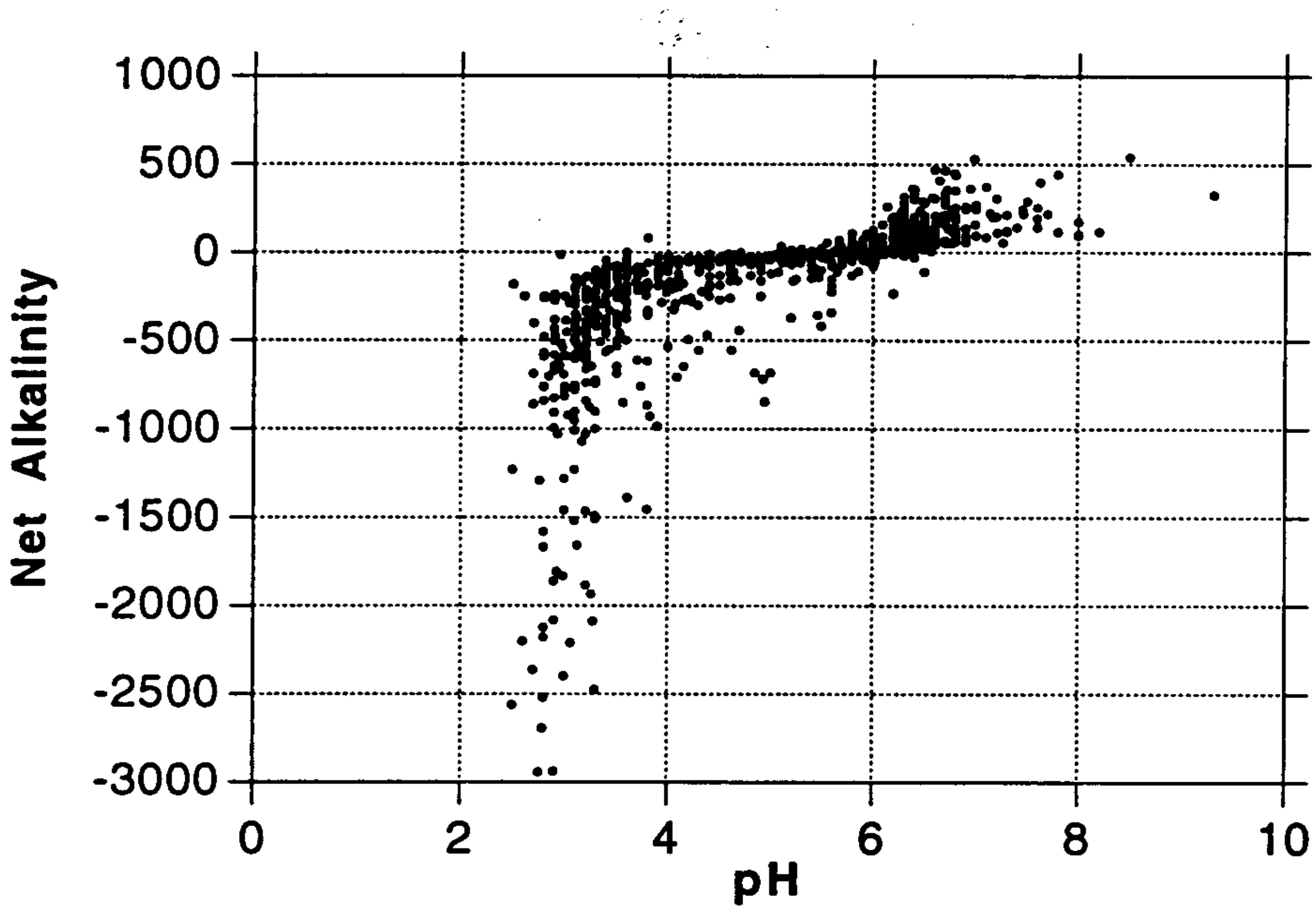


Figure 1. Net Alkalinity vs. pH. Taken from Figure 1.2 Graph C, pages 1-5, of Coal Mine Drainage Prediction and Pollution Prevention in Pennsylvania

Attachment C

TMDLs By Segment

Little Scrubgrass Creek

The TMDL for Little Scrubgrass Creek consists of load allocations for twenty one sampling sites along Little Scrubgrass Creek, North Fork Little Scrubgrass Creek and various unnamed tributaries.

Little Scrubgrass Creek is listed for metals from AMD as being the cause of the degradation to the stream. The method and rationale for addressing pH is contained in Attachment B.

An allowable long-term average in-stream concentration was determined at the points below for aluminum, iron, manganese and acidity. The analysis is designed to produce an average value that, when met, will be protective of the water-quality criterion for that parameter 99% of the time. An analysis was performed using Monte Carlo simulation to determine the necessary long-term average concentration needed to attain water-quality criteria 99% of the time. The simulation was run assuming the data set was 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.

1B (51193) Northern Headwaters of Little Scrubgrass Creek

The TMDL for this sample point on Little Scrugbrass Creek consists of a load allocation to the segment upstream. The load allocation for this segment was computed using water-quality sample data collected at point 1B. The average flow, measured at the sampling point 1B (0.17 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 UNT01 shows pH ranging between 3.3 and 4.1, pH will be addressed in this TMDL because of the mining impacts. The objective is to reduce acid loading to the stream, which will in turn raise the pH to the desired range and keep a net alkalinity above zero, 99% of the time. The result of this analysis is an acid loading reduction that equates to meeting standards for pH (see TMDL Endpoint section in the report, Table 2). The method and rationale for addressing pH is contained in Attachment B.

Table C1. Load Allocations for Point 1B				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day
Al	10.25	14.9	0.21	0.3
Fe	1.39	2.0	0.47	0.7
Mn	8.91	12.9	0.62	0.9
Acid	107.13	155.3	0.43	0.6
Alk	1.27	1.8		

Table C2. Calculation of Load Reductions Necessary at Point 1B				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	14.9	2.0	12.9	155.3
Allowable Load = TMDL	0.3	0.7	0.9	0.6
Load Reduction	14.6	1.3	12.0	154.7
% Reduction Segment	98%	66%	93%	99.6%

1A Southern Headwater Tributary to Little Scrubgrass Creek

No load allocations were calculated for this sample point because this segment is net alkaline and the three samples for aluminum, iron and manganese were less than criteria or not detected.

1 (51223) Little Scrubgrass Run Downstream of Sample Points 1B and 1A

The TMDL for this sample point on Little Scrubgrass Creek consists of a load allocation to all of the area between sample points 1B and 1. The load allocation for this segment was computed using water-quality sample data collected at point 1. The average flow, measured at the sampling point 1 (1.17 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 UNT01 shows pH ranging between 4.9 and 7.6, pH will be addressed in this TMDL because of the mining impacts. The objective is to reduce acid loading to the stream, which will in turn raise the pH to the desired range and keep a net alkalinity above zero, 99% of the time. The result of this analysis is an acid loading reduction that equates to meeting standards for pH (see TMDL Endpoint section in the report, Table 2). The method and rationale for addressing pH is contained in Attachment B.

Table C3. Load Allocations for Point 1				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day
Al	0.77	7.5	0.10	1.0
Fe	0.33	3.2	0.13	1.2
Mn	2.19	21.4	0.46	4.5
Acid	6.48	63.4	3.76	36.8
Alk	25.55	249.7		

The calculated load reductions for all the loads that enter point 1 must be accounted for in the calculated reductions at sample point 1 shown in Table C6. A comparison of measured loads between points 1B and 1 shows that there is no additional loading entering the segment for aluminum and acidity. For aluminum and acidity the percent decrease in existing loads are applied to the allowable upstream loads entering the segment. There is additional loading entering the segment for iron and manganese. The total segment iron and manganese loads are the sum of the upstream allocated loads and any additional loading within the segment.

Table C4. Calculation of Load Reduction at Point 1				
	Al	Fe	Mn	Acidity
Existing Load	7.5	3.2	21.4	63.4
Difference in Existing Load between 1B & 1	-7.4	1.2	8.5	-91.9
Load tracked from 1B	0.3	0.7	0.9	0.6
Percent loss due to instream process	50	-	-	59
Percent load tracked from 1B	50	-	-	41
Total Load tracked from 1B	0.2	1.9	9.4	0.25
Allowable Load at 1	1.0	1.2	4.5	36.8
Load Reduction at 1	0.0	0.7	4.9	0.0
% Reduction required at 1	0	36	52	0

2 Little Scrubgrass Creek Before Confluence with Unt 51219

The TMDL for this unnamed tributary of Little Scrubgrass Creek consists of a load allocation to the watershed area between sample points 1 and 2. The load allocation for this segment was computed using water-quality sample data collected at point 2. The average flow, measured at the sampling point 1 (1.34 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 2 shows pH ranging between 5.5 and 7.4, pH will not be addressed in this TMDL because this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for acidity because the acidity samples were nearly all zero. Although a TMDL is not necessary, the measured load is considered at the next downstream point 4.

Table C5. Load Allocations at Point 2				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.59	6.6	0.06	0.7
Fe	0.79	8.9	0.13	1.5
Mn	1.26	14.1	0.20	2.3
Acid	1.67	18.7	1.67	18.7
Alk	34.85	390.4		

The calculated load reductions for all the loads that enter point 2 must be accounted for in the calculated reductions at sample point 2 shown in Table C6. A comparison of measured loads between points 1 and 2 shows that there is no additional loading entering the segment for aluminum, manganese and acidity. For aluminum, manganese and acidity the percent decrease in existing loads are applied to the allowable upstream loads entering the segment. There is additional loading entering the segment for iron. The total segment iron load is the sum of the upstream allocated load and any additional loading within the segment.

Table C6. Calculation of Load Reduction at Point 2				
	Al	Fe	Mn	Acidity
Existing Load	6.6	8.9	14.1	18.7
Difference in Existing Load between 1 & 2	-0.9	5.7	-7.3	-44.6
Load tracked from 1	1.0	1.2	4.5	36.8
Percent loss due to instream process	12	-	34	70
Percent load tracked from 1	88	-	66	30
Total Load tracked from 1	0.9	6.9	3.0	10.9
Allowable Load at 2	0.7	1.5	2.3	18.7
Load Reduction at 2	0.2	5.4	0.7	0.0
% Reduction required at 2	20	78	24	0

4 Headwaters of Unt (51219)

The TMDL for sampling point 4 consists of a load allocation to the area upstream of point 4. The load allocation for this tributary was computed using water-quality sample data collected at point 4. The average flow, measured at the sampling point 4 (0.49 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 4 shows pH ranging between 4.1 and 7.1, pH will be addressed in this TMDL because of the mining impacts. The objective is to reduce acid loading to the stream, which will in turn raise the pH to the desired range and keep a net alkalinity above zero, 99% of the time. The result of this analysis is an acid loading reduction that equates to meeting standards for pH (see TMDL Endpoint section in the report, Table 2). The method and rationale for addressing pH is contained in Attachment B.

Table C7. Load Allocations at Point 4

	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	1.25	5.1	0.28	1.1
Fe	1.12	4.6	0.40	1.6
Mn	17.94	73.1	0.54	2.2
Acid	41.22	168.1	4.12	16.8
Alk	17.82	72.7		

Table C8. Calculation of Load Reduction Necessary at Point 4

	Al	Fe	Mn	Acidity
	(#/day)	(#/day)	(#/day)	(#/day)
Existing Load	5.1	4.6	73.1	168.1
Allowable Load=TMDL	1.1	1.6	2.2	16.8
Load Reduction	4.0	3.0	70.9	151.3
Total % Reduction	78	64	97	90

3 Unt (51222)

The TMDL for sampling point 3 consists of a load allocation to all of the area upstream of point 3. The load allocation for this tributary was computed using water-quality sample data collected at point 3. The average flow, measured at the sampling point 3 (0.24 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 5 shows pH ranging between 6.9 and 7.4, pH will not be addressed in this TMDL because of this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Table C9. Load Allocations at Point 3				
	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	1.50	3.1	0.20	0.4
Fe	1.41	2.9	0.70	1.4
Mn	8.05	16.4	0.72	1.5
Acid	ND	NA	ND	NA
Alk	120.55	245.5		

Table C10. Calculation of Load Reduction Necessary at Point 3				
	Al	Fe	Mn	Acidity
	(#/day)	(#/day)	(#/day)	(#/day)
Existing Load	3.1	2.9	16.4	ND
Allowable Load=TMDL	0.5	1.4	1.5	NA
Load Reduction	2.6	1.5	14.9	0.0
Total % Reduction	87	50	91	0

5B Unt (51221) to Little Scrubgrass Creek Upstream of Sample Point 5

The TMDL for sampling point 5B consists of a load allocation to the all of the area upstream of point 5B. The load allocation for this tributary was computed using water-quality sample data collected at point 5B. The average flow, measured at the sampling point 5B (0.20 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 5B shows pH ranging between 7.5 and 7.8, pH will not be addressed in this TMDL because of this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron and acidity because there was only one each sample for aluminum and iron and there was no acidity present. Because WQS were met, TMDLs for aluminum, iron and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point 2.

Table C11. Load Allocations at Point 5B				
	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.26	0.4	0.26	0.4
Fe	0.09	0.1	0.09	0.1
Mn	0.43	0.7	0.16	0.3
Acid	ND	NA	ND	NA
Alk	192.17	326.0		

Table C12. Calculation of Load Reduction Necessary at Point 5B				
	Al	Fe	Mn	Acidity
	(#/day)	(#/day)	(#/day)	(#/day)
Existing Load	0.4	0.1	0.7	ND
Allowable Load=TMDL	0.4	0.1	0.3	NA
Load Reduction	0.0	0.0	0.4	0.0
Total % Reduction	0	0	62	0

5 Little Scrubgrass Creek Downstream of Unt (51221)

The TMDL for this segment of Little Scrubgrass Creek consists of a load allocation to the area between sample points 4, 3, 5B and 5. The load allocation for this segment was computed using water-quality sample data collected at point 5. The average flow, measured at the sampling point 5 (1.38 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 5 shows pH ranging between 6.8 and 7.5, pH will not be addressed in this TMDL because of this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for acidity because there was no acidity present. Because WQS were met, a TMDL for acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point 2.

Table C13. Load Allocations for Point 5				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.83	9.5	0.09	1.1
Fe	1.17	13.5	0.18	2.0
Mn	10.40	119.7	0.42	4.8
Acid	0.92	10.6	0.92	10.6
Alk	72.62	835.8		

The calculated load reductions for all the loads that enter point 5 must be accounted for in the calculated reductions at sample point 5 shown in Table C14. A comparison of measured loads between points 4, 3, 5B and 5 shows that there is no additional loading entering the segment for acidity. For acidity the percent decrease in existing loads are applied to the allowable upstream loads entering the segment. There is additional loading entering the segment for aluminum, iron and manganese. The total segment aluminum, iron and manganese loads are the sum of the upstream allocated loads and any additional loading within the segment.

Table C14. Calculation of Load Reduction at Point 5				
	Al	Fe	Mn	Acidity
Existing Load	9.5	13.5	119.7	10.6
Difference in Existing Load between 5B, 4, 3 & 5	0.9	5.9	29.4	-157.5
Load tracked from 5B, 4 & 3	1.9	3.1	4.0	16.8
Percent loss due to instream process	-	-	-	94
Percent load tracked from 5B, 4 & 3	-	-	-	6
Total Load tracked from 5B, 4 & 3	2.8	9.1	33.4	1.1
Allowable Load at 5	1.1	2.0	4.8	10.6
Load Reduction at 5	1.7	7.1	28.6	0.0
% Reduction required at 5	61	78	86	0

6 Little Scrubgrass Creek Downstream of Sample Points 2 and 5

The TMDL for this segment of Little Scrubgrass Creek consists of a load allocation to the area between sample points 2, 5 and 6. The load allocation for this segment was computed using water-quality sample data collected at point 6. The average flow, measured at the sampling point 6 (2.81 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 6 shows pH ranging between 5.9 and 7.7, pH will not be addressed in this TMDL because of this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for acidity because all but three of the acidity samples were zero. Because WQS were met, a TMDL for acidity is not necessary. Although a TMDL is not necessary, the measured load is considered at the next downstream point 12.

Table C15. Load Allocations for Point 6				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.72	16.9	0.07	1.7
Fe	0.95	22.2	0.14	3.3
Mn	6.54	153.4	0.39	9.2
Acid	0.95	22.2	0.95	22.2
Alk	54.77	1284.1		

The calculated load reductions for all the loads that enter point 6 must be accounted for in the calculated reductions at sample point 6 shown in Table C16. A comparison of measured loads between points 5, 2 and 6 shows that there is no additional loading entering the segment for iron and acidity. For iron and acidity the percent decrease in existing loads are applied to the allowable upstream loads entering the segment. There is additional loading entering the segment for aluminum and manganese. The total segment aluminum and manganese loads are the sum of the upstream allocated loads and any additional loading within the segment.

Table C16. Calculation of Load Reduction at Point 6				
	Al	Fe	Mn	Acidity
Existing Load	16.9	22.2	153.4	22.2
Difference in Existing Load between 5, 2 & 6	0.8	-0.2	19.6	-7.1
Load tracked from 5 & 2	1.8	3.5	7.0	29.3
Percent loss due to instream process	-0	1	-	24
Percent load tracked from 5 & 2		99	-	76
Total Load tracked from 5 & 2	2.6	3.5	26.7	22.2
Allowable Load at 6	1.7	3.3	9.2	22.2
Load Reduction at 6	0.9	0.2	17.5	0.0
% Reduction required at 6	35	5	65	0

7 Unt (51217) halfway Between Headwaters of 51217 and the Confluence with Unt 51218

The TMDL for this unnamed tributary of Little Scrubgrass Creek consists of a load allocation to all of the watershed area upstream of sample point 7. The load allocation for this segment was computed using water-quality sample data collected at point 7. The average flow, measured at the sampling point 7 (0.40 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 7 shows pH ranging between 7.3 and 8.0, pH will not be addressed in this TMDL because this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum and acidity because all of the aluminum samples were less than detection and there was no acidity present in this segment. Because WQS were met, TMDLs for aluminum and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point 8.

Table C17. Load Allocations at Point 7				
	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	ND	NA	ND	NA
Fe	0.37	1.23	0.36	1.2
Mn	1.23	4.1	0.36	1.2
Acid	ND	NA	ND	NA
Alk	120.40	404.5		

Table C18 Calculation of Load Reduction Necessary at Point 7				
	Al	Fe	Mn	Acidity
	(#/day)	(#/day)	(#/day)	(#/day)
Existing Load	ND	1.23	4.1	ND
Allowable Load=TMDL	NA	1.2	1.2	NA
Load Reduction	0.0	0.03	2.9	0.0
Total % Reduction	0	3	71	0

7B Sample Point Downstream of Sample Point 7

The TMDL for this unnamed tributary of Little Scrubgrass Creek consists of a load allocation to all of the watershed area upstream of sample point 7B. The load allocation for this segment was computed using water-quality sample data collected at point 7B. The average flow, measured at the sampling point 7B (0.40 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 7 shows pH ranging between 7.2 and 7.3, pH will not be addressed in this TMDL because this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for acidity because there was no acidity present in this segment. Because WQS were met, TMDLs for acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point 8.

Table C19. Load Allocations at Point 7B				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.75	2.5	0.16	0.5
Fe	0.25	0.9	0.25	0.9
Mn	0.87	2.9	0.77	2.6
Acid	ND	ND	NA	NA
Alk	61.40	206.0		

Table C20 Calculation of Load Reduction Necessary at Point 7B				
	Al	Fe	Mn	Acidity
	(#/day)	(#/day)	(#/day)	(#/day)
Existing Load	2.5	0.9	2.9	ND
Allowable Load=TMDL	0.5	0.9	2.6	NA
Load Reduction	2.0	0.0	0.3	0.0
Total % Reduction	80	0	12	0

8 Unt (51217) Upstream of the Confluence with Unt 51217

The TMDL for sampling point 8 consists of a load allocation of the area between sample points 7, 7B and 8. The load allocation for this tributary was computed using water-quality sample data collected at point 8. The average flow, measured at the sampling point 8 (0.86 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 8 shows pH ranging between 6.9 and 7.9, pH will not be addressed in this TMDL because this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for acidity because was no acidity present in this segment. Because WQS were met, a TMDL for acidity is not necessary. Although a TMDL is not necessary, the measured load is considered at the next downstream point 11.

Table C21. Load Allocations for Point 8				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.13	0.9	0.07	0.5
Fe	0.38	2.7	0.33	2.4
Mn	0.39	2.8	0.16	1.1
Acid	ND	ND	NA	NA
Alk	85.32	614.4		

The calculated load reductions for all the loads that enter point 8 must be accounted for in the calculated reductions at sample point 8 shown in Table C22. A comparison of measured loads between points 7,7B and 8 shows that there is no additional loading entering the segment for manganese and acidity. For manganese and acidity the percent decrease in existing loads are applied to the allowable upstream loads entering the segment. There is additional loading entering the segment for aluminum and iron. The total segment aluminum and iron load is the sum of the upstream allocated load and any additional loading within the segment.

Table C22. Calculation of Load Reduction at Point 8				
	Al	Fe	Mn	Acidity
Existing Load	0.9	2.7	2.8	0.0
Difference in Existing Load between 7, 7B & 8	-1.6	0.6	-4.2	0.0
Load tracked from 7, 7B & 8	0.5	2.1	3.8	0.0
Percent loss due to instream process	64	-	60	-
Percent load tracked from 7 & 7B	36	-	40	-
Total Load tracked from 7 & 7B	0.18	2.7	1.51	0.0
Allowable Load at 8	0.5	2.4	1.1	0.0
Load Reduction at 8	0.0	0.3	0.4	0.0
% Reduction required at 8	0	10	24	0

10 Unt (51218) Upstream of the Confluence with Unt 51217

The TMDL for this segment of Little Scrubgrass Creek consists of a load allocation to all of the watershed area upstream of sample point 10. The load allocation for this segment was computed using water-quality sample data collected at point 10. The average flow, measured at the sampling point 10 (0.35 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 10 shows pH ranging between 6.6 and 7.4, pH not be addressed in this TMDL because this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for acidity because there was very little acidity present in the segment. Because WQS were met, a TMDL for acidity is not necessary. Although a TMDL is not necessary, the measured load is considered at the next downstream point 11.

Table C23. Load Allocations for Point 10

	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.71	2.1	0.13	0.4
Fe	0.83	2.4	0.83	2.4
Mn	1.99	5.8	0.52	1.5
Acid	0.56	1.6	0.56	1.6
Alk	62.56	183.0		

Table C24 Calculation of Load Reduction Necessary at 10

	Al	Fe	Mn	Acidity
	(#/day)	(#/day)	(#/day)	(#/day)
Existing Load	2.1	2.4	5.8	1.6
Allowable Load=TMDL	0.4	2.4	1.5	1.6
Load Reduction	1.7	0.0	4.3	0.0
Total % Reduction	81	0	74	0

11 Mouth of Unt (51217) Upstream of the Confluence with Little Scrubgrass Creek

The TMDL for this segment of Little Scrubgrass Creek consists of a load allocation to all of the watershed area between sample points 8, 10 and 11. The load allocation for this segment was computed using water-quality sample data collected at point 11. The average flow, measured at the sampling point 11 (0.94 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 11 shows pH ranging between 6.0 and 8.0, pH not be addressed in this TMDL because this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for acidity because there was no acidity present in this segment. Because WQS were met, a TMDL for acidity is not necessary. Although a TMDL is not necessary, the measured load is considered at the next downstream point 12.

Table C25. Load Allocations for Point 11

	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.61	4.8	0.08	0.6
Fe	0.93	7.3	0.14	1.1
Mn	1.45	11.4	0.23	1.8
Acid	ND	NA	ND	NA
Alk	70.34	553.7		

The calculated load reductions for all the loads that enter point 11 must be accounted for in the calculated reductions at sample point 11 shown in Table C24. A comparison of measured loads between points 8, 10 and 11 shows that there is no additional loading entering the segment for acidity. For acidity the percent decrease in existing loads are applied to the allowable upstream loads entering the segment. There is additional loading entering the segment for aluminum, iron and manganese. The total segment aluminum, iron and manganese load is the sum of the upstream allocated load and any additional loading within the segment.

Table C26. Calculation of Load Reduction at Point 11

	Al	Fe	Mn	Acidity
Existing Load	4.8	7.3	11.4	0.0
Difference in Existing Load between 8, 10 & 11	1.8	2.2	2.8	-1.6
Load tracked from 8 & 10	0.9	4.8	2.7	1.6
Percent loss due to instream process	-	-	-	100
Percent load tracked from 8 & 10	-	-	-	0
Total Load tracked from 8 & 10	2.7	7.0	5.4	0.0
Allowable Load at 11	0.6	1.1	1.8	0.0
Load Reduction at 11	2.1	5.9	3.6	0.0
% Reduction required at 11	78	84	66	0

12 Little Scrubgrass Creek Downstream of Sample Points 11 and 6

The TMDL for this segment of Little Scrubgrass Creek consists of a load allocation to all of the watershed area between of sample points 6, 11 and 12. The load allocation for this segment was computed using water-quality sample data collected at point 12. The average flow, measured at the sampling point 12 (4.33 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 12 shows pH ranging between 5.9 and 8.7, pH will not be addressed in this TMDL because this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Table C27. Load Allocations for Point 12				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.63	22.6	0.08	2.7
Fe	0.81	29.3	0.14	5.0
Mn	4.24	153.4	0.47	16.9
Acid	0.19	7.0	0.15	5.5
Alk	58.38	2109.8		

The calculated load reductions for all the loads that enter point 12 must be accounted for in the calculated reductions at sample point 12 shown in Table C26. A comparison of measured loads between points 6, 11 and 12 shows that there is no additional loading entering the segment for iron, and manganese and acidity. For and iron, manganese and acidity the percent decrease in existing loads are applied to the allowable upstream loads entering the segment. There is additional loading entering the segment for aluminum. The total segment aluminum load is the sum of the upstream allocated load and any additional loading within the segment.

Table C28. Calculation of Load Reduction at Point 12				
	Al	Fe	Mn	Acidity
Existing Load	22.6	29.3	153.4	7.0
Difference in Existing Load between 6, 11 & 12	0.9	-0.2	-11.4	-15.2
Load tracked from 6 & 11	2.3	4.4	11.0	22.2
Percent loss due to instream process	-	1	7	68
Percent load tracked from 6 & 11	-	99	93	32
Total Load tracked from 6 & 11	3.2	4.4	10.26	7.0
Allowable Load at 12	2.7	5.0	16.9	5.5
Load Reduction at 12	0.5	0.0	0.0	1.5
% Reduction required at 12	16	0	0	22

13 Mouth of Unt (51216) Before Confluence with Little Scrubgrass Creek

No load allocations were calculated for this sample point because this segment is net alkaline and both of the aluminum; iron and manganese samples were either less than criteria or less than detection.

15 Little Scrubgrass Creek Downstream of Unt 51216

The TMDL for this segment of Little Scrubgrass Creek consists of a load allocation to all of the watershed area between sample points 12 and 15. The load allocation for this segment was computed using water-quality sample data collected at point 15. The average flow, measured at the sampling point 15 (4.82 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 15 shows pH ranging between 6.0 and 7.9, pH will not be addressed in this TMDL because this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for acidity because there was no acidity present in this segment. Because WQS were met, a TMDL for acidity is not necessary. Although a TMDL is not necessary, the measured load is considered at the next downstream point 18.

Table C29. Load Allocation at Point 15				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.52	21.1	0.07	3.0
Fe	0.68	27.4	0.15	6.0
Mn	3.62	145.6	0.43	17.5
Acid	ND	NA	ND	NA
Alk	54.17	2177.5		

The calculated load reductions for all the loads that enter point 15 must be accounted for in the calculated reductions at sample point 15 shown in Table C28. A comparison of measured loads between points 12 and 15 shows that there is no additional loading entering the segment for aluminum, iron, manganese and acidity. For aluminum, iron, manganese and acidity the percent decrease in existing loads are applied to the allowable upstream loads entering the segment.

Table C30. Calculation of Load Reduction at Point 15				
	Al	Fe	Mn	Acidity
Existing Load	21.1	27.4	145.6	0.0
Difference in Existing Load between 12 & 15	-1.5	-1.9	-7.8	-7.0
Load tracked from 12	2.7	5.0	16.9	5.5
Percent loss due to instream process	7	6	5	100
Percent load tracked from 12	93	94	95	0
Total Load tracked from 12	2.5	4.7	16.0	0.00
Allowable Load at 15	3.0	6.0	17.5	0.0
Load Reduction at 15	0.0	0.0	0.0	0.0
% Reduction required at 15	0	0	0	0

16A (51212) Headwaters of North Fork Little Scrubgrass Creek

No load allocations were calculated for this sample point because this segment is net alkaline and both of the aluminum; iron and manganese samples were either less than criteria or less than detection.

16B (51214) Headwaters of Unt to North Fork Little Scrubgrass Creek

No load allocations were calculated for this sample point because this segment is net alkaline and both of the aluminum; iron and manganese samples were either less than criteria or less than detection.

16 Most Upstream Sample Point on North Fork Little Scrubgrass Creek

The TMDL for this segment of North Fork Little Scrubgrass Creek consists of a load allocation to all of the watershed area upstream of sample point 16. The load allocation for this segment was computed using water-quality sample data collected at point 16. The average flow, measured at the sampling point 16 (0.91 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 16 shows pH ranging between 7.3 and 7.5, pH will not be addressed in this TMDL because this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, manganese and acidity because all of the aluminum samples were less than detection, the 99th percentile of manganese was less than criteria and there was no acidity present in this segment. Because WQS were met, TMDLs for aluminum, manganese and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point 17.

Table C31. Load Allocations for Point 16				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	ND	NA	ND	NA
Fe	0.57	4.3	0.29	2.2
Mn	0.26	2.0	0.26	2.0
Acid	ND	NA	ND	NA
Alk	65.27	495.6		

Table C32. Calculation of Load Reduction Necessary at 16				
	Al	Fe	Mn	Acidity
	(#/day)	(#/day)	(#/day)	(#/day)
Existing Load	ND	4.3	2.0	ND
Allowable Load=TMDL	NA	2.2	2.0	NA
Load Reduction	0.0	2.1	0.0	0.0
Total % Reduction	0	49	0	0

17A Mouth of Unt (51213) Before Confluence to North Fork Little Scrubgrass Creek

No load allocations were calculated for this sample point because this segment is net alkaline and both of the aluminum; iron and manganese samples were either less than criteria or less than detection.

17 North Fork Little Scrubgrass Creek Upstream of Confluence with Little Scrubgrass Creek

The TMDL for this segment of North Fork Little Scrubgrass Creek consists of a load allocation to all of the watershed area between sample points 16 and 17. The load allocation for this segment was computed using water-quality sample data collected at point 17. The average flow, measured at the sampling point 17 (0.90 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 17 shows pH ranging between 6.2 and 7.5, pH will not be addressed in this TMDL because this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for acidity because there was only one acid sample in this segment. Because WQS were met, a TMDL for acidity is not necessary. Although a TMDL is not necessary, the measured load is considered at the next downstream point 18.

Table C33. Load Allocations for Point 17				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.13	1.0	0.08	0.6
Fe	0.29	2.2	0.20	1.5
Mn	0.88	6.6	0.38	2.8
Acid	0.44	3.3	0.44	3.3
Alk	45.96	343.2		

The calculated load reductions for all the loads that enter point 17 must be accounted for in the calculated reductions at sample point 17 shown in Table C32. A comparison of measured loads between points 16 and 17 shows that there is no additional loading entering the segment for iron. For iron the percent decrease in existing loads are applied to the allowable upstream loads entering the segment. There is additional loading entering the segment for aluminum, manganese and acidity. The total segment aluminum, manganese and acidity load is the sum of the upstream allocated load and any additional loading within the segment.

Table C34. Calculation of Load Reduction at Point 17				
	Al	Fe	Mn	Acidity
Existing Load	1.0	2.2	6.6	3.3
Difference in Existing Load between 16 & 17	1.0	-2.1	4.6	3.3
Load tracked from 16	0.0	2.2	2.0	0.0
Percent loss due to instream process	-	49	-	-
Percent load tracked from 16	-	51	-	-
Total Load tracked from 16	1.0	1.1	6.6	3.3
Allowable Load at 17	0.6	1.5	2.8	3.3
Load Reduction at 17	0.4	0.0	3.8	0.0
% Reduction required at 17	40	0	57	0

18A Unt (51215) to Little Scrubgrass Creek

No load allocations were calculated for this sample point because this segment is net alkaline and all aluminum; iron and manganese samples were less than detection.

18 Little Scrubgrass Creek Downstream of the Confluence with North Fork Little Scrubgrass Creek

The TMDL for this segment of Little Scrubgrass Creek consists of a load allocation to all of the watershed area between sample points 15, 17 and 18. The load allocation for this segment was computed using water-quality sample data collected at point 18. The average flow, measured at the sampling point 18 (6.88 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 18 shows pH ranging between 5.6 and 7.6, pH will not be addressed in this TMDL because of this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for acidity because there was no acidity present in this segment. Because WQS were met, a TMDL for acidity is not necessary. Although a TMDL is not necessary, the measured load is considered at the next downstream point 26.

Table C35. Load Allocations at Point 18				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.39	22.4	0.06	3.4
Fe	1.07	61.1	0.15	8.6
Mn	1.70	97.3	0.34	19.5
Acid	ND	NA	ND	NA
Alk	50.26	2882.0		

The calculated load reductions for all the loads that enter point 18 must be accounted for in the calculated reductions at sample point 18 shown in Table C34. A comparison of measured loads between point's 15, 17 and 18 shows that there is no additional loading entering the segment for manganese. For manganese the percent decrease in existing loads are applied to the allowable upstream loads entering the segment. There is additional loading entering the segment for aluminum, iron and acidity. The total segment aluminum, iron and acidity load is the sum of the upstream allocated load and any additional loading within the segment.

Table C36. Calculation of Load Reduction at Point 18				
	Al	Fe	Mn	Acidity
Existing Load	22.4	61.1	97.3	0.0
Difference in Existing Load between 15, 17 & 18	0.3	31.5	-54.8	-3.3
Load tracked from 15 &17	3.6	7.5	20.3	3.3
Percent loss due to instream process	-	-	36	-
Percent load tracked from 15 & 17	-	-	64	-
Total Load tracked from 15 & 17	3.9	39.0	13.0	0.0
Allowable Load at 18	3.4	8.6	19.5	0.0
Load Reduction at 18	0.5	30.4	0.0	0.0
% Reduction required at 18	13	78	0	0

26 Little Scrubgrass Creek Downstream of Confluence with North Fork Little Scrubgrass Creek

The TMDL for this segment of Little Scrubgrass Creek consists of a load allocation to all of the watershed area between sample points 18 and 26. The load allocation for this segment was computed using water-quality sample data collected at point 26. The average flow, measured at the sampling point 26 (13.67 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 26 shows pH ranging between 5.6 and 8.0, pH will not be addressed in this TMDL because this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for acidity because there was no acidity present in this segment. Because WQS were met, a TMDL for acidity is not necessary. Although a TMDLs\ is not necessary, the measured load is considered at the next downstream point 29.

Table C37. Load Allocations at Point 26				
	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.44	50.6	0.06	7.1
Fe	0.96	109.9	0.14	16.5
Mn	1.52	172.8	0.26	29.4
Acid	ND	NA	ND	NA
Alk	63.01	7183.1		

The calculated load reductions for all the loads that enter point 26 must be accounted for in the calculated reductions at sample point 26 shown in Table C36. A comparison of measured loads between point's 18 and 26 shows that there is additional loading entering the segment for aluminum, iron, manganese and acidity. The total segment aluminum, iron, manganese and acidity load is the sum of the upstream allocated load and any additional loading within the segment.

Table C38. Calculation of Load Reduction at Point 26				
	Al	Fe	Mn	Acidity
Existing Load	50.6	109.9	172.8	0.0
Difference in Existing Load between 18 & 26	28.2	48.8	75.4	0.0
Load tracked from 18	3.4	8.6	19.5	0.0
Percent loss due to instream process	-	-	-	-
Percent load tracked from 18	-	-	-	-
Total Load tracked from 18	31.6	57.4	94.9	0.0
Allowable Load at 26	7.1	16.5	29.4	0.0
Load Reduction at 26	24.5	40.9	65.5	0.0
% Reduction required at 26	78	71	69	0

27 Upstream Sample Point on Unt (51200) to Little Scrubgrass Creek

The TMDL for this Unt of Little Scrubgrass Creek consists of a load allocation to all of the watershed area upstream of sample point 27. The load allocation for this segment was computed using water-quality sample data collected at point 27. The average flow, measured at the sampling point 27 (0.63 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 27 shows pH ranging between 6.1 and 7.6, pH will be not be addressed in this TMDL because this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for acidity because there was no acidity present in this segment. Because WQS were met, a TMDL for acidity is not necessary. Although a TMDL is not necessary, the measured load is considered at the next downstream point 28.

Table C39. Load Allocations at Point 27				
	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.21	1.1	0.06	0.3
Fe	0.49	2.6	0.16	0.8
Mn	0.50	2.6	0.20	1.0
Acid	ND	NA	ND	NA
Alk	52.31	274.7		

Table C40. Calculation of Load Reduction Necessary at 27				
	Al	Fe	Mn	Acidity
	(#/day)	(#/day)	(#/day)	(#/day)
Existing Load	1.1	2.6	2.6	ND
Allowable Load=TMDL	0.3	0.8	1.0	NA
Load Reduction	0.8	1.8	1.6	0.0
Total % Reduction	73	69	60	0

28 Unt (51200) Upstream of Confluence with Unt 51201

The TMDL for this segment of Little Scrubgrass Creek consists of a load allocation to all of the watershed area between sample points 27 and 28. The load allocation for this segment was computed using water-quality sample data collected at point 28. The average flow, measured at the sampling point 28 (1.45 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 28 shows pH ranging between 6.1 and 7.5, pH will not be addressed in this TMDL because this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for manganese or acidity because the 99th percentile of manganese was less than criteria and there was little acidity present in this segment. Because

WQS were met, TMDLs for manganese and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point 2.

Table C41. Load Allocations at Point 28				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.25	3.0	0.06	0.7
Fe	0.88	10.6	0.16	1.9
Mn	0.32	3.8	0.32	3.8
Acid	0.77	9.3	0.77	9.3
Alk	44.8	541.7		

The calculated load reductions for all the loads that enter point 26 must be accounted for in the calculated reductions at sample point 26 shown in Table C36. A comparison of measured loads between point's 27 and 28 shows that there is additional loading entering the segment for aluminum, iron, manganese and acidity. The total segment aluminum, iron, manganese and acidity load is the sum of the upstream allocated load and any additional loading within the segment.

Table C42. Calculation of Load Reduction at Point 28				
	Al	Fe	Mn	Acidity
Existing Load	3.0	10.6	3.8	9.3
Difference in Existing Load between 27 & 28	1.9	8.0	1.2	9.3
Load tracked from 27	0.3	0.8	1.0	0.0
Percent loss due to instream process	-	-	-	-
Percent load tracked from 27	-	-	-	-
Total Load tracked from 27	2.2	8.8	2.3	9.3
Allowable Load at 28	0.7	1.9	3.8	9.3
Load Reduction at 28	1.5	6.9	0.0	0.0
% Reduction required at 28	68	78	0	0

28A Unt (51201) to Unt 51200

No load allocations were calculated for this sample point because this segment is net alkaline and all aluminum; iron and manganese samples were less than detection or criteria.

28B Mouth of Unt (51200) Upstream of Confluence with Little Scrubgrass Creek

No load allocations were calculated for this sample point because this segment is net alkaline and all aluminum; iron and manganese samples were less than detection or criteria.

29A Unt (51199) to Little Scrubgrass Creek

No load allocations were calculated for this sample point because this segment is net alkaline and all aluminum; iron and manganese samples were less than detection or criteria.

29 Last Sample Point on Little Scrubgrass Creek

The TMDL for this segment of Little Scrubgrass Creek consists of a load allocation to all of the watershed area between sample points 18, 28 and 29. The load allocation for this segment was computed using water-quality sample data collected at point 29. The average flow, measured at the sampling point 29 (19.91 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 29 shows pH ranging between 6.5 and 8.0, pH will not be addressed in this TMDL because this segment is net alkaline. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for acidity because there was no acidity present in the segment. Because WQS were met, a TMDL for acidity is not necessary.

Table C43. Load Allocations at Point 29

	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.03	5.0	0.03	5.0
Fe	0.23	37.9	0.23	37.9
Mn	0.80	132.6	0.29	47.7
Acid	ND	NA	ND	NA
Alk	64.82	10765.3		

The calculated load reductions for all the loads that enter point 29 must be accounted for in the calculated reductions at sample point 29 shown in Table C42. A comparison of measured loads between points 26, 28 and 29 shows that there no additional loading entering the segment for aluminum, iron, manganese and acidity. For aluminum, iron, manganese and acidity the percent decrease in existing loads are applied to the allowable upstream loads entering the segment.

Table C44. Calculation of Load Reduction at Point 29				
	Al	Fe	Mn	Acidity
Existing Load	5.0	37.9	132.6	0.0
Difference in Existing Load between 26, 28 & 29	-48.6	-82.6	-44.0	-9.3
Load tracked from 26 & 28	7.8	18.4	33.2	9.3
Percent loss due to instream process	91	69	25	100
Percent load tracked from 26 & 28	9	31	75	0
Total Load tracked from 26 & 28	0.7	5.8	24.9	0.0
Allowable Load at 29	5.0	37.9	47.7	0.0
Load Reduction at 29	0.0	0.0	0.0	0.0
% Reduction required at 29	0	0	0	0

Margin of Safety (MOS)

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 added when 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 represent 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 303(d) narratives that justify changes in listings between the 1996, 1998, 2002, and 2004 list. The 303(d) listing process has undergone an evolution in Pennsylvania since the development of the 1996 list.

In the 1996 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 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 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).

Attachment E

Water Quality Data Used In TMDL Calculations

Monitoring Point: **1A** **Southern Headwater Tributary of Little Scrubgrass Creek (Butler County)**
1A **Ben Hal (10970104)**

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 901	4/7/2004	435	Meas	7.1	25.6	-1.2	<.3	0.521	<.5
4251 114	8/2/2004	60	Meas	6.7	46.2	-26	<.3	0.378	<.5
4251 283	10/18/2004	88	Meas	7.2	58	-29.8	<.3	0.623	<.5

Monitoring Point: **1B** **Northern Headwater Tributary of Little Scrubgrass Creek (Venango County)**

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 902	4/7/2004	277	Meas	3.5	0	169.2	1.13	10.8	18.9
4251 115	8/2/2004	19	Meas	3.3	0	88	2.33	8.94	5.86
4251 284	10/18/2004	66	Meas	4.1	3.8	64.2	0.698	6.99	6
	avg=	120.67		3.63	1.27	107.13	1.39	8.91	10.25
	stdev=					55.05	0.85	1.91	7.49

Monitoring Point: **1**

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 775	4/9/1987			4.9	8	14	0	2.66	2.02
4242 963	7/1/3087			6.4	30	4	0.61	1.32	0
4242 183	11/19/1987			6.2	15	18	0	2.03	0
4242 919	12/22/1988			6.1	20	0	0	1.47	0
4242 103	3/30/1989			6.2	16	0	7.08	1.03	6.08
4242 294	6/29/1989			6.1	15	10	1.44	3.99	1.92
4242 478	9/26/1989			7.3	48	0	0.614	1.32	0.617
4242 662	12/14/1989			6.8	36	0	0	2.49	0
4242 840	3/22/1990			6.2	13	0	0	2.4	0.95
4217 586	6/27/1990			6.8	19	0	0	3.25	0
4217 768	9/25/1990			6.4	18	1.2	0	2.49	0
4217 948	11/28/1990			6.5	14	0	0	1.94	0.665
4217 277	3/27/1991			5.5	7	3.4	0.369	2.84	1.8
4217 495	5/22/1991			6.8	24	0	0	2.79	0
4217 743	9/24/1991			7.3	56	0	0	2.28	0
4217 930	12/19/1991			6.9	38	0	0	2.91	0
4217 106	2/25/1992			6.3	9	3	0	1.62	0
4217 367	6/3/1992			7.2	44	0	0	2.39	0
4217 515	8/26/1992			7.1	32	0	0	2.81	0
4217 681	11/16/1992			5.9	12	5.8	0	1.81	0.685

4217 759	2/3/1993			4.9	9	15.4	0	3.09	3.49
4217 845	5/11/1993			4.9	8	16.6	0.304	3.6	2.33
4217 931	8/10/1993			7.6	94	0	0	0.217	0
4217 092	12/16/1993			6	11.8	16.2	0	2.32	1.14
4217 258	3/17/1994			5.2	9.6	7.2	0	1.83	1.92
4217 503	6/29/1994			6.8	34	0	0	3.33	0
4217 643	9/29/1994			6.9	38	0	0.359	1.19	0
4217 768	11/30/1994			6.2	19	22	0	1.08	0
4217 721	8/27/1996			6.4	48	0	0.308	1.07	0
4251 397	6/3/2003	933	Meas	5.8	8	35.4	0	2.2	0.714
4251 608	8/20/2003	416	Meas	7.1	29.6	0	0	1.71	0
4251 900	4/7/2004	1822	Meas	6.5	15.4	33.4	0	2.54	1.78
4251 113	7/29/2004	507	Meas	6.8	32.4	10.2	0	1.57	0
4251 257	10/12/2004	392	Meas	7	37.8	4.6	0	2.83	0
	avg=	814		6.38	25.55	6.48	0.33	2.19	0.77
	stdev=					9.64	1.23	0.84	1.31

Monitoring Point: 2

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 629	1/15/1987			6.2	18	24	0.52	1.55	0.783
4242 776	4/9/1987			5.5	10	4	0.307	2.08	1.24
4242 964	7/30/1987			6.5	38	0	0	0.161	0
4242 184	11/19/1987			6.5	24	0	0	0.498	0
4242 920	12/22/1988			6.3	30	0	0	1.24	0
4242 104	3/30/1989			6.3	22	0	16.7	5.54	13.6
4242 295	6/29/1989			6.3	24	0	0.561	2.7	0
4242 479	9/26/1989			7.4	46	0	0.47	0.519	0.559
4242 663	12/14/1989			6.9	40	0	0.34	0.763	0
4242 841	3/22/1990			6.5	20	0	0.33	1.62	0
4217 587	6/27/1990			7	26	0	0.315	1.27	0
4217 769	9/25/1990			6.7	30	0	0	1.08	0
4217 949	11/28/1990			6.9	26	0	0	0.949	0
4217 278	3/27/1991			6.9	24	0	0.446	1.92	0.895
4217 494	5/22/1991			7.1	40	0	0.362	0.533	0
4217 742	9/24/1991			7.5	78	0	0.696	0.274	0
4217 929	12/19/1991			7.1	44	0	0.616	1.31	0
4217 105	2/25/1992			6.8	16	0	0	1.06	0
4217 366	6/3/1992			7.2	42	0	0.489	0.566	0
4217 514	8/26/1992			7.4	50	0	0.561	0.24	0
4217 680	11/16/1992			6.3	24	0	0	0.863	0
4217 758	2/3/1993			6.8	20	0	0.428	2.1	2.1
4217 844	5/11/1993			6.5	26	0	0	1.75	0
4217 930	8/10/1993			7.2	92	0	0.861	0.282	0
4217 097	12/16/1993			6.4	26	0	1.65	1.06	0
4217 261	3/17/1994			6.4	13.6	3.6	0	1.5	1.46

4217 504	6/29/1994			6.4	38	0	0.53	0.818	0
4217 642	9/29/1994			7.1	46	0	0.403	0.453	0
4217 773	11/30/1994			6.3	26	14	0	0.572	0
4217 948	3/9/1995			6.6	24	0	1.72	1.36	1.79
4217 107	6/4/1995			6.5	24	0	0	0.991	0
4217 271	10/25/1995			6.8	70	0	0.679	0.373	0
4217 720	8/27/1996			6.4	54	0	0.663	0.263	0
4251 398	6/3/2003	1196	Meas	7.2	55.8	0	0.486	6.56	0
4251 611	8/21/2003	425	Meas	7.2	34.2	0	0	0.148	0
4251 922	4/21/2004	1927	Meas	6.8	23.2	18	0	1.59	0
4251 111	7/29/2004	666	Meas	7	35.6	0	0	0.294	0
4251 259	10/12/2004	449	Meas	7.3	44	0	0	0.992	0
	avg=	932.6		6.74	34.85	1.67	0.79	1.26	0.59
	stdev=					5.25	2.68	1.31	2.23

Monitoring Point: 4

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4217 761	2/3/1993			7.1	46	0	2.41	15.8	1.34
4217 846	5/11/1993			6.6	42	0	1.92	17.3	1.29
4217 932	8/10/1993			6.3	22	14.6	1.98	30.8	0
4217 094	12/16/1993			6.3	28	28	1.21	13.6	0.8
4217 259	3/17/1994			6.1	12.4	6.2	0.968	7.39	0.614
4217 951	3/9/1995			6.1	12.6	24	2.02	11.7	0.687
4251 402	6/3/2003	359	Meas	4.5	5.6	85.2	0.41	15	1.55
4251 614	8/21/2003	143	Meas	4.1	3.2	112	0.521	26.7	1.87
4251 903	4/19/2004	588	Meas	4.9	7.8	69.2	0.535	15.8	1.88
4251 118	8/2/2004	326	Meas	4.8	8.8	57.6	0.305	23.9	2.13
4251 274	10/14/2004	282	Meas	4.5	7.6	56.6	0	19.3	1.61
	avg=	339.60		5.57	17.82	41.22	1.12	17.94	1.25
	stdev=					37.47	0.84	6.83	0.65

Monitoring Poing: 3

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4217 760	2/3/1993			7.4	128	0	0.743	9.73	3.49
4217 847	5/11/1993			7	130	0	0.865	10.1	3.09
4217 933	8/10/1993			7.8	206	0	1.15	7.79	0
4217 093	12/16/1993			6.9	124	0	1.77	9.69	1.82
4217 260	3/17/1994			7.1	74	0	0.982	6.73	2.26
4217 952	3/9/1995			6.9	82	0	1.38	6.76	1.45
4251 401	6/3/2003	240	Meas	7	82.2	0	1.88	6.79	1.27
4251 613	8/21/2003	95	Meas	7.4	158.6	0	0.967	7.88	0
4251 904	4/19/2004	120	Meas	7	81.8	0	2.26	8.07	1.58
4251 117	8/2/2004	200	Meas	7	120.4	0	1.55	7.62	0.523

4251 275	10/14/2004	193	Meas	7.1	139	0	1.93	7.44	1.02
	avg=	169.6		7.15	120.55	0.00	1.41	8.05	1.50
	stdev=					0.00	0.51	1.24	1.14

Monitoring Point: 5B Unt to Little Scrubgrass Creek above 5 at road crossing

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 612	8/21/2003	53	Meas	7.7	276.8	0	0.34	0.156	0
4251 920	4/21/2004	251	Meas	7.5	212.8	0	0	1.27	1.03
4251 112	7/29/2004	77	Meas	7.5	20.86	0	0	0.189	0
4251 261	10/12/2004	184	Meas	7.8	258.2	0	0	0.121	0
	avg=	141.25		7.625	192.165	0	0.085	0.434	0.2575
	stdev=					0.00	0.17	0.56	0.52

Monitoring Point: 5

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 630	1/15/1987			6.4	44	12	2.52	5.55	2.53
4242 777	4/9/1987			6.1	36	0	1.48	10.1	3.61
4242 965	7/30/1987			6.9	78	0	0.565	20.3	1.43
4242 185	11/19/1987			6.7	54	0	0.516	12.3	0.834
4242 921	12/22/1988			6.6	64	0	1.05	13.6	0.777
4242 105	3/30/1989			6.3	28	0	14.4	2.57	8.47
4242 296	6/29/1989			6.5	58	0	0.942	13.5	1.69
4242 480	9/26/1989			7.5	80	0	1.29	20.4	1.56
4242 664	12/14/1989			7.3	88	0	1.46	13	0.873
4242 842	3/22/1990			7	66	0	1.76	11.6	2.11
4217 588	6/27/1990			7.6	94	0	0.689	14.8	0.824
4217 770	9/25/1990			7.1	70	0	1.11	15.7	0.925
4217 950	11/28/1990			7.2	62	0	0.56	8.72	0.738
4217 279	3/27/1991			7.4	72	0	1.24	12.6	1.39
4217 493	5/22/1991			7.9	102	0	0.554	14.9	0
4217 741	9/24/1991			7.6	96	0	0.577	15.4	0
4217 928	12/19/1991			7.5	100	0	1.13	9.97	0
4217 104	2/25/1992			7.4	46	0	0.659	4.61	0.501
4217 365	6/3/1992			7.6	104	0	0.373	10.2	0
4217 513	8/26/1992			7.2	86	0	0.634	12.2	0
4217 679	11/16/1992			6.6	64	0	0.776	8.29	0
4217 756	2/3/1993			7.6	100	0	0.974	8.46	0.984
4217 842	5/11/1993			7.1	86	0	0.706	9.77	0
4217 929	8/10/1993			7.5	116	0	0.735	8.9	0
4217 095	12/16/1993			7.1	84	0	0.769	6.74	0.57
4217 262	3/17/1994			7.2	50	0	0.718	5.58	0.874
4217 505	6/29/1994			6.6	66	0	0.657	14	0

4217 774	11/30/1994			6.4	44	22	0.823	7.37	0
4217 949	3/9/1995			6.8	50	0	0.976	6.37	0
4217 108	6/4/1995			7.4	94	0	0	5.02	0
4217 269	10/25/1995			6.9	80	0	0.635	16.3	0
4217 718	8/27/1996			6.6	78	0	0.462	16.1	0
4251 399	6/3/2003	1145	Meas	6.9	19	0	0	0.983	0
4251 610	8/21/2003	466	Meas	7.4	66.4	0	0.334	7.76	0
4251 923	4/21/2004	1737	Meas	7.5	67.2	0	0.39	7.69	0
4251 110	7/29/2004	650	Meas	7.4	85.4	0	0.437	5.93	0
4251 258	10/12/2004	794	Meas	7.6	108.8	0	0.449	7.49	0
	avg=	958.40		7.09	72.62	0.92	1.17	10.40	0.83
	stdev=					4.07	2.29	4.61	1.54

Monitoring Point: 6

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 631	1/15/1987			6.4	34	14	2.26	4.21	2.47
4242 778	4/9/1987			5.9	19	0	0.634	4.73	1.9
4242 966	7/30/1987			6.7	66	0	0.501	14.7	1
4242 186	11/19/1987			6.5	38	0	0.31	6.59	0
4242 922	12/22/1988			6.4	46	0	1.04	6.56	0
4242 106	3/30/1989			6.3	24	0	16.5	4.47	12.7
4242 297	6/29/1989			6.4	40	0	0.625	7.73	0.9
4242 481	9/26/1989			7.4	66	0	1.04	12.4	0.793
4242 665	12/14/1989			7.2	72	0	0.787	9.14	0
4242 843	3/22/1990			6.8	44	0	0.84	6.69	0.914
4217 589	6/27/1990			7.4	64	0	0.462	9.84	0
4217 771	9/25/1990			7	50	0	0.628	8.58	0.541
4217 951	11/28/1990			7	44	0	0.387	4.88	0
4217 280	3/27/1991			7.3	48	0	0.79	7.17	1.12
4217 492	5/22/1991			7.7	80	0	0.338	8.763	0
4217 740	9/24/1991			7.7	92	0	0.456	9.88	0
4217 927	12/19/1991			7.5	80	0	0.829	6.83	0
4217 103	2/25/1992			7.1	30	0	0.377	2.5	0
4217 364	6/3/1992			7.5	80	0	0	6.77	0
4217 512	8/26/1992			7	80	0	0.592	7.73	0
4217 678	11/16/1992			6.5	46	0	0.436	4.25	0
4217 757	2/3/1993			7.4	60	0	0.652	5.54	1.56
4217 843	5/11/1993			6.8	58	0	0.357	5.96	0
4217 928	8/10/1993			7.4	96	0	0.532	6.44	0
4217 096	12/16/1993			6.6	56	0	0.46	3.98	0
4217 263	3/17/1994			6.9	28	0	0.409	3.18	1.08
4217 506	6/29/1994			6.5	52	0	0.368	9.86	0
4217 775	11/30/1994			6.4	36	16.6	0.448	3.72	0
4217 950	3/9/1995			6.7	36	0	0.815	3.64	0.564
4217 109	6/4/1995			7.1	60	0	0	3.23	0

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4217 270	10/25/1995			6.9	78	0	0.529	11.5	0
4217 719	8/27/1996			6.5	68	0	0.331	9.87	0
4217 092	3/27/1997			6.7	40	0	0.53	4.58	0.849
4251 400	6/3/2003	2647	Meas	7.2	36.2	0	0	3.82	0
4251 609	8/21/2003	967	Meas	7.3	51	0	0	4.34	0
4251 921	4/21/2004	3354	Meas	7.2	45.4	5.4	0	4.77	0.986
4251 109	7/29/2004	1500	Meas	7.2	60	0	0.343	3.94	0
4251 260	10/12/2004	1293	Meas	7.5	77.6	0	0.347	5.87	0
	avg=	1952.2 0		6.95	54.77	0.95	0.95	6.54	0.72
	stdev=					3.55	2.62	2.84	2.09

Monitoring Point: 7

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4217 947	3/9/1995			7.3	86	0	0.672	1.32	0
4251 403	6/3/2003			7.7	116	0	0.396	0.908	0
4251 607	8/20/2003	141	Meas	8	147.6	0	0	0.408	0
4251 897	4/7/2004	513	Meas	7.8	103.2	0	0.439	2.37	0
4251 107	7/29/2004	257	Meas	7.6	127	0	0.698	1.29	0
4251 255	10/12/2004	208	Meas	7.8	142.6	0	0	1.07	0
	avg=	279.75		7.7	120.4	0	0.3675	1.227667	0
	stdev=					0.00	0.31	0.65	0.00

Monitoring Point: 7B Unt to Little Scrubgrass Creek @ 1300 feet south of 7

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 899	4/7/2004	509	Meas	7.3	60.6	-19.2	<.3	0.792	1.47
4251 108	7/29/2004	193	Meas	7.2	59.6	-15	0.42	0.829	<.5
4251 256	10/12/2004	136	Meas	7.3	64	-21.6	0.34	0.99	0.78

Monitoring Point: 8

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4217 264	3/17/1994			7.2	40	0	0.574	1.42	0.882
4217 946	3/9/1995			6.9	58	0	0.554	0.665	0
4251 404	6/3/2003	644	Meas	7.6	69.4	0	0.324	0.276	0
4251 606	8/20/2003	187	Meas	7.9	104	0	0	0.059	0
4251 895	4/6/2004	1319	Meas	7.6	65.4	0	1.14	1.1	0
4251 106	7/29/2004	500	Meas	7.6	82	0	0.426	0.15	0
4251 254	10/12/2004	348	Meas	7.9	105.8	0	0	0.36	0
	avg=	599.60		7.72	85.32	0.00	0.38	0.39	0.13
	stdev=					0.00	0.39	0.51	0.33

Monitoring Point 10

Coll ID	Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251	405	6/3/2003	210	Meas	7.3	72.6	0	0.789	1.25	0.593
4251	605	8/20/2003	92	Meas	7.4	71	0	0.639	1.44	0
4251	894	4/6/2004	478	Meas	6.6	30	2.8	0.752	2.54	2.15
4251	105	7/29/2004	243	Meas	7.1	65.8	0	0.801	2.31	0
4251	253	10/12/2004	195	Meas	7.3	73.4	0	1.15	2.43	0.802
		avg=	243.60		7.14	62.56	0.56	0.83	1.99	0.71
		stdev=					1.25	0.19	0.60	0.88

Monitoring Point: 11

Coll ID	Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242	633	1/15/1987			6.9	120	0	5.25	4.35	2.35
4242	780	4/9/1987			6	26	0	1.4	5.42	1.43
4242	188	11/19/1987			7	74	0	0.356	0.743	0
4242	924	12/22/1988			6.8	76	0	0	2.09	0
4242	108	3/30/1989			6.6	50	0	17.3	4.56	8.79
4242	299	6/29/1989			6.5	48	0	0.753	3.17	1.43
4242	483	9/26/1989			7.8	78	0	0.502	0.478	0
4242	667	12/14/1989			7.5	78	0	0.389	0.885	0
4242	845	3/22/1990			7.1	58	0	0.531	1.99	1.2
4217	591	6/27/1990			7.5	62	0	0.432	1.06	0
4217	773	9/25/1990			7.5	72	0	0	0.651	0
4217	953	11/28/1990			7.4	66	0	0.369	1.99	0
4217	282	3/27/1991			7.7	66	0	0.601	1.37	0.846
4217	490	5/22/1991			8	92	0	0	0.482	0
4217	738	9/24/1991			8	90	0	0	0.141	0
4217	925	12/19/1991			7.5	80	0	0.41	1.1	0
4217	101	2/25/1992			7	38	0	0.974	1.65	0
4217	362	6/3/1992			7.5	60	0	0	0.46	0
4217	510	8/26/1992			7.9	80	0	0	0.741	0
4217	676	11/16/1992			6.8	74	0	0.488	1.36	0
4217	754	2/3/1993			7.4	60	0	0.712	3.02	1.68
4217	840	5/11/1993			7.1	68	0	0.408	1.37	0.589
4217	926	8/10/1993			7.5	78	0	0	0.149	0
4217	099	12/16/1993			6.9	66	0	0.314	2.25	0.561
4217	256	3/17/1994			7	30	0	0.531	2.5	1.46
4217	508	6/29/1994			7	80	0	0	1.38	0
4217	638	9/29/1994			7.8	100	0	0.43	0.929	0
4217	765	11/30/1994			6.7	62	0	0.85	0.63	0
4217	944	3/9/1995			6.9	52	0	0.643	1	0
4217	104	6/4/1995			7.2	64	0	0	0.895	0

4217	267	10/25/1995			7.5	120	0	0	0.376	0
4217	716	8/27/1996			6.9	84	0	0	0.443	0
4217	922	12/5/1996			6.7	54	0	0.513	1.35	0.783
4217	090	3/27/1997			6.8	52	0	0.631	1.9	1.63
4251	407	6/3/2003	854	Meas	7.6	67.6	0	0	0.381	0
4251	604	8/20/2003	245	Meas	7.9	86.8	0	0	0.14	0
4251	104	7/29/2004	927	Meas	7.6	73	0	0.338	0.541	0
4251	252	10/12/2004	596	Meas	7.8	87.4	0	0.337	1.09	0.503
		avg=	655.50		7.24	70.34	0.00	0.93	1.45	0.61
		stdev=					0.00	2.82	1.24	1.49

Monitoring Point: 12

Coll ID	Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242	634	1/15/1987			6.6	72	0	3.85	4.38	3.61
4242	781	4/9/1987			5.9	24	0	1.21	5.06	2.14
4242	969	7/30/1987			8.7	80	0	0	8.25	0.507
4242	198	11/19/1987			6.8	50	0	0	3.5	0
4242	925	12/22/1988			6.6	56	0	0.496	5.19	0
4242	109	3/30/1989			6.5	42	0	15.5	3.72	9.73
4242	300	6/29/1989			6.4	44	0	1.71	5.41	1.28
4242	484	9/26/1989			7.6	68	0	0.445	7.1	0.583
4242	668	12/14/1989			7.4	72	0	0.521	6.67	0
4242	846	3/22/1990			6.9	48	0	0.626	4.67	0.882
4217	592	6/27/1990			7.5	62	0	0	6.07	0
4217	774	9/25/1990			7.2	58	0	0.419	4.42	0
4217	954	11/28/1990			7.2	52	0	0.336	3.67	0
4217	283	3/27/1991			7.6	56	0	0.584	3.56	0.796
4217	489	5/22/1991			7.9	82	0	0	6.31	0
4217	737	9/24/1991			7.7	88	0	0	4.36	0
4217	924	12/19/1991			7.4	78	0	0.472	4.08	0
4217	100	2/25/1992			6.9	32	0	0.557	2.12	0
4217	361	6/3/1992			7.5	68	0	0	3.8	0
4217	509	8/26/1992			7.7	72	0	0	3.87	0
4217	675	11/16/1992			6.5	52	0	0.424	3.23	0
4217	753	2/3/1993			7.4	60	0	0.666	4.45	1.44
4217	839	5/11/1993			6.9	56	0	0	4.35	0
4217	925	8/10/1993			7.4	84	0	0	3.63	0
4217	100	12/16/1993			6.7	58	0	0.47	3.49	0.568
4217	255	3/17/1994			6.9	30	0	0.709	2.9	1.36
4217	509	6/29/1994			6.6	54	0	0	7.28	0
4217	637	9/29/1994			7.5	72	0	0.514	3.5	0
4217	764	11/30/1994			6.5	44	0	0.525	2.29	0
4217	943	3/9/1995			6.8	42	0	0.576	2.42	0
4217	103	6/4/1995			6.9	50	0	0	3.02	0
4217	266	10/25/1995			7.1	86	0	0	5.74	0

4217 717	8/27/1996			6.6	70	0	0	6.01	0
4217 923	12/5/1996			6.6	46	0	0.443	2.87	0.511
4251 408	6/3/2003	3360	Meas	7.4	44.2	0	0	2.78	0
4251 603	8/20/2003	1152	Meas	7.6	55.2	0	0	2.34	0
4251 893	4/6/2004	6534	Meas	7.2	41.8	7.6	0.537	3.22	1.02
4251 103	7/29/2004	2226	Meas	7.6	57	0	0	2.6	0
4251 251	10/12/2004	1773	Meas	7.7	70.8	0	0	3.2	0
	avg=	3009.00		7.13	58.38	0.19	0.81	4.24	0.63
	stdev=					1.22	2.51	1.52	1.67

Monitoring Point: 13

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 409	6/4/2003	74	Meas	6.9	29	0	<.3	0.121	<.5
4251 602	8/20/2003	41	Meas	7.2	41.8	0	<.3	0.171	<.5

Monitoring Point: 15

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 635	1/15/1987			6.5	60	0	2.76	4.17	2.09
4242 782	4/9/1987			6	24	0	1.08	4.8	1.71
4242 970	7/30/1987			7.3	62	0	0.308	6.21	0
4242 190	11/19/1987			6.8	46	0	0	3.72	0
4242 926	12/22/1988			6.6	54	0	0.468	4.4	0
4242 110	3/30/1989			6.3	28	0	11.1	1.72	7.82
4242 301	6/29/1989			6.4	40	0	0.648	5.92	2.1
4242 485	9/26/1989			7.8	64	0	0.421	7.31	0.674
4242 669	12/14/1989			7.3	68	0	0.554	6.16	0
4242 847	3/22/1990			6.8	44	0	0.604	4.66	0.79
4217 593	6/27/1990			7.5	58	0	0	5.33	0
4217 775	9/25/1990			7.2	56	0	0.443	5.19	0
4217 955	11/28/1990			7.2	48	0	0	3.15	0
4217 284	3/27/1991			7.5	50	0	0.739	4.03	0.846
4217 488	5/22/1991			7.8	80	0	0	4.87	0
4217 736	9/24/1991			7.9	86	0	0.339	2.69	0
4217 923	12/19/1992			7.5	72	0	0.457	3.35	0
4217 099	2/25/1992			6.9	32	0	0.434	1.87	0
4217 360	6/3/1992			7.5	64	0	0	3.46	0
4217 508	8/26/1992			7.1	78	0	0.304	2.69	0
4217 674	11/16/1992			6.5	48	0	0.418	2.79	0
4217 752	2/3/1993			7.3	58	0	0.847	4.32	1.55
4217 838	5/11/1993			6.9	54	0	0	3.33	0
4217 924	8/10/1993			7.5	80	0	0	1.23	0
4217 101	12/16/1993			6.8	56	0	0.438	3.04	0
4217 254	3/17/1994			6.9	28	0	0.798	3.13	1.25

4217 510	6/29/1994			6.6	48	0	0.347	6.01	0
4217 631	9/21/1994			7.5	72	0	0.405	3.2	0
4217 763	11/29/1994			7	36	0	0.462	2	0
4217 942	3/9/1995			6.7	38	0	0.444	2.31	0
4217 102	6/4/1995			6.8	46	0	0	2.65	0
4217 268	10/25/1995			7.2	80	0	0	3.2	0
4217 924	12/5/1996			6.6	44	0	0.394	2.57	0
4217 089	3/27/1997			6.7	42	0	0.481	3.06	0.787
4251 410	6/4/2003	3748	Meas	7.4	51.2	0	0.446	2.48	0
4251 600	8/20/2003	1063	Meas	7.6	54.8	0	0	1.3	0
4251 891	4/6/2004	7058	Meas	7.2	39	0	0.455	3.33	0.83
4251 102	7/29/2004	2458	Meas	7.5	54	0	0	1.9	0
4251 250	10/12/2004	2407	Meas	7.8	69.8	0	0	3.69	0
	avg=	3346.80		7.09	54.17	0.00	0.68	3.62	0.52
	stdev=					0.00	1.78	1.46	1.35

Monitoring Point 16A Western Headwater Trib to the North Fork (originating from pond)

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 594	8/19/2003			7.5	72.8	0	0.777	0.359	<.5
4251 883	4/6/2004	875	Meas	7.7	75.8	-43.8	<.3	0.13	<.5

Monitoring Point 16B Northern Headwater Trib to the North Fork

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 593	8/19/2003			7.2	70.2	0	<.3	0.453	<.5
4251 882	4/6/2004	197	Meas	6.8	31.2	4.8	<.3	0.553	<.5

Monitoring Point 16

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 412	6/4/2003	673	Meas	7.3	64.8	0	1.2	0.322	0
4251 592	8/19/2003	205	Meas	7.5	69	0	0.515	0.255	0
4251 884	4/6/2003	1019	Meas	7.5	62	0	0	0.206	0
	avg=	632.33		7.43	65.27	0.00	0.57	0.26	0.00
	stdev=					0.00	0.60	0.06	0.00

Monitoring Point: 17A Unt Upstream 17

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 591	8/19/2003	25	Meas	7.8	144.8	0	0.32	0.75	<.5
4251 889	4/6/2004	171	Meas	7.4	50.2	-17.6	<.3	0.46	<.5

Monitoring Point: 17

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 636	1/15/1987			6.3	28	16	2.42	1.26	1.65
4242 783	4/9/1987			6.2	34	0	0	0.784	0
4242 971	7/30/1987			6.7	50	0	0	0.061	0
4242 191	11/19/1987			6.6	38	0	0	1.19	0
4242 927	12/22/1988			6.3	30	0	0	1.48	0
4242 302	6/29/1989			6.5	48	0	0.365	2.37	0
4242 486	9/26/1989			7.2	34	0	0	0.843	0.705
4242 670	12/14/1989			7	46	0	0	0.843	0
4242 848	3/22/1990			6.9	44	0	0.899	2.22	0.509
4217 594	6/27/1990			7.4	52	0	0.341	0.629	0
4217 776	9/25/1990			7.2	66	0	0.83	2.28	0
4217 956	11/28/1990			7.1	52	0	0.355	1.23	0
4217 285	3/27/1991			7.3	40	0	0.444	1.81	0
4217 487	5/22/1991			7.2	48	0	0.441	0.252	0
4217 735	9/24/1991			7.3	64	0	0	0.304	0
4217 922	12/19/1991			7.1	52	0	0.534	1.34	0
4217 098	2/25/1992			6.6	19	0	0	1.11	0
4217 359	6/3/1962			7.1	38	0	0	0.776	0
4217 507	8/26/1992			6.9	60	0	0	0.2	0
4217 673	11/16/1992			6.9	42	0	1.06	1.16	0.795
4217 751	2/3/1993			7.3	44	0	0.456	1.37	0
4217 837	5/11/1993			6.4	44	0	0	0.872	0
4217 923	8/10/1993			7.1	60	0	0	0.111	0
4217 102	12/16/1993			6.6	36	0	0	0.857	0
4217 253	3/17/1994			7.1	32	0	0.555	0.612	0.588
4217 511	6/29/1994			6.6	50	0	0.89	0.315	0.506
4217 630	9/21/1994			6.9	46	0	0	0.132	0
4217 762	11/29/1994			7.1	46	0	0	0.565	0
4217 941	3/9/1995			6.8	38	0	0	0.616	0
4217 101	6/4/1995			6.9	52	0	0	0.523	0
4217 710	8/27/1996			7	62	0	0	0.068	0
4251 411	6/4/2003	943	Meas	7.4	52	0	0.316	0.531	0
4251 590	8/19/2003	233	Meas	7.6	61.6	0	0	0.106	0
4251 924	4/21/2004	1079	Meas	7.3	43.6	0	0	0.598	0
4251 100	7/29/2004	691	Meas	7.2	53.2	0	0.459	0.917	0

4251 249	10/12/2004	163	Meas	7.5	49.2	0	0	1.41	0
	avg=	621.80		6.96	45.96	0.44	0.29	0.88	0.13
	stdev=					2.67	0.48	0.63	0.34

Monitoring Point: 18A Unt to Little Scrubgrass Creek Upstream 17B

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 597	8/20/2003	9	Meas	7.2	75.6	0	<.3	<.05	<.5
4251 890	4/6/2004	243	Meas	7.4	62.6	-41.6	<.3	<.05	<.5

Monitoring Point: 18

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 784	4/9/1987			5.6	26	0	0.823	3.16	0.918
4242 972	7/30/1987			6.6	54	0	0.952	2.03	0
4242 192	11/19/1987			6.7	42	0	0.552	2.09	0
4242 928	12/22/1989			6.5	44	0	0.619	2.53	0
4242 112	3/30/1989			6.4	34	0	19.1	2.98	11.6
4242 303	6/29/1989			6.4	38	0	0.63	4.19	0
4242 487	9/26/1989			7.4	54	0	0.625	0.402	0
4242 671	12/14/1989			7.1	58	0	0.748	2.97	0
4242 849	3/22/1990			7.7	80	0	0.403	0.64	0
4217 595	6/27/1990			7.3	50	0	0.561	2.46	0
4217 777	9/25/1990			7.2	52	0	0.572	2.79	0
4217 957	11/28/1990			7.2	44	0	0.348	1.83	0
4217 286	3/27/1991			7.5	44	0	0.605	2.78	0.505
4217 484	5/22/1991			7.5	66	0	0.655	2.25	0
4217 732	9/24/1991			7.3	74	0	1.35	0.57	0
4217 919	12/19/1991			7.1	56	0	0.871	1.75	0
4217 095	2/25/1992			6.8	28	0	0.399	1.3	0
4217 356	6/3/1992			7.2	54	0	0.416	0.684	1.2
4217 504	8/26/1992			7.4	64	0	0.757	0.594	0
4217 670	11/16/1992			6.6	46	0	0.425	1.73	0
4217 748	2/3/1993			7.4	52	0	0.636	3.32	0.575
4217 834	5/11/1993			6.8	54	0	0.682	2.3	0
4217 920	8/10/1993			6.9	70	0	1.14	0.21	0
4217 103	12/16/1993			6.7	50	0	0.448	1.85	0
4217 250	3/17/1994			7	26	0	0.695	2.14	0.829
4217 451	6/2/1994			6.6	50	0	0.478	2.69	0
4217 512	6/29/1994			6.8	48	0	0.722	0.889	0
4217 626	9/21/1994			7	64	0	0.923	0.669	0
4217 728	10/25/1994			6.9	64	0	0.78	0.926	0
4217 770	11/30/1994			6.5	40	0	0.379	1.29	0
4217 938	3/9/1995			6.7	38	0	0.476	1.52	0
4217 098	6/4/1995			6.7	44	0	0	1.07	0

4217	711	8/27/1996			6.8	60	0	0.919	0.501	0
4217	925	12/5/1996			6.6	42	0	0.372	1.8	0
4217	087	3/27/1997			6.7	38	0	0.363	1.98	0
4251	413	6/3/2003	6413	Meas	7.4	47.6	0	0.374	1.12	0
4251	595	8/20/2003	1768	Meas	7.4	54.6	0	0.495	0.107	0
4251	885	4/6/2004	9613	Meas	7.4	41.6	0	0.313	1.93	0
4251	097	7/29/2004	3375	Meas	7.2	49.6	0	0.455	0.451	0
4251	246	10/12/2004	2707	Meas	7.6	68.8	0	0.545	1.4	0
		avg=	4775.20		6.97	50.26	0.00	1.07	1.70	0.39
		stdev=					0.00	2.94	0.98	1.84

Monitoring Point: 26

Coll ID	Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242	639	1/15/1987			6.6	48	0	2.37	2.98	2.17
4242	786	4/9/1987			5.6	26	0	0.699	3.18	0.805
4242	974	7/30/1987			6.9	64	0	0.848	1.59	0
4242	194	11/19/1987			6.7	44	0	0.403	1.71	0
4242	930	12/22/1988			6.6	52	0	0.745	2.28	0
4242	114	3/30/1989			6.4	34	0	17.5	5.7	10.9
4242	305	6/29/1989			6.4	38	0	0.58	4.04	0.632
4242	489	9/26/1989			7.6	60	0	0.663	3.02	1.6
4242	673	12/14/1989			7.4	66	0	0.585	2.31	0
4242	851	3/22/1990			7	46	0	0.547	2.98	0
4217	597	6/27/1990			7.6	62	0	0.708	1.93	0
4217	779	9/25/1990			7.4	56	0	0.477	2.4	0
4217	959	11/28/1990			7.2	46	0	0.351	1.68	0
4217	288	3/27/1991			7.6	50	0	0.578	2.17	0
4217	486	5/22/1991			7.9	90	0	0.559	1.24	0
4217	734	9/24/1991			7.8	96	0	0.748	0.314	0
4217	921	12/19/1991			7.3	64	0	0.728	1.32	0
4217	097	2/25/1992			6.9	32	0	0.415	1.01	0
4217	358	6/3/1992			7.6	82	0	0.304	0.516	0.752
4217	506	8/26/1992			7.8	88	0	0.558	0.363	0
4217	672	11/16/1992			7.1	52	0	0.406	1.32	0
4217	750	2/3/1993			7.5	56	0	0.606	3.11	0.558
4217	836	5/11/1993			7.1	74	0	0.484	1.51	0
4217	922	8/10/1993			7.6	102	0	0.622	0.115	0
4217	105	12/16/1993			6.9	66	0	0.363	1.36	0
4217	252	3/17/1994			7.1	34	0	0.78	1.78	0.764
4217	453	6/2/1994			7.1	76	0	0.329	1.48	0
4217	514	6/29/1994			7	58	0	0.523	0.615	0
4217	628	9/21/1994			7.9	98	0	0.49	0.314	0
4217	730	10/25/1994			7.6	92	0	0.501	0.471	0
4217	772	11/30/1994			6.8	54	0	0.311	0.654	0
4217	940	3/9/1995			7	54	0	0.541	0.828	0

4217 100	6/4/1995			7.1	64	0	0	0.407	0
4217 713	8/27/1996			7.7	92	0	0.482	0.251	0
4217 927	12/5/1996			7	60	0	0.323	0.874	0
4217 086	3/27/1997			7	62	0	0.357	0.918	0
4251 415	6/4/2003	13074	Est	7.6	52.8	0	0.416	0.959	0
4251 599	8/20/2003	3941	Est	7.7	70.6	0	0.407	0.096	0
4251 887	4/6/2004	17681	Est	7.6	58.2	0	0.342	1.29	0
4251 099	7/29/2004	7175	Est	7.4	58.4	0	0.524	0.357	0
4251 248	10/12/2004	5591	Est	8	105.4	0	0.336	0.695	0
	avg=	9492.40		7.22	63.01	0.00	0.96	1.52	0.44
	stdev=					0.00	2.67	1.20	1.74

Monitoring Point: 27

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 788	4/9/1987			6.1	26	0	0.517	0.322	0
4242 977	7/30/1987			6.8	56	0	0.313	0.122	0
4242 197	11/19/1987			6.7	54	0	1.1	0.229	0.985
4242 933	12/22/1988			6.6	50	0	0	0.586	0
4242 117	3/30/1989			6.3	20	0	7.06	0.732	4.38
4242 308	6/29/1989			6.4	36	0	0.87	0.694	0.513
4242 492	9/26/1989			7.4	52	0	0	0.313	0.588
4242 676	12/14/1989			7.1	58	0	0	0.364	0
4242 854	3/22/1990			7	40	0	0	0.865	0
4217 600	6/27/1990			7.5	56	0	0	0.35	0
4217 782	9/25/1990			7.2	46	0	0	0.446	0
4217 962	11/28/1990			7	40	0	0.528	0.385	0
4217 291	3/27/1991			7.4	44	0	0.441	0.48	0
4217 480	5/22/1991			7.5	64	0	0	0.317	0
4217 728	9/24/1991			7.3	60	0	0.641	0.317	0
4217 915	12/19/1991			7.3	82	0	0	0.588	0
4217 091	2/25/1992			6.8	26	0	0.341	0.17	0
4217 352	6/3/1992			7.6	56	0	0	0.451	0
4217 500	8/26/1992			7	72	0	0	0.171	0
4217 666	11/16/1992			6.8	38	0	0.355	0.285	0
4217 744	2/3/1993			7.5	50	0	0	1.03	0
4217 830	5/11/1993			6.7	46	0	0	0.864	0
4217 916	8/10/1993			7.3	86	0	0	0.25	0
4217 109	12/16/1993			6.6	42	0	0	0.239	0
4217 246	3/17/1994			7	28	0	0.78	0.197	0
4217 518	6/29/1994			6.8	68	0	0.376	0.396	0
4217 645	9/29/1994			7.6	96	0	0.424	0.248	0
4217 759	11/29/1994			7	42	0	0.545	0.207	0
4217 934	3/9/1995			6.8	42	0	0.61	0.277	0
4217 094	6/4/1995			6.7	48	0	0	0.429	0
4251 421	6/4/2003	735	Meas	7.2	44	0	0.305	0.205	0

4251 621	9/10/2003	399	Meas	7.2	60.2	0	0.404	0.421	0
4251 101	7/29/2004	477	Meas	7.2	52	0	0.488	0.829	0
4251 244	10/12/2004	138	Meas	7.5	98.4	0	0.494	3.11	0.77
	avg=	437.25		7.03	52.31	0.00	0.49	0.50	0.21
	stdev=			0.39	18.57	0.00	1.20	0.52	0.77

Monitoring Point: 28A Unt Downstream 28

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 588	8/19/2003	69	Meas	7.1	47.2	0	0.358	0.20	<.5
4251 880	3/29/2004	277	Meas	7.1	27	-3.2	0.81	0.10	0.57

Monitoring Point: 28B

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 586	8/18/2003	692	Meas	6.8	51.4	0	<.3	<.05	<.5
4251 878	3/29/2004	2216	Meas	7.2	28	10.2	0.398	0.27	<.5

Monitoring Point: 28

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 640	1/15/1987			6.4	30	14	2.33	0.316	0.848
4242 787	4/9/1987			6.1	26	0	0.454	0.122	0
4242 975	7/30/1987			6.7	46	0	0.47	0.201	0
4242 195	11/19/1987			6.6	46	0	0.606	0.307	0
4242 931	12/22/1988			6.4	38	0	0.559	0.415	0
4242 115	3/30/1989			6.3	22	0	13.4	1.08	7.48
4242 306	6/29/1989			6.4	36	0	0.786	0.386	0
4242 490	9/26/1989			7.4	44	0	0.735	0.31	0.747
4242 674	12/14/1989			7	46	0	0.517	0.41	0
4242 852	3/22/1990			6.9	34	0	0.401	0.425	0
4217 598	6/27/1990			7.5	54	0	0.394	0.258	0
4217 780	9/25/1990			7.2	44	0	0.435	0.329	0
4217 960	11/28/1990			7.1	38	0	0.431	0.261	0
4217 289	3/27/1991			7.7	40	0	0.544	0.339	0
4217 482	5/22/1991			7.4	56	0	0.323	0.267	0
4217 730	9/24/1991			7.5	60	0	0	0.092	0
4217 917	12/19/1991			7	50	0	0.451	0.528	0
4217 093	2/25/1992			6.7	24	0	0.369	0.165	0
4217 354	6/3/1992			7.5	50	0	0.31	0.302	0
4217 502	8/26/1992			7	64	0	0	0.13	0
4217 668	11/16/1992			6.8	36	0	0.519	0.295	0
4217 746	2/3/1993			7.3	44	0	0.466	0.549	0

4217 832	5/11/1993			6.7	44	0	0.357	0.308	0
4217 918	8/10/1993			7.2	62	0	0	0.09	0
4217 106	12/16/1993			6.5	38	0	0.36	0.277	0
4217 248	3/17/1994			7	28	0	0.881	0.306	0
4217 515	6/29/1994			6.6	52	0	0.551	0.259	0
4217 651	9/29/1994			7.5	68	0	1.03	0.289	0
4217 761	11/29/1994			6.9	36	0	0.613	0.231	0
4217 936	3/9/1995			6.7	36	0	0.823	0.236	0
4217 096	6/4/1995			6.7	44	0	0	0.169	0
4217 714	8/27/1996			6.7	78	0	0.554	0.226	0
4251 422	6/4/2003	857	Meas	7.3	43.4	0	0.593	0.183	0
4251 589	8/19/2003	556	Meas	7.3	52.2	0	0.416	0.127	0
4251 881	3/29/2004	2065	Meas	7.2	30.2	14.4	0.63	0.446	0
4251 096	7/29/2004	1140	Meas	7.2	48.2	0	0.69	0.309	0
4251 243	10/12/2004	417	Meas	7.6	69.2	0	0.386	0.817	0
	avg=	1007.0		6.97	44.79	0.77	0.88	0.32	0.25
	stdev=			0.41	13.05	3.26	2.15	0.19	1.24

Monitoring Point: 29A

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 585	8/18/2003			6.2	17	14.6	0.504	<.05	<.5
4251 877	3/29/2004	549	Meas	6.6	12.4	7.4	0.466	<.05	<.5

Monitoring Point: 29

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 686	2/10/1987			6.5	70	0	0.792	2.52	0.509
4242 794	4/9/1987			6.6	32	0	0.345	1.24	0
4242 177	11/19/1987			7.5	78	0	0.301	1.26	0
4242 866	12/22/1988			7	66	0	0	1.03	0
4242 313	6/29/1989			6.8	72	0	0.579	1	0
4242 681	12/14/1989			7.4	70	0	0	1.01	0
4242 859	3/22/1990			7.4	58	0	0	1.8	0
4217 605	6/27/1990			7.8	70	0	0.334	0.562	0
4217 787	9/25/1990			7.6	60	0	0	0.963	0
4217 967	11/28/1990			7.4	48	0	0	0.734	0
4217 296	3/27/1991			7.7	54	0	0.483	1.36	0
4217 483	5/22/1991			8	88	0	0	0.407	0
4217 731	9/24/1991			8.1	94	0	0	<.05	0
4217 918	12/19/1991			7.5	62	0	0.468	0.707	0
4217 094	2/25/1992			6.9	30	0	0.316	0.658	0
4217 355	6/3/1992			8	86	0	0	0.21	0
4217 503	8/26/1992			8	90	0	0	0.076	0
4217 669	11/16/1992			7	50	0	0.381	0.825	0
4217 747	2/3/1993			7.8	72	0	0.373	1.72	0
4217 833	5/11/1993			7.2	76	0	0.515	0.833	0
4217 919	8/10/1993			7.8	98	0	0	<.05	0
4217 107	12/16/1993			7	64	0	0	0.904	0
4217 249	3/17/1994			7.2	36	0	0.499	1.18	0.538
4217 516	6/29/1994			7	60	0	0.358	0.277	0
4217 629	9/21/1994			7.9	90	0	0	0.113	0
4217 769	11/30/1994			6.6	46	0	0	0.629	0
4217 937	3/9/1995			6.9	42	0	0.424	0.867	0
4217 097	6/4/1995			7	54	0	0	0.284	0
4217 715	8/27/1996			7.1	86	0	0	0.068	0
4217 093	3/27/1997			6.9	48	0	0.35	1.01	0
4251 423	6/5/2003	13890	Meas	7.6	56.6	0	0.426	0.411	0
4251 584	8/18/2003	6013	Meas	7.1	69.8	0	0	0.05	0
4251 876	3/29/2004	29028	Meas	7.6	46.6	0	0.492	0.848	0
4251 095	7/28/2004	14562	Meas	7.5	53.6	0	0.557	0.192	0
4251 242	10/12/2004	5655	Meas	8	92	0	0	0.596	0
	avg=	13829.6		7.35	64.82	0.00	0.23	0.80	0.03
	stdev=					0.0	0.2	0.6	0.123

Monitoring Point: 31A UNT to Lockard Run

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 630	9/10/2003	1	Meas	5.1	7.8	13.8	<.3	0.18	<.5
4251 879	3/29/2004	41	Meas	5.3	8.2	5.4	<.3	0.159	<.5

Monitoring Point: 30

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4217 000	9/8/1999	0	0						

Monitoring Point: 31

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4217 000	9/8/1999	0	0						

Monitoring Point: 32

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4217 266	9/8/1999			6.6	34	0	<.3	<.05	<.5

The following sample points are on the delisted South Fork Little Scrubgrass Creek.

Monitoring Point: **19**
S4 (Amerikohl Wagner Mine SMP#10980105) Teri's Job

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 637	1/15/1987			6.6	48	0	2.94	3.03	2.02
4242 790	4/9/1987			6.4	56	0	0.36	0.95	<.5
4242 978	7/30/1987			7.2	112	0	1.2	0.412	<.5
4242 198	11/19/1987			6.9	84	0	2.89	0.775	2.01
4242 934	12/22/1988			6.8	86	0	0.797	1.35	<.5
4242 118	3/30/1989			6.5	44	0	8.9	1.46	8.11
4242 309	6/29/1989			6.6	58	0	0.566	2.53	<.5
4242 493	9/26/1989			7.8	90	0	0.662	1.36	<.5
4242 677	12/14/1989			7.4	100	0	0.604	1.36	<.5
4242 855	3/22/1990			7.5	74	0	0.472	1.55	<.5
4217 601	6/27/1990			7.8	94	0	0.69	0.959	<.5
4217 783	9/25/1990			7.5	80	0	0.483	1.61	<.5
4217 963	11/28/1990			7.4	76	0	0.751	1.37	<.5
4217 292	3/27/1991			7.7	68	0	0.494	2.03	<.5
4217 477	5/22/1991			7.7	102	0	0.546	0.672	<.5
4217 724	9/24/1991			7.6	120	0	0.657	0.567	<.5
4217 911	12/19/1991			7.4	104	0	0.629	1.37	<.5
4217 087	2/25/1992			7	44	0	0.405	0.859	<.5
4217 348	6/3/1992			7.7	116	0	0.924	0.481	<.5
4217 496	8/26/1992			7.6	110	0	0.574	0.214	<.5
4217 662	11/16/1992			7.2	74	0	0.527	1.08	<.5
4217 740	2/3/1993			7.6	80	0	0.54	1.55	<.5
4217 826	5/11/1993			7.2	102	0	0.472	736	<.5
4217 912	8/10/1993			7.4	116	0	0.676	0.304	<.5
4217 110	12/16/1993			7	88	0	0.455	0.704	<.5
4217 242	3/17/1994			7.2	50	0	0.364	1.44	<.5
4217 519	6/29/1994			7	90	0	0.619	0.913	<.5
4217 646	9/29/1994			7.4	78	0	0.725	0.778	<.5
4217 755	11/29/1994			7.2	62	0	0.513	1.2	<.5
4217 930	3/9/1995			6.8	56	0	0.463	1.67	<.5
4217 091	6/7/1995			6.9	68	0	<.3	0.967	<.5
*	3/28/1997	850	Meas	7.44	58.75	n.d.	0.38	1.71	0.26
*	4/22/1997	55	Meas	7.56	78.54	n.d.	0.69	1.55	0.11
*	5/28/1997	100	Meas	6.99	72.16	n.d.	0.4	1.06	0.07
*	6/25/1997	20	Meas	7.63	108.9	n.d.	0.48	0.37	0.07
*	7/29/1997	15	Meas	7.54	117.71	n.d.	0.57	0.25	0.05
*	8/25/1997	30	Meas	7.48	100.83	n.d.	0.61	0.86	0.05
*	2/12/1999	200	Meas	7.29	62.61	n.d.	0.4	0.8	0.2
*	4/12/1999	475	Meas	7.39	42.22	n.d.	0.3	0.79	0.37

*	8/9/1999	40	Meas	7.86	119.11	n.d.	0.55	0.29	0.08
*	10/5/1999	71	Meas	7.41	128.23	n.d.	0.42	0.44	<.04
*	3/22/2000	>100	Meas	7.62	71.16	n.d.	0.31	0.63	0.17
*	5/13/2000	>100	Meas	7.69	93.61	n.d.	0.44	0.54	0.06
4243 213	6/3/1998			7.2	110	0	0.37	1.02	<.5
4243 459	3/5/1999			7.1	56	0	0.398	1.1	<.5
4242 374	9/15/1999			7.3	142	0	0.641	0.436	<.5
4242 418	10/29/1999			7.1	130	0	0.977	0.477	<.5
4242 205	6/7/2001			7.1	106	0	0.51	0.643	<.5
4242 642	5/17/2002			7.4	60	0	0.624	0.8	<.5
4251 420	6/4/2003	1934	Meas	7.4	74.2	0	0.661	1.08	<.5
4251 622	9/10/2003	1296	Meas	7.5	83.2	0	0.589	0.968	<.5
4251 919	4/21/2004	1559	Meas	7.4	68.8	-29.4	0.422	1.97	1
4251 122	8/2/2004	1337	Meas	7.2	73	-44.6	0.551	0.848	<.5
4251 276	10/14/2004	629	Meas	7.4	107.4	-58.4	0.386	0.824	<.5

Monitoring Point: 19A

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 623	9/10/2003	332	Meas	8	321.8	0	<.3	0.272	<.5
4251 906	4/19/2004	511	Meas	8.1	281.4	-100	<.3	0.179	<.5

Monitoring Point: 19B
S5 (Amerikohl Wagner Mine SMP#10980105) Teri's Job

Monitoring Point	Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
S5	*	3/28/1997	700	Meas	7.51	60.04	n.d.	0.45	0.28	0.18
	*	4/22/1997	100	Meas	7.89	82.36	n.d.	0.33	0.22	0.05
	*	5/28/1997	85	Meas	7.09	74.96	n.d.	0.59	0.29	0.07
	*	6/25/1997	20	Meas	7.87	128.16	n.d.	0.69	0.45	0.07
	*	7/29/1997	15	Meas	8.04	145.23	n.d.	1.09	0.29	0.12
	*	8/25/1997	20	Meas	7.57	109.85	n.d.	0.79	0.52	0.09
	4243 214	6/3/1998			7.4	110	0	<.3	0.756	<.5
	*	2/12/1999	110	Meas	7.67	91.23	n.d.	0.4	0.48	0.12
	*	4/12/1999	500	Meas	7.47	48.48	n.d.	0.39	0.47	0.37
	4242 135	5/6/1999			7.5	110	0	0.427	0.206	<.5
	*	8/9/1999	35	Meas	8.12	142.54	n.d.	0.26	0.13	<.04
	*	10/5/1999	>100	Meas	7.74	147.8	n.d.	0.24	0.14	<.04
	4242 000	1/19/2000	0							
	*	3/22/2000	>200	Meas	7.69	79.02	n.d.	0.36	0.35	0.21
	*	5/13/2000	>200	Meas	7.96	127.28	n.d.	0.42	0.3	0.07
19B	4251 624	9/10/2003	704	Meas	7.8	96.6	0	0.397	0.276	<.5

4251 907	4/19/2004	998	Meas	7.8	66.2	-25.2	0.599	0.337	<.5
4251 123	8/2/2004	562	Meas	7.5	77.8	-47.8	0.604	0.173	<.5
4251 277	10/14/2004	433	Meas	7.8	120.8	-81.4	<.3	0.173	<.5

Monitoring Point: 20A

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 625	9/10/2003	18	Meas	6.8	16.8	0	<.3	0.059	<.5
4251 917	4/21/2004	63	Meas	6.6	14	5.8	<.3	1.02	1.06
4251 126	8/2/2004	36	Meas	6.7	19.4	31.2	<.3	<.05	<.5
4251 281	10/14/2004	28	Meas	7	20.8	-5.6	<.3	<.05	<.5

Monitoring Point: 20B

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 626	9/10/2003	221	Meas	6.7	13	0	0.376	0.09	<.5
4251 918	4/21/2004	289	Meas	6.5	11.8	38.6	0.767	1.17	1.29
4251 127	8/2/2004	179	Meas	6.2	17	35.4	1.37	0.445	0.703
4251 282	10/14/2004	52	Meas	6.9	20.8	23.2	0.433	0.1	<.5

Monitoring Point: 20

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 642	1/15/1987			6.2	12	28	0.578	0.087	<.5
4242 793	4/9/1987			6.2	10	16	0.307	<.05	<.5
4242 981	7/30/1987			6.1	12	18	0.324	<.05	<.5
4242 201	11/19/1987			6.9	24	0	<.3	0.065	<.5
4242 937	12/22/1988			6	10	0	<.3	0.062	<.5
4242 121	3/30/1989			6	10	2	3.9	0.394	2.77
4242 312	6/29/1989			6.1	11	6	0.346	0.16	<.5
4242 496	9/26/1989			7	20	0	0.406	0.152	1.26
4242 680	12/14/1989			6.4	11	14	<.3	<.05	<.5
4242 858	3/22/1990			6.3	11	0	<.3	0.064	<.5
4217 604	6/27/1990			7.4	42	0	<.3	0.118	<.5
4217 786	9/25/1990			7	24	0	<.3	0.083	<.5
4217 966	11/28/1990			6.8	16	0	<.3	0.074	<.5
4217 295	3/27/1991			7.1	22	0	<.3	0.091	<.5
4217 476	5/22/1991			7.5	54	0	<.3	0.202	<.5
4217 727	9/24/1991			7.3	122	0	<.3	0.276	<.5
4217 914	12/19/1991			6.6	13	0	<.3	0.175	<.5
4217 090	2/25/1992			6.3	10	0	<.3	0.163	<.5
4217 349	6/3/1992			7.2	46	0	0.893	0.241	<.5

4217 497	8/26/1992			7.1	42	0	0.439	0.216	<.5
4217 663	11/16/1992			6	16	1.6	<.3	0.065	<.5
4217 743	2/3/1993			7.2	32	0	<.3	0.089	<.5
4217 829	5/11/1993			6.7	52	0	<.3	0.167	<.5
4217 915	8/10/1993			7.6	150	0	0.497	0.871	<.5
4217 113	12/16/1993			6.3	22	2.2	<.3	0.062	<.5
4217 245	3/17/1994			6.8	15.8	0	<.3	0.081	<.5
4217 522	6/29/1994			6.6	52	0	0.729	0.324	<.5
4217 649	9/29/1994			7	28	0	<.3	0.096	<.5
4217 758	11/29/1994			6.7	15.4	0	<.3	0.088	<.5
4217 933	3/9/1995			6.5	19.2	0	<.3	0.081	<.5
4251 627	9/10/2003	230	Meas	6.8	13.2	0	<.3	0.053	<.5
4251 916	4/21/2004	383	Meas	6.6	12.6	36.8	0.562	1.12	1.27
4251 125	8/2/2004	229	Meas	6.7	19.4	22	0.442	<.05	<.5
4251 280	10/14/2004	88	Meas	7.1	28.2	-4.4	<.3	0.052	<.5

Monitoring Point: 21B

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 914	4/19/2004	1.25	Meas	5.6	7.8	19.2	<.3	1.35	<.5
4251 124	8/2/2004	4	Meas	6.6	18.4	35.8	0.805	1.23	<.5

Monitoring Point: 21C

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 628	9/10/2003	63	Meas	6.3	8.6	25.8	<.3	0.097	<.5
4251 915	4/19/2004	173	Meas	6.3	8.4	31.8	0.339	0.095	<.5

Monitoring Point: 21A

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 629	9/10/2003	149	Meas	7.5	94.8	0	0.559	0.38	<.5
4251 913	4/19/2004	205	Meas	7.5	82.8	-49.6	0.485	0.296	<.5

Monitoring Point: 21

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 791	4/9/1987			6.8	46	0	0.552	0.638	<.5
4242 979	7/30/1987			7.5	148	0	0.672	0.76	<.5
4242 199	11/19/1987			6.9	74	0	0.944	0.596	<.5
4242 935	12/22/1988			6.6	54	0	0.756	0.696	<.5
4242 119	3/30/1989			6.2	16	0	10.4	0.971	5.85
4242 310	6/29/1989			6.6	58	0	0.735	1.02	<.5
4242 494	9/26/1989			8	114	0	2.18	1.24	0.559
4242 678	12/14/1989			7.4	82	0	0.5	1.25	<.5
4242 856	3/22/1990			7.5	76	0	0.579	0.774	<.5
4217 602	6/27/1990			8	118	0	0.505	0.906	<.5
4217 784	9/25/1990			7.7	94	0	0.494	1	<.5
4217 964	11/28/1990			7.3	54	0	<.3	0.426	<.5
4217 293	3/27/1991			7.6	74	0	0.552	0.53	<.5
4217 478	5/22/1991			8.1	134	0	0.426	0.702	<.5
4217 725	9/24/1991			7.9	136	0	0.45	0.681	<.5
4217 912	12/19/1991			7.4	80	0	0.657	0.912	<.5
4217 088	2/25/1992			6.9	34	0	<.3	0.406	<.5
4217 350	6/3/1992			8.1	136	0	0.389	0.705	<.5
4217 498	8/26/1992			7.5	156	0	0.344	0.611	<.5
4217 664	11/16/1992			7.1	66	0	0.348	0.554	<.5
4217 741	2/3/1993			7.9	106	0	0.382	0.875	<.5
4217 827	5/11/1993			7.4	118	0	0.334	0.706	<.5
4217 913	8/10/1993			7.8	158	0	0.387	0.47	<.5
4217 111	12/16/1993			7.2	92	0	0.329	0.545	<.5
4217 243	3/17/1994			7.3	44	0	0.32	0.381	<.5
4217 520	6/29/1994			7.5	114	0	0.507	0.525	<.5
4217 647	9/29/1994			7.7	88	0	0.488	0.363	<.5
4217 756	11/29/1994			7.1	46	0	0.384	0.31	<.5
4217 931	3/9/1995			7	60	0	0.444	0.366	<.5
4217 092	6/7/1995			7.1	74	0	<.3	0.333	<.5
4251 417	6/4/2003	1253	Meas	7.5	66.6	0	1.06	0.28	<.5
4251 619	8/21/2003	415	Meas	7.9	116	0	0.395	0.297	<.5
4251 910	4/19/2004	1589	Meas	7.7	73.6	-38.2	0.445	0.291	<.5
4251 121	8/2/2004	684	Meas	7.6	93	-68.4	0.539	0.48	<.5
4251 279	10/14/2004	666	Meas	7.8	122.6	-43.6	0.376	0.469	<.5

Monitoring Point: 23A Unt to South Fork, Downstream from 24A

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 618	8/21/2003	141	Meas	8.2	216.8	0	0.317	0.171	<.5
4251 912	4/19/2004	475	Meas	8.2	201.4	-95.6	<.3	0.128	<.5

Monitoring Point: 23

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 641	1/15/1987			7.2	66	0	2.73	0.824	1.13
4242 792	4/9/1987			7	68	0	0.643	0.641	<.5
4242 980	7/30/1987			7.5	140	0	0.725	0.255	<.5
4242 220	11/19/1987			7.5	90	0	1.21	0.516	0.612
4242 936	12/22/1988			6.9	96	0	0.163	0.571	<.5
4242 120	3/30/1989			6.5	38	0	9.07	1.07	5.42
4242 311	6/29/1989			6.9	94	0	0.585	1.38	<.5
4242 495	9/26/1989			8	112	0	0.495	0.823	1.21
4242 679	12/14/1989			7.8	132	0	0.447	0.888	<.5
4242 857	3/22/1990			7.8	102	0	0.395	0.886	<.5
4217 603	6/27/1990			8	126	0	0.543	0.523	<.5
4217 785	9/25/1990			7.8	104	0	0.46	0.863	<.5
4217 965	11/28/1990			7.6	80	0	0.454	0.711	<.5
4217 294	3/27/1991			7.8	88	0	0.473	0.981	<.5
4217 479	5/22/1991			8.1	138	0	0.363	0.378	<.5
4217 726	9/24/1991			8	146	0	0.357	0.268	<.5
4217 913	12/19/1991			7.7	116	0	0.447	0.826	<.5
4217 089	2/25/1992			7.1	48	0	0.303	0.46	<.5
4217 351	6/3/2002			8.1	150	0	0.344	0.356	<.5
4217 499	8/26/1992			7.6	154	0	0.377	0.254	<.5
4217 665	11/16/1993			7.5	84	0	0.41	0.658	<.5
4217 742	2/3/1993			8	124	0	0.367	0.949	<.5
4217 828	5/11/1993			7.5	132	0	0.31	0.429	<.5
4217 914	8/10/1993			7.8	146	0	0.353	0.217	<.5
4217 112	12/16/1993			7.5	116	0	<.3	0.626	<.5
4217 244	3/17/1994			7.5	68	0	0.32	0.823	<.5
4217 521	6/29/1994			7.6	114	0	0.572	0.407	<.5
4217 648	9/29/1994			7.8	100	0	0.587	0.465	<.5
4217 757	11/29/1994			7.4	62	0	0.373	0.632	<.5
4217 932	3/9/1995			7.2	72	0	0.418	0.861	<.5
4217 093	6/4/1995			7.3	90	0	<.3	0.401	<.5
4251 419	6/4/2003	4878	Meas	7.7	93.6	0	0.709	0.534	<.5
4251 620	8/21/2003	1286	Meas	8	132.6	0	0.446	0.295	<.5
4251 908	4/19/2004	5622	Meas	7.9	94.4	-68.2	0.445	0.586	<.5
4251 120	8/2/2004	2936	Meas	7.7	94.8	-70.8	0.64	0.449	<.5

4251 278	10/14/2004	2185	Meas	7.9	132.8	-100.2	<.3	0.402	<.5

Monitoring Point: 23B Unt to South Fork, Upstream from 24A

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 617	8/21/2003	145	Meas	7.3	30.6	0	<.3	0.722	<.5
4251 911	4/19/2004	463	Meas	7	20	41.8	0.609	1.13	0.552

Monitoring Point: 24A Unt to South Fork, Upstream from 24

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4251 616	8/21/2003	38	Meas	7.6	92.4	0	0.513	0.501	<.5
4251 888	4/6/2004	489	Meas	7.5	59.6	-28.4	0.68	0.166	<.5

Monitoring Point: 24

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 789	4/9/1987			6.4	56	0	0.507	0.807	<.5
4242 976	7/30/1987			7.5	114	0	0.704	0.256	<.5
4242 196	11/19/1987			6.9	80	0	0.833	0.435	<.5
4242 932	12/22/1988			6.8	74	0	0.775	0.795	<.5
4242 116	3/30/1989			6.4	28	0	12	1.12	6.73
4242 307	6/29/1989			6.8	72	0	0.674	0.962	<.5
4242 491	9/26/1989			8	98	0	0.534	0.551	0.826
4242 675	12/14/1989			7.5	106	0	0.541	0.828	<.5
4242 853	3/22/1990			7.5	82	0	0.439	0.775	<.5
4217 599	6/27/1990			8	110	0	0.471	0.39	<.5
4217 781	9/25/1990			7.8	92	0	0.399	686	<.5
4217 961	11/28/1990			7.5	68	0	0.491	0.544	<.5
4217 290	3/27/1991			7.9	82	0	0.44	0.744	<.5
4217 481	5/22/1991			7.8	126	0	0.521	0.177	<.5
4217 729	9/24/1991			8.1	128	0	0.501	0.139	<.5
4217 916	12/19/1991			7.5	100	0	0.578	0.645	<.5
4217 092	2/25/1992			7.1	44	0	0.421	0.475	<.5
4217 353	6/3/1992			8.1	132	0	0.847	0.322	<.5
4217 501	8/26/1992			7.5	150	0	0.492	0.184	<.5
4217 667	11/16/1992			7.4	76	0	0.446	0.635	<.5
4217 745	2/3/1993			8	116	0	0.493	0.922	<.5
4217 831	5/11/1993			7.5	118	0	0.345	0.354	<.5
4217 917	8/10/1993			7.8	132	0	0.376	0.167	<.5
4217 108	12816/93			7.3	102	0	0.335	0.636	<.5
4217 247	3/17/1994			7.4	56	0	0.451	0.736	0.534
4217 517	6/29/1994			7.4	100	0	0.577	0.326	<.5

4217 760	11/29/1994			7.4	56	0	0.433	0.516	<.5
4217 935	3/9/1995			7.1	62	0	0.582	0.711	<.5
4217 095	6/4/1995			7.2	76	0	<.3	0.354	<.5
4251 416	6/4/2003	6183	Meas	7.7	79	0	0.432	0.429	<.5
4251 615	8/21/2003	2022	Meas	8.1	118	0	<.3	0.234	<.5
4251 119	8/2/2004	3631	Meas	7.6	86	-59.6	0.427	0.306	<.5
4251 245	10/12/2004	2797	Meas	8	133.2	-57.4	0.422	0.404	<.5

Monitoring Point: 25

Coll ID Seq	Date Collected	Initial Flow	Determ Method	pH pH units	ALK MG/L	HOT A MG/L	FE MG/L	MN MG/L	AL MG/L
4242 785	4/9/1987			5.8	52	0	0.633	0.701	0.51
4242 973	7/30/1987			6.6	52	0	0.961	2.07	<5
4242 193	11/19/1987			7.2	74	0	0.672	0.299	<.5
4242 929	12/22/1988			6.7	66	0	0.533	0.513	<.5
4242 113	3/30/1989			6.4	28	0	20	1.93	11
4242 304	6/29/1989			6.8	66	0	0.61	0.813	<.5
4242 488	9/26/1989			7.9	94	0	0.671	0.308	<.5
4242 672	12/14/1989			7.4	64	0	0.491	2.02	<.5
4242 850	3/22/1990			6.9	42	0	0.505	3.09	0.597
4217 569	6/27/1990			8	104	0	0.389	0.183	<.5
4217 778	9/25/1990			7.8	88	0	<.3	0.449	<.5
4217 958	11/28/1990			7.6	64	0	0.463	0.383	<.5
4217 287	3/27/1991			8	78	0	0.446	0.626	<.5
4217 485	5/22/1991			8.2	120	0	0.326	0.091	<.5
4217 733	9/24/1991			8.1	122	0	0.388	<.05	<.5
4217 920	12/19/1991			7.7	86	0	0.423	0.434	<.5
4217 096	2/25/1992			7.1	40	0	0.364	0.4	<.5
4217 357	6/3/1992			7.9	118	0	0.302	0.091	<.5
4217 505	8/26/1992			7.6	138	0	0.373	0.078	<.5
4217 671	11/16/1992			7.4	70	0	0.325	0.513	<.5
4217 749	2/3/1993			8	112	0	0.867	0.832	<.5
4217 835	5/11/1993			7.1	106	0	0.381	0.195	<.5
4217 921	8/10/1993			8	134	0	<.3	<.05	<.5
4217 104	12/16/1993			7.3	94	0	<.3	0.47	<.5
4217 251	3/17/1994			7.5	54	0	0.33	0.67	<.5
4217 452	6/2/1994			7.5	106	0	<.3	0.169	<.5
4217 513	6/29/1994			7.4	94	0	0.391	0.13	<.5
4217 627	9/21/1994			8.1	126	0	<.3	0.056	<.5
4217 729	10/25/1994			7.9	124	0	0.365	0.109	<.5
4217 771	11/30/1994			6.8	64	0	<.3	0.384	<.5
4217 939	3/9/1995			7.1	60	0	0.502	0.604	<.5
4217 099	6/4/1995			7.4	72	0	<.3	0.155	<.5
4217 712	8/27/1996			7.9	120	0	<.3	<.05	<.5
4217 926	12/5/1996			7	72	0	<.3	0.434	<.5
4217 088	3/27/1997			7.2	72	0	0.326	0.487	<.5

4251 414	6/4/2003	6661	Meas	7.9	74.8	0	0.512	0.219	<.5
4251 598	8/20/2003	2173	Meas	8	107.8	0	<.3	0.069	<.5
4251 886	4/6/2004	8068	Meas	7.8	77.2	-50.6	0.31	0.508	<.5
4251 098	7/29/2004	3800	Meas	7.7	71.8	-37.2	0.555	0.194	<.5
4251 247	10/12/2004	2884	Meas	8.2	128.6	-60.6	<.3	0.243	<.5

Attachment F

Comment and Response

No comments were received.