FINAL

Moshannon Creek Watershed TMDL
Clearfield and Centre Counties, Pennsylvania

Prepared by:

Pennsylvania Department of Environmental Protection

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FINAL TMDL
Moshannon Creek Watershed
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Introduction

This Total Maximum Daily Load (TMDL) calculation has been prepared for segments in the Moshannon 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 West Branch Susquehanna River

HUC 02050201 State Water Plan (SWP) Subbasin: 08D

Year	Miles	Segment ID	DEP Stream Code	Stream Name	Desig-nated Use	Data Source	Source	EPA 305(b) Cause Code
1996	26.2		25695	Moshannon Creek	HQ Source to Roup Run	303 (d) List	Resource Extraction	Metals
1996			25695	Moshannon Creek	TSF Roup Run to Mouth	303 (d) List	Resource Extraction	Metals
1998	26.2		25695	Moshannon Creek	HQ Source to Roup Run	SWMP	AMD	Metals
1998			25695	Moshannon Creek	TSF Roup Run to Mouth	SWMP	AMD	Metals
2002	26.2		25695	Moshannon Creek	HQ Source to Roup Run	SWMP	AMD	Metals
2002			25695	Moshannon Creek	TSF Roup Run to Mouth	SWMP	AMD	Metals
2004	1.43	20010509-1410-TAS	25818	Barlow Hollow	CWF	SWMP	AMD	Metals
2004	0.62	20010509-1410-TAS	25630	Unt Barlow Hollow	CWF	SWMP	AMD	Metals & Siltation
2004	0.62	20020627-1220-TAS		Dutch Hollow	CWF	SWMP	AMD	Metals
2004	1.77	20030728-1140-TAS	25698	Ames Run	CWF	SWMP	AMD	Metals & Siltation

2004	3.14	20020410-1030-TAS	25878	Beaver Run	CWF	SWMP	AMD	Metals & Siltation
2004	1.83	20020702-1130-TAS	25878	Beaver Run	CWF	SWMP	Atmospheric Deposition	pH
2004	2	20020411-1330-TAS	25878	Beaver Run	CWF	SWMP	AMD	Metals & Siltation
2004	0.54	20020410-1445-TAS	25885	Unt Beaver Run	CWF	SWMP	AMD	Metals & Siltation
2004	2.27	20020409-1425-TAS	25876	Big Run	CWF	SWMP	AMD	Metals & Siltaion
2004	0.26	20020409-1425-TAS	25877	Unt Big Run	CWF	SWMP	AMD	Metals & Siltaton
2004	3.56	20020625-1700-TAS	25764	Browns Run	CWF	SWMP	AMD	Metals & Siltaion
2004	0.51	20020625-1700-TAS	25765	Unt Browns Run	CWF	SWMP	AMD	Metals & Siltaion
2004	0.14	20020625-1700-TAS	25764	Browns Run	CWF	SWMP	AMD	Metals & Siltation
2004	4.4	20020409-1100-TAS	25879	Coal Run	CWF	SWMP	AMD	Metals & Siltation
2004	1.26	20020409-1100-TAS	25880	Unt Coal Run	CWF	SWMP	AMD	Metals & Siltation
2004	4.42	20020408-1245-TAS	25827	Emigh Run	CWF	SWMP	AMD	Metals & Siltation
2004	0.85	20020408-1245-TAS	25828	Unt Emigh Run	CWF	SWMP	AMD	Metals & Siltation
2004	0.62	20020408-1245-TAS	25829	Unt Emigh Run	CWF	SWMP	AMD	Metals & Siltation
2004	0.5	20020408-1245-TAS	25830	Unt Emigh Run	CWF	SWMP	AMD	Metals & Siltation
2004	1.65	20020411-1115-TAS	25884	Unt Goss Run	CWF	SWMP	AMD	Metals & Siltation
2004	1.92	20020625-1250-TAS	25762	Grassflat Run	CWF	SWMP	AMD	Metals & Siltation
2004	1.03	20020625-1250-TAS	25763	Knox Run	CWF	SWMP	AMD	Metals & pH
2004	2.96	20020410-1200-TAS	25882	Little Beaver Run	CWF	SWMP	AMD	Metals & Siltation
2004	1.32	20020410-1115-TAS	25881	Unt Little Beaver Run	CWF	SWMP	AMD	Metals & Siltation
2004	0.85	20020410-1115-TAS	65007	Unt Little Beaver Run	CWF	SWMP	AMD	Metals & Siltation
2004	51.7	20020128-1400-TAS	25695	Moshannon Creek	CWF	SWMP	AMD	Metals & Siltation
2004	0.89	20041004-1130-TAS	25754	Unt Moshannon Creek	CWF	SWMP	AMD	Metals & Siltation

2004	0.57	20030612-1245-TAS	25755	Unt Moshannon Creek	CWF	SWMP	AMD	Metals & Siltation
2004	0.87	20030612-1245-TAS	25756	Unt Moshannon Creek	CWF	SWMP	AMD	Metals & Siltation
2004	1.1	20030612-1245-TAS	25757	Unt Moshannon Creek	CWF	SWMP	AMD	Metals & Siltation
2004	0.49	20030612-1245-TAS	25758	Unt Moshannon Creek	CWF	SWMP	AMD	Metals & Siltation
2004	3.07	20020628-1515-TAS	25760	Unt Moshannon Creek	CWF	SWMP	AMD	Metals & Siltation
2004	1.08	20020625-1515-TAS	25761	Unt Moshannon Creek	CWF	SWMP	AMD	Metals & Siltation
2004	1.21	20010508-1605-TAS	25815	Unt Moshannon Creek	CWF	SWMP	AMD	Metals
2004	1.58	20010509-1245-TAS	25824	Unt Moshannon Creek	CWF	SWMP	AMD	Metals
2004	1.91	20010531-1145-TAS	25867	Unt Moshannon Creek	CWF	SWMP	AMD	Metals & pH
2004	1.61	20020128-1100-TAS	25888	Mountain Branch	CWF	SWMP	AMD	Metals & Siltation
2004	1	20020128-1100-TAS	25889	Unt Mountain Branch	CWF	SWMP	AMD	Metals & Siltation
2004	2	20020509-1200-TAS	25825	Onemile Run	CWF	SWMP	AMD	Metals
2004	0.58	20020509-1200-TAS	258265	Unt Onemile Run	CWF	SWMP	AMD	Metals
2004	3.75	20021003-1315-TAS	25700	Sevenmile Run	CWF	SWMP	AMD	Metals & Siltation
2004	0.91	20021003-1315-TAS	25701	Unt Sevenmile Run	CWF	SWMP	AMD	Metals & Siltation
2004	0.84	20021003-1315-TAS	25702	Unt Sevenmile Run	CWF	SWMP	AMD	Metals & Siltation
2004	3.11	20020409-1520-TAS	25866	Shimel Run	CWF	SWMP	AMD	Metals & Siltation
2004	2.47	20010531-1400-TAS	25862	Simeling Run	HQ-CWF	SWMP	Habitat Modification	Siltation
2004	2.37	20010508-1500-TAS	25807	Sulphur Run	CWF	SWMP	AMD	Metals & pH
2004	1.4	20010508-1410-TAS	25808	Unt Sulphur Run	CWF	SWMP	AMD	Metals & pH
2004	0.64	20010508-1300-TAS	25809	Unt Sulphur Run	CWF	SWMP	AMD	Metals & pH
2004	2.64	20020624-1410-TAS	25869	Trout Run	HQ-CWF	SWMP	AMD	Metals & pH
2004	1.65	20020624-1500-TAS	25870	Unt Trout Run	CWF Montola Dam to mouth	SWMP	AMD	Metals & Siltation
2004	0.47	20020624-1500-TAS	25871	Unt Trout Run	CWF	SWMP	AMD	Metals & Siltation

2004	1.39	20030612-1245-TAS	25753	Weber Run	CWF	SWMP	AMD	Metals & Siltation
2004	3.53	20020419-1230-TAS	25898	Whiteside Run	CWF	SWMP	AMD	Metals & Siltation
2004	1	20020419-1230-TAS	25899	Unt Whiteside Run	CWF	SWMP	AMD	Metals & Siltation
2004	0.26	20020419-1230-TAS	25902	Unt Whiteside Run	CWF	SWMP	AMD	Metals & Siltation
2004	0.94	20010509-1330-TAS	25820	Wolf Run	CWF	SWMP	AMD	Metals
2006	1.47	1853	25819	Barlow Hollow	CWF	SWMP	AMD	Metals
2006	0.62	1853	25819	Barlow Hollow	CWF	SWMP	AMD	Metals
2006	1.77	5388	25698	Ames Run	CWF	SWMP	AMD	Metals & Siltation
2006	3.36	3353	25878	Beaver Run	CWF	SWMP	AMD	Metals & Siltation
2006	2	3363	25878	Beaver Run	CWF	SWMP	AMD	Metals & Siltation
2006	1.91	4041	25878	Beaver Run	CWF	SWMP	Atmospherid Depostition	pH
2006	0.47	4041	25686	Unt Beaver Run	CWF	SWMP	Atmospherid Depostition	pH
2006	0.55	3353	25885	Unt Beaver Run	CWF	SWMP	AMD	Metals & Siltation
2006	2	3363	25886	Unt Beaver Run	CWF	SWMP	AMD	Metals & Siltation
2006	2.22	3347		Big Run	CWF	SWMP	AMD	Metals & Siltation
2006	0.26	3347	25877	Unt Big Run	CWF	SWMP	AMD	Metals & Siltation
2006	2.51	4534	25705	Unt Black Moshannon Creekl	CWF	SWMP	AMD	Metals & Siltation
2006	0.79	4534	25706	Unt Black Moshannon Creekl	CWF	SWMP	AMD	Metals & Siltation
2006	0.55	4534	25707	Unt Black Moshannon Creekl	CWF	SWMP	AMD	Metals & Siltation
2006	4.09 4.05	3966 11118	25764	Browns Run	CWF	SWMP	AMD	Metals & Siltation Metals & pH
2006	0.54	3966	25765	Unt Browns Run	CWF	SWMP	AMD	Metals & Siltation
2006	0.17	3966	25766	Unt Browns Run	CWF	SWMP	AMD	Metals & Siltation
2006	4.31	3339	25827	Emigh Run	CWF	SWMP	AMD	Metals & Siltation

2006	0.86	3339	25828	Unt Emigh Run	CWF	SWMP	AMD	Metals & Siltation
2006	0.62	3339	25829	Unt Emigh Run	CWF	SWMP	AMD	Metals & Siltation
2006	0.5	3339	25830	Unt Emigh Run	CWF	SWMP	AMD	Metals & Siltation
2006	1.22	3362	25884	Unt Goss Run	HQ-CWF	SWMP	AMD	Metals & Siltation
2006	1.91	3852	25762	Grassflat Run	CWF	SWMP	AMD	Metals & Siltation
2006	2.62	6577	25821	Hawk Run	CWF	SWMP	AMD	Siltation
2006	0.7	6577	25822	Unt Hawk Run	CWF	SWMP	AMD	Siltation
2006	0.69	6577	25823	Unt Hawk Run	CWF	SWMP	AMD	Siltation
2006	1.03	3952	25763	Knox Run	CWF	SWMP	AMD	Metals & Siltation
2006	2.86	3354	25881	Little Beaver Run	CWF	SWMP	AMD	Metals & Siltation
2006	0.85	3357	25882	Unt Little Beaver Run	CWF	SWMP	AMD	Metals & Siltation
2006	0.86	3354	65007	Unt Little Beaver Run	CWF	SWMP	AMD	Metals & Siltation
2006	3.85	11082	26517	Unt Little Beaver Run	CWF	SWMP	AMD	Metals, pH
2006	2.51 48.6	3274 7475	25695	Moshannon Creek	CWF	SWMP	AMD	Metals & Siltation Metals
2006	0.91	5065	25754	Unt Moshannon Creek	CWF	SWMP	AMD	Metals & Siltation
2006	0.57	5033	25755	Unt Moshannon Creek	CWF	SWMP	Cause Unknown	Metals & Siltation
2006	0.9	5053	25756	Unt Moshannon Creek	CWF	SWMP	AMD	Metals & Siltation
2006	1.14	5053	25757	Unt Moshannon Creek	CWF	SWMP	AMD	Metals & Siltation
2006	0.49	5053	25758	Unt Moshannon Creek	CWF	SWMP	AMD	Metals & Siltation
2006	1.32	7391	25759	Unt Moshannon Creek	CWF	SWMP	AMD	Siltation
2006	3.08	3963	25760	Unt Moshannon Creek	CWF	SWMP	AMD	Metals & Siltation
2006	1.09	3963	25761	Unt Moshannon Creek	CWF	SWMP	AMD	Metals & Siltation
2006	1.89	1833	25810	Unt Moshannon Creek	CWF	SWMP	AMD	Siltation

2006	1.02	1833	25811	Unt Moshannon Creek	CWF	SWMP	AMD	Siltation
2006	0.56	1833	25812	Unt Moshannon Creek	CWF	SWMP	AMD	Siltation
2006	1.33	1833	25813	Unt Moshannon Creek	CWF	SWMP	AMD	Siltation
2006	0.46	1833	25814	Unt Moshannon Creek	CWF	SWMP	AMD	Siltation
2006	1.25	1828	25815	Unt Moshannon Creek	CWF	SWMP	AMD	Siltation
2006	0.96	6578	25816	Unt Moshannon Creek	CWF	SWMP	AMD	Siltation
2006	0.49	65785	25817	Unt Moshannon Creek	CWF	SWMP	AMD	Siltation
2006	1.62	1845	25824	Unt Moshannon Creek	CWF	SWMP	AMD	Metals
2006	0.44	6563	25863	Unt Moshannon Creek	CWF	SWMP	AMD	Metals
2006	1.5	6572	25865	Unt Moshannon Creek	CWF	SWMP	AMD	Siltation
2006	1.94	2011	25867	Unt Moshannon Creek	CWF	SWMP	AMD	Metals, pH
2006	1.07	6810	25868	Unt Moshannon Creek	CWF	SWMP	AMD	Siltation
2006	2.21	3273	25888	Mountain Branch	CWF	SWMP	AMD	Metals & Siltation
2006	1.45	3273	25889	Unt Mountain Branch	CWF	SWMP	AMD	Metals & Siltation
2006	2.12	1840	25825	Onemile Run	CWF	SWMP	AMD	Metals
2006	0.58	1840	25826	Unt Onemile Run	CWF	SWMP	AMD	Metals
2006	3.82	4538	25700	Sevenmile Run	CWF	SWMP	AMD	Metals & Siltation
2006	1.76	4538	25701	Unt Sevenmile Run	CWF	SWMP	AMD	Metals & Siltation
2006	0.96	4538	25702	Unt Sevenmile Run	CWF	SWMP	AMD	Metals & Siltation
2006	2.39	3349	25866	Shimel Run	CWF	SWMP	AMD	Metals & Siltation
2006	2.34	2015	25862	Simeling Run	HQ-CWF	SWMP	Habitat Modification	Siltation
2006	2.38	1826	25807	Sulphur Run	CWF	SWMP	AMD	Metals, pH

	0.96	5961						
	1.27	10921						pH
2006	1.41	1824	25808	Unt Sulphur Run	CWF	SWMP	AMD	Metals, pH
2006	0.64	1822	25809	Unt Sulphur Run	CWF	SWMP	AMD	Metals, pH
2006	3.36	3275	25869	Trout Run	HQ-CWF	SWMP	Atmospheris Deposition	pH
2006	3.5	3936	25870	Unt Trout Run	CWF	SWMP	AMD	Metals & Siltation
	1.68	3938						Metals & Siltation
2006	0.48	3938	25871	Unt Trout Run	CWF	SWMP	AMD	Metals & Siltation
2006	3.6	3436	25898	Whiteside Run	CWF	SWMP	AMD	Metals & Siltation
2006	0.96	3436	25899	Unt Whiteside Run	CWF	SWMP	AMD	Metals & Siltation
2006	0.24	3436	25902	Unt Whiteside Run	CWF	SWMP	AMD	Metals & Siltation
2006	0.96	1851	25820	Wolf Run	CWF	SWMP	AMD	Metals
	1.99	9921						Metals, pH
2006	0.47	9921	26607	Unt Wolf Run	CWF	SWMP	AMD	Metals & pH

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

Directions to the Moshannon Creek Watershed

The Moshannon Creek Watershed is located in North Central Pennsylvania, occupying an eastern portion of Clearfield County (Cooper, Morris, Boggs, Decatur, Woodward, Bigler, Gulich and Beccaria Townships) and a western portion of Centre County (Burnside, Snow Shoe and Rush Townships). The Moshannon Creek serves as the county boundary between Clearfield and Centre Counties. The watershed area is found on United States Geological Survey maps covering Karthaus, Black Moshannon, Frenchville, Philipsburg, Wallaceton, Sandy Ridge, Houtzdale, Ramey, Blandburg and Tipton 7.5-Minute Quadrangles.

The Moshannon Creek watershed covers 288 square miles in eleven townships in Centre and Clearfield Counties. It has a maximum width of 13 miles and length of about 30 miles from the Blair/Centre County line northeast to the West Branch of the Susquehanna just south of Karthaus. Moshannon Creek flows from an elevation of 2200 feet in its headwaters at the Blair/Centre County line to an elevation of 960 feet at its confluence with the West Branch of the Susquehanna River near Karthaus. Named tributaries include: Ames Run, Seven Mile Run, Black Moshannon Creek, Weber Run, Crawford Run, Grassflat Run, Browns Run, Laurel Run, Potter Run, Dry Hollow, Tark Hill Run, Panther Hollow, Six Mile Run, Black Bear Run, Sulphur

Run, Hawk Run, Barlow Hollow, Wolf Run, Emigh Run, One Mile Run, Laurel Run, Cold Stream, Trout Run, Shimel Run, Big Run, Beaver Run, Bear Run, Mountain Branch, Whiteside Run, Roup Run and Wilson Run.

The Moshannon Creek watershed is located in an area that is easily accessed. Many roads cross the stream throughout its length. The upper reaches of the stream are more readily accessed than the lower reaches. Moshannon Creek can be reached by traveling on Interstate 80 to the Kylertown Interchange. SR 53 will cross over Moshannon Creek approximately 10 miles to the north or south. Most areas of the watershed are easily accessible from SR 53.

Segments addressed in this TMDL

The Moshannon Creek Watershed is affected by pollution from AMD. This pollution has caused high levels of metals throughout much of Moshannon Creek Watershed. The sources of the AMD are seeps and discharges from areas disturbed by surface and deep mining activities.

The Sky Haven Coal Co. Inc., Erickson operation has four discharge points that discharge to an adjacent watershed; therefore Waste Load Allocations (WLAs) are not required for these sites. The remaining operations are active coal mines and will be assigned WLAs.

The remaining discharges in the Moshannon Creek 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. Waste allocations for the existing mining operations were incorporated into the calculations at the sample points listed in Table 4 on page 27. These are the first downstream sample points that receive all the potential flow of treated water from the treatment facilities. No required reductions of these permits are necessary at this time because there are upstream non-point sources that when reduced will meet the TMDL or there is available assimilation capacity. All necessary reductions are assigned to non-point sources.

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 macro invertebrates, habitat surveys, and measurements of pH, temperature, conductivity, dissolved oxygen, and alkalinity. Benthic macro invertebrates 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 Scrubgrass Creek Watershed TMDL.

Watershed History

Mining has been conducted within the Moshannon creek watershed from the early 1800's until today. Deep mines were the first method of minin in the watershed. Most towns within the watershed were established in response to the extensive deep mining of coal. Most of these deep mines were left abandoned after coal was removed. In the early 1940's surface strip mining began to replace the deep mining method and eventually became prevalent across the water shed. Like the deep mines these mines were also left unreclaimed and abandoned after coal was removed. Recent mining within the watershed consists of surface strip mining. Many current mining operations are remining operations that include the reclamation of abandoned mine lands and include the elimination of abandoned underground mines and abandoned highwalls. These reclamation practices along with alkaline addition placed within the spoil of the mine site should help improve the water quality within the watershed.

Acidic discharges exist throughout the watershed where the coal measures are found. Nearly all of the tributaries are affected by acid mine drainage and the entire length of Moshannon Creek, exceptfor the extreme headwaters, is polluted by acid mine drainage. The only notable tributaries not seriously affected by acid mine drainage are Black Moshannon Creek, Cold Stream, Mountain branch, Black Bear Run and Six Mile Run. The first three are affect by deep mine discharges near their mouths.

The Moshannon Creek Watershed is the fifth largest tributary to the West Branch of the Suspuehanna River. The watershed is 288 square miles with a stream length of 30 miles.

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*

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

Protection, Chapter 93, Water Quality Standards, will be met instream at least 99 percent of the time. For each iteration, the required percent reduction is:

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

PR = required percent reduction for the current iteration

Cc = criterion in mg/l

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

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

Mean = average observed concentration

Standard Deviation = standard deviation of observed data

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

LTA = Mean * (1 – PR99) where (2)

LTA = allowable LTA source concentration in mg/l

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

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

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.

This document contains one or more future mining Waste Load Allocations (WLA) to accommodate possible future mining operations. The Moshannon District Mining Office determined the number of and location of the future mining WLAs. All comments and questions concerning permitting issues and future mining WLAs are to be directed to the appropriate DMO.

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

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

Method to Quantify Treatment Pond Pollutant Load

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

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

Standard Treatment Pond Effluent Limits:
Alkalinity > Acidity
6.0 <= pH <= 9.0
Al <= 0.75 mg/l (Criteria)
Fe <= 3.0 mg/l (BAT)
Mn <= 2.0 mg/l (BAT)

Discharge from treatment ponds on a mine site is intermittent and often varies as a result of precipitation events. Measured flow rates are almost never available. If accurate flow data are available, it is used along with the Best Available Technology (BAT) limits to quantify the WLA for one or more of the following: aluminum, iron, and manganese. The following formula is used:

$$\text{Flow (MGD) X BAT limit (mg/l) X } 8.34 = \text{lbs/day}$$

The following is an approach that can be used to determine a WLA for an active mining operation when treatment pond flow rates are not available. The methodology involves quantifying the hydrology of the portion of a surface mine site that contributes flow to the pit and then calculating WLA using NPDES treatment pond effluent limits.

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

In an active mining scenario, a mine operator pumps pit water to the ponds for chemical treatment. Pit water is often acidic with dissolved metals in nature. At the treatment ponds, alkaline chemicals are added to increase the pH and encourage dissolved metals to precipitate and settle. Pennsylvania averages 41.4 inches of precipitation per year (Mid-Atlantic River Forecast Center, National Weather Service, State College, PA, 1961-1990, ttp://www.dep.state.pa.us/dep/subject/hotopics/drought/PrecipNorm.htm). A maximum pit dimension without special permit approval is 1,500 feet long by 300 feet wide. Assuming that 5 percent of the precipitation evaporates and the remaining 95 percent flows to the low spot in the active pit to be pumped to the treatment ponds, results in the following equation and average flow rates for the pit area.

$$41.4 \text{ in. precip/yr} \times 0.95 \times 1 \text{ ft/12/in.} \times 1{,}500\text{'}\times300\text{'/pit} \times 7.48 \text{ gal/ft}^3 \times 1\text{yr/365days} \times 1\text{day/24hr} \times 1\text{hr/60 min} =$$

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

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

$$41.4 \text{ in. precip/yr} \times 3 \text{ pit areas} \times 1 \text{ ft/12/in.} \times 1{,}500\text{'}\times300\text{'/pit} \times 7.48 \text{ gal/ft}^3 \times 1\text{yr/365days} \times 1\text{day/24hr} \times 1\text{hr/60 min} \times 15 \text{ in. runoff/100 in. precip} =$$

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

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

Total Average Flow = Direct Pit Precipitation + Spoil Runoff

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

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

Allowable Aluminum WLA:
30.9 gal/min x 0.75 mg/l x 0.01202 = 0.3 lbs/day

Allowable Iron WLA:
30.9 gal/min x 3 mg/l x 0.01202 = 1.1 lbs/day

Allowable Manganese WLA:
30.9 gal/min x 2 mg/l x 0.01202 = 0.7 lbs/day

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

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

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

While most mining operations are permitted and allowed to have a standard, 1,500 ft x 300 ft pit, most are well below that size and have a corresponding decreased flow and load. Where pit dimensions are greater than the standard size or multiple pits are present, the calculations to define the potential pollution load can be adjusted accordingly. Hence, the above calculated WLA is very generous and likely high compared to actual conditions that are generally encountered. A large MOS is included in the WLA calculations.

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

Derivation of the flow used in the future mining WLAs:

30.9 gal/min X 2 (assume two pits) X 0.00144 = 0.09 MGD

Future TMDL Modifications

In the future, the Department may adjust the load and/or wasteload allocations in this TMDL to account for new information or circumstances that are developed or discovered during the implementation of the TMDL when a review of the new information or circumstances indicate that such adjustments are appropriate. Adjustment between the load and wasteload allocation will only be made following an opportunity for public participation. A wasteload allocation adjustment will be made consistent and simultaneous with associated permit(s) revision(s)/reissuances (i.e., permits for revision/reissuance in association with a TMDL revision will be made available for public comment concurrent with the related TMDL's availability for public comment). New information generated during TMDL implementation may include, among other things, monitoring data, BMP effectiveness information, and land use information. All changes in the TMDL will be tallied and once the total changes exceed 1% of the total original TMDL allowable load, the TMDL will be revised. The adjusted TMDL, including its LAs and WLAs, will be set at a level necessary to implement the applicable WQS and any adjustment increasing a WLA will be supported by reasonable assurance demonstration that load allocations will be met. The Department will notify EPA of any adjustments to the TMDL within 30 days of its adoption and will maintain current tracking mechanisms that contain accurate loading information for TMDL waters.

Changes in TMDLs That May Require EPA Approval

- Increase in total load capacity.
- Transfer of load between point (WLA) and nonpoint (LA) sources.
- Modification of the margin of safety (MOS).
- Change in water quality standards (WQS).
- Non-attainment of WQS with implementation of the TMDL.
- Allocations in trading programs.

Changes in TMDLs That May Not Require EPA Approval

- Total loading shift less than or equal to 1% of the total load.
- Increase of WLA results in greater LA reductions provided reasonable assurance of implementation is demonstrated (a compliance/implementation plan and schedule).
- Changes among WLAs with no other changes; TMDL public notice concurrent with permit public notice.
- Removal of a pollutant source that will not be reallocated.
- Reallocation between LAs.
- Changes in land use.

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	Total Recoverable
Manganese (Mn)	1.00	Total Recoverable
pH *	6.0-9.0	N/A

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

Station	***Paramete r***	***Existing Load (lbs/day)***	***TMDL Allowable Load (lbs/day)***	***WLA (lbs/day)***	***LA (lbs/day)***	***Load Reduction (lbs/day)***	***Percent Reduction %***
WHSD03	Most Upstream Sample Point on Whiteside Run (25898)						
	Al	2.2	1.3	0.0	1.3	0.9	42
	Fe	6.9	2.2	0.0	2.2	4.7	68
	Mn	4.9	1.5	0.0	1.5	3.4	70
	Acidity	72.9	72.9	0.0	0.0	0.0	0
WHSD02	Unt (25899) to Whiteside Run Unstream of Confluence with Whiteside Run						
	Al	0.3	0.3	NA	NA	NA0	0
	Fe	1.3	1.3	NA	NA	NA	0
	Mn	1.3	1.0	0.0	1.0	0.3	19
	Acidity	0.0	0.0	NA	NA	NA	0
WHSD01	Whiteside Run Upstream of Confluence with Moshannon Creek						
	Al	5.0	5.0	*0.56*	4.44	NA	0
	Fe	30.8	6.2	*2.25*	3.95	19.9	80
	Mn	8.3	6.2	*1.5*	4.7	0.0	25
	Acidity	ND	NA	NA	NA	NA	0
MTNB02	Most Upstream Sample Point on Mountain Branch (25695)						
	Al	13.4	13.4	0.0	NA	NA	0
	Fe	13.5	13.5	0.0	NA	NA	0
	Mn	1.3	1.3	0.0	NA	NA	0
	Acidity	1349.4	175.4	0.0	175.4	1174.0	87
MTNB01	Mouth of Mountain BranchUpstream of Confluence with Mosahnnon Creek						
	Al	13.5	9.3	0.56 + *2.8*	5.94	4.2	31
	Fe	72.7	27.6	2.23 + *11.25*	14.12	45.0	62
	Mn	28.2	25.9	1.49 + *7.5*	16.9	2.3	8
	Acidity	2196.6	197.7	0.0	197.7	824.9	81
BVER09	Most Upstream Sample Point on Beaver Run (25878)						
	Al	2.8	2.8	NA	NA	NA	0
	Fe	1.7	1.7	NA	NA	NA	0
	Mn	1.8	1.8	NA	NA	NA	0
	Acidity	0.0	0.0	0.0	0.0	0.0	0
BVER08	Mouth of Unt (25885) Beaver Run						
	Al	0.6	0.6	NA	NA	NA	0
	Fe	0.4	0.4	NA	NA	NA	0
	Mn	0.08	0.08	NA	NA	NA	0
	Acidity	0.0	0.0	NA	NA	NA	0
BVER10	Beaver Run Downstream of Sample Points BVER09 and BVER08k						

Station	Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	Load Reduction (lbs/day)	Percent Reduction %
	Al	0.7	0.7	NA	NA	NA	0
	Fe	0.4	0.4	NA	NA	NA	0
	Mn	0.07	0.07	NA	NA	NA	0
	Acidity	0.0	0.0	NA	NA	NA	0
BVER07	Beaver Run Downstream of Sample Point BVER10						
	Al	4.8	4.8	NA	NA	NA	0
	Fe	2.9	2.9	NA	NA	NA	0
	Mn	1.5	1.5	NA	NA	NA	0
	Acidity	0.0	0.0	NA	NA	NA	0
BVER06	Most Unspream Sample Point on Little Beaver Run (25881)						
	Al	1.5	0.09	0.04	0.05	1.41	94
	Fe	0.4	0.15	0.14	0.01	0.25	60
	Mn	0.7	0.22	0.10	0.12	0.48	70
	Acidity	24.9	0.5	0.0	0.5	24.4	98
BVER04	Little Beaver Run						
	Al	2.7	0.3	0.1	0.2	2.4	89
	Fe	5.1	0.4	0.38	0.02	4.7	92
	Mn	0.76	0.7	0.24	0.46	0.06	13
	Acidity	88.3	0.0	0.0	0.0.	63.9	100
BVER03	Mouth of Uut (25882) Little Beaver Run						
	Al	1.0	0.14	0.0	0.14	0.86	85
	Fe	6.0	0.12	0.0	0.12	5.88	98
	Mn	5.0	0.15	0.0	0.15	4.85	97
	Acidity	66.1	0.0	0.0	0.0	66.1	100
BVER02	Coal Run (25879) Upstream of Confluence with Little Beaver Run						
	Al	30.7	5.8	0.56 + *0.56*	4.68	24.9	81
	Fe	61.8	5.6	2.23 + *2.25*	1.12	56.2	91
	Mn	101.1	6.1	1.49 + *1.5*	3.11	95.0	94
	Acidity	1118.4	0.0	0.0	0.0	1118.4	100
BVER01	Mouth of Beaver Run Upstream of Confluence with Moshannon Creek						
	Al	20.1	15.7	2.23 + *0.56*	12.88	4.4	22
	Fe	103.9	45.7	8.92 +*2.25*	34.52	58.2	56
	Mn	120.6	32.6	5.96 + *1.5*	25.10	88.0	73
	Acidity	ND	NA	NA	NA	NA	0
HALE	Most Upstream Sample Point on Moshannon Creek						
	Al	21.4	21.4	0.0	NA	NA	0
	Fe	120.9	39.9	0.0	0.0	81.0	67
	Mn	69.4	36.8	0.0	0.0	32.6	47
	Acidity	1283.9	115.6	0.0	0.0	1168.3	91
UNT011	Unt Downstream of Mountain Branch						
	Al	27.5	2.8	*1.12*	1.68	24.7	90
	Fe	13.6	8.5	*4.5*	4.0	5.1	38
	Mn	21.0	4.4	*3.0*	1.4	16.6	79
	Acidity	539.2	5.4	0.0	5.4	533.8	99
BIG01	Big Run (25876) Upstream of Confluence with Moshannon Creek						
	Al	21.3	2.1	0.55	1.55	19.2	90
	Fe	26.2	4.7	2.21	2.49	21.5	82
	Mn	38.1	1.5	1.47	0.03	36.6	96
	Acidity	420.1	0.0	0.0	0.0	420.1	100

Station	Paramete r	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	Load Reduction (lbs/day)	Percent Reduction %
OSCEOLA	Moshannon Creek Upstream of Confluence with Trout Run (25869)						
	Al	1438.8	316.5	3.9 + *2.8*	309.8	1122.3	78
	Fe	2093.0	209.3	15.62 + *11.25*	182.43	1883.7	90
	Mn	2231.6	223.2	10.41 + *7.5*	205.29	2008.4	90
	Acidity	22907.0	916.3	0.0	916.3	17869.5	96
TROT03	Most Upstream Sample Point on Trout Run (25869)						
	Al	3.0	3.0	0.0	NA	NA	0
	Fe	1.8	1.8	0.0	NA	NA	0
	Mn	0.6	0.6	0.0	NA	NA	0
	Acidity	21.9	21.9	0.0	NA	NA	0
TROT02	Mouth of Unt (25870) Trout Run Upstream of Confluence with Trout Run						
	Al	20.7	0.8	0.28	0.52	19.9	96
	Fe	10.3	1.2	1.12	0.08	9.1	88
	Mn	6.8	1.2	0.74	0.46	5.6	83
	Acidity	281.1	0.0	0.0	0.0	0.0	100
TROT01	Mouth of Trout Run Upstream of Confluence with Moshannon Creek (50383)						
	Al	85.6	12.0	1.12 + *2.8*	8.08	73.6	86
	Fe	87.8	35.1	4.46 + *11.25*	19.39	52.6	60
	Mn	42.0	20.1	2.97 + *7.5*	9.63	21.9	52
	Acidity	1808.6	36.2	0.0	36.2	1491.3	98
UNT10	Mouth of Unt (25867) to Moshannon Creek						
	Al	11.0	1.1	0.19	0.91	9.9	90
	Fe	12.3	0.74	0.74	0.0	11.6	94
	Mn	2.3	0.6	0.50	0.1	1.7	75
	Acidity	212.8	0.0	0.0	0.0	212.8	100
SHIM01	Mouth of Shimmel Run (25866) Upstream of Confluence with Moshannon Creek						
	Al	0.3	0.3	0.04	0.26	NA	0
	Fe	0.2	0.2	0.15	0.05	NA	0
	Mn	0.1	0.1	0.1	0.0	NA	0
	Acidity	5.3	4.1	0.0	4.1	1.2	23
PRESQUEISLE	Moshannon Creek Downstream of Shimmel Run						
	Al	1032.7	134.3	3.9 + *2.8*	127.6	898.4	87
	Fe	1419.1	255.4	15.62 + *11.25*	228.53	1163.7	82
	Mn	1983.6	337.2	10.41 + *7.5*	319.29	1646.4	83
	Acidity	12424.7	2360.7	0.0	0.0	2360.7	81
ER-1	Most Upstream Sample Point on Emigh Run (25827)						
	Al	1.7	0.2	0.0	0.2	1.5	89
	Fe	0.2	0.1	0.0	0.1	0.1	55
	Mn	1.0	0.2	0.0	0.2	0.8	76
	Acidity	15.0	0.3	0.0	0.3	14.7	98
EMGH03	Emigh Run Upstream of Confluence with Unt (25830) of Emigh Run						
	Al	17.1	2.1	0.56	1.54	14.9	88
	Fe	70.0	2.8	2.23	0.57	67.2	96
	Mn	62.4	2.5	1.49	1.01	59.9	96
	Acidity	658.4	0.0	0.0	0.0	658.4	100
EMGH05	Unt (25831) of Emigh Run Upstream of Confluence with Emigh Run						
	Al	10.8	1.0	0.0	1.0	9.8	91
	Fe	2.6	0.5	0.0	0.5	2.1	81

Station	Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	Load Reduction (lbs/day)	Percent Reduction %
	Mn	9.8	1.4	0.0	1.4	8.4	86
	Acidity	98.2	5.9	0.0	5.9	92.3	94
EMGH01	Mouth of Emigh Run Upstream of Confluence with Moshannon Creek						
	Al	5.8	0.8	0.22	0.58	5.0	87
	Fe	3.1	1.1	0.89	0.21	2.0	65
	Mn	34.3	1.7	0.59	1.11	32.6	95
	Acidity	258.6	5.2	0.0	5.2	253.4	98
UNT09	Unt (25824) to Moshannon Creek						
	Al	5.0	0.4	0.0	0.4	4.6	92
	Fe	0.8	0.4	0.0	0.4	0.4	50
	Mn	2.3	0.5	0.0	0.5	1.8	78
	Acidity	66.1	0.0	0.0	0.0	66.1	100
UNT09.5	Unt to Moshannon Creek						
	Al	6.1	0.06	0.0	0.6	6.04	99
	Fe	5.5	0.06	0.0	0.06	5.44	99
	Mn	2.0	0.1	0.0	0.1	1.9	95
	Acidity	77.0	0.0	0.0	0.0	77.0	100
WOLF01	Mouth of Wolf Run (25820) Upstream of Confluence With Moshannon Creek						
	Al	61.8	0.25	0.08	0.17	61.55	99.6
	Fe	38.0	0.38	0.33	0.05	37.62	99
	Mn	27.3	0.27	0.22	0.05	27.03	99
	Acidity	849.0	0.0	0.0	0.0	849.0	100
BRLW01	Barlow Hollow (25818) Upstream of Confluence with Moshannon Creek						
	Al	4.6	0.18	0.0	0.18	4.42	96
	Fe	0.64	0.38	0.0	0.38	0.26	40
	Mn	3.1	0.22	0.0	0.22	2.88	93
	Acidity	48.5	0.0	0.0	0.0	48.5	100
CASANOVA	Moshannon Creek Downstream of Unt08						
	Al	3232.0	614.1	18.25 + *2.8*	620.05	2617.9	81
	Fe	6127.3	1225.5	50.9 + *11.25*	1163.35	4901.8	80
	Mn	5352.4	695.8	33.93 + *7.5*	654.37	4656.6	87
	Acidity	58306.8	3498.4	0.0	3498.4	54808.4	94
SLFR04	Most Upstream Sample Point on Sulphur Run (25807)						
	Al	22.0	0.44	0.23	0.21	21.56	98
	Fe	32.0	0.96	0.94	0.02	31.04	97
	Mn	4.0	0.71	0.62	0.09	3.29	82
	Acidity	305.2	0.0	0.0	0.0	305.2	100
SLFR03	Mouth of Unt (25809) of Sulphur Run Upstream of Confluence with Sulphur Run						
	Al	239.3	7.2	*1.68*	6.52	232.1	97
	Fe	425.7	8.5	*6.75*	1.75	417.2	98
	Mn	37.0	11.1	*4.5*	6.6	25.9	70
	Acidity	3270.3	0.0	0.0	0.0	3270.3	100
SLFR02	Mouth of Unt (25808) Sulphur Run Upstream of Confluence with Sulphur Run						
	Al	112.7	2.3	*0.56*	1.74	110.4	98
	Fe	160.8	3.2	*2.25*	0.95	157.6	98
	Mn	16.1	2.3	*1.5*	0.8	13.8	86
	Acidity	1545.7	0.0	0.0	0.0	1545.7	100
SLFR01	Mouth of Sulphur Run Upstream of Confluence with Moshannon Creek						
	Al	243.8	7.3	*2.8*	4.5	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 %
	Fe	414.5	12.4	*11.25*	1.15	0.0	0
	Mn	41.2	9.9	*7.5*	2.4	0.3	3
	Acidity	3756.0	0.0	0.0	0.0	0.0	0
GRAS02	Mouth of Knox Run (25763) Upstream of Confluence with Grassflat Run						
	Al	0.36	0.11	0.0	0.11	0.24	71
	Fe	0.54	0.15	0.0	0.15	0.39	73
	Mn	1.12	0.19	0.0	0.19	0.93	83
	Acidity	15.3	0.0	0.0	0.0	15.3	100
GRAS01	Mouth of Grassflat Run (25762) Upstream of Confluence with Moshannon Creek						
	Al	24.0	2.2	0.0	2.2	21.8	91
	Fe	52.9	3.2	0.0	3.2	49.7	94
	Mn	16.4	2.1	0.0	2.1	14.3	87
	Acidity	479.1	0.0	0.0	0.0	479.1	100
BRWN01	Mouth of Browns Run (25764) Upstream of Confluence with Moshannon Creek						
	Al	1.5	0.42	0.0	0.42	1.08	71
	Fe	0.44	0.44	0.0	0.0	0.0	0
	Mn	3.5	0.66	0.0	0.66	2.84	81
	Acidity	80.4	3.2	0.0	3.2	77.2	96
PEALE	Moshannon Creek Upstream of Confluence with Unt05 (25760)						
	Al	5192.5	882.7	2.23 + *2.8*	877.67	4309.8	83
	Fe	4216.7	1012.0	8.92 + *11.25*	991.83	3204.7	76
	Mn	5717.4	743.3	5.95 + *7.5*	729.85	4974.1	87
	Acidity	85785.4	1715.7	0.0	1715.7	84069.7	98
UNT06	Mouth of Unt (25761) Moshannon Creek Upstream of Confluence with Unt (25760)						
	Al	2.1	0.06	0.0	0.06	2.04	97
	Fe	0.61	0.12	0.0	0.12	0.49	80
	Mn	0.68	0.08	0.0	0.08	0.6	88
	Acidity	109.4	0.0	0.0	0.0	109.4	100
UNT07	Most Upstream Sample Point on Unt (25760) Upstream of Confluence with Unt (25761)						
	Al	1.56	0.09	0.04	0.05	1.47	94
	Fe	1.23	0.18	0.17	0.01	1.05	85
	Mn	0.33	0.12	0.11	0.01	0.21	63
	Acidity	74.6	0.0	0.0	0.0	40.5	100
UNT05	Mouth of Unt (25760) Upstream of Confluence with Moshannon Creek						
	Al	27.0	2.2	0.0	1.64	24.8	92
	Fe	14.6	4.4	0.0	2.15	10.2	70
	Mn	17.5	2.6	0.0	1.1	14.9	85
	Acidity	401.1	0.0	0.0	0.0	217.0	100
UNT04	Mouth of Unt (25757) Upstream of Confluence with Moshannon Creek						
	Al	1.37	0.22	0.0	0.22	1.15	84
	Fe	0.03	0.03	0.0	0.03	NA	0
	Mn	0.91	0.24	0.0	0.24	0.67	74
	Acidity	24.57	0.49	0.0	0.49	24.08	98
UNT03	Mouth of Unt (25756) Upstream of Confluence with Moshannon Creek						
	Al	0.82	0.17	0.0	0.17	0.65	79
	Fe	1.55	0.16	0.0	0.16	1.39	90
	Mn	2.14	0.15	0.0	0.15	1.99	93
	Acidity	25.2	0.0	0.0	0.0	25.2	100
UNT02	Mouth of Unt (25755) Upstream of Confluence with Moshannon Creek						

Station	Paramete r	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	Load Reduction (lbs/day)	Percent Reduction %
	Al	0.14	0.07	0.0	0.07	0.07	49
	Fe	0.01	0.01	0.0	0.0	NA	0
	Mn	0.09	0.08	0.0	0.08	0.01	6
	Acidity	2.6	0.75	0.0	0.75	1.85	71
UNT01	Mouth of Unt (25754) Upstream of Confluence with Moshannon Creek						
	Al	3.7	0.26	0.0	0.26	3.44	93
	Fe	0.8	0.48	0.0	0.48	0.32	40
	Mn	2.9	0.35	0.0	0.35	2.55	88
	Acidity	53.9	0.0	0.0	0.0	53.9	100
WERR01	Mouth of Weber Run (25753) Upstream of Confluence with Moshannon Creek						
	Al	3.07	0.22	0.0	0.22	2.85	93
	Fe	0.36	0.36	0.0	0.36	NA	0
	Mn	6.64	0.27	0.0	0.27	6.37	96
	Acidity	46.7	0.0	0.0	0.0	46.7	100
MOSHANNON	Moshannon Creek Upstream of Confluence with Black Moshannon Creek (25703)						
	Al	9132.5	1552.5	3.2 + *2.8*	1546.5	7580.0	83
	Fe	6157.5	1724.1	6.3 + *11.25*	1706.55	4433.4	72
	Mn	10071.0	1409.9	4.2 + *7.5*	1398.2	8661.1	86
	Acidity	177231.1	1772.3	0.0	1772.3	90836.3	99
SEVN03	Most Upstream Sample Point on Seven Mile Run (25700)						
	Al	0.75	0.30	0.0	0.30	0.45	60
	Fe	1.42	0.50	0.0	0.50	0.92	65
	Mn	1.81	0.90	0.0	0.90	0.91	50
	Acidity	47.08	12.24	0.0	12.24	34.84	74
SEVN02	Mouth of Unt to Seven Mile Run						
	Al	26.8	1.1	0.0	1.1	25.7	96
	Fe	6.0	2.7	0.0	2.7	3.3	55
	Mn	58.3	2.9	0.0	2.9	55.4	95
	Acidity	440.2	0.0	0.0	0.0	440.2	100
SEVN01	Mouth of Seven Mile Run (25700) Upstream of Confluence with Moshannon Creek						
	Al	47.3	6.2	*1.68*	4.52	41.1	87
	Fe	45.7	8.2	*6.75*	1.45	37.5	82
	Mn	120.0	6.0	*4.5*	1.5	114.0	95
	Acidity	859.8	3.4	0.0	3.4	856.4	99.6
AMES01	Mouth of Ames Run (25698) Upstream of Confluence to Moshannon Creek						
	Al	2.7	0.7	0.0	0.7	2.0	73
	Fe	0.2	0.2	0.0	NA	NA	0
	Mn	2.8	1.1	0.0	1.1	1.7	62
	Acidity	61.4	10.4	0.0	10.4	51.0	83
Mouth	Mouth of Moshannon Creek Upstream of Confluence with West Branch Susquehanna River						
	Al	11371.6	2274.3	*2.8*	2271.5	9097.3	80
	Fe	5980.2	2392.1	*11.25*	2380.85	3588.1	60
	Mn	14039.0	1825.1	*7.5*	1817.6	12213.9	87
	Acidity	324221.3	3242.2	0.0	3242.2	320979.1	99

The italicized values in the WLA column in table four are future mining wlas.

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

Wasteload allocations for the existing mining operations were incorporated into the calculations as shown in Table 4 below. These are the first downstream monitoring points that receive all the potential flow of treated water from any of the treatment sites. No required reductions of these permits are necessary at this time because there are upstream non-point sources that when reduced will met the TMDL or there is available assimilation capacity. All necessary reductions are assigned to non-point sources.

Table 4. Summary Table–Discharge Permits in Moshannon Creek Watershed

Junior Coal Contracting, Inc. Beaver Mine (SMP # 14940101, NPDES # PA 0219932)	**Myers & Supko Contracting, Coal Run Operation (SMP # 17040110, NPDES # PA 0243884)**
UNT10: BVRTF1	Osceola: CRTF1
	BIG01: CRTF2
	BVER01: CRTF3
Junior Coal Contracting, Inc. Little Beaver No 2 Mine (SMP # 17980115, NPDES # PA 0238074)	**Sky Haven Coal Inc., Bonita #1 Mine (SMP # 17663037, NPDES # PA 0611328)**
BVER01: BVRTF1 & BVRTF2	BVER06: Bonita#1 and Bonita#2
	BVER04: Bonita#3, Bonita#4 & Bonita#5
Sky Haven Coal Inc., Erickson Mine (SMP# 17930124, NPDES # PA 0219649)	**AMFIRE Mining Company, LLC, Mountain Top Mine(SMP#14820103, NPDES # PA 0611719)**
BVER06: ErickT1, ErickT2, ErickT7 and ErickT8	TROT02: MT017
	Prequeis: MT019
Forcey Coal Inc., Mailinich Mine (SMP # 17020101, NPDES # PA 0243205)	**Junior Coal Contracting, Inc., Elliot Mine (SMP # 17860144, NPDES # PA 0115711)**
Prequeis: MalinichT	SHIM01: El008, El009 & El010
	Prequeis: El011, El012 & El013
Junior Coal Contracting, Inc., Elliot South Mine (SMP # 17020112, NPDES # PA 023337)	**River Hill Coal Company, Inc., Ellis Mine, (SMP # 14040101, NPDES # PA 0243833)**
SHIM01: Elliot009, Elliot010, Elliot011, Elliot012 & Elliot013	Osceola: ElisTF-1 & ElisTF-2
	TROT01: EllisTF-3
Junior Coal Contracting, Inc., Big Run Mine (SMP # 17070106, NPDES # PA 0256528)	**Glenn O. Hawbaker, Inc., Sandy Ridge Quary #2 (SMP # 14060301, NPDES # PA 0256323)**
BIG01: BRTF-1,BRTF-2, BRTF-3 & BRTF-4	TROT02: SRQ2TF1
Sky Haven Coal, Inc., Piedmo Mine, (SMP # 17060104, NPDES # PA 0256358)	**RES Coal LLC, J-2 Operation (SMP # 17070101, NPDES # PA 0256471)**
Casanova: P004	Peale: J2TB-1, J2TB-2 & J2TB-3
Peale: P005	
Lee Coal Contracting, Inc., Johnson Operation, (SMP # 17050106, NPDES # PA 0256222)	**R.H. Carmen, LLC, Refuse Operation, (SMP # 14050101, NPDES # PA 0256242)**
UNT07: JOTB1 & JOTB2	WOLF01: ROTF1
Amfire Mining Co., LLC, (SMP # 14080102, NPDES # PA 0256854)	**Aimfire Mining Co., LLC, Crittenden Operation (SMP # 17030111, NPDES # PA 0243558)**
Presqueis: AimfireTB-1 & AimfireTB-2	Casanova: CritendenTB-1
Junior Coal Contracting, Inc., (SMP # 17080107, NPDES # PA 0256811)	**Junior Coal Contracting, Inc., Leslie Tipple Operation (SMP # 17051601, NPDES # PA 0235733)**
Osceola: JCCI006, JCCI007, JCCI008 & JCCI009	Osceola: JCCITB-1 & JCCITB-2
Junior Coal Contracting, Inc., Runk Operation (SMP # 17980117, NPDES # PA 0238104)	**Junior Coal Contracting, Inc., Little Beaver Operation (SMP # 17930103, NPDES # PA 0207241)**
Casanova: JCCITP1, JCCITP2 & JCCITP3	BVER01: JCCI011, JCCI012, JCCI013, JCCI014, JCCI015, JCCI016, JCCI017 & JCCI018

Junior Coal Contracting, Inc., Baltic Operation (SMP # 17020113, NPDES # PA 0243353)
Casanova: JCCITF1, JCCITF2 & JCCITF3
Power Operation Co. Inc., Dugan Operation (SMP # 14663004, NPDES # PA 0109011)
Osceola: Dugan016
Penn Coal Land, Inc., Drane#1 (SMP # 4473SM10, NPDES # PA 0119440)
Casanova: Drane#1001
RES Coal LLC, Bonita#1 (SMP # 17663037, NPDES # PA 0611328)
BVER06: Bonita#1001 & Bonita#1002
BVER04: Bonita#1003, Bonita#1004 & Bonita#1005
RES Coal LLC, J Operation (SMP # 17010104, NPDES # PA 0243060)
Peale: JOpTF1 & JOpTF2
RES Coal LLC, Lower Emigh#2 (SMP # 17870129, NPDES # PA 0116190)
EMGH01: LowerEmigh#2016, LowerEmigh#2017, LowerEmigh#2018, LowerEmigh#2019, LowerEmigh#2020, LowerEmigh#2021, LowerEmigh#2022, LowerEmigh#2023, LowerEmigh#2024
RES Coal LLC, Munson#2 (SMP # 17960101, NPDES # PA 0220256)
Casanova: Munson#2007, Munson#2008 & Munson#2011
River Hill Coal Co. Inc., Stein Operation (SMP # 17030102, NPDES # PA 0243426)
Casanova: SteinTF-1, SteinTF-2, SteinTF-3 & SteinTF-4
Benjamin Coal Co., Little Beaver#1 (SMP # 17820132, NPDES # PA 0610925)
BVER04: LittleBeaver#1001
BVER01: LittleBeaver#1002, LittleBeaver#1003, LittleBeaver#1004 & LittleBeaver#1005
Forcey Coal, Inc., Miller (SMP # 17970106, NPDES # PA 0220612)
Presqueis: MillerTF-1, MillerTF-2 & MillerTF-3
King Coal Sales, Inc., Royal (SMP # 17010115, NPDES # PA 0243183)
EMGH03: Royal006 & Royal007
A. W. Long Coal Co., Long#1 (SMP # 17714022 NPDES # PA 0611034)
Casanova: Long#1002 & Long#1003
Thompson Brothers Coal Co., Inc., Thompson #001 (SMP # 17810154, NPDES # PA 0611409)
EMGH03: Thompson001, Thompson002, Thompson003, Thompson004, Thompson005, Thompson006, Thompson007, Thompson008, Thompson009, Thompson010, Thompson011, Thompson012, Thompson013, Thompson014, Thompson015, Thompson016, & Thompson017
Moshannon Joint Sewer Authority (NPDES # PA0037966 POTW)
Casanova: Moshannon Sewer Authority

Power Operation Co. Inc., Vought Operation (SMP # 17820114, NPDES # PA 0611115)
Osceola: Vought001, Vought002 Vought003 & Vought 004
Power Operation Co. Inc., Dugan #2 Operation (SMP # 14663003, NPDES # PA 0109231)
TROT01: Dugan#2026, Dugan#2027, Dugan#2028, Dugan#2029, Dugan#2030, and Dugan#2031
Penn Coal Land, Inc., Drane#2 (SMP # 17813182, NPDES # PA 0609692)
BIG01: Drane#2001, Drane#2002
RES Coal LLC, Emigh#3 (SMP # 17060108, NPDES # PA 0256404)
EMGH01: Emigh#3TB1 & Emigh#3TF2
RES Coal LLC, Munson#1 (SMP # 17743172, NPDES # PA 0610909)
Casanova: Munson#1011, Munson#1012, Munson#1013, Munson#1014
RES Coal LLC, Maxton Operation (SMP # 17-08-08 Remining Permit, NPDES # PA 0256871)
Casanova: MaxtonRMTB-1
River Hill Coal Co. Inc., Six Mile (SMP # 17990102, NPDES # PA 0238236)
Casanova: SixMile008, SixMile009 & SixMile010
EnerCorp, Inc., Pauliny (SMP # 17930125, NPDES # PA 0219665)
Peale: Pauling001, Pauling002, Pauling003, Pauling004 & Pauling005
Al Hamilton Contracting Co., Sandturn (SMP # 17803176, NPDES # PA 0128252)
BVER02: Sandturn007
Lee Coal Contracting, Inc., Dale#2 (SMP # 17020111, NPDES # PA 0243329)
SLFR04: Dale#2TF01
Pennsylvania Mines, LLC, Rushton Mine (SMP # 14831301, NPDES # PA 008966)
Prequeis: RushtonMine001, RushtonMine003, RushtonMine004 & RushtonMine005
John and Justin Welker, 6 Mile Operation (SMP # 17-07-12 Reminig Permit, NPDES # PA 0256765)
Casanova: 6MileTB-1
RES Coal LLC, Hale#1, (SMP # 14080103 Remining Permit NPDES # PA 0256994)
Osceola: RESRMTB-1, , RESRMTB-3 & RESRMTB-4
MTNB01: RESRMTB-2 & RESRMTB-5
Central PA Water Treatment, Rex Energy Corp., (NPDES # PA0233684 IW permit)
Moshannon: Central PA Wat Treat

Dannic Energy (NPDES # Not yet assigned IW)	
Casanova: Dannic Energy	

Discharges and Treatment Systems on Moshannon Creek and Tributaries as the Result of Activities of the Al Hamilton Contracting Company

None of the following have permits and are not required to have WLAs. They are located on the map.

The Al Hamilton Contracting Company forfeited all bonds and abandoned all treatment systems in 2003. A trust fund was set up in 2004 under the Clean Streams Foundation (CSF) to resume operating Hamilton's systems, but several remain abandoned until they can be rebuilt to operate more efficiently.

Brenda Gayle – SMP 4770BSM9, Rush Township, Centre County. The Brenda Gayle site contains two treatment systems, one active and one passive.

The passive system consists of an anoxic limestone drain (ALD) that discharges to an aerobic wetland and then a series of four manganese removal beds. The system works well, but soon after construction by the Al Hamilton Company it was recognized that the majority of the contaminated mine drainage is not intercepted by the ALD, therefore, flows are far below what was intended. What does pass through is more than adequately treated. The discharge from the passive system, known as "001", enters a small drainageway and flows into Mountain Branch, tributary to Moshannon Creek. Raw water samples are no longer available.

The active system consists of a series of collection sumps that drain via pipelines to a single collection pond. Much of what is being collected is water that is not being intercepted by the ALD described above. The raw water entering the collection pond is known as discharge "CP". The pond is equipped with a sump and a water level activated submersible pump. Raw mine drainage is pumped over 1000' across a divide separating Mountain Branch from Moshannon Creek. Water runs through a caustic feeder, step aerator, and two settling ponds. Location and construction of the ponds were carried out by the Al Hamilton Company. Mining activity was based on the Lower Kittanning seam. Treated water discharges at "TP2" and enters a drainageway that leads directly to Moshannon Creek.

Miller Stein – SMP 17753159, Decatur Township, Clearfield County. The Miller Stein site holds one active and two passive treatment facilities.

The active system treats two raw water sources; a collection pond equipped with water level activated submersible pump, and a 60' deep well under 24 hour a day operation. Both sources discharge into a step aerator which off gasses CO_2, followed by caustic soda feed and three settling ponds. Location and construction of the ponds were carried out by the Al Hamilton Company. Raw water from the collection pond is known as "S1B"; raw water from the well is "MSWL"; and treated water is "SLB11". Raw water is impacted primarily by activities on the Middle Kittanning seam. Treated water discharges directly to Shimel Run, tributary to Moshannon Creek.

The passive systems are on the other side of a drainage divide on the Miller Stein site from the active facility, and discharge to a branch of Little Laurel Run, tributary to Laurel Run, tributary to Moshannon Creek. Both passive systems are ALDs of very low flow; W101 and W102. Raw water is impacted primarily by activities on the Middle Kittanning seam. Raw water is no longer available.

Morris #2 – SMP 17810104, Morris Township, Clearfield County. Morris #2 is a typically high flow active treatment system.

Raw water, known as "11", is collected in a long sump between the low point of the affected property and Sustrick Road. The AMD is related to the Lower Kittanning seam and is often a high volume (>150gpm) discharge. Water is directed into a sump equipped with a level activated pump. AMD is pumped back up hill for caustic soda feed and is directed through a series of lined treatment ponds for settling. Location and construction of the unlined ponds were carried out by the Al Hamilton Company. Treated water discharges back downhill near the raw water sump at "M2FT", and flows into a wetland of Laurel Run, Tributary to Moshannon Creek

There are two Government Financed Construction Contracts (GFCC) within the Moshannon Creek watershed. The A.W. Long Coal and the John and Justin Welker GFCCs. Neither of these require WLAs and are shown on the map. The Larry D. Baumgardner Coal Co. Inc., SMP # 14090101, NPDES PA0257061 is a remining permit on an unnamed tributary to Black Moshannon Creek, an HQ-CWF designated water body. This is a non-discharge permit using a baffle system and a wla is not required.

The Junior Coal Contracting, Inc., Beaver Mine (SMP#14940101 and NPDES PA0219932) has a standard pit size of 1500 feet in length and a width of 300 feet. There is one pit of this size. This pit size was used in the Method to Quantify Treatment Pond Pollutant Load calculation example shown below:

41.4 in. precip/yr x 0.95 x 1 ft/12/in. x 1500'x 300'/pit x 7.48 gal/ft^3 x 1yr/365days x 1day/24hr x 1hr/60 min = 21.0 gal/min average discharge from direct precipitation into the open mining pit area. Two pit flow = 42.0 gal/min.

41.4 in. precip/yr x 3 pit areas x 1 ft/12/in. x 1500'x 300'/pit x 7.48 gal/ft^3 x 1yr/365days x 1day/24hr x 1hr/60 min x 15 in. runoff/100 in. precip = 9.9 gal/min average discharge from spoil runoff into the pit area. Two pit flow = 19.8 gal/min.

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

Total Average Flow = Direct Pit Precipitation + Spoil Runoff

Total Average Flow = 42.0 gal/min. + 19.8 gal/min. = 61.8 gal/min.

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

Allowable Aluminum Waste Load Allocation:
61.8 gal./min. x 0.75 mg/l x 0.01202 = 0.56 lbs./day

Allowable Iron Waste Load Allocation:
61.8 gal./min. x 3 mg/l x 0.01202 = 2.23 lbs./day

Allowable Manganese Waste Load Allocation:
61.8 gal./min. x 2 mg/l x 0.01202 = 1.49 lbs./day

All of the discharge permits within the Moshannnon Creek watershed use a standard pit size of 1500 ft. X 300 ft. This pit size was used in the Method to Quantify Treatment Pond Pollutant Load calculation and is shown in Table 5. If there are multiple treatment facilities only one treatment pond will be discharging at a time.

Table 5. Waste Load Allocation of Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	Wla (lbs/day)	Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Junior Coal Contracting, Inc. Beaver Mine (SMP # 14940101, NPDES # PA 0219932) UNT10				Myers & Supko Contracting, Coal Run Operation (SMP # 17040110, NPDES # PA 0243884) BIG01			
Al	0.75	0.02	0.09	Al	0.75	0.03	0.18
Fe	3.0	0.02	0.37	Fe	3.0	0.03	0.74
Mn	2.0	0.02	0.25	Mn	2.0	0.03	0.49
Junior Coal Contracting, Inc. Little Beaver No 2 Mine (SMP # 17980115, NPDES # PA 0238074) BVER01				Myers & Supko Contracting, Coal Run Operation (SMP # 17040110, NPDES # PA 0243884) BVER01 and OSCEOLA			
Al	0.75	0.09	0.56	Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23	Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49	Mn	2.0	0.09	1.49
Sky Haven Coal Inc., Erickson Mine (SMP# 17930124, NPDES # PA 0219649) BVER06				Sky Haven Coal Inc., Bonita #1 Mine (SMP # 17663037, NPDES # PA 0611328) BVER06			
Al	0.75	0.03	0.19	Al	0.75	0.003	0.019
Fe	3.0	0.03	0.07	Fe	3.0	0.003	0.07
Mn	2.0	0.03	0.05	Mn	2.0	0.003	0.05
Forcey Coal Inc., Mailinich Mine (SMP # 17020101, NPDES # PA 0243205) PREQUEIS				Sky Haven Coal Inc., Bonita #1 Mine (SMP # 17663037, NPDES # PA 0611328)BVER04			
Al	0.75	0.09	0.56	Al	0.75	0.007	0.05
Fe	3.0	0.09	2.23	Fe	3.0	0.007	0.19
Mn	2.0	0.09	1.49	Mn	2.0	0.007	0.12
Junior Coal Contracting, Inc., Elliot Mine (SMP # 17860144, NPDES # PA 0115711) SHIM01				AMFIRE Mining Company, LLC, Mountain Top Mine(SMP#14820103, NPDES # PA 0611719) TROT02			
Al	0.75	0.003	0.02	Al	0.75	0.04	0.28
Fe	3.0	0.003	0.07	Fe	3.0	0.04	1.12
Mn	2.0	0.003	0.05	Mn	2.0	0.04	0.74
Junior Coal Contracting, Inc., Elliot Mine (SMP # 17860144, NPDES # PA 0115711) PREQUEIS				AMFIRE Mining Company, LLC, Mountain Top Mine(SMP#14820103, NPDES # PA 0611719) PREQUEIS			
Al	0.75	0.09	0.56	Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23	Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49	Mn	2.0	0.94	1.49
Junior Coal Contracting, Inc., Elliot South Mine (SMP # 17020112, NPDES # PA 023337) SHIM01				River Hill Coal Company, Inc., Ellis Mine, (SMP # 14040101, NPDES # PA 0243833) OSCEOLA and TROT01			
Al	0.75	0.003	0.02	Al	0.75	0.09	0.56
Fe	3.0	0.003	0.07	Fe	3.0	0.09	2.23
Mn	2.0	0.003	0.05	Mn	2.0	0.09	1.49
Junior Coal Contracting, Inc., Elliot South Mine (SMP # 17020112, NPDES # PA 023337) PRESQUEIS				Glenn O. Hawbaker, Inc., Sandy Ridge Quary #2 (SMP # 14060301, NPDES # PA 0256323) UNT10			
Al	0.75	0.09	0.56	Al	0.75	0.015	0.09
Fe	3.0	0.09	2.23	Fe	3.0	0.015	0.37
Mn	2.0	0.94	1.49	Mn	2.0	0.015	0.25
Junior Coal Contracting, Inc., Big Run Mine				RES Coal LLC, J-2 Operation (SMP # 17070101,			

(SMP # 17070106, NPDES # PA 0256528) BIG01					NPDES # PA 0256471) PEALE			
Al	0.75	0.03	0.18		Al	2.0	0.09	0.56
Fe	3.0	0.03	0.74		Fe	3.0	0.09	2.23
Mn	2.0	0.03	0.49		Mn	2.0	0.09	1.49
Sky Haven Coal, Inc., Piedmo Mine, (SMP # 17060104, NPDES # PA 0256358) CASANOVA & PEALE					R.H. Carmen, LLC, Refuse Operation, (SMP # 14050101, NPDES # PA 0256242) WOLF01			
Al	0.75	0.09	0.56		Al	2.0	0.013	0.08
Fe	3.0	0.09	2.23		Fe	3.0	0.013	0.33
Mn	2.0	0.09	1.49		Mn	2.0	0.013	0.22
Lee Coal Contracting, Inc., Johnson Operation, (SMP # 17050106, NPDES # PA 0256222) UNT07					Aimfire Mining Co., LLC, Crittenden Operation (SMP # 17030111, NPDES # PA 0243558) CASANOVA			
Al	0.75	0.007	0.04		Al	0.75	0.09	0.56
Fe	3.0	0.007	0.17		Fe	3.0	0.09	2.23
Mn	2.0	0.007	0.11		Mn	2.0	0.09	1.49
Aimfire Mining Co., LLC, (SMP # 1480102, NPDES # PA 0256854) PRESQUEIS					Junior Coal Contracting, Inc., Leslie Tipple Operation (SMP # 17051601, NPDES # PA 0235733) OSCEOLA			
Al	0.75	0.09	0.56		Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23		Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49		Mn	2.0	0.09	1.49
Junior Coal Contracting, Inc., (SMP # 17080107, NPDES # PA 0256811) OSCEOLA					Junior Coal Contracting, Inc., Little Beaver Operation (SMP # 17930103, NPDES # PA 0207241) BVER01			
Al	0.75	0.09	0.56		Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23		Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49		Mn	2.0	0.09	1.49
Junior Coal Contracting, Inc., Runk Operation (SMP # 17980117, NPDES # PA 0238104) CASANOVA					Power Operation Co. Inc., Vought Operation (SMP # 17820114, NPDES # PA 0611115) OSCEOLA			
Al	0.75	0.09	0.56		Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23		Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49		Mn	2.0	0.09	1.49
Junior Coal Contracting, Inc., Baltic Operation (SMP # 17020113, NPDES # PA 0243353) BALTIC OPERATION					Power Operation Co. Inc., Dugan #2 Operation (SMP # 14663003, NPDES # PA 0109231) TROT01			
Al	0.75	0.09	0.56		Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23		Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49		Mn	2.0	0.09	1.49
Power Operation Co. Inc., Dugan Operation (SMP # 14663004, NPDES # PA 0109011) OSCEOLA					Penn Coal Land, Inc., Drane#2 (SMP # 17813182, NPDES # PA 0609692) BIG01			
Al	0.75	0.09	0.56		Al	0.75	0.03	0.18
Fe	3.0	0.09	2.23		Fe	3.0	0.03	0.74
Mn	2.0	0.09	1.49		Mn	2.0	0.03	0.49
Penn Coal Land, Inc., Drane#1 (SMP # 4473SM10, NPDES # PA 0119440) CASANOVA					RES Coal LLC, Emigh#3 (SMP # 17060108, NPDES # PA 0256404) EMGH01			
Al	0.75	0.09	0.56		Al	0.75	0.02	0.11
Fe	3.0	0.09	2.23		Fe	3.0	0.02	0.45
Mn	2.0	0.09	1.49		Mn	2.0	0.02	0.30
RES Coal LLC, Bonita#1 (SMP # 17663037,					RES Coal LLC, Bonita#1 (SMP # 17663037,			

NPDES # PA 0611328) BVER06					NPDES # PA 0611328) BVER04			
Al	0.75	0.003	0.019		Al	0.75	0.007	0.05
Fe	3.0	0.003	0.07		Fe	3.0	0.007	0.19
Mn	2.0	0.003	0.05		Mn	2.0	0.007	0.12
RES Coal LLC, J Operation (SMP # 17010104, NPDES # PA 0243060) PEALE					RES Coal LLC, Munson#1 (SMP # 17743172, NPDES # PA 0610909) CASANOVA			
Al	0.75	0.09	0.56		Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23		Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49		Mn	2.0	0.09	1.49
RES Coal LLC, Lower Emigh#2 (SMP # 17870129, NPDES # PA 0116190) EMGH01					RES Coal LLC, Maxton Operation (SMP # 17-08-08 Remining Permit, NPDES # PA 0256871) CASANOVA			
Al	0.75	0.02	0.11		Al	0.75	0.09	0.56
Fe	3.0	0.02	0.45		Fe	3.0	0.09	2.23
Mn	2.0	0.02	0.30		Mn	2.0	0.09	1.49
RES Coal LLC, Lower Emigh#2 (SMP # 17870129, NPDES # PA 0116190) CASANOVA					River Hill Coal Co. Inc., Six Mile (SMP # 17990102, NPDES # PA 0238236) CASANOVA			
Al	0.75	0.09	0.56		Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23		Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49		Mn	2.0	0.09	1.49
RES Coal LLC, Munson#2 (SMP # 17960101, NPDES # PA 0220256) CASANOVA					EnerCorp, Inc., Pauling (SMP # 17930125, NPDES # PA 0219665) PEALE			
Al	0.75	0.09	0.56		Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23		Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49		Mn	2.0	0.09	1.49
River Hill Coal Co. Inc., Stein Operation (SMP # 17030102, NPDES # PA 0243426) CASANOVA					Al Hamilton Contracting Co., Sandturn (SMP # 17803176, NPDES # PA 0128252) BVER02			
Al	0.75	0.09	0.56		Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23		Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49		Mn	2.0	0.09	1.49
Benjamin Coal Co., Little Beaver#1 (SMP # 17820132, NPDES # PA 0610925) BVER04					Benjamin Coal Co., Little Beaver#1 (SMP # 17820132, NPDES # PA 0610925) BVER01			
Al	0.75	0.007	0.05		Al	0.75	0.09	0.56
Fe	3.0	0.007	0.19		Fe	3.0	0.09	2.23
Mn	2.0	0.007	0.12		Mn	2.0	0.09	1.49
Forcey Coal, Inc., Miller (SMP # 17970106, NPDES # PA 0220612) PRESQUEIS					Lee Coal Contracting, Inc., Dale#2 (SMP # 17020111, NPDES # PA 0243329) SLFR04			
Al	0.75	0.09	0.56		Al	0.75	0.037	0.23
Fe	3.0	0.09	2.23		Fe	3.0	0.037	0.94
Mn	2.0	0.09	1.49		Mn	2.0	0.037	0.62
King Coal Sales, Inc., Royal (SMP # 17010115, NPDES # PA 0243183) EMGH03					Pennsylvania Mines, LLC, Rushton Mine (SMP # 14831301, NPDES # PA 008966) PRESQUEIS			
Al	0.75	0.04	0.28		Al	0.75	0.09	0.56
Fe	3.0	0.04	1.11		Fe	3.0	0.09	2.23
Mn	2.0	0.04	0.74		Mn	2.0	0.09	1.49
A. W. Long Coal Co., Long#1 (SMP # 17714022, NPDES # PA 0611034) CASANOVA					John and Justin Welker, 6 Mile Operation (SMP # 17-07-12 Reminig Permit, NPDES # PA 0256765) CASANOVA			
Al	0.75	0.09	0.56		Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23		Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49		Mn	2.0	0.09	1.49
Thompson Brothers Coal Co., Inc., Thompson #001 (SMP # 17810154, NPDES # PA 0611409) EMGH03					RES Coal LLC, Hale#1, (SMP # 1408010103 Remining Permit, NPDES # PA 0256994) OSCEOLA			

Al	0.75	0.04	0.28		Al	0.75	0.09	0.56
Fe	3.0	0.04	1.12		Fe	3.0	0.09	2.23
Mn	2.0	0.04	0.74		Mn	2.0	0.09	1.49
Moshannon Joint Sewer Authority (NPDES # PA0037966, POTW,) CASANOVA					RES Coal LLC, Hale#1, (SMP # 1408010103 Remining Permit, NPDES # PA 0256994) MTNB01			
Al	0.75	1.5	9.4		Al	0.75	0.09	0.56
Fe	1.5	1.5	18.8		Fe	3.0	0.09	2.23
Mn	1.0	1.5	12.5		Mn	2.0	0.09	1.49
Dannic Energy (NPDES # Not yet assigned, IW) CASANOVA					Central PA Water Treatment, Rex Energy Corp., (NPDES # PA0233684 IW permit) MOSHANNON			
Al	0.75	0.25	1.6		Al	0.75	0.504	3.2
Fe	1.5	0.25	3.1		Fe	1.5	0.504	6.3
Mn	1.0	0.25	2.1		Mn	1.0	0.504	4.2

Recommendations

Various methods to eliminate or treat pollutant sources and to provide a reasonable assurance that the proposed TMDLs can be met exist in Pennsylvania. These methods include PADEP's primary efforts to improve water quality through reclamation of abandoned mine lands (for abandoned mining) and through the National Pollution Discharge Elimination System (NPDES) permit program (for active mining). Funding sources available that are currently being used for projects designed to achieve TMDL reductions include the Environmental Protection Agency (EPA) 319 grant program and Pennsylvania's Growing Greener Program. Federal funding is through the Department the Interior, Office of Surface Mining (OSM), for reclamation and mine drainage treatment through the Appalachian Clean Streams Initiative and through Watershed Cooperative Agreements.

OSM reports that nationally, of the $8.5 billion of high priority (defined as priority 1&2 features or those that threaten public health and safety) coal related AML problems in the AML inventory, $6.6 billion (78%) have yet to be reclaimed; $3.6 billion of this total is attributable to Pennsylvania watershed costs. Almost 83 percent of the $2.3 billion of coal related environmental problems (priority 3) in the AML inventory are not reclaimed.

The Bureau of Abandoned Mine Reclamation, Pennsylvania's primary bureau in dealing with abandoned mine reclamation (AMR) issues, has established a comprehensive plan for abandoned mine reclamation throughout the Commonwealth to prioritize and guide reclamation efforts for throughout the state to make the best use of valuable funds (www.dep.state.pa.us/dep/deputate/minres/bamr/complan1.htm). In developing and implementing a comprehensive plan for abandoned mine reclamation, the resources (both human and financial) of the participants must be coordinated to insure cost-effective results. The following set of principles is intended to guide this decision making process:

- Partnerships between the DEP, watershed associations, local governments, environmental groups, other state agencies, federal agencies and other groups organized to reclaim abandoned mine lands are essential to achieving reclamation and abating acid mine drainage in an efficient and effective manner.

- Partnerships between AML interests and active mine operators are important and essential in reclaiming abandoned mine lands.

- Preferential consideration for the development of AML reclamation or AMD abatement projects will be given to watersheds or areas for which there is an approved rehabilitation plan. (guidance is given in Appendix B to the Comprehensive Plan).

- Preferential consideration for the use of designated reclamation moneys will be given to projects that have obtained other sources or means to partially fund the project or to projects that need the funds to match other sources of funds.

- Preferential consideration for the use of available moneys from federal and other sources will be given to projects where there are institutional arrangements for any necessary long-term operation and maintenance costs.

- Preferential consideration for the use of available moneys from federal and other sources will be given to projects that have the greatest worth.

- Preferential consideration for the development of AML projects will be given to AML problems that impact people over those that impact property.

- No plan is an absolute; occasional deviations are to be expected.

A detailed decision framework is included in the plan that outlines the basis for judging projects for funding, giving high priority to those projects whose cost/benefit ratios are most favorable and those in which stakeholder and landowner involvement is high and secure.

In addition to the abandoned mine reclamation program, regulatory programs also are assisting in the reclamation and restoration of Pennsylvania's land and water. PADEP has been effective in implementing the NPDES program for mining operations throughout the Commonwealth. This reclamation was done, through the use of remining permits which have the potential for reclaiming abandoned mine lands, at no cost to the Commonwealth or the federal government. Long-term treatment agreements were initialized for facilities/operators who need to assure treatment of post-mining discharges or discharges they degraded which will provide for long-term treatment of discharges. According to OSM, "PADEP is conducting a program where active mining sites are, with very few exceptions, in compliance with the approved regulatory program".

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

- Project XL - The Pennsylvania Department of Environmental Protection ("PADEP"), has proposed this XL Project to explore a new approach to encourage the remining and reclamation of abandoned coal mine sites. The approach would be based on compliance with in-stream pollutant concentration limits and implementation of best management practices ("BMPs"), instead of National Pollutant Discharge Elimination System ("NPDES") numeric effluent limitations measured at individual discharge points. This XL project would provide for a test of this approach in up to eight watersheds with significant acid mine drainage ("AMD") pollution. The project will collect data to compare in-stream pollutant concentrations versus the loading from individual discharge points and provide for the evaluation of the performance of BMPs and this alternate strategy in PADEP's efforts to address AMD.

- Awards of grants for 1) proposals with economic development or industrial application as their primary goal and which rely on recycled mine water and/or a site that has been made suitable for the location of a facility through the elimination of existing Priority 1 or 2 hazards, and 2) new and innovative mine drainage treatment technologies that will provide waters of higher purity that may be needed by a particular industry at costs below conventional treatment costs as in common use today or reduce the costs of water treatment below those of conventional lime treatment plants. Eight contracts totaling $4.075 M were awarded in 2006 under this program.
- Projects using water from mine pools in an innovative fashion, such as the Shannopin Deep Mine Pool (in southwestern Pennsylvania), the Barnes & Tucker Deep Mine Pool (the Susquehanna River Basin Commission into the Upper West Branch Susquehanna River), and the Wadesville Deep Mine Pool (Excelon Generation in Schuylkill County).

The Moshannon Creek Watershed Coalition will continue to work with DEP and other stakeholders to acquire the funds to maintain the current AMD treatment systems and to pursue additional AMD abatement projects in the Moshannon Creek watershed that will work to achieve the reductions recommended in this TMDL document. The Moshannon Creek Watershed Coalition has completed a watershed assessment and development of a restoration plan for Emigh Run and a watershed assessment of Trout Run. The Coalition have proposed to assess stream quality in the Shimel Run watershed and in the headwaters of Moshannon Creek

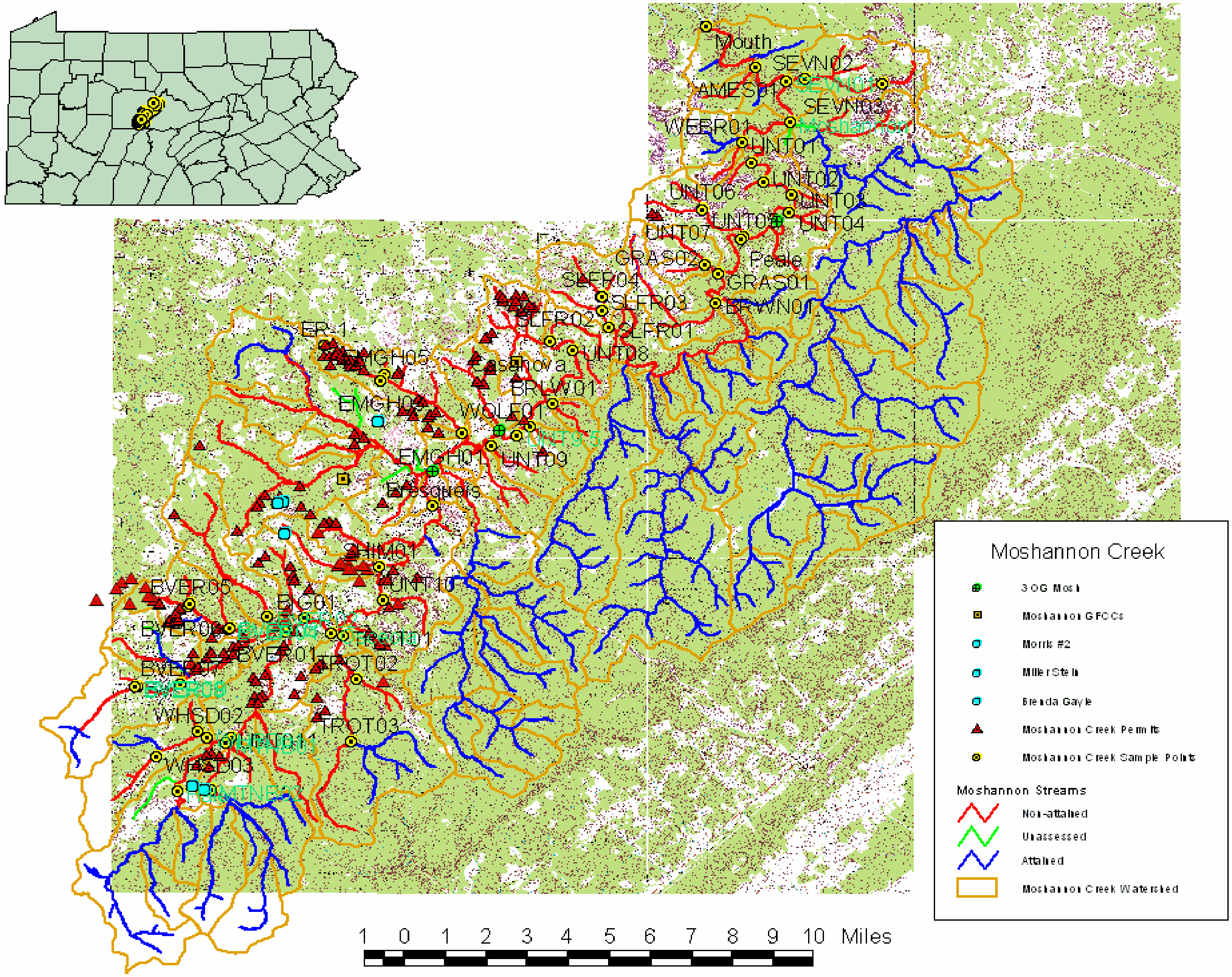
Candidate or federally-listed threatened and endangered species may occur in or near the watershed. While implementation of the TMDL should result in improvements to water quality, they could inadvertently destroy habitat for candidate or federally-listed species. TMDL implementation projects should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

Public Participation

Public notice of the draft TMDL was published in the *Pennsylvania Bulletin* on November 1, 2008 to foster public comment on the allowable loads calculated. A public meeting was held on November 25, 2008 beginning at 7:00 p.m., at the Rush Townshop Building in Philipsburg, PA, to discuss the proposed TMDL.

Attachment A

Moshannon Creek Watershed Maps



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SEVN02
AMES01
SEVN03
WEBR01
UNT01
UNT02
UNT06
UNT03
UNT04
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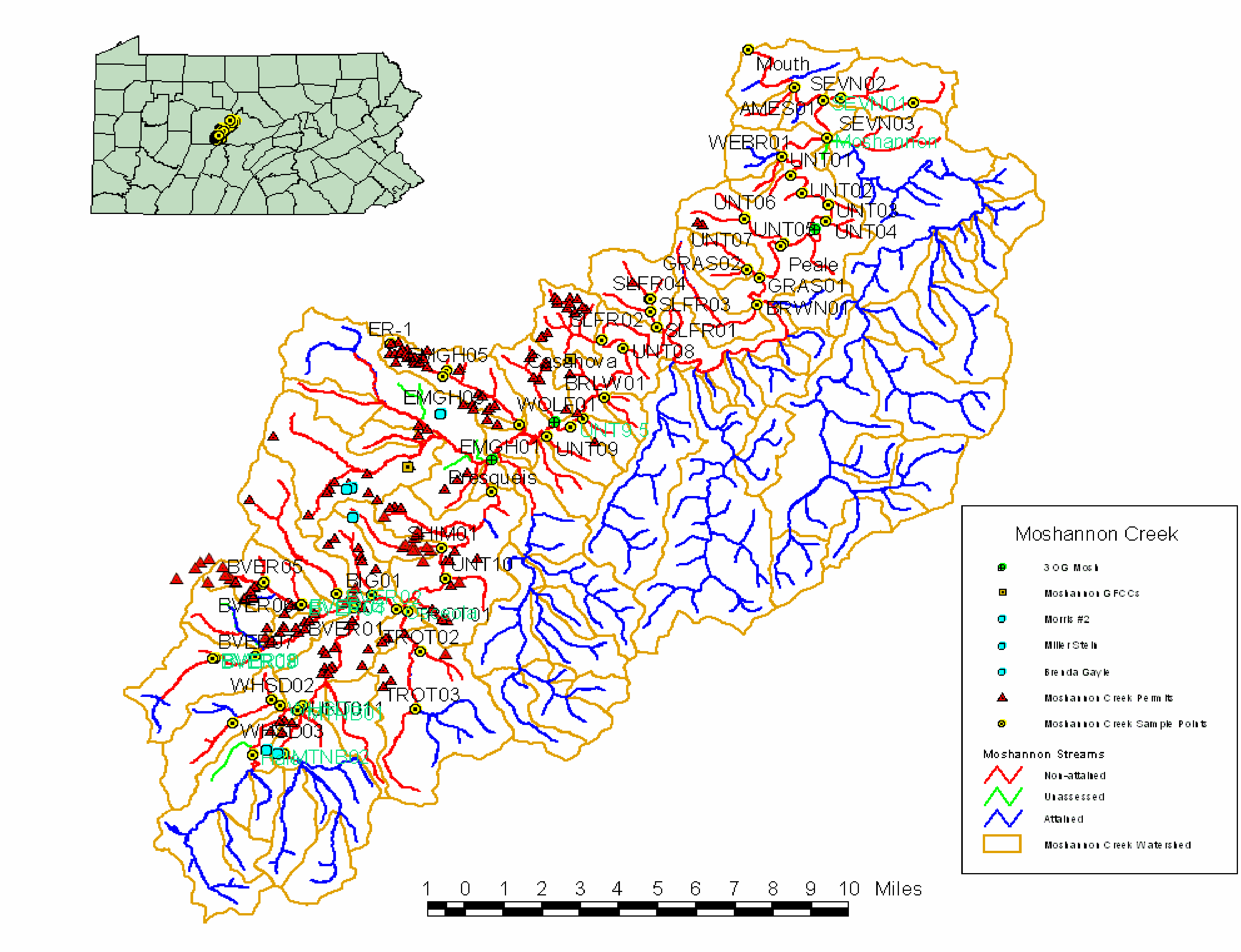
Peale
GRAS01
SLFR04
SLFR03
SLFR02
SLFR01
UNT08
BRLW01
WOLF01
EMGH05
EMGH01
UNT09
BVER05
BVER01
TROT02
TROT03
WHSD02
Moshannon Creek
Moshannon GFCCs
Morris #2
Miller Stein
Brenda Gayle
Moshannon Creek Permits
Moshannon Creek Sample Points
Moshannon Streams
Non-attained
Unassessed
Attained
Moshannon Creek Watershed
1 0 1 2 3 4 5 6 7 8 9 10 Miles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AMES01
SEVN01
SEVN03
WEBR01
Moshannon
UNT01
UNT02
UNT06
UNT03
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UNT07
GRAS02
Peale
SLFR04
GRAS01
SLFR03
BRWN01
SLFR02
SLFR01
ER-1
EMGH05
UNT08
Casanova
BRLW01
EMGH04
WOLF01
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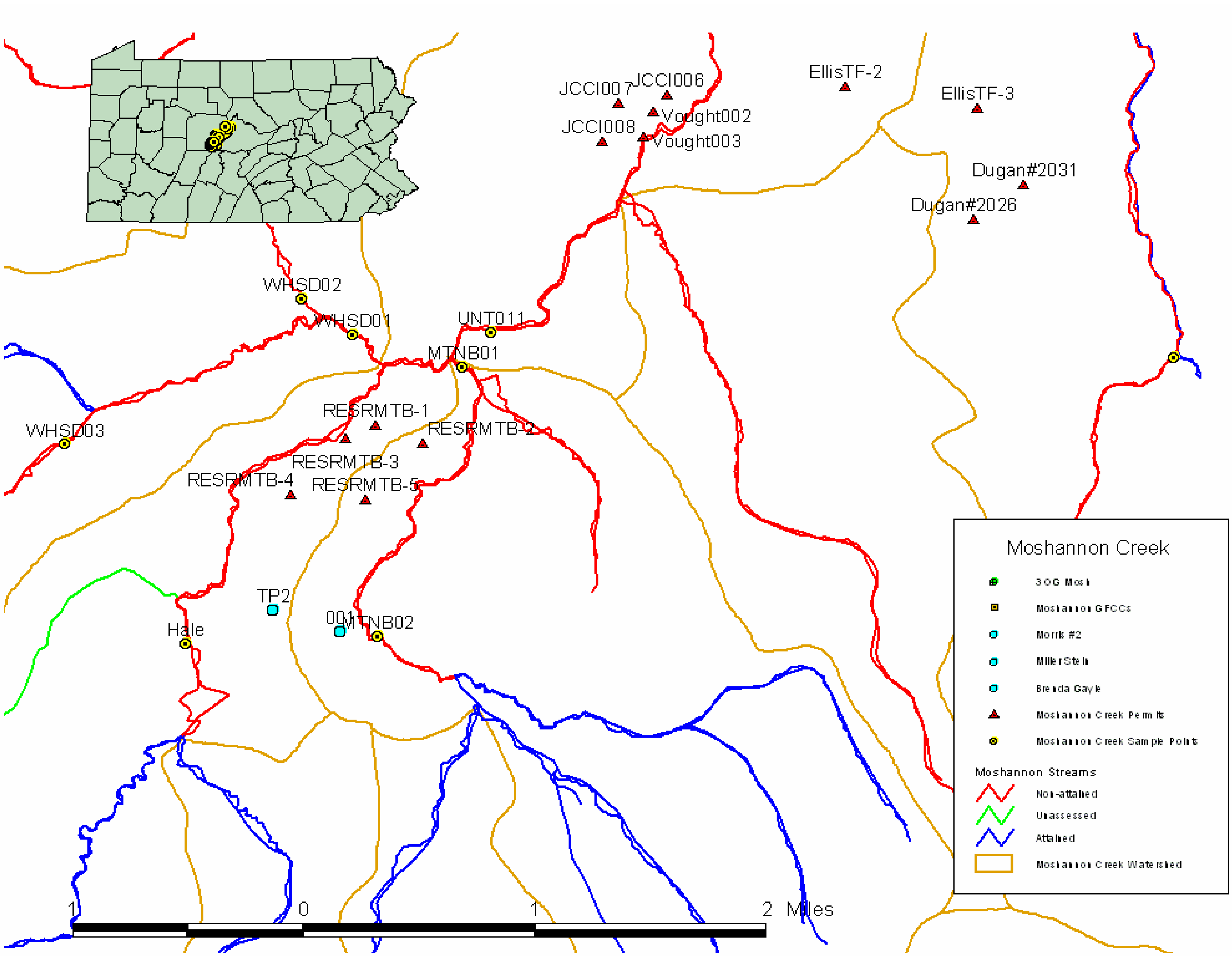
EMGH01
UNT09
Bresqueis
SHIM01
BVER05
UNT10
BIG01
BVER02
TROT01
BVER01
TROT02
BVER07
BVER08
WHSD02
TROT03
WHSD03
HUMTNB02
1 0 1 2 3 4 5 6 7 8 9 10 Miles
Moshannon Creek
3 OG Mosh
Moshannon GFCCs
Morris #2
Miller Stein
Brenda Gayle
Moshannon Creek Permits
Moshannon Creek Sample Points
Moshannon Streams
Non-attained
Unassessed
Attained
Moshannon Creek Watershed



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EllisTF-3
Vought002
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UNT011
MTNB01
RESRMTB-1
RESRMTB-2
WHSD03
RESRMTB-3
RESRMTB-4
RESRMTB-5
TP2
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Moshannon Creek
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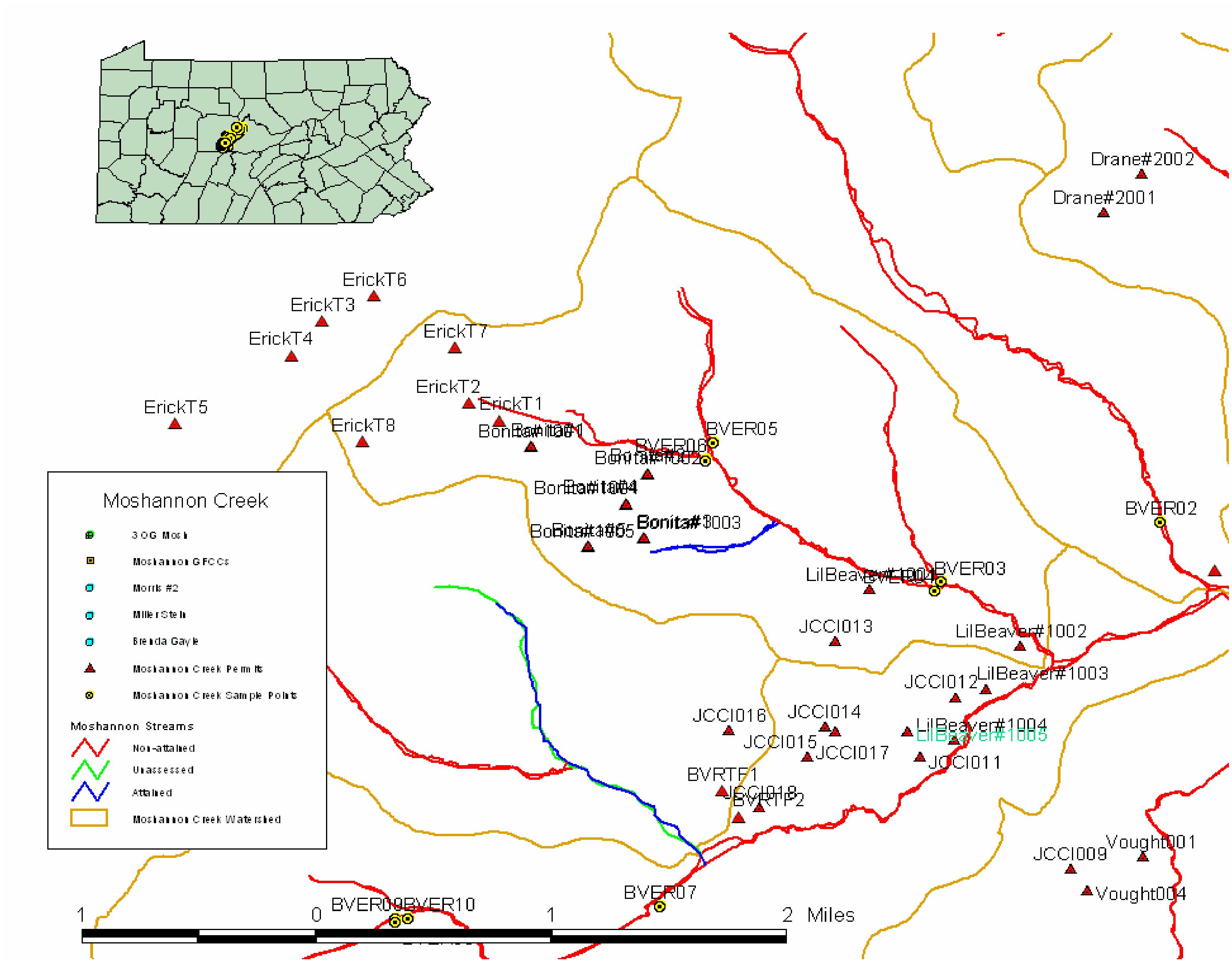
Moshannon GFCCs
Morris #2
Miller Stein
Brenda Gayle
Moshannon Creek Permits
Moshannon Creek Sample Points
Moshannon Streams
Non-attained
Unassessed
Attained
Moshannon Creek Watershed



Moshannon Creek
3 OG Mosh
Moshannon GFCCs
Morris #2
Miller Stein
Brenda Gayle
Moshannon Creek Permits
Moshannon Creek Sample Points
Moshannon Streams
Non-attained
Unassessed
Attained
Moshannon Creek Watershed
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ErickT3
ErickT4
ErickT7
ErickT5
ErickT2
ErickT1
ErickT8
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Drane#2002
Drane#2001
BVER02
BVER03
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LilBeaver#1002
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LilBeaver#1003
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JCCI014
JCCI015
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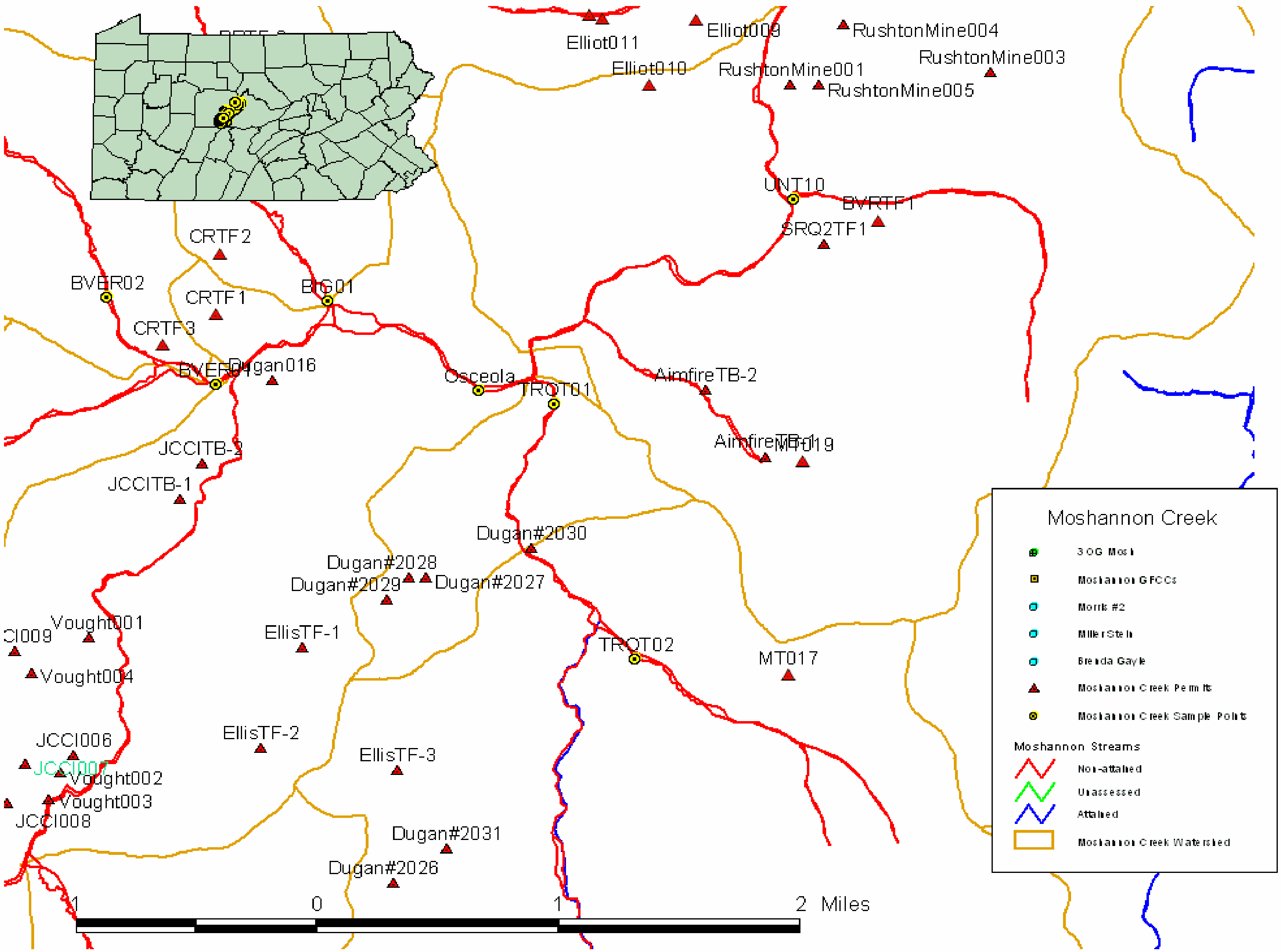

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RushtonMine003
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CRTF2
BVER02
CRTF1
BIG01
CRTF3
BVER01
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AimfireTB-2
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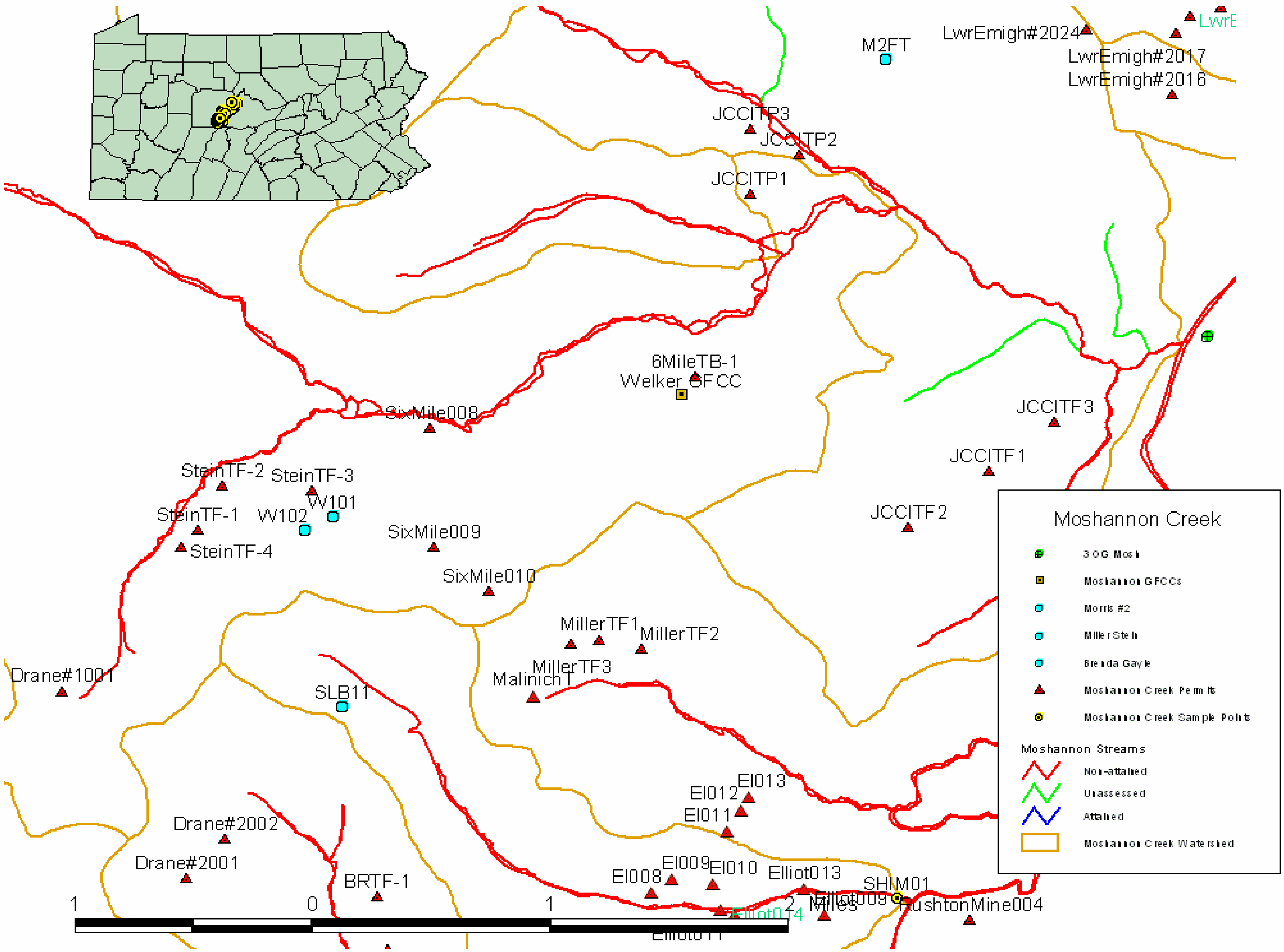
MT017
Vought004
JCCI006
EllisTF-2
EllisTF-3
JCCI007
Vought002
Vought003
JCCI008
Dugan#2031
Dugan#2026
1
0
1
2 Miles
Moshannon Creek
3 OG Most
Moshannon GFCCs
Morris #2
MillerStein
Brenda Gayle
Moshannon Creek Permits
Moshannon Creek Sample Points
Moshannon Streams
Non-attained
Unassessed
Attained
Moshannon Creek Watershed



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SixMile008
JCCITF3
JCCITF1
JCCITF2
SteinTF-2
SteinTF-3
W101
SteinTF-1
W102
SteinTF-4
SixMile009
SixMile010
MillerTF1
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El012
El011
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El008
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El010
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SHIM01
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Moshannon Creek
3 OG Mosh
Moshannon GFCCs
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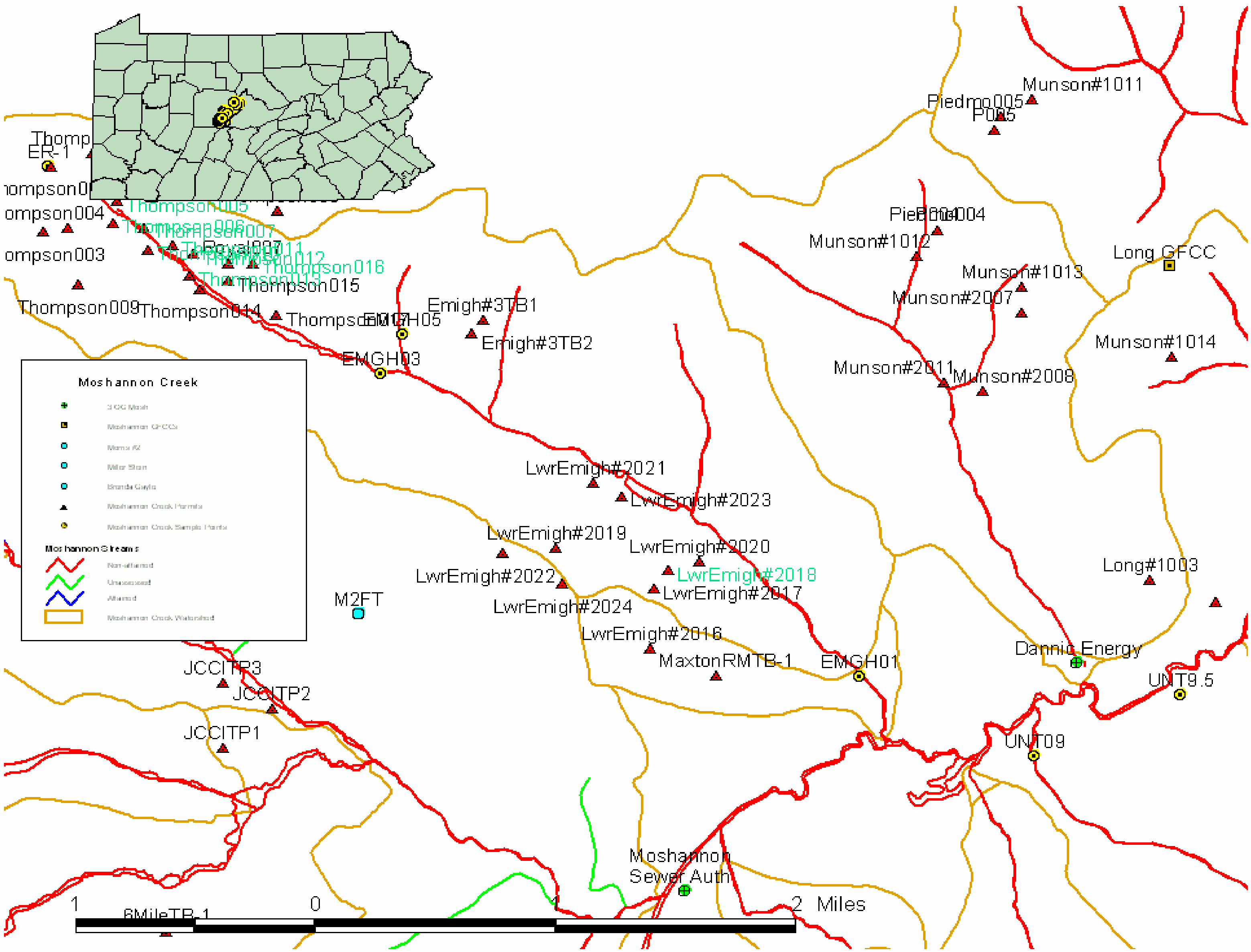
Moshannon Creek Watershed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Munson#2011
Munson#2008
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Thompson014
Thompson015
Thompson016
ompson004
ompson003
ER-1
Emigh#3TB1
Emigh#3TB2
EMGH03
LwrEmigh#2021
LwrEmigh#2023
LwrEmigh#2019
LwrEmigh#2020
LwrEmigh#2022
LwrEmigh#2018
LwrEmigh#2017
LwrEmigh#2024
LwrEmigh#2016
MaxtonRMTB-1
EMGH01
M2FT
Long#1003
Dannic Energy
UNT9.5
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JCCITP2
JCCITP1
Moshannon
Sewer Auth
1
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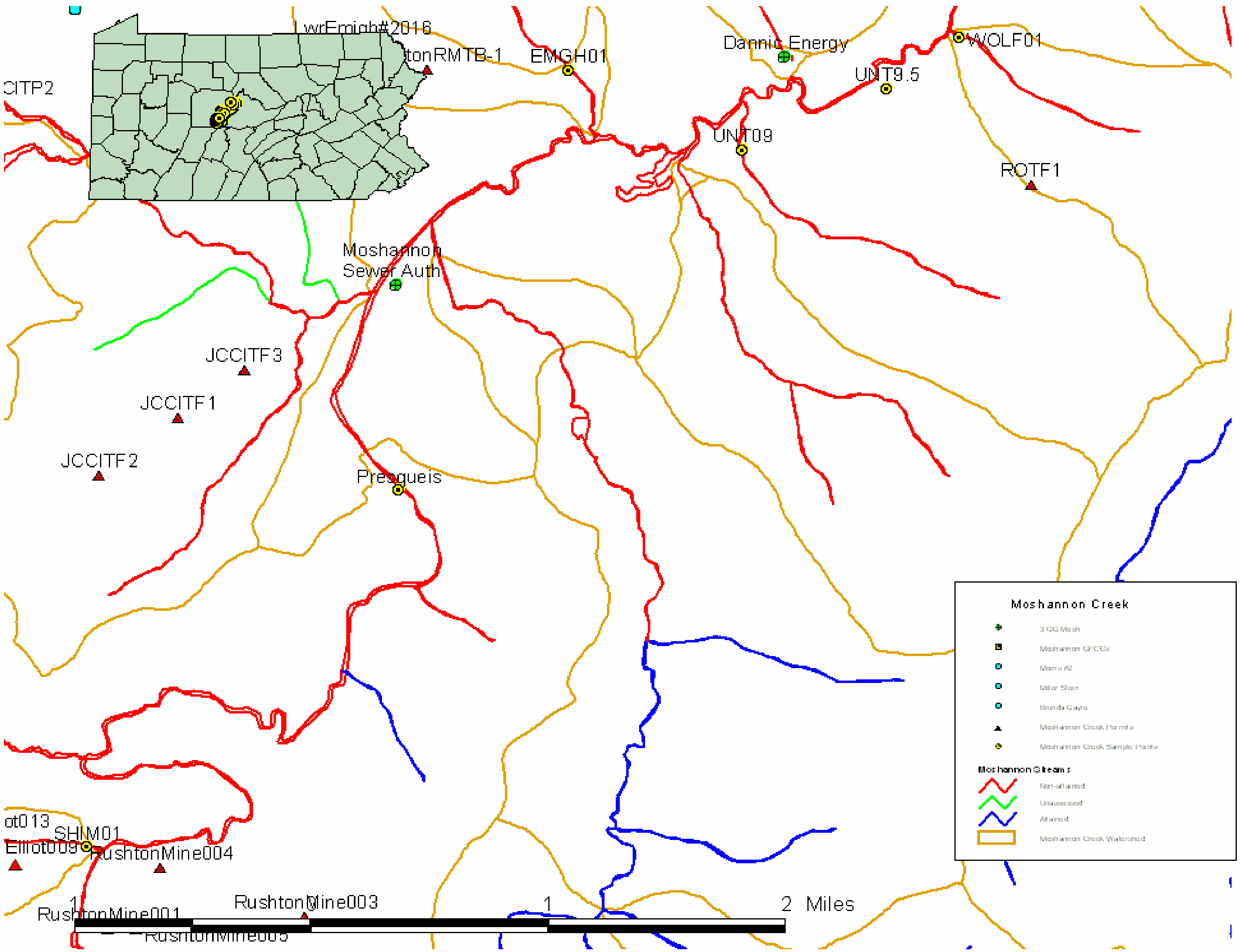
1
2 Miles



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JCCITF3
JCCITF1
JCCITF2
Presqueis
ot013
SHIM01
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1
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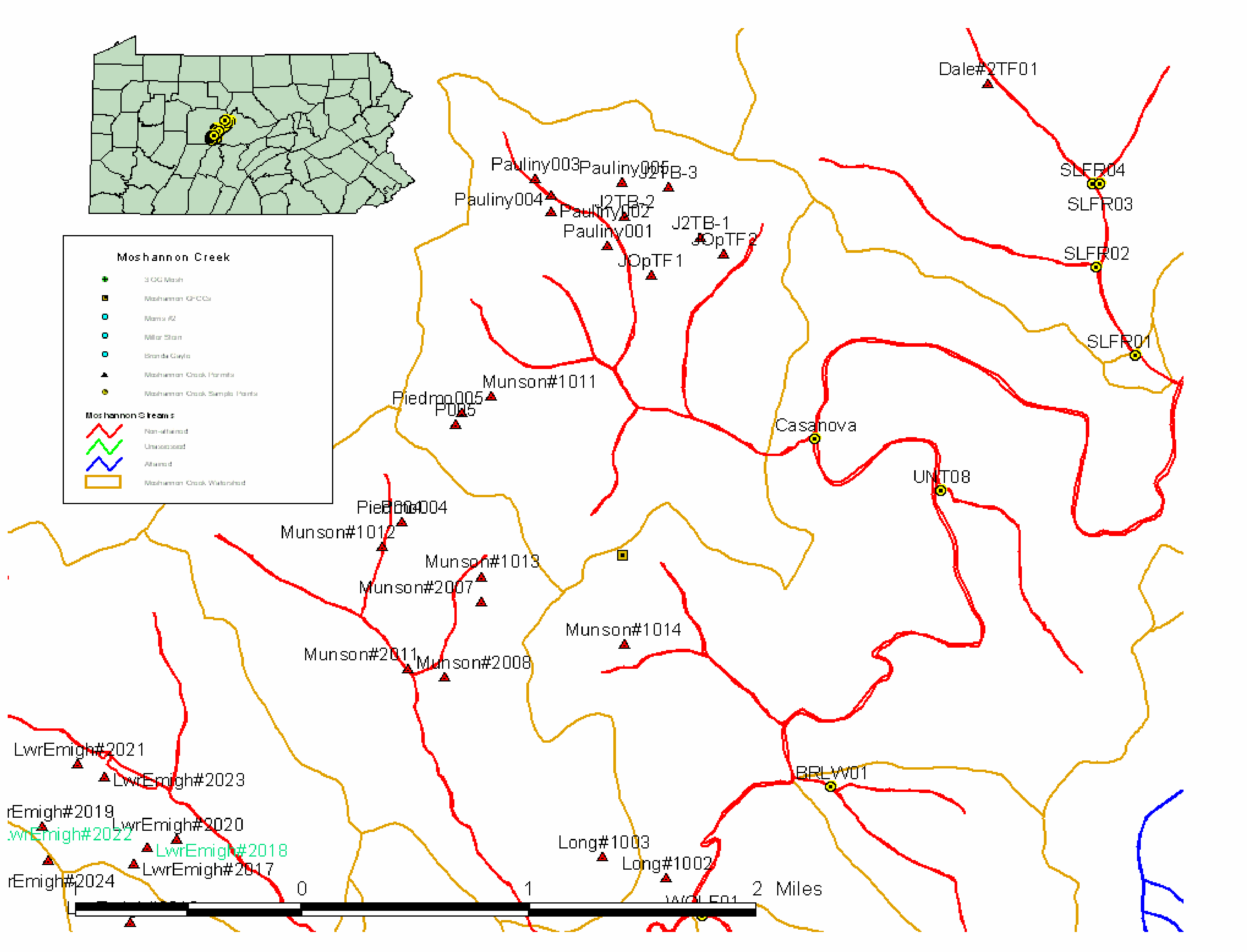
Moshannon Creek
Moshannon Streams



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SLFR03
SLFR02
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J2TB-3
Pauliny004
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Pauliny001
J2TB-1
JOpTF1
Munson#1011
P005
Casanova
UNT08
Munson#1012
Munson#1013
Munson#2007
Munson#1014
Munson#2011
Munson#2008
LwrEmigh#2021
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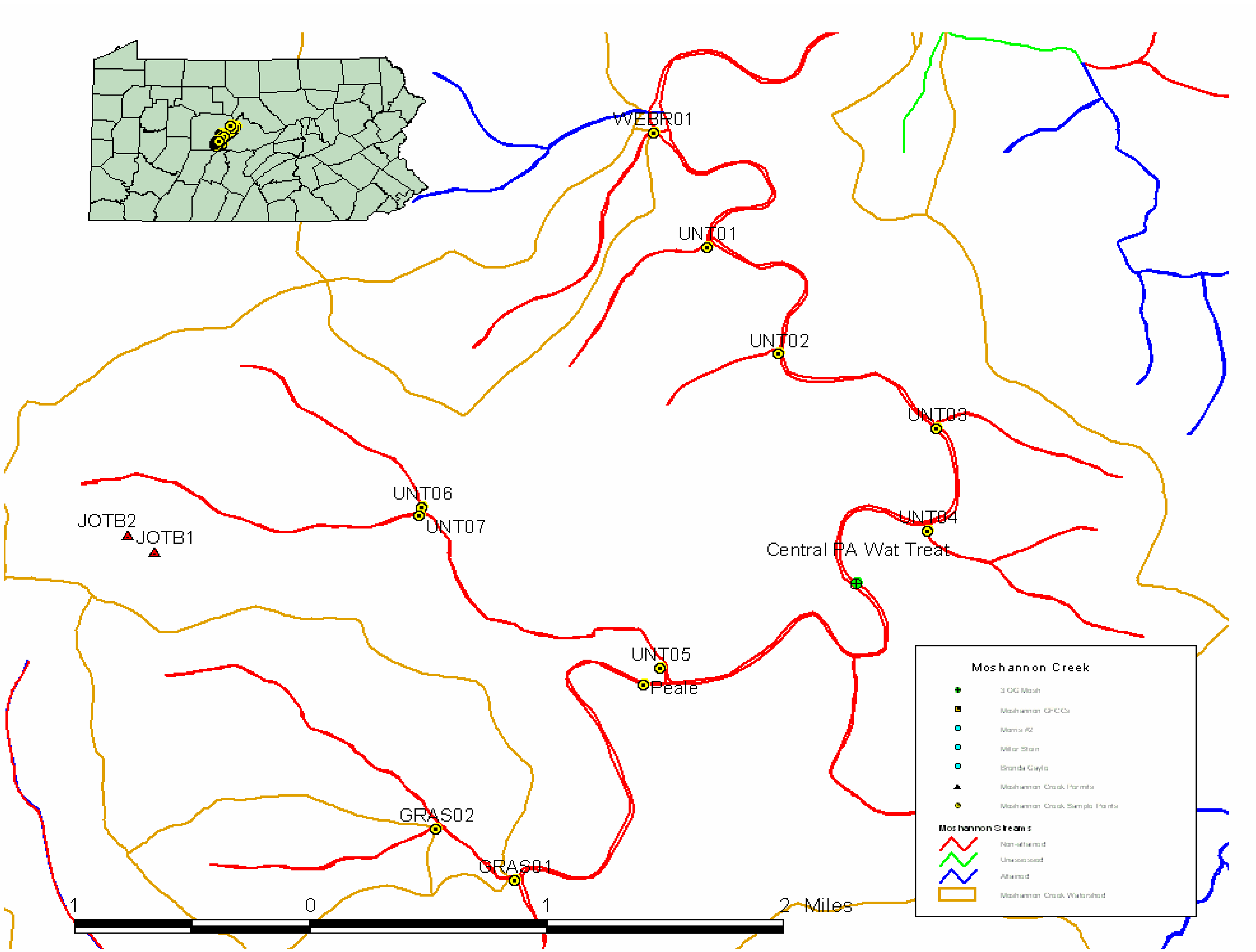
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UNT02
UNT03
UNT04
Central PA Wat Treat
UNT06
UNT07
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JOTB1
UNT05
Peale
GRAS02
GRAS01
1
0
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2 Miles
Moshannon Creek
Moshannon Creek Permits
Moshannon Creek Sample Points
Moshannon Streams
Non-attained
Unassessed
Attained
Moshannon Creek Watershed

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.*

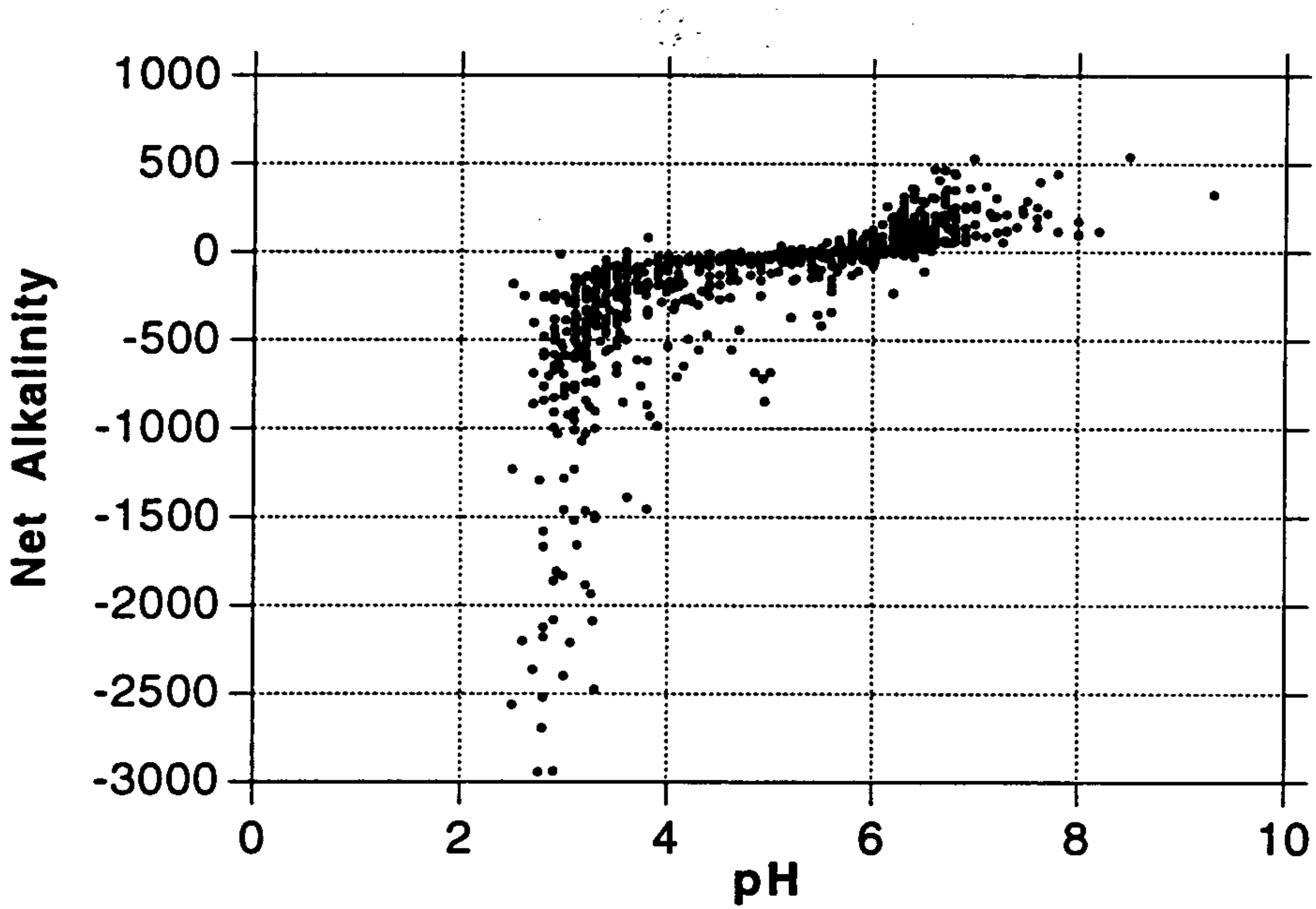

Figure 1. Net Alkalinity vs. pH. Taken from Figure 1.2 Graph C, pages 1-5, of Coal Mine Drainage Prediction and Pollution Prevention in Pennsylvania

Attachment C

TMDLs By Segment

Moshannon Creek

The TMDL for Moshannon Creek consists of load allocations for fifty five sampling sites along Moshannon Creek and various named and unnamed tributaries.

Moshannon Creek is listed for metals and pH 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.

WHSD03 Most Upstream Sample Point on Whiteside Run (25898)

The TMDL for this sample point on Whiteside Run 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 WHSD03. The average flow, measured at the sampling point WHSD03 (0.96 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point WHSD03 shows pH ranging between 6.3 and 7.0; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C1. Load Allocations and Load Reductions for Point WHSD03

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	0.28	2.2	0.16	1.3	0.9	42
Fe	0.86	6.9	0.27	2.2	4.7	68
Mn	0.61	4.9	0.18	1.5	3.4	70
Acid	9.07	72.9	9.1	72.9	0.0	0
Alk	28.4	228.5				

WHSD02 Unt(25899) to Whiteside Run Upstream of Confluence with Whiteside Run

The TMDL for this sample point on Whiteside Run consists of a load allocation to all of the area upstream of sample point WHSD02. The load allocation for this segment was computed using water-quality sample data collected at point WHSD02. The average flow, measured at the sampling point WHSD02 (0.30 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point WHSD02 shows pH ranging between 6.6 and 7.3; pH will not be addressed in this TMDL because there was not acidity present. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron and acidity because WQS were met and there was no acidity present. TMDLs for aluminum, iron and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point WHSD01.

Table C2. Load Allocations and Load Reductions for Point WHSD02

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	0.13	0.3	0.13	0.3	NA	0
Fe	0.50	1.3	0.5	1.3	NA	0
Mn	0.50	1.25	0.40	1.01	0.2	19
Acid	0.0	0.0	0.0	0.0	NA	0
Alk	43.4	109.4				

A waste load allocation for future mining was included for this segment of Whiteside Run (WHSD01) allowing for one operation with two active pits (1500’ x 300’) to be permitted in the future on this segment (page 17 for the method used to quantify treatment pond load).

WHSD01 Whiteside Run Upstream of Confluence with Moshannon Creek

The TMDL for this sample point on Whiteside Run consists of a load allocation to all of the area upstream of sample point WHSD01. The load allocation for this segment was computed using water-quality sample data collected at point WHSD01. The average flow, measured at the sampling point WHSD01 (2.40 MGD), is used for these computations.

Table C3. Waste Load Allocations for future mining operations

Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

There currently is no entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point WHSD01 shows pH ranging between 6.8 and 7.3; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum and acidity because WQS were met and there was no acidity present. TMDLs for aluminum and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point OSCEOLA.

Table C4. Load Allocations for Point WHSD01				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day
Al	0.25	5.0	0.25	5.0
Fe	1.54	30.8	0.31	6.2
Mn	0.41	8.3	0.31	6.2
Acid	0.0	0.0	0.0	0.0
Alk	63.7	1274.7		

The calculated load reductions for all the loads that enter point WHSD01 must be accounted for in the calculated reductions at sample point WHSD01 shown in Table C5. A comparison of measured loads between points WHSD03, WHSD02 and WHSD01 shows that there is additional loading entering the segment for aluminum, iron, manganese and acidity. The total segment aluminum, iron, manganese and acidity loads are the sum of the upstream allocated loads and any additional loading within the segment.

Table C5. Calculation of Load Reduction at Point WHSD01				
	Al	Fe	Mn	Acidity
Existing Load	2.50	30.8	8.3	0.00
Difference in Existing Load between WHSD03, WHSD02 & WHSD01	-0.03	22.6	2.1	-72.9
Load tracked from WHSD03 & WHSD02	1.6	3.5	2.5	72.9
Percent loss due to instream process	1	-	-	100
Percent load tracked from WHSD03 & WHSD02	99	-	-	0
Total Load tracked from WHSD03 & WHSD02	1.6	26.1	4.6	0.00
Allowable Load at WHSD01	2.5	6.2	6.2	0.00
Load Reduction at WHSD01	0.0	19.9	0.0	0.0
% Reduction required at WHSD01	0	76	0	0.0

Allocations were not calculated for aluminum, iron and manganese because WQS were met TMDLs for aluminum, iron and manganese are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point OSCEOLA.

MTNB02 Most Upstream Sample Point on Mountain Branch (25695)

The TMDL for this sample point on Mountain Branch consists of a load allocation to all of the area upstream of sample points MTNB02. The load allocation for this segment was computed using water-quality sample data collected at point MTNB02. The average flow, measured at the sampling point MTNB02 (6.45 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 MTNB02 shows pH ranging between 6.1 and 6.4; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron and manganese because WQS were met and there was no acidity present. TMDLs for aluminum, iron and manganese are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point MTNB01.

Table C6. Load Allocations and Load Reductions for Point MTNB02

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	0.25	13.4	0.25	12.4	NA	0
Fe	0.25	13.5	0.25	13.5	NA	0
Mn	0.03	1.3	0.03	1.3	NA	0
Acid	25.10	1349.4	3.26	175.4	1174.0	87
Alk	10.25	551.1				

The RES Coal LLC, Hale#1., SMP14080103 has two permitted treatment ponds, RESMTB-2 and RESMTB-5 that discharge to MTNB01. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data. Included in the permit are limits for aluminum, iron and manganese.

Table C8. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Remining Permit			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49

A waste load allocation for future mining was included for this segment of Mountain Branch (MTNB01) allowing for five operations with two active pits (1500' x 300') to be permitted in the future on this segment (page 17 for the method used to quantify treatment pond load).

Table C7. Waste Load Allocations for future mining operations

Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 4			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 5			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

MTNB01 Mouth of Mountain Branch
Upstream of Confluence with Moshannon Creek

The TMDL for Mountain Branch consists of a load allocation to all of the watershed area upstream of sample point MTNB01. The load allocation for this segment was computed using water-quality sample data collected at point MTNB01. The average flow, measured at the sampling point MTNB01 (6.87 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 MTNB01 shows pH ranging between 4.3 and 5.7; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C9. Load Allocations at Point MTNB01				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.24	13.5	0.16	9.3
Fe	1.27	72.7	0.48	27.6
Mn	0.49	28.2	0.45	25.9
Acid	38.35	2196.6	3.45	197.7
Alk	0.00	0.00		

The calculated load reductions for all the loads that enter point MTNB01 must be accounted for in the calculated reductions at sample point MTNB01 shown in Table C10. A comparison of measured loads between points MTNB02 and MTNB01 shows that there is additional loading entering the segment for aluminum, iron, manganese and acidity. The total segment aluminum, iron, manganese and acidity loads are the sum of the upstream allocated loads and any additional loading within the segment.

Table C10. Calculation of Load Reduction at Point MTNB01				
	Al	Fe	Mn	Acidity
Existing Load	13.5	72.7	28.2	2196.6
Difference in Existing Load between MTNB02 & MTNB01	0.0	59.1	26.9	847.2
Load tracked from MTNB02	13.4	13.5	1.3	175.4
Percent loss due to instream process	-	-	-	-
Percent load tracked from MTNB02	-	-	-	-
Total Load tracked from MTNB02	13.5	72.7	28.2	1022.6
Allowable Load at MTNB01	9.3	27.6	25.9	197.7
Load Reduction at MTNB01	4.2	45.0	2.3	824.9
% Reduction required at MTNB01	31	62	8	81

BVER09 Most Upstream Sample Point on Beaver Run (25878)

The TMDL for sampling point BVER09 consists of a load allocation to the area upstream of point SP1. The load allocation for this tributary was computed using water-quality sample data collected at point BVER09. The average flow, measured at the sampling point BVER09 (1.32 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 BVER09 shows pH ranging between 6.2 and 6.4; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron, manganese and acidity because WQS were met and there was no acidity present. TMDLs for aluminum, iron, manganese and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point BVER10.

Table C11. Load Allocations and Load Reductions for Point BVER09						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	0.25	2.8	0.25	2.8	NA	0
Fe	0.15	1.7	0.15	1.7	NA	0
Mn	0.03	0.4	0.03	0.4	NA	0
Acid	0.0	0.0	0.0	0.0	NA	0
Alk	99.13	1090.9				

BVER08 Mouth of Unt (25885) Beaver Run
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The TMDL for sampling point BVER08 consists of a load allocation to all of the area upstream of point BVER08. The load allocation for this tributary was computed using water-quality sample data collected at point BVER08. The average flow, measured at the sampling point BVER08 (0.27 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 BVER08 shows pH ranging between 6.4 and 7.3, 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, manganese and acidity because WQS were met and there was no acidity present. TMDLs for aluminum, iron, manganese and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point BVER10.

Table C12. Load Allocations and Load Reductions for Point BVER08						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	0.25	0.57	0.25	0.57	NA	0
Fe	0.18	0.42	0.18	0.42	NA	0
Mn	0.04	0.08	0.04	0.08	NA	0
Acid	0.0	0.0	0.0	0.0	NA	0
Alk	80.27	181.6				

BVER10 Beaver Run Downstream of sample Points BVER08 and BVER09

The TMDL for sampling point BVER10 consists of a load allocation to the all of the area upstream of point BVER10. The load allocation for this tributary was computed using water-quality sample data collected at point BVER10. The average flow, measured at the sampling point BVER10 (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 BVER10 shows pH ranging between 6.6 and 7.0; pH will not be addressed in this TMDL because there is no acidity present. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron and acidity because WQS were met and there was no acidity present. TMDLs for aluminum, iron and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point BVER07.

Table C13. Load Allocations at Point BVER10				
	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.25	0.7	0.25	0.7
Fe	0.15	0.4	0.15	0.4
Mn	0.03	0.07	0.03	0.07
Acid	0.0	0.0	0.0	0.0
Alk	92.00	296.6		

The calculated load reductions for all the loads that enter point BVER10 must be accounted for in the calculated reductions at sample point BVER10 shown in Table C14. A comparison of measured loads between points BVER09, BVER09 and BVER10 shows that there is no additional loading entering the segment for aluminum, iron and manganese. For aluminum, iron and manganese the percent decrease in existing load is applied to the allowable upstream load entering the segment.

Table C14. Calculation of Load Reduction at Point BVER10				
	Al	Fe	Mn	Acidity
Existing Load	0.73	0.44	0.07	0
Difference in Existing Load between BVER08, BVER09 & BVER10	-2.6	-1.6	-0.4	0.0
Load tracked from BVER08 & BVER08	3.3	2.1	0.4	0.0
Percent loss due to instream process	78	79	84	-
Percent load tracked from BVER08 & BVER09	22	21	16	-
Total Load tracked from BV3408 & BVER09	0.73	0.44	0.07	0.0
Allowable Load at BVER10	0.73	0.44	0.07	0
Load Reduction at BVER10	0.0	0.0	0.0	0.0
% Reduction required at BVER10	0	0	0	0.0

BVER07 Beaver Run Downstream of Sample Point BVER10

The TMDL for this segment of Beaver Run consists of a load allocation to the upstream of sample point BVER07. The load allocation for this segment was computed using water-quality sample data collected at point BVER07. The average flow, measured at the sampling point BVER071 (2.32 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 BVER07 shows pH ranging between 6.8 and 8.0; pH will not be addressed in this TMDL because there is not acidity present. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron and acidity because WQS were met and there was no acidity present. TMDLs for aluminum, iron and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point BVER01.

Table C15. Load Allocations at Point BVER07

	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.25	4.8	0.25	4.8
Fe	0.15	2.9	0.15	2.9
Mn	0.08	1.5	0.08	1.5
Acid	0.0	0.0	0.0	0.0
Alk	99.4	1926.3		

The calculated load reductions for all the loads that enter point BVER07 must be accounted for in the calculated reductions at sample point BVER07 shown in Table C16. A comparison of measured loads between points BVER10 and BVER07 shows that there is additional loading entering the segment for aluminum, iron, manganese and acidity. The total segment aluminum, iron, manganese and acidity loads are the sum of the upstream allocated loads and any additional loading within the segment.

Table C16. Calculation of Load Reduction at Point BVER07				
	Al	Fe	Mn	Acidity
Existing Load	4.8	2.9	0.6	0.00
Difference in Existing Load between BVER10 & BVER07	4.1	2.5	0.5	0.0
Load tracked from BVER10	0.7	0.4	0.1	0.0
Percent loss due to instream process	-	-	-	-
Percent load tracked from BVER10	-	-	-	-
Total Load tracked from BVER10	4.8	2.9	0.6	0.0
Allowable Load at BVER07	4.8	2.9	0.6	0.00
Load Reduction at BVER07	0.0	0.0	0.0	0.0
% Reduction required at BVER07	0	0	0	0.0

The Sky Haven Coal, Inc., SMP17930124 has four permitted treatment ponds, ErickT1, ErickT2, ErickT7 and ErickT8 that discharge to Little Beaver Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon one pit sized 300' by100'. Included in the permit are limits for aluminum, iron and manganese.

The Sky Haven Coal, Inc., SMP17663037 has two permitted treatment ponds, Bonita#1, and Bonita#2 that discharge to Little Beaver Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon one pit sized 300' by100'. Included in the permit are limits for aluminum, iron and manganese.

Table C17. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Erickson Mine			
Al	0.75	0.003	0.019
Fe	3.0	0.003	0.07
Mn	2.0	0.003	0.05
Bonita #1 Mine			
Al	0.75	0.003	0.019
Fe	3.0	0.003	0.07
Mn	2.0	0.003	0.05

BVER06 Most Upstream Sample Point on Little Beaver Run (25881)

The TMDL for this segment of Little Beaver Run consists of a load allocation to the area upstream of sample point BVER06. The load allocation for this segment was computed using water-quality sample data collected at point BVER06. The average flow, measured at the sampling point BVER06 (0.04 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 BVER06 shows pH ranging between 3.8 and 4.6; pH will be addressed in this TMDL because of the mining impairment. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron and manganese because WQS were met. TMDLs for aluminum, iron and manganese are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point BVER04.

Table C18. Load Allocations and Load Reductions for Point BVER06

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/da y	Load Reduction	% Reduction
Al	4.79	1.53	0.29	0.09	1.4	94
Fe	1.18	0.37	0.47	0.15	0.2	60
Mn	2.33	0.74	0.70	0.22	0.5	70
Acid	78.20	24.9	1.56	0.5	25.4	98
Alk	3.80	1.2				

The Sky Haven Coal, Inc., SMP17663037 has three permitted treatment ponds, Bonita#3, Bonita#4 and Bonita#5 that discharge to Little Beaver Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon one pit sized 500’ by150’. Included in the permit are limits for aluminum, iron and manganese.

The Benjamin Coal, Inc., SMP17820132 has one permitted treatment pond, LittleBeaver#1001 that discharges to Little Beaver Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon one pit sized 500’ by150’. Included in the permit are limits for aluminum, iron and manganese.

Table C19. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Bonita #1 Mine			
Al	0.75	0.007	0.05
Fe	3.0	0.007	0.19
Mn	2.0	0.007	0.12
LittleBeaver#1			
Al	0.75	0.007	0.05
Fe	3.0	0.007	0.19
Mn	2.0	0.007	0.12

BVER04 Little Beaver Run

The TMDL for this segment of Little Beaver Run consists of a load allocation to the area upstream of sample point BVER04. The load allocation for this segment was computed using water-quality sample data collected at point BVER04. The average flow, measured at the sampling point BVER04 (0.08 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 BVER04 shows pH ranging between 2.9 and 3.0; pH will be addressed in this TMDL because of the impact of mining. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron and manganese because WQS were met, a TMDL for aluminum, iron and manganese are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point BVER01.

Table C20. Load Allocations for Point BVER04

	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	4.04	2.7	0.44	0.3
Fe	7.51	5.1	0.60	0.4
Mn	1.12	0.76	0.97	0.7
Acid	130.1	88.3	0.00	0.00
Alk	0.00	0.0		

The calculated load reductions for all the loads that enter point BVER04 must be accounted for in the calculated reductions at sample point BVER04 shown in Table C21. A comparison of measured loads between points BVER06 and BVER04 shows that there is additional loading entering the segment for acidity. The total segment acidity loads are the sum of the upstream allocated loads and any additional loading within the segment.

Table C21. Calculation of Load Reduction at Point BVER04

	Al	Fe	Mn	Acidity
Existing Load	2.7	5.1	0.8	88.28
Difference in Existing Load between BVER06 & BVER04	1.2	4.7	0.02	63.4
Load tracked from BVER06	0.09	0.2	0.2	0.5
Percent loss due to instream process	-	-	-	-
Percent load tracked from BVER06	-	-	-	-
Total Load tracked from BVER06	1.3	4.9	0.22	63.9
Allowable Load at BVER04	0.3	0.4	0.66	0.00
Load Reduction at BVER04	1.0	4.5	0.0	63.9
% Reduction required at BVER04	77	92	0	100

BVER03 Mouth of Unt(25882) Little Beaver Run

The TMDL for this segment of Little Beaver Run consists of a load allocation to the area upstream of sample point BVER03. The load allocation for this segment was computed using water-quality sample data collected at point BVER03. The average flow, measured at the sampling point BVER03 (0.04 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 BVER03 shows pH ranging between 2.7 and 2.9; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron and manganese because WQS were met, TMDLs for aluminum, iron and manganese are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point BVER01.

Table C22. Load Allocations and Load Reductions for Point BVER03

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	2.88	0.95	0.43	0.14	0.8	85
Fe	18.14	5.98	0.36	0.12	5.9	98
Mn	15.10	4.98	0.45	0.15	4.8	97
Acid	200.2	86.1	0.0	0.0	86.1	100
Alk	0.00	0.0				

The Al Hamilton Contracting Co., SMP17803176 has one permitted treatment pond Sandturn007 that discharges to Little Beaver Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data. Included in the permit are limits for aluminum, iron and manganese.

Table C23. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Sandturn			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49

A waste load allocation for future mining was included for this segment of Coal Run (BVER02) allowing for one operation with two active pits (1500’ x 300’) to be permitted in the future on this segment (page 17 for the method used to quantify treatment pond load).

BVER02 Mouth of Coal Run (25879) Upstream of Confluence with Little Beaver Run

The TMDL for this segment of Coal Run consists of a load allocation to the area upstream of sample point BVER02. The load allocation for this segment was computed using water-quality sample data collected at point BVER02. The average flow, measured at the sampling point BVER02 (1.84 MGD), is used for these computations.

Table C24. Waste Load Allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

There currently is no entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point BVER02 shows pH ranging between 3.3 and 3.9; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Table C25. Load Allocations and Load Reductions for Point BVER02						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	2.00	30.7	0.38	5.8	24.8	81
Fe	4.03	61.8	0.36	5.6	56.3	91
Mn	6.59	101.1	0.40	6.1	95.3	94
Acid	72.87	1118.4	0.00	0.0	1118.4	100
Alk	0.00	0.0				

A waste load allocation for future mining was included for this segment of Coal Run (BVER01) allowing for one operation with two active pits (1500’ x 300’) to be permitted in the future on this segment (page 17 for the method used to quantify treatment pond load).

Table C26. Waste Load Allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

The Junior Coal Contracting, Inc., SMP17980115 has two permitted treatment ponds, BVRTF1 and BVRTF2 that discharge to Beaver Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data. Included in the permit are limits for aluminum, iron and manganese.

The Myers & Supko Contracting, SMP17040110 has one permitted treatment pond, CRTF3 that discharges to Beaver Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data. Included in the permit are limits for aluminum, iron and manganese.

The Junior Coal Contracting, Inc., SMP17930103 has eight permitted treatment ponds, JCCI011, JCCI012, JCCI013, JCCI014, JCCI015, JCCI016, JCCI017 & JCCI018 that discharge to Beaver Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500’ by300’. Included in the permit are limits for aluminum, iron and manganese.

The Benjamin Coal, Inc., SMP17820132 has four permitted treatment ponds, LittleBeaver#1002, LittleBeaver#1003, LittleBeaver#1004 and LittleBeaver#1005 that discharge to Little Beaver Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500’ by300’. Included in the permit are limits for aluminum, iron and manganese.

Table C27. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Little Beaver No.2			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Coal Run Operation			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Little Beaver Operation			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Little Beaver No.1			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49

BVER01 Mouth of Beaver Run Upstream of Confluence with Moshannon Creek

The TMDL for sampling point BVER01 consists of a load allocation to the all of the area between sample points BVER07, BVER04, BVER03, BVER02 and BVER01. The load allocation for this area was computed using water-quality sample data collected at point BVER01. The average flow, measured at the sampling point BVER01 (6.82 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 BVER01 shows pH ranging between 6.5 and 7.1; pH will not be addressed in this TMDL because there is no acidity present. The method and rationale for addressing pH is contained in Attachment B.

Table C28. Load Allocations for Point BVER01				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.35	20.1	0.28	15.7
Fe	1.83	103.9	0.80	45.7
Mn	2.12	120.6	0.57	32.6
Acid	0.00	0.0	0.00	0.0
Alk	48.33	2747.3		

The calculated load reductions for all the loads that enter point BVER01 must be accounted for in the calculated reductions at sample point BVER01 shown in Table C29. A comparison of measured loads between points BVER07, BVER04, BVER03, BVER02 and BVER01 shows that there is additional loading entering the segment for aluminum, iron, manganese and acidity. The total segment aluminum, manganese, and acidity loads are the sum of the upstream allocated loads and any additional loading within the segment.

Table C29. Calculation of Load Reduction at Point BVER01				
	Al	Fe	Mn	Acidity
Existing Load	20.1	103.9	120.6	0.0
Difference in Existing Load between BVER07, BVER04, BVER03, BVER02 & BVER01	-19.1	28.1	13.2	-1272.8
Load tracked from BVER07, BVER04, BVER03 & BVER02	11.1	9.0	7.4	0.0
Percent loss due to instream process	56	-	-	100
Percent load tracked from BVER07, BVER04, BVER03 & BVER02	44	-	-	0
Total Load tracked from BVER07, BVER04, BVER03 & BVER02	4.9	37.1	20.7	0.00
Allowable Load at BVER01	15.67	45.7	3546	0
Load Reduction at BVER01	0.0	0.0	0.0	0.0
% Reduction required at BVER01	0	0	6	0.0

HALE Most Upstream Sample Point on Moshannon Creek

The TMDL for this segment of Moshannon Creek consists of a load allocation to all of the watershed area upstream of sample point HALE. The load allocation for this segment was computed using water-quality sample data collected at point HALE. The average flow, measured at the sampling point HALE (10.26 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 HALE shows pH ranging between 4.2 and 5.9, pH will be addressed in this TMDL because of the effects of mining. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum because WQS were met. Because WQS were met, a TMDL for aluminum is not necessary. Although a TMDL is not necessary, the measured loads are considered at the next downstream point Osceola.

Table C30. Load Allocations and Load Reductions for Point HALE

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	0.25	21.4	NA	NA	NA	0
Fe	1.41	120.9	0.47	39.9	81.0	67
Mn	0.81	69.4	0.43	36.8	32.6	47
Acid	15.00	1283.9	1.35	115.6	1168.3	91
Alk	7.04	602.6				

A waste load allocation for future mining was included for this segment of Unt011 allowing for two operations with two active pits (1500' x 300') to be permitted in the future on this segment (see page 17 for the method used to quantify treatment pond load).

Table C31. Waste Load Allocations for future mining operations

Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

UNT011 Mouth of Unt011 Downstream of Mountain Branch

The TMDL for this segment of Unt011 consists of a load allocation to the entire watershed upstream of sample point Unt011. The load allocation for this segment was computed using water-quality sample data collected at point Unt011. The average flow, measured at the sampling point Unt011 (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 Unt011 shows pH ranging between 3.6 and 4.0, pH will be addressed in this TMDL because of the effects of mining. The method and rationale for addressing pH is contained in Attachment B.

Table C32. Load Allocations and Load Reductions for Point UNT011						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	2.28	27.5	0.23	2.8	24.7	90
Fe	1.13	13.6	0.70	8.5	5.2	38
Mn	1.74	21.0	0.37	4.4	16.6	79
Acid	44.70	539.2	0.45	5.4	533.8	99
Alk	0.60	7.2				

The Myers & Supko Contracting, SMP17040110 has one permitted treatment pond, CRTF2 that discharges to Big Run. The waste load allocation for the discharge is calculated with average monthly permit limits and reduced pit size of 1350' by 220'. Included in the permit are limits for aluminum, iron and manganese.

The Junior Coal Contracting, Inc., SMP17070106 has four permitted treatment ponds, BRTF-1, BRTF-2, BRTF-3 and BRTF-4 that discharges to Big Run. The waste load allocation for the discharge is calculated with average monthly permit limits and reduced pit size of 1350' by 220'. Included in the permit are limits for aluminum, iron and manganese.

The Penn Coal Land, Inc., SMP17813182 has four permitted treatment ponds, Drane#2001 and Drane#2002 that discharges to Big Run. The waste load allocation for the discharge is calculated with average monthly permit limits and reduced pit size of 1350' by 220'. Included in the permit are limits for aluminum, iron and manganese.

Table C33. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Coal Run Operation			
Al	0.75	0.03	0.18
Fe	3.0	0.03	0.74
Mn	2.0	0.03	0.49
Big Run Operation			
Al	0.75	0.03	0.18
Fe	3.0	0.03	0.74
Mn	2.0	0.03	0.49
Drane #2			
Al	0.75	0.03	0.18
Fe	3.0	0.03	0.74
Mn	2.0	0.03	0.49

BIG01 Mouth of Big Run (25876) Upstream of Confluence with Moshannon Creek

The TMDL for sampling point BIG01 consists of a load allocation to all of the area upstream of sample point BIG01. The load allocation for this tributary was computed using water-quality sample data collected at point BIG01. The average flow, measured at the sampling point BIG01 (0.62 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 BIG01 shows pH ranging between 3.3 and 3.7; pH will be addressed in this TMDL because of the mining impairment. The method and rationale for addressing pH is contained in Attachment B.

Table C34. Load Allocations and Load Reductions for Point BIG01

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	4.09	21.3	0.41	2.1	19.1	90
Fe	5.02	26.2	0.90	4.7	21.4	82
Mn	7.31	38.1	0.29	1.5	36.5	96
Acid	80.70	420.1	0.00	0.00	420.1	100
Alk	0.00	0.00				

The Myers & Supko Contracting, SMP17040110 has one permitted treatment pond, CRTF1 that discharges to OSCEOLA. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500' by300'. Included in the permit are limits for aluminum, iron and manganese.

The River Hill Coal Company, Inc., SMP14140101 has two permitted treatment ponds EllisTF-1 and EllisTF-2 that discharge to OSCEOLA. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500' by300'. Included in the permit are limits for aluminum, iron and manganese.

The Junior Coal Contracting, Inc., SMP17080107 has four permitted treatment ponds JCCI006, JCCI007, JCCI008 and JCCI009 that discharge to OSCEOLA. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500' by300'. Included in the permit are limits for aluminum, iron and manganese.

The Power Operation Co. Inc., SMP17020113 has one permitted treatment pond Dugan016 that discharges to OSCEOLA. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500' by300'. Included in the permit are limits for aluminum, iron and manganese.

The Power Operation Co. Inc., SMP17820114 has four permitted treatment ponds Vought001, Vought002, Vought003 and Vought004 that discharge to OSCEOLA. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500' by300'. Included in the permit are limits for aluminum, iron and manganese.

The Junior Coal Contracting, Inc., SMP17051601 has two permitted treatment ponds JCCITB-1 and JCCITB-2 that discharge to OSCEOLA. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500' by300'. Included in the permit are limits for aluminum, iron and manganese.

The RES Coal LLC, SMP14081031 has three permitted treatment ponds RESRMTB-1, RESRMTB-2 and RESRMTB-3 that discharge to OSCEOLA. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500' by300'. Included in the permit are limits for aluminum, iron and manganese.

Table C35. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Coal Run Operation			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Ellis Mine			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Junior Coal Contracting, Inc., SMP17080107			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Dugan Operation			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Vought Operation			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Leslie Tipple			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Hale#1			
Al	0.75	0.09	0.56

Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49

A waste load allocation for future mining was included for this segment of Moshannon Creek (OSCEOLA) allowing for five operations with two active pits (1500' x 300') to be permitted in the future on this segment (see page 17 for the method used to quantify treatment pond load).

Table C36. Waste Load Allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 4			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 5			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

OSCEOLA Moshannon Creek Upstream of Confluence with Trout Run (25869)

The TMDL for this segment of Moshannon Creek consists of a load allocation to all of the watershed area between sample points HALE, MTNB01, UNT011, BVER01, BIG01 and OSCEOLA. The load allocation for this segment was computed using water-quality sample data collected at point OSCEOLA. The average flow, measured at the sampling point OSCEOLA (73.31 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 OSCEOLA shows pH ranging between 4.0 and 5.0, pH be addressed in this TMDL because of the mining impairment. The method and rationale for addressing pH is contained in Attachment B.

Table C37. Load Allocations for Point OSCEOLA				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	2.35	1438.8	0.52	316.5
Fe	3.42	2093.0	0.34	209.3
Mn	3.65	2231.6	0.37	223.2
Acid	37.47	22907.0	1.50	916.3
Alk	5.93	3627.6		

The calculated load reductions for all the loads that enter point OSCEOLA must be accounted for in the calculated reductions at sample point OSCEOLA shown in Table C38. A comparison of measured loads between points HALE, MTNB01, UNT011, BVER01, BIG0 and OSCEOLA 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 OSCEOLA				
	Al	Fe	Mn	Acidity
Existing Load	1438.8	2093.0	2231.6	22907.0
Difference in Existing Load between WHSD01, HALE, MTNB01, UNT011, BVER01, BIG01 & OSCEOLA	1332.6	1725.1	1946.1	18467.2
Load tracked from WHSD01, HALE, MTNB01, UNT011, BVER01 & BIG01	53.7	132.5	107.4	318.6
Percent loss due to instream process	-	-	-	-
Percent load tracked from WHSD01, HALE, MTNB01, UNT011, BVER01& BIG01	-	-	-	-
Total Load tracked from WHSD01, HALE, MTNB01, UNT011, BVER01 & BIG01	1386.4	1857.6	2053.5	18785.8
Allowable Load at OSCEOLA	316.54	209.30	223.16	916.28
Load Reduction at OSCEOLA	1069.8	1648.3	1830.3	17869.5
% Reduction required at OSCEOLA	77	89	89	95

TROT03 Most Upstream Sample Point on Trout Run (25869)

The TMDL for this segment of Trout Run consists of a load allocation to all of the watershed area upstream of sample point TROT03. The load allocation for this segment was computed using water-quality sample data collected at point TROT03. The average flow, measured at the sampling point TROT03 (1.46 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 TROT03 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 aluminum, iron, manganese and acidity because WQS were met and there was little acidity present, TMDLs for aluminum, iron, manganese and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point TROT01.

Table C39. Load Allocations and Load Reductions for Point TROT03						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	0.25	3.0	0.25	3.0	NA	0
Fe	0.15	1.8	0.15	1.8	NA	0
Mn	0.05	0.6	0.05	0.6	NA	0
Acid	1.80	21.9	1.8	21.9	NA	0
Alk	17.35	211.2				

The AMFIRE Mining Company, LLC, SMP14820103 has one permitted treatment pond, MT017 that discharges to Trout Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500' by300'. Included in the permit are limits for aluminum, iron and manganese.

Table C40. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Coal Run Operation			
Al	0.75	0.04	0.28
Fe	3.0	0.04	1.12
Mn	2.0	0.04	0.74

TROT02 Mouth of Unt (25870) Trout Run Upstream of Confluence with Trout Run

The TMDL for this segment of Trout Run consists of a load allocation to all of the watershed area upstream of sample points TROT02. The load allocation for this segment was computed using water-quality sample data collected at point TROT02. The average flow, measured at the sampling point TROT02 (0.28 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 TROT02 shows pH ranging between 3.1 and 3.2; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Table C41. Load Allocations and Load Reductions for Point TROT02

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	8.98	20.7	0.36	0.8	19.9	96
Fe	4.48	10.3	0.54	1.2	9.1	88
Mn	2.94	6.8	0.50	1.2	5.6	83
Acid	121.75	281.1	0.00	0.0	281.1	100
Alk	0.00	0.0				

The River Hill Coal Company, Inc., SMP14040101 has one permitted treatment pond, EllisTF-3 that discharges to Trout Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500' by300'. Included in the permit are limits for aluminum, iron and manganese.

The Power Operation Co., Inc., SMP14663003 has six permitted treatment ponds Dugan#2026, Dugan#2027, Dugan#2028, Dugan#2029, Dugan#2030 and Dugan#2031 that discharge to Trout Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500' by300'. Included in the permit are limits for aluminum, iron and manganese.

Table C42. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Ellis Operation			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Dugan #2 Operation			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49

A waste load allocation for future mining was included for this segment of Trout Run (TROT01) allowing for five operations with two active pits (1500' x 300') to be permitted in the future on this segment (see page 17 for the method used to quantify treatment pond load).

Table C43. Waste Load Allocations for future mining operations

Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 4			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 5			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

TROT01 Mouth of Trout Run Upstream of Confluence with Moshannon Creek

The TMDL for this segment of Trout Run consists of a load allocation to all of the watershed area between sample points TROT03, TROT02 and TROT01. The load allocation for this segment was computed using water-quality sample data collected at point TROT01. The average flow, measured at the sampling point TROT01 (4.26 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 TROT01 shows pH ranging between 3.7 and 4.4; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Table C43. Load Allocations for Point TROT01				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	2.41	85.6	0.34	12.0
Fe	2.47	87.8	0.99	35.1
Mn	1.18	42.0	0.57	20.1
Acid	50.95	1808.6	1.02	36.2
Alk	1.95	69.2		

The calculated load reductions for all the loads that enter point TROT01 must be accounted for in the calculated reductions at sample point TROT01 shown in Table C45. A comparison of measured loads between points TROT03, TROT02 and TROT01 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 C45. Calculation of Load Reduction at Point TROT01				
	Al	Fe	Mn	Acidity
Existing Load	85.6	87.8	42.0	1808.6
Difference in Existing Load between TROT03, TROT02 & TROT01	61.8	75.6	34.6	1505.6
Load tracked from TROT03, & TROT02	3.9	3.1	1.8	21.9
Percent loss due to instream process	-	-	-	-
Percent load tracked from TROT03, & TROT02	-	-	-	-
Total Load tracked from TROT03 & TROT02	65.7	78.7	36.3	1527.5
Allowable Load at TROT01	12.0	35.1	20.1	36.2
Load Reduction at TROT01	53.7	43.6	16.2	1491.3
% Reduction required at TROT01	82	55	45	98

The Glenn O. Hawbaker, Inc., SMP14060301 has one permitted treatment pond, SRQ2TF1 that discharges to UNT10. The waste load allocation for the discharge is calculated with average monthly permit limits and reduced pit size of 1000’ by 150’. Included in the permit are limits for aluminum, iron and manganese.

The Junior Coal Contracting, Inc., SMP14940101 has one permitted treatment pond, BVRTF1 that discharges to UNT10. The waste load allocation for the discharge is calculated with average monthly permit limits and reduced pit size of 1000’ by 150’. Included in the permit are limits for aluminum, iron and manganese.

Table C46. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Sandy Ridge Quarry #2			
Al	0.75	0.015	0.09
Fe	3.0	0.015	0.37
Mn	2.0	0.015	0.25
Beaver Mine			
Al	0.75	0.015	0.09
Fe	3.0	0.015	0.37
Mn	2.0	0.015	0.25

UNT10 Mouth of Unt (25867) to Moshannon Creek

The TMDL for this Unt of Moshannon Creek consists of a load allocation to all of the watershed area upstream of sample point UNT10. The load allocation for this segment was computed using water-quality sample data collected at point UNT10. The average flow, measured at the sampling point UNT10 (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 UNT10 shows pH ranging between 3.0 and 3.0; pH will be addressed in this TMDL because of the mining impairment. The method and rationale for addressing pH is contained in Attachment B.

Table C47. Load Allocations and Load Reductions for Point UNT10

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	7.77	11.0	0.78	1.1	9.9	90
Fe	8.70	12.3	0.52	0.7	11.5	94
Mn	1.60	2.3	0.40	0.6	1.7	75
Acid	150.80	212.8	0.00	0.0	212.8	100
Alk	0.00	0.00				

The Junior Coal Contracting, Inc., SMP17860144 has three permitted treatment ponds, El008, El009 and El010 that discharge to Shimmel Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon one pit sized 300' by100'. Included in the permit are limits for aluminum, iron and manganese.

The Junior Coal Contracting, Inc., SMP17020112 has three permitted treatment ponds, Elliot008, Elliot009 and Elliot010 that discharge to Shimmel Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon one pit sized 300’ by 100’. Included in the permit are limits for aluminum, iron and manganese.

Table C48. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Elliot Mine			
Al	0.75	0.003	0.02
Fe	3.0	0.003	0.07
Mn	2.0	0.003	0.05
Elliot South Mine			
Al	0.75	0.003	0.02
Fe	3.0	0.003	0.07
Mn	2.0	0.003	0.05

SHIM01 Mouth of Shimmel Run (25866) Upstream of Confluence with Moshannon Creek

The TMDL for this segment of Moshannon Creek consists of a load allocation to all of the watershed area upstream of sample point SHIM01. The load allocation for this segment was computed using water-quality sample data collected at point SHIM01. The average flow, measured at the sampling point SHIM01 (0.15 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point SHIM01 shows pH ranging between 6.7 and 7.3, pH be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron and manganese because WQS were met, TMDLs for aluminum, iron and manganese are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point PRESQUEISLE.

Table C49. Load Allocations and Load Reductions for Point SHIM01

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	0.25	0.30	0.25	0.30	NA	0
Fe	0.15	0.18	0.15	0.18	NA	0
Mn	0.12	0.14	0.12	0.14	NA	0
Acid	4.40	5.34	3.39	4.11	1.2	23
Alk	23.87	28.95				

The AMFIRE Mining Company, LLC, SMP14820103 has one permitted treatment pond, MT019 that discharges to PRESQUEIS on Moshannon Creek. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500’ by300’. Included in the permit are limits for aluminum, iron and manganese.

The Forcey Coal, Inc., SMP17020101 has one permitted treatment pond, MalinichT that discharges to a PRESQUEIS on Moshannon Creek. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500’ by300’. Included in the permit are limits for aluminum, iron and manganese.

The Junior Coal Contracting, Inc., SMP17860144 has three permitted treatment ponds, El011, El012 and El013 that discharge to a PRESQUEIS on Moshannon Creek. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500’ by300’. Included in the permit are limits for aluminum, iron and manganese.

The AMFIRE Mining Company, LLC, SMP14080102 has two permitted treatment ponds AimfireTB-1 and AimfireTB-2 that discharge to PRESQUEIS on Moshannon Creek. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500’ by300’. Included in the permit are limits for aluminum, iron and manganese.

The Forcy Coal Inc., SMP17970106 has three permitted treatment ponds MillerTF-1, MillerTF-2 and MillerTB-3 that discharge to PRESQUEIS on Moshannon Creek. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500’ by300’. Included in the permit are limits for aluminum, iron and manganese.

The Pennsylvania Mines LLC, SMP14831301 has four permitted treatment ponds RushtonMine001, RushtonMine003, RushtonMine003 and RushtonMine005 that discharge to PRESQUEIS on Moshannon Creek. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500’ by300’. Included in the permit are limits for aluminum, iron and manganese.

The Junior Coal Contracting, Inc., SMP17020112 has one permitted treatment pond Elliot010 that discharges to Shimmel Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500’ by300’. Included in the permit are limits for aluminum, iron and manganese.

Table C50. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Mountain Top Mine			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49

Malinich Mine			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Elliot Mine			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Aimfire Mining Co. LLC			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Miller			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Rushton Mine			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Elliot South Mine			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49

A waste load allocation for future mining was included for this segment of Trout Run (PRESQUEIS) allowing for five operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (see page 17 for the method used to quantify treatment pond load).

Table C51. Waste Load Allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 4			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 5			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

PRESQUEIS Moshannon Creek Downstream of Shimmel Run

The TMDL for this segment of Moshannon Creek consists of a load allocation to all of the watershed area between sample points OSCEOLA, TROT01, UNT10, SHIM01 and PRESUUEIS. The load allocation for this segment was computed using water-quality sample data collected at point PRESQUEIS. The average flow, measured at the sampling point PRESQUEIS (95.81 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 PRESQUEIS shows pH ranging between 4.9 and 6.6; pH will be addressed in this TMDL because of the mining impairment. The method and rationale for addressing pH is contained in Attachment B.

Table C52. Load Allocations for Point PRESQUEIS				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	1.29	1023.7	0.17	134.3
Fe	1.78	1419.1	0.32	255.4
Mn	2.48	1983.6	0.42	337.2
Acid	15.55	12424.7	2.95	2360.7
Alk	10.50	8389.7		

The calculated load reductions for all the loads that enter point PRESQUEIS must be accounted for in the calculated reductions at sample point PRESQUEIS shown in Table C53. A comparison of measured loads between points OSCEOLA, TROT01, UNT10, SHIM01 and PRESQUEIS 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 load is applied to the allowable upstream load entering the segment.

Table C53. Calculation of Load Reduction at Point PRESQUEIS				
	Al	Fe	Mn	Acidity
Existing Load	1032.7	1419.1	1983.6	12424.7
Difference in Existing Load between OSCEOLA, TROT01, UNT10, SHIM01 & PRESQUEIS	-502.9	-774.2	-292.4	-12509.0
Load tracked from OSCEOLA, TROT01, UNT10 & SHIM01	329.9	245.3	244.0	956.6
Percent loss due to instream process	33	35	13	50
Percent load tracked from OSCEOLA, TROT01, UNT10 & SHIM01	67	65	87	50
Total Load tracked from OSCEOLA, TROT01, UNT10 & SHIM01	221.9	158.7	212.7	476.7
Allowable Load at PRESQUEIS	134.3	255.4	337.2	2360.7
Load Reduction at PRESUQUEIS	87.6	0.0	0.0	0.0
% Reduction required at PRESQUEIS	39	0	0	0

ER-1 Most Upstream Sample Point on Emigh Run (25827)

The TMDL for this segment of Emigh Run consists of a load allocation to all of the watershed area upstream of sample point ER-1. The load allocation for this segment was computed using water-quality sample data collected at point ER-1. The average flow, measured at the sampling point ER-1 (0.04 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point ER-1 shows pH ranging between 3.8 and 4.2, pH be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C54. Load Allocations and Load Reductions for Point ER-1						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	5.14	1.7	0.57	0.19	1.51	89
Fe	0.64	0.22	0.29	0.10	0.12	55
Mn	2.90	0.97	0.70	0.23	0.72	76
Acid	44.71	15.0	0.89	0.3	14.7	98
Alk	1.14	0.4				

The Thompson Brothers Coal Co., Inc., SMP17810154 has seventeen permitted treatment ponds Thompson001, Thompson002 Thompson003, Thompson004, Thompson005, Thompson006, Thompson007, Thompson008, Thompson009, Thompson010, Thompson011, Thompson012, Thompson013, Thompson014, Thompson015, Thompson016, and Thompson017 that discharge to Emigh Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500' by300'. Included in the permit are limits for aluminum, iron and manganese.

The King Coal Inc., SMP17010115 has two permitted treatment ponds Royal006 and Royal007 that discharge to Emigh Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500' by300'. Included in the permit are limits for aluminum, iron and manganese.

Table C55. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Thompson #001			
Al	0.75	0.04	0.28
Fe	3.0	0.04	1.12
Mn	2.0	0.04	0.74
Royal			
Al	0.75	0.04	0.28
Fe	3.0	0.04	1.12
Mn	2.0	0.04	0.74

A waste load allocation for future mining was included for this segment of Emigh Run (EMGH03) allowing for one operation with two active pits (1500' x 300') to be permitted in the future on this segment (see page 17 for the method used to quantify treatment pond load).

Table C56. Waste Load Allocations for future mining operations

Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

EMIGH03 Emigh Run Upstream Confluence with Unt(25830) of Emigh Run

The TMDL for this segment of Emigh Run consists of a load allocation to all of the watershed area between sample points ER-1 and EMIGH03. The load allocation for this segment was computed using water-quality sample data collected at point EMIGH03. The average flow, measured at the sampling point EMIGH03 (0.70 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 EMIGH01 shows pH ranging between 3.2 and 3.6; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Table C57. Load Allocations for Point EMIGH03				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	2.92	17.1	0.35	2.1
Fe	12.00	70.0	0.48	2.8
Mn	10.69	62.4	0.43	2.5
Acid	112.80	658.4	0.00	0.0
Alk	0.00	0.0		

The calculated load reductions for all the loads that enter point EMIGH01 must be accounted for in the calculated reductions at sample point EMIGH03 shown in Table C60. A comparison of measured loads between points ER-1 and EMIGH03 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 C58. Calculation of Load Reduction at Point EMGH03				
	Al	Fe	Mn	Acidity
Existing Load	17.1	70.0	62.4	658.4
Difference in Existing Load between ER-1 & EMGH03	15.3	69.8	61.4	643.4
Load tracked from ER-1	0.2	0.1	0.2	0.3
Percent loss due to instream process	-	-	-	-
Percent load tracked from ER-1	-	-	-	-
Total Load tracked from ER-1	15.5	69.9	61.6	643.7
Allowable Load at EMGH03	2.1	2.8	2.5	0.00
Load Reduction at EMGH03	13.5	67.1	59.1	643.7
% Reduction required at EMGH03	87	96	96	100

EMIGH05 Unt (25831) of Emigh Run Upstream of Confluence with Emigh Run

The TMDL for this segment of Emigh Run consists of a load allocation to all of the watershed area upstream of sample point EMIGH05. The load allocation for this segment was computed using water-quality sample data collected at point EMIGH05. The average flow, measured at the sampling point EMIGH05 (0.32 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point EMIGH05 shows pH ranging between 3.9 and 4.8, pH be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C59. Load Allocations and Load Reductions for Point EMIGH05						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	409	10.8	0.37	0.97	9.8	91
Fe	1.00	2.6	0.19	0.50	2.1	81
Mn	3.73	9.8	0.52	1.4	8.5	86
Acid	37.22	98.2	2.23	5.9	92.3	94
Alk	5.12	13.5				

The RES Coal LLC, SMP17870129 has seven permitted treatment ponds LowerEmigh#2016, LowerEmigh#2017, LowerEmigh#2018, LowerEmigh#2019, LowerEmigh#2020, LowerEmigh#2021, LowerEmigh#2022, LowerEmigh#2023, and LowerEmigh#2024,that discharge to Emigh Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon one pit sized 1200’ by 150’. Included in the permit are limits for aluminum, iron and manganese.

The RES Coal LLC, SMP17060108 has two permitted treatment ponds Emigh#3TB1 and Emigh#3TB2 that discharge to Emigh Run. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon one pit sized 1200’ by 150’. Included in the permit are limits for aluminum, iron and manganese.

Table C60. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Emigh#2			
Al	0.75	0.02	0.11
Fe	3.0	0.02	0.45
Mn	2.0	0.02	0.30
Emigh#3			
Al	0.75	0.02	0.11
Fe	3.0	0.02	0.45
Mn	2.0	0.02	0.30

EMGH01 Mouth of Emigh Run Upstream of Confluence with Moshannon Creek

The TMDL for this segment of Emigh Run consists of a load allocation to all of the watershed area between sample points EMGH03, EMGH05 and EMGH01. The load allocation for this segment was computed using water-quality sample data collected at point EMGH01. The average flow, measured at the sampling point EMGH01 (0.46 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 EMGH01 shows pH ranging between 3.4 and 6.3; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Table C61. Load Allocations for Point EMGH01				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	1.50	5.8	0.20	0.8
Fe	0.81	3.1	0.28	1.1
Mn	8.93	34.3	0.45	1.7
Acid	67.24	258.6	1.34	5.2
Alk	3.32	12.8		

The calculated load reductions for all the loads that enter point EMGH01 must be accounted for in the calculated reductions at sample point EMGH01 shown in Table C62. A comparison of measured loads between points EMGH03, EMGH05 and EMGH01 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 load is applied to the allowable upstream load entering the segment.

Table C62. Calculation of Load Reduction at Point EMGH01				
	Al	Fe	Mn	Acidity
Existing Load	5.8	3.1	34.3	258.6
Difference in Existing Load between EMGH03, EMGH05 & EMGH01	-22.1	-69.5	-37.9	-498.0
Load tracked from EMGH03 & EMGH05	3.0	3.3	3.9	5.9
Percent loss due to instream process	79	96	52	66
Percent load tracked from EMGH03 & EMGH05	21	4	48	34
Total Load tracked from EMGH03 & EMGH05	0.6	0.1	1.8	2.0
Allowable Load at EMGH01	0.8	1.1	1.7	5.2
Load Reduction at EMGH01	0.0	0.0	0.1	0.0
% Reduction required at EMGH01	0	0	7	0

UNT09 Unt (25824) to Moshannon Creek

The TMDL for this segment of a Unamed Tributary to Moshannon Creek consists of a load allocation to all of the watershed area upstream of sample point UNT09. The load allocation for this segment was computed using water-quality sample data collected at point UNT09. The average flow, measured at the sampling point UNT09 (0.09 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point UNT09 shows pH ranging between 3.4 and 3.6, pH be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C63. Load Allocations and Load Reductions for Point UNT09						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	6.72	5.0	0.54	0.40	4.6	92
Fe	1.00	0.8	0.50	0.37	0.43	50
Mn	3.08	2.3	0.68	0.51	1.79	78
Acid	88.20	66.1	0.00	0.00	66.1	100
Alk	0.00	0.0				

UNT09.5 Unt to Moshannon Creek

The TMDL for this segment of an unnamed tributary to Moshannon Creek consists of a load allocation to all of the watershed area upstream of sample point UNT09.5. The load allocation for this segment was computed using water-quality sample data collected at point UNT09.5. The average flow, measured at the sampling point UNT09.5 (0.02 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point UNT09.5 shows pH ranging between 2.8 and 2.8, pH be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C64 Load Allocations and Load Reductions for Point UNT09.5						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	37.13	6.1	0.37	0.06	6.04	99
Fe	33.57	5.5	0.34	0.06	5.44	99
Mn	12.09	2.0	0.60	0.1	1.9	95
Acid	466.47	77.0	0.00	0.0	77.0	100
Alk	0.00	0.00				

The R.H. Carmen, LLC, SMP14050101 has one permitted treatment pond, ROTF1 that discharges to Wolf Run. The waste load allocation for the discharge is calculated with average monthly permit limits and pit size of 750’ by 180’. Included in the permit are limits for aluminum, iron and manganese.

Table C65. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Refuse Operation			
Al	0.75	0.013	0.08
Fe	3.0	0.013	0.33
Mn	2.0	0.013	0.22

WOLF01 Mouth of Wolf Run (25820) Upstream of Confluence with Moshannon Creek

The TMDL for this segment of Wolf Run consists of a load allocation to all of the watershed area upstream of sample point WOLF01. The load allocation for this segment was computed using water-quality sample data collected at point WOLF01. The average flow, measured at the sampling point WOLF01 (0.16 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point WOLF01 shows pH ranging between 2.8 and 3.3, pH be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C66. Load Allocations and Load Reductions for Point WOLF01

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	45.83	61.8	0.18	0.25	61.55	99.6
Fe	28.19	38.0	0.28	0.38	37.62	99
Mn	20.24	27.3	0.20	0.27	27.03	99
Acid	629.75	849.0	0.00	0.0	849.0	100
Alk	0.00	0.00				

BRLW01 Barlow Hollow (25818) Upstream of Confluence with Moshannon Creek

The TMDL for this segment of Barlow Hollow consists of a load allocation to all of the watershed area upstream of sample point BRLW01. The load allocation for this segment was computed using water-quality sample data collected at point BRLW01. The average flow, measured at the sampling point BRLW01 (0.06 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point BRLW01 shows pH ranging between 3.5 and 3.9, pH be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C67. Load Allocations and Load Reductions for Point BRLW01						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	8.63	4.6	0.35	0.18	4.4	96
Fe	1.20	0.64	0.72	0.38	0.3	40
Mn	5.90	3.1	0.41	0.22	2.9	93
Acid	91.60	48.5	0.00	0.0	48.5	100
Alk	0.00	0.00				

The Sky Haven Coal Company, Inc., SMP17060104 has one permitted treatment pond, P004 that discharges to CASANOVA. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500' by 300'. Included in the permit are limits for aluminum, iron and manganese.

The Moshannon Joint Sewer Authority, NPDES # PA0037966, POTW has one permitted discharge, Moshannon Sewer Authority that discharges to CASANOVA. The waste load allocation for the discharge is calculated with permitted flow and criteria as permit limits. Included in the permit are limits for aluminum, iron and manganese.

The Dannic Energy, NPDES # not assigned,has one permitted discharge, Dannic Energy that discharges to CASANOVA. The waste load allocation for the discharge is calculated with permitted flow and criteria as permit limits. Included in the permit are limits for aluminum, iron and manganese.

The Junior Coal Contracting Inc., NPDES # 17980117 has three permitted discharges, JCCITP1, JCCITP2 and JCCITP3 that discharge to CASANOVA. The waste load allocation for the discharge is calculated with permitted criteria and flow based upon two pits sized 1500' by 300'. Included in the permit are limits for aluminum, iron and manganese.

The Junior Coal Contracting Inc., NPDES # 17020113 has three permitted discharges, JCCITF1, JCCITF2 and JCCITF3 that discharge to CASANOVA. The waste load allocation for the discharge is calculated with permitted criteria and flow based upon two pits sized 1500' by 300'. Included in the permit are limits for aluminum, iron and manganese.

The Penn Coal Land Inc., NPDES # 0119440 has one permitted discharge Drane#1001 that discharges to CASANOVA. The waste load allocation for the discharge is calculated with permitted criteria and flow based upon two pits sized 1500' by 300'. Included in the permit are limits for aluminum, iron and manganese.

The Aimfire Mining Co., LLC, NPDES # 0243558 has one permitted discharge CritendenTBP1 that discharges to CASANOVA. The waste load allocation for the discharge is calculated with permitted criteria and flow based upon two pits sized 1500' by 300'. Included in the permit are limits for aluminum, iron and manganese.

The RES Coal LLC, NPDES # 17743172 has four permitted discharges Munson#1011, Munson#102, Munson#1013, and Munson#1014 that discharge to CASANOVA. The waste load allocation for the discharge is calculated with permitted criteria and flow based upon two pits sized 1500' by 300'. Included in the permit are limits for aluminum, iron and manganese.

The RES Coal LLC, NPDES # 17-08-08, remining permit, has one permitted discharge MaxtonRMTB-1 that discharges to CASANOVA. The waste load allocation for the discharge is calculated with permitted criteria and flow based upon two pits sized 1500' by 300'. Included in the permit are limits for aluminum, iron and manganese.

The RES Coal LLC, NPDES # 17960101, has three permitted discharges Munson#2007, Munson#2008 and Munson#2011 that discharge to CASANOVA. The waste load allocation for the discharge is calculated with permitted criteria and flow based upon two pits sized 1500' by 300'. Included in the permit are limits for aluminum, iron and manganese.

The River Hill Coal Co. Inc., NPDES # 17030102, has three permitted discharges SteinTf-1, SteinTF-2 and SteinTF-3 that discharge to CASANOVA. The waste load allocation for the discharge is calculated with permitted criteria and flow based upon two pits sized 1500' by 300'. Included in the permit are limits for aluminum, iron and manganese.

The A. W. Long Coal Co., NPDES # 17711022, has two permitted discharges Long#1002 and Long#1003 that discharge to CASANOVA. The waste load allocation for the discharge is calculated with permitted criteria and flow based upon two pits sized 1500' by 300'. Included in the permit are limits for aluminum, iron and manganese.

The River Hill Coal Co. Inc., NPDES # 17990102, has three permitted discharges SixMile008, SixMile009 and SixMile010 that discharge to CASANOVA. The waste load allocation for the discharge is calculated with permitted criteria and flow based upon two pits sized 1500' by 300'. Included in the permit are limits for aluminum, iron and manganese.

The John and Justin Welker, NPDES # 0256765, has one permitted discharge 6MileTB-1 that discharges to CASANOVA. The waste load allocation for the discharge is calculated with permitted criteria and flow based upon two pits sized 1500' by 300'. Included in the permit are limits for aluminum, iron and manganese.

The RES Coal LLC, NPDES # 17870129, has three permitted discharges LowerEmigh#2016, LowerEmigh#2022 and LowerEmigh#2024 that discharge to CASANOVA. The waste load allocation for the discharge is calculated with permitted criteria and flow based upon two pits sized 1500' by 300'. Included in the permit are limits for aluminum, iron and manganese.

Table C68. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Piedmo Mine			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Moshannon Joint Sewer Authority PTOW			
Al	0.75	1.5	9.4
Fe	1.5	1.5	18.8
Mn	1.0	1.5	12.5
Dannic			
Al	0.75	0.25	1.6
Fe	1.5	0.25	3.1
Mn	1.0	0.25	2.1
Runk Operation			
Al	0.75	0.09	0.56
Fe	1.5	0.09	2.23
Mn	1.0	0.09	1.49
Baltic Operation			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Drane#1			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Crittenden Operation			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Munson#1			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Maxton Operation			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Munson#2			
Al	0.75	0.09	0.56

Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Stein Operation			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Long#1			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Six Mile			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
6 Mile Operation			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Lower Emigh#2			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49

A waste load allocation for future mining was included for this segment of Moshannon Creek (CASANOVA) allowing for five operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (see page 17 for the method used to quantify treatment pond load).

Table C69. Waste Load Allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 4			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 5			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

CASANOVA Moshannon Creek Downstream of UNT08

The TMDL for this segment of Moshannon Creek consists of a load allocation to all of the watershed area between sample points EMGH01, UNT09, UNT09.5, WOLF01, BRLW01, LR08, CS9 and CASANOVA. The load allocation for this segment was computed using water-quality sample data collected at point CASANOVA. The average flow, measured at the sampling point CASANOVA (219.50 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 CASANOVA shows pH ranging between 3.6 and 4.7; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Table C70. Load Allocations for Point CASANOVA				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	1.77	3232.0	0.34	614.1
Fe	3.35	6127.3	0.67	1225.5
Mn	2.92	5352.4	0.38	695.8
Acid	31.85	58306.8	1.91	3498.4
Alk	4.20	7688.8		

The calculated load reductions for all the loads that enter point CASANOVA must be accounted for in the calculated reductions at sample point CASANOVA shown in Table C71. A comparison of measured loads between points PRESQUEIS, EMGH01, UNT09, UNT09.5, WOLF01, BRLW01, and CASANOVA 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 C71. Calculation of Load Reduction at Point CASANOVA				
	Al	Fe	Mn	Acidity
Existing Load	3232.0	6127.3	5352.4	58306.8
Difference in Existing Load between PRESQUEIS, EMGH01, UNT09, UNT09.5, WOLF01, BRLW01 & CASANOVA	2116.0	4660.2	3299.8	44582.9
Load tracked from PRESQUEIS, EMGH01, UNT09, UNT09.5, WOLF01 & BRLWL01	135.9	257.7	340.0	2365.9
Percent loss due to instream process	-	-	-	-
Percent load tracked from PRESQUEIS, EMGH01, UNT09, UNT09.5, WOLF01 & BRLW01	-	-	-	-
Total Load tracked from PRESQUEIS, EMGH01, UNT09, UNT09.5, WOLF01 & BRLW01	2251.9	4917.9	3639.8	46948.7
Allowable Load at CASANOVA	614.1	1225.5	695.8	3498.4
Load Reduction at CASANOVA	1637.8	3692.4	2944.0	43450.3
% Reduction required at CASANOVA	73	75	81	93

The Lee Coal Contracting, Inc., SMP0243329 has one permitted treatment pond, Dale#2TF01 that discharges to SULFR04. The waste load allocation for the discharge is calculated with average monthly permit limits and pit size of 1350' by280'. Included in the permit are limits for aluminum, iron and manganese.

Table C72. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Dale #2			
Al	0.75	0.037	0.23
Fe	3.0	0.037	0.94
Mn	2.0	0.037	0.62

SLFR04 Most Upstream Sample Point on Sulphur Run (25807)

The TMDL for this segment of Sulphur Run consists of a load allocation to all of the watershed area upstream of sample point SLFR04. The load allocation for this segment was computed using water-quality sample data collected at point SLFR04. The average flow, measured at the sampling point SLFR04 (0.10 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point SLFR04 shows pH ranging between 2.9 and 3.0, pH be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C73. Load Allocations and Load Reductions for Point SLFR04						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	26.03	22.0	0.52	0.44	21.5	98
Fe	37.90	32.0	1.14	0.96	31.0	97
Mn	4.70	4.0	0.85	0.71	3.2	82
Acid	361.70	305.2	0.00	0.0	305.2	100
Alk	0.00	0.00				

A waste load allocation for future mining was included for this segment of Sulphur Run (SLFR03) allowing for three operations with two active pits (1500' x 300') to be permitted in the future on this segment (see page 17 for the method used to quantify treatment pond load).

Table C74. Waste Load Allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

SLFR03 Mouth of UNT (25809) of Sulphur Run Upstream of confluence with Sulphur Run

The TMDL for this segment of a UNT of Sulphur Run consists of a load allocation to all of the watershed area upstream of sample point SLFR03. The load allocation for this segment was computed using water-quality sample data collected at point SLFR03. The average flow, measured at the sampling point SLFR03 (1.55 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point SLFR03 shows pH ranging between 3.1 and 3.2, pH be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C75. Load Allocations and Load Reductions for Point SLFR03						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	18.53	239.3	0.56	7.2	232.1	97
Fe	32.95	425.7	0.66	8.5	417.2	98
Mn	2.86	37.0	0.86	11.1	25.9	70
Acid	253.15	3270.3	0.00	0.0	3270.3	100
Alk	0.00	0.00				

A waste load allocation for future mining was included for this segment of Sulphur Run (SLFR02) allowing for one operation with two active pits (1500’ x 300’) to be permitted in the future on this segment (see page 17 for the method used to quantify treatment pond load).

SLFR02 Mouth of UNT (25808) of Sulphur Run Upstream of confluence with Sulphur Run

The TMDL for this segment of a UNT of Sulphur Run consists of a load allocation to all of the watershed area upstream of sample point SLFR02. The load allocation for this segment was computed using water-quality sample data collected at point SLFR02. The average flow, measured at the sampling point SLFR02 (0.39 MGD), is used for these computations.

Table C76. Waste Load Allocations for future mining operations

Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point SLFR02 shows pH ranging between 2.9 and 2.9, pH be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C77. Load Allocations and Load Reductions for Point SLFR02

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	34.60	112.7	0.69	2.3	110.5	98
Fe	49.38	160.8	0.99	3.2	157.6	98
Mn	4.93	16.1	0.69	2.3	13.8	86
Acid	474.45	1545.6	0.00	0.0	1545.6	100
Alk	0.00	0.00				

A waste load allocation for future mining was included for this segment of Sulphur Run (SLFR01) allowing for five operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (see page 17 for the method used to quantify treatment pond load).

SLFR01 Mouth of Sulphur Run Upstream of Confluence with Moshannon Creek

The TMDL for this segment of Sulphur Run consists of a load allocation to all of the watershed area between sample points SLFR04, SLFR03, SULF02 and SULF01. The load allocation for this segment was computed using water-quality sample data collected at point SULF01. The average flow, measured at the sampling point SULF01; (1.53 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 SULF01 shows pH ranging between 3.0 and 3.0, pH will be addressed in this TMDL. The method and rationale for addressing pH is contained in Attachment B.

The calculated load reductions for all the loads that enter point SLFR01 must be accounted for in the calculated reductions at sample point SLFR01 shown in Table C80. A comparison of measured loads between points SLFR04, SLFR03, SLFR02 and SLFR01 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 C78. Waste Load Allocations for future mining operations

Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 4			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 5			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

Table C79. Load Allocations for Point SLULF01

	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	19.13	243.8	0.57	7.3
Fe	32.53	414.5	0.98	12.4
Mn	3.23	41.2	0.78	9.9
Acid	294.7	3756.0	0.00	0.0
Alk	0.00	0.0		

Table C80. Calculation of Load Reduction at Point SLFR01				
	Al	Fe	Mn	Acidity
Existing Load	243.8	414.5	41.2	3756.0
Difference in Existing Load between SLFR04, SLFR03, SLFR02, & SLFR01	-130.2	-203.9	-15.8	-1365.0
Load tracked from SLFR04, SLFR03 & SLFR02	9.9	12.7	14.1	0.0
Percent loss due to instream process	35	33	28	27
Percent load tracked from SLFR04, SLFR03 & SLFR02	65	67	72	73
Total Load tracked from SLFR04, SLFR03 & SLFR02	6.4	8.5	10.2	0.00
Allowable Load at SLFR01	7.3	12.4	9.9	0.00
Load Reduction at SLFR01	0.0	0.0	0.3	0.0
% Reduction required at SLFR01	0	0	3	0.0

GRAS02 Mouth of Knox Run (25763) Upstream of Confluence with Grassflat Run

The TMDL for this Unt of Grassflat Run consists of a load allocation to all of the watershed area upstream of the sample point. The load allocation for this segment was computed using water-quality sample data collected at point GRAS02. The average flow, measured at the sampling point GRAS02 (0.03 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 GRAS02 shows pH ranging between 3.2 and 3.3; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Table C81. Load Allocations and Load Reductions for Point GRAS02						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	1.51	0.36	0.44	0.11	0.3	71
Fe	2.26	0.54	0.61	0.15	0.4	73
Mn	4.66	1.12	0.79	0.19	0.9	83
Acid	63.60	15.3	0.00	0.0	15.3	100
Alk	0.00	0.0				

GRAS01 Mouth of Grasflat Run (25762) Upstream of Confluence with Moshannon Creek

The TMDL for this segment of Grassflat Run consists of a load allocation to all of the watershed area between sample points GRAS02 and GRAS01. The load allocation for this segment was computed using water-quality sample data collected at point GRAS01. The average flow, measured at the sampling point GRAS01 (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 GRAS01 shows pH ranging between 3.0 and 3.2; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Table C82. Load Allocations for Point GRAS01				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	7.12	24.0	0.64	2.16
Fe	15.73	52.9	0.94	3.17
Mn	4.89	16.4	0.64	2.14
Acid	142.47	479.1	0.00	0.0
Alk	0.00	0.0		

The calculated load reductions for all the loads that enter point GRAS01 must be accounted for in the calculated reductions at sample point GRAS01 shown in Table C83. A comparison of measured loads between points GRAS02 and GRAS01 shows that there is no additional loading entering the segment for aluminum, iron and acidity. For aluminum, iron and acidity the percent decrease in existing load is applied to the allowable upstream load entering the segment. There is additional loading entering the segment for manganese. The total segment manganese load is the sum of the upstream allocated load and any additional loading within the segment.

Table C83. Calculation of Load Reduction at Point GRAS01				
	Al	Fe	Mn	Acidity
Existing Load	8.6	14.6	4.5	479.1
Difference in Existing Load between GRAS02 & GRAS01	8.2	14.1	3.4	463.8
Load tracked from GRAS02 & GRAS01	0.11	0.15	0.19	0.00
Percent loss due to instream process	-	-	-	-
Percent load tracked from GRAS02	-	-	-	-
Total Load tracked from GRAS02	8.4	14.2	3.6	463.8
Allowable Load at EMGH01	0.3	0.7	0.5	0.00
Load Reduction at EMGH01	8.0	13.5	3.1	463.8
% Reduction required at EMGH01	96	95	87	100

BRWN01 Mouth of Browns Run (25764) Upstream of Confluence with Moshannon Creek

The TMDL for this segment of Browns Run consists of a load allocation to all of the watershed area upstream of sample point BRWN01. The load allocation for this segment was computed using water-quality sample data collected at point BRWN01. The average flow, measured at the sampling point BRWM01 (0.22 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 BRWN01 shows pH ranging between 3.9 and 4.3; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum and iron because WQS were met; a TMDL for aluminum and iron is not necessary. Although a TMDL is not necessary, the measured loads are considered at the next downstream point PEALE.

Table C84. Load Allocations and Load Reductions for Point BRWN01

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	0.78	1.5	0.23	0.42	1.03	71
Fe	0.24	0.44	0.24	0.44	NA	0
Mn	1.89	3.5	0.36	0.66	2.8	81
Acid	43.10	80.4	1.74	3.2	77.2	96
Alk	3.20	5.9				

The Sky Haven Coal, Inc., SMP17060104 has one permitted treatment pond, P005 that discharges to PEALE. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500’ by 300’. Included in the permit are limits for aluminum, iron and manganese.

The RES Coal LLC, SMP17070101 has three permitted treatment ponds, J2TB-1, J2TB-2 and J2TB-3 that discharges to PEALE. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500’ by 300’. Included in the permit are limits for aluminum, iron and manganese.

The RES Coal LLC, SMP17010104 has two permitted treatment ponds, JOpTF1 and JOpTF2 that discharges to PEALE. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500’ by 300’. Included in the permit are limits for aluminum, iron and manganese.

The EnerCorp, Inc., SMP17930125 has five permitted treatment ponds, Pauling001, Pauling002, Pauling003, Pauling004, and Pauling005 that discharge to PEALE. The waste load allocation for the discharge is calculated with average monthly permit limits and flow data based upon two pits sized 1500’ by 300’. Included in the permit are limits for aluminum, iron and manganese.

Table C85. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Piedmo Mine			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
J-2 Operation			

Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
J Operation			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49
Pauling			
Al	0.75	0.09	0.56
Fe	3.0	0.09	2.23
Mn	2.0	0.09	1.49

A waste load allocation for future mining was included for this segment of Moshannon Creek (PEALE) allowing for five operations with two active pits (1500' x 300') to be permitted in the future on this segment (see page 17 for the method used to quantify treatment pond load).

Table C86. Waste Load Allocations for future mining operations

Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 4			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 5			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

PEALE Moshannon Creek Upstream of Confluence with UNT05 (25760)

The TMDL for this segment of Moshannon Creek consists of a load allocation to all of the watershed area between sample points CASANOVA, SLFR01, GRAS01, BRWN01 and PEALE. The load allocation for this segment was computed using water-quality sample data collected at point PEALE. The average flow, measured at the sampling point PEALE (255.87 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 PEALE shows pH ranging between 3.4 and 4.3; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Table C87. Load Allocations for Point PEALE				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	2.43	5192.5	0.41	882.7
Fe	1.98	4216.7	0.47	1012.0
Mn	2.68	5717.4	0.35	743.3
Acid	40.20	85785.4	0.80	1715.7
Alk	2.15	4588.0		

The calculated load reductions for all the loads that enter point PEALE must be accounted for in the calculated reductions at sample point PEALE shown in Table C88. A comparison of measured loads between points CASANOVA, SLFR01, GRAS01, BRWN01 and PEALE shows that there is no additional loading entering the segment for, iron. For, iron the percent decrease in existing load is applied to the allowable upstream load 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 C88. Calculation of Load Reduction at Point PEALE				
	Al	Fe	Mn	Acidity
Existing Load	5192.5	4216.7	5717.4	85785.4
Difference in Existing Load between CASANOVA, SLFR01, GRAS01, BRWN01 & PEALE	1706.6	-2340.1	315.8	23163.1
Load tracked from CASANOVA, SLFR01, GRAS01 & BRWN01	622.2	1239.1	706.8	3501.6
Percent loss due to instream process	-	36	-	-
Percent load tracked from CASANOVA, SLFR01, GRAS01 & BRWN01	-	64	-	-
Total Load tracked from CASANOVA, SLFR01, GRAS01 & BRWN01	2328.8	796.8	1022.6	26664.7
Allowable Load at PEALE	882.7	284.4	743.3	1715.7
Load Reduction at PEALE	1446.1	512.4	279.4	24949.0
% Reduction required at PEALE	62	64	27	94

UNT06 Mouth of Unt (25761) Moshannon Creek Upstream of Confluence with UNT (25760)

The TMDL for this Unt of Moshannon Creek consists of a load allocation to all of the watershed area upstream of sample point UNT06. The load allocation for this segment was computed using water-quality sample data collected at point UNT06. The average flow, measured at the sampling point UNT06 (0.08 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 UNT06 shows pH ranging between 3.1 and 3.2; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Table C89. Load Allocations and Load Reductions for Point UNT06						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	3.01	2.1	0.09	0.06	2.04	97
Fe	0.87	0.61	0.17	0.12	0.49	80
Mn	0.98	0.68	0.12	0.08	0.60	88
Acid	157.10	109.4	0.00	0.0	109.4	100
Alk	0.00	0.0				

The Lee Coal Contracting, Inc., SMP17050106 has two permitted treatment ponds, JOTB1 and JOTB2 that discharges to UNT07. The waste load allocation for the discharge is calculated with average monthly permit limits and permit size 550' by 125'. Included in the permit are limits for aluminum, iron and manganese.

Table C90. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Johnson Operation			
Al	0.75	0.007	0.04
Fe	3.0	0.007	0.17
Mn	2.0	0.007	0.11

UNT07 Most Upstream Sample Point on Unt (25760) Upstream of Confluence with Unt (25761)

The TMDL for this Unt of Moshannon Creek consists of a load allocation to all of the watershed area upstream of sample point UNT07. The load allocation for this segment was computed using water-quality sample data collected at point UNT07. The average flow, measured at the sampling point UNT07 (0.12 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 UNT07 shows pH ranging between 3.3 and 3.8; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Table C91. Load Allocations and Load Reductions for Point UNT07						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	1.51	1.6	0.09	0.09	1.47	94
Fe	1.19	1.2	0.18	0.18	1.05	85
Mn	0.32	0.3	0.12	0.12	0.21	63
Acid	72.25	74.6	0.00	0.0	74.6	100
Alk	0.00	0.0				

A waste load allocation for future mining was included for this segment of a UNT of Moshannon Creel (UNT05) allowing for one operation with two active pits (1500' x 300') to be permitted in the future on this segment (see page 17 for the method used to quantify treatment pond load).

Table C92. Waste Load Allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

UNT05 Mouth of Unt (25760) Upstream of Confluence with Moshannon Creek

The TMDL for this segment of a Unt of Moshannon Creek consists of a load allocation to all of the watershed area between sample points UNT06, UNT07 and UNT05. The load allocation for this segment was computed using water-quality sample data collected at point UNT05. The average flow, measured at the sampling point UNT05 (0.52 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 UNT05 shows pH ranging between 3.2 and 3.4; pH will be addressed in this TMDL because of the mining impairment. The method and rationale for addressing pH is contained in Attachment B.

Table C93. Load Allocations at Point UNT05				
	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	6.26	27.0	0.50	2.2
Fe	3.39	14.6	1.02	4.4
Mn	4.06	17.5	0.61	2.6
Acid	92.90	401.1	0.0	0.0
Alk	0.00	0.0		

The calculated load reductions for all the loads that enter point UNT05 must be accounted for in the calculated reductions at sample point UNT05 shown in Table C94. A comparison of measured loads between point's UNT06, UNT07 and UNT05 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 C94 Calculation of Load Reduction at Point UNT05

	Al	Fe	Mn	Acidity
Existing Load	27.0	14.6	17.5	401.1
Difference in Existing Load between UNT06, UNT07 & UNT05	23.3	12.8	16.5	217.0
Load tracked from UNT06 & UNT07	0.2	0.3	0.2	0.0
Percent loss due to instream process	-	-	-	-
Percent load tracked from UNT06 & UNT07	-	-	-	-
Total Load tracked from UNT06 & UNT07	23.5	13.1	16.7	217.0
Allowable Load at UNT05	2.2	4.4	2.6	0.00
Load Reduction at UNT05	21.3	8.7	14.1	217.0
% Reduction required at UNT05	91	66	84	100

UNT04 Mouth of Unt (25757) Upstream of Confluence with Moshannon

The TMDL for this Unt of Moshannon Creek consists of a load allocation to all of the watershed area upstream of sample point UNT04. The load allocation for this segment was computed using water-quality sample data collected at point UNT04. The average flow, measured at the sampling point UNT04 (0.05 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 UNT04 shows pH ranging between 3.9 and 4.0; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for iron because WQS were met; a TMDL for iron is not necessary. Although a TMDL is not necessary, the measured loads are considered at the next downstream point MOSHANNON.

Table C95. Load Allocations and Load Reductions for Point UNT04

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	3.24	1.4	0.52	0.2	1.2	84
Fe	0.08	0.03	0.8	0.03	NA	0
Mn	2.15	0.91	0.56	0.2	0.71	74
Acid	58.10	24.6	1.16	0.5	24.1	98
Alk	1.00	0.4				

A waste load allocation for future mining was included for this segment of a UNT of Moshannon Creek (UNT03) allowing for five operations with two active pits (1500' x 300') to be permitted in the future on this segment (page 19 for the method used to quantify treatment pond load).

UNT03 Mouth of Unt (25756) Upstream of Confluence with Moshannon Creek

The TMDL for this Unt of Moshannon Creek consists of a load allocation to all of the watershed area upstream of sample point UNT03. The load allocation for this segment was computed using water-quality sample data collected at point UNT03. The average flow, measured at the sampling point UNT03 (0.03 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 UNT03 shows pH ranging between 3.0 and 3.4; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C96. Load Allocations and Load Reductions for Point UNT03

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	3.03	0.82	0.64	0.17	0.65	79
Fe	5.75	1.6	0.58	0.16	1.44	90
Mn	7.93	2.1	0.55	0.15	1.95	93
Acid	93.30	25.2	0.00	0.0	25.2	100
Alk	0.00	0.0				

UNT02 Mouth of Unt (25755) Upstream of Confluence with Moshannon Creek

The TMDL for this Unt of Moshannon Creek consists of a load allocation to all of the watershed area upstream of sample point UNT02. The load allocation for this segment was computed using water-quality sample data collected at point UNT02. The average flow, measured at the sampling point UNT02 (0.02 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 UNT02 shows pH ranging between 4.5 and 4.5; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for iron because WQS were met; a TMDL for iron is not necessary. Although a TMDL is not necessary, the measured loads are considered at the next downstream point Moshannon.

Table C97. Load Allocations and Load Reductions for Point UNT02						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	0.99	0.14	0.50	0.07	0.07	49
Fe	0.08	0.01	0.08	0.01	NA	0
Mn	0.63	0.09	0.59	0.08	0.01	6
Acid	18.00	2.59	5.22	0.75	1.85	71
Alk	6.00	0.86				

UNT01 Mouth of Unt (25754) Upstream of Confluence with Moshannon Creek

The TMDL for this Unt of Moshannon Creek consists of a load allocation to all of the watershed area upstream of sample point UNT01. The load allocation for this segment was computed using water-quality sample data collected at point UNT01. The average flow, measured at the sampling point UNT01 (0.07 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 3.2 and 3.4; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Table C98. Load Allocations and Load Reductions for Point UNT01						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	6.10	3.7	0.43	0.26	3.44	93
Fe	1.32	0.8	0.79	0.48	0.32	40
Mn	4.80	2.9	0.58	0.35	2.55	88
Acid	88.90	53.9	0.00	0.0	53.9	100
Alk	0.00	0.0				

WERR01 Mouth of Weber Run (25753) Upstream of Confluence with Moshannon Creek

The TMDL for this Unt of Moshannon Creek consists of a load allocation to all of the watershed area upstream of sample point WERR01. The load allocation for this segment was computed using water-quality sample data collected at point WERR01. The average flow, measured at the sampling point WERR01 (0.05 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 WERR01 shows pH ranging between 3.2 and 3.5; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for iron because WQS were met; a TMDL for iron is not necessary. Although a TMDL is not necessary, the measured loads are considered at the next downstream point Moshannon.

Table C99. Load Allocations and Load Reductions for Point WERR01

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	7.39	3.1	0.52	0.22	2.88	93
Fe	0.85	0.4	0.85	0.4	NA	0
Mn	15.95	6.6	0.64	0.27	6.37	96
Acid	112.15	46.7	0.00	0.0	46.7	100
Alk	0.00	0.0				

The Central PA Water Treament, Rex Energy Corp., NPDES # PA0233684 has one permitted discharge, Central PA Wat Treat that discharges to MOSHANNON. The waste load allocation for the discharge is calculated with permitted flow and criteria permit limits. Included in the permit are limits for aluminum, iron and manganese.

Table C100. Waste Load Allocations for Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Central PA Wat Treat			
Al	0.75	0.504	3.2
Fe	1.5	0.504	6.3
Mn	1.0	0.504	4.2

A waste load allocation for future mining was included for this segment of Moshannon Creek (MOSHANNON) allowing for five operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (page 17 for the method used to quantify treatment pond load).

MOSHANNON Moshannon Creek Upstream of Confluence with Black Moshannon Creek (25703)

The TMDL for this segment of Moshannon Creek consists of a load allocation to all of the watershed area between sample points PEALE, UNT03, UNT02, UNT01, WERR01 and MOSHANNON. The load allocation for this segment was computed using water-quality sample data collected at point MOSHANNON. The average flow, measured at the sampling point MOSHANNON (456.02 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 MOSHANNON shows pH ranging between 3.4 and 4.2; pH will be addressed in this TMDL because of the mining impairment. The method and rationale for addressing pH is contained in Attachment B.

Table C101. Waste Load Allocations for future mining operations

Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 4			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 5			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

The calculated load reductions for all the loads that enter point MOSHANNON must be accounted for in the calculated reductions at sample point MOSHANNON shown in Table C103. A comparison of measured loads between points's PEALE, UNT05, UNT04, UNT03, UNT02 UNT01, WERR01 and MOSHANNON 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 C102. Load Allocations at Point MOSHANNON

	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	2.40	9132.5	0.41	1552.5
Fe	1.62	6157.5	0.45	1724.1
Mn	2.65	10071.0	0.37	1409.9
Acid	46.60	177231.1	0.47	1772.3
Alk	1.95	7416.3		

Table C103. Calculation of Load Reduction at Point MOSHANNON				
	Al	Fe	Mn	Acidity
Existing Load	9132.5	6157.5	10071.0	177231.1
Difference in Existing Load between PEALE, UNT05, UNT04, UNT03, UNT02, UNT01, WERR01 & MOSHANNON	3904.0	1923.4	4323.3	90891.7
Load tracked from PEALE, UNT05, UNT04, UNT03, UNT02, UNT01 & WERR01	885.8	289.8	747.0	1717.0
Percent loss due to instream process	-	-	-	-
Percent load tracked from PEALE, UNT05, UNT04, UNT03, UNT02, UNT01 & WERR01	-	-	-	-
Total Load tracked from PEALE, UNT05, UNT04, UNT03, UNT02, UNT01 & WERR01	4789.8	2213.2	5070.3	92608.7
Allowable Load at MOSHANNON	1552.5	1724.1	1409.9	1772.31
Load Reduction at MOSHANNON	3237.2	489.1	3660.4	90836.3
% Reduction required at MOSHANNON	68	22	72	98

SEVN03 Most Upstream Sample Point on Seven Mile Run (25700)

The TMDL for this segment of Seven mile Run consists of a load allocation to all of the watershed area upstream of sample point SEVN03. The load allocation for this segment was computed using water-quality sample data collected at point SEVN03. The average flow, measured at the sampling point SEVN03 (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 SEVN03 shows pH ranging between4.9 and 6.6; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C104. Load Allocations and Load Reductions for Point SEVN03						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	0.45	0.75	0.18	0.30	0.45	60
Fe	0.84	1.4	0.29	0.50	0.9	65
Mn	1.07	1.8	0.54	0.90	0.9	50
Acid	27.95	47.1	7.27	12.2	34.8	74
Alk	18.35	30.9				

SEVN02 Mouth of Unt to Seven Mile Run

The TMDL for this Unt of Seven Mile Run consists of a load allocation to all of the watershed area upstream of sample point SEVN02. The load allocation for this segment was computed using water-quality sample data collected at point SEVN02. The average flow, measured at the sampling point SEVN02 (0.59 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 SEVN02 shows pH ranging between 3.4 and 3.8; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C105. Load Allocations and Load Reductions for Point SEVN02

	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	5.48	26.8	0.22	1.1	25.7	96
Fe	1.23	6.0	0.55	2.7	3.3	55
Mn	11.92	58.3	0.60	2.9	55.4	95
Acid	89.95	440.2	0.00	0.0	440.2	100
Alk	0.00	0.0				

A waste load allocation for future mining was included for this segment of Seven mile Run (SEVN01) allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (page 17 for the method used to quantify treatment pond load).

Table C106. Waste Load Allocations for future mining operations

Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

SVEN01 Mouth of Seven Mile Run (25700) Upstream of Confluence with Moshannon Creek

The TMDL for this segment of Sevem Mile Run consists of a load allocation to all of the watershed area between sample points SEVN02 and SEVN01. The load allocation for this segment was computed using water-quality sample data collected at point SEVN02. The average flow, measured at the sampling point SEVN01 (0.59 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 SVEN01 shows pH ranging between 3.4 and 4.0; pH will be addressed in this TMDL because of the mining impairment. The method and rationale for addressing pH is contained in Attachment B.

The calculated load reductions for all the loads that enter point SEVN01 must be accounted for in the calculated reductions at sample point SEVN01 shown in Table C108. A comparison of measured loads between point's SEVN 03, SEVN02 and SEVN01 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 C107. Load Allocations at Point SVEN01				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	3.75	47.3	0.49	6.2
Fe	3.62	45.7	0.65	8.2
Mn	9.50	120.0	0.48	6.0
Acid	68.10	859.8	0.27	3.4
Alk	0.50	6.3		

Table C108. Calculation of Load Reduction at Point SEVN01				
	Al	Fe	Mn	Acidity
Existing Load	47.3	45.7	120.0	859.8
Difference in Existing Load between SEVN03, SEVN02 & SEVN01	19.7	38.3	59.8	372.5
Load tracked from SEVEN03 & SEVN02	1.4	3.2	3.8	12.2
Percent loss due to instream process	-	-	-	-
Percent load tracked from SEVN03 & SEVN02	-	-	-	-
Total Load tracked from SEVN03 & SEVN02	21.1	41.5	63.6	384.7
Allowable Load at SEVN01	6.2	8.2	6.0	3.4
Load Reduction at SEVN01	15.0	33.3	57.6	381.3
% Reduction required at SEVN01	71	80	91	99

AMES01 Mouth of Ames Run (25698) Upstream of Confluence with Moshannon Creek

The TMDL for this Ames Run Run consists of a load allocation to all of the watershed area upstream of sample point AMES01. The load allocation for this segment was computed using water-quality sample data collected at point AMES01. The average flow, measured at the sampling point AMES01 (0.38 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 AMES01 shows pH ranging between 4.3 and 483; pH will be addressed in this TMDL because of the mining impact. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for iron because WQS were met; a TMDL for iron is not necessary. Although a TMDL is not necessary, the measured loads are considered at the next downstream point Moshannon.

Table C109. Load Allocations and Load Reductions for Point AMES01						
	Measured Sample Data		Allowable			
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. mg/l	Load Lbs/day	Load Reduction	% Reduction
Al	0.84	2.7	0.23	0.7	2.0	73
Fe	0.08	0.24	0.08	0.24	NA	0
Mn	0.88	2.8	0.33	1.1	1.7	62
Acid	19.40	61.4	3.3	10.4	51.0	83
Alk	6.50	20.6				

MOUTH Mouth of Moshannon Creek Upstream of Confluence with West Branch Suspuehanna River

The TMDL for this segment of Moshannon Creel consists of a load allocation to all of the watershed area between sample points MOSHANNON, SEVN01, AMES01 and MOUTH. The load allocation for this segment was computed using water-quality sample data collected at point MOUTH. The average flow, measured at the sampling point MOUTH (634.18 MGD), is used for these computations.

Table C110. Load Allocations at Point MOUTH				
	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	2.15	11371.6	0.43	2274.3
Fe	1.13	5980.2	0.45	2392.1
Mn	2.65	14039.0	0.35	1825.1
Acid	61.30	324221.3	0.61	3242.2
Alk	1.53	8109.9		

There currently is no entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point MOUTH shows pH ranging between 3.5 and 4.1; pH will be addressed in this TMDL because of the mining impairment. The method and rationale for addressing pH is contained in Attachment B.

The calculated load reductions for all the loads that enter point MOUTH must be accounted for in the calculated reductions at sample point MOUTH shown in Table C111. A comparison of measured loads between point's MOSHANNON, SEVN01, AMES01 and MOUTH shows that there is no additional loading entering the segment for iron. For iron the percent decrease in existing load is applied to the allowable upstream load 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 C111. Calculation of Load Reduction at Point MOUTH				
	Al	Fe	Mn	Acidity
Existing Load	11371.6	5980.2	14039.0	324221.3
Difference in Existing Load between MOSHANNON, SEVN01, AMES01 & MOUTH	2189.1	-223.2	3845.3	146069.1
Load tracked from MOSHANNON, SEVN01 & AMES01	1559.4	1732.6	1417.0	1786.2
Percent loss due to instream process	-	4	-	-
Percent load tracked from MOSHANNON, SEVN01 & AMES01	-	96	-	-
Total Load tracked from MOSHANNON, SEVN01 & AMES01	3748.5	1670.2	5262.3	147855.3
Allowable Load at MOUTH	2274.3	2392.1	1825.1	3242.2
Load Reduction at MOUTH	1474.2	0.0	3437.2	144613.1
% Reduction required at MOUTH	39	0	65	98

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, and 2002 Section 303(d) Lists and Integrated Report/List (2004, 2006)

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

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

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

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

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

Migration to National Hydrography Data (NHD)

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

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

Attachment E

Water Quality Data Used In TMDL Calculations

DEP Data	WHSD03	Whiteside Run		Latitude	40-48-02.5	Longitude	78-21-11.2
	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
6/9/2005	7.0	50.8	10.60	1.92	1.42	0.13	6.5
1/5/2006	6.6	17.6	10.00	0.58	0.27	0.58	1952
3/22/2006	6.3	16.8	6.60	0.08	0.14	0.13	51
avg=	6.6	28.4	9.1	0.9	0.6	0.3	669.8
stdev=			2.16	0.95	0.70	0.26	

DEP Data	WHSD02	UNT to Whiteside		Latitude	40-48-37	Longitude	78-20-01
	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
6/8/2005	7.3	47.0	-18.00	0.55	0.47	0.13	53
9/2/2005	6.8	61.6	-28.60	0.77	0.76	0.13	6
1/6/2006	6.7	27.2	15.80	0.32	0.54	0.13	716
3/22/2006	6.6	37.6	-10.60	0.37	0.21	0.13	65.7
avg=	6.9	43.4		0.5	0.5	0.1	210.2
stdev=				0.2	0.2	0.00	

DEP Data	WHSD01	Whiteside Run at beaver dam above mouth				Latitude Longitude	40-48-28.4 78-19-45.6
	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
6/9/2005	7.3	76.4	-21.00	2.78	0.56	0.13	315
9/2/2005	7.0	119.2	-20.20	2.93	0.71	0.13	211.9
1/6/2006	6.9	23.2	26.00	0.08	0.18	0.13	5733
3/22/2006	6.8	36.0	-6.80	0.36	0.21	0.13	405
avg=	7.0	63.7		1.5	0.4	0.1	1666.2
stdev=				1.5	0.3	0.0	

DEP Data	Hale	Moshannon Creek		Latitude	40-76-16	Longitude	78-20-35
	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
6/15/2006	5.7	8	8.00	1.15	0.98	0.25	4548
3/22/2007	5.1	6.4	10.60	0.70	0.98	0.25	22,215
8/1/2007	4.2	4.0	43.60	2.78	0.29	0.25	1090
11/16/2007	5.9	8.4	10.40	1.79	1.13	0.25	1463
1/7/2008	5.8	8.4	2.40	0.65	0.66	0.25	6319
avg=	5.3	7.0	15.0	1.4	0.8	0.25	7127.0
stdev=			16.33	0.89	0.34	0.00	

DEP Data MTNB02 Mountain Branch **Latitude** 40-47-18 **Longitude** 78-19-38

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/8/2005	6.4	9.6	49.40	0.32	0.03	0.25	2867
9/2/2005	6.3	12.0	16.40	0.15	0.03	0.25	493
1/5/2006	6.4	10.0	19.20	0.39	0.03	0.25	12367
3/22/2006	6.1	9.4	15.40	0.15	0.03	0.25	2179
avg=	6.3	10.3	25.1	0.3	0.03	0.3	4476.5
stdev=			16.3	0.1	0.0	0.0	

DEP Data MTNB01 Mountain Branch **Latitude** 40-48-21 **Longitude** 78-19-13

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/8/2005	5.7	7.4	44.40	0.89	0.42	0.125	3255
9/2/2005	5.4	8.0	41.60	2.37	0.76	0.125	525
1/5/2006	4.3	5.2	46.00	1.10	0.46	0.57	12845
3/22/2006	4.8	6.6	21.40	0.71	0.32	0.125	2452
avg=	5.1	6.8	38.4	1.3	0.5	0.2	4769.3
stdev=			11.4	0.8	0.2	0.2	

Latitude 40-48-29.1

DEP Data UNT011 UNT below Mountain Branch **Longitude** 78-19-04.7

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/8/2005	3.6	0.0	45.40	1.16	1.28	2.44	59
9/2/2005	3.8	0.0	60.40	0.90	2.91	0.74	2
1/5/2006	4.0	2.4	19.80	0.76	0.88	1.59	3806
3/21/2006	3.6	0.0	53.20	1.70	1.90	4.34	151
avg=	3.8	0.6	44.7	1.1	1.7	2.3	1004.5
stdev=			17.7	0.4	0.9	1.5	

DEP Data BVER09 **Latitude** 40-49-37 **Longitude** 78-21-47

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
7/19/2005	6.3	98.4	-42.20	0.15	0.00018	0.25	688
9/15/2005	6.4	102.2	-70.20	0.15	0.00022	0.25	516
5/22/2006	6.2	96.8	-72.80	0.15	0.098	0.25	1545
avg=	6.3	99.1		0.2	0.033	0.3	916.3
stdev=				0.00	0.06	0.00	

DEP Data	BVER08	Beaver Ru		Latitude	40-49-36	Longitude	78-21-47
	pH*	**Alkalinity^**	**Acidity**	**Iron**	**Manganese**	**Aluminum**	**Flow**
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
7/19/2005	6.4	101.2	-9.40	0.0034	0.0018	0.25	25
9/15/2005	7.3	113.0	-82.00	0.0025	0.0016	0.25	2
5/22/2006	6.5	26.6	8.80	0.55	0.11	0.25	538
avg=	6.7	80.3		0.2	0.037	0.3	188.3
stdev=				0.31	0.06	0.00	

DEP Data	BVER10			Latitude	40-49-37	Longitude	78-21-43
	pH*	**Alkalinity^**	**Acidity**	**Iron**	**Manganese**	**Aluminum**	**Flow**
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
7/19/2005	6.9	94.2	-69.00	0.15	0.03	0.25	307
9/15/2005	7.0	98.2	-70.00	0.15	0.03	0.25	75
5/23/2006	6.6	83.6	-53.20	0.15	0.03	0.25	350
avg=	6.8	92.0		0.15	0.03	0.3	244.0
stdev=				0.00	0.00	0.00	

DEP Data	BVER07		Latitude	40-49-40	Longitude	78-20-30	
	pH*	**Alkalinity^**	**Acidity**	**Iron**	**Manganese**	**Aluminum**	**Flow**
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
7/19/2005	7.8	108.2	-69.00	0.15	0.000072	0.25	1290
9/15/2005	8.0	107.4	-70.20	0.15	0.000070	0.25	1010
5/22/2006	6.8	82.6	-59.60	0.15	0.086	0.25	2541
avg=	7.5	99.4		0.2	0.03	0.3	1613.7
stdev=				0.00	0.05	0.00	

DEP Data	BVER06		Latitude	40-51-24	Longitude	78-20-17	
	pH*	**Alkalinity^**	**Acidity**	**Iron**	**Manganese**	**Aluminum**	**Flow**
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
7/18/2005	4.6	7.6	56.60	0.00169	0.0021	0.0032	43
9/13/2005	3.8	0.0	99.80	0.00067	0.0026	0.0064	10
avg=	4.2	3.8	78.2	0.00118	0.0023	0.0048	26.5
stdev=			30.5	0.0007	0.0004	0.0023	23.3

DEP Data	BVER05	Headwaters right branch Little Beaver Run				Latitude	40-51-28
						Longitude	78-20-15

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
7/18/2005	4.6	7.0	51.60	0.00089	0.00329	0.00145	29

DEP Data	BVER04	Unnamed trib	Latitude	40-50-54	Longitude	78-19-10

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
7/18/2005	3.0	0.0	114.20	0.0052	0.0111	0.0047	78
9/13/2005	2.9	0.0	146.00	0.0099	0.0113	0.0034	35
avg=	3.0	0.0	130.1	0.00751	0.01120	0.00404	56.5
stdev=			22.5	0.00334	0.00014	0.00093	

DEP Data	BVER03	Unnamed trib	Latitude	40-50-56	Longitude	78-19-08

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
7/18/2005	2.7	0.0	254.30	0.0264	0.0189	0.0024	20
9/13/2005	2.9	0.0	146.00	0.0099	0.0113	0.0034	35
avg=	2.8	0.0	200.2	0.0181	0.0151	0.0029	27.5
stdev=			76.58	0.0117	0.0054	0.0007	

DEP Data	BVER02	Coal Run	Latitude	40-51-10	Longitude	78-18-04

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
7/18/2005	3.3	0.0	64.60	0.0031	0.008	0.002	500
9/15/2005	3.3	0.0	113.40	0.0076	0.009	0.003	87
5/22/2006	3.9	0.0	40.60	1.39	3.17	1.34	3247
avg=	3.5	0.0	72.9	0.47	1.06	0.45	1278.0
stdev=			37.1	0.797	1.823	0.769	

DEP Data	BVER01	Beaver Run at confluence with Mo Crk				Latitude	40-50-50
						Longitude	78-17-33
	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	ug/l	ug/l	ug/l	gpm
7/18/2005	6.9	51.6	-5.60	0.00224	0.00277	0.250	3232
9/15/2005	7.1	55.0	-1.20	0.00203	0.00183	0.250	1919
5/22/2006	6.5	38.4	6.20	1.21	1.77	0.56	9048
avg=	6.8	48.3		0.41	0.59	0.35	4733.0
stdev=				0.6991	1.0177	0.1796	

DEP Data	BIG01	Big Run at mouth		Latitude	40-51-09.3	Longitude	78-17-01
	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
6/15/2005	3.3	0	94.60	5.61	0.94	3.47	501
9/6/2005	3.3	0.0	90.00	6.06	9.48	2.73	233
12/22/2005	3.6	0.0	75.60	4.96	10.50	5.08	584
3/21/2006	3.7	0.0	62.60	3.46	8.33	5.06	416
avg=	3.5	0.0	80.7	5.0	7.3	4.1	433.5
stdev=			14.5	1.1	4.3	1.2	

DEP Data	Osceola		Latitude	40-50-49	Longitude	78-16-18	
	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
3/22/2007	5	7.4	14.60	2.66	1.49	1.98	135000
8/1/2007	4.0	2.2	69.20	1.00	4.87	2.78	7092
11/19/2007	4.9	8.2	28.60	6.61	4.59	2.30	10635
avg=	4.6	5.9	37.5	3.4	3.7	2.4	50909.0
stdev=			28.4	2.9	1.9	0.4	

DEP Data	TROT03		Latitude	40-48-23.8	Longitude	78-15-42.1	
	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
6/16/2005	6.6	19.4	10.40	0.15	0.05	0.25	1585
9/6/2005	7.4	21.0	-1.20	0.15	0.05	0.25	177.3
12/22/2005	6.8	14.8	1.40	0.15	0.05	0.25	975
3/23/2006	6.8	14.2	-3.40	0.15	0.05	0.25	1317
avg=	6.9	17.4	1.8	0.2	0.1	0.3	1013.6
stdev=				0.0	0.0	0.0	

DEP Data TROT02 **Latitude** 40-49-47.8 **Longitude** 78-15-33.3

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/16/2005	3.2	0.0	99.80	2.74	2.67	6.56	200
9/6/2005	3.1	0.0	150.80	3.24	4.20	11.60	14
12/22/2005	3.1	0.0	134.40	8.02	2.91	11.00	373
3/22/2006	3.2	0.0	102.00	3.92	1.97	6.75	182
avg=	3.2	0.0	121.8	4.5	2.9	9.0	192.3
stdev=			25.0	2.4	0.9	2.7	

DEP Data TROT01 Trout Run at mouth **Latitude** 40-50-45.8 **Longitude** 78-15-56.4

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/16/2005	4.4	5.6	43.80	2.59	0.89	1.49	4292
9/6/2005	3.7	0.0	48.20	2.55	1.26	1.92	971
12/22/2005	4.0	1.4	72.60	2.91	1.58	3.60	4621
3/22/2006	3.9	0.8	39.20	1.84	1.00	2.63	1939
avg=	4.0	2.0	51.0	2.5	1.2	2.4	2955.8
stdev=			14.9	0.5	0.3	0.9	

DEP Data UNT10 Unnamed tributary **Latitude** 40-51-33 **Longitude** 78-14-49

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/8/2005	3.0	0.0	118.80	5.60	2.11	7.74	129
9/13/2005							
3/23/2006	3.0	0.0	182.80	11.80	1.08	7.80	106
avg=	3.0	0.0	150.8	8.7	1.6	7.8	117.5
stdev=			45.3	4.4	0.7	0.04	

Latitude 40-52-18
DEP Data SHIM01 Shimmel Run at before confluence with Mo Crk **Longitude** 78-14-56

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**ug/l**	**ug/l**	**ug/l**	**gpm**
6/8/2005	7.3	35.6	12.20	0.15	0.20	0.25	126
9/13/2005	7.0	20.4	0.00	0.15	0.03	0.25	5
3/23/2006	6.7	15.6	1.00	0.15	0.13	0.25	172
avg=	7.0	23.9	4.4	0.2	0.1	0.3	101.0
stdev=			6.8	0.0	0.1	0.0	

						Latitude	40-53-40
DEP Data	Presqueisle		Moshannon Creek			**Longitude**	78-13-26
	pH*	**Alkalinity^**	**Acidity**	**Iron**	**Manganese**	**Aluminum**	**Flow**
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
3/22/2007	4.9	7.0	18.80	3.47	1.29	2.45	195000
8/1/2007	6.0	9.4	25.20	0.15	3.58	0.25	12907
11/19/2007	6.6	17.6	0.00	0.44	3.18	0.25	16727
1/7/2008	4.8	8.0	18.20	3.04	1.88	2.22	41492
avg=	5.6	10.5	15.6	1.8	2.5	1.3	66531.5
stdev=			10.8	1.7	1.1	1.2	

						Latitude	40.95342
Mining Company's Data			ER-1	Emigh Run headwaters		**Longitude**	78.27486
	Flow	**pH**	**Alkalinity**	**Acidity**	**Iron**	**Manganese**	**Aluminum**
Date	**gpm**	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
5/26/2004	10	4.3	0	42	0.24	3.63	5.13
6/24/2002	6	3.8	0	46	1.15	2.69	4.89
5/12/2003	30	4	0	44	0.07	2.56	5.1
6/17/2003	12	4.1	2	48	0.37	2.67	5.9
7/23/2003	12	3.9	0	40	1.22	3.19	4.57
8/28/2003	12	3.9	0	40	1.93	3.59	4.18
9/18/2003	7.5	4	1	50	1.04	3.34	5.36
10/22/2003	14	4.1	4	48	0.38	3.66	5.41
11/18/2003	120	4	0	32	2	2.52	4.11
12/18/2003	40	4.2	3	46	0.07	2.72	5.83
1/22/2004	13	4.3	3	63	0.17	2.6	5.83
3/18/2004	25	4.2	3	42	0.08	2.32	5.45
4/21/2004	30	4	0	42	0.05	2.28	5.09
5/26/2004	60	4	0	43	0.25	2.83	5.16
avg=	27.96	4.06	1.14	44.71	0.64	2.90	5.14
stdev=				6.9	0.69	0.49	0.56

DEP Data	EMGH03	Emigh Run between two unnamed tribs				Latitude 40-56-25	Longitude 78-14-54
	pH*	**Alkalinity^**	**Acidity**	**Iron**	**Manganese**	**Aluminum**	**Flow**
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/15/2005	3.2	0.0	114.40	12.20	12.80	3.76	265
9/19/2005	3.2	0.0	177.40	19.20	13.40	1.69	190
6/8/2006	3.6	0.0	46.60	4.59	5.86	3.32	1003
avg=	3.3	0.0	112.8	12.0	10.7	2.9	486.0
stdev=			65.41	7.31	4.19	1.09	

Mining Company's Data			EMGH05	Upper unnamed trib to Emigh Run			Latitude 40-56-34	Longitude 78-14-48
	Flow	**pH**	**Conductivity**	**Alkalinity**	**Acidity**	**Iron**	**Manganese**	**Aluminum**
Date	**gpm**	**Lab**	**umhos/c**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
5/12/2003	200	4.5	407	6	28	0.17	2.92	2.79
6/19/2003	12.7	4.6	413	6	36	2.32	3.48	5.08
8/28/2003	96.6	4.7	500	6	28	0.53	5.01	2.84
9/18/2003	291.6	4.4	605	5	58	0.3	5.13	6.51
10/22/2003	291.6	4.6	488	7	38	0.38	3.73	3.63
11/18/2003	550	4.8	261	8	10	6.72	1.63	2.94
12/18/2003	546	4.5	522	6	46	0.27	3.72	5.55
1/22/2004	35.1	4.3	564	4	42	0.86	4.57	6.15
3/18/2004	198.4	4.4	524	4	42	0.23	3.62	5.31
4/21/2004	198.4	4.3	480	3	36	0.2	3.43	4.71
5/26/2004	198.4	4.6	350	6	22	0.31	2.59	2.26
9/19/2005	20	3.9		0.2	73.80	0.52	6.00	2.54
6/8/2006	217	4.4		5.4	24.00	0.15	2.61	2.91
avg=	219.68	4.46	464.91	5.12	37.22	1.00	3.73	4.09
stdev=					16.36	1.81	1.20	1.50

						Latitude	40-55-16
Mining Company's Data			EMGH01	Emigh Run at mouth		**Longitude**	78-12-37
	Flow	**pH**	**Alkalinity**	**Acidity**	**Iron**	**Manganese**	**Aluminum**
Date	**gpm**	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**
9/19/1988	725	4.3	6	90	0.26	8.1	
10/21/1988	300	4.6	6	84	0.03	7.3	
3/8/1989	600	4.5	8	48	0.01	4.21	
8/3/1989	300	4.3	4	60	0.03	9.3	
11/10/1989	275	4	0	60	0.23	10.5	
3/8/1990	280	4.7	8	54	0.12	7.8	
5/14/1990	292	4.4	6	40	0.11	5.77	
7/12/1990	360	4.5	6	50	0.4	6.74	
10/8/1990	256	4.2	4	50	0.16	9.41	
4/30/1991	300	4.3	4	52	0.15	5.72	
9/27/1991	100	3.4	0	134	2.69	13.8	
12/6/1991	185	3.7	0	88	2.57	7.16	
1/31/1992	200	3.7	0	80	2.04	6.18	
4/24/1992	400	3.7	0	56	0.55	6.65	
7/9/1992	210	3.4	0	84	0.69	11.73	
10/22/1992	325	3.7	0	116	0.58	9.86	
2/12/1993	750	4	0	108	3.07	10.1	
6/4/1993	325	3.9	0	96	0.25	16.5	
7/16/1993	122	3.7	0	92	0.38	13.3	
10/14/1993	210	3.5	0	116	1.4	11.6	
6/22/1994	216	4	0	48	0.08	0.01	
8/16/1994	200	3.7	0	86	0.92	11.92	
6/19/1995	125	4	0	42	0.18	5.86	
9/8/1995	50	4.1	2	56	1.09	12.19	
12/12/1995	262	4.2	6	34	1.19	5.4	
2/9/1996	500	4.3	4	76	2.77	8.79	
4/29/1996	460	4.8	8	38	0.44	6.04	
8/3/1996	48	4.6	6	40	0.69	10.02	
7/23/1998	56	4.2	6	52	0.16	11.07	
10/6/1998	100	4.2	4	26	0.74	12.96	
10/8/1999	150	3.8	0	50	1.37	13.03	
6/15/2005	590	4.7	8.4	61.20	0.15	8.90	2.56
9/19/2005	115	6.3	16.6	85.60	0.59	11.20	0.25
6/8/2006	1500	3.6	0.0	33.40	1.45	4.45	1.70
avg=	320.2	4.1	3.3	67.2	0.8	8.9	1.5
stdev=				27.2	0.9	3.4	1.2

DEP Data UNT09 **Latitude** 40-54-58 **Longitude** 78-11-47

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
3/27/2005	3.4	0	91.80	1.32	2.89	8.3	85
6/9/2005	3.4	0	79.20	1.43	3.47	5.89	137
9/22/2005	No	Flow					0
11/14/2005	3.6	0.0	103.20	0.15	3.59	6.35	2
3/24/2006	3.5	0.0	78.60	1.08	2.38	6.34	88
avg=	3.5	0.0	88.2	1.0	3.1	6.7	62.4
stdev=			11.7	0.6	0.6	1.1	

DEP Data UNT9.5 **Latitude** 40-55-12 **Longitude** 78-11-05

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/9/2005	2.8	0	550.60	63.00	15.70	42.6	38
9/22/2005	No	Flow					0
11/14/2005	2.8	0.0	427.80	11.70	10.60	37.30	1
3/27/2006	2.8	0.0	421.00	26.00	9.97	31.50	16
avg=	2.8	0.0	466.5	33.6	12.1	37.1	13.8
stdev=			72.9	26.5	3.1	5.6	

DEP Data WOLF01 **Latitude** 40-55-24 **Longitude** 78-10-44

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/9/2005	3.3	0.0	207.40	29.90	7.97	21.80	322
9/21/2005	2.8	0.0	1516.40	0.15	50.20	98.00	5
3/27/2006	3.2	0.0	252.00	23.70	6.47	21.80	117
11/14/2005	3.1	0.0	543.20	59.00	16.30	41.70	5
avg=	3.1	0.0	629.8	28.2	20.2	45.8	112.3
stdev=			609.6	24.2	20.4	36.0	

DEP Data BRLW01 **Latitude** 40-55-55 **Longitude** 78-10-05

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/9/2005	3.7	0	69.60	1.32	4.11	6.08	77
3/27/2006	3.9	0.0	74.20	0.83	3.20	6.89	87
9/21/2005	3.5	0.0	98.60	0.91	8.47	9.36	5
11/14/2005	3.5	0.0	124.00	1.74	7.82	12.20	7.5
avg=	3.7	0.0	91.6	1.2	5.9	8.6	44.1
stdev=			25.1	0.4	2.6	2.8	

Latitude 40-57-06 Longitude 78-09-32

DEP Data UNT08 Unnamed trib to Mo Crk above Cassanova bridge (1/2 mile)

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**ug/l**	**ug/l**	**ug/l**	**gpm**
6/15/2005	3.2	0.0	195.20	0.01	0.01	0.01	2

Latitude 40-57-18 Longitude 78-10-10

DEP Data Casanova Moshannon Creek upstream of Casanova bridge

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
3/21/2007	4.4	5	23.20	2.00	1.27	1.53	450000
8/1/2007	3.6	0.0	51.40	2.50	4.18	2.55	25200
11/19/2007	4.2	4.4	27.00	4.50	4.02	0.98	30000
1/8/2008	4.7	7.4	25.80	4.39	2.23	2.01	104535
avg=	4.2	4.2	31.9	3.3	2.9	1.8	152433.8
stdev=			13.1	1.3	1.4	0.7	

DEP Data SLFR04 Sulphur Run Latitude 40-58-19 Longitude 78-08-46

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/27/2005	2.9	0.0	355.40	34.40	4.77	27.40	85
9/22/2005	2.9	0.0	343.60	38.30	5.17	24.50	8
11/14/2005	3.0	0.0	341.60	43.90	4.49	19.80	121
4/11/2006	2.9	0.0	406.20	35.00	4.35	32.40	67
avg=	2.9	0.0	361.7	37.9	4.7	26.0	70.3
stdev=			30.3	4.4	0.4	5.3	

DEP Data SLFR03 Latitude 40-58-19 Longitude 78-08-44

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/27/2005	3.2	0.0	204.00	25.00	2.81	16.10	1700
9/22/2005	3.2	0.0	277.80	44.30	3.17	20.50	
11/14/2005	3.1	0.0	301.00	38.50	2.73	19.30	733
4/11/2006	3.1	0.0	229.80	24.00	2.74	18.20	794
avg=	3.2	0.0	253.2	33.0	2.9	18.5	1075.7
stdev=			44.2	10.0	0.2	1.9	

						Latitude	40-57-59
DEP Data	SLFR02	Unnamed trib to Sulfur Run				**Longitude**	78-08-45
	pH*	**Alkalinity^**	**Acidity**	**Iron**	**Manganese**	**Aluminum**	**Flow**
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/27/2005	2.9	0.0	411.20	48.30	5.49	32.40	450
9/22/2005	2.9	0.0	501.80	61.60	5.58	37.10	57
11/16/2005	2.8	0.0	579.40	55.50	4.66	39.40	322
4/11/2006	2.9	0.0	405.40	32.10	4.00	29.50	256
avg=	2.9	0.0	474.5	49.4	4.9	34.6	271.3
stdev=			82.7	12.7	0.7	4.5	

						Latitude	40-57-38
DEP Data	SLFR01	Sulfur Run before confluence with Mo Crk				**Longitude**	78-08-33
	pH*	**Alkalinity^**	**Acidity**	**Iron**	**Manganese**	**Aluminum**	**Flow**
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/15/2005	3.0	0.0	258.20	23.40	3.14	16.20	2298
9/22/2006	3.0	0.0	312.00	39.90	3.73	20.90	361
11/14/2005	3.0	0.0	344.00	39.20	3.04	19.90	129
4/11/2006	3.0	0.0	264.60	27.60	3.02	19.50	1457
avg=	3.0	0.0	294.7	32.5	3.2	19.1	1061.3
stdev=			40.7	8.3	0.3	2.0	

						Latitude	40-58-10
DEP Data	BRWN01	Browns Run at confluence with MOCRK				**Longitude**	78-05-32
	pH*	**Alkalinity^**	**Acidity**	**Iron**	**Manganese**	**Aluminum**	**Flow**
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/22/2005	3.9	0.0	41.40	0.15	0.00	0.00	60
11/14/2005	4.2	5.0	32.20	0.15	0.00	0.00	133
4/27/2006	4.3	4.6	56.60	0.41	0.80	0.25	270
avg=	4.1	3.2	43.4	0.2	0.3	0.1	154.3
stdev=			12.3	0.1	0.5	0.1	

DEP Data	GRAS02	Knox Run before confluence with Grassflt Run				Latitude Longitude	40-59-01 78-05-51
	pH*	**Alkalinity^**	**Acidity**	**Iron**	**Manganese**	**Aluminum**	**Flow**
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/22/2005	3.2	0.0	57.40	0.00	0.00	0.00	5
11/14/2005	3.2	0.0	72.60	0.00	0.01	0.00	24
4/12/2006	3.3	0.0	60.80	3.43	4.27	1.16	31
avg=	3.2	0.0	63.6	1.1	1.4	0.4	20.0
stdev=			8.0	2.0	2.5	0.7	

DEP Data	GRAS01	Grassflat Run before confluence with MOCRK				Latitude Longitude	40-58-49 78-05-28
	pH*	**Alkalinity^**	**Acidity**	**Iron**	**Manganese**	**Aluminum**	**Flow**
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/22/2005	3.0	0.0	133.80	0.01	0.00	0.01	372
11/14/2005	3.2	0.0	158.40	0.02	0.01	0.01	282
4/12/2006	3.1	0.0	135.20	13.00	4.00	7.67	186
avg=	3.1	0.0	142.5	4.3	1.3	2.6	280.0
stdev=			13.8	7.5	2.3	4.4	

DEP Data	Peale		Moshannon Creek			Latitude Longitude	40-59-35 78-04-51
	pH*	**Alkalinity^**	**Acidity**	**Iron**	**Manganese**	**Aluminum**	**Flow**
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
3/21/2007	4.2	3.6	24.60	1.89	1.07	1.66	500000
8/1/2007	3.4	0.0	59.00	0.51	3.51	3.17	33070
11/14/2007	3.6	0.0	48.00	2.11	4.25	2.81	34458
1/8/2008	4.3	5.0	29.20	3.40	1.89	2.09	143225
avg=	3.9	2.2	40.2	2.0	2.7	2.4	177688.3
stdev=			16.11	1.18	1.46	0.68	

DEP Data UNT06 Unnamed tributary to Pine Run 26053 **Latitude** 41-00-17 **Longitude** 78-05-55

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/22/2005	3.1	0	143.60	0.01	0.01	0.0131	78
9/21/2005	3.2	0.0	152.60	0.01	0.01	0.01	17
11/14/2005	3.2	0.0	165.80	0.01	0.01	0.01	64
3/24/2006	3.1	0.0	166.40	3.47	3.90	12.00	73
avg=	3.2	0.0	157.1	0.9	1.0	3.0	58.0
stdev=			11.0	1.7	1.9	6.0	

DEP Data UNT07 Unnamed tributary **Latitude** 41-00-15 **Longitude** 78-05-56

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/22/2005	3.4	0	65.80	0.00	0.00	0.00482	66
9/21/2005	3.4	0.0	72.20	0.00	0.00	0.00	46
11/14/2005	3.8	0.0	58.00	0.00	0.00	0.00	133
3/24/2006	3.3	0.0	93.00	4.74	1.26	6.04	99
avg=	3.5	0.0	72.3	1.2	0.3	1.5	86.0
stdev=			15.0	2.4	0.6	3.0	

DEP Data UNT05 Unnamed tributary **Latitude** 40-59-39 **Longitude** 78-04-46

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/22/2005	3.3	0.0	86.40	3.50	4.03	6.58	500
9/20/2005	3.2	0.0	93.80	2.53	4.61	4.72	234.00
11/14/2005	3.4	0.0	86.20	3.66	4.88	6.10	354
3/24/2006	3.4	0.0	105.20	3.85	2.73	7.62	350
avg=	3.3	0.0	92.9	3.4	4.1	6.3	359.5
stdev=			8.9	0.6	1.0	1.2	

DEP Data UNT04 **Latitude** 41-00-11.4 **Longitude** 78-03-28.1

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**mg/l**	**gpm**
6/23/2005	3.9	0	57.60	0.08	2.56	3.63	4.12
9/22/2005	No	Flow					0
4/13/2006	4.0	2.0	58.60	0.08	1.73	2.85	101.5
8/18/2006	No	Flow					DRY
avg=	4.0	1.0	58.1	0.1	2.1	3.2	35.2
stdev=			0.7	0.0	0.6	0.6	

DEP Data UNT03 **Latitude** 41-00-35.3 **Longitude** 78-03-25.4

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
6/23/2005	3.2	0.00	82.60	7.73	8.39	3.24	44
9/22/2005	3.0	0.00	134.60	8.25	10.20	2.85	2
4/13/2006	3.4	0.00	62.20	2.93	4.67	3.19	38
8/18/2006	3.1	0.00	93.80	4.10	8.45	2.82	5.8
avg=	3.2	0.0	93.3	5.8	7.9	3.0	22.5
stdev=			30.5	2.6	2.3	0.2	

DEP Data UNT02 **Latitude** 41-00-52.8 **Longitude** 78-04-11.5

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
6/23/2005	4.5	6.00	18.80	0.08	0.73	1.11	14
9/22/2005	No	Flow					0
4/13/2006	4.5	6.00	17.20	0.08	0.52	0.86	22
avg=	4.5	6.0	18.0	0.1	0.6	1.0	12.0
stdev=			1.1	0.0	0.2	0.2	

DEP Data UNT01 at mouth **Latitude** 41-01-18 **Longitude** 78-04-32.4

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
6/23/2005	3.3	0.00	86.00	1.89	5.06	7.20	61
9/22/2006	3.2	0.00	111.80	1.22	6.28	7.59	17
4/13/2006	3.4	0.00	67.80	1.15	3.34	3.98	68
8/18/2006	3.2	0.00	90.00	1.00	4.53	5.62	56
avg=	3.3	0.0	88.9	1.3	4.8	6.1	50.5
stdev=			18.1	0.4	1.2	1.6	

DEP Data WEBR01 Weber at mouth **Latitude** 41-01-45 **Longitude** 78-04-48.1

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
6/23/2005	3.4	0.00	93.60	0.75	15.90	6.56	41
9/22/2005	3.2	0.00	156.20	0.65	20.60	8.43	7
4/13/2006	3.5	0.00	89.40	1.01	11.50	6.53	74
8/18/2006	3.3	0.00	109.40	1.01	15.80	8.03	16.6
avg=	3.4	0.0	112.2	0.9	16.0	7.4	34.7
stdev=			30.6	0.2	3.7	1.0	

DEP Data	Moshannon Creek upstream of Balck Mo					Latitude Longitude	41-02-12 78-03-27
	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
3/21/2007	4.2	3.4	23.40	1.75	1.06	1.56	1,000,000
8/2/2007	3.4	0.0	81.80	0.32	3.61	3.06	50928
11/13/2007	3.6	0.0	53.60	1.55	4.01	2.82	35806
1/8/2008	4.2	4.4	27.60	2.85	1.91	2.17	180000
avg=	3.9	2.0	46.6	1.6	2.6	2.4	316683.5
stdev=			27.0	1.0	1.4	0.7	460116.6

DEP Data	SEVN03	Seven Mile Run	Latitude	41-03-03.2		Longitude	78-00-50.5
	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
6/30/2005	6.6	18.6	31.60	1.08	1.44	0.125	5
9/21/2005	6.6	39.2	9.60	1.99	1.21	0.13	3
1/13/2006	4.9	8.4	39.40	0.15	0.87	0.82	524
4/6/2006	5.2	7.2	31.20	0.15	0.77	0.72	29
avg=	5.8	18.4	28.0	0.8	1.1	0.4	140.3
stdev=			12.8	0.9	0.3	0.4	

DEP Data	SEVN02 trib to Seven Mile at confluence					Latitude Longitude	41-03-10.5 78-03-03.2
	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
6/30/2005	3.4	0.00	99.00	1.65	15.60	0.79	88
9/21/2005	3.6	0.00	93.20	0.30	9.78	3.73	36
1/13/2006	3.8	0.00	78.80	1.43	10.10	10.10	1276
4/6/2006	3.8	0.00	88.80	1.52	12.20	7.28	230
avg=	3.7	0.0	90.0	1.2	11.9	5.5	407.5
stdev=			8.5	0.6	2.7	4.1	

DEP Data	SEVN01		Latitude	41-03-06.4		Longitude	78-03-33.5
	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	Lab	mg/l	mg/l	mg/l	mg/l	mg/l	gpm
6/23/2005	3.4	0.00	66.80	3.74	12.00	4.69	284
9/21/2005	3.3	0.00	95.80	5.42	11.80	3.02	177
1/13/2006	4.0	2.00	50.80	1.87	5.64	3.39	3191
4/6/2006	3.8	0.00	59.00	3.45	8.57	3.88	553
avg=	3.6	0.5	68.1	3.6	9.5	3.7	1051.3
stdev=			19.6	1.5	3.0	0.7	

DEP Data AMES01 Ames Run near mouth **Latitude** 41-03-26.3 **Longitude** 78-04-24.6

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**ug/l**	**ug/l**	**ug/l**	**gpm**
6/29/2005	4.5	6	13.80	0.08	0.96	1.03	118
9/21/2005	4.3	5.8	28.40	0.08	1.56	1.48	4.2
1/10/2006	4.8	8.0	17.80	0.08	0.48	0.25	823
4/12/2006	4.8	6.2	17.60	0.08	0.52	0.60	108.8
avg=	4.6	6.5	19.4	0.1	0.9	0.8	263.5
stdev=			6.3	0.0	0.5	0.5	

DEP Data Moshannon Creek at confluence with WB Susquehanna River **Latitude** 41-04-20 **Longitude** 78-05-50

	pH*	Alkalinity^	Acidity	Iron	Manganese	Aluminum	Flow
Date	**Lab**	**mg/l**	**mg/l**	**ug/l**	**ug/l**	**ug/l**	**gpm**
3/28/2007	4.1	4.6		1.76	0.97	1.54	1,250,000
8/2/2007	3.5	0.0	74.60	0.31	3.45	2.63	36533
11/13/2007	3.7	0.0	48.00	1.32	3.54	2.28	34683
avg=	3.8	1.5	61.3	1.1	2.7	2.2	440405.3
stdev=			18.8	0.7	1.5	0.6	

Attachment F

TMDLs and NPDES Permitting Coordination

NPDES permitting is unavoidably linked to TMDLs through waste load allocations and their translation, through the permitting program, to effluent limits. Primary responsibility for NPDES permitting rests with the District Mining Offices (for mining NPDES permits) and the Regional Offices (for industrial NPDES permits). Therefore, the DMOs and Regions will maintain tracking mechanisms of available waste load allocations, etc. in their respective offices. The TMDL program will assist in this effort. However, the primary role of the of the TMDL program is TMDL development and revision/amendment (the necessity for which is as defined in the Future Modifications section) at the request of the respective office. All efforts will be made to coordinate public notice periods for TMDL revisions and permit renewals/reissuances.

Load Tracking Mechanisms

The Department has developed tracking mechanisms that will allow for accounting of pollution loads in TMDL watersheds. This will allow permit writers to have information on how allocations have been distributed throughout the watershed in the watershed of interest while making permitting decisions. These tracking mechanisms will allow the Department to make minor changes in WLAs without the need for EPA to review and approve a revised TMDL. Tracking will also allow for the evaluation of loads at downstream points throughout a watershed to ensure no downstream impairments will result from the addition, modification or movement of a permit.

Options for Permittees in TMDL Watersheds

The Department is working to develop options for mining permits in watersheds with approved TMDLs.

Options identified

- Build excess WLA into the TMDL for anticipated future mining. This could then be used for a new permit. Permittee must show that there has been actual load reduction in the amount of the proposed permit or must include a schedule to guarantee the reductions using current data referenced to the TMDL prior to permit issuance.
- Use WLA that is freed up from another permit in the watershed when that site is reclaimed. If no permits have been recently reclaimed, it may be necessary to delay permit issuance until additional WLA becomes available.
- Re-allocate the WLA(s) of existing permits. WLAs could be reallocated based on actual flows (as opposed to design flows) or smaller than approved pit/spoil areas (as opposed to default areas). The "freed-up" WLA could be applied to the new permit. This option would require the simultaneous amendment of the permits involved in the reallocation.
- Non-discharge alternative.

Other possible options

The following two options have also been identified for use in TMDL watersheds. However, before recommendation for use as viable implementation options, a thorough regulatory (both state and federal) review must be completed. These options should not be implemented until the completion of the regulatory review and development of any applicable administrative mechanisms.

- Issue the permit with in-stream water quality criteria values as the effluent limits. The in-stream criteria value would represent the monthly average, with the other limits adjusted accordingly (e.g., for Fe, the limits would be 1.5 mg/L monthly average, 3.0 mg/L daily average and 4.0 instantaneous max mg/L).

- The applicant would agree to treat an existing source (point or non-point) where there is no responsible party and receive a WLA based on a portion of the load reduction to be achieved. The result of using these types of offsets in permitting is a net improvement in long-term water quality through the reclamation or treatment of an abandoned source.

Attachment H

Comment and Response

Comments Submitted by Trout Unlimited March 19, 2009

The following comments/concerns were developed upon review of the Moshannon Creek Watershed TMDL draft document completed by the PA Department of Environmental Protection for the Moshannon Creek Watershed, Clearfield and Centre Counties, Pennsylvania, as presented by Chuck Yingling on February 24, 2009.

1) On page 12 of the TMDL document it describes the basic steps for determining a TMDL including "collection and summarization of pre-existing data." While some pre-existing data were included in the development of the TMDL, a large amount of data were not, including water chemistry and flow data that were collected for the development of the following implementation/restoration plans:

    - Moshannon Creek Phase I Assessment
    - Emigh Run Restoration Plan
    - Trout Run Restoration Plan
    - Shimel Run Restoration Plan
    - Moshannon Creek Headwaters Coldwater Conservation Plan.

    As Mr. Yingling explained, the DEP does not like to use data collected by volunteers. While we understand this approach, we still feel that it would be better to use these data than to calculate results based on only three or four sampling events, many with estimated flows. The assessments listed above were completed using Growing Greener funding, the volunteers collecting the data were trained in DEP approved sampling protocol, and the samples were analyzed by a state-certified laboratory. In addition, a plethora of mining permit data was also excluded from the TMDL study. While in some cases, it would be very time consuming to gather all of this data, fortunately, for this watershed it has already been compiled as part of the Moshannon Creek Clearinghouse project. Dr. Jennifer Demchak (jdemchak@newmilesofbluestream.com) is supposed to be forwarding this information, as well as, relevant water chemistry and flow data from the various restoration plans listed above, on to Mr. Yingling for inclusion in the TMDL document.

    REPLY: Another reason public collected data is sometimes not suited for use in a TMDL is that watershed groups in AMD affected watersheds often collect data upstream and downstream of various abandoned discharges. Data of this type often does not "fit" the Departments data sample point locations.

    The Department did not receive any data from the Moshannon Creek Clearinghouse project.

2) Upon review of the water chemistry and flow data that were included in this study (Attachment E), concern has arisen regarding the number of sampling events that were included for each site, the disparity in time of year sampled between sample sites, and the age of some of the sampling data. There were not many flow measurements included in the data analysis, yet flow is a key component in developing the TMDL. It appears that

many of the flows used were estimates. At least one base flow and high flow event should be taken into consideration for each of the sampling sites and additional flow data should be included to increase the accuracy of the calculations. Once again, a wealth of flow data were collected as part of the assessment projects in the watershed. These flows were collected using either weirs or a current meter, and although collected by volunteers, would be far more accurate than those which were calculated based on drainage area alone. The assessment data also contain flow measurements that were taken over the course of an entire year under varying flow conditions.

REPLY: When the Department developed the method to address AMD tmdls the states limited resources played a part in the decision to collect four to six samples during a one year period.

3) On page 34 of the TMDL document, it says that the Moshannon Creek Watershed Coalition (MCWC) will continue to work with the stakeholders to maintain current AMD treatment systems and pursue additional systems that will achieve the reductions recommended in the TMDL document. While MCWC will continue working within the watershed to assess pollution sources to Moshannon Creek and apply for funding to address identified impairments, it should be noted that the group is not capable of being financially responsible for the upkeep of current AMD treatment systems. Perhaps some rewording is in order to clarify the role of the watershed group in meeting TMDL reductions. Other stakeholders should be identified and the role of DEP in addressing the said reductions should be described as well.

   REPLY: The paragraph in question has been slightly rewritten. The state of Pennsylvania depends upon the work of groups like the Moshannon Creek Watershed Coalition to assess stream quality in listed watersheds and to address various problems. The Department, through BAMR, will also address issues in listed watersheds.

4) Coordinates for the sampling locations should be included in the TMDL document so that comparisons can be made between this and subsequent studies.
   REPLY: The coordinates of the sample points were added to the sample data in Attachment E.