WEST BRANCH SUSQUEHANNA RIVER WATERSHED TMDL

Clearfield, Indiana, Cambria, Centre, Clinton, Cameron, Elk, Potter, Tioga, Lycoming, Union, Northumberland, Montour, Sullivan, Bradford, Columbia, McKean, and Wyoming Counties

Prepared for:

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INTRODUCTION

This report presents the Total Maximum Daily Loads (TMDLs) developed for segments in the West Branch Susquehanna River Watershed (Attachment A). These are done to address the impairments noted on the 1996 Pennsylvania Section 303(d) list of impaired waters, required under the Clean Water Act, and cover three segments on that list (Table 1). The West Branch Susquehanna River is listed as impaired for metals and pH. All impairments result from drainage of abandoned coal mines. The TMDL addresses the three primary metals associated with abandoned mine drainage (iron, aluminum, and manganese) and acidity.

Table 1. 303(d) Listed Segments

State Master Plan (SWP) Subbasins: 08A, 008B, 08C, 08D, 09A, 09B, 09C, 10A, 10B, 10C, 10D										
HUCs: 02050201, 02050202, 02050203, 02050204, 02050205, 02050206										
Year	**Miles**	**Use Designation**	**Assessment ID**	**Segment ID**	**PADEP Stream Code**	**Stream Name**	**Designated Use**	**Data Source**	**Source**	**EPA 305(b) Cause Code**
1996	**79.7**	**Aquatic Life**	*****	**7170**	**18668**	**West Branch Susquehanna River**	**WWF**	**305(b)**	**AMD**	**Metals**
1996	**50.57**	**Aquatic Life**	*****	**7480**	**18668**	**West Branch Susquehanna**	**WWF**	**305(b)**	**AMD**	**Metals**
1996	**3.0**	**Aquatic Life**	*****	**7190**	**18668**	**West Branch Susquehanna**	**WWF**	**303(d)**	**AMD**	**Metals**
1996	**12.76**	**Aquatic Life**	*****	**7517**	**18668**	**West Branch Susquehanna**	**WWF**	**303(d)**	**AMD**	**Metals**
2002	**8.37**	**Aquatic Life**	*****	**11104**	**18668**	**West Branch Susquehanna**	**WWF**	**303(d)**	**AMD**	**Metals**
2002	**20.04**	**Aquatic Life**	*****	**11106**	**18668**	**West Branch Susquehanna**	**WWF**	**303(d)**	**AMD**	**Metals, Thermal**
2002	**7.55**	**Aquatic Life**	*****	**11120**	**18668**	**West Branch Susquehanna**	**WWF**	**303(d)**	**AMD**	**Metals**
2004	**12.54**	**Aquatic Life**	*****	**4352**	**18668**	**West Branch Susquehanna**	**WWF**	**303(d)**	**AMD**	**Metals, Siltation**
2006	**1.80**	**Aquatic Life**	*****	**12857**	**18668**	**West Branch Susquehanna**	**WWF**	**303(d)**	**AMD**	**Metals**

AMD = Abandoned Mine Drainage
WWF = Warm Water Fishery
See Attachment B, *Excerpts Justifying Changes Between the 1996, 1998, and 2002 303(d) Lists and Integrated Report (2004, 2006).* The use designations for the stream segments in this TMDL can found in PA Title 25 Chapter 93.

Location

The West Branch Susquehanna River mainstem is located on the U.S. Geological Survey 7.5 minute quadrangles of Carrolltown, Barnesboro, Burnside, Mahaffey, McGees Mills, Curwensville, Glen Richey, Clearfield, Lecontes Mills, Frenchville, Karthaus, Pottersdale, Snow Shoe NW, Keating, Renovo West, Farrandsville, Glen Union, Lock Haven, Jersey Shore, Linden, Williamsport, Montoursville South, Muncy, Allenwood, Milton, Lewisburg, and Northumberland, Pa. The major urban areas consist of Williamsport, Montoursville, Jersey Shore, Lock Haven, Renovo, Clearfield, and Lumber City. State Highways 879 and 120 travel parallel to the river through most of the watershed. State Highways 144, 970, 453, 36, U.S.

Routes 219, 322, and Interstate 80 are some of the major roads that bisect portions of the mainstem of the West Branch Susquehanna River. Numerous township roads provide access to the West Branch Susquehanna River and its tributaries.

Segments Addressed in this TMDL

The West Branch Susquehanna River is affected by pollution from AMD. This pollution has caused low pH, and in some cases, high levels of metals in the watershed. The TMDLs will be expressed as long-term average loadings. Due to the nature and complexity of mining effects on the watershed, expressing the TMDL as a long-term average gives a better representation of the data used for the calculations.

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 those uses. 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's) implementing regulations (40 CFR 130) require:

- States to develop lists (Section 303(d) lists) of impaired waters for which current pollution controls are not stringent enough to meet water quality standards (the list is used to determine which streams need TMDLs);

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

- States to submit the list of waters to USEPA every two years (April 1 of the even numbered years);

- States to develop TMDLs, specifying a pollutant budget that meets state water quality standards and allocate pollutant loads among pollution sources in a watershed, e.g., point and nonpoint sources; and

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

Section 303(d) Listing Process

Prior to developing TMDLs for specific waterbodies, sufficient data must be 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 (PADEP) 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 Section 305(b)[1] reporting process. Since that time, PADEP 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. A 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 include kick-screen sampling of benthic macroinvertebrates, habitat surveys, and measurements of pH, temperature, conductivity, dissolved oxygen, and alkalinity. Benthic macroinvertebrates are identified to the family level in the field.

After the survey is completed, the biologist determines the status of the stream segment. The decision is based on the performance of the segment using a series of biological metrics. If the stream is determined to be impaired, the source and cause of the impairment are documented. An impaired stream must be placed on the state's 303(d) list with the documented source and cause. A TMDL must be developed for the stream segment. Each 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, basic processes or steps apply to all cases. They include:

1. Collect and summarize 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. Provide public review and comment and comment period on draft TMDL;

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

6. Submit of final TMDL; and
7. Obtain USEPA approval of the TMDL.

This document will present the information used to develop the West Branch Susquehanna River Watershed TMDL.

Watershed Background

The West Branch Susquehanna River Watershed headwaters lie within the Appalachian Plateau Province. There is a vertical drop in the watershed of about 1,800 feet from its headwaters to the mouth. The average annual precipitation is approximately 40 inches. The region is characterized by warm summers and long, cold winters. Temperatures change frequently and sometimes rapidly.

The stream flows east from eastern Cambria County into western Northumberland County. Some of the larger tributaries to the West Branch Susquehanna River include Kettle Creek, Sinnemahoning Creek, Clearfield Creek, Pine Creek, Bald Eagle Creek, Lycoming Creek, Moshannon Creek, and Loyalsock Creek. The watershed drains approximately 6,992 square miles of Cambria, Clearfield, Elk, Cameron, Potter, Clinton, Centre, Tioga, Sullivan, Lycoming, Union, Northumberland, Indiana, Jefferson, Blair, Huntingdon, McKean, Bradford, Wyoming, Columbia, Snyder, and Montour Counties. It originates in West Carroll Township, Cambria County, near the borough of Carrolltown, and flows north into Clearfield County. The West Branch Susquehanna River then turns to the northeast and flows to Renovo, Clinton County. Next it swings southeast towards Lock Haven, Clinton County. At Lock Haven, the West Branch Susquehanna River cuts through the Allegheny Front and turns to the northeast to flow along the northern flank of Bald Eagle Mountain to Muncy, Lycoming County. At Muncy, the West Branch Susquehanna River turns to the south and flows to its confluence with the Susquehanna River at Northumberland, Northumberland County (Dillon, 2005).

The watershed is dominated by forested land uses which account for approximately 83 percent of the area. The land use is primarily rural in nature, containing more than 1.4 million acres of state forest land, greater than 250,000 acres of state game lands, and over 29,000 acres of state park land. Agriculture accounts for approximately 10 percent of the West Branch Susquehanna River Watershed. The remaining seven percent of land use is developed and disturbed lands (Dillon, 2005).

The West Branch Susquehanna River Watershed has primarily sandstone geology, which accounts for approximately 60 percent of the watershed. Interbedded sedimentary rock comprises the remaining 40 percent of the West Branch Susquehanna River Watershed.

Historical data show mining began in the watershed during the late 1800s with the development of deep mines for bituminous coal. A viable deep-mining coal industry was present in the watershed through the mid 1900s, with the decline of the industry around 1960-1970s (Vapco Engineering, 2001). In the late 1950s, many strip mining operations were initiated in the West Branch Susquehanna River Watershed. By the 1970s, surface or strip mining was the prevalent type of mining. Strip mining extracted the outcrop coals left behind by deep mining or the higher coal seams above the seams that were deep mined. Coal mining operations, both surface and deep, are currently active within the watershed (Table 3). The major coal seams in the watershed are the Upper and Lower Freeport and Upper, Middle, and Lower Kittanning seams, all of the Allegheny Group. The Brookville/Clarion seam of the Allegheny Group is also present, though it is not mined extensively, as it is thin or absent in many areas. The Mercer coal seam of the Pottsville Group and the Mahoning coal seam of the Conemaugh Group are also found in the watershed; however, these seams are usually thin and not of economic value (Gwin, Dobson, and Foreman, 1972).

In 2005, the Governor's West Branch Susquehanna River Task Force completed the West Branch Susquehanna River State of the Watershed Report. Of all the impaired stream miles in the subbasin, 1,205 miles are degraded by AMD. This represents 66 percent of the total AMD-impaired mileage in the entire Susquehanna River Basin. In addition, 42,062 acres of un-reclaimed AML features, or nearly 23 percent of the entire Commonwealth's share, are found within the West Branch Susquehanna Watershed. Nearly 6,462 of those acres are considered Priority I or II Health and Safety Problem sites, as designated by the U.S. Office of Surface Mining (OSM). These features include surface mine pits, highwalls, spoil piles, refuse piles, mine openings, subsidence prone areas, and other miscellaneous mine features. In addition, many of these features contribute to the problem associated AMD discharges to waterways. There are approximately 887 known mine drainage discharges with a combined flow of just over 300,000 gallons per minute (SRBC, 2008; West Branch Susquehanna River Task Force, 2005).

In the West Branch Susquehanna River, many of the discharges that contribute AMD to waterways are the result of surface refuse piles and flooded underground mine complexes. The flooded underground mine complexes are commonly referred to as "mine pools". The single most influential mine pool in the West Branch has historically been associated with the Barnes and Tucker Lancashire mine complex, and more specifically the Lancashire #15 mine. The Lancashire #15 mine complex covers about 12,000 acres. In addition, the mine pool is believed to be connected to at least 7 other major mine complexes. During a series of blowouts in 1970, the Lancashire #15 mine discharged severely acidic, metal-laden water that impacted water quality conditions as far down river as Williamsport. The major increase in pollutant loads resulted in extensive fish kills (OSM, 2004; Roller, 1970). From 1973 to 2001, a court ruling required the Barnes and Tucker Company to operate and maintain a pump/treat operation to prevent the mine pool water from discharging to the West Branch Susquehanna River. The operation discharged to the Allegheny River Watershed via Blacklick Creek. However, with the bankruptcy of the company in 2001, PA BAMR assumed control of the treatment facility. Based on inefficiencies with the treatment operation, as well as cost considerations, PA BAMR is planning to construct a new pump/treat operation that will discharge to the West Branch Susquehanna River (OSM, 2004).

Permits in the West Branch Susquehanna Watershed

There are numerous facilities that have permits for discharging effluent to water within the West Branch Susquehanna River Watershed. Facilities holding discharge permits have been given waste load allocations (WLAs) within the TMDL calculations, based on the nature of the effluent discharged and the status of the receiving water. The three types of WLA scenarios incorporated into the TMDL calculations are: (1)WLAs assigned to coal mining permits for existing and future operations, (2) WLAs assigned to any non-coal mining facility permits with metals limits (i.e. industrial waste) and (3) additional WLAs assigned to multiple facilities (coal mining or otherwise). Additional WLAs, rather than individual WLAs, were used when the receiving water was designated as impaired and needing a TMDL developed at a later date. The WLA is intended to cover a number of permitted discharges, as well as incorporate any potential unaccounted loads, based on data limitations that exist with regards to water quality and flow information for the contributing area. In addition, the unaccounted loads provide an added margin of safety. Information on known discharges for this WLA can be found in Attachment H.

Table 2. Coal Mining Permits in the West Branch Susquehanna Watershed

Permit No.	NPDES No.	Company Name	Permit Acronym	Operation	Status
11823011	PA0607614	L & J Energy	GAR1	Garmantown 1 Mine	Stage 1/Regraded
11830108	PA0605972	L & J Energy	GAR2	Garmantown 2 Mine	Stage 1/Regraded
11841604*	PA0009873	RNS SVC Inc.	LAN25	Lancashire #25 Prep	Stage 1/Regraded
11900106	PA0598909	Cloe Mining Co.	REED	Reed Mine	Stage 1/Regraded
11990101	PA0235041	Twin Brook Coal Co.	RJCK	RJC Kohl No 4	Stage 1/Regraded
17000109	PA0242985	Kenneth	RISH	Rishel 1 Mine	Active
17010103	PA0243051	Bells Resources	MIKE	Michaels Mine	Active
17010108	PA0243108	Swisher Coal	BUTL	Butler Mine	Stage 1/Regraded
17030101	PA0243418	Amfire Mining	BRM2	Bell Run No 2	Active
17921603	PA0241612	Hepburnia Coal Co.	BLLT	Bells Landing Tip	Active
17930128	PA0219720	Amfire Mining	HEPF	Hepfer Mine	Active
17970110	PA0220655	Amfire Mining	BRM1	Bell Run 1 Mine	Active
11020103	PA0249335	L & J Energy	GAR8	Garmantown No 8 Mine	Active
11920102	PA0599425	L & J Energy	GAR5	Garmantown No 5 Mine	Stage 1/Regraded
11980101	PA0234737	L & J Energy	GAR7	Garmantown No 7 Mine	Stage 1/Regraded
17813093	PA0609609	Amfire Mining	BRTH	Breth 1	Stage 1/Regraded
17960113	PA0220396	Sky Haven Coal Co.	MAN1	Maney Mine	Active
17990104	PA0238252	Sky Haven Coal Co.	KEEW	Keewaydin Mine	Stage 1/Regraded
11000102	PA0235342	MB Energy	TRINK	Trinkley Mine	Active
11743703*	PA0590363	RNS Services Inc.	RNS25	Lancashire 25	Active
17020107	PA0243281	Amfire Mining	CARB	Carbon Mine	Not Started
17030110	PA0243540	Swisher Coal	GILL	Gill Mine	Active
17814000	PA0608769	TDK Coal	GRHM	Graham Mine	Active
17880126	PA0116599	Waroquier	ANTH	Antis Hill 2	Active
17940116	PA0219908	Amfire Mining	PPRN	Poplar Run Mine	Stage 1/Regraded
11960104	PA0213365	L & J Energy	GAR6	Garmantown No 6 Mine	Stage 1/Regraded
17030121	PA0243671	Amfire Mining	BRN3	Bell Run Mine 3	Active
17031301*	PA0235571	Parkwood Resources Inc.	PRKW	Cherry Tree Mine	Active
11941301*	PA0215007	L & J Energy Co.	LJGM	Garmantown Mine	Active
32733708*	PA0215503	Greenwich	DOUG	Douglas Run	Active
17071301*	PA0235784	Rosebud Mining Co.	ROSE	Harmony Mine	Active

* Deep Mine, Coal Preparation Plant, or Refuse Reprocessing Operation

In addition to the coal mining operations, there are numerous industrial operations in the watershed (Table 3). These operations have been given waste load allocations (WLAs) within the TMDL calculations, based on the nature of the effluent discharged to select waters within the West Branch Susquehanna River Watershed.

Table 3. Industrial Permits in the West Branch Susquehanna Watershed

NPDES No.	Company Name	Permit Acronym	Operation	Status
PA0252697	Northern Cambria Municipal Authority	NCBMA	N. Cambria Borough	Active
PA0096971	West Carroll Township Water and Sewer Authority	WCTWA	Bakerton Water Treatment	Active
PA0097462	Cherry Tree Borough Municipal Authority	CTBMA	Susquehanna Township	Active
PA0095231	Indiana County Municipal Services Authority	ICMSA	Arcadia Water Treatment	Active
PA0010031	Reliant Energy Mid-Atlantic Power Holdings, LLC	REMAP	Shawville Power Plant	Active
PA0009725	Jersey Shore Steel Company	JSSCO	Pine Creek Township	Active
PA0228702	The Pennsylvania State University	PENST	State College Borough	Active
PA0228214	CCDA Waters, LLC	CCDAL	Boggs Township	Active
PA0115215	Lucas Trucking Corp.	LUTCO	Piatt Township	Active
PA0228818	First Quality Tissue, LLC	FQT	Castanea Township	Active
PA0014575	Jersey Shore Area Joint Water Authority	JSJWA	Anthony Township	Active

In addition, the TMDL contains several future mining WLAs. These WLAs were requested by the Moshannon, Cambria, and Pottsville District Mining Offices (DMOs) to accommodate one or more future mining operations. This will allow for a more efficient review of future mining permits without the time-consuming process of amending this TMDL document. All comments and questions concerning the future mining WLAs in this TMDL are to be directed to the appropriate DMO. Future WLAs are calculated using the method described for quantifying pollutant load in Attachment F.

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

All of the remaining discharges in the watershed are from abandoned mines and will be treated as nonpoint sources. The distinction between nonpoint and point sources in this case is determined on the basis of whether or not there is a responsible party for the discharge. By definition, TMDLs will be expressed as daily loadings.

Active mining operations in the watershed discharge to the mainstem and its tributaries. Some permits are for remining operations that are not contributing to point source pollution because they have not created any new discharges and have not caused degradation of pre-existing discharges. The discharges in the watershed stem from a combination of active and abandoned mines. Discharges from active mining will be treated as point sources and abandoned discharges will be treated as nonpoint sources. Each pollutant listed under Section 303(d) of the Clean Water Act will be addressed as a separate TMDL.

AMD METHODOLOGY

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

The statistical analysis described below can be applied to situations where all of the pollutant loading is from nonpoint sources, as well as those where there are both point and nonpoint sources. The following defines point sources and nonpoint sources for the purposes of our evaluation. Point sources are defined as permitted discharges or a discharge that has a responsible party; nonpoint sources are 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 is 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 uses the point source data and a mass balance is performed 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 are 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[2] by performing 5,000 iterations to determine the required percent reduction so that the water quality criteria, as defined in the *Pennsylvania Code, Title 25 Environmental Protection, Department of Environmental Protection, Chapter 93, Water Quality Standards,* will be met instream at least 99 percent of the time. For each iteration, the required percent reduction is:

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

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

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.

For pH TMDLs, acidity is compared to alkalinity. 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 from AMD 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.

Water Quality Data

The data used for the TMDL determinations relied primarily on water quality data collected during 2004 and 2005 (Attachment E). A total of 38 sites were monitored to determine the extent and severity of AMD impacts to the main stem of the West Branch Susquehanna River. Thirty-three of those monitoring sites were chosen to be used in the TMDL calculations. The impaired portion of the West Branch Susquehanna River covered by the TMDL analyses originates in the vicinity of Carrolltown in the headwaters and continues downstream to Williamsport. For some samples in the headwaters region, concentrations for iron, aluminum and acidity reached as high as 23 mg/l, 49 mg/l and >400 mg/l respectively. Within the same reaches of the river, the pH dropped as low as 3.2 during certain times of the year.

For the purposes of determining the true reductions needed for the West Branch Susquehanna River, the simulation for existing conditions incorporated a nonpoint source contribution from the Barnes and Tucker Lancashire #15 mine pool. If there were no diversion of mine pool waters via pumping to the Allegheny River Watershed, the water would naturally flow into the West Branch as an abandoned mine discharge, similar to other abandoned discharges within the watershed. For each monitoring point used in the TMDL determinations, the anticipated concentration and loading from the Lancashire #15 mine pool was added to the observed water quality condition. The average concentration determined from samples collected from the mine pool are 242.58 mg/l for iron, 49.64 mg/l for aluminum, 12.47 mg/l for manganese, and 716.30 mg/l for acidity. The flow value used to determine loads was 7.39 million gallons per day, which represents the amount of water needed to be pumped to keep the mine pool at a steady-state elevation to prevent a break-out into the West Branch Susquehanna River (OSM, 2006). The effects of the treatment plant discharge on existing water quality conditions outlined in this TMDL will be significant. Using the same methods utilized to determine the needed reductions for the TMDL, a "treated" scenario was simulated using the anticipated design parameters outlined in the previous paragraph. The treated scenario can be referenced in two attachments; Attachment H *Allocation Summary Table for the Barnes and Tucker Treated Scenario*, and Attachment I *TMDL by Segments for the Barnes and Tucker Treated Scenario*.

TMDL Endpoints

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

Because of the nature of the pollution sources in the watershed, the TMDL's components makeup will be load allocations for nonpoint sources and waste load allocations for point sources 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. Pa. Title 25 Chapter 96.3(c) specifies that the water quality standards must be met 99 percent of the time. The iron TMDLs are expressed as total recoverable as the iron data used for this analysis were reported as total recoverable. Table 4 shows the water quality criteria for the selected parameters.

Table 4. Applicable Water Quality Criteria

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

* The pH values shown will be used when applicable. In the case of freestone streams with little or no buffering capacity, the TMDL endpoint for pH will be the natural background water quality. These values are typically as low as 5.4 (Pennsylvania Fish and Boat Commission).

TMDL Elements (WLA, LA, MOS)

$$TMDL = WLA + LA + MOS$$

A TMDL equation consists of a waste load allocation (WLA), load allocation (LA), and a margin of safety (MOS). The WLA is the portion of the load assigned to point sources. The LA is the portion of the load assigned to nonpoint sources. The MOS is applied to account for uncertainties in the computational process. The MOS may be expressed implicitly (documenting conservative processes in the computations) or explicitly (setting aside a portion of the allowable load).

Allocations Summary

These TMDLs will focus remediation efforts on the identified numerical reduction targets for each watershed. The reduction schemes in Table 5 for each segment are based on the assumption that all upstream allocations are implemented and take into account all upstream reductions. Attachment D contains the TMDLs by segment analysis for each allocation point in a detailed discussion. As changes occur in the watershed, the TMDLs may be re-evaluated to reflect current conditions. An implicit MOS based on conservative assumptions in the analysis is included in the TMDL calculations.

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

Each permitted discharge in a segment is assigned a WLA and is included in this table. The WLAs have also been included at some points for future mining operations. The difference between the TMDL and the WLA at each point is the LA at the point. The LA at each point includes all loads entering the segment including those from upstream allocation points. The percent reduction is calculated to show the amount of load that needs to be reduced from nonpoint sources within a segment in order for water quality standards to be met at the point.

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

Table 5. West Branch Susquehanna River Watershed Summary

Parameter	*Existing Load (lbs/day)*	*TMDL Allowable Load (lbs/day)*	*WLA (lbs/day)*	*LA (lbs/day)*	*NPS Load Reduction (lbs/day)*	*NPS % Reduction*
WBSR 33.0: West Branch Susquehanna River Headwaters						
Iron (lbs/day)	**0.41**	**0.41**	**-**	**0.41**	**0.00**	**0.0%**
Manganese (lbs/day)	**0.07**	**0.07**	**-**	**0.07**	**0.00**	**0.0%**
Aluminum (lbs/day)	**1.69**	**0.30**	**-**	**0.00**	**1.39**	**82.2%**
Acidity (lbs/day)	**-337.56**	**-**	**-**	**-**	**-**	**-**
WBSR 32.0: West Branch Susquehanna River at Carrolltown, PA						
Iron (lbs/day)	**46.77**	**3.27**	**-**	**3.27**	**43.50**	**93.0%**
Manganese (lbs/day)	**1.31**	**1.31**	**-**	**1.31**	**0.00**	**0.0%**
Aluminum (lbs/day)	**9.16**	**0.92**	**-**	**0.92**	**6.85**	**88.2%**
Acidity (lbs/day)	**-223.79**	**-**	**-**	**-**	**-**	**-**
WBSR 31.0: West Branch Susquehanna River upstream of Barnes and Tucker Lancashire #20						
Iron (lbs/day)	**17.51**	**3.50**	**-**	**3.50**	**0.00**	**0.0%**
Manganese (lbs/day)	**1.47**	**1.47**	**-**	**1.47**	**0.00**	**0.0%**
Aluminum (lbs/day)	**7.98**	**0.64**	**-**	**0.64**	**0.16**	**20.0%**
Acidity (lbs/day)	**-150.40**	**-**	**-**	**-**	**-**	**-**
LN20: Lancashire 20 Facility						
Iron (lbs/day)	**1.51**	**0.26**	**-**	**0.26**	**1.25**	**82.8%**
Manganese (lbs/day)	**0.23**	**0.16**	**-**	**0.16**	**0.07**	**30.4%**
Aluminum (lbs/day)	**0.26**	**0.26**	**-**	**0.26**	**0.00**	**0.0%**
Acidity (lbs/day)	**-8.42**	**NA**	**-**	**-**	**-**	**-**
WBSR 30.0: West Branch Susquehanna River downstream of Barnes and Tucker Lancashire #20						
Iron (lbs/day)	**24.73**	**5.94**	***4.52***	**1.42**	**3.53**	**44.6%**
Manganese (lbs/day)	**3.38**	**3.38**	***3.00***	**0.38**	**0.00**	**0.0%**
Aluminum (lbs/day)	**14.62**	**2.19**	***1.12***	**1.07**	**5.09**	**69.9%**
Acidity (lbs/day)	**-104.49**	**-**	***0.00***	**-**	**-**	**-**
WBSR 29.0: West Branch Susquehanna River downstream of Bakerton Reservoir UNT						
Iron (lbs/day)	**55.76**	**13.38**	***6.85***	**6.53**	**23.59**	**63.8%**
Manganese (lbs/day)	**11.16**	**5.25**	***4.53***	**0.72**	**5.91**	**53.0%**
Aluminum (lbs/day)	**45.06**	**4.51**	***1.75***	**2.76**	**28.12**	**86.2%**
Acidity (lbs/day)	**458.93**	**59.66**	***0.00***	**59.66**	**399.27**	**87.0%**
WBSR 28.0: West Branch Susquehanna River at Bakerton, PA						
Iron (lbs/day)	**58.63**	**21.69**	***6.78***	**14.91**	**0.00**	**0.0%**
Manganese (lbs/day)	**22.99**	**6.21**	***4.50***	**1.71**	**10.87**	**63.6%**
Aluminum (lbs/day)	**85.29**	**5.97**	***1.68***	**4.29**	**38.77**	**86.7%**
Acidity (lbs/day)	**868.15**	**34.73**	***0.00***	**34.73**	**434.15**	**92.8%**
WBSR 27.0: West Branch Susquehanna River upstream of Lesle Run						
Iron (lbs/day)	**47.50**	**13.30**	***6.78***	**6.52**	**4.27**	**24.3%**
Manganese (lbs/day)	**21.05**	**8.00**	***4.50***	**3.50**	**0.00**	**0.0%**
Aluminum (lbs/day)	**66.74**	**7.34**	***1.68***	**5.66**	**0.00**	**0.0%**
Acidity (lbs/day)	**826.86**	**41.34**	***0.00***	**41.34**	**0.00**	**0.0%**
WBSR 26.0: West Branch Susquehanna upstream of Hoppel Run						
Iron (lbs/day)	**90.80**	**9.99**	***9.12***	**0.87**	**46.61**	**82.3%**
Manganese (lbs/day)	**29.83**	**11.93**	***6.06***	**5.87**	**4.85**	**28.9%**
Aluminum (lbs/day)	**102.58**	**10.26**	***2.68***	**7.58**	**32.92**	**76.2%**
Acidity (lbs/day)	**1,172.18**	**35.17**	***0.00***	**35.17**	**351.49**	**90.9%**

Table 5. West Branch Susquehanna River Watershed Summary (continued)

Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	NPS Load Reduction (lbs/day)	NPS % Reduction
WBSR 25.0: West Branch Susquehanna River downstream of previous Barnes & Watkins Refuse Pile						
Iron (lbs/day)	**344.42**	**17.22**	***8.53***	**8.69**	**246.39**	**93.5%**
Manganese (lbs/day)	**32.97**	**14.83**	***5.67***	**9.16**	**0.24**	**1.6%**
Aluminum (lbs/day)	**445.33**	**4.45**	***2.12***	**2.33**	**348.56**	**98.7%**
Acidity (lbs/day)	**3,928.63**	**0.39**	***0.00***	**0.39**	**2,791.62**	**99.99%**
WBSR 24.0: West Branch Susquehanna River upstream of Lancashire #15 proposed treatment facility						
Iron (lbs/day)	**736.07**	**29.44**	**-**	**29.44**	**379.43**	**92.8%**
Manganese (lbs/day)	**52.56**	**17.34**	**-**	**17.34**	**17.08**	**49.6%**
Aluminum (lbs/day)	**1,277.54**	**11.50**	**-**	**11.5**	**836.66**	**99.99%**
Acidity (lbs/day)	**10,682.29**	**1.07**	**-**	**1.07**	**6,753.66**	**99.99%**
WBSR 23.0: West Branch Susquehanna River downstream of Lancashire #15 proposed treatment facility						
Iron (lbs/day)	**16,029.66**	**160.30**	***6.78***	**153.52**	**15,162.73**	**99.0%**
Manganese (lbs/day)	**850.96**	**93.61**	***4.50***	**89.11**	**722.13**	**88.5%**
Aluminum (lbs/day)	**4,412.47**	**44.12**	***1.68***	**42.44**	**3,102.31**	**98.6%**
Acidity (lbs/day)	**56,005.38**	**5.60**	***0.00***	**5.60**	**45,317.49**	**99.98%**
WBSR 22.0: West Branch Susquehanna River downstream of Fox Run						
Iron (lbs/day)	**16,014.85**	**160.15**	***6.78***	**153.37**	**0.00**	**0.0%**
Manganese (lbs/day)	**904.81**	**108.58**	***4.50***	**104.08**	**38.88**	**26.4%**
Aluminum (lbs/day)	**4,329.08**	**43.29**	***1.68***	**42.01**	**0.00**	**0.0%**
Acidity (lbs/day)	**55,355.95**	**5.54**	***0.00***	**5.54**	**0.00**	**0.0%**
WBSR 21.0: West Branch Susquehanna River near West Branch, PA						
Iron (lbs/day)	**15,746.87**	**157.47**	***6.78***	**150.69**	**0.00**	**0.0%**
Manganese (lbs/day)	**886.20**	**159.52**	***4.50***	**155.02**	**0.00**	**0.0%**
Aluminum (lbs/day)	**3,950.54**	**79.01**	***1.68***	**77.33**	**0.00**	**0.0%**
Acidity (lbs/day)	**42,646.83**	**7,249.96**	***0.00***	**7,249.96**	**0.00**	**0.0%**
WBSR 20.0: West Branch Susquehanna River upstream of Walnut Run						
Iron (lbs/day)	**15,730.28**	**157.30**	***6.78***	**150.52**	**0.00**	**0.0%**
Manganese (lbs/day)	**886.08**	**168.35**	***4.50***	**163.85**	**0.00**	**0.0%**
Aluminum (lbs/day)	**3,926.92**	**117.81**	***1.68***	**116.13**	**0.00**	**0.0%**
Acidity (lbs/day)	**40,976.66**	**8,195.33**	***0.00***	**8,195.33**	**0.00**	**0.0%**
WBSR 19.0: West Branch Susquehanna River downstream of Walnut Run						
Iron (lbs/day)	**15,748.52**	**314.97**	***7.03***	**307.94**	**0.00**	**0.0%**
Manganese (lbs/day)	**893.63**	**196.60**	***4.63***	**191.97**	**0.00**	**0.0%**
Aluminum (lbs/day)	**3,952.73**	**118.58**	***2.18***	**116.40**	**25.04**	**17.4%**
Acidity (lbs/day)	**37,700.05**	**12,441.02**	***0.00***	**0.00**	**0.00**	**0.0%**
WBSR 18.0: West Branch Susquehanna River upstream of Amsbry, PA						
Iron (lbs/day)	**15,733.38**	**314.67**	***72.53***	**242.14**	**0.00**	**0.0%**
Manganese (lbs/day)	**906.40**	**235.66**	***48.343***	**187.317**	**0.00**	**0.0%**
Aluminum (lbs/day)	**3,924.67**	**156.99**	***20.393***	**136.597**	**0.00**	**0.0%**
Acidity (lbs/day)	**37,030.22**	**12,590.28**	***0.00***	**12,590.28**	**0.00**	**0.0%**
WBSR 17.0: West Branch Susquehanna River north of Emeigh, PA						
Iron (lbs/day)	**15,564.42**	**311.29**	***12.85***	**298.44**	**0.00**	**0.0%**
Manganese (lbs/day)	**896.78**	**260.07**	***6.81***	**253.26**	**0.00**	**0.0%**
Aluminum (lbs/day)	**3,762.30**	**150.49**	***3.01***	**147.48**	**0.06**	**0.03%**
Acidity (lbs/day)	**33,620.20**	**12,775.67**	***0.00***	**12,775.67**	**0.00**	**0.0%**
WBSR 16.0: West Branch Susquehanna River downstream of Cush Cushion Creek						
Iron (lbs/day)	**15,419.94**	**462.60**	***97.24***	**365.36**	**0.00**	**0.0%**

Table 5. West Branch Susquehanna River Watershed Summary (continued)

Parameter	*Existing Load (lbs/day)*	*TMDL Allowable Load (lbs/day)*	*WLA (lbs/day)*	*LA (lbs/day)*	*NPS Load Reduction (lbs/day)*	*NPS % Reduction*
Manganese (lbs/day)	**883.97**	**335.91**	***61.34***	**274.57**	**0.00**	**0.0%**
Aluminum (lbs/day)	**3,593.43**	**179.67**	***23.02***	**156.65**	**0.00**	**0.0%**
Acidity (lbs/day)	**31,876.67**	**14,344.50**	***0.00***	**14,344.50**	**0.00**	**0.0%**
WBSR 15.0: West Branch Susquehanna River at Kantz Hill Road						
Iron (lbs/day)	**15,319.73**	**612.79**	***6.78***	**606.01**	**0.07**	**0.01%**
Manganese (lbs/day)	**876.98**	**473.57**	***4.50***	**469.07**	**0.00**	**0.0%**
Aluminum (lbs/day)	**3,523.46**	**246.64**	***1.68***	**244.96**	**0.00**	**0.0%**
Acidity (lbs/day)	**27,542.87**	**13,771.43**	***0.00***	**13,771.43**	**0.00**	**0.0%**
WBSR 14.0: West Branch Susquehanna River upstream of Cush Creek						
Iron (lbs/day)	**15,362.36**	**921.74**	***6.78***	**914.96**	**0.00**	**0.0%**
Manganese (lbs/day)	**891.39**	**632.88**	***4.50***	**628.38**	**0.00**	**0.0%**
Aluminum (lbs/day)	**3,654.92**	**328.94**	***1.68***	**327.26**	**49.16**	**13.0%**
Acidity (lbs/day)	**18,061.50**	**9,753.21**	***0.00***	**9,753.21**	**0.00**	**0.0%**
WBSR 13.0: West Branch Susquehanna River downstream of Cush Creek						
Iron (lbs/day)	**15,395.24**	**1,231.62**	***10.13***	**1,221.49**	**0.00**	**0.0%**
Manganese (lbs/day)	**929.95**	**790.46**	***6.73***	**783.73**	**0.00**	**0.0%**
Aluminum (lbs/day)	**3,707.99**	**370.80**	***2.55***	**368.25**	**11.21**	**2.9%**
Acidity (lbs/day)	**21,693.26**	**11,063.56**	***0.00***	**11,063.56**	**2,321.41**	**17.3%**
WBSR 12.0: West Branch Susquehanna River at McGees Mills, PA						
Iron (lbs/day)	**15,952.25**	**2,233.31**	***9.00***	**2,224.31**	**0.00**	**0.0%**
Manganese (lbs/day)	**1,037.94**	**1,037.94**	***5.98***	**1,031.96**	**0.00**	**0.0%**
Aluminum (lbs/day)	**4,850.61**	**630.58**	***2.24***	**628.34**	**882.84**	**58.3%**
Acidity (lbs/day)	**14,621.38**	**8,041.76**	***0.00***	**8,041.76**	**0.00**	**0.0%**
BEAR 1.0: Bear Run at its mouth						
Iron (lbs/day)	**244.20**	**64.0**	**-**	**-**	**-**	**0.0%**
Manganese (lbs/day)	**209.00**	**56.2**	**-**	**-**	**-**	**7.0%**
Aluminum (lbs/day)	**141.10**	**48.3**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**5,677.40**	**510.70**	**-**	**-**	**-**	**73.0%**
WBSR 11.0: West Branch Susquehanna River at Bower, PA						
Iron (lbs/day)	**16,328.78**	**4,245.48**	***88.50***	**4,156.98**	**0.00**	**0.0%**
Manganese (lbs/day)	**1,255.85**	**1,255.85**	***57.26***	**1,198.59**	**0.00**	**0.0%**
Aluminum (lbs/day)	**6,060.46**	**909.07**	***21.46***	**887.61**	**838.55**	**48.0%**
Acidity (lbs/day)	**2,054.25**	**2,054.25**	***0.00***	**2,054.25**	**0.00**	**0.0%**
WBSR 10.0: West Branch Susquehanna River downstream of Curwensville Dam						
Iron (lbs/day)	**17,025.81**	**8,342.64**	***13.10***	**8,329.54**	**0.00**	**0.0%**
Manganese (lbs/day)	**1,922.88**	**1,922.88**	***8.71***	**1,914.17**	**0.00**	**0.0%**
Aluminum (lbs/day)	**9,658.07**	**1,448.71**	***4.60***	**1,444.11**	**3,057.97**	**67.9%**
Acidity (lbs/day)	**-29,655.95**	**-**	***0.00***	**-**	**-**	**-**
A 2: Anderson Creek at its mouth						
Iron (lbs/day)	**173.20**	**172.20**	**-**	**-**	**-**	**0.0%**
Manganese (lbs/day)	**569.30**	**-**	**-**	**-**	**-**	**0.0%**
Aluminum (lbs/day)	**488.80**	**-**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**7,783.80**	**5,290.30**	**-**	**-**	**-**	**0.0%**
HART 01: Hartshorn at its mouth						
Iron (lbs/day)	**-**	**-**	**-**	**-**	**-**	**0.0%**
Manganese (lbs/day)	**7.30**	**7.30**	**-**	**-**	**-**	**0.0%**
Aluminum (lbs/day)	**-**	**-**	**-**	**-**	**-**	**0.0%**

Table 5. West Branch Susquehanna River Watershed Summary (continued)

Parameter	*Existing Load (lbs/day)*	*TMDL Allowable Load (lbs/day)*	*WLA (lbs/day)*	*LA (lbs/day)*	*NPS Load Reduction (lbs/day)*	*NPS % Reduction*
Acidity (lbs/day)	**785.10**	**86.40**	**-**	**-**	**-**	**0.0%**
PR 01: UNT 26641 to WBSR at its mouth						
Iron (lbs/day)	**-**	**-**	**-**	**-**	**-**	**-**
Manganese (lbs/day)	**43.30**	**10.10**	**-**	**-**	**-**	**54.0%**
Aluminum (lbs/day)	**6.70**	**2.70**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**526.90**	**83.40**	**-**	**-**	**-**	**71.0%**
MC 1: Montgomery Creek at its mouth						
Iron (lbs/day)	**55.50**	**55.50**	**-**	**-**	**-**	**0.0%**
Manganese (lbs/day)	**1,007.20**	**40.70**	**-**	**-**	**-**	**0.0%**
Aluminum (lbs/day)	**412.90**	**33.30**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**7,652.20**	**75.90**	**-**	**-**	**-**	**0.0%**
WBSR 9.0 West Branch Susquehanna River at Hyde, PA						
Iron (lbs/day)	**17,360.65**	**8,853.93**	***8.75***	**8,848.27**	**0.00**	**0.0%**
Manganese (lbs/day)	**3,089.25**	**3,089.25**	***5.81***	**3,083.44**	**0.00**	**0.0%**
Aluminum (lbs/day)	**11,118.58**	**1,667.79**	***2.65***	**1,665.14**	**369.03**	**18.1%**
Acidity (lbs/day)	**34,824.20**	**21,591.01**	***0.00***	**21,591.01**	**12,021.19**	**35.8%**
MOOS 01: Moose Creek at its mouth						
Iron (lbs/day)	**-**	**-**	**-**	**-**	**-**	**-**
Manganese (lbs/day)	**128.90**	**56.70**	**-**	**-**	**-**	**26.0%**
Aluminum (lbs/day)	**96.60**	**44.40**	**-**	**-**	**-**	**24.0%**
Acidity (lbs/day)	**2,895.30**	**376.40**	**-**	**-**	**-**	**47.0%**
LR 01: Lick Run at its mouth						
Iron (lbs/day)	**-**	**-**	**-**	**-**	**-**	**-**
Manganese (lbs/day)	**180.40**	**103.10**	**-**	**-**	**-**	**0.0%**
Aluminum (lbs/day)	**-**	**-**	**-**	**-**	**-**	**-**
Acidity (lbs/day)	**5,764.90**	**856.90**	**-**	**-**	**-**	**1.0%**
CLCR 1.0: Clearfield Creek at its mouth						
Iron (lbs/day)	**4,024.00**	**1,530.20**	**-**	**-**	**-**	**0.0%**
Manganese (lbs/day)	**5,242.50**	**1,728.60**	**-**	**-**	**-**	**0.0%**
Aluminum (lbs/day)	**2,267.00**	**793.50**	**-**	**-**	**-**	**6.0%**
Acidity (lbs/day)	**42,790.30**	**11,561.90**	**-**	**-**	**-**	**57.0%**
WBSR 8.0: West Branch Susquehanna River at Shawville, PA						
Iron (lbs/day)	**22,046.89**	**11,023.44**	***145.53***	**10,877.91**	**22.93**	**0.2%**
Manganese (lbs/day)	**9,706.94**	**5,047.61**	***107.17***	**4,940.44**	**995.93**	**16.5%**
Aluminum (lbs/day)	**16,287.92**	**2,443.19**	***119.54***	**2,323.65**	**2,868.24**	**54.0%**
Acidity (lbs/day)	**192,477.05**	**65,442.20**	***0.00***	**65,442.20**	**75,155.36**	**53.5%**
MP 06: Surveyor Run at its mouth						
Iron (lbs/day)	**27.00**	**27.00**	**-**	**-**	**-**	**0.0%**
Manganese (lbs/day)	**188.60**	**28.30**	**-**	**-**	**-**	**0.0%**
Aluminum (lbs/day)	**166.30**	**26.60**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**3,277.90**	**295.00**	**-**	**-**	**-**	**62.0%**
WBSR 7.0: West Branch Susquehanna River at Frenchville Station, PA						
Iron (lbs/day)	**23,301.90**	**10,951.89**	***38.60***	**10,913.29**	**1,326.56**	**10.8%**
Manganese (lbs/day)	**8,851.26**	**4,956.71**	***25.72***	**4,930.99**	**0.00**	**0.0%**
Aluminum (lbs/day)	**18,874.06**	**2,831.11**	***10.12***	**2,820.99**	**2,058.52**	**42.1%**

Table 5. West Branch Susquehanna River Watershed Summary (continued)

Parameter	*Existing Load (lbs/day)*	*TMDL Allowable Load (lbs/day)*	*WLA (lbs/day)*	*LA (lbs/day)*	*NPS Load Reduction (lbs/day)*	*NPS % Reduction*
Acidity (lbs/day)	**200,189.95**	**64,060.78**	***0.00***	**64,060.78**	**6,111.42**	**8.7%**
DEER 1.0 Deer Creek at its mouth						
Iron (lbs/day)	**470.60**	**94.10**	**-**	**-**	**-**	**0.0%**
Manganese (lbs/day)	**589.40**	**94.10**	**-**	**-**	**-**	**60.0%**
Aluminum (lbs/day)	**291.30**	**96.40**	**-**	**-**	**-**	**48.0%**
Acidity (lbs/day)	**9,844.60**	**1,082.40**	**-**	**-**	**-**	**54.0%**
BR 01: Big Run at its mouth						
Iron (lbs/day)	**-**	**-**	**-**	**-**	**-**	**-**
Manganese (lbs/day)	**7.3**	**3.2**	**-**	**-**	**-**	**55.0%**
Aluminum (lbs/day)	**-**	**-**	**-**	**-**	**-**	**-**
Acidity (lbs/day)	**269.50**	**56.6**	**-**	**-**	**-**	**76.0%**
SC 1.0: Sandy Creek at its mouth						
Iron (lbs/day)	**263.60**	**78.50**	**-**	**-**	**-**	**65.0%**
Manganese (lbs/day)	**627.70**	**19.60**	**-**	**-**	**-**	**0.0%**
Aluminum (lbs/day)	**332.20**	**19.60**	**-**	**-**	**-**	**1.0%**
Acidity (lbs/day)	**5,860.20**	**175.30**	**-**	**-**	**-**	**1.0%**
AR 01: Alder Run at its mouth						
Iron (lbs/day)	**4,505.40**	**149.10**	**-**	**-**	**-**	**89.0%**
Manganese (lbs/day)	**1,067.40**	**100.40**	**-**	**-**	**-**	**76.0%**
Aluminum (lbs/day)	**2,091.20**	**110.00**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**38,433.60**	**0.00**	**-**	**-**	**-**	**100.0%**
WBSR 6.0: West Branch Susquehanna River at Rolling Stone, PA						
Iron (lbs/day)	**31,183.72**	**10,914.30**	***6.78***	**10,907.52**	**3,001.51**	**21.6%**
Manganese (lbs/day)	**10,953.52**	**5,148.15**	***4.50***	**5,143.65**	**0.00**	**0.0%**
Aluminum (lbs/day)	**15,378.59**	**6,305.22**	***1.68***	**6,303.54**	**0.00**	**0.0%**
Acidity (lbs/day)	**318,183.14**	**136,818.75**	***0.00***	**136,818.75**	**0.00**	**0.0%**
MOUTH: Moshannon Creek at its mouth						
Iron (lbs/day)	**11,371.55**	**2,274.31**	**-**	**-**	**-**	**98.0%**
Manganese (lbs/day)	**5,980.20**	**2,392.08**	**-**	**-**	**-**	**65.0%**
Aluminum (lbs/day)	**14039.01**	**1,,825.07**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**324,221.21**	**3,242.21**	**-**	**-**	**-**	**39.0%**
WBSR 5.0: West Branch Susquehanna River at Karthaus, PA						
Iron (lbs/day)	**53,281.23**	**8,525.00**	***10.11***	**8,514.89**	**24,486.81**	**74.2%**
Manganese (lbs/day)	**25,056.51**	**10,022.61**	***6.72***	**10,015.89**	**9,228.53**	**47.9%**
Aluminum (lbs/day)	**30,232.95**	**5,139.60**	***2.98***	**5,136.62**	**16,019.98**	**75.7%**
Acidity (lbs/day)	**570,238.76**	**148,262.08**	***0.00***	**148,262.08**	**240,612.29**	**61.9%**
BIR 02: Birch Island Run at its mouth						
Iron (lbs/day)	**-**	**-**	**-**	**-**	**-**	**-**
Manganese (lbs/day)	**17.4**	**17.4**	**-**	**-**	**-**	**0.0%**
Aluminum (lbs/day)	**-**	**-**	**-**	**-**	**-**	**-**
Acidity (lbs/day)	**1,254.70**	**589.70**	**-**	**-**	**-**	**5.0%**
CR 1.0: Cooks Run at its mouth						
Iron (lbs/day)	**709.50**	**22.10**	**-**	**-**	**-**	**0.0%**
Manganese (lbs/day)	**165.60**	**34.50**	**-**	**-**	**-**	**23.0%**
Aluminum (lbs/day)	**432.0**	**22.10**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**8,942.80**	**1,966.90**	**-**	**-**	**-**	**20.0%**
KC 1: Kettle Creek at its mouth						
Iron (lbs/day)	**278.50**	**278.00**	**-**	**-**	**-**	**0.0%**
Manganese (lbs/day)	**130.00**	**130.00**	**-**	**-**	**-**	**0.0%**

Table 5. West Branch Susquehanna River Watershed Summary (continued)

Parameter	*Existing Load (lbs/day)*	*TMDL Allowable Load (lbs/day)*	*WLA (lbs/day)*	*LA (lbs/day)*	*NPS Load Reduction (lbs/day)*	*NPS % Reduction*
Aluminum (lbs/day)	**278.50**	**241.40**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**3,063.90**	**1,875.50**	**-**	**-**	**-**	**0.0%**
WBSR 4.0: West Branch Susquehanna River at Renovo, PA						
Iron (lbs/day)	**29,716.20**	**29,716.20**	***29.23***	**29,686.97**	**0.00**	**0.0%**
Manganese (lbs/day)	**17,385.23**	**17,385.23**	***19.47***	**17,365.76**	**0.00**	**0.0%**
Aluminum (lbs/day)	**69,388.24**	**4,857.18**	***9.14***	**4,848.04**	**38,990.71**	**88.9%**
Acidity (lbs/day)	**904,707.05**	**117,611.92**	***0.00***	**117,611.92**	**356,990.71**	**75.2%**
WBSR 3.0: West Branch Susquehanna River at Lock Haven, PA						
Iron (lbs/day)	**39,316.66**	**31,453.33**	***19.30***	**31,434.03**	**4863.33**	**13%**
Manganese (lbs/day)	**20,268.21**	**20,268.21**	***12.85***	**20,255.36**	**0.00**	**0%**
Aluminum (lbs/day)	**33,949.66**	**10,863.89**	***10.03***	**10,853.86**	**0.00**	**0%**
Acidity (lbs/day)	**1,177,312.76**	**164,823.79**	***0.00***	**164,823.79**	**225393.84**	**58%**
WBSR 2.0: West Branch Susquehanna River at Jersey Shore, PA						
Iron (lbs/day)	**55,802.55**	**18,972.87**	***91.88***	**18,880.99**	**28966.35**	**60%**
Manganese (lbs/day)	**27,399.80**	**18,631.86**	***46.74***	**18,585.12**	**8767.94**	**32%**
Aluminum (lbs/day)	**51,270.12**	**9,741.32**	***73.49***	**9,667.83**	**18443.03**	**65%**
Acidity (lbs/day)	**355,565.19**	**167,115.64**	***0.00***	**167,115.64**	**0**	**0%**
WBSR 1.0: West Branch Susquehanna River at Williamsport, PA						
Iron (lbs/day)	**49,792.52**	**46,804.97**	***46.571***	**46,758.399**	**0.00**	**0.0%**
Manganese (lbs/day)	**19,901.66**	**19,901.66**	***30.83***	**19,870.83**	**0.00**	**0.0%**
Aluminum (lbs/day)	**50,622.55**	**18,730.34**	***29.26***	**18,701.08**	**0.00**	**0.0%**
Acidity (lbs/day)	**267,552.86**	**195,313.59**	***0.00***	**195,313.59**	**0.00**	**0.0%**

Italicized numbers indicate that future mining WLAs have been included.

The following is an example of how the allocations in Table 5 for a stream segment are calculated. For this example, aluminum allocations for WBSR 25.0 of the West Branch Susquehanna River are shown. As demonstrated in the example, all upstream contributing loads are accounted for at each point. Attachment D contains the TMDLs by segment analysis for each allocation point in a detailed discussion. These analyses follow the example below. Attachment A contains maps of the sampling point locations for reference.

Allocations for WBSR 26.0	
	Al* *(lbs/day)
Existing load at WBSR 26.0	102.58
Allowable load at WBSR 26.0	10.26

Allowable Load = 10.26

Load input = 342.75
(Difference between
existing loads
At WBSR 25.0 and WBSR
26.0)

Allocations at WBSR 25.0	
	Al (lbs/day)
Existing load at WBSR 25.0	445.33
Difference of measured loads between loads that enter and existing WBSR 25.0	342.75
Percent loss due calculated at WBSR 25.0	0.0%
Additional loads tracked from above samples	10.26
Percentage of upstream loads that reach WBSR 25.0	100.0%
Total load tracked between WBSR 26.0 and WBSR 25.0	353.01
Allowable load at WBSR 25.0	4.45
Load Reduction at WBSR 25.0	348.56
Percent Reduction required at WBSR 25.0	98.7%

Allowable load= 4.45

The allowable aluminum load tracked from WBSR 26.0 is 10.26 lbs/day. The existing load at WBSR 26.0 was subtracted from the existing load at WBSR 25.0 to show the actual measured increase of aluminum load that has entered the stream between these upstream sites and WBSR 25.0 (342.75 lbs/day). This increased value was then added to the calculated allowable load from WBSR 26.0 to calculate the total load that was tracked between WBSR 26.0 and WBSR 25.0 (allowable loads @ WBSR 26.0 + the difference in existing load between WBSR 26.0 and WBSR 25.0). This total load tracked was then subtracted from the calculated allowable load at WBSR 25.0 to determine the amount of load to be reduced at WBSR 25.0. This total load was found to be 353.01 lbs/day; it was 348.56 lbs/day greater than the allowable load at WBSR 25.0 of 4.45 lbs/day. Therefore, a 98.7 percent aluminum reduction at WBSR 25.0 is necessary.

RECOMMENDATIONS

Statewide Reclamation Efforts

Since the 1960s, Pennsylvania has been a national leader in establishing laws and regulations to ensure mine reclamation and well plugging occur after active operation is completed. Mine reclamation and well plugging refer to the process of cleaning up environmental pollutants and safety hazards associated with a site and returning the land to a productive condition, similar to PADEP’s Brownfields Program. Pennsylvania is striving for complete reclamation of its abandoned mines and plugging of its orphan wells. These concepts include legislative, policy, and land management initiatives designed to enhance mine operator/volunteer/PADEP reclamation efforts.

Various methods to eliminate or treat pollutant sources provide a reasonable assurance that the proposed TMDLs can be met. 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 that are currently being used for projects designed to achieve TMDL reductions include the USEPA 319 grant program and Pennsylvania's Growing Greener Program. Federal funding is through the Department of the Interior's Office of Surface Mining (OSM) for reclamation and mine drainage treatment through the Appalachian Clean Streams Initiative and through Watershed Cooperative Agreements.

The PADEP Bureau of District Mining Operations (DMO) administers an environmental regulatory program for all mining activities, including mine subsidence regulation, mine subsidence insurance, and coal refuse disposal. PADEP DMO also conducts a program to ensure safe underground bituminous mining and protect certain structures from subsidence; administers a mining license and permit program; administers a regulatory program for the use, storage, and handling of explosives; and provides for training, examination, and certification of applicants' blaster's licenses. In addition, PADEP Bureau of Mining & Reclamation administers a loan program for bonding anthracite underground mines and for mine subsidence, the Small Operator's Assistance Program (SOAP), and the Remining Operator's Assistance Program (ROAP).

Regulatory programs are assisting in the reclamation and restoration of Pennsylvania's land and water. PADEP has been effective in implementing the NPDES program for mining operations throughout the Commonwealth. This reclamation was done through the use of remining permits that have the potential for reclaiming abandoned mine lands, at no cost to the Commonwealth or the federal government. Long-term agreements were initialized for facilities/operators that need to assure treatment of post-mining discharges or discharges they degraded. These agreements 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." Acidity loads from abandoned discharges have been observed to decrease by an average of 61 percent when remined (Smith, Brady, and Hawkins, 2002. "Effectiveness of Pennsylvania's remining program in abating abandoned mine drainage: water quality impacts" in Transactions of the Society for Mining, Metallurgy, and Exploration, Volume 312, p. 166-170).

PADEP BAMR, which administers the program to address the Commonwealth's abandoned mine reclamation program, has established a comprehensive plan for abandoned mine reclamation throughout the Commonwealth to prioritize and guide reclamation efforts for 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 are intended to guide this decision making process:

- Partnerships between the PADEP, 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 Attachment G).

- 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.

The Commonwealth is exploring all identified 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:

- 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 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 into the Upper West Branch Susquehanna River), and the Wadesville Deep Mine Pool (Exelon Generation in Schuylkill County).

Candidate or federally-listed threatened and endangered species may occur in or near the watershed. While implementation of the TMDL may result in improvements to water quality, it may also 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 PADEP's policy titled Policy for Pennsylvania Natural Diversity Inventory (PNDI) Coordination During Permit Review and Evaluation (Document ID# 400-0200-001).

Reclamation Efforts in the West Branch Susquehanna River Watershed

While numerous remediation projects have already been completed and others are underway, it will take decades at current funding levels until many of the problem areas in the West Branch are addressed. With over 1,200 miles of streams impaired by AMD and more than 42,000 acres of abandoned mine lands, restoration of the West Branch poses a significant challenge. In response to the need to improve conditions for both environmental and economic reasons, Pennsylvania has placed a high priority on efforts in the West Branch.

Regional Studies

To work towards achieving regional-scale environmental results with limited funds, Pennsylvania formed the Governor’s West Branch Task Force (WBTF). The West Branch Task Force is comprised of individuals from state and federal agencies and conservation groups. The Task Force was formed for the purpose of “restoring water resources impacted by abandoned mine lands and mine drainage within the West Branch Susquehanna River” (WBTF, 2005). In addition to the problems associated with the water quality itself, tremendous amounts of recreation and tourism dollars have been lost in the watershed due to the mining impacts. Analyses completed by the Pennsylvania Fish and Boat Commission (PFBC) estimate the total recreational use loss at $16,404,228 per year (WBTF, 2005). Restoring recreational fishing in the West Branch would improve the quality of life for the local communities. The goals of the West Branch Task Force include:

- Develop a comprehensive assessment and restoration plan for the West Branch Susquehanna Watershed, with a primary focus on abandoned mine lands and mine drainage.
- Provide support and technical assistance for efforts to address abandoned mine drainage within the West Branch Susquehanna watershed, with an initial emphasis on the completion of projects underway in the Bennett Branch Sinnemahoning and Kettle Creek watersheds.
- Build public support within the West Branch Susquehanna Watershed for a broad restoration effort.
- Secure adequate funding to carry out a West Branch restoration initiative.

The Task Force concluded that a comprehensive restoration plan for the watershed is essential to prioritize major discharges, so financial resources can be used for high priority areas. This will allow for the greatest benefit at the lowest cost. In moving forward with those planning recommendations, Task Force members Trout Unlimited and Pennsylvania's Departments of Environmental Protection and Conservation and Natural Resources provided funding for two studies completed in 2008.

The Susquehanna River Basin Commission (SRBC) worked under contract with PADEP, DCNR, and Trout Unlimited to complete the West Branch Susquehanna Subbasin AMD Remediation Strategy. The study concluded that most of the AMD loading (80 percent) impacting the West Branch is only found in a very small portion (10 percent) of the West Branch basin. Clearfield Creek, Moshannon Creek, Bennett Branch Sinnemahoning Creek, Kettle Creek, Beech Creek Subwatersheds and the headwaters of the West Branch, were identified as priority areas for restoration that would lead to large scale water quality improvements. However, total capital costs for complete restoration could be as high as $400 million.

Trout Unlimited funded and contracted Downstream Strategies, LLC from West Virginia to complete a companion study to the West Branch Strategy titled *An Economic Benefits Analysis for Abandoned Mine Drainage Remediation in the West Branch Susquehanna River Watershed*. This study concluded that:

1. Remediation project expenditures will create thousands of jobs and could generate as much as $616 million for capital expenditures and $23 million per year for the operation and maintenance of those systems.
2. An additional $22.3 million in sport fishing expenditures could be expected each year after remediation of the watershed is completed.
3. Property values of parcels near AMD impacted streams may increase by over $2,500 per acre.
4. Drinking water options will be cheaper and more plentiful for public water suppliers, private residences, and businesses.
5. Pennsylvania residents are willing to pay on average $73.6 million for West Branch restoration efforts.

Major efforts focused on the restoration of this extremely beautiful and economically valuable watershed are currently underway at the federal, state, and grassroots level. Significant increases in progress with AMD/AML reclamation are guaranteed with over $1 billion that is projected to be distributed to Pennsylvania through 2021 from Surface Mining Control and Reclamation Act (SMCRA) Title IV funding.

PADEP AMD Treatment Facilities

PADEP is in the process of constructing three AMD treatment systems to treat nonpoint source pollution in the most severely impacted areas of the watershed. These three areas are the Clearfield Creek Watershed, the Bennett Branch Sinnemahoning Creek Watershed, and the mainstem headwaters of the West Branch.

An AMD treatment plant is being considered for the headwaters of Clearfield Creek near the town of Cresson in Cambria County. The proposed plant would treat the Cresson/Gallitzin mine pools, which are significant sources of nonpoint source pollution to Clearfield Creek and the West Branch Susquehanna River. If the AMD from these mine pools were treated, a significant section of Clearfield Creek could be restored with water quality improvements extending to the mouth of Clearfield Creek.

Within the Bennett Branch Watershed, the design phase for the Hollywood Treatment Facility was recently completed. The proposed treatment facility in the headwaters will collect and treat over 25 nonpoint source discharges currently impacting the Bennett Branch. The Hollywood Facility will be treating over 5,000 GPM of water containing concentrations at a minimum of 177 mg/l of acidity, 21 mg/l of iron, 1.2 mg/l of manganese, and 12 mg/l of aluminum. Once the facility is operational, water quality improvements should extend all the way to the confluence of the Bennett Branch Sinnemahoning Creek with the Driftwood Branch Sinnemahoning Creek.

The first project scheduled for construction (2009-10) will be the Lancashire #15 AMD Treatment Plant in the headwaters of the West Branch mainstem. This system will be used to treat the water from the Lancashire #15 mine pool, described in earlier sections of this document (*Watershed Background* and *Water Quality Data*). The system will treat approximately 7.39 million gallons per day of mine pool water, and discharge the water to the West Branch Susquehanna River. The current design parameters provided by Pennsylvania Bureau of Abandoned Mine Reclamation (BAMR) show an operating pH of 7.5 with effluent limits of 0.59 mg/L for total aluminum, 1.26 mg/L for total iron, 5.81 mg/L for total manganese, and 24.0 mg/L for alkalinity.

The effects of the treatment plant discharge on existing water quality conditions outlined in this TMDL will be significant. Using the same methods utilized to determine the needed reductions for the TMDL, a “treated” scenario was simulated using the anticipated design parameters outlined in the previous paragraph. The treated scenario can be referenced in two attachments; Attachment H *Allocation Summary Table for the Barnes and Tucker Treated Scenario,* and Attachment I *TMDL by Segments for the Barnes and Tucker Treated Scenario*. The results of the “treated” scenario show that instream water quality criteria will be met 99% of the time for iron and manganese for an additional 80+ miles when the treatment plant is operational. In addition, due to the surplus alkalinity provided by the discharge, there would be no needed reductions for acidity loadings after approximately 2 miles downstream of the discharge. This is a dramatic improvement on the present condition which currently requires reductions at every TMDL monitoring point along the nearly 200-mile stretch of the West Branch Susquehanna River. Additionally, even the sites that still would require reductions show a dramatic drop in metal loadings with the addition of treated water from the proposed Lancashire treatment facility when compared to the existing condition.

Remining and Refuse Pile Removal

Remining and refuel pile removal are increasingly becoming successful techniques utilized by PADEP in restoring water quality conditions in the West Branch. The PADEP District Mining Offices are working with private industry for the remining of previously unreclaimed surface mines throughout the watershed. These surface mines were mined before SMCRA in 1977, and were left unreclaimed with no responsible party to fund cleanup activities. Those sites inventoried on the PADEP AML Inventory List are eligible for reclamation utilizing Title IV funding from SMCRA.

In many instances, some unreclaimed areas still have mineable coal by today's technology/economic standards that make extraction through remining an attractive investment for private industry. In the Moshannon District Office alone, over 15 remining authorizations were issued in 2008 in the West Branch, resulting in over 500 acres restored with an estimated reclamation value close to $8 million.

Additionally, mine refuse piles line the banks of many streams throughout the West Branch. These piles generally consist of low quality coal or coal waste that did not have any economic value at the time of mining. However, with the advent of better technology, there exists the incentive to recover these materials for producing energy at the various cogeneration facilities now in operation in Pennsylvania.

One particular example of a successful removal effort that has already greatly improved water quality conditions in the West Branch includes the Barnes and Watkins Mine Refuse Pile Project. The project was located in the headwaters of the West Branch upstream of the town of Northern Cambria, and was completed in the fall of 2007. The pile covered an area of 18 acres and contained 1.3 million tons of coal refuse placed along the eastern bank of the headwaters of the West Branch. According to PADEP, the project removed loads to the West Branch on average of 1,400 lbs/day of acidity, 200 lbs/day of iron, and 280 lbs/day of aluminum (Spyker, 2009). Consequently, the water quality of the West Branch headwaters has been vastly improved.

Figure 1 (modified from Spyker, 2009) represents aluminum concentrations for the West Branch Susquehanna River pre- and post-pile Barnes and Watkins Pile removal. Note the reductions in concentrations at the two downstream monitoring points WB4 and 102, representing locations immediately downstream and 1-mile downstream respectively. Site WB3 represents conditions upstream of the refuse pile removal site.

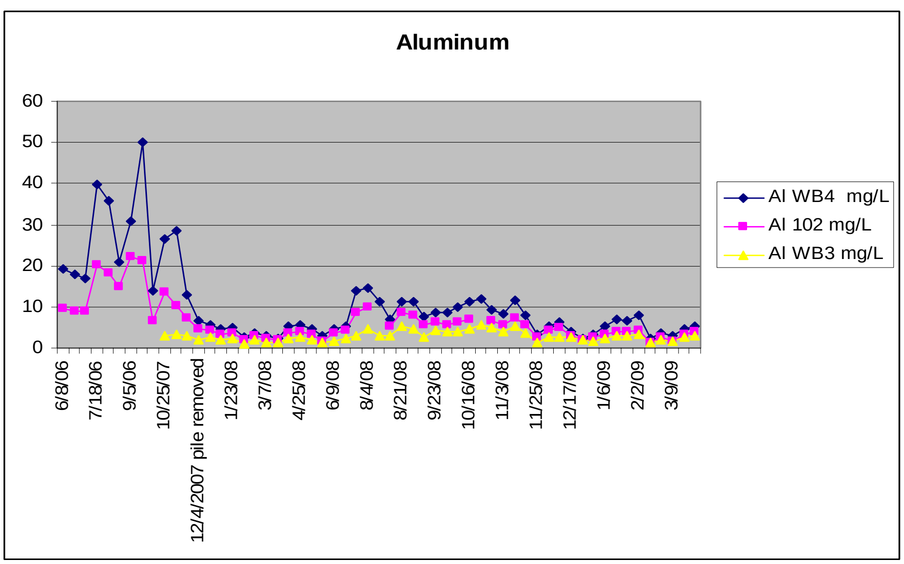

Figure 1. Aluminum Concentrations Pre- and Post-removal (from Spyker, 2009)

Partner Efforts

As part of the partner efforts in the West Branch, over thirty groups are actively engaged in restoration projects throughout the watershed and have organized collectively to form the West Branch Susquehanna Restoration Coalition (WBSRC). These groups include watershed associations, Trout Unlimited chapters, conservation districts, and local businesses. During 2009 alone, there is over $5 million in project work underway, not including contributed matching funds brought by the watershed partners.

Additionally, TU (in partnership with DEP) will be leading a monitoring effort focused on providing a benchmark for AMD recovery to track progress in the West Branch. Biological, habitat, and chemical data will be collected throughout the West Branch watershed during the spring and summer of 2009 using USEPA/PADEP protocols. The effort will target 86 AMD-impacted sites located primarily between the West Branch headwaters region to Lock Haven, and target both a high and low base flow event. All chemistry and flow data will be collected within the same two or three day time period in order to calculate comparable loadings. Additionally, the USGS will collect periphyton samples at all 86 locations mentioned above. Periphyton will be collected for both community structure identification and for fatty acid analyses in anticipation of creating a periphyton IBI.

Concurrent to the benchmark study, the Fish and Boat Commission and SRBC will be sampling fish communities at 4 and 8 river locations respectively, between the headwaters and Lock Haven. These data will be compared to data collected by the Fish and Boat Commission in 1998 and 1999.

Public Participation

In the beginning stages of the West Branch Susquehanna River Watershed TMDL, an early notification letter was sent to inform stakeholders and interested parties that a TMDL would be completed in their watershed and offer them the opportunity to submit information for TMDL development. PADEP considered all the information submitted and all pertinent information was included in the report.

The first round of public participation consisted of the draft TMDL that was published in the *Pennsylvania Bulletin* on January 18, 2007, and *The Progress* on February 17, 2007, to foster comment on the allowable loads calculated. A public meeting was held on February 22, 2007, at the Clearfield County Conservation District to discuss the proposed TMDL.

A second round of public participation included a public notice of the draft TMDL that was published in the *Pennsylvania Bulletin* on March 14, 2009, and *The Progress* on March 21, 2009, to foster public comment on the allowable loads calculated. A public meeting was held on March 26, 2009, at the Clearfield County Conservation District Office to discuss the proposed TMDL.

Future TMDL Modifications

In the future, PADEP may adjust the LA and/or WLA 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 LA and WLA will only be made following an opportunity for public participation. A WLA adjustment will be made consistent and simultaneous with associated permit(s) revision(s)/reissuances (i.e., permits for revision/reissuance in association with a TMDL revision will be made available for public comment concurrent with the related TMDLs availability for public comment). New information generated during TMDL implementation may include, among other things, monitoring data, BMP effectiveness information, and land use information. All changes in the TMDL will be tallied, and once the total changes exceed 1 percent 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. PADEP will notify USEPA 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 USEPA 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 WQS.
- Non-attainment of WQS with implementation of the TMDL.
- Allocations in trading programs.

Changes in TMDLs That May Not Require USEPA 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.

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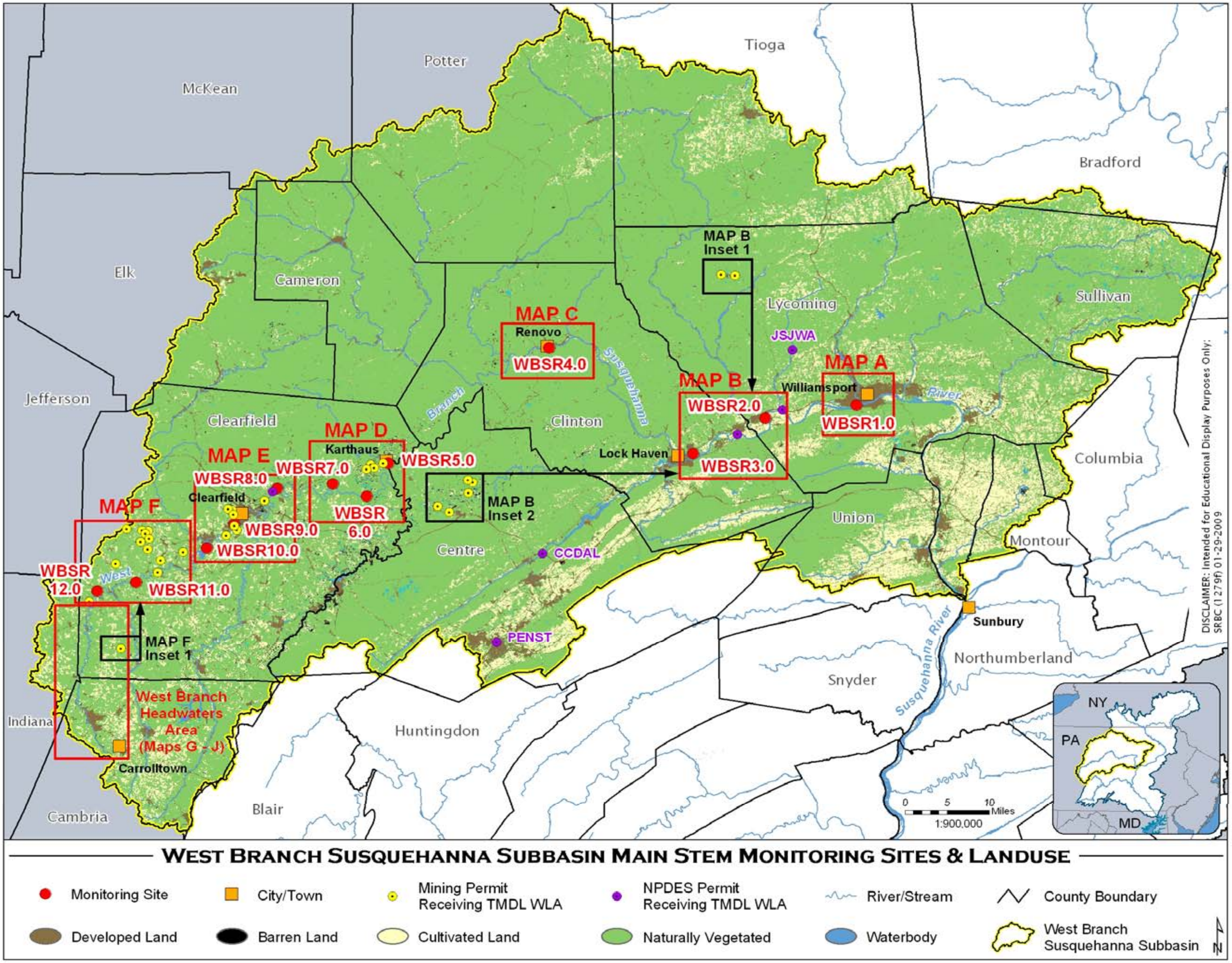
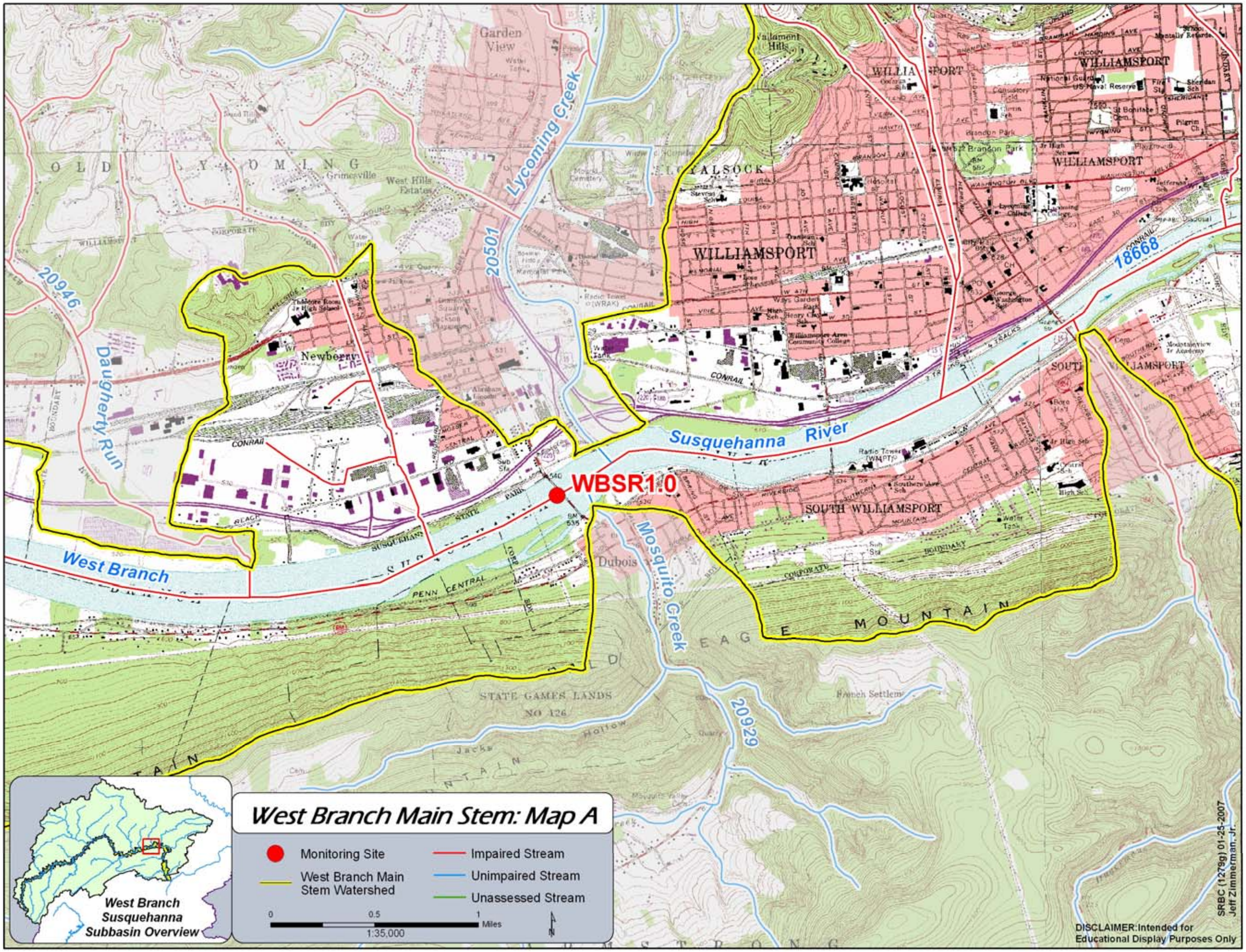
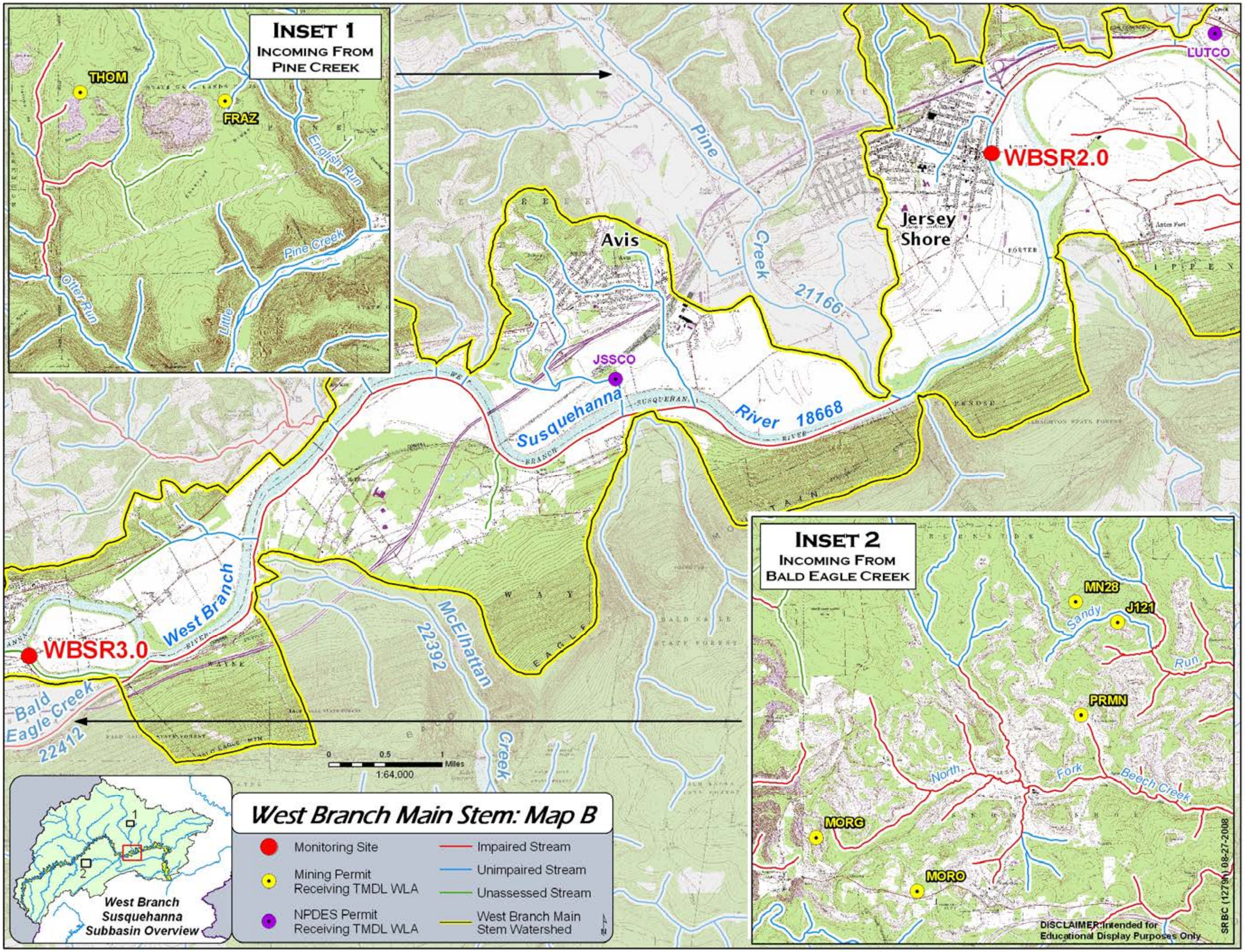
Attachment A

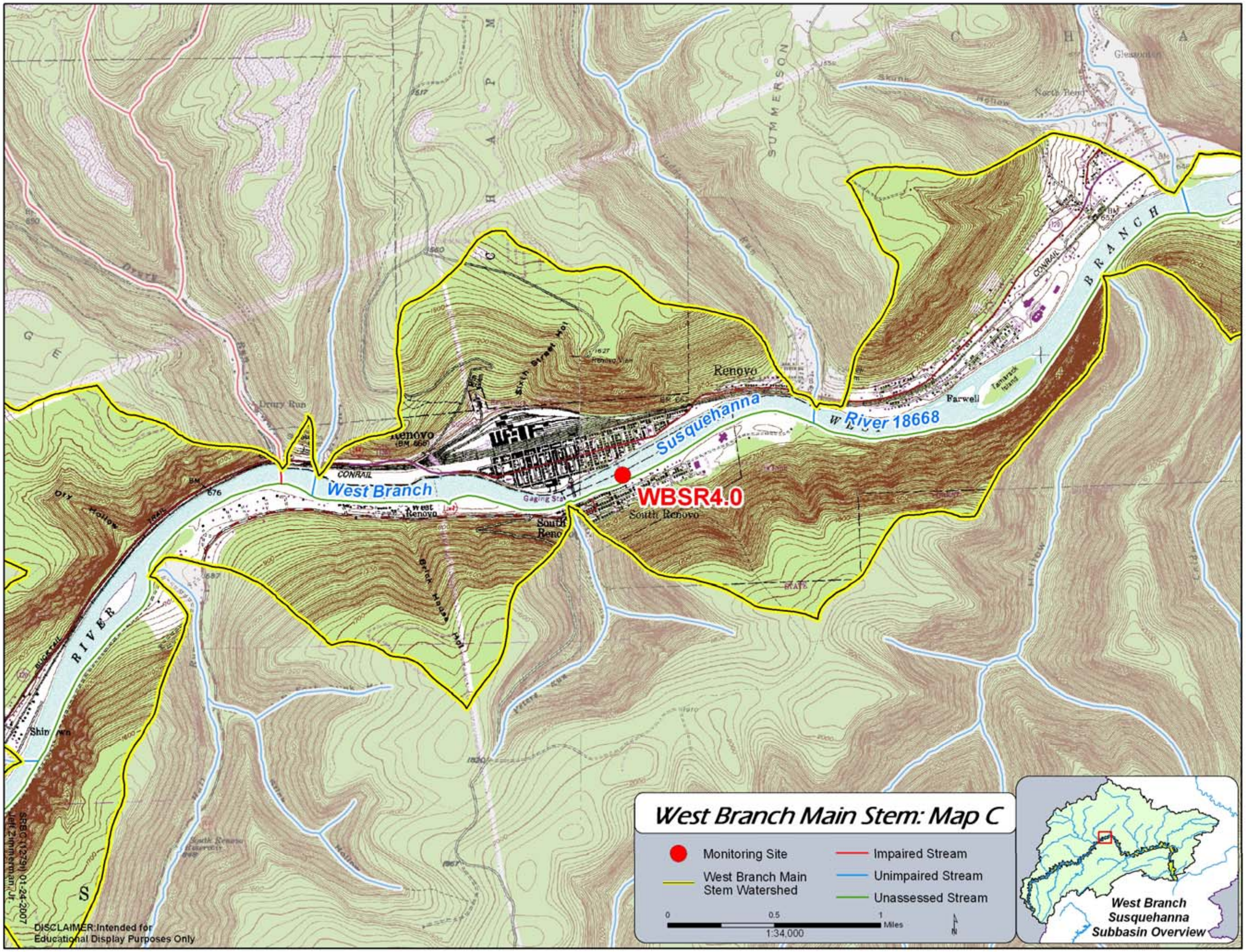
West Branch Susquehanna River Watershed Maps


WEST BRANCH SUSQUEHANNA SUBBASIN MAIN STEM MONITORING SITES & LANDUSE
McKean
Potter
Tioga
Bradford
Elk
Cameron
Lycoming
Sullivan
Jefferson
Clearfield
Clinton
Columbia
Centre
Union
Montour
Northumberland
Snyder
Indiana
Huntingdon
Cambria
Blair
MAP A
MAP B
MAP B Inset 1
MAP B Inset 2
MAP C
MAP D
MAP E
MAP F
MAP F Inset 1
West Branch Headwaters Area (Maps G - J)
WBSR1.0
WBSR2.0
WBSR3.0
WBSR4.0
WBSR5.0
WBSR 6.0
WBSR7.0
WBSR8.0
WBSR9.0
WBSR10.0
WBSR11.0
WBSR 12.0
Renovo
Karthaus
Clearfield
Lock Haven
Williamsport
Sunbury
Carrolltown
JSJWA
CCDAL
PENST
West
Branch
Susquehanna
River
Susquehanna River
NY
PA
MD
0 5 10 Miles
1:900,000
DISCLAIMER: Intended for Educational Display Purposes Only:
SRBC (1279f) 01-29-2009
Monitoring Site
City/Town
Mining Permit Receiving TMDL WLA
NPDES Permit Receiving TMDL WLA
River/Stream
County Boundary
Developed Land
Barren Land
Cultivated Land
Naturally Vegetated
Waterbody
West Branch Susquehanna Subbasin
N


West Branch Main Stem: Map A
Monitoring Site
West Branch Main Stem Watershed
Impaired Stream
Unimpaired Stream
Unassessed Stream
0
0.5
1
Miles
1:35,000
West Branch Susquehanna Subbasin Overview
WBSR1.0
Susquehanna River
West Branch
Lycoming Creek
Mosquito Creek
Daugherty Run
20946
20501
18668
20929
WILLIAMSPORT
SOUTH WILLIAMSPORT
Newberry
Dubois
STATE GAMES LANDS NO 126
DISCLAIMER:Intended for Educational Display Purposes Only
SRBC (1279g) 01-25-2007
Jeff Zimmerman, Jr.



INSET 1
INCOMING FROM PINE CREEK
THOM
FRAZ
English Run
Pine Creek
Otter Run
Little
Pine
Creek
21166
Avis
Jersey Shore
WBSR2.0
LUTCO
JSSCO
Susquehanna
River 18668
West Branch
WBSR3.0
McElhattan
22392
Creek
Bald Eagle Creek
22412
0 0.5 1 Miles
1:64,000
INSET 2
INCOMING FROM BALD EAGLE CREEK
MN28
J121
Sandy
Run
PRMN
North
Fork
Beech Creek
MORG
MORO
DISCLAIMER: Intended for Educational Display Purposes Only
SRBC (1279) 08-27-2008
West Branch Susquehanna Subbasin Overview
West Branch Main Stem: Map B
Monitoring Site
Mining Permit Receiving TMDL WLA
NPDES Permit Receiving TMDL WLA
Impaired Stream
Unimpaired Stream
Unassessed Stream
West Branch Main Stem Watershed


West Branch Main Stem: Map C
Monitoring Site
West Branch Main Stem Watershed
Impaired Stream
Unimpaired Stream
Unassessed Stream
0
0.5
1
Miles
1:34,000
West Branch Susquehanna Subbasin Overview
WBSR4.0
West Branch
Susquehanna
River 18668
RIVER
BRANCH
CONRAIL
Renovo
South Renovo
Farwell
Drury Run
Tamarack Island
Shintown
Glencoe
North Bend
SRBC (1227s) 01-24-2007
Jeff Zimmerman Jr.
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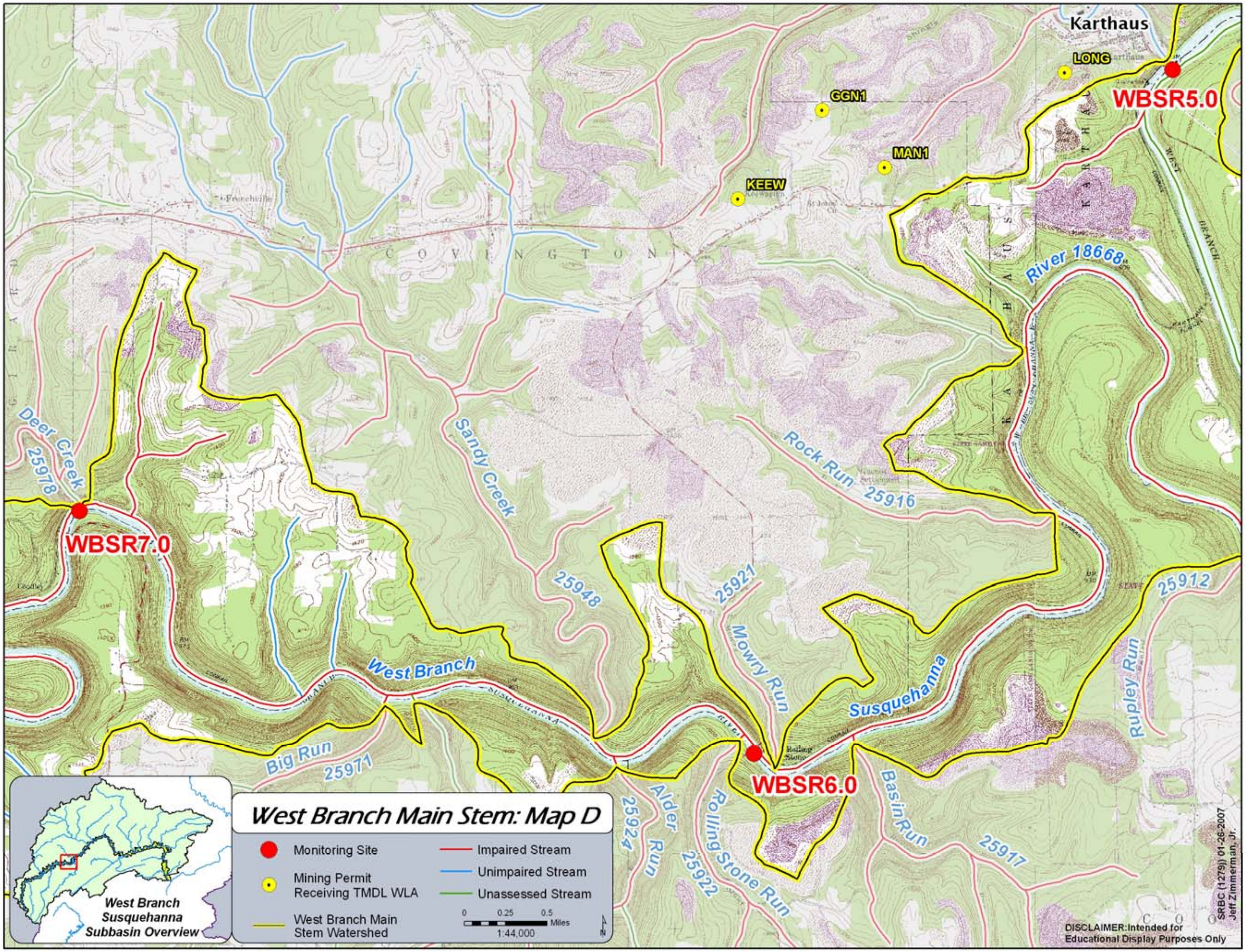
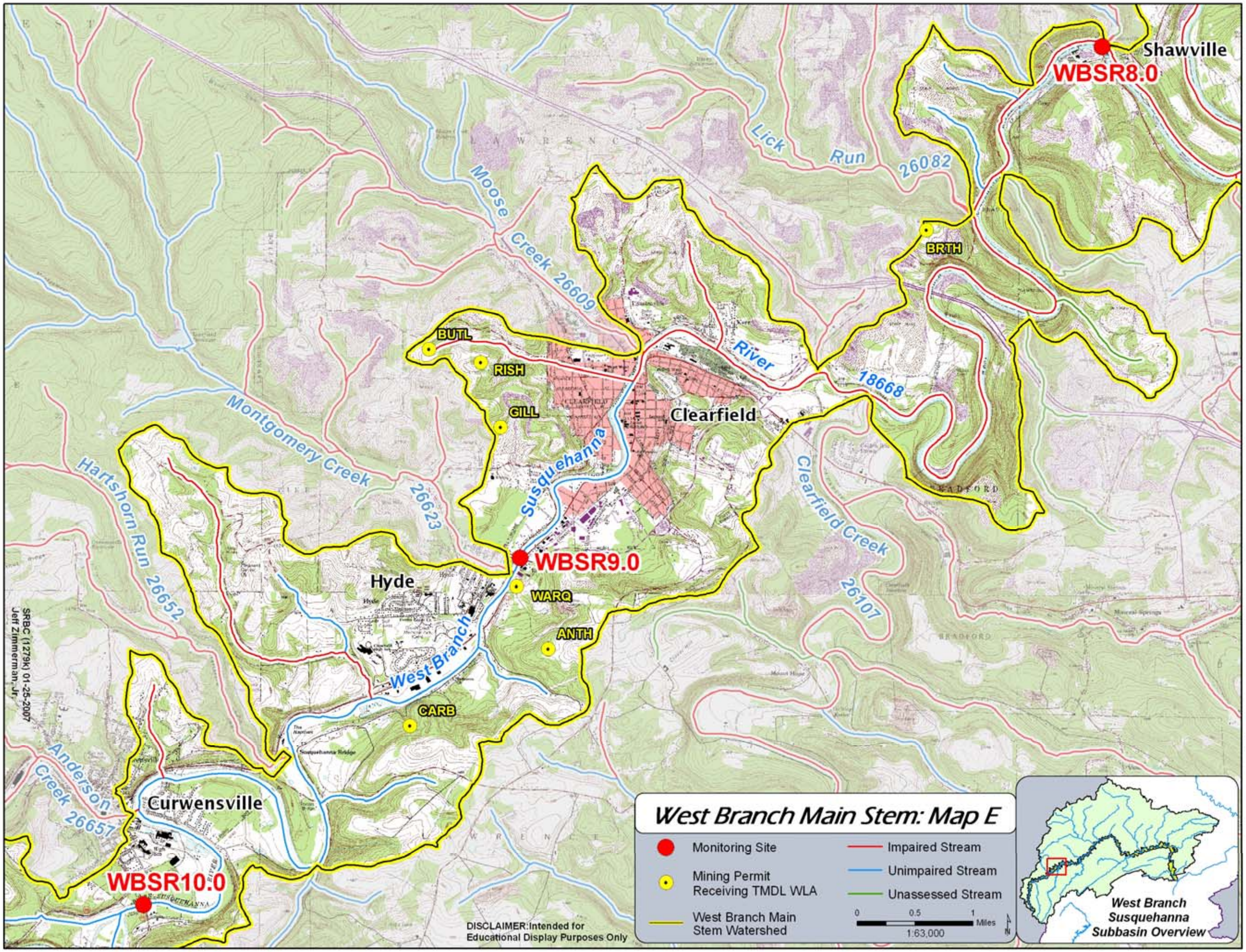
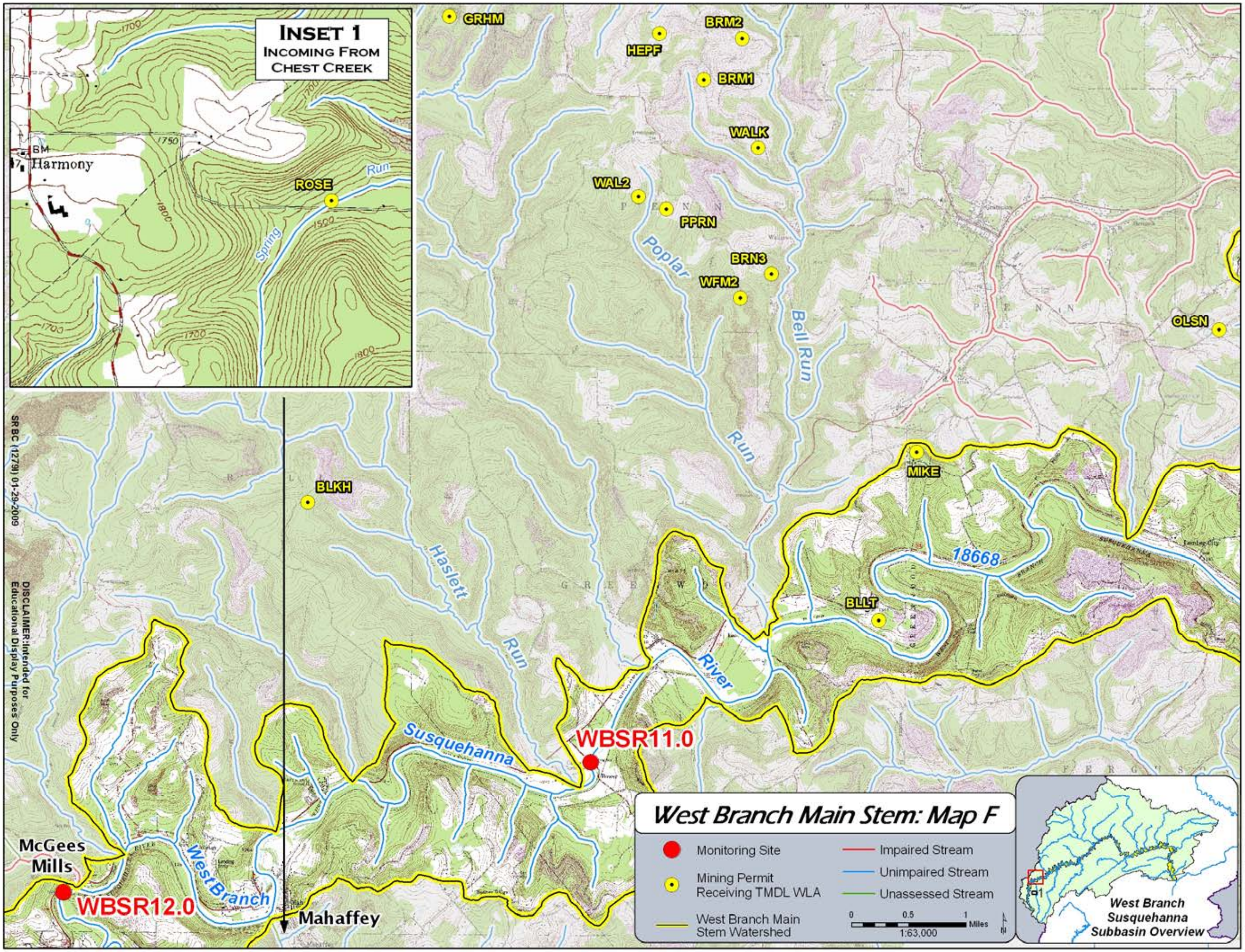

West Branch Main Stem: Map D
Monitoring Site
Mining Permit Receiving TMDL WLA
West Branch Main Stem Watershed
Impaired Stream
Unimpaired Stream
Unassessed Stream
0 0.25 0.5 Miles
1:44,000
West Branch Susquehanna Subbasin Overview
Karthaus
LONG
GGN1
MAN1
KEEW
WBSR5.0
WBSR6.0
WBSR7.0
C O V I N G T O N
River 18668
Rock Run 25916
Sandy Creek
25948
25921
Mowry Run
Deer Creek 25978
West Branch
Susquehanna
Big Run 25971
Alder Run 25924
Rolling Stone Run 25922
Basin Run 25917
Rupley Run
25912
DISCLAIMER: Intended for Educational Display Purposes Only
SRBC (1279) 01-26-2007
Jeff Zimmerman, Jr.


West Branch Main Stem: Map E
Monitoring Site
Mining Permit Receiving TMDL WLA
West Branch Main Stem Watershed
Impaired Stream
Unimpaired Stream
Unassessed Stream
0 0.5 1 Miles
1:63,000
West Branch Susquehanna Subbasin Overview
DISCLAIMER:Intended for Educational Display Purposes Only
SRBC (1279k) 01-25-2007
Jeff Zimmerman, Jr.
Shawville
WBSR8.0
WBSR9.0
WBSR10.0
Clearfield
Hyde
Curwensville
Lick Run 26082
Moose Creek 26609
River 18668
Susquehanna
West Branch
Montgomery Creek 26623
Hartshorn Run 26652
Anderson Creek 26657
Clearfield Creek 26107
BUTL
RISH
GILL
BRTH
WARQ
ANTH
CARB



West Branch Main Stem: Map F
Inset 1
Incoming From Chest Creek
Harmony
BM
Spring Run
ROSE
1700
1750
1800
1500
GRHM
HEPF
BRM2
BRM1
WALK
WAL2
PPRN
BRN3
WFM2
OLSN
MIKE
BLKH
BLLT
Poplar Run
Bell Run
Haslett Run
West Branch Susquehanna River
18668
WBSR11.0
WBSR12.0
McGees Mills
Mahaffey
Monitoring Site
Mining Permit Receiving TMDL WLA
West Branch Main Stem Watershed
Impaired Stream
Unimpaired Stream
Unassessed Stream
0 0.5 1 Miles
1:63,000
West Branch Susquehanna Subbasin Overview
SRBC (12/79) 01-29-2009
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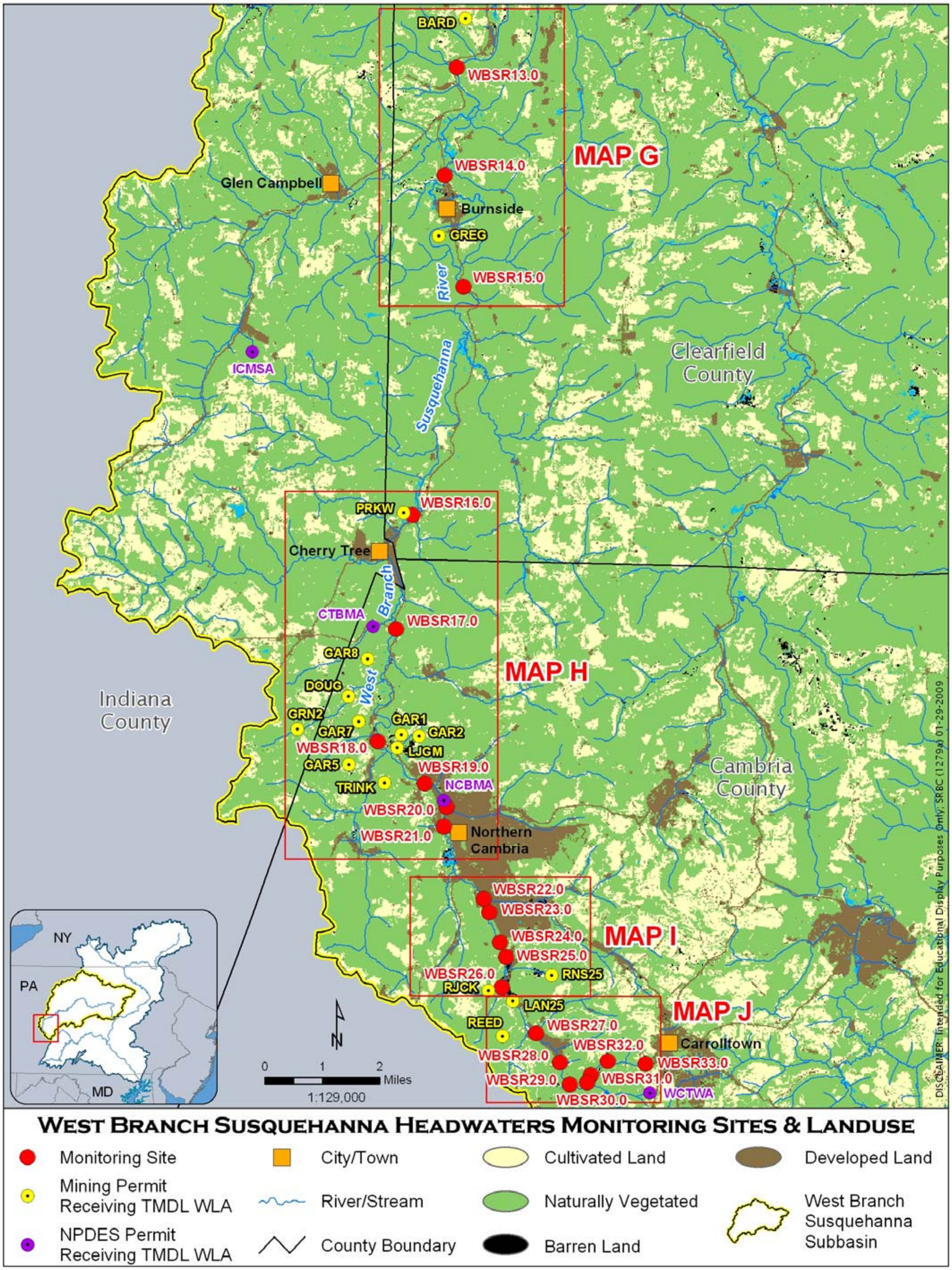
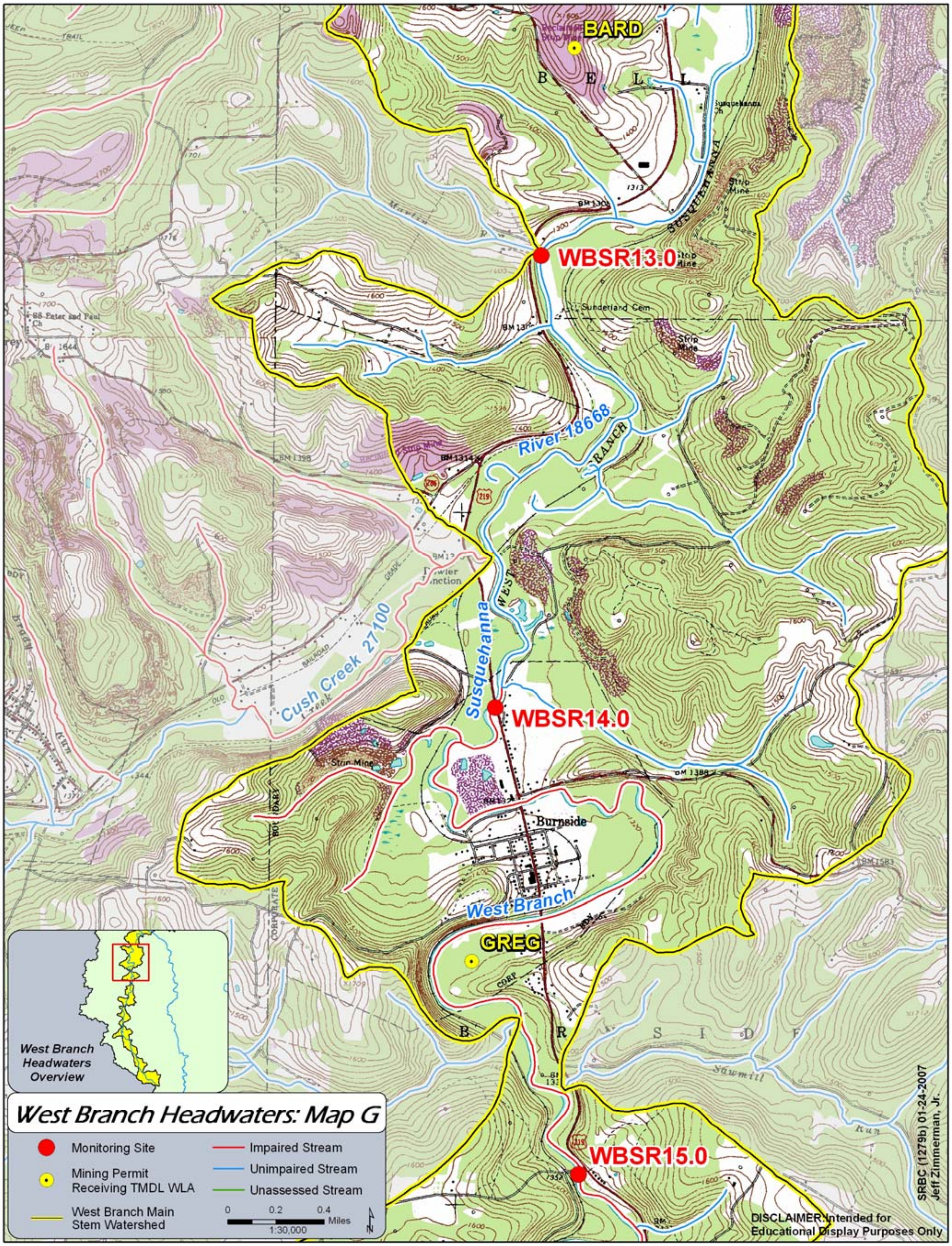


BARD
WBSR13.0
MAP G
WBSR14.0
Glen Campbell
Burnside
GREG
River
WBSR15.0
ICMSA
Susquehanna
Clearfield County
PRKW
WBSR16.0
Cherry Tree
Branch
CTBMA
WBSR17.0
GAR8
MAP H
DOUG
West
Indiana County
GRN2
GAR1
GAR7
GAR2
WBSR18.0
LJGM
GAR5
WBSR19.0
TRINK
NCBMA
Cambria County
WBSR20.0
WBSR21.0
Northern Cambria
WBSR22.0
WBSR23.0
WBSR24.0
MAP I
WBSR25.0
WBSR26.0
RNS25
RJCK
LAN25
MAP J
REED
WBSR27.0
WBSR32.0
Carrolltown
WBSR28.0
WBSR33.0
WBSR31.0
WBSR29.0
WCTWA
WBSR30.0
NY
PA
MD
0 1 2 Miles
1:129,000
DISCLAIMER: Intended for Educational Display Purposes Only. SRBC (1279a) 01-29-2009
WEST BRANCH SUSQUEHANNA HEADWATERS MONITORING SITES & LANDUSE
Monitoring Site
City/Town
Cultivated Land
Developed Land
Mining Permit Receiving TMDL WLA
River/Stream
Naturally Vegetated
West Branch Susquehanna Subbasin
NPDES Permit Receiving TMDL WLA
County Boundary
Barren Land


BARD
WBSR13.0
River 18668
Cush Creek 27100
Susquehanna
WBSR14.0
Burnside
West Branch
GREG
WBSR15.0
West Branch Headwaters Overview
West Branch Headwaters: Map G
Monitoring Site
Mining Permit Receiving TMDL WLA
West Branch Main Stem Watershed
Impaired Stream
Unimpaired Stream
Unassessed Stream
0 0.2 0.4 Miles
1:30,000
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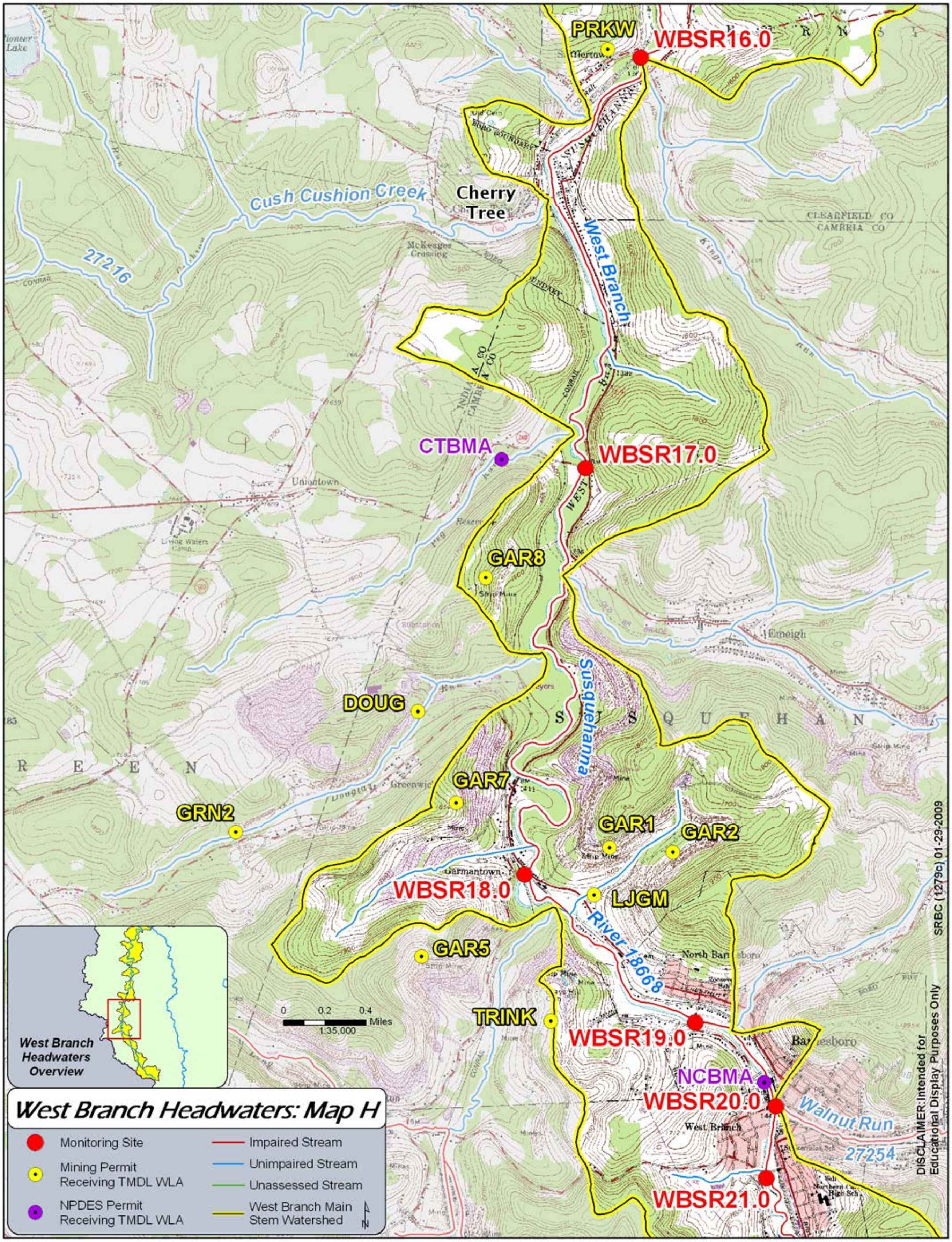
SRBC (1279b) 01-24-2007
Jeff Zimmerman, Jr.


West Branch Headwaters: Map H
Monitoring Site
Mining Permit Receiving TMDL WLA
NPDES Permit Receiving TMDL WLA
Impaired Stream
Unimpaired Stream
Unassessed Stream
West Branch Main Stem Watershed
West Branch Headwaters Overview
0 0.2 0.4 Miles
1:35,000
PRKW
WBSR16.0
Cherry Tree
Cush Cushion Creek
27216
West Branch
CTBMA
WBSR17.0
GAR8
Susquehanna
DOUG
GAR7
GRN2
GAR1
GAR2
WBSR18.0
LJGM
River 18668
GAR5
TRINK
WBSR19.0
NCBMA
WBSR20.0
Walnut Run
27254
WBSR21.0
CLEARFIELD CO
CAMBRIA CO
Emeigh
Barnesboro
North Barnesboro
West Branch
Garmantown
Uniontown
SRBC (1279c) 01-29-2009
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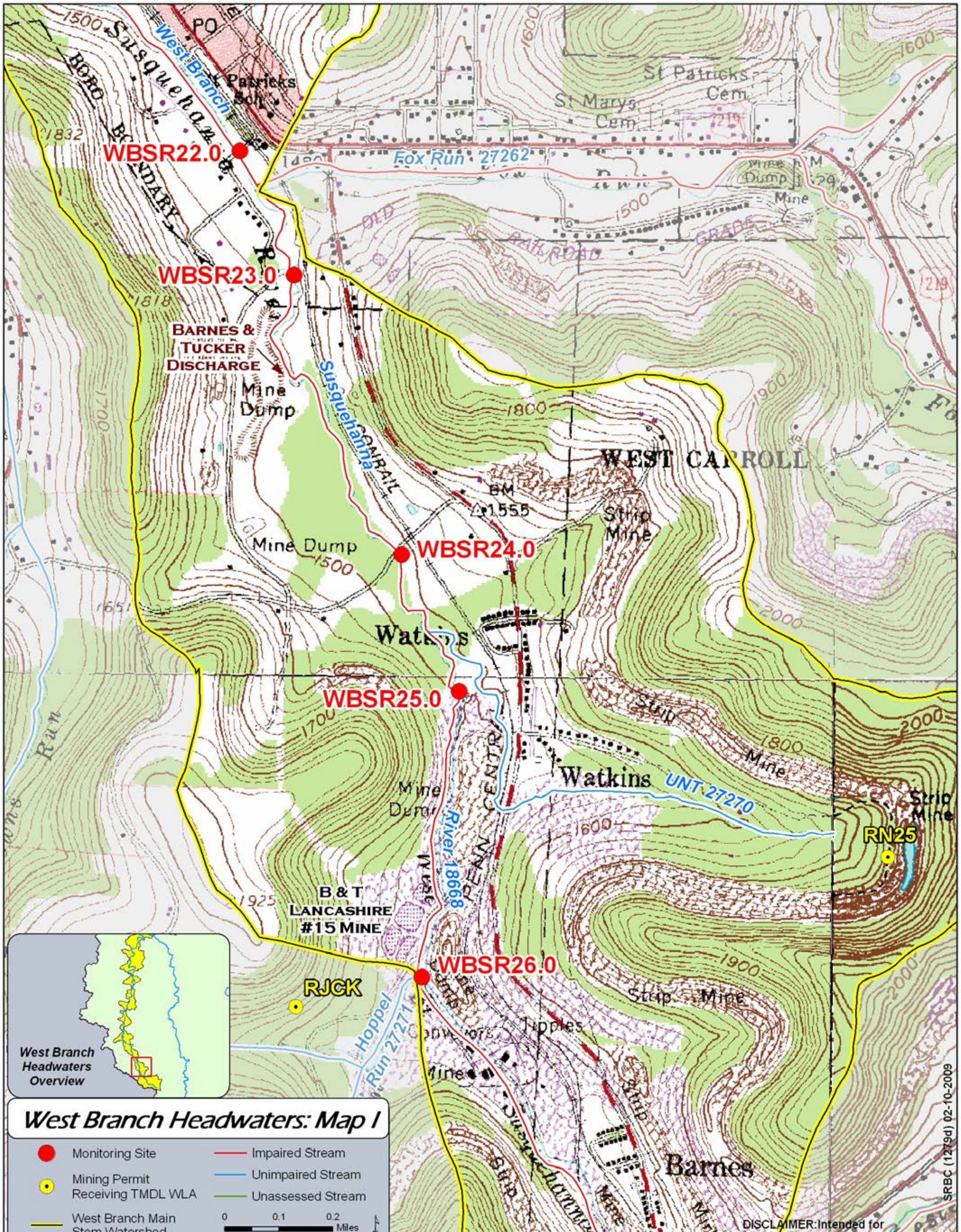
West Branch Headwaters: Map I
WBSR22.0
WBSR23.0
WBSR24.0
WBSR25.0
WBSR26.0
BARNES & TUCKER DISCHARGE
B & T LANCASHIRE #15 MINE
RJCK
RN25
Fox Run 27262
UNT 27270
Susquehanna River 18668
Hoppel Run 27271
West Branch
WEST CARROLL
Watkins
Barnes
St Patricks Cem
St Marys Cem
Mine Dump
Strip Mine
Tipples
CONRAIL
PENN CENTRAL
OLD RAILROAD GRADE
BM 1555
West Branch Headwaters Overview
Monitoring Site
Mining Permit Receiving TMDL WLA
West Branch Main Stem Watershed
Impaired Stream
Unimpaired Stream
Unassessed Stream
0 0.1 0.2 Miles
1:13,500
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SRBC (1279d) 02-10-2009


West Branch Headwaters: Map J
Monitoring Site
Mining Permit Receiving TMDL WLA
West Branch Main Stem Watershed
Impaired Stream
Unimpaired Stream
Unassessed Stream
0 0.1 0.2 Miles
1:17,000
West Branch Headwaters Overview
WBSR27.0
WBSR28.0
WBSR29.0
WBSR30.0
WBSR31.0
WBSR32.0
WBSR33.0
LAN25
REED
B & T LANCASHIRE #20 MINE
Lesle Run 27275
West Branch
UNT 27277
River 18668
UNT 27279
Susquehanna
Barnes
Bakerton (Elmora PO)
Carrolltown Road
Bakerton Reservoir
WEST CARROLL
PENN CENTRAL
Strip Mine
Mine
Tipple
River
DISCLAIMER: Intended for Educational Display Purposes Only

Attachment B

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 PADEP 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 USEPA 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, PADEP 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, PADEP contracted with USGS to add missing streams and correct any errors in the NHD. A GIS contractor transferred the old PADEP stream assessment information to the improved NHD and the old PADEP 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 PADEP 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. 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 C

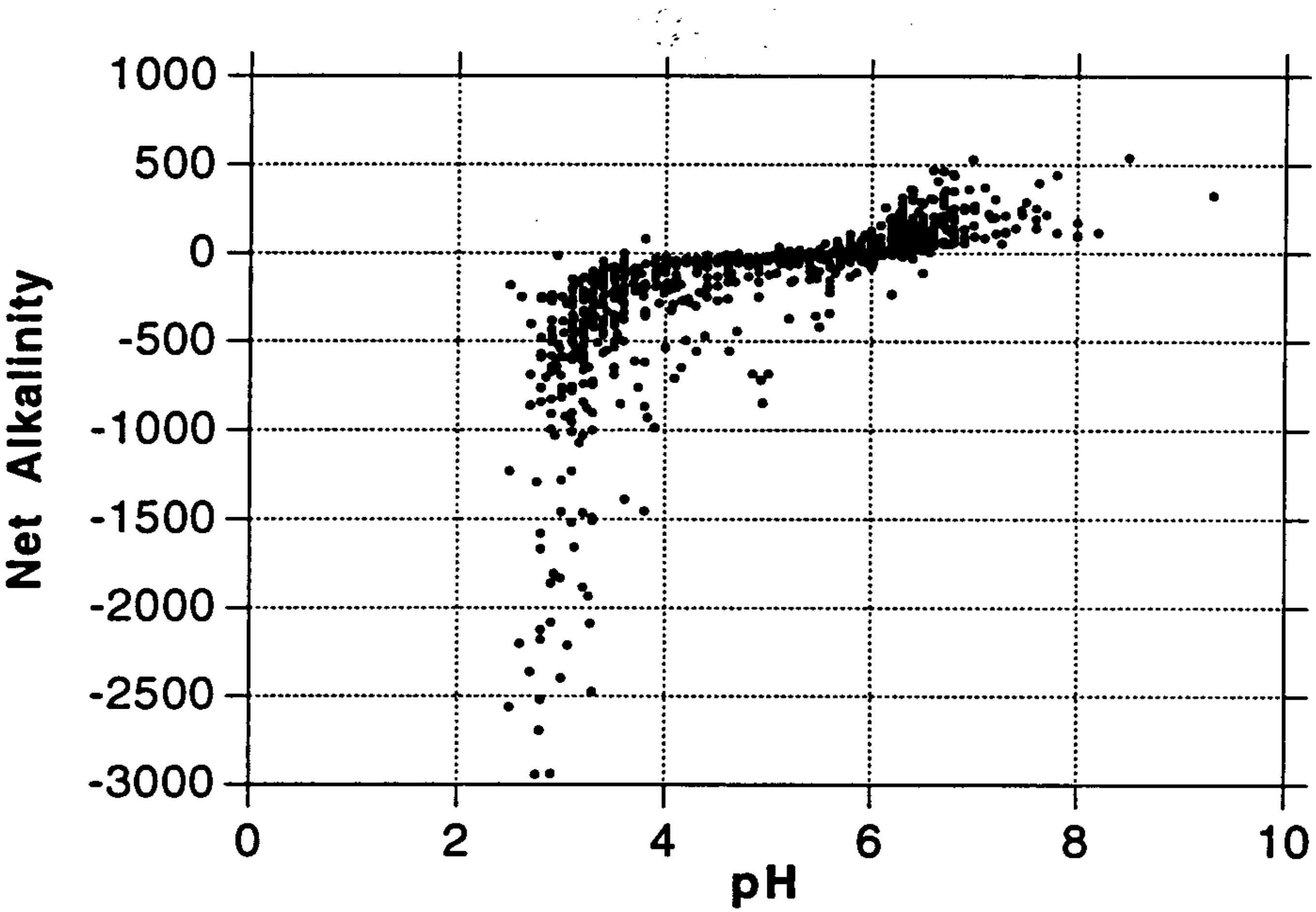
Method for Addressing 303(d) Listings for pH

There has been a great deal of research conducted on the relationship between alkalinity, acidity, and pH. Research published by PADEP 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 C-1). Where net alkalinity is positive (greater than or equal to zero), the pH range is most commonly six to eight, which is within the USEPA's acceptable range of six to nine and meets Pennsylvania water quality criteria in Chapter 93.

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

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

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



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

Attachment D

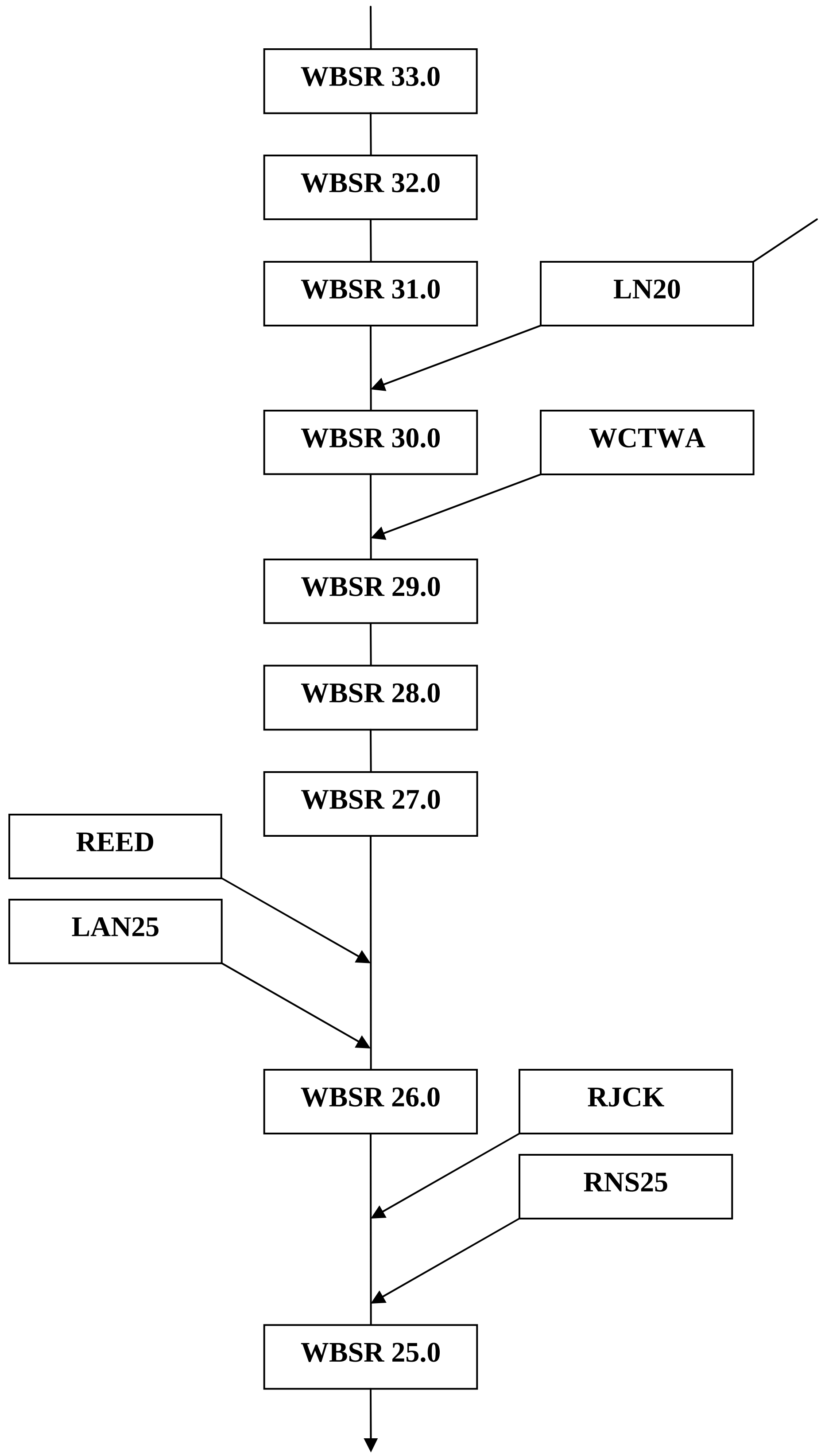
TMDLs By Segment

West Branch Susquehanna River

The TMDL for the West Branch Susquehanna River Watershed consists of a statement of previously calculated load allocations to numerous tributaries contained in EPA-approved TMDLs. These tributaries include Alder Run, Anderson Creek, Bear Run, Lick Run, Hartshorn Run, Moose Creek, Sandy Creek, Big Run, Deer Creek, Montgomery Creek, Surveyor Run, UNT 26641 West Branch Susquehanna River, Kettle Creek, Cooks Run, and Birch Island Run. The TMDLs completed for tributaries listed above, at their mouths, are included in this document, and are used to account for the upstream reductions of the AMD portion of the 303(d)/integrated water quality report listed segments of the West Branch Susquehanna River. As stated, the data and calculations for these tributaries are found in their respective TMDL documents and are not included in this report.

The upper portion of the West Branch Susquehanna River Watershed is listed as impaired on the Section 303(d) list for high metals from AMD as the cause of the degradation to the stream. For pH, the objective is to reduce acid loading to the stream that will in turn raise the pH to the acceptable range. The result of these analyses is an acid loading reduction that equates to meeting standards for pH (TMDL Endpoint section in the report, Table 2). The method and rationale for addressing pH is contained in Attachment C.

An allowable long-term average instream concentration for iron, manganese, aluminum, and acidity were determined at each sample point. These analyses are designed to produce a long-term average value that, when met, will be protective of the water quality criterion for that parameter 99 percent 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 percent of the time. The simulation was run assuming the data set was lognormally distributed. Using the mean and the standard deviation of the data set, 5,000 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 percent of the time. The mean value from this data set represents that long-term daily average concentration that needs to be met to achieve water quality standards.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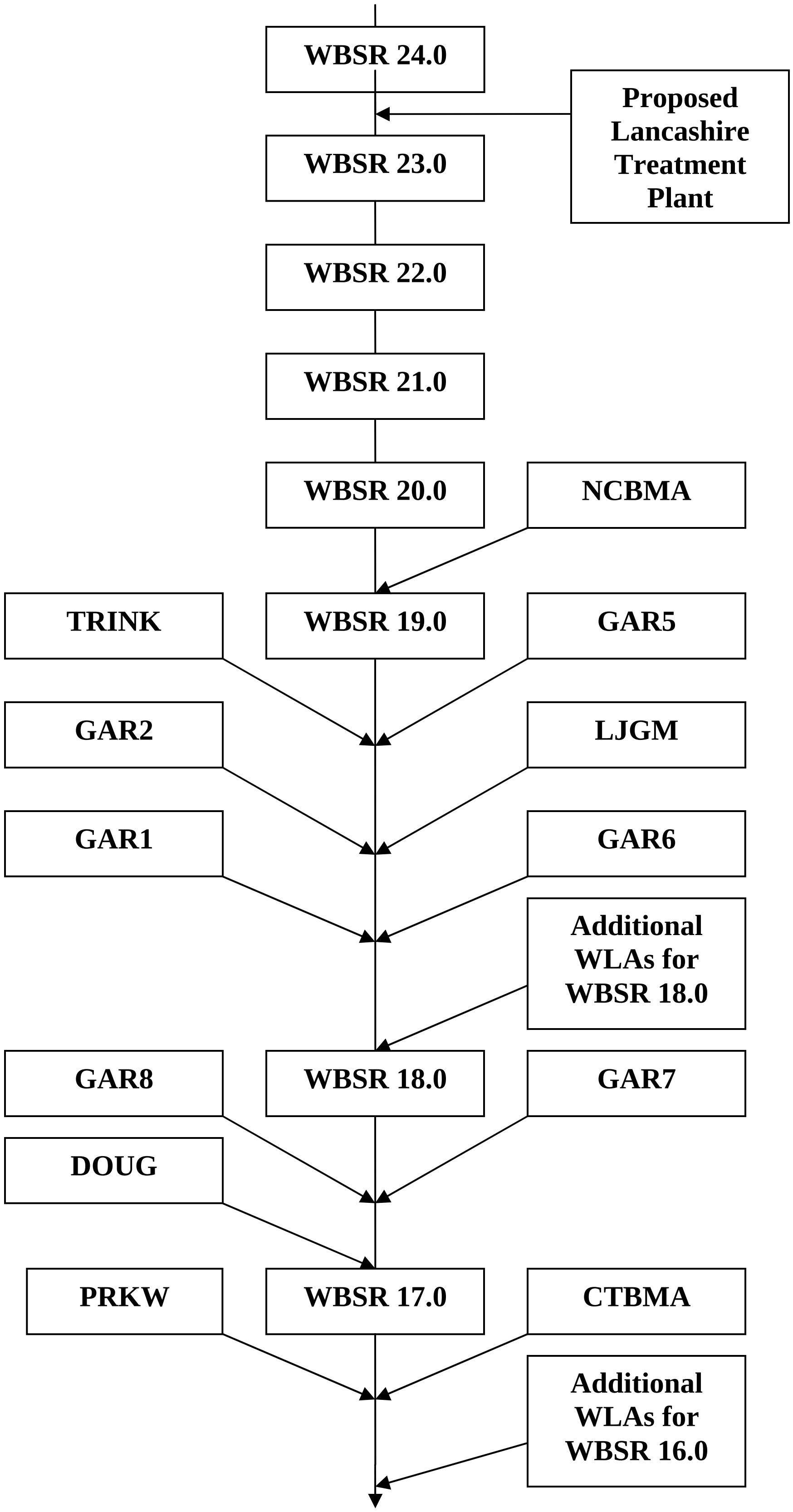
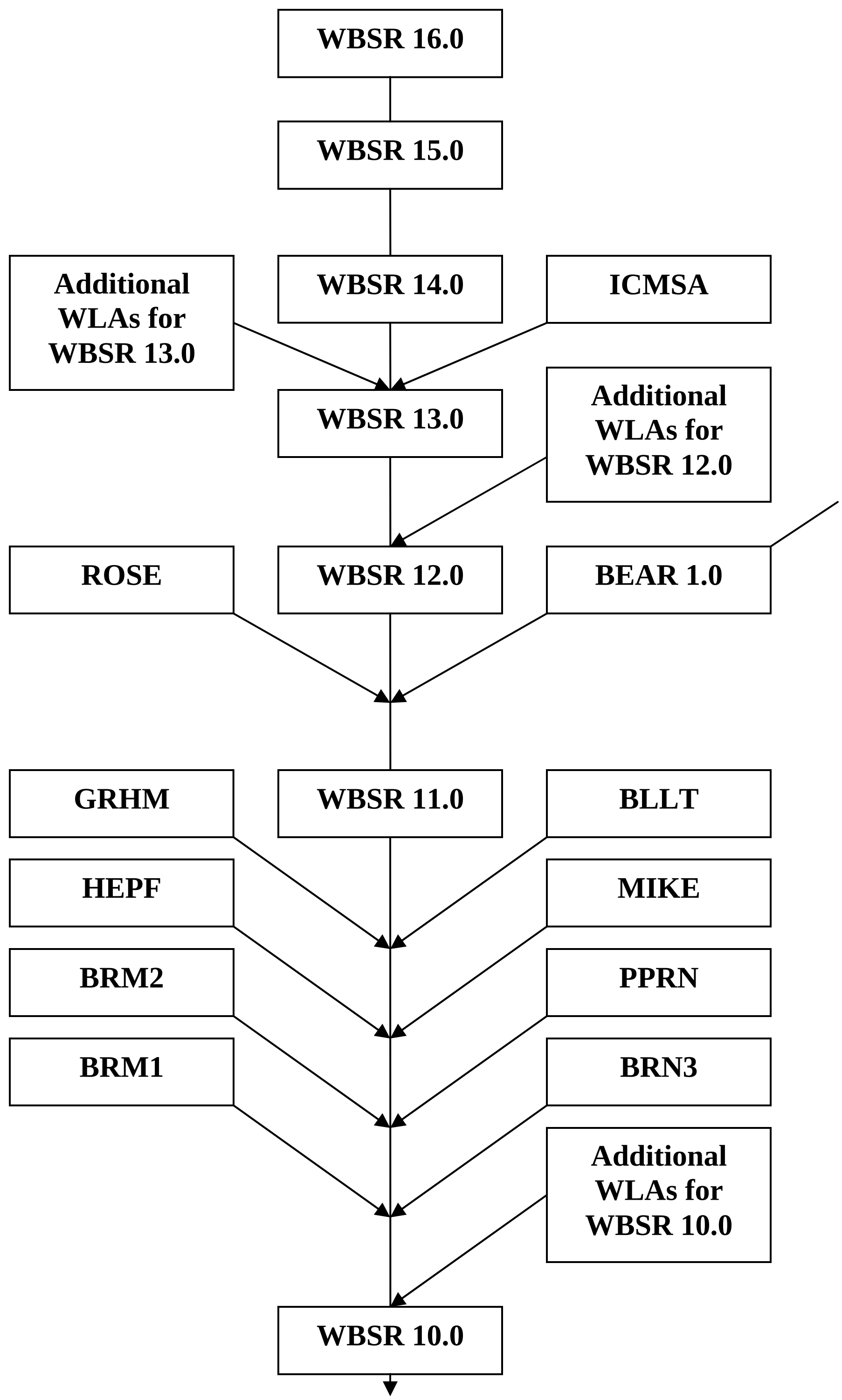
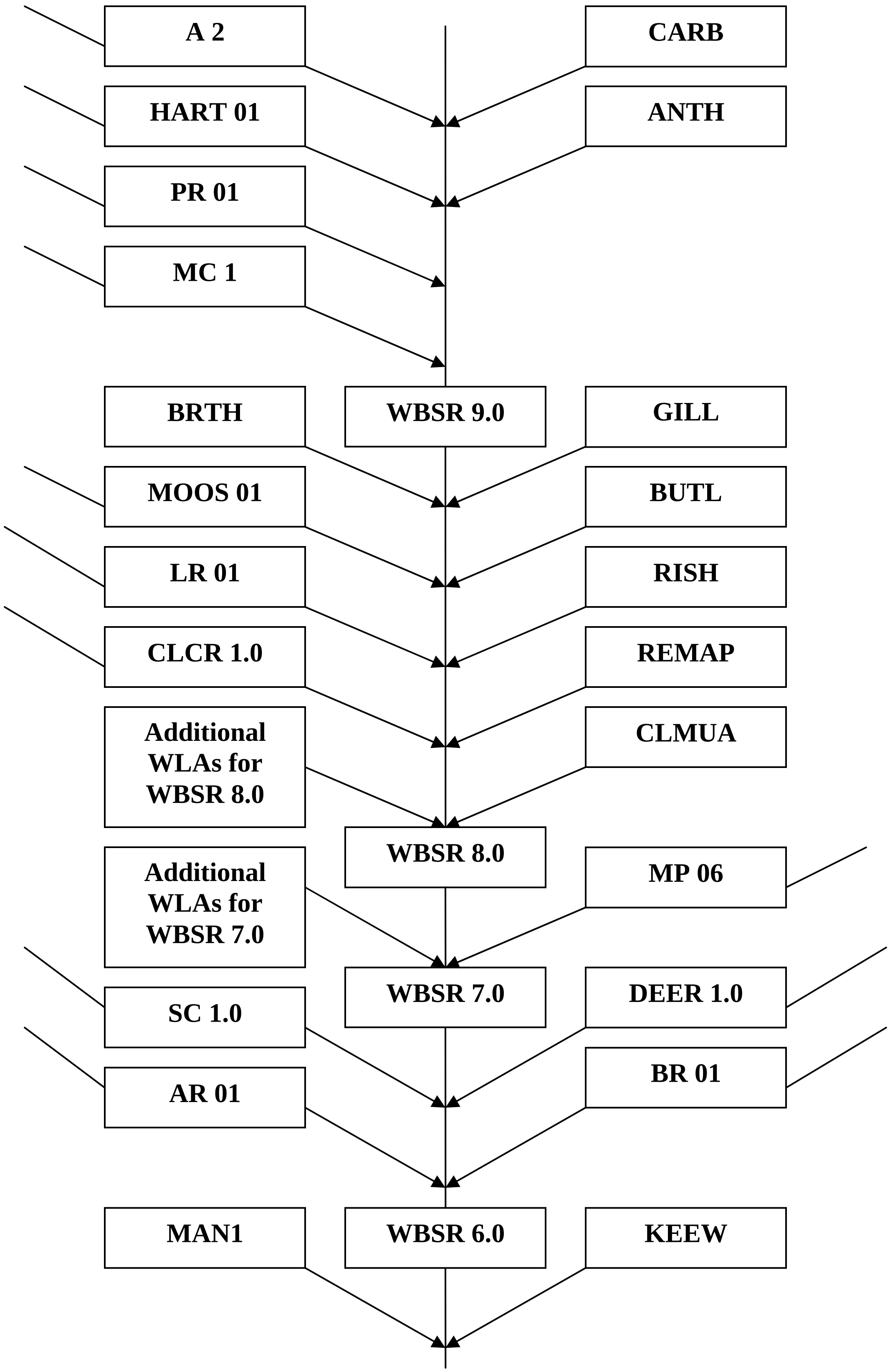
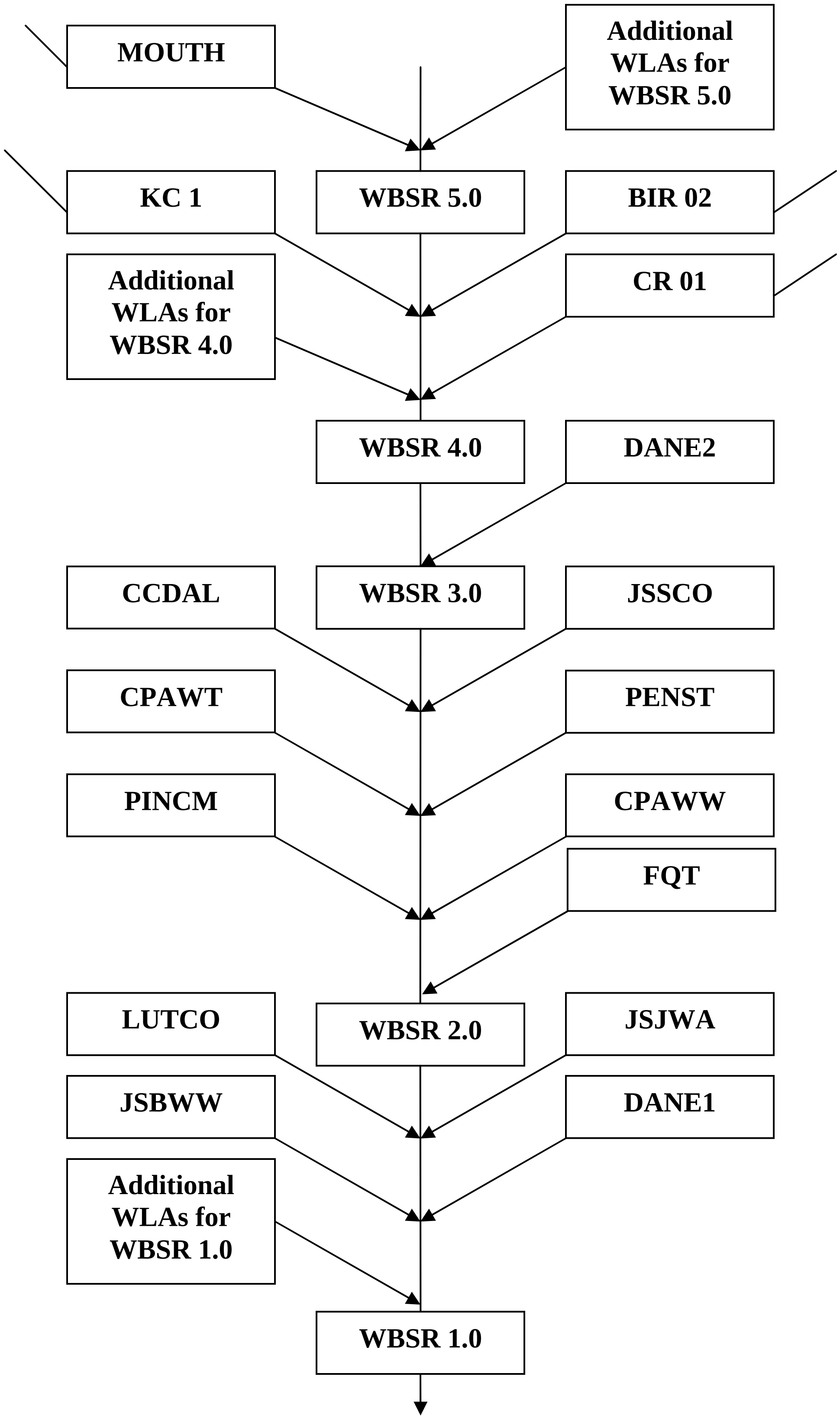
WBSR 32.0
WBSR 31.0
LN20
WBSR 30.0
WCTWA
WBSR 29.0
WBSR 28.0
WBSR 27.0
REED
LAN25
WBSR 26.0
RJCK
RNS25
WBSR 25.0


WBSR 24.0
Proposed Lancashire Treatment Plant
WBSR 23.0
WBSR 22.0
WBSR 21.0
WBSR 20.0
NCBMA
TRINK
WBSR 19.0
GAR5
GAR2
LJGM
GAR1
GAR6
Additional WLAs for WBSR 18.0
GAR8
WBSR 18.0
GAR7
DOUG
PRKW
WBSR 17.0
CTBMA
Additional WLAs for WBSR 16.0


WBSR 16.0
WBSR 15.0
Additional WLAs for WBSR 13.0
WBSR 14.0
ICMSA
WBSR 13.0
Additional WLAs for WBSR 12.0
ROSE
WBSR 12.0
BEAR 1.0
GRHM
WBSR 11.0
BLLT
HEPF
MIKE
BRM2
PPRN
BRM1
BRN3
Additional WLAs for WBSR 10.0
WBSR 10.0


A 2
CARB
HART 01
ANTH
PR 01
MC 1
BRTH
WBSR 9.0
GILL
MOOS 01
BUTL
LR 01
RISH
CLCR 1.0
REMAP
Additional WLAs for WBSR 8.0
CLMUA
WBSR 8.0
Additional WLAs for WBSR 7.0
MP 06
WBSR 7.0
SC 1.0
DEER 1.0
AR 01
BR 01
MAN1
WBSR 6.0
KEEW


MOUTH
Additional WLAs for WBSR 5.0
KC 1
WBSR 5.0
BIR 02
Additional WLAs for WBSR 4.0
CR 01
WBSR 4.0
DANE2
CCDAL
WBSR 3.0
JSSCO
CPAWT
PENST
PINCM
CPAWW
FQT
LUTCO
WBSR 2.0
JSJWA
JSBWW
DANE1
Additional WLAs for WBSR 1.0
WBSR 1.0

WBSR 33.0: West Branch Susquehanna River Headwaters in Carrolltown, Pa.

The headwaters of the West Branch Susquehanna River begin outside of West Carroll Township, Cambria County, near the borough of Carrolltown, Pa. Bituminous mining in the watershed severely disturbed the land surface and underground structure. This portion of the stream is visibly impaired by abandoned mine drainage with the presence of orange iron precipitate. Point WBSR 33.0 is located on the downstream side of the 3 C's Trout Nursery's outfall on Bakerton Road.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area above WBSR 33.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 33.0 (0.33 MGD). The load allocations made at point WBSR 33.0 for this stream segment are presented in Table D1.

Table D1. TMDL Calculations at Point WBSR 33.0				
Flow = 0.33 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.15	0.41	0.15	0.41
Mn	0.03	0.07	0.03	0.07
Al	0.61	1.69	0.11	0.30
Acidity	-122.20	NA	NA	NA
Alkalinity	248.33	685.99		

NA - Not Applicable

Reductions at point WBSR 33.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 33.0 are shown in Table D2.

Table D2. Calculation of Load Reduction Necessary at Point WBSR 33.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 33.0	0.41	0.07	1.69	-
Allowable load at WBSR 33.0	0.41	0.07	0.30	-
Load Reduction at WBSR 33.0	0.00	0.00	1.39	-
Percent reduction required at WBSR 33.0	0.0%	0.0%	82.2%	-

The TMDL for point WBSR 33.0 requires a load reduction for total aluminum.

WBSR 32.0: West Branch Susquehanna River at Myers Road, in Carrolltown

WBSR 32.0 is located on the Myers Road Bridge near Carrolltown. All measurements were recorded on the upstream side of the bridge. This monitoring point is located near the beginning of AMD impairment for the West Branch Susquehanna River. This section of the West Branch Susquehanna River is listed for metals impairment from AMD.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 32.0 and WBSR 33.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 32.0 (0.83 MGD). The load allocations made at point WBSR 32.0 for this stream segment are presented in Table D3.

Table D3. TMDL Calculations at Point WBSR 32.0				
Flow 0.83 MGD	*Measured Sample Data*		*Allowable*	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	6.79	46.77	0.48	3.27
Mn	0.19	1.31	0.19	1.31
Al	1.33	9.16	0.13	0.92
Acidity	-32.48	NA	NA	NA
Alkalinity	131.52	906.06		

The loading reduction for point WBSR 33.0 was used to show the total load that was removed from upstream sources. The total aluminum load that was removed upstream was subtracted from the existing load at point WBSR 32.0. This value was compared to the allowable load at point WBSR 32.0. Reductions at point WBSR 32.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 32.0 are shown in Table D4.

Table D4. Calculation of Load Reduction Necessary at Point WBSR 32.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 32.0	46.77	1.31	9.16	-
Difference of measured loads between loads that enter and existing WBSR 32.0	46.36	1.24	7.47	-
Percent loss due calculated at WBSR 32.0	0.0%	0.0%	0.0%	-
Additional loads tracked from above samples	0.41	0.07	0.30	-
Percentage of upstream loads that reach WBSR 32.0	100.0%	100.0%	100.0%	-
Total load tracked between WBSR 33.0 and WBSR 32.0	46.77	1.31	7.77	-
Allowable load at WBSR 32.0	3.27	1.31	0.92	-
Load Reduction at WBSR 32.0	43.50	0.00	6.85	-
Percent reduction required at WBSR 32.0	93.0%	0.0%	88.2%	-

The TMDL for point WBSR 32.0 requires a load reduction for total iron and total aluminum.

WBSR 31.0: West Branch Susquehanna River upstream of Barnes and Tucker Lancashire #20 Mine

WBSR 31.0 is located west of Deveaux Street near the Barnes and Tucker Lancashire #20 Mine treatment site. All measurements were recorded on the upstream side of the treatment ponds. This monitoring point accounts for AMD impairment levels on the West Branch Susquehanna River before monitoring point WBSR 31.0.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 31.0 and WBSR 32.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 31.0 (0.79 MGD). The load allocations made at point WBSR 31.0 for this stream segment are presented in Table D5.

Table D5. TMDL Calculations at Point WBSR 31.0				
Flow = 0.79 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	2.67	17.51	0.53	3.50
Mn	0.22	1.47	0.22	1.47
Al	1.22	7.98	0.10	0.64
Acidity	-22.97	NA	NA	NA
Alkalinity	97.10	635.87		

The loading reduction for point WBSR 32.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 31.0. This value was compared to the allowable load at point WBSR 31.0. Reductions at point WBSR 31.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 31.0 are shown in Table D6.

Table D6. Calculation of Load Reduction Necessary at Point WBSR 31.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 31.0	17.51	1.47	7.98	NA
Difference of measured loads between loads that enter and existing WBSR 31.0	-29.26	0.16	-1.18	-
Percent loss due calculated at WBSR 31.0	62.6%	0.0%	12.9%	-
Additional loads tracked from above samples	3.27	1.31	0.92	-
Percentage of upstream loads that reach WBSR 31.0	37.4%	100.0%	87.1%	-
Total load tracked between WBSR 32.0 and WBSR 31.0	1.22	1.47	0.80	-
Allowable load at WBSR 31.0	3.50	1.47	0.64	-
Load Reduction at WBSR 31.0	0.00	0.00	0.16	-
Percent reduction required at WBSR 31.0	0.0%	0.0%	20.0%	-

The TMDL for point WBSR 31.0 requires a load reduction for total aluminum.

WBSR 30.0: INPUTS IN DOWNSTREAM ORDER

LN20: Lancashire No. 20 Mine

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the discharge LN20, the Barnes and Tucker Treatment Facility #20. An average flow measurement was available for point LN20 (0.123 MGD). The load allocations made at point LN20 for this discharge are presented in Table D7.

Table D7. TMDL Calculations at Point LN20				
Flow = 0.123 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	1.47	1.51	0.25	0.26
Mn	0.22	0.23	0.15	0.16
Al	0.25	0.26	0.25	0.26
Acidity	-8.19	-8.42	NA	NA
Alkalinity	43.31	44.53		

Reductions at point LN20 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point LN20 are shown in Table D8.

Table D8. Calculation of Load Reduction Necessary at Point LN20				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at LN20	1.51	0.23	0.26	NA
Difference of measured loads between loads that enter and existing LN20	1.51	0.23	0.26	-
Percent loss due calculated at LN20	0.0%	0.0%	0.0%	-
Additional loads tracked from above samples	0.00	0.00	0.00	-
Percentage of upstream loads that reach LN20	100.0%	100.0%	100.0%	-
Total load tracked at LN20	1.51	0.23	0.26	-
Allowable load at WBSR LN20	0.26	0.16	0.26	-
Load Reduction at WBSR LN20	1.25	0.07	0.00	-
Percent reduction required at WBSR LN20	82.8%	30.4%	0.0%	-

The TMDL for point LN20 requires a load reduction for total iron and total manganese.

WBSR 30.0: West Branch Susquehanna River downstream of Barnes and Tucker Lancashire #20 Treatment Facility

WBSR 30.0 is located just downstream of monitoring point WBSR 31.0. All measurements were recorded on the downstream side of the Barnes and Tucker Lancashire #20 Mine Treatment Facility. This monitoring point accounts for the water quality after it has been processed through the treatment plant.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 30.0 and WBSR 31.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 30.0 (1.18 MGD). The load allocations made at point WBSR 30.0 for this stream segment are presented in Table D9.

Table D9. TMDL Calculations at Point WBSR 30.0				
Flow = 1.18 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	2.52	24.73	0.60	5.94
Mn	0.34	3.38	0.34	3.38
Al	1.49	14.62	0.22	2.19
Acidity	-10.63	NA	NA	NA
Alkalinity	50.40	495.28		

The loading reduction for point WBSR 31.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 30.0. This value was compared to the allowable load at point WBSR 30.0. Reductions at point WBSR 30.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 30.0 are shown in Table D10.

Table D10. Calculation of Load Reduction Necessary at Point WBSR 30.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 30.0	24.73	3.38	14.62	NA
Difference of measured loads between loads that enter and existing WBSR 30.0	5.71	1.68	6.38	-
Percent loss due calculated at WBSR 30.0	0.0%	0.0%	0.0%	-
Additional loads tracked from above samples	3.76	1.63	0.90	-
Percentage of upstream loads that reach WBSR 30.0	100.0%	100.0%	100.0%	-
Total load tracked between WBSR 31.0 and WBSR 30.0	9.47	3.31	7.28	-
Allowable load at WBSR 30.0	5.94	3.38	2.19	-
Load Reduction at WBSR 30.0	3.53	0.00	5.09	-
Percent Reduction required at WBSR 30.0	37.3%	0.0%	69.9%	

The TMDL for point WBSR 30.0 requires a load reduction for total iron. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for two operations with two active pits (1500' x 300') to be permitted in the future on this segment (Table D11).

Table D11. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 29.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

WCTWA: West Carroll Township Water Authority

The West Carroll Township Water Authority (NPDES PA 0202061) Bakerton Water Treatment Plant has one outfall (001) in the West Branch Watershed. This outfall has effluent limits for total iron, total manganese, and total aluminum. Table D12 shows the WLA for this discharge.

Table D12. WLA at West Carroll Township Water Authority			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	2.0	0.004	0.07
Mn	1.0	0.004	0.03
Al	2.2	0.004	0.07

WBSR 29.0: West Branch Susquehanna River downstream of Bakerton Reservoir UNT

WBSR 29.0 is located at the bridge on No. 6 Road (State Route 4004), near the town of Bakerton, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for the Bakerton Reservoir tributary entering the West Branch Susquehanna River.

This TMDL section for the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 29.0 and WBSR 30.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 29.0 (2.1 MGD). The load allocations made at point WBSR 29.0 for this stream segment are presented in Table D13.

Table D13. TMDL Calculations at Point WBSR 29.0				
Flow = 2.1 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	3.18	55.76	0.76	13.38
Mn	0.64	11.16	0.30	5.25
Al	2.57	45.06	0.26	4.51
Acidity	26.13	458.93	3.40	59.66
Alkalinity	22.33	392.20		

The loading reduction for point WBSR 30.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 29.0. This value was compared to the allowable load at point WBSR 29.0. Reductions at point WBSR 29.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 29.0 are shown in Table D14.

Table D14. Calculation of Load Reduction Necessary at Point WBSR 29.0				
	Fe (lbs/day)	*Mn (lbs/day)*	*Al (lbs/day)*	*Acidity (lbs/day)*
Existing load at WBSR 29.0	55.76	11.16	45.06	458.93
Difference of measured loads between loads that enter and existing WBSR 29.0	31.03	7.78	30.44	458.93
Percent loss due calculated at WBSR 29.0	0.0%	0.0%	0.0%	0.0%
Additional loads tracked from above samples	5.94	3.38	2.19	-
Percentage of upstream loads that reach WBSR 29.0	100.0%	100.0%	100.0%	100.0%
Total load tracked between WBSR 30.0 and WBSR 29.0	36.97	11.16	32.63	458.93
Allowable load at WBSR 29.0	13.38	5.25	4.51	59.66
Load Reduction at WBSR 29.0	23.59	5.91	28.12	399.27
Percent Reduction required at WBSR 29.0	63.8%	53.0%	86.2%	87.0%

The TMDL for point WBSR 29.0 requires a load reduction for total iron, total manganese, total aluminum, and acidity. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500' x 300') to be permitted in the future on this segment (Table D15).

Table D15. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 28.0: West Branch Susquehanna River at Bakerton, Pa.

WBSR 28.0 is located at the bridge on Goodway Road, near the town of Bakerton, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for the water quality before the confluence of a nonimpaired UNT that enters the West Branch Susquehanna River.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 28.0 and WBSR 29.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 28.0 (2.75 MGD). The load allocations made at point WBSR 28.0 for this stream segment are presented in Table D16.

Table D16. TMDL Calculations at Point WBSR 28.0				
Flow = 2.75 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	2.56	58.63	0.95	21.69
Mn	1.00	22.99	0.27	6.21
Al	3.72	85.29	0.26	5.97
Acidity	37.83	868.15	1.51	34.73
Alkalinity	9.00	206.52		

The loading reduction for point WBSR 29.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 28.0. This value was compared to the allowable load at point WBSR 28.0. Reductions at point WBSR 28.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 28.0 are shown in Table D17.

Table D17. Calculation of Load Reduction Necessary at Point WBSR 28.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 28.0	58.63	22.99	85.29	868.15
Difference of measured loads between loads that enter and existing WBSR 28.0	2.87	11.83	40.23	409.22
Percent loss due calculated at WBSR 28.0	0.0%	0.0%	0.0%	0.0%
Additional loads tracked from above samples	13.38	5.25	4.51	59.66
Percentage of upstream loads that reach WBSR 28.0	100.0%	100.0%	100.0%	100.0%
Total load tracked between WBSR 29.0 and WBSR 28.0	16.25	17.08	44.74	468.88
Allowable load at WBSR 28.0	21.69	6.21	5.97	34.73
Load Reduction at WBSR 28.0	0.00	10.87	38.77	434.15
Percent Reduction required at WBSR 28.0	0.0%	63.6%	86.7%	92.8%

The TMDL for point WBSR 28.0 requires a load reduction for total manganese, total aluminum, and acidity. A WLA for future mining was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D18).

Table D18. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 27.0: WBSR upstream of Lesle Run

WBSR 27.0 is located at the Road No. 1 bridge east of Bakerton, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for the AMD water quality of the West Branch Susquehanna River before the confluence of Lesle Run.
The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 27.0 and WBSR 28.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 27.0 (2.58 MGD). The load allocations made at point WBSR 27.0 for this stream segment are presented in Table D19.

Table D19. TMDL Calculations at Point WBSR 27.0				
Flow = 2.58 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	2.20	47.50	0.62	13.30
Mn	0.98	21.05	0.37	8.00
Al	3.10	66.74	0.34	7.34
Acidity	38.37	826.86	1.92	41.34
Alkalinity	8.93	192.53		

The loading reduction for point WBSR 28.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 27.0. This value was compared to the allowable load at point WBSR 27.0. Reductions at point WBSR 27.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 27.0 are shown in Table D20.

Table D20. Calculation of Load Reduction Necessary at Point WBSR 27.0				
	***Fe* (lbs/day)**	***Mn* (lbs/day)**	***Al* (lbs/day)**	***Acidity* (lbs/day)**
Existing load at WBSR 27.0	47.50	21.05	66.74	826.86
Difference of measured loads between loads that enter and existing WBSR 27.0	-11.13	-1.94	-18.55	-41.29
Percent loss due calculated at WBSR 27.0	19.0%	8.4%	21.7%	4.8%
Additional loads tracked from above samples	21.69	6.21	5.97	34.73
Percentage of upstream loads that reach WBSR 27.0	81.0%	91.6%	78.3%	95.2%
Total load tracked between WBSR 28.0 and WBSR 27.0	17.57	5.69	4.67	33.06
Allowable load at WBSR 27.0	13.30	8.00	7.34	41.34
Load Reduction at WBSR 27.0	4.27	0.00	0.00	0.00
Percent Reduction required at WBSR 27.0	24.3%	0.0%	0.0%	0.0%

The TMDL for point WBSR 27.0 requires a load reduction for total iron. A WLA for future mining was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D21).

Table D21. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 26.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

REED: Cloe Mining Company Reed Mine

Cloe Mining Co., MP#11900106, operates a surface mine in the West Branch Susquehanna River Watershed along the stream channel. Any discharge from the operations treatment pond is treated to the Best Available Technology (BAT) limits, assigned to the permit before it enters the West Branch Susquehanna River.

REED is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The standard 1500’ x 300’ open pit size was used for this operation. Table D22 shows the WLAs for the discharge.

Table D22. WLAs at REED			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	1.6	0.0445	0.69

LAN25: RNS SVC Inc. Lancashire #25 Prep.

RNS SVC Inc., MP#11841604, operates a coal preparation plant in the West Branch Susquehanna River Watershed along the stream channel. Any discharge from the operations treatment pond is treated to assigned limits in the permit before it enters the West Branch Susquehanna River.

LAN25 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using permitted effluent limits and permitted discharge rates. Table D23 shows the WLAs for the discharge.

Table D23. WLAs at LAN25			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.049	1.23
Mn	2.0	0.049	0.82
Al	0.75	0.049	0.31

WBSR 26.0: West Branch Susquehanna River upstream of Hoppel Run

WBSR 26.0 is located adjacent to the gate at Shop Road south of Watkins, Pa. All measurements were recorded above the confluence of Hoppel Run. This monitoring point accounts for Lesle Run entering the West Branch Susquehanna River.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 26.0 and WBSR 27.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 26.0 (3.41 MGD). The load allocations made at point WBSR 26.0 for this stream segment are presented in Table D24.

Table D24. TMDL Calculations at Point WBSR 26.0				
Flow = 3.41 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	3.19	90.80	0.35	9.99
Mn	1.05	29.83	0.42	11.93
Al	3.60	102.58	0.36	10.26
Acidity	41.18	1,172.18	1.24	35.17
Alkalinity	5.57	158.44		

The loading reduction for point WBSR 27.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 26.0. This value was compared to the allowable load at point WBSR 26.0. Reductions at point WBSR 26.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 26.0 are shown in Table D25.

Table D25. Calculation of Load Reduction Necessary at Point WBSR 26.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 26.0	90.80	29.83	102.58	1,172.18
Difference of measured loads between loads that enter and existing WBSR 26.0	43.30	8.78	35.84	345.32
Percent loss due calculated at WBSR 26.0	0.0%	0.0%	0.0%	0.0%
Additional loads tracked from above samples	13.30	8.00	7.34	41.34
Percentage of upstream loads that reach WBSR 26.0	100.0%	100.0%	100.0%	100.0%
Total load tracked between WBSR 27.0 and WBSR 26.0	56.60	16.78	43.18	386.66
Allowable load at WBSR 26.0	9.99	11.93	10.26	35.17
Load Reduction at WBSR 26.0	46.61	4.85	32.92	351.49
Percent Reduction required at WBSR 26.0	82.3%	28.9%	76.2%	90.9%

The TMDL for point WBSR 26.0 requires a load reduction for total iron, total manganese, total aluminum, and acidity. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D26).

Table D26. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 25.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

RJCK: Twin Brook Coal Co., RJC Kohl No. 4

Twin Brook Coal Co., MP#11990101, operates a surface mine near Hoppel Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits, assigned to the permit before it enters the West Branch Susquehanna River.

RJCK is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The standard 1500' x 300' open pit size was used for this operation. Table D27 shows the WLAs for the discharge.

Table D27. WLAs at RJCK			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	0.75	0.0445	0.28

RNS25: RNS SVC Inc. Lancashire #25

RNS SVC Inc., MP#11743703, operates a coal refuse disposal permit in the West Branch Susquehanna River Watershed along the stream channel. Any discharge from the operations treatment pond is treated to assigned limits in the permit before it enters the West Branch Susquehanna River.

RNS25 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using permitted effluent limits and permitted discharge rates. Flow data were available for this point source discharge. Table D28 shows the WLAs for the discharge.

Table D28. WLAs at RNS25			
Parameter	*Monthly Avg. Allowable Conc. (mg/l)*	*Average Flow (MGD)*	*Allowable Load (lbs/day)*
Fe	3.0	0.0256	0.64
Mn	2.0	0.0256	0.43
Al	0.75	0.0256	0.16

WBSR 25.0: West Branch Susquehanna River downstream of previously-existing Barnes Watkins Refuse Pile

WBSR 25.0 is located at the northern edge of the reclaimed Barnes Watkins refuse piles near Watkins, Pa. All measurements were recorded just upstream of UNT 27270 along the old railroad grade. This monitoring point accounts for Hoppel Run and the large refuse piles (Barnes and Watkins) adjacent to the West Branch Susquehanna River.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 25.0 and WBSR 26.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 25.0 (4.35 MGD). The load allocations made at point WBSR 25.0 for this stream segment are presented in Table D29.

Table D29. TMDL Calculations at Point WBSR 25.0				
Flow = 4.35 MGD	*Measured Sample Data*		*Allowable*	
Parameter	*Conc. (mg/l)*	*Load (lbs/day)*	*LTA Conc. (mg/l)*	*Load (lbs/day)*
Fe	9.49	344.42	0.47	17.22
Mn	0.91	32.97	0.41	14.83
Al	12.27	445.33	0.12	4.45
Acidity	108.27	3,928.63	0.01	0.39
Alkalinity	1.43	52.01		

The loading reduction for point WBSR 26.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 25.0. This value was compared to the allowable load at point WBSR 25.0. Reductions at point WBSR 25.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 25.0 are shown in Table D30.

Table D30. Calculation of Load Reduction Necessary at Point WBSR 25.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 25.0	344.42	32.97	445.33	3,928.63
Difference of measured loads between loads that enter and existing WBSR 25.0	253.62	3.14	342.75	2,756.45
Percent loss due calculated at WBSR 25.0	0.0%	0.0%	0.0%	0.0%
Additional loads tracked from above samples	9.99	11.93	10.26	35.17
Percentage of upstream loads that reach WBSR 25.0	100.0%	100.0%	100.0%	100.0%
Total load tracked between WBSR 26.0 and WBSR 25.0	263.61	15.07	353.01	2,791.62
Allowable load at WBSR 25.0	17.22	14.83	4.45	0.39
Load Reduction at WBSR 25.0	246.39	0.24	348.56	2,791.23
Percent Reduction required at WBSR 25.0	93.5%	1.6%	98.7%	99.99%

The TMDL for point WBSR 25.0 requires a load reduction for total iron, total manganese, total aluminum, and acidity. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500' x 300') to be permitted in the future on this segment (Table D31).

Table D31. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 24.0: West Branch Susquehanna River upstream of proposed Lancashire treatment facility

WBSR 24.0 is located upstream of the Patterson Road bridge north of Watkins, Pa. All measurements were recorded upstream of the old bridge abutments. This monitoring point accounts for the flow and water quality contributions from UNT 27270.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 24.0 and WBSR 25.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 24.0 (5.69 MGD). The load allocations made at point WBSR 24.0 for this stream segment are presented in Table D32.

Table D32. TMDL Calculations at Point WBSR 24.0				
Flow 5.69 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	15.51	736.07	0.62	29.44
Mn	1.11	52.56	0.37	17.34
Al	26.92	1,277.54	0.24	11.50
Acidity	225.07	10,682.29	0.02	1.07
Alkalinity	3.20	151.85		

The loading reduction for point WBSR 25.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 24.0. This value was compared to the allowable load at point WBSR 24.0. Reductions at point WBSR 24.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 24.0 are shown in Table D33.

Table D33. Calculation of Load Reduction Necessary at Point WBSR 24.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 24.0	736.07	52.56	1,277.54	10,682.29
Difference of measured loads between loads that enter and existing WBSR 24.0	391.65	19.59	832.21	6,753.66
Percent loss due calculated at WBSR 24.0	0.0%	0.0%	0.0%	0.0%
Additional loads tracked from above samples	17.22	14.83	4.45	0.39
Percentage of upstream loads that reach WBSR 24.0	100.0%	100.0%	100.0%	100.0%
Total load tracked between WBSR 25.0 and WBSR 24.0	408.87	34.42	836.66	6,754.05
Allowable load at WBSR 24.0	29.44	17.34	11.50	1.07
Load Reduction at WBSR 24.0	379.43	17.08	825.16	6,752.98
Percent Reduction required at WBSR 24.0	92.8%	49.6%	98.6%	99.98%

The TMDL for point WBSR 24.0 requires a load reduction for total iron, total manganese, total aluminum, and acidity.

WBSR 23.0: West Branch Susquehanna River downstream of proposed Lancashire treatment facility

WBSR 23.0 is located at the upstream of Fox Run near Northern Cambria, Pa. All measurements were recorded near an electrical plant south of Northern Cambria. This monitoring point accounts for AMD runoff caused by refuse piles adjacent to the river that are present before WBSR 23.0. In addition, this monitoring site accounts for the untreated Barnes and Tucker Lancashire #15 mine discharge.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 23.0 and WBSR 24.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 23.0 (14.84 MGD). The load allocations made at point WBSR 23.0 for this stream segment are presented in Table D34.

Table D34. TMDL Calculations at Point WBSR 23.0				
Flow = 14.84 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	129.45	16,029.66	1.29	160.30
Mn	6.87	850.96	0.76	93.61
Al	35.63	4,412.47	0.36	44.12
Acidity	452.27	56,005.38	0.05	5.60
Alkalinity	0.00	0.00		

The loading reduction for point WBSR 24.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 23.0. This value was compared to the allowable load at point WBSR 23.0. Reductions at point WBSR 23.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 23.0 are shown in Table D35.

Table D35. Calculation of Load Reduction Necessary at Point WBSR 23.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 23.0	16,029.66	850.96	4,412.47	56,005.38
Difference of measured loads between loads that enter and existing WBSR 23.0	15,293.59	798.40	3,134.93	45,323.09
Percent loss due calculated at WBSR 23.0	0.0%	0.0%	0.0%	0.0%
Additional loads tracked from above samples	29.44	17.34	11.50	1.07
Percentage of upstream loads that reach WBSR 23.0	100.0%	100.0%	100.0%	100.0%
Total load tracked between WBSR 24.0 and WBSR 23.0	15,323.03	815.74	3,146.43	45,324.16
Allowable load at WBSR 23.0	160.30	93.61	44.12	5.60
Load Reduction at WBSR 23.0	15,162.73	722.13	3,102.31	45,318.56
Percent Reduction required at WBSR 23.0	99.0%	88.5%	98.6%	99.98%

The TMDL for point WBSR 23.0 requires a load reduction for total iron, total manganese, total aluminum, and acidity. A waste load allocation for future mining was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D36).

Table D36. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 22.0: West Branch Susquehanna River downstream of Fox Run

WBSR 22.0 is located just downstream of Fox Run near Northern Cambria, Pa. All measurements were recorded on the upstream side of the 16th Street bridge. This monitoring point accounts for the water quality contributions from Fox Run. Fox Run is listed as being impaired by AMD for metals and pH. Loadings for Fox Run will be allocated in future TMDLs.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 22.0 and WBSR 23.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 22.0 (18.60 MGD). The load allocations made at point WBSR 22.0 for this stream segment are presented in Table D37.

Table D37. TMDL Calculations at Point WBSR 22.0				
Flow = 18.60 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	103.20	16,014.85	1.03	160.15
Mn	5.83	904.81	0.70	108.58
Al	27.90	4,329.08	0.28	43.29
Acidity	356.71	55,355.95	0.04	5.54
Alkalinity	0.60	93.51		

The loading reduction for point WBSR 23.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 22.0. This value was compared to the allowable load at point WBSR 22.0. Reductions at point WBSR 22.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 22.0 are shown in Table D38.

Table D38. Calculation of Load Reduction Necessary at Point WBSR 22.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 22.0	16,014.85	904.81	4,329.08	55,355.95
Difference of measured loads between loads that enter and existing WBSR 22.0	-14.81	53.85	-83.39	-649.43
Percent loss due calculated at WBSR 22.0	0.1%	0.0%	1.9%	1.2%
Additional loads tracked from above samples	160.30	93.61	44.12	5.60
Percentage of upstream loads that reach WBSR 22.0	99.9%	100.0%	98.1%	98.8%
Total load tracked between WBSR 23.0 and WBSR 22.0	160.14	147.46	43.28	5.53
Allowable load at WBSR 22.0	160.15	108.58	43.29	5.54
Load Reduction at WBSR 22.0	0.00	38.88	0.00	0.00
Percent Reduction required at WBSR 22.0	0.0%	26.4%	0.0%	0.0%

The TMDL for point WBSR 22.0 requires a load reduction for total manganese. A WLA for future mining was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500' x 300') to be permitted in the future on this segment (Table D39).

Table D39. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 21.0: West Branch Susquehanna River upstream near West Branch, Pa.

WBSR 21.0 is located at the Barr Avenue bridge near West Branch, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for the water quality of the West Branch Susquehanna River before the McCombie Discharge.

This TMDL section for the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 21.0 and WBSR 22.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 21.0 (22.73 MGD). The load allocations made at point WBSR 21.0 for this stream segment are presented in Table D40.

Table D40. TMDL Calculations at Point WBSR 21.0				
Flow = 22.73 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	83.03	15,746.87	0.83	157.47
Mn	4.67	886.20	0.84	159.52
Al	20.83	3,950.54	0.42	79.01
Acidity	224.86	42,646.83	38.23	7,249.96
Alkalinity	45.62	8,651.53		

The loading reduction for point WBSR 22.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 21.0. This value was compared to the allowable load at point WBSR 21.0. Reductions at point WBSR 21.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 21.0 are shown in Table D41.

Table D41. Calculation of Load Reduction Necessary at Point WBSR 21.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 21.0	15,746.87	886.20	3,950.54	42,646.83
Difference of measured loads between loads that enter and existing WBSR 21.0	-267.98	-18.61	-378.54	-12,709.12
Percent loss due calculated at WBSR 21.0	1.7%	2.1%	8.7%	23.0%
Additional loads tracked from above samples	160.15	108.58	43.29	5.54
Percentage of upstream loads that reach WBSR 21.0	98.3%	97.9%	91.3%	77.0%
Total load tracked between WBSR 22.0 and WBSR 21.0	157.42	106.30	39.52	4.27
Allowable load at WBSR 21.0	157.47	159.52	79.01	7,249.96
Load Reduction at WBSR 21.0	0.00	0.00	0.00	0.00
Percent Reduction required at WBSR 21.0	0.0%	0.0%	0.0%	0.0%

The TMDL for point WBSR 21.0 does not require a load reduction A WLA for future mining was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D42).

Table D42. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 20.0: West Branch Susquehanna River upstream of Walnut Run

WBSR 20.0 is located near Maple Avenue in West Branch, Pa. All measurements were recorded upstream of Walnut Run. This monitoring point accounts for an AMD discharge, McCombie Discharge, which enters the West Branch Susquehanna River just upstream of this site. McCombie Discharge is an abandoned discharge.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 20.0 and WBSR 21.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 20.0 (23.63 MGD). The load allocations made at point WBSR 20.0 for this stream segment are presented in Table D43.

Table D43. TMDL Calculations at Point WBSR 20.0				
Flow = 23.63 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	79.79	15,730.28	0.80	157.30
Mn	4.49	886.08	0.85	168.35
Al	19.92	3,926.92	0.60	117.81
Acidity	207.85	40,976.66	41.57	8,195.33
Alkalinity	53.51	10,548.74		

The loading reduction for point WBSR 21.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 20.0. This value was compared to the allowable load at point WBSR 20.0. Reductions at point WBSR 20.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 20.0 are shown in Table D44.

Table D44. Calculation of Load Reduction Necessary at Point WBSR 20.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 20.0	15,730.28	886.08	3,926.92	40,976.66
Difference of measured loads between loads that enter and existing WBSR 20.0	-16.59	-0.12	-23.62	-1,670.17
Percent loss due calculated at WBSR 20.0	0.1%	0.01%	0.6%	3.9%
Additional loads tracked from above samples	157.47	159.52	79.01	7,249.96
Percentage of upstream loads that reach WBSR 20.0	99.9%	99.99%	99.4%	96.1%
Total load tracked between WBSR 21.0 and WBSR 20.0	157.31	159.50	78.54	6,967.21
Allowable load at WBSR 20.0	157.30	168.35	117.81	8,195.33
Load Reduction at WBSR 20.0	0.01	0.00	0.00	0.00
Percent Reduction required at WBSR 20.0	0.0%	0.0%	0.0%	0.0%

The TMDL for point WBSR 20.0 does not require a load reduction. A WLA for future mining was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D45).

Table D45. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 19.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

NCBMA: Northern Cambria Municipal Authority

The Northern Cambria Municipal Authority (NPDES PA0252697) Northern Cambria Borough has one outfall (001) in the West Branch Watershed. This outfall has effluent limits for total iron, total manganese, and total aluminum. The following table (D46) shows the WLA for this discharge.

Table D46. WLA Northern Cambria Municipal Authority			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	2.0	0.015	0.25
Mn	1.0	0.015	0.13
Al	4.0	0.015	0.50

WBSR 19.0: West Branch Susquehanna River downstream of Walnut Run

WBSR 19.0 is located at the Redbud Street bridge north of Northern Cambria, Pa. All measurements were recorded on the upstream side of the Redbud Street bridge. This monitoring point accounts for Walnut Run and Porter Run entering the West Branch Susquehanna River.

The TMDL for this section of the WBSR consists of a load allocation to the watershed area between WBSR 19.0 and WBSR 20.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 19.0 (28.04 MGD). The load allocations made at point WBSR 19.0 for this stream segment are presented in Table D47.

Table D47. TMDL Calculations at Point WBSR 19.0				
Flow = 28.04 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	67.31	15,748.52	1.35	314.97
Mn	3.82	893.63	0.84	196.60
Al	16.89	3,952.73	0.51	118.58
Acidity	161.13	37,700.05	53.17	12,441.02
Alkalinity	70.18	16,419.36		

The loading reduction for point WBSR 20.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 19.0. This value was compared to the allowable load at point WBSR 19.0. Reductions at point WBSR 19.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 19.0 are shown in Table D48.

Table D48. Calculation of Load Reduction Necessary at Point WBSR 19.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 19.0	15,748.52	893.63	3,952.73	37,700.05
Difference of measured loads between loads that enter and existing WBSR 19.0	18.24	7.55	25.81	-3,276.61
Percent loss due calculated at WBSR 19.0	0.0%	0.0%	0.0%	8.0%
Additional loads tracked from above samples	157.30	168.35	117.81	8,195.33
Percentage of upstream loads that reach WBSR 19.0	100.0%	100.0%	100.0%	92.0%
Total load tracked between WBSR 20.0 and WBSR 19.0	175.54	175.90	143.62	7,539.70
Allowable load at WBSR 19.0	314.97	196.60	118.58	12,441.02
Load Reduction at WBSR 19.0	0.00	0.00	25.04	0.00
Percent Reduction required at WBSR 19.0	0.0%	0.0%	17.4%	0.00

The TMDL for point WBSR 19.0 requires a load reduction for total aluminum. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D49).

Table D49. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 18.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

Additional WLA for WBSR 18.0

The WBSR 18.0 site incorporates a WLA of 2.22 lbs/day of iron, 1.48 lbs/day of manganese, and 0.56 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table D50.

Table D50. WLA for WBSR 18.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow (MGD)***	***WLAs (lbs/day)***
Ridge Energy Co.	PA0262463, 11070203	Fe - 3.0 Mn - 2.0 Al - 0.75	0.0445	Fe - 1.11 Mn – 0.74 Al – 0.28
L&J Energy Co. Inc.	PA0213365, 11960104	Fe - 3.0 Mn - 2.0 Al - 0.75	0.0445	Fe - 1.11 Mn – 0.74 Al – 0.28
TOTAL				Fe – 2.22 Mn – 1.48 Al – 0.56

TRINK: MB Energy, Trinkley Mine

MB Energy, MP#11000102, operates a surface mine near Moss Creek in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

TRINK is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. Flow data were available for this point source discharge. Table D51 shows the WLAs for the discharge.

Table D51. WLAs at TRINK

Parameter	*Monthly Avg. Allowable Conc. (mg/l)*	*Average Flow (MGD)*	*Allowable Load (lbs/day)*
Fe	3.0	0.0002	0.01
Mn	2.0	0.0002	0.003
Al	2.0	0.0002	0.003

GAR2: L & J Energy, Garmantown Mine 2

L & J Energy., MP#11830108, operates a surface mine near UNT 27252 in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

GAR2 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The standard 1500’ x 300’ open pit size was used for this operation. Table D52 shows the WLAs for the discharge.

Table D52. WLAs at GAR2

Parameter	*Monthly Avg. Allowable Conc. (mg/l)*	*Average Flow (MGD)*	*Allowable Load (lbs/day)*
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	0.75	0.0445	0.28

GAR1: L & J Energy, Garmantown Mine 1

L & J Energy., MP#11823011, operates a surface mine near UNT 27252 in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

GAR1 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage*

Treatment Facilities from Surface Mines section in Attachment F. The standard 1500' x 300' open pit size was used for this operation. Table D53 shows the WLAs for the discharge.

Table D53. WLAs at GAR1			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0446	1.11
Mn	2.0	0.0446	0.74
Al	0.75	0.0446	0.28

GAR5: L & J Energy, Garmantown Mine 5

L & J Energy., MP#11920102, operates a surface mine near Moss Creek in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

GAR5 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is than the standard 1500' x 300'. Table D54 shows the WLAs for the discharge.

Table D54. WLAs at GAR5			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	0.9	0.0445	0.33

LJGM: Garmantown Mine, L & J Energy, Inc.

L & J Energy, Inc. (11941301, PA0215007) has four outfalls from their Garmantown Deep Mine. Outfalls 001, SP, and 002 are drainage from the deep mine with effluent limits for iron, manganese, aluminum, and flow. Outfall 003 is drainage from the deep mine with effluent limits for iron, manganese, and flow. These outfalls then enter an unnamed tributary to the West Branch Susquehanna River. The following table shows the waste load allocation for these discharges (Table D55).

Table D55. Waste Load Allocation for NPDES Permit No. PA0215007			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.59	14.77
Mn	2.0	0.59	9.85
Al	0.9	0.59	4.43
Outfall SP			
Fe	3.0	0.59	14.77
Mn	2.0	0.59	9.85
Al	0.9	0.59	4.43
Outfall 002			
Fe	3.0	0.59	14.77
Mn	2.0	0.59	9.85
Al	0.9	0.59	4.43
Outfall 003			
Fe	3.0	0.59	14.77
Mn	2.0	0.59	9.85
Al	0.75	0.59	3.69

GAR6: L & J Energy, Garmantown Mine 6

L & J Energy., MP#11960104, operates a surface mine near Moss Creek in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

GAR6 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is than the standard 1500’ x 300’. Table D56 shows the WLAs for the discharge.

Table D56. WLAs at GAR6			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	0.75	0.0445	0.28

WBSR 18.0: West Branch Susquehanna River upstream of Amsbry, Pa.

WBSR 18.0 is located at the old railroad bridge near the White Garman Church of God in Garmantown, Pa. All measurements were recorded on the upstream side of the railroad bridge. This monitoring point accounts for the #39 Discharge and Moss Creek entering the West Branch Susquehanna River. The #39 discharge is an abandoned discharge.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 18.0 and WBSR 19.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 18.0 (32.46 MGD). The load allocations made at point WBSR 18.0 for this stream segment are presented in Table D57.

Table D57 TMDL Calculations at Point WBSR 18.0				
Flow 32.46 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	58.08	15,733.38	1.16	314.67
Mn	3.35	906.40	0.87	235.66
Al	14.49	3,924.67	0.58	156.99
Acidity	136.70	37,030.22	46.48	12,590.28
Alkalinity	70.72	19,156.35		

The loading reduction for point WBSR 19.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 18.0. This value was compared to the allowable load at point WBSR 18.0. Reductions at point WBSR 18.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 18.0 are shown in Table D58.

Table D58. Calculation of Load Reduction Necessary at Point WBSR 18.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 18.0	15,733.38	906.40	3,924.67	37,030.22
Difference of measured loads between loads that enter and existing WBSR 18.0	-15.14	12.77	-28.06	-669.83
Percent loss due calculated at WBSR 18.0	0.1%	0.0%	0.7%	1.8%
Additional loads tracked from above samples	314.97	196.60	118.58	12,441.02
Percentage of upstream loads that reach WBSR 18.0	99.9%	100.0%	99.3%	98.2%
Total load tracked between WBSR 19.0 and WBSR 18.0	314.66	209.37	117.75	12,217.08
Allowable load at WBSR 18.0	314.67	235.66	156.99	12,590.28
Load Reduction at WBSR 18.0	0.00	0.00	0.00	0.00
Percent Reduction required at WBSR 18.0	0.0%	0.0%	0.0%	0.0%

The TMDL for point WBSR 18.0 does not require a load reduction. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D59).

Table D59. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 17.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

GAR7: L & J Energy, Garmantown Mine 7

L & J Energy., MP#11980101, operates a surface mine near UNT 27243 in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

GAR7 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 1500' x 300'. Table D60 shows the WLAs for the discharge.

Table D60. WLAs at GAR7			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	0.75	0.0445	0.28

GAR8: L & J Energy, Garmantown Mine 8

L & J Energy., MP#11020103, operates a surface mine in the West Branch Susquehanna River Watershed along the stream channel. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

GAR8 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 1500' x 300'. Table D61 shows the WLAs for the discharge.

Table D61. WLAs at GAR8			
Parameter	*Monthly Avg. Allowable Conc. (mg/l)*	*Average Flow (MGD)*	*Allowable Load (lbs/day)*
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	2.0	0.0445	0.74

DOUG: No. 1 Refuse Site, Greenwich

Greenwich (32733708, PA0215503) has two outfalls from their No. 1 Refuse Site. Outfall 012 is drainage from the deep mine with effluent limits for iron, manganese, and flow. Outfall 013 is erosion and sediment control. These outfalls then enter Douglas Run. The following table shows the waste load allocation for these discharges (Table D62).

Table D62. Waste Load Allocation for NPDES Permit No. PA0215503			
Parameter			
Outfall 012	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.05	1.25
Mn	2.0	0.05	0.83
Al	0.75	0.05	0.31
Outfall 013			
Fe	7.0	0.0445	2.60

WBSR 17.0: West Branch Susquehanna River north of Emeigh, Pa.

WBSR 17.0 is located at the State Highway 240 bridge just north of Emeigh, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for Emeigh Run and Douglas Run entering the West Branch Susquehanna River.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 17.0 and WBSR 18.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 17.0 (35.27 MGD). The load allocations made at point WBSR 17.0 for this stream segment are presented in Table D63.

Table D63. TMDL Calculations at Point WBSR 17.0				
Flow = 35.27 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	52.88	15,564.42	1.06	311.29
Mn	3.05	896.78	0.88	260.07
Al	12.78	3,762.30	0.51	150.49
Acidity	114.22	33,620.20	43.40	12,775.67
Alkalinity	70.14	20,644.22		

The loading reduction for point WBSR 18.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 17.0. This value was compared to the allowable load at point WBSR 17.0. Reductions at point WBSR 17.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 17.0 are shown in Table D64.

Table D64. Calculation of Load Reduction Necessary at Point WBSR 17.0

	Fe (lbs/day)	*Mn (lbs/day)*	*Al (lbs/day)*	*Acidity (lbs/day)*
Existing load at WBSR 17.0	15,564.42	896.78	3,762.30	33,620.20
Difference of measured loads between loads that enter and existing WBSR 17.0	-168.96	-9.62	-162.37	-3,410.02
Percent loss due calculated at WBSR 17.0	1.1%	1.1%	4.1%	9.2%
Additional loads tracked from above samples	314.67	235.66	156.99	12,590.28
Percentage of upstream loads that reach WBSR 17.0	98.9%	98.9%	95.9%	90.8%
Total load tracked between WBSR 18.0 and WBSR 17.0	311.21	233.07	150.55	11,431.97
Allowable load at WBSR 17.0	311.29	260.07	150.49	12,775.67
Load Reduction at WBSR 17.0	0.00	0.00	0.06	0.00
Percent Reduction required at WBSR 17.0	0.0%	0.0%	0.03%	0.0%

The TMDL for point WBSR 17.0 does not require a load reduction. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D65).

Table D65. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 16.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

Additional WLA for WBSR 16.0

The WBSR 16.0 site incorporates a WLA of 1.11 lbs/day of iron, 0.74 lbs/day of manganese, and 0.28 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table D66.

Table D66. WLA for WBSR 16.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow (MGD)***	***WLAs (lbs/day)***
Twin Brook Coal Co.	PA0125504, 32813001	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
TOTAL				Fe – 1.11 Mn – 0.74 Al – 0.28

CTBMA: Cherry Tree Borough Municipal Authority

The Cherry Tree Borough Municipal Authority (NPDES PA0097462) has one outfall (001) in the West Branch Watershed. This outfall has effluent limits for total iron, total manganese, and total aluminum. Table D67 shows the WLA for this discharge.

Table D67. WLA Cherry Tree Borough Municipal Authority			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	2.0	0.0009	0.02
Mn	1.0	0.0009	0.01
Al	4.0	0.0009	0.03

PRKW: Cherry Tree Mine, Parkwood Resources, Inc.

Parkwood Resources, Inc. (17031301, PA0235571) has three outfalls from their Cherry Tree Deep Mine. Outfall 001 is drainage from the deep mine with effluent limits for iron, manganese, and flow. Outfalls 002 and 003 are for erosion and sediment. These outfalls then enter an unnamed tributary to the West Branch Susquehanna River. The following table shows the waste load allocation for these discharges (Table I68).

Table D68. Waste Load Allocation for NPDES Permit No. PA0215007			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	3.36	84.13
Mn	2.0	3.36	56.09
Al	0.75	3.36	21.03
Outfall 002			
Fe	7.0	0.0445	2.60
Outfall 003			
Fe	7.0	0.0445	2.60

WBSR 16.0: West Branch Susquehanna River downstream of Cush Cushion Creek

WBSR 16.0 is located at the State Route 3004 bridge just north of Cherry Tree, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for several tributaries entering the West Branch Susquehanna River. Cush Cushion Creek, Kilns Run, and Kings Run all contribute significant flow to the West Branch Susquehanna River.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 16.0 and WBSR 17.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 16.0 (43.70 MGD). The load allocations made at point WBSR 16.0 for this stream segment are presented in Table D69.

Table D69. TMDL Calculations at Point WBSR 16.0				
Flow = 43.70 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	42.29	15,419.94	1.27	462.60
Mn	2.42	883.97	0.92	335.91
Al	9.85	3,593.43	0.49	179.67
Acidity	87.41	31,876.67	39.34	14,344.50
Alkalinity	67.61	24,653.12		

The loading reduction for point WBSR 17.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 16.0. This value was compared to the allowable load at point WBSR 16.0. Reductions at point WBSR 16.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 16.0 are shown in Table D70.

Table D70. Calculation of Load Reduction Necessary at Point WBSR 16.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 16.0	15,419.94	883.97	3,593.43	31,876.67
Difference of measured loads between loads that enter and existing WBSR 16.0	-144.48	-12.81	-168.87	-1,743.53
Percent loss due calculated at WBSR 16.0	0.9%	1.4%	4.5%	5.2%
Additional loads tracked from above samples	311.29	260.07	150.49	12,775.67
Percentage of upstream loads that reach WBSR 16.0	99.1%	98.6%	95.5%	94.8%
Total load tracked between WBSR 17.0 and WBSR 16.0	308.49	256.43	143.72	12,111.34
Allowable load at WBSR 16.0	462.60	335.91	179.67	14,344.50
Load Reduction at WBSR 16.0	0.00	0.00	0.00	0.00
Percent Reduction required at WBSR 16.0	0.0%	0.0%	0.0%	0.0%

The TMDL for point WBSR 16.0 does not require a load reduction. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D71).

Table D71. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 15.0: West Branch Susquehanna River at Kantz Hill Road

WBSR 15.0 is located at the bridge on Kantz Hill Road, south of Burnside, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for several large tributaries entering the West Branch Susquehanna River. Shyrock Run, Boiling Spring Run, Beaver Run, and Patchin Run enter the West Branch Susquehanna River upstream of WBSR 15.0.

This TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 15.0 and WBSR 16.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 15.0 (61.41 MGD). The load allocations made at point WBSR 15.0 for this stream segment are presented in Table D72.

Table D72. TMDL Calculations at Point WBSR 15.0				
Flow = 61.41 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	29.89	15,319.73	1.20	612.79
Mn	1.71	876.98	0.92	473.57
Al	6.88	3,523.46	0.48	246.64
Acidity	53.74	27,542.87	26.87	13,771.43
Alkalinity	73.86	37,853.28		

The loading reduction for point WBSR 16.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 15.0. This value was compared to the allowable load at point WBSR 15.0. Reductions at point WBSR 15.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 15.0 are shown in Table D73.

Table D73. Calculation of Load Reduction Necessary at Point WBSR 15.0				
	Fe (lbs/day)	*Mn (lbs/day)*	*Al (lbs/day)*	*Acidity (lbs/day)*
Existing load at WBSR 15.0	15,319.73	876.98	3,523.46	27,542.87
Difference of measured loads between loads that enter and existing WBSR 15.0	-100.21	-6.99	-69.97	-4,333.80
Percent loss due calculated at WBSR 15.0	0.6%	0.8%	1.9%	13.6%
Additional loads tracked from above samples	462.60	335.91	179.67	14,344.50
Percentage of upstream loads that reach WBSR 15.0	99.4%	99.2%	98.1%	86.4%
Total load tracked between WBSR 16.0 and WBSR 15.0	459.82	333.22	176.26	12,393.65
Allowable load at WBSR 15.0	612.79	473.57	246.64	13,771.43
Load Reduction at WBSR 15.0	0.07	0.00	0.00	0.00
Percent Reduction required at WBSR 15.0	0.01%	0.0%	0.0%	0.0%

The TMDL for point WBSR 15.0 does not require a load reduction. A WLA for future mining was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D74).

Table D74. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 14.0: West Branch Susquehanna River upstream of Cush Creek

WBSR 14.0 is located at the U.S. Route 219 bridge north of Burnside, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for several tributaries entering the West Branch Susquehanna River. Sawmill Run, Rock Run, and UNT 27146 all enter the West Branch Susquehanna River upstream of WBSR 14.0. UNT 27146 is listed as impaired by AMD. Loadings for UNT 27146 will be allocated in future TMDLs.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 14.0 and WBSR 15.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 14.0 (85.24 MGD). The load allocations made at point WBSR 14.0 for this stream segment are presented in Table D75.

Table D75. TMDL Calculations at Point WBSR 14.0				
Flow = 85.24 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	21.60	15,362.36	1.30	921.74
Mn	1.25	891.39	0.89	632.88
Al	5.14	3,654.92	0.46	328.94
Acidity	25.39	18,061.50	13.71	9,753.21
Alkalinity	71.42	50,803.33		

The loading reduction for point WBSR 15.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 14.0. This value was compared to the allowable load at point WBSR 14.0. Reductions at point WBSR 14.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 14.0 are shown in Table D76.

Table D76. Calculation of Load Reduction Necessary at Point WBSR 14.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 14.0	15,362.36	891.39	3,654.92	18,061.50
Difference of measured loads between loads that enter and existing WBSR 14.0	42.63	14.41	131.46	-9,481.37
Percent loss due calculated at WBSR 14.0	0.0%	0.0%	0.0%	34.4%
Additional loads tracked from above samples	612.79	473.57	246.64	13,771.43
Percentage of upstream loads that reach WBSR 14.0	100%	100.0%	100.0%	65.6%
Total load tracked between WBSR 15.0 and WBSR 14.0	655.42	487.98	378.10	9,034.06
Allowable load at WBSR 14.0	921.74	632.88	328.94	9,753.21
Load Reduction at WBSR 14.0	0.00	0.00	49.16	0.00
Percent Reduction required at WBSR 14.0	0.0%	0.0%	13.0%	0.0%

The TMDL for point WBSR 14.0 requires a load reduction for total aluminum. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D77).

Table D77. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 13.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

Additional WLA for WBSR 13.0

The WBSR 13.0 site incorporates a WLA of 3.33 lbs/day of iron, 2.22 lbs/day of manganese, and 0.84 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table D78.

Table D78. WLA for WBSR 13.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow (MGD)***	***WLAs (lbs/day)***
Black Oak Developers Inc.	PA0598763, 32900103	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
P&N Coal Co. Inc.	PA0249378, 32030101	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Beth Contracting Inc.	PA0249823, 32050106	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
TOTAL				Fe – 3.33 Mn – 2.22 Al – 0.84

ICMSA: Indiana County Municipal Services Authority

The Indiana County Municipal Services Authority (NPDES PA0095231) has one outfall (001) in the West Branch Watershed. This outfall has effluent limits for total iron, total manganese, and total aluminum. The following table (D79) shows the WLA for this discharge.

Table D79. WLA Indiana County Municipal Services Authority			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	2.0	0.001	0.02
Mn	1.0	0.001	0.01
Al	4.0	0.001	0.03

WBSR 13.0: West Branch Susquehanna River downstream of Cush Creek

WBSR 13.0 is on the West Branch Susquehanna River near Dave's Auto Service, north of State Highway 286 and U.S. Route 219. All measurements were recorded at the head of a riffle area adjacent to Dave's Auto Service. This monitoring point accounts for Cush Creek entering the West Branch Susquehanna River.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 13.0 and WBSR 14.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 13.0 (105.37 MGD). The load allocations made at point WBSR 13.0 for this stream segment are presented in Table D80.

Table D80. TMDL Calculations at Point WBSR 13.0				
Flow = 105.37 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	17.15	15,395.24	1.40	1,231.62
Mn	1.06	929.95	0.90	790.46
Al	4.22	3,707.99	0.42	370.80
Acidity	24.67	21,693.26	12.58	11,063.56
Alkalinity	63.66	55,979.58		

The loading reduction for point WBSR 14.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 13.0. This value was compared to the allowable load at point WBSR 13.0. Reductions at point WBSR 13.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 13.0 are shown in Table D81.

Table D81. Calculation of Load Reduction Necessary at Point WBSR 13.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 13.0	15,395.24	929.95	3,707.99	21,693.26
Difference of measured loads between loads that enter and existing WBSR 13.0	32.88	38.56	53.07	3,631.76
Percent loss due calculated at WBSR 13.0	0.0%	0.0%	0.0%	0.0%
Additional loads tracked from above samples	921.74	632.88	328.94	9,753.21
Percentage of upstream loads that reach WBSR 13.0	100.0%	100.0%	100.0%	100.0%
Total load tracked between WBSR 14.0 and WBSR 13.0	954.62	671.44	382.01	13,384.97
Allowable load at WBSR 13.0	1,231.62	790.46	370.80	11,063.56
Load Reduction at WBSR 13.0	0.00	0.00	11.21	2,321.41
Percent Reduction required at WBSR 13.0	0.0%	0.0%	2.9%	17.3%

The TMDL for point WBSR 13.0 requires a load reduction for total aluminum and acidity. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D82).

Table D82. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 12.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

Additional WLA for WBSR 12.0

The WBSR 12.0 site incorporates a WLA of 2.22 lbs/day of iron, 1.48 lbs/day of manganese, and 0.56 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table D83.

Table D83. WLA for WBSR 12.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow (MGD)***	***WLAs (lbs/day)***
Beth Contracting Inc.	PA0262561, 32080101	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Beth Contracting Inc.	(Proposed), 17080117	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
TOTAL				Fe – 2.22 Mn – 1.48 Al – 0.56

WBSR 12.0: West Branch Susquehanna River at McGees Mills, Pa.

WBSR 12.0 is located at the Township Route 322 bridge in McGees Mills, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for three large tributaries, Deer Run, North Run, and Martin Run, entering the West Branch Susquehanna River upstream of WBSR 12.0.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 12.0 and WBSR 13.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 12.0 (200.40 MGD). The load allocations made at point WBSR 12.0 for this stream segment are presented in Table D84.

Table D84. TMDL Calculations at Point WBSR 12.0				
Flow = 200.40 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	9.54	15,952.25	1.34	2,233.31
Mn	0.62	1,037.94	0.62	1,037.94
Al	2.90	4,850.61	0.38	630.58
Acidity	8.74	14,621.38	4.81	8,041.76
Alkalinity	57.34	95,890.18		

The loading reduction for point WBSR 13.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 12.0. This value was compared to the allowable load at point WBSR 12.0. Reductions at point WBSR 12.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 12.0 are shown in Table D85.

Table D85. Calculation of Load Reduction Necessary at Point WBSR 12.0				
	***Fe* (lbs/day)**	***Mn* (lbs/day)**	***Al* (lbs/day)**	***Acidity* (lbs/day)**
Existing load at WBSR 12.0	15,952.25	1,037.94	4,850.61	14,621.38
Difference of measured loads between loads that enter and existing WBSR 12.0	557.01	107.99	1,142.62	-7,071.88
Percent loss due calculated at WBSR 12.0	0.0%	0.0%	0.0%	32.6%
Additional loads tracked from above samples	1,231.62	790.46	370.80	11,063.56
Percentage of upstream loads that reach WBSR 12.0	100.0%	100.0%	100.0%	67.4%
Total load tracked between WBSR 13.0 and WBSR 12.0	1,788.63	898.45	1,513.42	7,456.84
Allowable load at WBSR 12.0	2,233.31	1,037.94	630.58	8,041.76
Load Reduction at WBSR 12.0	0.00	0.00	882.84	0.00
Percent Reduction required at WBSR 12.0	0.0%	0.0%	58.3%	0.0%

The TMDL for point WBSR 12.0 requires a load reduction for total aluminum. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500' x 300') to be permitted in the future on this segment (Table D86).

Table D86. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 11.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS AND WLAs)

BEAR 1.0: Bear Run at its mouth

Bear Run enters the West Branch Susquehanna River between monitoring points WBSR 12.0 and 11.0 and is highly polluted by AMD at its mouth. The TMDLs assigned in Tables D87 and D88 are based on the data and calculations found in the Bear Run Watershed TMDL completed by SRBC for PADEP and approved by USEPA on April 7, 2005.

The TMDL for Bear Run consists of a load allocation to the watershed area above BEAR 1.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point BEAR 1.0 (15.66 MGD). The load allocations made at point BEAR 1.0 for this stream segment are presented in Table D87.

Table D87. TMDL Calculations at Point BEAR 1.0				
Flow = 15.66 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	1.87	244.20	0.49	64.00
Mn	1.60	209.00	0.43	56.20
Al	1.08	141.10	0.37	48.30
Acidity	43.47	5,677.40	3.91	510.70
Alkalinity	7.20	940.40		

Reductions at point BEAR 1.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point BEAR 1.0 are shown in Table D88.

Table D88. Calculation of Load Reduction Necessary at Point BEAR 1.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	244.20	209.00	141.10	5,677.40
Allowable load at BEAR 1.0	64.00	56.20	48.30	510.70
Percent reduction required at BEAR 1.0	0.0%	7.0%	0.0%	73.0%

The TMDL for point BEAR 1.0 does require a load reduction for total manganese and acidity.

ROSE: Harmony Mine, Rosebud Mining, Inc.

Rosebud Mining, Inc. (17071301, PA0235784) has three outfalls from their Harmony Deep Mine. Outfalls 003 and 001 drain from the deep mine with effluent limits for iron, manganese, and flow. Outfall 002 is for erosion and sediment ponds. These outfalls then enter an unnamed tributary Spring Run. The following table shows the waste load allocation for these discharges (Table D89).

Table D89. Waste Load Allocation for NPDES Permit No. PA0215007			
Parameter			
Outfall 003	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	3.02	39.56
Mn	2.0	3.02	26.38
Al	0.75	3.02	9.89
Outfall 001			
Fe	3.0	3.02	39.56
Mn	2.0	3.02	26.38
Al	0.75	3.02	9.89
Outfall 002			
Fe	3.0	0.0445	2.60

WBSR 11.0: West Branch Susquehanna River at Bower, Pa.

WBSR 11.0 is located at the Township Road 418 bridge in Bower, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for two large tributaries entering the West Branch Susquehanna River. Haslett Run and Laurel Run are two nonimpaired streams that contribute significant flow.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 11.0 and WBSR 12.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 11.0 (395.18 MGD). The load allocations made at point WBSR 11.0 for this stream segment are presented in Table D90.

Table D90. TMDL Calculations at Point WBSR 11.0

Flow 395.18 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	4.95	16,328.78	1.29	4,245.48
Mn	0.38	1,255.85	0.38	1,255.85
Al	1.84	6,060.46	0.28	909.07
Acidity	0.62	2,054.25	0.62	2,054.25
Alkalinity	49.46	163,100.03		

The loading reduction for points WBSR 12.0 and BEAR 1.0 were used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 11.0. This value was compared to the allowable load at point WBSR 11.0. Reductions at point WBSR 11.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 11.0 are shown in Table D91.

Table D91. Calculation of Load Reduction Necessary at Point WBSR 11.0

	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 11.0	16,328.78	1,255.85	6,060.46	2,054.25
Difference of measured loads between loads that enter and existing WBSR 11.0	132.33	8.91	1,068.75	-18,244.53
Percent loss due calculated at WBSR 11.0	0.0%	0.0%	0.0%	89.9%
Additional loads tracked from above samples	2,297.31	1,094.14	678.88	8,552.46
Percentage of upstream loads that reach WBSR 11.0	100.0%	100.0%	100.0%	10.1%
Total load tracked between WBSR 12.0 and WBSR 11.0	2,429.64	1,103.05	1,747.63	863.80
Allowable load at WBSR 11.0	4,245.48	1,255.85	909.07	2,054.25
Load Reduction at WBSR 11.0	0.00	0.00	838.55	0.00
Percent Reduction required at WBSR 11.0	0.0%	0.0%	48.0%	0.0%

The TMDL for point WBSR 11.0 requires a load reduction for total aluminum. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D92).

Table D92. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 10.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

Additional WLA for WBSR 10.0

The WBSR 10.0 site incorporates a WLA of 1.11 lbs/day of iron, 0.74 lbs/day of manganese, and 0.28 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table D93.

Table D93. WLA for WBSR 10.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow (MGD)***	***WLAs (lbs/day)***
Hepburnia Coal Co.	PA0243469, 17030105	Fe – 1.11 Mn – 0.74 Al – 0.28	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
TOTAL				Fe – 1.11 Mn – 0.74 Al – 0.28

GRHM: TDK Coal, Graham Mine

TDK Coal, SMP#17814000, operates a surface mine near Irish Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.
GRHM is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. Flow data were available for this point source discharge. Table D94 shows the WLAs for the discharge.

Table D94. WLAs at GRHM			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0398	1.00
Mn	2.0	0.0398	0.66
Al	2.0	0.0398	0.66

HEPF: Amfire Mining, Hepfer Mine

Amfire Mining, SMP#17930128, operates a surface mine near Bell Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

HEPF is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The standard 1500' x 300' open pit size was used for this operation. Table D95 shows the WLAs for the discharge.

Table D95. WLAs at HEPF			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	2.0	0.0445	0.74

BRM2: Amfire Mining, Bell Run No. 2

Amfire Mining, SMP#17030101, operates a surface mine near Bell Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

BRM2 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is 100' x 100', smaller than the standard 1500' x 300'. Table D96 shows the WLAs for the discharge.

Table D96. WLAs at BRM2			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0010	0.03
Mn	2.0	0.0010	0.02
Al	2.0	0.0010	0.02

BRM1: Amfire Mining, Bell Run No. 1

Amfire Mining, SMP#17970110, operates a surface mine near Bell Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

BRM1 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is 650' x 250', smaller than the standard 1500' x 300'. Table D97 shows the WLAs for the discharge.

Table D97. WLAs at BRM1

Parameter	*Monthly Avg. Allowable Conc. (mg/l)*	*Average Flow (MGD)*	*Allowable Load (lbs/day)*
Fe	3.0	0.0161	0.40
Mn	2.0	0.0161	0.27
Al	2.0	0.0161	0.27

BLLT: Hepburnia Coal Co., Bells Landing Tip

Hepburnia Coal Co., SMP#17921603, operates a surface mine in the West Branch Susquehanna River Watershed along the stream channel. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

BLLT is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The standard 1500' x 300' open pit size was used for this operation. Table D98 shows the WLAs for the discharge.

Table D98. WLAs at BLLT

Parameter	*Monthly Avg. Allowable Conc. (mg/l)*	*Average Flow (MGD)*	*Allowable Load (lbs/day)*
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	2.0	0.0445	0.28

MIKE: Bell Resources, Michaels Mine

Bell Resources, SMP#17010103, has not started, but a WLA is being assigned for future loadings. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

MIKE is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 1500' x 300'. Table D99 shows the WLAs for the discharge.

Table D99. WLAs at MIKE			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	1.0	0.0445	0.37

PPRN: Amfire Mining, Poplar Run Mine

Amfire Mining, SMP#17940116, operates a surface mine near Poplar Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

PPRN is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 500' x 300'. Table D100 shows the WLAs for the discharge.

Table D100. WLAs at PPRN			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0149	0.37
Mn	2.0	0.0149	0.25
Al	2.0	0.0149	0.25

BRN3: Amfire Mining, Bell Run Mine 3

Amfire Mining, SMP#170300121, has not started yet and is being allocated for future permit approval. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

BRN3 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 300' x 100'. Table D101 shows the WLAs for the discharge.

Table D101. WLAs at BRN3			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0030	0.08
Mn	2.0	0.0030	0.05
Al	2.0	0.0030	0.05

WBSR 10.0: West Branch Susquehanna River downstream of Curwensville Dam

WBSR 10.0 is located at the State Highway 453 bridge near Curwensville, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for several large tributaries entering the West Branch Susquehanna River. Curry Run, McCracken Run, Bell Run, Hiles Run, Passmore Run, and Porter Run enter the West Branch Susquehanna River upstream of monitoring point WBSR 10.0.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 10.0 and WBSR 11.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 10.0 (839.46 MGD). The load allocations made at point WBSR 10.0 for this stream segment are presented in Table D102.

Table D102. TMDL Calculations at Point WBSR 10.0				
Flow = 839.46 MGD	*Measured Sample Data*		*Allowable*	
Parameter	*Conc. (mg/l)*	*Load (lbs/day)*	*LTA Conc. (mg/l)*	*Load (lbs/day)*
Fe	2.43	17,025.81	1.19	8,342.64
Mn	0.27	1,922.88	0.27	1,922.88
Al	1.38	9,658.07	0.21	1,448.71
Acidity	-4.23	-29,655.95	NA	NA
Alkalinity	42.16	295,334.26		

The loading reduction for point WBSR 11.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 10.0. This value was compared to the allowable load at point WBSR 10.0. Reductions at point WBSR 10.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 10.0 are shown in Table D103.

Table D103. Calculation of Load Reduction Necessary at Point WBSR 10.0				
	Fe (lbs/day)	*Mn (lbs/day)*	*Al (lbs/day)*	*Acidity (lbs/day)*
Existing load at WBSR 10.0	17,025.81	1,922.88	9,658.07	NA
Difference of measured loads between loads that enter and existing WBSR 10.0	697.03	667.03	3,597.61	-
Percent loss due calculated at WBSR 10.0	0.0%	0.0%	0.0%	-
Additional loads tracked from above samples	4,245.48	1,255.85	909.07	-
Percentage of upstream loads that reach WBSR 10.0	100.0%	100.0%	100.0%	-
Total load tracked between WBSR 11.0 and WBSR 10.0	4,942.51	1,922.88	4,506.68	-
Allowable load at WBSR 10.0	8,342.64	1,922.88	1,448.71	-
Load Reduction at WBSR 10.0	0.00	0.00	3,057.97	-
Percent Reduction required at WBSR 10.0	0.0%	0.0%	67.9%	-

The TMDL for point WBSR 10.0 requires a load reduction for total aluminum. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D104).

Table D104. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 9.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS AND WLAs)

CARB: Moravian, Carbon Mine

Moravian, SMP#17020107, operates a mining permit near the West Branch Susquehanna River. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

CARB is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. Flow data were available for this point source discharge. Table D105 shows the WLAs for the discharge.

Table D105. WLAs at CARB			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0464	1.16
Mn	2.0	0.0464	0.77
Al	2.0	0.0464	0.77

ANTH: Waroquier Coal Inc., Antis Hill 2

Waroquier Coal Inc., SMP#17880126, operates a surface mine near UNT 26640 in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

ANTH is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. Flow data were available for this point source discharge. Table D106 shows the WLAs for the discharge.

Table D106. WLAs at ANTH			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0323	0.81
Mn	2.0	0.0323	0.54
Al	0.75	0.0323	0.20

A 2: Anderson Creek at its mouth

Anderson Creek enters the West Branch Susquehanna River, between monitoring points WBSR 10.0 and 9.0, near Curwensville, Pa. Anderson Creek is polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables D107 and D108 are based on the data and calculations found in the Anderson Creek Watershed TMDL completed by SRBC for PADEP and approved by the USEPA on April 7, 2005.

The TMDL for this section of Anderson Creek consists of a load allocation from the established Anderson Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point A 2 (74.19 MGD). The load allocations made at point WBSR 4.0 for this stream segment are presented in Table D107.

Table D107. TMDL Calculations at Point A 2				
Flow = 74.19 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.28	173.20	0.28	172.20
Mn	0.92	569.30	-	-
Al	0.79	488.80	-	-
Acidity	12.58	7,783.80	8.55	5,290.30
Alkalinity	17.85	11,044.60		

Reductions at point A 2 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point A 2 are shown in Table D108.

Table D108. Calculation of Load Reduction Necessary at Point A 2				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	173.30	569.30	488.80	7,783.80
Allowable load at A 2	172.20	-	-	5,290.30
Percent reduction required at A 2	0.0%	0.0%	0.0%	0.0%

The TMDL for point A 2 does not require a load reduction.

HART 01: Hartshorn Run at its mouth

Hartshorn Run enters the West Branch Susquehanna River between monitoring points WBSR 10.0 and 9.0, downstream of Curwensville, Pa. Hartshorn Run is polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables D109 and D110 are based on the data and calculations found in the Hartshorn Run Watershed TMDL completed by PADEP and approved by the USEPA on April 1, 2005.

This TMDL section for Hartshorn Run consists of a load allocation from the established Hartshorn Run TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point HART 01 (3.15 MGD). The load allocations made at point HART 01 for this stream segment are presented in Table D109.

Table D109. TMDL Calculations at Point HART 01

Flow = 3.15 MGD	*Measured Sample Data*		*Allowable*	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	ND	NA	NA	NA
Mn	0.28	7.30	0.28	7.30
Al	ND	NA	NA	NA
Acidity	29.90	785.10	3.29	86.40
Alkalinity	7.85	206.10		

Reductions at point HART 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point HART 01 are shown in Table D110.

Table D110. Calculation of Load Reduction Necessary at Point HART 01

	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	NA	7.30	NA	785.10
Allowable load at HART 01	-	7.30	-	86.40
Percent reduction required at HART 01	0.0%	0.0%	0.0%	0.0%

The TMDL for point HART 01 does not require a load reduction.

PR 01: UNT 26641 to the West Branch Susquehanna River at its mouth

UNT 26641 enters the West Branch Susquehanna River between monitoring points WBSR 10.0 and 9.0, downstream of Curwensville, Pa. UNT 26641 is polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables D111 and D112 are based on the data and calculations found in the UNT 26641 to West Branch Susquehanna River Watershed TMDL completed by PADEP and approved by USEPA on September 20, 2006.

The TMDL for this section of UNT 26641 consists of a load allocation from the established UNT 26641 TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point PR 01

(2.46 MGD). The load allocations made at point PR 01 for this stream segment are presented in Table D111.

Table D111. TMDL Calculations at Point PR 01				
Flow = 2.46 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	ND	NA	NA	NA
Mn	2.11	43.30	0.49	10.10
Al	0.33	6.70	0.13	2.70
Acidity	25.70	526.90	4.07	83.40
Alkalinity	18.30	375.20		

Reductions at point PR 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point PR 01 are shown in Table D1123.

Table D112. Calculation of Load Reduction Necessary at Point PR 01				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	NA	43.30	6.70	526.90
Allowable load at PR 01	-	10.10	2.70	83.40
Percent reduction required at PR 01	-	54.0%	0.0%	71.0%

The TMDL for point PR 01 requires a load reduction for total manganese and acidity.

MC 1: Montgomery Creek at its mouth

Montgomery Creek enters the West Branch Susquehanna River between monitoring points WBSR 10.0 and 9.0, downstream of Hyde, Pa. Montgomery Creek is polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables D113 and D114 are based on the data and calculations found in the Montgomery Creek Watershed TMDL completed by SRBC for PADEP and approved by the USEPA on April 9, 2003.

The TMDL for this section of Montgomery Creek consists of a load allocation from the established Montgomery Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point MC 1 (22.20 MGD). The load allocations made at point MC 1 for this stream segment are presented in Table D113.

Table D113. TMDL Calculations at Point MC 1				
Flow = 22.20 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.30	55.50	0.30	55.50
Mn	5.44	1,007.20	0.22	40.70
Al	2.23	412.90	0.18	33.30
Acidity	41.33	7,652.20	0.41	75.90
Alkalinity	6.07	1,123.80		

Reductions at point MC 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point MC 01 are shown in Table D114.

Table D114. Calculation of Load Reduction Necessary at Point MC 1				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	55.50	1,007.20	412.90	7,652.20
Allowable load at MC 1	54.70	40.20	32.80	75.90
Percent reduction required at MC 1	0.0%	0.0%	0.0%	0.0%

The TMDL for point MC 1 does not require a load reduction.

WBSR 9.0: West Branch Susquehanna River at Hyde, Pa.

WBSR 9.0 is located at State Highway 879 bridge in Hyde, Pa. All measurements were recorded on the upstream side of the bridge.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 9.0 and WBSR 10.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 9.0 (941.42 MGD). The load allocations made at point WBSR 9.0 for this stream segment are presented in Table D115.

Table D115. TMDL Calculations at Point WBSR 9.0				
Flow 941.42 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	2.21	17,360.65	1.13	8,853.93
Mn	0.39	3,089.25	0.39	3,089.25
Al	1.42	11,118.58	0.21	1,667.79
Acidity	4.43	34,824.20	2.75	21,591.01
Alkalinity	37.21	292,294.13		

The loading reduction for points WBSR 10.0, A 2, HART 01, PR 01, and MC 1 were used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 9.0. This value was compared to the allowable load at point WBSR 9.0. Reductions at point WBSR 9.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 9.0 are shown in Table D116.

Table D116. Calculation of Load Reduction Necessary at Point WBSR 9.0				
	Fe (lbs/day)	*Mn (lbs/day)*	*Al (lbs/day)*	*Acidity (lbs/day)*
Existing load at WBSR 9.0	17,360.65	3,089.25	11,118.58	34,824.20
Difference of measured loads between loads that enter and existing WBSR 9.0	106.14	-460.73	552.11	28,076.20
Percent loss due calculated at WBSR 9.0	0.0%	13.0%	0.0%	0.0%
Additional loads tracked from above samples	8,570.34	1,980.98	1,484.71	5,536.00
Percentage of upstream loads that reach WBSR 9.0	100.0%	87.0%	100.0%	100.0%
Total load tracked between WBSR 10.0 and WBSR 9.0	8,676.48	1,723.45	2,036.82	33,612.20
Allowable load at WBSR 9.0	8,853.93	3,089.25	1,667.79	21,591.01
Load Reduction at WBSR 9.0	0.00	0.00	369.03	12,021.19
Percent Reduction required at WBSR 9.0	0.0%	0.0%	18.1%	35.8%

The TMDL for point WBSR 9.0 requires a load reduction for total aluminum and acidity. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D117).

Table D117. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 8.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS AND WLAs)

Additional WLA for WBSR 8.0

The WBSR 8.0 site incorporates a WLA of 4.44 lbs/day of iron, 2.96 lbs/day of manganese, and 1.12 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table D118.

Table D118. WLA for WBSR 8.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow***	***WLAs***
P&N Coal Co. Inc.	PA0207110, 17920115	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Waroquier Coal Co.	(Proposed), 17080118	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Waroquier Coal Co.	(Proposed), 17080111	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Sky Haven Coal Inc.	PA0243469, 17030105	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
TOTAL				Fe – 4.44 Mn – 2.96 Al – 1.12

GILL: Swisher Coal, Gill Mine

Swisher Coal, SMP#17030110, operates a surface mine near UNT 26622 in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

GILL is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. Flow data were available for this point source discharge. Table D119 shows the WLAs for the discharge.

Table D119. WLAs at GILL			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0041	0.10
Mn	2.0	0.0041	0.07
Al	0.8	0.0041	0.03

BUTL: Swisher Coal, Butler Mine

Swisher Coal, SMP#17010108, operates a surface mine near UNT 26622 in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

BUTL is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The standard 1500’ x 300’ open pit size was used for this operation. Table D120 shows the WLAs for the discharge.

Table D120. WLAs at BUTL			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	0.70	0.0445	0.26

RISH: Kenneth, Rishel 1 Mine

Kenneth, SMP#17000109, operates a surface mine near UNT 26622 in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

RISH is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is 100' x 50'. Table D121 shows the WLAs for the discharge.

Table D121. WLAs at RISH			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0003	0.01
Mn	2.0	0.0003	0.01
Al	1.6	0.0003	0.01

BRTH: Amfire Mining, Breth 1

Amfire Mining, SMP#17813093, operates a surface mine near Lick Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

BRTH is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 1500' x 300'. Table D122 shows the WLAs for the discharge.

Table D122. WLAs at BRTH			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	2.0	0.0445	0.74

MOOS 01: Moose Creek at its Mouth

Moose Creek enters the West Branch Susquehanna River between monitoring points WBSR 9.0 and 8.0, near Clearfield, Pa. Moose Creek is polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables D123 and D124 are based on the data and calculations found in the Moose Creek Watershed TMDL completed by PADEP and approved by USEPA on March 21, 2005.

The TMDL for this section of Moose Creek consists of a load allocation from the established Moose Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point MOOS 01 (10.75 MGD). The load allocations made at point MOOS 01 for this stream segment are presented in Table D123.

Table D123. TMDL Calculations at Point MOOS 01				
Flow = 10.65 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	ND	NA	NA	NA
Mn	1.44	128.90	0.63	56.70
Al	1.08	96.60	0.50	44.40
Acidity	32.30	2,895.30	4.20	376.40
Alkalinity	7.30	654.30		

Reductions at point MOOS 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point MOOS 01 are shown in Table D124.

Table D124. Calculation of Load Reduction Necessary at Point MOOS 01				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	NA	128.90	96.6	2,895.30
Allowable load at MOOS 01	-	56.70	44.4	376.40
Percent reduction required at MOOS 01	-	26.0%	24.0%	47.0%

The TMDL for point MOOS 01 requires a load reduction for total manganese, total aluminum, and acidity.

LR 01: Lick Run at its mouth

Lick Run enters the West Branch Susquehanna River between monitoring points WBSR 9.0 and 8.0, downstream of Clearfield, Pa. Lick Run is polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables D125 and D126 are based on the data and calculations found in the Lick Run Watershed TMDL completed by SRBC for PADEP and approved by USEPA on April 4, 2005.

The TMDL for this section of Lick Run consists of a load allocation from the established Lick Run TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point LR 01 (30.90 MGD). The load allocations made at point LR 01 for this stream segment are presented in Table D125.

Table D125. TMDL Calculations at Point LR 01				
Flow = 30.90 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	ND	NA	NA	NA
Mn	0.70	180.40	0.40	103.10
Al	ND	NA	NA	NA
Acidity	22.37	5,764.90	3.36	865.90
Alkalinity	7.33	1,889.00		

Reductions at point LC 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point LC 01 are shown in Table D126.

Table D126. Calculation of Load Reduction Necessary at Point LR 01				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	NA	180.40	NA	5,764.9
Allowable load at LR 01	-	103.10	-	865.9
Percent reduction required at LR 01	-	0.0%	-	1.0%

The TMDL for point LR 01 requires a load reduction for acidity.

CLCR 1.0: Clearfield Creek at its mouth

Clearfield Creek enters the West Branch Susquehanna River between monitoring points WBSR 9.0 and 8.0, downstream of Clearfield, Pa. Clearfield Creek is polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables D127 and D128 are based on the data and calculations found in the Clearfield Creek Watershed TMDL completed by SRBC for PADEP and approved by USEPA in April 2007.

The TMDL for this section of Clearfield Creek consists of a load allocation from the established Clearfield Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point CLCR 1.0 (339.58 MGD). The load allocations made at point LR 01 for this stream segment are presented in Table D127.

Table D127. TMDL Calculations at Point CLCR 1.0				
Flow = 339.58 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	1.42	4,024.00	0.54	1,530.20
Mn	1.85	5,242.50	0.61	1,728.60
Al	0.80	2,267.00	0.28	793.50
Acidity	15.10	42,790.30	4.08	11,561.90
Alkalinity	27.40	59,509.70		

Reductions at point CLCR 1.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point CLCR 1.0 are shown in Table D128.

Table D128. Calculation of Load Reduction Necessary at Point CLCR 1.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	4,024.00	5,242.50	2,267.00	42,790.30
Allowable load at CLCR 1.0	1,530.20	1,728.60	793.50	11,561.90
Percent reduction required at CLCR 1.0	0.0%	0.0%	6.0%	57.0%

The TMDL for point CLCR 1.0 requires a load reduction for total aluminum and acidity.

REMAP: Reliant Energy Mid-Atlantic Power Holdings, LLC

The Reliant Energy Mid-Atlantic Power Holdings, LLC (NPDES PA0095231) Shawville Power Plant has one outfall (405) in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (D129) shows the WLA for this discharge.

Table D129. WLA at Reliant Energy Mid-Atlantic Power Holdings, LLC			
Parameter			
Outfall 405	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	1.8	1.314	19.74
Mn	2.1	1.314	23.03
Al	3.7	1.314	40.58

CLMUA: Clearfield Municipal Authority

The Clearfield Municipal Authority (NPDES PA0026310) operates an industrial wastewater permit that additionally treats oil and gas by-product in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (D130) shows the WLA for this discharge.

Table D130. WLA at Clearfield Municipal Authority			
Parameter			
Outfall	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	4.500	112.68
Mn	2.0	4.500	75.12
Al	2.0	4.500	75.12

WBSR 8.0: West Branch Susquehanna River at Shawville, Pa.

WBSR 8.0 is located at the State Route 1006 bridge near a power plant in Shawville, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for several tributaries entering the West Branch Susquehanna River. Moose Creek and Lick Run enter the West Branch Susquehanna River upstream of WBSR 8.0 and have completed TMDLs for their watersheds. Also, UNT 26622, UNT 26608, Wolf Run, and Clearfield Creek enter the WBSR in this section and are listed as being impaired by AMD for metals and pH. Loadings for UNT 26622, UNT 26608 and Wolf Creek will be allocated in future TMDLs.

This TMDL section for the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 8.0 and WBSR 9.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 8.0 (1,478.09 MGD). The load allocations made at point WBSR 8.0 for this stream segment are presented in Table D131.

Table D131. TMDL Calculations at Point WBSR 8.0				
Flow = 1,478.09 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	1.79	22,046.89	0.89	11,023.44
Mn	0.79	9,706.94	0.41	5,047.61
Al	1.32	16,287.92	0.20	2,443.19
Acidity	15.60	192,477.05	5.31	65,442.20
Alkalinity	29.77	367,168.96		

The loading reduction for points WBSR 9.0, LR 01, CLCR 1.0, and MOOS 01 were used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 8.0. This value was compared to the allowable load at point WBSR 8.0. Reductions at point WBSR 8.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 8.0 are shown in Table D132.

Table D132. Calculation of Load Reduction Necessary at Point WBSR 8.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 8.0	22,046.89	9,706.94	16,287.92	192,477.05
Difference of measured loads between loads that enter and existing WBSR 8.0	662.24	1,065.89	2,805.74	106,202.35
Percent loss due calculated at WBSR 8.0	0.0%	0.0%	0.0%	0.0%
Additional loads tracked from above samples	10,384.13	4,977.65	2,505.69	34,395.21
Percentage of upstream loads that reach WBSR 8.0	100.0%	100.0%	100.0%	100.0%
Total load tracked between WBSR 9.0 and WBSR 8.0	11,046.37	6,043.54	5,311.43	140,597.56
Allowable load at WBSR 8.0	11,023.44	5,047.61	2,443.19	65,442.20
Load Reduction at WBSR 8.0	22.93	995.93	2,868.24	75,155.36
Percent Reduction required at WBSR 8.0	0.2%	16.5%	54.0%	53.5%

The TMDL for point WBSR 8.0 requires a load reduction for total iron, total manganese, total aluminum, and acidity. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D133).

Table D133. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 7.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS AND WLAs)

Additional WLA for WBSR 7.0

The WBSR 7.0 site incorporates a WLA of 31.82 lbs/day of iron, 21.22 lbs/day of manganese, and 8.44 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table D134.

Table D134. WLA for WBSR 7.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow***	***WLAs***
E.M. Brown, Inc (Passive Treatment)	17813024	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Bradford Coal (Passive Treatment)	3268BSM34	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Amfire Mining Co LLC	PA0243817, 17040107	Fe – 3.0 Mn – 2.0 Al – 2.0	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.74
King Coal Sales Inc	PA0256277, 17050108	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Energy Resources (2 outfalls)	PA06117083, 17823701	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 2.22 Mn – 1.48 Al – 0.56
Energy Resources (2 outfalls)	PA0100803, 17841607	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 2.22 Mn – 1.48 Al – 0.56
Manor Mining	PA0014095, 17841301	Fe – 3.0 Mn – 2.0 Al – 0.75	0.917	Fe – 22.94 Mn – 15.30 Al – 5.74
TOTAL				Fe – 31.82 Mn – 21.22 Al – 8.44

MP 06: Surveyor Run at its mouth

Surveyor Run enters the West Branch Susquehanna River between monitoring points WBSR 8.0 and 7.0, downstream of Croft, Pa. Surveyor Run is highly polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables D135 and D136 are based on the data and calculations found in the Surveyor Run Watershed TMDL completed by PADEP and approved by USEPA on September 30, 2004.

The TMDL for this section of Surveyor Run consists of a load allocation from the established Surveyor Run TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point MP 06 (5.99 MGD). The load allocations made at point MP 06 for this stream segment are presented in Table D135.

Table D135. TMDL Calculations at Point MP 06				
Flow = 5.99 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.54	27.00	0.54	27.00
Mn	3.78	188.60	0.57	28.30
Al	3.33	166.30	0.53	26.60
Acidity	65.63	3,277.90	5.91	295.00
Alkalinity	7.53	375.90		

Reductions at point MP 06 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point MP 06 are shown in Table D136.

Table D136. Calculation of Load Reduction Necessary at Point MP 06				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	27.00	188.60	166.30	3,277.90
Allowable load at MP 06	27.00	28.30	26.60	295.00
Percent reduction required at MP 06	0.0%	0.0%	0.0%	62.0%

The TMDL for point MP 06 requires a load reduction for acidity.

WBSR 7.0: West Branch Susquehanna River at Frenchville Station, Pa.

WBSR 7.0 is located at the State Route 1009 bridge near Frenchville Station, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for Surveyor Run which has a TMDL completed for its watershed. Also, four additional AMD impaired tributaries enter the West Branch Susquehanna River above monitoring point WBSR 7.0. Trout Run, Millstone Run, Bald Hill Run, and Moravian Run are listed for AMD impairment for metals and pH. Loadings for Trout Run, Millstone Run, Bald Hill Run, and Moravian Run will be allocated in future TMDLs.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 7.0 and WBSR 8.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 7.0 (1,666.74 MGD). The load allocations made at point WBSR 7.0 for this stream segment are presented in Table D137.

Table D137. TMDL Calculations at Point WBSR 7.0				
Flow = 1,666.74 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	1.68	23,301.90	0.79	10,951.89
Mn	0.64	8,851.26	0.36	4,956.71
Al	1.36	18,874.06	0.20	2,831.11
Acidity	14.39	200,189.95	4.61	64,060.78
Alkalinity	26.85	373,414.17		

The loading reduction for points WBSR 8.0 and MP 06 were used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 7.0. This value was compared to the allowable load at point WBSR 7.0. Reductions at point WBSR 7.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 7.0 are shown in Table D138.

Table D138. Calculation of Load Reduction Necessary at Point WBSR 7.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 7.0	23,301.90	8,851.26	18,874.06	200,189.95
Difference of measured loads between loads that enter and existing WBSR 7.0	1,228.01	-1044.28	2,419.84	4,435.00
Percent loss due calculated at WBSR 7.0	0.0%	10.6%	0.0%	0.0%
Additional loads tracked from above samples	11,050.44	5,075.91	2,469.79	65,737.20
Percentage of upstream loads that reach WBSR 7.0	100.0%	89.4%	100.0%	100.0%
Total load tracked between WBSR 8.0 and WBSR 7.0	12,278.45	4,537.86	4,889.63	70,172.20
Allowable load at WBSR 7.0	10,951.89	4,956.71	2,831.11	64,060.78
Load Reduction at WBSR 7.0	1,326.56	0.00	2,058.52	6,111.42
Percent Reduction required at WBSR 7.0	10.8%	0.0%	42.1%	8.7%

The TMDL for point WBSR 7.0 requires a load reduction for total iron, total aluminum, and acidity. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D139).

Table D139. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 6.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS)

DEER 1.0: Deer Creek at its mouth

Deer Creek enters the West Branch Susquehanna River between monitoring points WBSR 7.0 and 6.0, downstream of Frenchville Station, Pa. Deer Creek is highly polluted at its mouth and has a TMDL completed for its watershed. The TMDLs assigned in Tables D140 and D141 are based on the data and calculations found in the Deer Creek Watershed TMDL completed by SRBC for PADEP and approved by USEPA on April 8, 2005.

The TMDL for this section of Deer Creek consists of a load allocation from the established Deer Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point DEER 1.0 (26.87 MGD). The load allocations made at point DEER 1.0 for this stream segment are presented in Table D140.

Table D140. TMDL Calculations at Point DEER 1.0				
Flow = 26.87 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	2.10	470.60	0.42	94.10
Mn	2.63	589.40	0.42	94.10
Al	1.30	291.30	0.43	96.40
Acidity	43.93	9,844.60	4.83	1,082.40
Alkalinity	7.17	1,606.80		

Reductions at point DEER 1.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point DEER 1.0 are shown in Table D141.

Table D141. Calculation of Load Reduction Necessary at Point DEER 1.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	470.60	589.40	291.30	9,844.60
Allowable load at DEER 1.0	94.10	94.10	96.40	1,082.40
Percent reduction required at DEER 1.0	0.0%	60.0%	48.0%	54.0%

The TMDL for point DEER 1.0 requires a load reduction for total manganese, total aluminum, and acidity.

BR 01: Big Run at its mouth

Big Run enters the West Branch Susquehanna River between monitoring points WBSR 7.0 and 6.0, downstream of Frenchville Station, Pa. Big Run is highly polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables D142 and D143 are based on the data and calculations found in the Big Run Watershed TMDL completed by PADEP and approved by USEPA on December 13, 2004.

The TMDL for this section of Big Run consists of a load allocation from the established Big Run TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point BR 01 (3.12 MGD). The load allocations made at point BR 01 for this stream segment are presented in Table D142.

Table D142. TMDL Calculations at Point BR 01				
Flow = 3.12 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	ND	NA	NA	NA
Mn	0.28	7.30	0.12	3.20
Al	ND	NA	NA	NA
Acidity	10.35	269.50	2.17	56.60
Alkalinity	12.10	315.00		

Reductions at point BR 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point BR 01 are shown in Table D143.

Table D143. Calculation of Load Reduction Necessary at Point BR 01				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	ND	7.30	ND	269.50
Allowable load at BR 01	-	3.20	-	56.60
Percent reduction required at BR 01	-	55.0%	-	76.0%

The TMDL for point BR 01 does require a load reduction for total manganese and acidity.

SC 1.0: Sandy Creek at its mouth

Sandy Creek enters the West Branch Susquehanna River between monitoring points WBSR 7.0 and 6.0, near Rolling Stone, Pa. Sandy Creek is highly polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables D144 and D145 are based on the data and calculations found in the Sandy Creek Watershed TMDL completed by SRBC for PADEP and approved by USEPA on April 4, 2007.

The TMDL for this section of Sandy Creek consists of a load allocation from the established Sandy Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point SC 1.0 (14.7 MGD). The load allocations made at point SC 1.0 for this stream segment are presented in Table D144.

Table D144. TMDL Calculations at Point SC 1.0

Flow 14.7 MGD	*Measured Sample Data*		*Allowable*	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	2.15	263.60	0.64	78.50
Mn	5.12	627.70	0.16	19.60
Al	2.71	332.20	0.16	19.60
Acidity	47.80	5,860.20	1.43	175.30
Alkalinity	5.80	711.10		

Reductions at point SC 1.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point SC 1.0 are shown in Table D145.

Table D145. Calculation of Load Reduction Necessary at Point SC 1.0

	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	263.60	627.70	332.20	5,860.20
Allowable load at SC 1.0	78.50	19.60	19.60	175.30
Percent reduction required at SC 1.0	65.0%	0.0%	1.0%	1.0%

The TMDL for point SC 01 requires a load reduction for total iron, total aluminum, and acidity.

AR 01: Alder Run at its mouth

Alder Run enters the West Branch Susquehanna River between monitoring points WBSR 7.0 and 6.0, near Rolling Stone, Pa. Alder Run is highly polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables D146 and D147 are based on the data and calculations found in the Alder Run Watershed TMDL completed by PADEP and approved by USEPA on August 2, 2006.

The TMDL for this section of Alder Run consists of a load allocation from the established Alder Run TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point AR 01 (25.82 MGD). The load allocations made at point AR 01for this stream segment are presented in Table D146.

Table D146. TMDL Calculations at Point AR 01				
Flow = 25.82 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	20.93	4,505.40	0.69	149.10
Mn	4.96	1,067.40	0.47	100.40
Al	9.71	2,091.20	0.51	110.00
Acidity	178.50	38,433.60	0.00	0.00
Alkalinity	0.00	0.00		

Reductions at point AR 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point AR 01 are shown in Table D147.

Table D147. Calculation of Load Reduction Necessary at Point AR 01				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	4,505.40	1,067.40	2,091.20	38,433.60
Allowable load at AR 01	149.10	100.40	110.00	0.00
Percent reduction required at AR 01	89.0%	76.0%	0.0%	100.0%

The TMDL for point AR 01 requires a load reduction for total manganese, total iron, and acidity.

WBSR 6.0: West Branch Susquehanna River at Rolling Stone, Pa.

WBSR 6.0 is at the State Route 1011 bridge in Rolling Stone, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for the water quality contributions from Deer Creek, Big Run, Sandy Creek, Alder Run, and Rolling Stone Run. All of the tributaries, with the exception of Rolling Stone Run, have TMDLs completed for their watersheds. Rolling Stone Run is a tributary that enters the West Branch Susquehanna River that is impaired by AMD for metals and pH. Loadings for Rolling Stone Run will be allocated in future TMDLs.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 6.0 and WBSR 7.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 6.0 (1,747.75 MGD). The load allocations made at point WBSR 6.0 for this stream segment are presented in Table D148.

Table D148. TMDL Calculations at Point WBSR 6.0				
Flow = 1,747.75 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	2.14	31,183.72	0.75	10,914.30
Mn	0.75	10,953.52	0.35	5,148.15
Al	1.05	15,378.59	0.43	6,305.22
Acidity	21.82	318,183.14	9.38	136,818.75
Alkalinity	22.40	326,773.38		

The loading reduction for points WBSR 7.0, DEER 1.0, BR 01, SC 1.0, and AR 01 were used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 6.0. This value was compared to the allowable load at point WBSR 6.0. Reductions at point WBSR 6.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 6.0 are shown in Table D149.

Table D149. Calculation of Load Reduction Necessary at Point WBSR 6.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 6.0	31,183.72	10,953.52	15,378.59	318,183.14
Difference of measured loads between loads that enter and existing WBSR 6.0	2,642.22	-189.54	-6,210.17	63,585.29
Percent loss due calculated at WBSR 6.0	0.0%	1.7%	28.8%	0.0%
Additional loads tracked from above samples	11,273.59	5,174.01	3,057.11	65,375.08
Percentage of upstream loads that reach WBSR 6.0	100.0%	98.3%	71.2%	100%
Total load tracked between WBSR 7.0 and WBSR 6.0	13,915.81	5,086.05	2,176.66	128,960.37
Allowable load at WBSR 6.0	10,914.30	5,148.15	6,305.22	136,818.75
Load Reduction at WBSR 6.0	3,001.51	0.00	0.00	0.00
Percent Reduction required at WBSR 6.0	21.6%	0.0%	0.0%	0.0%

The TMDL for point WBSR 6.0 requires a load reduction for total iron. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D150).

Table D150. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 5.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS AND WLAs)

Additional WLA for WBSR 5.0

The WBSR 5.0 site incorporates a WLA of 1.11 lbs/day of iron, 0.74 lbs/day of manganese, and 0.28 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges

. Information on known discharges for this WLA can be found in Table D151.

Table D151. WLA for WBSR 5.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow***	***WLAs***
EM Brown Inc. (Active Treatment)	17803023	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
TOTAL				Fe – 1.11 Mn – 0.74 Al – 0.28

KEEW: Sky Haven Coal Co., Keewaydin Mine

Sky Haven Coal Co., SMP#17990104, operates a surface mine near Grimes Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

KEEW is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 1500’ x 300’. Table D152 shows the WLAs for the discharge.

Table D152. WLAs at KEEW			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	2.0	0.0445	0.74

MAN1: Sky Haven Coal Co., Maney 1

Sky Haven Coal Co., SMP#17960113, operates a surface mine near Curleys Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

MAN1 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 1500’ x 300’. Table D153 shows the WLAs for the discharge.

Table D153. WLAs at MAN1			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	2.0	0.0445	0.28

MOUTH: Moshannon Creek at its mouth

Moshannon Creek enters the West Branch Susquehanna River between monitoring points WBSR 6.0 and WBSR 5.0, near Westport, Pa. Moshannon Creek is highly polluted by AMD and has a TMDL in review for its watershed. The TMDLs assigned in Tables D154 and D155 are based on the data and calculations found in the Moshannon Creek Watershed TMDL completed by PADEP and approved by USEPA on June 9, 2009.

The TMDL for this section of Moshannon Creek consists of a load allocation from the established Moshannon Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point MOUTH (634.18 MGD). The load allocations made at point MOUTH for this stream segment are presented in Table D154.

Table D154. TMDL Calculations at Point MOUTH				
Flow = 634.18 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	2.15	11,371.55	0.25	2,274.31
Mn	1.13	5,980.20	0.49	2,392.08
Al	2.65	14,039.01	0.42	1,825.07
Acidity	61.30	324,221.33	3.9	3,242.21
Alkalinity	1.53	8092.26		

Reductions at point MOUTH are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point MOUTH are shown in Table D155.

Table D155. Calculation of Load Reduction Necessary at Point MOUTH				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	11,371.55	5,980.20	14,039.01	324,221.33
Allowable load at MOUTH	2,274.31	2,392.08	1,825.07	3,242.21
Percent reduction required at MOUTH	39.0%	0.0%	65.0%	98.0%

The TMDL for point MOUTH requires a load reduction for total iron, total aluminum and acidity.

WBSR 5.0: West Branch Susquehanna River at Karthaus, Pa.

WBSR 5.0 is located at the State Highway 879 bridge near Karthaus, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for the water quality contributions from Mowry Run, Basin Run, Rock Run, Rupley Run, and UNT 25693. All five tributaries are harshly impaired by AMD for metals and pH. Loadings for Mowry Run, Basin Run, Rock Run, Rupley Run, and UNT 25693 will be allocated in future TMDLs.

This TMDL section for the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 5.0 and WBSR 6.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 5.0 (2,462.66 MGD). The load allocations made at point WBSR 5.0 for this stream segment are presented in Table D156.

Table D156. TMDL Calculations at Point WBSR 5.0				
Flow = 2,462.66 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	2.59	53,281.23	0.41	8,525.00
Mn	1.22	25,056.51	0.49	10,022.61
Al	1.47	30,232.95	0.25	5,139.60
Acidity	27.75	570,238.76	7.21	148,262.08
Alkalinity	13.01	267,384.54		

The loading reduction for point WBSR 6.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 5.0. This value was compared to the allowable load at point WBSR 5.0. Reductions at point WBSR 5.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 5.0 are shown in Table D157.

Table D157. Calculation of Load Reduction Necessary at Point WBSR 5.0

	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 5.0	53,281.23	25,056.51	30,232.95	570,238.76
Difference of measured loads between loads that enter and existing WBSR 5.0	10,725.96	8,122.79	815.35	-54,165.71
Percent loss due calculated at WBSR 5.0	0.0%	0.0%	0.0%	8.7%
Additional loads tracked from above samples	13,188.61	7,540.23	8,130.29	140,060.96
Percentage of upstream loads that reach WBSR 5.0	100.0%	100.0%	100.0%	91.3%
Total load tracked between WBSR 6.0 and WBSR 5.0	23,914.57	15,663.02	8,945.64	127,875.65
Allowable load at WBSR 5.0	8,525.00	10,022.61	5,139.60	148,262.08
Load Reduction at WBSR 5.0	15,389.57	5,640.41	3,806.04	0.00
Percent Reduction required at WBSR 5.0	64.4%	36.0%	42.5%	0.0%

The TMDL for point WBSR 5.0 requires a load reduction for total iron, total manganese, and total aluminum. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500' x 300') to be permitted in the future on this segment (Table D158).

Table D158. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 4.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS AND WLAs)

Additional WLA for WBSR 4.0

The WBSR 4.0 site incorporates a WLA of 22.45 lbs/day of iron, 14.97 lbs/day of manganese, and 7.46 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table D159.

Table D159. WLA for WBSR 4.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow***	***WLAs***
Allegheny Enterprises	PA0256366, 12060101	Fe – 3.0 Mn – 2.0 Al – 2.0	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.74
Ed Hansloven (Passive Treatment)	PA0610976, 18840101	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.74
River Hill Coal Co (Chemical Treatment)	17790145	Fe – 3.0 Mn – 2.0 Al – 2.0	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.74
River Hill Coal Co (Passive Treatment)	PA0215317, 17831601	Fe – 3.0 Mn – 2.0 Al – 0.75	0.720	Fe – 18.01 Mn – 12.01 Al – 4.50
River Hill Coal Co (Active Treatment)	17910114	Fe – 3.0 Mn – 2.0 Al – 2.0	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.74
TOTAL				Fe – 22.45 Mn – 14.97 Al – 7.46

BIR 02: Birch Island Run at its mouth

Birch Island Run enters the West Branch Susquehanna River between monitoring points WBSR 5.0 and WBSR 4.0, near Cataract, Pa. Birch Island Run is highly polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables D160 and D161 are based on the data and calculations found in the Birch Island Run Watershed TMDL completed by PADEP and approved by USEPA on March 17, 2005.

The TMDL for this section of Birch Island Run consists of a load allocation from the established Birch Island Run TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point BIR 02 (13.34 MGD). The load allocations made at point BIR 02 for this stream segment are presented in Table D160.

Table D160. TMDL Calculations at Point BIR 02				
Flow = 13.34 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	ND	NA	NA	NA
Mn	0.16	17.40	0.16	17.40
Al	ND	NA	NA	NA
Acidity	11.28	1,254.70	5.30	589.70
Alkalinity	7.98	887.50		

Reductions at point BIR 02 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point BIR 02 are shown in Table D161.

Table D161. Calculation of Load Reduction Necessary at Point BIR 02

	Fe (lbs/day)	Mn (lbs/day)	Al (lbs/day)	Acidity (lbs/day)
Existing load	-	17.40	-	1,254.70
Allowable load at BIR 02	-	17.40	-	589.70
Percent reduction required at BIR 02	-	0.0%	-	5.0%

The TMDL for point BIR 02 requires a load reduction for acidity.

CR 01: Cooks Run at its mouth

Cooks Run enters the West Branch Susquehanna River between monitoring points WBSR 5.0 and WBSR 4.0, near Cooks Run, Pa. Cooks Run is highly polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables D162 and D163 are based on the data and calculations found in the Cooks Run Watershed TMDL completed by SRBC for PADEP and approved by USEPA on April 9, 2003.

The TMDL for this section of Cooks Run consists of a load allocation from the established Cooks Run TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point CR 01 (16.55 MGD). The load allocations made at point CR 01for this stream segment are presented in Table D162.

Table D162. TMDL Calculations at Point CR 01				
Flow = 16.55 MGD	*Measured Sample Data*		*Allowable*	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	5.14	709.50	0.16	22.10
Mn	1.20	165.60	0.25	34.50
Al	3.13	432.00	0.16	22.10
Acidity	64.79	8,942.80	14.25	1,966.90
Alkalinity	74.47	10,278.90		

Reductions at point CR 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point CR 01 are shown in Table D163.

Table D163. Calculation of Load Reduction Necessary at Point CR 01				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	709.50	165.60	432.00	8,942.80
Allowable load at CR 01	22.10	34.50	22.10	1,966.90
Percent reduction required at CR 01	0.0%	23.0%	0.0%	20.0%

The TMDL for point CR 01 requires a load reduction for total manganese and acidity.

KC 1: Kettle Creek at its mouth

Kettle Creek enters the West Branch Susquehanna River between monitoring points WBSR 5.0 and WBSR 4.0, near Westport, Pa. Kettle Creek is highly polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables D164 and D165 are based on the data and calculations found in the Kettle Creek Watershed TMDL completed by SRBC for PADEP and approved by USEPA on February 7, 2007.

The TMDL for this section of Kettle Creek consists of a load allocation from the established Kettle Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point KC 1 (222.65 MGD). The load allocations made at point KC 1 for this stream segment are presented in Table D164.

Table D164. TMDL Calculations at Point KC 1				
Flow = 222.65 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.15	278.50	0.15	278.50
Mn	0.07	130.00	0.07	130.00
Al	0.15	278.50	0.13	241.40
Acidity	1.65	3,063.90	1.01	1,875.50
Alkalinity	11.17	20,741.60		

Reductions at point KC 1 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point KC 1 are shown in Table D165.

Table D165. Calculation of Load Reduction Necessary at Point KC 1				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	278.50	130.00	278.50	3,063.90
Allowable load at KC 1	278.50	130.00	241.40	1,875.50
Percent reduction required at KC 1	0.0%	0.0%	0.0%	0.0%

The TMDL for point KC 1 does not require a load reduction.

WBSR 4.0: West Branch Susquehanna River at Renovo, Pa.

WBSR 4.0 is located at the bridge between Renovo and South Renovo, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for three TMDLs: Birch Island Run, Cooks Run, and Kettle Creek. This point also contains water quality for five other AMD impaired tributaries: Saltlick Run, Laurel Run, UNT 25611, Sterling Run, and Milligan Run. Loadings for Saltlick Run, Laurel Run, UNT 25611, Sterling Run, and Milligan Run will be allocated in future TMDLs. There is also several nonimpaired tributaries upstream of this point: Mosquito Creek, Upper Three Runs, Lower Three Runs, Fields Run, Yost Run, Burns Run, Sinnemahoning Creek, Fish Dam Run, Shintown Run, Peters Run, Brewery Run, Hall Run, Dry Run, Barney Run, North Smith Run, Smith Run, Jews Run, Morris Run, Grove Run, Moores Run, Sugarcamp Run, Leaning Pine Run, Little Bougher Run, Bougher Run, Spruce Run, and Loop Run.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 4.0 and WBSR 5.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 4.0 (5,095.51 MGD). The load allocations made at point WBSR 4.0 for this stream segment are presented in Table D166.

Table D166. TMDL Calculations at Point WBSR 4.0				
Flow = 5,095.51 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.70	29,716.20	0.70	26,716.20
Mn	0.41	17,385.23	0.41	17,385.23
Al	1.63	69,388.24	0.11	4,857.18
Acidity	21.28	904,707.05	2.77	117,611.92
Alkalinity	14.08	598,690.72		

The loading reduction for points WBSR 5.0, KC 1, BIR 01, and CR 01 were used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 4.0. This value was compared to the allowable load at point WBSR 4.0. Reductions at point WBSR 4.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 4.0 are shown in Table D167.

Table D167. Calculation of Load Reduction Necessary at Point WBSR 4.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 4.0	29,716.20	17,385.23	69,388.24	904,707.05
Difference of measured loads between loads that enter and existing WBSR 4.0	-24,553.03	-7,984.28	38,444.79	321,206.89
Percent loss due calculated at WBSR 4.0	45.2%	31.5%	0.0%	0.0%
Additional loads tracked from above samples	8,825.60	10,204.51	5,403.10	152,694.18
Percentage of upstream loads that reach WBSR 4.0	54.8%	68.5%	100.0%	100.0%
Total load tracked between WBSR 5.0 and WBSR 4.0	4,836.43	6,990.09	43,847.89	473,901.07
Allowable load at WBSR 4.0	26,716.20	17,385.23	4,857.18	117,611.92
Load Reduction at WBSR 4.0	0.00	0.00	38,990.71	356,289.15
Percent Reduction required at WBSR 4.0	0.0%	0.0%	88.9%	75.2%

The TMDL for point WBSR 4.0 requires a load reduction for total aluminum and acidity. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D168).

Table D168. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 3.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

DANE2: Dannic Energy

The Dannic Energy (NPDES not yet assigned) will operate an industrial wastewater permit that additionally treats oil and gas by-product in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (D169) shows the WLA for this discharge.

Table D169. WLA at Dannic Energy			
Parameter			
Outfall	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.500	12.52
Mn	2.0	0.500	8.35
Al	2.0	0.500	8.35

WBSR 3.0: West Branch Susquehanna River at Lock Haven, Pa.

WBSR 3.0 is located at the Jay Street bridge in Lock Haven, Pa. All measurements were recorded on the upstream side of the bridge. WBSR 3.0 accounts for several large nonimpaired tributaries. Young Woman’s Creek, Paddy Run, Boggs Hollow, Caldwell Run, Dry Run, Hyner Run, Huff Run, Little McCoskey Run, Big McCoskey Run, Schoolhouse Hollow, Goodman Hollow, Johnson Run, Ritchie Run, Green Run, Rattlesnake Run, Grugan Hollow, Mill Run, Baker Run, Teats Run, McCoskey Run, Ferney Run, Holland Run, East Ferney Run, Graham Run, Lick Run, Queens Run, Lusk Run, and Reeds Run enter the West Branch Susquehanna River between monitoring points WBSR 4.0 and WBSR 3.0.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 3.0 and WBSR 4.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 3.0 (5,915.42 MGD). The load allocations made at point WBSR 3.0 for this stream segment are presented in Table D170.

Table D170. TMDL Calculations at Point WBSR 3.0				
Flow = 5,915.42 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.80	39,316.66	0.64	31,453.33
Mn	0.41	20,268.21	0.41	20,268.21
Al	0.69	33,949.66	0.22	10,863.89
Acidity	23.85	1,177,312.76	3.34	164,823.79
Alkalinity	13.90	686,126.08		

The loading reduction for point WBSR 4.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 3.0. This value was compared to the allowable load at point WBSR 3.0. Reductions at point WBSR 3.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 3.0 are shown in Table D171.

Table D171. Calculation of Load Reduction Necessary at Point WBSR 3.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 3.0	39,316.66	20,268.21	33,949.66	1,177,312.76
Difference of measured loads between loads that enter and existing WBSR 3.0	9,600.46	2,882.98	-35,438.58	272,605.71
Percent loss due calculated at WBSR 3.0	0%	0%	0%	0%
Additional loads tracked from above samples	26,716.20	17,385.23	4,857.18	117,611.92
Percentage of upstream loads that reach WBSR 3.0	100%	100%	49%	100%
Total load tracked between WBSR 4.0 and WBSR 3.0	36316.66	20268.21	-30581.40	390217.63
Allowable load at WBSR 3.0	31453.33	20268.21	10863.89	164823.79
Load Reduction at WBSR 3.0	4,863.33	0.00	0.00	225,393.84
Percent Reduction required at WBSR 3.0	13%	0%	0%	58%

The TMDL for point WBSR 3.0 requires a load reduction for total iron and acidity. A WLA for future mining was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D172).

Table D172. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 2.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

JSSCO: Jersey Shore Steel Company

The Jersey Shore Steel Company (NPDES PA0009725) has one outfall (001) in the West Branch Watershed. This outfall does not currently have effluent limits for total iron; therefore, the WLA has been assigned based on BAT limits for Fe. The following table (D173) shows the WLA for this discharge.

Table D173. WLA at Jersey Shore Steel Company			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.300	7.51

CPAWT: Central PA Water Treatment

The Central PA Water Treatment (NPDES PA0233617) will operate an industrial wastewater permit that additionally treats oil and gas by-product in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (D174) shows the WLA for this discharge.

Table D174. WLA at Central PA Water Treatment			
Parameter			
Outfall	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.504	12.62
Mn	2.0	0.504	8.41
Al	2.0	0.504	8.41

PINCM: Pine Creek Municipal Authority

The Pine Creek Municipal Authority (NPDES PA0027553) will operate an industrial wastewater permit that additionally treats oil and gas by-product in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (D175) shows the WLA for this discharge.

Table D175. WLA at Pine Creek Municipal Authority			
Parameter			
Outfall	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	1.300	32.55
Mn	2.0	1.300	21.70
Al	2.0	1.300	21.70

CPAWW: Central PA Wastewater

The Central PA Wastewater (NPDES PA0233706) will operate an industrial wastewater permit that additionally treats oil and gas by-product in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (D176) shows the WLA for this discharge.

Table D176. WLA at Central PA Wastewater			
Parameter			
Outfall	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.400	10.02
Mn	2.0	0.400	6.68
Al	2.0	0.400	6.68

PENST: The Pennsylvania State University

The Pennsylvania State University (NPDES PA0228702) has one outfall (001) in the West Branch Watershed. This outfall has effluent limits for dissolved iron with no assigned value; therefore, the average monthly recorded values were used for calculations. The following table (D177) shows the WLA for this discharge.

Table D177. WLA at The Pennsylvania State University			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	0.8	0.216	1.44

CCDAL: CCDA Waters, LLC

The CCDA Waters, LLC (NPDES PA0095231) has one outfall (002) in the West Branch Watershed. This outfall has effluent limits for total iron and total manganese. However, there was no design flow assigned, therefore the average monthly flow reported on the Discharge Monitoring Reports (DMR) was used. The following table (D178) shows the WLA for this discharge.

Table D178. WLA at CCDA Waters, LLC			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	2.0	0.037	0.62
Mn	1.0	0.037	0.31

FQT: First Quality Tissue, LLC

First Quality Tissue, LLC (NPDES PA0228818) has one outfall (003) in the West Branch Watershed. This outfall has effluent limits for total iron, total aluminum, and total manganese. The following table (D179) shows the WLA for this discharge.

Table D1179. WLA at First Quality Tissue			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	.53	4.56	20.34
Mn	.13	4.56	5.14
Al	.92	4.56	35.02

WBSR 2.0: West Branch Susquehanna River at Jersey Shore, Pa.

WBSR 2.0 is at the State Highway 44 bridge in Jersey Shore, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for the water quality contributions from McElhattan Creek, Bald Eagle Creek, Chatham Run, Kryder Hollow, Spong Hollow, Love Run, Pine Creek, and Antes Creek. All of these tributaries are meeting water quality standards, with the exception of Bald Eagle Creek, which is listed as being impaired for metals from AMD.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 2.0 and WBSR 3.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 2.0 (6,791.80 MGD). The load allocations made at point WBSR 2.0 for this stream segment are presented in Table D180.

Table D180. TMDL Calculations at Point WBSR 2.0				
Flow = 6,791.80 MGD	**Measured Sample Data**		**Allowable**	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.98	55,802.55	0.33	18,972.87
Mn	0.48	27,399.80	0.33	18,631.86
Al	0.90	51,270.12	0.17	9,741.32
Acidity	6.27	355,565.19	2.95	167,115.64
Alkalinity	30.37	1,721,124.12		

The loading reduction for point WBSR 3.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 2.0. This value was compared to the allowable load at point WBSR 2.0. Reductions at point WBSR 2.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 2.0 are shown in Table D181.

Table D181. Calculation of Load Reduction Necessary at Point WBSR 2.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 2.0	55,802.55	27,399.80	51,270.12	355,565.19
Difference of measured loads between loads that enter and existing WBSR 2.0	16,485.89	7,131.59	17,320.46	-821,747.57
Percent loss due calculated at WBSR 2.0	0%	0%	0%	70%
Additional loads tracked from above samples	31,453.33	20,268.21	10,863.89	164,823.79
Percentage of upstream loads that reach WBSR 2.0	100%	100%	100%	30%
Total load tracked between WBSR 3.0 and WBSR 2.0	47,939.22	27,399.80	28,184.35	49,779.13
Allowable load at WBSR 2.0	18,972.87	18,631.86	9,741.32	167,115.64
Load Reduction at WBSR 2.0	28,966.35	8,767.94	18,443.03	0.00
Percent Reduction required at WBSR 2.0	60%	32%	65%	0%

The TMDL for point WBSR 2.0 requires a load reduction for total iron, total manganese, and total aluminum. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D182).

Table D182. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 1.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

JSBWW: Jersey Shore Boro Wastewater

The Jersey Shore Boro Wastewater (NPDES PA0028665) will operate an industrial wastewater permit that additionally treats oil and gas by-product in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (D183) shows the WLA for this discharge.

Table D183. WLA at Jersey Shore Boro Wastewater			
Parameter			
Outfall	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	1.050	26.29
Mn	2.0	1.050	17.53
Al	2.0	1.050	17.53

DANE1: Dannic Energy

The Dannic Energy (NPDES PA0233765) will operate an industrial wastewater permit that additionally treats oil and gas by-product in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (D184) shows the WLA for this discharge.

Table D184. WLA at Dannic Energy			
Parameter			
Outfall	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.500	12.52
Mn	2.0	0.500	8.35
Al	2.0	0.500	8.35

JSJWA: Jersey Shore Area Joint Water Authority

The Jersey Shore Area Joint Water Authority (NPDES PA0014575) has one outfall (001) in the West Branch Watershed. This outfall has effluent limits for total iron, total manganese and total aluminum. The following table (D185) shows the WLA for this discharge.

Table D185. WLA at Jersey Shore Area Joint Water Authority			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	2.0	0.05	0.83
Mn	1.0	0.05	0.42
Al	4.0	0.05	1.67

LUTCO: Lucas Trucking Corp.

The Lucas Trucking Corp. (NPDES PA0115215) has one outfall (001) in the West Branch Watershed. This outfall has effluent limits for dissolved iron with no assigned value; therefore, the average monthly recorded values were used for calculations. The following table (D186) shows the WLA for this discharge.

Table D186. WLA at Lucas Trucking Corp.			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	0.01	0.0072	0.001

Additional WLA for WBSR 1.0

The WBSR 1.0 site incorporates a WLA of 0.15 lbs/day of iron, and 0.03 lbs/day of manganese. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table 187.

Table D187. WLA for WBSR 1.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow***	***WLAs***
Textron Lycoming	PA0007455	Fe – 0.22 Mn – 0.05	0.071	Fe – 0.13 Mn – 0.03
Wirerope Works Inc. (2-outfalls)	PA0008575	Fe – 0.03	0.05	Fe – 0.02
TOTAL				Fe – 0.15 Mn – 0.03

WBSR 1.0: West Branch Susquehanna River at Williamsport, Pa.

WBSR 1.0 is located at the U.S. Route 15 bridge in Williamsport, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for the water quality contributions from Nice Hollow, Stewards Run, Larry's Creek, Big Run, Pine Run, Quenshukeny Run, Blender Run, Daugherty Run, Fox Hollow, Mosquito Creek, Lycoming Creek, and Grafius Run.

This TMDL section for the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 1.0 and WBSR 2.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 1.0 (9,982.88 MGD). The load allocations made at point WBSR 1.0 for this stream segment are presented in Table D188.

Table D188. TMDL Calculations at Point WBSR 1.0				
Flow = 9,982.88 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.60	49,792.52	0.56	46,804.97
Mn	0.24	19,901.66	0.24	19,901.66
Al	0.61	50,622.55	0.22	18,730.34
Acidity	3.21	267,552.86	2.34	195,313.59
Alkalinity	32.83	2,734,612.66		

The loading reduction for point WBSR 2.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 1.0. This value was compared to the allowable load at point WBSR 1.0. Reductions at point WBSR 1.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 1.0 are shown in Table D189.

Table D189. Calculation of Load Reduction Necessary at Point WBSR 1.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 1.0	49,792.52	19,901.66	50,622.55	267,552.86
Difference of measured loads between loads that enter and existing WBSR 1.0	-6,010.03	-7,498.14	-647.57	-88,012.33
Percent loss due calculated at WBSR 1.0	11%	27%	1%	25%
Additional loads tracked from above samples	18,972.87	18,631.86	9,741.32	167,115.64
Percentage of upstream loads that reach WBSR 1.0	89%	73%	99%	75%
Total load tracked between WBSR 2.0 and WBSR 1.0	16,929.46	13,533.13	9,618.28	125,749.84
Allowable load at WBSR 1.0	46,804.97	19,901.66	18,730.34	195,313.59
Load Reduction at WBSR 1.0	0.00	0.00	0.00	0.00
Percent Reduction required at WBSR 1.0	0%	0%	0%	0%

The TMDL for point WBSR 1.0 does not require a load reduction. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table D190).

Table D190. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

Margin of Safety (MOS)

An implicit MOS was used in these TMDLs derived from the Monte Carlo statistical analysis employing the @Risk software. Pa. Title 25 Chapter 96.3(c) states that water quality criteria must be met at least 99 percent of the time. All of the @Risk analyses results surpass the minimum 99 percent level of protection. Other MOS used for this TMDL analyses are:

- An additional MOS is that the calculations were performed using a daily iron average, instead of the 30-day average.

- The method used to calculate a flow for a WLA using the area of the pit and ungraded portions of an active mine is conservative and an implicit MOS.

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 E

Water Quality Data Used in TMDL Calculations

Site Location	Date	Time	Alk mg/L	Hot Acidity mg/L	Total Al mg/L	Total Fe mg/L	Total Mn mg/L	pH	Flow gpm
WBSR 1.0	12-01-2004	13:30	24.60	24.20	0.250	0.646	0.106	7.00	13,689,315.00
	01-13-2005	11:35	26.20	29.80	0.588	0.670	0.320	7.30	15,343,554.27
	07-13-2005	14:55	41.00	-23.20	1.040	0.150	0.025	7.20	-
	06-15-2005	07:40	35.60	-16.00	1.050	0.150	0.150	7.10	1,011,485.80
	05-12-2005	07:15	31.00	-4.20	0.250	0.150	0.224	7.30	1,336,935.76
	03-02-2005	08:40	38.60	3.80	0.250	0.771	0.540	7.20	-
	03-02-2005	08:55	38.80	7.20	0.250	0.718	0.568	7.20	3,255,815.29
AVERAGE			**33.69**	**3.09**	**0.53**	**0.47**	**0.28**	**7.19**	**6,927,421.22**
STANDARD DEVIATION			**6.50**	**19.52**	**0.38**	**0.30**	**0.21**	**0.11**	**7,005,123.35**
WBSR 2.0	02-10-2005	11:50	30.20	7.60	2.504	2.788	0.861	7.40	5,291,705.70
	01-13-2005	-	-	-	-	-	-	-	14,315,694.00*
	03-02-2005	10:05	31.80	13.80	0.250	0.557	0.584	7.10	3,070,446.03
	03-10-2005	12:00	26.80	20.20	0.939	1.170	0.783	7.40	4,687,580.52
	05-12-2005	08:15	29.60	10.20	0.250	0.150	0.506	7.20	1,527,817.32
	06-15-2005	09:45	33.80	-12.00	1.160	0.336	0.220	7.20	1,164,713.85
	07-12-2005	09:10	39.00	-22.80	1.110	0.150	0.025	7.30	908,880.75
	11-09-2004	11:35	36.40	-2.20	0.252	0.263	0.439	7.20	3,077,627.31
	12-15-2004	11:35	15.60	29.20	0.347	0.410	0.345	7.30	8,358,112.26
AVERAGE			**30.40**	**5.50**	**0.85**	**0.73**	**0.47**	**7.26**	**4,711,397.53**
STANDARD DEVIATION			**7.13**	**17.07**	**0.78**	**0.90**	**0.28**	**0.11**	**4,307,168.05**
WBSR 3.0	01-13-2005	10:10	14.00	44.80	0.654	0.751	0.427	6.80	12,102,942.00*
	12-01-2004	11:10	14.00	38.80	0.250	0.867	0.261	6.70	7,271,046.00
	03-02-2005	11:15	12.20	35.20	0.250	0.552	0.595	6.60	3,070,446.03
	05-12-2005	09:35	13.20	8.40	-	0.150	0.599	6.80	1,027,820.70
	05-12-2005	09:50	13.40	11.20	-	0.150	0.597	6.70	1,027,820.70
	06-15-2005	11:10	15.20	9.40	1.160	0.150	0.297	6.80	668,756.70
	07-13-2005	13:55	14.60	0.20	1.170	0.150	0.190	6.70	475,759.80
AVERAGE			**13.80**	**21.14**	**0.70**	**0.40**	**0.42**	**6.73**	**4,102,795.21**
STANDARD DEVIATION			**0.98**	**17.83**	**0.46**	**0.32**	**0.18**	**0.08**	**4,679,944.04**

* A high flow event was monitored for the West Branch TMDL sites in January 2005. However, due to field conditions, flows were not able to be measured for WBSR 3.0 and WBSR 2.0. To remedy this issue, a statistical analysis demonstrated that during other monitoring events, WBSR 3.0 and WBSR 2.0 were on average 19.85% and 41.76% higher in flow than site WBSR 4.0 respectively. This information was used to estimate flows on January 13, 2005, for sites WBSR 3.0 and WBSR 2.0.

Site Location	Date	Time	Alk mg/L	Hot Acidity mg/L	Total Al mg/L	Total Fe mg/L	Total Mn mg/L	pH	Flow gpm
WBSR 4.0	01-13-2005	08:55	14.00	43.20	0.532	0.535	0.391	6.80	10,098,675.00
	01-13-2005	09:10	13.20	37.80	0.533	0.542	0.380	6.60	-
	12-01-2004	09:20	12.60	39.20	0.250	0.504	0.263	6.60	7,226,163.00
	12-01-2004	09:35	12.60	37.00	0.250	0.475	0.270	6.60	-
	03-02-2005	12:45	11.20	33.20	0.250	0.607	0.544	6.50	2,004,025.95
	05-12-2005	11:05	13.60	16.20	6.080	0.150	0.537	6.70	924,589.80
	06-15-2005	12:50	16.00	6.00	1.210	0.150	0.395	6.50	570,014.10
	07-13-2005	12:35	17.60	-12.40	1.050	0.150	0.220	6.80	377,017.20
AVERAGE			**13.85**	**25.03**	**1.27**	**0.39**	**0.38**	**6.64**	**3,533,414.17**
STANDARD DEVIATION			**2.05**	**19.80**	**1.98**	**0.20**	**0.12**	**0.12**	**4,006,597.81**
WBSR 5.0	02-10-2005	08:20	7.00	28.20	3.202	5.211	1.996	6.30	2,175,479.01
	03-02-2005	14:10	19.80	15.60	0.736	1.260	1.240	6.70	1,045,773.90
	03-10-2005	08:30	10.00	22.60	1.180	1.850	1.250	6.70	1,620,276.30
	05-12-2005	12:20	14.40	35.00	0.644	3.780	1.480	6.60	462,294.90
	06-15-2005	14:15	14.40	29.60	1.570	0.150	1.070	6.30	309,243.87
	07-12-2005	12:00	20.20	17.00	1.300	0.150	0.713	6.80	230,698.62
	12-15-2004	08:20	13.20	22.00	0.671	1.010	0.846	7.00	2,096,484.93
	01-11-2005	08:05	5.40	35.40	1.306	1.551	0.888	6.20	5,700,141.00
AVERAGE			**13.05**	**25.68**	**1.33**	**1.87**	**1.19**	**6.58**	**1,705,049.07**
STANDARD DEVIATION			**5.41**	**7.59**	**0.83**	**1.77**	**0.41**	**0.28**	**1,790,591.90**
WBSR 6.0	01-10-2005	14:35	12.20	35.00	0.922	1.520	0.598	6.40	4,171,964.62
	11-30-2004	09:30	21.60	20.00	0.758	1.360	0.668	6.90	1,544,289.38
	03-02-2005	15:25	22.80	14.20	0.565	1.100	1.110	6.80	783,926.48
	05-12-2005	13:10	17.80	19.80	0.644	2.160	1.240	6.60	346,541.64
	06-15-2005	15:35	26.80	19.60	1.240	0.398	0.394	6.80	231,820.70
	07-13-2005	10:30	38.60	-5.80	1.110	0.369	0.241	7.10	172,934.20
AVERAGE			**23.30**	**17.13**	**0.87**	**1.15**	**0.71**	**6.77**	**1,208,579.50**
STANDARD DEVIATION			**8.98**	**13.23**	**0.27**	**0.69**	**0.39**	**0.24**	**1,539,117.34**
WBSR 7.0	01-10-2005	13:15	15.80	32.60	0.621	1.110	0.511	6.60	4,004,281.73
	11-30-2004	10:40	24.40	23.20	0.621	1.180	0.583	7.00	1,451,157.16
	11-30-2004	10:45	24.80	28.00	0.620	1.120	0.557	7.00	-
	03-03-2005	14:05	23.80	15.80	0.250	0.904	1.010	7.00	746,359.41
	05-12-2005	14:00	30.20	7.20	2.980	0.150	0.901	7.30	326,748.24
	06-16-2005	07:45	29.60	2.20	1.260	0.150	0.424	7.10	220,734.59

Site Location	Date	Time	Alk mg/L	Hot Acidity mg/L	Total Al mg/L	Total Fe mg/L	Total Mn mg/L	pH	Flow gpm
	07-13-2005	09:15	37.80	-15.80	1.120	0.150	0.086	7.30	164,662.26
AVERAGE			**26.63**	**13.31**	**1.07**	**0.68**	**0.58**	**7.04**	**1,152,323.90**
STANDARD DEVIATION			**6.83**	**16.83**	**0.91**	**0.50**	**0.31**	**0.24**	**1,477,340.94**
WBSR 8.0	01-10-2005	12:20	16.80	34.80	0.521	0.847	0.485	6.60	3,565,595.29
	11-30-2004	11:20	26.60	19.20	0.515	1.110	0.600	7.00	1,303,581.85
	03-03-2005	13:10	26.60	16.20	0.250	0.873	0.889	7.00	624,681.59
	05-12-2005	14:50	33.80	16.00	2.850	0.150	1.260	7.30	290,931.61
	06-16-2005	09:00	33.80	8.00	1.250	0.305	0.833	7.00	196,542.66
	06-16-2005	09:15	34.40	3.00	1.130	0.359	0.836	7.00	-
	07-13-2005	08:20	45.80	-19.20	1.140	0.150	0.301	7.40	146,614.81
AVERAGE			**31.11**	**11.14**	**1.09**	**0.54**	**0.74**	**7.04**	**1,021,324.63**
STANDARD DEVIATION			**9.01**	**16.69**	**0.86**	**0.39**	**0.31**	**0.26**	**1,318,268.91**
WBSR 9.0	01-10-2005	11:10	16.60	28.80	0.512	0.837	0.208	6.60	2,549,354.40
	11-30-2004	12:36	30.00	14.00	0.250	0.410	0.253	7.30	758,522.70
	03-03-2005	12:15	28.40	13.80	0.250	0.150	0.419	7.10	293,534.82
	05-16-2005	17:40	41.00	-0.60	2.780	0.150	0.253	7.60	167,862.42
	06-16-2005	10:10	46.60	-23.20	1.280	0.150	0.400	7.30	67,773.33
	07-13-2005	07:10	62.40	-40.00	1.130	0.150	0.253	7.60	54,757.26
AVERAGE			**37.50**	**-1.20**	**1.03**	**0.31**	**0.30**	**7.25**	**648,634.16**
STANDARD DEVIATION			**16.07**	**25.87**	**0.96**	**0.28**	**0.09**	**0.37**	**966,658.06**
WBSR 10.0	01-10-2005	10:30	17.00	23.60	0.250	0.677	0.183	6.60	2,437,146.90
	11-29-2004	14:35	39.20	7.60	0.250	0.507	0.162	7.30	-
	03-03-2005	11:20	35.80	3.20	0.250	0.150	0.237	7.30	239,675.22
	05-16-2005	18:10	49.00	-9.40	2.620	0.150	0.228	7.70	110,412.18
	06-16-2005	11:05	60.00	-38.80	1.140	0.150	0.067	7.60	61,040.88
	07-12-2005	16:25	70.40	-50.00	1.190	0.150	0.120	7.90	40,843.53
AVERAGE			**45.23**	**-10.63**	**0.95**	**0.30**	**0.17**	**7.40**	**577,823.74**
STANDARD DEVIATION			**18.91**	**28.43**	**0.93**	**0.23**	**0.06**	**0.46**	**1,042,270.70**
WBSR 11.0	01-10-2005	09:45	25.40	19.80	0.250	0.633	0.215	6.70	884,195.10
	11-29-2004	14:00	31.80	18.40	0.250	0.857	0.175	7.30	379,261.35
	03-03-2005	10:00	42.80	3.80	0.250	0.573	0.283	7.40	181,327.32
	03-03-2005	10:15	42.60	2.40	0.250	0.618	0.296	7.50	-
	05-16-2005	18:45	63.20	-14.60	2.450	0.150	0.099	7.90	98,293.77
	06-16-2005	12:25	79.60	-55.40	1.220	0.150	0.099	8.00	40,843.53

Site Location	Date	Time	Alk mg/L	Hot Acidity mg/L	Total Al mg/L	Total Fe mg/L	Total Mn mg/L	pH	Flow gpm
	07-12-2005	15:20	73.60	-49.40	1.140	0.150	0.025	8.20	31,866.93
AVERAGE			**51.29**	**-10.71**	**1.603**	**0.670**	**0.195**	**7.57**	**256,730.76**
STANDARD DEVIATION			**20.97**	**30.74**	**0.734**	**0.127**	**0.086**	**0.51**	**300,657.59**
WBSR 12.0	01-10-2005	09:05	29.00	13.80	0.520	0.905	0.166	6.70	395,957.83
	01-10-2005	09:20	28.60	8.00	0.250	0.778	0.171	6.80	-
	11-29-2004	12:00	27.00	18.80	0.533	0.926	0.310	7.10	169,837.27
	03-03-2005	09:10	51.20	-6.80	0.648	0.850	0.226	7.30	164,886.68
	05-17-2005	08:45	73.20	-26.40	2.600	0.332	0.108	7.90	41,355.20
	05-17-2005	09:00	73.20	-25.80	2.680	0.329	0.108	7.90	-
	06-16-2005	14:00	104.00	-43.80	1.380	0.466	0.127	7.90	18,388.57
	07-12-2005	14:30	90.80	-64.20	1.210	0.331	0.062	7.90	13,795.69
AVERAGE			**59.63**	**-15.80**	**1.23**	**0.61**	**0.16**	**7.44**	**134,036.87**
STANDARD DEVIATION			**30.11**	**29.42**	**0.95**	**0.27**	**0.08**	**0.53**	**146,463.87**
WBSR 13.0	11-09-2004	09:00	56.80	-16.40	0.250	0.356	0.200	7.70	76,323.54
	01-18-2005	08:30	43.80	4.80	0.692	0.785	0.215	7.10	159,469.30
	01-18-2005	08:45	43.40	10.40	0.698	0.796	0.216	7.10	-
	03-16-2005	08:30	57.40	-16.60	0.656	0.980	0.253	7.50	84,604.46
	03-16-2005	08:45	57.40	-16.80	0.660	0.993	0.255	7.40	-
	05-17-2005	10:00	84.00	-46.00	2.640	0.323	0.177	8.00	38,388.43
	06-14-2005	08:30	105.60	-31.20	0.250	0.379	0.212	7.90	26,126.39
	06-14-2005	08:35	104.80	-24.60	0.250	0.350	0.216	8.00	-
	07-26-2005	08:34	96.60	-68.00	0.250	0.371	0.122	7.80	26,323.88
	07-26-2005	08:35	93.80	-63.20	0.250	0.357	0.118	7.80	-
AVERAGE			**74.36**	**-26.76**	**0.66**	**0.57**	**0.20**	**7.63**	**68,539.33**
STANDARD DEVIATION			**25.04**	**26.06**	**0.73**	**0.28**	**0.05**	**0.34**	**51,141.02**
WBSR 14.0	01-18-2005	09:00	52.80	-5.20	1.030	1.160	0.225	7.20	127,018.89
	03-16-2005	09:45	63.60	-23.00	0.969	1.370	0.252	7.50	72,028.24
	05-17-2005	10:50	93.20	-58.40	2.730	0.150	0.151	8.10	33,370.51
	11-09-2004	10:11	62.80	-29.00	0.250	0.365	0.193	7.80	52,163.02
	11-09-2004	10:15	61.20	-25.20	0.250	0.355	0.190	7.30	-
	06-14-2005	09:25	120.00	-48.40	0.250	0.324	0.226	8.10	20,816.74
	07-26-2005	09:24	103.20	-78.60	0.250	0.340	0.084	8.10	18,976.53
AVERAGE			**79.54**	**-38.26**	**0.82**	**0.58**	**0.19**	**7.73**	**54,062.32**

Site Location	Date	Time	Alk mg/L	Hot Acidity mg/L	Total Al mg/L	Total Fe mg/L	Total Mn mg/L	pH	Flow gpm
STANDARD DEVIATION			**25.72**	**24.89**	**0.91**	**0.48**	**0.06**	**0.39**	**41,020.67**
WBSR 15.0	01-18-2005	09:25	58.60	-10.20	1.240	1.350	0.248	7.20	-
	03-16-2005	10:30	67.60	-28.40	1.050	1.510	0.260	7.50	63,401.73
	05-17-2005	11:40	103.00	-16.60	2.830	0.365	0.279	8.10	30,444.14
	11-09-2004	10:59	68.00	-34.20	0.250	0.498	0.244	7.40	40,583.21
	06-14-2005	10:18	122.80	-45.80	0.526	0.566	0.277	8.10	22,939.70
	07-26-2005	10:09	111.60	-86.20	0.250	0.481	0.128	8.10	30,206.26
AVERAGE			**88.60**	**-36.90**	**1.02**	**0.80**	**0.24**	**7.73**	**37,515.01**
STANDARD DEVIATION			**27.10**	**27.26**	**0.98**	**0.50**	**0.06**	**0.41**	**15,774.91**
WBSR 16.0	01-18-2005	09:50	59.80	-14.00	2.020	2.260	0.340	7.20	-
	03-16-2005	12:10	71.20	-32.20	1.940	2.400	0.392	7.50	46,642.41
	05-17-2005	12:50	96.00	-58.80	3.720	1.350	0.423	8.20	22,360.71
	11-09-2004	11:57	72.80	-37.60	1.150	1.430	0.373	7.60	31,296.92
	06-14-2005	11:17	112.20	-27.60	1.450	1.320	0.483	8.20	15,228.80
	07-26-2005	11:00	102.00	-73.40	0.250	0.321	0.264	8.60	10,538.53
AVERAGE			**85.67**	**-40.60**	**1.76**	**1.51**	**0.38**	**7.88**	**25,213.47**
STANDARD DEVIATION			**20.60**	**21.74**	**1.16**	**0.75**	**0.07**	**0.53**	**14,312.53**
WBSR 17.0	01-18-2005	10:10	65.60	-16.00	2.570	2.810	0.375	7.10	-
	03-16-2005	12:50	77.80	-39.60	2.560	3.190	0.464	7.30	36,409.09
	05-17-2005	13:30	97.40	-56.40	4.940	2.810	0.541	8.00	17,522.32
	11-09-2004	12:51	84.20	-48.60	2.220	2.580	0.556	7.50	21,292.50
	06-14-2005	12:33	111.00	-25.60	4.530	3.160	0.704	7.90	12,708.17
	07-26-2005	11:52	118.40	-86.20	1.240	0.961	0.651	8.20	8,860.35
AVERAGE			**92.40**	**-45.40**	**3.01**	**2.59**	**0.55**	**7.67**	**19,358.49**
STANDARD DEVIATION			**20.23**	**24.84**	**1.43**	**0.83**	**0.12**	**0.43**	**10,633.35**
WBSR 18.0	01-18-2005	10:25	67.80	-17.20	3.140	3.590	0.431	7.00	-
	03-16-2005	13:55	78.40	-37.20	3.100	4.240	0.523	7.00	33,792.41
	05-17-2005	14:10	101.40	2.80	6.530	4.290	0.638	7.60	14,923.60
	11-09-2004	13:30	91.60	-61.40	3.190	3.940	0.607	7.00	18,263.79
	06-14-2005	13:20	115.40	-58.00	4.470	2.830	0.763	7.50	11,179.01
	07-26-2005	12:48	125.80	-34.00	4.320	3.250	0.976	7.80	8,887.73
AVERAGE			**96.73**	**-34.17**	**4.13**	**3.69**	**0.66**	**7.32**	**17,409.31**
STANDARD DEVIATION			**21.98**	**24.39**	**1.33**	**0.58**	**0.19**	**0.36**	**9,832.97**

Site Location	Date	Time	Alk mg/L	Hot Acidity mg/L	Total Al mg/L	Total Fe mg/L	Total Mn mg/L	pH	Flow gpm
WBSR 19.0	01-18-2005	11:00	69.60	-18.60	3.590	4.090	0.431	6.90	-
	03-15-2005	14:50	72.20	-30.00	3.040	3.950	0.430	7.10	28,683.83
	05-18-2005	10:20	106.40	-59.80	7.590	5.630	0.759	7.50	12,106.74
	11-09-2004	14:22	94.20	-60.40	4.200	5.180	0.666	7.00	14,217.14
	06-14-2005	13:49	111.80	-27.20	6.210	3.990	0.921	7.40	9,645.81
	07-26-2005	13:28	123.40	-29.60	6.400	4.570	1.130	7.40	7,033.17
AVERAGE			**96.27**	**-37.60**	**5.17**	**4.57**	**0.72**	**7.22**	**14,337.34**
STANDARD DEVIATION			**21.79**	**17.91**	**1.81**	**0.70**	**0.28**	**0.25**	**8,458.33**
WBSR 20.0	01-18-2005	11:40	49.80	5.40	5.030	5.730	0.582	6.80	-
	03-15-2005	13:30	59.00	-13.00	4.060	5.300	0.555	6.80	21,927.59
	05-18-2005	08:45	92.00	-40.40	8.640	6.680	0.861	7.20	9,161.97
	11-09-2004	15:18	76.60	-37.60	5.400	6.460	0.813	6.80	10,793.91
	06-14-2005	14:32	92.20	-40.80	7.840	4.990	1.100	7.00	7,244.57
	07-26-2005	14:10	109.00	-15.40	7.350	4.890	1.270	7.10	7,238.73
AVERAGE			**79.77**	**-23.63**	**6.39**	**5.68**	**0.86**	**6.95**	**11,273.35**
STANDARD DEVIATION			**22.35**	**18.95**	**1.81**	**0.76**	**0.28**	**0.18**	**6,138.20**
WBSR 21.0	01-18-2005	12:00	46.40	8.00	5.090	5.770	0.580	6.60	-
	03-15-2005	12:40	48.60	-0.60	4.400	5.720	0.595	6.80	20,499.86
	05-18-2005	09:35	75.20	-22.80	9.540	7.460	0.949	7.00	9,149.85
	11-08-2004	14:56	67.60	-18.20	5.670	6.860	0.856	6.90	10,542.12
	06-14-2005	15:17	79.40	-29.40	8.510	5.250	1.160	6.90	7,316.83
	07-26-2005	14:52	102.20	-8.80	8.460	5.760	1.350	7.00	5,741.43
AVERAGE			**69.90**	**-11.97**	**6.95**	**6.14**	**0.92**	**6.87**	**10,650.02**
STANDARD DEVIATION			**20.85**	**14.13**	**2.15**	**0.84**	**0.31**	**0.15**	**5,798.40**
WBSR 22.0	01-19-2005	08:30	13.60	47.40	6.760	6.950	0.641	5.50	17,977.44
	01-19-2005	08:45	13.60	45.80	7.320	7.620	0.691	5.50	-
	03-15-2005	11:30	8.80	60.20	6.180	7.100	0.682	4.70	13,381.87
	05-18-2005	11:10	7.80	114.00	15.100	12.700	1.370	4.30	5,023.31
	11-08-2004	13:24	8.80	97.40	10.900	12.000	1.230	4.50	5,653.01
	06-15-2005	09:15	0.00	194.80	19.000	14.500	2.150	3.50	2,832.57
	07-27-2005	09:10	0.00	204.20	23.100	14.000	2.610	3.40	1,820.01
AVERAGE			**7.51**	**109.11**	**12.62**	**10.70**	**1.34**	**4.49**	**7,781.37**
STANDARD DEVIATION			**5.63**	**66.78**	**6.63**	**3.35**	**0.78**	**0.85**	**6,441.90**

Site Location	Date	Time	Alk mg/L	Hot Acidity mg/L	Total Al mg/L	Total Fe mg/L	Total Mn mg/L	pH	Flow gpm
WBSR 23.0	01-19-2005	09:20	11.00	74.40	11.500	9.460	0.665	4.60	11,971.19
	03-15-2005	10:30	9.00	98.20	10.400	11.100	0.732	4.50	8,256.23
	05-18-2005	11:50	0.00	183.20	22.400	18.900	1.210	3.80	3,191.18
	11-08-2004	12:45	0.00	167.20	18.900	18.300	1.210	3.80	4,058.77
	06-15-2005	09:53	0.00	293.20	30.400	22.100	2.010	3.40	2,092.00
	07-27-2005	09:49	0.00	325.60	36.800	23.300	2.080	3.30	1,466.78
AVERAGE			**3.33**	**190.30**	**21.73**	**17.19**	**1.32**	**3.90**	**5,172.69**
STANDARD DEVIATION			**5.20**	**101.38**	**10.43**	**5.70**	**0.61**	**0.54**	**4,101.70**
WBSR 24.0	01-19-2005	12:10	10.40	76.40	12.600	9.760	0.576	4.50	9,776.42
	03-15-2005	09:45	8.80	109.40	11.400	9.540	0.538	4.40	6,570.42
	05-18-2005	14:25	0.00	216.60	27.700	15.900	0.990	3.50	2,316.41
	11-08-2004	11:30	0.00	188.00	22.300	16.500	1.030	3.60	2,532.30
	11-08-2004	11:35	0.00	187.60	21.900	16.200	1.010	3.60	-
	06-15-2005	12:36	0.00	348.80	38.300	19.500	1.660	3.20	1,644.96
	07-27-2005	12:07	0.00	411.40	49.400	22.000	1.860	3.20	857.71
AVERAGE			**3.20**	**219.74**	**26.23**	**15.63**	**1.09**	**3.71**	**3,949.70**
STANDARD DEVIATION			**4.98**	**121.22**	**13.69**	**4.62**	**0.50**	**0.53**	**3,474.70**
WBSR 25.0	01-19-2005	13:15	10.20	69.40	12.400	10.300	0.554	4.50	7,145.82
	03-15-2005	09:00	8.60	64.80	6.410	5.910	0.435	4.70	5,298.89
	05-18-2005	14:05	8.40	84.00	11.400	7.390	0.889	4.50	1,786.79
	11-04-2004	10:34	4.40	113.40	10.300	9.200	0.858	4.20	2,094.24
	06-15-2005	13:15	0.00	248.60	27.400	20.200	1.250	3.40	1,052.51
	07-28-2005	08:00	8.60	68.40	5.860	4.080	1.490	4.60	739.67
	07-28-2005	08:03	8.60	70.40	5.590	3.810	1.440	4.60	-
AVERAGE			**6.97**	**102.71**	**11.34**	**8.70**	**0.99**	**4.36**	**3,019.65**
STANDARD DEVIATION			**3.55**	**66.48**	**7.61**	**5.62**	**0.42**	**0.45**	**2,594.78**
WBSR 26.0	01-20-2005	09:45	17.80	24.80	3.180	2.350	0.627	6.50	4,808.32
	03-14-2005	14:40	18.60	-8.80	2.250	2.550	0.557	6.60	4,583.90
	05-18-2005	13:05	8.00	46.40	5.510	2.660	1.010	4.80	1,499.54
	11-04-2004	08:30	7.80	44.60	2.850	2.620	0.973	4.70	1,940.29
	11-04-2004	08:45	8.00	48.00	2.900	2.640	0.975	4.70	-
	06-16-2005	07:59	5.40	67.00	4.440	0.827	1.450	4.30	832.13
	06-16-2005	08:01	5.40	69.80	4.480	0.830	1.450	4.30	-

Site Location	Date	Time	Alk mg/L	Hot Acidity mg/L	Total Al mg/L	Total Fe mg/L	Total Mn mg/L	pH	Flow gpm
	07-28-2005	08:53	6.00	70.00	3.350	0.666	1.670	4.30	547.12
AVERAGE			**9.63**	**45.23**	**3.62**	**1.89**	**1.09**	**5.03**	**2,368.55**
STANDARD DEVIATION			**5.41**	**26.83**	**1.08**	**0.93**	**0.40**	**0.96**	**1,869.60**
WBSR 27.0	01-20-2005	08:45	17.60	25.60	2.950	2.920	0.590	6.40	3,564.16
	03-14-2005	14:05	19.40	-10.40	1.990	2.950	0.479	6.70	3,293.51
	05-16-2005	15:05	8.40	46.40	4.370	2.880	0.808	5.10	1,148.11
	11-03-2004	11:06	11.20	23.20	1.700	2.440	0.824	6.30	1,979.34
	06-16-2005	09:01	5.80	69.20	4.220	1.070	1.460	4.30	384.20
	07-28-2005	10:19	6.20	76.20	3.350	0.964	1.700	4.30	391.38
AVERAGE			**11.43**	**38.37**	**3.10**	**2.20**	**0.98**	**5.52**	**1,793.45**
STANDARD DEVIATION			**5.83**	**32.30**	**1.11**	**0.94**	**0.49**	**1.09**	**1,399.17**
WBSR 28.0	01-17-2005	14:45	27.20	12.60	1.960	1.720	0.360	6.90	5,555.17
	03-14-2005	13:00	27.20	-14.20	1.920	2.710	0.426	6.70	2,996.39
	05-16-2005	13:25	8.40	46.00	5.610	3.040	0.810	4.90	915.16
	11-03-2004	09:58	10.20	25.80	2.450	2.410	0.726	5.80	1,109.06
	06-13-2005	14:14	0.00	72.40	5.210	3.070	1.480	3.90	381.06
	07-25-2005	13:42	0.00	84.40	5.151	2.380	2.210	3.80	500.45
AVERAGE			**12.17**	**37.83**	**3.72**	**2.56**	**1.00**	**5.33**	**1,909.55**
STANDARD DEVIATION			**12.38**	**37.20**	**1.78**	**0.50**	**0.71**	**1.35**	**2,021.05**
WBSR 29.0	01-17-2005	15:25	26.00	24.60	3.630	3.090	0.460	6.60	4,237.85
	03-14-2005	15:15	40.20	-32.40	0.896	2.450	0.283	7.10	1,985.62
	05-16-2005	13:45	26.00	24.60	3.630	3.090	0.460	6.60	684.91
	11-03-2004	09:08	28.20	10.40	1.110	1.830	0.410	6.80	1,163.82
	06-13-2005	12:52	8.00	56.40	2.510	4.440	0.790	4.80	312.83
	07-25-2005	13:09	5.60	73.20	3.620	4.150	1.410	4.20	383.30
AVERAGE			**22.33**	**26.13**	**2.57**	**3.18**	**0.64**	**6.02**	**1,461.39**
STANDARD DEVIATION			**13.16**	**36.90**	**1.29**	**0.99**	**0.41**	**1.20**	**1,493.75**
WBSR 30.0	01-17-2005	13:10	67.40	-25.80	0.817	1.480	0.300	7.60	2,201.51
	03-14-2005	12:00	65.40	-58.40	0.793	1.870	0.203	7.50	1,370.28
	05-16-2005	12:55	56.00	-8.40	3.220	2.180	0.275	7.90	396.77
	11-02-2004	15:12	47.80	-1.00	1.550	3.290	0.357	7.30	480.25
	06-13-2005	13:16	36.40	21.60	1.840	4.450	0.529	7.30	226.66
	07-25-2005	12:50	40.20	8.20	0.709	1.830	0.397	7.00	231.15

Site Location	Date	Time	Alk mg/L	Hot Acidity mg/L	Total Al mg/L	Total Fe mg/L	Total Mn mg/L	pH	Flow gpm
AVERAGE			**52.20**	**-10.63**	**1.49**	**2.52**	**0.34**	**7.43**	**817.77**
STANDARD DEVIATION			**12.91**	**28.30**	**0.97**	**1.13**	**0.11**	**0.31**	**800.59**
WBSR 31.0	01-17-2005	12:30	74.00	-34.80	0.639	1.360	0.111	7.50	1,439.85
	03-14-2005	11:30	76.20	-62.20	0.250	2.040	0.137	7.40	877.91
	05-16-2005	11:15	59.60	-13.20	5.310	3.190	0.226	7.00	316.43
	11-02-2004	14:35	61.00	-20.00	0.250	1.940	0.246	7.30	319.12
	06-13-2005	11:52	48.60	4.20	0.613	5.180	0.343	7.10	180.43
	07-25-2005	11:08	58.20	-11.80	0.250	2.330	0.285	7.20	136.00
AGE			**62.93**	**-22.97**	**1.22**	**2.67**	**0.22**	**7.25**	**544.95**
STANDARD DEVIATION			**10.40**	**23.01**	**2.01**	**1.37**	**0.09**	**0.19**	**512.84**
WBSR 32.0	01-17-2005	11:45	83.80	-54.00	0.250	2.260	0.080	7.00	1,500.89
	03-14-2005	11:00	89.00	-72.20	0.250	3.220	0.109	6.80	1,050.26
	05-16-2005	10:30	74.00	-23.20	2.930	6.600	0.208	6.60	297.57
	05-16-2005	10:45	74.00	-21.60	5.540	6.840	0.216	6.60	-
	11-02-2004	13:50	76.40	-31.00	0.864	6.570	0.211	6.80	315.53
	06-13-2005	11:16	64.40	1.40	1.270	12.500	0.383	6.60	179.53
	06-13-2005	11:18	65.00	4.00	1.160	12.000	0.365	6.60	-
	07-25-2005	10:22	75.20	-16.60	1.200	10.000	0.263	6.70	96.05
	07-25-2005	10:25	75.00	-18.60	1.130	9.420	0.255	6.70	-
AVERAGE			**75.20**	**-25.76**	**1.62**	**7.71**	**0.23**	**6.71**	**573.31**
STANDARD DEVIATION			**7.82**	**24.40**	**1.66**	**3.58**	**0.10**	**0.14**	**568.01**
WBSR 33.0	01-17-2005	11:25	141.20	-119.60	0.250	0.150	0.025	7.60	460.05
	03-14-2005	10:15	142.40	-128.40	0.250	0.150	0.025	7.60	453.32
	03-14-2005	10:30	139.40	-126.00	`0.250	0.150	0.025	7.60	-
	05-16-2005	09:40	145.60	-122.20	2.430	0.150	0.025	7.60	130.16
	11-02-2004	12:55	147.20	-127.20	0.250	0.150	0.025	7.60	199.28
	06-13-2005	10:29	150.20	-114.00	0.250	0.150	0.025	7.60	80.79
	07-25-2005	09:45	156.00	-123.60	0.250	0.150	0.025	7.70	55.65
AVERAGE			**146.00**	**-123.00**	**0.56**	**0.15**	**0.03**	**7.61**	**229.88**
STANDARD DEVIATION			**5.76**	**4.99**	**0.82**	**0.00**	**0.00**	**0.04**	**182.41**

Attachment F

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

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

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

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

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

Total Measured Load = Allowed Load + Reduced Load

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

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

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

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

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

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

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

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

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

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

Pit water can also result from runoff from the unregraded and revegetated area following the pit. In the case of roughly backfilled and highly porous spoil, there is very little surface runoff. It is estimated that 80 percent of precipitation on the roughly regarded mine spoil infiltrates, 5 percent evaporates, and 15 percent may run off to the pit for pumping and potential treatment (Jay Hawkins, Office of Surface Mining, Department of the Interior, Personal Communications 2003). Regrading and revegetation of the mine spoil is conducted as the mining progresses. 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 in. precip./yr x 3 pit areas x 1 ft./12/in. x 1500'x300'/pit x 7.48 gal/ft^3 x 1yr/365days x 1day/24hr. x 1hr./60 min. x 15 in. runoff/100 in. precipitation =

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

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

Total Average Flow = Direct Pit Precipitation + Spoil Runoff

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

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

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

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

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

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

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

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

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

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

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

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

Attachment G
TMDLs and NPDES Permitting Coordination

NPDES permitting is unavoidably linked to TMDLs through WLAs 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 WLAs, etc., in their respective offices. The TMDL program will assist in this effort. However, the primary role of the TMDL program is TMDL development and revision/amendment (the necessity for which is as defined in the Future Modifications section) at the request of the respective office. All efforts will be made to coordinate public notice periods for TMDL revisions and permit renewals/reissuances.

Load Tracking Mechanisms

PADEP 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 PADEP to make minor changes in WLAs without the need for USEPA 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

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

Options identified

1. 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.

2. 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.

3. 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.

4. 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.

1. Issue the permit with instream water quality criteria values as the effluent limits. The instream 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).

2. The applicant would agree to treat an existing source (point or nonpoint) 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

Allocation Summary Table
for the
Barnes and Tucker Treated Scenario

Parameter	*Existing Load (lbs/day)*	*TMDL Allowable Load (lbs/day)*	*WLA (lbs/day)*	*LA (lbs/day)*	*NPS Load Reduction (lbs/day)*	*NPS % Reduction*
WBSR 24.0: West Branch Susquehanna River upstream of Lancashire #15 proposed treatment facility						
Iron (lbs/day)	**736.07**	**29.44**	**-**	**29.44**	**379.43**	**92.8%**
Manganese (lbs/day)	**52.56**	**17.34**	**-**	**17.34**	**17.08**	**49.6%**
Aluminum (lbs/day)	**1,277.54**	**11.50**	**-**	**11.5**	**836.66**	**99.99%**
Acidity (lbs/day)	**10,682.29**	**1.07**	**-**	**1.07**	**6,753.66**	**99.99%**
WBSR 23.0: West Branch Susquehanna River downstream of Lancashire #15 proposed treatment facility						
Iron (lbs/day)	**1,146.43**	**57.32**	***6.78***	**50.54**	**382.48**	**87.0%**
Manganese (lbs/day)	**440.25**	**83.65**	***4.50***	**79.15**	**321.69**	**79.4%**
Aluminum (lbs/day)	**1,387.31**	**13.87**	***1.68***	**12.19**	**88.60**	**88.6%**
Acidity (lbs/day)	**11,828.90**	**236.58**	***0.00***	**236.58**	**911.10**	**79.4%**
WBSR 22.0: West Branch Susquehanna River downstream of Fox Run						
Iron (lbs/day)	**1,130.99**	**90.48**	***6.78***	**83.70**	**0.00**	**0.0%**
Manganese (lbs/day)	**494.04**	**88.93**	***4.50***	**84.43**	**48.51**	**35.3%**
Aluminum (lbs/day)	**1,303.72**	**26.07**	***1.68***	**24.39**	**0.00**	**0.0%**
Acidity (lbs/day)	**11,177.22**	**335.32**	***0.00***	**335.32**	**0.00**	**0.0%**
WBSR 21.0: West Branch Susquehanna River near West Branch, PA						
Iron (lbs/day)	**863.08**	**181.25**	***6.78***	**174.47**	**0.00**	**0.0%**
Manganese (lbs/day)	**475.43**	**142.63**	***4.50***	**138.13**	**0.00**	**0.0%**
Aluminum (lbs/day)	**925.20**	**55.51**	***1.68***	**53.83**	**0.00**	**0.0%**
Acidity (lbs/day)	**-1,531.48**	**-**	***0.00***	**-**	**-**	**-**
WBSR 20.0: West Branch Susquehanna River upstream of Walnut Run						
Iron (lbs/day)	**846.50**	**194.70**	***6.78***	**187.92**	**0.00**	**0.0%**
Manganese (lbs/day)	**475.31**	**147.35**	***4.50***	**142.85**	**0.00**	**0.0%**
Aluminum (lbs/day)	**901.59**	**63.11**	***1.68***	**61.43**	**0.00**	**0.0%**
Acidity (lbs/day)	**-3,201.60**	**-**	***0.00***	**-**	**-**	**-**
WBSR 19.0: West Branch Susquehanna River downstream of Walnut Run						
Iron (lbs/day)	**864.78**	**224.84**	***7.03***	**217.81**	**0.00**	**0.0%**
Manganese (lbs/day)	**482.87**	**169.00**	***4.63***	**164.37**	**0.00**	**0.0%**
Aluminum (lbs/day)	**927.41**	**64.92**	***2.18***	**62.74**	**0.00**	**0.0%**
Acidity (lbs/day)	**-6,478.06**	**-**	***0.00***	**-**	**-**	**-**
WBSR 18.0: West Branch Susquehanna River upstream of Amsbry, PA						
Iron (lbs/day)	**849.67**	**263.40**	***72.53***	**190.87**	**0.00**	**0.0%**
Manganese (lbs/day)	**495.64**	**213.12**	***48.343***	**164.777**	**0.00**	**0.0%**
Aluminum (lbs/day)	**899.36**	**80.94**	***20.393***	**60.547**	**0.00**	**0.0%**
Acidity (lbs/day)	**-7,147.81**	**-**	***0.00***	**-**	**-**	**-**
WBSR 17.0: West Branch Susquehanna River north of Emeigh, PA						
Iron (lbs/day)	**679.16**	**203.75**	***12.85***	**190.90**	**6.71**	**3.2%**
Manganese (lbs/day)	**485.98**	**247.85**	***6.81***	**241.04**	**0.00**	**0.0%**
Aluminum (lbs/day)	**736.67**	**73.67**	***3.01***	**70.66**	**0.00**	**0.0%**
Acidity (lbs/day)	**-10,562.41**	**-**	***0.00***	**-**	**-**	**-**
WBSR 16.0: West Branch Susquehanna River downstream of Cush Cushion Creek						
Iron (lbs/day)	**536.28**	**198.42**	***97.24***	**101.18**	**0.00**	**0.0%**
Manganese (lbs/day)	**473.21**	**317.05**	***61.34***	**255.71**	**0.00**	**0.0%**
Aluminum (lbs/day)	**568.13**	**68.18**	***23.02***	**45.16**	**0.00**	**0.0%**
Acidity (lbs/day)	**-12,301.20**	**-**	***0.00***	**-**	**-**	**-**
WBSR 15.0: West Branch Susquehanna River at Kantz Hill Road						
Iron (lbs/day)	**436.10**	**248.58**	***6.78***	**241.80**	**0.00**	**0.0%**
Manganese (lbs/day)	**466.22**	**442.91**	***4.50***	**438.41**	**0.00**	**0.0%**
Aluminum (lbs/day)	**498.17**	**74.73**	***1.68***	**73.05**	**0.00**	**0.0%**

Parameter	*Existing Load (lbs/day)*	*TMDL Allowable Load (lbs/day)*	*WLA (lbs/day)*	*LA (lbs/day)*	*NPS Load Reduction (lbs/day)*	*NPS % Reduction*
Acidity (lbs/day)	**-16,634.90**	**-**	***0.00***	**-**	**-**	**-**
WBSR 14.0: West Branch Susquehanna River upstream of Cush Creek						
Iron (lbs/day)	**478.76**	**277.68**	***6.78***	**270.90**	**13.56**	**4.7%**
Manganese (lbs/day)	**480.63**	**480.63**	***4.50***	**476.13**	**0.00**	**0.0%**
Aluminum (lbs/day)	**629.63**	**100.74**	***1.68***	**99.06**	**105.45**	**51.1%**
Acidity (lbs/day)	**-26,116.18**	**-**	***0.00***	**-**	**-**	**-**
WBSR 13.0: West Branch Susquehanna River downstream of Cush Creek						
Iron (lbs/day)	**511.66**	**491.19**	***10.13***	**481.06**	**0.00**	**0.0%**
Manganese (lbs/day)	**519.20**	**519.23**	***6.73***	**512.50**	**0.00**	**0.0%**
Aluminum (lbs/day)	**682.71**	**109.23**	***2.55***	**106.68**	**43.59**	**29.0%**
Acidity (lbs/day)	**-22,484.41**	**-**	***0.00***	**-**	**-**	**-**
WBSR 12.0: West Branch Susquehanna River at McGees Mills, PA						
Iron (lbs/day)	**1,068.69**	**983.19**	***9.00***	**974.19**	**65.03**	**6.2%**
Manganese (lbs/day)	**627.18**	**627.18**	***5.98***	**621.20**	**38.57**	**5.8%**
Aluminum (lbs/day)	**1,825.33**	**310.31**	***2.24***	**308.07**	**994.62**	**76.2%**
Acidity (lbs/day)	**-29,556.24**	**-**	***0.00***	**-**	**-**	**-**
BEAR 1.0: Bear Run at its mouth						
Iron (lbs/day)	**244.20**	**64.0**	**-**	**-**	**-**	**0.0%**
Manganese (lbs/day)	**209.00**	**56.2**	**-**	**-**	**-**	**7.0%**
Aluminum (lbs/day)	**141.10**	**48.3**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**5,677.40**	**510.70**	**-**	**-**	**-**	**73.0%**
WBSR 11.0: West Branch Susquehanna River at Bower, PA						
Iron (lbs/day)	**1,445.24**	**1,358.52**	***88.50***	**1,270.02**	**0.00**	**0.0%**
Manganese (lbs/day)	**845.09**	**845.09**	***57.26***	**787.83**	**0.00**	**0.0%**
Aluminum (lbs/day)	**3,035.18**	**515.98**	***21.46***	**494.52**	**911.38**	**63.9%**
Acidity (lbs/day)	**-42,123.35**	**-**	***0.00***	**-**	**-**	**-**
WBSR 10.0: West Branch Susquehanna River downstream of Curwensville Dam						
Iron (lbs/day)	**2,064.56**	**2,064.56**	***13.10***	**2,051.46**	**0.00**	**0.0%**
Manganese (lbs/day)	**1,153.79**	**1,153.79**	***8.71***	**1,145.08**	**0.00**	**0.0%**
Aluminum (lbs/day)	**6,596.41**	**989.46**	***4.60***	**984.86**	**3,087.75**	**75.7%**
Acidity (lbs/day)	**-73,833.53**	**-**	***0.00***	**-**	**-**	**-**
A 2: Anderson Creek at its mouth						
Iron (lbs/day)	**173.20**	**172.20**	**-**	**-**	**-**	**0.0%**
Manganese (lbs/day)	**569.30**	**-**	**-**	**-**	**-**	**0.0%**
Aluminum (lbs/day)	**488.80**	**-**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**7,783.80**	**5,290.30**	**-**	**-**	**-**	**0.0%**
HART 01: Hartshorn at its mouth						
Iron (lbs/day)	**-**	**-**	**-**	**-**	**-**	**0.0%**
Manganese (lbs/day)	**7.30**	**7.30**	**-**	**-**	**-**	**0.0%**
Aluminum (lbs/day)	**-**	**-**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**785.10**	**86.40**	**-**	**-**	**-**	**0.0%**
PR 01: UNT 26641 to WBSR at its mouth						
Iron (lbs/day)	**-**	**-**	**-**	**-**	**-**	**-**
Manganese (lbs/day)	**43.30**	**10.10**	**-**	**-**	**-**	**54.0%**
Aluminum (lbs/day)	**6.70**	**2.70**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**526.90**	**83.40**	**-**	**-**	**-**	**71.0%**
MC 1: Montgomery Creek at its mouth						
Iron (lbs/day)	**55.50**	**55.50**	**-**	**-**	**-**	**0.0%**
Manganese (lbs/day)	**1,007.20**	**40.70**	**-**	**-**	**-**	**0.0%**

Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	NPS Load Reduction (lbs/day)	NPS % Reduction
Aluminum (lbs/day)	412.90	33.30	-	-	-	0.0%
Acidity (lbs/day)	7,652.20	75.90	-	-	-	0.0%
WBSR 9.0 West Branch Susquehanna River at Hyde, PA						
Iron (lbs/day)	2,477.12	2,477.12	*8.75*	2,468.37	0.00	0.0%
Manganese (lbs/day)	2,678.49	2,678.49	*5.81*	2,672.68	0.00	0.0%
Aluminum (lbs/day)	8,093.31	1,214.00	*2.65*	1,211.35	0.00	24.8%
Acidity (lbs/day)	-9,353.41	-	*0.00*	-	-	-
MOOS 01: Moose Creek at its mouth						
Iron (lbs/day)	-	-	-	-	-	-
Manganese (lbs/day)	128.90	56.70	-	-	-	26.0%
Aluminum (lbs/day)	96.60	44.40	-	-	-	24.0%
Acidity (lbs/day)	2,895.30	376.40	-	-	-	47.0%
LR 01: Lick Run at its mouth						
Iron (lbs/day)	-	-	-	-	-	-
Manganese (lbs/day)	180.40	103.10	-	-	-	0.0%
Aluminum (lbs/day)	-	-	-	-	-	-
Acidity (lbs/day)	5,764.90	856.90	-	-	-	1.0%
CLCR 1.0: Clearfield Creek at its mouth						
Iron (lbs/day)	4,024.00	1,530.20	-	-	-	0.0%
Manganese (lbs/day)	5,242.50	1,728.60	-	-	-	0.0%
Aluminum (lbs/day)	2,267.00	793.50	-	-	-	6.0%
Acidity (lbs/day)	42,790.30	11,561.90	-	-	-	57.0%
WBSR 8.0: West Branch Susquehanna River at Shawville, PA						
Iron (lbs/day)	7,163.35	5,085.98	*145.53*	4,940.45	0.00	0.0%
Manganese (lbs/day)	9,296.18	4,926.98	*107.17*	4,819.81	705.80	12.5%
Aluminum (lbs/day)	13,262.65	1,989.40	*119.54*	1,869.86	2,868.24	59.0%
Acidity (lbs/day)	148,299.40	51,904.79	*0.00*	51,904.79	57,748.31	52.7%
MP 06: Surveyor Run at its mouth						
Iron (lbs/day)	27.00	27.00	-	-	-	0.0%
Manganese (lbs/day)	188.60	28.30	-	-	-	0.0%
Aluminum (lbs/day)	166.30	26.60	-	-	-	0.0%
Acidity (lbs/day)	3,277.90	295.00	-	-	-	62.0%
WBSR 7.0: West Branch Susquehanna River at Frenchville Station, PA						
Iron (lbs/day)	8,418.37	4,966.84	*38.60*	4,928.24	1,374.16	21.7%
Manganese (lbs/day)	8,440.51	4,726.68	*25.72*	4,700.96	0.00	0.0%
Aluminum (lbs/day)	15,848.79	2,377.32	*10.12*	2,367.20	2,058.52	46.4%
Acidity (lbs/day)	156,012.31	51,484.06	*0.00*	51,484.06	5,150.74	9.1%
DEER 1.0 Deer Creek at its mouth						
Iron (lbs/day)	470.60	94.10	-	-	-	0.0%
Manganese (lbs/day)	589.40	94.10	-	-	-	60.0%
Aluminum (lbs/day)	291.30	96.40	-	-	-	48.0%
Acidity (lbs/day)	9,844.60	1,082.40	-	-	-	54.0%
BR 01: Big Run at its mouth						
Iron (lbs/day)	-	-	-	-	-	-
Manganese (lbs/day)	7.3	3.2	-	-	-	55.0%
Aluminum (lbs/day)	-	-	-	-	-	-
Acidity (lbs/day)	269.50	56.6	-	-	-	76.0%
SC 1.0: Sandy Creek at its mouth						
Iron (lbs/day)	263.60	78.50	-	-	-	65.0%

Parameter	*Existing Load (lbs/day)*	*TMDL Allowable Load (lbs/day)*	*WLA (lbs/day)*	*LA (lbs/day)*	*NPS Load Reduction (lbs/day)*	*NPS % Reduction*
Manganese (lbs/day)	**627.70**	**19.60**	**-**	**-**	**-**	**0.0%**
Aluminum (lbs/day)	**332.20**	**19.60**	**-**	**-**	**-**	**1.0%**
Acidity (lbs/day)	**5,860.20**	**175.30**	**-**	**-**	**-**	**1.0%**
AR 01: Alder Run at its mouth						
Iron (lbs/day)	**4,505.40**	**149.10**	**-**	**-**	**-**	**89.0%**
Manganese (lbs/day)	**1,067.40**	**100.40**	**-**	**-**	**-**	**76.0%**
Aluminum (lbs/day)	**2,091.20**	**110.00**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**38,433.60**	**0.00**	**-**	**-**	**-**	**100.0%**
WBSR 6.0: West Branch Susquehanna River at Rolling Stone, PA						
Iron (lbs/day)	**16,300.19**	**7,009.08**	***6.78***	**7,002.30**	**921.68**	**11.6%**
Manganese (lbs/day)	**10,542.76**	**4,955.10**	***4.50***	**4,950.60**	**0.00**	**0.0%**
Aluminum (lbs/day)	**12,353.32**	**5,558.99**	***1.68***	**5,557.31**	**0.00**	**0.0%**
Acidity (lbs/day)	**274,005.47**	**123,302.46**	***0.00***	**123,302.46**	**0.00**	**0.0%**
MOUTH: Moshannon Creek at its mouth						
Iron (lbs/day)	**11,371.55**	**2,274.31**	**-**	**-**	**-**	**98.0%**
Manganese (lbs/day)	**5,980.20**	**2,392.08**	**-**	**-**	**-**	**65.0%**
Aluminum (lbs/day)	**14039.01**	**1,,825.07**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**324,221.21**	**3,242.21**	**-**	**-**	**-**	**39.0%**
WBSR 5.0: West Branch Susquehanna River at Karthaus, PA						
Iron (lbs/day)	**38,397.70**	**6,527.61**	***10.11***	**6,517.50**	**13,481.74**	**67.4%**
Manganese (lbs/day)	**24,645.76**	**9,858.30**	***6.72***	**9,851.58**	**5,611.68**	**36.3%**
Aluminum (lbs/day)	**27,207.67**	**4,625.30**	***2.98***	**4,622.32**	**3,574.10**	**43.6%**
Acidity (lbs/day)	**526,061.07**	**142,036.49**	***0.00***	**142,036.49**	**0.00**	**0.0%**
BIR 02: Birch Island Run at its mouth						
Iron (lbs/day)	**-**	**-**	**-**	**-**	**-**	**-**
Manganese (lbs/day)	**17.4**	**17.4**	**-**	**-**	**-**	**0.0%**
Aluminum (lbs/day)	**-**	**-**	**-**	**-**	**-**	**-**
Acidity (lbs/day)	**1,254.70**	**589.70**	**-**	**-**	**-**	**5.0%**
SC 1.0: Sandy Creek at its mouth						
Iron (lbs/day)	**709.50**	**22.10**	**-**	**-**	**-**	**0.0%**
Manganese (lbs/day)	**165.60**	**34.50**	**-**	**-**	**-**	**23.0%**
Aluminum (lbs/day)	**432.0**	**22.10**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**8,942.80**	**1,966.90**	**-**	**-**	**-**	**20.0%**
KC 1: Kettle Creek at its mouth						
Iron (lbs/day)	**278.50**	**278.00**	**-**	**-**	**-**	**0.0%**
Manganese (lbs/day)	**130.00**	**130.00**	**-**	**-**	**-**	**0.0%**
Aluminum (lbs/day)	**278.50**	**241.40**	**-**	**-**	**-**	**0.0%**
Acidity (lbs/day)	**3,063.90**	**1,875.50**	**-**	**-**	**-**	**0.0%**
WBSR 4.0: West Branch Susquehanna River at Renovo, PA						
Iron (lbs/day)	**14,832.68**	**14,832.68**	***29.23***	**14,803.45**	**0.00**	**0.0%**
Manganese (lbs/day)	**16,974.47**	**16,974.47**	***19.47***	**16,955.00**	**0.00**	**0.0%**
Aluminum (lbs/day)	**66,362.96**	**4,645.41**	***9.14***	**4,636.27**	**38,688.18**	**89.3%**
Acidity (lbs/day)	**860,529.38**	**111,868.82**	***0.00***	**111,868.82**	**355,806.68**	**76.1%**
WBSR 3.0: West Branch Susquehanna River at Lock Haven, PA						
Iron (lbs/day)	**24,433.13**	**21,501.15**	***19.30***	**21,481.85**	**2,931.98**	**12.0%**
Manganese (lbs/day)	**19,857.46**	**19,857.46**	***12.85***	**19,844.61**	**0.00**	**0.02%**
Aluminum (lbs/day)	**30,924.39**	**9,895.80**	***10.03***	**9,885.77**	**0.00**	**0.0%**
Acidity (lbs/day)	**1,133,135.09**	**158,638.91**	***0.00***	**158,638.91**	**225,835.65**	**58.7%**
WBSR 2.0: West Branch Susquehanna River at Jersey Shore, PA						
Iron (lbs/day)	**40,919.02**	**14,321.66**	***91.88***	**14,229.78**	**23,630.82**	**62.3%**

Parameter	*Existing Load (lbs/day)*	*TMDL Allowable Load (lbs/day)*	*WLA (lbs/day)*	*LA (lbs/day)*	*NPS Load Reduction (lbs/day)*	*NPS % Reduction*
Manganese (lbs/day)	**26,989.04**	**18,622.44**	***46.74***	**18,575.70**	**8,366.60**	**31.0%**
Aluminum (lbs/day)	**48,244.85**	**9,166.52**	***73.49***	**9,093.03**	**18,049.74**	**66.3%**
Acidity (lbs/day)	**311,387.57**	**155,693.78**	***0.00***	**155,693.78**	**0.00**	**0.0%**
WBSR 1.0: West Branch Susquehanna River at Williamsport, PA						
Iron (lbs/day)	**34,908.99**	**34,908.99**	***46.571***	**34,862.419**	**0.00**	**0.0%**
Manganese (lbs/day)	**19,490.91**	**19,490.91**	***30.83***	**19,460.08**	**0.00**	**0.0%**
Aluminum (lbs/day)	**47,597.28**	**17,610.99**	***29.26***	**17,581.73**	**0.00**	**4.6%**
Acidity (lbs/day)	**223,375.25**	**189,868.96**	***0.00***	**189,868.96**	**0.00**	**0.0%**

Attachment I

TMDL by Segments
for the
Barnes and Tucker Treated Scenario

WBSR 24.0: West Branch Susquehanna River upstream of proposed Lancashire treatment facility

WBSR 24.0 is located upstream of the Patterson Road bridge north of Watkins, Pa. All measurements were recorded upstream of the old bridge abutments. This monitoring point accounts for the flow and water quality contributions from UNT 27270.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 24.0 and WBSR 25.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 24.0 (5.69 MGD). The load allocations made at point WBSR 24.0 for this stream segment are presented in Table I32.

Table I32. TMDL Calculations at Point WBSR 24.0				
Flow 5.69 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	15.51	736.07	0.62	29.44
Mn	1.11	52.56	0.37	17.34
Al	26.92	1,277.54	0.24	11.50
Acidity	225.07	10,682.29	0.02	1.07
Alkalinity	0.00	0.00		

The loading reduction for point WBSR 25.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 24.0. This value was compared to the allowable load at point WBSR 24.0. Reductions at point WBSR 24.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 24.0 are shown in Table I33.

Table I33. Calculation of Load Reduction Necessary at Point WBSR 24.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 24.0	736.07	52.56	1,277.54	10,682.29
Difference of measured loads between loads that enter and existing WBSR 24.0	391.65	19.59	832.21	6,753.66
Percent loss due calculated at WBSR 24.0	0.0%	0.0%	0.0%	0.0%
Additional loads tracked from above samples	17.22	14.83	4.45	0.00
Percentage of upstream loads that reach WBSR 24.0	100.0%	100.0%	100.0%	100.0%
Total load tacked between WBSR 25.0 and WBSR 24.0	408.87	34.42	836.66	6,753.66
Allowable load at WBSR 24.0	29.44	17.34	11.50	1.07
Load Reduction at WBSR 24.0	379.43	17.08	825.16	6,752.59
Percent Reduction required at WBSR 24.0	92.8%	49.6%	98.6%	99.99%

The TMDL for point WBSR 24.0 requires a load reduction for total iron, total manganese, total aluminum, and acidity.

WBSR 23.0: West Branch Susquehanna River downstream of proposed Lancashire treatment facility

WBSR 23.0 is located at the upstream of Fox Run near Northern Cambria, Pa. All measurements were recorded near an electrical plant south of Northern Cambria. This monitoring point accounts for AMD runoff caused by refuse piles adjacent to the river that are present before WBSR 23.0. In addition, this monitoring site accounts for the untreated Barnes and Tucker Lancashire #15 mine discharge.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 23.0 and WBSR 24.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 23.0 (14.84 MGD). The load allocations made at point WBSR 23.0 for this stream segment are presented in Table I34.

Table I34. TMDL Calculations at Point WBSR 23.0				
Flow = 14.84 MGD	*Measured Sample Data*		*Allowable*	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	9.26	1,146.43	0.46	57.32
Mn	3.56	440.25	0.68	83.65
Al	11.20	1,387.31	0.11	13.87
Acidity	95.52	11,828.90	1.91	236.58
Alkalinity	11.95	1,480.19		

The loading reduction for point WBSR 24.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 23.0. This value was compared to the allowable load at point WBSR 23.0. Reductions at point WBSR 23.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 23.0 are shown in Table I35.

Table I35. Calculation of Load Reduction Necessary at Point WBSR 23.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 23.0	1,146.43	440.25	1,387.31	11,828.90
Difference of measured loads between loads that enter and existing WBSR 23.0	410.36	388.00	109.77	1,146.61
Percent loss due calculated at WBSR 23.0	0.0%	0.0%	0.0%	0.0%
Additional loads tracked from above samples	29.44	17.34	11.50	1.07
Percentage of upstream loads that reach WBSR 23.0	100.0%	100.0%	100.0%	100.0%
Total load tacked between WBSR 24.0 and WBSR 23.0	439.80	405.34	121.27	1,147.68
Allowable load at WBSR 23.0	57.32	83.65	13.87	236.58
Load Reduction at WBSR 23.0	382.48	321.69	107.40	911.10
Percent Reduction required at WBSR 23.0	87.0%	79.4%	88.6%	79.4%

The TMDL for point WBSR 23.0 requires a load reduction for total iron, total manganese, total aluminum, and acidity. A waste load allocation for future mining was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500' x 300') to be permitted in the future on this segment (Table I36).

Table I36. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 22.0: West Branch Susquehanna River downstream of Fox Run

WBSR 22.0 is located just downstream of Fox Run near Northern Cambria, Pa. All measurements were recorded on the upstream side of the 16^{th} Street bridge. This monitoring point accounts for the water quality contributions from Fox Run. Fox Run is listed as being impaired by AMD for metals and pH. Loadings for Fox Run will be allocated in future TMDLs.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 22.0 and WBSR 23.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 22.0 (18.60 MGD). The load allocations made at point WBSR 22.0 for this stream segment are presented in Table I37.

Table I37. TMDL Calculations at Point WBSR 22.0				
Flow = 18.60 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	7.29	1,130.99	0.58	90.48
Mn	3.18	494.04	0.57	88.93
Al	8.40	1,303.72	0.17	26.07
Acidity	72.03	11,177.22	2.16	335.32
Alkalinity	10.14	1,573.70		

The loading reduction for point WBSR 23.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 22.0. This value was compared to the allowable load at point WBSR 22.0. Reductions at point WBSR 22.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 22.0 are shown in Table I38.

Table I38. Calculation of Load Reduction Necessary at Point WBSR 22.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 22.0	1,130.99	494.04	1,303.72	11,177.22
Difference of measured loads between loads that enter and existing WBSR 22.0	-15.44	53.79	-83.59	-651.68
Percent loss due calculated at WBSR 22.0	1.3%	0.0%	6.0%	5.5%
Additional loads tracked from above samples	57.32	83.65	13.87	236.58
Percentage of upstream loads that reach WBSR 22.0	98.7%	100.0%	94.0%	94.5%
Total load tacked between WBSR 23.0 and WBSR 22.0	56.57	137.44	13.04	223.57
Allowable load at WBSR 22.0	90.48	88.93	26.07	335.32
Load Reduction at WBSR 22.0	0.00	48.51	0.00	0.00
Percent Reduction required at WBSR 22.0	0.0%	35.3%	0.0%	0.0%

The TMDL for point WBSR 22.0 requires a load reduction for total manganese. A WLA for future mining was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500' x 300') to be permitted in the future on this segment (Table I39).

Table I39. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 21.0: West Branch Susquehanna River upstream near West Branch, Pa.

WBSR 21.0 is located at the Barr Avenue bridge near West Branch, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for the water quality of the West Branch Susquehanna River before the McCombie Discharge.

This TMDL section for the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 21.0 and WBSR 22.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 21.0 (22.73 MGD). The load allocations made at point WBSR 21.0 for this stream segment are presented in Table I40.

Table I40. TMDL Calculations at Point WBSR 21.0				
Flow = 22.73 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	4.55	863.08	0.96	181.25
Mn	2.51	475.43	0.75	142.63
Al	4.88	925.20	0.29	55.51
Acidity	-8.08	-1,531.48	NA	NA
Alkalinity	53.42	10,131.58		

The loading reduction for point WBSR 22.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 21.0. This value was compared to the allowable load at point WBSR 21.0. Reductions at point WBSR 21.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 21.0 are shown in Table I41.

Table I41. Calculation of Load Reduction Necessary at Point WBSR 21.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 21.0	863.08	475.43	925.20	NA
Difference of measured loads between loads that enter and existing WBSR 21.0	-267.91	18.61	-378.52	-
Percent loss due calculated at WBSR 21.0	23.7%	0.0%	29.0%	-
Additional loads tracked from above samples	90.48	88.93	26.07	-
Percentage of upstream loads that reach WBSR 21.0	76.3%	100.0%	71.0%	-
Total load tacked between WBSR 22.0 and WBSR 21.0	69.04	107.54	18.51	-
Allowable load at WBSR 21.0	181.25	142.63	55.51	-
Load Reduction at WBSR 21.0	0.00	0.00	0.00	-
Percent Reduction required at WBSR 21.0	0.0%	0.0%	0.0%	-

The TMDL for point WBSR 21.0 does not require a load reduction. A WLA for future mining was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table I42).

Table I42. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 20.0: West Branch Susquehanna River upstream of Walnut Run

WBSR 20.0 is located near Maple Avenue in West Branch, Pa. All measurements were recorded upstream of Walnut Run. This monitoring point accounts for an AMD discharge, McCombie Discharge, which enters the West Branch Susquehanna River just upstream of this site. McCombie Discharge is an abandoned discharge.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 20.0 and WBSR 21.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 20.0 (23.63 MGD). The load allocations made at point WBSR 20.0 for this stream segment are presented in Table I43.

Table I43. TMDL Calculations at Point WBSR 20.0				
Flow = 23.63 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	4.29	846.50	0.99	194.70
Mn	2.41	475.31	0.75	147.35
Al	4.57	901.59	0.32	63.11
Acidity	-16.24	-3,201.60	NA	NA
Alkalinity	61.01	12,028.76		

The loading reduction for point WBSR 21.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 20.0. This value was compared to the allowable load at point WBSR 20.0. Reductions at point WBSR 20.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 20.0 are shown in Table I44.

Table I44. Calculation of Load Reduction Necessary at Point WBSR 20.0				
	Fe (lbs/day)	*Mn (lbs/day)*	*Al (lbs/day)*	*Acidity (lbs/day)*
Existing load at WBSR 20.0	846.50	475.31	901.59	NA
Difference of measured loads between loads that enter and existing WBSR 20.0	-16.58	-0.12	-23.61	-
Percent loss due calculated at WBSR 20.0	1.9%	0.02%	2.6%	-
Additional loads tracked from above samples	181.25	142.63	55.51	-
Percentage of upstream loads that reach WBSR 20.0	98.1%	99.98%	97.4%	-
Total load tacked between WBSR 21.0 and WBSR 20.0	177.81	142.60	54.07	-
Allowable load at WBSR 20.0	194.70	147.32	63.11	-
Load Reduction at WBSR 20.0	0.00	0.00	0.00	-
Percent Reduction required at WBSR 20.0	0.0%	0.0%	0.0%	-

The TMDL for point WBSR 20.0 does not require a load reduction. A WLA for future mining was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table I45).

Table I45. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 19.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

NCBMA: Northern Cambria Municipal Authority

The Northern Cambria Municipal Authority (NPDES PA0252697) Northern Cambria Borough has one outfall (001) in the West Branch Watershed. This outfall has effluent limits for total iron, total manganese, and total aluminum. The following table (I46) shows the WLA for this discharge.

Table I46. WLA Northern Cambria Municipal Authority			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	2.0	0.015	0.25
Mn	1.0	0.015	0.13
Al	4.0	0.015	0.50

WBSR 19.0: West Branch Susquehanna River downstream of Walnut Run

WBSR 19.0 is located at the Redbud Street bridge north of Northern Cambria, Pa. All measurements were recorded on the upstream side of the Redbud Street bridge. This monitoring point accounts for Walnut Run and Porter Run entering the West Branch Susquehanna River.

The TMDL for this section of the WBSR consists of a load allocation to the watershed area between WBSR 19.0 and WBSR 20.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 19.0 (28.04 MGD). The load allocations made at point WBSR 19.0 for this stream segment are presented in Table I47.

Table I47. TMDL Calculations at Point WBSR 19.0

Flow = 28.04 MGD	*Measured Sample Data*		*Allowable*	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	3.70	864.78	0.96	224.84
Mn	2.06	482.87	0.72	169.00
Al	3.96	927.41	0.28	64.92
Acidity	-27.69	-6,478.06	NA	NA
Alkalinity	76.50	17,899.33		

The loading reduction for point WBSR 20.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 19.0. This value was compared to the allowable load at point WBSR 19.0. Reductions at point WBSR 19.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 19.0 are shown in Table I48.

Table I48. Calculation of Load Reduction Necessary at Point WBSR 19.0

	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 19.0	864.78	482.87	927.41	NA
Difference of measured loads between loads that enter and existing WBSR 19.0	18.28	7.44	2.21	-
Percent loss due calculated at WBSR 19.0	0.0%	0.0%	0.0%	-
Additional loads tracked from above samples	194.70	147.35	63.11	-
Percentage of upstream loads that reach WBSR 19.0	100.0%	100.0%	100.0%	-
Total load tacked between WBSR 20.0 and WBSR 19.0	212.98	154.79	65.32	-
Allowable load at WBSR 19.0	224.84	169.00	64.92	-
Load Reduction at WBSR 19.0	0.00	0.00	0.00	-
Percent Reduction required at WBSR 19.0	0.0%	0.0%	0.0%	-

The TMDL for point WBSR 19.0 does not require a load reduction. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500' x 300') to be permitted in the future on this segment (Table I49).

Table I49. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 19.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

Additional WLA for WBSR 18.0

The WBSR 18.0 site incorporates a WLA of 2.22 lbs/day of iron, 1.48 lbs/day of manganese, and 0.56 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table I50.

Table I50. WLA for WBSR 18.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow (MGD)***	***WLAs (lbs/day)***
Ridge Energy Co.	PA0262463, 11070203	Fe - 3.0 Mn - 2.0 Al - 0.75	0.0445	Fe - 1.11 Mn – 0.74 Al – 0.28
L&J Energy Co. Inc.	PA0213365, 11960104	Fe - 3.0 Mn - 2.0 Al - 0.75	0.0445	Fe - 1.11 Mn – 0.74 Al – 0.28
TOTAL				Fe – 2.22 Mn – 1.48 Al – 0.56

TRINK: MB Energy, Trinkley Mine

MB Energy, MP#11000102, operates a surface mine near Moss Creek in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

TRINK is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage*

Treatment Facilities from Surface Mines section in Attachment F. Flow data were available for this point source discharge. Table I51 shows the WLAs for the discharge.

Table I51. WLAs at TRINK			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0002	0.01
Mn	2.0	0.0002	0.003
Al	2.0	0.0002	0.003

GAR2: L & J Energy, Garmantown Mine 2

L & J Energy., MP#11830108, operates a surface mine near UNT 27252 in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

GAR2 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The standard 1500’ x 300’ open pit size was used for this operation. Table I52 shows the WLAs for the discharge.

Table I52. WLAs at GAR2			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	0.75	0.0445	0.28

GAR1: L & J Energy, Garmantown Mine 1

L & J Energy., MP#11823011, operates a surface mine near UNT 27252 in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

GAR1 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The standard 1500’ x 300’ open pit size was used for this operation. Table I53 shows the WLAs for the discharge.

Table I53. WLAs at GAR1			
Parameter	***Monthly Avg. Allowable Conc.***	***Average Flow***	***Allowable Load***

	(mg/l)	(MGD)	(lbs/day)
Fe	3.0	0.0446	1.11
Mn	2.0	0.0446	0.74
Al	0.75	0.0446	0.28

GAR5: L & J Energy, Garmantown Mine 5

L & J Energy., MP#11920102, operates a surface mine near Moss Creek in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

GAR5 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is than the standard 1500' x 300'. Table I54 shows the WLAs for the discharge.

Table I54. WLAs at GAR5

Parameter	*Monthly Avg. Allowable Conc. (mg/l)*	*Average Flow (MGD)*	*Allowable Load (lbs/day)*
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	0.9	0.0445	0.33

LJGM: Garmantown Mine, L & J Energy, Inc.

L & J Energy, Inc. (11941301, PA0215007) has four outfalls from their Garmantown Deep Mine. Outfalls 001, SP, and 002 are drainage from the deep mine with effluent limits for iron, manganese, aluminum, and flow. Outfall 003 is drainage from the deep mine with effluent limits for iron, manganese, and flow. These outfalls then enter an unnamed tributary to the West Branch Susquehanna River. The following table shows the waste load allocation for these discharges (Table I55).

Table I55. Waste Load Allocation for NPDES Permit No. PA0215007

Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.59	14.77
Mn	2.0	0.59	9.85
Al	0.9	0.59	4.43
Outfall SP			
Fe	3.0	0.59	14.77
Mn	2.0	0.59	9.85
Al	0.9	0.59	4.43
Outfall 002			
Fe	3.0	0.59	14.77
Mn	2.0	0.59	9.85
Al	0.9	0.59	4.43
Outfall 003			
Fe	3.0	0.59	14.77
Mn	2.0	0.59	9.85
Al	0.75	0.59	3.69

GAR6: L & J Energy, Garmantown Mine 6

L & J Energy., MP#11960104, operates a surface mine near Moss Creek in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

GAR6 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is than the standard 1500' x 300'. Table I56 shows the WLAs for the discharge.

Table I56. WLAs at GAR6

Parameter	*Monthly Avg. Allowable Conc. (mg/l)*	*Average Flow (MGD)*	*Allowable Load (lbs/day)*
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	0.75	0.0445	0.28

WBSR 18.0: West Branch Susquehanna River upstream of Amsbry, Pa.

WBSR 18.0 is located at the old railroad bridge near the White Garman Church of God in Garmantown, Pa. All measurements were recorded on the upstream side of the railroad bridge. This monitoring point accounts for the #39 Discharge and Moss Creek entering the West Branch Susquehanna River. The #39 discharge is an abandoned discharge.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 18.0 and WBSR 19.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 18.0 (32.46 MGD). The load allocations made at point WBSR 18.0 for this stream segment are presented in Table I57.

Table I57 TMDL Calculations at Point WBSR 18.0				
Flow 32.46 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	3.14	849.67	0.97	263.40
Mn	1.83	495.64	0.79	213.12
Al	3.32	899.36	0.30	80.94
Acidity	-26.39	-7,147.81	NA	NA
Alkalinity	76.18	20,636.32		

The loading reduction for point WBSR 19.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 18.0. This value was compared to the allowable load at point WBSR 18.0. Reductions at point WBSR 18.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 18.0 are shown in Table I58.

Table I58. Calculation of Load Reduction Necessary at Point WBSR 18.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 18.0	849.67	495.64	899.36	NA
Difference of measured loads between loads that enter and existing WBSR 18.0	-15.11	12.77	-28.05	-
Percent loss due calculated at WBSR 18.0	1.7%	0.0%	3.0%	-
Additional loads tracked from above samples	224.84	169.00	64.92	-
Percentage of upstream loads that reach WBSR 18.0	98.3%	100.0%	97.0%	-
Total load tacked between WBSR 19.0 and WBSR 18.0	221.08	181.77	62.97	-
Allowable load at WBSR 18.0	263.40	213.12	80.94	-
Load Reduction at WBSR 18.0	0.00	0.00	0.00	-
Percent Reduction required at WBSR 18.0	0.0%	0.0%	0.0%	-

The TMDL for point WBSR 18.0 does not require a load allocation. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table I59).

Table I59. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 17.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

GAR7: L & J Energy, Garmantown Mine 7

L & J Energy., MP#11980101, operates a surface mine near UNT 27243 in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

GAR7 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 1500’ x 300’. Table I60 shows the WLAs for the discharge.

Table I60. WLAs at GAR7			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	0.75	0.0445	0.28

GAR8: L & J Energy, Garmantown Mine 8

L & J Energy., MP#11020103, operates a surface mine in the West Branch Susquehanna River Watershed along the stream channel. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

GAR8 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 1500’ x 300’. Table I61 shows the WLAs for the discharge.

Table I61. WLAs at GAR8			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	2.0	0.0445	0.74

DOUG: No. 1 Refuse Site, Greenwich

Greenwich (32733708, PA0215503) has two outfalls from their No. 1 Refuse Site. Outfall 012 is drainage from the deep mine with effluent limits for iron, manganese, and flow. Outfall 013 is erosion and sediment control. These outfalls then enter Douglas Run. The following table shows the waste load allocation for these discharges (Table D62).

Table I62. Waste Load Allocation for NPDES Permit No. PA0215503			
Parameter			
Outfall 012	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.05	1.25
Mn	2.0	0.05	0.83
Al	0.75	0.05	0.31
Outfall 013			
Fe	7.0	0.0445	2.60

WBSR 17.0: West Branch Susquehanna River north of Emeigh, Pa.

WBSR 17.0 is located at the State Highway 240 bridge just north of Emeigh, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for Emeigh Run and Douglas Run entering the West Branch Susquehanna River.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 17.0 and WBSR 18.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 17.0 (35.27 MGD). The load allocations made at point WBSR 17.0 for this stream segment are presented in Table I63.

Table I63. TMDL Calculations at Point WBSR 17.0				
Flow = 35.27 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	2.31	679.16	0.69	203.75
Mn	1.65	485.98	0.84	247.85
Al	2.50	736.67	0.25	73.67
Acidity	-35.89	-10,562.41	NA	NA
Alkalinity	75.17	22,124.35		

The loading reduction for point WBSR 18.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 17.0. This value was compared to the allowable load at point WBSR 17.0. Reductions at point WBSR 17.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 17.0 are shown in Table I64.

Table I64. Calculation of Load Reduction Necessary at Point WBSR 17.0

	Fe (lbs/day)	*Mn (lbs/day)*	*Al (lbs/day)*	*Acidity (lbs/day)*
Existing load at WBSR 17.0	679.16	485.98	736.67	NA
Difference of measured loads between loads that enter and existing WBSR 17.0	-170.51	-9.66	-162.69	-
Percent loss due calculated at WBSR 17.0	20.1%	1.9%	18.1%	-
Additional loads tracked from above samples	263.40	181.77	62.97	-
Percentage of upstream loads that reach WBSR 17.0	79.9%	98.1%	81.9%	-
Total load tacked between WBSR 18.0 and WBSR 17.0	210.46	178.32	51.57	-
Allowable load at WBSR 17.0	203.75	247.85	73.67	-
Load Reduction at WBSR 17.0	6.71	0.00	0.00	-
Percent Reduction required at WBSR 17.0	3.2%	0.0%	0.0%	-

The TMDL for point WBSR 17.0 requires a load reduction for total iron. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500' x 300') to be permitted in the future on this segment (Table I65).

Table I65. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 16.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

Additional WLA for WBSR 16.0

The WBSR 16.0 site incorporates a WLA of 1.11 lbs/day of iron, 0.74 lbs/day of manganese, and 0.28 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table I66.

Table I66. WLA for WBSR 16.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow (MGD)***	***WLAs (lbs/day)***
Twin Brook Coal Co.	PA0125504, 32813001	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
TOTAL				Fe – 1.11 Mn – 0.74 Al – 0.28

CTBMA: Cherry Tree Borough Municipal Authority

The Cherry Tree Borough Municipal Authority (NPDES PA0097462) has one outfall (001) in the West Branch Watershed. This outfall has effluent limits for total iron, total manganese, and total aluminum. Table I67 shows the WLA for this discharge.

Table I67. WLA Cherry Tree Borough Municipal Authority			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	2.0	0.0009	0.02
Mn	1.0	0.0009	0.01
Al	4.0	0.0009	0.03

PRKW: Cherry Tree Mine, Parkwood Resources, Inc.

Parkwood Resources, Inc. (17031301, PA0235571) has three outfalls from their Cherry Tree Deep Mine. Outfall 001 is drainage from the deep mine with effluent limits for iron, manganese, and flow. Outfalls 002 and 003 are for erosion and sediment. These outfalls then enter an unnamed tributary to the West Branch Susquehanna River. The following table shows the waste load allocation for these discharges (Table I68).

Table I68. Waste Load Allocation for NPDES Permit No. PA0215007			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	3.36	84.13
Mn	2.0	3.36	56.09
Al	0.75	3.36	21.03
Outfall 002			
Fe	7.0	0.0445	2.60
Outfall 003			
Fe	7.0	0.0445	2.60

WBSR 16.0: West Branch Susquehanna River downstream of Cush Cushion Creek

WBSR 16.0 is located at the State Route 3004 bridge just north of Cherry Tree, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for several tributaries entering the West Branch Susquehanna River. Cush Cushion Creek, Kilns Run, and Kings Run all contribute significant flow to the West Branch Susquehanna River.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 16.0 and WBSR 17.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 16.0 (43.70 MGD). The load allocations made at point WBSR 16.0 for this stream segment are presented in Table I69.

Table I69. TMDL Calculations at Point WBSR 16.0				
Flow = 43.70 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	1.47	536.28	0.54	198.42
Mn	1.30	473.21	0.87	317.05
Al	1.56	568.13	0.19	68.18
Acidity	-33.73	-12,301.20	NA	NA
Alkalinity	71.66	26,133.10		

The loading reduction for point WBSR 17.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 16.0. This value was compared to the allowable load at point WBSR 16.0. Reductions at point WBSR 16.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 16.0 are shown in Table I70.

Table I70. Calculation of Load Reduction Necessary at Point WBSR 16.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 16.0	536.28	473.21	568.13	NA
Difference of measured loads between loads that enter and existing WBSR 16.0	-142.88	-12.77	-331.23	-
Percent loss due calculated at WBSR 16.0	21.0%	2.6%	36.8%	-
Additional loads tracked from above samples	203.75	247.85	73.67	-
Percentage of upstream loads that reach WBSR 16.0	79.0%	97.4%	63.2%	-
Total load tacked between WBSR 17.0 and WBSR 16.0	160.96	241.41	46.56	-
Allowable load at WBSR 16.0	198.42	317.05	68.18	-
Load Reduction at WBSR 16.0	0.00	0.00	0.00	-
Percent Reduction required at WBSR 16.0	0.0%	0.0%	0.0%	-

The TMDL for point WBSR 16.0 does not require a load reduction. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table I71).

Table I71. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 15.0: West Branch Susquehanna River at Kantz Hill Road

WBSR 15.0 is located at the bridge on Kantz Hill Road, south of Burnside, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for several large tributaries entering the West Branch Susquehanna River. Shyrock Run, Boiling Spring Run, Beaver Run, and Patchin Run enter the West Branch Susquehanna River upstream of WBSR 15.0.

This TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 15.0 and WBSR 16.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 15.0 (61.41 MGD). The load allocations made at point WBSR 15.0 for this stream segment are presented in Table I72.

Table I72. TMDL Calculations at Point WBSR 15.0				
Flow = 61.41 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.85	436.10	0.49	248.58
Mn	0.91	466.22	0.86	442.91
Al	0.97	498.17	0.15	74.73
Acidity	-32.46	-16,634.90	NA	NA
Alkalinity	76.75	39,333.24		

The loading reduction for point WBSR 16.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 15.0. This value was compared to the allowable load at point WBSR 15.0. Reductions at point WBSR 15.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 15.0 are shown in Table I73.

Table I73. Calculation of Load Reduction Necessary at Point WBSR 15.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 15.0	436.10	466.22	498.17	NA
Difference of measured loads between loads that enter and existing WBSR 15.0	-100.18	-6.99	-69.96	-
Percent loss due calculated at WBSR 15.0	18.7%	1.5%	12.3%	-
Additional loads tracked from above samples	198.42	317.05	68.18	-
Percentage of upstream loads that reach WBSR 15.0	81.3%	98.5%	87.7%	-
Total load tacked between WBSR 16.0 and WBSR 15.0	161.32	312.29	59.79	-
Allowable load at WBSR 15.0	248.58	442.91	74.73	-
Load Reduction at WBSR 15.0	0.00	0.00	0.00	-
Percent Reduction required at WBSR 15.0	0.0%	0.0%	0.0%	-

The TMDL for point WBSR 15.0 does not require a load reduction. A WLA for future mining was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500' x 300') to be permitted in the future on this segment (Table I74).

Table I74. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 14.0: West Branch Susquehanna River upstream of Cush Creek

WBSR 14.0 is located at the U.S. Route 219 bridge north of Burnside, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for several tributaries entering the West Branch Susquehanna River. Sawmill Run, Rock Run, and UNT 27146 all enter the West Branch Susquehanna River upstream of WBSR 14.0. UNT 27146 is listed as impaired by AMD. Loadings for UNT 27146 will be allocated in future TMDLs.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 14.0 and WBSR 15.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 14.0 (85.24 MGD). The load allocations made at point WBSR 14.0 for this stream segment are presented in Table I75.

Table I75. TMDL Calculations at Point WBSR 14.0				
Flow = 85.24 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.67	478.76	0.39	277.68
Mn	0.68	480.63	0.68	480.63
Al	0.89	629.63	0.14	100.74
Acidity	-36.71	-26,116.18	NA	NA
Alkalinity	73.50	52,283.30		

The loading reduction for point WBSR 15.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 14.0. This value was compared to the allowable load at point WBSR 14.0. Reductions at point WBSR 14.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 14.0 are shown in Table I76.

Table I76. Calculation of Load Reduction Necessary at Point WBSR 14.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 14.0	478.76	480.63	629.63	NA
Difference of measured loads between loads that enter and existing WBSR 14.0	42.66	14.41	131.46	-
Percent loss due calculated at WBSR 14.0	0.0%	0.0%	0.0%	-
Additional loads tracked from above samples	248.58	442.91	74.73	-
Percentage of upstream loads that reach WBSR 14.0	100.0%	100.0%	100.0%	-
Total load tacked between WBSR 15.0 and WBSR 14.0	291.24	457.32	206.19	-
Allowable load at WBSR 14.0	277.68	480.63	100.74	-
Load Reduction at WBSR 14.0	13.56	0.00	105.45	-
Percent Reduction required at WBSR 14.0	4.7%	0.0%	51.1%	-

The TMDL for point WBSR 14.0 requires a load reduction for total iron and total aluminum. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table I77).

Table I77. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 13.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

Additional WLA for WBSR 13.0

The WBSR 13.0 site incorporates a WLA of 3.33 lbs/day of iron, 2.22 lbs/day of manganese, and 0.84 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table I78.

Table I78. WLA for WBSR 13.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow (MGD)***	***WLAs (lbs/day)***
Black Oak Developers Inc.	PA0598763, 32900103	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
P&N Coal Co. Inc.	PA0249378, 32030101	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Beth Contracting Inc.	PA0249823, 32050106	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
TOTAL				Fe – 3.33 Mn – 2.22 Al – 0.84

ICMSA: Indiana County Municipal Services Authority

The Indiana County Municipal Services Authority (NPDES PA0095231) has one outfall (001) in the West Branch Watershed. This outfall has effluent limits for total iron, total manganese, and total aluminum. The following table (I79) shows the WLA for this discharge.

Table I79. WLA Indiana County Municipal Services Authority			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	2.0	0.001	0.02
Mn	1.0	0.001	0.01
Al	4.0	0.001	0.03

WBSR 13.0: West Branch Susquehanna River downstream of Cush Creek

WBSR 13.0 is on the West Branch Susquehanna River near Dave's Auto Service, north of State Highway 286 and U.S. Route 219. All measurements were recorded at the head of a riffle area adjacent to Dave's Auto Service. This monitoring point accounts for Cush Creek entering the West Branch Susquehanna River.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 13.0 and WBSR 14.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 13.0 (105.37 MGD). The load allocations made at point WBSR 13.0 for this stream segment are presented in Table I80.

Table I80. TMDL Calculations at Point WBSR 13.0				
Flow = 105.37 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.58	511.66	0.56	491.19
Mn	0.59	519.20	0.59	519.20
Al	0.78	682.71	0.12	109.23
Acidity	-25.57	-22,484.41	NA	NA
Alkalinity	65.35	57,459.57		

The loading reduction for point WBSR 14.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 13.0. This value was compared to the allowable load at point WBSR 13.0. Reductions at point WBSR 13.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 13.0 are shown in Table I81.

Table I81. Calculation of Load Reduction Necessary at Point WBSR 13.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 13.0	511.66	519.20	682.71	NA
Difference of measured loads between loads that enter and existing WBSR 13.0	32.90	38.57	53.08	-
Percent loss due calculated at WBSR 13.0	0.0%	0.0%	0.0%	-
Additional loads tracked from above samples	277.68	480.63	100.74	-
Percentage of upstream loads that reach WBSR 13.0	100.0%	100.0%	100.0%	-
Total load tacked between WBSR 14.0 and WBSR 13.0	310.58	519.20	153.82	-
Allowable load at WBSR 13.0	491.19	519.20	109.23	-
Load Reduction at WBSR 13.0	0.00	0.00	43.59	-
Percent Reduction required at WBSR 13.0	0.0%	0.0%	29.0%	-

The TMDL for point WBSR 13.0 requires a load reduction for total aluminum. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table I82).

Table I82. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 12.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

Additional WLA for WBSR 12.0

The WBSR 12.0 site incorporates a WLA of 2.22 lbs/day of iron, 1.48 lbs/day of manganese, and 0.56 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table I83.

Table I83. WLA for WBSR 12.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow (MGD)***	***WLAs (lbs/day)***
Beth Contracting Inc.	PA0262561, 32080101	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Beth Contracting Inc.	(Proposed), 17080117	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
TOTAL				Fe – 2.22 Mn – 1.48 Al – 0.56

WBSR 12.0: West Branch Susquehanna River at McGees Mills, Pa.

WBSR 12.0 is located at the Township Route 322 bridge in McGees Mills, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for three large tributaries, Deer Run, North Run, and Martin Run, entering the West Branch Susquehanna River upstream of WBSR 12.0.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 12.0 and WBSR 13.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 12.0 (200.40 MGD). The load allocations made at point WBSR 12.0 for this stream segment are presented in Table I84.

Table I84. TMDL Calculations at Point WBSR 12.0				
Flow = 200.40 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.64	1068.69	0.59	983.19
Mn	0.38	627.18	0.38	627.18
Al	1.09	1825.33	0.19	310.31
Acidity	-17.67	-29556.24	NA	NA
Alkalinity	58.22	97370.19		

The loading reduction for point WBSR 13.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 12.0. This value was compared to the allowable load at point WBSR 12.0. Reductions at point WBSR 12.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 12.0 are shown in Table I85.

Table I85. Calculation of Load Reduction Necessary at Point WBSR 12.0				
	Fe (lbs/day)	*Mn (lbs/day)*	*Al (lbs/day)*	*Acidity (lbs/day)*
Existing load at WBSR 12.0	1,068.69	627.18	1,825.33	NA
Difference of measured loads between loads that enter and existing WBSR 12.0	557.03	146.55	1,195.70	-
Percent loss due calculated at WBSR 12.0	0.0%	0.0%	0.0%	-
Additional loads tracked from above samples	491.19	519.20	109.23	-
Percentage of upstream loads that reach WBSR 12.0	100.0%	100.0%	100.0%	-
Total load tacked between WBSR 13.0 and WBSR 12.0	1,048.22	665.75	1,304.93	-
Allowable load at WBSR 12.0	983.19	627.18	310.31	-
Load Reduction at WBSR 12.0	65.03	38.57	994.62	-
Percent Reduction required at WBSR 12.0	6.2%	5.8%	76.2%	-

The TMDL for point WBSR 12.0 requires a load reduction for total aluminum, total iron and total manganese. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table I86).

Table I86. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 11.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS AND WLAs)

BEAR 1.0: Bear Run at its mouth

Bear Run enters the West Branch Susquehanna River between monitoring points WBSR 12.0 and 11.0 and is highly polluted by AMD at its mouth. The TMDLs assigned in Tables I87 and I88 are based on the data and calculations found in the Bear Run Watershed TMDL completed by SRBC for PADEP and approved by USEPA on April 7, 2005.

The TMDL for Bear Run consists of a load allocation to the watershed area above BEAR 1.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point BEAR 1.0 (15.66

MGD). The load allocations made at point BEAR 1.0 for this stream segment are presented in Table I87.

Table I87. TMDL Calculations at Point BEAR 1.0				
Flow = 15.66 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	1.87	244.20	0.49	64.00
Mn	1.60	209.00	0.43	56.20
Al	1.08	141.10	0.37	48.30
Acidity	43.47	5,677.40	3.91	510.70
Alkalinity	7.20	940.40		

Reductions at point BEAR 1.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point BEAR 1.0 are shown in Table I88.

Table I88. Calculation of Load Reduction Necessary at Point BEAR 1.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	244.20	209.00	141.10	5,677.40
Allowable load at BEAR 1.0	64.00	56.20	48.30	510.70
Percent reduction required at BEAR 1.0	0.0%	7.0%	0.0%	73.0%

The TMDL for point BEAR 1.0 does require a load reduction for total manganese and acidity.

ROSE: Harmony Mine, Rosebud Mining, Inc.

Rosebud Mining, Inc. (17071301, PA0235784) has three outfalls from their Harmony Deep Mine. Outfalls 003 and 001 drain from the deep mine with effluent limits for iron, manganese, and flow. Outfall 002 is for erosion and sediment ponds. These outfalls then enter an unnamed tributary Spring Run. The following table shows the waste load allocation for these discharges (Table D89).

Table I89. Waste Load Allocation for NPDES Permit No. PA0215007			
Parameter			
Outfall 003	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	3.02	39.56
Mn	2.0	3.02	26.38
Al	0.75	3.02	9.89
Outfall 001			
Fe	3.0	3.02	39.56
Mn	2.0	3.02	26.38
Al	0.75	3.02	9.89
Outfall 002			
Fe	3.0	0.0445	2.60

WBSR 11.0: West Branch Susquehanna River at Bower, Pa.

WBSR 11.0 is located at the Township Road 418 bridge in Bower, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for two large tributaries entering the West Branch Susquehanna River. Haslett Run and Laurel Run are two nonimpaired streams that contribute significant flow.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 11.0 and WBSR 12.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 11.0 (395.18 MGD). The load allocations made at point WBSR 11.0 for this stream segment are presented in Table I90.

Table I90. TMDL Calculations at Point WBSR 11.0				
Flow 395.18 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.44	1,445.24	0.41	1,358.52
Mn	0.26	845.09	0.26	845.09
Al	0.92	3,035.18	0.16	515.98
Acidity	-12.77	-42,123.35	NA	NA
Alkalinity	49.91	164,580.07		

The loading reduction for points WBSR 12.0 and BEAR 1.0 were used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 11.0. This value was compared to the allowable load at point WBSR 11.0. Reductions at point WBSR 11.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 11.0 are shown in Table I91.

Table I91. Calculation of Load Reduction Necessary at Point WBSR 11.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 11.0	1,445.24	845.09	3,035.18	NA
Difference of measured loads between loads that enter and existing WBSR 11.0	132.35	8.91	1,068.75	-
Percent loss due calculated at WBSR 11.0	0.0%	0.0%	0.0%	-
Additional loads tracked from above samples	1,047.19	683.38	358.61	-
Percentage of upstream loads that reach WBSR 11.0	100.0%	100.0%	100.0%	-
Total load tacked between WBSR 12.0 and WBSR 11.0	1,179.54	692.29	1,427.36	-
Allowable load at WBSR 11.0	1,358.52	845.09	515.98	-
Load Reduction at WBSR 11.0	0.00	0.00	911.38	-
Percent Reduction required at WBSR 11.0	0.0%	0.0%	63.9%	-

The TMDL for point WBSR 11.0 requires a load reduction for total aluminum. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500' x 300') to be permitted in the future on this segment (Table I92).

Table I92. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 10.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

Additional WLA for WBSR 10.0

The WBSR 10.0 site incorporates a WLA of 1.11 lbs/day of iron, 0.74 lbs/day of manganese, and 0.28 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table I93.

Table I93. WLA for WBSR 10.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow (MGD)***	***WLAs (lbs/day)***
Hepburnia Coal Co.	PA0243469, 17030105	Fe – 1.11 Mn – 0.74 Al – 0.28	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
TOTAL				Fe – 1.11 Mn – 0.74 Al – 0.28

GRHM: TDK Coal, Graham Mine

TDK Coal, SMP#17814000, operates a surface mine near Irish Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.
GRHM is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. Flow data were available for this point source discharge. Table I94 shows the WLAs for the discharge.

Table I94. WLAs at GRHM			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0398	1.00
Mn	2.0	0.0398	0.66
Al	2.0	0.0398	0.66

HEPF: Amfire Mining, Hepfer Mine

Amfire Mining, SMP#17930128, operates a surface mine near Bell Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

HEPF is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The standard 1500' x 300' open pit size was used for this operation. Table I95 shows the WLAs for the discharge.

Table I95. WLAs at HEPF			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	2.0	0.0445	0.74

BRM2: Amfire Mining, Bell Run No. 2

Amfire Mining, SMP#17030101, operates a surface mine near Bell Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

BRM2 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is 100' x 100', smaller than the standard 1500' x 300'. Table I96 shows the WLAs for the discharge.

Table I96. WLAs at BRM2			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***

Fe	3.0	0.0010	0.03
Mn	2.0	0.0010	0.02
Al	2.0	0.0010	0.02

BRM1: Amfire Mining, Bell Run No. 1

Amfire Mining, SMP#17970110, operates a surface mine near Bell Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

BRM1 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is 650' x 250', smaller than the standard 1500' x 300'. Table I97 shows the WLAs for the discharge.

Table I97. WLAs at BRM1

Parameter	*Monthly Avg. Allowable Conc. (mg/l)*	*Average Flow (MGD)*	*Allowable Load (lbs/day)*
Fe	3.0	0.0161	0.40
Mn	2.0	0.0161	0.27
Al	2.0	0.0161	0.27

BLLT: Hepburnia Coal Co., Bells Landing Tip

Hepburnia Coal Co., SMP#17921603, operates a surface mine in the West Branch Susquehanna River Watershed along the stream channel. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

BLLT is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The standard 1500' x 300' open pit size was used for this operation. Table I98 shows the WLAs for the discharge.

Table I98. WLAs at BLLT

Parameter	*Monthly Avg. Allowable Conc. (mg/l)*	*Average Flow (MGD)*	*Allowable Load (lbs/day)*
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	2.0	0.0445	0.28

MIKE: Bell Resources, Michaels Mine

Bell Resources, SMP#17010103, has not started, but a WLA is being assigned for future loadings. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

MIKE is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 1500' x 300'. Table I99 shows the WLAs for the discharge.

Table I99. WLAs at MIKE

Parameter	*Monthly Avg. Allowable Conc. (mg/l)*	*Average Flow (MGD)*	*Allowable Load (lbs/day)*
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	1.0	0.0445	0.37

PPRN: Amfire Mining, Poplar Run Mine

Amfire Mining, SMP#17940116, operates a surface mine near Poplar Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

PPRN is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 500' x 300'. Table I100 shows the WLAs for the discharge.

Table I100. WLAs at PPRN

Parameter	*Monthly Avg. Allowable Conc. (mg/l)*	*Average Flow (MGD)*	*Allowable Load (lbs/day)*
Fe	3.0	0.0149	0.37
Mn	2.0	0.0149	0.25
Al	2.0	0.0149	0.25

BRN3: Amfire Mining, Bell Run Mine 3

Amfire Mining, SMP#170300121, has not started yet and is being allocated for future permit approval. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

BRN3 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 300' x 100'. Table I101 shows the WLAs for the discharge.

Table I101. WLAs at BRN3			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0030	0.08
Mn	2.0	0.0030	0.05
Al	2.0	0.0030	0.05

WBSR 10.0: West Branch Susquehanna River downstream of Curwensville Dam

WBSR 10.0 is located at the State Highway 453 bridge near Curwensville, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for several large tributaries entering the West Branch Susquehanna River. Curry Run, McCracken Run, Bell Run, Hiles Run, Passmore Run, and Porter Run enter the West Branch Susquehanna River upstream of monitoring point WBSR 10.0.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 10.0 and WBSR 11.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 10.0 (839.46 MGD). The load allocations made at point WBSR 10.0 for this stream segment are presented in Table I102.

Table I102. TMDL Calculations at Point WBSR 10.0				
Flow = 839.46 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.30	2,064.56	0.30	2,064.56
Mn	0.17	1,153.79	0.17	1,153.79
Al	0.95	6,596.41	0.14	989.46
Acidity	-10.63	-73,833.53	NA	NA
Alkalinity	42.53	295,334.13		

The loading reduction for point WBSR 11.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 10.0. This value was compared to the allowable load at point WBSR 10.0. Reductions at point WBSR 10.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 10.0 are shown in Table I103.

Table I103. Calculation of Load Reduction Necessary at Point WBSR 10.0				
	***Fe* (lbs/day)**	***Mn* (lbs/day)**	***Al* (lbs/day)**	***Acidity* (lbs/day)**
Existing load at WBSR 10.0	2,064.56	1,153.79	6,596.41	NA
Difference of measured loads between loads that enter and existing WBSR 10.0	619.32	308.61	3,561.23	-
Percent loss due calculated at WBSR 10.0	0.0%	0.0%	0.0%	-
Additional loads tracked from above samples	1,358.52	845.09	515.98	-
Percentage of upstream loads that reach WBSR 10.0	100.0%	100.0%	100.0%	-
Total load tacked between WBSR 11.0 and WBSR 10.0	1,977.84	1,153.70	4,077.21	-
Allowable load at WBSR 10.0	2,064.56	1,153.79	989.46	-
Load Reduction at WBSR 10.0	0.00	0.00	3,087.75	-
Percent Reduction required at WBSR 10.0	0.0%	0.0%	75.7%	-

The TMDL for point WBSR 10.0 requires a load reduction for total aluminum. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table I104).

Table I104. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 9.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS AND WLAs)

CARB: Moravian, Carbon Mine

Moravian, SMP#17020107, operates a mining permit near the West Branch Susquehanna River. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

CARB is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. Flow data were available for this point source discharge. Table I105 shows the WLAs for the discharge.

Table I105. WLAs at CARB			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0464	1.16
Mn	2.0	0.0464	0.77
Al	2.0	0.0464	0.77

ANTH: Waroquier Coal Inc., Antis Hill 2

Waroquier Coal Inc., SMP#17880126, operates a surface mine near UNT 26640 in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

ANTH is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. Flow data were available for this point source discharge. Table I106 shows the WLAs for the discharge.

Table I106. WLAs at ANTH			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0323	0.81
Mn	2.0	0.0323	0.54
Al	0.75	0.0323	0.20

A 2: Anderson Creek at its mouth

Anderson Creek enters the West Branch Susquehanna River, between monitoring points WBSR 10.0 and 9.0, near Curwensville, Pa. Anderson Creek is polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables I107 and I108 are based on the data and calculations found in the Anderson Creek Watershed TMDL completed by SRBC for PADEP and approved by the USEPA on April 7, 2005.

The TMDL for this section of Anderson Creek consists of a load allocation from the established Anderson Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point A 2 (74.19 MGD). The load allocations made at point WBSR 4.0 for this stream segment are presented in Table I107.

Table I107. TMDL Calculations at Point A 2				
Flow = 74.19 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.28	173.20	0.28	172.20
Mn	0.92	569.30	-	-
Al	0.79	488.80	-	-
Acidity	12.58	7,783.80	8.55	5,290.30
Alkalinity	17.85	11,044.60		

Reductions at point A 2 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point A 2 are shown in Table I108.

Table I108. Calculation of Load Reduction Necessary at Point A 2				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	173.30	569.30	488.80	7,783.80
Allowable load at A 2	172.20	-	-	5,290.30
Percent reduction required at A 2	0.0%	0.0%	0.0%	0.0%

The TMDL for point A 2 does not require a load reduction.

HART 01: Hartshorn Run at its mouth

Hartshorn Run enters the West Branch Susquehanna River between monitoring points WBSR 10.0 and 9.0, downstream of Curwensville, Pa. Hartshorn Run is polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables I109 and I110 are based on the data and calculations found in the Hartshorn Run Watershed TMDL completed by PADEP and approved by the USEPA on April 1, 2005.

This TMDL section for Hartshorn Run consists of a load allocation from the established Hartshorn Run TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point HART 01 (3.15 MGD). The load allocations made at point HART 01 for this stream segment are presented in Table I109.

Table I109. TMDL Calculations at Point HART 01				
Flow = 3.15 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	ND	NA	NA	NA
Mn	0.28	7.30	0.28	7.30
Al	ND	NA	NA	NA
Acidity	29.90	785.10	3.29	86.40
Alkalinity	7.85	206.10		

Reductions at point HART 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point HART 01 are shown in Table I110.

Table I110. Calculation of Load Reduction Necessary at Point HART 01				
	Fe (lbs/day)	*Mn (lbs/day)*	*Al (lbs/day)*	*Acidity (lbs/day)*
Existing load	NA	7.30	NA	785.10
Allowable load at HART 01	-	7.30	-	86.40
Percent reduction required at HART 01	0.0%	0.0%	0.0%	0.0%

The TMDL for point HART 01 does not require a load reduction.

PR 01: UNT 26641 to the West Branch Susquehanna River at its mouth

UNT 26641 enters the West Branch Susquehanna River between monitoring points WBSR 10.0 and 9.0, downstream of Curwensville, Pa. UNT 26641 is polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables I111 and I112 are based on the data and calculations found in the UNT 26641 to West Branch Susquehanna River Watershed TMDL completed by PADEP and approved by USEPA on September 20, 2006.

The TMDL for this section of UNT 26641 consists of a load allocation from the established UNT 26641 TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point PR 01 (2.46 MGD). The load allocations made at point PR 01 for this stream segment are presented in Table I111.

Table I111. TMDL Calculations at Point PR 01				
Flow = 2.46 MGD	*Measured Sample Data*		*Allowable*	
Parameter	*Conc. (mg/l)*	*Load (lbs/day)*	*LTA Conc. (mg/l)*	*Load (lbs/day)*
Fe	ND	NA	NA	NA
Mn	2.11	43.30	0.49	10.10
Al	0.33	6.70	0.13	2.70
Acidity	25.70	526.90	4.07	83.40
Alkalinity	18.30	375.20		

Reductions at point PR 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point PR 01 are shown in Table I1123.

Table I112. Calculation of Load Reduction Necessary at Point PR 01				
	Fe (lbs/day)	*Mn (lbs/day)*	*Al (lbs/day)*	*Acidity (lbs/day)*
Existing load	NA	43.30	6.70	526.90
Allowable load at PR 01	-	10.10	2.70	83.40
Percent reduction required at PR 01	-	54.0%	0.0%	71.0%

The TMDL for point PR 01 requires a load reduction for total manganese and acidity.

MC 1: Montgomery Creek at its mouth

Montgomery Creek enters the West Branch Susquehanna River between monitoring points WBSR 10.0 and 9.0, downstream of Hyde, Pa. Montgomery Creek is polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables I113 and I114 are based on the data and calculations found in the Montgomery Creek Watershed TMDL completed by SRBC for PADEP and approved by the USEPA on April 9, 2003.

The TMDL for this section of Montgomery Creek consists of a load allocation from the established Montgomery Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point MC 1 (22.20 MGD). The load allocations made at point MC 1 for this stream segment are presented in Table I113.

Table I113. TMDL Calculations at Point MC 1				
Flow = 22.20 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.30	55.50	0.30	55.50
Mn	5.44	1,007.20	0.22	40.70
Al	2.23	412.90	0.18	33.30
Acidity	41.33	7,652.20	0.41	75.90
Alkalinity	6.07	1,123.80		

Reductions at point MC 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point MC 01 are shown in Table I114.

Table I114. Calculation of Load Reduction Necessary at Point MC 1				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	55.50	1,007.20	412.90	7,652.20
Allowable load at MC 1	54.70	40.20	32.80	75.90
Percent reduction required at MC 1	0.0%	0.0%	0.0%	0.0%

The TMDL for point MC 1 does not require a load reduction.

WBSR 9.0: West Branch Susquehanna River at Hyde, Pa.

WBSR 9.0 is located at State Highway 879 bridge in Hyde, Pa. All measurements were recorded on the upstream side of the bridge.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 9.0 and WBSR 10.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 9.0 (941.42 MGD). The load allocations made at point WBSR 9.0 for this stream segment are presented in Table I115.

Table I115. TMDL Calculations at Point WBSR 9.0				
Flow 941.42 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.32	2,477.12	0.32	2,477.12
Mn	0.34	2,678.49	0.34	2,678.49
Al	1.03	8,093.31	0.15	1,214.00
Acidity	-1.19	-9,353.41	NA	NA
Alkalinity	37.39	293,774.20		

The loading reduction for points WBSR 10.0, A 2, HART 01, PR 01, and MC 1 were used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 9.0. This value was compared to the allowable load at point WBSR 9.0. Reductions at point WBSR 9.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 9.0 are shown in Table I116.

Table I116. Calculation of Load Reduction Necessary at Point WBSR 9.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 9.0	2,477.12	2,678.49	8,093.31	NA
Difference of measured loads between loads that enter and existing WBSR 9.0	183.76	-102.40	588.50	-
Percent loss due calculated at WBSR 9.0	0.0%	3.7%	0.0%	-
Additional loads tracked from above samples	2,291.46	1,211.39	1,024.96	-
Percentage of upstream loads that reach WBSR 9.0	100.0%	96.3%	100.0%	-
Total load tacked between WBSR 10.0 and WBSR 9.0	2,475.22	1,166.57	1,613.46	-
Allowable load at WBSR 9.0	2,477.12	2,678.49	1,214.00	-
Load Reduction at WBSR 9.0	0.00	0.00	399.46	-
Percent Reduction required at WBSR 9.0	0.0%	0.0%	24.8%	-

The TMDL for point WBSR 9.0 requires a load reduction for total aluminum and acidity. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table I117).

Table I117. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 8.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS AND WLAs)

Additional WLA for WBSR 8.0

The WBSR 8.0 site incorporates a WLA of 4.44 lbs/day of iron, 2.96 lbs/day of manganese, and 1.12 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table I118.

Table I118. WLA for WBSR 8.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow***	***WLAs***
P&N Coal Co. Inc.	PA0207110, 17920115	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Waroquier Coal Co.	(Proposed), 17080118	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Waroquier Coal Co.	(Proposed), 17080111	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Sky Haven Coal Inc.	PA0243469, 17030105	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
TOTAL				Fe – 4.44 Mn – 2.96 Al – 1.12

GILL: Swisher Coal, Gill Mine

Swisher Coal, SMP#17030110, operates a surface mine near UNT 26622 in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

GILL is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. Flow data were available for this point source discharge. Table I119 shows the WLAs for the discharge.

Table I119. WLAs at GILL			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0041	0.10
Mn	2.0	0.0041	0.07
Al	0.8	0.0041	0.03

BUTL: Swisher Coal, Butler Mine

Swisher Coal, SMP#17010108, operates a surface mine near UNT 26622 in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

BUTL is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The standard 1500' x 300' open pit size was used for this operation. Table I120 shows the WLAs for the discharge.

Table I120. WLAs at BUTL			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	0.70	0.0445	0.26

RISH: Kenneth, Rishel 1 Mine

Kenneth, SMP#17000109, operates a surface mine near UNT 26622 in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

RISH is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is 100' x 50'. Table I121 shows the WLAs for the discharge.

Table I121. WLAs at RISH			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***

Fe	3.0	0.0003	0.01
Mn	2.0	0.0003	0.01
Al	1.6	0.0003	0.01

BRTH: Amfire Mining, Breth 1

Amfire Mining, SMP#17813093, operates a surface mine near Lick Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

BRTH is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 1500' x 300'. Table I122 shows the WLAs for the discharge.

Table I122. WLAs at BRTH

Parameter	*Monthly Avg. Allowable Conc. (mg/l)*	*Average Flow (MGD)*	*Allowable Load (lbs/day)*
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	2.0	0.0445	0.74

MOOS 01: Moose Creek at its Mouth

Moose Creek enters the West Branch Susquehanna River between monitoring points WBSR 9.0 and 8.0, near Clearfield, Pa. Moose Creek is polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables I123 and I124 are based on the data and calculations found in the Moose Creek Watershed TMDL completed by PADEP and approved by USEPA on March 21, 2005.

The TMDL for this section of Moose Creek consists of a load allocation from the established Moose Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point MOOS 01 (10.75 MGD). The load allocations made at point MOOS 01 for this stream segment are presented in Table I123.

Table I123. TMDL Calculations at Point MOOS 01

Flow = 10.65 MGD	*Measured Sample Data*		*Allowable*	
Parameter	*Conc. (mg/l)*	*Load (lbs/day)*	*LTA Conc. (mg/l)*	*Load (lbs/day)*
Fe	ND	NA	NA	NA
Mn	1.44	128.90	0.63	56.70
Al	1.08	96.60	0.50	44.40
Acidity	32.30	2,895.30	4.20	376.40
Alkalinity	7.30	654.30		

Reductions at point MOOS 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point MOOS 01 are shown in Table I124.

Table I124. Calculation of Load Reduction Necessary at Point MOOS 01				
	***Fe* (lbs/day)**	***Mn* (lbs/day)**	***Al* (lbs/day)**	***Acidity* (lbs/day)**
Existing load	NA	128.90	96.6	2,895.30
Allowable load at MOOS 01	-	56.70	44.4	376.40
Percent reduction required at MOOS 01	-	26.0%	24.0%	47.0%

The TMDL for point MOOS 01 requires a load reduction for total manganese, total aluminum, and acidity.

LR 01: Lick Run at its mouth

Lick Run enters the West Branch Susquehanna River between monitoring points WBSR 9.0 and 8.0, downstream of Clearfield, Pa. Lick Run is polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables I125 and I126 are based on the data and calculations found in the Lick Run Watershed TMDL completed by SRBC for PADEP and approved by USEPA on April 4, 2005.

The TMDL for this section of Lick Run consists of a load allocation from the established Lick Run TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point LR 01 (30.90 MGD). The load allocations made at point LR 01 for this stream segment are presented in Table I125.

Table I125. TMDL Calculations at Point LR 01				
Flow = 30.90 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	ND	NA	NA	NA
Mn	0.70	180.40	0.40	103.10
Al	ND	NA	NA	NA
Acidity	22.37	5,764.90	3.36	865.90
Alkalinity	7.33	1,889.00		

Reductions at point LC 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point LC 01 are shown in Table I126.

Table I126. Calculation of Load Reduction Necessary at Point LR 01				
	***Fe* (lbs/day)**	***Mn* (lbs/day)**	***Al* (lbs/day)**	***Acidity* (lbs/day)**
Existing load	NA	180.40	NA	5,764.9
Allowable load at LR 01	-	103.10	-	865.9
Percent reduction required at LR 01	-	0.0%	-	1.0%

The TMDL for point LR 01 requires a load reduction for acidity.

CLCR 1.0: Clearfield Creek at its mouth

Clearfield Creek enters the West Branch Susquehanna River between monitoring points WBSR 9.0 and 8.0, downstream of Clearfield, Pa. Clearfield Creek is polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables I127 and I128 are based on the data and calculations found in the Clearfield Creek Watershed TMDL completed by SRBC for PADEP and approved by USEPA in April 2007.

The TMDL for this section of Clearfield Creek consists of a load allocation from the established Clearfield Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point CLCR 1.0 (339.58 MGD). The load allocations made at point LR 01 for this stream segment are presented in Table I127.

Table I127. TMDL Calculations at Point CLCR 1.0

Flow = 339.58 MGD	*Measured Sample Data*		*Allowable*	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	1.42	4,024.00	0.54	1,530.20
Mn	1.85	5,242.50	0.61	1,728.60
Al	0.80	2,267.00	0.28	793.50
Acidity	15.10	42,790.30	4.08	11,561.90
Alkalinity	27.40	59,509.70		

Reductions at point CLCR 1.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point CLCR 1.0 are shown in Table I128.

Table I128. Calculation of Load Reduction Necessary at Point CLCR 1.0

	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	4,024.00	5,242.50	2,267.00	42,790.30
Allowable load at CLCR 1.0	1,530.20	1,728.60	793.50	11,561.90
Percent reduction required at CLCR 1.0	0.0%	0.0%	6.0%	57.0%

The TMDL for point CLCR 1.0 requires a load reduction for total aluminum and acidity.

REMAP: Reliant Energy Mid-Atlantic Power Holdings, LLC

The Reliant Energy Mid-Atlantic Power Holdings, LLC (NPDES PA0095231) Shawville Power Plant has one outfall (405) in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (I129) shows the WLA for this discharge.

Table I129. WLA at Reliant Energy Mid-Atlantic Power Holdings, LLC

Parameter			
Outfall 405	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***

Fe	1.8	1.314	19.74
Mn	2.1	1.314	23.03
Al	3.7	1.314	40.58

CLMUA: Clearfield Municipal Authority

The Clearfield Municipal Authority (NPDES PA0026310) operates an industrial wastewater permit that additionally treats oil and gas by-product in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (I130) shows the WLA for this discharge.

Table I130. WLA at Clearfield Municipal Authority			
Parameter			
Outfall	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	4.500	112.68
Mn	2.0	4.500	75.12
Al	2.0	4.500	75.12

WBSR 8.0: West Branch Susquehanna River at Shawville, Pa.

WBSR 8.0 is located at the State Route 1006 bridge near a power plant in Shawville, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for several tributaries entering the West Branch Susquehanna River. Moose Creek and Lick Run enter the West Branch Susquehanna River upstream of WBSR 8.0 and have completed TMDLs for their watersheds. Also, UNT 26622, UNT 26608, Wolf Run, and Clearfield Creek enter the WBSR in this section and are listed as being impaired by AMD for metals and pH. Loadings for UNT 26622, UNT 26608 and Wolf Creek will be allocated in future TMDLs.

This TMDL section for the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 8.0 and WBSR 9.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 8.0 (1,478.09 MGD). The load allocations made at point WBSR 8.0 for this stream segment are presented in Table I131.

Table I131. TMDL Calculations at Point WBSR 8.0				
Flow = 1,478.09 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.58	7,163.35	0.41	5,085.98
Mn	0.75	9,296.18	0.40	4,926.98
Al	1.08	13,262.65	0.16	1,989.40
Acidity	12.02	148,299.40	4.21	51,904.79
Alkalinity	29.89	368,649.05		

The loading reduction for points WBSR 9.0, LR 01, CLCR 1.0, and MOOS 01 were used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 8.0. This value was compared to the allowable load at point WBSR 8.0. Reductions at point WBSR 8.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 8.0 are shown in Table I132.

Table I132. Calculation of Load Reduction Necessary at Point WBSR 8.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 8.0	7,163.35	9,296.18	13,262.65	148,299.40
Difference of measured loads between loads that enter and existing WBSR 8.0	662.23	1,065.89	2,508.74	96,848.90
Percent loss due calculated at WBSR 8.0	0.0%	0.0%	0.0%	0.0%
Additional loads tracked from above samples	4,007.32	4,566.89	2,051.90	12,804.20
Percentage of upstream loads that reach WBSR 8.0	100.0%	100.0%	100.0%	100.0%
Total load tacked between WBSR 9.0 and WBSR 8.0	4,669.55	5,632.78	4,857.64	109,653.10
Allowable load at WBSR 8.0	5,085.98	4,926.98	1,989.40	51,904.79
Load Reduction at WBSR 8.0	0.00	705.80	2,868.24	57,748.31
Percent Reduction required at WBSR 8.0	0.0%	12.5%	59.0%	52.7%

The TMDL for point WBSR 8.0 requires a load reduction for total iron, total manganese, total aluminum, and acidity. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500' x 300') to be permitted in the future on this segment (Table I133).

Table I133. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 7.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS AND WLAs)

Additional WLA for WBSR 7.0

The WBSR 7.0 site incorporates a WLA of 31.82 lbs/day of iron, 21.22 lbs/day of manganese, and 8.44 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table I134.

Table I134. WLA for WBSR 7.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow***	***WLAs***
E.M. Brown, Inc (Passive Treatment)	17813024	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Bradford Coal (Passive Treatment)	3268BSM34	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Amfire Mining Co LLC	PA0243817, 17040107	Fe – 3.0 Mn – 2.0 Al – 2.0	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.74
King Coal Sales Inc	PA0256277, 17050108	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
Energy Resources (2 outfalls)	PA06117083, 17823701	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 2.22 Mn – 1.48 Al – 0.56
Energy Resources (2 outfalls)	PA0100803, 17841607	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 2.22 Mn – 1.48 Al – 0.56
Manor Mining	PA0014095, 17841301	Fe – 3.0 Mn – 2.0 Al – 0.75	0.917	Fe – 22.94 Mn – 15.30 Al – 5.74
TOTAL				Fe – 31.82 Mn – 21.22 Al – 8.44

MP 06: Surveyor Run at its mouth

Surveyor Run enters the West Branch Susquehanna River between monitoring points WBSR 8.0 and 7.0, downstream of Croft, Pa. Surveyor Run is highly polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables I135 and I136 are based on the data and calculations found in the Surveyor Run Watershed TMDL completed by PADEP and approved by USEPA on September 30, 2004.

The TMDL for this section of Surveyor Run consists of a load allocation from the established Surveyor Run TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point MP 06 (5.99 MGD). The load allocations made at point MP 06 for this stream segment are presented in Table I135.

Table I135. TMDL Calculations at Point MP 06				
Flow = 5.99 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.54	27.00	0.54	27.00
Mn	3.78	188.60	0.57	28.30
Al	3.33	166.30	0.53	26.60
Acidity	65.63	3,277.90	5.91	295.00
Alkalinity	7.53	375.90		

Reductions at point MP 06 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point MP 06 are shown in Table I136.

Table I136. Calculation of Load Reduction Necessary at Point MP 06				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	27.00	188.60	166.30	3,277.90
Allowable load at MP 06	27.00	28.30	26.60	295.00
Percent reduction required at MP 06	0.0%	0.0%	0.0%	62.0%

The TMDL for point MP 06 requires a load reduction for acidity.

WBSR 7.0: West Branch Susquehanna River at Frenchville Station, Pa.

WBSR 7.0 is located at the State Route 1009 bridge near Frenchville Station, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for Surveyor Run which has a TMDL completed for its watershed. Also, four additional AMD impaired tributaries enter the West Branch Susquehanna River above monitoring point WBSR 7.0. Trout Run, Millstone Run, Bald Hill Run, and Moravian Run are listed for AMD impairment for metals and pH. Loadings for Trout Run, Millstone Run, Bald Hill Run, and Moravian Run will be allocated in future TMDLs.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 7.0 and WBSR 8.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 7.0 (1,666.74 MGD). The load allocations made at point WBSR 7.0 for this stream segment are presented in Table I137.

Table I137. TMDL Calculations at Point WBSR 7.0				
Flow = 1,666.74 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.61	8,418.37	0.36	4,966.84
Mn	0.61	8,440.51	0.34	4,726.68
Al	1.14	15,848.79	0.17	2,377.32
Acidity	11.22	156,012.31	3.70	51,484.06
Alkalinity	26.95	374,894.27		

The loading reduction for points WBSR 8.0 and MP 06 were used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 7.0. This value was compared to the allowable load at point WBSR 7.0. Reductions at point WBSR 7.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 7.0 are shown in Table I138.

Table I138. Calculation of Load Reduction Necessary at Point WBSR 7.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 7.0	8,418.37	8,440.51	15,848.79	156,012.31
Difference of measured loads between loads that enter and existing WBSR 7.0	1,228.02	-1,044.27	2,419.84	4,435.01
Percent loss due calculated at WBSR 7.0	0.0%	11.0%	0.0%	0.0%
Additional loads tracked from above samples	5,112.98	4,955.28	2,016.00	52,199.79
Percentage of upstream loads that reach WBSR 7.0	100.0%	89.0%	100.0%	100.0%
Total load tacked between WBSR 8.0 and WBSR 7.0	6,341.00	4,410.20	4,435.84	56,634.80
Allowable load at WBSR 7.0	4,966.84	4,726.68	2,377.32	51,484.06
Load Reduction at WBSR 7.0	1,374.16	0.00	2,058.52	5,150.74
Percent Reduction required at WBSR 7.0	21.7%	0.0%	46.4%	9.1%

The TMDL for point WBSR 7.0 requires a load reduction for total iron, total aluminum, and acidity. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500' x 300') to be permitted in the future on this segment (Table I139).

Table I139. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 6.0: INPUTS IN DOWNSTREAM ORDER (WLAs)

DEER 1.0: Deer Creek at its mouth

Deer Creek enters the West Branch Susquehanna River between monitoring points WBSR 7.0 and 6.0, downstream of Frenchville Station, Pa. Deer Creek is highly polluted at its mouth and has a TMDL completed for its watershed. The TMDLs assigned in Tables I140 and I141 are based on the data and calculations found in the Deer Creek Watershed TMDL completed by SRBC for PADEP and approved by USEPA on April 8, 2005.

The TMDL for this section of Deer Creek consists of a load allocation from the established Deer Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point DEER 1.0 (26.87 MGD). The load allocations made at point DEER 1.0 for this stream segment are presented in Table I140.

Table I140. TMDL Calculations at Point DEER 1.0				
Flow = 26.87 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	2.10	470.60	0.42	94.10
Mn	2.63	589.40	0.42	94.10
Al	1.30	291.30	0.43	96.40
Acidity	43.93	9,844.60	4.83	1,082.40
Alkalinity	7.17	1,606.80		

Reductions at point DEER 1.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point DEER 1.0 are shown in Table I141.

Table I141. Calculation of Load Reduction Necessary at Point DEER 1.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	470.60	589.40	291.30	9,844.60
Allowable load at DEER 1.0	94.10	94.10	96.40	1,082.40
Percent reduction required at DEER 1.0	0.0%	60.0%	48.0%	54.0%

The TMDL for point DEER 1.0 requires a load reduction for total manganese, total aluminum, and acidity.

BR 01: Big Run at its mouth

Big Run enters the West Branch Susquehanna River between monitoring points WBSR 7.0 and 6.0, downstream of Frenchville Station, Pa. Big Run is highly polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables I142 and I143 are based on the data and calculations found in the Big Run Watershed TMDL completed by PADEP and approved by USEPA on December 13, 2004.

The TMDL for this section of Big Run consists of a load allocation from the established Big Run TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point BR 01 (3.12 MGD). The load allocations made at point BR 01 for this stream segment are presented in Table I142.

Table I142. TMDL Calculations at Point BR 01				
Flow = 3.12 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	ND	NA	NA	NA
Mn	0.28	7.30	0.12	3.20
Al	ND	NA	NA	NA
Acidity	10.35	269.50	2.17	56.60
Alkalinity	12.10	315.00		

Reductions at point BR 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point BR 01 are shown in Table I143.

Table I143. Calculation of Load Reduction Necessary at Point BR 01				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	ND	7.30	ND	269.50
Allowable load at BR 01	-	3.20	-	56.60
Percent reduction required at BR 01	-	55.0%	-	76.0%

The TMDL for point BR 01 does require a load reduction for total manganese and acidity.

SC 1.0: Sandy Creek at its mouth

Sandy Creek enters the West Branch Susquehanna River between monitoring points WBSR 7.0 and 6.0, near Rolling Stone, Pa. Sandy Creek is highly polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables I144 and I145 are based on the data and calculations found in the Sandy Creek Watershed TMDL completed by SRBC for PADEP and approved by USEPA on April 4, 2007.

The TMDL for this section of Sandy Creek consists of a load allocation from the established Sandy Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point SC 1.0 (14.7 MGD). The load allocations made at point SC 1.0 for this stream segment are presented in Table I144.

Table I144. TMDL Calculations at Point SC 1.0

Flow 14.7 MGD	*Measured Sample Data*		*Allowable*	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	2.15	263.60	0.64	78.50
Mn	5.12	627.70	0.16	19.60
Al	2.71	332.20	0.16	19.60
Acidity	47.80	5,860.20	1.43	175.30
Alkalinity	5.80	711.10		

Reductions at point SC 1.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point SC 1.0 are shown in Table I145.

Table I145. Calculation of Load Reduction Necessary at Point SC 1.0

	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	263.60	627.70	332.20	5,860.20
Allowable load at SC 1.0	78.50	19.60	19.60	175.30
Percent reduction required at SC 1.0	65.0%	0.0%	1.0%	1.0%

The TMDL for point SC 01 requires a load reduction for total iron, total aluminum, and acidity.

AR 01: Alder Run at its mouth

Alder Run enters the West Branch Susquehanna River between monitoring points WBSR 7.0 and 6.0, near Rolling Stone, Pa. Alder Run is highly polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables I146 and I147 are based on the data and calculations found in the Alder Run Watershed TMDL completed by PADEP and approved by USEPA on August 2, 2006.

The TMDL for this section of Alder Run consists of a load allocation from the established Alder Run TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point AR 01 (25.82 MGD). The load allocations made at point AR 01for this stream segment are presented in Table I146.

Table I146. TMDL Calculations at Point AR 01				
Flow = 25.82 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	20.93	4,505.40	0.69	149.10
Mn	4.96	1,067.40	0.47	100.40
Al	9.71	2,091.20	0.51	110.00
Acidity	178.50	38,433.60	0.00	0.00
Alkalinity	0.00	0.00		

Reductions at point AR 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point AR 01 are shown in Table I147.

Table I147. Calculation of Load Reduction Necessary at Point AR 01				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	4,505.40	1,067.40	2,091.20	38,433.60
Allowable load at AR 01	149.10	100.40	110.00	0.00
Percent reduction required at AR 01	89.0%	76.0%	0.0%	100.0%

The TMDL for point AR 01 requires a load reduction for total manganese, total iron, and acidity.

WBSR 6.0: West Branch Susquehanna River at Rolling Stone, Pa.

WBSR 6.0 is at the State Route 1011 bridge in Rolling Stone, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for the water quality contributions from Deer Creek, Big Run, Sandy Creek, Alder Run, and Rolling Stone Run. All of the tributaries, with the exception of Rolling Stone Run, have TMDLs completed for their watersheds. Rolling Stone Run is a tributary that enters the West Branch Susquehanna River that is impaired by AMD for metals and pH. Loadings for Rolling Stone Run will be allocated in future TMDLs.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 6.0 and WBSR 7.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 6.0 (1,747.75 MGD). The load allocations made at point WBSR 6.0 for this stream segment are presented in Table I148.

Table I148. TMDL Calculations at Point WBSR 6.0				
Flow = 1,747.75 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	1.12	16,300.19	0.48	7,009.08
Mn	0.72	10,542.76	0.34	4,955.10
Al	0.85	12,353.32	0.38	5,558.99
Acidity	18.79	274,005.47	8.45	123,302.46
Alkalinity	22.51	328,253.50		

The loading reduction for points WBSR 7.0, DEER 1.0, BR 01, SC 1.0, and AR 01 were used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 6.0. This value was compared to the allowable load at point WBSR 6.0. Reductions at point WBSR 6.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 6.0 are shown in Table I149.

Table I149. Calculation of Load Reduction Necessary at Point WBSR 6.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 6.0	16,300.19	10,542.76	12,542.76	274,005.47
Difference of measured loads between loads that enter and existing WBSR 6.0	2,642.22	-189.55	-5,656.73	63,585.26
Percent loss due calculated at WBSR 6.0	0.0%	1.8%	31.1%	30.2%
Additional loads tracked from above samples	5,288.54	4,943.98	2,603.32	52,798.36
Percentage of upstream loads that reach WBSR 6.0	100.0%	98.2%	68.9%	69.8%
Total load tacked between WBSR 7.0 and WBSR 6.0	7,930.76	4,854.99	1,793.69	36,853.26
Allowable load at WBSR 6.0	7,009.08	4,955.10	5,558.99	123,302.46
Load Reduction at WBSR 6.0	921.68	0.00	0.00	0.00
Percent Reduction required at WBSR 6.0	11.6%	0.0%	0.0%	0.0%

The TMDL for point WBSR 6.0 requires a load reduction for total iron. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table I150).

Table I150. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 5.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS AND WLAs)

Additional WLA for WBSR 5.0

The WBSR 5.0 site incorporates a WLA of 1.11 lbs/day of iron, 0.74 lbs/day of manganese, and 0.28 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table I151.

Table I151. WLA for WBSR 5.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow***	***WLAs***
EM Brown Inc. (Active Treatment)	17803023	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.28
TOTAL				Fe – 1.11 Mn – 0.74 Al – 0.28

KEEW: Sky Haven Coal Co., Keewaydin Mine

Sky Haven Coal Co., SMP#17990104, operates a surface mine near Grimes Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

KEEW is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 1500’ x 300’. Table I152 shows the WLAs for the discharge.

Table I152. WLAs at KEEW			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	2.0	0.0445	0.74

MAN1: Sky Haven Coal Co., Maney 1

Sky Haven Coal Co., SMP#17960113, operates a surface mine near Curleys Run in the West Branch Susquehanna River Watershed. Any discharge from the operations treatment pond is treated to the BAT limits and assigned to the permit before it enters the West Branch Susquehanna River.

MAN1 is considered to be a point source discharge in the watershed; therefore, the allocation made at this point is a WLA. The WLAs for iron, manganese, and aluminum were calculated using the methodology described in the *Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines* section in Attachment F. The open pit size for this operation is the standard 1500' x 300'. Table I153 shows the WLAs for the discharge.

Table I153. WLAs at MAN1			
Parameter	***Monthly Avg. Allowable Conc. (mg/l)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.0445	1.11
Mn	2.0	0.0445	0.74
Al	2.0	0.0445	0.28

MOUTH: Moshannon Creek at its mouth

Moshannon Creek enters the West Branch Susquehanna River between monitoring points WBSR 6.0 and WBSR 5.0, near Westport, Pa. Moshannon Creek is highly polluted by AMD and has a TMDL in review for its watershed. The TMDLs assigned in Tables D154 and D155 are based on the data and calculations found in the Moshannon Creek Watershed TMDL completed by PADEP and approved by USEPA on June 9, 2009.

The TMDL for this section of Moshannon Creek consists of a load allocation from the established Moshannon Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point MOUTH (634.18 MGD). The load allocations made at point MOUTH for this stream segment are presented in Table D154.

Table D154. TMDL Calculations at Point MOUTH				
Flow = 634.18 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	2.15	0.86	0.25	0.86
Mn	1.13	5.6	0.49	1.7
Al	2.65	24.0	0.42	1.4
Acidity	61.30	75.0	3.9	13.5
Alkalinity	1.53	66.3		

Reductions at point MOUTH are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point MOUTH are shown in Table D155.

Table D155. Calculation of Load Reduction Necessary at Point MOUTH				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	11,371.55	5,980.20	14,039.01	32,4221.33
Allowable load at MOUTH	2,274.31	2,392.08	1,825.07	3,242.21
Percent reduction required at MOUTH	39.0%	0.0%	65.0%	98.0%

The TMDL for point MOUTH requires a load reduction for total iron, total aluminum, and acidity.

WBSR 5.0: West Branch Susquehanna River at Karthaus, Pa.

WBSR 5.0 is located at the State Highway 879 bridge near Karthaus, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for the water quality contributions from Mowry Run, Basin Run, Rock Run, Rupley Run, and UNT 25693. All five tributaries are harshly impaired by AMD for metals and pH. Loadings for Mowry Run, Basin Run, Rock Run, Rupley Run, and UNT 25693 will be allocated in future TMDLs.

This TMDL section for the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 5.0 and WBSR 6.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 5.0 (2,462.66 MGD). The load allocations made at point WBSR 5.0 for this stream segment are presented in Table I156.

Table I156. TMDL Calculations at Point WBSR 5.0				
Flow = 2,462.66 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	1.87	38,397.70	0.32	6,527.61
Mn	1.20	24,645.76	0.48	9,858.30
Al	1.32	27,207.67	0.23	4,625.30
Acidity	25.60	526,061.07	6.91	142,036.49
Alkalinity	13.08	268,864.69		

The loading reduction for point WBSR 6.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 5.0. This value was compared to the allowable load at point WBSR 5.0. Reductions at point WBSR 5.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 5.0 are shown in Table I157.

Table I157. Calculation of Load Reduction Necessary at Point WBSR 5.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 5.0	38,397.70	24,645.76	27,207.67	526,061.07
Difference of measured loads between loads that enter and existing WBSR 5.0	10,725.96	8,122.80	815.34	-72,165.73
Percent loss due calculated at WBSR 5.0	0.0%	0.0%	0.0%	12.1%
Additional loads tracked from above samples	9,283.39	7,347.18	7,384.06	126,544.67
Percentage of upstream loads that reach WBSR 5.0	100.0%	100.0%	100.0%	87.9%
Total load tacked between WBSR 6.0 and WBSR 5.0	20,009.35	15,469.98	8,199.40	111,232.76
Allowable load at WBSR 5.0	6,527.61	9,858.30	4,625.30	142,036.49
Load Reduction at WBSR 5.0	13,481.74	5,611.68	3,574.10	0.00
Percent Reduction required at WBSR 5.0	67.4%	36.3%	43.6%	0.0%

The TMDL for point WBSR 5.0 requires a load reduction for total iron, total manganese, and total aluminum. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table I158).

Table I158. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 4.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS AND WLAs)

Additional WLA for WBSR 4.0

The WBSR 4.0 site incorporates a WLA of 22.45 lbs/day of iron, 14.97 lbs/day of manganese, and 7.46 lbs/day of aluminum. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table I159.

Table I159. WLA for WBSR 4.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow***	***WLAs***
Allegheny Enterprises	PA0256366, 12060101	Fe – 3.0 Mn – 2.0 Al – 2.0	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.74
Ed Hansloven (Passive Treatment)	PA0610976, 18840101	Fe – 3.0 Mn – 2.0 Al – 0.75	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.74
River Hill Coal Co (Chemical Treatment)	17790145	Fe – 3.0 Mn – 2.0 Al – 2.0	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.74
River Hill Coal Co (Passive Treatment)	PA0215317, 17831601	Fe – 3.0 Mn – 2.0 Al – 0.75	0.720	Fe – 18.01 Mn – 12.01 Al – 4.50
River Hill Coal Co (Active Treatment)	17910114	Fe – 3.0 Mn – 2.0 Al – 2.0	0.0445	Fe – 1.11 Mn – 0.74 Al – 0.74
TOTAL				Fe – 22.45 Mn – 14.97 Al – 7.46

BIR 02: Birch Island Run at its mouth

Birch Island Run enters the West Branch Susquehanna River between monitoring points WBSR 5.0 and WBSR 4.0, near Cataract, Pa. Birch Island Run is highly polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables I160 and I161 are based on the data and calculations found in the Birch Island Run Watershed TMDL completed by PADEP and approved by USEPA on March 17, 2005.

The TMDL for this section of Birch Island Run consists of a load allocation from the established Birch Island Run TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point BIR 02 (13.34 MGD). The load allocations made at point BIR 02 for this stream segment are presented in Table I160.

Table I160. TMDL Calculations at Point BIR 02				
Flow = 13.34 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	ND	NA	NA	NA
Mn	0.16	17.40	0.16	17.40
Al	ND	NA	NA	NA
Acidity	11.28	1,254.70	5.30	589.70
Alkalinity	7.98	887.50		

Reductions at point BIR 02 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point BIR 02 are shown in Table I161.

Table I161. Calculation of Load Reduction Necessary at Point BIR 02				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	-	17.40	-	1,254.70
Allowable load at BIR 02	-	17.40	-	589.70
Percent reduction required at BIR 02	-	0.0%	-	5.0%

The TMDL for point BIR 02 requires a load reduction for acidity.

CR 01: Cooks Run at its mouth

Cooks Run enters the West Branch Susquehanna River between monitoring points WBSR 5.0 and WBSR 4.0, near Cooks Run, Pa. Cooks Run is highly polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables I162 and I163 are based on the data and calculations found in the Cooks Run Watershed TMDL completed by SRBC for PADEP and approved by USEPA on April 9, 2003.

The TMDL for this section of Cooks Run consists of a load allocation from the established Cooks Run TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point CR 01 (16.55 MGD). The load allocations made at point CR 01for this stream segment are presented in Table I162.

Table I162. TMDL Calculations at Point CR 01				
Flow = 16.55 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	5.14	709.50	0.16	22.10
Mn	1.20	165.60	0.25	34.50
Al	3.13	432.00	0.16	22.10
Acidity	64.79	8,942.80	14.25	1,966.90
Alkalinity	74.47	10,278.90		

Reductions at point CR 01 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point CR 01 are shown in Table I163.

Table I163. Calculation of Load Reduction Necessary at Point CR 01				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	709.50	165.60	432.00	8,942.80
Allowable load at CR 01	22.10	34.50	22.10	1,966.90
Percent reduction required at CR 01	0.0%	23.0%	0.0%	20.0%

The TMDL for point CR 01 requires a load reduction for total manganese and acidity.

KC 1: Kettle Creek at its mouth

Kettle Creek enters the West Branch Susquehanna River between monitoring points WBSR 5.0 and WBSR 4.0, near Westport, Pa. Kettle Creek is highly polluted by AMD and has a TMDL completed for its watershed. The TMDLs assigned in Tables I164 and I165 are based on the data and calculations found in the Kettle Creek Watershed TMDL completed by SRBC for PADEP and approved by USEPA on February 7, 2007.

The TMDL for this section of Kettle Creek consists of a load allocation from the established Kettle Creek TMDL. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point KC 1 (222.65 MGD). The load allocations made at point KC 1 for this stream segment are presented in Table I164.

Table I164. TMDL Calculations at Point KC 1				
Flow = 222.65 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.15	278.50	0.15	278.50
Mn	0.07	130.00	0.07	130.00
Al	0.15	278.50	0.13	241.40
Acidity	1.65	3,063.90	1.01	1,875.50
Alkalinity	11.17	20,741.60		

Reductions at point KC 1 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point KC 1 are shown in Table I165.

Table I165. Calculation of Load Reduction Necessary at Point KC 1				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load	278.50	130.00	278.50	3,063.90
Allowable load at KC 1	278.50	130.00	241.40	1,875.50
Percent reduction required at KC 1	0.0%	0.0%	0.0%	0.0%

The TMDL for point KC 1 does not require a load reduction.

WBSR 4.0: West Branch Susquehanna River at Renovo, Pa.

WBSR 4.0 is located at the bridge between Renovo and South Renovo, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for three TMDLs: Birch Island Run, Cooks Run, and Kettle Creek. This point also contains water quality for five other AMD impaired tributaries: Saltlick Run, Laurel Run, UNT 25611, Sterling Run, and Milligan Run. Loadings for Saltlick Run, Laurel Run, UNT 25611, Sterling Run, and Milligan Run will be allocated in future TMDLs. There is also several nonimpaired tributaries upstream of this point: Mosquito Creek, Upper Three Runs, Lower Three Runs, Fields Run, Yost Run, Burns Run, Sinnemahoning Creek, Fish Dam Run, Shintown Run, Peters Run, Brewery Run, Hall Run, Dry Run, Barney Run, North Smith Run, Smith Run, Jews Run, Morris

Run, Grove Run, Moores Run, Sugarcamp Run, Leaning Pine Run, Little Bougher Run, Bougher Run, Spruce Run, and Loop Run.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 4.0 and WBSR 5.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 4.0 (5,095.51 MGD). The load allocations made at point WBSR 4.0 for this stream segment are presented in Table I166.

Table I166. TMDL Calculations at Point WBSR 4.0				
Flow = 5,095.51 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.35	14,832.68	0.35	14,832.68
Mn	0.40	16,974.47	0.40	16,974.47
Al	1.56	66,362.96	0.11	4,645.41
Acidity	20.24	860,529.38	2.63	111,868.82
Alkalinity	14.11	600,170.87		

The loading reduction for points WBSR 5.0, KC 1, BIR 01, and CR 01 were used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 4.0. This value was compared to the allowable load at point WBSR 4.0. Reductions at point WBSR 4.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 4.0 are shown in Table I167.

Table I167. Calculation of Load Reduction Necessary at Point WBSR 4.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 4.0	14,832.68	16,974.47	66,362.96	860,529.38
Difference of measured loads between loads that enter and existing WBSR 4.0	-24,553.02	-7,984.29	38,444.79	321,206.91
Percent loss due calculated at WBSR 4.0	62.3%	32.0%	0.0%	0.0%
Additional loads tracked from above samples	6,828.21	10,040.20	4,888.80	146,468.59
Percentage of upstream loads that reach WBSR 4.0	37.7%	68.0%	100.0%	100.0%
Total load tacked between WBSR 5.0 and WBSR 4.0	2,574.24	6,827.34	43,333.59	467,675.50
Allowable load at WBSR 4.0	14,832.68	16,974.47	4,645.41	111,868.82
Load Reduction at WBSR 4.0	0.00	0.00	38,688.18	355,806.68
Percent Reduction required at WBSR 4.0	0.0%	0.0%	89.3%	76.1%

The TMDL for point WBSR 4.0 requires a load reduction for total aluminum and acidity. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500' x 300') to be permitted in the future on this segment (Table I168).

Table I168. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 3.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS AND WLAs)

DANE2: Dannic Energy

The Dannic Energy (NPDES not yet assigned) will operate an industrial wastewater permit that additionally treats oil and gas by-product in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (D169) shows the WLA for this discharge.

Table I169. WLA at Dannic Energy			
Parameter			
Outfall	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.500	12.52
Mn	2.0	0.500	8.35
Al	2.0	0.500	8.35

WBSR 3.0: West Branch Susquehanna River at Lock Haven, Pa.

WBSR 3.0 is located at the Jay Street bridge in Lock Haven, Pa. All measurements were recorded on the upstream side of the bridge. WBSR 3.0 accounts for several large nonimpaired tributaries. Young Woman's Creek, Paddy Run, Boggs Hollow, Caldwell Run, Dry Run, Hyner Run, Huff Run, Little McCoskey Run, Big McCoskey Run, Schoolhouse Hollow, Goodman Hollow, Johnson Run, Ritchie Run, Green Run, Rattlesnake Run, Grugan Hollow, Mill Run, Baker Run, Teats Run, McCoskey Run, Ferney Run, Holland Run, East Ferney Run, Graham Run, Lick Run, Queens Run, Lusk Run, and Reeds Run enter the West Branch Susquehanna River between monitoring points WBSR 4.0 and WBSR 3.0.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 3.0 and WBSR 4.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 3.0 (5,915.42 MGD). The load allocations made at point WBSR 3.0 for this stream segment are presented in Table I170.

Table I170. TMDL Calculations at Point WBSR 3.0				
Flow = 5,915.42 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.49	24,433.13	0.44	21,501.15
Mn	0.40	19,857.46	0.40	19,857.46
Al	0.63	30,924.39	0.20	9,895.80
Acidity	22.95	1,133,135.09	3.21	158,638.91
Alkalinity	13.93	687,606.23		

The loading reduction for point WBSR 4.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 3.0. This value was compared to the allowable load at point WBSR 3.0. Reductions at point WBSR 3.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 3.0 are shown in Table I171.

Table I171. Calculation of Load Reduction Necessary at Point WBSR 3.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 3.0	24,433.13	19,857.46	30,924.39	1,133,135.09
Difference of measured loads between loads that enter and existing WBSR 3.0	9,600.45	2,882.99	-35,438.57	272,605.74
Percent loss due calculated at WBSR 3.0	0.0%	0.0%	53.4%	0.0%
Additional loads tracked from above samples	14,832.68	16,974.47	4,645.41	111,868.82
Percentage of upstream loads that reach WBSR 3.0	100.0%	100.0%	46.6%	100.0%
Total load tacked between WBSR 4.0 and WBSR 3.0	24,433.13	19,857.46	2,164.76	384,474.56
Allowable load at WBSR 3.0	21,501.15	19,857.46	9,895.80	158,638.91
Load Reduction at WBSR 3.0	2,931.98	0.00	0.00	225,835.65
Percent Reduction required at WBSR 3.0	12.0%	0.0%	0.0%	58.7%

The TMDL for point WBSR 3.0 requires a load reduction for total iron and acidity. A WLA for future mining was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table I172).

Table I172. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 2.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS AND WLAs)

JSSCO: Jersey Shore Steel Company

The Jersey Shore Steel Company (NPDES PA0009725) has one outfall (001) in the West Branch Watershed. This outfall does not currently have effluent limits for total iron; therefore, the WLA has been assigned based on BAT limits for Fe. The following table (I173) shows the WLA for this discharge.

Table I173. WLA at Jersey Shore Steel Company			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.300	7.51

CPAWT: Central PA Water Treatment

The Central PA Water Treatment (NPDES PA0233617) will operate an industrial wastewater permit that additionally treats oil and gas by-product in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (I174) shows the WLA for this discharge.

Table I174. WLA at Central PA Water Treatment			
Parameter			
Outfall	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.504	12.62
Mn	2.0	0.504	8.41
Al	2.0	0.504	8.41

PINCM: Pine Creek Municipal Authority

The Pine Creek Municipal Authority (NPDES PA0027553) will operate an industrial wastewater permit that additionally treats oil and gas by-product in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (I175) shows the WLA for this discharge.

Table I175. WLA at Pine Creek Municipal Authority

Parameter			
Outfall	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	1.300	32.55
Mn	2.0	1.300	21.70
Al	2.0	1.300	21.70

CPAWW: Central PA Wastewater

The Central PA Wastewater (NPDES PA0233706) will operate an industrial wastewater permit that additionally treats oil and gas by-product in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (I176) shows the WLA for this discharge.

Table I176. WLA at Central PA Wastewater

Parameter			
Outfall	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.400	10.02
Mn	2.0	0.400	6.68
Al	2.0	0.400	6.68

PENST: The Pennsylvania State University

The Pennsylvania State University (NPDES PA0228702) has one outfall (001) in the West Branch Watershed. This outfall has effluent limits for dissolved iron with no assigned value; therefore, the average monthly recorded values were used for calculations. The following table (I177) shows the WLA for this discharge.

Table I177. WLA at The Pennsylvania State University

Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	0.8	0.216	1.44

CCDAL: CCDA Waters, LLC

The CCDA Waters, LLC (NPDES PA0095231) has one outfall (002) in the West Branch Watershed. This outfall has effluent limits for total iron and total manganese. However, there was no design flow assigned, therefore the average monthly flow reported on the Discharge Monitoring Reports (DMR) was used. The following table (I178) shows the WLA for this discharge.

Table I178. WLA at CCDA Waters, LLC			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Average Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	2.0	0.037	0.62
Mn	1.0	0.037	0.31

FQT: First Quality Tissue, LLC

First Quality Tissue, LLC (NPDES PA0228818) has one outfall (003) in the West Branch Watershed. This outfall has effluent limits for total iron, total aluminum, and total manganese. The following table (I179) shows the WLA for this discharge.

Table I1179. WLA at First Quality Tissue			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	.53	4.56	20.34
Mn	.13	4.56	5.14
Al	.92	4.56	35.02

WBSR 2.0: West Branch Susquehanna River at Jersey Shore, Pa.

WBSR 2.0 is at the State Highway 44 bridge in Jersey Shore, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for the water quality contributions from McElhattan Creek, Bald Eagle Creek, Chatham Run, Kryder Hollow, Spong Hollow, Love Run, Pine Creek, and Antes Creek. All of these tributaries are meeting water quality standards, with the exception of Bald Eagle Creek, which is listed as being impaired for metals from AMD.

The TMDL for this section of the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 2.0 and WBSR 3.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 2.0 (6,791.80 MGD). The load allocations made at point WBSR 2.0 for this stream segment are presented in Table I180.

Table I180. TMDL Calculations at Point WBSR 2.0				
Flow = 6,791.80 MGD	**Measured Sample Data**		**Allowable**	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.72	40,919.02	0.25	14,321.66
Mn	0.48	26,989.04	0.33	18,622.44
Al	0.85	48,244.85	0.16	9,166.52
Acidity	5.49	311,387.57	2.75	155,693.78
Alkalinity	30.39	1,722,604.22		

The loading reduction for point WBSR 3.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 2.0. This value was compared to the allowable load at point WBSR 2.0. Reductions at point WBSR 2.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 2.0 are shown in Table I180.

Table I181. Calculation of Load Reduction Necessary at Point WBSR 2.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 2.0	40,919.02	26,989.04	48,244.85	311,387.57
Difference of measured loads between loads that enter and existing WBSR 2.0	16,485.89	7,131.58	17,320.46	-821,747.52
Percent loss due calculated at WBSR 2.0	0.0%	0.0%	0.0%	72.5%
Additional loads tracked from above samples	21,501.15	19,857.46	9,895.80	158,638.91
Percentage of upstream loads that reach WBSR 2.0	100.0%	100.0%	100.0%	27.5%
Total load tacked between WBSR 3.0 and WBSR 2.0	37,987.04	26,989.04	27,216.26	43,625.70
Allowable load at WBSR 2.0	14,321.66	18,622.44	9,166.52	155,693.78
Load Reduction at WBSR 2.0	23,665.38	8,366.60	18,049.74	0.00
Percent Reduction required at WBSR 2.0	62.3%	31.0%	66.3%	0.0%

The TMDL for point WBSR 2.0 requires a load reduction for total iron, total manganese, and total aluminum. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table I182).

Table I182. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

WBSR 1.0: INPUTS IN DOWNSTREAM ORDER (APPROVED TMDLS AND WLAs)

JSBWW: Jersey Shore Boro Wastewater

The Jersey Shore Boro Wastewater (NPDES PA0028665) will operate an industrial wastewater permit that additionally treats oil and gas by-product in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (I183) shows the WLA for this discharge.

Table I183. WLA at Jersey Shore Boro Wastewater			
Parameter			
Outfall	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	1.050	26.29
Mn	2.0	1.050	17.53
Al	2.0	1.050	17.53

DANE1: Dannic Energy

The Dannic Energy (NPDES PA0233765) will operate an industrial wastewater permit that additionally treats oil and gas by-product in the West Branch Watershed. This outfall does have effluent limits for total iron, total manganese, and total aluminum. The following table (I184) shows the WLA for this discharge.

Table I184. WLA at Dannic Energy			
Parameter			
Outfall	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	3.0	0.500	12.52
Mn	2.0	0.500	8.35
Al	2.0	0.500	8.35

JSJWA: Jersey Shore Area Joint Water Authority

The Jersey Shore Area Joint Water Authority (NPDES PA0014575) has one outfall (001) in the West Branch Watershed. This outfall has effluent limits for total iron, total manganese and total aluminum. The following table (I185) shows the WLA for this discharge.

Table I185. WLA at Jersey Shore Area Joint Water Authority			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	2.0	0.05	0.83
Mn	1.0	0.05	0.42
Al	4.0	0.05	1.67

LUTCO: Lucas Trucking Corp.

The Lucas Trucking Corp. (NPDES PA0115215) has one outfall (001) in the West Branch Watershed. This outfall has effluent limits for dissolved iron with no assigned value; therefore, the average monthly recorded values were used for calculations. The following table (I186) shows the WLA for this discharge.

Table I186. WLA at Lucas Trucking Corp.			
Parameter			
Outfall 001	***Monthly Average Conc. (mg/L)***	***Design Flow (MGD)***	***Allowable Load (lbs/day)***
Fe	0.01	0.0072	0.001

Additional WLA for WBSR 1.0

The WBSR 1.0 site incorporates a WLA of 0.15 lbs/day of iron, and 0.03 lbs/day of manganese. This WLA is intended to cover a number of permitted discharges. Information on known discharges for this WLA can be found in Table 187.

Table I187. WLA for WBSR 1.0				
Company	***Permit(s)***	***Effluent limits (mg/L)***	***Design Flow***	***WLAs***
Textron Lycoming	PA0007455	Fe – 0.22 Mn – 0.05	0.071	Fe – 0.13 Mn – 0.03
Wirerope Works Inc. (2-outfalls)	PA0008575	Fe – 0.03	0.05	Fe – 0.02
TOTAL				Fe – 0.15 Mn – 0.03

WBSR 1.0: West Branch Susquehanna River at Williamsport, Pa.

WBSR 1.0 is located at the U.S. Route 15 bridge in Williamsport, Pa. All measurements were recorded on the upstream side of the bridge. This monitoring point accounts for the water quality contributions from Nice Hollow, Stewards Run, Larry’s Creek, Big Run, Pine Run, Quenshukeny Run, Blender Run, Daugherty Run, Fox Hollow, Mosquito Creek, Lycoming Creek, and Grafius Run.

This TMDL section for the West Branch Susquehanna River consists of a load allocation to the watershed area between WBSR 1.0 and WBSR 2.0. Addressing the mining impacts above this point addresses the impairment for the stream segment. An average instream flow measurement was available for point WBSR 1.0 (9,982.88 MGD). The load allocations made at point WBSR 1.0 for this stream segment are presented in Table I188.

Table I188. TMDL Calculations at Point WBSR 1.0				
Flow = 9,982.88 MGD	***Measured Sample Data***		***Allowable***	
Parameter	***Conc. (mg/l)***	***Load (lbs/day)***	***LTA Conc. (mg/l)***	***Load (lbs/day)***
Fe	0.42	34,908.99	0.42	34,908.99
Mn	0.23	19,490.91	0.23	19,490.91
Al	0.57	47,597.28	0.21	17,610.99
Acidity	2.68	223,375.25	2.28	189,868.96
Alkalinity	32.84	2,736,092.74		

The loading reduction for point WBSR 2.0 was used to show the total load that was removed from upstream sources. For each parameter, the total load that was removed upstream was subtracted from the existing load at point WBSR 1.0. This value was compared to the allowable load at point WBSR 1.0. Reductions at point WBSR 1.0 are necessary for any parameter that exceeds the allowable load at this point. Necessary reductions at point WBSR 1.0 are shown in Table I189.

Table I189. Calculation of Load Reduction Necessary at Point WBSR 1.0				
	Fe (lbs/day)	***Mn (lbs/day)***	***Al (lbs/day)***	***Acidity (lbs/day)***
Existing load at WBSR 1.0	34,908.99	19,490.91	47,597.28	223,375.25
Difference of measured loads between loads that enter and existing WBSR 1.0	-6,010.03	-7,498.13	-647.57	-88,012.32
Percent loss due calculated at WBSR 1.0	14.7%	27.8%	1.3%	28.3%
Additional loads tracked from above samples	14,321.66	18,622.44	9,166.52	155,693.78
Percentage of upstream loads that reach WBSR 1.0	85.3%	72.2%	98.7%	71.1%
Total load tacked between WBSR 2.0 and WBSR 1.0	12,216.38	13,445.40	9,047.36	110,698.27
Allowable load at WBSR 1.0	34,908.99	19,490.91	17,610.99	189,868.96
Load Reduction at WBSR 1.0	0.00	0.00	0.00	0.00
Percent Reduction required at WBSR 1.0	0.0%	0.0%	0.0%	0.0%

The TMDL for point WBSR 1.0 does not require a load reduction. A WLA for future mining operations was included for this segment for the West Branch Susquehanna River, allowing for three operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (Table I190).

Table I190. WLA 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	2.26
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.26
Mn	2.0	0.090	1.50

Margin of Safety (MOS)

An implicit MOS was used in these TMDLs derived from the Monte Carlo statistical analysis employing the @Risk software. Pa. Title 25 Chapter 96.3(c) states that water quality criteria must be met at least 99 percent of the time. All of the @Risk analyses results surpass the minimum 99 percent level of protection. Other MOS used for this TMDL analyses are:

- An additional MOS is that the calculations were performed using a daily iron average, instead of the 30-day average.

- The method used to calculate a flow for a WLA using the area of the pit and ungraded portions of an active mine is conservative and an implicit MOS.

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 J
Comment and Response

COMMENTS FROM FEBRUARY 2007 COMMENT PERIOD:

Commenter: United States Environmental Protection Agency

Comment:
Previously approved TMDLs do not have correct approval dates. Please check the Region 3 web site, http://www.epa.gov/reg3wapd/tmdl/ for correct date. If it isn't there, contact me. Also, Sandy Creek is not approved.

Response:
The TMDL approval dates have been changed using the requested website. Sandy Creek will remain in the *TMDL by Segments* for future approval.*

Comment:
Just curious, in Summary Table 3, the LAs are shown only when there is a WLA, but why aren't all load reductions shown?

Response:
The requested edits have been made to table 5 *Summary Table – WBSR Watershed*.

Comment:
Don't any of the permits have a NPDES number?

Response:
SRBC inserted "NPDES No." in Table 3 to show the both the Mining Permit number and the NPDES permit number.

Comment:
Explaination should be added to the text above that the reductions shown are after any upstream reductions have been made. Same for tables 38 and 52.

Response:
SRBC included text in the TMDL summaries of Attachment D that stated these calculations at the mouth of the approved TMDLs are the result of upstream reductions being taken out.

Comment:
Attachment E, Data Used, should have a footnote identifying "PBQ."

Response:
SRBC changed all "PBQ" data entries to the lab detection limits.

Comment:
The calculations were done ignoring <DL instead of setting them equal to zero.

Response:
All values for calculations where laboratory values were reported as less than the detection limit.

* The Sandy Creek Watershed TMDL was approved by EPA on April 4, 2007.

<u>COMMENTER:</u> Amfire Mining Company, LLC

AMFIRE recognizes and supports the goal of the federal Clean Water Act of 1972 to improve the quality of the water we drink, increase the outdoor recreational activities that we enjoy, and enhance the overall quality of life that we enjoy in our communities as it relates to our water resources. While Pennsylvania is moving forward to develop TMDL's for impaired waters, questions have been raised regarding the quality of information and data used to determine the TMDL. In a National Research Council report titled "Assessing the TMDL Approach to Water Quality Management" released in 2001, scientific uncertainty was recognized as a major shortcoming of TMDL development.

The West Branch Susquehanna River Draft TMDL is an example in which data used to compile the report is incomplete or lacks sound scientific reason. Here are specific points to support this position:

Comment:
Do not use a blanket approach when determining Waste Load Allocations.
The report lacks specific hydrologic information that is unique to each Point Source Discharge. A blanket approach has been utilized to establish Waste Load Allocations based upon a formula developed by PA DEP and found in Attachment F on Page 154. This formula revolves around pit dimensions to establish the Waste Load Allocation.

Often times, during the life span of a Surface Mining Permit, pit dimensions and/or the number of pits can change when Bonding Increments are applied for and issued.
AMFIRE Mining Company suggests that the unique hydrologic information assembled in a mining permit application be used in the prediction of flows and the development of Waste Load Allocations. Each and every surface mining permit application in the West Branch Susquehanna River Watershed has a module specifically addressing hydrology of the particular site. This data should be incorporated into TMDL development.

In general, the Waste Load Allocations should be more directly proportional to the size of the operation and/or the drainage area rather than the size of a pit that is open at any particular point in time. Current methodology assigns the same WLA to a 10 acre surface mining permit as it does a 300 acre permit. The mining industry simply cannot accept the current WLA development approach.

Response:
The Department will investigate alternate methods to calculate WLAs for permitted surface mines such as those mentioned. In cases where a permitted flow is included in the NPDES portion of the mining permit for an operation, that permitted flow is used instead of the default method described in Attachment F. Also in cases where operational acres are available and it is applicable, these values are included in the waste load allocation calculations. In addition, deep mine permits, as a default value, are assigned flow values at 0.5 gallons per minute per operational underground acre to more accurately represent flow values from these operations.

Comment:
Seasonal variation of water monitoring data is not implicitly accounted for as the report suggests on Page 107.

a) With respect to Stream Segments 1-33, there were at most 8 samples taken from unique days over the course of a 12 month period. On Segments 1-33 there was no monitoring done during the months of April, August and October, 2005.
First to assume that flow conditions of any stream can be characterized by monitoring that spans only one hydrologic year would in our estimation be considered unscientific. Next, to assume that flow conditions can be characterized by a data set of only samples over the course of a 12 month period is even more unscientific. But to state in a report that seasonal variations are implicitly accounted for by a data set of 8 samples is simply not acceptable. Once approved, TMDLs will essentially be incorporated into regulation. Let us please have the data gathering reflect this most important concept.

Response:
We recognize that hydrologic conditions can change from year to year. However, with the various flows collected throughout the TMDL process, Monte Carlo simulation calculates 5000 iterations to cover wide varieties of flows in the TMDL.

Comment:
The report fails to include separate Waste Load Allocations from Erosion and Sedimentation facilities on individual mining permits. For instance, AMFIRE Mining Company's Bell Run #1 Surface Mine Permit was issued with six (6) separate and distinct Outfalls from Erosion & Sedimentation facilities, yet the report does not account for any of them. To simply ignore the potential Waste Loads from Erosion and Sedimentation facilities cannot be accepted by the mining industry. Once again, when the WLA for a particular site is established, there will be no turning back. AMFIRE requests that all Erosion & Sedimentation facilities be assigned an individual Waste Load Allocation in addition to the Outfall from the Treatment Facilities. This will assure that the correct WLA is provided to a surface mine operator.

Response:
The Department does not include WLAs for facilities controlling erosion and sedimentation in mining TMDLs based on the following rationale taken from the Little Schuylkill River TMDL (available at www.depweb.pa.us, search for “TMDL”):

> “It has been determined that effects from sedimentation ponds are negligible because their potential discharges are based on infrequent and temporary events and the ponds should rarely discharge if reclamation and revegetation is concurrent. In addition, sedimentation ponds are designed in accordance with PA Code Title 25 Chapter 87.108(h) to at minimum contain runoff from a 10-year 24-hour precipitation event.”

Comment:
There were missing Mining Permits in the Draft West Branch Susquehanna River TMDL. AMFIRE Mining Company, LLC suggests the following three mining permits be added to the West Branch Susquehanna River TMDL:

AMFIRE Mining Company, USC Fox Surface Mine SMP# 17990120
AMFIRE Mining Company, LLC Poplar Run Mine SMP# 17940116
AMFIRE Mining Company, LLC Bell Run #3 Mine SMP# 17030121

Response:
Stage 2 approved permits, such as SMP# 17990120, are not included in this TMDL since mining has stopped. Permits 17940116 and 17030121 have been added to this document.

Comment:
AMFIRE Mining Company, LLC is the current permittee of Carbon Mine SMP# 17020107.

Response:
The permitee/Company name column of table 3 *Mining Permits in the WBSR Watershed* has been edited to meet the requested change.

Comment:
There was no representation from any government and or regulating agencies at the West Branch Susquehanna River Watershed TMDL Public Meeting, thereby making it impossible to obtain answers on the following important questions.

Questions:

> What does this mean to future permit applications for Point Source Discharges?
>
> Will specific Waste Load Allocations be reserved for future mining permits?
>
> Which DEP agency will be responsible for implementation?
>
> Should Water Quality Budgeting be implemented, who is going to budget the waste loads from point source contributors, the Bureau of Mining & Reclamation or the Bureau of Watershed Management?
>
> Will there be a bridge between the two government agencies with respect to budgeting if Bureau of Watershed Management has budgeting authority?
>
> Which government agency do we negotiate with, if we need relief?
>
> Are there plans to accept Best Management Practices for Waste Load Allocations or will we be left to mitigate another area should it become necessary?
>
> Who will review mitigation plans should they be needed?
>
> Will the District Mining Offices be given guidance as it pertains to their review of new permit applications from those responsible for developing the TMDL, or will it be a "here's the book with all the numbers, go enforce it" approach.
>
> How will the quantification of the potential pollution load for a deep mine permit be evaluated should a deep mine permit application be proposed in this watershed? It is apparent from the calculations for the Surface Mine Permits that Waste Load Allocations are flow dependent. As our business includes many deep mines, is there a process to handle this scenario.

<u>Conclusion</u>

On the cover of the Draft West Branch Susquehanna River Watershed TMDL, it states the TMDL was prepared for the Pennsylvania Department of Environmental Protection, However, representatives of the Pennsylvania Department of Environmental Protection were not present at the Public Meeting held February 22, 2007, Therefore, AMFIRE Mining Company, LLC respectfully requests that the TMDL development on West Branch Susquehanna River Watershed be suspended until a proper public forum can be held where representatives of the Pennsylvania Department of Environmental Protection can be present to answer important questions from major stakeholders in the watershed.

Response:
The Pennsylvania Department of Environmental Protection is developing policies and procedures to address these issues in the future and welcomes feedback from industry in this process.

<u>COMMENTER:</u> PennFUTURE

Comment:

The Draft TMDL fails to identify any post-mining discharges from regulated mines in the West Branch Susquehanna River watershed, which are point source discharges that must receive WLAs in the TMDL.

The West Branch Susquehanna River (WBSR) watershed covers approximately 6,992 square miles in one of the most heavily mined regions of the Commonwealth.* (Draft TMDL, p- 5) The Draft TMDL lists 42 mining operations in the WBSR watershed that are authorized by a surface mining permit or government-financed construction or reclamation contract. (Draft TMDL, p. 6, Table 3). Except in a few instances in which monitored flow data are available for these mines, the Draft TMDL applies the "Method to Quantify Treatment Pond Pollutant Load" set forth in its Attachment F.

With the possible exception of the discharge from the Pennsylvania Mines Greenwich No. 2 coal refuse disposal area ("GRN2," Draft TMDL, p. 64), the Draft TMDL does not identify any treated, <u>post-mining</u> discharges. Although some such discharges may be identified and assigned wasteload allocations (WLAs) in TMDLs for impaired tributary watersheds, PennFuture finds it difficult to believe that there is not a single, NPDES-permitted post-mining discharge in the heavily-mined WBSR watershed that has not already been accounted for through a WLA in another TMDL. The failure to allocate allowable load to such post-mining discharges through WLAs is the equivalent of establishing a WLA of <u>zero</u> pounds per day for each relevant pollutant, which in turn would require that the NPDES permits for the discharges contain "non-detect" effluent limitations prohibiting the release of any of the pollutants for which the relevant segment is impaired. See 40 C.F.R. § 122.44(d)(1)(vii)(B) (incorporated into Pennsylvania law by 25 Pa. Code § 92.2(b)(14); <u>Mountain Watershed Association and PennFuture v. Department of Environmental Protection and Kaiser Refractories,</u> EHB Docket No. 2004-102-R (Opinion and Order on Motion for Partial Summary Judgment dated June 23, 2005), p. 3. The TMDL should properly account for any treated post-mining discharges — both those that are permitted and those that should be permitted (see Comment 2) — by assigning them WLAs.

Response:

The following permits were researched for the possibility of post-mining discharges: 17870104, 59830101, 59850101, 144663010, 4777SM7, 14743007, 4675SM13, 14860103, 17910114, 32813001, 57830101, and 3265BSM34. The following permits are located in the Wilson Creek Watershed, which is listed as being AMD impaired: 59830101, and 59850101. The following permits are located in the Beech Creek Watershed, which is listed as being AMD impaired, and currently has a draft TMDL developed for it: 14743007, and 14860103.

Comment:

Discharges from mine drainage treatment systems being operated with funds controlled by a trustee are point source discharges that must be authorized by NPDES permits, and must receive WLAs in the TMDL.

As described in the Draft TMDL, monitoring point WBSR 30.0 is "on the downstream side of the Barnes and Tucker Lancashire #20 Mine Treatment Facility" and "accounts for the water quality after it has been processed through the treatment plant," (Draft TMDL, p. 47) The Draft

* On a tangential point. PennFuture questions whether, in light of the recent drop in population from 86 to 84, Lumber City qualifies as one of the `Major urban areas" in the WBSR watershed. (Draft TMDL, p. 1)

TMDL, however, does not assign this treatment facility a WLA. Instead, it assigns the entire allowable load for the segment between WBSR 31.0 and WBSR 30.0 to the nonpoint sources in the form of a load allocation (LA), thereby implicitly classifying the Barnes and Tucker Lancashire #20 Mine Treatment Facility as a nonpoint source. (Draft TMDL, p. 47) In fact, the treatment facility is a point source. As such, its discharge must be authorized by a NPDES permit, and the discharge must receive a WLA in the WBSR Watershed TMDL.[*]

The Draft TMDL explains that "[t]he distinction between point and nonpoint sources in this case is determined on the basis of whether or not there is a responsible party for the discharge?' Where there is no responsible party, the discharge is considered to be a nonpoint source." (Draft TMDL, p. 2) PennFuture believes that the Clean Streams Foundation, Inc. (CSF) now has the responsibility, under agreements with PADEP, to provide for the continued operation of the treatment facility. Thus, even if the "distinction" drawn by the Draft TMDL were valid, the treatment facility discharge in question would be a point source discharge.

Moreover, as PennFuture has explained in comments submitted on several TMDLs, PADEP's "distinction" finds no support in the law. For the purposes of the Clean Water Act, it is the Clean Water Act itself that defines what constitutes a point source, which includes any "discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, [or] channel$_{1.1}$" 33 U.S.C, § 1362(14). The outfall from the Barnes and Tucker Lancashire #20 Treatment Facility no doubt falls within that description, so the addition of any pollutant to the navigable waters from the treatment facility is a point source discharge. See id. § 1362(6), (12), (14), (16).

As PennFuture explained in the attached letter dated December 21, 2005, a NPDES-permitted point source discharge from a permitted mining operation is not magically transformed into a nonpoint source discharge or otherwise exempted from the Clean Water Act's NPDES permit requirement because the mining company switches from operating the treatment system itself to providing for the operation of the treatment system through establishing a trust. Whether it is a trustee rather than a mining company who pays the treatment plant operator does not affect whether the discharge is properly classified as a point source discharge within the meaning of the federal Clean Water Act and its implementing regulations. See 33 U.S.C. 1362(6), (12), (14), (16); 40 C.F.R, § 122.2; see also 25 Pa. Code § 92.2(b)(1) (incorporating by reference 40 C.F.R. § 122.2). The post-mining discharge from the Lancashire #20 Treatment Facility was properly classified as point source discharge when Barnes and Tucker operated the facility, and it remains a point source discharge today, when money paid into the Barnes and Tucker CSF trust account provides for the continued operation of the same facility. As a result, the discharge must be authorized by a NPDES permit, see 33 U.S.C. §§ 1311(a), 1342(a), and the TMDL must assign WLAs to it for the three metals. See 40 C.F.R. § 130.2(b).

In the situation involving the Potato Ridge Mine and Smith Mine addressed in the attached letter, CSF recently created a separate entity, Potato Ridge, LLC, to hold the relevant mining and NPDES permits. See 37 Pa. Bull. 255 (January 13, 2007). Whether a separate entity or CSF itself holds the NPDES permit, however, the treated post-mining discharge from the Lancashire #20 Treatment Facility similarly must be covered by a NPDES permit.

[*] The Barnes and Tucker Lancashire #20 Mine Treatment Facility appears to account for essentially all of the additional mine drainage pollutant load between monitoring points WBSR 31.0 and WBSR 30.0, which are little more than a tenth of a mile apart. (Draft TMDL, p. 36) Thus, determining the WLA for the treatment facility would simply involve switching the LAs for monitoring point WBSR 30.0 to WLAs.

Response:
The Department disagrees with Commenter's assertion that the Clean Streams Foundation is "responsible" for treating the Barnes & Tucker discharges identified by the commenter. The foundation merely acts as the trustee for a trust fund established by the mine operator liable for treating discharges caused by the operator's mining operations—which trust fund is used to pay ongoing treatment costs after the liable operator ceased to exist.

The Department disagrees with Commenter's contention that these particular discharges should be classified as "point source discharges" pursuant to applicable law. The mine operator liable for completing reclamation of these permitted mine sites—including the treatment of any post-mining discharges associated with those sites—has been liquidated, dissolved or otherwise ceased to exist prior to completing the reclamation. Consequently, these unreclaimed sites are considered abandoned mine sites. A post-mining discharge emanating from an abandoned mine site is properly classified as a non-point source discharge, because no person liable for causing the discharge exists. EPA has articulated this interpretation in the past, see 55 FR 35248 (Aug. 28, 1990) (describing "acid mine drainage from abandoned mines" as "non-point sources" because no owner can be found); and, more recently, EPA has approved Department TMDLs classifying discharges from abandoned mine sites as non-point sources. *See, e.g.*, EPA Decision Rationale, TMDL, Elk Creek Watershed for Acid Mine Drainage Affected Segments (April 1, 2005). Because the discharges identified are appropriately classified as non-point sources, the Department disagrees with the Commenter's assertion that these discharges should be assigned WLAs in the TMDL. These discharges will be assigned LAs along with the other non-point sources identified in the TMDL. To further provide clarity in the impact of the Lancashire #20 discharge on the West Branch, a discharge-specific load allocation has been included in the revised TMDL.

Comment:
The Draft TMDL fails to account for the proposed redirection of the discharge from the Barnes and Tucker Lancashire #15 Mine into the WBSR watershed.

On July 18, 2006, the Susquehanna River Basin Commission announced a project funded by the Commonwealth of Pennsylvania to divert (or re-divert) ten million gallons per day (mgd) of treated mine drainage from the Ohio/Allegheny River watershed into the WBSR watershed. The project would involve construction of a new gravity-fed treatment plant in the WBSR watershed to replace the existing Dumans Treatment Facility, which treats water pumped from the Barnes and Tucker Lancashire #15 Mine and discharges it into a tributary to Elk Creek in the Allegheny River watershed. The Draft TMDL, however, does not account for or mention the dramatic change in the upper WBSR watershed that would be affected by this project. The final TMDL should account for the future point source discharge by assigning WLAs to it.

The discharge from the new treatment facility presumably will be near monitoring point WBSR 25.0, "WBSR downstream of Barnes and Tucker Lancashire Mine #15." (Draft TMDL, p. 54) The average instream flow at point WBSR 25,0 is 3,019.66 gallons per minute (gpm), or about 4.35 mgd. (Draft TMDL, p. 114) Thus, the proposed discharge would more than triple the current average flow of the river at this point. Using the Best Available Technology (BAT) monthly average limits of 3 mg/I for iron and 2 mg/I for manganese, and the standard technology-based limit of 2 mg/I for aluminum used in Pennsylvania TMDLs, the new 10 mgd discharge would add about 250 pounds of iron and 167 pounds of both manganese and aluminum to the river each day. As a result, the loadings of the three metal contaminants added between points WBSR 26.0 and WBSR 25.0 would increase by the following amounts:

Parameter	Load currently added between WBSR 26.0 and WBSR 25.0 (lbs/day) (Draft TMDL, Table I22)	Load added by new Lancashire Mine discharge at 10 ingd and standard TMDL concentrations (lbs/day)	Total load added between WBSR 26.0 and WBSR 25.0 after redirection of Lancashire Mine #15 discharge (lbs/da)	'Percentage increase with redirected Lancashire Mine #15 discharge
Fe	253.7	250.2	503.9	98.6
Mn	3.1	166.8	169.9	5,380.6
Al	343.0	166.8	509.8	48.6

The TMDL should account for these anticipated, significant changes. And the way it should account for them is through the assignment of WLAs to the proposed treatment facility discharge.

Though the existing Duman's Treatment Facility indisputably is a point source within the meaning of the Clean Water Act, see 33 U.S.C. § 1362(14), and its discharge of up to ten million gallons of treated mine drainage per day indisputably is a point source discharge, see id, § 1362(6), (12), (14), (16), the Elk Creek Watershed TMDL does not classify it as a point source discharge, and therefore does not assign it WLAs. That error should have caused EPA to disapprove the Elk Creek Watershed TMDL as submitted and to require PADEP to modify it. Instead, EPA approved the TMDL with the express caveat that its approval should not be read either to ratify the TMDLs classification of the discharge from a mine drainage treatment system as a nonpoint source discharge, or to imply that the discharge need not be authorized by a NPDES permit. (E.g., Decision Rationale, Total Maximum Daily Loads, Elk Creek Watershed For Acid Mine Drainage Affected Segments (April 1, 2005), p. 5)

The discharge from the new Lancashire Mine #15 treatment facility in the WBSR watershed will add pollutants to the waters of the United States (the West Branch of the Susquehanna) from outside the waters of the United States (the Lancashire Mine #15 Mine Pool). It therefore will constitute a point source discharge. See 33 U.S.C. 1362(6), (12), (14), (16). Such a discharge must be authorized through the issuance of a NPDES permit, see 33 U.S.C. § § 1311 (a), 1342(a), and a TMDL must account for the discharge through the assignment of WLAs to it for the relevant pollutants. See 40 C.F.R. § 130.2(h).

There is no reason to wait for the new treatment system to be built before accounting for it in the WBSR TMDL. EPA's TMDL regulations expressly provide that WLAs may be assigned to "existing and future point sources of pollution," 40 C.F.R. 130.2(h). The Draft TMDL should be revised to account for the anticipated, funded treatment project by assigning WLAs to the proposed 10 mgd discharge from the Barnes and Tucker Lancashire #15 Mine into the West Branch of the Susquehanna River.

Response:
The Department acknowledges that changes will occur in the West Branch Susquehanna River Watershed as a result of the diversion and treatment of water from the Barnes & Tucker Lancashire #15 Mine Pool. Mathematical calculations such as those presented by the commenter can show a modeled scenario of the impacts of the treated mine pool water on the West Branch Susquehanna River. The Department included a modeled treatment scenario in the revised document to show the anticipated impact of the untreated discharge, if allowed to break out to

the West Branch, on the downstream reaches. In addition, the report prepared by the Susquehanna River Basin Commission "West Branch Susquehanna River Subbasin AMD Remediation Strategy" gives a detailed account of the predicted impact of the treated Lancashire discharge on the downstream reaches of the West Branch.

Comment:
Bear Run Watershed TMDL

The Draft TMDL includes a monitoring point designated Bear 1.0 (Bear Run at its mouth). With respect to that point, the Draft TMDL states that the "TMDLs assigned in Tables D59 and D60 are based on the data and calculations found in the Bear Creek Watershed TMDL completed by SRBC for PADEP and submitted to USEPA in March 2005." (Draft TMDL, p.72) The reference apparently should be to the March 24, 2005 Bear Run Watershed TMDL, upon which EPA has not acted. PennFuture simply notes, as it has separately notified EPA, that Attachment F (p. 72) of the March 24, 2005 Bear Run Watershed TMDL incorrectly claims that "[n]o public comments were received for the (December 31, 2004 draft) Bear Run Watershed TMDL document." In fact, PennFuture submitted comments on the draft Bear Run Watershed TMDL to PADEP on February 15, 2005, with a copy to EPA Region 3. The original comments mailed to PADEP were not returned to PennFuture by the U.S. Postal Service.

Response:
The reference of "Bear Creek" was changed to "Bear Run" in the document. The Bear Run Watershed TMDL was approved by EPA on April 7, 2007 and loads calculated in that TMDL are included in the West Branch Susquehanna River TMDL. In addition, the Department acknowledges that comments were indeed received from PennFuture on the Bear Run TMDL and were incorporated and addressed in that final TMDL document.

<u>COMMENTER:</u> Pennsylvania Coal Association

The Pennsylvania Coal Association (PCA) submits the following comments on the proposed TMDLs for the West Branch Susquehanna River watershed PCA is a trade association organized and operating under the laws of Pennsylvania representing producers of bituminous coal in Pennsylvania. PCA members produce about 75% of the approximately 70 million tons of bituminous coal mined in Pennsylvania annually. PCA members produce coal by both underground and surface mining methods. PCA also has approximately 90 associate members who work with, support and depend upon the mining industry. The following comments are presented for the Department's consideration regarding the proposed TMDL:

Comment:
Lack of Wasteload Allocations for Future Mining

The proposed TMDLs provide for wasteload allocations for currently permitted active and yet to be started surface coal mines. They provide load allocations for discharges of acid mine drainage (AMD) from abandoned and unpermitted mines that were permitted and operated long before current permitting and reclamation requirements. They also provide for a margin of safety. Most of the pollutant loading for the pollutants addressed in the proposed TMDLs is from abandoned and unpermitted mines. In the past ten to fifteen years Pennsylvania's coal mine operators have contributed significantly to the abatement and or improvement of AMD discharges through mining operations that included remining of abandoned mine lands. We are concerned that because of the lack of specific wasteload allocations for future mining, BAT effluent limits may not be available for future permits that may include remining. If that situation develops, coal mine operators are likely to elect to locate their new mines in watersheds that are not impaired by AMD where they can discharge at BAT limits. In such a scenario, the free reclamation and pollution abatement that often comes with remining will be lost. Even if remining will not be part of new mining operations, future mining should still be encouraged in AMD impaired watersheds so that new mines are not disproportionately located in watersheds that are not impaired by AMD. Thus, TMDLs for AMD impaired watersheds should be crafted to encourage future mining and, to the extent feasible, remining in the watersheds by reserving wasteload allocations for future surface and/or underground coal mining, depending on the nature of the coal reserves in the watersheds in question.

Response:
The Department has included waste load allocations for future mining (and non-mining) discharges in the West Branch Susquehanna Watershed. In addition, Attachment G has been added to the TMDL document which outlines further options for permittees in watersheds with approved TMDLs.

COMMENTS FROM MAY 2009 COMMENT PERIOD:

COMMENTOR: PennFUTURE

Citizens for Pennsylvania's Future (PennFuture) submits these comments on the draft "West Branch Susquehanna River Watershed TMDL" dated March 14, 2009 (Revised Draft TMDL), which was prepared for the Pennsylvania Department of Environmental Protection (PADEP), apparently by the Susquehanna River Basin Commission (SRBC). PennFuture is a public interest membership organization dedicated to creating a just future in which the environment, communities, and the economy thrive. One focus of PennFuture's work is to improve and protect water resources and water quality across Pennsylvania through public outreach and education, advocacy, and litigation. PennFuture submitted comments dated March 5, 2007 on the original draft of the West Branch Susquehanna River Watershed TMDL, which was dated February 2, 2007.

Some of PennFuture's March 5, 2007 comments continue to apply, with slight variation, to the Revised Draft TMDL. For example, instead of accounting for the Barnes & Tucker Lancashire #20 Mine treatment plant discharge as part of the Load Allocation (LA) for Monitoring Point WBSR 30.0, as in the 2007 draft, the Revised Draft TMDL accounts for it separately by assigning the discharge its own LA at new point LN20. In so doing, however, it repeats the original draft TMDL's errors of failing to classify the Lancashire #20 discharge as a point source discharge, and therefore failing to assign the allowable loads to it in the form of Wasteload Allocations (WLAs). The Revised Draft TMDL extends these same errors to the proposed discharge from the Barnes & Tucker Lancashire #15 Mine, which would be relocated from the Allegheny River watershed and enter the upper West Branch Susquehanna River (West Branch) between Monitoring Points WBSR 24.0 and WBSR 23.0.

For a second go-round, the Revised Draft TMDL is remarkably slip-shod. In several places, it uses contaminant concentrations values in portions of tables that are supposed to contain contaminant loads, and also contains a number of calculation errors. It fails to require load reductions to offset WLAs assigned to future point source discharges, thereby authorizing excessive daily pollutant loads for all segments with such WLAs. For Monitoring Point WBSR 24.0, the Revised Draft TMDL would require an impossibly low long-term average concentration for aluminum — 3 parts per billion — which a tiny fraction of the target instream concentration for special protection waters derived from monitoring data for High Quality streams. And for two of the eleven river segments PennFuture examined in detail, the Revised Draft TMDL would require a net negative load for one pollutant, that is, a lower load at the end of the segment than is assumed to reach the segment from upstream. In the absence of a plan to withdraw water from the West Branch and treat it for mine drainage contaminants, an assumption that several pounds of metals reaching a given segment from upstream will magically disappear from the river each day is simply fantasy, which by definition is not a rational basis for agency action.

PennFuture details these and other points in the comments below, which begin at the headwaters of the West Branch watershed and proceed downstream. Because of time constraints, PennFuture's analysis of the Revised Draft TMDL extends only through Monitoring Point WBSR 23.0. Several of our comments, however, have implications for downstream monitoring points, and indeed for other TMDLs and the methodologies used to determine them.

Comment: The visible impairment of the West Branch by "orange iron precipitate" at WBSR 33.0 will not be addressed by a TMDL that requires no load reduction for iron.

The Revised Draft TMDL states that the headwaters "portion of the stream is visibly impaired by abandoned mine drainage with the presence of orange iron precipitate," also known as "yellow boy." (Revised Draft TMDL, p. 55) (emphasis added) The TMDL for this initial segment of the West Branch, however, requires no reduction in the long term average concentration of iron or the allowable daily load of iron at Monitoring Point WBSR 33.0. (Revised Draft TMDL, p. 55, Tables D1 and D2) The Revised Draft TMDL therefore will not alleviate the visible impairment of the headwaters segment by iron precipitate.

The results for Monitoring Point WBSR 33.0 illustrate that in at least some circumstances, the statewide water use of "Esthetics," see 25 Pa. Code§ 93.4(a), is the critical water use, and requires an instream concentration of iron far below the instream water quality criterion for the aquatic life use that PADEP and its contractors generally use in determining TMDLs for mine drainage impairments. The measured average iron concentration for point WBSR 33.0 listed in the Revised Draft TMDL is 0.15 milligrams per liter (mg/1) (Revised Draft TMDL, p. 55, Table Dl), which is just one tenth of the instream target or "endpoint" concentration of 1.5 mg/1 used in this and other mine drainage TMDLs. (Revised Draft TMDL, p. 11) Based on other Pennsylvania TMDLs, the underscoring of the value of "0.150" mg/1 reported for all of the iron concentration readings at WBSR 33.0 (Revised Draft TMDL, pp. 15152) apparently signifies that the value represents one half the detection limit, so no individual sample collected at WBSR 33.0 contained an iron concentration exceeding 0.30 mg/l.

These monitoring results for Monitoring Point WBSR 33.0, along with the obvious impairment of the headwaters segment of the West Branch by "orange iron precipitate," reveal that protecting the aquatic life use by achieving an average instream iron concentration of 1.5 mg/1 at Monitoring Point 33.0 will not protect the esthetics use, which requires further reductions in the relatively low iron loads in this segment. This phenomenon doubtless is not restricted to this lone segment of the West Branch, and requires PADEP and the Environmental Protection Agency (EPA) to: a) determine whether other segments of the West Branch may exhibit the same sort of esthetic impairment, even if the instream target for the aquatic life use is achieved; b) be on the lookout for this issue in future mine drainage TMDLs; and c) examine all streams for which aquatic life TMDLs have been completed for impairment of the esthetics use, and if impaired, prepare TMDLs that determine what instream iron concentration and maximum daily load of iron must be achieved in order to alleviate the esthetic impairment.

PennFuture understands that the Revised Draft TMDL was prepared to address listed impairments of the aquatic life use. (Revised Draft TMDL, p. 2) With respect to Monitoring Point WBSR 33.0, PADEP appears to have two options: 1) address the observed impairment of the esthetics use at WBSR 33.0 in this TMDL by determining an appropriate endpoint and the iron load reductions necessary to alleviate impairment; or 2) add this segment of the West Branch to the "Category 5" list of impaired streams needing a TMDL (listing the impaired use as "Esthetics"), and sometime in the future perform the TMDL determination necessary to protect the esthetics use. PADEP also should presumptively consider as impaired for the esthetics use any other segment of the West Branch with an instream concentration of iron exceeding 0.15 mg/l, and should assume that achieving the iron load reductions determined to be necessary to achieve the aquatic life use will not result in attaining the esthetics use.

Response: Water column concentrations of less than 0.3 mg/L total iron are considerably below the water quality criterion of 1.5 mg/L. Therefore, the impairment due to yellow boy staining is not due to a pollutant at this point in the stream. Iron, as many other metals, undergoes complex geochemical reactions instream which, in many cases, results in precipitation of metals onto the stream substrate as dissolved metals leave their soluable phase in solution. The precipitation of metals at point WBSR33.0 likely is caused by upstream inputs of iron into the river (likely from abandoned mine discharges) that have had time to complete these geochemical processes in the stream. This is why the metals are present in the solid form (as bottom precipitates) and not in the water column (to be measured as total iron). The Department will investigate the watershed area upstream of point WBSR33.0 to determine the sources of the iron inputs into the stream and will direct resources to characterize these sources. However, because the instream concentration at the point WBSR33.0 is lower than the criterion, it is indicative not of a pollutant problem at WBSR33.0 but rather a pollution (habitat alteration) problem caused by upstream pollutant inputs that cannot be characterized at this instream point.

Comment: The Revised Draft TMDL fails to explain the unique pattern of monitoring results for aluminum at WBSR 33.0 and therefore fails to provide reasonable assurance that the required load reductions for aluminum will be achieved.

The aquatic life-based instream criterion for aluminum is 0.75 mg/1 as an instantaneous maximum, 25 Pa. Code Ch. 16, App. A, which the Revised Draft TMDL uses as the endpoint for aluminum. (Revised Draft TMDL, p. 11) The average aluminum concentration of 0.61 mg/1 measured at Monitoring Point WBSR 33.0 in the headwaters of the West Branch (Revised Draft TMDL, p. 55, Table D1) is the average of five[*] samples with underscored concentration values of 0.25 mg/1 (apparently representing one half of the detection limit), and one sample with a concentration of 2.43 mg/l. (Revised Draft TMDL. pp. 151-52) That lone sample results in the Revised Draft TMDL's determination that the River must achieve a long-term average concentration of 0.11 mg/1 in order to satisfy the aluminum criterion at least 99% of the time, and that a reduction of 1.39 lbs/day (82.2%) in the aluminum load to the headwaters segment is required[*] (Revised Draft TMDL, p. 55) The aluminum TMDL calculations for all other segments of the river are based on the assumption that the calculated required load reduction of 1.39 pounds of aluminum per day will be achieved at WBSR 33.0.

The Revised Draft TMDL offers no explanation for the aluminum concentration at WBSR 33.0 being at or below the detection or quantification limit of 0.25 mg/1 in November 2004 and January, March, June, and July 2005, but spiking to 2.43 mg/l just once, in May 2005. Being able to explain that odd pattern might suggest both the source of the (apparently) episodic spikes in the aluminum concentration at WBSR 33.0 and how to prevent those spikes from occurring and

[*] The water quality data in Attachment E to the Revised Draft TMDL show six samples with underscored concentration values of 0.25 mg/1 and an average concentration of 0.61 mg/1 overall, but SRBC properly collapsed the two samples collected on March 14, 2005 into a single value for the purposes of all of the calculations pertaining to Monitoring Point WBSR 33.0. It also properly took this same approach to the calculations for other monitoring points for which two samples were collected on the same day. However, because this approach results in apparent discrepancies between the average water quality and flow data used in the body of the Revised Draft TMDL and the average values reported in Appendix E, the Revised Draft TMDL should explain why the values differ. It also should indicate in Appendix E what the underscoring of various concentration readings reported in that appendix signifies.

[*] The Revised Draft TMDL does not mention the presence in the headwaters segment of the West Branch of any white or gray precipitate, which is typically associated with aluminum contamination.

thereby alleviate the impairment. In the absence of such an explanation, the Revised Draft TMDL's rote palliative — "Addressing the mining impacts above this point addresses the impairment for the stream segment." (Revised Draft TMDL, p. 55) — falls completely flat. Obviously, one can make that same statement about all stream segments impaired by mine drainage. To make a meaningful statement, however, one must identify the specific mining impacts to be addressed. Here, that explanation must account for the apparently rare but dramatic spikes in the aluminum concentration.

For TMDLs that include both WLAs to point sources and LAs to nonpoint sources, like the Revised Draft TMDL, EPA's guidance provides that "the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable." EPA, "Guidelines for Reviewing TMDLs under Existing Regulations Issued in 1992" (May 20, 2002), p. 4 (emphasis added). Because the Revised Draft TMDL does not explain the unique pattern of the monitoring data for aluminum at WBSR 33.0 or how the aluminum load reductions in the headwaters segment will be achieved, it fails to provide the required reasonable assurance. As a result, it is improper for the Revised Draft TMDL to assume in the subsequent calculations that the aluminum load at WBSR 33.0 will be reduced by 1.39 pounds per day, to 0.30 pounds per day. Instead, the full load of 1.69 pounds per day should be assumed to reach the next downstream segment monitored at WBSR 32.0.

Response: Monitoring point WBSR 33.0 is located approximately 0.4 miles from Carrolltown, Pa. There are numerous sources of nonpoint pollution that could have caused an episodic spike in aluminum concentration on 5/16/2005. The underlined data (such as <u>0.250)</u> in the water quality data section represents half the detection limits of 0.500 and is underlined to distinguish the difference between data above the detection limit. Secondly, the data in Appendix E is a catalog of all data collected at each monitoring point. The duplicates (data sampled twice on the same date at the monitoring point) were displayed to show there were quality assurance efforts taken during the sampling. However, from a calculation standpoint, these data points were averaged in Monte Carlo simulation as one record.

Comment: The Lancashire #20 treatment facility outfall (LN20)

The original, 2007 Draft TMDL accounted for the discharge from the mine drainage treatment facility at the Barnes & Tucker Lancashire #20 Mine as part of the TMDL and Load Allocation at the instream monitoring point immediately downstream from the treatment facility outfall, WBSR 30.0. Copying verbatim a sentence appearing in the 2007 draft, the Revised Draft TMDL states that "[t]his monitoring point [WBSR 30.0] accounts for the water quality after it has been processed through the [Lancashire #20] treatment plant." (Revised Draft TMDL, p. 58) In fact, that statement no longer is accurate, because the Revised Draft TMDL accounts for the load from the Lancashire #20 treatment facility through a TMDL and Load Allocation assigned to the treatment facility discharge itself, which is identified as a new point — LN20 — between instream monitoring points WBSR 31.0 and WBSR 30.0. (Revised Draft TMDL, p. 13, Table 5; pp. 57-58) Attachment E to the Revised Draft TMDL fails, however, to include the monitoring data for this new point that was used in the TMDL calculations. The final TMDL should provide that monitoring data.

Because the Lancashire #20 treatment facility outfall is a discrete conveyance of mine drainage that enters the West Branch at a single point, assigning the Lancashire #20 discharge a discrete set of maximum daily loads is the correct conceptual approach. The Revised Draft TMDL makes three errors, however, with respect to point LN20: a) it erroneously uses the boilerplate language for instream monitoring points to describe LN20, which is not an instream point; b) it erroneously classifies the Lancashire #20 treatment facility outfall as a nonpoint source discharge and therefore erroneously classifies the allowable load at LN20 as a LA rather than a WLA; and c) it fails to provide reasonable assurance that the load reductions it determines are necessary at LN20 actually will be achieved. PennFuture explains these three shortcomings in the subsections below.

A. Language applicable to instream monitoring points should be removed from the discussion of point LN20, which is a discrete discharge.

The discussion of "LN20: Lancashire No. 20 Mine" on pages 57-58 of the Revised Draft TMDL follows the format of the discussion of instream monitoring points like WBSR 31.0 and WBSR 30.0, which bracket the Lancashire #20 treatment facility's outfall. Thus, the section of the Revised Draft TMDL concerning LN20 speaks of a "load allocation to the watershed area LN20," and of "this segment" and "this stream segment." (Revised Draft TMDL, p. 57) LN20, however, is not an instream monitoring point, so it does not define a stream segment or watershed area, and the TMDL provides no instream monitoring data or average instream water quality figures for the location at which the Lancashire #20 discharge enters the West Branch (though they are approximated by the monitoring data and figures for WBSR 30.0, immediately downstream). Similarly, the Revised Draft TMDL is misleading when it states that "[f] or each parameter, the total load that was removed upstream was subtracted from the existing load at point LN20" (Revised Draft TMDL. p. 58), because the load reductions for the monitoring points above the location where LN20 enters the River were not removed from the existing loads at LN20. Because LN20 is a discharge, it is its own "upstream," which is why all three entries for the "Percentage of upstream loads that reach LN20" in Table D8 on page 58 of the Revised Draft TMDL are "100.0%".

In short, the Lancashire #20 treatment facility outfall is a discharge, not an instream monitoring point. As a result, the Revised Draft TMDL should discuss LN20 as a discharge, just as it does the many other existing and potential discharges to which it assigns WLAs.

Response: Any language referring to upstream, stream, or watershed have been removed from this data point.

B. The outfall from the Lancashire #20 treatment facility is a point source discharge that should receive WLAs rather than LAs.

The outfall from the Lancashire #20 treatment facility is a confined and discrete conveyance of treated mine drainage that adds a number of pollutants to the West Branch. As such, it is a "point source" as defined in the Clean Water Act, see 33 U.S.C. § 1362(14), and the load it is allowed to add to the West Branch must be allocated in the form of a WLA, see 40 C.F.R. §§ 130.2(h), 130.7(c).

PennFuture recognizes that PADEP disagrees with our analysis of this legal issue, and already has responded to this comment in Attachment I to the Revised Draft TMDL. Because the original draft TMDL apparently has been withdrawn and judicial review of any approval of the Revised Draft TMDL may be limited to issues raised in the comments submitted on the Revised Draft TMDL, however, see 5 U.S.C. § 706, PennFuture reiterates most of its earlier comment on this issue, adding some details that did not appear in our 2007 comments.

The Revised Draft TMDL assigns the Lancashire #20 treatment facility LAs for iron, manganese, and aluminum, and required load reductions for the first two of those pollutants, at LN20. (Revised Draft TMDL. p. 13, Table 5; p. 58, Tables D7 and D8) (Note that in Table 5, the figure of 1.47 lbs/day of iron shown as the Existing Load at LN20 should read 1.51; as shown in Tables D7 and D8 on page 58, 1.47 is the existing average concentration of iron in the discharge at LN20.) It thereby considers the Lancashire #20 Mine treatment facility outfall a nonpoint source. In fact, the treatment facility is a point source. As such, its discharge must be authorized by a NPDES permit, and the discharge must receive a WLA in the WBSR Watershed TMDL. All that is required to correct this basic error is to convert the LAs at point LN20 into WLAs.

Like the original draft, the Revised Draft TMDL explains that "[t]he distinction between point and nonpoint sources in this case is determined on the basis of whether or not there is a responsible party for the discharge." (Revised Draft TMDL, pp. 8-9) The Revised Draft has deleted the sentence that followed this sentence in the original, 2007 draft: "Where there is no responsible party, the discharge is considered to be a nonpoint source."

The Clean Streams Foundation, Inc. (CSF) has two trust accounts pertaining to mines formerly operated by the Barnes & Tucker Company. One trust account, identified as "Barnes & Tucker," apparently applies to the Barnes & Tucker No. 20 and No. 24 mines. As of February 27, 2009, that account contained about $1.05 million. The second account, labeled "Lancashire #15 Mine," apparently is limited to guaranteeing the treatment of the discharge from the identified mine, which is discussed in Sections 10.B and 10.C, below. As of February 27, 2009, the Lancashire #15 Mine account contained about $3.06 million. Whether it is the CSF itself or its contractor (Lloyd Environmental Services), somebody must be responsible for ensuring that the Lancashire

#20 treatment facility continues to be properly operated and maintained. If PADEP observes that the treatment facility has suffered a malfunction, surely it has the number of someone to call who is responsible for fixing the problem. Thus, even if the "distinction" drawn by the Draft TMDL were valid, the treatment facility discharge in question would be a point source discharge.

Moreover, as PennFuture has explained in comments submitted on several TMDLs, PADEP's "distinction" finds no support in the law. For the purposes of the Clean Water Act, it is the Clean Water Act itself that defines what constitutes a point source, which includes any "discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, [or] channel[.]" 33 U.S.C. § 1362(14). The outfall from the Barnes and Tucker Lancashire #20 Treatment Facility no doubt falls within that description, so the addition of any pollutant to the navigable waters from the treatment facility is a point source discharge. See id. § 1362(6), (12), (14), (16).

As PennFuture explained in the attached letter to the Chief Counsels of PADEP and the Pennsylvania Department of Conservation and Natural Resources dated December 21, 2005 (Attachment A), a NPDES-permitted point source discharge from a permitted mining operation is not magically transformed into a nonpoint source discharge or otherwise exempted from the Clean Water Act's NPDES permit requirement because the mining company switches from operating the treatment system itself to providing for the operation of the treatment system through establishing a trust fund.* More recently, PennFuture addressed the NPDES permitting issue in comments dated February 27, 2009 that were submitted on behalf of six organizations to the Office of Surface Mining Reclamation and Enforcement (OSM) at Docket No. OSM-2008-0021, 74 Fed. Reg. 2005 (January 14, 2009). Section 6.D.5 of the February 27, 2009 comment letter to OSM states, in relevant part:

> The recent decision in *West Virginia Highlands Conservancy v. Huffman,* 2009 U.S. Dist. LEXIS 2526 (N.D.W. Va., January 14, 2009), holds that West Virginia's Department of Environmental Protection (WVDEP) must obtain NPDES permits at eighteen ABS bond forfeiture discharge sites. *Id.* at * 10, *39• The Secretary of the WVDEP argued that "requiring the WVDEP now to obtain and meet the more stringent requirements of an NPDES permit is impractical and would work a serious financial hardship on West Virginia." *Id.* at *14. Though "mindful that ... the WVDEP ... will be heavily burdened if it must obtain NPDES permits," the Court held that the federal Clean Water Act (CWA) plainly made the discharges subject to the NPDES requirements, and that WVDEP was violating the CWA by discharging pollutants from the sites without NPDES permits. *Id.* at *38. The Court rejected as barred by the Supremacy Clause WVDEP's argument that its compliance with the provisions of its approved state program under SMCRA, which provisions are purely state law, *see* Bragg v. West Virginia Coal Ass'n, 248 F.3d 275 (4th Cir. 2001); *see also* Pennsylvania Federation of Sportsmen's Clubs, Inc. v. Hess, 297 F.3d 310 (3d Cir. 2002) (approved Pennsylvania program is state law), "shields it from the requirements of the federal CWA" *Huffman,* 2009 U.S. Dist. LEXIS 2526 at *38.

* In the situation involving the Potato Ridge Mine and Smith Mine addressed in the attached letter, the Clean Streams Foundation ultimately created a separate entity, Potato Ridge, LLC, to hold the relevant mining and NPDES permits. See 37 Pa. Bull. 255 (January 13, 2007).

> If a state agency must comply with the requirements of the NPDES program at bond forfeiture discharge sites, it follows with greater force that the NPDES requirements apply to trust fund discharge sites. A treatment trust is simply a financial vehicle to provide continued treatment for a discharge that, if treated by the mine operator himself or a contractor hired directly by the mine operator, would have to be authorized by a NPDES permit. If the mine operator winds up affairs or otherwise cedes control of the treatment system to another person, that person must hold an NPDES permit for continued discharge from the treatment system. Nothing in the CWA implies that a NPDES-permitted discharge suddenly becomes exempt from the NPDES requirement when the mine operator switches from providing or paying for treatment of the discharge directly to paying for it indirectly through a trustee.[*] " Cf. Huffman, 2009 U.S. Dist. LEXIS 2526 at *11 (noting that WVDEP had issued NPDES permits to the former mine operators for the discharges from all eighteen bond forfeiture sites, and had issued itself a NPDES permit for a reclamation project at one of the sites).

There are many good reasons why mine drainage treatment facilities that were permitted and regulated under the NPDES program should remain permitted and regulated under the NPDES program. For example, NPDES permits play a critical role in helping to ensure that water quality standards, including instream water quality criteria and new or revised total maximum daily load (TMDL) allocations, are effectuated. *See, e.g.,* 40 C.F.R. § § 122.4(d), (i), 122.44(d)(1)(vii)(B) (incorporated by 25 Pa. Code § 92.2(b)(2), (14)); 25 Pa. Code § 92.31(a). *See also Friends of Pinto Creek v. U.S. EPA,* 504 F.3d 1007 (9th Cir. 2007), *cert. denied,* 77 U.S.L.W. 3396 (2009). The standard conditions in all NPDES permits require that all discharges comply with water quality standards, and that the discharger prevent discharges that create various offensive conditions or a danger of being inimical to any water use. 25 Pa. Code § 92.51(6), (7). Those conditions further require that the treatment system be maintained in good working order and operated as efficiently as possible, id. § 92.51(4), and ensure that federal and state water quality regulators have uninhibited access to the premises to inspect the treatment system and sample its effluent. *Id.* § 92.51(3). Having effluent limitations and permit conditions that are enforceable by the public is particularly important where the treatment is provided by a treatment trust, because the trustee, whose compensation is a percentage of the trust's assets, has a financial incentive to defer big-ticket recapitalization expenditures and more

[*] Where the mine operator hired a contractor to operate the treatment system, it literally may be true that the only change is who writes the checks: the treatment system is the same, the treated discharge is (or should be) the same, the source of the funds is the same, and even the contractor may be the same. Whether or not a NPDES-permitted discharge must remain a NPDES-permitted discharge should not turn on who writes the check to the operator of the treatment system.

> generally to sacrifice the level of treatment in order to keep more money in the trust for a longer time.
>
> More important, however, is that under the plain terms of the CWA, mine drainage treatment facilities that were permitted and regulated under the NPDES program <u>must</u> remain permitted and regulated under the NPDES program. Just as there is no exception in the CWA and the NPDES regulations for bond forfeiture discharge sites, *see Huffman,* 2009 U.S. Dist. LEXIS 2526 at *36, <u>the CWA and NPDES regulations likewise contain no exception for treatment trust</u> discharge <u>sites.</u> Like the former, the latter are subject to the NPDES requirements of the CWA. *See also Sierra Club v. El Paso Gold Mines, Inc.*, 421 F.3d 1133 (10th Cir. 2005); *Committee to Save the Mokelumne River v. East Bay Mun. Util. Dist.*, 13 F.3d 305 (9th Cir. 1993), *cent denied, 513* U.S. 873 (1994).

(February 27, 2009 Comments of the Pennsylvania Federation of Sportsmen's Clubs, et al., PA-153-FOR, Docket ID: OSM-2008-0021, Comment 6.D.5, pp. 46-48)

The situation envisioned by the footnote in the quoted comment (which appears at the bottom of the preceding page) is presented by the Barnes & Tucker deep mine discharges. For a number of years before Barnes & Tucker Company went bankrupt in late 2001, Dennis A. Lloyd submitted the discharge monitoring reports for the various Barnes & Tucker deep mine discharges under the cover of letters written on the Barnes & Tucker Company's letterhead. For several years thereafter, he submitted the same reports under the cover of letters written on the letterhead of his own company, Lloyd Environmental Services. Thus, it appears that the same individual continued to run (or supervise the running of) the same treatment systems, and continued to be paid with money provided, at least in the main[*] by the same company -- Barnes & Tucker. Apparently, all that changed was the name on the hat worn by Mr. Lloyd, and who was writing the checks, with the CSF substituted for Barnes & Tucker.

Who is responsible for writing the checks — that is, whether it is a trustee funded by a mining company rather than the mining company itself who pays the treatment plant operator - does not affect whether a discharge is properly classified as a point source discharge within the meaning of the federal Clean Water Act and its implementing regulations. See 33 U.S.C. 1362(6), (12), (14), (16); 40 C.F.R. § 122.2; see also 25 Pa. Code § 92.2(b)(1) (incorporating by reference 40 C.F.R. § 122.2). The post-mining discharge from the Lancashire #20 treatment facility was properly classified as a point source discharge when Barnes & Tucker operated the facility, and it remains a point source discharge today, when money paid into the Barnes & Tucker CSF trust account provides for the continued operation of the same facility. As a result, the discharge must be authorized by a NPDES permit, see 33 U.S.C. §§ 1311(a), 1342(a), and the TMDL must assign WLAs to it for the three metals. See 40 C.F.R. § 130.2(h).

Response: The Department incorporates its response to commenter’s 2007 comment on these issues, which is set forth in Attachment I to the Revised Draft TMDL. As further explanation, the Department disagrees with commenter’s argument that the Clean Streams Foundation is

[*] IKON Office Solutions contributed some amount to the Barnes & Tucker trust account for the No. 20 and No. 24 mines pursuant to a 2002 Consent Order and Agreement.

“responsible” for treating the Barnes & Tucker discharges identified by the commenter. The foundation merely acts as the trustee for a trust fund established by the mine operator liable for treating the discharges caused by the operator’s mining operations—which trust fund is used to pay ongoing treatment costs after the liable operator ceased to exist. The Revised Draft TMDL, in referring to a responsible party, means a person who caused the postmining pollutional discharge and is therefore liable for treating the pollution caused by its mining operation. The mine operator liable for treating the Lancashire # 20 discharge was liquidated, dissolved or otherwise ceased to exist prior to completing reclamation of the mine site—including treatment of all postmining pollutional discharges from the site. Consequently, the unreclaimed mine site is an abandoned mine site.

The Department also disagrees with commenter’s contention that the discharge from the Lancashire # 20 treatment facility should be considered a “point source discharge” pursuant to applicable law. The discharge from the treatment facility is properly characterized as a nonpoint source discharge for two main reasons. First, no person responsible for causing the discharge exists. Second, a treatment facility for an abandoned mine discharge does not add pollutants to a surface water; on the contrary, the treatment facility removes pollutants that would reach the surface water from an abandoned mine drainage source for which there is no responsible party. Consequently, the discharge from the Lancashire # 20 treatment facility does not fit within the definition of a “point source discharge” under the Clean Water Act, see 33 U.S.C. §§ 1362(12), (14), (16),.and is properly characterized as a nonpoint source discharge under applicable law. EPA has approved Department TMDLs classifying discharges from abandoned mine sites as non-point sources, see, e.g., EPA Decision Rationale, TMDL, Elk Creek Watershed for Acid Mine Drainage Affected Segments (April 1, 2005). Moreover, the recent decision in *West Virginia Highlands Conservancy v. Huffman*, 2009 U.S. Dist. LEXIS 2526 (N.D.W.Va. Jan. 14, 2009) referred to and discussed by commenter addressed whether West Virginia should be required to issue NPDES permits to itself for bond forfeiture sites for which West Virginia had assumed responsibility for treating the discharges. The case did not address the characterization of abandoned mine discharges in the context of a TMDL; nor did it address the assignment of LAs or WLAs to such discharges.

C. The Revised Draft TMDL fails to provide reasonable assurance that the required load reductions will be achieved at LN20.

The Revised Draft TMDL requires an 82.8% reduction in the daily load of iron released at the Lancashire #20 outfall (1.25 pounds per day) and a 30.4% reduction in the daily manganese load (0.07 pounds per day). (Revised Draft TMDL, p. 58, Table D8) The Revised Draft TMDL fails to provide any reason to believe, however, that these reductions will be achieved.

The Revised Draft TMDL contains a description of the statewide and watershed-specific programs and projects that supposedly provide "reasonable assurance" that all of the nonpoint source load reductions required by the TMDL will be achieved. (Revised Draft TMDL, pp. 19-24) The only project that could reduce the iron and manganese loadings at LN20, however, is an improvement in the treatment efficiency of the Lancashire #20 treatment facility. The Revised

Draft TMDL does not suggest that it would be possible to reduced the average iron concentration in the discharge from 1.47 mg/l to 0.25 mg/l, which is the reduction the TMDL for point LN20 would demand, or that the average manganese concentration could be reduced from the current average of 0.22 mg/l to the required level of 0.15 mg/i. (Revised Draft TMDL, p. 58, Table D7) Moreover, even if such reductions were feasible, the Revised Draft TMDL does not suggest that there is any project in the works to try to improve the treatment provided by the Lancashire #20 treatment facility. Thus, the TMDL fails to provide the required reasonable assurance that load reductions at LN20 actually will be achieved. As a result, it is improper for the Revised Draft TMDL to assume that these reductions will be achieved when calculating the TMDLs and LAs for Monitoring Point WBSR 30.0, which must be reduced by 1.25 pounds per day for iron and 0.07 pounds per day for manganese.

Response: The existing programs identified in the statewide and watershed recommendations sections of the TMDL are to be used construct and improve upon existing treatment facilities in areas where nonpoint source inputs of pollution are added to waters of the Commonwealth. To this end, as means are available, improvement to projects such as the Lancashire #20 treatment facility will be conducted on a timeframe as determined by the Department.

Comment: The required load reductions at Monitoring Point WBSR 30.0 fail to account for the WLAs, and the true required nonpoint source load reduction for iron at WBSR 30.0 are impossible to achieve because they exceed the amount of iron load added to the river in the segment between WBSR 31.0 and WBSR 30.0.

In a TMDL, if you:

(a) calculate the required load reductions for an impaired stream segment based on the existing, monitored pollutant loads; and

(b) reduce the LAs corresponding to those required load reductions in order to add WLAs for future growth (future mining) in the segment; then you

(c) must go back and recalculate the required nonpoint source load reductions for the segment by increasing them to account for the "future growth" WLAs, because otherwise, you will authorize too much load for the segment. For each parameter for which the stream currently is impaired, the necessary increase in the required nonpoint source load reductions will equal the total WLAs for future growth in the segment.

As PennFuture explains in greater detail in Section 4.A, below, for Monitoring Point WBSR 30.0, SRBC did steps (a) and (b), but it neglected to "balance the books" by doing step (c). It calculated the required load reductions at WBSR 30.0 based on the instream loads monitored between November 2004 through July 2005 and assigned those load reductions to the nonpoint sources, but when it added WLAs for future mining (and reduced the LAs commensurately), it neglected to increase the required (nonpoint source) load reductions commensurately. As a result, even if the required nonpoint source load reductions for Monitoring Point WBSR 30.0 shown in Table 5 of the Revised Draft TMDL are achieved, the nonpoint source loads will exceed the LAs, and the overall load (including the load from the future mining operations) will exceed the TMDLs.

The key to understanding this error, which may appear in many other Pennsylvania TMDLs, is that unlike pollutant load coming from existing point sources, the load associated with WLAs for "future growth" did not exist at the time the instream monitoring was conducted, and therefore is not accounted for in the "load tracked" for the relevant monitoring point. Instead, that "future growth" load is outside the modeled system.[*] To ensure that an impaired segment has sufficient assimilative capacity available for the exogenous, future load, the TMDL must create a "cushion" of assimilative capacity by requiring load reductions for the segment that go beyond the reductions needed today to attain the instream criteria, or include in the future growth WLAs a requirement that future loads be offset at or before the time they are created.

In short, "future growth" load is not the same as existing load. If no future sources are involved, a reallocation of allowable load between the LAs and WLAs requires a reallocation of the required load reductions between the nonpoint sources and point sources, but does not change the overall load reductions required for the segment. In contrast, to the extent the WLAs are for "future growth," the overall required load reductions must be increased by the same amount.
In this instance, SRBC cannot fully correct the error by increasing the required nonpoint source load reductions, because the existing nonpoint source load of iron entering the West Branch in this segment is less than the reduction that would be required to fully accommodate the WLAs (which, as presented in the Revised Draft TMDL, are exclusively for future mining[+]). Thus, to fully accommodate the proposed WLAs, either: a) there would have to be reasonable assurance that load would be removed from this segment by taking water from the West Branch and treating it; or b) the TMDL would have to be modified to require additional load reductions at one or more upstream points. PennFuture suggests below that the proper course here is simply to eliminate the future mining WLAs assigned to this segment.

A. **Failure to balance the books for Monitoring Point WBSR 30.0.**

Table D 10 on page 59 of the Revised Draft TMDL correctly calculates the allowable loads (Row 7) and required load reductions (Row 8) at WBSR 30.0. The text immediately below Table D10 states that the TMDL "requires a load allocation for total iron," (Revised Draft TMDL. p. 59), which is true as far as it goes, but both Table D 10 and the earlier Table 5 (p. 13) show that the TMDL also requires a load allocation (and substantial load reduction) for aluminum.

To understand the error made in the Revised Draft TMDL for point WBSR 30.0, it is helpful to pull apart some of the numbers in Table D 10. In the column for iron, the figure of 5.71 lbs/day in Row 2 represents the portion of the monitored load at point WBSR 30.0 that is newly contributed by the existing sources in this segment, all of which apparently are nonpoint

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[*] As explained below, the same is true of the load associated with WLAs for point sources that begin discharging after the stream monitoring period. This is another systemic defect in Pennsylvania's TMDLs. Sources that begin discharging during the monitoring period are only partially accounted for by the instream monitoring, so the protective approach would be to treat their entire load in the same way as the future load from a potential source.

[+] All of the WLAs for point WBSR 30.0 shown in Table 5 of the Revised Draft TMDL are for future mining operations. (Revised Draft TMDL, p. 13, Table 5; pp. 59-60).

sources.* The figure of 3.76 lbs/day in Row 4 is the load that will reach this segment from upstream if all of the required load reductions upstream are achieved (as the TMDL assumes). Adding those two numbers together gives you the figure of 9.47 lbs/day in Row 6, which represents the iron load that would reach WBSR 30.0 if all upstream load reductions were achieved but there were no reduction of the existing load that is added within this segment. Given the separate determination that the allowable iron load at WBSR 30.0 is 5.94 pounds per day, the 9.47 lbs/day of "tracked" iron load must be reduced by the amount of 3.53 pounds per day shown in Row 8 in order to meet the instream target concentration for iron. In the last row, Table Dl 0 shows that the required iron load reduction represents a reduction of 37.3% from the figure of 9.47 lbs/day (the assumed upstream load plus the maximum segment-specific load).+ A parallel explanation applies to the figures in the column for aluminum in Table D10.

If the required iron load reduction of 3.53 lbs/day (Row 8) is achieved, then the iron load added in this segment will be 5.71-3.53 = 2.18 lbs/day, which represents the allowable daily iron load added within this segment. Combining that segment-specific allowable load with the 3.76 lbs/day of allowable load entering the segment from upstream yields the total maximum allowable daily load of 5.94 lbs/day at WBSR 30.0.

So, the figures in Table Dl 0 reveal that a maximum of 2.18 lbs/day of iron may enter the West Branch within this segment. On the same page, however, Table D 11 shows that the Revised Draft TMDL would allow (future) point source discharges to add much more than 2.18 lbs/day of iron - a total of 4.52 lbs/day - to this segment of the West Branch. That same total of 4.52 lbs/day appears in Table 5 as the total WLA for this segment. But if all the sources in this segment of the river collectively are allowed to add only 2.18 lbs/day of iron to the river, how can just two sources be allowed to discharge 4.52 lbs/day of iron into the river in this segment?

The answer, of course, is "they can't."

Another way to see that something is wrong with the TMDL for this segment is to compare the TMDL for point WBSR 30.0 in Table 5 of the Revised Draft TMDL against how that portion of the table would look if there were no WLAs for future mining point source discharges into this segment of the river. Using the data in Table D10 of the Revised Draft TMDL, if there were no WLAs at point WBSR 30.0, Table 5 would appear as follows:

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* Like the WLAs at point WBSR 30.0 for the two future mining operations (Revised Draft TMDL, p. 59, Table D 11), the WLA for the West Carroll Township Water Authority's Bakerton Water Treatment Plant appears before the discussion of the next segment downstream, monitored at point WBSR 29.0. (Revised Draft TMDL. p. 60, Table D12) Because the WLAs for point WBSR 29.0 (Revised Draft TMDL, p. 13, Table 5) include the small amounts listed in Table Di 2, PennFuture assumes that the Bakerton Water Treatment Plant's discharge enters the West Branch between WBSR 30.0 and WBSR 29.0. The text of TMDL should make clear that the Bakerton Water Treatment Plant WLAs are included in the overall WLAs for point WBSR 29.0.

+ Perhaps more relevant is a percentage the Revised Draft TMDL does not report, namely the percentage reduction required in the segment-specific load. In light of the facts that the 3.76 lbs/day in iron load reaching this segment from upstream must be taken as a given (i.e., that load could be reduced only by re-doing all of the calculations, starting at the relevant upstream point), and only 5.71 lbs/day of iron is added to the stream within this segment, a more meaningful percent reduction figure would use 5.71 lbs/day as the denominator. The resulting figure - 61.8% -- shows how much the iron loads originating in this segment must be reduced in order to satisfy the TMDL. For aluminum, Table D10 of the Revised Draft TMDL reports the required percentage reduction as 69.9%, but the required percentage reduction of the aluminum load originating within this particular segment is 5.09 lbs/day / 6.38 lbs/day = 79.8%.

No point source (no WLA) scenario						
	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	NS Load Reduction (lbs/day)	NPS % Reduction
WBSR 30.0: West Branch Susquehanna River downstream of Barnes and Tucker Lancashire #20						
Iron (lbs/day)	24.73	5.94	0.00	5.94	3.53	37.3%
Manganese (lbs/day)	3.38	3.38	0.00	3.38	0.00	0.0%
Aluminum (lbs/day)	14.62	2.19	0.00	2.19	5.09	69.9%
Acidity (lbs/day)	-104.49	-	0.00	-	-	-

In contrast, here is how Table 5 actually appears, with the WLAs for future mining:

Table 5, as presented on page 13 of the Revised Draft TMDL						
	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	NS Load Reduction (lbs/day)	NPS % Reduction
WBSR 30.0: West Branch Susquehanna River downstream of Barnes and Tucker Lancashire #20						
Iron (lbs/day)	24.73	5.94	4.52	1.42	3.53	37.3%
Manganese (lbs/day)	3.38	3.38	3.00	0.38	0.00	0.0%
Aluminum (lbs/day)	14.62	2.19	1.12	1.07	5.09	69.9%
Acidity (lbs/day)	-104.49	-	0.00	-	-	-

The two highlighted columns in the tables show that despite the fact that all of the LAs to the nonpoint sources in the actual Table 5 are much lower than in the "no WLA" version above it, the required nonpoint source (NPS) load reductions are precisely the same. If the LAs to the nonpoint sources are lower when the WLAs to the future mining operations are taken into account, how can the required NPS load reductions be the same?

Again, the answer is, "they can't." The NPS load reductions in Table 5 are too low, because they were not adjusted (increased) commensurately with the reductions in the LAs.

Here is what went wrong. The 4.52 lbs/day of iron load that would be added to this segment of the West Branch by the point source discharges from the two future mining operations is not included in the existing (monitored) iron load, and therefore is not accounted for in the "Calculation of Load Reductions Necessary at Point WBSR 30.0" presented in Table D10 on page 59 on the Revised Draft TMDL. Table D10 calculates the load reductions that would be necessary to lower the existing, segment-specific pollutant loads (or more precisely, the segment-specific pollutant loads that existed as of November through July 2005) to the levels necessary to attain the allowable pollutant loads at WBSR 30.0. Table Dl 0 is not designed to determine what load reductions would be necessary if additional, unmonitored load were added to the river within this segment.

There are a number of possible ways to account for the "future growth" WLAs for the segment of the river monitored at WBSR 30.0. Using iron as an example, one way would be to add the 4.52 lbs/day of future mining point source load to the 9.47 lbs/day of "Total load t[r]acked between WBSR 31.0 and 30.0" in Row 6 of Table D10, which would increase that total to 13.99 lbs/day. This adjustment would be appropriate because one must assume that if the mine discharges were established, their entire load would reach point WBSR 30.0. Subtracting out the 5.94 lbs/day of allowable load at WBSR 30.0 would result in a required iron load reduction of 8.05 lbs/day in this segment (Row 8). For aluminum, the corresponding figures would be a total tracked load of 8.40 lbs/day in Row 6 and a required load reduction of 6.21 lbs/day in Row 8.

Response: On page 263, the commenter acknowledges that instead of the "balancing the books" approach to handling future wasteload allocations, another acceptable approach to accounting for these WLAs is acceptable. In the second paragraph, the commenter makes the following statement: "To ensure that an impaired segment has sufficient assimilative capacity available for the exogenous, future load, the TMDL must create a "cushion" of assimilative capacity by requiring load reductions for the segment that go <u>beyond</u> the reductions needed today to attain the instream criteria, *or include in the future growth WLAS a requirement that future loads be offset at or before the time they are created*." (Italics added for emphasis). This alternative approach is exactly the approach the Department is proposing to use to handle these future WLAs. Attachment G – TMDLs and NPDES Permitting Coordination contained on pages 158-160 lists a number of options identified that can be used by permittees wishing to obtain NPDES permits in TMDL watersheds. In the section headed "Options identified", item 1 contains the following statement addressing the handling of the "balancing of the books" related to future WLAs: "Build excess WLA in the TMDL for anticipated future mining. This could then be used for a new permit. Permittee must show that there has been an 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."

B. Failure to provide reasonable assurance that required nonpoint source load reductions will be achieved.

As mentioned above, TMDLs that include both WLAs to point sources and LAs to nonpoint sources "should provide <u>reasonable assurances that nonpoint source control measures will achieve expected load reductions</u> in order for the TMDL to be approvable." EPA, "Guidelines for Reviewing TMDLs under Existing Regulations Issued in 1992" (May 20, 2002), p. 4 (emphasis added). If the agency cannot provide "reasonable assurances" that load reductions assigned to nonpoint sources will be realized, it must further reduce the WLAs and tighten the enforceable effluent limits on the point sources in order to fulfill the requirement of ensuring that the overall load will be reduced below the level at which impairment of water quality standards begins. See 40 C.F.R. § 130.7(c)(1).

The Revised Draft TMDL cannot provide the required reasonable assurances with respect to point WBSR 30.0, because unless the West Branch itself is treated, a load reduction of 8.05 lbs/day of iron in this segment is impossible. As discussed above and shown in Row 2 of Table D10, only 5.71 lbs/day of iron is currently added to the West Branch in this segment. Even if all of that existing, segment-specific iron load were eliminated, however, the instream iron load would still have to be reduced by 2.34 lbs/day in order to meet the allowable load of 5.94 lbs/day at WBSR 30.0. Unless someone is planning to build a system to siphon water out of the river in this segment and treat it for iron, the only place to shed that excess load in this segment* is from the WLAs for future mining.

The fact that the TMDL for this segment is in error also is revealed by examining the existing and allowable loads from the nonpoint sources in this segment and the load reductions the TMDL would demand from those sources. As shown above, the existing nonpoint sources in this segment add an average of 5.71 pounds per day of iron to the river. If the Revised Draft TMDL's required nonpoint source reduction of 3.53 pounds per day were achieved, the resulting nonpoint source load would be 2.11 pounds per day. However, the allowable load from the nonpoint sources at point WBSR 30.0 — that is, the LA — is only 1.42 pounds per day. (Revised Draft TMDL, p. 13, Table 5) Obviously, the required nonpoint source load reductions must result in a nonpoint source load that is no more than the LA.

Most important, the insufficiency of the Revised Draft TMDL's required nonpoint source load reductions is confirmed by calculating the instream iron load that would result if the required nonpoint source load reductions were achieved and all of the future mining operations were discharging. If the nonpoint source load of iron in this segment is reduced by only 3.53 pounds per day, 2.18 pounds per day of the existing (nonpoint source) iron load will continue to enter the West Branch in this segment. Adding that continued, segment-specific load to the 3.76 pounds per day of allowable load from upstream sources and the 4.52 pounds per day of allowable load from the future mining operations in this segment would result in a total daily iron load of 10.46 pounds per day at WBSR 30.0, which is 4.52 pounds per day more than the TMDL of 5.94 pounds per day. (It is no coincidence that the amount of the exceedance equals the amount of the WLAs for the future mining operations.)

For aluminum, the error in the TMDL is again confirmed by examining the LA and the required nonpoint source load reduction. Row 2 of Table Dl 0 shows that the existing load from the nonpoint sources in this segment is 6.38 pounds of aluminum per day. Even if the entire required nonpoint source reduction of 5.09 pounds per day were achieved, the resulting nonpoint source load would be 1.29 pounds per day, which would exceed the LA for aluminum of 1.07 pounds per day. (Revised Draft TMDL, p. 13, Table 5)

Comparing the TMDL for aluminum against the instream aluminum loads that would result from making the required nonpoint source load reductions also reveals the inadequacy of the TMDL's required reductions. If the nonpoint source load of aluminum in this segment is reduced by only 5.09 pounds per day, 1.29 pounds per day of the existing aluminum load will continue to enter the River in this segment. Adding that 1.29 pounds per day to the 0.90 pounds per day of allowable load from upstream sources and the 1.12 pounds per day of allowable load from the future mining operations in this segment would result in a total daily aluminum load of 3.31 pounds per day at WBSR 30.0, which exceeds the TMDL of 2.19 pounds per day by 1.12 pounds per day (which again, is precisely the amount of the WLAs for the future mining operations).

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* Another alternative would be to require additional load reductions totaling 2.34 lbs/day at one or more upstream locations (including the Lancashire #20 treatment facility discharge, LN20). Doing so, however, would require a new series of TMDL calculations, and there would have to be reasonable assurance that those additional load reductions upstream will actually occur.

For aluminum, accounting for the WLAs for future mining in this segment would require a load reduction of 6.21 lbs/day, or 97.3% of the existing load of 6.38 lbs/day that is added to the river in this segment. (Table Dl 0, Row 2) Thus, the WLAs for future mining would require nearly complete elimination of the existing (nonpoint source) load of aluminum between WBSR 31.0 and WBSR 30.0.* There is no suggestion in the Revised Draft TMDL, much less the required reasonable assurance, that complete elimination of the segment-specific aluminum load is feasible.

Manganese is slightly more complicated. The Revised Draft TMDL indicates that, assuming all required manganese load reductions upstream are achieved, no further load reductions are necessary in this segment of the River. (Revised Draft TMDL, page 59, Table Dl 0, Rows 8 & 9) As -a result, the Revised Draft TMDL requires no nonpoint source load reductions for this segment. (Revised Draft TMDL, p. 13, Table 5) If there were no future mining WLAs for this segment, it would be true that no further manganese load reductions would be required in this segment, because the total manganese load of 3.31 pounds per day tracked between WBSR 31.0 and 30.0, is 0.07 pounds per day less than the allowable load of 3.38 pounds per day at WBSR 30.0. (Revised Draft TMDL. p. 59, Table D10, Rows 6 & 7) When the future mining WLAs are properly taken into account, however, nonpoint source load reductions for manganese are required at WBSR 30.0.

Again, start by examining the LA. Table 5 on page 13 of the Revised Draft TMDL shows a LA of 0.38 pounds per day of manganese and no required nonpoint source load reduction at all at point WBSR 30.0. Row 2 of Table D10 on page 59 shows that the existing (nonpoint source) manganese load in this segment is 1.68 pounds per day. The Revised Draft TMDL would not require any reduction in that nonpoint source manganese load (Revised Draft TMDL. p. 13, Table 5), which obviously exceeds the LA of 0.38 pounds per day.

The total manganese load also confirms that the Revised Draft TMDL incorrectly fails to require nonpoint source load reductions for manganese in this segment. If, as the Revised Draft TMDL would allow, no nonpoint source manganese load reductions are made in this segment, there will be 1.68 pounds per day of existing manganese load entering the river in this segment. Adding that figure to the 1.63 pounds per day of allowable load from upstream sources and the 3.00 pounds per day of allowable load from the future mining operations in this segment results in a total daily manganese load of 6.31 pounds per day at WBSR 30.0, which exceeds the TMDL of 3.38 pounds per day by 2.93 pounds per day. (For manganese, this exceedance does not precisely match the total WLAs for the future mining operations of 3.00 pounds per day because the assumed upstream load reductions would leave 0.07 pounds per day of assimilative capacity at WBSR 30.0 unused. This amount is the difference between the allowable load of 3.38 lbs/day in Row 7 of Table Dl 0 and the total tracked load of 3.31 lbs/day shown immediately above in Row 6 of Table Dl 0.) Thus, for manganese, the maximum daily load authorized by the Revised Draft TMDL actually would allow a segment that currently is unimpaired for manganese to become impaired for manganese, exactly the opposite of what a TMDL is supposed to do.

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* Although the Revised Draft TMDL classifies the Lancashire #20 treatment facility outfall as a nonpoint source, it already has accounted for that particular discharge, the allowable pollutant loadings from which are included in the calculations point WBSR 30.0 as part of the loads reaching this segment from upstream.

For each of the three metals, in order to achieve the TMDLs at Monitoring Point WBSR 30.0, the nonpoint source load reductions in Table 5 of the Revised Draft TMDL would have to be increased to account for the loads to be added to the system by the future mining operations. With a slight exception for manganese, the additional nonpoint source load reductions that would be required at WBSR 30.0 would equal the amount of the WLAs for the future mining operations. The total required nonpoint source load reductions at WBSR 30.0 would be 8.05 pounds per day for iron (instead of 3.53 pounds per day, as shown in Table 5), 6.21 pounds per day for aluminum (instead of 5.09 pounds per day), and 2.93 pounds per day of manganese (instead of zero pounds per day). Far from being reasonably assured, however, such nonpoint source load reductions in this segment are highly unlikely, and as shown above, in the case of iron, they are impossible unless the river water itself is treated.

The best, simplest, and most honest way to rectify the errors for Monitoring Point WBSR 30.0 would be to eliminate the WLAs for future mining, which would necessitate increasing the LAs at WBSR 30.0 while allowing the required nonpoint source load reductions in the Revised Draft TMDL to remain unchanged. If the WLAs for future mining in this segment were eliminated, it would be fairly simple to correct the Revised Draft TMDL. Table D10 would remain as is, Table Dl 1 would be eliminated, and the section of Table 5 for point WBSR 30.0 would be revised in accordance with the first table on page 13, above, for the "No point source (no WLA) scenario."

In sum, the mistake SRBC made was treating non-existent, future loads as if they were accounted for by the existing monitoring data and the calculation of the load reductions needed today to reach the maximum allowable loads for this segment. In order to allow for additional loads from future mining operations, the TMDL would have to "provide a cushion" for them by requiring other sources to reduce their pollutant loads by more than the amounts that would be necessary to meet the allowable load for the segment today. The problem, however, is that there is no reasonable assurance that the nonpoint source load reductions necessary to accommodate the future mining operation pollutant loads can be achieved, and in the case of iron, the only way to achieve sufficient reductions would be to treat the river itself. As a result, in order to assure that this segment of the river will attain both the maximum allowable daily pollutant loads and the instream endpoints for each parameter, the WLAs for future mining operations must be eliminated from the final TMDL for point WBSR 30.0.

Response: As explained in response 4A, the Department has decided to take an alternative method to the one proposed by the commenter to addressing future WLAs in the segment. Because of this, the underlying reason why the reasonable assurance would need to be provided (needing to treat the West Branch itself) is no longer existent and reasonable assurance need not be addressed.

C. **The implications of the proper analysis for WBSR 30.0.**

In many TMDLs, PADEP and its contractors have applied the flawed methodology that resulted in the erroneous nonpoint source load reduction determinations discussed in the preceding subsections of this comment. Thus, our analysis of the TMDL for Monitoring Point WBSR 30.0 has implications that extend well beyond point WBSR 30.0, and beyond the Revised Draft

TMDL for the West Branch. PennFuture briefly discusses one obvious and one less obvious implication immediately below.

i."Future growth" WLAs

The obvious implication of the analysis above is that PADEP's methodology fails to account properly for "future growth" WLAs, whether they are for future mining operations or any other variety of additional, future point source pollutant load. If the required nonpoint source reductions for a given segment were calculated without considering the future growth WLAs as part of the "total load tracked" for the segment, then if the segment was already impaired for the relevant parameter, the required nonpoint source load reductions are too low by the same amount as the future growth WLAs.

Two additional examples of this same problem may be found in draft Pennsylvania mine drainage impairment TMDLs currently pending before EPA for approval. In the draft "Buffalo Creek Watershed TMDL, Somerset County" (September 18, 2008), the LAs for aluminum and manganese at point BUFF 12 were correctly reduced by the amount of the WLAs for the future mining operation, but the NPS load reduction figures were not increased to reflect those reductions in the LAs. To properly account for the load from the future mining operation (i.e., to create the "cushion" in assimilative capacity necessary to accommodate those future loads), the NPS load reduction figures in Table 3 on page 11 of that draft TMDL should read 23.41 lbs/day for aluminum (rather than 22.85 lbs/day) and 18.16 lbs/day for manganese (rather than 16.66 lbs/day). Similarly, in the pending draft "Moshannon Creek Watershed TMDL, Clearfield and Centre Counties, Pennsylvania" (October 30, 2008), the NPS load reduction figures for the three metals shown in Table 3 on page 22 for monitoring point BVER02 would be correct if there were no WLAs to a future mining operation, but they must be increased by the amount of the future mining WLAs in order to ensure that the LAs and TMDLs for that segment will be attained. To use aluminum as an example, the NPS load reduction of 5.4 lbs/day for point BVER02 shown in Table 3 of the draft Moshannon Creek TMDL would reduce the existing nonpoint source load from 6.9 lbs/day to 1.5 lbs/day, which would exceed the aluminum LA of 0.94 lbs/day.

PennFuture identified these additional examples in a quick examination of the only two pending draft TMDLs we checked. In light of these additional examples of the problem illustrated by the calculations for point WBSR 30.0 in the Revised Draft TMDL, PADEP and EPA should examine all Pennsylvania TMDLs containing future growth WLAs and make any necessary corrections.

Response: As explained in response 4A, the Department has decided to take an alternative method to the one proposed by the commenter to addressing future WLAs in the segment. Because of this, the comment need not be addressed.

ii. WLAs for functionally future point sources

The less obvious but equally important implication of the analysis for point WBSR 30.0 is that sources that begin to discharge after the completion of the instream monitoring used in the

TMDL are functionally the same as future sources, because the load they contribute is not accounted for in the instream monitoring and therefore is not part of the "total load tracked" for the segment. In essence, any load that is first added to the stream after the instream monitoring period is "future" growth, even if the source exists at the time the TMDL is prepared. As a result, just as the required load reduction for a segment must be increased to properly account for a WLA for future growth, it likewise must be increased in order to account for a WLA to any existing source that began discharging after the end of the monitoring period for the instream water quality and flow data used in the TMDL calculations. That approach also would be correct for sources that began discharging during the monitoring period, for which the "tracked load" would only partially reflect the impact of the new discharge.

Like the failure to properly account for future growth WLAs by increasing the required load reductions for the relevant segment, the failure to properly account in the same manner for WLAs to these functionally future, post-monitoring point source discharges appears to be a systemic, methodological error that applies to all similar WLAs in all Pennsylvania TMDLs. As a result, PADEP and EPA should examine all Pennsylvania TMDLs to determine whether WLAs for recently-permitted point sources are properly accounted for in the monitoring data and the calculations of the required load reductions, and where necessary should revise the TMDLs accordingly.

Response: As explained in response 4A, the Department has decided to take an alternative method to the one proposed by the commenter to addressing future WLAs in the segment. Because of this, the comment need not be addressed.

Comment: The WLAs for iron at point WBSR 28.0 do not add up.

The Revised Draft TMDL provides "an aggregate WLA of 6.26 lbs/day of iron, 4.17 lbs/day of manganese, and 3.13 lbs/day of aluminum" at point WBSR 28.0. (Revised Draft TMDL. p. 61). It also includes a WLA for future mining in this segment, allowing for one operation with two, standard-sized pits. (Revised Draft TMDL, p. 62) For manganese and aluminum, the sum of the "aggregate WLA" and the standard, two-pit future mining WLA equals the total WLA for point WBSR 28.0 reported in Table 5 on page 13 of the Revised Draft TMDL. For iron, however, the sum of the "aggregate WLA" (6.26 lbs/day) and the standard, two-pit future mining WLA (2.26 lbs/day) is 8.52 lbs/day, which is lower than the figure of 8.85 lbs/day presented in Table 5. Unless there is another WLA for iron in this segment (which should be mentioned in the text of the TMDL if true), then the WLA for iron at point WBSR in Table 5 on page 13 should be 8.52 lbs/day rather than 8.85 lbs/day.

Response: The requested changes have been made.

Comment: The allowable loads at point WBSR 28.0 should be reduced by the amounts provided in the "aggregate WLA," which should be eliminated from the TMDL.

The "aggregate WLA" at point WBSR 28.0 is the first (farthest upstream) WLA of this nature in the Revised Draft TMDL, which explains: "This aggregate WLA is intended to cover a number of permitted discharges, as well as incorporate any potential unaccounted loads, based on data limitations that exist with regards to water quality and flow information for the contributing area. In addition, the unaccounted loads provide an added margin of safety. Information on known discharges for this aggregate WLA can be found in Attachment H." (Revised Draft TMDL. p. 61)

For starters, all of the known discharges listed in Attachment H are at least six segments downstream, extending no farther upstream than the segment monitored at WBSR 22.0 (Revised Draft TMDL, p. 166), so there are no "known discharges" for this particular aggregate WLA. Second, the Revised Draft TMDL does not explain why there would be "potential unaccounted loads," that is, why SRBC might have missed point source discharges into this segment, or why the instream monitoring in this segment might have failed to detect load coming from point sources. Third, the Revised Draft TMDL similarly fails to explain how the specific aggregate WLA figures were determined. Why, for example, should unidentified point sources be authorized to discharge an aggregate WLA of 4.17 lbs/day of manganese into this segment of the river while the nonpoint sources are collectively authorized to discharge only 0.54 lbs/day? (Revised Draft TMDL, p. 13, Table 5)

Finally, the Revised Draft TMDL fails to explain how "the unaccounted loads" - apparently meaning the amounts authorized to be discharged by the aggregate WLAs — "provide an added margin of safety." (Revised Draft TMDL. p. 61) To truly provide "an added margin of safety," one should eliminate pollutant load, not authorize its discharge. Thus, the final TMDL should simply reduce the maximum allowable daily loads at point WBSR 28.0 by 6.26 lbs/day of iron, 4.17 lbs/day of manganese, and 3.13 lbs/day of aluminum rather than authorize the discharge of those amounts through the proposed "aggregate WLA."

For all of these reasons, PennFuture recommends that the "aggregate WLA" at Monitoring Point 28.0 be deleted from the final TMDL, and the amounts assigned to the aggregate WLA be subtracted from the allowable loads for that point.

Response: After further review, the “aggregate WLA” was removed from monitoring point WBSR 28.0. However, these WLAs will remain in the document for monitoring sites WBSR 1.0, WBSR 2.0, WBSR 4.0, WBSR 5.0, WBSR 7.0, WBSR 8.0, WBSR 10.0, WBSR 12.0, WBSR 13.0, WBSR 16.0 and WBSR 18.0. An “aggregate WLA” is assigned to permits with metal (iron, manganese, and aluminum) effluent limits that are located on impaired streams (according to Commonwealth assessments) that have not had a TMDL written or currently in review.

Comment: The "Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines" in Attachment F of the Revised Draft TMDL does not apply to RNS Services, Inc.'s Lancashire #25 coal preparation plant or its Lancashire #25 coal refuse disposal area.

Attachment F to the Revised Draft TMDL, titled "Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines," explains how flow rates and pollutant loads are determined for water pumped from open pits of an assumed, standard size at active surface mines. (Revised Draft TMDL, pp. 153-57) The Revised Draft TMDL states that this method was applied in determining the WLAs for the discharges from RNS Services, Inc.'s Lancashire #25 coal preparation plant (Revised Draft TMDL, pp 64-65 & Table D23) and its Lancashire #25 coal refuse disposal area (Revised Draft TMDL, p. 67 & Table D28). It fails to explain, however, why a methodology based on open mining pits at surface mines would apply to a coal preparation plant or a coal refuse disposal area.

In the WLAs for the Lancashire #25 prep plant, the Revised Draft TMDL uses the standard flow rate of 0.0445 mgd (or 30.9 gpm) and standard pollutant loads from Attachment F for a single, 1500' x 300' open pit at a surface mine. (Revised Draft TMDL, pp. 64-65 & Table D23) It is unclear why this method and the resulting flow and load figures are applicable to a preparation plant. The final TMDL should either justify the use of these numbers or use monitored flow data from the preparation plant.

The Revised Draft TMDL s it uses the Attachment F methodology in calculating the WLAs for the Lancashire #25 coal refuse disposal area (Revised Draft TMDL, p. 67), but the average flow rate of 0.0256 mgd and the allowable pollutant loads presented in Table D28 on page 67 do not appear to match up with any figures in Attachment F. The TMDL should explain how these figures were derived, and if they were not determined using the Attachment F methodology, the references to Attachment F should be deleted.

Response: Any references to "Method for Calculating Loads from Mine Drainage Treatment Facilities from Surface Mines" were removed from these permits. The discharges from the permits were used in calculating the WLAs.

Comment: The description of the segment monitored at point WBSR 25.0 should be clarified.

PennFuture understands that the removal and reclamation of what was considered the Barnes Watkins refuse pile (or piles) was completed in late 2007 or early 2008. The Revised Draft TMDL refers to this feature as the "previously-existing Barnes Watkins Refuse Pile," and describes the location of Monitoring Point WBSR 25.0 as "at the northern edge of the Barnes Watkins refuse piles," which implies that the piles still exist. The description goes on to refer to "the large refuse piles adjacent to the West Branch Susquehanna River" without making clear whether the reference is to the now-reclaimed Barnes Watkins piles (as we assume) or instead to other refuse piles that still exist next to this segment of the West Branch. These points should be clarified in the final TMDL. We also suggest that the final TMDL refer to the Barnes Watkins pile(s) as "reclaimed" rather than "previously existing."

Response: References containing "previously existing" were changed to "reclaimed. Also, clarification was made on the second reference to "the large refuse piles adjacent to the West Branch Susquehanna River."

Comment: Monitoring Point WBSR 24.0

A. **Data entry and calculation errors in the tables for point WBSR 24.0 must be corrected.**

Table D32, page 69

In the columns for the "Measured Sample Data" in Table D32 on page 69 of the Revised Draft TMDL, the values reported for alkalinity are a concentration of 0.00 mg/l and a load of 0.00 lbs/day. The water quality data table on page 149 in Attachment E, however, reports an average alkalinity concentration of 2.74 mg/1 at WBSR 24.0. Following the form of the other calculations by collapsing the two measurements for November 18, 2004 into a single value, an average concentration of 3.2 mg/l for alkalinity should appear in Table D32. At the average flow rate of 5.69 mgd, that concentration would result in an average load of 151.85 lbs/day, which also should appear in Table D32.

Table D33, page 70

In the column for aluminum in Table D33 on page 70 of the Revised Draft TMDL, the "Allowable load at WBSR 24.0" shown in Row 7 is 0.003 lbs/day. In fact, as shown in Table D32 on page 69, the figure of 0.003 is the allowable instream concentration of aluminum in mg/1 at WBSR 24.0, not the allowable daily load, which is 0.13 lbs/day. Thus, that cell of Table D33 should read 0.13 rather than 0.003, and as a result, the value in the next row of the aluminum column (the required load reduction at WBSR 24.0) should read 836.53 rather than 836.657. In turn, that correction changes the percent reduction figure in the last row of the aluminum column from 99.99% to 99.98%. These minor corrections, however, do nothing to change the fact, explained in the next subsection, that it is impossible to achieve the aluminum load reductions and instream aluminum concentration that would be required by the figures in Table D33.

The figure of 0.00 lbs/day in Row 4 of the column for acidity in Table D33 is incorrect. Based on Table D29 on page 68 of the Revised Draft TMDL, the correct figure is 0.39 lbs/day.
As a result of this correction, the figure in Row 6 of the same column should read 6,754.05 rather than 6,753.66, the figure in Row 8 should read 6,752.98 rather than 6,752.59., and the percent reduction figure in the last row of the acidity column should read 99.98% rather than 99.99%.

Table 5, page 14

In the section of Table 5 for point WBSR 24.0 on page 14 of the Revised Draft TMDL, the following corrections should be made.

In the row for Aluminum:

In the columns for both the TMDL Allowable Load and the LA, the figure should be 0.13.

The NPS Load Reduction figure should read 836.53 rather than 836.66.

The NPS % Reduction figure should read 99.98% rather than 99.99%.

In the row for Acidity:

In the columns for both the TMDL Allowable Load and the LA, the figure should be 1.07. (The figure of 0.02 listed in the TMDL Allowable Load column is the allowable long term average concentration, not the allowable load - see Table D32 on page 69.)

> The NPS Load Reduction figure should read 6,752.98 rather than 6,753.66. (Even if one were to use the uncorrected load reduction figure from Table D33, this figure would be 6,752.59 rather than *6,753.66.)*
>
> The NPS % Reduction figure should read 99.98% rather than 99.99%.

Response: The calculation errors outlined above have been corrected.

B. It is impossible to achieve the nonpoint source aluminum load reductions required at point WBSR 24.0.

i. It is irrational to base a TMDL on the assumptions that the long term average instream concentration of aluminum at WBSR 24.0 ever could be reduced to 3 parts per billion, and that there will be a net negative load of aluminum in this segment.

There are several flashing red rights warning that what the Revised Draft TMDL would require at point WBSR 24.0 is simply and indisputably impossible.

The first clear indication of a problem is that despite the fact that the river's flow rate at WBSR 24.0 is more than 1,000 gpm and 39% higher than the flow rate at the monitoring point immediately upstream, WBSR 25.0, the allowable aluminum load at WBSR 24.0 is 97% lower than the allowable load at WBSR 25.0. A higher flow may dilute the load coming from upstream and thus reduce the instream concentration, but even if all of the water entering the downstream segment contains no aluminum at all, that dilution effect leaves the loading unchanged. Moreover, in an area like the upper portion of the West Branch watershed, some of the water entering the segment will contain aluminum and thus will increase the aluminum load.

Monitoring Point WBSR 25.0 is little more than a quarter mile upstream from WBSR 24.0. (Revised Draft TMDL, p. 40) At WBSR 25.0, the existing aluminum load is 445.33 lbs/day. (Revised Draft TMDL, p. 68, Table D29) The existing aluminum load at WBSR 24.0 is nearly three times that amount, specifically 1,277.54 lbs/day. (Revised Draft TMDL, p. 69, Table D32) This relationship would be reversed for the allowable aluminum loads under the Revised Draft TMDL. The allowable aluminum load at the upstream point, WBSR 25.0, is 4.45 lbs/day (Revised Draft TMDL, p. 68, Table D29), which is also shown as the "Additional load tracked from above samples" at point WBSR 24.0. (Revised Draft TMDL, p. 70, Table D33) The allowable aluminum load at WBSR 24.0, however, is just 0.13 lbs/day, or 4.32 lbs/day and 97.1% less than at the monitoring point a quarter mile upstream. Despite the considerably lower allowable load downstream, Table D33 reports that the "Percent loss due calculated at WBSR 24.0" for aluminum (and all other pollutants) is 0.0%. (Revised Draft TMDL. p. 70, Table D33) The Revised Draft TMDL does not suggest why or how 97% of the aluminum load would magically disappear in this short stretch of the river.

The second (and related) indication of a major problem is that the aluminum load reduction required at WBSR 24.0 (which is reported in Tables 5 (p. 14) and D33 (p. 70) as 836.657

lbs/day, but actually should read 836.53 lbs/day) exceeds the amount of existing aluminum load contributed by all sources in this segment (832.21 lbs/day, shown in Row 2 of Table D33). These figures again imply that the (nonpoint) sources of aluminum load in this segment not only will be completely eliminated, but further that there will be a net reduction in the instream aluminum load in this segment. Or stated another way, the TMDL would require that the nonpoint sources in this segment go from adding an average of 832.21 pounds of aluminum to the West Branch each day to removing an average of 4.32 pounds of aluminum from the river each day. The Revised Draft TMDL does not suggest that someone plans to pump and treat water from the river in this segment, so there is zero probability that there will be a net negative aluminum load in this segment. Thus, instead of providing the required "reasonable assurances" that all of the aluminum load reductions assumed by the Revised Draft TMDL actually will occur, the Revised Draft TMDL shows that it is impossible for all of those reductions to occur.

The most obvious signal of a problem, however, is the long term average instream aluminum concentration of 0.003 mg/l, or 3 parts per billion (ppb), that the Revised Draft TMDL would require to be achieved at WBSR 24.0. An aluminum concentration of 3 ppb:

- is the lowest detection limit for the most sensitive EPA-approved analysis method for water samples, see 25 Pa. Code Ch. 16, Table 2A;

- is 98.5% below the target instream aluminum concentration of 200 ppb (0.2 mg/1) used in several EPA-approved Pennsylvania TMDLs for High Quality streams, based on the 95th percentile instream concentration in reference High Quality streams (e.g., West Creek Watershed TMDL, Elk County (approved March 27, 2007); Laurel Branch Run Watershed TMDL., Clearfield County (approved March 27, 2007); UNT 26051 Trout Run and UNT 26053 Pine Run Watersheds, Clearfield County (approved April 4, 2007)); and

- is 98.7% below the concentration of 231 ppb (0.231 mg/1) used as the target long term average aluminum concentration for High Quality stream segments in EPA's draft Kiskiminetas River watershed TMDL (March 2009), which represents the 95th percentile aluminum concentration for Clear Shade Creek in Somerset County, a High Quality stream.

It is pure fantasy to believe that the concentration of aluminum in the West Branch at WBSR 24.0 can ever be reduced from the current level of 26,920 ppb all the way down to a long term average of just 3 ppb, which would require running every drop of water in the river and every drop entering the WBSR 25.0-to-WBSR 24.0 segment through a reverse osmosis treatment system. Like basin a family budget on an assumption of winning the lottery, it is irrational to base a TMDL, or any other decision, on a fantasy.

In sum, it is simply impossible to achieve the proposed TMDL at WBSR 24.0. The Revised Draft TMDL must be further modified to set a realistic instream aluminum concentration target and realistic aluminum load reductions for this segment of the river.

Response: The aluminum concentration at point WBSR24.0 was remodeled and a new, more realistic concentration of 0.24 mg/L was determined to be the allowable long-term average concentration. Therefore, this comment no longer is applicable.

ii. **The analysis for aluminum at point WBSR 24.0 reveals another fundamental and systemic problem in Pennsylvania's mine drainage TMDL methodology.**

Again, the import of this analysis goes well beyond both Monitoring Point WBSR 24.0 and the Revised Draft TMDL. It reveals another fundamental, systemic problem in Pennsylvania's mine drainage TMDL methodology that may obscure necessary load reductions at downstream monitoring points and thereby render the resulting TMDLs poor and sometimes misleading guidance for targeting pollutant load reductions.

The source of the problem — the reason the Revised Draft TMDL comes up with an unattainable average allowable instream aluminum concentration of 3 ppb at WBSR 24.0 — is determining the long-term allowable instream concentration by using Monte Carlo modeling based on a small number of samples (here, usually 6), and consequently a small number of statistical degrees of freedom.* When combined with the natural (seasonal and episodic) variability of monitored instream concentration, the Monte Carlo statistical analysis produces instream concentration targets that often are extremely conservative and sometimes (as in this instance) are downright wacky. If you have to target an instream concentration of 0.003 mg/l in order to ensure that the instream concentration will remain at or below 0.75 mg/1 (250 times the target value), something is seriously wrong with your targeting system.

It may seem that PennFuture should applaud a method that results in targeting such pristine instream pollutant concentrations. The problem, however, is that because of the headwaters-to-mouth of the watershed approach to calculating the allowable loads, flawed analysis at an upstream point infects the entire TMDL by affecting the calculations for the downstream segments. Specifically, by creating a false premise that essentially all of the upstream pollutant load has been eliminated, and therefore that the full flow of the river will have the assimilative capacity of nearly pure water, this approach greatly overstates the assimilative capacity that actually can be expected and thus incorrectly and misleadingly overestimates the amount of instream load that can be added in downstream segments. In turn, authorizing too much additional load downstream based on an unfounded assumption of nearly pure dilution from the upstream segment(s) will result in excessive pollutant load and failure to achieve the instream criterion.

A TMDL that targets an unrealistic instream concentration, and thereby further assumes that concentration is attained when modeling the downstream segments, may obscure pollutant load reductions that are not only necessary but readily available in a downstream segment. For example, if a TMDL assumes that the targeted instream concentration of 0.003 mg/1 of aluminum for a given segment will be achieved, the calculation for the segment immediately downstream might imply that no aluminum load reductions are necessary in that segment. In

* An approximation of the long-term allowable instream pollutant concentration also may be calculated using the average measured parameter concentration, the standard deviation, and the (one-tailed) t-statistic for the selected confidence level and appropriate degrees of freedom. Allowable instream concentrations estimated by PennFuture in this manner generally are within a few hundredths of a milligram per liter of the concentrations produced by Pennsylvania's Monte Carlo simulations.

turn, this implication could cause planners to turn a blind eye to a discharge that offers low-cost aluminum load reductions, and the treatment of which actually may be essential to achieving the instream criterion in the downstream segment.

For example, assume that the average flow in the upstream segment is 3,000 gpm, and that a discharge with an average flow of 20 gpm and concentration of 30 mg/l of aluminum enters the river in the next segment downstream. Based on a simple mixing analysis using average values, if one assumes the upstream segment will achieve the targeted instream average concentration of 0.003 mg/l, one probably would conclude that there is no need to treat the discharge, because on average, it would increase the instream aluminum concentration only to 0.213 mg/1.[+] If, instead, it is assumed that the upstream segment eventually will attain, on an average basis, an instream concentration of 0.60 mg/l (which is an heroic assumption for many streams impaired by mine drainage), then a similar calculation would reveal the importance of treating the discharge, because allowing it to remain untreated would result in an exceedance of the instream aluminum criterion.[*] This simplified hypothetical serves to illustrate that unrealistic assumptions about upstream pollutant concentrations and loads resulting from the Monte Carlo analysis may be counterproductive, because they may cause those who write and implement TMDLs to overlook loading sources downstream that are worthy of attention.

One possible solution to this problem would be to use the instream concentrations and loads resulting from the Monte Carlo analysis as target values for the purpose of calculating allowable concentrations and loads, but, when carrying those loads forward to the downstream segments, to instead assume that the instream concentration that actually will be achieved at the end of the upstream segment will just meet, on a long term average basis, the criterion concentration. This more realistic approach would prevent the need for load reductions (or additional load reductions) in downstream segments from being obscured by assuming unattainably low concentrations in upstream waters, and thus would help to provide greater assurance that the TMDL actually will be achieved.

Whatever remedy is chosen, however, Pennsylvania may not continue to base TMDLs on modeling results, like the assumed instream aluminum concentration of 3 ppb at WBSR 24.0, that have no chance of occurring in the real world.

Response: As stated in response to the previous comment, a more realistic number for the aluminum concentration at WBSR24.0 has been included in the TMDL document. The Department will take the commentor’s comment into consideration in future mine drainage TMDL development.

Comment: Monitoring Point WBSR 23.0

[+] (3,000 gpm/3020 gpm)(0.003 mg/l) + (20 gpm/3,020 gpm)(30 mg/1) = (.993) (0.003 mg/1) + (.007)(30 mg/1) = 0.003 mg/1 + 0.21 mg/1= 0.213 mg/1

[*] (3,000 gpm/3020 gpm)(0.60 mg/1) + (20 gpm/3,020 gpm) (30 mg/1) = (.993)(0.60 mg/1) + (.007)(30 mg/1) = 0.596 mg/1 + 0.21 mg/1= 0.806 mg/l

The Revised Draft TMDL states that Monitoring Point 23.0 "accounts for the untreated Barnes and Tucker Lancashire #15 mine discharge," and that "[a]n average flow measurement was available for point WBSR 23.0 (14.84 MGD)." (Revised Draft TMDL, p. 70) Actually, the average flow measurement for WBSR 23.0 (which is based on six observations, treating the identical flow measurements on November 8, 2004 as a single observation) is an average of only 5,172.69 gpm, or 7.45 mgd. (Draft TMDL. p. 149) The flow of 14.84 mgd used in the modeling is the sum of the average measured flow of 7.45 mgd and the expected average flow of 7.39 mgd from the re-directed, treated discharge from the Barnes & Tucker Lancashire #15 Mine.[+]

A. Data entry and calculation errors in the tables for point WBSR 23.0 must be corrected.

Table D35, page 71

In the column for aluminum in Table D35 on page 71 of the Revised Draft TMDL, the "Additional loads tracked from above samples" in Row 4 is shown as 0.00 lbs/day but should read 0.13 lbs/day, which is the allowable aluminum load at WBSR 24.0 shown in Table D32 on page 69. (As explained above, PennFuture objects to the figure of 0.13 lbs/day as impossible. Here we are merely indicating that the Revised Draft TMDL's figures are internally inconsistent.) As a result of this correction, the value in Row 6 of the aluminum column (the total load tracked between WBSR 24.0 and WBSR 23.0) should read 3,135.06 rather than 3,134.93. In turn, that correction changes the "Load Reduction at WBSR 23.0" from 3,090.81 to 3,090.94. Finally, the percent reduction figure in the last row of the aluminum column should read 98.6% rather than 98.3% (and this would be true even if the other figures in the column are not corrected).

The figure of 0.00 lbs/day in Row 4 of the column for acidity in Table D35 is incorrect. Based on Table D32 on page 69 of the Revised Draft TMDL, the correct figure is 1.07 lbs/day. As a result of this correction, the figure in Row 6 of the same column should read 45,324.16 rather than 45,323.09, and the figure in Row 8 should read 45,318.56 rather than 45,317.49.

Table 5, page 14

In the section of Table 5 for point WBSR 23.0 on page 14 of the Revised Draft TMDL, the following corrections should be made:

In the row for Aluminum:

The NPS Load Reduction figure should read 3,090.94 rather than 3,090.81.

[+] The two "West Branch Susquehanna River Site 23.0" Excel spreadsheets PADEP provided to PennFuture pursuant to a Right to Know Law request use an instream flow rate of 5,172.692 gpm (or 7.449 mgd) at WBSR 23.0, and an average discharge rate of 5,132.374 gpm (or 7.391 mgd) for the Barnes & Tucker Lancashire #15 discharge. In addition, a January 9, 2009 email message from SRBC to PADEP states that an OSM report on the Lancashire #15 mine determined that the average pumping rate at the existing Duman treatment plant was 7,390,619 gallons per day. An article published by two OSM authors states that "[b]etween 4.68 and 9.36 x 10^6 gal/day (17.735.4 x 10^6 L/day) are pumped from the mine pool, with an annual mean of 7.4 x 10^6 gal/day (28 x 10^6 L/day)." Hawkins, J. and Dunn, M., Hydrologic Characteristics of a 35-Year-Old Underground Mine Pool, 26 Mine Water Environ 150, 152 (2007). Thus, the figure of 7.29 mgd given on page 24 of the Revised Draft TMDL as the average anticipated flow from the proposed treatment system apparently should read 7.39 mgd. (Revised Draft TMDL, p. 24)

The NPS % Reduction figure should read 98.6% rather than 98.3%.

In the row for Acidity:

The NPS Load Reduction figure should read 45,318.56 rather than 45,317.49.

Table D36, page 71

In section 1 0.C.iv.d, below, PennFuture recommends that the WLAs for future mining operations in this Table be deleted from the TMDL. If these WLAs are retained, the order of "Fe" and "Al" should be reversed in the first column for Future Operations 2 and 3 to match the order for Future Operation 1.

Response: The requested changes have been made. The future mining WLA will remain in the document to allow room for future operations.

B. The outfall from the proposed Barnes & Tucker Lancashire #15 treatment facility would be a point source discharge that must be authorized by a WLA.

The TMDL for point WBSR 23.0 includes WLAs for three future mining operations, which would (if all operated at the same time) have a cumulative average flow of 0.27 mgd. (Revised Draft TMDL, p. 71 & Table D36). The redirected, piped discharge of nearly 7.4 mgd from the Barnes & Tucker Lancashire #15 Mine, however, is considered as a nonpoint source discharge, and its authorized load is included (or partially included, see Section 10.C, below) in the LA for this segment.

As an initial matter, it is unclear why the Revised Draft TMDL takes two different approaches to the modeling of the Lancashire #20 and Lancashire #15 discharges. As described in Section 3, above, the Revised Draft TMDL models the Lancashire #20 treatment facility as its own separate TMDL point (LN20). It does not do the same, however, for the proposed Lancashire #15 AMD Treatment Plant discharge, which instead is included in the modeling for the monitoring point immediately downstream, WBSR 23.0. If you were going to choose just one of the two Barnes & Tucker discharges to model as a separate point, however, it obviously would be Lancashire #15. On average, the 0.123 mgd Lancashire #20 discharge makes up about 10% of the river's flow at WBSR 30.0, while downstream at WBSR 23.0, the much larger, 7.39 mgd Lancashire #15 discharge would make up roughly half the instream flow. Because redirecting the Lancashire #15 discharge would be akin to creating another, similarly-sized fork joining the river just above WBSR 23.0, it would make more sense to model Lancashire #15 rather than Lancashire #20 as a separate TMDL point. If the final TMDL continues to model the two Barnes & Tucker discharges in threes different ways, it should explain why.

Regardless of the modeling methodology applied, the outfall into the West Branch from the proposed Lancashire #15 AMD Treatment Plant would be a point source discharge that must be authorized by a WLA. The reasoning presented with respect to the Lancashire #20 treatment facility discharge in Section 3.B, above, applies with equal or greater force to the proposed outfall into the West Branch from the future Lancashire #15 treatment facility.

Today, the discharge of treated mine drainage pumped from the Lancashire #15 mine pool enters a tributary to Elk Creek in the Allegheny River watershed from the Duman treatment facility, which is operated with funding provided by the Barnes & Tucker Company that is held in the CSF "Lancashire #15 Mine" trust account. EPA's April 1, 2005 Decision Rationale approving the Final Elk Creek Watershed TMDL, Cambria County (January 14, 2005),[*] states that "[t]he continued mine pool water treatment of the Eastern Associated Coal Corporation's Y-Portal and Barnes and Tucker's Lancashire Number 15 Mine will . . . have an overall positive effect on the Elk Creek Watershed." (EPA Decision Rationale, Final Elk Creek Watershed TMDL, p. 13)

It is of no legal consequence that if the pumping of the Lancashire #15 mine pool ceased, most of the surface breakout would enter the West Branch, as it did for a period in 1970 with devastating consequence.[+] First, but for the deliberate diversion of the Lancashire #15 discharge into the West Branch watershed, the CSF would be obligated to use the funding in the Lancashire #15 Mine trust account to pump the mine pool water to the Duman treatment facility and to release the treated mine drainage into the Allegheny River watershed. That is to say, a hypothetical cessation of pumping is a false premise. The relevant premise is the controlling legal regime, in which pumping and treatment of discharge and release of the effluent into the Allegheny River basin is required.

Second, it is important to recognize that the Lancashire #15 discharge does not go anywhere "naturally," and that the short-lived breakout from the Lancashire #15 mine complex into the West Branch in 1970 was not a natural phenomenon. Though various laws of nature were at work, but for the borehole and extensive mine tunnels made by man, no highly contaminated water would have broken out into the West Branch.[*] Thus, the breakout of the Lancashire #15 mine pool into the West Branch that occurred nearly forty years ago was no more of a "natural" condition than is the current discharge into the Allegheny basin. In 1970, a manmade borehole re-directed the man-made mine's discharge from the Allegheny basin to the West Branch. Since 1970, another man-made system, with an overlay of legal obligations, has restored the discharge to the Allegheny River watershed. Substituting a different pumping and treatment system that would re-route the mine pool water to the West Branch does not mimic what would happen in nature, but simply chooses one manipulation of an artificial hydrological system over another.

Third, the dispositive consideration is that regardless of whether the outfall from the Lancashire #15 treatment facility is to the tributary to Elk Creek in the Allegheny River basin or into the West Branch of the Susquehanna River, the treatment facility would add pollutants to the waters of the United States (the receiving stream) from outside the waters of the United States (the Lancashire #15 mine pool). Just last year, EPA issued a rule exempting any "water transfer" from

[*] The Final Elk Creek Watershed TMDL would be superseded by the Kiskiminetas River watershed TMDL, the March 2009 draft of which is pending before EPA.

[+] The Final Elk Creek Watershed TMDL (p. 8) and Decision Rationale (p. 5) state that the Lancashire #15 mine pool broke out onto the surface in 1970, and that Barnes & Tucker began pumping and treatment in November 1970 "and effectively eliminated the mine breakout." A July 18, 2006 SRBC press release indicates that some portion of the 1970 breakout entered the Blacklick Creek watershed.

[*] Considerably more than half of the recharge area for the interconnected mine complex dewatered by the Duman boreholes lies in the Allegheny River watershed. See Hawkins, J. and Dunn, M., Hydrologic Characteristics of a 35-Year-Old Underground Mine Pool, 26 Mine Water Environ 150, 152 Fig. 2 (2007).

the NPDES permit requirement, which it defined as "an activity that conveys or connects waters of the United States without subjecting the transferred water to intervening industrial, municipal, or commercial use," and without introducing pollutants into the water being transferred. 40 C.F.R. § 122.3(i). See 73 Fed. Reg. 33697, 33708 (col. 3) (June 13, 2008) (adopting exclusion codified at § 122.3(1)). See also id. at 33699 (col. 1) (noting that "Pennsylvania is the only NPDES permitting authority that regularly issues NPDES permits for water transfers"). EPA explained that "[i]n order to constitute a 'water transfer' under [the new exemption,] and, therefore, be exempt from the requirement to obtain an NPDES permit, the water being conveyed must be a water of the U.S. prior to being discharged to the receiving waterbody." Id. at 33699 (col. 2-3) (emphasis added, footnote omitted).

The groundwater in the Lancashire #15 mine pool is not part of the "waters of the U.S." as defined at 40 C.F.R. § 122.2. Thus, the proposed Lancashire #15 AMD Treatment Plant project described on page 24 of the Revised Draft TMDL would not involve a transfer or conveyance of surface water from one water of the United States to another. Instead, the project would convey pollutant laden groundwater from the Lancashire #15 mine pool into the waters of the United States (the West Branch), and in so doing would introduce pollutants to the waters of the United States through a pipe, channel, or other confined and discrete conveyance. As a result, the outfall from the new Treatment Plant would be a "point source" as defined in the Clean Water Act, see 33 U.S.C. § 1362(14), and the load it is allowed to add to the West Branch must be allocated in the form of a WLA, see 40 C.F.R. §§ 130.2(h), 130.7(c).

Response: The difference in approaches to the Lancashire #20 and the Lancashire #15 discharges is related to one being existent (Lancashire #20) and one being anticipated in the future (Lancashire #15). Once the Lancashire #15 plant comes into existence, the TMDL can re-evaluate to determine if it should receive its own load allocation as Lancashire #20 currently does.

The Department disagrees with commenter’s argument that the Clean Streams Foundation is “responsible” for treating the Barnes & Tucker discharges identified by the commenter. The foundation merely acts as the trustee for a trust fund established by the mine operator liable for treating the discharges caused by the operator’s mining operations—which trust fund is used to pay ongoing treatment costs after the liable operator ceased to exist. The TMDL, in referring to a responsible party, means a person who caused the postmining pollutional discharge and is therefore liable for treating the pollution caused by its mining operation. The mine operator liable for treating the Lancashire # 20 discharge was liquidated, dissolved or otherwise ceased to exist prior to completing reclamation of the mine site—including treatment of all postmining pollutional discharges from the site. Consequently, these unreclaimed mine sites are properly considered abandoned mine sites.

The Department also disagrees with commenter’s contention that the discharge from the proposed Lancashire # 15 AMD treatment facility should be considered a “point source discharge” pursuant to applicable law. The discharge from the treatment facility is properly characterized as a nonpoint source discharge for two main reasons. First, no person responsible for causing the discharge exists. Second, a treatment facility for an abandoned mine discharge does not add pollutants to a surface water. As a matter of basic fact, the Lancashire # 15 mine pool exists and but for pumping and treating of the mine pool water a breakout will occur and a discharge of abandoned mine drainage will flow into the West Branch watershed. In the absence of any action being taken to address the Lancashire # 15 mine pool, the discharge will occur—that is the nature of abandoned mine drainage. The proposed Lancashire # 15 AMD treatment facility will remove pollutants that would otherwise reach the surface water from an abandoned mine source for which there is no responsible party. The discharge from the Lancashire # 20 treatment facility does not fit within the definition of a “point source discharge” under the Clean Water Act, see 33 U.S.C. § 1362,. is therefore properly characterized as a nonpoint source discharge under applicable law, and has been properly assigned a LA in the Revised Draft TMDL.

The Department disagrees with the assertion that withdrawal of the water from the mine pool so that it can be treated before it would inevitably discharge into the West Branch excludes it from EPA’s NPDES permit requirement exemption for the transfer. Currently, the water would discharge to the West Branch without any intervention and this treatment facility is averting further water quality degradation by pumping the water directly from the mine pool for treatment.

C. **The modeling for WBSR 23.0 fails to provide the required reasonable assurance that the load reductions necessary to satisfy all water quality standards will be achieved, and to the contrary shows that the redirection of the Lancashire #15 discharge will greatly worsen the existing impairment of the West Branch by manganese.**

The Revised Draft TMDL states: "Using the same methods utilized to determine the needed reductions from the TMDL, a'treated' scenario was simulated using the anticipated design parameters" for the proposed Lancashire #15 AMD Treatment Plant project, the results of which "show that instream water quality criteria will be met 99% of the time for iron and manganese for an additional 80+ miles when the treatment plant is operational." (Revised Draft TMDL, p. 24)

PennFuture suspects that the word "manganese" in this statement is supposed to read "aluminum," because far from showing that the instream manganese criterion would be met for 80 or more miles, the "treated scenario" modeling provided to PennFuture shows that the rerouted discharge actually would increase the instream concentration of manganese, causing it to jump from 32% above the instream criterion to more than 255% above the criterion. That is to say, redirecting the discharge will virtually ensure that the West Branch never meets the manganese criterion for many miles below the new outfall location. PennFuture details this and other problems with the Revised Draft TMDL's analysis for point WBSR 23.0 in the subsections below.

i. The TMDL for aluminum at Monitoring Point WBSR 23.0 is founded on an impossible premise.

As explained in Section 9.B, above, the TMDL for aluminum at the upstream point WBSR 24.0 in the Revised Draft TMDL is impossible to attain. Unfortunately, the modeling for all of the downstream monitoring points depends upon the impossible premises that the concentration of aluminum in the West Branch at point WBSR 24.0 will be magically reduced to just 3 ppb, and that there will be a net removal of aluminum load between WBSR 25.0 and WBSR 24.0 that reduces average aluminum load reaching the downstream segment modeled at WBSR 23.0 to only 0.13 lbs/day. It is clearly irrational to base any decision on the premise that the segment of the river modeled at WBSR 24.0 will provide a diluting flow of 5.69 mgd containing an aluminum concentration of only 3 ppb. The modeling for all downstream monitoring points founders on this impossible premise that when the river reaches the segment monitored at WBSR 23.0, it will be magically cleansed of virtually all traces of aluminum. Correcting that premise and using a realistic background aluminum load will require additional load reductions in the segment modeled at WBSR 23.0, in which (assuming all required load reductions upstream are achieved) most of the pollutant load would come from the redirected Barnes & Tucker Lancashire #15 discharge.

Response: As explained in previous responses, the aluminum concentration at WBSR24.0 has been recalculated and a more realistic long-term average concentration of 0.24 mg/L has been assigned at that point. Therefore, the comment is no longer applicable as the instream average concentration is no longer at such a stringent level.

ii. Determination of allowable concentrations and loads for point WBSR 23.0

The "measured" concentration figures in Table D34 on page 70 of the Revised Draft TMDL were not actually measured, but instead are flow-weighted, calculated figures for a hypothetical combined flow of the West Branch at WBSR 23.0 and the redirected Lancashire #15 Mine discharge. The concentrations were calculated by combining: 1) the average, flow-weighted concentrations for the instream water quality at WBSR 23.0 in November 2004 through July 2005; and 2) the average, flow-weighted concentrations for a hypothetical untreated discharge of the Lancashire #15 mine pool into the West Branch, using the water quality data for Withdrawal Well B-3B in August 2006 through February 2007 and an average discharge rate of 7.39 mgd.

What is unclear to PennFuture is how, given those unmatched sets of monitoring data, SRBC came up with standard deviation figures for the pollutant concentrations in the hypothetical combined flow, which are necessary inputs for the Monte Carlo simulations used to determine the instream target concentration at WBSR 23.0. It appears that in performing the Monte Carlo simulation, the value input for the standard deviation of the concentration in the 14.84 mgd combined flow was simply the standard deviation shown in the Revised Draft TMDL for the roughly half (7.45 mgd) of the flow monitored at WBSR 23.0. PennFuture believes that is what happened because when we performed our shortcut, hand calculation approximations of the Monte Carlo simulations* using the combined flow ("measured") pollutant concentrations from Table D34 on page 70 of the Revised Draft TMDL and the standard deviations for the WBSR 23.0 monitoring data shown on page 149, we came up with allowable long term concentration

* See footnote on page 275, above.

estimates that are within a rounding error — one or two hundredths of a milligram per liter — of the values shown in Table D34 of the Revised Draft TMDL[+]

If SRBC did, in fact, use the standard deviation of the WBSR 23.0 concentration monitoring data as the standard deviation of the combined flow, that method seems bogus from the standpoint of statistics. First, only in the rarest of circumstances (e.g., when the two constituent flows have equal average flow rates and standard deviations) will the standard deviation of the concentration of a combined flow equal the standard deviation of one of the constituent flows. Second, the standard deviations of the iron and manganese concentrations in the raw water pumped from the Lancashire #15 mine pool are much higher than the standard deviations for the instream concentrations monitored at WBSR 23.0. For example, the mean and standard deviation of the iron concentration at WBSR 23.0 are 17.19 mg/1 and 5.70 mg/l, respectively (Revised Draft TMDL. p. 149), while the corresponding figures for the iron concentration monitored at Withdrawal Well B-3B in August 2006 through February 2007 are 242.58 mg/l and 32.24 mg/1.[*] Obviously, when roughly equal flows from those two sources are combined, the standard deviation of the concentration in the combined flow is unlikely to equal, and is likely to greatly exceed, the lower of the two standard deviations of the constituent flows.

Third, the standard deviation of the concentration of a combined flow actually may exceed the highest of the standard deviations of the two constituent flows. This phenomenon is illustrated by the spreadsheet pasted immediately below, in which the standard deviation of the concentration of the combined flow of sources A and B (25.11 mg/1) exceeds both the standard deviation for source A (0.89 mg/1) and that for source B (8.94 mg/1). This example simply confirms that it is improper to use the standard deviation of a contaminant concentration for one component of a combined flow as the standard deviation for the combined flow.

Monitoring Event	Conc. A (mg/I	Flow A m	A % Flow	Conc. B (mg/I	Flow B m	B % Flow	Combined Conc. (mg/1)
1	2	400	0.4	80	600	0.6	38.4
2	3	500	0.35714	90	900	0.642857	61.9898
3	4	500	0.33333	100	1000	0.666667	88.88889
4	2	600	0.35294	80	1100	0.647059	36.53979
5	3	600	0.33333	90	1200	0.666667	60
6	4	500	0.41667	100	700	0.583333	97.22222
Average	3	516.6667	0.36557	90	916.6667	0.63443	63.84012
Standard Deviation	0.894427			8.944272			25.10969

[+] PennFuture's estimates of the allowable long term average concentration are:

Iron:	1.31 mg/I (vs. 1.29 mg/l in Table D34)
Manganese:	0.77 mg/1 (vs. 0.76 mg/1 in Table D34)
Aluminum:	0.38 mg/l (vs. 0.36 mg/l in Table D34)

[*] For manganese the mean and standard deviation at WBSR 23.0 are 1.32 mg/1 and 0.61 mg/1 (Revised Draft TMDL, p. 149), while the corresponding figures for Well B-3B are 12.47 mg/1 and 2.04 mg/I. Although the standard deviations for aluminum are similar (10.43 mg/1 for WBSR 23.0 and 9.91 mg/1 for Well B-3B), the standard deviation of the blended flow would depend on such factors as the correlation (if any) between the concentration levels in the two constituent flows.

Adding to the confusion is that the "Allowable" long-term average concentration and load figures in Table D34 do not square with the figures reported under "Allowable" for the flow rate of 14.84 mgd in the spreadsheet at tab "WBSR 23" (WBSR 23 Spreadsheet) in the Excel file provided to PennFuture entitled "PENNFUTURE_ excel request Barnes and Tucker treated.xls." A comparison of the figures from those two sources is presented immediately below:

	Allowable Concentration (mg/L)			**Allowable Load (lbs/day)**	
Parameter	**Table D34**	**WBSR 23**		**Table D34**	**WBSR 23**
Fe	1.29	0.46		160.30	57.32
Mn	0.76	0.68		93.61	83.65
Al	0.36	0.11		44.12	13.87
Acidity	0.05	1.91		5.60	236.58

The final TMDL should explain the differences between these two sets of figures. In light of the discussion above, it also should explain how the standard deviations were determined for the Monte Carlo simulation for point WBSR 23.0, and why it is proper to use the specific figures chosen.

Response: The standard deviation figures for WBSR23.0 used in the Monte Carlo simulation modeling were those for the instream dataset only and did not include the standard deviation for the treated discharge. There are two reasons why this approach was taken. First, the discharge from the Lancashire #15 treatment plant is still a future discharge and the variability (standard deviation) in the effluent concentration is not known. This value is known for the Dumans plant effluent (the plant on the Blacklick Creek/Ohio River Basin side of the mine pool); however, the quality of the discharge will be different from the Lancashire #15 facility as compared to the Dumans facility as they will be drawing water from different portions of the mine pool. Therefore, it would be misleading to use values from the Dumans facility to characterize the Lancashire #15 facility. Second, using the standard deviation of the instream data gives a comparable degree of variability to the data used to model the impact of the Lancashire #15 discharge as compared to those used at other instream datapoints. Depending on the treatment efficiency at a facility, standard deviations of effluent concentrations can either be very large (very variable effluent quality) or very small (very constant effluent quality). However, the difference in the variability of the effluent is dependent on the operation of the plant and not seasonal conditions, etc. that impact instream data. Therefore, using the standard deviation from the instream data only better typified the instream conditions of which the TMDL is to be protective.

iii. The treated Lancashire #15 discharge would cause a substantial increase in the already-excessive instream concentration of manganese at WBSR 23.0, and by itself would cause a violation of the instream criterion for manganese even if the river contained no manganese immediately upstream.

The WBSR 23 Spreadsheet includes simple mass-balance mixing analyses using average flow and concentration data for a "treated scenario" in which the water pumped from the Lancashire #15 mine pool at an average rate of 7.39 mgd is treated and discharged into the West Branch above point WBSR 23.0. The mixing analysis assumes that the river's existing flow of 7.45 mgd will have the average pollutant concentrations monitored during 2004-2005, as shown in the Revised Draft TMDL. It further assumes that the treated Lancashire #15 discharge will have average pollutant concentrations that apparently were determined using bench-scale testing for a targeted effluent pH of 7.5. The excerpt of the treatment system study provided to PennFuture explains: "At the start of the study, removal of manganese was not a requirement. Since effluent limits for manganese were not included in the project objectives, an operating pH of 7.5 [standard units] was chosen to conduct the bench-top laboratory study, as this pH would effectively remove both iron and aluminum." For manganese, the treated scenario analysis assumes that the treatment system effluent will have an average concentration of 5.81 mg/l.

The treated scenario mixing analysis shows that the introduction of the treated Lancashire #15 discharge would dramatically increase the already excessive concentration of manganese in the West Branch. The existing average manganese concentration at WBSR 23.0 is 1.32 mg/l, or 32% above the instream maximum criterion of 1.0 mg/l. Adding the treated Lancashire #15 discharge and its (assumed) 5.81 mg/l of manganese would raise the instream concentration to 3.56 mg/l, or 256% above the instream criterion. Obviously, that is the wrong direction: the TMDL is supposed to provide for eliminating, not exacerbating, any exceedance of the instream criterion.

Moreover, even if the existing concentration and load of manganese in the West Branch were magically reduced to zero, so that the treated discharge from the proposed Lancashire #15 AMD Treatment Plant were diluted by 7.45 mgd of pure, uncontaminated water, the discharge would by itself cause the river to exceed the manganese criterion at WBSR 23.0. Specifically, in this "pure river" permutation on the "treated scenario," the average instream concentration of manganese would be 2.89 mg/1,[*] nearly triple the instream criterion of 1.0 mg/l. By itself, this calculation shows that the Revised Draft TMDL fails to provide "reasonable assurance" for the required overall manganese load reductions and nonpoint source manganese load reductions at point WBSR 23.0, and further shows that the only way to afford such assurance is to provide additional treatment of the Lancashire #15 discharge for manganese.

PennFuture realizes that PADEP and SRBC consider the other water quality and water quantity impacts of the proposed Lancashire #15 rerouting project to outweigh this worsening of the existing impairment of the West Branch by manganese. That is to say, the agencies recognize that the project will have a detrimental impact with respect to manganese, but conclude that the project will have an overall net benefit. The issue presented by the TMDL, however, is not whether the project, as designed (without regard to the manganese criterion), would represent a net benefit for the West Branch, but instead whether the TMDL will result in attainment of all of the relevant water quality standards. The analysis of the "pure river" hypothetical conclusively shows that the answer to that salient question is "no." Additional reasons for this conclusion are explained below.

[*] (7.45 mgd/14.84 mgd)(0.0 mg/1) + (7.39 mgd/14.84 mgd)(5.81 mg/1) = (.502)(0.0 mg/l) + (.498)(5.81 mg/1) = 2.89 mg/l

Response: As stated by the commentor, the Department does recognize that a marginal increase in manganese concentration instream will result in the improvement of a large number of stream miles downstream of the Lancashire #15 discharge. However, also as recognized by the commentor, the Department considers the impact to water quality from the discharge to be far outweighed by the improvement to the downstream waters. Manganese is a potable water supply criterion to protect for taste and odor issues; it is not an aquatic life criterion. Therefore, manganese values greater than the water quality criterion do not mean a concurrent impairment in the aquatic biological community.

iv. The TMDL fails to provide reasonable assurance that the necessary load reductions at WBSR 23.0 will be achieved.

a. By itself, the treated Lancashire #15 discharge would exceed the Revised Draft TMDL's overall allowable load and LA for manganese at WBSR 23.0.

The WBSR 23 Spreadsheet shows that by itself, the treated discharge from the proposed Lancashire #15 AMD Treatment Plant would add an average of 358.43 pounds of manganese per day to the West Branch between WBSR 24.0 and WBSR 23.0. The Revised Draft TMDL, however, would set an overall allowable manganese load of only 93.61 lbs/day[*] at WBSR 23.0, and a LA of 89.11 lbs/day. (Revised Draft TMDL, p. 14, Table 5) Obviously, if the expected load from one identified source would be nearly four times the entire allowable daily load for the segment, there is no chance that the TMDL will be achieved and the impairment of the stream by manganese alleviated. Thus, the Revised Draft TMDL not only fails to provide the required reasonable assurance that the necessary manganese load reductions will be achieved, but to the contrary assumes that exactly the opposite will be true.

Response: As stated by the commentor, the Department does recognize that a marginal increase in manganese concentration instream will result in the improvement of a large number of stream miles downstream of the Lancashire #15 discharge. However, also as recognized by the commentor, the Department considers the impact to water quality from the discharge to be far outweighed by the improvement to the downstream waters.

b. By itself, the treated Lancashire #15 discharge would consume nearly all of the Revised Draft TMDL's overall allowable load and LA for aluminum at WBSR 23.0, and would exceed the allowable load for aluminum shown in the WBSR 23 Spreadsheet.

The WBSR 23 Spreadsheet shows that by itself, the treated discharge from the proposed Lancashire #15 AMD Treatment Plant would add an average of 36.40 pounds of aluminum per day to the West Branch between WBSR 24.0 and WBSR 23.0. The Revised Draft TMDL would set an overall allowable aluminum load of just 44.12 lbs/day at WBSR 23.0, and a LA of 42.44

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[*] If the WBSR 23 Spreadsheet is correct, this figure would be 83.65 lbs/day.

lbs/day.[+] (Revised Draft TMDL, p. 14, Table 5) Thus, the expected load from the rerouted Lancashire #15 discharge would consume nearly 85.5% of the LA for aluminum at point WBSR 23.0, leaving just 8.04 lbs/day for all other nonpoint sources[◆] contributing to this segment of the river.
As monitored in 2004-2005, the aluminum load in the West Branch was 1,277.54 lbs/day at WBSR 24.0 and 1,350.15 lbs/day at WBSR 23.0, meaning that the existing nonpoint sources in this segment were adding an average of 72.61 lbs/day of aluminum to the river. The TMDL contains no suggestion that these nonpoint source loads can be reduced to 8.04 lbs/day (or, if the WLAs for future mining operations are retained, to 6.36 lbs/day, see footnote23, above).

Finally, if the allowable aluminum load figure of 13.87 lbs/day presented in the WBSR 23 Spreadsheet is correct, then the situation for aluminum at WBSR 23.0 is the same as that discussed above with respect to manganese: by itself, the expected aluminum load of 36.40 lbs/day from the rerouted Lancashire #15 discharge would exceed the total allowable load for the segment nearly three fold. No matter which allowable load figure for point WBSR 23.0 is correct, however, the result is the same: the Revised Draft TMDL fails to provide the required reasonable assurance that the necessary aluminum load reductions will be achieved, and thus that the existing aluminum impairment at WBSR 23.0 will be alleviated.

Response: As stated by the commentor, the Department does recognize that a marginal increase in aluminum concentration instream will result in the improvement of a large number of stream miles downstream of the Lancashire #15 discharge. However, also as recognized by the commentor, the Department considers the impact to water quality from the discharge to be far outweighed by the improvement to the downstream waters.

c. By itself, the treated Lancashire #15 discharge would exceed the allowable load for iron shown in the WBSR 23 Spreadsheet.

If the allowable iron load figure of 57.32 lbs/day presented in the WBSR 23 Spreadsheet is correct, then the situation for iron at WBSR 23.0 is the same as that discussed above with respect to manganese: by itself, the expected iron load of 77.73 lbs/day from the rerouted Lancashire #15 discharge would exceed the total allowable load for the segment. Again, in that situation, the Revised Draft TMDL obviously would fail to provide the required reasonable assurance that the necessary iron load reductions will be achieved, and thus that the existing iron impairment at WBSR 23.0 will be alleviated.

Response: As stated by the commentor, the Department does recognize that a marginal increase in iron concentration instream will result from the addition to the West Branch Susquehanna River of the Lancashire #15 discharge. However, also as recognized by the commentor, the Department considers the impact to water quality from the discharge to be far outweighed by the improvement to the downstream waters.

[+] For the reasons explained in Section 4, above, if the final TMDL retains the WLAs for three future mining operations in this segment, both the overall allowable load and the LA for aluminum would have to be reduced by the total aluminum WLAs for this segment of 1.68 lbs/day, making the overall allowable load 42.44 lbs/day and the LA 40.76 lbs/day.

[◆] For the reasons explained in Section 10.B, above, PennFuture disagrees with the classification of the Lancashire #15 treatment facility as a nonpoint source.

d. The WLAs for future mining operations at point WBSR 23.0 must be deleted from the final TMDL.

As explained in Section 10.C.iv.a, above, the data used in preparing the Revised Draft TMDL show that SRBC expects the average daily manganese load from the proposed Lancashire #15 AMD Treatment Plant to greatly exceed the allowable daily load at WBSR 23.0. According to the Revised Draft TMDL, the new treatment plant is expected to be constructed in 2009-2010. In this situation, in which the pollutant load from a single source is expected to greatly exceed the allowable load for the segment for the long-term future, it clearly would be arbitrary and unreasonable to authorize nonexistent, future mining operations to make the already excessive load even more excessive by discharging more manganese into the impaired waters. Or, to put it in the terms of EPA's 2002 memorandum, where it is impossible to provide "reasonable assurances" that the nonpoint source loads will be reduced to the LA, one may not authorize additional load of that pollutant from point sources through WLAs. As a result, the WLAs for the three future mining operations at WBSR 23.0 must be deleted from the final TMDL.

Response: The WLA for the future mining operation at WBSR23.0 has been removed.

v. The analysis for WBSR 23.0 does not account for the specified critical flow condition of Q7-10, which would be taken into account by employing the Pentoxsd model.

Pennsylvania's regulations governing water quality standards implementation provide that "[m]athematical modeling at the design flow conditions listed in Table I shall be used as applicable to develop TMDLs and WQBELs for point source discharges." 25 Pa. Code § 96.4(g). For the fish and aquatic life water use, the steady state design flow rate in Table I is the Q7-l0 rate, which is "[t]he actual or estimated lowest 7 consecutive-day average flow that occurs once in 10 years for a stream with unregulated flow, or the estimated minimum flow for a stream with regulated flow. 25 Pa. Code § 96.1.

Like most Pennsylvania mine drainage TMDLs, the "Critical Conditions" section of the Revised Draft TMDL states, in its entirety: "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." (Revised Draft TMDL. p. 134) For aluminum and iron, however, there is no need to search for the critical flow condition, because 25 Pa. Code § 96.4(g) specifies it: Q7-10.

The "StreamStats" report attached hereto as Attachment B shows that the estimated arithmetic average flow at the approximate location of WBSR 23.0 is 13.9 cubic feet per second (cfs), or about 8.98 mgd. This estimated average flow is slightly higher than the average of 7.45 mgd measured during November 2004 through July 2005. The estimated Q7_10 flow at the approximate location of WBSR 23.0, which is labeled "M7D1OY" on the StreamStats report, is 0.43 cfs, or about 193.0 gpm and 0.28 mgd. The lowest flow recorded at WBSR 23.0 during the 2004-2005 monitoring period for the Revised Draft TMDL was 1,466.78 gpm (2.11 mgd). Thus, the lowest flow condition experienced during the collection of the data used in the Revised Draft TMDL's modeling was 7.6 times the Q7-10 flow as estimated by StreamStats.

As is true in most Pennsylvania mine drainage TMDLs, the Monte Carlo analysis in the Revised Draft TMDL does not directly consider flows or loads, and does not model or attempt to determine the correlation (if any) between concentration and flow. Instead, the critical, initial step of determining the long-term allowable concentration is based exclusively on the mean and standard deviation for the parameter concentration. Thus, if the Monte Carlo analysis takes the stream flow into account at all, it does so indirectly, through whatever impact the flow rate has on the values of the mean and standard deviation of the pollutant concentration. But where all of the concentration data were collected during flows that exceeded by many times the aquatic life use critical flow condition of Q7-10, it is simply unsupported speculation to say that the TMDL accounts for that flow condition.

In contrast, PADEP's Pentoxsd model directly takes into account, as an input, any specified critical stream flow condition for each parameter being analyzed. Regardless of whether the proposed Lancashire #15 AMD Treatment Plant is classified as a point source or a nonpoint source, the discharge from the treatment system into the West Branch would be a single discharge into a free-flowing river, which is to say, precisely the situation that the Pentoxsd software was designed to model. In order to ensure that the critical, Q7-10 flow condition is properly taken into account, regardless of how the Lancashire #15 Mine discharge is classified, the allowable concentrations and loadings assigned to it by the final TMDL should be determined using the best tool available — the Pentoxsd software.

This point applies more generally to the TMDL modeling for all confined and discrete discharges from mining operations into free-flowing waters impaired by one or more mine drainage contaminants. Pentoxsd is designed for determining the water quality-based effluent limitations applicable to such discharges. In light of the fact that PADEP invested a lot of resources in developing Pentoxsd and training its personnel to use it, PADEP should not leave it on the shelf when it could be put to good use in determining WLAs for TMDLs.

Response: Pentoxsd is used in modeling a single discharge situation, not in situations where there are multiple inputs of pollutants to a receiveing water along its length. In addition, the TMDL for the West Branch Susquehanna River incorporated data from all flow conditions (high and low) over the period of a hydrologic year to assure different flow conditions were represented in the dataset and, further, in the allowable loads calculated.

Comment: Typographical errors

Page 24: In the last sentence of the third paragraph, the figure of "7.29" should read "7.39" See footnote 14, above.

Page 26: In the list of references, the year of the Roller memorandum should be changed from 1958 to 1970, as cited in the text on page 6.

Page 62: In the last sentence, "one operations" should read "one operation"

Tables: Beginning with the example table titled "Allocations at WBSR 25.0" on page 19,' and continuing with all of the tables titled "Calculation of Load Reduction Necessary at Point WBSR__" for all of the monitoring points, the phrase "Total load tracked" incorrectly appears throughout the tables as "Total load tacked"

Response: The requested changes have been made.

ATTACHMENT A

On behalf of Mountain Watershed Association (MWA) and Citizens for Pennsylvania's Future (PennFuture), and in the hope of avoiding a series of wasteful legal disputes, I am writing to you about the permit requirements applicable to the replacement of the two mine drainage treatment systems at the Potato Ridge Mine and the "A/C Seeps Treatment System" at the Smith Mine. Replacement of those treatment systems is essential for the protection of Laurel Run and the downstream waters of Meadow Run, both of which have a designated aquatic life use of High Quality-Cold Water Fishes.

The Potato Ridge Mine and the Smith Mine are adjacent, inactive clay mines in Fayette County that discharge mine drainage into Laurel Run. The Potato Ridge Mine is owned by Kaiser Aluminum & Chemical Corporation (KACC), a subsidiary of Kaiser Aluminum Corporation. KACC formerly did business under the name of one of its former divisions, Kaiser Refractories. Under the name Kaiser Refractories, KACC holds Noncoal Surface Mining Permit No 2966BSM50 for the Potato Ridge Mine, and National Pollutant Discharge Elimination System (NPDES) Permit No. PA0202851, which authorizes discharges into Laurel Run from two mine drainage treatment systems at the Potato Ridge Mine. A short distance downstream from the Potato Ridge Mine is the Smith Mine, which is owned by the Commonwealth of Pennsylvania and managed by the Department of Conservation and Natural Resources (DCNR) as part of the Ohiopyle State Park. DCNR holds an old Mine Drainage Permit (No 2969BSM24) for the Smith Mine, which was transferred to DCNR on March 27, 1997 by Harbison Walker. Refractories Company pursuant to a Consent Decree approved by the Commonwealth Court of Pennsylvania. DCNR does not have a NPDES permit authorizing the discharges from any of the mine drainage treatment systems at the Smith Mine.

In an appeal before the Pennsylvania Environmental Hearing Board (EHB) filed in April 2004, MWA and PennFuture challenged the Pennsylvania Department of Environmental Protection's (DEP's) renewal of KACC's NPDES Permit No. PA0202851. On June 23, 2005, the EHB granted summary judgment to PennFuture and MWA, voided DEP's renewal of the NPDES permit, and remanded the.permit to DEP for further action. The EHB held that the permittee's routine violations of the NPDES permit's effluent limits barred DEP from renewing the permit, and that the renewed permit unlawfully was inconsistent with the Total Maximum Daily Load (TMDL) for Laurel Run approved by the Environmental Protection Agency (EPA) in 2003. The discharges of mine drainage from the Potato Ridge Mine treatment systems remain in virtually constant violation of the effluent limits for manganese in the NPDES permit.

In light of defects in the Laurel Run TMDL brought to light by the EHB appeal, DEP issued a draft "Amended Final Laurel Run Watershed TMDL, Fayette County, for Acid Mine Drainage Affected Segments" on April 9, 2005. In June 2005, Kaiser Aluminum Corporation, MWA/PennFuture, and DCNR submitted comments to DEP on the draft Amended TMDL, which DEP apparently has not finalized and submitted to EPA for approval. In order to rectify an error in the original TMDL, the draft Amended TMDL classifies the discharges from the "A/C Seeps Treatment Systein" and the "B Seeps Treatment System" at the Smith Mine as point source discharges and assigns them wasteload allocations. Both the Smith Mine's "A/C Seeps Treatment System", and the two Potato Ridge Mine treatment systems must be replaced in order to satisfy the wasteload allocations in the draft Amended TMDL. Those wasteload allocations are likely to become even more stringent if DEP, in response to the comments submitted in June, recalculates them in accordance with Laurel Run's designated use of High Quality-Cold Water Fishes.

In short, Laurel Run currently receives two NPDES permitted discharges of mine drainage from the Potato Ridge Mine and (at least) two other point source discharges of mine drainage from the Smith Mine that should be covered by a NPDES permit. All four of those discharges emanate from mine sites permitted and regulated by DEP's mining program.

Recently, DEP, DCNR, and. KACC have taken steps toward implementing a plan in which three of those four discharges would be collected in a single "combined" treatment system that would discharge to Laurel Run without the authorization of any permit. Implementing that plan would clearly violate Section 304d) of the Clean Water Act, 33 U.S.C. § 1311(a), which prohibits the addition, of pollutants to waters of the United States from a point source without the authorization of a NPDES permit. Equally clearly, it would violate Pennsylvania's Clean Streams Law, see 35 P.S. §§ 691.301i 691.307(a), and the requirements of Pennsylvania's EPA approved NPDES permitting program, 25 Pa. Code §§ 92.3, 92.5. I am writing to you today in an effort to avoid wasteful litigation over an obvious point the discharge from the new combined treatment system, or the discharges from separate replacement treatment systems at each of the mines must be authorized by a NPDES permit.

Kaiser Aluminum Corporation and sixteen subsidiaries, including KACC, are part of a pending reorganization proceeding under Chapter 11 of the federal Bankruptcy Code. On December 14, 2005, the United States Bankruptcy Court for the District of Delaware granted a motion filed by KACC and authorized KACC to enter into two separate agreements, one with DEP, and the other with the Clean Streams Foundation, Inc. (CSF). CSF is a Pennsylvania nonprofit corporation that serves as the trustee of a "Master Trust" created in 2001 that names DEP as the beneficiary. The drafts of those two agreements submitted to the Bankruptcy Court provide that a separate set of agreements, one between DEP .and DCNR and the other between DCNR and CSF, must be executed at or the time the agreements involving KACC are executed. That second set of agreements involving DCNR was not included in the Bankruptcy Court filing. It is possible that all of these agreements have been executed already, but MWA and PennFuture have received no indication that such is the case.

Based on the two available draft agreements involving KACC, the agreements among DEP, DCNR, KACC, and CSF would require KACC and DCNR to transfer land and money to the "Ohiopyle Trust Account," a sub-account within the CSF Master Trust dedicated to guaranteeing the treatment of the Potato Ridge Mine and. Smith Mine discharges CSF would be required to use the land and funds in the Ohiopyle Trust Account to fulfill the ongoing mine drainage treatment obligations of KACC and DCNR. The draft agreement between DEP and KACC provides that KACC must transfer its portion of the land and funds to the trust account on the eleventh day after the entry of the Bankruptcy Court's order authorizing KACC to execute the agreement, or the first business day thereafter. By our calculation, the eleventh day after the entry of the December 14, 2005 Order is Christmas Day, and the first business day thereafter is December 27, 2005. The draft agreement further provides KACC's permits, including NPDES

Permit - No. PA0202851, "are hereby declared revoked" on the date KACC completes the actions it must complete within the eleven day period. So, based on the terms of the draft agreement between KACC and DEP, it appears that the NPDES-permitted discharges from the Potato Ridge Mine may instantly become unpermitted discharges very shortly.

None of the parties involved in this matter has been able to articulate a legal theory under which two permittees' transfer of land and money to a trust account in exchange for the trustee's commitment to perform the permittees' treatment obligations somehow eliminates the NPDES permit requirement. Certainly nothing in the Clean Water Act or the Clean Streams Law suggests that a trustee who enters into agreements with two mine permittees to ensure that the permittees' water treatment obligations are performed is exempt from the NPDES permitting requirements that indisputably would apply to the permmees if they performed the treatment and discharged the effluent themselves. And unlike other situations in which CSF has taken responsibility for ensuring the operation of mine drainage treatment systems, in this instance, neither DCNR nor KACC is winding up affairs under federal bankruptcy or state dissolution laws. Although MWA and PennFuture do not agree that a NPDES permit is not required in those liquidation/dissolution situations, at least there the permittees were going out of existence. Here, the permittees who are contracting for the performance of their legal obligations will continue to exist while those obligations are being discharged (so to speak) by someone else, but without a permit.

The law clearly and absolutely requires some responsible entity to hold a NPDES permit for the treatment system discharge. And for several reasons, a NPDES permit is at its utmost importance it this situation. First, because the discharges in question are assumed to be perpetual, the regular monitoring required by a NPDES permit and the need to renew the permit every five years are important to help DEP and the public keep tabs on the discharge and the performance of the treatment system. Regular monitoring and permit renewal function as something of a tickler system, making it harder for things to slip by the wayside ten or twenty or 100 years down the road. Second, if DEP’s oversight is not up to par, the presence of a NPDES permit and the monitoring it requires allows concerned citizens to take matters into their own hands, whether through objecting to the renewal of the permit (as MWA and PemiFuture successfully did with respect to KACC's permit) or bringing a citizen suit to ensure that the discharge meets all applicable water quality requirements. Again, this availability of citizen enforcement is particularly important where the discharge is extremely long-lived and may be neglected by regulators because of new or accumulated responsibilities, or simply because they become tired of the same old thing. Third, there is a TMDL for the receiving stream in this case, and according to DEP, the pending amendment to that TMDL may include wasteload allocations so strict that the best demonstrated mine drainage treatment technology available may not be able to satisfy them. See 25 Pa. Code § 95.4(g). Without a NPDES pernnit to implement it, a TMDL wasteload allocation is a meaningless and wasteful bureaucratic exercise. It is only through a NPDES permit that the new, stringent wasteload allocations for Laurel Run would be translated into enforceable effluent limits, see 40 C.F.R. § 122.44(d)(1)(vii)(B); 25 Pa. Code §§ 92.2(b)(14), 96.4(a), and only through the NPDES permitting process that DEP may allow dichargers additional time to meet water quality-based effluent limits that are more stringent than state-of-the-art treatment systems can achieve. See 25 Pa. Code § 95.4.

In addition to transforming TMDLs into meaningful and enforceable effluent limitations, a NPDES permit is the only mechanism that guarantees citizens will have access regular discharge monitoring data and will be able, if necessary, to compel compliance withwater quality standards. Without a NPDES permit, there would be no enforceable effluent limits and no opportunities for public participation in determining the effluent quality the treatment system(s) must achieve. Moreover, without a NPDES permit and.the citizen enforcement it allows, the public would be forced to rely exclusively on the oversight of DEP, which for many years turned a blind eye to KACC's permit violations until MWA and PennFuture stepped in.

The NPDES permit issue here will not magically vanish. MWA and PennFuture will take whatever steps we must to require that the discharge treatment systems are properly permitted. As indicated above, we read the draft DEP—KACC and KACC—CSF agreements as requiring the execution of all of the agreements among KACC, DEP, DCNR and CSF, as well as KACC's transfer of land and funds to the Ohiopyle Trust Account, on or before December 27, 2005. In addition, unless the terms of the DEP-KACC agreement are revised, KACC’s NPDES permit would automatically be "declared revoked" when KACC completes the transfers to the trust account. In addition to being unlawful procedurally, <u>see</u> 40 C.F.R. § 122.64(b); 25 Pa.. Code § 92.2(b)(18),[*] that revocation would instantly turn NPDES-permitted discharges into a unpermitted discharges of pollutants into the waters of the United States and waters of the Commonwealth, in violation of the Clean Water Act, Clean Streams Law, and the NPDES program regulations. We hope that instead of revoking KACC's NPDES permit, DEP instead will find a way to <u>transfer</u> it to an entity responsible for the ongoing treatment and discharge of mine drainage from the Potato Ridge Mine, which is an activity that just as it has been for years must be authorized and regulated by a NPDES permit. More generally, we hope that all of the parties involved will find a way to avoid the unnecessary waste of resources that moving forward without the required NPDES permit(s) will bring about. In the situation presented, going from permitted discharges at permitted mines to discharges that will remain unpermitted for their presumed endless duration is a result that DEP as the NPDES permitting authority should not create, EPA as the overseer of Pennsylvania's NPDES program should not tolerate, and PennFuture and MWA will not accept.

As the timing of this letter illustrates, the Bankruptcy Court’s recent order and the events it appears to set in motion come at an inopportune time of the year. Should you like to discuss these matters, however, I except to be in the office for the remainder of this week as well as between and immediately after the holidays. Please feel free to call me at my direct telephone number: 717-214-7925.

Sincerely,
Kurt J. Weist
Senior Attorney

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[*] Under § 124.64(b), a NPDES permit generally must be terminated publisbing'a draft permit and accepting public.bomment on the proposed termination. "Expedited permit termination" may be accomplished by sending notice to the pentaittee only if "the entire discharge is permanently terminated by elimination of the flow or by connection to a POTW" and the permittee is not subject to any pending state or federal enforcement action. Id. The discharges here obviously would not be eliminated, and DEP enforcement orders remain outstanding against KACC. Even when "expedited permit terminations procedures" are permissible, the termination does not take effect until 30 days after the notice of termination is sent to the permittee. Id.

ATTACHMENT B

Low Flow Basin Characteristics			
100% Low Flow Region 3 (8.11 mi2)			
Parameter	**Value**	**Min**	**Max**
Drainage Area (square miles)	8.11	2.33	1720
Mean Basin Elevation (feet)	1870	898	2700
Mean Annual Precipitation (inches)	43	38.7	47.9

Mean-Annual and Base-Flow Basin Characteristics			
100% Statewide Mean and Base-Flow (8.11 mi2)			
Parameter	**Value**	**Min**	**Max**
Drainage Area (square miles)	8.11	2.26	1720
Mean Basin Elevation (feet)	1870	130	2700
Mean Annual Precipitation (inches)	43	33.1	50.4
Percent Carbonate (percent)	0	0	99
Percent Forest (percent)	78.7	5.1	100
Percent Urban (percent)	4.77	0	89

Peak Flow Basin Characteristics			
100% Peak Flow Region 3 (8.11 mi2)			
Parameter	**Value**	**Min**	**Max**
Drainage Area (square miles)	8.11	1.44	1610
Mean Basin Elevation (feet)	1870	457	2150
Percent Carbonate (percent)	0	0	99
Percent Urban (percent)	4.77	0	64
Percent Storage (percent)	0	0	22.6

Streamflow Statistics					
Statistic	**Flow (ft^3/s)**	**Standard Error (percent)**	**Equivalent years of record**	**90-Percent Prediction Interval**	
				Minimum	**Maximum**
Low-Flow Statistics					
M7D2Y	0.98	43			
M30D2Y	1.38	38			
M7D10Y	0.43	54			
M30D10Y	0.59	49			
M90D10Y	0.86	41			

Streamflow Statistics					
Statistic	Flow (ft^3/s)	Standard Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
				Minimum	Maximum
Mean-Annual and Base-Flow Statistics					
QA	13.9	12			
QAH	2.98	38			
BF10YR	5.33	21			
BF25YR	4.75	21			
BF50YR	4.42	23			

Streamflow Statistics					
Statistic	Flow (ft^3/s)	Standard Error (percent)	Equivalent years of record	90-Percent Prediction Interval	
				Minimum	Maximum
Peak-Flow Statistics					
PK2	349	31	3		
PK5	580	28	5		
PK10	756	28	7		
PK50	1200	31	11		
PK100	1410	36	11		
PK500	1960	43	11		

<u>COMMENTOR</u>: Trout Unlimited

On behalf of Trout Unlimited, I am submitting the following suggested changes and comments for the proposed West Branch Susquehanna River Watershed TMDL.

Comment: Page 23: Please change Pt sentence in 21d paragraph to "The Susquehanna River Basin Commission (SRBC) was contracted by <u>Trout Unlimited to develop</u> the West Branch Susquehanna Subbasin AMD Remediation Strategy." (changes underlined)

Response: The change included PADEP, DCNR and TU were sources of funding for the development of the West Branch Susquehanna Subbasin AMD Remediation Strategy.

Comment: Page 23: Please change last sentence in 2' paragraph to "However, <u>total capital costs for complete restoration could be as high as $400 million</u>." (changes underlined)

Response: The requested change has been made to the document.

Comment: Page 23: Please change first sentence in 3`' paragraph to "<u>Trout Unlimited funded and contracted Downstream Strategies, LLC from West Virginia to complete</u> a companion study to the West Branch Strategy titled An Economic Benefits Analysis for Abandoned Mine Drainage Remediation in the West Branch Susquehanna River Watershed." (changes underlined)

Response: The requested change has been made to the document.

Comment: Page 23: Please change #1, #2, and #4 (#3 and #5 are fine) under economic benefit analysis study conclusions to the following (changes underlined):

1. Remediation project expenditures will create thousands of jobs and could generate as much as $616 million for capital expenditures and $23 million per year for the operation and maintenance of those systems.

2. An additional $22.3 million in sport fishing expenditures could be expected each year after remediation of the watershed is completed.

4. Drinking water options will be cheaper and more plentiful for public water suppliers,private residences, and businesses.

Response: The requested changes have been completed.

Comment: Page 26: Citations for the West Branch Susquehanna Subbasin AMD Remediation Strategy: Background, Data Assessment, and Method Development (2008) by the Susquehanna River Basin Commission and An Economic Benefit Analysis for Abandoned Mine Drainage Remediation in the West Branch Susquehanna River Watershed, Pennsylvania (2008) by Downstream Strategies, LLC should be added to the

References section. Both documents can be downloaded at (http://www.wbsrc.com/plansandprojects.html)

Response: The two citations have been added to the References section.

Comment: You may also want to consider adding the following to the Current and Future Reclamation Efforts in the West Branch Susquehanna River Watershed section:

"PADEP provided a Growing Greener grant to Trout Unlimited (TU) to conduct the West Branch Susquehanna Watershed Recovery Benchmark study in order to 1) Provide a benchmark of the AMD-recovery of the watershed-, and 2) Provide sufficient data for the integrated database and model created by the Susquehanna River Basin Commission as part of the West Branch Susquehanna Subbasin AMD Remediation Strategy.

In partnership with PADEP and other state and federal agencies, TU is collecting habitat, benthic, and water quality data at 86 sites located on the river and on tributaries between the West Branch headwaters and Lock Haven. All data will be collected accordin•to EPA and DEP .rotocols. Additionall the PA Fish and Boat Commission and Susquehanna River Basin Commission will be conducting fish surveys at a total of twelve stations along this same reach of the river. "

Response: The requested information has been inserted into the Recommendation section of the report.

Comment: For your information (and optional use in the TMDL), the following is our general summary for the West Branch Susquehanna Watershed Recovery Benchmark project. A map of sample sites is available upon request.

West Branch Susquehanna Recovery Benchmark Project Summary

TU (in partnership with DEP) will be collecting a suite of biological and chemical data throughout the West Branch watershed this spring and summer. We are targeting 86 AMD-impacted sites located primarily between the West Branch headwaters region to Lock Haven. Our primary motives for this project are to 1 - provide a benchmark of the AMD-recovery of the watershed and 2 - provide sufficient data for the integrated database and model created by the SRBC as part of the West Branch Remediation Strategy.

Our work will consist of habitat and benthic data collections at all 86 sites before the end of May and according to EPA and DEP ICE protocols respectively. Additionally, we will be collecting water quality and flow data at all sites twice: once during a high flow baseflow event (tentatively scheduled for the week of May 18th) and once during a low flow baseflow event (tentatively scheduled for the week of July 20). All chemistry and flow data will be collected within the same two or three day time period in order to calculate comparable loadings.

Complementary to the data we are collecting, the Fish and Boat Commission will be sampling fish communities at 4 river locations this summer and the SRBC will be sampling fish communities at another 8 - all of these collections will occur between the headwaters and Lock

Haven and will be compared to data collected by the Fish and Boat Commission in 1998 and 1999. We are also working with the USGS to collect periphyton samples at all 86 locations mentioned above. Periphyton will be collected for both community structure identification and also for fatty acid analysis in anticipation of creating a periphyton IBI.

Response: The entire summary was inserted to the Additional Efforts sub-heading of the Recommendations section.

COMMENTOR: United States Environmental Protection Agency

West Branch Susquehanna Informal Comments- USEPA region 3

Comment: 1. We have discussed that EPA would like to see individual WLAs rather than gross WLAs for permits within the watershed. PADEP has told me that SRBC is working on that and those WLAs will be in the final TMDL.

Response: Each of the “aggregate WLAs” has recently gone through a complete file review. Therefore simulated effluent limits (previously shown) have been changed to actual permitted effluent limits listed in the NPDES file.

Comment: 2. Mass Balance

- Page 17 is mislabeled- two TMDLs are identified as Sandy Run, The bottom of the page appears to be Cooks Run TMDL data, numbers are correct
- Pg 18 WBSR 4- data transferred incorrectly from the calc sheets. FE is 29,716 for both existing and TMDL, no other calc changes
- Sampling point 4 has 5.088 MGD flow and sampling point 3 has 3.603 MGD flow. Are we losing 1.5 MGD in an estimated 20 plus miles and the additional flow of 33 plus tribs feeding the stream in between WBSR4 and WBSR3. Are there powerplants or other major consumptions of water in this area? Are these flows correct?
- Modeling of the down stream points uses a weighted average for the combination of Lancashire 15 back into the WBSR, the standard deviation is the same as the data set for the mainstem only. Modeling the standard deviation change would reduce or increase the TMDL allowances depending on flows and individual STDEV. The changes get smaller as the flow of the stream increases. Also, in the text, the flow is 7.39 MGD on p 11 and 7.29 on p 24. Please clarify which is correct.

Response: The changes requested for pages 17 and 18 have been added to the document. Bulleted item three was addressed by modeling flow data that was not recorded during the 2005 sampling. Please refer to page 144 of the report where these flows are identified and an explaination has been added to the attachment. The discharge value for the Barnes and Tucker Lancashire 15 is 7.39 MGD and has been corrected on page 24.

Comment: 3. Lancashire 15 diversion- The impact to the WBSR will be “treated effluent,” which is currently going into the Ohio River basin. On p. 68 it says that point 23.0 accounts for untreated Barnes and Tucker #15 discharge. The proposed changes as a result of the diversion would require new treatment ponds and theoretical performance

that enhance removal and reduce the standard deviation from greater retention capacity. The performance that is modeled is based on "current flows and associated stand deviations" from the mine pool. How were these data calculated and how do they compare with treated diversion "effluent?"

Average Influence with Barnes and Tucker Water Quality and Flow

AVG Fe mg/L	242.583	**STDV Fe mg/L**	32.240
AVG Mn mg/L	12.470	**STDV Mn mg/L**	2.038
AVG Al mg/L	49.642	**STDV Al mg/L**	49.642
AVG Acidity mg/L	716.300	**STDV Acidity mg/L**	141.780
AVG Alk mg/L	0.000	**STDV Alk mg/L**	0.000
Flow GPM	5132.374		
Flow MGD	7.390619		

Response: SRBC provided all data, documentation and assumptions inherent in the calculations to US EPA. The requested information is also included in the document.

Comment: 4. Does this diversion require permitting by the NPDES program? We have heard that inter-basin tranfers require a permit? What is the proposed performance of treatment at the site? Will WQS be met? Tech based limits? Fe, Al, Mn, pH? There are references to meeting standards for Fe and Mn, but not Al, which is an aquatic life concern. Anticipated design parameters are mentioned, but not presented.

Response: The Department disagrees with any contention that the discharge from the proposed Lancashire # 15 AMD treatment facility should be considered a "point source discharge" pursuant to applicable law. The discharge from the treatment facility is properly characterized as a nonpoint source discharge for two main reasons. First, no person responsible for causing the discharge exists. Second, a treatment facility for an abandoned mine discharge does not add pollutants to a surface water. As a matter of basic fact, the Lancashire # 15 mine pool exists and but for pumping and treating of the mine pool water a breakout will occur and a discharge of abandoned mine drainage will flow into the West Branch watershed. In the absence of any action being taken to address the Lancashire # 15 mine pool, the discharge will occur—that is the nature of abandoned mine drainage. The proposed Lancashire # 15 AMD treatment facility will remove pollutants that would otherwise reach the surface water from an abandoned mine source for which there is no responsible party. EPA has articulated this interpretation in the past, see 55 FR 35248 (Aug. 28, 1990) (describing "acid mine drainage from abandoned mines" as "non-point sources" because no owner can be found); and, more recently, EPA has approved Department TMDLs classifying discharges from abandoned mine sites as non-point sources. *See, e.g.*, EPA Decision Rationale, TMDL, Elk Creek Watershed for Acid Mine Drainage Affected Segments (April 1, 2005). Because the discharges identified are appropriately classified as non-point sources, the Department does not agree that these discharges require an NPDES permit. These discharges will be assigned LAs along with the other non-point sources identified in the TMDL.

On the water transfer issue, another commentor pointed out that "(j)ust last year, EPA issued a rule exempting any "water transfer" from the NPDES permit requirement. They defined a transfer as "an activity that conveys or connects waters of the United States without subjecting the transferred water to intervening industrial, municipal, or commercial use," and without introducing pollutants into the water being transferred. 40 C.F.R. § 122.3(i). See 73 Fed. Reg. 33697, 33708 (col. 3) (June 13, 2008) (adopting exclusion codified at § 122.3(1)). See also id. at 33699 (col. 1) (noting that "Pennsylvania is the only NPDES permitting authority that regularly issues NPDES permits for water transfers")". While the commentor suggested that the fact that this water originated in a mine pool which would exclude it from EPA's definition of a "water transfer", the scope of whether this "transfer" requires a permit is beyond that of the TMDL. In any case, the withdrawal, into-basin transfer, treatment and discharge of water from the Lancashire #15 mine pool into the West Branch Susquehanna was approved on June 18, 2009, by the Susquehanna River Basin Commisioners (see SRBC Docket No. 20090622).

Performance standards for this treatment facility have been provided to US EPA and documented in this report. Though the treatment facility and other documented efforts in the West Branch Susquehanna remove a significant portion of the Al, Fe and acidity that would enter the West Branch (and significantly dilutes the existing flow), meeting water quality standards will require additional nonpoint source remediation. The document provides an explanation of the Barnes & Tucker Treated scenario and shows the anticipated effluent quality. Documentation supporting those assumptions was provided by SRBC.

Comment: 5. Depending which draft we look at, there is a date missing from the public participation section. More importantly, none of the drafts we have contain the comments and responses from this comment period.

Response: The comments were not included at the time because the public comment period was still in effect. All comments have been added to date and all dates have been corrected.

Comment: 6. I agree with the IDs for the 1996 listings, but are those "all that you want credit for?" I understand that the TMDL is only for the mainstem, but wasn't it listed subsequently?

Response:
All later listings pertaining abandoned mine drainage as the source and metals being the cause have been added to the report.