FINAL
Redbank Creek Watershed TMDL

Armstrong, Clarion, Clearfield & Jefferson Counties, Pennsylvania

Prepared by:

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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Introduction

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

Table 1. 303(d) Listed Segments

State Water Plan (SWP) Subbasin: 17C

HUC: 05010006 Middle Allegheny – Redbank

Year	Miles	Segment Identification	DEP Stream Code	Stream Name	Desig-nated Use	Data Source	Source	EPA 305(b) Cause Code
1996	0.6	5303	48064	Redbank Creek	TSF	303 (d) List	RE	Other Inorganics
1996	1.4	5303	48064	Redbank Creek	TSF	303 (d) List	RE	Metals
1996	3.0	5318	48447	Beaver Run	CWF	303 (d) List	RE	Other Inorganics/ Metals
1996	3.9	7209	48803	Laborde Branch	CWF	303 (d) List	RE	Metals
1996	1.3	7210	48807	Luthersburg Branch	CWF	303 (d) List	RE	Other Inorganics
1996	2.5	7210	48807	Luthersburg Branch	CWF	303 (d) List	RE	Metals

Pennsylvania's 1996, 1998, and 2002 Section 303(d) lists and the 2004 and 2006 Integrated Water Quality Report were approved by the Environmental Protection Agency (EPA). The 1996 Section 303(d) list provides the basis for measuring progress under the 1997 lawsuit settlement of *American Littoral Society and Public Interest Group of Pennsylvania v. EPA.*
CWF = Cold Water Fisheries
pH = Potenz Hydrogen, Hydrogen Ion Concentration. See Attachment B.
RE = Resource Extraction
TSF = Trout Stocking Fisheries
The use designations for the stream segments in this TMDL can be found in PA Title 25 Chapter 93.
See Attachment D**,** *Excerpts Justifying Changes Between the 1996, 1998, and 2002 Section 303(d) Lists and the 2004 and 2006 Integrated Water Quality Report.*
See Attachment I for additional listings to 2006**,** *Pennsylvania Integrated Water Quality Monitoring and Assessment Report Streams, Category 5 Waterbodies, Pollutants Requiring a TMDL*

Directions to Redbank Creek

The Redbank Creek Watershed is approximately 573.0 square miles in area. It is located in southwestern Jefferson County, southern Clarion County and northern Armstrong County. Redbank Creek is formed by the confluence of Sandy Lick Creek and North Fork Redbank Creek in the borough of Brookville and flows for approximately 50.3 miles in a southwestern direction to its confluence with the Allegheny River near the borough of East Brady. The Redbank Creek Watershed is classified as a Trout Stocking Fishery (TSF) under Title 25 PA Code Chapter 93, Section 93.9r and can be found on the Brookville, Coolspring, Corsica, Dayton, Distant, East Brady, New Bethlehem, Reynoldsville, Rimersburg, Sligo, Summerville, Templeton and Valier 7-1/2 minute quadrangles. Redbank Creek (stream code – 48064) is part of the Hydrologic Unit Code 05010006 – Middle Allegheny River – Redbank Creek (formerly State Water Plans 17C and 17D). There are 63 named tributaries to Redbank Creek. Major named tributaries to include: Beaver Run, Leatherwood Creek, Little Sandy Creek, North Fork Redbank Creek, Sandy Lick Creek, Town Run, and Wildcat Run.

The mouth of Redbank Creek Watershed can be accessed by taking Exit 78 (Sigel/Brookville Route 36) from Interstate 80 (I-80) and traveling south on Rt. 36 for approximately 0.4 miles to the intersection with Rt. 322 East and Rt. 28 North/South. Turn left onto Rt. 36 South and travel approximately 0.9 miles into the borough of Brookville to the first traffic light. Continue straight onto Main Street (Rt. 322 East/ Rt. 28 North) for approximately 0.1 miles and turn right onto Pickering Street. Travel on Pickering Street for 0.2 miles and Redbank Creek flows under the road at this point (monitoring point RC09). Approximately 920 feet upstream from this location, the North Fork Redbank Creek and Sandy Lick Creek combine to form Redbank Creek. The mouth of Redbank Creek can be accessed by taking Exit 78 from I-80 and traveling South on Rt. 36 for 0.4 miles to the intersection with Rt. 322 East and Rt. 28 North/Sough. Proceed straight onto Rt. 28 South and travel for approximately 18.9 miles to the town of New Bethlehem. At this point, Rt. 66 South merges with Rt. 28 South. Continue on Rt. 28/ Rt. 66 South for approximately 3.1 miles and turn right onto Madison Road (SR1004) in the village of Distant. Continue to travel on Madison Road (SR1004) for approximately 8.6 miles to the village of Tidal and turn right onto SR1002. Travel on SR1002 for approximately 3.4 miles towards the village of Redbank until the road ends. At this location, Redbank Creek flows into the Allegheny River (monitoring point RC01).

Segments addressed in this TMDL

The Redbank Creek Watershed is affected by pollution from AMD. This pollution has caused elevated levels of metals and depressed pH in sections of the mainstem and in numerous tributaries of Redbank Creek. The sources of the AMD are seeps and discharges from areas disturbed by surface and deep mining. All of the discharges are considered to be nonpoint sources of pollution because they are from abandoned Pre-Act mining operations or from coal companies that have settled their bond forfeitures with the Pennsylvania Department of Environmental Protection (PADEP). The TMDL for the Beaver Run Watershed was completed and approved by the EPA in 2003. TMDLs for the Leatherwood Creek, Town Run and Welch Run watersheds have also been approved by the EPA.

There are currently fifty three surface mining permits (SMPs) issued in the Redbank Creek Watershed. Active mining has been completed on thirty four of these permits; therefore, waste load allocations (WLAs) will not be assigned to these permits. Seven of the active SMPs in the watershed are non coal operations (quarries) that do not have aluminum, iron or manganese in their permits, do not have NPDES permits, and are not required to have WLAs assigned to them. Eight of the issued SMPs are active coal mining operations; Original Fuels Inc. SMP#33930102, P&N Coal Co. Inc. SMP#33020105, SMP#33070101 & SMP#33070102, Timothy A Keck SMP#16050106, MSM Coal Co. Inc. SMP#33060104, Ben Hal Mining Co. SMP#33070108, Amerikhol Mining Inc. SMP#16080102 and Hawthorn Area Water Authority NPDES PA0098329, an industrial permit; therefore, these permits will be assigned WLAs. The remaining four issued SMPs resulted in post mining discharges; Harmon Coal Co. SMP#3872SM7, Compass Coal Co. Inc. SMP#3877SM29, REM Coal Co. Inc. SMP#33810109 and Terry Coal Sales Inc. SMP#33860107. Passive treatment systems are installed on these sites and WLAs will be assigned to these permits. All of the discharges in the watershed are from abandoned mines and will be treated as non-point sources. The distinction between non-point and point sources in this case is determined on the basis of whether or not there is a responsible party for the discharge. Where there is no responsible party the discharge is considered to be a non-point source. Each segment on the 303(d) list will be addressed as a separate TMDL. These TMDLs will be expressed as long-term, average loadings. Due to the nature and complexity of mining effects on the watershed, expressing the TMDL as a long-term average gives a better representation of the data used for the calculations.

The use designations for the stream segments in this TMDL can be found in PA Title 25 Chapter 93.

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

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

Clean Water Act Requirements

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

Additionally, the federal Clean Water Act and the U.S. Environmental Protection Agency’s (USEPA) implementing regulations (40 CFR 130) require:

- States to develop lists of impaired waters for which current pollution controls are not stringent enough to meet water quality standards (the list is used to determine which streams need TMDLs);
- States to establish priority rankings for waters on the lists based on severity of pollution and the designated use of the waterbody; states must also identify those waters for which TMDLs will be developed and a schedule for development;
- States to submit the list of waters to USEPA every two years (April 1 of the even numbered years);
- States to develop TMDLs, specifying a pollutant budget that meets state water quality standards and allocate pollutant loads among pollution sources in a watershed, e.g., point and nonpoint sources; and
- USEPA to approve or disapprove state lists and TMDLs within 30 days of final submission.

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

In the cases that have been settled to date, the consent agreements require USEPA to backstop TMDL development, track TMDL development, review state monitoring programs, and fund studies on issues of concern (e.g., AMD, implementation of nonpoint source Best Management Practices (BMPs), etc.).

303(d) List and Integrated Water Quality Report Listing Process

Prior to developing TMDLs for specific waterbodies, there must be sufficient data available to assess which streams are impaired and should be on the Section 303(d) list and/or the Integrated Water Quality Report. With guidance from the USEPA, the states have developed methods for assessing the waters within their respective jurisdictions.

The primary method adopted by the Pennsylvania Department of Environmental Protection (Pa. DEP) for evaluating waters changed between the publication of the 1996 and 1998 303(d) lists. Prior to 1998, data used to list streams were in a variety of formats, collected under differing protocols. Information also was gathered through the 305(b) reporting process. Pa. DEP is now using the Unassessed Waters Protocol (UWP), a modification of the USEPA Rapid Bioassessment Protocol II (RPB-II), as the primary mechanism to assess Pennsylvania's waters. The UWP provides a more consistent approach to assessing Pennsylvania's streams.

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

After the survey is completed, the biologist determines the status of the stream segment. The decision is based on the performance of the segment using a series of biological metrics. If the stream is determined to be impaired, the source and cause of the impairment is documented. An impaired stream must be listed on the state's 303(d) list and/or the Integrated Water Quality Report with the documented source and cause. A TMDL must be developed for the stream segment. A TMDL is for only one pollutant. If a stream segment is impaired by two pollutants, two TMDLs must be developed for that stream segment. In order for the process to be more effective, adjoining stream segments with the same source and cause listing are addressed collectively, and on a watershed basis.

Basic Steps for Determining a TMDL

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

1. Collection and summarization of pre-existing data (watershed characterization, inventory contaminant sources, determination of pollutant loads, etc.);
2. Calculate TMDL for the waterbody using USEPA approved methods and computer models;
3. Allocate pollutant loads to various sources;
4. Determine critical and seasonal conditions;
5. Submit draft report for public review and comments; and
6. USEPA approval of the TMDL.

Watershed History

There are limited records available to document mining that occurred prior to the 1970's, sometimes referred to as pre-Act mining (mining that occurred prior to the passage of the Federal Surface Mining Control and Reclamation Act of 1977). Although the date of the earliest mining within this watershed is not known, environmental scars from some of these operations such as unreclaimed pits, spoil piles and post-mining discharges is evidence of a long history of mining and may contribute to the non-point source loading within the Redbank Creek Watershed.

The majority of the mining within the Redbank Creek watershed occurred in the 1970's and 1980's and continues on a smaller scale today. The last application for a permit to mine coal in this watershed was issued by the Department of Environmental Protection in 2008. Although the complete files for the older mining permits no longer exist, the following information gathered from microfiche and more recent surface mining permits provides a brief outline of the mining history in the Redbank Creek watershed:

Company Name	Mine Name	Permit Number	Date Issued	Acres	Coal Seam(s)	Status
GLENN COAL CO	GLENN 6 MINE	3067BSM30	4/10/1968	268.0	LK, MK, UK, LF, UF	ABANDONED-BOND FORFEITURE-RECLAIMED
RD BAUGHMAN COAL CO INC	STARTZELL MINE	3870BSM7	6/3/1971	592.0	C, LK, MK	INACTIVE-RECLAMATION COMPLETE
MAUERSBERG COAL CO	CHAMPION MINE	3671BSM8	10/4/1971	143.0	LK, MK	ABANDONED-BOND FORFEITED
MAUERSBERG COAL CO	HENRY MINE	3671BSM12	11/26/1971	49.9		ABANDONED-BOND FORFEITED
W PAUL GLENN	W PAUL GLEN MINE	3066BSM59	5/23/1972	96.7		ABANDONED-BOND FORFEITED
LUCINDA COAL CO INC	DEITZ MINE	3672SM21	12/4/1972	399.0	LF, UK, MK, LK	ABANDONED-BOND FORFEITED
GLENN BROS QUARRY	GLENN MINE	3872SM12	5/10/1973	46.0	Sandstone	ACTIVE-STAGE1/REGRADED
HARMON COAL CO	HARMON 6 MINE	3872SM7	10/4/1973	181.0	LF, MK	ACTIVE-RECLAIMED/PASSIVE TREATMENT
REM COAL CO INC	SHERMAN MINE	3673SM10	2/13/1974	333.0	LK, MK, UF	INACTIVE-RECLAMATION COMPLETE
COLT RESOURCES INC	BOWERSOX MINE	3673SM7	5/23/1974	98.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
RD BAUGHMAN COAL CO INC	KENNEMUTH MINE	3674SM10	7/18/1974	615.0	LK, MK, UK, UF	INACTIVE-RECLAMATION COMPLETE
P & Y COAL CO	PANSY MINE	3874SM14	9/23/1974	101.0	LK, LF	ABANDONED-BOND FORFEITED
STEVEN C MILES COAL CO	YOUSEE MINE	3674SM15	10/9/1974	439.0	LK, MK, UK	ABANDONED-BOND FORFEITED
RICHARD R STANFORD	STANFORD MINE	3874SM29	11/7/1974	54.0	LK	ABANDONED-BOND FORFEITED
ALVIN GEARHART	GEARHART 2 MINE	3671BSM21	12/16/1974	43.0	LF	INACTIVE-RECLAMATION COMPLETE
W & M COAL CO	MUSSER MINE	3674SM35	12/17/1974	88.0	LF, UF, UK, MK	ABANDONED-BOND FORFEITURE-RECLAIMED
DELP BROS COAL CO	KNAPP MINE	3874SM46	12/31/1974	65.0	LK, C	ABANDONED-BOND FORFEITED
ANDREW R METERKO	METERKO 1 MINE	3874SM33	2/4/1975	314.0	LF, UF	INACTIVE-RECLAMATION COMPLETE
DONALD W DEITZ	DEITZ 1 MINE	3674SM51	2/5/1975	193.0	LF, UF, LK, MK, UK	ABANDONED-BOND FORFEITED
RE WYANT COAL CO	WYANT MINE	3674SM49	2/18/1975	77.0	UK	INACTIVE-RECLAMATION COMPLETE
ROBERT FAGLEY	DITTY MINE	3674SM46	2/24/1975	18.0		ABANDONED-BOND FORFEITED
RICE COAL CO	MAUK MINE	3874SM35	4/15/1975	7.0	LK	INACTIVE-RECLAMATION COMPLETE
S & M COAL CO	S & M 1 MINE	3873SM3	4/18/1975	414.0	LK, MK, LF, UF	ABANDONED-BOND FORFEITED
DONALD W DEITZ	DEITZ 4 MINE	3675SM5	5/13/1975	353.0	MK, LF	ABANDONED-BOND FORFEITED
H & G COAL & CLAY CO INC	H & G 37 MINE	3674SM54	5/19/1975	131.0	MK, LF, UF	INACTIVE-RECLAMATION COMPLETE
MERLE H PHILLIPS	PHILLIPS 1 MINE	3670BSM3	6/17/1975	592.5		ABANDONED-BOND FORFEITED
ZACHERL COAL CO INC	SHAFFER 4 MINE	3675SM11	6/26/1975	82.0	LK, MK, UK	ABANDONED-BOND FORFEITED
DOVERSPIKE BROS COAL CO	EAGLE 12 MINE	3873SM11	7/8/1975	57.0	LK, MK, UK	INACTIVE-RECLAMATION COMPLETE
BURKETT MAXINE L	WACHOB MINE	3874SM47	8/14/1975	63.0	LK	INACTIVE-RECLAMATION COMPLETE
COLT RESOURCES INC	MINICH MINE	3675SM2	10/6/1975	333.0	LK, MK, UK	INACTIVE-RECLAMATION COMPLETE

DOVERSPIKE BROS COAL CO	EAGLE 4 MINE	3875SM52	10/29/1975	106.0	C, LK	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	C & K 87 MINE	3675SM40	11/6/1975	243.0	LK, MK	ABANDONED-BOND FORFEITED-PASSIVE TREATMENT
TERRY REDDINGER	MCCULLOUGH MINE	3674SM47	12/15/1975	387.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
WA COTTERMAN COAL CO	BARGER MINE	3676SM31	12/16/1975	136.0	LF, UF, LK, MK, UK	ABANDONED-BOND FORFEITED
GLENN COAL CO	CHAMPION 1 MINE	3875SM36	12/16/1975	70.0	LK	ABANDONED-BOND FORFEITED
REM COAL CO INC	CHITTESTER MINE	3875SM17	1/7/1976	118.0	LK	INACTIVE-RECLAMATION COMPLETE
HAWK CONTR INC	MUSSER MINE	3675SM44	1/30/1976	321.0	LF, LK, MK, UK	ABANDONED-BOND FORFEITED
JOHN R YENZI JR	YENZI 1 MINE	3875SM42	2/20/1976	141.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
WHITE COAL	WHITE 1 MINE	3675SM53	2/23/1976	208.0	LK, MK, UK, LF, UF	INACTIVE-RECLAMATION COMPLETE
P & Y COAL CO	P & Y 1 MINE	3875SM48	2/24/1976	278.0	LK, LF	ACTIVE-STAGE 2 ELIGIBLE
GLENN COAL CO	CHAMPION 3 MINE	3875SM54	2/26/1976	211.0	C, LK, MK	ABANDONED-BOND FORFEITED
WA COTTERMAN COAL CO	CARMICHAEL MINE	3676SM5	4/20/1976	130.0	LK, MK	ABANDONED-BOND FORFEITED
ZACHERL COAL CO INC	ZACHERL 35 MINE	3675SM65	4/22/1976	394.0	LK, MK, LF, C	ABANDONED-BOND FORFEITED
GLACIAL MINERALS INC	RANKIN MINE	3675SM55	5/24/1976	94.0	LK, MK	ABANDONED-BOND FORFEITED
C & K COAL CO	DEITZ 6 MINE	3675SM43	5/24/1976	152.0	MK, UK	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	HENRY MINE	3675SM69	5/27/1976	146.0	MK	ABANDONED-BOND FORFEITED
GLENN COAL CO	CHAMPION 5 MINE	3875SM60	6/10/1976	62.0	LK, MK	ABANDONED-BOND FORFEITED
PENN MINERALS CO	HIMES MILLIN MINE	38A76SM16	6/15/1976	63.0	UF	ABANDONED-BOND FORFEITED
GLACIAL MINERALS INC	FOX MCMASTERS MINE	3675SM68	6/21/1976	696.0	LK, MK, UK, LF	ABANDONED-BOND FORFEITED
GENE REICHARD PAVING & EXCAV	COTTAGE HILL MINE	3671BSM2	7/22/1976	122.0	LK, MK, UK, LF	INACTIVE-RECLAMATION COMPLETE
GLENN COAL CO	CHAMPION 4 MINE	3875SM59	7/27/1976	42.0	LK, MK	ABANDONED-BOND FORFEITED
WHITE COAL	WHITE 2 MINE	3676SM16	8/3/1976	261.0	MK, UK, LF, UF	INACTIVE-RECLAMATION COMPLETE
MINICH COAL CO	TRAYER MINE	3876SM7	8/25/1976	147.0	LK	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	NOLF MINE	3676SM18	9/1/1976	53.0	MK, UK	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	MORTIMER MINE	3676SM11	9/3/1976	128.0	LK, UK	INACTIVE-RECLAMATION COMPLETE
GLENN COAL CO	CHAMPION 7 MINE	3876SM11	9/10/1976	424.0	LK, LF	ABANDONED-BOND FORFEITED
GLENN COAL CO	CHAMPION 6 MINE	3876SM2	9/30/1976	64.0	LK, MK	ABANDONED-BOND FORFEITED
DOVERSPIKE BROS COAL CO	WORTHVILLE MINE	3876SM9	9/30/1976	401.0	LF, UF	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	GLACIAL 41 MINE	3676SM10	10/26/1976	182.0	MK, UK	INACTIVE-RECLAMATION COMPLETE
TERRY REDDINGER	NOLF MINE	3676SM35	12/9/1976	340.0	LK, MK, UK, LF	INACTIVE-RECLAMATION COMPLETE
KIT IND INC	SWINEFORD WOLFE MINE	38(A)76SM10	12/13/1976	30.0	C, LK	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	STAHLMAN 33 MINE	3671BSM4	12/20/1976	532.0	LF, MK, LK, C	ABANDONED-BOND FORFEITED-PASSIVE TREATMENT

KIT IND	KNAPP MINE	3875SM25	12/20/1976	362.0	LK, MK, UK	INACTIVE-RECLAMATION COMPLETE
L & L BURKETT COAL CO	KEITH MINE	3876SM8	12/20/1976	118.0	LK, UK, LF, UF	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	STAHLMAN 46 MINE	38A76SM21	12/28/1976	117.0	C	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	DELP MINE	3676SM32	1/11/1977	133.0	UK, MK	ABANDONED-BOND FORFEITED
GLEN IRVAN CORP	KIEBLER MINE	3876SM20	1/25/1977	337.0	LK, MK, LF	ABANDONED-BOND FORFEITED
L & L BURKETT COAL CO	CARRIER MINE	3877SM8	2/6/1977	103.0	UF, LK	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	STAHLMAN 49 MINE	3676SM43	4/18/1977	22.0	MK, UK	INACTIVE-RECLAMATION COMPLETE
REM COAL CO INC	HOLLOBAUGH MINE	3676SM40	4/18/1977	417.0	UF, LK	INACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	MID RUN MINE	3677SM8	6/1/1977	378.0	MK, UK, LF, UF	INACTIVE-RECLAMATION COMPLETE
RD BAUGHMAN COAL CO INC	BAXTER MINE	38A77SM8	6/1/1977	58.0	LK, UF	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	RIMER MINE	3676SM37	6/2/1977	575.0	LK, MK, UK	INACTIVE-RECLAMATION COMPLETE
SHAFFER MINING CO	KIRKPATRICK MINE	3675SM61	7/12/1977	114.0	LK	INACTIVE-RECLAMATION COMPLETE
SPRING VALLEY COAL CO INC	SPRING VALLEY 1 MINE	3877SM15	8/22/1977	15.0	LK	INACTIVE-RECLAMATION COMPLETE
W & M COAL CO	FORRINGER MINE	3674SM17	8/24/1977	170.0	LK, MK, UK	ABANDONED-BOND FORFEITED
TERRY REDDINGER	HAWTHORN MINE	3677SM27	10/19/1977	236.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	MONTGOMERY 2 MINE	3876SM15	10/20/1977	358.0	LK, MK, UK, UF	INACTIVE-RECLAMATION COMPLETE
ANCIENT SUN INC	ANCIENT SUN 6 MINE	3677SM28	11/4/1977	52.0	MK, UK	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	BARLETT MINE	3675SM73	11/30/1977	22.0	LF, UF	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	TAYLOR MINE	3877SM4	12/14/1977	239.0	C, LK, MK, UK	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	GEORGE MINE	3677SM33	12/14/1977	155.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
LAUREL HILL MINING	REED MINE	3677SM14	1/24/1978	524.0	LK, MK, LF	INACTIVE-RECLAMATION COMPLETE
GLENN COAL CO	GLENN 12 MINE	3877SM16	2/3/1978	75.0	MK	ABANDONED-BOND FORFEITED
GLENN COAL CO	RAYBUCK MINE	3877SM26	2/3/1978	63.0	LK	ABANDONED-BOND FORFEITED
DOVERSPIKE BROS COAL CO	EAGLE 6 MINE	3875SM53	2/3/1978	155.0	LK	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	SMITH MINE	3876SM22	2/3/1978	180.0	C, LK	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	LEHNER MINE	3677SM37	5/2/1978	106.0	LK, UF	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	SMITH 2 MINE	3877SM22	5/9/1978	60.0	C, LK, MK	INACTIVE-RECLAMATION COMPLETE
TERRY P KIEFER	SMITH MINE	3875SM9	5/30/1978	88.0	C, LK, MK, UK	ABANDONED-BOND FORFEITED
GLENN COAL CO	HETRICK MINE	3877SM31	7/11/1978	145.0	LK	ABANDONED-BOND FORFEITED
COMPASS COAL CO INC	ENTERLINE 1 MINE	3877SM29	7/14/1978	207.0	LK, MK	ACTIVE-RECLAIMED/PASSIVE TREATMENT

HANLEY PRODUCING INC	SUMMERVILLE TRIANGLE MINE	38A78SM1	8/4/1978	4.0	C	INACTIVE-RECLAMATION COMPLETE
MAUERSBERG COAL CO	KING MINE	3675SM1	10/19/1978	78.0	MK, UK	INACTIVE-RECLAMATION COMPLETE
SPRING VALLEY COAL CO INC	KURTZ MINE	3878BC8	11/20/1978	121.0	LK, MK, LF	INACTIVE-RECLAMATION COMPLETE
D & M CONST	SPUDIC MINE	3678SM2	12/7/1978	44.0	LK, MK	ABANDONED-BOND FORFEITED
DOVERSPIKE BROS COAL CO	GEORGE 2 MINE	3678BC7	12/13/1978	206.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	MAGNESS MINE	3678BC10	12/22/1978	38.0	MK	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	GOURLEY 2 MINE	3678BC11	1/31/1979	96.0	MK	ABANDONED-BOND FORFEITED
COMPASS COAL CO INC	EAST BRANCH 1 MINE	3876SM12	2/3/1979	173.0	LF, UK, MK	INACTIVE-RECLAMATION COMPLETE
GENE REICHARD PAVING & EXCAV	DWYER MINE	3678SM1	2/23/1979	95.0	LF, UF, LK, MK	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	C & K 51 MINE	38(A)78SM3	3/13/1979	85.0	LK, C	INACTIVE-RECLAMATION COMPLETE
NORTH CAMBRIA FUEL CO	COOLSPRING MINE	3878BC11	3/27/1979	201.0	LK	INACTIVE-RECLAMATION COMPLETE
GLENN COAL CO	SMITH MINE	3379122	6/1/1979	482.0	LK, MK, LF	ABANDONED-BOND FORFEITED
GLENN COAL CO	GLENN 11 MINE	3877SM17	12/18/1979	97.0	LK	ABANDONED-BOND FORFEITED
SPRING VALLEY COAL CO INC	ROACH MINE	3878BC10	1/4/1980	215.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
WHITE COAL	WHITE MINE	1679139	1/11/1980	59.0	MK, UK, LF, UF	INACTIVE-RECLAMATION COMPLETE
TERRY REDDINGER	REED MINE	1679105	1/28/1980	46.0	LK, MK, UK, LF	INACTIVE-RECLAMATION COMPLETE
H & R COAL CO	WORTHVILLE MINE	3379109	2/6/1980	315.0	LK, UF	ABANDONED-BOND FORFEITURE-RECLAIMED
HANLEY BRICK INC	OHL MINE	3379131	2/6/1980	19.0	C	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	STAHLMAN 53 MINE	3379126	2/7/1980	103.0	MK, LK, C	INACTIVE-RECLAMATION COMPLETE
WAGNER COAL CO	MAYS MINE	1679134	2/25/1980	92.0	MK, UK, LF	ABANDONED-BOND FORFEITED
BLACKHAWK COAL CO	BLACKHAWK 1 MINE	3379134	2/25/1980	14.0	LK	INACTIVE-RECLAMATION COMPLETE
ICON COAL CORP	DOVERSPIKE MINE	3678BC12	2/27/1980	15.3		ABANDONED-BOND FORFEITED
COLT RESOURCES INC	OAKS MINE	3379130	3/10/1980	30.0	C	INACTIVE-RECLAMATION COMPLETE
REM COAL CO INC	ALLSHOUSE MINE	3379128	3/25/1980	143.0	UF	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	088 MINE	16880105	6/6/1980	305.0	LK, MK, UK, LF	ABANDONED-BOND FORFEITED
CHERNICKY COAL CO INC	BRINKER MINE	1680105	6/6/1980	305.0	LK, MK, UK, LF	ABANDONED-BOND FORFEITED
GENE REICHARD PAVING & EXCAV	REITZ MINE	1680109	6/10/1980	27.0	LF, UK	INACTIVE-RECLAMATION COMPLETE
RD BAUGHMAN COAL CO INC	SHIELDS MINE	3066BSM36	6/11/1980	190.0	C	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	MOORE MINE	1679140	7/9/1980	205.0	LK, MK, C	ABANDONED-BOND FORFEITED-PASSIVE TREATMENT
TERRY REDDINGER	JACKS MTN MINE	1679115	8/11/1980	480.0	LK, MK, UK	INACTIVE-RECLAMATION COMPLETE

GLACIAL MINERALS INC	NOLF BOOZER MINE	1679145	8/12/1980	182.0	MK, UK	INACTIVE-RECLAMATION COMPLETE
COMPASS COAL CO INC	BLOOD JENKS WINSLOW MINE	33800116	8/12/1980	125.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
MSM COAL CO INC	BURNS MINE	16800113	10/23/1980	37.0	UF	INACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	BOWERSOX MINE	3677SM9	11/14/1980	281.0	LK, MK, UK, UF	INACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	EVANS MINE	3674SM57	12/16/1980	447.0	LK, MK, UK, LF, UF	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	MAUK 1 MINE	33800117	1/23/1981	390.0	LK	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	DINGER MINE	33800128	3/30/1981	373.0	UF, LK	INACTIVE-RECLAMATION COMPLETE
REM COAL CO INC	SHOFESTALL MINE	1679108	4/6/1981	52.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	FENNELL MINE	33800132	5/21/1981	144.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
MINICH COAL CO	FERRINGER MINE	3380104	6/16/1981	55.0	LK	INACTIVE-RECLAMATION COMPLETE
CHERNICKY COAL CO INC	GLOSSER MINE	16800127	6/19/1981	25.0	C	ABANDONED-BOND FORFEITED
COMPASS COAL CO INC	ENTERLINE 1 MINE	33800123	6/23/1981	371.0	C, LK, MK	INACTIVE-RECLAMATION COMPLETE
PGH & SHAWMUT COAL CO	SPRANKLE MILLS TIPPLE	3380203	7/30/1981	5.0	TIPPLE	INACTIVE-RECLAMATION COMPLETE
CLYDE MILES COAL CO	TRIPLE W MINE	16800124	8/8/1981	140.0	MK, UK	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	C & K 106 MINE	3676SM7	8/8/1981	199.0	C, LK, MK, UF	INACTIVE-RECLAMATION COMPLETE
TERRY REDDINGER	SHERMAN MINE	16810112	9/22/1981	121.0	UF	INACTIVE-RECLAMATION COMPLETE
HANLEY BRICK INC	HANLEY BRICK MINE	33800901	10/9/1981	2.0	C	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	C & K 162 MINE	16800121	10/19/1981	226.0	LF, MK, UK	INACTIVE-RECLAMATION COMPLETE
REM COAL CO INC	HERIGER MINE	3380139	11/4/1981	33.0	LK	INACTIVE-RECLAMATION COMPLETE
HAWK CONTR INC	MUSSER MINE	16800131	11/10/1981	471.0	MK, UK, LF, UF	ABANDONED-BOND FORFEITED
MALINSKI MINING CO INC	BROAD MINE	10810122	11/18/1981	83.0	MK, LK	INACTIVE-RECLAMATION COMPLETE
ANCIENT SUN INC	ANCIENT SUN 8 MINE	16800133	12/28/1981	121.0	MK, UK	INACTIVE-RECLAMATION COMPLETE
H & R COAL CO	MARTZ MINE	33800125	12/29/1981	66.0	LK	ABANDONED-BOND FORFEITED
DOVERSPIKE BROS COAL CO	MAUD 2 MINE	33810115	12/29/1981	874.0	LF, LK	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	GEER MINE	33800137	1/28/1982	77.0	UF	INACTIVE-RECLAMATION COMPLETE
REM COAL CO INC	OLIVEBURG MINE	33810109	2/4/1982	122.0	LK, MK	ACTIVE-RECLAIMED/PASSIVE TREATMENT
F & S FUEL CO	OPAL 2 MINE	33800130	2/16/1982	36.0	LF	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	KNOXDALE MINE	33800133	2/17/1982	254.0	MK, LK	INACTIVE-RECLAMATION COMPLETE

C & K COAL CO	C & K 167 MINE	16810113	4/19/1982	18.0	LF	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	NULPH MINE	16800114	7/8/1982	27.0	LK, MK	ABANDONED-BOND FORFEITED-PASSIVE TREATMENT
INGRAM COAL CO	GREEN MINE	3875SM35	7/14/1982	101.0	LK	ABANDONED-BOND FORFEITED
SHAFFER MINING CO	MARTZ MINE	33820103	7/28/1982	19.0	LK	ABANDONED-BOND FORFEITED
CLYDE MILES COAL CO	CHAMPION MINE	16820102	9/16/1982	57.0	UK, LF	INACTIVE-RECLAMATION COMPLETE
INGRAM COAL CO	SMITH 1 MINE	3379103	10/22/1982	147.0	C	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	REID & HAWLEY 3 MINE	16820110	11/12/1982	80.0	LF, MK, UK	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	CHERRY RUN MINE	16820116	2/8/1983	68.0	MK	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	BARNACASTLE MINE	33820151	2/11/1983	159.0	LK	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	DEITZ 7 MINE	16820133	3/16/1983	49.0	MK	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	HIMES MINE	33820132	5/10/1983	100.0	LK	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	STEELE EXT MINE	33820136	11/2/1983	63.0	C	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	WOODROW MINE	33830110	11/3/1983	91.0	LF	INACTIVE-RECLAMATION COMPLETE
REM COAL CO INC	FITZMARTIN MINE	33830111	1/23/1984	38.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
OLIVE AFTON	AFTON 1 MINE	33773118	1/25/1984	56.0	LF	INACTIVE-RECLAMATION COMPLETE
HEPBURNIA COAL CO	BARNES MINE	33820130	2/6/1984	138.0	C	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	C & K 179 MINE	16830104	2/8/1984	29.0	UF	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	MOORE MINE	16793038	2/10/1984	99.5	MK, UK	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	ESHBAUGH MINE	16813024	4/3/1984	85.0	UF	INACTIVE-RECLAMATION COMPLETE
MILL RUN CONTR INC	SKYLINE DAIRY MINE	33820131	5/3/1984	69.0	UF	INACTIVE-RECLAMATION COMPLETE
GENE REICHARD PAVING & EXCAV	OCHS MINE	16830116	5/14/1984	35.0	MK, UK, LF	INACTIVE-RECLAMATION COMPLETE
MCKAY COAL CO INC	SHAFFER MINE	33820129	5/14/1984	74.2	LK, UK	INACTIVE-RECLAMATION COMPLETE
ANCIENT SUN INC	ANCIENT SUN 12 MINE	16830111	5/14/1984	107.0	UK	ACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	IZZI MINE	16820101	6/1/1984	53.0	MK, UK	ABANDONED-BOND FORFEITED
GLACIAL MINERALS INC	REID & HAWLEY 1 MINE	16820109	6/1/1984	97.0	MK, UK	ABANDONED-BOND FORFEITED
GLACIAL MINERALS INC	THOMPSON MINE	16820113	6/1/1984	128.7	UK	INACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	MCNEAL MINE	16820120	6/13/1984	766.0	LF, UK, MK	INACTIVE-RECLAMATION COMPLETE
SHAFFER MINING CORP	REED MINE	33840106	9/10/1984	21.2	LK	ABANDONED-BOND FORFEITED
TERRY COAL SALES INC	NEALE 1 MINE	33820146	9/10/1984	131.4	LK, MK	INACTIVE-RECLAMATION COMPLETE

NEW SHAWMUT MINING CO	RAMSAYTOWN 1 MINE	33840110	10/18/1984	75.0	LF	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	MONTGOMERY 1 MINE	33840107	10/22/1984	83.0	LK	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	C & K 187 MINE	16830122	12/14/1984	26.0	MK	INACTIVE-RECLAMATION COMPLETE
COOKPORT COAL CO INC	MOTTERN HOLLOW MINE	33830102	1/23/1985	505.0	LK	INACTIVE-RECLAMATION COMPLETE
HARMON COAL CO	GLENN MINE	33840121	1/28/1985	48.2	LK, MK	INACTIVE-RECLAMATION COMPLETE
REM COAL CO INC	MAUK MINE	33840112	1/30/1985	165.0	UF	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	LEHNER 2 MINE	16830110	3/7/1985	181.4	MK	INACTIVE-RECLAMATION COMPLETE
TERRY REDDINGER	NOLF MINE	16763035	3/19/1985	230.6	LK, MK, UK	INACTIVE-RECLAMATION COMPLETE
TERRY REDDINGER	JACKS MTN MINE	16793015	3/19/1985	258.6	MK, UK	INACTIVE-RECLAMATION COMPLETE
TERRY REDDINGER	REED MINE	16793005	3/19/1985	624.1	LK, MK, UK, LF	INACTIVE-RECLAMATION COMPLETE
COMPASS COAL CO INC	EAST BRANCH 1 MINE	33803043	4/5/1985	398.3	LK, MK	ACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	MCFADDEN 2 MINE	16840109	4/12/1985	219.5	MK, UK, LF, UF	INACTIVE-RECLAMATION COMPLETE
CLYDE MILES COAL CO	TRIPLE W MINE	16803024	4/22/1985	103.3	MK, UK	ACTIVE-RECLAMATION COMPLETE
C & K COAL CO	MORTIMER 67 MINE	16813013	4/30/1985	40.0	LF, C	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	C & K 71 BROSIUS MINE	16840101	4/30/1985	16.0	LK	INACTIVE-RECLAMATION COMPLETE
E & L EARTHMOVERS INC	JER JON MINE	33840109	5/6/1985	137.0	MK	ABANDONED-BOND FORFEITED
MCKAY COAL CO INC	BOWERSOX MINE	16773009	5/13/1985	414.9	LK, MK, UK, LF	INACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	MID RUN MINE	16813009	5/28/1985	434.0	LK, MK, UK, LF	INACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	PRESTON MINE	16693007	5/30/1985	618.5	LF, UF, LK, MK, UK	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	SAM MYERS EAST MINE	16830118	6/3/1985	52.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	BLAIR MINE	16850101	6/6/1985	427.1	MK, UK, LF	ABANDONED-BOND FORFEITED-PASSIVE TREATMENT
DOVERSPIKE BROS COAL CO	EAGLE 12 MINE	33733011	6/10/1985	146.4	LK, MK	INACTIVE-RECLAMATION COMPLETE
COMPASS COAL CO INC	ENTERLINE MINE	33793036	6/14/1985	646.0	C, LK, MK, UK	INACTIVE-RECLAMATION COMPLETE
ORIGINAL FUELS INC	SUMMERVILLE MINE	16713021	6/21/1985	135.0	UK, LF	INACTIVE-RECLAMATION COMPLETE
TWIN BROOK COAL CO	HEITZENRATER MINE	33840120	6/27/1985	31.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
AL HAMILTON CONTR CO	SWINEFORD MINE	33763110	7/2/1985	99.2	C	INACTIVE-RECLAMATION COMPLETE
PENN GRAMPIAN COAL CO	BARNETT MINE	33840104	7/9/1985	123.6	LK, MK	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	BAXTER MINE	33840118	7/11/1985	208.0	C, LK, MK, LF	INACTIVE-RECLAMATION COMPLETE

C & K COAL CO	SMITH HEASLEY MINE	16803030	7/15/1985	105.0	MK	ABANDONED-BOND FORFEITED-PASSIVE TREATMENT
C & K COAL CO	SMITH WALTON MINE	33773143	7/15/1985	279.5	LK, MK	ABANDONED-PRIMACY BOND FORFEITED
C & K COAL CO	C & K 106 MINE	16763007	7/15/1985	582.0	LK, MK, LF	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	GLENN AIKEN MINE	33803003	7/15/1985	602.0	LK, C	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	MAYS 4 MINE	16743016	7/15/1985	107.0	LK	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	YEANEY BLOTZER MINE	16763043	7/18/1985	247.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
KIT IND INC	DOVERSPIKE MINE	16813015	7/23/1985	107.7	UK	INACTIVE-RECLAMATION COMPLETE
SCHALL EQUIP INC	KNAPP MINE	33800134	7/23/1985	111.5	UF, MK	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	GOHEEN MINE	16763010	7/24/1985	67.8	LK, MK	ABANDONED-BOND FORFEITED
DOVERSPIKE BROS COAL CO	MILES 1 MINE	16743011	7/25/1985	225.5	UF, LK, MK, UK	ABANDONED-BOND FORFEITED
GLACIAL MINERALS INC	BISH MINE	16810133	7/25/1985	569.0	C, LK	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	DECHANT MINE	16753048	8/6/1985	91.0	MK	INACTIVE-RECLAMATION COMPLETE
ORIGINAL FUELS INC	WORTHVILLE MINE	33813001	8/6/1985	507.6	LK, LF, UF	INACTIVE-RECLAMATION COMPLETE
REICHARD CONTR INC	SAYERS MINE	16840106	9/3/1985	286.4	UK, MK, LF, UF	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	KIEBLER 2 MINE	33803019	9/16/1985	86.7	LK, MK	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	WHITE DINGER MINE	33840122	9/27/1985	132.0	LK, C	INACTIVE-RECLAMATION COMPLETE
HARMON COAL CO	SHIREY MINE	33763010	10/2/1985	162.0	LK	INACTIVE-RECLAMATION COMPLETE
ANCIENT SUN INC	WELLS MINE	16850102	10/23/1985	19.6	MK, UK	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	WIANT MINE	16850104	11/15/1985	110.5	MK, UK	ABANDONED-BOND FORFEITED
MB ENERGY INC	KNOXDALE 4 MINE	33840116	12/2/1985	714.0	UK, MK, LF	INACTIVE-RECLAMATION COMPLETE
NEW SHAWMUT MINING CO	RAMSAYTOWN 2 MINE	33850112	12/2/1985	24.0	LF	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	WPS 65 MINE	33850105	1/13/1986	219.5	LK, MK, UK	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	MARTZ MINE	16840102	1/13/1986	80.0	MK, UK	INACTIVE-RECLAMATION COMPLETE
REM COAL CO INC	KARIMOR MINE	16840108	2/7/1986	482.5	UF, LK, LF, MK	ABANDONED-BOND FORFEITED
HARMON COAL CO	HARMON FARM MINE	33850116	2/12/1986	69.8	MK	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	HENRY MINE	16850118	3/17/1986	66.4	MK	INACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	SHIREY MINE	16850115	3/24/1986	93.0	UK, MK, LF, UF	INACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	MCFADDEN 1 MINE	16850116	4/10/1986	648.5	LF, MK, UF, UK	ACTIVE-STAGE 2 APPROVED
ANCIENT SUN INC	WYANT MINE	16850108	5/7/1986	619.0	MK, UK, LF	INACTIVE-RECLAMATION COMPLETE

DOVERSPIKE BROS COAL CO	FIDDLERS RUN MINE	16850117	5/22/1986	229.0	LK, MK, UK	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	SIMPSON SONGER MINE	33850110	5/27/1986	102.0	C	ABANDONED-BOND FORFEITED
ENERGY RESOURCES INC	ENERGY RES 13 MINE	33860102	12/24/1986	465.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
ORIGINAL FUELS INC	BURKETT HOLLOW MINE	33830116	2/9/1987	154.3	LK, MK	INACTIVE-RECLAMATION COMPLETE
MCKAY COAL CO INC	MITCHELL MINE	16860105	4/6/1987	110.5	MK	INACTIVE-RECLAMATION COMPLETE
RICE COAL CO	SENECA MINE	33860115	5/26/1987	134.6	UK, LF	INACTIVE-RECLAMATION COMPLETE
ANCIENT SUN INC	THOMPSON MINE	16860106	6/8/1987	133.5	LK, MK	INACTIVE-RECLAMATION COMPLETE
MSM COAL CO INC	MCKINLEY MINE	33870103	7/31/1987	54.1	LK	INACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	COULTER 1 MINE	33860101	8/10/1987	145.0	LK, MK, UK	INACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	SANFORD MINE	33860107	8/10/1987	67.0	LK, MK	ACTIVE-RECLAIMED/PASSIVE TREATMENT
C & K COAL CO	STAHLMAN 27 MINE	3068BSM12	8/28/1987	523.0	LK	INACTIVE-RECLAMATION COMPLETE
C & K COAL CO	STAHLMAN 32 MINE	3671BSM1	8/28/1987	273.0	LK, MK, UK, LF, UF	INACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	REID & HOWLEY MINE	16860114	9/23/1987	295.0	MK, UK, LF, UF	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	BAXTER 2 MINE	33860106	10/13/1987	91.2	C	INACTIVE-RECLAMATION COMPLETE
RITA BEVERIDGE	MCLAUGHLIN MINE	33870107	11/2/1987	68.5	C, LK	INACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	MAYS MINE	16870103	1/5/1988	117.4	LF, UF, MK, UK	INACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	STAIR MINE	33870111	3/31/1988	105.9	MK, UK	INACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	MUSSER MINE	16870105	3/31/1988	56.4	LF, UF, MK, UK	INACTIVE-RECLAMATION COMPLETE
REICHARD CONTR INC	SKINNER MINE	16870101	6/20/1988	110.5	UF, LF, UK	INACTIVE-RECLAMATION COMPLETE
SWISHER CONTR INC	HOLLIS MINE	33880102	8/5/1988	58.0	LF	INACTIVE-RECLAMATION COMPLETE
MCKAY COAL CO INC	REITZ MINE	33880105	8/26/1988	111.0	LK	INACTIVE-RECLAMATION COMPLETE
MB ENERGY INC	FROSTBURG 2 MINE	33880101	11/14/1988	288.0	LK	INACTIVE-RECLAMATION COMPLETE
REM COAL CO INC	NOLPH MINE	33880113	5/4/1989	89.0	LK, UF	ABANDONED-BOND FORFEITED
AL HAMILTON CONTR CO	HUMBLE MINE	33880111	5/22/1989	71.3	LK	ACTIVE-RECLAMATION COMPLETE
DJ & W MINING INC	SPRANKLE MILLS MINE	33880115	5/26/1989	146.5	LK	INACTIVE-RECLAMATION COMPLETE
AL HAMILTON CONTR CO	KARKOSKEY MINE	33880116	6/7/1989	37.7	LK	INACTIVE-RECLAMATION COMPLETE
OLSON INC	OLSON MINE	33890808	7/14/1989	5.0	Sandstone	ACTIVE
GLACIAL MINERALS INC	FITZSIMMONS MINE	33890107	8/17/1989	49.5	C	ABANDONED-BOND FORFEITED
FLOYD MOTTERN COAL INC	FLEMING MINE	33890106	8/28/1989	21.3	UF	INACTIVE-RECLAMATION COMPLETE

MCKAY COAL CO INC	WOODALL MINE	33890101	9/21/1989	183.9	LK, MK	INACTIVE-RECLAMATION COMPLETE
GLACIAL MINERALS INC	SHIELDS MINE	33890109	11/22/1989	237.1	C, LK	ABANDONED-BOND FORFEITED
MSM COAL CO INC	DINGER MINE	33890114	11/27/1989	58.1	LK	INACTIVE-RECLAMATION COMPLETE
REICHARD CONTR INC	SKINNER MINE	16890109	5/30/1990	110.5	UK, LF, UF	INACTIVE-RECLAMATION COMPLETE
ASPEN MINERALS INC	HEFFNER MINE	16900104	6/21/1990	57.0	UK, LF, UF	INACTIVE-RECLAMATION COMPLETE
COLT RESOURCES INC	MARKTON MINE	33900101	7/25/1990	220.0	LK	INACTIVE-RECLAMATION COMPLETE
REM COAL CO INC	STEWART MINE	3379113	8/18/1990	118.0	LK, MK	INACTIVE-RECLAMATION COMPLETE
VISTA MINING CO	GATHERS MINE	33900106	9/27/1990	29.0	LK	INACTIVE-RECLAMATION COMPLETE
MCKAY COAL CO INC	SMITH MINE	03890112	12/18/1990	45.0	LF, UK, MK	INACTIVE-RECLAMATION COMPLETE
TERRY COAL SALES INC	RAMSAYTOWN 1 MINE	33890122	1/7/1991	200.0	MK	ACTIVE-STAGE 2 APPROVED
ANCIENT SUN INC	KELLY MINE	16900112	2/1/1991	140.2	MK	INACTIVE-RECLAMATION COMPLETE
ANCIENT SUN INC	SHANNONDALE MINE	16900113	3/19/1991	214.6	LK, MK, UK	ACTIVE-STAGE 2 ELIGIBLE
MCKAY COAL CO INC	OLSON MINE	33900118	6/6/1991	117.5	LK	INACTIVE-RECLAMATION COMPLETE
MCKAY COAL CO INC	ISEMAN MINE	03910103	9/5/1991	31.0	LF, UF	INACTIVE-RECLAMATION COMPLETE
MSM COAL CO INC	SANDY FLAT MINE	16910102	10/29/1991	27.8	UF	INACTIVE-RECLAMATION COMPLETE
JOHN R YENZI JR	NOLPH MINE	33910104	2/21/1992	133.7	LK, Limestone	INACTIVE-RECLAMATION COMPLETE
ORIGINAL FUELS INC	WORTHVILLE II MINE	33910101	5/29/1992	149.7	LK	INACTIVE-RECLAMATION COMPLETE
ORIGINAL FUELS INC	THOMAS MINE	33910107	5/29/1992	91.5	LK	ACTIVE-STAGE 1/REGRADED
C & K COAL CO	C & K 222 MINE	16910106	6/11/1992	255.0	UF, MK, LK	INACTIVE-RECLAMATION COMPLETE
MSM COAL CO INC	HIMES MINE	33910110	7/15/1992	74.6	LK, MK, UK	INACTIVE-RECLAMATION COMPLETE
ANCIENT SUN INC	REICHARD MINE	16910107	7/28/1992	157.0	MK, UK, LF	INACTIVE-RECLAMATION COMPLETE
COLT RESOURCES INC	MARKTON 2 MINE	33910109	9/3/1992	51.5	LK, MK	INACTIVE-RECLAMATION COMPLETE
RICE COAL CO	SENECA 2 MINE	33920107	7/15/1993	46.3	LF, MK	ACTIVE-STAGE 2 APPROVED
ASPEN MINERALS INC	JONES MINE	16930101	8/11/1993	57.0	UK, LF, UF	INACTIVE-RECLAMATION COMPLETE
ORIGINAL FUELS INC	CARRIER MINE	33930102	10/25/1993	120.3	UF, LK	ACTIVE
WAROQUIER COAL CO	FIKE MINE	33930108	10/26/1993	53.0	C, LK, MK, UK, LF	INACTIVE-RECLAMATION COMPLETE
COOKPORT COAL CO INC	MOORE MINE	33930109	11/16/1993	16.8	LK, MK	INACTIVE-RECLAMATION COMPLETE
AMFIRE MINING CO LLC	REITZ MINE	33930112	6/17/1994	211.2	UF	INACTIVE-RECLAMATION COMPLETE
REICHARD CONTR INC	GOHEEN MINE	16940101	8/18/1994	65.5	LF, UF, UK	INACTIVE-RECLAMATION COMPLETE
ORIGINAL FUELS INC	BURKETT HOLLOW II MINE	33940101	12/23/1994	175.0	LK, MK	INACTIVE-RECLAMATION COMPLETE

MSM COAL CO INC	ALCORN MINE	33940104	1/30/1995	109.2	UF, LK, Shale	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	DISTANT MINE	03940106	3/9/1995	106.0	MK	INACTIVE-RECLAMATION COMPLETE
MAHONING MINING INC	RAMSAYTOWN 2 MINE	33940102	4/4/1995	101.0	MK	ACTIVE-STAGE 2 APPROVED
MSM COAL CO INC	BODENHORN MINE	33940109	5/12/1995	27.3	LK	INACTIVE-RECLAMATION COMPLETE
MSM COAL CO INC	GLENN AIKEN MINE	33940111	5/25/1995	36.0	LK	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	SHANNONDALE MINE	16950108	11/20/1995	274.0	UK, LF	ACTIVE-PRIMACY-BOND FORFEITED-PASSIVE TREATMENT
DJ & W MINING INC	SPRANKLE MILLS 2 MINE	33940110	4/30/1996	16.5	LK	INACTIVE-RECLAMATION COMPLETE
ORIGINAL FUELS INC	BROSIUS MINE	33950109	5/24/1996	110.5	LK	INACTIVE-RECLAMATION COMPLETE
TLH COAL CO	SMITH MINE	33950108	7/15/1996	67.0	LF	ACTIVE-STAGE 2 APPROVED
REICHARD CONTR INC	PERROTTI MINE	16970801	4/19/1997	3.9	Sandstone	ACTIVE
DOVERSPIKE BROS COAL CO	LAWSONHAM 1 MINE	16960107	4/21/1997	226.0	MK	ABANDONED-BOND FORFEITED
DONALD L SHIREY	SHIREY MINE	16960805	6/19/1997	4.0	Sandstone	ACTIVE
MSM COAL CO INC	YEANY MINE	16960106	7/24/1997	38.6	UF	INACTIVE-RECLAMATION COMPLETE
MSM COAL CO INC	HILLIARD MINE	33960105	9/30/1997	21.2	LK	INACTIVE-RECLAMATION COMPLETE
R & L COAL CORP	NEWCOME BURKETT MINE	33960106	1/8/1998	66.7	LK, MK, UK, C	ABANDONED-BOND FORFEITURE-RECLAIMED
MSM COAL CO INC	PARK MINE	33970109	1/15/1998	85.2	UF	INACTIVE-RECLAMATION COMPLETE
MSM COAL CO INC	DOBSON MINE	33970103	3/9/1998	26.9	UF	INACTIVE-RECLAMATION COMPLETE
DOVERSPIKE BROS COAL CO	LAWSONHAM II MINE	16970105	3/18/1998	360.0	MK, UK, LF	ABANDONED-BOND FORFEITED
ORIGINAL FUELS INC	WORTHVILLE III MINE	33970110	3/29/1998	111.5	LK	INACTIVE-RECLAMATION COMPLETE
BEN HAL MINING CO	CORSICA 1 MINE	33960107	8/16/1998	17.8	LK	ACTIVE-STAGE 2 ELIGIBLE
ORIGINAL FUELS INC	PARK MINE	33970107	9/18/1998	171.6	LK, MK	INACTIVE-RECLAMATION COMPLETE
COOKPORT COAL CO INC	WOODROW MINE	33980104	11/13/1998	25.6	LF	INACTIVE-RECLAMATION COMPLETE
GLENN BROS QUARRY	GLENN BROS QUARRY	33980305	4/3/1999	10.3	LK	ACTIVE-STAGE1/REGRADED
COOLSPRING SAND & GRAVEL CO INC	COOLSPRING SAND & GRAVEL 1	33980308	8/23/1999	33.8	Sand & Gravel, Topsoil	ACTIVE
ORIGINAL FUELS INC	GOURLEY MINE	16990104	2/8/2000	208.5	MK, UK	ACTIVE-STAGE 2 APPROVED
MSM COAL CO INC	GALBRAITH MINE	33980109	2/15/2000	52.0	UF	INACTIVE-RECLAMATION COMPLETE
ALLEGHENY MILESTONE INC	HEFFNER MINE	03990110	10/18/2000	81.9	LK	ACTIVE-STAGE 2 APPROVED
REICHARD CONTR INC	SMITH RECLAMATION PROJ	33-00-04	3/21/2001	17.0	B, LK	ACTIVE-STAGE 2 APPROVED
REICHARD CONTR INC	SUMMERVILLE MINE	33010104	4/1/2002	29.5	LK	ACTIVE-STAGE 2 APPROVED
GLEN GERY CORP	REITZ MINE	33022802	5/22/2002	5.7	Shale	ACTIVE-RECLAMATION COMPLETE
ORIGINAL FUELS INC	DEAN MINE	03020110	1/17/2003	73.0	LK, MK	ACTIVE-STAGE 2 APPROVED
MSM COAL CO INC	UNION TWP MINE	33020106	5/27/2003	33.8	LK	ACTIVE-STAGE 2 ELIGIBLE

GLEN GERY CORP	REITZ MINE	33020303	6/5/2003	129.6	Shale	ACTIVE-STAGE1/REGRADED
COOLSPRING SAND & GRAVEL CO INC	ALCORN SHALE MINE	33032805	7/14/2003	5.0	Shale, Sandstone	ACTIVE
FALLS CREEK ENERGY CO INC	ROY MINE	33030108	1/28/2004	97.8	LK, B	ACTIVE-STAGE 2 ELIGIBLE
BEN HAL MINING CO	ARBUCKLE MINE	16030101	2/2/2004	75.2	UK	ACTIVE-STAGE 1/REGRADED
ORIGINAL FUELS INC	BURKETT MINE	33020107	3/4/2004	138.7	MK, LK	ACTIVE-STAGE 1/REGRADED
P & N COAL CO INC	KUDLA 1 MINE	33020105	4/20/2004	128.0	LF, MK	ACTIVE
GLENN BROS QUARRY	GLENN 2 MINE	33042803	8/3/2004	7.3	Sandstone	ACTIVE-STAGE1/REGRADED
GLEN GERY CORP	OLIVER TWP MINE	33042805	11/3/2004	10.5	Shale	ACTIVE-RECLAMATION COMPLETE
BEN HAL MINING CO	76 ACRE MINE	33040104	12/22/2004	16.5	LK	ACTIVE-STAGE 2 APPROVED
REM COAL CO INC	TRUITTSBURG MINE	16820107	2/11/2005	164.0	LK, MK, UK	ABANDONED-PRIMACY BOND FORFEITED
REICHARD CONTR INC	SHAFFER MINE	16040104	6/28/2005	62.8	UF, LF, UK	ACTIVE-STAGE 1/REGRADED
MARTIN N MCGUIRE	ANTHONY MINE	16050801	7/5/2005	7.0	Sandstone	ACTIVE
BEN HAL MINING CO	KENNEMUTH MINE	16050103	9/14/2005	47.0	UK	ACTIVE-STAGE 1/REGRADED
BEN HAL MINING CO	ARBUCKLE 2 MINE	16050105	9/14/2005	57.1	UK, UF	ACTIVE-STAGE 1/REGRADED
ORIGINAL FUELS INC	TRUITT MINE	16050110	3/9/2006	65.0	UK, UF	ACTIVE-STAGE 1/REGRADED
TIMOTHY A KECK	KECK 1 MINE	16050106	3/29/2006	224.0	LF, UK, MK, Shale, Sandstone, Clay	ACTIVE
GLEN GERY CORP	OLIVER TWP MINE	33050304	4/19/2006	51.5	Shale	ACTIVE
ORIGINAL FUELS INC	BURKETT MINE	33050106	11/7/2006	75.3	MK	ACTIVE-STAGE 1/REGRADED
MSM COAL CO INC	GAULT MINE	33060104	7/19/2007	38.9	MK, Topsoil, Shale, Sandstone	ACTIVE
P & N COAL CO INC	OLIVEBURG MINE	33070101	10/11/2007	53.6	LF	ACTIVE
BEN HAL MINING CO	RAMSEY MINE	33070108	5/13/2008	40.0	MK, Sandstone, Shale	ACTIVE
P & N COAL CO INC	LEATHEM MINE	33070102	5/19/2008	23.1	MK, UK	ACTIVE
AMERIKOHL MINING INC	TAYLOR MINE	16080102	10/28/2008	73.5	LK, MK	ACTIVE-NOT STARTED
SHIREY FARMS	SHIREY MINE	03080801	12/22/2008	2.0		ACTIVE-PROPOSED AWAITING AUTH DECISION
GLENN BROS QUARRY	GLENN 2 MINE	33032802				ACTIVE-PROPOSED BUT NEVER MATERIALIZED

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

Allowable loads are determined for each point of interest using Monte Carlo simulation. Monte Carlo simulation is an analytical method meant to imitate real-life systems, especially when other analyses are too mathematically complex or too difficult to reproduce. Monte Carlo simulation calculates multiple scenarios of a model by repeatedly sampling values from the probability distribution of the uncertain variables and using those values to populate a larger data set. Allocations are applied uniformly for the watershed area specified for each allocation point. For each source and pollutant, it is assumed that the observed data is log-normally distributed. Each pollutant source is evaluated separately using @Risk[1] by performing 5,000 iterations to determine the required percent reduction so that the water quality criteria, as defined in the *Pennsylvania Code. Title 25 Environmental Protection, Department of Environmental Protection, Chapter 93, Water Quality Standards*, will be met instream at least 99 percent of the time. For each iteration, the required percent reduction is:

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

PR = required percent reduction for the current iteration

Cc = criterion in mg/l

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.

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

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

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

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

In low pH TMDLs, acidity is compared to alkalinity as described in Attachment B. Each sample point used in the analysis of pH by this method must have measurements for total alkalinity and total acidity. Net alkalinity is alkalinity minus acidity, both in units of milligrams per liter (mg/**l**) $CaCO_3$. Statistical procedures are applied, using the average value for total alkalinity at that point as the target to specify a reduction in the acid concentration. By maintaining a net alkaline stream, the pH value will be in the range between six and eight. This method negates the need to specifically compute the pH value, which for streams affected by low pH may not a true reflection of acidity. This method assures that Pennsylvania’s standard for pH is met when the acid concentration reduction is met.

Information for the TMDL analysis performed using the methodology described above is contained in the “TMDLs by Segment” section of this report.

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

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

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

Method to Quantify Treatment Pond Pollutant Load

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

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

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

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

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

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

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

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

$$41.4 \text{ in. precip/yr} \times 0.95 \times 1 \text{ ft/12/in.} \times 1{,}500' \times 300'\text{/pit} \times 7.48 \text{ gal/ft}^3 \times 1\text{yr/365days} \times 1\text{day/24hr} \times 1\text{hr/60 min} =$$

$$= 21.0 \text{ gal/min average discharge from direct precipitation into the open mining pit area}$$

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

$$41.4 \text{ in. precip/yr} \times 3 \text{ pit areas} \times 1 \text{ ft/12/in.} \times 1{,}500' \times 300'\text{/pit} \times 7.48 \text{ gal/ft}^3 \times 1\text{yr/365days} \times 1\text{day/24hr} \times 1\text{hr/60 min} \times 15 \text{ in. runoff/100 in. precip} =$$

$$= 9.9 \text{ gal/min average discharge from spoil runoff into the pit area}$$

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

Total Average Flow = Direct Pit Precipitation + Spoil Runoff

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

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

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

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

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

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

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

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

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

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

Derivation of the flow used in the future mining WLAs:

$$30.9 \text{ gal/min X 2 (assume two pits) X } 0.00144 = 0.09 \text{ MGD}$$

Future TMDL Modifications

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

Changes in TMDLs That May Require EPA Approval

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

Changes in TMDLs That May Not Require EPA Approval

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

TMDL Endpoints

One of the major components of a TMDL is the establishment of an instream numeric endpoint, which is used to evaluate the attainment of acceptable water quality. An instream numeric endpoint, therefore, represents the water quality goal that is to be achieved by implementing the load reductions specified in the TMDL. The endpoint allows for comparison between observed instream conditions and conditions that are expected to restore designated uses. The endpoint is based on either the narrative or numeric criteria available in water quality standards.
Because of the nature of the pollution sources in the watershed, the TMDLs component makeup will be load allocations that are specified above a point in the stream segment. All allocations will be specified as long-term average daily concentrations. These long-term average daily concentrations are expected to meet water quality criteria 99 percent of the time. Pennsylvania Title 25 Chapter 96.3(c) specifies that a minimum 99 percent level of protection is required. All metals criteria evaluated in this TMDL are specified as total recoverable. Table 2 shows the water quality criteria for the selected parameters.

Table 2. Applicable Water Quality Criteria

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

*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).
NA = Not Applicable

TMDL Elements (WLA, LA, MOS)

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

Allocation Summary

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

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

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

Table 3. Summary Table – Redbank Creek Watershed

Station	Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	Load Reduction (lbs/day)	Percent Reduction %
RC09	RC09 Most Upstream Sample Point on Redbank Creek, 48064						
	Al	758.3	758.3	0.102	755.4	0.0	0
	Fe	2854.3	1284.4	0.179	1273.0	1569.9	55
	Mn	659.7	620.2	0.123	612.6	39.6	6
	Acidity	0.0	0.0	0.0	0.0	0.0	0
RC08	RC08 Redbank Creek, 48064, Upstream of Confluence with Simpson Run						
	Al	801.5	801.5	*2.8*	798.7	0.0*	0*
	Fe	1967.6	1967.6	*11.25*	1956.35	0.0*	0*
	Mn	483.3	435.0	*7.5*	427.5	19.3*	4*
	Acidity	0.0	0.0	0.0	0.0	0.0*	0*
SR01	SR01 Mouth of Simpson Run, 48493						
	Al	12.6	2.4	*0.56*	1.84	10.2	81
	Fe	10.7	2.4	*2.25*	0.15	8.3	78
	Mn	69.1	2.8	*1.5*	1.3	66.3	96
	Acidity	226.4	2.3	0.0	2.3	224.1	99
WR1	WR1 Mouth of Welch Run, 48486						
	Al	45.4	8.2	*2.8*	5.4	2.9	26
	Fe	185.1	13.0	*11.25*	1.75	4.7	27
	Mn	222.2	15.6	*7.5*	8.1	38.3	71
	Acidity	1203.4	48.1	0.0	48.1	57.3	54
RC07	RC07 Redbank Creek, 48064, upstream of Confluence with UNT39						
	Al	824.4	824.4	*2.8*	NA	0.0*	0*
	Fe	3095.7	2817.1	*11.25*	2805.9	98.2*	3*
	Mn	2359.5	2288.7	*7.5*	2281.2	0.0*	0*
	Acidity	6265.5	6265.5	0.0	0.0	0.0*	0*
UNT39	Mouth of UNT39, 48482, Upstream of Confluence with Redbank Creek						
	Al	121.9	1.2	0.0	1.2	120.7	99
	Fe	221.6	2.2	0.0	2.2	219.4	99
	Mn	15.1	1.7	0.0	1.7	13.5	89
	Acidity	1536.4	0.0	0.0	0.0	1536.4	100
RR01	RR01 Mouth of Runaway Run, 48477, Upstream of Confluence with Redbank Creek						
	Al	50.9	7.6	*2.8*	4.8	43.2	85
	Fe	47.7	12.4	*11.25*	1.15	35.3	74
	Mn	147.7	8.9	*7.5*	1.4	138.8	94
	Acidity	808.0	16.2	0.0	16.2	791.8	98
BR01	BR01 Mouth of Beaver Run, 48447, Upstream of Confluence with Redbank Creek						
	Al	0.0	0.0	0.0	0.0	0.0	0
	Fe	31.9	20.4	0.0	20.4	11.5	36
	Mn	22.9	15.1	0.0	15.1	7.8	34
	Acidity	4.1	4.1	0.0	0.0	0.0	0
RC06	RC06 Redbank Creek, 48064, Downstream of the Confluence with Beaver Run						
	Al	864.7	864.7	*2.8*	861.9	0.0*	0*
	Fe	1957.6	1957.6	*11.25*	1946.35	0.0*	0*
	Mn	1645.4	1645.4	*7.5*	1637.9	0.0*	0*
	Acidity	0.0	0.0	0.0	0.0	0.0*	0*
UNT29	Mouth of UNT29, 48255, Upstream of Confluence with Redbank Creek						
	Al	14.9	1.5	*0.56*	0.94	13.4	90

Station	Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	Load Reduction (lbs/day)	Percent Reduction %
	Fe	10.9	4.3	*2.25*	2.05	6.7	61
	Mn	27.7	2.5	*1.5*	1.0	25.2	91
	Acidity	31.4	7.8	0.0	7.8	23.5	75
RC05	RC05 Redbank Creek, 48064, Downstream of Confluence with UNT25						
	Al	1101.7	1101.7	2.498+*2.8*	1096.4	NA*	0*
	Fe	1243.8	1243.8	7.521+*11.25*	1225.0	NA*	0*
	Mn	932.1	932.1	5.822+*7.5*	918.8	0.0*	0*
	Acidity	0.0	0.0	0.0	0.0	0.0*	0*
UNT25	UNT25 Mouth of UNT25, 48249, Upstream of Confluence with Redbank Creek						
	Al	0.4	0.4	0.0	0.0	0.0	0
	Fe	0.3	0.3	0.0	0.0	0.0	0
	Mn	0.43	0.27	0.0	0.1	0.0	38
	Acidity	0.0	0.0	0.0	0.0	0.0	0
TR01	TR01 Mouth of Town Run, 48227, Upstream of Confluence with Redbank Creek						
	Al	30.4	16.4	*2.8*	13.6	14.0	46
	Fe	31.1	31.1	*11.25*	19.85	0.0	0.0
	Mn	113.3	40.8	*7.5*	33.3	72.5	64
	Acidity	0.0	0.0	0.0	0.0	0.0	0.0
MR01	MR01 Mouth of Middle Run, 48223, Upstream of Confluence with Redbank Creek						
	Al	3.6	1.9	*0.56*	1.34	1.7	47
	Fe	3.1	3.1	*2.25*	0.85	0.0	0
	Mn	10.0	1.8	*1.5*	0.3	8.2	82
	Acidity	0.0	0.0	0.0	0.0	0.0	0
RC04	RC04 Redbank Creek, 48064						
	Al	1154.3	1154.3	*2.8*	1151.5	0.0*	0*
	Fe	1430.1	1430.1	*11.25*	1418.85	0.0*	0*
	Mn	1418.6	1290.9	*7.5*	1283.4	46.8*	3*
	Acidity	0.0	0.0	0.0	0.0	0.0*	0*
RC03	RC03 Redbank Creek, 48064						
	Al	1783.8	1141.7	*2.8*	1138.9	642.2*	36*
	Fe	1442.2	1442.2	*11.25*	1130.95	0.0*	0*
	Mn	2410.7	1060.7	*7.5*	1053.2	1222.3*	54*
	Acidity	0.0	0.0	0.0	0.0	0.0*	0*
UNT16	UNT16 Mouth of UNT16, 48123, Upstream of Confluence with Redbank Creek						
	Al	5.6	0.2	0.0	0.2	5.4	97
	Fe	4.1	0.3	0.0	0.3	3.8	94
	Mn	2.8	0.3	0.0	0.3	2.5	90
	Acidity	8.9	2.4	0.0	2.4	6.5	73
RC02	RC02 Redbank Creek, 48064						
	Al	1259.3	1259.3	*2.8*	1256.5	0.0*	0*
	Fe	1012.5	1012.5	*11.25*	1001.25	0.0*	0*
	Mn	1036.4	995.0	*7.5*	987.5	0.0*	0*
	Acidity	0.0	0.0	0.0	0.0	0.0*	0*
WRC01	WRC01 Mouth of Wildcat Run, 48086, Upstream of Confluence with Redbank Creek						
	Al	43.3	14.7	*2.8*	11.9	28.6	66
	Fe	28.7	19.0	*11.25*	8.75	9.8	34
	Mn	37.7	19.0	*7.5*	11.5	18.9	50
	Acidity	269.0	182.9	0.0	182.9	86.1	32
UNT05	Mouth of UNT05, 48081, Upstream of Confluence with Redbank Creek						

Station	Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	Load Reduction (lbs/day)	Percent Reduction %
	Al	6.1	2.8	*1.12*	1.68	3.3	54
	Fe	10.2	5.2	*4.5*	0.7	5.0	49
	Mn	7.8	7.8	*3.0*	4.8	0.0	0
	Acidity	31.7	31.7	0.0	0.0	0.0	0
UNT06	Mouth of UNT06, 48077, Upstream of Confluence with Redbank Creek						
	Al	59.2	1.2	0.0	1.2	58.0	98
	Fe	45.2	2.3	0.0	2.3	43.0	95
	Mn	20.7	0.4	0.0	0.4	20.3	98
	Acidity	721.9	0.0	0.0	0.0	721.9	100
UNT03	Mouth of UNT03, 48076, Upstream of Confluence with Redbank Creek						
	Al	6.1	0.8	0.0	0.8	5.3	87
	Fe	0.5	0.4	0.0	0.4	0.1	18
	Mn	3.9	0.9	0.0	0.9	3.1	78
	Acidity	49.3	6.9	0.0	6.9	42.4	86
UNT01	Mouth of UNT01, 48065, Upstream of Confluence with Redbank Creek						
	Al	21.3	9.8	*2.8*	7.0	11.5	54
	Fe	34.0	23.8	*11.25*	12.55	10.2	30
	Mn	14.8	14.4	*7.5*	6.9	0.4	3
	Acidity	0.0	0.0	0.0	0.0	0.0	0.0
RC01	Mouth of RC01, 48064, Upstream of Confluence with Allegheny River						
	Al	1321.3	1321.3	*2.8*	1318.5	0.0*	0*
	Fe	1405.8	1405.8	*11.25*	1394.55	0.0*	0*
	Mn	1112.5	1112.5	*7.5*	1105.0	0.0*	0*
	Acidity	792.8	792.8	0.0	0.0	0.0*	0*

*Takes into account load reductions from upstream sources.
Items *in italics are future WLAs* and current WLAs are not italicized, for that stream segment.
ND = Non-detectable
NA = Not Applicable

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

Wasteload allocations for the existing mining operations were incorporated into the calculations at RC09 (MSM Coal Co. Inc., Gault Mine, T1, T2 and T3 and P and N Coal Co., Inc., Kudla 1 mine, E, F and G), RC05 (Ben Hal Mining Company, Ramsey mine, TA; Original Fuels, Inc,. Carrier Mine, TP1, TP2 and TP3; Pand N Coal Co., Inc., Leathem Mine, TB1; Timothy A. Keck, Keck 1 Mine, T1, T2, T3, T4, T5, T6 and T7; Compass Coal Co., Inc., a post mining discharge, Enterline 1 mine, SP4 and SP6; Harmon Coal Co., a post mining discharge, Harmon 6 mine, BOG; REM Coal Co., Inc., a post mining discharge, Oliveburg mine, Bog; Terry Coal Sales, Inc,. a post mining discharge, TA and TB; Hawthorn Area Water Authority, filter backwash, an industrial permit). These are the first downstream monitoring points that receive all the potential flow of treated water from any of the treatment sites. No required reductions of these permits are necessary at this time because there are upstream non-point sources that when reduced will met the TMDL or there is available assimilation capacity. All necessary reductions are assigned to non-point sources.

The MSM Coal Company, Inc., (permit SMP#33060104, NPDES PA0258229) is actively mining coal. There are three permitted treatment ponds on the permit. Only one treatment pond will be discharging at any time. The standard pit size for the one pit is 200 ft. X 100 ft. This pit size was used in the Method to Quantify Treatment Pond Pollutant Load calculation and is shown in Table 4.

The P and N Coal Co., Inc., Kudla 1 Mine (permit SMP#33020105, NPDES PA0242195) is actively mining coal. There are three permitted treatment ponds on the permit. Only one treatment pond will be discharging at any time. The standard pit size for the pit is 360 ft. X 150 ft. This pit size is used in the Method to Quantify Treatment Pond Pollutant Load calculation shown in Table 4.

The Ben Hal Mining Company, Ramsey Mine (permit SMP#33070108, NPDES PA0258474) is actively mining coal. Only one treatment pond will be discharging at any time. The standard pit size for the pit is 100 ft. X 80 ft. This pit size is used in the Method to Quantify Treatment Pond Pollutant Load calculation shown in Table 4.

The Original Fuels, Inc., Carrier Mine (permit SMP#339030102, NPDES PA0211508) is actively mining coal. There are three permitted treatment ponds on the permit, although only one discharges at a time. The standard pit size for the pit is 300 ft. X 300 ft. This pit size is used in the Method to Quantify Treatment Pond Pollutant Load calculation shown in Table 4.

The P and N Coal Company, Inc., Leathem Mine (permit SMP#33070102, NPDES PA0258300) is actively mining coal. There is one treatment pond on the permit. The standard pit size for the pit is 340 ft. X 140 ft. This pit size is used in the Method to Quantify Treatment Pond Pollutant Load calculation shown in Table 4.

The Timothy A. Keck, Keck 1 Mine (permit SMP#16050106, NPDES PA024675) is actively mining coal. There are seven treatment ponds on the permit. Only one treatment pond will be discharging at any time. The standard pit size for the pit is 100 ft. X 100 ft. This pit size is used in the Method to Quantify Treatment Pond Pollutant Load calculation shown in Table 4.

The Hawthorn Area Water Authority (permit NPDES PA0098329) is a water treatment plant. The permit is for the discharge of filter backwash and other miscellaneous WTP wastes. An effluent discharge of 0.0105 mgd is noted in the permit and was used in the calculations of the WLAs shown in Table 4.

The Compass Coal Co., Inc., Enterline 1 Mine post mining discharge (permit SMP#3877SM29).

The Harmon Coal Co., Harmon 6 Mine post mining discharge (permit SMP#3872SM7).

The REM Coal Co., Inc., Oliveburg Mine post mining discharge (permit SMP#33810109).

The Terry Coal Sales, Inc., Sanford Mine post mining discharge (permit SMP#33860107).

Table 4. Waste Load Allocation of Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	Wla (lbs/day)	Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
MSM Coal Company, Inc. Gault Mine (SMP # 33060104)				P and N Coal Co., Inc., Kudla 1 Mine (SMP # 33020105)			
Al	0.75	0.002	0.012	Al	2.0	0.005	0.09
Fe	3.0	0.002	0.049	Fe	3.0	0.005	0.13
Mn	2.0	0.002	0.033	Mn	2.0	0.005	0.09
Ben Hal Mining Company, Ramsey Mine (SMP # 33070108)				Original Fuels Inc., Carrier #1 Mine (SMP # 33930102)			
Al	0.9	0.002	0.006	Al	0.75	0.0007	0.005
Fe	2.8	0.002	0.018	Fe	3.0	0.0007	0.018
Mn	1.0	0.002	0.007	Mn	2.0	0.0007	0.012
P and N Coal Company Inc., Leathem Mine (SMP# 33070102)				Timothy A. Keck, Keck 1 Mine(SMP#16050106)			
Al	0.75	0.005	0.03	Al	0.75	0.001	0.006
Fe	3.0	0.005	0.12	Fe	3.0	0.001	0.03
Mn	2.0	0.005	0.08	Mn	2.0	0.001	0.02
Compas Coal Co., Inc., post mining discharge (SMP # 3877SM29) SP4				Harmon Coal Co., post mining discharge (SMP # 3872SM7)			
Al	0.75	0.0002	0.001	Al	0.75	0.08	0.5
Fe	3.0	0.0002	0.005	Fe	3.0	0.08	2.0
Mn	2.0	0.0002	0.003	Mn	2.0	0.08	1.3
Compas Coal Co., Inc., post mining discharge (SMP # 3877SM29) SP6				Terry Coal Sales, Inc., post mining discharge, (SMP # 33860107)			
Al	0.75	0.006	0.4	Al	0.75	0.1	0.6
Fe	3.0	0.006	0.15	Fe	3.0	0.1	2.5
Mn	2.0	0.006	0.1	Mn	2.0	0.1	1.7
REM Coal Co., Inc., post mining discharge SMP # 33810109)				Hawthorn Area Water Authority (NPDES PA0098329)			
Al	0.75	0.1	0.6	Al	4.0	0.0105	0.35
Fe	3.0	0.1	2.5	Fe	2.0	0.0105	0.18
Mn	2.0	0.1	1.7	Mn	1.0	0.0105	0.09

Recommendations

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

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

The Bureau of Abandoned Mine Reclamation (BAMR) is Pennsylvania's primary bureau in dealing with abandoned mine reclamation (AMR) issues. BAMR has established a comprehensive plan for AMR throughout the Commonwealth. The plan prioritizes and guides reclamation efforts throughout the state and makes the most of available funds. For more information please visit (www.dep.state.pa.us/dep/deputate/minres/bamr/complan1.htm).

In developing and implementing a comprehensive plan for abandoned mine reclamation, the resources (both human and financial) of the participants must be coordinated to insure cost-effective results. The following set of principles is intended to guide this decision making process:

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

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

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

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

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

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

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

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

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

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

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

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

- Awards of grants for 1) proposals with economic development or industrial application as their primary goal and which rely on recycled mine water and/or a site that has been made suitable for the location of a facility through the elimination of existing Priority 1 or 2 hazards, and 2) new and innovative mine drainage treatment technologies that will provide waters of higher purity that may be needed by a particular industry at costs below conventional treatment costs as in common use today or reduce the costs of water treatment below those of conventional lime treatment plants. Eight contracts totaling $4.075 M were awarded in 2006 under this program.

- Projects using water from mine pools in an innovative fashion, such as the Shannopin Deep Mine Pool (in southwestern Pennsylvania), the Barnes & Tucker Deep Mine Pool (the Susquehanna River Basin Commission into the Upper West Branch Susquehanna River), and the Wadesville Deep Mine Pool (Excelon Generation in Schuylkill County).

The Beaver Run Watershed project began in 1997 with the execution of the Hanley Brick, Inc. Consent Decree which established the Redbank Creek Watershed Trust and required Hanley

Brick to complete the initial reclamation/treatment project in Conifer. Studies by the Knox DMO identified 10 sources of AMD in the Beaver Run Watershed. Hedin Environmental completed a hydrologic unit plan in early 1998 that identified two primary mine pools in the Conifer area (eastern and western) which contributed the majority of the pollution loading to Beaver Run. Passive treatment systems were installed to remediate these discharges in 2003 (referred to the Conifer East and West systems). In 2006 the Jefferson County Conservation District received a DEP Growing Greener Grant to upgrade the Conifer West treatment system. For more detailed information on restoration efforts in the Beaver Run watershed, including maps and water quality data, the Knox DMO watershed web page can be accessed by clicking the following link:
http://www.dep.state.pa.us/dep/deputate/minres/districts/homepage/Knox/Watershed/Priority%20Watersheds.htm

In 2004, the Western Pennsylvania Conservancy was awarded a grant from the Department of Conservation and Natural Resources (DCNR) through their Community Conservation and Partnership Program (C2P2) to develop a Watershed Conservation Plan for Redbank Creek. The Plan identified project area characteristics and land, water, biological and cultural resources in the Watershed and provided management recommendations for each resource. A copy of the Draft Redbank Creek Watershed Conservation Plan can be accessed by clicking the following link: http://www.dcnr.state.pa.us/brc/rivers/riversconservation/registry/redbank.pdf/

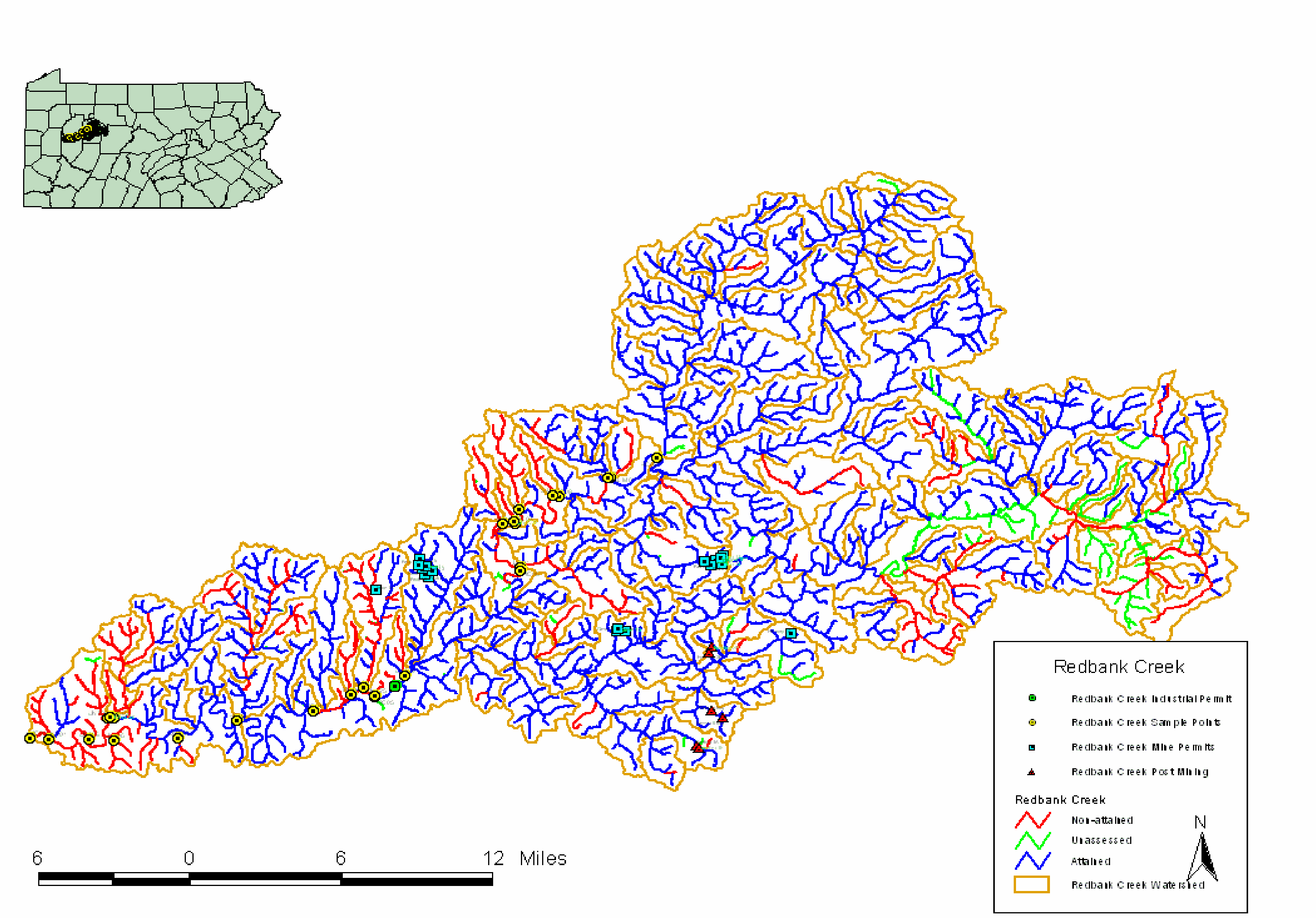
Candidate or federally-listed threatened and endangered species may occur in or near the watershed. While implementation of the TMDL should result in improvements to water quality, they could inadvertently destroy habitat for candidate or federally-listed species. TMDL implementation projects should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

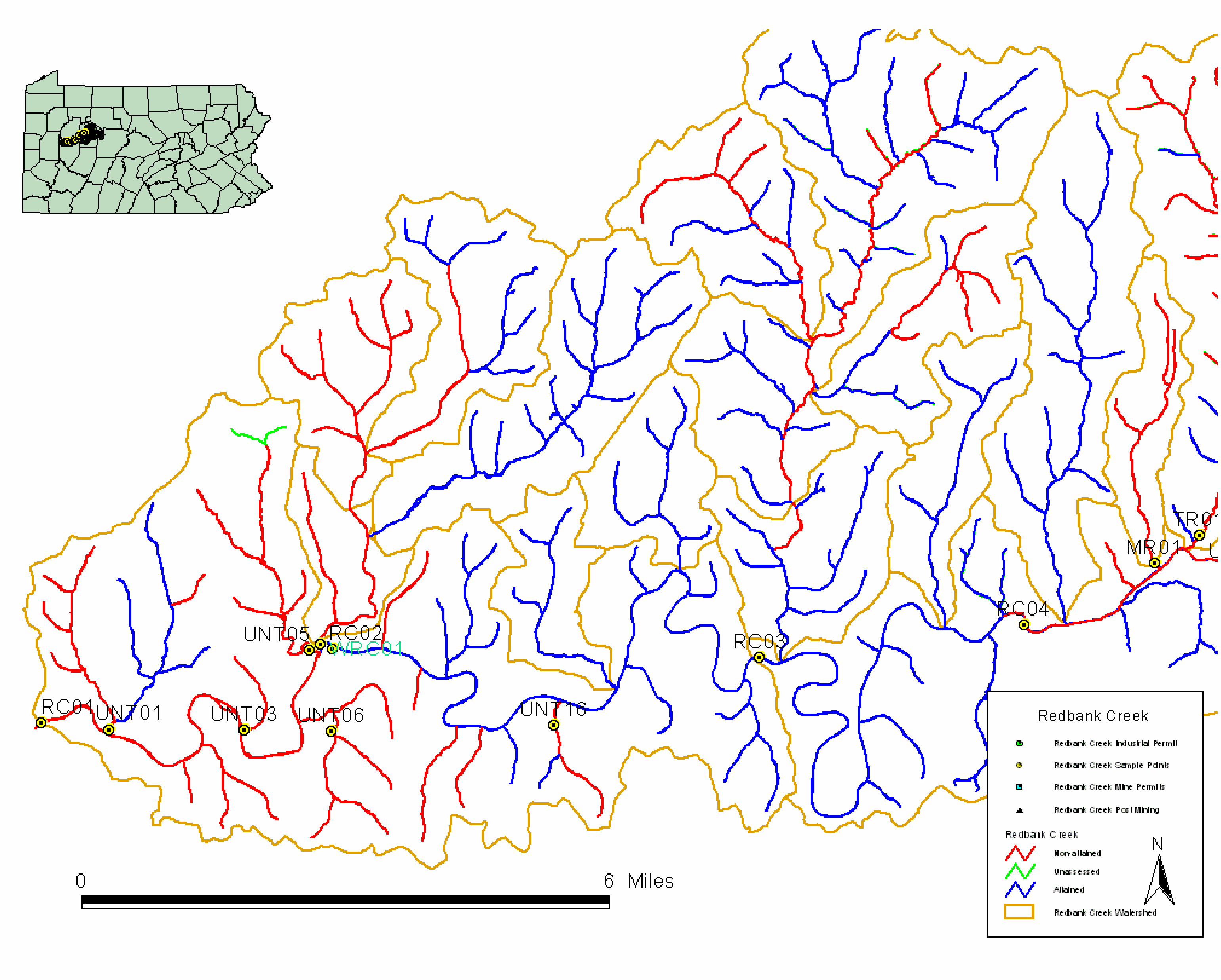
Public Participation

Public notice of the draft TMDL was published in the *Pennsylvania Bulletin* on December 22, 2008 and the Leader-Vindicator on March 4, 2009 to foster public comment on the allowable loads calculated. A public meeting was held on March 10, 2009 beginning at 9AM at the Knox District Mining Office in Knox, PA to discuss the proposed TMDL.

Attachment A

Redbank Creek Watershed Maps


Redbank Creek
Redbank Creek Industrial Permit
Redbank Creek Sample Points
Redbank Creek Mine Permits
Redbank Creek Post Mining
Redbank Creek
Non-attained
Unassessed
Attained
Redbank Creek Watershed
N
6
0
6
12 Miles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UNT01
UNT03
UNT06
UNT05
RC02
UNT16
RC03
RC04
MR01
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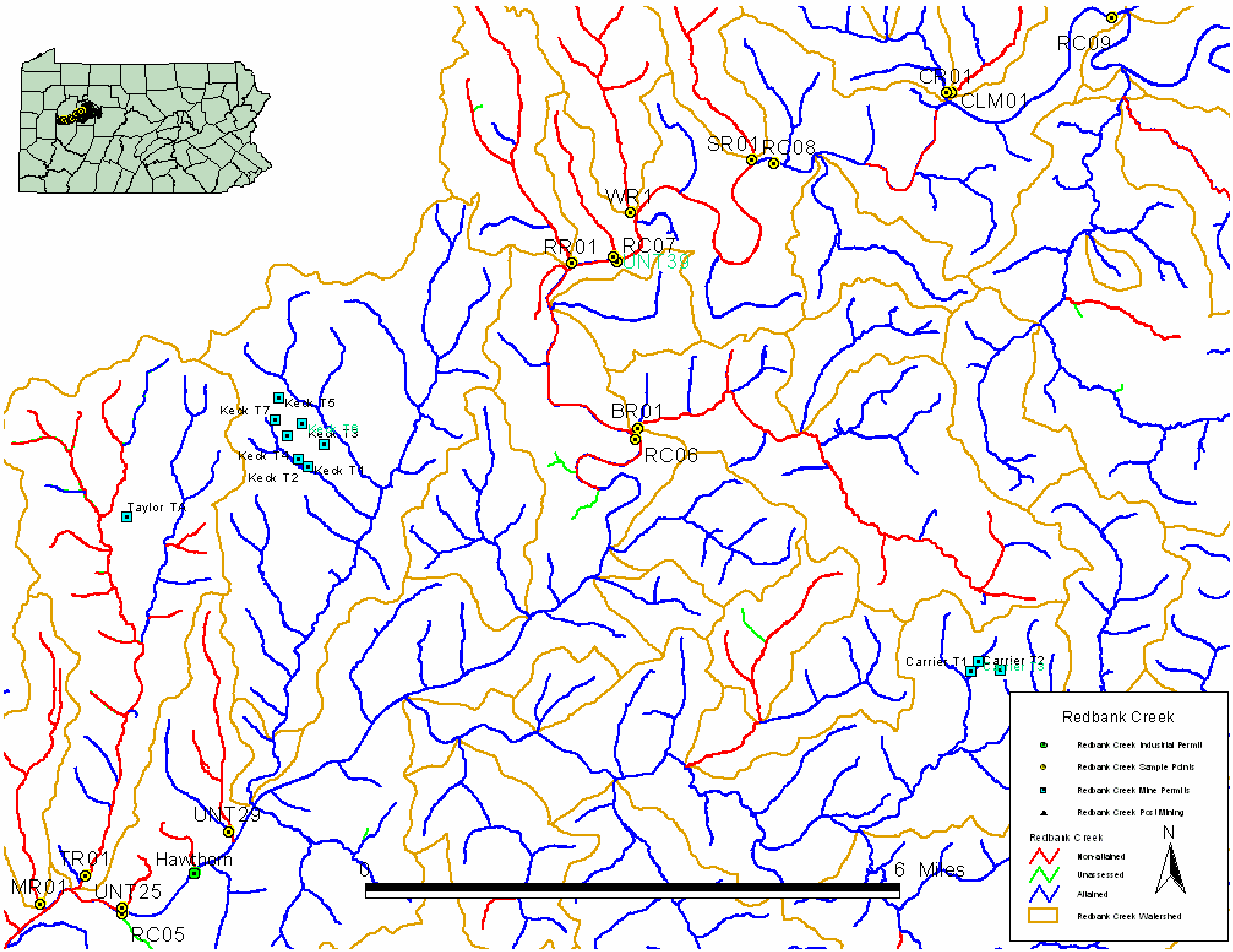
6 Miles
Redbank Creek
Redbank Creek Industrial Permit
Redbank Creek Sample Points
Redbank Creek Mine Permits
Redbank Creek Post Mining
Redbank Creek
Nonattained
Unassessed
Attained
Redbank Creek Watershed
N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CLM01
SR01
RC08
WR1
RP01
RC07
UNT39
BR01
RC06
Keck T5
Keck T7
Keck T6
Keck T3
Keck T4
Keck T1
Keck T2
Taylor TA
Carrier T1
Carrier T2
Carrier T3
UNT29
TR01
Hawthorn
MR01
UNT25
RC05
0
6 Miles
Redbank Creek
Redbank Creek Industrial Permit
Redbank Creek Sample Points
Redbank Creek Mine Permits
Redbank Creek Post Mining
Redbank Creek
Nonattained
Unassessed
Attained
Redbank Creek Watershed
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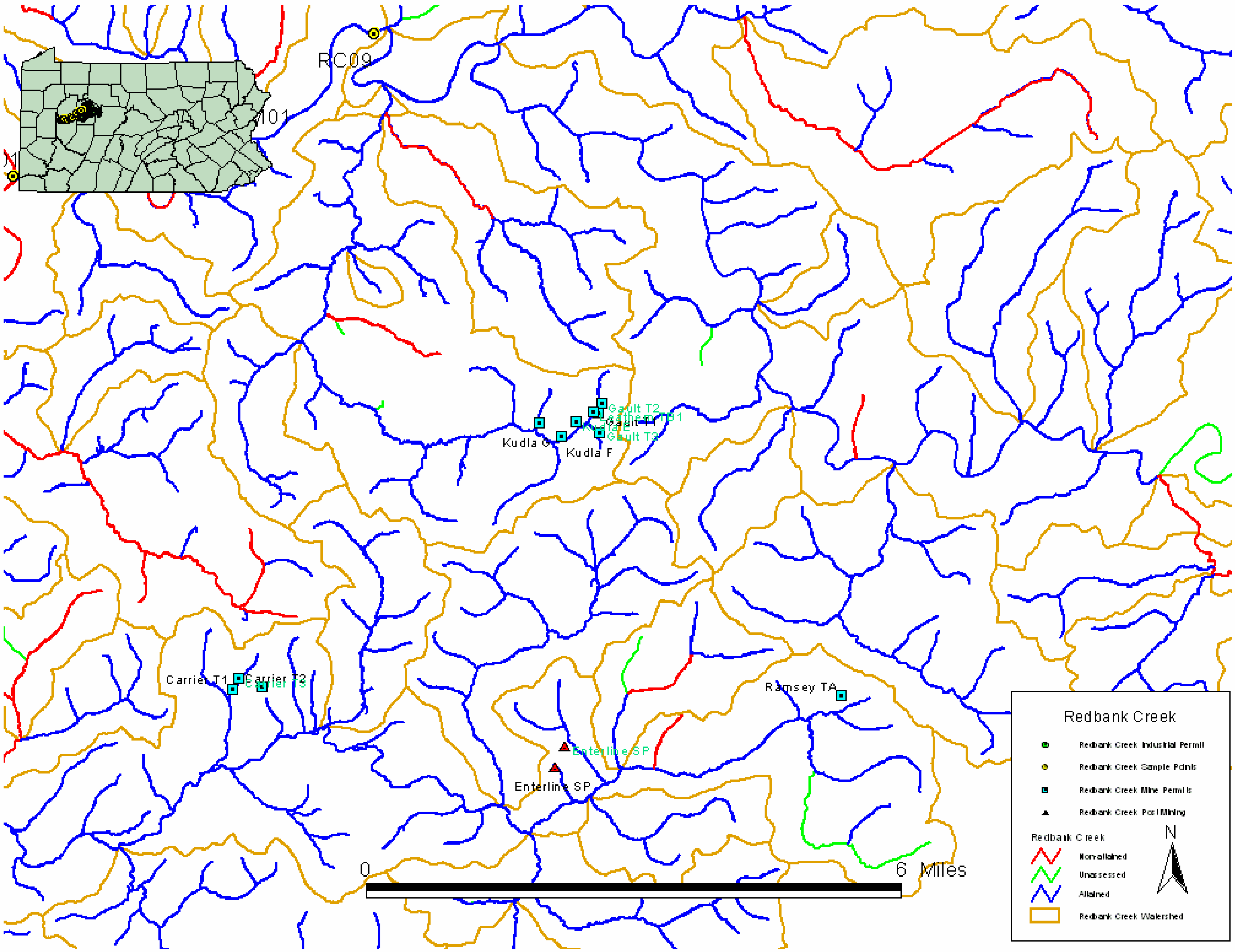
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Kudla F
Gault T2
Gault T1
Gault T3
Carrier T1
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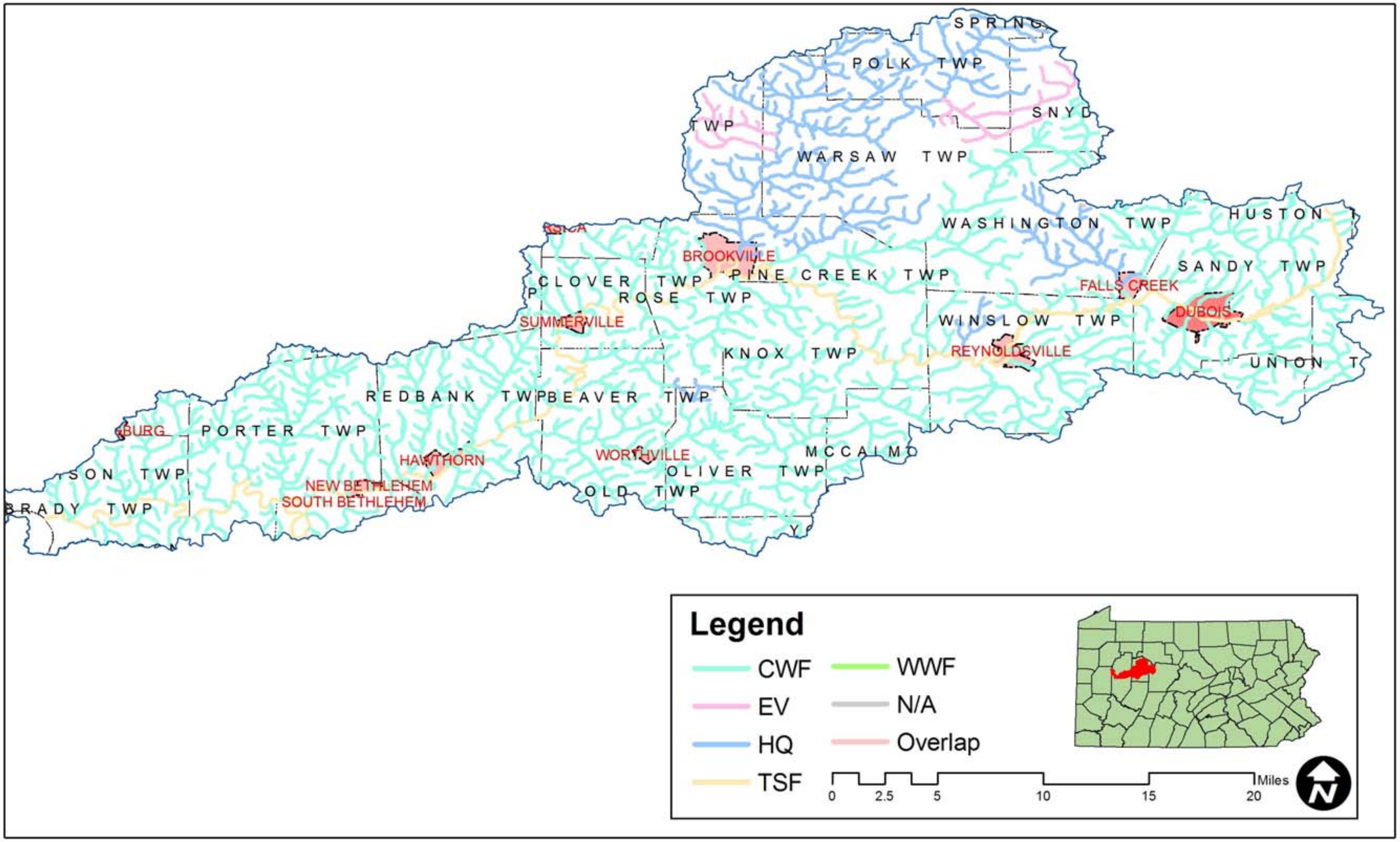
Carrier T3
Ramsey TA
Enterline SP
0
6 Miles
Redbank Creek
Redbank Creek Industrial Permit
Redbank Creek Sample Points
Redbank Creek Mine Permits
Redbank Creek Post Mining
Redbank Creek
Nonattained
Unassessed
Attained
Redbank Creek Watershed
N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SNYD
TWP
WARSAW TWP
WASHINGTON TWP
HUSTON
BROOKVILLE
PINE CREEK TWP
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ROSE TWP
FALLS CREEK
SANDY TWP
DUBOIS
SUMMERVILLE
WINSLOW TWP
KNOX TWP
REYNOLDSVILLE
UNION
REDBANK TWP
BEAVER TWP
PORTER TWP
HAWTHORN
WORTHVILLE
MCCALMO
OLIVER TWP
NEW BETHLEHEM
SOUTH BETHLEHEM
OLD TWP
BRADY TWP
Legend
CWF
EV
HQ
TSF
WWF
N/A
Overlap
0 2.5 5 10 15 20 Miles

Attachment B

Method for Addressing 303(d) List and/or Integrated Water Quality Report Listings for pH

Method for Addressing 303(d) List and/or Integrated Water Quality Report Listings for pH

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

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

Each sample point used in the analysis of pH by this method must have measurements for total alkalinity and total acidity. Net alkalinity is alkalinity minus acidity, both being in units of milligrams per liter (mg/l) $CaCO_3$. The same statistical procedures that have been described for use in the evaluation of the metals is applied, using the average value for total alkalinity at that point as the target to specify a reduction in the acid concentration. By maintaining a net alkaline stream, the pH value will be in the range between six and eight. This method negates the need to specifically compute the pH value, which for mine waters is not a true reflection of acidity. This method assures that Pennsylvania's standard for pH is met when the acid concentration reduction is met.

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

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

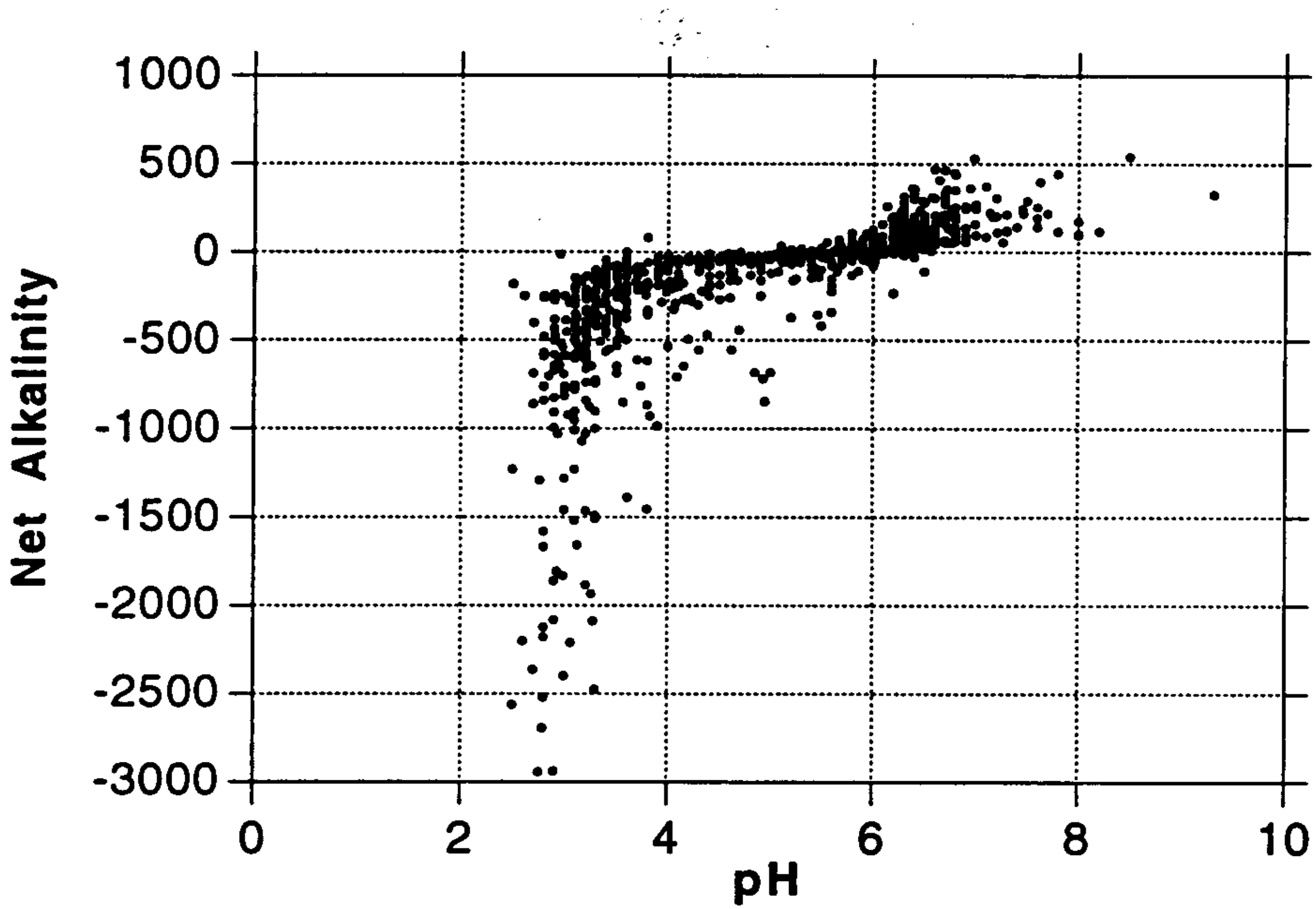
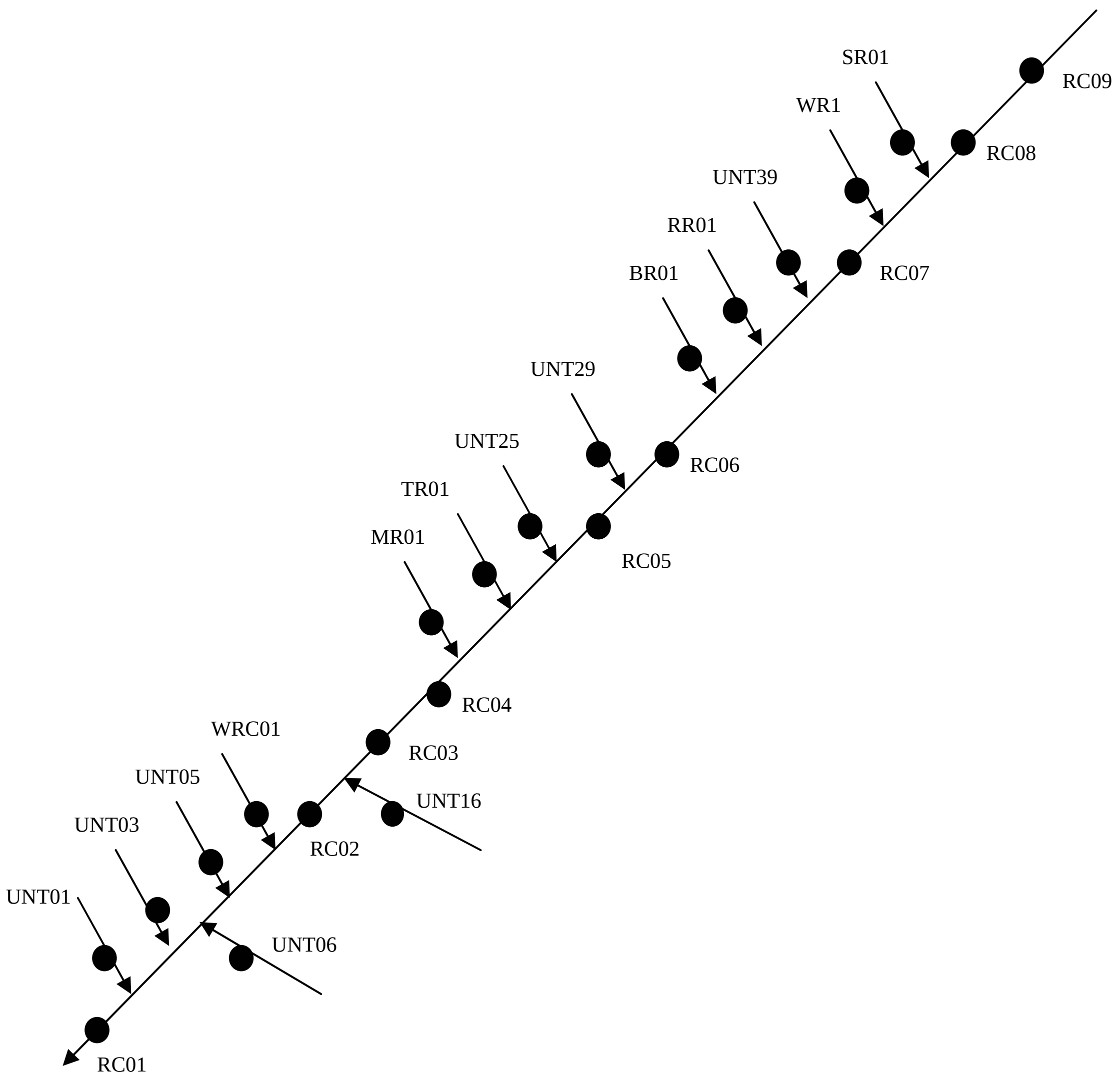


Figure 1. Net Alkalinity vs. pH. Taken from Figure 1.2 Graph C, pages 1-5, of Coal Mine Drainage Prediction and Pollution Prevention in Pennsylvania

Attachment C

TMDLs by Segment

Redbank Creek Sampling Stations Diagram
Arrows represent direction of flow
Diagram not to scale



Redbank Creek

The TMDL for Redbank Creek, stream code 48064, consists of load allocations for twenty-four sampling stations along Redbank Creek and fifteen of its tributaries.

Redbank Creek and eight of its tributaries were listed as being impaired by AMD in 1996. Table 1, *303(d) Listed Segments*, provides details on the specific impairments documented in 1996 for which this TMDL addresses. Impairments documented after 1996 and found in Attachment I, *Pennsylvania Integrated Water Quality Monitoring and Assessment Report Streams, Category 5 Waterbodies, Pollutants Requiring a TMDL*, will be addressed in future TMDLs.

An allowable long-term average in-stream concentration was determined at the points below for the parameters associated with AMD impairment. Those parameters are aluminum, iron, manganese and acidity. The analysis was designed to produce an average value that, when attained, is protective of the water-quality criterion for that parameter 99% of the time. An analysis was performed using Monte Carlo simulation to determine the necessary long-term average concentration needed to attain water-quality criteria 99% of the time. The simulation was run assuming the data set was lognormally distributed. Using the mean and standard deviation of the data set, 5000 iterations of sampling were completed, and compared against the water-quality criterion for that parameter. For each sampling event a percent reduction was calculated, when necessary, to meet water-quality criteria. A second simulation that multiplied the percent reduction times the sampled value was run to ensure criteria were met 99% of the time. The mean value from this data set represents the long-term average concentration that must be attained or surpassed in order to achieve water-quality standards.

The method and rationale for addressing pH is contained in Attachment B.

Redbank Creek

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

An allowable long-term average in-stream concentration was determined at the points below for aluminum, iron, manganese and acidity. The analysis is designed to produce an average value that, when met, will be protective of the water-quality criterion for that parameter 99% of the time. An analysis was performed using Monte Carlo simulation to determine the necessary long-term average concentration needed to attain water-quality criteria 99% of the time. The simulation was run assuming the data set was lognormally distributed. Using the mean and standard deviation of the data set, 5000 iterations of sampling were completed, and compared against the water-quality criterion for that parameter. For each sampling event a percent reduction was calculated, if necessary, to meet water-quality criteria. A second simulation that multiplied the percent reduction times the sampled value was River to insure that criteria were met 99% of the time. The mean value from this data set represents the long-term average concentration that needs to be met to achieve water-quality standards.

The MSM Coal Company, Inc., SMP33060104 has three permitted treatment ponds, T1, T2, and T3 that discharge to Redbank Creek. The waste load allocation for the discharge is calculated with average monthly permit limits and pit size. Included in the permit are limits for aluminum, iron and manganese.

The P and N Coal Company, Inc., SMP33020105 has three permitted treatment ponds, E, F and G that discharge to Redbank Creek. The waste load allocation for the discharge is calculated with average monthly permit limits and pit size. Included in the permit are limits for aluminum, iron and manganese.

Table C1. Waste Load Allocation of Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	Wla (lbs/day)
MSM Coal Company, Inc. Gault Mine (SMP # 33060104)			
Al	0.75	0.002	0.012
Fe	3.0	0.002	0.049
Mn	2.0	0.002	0.033

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
P and N Coal Co., Inc., Kudla 1 Mine (SMP # 33020105)			
Al	2.0	0.005	0.09
Fe	3.0	0.005	0.13
Mn	2.0	0.005	0.09

RC09 Most Upstream Sample Point on Redbank Creek

The TMDL for this sample point on Redbank Creek consists of a load allocation to the segment upstream. The load allocation for this segment was computed using water-quality sample data collected at point RC09. The average calculated by the unit area flow method at the sampling point RC09 (363.70 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point RC09 shows pH ranging between 7.3 and 7.4; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum and acidity because WQS were met and there was no acidity present. TMDLs for aluminum and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point RC08.

Table C2. Load Allocations for Point RC09				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.25	758.3	0.25	758.3
Fe	0.94	2854.3	0.42	1284.4
Mn	0.22	659.7	0.20	620.2
Acid	0.00	0.0	ND	ND
Alk	31.85	96609.3		

Table C3. Calculation of Load Reductions Necessary at Point RC09				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	758.3	2854.3	659.7	0.0
Allowable Load = TMDL	758.3	1284.4	620.2	0.0
Load Reduction	0.0	1569.9	39.6	0.0
% Reduction Segment	0%	55%	6%	0%

A waste load allocation for future mining was included for this segment of Redbank Creek allowing for five operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

RC08 Redbank Creek Most Upstream Sample Point on Redback Ceek

The TMDL for this sample point on Redbank Creek consists of a load allocation to the segment between sample points RC09 and RC08. The load allocation for this segment was computed using water-quality sample data collected at point RC08. The average flow, calculated by the unit area flow method at the sampling point RC08 (384.40 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point RC08 shows pH ranging between 7.5 and 7.7; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron and acidity because WQS were met and there was no acidity present. TMDLs for aluminum, iron and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point RC07.

Table C4. Waste Load Allocations for future mining operations

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

Table C5. Load Allocations for Point RC08				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.25	801.5	0.25	801.5
Fe	0.61	1967.6	0.61	1967.6
Mn	0.15	483.3	0.14	435.0
Acid	0.00	0.0	0.00	0.0
Alk	41.75	133846.2		

The calculated load reductions for all the loads that enter point RC08 must be accounted for in the calculated reductions at sample point RC08 shown in Table C6. A comparison of measured loads between points RC09 and RC08 shows that there is no additional loading entering the segment for iron and manganese. For iron and manganese the percent decrease in existing loads are applied to the allowable upstream loads entering the segment. There is additional loading entering the segment for aluminum. The total segment aluminum load is the sum of the upstream allocated load and any additional loading within the segment.

Table C6. Calculation of Load Reduction at Point RC08				
	Al	Fe	Mn	Acidity
Existing Load	801.5	1967.6	483.3	0.0
Difference in Existing Load between RC09 & RC08	43.2	-886.7	-176.4	0.0
Load tracked from RC09	758.3	1284.4	620.2	0.0
Percent loss due to instream process	-	31	27	-
Percent load tracked from RC09	-	69	73	-
Total Load tracked from RC09	801.5	885.4	454.3	0.0
Allowable Load at RC08	801.5	1967.6	435.0	0.0
Load Reduction at RC08	0.0	0.0	19.3	0.0
% Reduction required at RC08	0	0	4	0.0

A waste load allocation for future mining was included for this segment of Simpson Run allowing for one operation with two active pits (1500’ x 300’) to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

Table C7. Waste Load Allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

SR01 Mouth of Simpson Run

The TMDL for this sample point on Simpson Run consists of a load allocation to all of the area upstream of the sample point. The load allocation for this segment was computed using water-quality sample data collected at point SR01. The average flow, calculated by the unit area flow method at the sampling point SR01 (0.58MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point SR01 shows pH ranging between 3.6 and 4.0; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C8. Load Allocations for Point SR01				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	2.60	12.6	0.49	2.4
Fe	2.21	10.7	0.49	2.4
Mn	14.26	69.1	0.57	2.8
Acid	46.75	226.4	0.47	2.3
Alk	0.45	2.2		

Table C9. Calculation of Load Reductions Necessary at Point SR01				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	12.6	10.7	69.1	226.4
Allowable Load = TMDL	2.4	2.4	2.8	2.3
Load Reduction	10.2	8.3	66.3	224.1
% Reduction Segment	81%	78%	96%	99%

A waste load allocation for future mining was included for this segment of Welch Run allowing for five operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

WR01 Mouth of Welch Run

The allocations for this sample point on Welch Run consists of a load allocation to the segment upstream of sample point WR01. The load allocation for this segment was computed using water-quality sample data collected at point WR01. The average flow, calculated by the unit area flow method at the sampling point WR01 (2.95 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point WR01 shows pH ranging between 3.7 and 5.1; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C10. Waste Load Allocations for future mining operations

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

Table C11. Load Allocations at Point WR01

	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	1.85	45.4	0.33	8.2
Fe	7.53	185.1	0.53	13.0
Mn	9.03	222.2	0.63	15.6
Acid	48.93	1203.4	1.96	48.1
Alk	4.73	116.4		

The calculated load reductions for all the loads that enter point WR1 must be accounted for in the calculated reductions at sample point WR1 shown in Table C12. A comparison of measured loads between points WR3 and WR1 shows that there is additional loading entering the segment for aluminum, iron, manganese and acidity. The total segment aluminum, iron, manganese and acidity load is the sum of the upstream allocated load and any additional loading within the segment.

Table C12. Calculation of Load Reduction at Point WR1

	Al	Fe	Mn	Acidity
Existing Load	45.4	185.1	222.2	1203.4
Difference in Existing Load between WR3 & WR1	5.5	5.1	43.1	83.0
Load tracked from WR3	5.6	12.6	10.7	22.4
Percent loss due to instream process	-	-	-	-
Percent load tracked from WR3	-	-	-	-
Total Load tracked from WR3	11.1	17.7	53.9	105.4
Allowable Load at WR1	8.2	13.0	15.6	48.1
Load Reduction at WR1	2.9	4.7	38.3	57.3
% Reduction required at WR1	26	27	71	54

A waste load allocation for future mining was included for this segment of Welch Run allowing for five operations with two active pits (1500' x 300') to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

Table C13. Waste Load Allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 4			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 5			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

RC07 Redbank Creek Upstream of Confluence with UNT39

The TMDL for this sample point on Redbank Creek consists of a load allocation to the segment between sample points RC08, SR01, WR01 and RC07. The load allocation for this segment was computed using water-quality sample data collected at point RC07. The average flow, calculated by the unit area flow method at the sampling point RC07 (395.40 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point RC07 shows pH ranging between 7.2 and 7.6; pH will not be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum and acidity because WQS were met and there was no acidity present. TMDLs for aluminum and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point RC06.

Table C14. Load Allocations for Point RC07				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.25	824.4	NA	NA
Fe	0.94	3095.7	0.85	2817.1
Mn	0.72	2359.5	0.69	2288.7
Acid	1.90	6265.5	NA	NA
Alk	38.45	126794.1		

The calculated load reductions for all the loads that enter point RC07 must be accounted for in the calculated reductions at sample point RC07 shown in Table C15. A comparison of measured loads between points RC08, SR01, WR01 and RC07 shows that there is no additional loading entering the segment for aluminum. For aluminum the percent decrease in existing loads are applied to the allowable upstream loads entering the segment. There is additional loading entering the segment for iron, manganese and acidity. The total segment iron, manganese and acidity load is the sum of the upstream allocated load and any additional loading within the segment.

Table C15. Calculation of Load Reduction at Point RC07				
	Al	Fe	Mn	Acidity
Existing Load	824.4	3095.7	2359.5	6265.5
Difference in Existing Load between RC08, SR01, WR1 & RC07	-35.1	932.3	1584.9	4835.7
Load tracked from RC08, SR01 & WR1	812.1	1983.0	453.3	50.4
Percent loss due to instream process	4	-	-	-
Percent load tracked from RC08, SR01 & WR1	96	-	-	-
Total Load tracked from RC08, SR01 & WR1	778.9	2915.2	2038.2	4886.1
Allowable Load at RC07	824.4	2817.1	2288.7	6265.5
Load Reduction at RC07	0.0	98.2	0.0	0.0
% Reduction required at RC07	0	3	0	0

UNT39 Mouth of UNT39 Upstream of Confluence with Redbank Creek

The TMDL for this sample point on UNT39 Run consists of a load allocation to the segment upstream of sample point UNT39. The load allocation for this segment was computed using water-quality sample data collected at point UNT39. The average flow, calculated by the unit area flow method at the sampling point UNT39 (0.32 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point UNT39 shows pH ranging between 2.8 and 2.9; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C16. Load Allocations at Point UNT39				
	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	45.57	121.9	0.46	1.2
Fe	82.85	221.6	0.83	2.2
Mn	5.65	15.1	0.62	1.7
Acid	574.33	1536.4	0.00	0.0
Alk	0.00	0.0		

Table C17. Calculation of Load Reductions Necessary at Point UNT39				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	121.9	221.6	15.1	1536.4
Allowable Load = TMDL	1.2	2.2	1.7	0.0
Load Reduction	120.7	219.4	13.5	1536.4
% Reduction Segment	99%	99%	89%	100%

A waste load allocation for future mining was included for this segment of Runaway Run allowing for five operations with two active pits (1500' x 300') to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

Table C18. Waste Load Allocations for future mining operations

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

RR01 Mouth of RR01 Mouth of Runaway Run Upstream of Confluence with Redbank Creek

The TMDL for this sample point on RR01 Run consists of a load allocation to the segment upstream of sample point RR01. The load allocation for this segment was computed using water-quality sample data collected at point RR01. The average flow, calculated by the unit area flow method at the sampling point RR01 (1.70 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point RR01 shows pH ranging between 3.8 and 4.9; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C19. Load Allocations at Point RR01

	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	3.59	50.9	0.54	7.6
Fe	3.37	47.7	0.88	12.4
Mn	10.43	147.7	0.63	8.9
Acid	57.05	808.0	1.14	16.2
Alk	2.00	28.3		

Table C20. Calculation of Load Reductions Necessary at Point RR01				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	50.9	47.7	147.7	808.0
Allowable Load = TMDL	7.6	12.4	8.9	16.2
Load Reduction	43.2	35.3	138.8	791.8
% Reduction Segment	85%	74%	94%	98%

BR01 Mouth of Beaver Run, 48447, Upstream of Confluence with Redbank Creek

The TMDL for this sample point on BR01 Run consists of a load allocation to the segment upstream of sample point BR01. The load allocation for this segment was computed using water-quality sample data collected at point BR01. The average flow, calculated by the unit area flow method at the sampling point BR01 (5.32 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point BR01 shows pH ranging between 5.0 and 7.0; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum and acidity because WQS were met and there was no acidity present. TMDLs for aluminum and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point RC06.

Table C21. Load Allocations at Point BR01				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.00	0.0	NA	NA
Fe	0.72	31.9	0.46	20.4
Mn	0.52	22.9	0.34	15.1
Acid	0.09	4.1	0.09	4.1
Alk	37.27	1654.1		

Table C22. Calculation of Load Reductions Necessary at Point BR01				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	0.0	31.9	22.9	4.1
Allowable Load = TMDL	0.0	20.4	15.1	4.1
Load Reduction	0.0	11.5	7.8	0.0
% Reduction Segment	0%	36%	34%	0%

A waste load allocation for future mining was included for this segment of Redbank Creek allowing for five operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

RC06 Redbank Creek Downstream of Confluence with Beaver Run

The TMDL for this sample point on Redbank Creek consists of a load allocation to the segment between sample points RC07, UNT39, RR01, BR05 and RC06. The load allocation for this segment was computed using water-quality sample data collected at point RC06. The average flow, calculated by the unit area flow method at the sampling point RC06 (414.70 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point RC06 shows pH ranging between 7.4 and 7.6; pH will not be addressed in this TMDL because there was little acidity present. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron, manganese and acidity because WQS were met and there was no acidity present. TMDLs for aluminum, iron, manganese and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point RC05.

Table C23. Waste Load Allocations for future mining operations

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

Table C24. Load Allocations for Point RC06

	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.25	864.7	0.25	864.7
Fe	0.57	1957.6	0.57	1957.6
Mn	0.48	1645.4	0.48	1645.4
Acid	0.00	0.0	0.00	0.0
Alk	37.20	128659.9		

The calculated load reductions for all the loads that enter point RC06 must be accounted for in the calculated reductions at sample point RC06 shown in Table C25. A comparison of measured loads between points RC06, UNT39, RR01, BR05 and RC06 shows that there is no additional loading entering the segment for aluminum, iron, manganese and acidity. For aluminum iron, manganese and acidity the percent decrease in existing loads are applied to the allowable upstream loads entering the segment.

Table C25. Calculation of Load Reduction at Point RC06

	Al	Fe	Mn	Acidity
Existing Load	864.7	1957.6	1645.4	0.00
Difference in Existing Load between RC07, UNT39, RR01, BF01 & RC06	-132.5	-1439.3	-899.8	-8614.0
Load tracked from RC07, UNT39, RR01 & BR01	833.3	2852.1	2314.3	6285.8
Percent loss due to instream process	13	42	35	100
Percent load tracked from RC07, UNT39, RR01 & BR01	87	58	65	0
Total Load tracked from RC07, UNT39, RR01 & BR01	722.5	1643.6	1496.2	0.0
Allowable Load at RC06	864.7	1957.6	1645.4	0.0
Load Reduction at RC06	0.0	0.0	0.0	0.0
% Reduction required at RC06	0	0	0	0

A waste load allocation for future mining was included for this segment of UNT29 (48255) allowing for one operations with two active pits (1500' x 300') to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

Table C26. Waste Load Allocations for future mining operations

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

UNT29 Mouth of UNT29 (48255) Upstream of Confluence with Redbank Creek

The TMDL for this sample point on UNT29 Run consists of a load allocation to the segment upstream of sample point UNT29. The load allocation for this segment was computed using water-quality sample data collected at point UNT29. The average flow, calculated by the unit area flow method at the sampling point UNT29 (0.71 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point UNT29 shows pH ranging between 4.5 and 6.6; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C27. Load Allocations at Point UNT29				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	2.52	14.9	0.25	1.5
Fe	1.85	10.9	0.72	4.3
Mn	4.68	27.7	0.42	2.5
Acid	5.30	31.4	1.33	7.8
Alk	9.60	56.8		

Table C28. Calculation of Load Reductions Necessary at Point UNT29				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	14.9	10.9	27.7	31.4
Allowable Load = TMDL	1.5	4.3	2.5	7.8
Load Reduction	13.4	6.7	25.2	23.5
% Reduction Segment	90%	61%	91%	75%

The BenHal Mining Company, SMP33070108 has one permitted treatment pond, TA that discharges to Redbank Creek. The waste load allocation for the discharge is calculated with average monthly permit limits and pit size. Included in the permit are limits for aluminum, iron and manganese.

The Original Fuels, Inc., SMP33930102 has three permitted treatment ponds, TP1, TP2 and TP3 that discharge to Redbank Creek. The waste load allocation for the discharge is calculated with average monthly permit limits and pit size. Included in the permit are limits for aluminum, iron and manganese.

The Pand N Mining Company, SMP33070102 has one permitted treatment pond, TB1 that discharges to Redbank Creek. The waste load allocation for the discharge is calculated with average monthly permit limits and pit size. Included in the permit are limits for aluminum, iron and manganese.

The Timothy A Keck, SMP16050106 has seven permitted treatment ponds, T1, T2, T3, T4, T5, T6 and T7 that discharge to Redbank Creek. The waste load allocation for the discharge is calculated with average monthly permit limits and pit size. Included in the permit are limits for aluminum, iron and manganese.

The Hawthorn Area Water Authority, NPDES PA0098329 has one permitted discharge to Redbank Creek. The waste load allocation for the discharge is calculated with average monthly permit limits and an effluent discharge flow. Included in the permit are limits for aluminum, iron and manganese.

The Compass Coal Co., Inc., Enterline 1 Mine post mining discharge (permit SMP#3877SM29).

The Harmon Coal Co., Harmon 6 Mine post mining discharge (permit SMP#3872SM7).

The REM Coal Co., Inc., Oliveburg Mine post mining discharge (permit SMP#33810109).

The Terry Coal Sales, Inc., Sanford Mine post mining discharge (permit SMP#33860107).

Table 29. Waste Load Allocation of Permitted Discharges

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	Wla (lbs/day)
Ben Hal Mining Company, Ramsey Mine (SMP # 33070108)			
Al	0.9	0.002	0.006
Fe	2.8	0.002	0.018
Mn	1.0	0.002	0.007
P and N Coal Company Inc., Leathem Mine (SMP# 33070102)			
Al	0.75	0.005	0.03
Fe	3.0	0.005	0.12
Mn	2.0	0.005	0.08
Compas Coal Co., Inc., post mining discharge (SMP # 3877SM29) SP4			
Al	0.75	0.0002	0.001
Fe	3.0	0.0002	0.005
Mn	2.0	0.0002	0.003
Compas Coal Co., Inc., post mining discharge (SMP # 3877SM29) SP6			
Al	0.75	0.006	0.4
Fe	3.0	0.006	0.15
Mn	2.0	0.006	0.1
REM Coal Co., Inc., post mining discharge SMP # 33810109)			
Al	0.75	0.1	0.6
Fe	3.0	0.1	2.5
Mn	2.0	0.1	1.7

Parameter	Allowable Average Monthly Conc. (mg/l)	Calculated Average Flow (MGD)	WLA (lbs/day)
Original Fuels Inc., Carrier #1 Mine (SMP # 33930102)			
Al	0.75	0.0007	0.005
Fe	3.0	0.0007	0.018
Mn	2.0	0.0007	0.012
Timothy A. Keck, Keck 1 Mine(SMP#16050106)			
Al	0.75	0.001	0.006
Fe	3.0	0.001	0.03
Mn	2.0	0.001	0.02
Harmon Coal Co., post mining discharge (SMP # 3872SM7)			
Al	0.75	0.08	0.5
Fe	3.0	0.08	2.0
Mn	2.0	0.08	1.3
Terry Coal Sales, Inc., post mining discharge, (SMP # 33860107)			
Al	0.75	0.1	0.6
Fe	3.0	0.1	2.5
Mn	2.0	0.1	1.7
Hawthorn Area Water Authority, (NPDES PA0098329)			
Al	4.0	0.0105	0.35
Fe	2.0	0.0105	0.18
Mn	1.0	0.0105	0.9

A waste load allocation for future mining was included for this segment of Redbank Creek allowing for five operations with two active pits (1500' x 300') to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

RC05 Redbank Creek Downstream of Confluence with UNT29

The TMDL for this sample point on Redbank Creek consists of a load allocation to the area between sample points RC06, UNT29 and RC05. The load allocation for this segment was computed using water-quality sample data collected at point RC05. The average flow, calculated by the unit area flow method at the sampling point RC05 (528.40 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point RC05 shows pH ranging between 7.3 and 8.6; pH will not be addressed in this TMDL because there was little acidity present. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron, manganese and acidity because WQS were met and there was no acidity present. TMDLs for aluminum, iron, manganese and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point RC04.

Table C30. Waste Load Allocations for future mining operations

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

Table C31. Load Allocations for Point RC05

	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.25	1101.7	0.25	1101.7
Fe	0.28	1243.8	0.28	1243.8
Mn	0.21	932.1	0.21	932.1
Acid	0.00	0.0	0.00	0.0
Alk	38.55	169884.3		

The calculated load reductions for all the loads that enter point RC05 must be accounted for in the calculated reductions at sample point RC05 shown in Table C32. A comparison of measured loads between points RC06, UNT29 and RC05 shows that there is no additional loading entering the segment for iron, manganese and acidity. For iron, manganese and acidity the percent decrease in existing loads are applied to the allowable upstream loads entering the segment. There is additional loading entering the segment for aluminum. The total segment aluminum load is the sum of the upstream allocated load and any additional loading within the segment.

Table C32. Calculation of Load Reduction at Point RC05				
	Al	Fe	Mn	Acidity
Existing Load	1101.7	1243.8	932.1	0.0
Difference in Existing Load between RC06, UNT29 & RC05	222.2	-724.7	-741.1	-31.4
Load tracked from RC06 & UNT29	866.1	1961.8	1647.9	7.8
Percent loss due to instream process	-	37	44	100
Percent load tracked from RC06 & UNT29	-	63	56	0
Total Load tracked from RC06 & UNT29	1088.3	1239.6	918.0	0.00
Allowable Load at RC05	1101.7	1243.8	932.1	0.00
Load Reduction at RC05	0.0	0.0	0.0	0.0
% Reduction required at RC05	0	0	0	0

UNT25 Mouth of UNT25 Upstream of Confluence with Redbank Creek

The TMDL for this sample point on UNT25 consists of a load allocation to the segment upstream of sample point UNT25. The load allocation for this segment was computed using water-quality sample data collected at point UNT25. The average flow, calculated by the unit area flow method at the sampling point UNT25 (0.18 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point UNT25 shows pH ranging between 7.9 and 8.3; pH will not be addressed in this TMDL because there is no acidity present. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron and acidity because WQS were met and there was no acidity present. TMDLs for aluminum, iron and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point RC04.

Table C33. Load Allocations at Point UNT25				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.25	0.4	0.25	0.4
Fe	0.22	0.3	0.22	0.3
Mn	0.29	0.43	0.18	0.27
Acid	0.00	0.0	0.00	0.0
Alk	139.85	211.2		

Table C34. Calculation of Load Reductions Necessary at Point UNT25				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	0.4	0.3	0.43	0.0
Allowable Load = TMDL	0.4	0.3	0.27	0.0
Load Reduction	0.0	0.0	0.16	0.0
% Reduction Segment	0%	0%	38%	0%

A waste load allocation for future mining was included for this segment of Town Run allowing for five operations with two active pits (1500' x 300') to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

Table C35. Waste Load Allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 4			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 5			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

TR01 Mouth of Town Run Upstream of Confluence with Redbank Creek

The TMDL for this sample point on TR01 consists of a load allocation to the segment upstream of sample point TR01. The load allocation for this segment was computed using water-quality sample data collected at point TR01. The average flow, calculated by the unit area flow method at the sampling point TR01 (8.58 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point TR01 shows pH ranging between 7.3 and 7.5; pH will not be addressed in this TMDL because there is no acidity present. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for acidity because there was no acidity present. A TMDL for acidity are not necessary. Although a TMDL is not necessary, the measured loads are considered at the next downstream point RC04.

Table C36. Load Allocations at Point TR1				
	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.43	30.4	0.23	16.4
Fe	0.44	31.1	0.44	31.1
Mn	1.58	113.3	0.57	40.8
Acid	ND	ND	NA	NA
Alk	35.27	2524.0		

The calculated load reductions for all the loads that enter point TR01 must be accounted for in the calculated reductions at sample point TR01 shown in Table C37. A comparison of measured loads between points 2 and TR01 shows that there is no additional loading entering the segment for and iron and manganese. For iron and manganese the percent decrease in existing loads are applied to the allowable upstream loads entering the segment. There is additional loading entering the segment for aluminum. The total segment aluminum load is the sum of the upstream allocated load and any additional loading within the segment.

Table C37. Calculation of Load Reduction at Point TR01				
	Al	Fe	Mn	Acidity
Existing Load	30.4	31.1	113.3	0.0
Difference in Existing Load between 2 & TR1	2.6	-5.1	-21.7	0.0
Load tracked from 2	17.3	36.2	43.2	0.0
Percent loss due to instream process	-	14	16	-
Percent load tracked from 2	-	86	84	-
Total Load tracked from 2	19.8	31.1	36.3	0.0
Allowable Load at TR1	16.4	31.1	40.8	0.0
Load Reduction at TR1	3.4	0.0	0.0	0.0
% Reduction required at TR1	17	0	0	0

A waste load allocation for future mining was included for this segment of Middle Run allowing for one operation with two active pits (1500’ x 300’) to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

MR01 Mouth of Middle Run (48223) Upstream of Confluence with Redbank Creek

Table C38. Waste Load Allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

The TMDL for this sample point on MR01 consists of a load allocation to the segment upstream of sample point MR01. The load allocation for this segment was computed using water-quality sample data collected at point MR01. The average flow, calculated by the unit area flow method at the sampling point MR01 (0.92 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point MR01 shows pH ranging between 7.7 and 7.9; pH will not be addressed in this TMDL because there is no acidity present. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for iron and acidity because WQS were met and there was no acidity present. TMDLs for iron and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point RC04.

Table C39. Load Allocations at Point MR01				
	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.46	3.6	0.25	1.9
Fe	0.41	3.1	NA	NA
Mn	1.30	10.0	0.23	1.8
Acid	0.00	0.0	NA	NA
Alk	75.35	581.2		

Table C40. Calculation of Load Reductions Necessary at Point MR01				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	3.6	3.1	10.0	0.0
Allowable Load = TMDL	1.9	3.1	1.8	0.0
Load Reduction	1.7	0.0	8.2	0.0
% Reduction Segment	47%	0%	82%	0%

A waste load allocation for future mining was included for this segment of Redbank Creek allowing for five operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

RC04 Redbank Creek

The TMDL for this sample point on Redbank Creek consists of a load allocation to the area upstream of sample points RC05, UNT25, TR1, MR01 and RC04. The load allocation for this area was computed using water-quality sample data collected at point RC04. The average flow, calculated by the unit area flow method at the sampling point RC04 (553.60 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point RC04 shows pH ranging between 7.4 and 7.7; pH will not be addressed in this TMDL because there is no acidity present. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron and acidity because WQS were met and there was no acidity present. TMDLs for aluminum, iron and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point RC03.

Table C41. Waste Load Allocations for future mining operations

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

Table C42. Load Allocations at Point RC04

	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.25	1154.3	NA	NA
Fe	0.31	1430.1	NA	NA
Mn	0.31	1418.6	0.28	1290.9
Acid	0.00	0.0	NA	NA
Alk	42.35	195531.0		

The calculated load reductions for all the loads that enter point RC04 must be accounted for in the calculated reductions at sample point RC04 shown in Table C43. A comparison of measured loads between points RC05, UNT25, TR1, MR01 and RC04 shows that there is additional loading entering the segment for aluminum iron and manganese. The total segment aluminum iron and manganese load is the sum of the upstream allocated load and any additional loading within the segment.

Table C43. Calculation of Load Reduction at Point RC04				
	Al	Fe	Mn	Acidity
Existing Load	1154.3	1430.1	1418.6	0.0
Difference in Existing Load between RC05, UNT25, TR01, MR01 & RC04	18.2	151.7	362.8	0.0
Load tracked from RC05, UNT25, TR01 & MR01	1120.4	1278.4	974.9	0.0
Percent loss due to instream process	-	-	-	-
Percent load tracked from RC05, UNT25, TR01 & MR01	-	-	-	-
Total Load tracked from RC05, UNT25, TR01 & MR01	1138.6	1430.1	1337.7	0.0
Allowable Load at RC04	1154.3	1430.1	1290.9	0.0
Load Reduction at RC04	0.0	0.0	46.8	0.0
% Reduction required at RC04	0	0	3	0.0

A waste load allocation for future mining was included for this segment of Redbank Creek allowing for five operations with two active pits (1500' x 300') to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

RC03 Redbank Creek

The TMDL for this sample point on Redbank Creek consists of a load allocation to the area upstream of sample points RC04 and RC03. The load allocation for this area was computed using water-quality sample data collected at point RC03. The average flow, calculated by the unit area flow method at the sampling point RC03 (587.20 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point RC03 shows pH ranging between 7.4 and 8.6; pH will not be addressed in this TMDL because there is no acidity present. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for iron and acidity because WQS were met and there was no acidity present. TMDLs for iron and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point RC02.

Table C44. Waste Load Allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 4			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 5			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

Table C45. Load Allocations at Point RC03				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.36	1783.8	0.23	1141.7
Fe	0.29	1442.2	NA	NA
Mn	0.49	2410.7	0.22	1060.7
Acid	0.00	0.0	NA	NA
Alk	41.35	202501.2		

The calculated load reductions for all the loads that enter point RC03 must be accounted for in the calculated reductions at sample point RC03 shown in Table C46. A comparison of measured loads between points RC04 and RC01 shows that there is additional loading entering the segment for aluminum, iron and manganese. The total segment aluminum, iron and manganese load is the sum of the upstream allocated load and any additional loading within the segment.

Table C46. Calculation of Load Reduction at Point RC03				
	Al	Fe	Mn	Acidity
Existing Load	1783.8	1442.2	2410.7	0.0
Difference in Existing Load between RC04 & RC03	629.6	12.1	992.1	0.0
Load tracked from RC04	1154.3	1430.1	1290.9	0.0
Percent loss due to instream process	-	-	-	-
Percent load tracked from RC04	-	-	-	-
Total Load tracked from RC04	1783.8	1442.2	2283.0	0.0
Allowable Load at RC03	1141.7	1442.2	1060.7	0.0
Load Reduction at RC03	642.2	0.0	1222.3	0.0
% Reduction required at RC03	36	0	54	0

UNT16 Mouth of UNT16 Upstream of Confluence with Redbank Creek

The TMDL for this sample point on UNT16 consists of a load allocation to the segment upstream of sample point UNT16. The load allocation for this segment was computed using water-quality sample data collected at point UNT16. The average flow, calculated by the unit area flow method at the sampling point UNT16 (0.18 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point UNT16 shows pH ranging between 5.4 and 6.7; pH will be addressed in this TMDL because of the affects of mining. The method and rationale for addressing pH is contained in Attachment B.

Table C47. Load Allocations at Point UNT16				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	3.79	5.6	0.11	0.17
Fe	2.78	4.1	0.17	0.25
Mn	1.89	2.8	0.19	0.28
Acid	6.00	8.9	1.62	2.39
Alk	12.00	17.7		

Table C48. Calculation of Load Reductions Necessary at Point UNT16				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	5.6	4.1	2.8	8.9
Allowable Load = TMDL	0.2	0.3	0.3	2.4
Load Reduction	5.4	3.9	2.5	6.5
% Reduction Segment	97%	94%	90%	73%

A waste load allocation for future mining was included for this segment of Redbank Creek allowing for five operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

RC02 Redbank Creek

The TMDL for this sample point on Redbank Creek consists of a load allocation to the area between sample points RC03 and RC02. The load allocation for this area was computed using water-quality sample data collected at point RC02. The average flow, calculated by the unit area flow method at the sampling point RC02 (604.00 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point RC02 shows pH ranging between 7.4 and 7.8; pH will not be addressed in this TMDL because there is no acidity present. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum iron and acidity because WQS were met and there was no acidity present. TMDLs for aluminum, iron and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point RC01.

Table C49. Waste Load Allocations for future mining operations

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

Table C50. Load Allocations at Point RC02				
	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.25	1259.3	NA	NA
Fe	0.20	1012.5	NA	NA
Mn	0.21	1036.4	0.20	995.0
Acid	0.00	0.0	NA	NA
Alk	40.45	203761.2		

The calculated load reductions for all the loads that enter point RC02 must be accounted for in the calculated reductions at sample point RC02 shown in Table C51. A comparison of measured loads between points RC03, UNT16 and RC02 shows that there is no additional loading entering the segment for aluminum, iron and manganese. For aluminum, iron and manganese the percent decrease in existing loads are applied to the allowable upstream loads entering the segment.

Table C51. Calculation of Load Reduction at Point RC02				
	Al	Fe	Mn	Acidity
Existing Load	1259.3	1012.5	1036.4	0
Difference in Existing Load between RC03, UNT16 & RC02	-530.1	-433.8	-1377.0	-8.9
Load tracked from RC03 & UNT16	1141.8	1442.5	1061.0	2.39
Percent loss due to instream process	30	30	57	100
Percent load tracked from RC03 & UNT16	70	70	43	0
Total Load tracked from RC03 & UNT16	803.6	1009.8	455.6	0.00
Allowable Load at RC05	1259.3	1012.5	995.0	0.00
Load Reduction at RC05	0.0	0.0	0.0	0.0
% Reduction required at RC05	0	0	0	0

A waste load allocation for future mining was included for this segment of Wildcat Run allowing for five operations with two active pits (1500’ x 300’) to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

WRC01 Mouth of Wildcat Run (48086) Upstream of Confluence with Redbank Creek

The TMDL for this sample point on Wildcat Run consists of a load allocation to the area upstream of sample point WRC01. The load allocation for this area was computed using water-quality sample data collected at point WRC01. The average flow, calculated by the unit area flow method at the sampling point WRC01 (4.93 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point WRC01 shows pH ranging between 5.8 and 7.0; pH will be addressed in this TMDL because of the mining impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C52. Waste Load Allocations for future mining operations

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

Table C53. Load Allocations at Point WRC01

	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	1.18	43.3	0.40	14.7
Fe	0.78	28.7	0.52	19.0
Mn	1.03	37.7	0.52	18.9
Acid	7.35	269.0	5.00	182.9
Alk	13.35	488.6		

Table C54. Calculation of Load Reductions Necessary at Point WRC01				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	43.3	28.7	37.7	269.0
Allowable Load = TMDL	14.7	19.0	18.9	182.9
Load Reduction	28.6	9.8	18.9	86.1
% Reduction Segment	66%	34%	50%	32%

A waste load allocation for future mining was included for this segment of UNT05 allowing for two operations with two active pits (1500' x 300') to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

Table C55. Waste Load Allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

UNT05 Mouth of UNT05 (48801) Upstream of Confluence with Redbank Creek

The TMDL for this sample point on UNT05 consists of a load allocation to the area upstream of sample point UNT05. The load allocation for this area was computed using water-quality sample data collected at point UNT05. The average flow, calculated by the unit area flow method at the sampling point UNT05 (1.41 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point UNT05 shows pH ranging between 5.8 and 7.0; pH will not be addressed in this TMDL because little acidity was present. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for manganese and acidity because WQS were met and there was little acidity present. TMDLs for manganese and acidity are not necessary. Although TMDLs are not necessary, the measured loads are considered at the next downstream point RC01.

Table C56. Load Allocations at Point UNT05				
	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.52	6.1	0.24	2.8
Fe	0.87	10.2	0.44	5.2
Mn	0.67	7.8	0.67	7.8
Acid	2.70	31.7	2.70	31.7
Alk	12.60	147.7		

Table C57. Calculation of Load Reductions Necessary at Point UNT05				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	6.1	10.2	7.8	31.7
Allowable Load = TMDL	2.8	5.2	7.8	31.7
Load Reduction	3.3	5.0	0.0	0.0
% Reduction Segment	54%	49%	0%	0%

UNT06 Mouth of UNT06 (48077) Upstream of Confluence with Redbank Creek

The TMDL for this sample point on UNT06 consists of a load allocation to the area upstream of sample point UNT06. The load allocation for this area was computed using water-quality sample data collected at point UNT06. The average flow, calculated by the unit area flow method at the sampling point UNT06 (0.63 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point UNT06 shows pH ranging between 3.0 and 3.4; pH will be addressed in this TMDL because of the acidity impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C58. Load Allocations at Point UNT06				
	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	11.3	59.2	0.23	1.2
Fe	8.6	45.2	0.43	2.3
Mn	3.9	20.7	0.08	0.4
Acid	137.4	721.9	0.00	0.0
Alk	0.00	0.0		

Table C59. Calculation of Load Reductions Necessary at Point UNT06				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	59.2	45.2	20.7	721.9
Allowable Load = TMDL	1.2	2.3	0.4	0.0
Load Reduction	58.0	43.0	20.3	721.9
% Reduction Segment	98%	95%	98%	100%

UNT03 Mouth of UNT03 Upstream of Confluence with Redbank Creek

The TMDL for this sample point on UNT03 consists of a load allocation to the area upstream of sample point UNT03. The load allocation for this area was computed using water-quality sample data collected at point UNT03. The average flow, calculated by the unit area flow method at the sampling point UNT03 (0.18 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point UNT03 shows pH ranging between 4.3 and 4.4; pH will be addressed in this TMDL because of the acidity impacts. The method and rationale for addressing pH is contained in Attachment B.

Table C60. Load Allocations at Point UNT03				
	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	4.00	6.1	0.53	0.8
Fe	0.34	0.52	0.28	0.4
Mn	2.59	3.9	0.57	0.9
Acid	32.55	49.3	4.56	6.9
Alk	6.35	9.6		

Table C61. Calculation of Load Reductions Necessary at Point UNT03				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	6.1	0.52	3.9	49.3
Allowable Load = TMDL	0.8	0.42	0.9	6.9
Load Reduction	5.3	0.1	3.0	42.4
% Reduction Segment	87%	18%	78%	86%

A waste load allocation for future mining was included for this segment of UNT03 allowing for one operations with five active pits (1500’ x 300’) to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

UNT01 Mouth of UNT01 (48065) Upstream of Confluence with Redbank Creek

The TMDL for this sample point on UNT01 consists of a load allocation to the area upstream of sample point UNT01. The load allocation for this area was computed using water-quality sample data collected at point UNT01. The average flow, calculated by the unit area flow method at the sampling point UNT01 (2.33 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point UNT01 shows pH ranging between 7.5 and 8.0; pH will not be addressed in this TMDL because there is no acidity present. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for acidity because there was no acidity present. A TMDL for acidity is not necessary. Although a TMDL is not necessary, the measured load are considered at the next downstream point RC01.

Table C62. Waste Load Allocations for future mining operations

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

Table C63. Load Allocations at Point UNT01

	Measured Sample Data		**Allowable**	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	1.10	21.3	0.50	9.8
Fe	1.75	34.0	1.22	23.8
Mn	0.76	14.8	0.74	14.4
Acid	0.00	0.0	NA	NA
Alk	67.40	1311.9		

Table C64. Calculation of Load Reductions Necessary at Point UNT01				
	Al (lbs/day)	Fe (lbs/day)	Mn (lbs/day)	Acidity (lbs/day)
Existing Load	21.3	34.0	14.8	0.0
Allowable Load = TMDL	9.8	23.8	14.4	0.0
Load Reduction	11.5	10.2	0.4	0.0
% Reduction Segment	54%	30%	3%	0%

A waste load allocation for future mining was included for this segment of Redbank Creek allowing for five operations with two active pits (1500' x 300') to be permitted in the future on this segment (see page 23 for the method used to quantify treatment pond load).

RC01 Redbank Creek

The TMDL for this sample point on Redbank Creek consists of a load allocation to the area between sample points RC02 and RC01. The load allocation for this area was computed using water-quality sample data collected at point RC01. The average flow, calculated by the unit area flow method at the sampling point RC01 (633.70 MGD), is used for these computations.

There currently is an entry for this segment on the Pa Section 303(d) list for impairment due to pH. Sample data at point RC01 shows pH ranging between 7.0 and 7.8; pH will not be addressed in this TMDL because there is no acidity present. The method and rationale for addressing pH is contained in Attachment B.

Allocations were not calculated for aluminum, iron, manganese and acidity because WQS were met and there was no acidity present. TMDLs for aluminum, iron, manganese and acidity are not necessary.

Table C65. Waste Load Allocations for future mining operations			
Parameter	Monthly Avg. Allowable Conc. (mg/L)	Average Flow (MGD)	Allowable Load (lbs/day)
Future Operation 1			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 2			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 3			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 4			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50
Future Operation 5			
Al	0.75	0.090	0.56
Fe	3.0	0.090	2.25
Mn	2.0	0.090	1.50

Table C66. Load Allocations at Point RC01				
	Measured Sample Data		Allowable	
Parameter	Conc. (mg/l)	Load (lbs/day)	Conc. (mg/l)	Load (lbs/day)
Al	0.25	1321.3	NA	NA
Fe	0.27	1405.8	NA	NA
Mn	0.21	1112.5	NA	NA
Acid	0.15	792.8	NA	NA
Alk	38.70	204531.7		

The calculated load reductions for all the loads that enter point RC01 must be accounted for in the calculated reductions at sample point RC01 shown in Table C67. A comparison of measured loads between points RC02, WRC01, UNT05, UNT06, UNT03, UNT01 and RC01 shows that there is no additional loading entering the segment for and iron and manganese. For iron and manganese the percent decrease in existing loads are applied to the allowable upstream loads entering the segment. There is additional loading entering the segment for aluminum. The total segment aluminum load is the sum of the upstream allocated load and any additional loading within the segment.

Table C67. Calculation of Load Reduction at Point RC01				
	Al	Fe	Mn	Acidity
Existing Load	1321.3	1405.8	1112.5	792.8
Difference in Existing Load between RC02, WRC01, UNT05, UNT06, UNT03, UNT01 & RC01	-74.2	274.7	-8.9	-279.1
Load tracked from RC02, WRC01, UNT05, UNT06, UNT03 &UNT01	1288.7	1063.1	1037.3	221.5
Percent loss due to instream process	5	-	1	26
Percent load tracked from RC02, WRC01, UNT05, UNT06, UNT03 &UNT01	95	-	99	74
Total Load tracked from RC02, WRC01, UNT05, UNT06, UNT03 &UNT01	1220.2	1337.8	1029.1	163.8
Allowable Load at RC01	1321.3	1405.8	1112.5	792.8
Load Reduction at RC01	0.0	0.0	0.0	0.0
% Reduction required at RC01	0	0	0	0

Margin of Safety (MOS)

PADEP used an implicit MOS in these TMDLs derived from the Monte Carlo statistical analysis. The Water-Quality standard states that water-quality criteria must be met at least 99% of the time. All of the @Risk analyses results surpass the minimum 99% level of protection. Another margin of safety used for this TMDL analysis results from:

A MOS is added when the calculations were performed with a daily iron average instead of the 30-day average.

Seasonal Variation

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

Critical Conditions

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

Attachment D

Excerpts Justifying Changes between the 1996, 1998, and 2002 Section 303(d) Lists and the 2004 and 2006 Integrated Water Quality Reports

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

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

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

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

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

Migration to National Hydrography Data (NHD)

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

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

Attachment E

Water Quality Data Used In TMDL Calculations

Monitoring Point:		RC09	RC09 Headwaters Redbank Creek 48064		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/29/2008	-11.8	21.2	<.5	<.3	0.092
6/17/2008	-10.4	25.4	<.5	0.824	0.114
7/24/2008	4.2	23.8	<.5	1.044	0.118
9/23/2008	-45	57	<.5	1.746	0.546

Monitoring Point:		RC08	RC08 Main Stem Redbank Creek 48064		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/29/2008	-18	27.4	<.5	<.3	0.204
6/17/2008	-22.4	37.4	<.5	0.802	0.17
7/24/2008	-28.8	38.8	<.5	0.755	0.109
9/23/2008	-50.8	63.4	<.5	0.748	0.12

Monitoring Point:		SR01	SR01 Mouth of Simpson Run 48493		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/29/2008	39.6	1.8	3.062	4.097	10.529
6/17/2008	41.2	0	2.764	1.404	14.019
7/24/2008	52.8	0	1.957	1.384	12.502
9/23/2008	53.4	0	2.63	1.938	19.992

Monitoring Point:		WR1	WR1 Mouth of Welch Run 48486		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
7/20/2005	56.4	0	1.73	4.93	13.1
11/4/2005	51	0	0.903	5.19	8.19
4/3/2006	82.6	8.8	1.65	8.81	7.74
8/8/2006	27.4	0	1.43	4.46	7.76
11/14/2006	34	9	2.38	6.86	7.41
2/8/2007	42.2	10.6	2.98	14.9	10
1/29/2008	31.8	9.4	2.216	10.662	7.753
6/17/2008	35.6	0.8	1.876	4.374	9.923
7/24/2008	25.2	2.4	1.485	5.423	9.715
9/23/2008	37	0	1.46	4.845	12.546

Monitoring Point:		RC07	RC07 Main Stem Redbank Creek 48064		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/29/2008	7.6	23.4	<.5	1.02	0.875
6/17/2008	-4	38	<.5	1.022	0.717
7/24/2008	-24.8	36.6	<.5	1.134	0.6
9/23/2008	-43.2	55.8	<.5	0.579	0.67

Monitoring Point:		UNT39	UNT39 Mouth of Unnamed Tributary 48482		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/19/2008	410.6	0	35.85	71.783	4.112
6/17/2008	636.3	0	46.58	92.662	5.969
7/24/2008	596.6	0	45.259	79.644	5.658
9/23/2008	653.8	0	54.61	87.295	6.868

Monitoring Point:		RR01	RR01 Mouth of Runaway Run 48477		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/29/2008	47.4	8	3.215	2.89	6.757
6/17/2008	67.6	0	4.372	4.42	11.202
7/24/2008	53.6	0	3.334	3.575	11.131
9/23/2008	59.6	0	3.442	2.596	12.625

Monitoring Point:		BR01	BR01 Mouth of Beaver Run 48447		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
7/9/1996	0	34	<.5	1.01	0.831
8/15/1996	0	26	<.5	0.982	0.807
9/24/1996	0	24	<.5	0.694	0.958
10/30/1996	0	24	<.5	0.918	0.92
11/21/1996	0	26	<.5	1.32	0.982
12/30/1996	1.8	24	<.5	0.892	0.686
2/26/1997	0	24	<.5	1.46	0.997
6/6/1997	0	28	<.5	0.702	0.554
6/10/1997	24	10.6	6.48	32.9	2.65
6/16/1997	0	30	<.5	0.582	0.664
7/15/1997	0	38	<.5	<.3	0.308
9/11/1997	0	46	<.5	0.306	0.237
11/13/1997	2	24	<.5	2.04	0.828
3/19/1998	0	24	<.5	1.55	0.768
5/13/1998	0	26	<.5	0.722	0.651

7/28/1998	0	48	<.5	0.413	0.159
8/5/1998	0	50	<.5	0.374	0.121
9/10/1998	0	56	<.5	<.3	0.284

Monitoring Point:		BR01	BR01 Mouth of Beaver Run 48447		
Date Collected	HOT A MG/L	ALK MG/L	Al MG/L	Fe MG/L	Mn MG/L
9/23/1998	0	48	<.5	0.462	0.421
10/14/1998	0	56	<.5	<.3	0.328
10/28/1998	0	56	<.5	<.3	0.267
11/12/1998	0	62	<.5	<.3	0.328
12/8/1998	0	58	<.5	<.3	0.087
12/21/1998	0	56	<.5	<.3	0.196
2/10/1999	0	24	<.5	0.855	0.647
2/26/1999	0	40	<.5	1.29	1.08
3/12/1999	0	34	<.5	1.34	0.82
4/8/1999	0	30	<.5	0.863	0.602
5/11/1999	0	26	<.5	0.479	0.554
5/27/1999	0	32	<.5	0.581	0.692
6/10/1999	0	40	<.5	0.348	0.276
6/24/1999	0	46	<.5	0.375	0.222
7/15/1999	0	44	<.5	<.3	0.176
8/12/1999	0	44	<.5	<.3	0.101
8/26/1999	0	58	<.5	0.612	0.224
9/10/1999	0	46	<.5	<.3	0.149
11/12/1999	0	40	<.5	<.3	0.528
12/10/1999	0	32	<.5	1.76	0.481
1/5/2000	0	24	<.5	0.719	0.412
3/10/2000	0	30	<.5	1.1	0.626
3/23/2000	0	20	<.5	0.675	0.415
5/4/2000	0	30	<.5	0.647	0.762
5/25/2000	0	32	<.5	0.846	0.607
6/19/2000	0	32	<.5	0.796	0.486
7/25/2000	0	42	<.5	0.502	0.309
8/15/2000	0	48	<.5	0.384	16
9/5/2000	0	54	<.5	<.3	0.123
9/14/2000	0	52	<.5	0.408	0.282
10/4/2000	0	48	<.5	20.3	1.82
11/7/2000	0	48	<.5	<.3	0.404
12/6/2000	0	40	<.5	0.599	0.494
2/7/2001	0	32	<.5	0.701	0.565
3/21/2001	0	28	<.5	0.853	0.543
5/2/2001	0	38	<.5	0.633	0.489
5/30/2001	0	44	<.5	0.474	0.313
6/26/2001	0	54	<.5	0.513	0.2
7/19/2001	0	62	<.5	0.338	0.061
8/8/2001	0	62	<.5	0.458	0.103
9/12/2001	0	60	<.5	<.3	0.091
10/2/2001	0	62	<.5	1.28	0.201
11/14/2001	0	50	<.5	<.3	0.572
12/5/2001	0	30	<.5	0.356	0.399

Monitoring Point:		BR01	BR01 Mouth of Beaver Run 48447		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/23/2002	0	36	<.5	1.03	0.672
2/13/2002	0	24	<.5	0.705	0.523
3/14/2002	0	34	<.5	0.841	0.618
4/4/2002	0	26	<.5	0.767	0.598
7/10/2002	0	44	<.5	1.07	0.597
8/8/2002	0	44	<.5	<.3	0.289
9/4/2002	0	46	<.5	0.337	0.157
10/1/2002	0	44	<.5	<.3	0.372
12/16/2002	33.4	24	<.5	0.546	0.246
1/15/2003	0	28.2	<.5	1.54	0.906
3/20/2003	0	22	0.524	1.06	0.623
4/23/2003	0	35.8	<.5	0.55	0.546
5/22/2003	0	25.8	<.5	0.547	0.32
6/23/2003	0	33.8	<.5	0.464	0.323
7/30/2003	0	22	<.5	0.597	0.853
8/20/2003	0	44.4	<.5	<.3	0.347
10/9/2003	0	41.6	<.5	0.308	0.408
3/25/2004	20.6	25.2	0.523	1.31	0.807
5/20/2004	14.4	43	<.5	0.787	0.507
8/18/2004	-39.6	48	<.5	0.629	0.254
10/19/2004	-3.2	47.2	0.826	3.07	0.817
3/29/2005	23	23.2	<.5	0.944	0.529
4/28/2005	10.2	35.2	<.5	0.848	0.622
7/21/2005	-22.4	54.6	<.5	0.393	0.122
3/23/2006	-1.2	30	<.5	0.792	0.56
7/20/2006	-37	48.2	<.5	0.437	0.148
1/29/2008	-25	37.6	<.5	2.475	0.698
6/17/2008	-30.8	53.2	<.5	0.667	0.361
7/27/2008	-43.2	56.7	<.5	20.56	0.336
9/23/2008	-45	64.2	<.5	0.314	0.267

Monitoring Point:		RC06	RC06 Main Stem Redbank Creek 48064		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/29/2008	-13.2	24.2	<.5	0.45	0.575
6/17/2008	-22	36.2	<.5	0.894	0.644
7/24/2008	-25.8	36.2	<.5	0.613	0.346
9/23/2008	-38	52.2	<.5	0.307	0.338

Monitoring Point:		UNT29	UNT29 Mouth of Unnamed Tributary 48255		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/30/2008	3.8	13.2	0.996	2.617	2.125
6/17/2008	-80	9	2.216	1.348	5.316
7/28/2008	17.4	9	2.454	1.258	4.811
9/24/2008	-66.8	7.2	4.418	2.168	6.45

Monitoring Point:		RC05	RC05 Main Stem Redbank Creek 48064		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/30/2008	-10.6	23.8	<.5	0.507	0.436
6/17/2008	-12	38.4	<.5	0.322	0.291
7/28/2008	-29.2	39	<.5	<.3	0.059
9/24/2008	-41.2	53	<.5	<.3	0.06

Monitoring Point:		UNT25	UNT25 Mouth of Unnamed Tributary 48249		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/30/2008	-64.8	81.4	<.5	0.419	0.788
6/17/2008	-136.6	117	<.5	<.3	0.17
7/28/2008	-177.6	180.8	<.5	<3	0.124
9/24/2008	-94.6	180.2	<.5	<.3	0.063

Monitoring Point:		TRC01	TRC01 Mouth of Town Run 48227		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/30/2008	-14.8	33.2	2.143	4.091	1.153
6/17/2008	-36.2	67	<.5	<.3	0.361
7/8/2008	-57.8	68.6	<.5	<.3	0.067
9/24/2008	-57.4	70	<.5	<.3	0.098

Monitoring Point:		MR01	MR01 Mouth of Middle Run 48223		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/30/2008	-34.8	53.6	0.809	0.802	2.917
6/17/2008	-47.4	77.8	0.547	<.3	1.092
7/28/2008	-69.8	81.6	<.5	0.355	0.642
9/24/2008	-72.6	88.4	<.5	0.315	0.556

Monitoring Point:		RC04	RC04 Main Stem Redbank Creek 48064		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/30/2008	-19.4	31.8	<.5	0.376	0.631
6/17/2008	-8.8	41.8	<.5	<.3	0.24
7/28/2008	-30.6	42	<.5	0.328	0.184
9/24/2008	-42.6	53.8	<.5	0.385	0.174

Monitoring Point:		RC03	RC03 Main Stem Redbank Creek 48064		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/30/2008	-17	27.4	<.5	0.728	0.615
6/17/2008	-22	39.6	0.707	<.3	1.01
7/28/2008	-33.8	43.2	<.5	<.3	<.05
9/24/2008	-42.2	55.2	<.5	<.3	0.094

Monitoring Point:		UNT16	UNT16 Mouth of Unnamed Tributary 48123		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/30/2008	3.4	6.6	0.927	<.3	0.667
6/17/2008	20.6	9.6	12.784	10.668	4.88
7/29/2008	-1.4	15.8	0.547	<.3	0.902
9/24/2008	-2	16	0.893	<.3	1.102

Monitoring Point:		RC02	RC02 Main Stem Redbank Creek 48064		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/30/2008	-17	26.8	<.5	0.354	0.515
6/17/2008	-5.4	37.8	<.5	<.3	0.162
7/29/2008	-31.4	44.2	<.5	<.3	0.121
9/24/2008	-41	53	<.5	<.3	<.05

Monitoring Point:		WRC01	WRC01 Mouth of Wildcat Run 48086		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
2/14/2008	12.8	8.4	1.578	1.236	1.165
6/18/2008	5	14.2	1.337	1.058	1.394
7/29/2008	5.4	18.6	0.824	0.498	0.922
9/24/2008	6.2	12.2	0.989	0.346	0.641

Monitoring Point:		UNT05	UNT05 Mouth of Unnamed Tributary 48081

Date Collected	HOT A MG/L	ALK MG/L	Al MG/L	Fe MG/L	Mn MG/L
1/30/2008	-1	12.6	0.759	1.049	0.724
6/18/2008	6	15.4	<.5	0.76	0.737
7/29/2008	1.6	13.6	0.836	1.526	0.648
9/24/2008	3.2	8.8	<.5	<.3	0.553

Monitoring Point:		UNT06	UNT06 Mouth of Unnamed Tributary 48077		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
1/30/2008	89.2	0	9.267	9.066	3.675
6/17/2008	142.2	0	<.5	<.3	0.17
7/29/2008	106.6	0	16.563	12.976	5.572
9/24/2008	211.6	0	19.012	12.246	6.332

Monitoring Point:		UNT03	UNT03 Mouth of Unnamed Tributary 48076		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
2/4/2008	26.4	5.8	3.15	0.913	1.78
6/18/2008	32.8	7	3.918	<.3	2.369
7/29/2008	35	5.6	4.46	<.3	2.923
9/25/2008	36	7	4.641	<.3	3.29

Monitoring Point:		UNT01	UNT01 Mouth of Unnamed Tributary 48065		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
2/14/2008	-33.4	47	1.386	1.916	0.896
6/18/2008	-39.4	65.6	1.022	1.712	0.746
7/29/2008	-49.6	66.4	0.955	1.817	0.65
9/25/2008	-76.2	90.6	1.02	1.539	0.757

Monitoring Point:		RC01	RC01 Main Stem Redbank Creek 48064		
Date	HOT A	ALK	Al	Fe	Mn
Collected	MG/L	MG/L	MG/L	MG/L	MG/L
2/21/2008	0.6	21.2	<.5	0.416	0.381
6/18/2008	-16.2	41.2	<.5	<.3	0.2
7/29/2008	-29.8	41	<.5	0.348	0.125
9/25/2008	-37.4	51.4	<.5	<.3	0.136

Attachment F

Comment and Response

Comments from EPA

1. Table 1:
    a. Please remove the following streams from Table 1 which have existing TMDLs or are not in the watershed: Leatherwood Creek, West Fork Leatherwood Creek, Narrows Creek, Town Run and Welch Run
    Corrected.
    b. Please remove Sandy Lick Creek because there are no sampling points along that creek in this TMDL
    Corrected.
2. Please correct the following wording which is confusing
    a. On p6 this text suggests that AMD is the only source of impairment to the watershed "All of the discharges in the watershed are from abandoned mines and will be treated as non-point sources."
    The sentence, above, is in reference to the first paragraph of the Segments addressed in this TMDL section and does not reference Table 1 as implied by the comment.
    b. On p6 this text suggests that each segment will have its own TMDL, but it is each sample point which has its own TMDL - "Each segment on the 303(d) list will be addressed as a separate TMDL"
    The concept that each sample point is an allocation for the area upstream of the sample point or between two sample points was arrived at many years ago by PADEP with consultation with EPA Region III. The statement above that a TMDL is only at each sample point is incorrect. The above statement has been in nearly every AMD TMDL completed by PADEP.
    c. On p6 please identify and describe the "Seven of the active SMPs in the watershed are non-coal operations that are not required to have WLAs assigned to them" and explain why they are not required to have WLAs.
    The active SMPs above are contained in the table that begins on page 9 in the Watershed History Section. None of these are coal mines but are quarries that produce sandstone, shale, gravel, and or topsoil. When we state various SMPs are non coal operations or they do not require WLAs the permits in question either do not have the metals in their permits or they do not discharge and thus do not have an NPDES permit two items required for a WLA to be assigned. I added language to the sentence in question that adds to the explanation.
3. TMDL summary table, p.30
    a. SR01, RR01 and UNT29 have substantial reductions but were assigned future WLAs. EPA will not approve future WLAs at these sites. Please remove the future WLAs from SR01, RR01 and UNT29 in the summary table and in the calculations in Attachment C
    The reserved allocations are called future mining WLAs but they are intended for use by any permitted discharger. In EV and HQ watersheds a non discharge option will likely be used for a permitted mining discharger. However, a future mining WLA can also accommodate any non mining discharge that may contain aluminum, iron and/or manganese in it. We reserve the right to use mining WLAs for non-mining permits (an industrial permit with metals limits); we reserve the

right to move existing and future waste load allocations spatially throughout a watershed area as capacity allows; and we reserve the right to amend a TMDL document to accommodate additional permits as capacity allows even if future waste load allocations have been built into the TMDL.

   b. WR1 and TR1 have previously approved TMDLs. We do want you to include the sampling data but calling them TMDLs is confusing, since we want the pre-existing TMDLs to remain as they are. Please refer to these only as sampling points rather than TDMLs. Also, please correct Table 3 and the tables in Attachment 3 (p55 and p67) to have the same reductions as listed in those TMDLs.
      Corrected.

4. Typos/Copy and paste errors
   a. The sample id when presenting the pH range is wrong in the descriptions of the following sampling points: RC09 (p 51), RC07(p 56), UNT39(p 57), RC06(p 61), UNT25(p 66), RC03(p 72), and UNT16 (p). Please correct.
      Corrected all.
   b. In the description of the samples that are tributary to RC06 (p 61), BR05 is listed. Please correct to be BR01.
      Corrected.
   c. p69- Tables C40 and C41 have TR1 in the titles. Please correct to MR1.
      Corrected.
   d. Please correct the % Reduction for Mn at UNT25 to be 25% in Table C35 (p 67) and Table 3 (p 31). Also, please correct the load allocations and load reductions for all parameters at UNT25 in Table 3 (p 31) to reflect the correct values listed in Table C35 (p 67).
      Corrected.
   e. Table C67 (p 82) does not have Allowable concentrations or loads listed. Please add them
      The last paragraph on page 81 explains this.
   f. Table C68 (p 82) had the wrong values for the existing load which propagated down through the calculation. Please correct. Our calculations are shown below. Please correct the corresponding errors in the Summary Table 3 (p 30).
      Corrected.

Attachment G

TMDLs and NPDES Permitting Coordination

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

Load Tracking Mechanisms

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

Options for Permittees in TMDL Watersheds

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

Options identified

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

Other possible options

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

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

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

Attachment H

Pennsylvania Integrated Water Quality Monitoring and Assessment Report Streams, Category 5 Waterbodies, Pollutants Requiring a TMDL

Stream Name / Use Designation (Assessment ID) / Source	Cause	Date Listed	TMDL Date

Hydrologic Unit Code: 05010006 - Middle Allegheny-Redbank

Beaver Run			
HUC: 05010006			
Aquatic Life (7479) - 6.44 miles; 15 Segment(s)*			
Abandoned Mine Drainage	Metals	1996	2009
Beaver Run (Unt 48451)			
HUC: 05010006			
Aquatic Life (7479) - 0.49 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	1996	2009
Beaver Run (Unt 48469)			
HUC: 05010006			
Aquatic Life (7479) - 0.63 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	1996	2009
Beaver Run (Unt 48471)			
HUC: 05010006			
Aquatic Life (7479) - 1.05 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	1996	2009
Big Run (Unt 48335)			
HUC: 05010006			
Aquatic Life (1140) - 1.97 miles; 6 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Big Run (Unt 48356)			
HUC: 05010006			
Aquatic Life (1140) - 0.59 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Coder Run			
HUC: 05010006			
Aquatic Life (1323) - 1.88 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Coder Run (Unt 48525)			
HUC: 05010006			
Aquatic Life (1323) - 0.57 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015

*Segments are defined as individual COM IDs.

Stream Name / Use Designation (Assessment ID) / Source	Cause	Date Listed	TMDL Date
Falls Creek (Unt 48744) HUC: 05010006			
Aquatic Life (1671) - 1.41 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Falls Creek (Unt 48745) HUC: 05010006			
Aquatic Life (7712) - 1.81 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	1998	2011
Fehley Run HUC: 05010006			
Aquatic Life (852) - 2.18 miles; 4 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Ferguson Run HUC: 05010006			
Aquatic Life (1140) - 1.10 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Fivemile Run HUC: 05010006			
Aquatic Life (8476) - 3.30 miles; 5 Segment(s)*			
Package Plants	Nutrients	1998	2011
Package Plants	Organic Enrichment/Low D.O.	1998	2011
Aquatic Life (8482) - 2.26 miles; 2 Segment(s)*			
On site Wastewater	Metals	1998	2011
Aquatic Life (8487) - 0.68 miles; 1 Segment(s)*			
Habitat Modification	Siltation	1998	2011
Fivemile Run (Unt 48545) HUC: 05010006			
Aquatic Life (1391) - 1.48 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Fivemile Run (Unt 48546) HUC: 05010006			
Aquatic Life (1391) - 0.23 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Jack Run HUC: 05010006			
Aquatic Life (1293) - 2.53 miles; 6 Segment(s)*			

*Segments are defined as individual COM IDs.

Stream Name Use Designation (Assessment ID) Source	Cause	Date Listed	TMDL Date
Jack Run HUC: 05010006			
Aquatic Life (1293) - 2.53 miles; 6 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Jack Run (Unt 48157) HUC: 05010006			
Aquatic Life (1293) - 0.38 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Jack Run (Unt 48159) HUC: 05010006			
Aquatic Life (1293) - 0.65 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Jack Run (Unt 48161) HUC: 05010006			
Aquatic Life (1293) - 0.12 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Kyle Run HUC: 05010006			
Aquatic Life (1671) - 0.78 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Kyle Run (Unt 48747) HUC: 05010006			
Aquatic Life (1671) - 0.96 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Kyle Run (Unt 48748) HUC: 05010006			
Aquatic Life (1671) - 0.17 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Kyle Run (Unt 48749) HUC: 05010006			
Aquatic Life (1671) - 0.61 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Kyle Run (Unt 48750) HUC: 05010006			
Aquatic Life (1671) - 0.57 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017

*Segments are defined as individual COM IDs.

Stream Name / Use Designation (Assessment ID) / Source	Cause	Date Listed	TMDL Date
Kyle Run (Unt 48751) HUC: 05010006			
Aquatic Life (1671) - 0.60 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Laborde Branch HUC: 05010006			
Aquatic Life (1681) - 6.00 miles; 6 Segment(s)*			
Abandoned Mine Drainage	Metals	1996	2009
Aquatic Life (8031) - 1.92 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	1996	2009
Leatherwood Creek HUC: 05010006			
Aquatic Life (7703) - 4.43 miles; 14 Segment(s)*			
Abandoned Mine Drainage	Metals	1996	2009
Aquatic Life (13052) - 2.09 miles; 7 Segment(s)*			
Agriculture	Siltation	2008	2021
Leatherwood Creek (Unt 48185) HUC: 05010006			
Aquatic Life (13053) - 0.54 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2008	2021
Crop Related Agric	Siltation	2008	2021
Grazing Related Agric	Siltation	2008	2021
Leatherwood Creek (Unt 48190) HUC: 05010006			
Aquatic Life (12974) - 0.86 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2008	2021
Crop Related Agric	Siltation	2008	2021
Grazing Related Agric	Siltation	2008	2021
Little Sandy Creek (Unt 48417) HUC: 05010006			
Aquatic Life (1695) - 0.72 miles; 1 Segment(s)*			
Abandoned Mine Drainage	pH	2002	2015
Luthersburg Branch HUC: 05010006			
Aquatic Life (8033) - 2.87 miles; 7 Segment(s)*			
Abandoned Mine Drainage	Metals	1996	2009
McCracken Run HUC: 05010006			

*Segments are defined as individual COM IDs.

Stream Name / Use Designation (Assessment ID) / Source	Cause	Date Listed	TMDL Date
McCracken Run HUC: 05010006			
Aquatic Life (1140) - 0.53 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
McCreight Run HUC: 05010006			
Aquatic Life (885) - 1.99 miles; 3 Segment(s)*			
Abandoned Mine Drainage	pH	2002	2015
Middle Branch Little Sandy Creek HUC: 05010006			
Aquatic Life (1695) - 0.97 miles; 1 Segment(s)*			
Abandoned Mine Drainage	pH	2002	2015
Middle Run HUC: 05010006			
Aquatic Life (1097) - 3.54 miles; 4 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Middle Run (Unt 48224) HUC: 05010006			
Aquatic Life (1097) - 0.55 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Middle Run (Unt 48225) HUC: 05010006			
Aquatic Life (1097) - 0.65 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Narrows Creek HUC: 05010006			
Aquatic Life (1678) - 5.85 miles; 5 Segment(s)*			
Abandoned Mine Drainage	Metals	1996	2009
Nolf Run (Unt 48294) HUC: 05010006			
Aquatic Life (1140) - 0.63 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Pentz Run HUC: 05010006			
Aquatic Life (1867) - 0.84 miles; 2 Segment(s)*			

*Segments are defined as individual COM IDs.

Stream Name Use Designation (Assessment ID) Source	Cause	Date Listed	TMDL Date
Pentz Run HUC: 05010006			
Aquatic Life (1867) - 0.84 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Pentz Run (Unt 48792) HUC: 05010006			
Aquatic Life (1867) - 1.04 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Pentz Run (Unt 48793) HUC: 05010006			
Aquatic Life (1867) - 0.28 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Redbank Creek HUC: 05010006			
Aquatic Life (1917) - 4.66 miles; 7 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Aquatic Life (2143) - 5.77 miles; 7 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Aquatic Life (2415) - 4.31 miles; 11 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	Siltation	2002	2015
Aquatic Life (2507) - 4.07 miles; 8 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Redbank Creek (Unt 48065) HUC: 05010006			
Aquatic Life (1203) - 0.20 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Redbank Creek (Unt 48066) HUC: 05010006			
Aquatic Life (1203) - 2.26 miles; 5 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Redbank Creek (Unt 48067) HUC: 05010006			
Aquatic Life (1203) - 0.48 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Redbank Creek (Unt 48068) HUC: 05010006			
Aquatic Life (1203) - 0.52 miles; 2 Segment(s)*			

*Segments are defined as individual COM IDs.

Stream Name Use Designation (Assessment ID) Source	Cause	Date Listed	TMDL Date
Redbank Creek (Unt 48068) HUC: 05010006			
Aquatic Life (1203) - 0.52 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Redbank Creek (Unt 48069) HUC: 05010006			
Aquatic Life (1203) - 0.39 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Redbank Creek (Unt 48072) HUC: 05010006			
Aquatic Life (1018) - 0.58 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48073) HUC: 05010006			
Aquatic Life (2146) - 0.49 miles; 2 Segment(s)*			
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48074) HUC: 05010006			
Aquatic Life (2145) - 2.01 miles; 5 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48076) HUC: 05010006			
Aquatic Life (1018) - 1.16 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48077) HUC: 05010006			
Aquatic Life (1975) - 2.89 miles; 6 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48078) HUC: 05010006			
Aquatic Life (1975) - 1.26 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015

*Segments are defined as individual COM IDs.

Stream Name Use Designation (Assessment ID) Source	Cause	Date Listed	TMDL Date
Redbank Creek (Unt 48079) HUC: 05010006			
Aquatic Life (1975) - 0.92 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48081) HUC: 05010006			
Aquatic Life (1018) - 3.54 miles; 10 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48082) HUC: 05010006			
Aquatic Life (1018) - 0.68 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48083) HUC: 05010006			
Aquatic Life (1018) - 0.62 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48084) HUC: 05010006			
Aquatic Life (1018) - 1.31 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48085) HUC: 05010006			
Aquatic Life (1018) - 0.48 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48114) HUC: 05010006			
Aquatic Life (1027) - 1.31 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Redbank Creek (Unt 48115) HUC: 05010006			
Aquatic Life (2355) - 0.48 miles; 2 Segment(s)*			
Abandoned Mine Drainage	pH	2002	2015

*Segments are defined as individual COM IDs.

Stream Name Use Designation (Assessment ID) Source	Cause	Date Listed	TMDL Date
Redbank Creek (Unt 48120) HUC: 05010006			
Aquatic Life (2338) - 1.49 miles; 4 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48121) HUC: 05010006			
Aquatic Life (2343) - 1.04 miles; 2 Segment(s)*			
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48123) HUC: 05010006			
Aquatic Life (2148) - 1.59 miles; 4 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48222) HUC: 05010006			
Aquatic Life (1097) - 0.66 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Redbank Creek (Unt 48249) HUC: 05010006			
Aquatic Life (2209) - 0.83 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48250) HUC: 05010006			
Aquatic Life (2209) - 0.85 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48255) HUC: 05010006			
Aquatic Life (2209) - 2.77 miles; 5 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Redbank Creek (Unt 48257) HUC: 05010006			
Aquatic Life (2209) - 0.72 miles; 4 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015

*Segments are defined as individual COM IDs.

Stream Name Use Designation (Assessment ID) Source	Cause	Date Listed	TMDL Date
Redbank Creek (Unt 48476) HUC: 05010006			
Aquatic Life (1296) - 0.83 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Reitz Run HUC: 05010006			
Aquatic Life (1140) - 2.25 miles; 4 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Reitz Run (Unt 48315) HUC: 05010006			
Aquatic Life (1140) - 0.72 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Reitz Run (Unt 48316) HUC: 05010006			
Aquatic Life (1140) - 0.49 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Reitz Run (Unt 48317) HUC: 05010006			
Aquatic Life (1140) - 0.06 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Runaway Run HUC: 05010006			
Aquatic Life (1297) - 3.70 miles; 7 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Runaway Run (Unt 48479) HUC: 05010006			
Aquatic Life (1297) - 1.19 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Runaway Run (Unt 48480) HUC: 05010006			
Aquatic Life (1297) - 0.16 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015

*Segments are defined as individual COM IDs.

Stream Name / Use Designation (Assessment ID) / Source	Cause	Date Listed	TMDL Date
Runaway Run (Unt 48480)			
HUC: 05010006			
Aquatic Life (1297) - 0.16 miles; 2 Segment(s)*			
Abandoned Mine Drainage	pH	2002	2015
Sandy Lick Creek			
HUC: 05010006			
Aquatic Life (1815) - 0.90 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Aquatic Life (1860) - 2.95 miles; 8 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Aquatic Life (13879) - 12.46 miles; 30 Segment(s)*			
Source Unknown	Cause Unknown	2008	2021
Sandy Lick Creek (Unt 48644)			
HUC: 05010006			
Aquatic Life (1708) - 0.74 miles; 2 Segment(s)*			
Abandoned Mine Drainage	pH	2002	2015
Sandy Lick Creek (Unt 48709)			
HUC: 05010006			
Aquatic Life (13879) - 0.50 miles; 3 Segment(s)*			
Source Unknown	Cause Unknown	2008	2021
Sandy Lick Creek (Unt 48718)			
HUC: 05010006			
Aquatic Life (13879) - 0.80 miles; 2 Segment(s)*			
Source Unknown	Cause Unknown	2008	2021
Sandy Lick Creek (Unt 48719)			
HUC: 05010006			
Aquatic Life (13879) - 0.55 miles; 2 Segment(s)*			
Source Unknown	Cause Unknown	2008	2021
Sandy Lick Creek (Unt 48721)			
HUC: 05010006			
Aquatic Life (13879) - 1.12 miles; 5 Segment(s)*			
Source Unknown	Cause Unknown	2008	2021
Sandy Lick Creek (Unt 48722)			
HUC: 05010006			
Aquatic Life (13879) - 1.11 miles; 1 Segment(s)*			
Source Unknown	Cause Unknown	2008	2021

*Segments are defined as individual COM IDs.

Stream Name / Use Designation (Assessment ID) / Source	Cause	Date Listed	TMDL Date
Sandy Lick Creek (Unt 48726)			
HUC: 05010006			
Aquatic Life (13879) - 1.91 miles; 5 Segment(s)*			
Source Unknown	Cause Unknown	2008	2021
Sandy Lick Creek (Unt 48727)			
HUC: 05010006			
Aquatic Life (13879) - 0.17 miles; 2 Segment(s)*			
Source Unknown	Cause Unknown	2008	2021
Simpson Run			
HUC: 05010006			
Aquatic Life (1309) - 3.19 miles; 4 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Simpson Run (Unt 48494)			
HUC: 05010006			
Aquatic Life (1309) - 0.49 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Slab Run			
HUC: 05010006			
Aquatic Life (1817) - 0.66 miles; 3 Segment(s)*			
Source Unknown	Metals	2002	2015
Soldier Run			
HUC: 05010006			
Aquatic Life (852) - 2.77 miles; 7 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Soldier Run (Unt 48686)			
HUC: 05010006			
Aquatic Life (852) - 0.63 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Soldier Run (Unt 48687)			
HUC: 05010006			
Aquatic Life (852) - 1.18 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015

*Segments are defined as individual COM IDs.

Stream Name / Use Designation (Assessment ID) / Source	Cause	Date Listed	TMDL Date
Soldier Run (Unt 48698)			
HUC: 05010006			
Aquatic Life (852) - 0.32 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Soldier Run (Unt 48700)			
HUC: 05010006			
Aquatic Life (852) - 0.42 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Sugarcamp Run			
HUC: 05010006			
Aquatic Life (1756) - 1.82 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Aquatic Life (8033) - 0.90 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	1996	2009
Sugarcamp Run (Unt 48810)			
HUC: 05010006			
Aquatic Life (1756) - 0.43 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Swamp Run			
HUC: 05010006			
Aquatic Life (1398) - 2.00 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Town Run			
HUC: 05010006			
Aquatic Life (1369) - 3.20 miles; 9 Segment(s)*			
Abandoned Mine Drainage	Metals	1996	2009
Town Run (Unt 48230)			
HUC: 05010006			
Aquatic Life (12995) - 0.50 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2006	2019
Town Run (Unt 48232)			
HUC: 05010006			
Aquatic Life (1370) - 3.54 miles; 6 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Aquatic Life (12995) - 0.10 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2006	2019

*Segments are defined as individual COM IDs.

Stream Name / Use Designation (Assessment ID) / Source	Cause	Date Listed	TMDL Date
Town Run (Unt 48233)			
HUC: 05010006			
Aquatic Life (12995) - 0.45 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2006	2019
Town Run (Unt 48234)			
HUC: 05010006			
Aquatic Life (1370) - 0.51 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Town Run (Unt 48235)			
HUC: 05010006			
Aquatic Life (12996) - 0.16 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2008	2021
Grazing Related Agric	Nutrients	2008	2021
Town Run (Unt 48236)			
HUC: 05010006			
Aquatic Life (1370) - 0.84 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Town Run (Unt 48237)			
HUC: 05010006			
Aquatic Life (1370) - 0.41 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Aquatic Life (12975) - 0.30 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2008	2021
Grazing Related Agric	Siltation	2008	2021
Aquatic Life (12994) - 0.88 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2008	2021
Grazing Related Agric	Nutrients	2008	2021
Town Run (Unt 48239)			
HUC: 05010006			
Aquatic Life (12977) - 0.48 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2008	2021
Grazing Related Agric	Nutrients	2008	2021
Town Run (Unt 48240)			
HUC: 05010006			
Aquatic Life (12976) - 0.43 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2008	2021
Grazing Related Agric	Siltation	2008	2021

*Segments are defined as individual COM IDs.

Stream Name Use Designation (Assessment ID) Source	Cause	Date Listed	TMDL Date
Town Run (Unt 48242) HUC: 05010006			
Aquatic Life (1370) - 0.39 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Town Run (Unt 48244) HUC: 05010006			
Aquatic Life (1370) - 0.51 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Town Run (Unt 48245) HUC: 05010006			
Aquatic Life (1370) - 0.43 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Welch Run HUC: 05010006			
Aquatic Life (1303) - 3.37 miles; 6 Segment(s)*			
Abandoned Mine Drainage	Metals	1996	2009
Abandoned Mine Drainage	pH	1996	2009
Aquatic Life (1304) - 1.20 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Welch Run (Unt 48487) HUC: 05010006			
Aquatic Life (1305) - 0.63 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Abandoned Mine Drainage	pH	2004	2017
Welch Run (Unt 48488) HUC: 05010006			
Aquatic Life (1305) - 0.66 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Abandoned Mine Drainage	pH	2004	2017
Welch Run (Unt 48489) HUC: 05010006			
Aquatic Life (1305) - 0.51 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Abandoned Mine Drainage	pH	2004	2017
Welch Run (Unt 48490) HUC: 05010006			
Aquatic Life (1305) - 0.73 miles; 1 Segment(s)*			

*Segments are defined as individual COM IDs.

Stream Name / Use Designation (Assessment ID) / Source	Cause	Date Listed	TMDL Date
Welch Run (Unt 48490)			
HUC: 05010006			
Aquatic Life (1305) - 0.73 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2004	2017
Abandoned Mine Drainage	pH	2004	2017
West Fork Leatherwood Creek			
HUC: 05010006			
Aquatic Life (7704) - 3.71 miles; 8 Segment(s)*			
Abandoned Mine Drainage	Metals	1996	2009
West Fork Leatherwood Creek (Unt 48171)			
HUC: 05010006			
Aquatic Life (7705) - 0.62 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	1996	2009
West Fork Leatherwood Creek (Unt 48172)			
HUC: 05010006			
Aquatic Life (7706) - 0.73 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	1996	2009
Wildcat Run			
HUC: 05010006			
Aquatic Life (1020) - 6.19 miles; 12 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Wildcat Run (Unt 48087)			
HUC: 05010006			
Aquatic Life (1020) - 1.81 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Wildcat Run (Unt 48109)			
HUC: 05010006			
Aquatic Life (1020) - 0.63 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Wildcat Run (Unt 48111)			
HUC: 05010006			
Aquatic Life (1020) - 0.82 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015

*Segments are defined as individual COM IDs.

Stream Name Use Designation (Assessment ID) Source	Cause	Date Listed	TMDL Date
Wildcat Run (Unt 48112) HUC: 05010006			
Aquatic Life (1020) - 0.48 miles; 1 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Wildcat Run (Unt 48113) HUC: 05010006			
Aquatic Life (1020) - 0.73 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Wildcat Run East Fork HUC: 05010006			
Aquatic Life (1020) - 2.85 miles; 4 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015
Work Run HUC: 05010006			
Aquatic Life (1150) - 1.69 miles; 2 Segment(s)*			
Abandoned Mine Drainage	pH	2002	2015
zz Unknown NHD Name: 05010006000983 HUC: 05010006			
Aquatic Life (13879) - 0.65 miles; 4 Segment(s)*			
Source Unknown	Cause Unknown	2008	2021
zz Unknown NHD Name: 05010006000985 HUC: 05010006			
Aquatic Life (13879) - 0.14 miles; 1 Segment(s)*			
Source Unknown	Cause Unknown	2008	2021
zz Unknown NHD Name: 05010006008697 HUC: 05010006			
Aquatic Life (13879) - 0.19 miles; 3 Segment(s)*			
Source Unknown	Cause Unknown	2008	2021
zz Unknown NHD Name: 05010006008732 HUC: 05010006			
Aquatic Life (1018) - 0.43 miles; 3 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015

*Segments are defined as individual COM IDs.

Stream Name Use Designation (Assessment ID) Source	Cause	Date Listed	TMDL Date
zz Unknown NHD Name: 05010006009469 HUC: 05010006			
Aquatic Life (13879) - 0.05 miles; 2 Segment(s)*			
Source Unknown	Cause Unknown	2008	2021
zz Unknown NHD Name: 05010006009484 HUC: 05010006			
Aquatic Life (13879) - 0.18 miles; 2 Segment(s)*			
Source Unknown	Cause Unknown	2008	2021
zz Unknown NHD Name: 05010006009811 HUC: 05010006			
Aquatic Life (13879) - 0.41 miles; 2 Segment(s)*			
Source Unknown	Cause Unknown	2008	2021
zz Unknown NHD Name: 05010006010409 HUC: 05010006			
Aquatic Life (2209) - 0.12 miles; 2 Segment(s)*			
Abandoned Mine Drainage	Metals	2002	2015
Abandoned Mine Drainage	pH	2002	2015

Report Summary

Watershed Summary

	Stream Miles	Assessment Units	Segments (COMIDs)
Watershed Characteristics	1,176.34	64	3,021

Impairment Summary

Source	Cause	Miles	Assessment Units	Segments (COMIDs)
Abandoned Mine Drainage	Metals	174.78	51	369
Abandoned Mine Drainage	Siltation	4.31	1	11
Abandoned Mine Drainage	pH	80.80	23	175
Agriculture	Siltation	2.09	1	7
Crop Related Agric	Siltation	1.40	2	2
Grazing Related Agric	Nutrients	1.52	3	5
Grazing Related Agric	Siltation	2.13	4	4
Habitat Modification	Siltation	.68	1	1
On site Wastewater	Metals	2.26	1	2
Package Plants	Nutrients	3.30	1	5
Package Plants	Organic Enrichment/Low D.O.	3.30	1	5
Source Unknown	Cause Unknown	20.24	1	64
Source Unknown	Metals	.66	1	3

*Segments are defined as individual COM IDs.

Stream Name Use Designation (Assessment ID) Source	Cause		Date Listed	TMDL Date
		212.12 **	**64** **	**466** **

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

Use Designation Summary

	Miles	Assessment Units	Segments (COMIDs)
Aquatic Life	212.12	64	466

*Segments are defined as individual COM IDs.