UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Decision Rationale
Total Maximum Daily Loads
North Branch Bear Creek Watershed
For Acid Mine Drainage Affected Segments
Butler County

Signed

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Water Protection Division

Date: 4/4/2007

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I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) to be developed for those waterbodies identified as impaired by the state where technology-based and other controls will not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety (MOS), that may be discharged to a water quality-limited waterbody without violating water quality standards.

The Pennsylvania Department of Environmental Protection (PADEP), Bureau of Watershed Conservation, submitted the *North Branch Bear Creek TMDL*, dated March 28, 2007 (TMDL Report), to the U.S. Environmental Protection Agency (EPA) for final Agency review on March 28, 2007. The TMDL Report addresses one segment on Pennsylvania's 1996 Section 303(d) list of impaired waters, North Branch Bear Creek, and twelve segments on the 2004 Section 303(d) list that include unnamed tributaries to North Branch Bear Creek (UNT 49124, UNT 49125, UNT 49127, UNT 49128, UNT 49129, UNT 49130, UNT 49132, UNT 49133, UNT 49134, UNT 49135, UNT 49136, and UNT 64604).

EPA's rationale is based on the TMDL Report and information contained in the attachments to the report. EPA's review determined that the TMDL meets the following eight regulatory requirements pursuant to 40 CFR Part 130.

1. The TMDLs are designed to implement the applicable water quality standards.
2. The TMDLs include a total allowable load as well as individual wasteload allocations (WLAs) and load allocations (LAs).
3. The TMDLs consider the impacts of background pollutant contributions.
4. The TMDLs consider critical environmental conditions.
5. The TMDLs consider seasonal environmental variations.
6. The TMDLs include a MOS.
7. There is reasonable assurance that the proposed TMDLs can be met.
8. The TMDLs have been subject to public participation.

II. Summary

Table 1 presents the 1996, 1998, 2002 and 2004 Section 303(d) listing information for the water quality limited segments listed in 1996.

Table 1. Section 303(d) List of Impaired Waters in North Branch Bear Creek Watershed

303(d) Sub-List Central Allegheny River								
State Water Plan (SWP) Subbasin: 17C North Branch Bear Creek								
Year	**Miles**	**Segment ID**	**DEP Stream Code**	**Stream Name**	**Designated Use**	**Data Source**	**Source**	**EPA 305(b) Cause Code**
1996	2.0	6962	49118	North Branch Bear Creek	CWF	303(d) List	RE	Metals
1998	5.56	6962	49118	North Branch Bear Creek	CWF	SWMP	AMD	Metals
2002	3.3	20010625-1100-JJM	49118	North Branch Bear Creek	CWF	SWMP	AMD	Metals, pH
2002	11.2	20000627-1400-JJM	49118	North Branch Bear Creek	CWF	SWMP	AMD	Metals
2004	6.3	20000628-1430-JJM	49118	North Branch Bear Creek	CWF	SWMP	AMD	Metals, pH
2004	0.7	20000627-1400-JJM	49118	North Branch Bear Creek	CWF	SWMP	AMD	Metals
2004	2.6	20010625-1000-JJM	49124	Unt. North Fork Bear Creek	CWF	SWMP	AMD	Metals, pH
2004	2.44	20010627-1400-JJM	49125	Unt. North Fork Bear Creek	CWF	SWMP	AMD	pH
2004	1.0	20000627-1400-JJM	49127	Unt. North Fork Bear Creek	CWF	SWMP	AMD	pH
2004	0.73	20000627-1400-JJM	49128	Unt. North Fork Bear Creek	CWF	SWMP	AMD	pH
2004	0.5	20000627-1400-JJM	49129	Unt. North Fork Bear Creek	CWF	SWMP	AMD	pH
2004	0.4	20000627-1400-JJM	49130	Unt. North Fork Bear Creek	CWF	SWMP	AMD	pH
2004	1.8	20000627-1400-JJM	49132	Unt. North Fork Bear Creek	CWF	SWMP	AMD	pH

Year	Miles	Segment ID	DEP Stream Code	Stream Name	Designated Use	Data Source	Source	EPA 305(b) Cause Code
2004	1.1	20000627-1400-JJM	49133	Unt. North Fork Bear Creek	CWF	SWMP	AMD	pH
2004	0.5	20000627-1400-JJM	49134	Unt. North Fork Bear Creek	CWF	SWMP	AMD	pH
2004	0.5	20000627-1400-JJM	49135	Unt. North Fork Bear Creek	CWF	SWMP	AMD	pH
2004	0.4	20000627-1400-JJM	49136	Unt. North Fork Bear Creek	CWF	SWMP	AMD	pH
2004	0.7	20010625-1100-JJM	64604	Unt. North Fork Bear Creek	CWF	SWMP	AMD	Metals, pH

Resource Extraction = RE
Cold Water Fish = CWF
Surface Water Monitoring Program = SWMP
Abandoned Mine Drainage = AMD
See Attachment D, *Excerpts Justifying Changes Between the 1996, 1998, 2002, and 2004 Section 303(d) Lists*. The use designations for the stream segments in this TMDL can be found in PA Title 25 Chapter 93.

TMDLs were developed for the 1996 Section 303(d) listed North Branch Bear Creek and twelve 2004 Section 303(d) listed unnamed tributaries to North Branch Bear Creek. The TMDLs were developed using a statistical procedure to ensure that water quality criteria are met 99 percent of the time as required by Pennsylvania's water quality standards at Pennsylvania Code Title 25, Chapter 96.3(c). Section IV, Table 3 shows the TMDLs for the North Branch Bear Creek Watershed.

TMDLs are defined as the summation of the point source WLAs plus the summation of the nonpoint source LAs plus a MOS and are often shown as:

$$TMDL = \sum WLAs + \sum LAs + MOS$$

The TMDL is a written plan and analysis established to ensure that a waterbody will attain and maintain water quality standards. The TMDL is a scientifically-based strategy which considers current and foreseeable conditions, the best available data, and accounts for uncertainty with the inclusion of a MOS value. Conditions, available data, and the understanding of the natural processes can change more than anticipated by the MOS. The option is always available to refine the TMDL for resubmittal to EPA for approval.

Pennsylvania's Surface Water Assessment Program (formerly the Unassessed Waters Protocol) is PADEP's method of conducting biological assessments of Pennsylvania's waters. PADEP's goal is a statewide assessment of surface waters in Pennsylvania. After completion of the initial assessments, the long-range goal is to reassess all waters on a five-year cycle.

Therefore, while the TMDL should not be modified at the expense of achieving water quality standards expeditiously, the TMDL may be modified when warranted by additional data or other information.

III. Background

The North Branch Bear Creek Watershed is located in northeastern Butler County and encompasses approximately 17 square miles. The North Branch Bear Creek flows approximately 6.5 miles southeast from its headwaters south of Eau Claire, Pennsylvania to its confluence with Bear Creek southeast of Parker, Pennsylvania. A portion of the stream flows through Pennsylvania State Game Lands No. 95.

The North Branch Bear Creek Watershed is affected by pollution from acid mine drainage (AMD) causing high levels of metals and depressed pH in the watershed. There are limited records available to document mining prior to the 1970's, sometimes referred to as Pre-Act mining. Although the date of the earliest mining within the watershed is not known, environmental scars such as reclaimed pits, spoil piles, and post-mining discharges are evidence of a long history of mining in this watershed. The most recent mining occurred in the 1970's and 1980's with the last application for a permit to mine coal in this watershed submitted to PADEP in 1989. The sources of the AMD are seeps and discharges from areas disturbed by surface mining. Most of the discharges originate from mining on the Lower Kittanning and Clarion coal seams or refuse piles associated with them. 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 PADEP.

There are no active mining operations in the North Branch Bear Creek Watershed. All other discharges in the watershed are from abandoned mines and are treated as nonpoint sources. For purposes of these TMDLs only, point sources are identified as permitted discharge points and nonpoint sources are identified as other discharges from abandoned mine lands which can include tunnel discharges, seeps, and surface runoff. Abandoned and reclaimed mine lands are treated in the allocations as nonpoint sources because there are no National Pollutant Discharge Elimination System (NPDES) permits associated with these areas. As such, the discharges associated with these landuses were assigned LAs (as opposed to WLAs). The decision to assign LAs to abandoned and reclaimed mine lands does not reflect any determination by EPA as to whether there are unpermitted point source discharges within these landuses. In addition, by approving these TMDLs with mine drainage discharges treated as LAs, EPA is not determining that these discharges are exempt from NPDES permitting requirements.

PADEP treats each segment defined by the sampling points as a separate TMDL while EPA, for purposes of the national tracking system, identifies TMDLs for each listed Section 303(d) listed segment. The TMDLs are expressed as long-term averages. See the North Branch Bear Creek Watershed TMDL Report, Attachment C, for TMDL calculations.

The Surface Mining Control and Reclamation Act of 1977 (SMCRA, Public Law 95-87) and its subsequent revisions were enacted to establish a nationwide program to, among other things, protect the beneficial uses of land or water resources, and public health and safety from the adverse effects of current surface coal mining operations, as well as promote the reclamation of mined areas left without adequate reclamation prior to August 3, 1977. SMCRA requires a permit for the development of new, previously mined, or abandoned sites for the purpose of surface mining. Permittees are required to post a performance bond that will be sufficient to ensure the completion of reclamation requirements by the regulatory authority in the event that the applicant forfeits. Mines that ceased operating by the effective date of SMCRA (often called "pre-law" mines) are not subject to the requirements of SMCRA.

These TMDLs were completed by PADEP to meet the tenth year (2007) TMDL milestone commitment under the requirements of the 1997 TMDL lawsuit settlement agreement. Tenth year milestones include the development of TMDLs for 20 percent of the waters listed on Pennsylvania's 1996 Section 303(d) list of impaired waters by the effects of AMD (80 waters) since 2005, and the remaining waters listed as impaired by non-AMD related impacts. Delisted waters may count for 20 percent of the requirement.

Computational Procedure

The TMDLs were developed using a statistical procedure to ensure that water quality criteria are met 99 percent of the time as required by Pennsylvania's water quality standards. The North Branch Bear Creek Watershed TMDLs allocate loading to six sampling sites along the mainstem of North Branch Bear Creek (NB41, NB40, NB30, NB20, NB10, and NB05), and eleven sampling sites on unnamed tributaries to North Branch Bear Creek including UNT 49124 (NB15), UNT 49125 (NBE65, NBE66, NBE50, and NBE01), UNT 49126 (NBE10), UNT 49127 (NBE20), UNT 49128 (NBE40), UNT 49131 (NBF35A), and UNT 49132 (NBG20 and NBG01).

A critical flow was not identified, and the reductions specified in this TMDL apply at all flow conditions. Regression and correlation analyses between flow and concentration almost always produce little or no correlation and disclose no critical condition.

TMDLs for each parameter were determined using a Monte Carlo simulation, @RISK,[1] with the measured, or existing, pollutant concentration data. For each source and pollutant, it was assumed that the observed data are lognormally distributed. Each pollutant was evaluated separately using @RISK.

Using the collected sample concentration parameters, mean and standard deviation, the simulation performs 5,000 iterations and predicts an existing long-term average concentration and this analysis shows whether or not the existing data is from a population where water

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

quality standards are exceeded more than one percent of the time. A second simulation of 5,000 iterations is performed to calculate the percent reduction necessary to meet the criteria 99 percent of the time. Finally, using the calculated percent reductions, a final simulation is run to confirm that the target value for a long-term average concentration will result in meeting water quality criteria 99 percent of the time.

The existing and allowable long-term average loads were computed using the mean concentration from @RISK multiplied by the average flow. The TMDL Report points out that the loads are being computed based on average 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.

IV. Discussions of Regulatory Requirements

EPA has determined that these TMDLs are consistent with statutory and regulatory requirements and EPA policy and guidance.

1. The TMDLs are designed to implement the applicable water quality standards.

Water quality standards are state regulations that define the water quality goals of a waterbody. Standards are comprised of three components, including: (1) designated uses, (2) criteria necessary to protect those uses, and (3) antidegradation provisions that prevent the degradation of water quality. All of North Branch Bear Creek has been designated by Pennsylvania for cold water fishes with criteria to protect the aquatic life uses. The designations for these stream segments can be found at Pennsylvania Title 25 §93.9. To protect the designated uses, as well as the existing uses, the water quality criteria shown in Table 2 apply to all evaluated segments. The table includes the instream numeric criterion for each parameter and any associated specifications.

Table 2. Applicable Water Quality Criteria

Parameter	Criterion Value (mg/l)	Duration	Total Recoverable/ Dissolved
Aluminum (Al)	0.75	Maximum	Total Recoverable
Iron (Fe)	1.5 0.3	30-day Average Maximum	Total Recoverable Dissolved
Manganese (Mn)	1.0	Maximum	Total Recoverable
pH	6.0 - 9.0	Inclusive	N/A

Pennsylvania Title 25 §96.3(c) requires that water quality criteria be achieved at least 99 percent of the time, and TMDLs expressed as long-term average concentrations, are expected to meet these requirements. That is, the statistical Monte Carlo simulation used to develop TMDLs and LAs for each parameter results in a determination that any required percent

pollutant reduction assures that the water quality criteria will be met instream at least 99 percent of the time. The Monte Carlo simulation used 5,000 iterations where each iteration was independent of all other iterations, and the observed data were assumed to be lognormally distributed for each source and pollutant.

EPA finds that these TMDLs will attain and maintain the applicable narrative and numerical water quality standards.

The pH values shown in Table 2 were used as the TMDL endpoints for these TMDLs. In the case of freestone streams with little or no buffering capacity, the allowable TMDL endpoint for pH may be the natural background water quality; these values can get as low as 5.4 (Pennsylvania Fish and Boat Commission). However, PADEP chose to set the pH standard between 6.0 to 9.0, inclusive, which is presumed to be met when the net alkalinity is maintained above zero. This presumption is based on the relationship between net alkalinity and pH, on which PADEP based its methodology to addressing pH in the watershed. See the North Branch Bear Creek Watershed TMDL Report, Attachment B. A summary of the methodology is presented as follows.

The parameter of pH, a measurement of hydrogen ion acidity presented as a negative logarithm of effective hydrogen ion concentration, is not conducive to standard statistics. Additionally, pH does not measure latent acidity that can be produced from the hydrolysis of metals. PADEP is using the following approach to address the stream impairments noted on the Section 303(d) list due to pH. Because the concentration of acidity in a stream is partially dependent upon metals, it is extremely difficult to predict the exact pH values which would result from treatment of AMD. 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 able to measure the reduction of acidity. When acidity in a stream is neutralized or is restored to natural levels, pH will be acceptable ($\geq$6.0). 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 used to calculate the required 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. EPA finds this approach to pH to be reasonable.

PADEP also has an alkalinity standard. Alkalinity (of a minimum 20 mg/l calcium carbonate except where natural conditions are less) is related to but not identical with pH. Alkalinity is a measure of the buffering capacity of the water. Adequate buffering prevents large swings in pH with additions of small amounts of acid. Although many of the AMD-impacted streams are naturally low in alkalinity, available monitoring data does not always include upstream waters unimpacted by AMD. As PADEP does not list waters for inadequate alkalinity, TMDLs are not being developed for alkalinity but PADEP should monitor the waters for alkalinity and if, after these TMDLs are implemented, alkalinity is less than 20 mg/l or natural conditions, PADEP should list the waters for alkalinity and develop TMDLs.

2. The TMDLs include a total allowable load as well as individual WLAs and LAs.

For purposes of these TMDLs only, point sources are identified as permitted discharge points and nonpoint sources are identified as other discharges from abandoned mine lands which can include, but are not limited to, tunnel discharges, seeps, and surface runoff. Abandoned and reclaimed mine lands were treated in the allocations as nonpoint sources because there are no NPDES permits associated with these areas. As such, the discharges associated with these landuses were assigned LAs (as opposed to WLAs). The decision to assign LAs to abandoned and reclaimed mine lands does not reflect any determination by EPA as to whether there are unpermitted point source discharges within these landuses. In addition, by approving these TMDLs with mine drainage discharges treated as LAs, EPA is not determining that these discharges are exempt from NPDES permitting requirements. There are no permitted dischargers and no WLAs were allocated. All necessary reductions are assigned to nonpoint sources.

Table 3 presents a summary of the allowable loads for the North Branch Bear Creek Watershed. In the instance that the allowable load is equal to the existing load, the simulation determined that water quality standards are being met instream 99% of the time and no TMDL is necessary for the parameter at that point. Although no TMDL is necessary, the loading at the point is considered at the next downstream point. This is denoted as "NA" in Table 3.

Table 3. North Branch Bear Creek Watershed TMDLs

Station	Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lb/day)	WLA (lbs/day)	LA (lbs/day)	NPS Load Reduction (lbs/day)	Percent Reduction* %
NBG20	**Upstream of NBG01 and UNT 49132**						
	Al	5.1	2.2	0.0	2.2	2.9	57
	Fe	31.5	9.8	0.0	9.8	21.7	69
	Mn	11.0	4.1	0.0	4.1	6.9	63
	Acidity	206.4	35.1	0.0	35.1	171.3	83
	Alkalinity	117.2					
NBG01	**Mouth of UNT 49132 Upstream of Confluence with North Branch Bear Creek**						
	Al	47.6	3.3	0.0	3.3	41.4	93*
	Fe	130.0	9.1	0.0	9.1	99.2	92*
	Mn	19.6	3.9	0.0	3.9	8.8	69*
	Acidity	868.0	8.7	0.0	9.7	688.0	99*
	Alkalinity	32.4					
NB41	**Most Upstream Sample Point on North Branch Bear Creek**						
	Al	6.4	1.5	0.0	1.5	4.9	77
	Fe	25.3	2.5	0.0	2.5	22.8	90
	Mn	8.5	1.9	0.0	1.9	6.6	78
	Acidity	72.2	14.4	0.0	14.4	57.8	80
	Alkalinity	122.0					
NB40	**Sample Point Downstream of NB41 and NBG01 on North Branch Bear Creek**						
	Al	38.8	9.3	0.0	9.3	0.0	0*
	Fe	135.4	21.7	0.0	21.7	0.0	0*
	Mn	26.0	7.8	0.0	7.8	0.0	0*
	Acidity	632.3	50.6	0.0	50.6	0.0	0*

Station	Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lb/day)	WLA (lbs/day)	LA (lbs/day)	NPS Load Reduction (lbs/day)	Percent Reduction* %
	Alkalinity	181.9					
NB30	**Sample Point Downstream of NB40 on North Branch Bear Creek**						
	Al	88.7	12.4	0.0	12.4	46.8	79*
	Fe	281.3	33.8	0.0	33.8	133.8	80*
	Mn	72.9	14.6	0.0	14.6	40.1	73*
	Acidity	2,101.1	84.0	0.0	84.0	1,435.4	95*
	Alkalinity	185.4					
NBE65	**Headwaters of UNT 49125**						
	Al	0.8	0.6	0.0	0.6	0.2	25
	Fe	0.3	0.3	0.0	0.3	0.0	0
	Mn	2.1	1.0	0.0	1.0	1.1	52
	Acidity	21.5	2.4	0.0	2.4	19.1	89
	Alkalinity	8.5					
NBE66	**Mouth of UNT 49130 Upstream of Confluence with UNT 49125**						
	Al	0.2	0.1	0.0	0.1	0.1	50
	Fe	0.5	0.3	0.0	0.3	0.2	40
	Mn	0.5	0.4	0.0	0.4	0.1	20
	Acidity	47.1	7.1	0.0	7.1	40.0	85
	Alkalinity	13.7					
NBE50	**UNT 49125 Downstream of Sample Points NBE65 and NBE66**						
	Al	7.1	1.3	0.0	1.3	5.5	80*
	Fe	1.2	1.2	0.0	1.2	0.0	0*
	Mn	10.4	1.9	0.0	1.9	7.3	80*
	Acidity	104.6	5.2	0.0	5.2	40.3	88*
	Alkalinity	14.8					
NBE40	**Mouth of UNT 49128 Upstream of Confluence with UNT 49125**						
	Al	0.3	0.3	0.0	0.3	0.0	0
	Fe	0.7	0.7	0.0	0.7	0.0	0
	Mn	1.2	1.1	0.0	1.1	0.1	8
	Acidity	29.9	3.3	0.0	3.3	26.6	90
	Alkalinity	21.3					
NBE20	**Mouth of UNT 49127 Upstream of the Confluence with UNT 49125**						
	Al	48.1	1.9	0.0	1.9	46.2	96
	Fe	9.3	2.7	0.0	2.7	6.6	71
	Mn	53.6	1.6	0.0	1.6	52.0	97
	Acidity	507.2	0.0	0.0	0.0	507.2	100
	Alkalinity	0.0					
NBE10	**UNT 49126 Upstream of the Confluence with UNT 49125**						
	Al	5.5	1.9	0.0	1.9	3.6	66
	Fe	3.5	3.5	0.0	3.5	0.0	0
	Mn	9.2	2.6	0.0	2.6	6.6	72
	Acidity	227.3	18.2	0.0	18.2	209.1	92
	Alkalinity	134.3					
NBE01	**Mouth of UNT 49125 Upstream of Confluence with North Branch Bear Creek**						
	Al	64.5	9.7	0.0	9.7	0.0	0*
	Fe	19.3	15.6	0.0	15.6	0.0	0*
	Mn	88.5	13.3	0.0	13.3	8.0	38*

Station	Parameter	Existing Load (lbs/day)	TMDL Allowable Load (lb/day)	WLA (lbs/day)	LA (lbs/day)	NPS Load Reduction (lbs/day)	Percent Reduction* %
	Acidity	1,045.7	31.4	0.0	31.4	172.0	85*
	Alkalinity	65.2					
NBF35A	**Mouth of UNT 49131 Upstream of Confluence with North Branch Bear Creek**						
	Al	ND	NA	0.0	NA	NA	-
	Fe	1.8	1.8	0.0	1.8	0.0	0
	Mn	0.5	0.5	0.0	0.5	0.0	0
	Acidity	60.8	10.3	0.0	10.3	50.5	83
	Alkalinity	66.6					
NB20	**North Branch Bear Creek Downstream of UNT 49125**						
	Al	140.6	29.5	0.0	29.5	0.0	0*
	Fe	147.2	38.3	0.0	38.3	0.0	0*
	Mn	161.6	30.7	0.0	30.7	0.0	0*
	Acidity	2,638.4	79.2	0.0	79.2	23.9	23
	Alkalinity	162.4					
NB15	**Mouth of UNT 49124 Upstream of Confluence with North Branch Bear Creek**						
	Al	27.6	8.8	0.0	8.8	18.8	68
	Fe	102.1	15.3	0.0	15.3	86.8	85
	Mn	47.4	6.6	0.0	6.6	40.8	86
	Acidity	996.3	119.6	0.0	119.6	876.7	88
	Alkalinity	174.2					
NB10	**North Branch Bear Creek Downstream of NB15**						
	Al	109.9	19.8	0.0	19.8	5.2	21*
	Fe	72.8	29.8	0.0	29.8	0.0	0*
	Mn	135.3	21.6	0.0	21.6	2.6	11*
	Acidity	1,766.3	53.0	0.0	53.0	44.4	46*
	Alkalinity	114.0					
NB05	**Most Downstream Sample Point on North Branch Bear Creek Upstream of Confluence with the Allegheny River**						
	Al	124.1	34.8	0.0	34.8	0.0	0*
	Fe	80.7	44.4	0.0	44.4	0.0	0*
	Mn	157.2	33.0	0.0	33.0	10.5	24*
	Acidity	2,190.3	131.4	0.0	131.4	345.6	73*
	Alkalinity	459.7					

LTA = Long Term Average
WLA = point source loads
LA = total nonpoint loads entering segment, including any upstream loads
*Reductions from upstream sources have been subtracted from the reductions necessary at these points; in some cases this results in the situation where no reductions are necessary.

PADEP allocated only to nonpoint sources as there are no permitted dischargers in the watershed. Where there are active mining operations or post-mining discharge treatment in the watershed, Federal regulations require that subsequent to TMDL development and approval,

point source permitted effluent limitations be water quality-based.[2] In addition, PA Title 25, Chapter 96, Section 96.4(d) requires that WLAs shall serve as the basis for determination of permit limits for point source discharges regulated under Chapter 92 (relating to NPDES permitting, monitoring and compliance). Therefore, no new mining may be permitted within the watershed without reallocation of the TMDL.

3. The TMDLs consider the impacts of background pollutant contributions.

North Branch Bear Creek Watershed is located in an area that was extensively mined. The TMDLs were developed using instream data which account for existing background conditions.

4. The TMDLs consider critical environmental conditions.

The reductions specified in this TMDL apply at all flow conditions. A critical flow condition was not identified from the data used for this analysis. The average flow for each sampling site was used to derive loading values for the TMDL.

5. The TMDLs consider seasonal environmental variations.

All sample sets included data points from various seasons which, together with the lack of correlations between flow and concentration, indicate that PADEP considered seasonal variations to the extent that data was available.

6. The TMDLs include a MOS.

The CWA and Federal regulations require TMDLs to include a MOS to take into account any lack of knowledge concerning the relationship between effluent limitations and water quality. EPA guidance suggests two approaches to satisfy the MOS requirement. First, it can be met implicitly by using conservative model assumptions to develop the allocations. Alternately, it can be met explicitly by allocating a portion of the allowable load to the MOS.

PADEP used an implicit MOS in these TMDLs by assuming the treated instream concentration variability to be the same as the untreated stream's concentration variability. This is a more conservative assumption than the general assumption that a treated discharge has less variability than an untreated discharge. By retaining variability in the treated discharge, a lower average concentration is required to meet water quality criteria 99 percent of the time than if the variability of the treated discharge is reduced.

[2]It should be noted that technology-based permit limits may be converted to water quality-based limits according to EPA's *Technical Support Document For Water Quality-based Toxics Control*, March 1991, recommendations.

With respect to iron, PADEP identified an additional implicit MOS in the analysis and TMDL development by treating the iron water quality criterion as if the 1.50 mg/l were a maximum value instead of a thirty-day average value.

7. There is reasonable assurance that the proposed TMDLs can be met.

The *Recommendations* section highlights what can be done in the watershed to eliminate or treat pollutant sources. Aside from PADEP's primary efforts to improve water quality in the North Branch Bear Creek Watershed through reclamation of abandoned mine lands and through the NPDES permit program, additional opportunities for reasonable assurance exist. PADEP expects activities, such as research conducted by its Bureau of Abandoned Mine Reclamation, funding from EPA's §319 grant program, and Pennsylvania's Growing Greener program will also help remedy abandoned mine drainage impacts. PADEP also has in place an initiative that aims to maximize reclamation of Pennsylvania's abandoned mineral extraction lands. Through Reclaim PA, Pennsylvania's goal is to accomplish complete reclamation of abandoned mine lands and plugging of orphaned wells. Pennsylvania strives to achieve this objective through legislative and policy land management efforts, and activities described in the TMDL report.

The Bear Creek Watershed Association (BCWA) was formed in 2002 in part by a Growing Greener Grant received by Butler County Conservation District. The goal of the BCWA is to restore and maintain the water quality of the Bear Creek Watershed. The BCWA holds meetings at 7:00 p.m. on the fourth Monday of each month at the Fairview Township Building in the town of Petrolia, Butler County, Pennsylvania.

Hedin Environmental completed the Acid Mine Drainage Restoration Plan for the North Branch Bear Creek on May 24, 2004, for the BCWA and the Butler County Conservation District (BCCD), funded by the PA DEP Growing Greener program. As part of the plan, an assessment of the North Branch Bear Creek Watershed was conducted which established 53 monitoring points consisting of dischargers and stream locations that were sampled monthly for one year. Recommendations and cost estimates were provided for 29 AMD discharges identified in the assessment. Seven of the dischargers were identified as high priority projects since they are the largest contributors of AMD in the watershed. BCWA is currently evaluating potential treatment and abatement options.

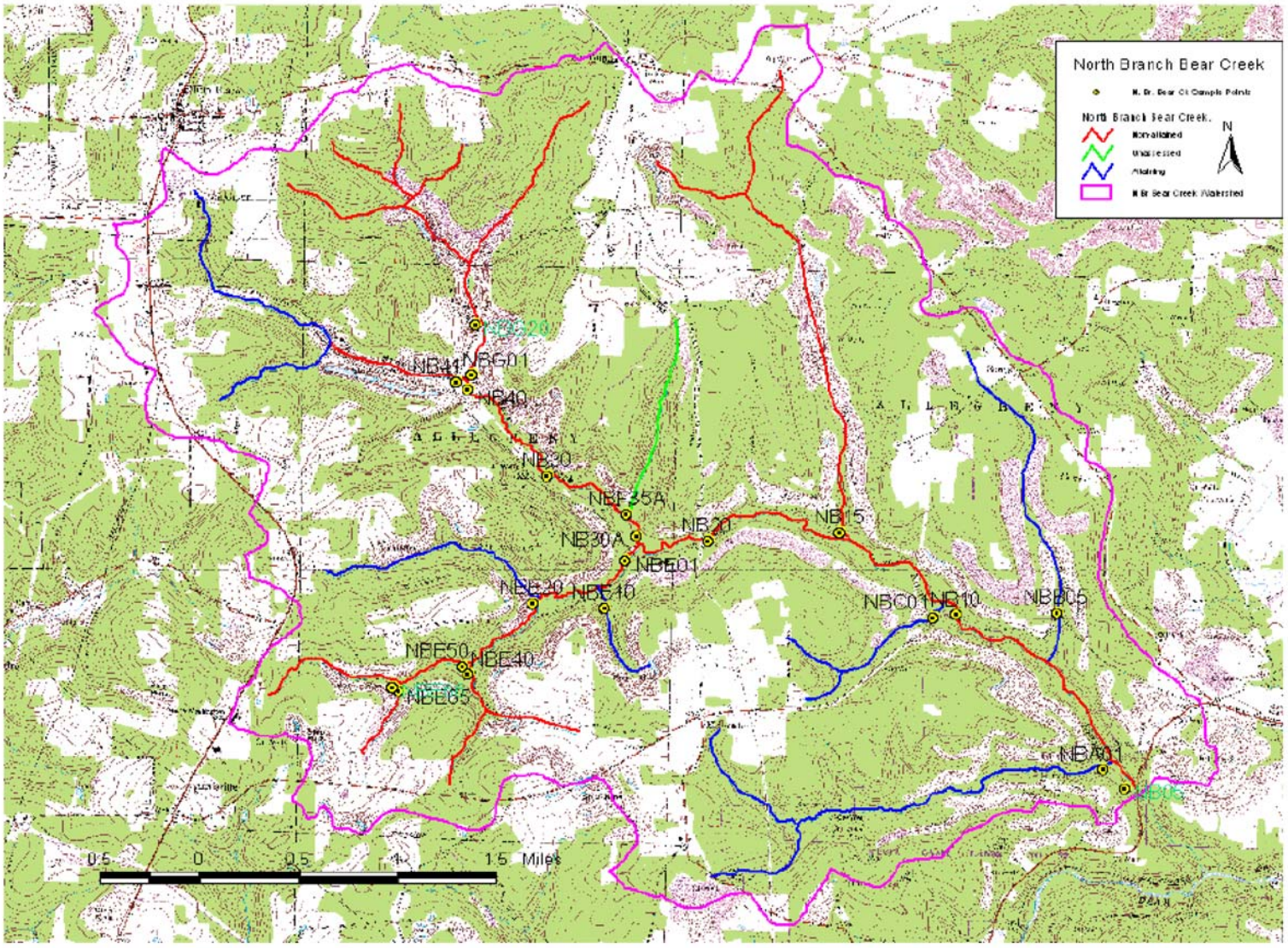
8. The TMDLs have been subject to public participation.

Public notice of the draft TMDL was published in the *Pennsylvania Bulletin* on September 28, 2006, and the *Butler Eagle* on September 28, 2006, to foster public comment on the allowable loads calculated. A public meeting was held on October 11, 2006 at the USDA Service Center Building in Butler, Pennsylvania, to discuss the proposed TMDL. The public comment period ended November 29, 2006. Pennsylvania did not receive any comments on these TMDLs.

Although not specifically stated in the TMDL Report, PADEP routinely posts the approved TMDL report on their web site: www.dep.state.pa.us/watermanagement_apps/tmdl/.

Attachment A

North Branch Bear Creek Watershed Maps


North Branch Bear Creek
N. Br. Bear Ck Sample Points
North Branch Bear Creek
Non-Attained
Unassessed
Attaining
N Br Bear Creek Watershed
N
NB41
NBG01
NB40
NB30
NBE35A
NB20
NB15
NB30A
NBE01
NBE20
NBE10
NBC01
NB10
NBE05
NBE50
NBE40
NBE65
NBA01
0.5 0 0.5 1 1.5 Miles