UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
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Decision Rationale
Total Maximum Daily Loads
Anderson Creek Watershed
For Acid Mine Drainage Affected Segments
Clearfield County, Pennsylvania

Signed

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Water Protection Division

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Date: ___________________

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I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) 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, 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 final *Anderson Creek Watershed TMDL*, dated March 1, 2003, (TMDL Report) to EPA for final Agency review on November 3, 2004. This report included TMDLs for three metals (aluminum, iron, and manganese) and pH, in addition to nutrients (phosphorus) and sediment. Note that this approval and rationale only addresses the mining-related impairments, metals and pH, and that the non-mining TMDLs will be addressed in a separate decision rationale document. The TMDL Report addresses three segments on Pennsylvania's 1996 Section 303(d) list of impaired waters, Anderson Creek, Krazter Run, and Little Anderson Creek, as well as other waters first identified on subsequent Section 303(d) lists.

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 Margin Of Safety (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 proposed 2004 Section 303(d) listing information for the water quality limited segments listed in 1996 and later. Note that Table 1 of the TMDL Report differs from the table below due to factors related to the timing of this TMDL approval. During the time between EPA's receipt of PADEP's final TMDL submittal and EPA's approval of the mining related TMDLs for the Anderson Creek Watershed, EPA received Pennsylvania's proposed 2004 Integrated Report, which contains listing changes for segments addressed within the Anderson Creek Watershed additional to those described in Attachment B of the TMDL Report. Table 1 below incorporates the most recent mining-related listing information to date.

Table 1. 303(d) Sub-List

State Water Plan (SWP) Subbasin 08-B: Upper West Branch Susquehanna River Basin							
Year	***Miles***	***Segment ID***	***DEP Stream Code***	***Stream Name***	***Data Source***	***Source***	***EPA 305(b) Cause Code***
1996	10.3	Part C of List	26657	Anderson Creek	305(b) Report	Resource Extraction	Metals
1998	10.3	Part C of List	26657	Anderson Creek	305(b) Report	Resource Extraction	Metals
2002	18	981029-1035-JLR	26657	Anderson Creek	SWAP	AMD	Metals, pH
2004	10.3	981029-1035-JLR	26657	Anderson Creek	SWAP	AMD	Metals, pH
2004	2.12	981029-1037-JLR	26658	UNT Anderson Creek	SWAP	AMD	Metals, pH
2004	1.28	981029-1037-JLR	26680	UNT Anderson Creek	SWAP	AMD	Metals, pH
2004	0.8	981029-1037-JLR	26681	UNT Anderson Creek	SWAP	AMD	Metals, pH
2004	0.86	981029-1037-JLR	26682	UNT Anderson Creek	SWAP	AMD	Metals, pH
2002	1.08	990506-0950-JLR	26660	Bilger Run	SWAP	AMD	Metals, pH
2004	1.08	990506-0951-JLR	26660	Bilger Run	SWAP	AMD	Metals, pH

Year	*Miles*	*Segment ID*	*DEP Stream Code*	*Stream Name*	*Data Source*	*Source*	*EPA 305(b) Cause Code*
1996	5.1	7193	26659	Kratzer Run	305(b) Report	Resource Extraction	Metals
1998	3.51	7193	26659	Kratzer Run	SWMP	AMD	Metals
2002	11.5	990506-0950-JLR	26659	Kratzer Run	SWAP	AMD	Metals, pH
2004	3.5	990506-0950-JLR	26659	Kratzer Run	SWAP	AMD	Metals, pH
2004	6.36	990506-0951-JLR	26659	Kratzer Run	SWAP	AMD	Metals, pH
2004	1.14	990506-0952-JLR	26665	UNT Kratzer Run	SWAP	AMD	Metals, pH
2004	1.02	990506-0952-JLR	26670	UNT Kratzer Run	SWAP	AMD	Metals, pH
2004	1.33	990506-0952-JLR	26671	UNT Kratzer Run	SWAP	AMD	Metals, pH
2004	0.61	990506-0952-JLR	26672	UNT Kratzer Run	SWAP	AMD	Metals, pH
1996	5.7	7195	26687	Little Anderson Creek	305(b) Report	Resource Extraction	Metals
1998	5.87	7195	26687	Little Anderson Creek	SWMP	AMD	Metals
2002	15.5	990505-0855-JLR	26687	Little Anderson Creek	SWAP	AMD	Metals, pH
2004	5.86	990505-0855-JLR	26687	Little Anderson Creek	SWAP	AMD	Metals, pH
2004 (2002 date)	1.6	990505-0856-JLR	26687	Little Anderson Creek	SWAP	AMD	Metals, pH
2004	0.59	990505-0857-JLR	26688	UNT Little Anderson Creek	SWAP	AMD	Metals, pH
2004	0.37	990505-0857-JLR	26691	Little Anderson Creek	SWAP	AMD	Metals, pH

Year	*Miles*	*Segment ID*	*DEP Stream Code*	*Stream Name*	*Data Source*	*Source*	*EPA 305(b) Cause Code*
2004	0.73	990505-0857-JLR	26692	UNT Little Anderson Creek	SWAP	AMD	Metals, pH
2004	0.67	990505-0857-JLR	26693	Little Anderson Creek	SWAP	AMD	Metals, pH
2004	1.18	990505-0857-JLR	26694	Little Anderson Creek	SWAP	AMD	Metals, pH
2004	1.19	990505-0857-JLR	26695	UNT Little Anderson Creek	SWAP	AMD	Metals, pH
2002	15.5	990505-0855-JLR	26689	Rock Run	SWAP	AMD	Metals, pH
2004	3.67	990505-0856-JLR	26689	Rock Run	SWAP	AMD	Metals, pH
2004	0.57	990505-0857-JLR	26690	UNT Rock Run	SWAP	AMD	Metals, pH
2004	2.23	20030827-1200-JCO	26661	Fenton Run	SWAP	AMD	pH
2004	1.85	20030827-1200-JCO	26664	Hughey Run	SWAP	AMD	pH

AMD = Abandoned Mine Drainage
SWMP = Surface Water Monitoring Program
SWAP = Surface Water Assessment Program

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).

TMDLs are a defined as the summation of the point source WLAs plus the summation of the non-point 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), PADEP's method of conducting biological assessments of Pennsylvania's waters, was developed in 1996 and implementation began in 1997. 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 Anderson Creek Watershed, approximately 78 square miles in area, is located in Clearfield County, Pennsylvania. Anderson Creek flows from its headwaters to its confluence with the West Branch of the Susquehanna River. Major tributaries of Anderson Creek include Kratzer Run and Little Anderson Creek, and smaller tributaries include, among others, Bilger Run, Hughey Run, Fenton Run, and Rock Run. The watershed is primarily forested (83.9 percent), with remaining areas comprised of the following land uses: agriculture (11.7 percent), developed lands (1.3 percent), surface coal and clay mines (2.6 percent), and water-bodies and wetlands.

The Anderson Creek Watershed is affected by pollution from Acid Mine Drainage (AMD), on-site wastewater, and grazing-related agriculture. AMD has caused high levels of metals and low pH in the mainstem of Anderson Creek below Little Anderson Creek. Little Anderson Creek and its tributary, Rock Run, have major impacts on Anderson Creek. Little Anderson Creek's flow is substantial and is a major contributor to the main stem's reduced quality. The mainstem of Anderson Creek is also adversely affected by mine discharges after its confluence with Little Anderson Creek, as well as Kratzer Run. Strip mining is prevalent along Hughey Run, Fenton Run, and Bilger Run, which are tributaries to Kratzer Run.

Bituminous coal has historically been the most economically important geologic resource in Clearfield County. The extraction of coal and clay from seams in Clearfield County has been primarily by surface mining, although several of the older mining permits were for deep mining in the Mercer Clay seam. Strip and drift mining of coal seams that are horizontal in orientation characterize the bituminous coal region; this often resulted in fairly level underground tunnels running for miles as coal was mined along a particular seam. After the mine workings had been abandoned, the tunnels often collapsed, filling up with water, and some discharged to the surface. Many of these discharges are very large and are responsible for much of the water quality impairments in the watershed. The TMDL Report indicates that 14 of the 60+ discharges have historically accounted for over 80 percent of the AMD loadings.

Anderson Creek Watershed has been the subject of numerous grant applications and studies over the past 15 years. Various federal and state agencies, conservation districts, municipalities, and watershed associations have completed reclamation and/or assessment projects within the watershed (see TMDL Report). Several active watershed and conservation agencies are active within the Anderson Creek Watershed, and some of their most recent projects are described in the TMDL Report.

There are four active mining operations in the watershed, and they are identified in Attachment C of the TMDL Report along with other mining permits for operations either completed or in the bond release stage. However, none of the active operations produce a discharge. Some are also remining operations that are not contributing to point source pollution because they have not created any new discharges and have not caused pre-existing discharges to worsen (See Attachment D of the TMDL Report). As such, all of the discharges in the watershed are from abandoned mines and were 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 were 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. There are three NPDES permitted dischargers in the watershed, although no active discharge has occurred to date. These permits are not expected to produce a discharge either, and so the allocations are to nonpoint sources. PADEP treats each segment on the Section 303(d) list as a separate TMDL while EPA, for purposes of EPA's national tracking system, sums the loads for a watershed TMDL. The TMDLs are expressed as long-term averages (see the *Anderson Creek Watershed TMDL* Report, Attachment G, 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 sixth year (2003) TMDL milestone commitment under the requirements of the 1997 TMDL lawsuit settlement agreement. At that time, EPA received more than the required number of AMD TMDLs needed. Therefore, the additional TMDLs, including the Anderson Creek Watershed TMDL, were carried over to fulfill the eighth year (2005) TMDL milestone commitment under the above-mentioned Consent Decree. Eighth 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 Acid Mine Drainage (81 waters) since 2003, and 20 percent of waters listed impaired by non-AMD related impacts (34 waters) since 2003. 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 Anderson Creek TMDL assigns load allocations to six tributaries, ten AMD discharges, and one sampling point along the main stem of Anderson Creek. A great amount of data for each of the sampling points was available to support development of the TMDL. A majority of this data was collected by various coal companies, the Clearfield County Conservation District, and for the Scarlift Report, and some monitoring results date as far back as the early 1970's.

Flow measurements used for each loading point were taken from several different studies, and these data were combined if the sampling points from different studies were closely located together. This allowed for more flow data points to be included in the data set, adding more natural variation. Data for points KR1, KR2, and A2 did not include measurements of flow where they were taken. And, although an average flow was available at points BR2, LA3, RR3, LA2, and A1, the values were not used because the flow data that were available underestimated that actual mean flow at these points. Therefore, flow determinations were made at these points using the ArcView Version Generalized Watershed Loading Function (AVGWLF) model. A critical flow could not be 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 5000 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 quality standards are exceeded more than one percent of the time. A second simulation of 5000 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

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

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 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.

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. The stream segments evaluated in the Anderson Creek Watershed, with the exception of the mainstem of Anderson Creek from the DuBois Dam to Bear Run and Bear Run from its source to the Pike Township Municipal Authority dam, have been designated by Pennsylvania as Cold Water Fishes with criteria to protect the aquatic life uses. Anderson Creek from the DuBois Dam to Bear Run and portions of Bear Run have been designated by Pennsylvania as High Quality Cold Water Fishes. The designations for these stream segments can be found at Pennsylvania Title 25 § 93.9(i). 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 in-stream at least 99 percent of the time. The Monte Carlo simulation used 5000 iterations where each iteration was independent of all other iterations, and the observed data were assumed to be log-normally distributed for each source and pollutant.

EPA finds that these TMDLs will attain and maintain the applicable narrative and numerical water quality standards. For iron, the TMDL endpoint was expressed as total recoverable iron because all monitoring data was expressed as total recoverable iron.

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 *Anderson Creek Watershed TMDL* report, Attachment E). 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 in-stream 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.*

There are four active mining operations in the watershed, but none of the operations produce a discharge. Some are also re-mining operations that are not contributing to point source pollution because they have not created any new discharges and have not caused pre-existing discharges to worsen. None of the mining operations produce a discharge, and so the allocations are to non-point sources only. For purposes of these TMDLs only, point sources are identified as permitted discharge points and non-point 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 non-point sources because there are no NPDES permits associated with these areas. As such, the discharges associated with these land-uses 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 land-uses. 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.

The LA for each sampling point was computed using water-quality data collected from that point. The sampling points are shown on the map in Attachment A.

Once PADEP determined the allowable concentration and load for each pollutant, a mass-balance accounting was performed starting at the top of the watershed and working down in sequence. This mass-balance or load tracking is explained below. Load tracking through the watershed utilizes the change in measured loads from sample location to sample location as a guide for expected changes in the allowable loads.

PADEP used two basic rules for the load tracking between two ends of a stream segment; (1) if the measured upstream loads are less than the downstream loads, it is indicative that there is an increase in load between the points being evaluated and no in-stream processes are assumed, (2) 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 in-stream load between the points, and the ratio of the decrease shall be applied to the allowable load being tracked from the upstream point.

Tracking loads through the watershed provides a picture of how the pollutants are affecting the watershed, based on the available information. The analysis is done to insure that water quality standards will be met at all points in the stream. EPA finds this approach reasonable.

Table 3 presents a summary of the allowable loads for the Anderson Creek Watershed. Note the reductions identified for some of the sampling points are the reduction necessary after upstream reductions have been made. Note that sufficient data were not available for manganese and aluminum for some of the sampling points. In these cases, PADEP assumes that the best management practices (BMPs) used to reduce iron loads in these reaches should also reduce the amount of manganese and aluminum to acceptable levels.

For Table 3, PADEP defined LA to be the sum of the loads entering the stream segment including loads from the upstream segment. Because there are no point sources requiring WLAs, the allowable load equals the LA.

Table 3. Summary Table for Anderson Creek Watershed

Station	Parameter	Measured Sample Data		Allowable		Reduction Identified* %
		Conc. (mg/l)	Load (lbs/day)	LTA Conc. (mg/l)	Load (lbs/day)	
LA1 Little Anderson Creek headwaters	Fe	3.73		0.15		96
	Mn	5.09		0.15		97
	Al	0.25		0.21		16
	Acidity	24.91		1.49		94
	Alkalinity	10.87				
UNT LA1 UNT Little Anderson Creek headwaters	Fe	2.02		0.36		82
	Mn	3.54		0.18		95
	Al	0.11		0.11		0
	Acidity	0.43		0.44		0
	Alkalinity	27.52				

Station	Parameter	Measured Sample Data		Allowable		Reduction Identified* %
		Conc. (mg/l)	Load (lbs/day)	LTA Conc. (mg/l)	Load (lbs/day)	
LA2 Little Anderson Ck at confluence with UNT	Fe	0.52		0.34		0*
	Mn	3.56		0.25		91*
	Al	0.32		0.21		34*
	Acidity	2.66		1.38		0*
	Alkalinity	12.61				
UNT LA2 UNT Little Anderson Creek mouth	Fe	0.63		0.25		60
	Mn	2.27		0.16		93
	Al	1.48		0.07		95
	Acidity	10.44		1.35		87
	Alkalinity	11.93				
OSL 352 Spencer Mine 352 discharge	Fe	78.80		0.63		99.2
	Mn	No data available				
	Al	No data available				
	Acidity	860.00		0		100
	Alkalinity	0				
OSL 329 Korb Mine discharge	Fe	143.02		0.57		99.6
	Mn	No data available				
	Al	No data available				
	Acidity	760.00		0		100
	Alkalinity	0				
OSL 330 Spencer Mine 330 discharge	Fe	1.82		0.42		77
	Mn	No data available				
	Al	No data available				
	Acidity	201.40		0		100
	Alkalinity	0	0			
OSL 301 Draucker discharge	Fe	153.13		0.61		99.6
	Mn	19.79				
	Al	46.67				
	Acidity	929.33		0		100
	Alkalinity	0.47				
OSL 303 Wingert discharge	Fe	20.66		0.41		98
	Mn	8.00				
	Al	7.48				
	Acidity	232.62		0		100
	Alkalinity	0				

Station	Parameter	Measured Sample Data		Allowable		Reduction Identified* %
		Conc. (mg/l)	Load (lbs/day)	LTA Conc. (mg/l)	Load (lbs/day)	
OSL 305 Little Anderson seeps discharge	Fe	49.11		0.44		99.1
	Mn	No data available				
	Al	No data available				
	Acidity	479.17		0		100
	Alkalinity	0				
RR1 Rock Run headwaters	Fe	2.17		0.54		75
	Mn	18.86		0.38		98
	Al	2.70		0.32		88
	Acidity	82.54		0.25		99.7
	Alkalinity	0.69				
RR2 Rock Run	Fe	1.62		0.31		47*
	Mn	17.49		0.17		97*
	Al	2.76		0.28		78*
	Acidity	62.88		3.77		65*
	Alkalinity	14.35				
UNT RR UNT Rock Run	Fe	0.62		0.30		52
	Mn	22.03		0.20		99.1
	Al	0.80				
	Acidity	59.38		1.19		98
	Alkalinity	5.99				
RR3 Rock Run after confluence with UNT Rock Run	Fe	2.61		0.31		83*
	Mn	20.20		0.20		97*
	Al	0.92		0.19		0*
	Acidity	76.85		4.61		82*
	Alkalinity	17.88				
LA3 Little Anderson below confluence with Rock Run	Fe	5.06		0.56		0*
	Mn	4.74		0.52		0*
	Al	5.47		0.38		92*
	Acidity	78.00		0		0*
	Alkalinity	0				
OSL 350 Korb discharge	Fe	111.02		0.44		99.6
	Mn	0.91				
	Al	13.00				
	Acidity	872.92		0		100
	Alkalinity	0				

Station	Parameter	Measured Sample Data		Allowable		Reduction Identified* %
		Conc. (mg/l)	Load (lbs/day)	LTA Conc. (mg/l)	Load (lbs/day)	
OSL 351 Korb discharge	Fe	45.93		0.41		99.1
	Mn	0.10				
	Al	0.20				
	Acidity	604.15		0		100
	Alkalinity	4.00				
HR1 Hughey Run	Fe	0.62		0.25		59
	Mn	0.19		0.19		0
	Al	0.21		0.21		0
	Acidity	8.31		1.16		86
	Alkalinity	9.58				
OSL 221-214 Stronach discharge	Fe	7.40		0.07		99
	Mn	No data available				
	Al	No data available				
	Acidity	271.54		0		100
	Alkalinity	0				
BR1 Bilger Run	Fe	1.66		0.20		58*
	Mn	6.01		0.24		96*
	Al	2.44		0.15		94*
	Acidity	43.05		0.86		0*
	Alkalinity	4.76				
BR2 Bilger Run below confluence with Hughey Run	Fe	0.87		0.40		0*
	Mn	6.51		0.31		92*
	Al	1.73		0.12		83*
	Acidity	45.59		0.91		85*
	Alkalinity	4.54				
FR1 Fenton Run	Fe	0.51		0.19		63
	Mn	1.92		0.13		93
	Al	1.56				
	Acidity	5.50		3.24		41
	Alkalinity	22.72				
KR1 Kratzer Run headwaters	Fe	0.58		0.58		0
	Mn	0.13		0.13		0
	Al	0.25		0.25		0
	Acidity	0.50		0.51		0
	Alkalinity	53.00				
KR2 Kratzer Run	Fe	0.83				
	Mn	0.87				

Station	Parameter	Measured Sample Data		Allowable		Reduction Identified* %
		Conc. (mg/l)	Load (lbs/day)	LTA Conc. (mg/l)	Load (lbs/day)	
	Al	0.38				
	Acidity	1.53				
	Alkalinity	22.13				
OSL 220 Widemire discharge	Fe	10.17		0.51		95
	Mn	No data available				
	Al	No data available				
	Acidity	86.83		0		100
	Alkalinity	0				
A2 Anderson Creek mouth	Fe	0.28		0.28		0*
	Mn	0.92				0*
	Al	0.79				0*
	Acidity	12.58		8.55		0*
	Alkalinity	1.63 (17.85)9				

LTA = Long Term Average
ND = not detected
LA = total loads entering segment, including any upstream loads
*Reduction required after upstream reductions are made
**Only one sample result was greater than the detection level
9= Alkalinity Value used as water quality standard

PADEP assigned allocations to non-point sources only as there are current mining operations with a discharge within the watershed. EPA interprets the absence of a WLA for any of the mining operations as meaning a zero discharge for the parameters in Table 3. 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.

The Hawk Mining District Office foresees new coal mining permits in the Kratzer Run Subwatershed within the next few years, and the TMDL Report indicates that these permits will be limited to the upper coal seams, which are alkaline in nature. Also mentioned is the

[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.

possibility of several new noncoal mining permits in the Little Anderson Subwatershed. Should any of these new permitted mines produce a discharge, the TMDL for Anderson Creek will have to be reevaluated.

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

All of the soils in the Anderson Creek Watershed are formed from acidic bedrock, which results in strongly acidic soils with little buffering capacity. The 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 could not be 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.

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 Anderson 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.

There have been several reports published since 1974 with recommendations for treating AMD in the Anderson Creek Watershed. The earliest of these reports, the Operations Scarlift Report, credited approximately 72 percent of the acid load to six major discharges listed in the TMDL Report. Reclamation of any one or a combination of these discharges would have a major impact on the water quality in Anderson Creek. The TMDL Report also describes sites prioritized for reclamation efforts in the Scarlift Report and what the recommendations for those sites entail. The sites prioritized in the Scarlift Report concur with the TMDL points for old mine discharges. The Headwaters Resource Conservation and Development Council with the Clearfield County Conservation District completed the Anderson Creek Preliminary Assessment in October 1999, and this report listed the discharges mentioned in the TMDL Report as priorities for reclamation and identified additional discharge sites to the list for reclamation.

There are several active watershed and conservation agencies in the Anderson Creek Watershed including the Anderson Creek Watershed Association, City of DuBois Watershed Commission, and the Clearfield County Conservation District. There also is a large amount of interest shown by the various municipalities and concerned citizens to start reclaiming the AMD discharges. The Anderson Creek Watershed Association has been active in the watershed since 1998. The Watershed Association, along with an Ameri-Corps member of the Clearfield County Conservation District, have been taking water quality samples from the major discharges in the watershed. The collections should continue so that current, seasonal data will be available for treatment system designs. The Anderson Creek Technical Committee was formed in 1999 to prepare a draft watershed restoration plan for Anderson Creek. The committee proposed a Geographic Information System (GIS) Watershed Modeling System to help identify, evaluate, and recommend treatment facilities or BMPs for point and non-point pollution in the watershed. The Clearfield County Conservation District and the Anderson Creek Watershed Association were said to have submitted a Growing Greener Grant application in February 2002 to finish the watershed restoration plan.

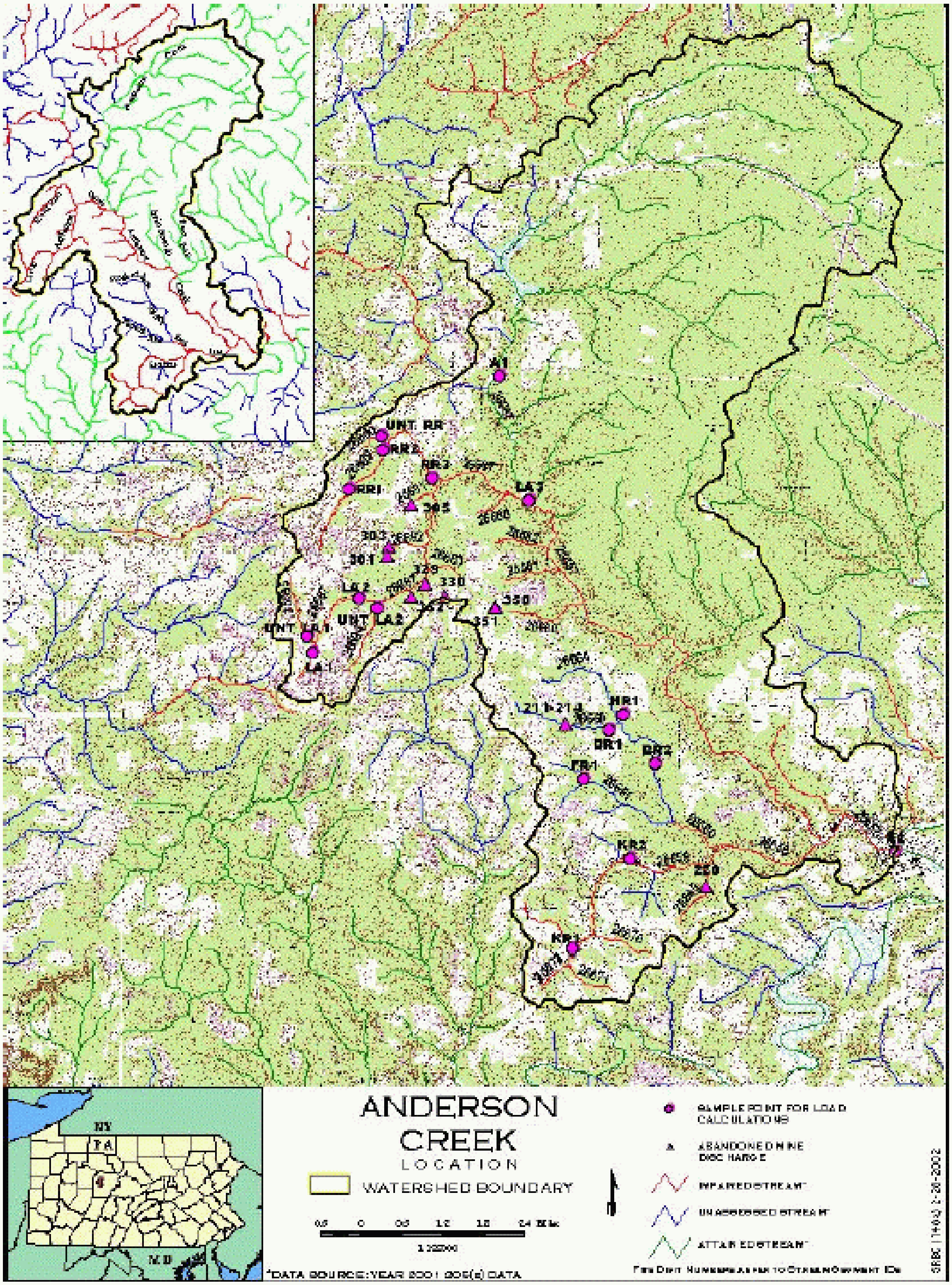
8. The TMDLs have been subject to public participation.

PADEP public noticed the draft TMDLs in the *Pennsylvania Bulletin* on December 14, 2002, and in *The Progress* on January 6, 2003. A public meeting was held on January 9, 2003, at the Anderson Creek Watershed Organization's meeting in the Pike Township Municipal Building to discuss the proposed 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

Anderson Creek Watershed Map



ANDERSON
CREEK
LOCATION
WATERSHED BOUNDARY
SAMPLE POINT FOR LOAD CALCULATIONS
ABANDONED MINE DISCHARGE
IMPAIRED STREAM*
UNASSESSED STREAM*
ATTAINED STREAM*
*DATA SOURCE: YEAR 2001 305(b) DATA
NY
PA
MD
A1
UNT RR
RR2
RR3
RR1
LA7
LA2
UNT LA2
UNT LA1
LA1
HR1
DR1
DR2
FR1
KR2
KR1