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

Decision Rationale
Total Maximum Daily Loads
Sandy Creek Watershed
Clearfield County, Pennsylvania
For Acid Mine Drainage Affected Segments

Signed

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Jon M. Capacasa, Director
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) 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 *Sandy Creek Watershed TMDL*, dated March 15, 2007(TMDL Report), electronically to the U.S. Environmental Protection Agency (EPA) for final Agency review on March 15, 2007. This report includes TMDLs for three metals (aluminum, iron, and manganese), and pH, and addresses one segment on Pennsylvania's 1996 Section 303(d) list and six segments on the 2004 Section 303(d) list[1].

Pennsylvania's 1996 Section 303(d) list also included "other inorganics" (i.e., sulfates) as a cause of impairment for this waterbody. However, PADEP has since requested the delisting of 1996 "other inorganics" impairment as part of Pennsylvania's 2006 Integrated Report submittal, since the original 1996 listings were based on a presumed sulfate impairment. The 2006 Integrated Report will be addressed in a separate document. As PADEP continues to reassess its waters and finds that an "other inorganics" (sulfates) impairment does actually exist, these waters must return to the Section 303(d) list and would then require a TMDL.

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.

[1]Pennsylvania's 1996, 1998,2002, and 2004 Section 303(d) lists were approved by the Environmental Protection Agency (EPA). Approval of the 2006 Pennsylvania Integrated Water Quality Monitoring and Assessment Report is pending. 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.*

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 impaired segment first listed in 1996.

Table 1. 303(d) Sublist for the Sandy Creek Watershed, Clearfield County, Pennsylvania

Table 1. 303(d) Sub-List								
State Water Plan (SWP) Subbasin: 08C Susquehanna River								
Year	**Miles**	**Segment ID Assessment ID**	**DEP Stream Code**	**Stream Name**	**Designated Use**	**Data Source**	**Source**	**EPA 305(b) Cause Code**
1996	4.2	7161	25948	Sandy Creek	CWF	305(b) Report	RE	Metals, Other Inorganics
1998	4.27	7161	25948	Sandy Creek	CWF	SWAP	AMD	Metals Other Inorganics
2002	4.1	990819-1400-LMS	25948	Sandy Creek	CWF	Unassessed Waters	AMD	Metals Other Inorganics, pH
2004	4.1	990819-1400-LMS	25948	Sandy Creek	CWF	Unassessed Waters	AMD	Metals Other Inorganics, pH
2004	0.7	990819-1400-LMS	25949	UNT Sandy Creek	CWF	Unassessed Waters	AMD	Metals Other Inorganics, pH
2004	0.6	990819-1400-LMS	25950	UNT Sandy Creek	CWF	Unassessed Waters	AMD	Metals Other Inorganics, pH
2004	0.7	990819-1400-LMS	25951	UNT Sandy Creek	CWF	Unassessed Waters	AMD	Metals Other Inorganics, pH
2004	0.6	20030929-1833-JCO	25952	UNT Sandy Creek	CWF	Unassessed Waters	AMD	pH, Metals

Year	Miles	Segment ID Assessment ID	DEP Stream Code	Stream Name	Designated Use	Data Source	Source	EPA 305(b) Cause Code
2004	0.7	990819-1400-LMS	25955	UNT Sandy Creek	CWF	Unassessed Waters	AMD	Metals, Other Inorganics, pH
2004	0.8	990819-1400-LMS	25956	UNT Sandy Creek	CWF	Unassessed Waters	AMD	Metals, Other Inorganics, pH

Resource Extraction = RE
Cold Water Fishery = CWF
Surface Water Monitoring Program = SWMP
Abandoned Mine Drainage = AMD
The TMDL Report included proposed 2006 listing not included on this table.

See Attachment D of the TMDL Report, *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 93.9. Section IV, Table 3, shows the TMDLs for the Sandy Creek Watershed.

In 1997, PADEP began utilizing the Statewide Surface Waters Assessment Protocol to assess Pennsylvania's waters. This protocol is a modification of EPA's 1989 Rapid Bioassessment Protocol II and provides for a more consistent approach to conducting biological assessments than previously used methods. The biological assessments are used to determine which waters are impaired and should be included on the State's Section 303(d) list.

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 96.3c. Table 3 of the TMDL Report lists the TMDLs for the Sandy Creek Watershed, addressing metals and pH in the stream segments listed in Table 1 above.

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.

III. Background

The Sandy Creek Watershed area is approximately 17.3 square miles with the town of Frenchville, PA located in the central, western side of the watershed. Sandy Creek flows about ten miles south from its headwaters in Girard Township, Clearfield County to its confluence with the West Branch Susquehanna River in Covington Township, Clearfield County. The headwaters of Sandy Creek are located in a forested area upstream of coal areas.

Sandy Creek Watershed is dominated primarily by forested land, constituting 75.2 percent of the area. The northern half of the watershed is almost totally forested with the headwaters of Sandy Creek beginning in Moshannon State Forest. Agriculture comprises 14.1 percent of the land use and is located along the western edge and middle section of the watershed. Disturbed land (abandoned coal mines, quarries, etc.) comprises over ten percent of the watershed. The majority of the mining that was done in the watershed is located below State Route 879 towards the eastern side of the Sandy Creek Watershed.

The Sandy Creek Watershed is affected by pollution from AMD. This pollution has caused high levels of metals and low pH in the mainstem of Sandy Creek and several of its tributaries. About four miles of the mainstem of Sandy Creek are impaired, beginning at river mile 4.06 and continuing downstream to its confluence with the West Branch Susquehanna River. There are eight unnamed tributaries to Sandy Creek that are impaired by AMD.

Historical data shows that mining began in this area in the early nineteenth century and continued until the 1980s. The majority of mining done in the area was strip mining. Currently, there is no mining activity in the watershed. The last two mining companies in the watershed were Al Hamilton Contacting Co. and K & J Coal Co. Al Hamilton Contracting Co. (SMP# 17793169) released its final bond on October 6, 1997. The area has been reclaimed to meet standards. Another bond for Al Hamilton Contracting Co. (SMP# 4577SM8) was forfeited on September 30, 2003. Al Hamilton Contacting Co. has declared bankruptcy and no longer exists. Discharges from this permit have alternated between being treated and not treated. Currently, the discharges to Sandy Creek are being treated under a federal order.

K & J Coal Co., SMP# 4571BSM15, began mining in the watershed in the 1970s. It was recommended the bond be forfeited when the discharge was not meeting standards. The mined area had been reclaimed to meet standards. The bond was forfeited on February 2, 2003. Treatment on the discharge after the bond forfeiture was discontinued because of low flow, with larger discharges being located in the surrounding area (Mital, 2004). When SMP# 4571BSM15 was issued, very little bond was posted, leaving minimal bond to treat the discharge.

In 1931, the Pennsylvania Fish and Boat Commission (PFBC) (Sorenson, 1931) approved Sandy Creek to be stocked with brook trout in the lower five miles. At that time brook and brown trout, along with minnows were present in the creek (Sorenson, 1931). In 1975, the PFBC reassessed Sandy Creek and removed 1.5 miles from the approved stocking length. The creek was no longer stocked below Frenchville because of acidic water conditions from natural

causes and mine discharges (Hollender and Marcinko, 1975). On December 15, 1980, the remaining portion of Sandy Creek was removed from the trout stocking list because of low fertility and pH (Hollender and others, 1980). Sandy Creek contributed 4,200 pounds of acid per day to the West Branch Susquehanna, according to historical reports (Rhodes and Davis, 1968).

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 are 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 in the watershed, therefore, the allocations are to nonpoint sources. PADEP treats each segment on the Section 303(d) list as a separate TMDL. The TMDLs are expressed as long-term averages. See the *Sandy Creek Watershed TMDL* Report, Attachment D, for TMDL calculations.

The Surface Mining Control and Reclamation Act of 1977 (SMCRA, Public Law 95-87) and its subsequent revisions were enacted to established 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 40 percent of the waters listed on Pennsylvania's 1996 Section 303(d) list of impaired waters by the effects of acid mine drainage (AMD) or 80 waters since 2005, and the remaining waters listed as impaired by non-AMD 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 TMDL for Sandy Creek allocates loading to four tributaries (SCT4.0, SCT3.0, SCT2.0, and SCT1.0) and three sampling sites (SC3.0, SC2.0, and SC1.0) along the stream. Between

December 2001 and July 2002, five samples were collected in the Sandy Creek Watershed at each of the sampling points.

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,[2] with the measured, or existing, pollutant concentration data. For each source and pollutant, it was assumed that the observed data are log normally 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 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 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. All of the stream segments evaluated in the Sandy Creek Watershed have 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 §93.9l. To protect the designated uses, as well as the existing uses, the water quality

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

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)	1.50 0.30	30-day Average Maximum	Total Recoverable Dissolved
Manganese (Mn)	1.00	Maximum	Total Recoverable
pH	6.0 - 9.0	Inclusive	NA

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 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 *Sandy 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.

There are no permitted dischargers in the watershed; therefore, the allocations are to nonpoint sources only. 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.

The LA for each sampling point was computed using water-quality data collected from that point. Between December 2001 and July 2002, five samples were collected in the Sandy Creek Watershed at each of the sampling points. The instream TMDLs for sampling points SC3.0, SCT4.0, SCT3.0, SCT2.0, and SCT1.0 consist of LAs made to the area above those points to the watershed boundary. The instream TMDLs for sampling points SC2.0 and SC1.0 consist of LAs to the area between them, the upstream sample points, and the upstream load. 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 instream 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 instream 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 Sandy Creek Watershed. Note the reduction identified for sampling points SC2.0 and SC1.0 are the reductions necessary after upstream reductions have been made.

Table 3. TMDL Component Summary for the Sandy Creek Watershed

Parameter (lbs/day)	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	Load Reduction (lbs/day)	Percent Identified* (%)
SC3.0 - Sandy Creek above impaired segment						
Aluminum	ND	NA	NA	NA	0.00	0
Iron	ND	NA	NA	NA	0.00	0
Manganese	6.50	6.50	0.00	6.50	0.00	0
Acidity	900.10	197.70	0.00	197.70	702.40	78
Alkalinity	753.40					
SCT4.0 - UNT 25960 near confluence with Sandy Creek						
Aluminum	ND	NA	NA	NA	0.0	0
Iron	ND	NA	NA	NA	0.0	0
Manganese	0.4	0.4	0.0	0.4	0.0	0
Acidity	27.2	17.2	0.0	17.2	10.0	37
Alkalinity	111.0					
SCT3.0 - UNT 25955 near confluence with Sandy Creek						
Aluminum	8.0	3.4	0.0	3.4	4.6	58
Iron	ND	NA	NA	NA	0.0	0
Manganese	5.8	4.3	0.0	4.3	1.5	26
Acidity	158.1	23.7	0.0	23.7	134.4	85
Alkalinity	44.3					
SCT2.0 - Mouth of UNT 25951						
Aluminum	14.7	1.9	0.0	1.9	12.8	87
Iron	29.3	2.9	0.0	2.9	26.4	90

Parameter (lbs/day)	Existing Load (lbs/day)	TMDL Allowable Load (lbs/day)	WLA (lbs/day)	LA (lbs/day)	Load Reduction (lbs/day)	Percent Identified* (%)
Manganese	24.7	2.5	0.0	2.5	22.2	90
Acidity	388.1	62.0	0.0	62.0	326.1	84
Alkalinity	124.6					
SCT1.0 - Mouth of UNT 25950						
Aluminum	98.3	1.0	0.0	1.0	97.3	99
Iron	19.6	4.1	0.0	4.1	15.5	79
Manganese	190.4	0.0	0.0	0.0	190.4	100
Acidity	1,205.6	0.0	0.0	0.0	1,205.6	100
Alkalinity	0.0					
SC2.0 - Sandy Creek below UNT 25950						
Aluminum	397.1	23.6	0.0	23.6	258.8	92
Iron	96.6	58.9	0.0	58.9	0.0	0
Manganese	642.3	18.9	0.0	18.9	409.3	96
Acidity	7,839.0	23.6	0.0	23.6	5,224.8	96
Alkalinity	650.5					
SC1.0 - Mouth of Sandy Creek						
Aluminum	332.2	19.6	0.0	19.6	0.2	1
Iron	263.6	78.5	0.0	78.5	147.1	65
Manganese	627.7	19.6	0.0	19.6	0.0	0
Acidity	5,860.2	175.3	0.0	175.3	1.5	1
Alkalinity	711.1					

ND = not detected
NA = not applicable, meets water quality standards, no TMDL necessary
* Percent reduction after upstream reductions are made

PADEP allocated only to nonpoint sources as there are no current mining operations within 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 sources permitted effluent limitations be water quality-based.[3] 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.

Sandy Creek 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.

[3]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 Sandy 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.

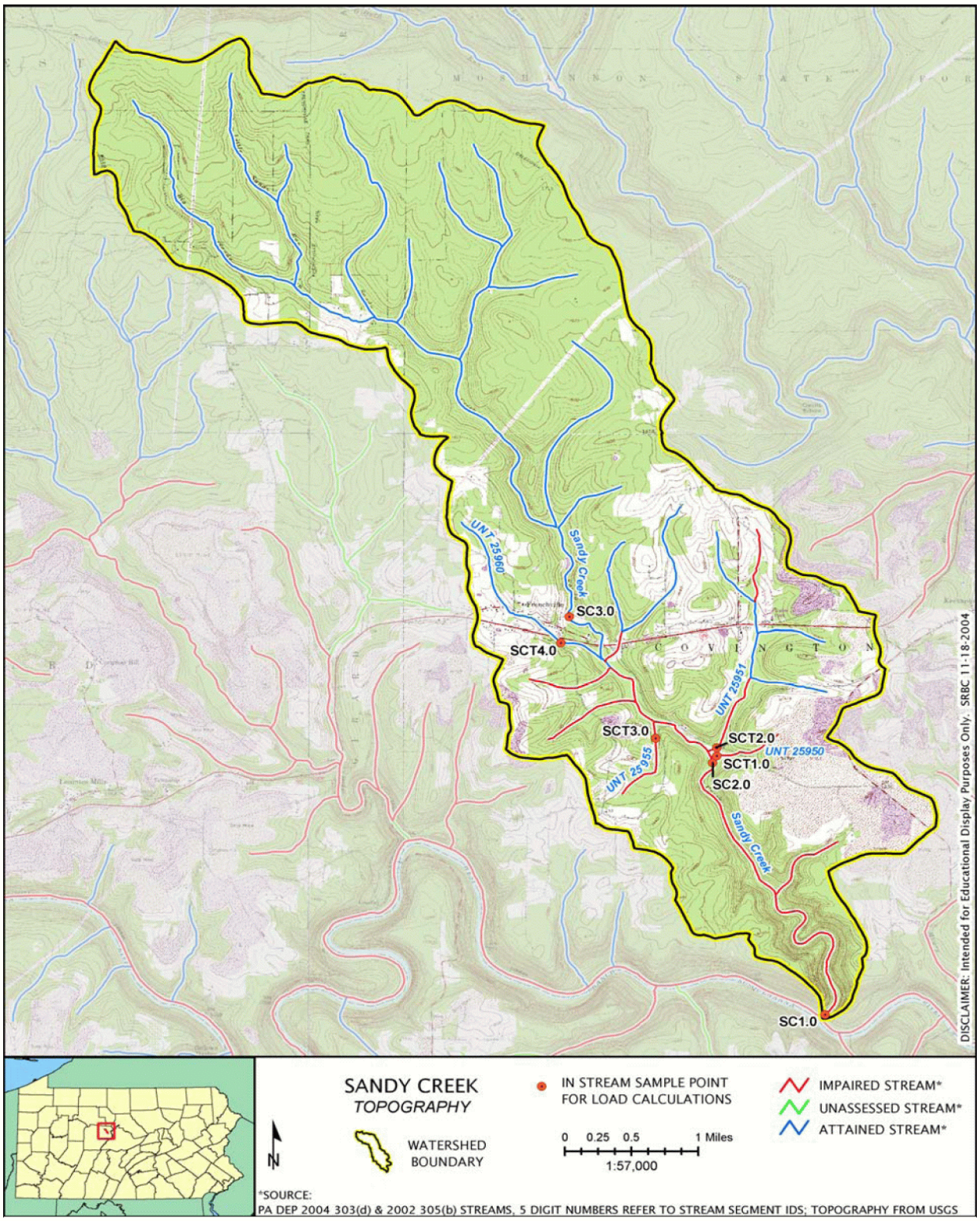
8. The TMDLs have been subject to public participation.

PADEP public noticed the draft TMDLs in the *Pennsylvania Bulletin* on January 8, 2005, and in *The Progress* on January 27, 2005. A public meeting was held on February 2, 2005, at the Karthaus Fire Hall in Karthaus, PA, to discuss the proposed TMDLs. PADEP received no formal comments on this TMDL Report.

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

Sandy Creek Watershed Maps


SANDY CREEK
TOPOGRAPHY
WATERSHED BOUNDARY
IN STREAM SAMPLE POINT FOR LOAD CALCULATIONS
0 0.25 0.5 1 Miles
1:57,000
IMPAIRED STREAM*
UNASSESSED STREAM*
ATTAINED STREAM*
*SOURCE:
PA DEP 2004 303(d) & 2002 305(b) STREAMS, 5 DIGIT NUMBERS REFER TO STREAM SEGMENT IDS; TOPOGRAPHY FROM USGS
DISCLAIMER: Intended for Educational Display Purposes Only. SRBC 11-18-2004
SC3.0
SCT4.0
SCT3.0
SCT2.0
SCT1.0
SC2.0
SC1.0
UNT 25960
Sandy Creek
UNT 25951
UNT 25950
UNT 25955
Sandy Creek
COVINGTON