



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
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Decision Rationale
Total Maximum Daily Loads
UNT 45603 Stonycreek River Watershed
For Acid Mine Drainage Affected Segments
Somerset County, Pennsylvania

/S/

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I. Introduction

The Clean Water Act (CWA) requires that Total Maximum Daily Loads (TMDLs) 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 waterbody without exceeding water quality standards.

The Pennsylvania Department of Environmental Protection (PADEP) Bureau of Watershed Management submitted the *UNT 45603 Stonycreek River Watershed TMDL, Somerset County, For Acid Mine Drainage Affected Segments* (TMDL Report), dated April 4, 2007, to the U.S. Environmental Protection Agency (EPA) which was received for final Agency review on April 4, 2007. This report includes the TMDLs for the three primary metals associated with acid mine drainage (AMD) (i.e., iron, manganese, and aluminum) and pH and addresses one segment on Pennsylvania's 1996 Section 303(d) list of impaired waters.

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, and 2004 Section 303(d) listing information for the impaired segment first listed in 1996.¹

Table 1. 303(d) Sublist for the UNT 45603 Stonycreek River Watershed, Somerset County, Pennsylvania

| State Water Plan (SWP) Subbasin: 18-E UNT 45603 Stonycreek River | | | | | | | | |
|--|-------|------------|-----------------|----------------------------|----------------|---------------|--------|-----------------------|
| Year | Miles | Segment ID | DEP Stream Code | Stream Name | Designated Use | Data Source | Source | EPA 305(b) Cause Code |
| 1996 | 2.1 | 5164 | 45603 | UNT 45603 Stonycreek River | CWF | 305(b) Report | RE | Metals |
| 1998 | 2.1 | NA* | 45603 | UNT 45603 Stonycreek River | CWF | SWMP | AMD | Metals |
| 2004 | 3.0 | 5164 | 45603 | UNT 45603 Stonycreek River | CWF | | AMD | Metals |

Resource Extraction = RE

High Quality = HQ

Cold Water Fishery = CWF

Surface Water Monitoring Program = SWMP

Abandoned Mine Drainage = AMD

*Not placed on GIS. Segment located on part C of 1998 list.

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 in this report were developed using a statistical procedure to ensure that water quality criteria are met 99% 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 UNT 45603 Stonycreek River Watershed, addressing metals and pH in the stream segments listed as PADEP stream code 45603.

¹Pennsylvania's 1996, 1998, 2002, and 2004 Section 303(d) lists were approved by the Environmental Protection Agency (EPA). The 1996 Section 303(d) list provides the basis for measuring progress under the 1997 lawsuit settlement of *American Littoral Society and Public Interest Group of Pennsylvania v. EPA*.

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 follows:

$$\text{TMDL} = \sum \text{WLAs} + \sum \text{LAs} + \text{MOS}$$

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

III. Background

The UNT 45603 Stonycreek River Watershed is located in Western Pennsylvania, occupying a north central portion of Somerset County in Shade Township. This stream is locally known as “Dixie Run.” Approximately 1,016 acres, or 77%, of the UNT 45603 Stonycreek River Watershed are located within the Hooversville Quadrangle. The remaining approximately 304 acres, or 23%, of the upstream reaches of the watershed, are located within the Windber Quadrangle. The total area within the watershed consists of approximately 1,320 acres, or 2.06 square miles. Land uses within the watershed include abandoned mine lands, forestlands, rural residential properties and small communities.

UNT 45603 Stonycreek River flows through the town of Hooversville near its mouth, just prior to its junction with the Stronycreek River. The headwaters of this river start at a point approximately 3.0 miles east-southeast of the stream’s junction with the Stonycreek River at Hooversville. From this point, UNT 45603 Stonycreek River flows in a generally west-northwest direction toward Hooversville.

Since the late 1940's extensive mining has been conducted in the entire watershed including underground mines on the Lower and Upper Kittanning coal seams. Surface mining operations were completed on the Lower Kittanning, Middle Kittanning, Upper Kittanning, Lower Freeport and Upper Freeport Coal Seams. Evidence of past mining activities includes abandoned pits, deep mine drifts, and buildings connected with preparation plant operations.

UNT 45603 Stonycreek River is affected by pollution from AMD. This pollution has caused high levels of metals in the watershed. There are currently two active mining operations in the watershed permitted to the Marquise Mining Corporation. The Marquise #11 Mine SMP #56050106, NPDES No. PA0249807 and the Baker Whitely Mine SMP #56010106, NPDES No. PA0249076 both have been assigned WLAs in this TMDL.

PADEP treats each segment on the Section 303(d) list as a separate TMDL and expresses each TMDL as a long-term average loading. (See the *UNT 45603 Stonycreek River Watershed TMDL Report*, Attachment C, for the 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, protect public health and safety from the adverse effects of current surface coal mining operations, and promote the reclamation of mined areas left without adequate reclamation prior to August 3, 1977. SMCRA requires a surface mining 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.

UNT 45603 Stonycreek River was on the 1996 Section 303(d) list of impaired waters and counts toward the twelfth year (2009) TMDL milestone commitment under the requirements of the 1997 TMDL lawsuit settlement agreement. The twelfth year milestone is the development of TMDLs, or delisting, for all remaining waters listed as impaired by AMD impacts on Pennsylvania’s 1996 Section 303(d) list of impaired waters.

Computational Procedure

The TMDLs were developed using a statistical procedure to ensure that water quality criteria are met 99% of the time as required by Pennsylvania’s water quality standards. A two-step approach was used for the TMDL analysis of impaired stream segments.

The first step used a statistical method for determining the allowable instream concentration at the point of interest necessary to meet water quality standards. An allowable long-term average instream concentration was determined at each sample point for metals and acidity. The analysis was performed using Monte Carlo simulation to determine the necessary long-term average concentration needed to attain water quality criteria 99% of the time, and the simulation was run assuming the data set was log normally distributed. Using @RISK², each pollutant source was evaluated separately by performing 5,000 iterations of the model where each iteration was independent of all other iterations. This procedure was used to determine the required percent reduction that would allow the water quality criteria to be met instream at least 99% of the time. A second simulation that multiplied the percent reduction by the sampled value was run to ensure that criteria were met 99% of the time. The mean value from this data set represents the long-term average concentration that needs to be met to achieve water quality standards.

The second step was a mass balance of the loads as they passed through the watershed. Loads at these points were computed based on average annual flow. Once the allowable concentration and load for each pollutant was determined, mass-balance accounting was performed starting at the top of the watershed and working downstream in sequence. This mass

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

balance or load tracking through the watershed utilized the change in measured loads from sample location to sample location as a guide for expected changes in the allowable loads.

The existing and allowable long-term average loads were computed using the mean concentration from @RISK multiplied by the average flow. The loads were computed based on average annual flow and should not be taken out of the context for which they are intended. They are intended to depict how the pollutants affect the watershed and where the sources and sinks are located spatially in the watershed. A critical flow was not identified, and the reductions specified in this TMDL apply at all flow conditions.

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: (1) designated uses; (2) criteria necessary to protect those uses; and (3) antidegradation provisions that prevent the degradation of water quality. UNT 45603 Stonycreek River has been designated by Pennsylvania as a high quality cold water fishery with criteria to protect the aquatic life use, and the designation can be found at Pennsylvania Title 25 §93.9. To protect the designated use as well as the existing use, 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) | 1.50 | 30-day Average | Total Recoverable |
| Manganese (Mn) | 1.00 | Maximum | Total Recoverable |
| pH | 6.0 - 9.0 | Inclusive | N/A |

Pennsylvania Title 25 §96.3c requires that water quality criteria be achieved at least 99% 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 TMDL WLAs and LAs for each parameter resulted in a determination that any required percent pollutant reduction would assure that the water quality criteria would be met instream at least 99% of the time. The Monte Carlo analysis performed 5,000 iterations of the model where each iteration was independent of all other iterations and the data set was assumed to be log normally distributed.

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

The pH values shown in Table 2 were used as the 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, and these values can be 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 *UNT 45603 Stonycreek River 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 has been using an alternate 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 (≥ 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 addressing pH to be reasonable.

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 or discharges having responsible parties, and nonpoint sources are identified as any pollution sources that are not point sources. Abandoned mine lands were treated in the allocations as nonpoint sources. As such, the discharges associated with these land uses were assigned LAs (as opposed to WLAs). The decision to assign LAs to abandoned 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 the National Pollutant Discharge Elimination System (NPDES) permitting requirements.

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, it 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 performed to ensure 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, LAs, and WLAs for the UNT 45603 Stonycreek River Run Watersheds.

Table 3. TMDL Component Summary for the UNT 45603 Stonycreek River 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 (%) |
|---|-------------------------------|--|------------------|-----------------|--------------------------------|------------------------------|
| SP13 - UNT 45603 Stonycreek River below reclaimed strip mine | | | | | | |
| Al | 0.37 | 0.37 | 0.0 | 0.37 | 0.0 | 0 |
| Fe | 0.32 | 0.32 | 0.0 | 0.32 | 0.0 | 0 |
| Mn | 0.07 | 0.07 | 0.0 | 0.07 | 0.0 | 0 |
| Acidity | ND | NA | 0.0 | NA | 0.0 | 0 |
| SP12 - UNT 45603 Stonycreek River near mouth in Hooversville | | | | | | |
| Al | 11.46 | 4.72 | 1.50 | 3.22 | 6.74 | 59 |
| Fe | 19.81 | 14.97 | 2.25 | 12.72 | 4.84 | 25 |
| Mn | 7.45 | 7.45 | 1.50 | 5.95 | 0.0 | 0 |
| Acidity | ND | NA | 0.0 | NA | 0.0 | 0 |

ND = not detected

NA = not applicable, meets water quality standards, no TMDL necessary

PADEP allocated to nonpoint only as there are no mining operations in the watersheds. Where there are active mining operations, Federal regulations require that point source permitted effluent limitations be water quality-based subsequent to TMDL development and approval.³ In addition, PA Title 25, Chapter 96, Section 96.4d requires that WLAs 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 watersheds without reallocation of the TMDL.

Table 4. UNT 45603 Stonycreek River Watershed Wasteload Allocations

³It 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.

| Mine | Parameter | Allowable Average Monthly Concentration (mg/L) | Average Flow (MGD) | WLA (lbs/day) |
|---|-----------|--|--------------------|---------------|
| Marquise No. 11 Mine (M001) SMP #56050106 NPDES PA0249807 | Al | 2 | 0.06 | 1.00 |
| | Fe | 3 | 0.06 | 1.50 |
| | Mn | 2 | 0.06 | 1.00 |
| Baker Whitely Mine (BW001) SMP #56010106 NPDES PA0249076 | Al | 2 | 0.03 | 0.50 |
| | Fe | 3 | 0.03 | 0.75 |
| | Mn | 2 | 0.03 | 0.50 |

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

The TMDLs were developed using instream data, which account for existing background conditions.

4. The TMDLs consider critical environmental conditions.

The reductions specified in these TMDLs apply at all flow conditions. A critical flow condition was not identified from the available data.

5. The TMDLs consider seasonal environmental variations.

The data set included data points from all seasons, thereby accounting for seasonal variation implicitly.

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 that the treated instream concentration variability was 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% of the time than if the variability of the treated discharge is reduced.

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

The *Recommendations* section of the TMDL Report highlights what can be done in the UNT 45603 Stonycreek River Watershed to eliminate or treat pollutant sources. Aside from PADEP's primary efforts to improve water quality in the UNT 45603 Stonycreek River Watershed through reclamation of abandoned mine lands and through the NPDES permit program, additional opportunities for reasonable assurance exist. PADEP expects that 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 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 is currently a watershed organization focused on the UNT 45603 Stonycreek River Watershed, however, the PADEP is not aware of any projects in-place to address abandoned mine lands and discharges within this watershed. Any such efforts may be addressed either by the Bureau of Abandoned Mine Reclamation (BAMR), or through other programs within District Mining Operations (DMOs), such as remining and Government Financed Construction Contracts (GFCCs). Any post-mining discharges of sub-standard quality might then be addressed through the Growing Greener Program.

8. *The TMDLs have been subject to public participation.*

Public notice of the draft TMDL was published in the *Pennsylvania Bulletin* and *The Somerset Daily American* on February 24, 2007 to foster public comment on the calculated allowable loads. A public meeting was held on March 7, 2007, at the Cambria District Mining Office in Ebensburg, to discuss the proposed TMDL. No official comments were received.

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

Attachment A

UNT 45603 Stonycreek River Watershed Map

