TOTAL MAXIMUM DAILY LOADS (TMDL)
TEN MILE CREEK, WEST VIRGINIA

Introduction

The West Virginia Division of Environmental Protection (DEP) listed the Ten Mile Creek (stream code #MTB-25) on its 1996 Section 303(d) list due to metals and pH from mine drainage. The impaired segment is a 5.40 mile reach. Since the time of the 1996 303(d) list, DEP determined that the creek was no longer exceeding water quality criteria for pH. The state provided the more recent data to EPA to justify removing pH from the more recent 1998 303(d) list. Therefore, the TMDLs presented here address only the impairment due to metals.

To develop this TMDL, EPA used a computer model, the Hydrologic Simulation Program Fortran (HSPF), to simulate the runoff of pollutants from the watershed, the delivery of those pollutants to the stream channel, the delivery of pollutants from point sources, and the routing of the pollutants through the channel. The analysis included ten subwatersheds in the drainage area, encompassing the mainstem of Ten Mile Creek from the confluence with the Buckhannon River up to the headwaters, and the Right Fork of Ten Mile Creek. The model was run with reduced pollutant loads until water quality standards were predicted to be met. The technical TMDL development report for these TMDLs includes a complete description of the analysis.

The analysis revealed that the water quality criteria for iron and aluminum are exceeded 27.6% of the time in the mainstem of Ten Mile Creek above the confluence with the Right Fork. The aluminum criteria is exceeded 0.14% of the time in this same reach. Therefore, these TMDLs will focus on improving the water quality in the mainstem of Ten Mile Creek above the Right Fork. The wasteload and load allocations apply to sources on this section of the creek.

Table 1 summarizes the iron and aluminum TMDLs and the component wasteload (WLA) and load allocations (LA) needed to meet the TMDLs.

Table 1. Summary of TMDLs (lb/day)[a]

PARAMETER	WLA[b]	LA[b]	MOS	TMDL
Aluminum	17.56	2.39	implicit	19.95
Iron	12.36	3.91	implicit	16.27

TABLE NOTES:

a. The TMDL technical development report expresses the loads on an annual basis. For the purpose of this table, and consistency with previous TMDLs, EPA has divided those values by 365 days to arrive at daily loads.

b. The wasteload and load allocations are the sum of the loads from several categories or individual sources. The separate allocations to each of the categories and individual sources are shown in the discussion of WLAs and LAs.

EPA developed these TMDLs consistent with statutory and regulatory requirements and EPA policy and guidance. The Ten Mile Creek TMDLs address the following seven regulatory elements:

1. Water quality standards.

These TMDLs ensure that Ten Mile Creek will meet the applicable water quality criteria for aluminum and iron, thus ensuring that the water supports its designated uses. The Ten Mile Creek is designated as a B-2 (Cold Water Fishery). The applicable water quality criteria are as shown in Table 2. These TMDLs ensure that these criteria are not exceeded.

Table 2. Water Quality Criteria applicable to Ten Mile Creek

Pollutant	Acute Criteria[a]	Chronic Criteria[b]
Aluminum, Total (mg/l)	0.75	none
Iron, Total (mg/l)	none	0.5

TABLE NOTES:

a. Acute criteria are evaluated as instantaneous values. Not to be exceeded more than once every three years.
b. Chronic criteria are evaluated using a four-day average.

2. Wasteload allocations and load allocations.

Wasteload Allocation.
These TMDLs include wasteload allocations (WLA) for all point sources on the mainstem of Ten Mile Creek above the Right Fork. In the analysis, all major point sources were explicitly included in the model. For the sake of modeling efficiency, the pollutant loads from some of the minor point sources in close proximity to each other were combined and treated as a single discharge. Each point source, however, was given an individual wasteload allocation. For the allocation run, the point sources were assumed to be discharging at their maximum permitted flow and concentration. In cases where a facility had only a flow or concentration limit, but not both, the missing parameter was based on the most recent Discharge Monitoring Report. Table 3 summarizes the WLA.

Table 3. Wasteload Allocations and Needed Reductions (lb/day)

SOURCE		ALUMINUM		IRON	
Permit Number	Pipe Number	Allocation	% Red.	Allocation	% Red.
WV67881	2	0.024	0	0.024	0
WV67881	7	0.03	0	0.03	0
WV67881	8	1.128	0	1.128	0
WV50717	1	0.163	0	0.126	0
WV50717	2	7.758	62	3.885	62

SOURCE		ALUMINUM		IRON	
Permit Number	Pipe Number	Allocation	% Red.	Allocation	% Red.
WV50717	3	0.233	0	0.181	0
WV50717	4	0.741	0	0.574	0
WV50717	6	2.134	50	1.07	50
WV50717	8	0.048	0	0.039	0
WV67601	3	5.208	0	5.208	0
WV67601	3a	0.089	0	0.089	0
TOTAL WLA		17.56	37	12.36	34

Load Allocation.

These TMDLs also includes load allocations (LA) for nonpoint sources. Reclaimed mine lands were treated in the analysis as nonpoint sources because there are no NPDES permits associated with these areas. As such, the discharges associated with these land uses were assigned load allocations (as opposed to wasteload allocations). The decision to assign load allocations 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.

Table 4 summarizes the LAs. The load allocation is to the nonpoint sources that drain to Ten Mile Creek above the Right Fork (the impaired portion). This area corresponds to subwatershed numbers (5020001166 through 5020001170) as shown in figure 1.1 of the technical report. It is important to recognize that the load allocation represents the nonpoint source load that was shown to meet water quality standards during the typical hydrologic year on which the TMDL is based. It is conceivable, due to meteorologic variations in other years, that an even greater load allocation would still not exceed water quality standards. Likewise, it is possible that a lower load allocation would exceed water quality standards under certain meteorologic conditions. Given this situation, the load allocation in Table 4 is less meaningful, particularly in terms of implementation, than is the associated percent reduction. When the prescribed reduction is applied to all meteorologic conditions, unlike the numeric allocation, the resulting load will prevent the water quality standards from being exceeded.

The prescribed reduction is expected to come entirely from reclaimed mining lands. In the analysis these load reductions were achieved by converting 25% of the reclaimed mine land to forest. No load reductions are expected of any other land uses in the watershed.

We note that Table 4 shows only the overall load allocation and not individual allocations to different land uses. This was done largely out of technical necessity; the output of the model is in a form that makes calculating the delivered load from individual land uses extremely impractical. We think this approach is appropriate in this case for several reasons. First, as discussed above, the prescribed percent reduction is more meaningful than the allocation itself because of variations in hydrology from year to year. Second, we have identified the land use from which the reduction is expected to come. Third, we believe the information we have included with the LA—the percent reduction and the understanding of where that reduction must come from—are the critical pieces of information that will guide implementation activities.

Table 4. Load Allocations and Needed Reductions (lb/day)

SOURCE	ALUMINUM		IRON	
	Allocation	% Reduction	Allocation	% Reduction
TOTAL LA	2.39	20%	3.91	22.4%

3. Background pollutant contributions.

Natural background is included as a component of the load allocations. The loads associated with each land use category include the naturally occurring as well as human-induced contributions. The model was calibrated (i.e., adjusted so that the model predictions matched measured values) to water quality data that represents the cumulative impact from all sources—naturally-occurring and human-induced combined.

4. Critical conditions.

There is no single critical condition for iron and aluminum. The modeling showed that the water quality standards can be violated during low flows when point source loads predominate and there is inadequate stream flow available for dilution. The modeling also showed that water quality standards can be violated during high flow periods when nonpoint source loads are highest. By using a continuous simulation model that simulates both dry and wet weather conditions, we have accounted for all possible critical conditions, both in terms of loading and water quality.

5. Seasonal variations.

These TMDLs appropriately consider seasonal variation. We have explicitly considered all seasonal variation by using a continuous simulation model that simulates loading and water quality throughout an entire year.

6. Margin of safety.

The Clean Water Act and federal regulations requires TMDLs to include a margin of safety (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.

In these TMDLs we used conservative assumptions in the analysis to provide a margin of safety. Most notably, we assumed in the analysis that each point source discharge was constant. That is, the each point source is assumed to discharge continuously regardless of hydrologic or operational variations. A review of Discharge Monitoring Reports for the facility show that, in reality, the discharges are variable. We made this assumption out of necessity—no data exist to characterize the time-variable nature of the flows. A second aspect of this assumption further contributes to the margin of safety: all discharges, not just a selection of the total, are assumed to be discharging continuously.

7. Public participation

EPA published and requested comments on the proposed TMDLs on July 2, 1998 in the Charleston Gazette and six other newspapers across the state. EPA held a public meeting on July 15, 1998 in Buckhannon, West Virginia. In addition, EPA requested comments from United States Fish and Wildlife Service and no comments were received. EPA received comments from five individuals and organizations. Our responses to those comments are attached.

FINAL AGENCY ACTION

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W. Michael McCabe   Date
Regional Administrator
EPA Region III