Decision Rationale
Total Maximum Daily Load of Iron and Manganese
for the Unnamed Tributary of the Monongahela River, West Virginia

I. Introduction

This document will set forth the Environmental Protection Agency's (EPA) rationale for establishing the Total Maximum Daily Load (TMDL) of iron and manganese for the Unnamed Tributary of the Monongahela River. EPA's rationale is based on the determination that the TMDL meets the following eight regulatory conditions pursuant to 40 CFR §130.

1) The TMDL is designed to implement applicable water quality standards.
2) The TMDL includes a total allowable load as well as individual waste load allocations and load allocations.
3) The TMDL considers the impacts of background pollutant contributions.
4) The TMDL considers critical environmental conditions.
5) The TMDL considers seasonal environmental variations.
6) The TMDL includes a margin of safety.
7) The TMDL has been subject to public participation.
8) There is reasonable assurance that the TMDL can be met.

II. Background

The Unnamed Tributary to the Monongahela River (also known as the Unnamed Tributary at Sharon Steel) is located within the Monongahela River watershed (HUC 05020003) in the city of Fairmont in northern West Virginia (Figure 1-1). The stream has been placed on West Virginia's 1998 303(d) list for iron and manganese impairments with a priority ranking of high. The Unnamed Tributary is located in the southern portion of the watershed and is approximately 0.5 miles in length, all of which is impaired. The Unnamed Tributary flows west between two inactive industrial areas that are now Superfund sites. The two Superfund sites are Big John's Salvage (AKA, Reilly Tar and Chemical Plant) and Sharon Steel (AKA, Fairmont Coke Works) (Figure 1-2). Note that the Unnamed Tributary was digitized based on hardcopy maps of the area. The predominant land uses in the 187-acre watershed were identified based in the West Virginia GAP 2000 Land Use Database. The major land uses in the watershed are forested and barren land. Table 1-1 presents the 1998 303(d) list information for the Unnamed Tributary.

Table 1-1. 1998 303(d) list information for the Unnamed Tributary at Sharon Steel

Stream Name	Stream Code	Designated Use	Pollutants	Primary Source of Impairment	Stream Length
Unnamed Tributary to the Monongahela River	M-23.5	Aquatic Life	Iron, Manganese	Sharon Steel-Fairmont, West Virginia	0.5

The EPA's *Water Quality Planning and Management Regulations* (40 CFR 130) require states to develop Total Maximum Daily Loads (TMDLs) for waters that are exceeding water quality standards. In settlement of the TMDL lawsuit in West Virginia, iron and manganese TMDLs were developed by EPA for the Unnamed Tributary to the Monongahela River at Sharon Steel (hereafter referred to as the Unnamed Tributary), which was included on West Virginia's 1998 303(d) list of impaired waters. This report presents the TMDLs for the listed segment of the Unnamed Tributary.

In general, the impairment and hydrology of the Unnamed Tributary is heavily influenced by the Big John's Salvage and Sharon Steel Superfund sites. One hundred and sixty five potential pollutants (including iron and manganese) have been identified in surface water samples from the watershed of the Unnamed Tributary. Some of the additional pollutants have been identified in high concentrations in the surface waters of the watershed, but iron and manganese are the only pollutants listed on the 303(d) list. This TMDL will not focus on the additional 163 potential pollutants identified in the watershed since the majority of the land in the watershed consists of the Sharon Steel and Big John Salvage Superfund sites, which are being cleaned up under the Comprehensive Environmental Resource Compensation and Liabilities Act (CERCLA). At this time it is anticipated that the additional pollutants identified in the watershed will be dealt with during the clean up of the two sites, thereby eliminating the need to develop TMDLs for the additional potential pollutants. However, a review(s) of the watershed will be conducted both during and following the completion of the Superfund cleanup to identify the need for the development of any additional TMDLs for the Unnamed Tributary. This TMDL focuses on the pollutants listed on the 1998 303(d) list (iron and manganese), but the additional pollutants identified in the Unnamed Tributary and at the Superfund sites include the following:

- polynuclear aromatic hydrocarbons (PAHs)
- phenolics
- metals — aluminum, barium, beryllium, boron, chromium, cobalt, copper, nickel, silver, vanadium, zinc, antimony, arsenic, cadmium, lead, mercury, selenium, thallium, and tin
- Organic compounds—acid extractable organics, base/neutral extractable organics, and purgeable organics

The iron and manganese reductions required by this TMDL may result in the reduction of other metals as well. Further study and application of treatment technologies in addition to those driven by this TMDL may be necessary. A data analysis for the additional pollutants identified in the watershed that have numeric water quality criteria is also presented in this report (Appendix B). The majority of

the land in the watershed consists of Sharon Steel and Big John's Salvage, therefore, the descriptions of the two sites in the TMDL report provide the best description of the watershed.

III. Discussion of Regulatory Conditions

EPA finds that the TMDL has provided sufficient information to meet all of the requirements for establishing a Total Maximum Daily Load of Iron and Manganese for the Unnamed Tributary of the Monongahela River, West Virginia. EPA's decision is outlined according to the regulatory requirements listed below.

1) The TMDL is designed to implement the applicable water quality standards.

West Virginia's *Requirements Governing Water Quality Standards* (WVSQS, 1999) have defined water quality criteria for surface waters as a numeric constituent concentration or a narrative statement representing a quality of water that supports a designated use or uses of the waterbody. Total iron and manganese are given numeric criteria under the Aquatic Life and Human Health use designation categories. The Unnamed Tributary has been designated as having Aquatic Life and Human health uses (WVDEP, 1998). Table 2 below lists the applicable water quality standards used to develop this TMDL for the waterbody.

Table 2. Applicable West Virginia water quality criteria

POLLUTANT	USE DESIGNATION					
	Aquatic Life				Human Health	
	B1, B4		B2		C[3]	A[4]
	Acute [a]	Chronic [b]	Acute [a]	Chronic [b]		
Iron, Total (mg/L)	-	1.5	-	0.5	-	1.5
Manganese, Total (mg/L)	-	-	-	-	-	1.0

Source: WVSQS, 1999; B1 = Warm water fishery streams, B4 = Wetlands, B2 = Trout waters, C = Water contact recreation—this category includes swimming, fishing, water skiing and certain types of pleasure boating such as sailing in very small craft and outboard motor boats, A = Water Supply, Public—This category is used to describe waters which, after conventional treatment, are used for human consumption.

[a] Not to be exceeded

[b] Four-day average concentration not to be exceeded more than once every three years on the average

[3] These criteria have been calculated to protect human health from toxic effects through fish consumption, unless otherwise noted.

[4] These criteria have been calculated to protect human health from toxic effects through drinking water and fish consumption, unless otherwise noted

2) The TMDL includes a total allowable load as well as individual waste load allocations and

load allocations.

Total Allowable Loads

The iron and manganese TMDL for the Unnamed Tributary includes a Total Allowable Load which is the sum of the Margin of Safety (MOS), Waste Load Allocation, and Load Allocation. Loading contributions were reduced from applicable sources for the Unnamed Tributary and TMDLs were developed. Background concentrations of iron and manganese were well below the TMDL endpoints for iron and manganese in the watershed, so nonpoint sources in the watershed did not require a reduction. The iron and manganese concentrations from the two Superfund sites and pH values from Sharon Steel were exceeding the West Virginia State water quality criteria. If the Superfund sites were not located in the watershed, it is assumed that in-stream iron and manganese concentrations and pH values would meet the state water quality criteria. Therefore, the two Superfund sites are the only sources that require a reduction in loading. The following general methodology was used when allocating to sources for the Unnamed Tributary at Sharon Steel TMDL:

- Nonpoint sources in the watershed did not appear to be contributing excessive loads of iron and manganese to the watershed and, therefore, are not required to reduce loadings.
- The WLAs were determined by setting the allocation at the water quality criteria for iron and manganese as well as the water quality criteria for pH.

The TMDLs for the Unnamed Tributary are presented in Table 3.

Table 3. Iron, manganese, and pH TMDLs for the Unnamed Tributary at Sharon Steel

Source	TMDL			MOS	WLA			LA		
	Iron (mg/L)	Manganese (mg/L)	pH		Iron (mg/L)	Manganese (mg/L)	pH	Iron (mg/L)	Manganese (mg/L)	pH
Sharon Steel	1.5	1.0	6-9	implicit	1.5	1.0	6-9	N/A	N/A	N/A
Big John's Salvage	1.5	1.0	6-9	implicit	1.5	1.0	6-9	N/A	N/A	N/A
Nonpoint Sources	1.5	1.0	6-9	implicit	N/A	N/A	N/A	0	0	0

The Unnamed Tributary

The Unnamed Tributary accepts flow from the limestone drainage ditch at Sharon Steel, on-site surface water channels from Sharon Steel and Big John's Salvage, and off-site sources. The waters forming the tributary are primarily surface drainage from the northern half of the site and surface drainage from Big John's Salvage. A small percentage is drainage collected from residential yards at the eastern side

of the site. The main body of the tributary runs west for approximately 1,600 feet, dropping roughly 60 feet, to the Monongahela River. Before entering the Monongahela River, the Unnamed Tributary flows into an engineered detention/sedimentation pond that contains overflow pipes. The structure was installed in March 2001. For a more detailed description of the two sites, see section1 of the TMDL report.

Wasteload Allocations

Wasteload allocations (WLAs) were assigned to the two Superfund sites. Based on a site visit and discussion with WVDEP and the Superfund Remedial Project Managers, it was assumed that the two Superfund sites were the only point sources of iron and manganese in the watershed and were the sole reason for exceedances of the iron and manganese water quality criteria. The WLAs are presented as concentrations, in terms of milligrams per liter at a 7Q10 flow of 0 cfs. The WLAs for each site are 1.5 mg/L and 1.0 mg/L for iron and manganese, respectively and pH values between 6 and 9 based on the assumption that a discharge concentration meeting the water quality criteria will result in meeting the water quality criteria in the Unnamed Tributary as well. It is assumed that after implementation of wastewater treatment systems at the Superfund sites, that the sites will essentially function as point source discharges and will continue to discharge during 7Q10 conditions of 0 cfs. For additional information on the WLA please see section 5.3 of the Unnamed Tributary TMDL report.

Load Allocations

According to federal regulations at 40 CFR 130.2(g), load allocations are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible natural and nonpoint source loads should be distinguished.
Load allocations (LAs) were assigned to the background contribution of iron and manganese to the watershed from the existing land uses based on the background conditions in the reference watershed Laurel Run. Since a 7Q10 flow of 0 cfs would result in an absence of flow from nonpoint sources because of their dependence on rainfall and runoff processes, the LA is equivalent to 0 pH and 0 mg/L for both iron and manganese. For additional information on the sampling event, please see section 5.3.2 of the Unnamed Tributary TMDL report.

3) The TMDL considers the impacts of background pollutants.

No water quality observations representing background conditions in the watershed were available, so a reference watershed method was used to estimate iron and manganese loading from background sources in the watershed. Section 4.2 describes the reference watershed method and how it was used to determine the background concentrations of iron and manganese in the watershed.

4) The TMDL considers critical environmental conditions.

The iron and manganese concentrations in surface water samples tended to be significantly higher under low flow conditions than high flow conditions (Tables 3-4 and 3-5 of the report). Based on the limited data with corresponding flow observations, low flow appears to be the critical condition for both iron and manganese.

5) The TMDLs consider seasonal environmental variations.

A TMDL must consider seasonal variation in the derivation of the allocation. For the Unnamed Tributary watershed iron and manganese TMDLs, seasonal variation was considered in the formulation of the flow estimation. By using continuous flow simulation (estimating flow over a period of several years), seasonal hydrologic and source loading variability was inherently considered. The metals concentrations estimated on a daily time-step were compared to TMDL endpoints.

6) The TMDLs include a margin of safety.

In meeting the West Virginia water quality criteria for iron, manganese, and pH at the end of pipe for the Sharon Steel and Big John's Salvage Superfund sites, there will be no excessive contribution of the pollutants of concern to the Unnamed Tributary at the low flow 7Q10 conditions where the assimilative capacity is lowest. This results in the inclusion of an implicit margin of safety.

7) The TMDLs have been subject to public participation.

There was one informational meeting held on April 10, 2001 in the watershed to discuss the TMDL process and request information from interested parties. A public hearing was also held August 30, 2001 during the public comment period. A 45 day public notice opened on July 16, 2001 and closed on August 31, 2001. The notice was published in the Dominion Post and the Times- West Virginian papers.

8) There is a reasonable assurance that the TMDL can be met.

This TMDL will not focus on the 163 pollutants in addition to iron and manganese identified in the watershed since the majority of the land in the watershed consists of the Sharon Steel and Big John Salvage Superfund sites which are being cleaned up under the Comprehensive Environmental Resource Compensation and Liabilities Act (CERCLA). At this time it is anticipated that the additional pollutants identified in the watershed will be dealt with during the clean up of the two sites, thereby eliminating the need to develop TMDLs for the additional potential pollutants. However, a review(s) of the watershed will be conducted both during and following the completion of the Superfund cleanup to identify the need for the development of any additional TMDLs for the Unnamed Tributary.