Decision Rationale
Total Maximum Daily Load of Polychorinated Biphenyls (PCBs)
for Flat Fork Creek, 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 PCBs for the Flat Fork Creek. EPA's rationale is based on the determination that the TMDL meets the following 8 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) There is reasonable assurance that the TMDL can be met.
8) The TMDL has been subject to public participation.

II. Background

The West Virginia Department of Environmental Protection (WVDEP) has listed Flat Fork Creek on the state's section 303(d) list because PCBs were found in fish tissue samples (Table 1), resulting in a fish consumption advisory (issued by WVDEP) and nonsupport of the designated uses set by the state for the waterbody: propagation of fish and other aquatic life and contact recreation (46 CSR 1).

The Flat Fork Creek watershed is part of the Lower Kanawha basin (HUC 05050008) in the southeastern part of West Virginia (Figure 1-1 of the report). Flat Fork Creek is a tributary of the Pocatalico River, and the impaired segment is 5.0 miles long. The watershed encompasses 30.51 square miles (19,528 acres) of land that occupies portions of Roane County. The city of Charleston, West Virginia, is approximately 25 miles to the south-southwest of the watershed. The major land use in the Flat Fork Creek watershed is forest, the rest of the watershed is primarily agricultural.

The stream segment in the Flat Fork Creek watershed that is impaired due to PCBs is influenced by the Spencer Transformer industrial site, which is a Superfund site for which cleanup and remedial actions were conducted from 1991 to 1994 because of PCB contamination onsite.

Table 1. Summary of West Virginia 1998 303(d) stream listing

Stream Name	Stream Code	Miles Affected	Potential Source(s)	Pollutant(s) of Concern
Flat Fork Creek	KP-33	5.0	Spencer Transformer Harmony, WV	PCBs*

* Contaminant found in fish tissue.

Polychlorinated biphenyls (PCBs) consist of 209 related chemical compounds that were manufactured and sold as mixtures under various trade names, including Aroclor, Phenoclor, Clophen, and Kenechlor (GE, 1999). They were used from approximately the 1940s through the 1970s. Because they have excellent dielectric and flame-resistant properties, PCBs were extensively used as heat transfer fluids, hydraulic fluids, flame retardants, and dielectric fluids. These same properties cause PCBs to accumulate in the fatty tissue of biota and bioaccumulate in the food chain. Concerns regarding potential human health effects led to the cessation of PCB production and use in the United States in 1979.

A bioaccumulation mass balance approach was taken to determine source load allocations for Flat Fork Creek, because of no known active PCBs sources. PCBs within Flat Fork are assumed to be contained within the sediment portion of the stream. To achieve the West Virginia water quality criteria, the contributing PCB load needs to be adjusted. Currently, there are no known direct discharges of PCBs (waste loads are equal to zero), and no known nonpoint source contributions in the Flat Fork. The PCB contamination of the Flat Fork is attributed to historical contributions from the Spencer Transformer site, resulting in accumulation of PCBs in the sediment particulate matter. Based on the above conditions, the allocation of the allowable PCB loading to Flat Fork Creek was attributed to the in-stream sediment (Table 3).

The implied decreasing trend of fish tissue concentrations coupled with the only known source of PCBs having been rededicated supports reliance on natural attenuation as an appropriate action alternative to ensure that the TMDL is met and water quality standards are achieved

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 PCBs for Flat Flork Creek, 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* (WVWQS, 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. PCBs are given numeric criteria under the aquatic life and the human health use designation categories (Table 2).

Table 2. Applicable West Virginia water quality criteria for total PCBs

POLLUTANT	USE DESIGNATION						
	Aquatic Life				Human Health		All Other Uses
	B1, B4		B2		C [c]	A [d]	
	Acute[a]	Chronic[b]	Acute[a]	Chronic[b]			
PCB[e], Total (ng/L)	-	14.0	-	14.0	0.045	0.044	0.045

B1 = warm water fishery streams, B4 = wetlands, B2 = trout waters, A = public water supply

[a] One-hour average concentration not to be exceeded more than once every 3 years on the average.

[b] Four-day average concentration not to be exceeded more than once every 3 years on the average.

[c] Unless otherwise noted, these criteria have been calculated to protect human health from toxic effects through fish consumption.

[d] Unless otherwise noted, these criteria have been calculated to protect human health from toxic effects through drinking water and fish consumption.

[e] Known or suspected carcinogen. Human health standards are for a risk level of 10^{-6}.

Source: WVWQS, 2000.

The state has both fish tissue and water column human health criteria for PCBs. West Virginia's human health water column standards are based on a $1:10^6$ risk assessment. Recognizing that a subpopulation, recreational fishermen, was underprotected, West Virginia moved from the FDA advisory level to risk-based consumption advisories in July 2001. The FDA advisory level is 2.0 mg of PCBs/kg of raw fish tissue while the West Virginia advisory level is 0.036 mg of PCBs/kg of raw skin-off fish fillet (catfish) and 0.05 mg of PCBs/kg of raw fish fillet with skin (such as bass and bream) for Risk Group 1 (See section 1.3 of the TMDL report).

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

Total Allowable Loads

The calculation of the Flat Fork Creek TMDL used the water quality criteria and flow data. Because there is no flow gauge station on the Flat Fork Creek, an area weighted approach was used (based on the USGS station located downstream of the Flat Fork Creek, USGS 03201000). The 7Q10 flow for Flat Fork Creek is used in calculating the TMDL by multiplying it by the water quality criteria and a multiplier to convert from (cfs x µg/L) to(lb/day). This load represents the Total Maximum

Daily Load of PCBs in the Flat Fork Creek.

TMDL = WQ(std) * 7Q10*0.00539
TMDL = 0.000044 (µg/L) *0.01 (cfs)*0.00539
TMDL = 2.0×10^{-9} lbs/day or 8.65×10^{-7} lbs/yr

To achieve the West Virginia water quality criteria, the contributing PCB load needs to be adjusted. Currently, there are no known direct discharges of PCBs (waste loads are equal to zero), and no known nonpoint source contributions in the Flat Fork. The PCB contamination of the Flat Fork is attributed to historical contributions from the Spencer Transformer site, resulting in accumulation of PCBs in the sediment particulate matter. Based on the above conditions, the allocation of the allowable PCB loading to Flat Fork Creek was attributed to the in-stream sediment (Table 3).

Table 3. TMDL summary

Pollutant	**TMDL (lb/yr)**	**WLA (lb/yr)**	**LA (lb/yr)**	**MOS (lb/yr)**
Total PCBs	8.65×10^{-7}	0	7.79×10^{-7}	8.65×10^{-8}

Wasteload Allocations

No facilities actively contributing PCBs (point sources) were identified in the Flat Fork Creek watershed.

Load Allocations

Review of Superfund sites, under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) found one site was listed for PCB contamination. The site was the Spencer Transformer facility.

Hazardous Waste Site- Spencer Transformer

The Spencer Transformer site is located in the rural area of Roane County, West Virginia, about 2 miles west of Gandeeville, West Virginia. The site is situated at the confluence of tributaries of Flat Fork Creek and is bordered on the east by Roane County Road 13, and on the south by the confluence of two additional tributaries of Flat Fork Creek. It covers around 17 acres, 7 of which are wooded uplands (WV DWR). From 1991 to 1994 the Spencer Transformer site was under Superfund activities for removal and cleanup processes. Detailed information about this site is described in section 3 of the TMDL report.

The load allocation is the amount of pollutant that reaches the waterbody through nonpoint source contributions as well as any natural background in the waterbody itself. The natural background is assumed to be negligible. However, PCBs were introduced to Flat Fork Creek through runoff from

the Spencer Transformer facility and have contaminated the stream sediments. Therefore, the load allocation represents contributions from the streambed sediments due to resuspension and streambank erosion. Currently, there are no other known nonpoint sources of PCBs in the basin.

3) The TMDL considers the impacts of background pollutants.

Nonpoint source contributions of PCBs to Flat Fork Creek might include runoff from contaminated locations, atmospheric deposition, and historically contaminated sediment within the stream or along the stream. There was no evidence or any reason to suspect any other source of PCBs, point or nonpoint in the rural area. Natural and background conditions are considered negligible, so they were omitted as contributing sources. The in-stream water column background concentration of PCBs is assumed equal to zero.

4) The TMDL considers critical environmental conditions.

The 7Q10 flow is used as the critical design condition for calculation of the TMDL. The 7Q10 flow was applied with the assumption that any greater flow would represent an increase in load capacity of the creek, thereby reducing the conservativeness of the TMDL.

5) The TMDL considers seasonal environmental variations.

West Virginia uses 7Q10 flow (the lowest seven day average flow with a recurrence interval of ten years) as the design stream flow for permitting purposes. This low flow represents the minimum in-stream load (assimilative) capacity of Flat Fork Creek. Due to the lack of monitoring data, no relationship between flow and PCB water column concentration could be ascertained. The 7Q10 flow was applied with the assumption that any greater flow would represent an increase in load capacity of the creek, thereby reducing the conservativeness of the TMDL.

6) The TMDL includes a margin of safety.

The margin of safety is intended to add a level of conservation to the analytical process to account for any uncertainty. A ten percent margin of safety was applied to account for uncertainty in this TMDL.

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

The implied decreasing trend of fish tissue concentrations coupled with the only known source of PCBs having been rededicated supports reliance on natural attenuation as an appropriate action alternative to ensure that the TMDL is met and water quality standards are achieved. For more details on reasonable assurance, see section 5.0 of the TMDL report.

8) *The TMDL has been subject to public participation.*

There was one informational meeting held on February 20, 2001 in the watershed to discuss the TMDL process and request information from interested parties. A public hearing was also held August 28, 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 Roane County Reporter on July 19, 2001.