



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
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**Decision Rationale
Total Maximum Daily Loads
For Fecal Coliform Bacteria
In Chesapeake and Ohio Canal**

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Date: _____



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District of Columbia
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For Fecal Coliform Bacteria
December 15, 2004**

I. Introduction

The Clean Water Act (CWA) requires that Total Maximum Daily Loads (TMDLs) be developed for those water bodies that will not attain water quality standards after application of technology-based and other required controls. A TMDL sets the quantity of a pollutant that may be introduced into a waterbody without exceeding the applicable water quality standard. EPA's regulations define a TMDL as the sum of the wasteload allocations (WLAs) assigned to point sources, the load allocations (LAs) assigned to nonpoint sources and natural background, and a margin of safety.

This document sets forth the United States Environmental Protection Agency's (EPA) rationale for approving the TMDLs for fecal coliform bacteria in the Chesapeake and Ohio (C&O) Canal. These TMDLs were established to address impairment of water quality as identified in the District of Columbia's (DC) 1998 Section 303(d) list of impaired waters. The DC Department of Health, Environmental Health Administration, Bureau of Environmental Quality, Water Quality Division, submitted the *Final Total Maximum Daily Load for Fecal Coliform in Chesapeake and Ohio Canal* dated December 2004 (TMDL Report) to EPA for final review which was received by EPA on December 7, 2004.

Based on this review, EPA determined that the following eight regulatory requirements have been met:

1. The TMDLs are designed to implement the applicable water quality standards,
2. The TMDLs include a total allowable load as well as individual waste load allocations and load allocations,
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 margin of safety,
7. There is reasonable assurance that the proposed TMDLs can be met, and
8. The TMDLs have been subject to public participation.

II. Summary

Table 1 presents the 1998 Section 303(d) listing information for the water quality-limited waters of the Potomac River tributaries in effect at the time the consent decree was filed. The District's 2002 Section 303(d) list for the C&O Canal identifies the same pollutants as the 1998 list.

Table 1 - Section 303(d) Listing Information

1998 Section 303(d) List					
Segment No.	Waterbody	Pollutants of Concern	Priority	Ranking	Action Needed
33.	Chesapeake and Ohio Canal	Bacteria	Low	33	Nonpoint Source (NPS) pollution

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 margin of safety value. TMDLs may be revised in order to address new water quality data, better understanding of natural processes, refined modeling assumptions or analysis and/or reallocation.

III. Background

C&O Canal Watershed

The Potomac River watershed covers 14,679 square miles in four states and the District of Columbia. The river is more than 380 miles long from its start in West Virginia to Point Lookout on the Chesapeake Bay.

The Potomac River provides 75 percent of the metropolitan Washington drinking water and all of the District's drinking water. The river also receives discharges from wastewater treatment plants, including the District's Blue Plains Plant and treatment plants for Arlington and Alexandria located just upstream of the DC/MD line. There are no drinking water intakes downstream of the District.

The C&O Canal is located in the Potomac River Basin, and receives much of its water from the mainstem Potomac via intakes located along the length of the Canal. Water also enters the District portion of the Canal from the upstream sections located in Maryland, storm water discharge, and direct runoff from an approximately 100 foot bank area that drains into the Canal.

The Canal is 184.5 miles long and runs parallel to the Potomac River. The District portion of the C&O Canal begins at the mouth of Rock Creek in Georgetown, Washington D.C. and extends approximately 5 miles to the Maryland state line.

Significant urban development occurs in the lower reaches of the Basin in and around the Washington, D.C. metro area. Within the District, the approximately 426 acres from which stormwater discharges into the Canal is comprised mainly of residential lands. Storm runoff flowing directly into the Canal drains urban park land encompassed by the Chesapeake and Ohio Canal National Historic Park, as well as impervious surfaces such as roads.

Consent Decree

This bacteria TMDL was completed by the District to partially meet the fourth-year TMDL milestone commitments under the requirements of the 2000 TMDL lawsuit settlement of *Kingman Park Civic Association et al. v. EPA*, Civil Action No. 98-758 (D.D.C.), effective June 13, 2000, as modified March 25, 2003. Fourth-year milestones also include the development of fecal coliform bacteria TMDLs for Washington Ship Channel, Tidal Basin, and Oxon Run and various metals, organics, and pH TMDLs for Oxon Run, Washington Ship Channel, and Tidal Basin.

IV. Technical Approach

When models are used to develop TMDLs, the model selection depends on many factors, including but not limited to, the complexity of the system being modeled, available data, and impact of the pollutant loading. The District Department of Health (DOH) used the Hydrologic Simulation Program-Fortran (HSPF) model to develop the bacteria TMDLs for the C&O Canal.

HSPF is a hydrologic, watershed-based water quality model. HSPF can explicitly account for the specific watershed conditions, seasonal variations in rainfall and climate conditions, and activities and uses related to fecal coliform loading. The modeling process in HSPF starts with delineating the C&O Canal into smaller segments, entering the physical data that describe each segment, and entering values for the rates and constants that describe the sources and the activities related to the fecal coliform loading in the watershed. Overall, EPA finds that the District's approach is reasonable and appropriate as described in the following sections.

Information used to support the modeling analysis and calibrate the model include meteorological data, and fecal load data. These are used to estimate the percent reduction necessary to meet water quality standards. The water quality model was calibrated between October 1991 to September 1994 and validated with bacteria sampling data for the period from 1994 to 2000. The HSPF model was run for the for the years 1991 to 2002 using weather condition and instream fecal coliform data from this period to capture the range of fecal coliform concentrations under both wet and dry weather conditions. Model inputs include headwater fecal coliform load, nonpoint source fecal coliform load, and stormwater runoff, which are used to estimate average monthly loads to the C&O Canal. Existing fecal coliform loads are

presented as average annual loads based on an actual five-year model simulation period from 1995 to 1999. A range of reduction scenarios were then developed and one was chosen that achieves the applicable fecal coliform standard at all times during model simulations.

V. Discussions of Regulatory Requirements

EPA has determined that these TMDLs are consistent with statutory and regulatory requirements and EPA policy and guidance. EPA's rationale for approval is set forth according to the regulatory requirements listed below.

The TMDL is the sum of the individual waste load allocations (WLAs) for point sources and the load allocations (LAs) for nonpoint sources and natural background and must include a margin of safety (MOS). The TMDL is commonly expressed as:

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

where

WLA = waste load allocation
LA = load allocation
MOS = margin of safety

1. The TMDLs are designed to implement the applicable water quality standards.

The TMDL Report states that the C&O Canal is on the District's 1998 Section 303(d) list of impaired waters for fecal coliform bacteria, because the District's ambient monitoring program disclosed exceedances of the water quality standards.

In the TMDL Report, the District lists the C&O Canal's beneficial water uses as well as the general and specific water quality criteria designed to protect those uses. The designated uses for the C&O Canal are:

- A. Primary contact recreation,
- B. Secondary contact recreation and aesthetic enjoyment,
- C. Protection and propagation of fish, shellfish and wildlife,
- D. Protection of human health related to consumption of fish and shellfish,
and
- E. Navigation.

Table 2 - Water Quality Standards

Fecal Coliform - No./100 ml		
District of Columbia*		
Class of Use	A	B
Bacteriological		
Fecal coliform - maximum 30-day geometric mean for 5 samples	200	1,000

*49 D.C. REG. 3012; and 49 D.C. REG.4854

The TMDL Report specifically identifies the 200 MPN/100 ml as the water quality criterion to be met. Based on EPA’s review of the TMDL report, EPA finds that this TMDL is consistent with previously established TMDLs will adequately achieve and maintain the applicable District’s water quality standards.

2. The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.

The TMDL Report divides storm water discharges into the following categories: separate sewer, nonpoint sources, and upstream loads. EPA guidance memorandum clarifies existing EPA regulatory requirements for establishing wasteload allocations (WLAs) for storm water discharges in TMDLs approved or established by EPA.¹ This document identifies WLAs for storm water discharges, and makes the following key points:

- NPDES-regulated storm water discharges must be addressed by the wasteload allocation component of a TMDL.
- NPDES-regulated storm water discharges may not be addressed by the load allocation (LA) component of a TMDL.
- Storm water discharges from sources that are not currently subject to NPDES regulation may be addressed by the load allocation component of a TMDL.
- It may be reasonable to express allocations for NPDES-regulated storm water discharges from multiple point sources as a single categorical wasteload allocation when data and information are insufficient to assign each source or outfall individual WLAs.

In conformance with this EPA guidance memorandum, the District of Columbia equated the separate sewer category to WLA and the nonpoint source category to LA. Upstream boundary loads were added to account for loads from Maryland. The allocation scenario chosen for the C&O Canal TMDL takes into account the previously established Rock Creek bacteria TMDL which calls for a 95% waste load and load reduction to meet the water quality criteria.

¹Memorandum *Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs*, from Robert H. Wayland, III, Director, Office of Wetlands, Oceans and Watersheds, and James A. Hanlon, Director, Office of Wastewater Management, to Water Division Directors, Regions 1 - 10, dated November 22, 2002.

The C&O Canal TMDL is capable of meeting water quality standards using a 90% reduction of waste loads and loads (Scenario #8), but instead adopts 95% reductions (Scenario #9) to maintain consistency with the Rock Creek bacteria TMDL. EPA finds the District's reduction and allocation strategy acceptable and consistent with previously established TMDLs. The specific waste load and load allocations for the C&O Canal are found in Table 3 - TMDL summary, below.

Table 3 - TMDL Summary (Maximum Annual Loads)

Waterbody	Existing Load (MPN/100 ml)	TMDL (MPN/100 ml)	% Reduction	WLA (MPN/100 ml)	LA (MPN/100 ml)	1% MOS (MPN/100 ml)
C&O Canal	2.75E+13	2.03E+12	93%	7.72E+11	1.15E+12	2.01E+10

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

The C&O Canal's headwater pollutant loads are derived from inputs from Maryland. Maryland's pollutant loads are "background" to the District's portion of the C&O Canal. Maryland's contribution to the pollutant loads has been estimated based on available USGS information from 1991 to 1994. EPA finds this approach reasonable and consistent with previously established District TMDLs.

4. The TMDLs consider critical environmental conditions.

The TMDL Report considers critical environmental conditions in the C&O Canal by evaluating average monthly loads for five years. Model calibration data used data from 1988 to 2000 to represent annual average flows, a wetter than average years, and a drier than average years.

At the Ronald Reagan National Airport, the average annual rainfall for the period of record, 1949 to 1998, is 38.95 inches.² Yearly totals vary, from 26.94 inches in 1965 to 51.97 inches in 1972. Individual events, often hurricanes, can be significant. Hurricane Agnes in 1972 delivered approximately 10 inches of rain in the Washington, DC area. The District selected 1988 to 2000 as their representative rainfall years as shown:

²Study Memorandum LTCP-3-2: Rainfall Conditions, Draft, September 1999.

Table 4 - Average Annual Precipitation Data Collected at Reagan National Airport (Arlington, Virginia)

Year	Average Annual Precipitation (inches/year)
1988	31.7
1989	50.3
1990	40.8
1991	29.6
1992	36.4
1993	41.4
1994	37.6
1995	39.9
1996	50.2
1997	32.2
1998	33.3
1999	40.0
2000	39.3
Average	38.7

5. The TMDLs consider seasonal environmental variations.

The TMDL Report considers seasonal variations by modeling the watershed average monthly loads for five years. EPA finds this approach reasonable and consistent with previously established TMDLs including Rock Creek bacteria TMDL.

6. The TMDLs include a margin of safety.

The Clean Water Act and federal regulations require 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 suggest 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.

The District has chosen to use an explicit margin of safety equal to one percent of the TMDL load. EPA finds this approach reasonable and consistent with previously established TMDLs including Rock Creek bacteria TMDL.

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

Although the current MS4 (municipal separate storm sewer system) permit does not specifically list the C&O Canal bacteria TMDL because the MS4 permit was issued prior to establishing this TMDL, the MS4 permit promotes storm water load reductions and should provide reasonable assurance that the TMDLs will be implemented. The National Park Service has also developed a resource management plan for the Chesapeake and Ohio Canal National Historic Park, which encompasses the entire C&O Canal designed to protect the park's national resources, including water-related resources.

The TMDL Report, *Storm Water Reductions*, lists remediation projects and programs undertaken by the District to improve water quality. EPA finds the District's approach reasonable and consistent with previously established TMDLs.

8. The TMDLs have been subject to public participation.

DC public noticed an October 2004 version of this TMDL with the comment period closing on November 1, 2004. The TMDL report was placed in the Martin Luther King Jr. Library and a public notice was published in the D.C. Register. In addition, EPA requested the District to use their e-mail list from the TMDL meetings to notify the interested parties of public comment period extensions. EPA finds all interested parties have had adequate time to comment on this TMDL.

Comments were received from Earthjustice Legal Defense Fund. As part of DC's TMDL submittal, a response to comments document was submitted by the District to EPA via e-mail.