



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

**Decision Rationale
Total Maximum Daily Loads
For Fecal Coliform Bacteria
In Tidal Basin and Washington Ship Channel**

**Jon M. Capacasa, Director
Water Protection Division**

Date: _____



**Decision Rationale
District of Columbia
Total Maximum Daily Loads
Tidal Basin and Washington Ship Channel
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 Tidal Basin and Washington Ship Channel. 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 Tidal Basin and Washington Ship Channel* 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 added a pH impairment to the Tidal Basin.

Table 1 - Section 303(d) Listing Information

1998 Section 303(d) List					
Segment No.	Waterbody	Pollutants of Concern	Priority	Ranking	Action Needed
18.	Washington Ship Channel	Bacteria, organics, and pH	Low	18	Point and Nonpoint Source (NPS) pollution
32.	Tidal Basin	Bacteria and organics	Low	33	Nonpoint Source (NPS) pollution
2002 Section 303(d) List					
Listing Year	Waterbody	Pollutants of Concern	Priority Ranking	TMDL Establishment Date	
2002	Tidal Basin	pH	Medium	August 2008	

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

Tidal Basin and Washington Ship Channel 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 Washington Ship Channel and Tidal Basin are man-made waterbodies located east of the Potomac River and were built in the late 19th century by the Army Corps of Engineers. The Washington Ship Channel runs from Hains Point at the confluence of the Anacostia and Potomac Rivers to the Tidal Basin. The primary purpose of the Tidal Basin is to flush the Washington Ship Channel with the freshwater of the Potomac River. Parklands/grass areas make up about 43 percent of the Tidal Basin watershed while 53 percent of the Washington Ship Channel watershed is comprised of government, commercial, and residential development. Recreational grass and parklands are found along the southern bank of the Ship Channel.

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 C&O Canal 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 DOH used an integrated modeling approach to develop the bacteria TMDLs for the Tidal Basin and Washington Ship Channel. The general framework uses the Environmental Fluid Dynamics Code (EFDC) model, which couples hydrodynamics, sediment transport, eutrophication, and toxics. Because EFDC does not simulate pH, a pH-alkalinity model was added into the EFDC model for simulating fate and multiple modes of transport (free-swimming and sediment). The model design also simulates water quality, and pH. It utilizes a model grid structure divided into 265 active cells fitting the boundaries of each stream segment. 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, tidal elevation, flood gate operation, and stormwater runoff data combined with total suspended solids (TSS) and fecal coliform information. These are used to estimate the percent reduction necessary to meet water quality standards. The model is constructed using weather conditions from 1988, 1989, and 1990. Model inputs include runoffs from the storm water system, direct runoffs from park areas, and direct deposits from waterfowls, which are used to estimate average monthly loads to the Tidal Basin and Washington Ship Channel. Illicit and cross connections between sanitary and storm sewers however, were not accounted for in the model due to data limitations.

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 Tidal Basin and Washington Ship Channel are 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 Tidal Basin and Washington Ship Channel’s beneficial water uses as well as the general and specific water quality criteria designed to protect those uses. The designated uses for Tidal Basin and Washington Ship Channel 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 and the water quality criterion to be met. The method of analysis used by the District reallocated the total bacterial load causing reductions in separate storm water and direct runoff loads and assigning these reductions to the margin of safety. Specifically, the separate storm water and direct runoff loads for both the Tidal Basin and Washington Ship Channel, respectively, were each reduced by ten percent and this reduction was assigned to the margin of safety. The total average annual load to the Tidal Basin and Washington Ship Channel however, remained constant and continues to

meet water quality standards.¹ Table 3 details the TMDL allocations. Based on EPA's review of the TMDL report, EPA finds that this TMDL 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 stormwater, direct runoff, and direct deposit. EPA guidance memorandum clarifies existing EPA regulatory requirements for establishing wasteload allocations (WLAs) for NPDES storm water discharges in TMDLs approved or established by EPA.² Therefore, this document identifies WLAs for storm water discharges.

The key points established in the memorandum are:

- 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.
- The wasteload allocations for NPDES-regulated municipal storm water discharge effluent limits should be expressed as best management practices.

The November 2002 memorandum recognizes that WLA/LA allocations may be fairly rudimentary because of data limitations. The District of Columbia divided the Tidal Basin and Washington Ship Channel TMDLs into categories based on separate storm sewers (WLA) and direct runoff plus direct deposits (LA). The specific waste load and load allocations for Tidal Basin and Washington Ship Channel are found in Table 3 - TMDL summary, below and indicate zero percent reductions for both stream segments. The modeling results demonstrate that there is no violation of the water quality bacteria standard under the existing loads. However, ambient water quality modeling will assist in verifying modeling outcomes.

EPA finds the District's reduction and allocation strategy acceptable and consistent with previously established TMDLs.

¹The Anacostia River mainstem TMDLs approved by EPA for fecal coliform bacteria requires a 90 percent reduction all storm water loads.

²Memorandum *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.

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)	10% MOS (MPN/100 ml)
Tidal Basin	5.28E+16	5.28E+16	0%	1.44E+14	5.27E+16	2.90E+13
Washington Ship Channel	2.30E+16	2.18E+16	0%	4.76E+14	2.12E+16	7.52E+13

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

Tidal Basin and Washington Ship Channel's background pollutant loads are made up from inputs from the direct runoff, direct deposits, and separate storm water sewers. The Tidal Basin's headwater pollutant loads are derived from inputs from the Potomac. The Washington Ship Channel was also analyzed for its upstream contribution to the Anacostia River. Because the Washington Ship Channel meets bacteria water quality standards at all times, its allocations are consistent with those for the Anacostia. The Potomac's and the Washington Ship Channel's contribution to the down stream pollutant loads has been estimated based on model simulation runs from 1988 to 1990. EPA finds this approach reasonable and consistent with previously established TMDLs.

4. The TMDLs consider critical environmental conditions.

The TMDL Report considers critical environmental conditions in Tidal Basin and Washington Ship Channel by evaluating average monthly loads for three years. The three years represent average flow, a wetter than average year, and a drier than average year.

At the Ronald Reagan National Airport, the average annual rainfall for the period of record, 1949 to 1998, is 38.95 inches.³ 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 1990 as their representative rainfall years as shown:

Table 4 - Rainfall

Year	Annual Rainfall (inches)	Representing
1988	31.74	10 percentile, dry year
1989	50.32	90 percentile, wet year
1990	40.84	median, approx. 38 percentile

(LTCP-3-2, September 1999)

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

EPA finds the District's approach reasonable and consistent with previously established TMDLs.

5. The TMDLs consider seasonal environmental variations.

The TMDL Report considers seasonal variations by modeling the watershed average monthly loads for three years. EPA finds the District's approach reasonable and consistent with previously established TMDLs.

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 ten percent of the TMDL load. EPA finds the District's approach reasonable and consistent with previously established TMDLs.

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 this TMDL because it was issued prior to establishing this TMDL, the MS4 promotes storm water load reductions. Additionally, the WWII Memorial permits provides regulatory authority to require providing reasonable assurance that the TMDLs will be implemented. The District of Columbia has, along with federal partners, begun to investigate potential cross-connections and DC Water and Sewer Authority (WASA) has undertaken a citywide sanitary sewer system investigation.

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 these TMDLs on October 29, 2004, with the comment period closing on November 29, 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 for the TMDL meetings to notify the interested parties of public comment period extensions. EPA believes all interested parties have had adequate time to comment on these TMDLs.

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

