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
Rock Creek

Approved

_____*John A. Armstead for*____
Jon M. Capacasa, Director
Water Protection Division

Date: _*2/27/2004*________

Decision Rationale
District of Columbia
Total Maximum Daily Loads
for
Fecal Coliform Bacteria
in
Rock Creek
February 27, 2004

I. Introduction

The Clean Water Act (CWA) requires that Total Maximum Daily Loads (TMDLs) be developed for those waterbodies 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 metals in the mainstem Rock Creek. 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 Divistion, submitted the *Total Maximum Daily Loads for Fecal Coliform Bacteria in Rock Creek*, dated February 2004 (TMDL Report), to EPA for final review which was received by EPA on February 9, 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 Rock Creek and tributaries in effect at the time the consent decree was filed.

Table 1 - 1998 Section 303(d) Listing Information

1998 Section 303(d) list					
Segment No.	Waterbody	Pollutants of Concern	Priority	Ranking	Action Needed
15.	Upper Rock Creek (from Pierce Mill Dam to MD/DC line)	Bacteria, organics, and metals,	Medium	15	Control Upstream, CSO and Nonpoint Source (NPS) pollution
16.	Lower Rock Creek (from Potomac River to National Zoo below Pierce Mill Dam)	Bacteria, organics, and metals	Medium	16	Control CSO and Nonpoint Source (NPS) pollution
17.	Soapstone Creek	Organics	Low	19	Control Point and NPS pollution
21.	Broad Branch	Organics	Low	21	Control NPS pollution
24.	Klingle Valley Creek	Organics	Low	24	Control CSO and NPS pollution
25.	Luzon Branch	Organics	Low	25	Control CSO and NPS pollution
28.	Pinehurst Branch	Organics	Low	28	Control NPS pollution
30.	Piney Branch	Organics and metals	Low	30	Control NPS pollution and CSO

Note: Rock Creek Tributary TMDLs are addressed in a separate TMDL Report.

DC's 2002 Section 303(d) list of impaired waters includes fecal coliform for each of the above Rock Creek tributaries. These TMDL's approved today address only the bacteria impairments on the Upper and Lower Rock Creek segments. The District has scheduled TMDL development for those tributaries between August 2008 and April 2009.[1]

Maryland's 1998 Section 303(d) list of impaired waters included Rock Creek for fecal coliform. Maryland's 2002 Section 303(d) list of impaired waters adds biological, nutrients, and suspended solids as impairing substances to Rock Creek.

[1]Schedule contained in the District's 2002 Section 303(d) list of impaired waters.

The following summary table is discussed in Section V.2.

Table 2 - TMDL Summary - Average Annual Fecal Coliform Loads in Rock Creek (MPN[1])

Upper Rock Creek		
Source	Existing Loads	TMDL/Allocated
Upstream	9.917e+14	4.909e+13
Separate Storm Water - WLA	1.265e+15	6.266e+13
Direct Storm Runoff - LA	6.875e+13	3.403e+12
1% Margin of Safety		1.163e+12
Total	2.325e+15	1.163e+14
Lower Rock Creek		
Upstream	2.325e+15	1.151e+14
CSO - WLA	1.860e+15	1.360e+14[2]
Separate Storm Water - WLA	4.457e+14	2.206e+13
Direct Storm Runoff - LA	5.371e+13	2.659e+12
1% Margin of Safety		1.413e+12
Total	4.685e+15	2.772e+14

[1]Most Probable Number is a statistical estimation of bacteria count based on a specific analytical method

[2]The CSO loads are not reduced by the MOS

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

Rock Creek Watershed

Rock Creek flows through Montgomery County, Maryland, and the northwest portion of Washington, DC, to join with the Potomac River. The watershed is 76.5 square miles with 15.9 square miles in DC or approximately 21 percent in DC and 79 percent in Maryland (USGS, 2002). The Rock Creek basin is part of the Middle Potomac-Anacostia-Occoquan watershed (Hydrologic Unit Code 02070010).

The total length of Rock Creek is approximately 33 miles from Llaytonsville, Maryland, to its confluence with the Potomac River. The District's Upper Rock Creek is 5.9 miles long and Lower Rock Creek is 3.6 miles long. Only about the last quarter mile of Lower Rock Creek is tidal. A USGS gaging station is located at Sherrill Drive (USGS 01648000).

The District's portion of the Rock Creek watershed is heavily urbanized as shown in Table 3.

Table 3 - Land Use in the Rock Creek Watershed (acres)

	Water/ Wetland	Low Intensity Residential	High Intensity Residential/	Forest/ Grassland	Agriculture
District of Columbia	1	9,980	1,402	201	384
Maryland	895	7,620	3,270	15,287	10,853
Total	896	17,600	4,672	15,488	10,304

Agriculture includes urban recreational grasses (USGS, 2002)

The heavily urbanized nature of the Rock Creek watershed makes it susceptible changes resulting from the episodic nature of rainfall and runoff. For example, in 1989 the bed material was comprised of cobbles but by 1999, the cobbles are covered with sand.

As part of the formulation of the DC Washington Area Sewer Authority (WASA) Long Term Control Plan (LTCP) (2002), a statistical analysis of the rainfall records from Ronald Reagan National Airport was performed. The analysis identified a dry year, a wet year, and an average rainfall year, which are the consecutive years 1988, 1989, 1990. The flow for these representative years was used in the modeling for the TMDLs. The average flow based on the USGS gage at Sherrill Drive (USGS 01648000) is presented for the representative years in Table 4.

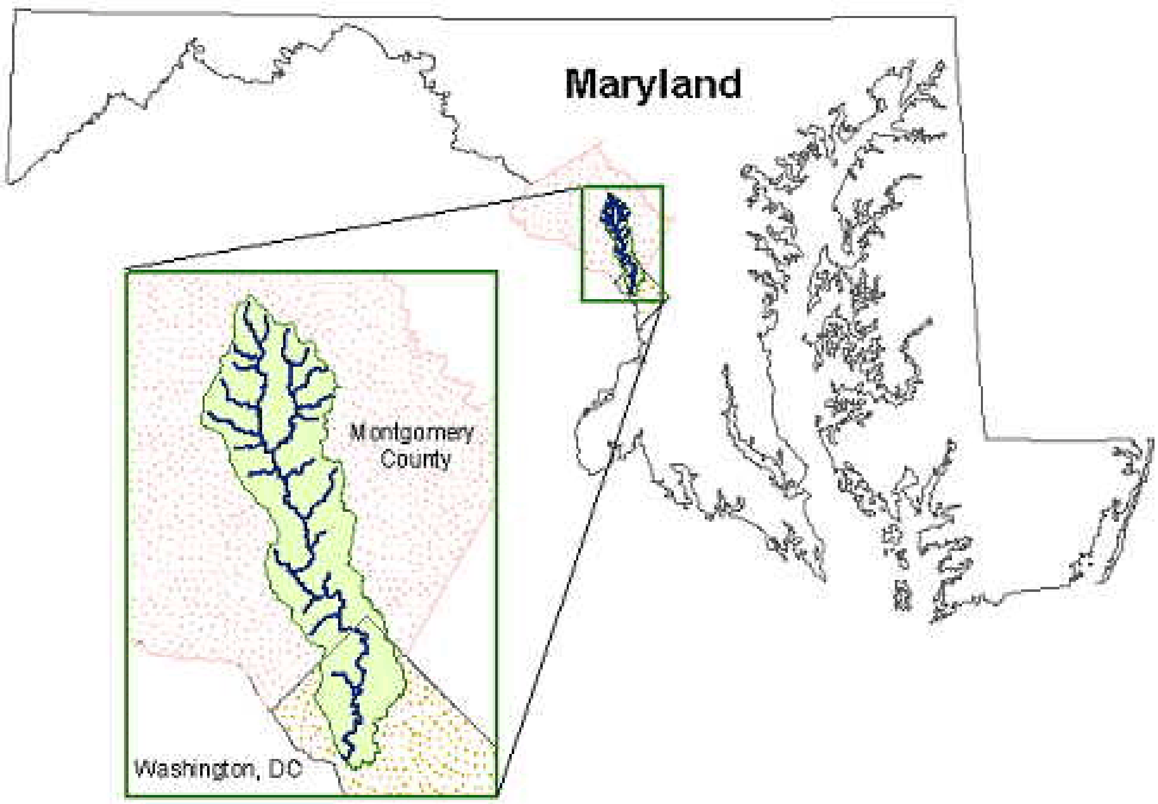

Figure 1 - Rock Creek Watershed

Figure 2 - Rock Creek Tributaries

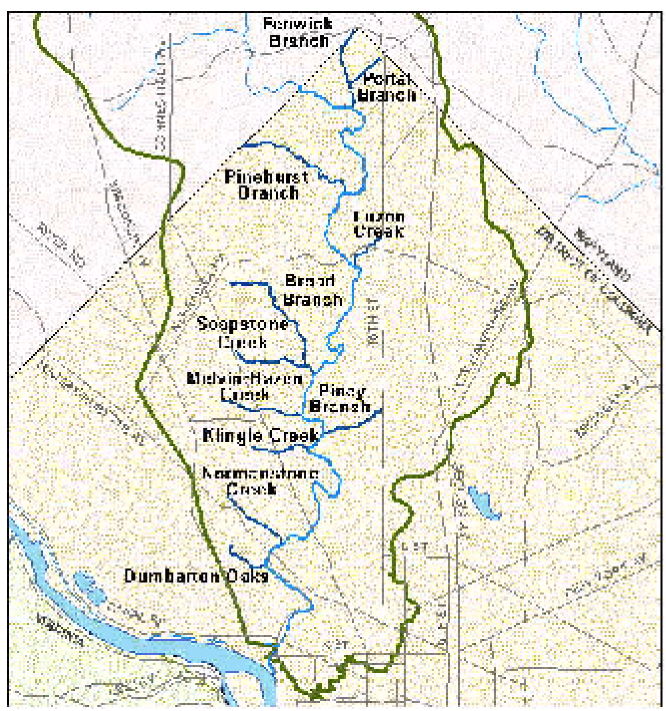

Table 4 - Total Precipitation and Average Flow Data

Year	Total Precipitation (in)	Days of Precipitation	Average Flow in Rock Creek (cfs)
1988	31.7	107	56.6
1989	50.3	128	81.8
1990	40.8	127	77.9

(LTCP)

Combined sewer overflows (CSOs) are a contributor of fecal coliform bacteria to the creek.[2] CSOs drain approximately 5.7 square miles of in the District of Columbia with 28 CSO outfalls draining into Rock Creek or a tributary. The CSO outfall with the largest drainage area, and flow, discharges to Piney Branch.

The management of CSOs is the responsibility of the WASA, an independent agency of the District of Columbia which is responsible for the District's combined sanitary and storm sewers, sanitary sewers, and the waste water treatment plant at Blue Plains. WASA developed a Long-Term Control Plan (LTCP) for the District's CSOs, dated July 2002, and submitted it to EPA for review. WASA has chosen a "demonstration approach" for the design of the LTCP, meaning that it is designed to achieve applicable water quality standards.[3] As part of the LTCP, computer simulation models of the District's combined sewer and storm water system were constructed. Those models were used to simulate current conditions and alternative management plans. WASA's recommended LTCP separates some combined sewers into sanitary and storm water systems and limits discharges to an annual average of one to four discharges per year during the representative three years of modeling described in the LTCP (page 11-36). The average annual volume of CSO discharges is reduced from 221 mgal to 5 mgal.

Rock Creek Tributaries

The tributaries described below comprise approximately 86 percent of all of the District's Rock Creek tributaries in drainage areas.

Piney Branch

Piney Branch is a concrete-lined channel which runs approximately three-quarters of a mile through a strip of forested parkland about 1,000 yards wide before it enters Rock Creek from the east above the National Zoo. The Piney Branch watershed is the largest of all the District's Rock Creek tributaries. The watershed comprises 2,500 acres and is completely within

---

[2]Although sampling for the LTCP was performed, analytical methods' detection levels were not low enough to quantify the organics concentration. (ICPRB, 2003)

[3]EPA's 1994 CSO Policy, 59 FR 18688

the District of Columbia. The large size of the watershed compared to the short stream length results from the extensive system of combined sewer and storm sewer systems that discharge to Piney Branch. The surface stream portion of the watershed is surrounded by predominantly forested parkland, and comprises about five percent of the entire watershed. The rest of the watershed is primarily urban residential and some light commercial. Piney Branch is approximately 12 feet wide and has a depth of about four inches. CSOs 046 through 048 discharge to Piney Branch.

Pinehurst Branch

Pinehurst Branch originates at the DC/Maryland state line in Chevy Chase Manor, Maryland, traveling about 1.3 miles east-southeast to its confluence with Rock Creek. The 619-acre Pinehurst watershed includes mainly urban land uses, with 70 percent residential and commercial, and the 30 percent parklands. About 70 percent of the watershed lies in the District, with the remaining in Montgomery County, Maryland. The average gradient of the stream is approximately two percent over its entire length. Pinehurst Branch is shallow with a depth of about five inches. Evidence of the stream topping its banks suggests high flows are common and easily top their relatively low banks.

Broad Branch

Broad Branch is about a two-mile long western tributary of Rock Creek beginning near Nebraska and Connecticut Avenues although its sewersheds extend to the DC/MD line. It is joined by Soapstone Creek about 800 feet before discharging into Rock Creek. For half of its length, Broad Branch is bordered on one side by National Park Service parkland and on the other side by Broad Branch Road which directly abuts it. The lower reach of the stream travels through Rock Creek Park and is bordered by an approximately 200-foot buffer of tree and shrubs. The Broad Branch watershed encompasses 1129 acres. Fifteen percent of the watershed is parkland, while the remaining area is residential and retail commercial. The stream is about 25 feet wide with a very shallow depth of approximately three inches.

Soapstone Branch

Soapstone Creek, a Broad Branch tributary, joins Broad Branch just before Broad Branch's confluence with Rock Creek. The watershed covers 520 acres and is mostly urban, with approximately 15 percent parkland and forest in the lower reaches of the creek. The northern quarter of the urban watershed is densely populated residential property. The southwestern quarter of the watershed is much less densely populated residential and commercial property. Soapstone Creek runs about 0.9 miles through a steep-sided heavily wooded valley about 500 yards wide. The average channel width is approximately 15 feet.

Luzon Valley

Luzon Branch is an eastern tributary of Rock Creek. It travels roughly half a mile southwest and empties into Rock Creek at Joyce Road. The stream's watershed measures about

648 acres, with almost 90 percent of the watershed is residential and light commercial, and the rest is parkland. The stream is buffered by 100-1000 foot of parkland. Luzon Branch is approximately 26 feet wide, and has a depth of about seven inches and a flow of about 0.8 cubic feet per second. The combined sewer system was separation was completed in 2002.

Other Tributaries

Other, smaller tributaries are Fenwick Branch, Portal Branch Melvin Hazen Valley Branch, Klingle Valley Creek, Normanstone Creek, and Dumbarton Oaks.

Consent Decree

These metals TMDLs were 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 include the development of TMDLs for various combinations of the Rock Creek and tributaries for organics, metals, and/or bacteria.

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. In this case, the model used for the metal TMDLs was a modified version of the model developed by WASA for the LTCP.

SWMM is one of several urban runoff models but has been extensively used by both public and private engineers. SWMM simulates real storm events on the basis of rainfall and other meteorological inputs, and system characterization to predict both volume and quality. System characteristics include: (1) catchment area and type, (2) conveyance, and (3) storage/ treatment. The LTCP and these TMDLs use the SWMM model to assess and compare the relative impact of CSOs, storm water, and upstream loads under a range of storm events and environmental conditions. The LTCP also used SWMM to forecast the improvements from proposed CSO control alternatives and assess the LTCP's compliance with water quality standards and the LTCP's contribution to other applicable water quality goals.[4]

The Rock Creek modeling used two SWMM modules: RUNOFF which calculated the upstream flow from each subwatershed, and TRANSPORT which transported flow and pollutant loads in the Rock Creek stream channel. The LTCP model considered fecal coliform, E. coli, five-day biochemical oxygen demand ($CBOD_5$), and total suspended solids (TSS).

Rock Creek was divided into 40 one-dimensional segments, starting at segment one at the confluence with the Potomac River and segment 40 at the DC/MD line. Piney Branch is the only tributary simulated by three segments joining segment 17. Piney Branch was simulated because of the large CSO discharges it receives.

The model predicts fecal coliform, E. coli, CBOD, and TSS concentrations at an hourly time step for each of the 43 model segments. The data is then averaged to generate daily values.

The model was calibrated with data from October 1999 to June 2000 while the TMDLs were developed based on the three-year forecast period 1988 to 1990, consistent with the LTCP and other District TMDLs.

Four different sources of flow were used for modeling Rock Creek described below.

Upstream flow from Maryland was based on data recorded at the USGS gage in the District at Sherill Drive. First the flow was reduced in order to estimate Rock Creek flow from Maryland to the District based on the ratio of drainage area above the DC/MD line and the gage's drainage area. Then the gage's daily flow was divided into a constant hourly flow because the time step used in the model was one hour. Rock Creek has a steep gradient with rapid changes in elevation and a short residence time, approximately eight hours.

---

[4] *Study Memorandum LTCP-6-6: Rock Creek Model Documentation, Draft,* August 2001.

Storm water and combined sewer flow to Rock Creek was estimated as part of the LTCP. Each flow was distributed to appropriate model segments. Each of these flows is permitted and is a point source. Because of the complex nature of the hydrology and hydraulics governing the combined sewer system (CSS), a comprehensive model was required to relate the occurrence of CSO outfall events to a system-wide precipitation event. The model needed to be sufficiently detailed to allow prediction of overflow events observed during the monitoring period and flexible enough to allow modification that accurately characterize the implementation of future long-term control options. (Study Memorandum LTCP-5-4) The selected model is the propriety program MOUSE by the Danish Hydraulic Institute.

The MOUSE hydrology characterization consists of 969 separate catchment areas, each with its own associated hydrologic parameters. The MOUSE network is comprised of six element types: (1) manholes, (2) basins, (3) outlets, (4) weirs, (5) pumps, and (6) pipes or (7) custom cross-sections. MOUSE input data includes several separate time series databases. Types of data include rainfall, water level (tide), and discharge. The systems diversion structures, inflatable dams and dynamic gates, and pumping stations were also modeled.

The combined sewer system has evolved over the years. In 1960 the District adopted a policy to separate the system over time. Separation projects undertaken in several smaller drainage areas on the west side of Rock Creek but construction difficulty brought the project to a halt. In 1970 and 1973 feasibility studies were performed regarding off-line storage. However, both studies were rejected by the District because of the costs involved.

In the early 1980s, another attempt at CSO discharge abatement was made. A two-phase program was developed that focused primarily on overflows to the Anacostia River. Phase I was completed in 1991. Phase I consisted of a 400 million gallons per day (mgd) CSO treatment facility, the Northeast boundary Swirl Facility, and installation of inflatable dams at eight of the largest CSOs. Phase II, consisting of two additional swirl concentrator facilities, a sewer separation project, and a screening facility for the Piney Branch drainage area, was never implemented because of lack of funding (LTCP). A 1998 evaluation of WASA's pumping stations and conveyance system recommended rehabilitation of restore capacity.

MOUSE was also used to develop storm sewer volumes during the representative three-year period of analysis, 1988 to 1990. The year 1988 was a dry year with a total rainfall of 31.74 inches, 1989 was a wet year with 50.32 inches of rain, and 1990 was an average year with 40.94 inches of rain. This TMDL and the previous Anacostia River TMDLs for biochemical demand and total suspended solids also used the same period of analysis. EPA finds that the use of these representative years is appropriate.

Fourth, storm water draining directly into Rock Creek needed to be estimated. Compared to many of the District's other waterbodies, a large portion of the drainage area drains directly into Rock Creek. A variation of the rational equation, a very simple rainfall runoff equation, was used. This runoff represents the storm water nonpoint sources.

The following concentrations were used in the Rock Creek modeling for these TMDLs. Storm water, combined sewer, and upstream concentrations were developed for the LTCP. The storm water and combined sewer event mean concentrations (EMC) were based on both historical and current sampling results, including the Nationwide Urban Runoff Program (NURP) sampling in 1983, and the upstream EMCs were based on Montgomery County's sampling results.

Table 5 - Event Mean Concentrations by Source

Parameter	Source			
	Storm Water	Combined Sewer	Upstream	
			Base Flow	Storm Flow
Fecal Coliform - MPN/100 ml	28,265	36	280	2,100

(LTCP Study Memorandums LTCP-5-8,September 2000, and LTCP-6-6, August 2001)

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:

$$TMDL = \sum WLAs + \sum LAs + MOS \text{ (+upstream loads)}$$

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 designated uses for Rock Creek 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.

For purposes of the bacteria impairment identified on the District's 1998 Section 303(d) list, the TMDL Report notes that these bacteria TMDLs are designed to "achieve or exceed water quality standard[s] as measured by fecal coliform as indicator organism" for two of those uses: Class A (primary contact recreation) and B (secondary recreation and aesthetic enjoyment).[5] The District's definition of primary contact recreation is "those water contact sports or activities that result in frequent whole body immersion or involve significant risks of ingestion of the water."

The majority of the Rock Creek Watershed lies in Maryland. Therefore, consistent with the Clean Water Act, the Rock Creek waters crossing the DC/Maryland border must meet the District's water quality standards at the border.

---

[5] The numeric standards for fecal coliform only apply to Class A and B uses since exposure to bacteria is normally express through illnesses related to human contact, *i.e.*, primary and secondary contact recreation.

Table 5 - 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
Maryland**		
Bacteriological	Public health	
Fecal coliform - maximum log mean based on not less than 5 samples over any 30-day period, or	200	
Fecal coliform - maximum value which may exceeded during any 30-day period by less than 10% of total number of samples taken	400	

*49 D.C. REG. 3012; and 49 D.C. REG.4854
**COMAR 26.08.02.03-3

Table 7 - Comparison of Fecal Coliform Geometric Means Between Existing and TMDL Scenarios

Criteria	Model Segment					
	1	7	12	17	18	40
Existing Conditions						
No. of Months where Geomean > 200 MPN/100 ml	12	12	12	12	12	12
No. of Months where Geomean > 1000 MPN/100 ml	7	8	9	11	18	0
TMDL Allocation Run						
No. of Months where Geomean > 200 MPN/100 ml	0	0	0	0	0	0
No. of Months where Geomean > 1000 MPN/100 ml	0	0	0	0	0	0

The District also considered Maryland’s water quality standards in selecting the TMDL allocations.

Table 8 - Average Number of Days Exceeding 400 MPN/100 ml

Fecal Coliform # of days > 400 MPN/100ml						
Month	Segment No.					
	1	7	12	17	18	40
1	<1	<1	<1	<1	<1	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	<1	<1	<1	<1	0	0
6	<1	<1	0	0	0	0
7	1	1	0	0	0	0
8	<1	<1	0	0	0	0
9	1	1	<1	<1	<1	0
10	1	1	1	1	<1	0
11	<1	<1	<1	<1	0	0
12	<1	<1	<1	<1	<1	0
Total	4	4	2	2	1	0
% Year	1%	1%	1%	1%	0%	0%

The “<1" in the above table represents one exceedance is the three-year period of analysis and the “1" represents two exceedances in the three-year period of analysis.

The Rock Creek TMDL and LTCP Reports and the modeling demonstrate that water quality standards are met in the Rock Creek mainstem. The tributaries identified in Section III have storm water loads, and percent reductions, as part of the TMDL scenario but the tributaries themselves have not been modeled, *i.e.*, there is no demonstration that water quality standards will be met. The exception is Piney Branch which has been modeled as model segments 41 through 43. The modeling was developed for the LTCP which is primarily concerned with wet weather conditions and does not simulate dry weather flow, and wet wether flow (storm water and CSO flow) does not achieve water quality standards. Based on the District’s TMDL schedule, attached to the District’s 2002 Section 303(d) list, EPA expects the District to establish the tributory bacteria TMDLs between 2008-2009.

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

The TMDL Report identifies the CSOs as permitted point sources and correctly divides storm water discharges into WLA or LA, consistent with EPA guidance. EPA guidance memorandum clarifies existing EPA regulatory requirements for establishing wasteload allocations (WLAs) for storm water discharges in TMDLs approved or established by EPA.[6]

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 does recognize that WLA/LA allocations may be fairly rudimentary because of data limitations. However, because the original Rock Creek model was developed for the LTCP, the separate storm sewer system discharges were modeled separately from storm water that discharges directly into Rock Creek.

Bacteria TMDLs were developed for both the Upper and Lower Rock Creek, consistent with the District's 1998 Section 303(d) list and the Consent Decree. Water quality standards are attained for the entire length of those segments.

The TMDL Report requires the reductions from existing loads in Table 6 by source type as follows:

- Upstream loads - 95 percent
- Storm water loads - 95 percent
- Combined sewer loads - 92.7 percent

Because most of the loading to Rock Creek is precipitation induced, TMDL, WLA, and LA loads are shown as average annual loads. EPA believes that this representation is appropriate because of the intermittent nature of the discharge of this pollutant.

The following table contains the Rock Creek bacteria TMDLs and combines similar sources.

---

[6]Memorandum *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 6 - Average Annual Fecal Coliform Loads in Rock Creek (MPN / 100 ml/year)

Upper Rock Creek		
Source	Existing Loads	TMDL/Allocated Loads
Upstream	9.917e+14	4.909e+13
Separate Storm Water - WLA	1.265e+15	6.266e+13
Direct Storm Runoff - LA	6.875e+13	3.403e+12
1% Margin of Safety	NA	1.163e+12
Total	2.325e+15	1.163e+14
Lower Rock Creek		
Upstream	2.325e+15	1.151e+14
CSO - WLA	1.860e+15	1.360e+14
Separate Storm Water - WLA	4.457e+14	2.206e+13
Direct Storm Runoff - LA	5.371e+13	2.659e+12
1% Margin of Safety	NA	2.772e+12
Total	4.685e+15	2.772e+14

[1]The CSO loads are not reduced by the MOS

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

All of Maryland's pollutant loads are "background" to the District's portion of the Rock Creek. Maryland's contribution to the pollutant loads has been estimated based on available information. Maryland currently lists Rock Creek for biological impairment, source unknown, and fecal coliform. TMDLs will be developed.

4. The TMDLs consider critical environmental conditions.

The TMDL Report considers critical environmental conditions by modeling the watershed using daily simulations for three years. The three years represent average, a wetter than average year, and a drier than average year rainfall in the District.

The average annual rainfall for the period of record, 1949 to 1998, is 38.95 inches at the Ronald Reagan National Airport.[7] 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:

---

[7]*Study Memorandum LTCP-3-2: Rainfall Conditions*, Draft, September 1999.

Table 10 - 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

(Study Memorandum LTCP-3-2, September 1999)

5. The TMDLs consider seasonal environmental variations.

The TMDL Report considers seasonal variations by modeling the watershed using daily simulations for three years with seasonal data as appropriate.

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 in addition to any other conservative assumptions used in the modeling except that the MOS is not applied to the CSO discharge.

In developing the LTCP, it was realized that controlling CSO discharge without controlling other sources of fecal coliform would not result in attaining instream water quality standards. One of the analyses performed evaluated the influence of the CSO discharge on instream water quality. Not only was the 200 MPN/100 ml geometric mean criterion evaluated but 200 MPN/100 ml as a maximum value was also evaluated. The LTCP analysis indicates that the when the LTCP implementation is complete, the geometric mean criterion will not be exceeded and the 200 MPN/100 ml as a maximum will be exceeded once during an average year. Therefore, the LTCP was developed including an implicit MOS and EPA feels it is not necessary to apply the second, one percent, MOS. EPA concurs with the District's decision not to apply the MOS reduction to the CSO discharge.

With respect to CSO loads, there is an implicit margin of safety, the recognized "first flush" effect. If the CSO concentrations were constant over time, capturing 92 percent of the volume captures 92 percent of the load; however, as concentrations are generally higher for the first one-half inch of storm water runoff, capturing 92 percent of the volume captures more than 90 percent of the storm water part of the load. The relative proportion of storm water to sanitary flow determines the size of the margin of safety.

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

The load reductions identified as WLAs will be implemented as part of NPDES permits in the District. The combined sewer discharge reductions will be addressed by the Blue Plains NPDES permit for wastewater treatment facility and CSO outfalls. The MS4 (municipal separate storm sewer system) permit and the NPDES storm water permits both provide regulatory authority to require storm water load reductions consistent with the WLAs, providing reasonable assurance that the TMDLs will be implemented.

The TMDL Report, Implementation, refers to the Chesapeake Bay Agreement, Maryland's commitment to the Bay Agreement, Prince Georges and Montgomery Counties aggressive storm water management programs, and the District's storm water management programs and best management practices as a further assurance demonstration that the TMDLs will be implemented.

Actual stream restoration activities have begun in Rock Creek, although not related to the bacteria impairment. As part of the environmental mitigation plan for the Woodrow Wilson Bridge Project, upstream fish migration barriers will be removed at eight locations in Rock Creek, including a fishway at Peirce Mill Dam.

EPA finds there is reasonable assurance that these TMDLs can be met.

8. The TMDLs have been subject to public participation.

DC public noticed a October 2003 draft TMDLs for Fecal Coliform Bacteria in Rock Creek on October 31, 2003, with comments due November 31 (*sic*), 2003. The TMDLs was placed in the Martin Luther King Jr. Library. Although the public notice was published in the D.C. Register, a subscription is required to access the Register on line. In addition, the District used their e-mail list for the TMDL meetings to notify the interested parties of public comment period. EPA believes all interested parties had adequate notice of these TMDLs.

The District and WASA held monthly technical (modeling) meetings where interested parties were briefed on the technical progress toward the District's Anacostia River TMDLs and WASA's LTCP.

A response to comments document was included in the TMDL package submittal. In addition to EPA's comments, comments were received from Earthjustice Legal Defense Fund, and the District of Columbia Water and Sewer Authority.

EPA finds that there has been adequate public participation.