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

Decision Rationale
Total Maximum Daily Loads
Rock Creek
For Metals

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
Rock Creek
For Metals
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 Division, submitted the *Total Maximum Daily Loads, for Metals in Rock Creek,* dated February 2004 (TMDL Report), to EPA for final review which was received by EPA on February 25, 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.

Section V.2. contains tables for copper, lead, zinc, and mercury identifying the TMDLS, WLAs, LAs, and allocated loads to tributaries. The allocated loads are one scenario of tributary loads which allow Rock Creek to achieve and maintain water quality standards. Allocated tributary loads are not TMDL loads in that no presumption of achieving and maintaining instream water quality standards is made for the tributaries. Concurrently with approving these TMDLs for Rock Creek, EPA is approving Rock Creek Tributary TMDLs for Organics and Metals. Piney Branch is the only tributary which is also listed for metals. It should be noted that the Piney Branch TMDLs for copper, lead, and zinc are more stringent than Rock Creek TMDLs allocations for Piney Branch. Any NPDES permits with effluent limits for metals shall be consistent with the approved TMDLs. The Piney Branch tributary allocations contained in this decision rationale shall not be used in establishing NPDES effluent limits for metals.

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
22.	Dumberton Oaks	Organics	Low	22	Control NPS pollution
23.	Fenwick Branch	Organics	Low	23	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
26.	Melvin Hazen Valley Branch	Organics	Low	26	Control CSO and NPS pollution
27.	Norman Stone Creek	Organics	Low	27	Control NPS pollution

1998 Section 303(d) list					
Segment No.	Waterbody	Pollutants of Concern	Priority	Ranking	Action Needed
28.	Pinehurst Branch	Organics	Low	28	Control NPS pollution
27.	Portal Branch	Organics	Low	29	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 added fecal coliform as a pollutant of concern for each of the above Rock Creek tributaries and TMDLs are scheduled to be developed between August 2008 and April 2009. The Rock Creek Bacteria TMDL Report was submitted and is being approved at this time.

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.

Although both Upper and Lower Rock Creek are listed as impaired by organics, a data search[1] disclosed no organics data violating water quality criteria, albeit little data exists.

Table 2 - Results of Data Search for Organics Data

Organic Pollutant / Results	District's WQS - ug/L		
	CCC	CMC	Class D
Dieldrin			
21 samples < DL of 0.001	.0019	2.5	0.00014
P,P' DDE (DDT isomer)			
21 samples < DL of 0.006	0.001	1.1	0.00059
Lindane			
21 samples < DL of 0.004	*0.9**		

*EPA value

[1] *Data Report for the Washington, DC Portion of the Rock Creek Watershed, Total Maximum Daily Load Calculation, Draft,* January 3, 2003, prepared for USEPA Region 3, by Limno-Tech, Inc.

A recent USGS water and sediment quality study[2] in Rock Creek comprised of 21 water samples analyzed for 86 compounds resulted in two pesticide results greater than EPA recommended criteria and quantifiable results on three compounds for which no criteria exists. A Malathion value of 0.0274 ug/L is greater than EPA's CCC value of 0.1 ug/L and an Aldrin plus Dieldrin result of 0.006 ug/L is greater than Great Lakes criterion for aquatic life of 0.001 ug/L. The District does not have criteria for Malathion and it is unknown if Great Lakes criteria is appropriate for Rock Creek. Therefore, the data does not support organics as the cause of Rock Creek impairment. Because of the above, EPA has determined that TMDLs for orgaincs are not required. These TMDLs address metals only.

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 Laytonsville, 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.

[2] *Water Quality, Sediment Quality, and Stream-Channel Classification of Rock Creek, Washington, D.C., 1999-2000*, Water-Resources Investigations Report 02-4067, 2002, USGS, Baltimore, MD.

Table3 - 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 to 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 were 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.

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 various metals to the creek.[3] 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. The LTCP addresses the discharge of fecal coliform and E. coli but not metals

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

to Rock Creek. 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. Although the LTCP did not address metals, when fully implemented, more than 93 percent of the metals can be expected to be removed (see Section IV.6.).

Piney Branch

Piney Branch 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 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.

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.

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 developed by WASA for the LTCP was modified to model metals instead of bacteria, see TMDL Report , Appendices A and B. EPA finds the model appropriate for determining Rock Creek instream pollutant concentrations.

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). For these TMDLs, $CBOD_5$ was modified to represent metals.

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 (or metals), 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. EPA finds that the model was adequately calibrated.

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

Upstream flow from Maryland was based on recorded flows at the USGS gage at Sherill Drive. First the flow was reduced based on the ratio of drainage area above the DC/MD line and the gages drainage area. For modeling purposes, 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.

Storm water and combined sewer flow to Rock Creek was estimated by modeling as part of the LTCP. The actual LTCP model files were used and each flow was distributed to appropriate model segments. Each of these flows is regulated by NPDES permits and is a point source.

Fourth, storm water beyond the scope of the MS4 or NPDES permits 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.

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

Storm water and combined sewer concentrations were developed for the LTCP. Rock Creek instream existing concentrations for total copper and TSS concentrations were based on a regression analysis of the TMDL-specific sampling and analysis, and the remaining metals concentration was estimated from all available data. See the TMDL Report, Appendices A and B for further details. The following concentrations were used in the model.

Table 5 - Source Concentrations

Parameter	Source		
	Storm Water	Combined Sewer	Upstream
Total Suspended Solids -mg/L	94	130	0.436 Flow (cfs) - 5.255
Total Copper - ug/L	78	26	0.053 Flow (cfs) + 4.491
Total Zinc - ug/L	183	110	Dry Weather -10.0, Wet Weather - 41
Total Lead - ug/L	36	35	Dry Weather - 2.5, Wet Weather - 24
Total Mercury - ug/L	0.19	0.4	5.96×10^{-4} Flow (cfs)

The District's current numeric water quality criteria for copper, zinc, and lead are in the form of dissolved metal concentration, not the total metal concentration. The metal models simulated the total metal. Therefore, in order to evaluate the model output with the applicable criteria, the dissolved portion of the total recoverable copper, zinc, and lead output was calculated. A partition coefficient, as a function of the TSS concentration, was available for copper and zinc. For lead, the conversion factor used to translate the dissolved metal concentration from the total metal concentration found at 60 FR 22231 was used. The dissolved metal portion was then compared to the District's water quality standards.

TMDL Report, Appendix A, discusses copper, zinc, and lead input parameters and model calibration. Appendix B discusses development of the mercury model. The mercury SWMM model is similar to the previous three metals models.

TMDL Report, Sections 5 through 8 are pollutant specific. Each section discusses potential nonpoint sources, although none have been identified as actual sources. Actual nonpoint sources may need to be identified as part of the TMDL implementation.

Existing copper data was inadequate to model Rock Creek and, as part of this TMDL development, additional water column and sediment copper concentration and TSS data was collected. Existing data met the minium modeling data requirements for zinc, lead, and mercury.

Existing mercury data at the DC/MD line was inadequate to model Rock Creek. DC DOH sampling and analysis program yielded non-detects, or results < 0.2 ug/L except for one sample of 0.3 ug/L from 1991. The TMDL Report, Appendix B, describes how a regional model for aerosols and deposition, together with estimating watershed yield, was used to estimate the mercury concentration at the DC/MD line.

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:

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

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.

The only fully supporting use is navigation. These TMDLs address the Section 303(d) list impairments for aquatic life protection and human health related to consumption of fish and shellfish.

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.

Table 6 - DC's Water Quality Standards for Metals

Metals	Criteria for Classes		
	Class C		Class D
	Criteria Maximum Concentration (CMC) One-Hour Average - ug/L	Criteria Continuous Concentration (CCC) Four-Day Average - ug/L	30-Day Average - ug/L (Risk Level 10^{-6})
Copper - Dissolved	18.6	12.3	NA
Lead - Dissolved	71.63	2.79	NA
Zinc - Dissolved	124.1	113.3	NA
Mercury - Total Recoverable	0.012	2.4	0.15

The respective aquatic life water quality criterion for copper, lead, and zinc is hardness dependant. The Rock Creek criteria shown are based on a hardness of 110 mg/L as $CaCO_3$ from DC DOH monitoring data. It should be noted that the District's water quality regulations 49 D.C. REG. 3012; and 49 D.C. REG. 4854 require very careful reading and the Federal Register (60 FR 22,231) must be consulted to obtain the correct numerical values and units for dissolved and hardness dependent criteria.

Maryland's COMAR 26.08.02.03-2, Numerical Criteria for Toxic Substances in Surface Waters, Table 1, Toxic Substances Criteria for Ambient Surface Waters–Inorganic Substances, list Maryland's criteria. Copper, lead, and zinc numerical values are noted to be increased or decreased by hardness or pH. Although the regulations do not include the hardness equations to determine site specific criteria, Maryland Department of Environment indicated that they use the same equations as the District. Therefore, Maryland's metals criteria is the same as the District's with one exception. Maryland's human health fish consumption mercury criterion is 0.051 ug/L vs. the District's 0.15 ug/L for mercury.

Not specifically addressed in the District's water quality standards or the TMDL Report are numeric criteria for Class A and B uses. EPA's recommended human health consumption of water and organism criterion[5] for total copper is 1,300 ug/L and 1,000 ug/L for organoleptic effects (taste and order). Zinc is listed as 5,000 ug/L for organoleptic effects also. EPA's National Primary Drinking Water Standards inorganic mercury criteria is 2 ug/L with action levels of 1,300 ug/L for copper and 15 ug/L for lead. The national Secondary Drinking Water Standard for zinc is 5,000 ug/L. Therefore, protecting aquatic life protects human health.

Based on the TMDL Report, modeling information, and information from the LTCP, EPA finds that these TMDLs, when fully implemented, will attain water quality standards for these pollutants throughout the entire length of Rock Creek.

---

[5] *National Recommended Water Quality Criteria: 2002*, EPA-822-R-02-047, November 2002.

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 <u>not</u> be addressed by the load allocation (LA) component of a TMDL.
- Storm water discharges from sources that are not currently subject to NPDES regulation <u>may</u> 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.

TMDLs were developed for both the Upper and Lower Rock Creek, consistent with the District's Section 303(d) list and the Consent Decree.

The TMDL Report identifies the load reductions necessary to achieve and maintain water quality standards as shown below. The metal concentrations are expressed as total metals even though the water quality standards for the metals addressed by these TMDLs are for the dissolved fraction (except mercury). To determine attainment of the water quality standards, only the dissolved output concentrations were evaluated.

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.

---

[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 7 - Average Annual Total Copper Loads in Rock Creek (pounds/year)

Upper Rock Creek			
Source	Existing Loads	TMDL Loads	Required Reduction[1]
Upstream	1,867.15	1,773.79	0%
Separate Storm Water - WLA	155.60	147.82	0%
Direct Storm Runoff - LA	1.74	1.66	0%
	Existing Loads	Allocated Loads	
Pinehurst Branch	84.57	80.34	0%
Broad Branch	221.77	210.68	0%
Soapstone Branch	112.77	107.13	0%
Luzon Valley	194.72	184.98	0%
5% Margin of Safety		131.91	
Total	2,638.31	2,638.31	0%
Lower Rock Creek			
	Existing Loads	TMDL Loads	
Upstream	2,638.31	2,506.40	0%
CSO - WLA	2.64	2.50	0%
Separate Storm Water - WLA	149.67	142.19	0%
Direct Storm Runoff - LA	1.30	1.24	0%
	Existing Loads	Allocated Loads	
Piney Branch	31.86	30.26	0%
Klingle Run	98.49	93.56	0%
5% Margin of Safety		146.11	
Total	2,922.26	2,922.26	0%

[1]The allocated loads are reduced by the MOS

The existing copper loads do not cause an impairment to Rock Creek. However, consistent with the District's practice and as identified in the TMDL Report and the table above, the allocated copper loads are reduced by the margin of safety to further ensure that the water quality standards will be achieved.

The Rock Creek Tributaries TMDL Report for Organics and Metals, February 2004, identifies the Piney Branch copper TMDL as 2.40 pounds/ average year vs. the above Average Annual TMDL of 30.26 pounds/ year. The pounds/average year and average annual pounds/ year are based on daily simulations for 1988 to 1990.

Table 8 - Average Annual Total Zinc Loads in Rock Creek (pounds/year)

Upper Rock Creek			
Source	Existing Loads	TMDL Loads	Required Reduction[1]
Upstream	4,438.30	4,216.39	0%
Separate Storm Water - WLA	365.04	346.79	0%
Direct Storm Runoff - LA	4.09	3.88	0%
	Existing Loads	Allocated Loads	
Pinehurst Branch	198.42	188.49	0%
Broad Branch	520.30	494.28	0%
Soapstone Branch	264.56	251.33	0%
Luzon Valley	456.84	433.99	0%
5% Margin of Safety		312.38	
Total	6,247.53	6,247.53	0%
Lower Rock Creek			
	Existing Loads	TMDL Loads	
Upstream	6,247.53	5,935.16	0%
CSO - WLA	11.15	10.59	0%
Separate Storm Water - WLA	351.14	333.58	0%
Direct Storm Runoff - LA	3.06	2.91	0%
	Existing Loads	Allocated Loads	
Piney Branch	91.12	86.57	0%
Klingle Run	231.05	219.50	0%
5% Margin of Safety		346.75	
Total	6,935.06	6,935.06	0%

[1]The allocated loads are reduced by the MOS

The existing zinc loads do not cause an impairment to Rock Creek. However, consistent with the District's practice and as identified in the TMDL Report and the table above, the allocated zinc loads are reduced by the margin of safety to further ensure that the water quality standards will be achieved.

The Rock Creek Tributaries TMDL Report for Organics and Metals, February 2004, identifies the Piney Branch zinc TMDL as 15.05 pounds/ average year vs. the above Average Annual TMDL of 86.57 pounds/ year.

Table 9 - Average Annual Total Lead Loads in Rock Creek (pounds/year)

Upper Rock Creek			
Source	Existing Loads	TMDL Loads	Required Reduction[1]
Upstream	2,472.00	328.78	86%
Separate Storm Water - WLA	71.82	9.55	86%
Direct Storm Runoff - LA	0.80	0.11	86%
	Existing Loads	Allocated Loads	
Pinehurst Branch	39.03	5.19	86%
Broad Branch	102.36	13.61	86%
Soapstone Branch	52.05	6.92	86%
Luzon Valley	89.87	11.95	86%
5% Margin of Safety		19.80	
Total	2,827.93	395.91	
Lower Rock Creek			
	Existing Loads	TMDL Loads	
Upstream	2,827.93	376.11	86%
CSO	3.55	0.66	90%
Separate Storm Water	69.08	9.19	86%
Direct Storm Runoff	0.60	0.08	86%
	Existing Loads	Allocated Loads	
Piney Branch	22.40	1.88	86%
Klingle Run	45.46	6.05	86%
5% Margin of Safety		20.68	
Total	2,969.01	414.65	

[1]The percent reduction is applied before the 5 percent margin of safety is applied.

The Rock Creek Tributaries TMDL Report for Organics and Metals, February 2004, identifies the Piney Branch lead TMDL as 1.44 pounds/ average year vs. the above Average Annual TMDL of 1.88 pounds/ year.

Table 10 - Average Annual Total Mercury Loads in Rock Creek (pounds/year)

Upper Rock Creek			
Source	Existing Loads	TMDL Loads	Required Reduction
Upstream	14.37	0.409	97%
Separate Storm Water - WLA	0.38	0.055	85%
Direct Storm Runoff - LA	< 0.01	0.001	85%
	Existing Loads	Allocated Loads	
Pinehurst Branch	0.21	0.030	85%
Broad Branch	0.54	0.078	85%
Soapstone Branch	0.27	0.040	85%
Luzon Valley	0.47	0.069	85%
5% Margin of Safety		0.036	
Total	16.24	0.718	
Lower Rock Creek			
	Existing Loads	TMDL Loads	
Upstream	16.24	0.682	95.8%
CSO	0.04	0.008	90%
Separate Storm Water	0.36	0.053	85%
Direct Storm Runoff	< 0.01	< 0.001	85%
	Existing Loads	Allocated Loads	
Piney Branch	0.19	0.013	85%
Klingle Run	0.24	0.035	85%
5% Margin of Safety		0.041	
Total	17.07	0.832	

The Rock Creek Tributaries TMDL Report for Organics and Metals, February 2004, does not identify mercury as a pollutant of concern in the Piney Branch copper.

The Piney Branch loads are made up of three components, CSO discharge, separate storm water system discharge, and direct storm water flow. As explained in Section IV the pollutant loads to Rock Creek are based on modeling performed by WASA in developing the LTCP.

Table 11 - Piney Branch allocated load components by source, average annual load in pounds/ year

Source	Copper	Zinc	Lead	Mercury
CSO	8.26	34.95	0.46	0.005
SW	21.95	51.49	1.42	0.008
Direct Storm Water	0.05	0.13	< 0.01	< 0.001

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

All of Maryland's pollutant loads that are carried into the District 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. It should be noted that Maryland currently lists Rock Creek for a biological impairment, source unknown, and TMDLs for that impairment will be required. In the course of developing their TMDLs, Maryland may find that metals are the source of the impairment.

4. The TMDLs consider critical environmental conditions.

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

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

Table 12 - 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)

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

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

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 five percent of the TMDL load in addition to any other conservative assumptions used in the modeling.

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 90 percent of the volume captures 90 percent of the load; however, as concentrations are generally higher for the first one-half inch of storm water runoff, capturing 90 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, Section 8, Reasonable Assurance, discusses remediation projects and programs undertaken by the District, Maryland, and the National Park Service to improve water quality.

Mercury, as an air deposited pollutant, is not addressed in Section 9.0, Reasonable Assurance. However, mercury, as a product of coal combustion and other sources, is adequately addressed under EPA programs.

For this TMDL, the dominant source of mercury to Rock Creek is from nonpoint sources. These sources consist of air emission sources and would include industrial sources such as power plants, municipal waste combustors, medical waste incinerators, Portland cement plants, and other sources. These sources may originate in Maryland, the surrounding region, the United States, and/or globally. Local sources of mercury air emissions are expected to contribute a significant amount to the mercury air deposition to the Rock Creek watershed. As a result, the control and reduction of mercury air emissions is the primary method for implementation of this TMDL and implementation of the Clean Air Act (CAA) requirements is the primary vehicle. The following is a summary of the major existing CAA requirements:

- EPA issued final Maximum Achievable Control Technology (MACT) regulations for municipal waste combustors in 1995 that were expected, by 2000, to reduce mercury emissions from these facilities by 90% from 1990 levels;

- EPA issued MACT emission standards for medical waste incinerators in 1997 that were expected, by 2002, to reduce mercury emissions from these facilities by 94% from 1990 levels;EPA issued MACT emission standards for hazardous waste combustors in 1999 that, when fully implemented, are expected to reduce mercury emissions from these facilities by over 50% from 1990 levels;

- EPA has established National Emission Standards for Hazardous Air Pollutants (NESHAPs) for ore processing facilities, mercury cell chlor-alkali plants, and sewage sludge driers; and,

- EPA is currently engaged in a rulemaking process to set a standard for mercury emissions from power plants that would go into effect no sooner than 2007.

In addition, new air pollution legislation was first introduced to U.S. Congress in 2002 and reintroduced in February 27, 2003. Known as the Clear Skies Act of 2003, this emissions reduction program would utilize market-based emissions caps and trading to achieve reductions of certain pollutants including mercury. Clear Skies incorporates two phases of reductions, ultimately achieving 70 percent reductions in mercury from 2000 levels (*i.e.*, 48 tons to 15 tons per year) at coal-fired utilities or power plants. In Maryland, mercury deposition is projected to decrease by up to 50 percent. Mercury emissions from power generators are projected to decrease by 85 percent in Maryland by the year 2020, relative to 2000. In the Mid-Atlantic region, this decrease is projected to be 81 percent from 2000 to 2020. The controls that are expected to be installed at these power plants include scrubbers and selective catalytic reduction units. If enacted, EPA expects decreases in mercury emissions over the next five years.[8] These projections take into account future growth projections, electricity generation and demand, and economics including trading scenarios.

In the event that reductions currently required under the Clean Air Act, and projected under the Clear Skies Act, are not adequate for achieving the allowable loads under this TMDL, the State of Maryland (and other states) and local authorities still retain the authority under the Clean Air Act to require more stringent air controls at specific sources within those jurisdictions, as necessary to protect human health and the environment.

The other critical aspect to mercury reductions is source reduction of mercury. Maryland has a number of recent and ongoing initiatives ranging from voluntary to regulatory, that involve the phase-out of mercury usage, industrial handling of mercury-containing products and wastes, and consumer recycling of mercury containing products. The implementation of these practices within Maryland and elsewhere in the United States will serve to decrease the amount of mercury that enters the waste stream destined for incineration or landfills, with their associated air emissions. Also, the use of alternative fuels to coal or fossil fuels containing lower levels of mercury would also serve to reduce mercury air emissions in power plants and other utilities. Unfortunately, the extent to which the implementation of one or more of these efforts will result in reduced mercury emissions has yet to be quantified, and is therefore difficult to predict the impact upon water quality in Rock Creek.

8. The TMDLs have been subject to public participation.

DC public noticed a January 2004 draft TMDLs for Metals in Rock Creek on January 23, 2004, with comments due February 23, 2004. The TMDLs was placed in the Martin Luther

[8] Source: www.epa.gov/air/clearskies

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 an effort to provide wider distribution of the TMDLs, EPA posted the public notice and TMDL Report on the Region III web site. In addition, the District used their e-mail list for the TMDL meetings to notify the interested parties of public comment period extensions and future postings on the Region III web site. 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.

As part of DC's TMDL submittal, a response to comments document was submitted. In addition to EPA's comments, comments were received from Earthjustice Legal Defense Fund, the District of Columbia Water and Sewer Authority, and EA Engineering and Science. Although WASA's comment arrived after the close of the public comment period, DOH chose to respond to the comments and submitted to EPA a revised response to comments via e-mail. EPA finds the District affirmatively considered the comments as described in the response to comments document and/or in the final TMDL.