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

Decision Rationale
Total Maximum Daily Loads
Rock Creek Tributaries
For Organics and Metals

Approved

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Date: *2/27/2004*

Decision Rationale
Total Maximum Daily Loads
Anacostia River Watershed
For Organics and Metals
Executive Summary
February 28, 2003

I. Introduction

The Clean Water Act 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 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 (MOS). The TMDL is commonly expressed as:

$$TMDL = WLAs + LAs + MOS$$

This document sets forth EPA's rationale for approving the *District of Columbia Final Total Maximum Daily Loads for Organics and Metals in Broad Branch, Dumbarton Oaks, Fenwick Branch, Klingle Valley Creek, Luzon Branch, Melvin Hazen, Valley Branch, Normanstone Creek, Pinehurst Branch, Piney Branch, Portal Branch and Soapstone Creek*. The following TMDL Summary table is discussed in Section V.2. of the decision rationale.

II. Background

The Rock Creek Watershed covers 76.5 square miles throughout the District of Columbia and Maryland. The total length of Rock Creek itself is approximately 33 miles with only a small percentage of the creek affected by tidal influences. Although the District's portion of the Rock Creek Watershed is heavily urbanized, its parcels of park land and open space host a number of recreational activities.

III. History and use of the Tidal Anacostia Model/Water Quality Simulation Program (TAM/WASP)

ICPRB[1] constructed a simple mass balance model to estimate tributary organic and metal loads. The model treats each tributary as a "bathtub" where the daily base flow and storm water loads are reduced until instream water quality standards are met.

[1]Interstate Commission on the Potomac River Basin

Additionally, a variety of methods are used to simulate daily input flows and loads, including use of a HSPF[2] model for the Watts Branch sub-watershed.

Tables containing the TMDLs, WLAs, LAs, and percent reductions are in Appendix A of this decision rationale.

IV. Discussions of Regulatory Requirements

EPA has determined that these TMDLs are consistent with statutory and regulatory requirements and EPA policy and guidance. 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.

[2]Hydrologic Simulation Program - Fortran

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District of Columbia
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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. Environmental Protection Agency 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 (MOS).

This document sets forth EPA's rationale for approving the TMDLs for organics and metals in the Rock Creek tributaries. 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 TMDL report for Rock Creek tributaries entitled, *District of Columbia Final Total Maximum Daily Loads, for Organics and Metals in Broad Branch, Dumbarton Oaks, Fenwick Branch, Klingle Valley Creek, Luzon Branch, Melvin Hazen, Valley Branch, Normanstone Creek, Pinehurst Branch, Piney Branch, Portal Branch and Soapstone Creek*, dated February 2004, to EPA for final review which was received by EPA on February 6, 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 Anacostia River and tributaries in effect at the time the consent decree was filed.

Table 1 - 1998 Section 303(d) Listing Information

S. No	Waterbody	Pollutant of Concern	Priority Ranking	Action Needed
1.	Broad Branch	Organics	Low	Control nonpoint source (NPS) pollution
2.	Dumbarton Oaks	Organics	Low	Control NPS pollution
3.	Fenwick Branch	Organics	Low	Control NPS pollution
4.	Klingle Valley Creek	Organics	Low	Control CSO and NPS pollution
5.	Luzon Branch	Organics	Low	Control CSO and NPS pollution
6.	Melvin Hazel Valley	Organics	Low	Control NPS pollution
7	Normanstone Creek	Organics	Low	Control NPS pollution
8.	Pinehurst Branch	Organics	Low	Control NPS pollution
9.	Piney Branch	Organics Metals	Low	Control CSO and NPS pollution
10.	Portal Branch	Organics	Low	Control Point Source and NPS pollution
11.	Soapstone Creek	Organics	Low	Control NPS pollution

Note: Rock Creek is also listed for organics, metals, and bacteria. Rock Creek mainstem TMDLs are addressed in separate TMDL reports.

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 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 added biological, nutrient, and suspended solids as impairments to Rock Creek.

Although both Upper and Lower Rock Creek are listed as impaired by organics, a data search[3] failed to disclose organics data that exceeded water quality criteria, although little data exists.

A recent United States Geological Survey water and sediment quality study[4] done in Rock Creek and on its tributaries was comprised of 21 water samples, which were analyzed for 86 compounds. Overall, the study found two pesticide levels that were greater than EPA recommended criteria and quantifiable results on three compounds for which no numeric criteria exists. For the tributaries, Dieldrin values of 0.007 ug/L on Broad Branch and 0.006 ug/L on Pinehurst Branch are greater than EPA's CCC value of 0.0019 ug/L. They are also greater than Great Lakes criterion for aquatic life of 0.001 ug/L. It is unknown if Great Lakes criteria is appropriate for Rock Creek. However, samples taken for at least twenty different organic chemical on Piney Branch revealed values, albeit inconclusive, indicating some level of organic impairment. Therefore, the data suggests that organic chemicals are an impairment to Piney Branch, but owing to its ambiguity, the data is insufficient to make a determination that organics TMDLs are not required.

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 an MOS 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, approximately 21% of the watershed, and 79% located 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 stretching from Laytonsville, Maryland, to its confluence with the Potomac River. The District's portion of 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 2.

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[3] *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.

[4] *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.

Table 2 - 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 Water and 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, identified as 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 3.

Table 3: 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 and are assumed to contribute various organics to the creek.[5] CSOs drain approximately 5.7 square miles in the District of Columbia with 28 CSO outfalls draining into Rock Creek or one of its tributaries. The CSO outfall with the largest drainage area and flow, discharges to Piney Branch.

CSOs are managed by the WASA, an independent agency of the District, 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 LTCP for the District's CSOs, dated

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

July 2002, and submitted it to EPA for review. The LTCP does not address metals. 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). In the LTCP, the total volume of CSO discharges is reduced from 221 mgal to 5 mgal.

Rock Creek Watershed

Landuse in Rock Creek is predominantly residential, commercial, and park land/open space. Rock Creek Park is one of the oldest city parks in the nation and is host to many recreation activities, including biking, jogging, golf, and horseback riding. The United States Park Police maintain two horse stables within the Park and a private stable is located in Montgomery County just upstream from the District border. The park and watershed are also home to the Smithsonian Institution's National Zoological Park, boasting a wide array of exotic and domestic fauna.

Rock Creek is fairly shallow and swift, as it lies mainly along the fall line between the Piedmont and Coastal Plain provinces. The low volume in the creek results in poor dilution potential, but the rapid flow rates allow for good flushing rates. The average flow rate in Rock Creek is approximately 63.7 cubic feet per second.

Broad Branch

Broad Branch is about a two-mile long western tributary of Rock Creek. It is joined by Soapstone Creek about 800 feet before it discharges into Rock Creek. Broad Branch begins near Nebraska and Connecticut Avenues. 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 and a flow of approximately 7.8 cubic feet per second.

Dumbarton Oaks

Dumbarton Oaks is a minor western tributary whose confluence with Rock Creek is about 100 yards south of Massachusetts Avenue over Rock Creek. The Dumbarton Oaks Watershed is approximately 168 acres and drains mostly National Park Service parkland, including about a quarter of the grounds of the US Naval Observatory and Dumbarton Oaks Gardens. Approximately two-thirds of the watershed is landscaped or forested parkland, with the remainder area as residential. Dumbarton Oaks is a little more than a half-mile long and is buffered with varying widths of landscaped parkland as it flows eastward to Rock Creek. It is very steep, dropping 200 feet from the head of its watershed to its mouth near Rock Creek. The channel is about 22 feet wide with an estimated flow of 0.3 cubic feet per second.

Fenwick Branch

Fenwick Branch is a second order eastern tributary of Rock Creek originating in Maryland just outside the Northeastern D.C. boarder. Fenwick Branch's Watershed measures approximately 612 acres, but about 205 acres are within District boundaries, the rest being in Montgomery County, Maryland. The watershed is primarily urbanized, including residential areas inside the District and some commercial and light industrial in Maryland. The tributary runs a little more than half a mile before joining Portal Branch, approximately 120 feet north of its confluence with Rock Creek. Throughout the length of the stream it is buffered by approximately 100 feet of forested parkland on both sides. The stream channel is about six feet wide with an average depth of about three inches and a flow of approximately 2.0 cubic feet per second.

Klingle Valley Creek

Klingle Valley tributary flows through a residential area and discharges into Rock Creek from the west near the Porter Street Bridge. The stream's reach parallels the south side of Klingle Road. The watershed comprises about 354 acres and is primarily residential. A wooded buffer of a few hundred feet covers one side of the stream. Klingle Valley Tributary is an approximately half a mile long stream that falls at a grade of about five percent from its headwaters to its confluence with Rock Creek. The stream channel is about 30 feet wide with an average depth of about 3.5 inches and a flow of approximately 0.83 cubic feet per second.

Luzon Branch

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% 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.

Melvin Hazen Valley Branch

Melvin Hazen is a second order tributary of Rock Creek. It originates near 34th street and Tilden Street, NW and flows approximately 600 feet eastward before emptying into Rock Creek. The Melvin Hazen Watershed covers 184 acres, with more than two-thirds of the watershed is residential and commercial. The lower segment of the watershed is parkland. Melvin Hazen stretches approximately 4,500 feet to its mouth at Rock Creek, and buffered on both sides by a several hundred foot wide forested parkland. The stream is about 11 feet wide, six inches deep and has a flow of approximately 0.9 cubic feet per second.

Normanstone Creek

Normanstone Creek is a first order western tributary of Rock Creek and originates from a storm drain near Garfield Avenue and 33rd Street, NW. The stream travels parallel to Normanstone Parkway three quarters of a mile southeast to its confluence with Rock Creek, about 1000 ft northeast of the Massachusetts Avenue bridge. The watershed covers 249 acres area and includes most of the grounds of the National Cathedral, part of U.S. Naval Observatory and parts of Cleveland and Woodley Park. Most of the acreage is residential and light commercial (retail) with about 10% forested parkland along the stream reach. Both sides of the stream are buffered by a 100-1000 feet strip of forested parkland. Normanstone Creek is approximately 12 feet wide and has a shallow depth of seven inches. The channel flow is estimated to be around 0.63 cubic feet per second.

Pinehurst Branch

Pinehurst Branch originates at the DC/Maryland state line in Chevy Chase Manor, Maryland. Pinehurst travels about 1.3 miles east-southeast to its confluence with Rock Creek. The 619-acre Pinehurst Watershed includes mainly urban landuses, with 70% low-medium density residential and commercial, and the remaining area being parklands. About 70% 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 and a flow of approximately 1-2 cubic feet per second. Evidence of the stream topping its banks suggests high flows are common and easily top their relatively low banks.

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 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 such a short stream length can be attributed to the extensive system of combined sewer and storm drains that underlie the city in this area. 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. The flow in the channel is estimated to be about 1.8 cubic feet per second.

Portal Branch

Portal Branch is an eastern tributary of Rock Creek near the northern corner of DC, and joins Fenwick Branch about 120 ft. north of the Fenwick Branch's confluence with Rock Creek. The surface portion of the stream is less than half a mile long and is completely contained in the District. The watershed measures 213 acres, of which 75 acres lie within the District. The watershed in the District is mainly low-medium density residential and parklands, while in

Montgomery County mostly commercial/industrial uses dominate the watershed. The stream is buffered by 100 feet or less of parkland. Portal Branch stretches about 2220 feet and has an average width of 10 feet. It is a shallow stream with a depth of 3-4 inches and a flow of approximately 1.1 cubic feet per second.

Soapstone Creek

Soapstone Creek is a tributary of Broad Branch. Soapstone joins Broad Branch just before Broad Branch's confluence with Rock Creek. The watershed covers 520 acres and is mostly urban, with approximately 15% 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 and the flow rate is estimated to be about three cubic feet per second.

Consent Decree

These organics and 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. For example, the District used the Tidal Anacostia Model/Water Quality Analysis Simulation Program (TAM/WASP) Toxics Screening Level Model to develop the organics and metals TMDLs for the Upper and Lower Anacostia River mainstem because loading from these segments significantly impacted water quality and the minimum data requirements were generally satisfied. The District chose to use less complex models to develop the TMDLs for the Anacostia River tributaries partly because of the relative lack of data and because the overall impact of pollutant loadings from the individual tributaries of organics and metals on water uses is less significant that the impact of the mainstem loadings. An analogous approach was taken for the Rock Creek Watershed. The TMDLs for Rock Creek tributaries employed the identical model used for the Anacostia tributaries organics and metals TMDLs in light of the similarities in hydrology and water quality data. Overall, EPA finds that the

District's selection of the model for these waterbodies is reasonable and appropriate as described in the following sections.

Anacostia River Tributary Modeling

The District utilized ICPRB's simple mass balance model, also designed for tributaries to the Anacostia River, to develop TMDLs for Rock Creek's tributaries. The model is comprised of three sub-models, one of which is for organic pollutants and one for inorganic pollutants (metals).[6] These three sub-models predict daily water column concentrations of each pollutant in each of the Rock Creek tributaries under current conditions and under TMDL conditions. A discussion of ICPRB's methodology is included in the TMDL Report as Appendix C.

The mass balance model treats each tributary as a "bathtub" which, on each day of the simulation period, receives a volume of water representing storm water runoff and a volume of water representing base flow from groundwater infiltration. Base flow and storm water are assumed to contain a pollutant load based pollutant concentrations used in the mainstem modeling. Little toxics data exists for the tributaries, and what does exist relates is primarily to metals. In cases where samples were analyzed for organics, the detection level was frequently

[6]The third sub-model models bacteria.

Table 4 - PAH Subgroupings

Constituent	Chemical Designation
Polynuclear aromatic hydrocarbons (PAH) Model	
Napthalene	PAH1 (2 and 3 ring PAHs)
2-methyl napthalene	
Acenapthylene	
Acenapthene	
Fluorene	
Phenanthrene	
Fluoranthene	PAH2 (4 ring PAHs)
Pyrene	
Benz[a]anthracene	
Chrysene	
Benzo[k]fluoranthene	PAH3 (5 and 6 ring PAHs)
Benzo[a]pyrene	
Perylene	
Indeno[1,2,3-c,d]pyrene	
Benzo[g,h,i]perylene	
Dibenz[a,h+ac]anthracene	

higher than the water quality standards. Table 4 details the groupings used for polyaromatic hydrocarbons (PAHs). All other chemicals were considered individually in the model except for polychlorinated biphenyls (PCBs), which were considered in total. No additional instream processes, such as sediment resuspension or decay, are simulated. EPA concurs that this is appropriate based on the amount of data available and because each tributary's impact on Rock Creek's instream water quality is small. Again, the Small Tributary Model does a fair job in simulating daily pollutant concentrations based on the available data.

Daily estimates of base flow and storm water volume for each tributary is based on ICPRB's Watts Branch HSPF model[7] and landuse information. The Watts Branch HSPF[8] model was calibrated using stream discharge data from the USGS gage 01658000 on Watts Branch near Minnesota Avenue which has been in operation since June 1992. The HSPF model provided daily runoff for the period of January 1, 1988, through December 31, 1990, by landuse. Each

[7] Appendix B, ICPRB October 6, 2000.

[8] Hydrologic Simulation Program - Fortran

tributary's drainage area was divided into three representative landuses: (1) impervious, (2) urban pervious, and (3) forested pervious. Based on the assumption that tributaries have hydrologic properties similar to those of the Watts Branch drainage area, the flow for each day from each tributary was determined and the instream organics and metals concentrations were compared to the District's water quality criteria. EPA finds this modeling approach reasonable.

Because each tributary receives water discharged from the District's separate sewer system, tributaries' watershed boundaries were delineated using a combination of topographic information and sewer outfall tributary and watershed discharge data. Piney Branch is the largest tributary which discharges CSO loads from the District's combined sewer system.

EPA believes the DC Small Tributaries TMDL Model produces reasonable results given the available information and that all reasonable efforts were made to secure available information.

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 WLAs for point sources and the 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 TMDL Report indicates that the chemicals of concern within the Rock Creek tributaries in the District's 1998 Section 303(d) list of impaired waters were derived in response to U.S. Fish and Wildlife Service analysis of fish tissue and sediment analysis performed by the Academy of Natural Sciences of Philadelphia's Patrick Center for Environmental Research. These tests were performed for the Anacostia River. Assessments of the Rock Creek mainstem toxics included analyses by WASA for the LTCP and the USGS in addition to bioasessments, ambient monitoring and storm water permit application procedures, all of which were conducted by the District.

In the TMDL report the District recites Rock Creek's beneficial water uses as well as the general and specific water quality criteria designed to protect those uses. The District identifies the designated uses for Rock Creek and its tributaries, which 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 majority of the Rock Creek Watershed lies in Maryland. Therefore, consistent with the CWA, the Rock Creek waters crossing the DC/Maryland border must meet the District's water quality standards at the border.

Table 5 - DC's Water Quality Standards for Metals

Metals	Criteria for Classes (ug/L)		
	Class C		Class D
	Criteria Maximum	Criteria Continuous	
Arsenic - Dissolved	150.00	340.00	0.14
Copper - Dissolved	12.31	18.61	NA
Lead - Dissolved	2.79	71.63	NA
Zinc - Dissolved	113.29	124.07	NA

The water quality criteria for copper, lead, and zinc is hardness dependant. The 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 hardness dependent criteria. The TMDL report's Table 2-2: Dissolved Metals Numerical Criteria, and notes provided a complete explanation of the criteria.

The organic pollutant water quality criteria are found in the DC regulations at Section 1104.7, Table 3.

Table 6 - DC's Water Quality Standards for Organics

Organics	Criteria for Classes (ug/L)		
	Class C		Class D
	CCC	CMC	30-Day Average
Chlordane	0.004	2.4	0.00059
DDE	0.001	1.1	0.00059
DDD	0.001	1.1	0.00059
DDT	0.11	1.1	0.00059
Dieldrin	.00019	2.5	0.00014
Heptachlor Epoxide	0.0038	0.52	0.00011
PAH1	50.0	NA	1,4000.0
PAH2	400.0	NA	0.031
PAH3	NA	NA	0.31
Total PCBs	0.014	NA	0.00045

Within each PAH group, the most stringent water quality criterion was used as the criteria for each member of the group. Each group's constituents are shown in Table 4. For example, the Class D water quality standard for fluoranthene, pyrene, benz[a]anthracene, and chrysene are 370, 11000, 0.031, and 0.031 ug/L, respectively. Therefore, the most stringent of the individual standards, 0.031 ug/L is given in the TMDL report Table 2-3 and Table 6 above as the Class D standard for PAH2.

Maryland's Code of Maryland Regulations 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 bases its arsenic fish consumption criteria on a 10^{-5} risk level instead of the District's more conservative 10^{-6} risk level, Maryland's 41 ug/L vs. the District's 0.14 mg/L for arsenic. Maryland will need to ensure Rock Creek instream arsenic concentration at the District's border is no greater than 0.14 ug/L.

The District includes more organics in its water quality standards than does Maryland and uses the more conservative 10^{-6} risk level for many of the pollutants Class D uses. Maryland will need to ensure Rock Creek's instream organic pollutant concentrations do not exceed the District's water quality standards at the DC/Maryland border.

Table 7 - Maryland's Water Quality Standards for Organics

Organics	Criteria for Classes		
	CCC Four-Day Average - ug/L	CMC One-Hour Average - ug/L	Fish Consumption 30-Day Average - ug/L (Risk Level 10^{-5})
Chlordane	0.0043	2.4	0.0022
DDE	NA	NA	0.0059
DDD	NA	NA	0.0084
DDT	NA	NA	0.0059
Dieldrin	0.0056	0.24	0.0014
Heptachlor Epoxide	0.0038	0.52	0.0011
PAH1	NA	NA	1,4000.0
PAH2	NA	NA	370.0
PAH3	NA	NA	0.49
Total PCBs	0.014	NA	0.0017

The Small Tributary Model calculated load reductions which would achieve water quality standards. As discussed in Section IV, the Small Tributary Model is a simple mass balance model which only considers the estimated loads entering the tributary each day. Because the model does not consider air deposition, the District estimated PCB air deposition using *Chesapeake Bay Basin Toxics Loading and Release Inventory*, May 1999, as their reference and their calculations are in the TMDL Report, Appendix D. The TMDL Report allocates 23-23 percent of the instream PCB load to air deposition, and the remaining 77-80 percent to existing sources and requires a 99.9% reduction for all tributaries.

Although the TMDL Report correctly states that releases from unidentified land sources are accounted for in the model by the CSO and storm water loads from the MS4 storm sewers, the allocations do not require any reduction from such sources.

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 National Pollution Discharge Elimination System (NPDES) permitted point sources and lumps all storm water discharges together whether or not the storm water source has a NPDES permit. EPA guidance memorandum clarifies existing EPA regulatory requirements for establishing WLAs for storm water discharges in TMDLs approved or established by EPA.[9]

[9]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.

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 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. Therefore, the permitted storm water allocations were made based on the ratio of sewered areas to unsewered areas. Rock Creek's tributaries' drainage area includes the sewershed areas as estimated from sewer maps. The District divided the tributaries' TMDLs into wasteload allocations and load allocations based on an estimated ratio of sewered to unsewered areas.

Appendix A reports the TMDLs for tributary load reductions for organics from existing loads (TMDL Section 6.0) and shows the load reductions from existing metal loads in Piney Branch (TMDL Section 6.9).

The metal concentrations are expressed in the form of total metals even though the water quality standards for the metals addressed by these TMDLs are expressed as the dissolved fraction. To determine attainment of the water quality standards, only the dissolved output concentrations were evaluated.

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 Watershed. Maryland's contribution to the pollutant loads has been estimated based on available information. It should be noted that Maryland currently lists Rock Creek as impaired by bacteria, biological, nutrients, and sediment and will develop TMDLs.

4. The TMDLs consider critical environmental conditions.

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

5. The TMDLs consider seasonal environmental variations.

The TMDL report adequately 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 CWA and Federal regulations require TMDLs to include a 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.

With respect to CSO loads, there is an implicit MOS, the recognized "first flush" effect. If the CSO concentrations were constant over time, capturing 95% of the volume captures 95% of the load; however, as concentrations are generally higher for the first one-half inch of storm water runoff, capturing 95% of the volume captures more than 95% of the storm water part of the load. The relative proportion of storm water to sanitary flow determines the size of the MOS. EPA finds the District's combination of implicit and explicit MOS to be a reasonable approach.

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

The MS4 (municipal separate storm sewer system) permit and the NPDES storm water permits both provide regulatory authority to require storm water load reductions, providing reasonable assurance that the TMDLs will be implemented.

In Piney Branch, the largest tributary with CSO outfalls, a storage system has been proposed by DC WASA in the Final CSO LTCP.

For this TMDL, the dominant source of PCBs to the Rock Creek Watershed is nonpoint sources. These sources emanate from legacy use in the form of atmospheric deposition, historic spills, land applications, and sediment contamination. These sources may originate in locally, in the surrounding region, the United States, and/or globally, but are expected decrease over time.

The TMDL Report, Section 8, Reasonable Assurance, lists remediation projects and programs undertaken by the District to improve water quality. While they may not specifically control pollutants addressed in this decision rationale, controlling one pollutant generally helps control others. EPA finds the District's approach to be reasonable.

8. The TMDLs have been subject to public participation.

DC public noticed a version of these TMDLs on October 31, 2003, with comments due on Novermber 31, 2003. The TMDLs were 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. Any notice in the Washington Post would be easy to miss and such notices are not included in the on-line version of the newspaper. 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, EPA requested the District to use 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 have had adequate time to comment on

these TMDLs.

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

As part of DC's TMDL submittal, a response to comments document was submitted to EPA via e-mail. 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 the District's response to public comments to be reasonable.

The TMDL Report demonstrates that water quality standards are being met or will be met upon implementation the these TMDLs for all pollutants.