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

Ms. Marie Halka, Acting Director
Science Services Administration
Maryland Department of the Environment
1800 Washington Blvd., Suite 540
Baltimore, Maryland 21230-1718

OCT 01 2012

Dear Ms. Halka:

The U.S. Environmental Protection Agency (EPA), Region III, is pleased to approve the report, *Total Maximum Daily Loads of Polychlorinated Biphenyls in Back River Oligohaline Tidal Chesapeake Bay Segment, Maryland.* The TMDL report was submitted by the Maryland Department of the Environment (MDE) to EPA for final review on September 30, 2011, and received on October 5, 2011. The TMDL was established and submitted in accordance with Section 303(d)(1)(c) and (2) of the Clean Water Act to address impairments of water quality as identified in Maryland's Section 303(d) List.

The Maryland Department of the Environment (MDE) has identified the waters of the Back River Oligohaline Tidal Chesapeake Bay Segment (Integrated Report Assessment Unit ID: BACOH) on the State's 2010 Integrated Report as impaired by PCBs in both sediment (1998) and fish tissue (2008), sediments (1996), chlordane (1996), zinc (1998), nutrients – nitrogen and phosphorus (1996), and impacts to biological communities (2002). Chlordane and nutrients (nitrogen and phosphorus) TMDLs, and a zinc water quality analysis were approved by EPA in 1999, 2005 and 2004, respectively. Then, in 2010, the Chesapeake Bay nutrient and sediment TMDLs were developed by EPA which addressed the sediment impairment listing for the embayment. The listing for impacts to biological communities will be addressed at a future date. This TMDL addresses the PCB impairment only.

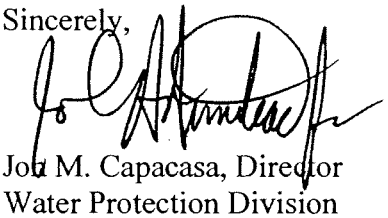
In accordance with Federal regulations at 40 CFR §130.7, a TMDL must comply with the following requirements: (1) be designed to attain and maintain the applicable water quality standards; (2) include a total allowable loading and as appropriate, wasteload allocations for point sources and load allocations for nonpoint sources; (3) consider the impacts of background pollutant contributions; (4) take critical stream conditions into account (the conditions when water quality is most likely to be violated); (5) consider seasonal variations; (6) include a margin of safety (which accounts for uncertainties in the relationship between pollutant loads and instream water quality); and (7) be subject to public participation. In addition, these TMDLs

considered reasonable assurance that the TMDL allocations assigned to the nonpoint sources can be reasonably met. The enclosure to this letter describes how the PCB TMDL for the Back River Oligohaline Tidal Chesapeake Bay Segment watershed satisfies each of these requirements.

As you know, any new or revised National Pollutant Discharge Elimination System permits must be consistent with the TMDL's wasteload allocation pursuant to 40 CFR §122.44(d)(1)(VII)(B). Please submit all such permits to EPA for review as per EPA's letter dated October 1, 1998.

If you have any questions or comments concerning this letter, please do not hesitate to contact Ms. Maria Garcia, at 215-814-3199.

Sincerely,



Joh M. Capacasa, Director
Water Protection Division

Enclosure

cc: Melissa Chatham, MDE-SSA
Jay Sakai, MDE-WMA

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

Decision Rationale
Total Maximum Daily Loads
Polychlorinated Biphenyls in Back River Oligohaline Tidal Chesapeake Bay Segment, Maryland

Jon M. Capacasa, Director
Water Protection Division

Date: 10/1/12

Decision Rationale
Total Maximum Daily Loads of Polychlorinated Biphenyls in
Back River Oligohaline Tidal Chesapeake Bay Segment, Maryland

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those waterbodies identified as impaired by the State where technology based and other controls will not provide for attainment of water quality standards (WQS). A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a Margin of Safety (MOS) that may be discharged to a waterbody without exceeding water quality standards.

This document sets forth the U.S. Environmental Protection Agency's (EPA) rationale for approving the TMDLs for total Polychlorinated Biphenyls (PCB) in the Back River Oligohaline Tidal Chesapeake Bay Segment. The TMDL was established to address impairments of water quality, caused by PCBs, as identified in Maryland's 1998 (sediment) and 2008 (fish tissue) Section 303(d) List for water quality limited segments. The Maryland Department of the Environment (MDE) submitted the report, *Total Maximum Daily Loads of Polychlorinated Biphenyls in Back River Oligohaline Tidal Chesapeake Bay Segment, Maryland,* dated September 2011, to EPA for final review on September 30, 2011, and received on October 5, 2011.

EPA's rationale is based on the TMDL report and information contained in the computer files provided to EPA by MDE. EPA's review determined that the TMDLs meet the following seven regulatory requirements pursuant to 40 CFR Part 130.

1. The TMDL is designed to implement applicable water quality standards.
2. The TMDL includes a total allowable load as well as individual wasteload allocations (WLAs) and load allocations (LAs).
3. The TMDL considers the impacts of background pollutant contributions.
4. The TMDL considers critical environmental conditions.
5. The TMDL considers seasonal environmental variations.
6. The TMDL includes a MOS.
7. The TMDL has been subject to public participation.

In addition, these TMDLs considered reasonable assurance that the TMDL allocations assigned to nonpoint sources can be reasonably met.

II. Summary

The TMDL specifically allocates the allowable total PCB (tPCB) loading to the Back River Oligohaline Tidal Chesapeake Bay Segment watershed. There are 55 permitted point sources of PCB, which are included in the WLA. The fact that the TMDL does not assign WLAs

to any other sources in the watershed should not be construed as a determination by either EPA or MDE that there are no additional sources in the watershed that are subject to the National Pollutant Discharge Elimination System (NPDES) program. In addition, the fact that EPA is approving this TMDL does not mean that EPA has determined whether some of the sources discussed in the TMDL, under appropriate conditions, might be subject to the NPDES program. The annual average TMDLs and maximum daily load (MDL) for tPCBs for the Back Creek Oligohaline Tidal Chesapeake Bay Segment are presented in Table 1. Individual annual and maximum daily WLAs for permitted point sources are provided in Tables 2 and 3.

Table 1. Summary of Baseline tPCB Baseline Loads, TMDL Allocations, Load Reductions and Maximum Daily Loads (MDLs) in the Back River Embayment

Source	Baseline Load (g/year)	Percent of Total Baseline Load (%)	TMDL (g/year)	Load Reduction (%)	MDL (g/day)
Direct Atmospheric Deposition	267.8	29.0	160.0	40.3	1.09
Non-regulated Watershed Runoff	65.7	7.1	31.2	52.5	0.21
Contaminated Sites	12.8	1.4	12.8	0.0	0.09
Nonpoint Sources/LAs	***346.3***	***37.5***	***204.0***	***41.1***	***1.39***
WWTP	133.2	14.4	48.5	63.6	0.41
NPDES Regulated Stormwater[1]					
Baltimore County	273.7	29.7	127.6	53.4	0.87
Baltimore City	169.9	18.4	82.3	51.6	0.56
Point Sources/WLAs	***576.8***	***62.5***	***258.4***	***55.2***	***1.84***
MOS (5%)	-	-	***24.3***	-	***0.17***
Total	**923.1**	**100.0**	**486.7**	**47.3**	**3.40**

Note: [1] Load per jurisdiction applies to all NPDES stormwater dischargers within the jurisdiction's portion of the watershed draining to the Back River embayment.

Table 2. Municipal Wastewater Treatment Plant (WWTP) tPCB WLAs

Facility Name	NPDES #	Outfall	tPCB Water Column TMDL Endpoint (ng/L)	Design Flow (MGD)	tPCB WLA (g/year)	tPCB MDL (g/day)
Back River WWTP	MD002155	001A	0.27	130.0	48.5	0.41

Table 3. NPDES Regulated Stormwater tPCB WLAs

Jurisdiction	tPCB Baseline Load (g/year)	tPCB WLA (g/year)	tPCB MDL (g/day)
Baltimore County	273.7	127.6	0.87
Baltimore City	169.9	82.3	0.56
Total	**443.6**	**209.9**	**1.43**

Note: [1] The load per jurisdiction represents an aggregation of loads from all of the permitted stormwater entities within the jurisdiction (See Table 4 below).

Table 4. Summary NPDES Regulated Stormwater Permit Summary for the Back River Embayment Watershed[1]

MDE Permit	NPDES	Facility	City	County
04DP3313	MD0068276	STATE HIGHWAY ADMINISTRATION (MS4)	STATE-WIDE	ALL PHASE I (Baltimore City, Baltimore County, Anne Arundel)
	MDR100000	MDE GENERAL PERMIT TO CONSTRUCT	ALL	ALL
05DP3317	MD0068314	BALTIMORE COUNTY MS4	COUNTY-WIDE	BALTIMORE
04DP3315	MD0068292	BALTIMORE CITY MS4	BALTIMORE	BALTIMORE CITY
02SW0033		THE DAVIDSON TRANSFER & STORAGE COMPANY	BALTIMORE	BALTIMORE CITY
02SW0254		BOWLEY'S LANE LANDFILL	BALTIMORE	BALTIMORE CITY
02SW0287		CROWN CORK & SEAL COMPANY, INC. - BALTIMORE	BALTIMORE	BALTIMORE
02SW0302		ROCKLAND INDUSTRIES, INC.	BALTIMORE	BALTIMORE CITY
02SW0468		SHASTA BEVERAGES, INC.	BALTIMORE	BALTIMORE CITY
02SW0576		DAP INC.	BALTIMORE	BALTIMORE
02SW0581		GRAHAM PACKAGING PLASTIC PRODUCTS, INC. - BLT047	BALTIMORE	BALTIMORE CITY
02SW0630		BACK RIVER WWTP	BALTIMORE	BALTIMORE
02SW0655		AMERICAN YEAST CORPORATION	BALTIMORE	BALTIMORE CITY
02SW0683		BFI - NORRIS FARM LANDFILL	BALTIMORE	BALTIMORE
02SW0706		BALTIMORE CITY DPW - EASTERN SUBSTATION	BALTIMORE	BALTIMORE CITY
02SW0708		BALTIMORE CITY DPW - MECHANIC SHOP	BALTIMORE	BALTIMORE CITY
02SW0745		U.S. POSTAL SERVICE - PARKVILLE AUXILLARY VMF	BALTIMORE	BALTIMORE
02SW0829		AUTOMATIC ROLLS OF BALTIMORE	BALTIMORE	BALTIMORE CITY
02SW0852		UNITED PARCEL SERVICE - QUAD AVENUE	BALTIMORE	BALTIMORE CITY
02SW0879		BALL - STEELTIN	BALTIMORE	BALTIMORE
02SW0979		BALTIMORE REINFORCING STEEL	BALTIMORE	BALTIMORE
02SW0989		COCA-COLA BOTTLING CO. - BALTIMORE	BALTIMORE	BALTIMORE CITY
02SW1032		VALLEYWOOD INDUSTRIES, INC.	BALTIMORE	BALTIMORE CITY
02SW1044		FEDERAL EXPRESS CORP. - BALTIMORE	BALTIMORE	BALTIMORE
02SW1055		CON-WAY CENTRAL EXPRESS - XBX - BALTIMORE	BALTIMORE	BALTIMORE CITY
02SW1149		EASTSIDE AUTO RECYCLING, INC.	BALTIMORE	BALTIMORE CITY
02SW1157		NORFOLK SOUTHERN RAILWAY COMPANY - BAYVIEW YARD	BALTIMORE	BALTIMORE CITY
02SW1253		MARYLAND RECYCLE COMPANY, INC.	BALTIMORE	BALTIMORE
02SW1275		UNIVERSAL DISTRIBUTION SERVICES, INC.	BALTIMORE	BALTIMORE
02SW1301		MARINE CORPS TRAINING CENTER	BALTIMORE	BALTIMORE CITY
02SW1328		SHA - GOLDEN RING SHOP	BALTIMORE	BALTIMORE

MDE Permit	NPDES	Facility	City	County
02SW1351		SULLIVAN GARAGE	ROSEDALE	BALTIMORE
02SW1359		P & J CONTRACTING COMPANY, INC.	BALTIMORE	BALTIMORE CITY
02SW1463		ERDMAN AUTO PARTS	BALTIMORE	BALTIMORE CITY
02SW1491		CAVANAUGH PRESS, INC.	BALTIMORE	BALTIMORE
02SW1496		NELSON ENTERPRISES, INC.	BALTIMORE	BALTIMORE CITY
02SW1502		O.S.T. TRUCKING COMPANY, INC.	BALTIMORE	BALTIMORE
02SW1548		LONZA BALTIMORE, INC. - BALTIMORE	BALTIMORE	BALTIMORE CITY
02SW1549		SIEMENS WATER TECHNOLOGIES CORPORATION - BALTIMORE	BALTIMORE	BALTIMORE CITY
02SW1552		CONSOLIDATED CONTAINER COMPANY, LP.	BALTIMORE	BALTIMORE
02SW1628		DORACON CONTRACTING COMPANY - EAST BIDDLE STREET	BALTIMORE	BALTIMORE CITY
02SW1663		USF HOLLAND, INC.	BALTIMORE	BALTIMORE CITY
02SW1698		LONZA BALTIMORE, INC.	BALTIMORE	BALTIMORE CITY
02SW1800		MHS ENTERPRISES, LLC	BALTIMORE	BALTIMORE
02SW1852		ENGINEERED POLYMER SOLUTIONS, INC. - BALTIMORE	BALTIMORE	BALTIMORE
02SW1859		POMPEIAN, INC.	BALTIMORE	BALTIMORE CITY
02SW1905		COMMUNITY COLLEGE OF BALTIMORE COUNTY - ESSEX	BALTIMORE	BALTIMORE
02SW1921		AMTRAK - QUAD AVENUE ELECTRIC TRACTION OFFICE	BALTIMORE	BALTIMORE CITY
02SW1970		BALTIMORE COUNTY BUREAU OF HIGHWAYS - SHOP 7-1	BALTIMORE	BALTIMORE
02SW1987		4600 EAST FAYETTE, LLC	BALTIMORE	BALTIMORE CITY
02SW1989		FRANKFORD AUTO RECYCLERS	BALTIMORE	BALTIMORE CITY
02SW2020		A-1 TREE & LAWNCARE, LTD.	ROSEDALE	BALTIMORE
02SW3018		BALTIMORE GALVANIZING COMPANY, INC.	BALTIMORE	BALTIMORE
02SW3021		ROBBINS MOTOR TRANSPORTATION, INC.	BALTIMORE	BALTIMORE
02SW1257		BALTIMORE AUTO RECYCLING, INC.	BALTIMORE	BALTIMORE CITY

Note: [1] Although not listed in this table, some individual process water permits incorporate stormwater requirements and are accounted for within the NPDES stormwater WLA, as well as additional Phase II permitted MS4s, such as military bases, hospitals, etc.

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 that considers current and foreseeable conditions, the best available data, and accounts for uncertainty with the inclusion of a MOS value. The option is always available to refine the TMDL for resubmittal to EPA for approval if environmental conditions, new data, or the understanding of the natural processes change more than what was anticipated by the MOS.

III. Background

The Back River Oligohaline Chesapeake Bay Segment is a tidal estuary, or embayment, located on the western shore of the Chesapeake Bay, just north of the Patapsco River embayment. Herring Run is the major freshwater tributary that drains to the Back River embayment. The tidal range of the embayment is 0.37 meters (m). The watershed draining to the embayment covers approximately 141.7 square kilometers (km^2) (35,014 acres) and spans portions of Baltimore City and Baltimore County. There are no "high quality," or Tier II, stream segments (Benthic Index of Biotic Integrity (BIBI) and Fish Index of Biotic Integrity (FIBI) aquatic life assessment scores > 4 (scale 1-5)) located within the embayment's watershed requiring the implementation of Maryland's anti-degradation policy (COMAR 2011c; MDE 2010). Approximately 0.6% percent of the embayment's drainage area is covered by water (i.e., streams, ponds, etc). The total population in the embayment's watershed is approximately 331,400 (US Census Bureau 2000).

According to the United States Geological Survey's (USGS) 2006 land cover data (USGS 2011), which was specifically developed to be applied within the Chesapeake Bay Program's (CBP) Phase 5.3.2 watershed model, land use in the Back River embayment's watershed is predominantly urban. Urban land occupies approximately 87.4% of the watershed, while 7.8% is forested and 2.7% is wetlands. The remaining 2.1% is classified as barren, agricultural, natural grassland, and water.

Maryland water quality standards specify that all surface waters of the State shall be protected for water contact recreation, fishing, and the protection of aquatic life (COMAR 2011a). Additionally, the specific designated use of the Back River Oligohaline Tidal Chesapeake Bay Segment is Use II – Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting (COMAR 2011b).

MDE has identified the waters of the Back River Oligohaline Tidal Chesapeake Bay Segment (Integrated Report Assessment Unit ID: BACOH) on the State's 2010 Integrated Report as impaired by PCBs in both sediment (1998) and fish tissue (2008), sediments (1996), chlordane (1996), zinc (1998), nutrients – nitrogen and phosphorus (1996), and impacts to biological communities (2002). The Back River Oligohaline Tidal Chesapeake Bay Segment is often referred to as the Back River embayment, and therefore, for the purposes of this report, will be referred to as such for simplicity. Chlordane and nutrients (nitrogen and phosphorus) TMDLs, and a zinc water quality analysis (WQA) were approved by EPA in 1999, 2005 and 2004, respectively. Then, in 2010, the Chesapeake Bay nutrient and sediment TMDLs were developed by EPA, which addressed the sediment impairment listing for the embayment. The listing for impacts to biological communities will be addressed at a future date.

CWA Section 303(d) and its implementing regulations require that TMDLs be developed for waterbodies identified as impaired by the State where technology based and other required controls do not provide for attainment of water quality standards. The PCB TMDLs submitted by MDE are designed to allow for the attainment of the Back River Oligohaline Tidal Chesapeake Bay Segment watershed's designated uses, and to ensure that there will be no PCB impacts affecting the attainment of these uses. Refer to Table 1 above for a summary of allowable loads.

Since the Back River embayment was identified as impaired for PCBs in fish tissue, the overall objective of the tPCB TMDL established in this document is to ensure that the "fishing" designated use, which is protective of human health related to the consumption of fish, in the Back River embayment is supported; however, this TMDL will also ensure the protection of all other applicable designated uses within the embayment. This objective was achieved via the use of extensive field observations and a tidal prism model. The model incorporates the influences of freshwater inputs, tidal flushing, and exchanges between the water column and bottom sediments, thereby representing realistic dynamic transport within the Back River embayment.

From 2001 to 2002, monitoring surveys were conducted under the Comprehensive Harbor Assessment and Regional Modeling Study (CHARM) to measure tidal and non tidal water column tPCB concentrations at stations throughout the Back River embayment and watershed (Baker et al. 2002). Sediment samples were collected in 2001 under the Back River Chemical Contaminant Survey (BRCCS) to charactierize tPCB sediment concentrations throughout the embayment (Baker 2001). MDE collected fish tissue samples for PCB analysis in the Back River from 2000 to 2004. From 2008 to 2009, MDE collected additional fish tissue, water column (non tidal and tidal), and sediment samples that were applied in this analysis.

Both point and nonpoint sources of PCBs have been identified throughout the Back River embayment's watershed. Nonpoint sources include loads from:

Resuspension and Diffusion from Bottom Sediments – The tidal prism model, applying observed tPCB concentrations in the water column and sediment, predicts a net tPCB transport of 11,339.8 gram/year to the bottom sediment of the Back River embayment. Even if resuspension and diffusion from bottom sediments served as a source of PCBs to the water column it would still not be considered a directly controllable source (reducible), since the load contribution is resultant from other point and nonpoint source inputs (both historic and current) within the embayment's watershed.

Chesapeake Bay Mainstem Tidal Influence – The tidal prism model, using observed tPCB concentrations measured at the mouth of the Back River embayment, predicts an estimated net tPCB transport of 7,262.9 g/year from the Back River embayment to the Chesapeake Bay mainstem. Therefore, there is a net export of tPCBs from the Back River embayment to the Chesapeake Bay mainstem due to the higher water column concentrations inside the embayment. However, upon reductions to watershed loads, this net transport of PCBs out of the embayment and into the Bay mainstem could shift in the future. Even if this shift occurred though, the load contribution is resultant from historic and present point and nonpoint source inputs throughout the Upper Chesapeake Bay watershed; and it is, therefore, still not considered to be a directly controllable source (reducible).

Atmospheric Deposition – There is no recent study of the atmospheric deposition of PCBs to the surface of the Back River embayment. A depositional rate of 16.3 $\mu g/m^2$/ year of tPCBs for urban areas and a net deposition of 1.6 $\mu g/m^2$/year of tPCBs for regional (non urban) areas from a CBP study was used for this TMDL. In the Delaware River estuary, an extensive atmospheric deposition monitoring program found PCB deposition rates ranging from 1.3 (non

urban) to 17.5 (urban) $\mu g/m^2$/year of tPCBs. Since urban land use comprises the majority of the Back River embayment's watershed, the 16.3 $\mu g/m^2$/year tPCB depositional rate for urban areas resultant from CBP's 1999 study is appropriate for the Back River embayment. A direct atmospheric deposition load was calculated for both the surface to the embayment and for the embayment's watershed. The direct atmospheric deposition load to the surface of the embayment (267.8 g/year) was calculated by multiplying the surface area of the Back River embayment (16.4 km^2) and the deposition rate of 16.3 $\mu g/m^2$/year. Similarly, the atmospheric deposition load to the embayment's watershed (2,310.7g/year) can be calculated by multiplying 16.3 $\mu g/m^2$/year by the embayment's watershed area (total) of 141.8 km^2. However, according to *Totten et al., (2006)*, not all of the atmospherically deposited tPCB load to the terrestrial part of the watershed is expected to be delivered to the embayment. Applying the PCB pass-through efficiency estimated by *Totten et al., (2006)* for the Delaware River watershed of approximately 1%, the atmospheric deposition load to the Back River embayment from the watershed is approximately 23.1 g/year. This load, however, is inherently modeled as part of the non-regulated watershed runoff/NPDES regulated stormwater loads described below.

Non-Regulated Watershed Runoff – From April 2008 to March 2009, MDE collected monthly water column samples for PCB analysis at one non-tidal monitoring station in the Herring Run tributary draining to the Back River embayment. Additionally, flow information from the closest USGS gage was obtained for each sample date, and the average daily flow was calculated. A tPCB load for each sample was then calculated based on the observed tPCB concentration and average daily flow, and the relationship between loads and flows was developed via regression analysis for the monitoring station. With this relationship, the tPCB load corresponding to any flow can be estimated. A watershed load time series was then calculated using this relationship and the flow time series from CBP's Phase 5 watershed model output for the model segments within the Back River embayment's watershed. The non-regulated watershed runoff tPCB load only corresponds to the non-urbanized areas (i.e., primarily forest and wetland areas) of the Back River embayment's watershed. The load associated with the urbanized area of the embayment's watershed represents the NPDES regulated stormwater tPCB baseline load. The non-regulated watershed runoff tPCB baseline load to the Back River embayment is 65.7 g/year.

Contaminated Sites – Contaminated sites refers to areas with known PCB soil contamination, as documented by state or federal hazardous waste cleanup programs (i.e., state or federal Superfund programs). The list of sites has been compiled based on information gathered from the EPA's Superfund database and MDE's Land Restoration Program Geospatial Database (LRP-MAP). Five sites have been identified with PCB soil concentrations at or above method detection levels, as determined via soil sample results contained within MDE Land Management Administration's (LMA) contaminated site survey and investigation records. The median tPCB concentration of the site samples was multiplied by the soil loss rate, which is a function of soil type, pervious area, and land cover, to estimate the tPCB edge of field (EOF) load. Since all of the sites were immediately adjacent to the tidal embayment, a sediment delivery ratio of one was applied, and as a result the final edge-of-stream (EOS) load is equivalent to the final EOF load. The contaminated site tPCB baseline load is estimated to be 12.8 g/year. This load is the summation of individual PCB loads from the five identified contaminated sites within the Back

River embayment's watershed. Three of these sites have already undergone some degree of soil remediation, in which case the estimated tPCB load is reflective of post remediation PCB soil levels.

Point sources include loads from:

Industrial Process Water Facilities – Industrial process water facilities are included in Maryland's PCB TMDL analyses if they are located within the applicable watershed, and if they have the potential to discharge PCBs. One facility was identified using guidance developed by Virginia (VA) for monitoring point sources in support of TMDL development. As per VA's guidance, specific types of industrial and commercial operations are more likely than others to discharge PCBs based on historic or current activities. The State identified specific types of permitted industrial and municipal facilities based on their Standard Industrial Classification (SIC) codes as having the potential to contain PCBs within their process water discharge. One industrial process water facility with an SIC code defined in the VA guidance as having the potential to discharge PCBs was identified within the Back River embayment's watershed. However, the facility was considered *de minimis* under this analysis, as its average flow was below one Million Gallons per Day (MGD).

Municipal Wastewater Plants – Back River WWTP is the only municipal WWTP that has been identified within the Back River embayment's watershed. The facility contains two outfalls, 001A and 002A. Effluent from Outfall 002A is sent to the RG Steel industrial facility, located in the Baltimore Harbor Maryland 8-Digit (MD 8-Digit) watershed, for use in its plant processes and will therefore not be included in this analysis. Outfall 001A was sampled by MDE in March and May of 2006 for PCB analysis. The baseline tPCB loading was calculated based on the average discharge flow for the period of March 2010 through February 2011, and the average observed tPCB effluent concentration. The estimated tPCB baseline load for outfall 001A is 133.2 g/year.

NPDES Regulated Stormwater – MDE estimates pollutant loads from NPDES regulated stormwater areas based on urban land use classification within a given watershed. The 2006 USGS spatial land cover, which was used to develop CBP's Phase 5.3.2 watershed model land use, was applied in this TMDL to estimate the NPDES Regulated Stormwater tPCB Baseline Load. The Back River embayment's watershed spans a portion of Baltimore County and Baltimore City, Maryland. The NPDES stormwater permits within the Back River embayment's watershed include: (i) the area covered under Baltimore County and Baltimore City's Phase I jurisdictional MS4 permit; (ii) the State Highway Administration's Phase I MS4 permit; (iii) state and federal general Phase II MS4's; (iv) industrial facilities permitted for stormwater discharges; and (v) construction sites. The NPDES regulated stormwater tPCB baseline load was estimated by multiplying the percentage of urban land use within the Back River embayment's watershed by the total watershed baseline load. The remainder of the total watershed baseline load is associated with the non-regulated watershed runoff tPCB baseline load. Since the identified contaminated sites are located within the urban land use area, their total load of 12.8 g/year is subtracted giving a final NPDES regulated stormwater tPCB baseline load of 443.6 g/year.

A tidal prism model that incorporates the influences of both freshwater inputs and tidal flushing was used to simulate the dynamic interactions between the water column and bottom sediments within the Back River embayment and the Chesapeake Bay mainstem. Within the Back River embayment, the tidal exchange with the Chesapeake Bay mainstem, freshwater inputs, exchanges with the atmosphere due to deposition and volatilization, and the exchange with the bottom sediments through diffusion, resuspension, and settling are the dominant processes affecting the transport of PCBs in the water column. The burial of PCBs to deeper inactive layers of sediment and exchanges at the sediment-water column interface (through diffusion, resuspension, and settling) are the dominant processes affecting the transport of PCBs in the bottom sediments.

The mean 2001 observed tPCB concentrations in the water column and sediment were used to characterize initial (baseline) model conditions. Relative to the tidal influence from the Chesapeake Bay mainstem and Upper Chesapeake Bay, the Susquehanna River is the major freshwater input, and as a result the major source of PCBs, to the upper Bay. Observations show that on average the tPCB concentrations in the Upper Chesapeake Bay are decreasing at a rate of 6.5% per year. Since inflow from the Susquehanna River dominates the freshwater input to the upper Chesapeake Bay, it is reasonable to assume that tPCB concentrations in the upper Bay are decreasing as well. It was assumed within this analysis that boundary condition tPCB concentrations between the Back River embayment and the Chesapeake Bay mainstem will decrease at a rate of 5%, following the current trend observed in the upper Chesapeake Bay, but taking into consideration specific conditions within the embayment.

The time series applies 2001 tPCB water column and sediment concentrations within the Back River embayment and tidal boundary with the Chesapeake Bay mainstem as the initial conditions. The mean observed water column tPCB concentrations from 2008-2009 are used to validate the model. All other factors (i.e., freshwater inputs, tidal exchange rates, bottom sediment and water column exchange rates, and burial rates) were kept constant. Assuming that water column tPCB concentrations decrease at a rate of 5.0% per year at the tidal boundary of the embayment with the Chesapeake bay mainstem, it will take approximately 50 years for the water column tPCB concentration near the mouth of the Back River embayment to meet the TMDL endpoint. Thus, it is reasonable to use 50 years as an approximate time frame for achieving the TMDL. Different model simulation scenarios were conducted by reducing point and nonpoint source loads, while assuming that the boundary tPCB concentrations will decrease exponentially at a rate of 5.0% per year. The simulation results show that with a 52.5% reduction for all watershed sources (i.e., non-regulated watershed runoff and NPDES regulated stormwater), with slight variations in the regulated stormwater due to the locations of contaminated sites, as well as a 40.3% reduction from atmospheric deposition, it will take approximately 54.9 years (20,026 days) for the Back River embayment to meet the TMDL endpoints and thus be supportive of the "fishing" designated use. However, the time required to reach the TMDL endpoint will depend on the selection of the initial conditions. In order to assess the effect of varying the baseline conditions on the time required to achieve the TMDL, the upper and lower bounds of the 95% confidence interval (CI) around the mean water column tPCB concentration were estimated and applied in the analysis. The time required to reach the TMDL endpoints increased by about 20% (11 years) when the higher tPCB water column concentration was used as the baseline condition.

IV. Discussion of Regulatory Conditions

EPA finds that MDE has provided sufficient information to meet all seven of the basic requirements for establishing a PCB TMDL for the Back River Oligohaline Chesapeake Bay Segment watershed. EPA, therefore, approves this PCB TMDL for the Back River Oligohaline Tidal Chesapeake Bay Segment watershed. This approval is outlined below according to the seven regulatory requirements.

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

WQS consist of three components: designated and existing uses; narrative and/or numerical water quality criteria necessary to support those uses; and an anti-degradation statement. Maryland WQS specify that all surface waters of the State shall be protected for water contact recreation, fishing, and the protection of aquatic life (COMAR 2011a). Additionally, the specific designated use of the Back River Oligohaline Tidal Chesapeake Bay Segment is Use II – Support of Estuarine and Marine Aquatic Life and Shellfish Harvesting (COMAR 2011b). There are no "high quality," or Tier II, stream segments BIBI and FIBI aquatic life assessment scores > 4 (scale 1-5) located within the embayment's watershed requiring the implementation of Maryland's anti-degradation policy.

The State of Maryland has adopted three separate water column tPCB criteria: criterion for protection of human health associated with consumption of PCB contaminated fish, as well as fresh and salt water chronic tPCB criteria for the protection of aquatic life. The Maryland human health tPCB criterion is set at 0.64 ng/L, ppt. The Maryland fresh and salt water chronic aquatic life tPCB criteria are set at 14 ng/L and 30 ng/L, respectively. The water column mean tPCB concentration within the embayment exceeds the human health criterion of 0.64 ng/L; however, none of the water column samples exceed the salt water aquatic life tPCB criterion of 30 ng/L.

A sediment tPCB criterion has not yet been established in Maryland; however, in order to assess waters of the State for toxic impairments in sediment, an integrated report assessment methodology has been established. If toxicity and a degraded benthic community are present within the sediment, and the sediment concentration of a given toxic substance exceeds the Sediment Quality Guideline (SQG) effects-range median (ERM), the waterbody will be listed as impaired on the Integrated Report for that substance. The Back River embayment was listed as impaired for PCBs in sediment due to the presence of toxicity, degraded benthic community and exceedances of the sediment tPCB ERM concentration of 180 ng/g, or ppb.

In addition to the water column criteria, fish tissue monitoring data can serve as an indicator of PCB water quality conditions. Maryland applies 39 ng/g as the tPCB fish tissue listing threshold. MDE collected fish tissue samples for PCB analysis in the Back River embayment from 2000 to 2004. In 2008, additional fish tissue samples were collected in support of this TMDL. The tPCB concentrations for all of the fish samples (several species of fish including channel catfish, white perch, etc. were collected) exceed the listing threshold, demonstrating that a PCB impairment exists within the Back River embayment.

Since the overall objective of the tPCB TMDLs for the Back River Oligohaline Chesapeake Bay Segment is to ensure the support of the "fishing" designated use, the tPCB fish tissue listing threshold (39 ng/g) was translated into an associated water column tPCB threshold concentration to apply within this analysis as the water column TMDL endpoint. This was done using the Adjusted Total Bioaccumulation Factor (Adj-tBAF) of 68,496 L/kg for the Back River Oligohaline embayment. A total Bioaccumulation Factor (tBAF) is calculated per fish species, and subsequently the tBAFs are normalized by the median species lipid content and median dissolved water column tPCB concentration in the species home range to produce the Adj-tBAF per species. The most environmentally conservative of the Adj-tBAFs is then selected to calculate the water column TMDL endpoint tPCB concentration. This final water column tPCB concentration was then subsequently compared to the water column tPCB criteria concentrations, to ensure that all applicable criteria within the embayment would be attained. Based on this analysis, the water column tPCB concentration and TMDL endpoint of 0.57 ng/L for the Back River embayment, derived from the tPCB fish tissue listing threshold, is less than both the human health water column tPCB criterion of 0.64 ng/L as well as the fresh and saltwater aquatic life chronic tPCB criteria of 14 ng/L and 30 ng/L, respectively.

Similarly, in order to establish a sediment tPCB concentration that is protective of the "fishing" designated use within the embayment, a tPCB sediment concentration was derived from the tPCB fish tissue listing threshold to apply within this analysis as the sediment TMDL endpoint concentration. Using an Adjusted Sediment Bioaccumulation Factor of 5.6 for the Back River embayment, would result in a sediment tPCB concentration of 6.9 ng/g.

Although the ERM is sufficient for providing an official assessment (i.e., Integrated Report listing purposes) of PCB sediment impairments, since it provides reasonable certainty that concentrations above this threshold do in fact result in toxicity, concentrations below this threshold may still be representative of conditions that adversely impact benthic life, in some instances. Conversely, the SQG Threshold Effects Level (TEL) of 21.6 ng/g, or ppb, for PCBs in estuarine sediments indicates that concentrations below this threshold are highly unlikely to result in toxicity and will therefore be protective of benthic life. Thus, the final target sediment tPCB concentration was then subsequently compared to the tPCB TEL of 21.6 ng/g, since the endpoint concentration must be protective of benthic life within the Back River embayment, in order to address the specific sediment PCB impairment listing. Based on this analysis, the sediment tPCB concentration of 6.9 ng/g for the Back River embayment, derived from the tPCB fish tissue listing threshold, is less than the TEL of 21.6 ng/g.

EPA believes these are reasonable and appropriate water quality goals.

2) ***The TMDLs include a total allowable load as well as individual wasteload allocations and load allocations.***

Total Allowable Load

EPA regulations at 40 CFR §130.2(i) state *that the total allowable load shall be the sum of individual WLAs for point sources, LAs for nonpoint sources, and natural background*

concentrations. The TMDL for PCBs Back River Oligohaline Tidal Chesapeake Bay Segment watershed is consistent with 40 CFR §130.2(i) because the total loads provided by MDE equal the sum of the individual WLAs for point sources and the land based LAs for nonpoint sources.

The allowable load was determined by first estimating a baseline load calculated using mean 2001 observed tPCB concentrations in the water column and sediment to characterize initial model conditions. Different model simulation scenarios were conducted by reducing point and nonpoint source loads, while assuming that the boundary tPCB concentrations will decrease exponentially at a rate of 5.0% per year. The simulation results show that with a 52.5% reduction for all watershed sources (i.e., non-regulated watershed runoff and NPDES regulated stormwater), with slight variations in the regulated stormwater due to the locations of contaminated sites, as well as a 40.3% reduction from atmospheric deposition, it will take approximately 54.9 years (20,026 days) for the Back River embayment to meet the TMDL endpoints and thus be supportive of the "fishing" designated use. However, the time required to reach the TMDL endpoint will depend on the selection of the initial conditions. In order to assess the effect of varying the baseline conditions on the time required to achieve the TMDL, the upper and lower bounds of the 95% confidence interval (CI) around the mean water column tPCB concentration were estimated and applied in the analysis. The time required to reach the TMDL endpoints increased by about 20% (11 years) when the higher tPCB water column concentration was used as the baseline condition.

The allowable load was calculated as 486.7 g/year. This load is considered the maximum allowable load the watershed can assimilate and still attain water quality standards. The allowable load was reported in units of grams/year for the average annual load and in grams/day for the maximum daily load. Expressing TMDLs using these units is consistent with Federal regulations at 40 CFR §130.2(i), which states that *TMDLs can be expressed in terms of either mass per time, or other appropriate measure*. The average annual and maximum daily tPCB TMDLs are presented in Table 1.

Load Allocations

The TMDL summary in Table 1 contains the LAs for the Back River Oligohaline Chesapeake Bay Segment Watershed. According to Federal regulations at 40 CFR §130.2(g), LAs are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting the loading. Wherever possible, natural and nonpoint source loadings should be distinguished.

LAs have been assigned to the following nonpoint sources in order to meet the "fishing" designated use in the Back River embayment: direct atmospheric deposition to the surface of the embayment, identified contaminated sites and non-regulated watershed runoff. The model results show that in order to meet the "fishing" designated use in the embayment, the TMDL requires load reductions of 40.3% from atmospheric deposition and 52.5% from non-regulated watershed runoff. A smaller reduction for atmospheric deposition is required since it has a much smaller impact on water quality than the watershed land sources. A smaller reduction for

atmospheric deposition is required since it has a much smaller impact on water quality than the watershed land sources. Given that a number of contaminated sites have already undergone some degree of remediation and their baseline loads constitute a relatively small percentage of the total baseline load to the embayment (1.4%), these sites were currently not subjected to any reductions. Loads from resuspension and diffusion from bottom sediments and the tidal influence from the Chesapeake Bay mainstem were included in the model in order to predict tPCB concentrations within the embayment; however, they are not deemed to be directly controllable within the framework of the TMDL. Therefore, these sources will not be assigned an allocation or a required reduction. These loads are expected to reduce over time via natural attenuation as evidenced by the observed decrease in tPCB concentrations in both the Upper Chesapeake Bay and at the tidal boundary between the embayment and the Bay mainstem.

Wasteload Allocations

There are 55 permitted point sources of PCBs with NPDES permits regulating the discharge of PCBs in the Back River Oligohaline Tidal Chesapeake Bay Segment watershed which are included in the WLAs. Point sources include one municipal WWTP, and 54 NPDES regulated stormwater facilities.

Back River is the only municipal WWTP that has been identified within the Back River embayment's watershed. The facility has two outfalls, 001A and 002A. Effluent from outfall 002A is sent to the RG Steel industrial facility, located in the Baltimore Harbor MD 8-Digit watershed, for use in its plant processes and will therefore not be incorporated in this analysis. The estimated tPCB baseline loading for outfall 001A is 133.2 g/year, which was calculated based on the average discharge flow for the period of March 2010 through February 2011, and the average observed tPCB effluent concentration. Since: (1) WWTP allocations in Maryland's PCB TMDLs are calculated as facility design flow multiplied by the water column TMDL endpoint tPCB concentration for the applicable waterbody, and (2) the effluent from outfall 002A will eventually discharge to the Baltimore Harbor via the RG Steel industrial facility, the tPCB load from this outfall must comply with the water column TMDL endpoint tPCB concentration applied within the Baltimore Harbor PCB TMDL of 0.27 ng/L (MDE 2011d). This water column TMDL endpoint tPCB concentration is lower than the endpoint concentration applied within this analysis of 0.57 ng/L. Since there is only one waste stream from the Back River WWTP, it is not possible to provide two different levels of treatment for the two separate outfalls at the facility. Thus, the WLA for outfall 001A was calculated by multiplying the water column TMDL endpoint tPCB concentration of 0.27 ng/L from the Baltimore Harbor PCB TMDL by the design flow for the WWTP allocated to the outfall (130 MGD). The WLA for outfall 001A is 48.5 g/year. Under current conditions, the WLA is lower than the tPCB baseline loading, resulting in a load reduction to the facility. The elevated tPCB concentrations in wastewater are believed to be primarily due to external sources (e.g., source water, atmospheric deposition, and stormwater runoff) infiltrating the waste water collection system through broken sewer lines and connections. There are currently no effluent PCB limits established in the discharge permits for the Back River WWTP. Inclusion of a WLA in this document does not reflect any determination to impose an effluent limit in a future permit.

The NPDES regulated stormwater WLA was established by reducing the NPDES regulated stormwater baseline loads proportionally to the non-regulated watershed runoff baseline load, after the WLAs for the remaining source sectors were set, until the TMDL was achieved. The NPDES regulated stormwater WLA may include any or all of the NPDES stormwater discharges listed in Table 4.

Federal regulations at 40 CFR §122.44(d)(1)(vii)(B) require that, for an NPDES permit for an individual point source, the effluent limitations must be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the State and approved by EPA. There is no express or implied statutory requirement that effluent limitations in NPDES permits necessarily be expressed in daily terms. The CWA definition of "effluent limitation" is quite broad (effluent limitation is "any restriction on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources ...)." See CWA 502(11). Unlike the CWA's definition of TMDL, the CWA definition of "effluent limitation" does not contain a "daily" temporal restriction. NPDES permit regulations do not require that effluent limits in permits be expressed as maximum daily limits or even as numeric limitations in all circumstances, and such discretion exists regardless of the time increment chosen to express the TMDL. For further guidance, refer to Benjamin H. Grumbles memo (November 15, 2006) titled *Establishing TMDL Daily Loads in Light of the Decision by the U.S. Court of Appeals for the D.C. Circuit in Friends of the Earth, Inc. v. EPA, et al., No. 05-5015 (April 25, 2006) and implications for NPDES Permits.*

EPA has authority to object to the issuance of an NPDES permit that is inconsistent with WLAs established for that point source. It is also expected that MDE will require periodic monitoring of the point source(s) through the NPDES permit process, in order to monitor and determine compliance with the TMDL's WLAs. Based on the foregoing, EPA has determined that the TMDLs are consistent with the regulations and requirements of 40 CFR Part 130.

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

The TMDLs consider the impact of background pollutants by considering land uses.

4. The TMDLs consider critical environmental conditions.

EPA regulations at 40 CFR §130.7(c)(1) require TMDLs to account for critical conditions for stream flow, loading, and water quality parameters. The intent of the regulations is to ensure that: (1) the TMDLs are protective of human health, and (2) the water quality of the waterbodies is protected during the times when they are most vulnerable.

Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards[1]. Critical conditions are a combination of environmental factors (e.g., flow, temperature, etc.), which have an acceptably low frequency of

[1] EPA memorandum regarding EPA Actions to Support High Quality TMDLs from Robert H. Wayland III, Director, Office of Wetlands, Oceans, and Watersheds to the Regional Management Division Directors, August 9, 1999.

occurrence. In specifying critical conditions in the waterbody, an attempt is made to use a reasonable worst-case scenario condition. The TMDLs are protective of human health at all times; thus, they implicitly account for seasonal variations as well as critical conditions. Since PCB levels in fish tissue become elevated due to long-term exposure it has been determined that the selection of the average annual tPCB water column and sediment concentrations for comparison to the endpoints applied within the TMDLs adequately considers the impact of seasonal variations and critical conditions on the "fishing" designated use in the Back River embayment. Furthermore, the water column tPCB TMDL endpoint is lower than the current human health criterion for fish consumption. The water column TMDL endpoint tPCB concentration also is more protective of water quality than the freshwater and saltwater chronic criteria tPCB concentrations, which are necessary to protect aquatic life. In addition, the sediment TMDL endpoint tPCB concentration is also lower, and thus more conservative, than the TEL, which is protective of benthic aquatic life.

5) The TMDLs consider seasonal environmental variations.

As mentioned above, the TMDLs are protective of human health at all times; thus, they implicitly account for seasonal variations as well as critical conditions. Also, since PCB levels in fish tissue become elevated due to long-term exposure it has been determined that the selection of the average annual tPCB water column and sediment concentrations for comparison to the endpoints applied within the TMDLs adequately considers the impact of seasonal variations and critical conditions on the "fishing" designated use in the Back River embayment.

6) The TMDLs include a Margin of Safety.

The requirement for a MOS is intended to add a level of conservatism to the modeling process in order to account for uncertainty. Based on EPA guidance, the MOS can be achieved through two approaches. One approach is to reserve a portion of the loading capacity as a separate term, and the other approach is to incorporate the MOS as part of the design conditions.

Uncertainty within the model framework includes the estimated rate of decline in tPCB concentrations within the upper Chesapeake Bay as well as the initial condition of mean tPCB concentrations that was selected for the Back River embayment. A model sensitivity analysis was conducted using the 95% CI's as the initial condition to determine the influence on recovery time for achieving the TMDL endpoints supportive of the "fishing" designated use. Further explanation of this analysis is found in Appendix G of the TMDL report. In order to account for these uncertainties, MDE applied an explicit 5% MOS, in order to provide an adequate and environmentally protective TMDL.

7) The TMDLs have been subject to public participation.

MDE provided an opportunity for public review and comment on the PCB TMDL for the Back River embayment watershed. The public review and comment period was open from August 26, 2011 through September 26, 2011. MDE received two sets of written comments. All the comments were satisfactorily addressed by MDE.

A letter was sent to the U.S. Fish and Wildlife Service pursuant to Section 7(c) of the Endangered Species Act, requesting the Service's concurrence with EPA's findings that approval of this TMDL does not adversely affect any listed endangered and threatened species, and their critical habitats.

V. Discussion of Reasonable Assurance

EPA requires that there be a reasonable assurance that the TMDLs can be implemented. WLAs will be implemented through the NPDES permit process. According to 40 CFR §122.44(d)(1)(vii)(B), the effluent limitations for an NPDES permit must be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the State and approved by EPA. Furthermore, EPA has the authority to object to issuance of an NPDES permit that is inconsistent with WLAs established for that point source.

The TMDLs presented in this report call for substantial reduction in PCB loads from diffuse sources present throughout the Back River embayment's watershed. Since PCBs are no longer manufactured and their use has been substantially restricted, it is reasonable to expect that with time PCB concentration in the aquatic environment will decline. Observations show that the average tPCB concentration in the Upper Chesapeake Bay is decreasing at a rate of 6.5 percent per year and since water quality data for sediments and the water column in the embayment from 2000 and 2008 demonstrate that PCB concentrations are declining over time, within this TMDL analysis, as a conservative estimate, a five percent rate of decline in tPCB concentrations at the boundary between the embayment and the Bay mainstem has been assumed. Given this rate of decline, the tPCB levels in the Back River embayment are expected to decline over time due to natural attenuation, such as the burial of contaminated sediments with newer, less contaminated materials, flushing of sediments during periods of high stream flow, and biodegradation. Discovering and remediating any existing PCB land sources throughout the Upper Chesapeake Bay watershed via future TMDL development and implementation efforts will further help to meet water quality goals in the Back River embayment.

One alternative for reducing the tPCB concentrations in the water column that MDE may consider is removal of PCB-contaminated systems (i.e., dredging – specifically, additional dredging outside of that which is already currently conducted for the navigational channels). However, dredging is the least desirable alternative because of its potential biological destruction.

PCBs are still being released to the environment via accidental fires, leaks, disposal of PCB containing products, etc. Therefore, an adaptive approach of implementation is anticipated, with subsequent monitoring to assess the effectiveness of the ongoing implementation efforts to manage potential risks to both recreational and subsistence fish consumers.

A collaborative approach involving MDE and the identified NPDES permit holders as well as those responsible for nonpoint PCB runoff throughout the watersheds will be used to work toward attaining the WLAs and LAs presented in this report. The reductions will be implemented in an adaptive and iterative process that will: (1) identify specific sources, or areas

of PCB contamination, within the embayment's watershed, and (2) target remedial action to those sources with the largest impact on water quality, while giving consideration to the relative cost and ease of implementation. The implementation efforts will be periodically evaluated, and if necessary, improved, in order to further progress toward achieving the water quality goals.

Under certain conditions, EPA's NPDES regulations allow the use of non-numeric, Best Management Practices (BMP) water quality based effluent limits (WQBELs). BMP WQBELs can be used where "numeric effluent limitations are infeasible; or the practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA (CFR 2011c)." For example, MDE's Phase I MS4 permits require restoration targets for impervious surfaces (i.e., restore 10 percent or 20 percent of a jurisdiction's total impervious cover with no stormwater management/BMPs), and these restoration efforts have known total suspended solids (TSS) reduction efficiencies. Since PCBs are known to adsorb to sediments and their concentrations correlate with TSS concentrations, the significant restoration requirements in the MS4 permits, which will lead to a reduction in sediment loads entering the Back River embayment, will also contribute toward PCB load reductions and meeting PCB water quality goals. Other BMPs that focus on PCB source tracking and elimination at the source rather than end-of-pipe controls are also warranted.

Where necessary, the source characterization efforts will be followed with pollution minimization and reduction measures that will include BMPs for reducing runoff from urban areas, identification and termination of ongoing sources (e.g., industrial uses of equipment that contain PCBs), etc. The identified NPDES regulated WWTP and stormwater control agency permits will be expected to be consistent with the WLAs presented in this report. Numerous stormwater dischargers are located in the Back River embayment's watershed including Municipal Phase I MS4, the SHA Phase I MS4, industrial facilities, State and Federal Phase II MS4s, and any construction activities on areas greater than one acre. The current Montgomery County Phase I MS4 permit already requires that the jurisdiction develop an implementation plan to meet its assigned NPDES regulated stormwater WLAs. Thus, similar requirements are expected to be put in place in the future for the other Phase I MS4 permits.

Since a number of contaminated sites have already undergone some degree of remediation and their baseline loads constitute a relatively small percentage of the total baseline load (1.3%), these sites are not intended to be targeted during the initial stages of implementation and thus at this point were not subjected to any reductions. However, if in the future it becomes clear that the TMDL goals cannot be achieved without load reductions from these sites, additional reduction measures might need to be considered.

Given the persistent nature of PCBs, the difficulty in removing them from the environment, and the significant reductions necessary in order to achieve water quality goals in the Back River embayment, effectiveness of the implementation effort will need to be reevaluated throughout the process to ensure progress is being made towards reaching the TMDLs. As part of Maryland's Watershed Cycling Strategy, follow-up monitoring and assessment will be routinely conducted to evaluate the implementation status. MDE also

periodically monitors and evaluates concentrations of contaminants in recreationally caught fish, shellfish and crabs throughout Maryland. MDE will use these monitoring programs to evaluate progress towards meeting the "fishing" designated use.