FINAL

Comment Response Document
Regarding the Total Maximum Daily Loads (TMDLs) of Polychlorinated Biphenyls (PCBs) in the Baltimore Harbor, Curtis Creek/Bay, and Bear Creek Portions of the Patapsco River Mesohaline Tidal Chesapeake Bay Segment, Maryland

The Maryland Department of the Environment (MDE) has conducted a public review of the proposed PCB TMDLs for the Baltimore Harbor, Curtis Creek/Bay, and Bear Creek portions of the Patapsco River Mesohaline Tidal Chesapeake Bay Segment. The public comment period was open from August 26, 2011 through September 26, 2011. MDE received three sets of written comments.

The commentors, their affiliations, the date comments were submitted, and the numbered references to the comments submitted are identified below. In the pages that follow, comments are summarized and listed with MDE's response.

List of Commentors

Author	Affiliation	Date	Comment Number
Nat Brown	Maryland Port Authority	September 26, 2011	1
Kevin Brittingham	Baltimore County Department of Environmental Protection and Sustainability	September 26, 2011	2-5
Dana Cooper	Baltimore City Department of Public Works	September 26, 2011	6-11

Comments and Responses

1. The commentor states that the Maryland Port Administration (MPA) currently manages the placement of sediments dredged from the Baltimore Harbor embayment. The average placement of sediments totals approximately 1.5 million cubic yards (MCY) annually, with roughly 1.0 MCYs derived from the maintenance of existing channels, and the remaining 0.5 MCYs of sediments are associated with the dredging of new or modified channels and berths. The two existing Dredged Material Containment Facilities (DMCFs) identified within the TMDL are designed to receive approximately 0.5 MCYs each on an annual basis and are currently being used for the placement of generally fine-grained sediment from maintenance dredging.

   Maintenance dredging typically removes newly deposited sediments or sediments that have been relocated from areas adjacent to the channels by currents, storms, or shipping activity that have accumulated within the existing channels. The sloughing of the lateral portions of the channels may also add to the maintenance material, but initial dredging typically establishes a slope for the side walls that minimizes sloughing.

The commentor states the average tPCB concentration in the surficial sediments of the Baltimore Harbor embayment is 205 nanograms per gram (ng/g). Assuming that the average concentration is a reasonable estimate of the tPCB levels within the maintenance material being dredged, an estimated 78,000 g of tPCBs are removed from the embayment each year through the placement of 1.0 MCY of maintenance dredged material in the two DMCF containment facilities. If the new work dredge material is also assumed to have the same average sediment tPCB concentration, an additional 39,000 g of tPCBs are removed annually. However, since the sediment tPCB concentration of new work dredge material is not documented as well as the concentrations in the maintenance material, MPA will not provide an estimate of the tPCBs being removed from the system that are associated with the new work dredge material.

Assuming the sediment tPCB concentrations and dredge material placement rates described above, MPA's DMCF operations are permanently removing (sequestering) approximately 13 times the tPCB baseline loads to the Baltimore Harbor embayment that have been estimated within the TMDL from all sources combined. This load reduction could have a significant overall benefit to the aquatic environment, but there is concern regarding the inclusion of these estimates within the TMDL, since the tPCBs being removed from the embayment are taken from the existing channels, where biological communities are limited to begin with. Therefore, the benefit derived from this estimated reduction in tPCB loads on humans and the aquatic environment may be substantially less than it would be if contaminated sediments were being removed from functional biological communities within the Baltimore Harbor embayment, where the uptake, bioaccumulation, and resulting exposure of PCBs to humans is more likely. Although quantifying the overall benefit to the Baltimore Harbor embayment, relative to current tPCB levels, is difficult, it is reasonable to conclude that sequestering large tPCB loads in the DMCFs will reduce the available tPCB load to the embayment from the resuspension from bottom sediments. Furthermore, it will reduce the potential for further downstream transport to the Chesapeake Bay mainstem and will shorten the estimated timeframe to reach the TMDL endpoint tPCB concentrations for the embayment.

Response: MDE acknowledges that the dredging of sediment from navigational channels within the Baltimore Harbor embayment and subsequent placement in DMCFs will result in the removal of contaminated sediments containing elevated levels of PCBs from the embayment. Thus, MDE has added a statement to the main TMDL report stating that these facilities receive 1.0 MCY annually of PCB contaminated maintenance material that has been dredged from the navigational channels within the Baltimore Harbor embayment, which will sequester a significant mass of PCBs bound to the contaminated sediment from the system. However, it currently cannot be determined whether or not this removal effort will reduce tPCB concentrations in the surficial layer of sediments within the embayment, thus lowering the overall exposure of PCBs to the benthic community, aquatic food chain, and subsequently humans through the consumption of aquatic organisms (fish). Therefore, the statement that MDE added to the main TMDL report solely indicates 1) the amount of sediment being removed from the embayment due to maintenance dredging, 2) that this sediment contains elevated levels of PCBs, and 3) that this removal will sequester a

significant mass of PCBs bound to the contaminated sediment from the embayment. The statement will not include MPA's estimate of the exact tPCB load being removed from the system, nor will it make a general claim that the removal of these sediments is reducing the net tPCB loading to the embayment from the bottom sediments. The rationale for these exclusions is explained below.

The relocation of surficial sediments within the embayment from adjacent areas to the navigational channels due to currents, storms, and shipping activity will expose a new layer of underlying sediments to the water column at these adjacent areas. Although there is currently no data available regarding tPCB levels in this underlying layer of sediments, it is likely that tPCB levels in these sediments will also be elevated and could potentially have even higher tPCB levels than the surficial sediments, due to the historic releases of PCBs from past industrial activities. Therefore, it is uncertain whether or not the relocation of surficial sediments from adjacent areas to the navigation channels results in a net reduction or increase in tPCB loads from the bottom sediments to the embayment. Furthermore, even though the sediments within the navigational channels that are removed from the system will contain elevated levels of PCBs, the channels are not actually considered to be part of the embayment's benthic ecosystem. Since dissolved oxygen (DO) levels are too low in the channel to support benthic aquatic life, due to an artificially created condition, their removal will not reduce the overall exposure of PCBs to the aquatic food chain. Also, since PCB levels in the environment are currently decreasing due to natural attenuation and there are nn new inputs of PCBs to the environment due to their ban in the 1970's, it is reasonably estimated that the new sediments deposited on the embayment floor will contain lower levels of PCBs than the underlying sediments. Thus, due to the transport of these sediments into and the subsequent removal from the navigational channels over time, a negative impact may be incurred, as the exposed underlying sediments that remain could contain higher levels of PCBs. For implementation purposes, dredging could be very useful in improving conditions within the sediment; however, removal would have to occur at a depth where tPCB levels in the sediment meet the TMDL endpoint tPCB concentrations.

MPA estimates that the dredging of PCB contaminated sediments from navigational channels in the Baltimore Harbor embayment and their subsequent placement in DMCFs removes 13 times the total baseline tPCB load to the embayment. The commentor suggests that this could have a significant overall benefit to the aquatic environment within the embayment, since sequestering these sediments would reduce the tPCB load to the embayment from the resuspension from bottom sediments. Furthermore, it will reduce the potential for further downstream transport to the Chesapeake Bay mainstem and will shorten the estimated timeframe to reach the TMDL endpoint tPCB concentrations for the embayment. MDE does not agree with this conclusion due to the reasons described in the preceding paragraph. Therefore, MDE will acknowledge within the main TMDL report that the DMCFs receive 1.0 MCY of sediments from the dredging of navigational channels within the embayment that have elevated PCB levels, which will sequester a certain mass of PCBs from the embayment; however, MDE will not include language that there is an environmental benefit relative to the net PCB loadings to the embayment, specifically the resuspension of PCBs

from the bottom sediments, due to the removal and containment of the PCB contaminated dredged material.

2. The commentor states that the Wastewater Treatment Plant (WWTP) tPCB baseline loads are based on 2006 data. The commentor then asks if more recent data is available to provide a more accurate estimate of current tPCB concentrations in WWTP effluent?

   Response: The 2006 WWTP effluent tPCB concentration data is the most recent data available for estimating the tPCB baseline loads for WWTPs in this TMDL. A data solicitation was conducted, and all readily available data from the past five years was considered in this TMDL. Effluent samples from these WWTPs were analyzed for PCBs using a full congener based, ultra-low detection level method [US Environmental Protection Agency (EPA) method 1668]. These effluent samples should be representative of tPCB concentrations in the applicable WWTPs' effluent. The concentrations would not be expected to have declined significantly over the past five years, since PCBs are a persistent, bioaccumulative compound that degrade slowly over time. Even though the baseline load estimates could potentially change if more recent effluent tPCB concentration data were available, the WLA for these facilities, calculated based on the water column tPCB TMDL endpoint and the design flow for the facilities, would remain the same. It is expected that these facilities will be required to characterize tPCB concentrations in their effluent in the future, when their permits are renewed, since MDE's NPDES permitting program has incorporated this requirement in other recently renewed WWTP permits. This future monitoring will lead to a refinement of the estimated tPCB baseline loads from these facilities.

3. The commentor states that the tPCB atmospheric deposition rate applied within the TMDL is based on a 1999 study. The commentor then asks if more accurate data are available for estimating tPCB atmospheric deposition rates?

   Response: The tPCB atmospheric deposition rate of 16.3 micrograms per square meter per year ($\mu g/m^2$/year) from the Chesapeake Bay Program's (CBP) 1999 Atmospheric Deposition Study is the most accurate data available for estimating tPCB baseline loads from atmospheric deposition for urban areas within this TMDL. This depositional rate is within the range defined by Bamford et al. (2002) for the Baltimore Harbor watershed; however, the study did not specifically estimate rates for urban and non-urban areas. Therefore, CBP's estimate is more precise, and thus more applicable for this analysis. The depositional rate applied within this TMDL was also used to estimate tPCB baseline loads for urban areas in the Tidal Potomac and Anacostia River PCB TMDL, which was approved by the EPA in 2007.

4. The commentor states that the sediment and fish tissue tPCB concentration data is insufficient relative to the support of model development. Specifically, the commentor says that MDE should have tPCB data from the Cox Creek DMCF.

Response: The sediment and fish tissue tPCB concentration data were not directly applied in the development of the model for the Baltimore Harbor PCB TMDL. Sediment tPCB concentration data are applied as the initial condition for establishing the sediment tPCB concentration profile within the embayment. A comprehensive mapping study was conducted in 1996 to characterize the sediment tPCB concentrations within all of the regions within the Baltimore Harbor embayment. Sediment samples were collected from over seventy monitoring stations, and these samples were subsequently analyzed for PCBs, thus providing sufficient information for characterizing sediment tPCB levels in the Baltimore Harbor embayment. The model was successfully calibrated based on the water column tPCB concentrations within the embayment, and validation of the model was conducted using more recent sediment and water column tPCB concentration data collected in 2008. Thus, MDE contends that there was sufficient sediment tPCB concentration data available to establish an initial condition within the modeling framework.

Fish tissue tPCB concentration data was applied in the calculation of site-specific bioaccumulation factors for various fish species in the Baltimore Harbor embayment, in order to develop tPCB TMDL endpoints for the water column and sediment. This information is not directly applied in the development of the model and the simulation of tPCB water column and sediment concentrations. A significant amount of fish tissue concentration data was available for developing the TMDL endpoints. Forty-one fish tissue composites (minimum of five fish in each composite) from different fish species (i,e. white perch, channel catfish, etc.) were used to calculate the bioaccumulation factors. Thus, MDE contends that there was sufficient fish tissue tPCB concentration data available for use in the development of the applicable water column and sediment tPCB TMDL endpoints.

The elutriate tPCB concentration data provided by the Cox Creek DMCF are reported as non-detects (i,e. below detection levels) for all applicable samples. The laboratory that analyzes the elutriate samples for PCBs uses EPA Method 608, which does not provide a detection level that is sufficiently low enough for measuring tPCB concetrations. Therefore, the tPCB baseline load from the facility cannot be estimated. Non-detects do not preclude that PCBs are not present in the facility's elutriate. Rather, they solely indicate that the analytical method applied cannot provide detection levels that are well above the water column tPCB TMDL endpoint. This is explained in Section 4.2 (Point Sources), under the DMCF sub-heading, of the main TMDL report.

5. The commentor says that given the location of the RG steel industrial facility discharge point, it should be included in the Bear Creek tPCB TMDL, due to the movement of tidal waters from the discharge point.

Response: The specific Curtis Creek/Bay and Bear Creek PCB TMDLs only include WWTPs, industrial process water facilities, contaminated sites, etc., that are located within the segments' specific drainage areas/discharge directly to the segments. tPCB loads from sources that discharge nearby these specific segments are not included in the TMDLs, since it is unknown exactly what proportion of the tPCB loads from these facilities are transported to

the segments. However, MDE does recognize that one outfall from the RG Steel industrial facility discharges into Bear Creek. In Table ES-3 (Summary of tPCB Baseline Loads, TMDL Allocations, Load Reductions, and MDLs in Bear Creek), Table 12 (Summary of tPCB Baseline Loads in Bear Creek), and Table 17 (Summary of tPCB Baseline Loads, TMDL Allocations, Load Reductions, and MDLs in Bear Creek) a note is included explaining that even though one of facility's outfalls discharges to Bear Creek, the facility as a whole is included as an aggregate baseline load and waste load allocation (WLA) for all industrial process water discharges and is accounted for in the summary baseline load and TMDL tables for the Baltimore Harbor embayment. Therefore, an individual baseline load and WLA for this outfall will not be included in the Bear Creek TMDL, since this would negate the purpose of applying an aggregate allocation to the entirety of industrial process water facilities within the embayment.

6. The commentor says that it is unclear how the target reduction percentages were determined, since WWTP effluent and urban stormwater monitoring studies have not been completed. More accurate targets could be calculated, if data from these sources were included.

   Response: Target reduction percentages within the TMDL were calculated based on the estimated tPCB baseline loads from WWTPs and watershed sources (non-regulated watershed runoff and NPDES regulated stormwater) and the reductions required within the model to meet the water column and sediment tPCB TMDL endpoints. For WWTPs, the tPCB baseline was estimated based on observed tPCB effluent concentration data and the average flow for the facilities. The WLA for WWTPs was calculated based on the water column tPCB TMDL endpoint and the design flow of the facilities. Therefore, the target reduction is merely based on the difference between the estimated baseline load and WLA for each facility.

   For watershed runoff, the tPCB baseline loads were estimated based on observed tPCB concentration data from several tributary monitoring stations throughout the Baltimore Harbor embayment's watershed. Monthly samples were collected over an annual period in order to capture the seasonal and critical conditions for tPCB loads from the watershed. These stations characterize the tPCB loads from non-regulated watershed runoff and NPDES regulated stormwater throughout the watershed. Using this information, a regression was developed between the observed tPCB loads from these monitoring stations and the observed flow at nearby United States Geological Survey (USGS) stations. With this relationship established, the flow time series from CBP's Phase 5 Watershed Model was applied to develop a tPCB load time series for incorporation into the model as the tPCB baseline load for the watershed. No stormwater monitoring studies are required to improve the baseline load estimates for the watershed. This loading time series is applied in the model and reduced under the TMDL scenario in order to achieve the TMDL endpoints necessary for protecting the fishing designated use of the embayment. The reductions defined by this scenario establish the WLAs and LAs for the TMDL. The total watershed allocation is apportioned between the LA and WLA for non-regulated watershed runoff and NPDES regulated

stormwater, respectively, based on the percentage of urban and non-urban land cover within the watershed.

7. The commentor says that it is unrealistic to set a percent reduction of an undetermined mass of PCBs from ubiquitous sources. Since the target size is completely uncertain, Baltimore City and other stakeholders could be required to achieve a 91% reduction of zero, or be obligated to reduce a quantifiable number so infinitesimally small that it would neither impact the receiving waters nor make financial sense. The proposed TMDL implies that there is an active controllable source of PCBs that can be reduced or eliminated. Since no data in the parts per quadrillion range exist for WWTPs or urban stormwater, we are unable to determine if this is accurate or not. At a time when the City and other Maryland jurisdictions are attempting to comply with numerous clean water mandates, this level of uncertainty is troubling at best.

   Response: The target reductions have been calculated from tPCB baseline loads estimated based on observed data and the associated WLAs/LAs required to achieve the TMDL endpoints. The reductions have not been assigned based on an undetermined tPCB load. The target size should not be considered as completely uncertain since the tPCB baseline loads are calculated based on actual monitoring data. Ongoing sources of PCBs do exist in the Baltimore Harbor embayment's watershed, as water column samples from several sources (i.e, WWTPs, industrial process water facilities, non-tidal tributaries, and urban stormwater outfalls) have been analyzed for PCBs using congener based methods with detection levels sufficient for measuring concentrations in the nanograms per Liter (ng/L), or parts per trillion (ppt), range. MDE contends that there is not significant uncertainty in the estimation of baseline loads within the TMDL, since the calculations are based on observed tPCB concentrations from the various sources.

8. Although the commentor recognizes that it may be difficult to quantify, it is still believed that the proposed TMDLs lack the necessary information to estimate tPCB loads from atmospheric deposition and how the proposed 58% reduction to this source sector will be achieved.

   Response: Atmospheric deposition is a significant source of PCBs within the environment, as existing land sources of PCBs are highly volatile. Therefore, PCBs will enter the atmosphere from these land sources and redeposit through dry and wet atmospheric deposition. The incineration of PCB containing materials is also a source of PCBs to the atmosphere. Since atmospheric deposition is not a directly controllable source, the reduction will be achieved by eliminating the sources of PCBs within the environment (i.e., land sources via which PCBs volatize to the atmosphere). Via the implementation process, reductions to watershed sources of PCBs will result in a reduction to the tPCB loads associated with atmospheric deposition as well.

9. The commentor says that TMDLs are required to set daily loads of target pollutants. The proposed TMDLs, however, appear weak in identifying or limiting the use of the defined

Maximum Daily Loads (MDLs), as compared to the average annual TMDL WLAs and LAs. Since long-term fish flesh accumulation is the endpoint applied within the analysis, PCB TMDLs represent a circumstance where the daily allocations are not useful relative to implementation. The City recommends that MDE acknowledge this in the documents.

Response: MDE agrees with the commentor that the fluctuation of daily PCB loads to the embayment do not influence long-term bioaccumulation in the aquatic food chain and thus the protection of the "fishing" designated use. However, EPA regulations require that MDE incorporate MDLs in every TMDL. The TMDL does state that the inclusion of WLAs for WWTPs, DMCFs and industrial process water facilities does not reflect a determination to impose end of pipe effluent limitations in future permits. Also, the assurance of implementation section states that BMP based non-numeric water quality based effluent limits are applicable for regulating PCB discharges from NPDES regulated sources. The inclusion of MDLs for these regulated sources would not impose unnecessary regulation, if effluent limitations are not defined for individual outfalls.

10. The commentor notes that EPA's method for analyzing PCB congeners has already been replaced once, as the original method was unreliable, and the new method, 1668B, has unrealistic quality control acceptability requirements. Furthermore, another method (1668C) will likely be promulgated in the near future. This suggests that data that has already been generated may be questionable.

    Response: The WWTP and industrial process water facility tPCB concentration data was analyzed using EPA Method 1668A. Even though revisions to this method have improved the quality control acceptability requirement, this does not preclude that the information is incorrect. The original method was approved by EPA, and samples analyzed under this method are applicable for use in this TMDL. This information was solely used for estimating the baseline load for these facilities. It is also anticipated that these facilities will be required to characterize tPCB concentrations in their effluent in the future, when their permits are renewed, since MDE's NPDES permitting program has incorporated this requirement in other recently renewed WWTP permits. This future monitoring will lead to a refinement of the estimated tPCB baseline loads from these facilities.

11. The commentor states the implementation of the TMDL is concerning. It is Baltimore City's strongly held opinion that BMP-based implementation provisions are more appropriate than numerical limitations in these PCB TMDLs. While the TMDLs discuss the use of BMPs for implementation, the City would like MDE to commit to BMPs as the exclusive implementation strategy.

    Response: The assurance of implementation section of the TMDL suggests that the BMP non-numeric water quality based effluent limits for NPDES regulated sources be applied for implementing the required reductions. The request to include a statement that MDE will commit to BMPs as the exclusive implementation strategy falls outside the scope of this TMDL. The specific strategy applied for implementation will be determined when the City

owned and operated WWTPs are due for permit renewal and the City's municipal separate storm sewer system (MS4) permit is due for renewal, which will require the City to develop an implementation plan that demonstrates how the jurisdiction plans to work toward achieving NPDES regulated stormwater WLA .