Toxics Contaminants Policy and Prevention Outcome

Management Strategy

2015–2025, v.2

An oily sheen covers the surface of the water near boats docked on Hoopers Island on the Eastern Shore in Dorchester County, Md. (Photo by Will Parson/Chesapeake Bay Program)

I. Introduction

The 2014 *Chesapeake Bay Watershed Agreement* includes a goal to ensure that the Bay and its rivers are free of effects of toxic contaminants on living resources and human health. The two associated outcomes are (1) research and (2) policy and prevention. Toxic contaminants that enter the Chesapeake Bay and its watershed harm aquatic life, compromise the economic value of its living resources and present risk to human health. In the 2014 *Chesapeake Bay Watershed Agreement*, the Chesapeake Bay Program identified a desired outcome to "Continually improve practices and controls that reduce and prevent the effects of toxic contaminants below levels that harm aquatic systems and humans." Because there are many contaminants of potential concern, the partners decided to identify a group of contaminants—polychlorinated biphenyls (PCBs)—for which to begin to develop a comprehensive strategy to reduce the amount that enters the Bay and watershed. PCBs are chemicals that accumulate in fish and are most often the primary reason for fish consumption advisories in the Bay. The outcome statement went on, therefore, to include "Build on existing programs to reduce the amount and effects of PCBs in the Bay and watershed." This strategy identifies management approaches that use regulatory and non-regulatory programs to reduce the amount of PCBs entering the Bay and its watershed.

The outcome statement also directs the Chesapeake Bay Program to "use research findings to evaluate the implementation of additional policies, programs and practices for other contaminants that need to be further reduced or eliminated." It was recognized that developing a comprehensive PCB strategy is a significant undertaking but it is only a starting point. The partnership will apply its collective abilities to reduce inputs of other contaminants of concern including but not limited to mercury, pesticides, polycyclic aromatic hydrocarbons, known and suspected endocrine disruptors, and microplastics. The results of the research-oriented toxic contaminants outcome will be used along with current information on policies and programs to develop strategies to address other contaminants, which will be reflected in future iterations of this strategy.

II. The Goal, Outcomes and Baseline

This management strategy identifies approaches for achieving the following goal and outcome:

Toxic Contaminants Goal

Ensure that the Bay and its rivers are free of effects of toxic contaminants on living resources and human health.

Policy and Prevention Outcome

Continually improve practices and controls that reduce and prevent the effects of toxic contaminants below levels that harm aquatic systems and humans. Build on existing programs to reduce the amount and effects of PCBs in the Bay and watershed. Use research findings to evaluate the implementation of additional policies, programs and practices for other contaminants that need to be further reduced or eliminated.

Baseline and Current Condition

The following statements regarding PCB baseline conditions are derived from information provided by jurisdiction agencies responsible for issuing fish consumption advisories and implementation of Clean Water Act (CWA) programs.

- Widespread contamination of fish and extensive fish consumption advisories
- Extensive impairments of both tidal and non-tidal waters due to polychlorinated biphenyls (PCBs), as shown in Toxic Contaminants indicator map recent updates, and panel 1 of PCB story map
- Numerous existing PCB TMDLs across the watershed as well as additional PCB TMDLs under development, as shown in recent updates to Panels 2 and 3 of PCB Story Map

III. Participating Partners

The Toxic Contaminants Workgroup (TCW) has succeeded in extensive outreach and engagement of a wide array of stakeholders. *Watershed Agreement* signatories and stakeholders who have indicated their intention to participate in management strategy development have been identified on the workgroup membership list. The membership of the TCW includes members from the following groups:

Chesapeake Bay Watershed Agreement Signatories

- Maryland Department of the Environment
- Maryland Department of Natural Resources
- Virginia Department of Environmental Quality
- DC Department of the Environment
- Pennsylvania Department of Environmental Protection
- Delaware Department of Natural Resources and Environmental Control
- New York Department of Environmental Conservation
- West Virginia Department of Environmental Protection
- Chesapeake Bay Commission
- Federal Agencies: EPA, USGS, FWS, DHS, NOAA

Other Key Participants

- Non-Governmental Organizations (NGO)
- Private sector organizations
- Local government organizations
- Academic institutions
- CBP Water Quality Goal Implementation Team Workgroups

These partners have participated in the development of this strategy. A two-year workplan will be published concurrently with this management strategy in Fall 2018. It will identify specific partner commitments for implementing the strategy.

Local Engagement

Whereas much of the focus on implementation of practices and controls to reduce the amounts and effects of PCBs will initially be targeted to federal and state regulatory programs, there will be many opportunities for local governments, watershed associations, nonprofits, and the private sector to engage in innovative and collaborative efforts. As described above, the TCW has engaged non-government organizations (NGOs) in the more urbanized areas of the Bay's tidal waters. This was done to ensure that the organizations in those areas that are influential in local efforts to improve environmental condition (e.g., Blue Water Baltimore, Anacostia Watershed Society, Elizabeth River Project) are represented in the management strategy and also as one element of increasing the diversity of participating stakeholders because these organizations work actively in communities that tend to be socially diverse. In addition, the TCW has several members that are from local water authorities (e.g., Metropolitan Washington Council of Governments, Hampton Roads Sanitation District). They are relied upon to help ensure that local government perspectives are considered and included in the management strategy. It is the responsibility of all members of the TCW to continually promote a high level of engagement by local entities (i.e., government and non-government) in this management strategy. The strategy will be distributed on a regular basis for input from local entities.

IV. Factors Influencing Success

The following are natural and human factors that influence the Partnership's ability to attain this outcome:

- Broad geographic extent and distribution of PCBs and other contaminants of concern (i.e. PAHs)
- Political will to modify regulatory programs and/or create voluntary programs
- High cost of testing and remedies: in-stream sediment remediation; waste water PCB source trackdown studies; electrical equipment replacements; stormwater controls; contaminated site remediation
- Variety of sources and pathways for PCBs entering the environment that necessitate a wide-range of very different management responses (e.g., primary sources such as electrical equipment, secondary sources such as wastewater treatment by-products, and pathways such as stormwater runoff contaminated by air deposition or contaminated sites)
- Need to continue shifting paradigm by acknowledging that there are ongoing sources of PCBs (i.e., PCBs are not static "legacy" contaminants)
- Knowledge gaps on relative sizes of PCB sources
- The extent of collaboration and coordination among the science and management communities at a scale that is commensurate with the extent of PCB impairments and TMDLs

V. Current Efforts and Gaps

To summarize current efforts, the Water Quality Goal Implementation Team's TCW has chosen to organize information by PCB pathways (i.e., loading mechanisms). Within each pathway, the sources of PCBs specific to that pathway and current programs, gaps and potential additional actions are discussed. As other toxic contaminants are subsequently prioritized, the Policy and Prevention Outcome provides the management process by which other contaminants in the watershed will be addressed, even though sources, management options and goals may differ.

General Total Maximum Daily Loads (TMDL)

The CWA established the framework for regulations related to the direct discharge of PCBs into the nation's waterways. States and jurisdictions share in the implementation of the CWA through adoption of water quality standards, determination of whether water bodies meet water quality standards, and establishment of plans to achieve standards in impaired water bodies.

All of the states in the Chesapeake watershed have identified waterbodies as impaired for PCBs based mostly on fish tissue concentrations. Some of these impaired waterbodies are located in areas with diverse populations although a comprehensive analysis of this has not yet been undertaken. To address these impairments under the authority of the CWA, significant work has been completed in the watershed through TMDL development. TMDLs have been developed by the state of Maryland (MD), the Commonwealth of Virginia (VA), the District of Columbia (DC), the Commonwealth of Pennsylvania (PA), the state of West Virginia (WV) and Delaware (DE) to address PCB impairments in the Chesapeake Bay and watershed. In addition, a TMDL has been developed for the Delaware Bay and an extensive implementation strategy is under way and is achieving reductions of PCBs from regulated sources of stormwater and wastewater. New York (NY) has not at this time developed TMDLs to address their PCB listings.

The TMDL projects range in scope from small-segment TMDLs to large sub-watershed TMDLs. Most notably, multi-jurisdictional PCB TMDLs have been approved for the Tidal Potomac River. Agencies in MD and VA along with U.S. Environmental Protection Agency (EPA) Region 3 staff were actively involved in the development of the Tidal Potomac River TMDL. Other substantial PCB TMDLs that are being developed or are planned for development include the lower Susquehanna and the James rivers. Multi-jurisdictional TMDLs have encouraged collaboration among government entities, which leads to more effective TMDL development. As an example, substantial progress has been achieved towards reducing levels of PCBs in the Delaware Estuary. Under the lead of the Delaware River Commission (DRBC), implementation efforts by multiple jurisdictions have resulted in a significant reduction of PCB levels. The successes in the Delaware Estuary have and will continue to inform the proposed reduction approaches in this management strategy and should be helpful in implementation of existing TMDLs in the Chesapeake Bay watershed.

VA is working on PCB TMDLs in a tributary to the Rappahannock River (Mountain Run), the Elizabeth River, and the non-tidal and tidal James River watershed. MD is developing PCB TMDLs in watersheds such as the Severn River, Bird River, Bush River and the Gunpowder River. Also, MD and PA are planning to sample the sediments behind Conowingo Dam to better understand Susquehanna River sources and inform TMDL development. The District of Columbia is working on revising TMDLs for a number of toxic pollutants in order to incorporate daily loads. While much of DC's streams are covered under the 2007 Potomac River PCB TMDL, more work is needed in the Rock Creek watershed. EPA is providing technical assistance on this project through a grant with the Interstate Commission on the Potomac River Basin (ICPRB).

Other Regulatory Efforts

In addition to the CWA, the EPA regulates the use, disposal, and clean-up of PCBs under the Toxic Substance Control Act (TSCA). The Resource Conservation and Recovery Act (RCRA) Corrective Action (CA) program has authority to require investigation and cleanup of a host of hazardous constituents. PCBs are not defined as a hazardous waste under RCRA and are not, in general, a common constituent of concern at RCRA Corrective Action (CA) facilities. In an instance where PCBs are the main concern at a RCRA CA site, however, the investigation and remediation are conducted under the TSCA program.

TSCA provided the authority to phase out the manufacture and importation of PCBs. Since 1979, the manufacturing of PCBs has been prohibited unless exempted for example, for research and development purposes. The use of PCBs in existing equipment was allowed to continue for the useful or normal life of the equipment as long as specific conditions were met. Products and equipment containing PCBs are regulated mostly on the basis of their PCB concentrations. Products and equipment containing 500 parts per million (ppm) PCBs or greater are the most strictly regulated; those containing between 50ppm and 499 ppm less so. Products or equipment containing less than 50ppm are not generally regulated.

The PCB program is managed under the EPA Office of Chemical Safety and Pollution Prevention (OCSPP), Solid Waste and Emergency Response (OSWER), and Enforcement and Compliance Assistance (OECA). Each Office is responsible for implementing a different aspect of the PCB Program.

EPA Office	OCSPP	OSWER	OECA
Function	Implement Regulatory programs related to ongoing uses of PCBs	PCB cleanup and permitting of storage and disposal facilities	Compliance monitoring and enforcement

In EPA Region 3, the PCB regulations and enforcement are managed by the Land and Chemicals Division (LCD). As part of its annual commitments since 2002, LCD has conducted PCB inspections at facilities throughout the Chesapeake Bay watershed. These entities included commercial storage and disposal facilities; facilities that own in-use PCB transformers, and a number of naval ships. Five enforcement actions have been undertaken by LCD for violations of the TSCA PCB regulations.

Stormwater

Stormwater is a significant pathway for the transport and loading of PCBs to the surface waters of the watershed. Stormwater transports both dissolved and particulate-attached PCBs. Stormwater in urbanized areas is more likely to be contaminated with PCBs than stormwater in suburban, agricultural, or forested land areas. Stormwater becomes contaminated with PCBs due to runoff from contaminated surfaces (soils, hardscapes) and through wet atmospheric deposition during storm events. Stormwater from developed land areas (i.e., urban land use) is regulated under the National Pollutant Discharge Elimination System (NPDES) permit program for the following source categories: 1) Phase I/II County Municipal Separate Storm Sewer Systems (MS4), 2) Phase II Municipality MS4, 3) Phase II Federal & State Facilities, 4) Phase I State Highway Administration (SHA), 5) Industrial Stormwater, and 6) Construction Activity. Stormwater from undeveloped land areas (i.e., non-urban) is generally unregulated.

The predominant source of PCBs in NPDES regulated and unregulated stormwater is contaminated soils from historical and ongoing activities involving PCB containing equipment or materials. PCB contaminated soils may be present at contaminated sites regulated under Comprehensive Environmental Response Compensation and Liability Act (CERCLA/Superfund), active industrial and commercial facilities, illegal dumpsites, and construction sites as well as sites owned by federal agencies. Active electrical equipment such as transformers may also contaminate soils due to failure and release of PCBs. An additional potential source of PCBs in stormwater is atmospheric deposition. Building materials such as caulking materials and paints may mobilize PCBs during demolition. The land application of biosolids and dredged materials from the maintenance of stormwater BMPs may also be pathways for PCBs to enter stormwater. PCB sources from regulated contaminated sites and atmospheric deposition will be addressed in separate sections of this document.

Stormwater Sources, Current Management Efforts and Gaps

TMDL Development: In the development of TMDLs, some watershed monitoring has been conducted using high resolution PCB congener based methods (e.g., EPA Method 1668) to estimate loads for NPDES regulated and unregulated stormwater. For TMDLs in MD that have already been approved, no stormwater outfall monitoring was conducted in order to estimate loads for NPDES regulated stormwater. Aggregate loads for all NPDES regulated stormwater dischargers under the county level Phase I MS4 permits have been assigned in these TMDLs. VA is currently applying a land use-based approach for estimating PCB loads for NPDES regulated stormwater using outfall monitoring data if available. VA has also monitored and estimated loads for industrial stormwater facilities from PCB results using EPA Method 1668.

TMDL Implementation: TMDL implementation for NPDES regulated and unregulated stormwater is required when reductions are assigned to these pathways in a TMDL. Currently no implementation plans have been developed by regulatory agencies within MD, VA, or DC to address reductions assigned to NPDES regulated or unregulated stormwater. In MD, Phase I MS4 permittees are required to develop a county-level implementation plan to address reductions assigned to NPDES regulated stormwater within one year of TMDL approval. MD has developed guidance to assist counties in the development of these plans. Montgomery County MD has developed a plan that has been approved by MD to address reductions assigned in the Tidal Potomac and Anacostia PCB TMDLs. Baltimore County, Baltimore City, and Prince George's County MD have also developed plans to address PCB reductions to NPDES regulated stormwater that are currently under review by MD. VA is also developing a Pollution Minimization Plan (PMP) guidance document, which will provide technical assistance to NPDES regulated wastewater and stormwater dischargers for achieving PCB load reductions assigned in TMDLs.

Monitoring Gaps: There is currently limited PCB monitoring data for unregulated and NPDES-regulated stormwater from all jurisdictions within the Chesapeake Bay watershed. Jurisdictions which have already developed TMDLs to address PCB impairments have estimated loads for unregulated and NPDES-regulated stormwater using in-stream PCB monitoring data. In VA, permittees have conducted PCB monitoring of stormwater from NPDES industrial facilities. However, TMDL programs in general have limited resources to conduct outfall monitoring for NPDES regulated stormwater dischargers and thus apply a watershed scale approach to estimate these loads.

Except for very few industrial MS4 stormwater permittees, NPDES regulated stormwater dischargers in all Bay jurisdictions are not currently required to monitor for PCBs under any permit category. Without this information it is not feasible for TMDL programs to estimate loads from specific dischargers to identify sources of PCBs that require reductions as well as to track-down sources of PCB contamination within the watershed. High resolution/low detection limit data is needed as demonstrated in the Delaware Bay TMDL where such data was critical to target PCB reductions.

Regulatory Gaps: Transformers and other electrical equipment that contain PCBs remain in operations. These transformers have the potential to release PCBs during failure and to contaminate storm water at levels that may impact water quality. Bulk products such as paints and caulks also release PCBs to stormwater. While not necessarily indicating any needed changes, NPDES regulated stormwater dischargers do not currently have effluent concentration limits for PCBs in their permits. All Bay jurisdictions have adopted human health criterion to prevent potential carcinogenic impacts from the consumption of fish. However, this criterion is currently only applicable to ambient waters.

Programmatic Gaps: PMPs are required to address PCB load reductions from unregulated and NPDES-regulated stormwater that have been allocated through TMDL development. Currently no jurisdiction within the Bay has begun implementing TMDLs to reduce these loads. A PMP framework should include an approach for identifying sources of contamination within the watershed which contribute PCBs to unregulated and NPDES regulated stormwater and provide guidance on best management practices (BMPs) and treatment technology for controlling or reducing sources of PCBs.

Stormwater BMPs designed to reduce nutrients and sediments may also provide a secondary benefit of removing PCBs, which preferentially bind to the organic carbon fraction of sediments. There is insufficient knowledge regarding the effectiveness of PCB removal from these BMPs.

The public is generally unaware of the potential health impacts of consuming fish with elevated levels of PCBs and continued presence of PCBs in many sources (e.g., transformers, building materials, paints) within the environment that may contribute to unregulated and NPDES-regulated stormwater.

Research Gaps: Biosolids which may contain PCBs are often land applied in agricultural and commercial practices as an alternative to chemical fertilizers. Limited information is available on whether land application of biosolids containing PCBs are a pathway of PCBs in unregulated and NPDES regulated stormwater.

Stormwater BMPs are routinely dredged to maintain capacity and effectiveness in the removal of sediments. Dredged materials may contain PCBs associated with these sediments and are often land applied for disposal as they are not categorized as hazardous materials. Limited information is available on whether land application of dredged materials is a source of PCBs in unregulated and NPDES regulated stormwater.

Construction activities associated with the demolition/remodeling of buildings with PCB containing materials and disturbance of soil contaminated with PCBs due to historical activities has the potential to release PCBs into the environment. Limited information is available on whether construction activities are a source of PCBs in unregulated and NPDES regulated stormwater.

As further discussed below, there is a need for advancing understanding of the atmospheric sources of PCBs to the landscape during dry and wet atmospheric deposition.

Wastewater

Surface water contamination from PCBs may occur through both industrial and municipal wastewater discharges; however, the presence of PCBs in effluent is highly dependent on the particular site or facility. If elevated concentration of PCBs are a concern for an industry, wastewater contamination can occur through exposure of process waters to residual PCBs from historical spills, through the inadvertent production of PCBs from the process itself or from intermediary materials used in the process, or from the recycling of products that contain residual inadvertently produced PCBs. Exposure of stormwater to historic spills on industrial sites may also be a loading source to wastewater. Similarly, if elevated concentrations of PCBs are a concern for a municipal discharger, potential PCB sources can include light industrial waste water, contaminated sites contributing to combined sewer overflows (CSO), inflow & infiltration from contaminated sites, or residual contamination in the municipal pipe infrastructure from historic spills. PCBs may also enter municipal systems via surface water used for potable water. Due to the highly varied nature of the sources to municipal facilities, identifying the potential source or sources presents a unique challenge as compared to industrial dischargers. Placeholder for WWTP upgrades and PCB removal report learning

Wastewater Sources, Current Management Efforts and Gaps

Industrial and Municipal Wastewater: TMDLs are the primary mechanism for addressing PCB impairments for the Chesapeake Bay watershed. Until recently, it was not apparent that wastewater could serve as a PCB conduit to the Chesapeake Bay watershed. Dating back to the early 1980's and extending to more a recent time, this extremely hydrophobic contaminant was not detected in wastewaters using 40 CFR promulgated analytical methods. With the availability of improved analytical tools to screen wastewater at environmentally relevant concentrations (low part per quadrillion), determining whether PCBs are present can now be made in any matrix, including wastewater. Low level (part per quadrillion) water quality criteria intended to protect fish from bioaccumulating PCBs at concentrations considered unsafe for human consumption have been promulgated by each Bay jurisdiction.

Once PCB fish consumption advisories have been created for a water body, there is a requirement for a TMDL study or similar approach to restore the impairment. A critical component to the TMDL study is identification and delineation of all prospective PCB sources. In the majority of PCB impaired water bodies, the potential for wastewater as a source requires examination.

Table 2. Comparison of Chesapeake Bay jurisdictions wastewater PCB screening methods and approaches used to attain reductions

Chesapeake Bay Watershed Jurisdiction	Reason(s) for impairment(s)	PCB TMDLs Developed/Under Development in Watershed	Watershed Screening Methods	Reduce PCBs if TMDL WLA (or other threshold exceeded)
Delaware	PCB Fish Consumption Advisories; PCB water and Sediment exceedances also applicable	No impairments to CPB watershed; C&D Canal has net transport to Delaware estuary	If point source significantly contributing to impairment then will monitor using Method 1668	Pollutant Minimization Plan implemented when necessary
Washington, D.C.	PCB Fish Consumption Advisories	Anacostia and Tidal Potomac Rivers	Limited screening/monitoring of NPDES effluent using Method 1668	BMPs and source control utilized to reduce PCBs
Maryland	PCB Fish Consumption Advisories; total PCB violation of WQC also applicable	Tidal Potomac and Anacostia R., Corsica R., Baltimore Harbor, Back R., Elk, Bohemia, Northeast R. Sassafras Rivers, C&D Canal	Selected Municipal and Industrial effluents may be screened/monitored for PCB congeners and total PCBs using Method 1668; Industrial stormwater is excluded	Pollutant Minimization Plan implemented within NPDES Permit when WLA exceeded
Pennsylvania	PCB Fish Consumption Advisory	Susquehanna upstream of the confluence with the West Branch	Not Applicable	MS4 permittees must complete Pollutant Control Measures (PCMs) if included in a TMDL or identified as causing or contributing to PCB impairment
Virginia	PCB Fish Consumption Advisories; total PCB violation of WQC also applicable	Shenandoah R., tidal Potomac R., tidal James and Elizabeth Rivers, & Mountain Run (trib. To the Rappahannock)	Municipal and industrial effluents screened for PCB congeners and total PCBs using Method 1668; Facilities selected based on SIC and often include industrial stormwater	Pollutant Minimization Plan implemented through NPDES Permit when WLA exceeded
West Virginia	PCB Fish Consumption Advisories	Applies to portion of the Shenandoah R.	Not applicable	Not Applicable

With emphasis on the wastewater pathway for purposes of this discussion, Table 2 provides a summary of jurisdictional activities used to address PCBs. This table will be updated. There are moderate differences among the jurisdictions on the types of facilities selected to monitor for PCBs in wastewater. DE, MD, VA, and D.C. approach the screening of municipal and industrial facilities in a similar manner although there are variants in the types of facilities that are assessed. For example, VA adheres to guidelines predicated on the Standard Industrial Classification (SIC) used in the NPDES Permitting Program, for identifying and selecting a broader array of industrial facilities known to be potential PCB sources. The numbers and type of samples collected and analyzed at a facility may vary depending on the jurisdiction. In all cases when a jurisdiction is developing a PCB TMDL and monitoring occurs for that purpose, a low detection, high resolution method is used that is also capable of detecting 209 PCB congeners.

Upon generating the low-level PCB data, total PCB concentrations are converted to a mass loading and then compared to the TMDL-derived Waste Load Allocation (WLA). If there is an exceedance of the WLA, the reduction is often addressed as a non-numeric Water Quality Based Effluent Limit (WQBEL) administered through each jurisdiction's respective NPDES Program as a PMP.

TMDL Implementation and Wastewater: In situations where an industrial or municipal facility has an effluent loading in excess of the assigned WLA, a PMP may be utilized to reduce PCB loadings through adaptive implementation in order to meet the WLA. PMPs are intended to be flexible tools that allow dischargers to identify and respond to potential sources in the most effective manner possible. Numerous examples of PMPs from outside the watershed exist along with guidance that can be used in the development of PMPs

The basic elements of the PMPs may include a better characterization of PCB loadings into the system under varying conditions as needed in order to provide the permittee with additional information that may aid in source identification; proposed actions for known or potential sources; proposed actions to find and control unknown sources; and an identification of the methods used to measure, demonstrate and report progress. The sensitivity of the analytical method(s) used for PCB identification in monitoring or track-down studies must be aligned with the detection and quantification objectives of the study.

Wastewater Efforts – Combined Sewer Systems: In a combined sewer systems (CSS), both stormwater and sanitary sewage are conveyed to a wastewater treatment facility. If a wet weather event generates a stormwater volume that exceeds the capacity of the collection system and/or treatment facility, a portion of the combined waste stream is diverted to combined sewer outfalls resulting in a combined sewer overflow (CSO). Depending on the system, the combined release of stormwater and untreated wastewater may be a pathway for PCBs to local waterways. CSS communities in the Chesapeake Bay watershed are implementing measures to reduce the frequency of CSOs which could have a concurrent benefit of reducing the loadings of PCBs to surface waters. Several of these communities are pursuing an integrated planning approach that allows the community to prioritize the wastewater and stormwater management activities for the greatest water quality benefit.

Tools to Support Trackdown Studies: The current high resolution analytical method for PCBs is expensive relative to the costs of most other organic contaminant monitoring and may be cost-prohibitive for large-scale trackdown studies. An inexpensive tool that can provide real-time data can greatly improve the efficacy of a trackdown study in municipal service areas. Information regarding lessons learned in other PCB trackdown studies would be useful in guiding municipalities in their own local efforts.

Coordination among CERCLA, RCRA, TSCA and CWA targets: Two issues relating to PCB investigations and remediation could benefit from efforts promoting improved coordination. First, there are inconsistencies across programs in the methods used to analyze PCBs in environmental media. Second, lack of coordination among programs may lead to inconsistencies in approaches to PCB investigation and remediation.

Inadvertent Production of PCBs: While PCBs have been banned since the late 1970's, data suggests there is inadvertent manufacture of PCBs. The allowed concentration is up to a maximum of 50 parts per million (ppm) provided an annual average of 25 ppm is met by the manufacturer. As PCB data are made available from wastewater monitoring using a sensitive method, it is becoming more evident that inadvertent PCBs may be entering the environment. Placeholder: further references for PCB production and inadvertent production in manufactured products and wastewater (WA Dept of Ecology; City of Spokane?)

Groundwater

Groundwater can be a transport pathway for PCBs particularly when it underlies highly contaminated surface soils. Contaminated groundwater that is near edge of stream is more likely to contribute to bio-availability of PCBs than upland groundwater.

Groundwater Sources, Current Management Efforts and Gaps

Underground Injection Control: The Underground Injection Control (UIC) program under the Safe Drinking Water Act (SDWA) will continue to conduct inspections of close endangering shallow injection wells. If any PCBs are identified at inspected facilities, any groundwater discharge is eliminated.

Drinking Water Data is collected and managed on public water supplies located in the Chesapeake Bay watershed. Data on exceedances of Maximum Contaminant Levels (MCLs) or drinking water standards is available. The MCL for PCB is 0.0005 milligram per liter (mg/L). Monitoring frequency for PCBs is dependent on the size of the public water supply. Monitoring is conducted post-treatment. Data on detections of unregulated contaminants under the Unregulated Contaminant Monitoring Rule (UCMR) cycle 1, 2 and 3 from public water supplies are available. These unregulated contaminants may be a health concern and EPA assesses their occurrence in order to decide if they should be regulated in the future. Cycle 1 and 2 were completed earlier and cycle 3 just began in January 2013 and monitoring is still ongoing. Determining the contaminants for Cycle 4 will begin in 2015 and data collection is estimated to begin in 2017.

Groundwater Gaps: A gap may exist in the availability of high resolution-low detection data on groundwater PCB concentrations.

Atmospheric

Atmospheric deposition of PCBs occurs both as indirect loading to the land surface which is transported to surface waters mostly through stormwater and as loading that is directly deposited on surface water. Loadings occur as wet deposition (i.e., during rain events) and as dry deposition. Once in the system, PCBs volatilize to the atmosphere and are redeposited as part of the ongoing flux and transportation of

PCBs. The amount of atmospheric PCBs that originate inside as opposed to outside the watershed has not been established but it is expected that many sources within the watershed comprise the majority of the atmospheric inputs. Atmospheric PCBs deposited to land are problematic to water management programs such as in stormwater and combined stormwater and wastewater systems.

Atmospheric Sources, Current Management Efforts and Gaps

There are several sources of PCBs in the atmosphere. Such sources include 1) thermal and other industrial processes (i.e., industrial emitters); 2) emission from water bodies containing PCBs; 3) materials containing PCBs (i.e., transformers); 4) use of products containing PCBs (i.e., heating oil). Of the above sources, some are more likely to be current contributors to atmospheric loads of PCB. Thermal processes of any type can contribute to production of PCBs in the atmosphere if chlorine and organic carbon are present in the combustion feed. Likewise the burning of heating oils may contribute to airborne PCBs if PCBs are present in the heating oil and are combusted. Additionally, there are PCBs emitted due to incomplete combustion of PCB impurities in heating oil, or if PCBs volatilize from the contaminated oil product when transferred for use or otherwise spilled/mishandled. Current RCRA regulations allow for the reuse of oils that contain less than 2 parts per million PCBs for a variety of applications including as fuel oil.

The production of PCBs as a product on their own has been banned for decades so this is most likely not a prominent source of PCB contamination to the atmosphere. Also, due to the hydrophobicity of most congeners of PCB, emission from water bodies is also likely a minor source of atmospheric load.

The largest contributor to atmospheric load of PCBs is potentially dielectric fluids that are spilled or otherwise released from transformers and capacitors that utilized the fluids for proper operation. When heated due to electrical load, transformers develop positive internal pressure, which can result in release of PCB-containing vapors.

In the year 1970, dielectric fluids accounted for 56 percent of the PCBs manufactured in the US. Plasticizers and hydraulic fluids and lubricants were the next largest categories at 30 and 12 percent respectively. The National Response Center (maintained by EPA) is notified of releases of PCBs that exceed reportable quantities. To emphasize the point that PCBs are not simply related to past releases (i.e., legacy contamination), data indicates that from 1990 through 2002, over 1000 PCB releases were reported in the Great Lakes states. These reported releases typically involved accidents or illicit activities involving transformers or capacitors, such as a capacitor leaking due to an electrical failure, vandalism of transformers, transformer fires, and illegal dumping.

PCBs are listed as a group as one of 188 hazardous air pollutants (HAPs) under section 112(b) of the 1990 Clean Air Act Amendments. Incineration of PCBs is regulated under 60 CFR 761. However, there are currently no PCB incinerators in the Chesapeake Bay watershed. The EPA also established National Emissions Standards for Hazardous Air Pollutants (NESHAP) under the CAA to protect the public and lists PCBs as one of 33 Hazardous Air Pollutants (HAPs) presenting the greatest threat to public health in urban areas.

Atmospheric Monitoring Gaps

- Consistency in interpretation of data among air/water/waste programs some of which use low resolution non-congener PCB methods and others that use congener-specific methods

- Data is needed on atmospheric sources. Such data should generated by matching data quality objectives to appropriate analytical methods.
- Monitoring of fuel oil burning facilities in order to determine the extent of PCB releases

Information on Localized Air Deposition Gaps: The lack of PCB air depositional data is of particular concern because it limits the ecosystem-scale understanding of the delivery pathway of PCBs to the Chesapeake Bay watershed. It is of regulatory relevance because permit holders of stormwater-derived effluents believe that air deposition comprises a significant portion, if not all, of their PCB loads. Municipal effluent permit holders also maintain that their PCBs are derived from the intake water from rivers that in turn contain background PCBs derived from atmospheric fluxes. Consequently, there is a need to 1) provide reliable PCB air deposition flux data for the purpose of calculating representative loads, and 2) determine the spatial contribution from air deposition fluxes to different land use areas throughout the Bay watershed. There are no current comprehensive atmospheric deposition source studies for the watershed. Available studies are from late 1990's.

Combustion creates some amount of PCBs, even when it is not in the feed. The amount that is generated will vary with the feed material and the design and operation of the combustor (e.g., hazardous waste incinerator, municipal waste combustor, medical waste incinerators) but design and operating practices can be used to minimize PCB formation. For well-operated systems, the emitted amounts are extremely low, but they are usually detectable. Monitoring studies similar to the ones conducted in the Delaware Estuary could be used to track sources of air-borne emissions of PCBs in the Chesapeake Bay watershed.

In-Stream Sediment

In many areas of the watershed, PCB-contaminated sediments have accumulated on the bottom of streams, rivers, embayments and the Bay. The contamination comes from many sources and its presence is explained by the high affinity for PCBs to bind with sediment and to be transported by surface waters. These sources and transport pathways lead to the accumulation of contaminated sediments within bodies of surface water.

In-stream Sediment Sources, Current Management Efforts and Gaps

Defining the source of anthropogenic contamination into waterway sediments can be a difficult task. This is particularly true in settings where multiple point sources are present along with persistent non-point sources. This situation often results in complex mixtures of contaminants in sediments.

Remediation of PCB-contaminated sediments may affect local and downstream water quality during activities such as dredging and dewatering. The Clean Water Act establishes requirements and discharge limits for actions that affect surface water quality. Accordingly, the technical requirements of permits, such as the NPDES permit, may have to be met.

Within the Chesapeake Bay watershed, several current monitoring, restoration, and regulatory programs will reduce PCB loads from both point and non-point sources. These programs involve storm water runoff controls, erosion control measures to reduce sediments and nutrients, identification of additional PCB sources and contaminated sites, non-numeric water quality based effluent limits, construction site inspections, and remediation of contaminated sites. Follow up monitoring of sediments is an important feature of each jurisdiction's implementation strategy.

The District of Columbia provides examples of ongoing cleanup activities occurring within the Bay region. For these, DC has several well-established programs to draw upon for their PCB TMDLs, including the Erosion and Sedimentation Control Amendment Act of 1994 and DC Law 5-188 (Storm Water Management Regulations – 1988) of The District of Columbia Water Pollution Control Act of 1984, and the Federal Nonpoint Source Management Program (Section 319 of the Clean Water Act).

The District of Columbia, under authority of various laws, implements a number of action plans that involve reviewing and approving construction plans for stormwater runoff control measures, erosion and sediment control measures, and landscaping; conducting routine and programmed inspections at construction sites; providing technical assistance to developers and DC residents; and conducting investigations of citizen complaints related to drainage and erosion and sediment control. In conjunction with regulatory activities, voluntary programs are implemented through the Non-point Source Management and Chesapeake Bay Implementation programs. It is expected that through implementation of sediment and nutrient control measures, PCB-contaminated sediment will also be removed.

Many PCB contaminated sediments can be large-scale, measured in acres, river miles, or tons of sediment. The sheer volume and mass of PCB contaminated in-stream sediments makes the application of remediation options a difficult task. The implementation of a comprehensive risk management strategy is even more complex. Management of these sites is further complicated by the fact that many of the sediments also contain other chemicals of concern, including polycyclic aromatic hydrocarbons, metals, and pesticides. The time required to design and implement a management strategy and to evaluate the need for in-stream sediment remediation might reasonably range from years to decades.

The paramount consideration for PCB-contaminated sediment sites should be the management of overall risks to humans and the environment rather than the selection of a remediation technology (e.g., dredging, capping or natural attenuation).

Recognizing the challenge of these contaminated in-stream sediments, an initial goal for this portion of the strategy is to assess the information that is available and forthcoming (e.g., the characterization of Anacostia river sediments by DC Department of Environment) that describes the most highly contaminated in-stream sediments in the watershed and to engage the jurisdictions and federal regulators in exploring the feasibility of additional remedial actions such as capping and/or dredging.

A project is underway to determine the relative amount of PCB reduction that might occur across the range of BMPs implemented for the Chesapeake Bay nutrient and sediment TMDL, which will also establish opportunities to reduce the volume of sediment entering surface waters. The BMPs will be cross-correlated with contaminant pathways and their association with land use and sources. The study will assess and explain the most beneficial management actions that could leverage current TMDLs and watershed implementation plans (WIPs) to achieve multiple benefits for nutrient, sediment, and toxic contaminant reductions. Combined with other activities discussed in this strategy, it is expected that future sediment inputs will have lower PCB concentrations thereby improving the quality of overlaying sediments.

Region 3 is currently overseeing a PCB clean up at the Lockheed Martin plant located in Middle River, Maryland. The Middle River facility is located on Cowpen Creek which contains contaminated sediments considered to be a major contributor to PCBs in the Bay. Lockheed Martin owns the site, where it assembles military launch electronic systems. The clean-up is being done under TSCA authority and will be broken up into 3 phases:

1. Expedited sediment removal action (2014): dredging 1.2 acres containing sediments with the greatest amount of PCB contamination (3600 ppm) is underway;
2. Full sediment remedy (2016-2018): additional removal of 13.8 acres will begin in 2016-2017, and activated carbon in-situ treatment over 10.2 acres (remedial goal of 0.676 ppm expected to be reached after 7 years of in-situ treatment); and
3. Full soil remedy.

Contaminated Sites

Contaminated sites are a potential source of PCBs in stormwater, groundwater, wastewater and atmospheric deposition. PCBs may enter stormwater from the erosion and transport of contaminated soils in surface runoff. Secondly, PCBs may enter groundwater from the infiltration of rainfall through contaminated soils. Finally, PCBs may enter the atmosphere through volatilization from contaminated soils. CERCLA, otherwise known as the Superfund Program, governs the clean-up of hazardous substances at contaminated sites. In addition, clean-up of contaminated sites for redevelopment may also occur under the Brownfields and VCP programs. Site remediation requires that PCB soil concentrations meet soil cleanup standards protective of human health through soil ingestion, inhalation and dermal contact.

Current Management Efforts for to Control or Reduce PCB Loads from Contaminated Sites

State Efforts

TMDL Development: MD, VA, and DC have estimated loads and assigned allocations for contaminated sites in the development of PCB TMDLs. These jurisdictions have estimated loads using soil concentration data acquired from environmental site assessment studies conducted by each State's Land Management Programs. The soil concentration data from these studies are generally measured using Aroclor based methods (e.g., EPA Methods 8082).

TMDL Implementation: TMDL implementation includes remediation of contaminated sites, which is often the responsibility of the site owner.This is critically important when reductions are assigned toloads originating from contaminated sites. MD and DC currently have not assigned reductions specific to contaminated sites within existing PCB TMDLs. VA has identified contaminated sites that require remediation in order to achieve a TMDL, however an implementation plan has not been developed to address these reductions.

Contaminated Site Assessment & Remediation: State Land Management Programs are responsible for conducting Environmental Site Assessments and Ecological/Human Health Risk Assessments to identify toxic contaminants which require remediation. Clean-up of these sites may be facilitated through the Federal Superfund Program.

EPA Efforts

CERCLA/Superfund: Contaminated sites regulated under Superfund require remediation of environmental media contaminated with PCBs to levels that do not impact aquatic life and human health. Within its Chesapeake Bay initiative, the EPA Region 3 Hazardous Site Cleanup Division (HSCD) Site Assessment program is working with the states and other federal agencies to review the existing CERCLIS inventory to create a current status or "baseline" of the three high-urban areas of the Chesapeake Bay that were identified in the past: the Baltimore Harbor, Anacostia and Elizabeth River areas. Sites identified in this review have been or are being investigated for potential cleanup through the CERCLA site assessment process. EPA Region 3 HSCD is working closely with the Maryland Department of the Environment, Virginia Department of Environmental Quality, District of Columbia, and the US Army Corps of Engineers to ensure that these priority areas are assessed under a comprehensive systematic approach.

The purpose of this project was to accomplish identifying and investigating possible land sources of toxic substances including PCBs, which are contributing to contaminated sediments in the Chesapeake Bay watershed. If land sources are identified, these sources may be listed on the National Priorities List (NPL) for potential remedial actions. Also, if other cleanup mechanisms are available, such as state voluntary cleanup programs, the sites may be deferred to the respective jurisdictions. Cleanup of these sources will ultimately assist in developing a comprehensive strategy restoring the three priority watershed areas.

In accordance with the Region III Chesapeake Bay goals, a baseline of 65 sites had been identified in the three priority high-urban areas. Since this initiative began in FY2010, the site assessment program has completed assessments at 120 sites, far exceeding even combined Regional goals. During this time through typical site assessment work and activities, additional sites have been identified within the priority areas, investigated, and added to the baseline. Accomplishments for FY2010 through FY2014 are shown in the following chart:

Fiscal Year	Baltimore Harbor	Anacostia	Elizabeth River
2010	4	4	1
2011	3	3	2
2012	25	16	4
2013	14	10	2
2014	16	14	2

District Department of the Environment (DDOE), the EPA, and the Maryland Department of the Environment (MDE), have been focusing on potential land sources of PCBs that have been found in the sediments of the Anacostia River. EPA has been working with DDOE to address three sites along the Anacostia that are known PCB sources. DDOE has entered into a consent decree with Washington Gas Light and Pepco Benning Road to evaluate and remediate sources of contamination onsite. Also, DDOE is in the process of doing an investigation at Kenilworth Landfill to determine whether remediation is necessary.

The DDOE has also been concerned about potential up-gradient sources of PCBs in the Anacostia and its tributaries coming from Maryland. Under a CERCLA pre-remedial cooperative agreement with EPA, MDE has evaluated five sites in the Anacostia watershed that area adjacent to the Anacostia and/or its tributaries and were known to have used PCBs in the past. Results of these investigations did not show any clear evidence of ongoing PCB contamination into the Anacostia or its tributaries from these five sites.

The HSCD Site Assessment Program continues to evaluate sites within the Chesapeake Bay watershed as part of everyday responsibilities to evaluate sites for the NPL. While the focus has not exclusively been on PCBs, most of the sites are evaluated for the full range of pollutants, which includes PCBs.

While the HSCD Brownfields program has had a tremendous amount of success over the years assessing and cleaning up sites in the Bay watershed, it is difficult to quantify specific types of contaminants being identified or cleaned up on sites. The program collects general information in the ACRES database (e.g., VOCs, PAHS, metals, petroleum) but the database does not have details on the site constituents or levels of contamination. As with Site Assessment, Brownfields does not have any special focus on PCBs, but they are addressed in the program. The jurisdictions also conduct brownfields assessments using funds that EPA provides to them to support their voluntary cleanup programs.

Examples of Brownfields include:

- Industrial/commercial facilities with PCB soil contamination due to historical use or from materials/equipment containing PCBs stored on-site (facility may have a general industrial stormwater permit or be unregulated)
- Illegal dumpsites with materials/equipment containing PCBs
- Construction sites with PCB soil contamination due to historical use or from existing materials containing PCBs
- Demolition or remodeling of buildings during construction may also be a source of PCBs to stormwater

RCRA Corrective Action (CA): Since FY 2010, EPA Region 3 has focused on reducing toxics in the Chesapeake Bay watershed with increased emphasis in the three regional priority areas: the Baltimore Harbor, the Anacostia River and the Elizabeth River. In the FY 2010 to 2014 time period, the EPA Region 3 RCRA CA program expedited cleanups for the 213 facilities within the Chesapeake Bay watershed. EPA Region 3 expects to meet or exceed the three RCRA National Program goals within this sensitive ecosystem. These goals are: to control human exposure to hazardous constituents at RCRA facilities; to delineate and control groundwater releases at RCRA facilities; and, to complete remedy construction at RCRA facilities that permanently eliminates releases to the environment, all of which will contribute to some PCB reductions.

In an instance where PCBs are the main concern at a RCRA CA site, the investigation and remediation are conducted under the TSCA program. As of September 30, 2014, EPA Region 3 has made significant progress in the Chesapeake Bay watershed. It has been determined that human health exposures are under control at 181 facilities (85%); groundwater migration is under control at 170 facilities (80%) and that permanent remedies have been constructed at 123 facilities. This level of success exceeds the average performance of the RCRA corrective program outside the watershed in EPA Region 3, and reflects our commitment to OECA to place higher priority on facilities located in the Chesapeake Bay watershed.

EPA Region 3 is committed to continue its oversight of the proper use, storage, handling, and disposal of PCBs to prevent environmental contamination and human health exposure. EPA Region 3 will continue to oversee and expedite clean-up activities at all PCB Remediation sites and facilities, and RCRA CA facilities in the Chesapeake Bay watershed, as well as throughout the Region.

Voluntary Cleanup Programs: During fiscal years 2009 and 2010, EPA Region 3 initiated a “PCB Challenge” to 32 companies identified as owning in-use PCB transformers. The challenge aspect was to encourage the owners of PCB transformers to develop and implement a management plan and timeline to remove and properly dispose of them. Through this initiative, the region was able to identify facilities that had already removed their transformers from service and disposed of them, as well as which facilities still maintained in-use PCB transformers. Several companies that did not register their PCB transformers with the National PCB Transformer Database by the due date of Dec 28, 1998 were the subject of subsequent enforcement actions.

As a result of the PCB Challenge, two facilities in the Chesapeake Bay watershed (Dumfries, VA and Salisbury, MD) agreed to voluntarily remove and dispose of their PCB Transformers. Five of the six PCB transformers owned by these companies have been removed and properly disposed. The sixth is slated for removal in 2015.

Since 2002, there have been 18 PCB cleanups in the Chesapeake Bay watershed that were addressed under TSCA and the self-implementing PCB cleanup regulations. These 18 cleanups have resulted in the cumulative remediation of more than 5 acres of property, and the disposal of more than 2.9 million kg of PCB contaminated media (soil, concrete, building materials, etc.).

EPA Region 3 is responsible for reviewing, commenting and approving or disapproving all submitted self-implementing PCB cleanup plans. Implementation of a cleanup plan is not allowed by the regulations until approval is granted by EPA. EPA Region 3 issues a written decision on each notification/certification for self-implementing PCB cleanup under the Self-implementing PCB cleanup regulations at 761.61(a), which has specific cleanup levels and remedies. Alternatively, an entity may choose to conduct the cleanup under the Risk-based cleanup regulations at 761.61(c), which allow for some deviation from the specific cleanup levels and remedial alternatives, based upon the risk posed by the site. After approval and final cleanup of the site, EPA Region 3 receives a final disposal report and other documentation as necessary to ensure all clean up and disposal requirements were met.

Gaps in Current Management Efforts to Reduce PCB Loads from Contaminated Sites

There is currently limited PCB monitoring data from Bay jurisdictions for regulated contaminated sites using high resolution congener based methods such as EPA Method 1668. Only VA has conducted limited monitoring at contaminated sites using this method. It is infeasible for TMDL programs to monitor contaminated sites using EPA Method 1668 due to limited resources. Regulated contaminated sites are only required to use Aroclor based methods (e.g., EPA Methods 608 and 8082) to assess PCB concentrations in environmental media (i.e. soil, water, and sediment). This method is sufficient to assess violations of soil clean-up standards. However, detection levels for this method are insufficient to accurately estimate loads conveyed via stormwater from contaminated sites for TMDL development.

Contaminated sites are regulated to ensure protection of human health through direct exposure but may not effectively consider potential impacts through fish consumption. Responsible parties for contaminated sites are not required to determine whether stormwater PCB concentrations are in violation of human health water quality criteria. Ecological Risk Assessments may not account for the bioaccumulation of PCBs to protect aquatic biota (including fish) to meet the fish consumption designated use.

Actions, Tools and Support to Empower Local Government and Others

There is a need for communications tools that will emphasize the connection between PCBs and human health especially with regard to risks from the consumption of contaminated fish. It is expected that such information will motivate local and state-level governments to continue to apply public resources to mitigate and reduce PCBs with the additional benefit of raising awareness of safe levels of fish consumption for anglers in the watershed.

The management strategy will develop several initiatives to help raise the capacity of local communities to address PCBs and other toxics contamination within their respective waterways. To this end, the policy and prevention component of the toxics management strategy will focus on two core areas of concern for local engagement: public awareness and technical capacity.

VI. Management Approaches

The Partnership will work together to carry out the following actions and strategies to achieve the Toxic Contaminants Policy and Prevention goal. These approaches seek to address and be considerate of the factors affecting our ability to meet the goal and the gaps identified above.

The TCW's objective is to develop a management approach that adds value to the ongoing work of jurisdiction, federal, and local entities with respect to PCB controls and reductions. In keeping with the Chesapeake Bay Program Partnership's (the Partnership) mission, the TCW will look for opportunities to accelerate, enable and continually improve the management actions described above, finding synergies and opportunities to share information across the Partnership about what approaches are most cost effective (including based on information from other watershed programs).

The management approach described below identifies near term actions that are directly focused on management actions to reduce PCBs as well as the continuation of data synthesis and analysis to enhance future decisions on how the Partnership can enhance existing efforts. A key objective in the management approach is to seek out innovation and develop new commitments and stakeholder involvement that will work to reduce PCBs within regulatory programs and across voluntary programs and to engage diverse communities in these efforts.

The approach will be informed by analysis of the relative size of the PCB load across the different pathways and sources followed by assessment of where there are opportunities to enhance existing programs for those sources and to create new programs. The management approach will be highly influenced by what we learn from other watersheds (e.g., Delaware Bay and the Great Lakes) as far as identifying management actions with the lowest cost and highest benefit.

Activities are described within the following top-level categories: Regulatory Approaches, Education and Awareness, Voluntary Programs, and Science.

Regulatory Approaches	
Monitoring	Continue jurisdictional monitoring programs for PCB occurrence to assess need for new TMDLs and progress related to reducing PCB loads
Jurisdiction TMDL Implementation	Continue TMDL implementation utilizing to the extent possible the outputs of this strategy including data compilations, results of enhanced monitoring, guidance documents and local-level input Determine areas that might benefit from the use of the TMDL alternative
EPA TMDL Support	EPA will work with the jurisdictions to evaluate the status of PCB TMDLs to determine needs for organizational and technical assistance. EPA and the jurisdictions will review the findings to determine the highest priority assistance needs. Provide technical support to the jurisdictions to help determine whether PCB impairments could be addressed through the TMDL alternative. TMDL alternatives is a new approach that is available to the jurisdictions through the long-term vision for the 303(d) program and which allows for addressing an impairment without necessarily developing a TMDL. This approach may be valuable in waterbodies where there are not very many permitted sources. Summarize the ambient water quality standards and the fish consumption values that are used in the jurisdictions.
Program Integration	Develop guidance on integration of the various programs addressing toxics to reduce inconsistencies in analytical methods, target thresholds, and investigation and remediation approaches (e.g. extent to which risk assessment requirements under contaminated site regulations evaluate potential carcinogenic effects from fish consumption by comparing ambient surface water concentrations of PCBs with human health criterion used in site cleanups).
Enhance TMDL Progress Monitoring	Determine consistent implementation measures to use throughout the Bay watershed for tracking TMDL development and implementation progress.
Data Compilation for Enhanced Regulatory Programs	Determine whether the jurisdictions compile existing PCB outfall monitoring data for NPDES dischargers and assist with development of systems to compile all available information from governmental and academic organizations. This inventory will help determine whether there is a need for additional monitoring requirement to support TMDL development and implementation. Assess the information that is available and forthcoming (e.g., the characterization of Anacostia river sediments by DC Department of Environment) that describes the most highly contaminated in-stream sediments in the watershed to engage the jurisdictions and federal regulators to explore the feasibility of additional remedial actions such as capping and/or dredging. Explore options for making existing contaminated site PCB concentration data available. This inventory will provide information on the extent of PCB contamination at contaminated sites and can be used to guide the selection of analytical methods that align with detection and quantification objectives to support TMDL development and implementation. The EPA Region 3 HSCD Site Assessment program will continue to track sites that are being evaluated in the Chesapeake Bay watershed. Additionally, a GIS desktop tool is being developed to assist HSCD in identifying potential land sources of contamination in the watershed. This project is not limited to PCBs, but any type of contamination that could be migrating from CERCLA sites and affecting the watershed. The GIS tool will help to identify potential CERCLA sites and their proximity to environmentally sensitive areas and receptors to better focus on priority site evaluations. The use of EJ SCREEN will be evaluated to identify the location of such sites in areas with diverse populations.

	The HSCD Site Assessment Program will conduct work share meetings with our State counterparts once per year to determine who will be the lead agency for further investigation of any potential PCBs sites that are on the active sites list. HSCD and TCW will continue to evaluate sites to identify industries or processes that used PCBs. Once this list is generated, the CERCLA, Brownfields, and RCRA programs can better focus resources on identifying and investigating these types of sites. As significant sources of PCBs, or other contaminants that are migrating into the watershed from contaminated land sources are discovered, HSCD will share this information as part of the progress monitoring of this strategy. Additionally, if there are potential land sources that other programs have found, HSCD can investigate those potential sources under the appropriate authority.
Permits and Enforcement	The EPA R3 NPDES Permits Branch will continue to address PCBs through the CWA framework. Where waters have been identified as impaired and a TMDL has been established creating WLA for point sources, the NPDES Permitting program will ensure that permits are consistent with the TMDL. The NPDES Permitting Program will draft and review permits with a focus on ensuring that PCB WLAs are clear and enforceable. The NPDES Enforcement Program, through state oversight and its independent compliance monitoring and enforcement authorities, will ensure that permit requirements are met. If a permittee is in non-compliance with its compliance obligations, EPA will take timely and appropriate action, including exercising its enforcement authority, to ensure that the permittee returns to compliance in an expeditious manner.
TSCA PCB Program and Enforcement	The EPA R3 Land and Chemicals (LCD) Toxics Program Branch will continue to ensure compliance with PCB TSCA regulations through its PCB inspection and enforcement program. Inspections will be targeted based on potential for releases, cumulative burden on EJ communities, or permitting. The R3 Toxics Program Branch will also responds to on tips/complaints that involve potential for illegal disposal and significant risk.
PCB Clean-Ups and Middle River, MD	The EPA R3 LCD Office of Materials Management will continue to partner with the Maryland Department of Environment to oversee the PCB clean up at the Lockheed Martin plant located in Middle River, Maryland. The Middle River facility, which is located on Cowpen Creek, is considered to be a major contributor to PCBs in the Bay. Phase 2 of the clean-up is commencing.
Drinking Water Source Protection	Identify opportunities for improved communication between the SDWA delegated authorities and the public water supply utilities and any entity that has located an upstream source of PCBs or is conducting any type of activity (e.g., dredging) which could impact a public water supply. This effort would aid in reevaluating the monitoring frequency at the public water supply and preventing impacts to drinking water supplies.

Education and Awareness	
Guidance Development	Develop PMP guidance document for the control and reduction of PCBs in NPDES regulated stormwater and wastewater including an inventory of stormwater BMP options. This document would provide guidance to all Bay jurisdictions in implementing PCB load reductions established for dischargers through TMDL development while recognizing the need for flexibility in PMP design. Develop guidance for unregulated sources of PCBs for use in developing implementation plans under TMDLs. (New)
Education and Awareness Activities	Coordinate educational workshops to provide the general public, local governments and regulated stormwater facilities owners with expert knowledge regarding human health impacts from PCBs, existing and tracking new sources of PCBs in the environment, monitoring and actions that can be taken to eliminate these sources preventing the contribution of PCBs. Include best practices for conducting historical and community-participatory research. The TCW will conduct a workshop on sediment remediation technologies to provide the latest information on ongoing remediation activities in the watershed, recent developments in remediation options, and the costs associated with remediation. Working with local government and non-profit organizations, the TCW will inform the public regarding risks from consuming contaminated fish by developing communications

	materials and corresponding procedures for their dissemination throughout the targeted communities. Compile education materials regarding existing procedures and best practices for containment and prevention of release of PCBs. (new)

Voluntary Programs	
Equipment Phase-out	Complete the feasibility analysis Coordinate a voluntary action program to reduce transformers and other PCB containing equipment (e.g., fluorescent light ballasts). Include those classified as PCB free (less than 50 ppm) Provide to program participants information on remediating PCB contamination on-site from historical releases of these transformers and use EPA's EJ SCREEN tool to help identify where such equipment is located in areas with diverse populations.
Community Involvement	The TCW will work with local non-profits to explore the use of volunteers to support the work of PCBs source-tracking, identifying the best opportunities for community-participatory research into local environmental history.

Science	
Inadvertent Production	Identify opportunities to estimate the quantify and impact of inadvertent manufacture of PCBs
Identify PCB Sources	Support enhancement of available information on construction activities associated with the demolition/remodeling of buildings PCB containing materials and disturbance of contaminated soils is a source of PCBs in unregulated and NPDES regulated stormwater. Conduct literature search to investigate whether land application of biosolids in commercial and agricultural practices is a pathway for PCBs in unregulated and NPDES regulated stormwater. Based on results, determine whether additional research is needed. Conduct research initiative to investigate whether land application of dredged material from the maintenance of stormwater BMPs is a source of PCBs in unregulated and NPDES regulated stormwater. Based on results, determine whether additional research is needed. Support research on cost-effective tools for track-down studies and provide a mechanism for municipalities to share information on lessons learned from PMP development and implementation strategies and methods for documenting and sharing the information. Review the 2015 NATA report to determine the need for further investigation of atmospheric sources of PCBs, characterization of PCB concentrations in atmospheric deposition to the watershed and Bay, and determine the significance of these sources for bioaccumulation in fish. Homolog distribution profiles for PCBs in atmospheric deposition could be evaluated to determine whether mid-weight congeners are present at levels that significantly contribute to bioaccumulation in fish. Conduct literature search to evaluate the contribution of smaller combustion sources to PCB loads in the watershed. Example sources include residential wood stoves, fireplaces, oil burners that use recycled oil and backyard trash burning. The sheer number of them, combined with their poor dispersion characteristics, might make these sources, when aggregated, a measurable source of deposition to the Bay or to smaller sub-watersheds. An evaluation of these sources in the Chesapeake Bay watershed could informative as part of a future source track-down study. High-volume storm flows are being assessed to measure sediment bound PCBs and their contribution to overall loading in several branches of the Anacostia River. Use information from improved Conceptual Model and numerical, regional models (e.g., Anacostia, James, Potomac) to inform and prioritize mitigation options.
BMP Effectiveness	A project is underway to determine the relative amount of PCB reduction that might occur across the range of BMPs implemented for the Chesapeake Bay nutrient and sediment TMDL. The BMPs will be cross-correlated with contaminant pathways and their

	association with land use and industrial sources (e.g., urban stormwater, agriculture, landfills, dredged material disposal facilities, hazardous waste sites, and industrial operations). The study will assess and explain the most beneficial management actions that could leverage current TMDLs and watershed implementation plans (WIPs) to achieve multiple benefits for nutrient, sediment, and toxic contaminant reductions Multiple projects underway to assess the effectiveness of specific BMPs in the removal of PCBs, including dry ponds, bioretention. Project is underway to assess the enhancement of PCB degradation in stormwater controls, including detention basins (e.g., enhanced media, and biofilm coated activated carbon). Collaborate with agriculture, urban stormwater, and wastewater treatment source sector workgroups to explore and identify co-benefits of BMPs. Explore and develop tools to assist jurisdictions in evaluating co-benefits of BMPs (e.g., CAST)
Status and Change in Environmental Conditions	Encourage use of the high-sensitivity congener-based methods to analyze PCBs to ensure that PCB sources are being characterized accurately when such characterization can help with source identification. Identify barriers and opportunities related to more frequent use of EPA 1668 for contaminated sites, wastewater and regulated and unregulated stormwater dischargers as a screening tool (as is underway in VA) or for a targeted subset of permittees. This effort could also be targeted to industrial stormwater permittees with SIC classifications that indicate the facility has the potential for PCB contamination on site from historical use or current operation or disposal of PCB containing materials. As monitoring and implementation plans advance by jurisdictions to comply with local TMDLs, the data available will increase considerably and can be inventoried and assessed for status or trends. These data can be used to update the story map and any de-listings that occur. Support annual or biannual regional PCB technical workshops with Baltimore Urban Waters, and summarize and communicate outcomes from Baltimore Urban Waters PCB TMDL technical workshops. Establish collaboration Confluence site for PCB TMDL technical exchange for interested parties.

PCB Consortium	
Explore the value and feasibility of creating and sustaining a broader scale forum for collaboration (e.g. a consortium) on PCB TMDLs that are in place and under development across the watershed	Form an exploratory team Collect information about the role for a consortium and expected assistance to be provided to TMDL implementers. Estimate the cost of a consortium Evaluate other models (e.g. Chesapeake Conservancy) for methods of funding one or more part-time or full-time positions to manage the operations of the consortium. Prepare a report with jurisdiction input (after WIP III draft in April 2019) that summarizes options, costs and means of sustaining a collaborative forum.
Present the findings from exploratory phase above to the CBP Management Board for a partnership decision on whether to invest in a new collaboration forum or other new approaches to foster collaboration	Deliver a presentation of findings and determine next steps, if any, from consensus-based decisions by the CBP as to forming a consortium or other actions.

Approaches Targeted to Local Participation

In the more urbanized areas of the Bay, Baltimore, Washington D.C. and Norfolk/Elizabeth River, the TCW will continually coordinate and engage with NGOs and state and local governments as the management strategy is developed and implemented.

Recognizing that the general public and, even, local professionals do not understand well the extent and impact of PCBs and toxics contamination of their waterways, the management strategy will seek to raise baseline awareness with respect to the presence and extent of PCBs contamination in local communities, known and potential human health impact (especially with respect to fish consumption practices), and the sources and transport dynamics of PCBs contamination. The TCW will identify and prioritize communities for targeted outreach, based upon known levels of contamination, known and assumed levels of awareness, and known and assumed community risk of exposure with a particular emphasis on areas with diverse populations where subsistence fishing is known to occur. EJ SCREEN can be utilized for this purpose. The Diversity Action Team will work with the TCW to develop a pilot project to improve outreach and communications efforts and develop tools targeted towards diverse populations that undertake subsistence fishing in these areas of concern.

Building upon the fish contamination data collection and assessment efforts of state fish consumption advisory programs and through the aggregation of local/state/federal data on known sources of PCBs, the communications materials will expand upon and provide more and better narrative description about PCBs and toxics contamination of local waterways, the sources and transport dynamics of the PCBs (best available research), and more extensive explanation and interpretation about human health risks from fish consumption-based exposure (best available research). The materials will include individual watershed/jurisdiction reports as well as presentation materials for use by local government and non-profit employees for dissemination in various venues (e.g. neighborhood association meetings, classrooms, etc.). The TCW will also make the communications materials available online and work with the Diversity Action Team to ensure the information is getting distributed to diverse communities in the Bay watershed.

Cross-Outcome Collaboration and Multiple Benefits

A strong cross-dependency exists between this contaminants reduction strategy and the water quality strategy related to reduction of nutrients (nitrogen, phosphorous) and sediment. The TCW has completed work to rank the relative effectiveness of nutrient/sediment reduction practices on reduction of toxic contaminants including PCBs. As the jurisdictions continue to place high priority on management practices related to nutrients and sediment, the TCW will contribute to developing tools that help Chesapeake Bay Program partners assess multiple benefits of pollution control management practices. The TCW will work with the Water Quality Goal Team and its workgroups to find synergistic management approaches.

From an implementation perspective, this strategy will benefit from coordination with the Local Leadership and Diversity strategies. As mentioned above, there is an interest in building awareness of the impacts of PCB contamination and the extent of fish consumption advisories at the local level. The TCW will continue to lead the dissemination and use of the Fish Consumption Advisory Infographic. It has also been established that many toxic contaminants are more concentrated in urban areas where diverse and under-represented populations are critically important to effective achievement of the contaminants reduction goal.

Other *Watershed Agreement* goals will potentially benefit from progress achieved under this strategy including improving the quality of fish habitat, improving the health of submerged aquatic vegetation, improving stream health and maintaining healthy watersheds.

Lessons Learned

During the previous performance period, the Toxic Contaminants Workgroup compiled information into a series of maps that illustrate the wide extent of PCB impairments. The maps also illustrated the extent of the Chesapeake watershed jurisdictions' active large-scale PCB TMDLs in specific sub-basins, with more under development.

The workgroup learned that the TMDL programs are not effectively connected with the research community and there is very limited inter-state PCB TMDL collaboration. The workgroup also learned that more information is needed on BMP effectiveness to allow toxic contaminant reductions to be better targeted as a co-benefit to the nutrient/sediment TMDL and to inform the management plans developed under existing and future PCB TMDLs.

Therefore, we have identified a new factor that is critical to achieving needed PCB reductions and that is the extent of coordination among the science and management communities. The related new management gap is that there is no existing forum that is commensurate with the scale of the PCB contaminant problem and that is providing the level of collaboration needed for the jurisdictions to implement effective PCB TMDLs.

A management approach, titled "PCB Consortium," has been added to the management strategy and the first activity will be to explore ways to fill the identified gap. The partnership has agreed to collect information on the value, feasibility and sustainability of forming a consortium-like entity or pursuing other collaborative activities to increase the cooperative focus of the Bay Program Partnership on addressing PCB contamination and the PCB TMDLs. Following the exploratory first phase, the Chesapeake Bay Program partnership will decide whether to apply collective resources to establish a consortium or any other undertaking to improve collaboration among the jurisdictions and researchers.

VII. Monitoring Progress

Three types of progress monitoring will be pursued:

1. Progress on completion of planned activities for actions not directly under the direction of the Partnership and progress for activities for which the TCW is directly committing to oversight and dedication of resources of the Partnership. Examples include items in the TCW biennial workplan and jurisdiction progress with TMDL and PMP development.

2. Assessment of whether planned actions are having the result expected. Examples could include trends in the restrictiveness of fish consumption advisories, PCB concentrations in stormwater and wastewater effluents, extent of impairments and calculated estimates of load reductions.

3. Environmental monitoring to track response of the system as the strategy is implemented (to the extent possible given the high cost of PCB monitoring and the lag time that will influence how quickly an environmental response is detectable). Examples include fish tissue PCB concentrations for indicator species, and sediment concentrations.

VIII. Assessing Progress

For type 1) progress monitoring as described above, the frequency of assessing progress will be at least annual so that adjustments to the biennial workplan can be made to accommodate changing circumstances and availability of resources. Formal review of type 1) progress data will be completed through the update of the biennial workplan.

Progress assessment based on type 2) and 3) monitoring will be conducted on an as-available basis. These types of monitoring generally will involve measurements of environmental response and environmental condition, which do not necessarily occur at regular intervals and will be contingent on availability of data and/or monitoring funds.

IX. Adaptively Manage

Adaptive management will focus foremost on monitoring information described under type 2) above where there will be assessment of whether management actions are having the expected results in terms of PCB reductions. Over time, it is expected the TCW will learn which loading pathways and sources provide the greatest opportunities for continued reductions.

Other adaptations to the strategy will result from assessing the long-term response of the system (type 3 monitoring above) and, in the short term, whether the TCW and other entities are completing work as planned (type 1 monitoring above).

X. Biennial Workplan

Biennial workplans for each management strategy will be developed by September 2018. It will include the following information:

- Each key action
- Timeline for the action
- Expected outcome
- Partners responsible for each action
- Estimated resources

The TCW will prioritize the activities listed in the Management Approaches section above to determine which will be completed in the first biennial workplan. Some of the activities will be completed by TCW members or member organizations and some may be completed by organizations not directly represented through membership on the TCW. For the latter actions, the TCW will track completion of those activities and ensure that the outputs are used appropriately as the strategy is implemented.