Guidance for Developing Local PCB TMDL (Total Maximum Daily Load) Stormwater Wasteload Allocation (SW-WLA) Watershed Implementation Plans (WIPs)

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Introduction

MDE has developed numerous Polychlorinated Biphenyl (PCB) Total Maximum Daily Loads (TMDLs) for water bodies across Maryland. While PCBs are no longer produced in the US, they can be an inadvertent byproduct in certain manufacturing processes (e.g., pigments) and releases are still possible from older PCB containing equipment and materials. Of primary concern, legacy PCB contamination in watersheds poses a serious threat for downstream export to impaired waterbodies.

Some PCB TMDLs do not identify the contributing watersheds as a major source to impaired waterbodies. However, for other watersheds where the contributing drainage area has been identified as a major source of PCBs to a waterbody (driving water column, sediment, and fish tissue impairments), Wasteload Allocations (WLAs) and associated reductions have been assigned to permits, including Phase I Municipal Separate Storm Sewer System (MS4) jurisdictions. While significant and daunting, these reductions are objective, scientifically derived, and achievable over time. Adaptive management will enable jurisdictions to deal with the high costs of stormwater wasteload allocation (SW-WLA) implementation.

This document provides guidance to Phase I MS4 jurisdictions that are required to develop a PCB TMDL Implementation Plan and perform source tracking monitoring, which is the focus of PCB TMDL implementation in Maryland. The TMDLs provide watershed scale estimates of PCB loads from aggregate sources. The source trackdown methodology will enable jurisdictions and the State to identify specific sources of PCBs within applicable watershedsThe first step in implementation is to identify if, and where specific sources are located within these watersheds. MDE's Watershed Protection, Restoration, and Planning Program (WPRPP) presents this guidance on source trackdown via a risk evaluation framework in the context of the waterbody type and designated use impairment (e.g. fish consumption advisory) caused by PCBs. This guidance is intended as a prompt for jurisdictions to deliver data related to tracking down the origin of PCB pollution and problem areas, which will be conducted in various phases within and across permit cycles, e.g., every five years. In some watersheds, source identification may require less than five years based on watershed conditions, but in others, it will take longer than five years. Since the focus of PCB TMDL implementation is source trackdown, MDE does not currently expect jurisdictions to develop models to estimate load reductions within PCB impaired watersheds. This does not preclude future requirements for the use of such models in subsequent permits. Rather, MDE is requiring jurisdictions to conduct a desktop analysis (i.e. subwatershed prioritization/risk evaluation) and subsequently perform water quality monitoring as part of this source trackdown approach. Pursuing other programmatic/management options such as educational best management practices (e.g., industry/community awareness of PCB contaminated materials/equipment like transformers and light ballasts, voluntary removal/phase out, fish consumption advisory notifications at county level) will not be considered as meeting permit PCB Implementation Plan and source tracking monitoring requirements. Although the development of such programs and policies is certainly not discouraged by MDE. MDE has no expectation that information related to load reductions from best management practice (BMP) implementation will be included in these plans, unless being used as part of the desktop analysis to inform subwatershed prioritization. Furthermore, jurisdictions are also not required to assign an exact end-date to when WLAs will be achieved, given the focus on source tracking monitoring and not modeling.

Although PCB TMDLs are structured in a manner that presents discrete modeled loading figures, PCB TMDL Implementation Plans should be pragmatic in their approach. Particularly, in the early stages of implementation, so as to focus on the larger picture of source identification. Hence, MDE WPRPP requires that jurisdictions focus on source trackdown. In addition, it is unlikely that jurisdictions will ever be able to prove via monitoring that they are discharging at "an annual load of X g/yr." Therefore, MDE WPRPP recommends that jurisdictions outline the benefit of a discrete modeling analysis in the plan, if one is included. An example of this level of planning is as follows: if, after all of the County's source tracking efforts, it is determined that there are no specific sources and that PCBs are ubiquitous across urban watersheds, a record of modeled enhanced sediment control will become valuable for PCB TMDL implementation.

Contrary to previous MDE WPRPP guidance, jurisdictions will not receive credit towards a SW-WLA for PCB load reductions via the removal of contaminated materials from stormwater management facilities. Only the reduction of PCB loads discharged from BMPs will meet this goal. Therefore, in order to achieve required reductions, it will be necessary to focus on identifying and remediating sites where PCB soil contamination is the reason PCBs are being transported to BMPs or directly to the waterways. Jurisdictions should not consider dredged maintenance of BMPs in order to achieve PCB reductions. This should only be done in order to maintain trapping capacity within these BMPs or to address other contaminants of concern.

There is still a significant amount of research, monitoring, and analysis that needs to be done to better understand the nature of PCB sources, fate, and transport in impaired watersheds. Over time, as this understanding improves, it will help in defining future watershed planning schemes. MDE WPRPP requests that jurisdictions evaluate their planning processes on an "as needed" basis to meet the specific technical demands of different pollutants and subwatershed conditions.

Purpose of the Guidance

Jurisdictions that have PCB TMDL SW-WLAs need to develop Implementation Plans and perform source trackdown investigations to identify sources of PCB contamination that may be controlled or remediated through MDE regulatory actions (e.g., CERCLA, NPDES industrial permits). This guidance outlines the planning, monitoring, and reporting requirements and recommendations to fulfill these source trackdown investigation obligations.

Jurisdictions should be using a desktop analysis to enumerate and prioritize risks associated with PCB contamination. This process in conjunction with performing subsequent water quality monitoring are the primary components of the State of Maryland's guidance to tracking down and identifying potential sources of PCBs in the ambient environment in order to meet reductions called for by Maryland's PCB TMDL SW-WLAs.

Notably, no SW-WLA achievement end dates are required and no modeling of WLA Progress is required for PCB TMDL implementation plans as part of this guidance. The guidance is MDE's interpretation of the permit requirements, and thus MDE WSA policy.

Permit Term Deliverables

The chronology of sampling requirements within each permit term are described in this section. All final permit term deliverables need to be turned in by the end of the permit, which includes any administrative continuation of the permit.

Each permit term, jurisdictions are expected to complete and/or revise their Implementation Plan and accompanying PCB Source Assessment (desktop analysis) and submit all of the applicable deliverables associated with one phase of sampling as detailed below. MDE requires jurisdictions to commence and complete at least one phase of sampling per permit term, but conducting multiple phases per permit term is highly encouraged.

Deliverables per permit term:

1. Watershed Implementation Plan (WIP) document (submitted to MDE within two years of the publication of the guidance)
2. The Implementation Plan document should outline the entire strategy for PCB TMDL implementation in the applicable watershed (See MDE's "General Guidance for Local TMDL SW-WLA WIP Development" for further details on WIP development) including the desktop analysis and its results and the subsequent planned monitoring to identify potential sources of PCBs on the landscape.
    a. Includes spatial data submission of desktop analysis (See "PCB Source Assessment" section for further details)
    b. TMDL Subwatershed Risk Assessment (See "Subwatershed Prioritization Strategy" section for further details).
3. Phase I Source Trackdown Sampling and Analysis Plan (SAP) (submitted to MDE within two years of the publication of the guidance)
4. Phase I Source Trackdown Quality Assurance Project Plan (QAPP) (submitted to MDE within two years of the publication of guidance)
5. Phase I Source Trackdown Monitoring Data Report (submitted to MDE before the end the permit term)
6. Phase I Source Trackdown Monitoring Data Assessment Report, which summarizes the results of the Phase I source trackdown investigation with a plan for the next phase (submitted to MDE before the end of the permit term) (can be combined with Monitoring Data Report described in #5).
7. Jurisdictions which have already initiated Phase II source trackdown investigations (i.e., in-stream subwatershed PCB characterization) may choose to continue with subsequent Phase II and III source trackdown investigations instead of addressing Phase I source trackdown investigations within this permit term. Phase II and III source trackdown investigations will require the same deliverables as for Phase I source trackdown investigations (i.e., SAP, QAPP, monitoring data report, and monitoring data assessment report). Phase I source trackdown investigations will still need to be completed in a future permit term.

Toxics Chemicals in COMAR

This section will be forthcoming in the next year, and it will assist jurisdictions with developing local frameworks for governing the planning and management of toxic chemical TMDLs. Specifically, it will attempt to clarify the State entities involved with administration of toxic chemical TMDLs and associated regulatory activities. There is a need to clarify what will be addressed by MDE related to the loadings of toxic substances to surface waters through its Land and Materials Administration (LMA) and what will be addressed through actions required by local jurisdictions. Given that much of the policy surrounding PCB TMDL SW-WLA Implementation Plans is non-static and long-term, potential actions required of local jurisdictions by the State are not able to be clarified at this time. COMAR does not instruct MDE on this process. However, over time, roles and responsibilities will evolve and are anticipated to become more clear. It is anticipated that the reduction of toxic pollutant loadings to surface waters will need to be handled using cooperative collaboration among stakeholders both in the present and in the future. Currently, the role of the permitted Phase I MS4 jurisdiction is to develop a PCB TMDL implementation plan and conduct source tracking monitoring, as specified in this guidance.

Facilities that perform U.S. EPA Method 1668A

This section will be completed by the end of calendar year 2022, and will be for reference purposes only to support Maryland jurisdictions.

Overview of the PCB Source Trackdown Components

MDE WPRPP recommends that jurisdictions make source tracking monitoring for PCBs the starting point for making management decisions. Source tracking methodologies are used in order to find and locate elevated concentrations of PCBs on the landscape or in water bodies. Therefore, Watershed Implementation Plans should focus on PCB source trackdown; it is not the responsibility of jurisdictions to estimate loadings from the watershed bottom sediments and/or tidal system boundaries. Aside from this already having been accomplished through the TMDL model, this is not within the scope of implementation as defined by the Phase 1 MS4 permit.

The methodology described within this guidance for developing a source trackdown plan will be an adaptive process. The current recommendations may change over time depending on the results of these investigations moving forward. This guidance also incorporates elements of existing PCB Implementation Plans already developed by local jurisdictions. MDE will continue to work with the local jurisdictions, academic institutions, and private consulting firms involved in developing these approaches in order to alter/improve the approaches recommended in this guidance.

The source trackdown methodology will include the following components.

1. A "**PCB Source Assessment**" to identify potential sources within each TMDL subwatershed based on a desktop analysis of data resources,
2. A "**Subwatershed Prioritization Strategy**" to identify and prioritize which TMDL subwatersheds will require source trackdown investigations based on information provided by the PCB Source Assessment, and
3. A "**Multi-phase Source Trackdown Investigation**" to identify discrete sources of PCBs within TMDL subwatersheds. This will include three phases:
    a. subwatershed PCB screening,
    b. in-stream subwatershed PCB characterization, and
    c. MS4 PCB characterization.

Even though most jurisdictions are primarily in the source tracking stage as of 2022, there needs to be specificity in the reporting and tracking processes in order to: (1) properly assess progress towards meeting the SW-WLA, (2) consider and integrate new technical information and data into the plan efficiently, and (3) preserve institutional knowledge with greater ease. This may require jurisdictions to adopt tabular or illustrative formats in their Implementation Plans in order to outline specific adaptive management processes.

PCB Source Assessment

Jurisdictions will conduct a PCB Source Assessment within their respective TMDL watersheds to identify potential sources of PCBs based on a desktop analysis of data resources provided by MDE. The PCB Source Assessment should be conducted at the subwatershed scale designated by the jurisdictions within their respective TMDL subwatersheds. If a jurisdiction has not delineated subwatersheds, an approximate scale of 5-10 square miles per subwatershed should be applied. The information provided in the PCB Source Assessment will be used to identify subwatersheds that may require source trackdown investigations based on the prevalence of potential PCB sources.

TMDLs characterize PCB watershed loadings for various source sectors (e.g. NPDES regulated stormwater, non-regulated watershed runoff) and assign load reductions; however, the water quality data and modeling frameworks do not provide enough resolution to identify discrete sources of PCB contamination within the watershed. The desktop analysis should be conducted spatially and needs to be performed in order to identify: (1) potential sources in TMDL subwatersheds, and (2) prioritize these subwatersheds for source trackdown investigations. This should include an enumeration of datasets to account for natural and water resource assets and risks to those assets in watersheds with PCB TMDLs, e.g., potential sources of PCBs. "Use Class Designations" present an opportunity for jurisdictions to begin to delineate and consider how to concurrently prioritize management of toxic pollutants like PCBs and other natural resource assets.

Quick Take: From a human-health perspective, given that PCB TMDLs are intended to protect people from consuming toxins in fish tissue, should there be an emphasis on making reductions to PCB concentrations in fish?

The "Fishing" designated use falls under Use Class I, which is applicable to the entire waterbody when listed as impaired for PCBs in fish tissue. The majority of Maryland's PCB fish tissue listings are for estuarine waters of Chesapeake Bay tributaries. The consumable species of fish for which the listings are based have expansive home ranges and bioaccumulate PCBs throughout the entire system. The objective of the source trackdown efforts is to identify and control/eliminate sources of PCBs in the watershed that are contributing to bioaccumulation in fish in the impaired waterbody. The multi-phase source trackdown approach should ultimately result in reducing loadings from the watershed, which will result in reductions in fish tissue concentrations. Reductions in fish tissue concentrations will be assessed by MDE's routine fish consumption advisory monitoring program, which operates on a 5 year rotating basis. (https://mde.maryland.gov/programs/Marylander/fishandshellfish/Pages/fishconsumptionadvisory.aspx).

Jurisdictions should build a master map package of datasets and information that potentially could contribute to understanding PCB loading or increased risk of loading. This information can be layered and lead to a methodology for processing data and information to perform high resolution source trackdown efforts and risk evaluations. The end-product should be a prioritization of sites and watersheds. This will give assurance that all "bases are covered" if diffuse concentrations are found to be widespread, and reliable data for use for any future questions.

Desktop analysis to identify potential sources of PCBs in TMDL subwatersheds

Jurisdictions will use the following data resources in their desktop analysis to identify potential sources of PCBs in each TMDL subwatershed. If jurisdictions do not use individual datasets identified below, they should provide a rationale and documentation regarding why the data was excluded from the desktop analysis. MDE will provide a *PCB Guidance Resources Package* that contains the applicable datasets listed below as a corollary to this guidance on its webpage.

1. **EPA PCB Transformer Registry Database:** PCBs were used in electrical transformers manufactured from 1929 to 1977. A "PCB transformer" is classified as a transformer with PCB concentrations greater than 500 ppm under Toxics Substance Control Act (TSCA) regulations. PCB transformer owners must register their transformers with the EPA. Jurisdictions will need to create a table and GIS shapefile of "PCB Transformer" locations within their respective TMDL watersheds using registration information provided in EPA's "PCB Transformer Database" table at the following link: https://www.epa.gov/sites/default/files/2019-09/documents/pcb_transformer_database.pdf. The locations of PCB transformers will need to be mapped in GIS using address information provided in the table, as geographic coordinates are not included. In addition to "PCB transformers", a "PCB contaminated transformer" is classified as a transformer with a PCB concentration between 50 and 500 ppm. These transformers do not require registration under TSCA; however, they are still regulated for use and disposal under TSCA as the PCB concentrations exceed 50 ppm. A "non-PCB transformer" is classified as a transformer with a PCB concentration below 50 ppm and is not regulated for use or disposal. Many "PCB transformers" and "PCB contaminated transformers" have been reclassified as "non-PCB transformers" through replacement of PCB oil with mineral oil. While this significantly reduces the PCB concentration, residual PCB oil will remain within the transformer. While "PCB contaminated transformers" and "non-PCB transformers" do not require registration, they are still in-use and have the potential to contaminate stormwater and groundwater due to leakage and failure. Properties that have completely removed or replaced all PCB-containing transformers still have the potential to contaminate stormwater and groundwater due to legacy contamination of soils from historical releases. For more

information on transformer classifications jurisdictions can refer to EPAs "Reclassification of PCB and PCB Contaminated Electrical Equipment" document at the following link: https://www.federalregister.gov/documents/2001/04/02/01-8055/reclassification-of-pcb-and-pcb-contaminated-electrical-equipment. The excel file of the "PCB Transformer Database" and previously referenced documents have been included in the PCB Guidance Resources Package in the "1. EPA PCB Transformer Database" sub-folder within the "1. PCB Source Assessment Resources" folder.

2. **EPA PCB Activities Database:** Any company or person storing, transporting, or disposing of PCBs or conducting PCB research and development must notify EPA. The PCB Activities Database contains seventy sites in MD that have reported PCB activities to EPA from 1990 to 2020. While activities at these sites should not result in PCB contamination if managed properly, there is still the potential for accidental releases due to spills, leaks, or containment failures. Many of these sites may correspond with industrial facilities or hazardous waste sites which jurisdictions will also be required to identify as part of this PCB Source Assessment. Jurisdictions will need to create a table and GIS shapefile of the site locations within their respective TMDL watersheds using information provided in EPA's "National Spreadsheet of Facilities that have notified of PCB activities" at the following link: https://www.epa.gov/pcbs/notifications-polychlorinated-biphenyl-pcb-activities. The locations will need to be mapped in GIS based on address information as the database does not provide geographical coordinates. The site locations will need to be mapped in GIS using address information provided in the table as geographic coordinates are not included. The "PCB Activities" spreadsheet has been included in the PCB Guidance Resources Package in the "2. EPA PCB Activities Database" sub-folder within the "1. PCB Source Assessment Resources" folder.
3. **Hazardous Waste Sites:** MDE's Land Restoration Program (LRP) oversees the investigation, assessment, and cleanup of uncontrolled hazardous waste sites throughout Maryland under the State Superfund Program or Voluntary Cleanup Program (VCP). The VCP encourages voluntary cleanup and redevelopment of properties while the State Superfund Program oversees the assessment and cleanup of historically contaminated hazardous waste sites that have not been placed on the National Priority List (NPL), which is managed by the Federal Superfund Program. For more information on these programs you can refer to LRP's website at the following link: https://mde.maryland.gov/programs/land/MarylandBrownfieldVCP/Pages/index.aspx. The objective of these programs is to remediate contamination in soils, groundwater, and surface water to ensure they do not pose a risk to human health and the environment. LRP applies cleanup standards for soil and groundwater that are protective of human health from direct exposure (i.e, ingestion, inhalation, and dermal contact) and from drinking water. However, these standards may not be protective of human health from fish consumption, as contamination below cleanup standards may still impact surface water quality resulting in bioaccumulation in fish at PCB concentrations that could impact human health. Hazardous waste sites could still be a source of PCBs whether they

have undergone remediation. It is also possible that remediation was never required in the first place as PCB concentrations were below cleanup standards. For more information on cleanup standards you can refer to MDE's "Cleanup Standards for Soil and Groundwater" document at the following link: https://mde.maryland.gov/programs/LAND/MarylandBrownfieldVCP/Documents/www.mde.state.md.us/assets/document/MDE%20Soil%20and%20Groundwater%20Cleanup%20Standards%2010-2018%20Interim%20Final%20Update%203-2.pdf. Jurisdictions will need to create a table and GIS shapefile of hazardous waste sites within their respective TMDL watersheds using a GIS shapefile of all the hazardous waste sites in Maryland which can be downloaded from MDE's "LRP Project Site Map" at the following link: https://mdewin64.mde.state.md.us/LRP/index.html. The shapefile includes information on whether site remediation falls under Brownfields, VCP, CHS, or NPL as well as whether PCB contamination is present in groundwater, soils, or sediment. The sites identified in the shapefile should also be cross-checked with LRP's Brownfields Master Inventory (BMI), which provides a comprehensive list of all hazardous waste sites in Maryland in order to ensure all sites have been identified. A BMI # is assigned to each site which can be found in both the shapefile and BMI. The BMI reports (active and archived) can be accessed on LRP's BMI webpage at the following link: https://mde.maryland.gov/programs/land/MarylandBrownfieldVCP/Pages/BrownfieldMasterInventory.aspx. A link to fact sheets for most hazardous waste sites can be found in the shapefile and BMI reports. When available, these documents should also be reviewed for information pertaining to PCB contamination. While the shapefile also includes this information, a site may not have been identified as having PCB contamination in soils, groundwater, or sediment due to the levels not requiring remediation under LRP regulations. The fact sheet may contain additional information on PCB contamination that could still pose a risk to human health from fish consumption. Finally, site information should also be cross checked with the EPA online search portal for superfund sites "Superfund Enterprise Management System (SEMS)"to ensure all sites have been identified. SEMS can be accessed at the following link: https://www.epa.gov/enviro/sems-search. The table and GIS shapefile should include information on whether PCB site contamination has or has not been identified and whether the site was assessed in the TMDL. The GIS shapefile of Maryland hazardous waste sites, and previously referenced documents have been included in the PCB Guidance Resources Package in the "3. Hazardous Waste Sites" sub-folder within the "1. PCB Source Assessment Resources" folder.

4. **National Pollutant Discharge Elimination System (NPDES) Permitted Wastewater and Stormwater Dischargers:** NPDES permitted industrial facilities may have the potential to discharge PCBs in wastewater or stormwater due to active or historical industrial activities such as the use of PCB containing equipment (e.g., transformers, hydraulic equipment), disposal and processing of PCB containing materials or equipment (e.g., landfills, scrap recycling), and inadvertent production of PCBs in manufacturing (e.g, paint pigments). NPDES permitted municipal facilities (i.e., WWTPs) also have the

potential to discharge PCBs due to contamination of raw sewage from various sources such as human waste, food waste, greywater, legacy deposits within the sanitary sewer system, and industrial discharges to the sanitary sewer system. Virginia Department of Environmental Quality (VADEQ) conducted a monitoring study to determine which industrial and municipal facilities have PCBs in their wastewater or stormwater discharges. Table 1 below identifies Major Standard Industrial Classification (SIC) Code Groups for facilities which have the potential to discharge PCBs in wastewater or stormwater. For more information on this study you can refer to VADEQ's "The Relationship between Polychlorinated Biphenyls (PCBs), VPDES Wastewater/Stormwater Facilities, Stormwater Industrial General Permitted Facilities (ISWGPs), and the Standard Industrial Classification (SIC)" document at the following link: https://www.deq.virginia.gov/home/showpublisheddocument/4802/63747789026317000. The document has been included in the PCB Guidance Resources Package in the "4. NPDES Wastewater and Stormwater Dischargers" sub-folder within the "1. PCB Source Assessment Resources" folder. A list of all SIC codes and their descriptions can be found on the North American Industry Classification System (NAICS) website at the following link: https://www.naics.com/business-lists/counts-by-sic-code/. Jurisdictions can look up NPDES facility permit information using MDE's "Wastewater Permits Interactive Search Portal" at the following link: http://mes-mde.mde.state.md.us/WastewaterPermitPortal/. Searches can be filtered using the dropdown search fields by County, Md 8-digit Watershed, Type, and Status. Searches will need to include all permit types in the "Type" dropdown field (Industrial Wastewater Surface Dischargers, Municipal Wastewater Surface Dischargers, Wastewater Discharges to Groundwater, and General Permits). MDE issues general permits for industrial facilities that only discharge stormwater or for specific industrial sectors that discharge stormwater and wastewater such as marinas, swimming pools, mineral mines, coal mining, hydrostatic testing of tanks and pipes, and seafood processing facilities. For more information on NPDES permits you can refer to MDE's Wastewater Permits Program webpage at the following link: https://mde.maryland.gov/programs/Water/wwp/Pages/index.aspx. Search results include a parameter on "Status" and "Status Date", which will determine whether the facility is active or inactive. If a facility's most recent status is "Issued" or "Received" it is an indication the facility is active. If the most recent status is "History", then the facility is likely inactive. While wastewater discharges will no longer occur at inactive facilities, there is still the potential for contamination of stormwater or groundwater due to legacy PCB contamination at the site. Jurisdictions will need to create a table and GIS shapefile of facilities with SIC codes listed in the previous table within their respective TMDL watersheds using the information provided by the "Wastewater Permits Interactive Search Portal". The search results can be exported to excel and generally include SIC code information for each facility. However, if this information is not available it can also be obtained using EPA's "PCS-ICIS Search" at the following link:

https://www.epa.gov/enviro/pcs-icis-search. A search can be done using the facility's NPDES Number/ID or name under "Facility Selection" or county-wide under "Geography Search". The search results from the "Wastewater Permits Interactive Search Portal" also only include address information. EPA's "PCS-ICIS Search" will provide geographic coordinates for each facility as well. The results from the "PCS-ICIS Search" can also be exported to excel. The GIS shapefile must include the following information: (1) Facility Name, (2) Address, (3) State Number, (4) NPDES Number/ID, (5) Status (most recent) ,(6) Status Date (most recent), (7) Permit Type, (8) SIC Code, and (9) Lat/Longs.

Table 1: Major SIC Codes for NPDES Facilities potentially discharging PCBs.

Major SIC Code Group	**SIC Code Description**
2000	Food and Kindred Products
2100	Tobacco Products
2200	Textile Mill Products
2600	Paper and Allied Products
2700	Printing, Publishing and Allied Industries
2800	Chemical and Allied Products
3000	Rubber and Miscellaneous Plastics
3200	Stone,Clay, Glass and Concrete Products
3300	Primary Metal Industries
3400	Fabricated Metal Products
3600	Electronic and Other Electrical Equipment
3700	Transportation Equipment
4000	Railroad Transportation
4200	Motor Freight Transportation
4400	Water Transportation
4700	Transportation Services

4900	Electric, Gas and Sanitary Services
5000	Wholesale Trade - Durable Goods
5100	Wholesale Trade - Nondurable Goods
7600	Miscellaneous Repair Service
9700	National Security and International Affairs

5. **EPA Toxic Release Inventory (TRI) Database:** EPA's Toxic Release Inventory (TRI) tracks the management of certain toxic chemicals that may pose a threat to human health and the environment. U.S. facilities in different industry sectors must report annually how much of each chemical is released to the environment and/ or managed through recycling, energy recovery and treatment. The information submitted by facilities is compiled in the TRI. For more information on the TRI you can refer to EPA's TRI Program website at the following link: https://www.epa.gov/toxics-release-inventory-tri-program/what-toxics-release-inventory. Jurisdictions can identify TRI facilities that release PCBs using EPA's TRI online search portal at the following link: https://www.epa.gov/enviro/tri-search. A search for PCBs can be done by entering the chemical name "Polychlorinated biphenyls" or by CAS number "001226363". Jurisdictions should also search for TRI facilities with the potential for PCB releases based on their SIC code in case these facilities were not previously identified in the jurisdictions evaluation of NPDES permitted wastewater and stormwater dischargers. While unlikely, this will ensure that all active and historical facilities with the potential for PCB releases have been identified. Jurisdictions will need to create a table and GIS shapefile of the TRI facility locations within their respective TMDL watersheds using the information provided by the TRI online search portal. The search results provide geographic coordinates and can be exported in excel format. The SIC codes for facilities can be identified by first selecting the TRI Facility Report button within the search results and then selecting the FRS ID which will open a FRS Facility Detail Report that includes a table of the facility's SIC codes. SIC codes can also be entered as one of the TRI search parameters.
6. **National Response Center (NRC) Database:** The National Response Center (NRC) database records spills and accidents reported to the NRC. It tracks chemical spills, accidents involving chemicals (such as fires or explosions), oil spills, transportation accidents that involve oil or chemicals, releases of radioactive materials, sightings of oil sheens on bodies of water, terrorist incidents involving chemicals, incidents where illegally dumped chemicals have been found and drills intended to prepare responders to handle these kinds of incidents. The National Response Center is operated by the U.S. Coast Guard and has become the central point of contact for reporting many different kinds of incidents involving hazardous materials. Information from the NRC Database can be accessed on the NRC website at the following link:

https://nrc.uscg.mil/Default.aspx. The website contains annual reports from 1990 to 2021 in excel format and a data dictionary providing a description of all field names. The data dictionary has been included in the PCB Guidance Resources Package in the "5. USCG NRC Database" sub-folder within the "1. PCB Source Assessment Resources" folder. The reports will need to be downloaded as the files were too large to include in the resources package. Fields for "NRC Report Number (SEQNOS)", "County" and "State" for each incident can be found in the "Incident Commons" worksheet. A field for "Name of material" for each incident can be found in the "Material Involved" worksheet. The tables can be joined based on the "SEQNOS" field and filtered by "County", "State". Any incident involving a "Name of Material" associated with PCBs (e.g., PCB Transformer Oil, PCB Capacitor Fluid) should be filtered. Address information is also included in the "Incident Commons" worksheet. Jurisdictions will need to create a table and GIS shapefile of these incidents within their respective TMDL watersheds. The table and GIS shapefile should include the following fields: "SEQNOS", "Description of Incident", Type of Incident", "Incident Date", and all "Location" fields from the "Incident Commons" worksheet; "Amount of Material", "Unit of Measure", "If Reached Water", "Amount in Water", and "Unit of Measure in Water" from the "Material_Invovled" worksheet; and "Responsible Company", "Responsible Org Type" and all "Location" fields from the "Calls" worksheet. Geographic coordinates are not provided for all incident locations in the database. In these cases the incident locations will need to be mapped in GIS based on address information provided by the database. Information from the NRC Database can also be accessed from the Right-to-Know Network search portal at the following link: https://j4502-fs18.github.io/Right-to-Know/nrc.html. The search portal contains incident records from 1982 to 2018. Jurisdictions may also submit an application to NRC to obtain historical NRC reports through a FOIA request on the NRC website. Records may be available as far back as 1974 when the NRC began operation.

7. **MDE Historic Landfill Initiatives (HLI) Report:** The Historic Landfill Initiative was conducted by MDE to document historic landfill sites and assess the potential for further pre-remedial investigations. For the purposes of the study, the term landfill references all land disposal practices used prior to the modern age of lined sanitary landfills. These practices include open burning dumps, municipal and industrial fill areas, and rubble disposal sites. Historic landfills have the potential to contaminate groundwater and stormwater due to the disposal of PCB containing materials and equipment. The report can be found on MDE's "Historic Landfill Initiative Report" webpage at the following link: https://mde.maryland.gov/programs/land/marylandbrownfieldvcp/pages/historiclandfillinitiative.aspx. MDE's Solid Waste Program maintains historic records on 456 historical landfill sites. A table of these sites is provided in Appendix A of the report. MDE only has location information on 235 of the 456 sites which is provided in Appendix B of the report. Landfill locations from the ADC maps are displayed in Appendix E. The location information is presented either as an address or ADC map grid. The

report/appendices and a “Historic Landfills” excel file containing information on all 456 sites have been included in the PCB Guidance Resources Package in the “6. Historic Landfills” sub-folder within the “1. PCB Source Assessment Resources” folder. Jurisdictions will need to create a table and GIS shapefile of the historic landfill sites within their respective TMDL watersheds using the information provided in the “Historic Landfills” excel file. Some of the historic landfill sites may already have been identified by jurisdictions in their previous evaluation of hazardous waste sites. MDE also recommends jurisdictions use local records if available to identify the location of historic landfill sites for which location information is not provided in MDE’s “Historic Landfills” file.

8. **MDE Permitted Solid Waste Acceptance (SWA) Facilities:** MDE’s Solid Waste Management Program is responsible for assuring domestic, commercial, and non-hazardous industrial solid waste is handled properly and does not pose a risk to public health and water resources. MDE regulates Solid Waste Acceptance (SWA) facilities to ensure the proper disposal of solid waste to prevent contamination of groundwater and surface water. SWA facilities include operations such as municipal landfills, rubble landfills (construction and demolition debris), solid waste processing facilities, and solid waste transfer stations; and are permitted for Refuse Disposal (RD), groundwater discharges, and Natural Wood Waste Recycling (NWWR). For more information on SWA facility permits you can refer to MDE’s “Solid Waste Management in Maryland" webpage at the following link: https://mde.maryland.gov/programs/land/SolidWaste/Pages/index.aspx. SWA facilities have the potential to contaminate groundwater and stormwater due to the disposal, processing or transfer of PCB containing materials and equipment. Tables for SWA facilities with RD permits, closed SWA facilities, landfills with groundwater discharge permits, and NWWR facilities can be found on MDE’s “Permitted Solid Waste Facilities” webpage at the following link: https://mde.maryland.gov/programs/land/SolidWaste/Pages/PermittedFacilities.aspx. An excel file of all active permitted SWA facilities has been included in the PCB Guidance Resources Package in the “7. MDE Solid Waste Acceptance Facilities” sub-folder within the “1. PCB Source Assessment Resources” folder. Jurisdictions will need to create a table and GIS shapefile of all active and closed SWA facilities within their respective TMDL watersheds. The locations of each SWA facility will need to be mapped in GIS based on address information as the tables and the excel file do not provide geographic coordinates. Closed SWA facilities should be included as there is still the potential for PCB contamination in groundwater due to historical disposal of PCB-containing materials and equipment. The table for closed landfills does not contain any location information. MDE recommends reaching out to the contacts provided in the table if jurisdictions cannot find this information using online resources. NWWR and SWA facilities processing medical waste are unlikely to contain PCBs except for contamination due to background levels; however, they should still be included in the table and GIS

shapefiles in case the results of Phase II/III source trackdown investigations indicate that these facilities are potential sources.

9. **MDE Permitted Sewage Sludge Utilization Activities:** MDE requires a sewage sludge utilization permit for any activity involving the treatment, composting, transportation, storage, distribution land application, incineration, or disposal of sewage sludge or septage (effluent from septic tanks). Sewage sludge (also known as biosolids) is the final product of treated sewage in a wastewater treatment plant. It is composed of the fine particulate matter remaining after treatment of wastewater. For more information on sewage sludge utilization you can refer to MDE's "Resource Management Program" webpage at the following link: https://mde.maryland.gov/programs/land/RMP/Pages/index.aspx. The land application of sewage sludge in agricultural practices returns essential nutrients to the soil, adds organic matter, and can improve the tillability and moisture retention capability of the soil. However, sewage sludge may contain elevated levels of organic contaminants including PCBs, due to their presence in wastewater and accumulation in sewage sludge during treatment, which would be reintroduced into the environment through these permitted activities resulting in potential contamination of groundwater and stormwater. For more information on PCB contamination in wastewater and sewage sludge you can refer to the following studies: UMBC's "Four decades since the ban, old urban wastewater treatment plant remains a dominant source of PCBs to the environment" at the following link: https://www.sciencedirect.com/science/article/abs/pii/S026974911834168X, and TetraTech's "Assessing Benefits of Wastewater Treatment Plant Nutrient Control Upgrades on Toxic Contaminants" at the following link: https://cbtrust.org/wp-content/uploads/14564_Assessing-Benefits-of-Wastewater-Treatment-Plant-Nutrient-Control-Upgrades.pdf. These articles have been included in the PCB Guidance Resources Package in the "8. MDE Sewage Sludge Utilization Facilities" sub-folder within the "1. PCB Source Assessment Resources" folder. The permit does require that PCB concentrations in sewage sludge be lower than 10 ppm for land application. This threshold is relatively high considering the impact low level concentrations of PCBs have on bioaccumulation in fish and the potential impact on human health from fish consumption. Therefore, sewage sludge activities even when permitted still have the potential for contamination of groundwater and stormwater. An excel file of active sewage sludge utilization permits has been included in the PCB Guidance Resources Package in the "8. MDE Sewage Sludge Utilization Facilities" sub-folder within the "1. PCB Source Assessment Resources" folder. Jurisdictions will need to create a table and GIS shapefile of sewage sludge utilization activities within their respective TMDL watersheds. Geographic coordinates for the location of the permitted activities are provided in the excel file. At this time, MDE cannot release location information for permitted activities at facilities that are privately owned (e.g., farms). The information provided by MDE will be sufficient for the purposes of the PCB Source Assessment and source trackdown investigations.

10. **Public Angler Access Sites:** MDE requests that jurisdictions consult the Maryland Department of Natural Resources (MDDNR) Fishing and Boating Services Anglers Access Map during their planning. This product is an interactive GIS map of public fishing locations and access points. There is no publicly accessible, nontidal fishery in Maryland that does not receive a fair amount of fishing pressure. MDDNR Regional Managers can provide specific information if there are PCB hotspot issues. John Mullican, Field Operations Manager, Freshwater Fisheries and Hatcheries Division, Fishing and Boating Services, Department of Natural Resources is the primary contact at MDDNR. John can be contacted at john.mullican@maryland.gov. Jurisdictions need to consider the location of tidal and non-tidal public access sites for recreational anglers in their respective TMDL watersheds. Accessibility to fishing increases the potential for impacts from fish consumption at these locations, especially within the subsistence fishing population. While impairment listings are generally for estuaries, not all non-tidal streams have been evaluated for PCB levels in fish. Therefore these streams could potentially have levels of concern in fish consumed by recreational and subsistence anglers. Information on public angler access sites can be found on DNR's Public Angler Access Online map at the following link: https://gisapps.dnr.state.md.us/coastalatlas2019/PublicFishingAccess/. A GIS shapefile of this information is not currently available. Jurisdictions will need to create a table and GIS shapefile based on the information provided in the online map for their respective TMDL watersheds. The online map provides geographic coordinates for each site.
11. **Sanitary Sewer Overflows (SSOs):** Sanitary sewer overflows (SSOs) are the unauthorized discharge of untreated or partially treated sewage from a sanitary sewer system. SSOs may occur due to issues such as blockages in the sewer system, overloading from stormwater inflow and groundwater infiltration, and pumping equipment failure. SSOs adversely impact water quality and pose a risk to public health from sewage containing elevated levels of bacteria and disease causing pathogens. SSOs may also discharge significant levels of PCBs due to their presence in untreated or partially treated sewage. For more information on SSOs you can refer to EPA's "Sanitary Sewer Overflow Overview" webpage at the following link: https://www.epa.gov/npdes/sanitary-sewer-overflows-ssos. MDE has maintained a record of SSOs since 2005 in a "Maryland Reported Sewer Overflow Database". The database also includes information on bypasses and combined sewer overflows (CSOs). While these releases are intentional by design, they still have the potential to discharge PCBs. MDE requires that all public sewer system owners and operators report overflows. Jurisdictions can access this information on MDE's "Maryland Reported Sewer Overflow Database" online search portal at the following link: https://mde.maryland.gov/programs/water/compliance/pages/reportedseweroverflow.aspx Jurisdictions will need to create a table and GIS file of all SSOs, CSOs, and bypasses from 2005 to the present within their respective TMDL watersheds. Results from the search portal can be exported to an excel file. Locations of the overflow events may

need to be mapped in GIS based on address information as the database does not provide geographic coordinates for all overflow events.

12. **Military Installations:** Military installations have been known historically to use a significant amount of PCB containing electrical and hydraulic equipment and PCB containing materials (e.g., sealants, paints, fire retardants). These facilities have the potential to contaminate groundwater and stormwater with PCBs. A GIS shapefile of all military installations, ranges, and training areas within Maryland has been included in the PCB Guidance Resources Package in the "9. Military Installations" sub-folder within the "1. PCB Source Assessment Resources" folder. A GIS shapefile of all U.S. military installations can also be found on the "data.gov" website at the following link: https://catalog.data.gov/dataset/military-installations-ranges-and-training-areas. The majority of these installations fall under a NPDES Phase II MS4 Federal Facility Permit. A GIS shapefile of all Maryland Federal Facilities including military installations has been included in the PCB Guidance Resources Package in the "10. Federal Facilities" sub-folder within the "1. PCB Source Assessment Resources" folder. The shapefile identifies which facilities have a NPDES Phase II MS4 Federal Facility permit which can be used as supplemental information to identify the permitted and unpermitted installations. A GIS shapefile of all federal facilities in the Chesapeake Bay watershed can also be found on the "data.gov" website at the following link: https://data-chesbay.opendata.arcgis.com/datasets/ChesBay::federal-lands-2017-cast/about. Jurisdictions will need to create a table and GIS shapefile of the military installations, ranges, and training areas within their respective TMDL watersheds. Some of these military facilities may already have been identified by jurisdictions in their previous evaluation of hazardous waste sites.
13. **Land use (PCB Era Development):** Buildings constructed or renovated during the PCB manufacturing era (1929-1979) will commonly have PCB containing building materials (e.g., caulking, paints) and PCB containing electrical equipment (e.g., transformers). These properties have the potential to contaminate stormwater and groundwater due to leakage and failure of PCB containing electrical equipment, precipitation coming into contact with PCB containing building materials, and volatilization from these materials which may result in localized soil contamination. Additional information on PCB containing building materials and equipment can be found in EPA's "PCBs in Building Materials Q&A" document at the following link: https://www.epa.gov/sites/default/files/2016-03/documents/pcbs_in_building_materials_questions_and_answers.pdf and Oregon Department of Environmental Quality's Fact Sheet on sources of PCBs at the following link: https://www.oregon.gov/deq/FilterDocs/ph-SourcePCBs.pdf. Jurisdictions will need to create a GIS shapefile of PCB era development within their respective TMDL watersheds using a combination of the Maryland Department of Planning (MDP) 2010 Land Use/Land Cover and MD Property View GIS shapefiles which can be accessed on the MDP's Open Data GIS download website at the following link: https://planning.maryland.gov/Pages/OurProducts/downloadFiles.aspx. Jurisdictions will

need to categorize PCB era development (1929-1979) by urban land use type (i.e., industrial, commercial, institutional, high, medium, and low density residential, and extractive). The GIS shapefile should also include non-PCB era development urban land uses and non-urban land uses (i.e., agriculture, forest, water, wetlands). Information on MDP land use classifications can be found in MDP's "Land Use/Land Cover Classification Definitions" document at the following link: https://planning.maryland.gov/Documents/OurProducts/landuse/AppendixA_LandUseCategories.pdf. The MD Property View GIS shapefiles contain information on when properties were developed. The MDP Land use/Land Cover and previously referenced documents have been included in the PCB Guidance Resources Package in the "11. Land Use" sub-folder within the "1. PCB Source Assessment Resources" folder. The MD Property View GIS shapefiles will need to be downloaded as the files were too large to include in the resources package.

Desktop analysis to identify sources of PCBs for Phase II source trackdown investigations

Jurisdictions will need to evaluate the following resources in TMDL subwatersheds requiring Phase II source trackdown investigations. This information *will be used to inform sampling design* and is not necessary for the PCB Source Assessment, Subwatershed Prioritization Strategy, or Phase I source trackdown investigations. Mapping of outfall locations for potential PCB sources (e.g. NPDES wastewater and stormwater dischargers) is also not necessary for the PCB Source Assessment; however, this information will also be useful to inform sampling design in Phase II source trackdown investigations. MDE will work with jurisdictions to identify outfall locations of potential PCB sources when this information is not accessible through the data resources provided by MDE. An evaluation of the resources listed in this section will also need to be completed for TMDL subwatersheds where sampling during Phase I source trackdown investigations is not feasible. Further details will be provided in subsequent sections on source trackdown investigations.

1. **NPDES Phase I MS4:** Jurisdictions will need to create GIS shapefiles of the MS4 (i.e., outfalls, BMPs, and storm sewersheds) and impervious surfaces within their respective TMDL subwatersheds requiring Phase II source trackdown investigations and overlay them with all potential PCB sources identified in the source assessment. The location and magnitude of potential PCB sources within storm sewersheds with high imperviousness draining to specific outfalls and BMPs, could inform sampling design in Phase II source trackdown investigations. Jurisdictions may choose to enhance in-stream characterization with targeted monitoring at these locations where there is greater potential for stormwater discharges of PCBs. A comprehensive map of the storm sewer pipe network, inlets, and access points will also be necessary for designing a sewer trackback investigation under Phase III source trackdown investigations. The Phase I

MS4 permits require that jurisdiction create a geodatabase of the storm drain system including all infrastructure, major outfalls, inlets, and associated drainage areas and a GIS shapefile of impervious surfaces under the source identification component (Section C.) of the Phase I MS4 permit. Therefore, this information should already be readily accessible to the jurisdictions. If a GIS shapefile of impervious surfaces has not been completed, jurisdictions can create one using the 2013/2014 Chesapeake Conservancy land cover GIS dataset which can be accessed on the Chesapeake Conservancy Land Cover Data Project website at the following link: https://www.chesapeakeconservancy.org/conservation-innovation-center/high-resolution-data/land-cover-data-project/ GIS data impervious area. Information on the land cover classifications can be found in Chesapeake Conservancy's "2013/2014 Mapped 1-meter Resolution Land Cover Classes" document at the following link: https://www.chesapeakeconservancy.org/wp-content/uploads/2020/03/LC_Class_Descriptions.pdf. The GIS shapefile can be categorized by merging the following land cover classifications for pervious surfaces (1-6) and impervious surfaces (7-12). The document has been included in the PCB Guidance Resources Package in the "12. Impervious Surface" sub-folder within the "1. PCB Source Assessment Resources" folder. The Land Cover GIS dataset will need to be downloaded as the file was too large to include in the resources package.

2. **Aerial Imagery:** Jurisdictions will be required to overlay aerial imagery with all potential PCB sources identified in the source assessment for TMDL subwatersheds requiring Phase II source trackdown investigations. The objective is to identify potential illicit sources of PCBs (e.g., waste piles, junk yards) that would not have been identified through the source assessment. The location of these potential sources could inform sampling design in Phase II source trackdown investigations. Jurisdictions may choose to enhance in-stream characterization with targeted monitoring at these locations where there is greater potential for contamination of groundwater and stormwater. Imagery can be accessed from MD's GIS Data Catalog under the "Imagery" data category at the following link: https://data.imap.maryland.gov/ or the Maryland Statewide Imagery Download Tool at the following link: https://imagery.geodata.md.gov:8443/ExpressZip. These sites provide access to the 2018 National Agriculture Imagery Program (NAIP) aerial imagery and 2017 & 2020 Maryland Six Inch Resolution Aerial Imagery. The same imagery data can also be added directly to GIS platforms through ArcGIS online. Jurisdictions are free to use alternative high resolution imagery data resources to the options provided by MDE.
3. **Construction Activities:** Construction activities have the potential to contaminate stormwater from the redevelopment or renovation of properties that were previously constructed during PCB era development. MDE's Draft 2020 General Permit for "Stormwater Associated with Construction Activity" will include new PCB control requirements for the demolition of properties developed or renovated during PCB era development. Controls will be implemented to minimize exposure of PCB containing building materials and equipment (e.g., sealants, paints, fluorescent light ballasts) to

precipitation and stormwater and ensure proper disposal of these materials. However, the permit does not directly address the disturbance of soils potentially contaminated with PCBs during construction activities which could also result in the contamination of stormwater. Sediment control practices that remain in place post-development could continue to be an ongoing source of PCBs as well. The draft permit can be accessed at the following link: https://mde.maryland.gov/programs/water/wwp/Documents/20CP-TD/20CP-TD-Permit.pdf. The final permit is expected to be issued during the summer of 2022. These permits are also only applicable to construction activities that disturb more than one or more acres of land. MDE does not currently have an online search portal for jurisdictions to access information on current or historical general permits for construction activities. MDE recommends jurisdictions create a table and GIS shapefile of construction activities by accessing local construction permit information if available to identify construction activities within the past 5 years at properties originally built or renovated during PCB era development in TMDL subwatersheds that require Phase II source trackdown investigations. This information could be useful to inform sampling design or indicate that these activities are potential sources of PCB contamination based on the findings of the Phase II investigations. MDE understands it may not be feasible to incorporate this information into the process due to the short term impact that construction activities may pose for PCB contamination of stormwater. However, any information that leads to the identification of construction activities as potential sources of PCBs could also provide additional weight of evidence for bolstering PCB control requirements in the general permit. Construction activities are more than likely to occur in areas where sampling is conducted during Phase II and III investigations. It would be beneficial to the jurisdictions to be aware of these activities when evaluating the results of the investigations.

4. **Electrical Power Transmission Networks:** Electrical power transmission networks use PCB-containing equipment (e.g., transformers, capacitors) in the transmission and distribution of electrical power to consumers such as industrial, commercial and residential properties, telecommunications networks, and transportation systems (e.g., railways, mass-transit). This equipment can be located at electrical power plants, substations and as distribution transformers on electric poles, on above-ground concrete pads, and in underground vaults. Any currently active electrical equipment produced during the PCB era still has the potential to contain PCBs and pose a risk for contamination of groundwater and stormwater when compromised due to leakage or failure. PCB era equipment that has been replaced may have released PCBs in the past resulting in soil contamination that may still pose a risk for contamination of groundwater and stormwater. Additional details on PCB containing transformers were provided in the previous section on the EPA PCB Transformer Registry Database. Jurisdictions should already have identified the location of active and historical electrical power plants in their previous search of NPDES industrial wastewater and stormwater dischargers. A GIS shapefile of substation locations under the Homeland Infrastructure Foundation-Level Data (HIFLD) can be accessed on the U.S Energy Information Administration (EIA)

website at the following link: https://hifld-geoplatform.opendata.arcgis.com/datasets/electric-substations/explore?location=39.338024%2C-76.604297%2C10.60, and a GIS shapefile of power transmission lines can also be accessed on the US EIA website at the following link: https://hifld-geoplatform.opendata.arcgis.com/datasets/electric-power-transmission-lines/explore?location=39.516913%2C-76.796924%2C9.57. The shapefiles have been included in the PCB Guidance Resources Package in the "13. Electrical Power Transmission Network" sub-folder within the "1. PCB Source Assessment Resources" folder. Jurisdictions will need to create GIS shapefiles of the electrical power plants and substations within their respective TMDL subwatersheds requiring Phase II source trackdown investigations. The location of the electrical power plants and substations could inform sampling design in Phase II of the source trackdown investigations or indicate that these activities are potential sources of PCB contamination based on the findings of the Phase II investigations. Jurisdictions may choose to enhance in-stream characterization with targeted monitoring at these locations where there is greater potential for contamination of groundwater and stormwater. MDE does not currently have access to GIS shapefiles with the location of active PCB era transformers other than what is provided in the EPA PCB Transformer Registry Database. MDE recommends that jurisdictions contact local utilities to see if this information is available. While MDE understands it may not be likely that a jurisdiction will be able to link PCB contamination to a single transformer based on the findings of Phase II source trackdown investigations, the information could still be useful in identifying areas with greater density of transformers that in combination could indicate a more significant source of PCB contamination within a storm sewershed.

5. **State and Federal Facilities (non-military):** Jurisdictions will be required to create GIS shapefiles of all State and Federal Facilities (non-military) within their respective TMDL subwatersheds requiring Phase II source trackdown investigations. The majority of the non-military federal facilities fall under a NPDES Phase II MS4 Federal Facility Permit. A GIS shapefile of all Maryland Federal Facilities has been included in the PCB Guidance Resources Package as stated previously in the "Military Installation" section. The shapefile identifies which facilities have a NPDES Phase II MS4 Federal Facility permit, and can be used as supplemental information to identify the permitted and unpermitted facilities. A GIS shapefile of all federal facilities in the Chesapeake Bay watershed can also be found on the "Data.gov" website at the following link: https://data-chesbay.opendata.arcgis.com/datasets/ChesBay::federal-lands-2017-cast/about. A GIS shapefile for the Phase II MS4 State Facility regulated areas has also been included in the PCB Guidance Resources Package in the "14. NPDES Phase II MS4 State Facilities " sub-folder within the "1. PCB Source Assessment Resources" folder. This shapefile only provides the areas covered under these permits and does not delineate between the individual facilities. However, this is sufficient for the purposes of this analysis. MDE will work on providing the specific information in the future. This information could be

useful to inform sampling design or indicate that these facilities are potential sources of PCB contamination based on the findings of the Phase II investigations.

6. **NPDES Phase II MS4 Municipalities:** Jurisdictions will be required to create GIS shapefiles of NPDES Phase II MS4 Municipalities within their respective TMDL subwatersheds requiring Phase II source trackdown investigations and overlay them with all potential PCB sources identified in the source assessment. A GIS shapefile for Phase II MS4 municipalities has been included in the PCB Guidance Resources Package in the "15. NPDES Phase II MS4 Municipalities" sub-folder within the "1. PCB Source Assessment Resources" folder. The location and magnitude of potential PCB sources within storm sewersheds of the Phase II MS4 municipal areas draining to specific outfalls and BMPs, could inform sampling design in Phase II of the source trackdown investigations. Jurisdictions may choose to enhance in-stream characterization with targeted monitoring at these locations if there is greater potential for stormwater discharges of PCBs. While the jurisdictions will not be required to conduct source trackdown investigations within the storm sewer system regulated under Phase II MS4 municipalities, the findings of the Phase II investigation could indicate potential PCB sources at these locations requiring the permitted entities to conduct further investigations.
7. **NPDES Phase I MS4 State Highways Administration (SHA) infrastructure**: Jurisdictions will be required to create GIS shapefiles of Phase I MS4 SHA infrastructure within their respective TMDL subwatersheds requiring Phase II source trackdown investigations and overlay them with all potential PCB sources identified in the source assessment. A GIS shapefile for Phase I MS4 SHA infrastructure has been included in the PCB Guidance Resources Package in the "16. NPDES Phase I MS4 SHA Infrastructure" sub-folder within the "1. PCB Source Assessment Resources" folder. This shapefile only provides the areas covered under these permits and does not delineate between the individual SHA facilities and roadway infrastructure. However, this is sufficient for the purposes of this analysis. MDE will work on providing the specific information in the future. The location and magnitude of potential PCB sources within storm sewersheds of Phase I MS4 SHA areas draining to specific outfalls and BMPs, could inform sampling design in Phase II of the source trackdown investigations. Jurisdictions may choose to enhance in-stream characterization with targeted monitoring at these locations if there is greater potential for stormwater discharges of PCBs. While the jurisdictions will not be required to conduct source trackdown investigations within the storm sewer system regulated under the Phase I MS4 SHA permit, the findings of the Phase II investigation could indicate potential PCB sources at these locations requiring the permitted entities to conduct further investigations.
8. **Rail Transportation Network:** Similar to electrical power transmission networks, rail transportation networks use PCB-containing electrical equipment (e.g., transformers, capacitors) in the distribution of electrical power to electric locomotives and self-propelled railcars. The rail transportation network uses on-board transformers and stationary transformers at substations. Railcars also use capacitors for systems including

air brake controls and interior lighting. Other electrical equipment used in railway systems include electro-magnets and switches. For more information you can refer to Urban Mass Transport Administration's (UMTAs) "Polychlorinated Biphenyls (PCBs) in Transit Systems Electrical Equipment" document at the following link: https://rosap.ntl.bts.gov/view/dot/11961. Any currently active electrical equipment produced during the PCB era still has the potential to contain PCBs and pose a risk for PCB contamination of groundwater and stormwater when compromised due to leakage or failure. PCB contamination may occur anywhere along railway lines, at substations, or at railyards where locomotives and railcars undergo service and maintenance. PCB era equipment that has been replaced may have released PCBs in the past resulting in soil contamination that may still pose a risk for PCB contamination of groundwater and stormwater. Jurisdictions should have already identified the location of active and historical railyards in their previous search of NPDES industrial wastewater and stormwater dischargers. A GIS shapefile of National Rail Lines can be found on the "Data.gov" website at the following link: https://catalog.data.gov/dataset/tiger-line-shapefile-2019-nation-u-s-rails-national-shapefile. The shapefile and previously referenced documents have been included in the PCB Guidance Resources Package in the "17. Rail Transportation Network" sub-folder within the "1. PCB Source Assessment Resources" folder. Jurisdictions will need to create GIS shapefiles of the rail lines and railyards for their respective TMDL subwatersheds requiring Phase II source trackdown investigations. The location of the railyards and rail lines could inform sampling design in Phase II of the source trackdown investigations or indicate that these activities are potential sources of PCB contamination based on the findings of the Phase II investigations. Jurisdictions may choose to enhance in-stream characterization with targeted monitoring at these locations where there is greater potential for PCB contamination of groundwater and stormwater.

9. **Dredging Activities & Dredged Material Placement Sites:** Dredging activities have the potential to resuspend PCB contaminated sediments as well as expose buried sediments containing even higher levels of PCBs due to historical releases. The disposal of dredged material at placement sites and through land application also has the potential to reintroduce PCBs into the environment through contamination of groundwater and stormwater. MDE's Wetlands and Waterways Program oversees the permitting of all dredging activities. Jurisdictions can access permit information on MDE's "Wetlands and Waterways Permits Interactive Search Portal" at the following link: http://mdewin64.mde.state.md.us/ECollaboration/SearchPortal.aspx. Searches can be filtered using the dropdown search fields by "County" and "Work Description". Jurisdictions can look up "Dredging" and "Dredged Material Placement Sites" under the "Work Description" search field. Jurisdictions will need to create a table and GIS shapefile of all dredging activities and dredged material placement sites for their respective TMDL subwatersheds requiring Phase II source trackdown investigations. The location of dredging activities and dredged material placement sites could inform sampling design in Phase II of the source trackdown investigations or indicate that these

activities are potential sources of PCB contamination based on the findings of the Phase II investigations.. Jurisdictions may choose to enhance in-stream characterization with targeted monitoring at these locations where there is greater potential for PCB contamination of groundwater and stormwater. When selecting "More Info" in the search results for an individual permit a link is generally provided for a map of its location in MDE's "Watershed Resources Registry" Online Map and the permit application screening form. Both resources provide geographic coordinates for the activity. The online map can also be accessed at the following link: https://watershedresourcesregistry.org/map/?config=stateConfigs/maryland.json&screening=on. Results from the search portal can be exported to an excel file. Locations of the dredging activities and placement sites can also be mapped in GIS based on address information provided by the search portal. Information on dredged material placement and land application sites are generally not provided in the "search portal" and can only be found in the dredging activity permits which are not accessible to the jurisdictions. MDE will be able to provide this information to the jurisdictions. The table of dredging activities will also need to include tidal dredging activities within the impaired tidal waterbody as the dredged materials may be disposed of at sites within the TMDL watershed. Tidal dredging activities will also be useful for informational purposes in identifying potential disturbances of PCB contaminated sediments in the estuaries even if the information is not used directly for the subwatershed prioritization and PCB source trackdown investigations.

10. **Non-permitted Industrial Wastewater and Stormwater Dischargers:** Industrial facilities that discharge wastewater or stormwater to surface water or groundwater are required to obtain the appropriate NPDES permits to ensure discharges do not impact water quality based on Federal regulations under the Clean Water Act (CWA). For more information you can refer to EPA's "NPDES" webpage at the following link: https://www.epa.gov/npdes. There is the potential that industrial facilities may be operating without the necessary NPDES permits. The Phase I MS4 permits require that jurisdictions identify industrial and commercial sources and create a geodatabase under the source identification component (Section C.) of the Phase I MS4 permit. If this has not been completed, MDE recommends that jurisdictions access local business licensing information to identify industrial facilities that are operating without a NPDES permit in case one is required due to the illicit discharge of wastewater or stormwater. Jurisdictions can contact local government permits and inspection departments to see if this information is available. A list of departments can be found at the following link: https://msa.maryland.gov/msa/mdmanual/01glance/html/permloc.html. Industrial facilities with the potential to discharge PCBs can be identified based on the SIC codes associated with their business licenses. If business licenses only provide NAICS codes, the corresponding SIC codes can be looked up using the NAICS Association's "NAICS and SIC Crosswalks" search portal at the following link: https://www.naics.com/naics-to-sic-sic-to-naics-crosswalks/. This information can be compared with the NPDES permitted facilities that have already been identified to determine which ones are

unpermitted. Jurisdictions will need to create a table and GIS shapefile of the non-permitted industrial facilities with the potential to discharge PCBs in their stormwater or wastewater. This information will also be useful for MDE in order to require that these facilities obtain the necessary NPDES permits for operation. MDE also recommends that jurisdictions identify historical non-permitted industrial wastewater and stormwater dischargers that were active during the PCB era (1929-1979), using business licensing information if available, as there is still the potential for stormwater or groundwater discharges of PCBs due to legacy contamination at these sites.

Subwatershed Prioritization Strategy

In order to aid jurisdictions in the identification and prioritization of TMDL subwatersheds that may require source trackdown investigations, a TMDL subwatershed risk assessment will be applied to determine which subwatersheds have the greatest potential for PCB contamination based on the number of potential PCB sources identified in the PCB Source Assessment. The risk assessment will inform jurisdictions as to which TMDL subwatersheds should be prioritized for source trackdown investigations as well as identify TMDL subwatersheds that may not require source trackdown investigations if it is unlikely sources of PCBs are present that would require remediation or controls.

Jurisdictions will apply a TMDL subwatershed risk assessment based on an approach developed for Howard County's PCB TMDL Restoration Plan for the Patuxent River (April 2020). For more information on Howard County's approach you can refer to Appendix D of the Restoration Plan document, which has been included in the PCB Guidance Resources Package in the "2. Howard County PCB TMDL Restoration Plan" folder. The risk assessment presented in this guidance has been slightly modified from Howard County's approach. As with the application of the datasets identified in the prior section, if jurisdictions alter the assessment approach presented here, the rationale for doing so should be documented and presented to MDE.

The relative risk of PCB contamination for each TMDL subwatershed is based on: (1) the number of potential PCB sources identified in the PCB Source Assessment, and (2) level of PCB contamination risk associated with each PCB source category. The risk for each PCB source category is assessed based on a tiered approach using best professional judgment. Three tiers have been assigned based on individual source categories having a "high", "medium", or "low" potential for release of PCB contamination in wastewater, stormwater, or groundwater. The following risk values are assigned for each tier:

Tier 1 PCB Sources - 10 points
Tier 2 PCB Sources - 5 points
Tier 3 PCB Sources - 1 point

The overall risk score for each TMDL subwatershed can be calculated using the following equation:

$$S = (10 \times T1) + (5 \times T2) + (1 \times T3)$$

S = TMDL Subwatershed Risk Score
T1 = Number of Tier 1 PCB Sources
T2 = Number of Tier 2 PCB Sources
T3 = Number of Tier 3 PCB Sources

Urban land use associated with PCB era development, one of the PCB source categories evaluated in the PCB Source Assessment, will not be incorporated as a parameter within the risk assessment equation. Instead it will be evaluated along with the overall risk scores when prioritizing TMDL subwatersheds for source trackdown investigations.

A "TMDL Subwatershed Risk Assessment " excel spreadsheet will be provided by MDE for jurisdictions to conduct the risk analysis. The excel spreadsheet is included in the PCB Guidance Resources Package in the "3. TMDL Subwatershed Risk Assessment" folder. The excel spreadsheet includes a "TMDL Subwatershed Risk Table" worksheet, "NPDES Discharger Risk Table" worksheet, and "TMDL Subwatershed Ranking Table" worksheet. Jurisdictions will need to create these tables for their respective TMDL watersheds.

The "TMDL Subwatershed Risk Table" worksheet allows jurisdictions to calculate the risk score for the number of sources within each PCB source category identified in the PCB Source Assessment and the overall score for each TMDL subwatershed. The worksheet provides the tier and risk value assigned to each PCB source category. The "NPDES Discharger Risk Table" worksheet allows jurisdictions to calculate the total risk score for all NPDES dischargers within a TMDL subwatershed. The worksheet provides the tier and risk values assigned to NPDES permitted wastewater and stormwater dischargers by Major SIC Code groups with the potential to discharge PCBs. The total score will need to be entered into the "TMDL Subwatershed Risk Table" worksheet. The risk calculation for NPDES dischargers is done separately from the other PCB source categories as there are far too many Major SIC groups and permit types to include these calculations in the "TMDL Subwatershed Risk Table" worksheet.

The "TMDL Subwatershed Ranking Table" worksheet allows jurisdictions to enter risk scores for all TMDL subwatersheds and rank them in order to identify and prioritize TMDL subwatersheds with the greatest potential for PCB contamination that may require source trackdown investigations. The PCB era urban land use parameter is evaluated in this worksheet along with the overall risk scores to inform TMDL ranking and subwatershed prioritization. The non-PCB era urban land use and non-urban land use parameters will also be included in the worksheet to aid in identifying TMDL subwatersheds that may not require source trackdown investigations.

Multi-phase Source Trackdown Investigation

Quick Take: Do jurisdictions need to perform a watershed-wide Phase I PCB Subwatershed Screening of all subwatersheds before proceeding to Phase II, or can they move straight to Phase II based on the subwatershed risk scores from on desktop analysis?

The sections for the Subwatershed Prioritization Strategy and Phase I Source Trackdown Investigations (Subwatershed PCB Screening) explain the process in detail. The subwatershed risk assessment should be completed first to identify subwatersheds with greater potential to contribute PCBs; however, the PCB subwatershed screening will need to be done for all subwatersheds to confirm that PCBs are present using real data. Both steps will inform prioritization.

Subwatershed PCB Screening (Phase I Source Trackdown Investigations)

Phase I source trackdown investigations will require jurisdictions to conduct a subwatershed PCB screening within their respective TMDL watersheds to confirm the presence of PCBs at levels of concern within individual subwatersheds indicating the need for further investigation to identify discrete sources of PCBs. The PCB Source Assessment and Subwatershed Prioritization Strategy can only demonstrate the *potential* for sources of PCBs within TMDL subwatersheds. Subwatersheds identified as having many potential PCB sources, and assigned a high risk score through the Subwatershed Prioritization Strategy could potentially have insignificant levels of PCBs. Whereas subwatersheds identified with few or no potential PCB sources, and assigned a low risk score could have significant levels of PCBs. The subwatershed PCB screening data along with information provided by the PCB Source Assessment and Subwatershed Prioritization Strategy will determine whether subwatersheds will, or will not require further source trackdown investigations and also inform jurisdictions as to which subwatersheds to prioritize source trackdown investigations. In order to focus resources on subwatersheds with greater potential for significant sources of PCBs. If the subwatershed PCB screening establishes that PCB levels are insignificant within a subwatershed, indicating that no significant sources of PCBs exist, then further source trackdown investigations may not be required.

Monitoring design approach for subwatershed PCB screening

Subwatershed PCB screening will require a single monitoring site at the outlet of each subwatershed. The monitoring site location must be representative of the entire drainage area of the subwatershed, not be tidally influenced, and capture all potential sources within the subwatershed.

Two reference sites per TMDL watershed will be required for PCB screening to establish background levels of PCBs. Reference sites may be located within any portion of a subwatershed where no urban development or potential source of PCBs are present as identified through the PCB Source Assessment. Reference sites must be located in perennial streams with sufficient flow where PCB levels should only be influenced by background concentrations due to atmospheric deposition. Two reference sites are required in case the drainage area for one of the two sites contains illicit sources (e.g., illegal dumping) that could not be identified through the PCB Source Assessment resulting in elevated PCB levels that are not representative of background concentrations. If this occurs, the PCB concentration data from that reference site will not be used to establish background levels.

Presence of agriculture, roadways, and post PCB-era residential development is acceptable if there are no locations without urban development. If necessary, reference sites can be placed in an adjacent watershed if no acceptable locations are present within the TMDL watershed.

Subwatershed PCB screening will require that a single passive sampler (polyethylene (PE) or alternative polymer strip) be deployed in the water column for a 3-month period at each subwatershed outlet. Guidelines for using passive samplers can be found at the following link: https://semspub.epa.gov/work/HQ/100000146.pdf. The guidelines have been included in the PCB Guidance Resources Package in the "4. Passive Sampler Guidelines" folder. Subwatersheds that contain a boundary between two jurisdictions may require that the downstream jurisdiction place a passive sampler at the boundary, unless working collaboratively on Phase I source trackdown investigations with the upstream jurisdiction.

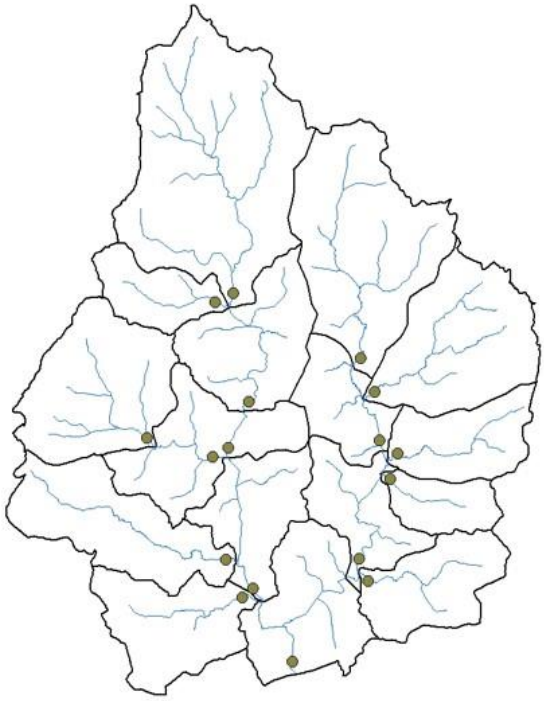
Multiple subwatersheds within a connected drainage area may also be aggregated for screening purposes if the PCB Source Assessment and Subwatershed Prioritization Strategy do not indicate the potential for PCB sources within these subwatersheds. However, if the findings of the initial screening demonstrate significant levels of PCBs, then further screening would be required to identify which subwatersheds will require further source trackdown investigations.

MDE requires a low detection level congener based method for all water column analyses. MDE recommends using EPA Method 1668. More information on the most recent version of this method (1668C) can be found at the following link: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.epa.gov/sites/default/files/2015-09/documents/method_1668c_2010.pdf. The document has been included in the PCB Guidance Resources Package in the "5. EPA Method 1668" folder. If a jurisdiction chooses to use an alternative method, MDE must determine if the method is acceptable for the purpose of these investigations.

Aroclor based methods (e.g. EPA Method 608, 8082A) will not be suitable for PCB screening of the water column as they may be insufficient for measuring PCBs due to their higher method detection limits. PCB levels must be measurable in all samples in order to successfully conduct data analysis and assessment.

Jurisdictions will be required to provide a SAP and QAPP for Phase I source trackdown investigations (Subwatershed PCB screening monitoring survey) and a Phase I source trackdown monitoring data report (Subwatershed PCB screening monitoring data) as previously outlined in the "Permit Term Deliverables" section.

Figure 1: An example figure of monitoring station locations for Subwatershed PCB screening monitoring sites.



Jurisdictions will conduct a subwatershed PCB screening data assessment to determine which subwatersheds will and will not require further source trackdown investigations. The assessment will also inform jurisdictions as to which subwatersheds to prioritize source trackdown investigations in order to focus resources on subwatersheds with greater potential for significant sources of PCBs.

Subwatershed monitoring site PCB concentration data will be compared with a reference threshold and TMDL water column endpoint to determine whether subwatersheds will or will not require further source trackdown investigations. The mean of the reference site concentration data should be applied as the reference threshold for comparison. The "TMDL subwatershed ranking table" worksheet of the "TMDL Subwatershed Risk Assessment" excel

spreadsheet includes columns for entering the subwatershed PCB concentration data and indicating whether PCB concentrations exceed the reference threshold or TMDL endpoint. Subwatershed monitoring sites with PCB concentrations at or below the reference threshold are an indication that there are no significant sources of PCBs within the subwatersheds. Therefore, further source trackdown investigation will not be required in these subwatersheds.

Subwatershed monitoring sites with PCB concentrations at or above TMDL water column endpoints are an indication that there are significant sources of PCBs within the subwatersheds. Therefore, further source trackdown investigations will be required in these subwatersheds.

For subwatershed monitoring sites with PCB concentrations above reference thresholds, but below TMDL water column endpoints, there can be no definitive determination as to whether there are significant sources of PCBs within the subwatershed. While passive samplers analyze the freely dissolved portion of the total PCB concentration, the TMDL water column endpoints are derived based on total PCB concentrations (i.e., dissolved organic carbon (DOC) bound PCBs, particulate organic carbon (POC) bound PCBs, and freely dissolved PCBs). Therefore, it is possible that the total PCB concentration containing the freely dissolved portion measured through passive sampling could exceed the TMDL water column endpoint. In these cases, MDE will determine whether these subwatersheds can be ruled out for further source trackdown investigations based on the existing data and information provided by the PCB Source Assessment, or if additional sampling may be required. As these subwatersheds will be ranked lower under the prioritization strategy, jurisdictions should focus resources on subwatersheds with the highest rankings.

For subwatersheds located downstream of other subwatersheds, an evaluation of the PCB concentration data between the two subwatershed monitoring sites must also be considered to determine whether there are significant sources of PCBs present within the downstream subwatershed, upstream subwatershed, or both. For example, if a downstream subwatershed PCB concentration is at or below the upstream subwatershed PCB concentration (even if the concentration is above the TMDL water column endpoint), and the PCB Source Assessment has not identified potential sources of PCBs, it is likely there are no significant sources of PCBs within the downstream subwatershed. Therefore, further source trackdown investigation may not be required in these subwatersheds.

Once a jurisdiction has identified which subwatersheds will require further source trackdown investigations, an assessment of the subwatershed PCB screening data along with information provided by the PCB Source Assessment and Subwatershed Prioritization Strategy will inform jurisdictions as to which subwatersheds to prioritize source trackdown investigations. This will allow jurisdictions to focus resources on subwatersheds with greater potential for significant sources of PCBs. Jurisdictions can re-rank subwatersheds based on an evaluation of the PCB screening data along with the information provided by the PCB Source Assessment to reprioritize subwatersheds for source trackdown investigations. As stated previously, the PCB Source Assessment and Subwatershed Prioritization Strategy can only indicate the potential for significant sources of PCBs within the subwatersheds. It is possible the PCB screening data may

alter the ranking of the subwatersheds, thereby leading jurisdictions to prioritize subwatersheds that may have lower overall risk scores.

Jurisdictions will be required to provide a Phase I source trackdown monitoring data assessment report (subwatershed PCB screening data assessment) as previously outlined in the "Permit Term Deliverables" section. The report will need to include an assessment of all the components discussed in the previous section and provide a preliminary plan on which subwatershed(s) will undergo Phase II source trackdown investigations in the next permit term. It may not be feasible for jurisdictions to conduct Phase II source trackdown investigations in all subwatersheds due to logistics and financial resources.

Phase I source trackdown investigations will not be applicable for subwatersheds comprised of direct drainage areas without a defined stream network (e.g., overland flow or direct discharges from MS4 stormwater outfalls), or streams where monitoring stations cannot be located above head of tide in order to characterize the drainage area of the subwatershed. In order to identify sources of PCBs within these subwatersheds, Phase III source trackdown investigations will be required to conduct a PCB characterization of the MS4 within storm sewersheds where potential sources of PCBs have been identified through the PCB Source Assessment. More information on this approach is presented in the section on Phase III Source Trackdown Investigations (MS4 Storm Sewer System PCB Characterization).

The jurisdictions will not be required to conduct a Phase II or Phase III source trackdown investigations during the first permit term. However, a jurisdiction may choose to begin Phase II or III source trackdown investigations in MS4 sewersheds where there is the potential for significant sources of PCBs based on the information provided by the PCB Source Assessment and Subwatershed Prioritization Strategy at any point. Eventually all subwatersheds identified during Phase I as requiring Phase II and III investigations will need to be evaluated during future permit terms. The "TMDL subwatershed ranking table" worksheet of the "TMDL Subwatershed Risk Assessment" excel spreadsheet includes a column for indicating whether Phase I source trackdown investigations can or cannot be conducted in a subwatershed.

MDE recommends that jurisdictions identify potential PCB sources that do not discharge to the MS4 based on the information provided by the PCB Source Assessment. This would only apply to subwatersheds that cannot undergo Phase I source trackdown investigations, in case MDE needs to pursue further investigations through other regulatory mechanisms. MDE recommends including this information in the Phase I source trackdown monitoring data assessment Report. To conduct this analysis the jurisdictions will need to evaluate their MS4 and identify outfall locations for potential PCB sources such as NPDES wastewater and stormwater dischargers. This analysis is not required for Phase II source trackdown investigation development, as explained previously in the "PCB Source Assessment" section. However, for these subwatersheds it is being recommended that the analysis be done for this assessment. Jurisdictions would need to create a table and GIS shapefile of these potential PCBs.

Quick Take: Why is fish tissue monitoring not part of the source tracking approach?

Fish tissue monitoring is not recommended due to the wide home range of fish. While fish could be collected at subwatershed outlets, the PCB contamination within the fish may not be due to loadings directly from that subwatershed, as fish will bioaccumulate PCBs through feeding, respiration, and dermal absorption anywhere it travels through out the waterbody. Sampling of forage fish, which have much smaller home ranges which can be indicative of localized sources, could be applicable but is not recommended at this time. It is believed that the passive sampling approach will be sufficient for screening purposes. For in-stream characterizations multiple lines of evidence are required (passive and sediment). Since the approach outlined in this document will need to adapt to new information over time, there is still the potential for additional lines of evidence to be required in the future, which could include fish tissue monitoring.

In-stream Subwatershed PCB Characterization (Phase II Source Trackdown Investigations)

The primary objective of the PCB Source Assessment, Subwatershed Prioritization Strategy and subwatershed PCB screening components of the overall source trackdown process is to identify and prioritize subwatersheds requiring further source trackdown investigations to identify discrete sources of PCBs. The Phase II source trackdown investigations will require a comprehensive in-stream PCB characterization within these subwatersheds to identify specific areas of concern within the stream network that contain upland sources of PCBs. This characterization effort will determine whether suspected sources of PCBs are transported directly to the stream from adjacent land areas, or from upland areas transported through the MS4 storm sewer system.

Phase II source trackdown investigations will only be applicable to subwatersheds with a defined stream network. As explained in the previous section on Phase I Source Trackdown Investigations, for subwatersheds that are comprised of direct drainage areas without a defined stream network (e.g., overland flow or direct discharges from MS4 outfalls) or streams where monitoring sites cannot be located above head of tide in order to characterize the drainage area of the subwatershed, Phase III source trackdown investigations will be applied.

Jurisdictions have the flexibility to focus resources on in-stream characterization of subwatersheds with greater potential for significant sources of PCBs that have been prioritized based on the findings of the PCB Source Assessment, Subwatershed Prioritization Strategy and subwatershed PCB screening. It may not be feasible for jurisdictions to conduct in-stream characterizations for all subwatersheds requiring Phase II source trackdown investigations depending on logistics and financial resources within a future permit term. Jurisdictions will

need to work with MDE to establish a tentative schedule for conducting Phase II source trackdown investigations if all subwatersheds cannot be addressed within a future permit term. In subsequent, future permit terms, it is expected that jurisdictions will commence and complete at least one round of monitoring associated with Phase II or III source trackdown investigations in a priority subwatershed as determined by Phase I screening and the PCB Source Assessment and submit all associated deliverables. MDE expects the PCB source trackdown process in its entirety to span several permit terms.

Monitoring design approach for in-stream PCB characterization

Monitoring for Phase II source trackdown investigations will require a comprehensive in-stream bracketing of the stream network to identify stream sections that contain potential upland sources of PCB contamination. This characterization effort will also determine whether suspected sources of PCBs are transported directly to the stream from adjacent land areas, from upland areas transporting through the MS4, or if the streambed and banks themselves are a source.

Jurisdictions will need to evaluate additional data resources for identifying potential sources of PCBs in these subwatersheds, an element not required under the Subwatershed Prioritization Strategy and Phase I source trackdown investigations as detailed in sub-section 6.0 of the "PCB Source Assessment" section. This information will be used to inform monitoring site selection for Phase II source trackdown investigations. Mapping of outfall locations for potential PCB sources such as NPDES wastewater and stormwater dischargers that was not previously assessed will also be useful to inform monitoring site selection in Phase II source trackdown investigations. MDE will work with jurisdictions to identify outfall locations of potential PCB sources when this information is not accessible through the data resources provided by MDE.

Monitoring site locations and density will be dependent upon the size of the subwatershed, total stream miles, number of confluences, stormwater outfalls, and the location of potential PCB sources. The monitoring should provide sufficient coverage of the stream network to successfully identify bracketed sections where potential upland sources of PCB contamination are present. Jurisdictions can increase monitoring site density in areas of the subwatershed where potential sources of PCBs are expected to be present. For areas of the subwatershed where few or no potential sources of PCBs were identified through the PCB Source Assessment, jurisdictions can choose to only monitor the outlet of the sub-tributary instead of bracketing the entire stream network. This would be sufficient to rule out these areas for further investigation similar to the approach applied for Phase I source trackdown investigations and allow jurisdictions to focus resources in areas more likely to contain sources of PCBs. However, if the concentrations are found to be at levels of concern, then further bracketing would be required for these sub-tributaries. Subsequent rounds of sampling may also be required to further bracket stream sections to isolate the location of potential sources of PCBs depending on the monitoring site density applied in the first round of sampling. MDE will work with the jurisdictions in developing a monitoring design for these in-stream PCB characterization efforts.

For each monitoring site: (1) a single passive sampler (polyethylene (PE) or alternative polymer strip) will be deployed in the water column for a 3-month period, and (2) a surficial composite sediment sample will be collected. Passive samplers should be deployed at the same time at all sites within the subwatershed to ensure there is no temporal variability between sites over the three month equilibration period. Sediment samples at all sites should also be collected concurrently during a dry period (72 hours post rain event of 0.1 inches or more) at any time during the passive sampling deployment. Multiple lines of evidence will be beneficial in identifying areas within the subwatershed where sources of PCB contamination are present. If the evaluation of passive water column and surficial sediment PCB concentration data is inconclusive in identifying stream segments containing potential upland sources of PCB contamination, it may be necessary to use alternative monitoring techniques such as sediment traps and discrete or automated sampling of the water column. Further information on these monitoring techniques is provided in the section on Phase III source trackdown investigations.

Surficial sediments (top 2 centimeters) should be collected as a composite sample of at least three samples along the cross section of the stream (left bank, mid-channel, right bank). For more information on sediment collection protocols you can refer to Appendix B of MDE's PCB TMDL QAPP. The QAPP has been included in the PCB Guidance Resources Package in the "6. MDE PCB TMDL QAPP" folder. Sediment composed of fine materials should be targeted if possible. Passive samplers should be deployed in the same location where sediments are sampled if the proposed monitoring site is shifted to an area of greater deposition of fine sediments. Sample locations within the cross section can be shifted depending on the presence of fine materials. Multiple samples from the center channel or the banks is acceptable.

Sediment samples need to be analyzed for total PCBs, total organic carbon (TOC), and grain size. MDE will also require a low detection level congener based method for all water column and sediment analyses for these investigations as required in Phase I source trackdown investigations (EPA Method 1668 preferred). As stated previously, if a jurisdiction chooses to use an alternative method, MDE must determine if the method is acceptable for the purpose of these investigations. Aroclor based methods (e.g. EPA Method 608, 8082A) will not be suitable for PCB screening of the water column or sediment as they may be insufficient for measuring PCBs due to their higher method detection limits. PCB levels must be measurable in all samples in order to successfully conduct data analysis and assessment.

Jurisdictions will need to conduct a water quality data evaluation and statistical analysis to identify bracketed sections within the stream network with upland sources of PCBs. Jurisdictions will need to create a GIS shapefile of all water quality data points within a subwatershed to conduct the evaluation.

A statistical analysis will be conducted to determine at which monitoring sites the PCB concentrations are statistically significant indicating sources of PCBs within the section upstream of the site. Statistical significance may be determined by identifying outlier concentrations that are either three standard deviations from the mean or an order of magnitude greater than the mean. The mean and standard deviation will be calculated from the distribution of all passive and sediment concentration data collected within the subwatershed. MDE recommends this approach; however, jurisdictions may propose alternative statistical methods. Monitoring sites

identified as statistical outliers indicate sections upstream of the site with the most significant upland sources of PCBs.

Following the statistical approach for identification of outliers, jurisdictions will need to compare relative concentrations between monitoring sites to identify stream sections where there is a significant increase in passive water column or sediment PCB concentrations between the upstream and downstream sites and the PCB concentrations for the downstream sites exceed the TMDL water column or sediment endpoints. These conditions indicate significant sources of PCBs are present within the bracketed stream sections requiring further source trackdown investigations.

Downstream monitoring sites where passive water column PCB concentrations are above the reference threshold, but below TMDL water column endpoints, may still be an indication that there are significant upland sources of PCBs within the bracketed stream section. As stated previously in the "Phase I source trackdown investigation" section, passive samplers analyze the freely dissolved portion of the total PCB concentration and the TMDL water column endpoints are derived based on total PCB concentrations. Therefore, it is possible that the total PCB concentration containing the freely dissolved portion measured through passive sampling could exceed the TMDL water column endpoint. Jurisdictions will need to evaluate the potential for significant sources of PCBs within the stream sections based on the findings of the PCB Source Assessment and magnitude of PCB concentrations to determine whether further source trackdown investigations are required.

Monitoring sites with PCB concentrations lower than upstream sites, yet still above TMDL water column and sediment endpoints, may still indicate there are significant upland sources of PCBs within the bracketed stream section. Jurisdictions will need to evaluate the potential for significant sources of PCBs within the stream section based on the findings of the PCB Source Assessment, and the degree of PCB concentration decline to determine whether further source trackdown investigation is required.

Monitoring sites with PCB concentrations above TMDL water column, or sediment endpoints and no upstream monitoring site to bracket the stream section in order to isolate the location of the upland sources of PCBs, may require additional Phase II source trackdown investigations. This is unless it is feasible to move to Phase III source trackdown investigations, or the evaluation definitively identifies sources of PCBs transporting or discharging directly to the stream.

Monitoring sites with PCB concentrations at or below the reference threshold are an indication that there are no significant sources of PCBs within the subwatershed upstream of the site, similar to the screening process in Phase I source trackdown investigations. Therefore, further source trackdown investigations may not be required in this portion of the subwatershed. If monitoring sites located upstream of these sites exceed the reference threshold, it is an indication that the upland sources of PCBs are insignificant and do not impact downstream water quality, requiring no further source trackdown investigations.

A single round of sampling in Phase II source trackdown investigations may be sufficient for identifying bracketed stream sections where upland sources of PCBs are present and moving on to Phase III source trackdown investigations. However, if monitoring site density is

insufficient or water quality data evaluation is not definitive, additional in-stream characterization may be warranted to further bracket stream sections to isolate the location of potential upland sources of PCBs.

If the evaluation definitively identifies sources of PCBs within the direct drainage area of the bracketed stream section transporting or discharging PCBs directly to the stream (e.g., contaminated sites, NPDES stormwater and wastewater dischargers), further investigation through MDE regulatory mechanisms may be required. WPRPP will coordinate with the appropriate regulatory authorities within MDE (e.g., LMA Land Restoration Program, WSA NPDES permitting programs) to identify responsible parties for pursuing further investigations at sites identified by the jurisdictions.

If the evaluation does not identify specific discrete sources within the direct drainage area of a bracketed stream section where the water quality data indicates significant sources of PCBs and there are no MS4 discharges to this section, the sources could potentially be due to diffuse contamination within the direct drainage area or due to legacy contamination within the bed sediments of the stream. In these cases, additional investigations or stormwater management/remediation practices may be required by the jurisdictions or a responsible party. MDE will work with the jurisdictions to identify responsible parties and address these sources.

Jurisdictions will be required to provide a SAP & QAPP for Phase II source trackdown investigations, monitoring data reports, and monitoring data assessment reports similar to the deliverables required for Phase I source trackdown investigations. An example of a SAP has been provided by Anne Arundel County for Phase II source trackdown investigations being conducted in Sawmill Creek. The SAP has been included in the PCB Guidance Resources Package in the "7. Anne Arundel PCB Source Trackdown SAP" folder.

The monitoring data assessment report will include the water quality data evaluation and statistical analysis, identify the bracketed stream sections having upland sources of PCBs, and provide a preliminary plan for Phase III source trackdown investigations or additional Phase II source trackdown investigations to further isolate the sources of PCBs. The report will also need to identify if any discrete sources of PCBs are located within the direct drainage area of the bracketed stream section requiring further investigation through MDE regulatory mechanisms, or if sources are diffuse within the direct drainage area or potentially due to legacy contamination within the bed sediments of the stream which could require additional investigations or stormwater management/remediation practices.

MS4 PCB Characterization (Phase III Source Trackdown Investigations)

In-stream PCB characterization efforts under Phase II source trackdown investigations which identified bracketed stream sections where upland sources of PCBs are present and the PCBs are transported to the stream through the MS4, will require Phase III source trackdown investigations to characterize PCBs within the MS4 to identify sources of PCBs within the storm sewershed. PCBs may also enter a storm sewer system through groundwater infiltration or diffusion and resuspension of legacy contaminated sediments trapped within the sewer system,

which could potentially be a significant source of PCBs. Jurisdictions will only be required to monitor MS4 infrastructure (e.g., outfalls, pipes, inlets, BMPs, etc.) regulated under their Phase I MS4 permit.

Phase III source trackdown investigations will also be required for subwatersheds where Phase I and II source trackdown investigations were not possible due to these subwatersheds being comprised of direct drainage without a defined stream network or tidally influenced. Information provided by the PCB Source Assessment and Subwatershed Prioritization Strategy will inform jurisdictions as to which storm sewersheds have potential upland sources of PCBs requiring Phase III source trackdown investigations.

Jurisdictions will need to evaluate additional data resources for identifying potential sources of PCBs in these subwatersheds where Phase I and II source trackdown investigations were not possible which was not required under the Subwatershed Prioritization Strategy and Phase I source trackdown investigations as detailed in sub-section 6.0 of the "PCB Source Assessment" section.

Monitoring design approach for MS4 PCB characterization

Evaluation of the MS4 infrastructure and location of potential PCB sources completed under the PCB Source Assessment will inform Phase III source trackdown investigation monitoring design for PCB characterization within the MS4 storm sewer system. The Phase I MS4 permits require that jurisdiction create a geodatabase of the storm drain system including all infrastructure, major outfalls, inlets, and associated drainage areas and a GIS shapefile of impervious surfaces under the source identification component (Section C.) of the Phase I MS4 permit. Therefore, this information should already be readily accessible to jurisdictions.

Surveys of the storm sewer system discharging to bracketed stream sections requiring Phase III source trackdown investigations may be required to update information on the stormwater infrastructure (e.g., outfall/stormwater BMP locations, outfall size, active/inactive outfalls, pipe network, catch basin/storm drain locations, manhole access, etc.) depending on how accurate and up to date the information is within the geodatabase.

Phase III source trackdown investigations comprise two stages of monitoring: (1) outfall and stormwater BMP monitoring, and (2) sewer trackback monitoring. For the first stage of the Phase III source trackdown investigations, all active outfalls and stormwater BMPs under the MS4 jurisdiction's purview discharging to bracketed stream sections which were identified as having upland sources of PCBs within the storm sewershed under Phase II source trackdown investigations will require monitoring.

MDE recommends using automated samplers to collect composite water samples during storm events or passive sediment traps to collect suspended sediment over multiple storm events. Only one monitoring technique and event will be required; however, MDE does not discourage jurisdictions from investigating multiple lines of evidence. Guidelines for automated sampling and a passive sediment trap design have been included in the PCB Guidance Resources Package in the "8. Automated Sampling Guidelines" and "9. Passive Sediment Trap Design" folders. The

passive sediment trap is designed for in-stream application and would need to be modified for application in storm sewer pipes. MDE will continue to research additional monitoring techniques for Phase III source trackdown investigations and update the PCB Guidance Resources Package.

MDE will require a low detection level congener-based method for all water column and sediment analyses for these investigations as required in Phase II source trackdown investigations (EPA Method 1668 preferred). When using passive sediment traps the sediment samples need to be analyzed for total organic carbon (TOC) and grain size.

MDE is open to alternative monitoring techniques recommended by the jurisdictions for monitoring MS4 outfalls and stormwater BMPs. Phase III source trackdown investigations will be an adaptive process to determine the effectiveness of different monitoring techniques and consideration of cost and feasibility of implementation.

Monitoring approaches (e.g., environmental media, monitoring techniques, sampling period) need to be consistent when feasible across all outfalls and stormwater BMPs to ensure data are comparable for assessment. PCB concentrations from outfalls and stormwater BMPs should be compared with TMDL endpoints and in-stream sediment and water column PCB concentrations from Phase II source trackdown investigations when possible to determine which storm sewersheds contain upland sources of PCBs or in-pipe PCB contamination requiring further source trackdown investigations. If the evaluation does not identify any outfalls or stormwater BMPs containing upland sources of PCBs, and no sources of PCBs are located within the direct drainage area of the stream section being evaluated, the sources could potentially be due to legacy contamination within the bed sediments of the stream in which no ongoing sources are present. In these cases, additional investigations and remediation practices may be required by the jurisdictions or a responsible party. MDE will work with the jurisdictions to identify responsible parties and address these sources.

For the second stage of the Phase III source trackdown investigations, outfalls or stormwater BMPs identified as having upland PCB sources within the storm sewershed based on the results of the first stage of monitoring, will require sewer trackback PCB investigations. Monitoring design will entail characterizing the storm sewer pipe network through a combination of outfall, in-pipe, catch basin/storm drain, and stormwater BMP sampling to identify specific areas within the storm sewershed with sources of PCBs. As stated previously, the jurisdictions will only be required to monitor storm sewer system infrastructure regulated under their Phase I MS4 permit.

Monitoring within a pipe network as well as catch basins or storm drains will pose a challenge as monitoring techniques will be difficult to implement due to limited accessibility and properly securing and preventing damage to equipment. MDE recommends automated sampling, passive sediment traps, and inlet sediment traps. Only one monitoring technique and event will be required; however, MDE does not discourage jurisdictions from investigating multiple lines of evidence. MDE will continue to research additional monitoring techniques for Phase III source trackdown investigations and update the PCB Guidance Resources Package.

MDE will require a low detection level congener based method for all water column and sediment analyses for these investigations as required in Phase II source trackdown

investigations (EPA Method 1668 preferred). When using passive sediment traps the sediment samples need to be analyzed for total organic carbon (TOC) and grain size.

MDE is open to alternative sampling approaches recommended by the jurisdictions for monitoring the stormwater sewer system. As stated previously, Phase III source trackdown investigations will be an adaptive process with regard to what sampling techniques are successful, less costly, and easier to implement logistically.

The location of potential PCB sources within the sewershed identified through the PCB Source Assessment will inform monitoring site selection within the storm sewer system. The monitoring should provide sufficient coverage of the storm sewer system to successfully identify areas of the storm sewershed where potential upland sources of PCBs are present. For areas of the storm sewershed where few or no potential sources of PCBs were identified through the PCB Source Assessment, jurisdictions may choose to reduce monitoring within these sections of the storm sewer system. This may rule out sections of the storm sewer system for further investigation similar to the approaches applied in Phase I and II source trackdown investigations. However, additional up-pipe and inlet monitoring may be required if PCB concentrations are elevated in these sections. MDE will work with jurisdictions in the development of their sewer trackback monitoring plans.

Outfalls will also need to be resampled when conducting sewer trackback investigations in order to compare relative concentrations between monitoring locations within outfalls, storm pipes, and inlets to provide a comprehensive characterization of the storm sewer system. Monitoring approaches (e.g., environmental media, monitoring techniques, sampling period) need to be consistent when feasible across all monitoring locations at outfalls, in-pipe, catch basins/storm drains, and stormwater BMPs to ensure data are comparable for assessment. A comparison of PCB concentrations from all monitoring locations within the storm sewer system will determine which areas of the storm sewershed contain significant upland sources of PCBs or in-pipe PCB contamination due to groundwater infiltration or legacy sediment contamination trapped within the storm sewer system and rule out areas of the storm sewershed with no significant upland sources of PCBs.

Similarly to the approach in Phase II source trackdown investigations, if the evaluation definitively identifies discrete sources of PCBs within a storm sewershed, further investigation through MDE regulatory mechanisms may be required. WPRPP will coordinate with the appropriate regulatory authorities within MDE (e.g., LMA Land Restoration Program, WSA NPDES permitting programs) to identify responsible parties for pursuing further investigations at sites identified by the jurisdictions. If the evaluation identifies pipe sections within the storm sewer system that contain PCB contamination due to groundwater infiltration or legacy sediment contamination trapped within the storm sewer, MDE recommends that jurisdictions further investigate and remediate these sources of PCBs. An example of a a stormwater outfall investigation and clean out by Lockheed Martin for the Middle River Dark Head Cove PCB remediation site can be found at the following link: https://www.lockheedmartin.com/content/dam/lockheed-martin/eo/documents/remediation/middle-river/mrc-sediment-protection-pcb-3-03-2017.pdf. The document has been included in the PCB Guidance Resources Package in the "10. Lockheed Martin MRC

Storm Drain PCB Remediation" folder. If the evaluation does not identify discrete sources within storm sewersheds that indicate the presence of significant PCB contamination, the source could be diffuse without the potential for site remediation. In these cases, stormwater management practices may be required by the jurisdictions to address these sources.

Jurisdictions will be required to provide a SAP & QAPP for Phase III source trackdown investigations, monitoring data reports, and monitoring data assessment reports similar to the deliverables required for Phase II source trackdown investigations. Phase III source trackdown investigations comprise two stages of monitoring: (1) outfall and stormwater BMP monitoring, and (2) sewer trackback monitoring which will require separate deliverables for each stage.

The monitoring data assessment report for the first stage of the Phase III source trackdown investigations will include the water quality data evaluation, identify which outfalls and stormwater BMPs contain upland sources of PCBs within the storm sewershed, and provide a preliminary plan for conducting sewer trackback investigations under the second stage of the Phase III source trackdown investigations. The report will also need to identify any streams with legacy contamination of bed sediments, potentially requiring additional investigations or remediation practices.

The monitoring data assessment report for the second stage of the Phase III source trackdown investigations will include the water quality data evaluation and identify discrete sources of PCBs within the storm sewershed requiring further investigation through MDE regulatory mechanisms. The report will also need to identify any areas of the storm sewershed where sources are diffuse, potentially requiring stormwater management practices.

Jurisdictions and Watersheds with Required PCB TMDL SW-WLAs Reductions

State Highway Administration
- Baltimore Harbor
- Lake Roland
- Gunpowder and Bird Rivers
- Back River
- Patuxent River
- Anacostia River
- Bush River

Harford County:
- Bush River

Baltimore County:
- Lake Roland
- Back River
- Gunpowder and Bird Rivers
- Baltimore Harbor

Baltimore City:
- Baltimore Harbor
- Back River

Anne Arundel:
- Baltimore Harbor
- Patuxent River

Howard:
- Patuxent River

Montgomery:
- Anacostia River
- Patuxent River

Prince George's:
- Anacostia River
- Patuxent River
- A WLA reduction was assigned to Prince George’s County in the Upper Tidal Potomac and Oxon Creek.