DEPARTMENT OF NATURAL RESOURCES
AND ENVIRONMENTAL CONTROL

DIVISION OF WASTE AND HAZARDOUS SUBSTANCES

SITE INVESTIGATION AND RESTORATION SECTION

Policy for Polychlorinated Biphenyl (PCB) Analysis Method

Issued: November 24, 2014

Purpose: This policy adopts the use of EPA Method 680 as the standard method for confirmatory analysis of polychlorinated biphenyls (PCBs) for Hazardous Substance Cleanup Act (HSCA)-defined releases overseen by the Department of Natural Resources and Environmental Control (DNREC), Division of Waste and Hazardous Substances (DWHS), Site Investigation and Restoration Section (SIRS). EPA Method 680 will be the standard analytical method for PCB analysis of soil, sediment and water samples collected in relation to HSCA-defined releases. In addition, this policy defines the criteria under which the DNREC-SIRS may require the use of EPA Method 1668, or equivalent, for confirmatory analysis of samples collected in relation to HSCA-defined releases, as well as the criteria for downgrading the analytical requirement to EPA Method 8082.

Authority: The DNREC-DWHS is responsible for hazardous substance cleanup in the State of Delaware. DWHS's SIRS investigates and remediates sites under the provisions of 7 Del. C. Chapter 91, the Delaware Hazardous Substance Cleanup Act (HSCA) and the Delaware Regulations Governing Hazardous Substance Cleanup (Regulations).

Polychlorinated Biphenyls: PCBs are a group of compounds constructed of two benzene rings bonded together to form a biphenyl molecule. One to ten chlorine atoms can bind to each biphenyl molecule creating up to 209 distinct PCB congeners. Each congener can be grouped into one of ten "families" of homologs based on the number of chlorine atoms that are present. Aroclors are mixtures of congeners manufactured to perform specific functions based on their chemical properties. Unfortunately, PCBs were found to be extremely harmful to human health and the environment due to their persistent, bioaccumulative and toxic (PBT) nature. Despite the persistent nature of PCBs, they are susceptible to weathering in the environment.

Available Methods and Limitations

- **EPA Method 8082 (PCB Aroclors):** EPA Method 8082 detects the presence of PCB aroclors. If PCBs are present but not in the form of one of the aroclors, or the aroclor is too weathered, the results can be reported as not detected. This situation can result

in the under-reporting of PCB-related risk for a particular site. The standard practice for analyzing HSCA- defined releases is a two- step process: the DNREC-SIRS screens all soil samples, and based on the results, sends one or more samples to a HSCA-approved laboratory for confirmatory PCB analysis. Recent evidence indicates that the use of EPA Method 8082 is not sufficient to fully characterize some HSCA releases. Under-characterization may allow for PCBs to continue loading from a site to an ecologically sensitive waterway. Although the aroclors may not be detected at concentrations above the minimum method detection limits (MDLs) of 0.1 to 0.5 parts per billion, PCBs may still be present at concentrations that pose a risk to human health and the environment. As of the signing of this policy, the cost to analyze a sample by EPA Method 8082 is approximately $85. While the most cost effective sampling method, it is only applicable in very specific situations.

- **EPA Method 680 (PCB Homologs):** EPA Method 680 detects the presence of PCB homologs. Homologs are the 10 "families" of congeners that contain 1 to 10 chlorine atoms regardless of position on the biphenyl molecule. This method has the advantage of detecting the presence of PCBs that may not be in the form of aroclors, as well as aroclors that have been weathered, or were misidentified or not detected by EPA Method 8082. EPA Method 680 MDLs are approximately the same as EPA Method 8082 MDLs (0.1 to 0.5 parts per billion), but the analysis will provide the total PCB concentration that can be used for site specific human health and/or ecological risk assessments. As of the signing of this policy, the cost to analyze a sample by EPA Method 680 is approximately $475.

- **EPA Method 1668 (PCB Congeners):** EPA Method 1668 is a high-resolution gas chromatography/mass spectrometry (GC/MS) procedure that identifies the presence and concentration of each of the 209 PCB congeners. The method detection limits are 0.3 to 0.8 part per trillion, which is much lower than EPA Method 8082 and EPA Method 680. As of the signing of this policy, the cost to analyze a sample by EPA Method 1668 is approximately $750 to $1000. This method can be invaluable if there is a need to quantify the group of dioxin-like PCBs that contain individual toxicity factors and/or provide the ability to fingerprint any unique signatures that can be compared to specific source areas.

EPA Method 680 as new Standard at SIRS: EPA Method 680 provides a cost effective method to determine the concentration of total PCBs in the environment. This policy adopts EPA Method 680 as the standard for PCB confirmatory analysis for all samples associated with HSCA-defined releases.

Criteria that require application of EPA Method 1668: The DNREC-SIRS may require the use of EPA Method 1668 for any sample collected at, or in connection with investigations of, sites that are adjacent to or are receiving waters of a Clean Water Act 303(d)-listed waterway for PCBs. The sensitive nature of the aquatic environment makes this application critical for determining the nature, extent, and source of PCBs in these waterways. A list of the 303(d)-listed waterways for PCBs (listed at the time of signing of this policy) is attached to this policy as Appendix A. The DNREC-SIRS may also require the use of EPA Method 1668 for any media sampled at locations where site-specific conditions indicate the need for fingerprint analysis of PCBs.

Procedure to Request EPA Method 8082: EPA Method 8082 may be the most appropriate method to use when a recent (within the last six months) known release of PCB-containing material has occurred. A formal written request must be submitted to the DNREC-SIRS for approval prior to submission of the sampling and analysis plan (SAP).

Screening Criteria: Analytical data received from a HSCA certified lab will be compared to the following section of the HSCA Screening Level table to determine if a risk assessment is required at a site. Criteria for sediment analytical results have not been determined as of October 2014, therefore any value recorded in sediment shall require a risk assessment until such time when sediment guidance is in place.

Analyte	Soil (mg/kg)	Groundwater (ug/L)
~Polychlorinated Biphenyls	0.24	0.19

Implementation: This policy is adopted on the date of the Director's signature with implementation to begin on January 5, 2015. All SAPs submitted to the DNREC-SIRS on or after the implementation date shall fully comply with the policy. The DNREC-SIRS will incorporate this policy in the Standard Operating Procedures for Chemical Analytical Programs (SOPCAP) before the implementation date.

Approved by:

Marjorie A. Crofts, Director
Division of Waste & Hazardous Substances

12.5.14
Date

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APPENDIX A: SECTION 303(d) LIST OF PCB WATERS		
Watershed Name	**Segment**	**Description**
Shellpot Creek	Lower Shellpot Creek	From the head of tide below the east set of railroad tracks to the mouth of the Delaware River
Brandywine Creek	Lower Brandywine	Mainstem Lower Brandywine
Brandywine Creek	Upper Brandywine	From State Line to Wilmington
Red Clay Creek	Mainstem	From PA-DE line to the confluence with White Clay Creek
White Clay Creek	Mainstem	White Clay Creek from the PA-DE line to the confluence with the Christina River
Christina River	Lower Christina River	Mainstem Lower Christina River
Christina River	Mid Christina River	Between White Clay Creek and Brandywine River
Christina River	Upper Christina River	Mainstem Upper Christina River
Christina River	Lower Christina Creek	Mainstem Lower Christina Creek
Christina River	Little Mill Creek and Willow Run	From the confluence of Willow Run and Chestnut Run to the confluence with the Christina River
Christina River	Smalleys Pond	Smalleys Pond east of Newark
Delaware River	DRBC Zone 5	From the Pennsylvania- Delaware line to Liston Point, Delaware
Army Creek	Lower Army Creek	Segment from Route 13 to mouth at Delaware River tidal freshwater segment
Army Creek	Upper Army Creek	Nontidal segment from headwaters to Route 13
Red Lion Creek	Lower Red Lion	From U.S. Route 13 to the mouth at Delaware River
Chesapeake & Delaware Canal	C&D Canal	C&D Canal from the MD Line to Delaware River
Appoquinimink River	Lower Appoquinimink River	Saline Tidal Reach, excluding Hangman's Run
Appoquinimink River	Upper Appoquinimink	Freshwater Tidal Reach
Appoquinimink River	Drawyer Creek	Tidal Portion
Appoquinimink River	Silver Lake	Lake adjacent to Middletown, below Deep Creek
Saint Jones River	Upper Saint Jones	From the dam at Silver Lake to Old Lebanon Bridge at Road 357
Saint Jones River	Isaac Branch	Wyoming Mill Pond
Saint Jones River	Moores Lake	Lake east of Camden
Saint Jones River	Silver Lake	Silver Lake at Dover
Cedar Creek	Slaughter Creek	From the headwaters to the Confluence with Cedar Creek
Delaware Bay	DRBC Zone 6	From Liston Point to the confluence with the Atlantic Ocean