

**REDUCING PCB LOADINGS TO THE DELAWARE ESTUARY:
A Staged Approach to Establishing TMDLs**

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Reducing PCB Loading in the Delaware River Estuary - General Concepts

The September 1996 *Delaware Estuary Comprehensive Conservation and Management Plan* (CCMP) identified, among other things, the need to mitigate the impacts of PCBs in the Estuary. Each Estuary state - Delaware, New Jersey and Pennsylvania - has long-standing fish advisories restricting consumption, due in part to the presence of PCBs. Included in the actions recommended by the CCMP was the implementation of 'phased limits on toxic pollutants using the Total Maximum Daily Load (TMDL) approach.'

In response to the Delaware Estuary PCB issue, EPA, the states of Delaware, New Jersey and Pennsylvania and the Delaware River Basin Commission (DRBC) have joined in a comprehensive effort to assess the sources and extent of PCB loading, evaluate its impact on water quality and develop recommendations to mitigate this impact. The regulatory agencies are supported in this effort by an extensive coalition of local governments, industries, environmental interest groups and the general public.

While the development of a PCB TMDL is the center of this effort, each participating agency recognizes that the TMDL monitoring, modeling and allocation analysis must be complemented by a parallel process to evaluate how the TMDL recommendations will be implemented. The goal of these combined processes is a TMDL that is implemented based on a set of coordinated actions to produce water quality improvements and to meet water quality standards.

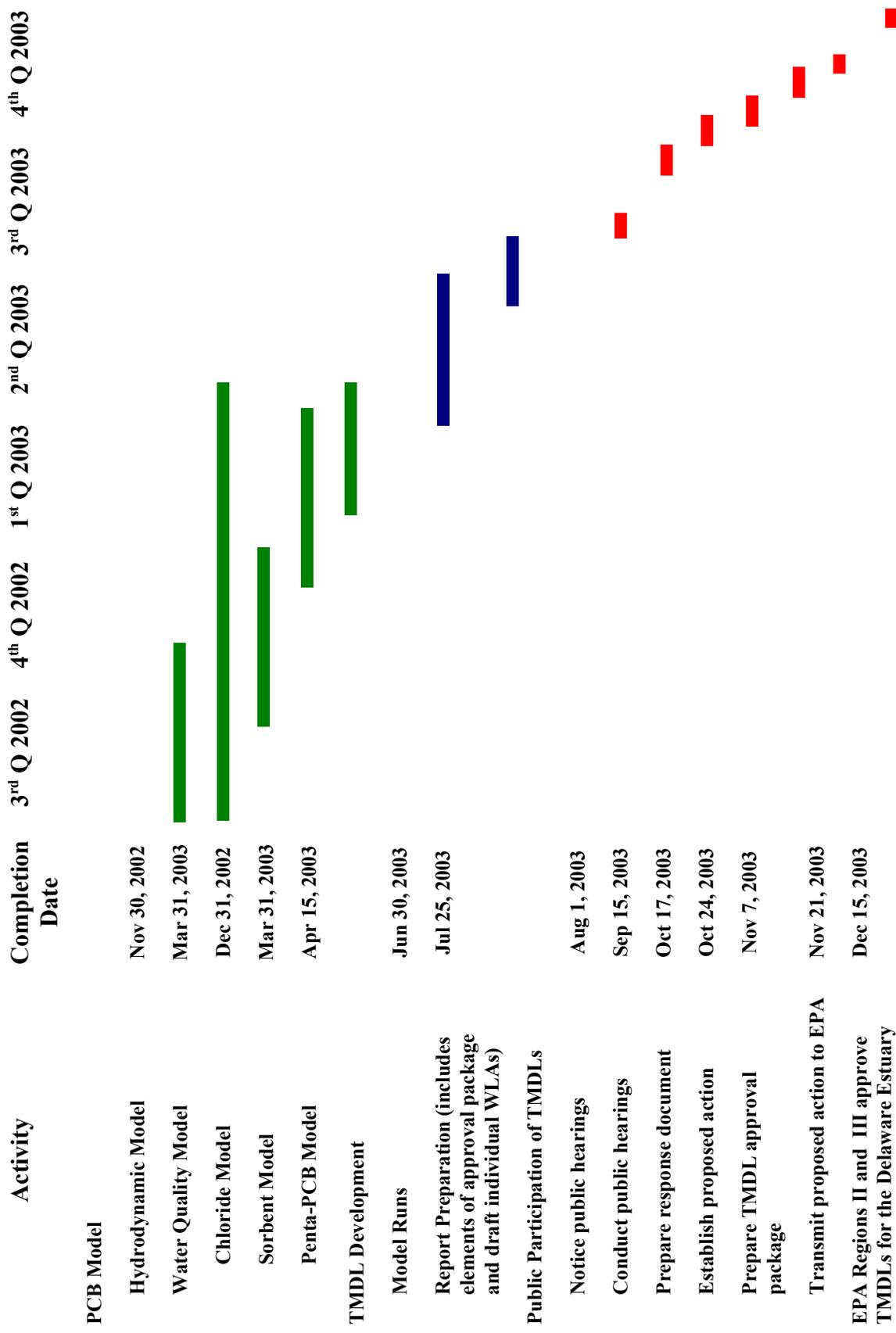
The general concepts of the plan to reduce PCB loadings to the Delaware River Estuary are:

- A comprehensive assessment of all sources - point source discharges (including regulated stormwater discharges), non-point stormwater sources, air deposition, hazardous waste sites and contaminated sediments - of PCB loads to the Estuary and development of a state-of-the-art water quality model to evaluate the impacts of these loads. DRBC has the lead for this work and is supported both by a Technical Advisory Committee and an Expert Panel convened to advise the modeling effort.
- A watershed-based approach to PCB assessment and implementation that will evaluate not just Delaware River main stem conditions but also assess and define the loadings from major tributaries to the Delaware River.
- An approach to incorporate the results of the TMDL into the NPDES permits of dischargers to the Estuary. EPA Regions II and III and the three states are responsible for this task. The permitting approach will be both innovative and flexible while ensuring that reductions in PCB loads are achieved.

- A companion effort that will explore options to achieve PCB reductions from sources other than NPDES dischargers, including air deposition, hazardous waste sites and contaminated sediments. DRBC is taking the lead to identify and quantify the loadings from these sources with support from EPA, the states and other interested parties. Once sources are clearly identified, DRBC will work with all agencies to develop an implementation plan for sources in these categories.
- The promulgation of the TMDL by EPA in two stages. The Stage 1 TMDL will be issued in December 2003 and Stage 2 will be issued in December 2005. The states and DRBC will join in support of EPA in the TMDL public review and promulgation. In the interval between Stage 1 and Stage 2 TMDL promulgation, EPA, the states and DRBC will continue to further refine the TMDL through more detailed, congener-specific monitoring to enhance the TMDL PCB water quality model.
- DRBC will lead an effort to begin an implementation strategy to complement the NPDES permit requirements that will likely focus on voluntary reduction efforts as soon as practical and will be expanded as the TMDL is completed. EPA and the states will support DRBC in these implementation efforts.

The complexity of the science involved in establishing a PCB TMDL, the extensive range of potential sources of PCB contributions and the magnitude of the costs that may be necessary to achieve PCB load reductions to meet the water quality objectives of the Delaware River Estuary compel all agencies and affected parties to work together to meet this challenge. By gaining consensus for the actions that will occur in this effort, EPA, the states and DRBC hope to forge a broad, long-term watershed partnership to achieve water quality standards for PCBs for the Delaware Estuary in an effective and efficient manner.

Delaware Estuary PCB Stage 1 TMDL Schedule



Staged PCB TMDLs for the Delaware Estuary

Overview

- The staged approach to development of total maximum daily loads (TMDLs) for polychlorobiphenyls (PCBs) provides for adaptive implementation through execution of load reduction strategies while additional monitoring and modeling efforts proceed. The approach recognizes that additional monitoring data and modeling results will be available following issuance of the Stage 1 TMDLs to enable a more sophisticated analysis to form the basis of the Stage 2 TMDLs.
- EPA requires that Stage 1 TMDLs meet all TMDL regulatory requirements, including the identification of individual wasteload allocations (WLAs).¹
- Furthermore, NPDES permits issued after the approval of Stage 1 TMDLs must include water quality-based effluent limits (WQBELs) consistent with Stage 1 WLAs.
- DRBC, with state and EPA input, will take the lead in preparing written documentation for Stage 1 TMDLs including WLAs and load allocations (LAs) to facilitate their establishment by EPA by December 15, 2003.
- DRBC, with state and EPA input, will take the lead in preparing written documentation for Stage 2 TMDLs including WLAs and LAs by December 31, 2005. When developing the revised WLAs in Stage 2, DRBC and the States will consider, among other things, the homolog-specific water quality model, the monitoring results from and effectiveness of the dischargers' PCB pollutant minimization programs, and whether further reductions from point sources are needed to attain and maintain applicable water quality criteria.
- DRBC, the individual states (New Jersey, Pennsylvania and Delaware) and EPA will conduct joint public hearings on the proposed TMDLs.
- DRBC, with state and EPA input, will take the lead in preparing the written documentation for the final TMDLs, and in preparing the required Public Responsiveness Documents.
- EPA will establish the Stage 1 TMDLs by December 15, 2003.

¹Consistent with an EPA policy memorandum dated November 22, 2002, it may be reasonable to express allocations for NPDES-regulated storm water discharges from multiple point sources as a single categorical wasteload allocation when data and information are insufficient to assign each source or outfall individual WLAs. The "individual WLAs" and "individual WQBELs" referred to throughout this document are, therefore, for non-storm water point sources.

- The DRBC may utilize all or part of the Stage 1 and Stage 2 TMDLs in assimilative capacity and wasteload allocation determinations in accordance with the Delaware River Basin Compact and the DRBC's regulations.
- The individual states will incorporate these TMDLs into their respective statewide water quality management plans.

TMDLs

- DRBC, the states and EPA will ensure that the Stage 1 TMDLs are technically defensible.
- DRBC, the states and EPA anticipate that the numeric Stage 1 WLAs for individual sources will be based on simplified methodologies. To present these Stage 1 numeric WLAs, DRBC will prepare a table which includes the current loading of each point source based on existing data, the current relative percentage contribution of the PCB loading for each point source by management zone², and the allocation to individual point sources resulting from application of the selected methodology.
- The Stage 1 TMDLs and individual wasteload allocations for total PCBs will be extrapolated from penta homolog data using the observed ratio in the Delaware River/Estuary of penta homolog to total PCBs.
- In approving the Stage 1 WLAs, EPA will clarify the authority of the states to adjust the individual WLAs without further EPA approval as long as the sum of the WLAs in each management zone is not exceeded and reasonable assurance is maintained for the LAs.
- The Stage 2 TMDLs issued on or before December 31, 2005 will contain individual WLAs that replace the Stage 1 WLAs. The Stage 2 WLAs and LAs will be based on all of the monitoring data obtained and modeling performed through the issuance of the Stage 2 TMDLs, and will be based on the summation of the PCB homolog groups, without the use of extrapolation. As such, the WLAs will be precise at the individual discharger level. DRBC, the States and EPA anticipate that the Stage 2 TMDLs will be based upon a more sophisticated allocation methodology than the Stage 1 TMDLs, and will likely reflect application of the procedures set forth in the DRBC Water Quality Regulations.
- Both the Stage 1 and Stage 2 TMDLs will require controls by non-point sources including, but not limited to, implementation of best management practices.
- Based on the Federal regulations for TMDLs currently in place, Stage 2 TMDLs would require EPA approval only if the overall TMDLs by management zone change, or as necessary to demonstrate reasonable assurance for revised LAs.

² The term "management zone" refers to each of the Delaware River Zones 2 through 5.

NPDES Permits

- All permits issued, reissued or modified after the approval of the Stage 1 TMDLs, and prior to the approval of the Stage 2 TMDLs, will include non-numeric WQBELs.
- The use of non-numeric WQBELs for Stage 1 is justified for the following two reasons.

(1) A best management practices (BMP) approach is the most appropriate way to control PCB discharges.

40 CFR 122.44(k)(4) allows the use of non-numeric, BMP-based WQBELs where a BMP approach is the most appropriate means to control pollutants to achieve the goals of the Clean Water Act. PCBs are not used in the industrial processes of the dischargers in the basin; the loading to the Delaware River is thought to be from contaminated hot spots in and around the areas of the dischargers or from unknown sources during the industrial process, either directly from old, leaking equipment or produced as an unwanted byproduct. Eliminating the sources of these PCBs is a more effective and efficient method by which to reduce PCB loading to the Delaware River than wastewater treatment to a numeric limit. A BMP approach that includes sensitive monitoring, pollutant trackdown, and mitigation of contamination is the most appropriate means to protect water quality and achieve the goals of the Clean Water Act.

(2) It will not be feasible to precisely calculate the individual WQBELs in Stage 1.

40 CFR 122.44(k)(3) allows non-numeric, BMP-based WQBELs in permits where it is infeasible to calculate numeric WQBELs. As indicated in the “TMDLs” section above, the Stage 1 individual WLAs will be extrapolated from penta homolog data. The Stage 2 WLAs will be based on the summation of individual PCB homolog groups without the use of extrapolation. Therefore, individual WQBELs in Stage 1 should be non-numeric whereas individual WQBELs in Stage 2 may be numeric.

- For the potentially significant individual dischargers³ of PCBs, the non-numeric WQBELs will require:
 - the use of Method 1668A to characterize the influent and effluent to quantify PCBs;
 - development of a PCB minimization plan; and
 - implementation of appropriate cost-effective PCB minimization measures identified through PCB minimization planning.

³See companion paper “Identification of Significant Point Source Dischargers.”

- For the potentially non-significant individual dischargers of PCBs, the non-numeric WQBEL will require the use of Method 1668A to characterize the influent and effluent in order to quantify PCBs.
- All permits issued, reissued or modified after the approval of Stage 2 TMDLs will include WQBELs consistent with the Stage 2 WLAs.

Water Quality Standards

- TMDLs will, in all cases, be based on the water quality standards in force when the TMDLs are approved.
- Water quality standard development and TMDL development schedules will be closely coordinated to avoid unnecessary work.

Identification of Significant Point Source Dischargers

Significant point source dischargers are defined as:

1. The fewest NPDES permittees with continuous discharges that, when combined, contribute the largest loading of pentachlorobiphenyls (penta-PCBs) during either dry or wet weather, and
2. NPDES permittees with stormwater discharges that have elevated concentrations of penta-PCBs (loadings will be developed following receipt of flows associated with precipitation events).

PCB Loading Estimates

Loading estimates for PCBs were calculated for each of 92 point source dischargers to Zones 2 through 5 of the Delaware Estuary. Concentrations for each discharge were determined by summing (a) the reported results for those penta congeners with detected values and (b) one-half the detection limit for those penta congeners reported as undetected. If multiple samples were collected and analyzed at a discharge, the mean of the sums was used. Loadings were derived by assuming these concentrations and using the design flows for each discharge, when available. Effluent design flows were calculated utilizing the guidelines for industrial and municipal dischargers outlined in DRBC's Water Quality Regulations. The calculations were performed using effluent flow data dating from prior to 2000. Effluent design flows are being recalculated to reflect current discharge data, and are being developed for those discharges for which an effluent design flow was not previously calculated. Revised data regarding concentrations are being incorporated in the calculations on an on-going basis. Therefore, loadings estimates are continually being refined as new data become available. Facilities with discharges consisting of solely non-contact cooling water have not been included in this analysis.

The identification of significant point source dischargers is a dynamic process that depends on several factors including the availability and extent of PCB congener data for each discharge, the flows used for each discharge, the procedure used to calculate the loadings, the location of the discharge in the estuary, and the proximity and loading of other sources of PCBs. As a result, **the list of significant point source dischargers is subject to change both prior to December 2003 and during the development of the Stage 2 TMDLs.**

The following graphs reflect the use of the procedure and data available as of the date noted on each graph. Figure 1 presents the fewest continuous discharges with the largest PCB loadings during non-precipitation influenced events (dry weather). Figure 2 presents the fewest continuous discharges with the largest PCB loadings during precipitation-influenced events (wet weather).

Figure 1

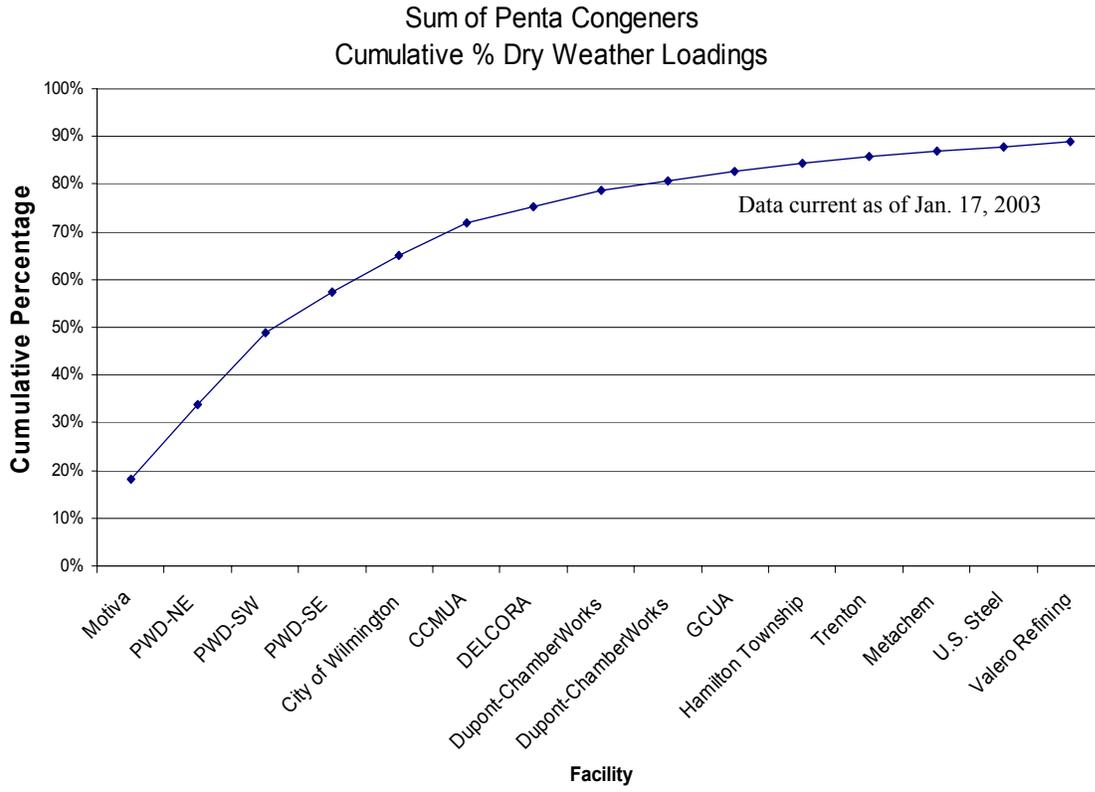
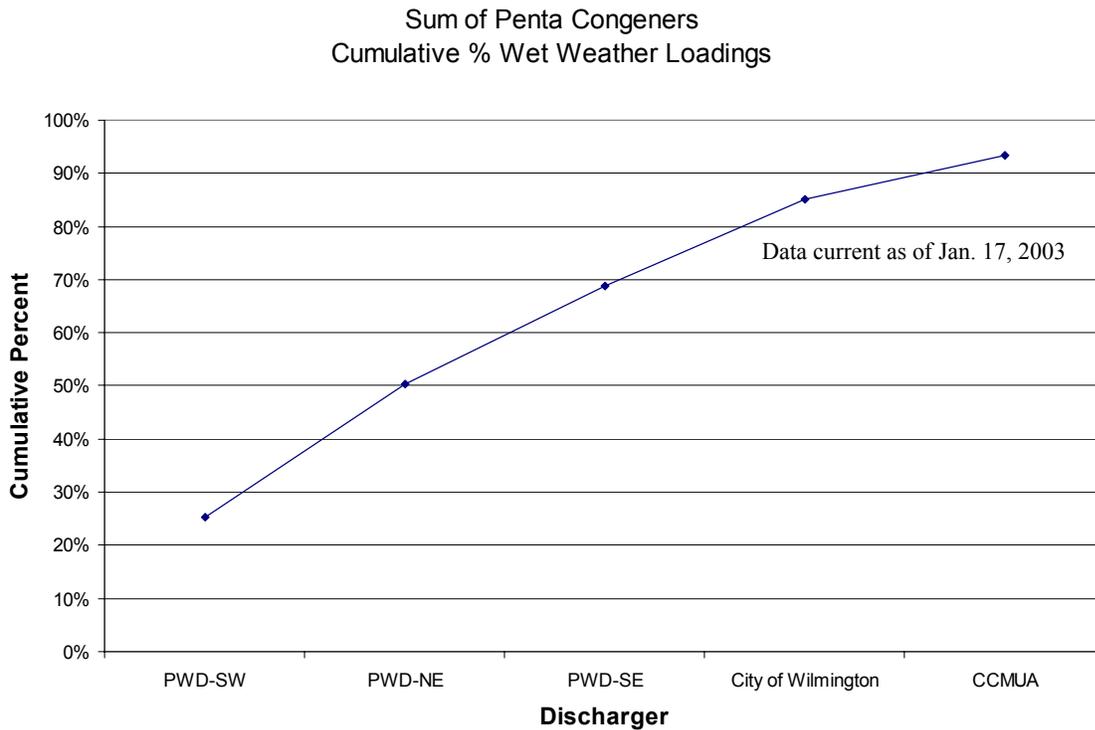
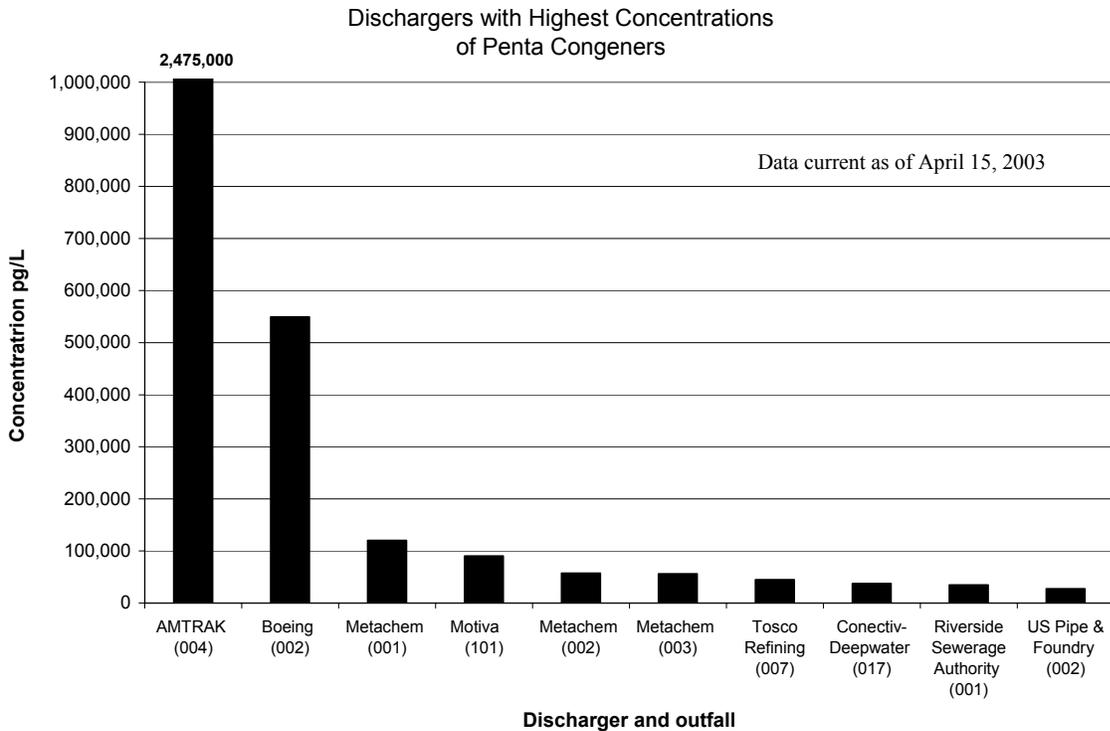


Figure 2



Stormwater Concentrations

The following graph indicates stormwater discharges with the highest concentrations of penta-PCBs.



Permit Expiration Dates for Dischargers Provisionally Identified as Significant Point Sources

The following table lists the permit expiration dates for the 16 point source dischargers identified as significant sources of PCBs using the procedures and data described above. **This list is expected to change as additional information becomes available.**

Name	NPDES No.	Permit Expiration Date
Motiva	DE0000256	August 31, 2002
Philadelphia Water Dept. – Northeast Plant	PA0026689	July 7, 2005
Philadelphia Water Dept. – Southwest Plant	PA0026671	July 7, 2005
Philadelphia Water Dept. – Southeast Plant	PA0026662	July 7, 2005
City of Wilmington	DE0020320	June 30, 2005
Camden County MUA	NJ0026182	May 31, 2005
DELCORA	PA0027103	May 22, 2005
Dupont – Chambers Works	NJ0005100	January 31, 2004
Gloucester County UA	NJ0024686	April 30, 2004
Hamilton Township	NJ0026301	July 31, 2006
City of Trenton	NJ0020923	October 31, 2006
Metachem	DE0020001	June 30, 2003
U.S. Steel	PA0013463	December 8, 2005
Valero Refining	NJ0005029	March 31, 2006
National Railroad Passenger Corp. (AMTRAK)	DE0050962	December 31, 2004
Boeing Corp.	PA0013323	January 7, 2007

Reducing Non-NPDES Sources of PCB Loadings to the Delaware Estuary

Air

- ' DRBC will seek funding sources to conduct monitoring to identify local sources, and to establish air monitoring sites for long term / regional trend monitoring.
- ' DRBC, EPA, and the states will work to identify local sources of airborne PCBs.
- ' EPA will determine projections of the long term trends for regional air concentrations of PCBs. EPA will assess existing regulatory programs for removal of other pollutants to determine if comparable airborne PCB reductions can be anticipated on a regional basis.

Tributaries

- ' DRBC will seek funding to continue tributary monitoring to identify tributaries adding a significant load of PCBs to the Delaware Estuary, and refine the loading estimates for those tributaries.
- ' The individual states will add the tributaries contributing significant loadings of PCBs to the estuary to their Section 303(d) lists for 2004, if not already listed.
- ' The individual states will reevaluate the priority of the TMDL development for those tributaries with significant PCB loadings that are already on the respective state's Section 303(d) lists.

Hazardous Waste Sites

- ' EPA will estimate PCB loads for Superfund National Priority List and Removal Response sites that have significant PCB contamination and close proximity to the estuary.
- ' The individual states will provide comparable PCB load estimates for state lead cleanup sites that have significant PCB contamination and close proximity to the estuary.
- ' DRBC will coordinate and utilize load estimates as part of the overall PCB TMDL effort for the Delaware Estuary.
- ' These sites will receive a categorical allocation in the load allocation developed for the Stage 1 TMDL. This load allocation will be updated as the analysis is refined, subsequent site reviews are made and remediation work proceeds. EPA will engage in discussions on the subject of TMDL/Superfund interface and the appropriate means to achieve WQS.

Non-point Stormwater Runoff (non-NPDES regulated sources)

- ' DRBC will develop stormwater monitoring plans and seek stable funding sources to conduct monitoring of stormwater entering the Delaware Estuary.
- ' DRBC, EPA, and the states will work to identify significant local sources of PCBs in stormwater.
- ' DRBC, EPA, and the states will work to establish BMPs to minimize discharge of PCBs from stormwater runoff.
- ' EPA and the states will work to elevate the priority for the remediation of significant stormwater discharges containing PCBs.

Contaminated Sediments

- ' DRBC, EPA, the states and other agencies will work to identify PCB hot spots in sediments in the Delaware Estuary.
- ' DRBC, EPA, the states and other agencies will work to identify strategies to address sediment contamination, which may potentially include removal as part of an alternative allocation strategy (i.e., pollutant trading approach).