



Implementing PCB TMDLs in the Delaware Estuary

A conceptual framework for addressing point source
discharges of PCBs to the Delaware River

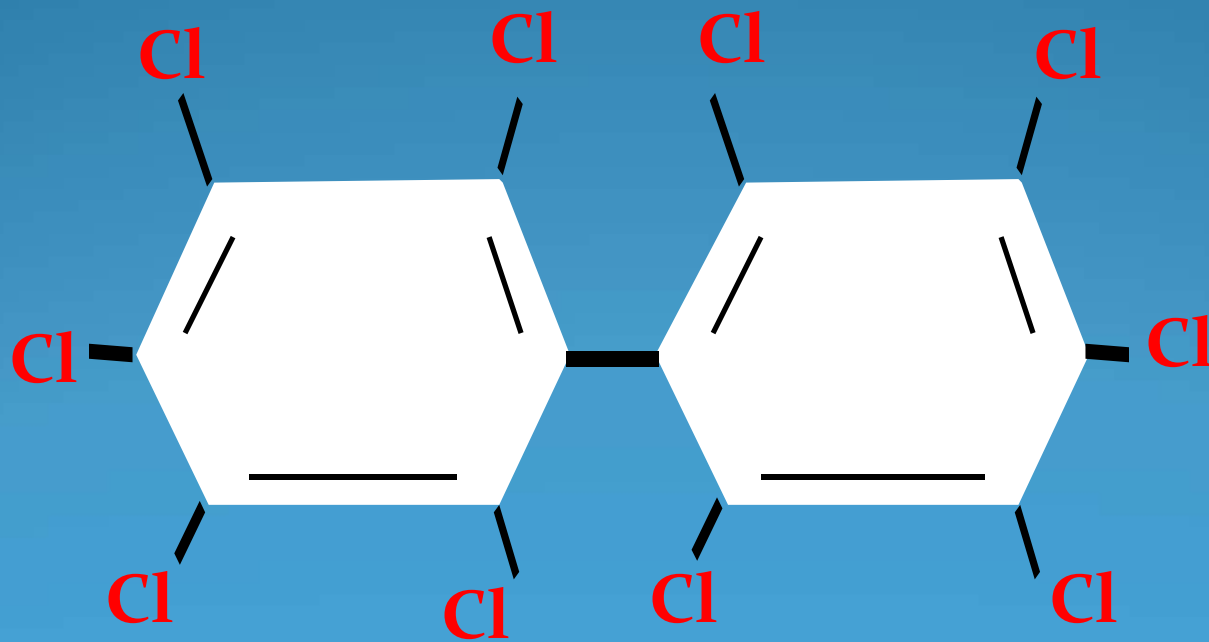
Background

- Delaware River watershed extends 330 miles from Hancock, NY to the mouth of Delaware Bay.
- Delaware Estuary portion of the Basin is 133 miles long and is bordered by DE, NJ and PA.
- Beginning in 1996, DE, NJ and PA identified the estuary as impaired due to high levels of PCBs in fish tissue – required development of TMDL.



PCBs - Background

- Polychlorinated Biphenyls or **PCBs** are a class of compounds that have up to 10 chlorine (Cl) atoms on a basic structure consisting of two connected rings of carbon atoms.





PCBs - Background

- 209 possible chlorine substitution patterns.
- Properties -hydrophobic, tend to accumulate in sediments and tissues.
- PCB Use:
 - manufacture and use was generally banned in the late 1970s, although existing uses in electrical equipment and exemptions were allowed.
 - PCBs - used in electrical equipment including transformers, paints, printing inks, lubricants, hydraulic fluids and pesticides.
 - PCBs - produced as a by-product in certain manufacturing processes.



Why are PCBs of concern?

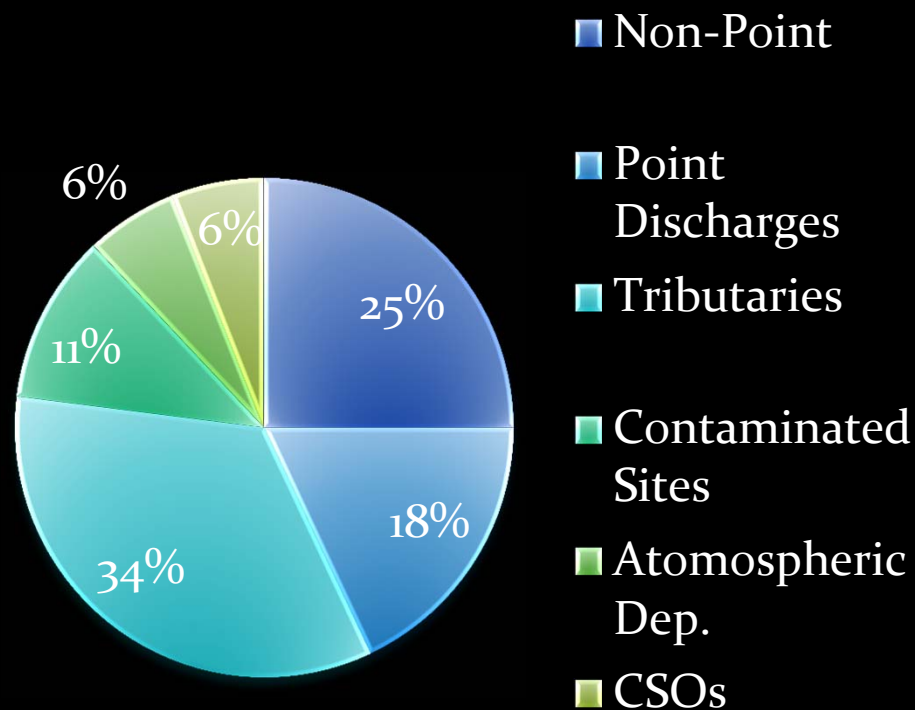
- PCBs are classified as a probable human carcinogen by the U.S. EPA.
- Exposure to PCBs has also been linked to:
 - Developmental Effects
 - Neurobehavioral Effects
 - Suppression of the Immune System



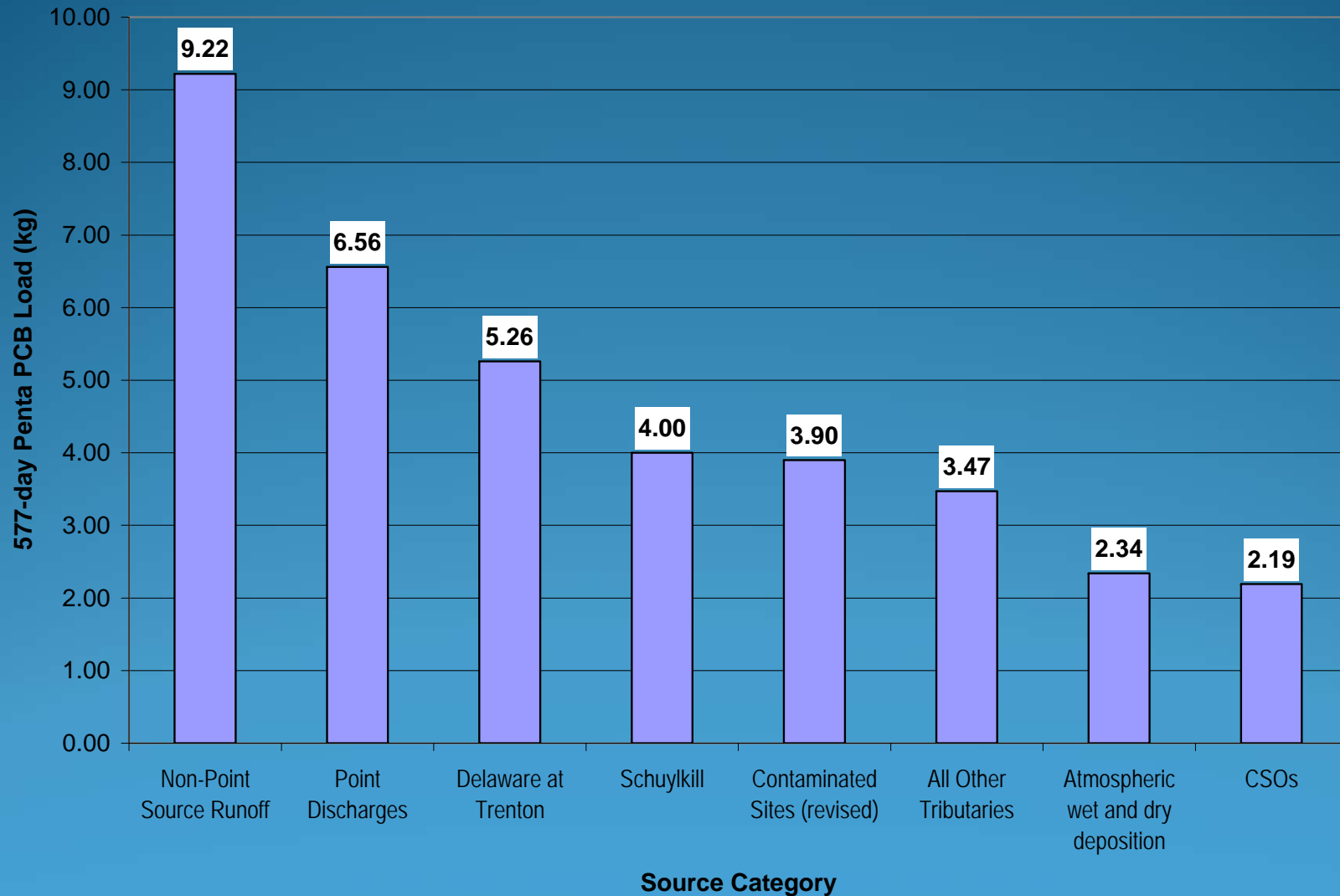
Estuary Conditions

- Current ambient PCB concentrations in the Estuary Range from 400-10,000 pg/L
- Current criteria range from 7.9 - 44 pg/L
- Main sources include:
 - active and inactive sources:
 - slow release (flux) of PCBs from estuary sediments
 - historic contamination and runoff from industrial sites and storm sewers
 - discarded transformer oil and other PCB containing products

PCB Loads by Source Category

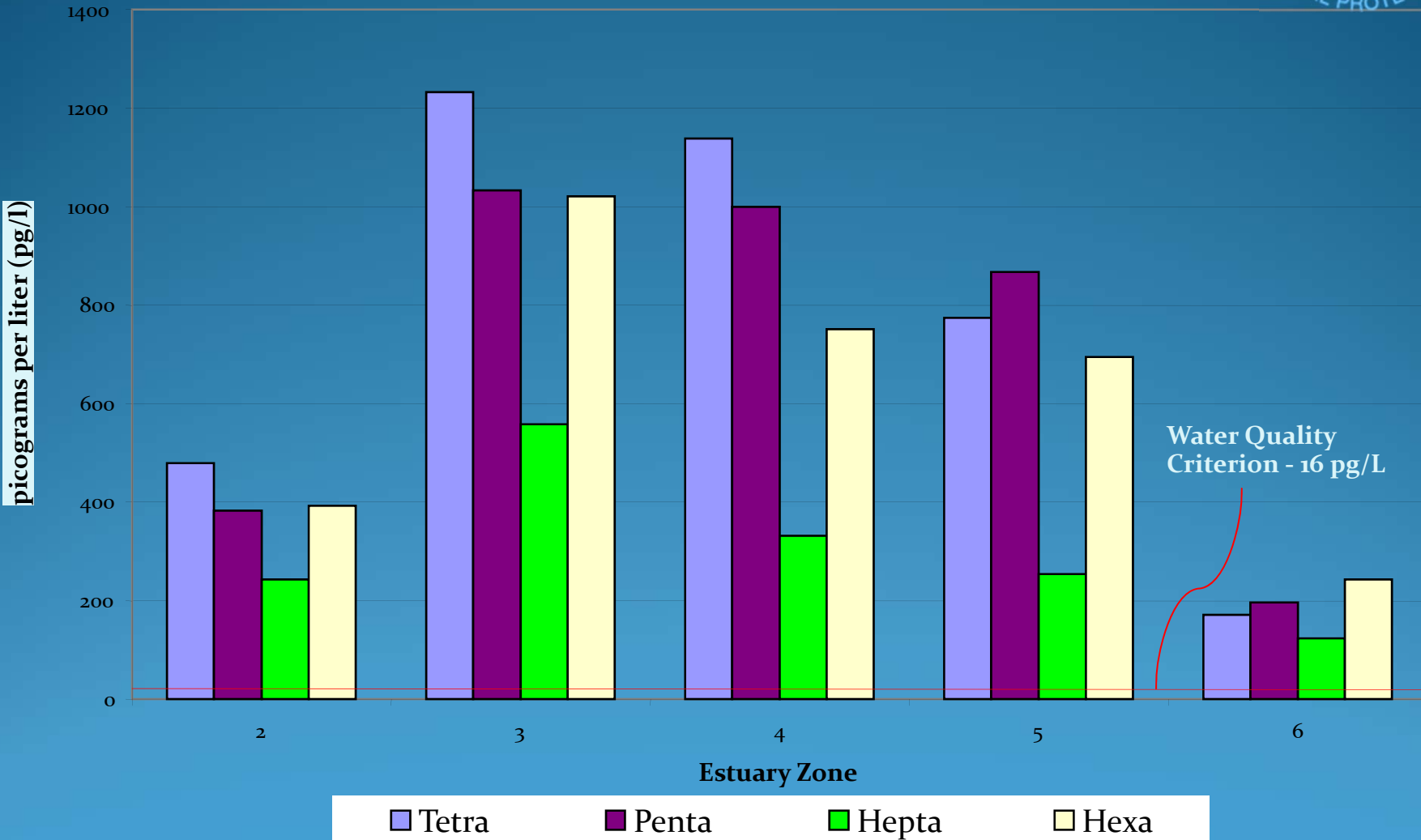


Penta-PCB load by source category - Sept. 2001 through March 2003





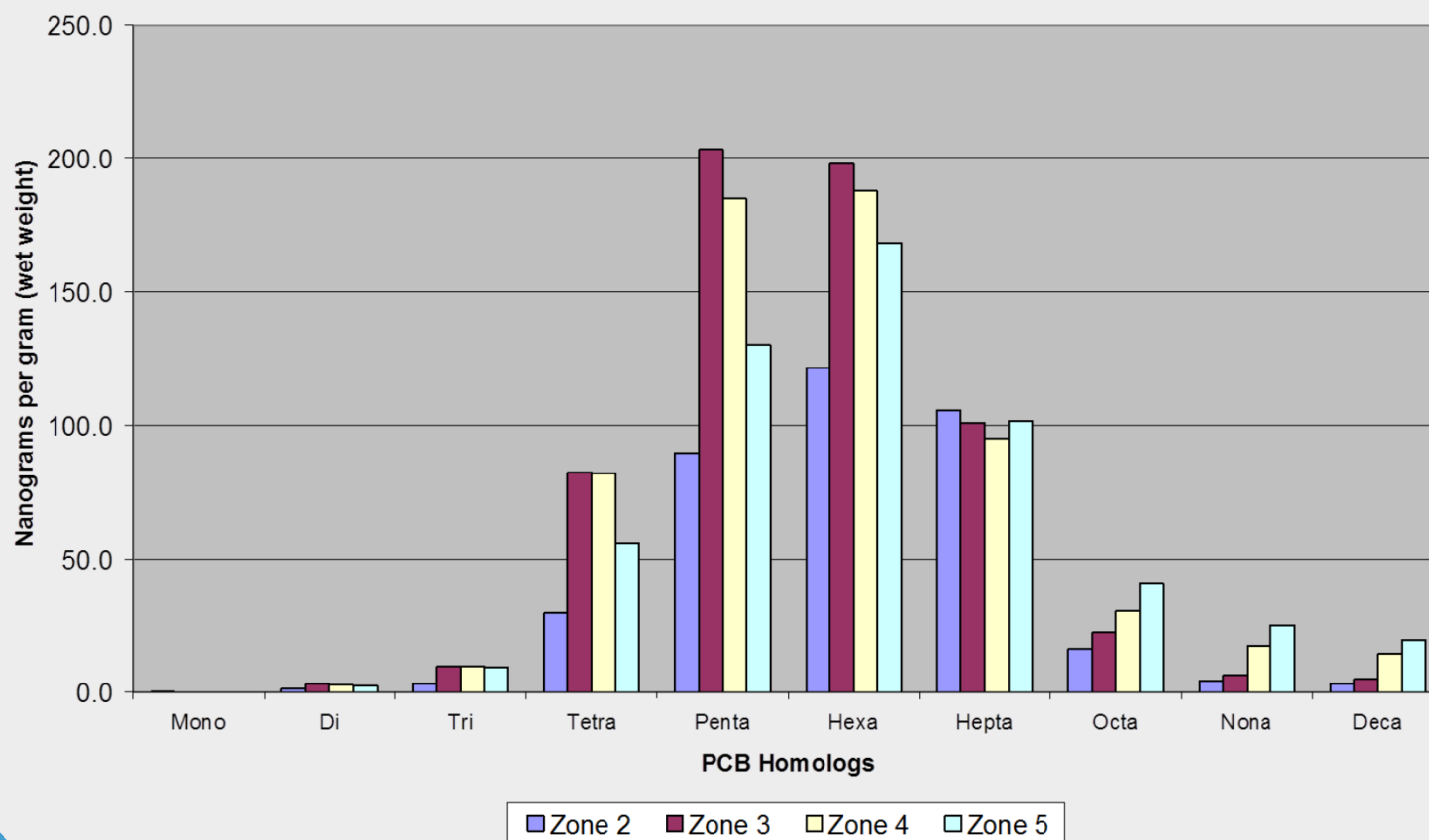
Median Ambient PCB Concentrations
Stage 1 - 2002 to 2003
Tetra through Hexa Homolog Distribution





PCB concentration in fish tissue

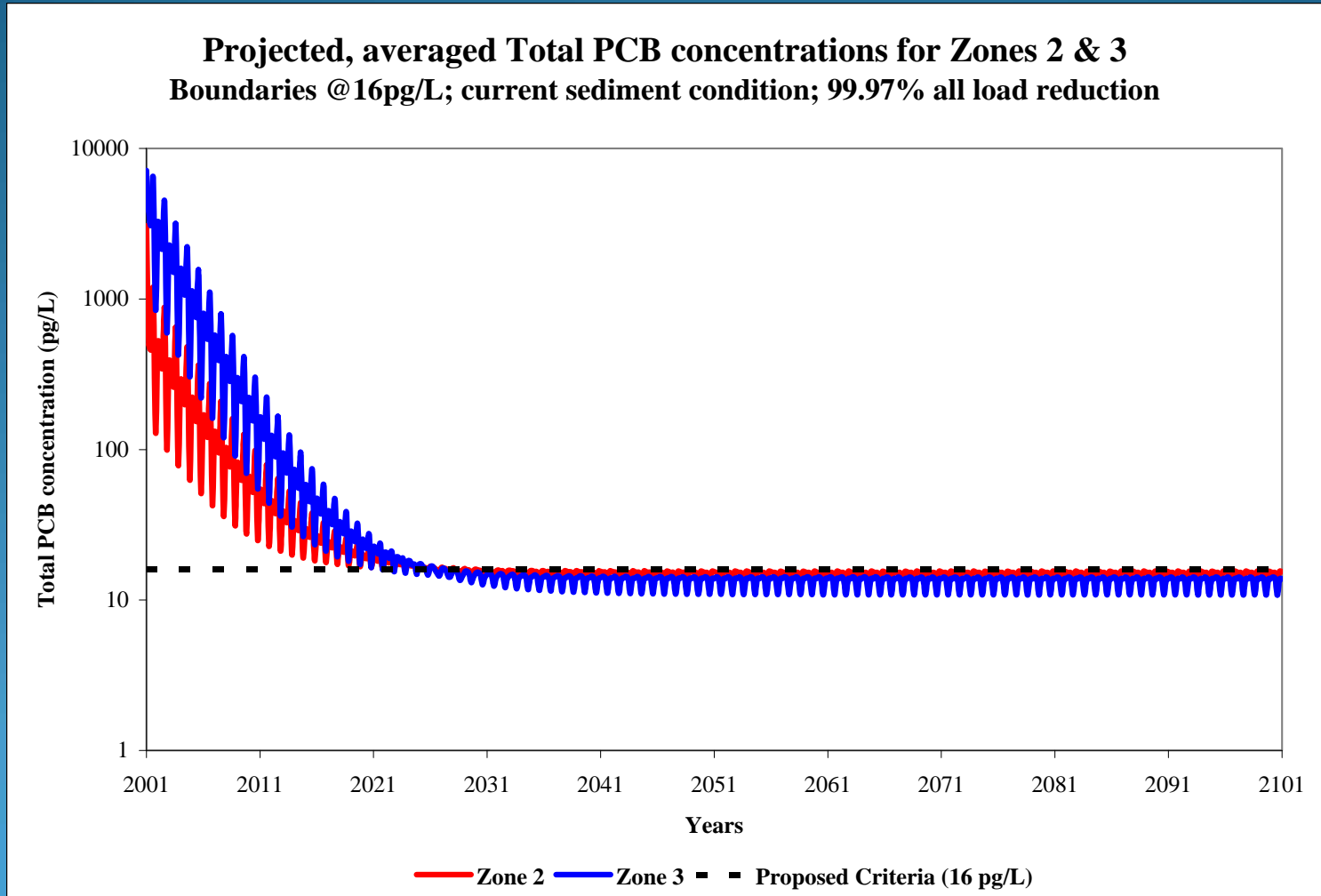
Homolog Distribution in Estuary Zones - 2003
White Perch





Achieving PCB water quality criteria

Projected, averaged Total PCB concentrations for Zones 2 & 3
Boundaries @16pg/L; current sediment condition; 99.97% all load reduction





The Challenge

- A long-term strategy for permitting point source discharges and addressing non-point sources such as contaminated sites and air sources to ensure continued progress in reducing PCBs.
- The Stage I TMDL reflected
 - Data uncertainty in PCB concentrations for point source discharges,
 - need for additional PCB model refinements and
 - uncertainty in treatment technologies.

TMDL Background

- The estuary consists of 5 water quality management units called Zones.
- EPA Regions II & III establish Stage 1 TMDLs for Zones 2 – 5 in December 2003.
- EPA Regions II & III establish Stage 1 TMDL for Zone 6 in December 2006.





Stage I TMDL Implementation

- Issuance of permits that require:
 - monitoring for 209 PCB congeners using Method 1668A
 - development and implementation of Pollutant Minimization Plans or PMPs to reduce PCB loads
- Close oversight by states and DRBC
- Commitment to a Stage 2 TMDL



Why a “Stage 2” TMDL?

- More data
- Better data
- New human health-based criterion for PCBs
 - based on most recent EPA methodologies
 - area-specific fish consumption rates
 - updated cancer potency factors
 - bioaccumulation factor specific to the Delaware River
- Improved PCB water quality model
- Adaptive management – lessons learned



Stage 2

- It seemed simple
- Key concepts:
 - a **regulatory mechanism** for driving measurable improvements to achieve long-term goal - - water quality standards
 - appropriate **interim controls and milestones** for permittees
 - **checkpoints** to evaluate progress and allow adaptive management
 - **Wasteload allocations** that derive from/comply with the applicable WQ criteria
 - **core tools** – PMPs and pollutant track down
- Legacy pollutants and the Clean Water Act – not a perfect fit
 - limitations on current technologies
 - many decades to meet effluent limits consistent with TMDL wasteload allocations



Stage 2

- What will the “regulatory mechanism” to implement the TMDL look like?
- Stakeholder concerns
 - Water quality variances or “use downgrade”
 - Numeric limits
- Alternatives explored
 - Restoration standard approach (2007)
 - implementation plan incorporated into standard itself
 - numeric & narrative baselines
 - PMPs are core
 - progressive improvement locked in during restoration periods



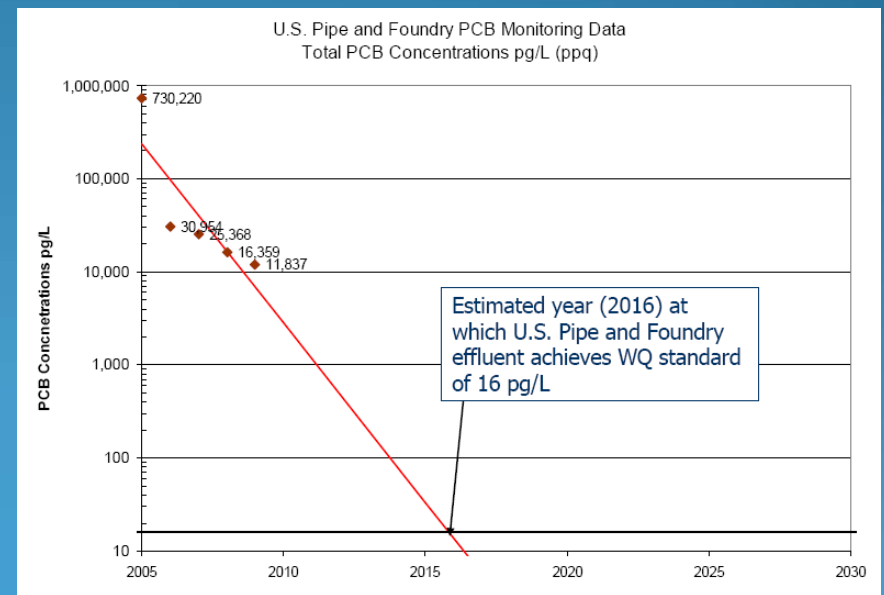
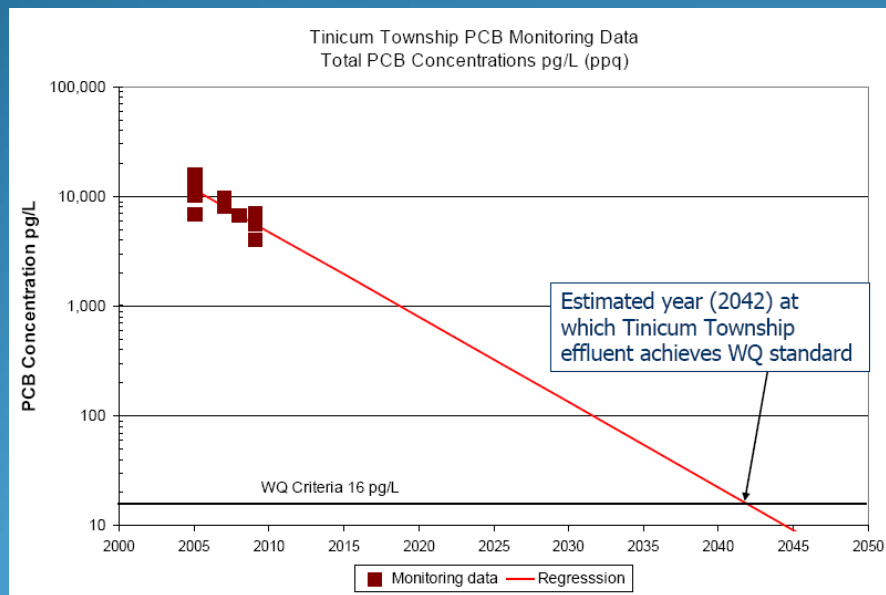
Stage 2 - Alternatives

- Permit compliance plan approach
 - interim effluent limit as baseline
 - final effluent limit specified, most likely beyond permit term
 - PMP requirement with annual milestones
 - PCB loading target to be achieved by the expiration date of the permit
- Permit compliance plan +
 - more realistic compliance schedules extending out decades
- Enhanced PMP approach



Reaching Consensus?

- Enhanced PMP approach
 - PMPs are working – load reduction at 90 of 102 point source discharges





Stage 2 – Key Implementation Elements

- **Point Source Permitting Strategy** to ensure that each discharger attains its Stage 2 TMDL wasteload allocation (WLA) as soon as possible.
- **Adaptive Management**
 - Zone-wide and estuary-wide ambient assessments
 - Rigorous **evaluation of program effectiveness** at end of each permit cycle.
- **Non Point Source Reduction Program** following DRBC's 2009 TMDL implementation plan.

Questions?

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