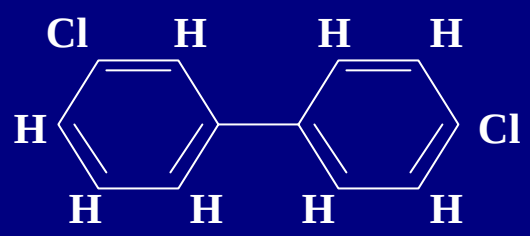
Tidal Potomac River PCB TMDL

Update to COG's Water Resources Technical Committee

May 10, 2007

What are Polychlorinated Biphenyls (PCBs)?



Example of a di-chloro-biphenyl molecule

- 209 related compounds formed by chlorination of biphenyl molecule.
- Between 1929-1977 thousands of tons of PCBs were produced and used as heat transfer, hydraulic, and dielectric fluids; also in inks, carbonless copy paper, paints, pesticides, adhesives.
- Highly fat soluble; tend to bioaccumulate; especially high concentrations in predator fish.
- 1977 - U.S. Environmental Protection Agency prohibited PCB production.
- PCB levels in the environment have generally decreased since 1977.

Health effects of PCBs

- Acne-like skin conditions in adults.
- Neurobehavioral and immunological changes in children.
- Known to cause cancer in animals.

TMDL Development Problem

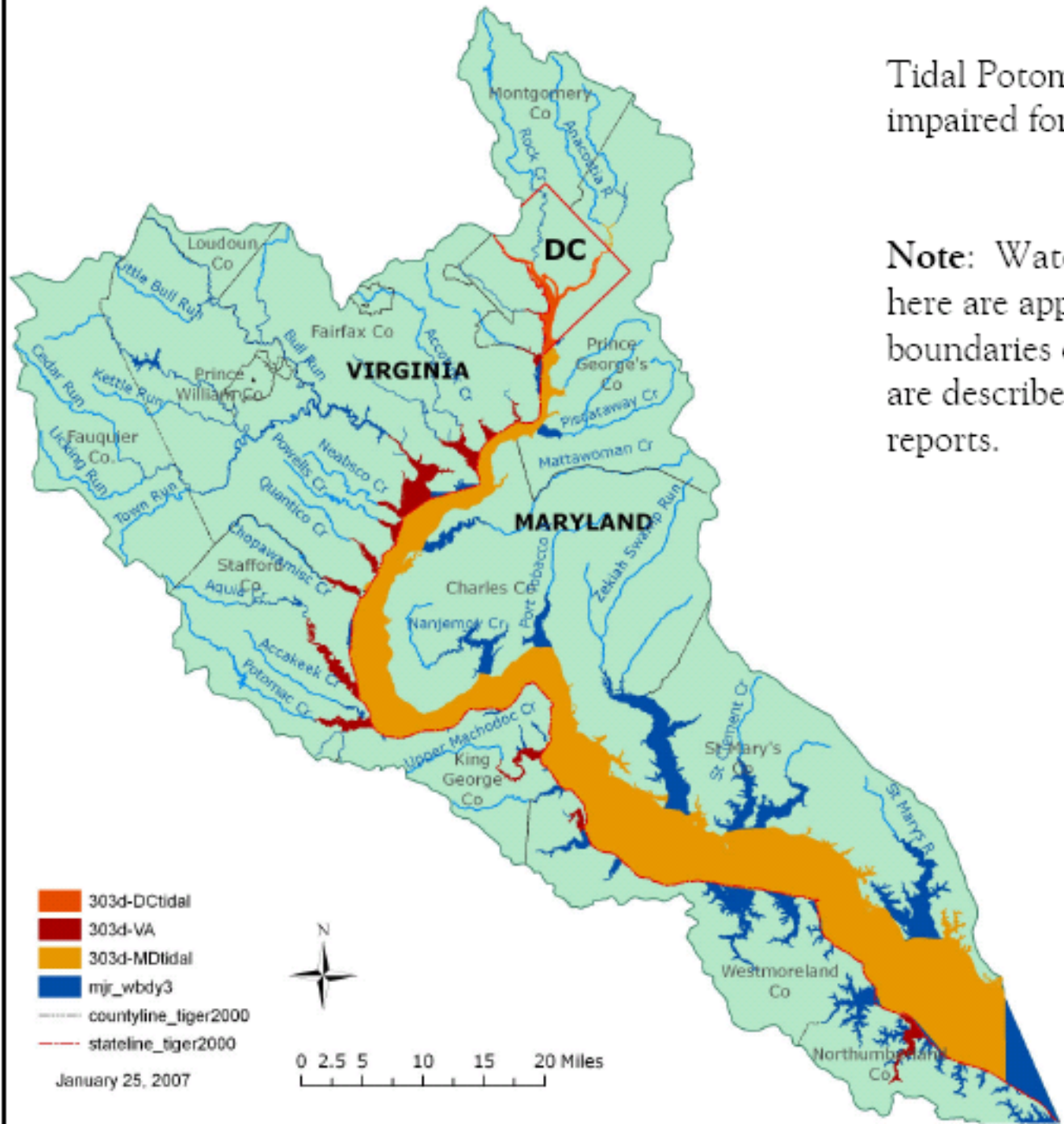
- DC, MD, and VA have placed portions of the tidal Potomac river on their 303(d) impaired waters lists for PCB contamination.
- DC consent decree requires TMDL by Sept. 2007, but MD and VA TMDLs not required until later.
- Because contaminated waters are in close proximity and it is likely that PCBs are transported across state lines, it makes sense to take a regional, coordinated approach to TMDL development.

State Criteria

	Consumption Advisories Fish Tissue (ng/g)	Water Quality Standards Total PCBs (ng/L)
DC DOH:	20 (EPA)	0.045
MDE:	78	0.64
VADEQ:	54	1.70

Applicable Designated Use

- For this Tidal Potomac PCB TMDL, it is the Fish Consumption use which is impaired, because of elevated PCB levels in fish tissue.



Tidal Potomac water bodies listed as impaired for PCBs in fish tissue.

Note: Water body boundaries shown here are approximate. Exact boundaries of impaired water bodies are described in state 303d/305b reports.

Summary: PCB concentrations in Potomac River water

	t-PCB (ng/L)
Chain Bridge	0.8-3.9
Anacostia River	5.6-6.4
Anacostia River (Foster, 2000)	2.0-28.9
Potomac River mainstem	0.1-4.8
Potomac River (Foster, 1996)	0.5-3.6
DC DOH:	0.045
MDE:	0.64
VADEQ:	1.70

PCB External Load Categories

- Chain Bridge ~ 41%
- Direct drainage ~ 28%
- Atmospheric deposition ~ 14%
- Tributary loads ~ 8%
- CSO discharges ~ 5%
- Point sources ~ 4%
- Contaminated sites ~ 0%
- Reminder: These are draft estimates of external PCB loads.

Phase V Watershed Model Land Use Assessment

- Nine non-agricultural land uses including:
  - Low Intensity Pervious Urban
  - High Intensity Pervious Urban
  - Low Intensity Impervious Urban
  - High Intensity Impervious Urban
- Sixteen agricultural land uses
- Calibrated flows will help drive the hydrodynamic model
- Calibrated loads of TSS and organic carbon will be inputs to the PCB model

Hydrodynamic Model

Hydrodynamics (DYNHYD5)

- Builds upon Chesapeake Bay Environmental Model Package, Toxics Anacostia Model, and Dynamic Estuary Models
- 1D branched spatial grid
- Anacostia and Virginia embayments
- 1994-1996 calibration

PCB Model

- PCB Mass Balance (WASP 5)
  - PCBs follow the organic carbon
  - Builds upon Delaware River Estuary PCB TMDL model
  - 1:1 spatial mapping between DYNHYD5 and WASP5
  - 2D horizontal spatial grid
  - 2004-2005 calibration
- Model grid based on CBP model
  - Original grid (~12K cells)
  - Aggregated grid (250 cells)

TMDL Development Schedule

- Calendar 2005
  - Compile historical data 2005
  - Select modeling framework 2005
  - New PCB samples in water, sediment, & WWTPs 2005-2006
  - 1st Technical Advisory Committee (TAC) Meeting Sep 2005
- Calendar 2006
  - 2nd TAC: Intro to model and load estimation methods Jan 23, 2006
  - Hydrodynamic / Salinity Model completed Feb 2006
  - 1st Round Public Stakeholder Meetings Jun 2006
  - 3rd TAC: Initial estimates external PCB loads by source Oct 31, 2006
  - Interim version of PCB model Dec 31, 2006
  - Draft loading summary document Dec 31, 2006

TMDL Development Schedule

- Calendar 2007
  - 4th TAC: Revised external PCB loads, Initial model runs Jan 30, 2007
  - Final validated PCB model Feb 23, 2007
  - Meet with WWTP operators Feb 22/23
  - Closing date for comments on loadings report Feb 28, 2007
  - Draft report on PCB model calibration April 1, 2007
  - 5th TAC: TMDL scenarios & model runs May 31, 2007
  - Draft PCB TMDL to states for internal review May 1, 2007
  - Final Modeling Report Jun 1, 2007
  - Final draft TMDL report for public review June 15, 2007
  - 2nd Round public stakeholder mtgs & comment period June 15–August 1, 2007
  - TMDL report submitted to EPA Sep 1, 2007
  - EPA approval of TMDL Sep 30, 2007

Implementation Considerations

TMDL Development Process - Implementation

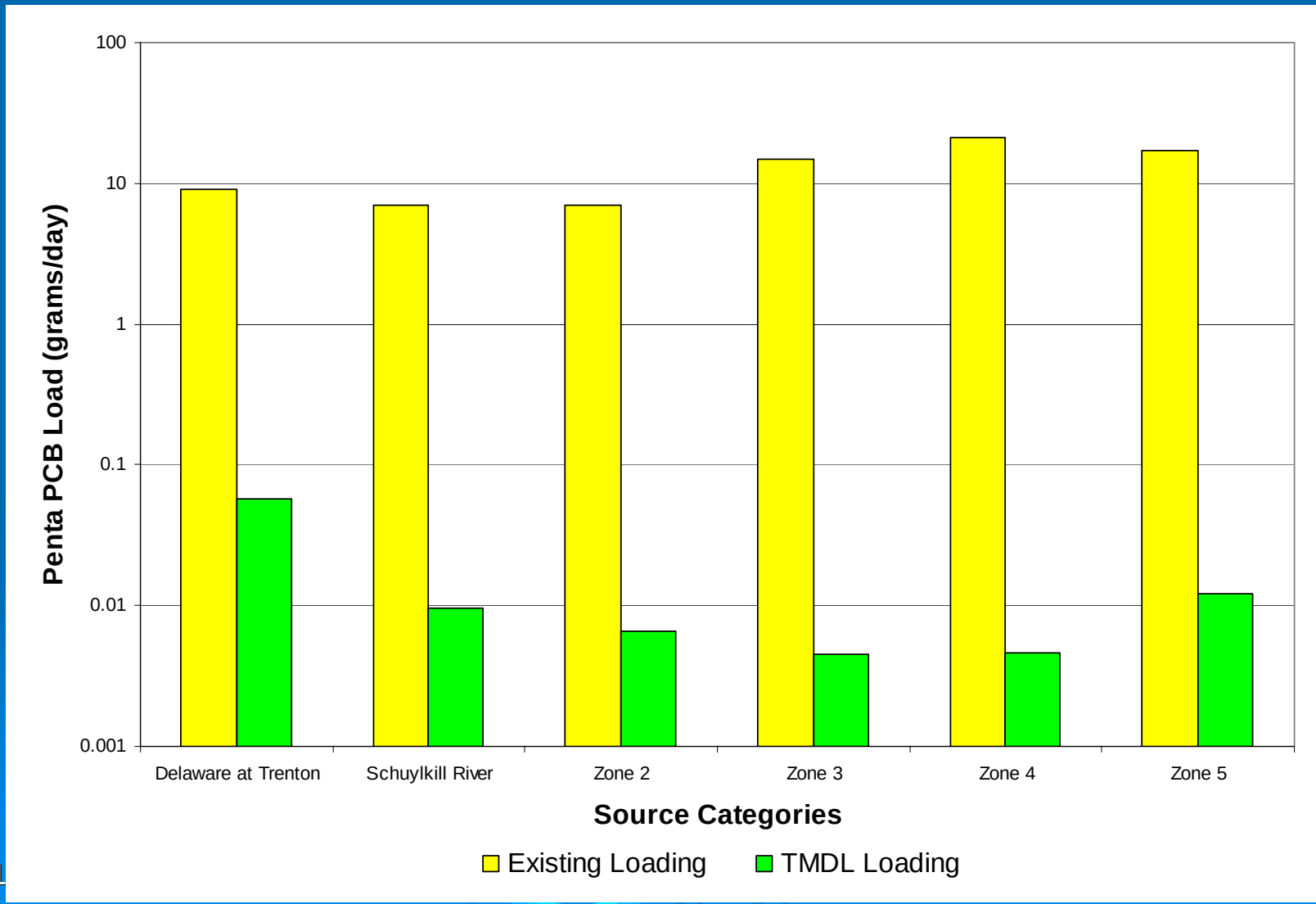
- EPA requires “reasonable assurance” of implementation (DC/MD/VA). Virginia also requires an Implementation Plan.
- Note that all NPDES permits must be consistent with the TMDL WLA, and all such permits must be submitted to EPA for review.
- Future ongoing monitoring to detect resulting improvements in water quality is likely.

TMDL Development Process - Implementation

It is too early to tell what specific Implementation Activities might be recommended for the Potomac Estuary….

But the Delaware River Basin Commission (DRBC) experience can be a useful reference…..

Existing Loads vs. TMDL Loads Delaware River



DRBCs PCB Implementation Strategies

- "On December 3, 2003, the DRBC passed Resolution 2003-27 authorizing and directing the Executive Director to require dischargers and other responsible parties to conduct monitoring and/or other data collection and analyses to further characterize point and non-point loadings of toxic contaminants, including PCBs, to the Delaware Estuary for purposes of developing and implementing TMDLs or actions under the DRBC Water Quality Regulations."

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DRBCs PCB Implementation Strategies

- Requirements in NPDES permits or through DRBC regulations may include:
  - The use of Method 1668A, a highly sensitive analytical method capable of detecting very small amounts of PCBs, for any monitoring of influent and effluent to better quantify individual PCB congeners;
  - The development of a PCB minimization plan; and
  - Implementation of appropriate PCB minimization measures identified through PCB minimization planning.

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DRBCs PCB Implementation Strategies

Remove PCBs from the Environment

- Prioritize and clean up PCB-contaminated sites
- Investigate, track and report annually on the progress being made
- Investigate and analyze options for addressing and remediating PCBs behind dams.
- Investigate and periodically consider bio-remediation and other new technologies

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DRBCs PCB Implementation Strategies

Remove PCBs Currently in Use Before They Enter the Environment

- Institute voluntary program to remove or replace electrical equipment containing PCBs
- Conduct education and outreach activities to targeted groups such as demolition contractors, Brownfields redevelopers, municipalities, building inspectors, scrapyards, fire departments, recyclers and others.

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DRBCs PCB Implementation Strategies

Human Risk Reduction

- Recognize and endorse programs that are addressing risk reduction strategies (e.g., multicultural outreach for fish consumption advisories)

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Implementation is likely to include risk management…

Questions?