Delaware River Basin Commission

Implementation of the PCB TMDLs in the Delaware Estuary and Bay

EPA Region III

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February 20, 2018

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Outline

- PCBs structure and nomenclature
- PCB TMDL background
- Data Quality Objectives and Data Management
- Goal of PCB Trackback
- PMP Elements and Approaches
- Examples

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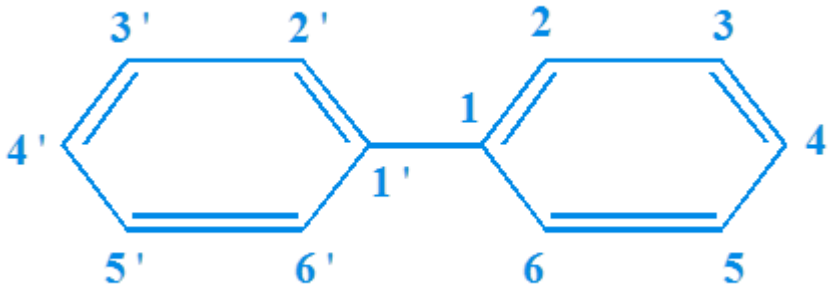

PCB Chemistry

- Polychlorinated biphenyls (PCBs) are man-made organic chemicals with a biphenyl base structure and 209 possible chlorine substitution patterns.
- Terminology: Aroclors, congeners, homologs.
- Properties: Hydrophobic, accumulate in sediments and tissues *(§303(d) listing of the estuary and bay by all 3 estuary states based upon fish tissue contamination is driver for PCB TMDLs)*
- Carcinogenic, and non-carcinogenic

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Point Source Requirements
Stage 1 TMDLs

- Implementation requirements for point sources. Requirements consisted of:

    a. Monitoring using a sensitive analytical method (Method 1668A) for all 209 congeners.

    b. Develop and implement a Pollutant Minimization Plan (PMP) to identify and reduce sources of PCBs.

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Standardized Data Quality Objectives

Reduce analytical uncertainty and improve comparability between samples by:

- Establishing sample collection and identification protocols
- Specifying DRBC project specific analytical (Method 1668A) and reporting protocols to achieve detection limits in the single pg/L range
- Establishing Method and Rinsate blank contamination acceptability criteria
- Incorporating all data into an Access database

Monitoring Resources http://www.nj.gov/drbc/quality/toxics/pcb.html

Benefits of Standardized Sampling and Analysis

- Greater accuracy in estimated loadings
  - Including fingerprinting and evaluation of trackback efforts
- Increased modeling accuracy
- More accurate long-term trends analysis
- Better temporal and spatial evaluation of data
- Data reliability and transferability

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Pollutant Minimization Plans (PMPs)
Initial Plan Elements

1. Good Faith Commitment
2. Facility Description and Contact Information
3. Known and Potential Source evaluation
4. Strategy for Identify Unknown Sources (Track-Down)
5. Previous Minimization Activities and Measures
6. Source Prioritization
7. Key Dates
8. Measuring, Demonstrating, and Reporting Progress
9. Annual Report

PMP Resources:
http://www.nj.gov/drbc/programs/quality/pmp.html

PMP Review

- The Commission jump started the PMP process by requiring 42 discharges to develop initial PMPs beginning in 2005 using its own authority.
- Subsequent PMP requirements were incorporated into NPDES permits as were the continuation of existing PMPs originally required by the Commission.
- Initial PMP reviews were undertaken by Commission staff and subsequently by State representatives and if adequate, a completeness determination letter was issued and the PMP clock started

Preparation and Submission of a PMP Annual Report

Five Main Elements in the Annual Report:

1. PMP Achievement Executive Summary
2. Revisions to PMP
3. Material and Process Modifications
4. Measures to Address Known, Probable, and Potential Sources
5. Incremental and Cumulative changes from the baseline loading
6. Tabular Summary

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PMP Implementation Approaches

- Identify Known or Potential PCB Sources
  - Transformers and switches
  - Contaminated soils
  - Hydraulic fluids
  - Lubricants, gasket sealers, paints, plasticizers, adhesives
- Control solids
  - Stormwater controls, geotextile filters
  - Remove pathways for contaminated solids
  - Cleaning sediment from interceptors and pump stations
  - Increasing solids removal from municipal and industrial treatment systems
- Investigate inadvertent PCB production

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Trackback Strategies

- Develop strategy for collecting samples “upstream” of discharge to more accurately identify areas of concern
- Review pretreatment and residual program permits to identify potential sources of PCBs
- Identification of PCB contaminated sites using
  - EPA and State lists
- Use The North American Industry Classification System (NAICS) to identify potential sources
- Use Geographical Information System (GIS) approach to focus trackback efforts

Trackback Goals:
Identify sources of PCBs and reduce loadings

- Develop sampling and analytical plan
  - Identify sampling locations
  - Grab vs composite
  - Dry and/or wet weather samples
- Select a method which is sufficiently sensitive to provide the PCB information need to calculate PCB mass:
  - *PCB Conc. X Flow= PCB mass*

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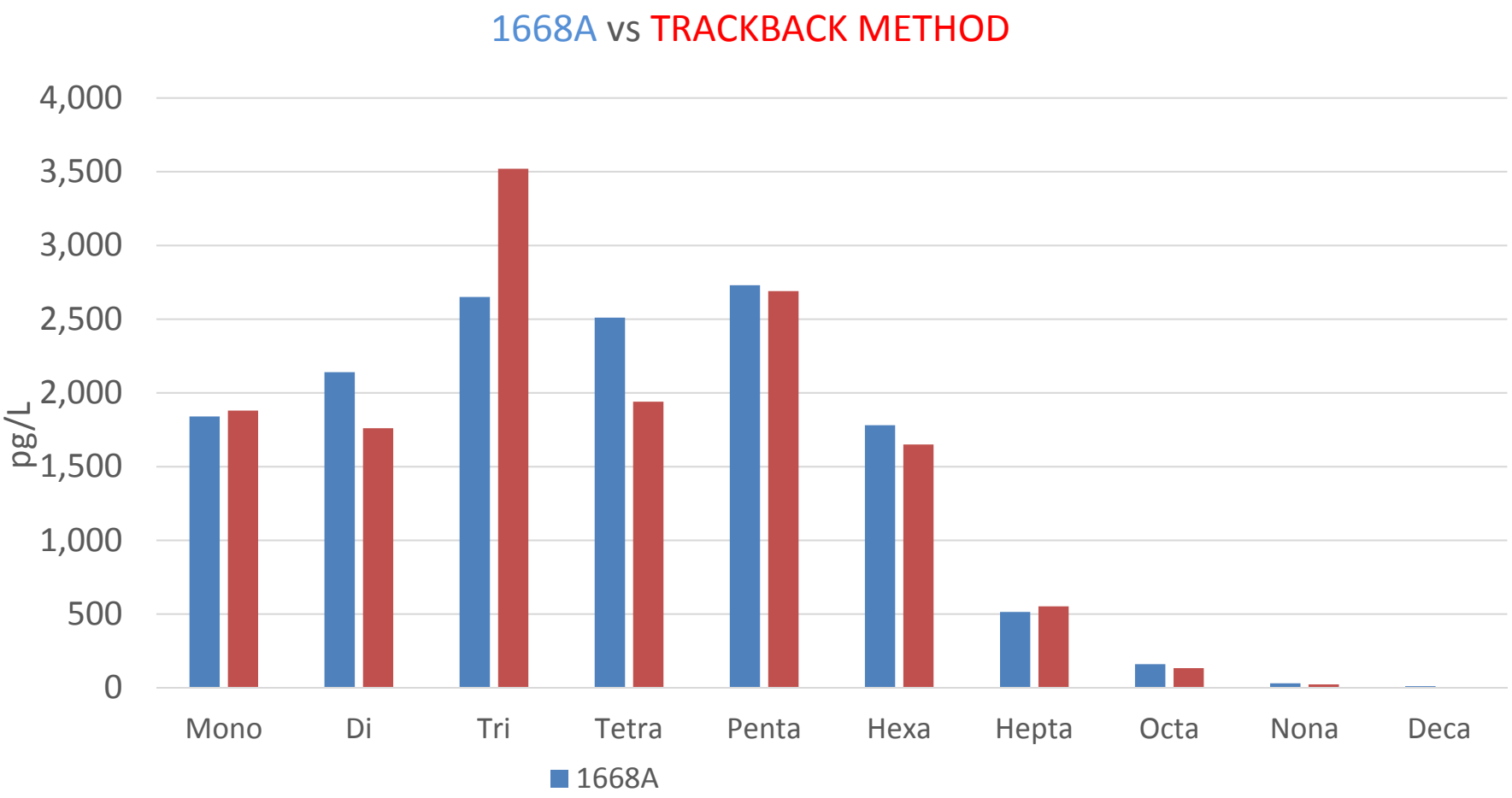
Selecting Sufficiently Sensitive Method

- Understand your existing data
  - What samples have been collected and where (maps help)
  - Summarize analytical results and identify methods used
  - Use data to identify potential sources
  - Select appropriate method for additional trackback efforts to meet Data Quality Objectives (DQOs)

Other Analytical Trackdown Methods

Method	Advantages	Disadvantages
608 *(GC/ECD)*	None, but cheap	High detection limits (ppb) (uses unweathered commercial Aroclor mixtures as standards, does not detect congeners)
8082a *(GC/ECD)*	Identifies Aroclors and 19 selected congeners	Limited results for congeners, high detection limits (ppb)
680 *(HRGC/LRMS)*	Reports homologs and all 209 congeners (can detect weathered congeners)	Detection limits (sub-ppb) but depending on expected concentrations may yield ND results
Trackback (HRGC/HRMS) *Similar to 1668A*	Reports homologs by summing congeners	Detection limits similar to 1668A

Comparison of Results
(from the same water sample)



Analytical results provided by Pace Labs

Effective Sediment Control

- Historical Foundry Site
  - Manufactured iron pipe from recycled and new material
  - Stored scrap metal on-site
  - Legacy site >100 years old
  - Storm water effluent contaminated with PCBs

Foundry Stormwater Outfall

Year	PMP Initiatives	Analytical Results
2007	Existing sedimentation basin no treatment	118,923 pg/L
2008	Sediment removed from basin and filtration system added	847 pg/L
2009	Filtration system failed and demolition of facility began	47,651 pg/L
2010	Demolition continues increasing sediment load	94,821 pg/L
2011	Demolition completed and rerouting of additional stormwater to sedimentation basin. Increased sediment trapping in stormwater drains	35,086 pg/L
2012	Filtration system under repair (during sample collection). Identification of remaining potential sources	33,434 pg/L
2013	Filtration system repairs completed. Continued system Maintence. Begin re-grading and seeding to reduce runoff	1,519 pg/L

Effective Trackback Strategies
Municipal Facility

- Permitted capacity 134 mgd (CSO system)
- Average dry weather flow ~80 mgd
  - ~10 mgd from City of Wilmington
  - ~70 mgd from New Castle County
- Total sewershed 2,150 sq. miles
- 200 miles of sewer lines most >90% combined
- 500,000 people served

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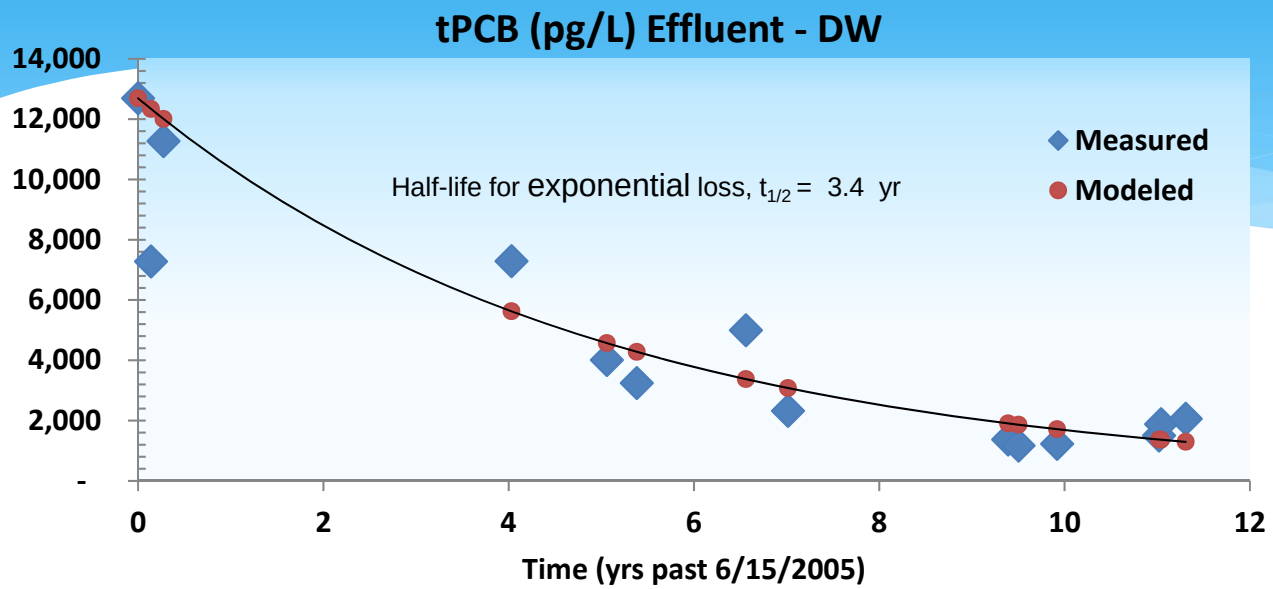
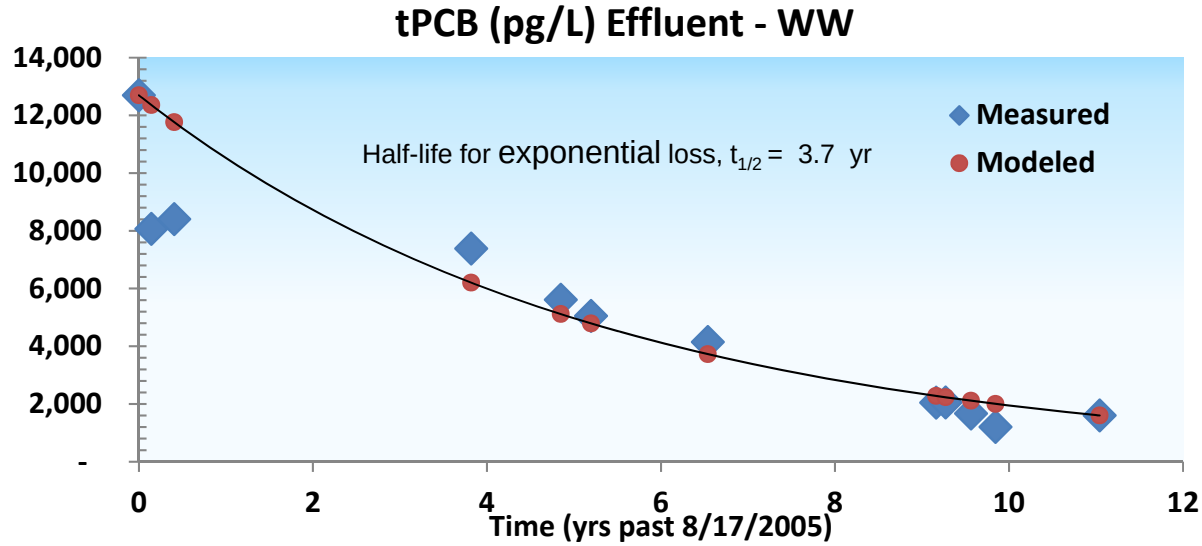
Ongoing Solids Removal Program from Interceptors

Year	Tons	lbs	lbs PCB removal*
2006	1,676	3,352,000	1.676
2010	374	748,000	0.374
2011	138	276,000	0.138
2012	463	926,000	0.463
2015	150	300,000	0.15
Total	2,801	5,602,000	2.801
*Assuming 1 ppm tPCB (50% moisture)			

City of Wilmington
PCB Loadings Reductions 2005-2016 (81%)





Graphs courtesy of Dr. R. Greene, 2017

Delaware Department of Natural Resources and Environmental Control, Dover DE.

Trackdown Study Design

- Define objectives and methods
  - Identify loadings by geographical area (concentration x flow)
  - Select sampling conditions (dry or wet weather)
  - Chose sampling method (grab or composite 24hrs)
  - Select analytical methods (1668A, 680, 8082A, other)
  - Other parameters
- Identify sampling drainage areas and associated pump stations
  - Coverage should include all influent flows to the WWTP
    - Include a pair influent and effluent sample to the WWTP
- Coordinate activities (New Castle County)
- Have a plan to manage the data

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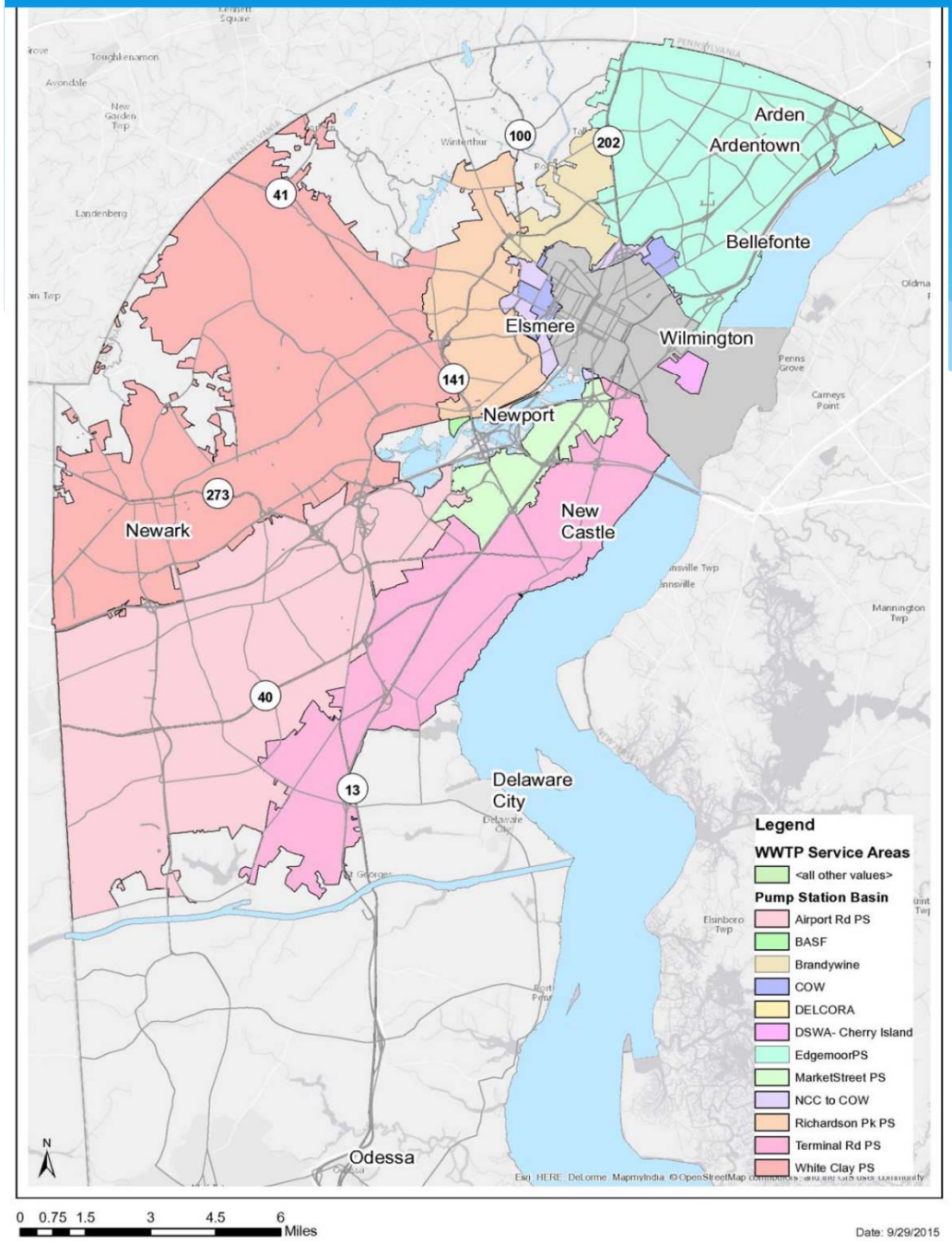
Watershed Map



Sampling Location	City of Wilmington	NCC
WWTP Influent	x	
WWTP Effluent	x	
11th Street P.S.	x	
12 Street P.S.	x	
DSWA	x	
Edgemoor P.S.		x
Terminal Ave. P.S.		x
Airport Rd. P.S.		x
Richardson Park P.S.		x
White Clay P.S.		x
S. Marker Street P.S.		x
Brandywine Park P.S.		x
BASF		x

Results May 2015 Dry Weather Sampling

Sample Location	Service Area	5/17/2015 - DW Flow (MGD)	Total PCB (pg/L)	PCB Load (g/d)
A.Pump Stations				
South Market Street P.S.	NCC	0.96	34,300	0.12
Terminal Avenue P.S.	NCC	4.60	14,600	0.25
White Clay P.S.	NCC	15.81	52,800	3.16
Richardson Park P.S.	NCC	3.35	211,000	2.68
Airport Road P.S.	NCC	10.89	2,180	0.09
Edgemoor P.S.	NCC	9.97	51,465	1.94
11th Street P.S.	COW	20.45	120,000	9.30
12th Street P.S.	COW	0.18	18,800	0.01
B.Other Misc.Locations				
Brandywine Meter (enters 11th St. P.S.)*	NCC	-	244,000	-
BASF (goes directly to COW STP)	NCC	0.50	50,200	0.10
DSWA(goes directly to COW STP)	COW	0.21	437,989	0.35
Total		66.92	-	18.02
Total from NCC Service Area		46.07	-	8.35
Total from COW Service Area		20.85	-	9.67
% from NCC Service Area		0.69	-	0.46
% from COW Service Area		0.31	-	0.54
% Brandywine Meter to 11th St. P.S.		-	-	-
WWTP Influent		**66.92**	**-**	**-**
WWTP Outfall		**69.65**	**1,227**	**0.32**

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Results March 2015 Wet Weather Sampling

		3/11/2015 - WW - .60" Rain		
Sample Location	**Service Area**	**Flow (MGD)**	**Total PCB (pg/L)**	**PCB Load (g/d)**
A.Pump Stations				
South Market Street P.S.	NCC	1.91	10,011	0.07
Terminal Avenue P.S.	NCC	8.49	10,775	0.35
White Clay P.S.	NCC	29.21	49,564	5.49
Richardson Park P.S.	NCC	5.65	105,461	2.26
Airport Road P.S.	NCC	16.66	8,302	0.52
Edgemoor P.S.	NCC	30.10	2,156	0.25
11th Street P.S.	COW	50.70	28,968	5.57
12th Street P.S.	COW	0.14	74,103	0.04
B.Other Misc.Locations				
Brandywine Meter (enters 11th St. P.S.)*	NCC	-	70,478	-
BASF (goes directly to COW STP)	NCC	0.70	112,823	0.30
DSWA(goes directly to COW STP)	COW	0.28	357,095	0.38
Total		143.84	-	15.22
Total from NCC Service Area		92.72	-	9.23
Total from COW Service Area		51.12	-	5.99
% from NCC Service Area		0.64	-	0.61
% from COW Service Area		0.36	-	0.39
% Brandywine Meter to 11th St. P.S.		-	-	-
WWTP Influent		**143.84**	**14,556**	**7.94**
WWTP Outfall		**141.38**	**1,671**	**0.90**

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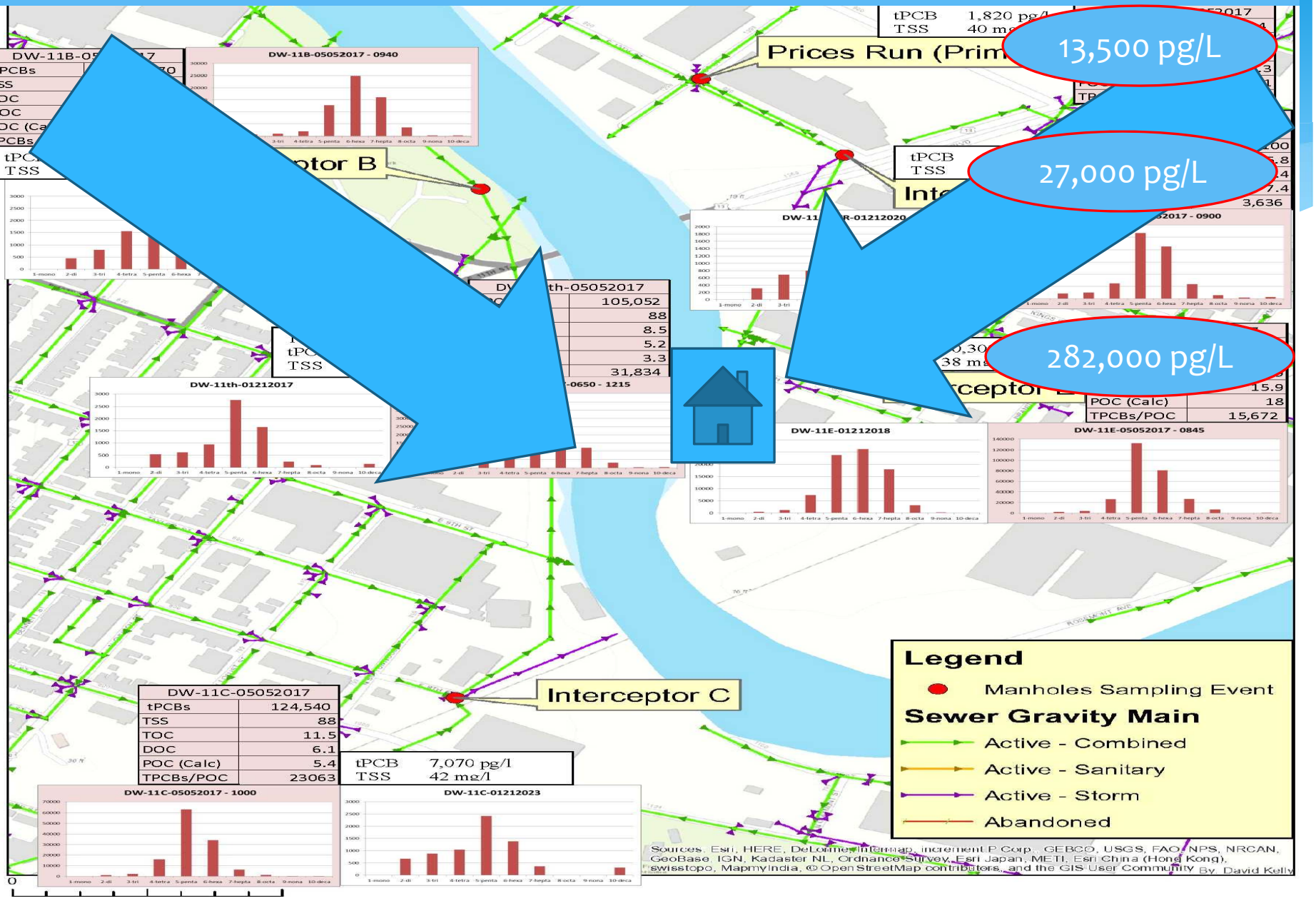
11 St. Pump Station Trackdown

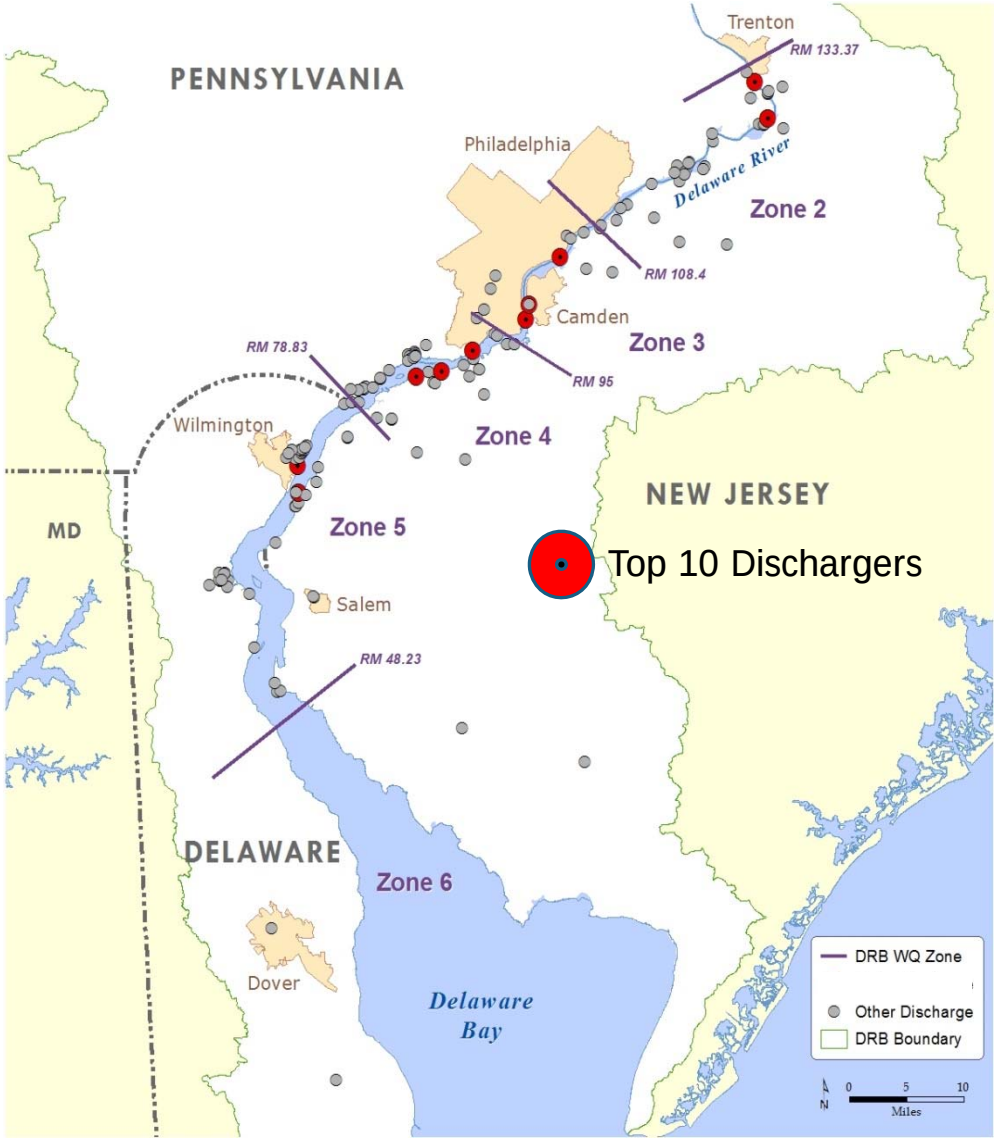


Commission's Responsibility in the PCB TMDL

- Commission maintains PCB database for three states
  - provides template for submission and datachecker
  - Coordinates with States, dischargers, consultants and laboratories.
- Provides technical review of the annual PMP reports to discharges and state representatives.
  - Reviews data and interpretation and offers suggestion for future trackdown efforts
  - PMPs reviewed by Commission Staff in 2017

State	PMPs reviewed by Facility
Delaware	13
New Jersey	39
Pennsylvania	29
Total	81

Point Source Monitoring



Since 2005 monitoring using 1668A was required of all dischargers using a standardized approach.

Monitoring was initially required by the Commission in 2005 and subsequently incorporated in NPDES permits upon reissuance.

PMP development was required either through NPDES permits or directly through Commission regulations beginning in 2005

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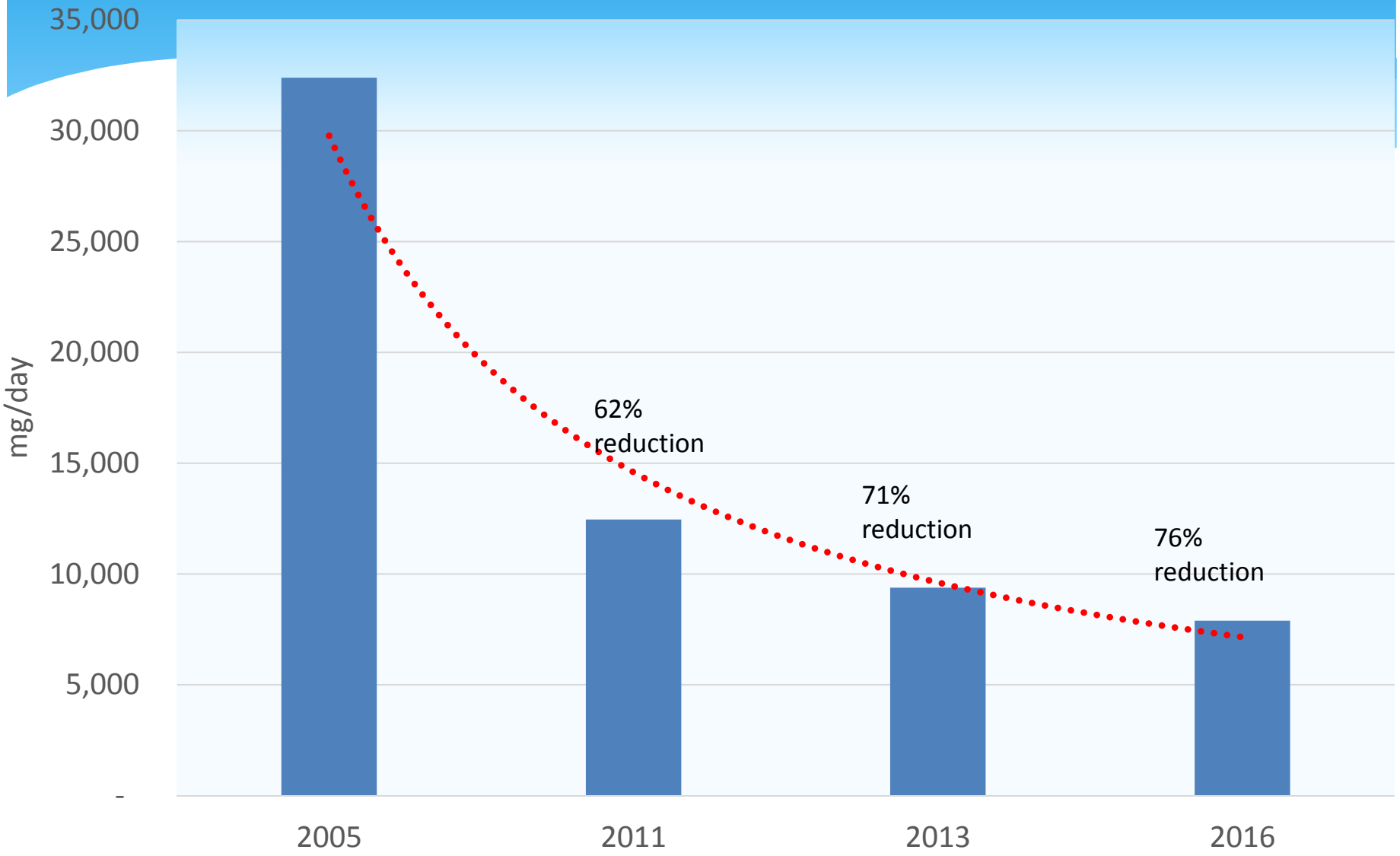
Top Ten PCB Point Source Loading Revisited

Top 90% of all P.S. Loadings (2005)	Loadings mg/day (2005)	Percent Reduction 2005-2016
Valero Refining	11,047	91%
U.S. Steel	7,008	85%
PWD-NE	4,049	73%
PWD-SW	3,141	32%
City of Wilmington	2,723	81%
PWD-SE	1,431	54%
Dupont-ChamberWorks	945	44%
CCMUA	921	68%
Trenton	664	24%
Dupont-Repauno	463	61%
Total	32,391	76%

PCB Loadings Top Ten Dischargers from 2005

mg/day



Conclusions

- The Implementation of the PCB TMDLs in the Delaware Estuary and Bay has achieved remarkable success, but more needs to be done. Essential elements include:
  - Requiring consistent monitoring (Method 1668A) and reporting methodologies and a centralized database management system to track reductions
  - Continued implementation of PMPs which provide a framework for evaluating PCB loadings and subsequent reductions by:
    - Identifying and removing active sources
    - Trackdown of legacy contamination and implementation of remedial measures
  - Review of annual reports and providing feedback to dischargers thereby fostering a environment of collaboration.

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Questions?

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