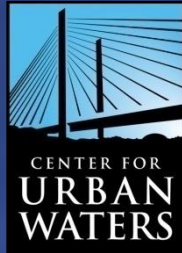


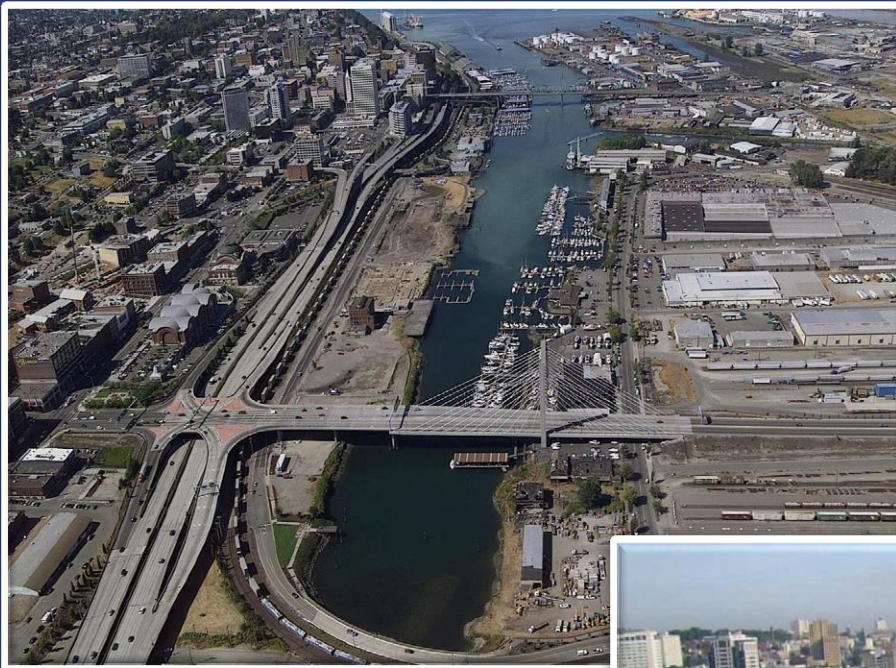
Improving Water Quality in an Urban Watershed

Washington Stormwater Conference
November 6, 2014



Lorna Mauren, P.E.
City of Tacoma
Environmental Services Department

Starts with the Foss Superfund Cleanup

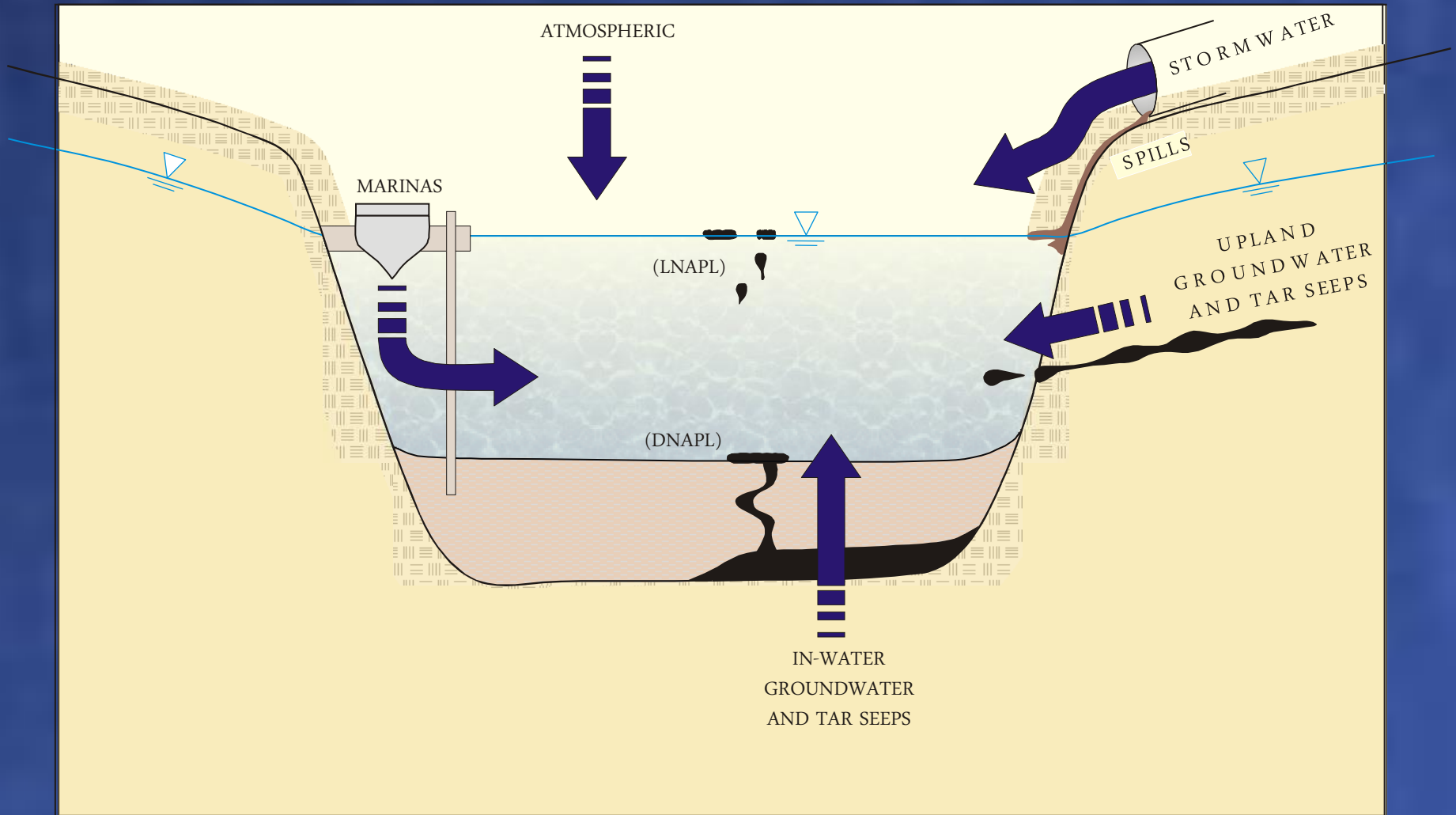


Over \$100 million invested to clean and cap the waterway.

- Reduce or eliminate contaminant sources to the waterway so that ratepayer investment is protected!



Waterway Pollutant Sources



Thea Foss Waterway - Background

1983 – Designated a unit in the Commencement Bay Superfund Cleanup

2001 – City, EPA and Ecology entered an agreement known as the Foss Work plan

- Aggressive source control paired with monitoring
- Focused on the watershed
- Program intent to prevent recontamination

2006 – Cleanup of the waterway complete

- \$105 million

Current – 12 years of monitoring data from 7 outfalls show Tacoma's program is successful.

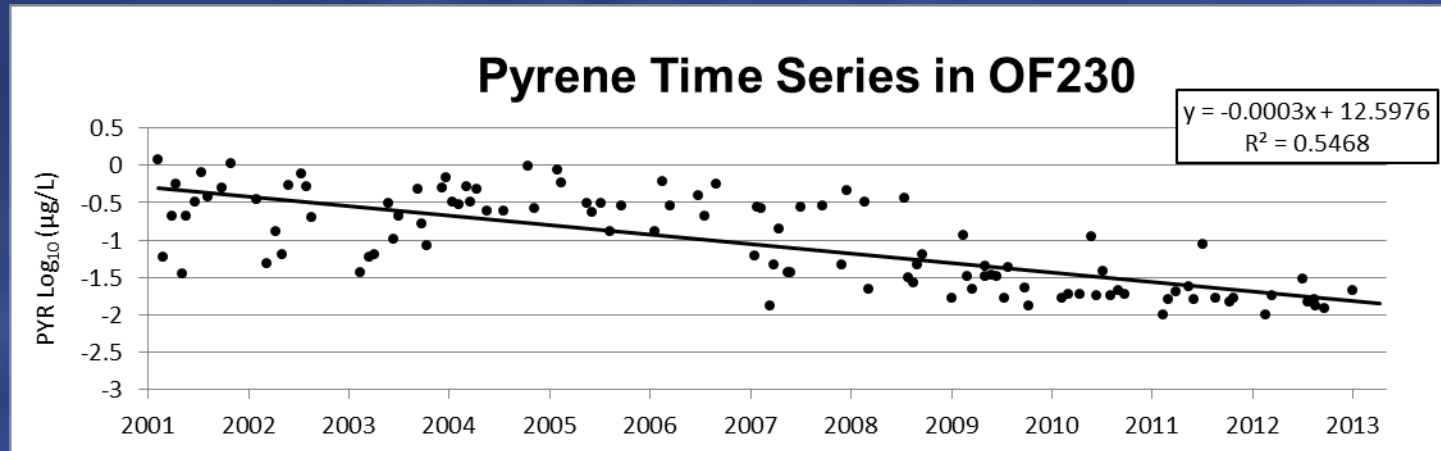
Monitoring Results – Year 12

- 1481 Upland samples collected at 7 outfalls
 - 322 Baseflow
 - 846 Stormwater
 - 313 Sediment samples
- 90% of trends show statistically significant decreases
- Improvement from last year

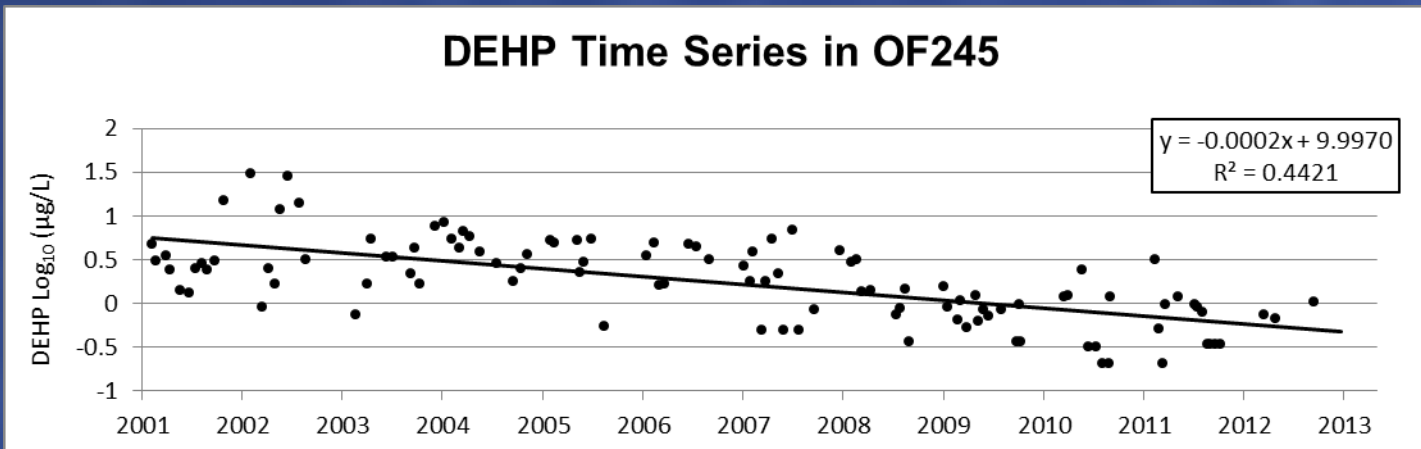


Monitoring Results – Year 12

97% Reduction,
>99.9% Confidence

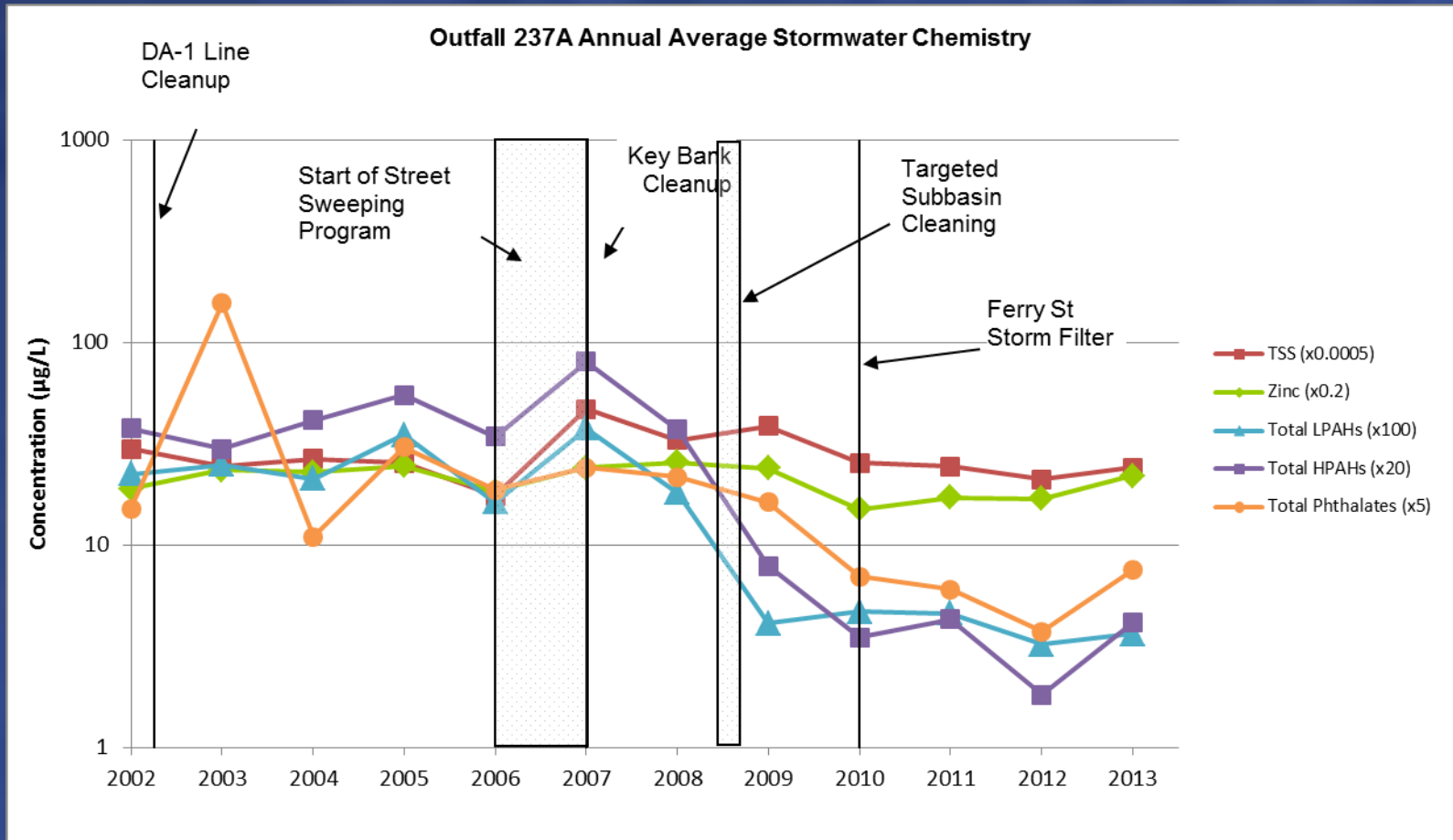


DEHP Time Series in OF245



92% Reduction,
>99.9% Confidence

Program Timelines and Trends



Source Control / Monitoring

- Source Control, Spill response, Business Inspections
- Sampling to determine progress
 - 7 outfalls and in associated tributary areas
 - Samples collected for stormwater, baseflow and sediment

Source control Investigations and Enforcement



Business Inspections



Sediment Traps



Whole Water Monitoring



Spill Response



Enhanced Maintenance

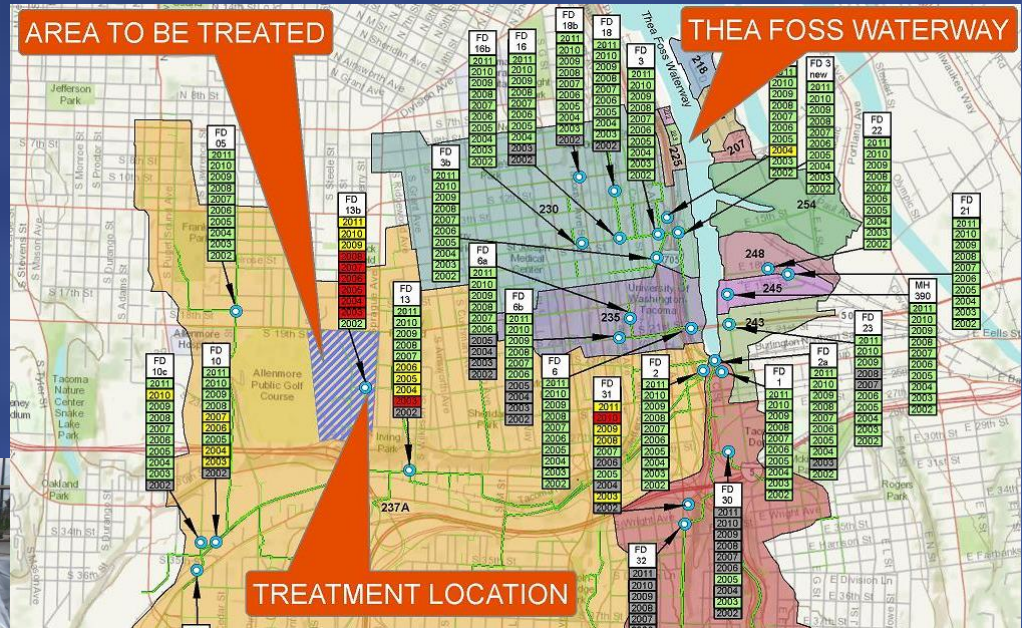
1. Scrub the storm system to remove chronic contaminants
 - \$375,000/year
 - 75 tons removed
 - 28 miles/year
 - \$13,000/mile of pipe

2. Remove more sediment from our streets. Avg. data per sweeper.
 - \$150,000/year
 - 850 tons removed
 - 15,000 miles/year
 - \$35/mile of road



Treatment – the final step

In spite of source control, identification and removal of a leaking fuel line and system cleaning... one area was still high in PAHs.



Treatment Retrofit - 2010

- \$1 million construction cost
- \$30,000 / year maintenance
- Treats 50 acres

Enhanced Maintenance vs. Treatment

Pipe Cleaning Project –

- \$300,000 (2007)
- 150,000 feet cleaned
- Improves 600 acres
- Continuing to monitor to determine return interval



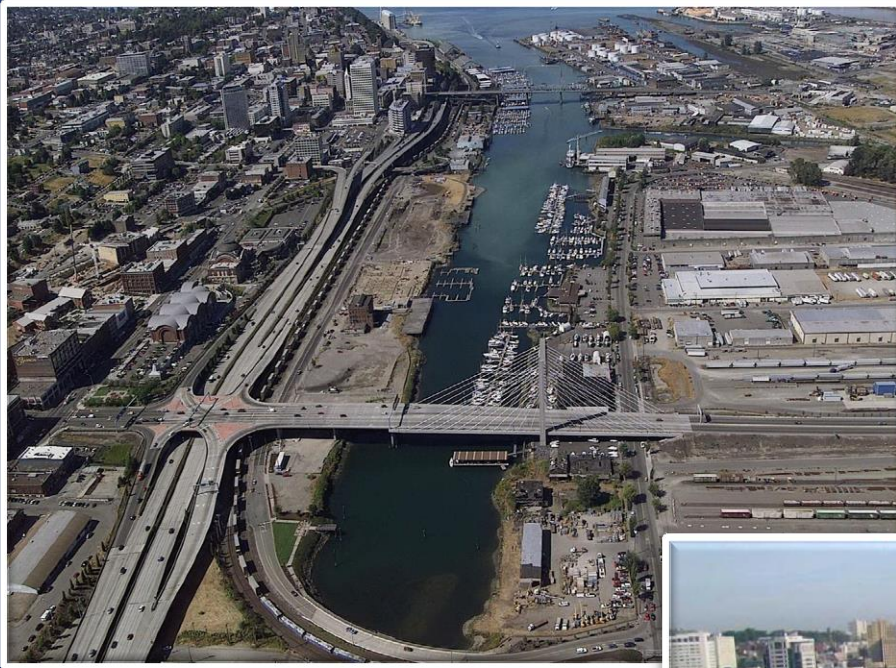
Treatment retrofit –

- \$1 million construction cost
- \$30,000 per year maintenance
- Treats 50 acres

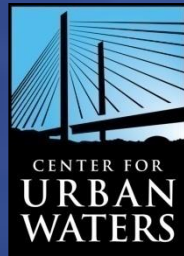


Lessons Learned

- Hierarchy of stormwater management includes 3 steps:
 1. Source Control
 2. Enhanced Maintenance
 3. Treatment Retrofit where issues remain
- Its all about the maintenance!
- Going forward:
 - Continue to sample and adapt programs



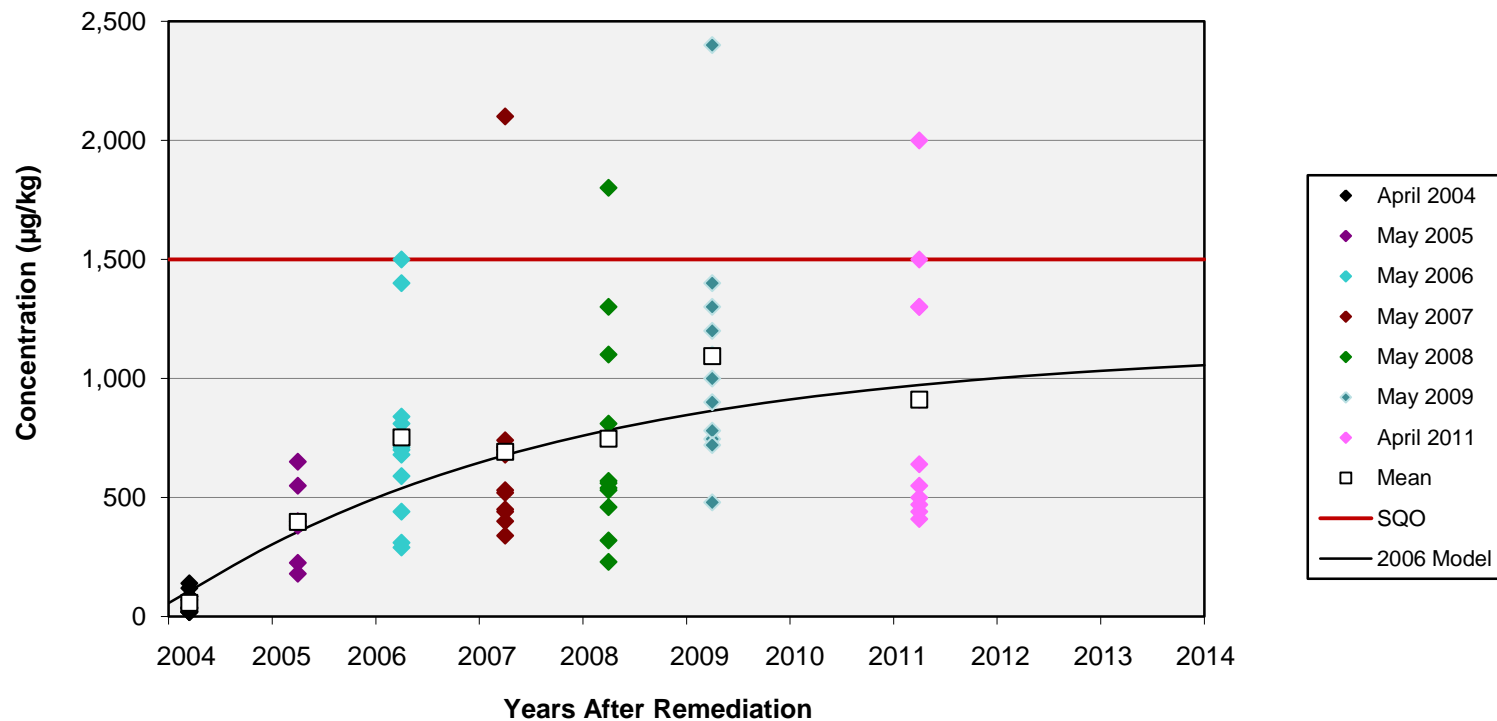
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In-Waterway Sampling: Post Cleanup

Polyaromatic Hydrocarbon (PAH)

Phenanthrene



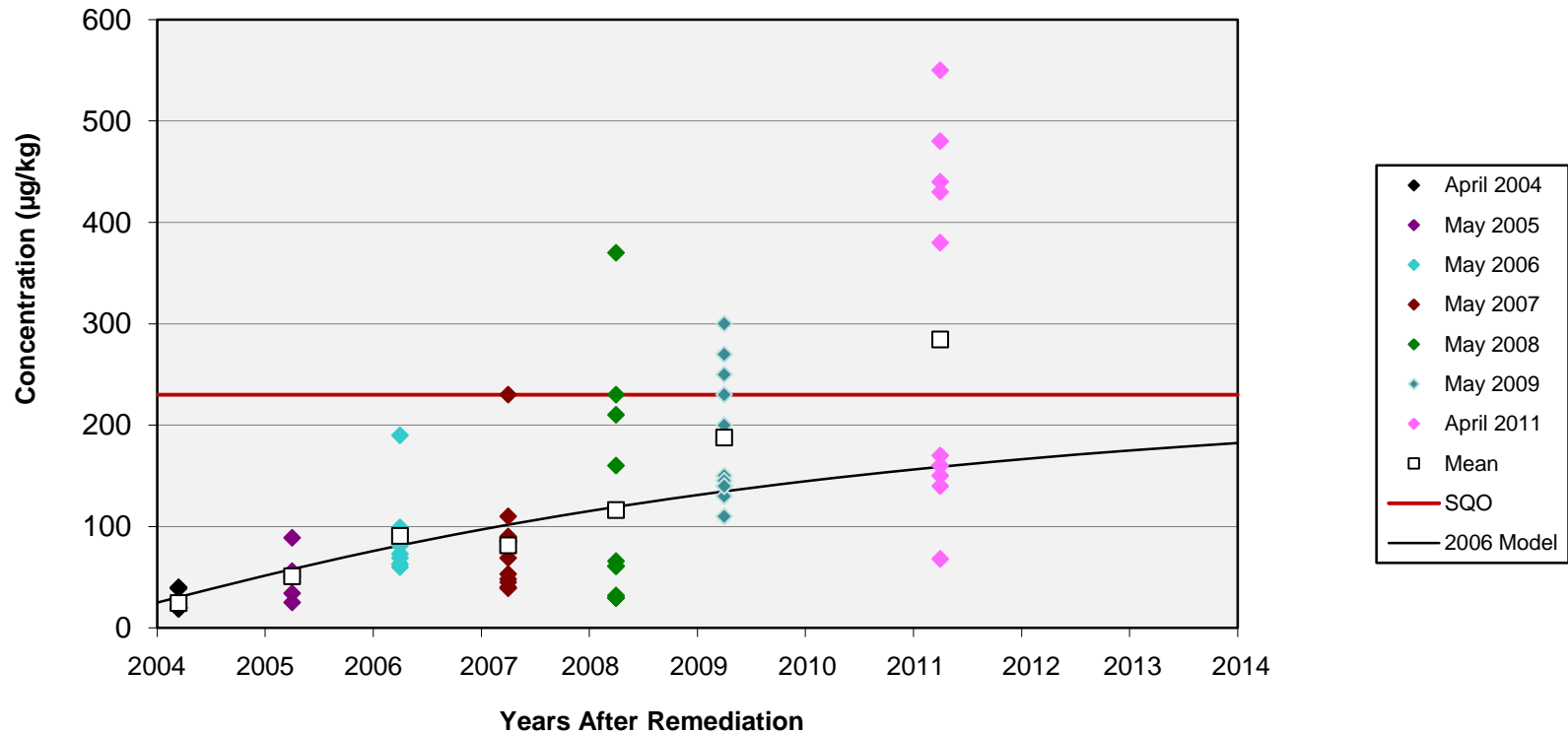
In-Waterway Sampling: Post Cleanup Phthalates

Bis(2-ethylhexyl)phthalate



In-Waterway Sampling: Post Cleanup

Dibenzo(a,h)anthracene (PAH)



Data Summary

- Increasing number of downward trends and improving stormwater water quality!
- In general, waterway sediments are remaining below sediment quality objectives (SQOs).
- Phthalates generally exceed SQOs, but were projected to do so. This legal substance is common to urban landscapes.
- Continue to watch one sediment trend at head of waterway.
- Continue to implement workplan based on in-pipe sediment sampling, but the list is shrinking.