Improving Water Quality in an Urban Watershed

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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

- Atmospheric
- In-water
- Groundwater and TAR seeps
- MARINAS
- Storm water
- Spills
- Upland groundwater and TAR seeps
- (LNAPL)
- (DNAPL)

In-water groundwater and TAR seeps
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

Pyrene Time Series in OF230

DEHP Time Series in OF245

92% Reduction, >99.9% Confidence
Program Timelines and Trends

![Graph showing program timelines and trends in stormwater chemistry](image-url)
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
Spill Response
Sediment Traps
Whole Water Monitoring
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.

- $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

• It's all about the maintenance!

• Going forward:
  – Continue to sample and adapt programs
In-Waterway Sampling: Post Cleanup

Polyaromatic Hydrocarbon (PAH)

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<th>Phenanthrene</th>
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<td>Concentration (µg/kg)</td>
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<td>Years After Remediation</td>
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- April 2004
- May 2005
- May 2006
- May 2007
- May 2008
- May 2009
- April 2011
- Mean
- SQO
- 2006 Model
In-Waterway Sampling: Post Cleanup
Phthalates

Bis(2-ethylhexyl)phthalate

Concentration (µg/kg)

Years After Remediation

April 2004
May 2005
May 2006
May 2007
May 2008
May 2009
April 2011
Mean
Mean*
BEL
2006 Model
In-Waterway Sampling: Post Cleanup

Dibenzo(a,h)anthracene (PAH)

Concentration (µg/kg)

Years After Remediation

- April 2004
- May 2005
- May 2006
- May 2007
- May 2008
- May 2009
- April 2011
- Mean

2006 Model

2011 Model
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.