Study Area
Stormwater Management in Spokane

Pathway for PCBs to enter the Spokane River

- MS4: Municipal Separate Storm Sewer System
- CSO: Combined Sewer Overflow (less frequent)

[Map showing PCB Sample Locations]
Adaptive Management Plan

Reduce PCBs in stormwater discharges

1. Analyze and interpret existing data
2. Identify likely sources of PCBs. Design and implement remedial actions and BMPs.
3. Adaptive approach – further data collection and remedial action

Phase I: remedial maintenance, sampling, analysis of existing information

- PCBs particulate bound: sample catch basin sediments
Priority Investigation Areas

Legend
2011 Groups
- CSO
- Stormwater
2010 Groups
- CSO
- Drywell
- Stormwater
Zoning
- Heavy Industrial
- City Boundary
- CSO 34

Drywells

2012 Re-Sample

MS4

CSO
Sampling Procedures

• Composite samples ~ 10 CBs each group
• Individual samples from 1 CB only
• Four sediment samples per catch basin
  • Mix contents of each catch basin sample
• Chain of custody procedures
  • Anatek: Method 8082
  • Pacific Rim: Method 1668

• Decontaminate sampling equipment:
  DI water rinse ➔ Liquinox soap ➔ DI water
  ➔ acetone ➔ air dry ➔ foil wrap
Remedial Maintenance

- Review Aroclor analysis results
  - Residential cleanup standard: 1.0 mg/kg
- Remove all sediments from catch basins
- Dump on separate pad, mix with sawdust
- Haul to lined cell at landfill
Curb Markers

Install markers at each basin after cleaning

Installation in progress throughout City on normal maintenance routes

• Over 4,200 Installed
2010 and 2011 Sampling Recap

Highest in HI Zone = 2012 Re-sampling
2010 and 2011 Sampling Recap

2010 Composite Samples

- 432 Catch Basins – broken into 41 Groups in Union Basin and HI CSO 34
- 280,000 lbs sediments removed
- **26 grams** PCBs removed

2011 Composite Samples

- 333 Catch Basins – 35 Groups in CSO 34 up-gradient (light industrial, commercial, residential)
- 268,000 lbs sediments removed
- **3.7 grams** PCBs removed

2011 Individual Samples

- Helped identify contaminated CB near City Parcel
  - Disconnected from MS4
- PCBs still found in 2010-cleaned CBs = continual PCB source in area
2012 Catch Basin Sampling

Focused on 2010 Groups

- Higher PCB concentrations than 2011
- Compare “apples to apples”
  - Preference: group composites
  - Individual testing if entire group can not be sampled (not enough sediment accumulation)
- Help determine continual PCB sources

2012 Sampling:
39,600 lbs sediments
2.7 grams PCBs removed
2012 Catch Basin Sampling
# Year-to-Year Comparisons

<table>
<thead>
<tr>
<th>Group Number</th>
<th>2010 Concentration (ug/kg)</th>
<th>2012 Concentration (ug/kg)</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1-C</td>
<td>754.0</td>
<td>464.0</td>
<td>38%</td>
</tr>
<tr>
<td>Group 2-C</td>
<td>296.0</td>
<td>126.0</td>
<td>57%</td>
</tr>
<tr>
<td>Group 8-C</td>
<td>115.0</td>
<td>87.9</td>
<td>24%</td>
</tr>
<tr>
<td>Group 11-C</td>
<td>179.0</td>
<td>74.0</td>
<td>59%</td>
</tr>
<tr>
<td>Group 12-C</td>
<td>731.0</td>
<td>612.0</td>
<td>16%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group Number</th>
<th>2011 Concentration (ug/kg)</th>
<th>2012 Concentration (ug/kg)</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 13-id-3</td>
<td>1185.0</td>
<td>767.0</td>
<td>35%</td>
</tr>
<tr>
<td>Group 13-id-4</td>
<td>279.0</td>
<td>120.0</td>
<td>57%</td>
</tr>
<tr>
<td>Group 13-id-11</td>
<td>5.0</td>
<td>5.6</td>
<td>-12%</td>
</tr>
<tr>
<td>Group 24-id-10</td>
<td>103.0</td>
<td>69.4</td>
<td>33%</td>
</tr>
<tr>
<td>Group 24-id-11</td>
<td>121.0</td>
<td>95.1</td>
<td>21%</td>
</tr>
<tr>
<td>Group 25-id-1</td>
<td>115.0</td>
<td>93.9</td>
<td>18%</td>
</tr>
</tbody>
</table>
2012 Catch Basin Sampling “Hot Spots”

PCBs in ug/kg (ppb), Congener Analysis
2012 Catch Basin Sampling “Hot Spots”

PCBs in ug/kg (ppb), Congener Analysis
2012 Catch Basin Sampling “Hot Spots”

PCBs in ug/kg (ppb), Aroclor Analysis
Stormwater Sampling: 2012-2013

Legend
- Stormwater Sampler

Stormwater Basin
- Cochran
- Union
- Washington

CSO Basin
- CSO 34
Stormwater Sampling

Automatic composite samplers

Depth ➔
Flow Rate ➔
Samples ➔
## Stormwater Sampling

<table>
<thead>
<tr>
<th>Location</th>
<th>Range (pg/L or ppq)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Union Basin Outfall</td>
<td>13,700 – 48,900</td>
<td>Industrial Land Use</td>
</tr>
<tr>
<td>Lee &amp; Springfield (below City Parcel site)</td>
<td>35,300 – 66,000</td>
<td>Industrial Land Use, just below PCB cleanup site</td>
</tr>
<tr>
<td>Cochran Basin</td>
<td>1,000 – 12,600</td>
<td>“Average” Spokane stormwater (large area of city)</td>
</tr>
<tr>
<td>Washington Basin</td>
<td>4,000 – 8,800</td>
<td>Commercial/Residential</td>
</tr>
<tr>
<td>CSO 34</td>
<td>No Data Yet</td>
<td></td>
</tr>
<tr>
<td>Liberty Lake Study (Ecology)</td>
<td>500 – 8,400</td>
<td>Urban “background,” no known point source</td>
</tr>
</tbody>
</table>
Conclusions

• Individual sources difficult to identify
• Widespread, diffuse source of PCBs
  • Legacy sources from historic industrial activity
  • PCBs found in everyday items (motor oil, hydraulic fluid, etc.)
• Investigating options for treatment and infiltration in Union basin (disconnect MS4 from river)
  • Integrated Plan: treat and infiltrate Cochran basin stormwater
Questions?

More information: 2013 PCB Annual Report
http://www.spokanewastewater.org/StormwaterDocs.aspx