Interim Analysis of Synoptic Survey Data

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Summary

• Most of the laboratory data has been received from the August synoptic survey
  – Until final QA/QC conducted, all results are draft

• No major red flags
  – Occasional very high concentrations – outliers?
  – River concentrations near level of blank contamination at Lake Coeur d’Alene outlet
  – River concentrations increase above blank contamination as we move downstream
Synoptic Survey

• August 12-24, 2014
• Seven Spokane River stations, plus Latah Creek  
  – Sampled seven times
• Seven point source discharges  
  – Sampled three times
### SPOKANE RIVER - SYNOPTIC SURVEY
DRAFT - Still undergoing QA/QC

<table>
<thead>
<tr>
<th>Station</th>
<th>Location</th>
<th>Result (pg/L) 8/12/14</th>
<th>Result (pg/L) 8/14/14</th>
<th>Result (pg/L) 8/16/14</th>
<th>Result (pg/L) 8/18/14</th>
<th>Result (pg/L) 8/20/14</th>
<th>Result (pg/L) 8/22/14</th>
<th>Result (pg/L) 8/24/14</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR-1</td>
<td>Spokane R. Below 9 Mile Dam</td>
<td>159/200</td>
<td>195</td>
<td>183</td>
<td>171</td>
<td>234</td>
<td>168</td>
<td>150</td>
</tr>
<tr>
<td>HC-1</td>
<td>Latah (Hangman) Creek</td>
<td>76.2</td>
<td>104</td>
<td>101/110</td>
<td>77.3</td>
<td>2450</td>
<td>297</td>
<td>103</td>
</tr>
<tr>
<td>SR-3</td>
<td>Spokane R. at Spokane</td>
<td>164</td>
<td>184 /144</td>
<td>308</td>
<td>205</td>
<td>172</td>
<td>409</td>
<td>165</td>
</tr>
<tr>
<td>SR-4</td>
<td>Spokane R. at Greene St. Bridge</td>
<td>173*</td>
<td>214</td>
<td>138</td>
<td>152/121</td>
<td>190</td>
<td>138</td>
<td>124</td>
</tr>
<tr>
<td>SR-7</td>
<td>Spokane R. below Trent Bridge</td>
<td>177</td>
<td>138</td>
<td>171</td>
<td>414</td>
<td>169/187</td>
<td>128</td>
<td>148</td>
</tr>
<tr>
<td>SR-9</td>
<td>Spokane R. at Barker Rd. Bridge</td>
<td>43.3</td>
<td>56.7</td>
<td>35.4</td>
<td>80.6</td>
<td>42</td>
<td>26.9 /73.2</td>
<td>37.1</td>
</tr>
<tr>
<td>SR-12</td>
<td>Spokane R. at Post Falls</td>
<td>65.9</td>
<td>51.4</td>
<td>44.4</td>
<td>61.2</td>
<td>40.8</td>
<td>50.1</td>
<td>71.3 /40.8</td>
</tr>
<tr>
<td>SR-15</td>
<td>Lake Coeur d’Alene Outlet</td>
<td>30.6</td>
<td>36.9</td>
<td>32.5</td>
<td>**</td>
<td>27.4</td>
<td>37.1</td>
<td>33**</td>
</tr>
</tbody>
</table>

* SR4 was done on 8/13/14
** SR15 was done on 8/23/14
= results pending
# Raw Lab Data - Discharges

<table>
<thead>
<tr>
<th>SPOKANE RIVER - SYNOPTIC SURVEY</th>
<th>DRAFT - Still undergoing QA/QC</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Station</strong></td>
<td><strong>Location</strong></td>
</tr>
<tr>
<td>SR-2</td>
<td>City of Spokane Riverside Park Advanced WWTP</td>
</tr>
<tr>
<td>SR-5</td>
<td>Spokane County Regional Water Reclamation Facility</td>
</tr>
<tr>
<td>SR-6</td>
<td>Inland Empire Paper</td>
</tr>
<tr>
<td>SR-8</td>
<td>Kaiser Aluminum</td>
</tr>
<tr>
<td>SR-10</td>
<td>Liberty Lake Sewer &amp; Water District</td>
</tr>
<tr>
<td>SR-11</td>
<td>Post Falls WWTP</td>
</tr>
<tr>
<td>SR-14</td>
<td>Coeur d’Alene Advanced WWTP</td>
</tr>
</tbody>
</table>

= results pending
Blank Contamination

- Distribution of measured blank concentration

![Graph showing the distribution of lab blanks across different concentration ranges.](image-url)
Blank Contamination

• Distribution of measured blank concentration

![Bar chart showing distribution of lab and bottle blanks](chart.png)
Blank Contamination

- Distribution of measured blank concentration

Lab, Bottle and Field Blanks

![Bar Chart]

Percent of Samples

Concentration Range (pg/l)
Blank Correction of Laboratory Data

- “Official” (i.e. required by QAPP) method
  - Compare measured concentration of each congener between field sample and lab blank
  - Set to zero any field measurement that is <3x blank concentration
- Alternate method to account for field blanks
  - Compare measured concentration of each congener between field blank and lab blank
  - Subtract larger of above values from field sample value
Blank Correction of Laboratory Data

• Example Blank Correction

<table>
<thead>
<tr>
<th>Congener</th>
<th>Lab Blank</th>
<th>Field Blank</th>
<th>Field Sample</th>
<th>QAPP Method</th>
<th>New Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCB-001</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>4 &lt; (3x2) :: 0</td>
<td>4 - max(2,1) = 2</td>
</tr>
<tr>
<td>PCB-002</td>
<td>1</td>
<td>1</td>
<td>8</td>
<td>8 &gt; (3x1) :: 8</td>
<td>8 - max(1,1) = 7</td>
</tr>
<tr>
<td>PCB-003</td>
<td>2</td>
<td>4</td>
<td>9</td>
<td>9 &gt; (3x2) :: 9</td>
<td>9 - max(2,4) = 5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5</strong></td>
<td><strong>6</strong></td>
<td><strong>21</strong></td>
<td><strong>17</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

• Results from QAPP method will always be reported
  – New method may also be used for mass balance assessment
Comparison of Field and Blanks

![Bar chart showing average concentrations (pg/l) for different locations along the Spokane River Station. The x-axis represents various locations, and the y-axis shows the concentration range from 0 to 300 pg/l. The chart includes bars for Lab Blank, Bottle Blank, Lake C’d’Al, Post Falls, Barker, Trent, Greene, Spokane, and Nine Mile. Each location has a corresponding bar with error bars indicating variability.]
Blank-Corrected Results

![Graph showing average concentrations at different Spokane River Station locations, comparing Uncorrected, QAPP, and New methods.](image-url)
Blank Correction Decisions

1. Correct with field blanks or lab blanks?
   - SRRTTF QAPP: Lab blanks
   - Ecology (2010): Field blanks
   - VDEQ (2014): Greater of lab or field blank

2. Exclude samples near level of blank?
   - SRRTTF QAPP: Exclude if sample ≤ 3x blank

3. Additional corrections?
   - SRRTTF QAPP: No
Ramifications of Blank Correction

• Why exclude samples near level of blank?
  – Reduce the likelihood of reporting false positives
  • Doesn’t address issue of false negatives, adds bias

• Why (or why not) subtract out blank correction?
  – Logic says that “field sample minus blank” is the best estimate of actual concentration
  – Eliminating this step Is a safety factor/opposing bias

• Existing method has counterbalancing biases
  – Proposed method eliminates both biases

• This shouldn’t matter – but it may