Role of Science: Documenting Sources of Stormwater Pollution

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Outline

• Stormwater Pollution – is it real?
• Sources
• Build-up and wash-off
• Some Best Management Practices
• Where do we go – prioritization
Concentrations of Non-Point Sources

- A highway example
- Chemical oxygen demand
- Oil and grease
- Total organic carbon
- Total suspended solids
Stormwater Runoff – A freeway example

Site: URS8-23C, 02/19/01 (2000-2001 Rainy Season)

- TSS
- COD
- Oil & Grease
- TOC
- Flow
- 15 min Rainfall
Comparison of Point Sources to Non-Point Sources

• Hyperion Treatment Plant – the major point source to Santa Monica Bay
  – Partial secondary (~25-30%) until 1999
  – Full secondary after 1999

• GIS-based non-point source model for the Santa Monica Bay Watershed
## Model Prediction vs. Hyperion Wastewater Treatment Plan (MT/Yr)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Model</th>
<th>HTP</th>
<th>T. Load</th>
<th>%NPS (30% 2&lt;sup&gt;nd&lt;/sup&gt;)</th>
<th>%NPS (full 2&lt;sup&gt;nd&lt;/sup&gt;)</th>
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<tbody>
<tr>
<td>TSS</td>
<td>37,000</td>
<td>30,000</td>
<td>67,000</td>
<td>55</td>
<td>88</td>
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<tr>
<td>BOD</td>
<td>1,500</td>
<td>60,000</td>
<td>61,500</td>
<td>3</td>
<td>11</td>
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<tr>
<td>TP</td>
<td>80</td>
<td>1,500</td>
<td>1,580</td>
<td>5</td>
<td>7</td>
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<tr>
<td>NO2+NO3</td>
<td>180</td>
<td>250</td>
<td>430</td>
<td>42</td>
<td>47</td>
</tr>
<tr>
<td>Cu</td>
<td>10</td>
<td>30</td>
<td>40</td>
<td>25</td>
<td>44</td>
</tr>
<tr>
<td>Pb</td>
<td>37</td>
<td>22</td>
<td>59</td>
<td>63</td>
<td>80</td>
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<tr>
<td>Zn</td>
<td>54</td>
<td>90</td>
<td>144</td>
<td>38</td>
<td>59</td>
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<tr>
<td>O&amp;G</td>
<td>1,200</td>
<td>7,800</td>
<td>9,000</td>
<td>13</td>
<td>50</td>
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Monitoring Problems

- Industrial Monitoring Program
- Self monitoring
- SIC codes for classifications
- Comparison to an engineered monitoring program, using composite samplers and professional monitoring crews
Monitoring Problems

First versus Second Sample

Grab versus Composite
Monitoring

- Saving money on monitoring may be ill advised if it leads to over estimates of pollutants or increased variability of the results
- We depend on current monitoring programs for planning future activities – poor monitoring may result in more expensive future programs
- We are currently designing a new program to replace the existing industrial monitoring program
Pollutant Build Up

![Graphs showing pollutant build-up over dry days](image)
Treatment or BMP Strategies

- Consider Landuse
- Devices – structural treatment
- New designs
- Imperviousness
Consider Landuse
An example of a small urban watershed in Northern California
## Sources

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Area (acres)</th>
<th>Runoff Coefficient</th>
<th>O&amp;G EMC (mg/L)</th>
<th>Product</th>
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<tbody>
<tr>
<td>Open Land</td>
<td>85</td>
<td>0.02</td>
<td>0</td>
<td>0.0</td>
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<tr>
<td>Residential</td>
<td>1221</td>
<td>0.19</td>
<td>3.9</td>
<td>0.7</td>
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<td>Industrial</td>
<td>70</td>
<td>0.76</td>
<td>7.1</td>
<td>5.4</td>
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<tr>
<td>Commercial</td>
<td>98</td>
<td>1.00</td>
<td>13.1</td>
<td>13.1</td>
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<tr>
<td>Parking Lots</td>
<td>94</td>
<td>0.94</td>
<td>12.8</td>
<td>12.0</td>
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<tr>
<td>Freeways &amp; Railroads</td>
<td>59</td>
<td>0.90</td>
<td>7.0</td>
<td>6.3</td>
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</table>
## Treatment Strategy

<table>
<thead>
<tr>
<th></th>
<th>90% Pollutant Reduction</th>
<th>Percent Total Watershed Reduction</th>
<th>Reduction divided by area treated (leverage!)</th>
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</thead>
<tbody>
<tr>
<td>Residential</td>
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<td>19.9</td>
<td>0.3</td>
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<tr>
<td>Industrial</td>
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<td>8.3</td>
<td>1.9</td>
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<tr>
<td>Commercial</td>
<td></td>
<td>28.4</td>
<td>4.7</td>
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<tr>
<td>Parking Lots</td>
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<td>25</td>
<td>4.3</td>
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<tr>
<td>Freeways &amp; Railroads</td>
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<td>8.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Commercial &amp; Parking</td>
<td></td>
<td>53.4</td>
<td>4.5</td>
</tr>
</tbody>
</table>
New Construction Techniques

Think about pollutant reduction before designing
BiolInfiltration Example
BiolInfiltration
Other Examples

• Storm drain inserts of various sorts
• Special screens and filters
• Programs to reduce imperviousness
• Product replacements – friendlier products
• Detention facilities
• New design techniques and procedures
Conclusions

• Stormwater pollution is real – we can quantify it and we are building databases to learn where it comes from and how much the sources contribute

• BMPs are in their infancy but many work well and others show great promise

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