Drugs Here, There and Everywhere

How One Utility Refined Its Approach to Emerging Contaminants

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Portland Water Bureau
May 2, 2012
Portland’s Drinking Water System

- Bull Run Watershed
  - Surface water source
  - Very well protected
  - Unfiltered
Portland’s Drinking Water System

• Columbia South Shore Well Field
  – Groundwater source
  – Comprehensive protection plan
  – Very high quality water
Pharmaceuticals and Personal Care Products (PPCPs)

- Recommendations by Oregon Health Authority in 2005
- Decision to test starting in 2006
- Bureau’s standard mode—test for contaminants beyond regulated suite
- Anticipated non-detect results
Initial Test Results

• Bull Run treated water entry point (2006)
  – Tested for 29 constituents
  – Caffeine detected in sample at 9.2 ng/L
• Groundwater treated water entry point (2007)
  – Tested for 31 constituents
  – 4 constituents detected in sample—sulfamethazole, caffeine, ibuprofen, acetaminophen
Potential Sources

- True detection from sample water
- Contamination during sample collection
  - Bottle contamination
  - Sampler—any contact, even through breath
  - Air
- Contamination during analysis
  - Analysts—any contact
  - Air
  - Equipment carryover from previous samples
Modified Protocol

• Tightened the sampling procedures
  – Collected duplicates and blanks for all samples
  – Switched to powderless nitrile gloves
  – Sample collectors not to drink caffeinated beverages, to avoid consumption of medications if possible
  – Collectors to avoid using fragrances and to wear masks during sample collection
Follow up Testing

• Bull Run
  – Samples collected at treated entry point and raw water intake, 2008 and 2009
  – All follow up results were non-detect
Follow up Testing

- **Groundwater**
  - Samples collected at treated entry point and raw water intake, 2008 and 2009
    - 4 of 6 tests had all non-detect results
    - Detection of ibuprofen at raw water intake
    - Detection of triclosan in field blank of a treated water sample
  - Samples collected at wells that had been contributing during initial detections, 2008 and 2009
    - In 10 samples, 2 detections of ethinyl estradiol, 2 detections of estradiol
    - In same sample sets, 1 field blank detection of fluoxetine, 2 blank detections of esterone, 1 blank detection of triclosan
### Summary of Detections

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<tr>
<th>Analyte</th>
<th>MRL</th>
<th>Units</th>
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Conclusions of Testing

• Inconsistent detections in samples and blanks precluded any statistical analysis
• Little knowledge about our water quality was gained
• Unanswered questions
• Public alarm
March 10, 2008, headlines in response to an AP article on pharmaceuticals found in drinking water through the U.S.
Where we are now

• Legacy of PPCPs detected in water
• No clear answer if PPCP detections in water were actually from the source water or from contamination in any step of the sample-transport-analysis process
Changes to Utility’s Approach to Emerging Contaminants

• Longer pre-testing process
  – Laboratory experience
  – QA/QC for test methods
  – Risk assessment for emerging contaminant
  – Value of results
Changes to Utility’s Approach to Emerging Contaminants

• Risk communication
  – Completed in advance of receiving results
  – Communication prepared for non-detect results as well as detections
Conclusions

- Consider value of testing in advance
- Design process carefully
- Choose best laboratories
- Prepare communication in advance