Drugs Here, There and Everywhere

How One Utility Refined Its Approach to Emerging Contaminants

Kristin Anderson
Portland Water Bureau
May 2, 2012

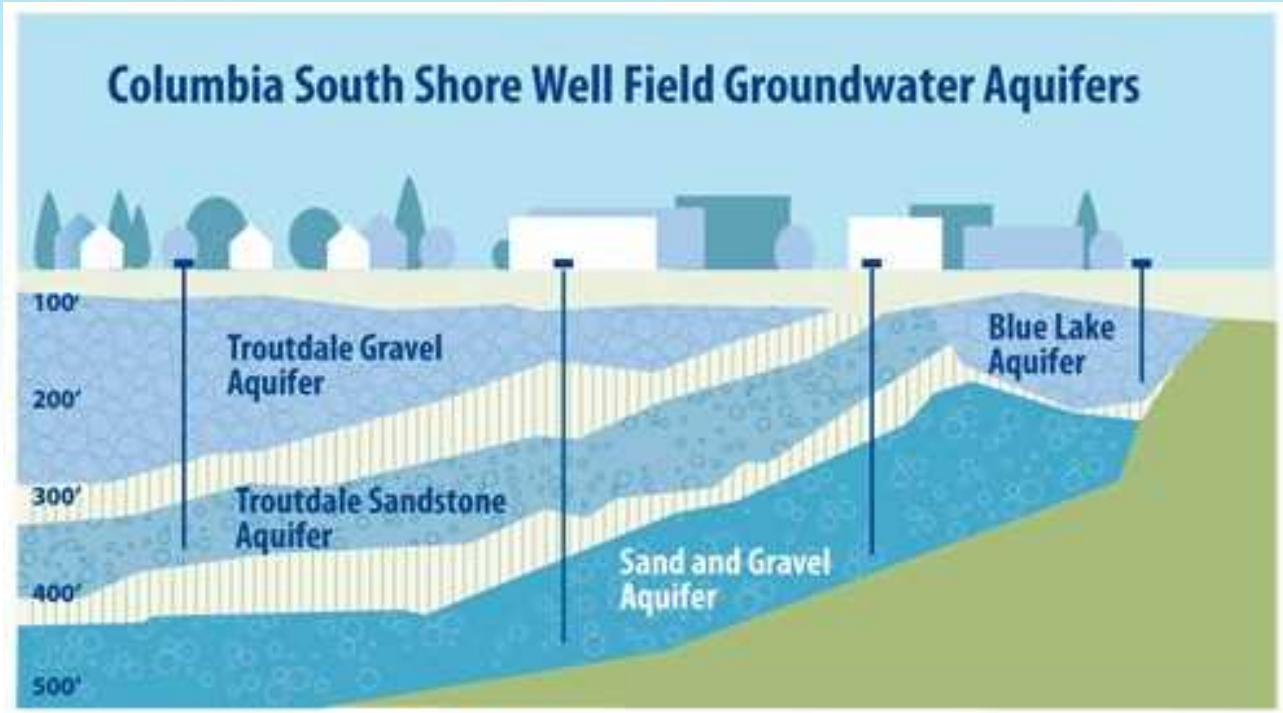
PORTLAND WATER BUREAU
FROM FOREST TO FAUCET

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

Analyte	MRL	Units	Bull Run	Groundwater									
			C3LO	GWPS Outlet	GWPS Outlet	GWPS Inlet	BLA			SGA			TSA
							Well 12	Well 13	Well 19	Well 16			Well 15
			SP	SP	FB	SP	SP	FB	FB	SP	FB	FB	SP
			8/8/06	10/4/07	8/10/09	8/10/09	4/14/08	4/14/08	4/17/08	4/15/08	4/15/08	8/12/09	4/16/08
Sulfamethoxazole	1	ng/l		1.8									
Caffeine	1	ng/l	9.2	25									
Ethinyl Estradiol -17 alpha	5	ng/l								11			18
Fluoxetine	1	ng/l							1				
Esterone	1	ng/l						1.9			1.4		
Estradiol	1	ng/l					5						1.2
Triclosan	5	ng/l			7.4							18	
Ibuprofen	1	ng/l		2.4		3.5							
Acetaminophen	1	ng/l		18									

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

Public Concern

Pharmaceuticals found in Portland's drinking water

KPAM 860, Portland Tribune

Drugs found in water supplies of nation's largest cities, including Portland

Oregonian

Wells To Blame For Drugs Found In Portland's Drinking Water

Oregon Public Broadcasting

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