

Emerging Contaminants: Tucson Water's Approach

Advisory Panel on Emerging Contaminants (APEC)

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What Have We Been Doing?

Review of Tucson Water's local, regional, and national research on chemical and microbial contaminants.



Micro-organic Chemical Research

Baseline Studies

- * UA-Sweetwater Wetlands, '99
- * EPA-UCMR, '01-present
- * USGS-National Stream Flow Study, '02

Surveillance Studies

- * General info gathering, '02-present
- * 3 specific studies, '09-'11: **WRF 4269** EDC/PCPs in Source Water; **USGS 104b** Perfluorinated Compounds in AZ Groundwater; **UA Water Sustainability Program – Trace Study**

Tucson Water

Microconstituent Monitoring Program, '09-present

Reducing Source Contamination

- * Dispose-A-Med Take Back Program, '09-'11
- * Dispose-A-Med Coalition, '11-present

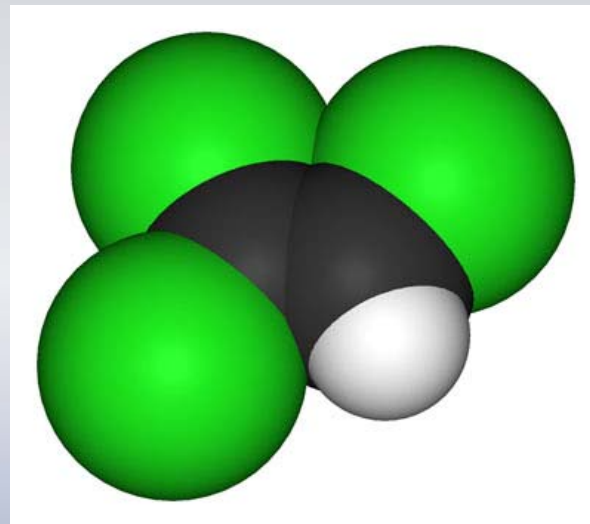


Present Chemical Contaminants of Concern

Alpha Emitters
Barium
Fluoride
Nitrate
Simazine
TCE

Arsenic
Copper
Lead
PCB
Sodium
Uranium

Chromium Hexvalent
Di (2-ethylene phthalate)
Haloacetic acids (5)
PCE
Total Trihalomethanes (4)
Total Xylenes



Emerging Chemical Contaminants of Concern

1,4 Dioxane

Albuterol

Caffeine

Dilantin

Cimetidine

Naproxen

DEA

DEET

Theobromine

Acesulfame-K

Azithromycin

Carbamzapine

Carisoprodol

Oxolinic Acid

Meprobamate

Meclofenamic acid

CCL3 Candidates

2,4-D

DACT

Contine

Ibuprofen

TCEP

Primodone

Suralose

Nifedipine

DIA

Perfluoro Butanoic Acid-PFBA

Perfluoro Octanesulfonic Acid-PFOS

Perfluoro Octanoic Acid-PFOA

Perfluoro-1-butanesulfonic acid

Perfluoro-1-hexanesulfonic acid

Perfluoro-n-heptanoic acid

Perfluoropentanoic acid

Sulfamethoxole

Chloramphenicol



Microbial Research

Baseline Studies

Unregulated Contaminant Monitoring Rule, '01-present

Naegleria Fowleri Related

- * Statewide study, '05-'08
- * *Naegleria* Advisory Committee, '05-'11

Tucson Water

Recycled Water Surveillance

WRF 0804: Approaches to Maintain Consistently High Quality Recycled Water in Storage & Distribution Systems, '08-'11

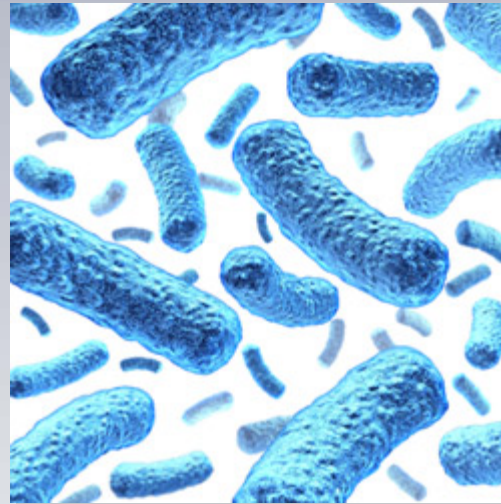
Surveillance & Monitoring

- * Microbial Surveillance Study, '08 - present
- * FastPhage Online Analyzer Study, '11-present
- * WRF 11-01: Monitoring for Reliability & Process Control of Reuse Applications '12-'15



Present Microbial Contaminants of Concern

E. Coli
Enteric Viruses
Fecal Coliform
Total Coliform



Emerging Microbial Contaminants of Concern

E. Coli O157:H7

Adenovirus

Naegleria fowleri

Mycobacterium avium

Pseudomonas aeruginosa

Unknown amoebic species

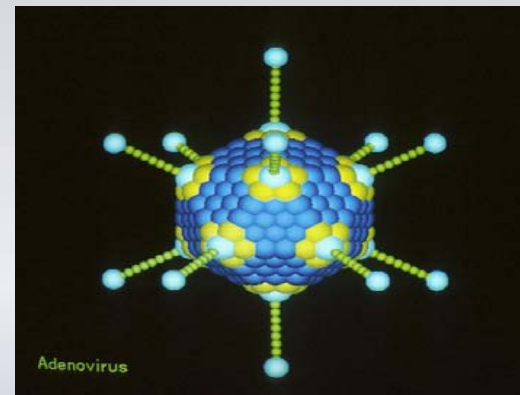
CCL3 Candidates

Acanthamoeba species

Balamuthia mandrillaris

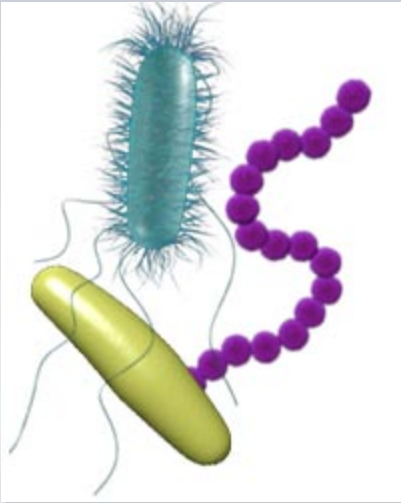
Enteoviruses (polio virus)

Legionella pneumophila

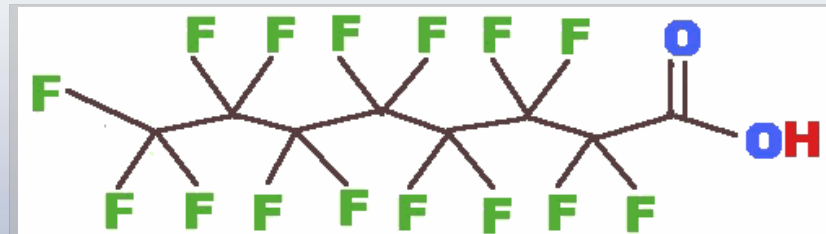


Where We Need to Go

1. Develop a single list of common, representative analytes.



Realize there are common analytes with some unique to location.



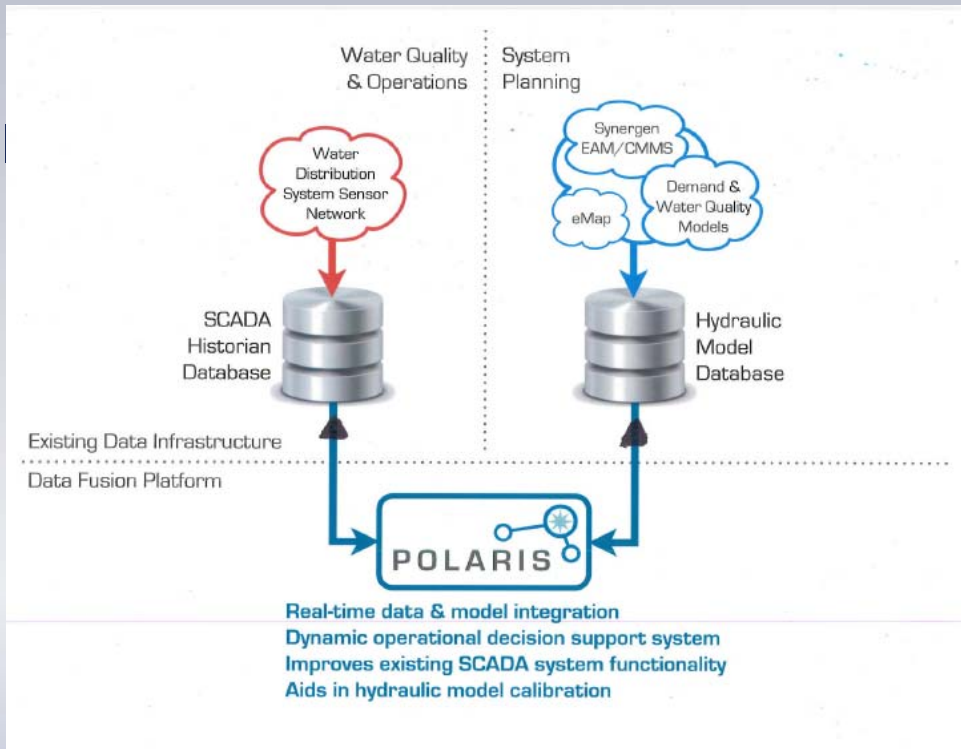
Where We Need to Go

2. Develop online instrumentation that will measure our target list in real time.



Where We Need to Go

3. Create a 'Smart' Distribution System



Incorporate continuous online monitoring with the utility's SCADA & hydraulic model. Result: an automated decision supported monitoring and delivery system.



Where We Need to Go

4. Translate data into informative, clear & understandable messages for our customers.

Provide understanding of the public health implications of 'big, hairy scary' monitoring data.



Where We Need to Go

5. Understand research, resources (labor), capital & operations investment; e.g.:

- \$31k Monitoring: UCMR & Microconstituent Programs
- \$481k Research: Chemical+Microbial+Online analyzers
- \$56k Outreach (by contaminant): 1,4-Dioxane 2011
- \$969k Smart Distribution System Development: Plan development+sensor network+model calibration & maintenance+real-time data & model integration

