

# Washington Aqueduct Future Treatment Alternatives Study

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# Washington Aqueduct Service Area

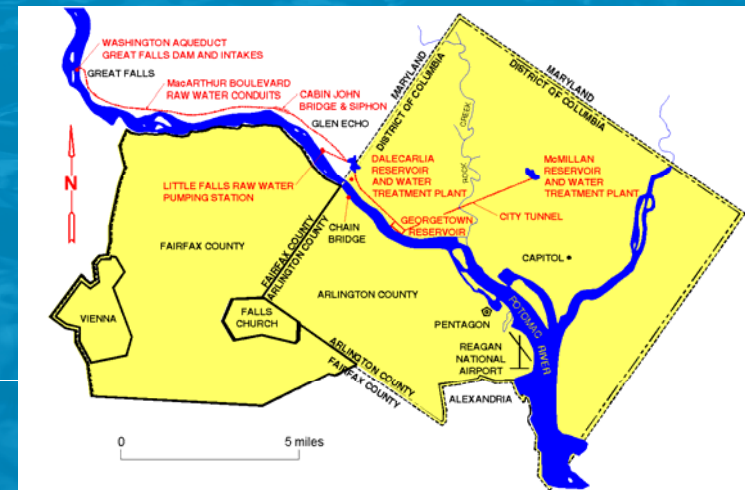
- Operates two drinking water treatment plants:

- Dalecarlia Plant: 220 MGD
- McMillan Plant: 120 MGD

- Supplies drinking water to 3 wholesale customers:

- DC Water
- Arlington County
- City of Falls Church

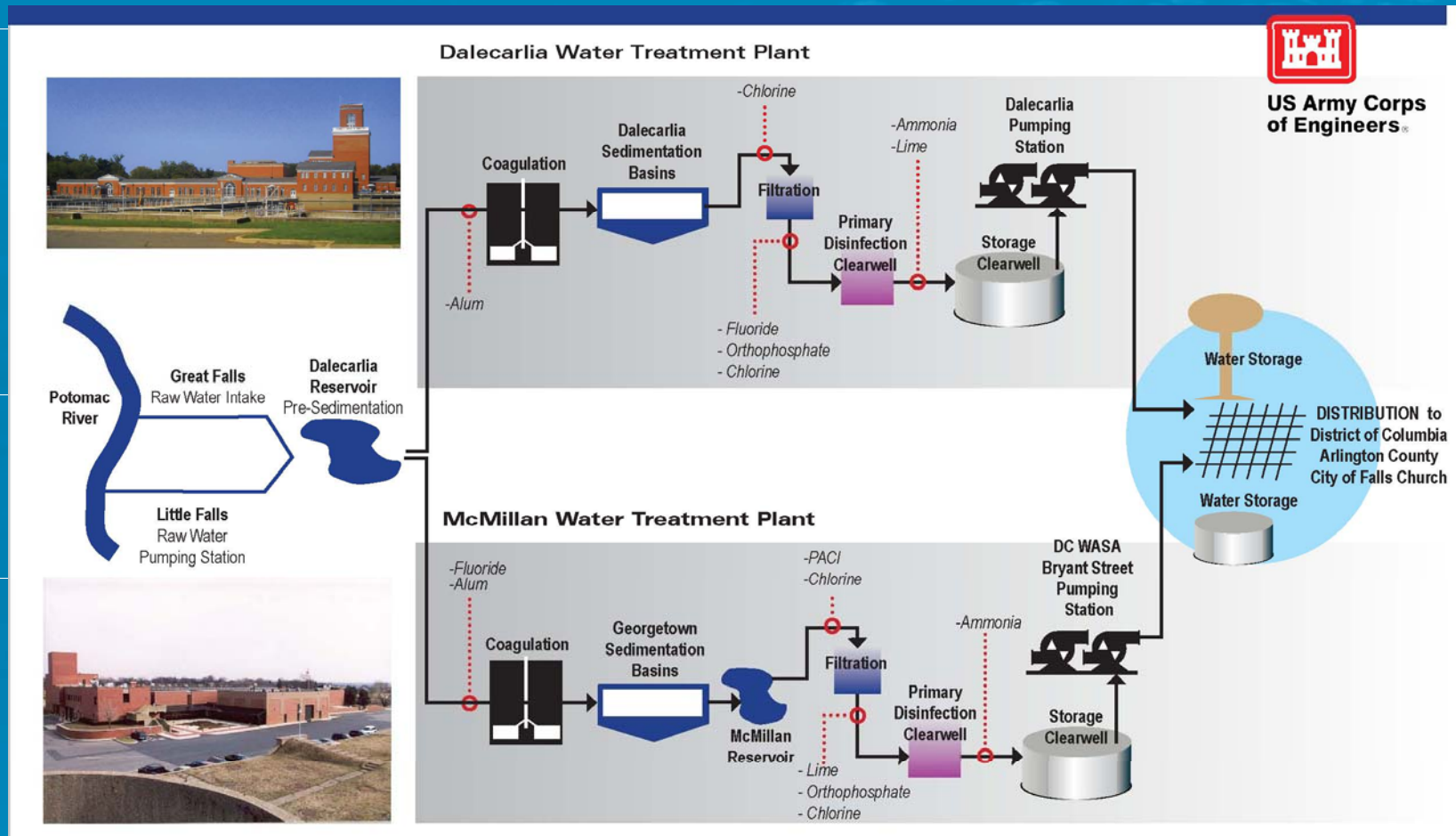
} ~1 Million people



# Washington Aqueduct Governance

- Washington Aqueduct is part of the Army Corps of Engineers.
- It was established in 1853 to provide water to the City of Washington.
- Today, it remains a federal organization, but all funds for operations and for capital improvements come from the wholesale customers.
- The customer principals comprise a Wholesale Customer Board that gives strategic direction to and approves budgets for Washington Aqueduct.

# Existing Treatment



# Washington Aqueduct Safe Drinking Water Act Compliance

- Washington Aqueduct complies with all existing and foreseeable SDWA requirements
  - Filtration
  - Disinfection
  - Corrosion control
  - Regulated contaminants
  - Etc.
  
- So, why undertake a Future Treatment study?

# Why Undertake a Future Treatment Study?

- Take appropriate precautions for public health, recognizing pace of EPA regulations
- Provide basis for Wholesale Customers to assess consumer willingness to invest in drinking water (at level beyond minimum required for regulatory compliance)
- Provide foundation for capital project planning

# Washington Aqueduct's Challenge:

- Providing the best possible drinking water, while
  - Minimizing negative effects on the environment
  - Being fiscally responsible to consumers, who pay for all Washington Aqueduct capital and operating costs through their water rates (water bills)
  - Anticipating and avoiding unintended negative consequences of any change

# Every Day Presents New Challenges to Drinking Water Utilities...

- Microbial water quality issues in source water, such as
  - Pathogens (bacteria, protozoa, etc.)
  - Algae and algal byproducts

# Every Day Presents New Challenges to Drinking Water Utilities...

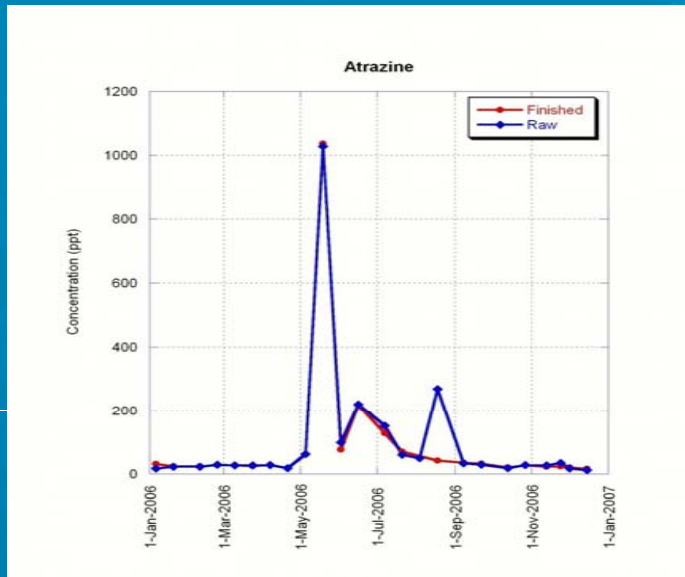
- Chemicals in source water, such as
  - Endocrine-disrupting compounds
  - Pharmaceuticals and personal care products
  - Pesticides
  - Perchlorate
  - Deicing salts
  - Nanomaterials
  - Hexavalent Chromium
  - Iodine 131

# Every Day Presents New Challenges to Drinking Water Utilities...

- Water quality issues resulting from treatment and distribution, such as
  - Disinfection byproducts
  - Corrosion byproducts
  - Trace contaminants in treatment chemicals

# What are the Relative Risks of Emerging Contaminants and Traditional Challenges?

## PPCPs detected ✓(USDA)



17A-ethynyl estradiol

17B-estradiol

Acetaminophen

✓ Caffeine

✓ Carbamazepine

Ceftiofur

Clofibric acid

Diclofenac

Erythromycin

Estrone

Gemfibrozil

✓ Ibuprofen

Ivermectin

Lasalocid

Meprobamate

✓ Monensin

✓ Naproxen

Omeprazole

Pyrantel tartrate

Sulfamethazine

✓ Sulfamethoxazole

✓ Triclocarban

Triclosan

Trimethoprim

Tylosin

Washington Aqueduct and partners have extensive data

# Future Treatment Project Overall Approach

- Involve experts and stakeholders to raise issues and debate choices ✓
- Compile and synthesize data and literature information ✓
- Prioritize treatment strategies and alternatives to treatment ✓
- Recommend implementation plan to Wholesale Customer Board
- When funding becomes available through Board, implement the most effective strategies

# Expert Panel—Visionary Leaders from Consulting, Academia, EPA, Utilities

## Expert Panel

Dr. Stephen Hrudy

Dr. Kimberly Jones

Dr. Phil Singer

Dr. Audrey Levine

Dr. Scott Summers

Dr. Alexa Obolensky

Dr. Vern Snoeyink

Mr. Joel Bluestein

Mr. Mike Hotaling

Mr. Plato Chen



## Consulting Team

Malcolm Pirnie - Dr. Kirk Nowack

Latis Associates - Dr. Vanessa Speight

Intertox - Dr. Richard Pleus

# Stakeholders and Observers

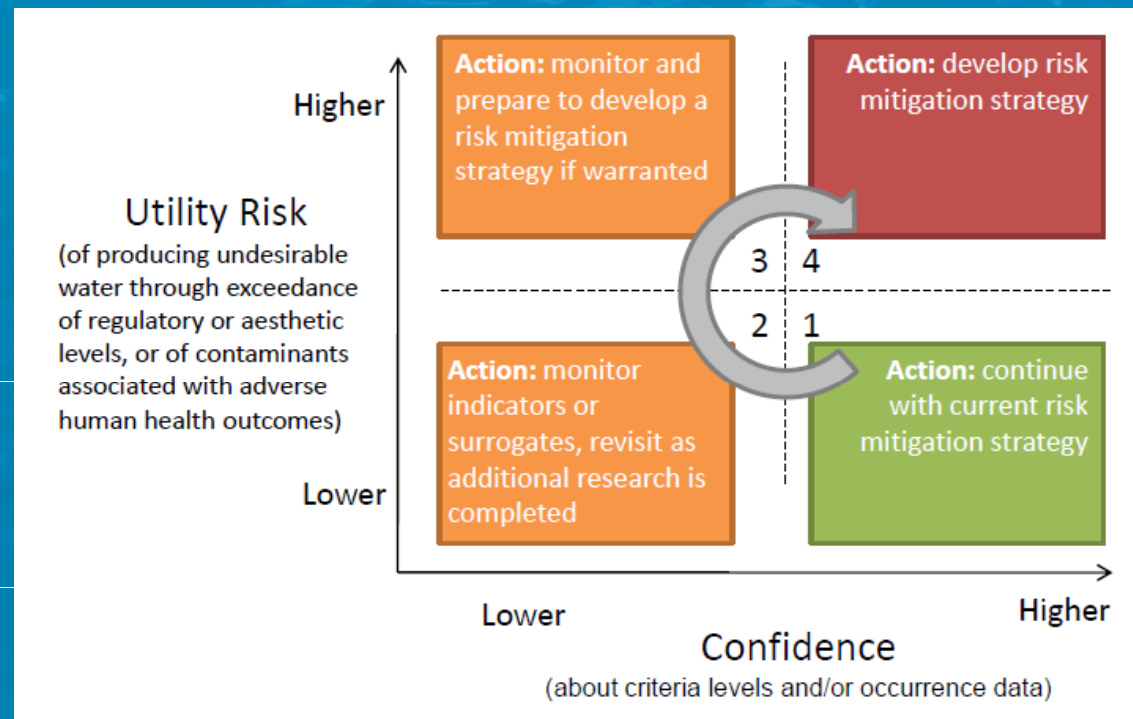
- Stakeholders (Opinion Leaders)
  - Andrew Fellows—Clean Water Action
  - Dana Best, MD—Children’s National Medical Center
  - Yanna Lambrinidou and Ralph Scott—Parents for Nontoxic Alternatives
  - Brian Kane—Board Member, Arlington Partnership for Affordable Housing
  - Erica Michaels Brown—Association of Metropolitan Water Agencies
  - Alan Roberson—American Water Works Association
- Observers—Wholesale Customer Water Utility Staff, Public Health Staff, Others

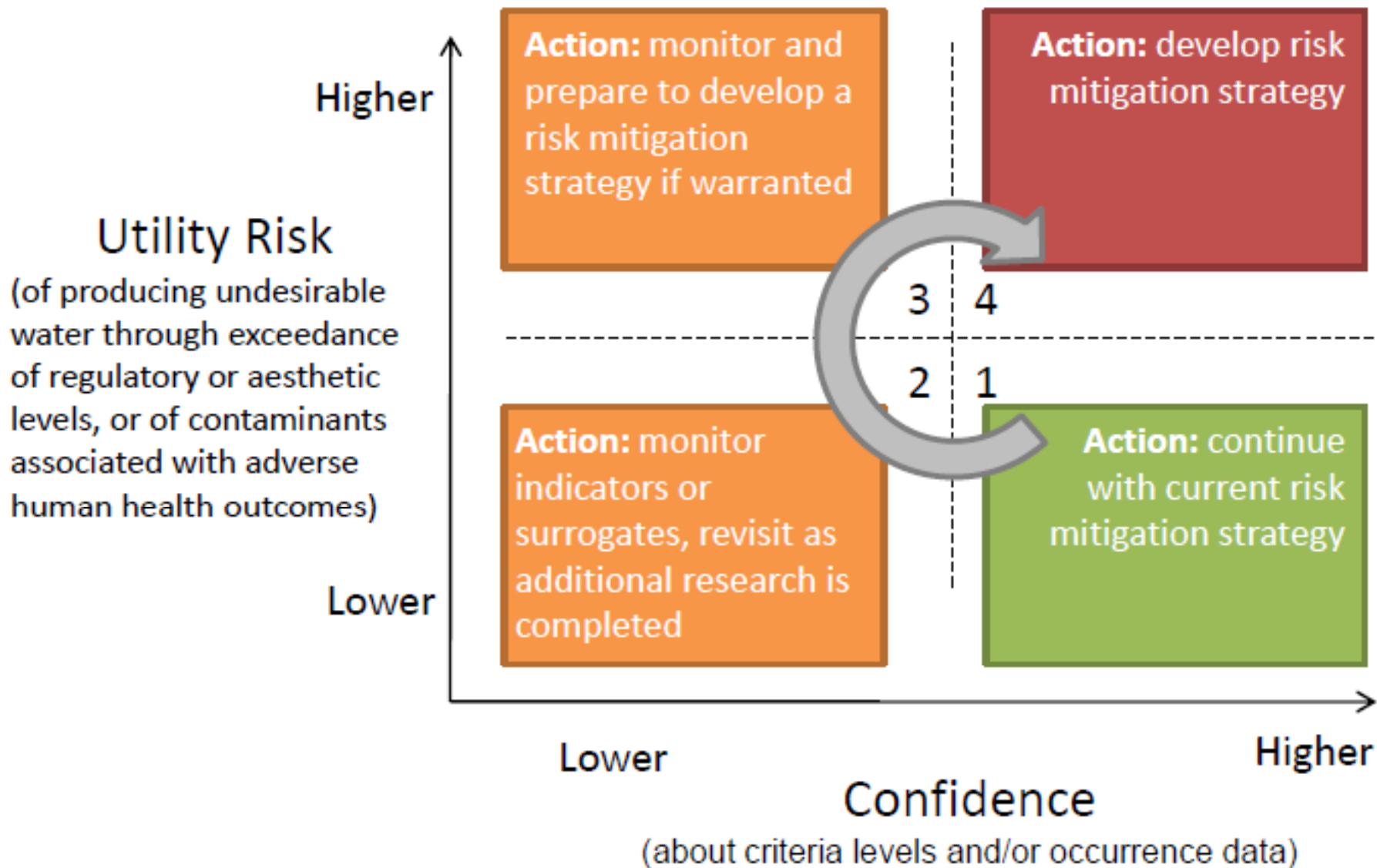
# Just what is the “Best Possible Drinking Water?”

- Providing the best possible drinking water in the face of uncertainty regarding:
  - **Contaminants** (Which ones occur? At what level?)
  - **Health Effects** (Harmful to humans? Is drinking water a pathway?)
  - **Treatment Process Effectiveness** (Are there known treatments? How effective are they? Can they treat trace levels?)
- How confident are we that the solution will not create bigger problems than what we started with?

# Screening and Prioritizing Issues

- Identified 700+ parameters or issues
- Screened those > 10% of a health/ regulatory value. Supplemented data with expertise
- Sorted based on utility risk (health, aesthetics, regulations) and confidence in the information
- Focused on Quadrant 4 (High risk/ High Confidence)





# Project Approach

1. Assess current treatment and Safe Drinking Water Act compliance.
2. Identify potential future water quality challenges.
3. Screen water quality challenges.

# Project Approach, continued

4. Prioritize screened parameters into categories for action.
5. Identify potential treatment processes.
6. Combine treatment processes into strategies that address multiple Quadrant 4 parameters.  
(125 Strategies identified)

# Project Approach, continued

## 7. Score each treatment strategy.

- Water quality improvements
- Special risks (unintended consequences)
- Energy use and emissions
- Resource consumption
- Safety
- Residuals production (hazardous?)
- Life Cycle Costs

## 8. Weight the evaluation criteria.

# Project Approach, continued

9. Check sensitivity to various drivers (e.g., health, environment, and cost).
10. Identify non-treatment options for Quadrant 4 parameters that are not addressed adequately via treatment.
11. Develop three alternatives.

# Project Approach, continued

12. Vet 3 viable alternatives with Expert Panel.

13. Develop an implementation plan and present it to the Wholesale Customer Board for consideration.

# Project Approach, continued

14. Update as new information becomes available.

- Monitor for Quadrant 3 and Quadrant 4 parameters.
- Participate in Potomac River Drinking Water Source Protection Partnership to address root causes.

# An Interim Result: Relative Weighting of Water Quality Issues

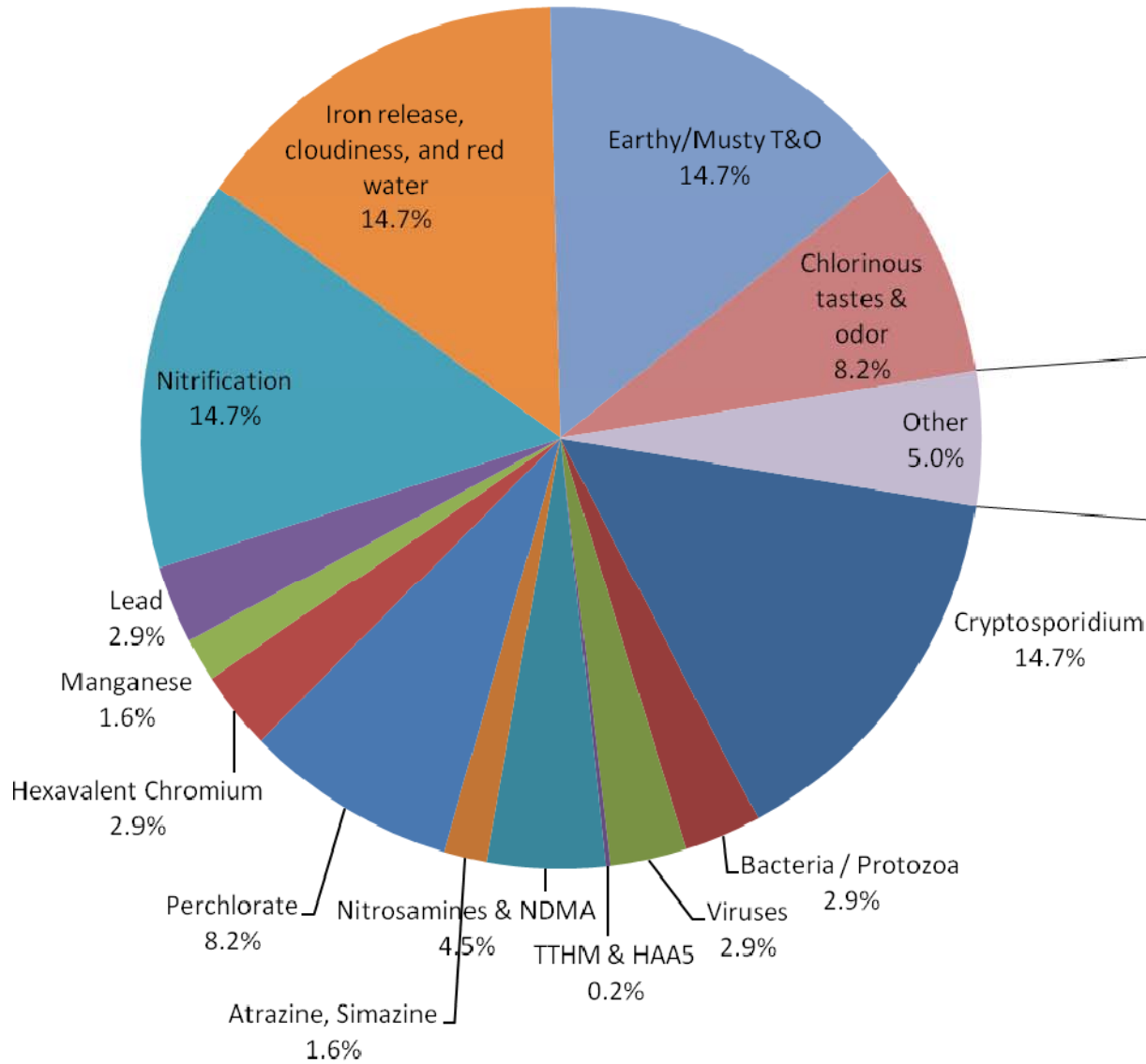
Based on

Probability of occurrence

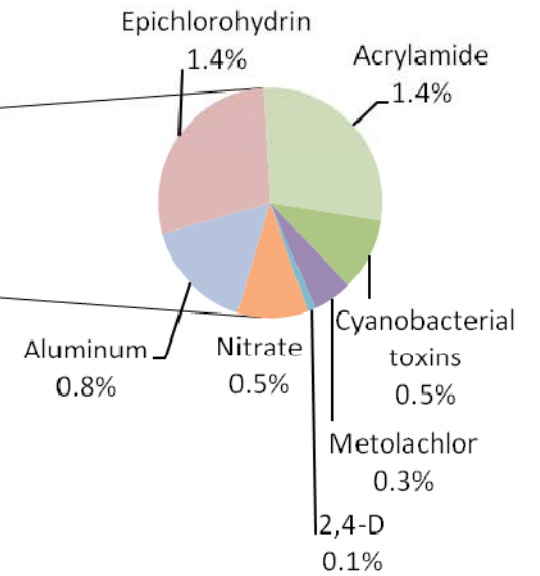
Potential consequences

Existing treatment effectiveness

**Quadrant 4 Water Quality Issues (95%)**



**Quadrant 3 Water Quality Issues (5%)**



# Protecting the Potomac—The Best Option for Improving Drinking Water Quality

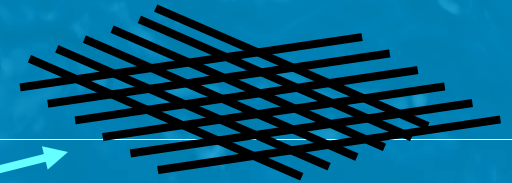
**Watershed Protection**



**Effective Treatment Technologies**



**Effective Distribution System Practices**



# Washington Aqueduct



**Safe, Reliable, Cost Effective**