

Solutions for Water Quality Issues in Your Water Storage Tank



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Concrete Tank Services

Importance of Water Quality



Vs.



Water Quality Issues

⦿ Physical

• Sediment Buildup

- Causes staining and discoloration
- Water flow increase can stir up sediment, causing discoloration
- Creates an environment for bacterial growth



Water Quality Issues

Physical

• Stratification

○ Thermocline

- Creates layer of cooler “heavier water” and warmer “lighter water”
- Inhibits mixing by creating barrier in water level



Mixing: The process we forgot?



- ⦿ Mixed by wind
- ⦿ Cooled by air



- ⦿ Sealed – no wind
- ⦿ Sealed – not cooled

Solutions

Baffle Walls

- Fabric and/or Concrete

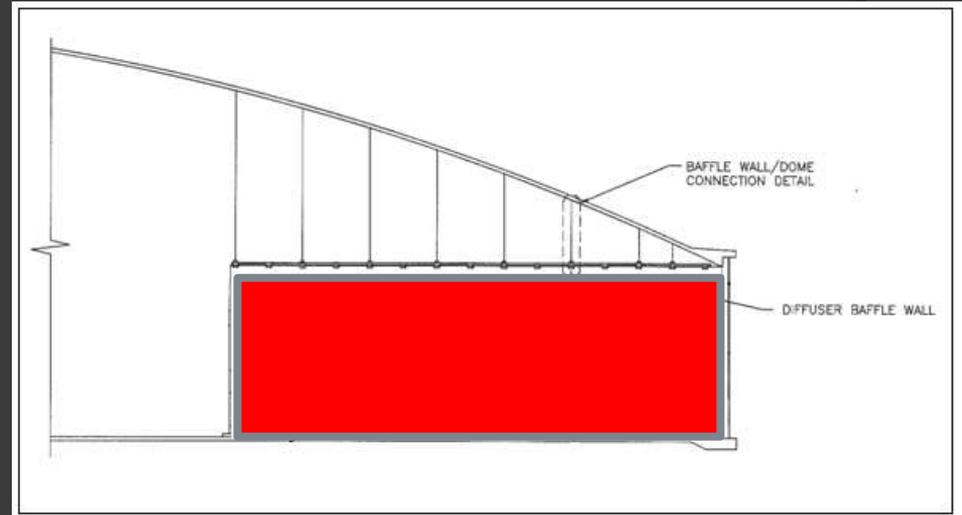
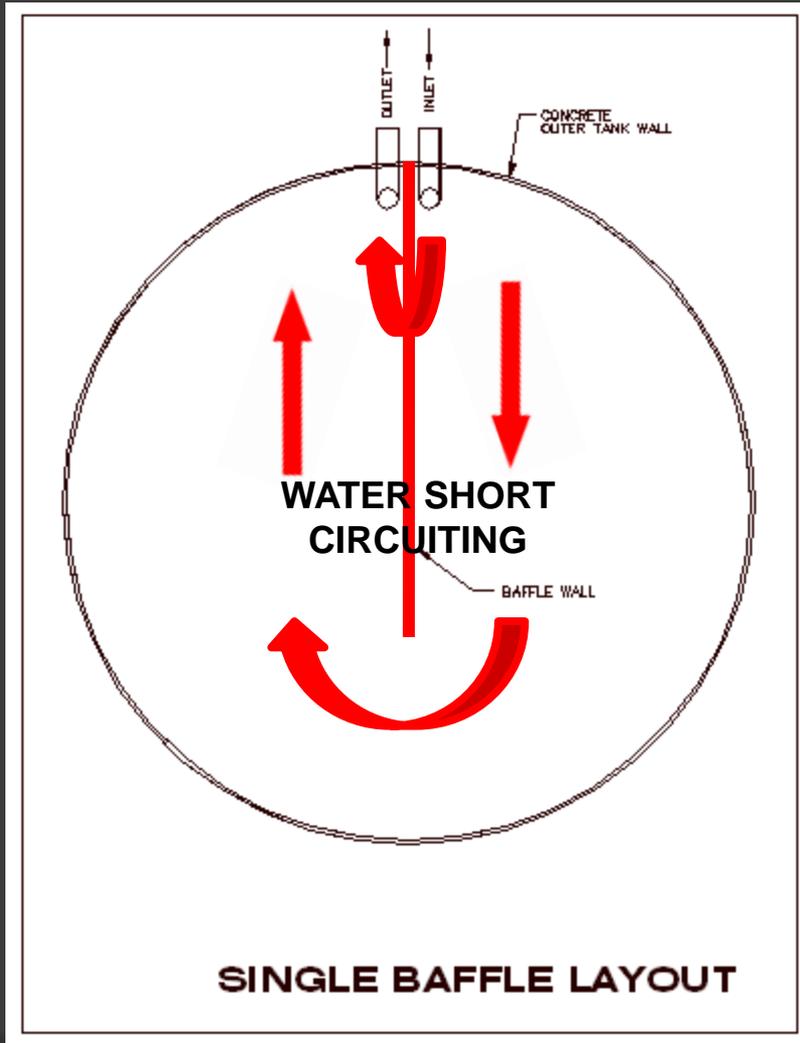
Mixing Systems

- Hydrodynamic vs Mechanical

Cleaning

- Chemical Application & Chlorine Disinfection

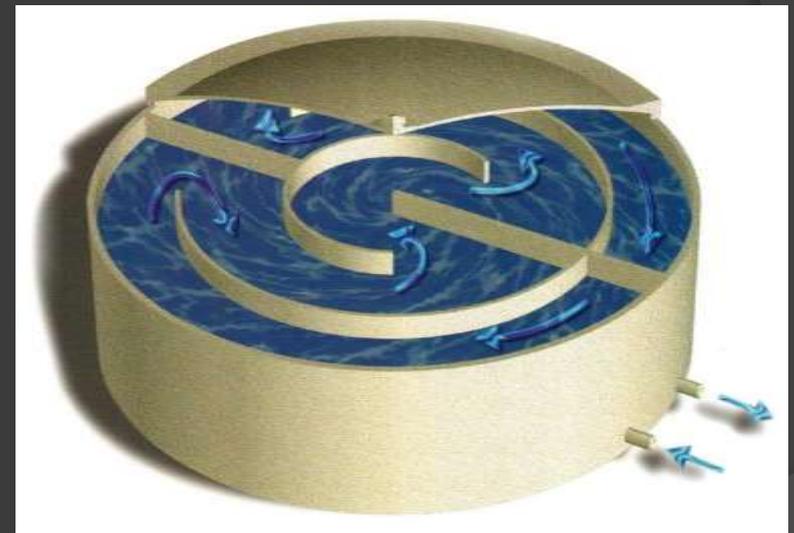
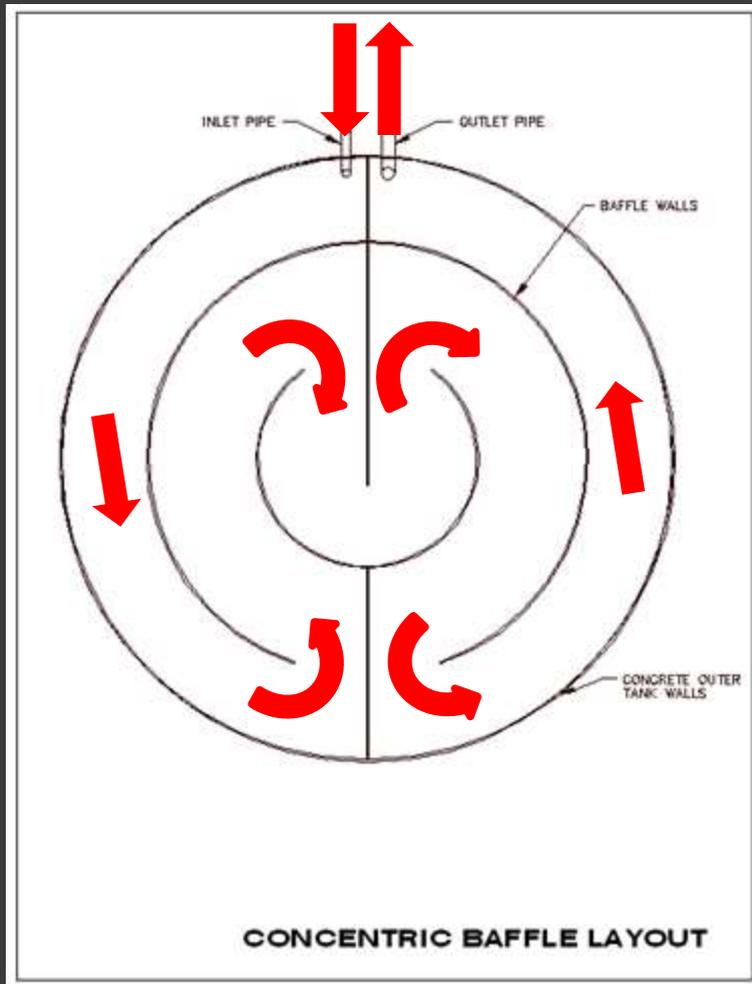
Single Curtain Baffle



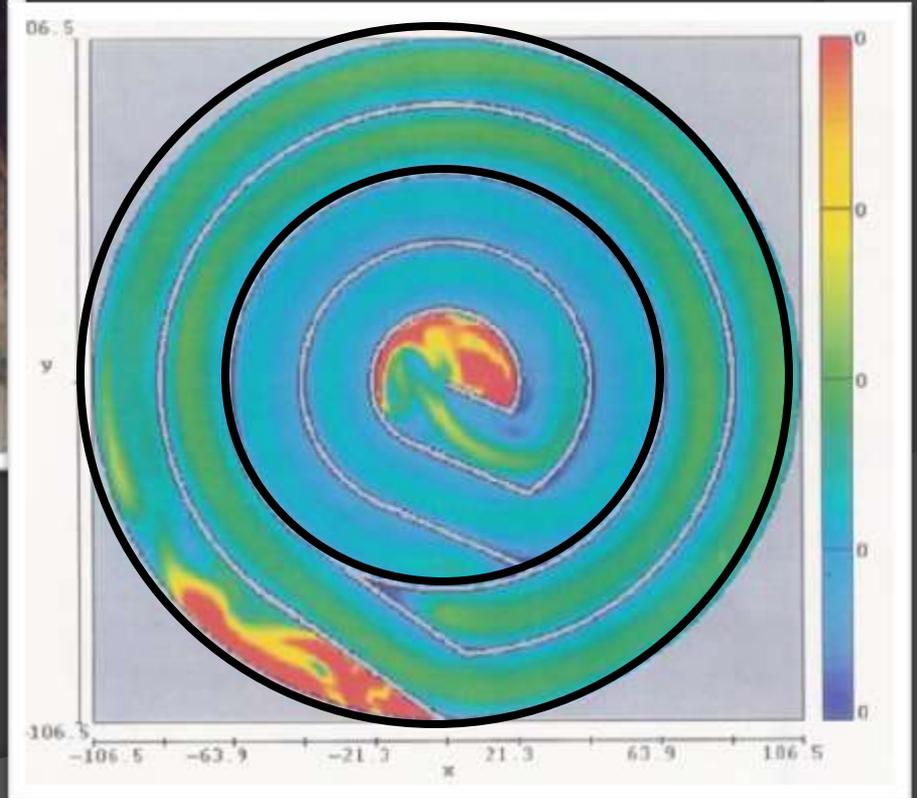
Fabric Single Curtain Baffle



Fabric & Concrete Concentric C Baffles

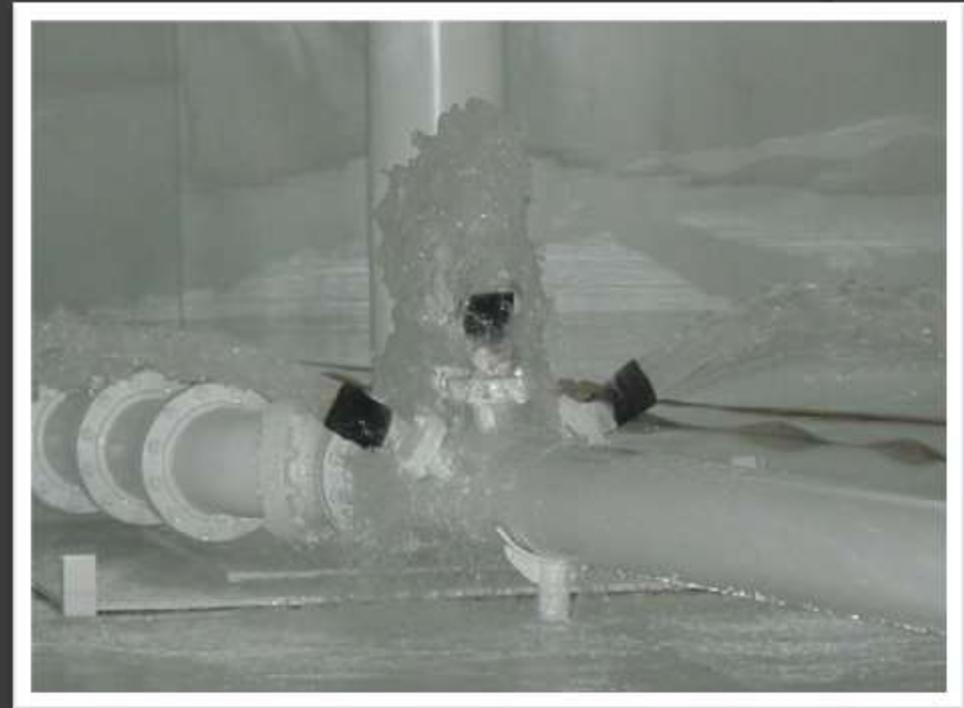


2.0 MG Tank within 5.0 MG Tank both with Interior Baffles



Hydrodynamic Mixing Systems

- Provides complete mixing of water in tank. Not plug flow.
- Eliminates stagnant water areas in tank
- Can be installed horizontally or vertically



Tideflex Technologies

Tank Cleaning

⦿ Chlorine Disinfection

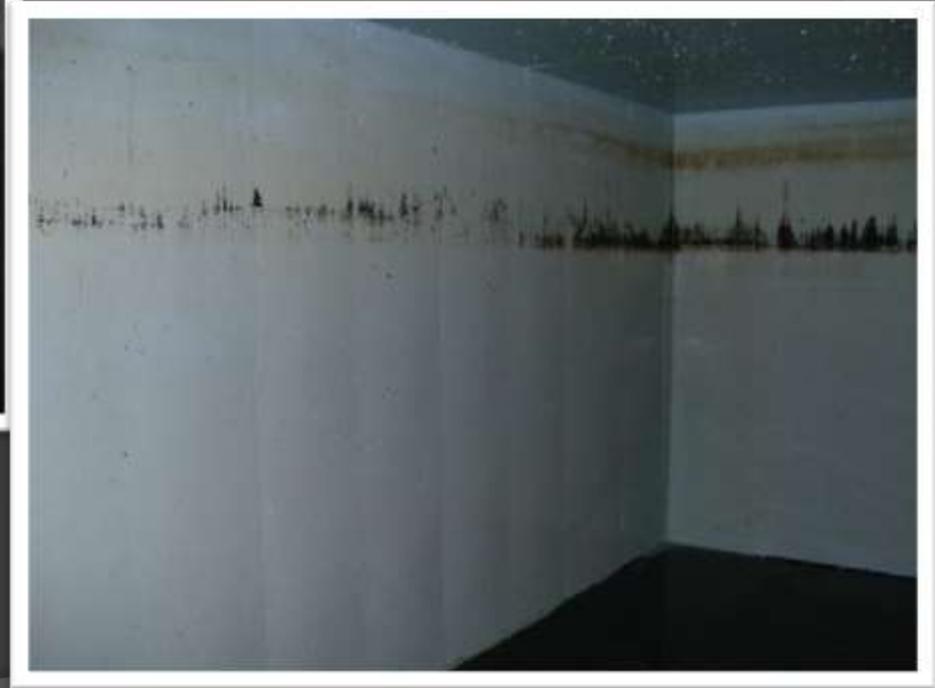
- Interior Chlorine Rinse
- Routine testing and cleaning can prevent bacteria growth and potential health hazards

⦿ Chemical Cleaning

- Iron & Manganese Removal
 - Fe & Mg may be present in groundwater
- Removes Biofouling
- Chlorine Alternative – Less Harmful



Clearwell with Heavy Iron & Manganese Buildup



Biofouling and Iron & Manganese Buildup



Inspection



Examples of Retrofits to meet safety and water Quality

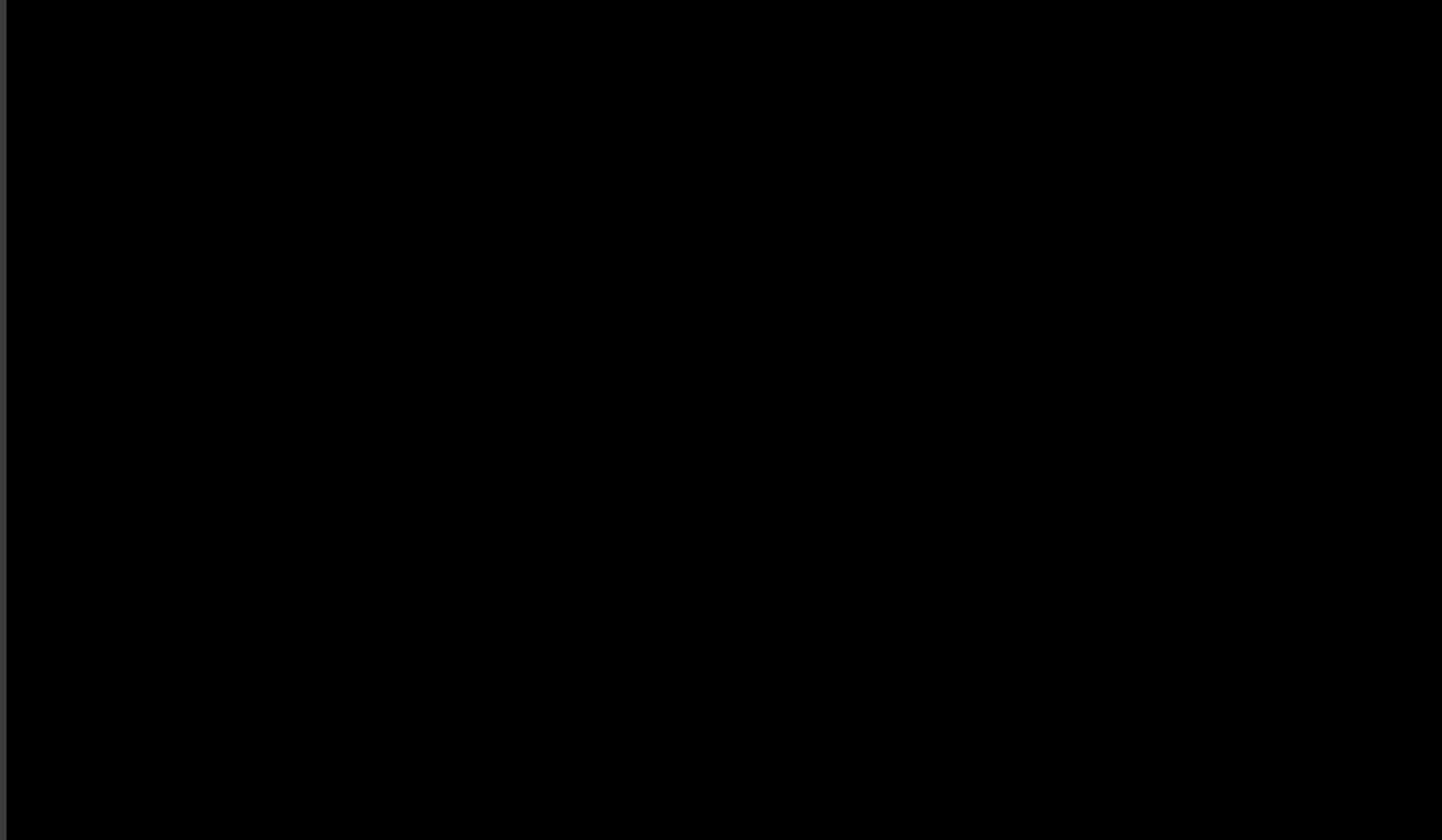
Rehabilitation - Repairs



Rehabilitation - Repairs



Automated Wash Down System



Rehabilitation - Repairs



Rehabilitation - Repairs



Rehabilitation – Repair

Puukolii Reservoir



Rehabilitation – Repair

Puukolii Reservoir



Rehabilitation – Repair

Puukolii Reservoir





Canby, Oregon 2.0 MG Retrofit







Retrofit – Seismic Upgrade

EBMUD Phase VII

Location: Oakland, CA
Problem: Seismic Retrofit



Forming of new machine footing and seismic cable system application



Seismic cable attached to wall before automated shotcrete application

Retrofit – Seismic Upgrade

EBMUD Phase VII



Retrofit – Seismic Upgrade

EBMUD Phase VII



Retrofit – *Safety/Security/Access Upgrades*



Retrofit – *Safety/Security/Access Upgrades*



Preventing Potential Issues

- ⦿ Perform routine self inspections
 - Identify potential issues before they become major problems
- ⦿ Professional Inspection every 5 years
 - Interior/Exterior
 - Should include inspection report sealed by a Professional Engineer

Retrofitting Existing Tanks

- ◎ It's never too late to retrofit a tank
 - Regulatory changes
 - Changing needs of a community
 - Water quality issues
 - Safety, Security and Access upgrades



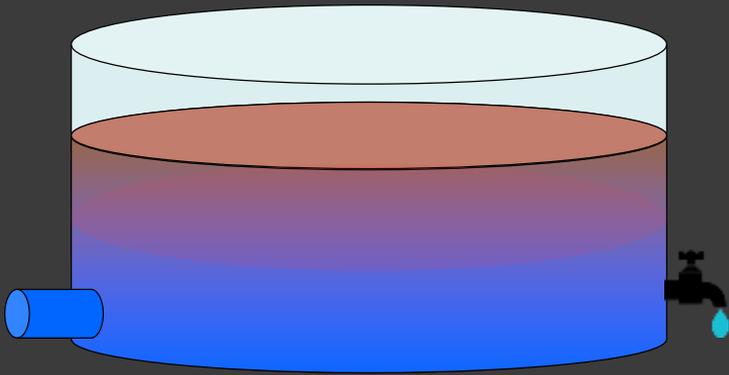
QUESTIONS?



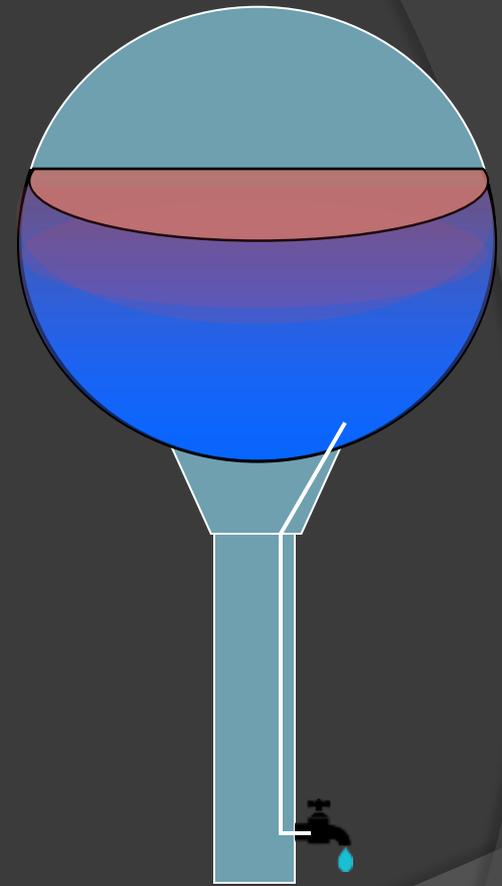
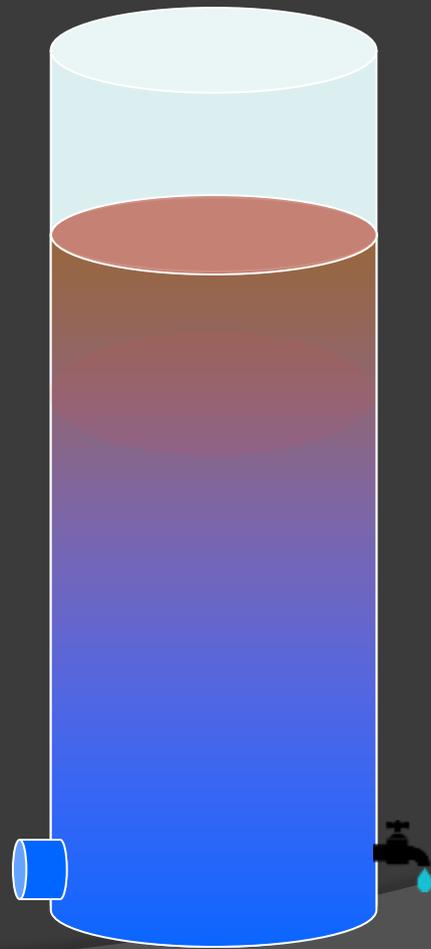
**Concrete
Tank Services**

Inspection | Rehab | Retrofit

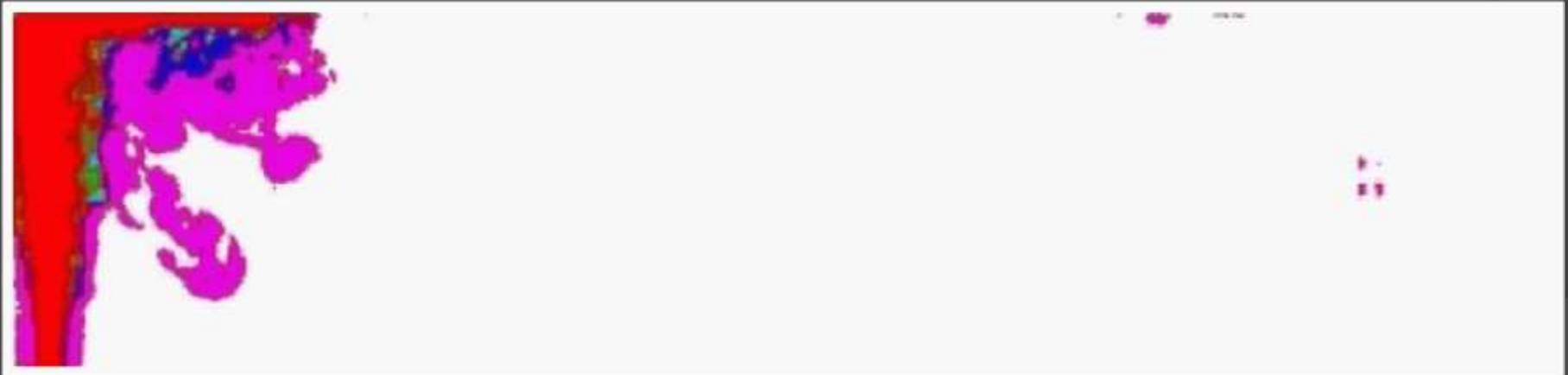
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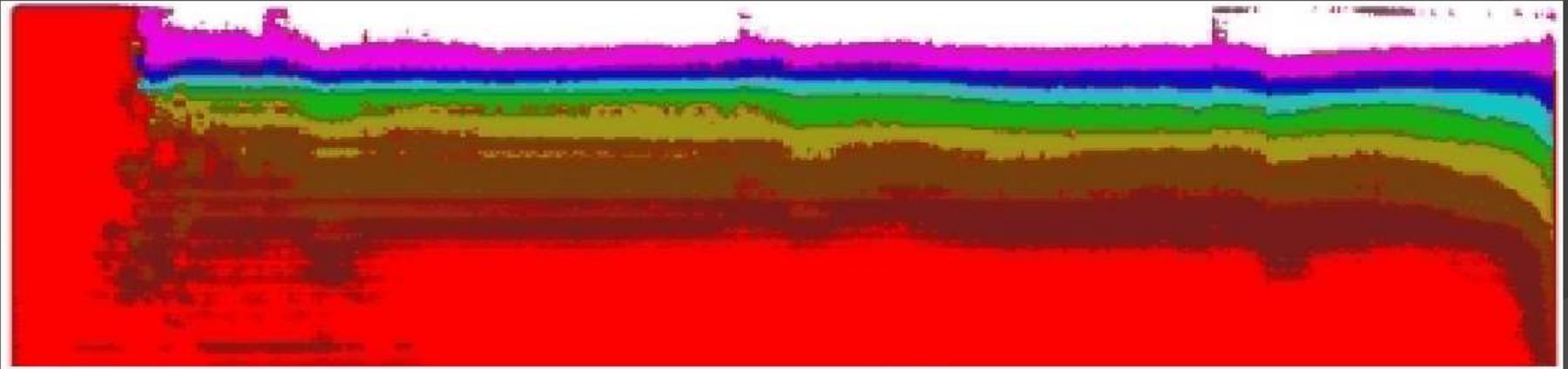
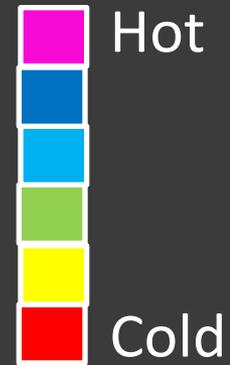
What water is being sampled?



Scaled model of passive mixing Georgia Tech



Courtesy of Prof. Phillip Roberts
Georgia Institute of Technology



Courtesy of Prof. Phillip Roberts
Georgia Institute of Technology