

Water Storage Tank Mixing System Alternatives

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Why Do Some Tanks Need Mixing?

- Tanks Are Generally Designed To Short Circuit
- Inlet and Outlet Pipes are Usually the Same Pipe
- Seasonal Lack of Demand
- Some Tanks are Oversized for Fire Flow Requirements

Basic Tank Styles

- Reservoirs and Standpipes
- Elevated Tanks – Dry Risers
- Elevated Tanks – Wet Risers

A large, blue, cylindrical water tower stands prominently in a grassy field. The word "SAGINAW" is painted in large, blue, serif capital letters across the middle of the tower's side. The tower has a white base and a small white square fixture on its left side. In the foreground, there are patches of dirt and grass, with two small mounds of brown material. A chain-link fence is visible on the left side of the tower. The background consists of dense green trees under a bright, cloudy sky.

SAGINAW



**SOUTHWEST
REGIONAL
WAYNE TOWNSHIP**







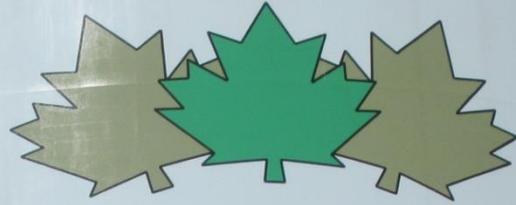


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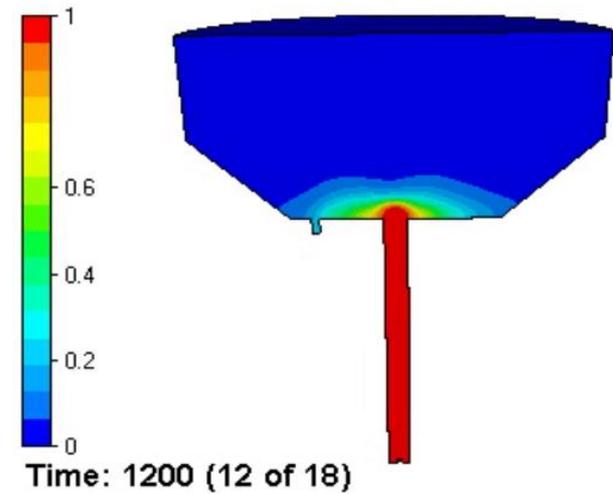
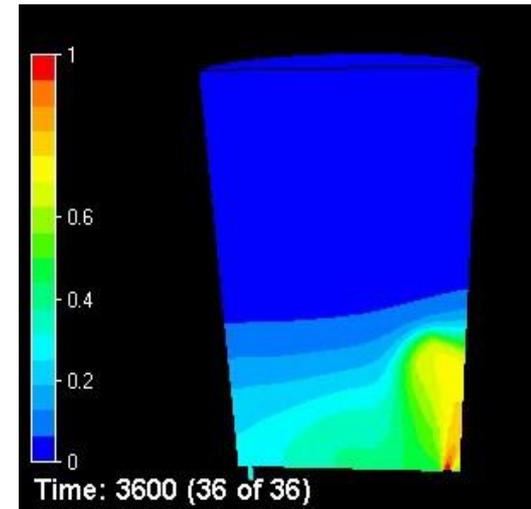
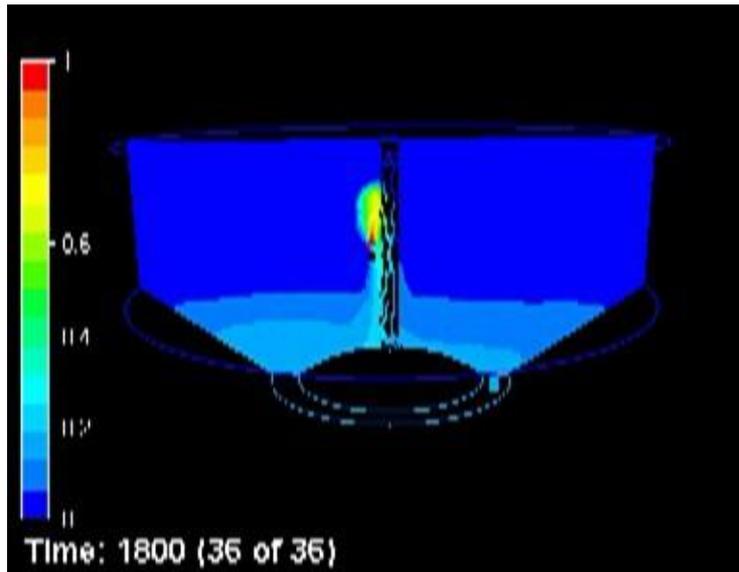


WATERVILLE









(Images Courtesy of Tide-Flex)

Problems Caused By Short Circuiting And/Or Low Usage

- Regulatory Compliance Concerns
- Loss of Disinfectant Residual
- Excess Disinfectant Byproduct Formation
- Taste and Odor Formation
- Biofilm Growth
- Icing Damage

Regulatory Compliance Concerns

Surface Water Treatment Rule -
Requires Detectable Disinfectant
Residual in 95% of all Bacteriological
Samples Over a Two Month Period

Failure to Meet This Requirement Means
Issuing Public Notice for a “Treatment
Technique Violation”



Regulatory Compliance Concerns Cont....

Stage 1 Disinfectant Byproducts Rule
Lowered TTHM MCL from 100 to 80 ppb.
Established HAA5 MCL at 60 ppb.

Stage 2 Disinfection Byproducts Rule
(Phased in Based on Population
Between April 2012 and October 2014)
Eliminates TTHM and HAA5 Averaging.
Every Sample Site Must Meet MCLs and
all Customer Supplies Must Sample and
Meet MCLs.



Taste and Odor Formation

Customer Complaints and
Loss of Consumer Confidence

Single Malt Scotch – Aging is Good
Drinking Water – Aging is not Good



Biofilm Growth

Creates Disinfectant Residual Demand, Potentially Causing or Increasing the Regulatory and Taste and Odor Concerns

Mineral Staining is **NOT** Biofilm!!!



Icing Damage

Most Likely Reason For Mixing in Northern Climates

Costs from Icing Damage May Far Exceed Capital and Operational Costs of Mixing Systems

Types of Icing Damage

- Catastrophic - Loss of Tank From Complete Freezing
- Structural Damage - Requiring Expensive Repair
- Coating Damage - Requiring More Frequent Repainting



WATER

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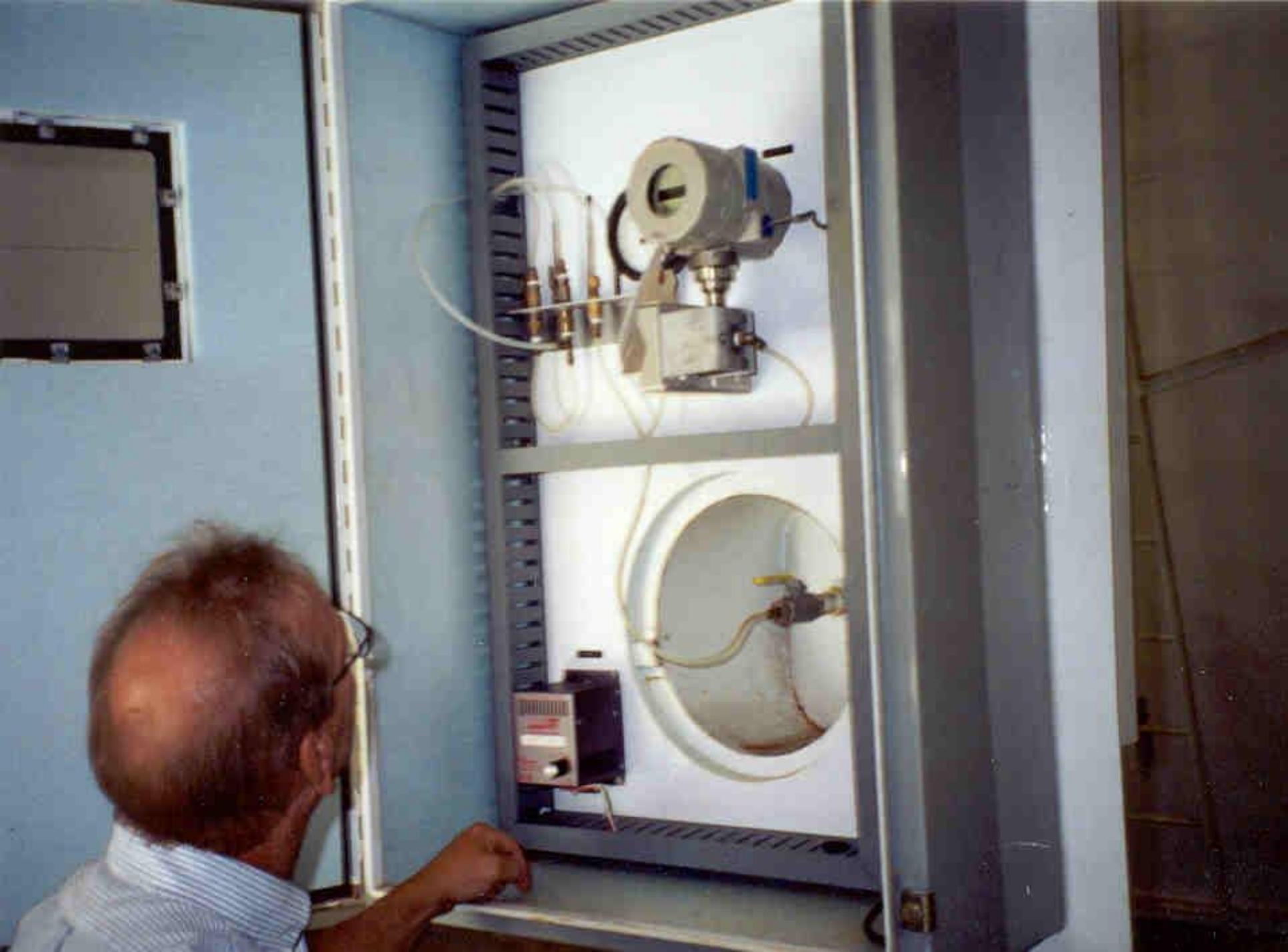


Are You Experiencing One Or More Of These Problems?

Try Operational Changes First

Operational Practices To Minimize Stagnation And Icing Damage

- Pump Cycle Adjustments
- Tank Level Variations
- Temperature Alarms
- Fill Pipe Insulation and Heat Tape
- Water Source Changes
- SCADA and Telemetry are Critical



Still Need A Mixing System?

Active Systems – Operate Continuously

Passive Systems – Operate During Fill Cycles Only

Disclaimer

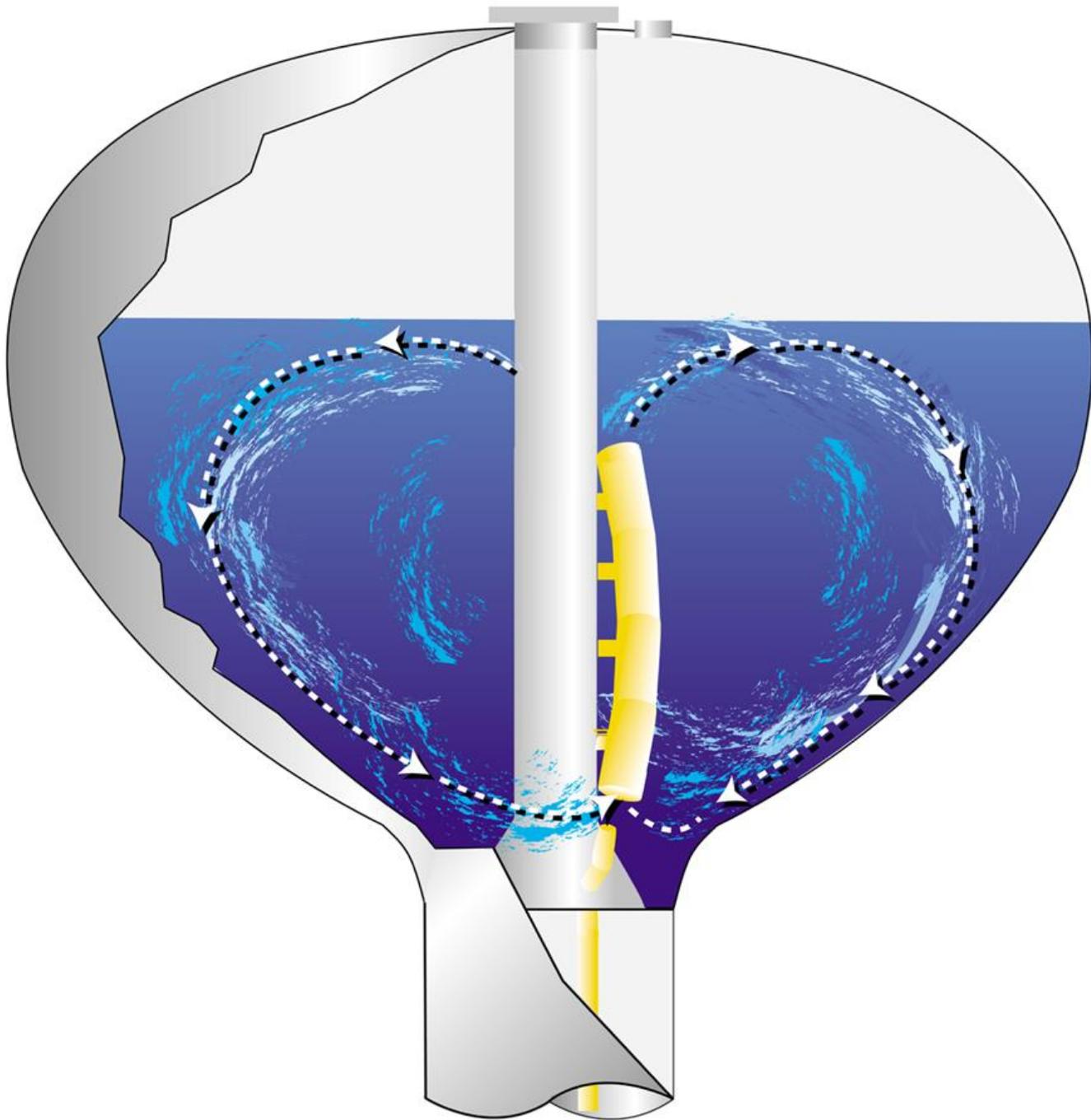
The Remainder of this Talk is a Discussion of Generic Types of Mixing Systems and is not Intended to Recommend One Type or Style Over Another

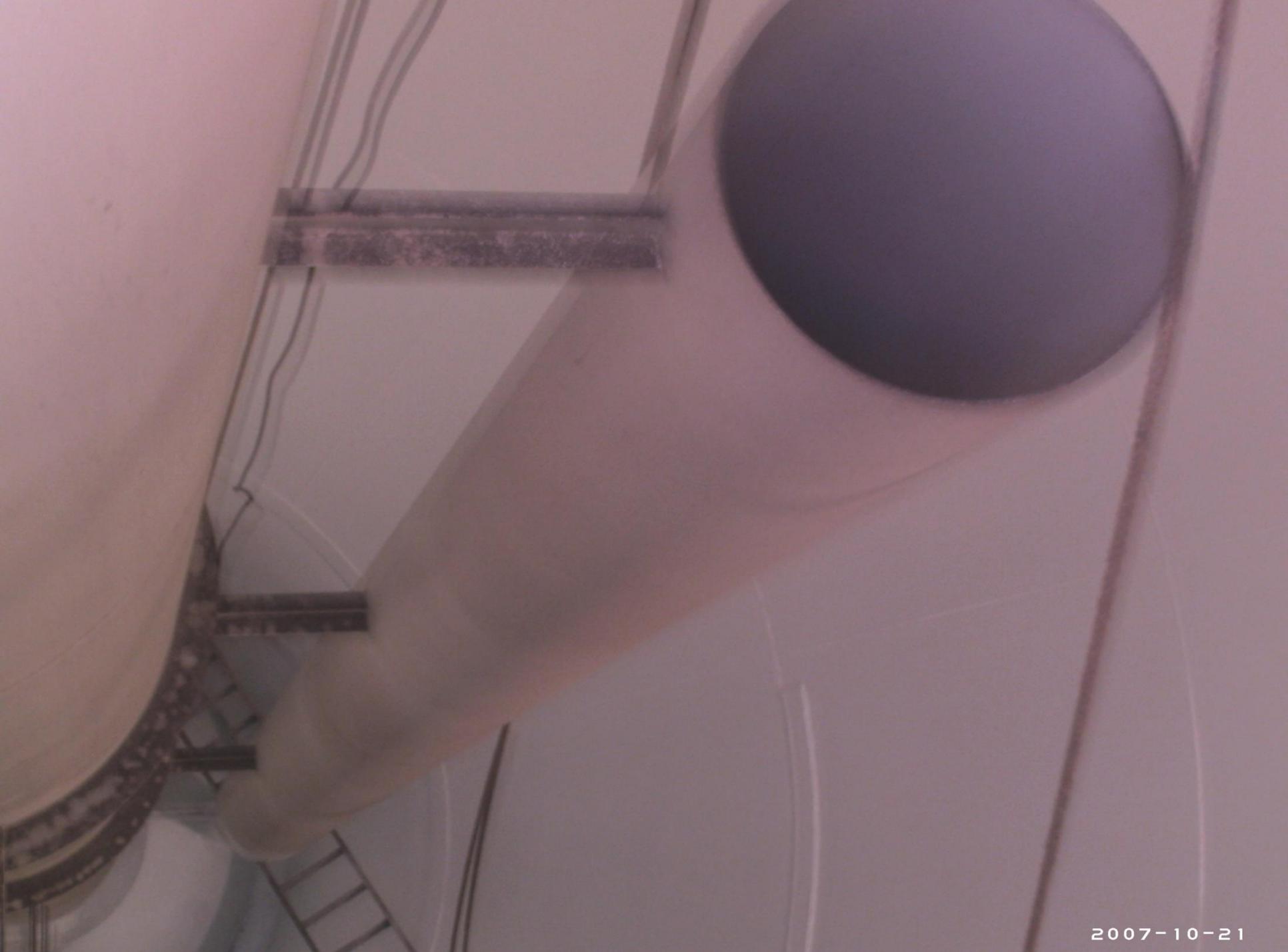
We Apologize In Advance to Any Mixing System Sales Personnel in Attendance

Passive Systems

Minimize Short Circuiting Through Installation of Piping and/or Valving to Bring “New” Water Into the Top of the Tank and Take “Old” Water Out of the Bottom

Reservoirs Generally Require More Capital Intensive Installations Than Elevated Tanks





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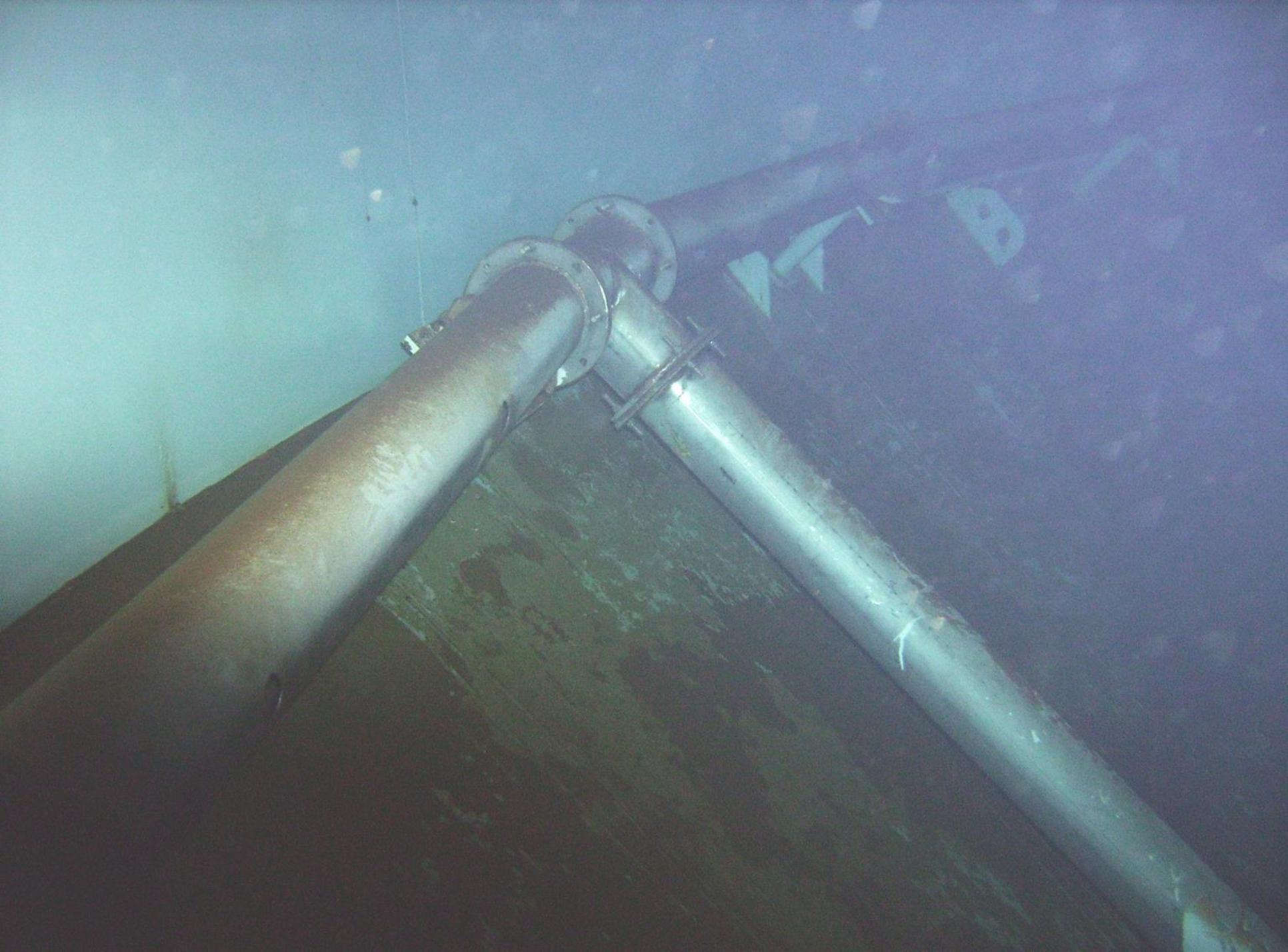


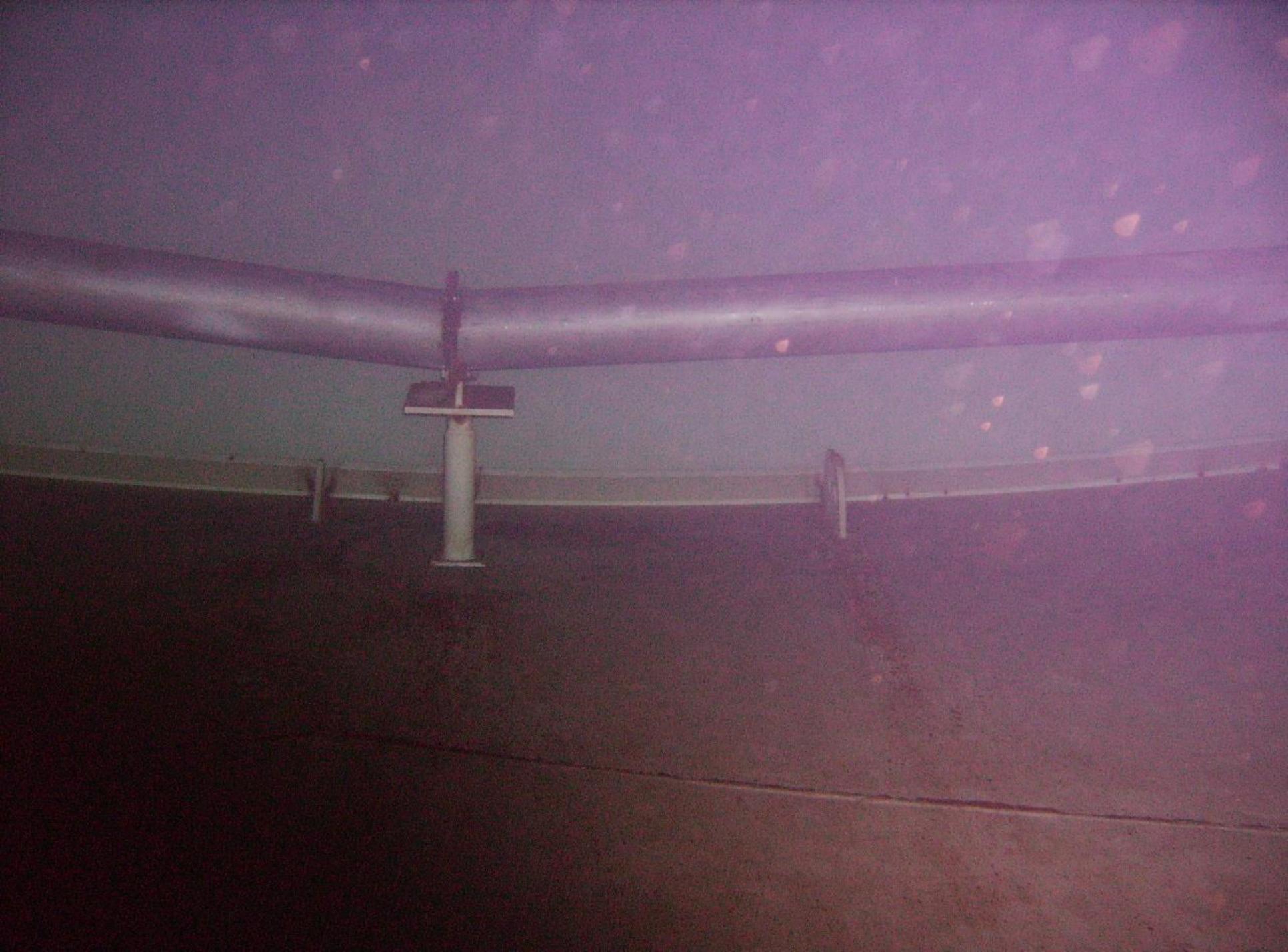




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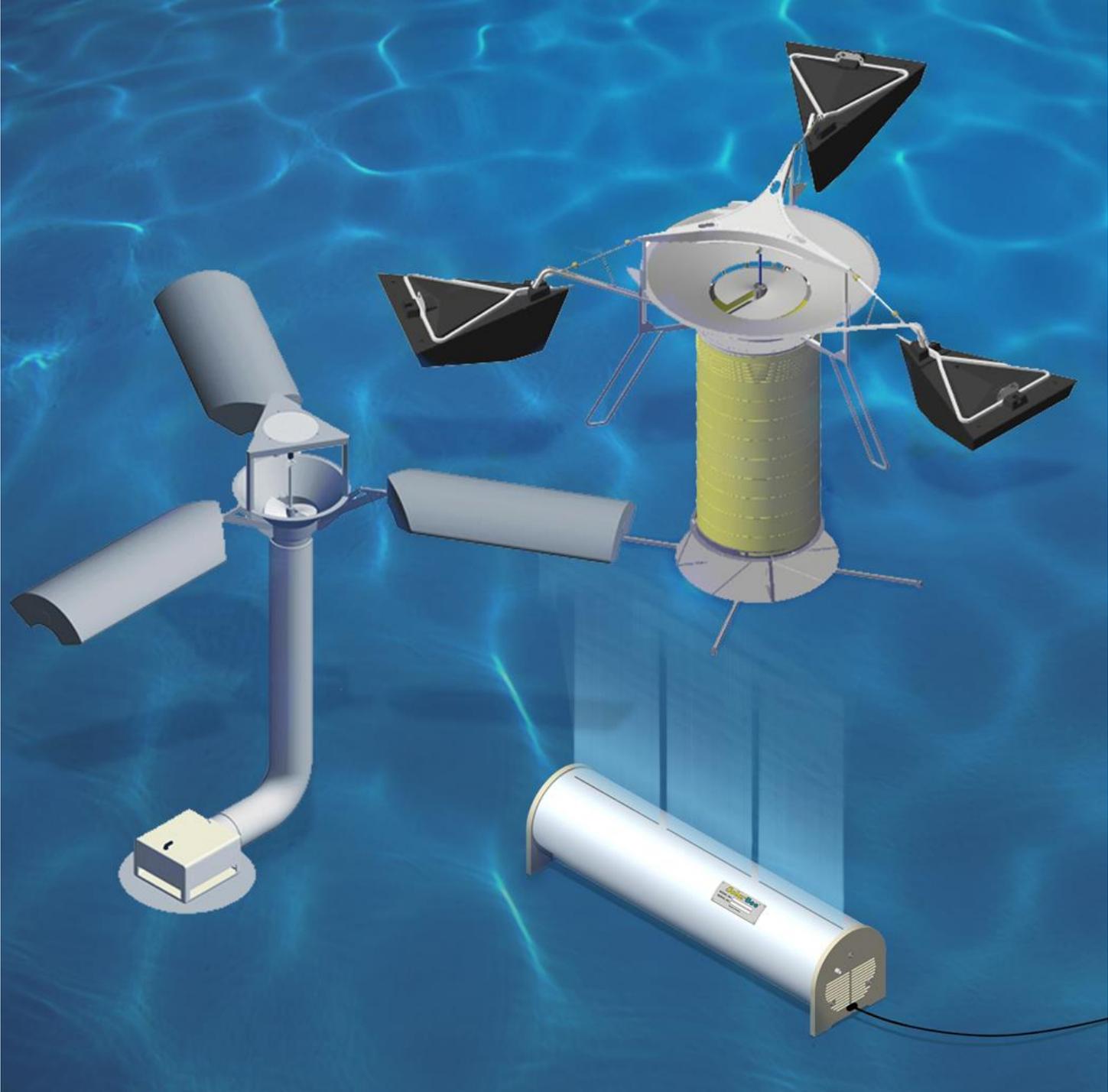


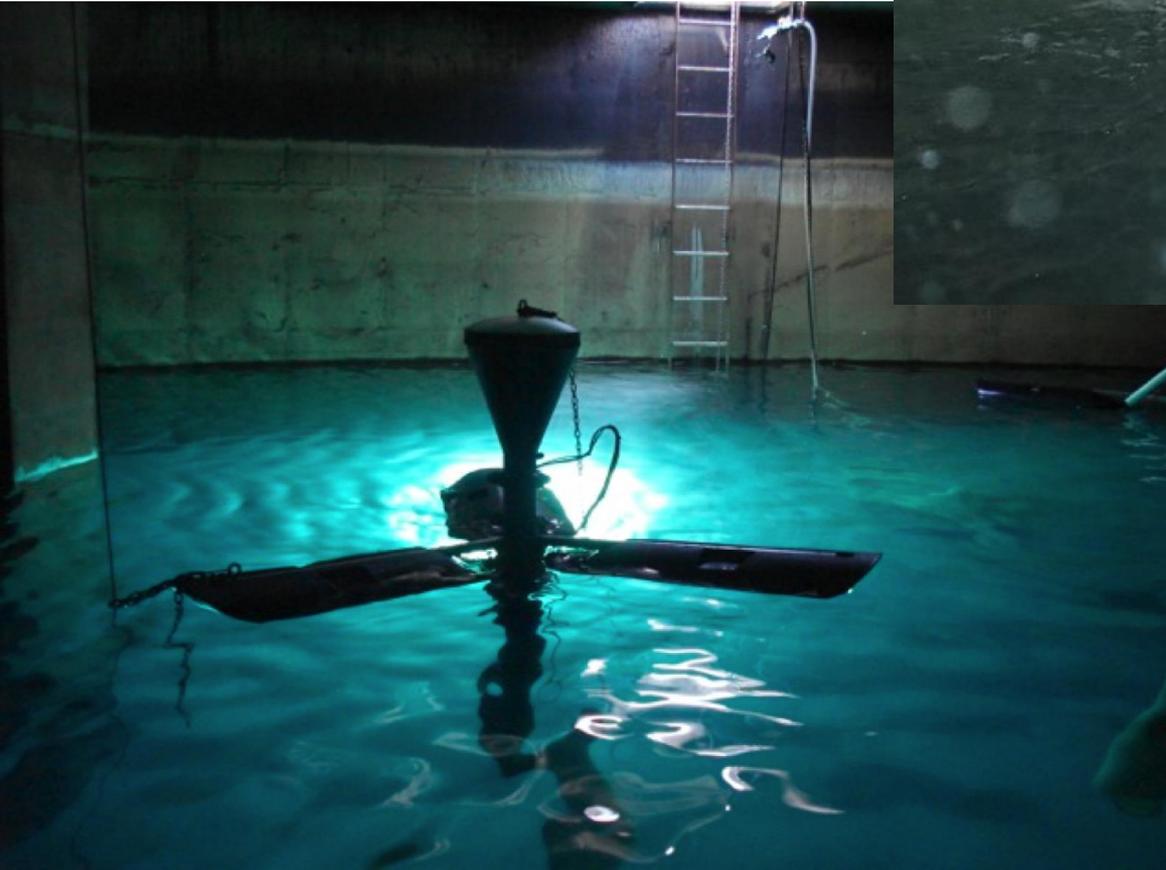




Active Systems

- Mechanical Mixers
- Air Bubblers
- Recirculation Systems



















19/02/2014





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Recirculation Pipe

Recirculation Pump



Conclusions

- Determine if You Have a Problem Caused By Short Circuiting and/or Low Demand
- Try To Solve That Problem by Operational Changes First
- If Mixing is Still Needed – Evaluate Alternatives
- Consider Capital Costs, Operational Costs, and Maintenance Requirements
- Utilize Mixing System Representatives as a Resource to Model Your Tank and Provide Specifications