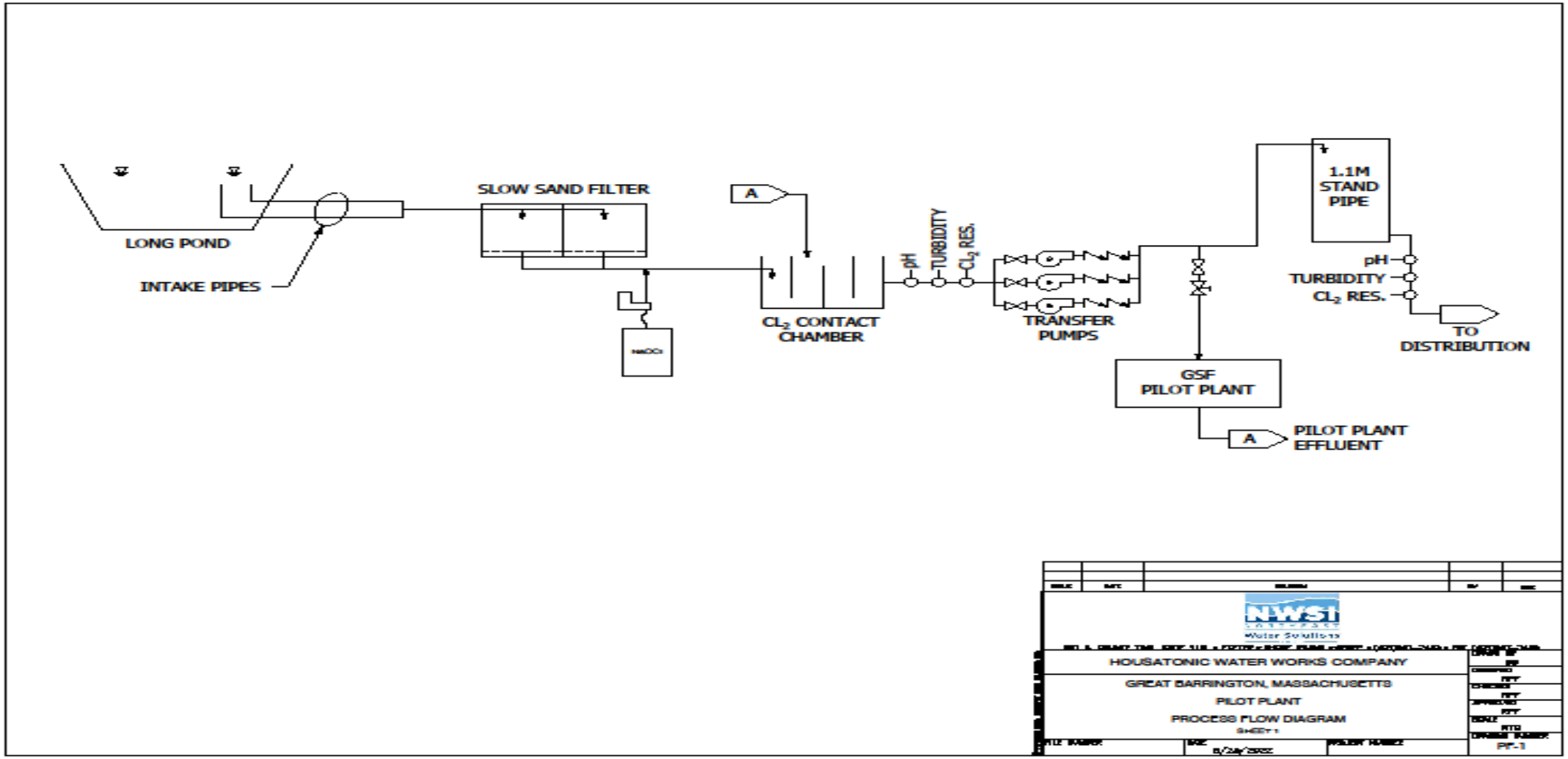

Housatonic Water Works
INFORMATION MEETING
November 15, 2022

HWWC's Water System

- Serves ~1,400 people via 824 service connections
- Averages ~107,000 gallons/day
- Small, almost totally undeveloped watershed
- Long Pond is a very high-quality source water (except for periodic spikes of manganese)
- Treatment includes slow sand filtration and chlorine disinfection
- Use as few chemicals as possible to keep the water natural (chlorine is the only chemical added)
- Chlorine contact tank and 1-MG storage tank provide plenty of disinfectant contact time and storage (~9-day supply)
- ~16 miles of pipe (2 to 14-inch diameter)
- Periodic discolored episodes have become problematic

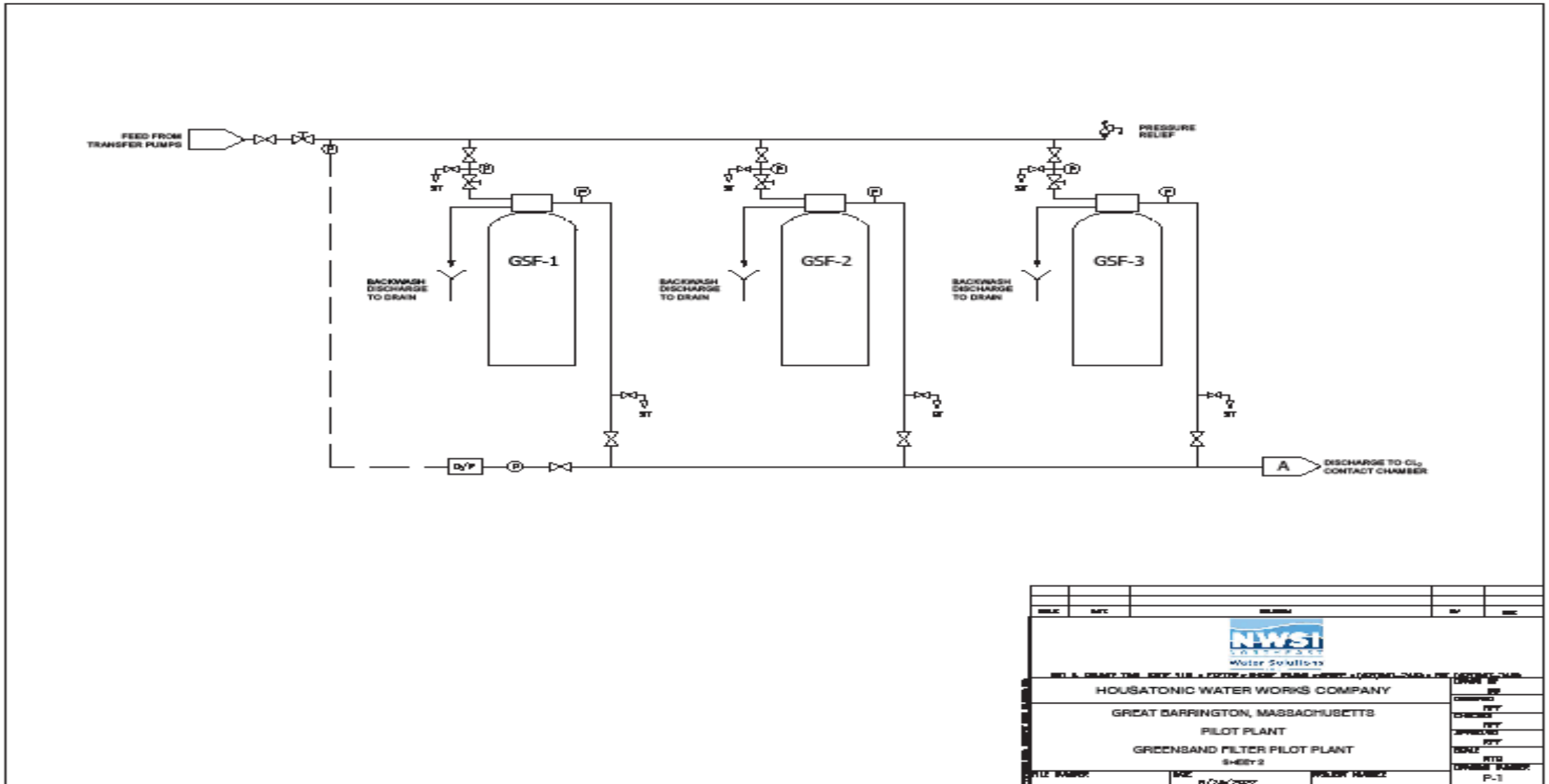
HWWC Water Treatment System



Manganese Treatment Via Greensand Filtration

- Manganese Greensand - Natural Zeolite
- Media Has Oxidative/Exchange Properties
- Enhanced w/Manganese Dioxide Coating – Catalyst of Oxidative-Reduction Reaction
- Soluble Mn is Oxidized and Precipitated
- Particulate Mn is Captured by Filtration in Media Bed
- Residual Soluble Mn will be Removed by Oxidative Exchange w/in Greensand Media Bed.
- No impact upon pH, Taste, Odor, etc.
- Integrates into Existing Water Treatment System.

Manganese Treatment – HWWC Pilot Plant



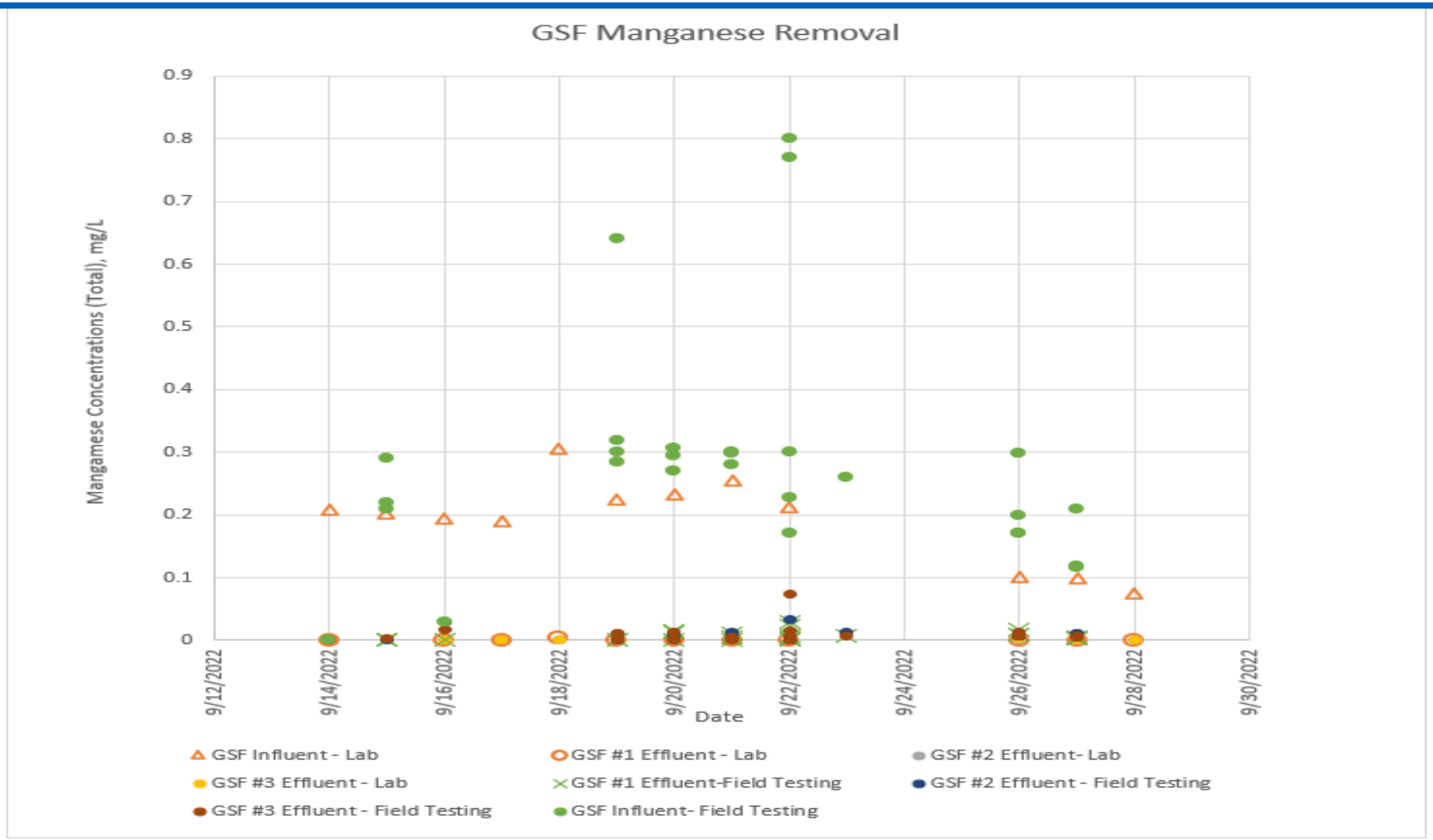
Manganese Treatment – Pilot Plant

- Assess Critical Operating Conditions & Variables of HWWC System;
- Determine Key Operating Criteria for Successful System Operation;
- Test Through Multiple Operating Cycles, Over 2-4 Weeks;
- Validate Consistency of Performance – Effluent Mn <0.01 Mg/L;
- Develop Comprehensive Performance Data Base to Support Final, Full-Scale Design & MassDEP Permitting;
- Evaluate Impact Upon Disinfection By Products (DBPs);
- Evaluate Overall Finished Water Quality;
- Optimize Integration into HWWC System;

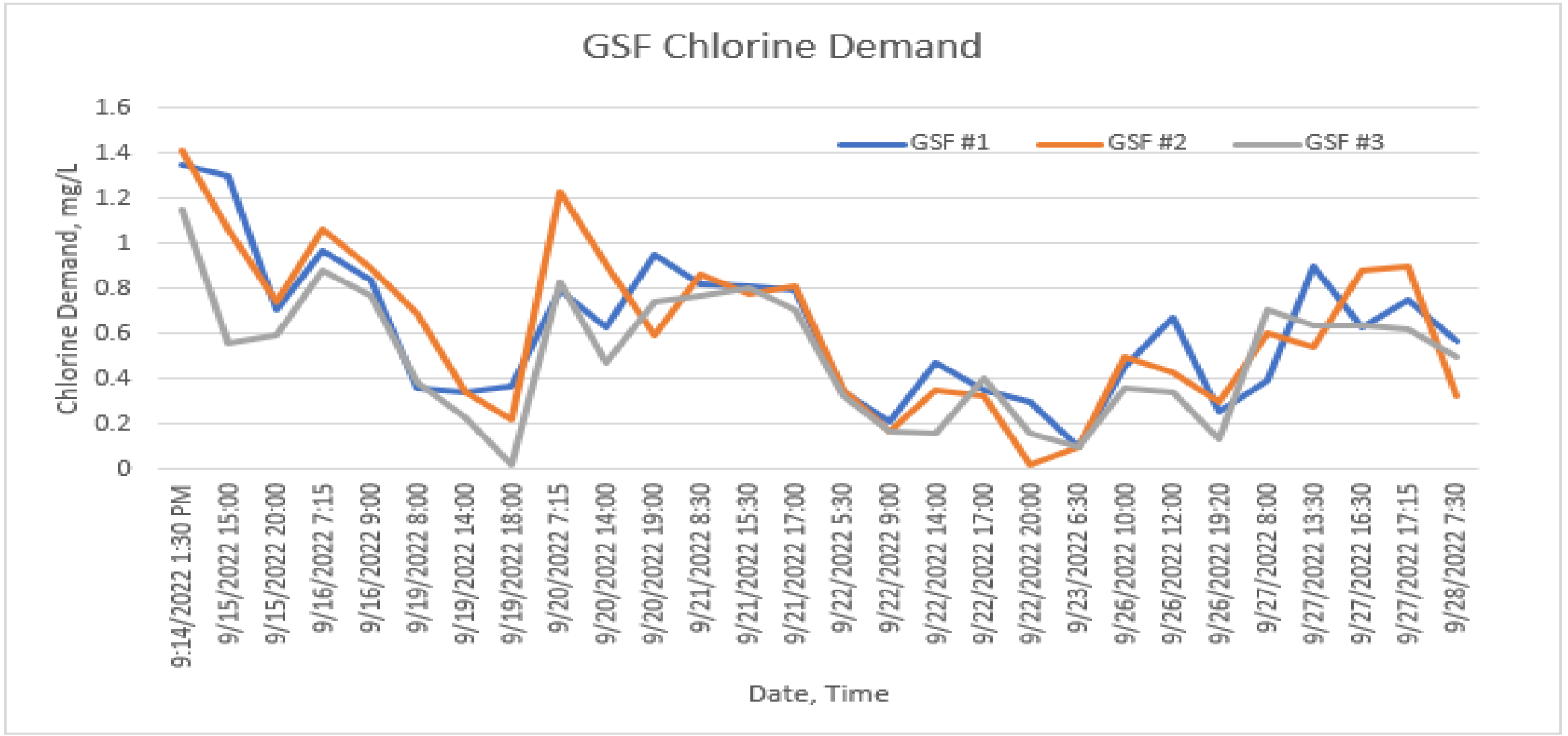
Manganese Treatment – Pilot Plant

- Pilot Plant Validation:
  - Validate Through Multiple Filter Operating Cycles;
  - Validate for Effluent Mn – Optimally Non-Detectable;
  - Validate Pre-Oxidant Chlorine Dosage;
  - Validate Chlorine Residual and DBP;
  - Hydraulic Loading & Operating Cycle Duration;
  - Influent & Effluent Mn and Other Key Parameters;
  - Operating Pressure & Differential Across Filter System;

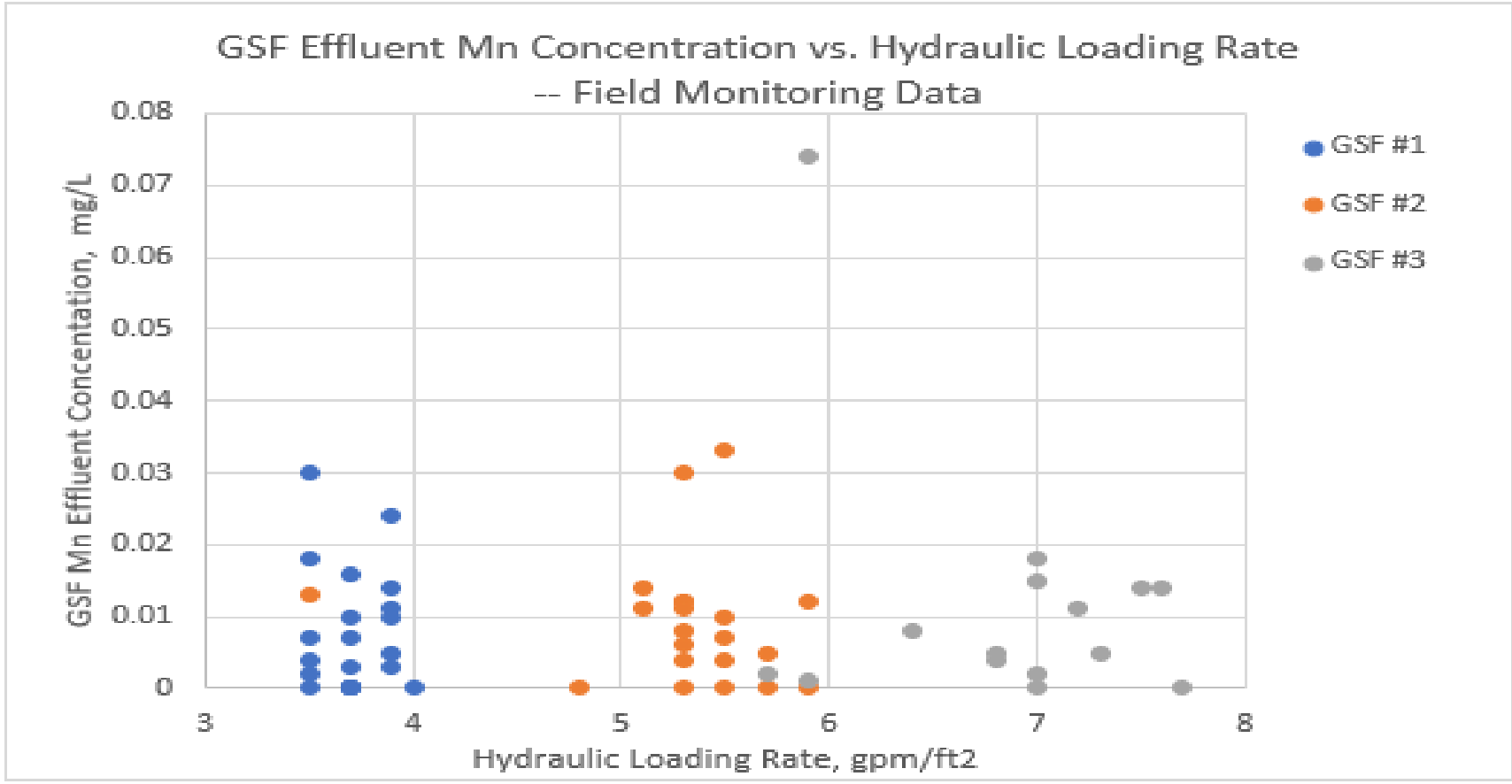
Manganese Treatment – Pilot Plant Results



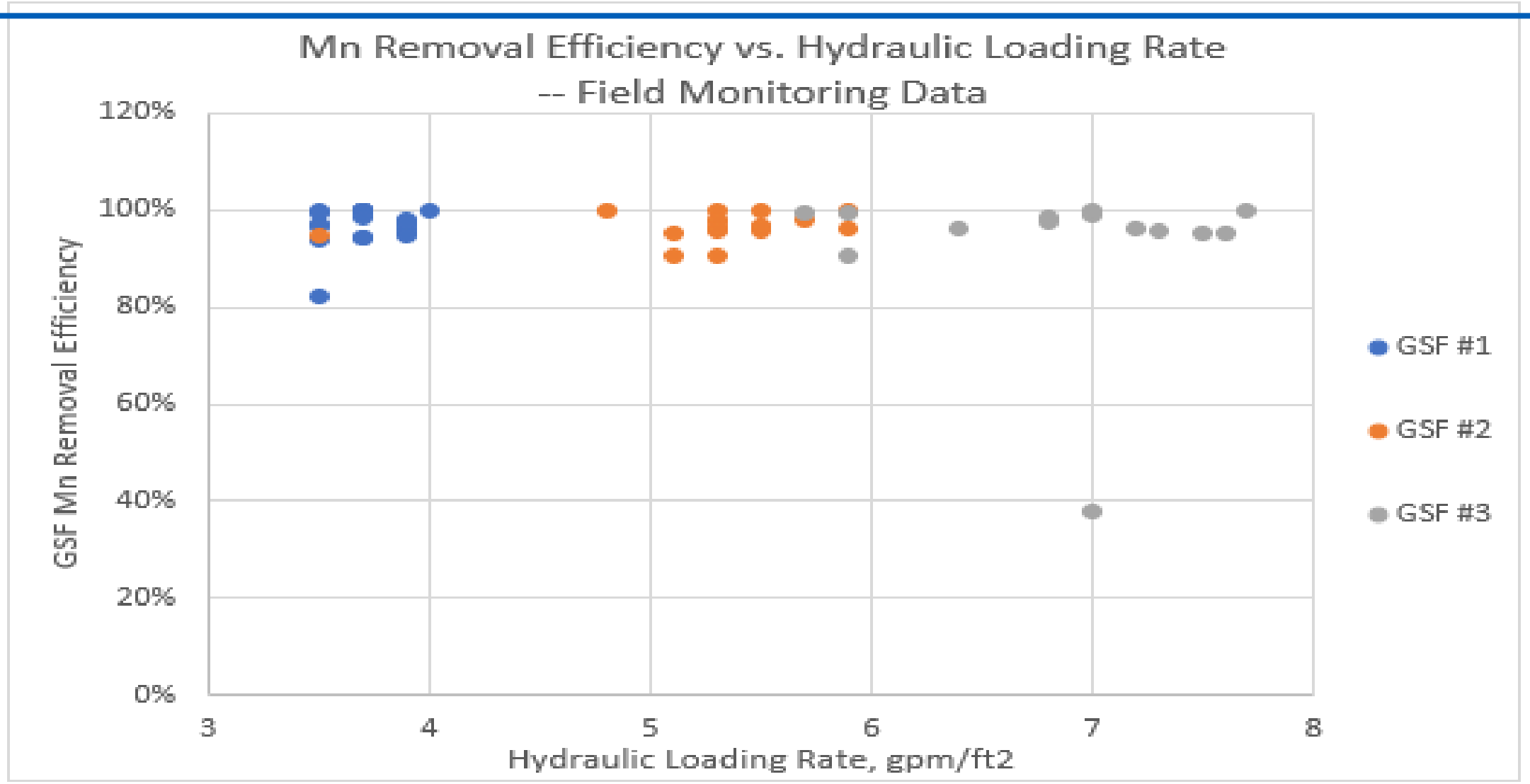
Greensand Filter Chlorine Demand Results



Greensand Filter Hydraulic Loading v Effluent Mn



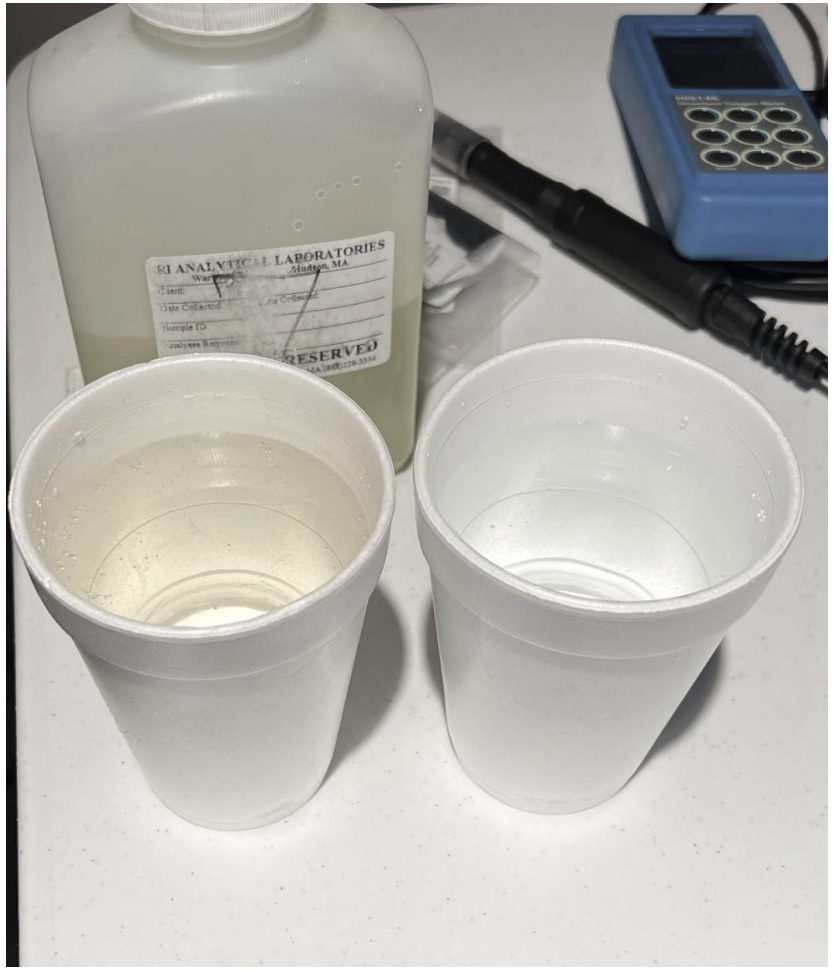
Greensand Filter Hydraulic Loading v Treatment Efficiency



1st Day of Operation

Robert Ferrari and Sean Murphy of Northeastern Water Solutions and Fred Mercer , President of HWWCO

Before & After



History of Disinfection

- 2000 BC: People used sunlight, charcoal, heat, and copper to sanitize their drinking water and stored it in containers.
- 1746: The first patent for a water filter was issued in France, consisting of wool, sponges, and charcoal.
- 1854: A cholera epidemic broke out in London, killing thousands of people, and the English doctor, John Snow, traced the cause of the outbreak back to a contaminated water pump.
- 1900: Scientists discovered the effectiveness of disinfectants, such as chlorine, in sterilizing drinking water, and the application was adopted by water treatment companies shortly thereafter.
- 1908, Jersey City, New Jersey was the first city in the United States to begin routine Chlorine disinfection of community drinking water.
- Thousands of cities and towns across the United States followed suit in routinely disinfecting their drinking water, contributing to a dramatic decrease in disease across the country

Disinfection Byproducts

Water systems add chlorine to drinking water to kill or inactivate harmful organisms in a process called “disinfection.” During this process, chlorine also reacts with naturally occurring organic matter that may be present in drinking water. Chlorine disinfection byproducts (DBPs) can form during this chemical reaction.

Disinfection vs Disinfection Byproducts (DBPs): A Complex Balancing Act

Disinfection byproducts (DBPs) are a family of chemicals

Total Trihalomethanes and Haloacetic Acids. DBPs are formed when chlorine-based disinfectants react with naturally occurring organic matter and other substances in the source water.

The levels of DBPs depend upon the nature of the source water, the type of treatment to remove particles and organic matter, and the type and concentration of disinfectant.

The risk of illness from DBPs is much lower than the risk of illness from drinking most surface water and some groundwater sources that have not been disinfected. The major health risks from DBPs are from long-term exposures.

Disinfectants and Disinfection Byproducts Rules

Disinfectants and Disinfection Byproducts Rules require water systems that use a disinfectant to monitor for two groups of DBPs. The U.S. Environmental Protection Agency (EPA) determined that regulating these two groups of DBPs would cause a general overall reduction in all DBPs.

Total Trihalomethanes (TTHM): The maximum contaminant level for TTHM is 0.080 mg/L.

Haloacetic acids (HAA5): The maximum contaminant level for HAA5 is 0.060 mg/L.

Short-Term Means of Reducing DBPs

Study: Evaluation of Reducing Water Age by Lowering Storage Tank Water Level

Conclusion: "*Based on the evaluation, lowering the water level in the 1.1-MG storage tank further than the current practice can decrease water age, however, it will adversely impact of the water pressure for certain areas in the distribution system especially during fire flow conditions*".

HWWCO is continuing to evaluate HAA5S and plans to develop treatment alternatives

Questions?