

WATER SYSTEM COMPUTER SIMULATION AND DISTRIBUTION SYSTEM IMPROVEMENTS ST. JOHNSBURY, VERMONT



The St. Johnsbury water system was cited by the Vermont Water Supply Division for several system deficiencies including inadequate pressure areas, customers with suction booster pumps, and failure to comply with the Stage 1 trihalomethane requirements. These violations led the Town to retain Dufresne Group to complete a comprehensive distribution system analysis. A key component of this analysis was the development of a water system computer model using WaterGEMS® software. The process of model development included reviewing Town maps, record information, and GIS information. Fire flow testing at all ISO test locations and several C-value tests were performed to calibrate the model, which was verified by recording pressures over a multiple day period at several locations throughout the water system. Dufresne Group also verified the elevation of all tanks and system control valves with a field survey.

Once the model is field verified to accurately depict system characteristics, the model was used as a tool to determine deficiencies, evaluate alternatives to resolve deficiencies, and to simulate system modifications and upgrades including new storage tanks and pressure zone reconfiguration. In St. Johnsbury the model set the design criteria for \$8,500,000 in water system improvements completed in 2010 with between 45% and 75% Rural Development grants in aid.

KEY FEATURES

- Use of WaterGEMS® Software
- Model Calibration based on Actual Field Survey and GIS Data
- Model Calibration included fire flow, C-Value Testing, and system pressure recorders
- Simulation results set criteria for \$8,500,000 in Water System Improvements including:
 - * Establishing two new pressure zones
 - * Four new Water Storage tanks
 - * New Constant Pressure Booster Pump Station
 - * Two Booster Chlorination Stations
 - * 1.5 Miles of Cleaning and Lining water main
 - * Two new pressure reducing valve vaults
- Use of both Extended Period Simulation and Steady State Analysis
- Evaluation of Water Age for Initial Distribution System Evaluation (IDSE)
- Computer Simulation Results led to Compliance with Stage 1 Disinfection Byproducts