Brown AND Caldwell
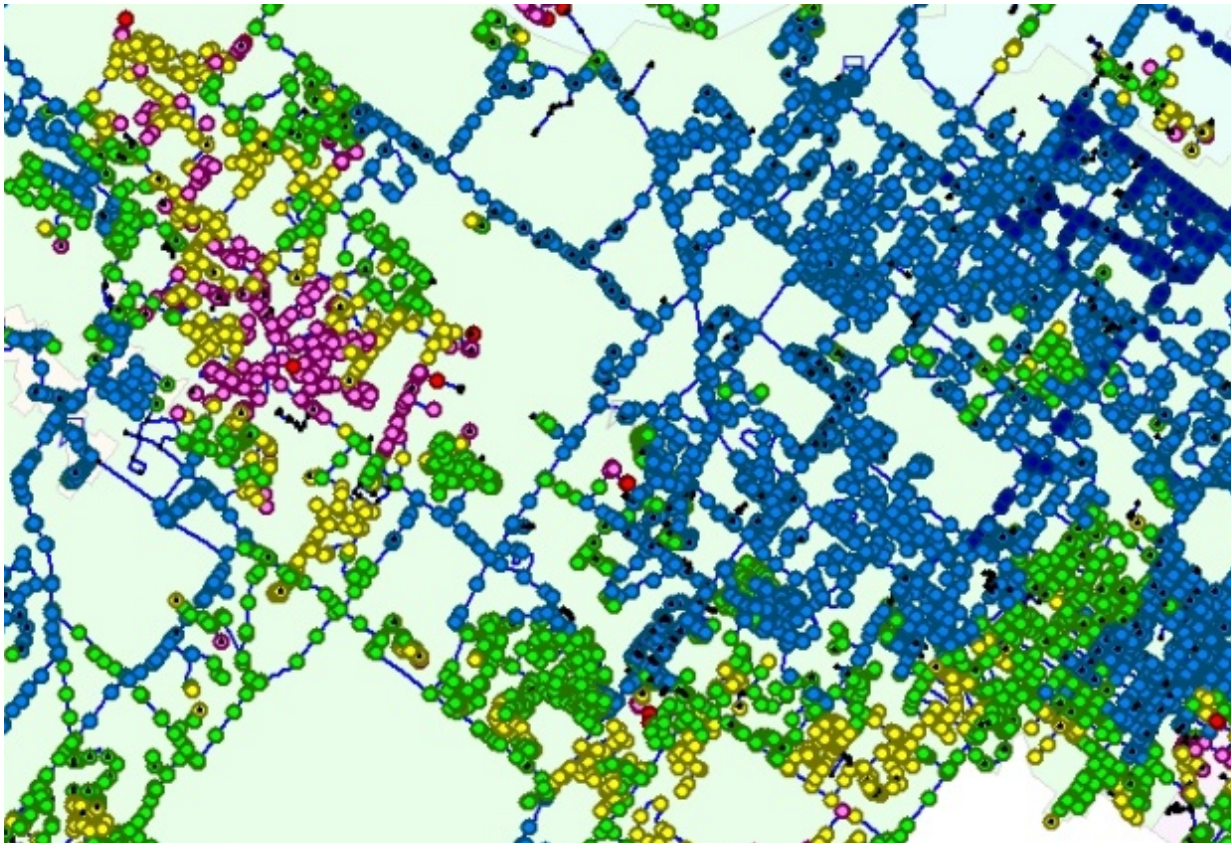
Forum on the Science of Disinfectant Residual

Taking the Mystery out of Chlorine Residual Sampling Locations

November 24 | 2015

Introduction

Challenge

The mechanisms of chlorine residual decay are well known, but the location of these mechanisms in the distribution network are unknown

Solution

Use of the right tools and data can take the mystery out of chlorine residual monitoring

Basics for Using Your Hydraulic Model for Chlorine Residual Optimization

1 Start with a well calibrated extended period simulation hydraulic model

2 Establish bulk decay rates for sources

3 Characterize distribution system chlorine residuals with robust sampling dataset

4 Adjust distribution system wall decay rates to match sample data. Be aware of:

- Daily supply variations and the affect of sample collection time
- Tank operation on chlorine residuals

Modeling as a Tool for Chlorine Residual Sampling

- Verified model can clarify localized or wide-spread nature of low chlorine residual areas for:
  - Follow-up sampling
  - Establishing chlorine residual correlations across the distribution system
  - Understanding upstream/downstream flow direction for troubleshooting unexpected low chlorine residuals
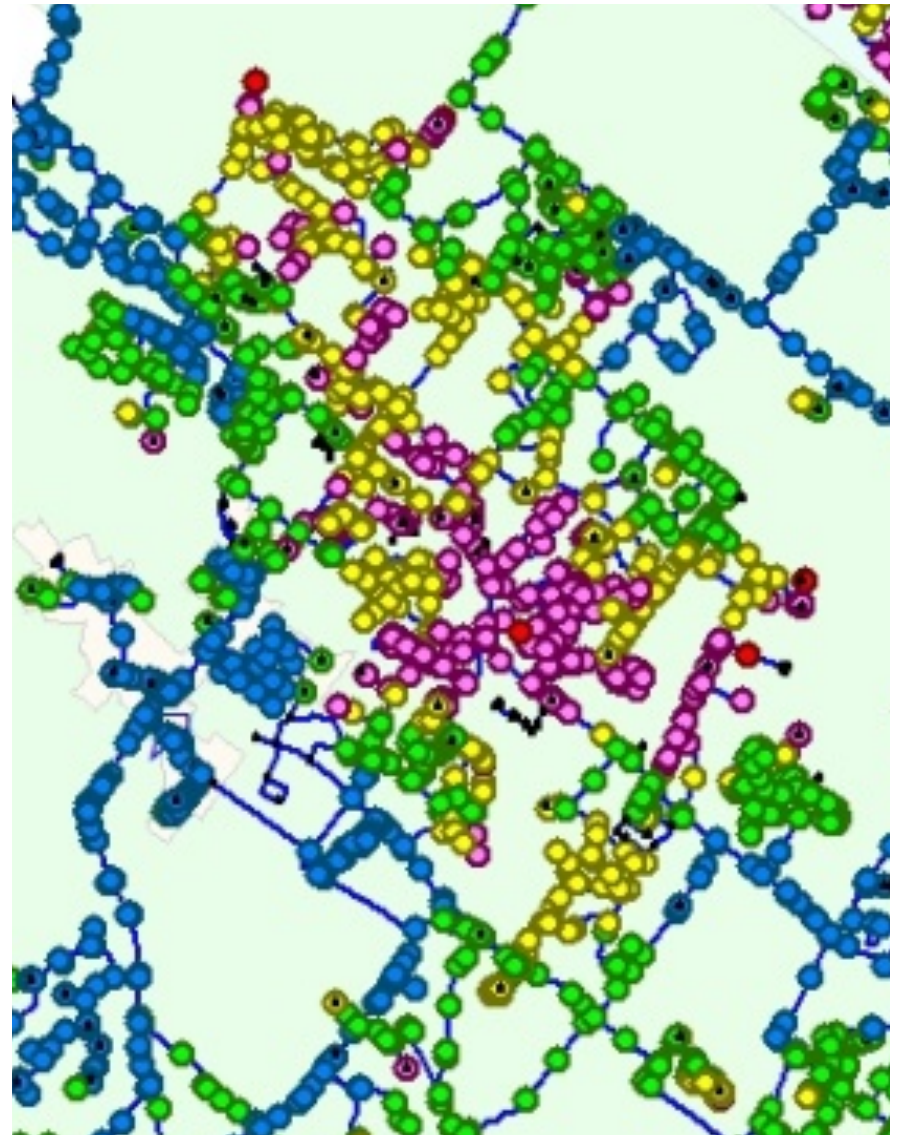
Modeling as a Tool for Chlorine Residual Sampling

- Specialized modeling (CFD) can clarify chlorine residual from tanks for understanding downstream chlorine residual performance
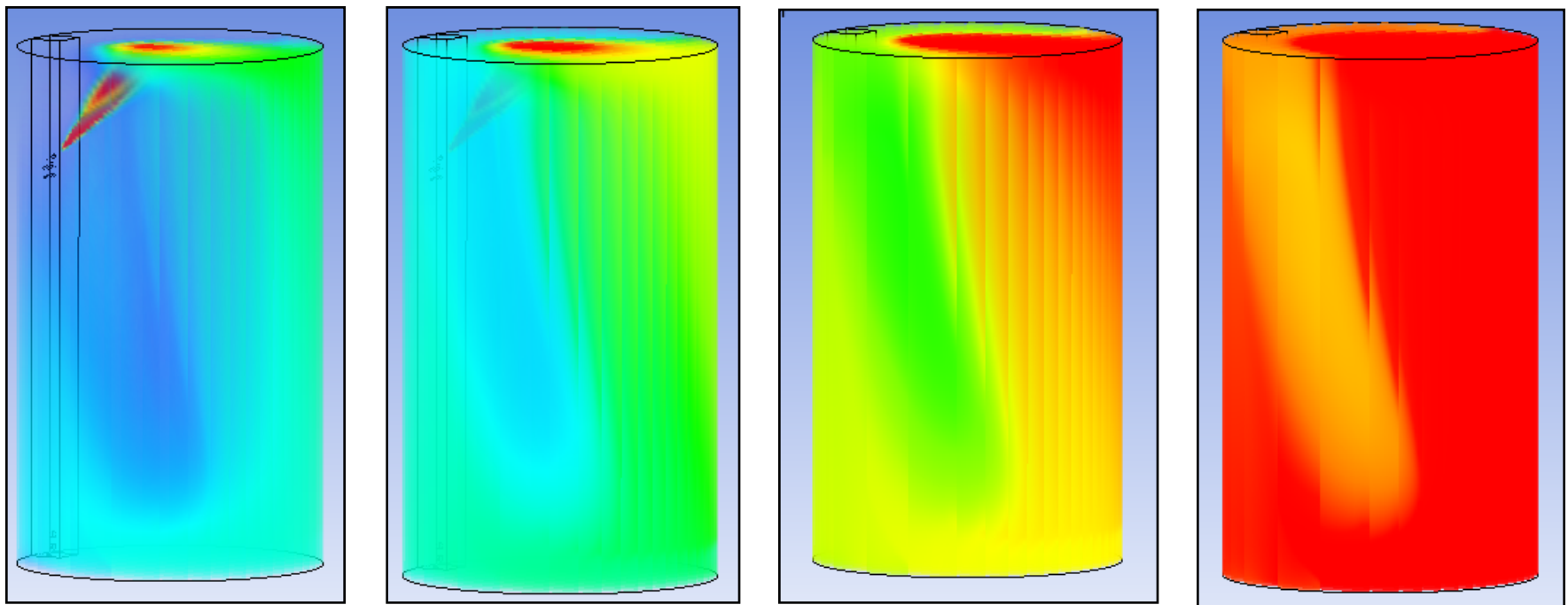
TEVA-SPOT as a Tool for Locating OWQM

- Threat Ensemble Vunerability Assessment – Sensor Placement Software

- Modeling tool developed for EPANET to:
  - Optimize water quality sensor placement for contaminant detection
  - Quantitatively compare effectiveness of various sensor designs

- Inputs
  - Calibrated hydraulic model
  - Population of service area
  - Contaminant type
  - Utility response time
  - Sensor design (number of sensors)

- Analysis
  - Computationally intensive
  - Contamination from each model node
  - Maximizes population protected

TEVA-SPOT as a Tool for Locating OWQM

- Knee of the curve analysis
  - Response time
  - Number of sensors
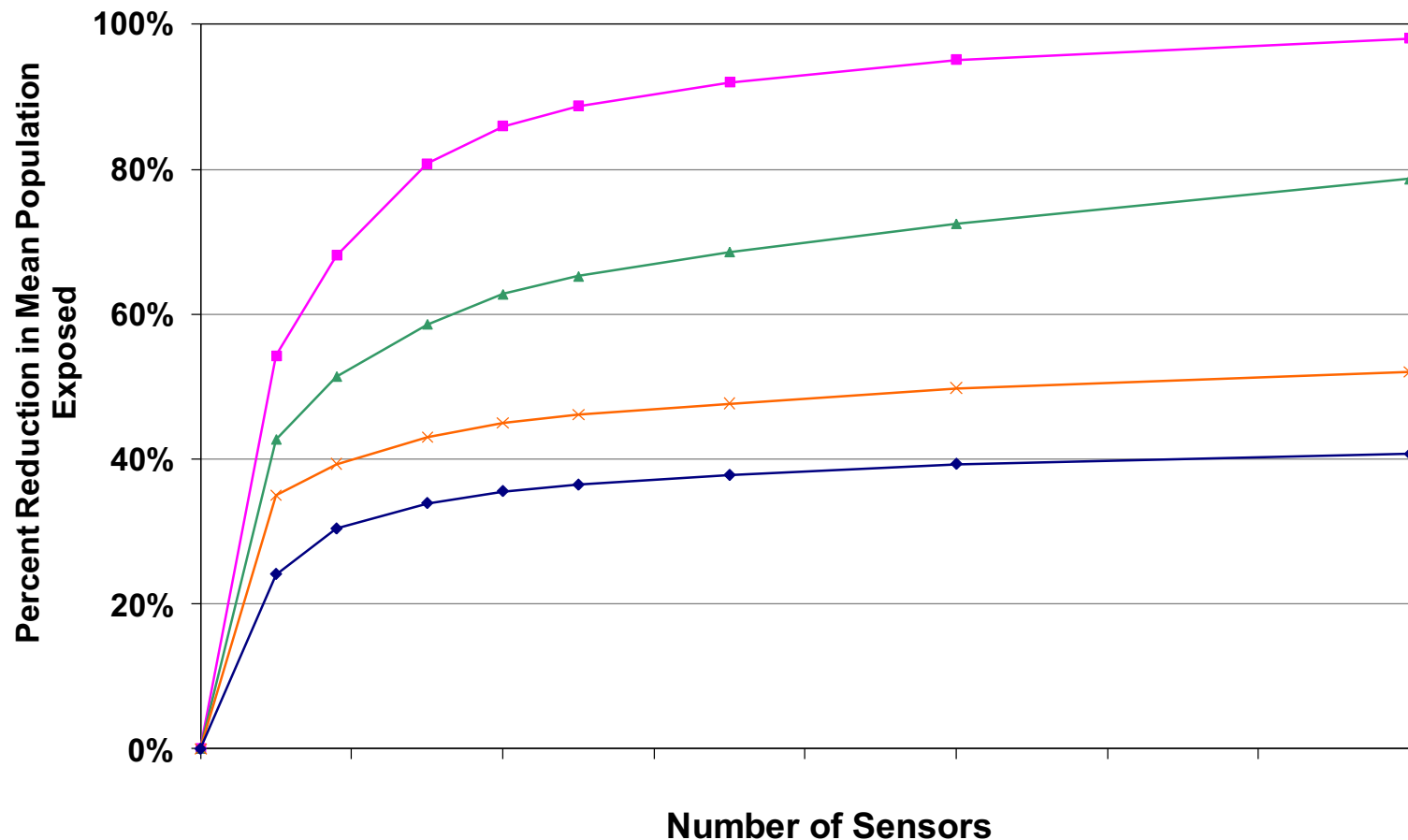
OWQM Benefits

- Real-time understanding of distribution system chlorine residual

- Correlation to grab sample data

- Operational tool for optimizing pumping and chlorine dosing strategies