Developing an Enhanced Distribution System
Online Water Quality Monitoring Program

By
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Acknowledgements

- City of Arlington Water Utilities Department
- CitiLogics
  - Jim Uber
  - Stu Hooper
- CH2M HILL
  - Ken Thompson
  - Katie Chamberlain
  - Michael Steinle
  - Christie Szili
  - S::CAN
Agenda

- Background
- Hydraulic Model Simulation Analysis
- Tabletop Exercise
- Next Steps
- Lessons Learned
Background
City of Arlington, Texas

Centered in the Dallas/Fort Worth metropolitan area

Approximately 367,000 residents

Numerous high population-density venues, including

- Cowboy Stadium
- Rangers Ballpark in Arlington
- Six Flags over Texas
- University of Texas at Arlington
Established in 1894 as Arlington Water Works
Currently serves over 100,000 accounts
All source water is surface water
Two water treatment plants
  – Pierce-Burch – 107.5 mgd
  – John F. Kubala – 97.5 mgd
Our Mission

– Protect public health
– Provide high quality water
– Safe disposing of wastewater
– Cost competitive manner
– Continuously Improve Service
– Planning for future needs
Arlington Water Utilities

- 2 Treatment Plants
- 4 Pressure Planes
- 11 Elevated Storage Tanks
- 1,410 Miles of Public Water Main
Quick turn-around project
- Phase I contract awarded November 1, 2009
- Phase I completed February 10, 2010

Phase I completed by 2010 NBA All-Star Game
Phase I Tasks

- Sensor technology and station design
- Site evaluation and selection (TEVA-SPOT)
- Event detection system (EDS) technology selection, procurement, customization, startup, and training
- Consequence management plan (CMP) and table-top exercise
Hydraulic Model Simulation Analysis
Hydraulic Model Simulation Analysis

- Determine the extent of contamination travel during ADD and MDD conditions
- Identify valves to isolate the contaminant
- Model water storage reservoirs in system for use in hydraulic isolation
- Develop isolation response books for each of the new OWQM stations for field crews
Hydraulic Model Simulation Run Approach

- Conduct simulation runs on hydraulic model using TEVA-SPOT analysis
  - Three OWQM monitoring stations (ADD and MDD)
- Simulation runs for 8 hours duration
- Identified valves for both ADD and MDD that required closure prior to the 8 hours period of detection
- Identification of hydrants for flushing program for isolating contaminate zone
- Evaluated water storage reservoir capacities and system pressures at ADD and MDD during flushing
Identification of Contamination Flow at ADD and MDD Flows
Reservoir Capacity Evaluation at ADD and MDD Flows
Tabletop Exercise
Staff Preparedness

- FEMA NIMS and ICS training
- AWU Staff attended emergency response training tailored to Public Works and Utilities industries
- Basic NIMS training was mandatory for all AWU employees
- Select staff attended other higher level training
Objective: Test the new CMP
Prepared Situation Manual for Tabletop Exercise
Conducted hydraulic simulation analysis to provide realistic scenario of contaminant spread
Conducted Tabletop Exercise
Held Hot Wash at the end of exercise
Developed “After Action” report
Preparing the Situation Manual

- HSEEP Compliant
- Distribution System Water Contamination Scenario
- Two Independent Groups
  - Management Team
  - Operations Teams
- External Observers
- External Facilitator
Establish communication protocols with mutual aid resources such as TXWARN
Provide key personnel with training for use of ICS forms and documentation protocol
Include ICS forms in the Emergency Response Plan (ERP)
Phase II
Distribution System Water Quality Monitoring Project - Phase II

🎯 Traditional Delivery
  – June, 2010 – April, 2011

🎯 Phase II focusing on 2011 NFL Super Bowl and distribution system protection
Phase II Tasks

- Five additional monitoring stations
- EDS, data management system, and geospatial dashboard development, customization, start-up, and training
- Emergency response
- 2011 Super Bowl preparation
Sample Dashboard View
Functional Exercise
Tool to evaluate and implement new ERP related to a contamination incident

EDS is one source of information. Other sources include:

- Law Enforcement
- Field Crews
- Customer Complaints
- Health Departments
- Hospitals and Pharmacies
Functional Exercise

 Routine Operation or Emergency?
   Follow CMP decision trees
   Determine if contamination event is plausible
     Review station maintenance history
     Identify related work orders in area (main breaks, low pressure, etc)
   Determine if contamination event is credible
   Confirmation of Contamination
Develop and test the Consequence Management Plan

TEVA-SPOT modeling tools provided benefits in multiple ways
  – OWQM site optimization
  – Predicting contaminant flows
  – Exercise planning

Combining modeling and GIS applications allows for proactive planning for isolating contamination events

EPA guidance documents were used in the rapid design and deployment of the Phases I and II of the Distribution System Water Quality Monitoring Project
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