Application of HACCP for Distribution System Protection

Presented by:

Kathy Martel, P. E.

Economic and Engineering Services, Inc.

P.O. Box 1989 • Bellevue, Washington 98009

Telephone (207) 642-3940 • FAX (207) 642-4762 • e-mail: kmartel@adelphia.net

AwwaRF Project #2856

Objective:

To evaluate the HACCP approach for protecting distribution system water quality

Project Tasks

- Develop Model HACCP Plan
- Desk Top Analysis of Model HACCP Plan
- **Pilot Test Model HACCP Plan**
- Integrate HACCP With Current Practices
- Prepare Interim and Final Reports

Pilot Testing Activities

- Conduct HACCP Training Workshops
- Develop HACC Plans
- Set Evaluation Criteria
- Implement HACCP Plans - 12 Month Pilot
- Prepare Pilot Testing Reports

Evaluation Criteria

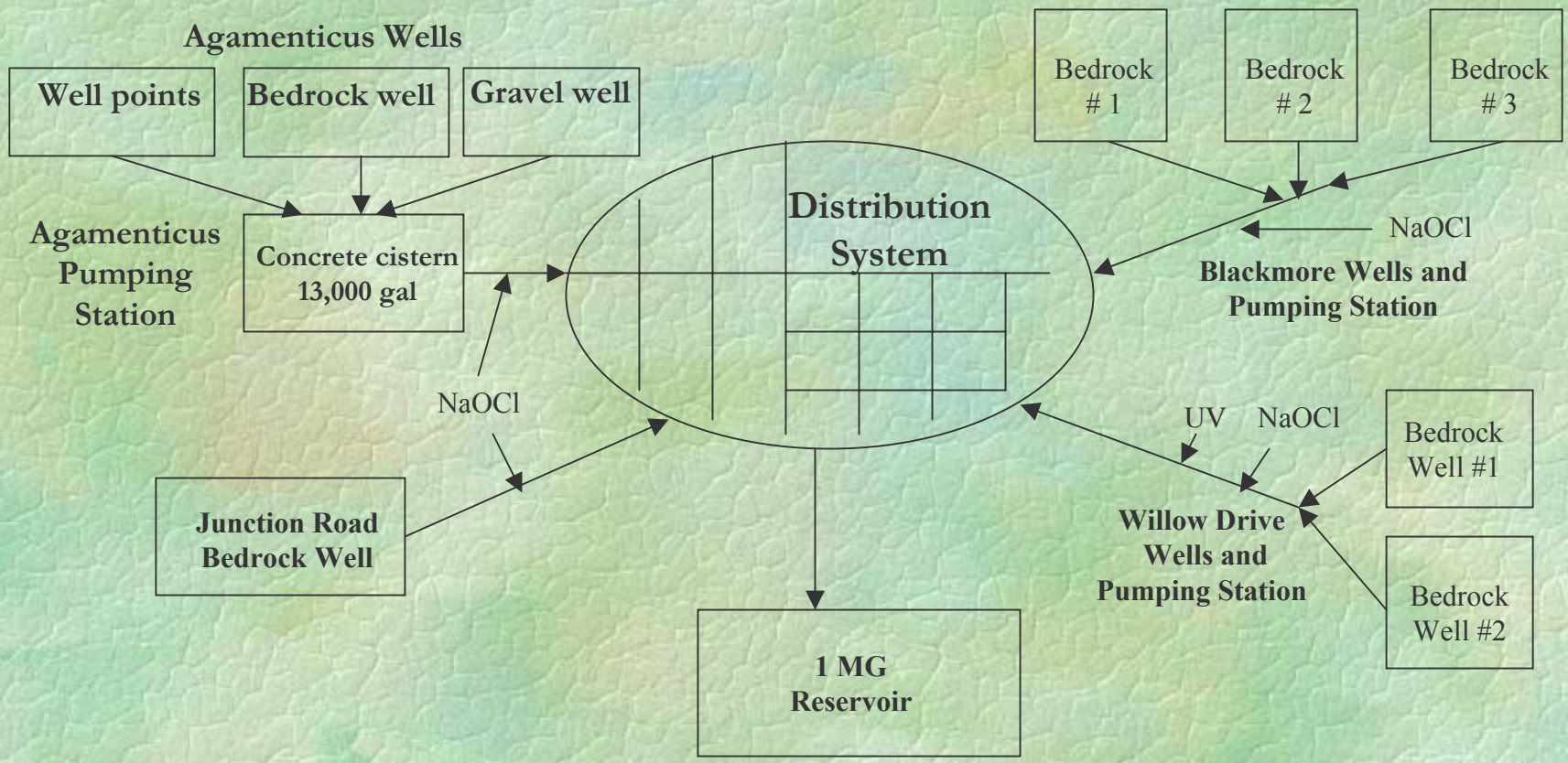
- Customer Satisfaction
- Regulatory Compliance
- Risk Management Approach
- Water System Management
- Human Factors
- Costs and Benefits of HACCP

Case Study:
South Berwick Water District,
South Berwick, Maine

South Berwick Water District

- HACCP Team
  - Superintendent
  - Foreman
  - Service Person
- Outside Experts
  - Engineer
  - Microbiologist, USEPA
  - State Regulator, CCC Expert
  - Risk Manager, Bottled Water Industry

Process Flow Diagram



***Mike Nadeau* 9/8/03**

Principle 1 - Conduct Hazard Analysis

Hazard Event	Severity of Consequences	Likelihood of Occurrence	Risk Factor = Likelihood x Severity
Backflow Through an Unprotected Cross-Connection	4	5	20
Contamination via Storage Facility Vents	5	2	10
Main Break	5	2	10

Three Priority Hazards Identified for Pilot Study

- Backflow Through an Unprotected Cross Connection
- Long Dead End Mains With Zero or Poor Disinfectant Residual
- Unintentional Contamination of Shallow Well Points at Agamenticus Wellfield

Example - Backflow through Unprotected Cross Connection

Identify Control Measures

- Install, test and repair backflow prevention devices as required at commercial service connections
- Install double check valves on residential services
- Public education
- Maintain adequate system pressure

Example - Backflow through Unprotected Cross Connection

Principle 2 - Identify Critical Control Points

- Each Commercial Service Connection
- Each Residential Service Connection
- Throughout System

Example - Backflow through Unprotected Cross Connection

Principle 3 - Establish Critical Limits

- Presence of working backflow prevention device
- Device meets Plumbing Code specifications
- Bill Stuffers or other informational flyers distributed
- System Pressure > 35 psi (normal conditions);
  > 20 psi (emergency conditions)

Example - Backflow through Unprotected Cross Connection

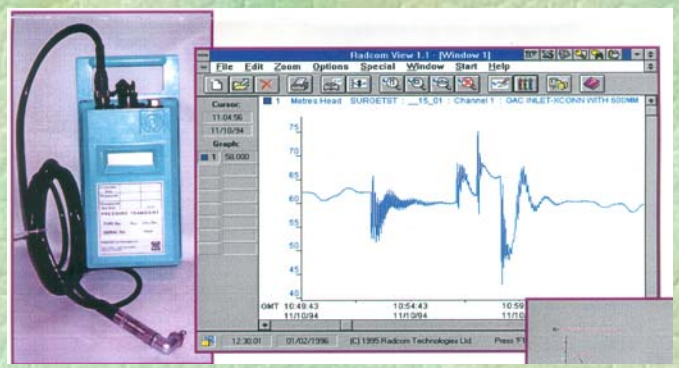
Principle 3 - Validate Critical Limits

- Maine Dept. of Human Services Cross-Connection regulations
- South Berwick Water District Cross Connection Control Program
- Maine State Plumbing code
- AWWA Manual M14 Recommended Practice for Backflow Prevention and Cross-Connection Control

Example - Backflow through Unprotected Cross Connection

Principle 4 - Identify Monitoring Procedures

- **Inspection of Devices**
- **Testing of Backflow Prevention Devices**
- **Pressure Monitoring**
- **Customer Complaints of Low Pressure**



Example - Backflow through Unprotected Cross Connection

Principle 5 - Establish Corrective Action Procedures

- Customer repairs or installs backflow prevention device as necessary
- Enforcement actions on non -compliant customers
- Remind plumbing inspector’s office and water district staff to distribute flyers

Principle 6 - Validate HACCP Plan

Plan Validated by:

- Outside Experts that Attended Workshop
- Australian Team Members on AwwaRF Project
- Quality Assurance Manager for Bottled Water Company

Example - Backflow through Unprotected Cross Connection

Principle 7 - Establish Documentation

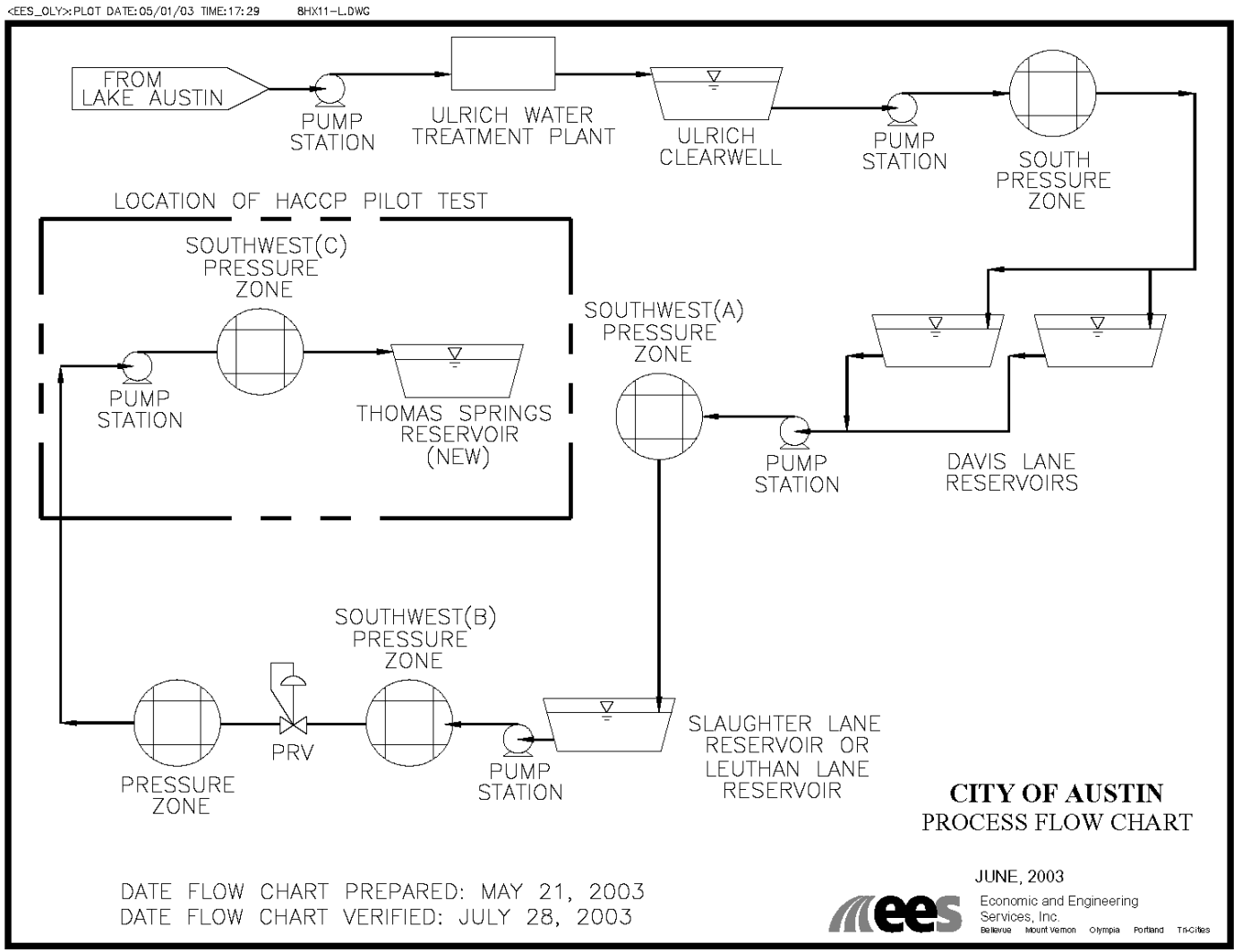
- Town Code Enforcement Officer and Plumbing Inspector Records
- Water District Records
- Inspection Reports
- Maintenance Records
- Inventory: # flyers distributed/year
- Pressure Data on SCADA system

Case Study:
City of Austin, Texas

HACCP Team

- Water Laboratory Supervisor
- Engineer/Planner
- Construction Inspector
- Water Quality Manager
- Cross Connection Control Supervisor
- State Regulator
- Assistant Director of Treatment
- Infrastructure Superintendent

Process Flow Diagram



Two Priority Hazards Identified for Pilot Study

- Backflow Through an Unprotected Cross Connection
  - Irrigation
  - Hydrant vandalism
- Contamination from New Construction Sites
  - Inappropriate valve turning

Example - Contamination from New Construction Sites

Identify Control Measures

- Conduct On-Site Inspections
- Train Inspectors in Water Quality Issues
- Manage Storm Water
- Use Contract Specifications
- Restrict Valve Operations
- Train Operators on Proper Valve Operations
- Maintain System Pressure to Avoid Transients

Example - Contamination from New Construction Sites

Principle 2 - Identify Critical Control Points

- Each new construction site

Example - Contamination from New Construction Sites

Principle 3 - Establish Critical Limits

- No unauthorized valve opening or closing
- No valves opened between pressure zones
- Inspector training completed
- All water mains disinfected prior to being placed into service
- Water samples free of bacteria

Example - Contamination from New Construction Sites

Principle 4 - Monitoring Procedures

- Telephone/Radio Calls to Site
- On site inspection of disinfection practices
- Laboratory testing for bacteria
- SCADA tank and pressure alarms
- Training attendance sheets

Example - Contamination from New Construction Sites

Principle 5 - Establish Corrective Action Procedures

- Close valves to isolate area
- Written warning to contractor
- Verbal warning to inspector
- Repeat disinfection and/or flushing

Utility Feedback on HACCP Training Workshops

"…Good process for rethinking."

" I learned how complicated the distribution system is and how difficult it is to manage."

"…valuable dialogue with other departments on how they do their jobs."

Next Steps

- Implement HACCP Plan for 12 Month Pilot
- Develop New Procedures as Needed
- Review Monitoring and Documentation Procedures with Staff
- Solicit feedback from utility staff on HACCP