Development of Distribution System Water Quality Optimization Plans [Project #2875]

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PRINCIPAL INVESTIGATORS:
Melinda Friedman, Gregory Kirmeyer, Gregory Pierson, Steve Harrison, Kathy Martel, Anne Sandvig, and Amie Hanson

OBJECTIVES:
The objectives of this project were to develop Distribution System Water Quality Optimization Plans (DSOPs) to improve water quality at three participating utilities, and to develop a DSOP approach, outline, and best management practices template for use by utilities of all sizes. These objectives were based on the future directions of the water supply industry in general, the specific needs of the three participating utilities, and the need for a general distribution system water quality optimization approach for all utilities.

BACKGROUND:
Distribution system water quality optimization planning is a process water utilities undergo to improve distribution system water quality conditions above and beyond regulatory requirements and to reduce the potential for contamination. The DSOP is a tool utilities can use for evaluating and improving programs that affect distribution system water quality, evaluating conditions within the distribution system, creating better documentation, and enhancing communication between the various utility functions that impact water quality in the distribution system.

HIGHLIGHTS:
The benefits of a DSOP and a comprehensive DSOP outline were presented. An audit approach and an example audit form were provided. Additionally, the report provided 11 examples of DSOP elements that can be used by the reader and applied to their own system. Example DSOP elements included (1) distribution system water quality goals, (2) a distribution system water quality monitoring plan, (3) biofilm control strategies, (4) a finished water storage facility management program, (5) a unidirectional flushing (UDF) program, (6) a dead-end management program, and (7) an investigation of the potential for water-hammer caused by hydrant exercising.

APPROACH:
Utility-specific DSOPs were developed for three participating utilities by conducting audits of the programs affecting distribution system water quality. These audits identified strong points and areas that needed improvement compared to industry standards. Water quality and operating goals were established and documented for each system. These goals helped to determine which programs the utilities would focus on for their specific DSOP. Selected DSOP elements were then developed and implemented at each utility. Based on the utility’s and the project team’s experience, a template of best management practices was developed, as well as a general approach for implementing DSOPs. This was a Tailored Collaboration project which was funded in part by the participating utilities. Products were developed to benefit the participating utilities and AwwaRF members.

RESULTS/FINDINGS:
The operation and management of water distribution systems plays a critical role in a utility’s ability to provide safe and appealing drinking water to its customers. The DSOP can be used to optimize all distribution system functions that impact water quality, or to target a few specific programs for water quality improvement. Distribution system water quality management can be optimized by assessing these areas: (1) water quality goals, monitoring, and data management; (2) operations management; (3) maintenance management; (4) planning and engineering; (5) construction practices and inspection; (6) training; and (7) customer relations. Developing a DSOP can be accomplished using the following process:

1. Develop water quality and operating goals for the distribution system
2. Identify other utility programs that may contribute valuable information on distribution system and water quality conditions
3. Conduct a distribution system audit
4. Compare findings to industry best management practices, regulatory guidance, regulations, and customer expectations
5. Develop a list of utility needs (DSOP elements) for optimizing distribution system water quality and prioritize these elements
6. Develop and implement programs outlined by DSOP elements
7. Review programs developed as part of the DSOP and goals for water quality and distribution system management.

**IMPACT:**
DSOPs can help utilities with the following tasks:
- Reduce the potential for waterborne pathogens to enter the distribution system
- Improve distribution system water quality above and beyond regulatory requirements
- Prepare for future revisions of the Total Coliform Rule that may focus on distribution system operation and maintenance, instead of numeric evaluation of coliforms
- Identify and address water quality concerns that can be attributed to the distribution system
- Improve communication between utility departments
- Address customer expectations above and beyond meeting drinking water regulatory requirements
- Develop programs and practices as recommended by AWWA’s distribution system accreditation program

**MULTIMEDIA:**
A CD is included with electronic versions of the 11 example DSOP elements, the comprehensive audit form, and the Distribution System Water Quality Industry Best Management Practices template. These documents can be edited and used by the reader to develop a utility-specific DSOP.

**RESEARCH PARTNERS:**
- Greater Cincinnati (Ohio) Water Works
- Calgary (Alta.) Waterworks
- City of Everett, Wash.