

Utility Management System

Operational Guide to AWWA Standard G400



G400

James F. Ginley and Todd A. Humphrey



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G400 Operational Guide

Utility Management System

SECTION 1: ACKNOWLEDGMENTS

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John Anderson	Lynn Lobb
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Tom Curtis	Mary Alice Parmelee
Gay Porter De Nileon	Stephanie Passarelli
Jack Hoffbuhr	Alan Roberson
Angela Lafferty	John Stubbart
Bill Lauer	Jim Wailes

Town of Bath, Bath, Mich.

Clyde Dugan (retired)

Benton Regional Public Water Authority, Rogers, Ark.

Scott Borman

Birmingham Water Works Board, Birmingham, Ala.

Patty Barron	Cary Prather
Stacy Finch	Joel Rhaly
Darryl Jones	Doug Stockham
Sonny Jones	Mac Underwood
Reginald Nall	

Black & Veatch Inc., Phoenix, Ariz.

Mark Waer

Champlain Water District, South Burlington, Vt.

Mike Barsotti

Charleston Water System, Charleston, S.C.

Kanwal Oberoi

Charlotte–Mecklenberg Utilities, Charlotte, N.C.

Barry Gullet

Cudahy Water Utility, Cudahy, Wis.

Michael Clark

Halifax Regional Water, Halifax, N.S.

Reid Campbell

HDR Inc., Bellevue, Wash.

Gregg Kirmeyer

City of Kelowna, Kelowna, B.C.

Don Degen

City of Long Beach Water, Long Beach, Calif.

Robert Cheng

Louisville Water Company, Louisville, Ky.

Bob Miller (retired)

Jack Wang

Malcolm Pirnie Inc., Newport News, Va.

Sandy Robinson

Marvel Water Systems, Cranston, R.I.

Jim Marvel

McKim & Creed, Cary, N.C.

Linda Vaughn

Town of Napa, Napa, Calif.

Phil Brun

NSF International, Ann Arbor, Mich.

Gordon Bellen (retired)

David Purkiss

Ontario Ministry of the Environment, Toronto, Ont.

Patricia Lachmaniuk

Indra Prashad

City of Palm Bay, Palm Bay, Fla.

Dan Roberts

Park Water Company, Downey, Calif.

Jim Elliott

Passaic Valley Water District, Clifton, N.J.

Joseph Bella

Peterborough Utilities Services Inc., Peterborough, Ont.

Wayne Stiver

Portland Water Bureau, Portland, Ore.

Todd Humphrey

Portland Water District, Portland, Maine

Jim West

Roscon Ltd., Columbus, Ohio

Ron Schwarzwald

R.V. Anderson Associates Ltd., Toronto, Ont.

Hershel Guttman

City of San Diego, San Diego, Calif.

Marsi Steirer

Sherwin-Williams Company, Villanueva, N.M.

Bob Murphy

Southern Nevada Water Authority, Las Vegas, Nev.

David Rexing

Startex-Jackson-Wellford-Duncan (SJWD) Water District, Lyman, S.C.

Mike Caston

Toho Water Authority, Kissimmee, Fla.

Rick Nipper

Underwriters Laboratories Inc., Northbrook, Ill.

Jerry Skaggs

Jim Wuolukka

Union Sanitary District, Union City, Calif.

Donna Wies

Utah Department of Environmental Quality, Salt Lake City, Utah

Eva Nieminski

City of Vancouver, Vancouver, B.C.

Dave Swanson

Washington County Service Authority, Abingdon, Va.

Robby Barnett

Roger Hagy

Doug Canody

Kahla McClure

Rick Clevenger

Kenneth Perrigan

David Dawson

Gary Van Huss

Cindy Fields

Washington Department of Health, Spokane, Wash.

Dan Sander (retired)

City of Wichita, Wichita, Kan.

Terryl Pajor

Witherspoon Consulting, Springfield, Mo.

John Witherspoon

SECTION 2: FOREWORD

Overview and Purpose

This operational guide is one of the first in a series designed to accompany each of a corresponding series of AWWA utility management standards. Specifically, this guide is intended to be paired with ANSI/AWWA G400, Utility Management System (AWWA 2009a), which has been created to provide a framework for the entire series of utility management standards.

The original idea for the operational guide series came from utility managers who participated in a two-year pilot project conducted/supported by the AWWA Utility Quality Programs Committee, the AWWA Accreditation Committee, and nearly 30 utility professionals from more than 10 North American utilities. The pilot project assessed the applicability and practicality of the series of AWWA utility management standards by working with two utilities—Birmingham (Ala.) Water Works and Sewer Board (BWWSB) and Washington County (Va.) Service Authority (WCSA)—and a team of volunteers from utilities, consulting firms, and other organizations.

In the pilot program, WCSA and BWWSB staff worked with fellow utility professionals and staff from AWWA to evaluate the feasibility of using the published ANSI/AWWA G200, Distribution Systems Operation and Management (AWWA 2004), and ANSI/AWWA G100, Water Treatment Plant Operation and Management (AWWA 2005a), as well as a working draft of the document that would eventually become ANSI/AWWA G300, Source Water Protection (AWWA 2007). The pilot project had three goals, essentially to answer the following questions:

- Are the documents (final and draft standards) written in a clear and understandable fashion; that is, are they useful as documents?

- Are the requirements fair and reasonable for a utility as small as WCSA (staff of 50, serving 50,000 people), as large as Birmingham (staff of several hundred, serving more than 700,000 people), and for other utilities?
- Do the participating utilities see any value in the process of adopting and using these standards, and if appropriate, any additional value in being recognized for doing so?

The pilot process revealed that not only were the new management standards clear, understandable, and usable, but they were on target in identifying the right things to be doing—in source protection, at the treatment plant, and in the distribution system—to properly protect public health, public safety, and the environment, and to properly and responsibly run the utility.

In addition, the pilot participants explained some of the key benefits they thought would come from using the standards and from any recognition that might come with their use.

- First, they thought that implementing the standards would have a direct and positive impact on their everyday operations. Even the process of simply identifying the gap between what the standards call for and what they had in place gave them the information they needed to make many operational improvements, which, when implemented, would make them both more effective and more efficient in many areas.
- Second, they thought that being able to say that they had successfully adopted and implemented the standards would give them more credibility as an organization, and further, give them the confidence to handle the tough questions that come from the media, the utility's governance, or customers.
- Third, they felt that being recognized (especially if it was by an organization of AWWA's stature) for using these standards would enhance their public image as responsible stewards of the natural, fiscal, and human resources entrusted to their care, and this image would serve as a source to attract businesses and people to their communities.
- Fourth, and perhaps most unexpected, they felt that implementing these standards would be a great way to capture the immense quantity of institutional knowledge possessed by their utility employees.

During the pilot process, the utility managers requested that AWWA develop some type of guidance or how-to documents to go along with the standards. These guidance documents would serve two purposes: (1) to help utility managers

understand the purpose and function of these new standards, and (2) to help them implement and incorporate the standards into everyday operations. From this suggestion resulted the series of guides (AWWA 2006).

SECTION 3: INTRODUCTION

How to Use This Guide

This guide is designed primarily as an organizing tool, that is, a mechanism from which a water and/or wastewater utility manager can craft a framework for systematic continuous improvement. This framework can lead to the development of a utility management system (UMS), which in turn, will help that manager with the everyday operations and management of his/her utility.

The UMS has component parts, all of which are outlined in G400, the Utility Management System standard (UMSS). This guide is set up to help one build a UMS. A quick summary is presented showing how each part of the guide can be used to build a unique UMS.

Table of Contents

Not only does this outline the contents of the guide, but it can also serve as the outline for a UMS. Each piece of this guide can, in some way, become a component of the system.

Overview and Purpose

This introductory part of the guide can be used to help a manager articulate why he/she is developing the system, where it has its origins, and what one hopes to get out of it. This is a good place to find words for a mission and vision.

Requirements and Verification

These parts of the guide mirror Sec. 4 and 5 of the actual standard. There are nine subsections total and a corresponding minichapter in the guide (see table of contents) for each subsection. Each minichapter has four parts:

Standard Language—The Standard Language is wording from a section of AWWA G400, as written in the latest standard document. In this guide, the standard language is shaded in gray.

Rationale—The Rationale provides background on the topic in each section of the standard and relevance to why the requirements are important for water distribution utilities.

Example of Methods or Procedures—The Examples given do not cover every aspect of the standard and will not apply to every utility's situation. Additionally, they are not intended to be a complete instruction guide for the implementation of AWWA G400, rather they are intended to point interested parties in the right direction and give insight on how processes and procedures may be properly implemented in accordance with parts of the standard. In order to maintain this publication at a reasonable size, only a handful of examples per topic are included. There are also many sources of additional information listed in the References and Resources section (Sec. 7).

Questions to Check Progress—The Questions are listed as a tool to self-assess the status of the utility's compliance with AWWA G400. If the utility can confirm that they have all items in the questions in place, they may wish to consider applying for recognition.

When a manager has assembled, recreated, or written all the components of the nine minichapters, then he/she will have successfully gathered most of the documentation for a UMS.

Glossary of Acronyms

This section explains a lot of the terminology that comes with the process of getting involved in continuous quality improvement, management systems, and so forth. This is by no means an exhaustive account of everything on the topic.

References and Resources

This section is both a bibliography of references used in this guide and a list of other documents, Web sites, and resources to help, at the very least, run one's utility better every day. These will also be helpful in building and maintaining a UMS.

Audit Checklist

The checklist can help monitor progress internally and can serve as the basis for reporting progress. It should be used as a key part of the management system and continuing efforts to improve both everyday operations and the service the system provides. It asks specific questions and looks for proof and documentation that procedures are indeed in place where called for by the standard. Just as the examples are not an instruction manual for implementing all of AWWA G400, neither is the checklist a blueprint. However, a utility that has all the components

represented in the checklist is likely to have a majority of the G400 standard well covered in their operating and management procedures and practices.

Background on Standards and Management Systems

AWWA Standards Process

The AWWA standards process has been used for more than 90 years to produce American National Standards Institute (ANSI) approved standards for materials and processes used by the water and wastewater utility industries. These standards are recognized worldwide and have been adopted by many utilities and organizations.

The AWWA standards program is designed to serve water and wastewater utilities, their customers, owners, service providers, and government regulators. The standards developed under the program are generally intended to improve a utility's overall operations and service.

Utility Management Standards: A New Series Under Development

AWWA has begun to create a series of utility management standards to respond to the widespread need of utility managers to have some consistency in approach and some reliability in knowing what is generally expected of utilities in all areas of utility management and operations. These standards are also valuable resources in light of the many issues facing utilities, including increased scrutiny and accountability, increased regulation, difficult economic realities from aging infrastructure, decreased demand, and a shrinking workforce.

The utility management standards (also known as the G-series) are designed to cover the principal activities of a typical water and/or wastewater utility. Some examples of the individual topics in this series include water treatment plants, distribution systems, and source water protection. Others under development include business practices, emergency planning, security, and communication and customer relations. More topics will be added over time, including those for wastewater utilities.

The utility management standards are developed using the same formal, ANSI-recognized, AWWA-managed process. Volunteer standards committees establish standard practices in a uniform and appropriate format. Formal standards committees are formed to address the individual standards practices for the diverse areas of water and wastewater utility operations.

The Utility Management System Standard

This specific standard, ANSI/AWWA G400, Utility Management System, has been designed for two related purposes (AWWA 2009a).

First, it is intended to define the minimum requirements for establishing a framework for a UMS for a drinking water or wastewater utility that will promote continuous improvement. This standard contains all the parts and pieces of a UMS. By adopting the standard and creating all of the policies, processes, and documents it calls for, the user will have effectively conformed to the standard and created a UMS.

The second purpose of the standard is to serve as a complementary tool for each of the individual standards in the series of AWWA utility management standards. As mentioned earlier, these standards are being developed to address specific management and operations practices.

The standards are developed and/or revised in concert with this utility management system standard. That is, the UMSS exists as the framework into which the others fall. Further, the UMSS includes some basic elements (commitment of resources, training, documentation, etc.) that would typically appear in each of the topic-specific standards. However, to avoid duplication and redundancy, these elements only appear once in the UMSS.

How ISO, EMS, UMS, and UMSS Fit Together

Environmental Management System

The concept of an environmental management system (EMS) has evolved from the International Organization for Standardization (ISO), a nongovernmental organization that is the world's largest developer and publisher of international standards (ISO 2008b).

More specifically, the ISO 14000 environmental management standards exist to help organizations minimize how their operations negatively affect the environment (ISO 2008a). ISO 14000 has two major parts: ISO 14001 and ISO 14004.

ISO 14001 is the international specification for an EMS. It specifies requirements for

- Establishing an environmental policy,
- Determining environmental impacts of products/activities/services,
- Planning environmental objectives and measurable targets,
- Implementation and operation of programs to meet objectives and targets,
- Checking and corrective action, and
- Management review.

ISO 14004 is a guidance document that explains the 14001 requirements in more detail. The document provides a structured approach to setting environmental objectives and targets. It also explains how to set up and monitor operational controls.

In brief, an EMS is a management tool that allows a company or organization of any size or kind to consciously make an effort to control the impact of its business activities, products, or services on the environment (ISO 2008a). With these improvements and efficiencies come a whole list of benefits other than decreased impact on the environment, including potential for savings in production costs, improved working conditions and employee morale, and even improved relationships with regulators, stakeholders, and the public.

Many useful books and Web sites are dedicated to explaining the details of ISO 14001 and EMS. The references section of this guide provides a list of resources for more information (Sec. 7).

Utility Management System

By creating the series of utility management standards, including ANSI/AWWA G400, Utility Management System (AWWA 2009a), AWWA has laid the groundwork for a management system specifically tailored for water and wastewater utilities.

Instead of taking the EMS approach and focusing on environmental impacts, the AWWA UMS is intended to cover any and all aspects of the everyday management and operations of a typical North American utility.

As a framework, the UMSS mirrors the ISO EMS model and contains all or most of the same considerations as an EMS, with some specific exceptions and adaptations that fit utilities. Accordingly, the key elements of a UMS are to

- Develop a utility management policy,
- Identify the most applicable individual standards from the AWWA UMS series,
- Clarify applicable legal and other requirements,
- Set utility management improvement objectives and targets,
- Create programs to implement the policy and achieve desired objectives and targets,
- Evaluate the UMS and involve management in the review process.

Differences Between EMS and UMS

The principal difference between the ISO-based EMS and the AWWA UMS is in the process of identifying what is going to be the key component or purpose of the management system.

One of the key features in the ISO EMS model is known as “setting the fence line.” This is targeting a process or set of processes and then setting some measurable goals and objectives to minimize or eliminate impacts on the environment. The fence line can be narrow or broad; it is not predetermined by the system and it is entirely up to the manager. The manager is, in a sense, the architect of what he/she intends to improve (USEPA 2004).

A system would be in conformance with its EMS if it (1) is in compliance with all applicable laws and regulations, (2) is making measurable improvement on the goals and objectives set, (3) is properly documenting the improvements, (4) has a system in place to keep management informed and allow them to review and verify the improvements being made, and (5) has management’s commitment to repeat the process in subsequent years.

When it comes to the AWWA model, the same management system components are in place; however, the options for the fence-line aspect of the UMS are already preestablished. That is, the list of specific topics in the G-series of utility management standards, including distribution systems, drinking water treatment plants, source water protection, business practices, and communication and customer relations, becomes a menu of sorts from which to select the area(s) of emphasis for the utility’s UMS.

Pulling It All Together

Consider the following example of how a utility could use the UMSS in a practical fashion.

Assume that the manager of a water utility’s distribution system wants to manage and operate that system as well as possible. To do that, the manager can rely on training, experience, and a number of publications, including ANSI/AWWA G200, Distribution Systems Operation and Management (AWWA 2004).

One approach the manager could take is to purchase that document and use it as a guide to help him/her do their job. This particular tool has an extra dimension to it, though, in that it is one part of a series of documents linked to the AWWA UMS.

So, as an alternative to using the distribution system standard solely on its own merits, the manager could elect to use this document along with its companion document, ANSI/AWWA G400, Utility Management System.

By doing so, a reliable and repeatable process could be set up to make sure the distribution system was not only properly operated and maintained, but that the organization also had a systematic way to set operating and management policies and objectives; identify areas for continuous and measurable improvement; establish a system for recording, documenting, and checking progress; and ensure adequate resources and personnel to do all of this properly, regularly, and sustainably.

In other words, the UMSS provides the framework and outline for the overall improvement program, and the distribution standard explains what is needed in that part of the operation. Used in tandem, the two standards become the *system*.

Getting Started

One can use the UMSS to get the system established, and then, depending on the organization's situation, use as many (or all) of the individual utility management standards in the areas needing improvement.

Implementing the system would be a combination of

1. Using the UMSS as the framework and guide,
2. Following the detailed requirements of the individual standards selected to match the organization and its goals,
3. Using the operational guide(s) developed to accompany those standards, and
4. Doing the work.

Similarly, to check progress, one can use the internal progress system established with the UMSS and the internal audit checklist(s) that comes with each of the operational guides that accompany the standards.

Like the ISO EMS, the AWWA UMS involves a continual cycle of planning, implementing, reviewing, and improving the processes and actions that a utility undertakes to meet its operational goals. So, once the system is put together and put into motion, it becomes the direction for action every day, every week, every month, and every year.

SECTION 4: REQUIREMENTS

Sec. 4.1 Commitment to Resources

Management shall provide evidence of its commitment to develop, implement, maintain, and continually improve the utility management system by ensuring the availability of adequate resources.

4.1.1

Responsibilities

Top management shall appoint a specific management representative who, irrespective of other responsibilities and duties, shall have defined roles, responsibilities, and authority for

1. Ensuring that the utility management system is developed, implemented, and maintained in accordance with the requirements of this standard.
2. Reporting to top management on the performance and opportunities for improvement of the utility management system.

Rationale

When a utility embarks on a continuous improvement effort, either utility-wide or in one of its core business areas, there must be a true commitment to provide the resources necessary to be successful. In the case of the AWWA utility management system (UMS), this section of the standard identifies the primary resource to be a person (or persons) who—aside from any other duties or responsibilities—is assigned some very specific roles and responsibilities regarding the successful implementation of both the standard and the UMS overall.

This role is twofold: first, to develop, implement, and maintain the UMS; and second, to report to top management about the ongoing progress and success of the UMS and how the system can be improved.

It is important to note that this section of the standard only identifies this role and gives a basic job description. Fortunately, most of the details around developing and maintaining the system are found in other sections/requirements of the standard.

It is essential for top management to understand the importance of designating a person or persons to do the job, and to give them the support, encouragement,

and resources to do the job right. Therefore, a formal tasking order defining who is responsible for the task, what resources are available to them, and their reporting schedule and timeline is appropriate. It is also important to note that ideally, over time, a team of people will be developed to share the duties with the primary person. Each of the specific standards in the series of utility management standards will have its own unique requirements. Accordingly, the utility will want to assign a specific role and level of responsibility to a staff member from that area. In other words, the utility will designate one person to be the overall manager or coordinator of the UMS and then designate additional individuals for leading the implementation of the individual standards.

The resources dedicated to this effort, especially the person(s), do not necessarily have to be “new” resources. The resources could be redirected from a noncore business area, borrowed resources, or resources derived from savings or improvements in other areas. In every case, though, the commitment to provide resources needed to successfully implement any continuous improvement initiative is a must from the very start.

Example of Methods or Procedures

Example 1

Figure 4.1-1 is an excerpt from a Peterborough Utilities Services Inc., Peterborough, Ont., policy that deals with continual improvement. It should be noted that utilities in Ontario are subject to mandatory regulatory requirements for conformance with a Drinking Water Quality Management Standard, (Ontario Ministry of the Environment 2007), which in part requires the development of a drinking water quality management *system* (note same initials: DWQMS).

Example 2

Figure 4.1-2 is an example of a job description from Startex-Jackson-Wellford-Duncan (SJWD) Water District, Lyman, S.C., in this case for the executive director of the utility. The job description is provided primarily as an example of a format or structure that can be used to describe any position, including those designated to be responsible and accountable for implementing the UMS.

Questions to Check Progress

1. Has top management made a commitment in writing to achieve the objectives of ANSI/AWWA G400, Utility Management System?
2. Have staffing and reporting assignments been made to this end?
3. Have the limits of authority been made clear to the staff mentioned in the previous question?
4. Has the commitment, staffing, and limits of authority of the assigned staff been related to the general utility staff?

Peterborough Utilities Services Inc. is committed to managing the drinking water system on behalf of the Peterborough Utilities Commission for the City of Peterborough by effectively establishing, maintaining, and continually improving its Drinking Water Quality Management System.

The implementation progress is tracked by internal audit results and management review. There are no specific key performance indicators built in to the quality system, except for legal and regulatory requirements.

The QMS Representative has both the responsibility and authority to:

- Ensure that the processes required by the DWQMS are established, implemented, and maintained;
- Ensure that the most current version of documents required by the DWQMS are in use at all times;
- Ensure that all personnel are aware of applicable current regulatory requirements within the operation of the drinking water system;
- Ensure the promotion of awareness and the effectiveness of the DWQMS throughout the operating authority;
- Report to top management on the performance of the QMS and any need for improvement.

Source: Peterborough Utilities Services Inc., Peterborough, Ont.

Figure 4.1-1 Continual Improvement

Job Description

Job Title: Executive Director
 Division/Section: Administration
 Reports To: Commission
 FLSA Status: Exempt
 Date Approved: 9/1/2000
 Approved By:

Job Summary

To plan, direct, lead, and control a variety of activities relating to the management of the water district. To oversee the district's business activities including capital construction and expenses, equipment and materials management, operations and water distribution, and financial administration. To develop and install policies and procedures to ensure efficient operation of all areas consistent with the District's vision and mission.

Decision-making is within District policy, uses independent judgment within guidelines set by Commission, and has authority to set standards or change precedent.

Essential Duties and Responsibilities include the following. Other duties may be assigned.

1. Plan, manage, and direct all areas of the SJWD Water District. Establish standards and monitor the District's operations.
2. Carry out policies established by the Commission and advise and inform the Commission in decisions relating to matters of policy.
3. Provide leadership and direction to immediate subordinates in the management of their assigned responsibilities to ensure the District's objectives are met.
4. Visit with customers, answer telephone inquiries, promote good will by being available to customers, contractors, vendors, etc.
5. Provide requests for opinions or review the work of others. Provide technical support to others.
6. Perform a variety of administrative paperwork such as contracts, report preparation, correspondence, performance appraisals, e-mails required to manage the District.
7. Prepare for Commission meetings by gathering information; develop reports and other requirements as deemed necessary.
8. Confer with the Board of Commissioners on policy matters; keep the Board informed on District issues.
9. Visit project sites; attend jobholder and contractor meetings as required.
10. Prepare and present annual budget for approval of the Commission. Stay within budget constraints.
11. Attend meetings; discuss, explain, and provide questions and answers on all matters of the District.
12. Act as a spokesperson within the district to fully inform the public as to the District's mission and goals, policies, and progress of planned programs.
13. Participate in professional organizations for the purposes of exchanging information, keeping informed of regulations, available funding, technical resources, etc.

Supervisory Responsibilities

Carry out supervisory responsibilities in accordance with Water District policies and applicable laws. Responsibilities may include interviewing, hiring, and training employees; planning, assigning, and directing work; appraising performance; rewarding and disciplining employees; addressing complaints and resolving problems.

Business Contacts

Customers, public at large, elected officials, vendors, consultants, regulatory agencies, and trade organizations.

Work with trade organizations such as AWWA, speak on behalf of these associations, and provide leadership through committees and other avenues.

Communicate, both written and verbal, with the media—TV, newspaper, and radio.

Source: SJWD Water District, Lyman, S.C.

Figure 4.1-2 Job Description

Sec. 4.2 Legal, Regulatory, and Other Requirements

The utility shall establish, implement, and maintain a procedure to ensure that applicable legal and other requirements to which the utility is subject are taken into account in establishing, implementing, and maintaining its utility management system.

4.2.1 Requirements

The utility shall identify and have access to the applicable legal, regulatory, and other requirements to which the utility is subject or subscribes, relative to each standard.

4.2.1.1 Operations. The utility shall determine how these requirements apply to the operation of the utility.

4.2.1.2 Compliance. The utility shall maintain a state of currency and compliance with respect to the legal and other requirements.

4.2.1.3 Review. The utility shall conduct periodic reviews of legal, regulatory, and other requirements.

4.2.2 Procedures

The utility shall ensure that the procedure specifically addresses the requirements of the operating permit issued by its primary regulating agency and assigns responsibility within the utility for each requirement of the permit.

4.2.3 Other Requirements

Other requirements shall be treated as equivalent to legal requirements by the utility in terms of their application to the utility. Other requirements may include

1. Agreements with public authorities.
2. Agreements with customers.
3. Nonregulatory guidelines.
4. Voluntary principles or codes of practice (including voluntary drinking water management practices).
5. Voluntary environmental labeling or product stewardship commitments.
6. Requirements of trade associations.
7. Agreements with community groups or nongovernmental organizations.
8. Public commitments of the organization or its parent organization.
9. Corporate requirements.

Rationale

It is important to keep in mind that, regardless of whether or not a UMS is in place, the utility is obliged to comply with all applicable legal and regulatory requirements.

The requirements of the UMSS focus on setting up a procedure or system-within-the-system that describes how to adequately identify all the rules and regulations that apply, how to stay current on any changes or new rules, and how to incorporate this process into the overall fabric of the UMS. Accordingly, the text of the requirements is straightforward.

It is important to clarify the difference between general compliance with all legal and regulatory requirements versus attending to the legal, regulatory, and other requirements that specifically fit the context and scope of the UMS. In other words, if the UMS includes every aspect of the utility's operations, then accordingly, the UMS would rightfully include all requirements for all areas.

On the other hand, if the UMS is more narrowly focused in one area (e.g., the distribution system) then in the context of that management system, it is necessary only to identify/include all the things that apply to that set of operations.

This means there is no need to account for and/or track all the rules that apply to source water protection, operation of treatment plants, the utility's business practices, and so forth, in the UMS until those standards (and the operational practices they address) are included in the UMS.

Most utility managers recognize and understand the federal, state/provincial, and local statutes and regulations that apply to them. However, the words *and other requirements* may raise some questions. *Requirements* can be a number of things, including laws, utility-mandated guidelines, water quality parameters, water quality reporting requirements, operator certification, safety training, chemical storage criteria, security plans, planning reports, plan reviews, land use, human resources practices, directives from the board of directors or city council, administrative rules, ordinances, and so forth.

The list of requirements will be different for different utilities. Certain requirements will apply to every utility, but others will be utility specific.

The requirements list is only relevant when aligned with the specific areas the utility is striving to improve. That is, there are likely few "legal, regulatory, and other requirements" that apply to the development of a management system. Rather, all these become important to know and track in direct relation to, for

example, the operation of the treatment plant or distribution system, or in how water rates are established or the public is informed during an emergency.

This is another area where a commitment of resources is important. Certainly the tasks described in this part of the standard would fall under the responsibility of the person or persons setting up the management system. But it might also mean collaborating with other staff in the utility, especially when more and more of the specific standards are added to the UMS. Other resources may include software to track bills, statutes, and regulations, or funds to pay for online subscriptions to do the same.

In summary, this section of the UMSS is a reminder to be aware, diligent, and proactive, and to communicate clearly about legal, regulatory, and other requirements. Consider first the area(s) of focus, then about how those activities impact the staff, the utility and its assets, the community served, and the physical environment they all share. The list of legal, regulatory, and other requirements should flow logically from this thoughtful assessment.

Example of Methods or Procedures

Example 1

Figure 4.2-1 is an example Regulatory and Other Requirements Form from the Charleston (S.C.) Water System that can be used by a utility to identify and maintain a listing of the most up-to-date versions of all regulatory and other requirements that apply to their system.

Example 2

Figure 4.2-2 from the Portland (Ore.) Water Bureau is an example of a written protocol that must be followed to stay in compliance with regulations. This is one of the many items that would be referenced in the chart in example 1 (Figure 4.2-1).

Questions to Check Progress

1. Has a documented search been made for applicable rules, regulations, agreements, and requirements for the portions of the utility's operations under consideration?
2. Have the sources for those applicable above been identified?
3. Have considerations been included for sources of rules, regulations, agreements, and requirements other than federal, state/provincial, and local?