Creating Water Quality Confidence

Sample Communication and Guidance - Reverse Osmosis [1]

Introduction

This document is intended to provide guidance for water utility managers related to creating water quality confidence, specifically related to implementing Water Supply Replenishment projects.

The sample communications are provided as an example of messages that will create confidence. They are not a final work product and do not address the different ways that the ideas in the sample communications can be delivered. Videos, PowerPoint presentations and many other forms can be used. The key to success is the messages that are conveyed, and the perceptions that stick with audience.

Terminology Guidelines

How we use words is extremely important when describing something that is unfamiliar to someone. We can use the same word in a variety of ways, which can be confusing if this is done within the same document or context. This is why it is best to follow a set of conventions or rules, some of which are included below.

- ***Results*** - What we want the water to be, which is pure, or clean.
- ***Water Purification*** - The term water purification is used to refer to the set of actions that we take to make the water pure, or clean. This was chosen over the term "water treatment" because treatment can be perceived as "doctoring" the water.
- ***Program*** - Used to describe all the specific actions that a utility takes to manage water quality including implementing a purification process, testing, and increasing knowledge.
- ***Process*** - Used to describe the multiple steps employed to make the water pure, or the overall water purification process.
- ***Multiple Steps Versus Multiple Barriers*** - Multiple steps is used instead of multiple barriers because the word barrier implies a specific structure or technique. In reality, all the steps are not "barriers." Using the term barrier can be confusing, especially since we have defined the different operations of separation, disinfection, and destruction.
- ***Techniques, Methods*** - These terms that used to describe the specific purification steps because each step describes specific technologies or ways of performing an operation.
- ***Process Water*** - The water that emerges from the purification process
- ***Separation, Disinfection, and Destruction*** - The sample communications categorize these important ideas as "operations" that we perform on the water to purify it, as opposed to categorizing them as processes, results, methods or techniques.

General Communication Guidelines

Emphasize the Utility Role - Another key aspect of the sample communications is that the steps are always described as an action of a utility, or that the utility made the decision to employ a certain approach. This is important for reminding the audience that the utility's competency, decision making, and diligence are the keys to ensuring high quality water. Anyone can buy technology, but quality comes from organizational competencies and diligence.

Connecting Actions with Motivations - Another important concept integrated into the samples is that we always want to connect an action, decision, or technique with a motivation. This is why each step is connected with the value it adds to the water purification process or overall process.

(1) *Why Two Samples? –Because there are different approaches to purifying water. The communication samples illustrate a separation-intensive approach and a natural treatment approach. There is an important difference between separating harmful compounds and naturally destroying them.*

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Step 1: Communicate the Basics

These paragraphs give the audience some meaningful background, or context, for understanding the basics of water, the natural environment, and the importance of the utility's diligence and investment in determining final water quality and safety. These paragraphs set the stage for developing the perception that the utility is the "trusted source of quality," which is important when dealing with an impaired source such as wastewater.

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Metropolis Water

WATER BASICS

Water is one of the most abundant substances on earth, covering approximately two thirds of the earth's surface. There is plenty of water in the oceans, but ocean water is too salty for most uses. Whether water is useable or not is determined by what we want to use it for, and what is mixed in with the water besides water.

We tend to believe that the best water is pure water; however, not all "contaminants" are bad. Water with beneficial minerals can be better for human health than water that is ultra pure, whereas water for high-pressure boilers *must be* ultra pure.

A common myth is that water in the natural environment is safe to drink. In some cases it is, and nature has its ways of purifying water, some of which are utilized by utilities. However, even mountain spring water can be deadly if it contains dangerous compounds.

Before the existence of municipal water utilities, millions died from water contamination. This is still true today in some developing countries. Although water itself is not manufactured, making water acceptable for drinking and other uses typically requires manufacturing processes similar to ones that produce sophisticated products. Therefore, the issue is not whether we can make water pure – making water pure is simply a function of investment and diligence on the part of the water utility. We can purify water from *any source* well beyond what is needed for human consumption. The issue is making sure that the water is the right quality for the intended use.

Step 2: Communicate the Challenges

Utilities get in trouble when they gloss over or downplay water quality realities and risks. People understand that there is risk in every part of life, so telling them that there is "nothing to worry about" does not go over well. In fact, people want to see that *the utility* is concerned about managing the risks. This is why outlining the water quality challenges establishes an important context for talking about the values and actions of the utility.

Source Water Protection - In many cases, water quality risks result from contamination of source water, whether it is a potable water resource or a wastewater resource. Not all water, or wastewater, has the same chemical makeup. The other important issue is the context in which source water protection is presented. Sometimes utility managers think that if we talk about source water protection, we are back to emphasizing the physical source as the key to final water quality, and continuing to confuse our audience. This confusion will not occur if source water protection is presented in the context of a comprehensive water quality program that is *planned and implemented by the utility*. Also, there are economic or other benefits of source protection that can be emphasized that are not directly related to final water quality.

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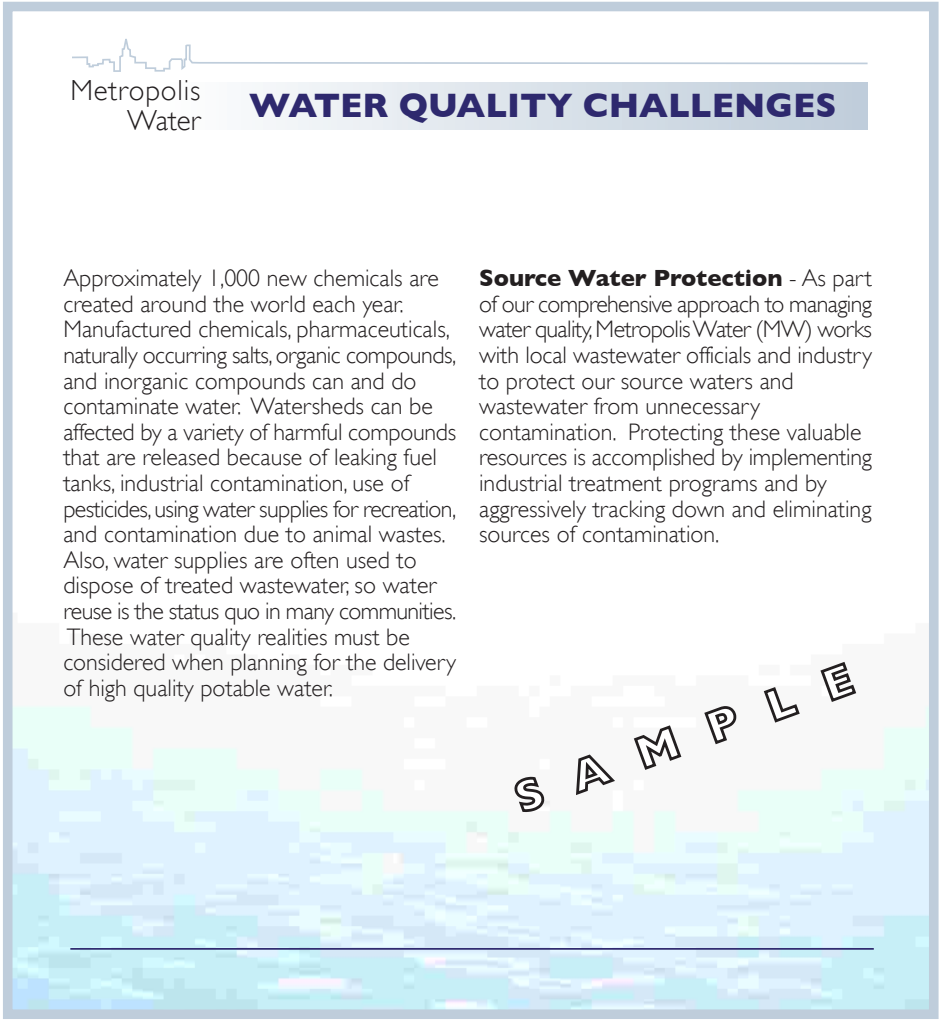

Step 3: Define Water Purification

This is an extremely important message in the sample communication because it again addresses the issue of context. It gives a layperson a basis for understanding water purification. In many cases utilities talk about technical issues or technology without the proper context. This is confusing to the audience, and a confused audience will be suspicious. However, if we begin by describing the basic operations that we can perform to purify water, we have created an important context for helping audiences understand the specific techniques that the utility is implementing. People can understand the ideas of separation, disinfection, and destruction. Once they understand these basic operations, they will have the ability to appreciate the different purification techniques, and how they combine to create safety factors and redundancy.

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Metropolis Water

PURIFYING WATER

Purifying water, or making water clean, involves performing a series of operations that typically involve separation, disinfection, or destruction. Separation occurs when unwanted compounds are filtered out, or separated, from the water. Disinfection results when living organisms such as bacteria and viruses are killed or made inactive. Destruction is when contaminants are destroyed at the molecular level, transforming them into harmless compounds or completely mineralizing them into carbon dioxide and water. There are many different methods or techniques that utilities can use to separate, destroy, or disinfect. Adding chlorine is a widely used method for disinfecting water and high-tech membranes are increasingly used for separating out contaminants.

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Step 4: Communicate Your Values

If the utility is to become the "trusted source of quality," then it follows that the utility must be able to capture the audience's trust. Trust comes from knowing what to expect from the utility, or knowing what you can count on them to do. This usually comes from developing a history, and seeing over time that utility's actions are consistent with their words. Trust departs quickly if promises are not kept. One way to create trust in an organization is to articulate a set of organizational values or commitments (promises), and then show that your actions are consistent with these commitments. In order to do this you must start by clearly stating the values of the organization. The sample communications do this by making a series of statements that define the commitments of Metropolis Water (MW) related to water quality.

MW's Promise to Improve - The primary water quality commitment of MW is improvement. Often, utility personnel feel uncomfortable with committing to improvement. They feel that stating a constant need to improve suggests that there is something wrong with the water today. Private sector companies that do not have a commitment to improvement typically do not stay in business very long, even if they enjoyed initial success. Water quality improvement is an important idea because it allows the audience to factor their past experience into their thinking about future risk. If the water is going to be as good, or better, than it has been in the past, then the person's past personal experience is relevant. Once the person feels that the water is being allowed to degrade in any way, then their personal experience is not longer valid.

Increasing Knowledge - One of the ways to get comfortable with the improvement promise is to link it to increasing knowledge. Everyone understands that good organizations are constantly learning. This is why the second idea in MW's commitment statement relates to increasing knowledge. It would be arrogant for a utility to assume it has nothing new to learn. Opponents to indirect potable reuse projects have brought up this arrogance as a reason for not trusting the utility, and being concerned about water quality.

Commitment to Improving Technology - People expect technology to improve, and at a brisk pace. Given people's exposure to recent advances in computers, communications, and advancing procedures such as laser eye surgery, this is an idea that utilities must enmbrace.

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Metropolis Water

WATER QUALITY COMMITMENT

Metropolis Water (MW) is committed to constantly improving water quality, increasing its knowledge about contaminants, and improving the tools and technology that it uses to produce high quality water. This means that your water will be safe to drink, and always be as good, or better, than the water you received yesterday, or last year. Here are some of the tools that MW uses to ensure that you receive water that continues to meet your needs.

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Step 5: Articulate Your Water Quality Program

It is important that the water quality program incorporate the ideas of multiple steps, diverse methods, rigorous testing, redundancy,and safety factors. The ideas of redundancy and safety factors arefairly universal and resonate with most people. Multiple steps areintuitively more reliable and certainly more redundant than a singlepurification step. As mentioned in the general communication guidelines, the sample repeatedly mentions Metropolis Water's role in deciding to "use" a specific technique, which reminds the audience that the decisions and diligence of the water utility are what create high quality water.

Separation, Disinfection, Destruction - Throughout the description of the specific purification steps we refer back to the ideas of separation, disinfection, and destruction. This gives the audience a basic context for understanding what is happening and helps them see more clearly the diverse nature of the purification process. The sample communication also carefully conforms to the terminology guidelines outlined on the first page of this tool.

Specific Purification Methods - The purpose of this sample is not to recommend specific purification methods for implementing Water Supply Replenishment. There are many different approaches that address regulations and public health. The purpose of the sample is to highlight confidence-building concepts that can be applied to different water purification strategies.

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Metropolis Water

WATER PURIFICATION PROCESS

Water Purification – MW has implemented a multistep process to purify the water that is used to replenish our potable water supplies. Using multiple techniques that separate, disinfect, and destroy contaminants creates both redundancy and diversity, which allows us to reliably address a broad range of contaminants, both known and unknown. The water that emerges from this purification process is much higher quality than water in the vast majority of rivers, lakes and reservoirs. This process includes the following steps and techniques:

- **Initial Treatment** – MW"D5s process for creating high quality water begins with water that came initially from the sewer, but has already been filtered and treated using biological processes. This water quality complies with the Clean Water Act, which means that 90 –'D0 95% of the contaminants have been removed, the water is acceptable for discharge into the environment, and meets standards that make it acceptable for fishing and swimming.
- **Micro-filtration** – Micro-filtration forces the water through a series of very small fibers. MW uses this technique to separate bacteria, protozoa and some viruses from the water. The micro-filtration fibers can separate out contaminants that are 1/300th the size of a human hair. Micro-filtration also prepares the water for the next filtration step, reverse osmosis.
- **Reverse Osmosis (RO)** – Reverse osmosis uses high pressure to push water through a plastic membrane. This membrane allows water molecules to pass through and traps or separates the larger molecules. MW uses this method to remove bacteria, viruses, and undesirable compounds such as pesticides, fertilizers and pharmaceuticals that may not have been removed by micro-filtration. Reverse Osmosis water is virtually 100% free of viruses and bacteria, and is comparable to distilled water. Reverse osmosis is used in home filtration systems, for kidney dialysis, to desalinate ocean water, and by some bottled water companies.
- **Advanced Oxidation** – MW uses Ultra-Violet (UV) light combined with hydrogen peroxide in order to both destroy remaining contaminants and disinfect the water. The UV light disinfects the water, and the UV light combined with hydrogen peroxide creates a powerful oxidation process that breaks down persistent compounds into carbon dioxide and water.

By using this combination of steps, MW has created a highly reliable water purification process that consistently delivers water that is fit to replenish our valuable groundwater.

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Step 5: Articulate Your Water Quality Program

Be Clear About Replenishment – The sample communication that is based on a separation-intensive approach addresses the issue of why we take a high quality process water and return it to the groundwater, or the reservoir, where the water quality is arguably inferior to the process water. Utility communications need to make sure that people do not perceive that this is done to dilute the process water. It is ludicrous to dilute higher quality water with water of lower quality. Audiences must understand that the idea of replenishment has several benefits that relate to public perceptions, risk management, safety factors, and overall water quality improvement.

Water Quality Monitoring, Testing - Testing is one of the areas where the utility can demonstrate its commitment to increasing knowledge. Monitoring or testing water when not necessarily required to by law, or conducting water quality studies of the watershed, are important ways to demonstrate that the utility" actions are not wholly determined by regulatory compliance, but also by the commitments or promises that the utility has made to the community. The community will and *should expect* that the utility is asking the difficult questions and leading a dialogue about response.

The water quality monitoring and response section of the samples also address emerging/unknown contaminants when they refer to compounds that are not regulated, and ensuring that concentrations of newly found contaminants do not increase. This is where the commitment to improvement can be a powerful tool. In conducting the Executive Seminars around the county we found that utility managers were concerned about increased monitoring because of lack of clarity about the appropriate response. The commitment to improvement can provide a basis for appropriate response.

Sample

Metropolis Water

WATER PURIFICATION PROCESS

Replenishing the Groundwater – The purification techniques noted above produce extremely clean water which is then allowed to percolate into the ground where it remains for several weeks or months before it is extracted and delivered to customers. Adding this high quality water to the existing groundwater is not done to dilute it. The process water is typically higher quality than the groundwater. The retention time and regular groundwater testing provide an additional safety factor, ensuring that the water that enters your home or business meets MW"D5s standards, and your needs.

Extraction and Final Disinfection – When the water is needed, it is pumped from the ground and treated with a small amount of chlorine. The chlorine keeps the water disinfected while it travels through the pipes on the way to your home or office.

Water Quality Monitoring and Response – The process of using multiple steps to purify the water is designed to address contaminants that are known and unknown. However, MW is still committed to knowing the impurities that are in the water, has a policy of constantly looking for new contaminants, and continuously updates its testing procedures. These commitments are why MW has its own testing and research laboratories and why MW tests for over 300 contaminants when regulations require testing for only 122. MW's water quality analyses include testing the water as it enters the purification process, as it leaves the purification process, and regularly testing the groundwater.

If the testing process detects a new contaminant, MW's commitment to improvement demands that the contaminant be tracked to determine if the detection was a one time event or if there is a trend of increasing concentration. If there is trend of increasing concentration, MW will communicate this to its customers and remove the contaminant from the water.

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