Water Log

A publication of the Ohio Rural Water Association
www.ohioruralwater.org

Fall/Winter 2016
Issue 2 of 2

Also

- Addressing Inorganic and Organic Contamination
- Importance of Flushing Your Water System
- Calculating MCRT
- Emergency Planning - Planning for the Unexpected
- Effectively Managing Inventory Space and Costs
- Flushed Away: The Risks

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President's Message

Hello Neighbors,

A lot has happened since we last talked; The crisis in Flint, Michigan, and the mishandling of information in Sebring, Ohio, have gained national headlines. Yet as these issues are debated across our great state and country, we continue to provide safe potable water. "Rural and small systems do an excellent job in complying with all requirements of the Safe Drinking Water Act," as mentioned in a press release by National Rural Water Association.

I, as a Certified Systems Operation Specialist, do my utmost to provide a water that meets all standards. When I have questions I call on the knowledgeable staff of Ohio Rural Water Association (ORWA) to help me find the answers I need. Please, if you have questions do not hesitate to give ORWA a call, we can help you understand the rules through on-site assistance. ■

Dusty Parker
OHRWA President

Executive Director's Message

With the completion of our database/web page project we have been able to generate several electronic newsletters via constant contact that you may have noticed in your mailbox lately:

1. ***NRWA Legislative Advisory -***
   Addressing issues on the national level
2. ***Week in Review -*** Outlining
   legislative activity on the state level weekly
3. ***Buckeye Pipeline -*** Review of any information
   that would impact the utility industry

These are in addition to our nationally recognized SPLASH newsletter generated by our marketing consultant Gary Golden.

These newsletters are specifically developed and delivered as a member benefit to you and your system.

Recent developments with lead and copper issues on both the state and national levels has prompted the Association to update available training on lead and copper, as well as corrosion control. These classes are in development and will be offered statewide ASAP. Soon, the dates and locations will be available on the website.

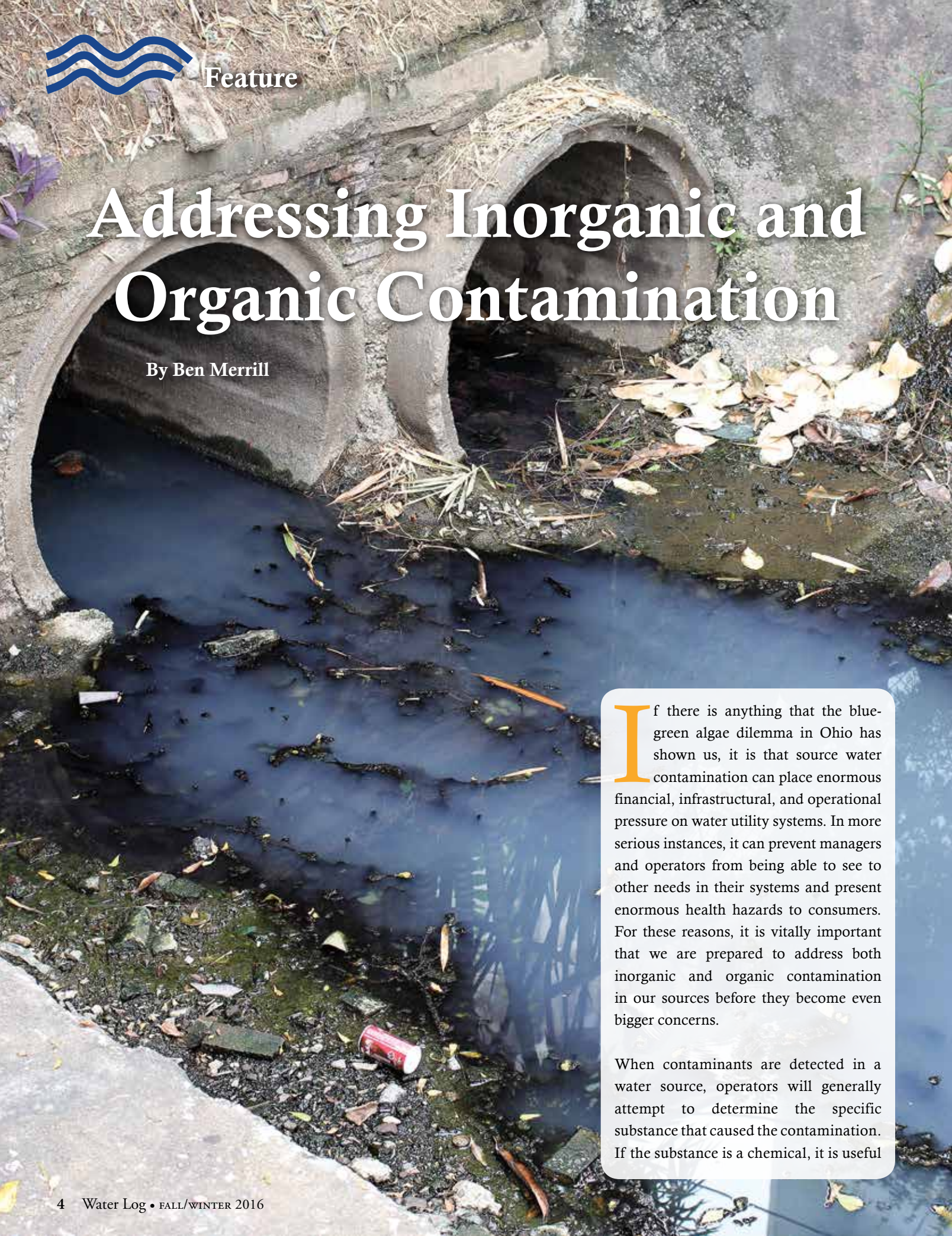
I would also like to take this opportunity to remind our membership of two of our most well-attended events in which they can participate. First is our Summer Quarterly Meeting held at Put-In-Bay, one of Ohio's most renowned tourist destinations. Northern Ohio Rural Water will sponsor this annual event. Make your plans today to visit the scenic Lake Erie islands and relax and reconnect with old friends while enjoying the unique atmosphere.

Second, please don't forget our annual Operator Expo, held at the Roberts Inn in Wilmington, Ohio. This event continues to grow and has become our most well-attended event of the season. This is a great venue to acquire up to 12 contact hours and see the latest in equipment and presentations on operations, maintenance, and regulatory issues; all while enjoying food, fun and reconnecting with old friends. Also at the Fall Expo, don't forget to participate in the Annual Sportsman's Auction! ■

Kevin Strang
ORWA Executive Director

Addressing Inorganic and Organic Contamination

By Ben Merrill



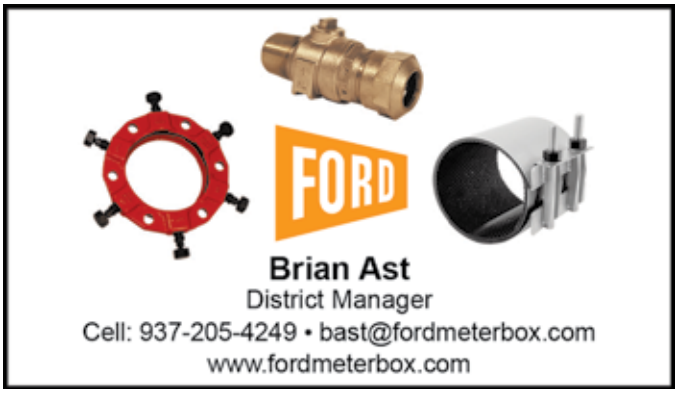
If there is anything that the blue-green algae dilemma in Ohio has shown us, it is that source water contamination can place enormous financial, infrastructural, and operational pressure on water utility systems. In more serious instances, it can prevent managers and operators from being able to see to other needs in their systems and present enormous health hazards to consumers. For these reasons, it is vitally important that we are prepared to address both inorganic and organic contamination in our sources before they become even bigger concerns.

When contaminants are detected in a water source, operators will generally attempt to determine the specific substance that caused the contamination. If the substance is a chemical, it is useful

to know its hazard classification. There are generally considered to be four broad hazard classifications. The first is a pollution hazard and is described as a condition through which an aesthetically objectionable or degrading material not dangerous to health enters a water system or another consumer's potable water supply. An example of a pollution hazard would be a food grade material. The second hazard classification is a system hazard. A system hazard is described as a condition, device, or practice posing an actual or potential threat of damage to the physical properties of the public water system or a consumer's potable water system. However, a system hazard will not cause an adverse health effect. An example of a system hazard would be an inert material that clogs a water line but not cause illness if ingested.

The last two hazard classifications are much more threatening and must be given a high degree of attention to ensure their potential for harm is eliminated. The first is a health hazard, and it is defined as any condition, device, or practice in a water supply system or its operation that creates, or may create, a danger to the health and well-being of others. An example of this would be a fluoride overfeed that results in a dangerously high concentration. The last hazard classification is a severe hazard. A severe hazard is defined as any health hazard that could reasonably be expected to result in significant morbidity or death. A large influx of industrial pesticide into a water supply would be considered a severe hazard. In general, if the degree of hazard cannot be determined, an operator should assume that it is a severe hazard.

In the event of a health or severe hazard, it is important to take a number of steps to ensure consumer safety. A no-use advisory should be issued immediately (a boil advisory will generally not be adequate) and operators should determine if the contamination can be isolated. Critical users of the water supply should be informed immediately and any emergency agencies and personnel should be contacted as well. It is important to have all of this contact information easy to access prior to an emergency situation. If at all possible, determine the cause and source of the contamination. Proceed to eliminate the source. Check to see if the cause may be due to a cross connection, backflow, or back siphonage. You can then begin flushing the distribution system to eliminate the contaminant from the public water supply. ■



Feature

Importance of Flushing Your Water System

By Wesley Croft

Maintaining the water quality to our consumers... no matter what the quality of your water is, particles are introduced into the distribution system. These particles are suspended solids that are transported to the consumers tap resulting in discoloration during use. No one notices when particles settle in water mains, but when these same particles become suspended again, the efficiency of the disinfection processes is reduced.

The preventative tool used to avoid events of discolored water is to flush the system at regular intervals. The magnitude and frequency of the flushing programs will vary from utility to utility, but it has been determined that flushing of the distribution system is vital to good water quality that serves even the last consumer on your system. How do we determine the effectiveness of a flushing program? Is it needed in your system?

If so, you need to plan accordingly and implement a data collection process, including water quality reports with a before and after program. You may need to evaluate and revise as you continue to implement your program.

Here are a few questions to determine the need to develop a flushing program:

1. Does your source have elevated iron and/or manganese?
2. Do you experience positive coliform results?
3. Do you have trouble maintaining a disinfectant residual in parts of your system?
4. Does your system lack an aggressive valve/hydranUtank exercising program?
5. Do you have sedimentation in your tank?

If you can answer yes to more than one of these questions, then you need to implement a flushing program.

If you answer yes to more than one of the questions, then your system would truly benefit from a flushing program. If you answered no to all of the questions above, then you should be able to document that the above are not occurring in your system.

How feasible is it for your utility to conduct an effective flushing program?

Questions that a utility should consider prior to initiating a flushing program may include:

1. Will hydraulic constraints prevent the achievement of desired flushing velocities?
2. Is there enough water available to flush at desired velocities for the

desired length of time to accomplish the desired goal?

3. What are the requirements for disposing of the water?
4. What is the cost of labor, power, equipment needed?
5. Is flushing the solution to our water quality concerns?
6. Do I need to flush the entire system or just areas of biggest concern.

The answers to these questions should help the utility to determine the amount of time that you need to put into planning and conducting the flushing program.

What are the water quality issues that need to be addressed?

- Removal of accumulated silt/sediment from distribution system piping.
- Reduction of chlorine demand throughout the system.
- Reduction of disinfection byproducts.
- Removal of biofilm.
- Reduction of customer complaints.

What other hydraulic and maintenance considerations could be addressed by implementing a flushing program?

1. Testing structural integrity of the system under controlled conditions.
2. Gives crew an opportunity to operate the system.
3. Chance to audit system.

There are three basic techniques to a flushing program:

Unidirectional: Isolation of a particular pipe section or area.

Conventional: Consists of opening hydrants in a specific area until water criteria is met.

Continuous blow off: This is used for systems that have numerous dead ends and severe water circulation problems. Continuous bleeding/blow off may be conducted to force a low velocity flow through a small portion of the system. This process uses large volumes of water without providing a solution to the cause of water quality problems. A more permanent solution would be to eliminate the dead ends through looping.

"The magnitude and frequency of the flushing programs will vary from utility to utility, but it has been determined that flushing of the distribution system is vital to good water quality"

So what do we do to get started?

1. Have a thorough understanding of distributions system hydraulics and flow patterns.
2. Who will be affected? Customers, businesses, etc.
3. Public notifications.
4. Obtain the necessary equipment to record the data you need to collect. Pressure gauges, pressure data loggers, pitometer, diffuser, testing equipment.
5. Identify the steps needed to obtain your desired goal. Ideally obtain flushing velocities of at least 6.0 ft. per second.

Flushing should progress from the treatment plant or well to the furthest point in the distribution system.

Flushing should progress from larger mains to smaller mains.

As previously indicated, flushing velocities should ideally be at least 6.0 feet per second (fps) if pipe scouring is desired.

Flushing should ideally be performed during late night and early morning hours to minimize impact on customers.

Hydrants should be opened completely to prevent the undermining of hydrant is through weep holes. If you have concerns about being able to flow hydrants at full open position, the use of smaller orifices may be needed.

Data collection is essential while doing your flushing program before, during and after.

It will be up to the utility to assess the advantage and disadvantages associated with their flushing programs and make the necessary change.

Not all utilities will require flushing programs. These utilities should have an aggressive water quality monitoring program beyond what is required. ■

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CALCULATING MCRT

MCRT STANDS FOR MEAN CELL RESIDENCE TIME

By Jim Abel

Mean: Average
Cell: Solids
Residence: In system
Time: Time

I look at MCRT as simply the average time mixed liquor solids are in the system, almost like a detention time for the solids. Using MCRT calculations for process control can be a valuable tool. In general the MCRT is the pounds of solids in the system (solids inventory) divided by the pounds of solids leaving the system per day. The problem is there are different methods used to determine MCRT. Some use clarifier volume and solids concentration and some do not. I have also seen situations where the effluent solids leaving the system have not been used. You need to be consistent when calculating MCRT or the numbers will be useless. For the purpose of this article I will be using clarifier information in calculations. All of the terms in the MCRT formula will be in lbs. or lbs./day.

In an activated sludge system the solids are located in two places, the aeration tanks (oxidation ditch, etc.) or the clarifiers. This is the solids inventory. There are two ways solids leave the system, wasting and effluent. In general:

(Lbs. solids in aeration tank) + (Lbs. solids in clarifier)
MCRT = (Lbs./Day solids in Effluent) + (Lbs./Day solids wasted)
Using the pounds formula we calculate the individual terms of the equation.
(Volume of Aeration MG x 8.34 x MLSS) + (Volume of Clarifier x 8.34 x MLSS)
MCRT = (Effluent Flow MGD x 8.34 x Eff. TSS) + (WAS MGD x 8.34 x WAS TSS)

Notice I used the MLSS for the concentration of solids in the clarifiers. Sometimes operators will use a core sample (sludge judge) and run suspended solids on it to use for calculations.

Example

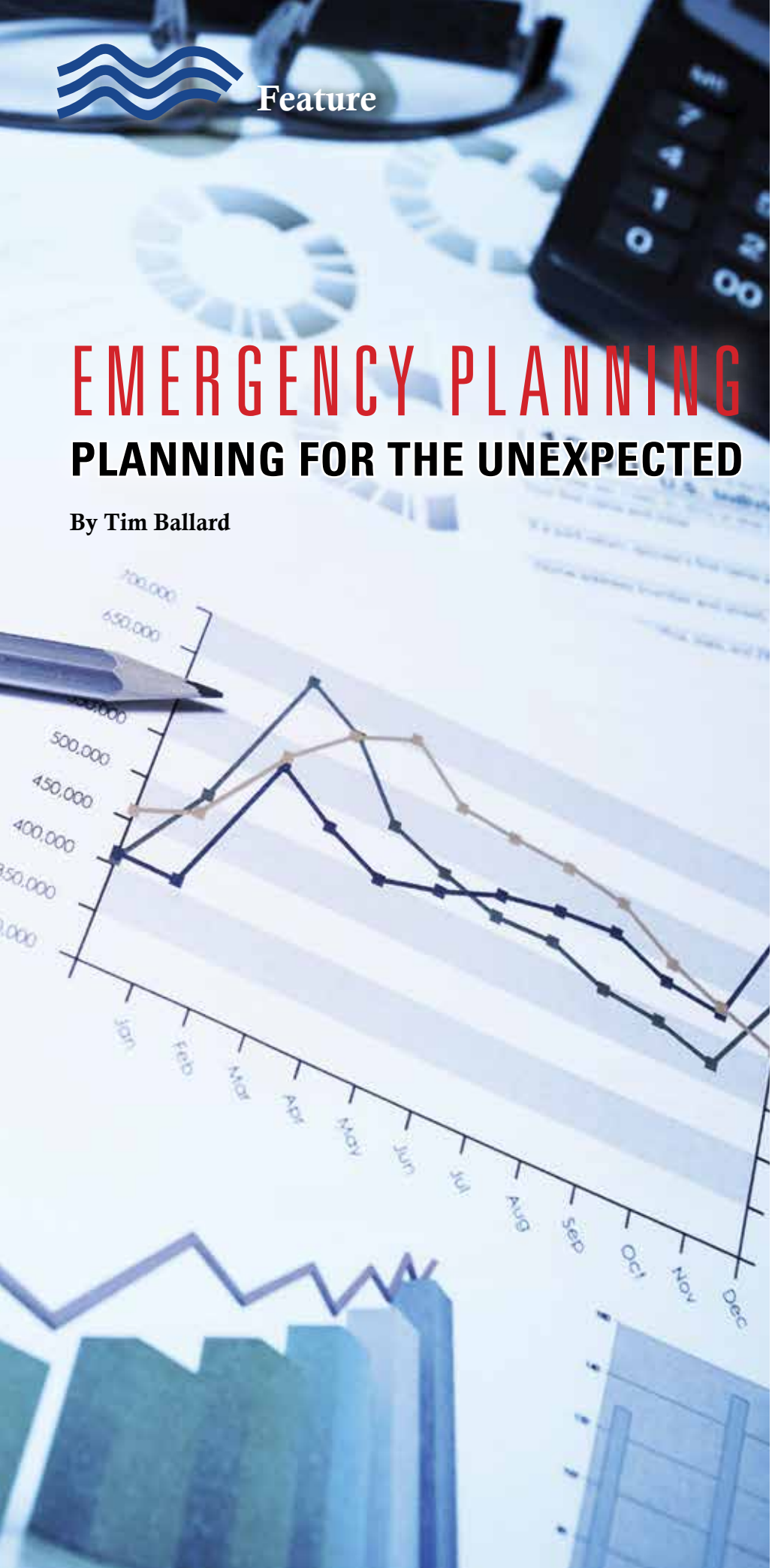
Aeration Volume: 1,000,000 gal
Clarifier Volume: 500,000 gal
Flow: 5.5 MGD
Waste Rate: .070 MGD
MLSS: 2750 mg/1
WAS mg/1: 6400 mg/1
Effluent TSS: 12 mg/1
(1 MGD x 8.34 X 2750 mg/1) + (.5 MGD x 8.34 x 2750 mg/1)
MCRT= (5.5 MGD x 8.34 x 12 mg/1) + (.07 MGD x 8.34 x 6400 mg/1)
22935 lbs + 11467.5 lbs
MCRT = 550.44 lbs/day + 3736.3 lbs/day
34402.5 lbs
MCRT = 4286.741bs/day
MCRT = 8 days

As stated above, there are several variations of MCRT calculations depending on the data supplied. These calculations should be made frequently and looked upon as a rolling average. One single calculation or snap shot of the activated sludge system does not have much operational meaning. The actual number of days for MCRT really doesn't matter. When the plant is operating properly and looking very good, that is the proper MCRT. Let's use the example above. If you determine your ideal MCRT is 8 days, adjust your wasting rate to maintain it. Although we went through the arithmetic and calculations, in the real world I would use a simple spreadsheet. There are examples online. ■

EMERGENCY PLANNING

PLANNING FOR THE UNEXPECTED

By Tim Ballard



Before we start planning for the unexpected, we must first understand what makes up an emergency plan. What is an *emergency? "A serious, unexpected situation requiring immediate response. It poses an immediate risk to health, life, property or environment."* So, what would constitute as an emergency in our water systems? A main break that has the potential to reduce pressure and possibly drain your water supply. This would put your system in a situation where it could be contaminated, lose fire protection, interrupt medical procedures or small business operations, such as a beauty salon or spa providing a cosmetic service to something as large as tornados, floods, train derailment, power outages or even a chlorine gas leak within your facility.

What about our wastewater collection systems, where an unexpected release or spill of a hazardous chemical could cause serious damage to your treatment process? There are numerous situations that could affect your system and it is up to you to plan for them. Your plan should describe how to react to each situation. This emergency plan must lead anyone through the process of managing the emergency. Your plan should include provisions to assess the severity of an incident and implement ways to manage and take corrective action. All members of your organization from the top official in your community to the E.M.A., E.P.A., P.D., and F.D. down to the newest employee should be familiar with the emergency plan. All employees should be aware of their duties during an emergency.

Training is an essential part of your emergency plan prior to any emergency, so practice your plan annually and any time changes are made. Your plan should state within it, the utilities function by defining it in writing, identify and prioritize which system processes must be sustained, and

provide the necessary information for maintaining them.

Your emergency plan should contain critical information a utility needs to know to keep operating during adverse events. Develop a comprehensive communication plan and remember that if normal communications are not working, what is your next best way to communicate within your organization and to your supplier or neighboring utilities. You may need to physically send someone to their home or business to get assistance.

Some of the key contacts that you need to communicate with are the power company, telephone, Railroad Company, natural gas suppliers and if your community has a petroleum line, be sure they are notified as well. Some of the other specialty services that you may need are: equipment, fuel suppliers, debris removal, vactor trucks, sewer to crews and, of course, motors, pumps, chemical suppliers, water tower inspection and wastewater plant equipment suppliers. In your plan, you should include an inventory of vehicles, computers and software, photos of facilities, equipment and other key pieces of equipment would be helpful. Current photos of employees and community leaders, such as Staff identification will be needed when working during an emergency, either within your community or when assisting other communities. Community leaders should also have identification cards that may be needed to assist you or gain access to your emergency operations center (EOC).

Every community or water utility should have an emergency operations center. Your county will also have an EOC, but because the emergency may be just within your system you should have in your plan where it is located and a possible alternate location is needed. Define who will be permitted in the EOC and what their duties are.

Maps of your system, community street maps, facility maps and diagrams, photographs of facilities both inside and outside, lists of hazardous chemicals and their locations, and the location and inventory of parts you keep on hand should be included. Inventory changes may be common but there should be at least a general idea of what you have.

"In your plan, you should include an inventory of vehicles, computers and software, photos of facilities, equipment and other key pieces of equipment would be helpful."

You need copies of written agreements with suppliers and vendors as well as mutual aid agreements with neighboring communities and other state communities.

A written communication procedure should be included in your plan that shows who reports to whom and who is responsible for what areas. Communication procedures should include: internal communication, external communications to customers, media and state agencies.

Create a chain of command chart. Create a diagram of each day's duties both during normal day to day operations and during emergency situations so the workflow is documented.

A written response plan should specify who will respond, where they are located and who they report to in the organization. Realizing that many rural systems have limited resources, this really spotlights the need to have partners to assist us, and they should be included in training and planning.

It is essential to remember that an individual can only work so long, so you must have a succession plan to continue operations in your response plan. You may want to include when those who are your first to respond are relieved with fresh bodies.

What should you include in your recovery plan? First there will be the financial concerns of both expenditures and income. We must realize that depending on the scale of the emergency and the number

of customers affected, your income could be greatly reduced, putting a burden on recovery efforts in the long term.

Damage assessment should be conducted as soon as possible upon notification of the event. Resources will need to be determined, so your emergency plan list of inventoried equipment and photographs of the facilities will make it easier for someone less familiar with your operation to accomplish these tasks.

Within your damage assessment you should focus on:

- What is damaged and how severely?
- What services can you safely deliver?
- What is needed to deliver minimal service?
- What is needed to deliver full service?

Remember to look at each service level individually, so that you may be able to restore fire service more quickly than potable drinking water. This may allow you to continue wastewater operations that were not damaged during the event. Can you make the needed repairs yourself? Should you request additional assistance from a mutual aid partner?

You should include a training component that gives you the opportunity to evaluate how well your plan really does work. There are 3 methods of exercising your plan.

Table Top Exercise: This is a training that is conducted in a group and is usually conducted from a scenario that was prepared and facilitated by someone outside your organization who will generate conversation and point out weaknesses in the discussion. A table top exercise does not necessarily need to include all sections or steps. You can exercise only one aspect of it at a time, if you want.

Functional Exercises: A functional exercise is more involved and should include a much larger group. This may include these outside of the group in various locations. These usually require a lot of time and additional planning members.

Full Scale Exercise: A full scale exercise will require full mobilization of all involved and the necessary equipment. This requires set up at an actual location to be prepared as an emergency. You can plan on it being an all-day event and including numerous resources from your emergency response family.

WHAT IS A CONTINGENCY?

A future event or circumstance that is possible, but cannot be predicted with certainty.

Here are a couple of examples of items that would be in a contingency plan that are not part of your emergency plan.

1. What are your daily feed requirements for your chemicals?
2. What are your power requirements for full operations?
3. What would you need for minimal operations?
4. Where would someone obtain advice in an unexpected situation? Operator death, theft of tools, where would someone get a replacement?

WHAT IS A PLAN?

Intention or decision about what one is to do in advance.

Response: retaliation to something or processes to return to normal.

Mitigation: The action of reducing the severity of seriousness of a situation. Shutting off a water main break, before it floods homes. Covering a hole in the roof before damage occurs inside a building.

Vulnerability: Open to attach harm or damage. Are you open to a train derailment, tornado, overturned chemical trucks, and power outages?

RECOVERY: *Assessment: Evaluation or estimation. The process of identifying or qualifying and prioritizing or ranking the potential damages that could or have occurred. Security assessment, damage assessment.*

Effectively Managing Inventory Space *and* Costs

By David Wheat

Managing water pipe clamps and couplings inventory is an issue that all water municipalities need to control. With a small inventory, municipalities can save on space and money but if there is a hitch with deliveries or a sudden spike in demand, installers won't have what they need for repairs. Municipalities often have tight budgets, meaning that a larger inventory to better supply clamps and couplings is not an option. This is especially true in smaller municipalities where the amount of space for inventory can be very tight.

This balancing act between cost and space can be tricky but with these five tips, municipalities can ensure they have the repair products they need while keeping storage costs down.

1. Evaluate how much stock is needed throughout the year

Before deciding on how much inventory you need, take a careful look at the demand for repair products and when they are used most frequently. Look at your orders over the course of the last three or four years. Do you notice periods when the demand for certain clamps or couplings is high, and other periods when it's low?

See if you can manage inventory based on past records and decide which products should be in high supply and which ones can be lower. In addition, knowing the size and types of pipes that are in the ground can help predict what kind of repair tools to store.

2. Use repair products that can be used in a number of applications

If you store clamps and couplings that can be used in a number of applications, then you don't need to keep as many repair products in stock and space is reduced. There are products on the market that offer full transition couplings that will fit pipes of varying types and sizes within your water or wastewater infrastructure. There are also products that have the versatility to either join or repair pipes. These space savers are significant as one of these products can take the place of three traditional ones given its capacity to be used on a variety of pipes and repair situations.

The HYMAX VERSA, for example, can be stab-fit between two separate pipes or repair the pipe by wrapping it around the damaged section. HYMAX VERSA offers high versatility to connect to a wide variety of piping materials and diameters, and gives installers the flexibility to make repairs within an extensive range of circumstances.

3. Take weather patterns into considerations

Weather can play a key role when repair supplies will be in high demand and how fast you can obtain them. Repairs are frequent when the ground shifts during the spring thaw, and other times of the year when the weather is harsh (e.g. hurricane season). Keep in mind when ordering products that orders will be harder to fill when weather conditions will get in the way of quick deliveries. It only takes one snowed-in regional shipping hub to delay orders across the entire nation.

4. Implement a streamlined purchasing system

Use software programs for both inventorying product and ordering. Small utilities may rely on a paper checklist and a clipboard or simply go by memory, which is unreliable. Make it easy to keep track of supplies and ordering so there is no confusion around ordering supplies. Assign a number for each product you order to supply categorization and keep track.

5. Make sure ordering is done by just one person

Delegate one person to be the purchasing manager to ensure multiple orders aren't placed unnecessarily. The designated purchasing manager should keep track of inventory and be informed of any changes in supply needs. A good purchasing manager will also ask vendors if they offer discounts for buying in volume or for paying the entire invoice within a specified amount of time.

Regardless of the size of your inventory, inventory is important to manage to keep costs down and ensure repair parts are available when crews need them. By following these tips, you can ensure that costs are lower and easily managed while ensuring you have the parts when a pipe break occurs. ■

About the Author:

David is the materials manager at Krausz USA in Ocala, FL.

Flushed Away: The Risks

By Shawn Dobson

Blockages are a source of heartache for the infrastructure of any sewer system. Many times these restrictions of flow can be avoided simply by people being aware of what they are sending down the drain. Tampons, condoms, and so-called flushable wipes are often the culprit of reduced flow or blockages that can lead to costly repairs. These extensive costs can either impact the homeowner or the members of Ohio Rural Water Association. Though these items are many times considered biodegradable and thought to be safe to send down a toilet drain, they unfortunately do not break down in a sewer system quickly enough to not make their presence known.

Condoms are primarily made from latex, but can also be made from natural materials or plastics. Latex breaks down relatively well in a landfill, but water within the infrastructure of the sewer system does not allow latex to dry out and degrade as it normally would within the landfill. A condom flushed into plumbing and eventually into the wastewater system can get caught in a narrowing of a pipe or possibly in a piping fitting. If a condom is to happen to become trapped, it can make a perfect seal within a pipe while catching any other solids trying to make its way through the sewer pipe.

One of the most common items to wreak havoc inside wastewater piping is tampons. Tampons are fibrous and primarily made of cotton fiber. Tampons are also biodegradable, but this product takes a significant amount of time to disintegrate as it moves throughout a plumbing or wastewater system. That being said, the fibers or the string of the feminine product can easily be caught on rough interiors of piping or joints. Same as the issue above,

a tampon can obstruct a pipe causing a system to run slowly or not at all. Tampons also are a potential obstacle during the process of clearing a pipe with a motorized sewer snake or a high pressure jet machine. The strings of the tampons can become wound in the cabling of the sewer snake that is sent into the pipe or the product can obstruct the head of the jet machine.

Wipes of many types are a great nuisance when flushed into plumbing. Same as tampons, the fibers of the wipe can become caught on roughness within the interior of a pipe. Once the wipe becomes lodged inside a pipe, it will become a magnet for the multitude of solids also moving throughout the sewer system. Some wipes are specifically marketed as being flushable; this creates a false sense of security for an unsuspecting shopper. Consumer Reports ran an analysis on wipes that were marketed as flushable. Two different tests were conducted and in neither test did the wipe begin to break apart making it safe like conventional toilet paper. To see a video clip of the analysis conducted by Consumer Reports go to www.consumerreports.org/cro/video-hub/22 783 507001.

The items and issues discussed are all examples of preventable blockages to a wastewater system. The repairs caused by these clogs will cost considerable money and loss of time. If and when these items make their way to a wastewater treatment plant, they will still ultimately end up in a landfill. This potentially creates a greater disposal cost for members. If the customers of municipal waste water systems are educated in the risks of sending these products into the plumbing of their own home and the risks of sending the products to the municipal waste water system it could have a positive impact by reducing resources wasted on repairs and disposal costs.

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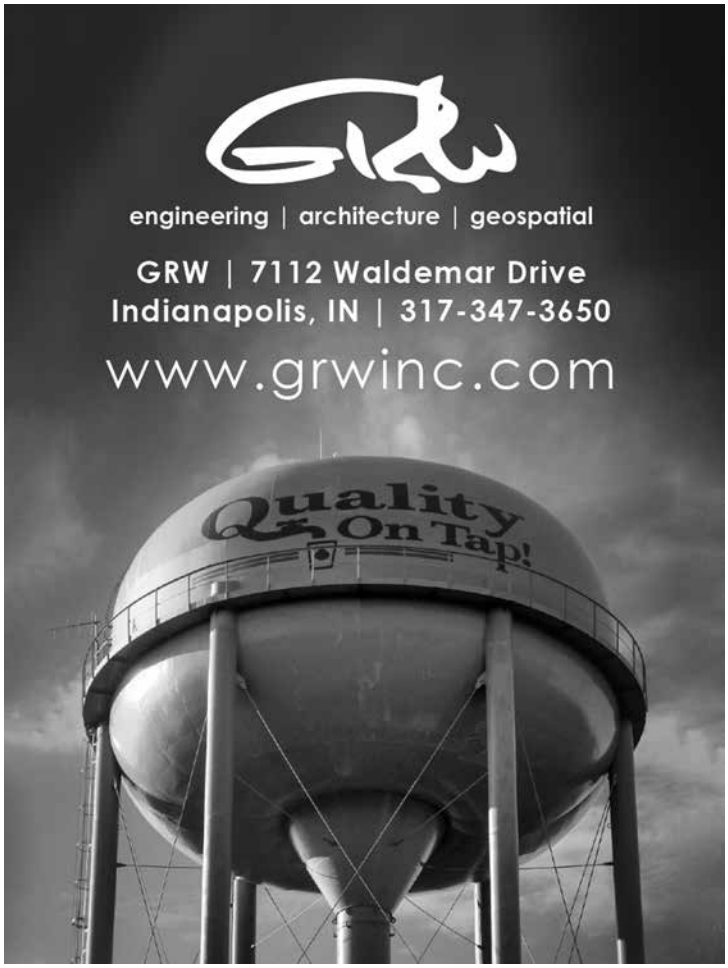

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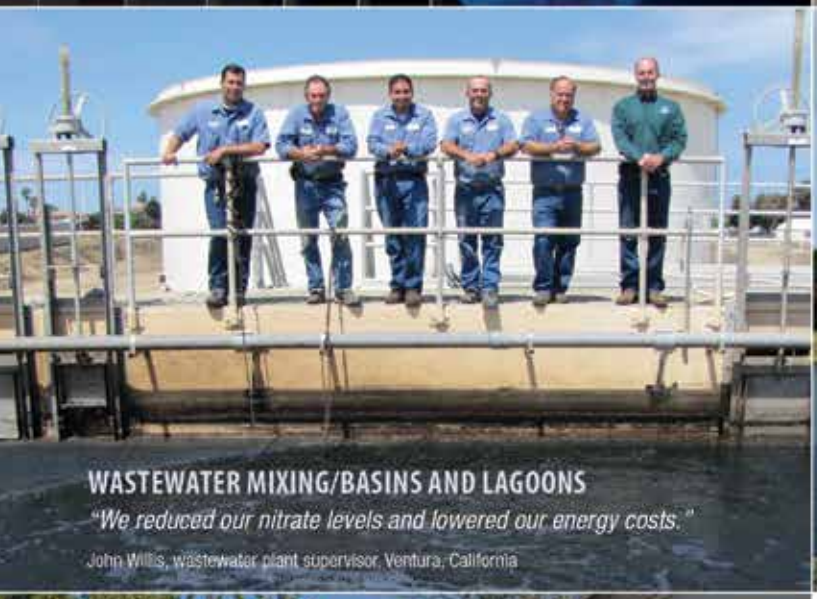

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