Mountain State Water Line

A Publication of the West Virginia Rural Water Association

Summer 2021

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- Insulating Your Tank
- Basic Hygiene Practices for Wastewater Workers

DON'T FORGET!!!

SNOWSHOE MOUNTAIN

Mark your calendars for

August 15-18, 2021

To attend the WVRWA 2021 Annual Technical Conference

To be held at

Snowshoe Mountain Resort

West Virginia Rural Water Association

Summer 2021

Welch, WV
Photo by: Amanda McGinnis

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Articles and Features

West Virginia Rural Water Association, WVRWA, is a non-profit organization of rural and small publicly owned water and wastewater systems. The vision of the WVRWA is to be the recognized leader and respected voice for water and wastewater systems. The mission or purpose of WVRWA is to provide and promote the highest level of utility service, technical assistance, training, and advocacy for all West Virginia water and wastewater systems.

WVRWA is affiliated with the National Rural Water Association.

By Jason Myers, WVRWA President

President's Message

The West Virginia Rural Water Association (WVRWA) 2021 Annual Technical Conference is just around the corner. It was a difficult decision to have to cancel the conference last year, but our main focus was one the safety and well-being of everyone involved. With that being said, we are overjoyed to bring back the WVRWA Annual Conference at Snowshoe Resort. We are going to have a wide variety of vendors in the Exhibit Hall and plenty of familiar and brand-new faces. Conference is the perfect time to obtain some CEHs, meet with vendors, network with your peers, and have a great time while doing it all.

In an attempt to make things flow smoother, we're making a couple changes this year. The golf tournament is moving to Sunday. Sunday will continue to play host to the cornhole, horseshoe, meter toss, track hoe, and water tapping competitions, which will be followed by the picnic. The Opening Session on Monday has been extended and will now include a short awards presentation. By holding the awards presentation on Monday morning, recipients will receive recognition all week long. We're pleased to have Mark Bowe, host of DIY Network's Barnwood Builders, as our Keynote Speaker at the Opening Session. Mark is a Glasgow, West Virginia native and graduate of WVU, who now resides in Lewisburg. In 1995, he founded his company, Antique Cabins and Barns, which he expanded to Barnwood Living in 2016.

As in the past, training classes will be held Monday, Tuesday, and Wednesday. The Exhibit Hall will open Monday evening and reopen Tuesday morning. Please take the time to thank our vendors and sponsors, who are instrumental in making this conference possible. Tuesday evening will include the raffle drawings and dinner. Myself, the Board of Directors, and the WVRWA staff can't wait to see you on the Mountain. Let's make this a conference to remember. ■

WWW.WVRWA.ORG

Online Training Classes

WVRWA has teamed up with SunCoast Learning Systems, Inc. to bring online computer-based water and wastewater training to operators throughout the state. Through WVRWA Online Learning, you now have the freedom to learn from home, the office, or your local library. Training can be accessed directly from your personal computer using your internet connection.

Water and wastewater operators registering for e-Learning courses will have a menu of courses from which to choose. We are constantly adding and updating courseware to reflect changing industry needs and regulations. For more information, you can visit www.wvrwa.org or contact the office at 800-339-4513. Some of the available courses are shown below.

Course	CEH Hours	Approved for	Price
Drinking Water Mathematics	10	Water/WW	$180
Surface Water Treatment	10	Water	$180
Basic Environmental Chemistry	10	Water/WW	$180
Small Water Systems I	5	Water	$100
Chlorinator Systems & Chemical Handling	10	Water/WW	$180
Water Transmission and Distribution	10	Water	$180
Practical Personnel Management	7	Water/WW	$125
Water Utility Calculations	10	Water	$180
Pumps & Motor Maintenance	10	Water/WW	$180

By Todd Grinstead, Executive Director

From Your Executive Director

2021 is looking much different than 2020. (Thank Goodness!)

In 2020, our annual technical conference was canceled; on-site visits and technical assistance was limited to emergencies, and in-person training classes were put on hold.

We are happy to be back to making physical on-site visits, holding in-person training courses, and planning our 2021 Annual Technical Conference. Pretty much, we're getting back to our somewhat "old normal".

The Annual Technical Conference will be held at Snowshoe Mountain Resort from August 15-18, 2021. The conference days will be filled with many exciting events; golf outing, picnic, awards, competitions, training classes, and ever important networking with your fellow water and wastewater professionals.

2021 has allowed us to add and expand our existing programs that are available to our members. We are very excited to get our Workforce Development/Apprenticeship Program up and running. We were blessed to expand our Circuit Rider Program from three circuit riders to four, as well as welcome a brand-new program. The Appalachian Regional Commission (ARC) Program provides a combined water and wastewater specialist to focus on water and wastewater systems located within distressed counties of the state.

As an association, we have many services to offer our members. If you are in the need of technical support, training, or resources, visit our website at wvrwa.org to see the services we have available, get our up-to-date training schedule, and much more.

Good News! We are going back to a printed calendar. By the end of this year, you should receive, in the mail, the 2022 Drinking Water & Wastewater Training Coalition Calendar. Keep an eye out!

Remember, we are here for you. Don't hesitate, reach out to us! ■

JOIN WVRWA

STATE OF WEST VIRGINIA
DEPARTMENT OF HEALTH AND HUMAN RESOURCES
Bureau for Public Health
Office of Maternal, Child and Family Health

Bill J. Crouch
Cabinet Secretary

Ayne Amjad, MD, MPH
Commissioner & State Health Officer

April 19, 2021

West Virginia Public Water Systems Receive Community Water Fluoridation Awards

The West Virginia Department of Health and Human Resources (DHHR) announced 56 public water systems have received a Water Fluoridation Quality Award from the U.S. Centers for Disease Control and Prevention (CDC). A total of 1,523 public water systems in 29 states recently received this award.

Fluoridation is the adjustment of fluoride in drinking water to a level that is effective in preventing tooth decay. The Water Fluoridation Quality Award recognizes communities that achieved excellence in community water fluoridation by maintaining a consistent level of fluoride in drinking water throughout the year.

"Water fluoridation is one of the best investments a community can make in maintaining the oral health of its citizens. It is equally effective in preventing cavities in children and adults," said Casey Hannan, Director of the CDC's Division of Oral Health. "Fluoridation is also highly cost effective. Studies show that for every $1 a community invests in water fluoridation, $20 is saved in dental treatment costs."

Honored for maintaining a consistent level of fluoride in drinking water for 50 consecutive years is the Town of Union, which received the 2020 Community Water Fluoridation 50-year award from the American Dental Association, Association of State and Territorial Dental Directors, and the CDC.

In 2020, 382 public water systems in 30 states received this prestigious award. Nationally, more than 211 million people, or 74.4% of those served by community water systems, have access to optimally fluoridated tap water.

"I am extremely proud of the Town of Union for receiving the 50-year award," said Dr. Jason Roush, State Dental Director for DHHR's Office of Oral Health. "The Town of Union sets a high standard for all West Virginia public water systems to maintain fluoridation levels to improve oral health."

Community water fluoridation has been recognized by the CDC as one of the 10 greatest public health achievements of the 20th century. Water fluoridation is a practical, cost effective, equitable, and safe measure for prevention of tooth decay and improvement in oral health.

"These awards demonstrate the commitment and positive impact West Virginia's public water systems have for oral health," Roush said. "In addition to healthier outcomes, community water fluoridation makes a difference financially for families and the healthcare system."

The following West Virginia public water systems received the CDC's Water Fluoridation Quality Award in 2019, the most recent reporting period:

- Beckley Water Company-Glade Plant
- Beckley Water Company-Sweenysburg Plant
- Belington Water
- Berkeley County PWSD – Bunker Hill (Bunker Hill Plant)
- Berkeley County PSWD – Potomac River
- Buffalo Creek PSD
- Buffalo Creek PSD – Man
- Cedar Grove Water
- Charles Town Water Dept.
- City of Fairmont
- City of Hurricane
- City of Martinsburg (Big Springs)

- City of Shinnston
- City of White Sulphur Springs
- Romney Water Dept.
- Clarksburg Water Board
- Claywood Park PSD
- Craigsville PSD
- Fairview Water System
- Flatwoods – Canoe Run PSD
- Green Valley–Glenwood PSD – Bulltail
- Green Valley–Glenwood PSD (Glenwood)
- Hughes River Water
- Kingwood Water Board
- Lewisburg Municipal Water
- Lubeck PSD
- McDowell Cty PSD – Berwind
- Mill Creek Water Dept.
- Monongah Water Works
- Morgantown Utility Board
- Mt. Hope Water
- New Haven Water Dept.
- Norton-Jimtown-Harding PSD
- Parkersburg Utility Board
- Petersburg Municipal Water
- Plant
- Taylor County PSD
- Point Pleasant Water Works
- Putnam PSD
- Raleigh Cty PSD – Coal City
- Ravenswood Municipal
- Red Sulphur PSD
- Sistersville Municipal Water
- Shepherdstown Water
- Spencer Water Dept.
- Summersville Water Works
- Town of Marlinton
- Town of West Union
- Wayne Water Board
- West Virginia American Water (WVAW) – Bluefield District
- WVAW – Bluestone
- WVAW – Kanawha Valley Dist.
- WVAW – New River Regional
- WVAW – Webster Springs
- WVAW – Weston District
- Wilderness PSD
- Williamson Utility Board ■

By Bertis M. McCarty, Water Circuit Rider

Batteries – Part 2
Battery Safety

OSHA and Consumer Products Safety Commission are two of the well-known safety experts. Who better to listen to on battery safety?

OSHA says there are four main hazards associated with batteries:

1. Battery acid: The electrolyte in a battery is corrosive and can burn skin or eyes, eat holes in clothing, or even etch a concrete floor.

2. Flammable gases: Batteries emit hydrogen gas, which is flammable. It ignites easily and can cause a fire or explosion if allowed to accumulate in a small area.

3. Electrical shock: Many of us are aware of this danger because we may have seen sparks fly when jumper cables are attached to a car battery.

4. Weight: Batteries, like those used in forklifts, are heavy and require proper material handling equipment to lift them safely.

Consumer Products Safety Commission says potential hazards include overheating, fire, electrical shock from *battery* chargers, thermal burns, exposure to alkaline *battery* electrolytes, and high-velocity ejected internal components of *batteries*. Reports indicate incidents have occurred while the product is in use, in storage, and during *battery* charging.

A little information about batteries to help with the safety aspect:

- A battery consists of a number of cells, each with a positive (+) and a negative (-) plate.
- Both plates are immersed in a solution of sulfuric acid and water called an electrolyte.
- Each battery cell can produce about 2 volts of power.
- Each cell has its own vent cap, designed to allow gases to escape and keep the electrolyte solution from spilling.
- When the battery is used (discharged), the acid level becomes weaker until the battery cannot produce an electrical current.
- Then the battery needs to be charged by connecting the terminals to a battery charger (an AC source of electricity).
- Charging restores the acidity of the electrolyte so the battery can again produce an electrical current.

Battery Storage Safety

Before

After

I have read articles about house and/or garage fires caused by poor battery storage habits. The “Before” picture above probably looks very familiar. If it’s the way you, yourself store batteries, I would recommend something like the “After” picture shows. For

less than $20, in most cases, a person could possibly save the family from having a house/garage fire. The cost is nothing compared to the loss of a home, dwelling, or business structure.

Follow these safety procedures for charging batteries safely:

- Be sure the proper charger is being used for the particular kind of battery.
- Check that vent caps are in place to prevent overflow and spilling of electrolyte.
- Shut off the charger when connecting or disconnecting the battery.
- Before charging a battery while it is still in a forklift, open the battery compartment and allow it to cool down following lift truck operation.
- After charging, again allow the battery to cool down—it prolongs battery life.
- Never overcharge a battery—that's another way to prolong battery life.

Know what to do in an emergency:

- Have an emergency kit with corrosion-resistant plastic tools and materials to absorb acid liquids. Don't forget to use your PPE!
- Baking soda is commonly used to neutralize electrolyte spills.
- All workers should know how to operate fire extinguishers properly.
- For contact with a worker's skin or eyes, rinse immediately for at least 10 minutes and then seek medical attention.

Many accidents are caused when workers are unclear about safe procedures, but are embarrassed to ask questions. Make sure your employees understand the importance of asking if there is any part of this information that's not clear. Understanding battery safety is the way they can protect themselves from serious injury.

For more detailed information on battery safety refer to OSHA regulations:29 CFR 1910.178(g), 1910.305(j)(7), 1917.157, and 1926.441 ■

NATIONAL RURAL WATER ASSOCIATION

NRWA *America's Largest Utility Membership*

NOW IS THE TIME TO ACT

Get Started on Your Water Utility Construction Project

Do you have a Water Utility Construction Project? Now is the time to act! Rates are at an all time low, and with the current pricing being opportunistic and taking action can result in benefits not only for your-self but for the customer as well. Consider the below items that detail positive reasons to act now that you can present to your governing body.

- Interest rates are at an all-time low.
- More project contractors are available, increasing the number of bids, potentially lowering project costs.
- Fuel costs are low, lowering pipe related costs.
- Most material costs for projects are down.
- Shipping costs for many have decreased.
- Road and water projects are easier to schedule due to decreased volume in traffic.
- Low construction costs and available contractors are not guaranteed to last.

USDA

USDA Rural Development is committed to helping improve the economy and quality of life in rural America. Offering loans, grants and loan guarantees are some of the ways Rural Development is supporting rural America.

WEST VIRGINIA RURAL WATER ASSOCIATION

Every drop counts.

By Daniel Vestal, Water Circuit Rider

Methods of Disinfection

Disinfection is a particularly important step to ensure that the water we produce is safe to drink. Most systems use chlorine gas for disinfection, so that got me to thinking about other ways of disinfection. It's been a long time since I looked at them, therefore, let's take a closer look into the different types of disinfection.

The primary methods for disinfection are chlorination through gas, sodium hypochlorite, and calcium chlorite. Also Chloramine, Ozonation, and Ultraviolet Light. We're going to look at these methods along with their advantages, limitations, process, equipment, and chemicals.

Disinfection is accomplished by filtering out harmful micro-organisms and adding disinfectant chemicals to kill any pathogens which pass through the filters and to provide a residual dose of disinfectant to kill or inactivate potentially harmful micro-organisms in the storage and distribution systems. Possible pathogens include viruses, bacteria, including Salmonella, Cholera, Campylobacter and Shigella, and protozoa, including Giardia lamblia and other cryptosporidia.

The most popular. **CHLORINATION (Gas)** is the process of adding chlorine to drinking water to disinfect it and kill germs. Different processes can be used to achieve safe levels of chlorine in drinking water. Chlorine is available as a compressed elemental gas, sodium hypochlorite solution, or solid calcium hypochlorite. While the chemicals could be harmful in high doses, when they are added to water, they all mix in and spread out, resulting in low levels that kill germs, but are still safe to drink. At normal pressures, elemental chlorine is a toxic, yellow-green gas, and is liquid at high pressures.

Advantages – Chlorine is very effective for removing almost all microbial pathogens and is appropriate as both a primary and a secondary disinfectant.

Limitations – Chlorine gas is dangerous and lethal at concentrations as low as 0.1 percent air by volume.

Process – Chlorine gas is released from a liquid chlorine cylinder by a pressure reducing and flow control valve operating at a pressure less than atmospheric. The gas is led to an injector in the water supply pipe where highly pressurized water is passed through a venture orifice creating a vacuum that draws the chlorine into the water stream. Adequate mixing and contact time must be provided after injection to ensure complete disinfection of pathogens.

Equipment – A basic system consists of a chlorine cylinder, a cylinder mounted chlorine gas vacuum regulator, a chlorine gas injector, and a contact tank or pipe. Prudence and/or state regulations would require that a second cylinder and gas regulator be provided with a change-over valve to ensure continuity of disinfection. The gas chlorinator should be installed in a room or chamber with direct emergency access to outside air and fitted with an exhaust fan ventilation system. Federal and state safety regulations must be observed. If not onsite, a self-contained breathing apparatus (SCBA) and a chlorine cylinder repair kit should be available within a reasonable time frame and/or distance.

Chemicals – Chlorine gas is supplied as liquid in high pressure cylinders.

CHLORINATION (Sodium hypochlorite solution) is available as a solution in concentrations of 5 to 15 percent chlorine but is more expensive than chlorine gas as available chlorine.

Advantages – Sodium hypochlorite is easier to handle than gaseous chlorine or calcium hypochlorite.

Limitations – Sodium hypochlorite is very corrosive and should be stored with care and kept away from equipment that can be damaged by corrosion. Hypochlorite solutions decompose and should not be stored for more than one month and must be stored in a cool, dark, dry area.

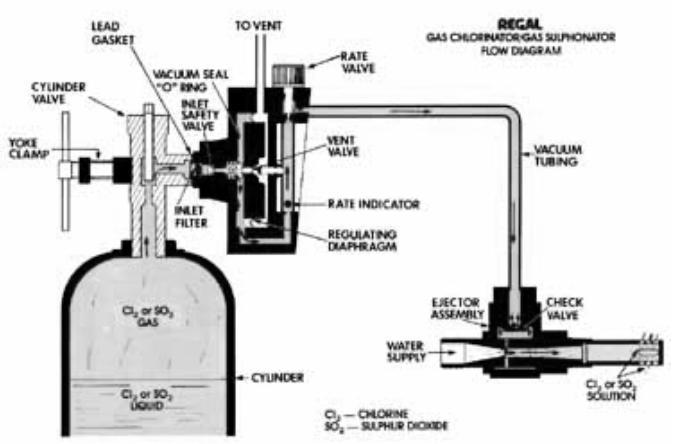
Process – Sodium hypochlorite solution is diluted

with water in a mixing/holding tank. The diluted solution is injected by a chemical pump into the water supply pipe at a controlled rate. Adequate mixing and contact time must be provided.

Equipment – A basic liquid chlorination system, or hypochlorinator, includes two metering pumps (one serving as a standby), a solution tank, a diffuser (to inject the solution into the water), and tubing.

Chemicals – Sodium hypochlorite solution is readily available and can also be generated onsite by electrolysis of sodium chloride solution in specialized proprietary equipment. The only supplies required are common salt and electricity. Hydrogen is given off as a by-product and must be safely dispersed.

CHLORINATION (Solid calcium hypochlorite) is a white solid that contains 65 percent available chlorine and dissolves easily in water.



Advantages – When packaged, calcium hypochlorite is very stable, allowing a year's supply to be bought at one time.

Limitations – Calcium hypochlorite is a corrosive material with a strong odor that requires proper handling. It must be kept away from organic materials such as wood, cloth, and petroleum products. Reactions between calcium hypochlorite and organic material can generate enough heat to cause a fire or explosion. Calcium hypochlorite readily absorbs moisture, forming chlorine gas. Therefore, shipping containers must be emptied completely or carefully resealed.

Process – Calcium hypochlorite may be dissolved in a mixing/holding tank and injected in the same manner as sodium hypochlorite. Alternatively, where the pressure can be lowered at atmospheric, such as at a storage tank, tablets of hypochlorite can be directly dissolved into the free flowing water by a proprietary device that provides flow-proportional chlorination with gravity feed of the tablets.

Equipment – The solution used to mix the solution and inject it into the water is the same as that for sodium hypochlorite. Solutions of 1 to 2 percent available chlorine can be delivered by a diaphragm-type, chemical feed/metering pump or by a tablet chlorinator.

Chemicals – Calcium hypochlorite can be purchased in granular, powdered, or tablet form.

CHLORAMINES are formed when water containing ammonia is chlorinated or when ammonia is added to water containing chlorine (hypochlorite or hypochlorous acid).

Advantages – An effective bactericide that produces fewer disinfection by-products and is generated onsite. Usually, chloramine-forming reactions are 99 percent complete within a few minutes. It is becoming more common as a disinfectant. Although not as strong an oxidant, it does provide a longer lasting residual than free chlorine and will not readily form THMs or haloacetic acids.

Limitations – Chloramine is a weak disinfectant. It is much less effective against viruses or protozoa than free chlorine. It is appropriate for use as a secondary disinfectant to prevent bacterial regrowth in a distribution system. Nitrogen trichloride appears to be the only detrimental reaction. It may be harmful to humans and imparts a disagreeable taste and odor to the water. The use of the proper amounts of each chemical reactant will avoid its production. Distribution systems may experience nitrification, as ammonia is a nutrient for bacterial growth, with nitrates being generated as a by-product.

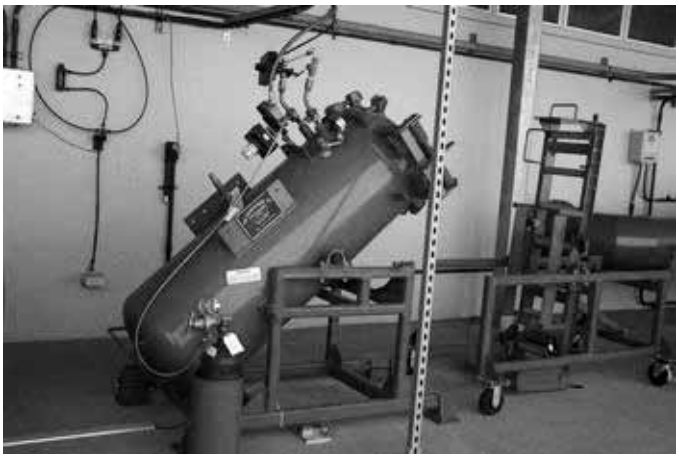
Process – Chlorine (gaseous solution or sodium hypochlorite) is injected into the supply main followed immediately by an injection of ammonia (gaseous solution or as ammonium hydroxide). As before, adequate mixing and contact time must be provided. The mix of products produced when water, chlorine, and ammonia are combined depends on the ratio of chlorine to ammonia and the pH of the water. Chlorine to ammonia ratios of 5:1 should not be exceeded. If the pH drops below 5, some nitrogen trichloride may be formed.

Equipment – The generation of chloramines requires the same equipment as chlorination (gaseous

or aqueous hypochlorination), plus equipment for adding ammonia (gaseous or aqueous).

Chemicals – Chemicals used to generate chloramine from ammonia and chlorine gas depend on the ammonia-based chemical used. Anhydrous ammonia is the least expensive. Ammonium sulfate is the most expensive.

OZONATION - Ozone, an allotrope of oxygen having 3 atoms to each molecule, is a powerful oxidizing and disinfecting agent. It is formed by passing dry air through a system of high voltage electrodes.



Advantages - Requiring shorter contact time and dosage than chlorine, ozone is widely used as a primary disinfectant in many parts of the world, but is relatively new to the U.S. Ozone does not directly produce halogenated organic materials unless a bromide ion is present.

Limitations - Ozone gas is unstable and must be generated onsite. A secondary disinfectant, usually chlorine, is required because ozone does not maintain an adequate residual in water.

Process - The five major elements of an ozonation system are:

- Air preparation or oxygen feed;
- Electrical power supply;
- Ozone generation—usually using a corona discharge cell consisting of two electrodes;
- Ozone contact chamber; and
- Ozone exhaust gas destruction.

Equipment - Ozonation equipment includes air preparation equipment; an ozone generator, contactor, destruction unit; and instrumentation and controls. The capital costs of ozonation systems are relatively high. Operation and maintenance are relatively complex. Electricity represents 26 to 43 percent of total operating and maintenance costs for small systems.

Chemicals - For many applications, pure oxygen is a more attractive ozone feed gas than air because:

- It has a higher production density,
- It requires lower energy consumption,
- It doubles the amount of ozone that can be generated per unit, and
- It requires smaller gas volumes for the same ozone output, thus lowering costs for ancillary equipment

ULTRAVIOLET LIGHT (UV) radiation is generated by a special lamp. When it penetrates the cell wall of an organism, the cell's genetic material is disrupted and the cell is unable to reproduce.

Advantages - UV radiation effectively destroys bacteria and viruses. As with ozone, a secondary disinfectant must be used to prevent regrowth of micro-organisms. UV radiation can be attractive as a primary disinfectant for small systems because:

- it is readily available,
- it produces no known toxic residuals,
- it requires short contact times, and
- the equipment is easy to operate and maintain

Limitations - UV radiation may not inactivate Giardia lamblia or Cryptosporidium cysts and should be used only by groundwater systems not directly influenced by surface water, where there is virtually no risk of protozoan cyst contamination. UV radiation is unsuitable for water with high levels of suspended solids, turbidity, color, or soluble organic matter. These materials can react with or absorb the UV radiation, reducing the disinfection performance.

Process - The effectiveness of UV radiation disinfection depends on the energy dose absorbed by the organism, measured as the product of the lamp's intensity (the rate at which photons are delivered to the target) and the time of exposure. If the energy dosage is not high enough, the organism's genetic material might only be damaged instead of destroyed. To provide a safety factor, the dosage should be higher than needed to meet disinfection requirements.

Equipment – UV lamps and a reactor.

Chemicals – No chemical oxidant required to kill micro-organisms.

Thank You for reading my article ---- *References: National Drinking Water Clearinghouse* ■

By Michael Hersman, Water Circuit Rider

Optimizing Your Distribution System: Chlorine Mapping

Distribution systems are a complex network of pipes, tanks, and pumps of various sizes, ages, and materials. There are no two systems that are alike, in either construction or operation, which provides a challenge when starting optimization efforts. It is, therefore, imperative for systems to have a full understanding of the physical aspects of their own system and how these aspects, as well as operation, can impact water quality.

In order to gain a more comprehensive characterization of water quality within the distribution system, additional sampling beyond regulatory sampling frequencies, locations, and parameters should be conducted. This can be done using a process called "Chlorine Mapping."

Chlorine Mapping is a process that a water system can use to identify the most critical, as well as representative, sample locations (for chlorine residual, DBPs, or other target parameters) throughout the distribution system. Chlorine Mapping can be used to establish a long-term monitoring program, which can be used as a process control tool and as an "early warning system" for locational and system-wide distribution system water quality problems.

Free chlorine is used in the mapping process since it can be an indicator of higher water age, higher THMs, poor microbial water quality (biogrowth), and contamination. Also, in areas where there is low to no chlorine, the chemical barrier is no longer present or effective in the event of an intentional or unintentional contamination event. Identifying these areas is critical in ensuring effective health protection.

A system can identify potential "critical" areas within the distribution system to monitor. Initially, a large number of investigative sample locations may be selected to ensure comprehensive coverage of the entire distribution system. Once an initial sampling event is conducted, the number of "critical" sample locations may be narrowed down to sites that will accurately characterize the water quality within the distribution system and can be used for long-term sampling. It is also important to ensure that the number of long-term sample sites is not excessive, requiring too much time and causing workforce issues or "hit-or-miss sampling."

Chlorine Mapping plays a major role in optimizing the distribution system. With the onset of emerging contaminants and current and future regulations that are directly related to the distribution system, Chlorine Mapping is an essential tool a utility can implement in the optimization process. Chlorine Mapping is a critical step before implementing a flushing program. ■

By Jerry Dotson, Sourcewater Specialist

Harmful Algal Blooms (HAB)

Algae produces most of the oxygen that we breathe and is a major source of food for sea life. But not all algae are good; in fact, some algae are very bad. According to the Ohio EPA website, Harmful Algal Blooms are not actually algae as we know it (epa.ohio.gov). Most of the harmful blooms that are encountered in West Virginia, and in most fresh water, are of the blue-green algae type, which is made up of bacteria, called cyanobacteria. A similar bacterium, that occurs in salt-water, known as red tide, can create similar problems. Besides the issues caused by all algal blooms: odor, oxygen depletions when they die-off, and reduced sunlight into the water column (which can cause fish and plants to die); cyanobacteria can also release toxins called cyanotoxins. Cyanotoxins are highly potent and can cause dangerous health risks.

Exposure to cyanotoxins often causes skin rash, hay fever symptoms, gastro-intestinal distress, and even liver damage if ingested. However, cyanobacteria may also contain neurotoxins that cause nerve damage and have been linked to neurodegenerative diseases like ALS, Alzheimer's disease, and Parkinson's disease from eating contaminated fish and shellfish. Of greatest concern is that some cyanotoxins can have lethal effects in animals and humans. In 1878, George Francis described the effects of an algal bloom that occurred in the estuary of the Murray River in Australia stating, "wildlife that drank the water died rapidly and terribly." In July of 2017, a blue-green algae outbreak in a Lake County, Oregon reservoir killed 32 head of cattle. Cattle had been drinking from the reservoir for 60 years without a problem until the HAB occurred. In 2018, a massive red tide bloom along Florida's southwestern coast killed 200 tons of marine life and caused $8 million in business losses.

Harmful Algal Blooms occur under the same conditions as normal algal blooms. Sunlight, slow moving water, and nutrients (nitrogen and phosphorus) allow algae to grow and reproduce. Nutrient pollution from agricultural activities, wastewater, fossil fuels, and cleaning products increase the frequency and severity of HABs. If you wonder why your dish soap does not work as well as it once did, it is because the U.S. imposed a voluntary ban on phosphates in laundry and dishwashing soaps in 1994 to combat nutrient pollution that feeds HABs.

The Chesapeake Bay, the U.S.'s largest estuary, has been experiencing HABs for decades. With 9 rivers and 141 streams and creeks in six states making up the watershed, the initiative to restore and protect this huge national treasure requires cooperation from a vast array of stakeholders. Individuals, corporations, farmers, conservation groups, and regulatory agencies are working together to mitigate the damages caused by years of pollutant discharges from various sources. Upgrading of sewer treatment plants alone eliminated an estimated 900 million pounds of nutrient discharge into the watershed from 1985 to 2015. And the efforts of the Chesapeake Bay Program continue to address other sources of pollution like agricultural and urban run-off to correct the damage and bring renewed life to the Bay.

The Chesapeake Bay Project has provided an excellent pilot program for initiatives to clean and restore other problem areas in the U.S. and

the world. For example, a huge dead zone in the Gulf of Mexico is caused by nutrients discharged into the Gulf through the Mississippi River. This could be the next region targeted for clean-up efforts. Addressing this problem will require a massive initiative that must encompass the entire Mississippi River watershed. That is an area of over 1.2 million square miles from the Appalachian Mountains in the east to the Rock Mountains in the west. All, or part, of thirty-two U.S. states and two Canadian provinces drain into the Mississippi River. This would be a monumental task that will require a tremendous level of cooperation and drive.

What does this mean to you as an individual? First, you need to protect yourself from the health risks involved with HABs. Determining the difference between a regular algal bloom and an HAB is very difficult without a microscope and an understanding of the biology involved. It is best to avoid contact with any algae. If you have pets or livestock, keep them away from algal blooms. Treat all algal blooms as if they are potentially harmful. Also, do not eat fish or shellfish from waters where an algal bloom may be nearby. If you see an algal bloom, report it to the WVDEP at http://tagis.dep.wv.gov/algae. More helpful information can be found on their website: https://dep.wv.gov/WWE/watershed/Algae/Pages/Harmful-Algal-Blooms.aspx#harm.

HABs also pose a major issue for some water systems using surface water as the source for drinking water. In August of 2014, the city of Toledo, Ohio advised 500,000 residents not to drink tap water because of high toxin levels from an algal bloom in Lake Erie. Similar situations have occurred in Kenya, China, and Australia.

If your source of drinking water includes a surface water source, be watchful for algal blooms and have a plan to deal with them. It is a good idea to include harmful algal bloom procedures in your Emergency Response Plan. ■

By Erin Schmitt, technical writer and media director for Pittsburg Tank & Tower Group

Insulating Your Tank

A fresh coat of paint is one of the best ways to help preserve the structural integrity of a storage tank. But it does have its limits. Exposure to wind, sun, and rain causes exterior paint to chip and flake off over time, leaving rust spots behind. Insulating a tank adds another layer of protection beyond a standard coating system.

More than half of the contiguous United States is in areas inclined to freezing at some point during the year. That means that water storage tanks, whether they be potable, fire protection, or designated for some other use, have the potential to freeze. Fire protection tanks subjected to freezing should be heated, according to NFPA 22-2018 16.1.1.

Fire protection tanks can be heated in several ways – via heater pipes, electric immersion heater elements, and open coil element heaters.

Heater pipes should be replaced when warranted, with ten years being the typical life cycle, according to NFPA 22-2018; A.16.15. Replacing the heater elements can be done during routine maintenance to minimize disruption.

Open coil element heaters allow economical and convenient maintenance. The open coil element heaters are inserted into a carbon steel pipe and mounted into the tank shell. Once the initial installation is complete, the elements can be replaced without draining the tank. So, installing open coil element heaters can help tank owners save money since the tank only has to be drained during the first installation.

If you are looking to heat your tank quickly and efficiently, immersion heaters may be the way to go. They are also relatively cheap to maintain. Unlike open coil element heaters, tanks must be drained and emptied before the immersion heaters can be replaced.

Heating systems function well, but insulation provides another layer of protection. Insulating a storage tank helps serve the same purpose as insulating a home – it helps the structure retain heat. Two of the most common types of insulation for storage tanks are panel and spray foam.

Made of polyisocyanurate that's bonded to embossed aluminum and factory-coated, panel insulation is manufactured to resist storm damage like hail. Panels are attached using circumferential galvanized steel cables that are properly equipped with pressure pads and tensioned with turnbuckles. Roof seams are enfolded in the downslope direction.

The mechanical precision with which the panel insulation is applied gives a panel insulated tank a smooth appearance that's much more aesthetically pleasing than spray foam insulation. The panels are a standard length and width that can be placed uniformly on the tank whereas foam spray is harder to evenly apply, giving it a rougher appearance.

The upfront cost for panel insulation is more than for spray foam insulation. However, panel insulation requires less upkeep, so the overall cost could be very similar in the long run. It can also be applied no matter the season.

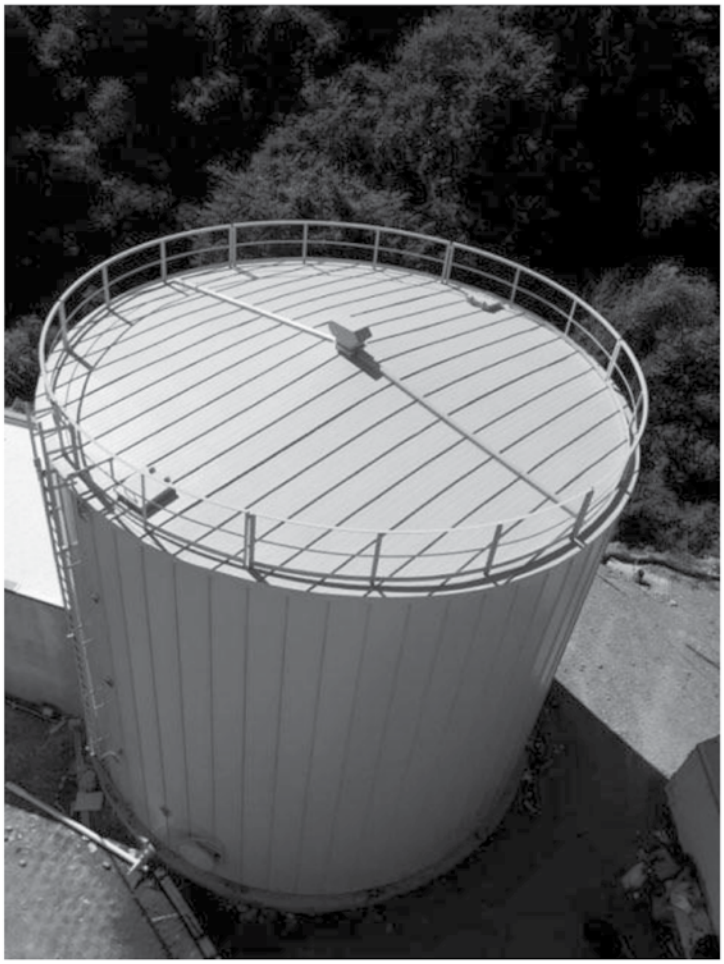
Moisture-resistant spray foam adheres to a tank and creates more protection against rain, sun, and wind. It should be sealed to maximize its effectiveness. Spray foam is appealing because not only is it

an affordable insulation option, it's also non-hazardous and environmentally friendly.

It's best to make sure a tank's surface is clean and ready for a new application – whether that be paint or spray foam. The spray foam should be applied when the temperature is above freezing and when the wind is calm. If it's too cold, the spray foam won't adhere to the steel and, if it's too windy, the foam can land everywhere but on the intended surface. Shrouds can be used to ensure there's no overspray on the surrounding structures, but they are expensive.

Over time, exposure to the sun's UV rays will cause the foam to break down. Since spray foam is susceptible to wear and tear, this can lead to unsightly damaged areas. Once the spray foam is no longer adhering to the tank, it should be repaired or touched up, depending on the shape of the existing spray foam. Repairing the damaged area requires cutting and removing the edge of the existing foam to provide a clean edge. Then the area must be cleaned to allow for a proper coating bond. Once it's cleaned, a primer can be applied to prevent corrosion before spraying foam to match the existing foam.

Whether it's spray foam or panel, insulation is a worthwhile investment for a tank if your tank is being heated. ■



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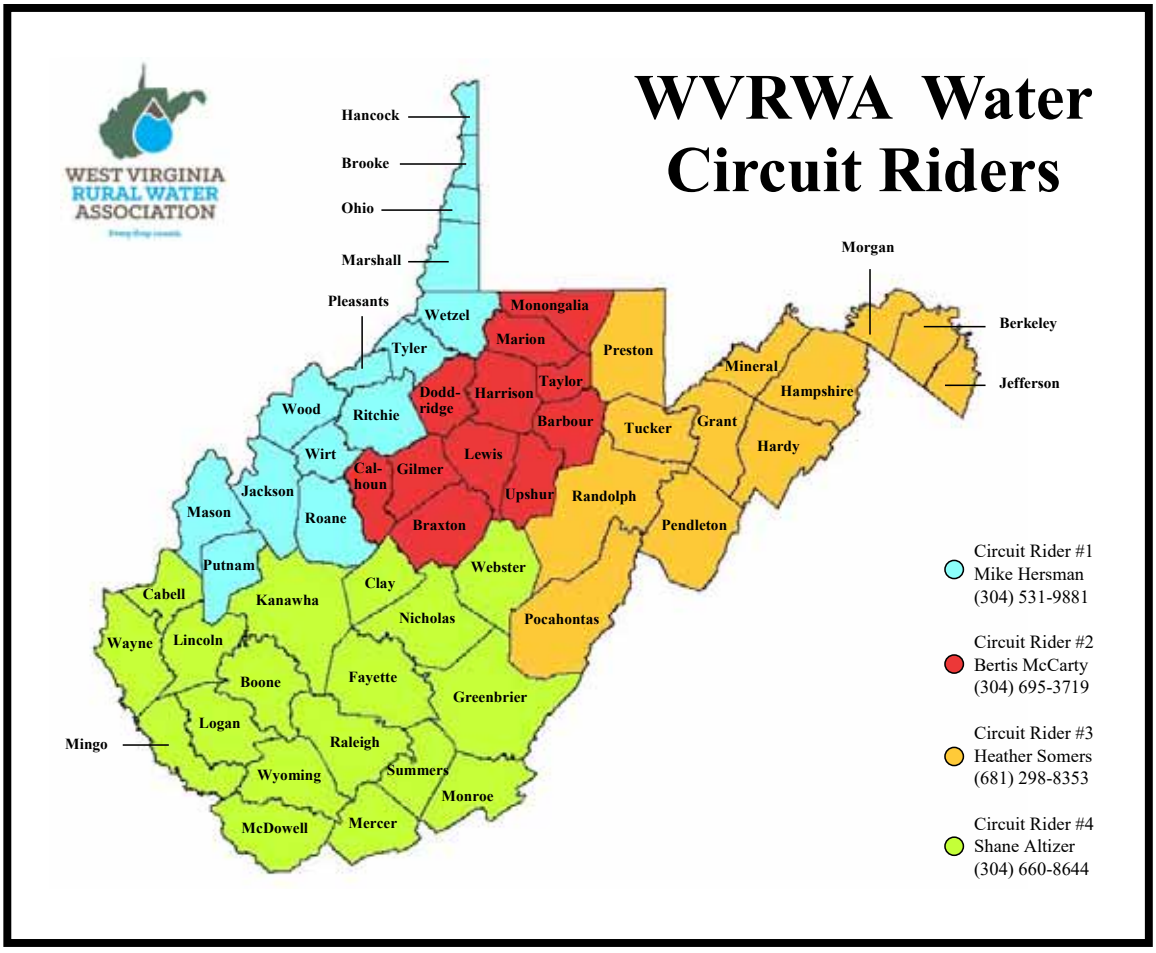
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- Pre-development (planning) costs for infrastructure projects
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Contact your State Rural Water Association or National Rural Water Association for help with the application process.

For More Information:

Applications, information and forms can be downloaded from the NRWA website, **www.NRWA.org/loans**.

Email applications to:
nrwarwlf@nrwa.org

Or mail to:
Rural Water Loan Funds
2915 South 13th
Duncan, OK 73533

For help, please call 1.800.332.8715 or email nrwarwlf@nrwa.org.

USDA Rural Development

NRWA

National Rural Water Association working in conjunction with US Department of Agriculture/ Rural Development

Recently, WVRWA published its new e-Newsletter, *News Droplets*. *News Droplets* provides information on new programs and benefits, training classes, conference, legislative news, and much more. If you are currently not receiving *News Droplets*, but would like to, please send your name and email address to connect@wvrwa.org to be added to the mailing list.

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SUDOKU PUZZLE

5						3		6
		8		1				
6		7	8		3	4		5
					7	9		
7	5	1			4	8	3	
	4		2	8		7		
	6		4				9	
				9		5	4	8

The aim of the canonical puzzle is to enter a numerical digit from 1 through 9 in each cell starting with various digits given in some cells (the "givens"). Each row, column, and region must contain only one instance of each numerical. Completing the puzzle requires patience and logical ability.

Answers can be found on page 38.

We're on the Web!

For the latest information on what WVRWA is up to, follow us on Twitter, Facebook, & Lindedin

- Twitter: WV Rural Water
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Answers to Soduko Puzzle

5	1	2	7	4	9	3	8	6
4	3	8	5	1	6	2	7	9
6	9	7	8	2	3	4	1	5
8	2	6	1	3	7	9	5	4
7	5	1	9	6	4	8	3	2
3	4	9	2	8	5	7	6	1
2	6	5	4	7	8	1	9	3
9	8	4	3	5	1	6	2	7
1	7	3	6	9	2	5	4	8

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By Jim Johnson, Wastewater Technician

Basic Hygiene Practices for Wastewater Workers

Those of us that work in the wastewater field know the basic hygiene practices we are supposed to be using as we complete our daily task. From the day we enter the business, we are told about the importance of hygiene in our line of work, but do we use those hygiene practices as we get into the daily routine of doing our jobs? I am going to say that some of us do for our entire career, some of us do for a while, and some never really take it that seriously; however, there are some basic hygiene practices that everyone in the wastewater field needs to be routinely doing.

Anytime we come in contact with any type of sewage or wastewater, we need to wash our hands immediately. Hands should be washed with soap and as warm a water as one can comfortably take.

After coming in contact with wastewater, avoid touching your face. Also, do not touch any open sore or wound you may have. If you have an open cut or sore, bandage it before going into an area in which you may have to come into contact with sewage or water.

In the sewer business, just as any other time, wash your hands before eating, drinking, or smoking. It would be extremely dangerous in our line of work to be around food or drink without washing up first. Do not eat in a contaminated area where sewer work is going on. If your work clothes are extremely soiled, change before taking your lunch break. Try to have a designated area where workers can eat that they are able to keep clean and sanitary.

Obviously, any time we use the rest room, we should wash our hands after using it. Workers in the sewer industry need to get in the practice of washing their hands both before and after using the rest room. This is very important because of what could be on our hands.

Do not smoke, chew tobacco, or chew gum while working around sewage. Wait until you can take a break or get away from the wastewater for a couple minutes before engaging in these activities.

If wastewater or sewage comes in contact with your eyes, flush them with clean water. It would be a good idea to have some eye drops or something to flush the eyes with in the first aid kit.

Wear waterproof gloves when you are going to come in contact with wastewater. You can either use the reusable rubber gloves or the throw away rubber gloves.

When appropriate, wear rubber boots. If you are going to have to get in a tank with a small amount of water or in other various situations, wear the rubber boots.

Do not wash your work clothes that were used to work in a wastewater environment with the rest of your laundry. Wash your work clothes separately. It is best if wastewater workers can either have facilities to wash their clothes at work or to have a uniform service to wash them, but defiantly do not wash them with the other household laundry.

Wastewater workers should be properly trained on the hygiene practices that they will encounter on the job. Protective clothing and other personal protective equipment should be available for the wastewater workers to use when necessary. Employees in the wastewater field should receive the proper immunization they need for working in this field. The main immunization is hepatitis B. The tetanus immunization is also encouraged for those working in the wastewater business.

Regarding the ongoing COVID-19 pandemic, the main recommendation for wastewater workers, in addition to social distancing and the mask requirement, was that we use the personal hygiene practices that we have been taught from the beginning of our careers. This is not to say that we could not contract the virus from the wastewater, but proper personal hygiene was the main recommendation.

If you work in the wastewater industry, it is very important to take care of the personal hygiene practices as recommended. There are always exceptions in the large world we live in with so many people, but these practices will go a long way toward keeping our wastewater employees healthy. ■

Where is this located in West Virginia?

Last issue's answer:

The Martinsburg Roundhouse in Martinsburg, WV

Recipes to Tempt Your Taste Buds

Baked Catfish

Ingredients:

- 1/4 cup extra-virgin olive oil, divided
- 1 cup cornmeal
- 1 tbsp. Cajun seasoning
- 4 catfish fillets
- Kosher salt
- Freshly ground black pepper
- Lemon wedges, for serving

Directions:

Preheat oven to 425° and drizzle 2 tablespoons of oil on a large baking sheet. On a large plate, combine cornmeal and Cajun seasoning. Season catfish with salt and pepper, then dredge fish in seasoned cornmeal, pressing to coat.

Place fish on prepared baking sheet and drizzle with the remaining 2 tablespoons of oil. Bake until golden and fish flakes easily with a fork, 15 minutes. Serve with lemon wedges.

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***DAS Group**
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672 Main Street, Suite H
Harleysville, PA 19438
Phone: (717) 521-7595
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***Dorsett Technologies, Inc.**
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Phone: (412) 247-4816
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***Duncan-Parnell**
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Charlotte, NC 28204
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*****Extreme Endeavors**
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Philippi, WV 26416
Phone: (304) 457-2500
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***Fehr & Cuda Sales, Inc.**
P.O. Box 127
Greensburg, PA 15601
Phone: (724) 838-9394
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***Forberg Smith Process Solutions**
800 Old Pond Rd., Suite 705
Bridgeville, PA 15017
Phone: (412) 257-1551
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***Ford Meter Box**
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***Gilson Engineering Sales, Inc.**
535 Rochester Road
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***Golden Equipment Co., Inc.**
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Mars, PA 16046
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Phone: (410) 734-9100
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***Master Leak Technologies, LLC**
100 Home Road
Hatboro, PA 19040
Phone: (267) 236-6184
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*****Master Meter, Inc.**
101 Regency Parkway
Mansfield, TX 76063
Phone: (800) 765-6518
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***Mid Atlantic Storage Systems, Inc.**
1551 Robinson Road
Washington C.H., OH 43160
Phone: (740) 335-2019
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***Miss Utility of West Virginia**
5608 MacCorkle Avenue, S.W.
South Charleston, WV 25309
Phone: (304) 345-3959
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***Muni-Link**
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Bellwood, PA 16617
Phone: (814) 742-7700
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****National Road Utility Supply, Inc.**
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Valley Grove, WV 26060
Phone: (304) 547-0101
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***Neptune Technology Group**
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Wilmington, DE 19806
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***Nexbillpay, LLC**
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(800) 639-2435

***Pittsburg Tank & Tower Co.**
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Phone: (270) 826-9000
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***John P. Place, Inc.**
90 Clairton Boulevard
Pittsburgh, PA 15236
Phone: (304) 343-2607
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***ProSource Water Products, Ltd.**
14680 Pleasant Valley Road
Chillicothe, OH 45601
Phone: (888) 772-5478
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***Quality Water Services, LLC**
160 John Street
Weston, WV 26452
Phone: (304) 452-9883
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***Service Pump & Supply Co.**
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***State Equipment Inc.**
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Phone: (304) 776-4405
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***Suez Water Advanced Solution**
1230 Peachtree Street, N.E., Suite 1100
Atlanta, GA 30309
Phone: (855) 526-4413
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***Tepco-Trombold Equipment Co., Inc.**
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Mars, PA 16046
Phone: (724) 625-4260
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***Tri State Industrial Coating Contractors Alliance**
512 33rd Street
Parkersburg, WV 26101
Phone: (304) 546-1909
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***United Systems & Software, Inc.**
P.O. Box 547
Benton, KY 42025
(800) 455-3593

*****USABlueBook**
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Waukegan, IL 60085
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327 Curtis St.
Delaware, OH 43015
Phone: (740) 369-4300
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****Utility Technologies, LLC**
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(513) 488-1940
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***Valtronics, Inc.**
P.O. Box 490
Ravenswood, WV 26164
Phone: (304) 273-5356
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***Vermeer of West Virginia**
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St. Albans, WV 25177
Phone: (304) 768-5965
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***Visu-Sewer East, LLC**
10994 Leadbetter Road
Ashland, VA 23005
Phone: (804) 752-6737

***Warren Pump & Supply**
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Phone: (304) 429-6723
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***Water Development Authority**
1009 Bullitt Street
Charleston, WV 25301
Phone: (304) 414-6500
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***W.C. Weil Company**
P.O. Box 7144
Charleston, WV 25256-0144
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