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RURAL MATTERS®

The magazine of the Rural Community Assistance Partnership

The Wastewater ISSUE

Three Lessons Learned from Wastewater Operators

Arkansas Town Explores Wastewater System Collaboration

RCAP Helps Kentucky System with Compliance Challenges

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Features

Letter From the CEO

Nathan Ohle
RCAP CEO

This is an important issue of Rural Matters. I would say that about any issue, but this quarter we are spotlighting too-often-overlooked wastewater and sanitation services. Most people across the United States know and care deeply about issues relating to drinking water, rightly so, as they are integral to life and often in the headlines, but proper wastewater management is also critical to human health – though you very rarely hear about it. The context for why wastewater is overlooked are complex, but the impact that proper wastewater services have on rural communities across the country cannot be overstated. No business will choose to locate or expand in a community without enough wastewater expertise and infrastructure. As a former boss of mine used to say, "You have to take care of the roads and the commodes to spur economic activity."

As we start 2020, there is much for us to accomplish. The RCAP network served millions of rural residents in communities across every state as well as in Puerto Rico and the U.S. Virgin Islands last year. That work will only continue to grow through the incredible network of technical assistance providers operating in thousands of rural and tribal communities throughout the country.

Most stories in this issue will highlight the work happening with wastewater systems across the RCAP network and showcase the incredible need that still exists here in the United States. Congress is starting to take note. In last year's appropriations process, Congress provided $12 million for Technical Assistance for Treatment Works, a wastewater program to provide technical assistance and training to rural, small and tribal Publicly Owned Treatment Works (POTWs) and decentralized wastewater systems. This is the first time funding has been provided for this new program enacted in the America's Water Infrastructure Act of 2018.

RCAP advocated for this funding specifically because of the needs identified in the communities we serve. This is the strength of the RCAP network. Relationships with thousands of rural communities allow us to listen, hear and act on the needs of those communities, and to raise their voices in conversations in which they may not have the chance to participate.

In 2020, RCAP will continue this important work, both in providing technical assistance and training to rural and tribal wastewater systems and lifting the voices of the communities we serve. Thank you for all the work happening in communities across the country, and for your continued support of the RCAP network. We look forward to a great year!

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RCAP Policy Corner

Ted Stiger
Senior Director of Government Affairs & Policy

RCAP is off to a busy start in 2020 engaging on federal policy issues important to small communities and the people we serve. Many political observers and pundits are predicting that Washington will not get much done in an election year. Some of these experts are the same folks who said the same thing about policy issues in 2018 and 2019, however RCAP successfully advanced fiscal year 2020 appropriations, the Farm Bill and other key issues during the last two years. We know authorizations for federal transportation and water resource programs require Congressional renewal by this fall, so we at RCAP are optimistic for continued progress this year. RCAP continues to be a strong advocate for existing and new programs that can help rebuild and upgrade critical infrastructure necessary for economic growth and prosperity for communities of all sizes, particularly those in rural areas.

Decentralized Wastewater Policy Highlight:

By the time this is published, a bipartisan group of Senators including Sens. Booker (D-NJ), Capito (R-WV), Jones (D-AL), and Schatz (D-HI) may have introduced the "Decentralized Wastewater Grant Act of 2019." This legislation is an important first step in providing much-needed assistance to communities across the country that are not connected to public sewer systems. RCAP and several national organizations support this bill.

In the United States, public sewer systems do not extend to all communities; according to U.S. Census data, more than 1.7 million people in the U.S. lack access to basic plumbing facilities, with communities of color and low-income communities bearing the majority of the burden. Without an available sewer line, families must rely on onsite individualized systems (typically a type of septic system) to dispose of wastewater. Much of the time, the burden also falls on the family to maintain and install these systems, which can cost anywhere from a few thousand dollars to $30,000 depending on the system type and geography of the area. Even after this initial capital expenditure, these systems require regular maintenance to function properly. A failing onsite system can result in sewage overflow into people's yards, and even their homes, causing serious public health and water quality concerns, along with degrading quality of life exacerbating other socioeconomic problems.

The "Decentralized Wastewater Grant Act of 2019" is an important first step in addressing this widespread problem. The bill creates a new grant program under the Clean Water Act to provide funding to low- and moderate-income households through a qualified nonprofit, to address these wastewater challenges. The bill is flexible in allowing solutions that best fit the needs of the household, geography, and community by allowing grants to be used for the construction, repair, or replacement of a decentralized wastewater system, connection to a publicly owned treatment works, or the installation of a larger decentralized wastewater system that can provide treatment to two or more households. Further, households without access to functioning wastewater systems are prioritized for receiving funding under this bill.

This important bipartisan legislation is vital to addressing the substantial infrastructure needs of communities not served by public wastewater and we thank Senators Booker, Capito, Jones, and Schatz for their leadership in introducing the bill. RCAP will continue to work with organizational partners to advance this bill in 2020.

Feature Article

Stories from Wastewater Operators: Lessons Learned

Josh Jabalera and Michelle Pond, Technical Assistance Providers, Midwest Assistance Program (MAP)

Wastewater Operator Lesson 1:

The Value of Attentive Operators and Thorough Records

It all started as another routine day. The operator made all daily inspections, ticking off his checklist as he went. All seemed well. Sitting in his pump house office, filling out paperwork, the operator heard the grinder pumps cycle again. Again? Already? That was not normal. The operator performed another inspection of the lift station. Once again, everything seemed to be operating normally, with inflows as expected. The operator returned to the pump house and inspected the starter box, which showed nothing out of the ordinary but, again, he noticed that the pumps were cycling more than usual.

At this point, the operator decided to investigate further. Upon this third inspection of the lift station, the operator noticed unusual flow and bubbling action. He then decided to utilize the manual operation of the grinder pump to draw down the water level. As the water level in the lift station pumped down, the operator noticed that wastewater was flowing out of a pipe break on the lagoon side of the check valve. The water was flowing back from the forced main and lagoon, back into the lift station. He immediately went into action, calling contractors to repair the pipe break. The pipe was quickly fixed, with no lasting damage done.

Having an attentive, diligent operator saved the small pipe break described in the scenario above from becoming a much larger crisis. In this instance, the operator knew his system well enough to know what normal run times for the pumps should be. He also knew to be concerned and investigate when the cycling changed. If a pump is cycling more than usual, there is probably a problem; it could indicate a higher inflow than usual, a pump nearing the end of its useful life cycle, or a potentially bigger problem, as in this case.

Operators should always be familiar with normal power settings and run times of the pumps. Had the operator not noticed the unusual pump cycling, a significant amount of the lagoon water could have drained back into the lift station, causing a Sanitary Sewer Overflow (SSO), triggering a violation and possibly a monetary fine. At this system, there was no overflow vault at the lift station and no pump redundancy to help deal with the excess flow, making quick detection and problem solving essential. It is important for operators to have a response plan in place and be ready to execute.

By keeping track of recurring issues in a system and evaluating

vulnerabilities, operators can identify areas of concern that need to be addressed. This can be based off the severity of the consequence if it does break or the likelihood that it will. It could be an area of the system prone to SSOs at a certain manhole or an aging pump, which are examples of components that have a high likelihood of failure. It could also be a valve or disinfection unit, which are examples of components with especially high consequences if failure occurs.

If you're an operator or system manager, think through some of the areas of concern in your system. With only one grinder pump and no headworks, the lift station in our story should have been an area of greater concern for the operator from the outset. Since there were no headworks stopping inorganic (garbage/debris) solids from getting in, the pump was more likely to fail. Headworks are not just for preventing sludge build-up in a lagoon. They also protect pumps from clogging and pump floats from damage. Since there is no pump redundancy in this case, the consequences when the pump fails could be serious. Without a functioning pump, a lift station can quickly fill and overflow, causing potential health risk and permit violations. It is important to make more frequent inspections of these high-risk areas. It is better to be proactive, monitoring or repairing areas of concern, than reactive, scrambling to deal with emergency failures. Catching a problem before it becomes an emergency is always the best course of action.

Many are over-reliant on sensors and alarms and less attention is given to the details of their system's operation. Trust, but verify, the electronic visual and audio warnings in your system, such as those on the pump starter box. These can fail. If you think there is an issue based on your observations, but there is no alarm, still investigate. It is good practice to do regular commonsense checks – do the sensor readings seem reasonable compared to your observations? If not, investigate. In this case, the sensors indicated nothing wrong, but the operator's senses said otherwise.

Experienced operators know the day-to-day workings of their systems better than anyone else. Their intimate knowledge of their systems is incredibly valuable. It is vital that operators keep detailed records of all routine checks, maintenance, and issues that occur. Having a written record can help identify patterns and trouble areas. It can also ensure that system knowledge is not lost when a new operator comes in.

Wastewater Operator Lesson 2:

The Value of Hiring Specialists for Special Tasks and Planning

After a complete pump failure at a lift station, the town council instructed the operator to replace the pumps. With the lift station completely out of order, the council was anxious to get it fixed as soon as possible. The operator ordered pumps, installed them in the lift station, and performed all the electrical wiring. Once the pumps arrived, this was completed swiftly, without serious disruption of service. Crisis averted, for now... A month later, the operator was back in front of the board, reporting pump failure at the same lift station. After discussion about how this could have happened, it came to light that the operator had ordered a different model of pump than what was previously used. Upon inspection, it was found that the replacement pumps were not applicable for this system.

Additionally, the wiring had been done incorrectly, voiding the warranty and any chance of getting money back for the pumps. The town was out $15,000 and back where they had started a month before – scrambling to quickly replace their pumps.

A system performing their own maintenance and minor repairs is a great way to save money and help keep rates low for customers. But don't overstretch. It is often worth the extra cost to hire a professional who is trained and qualified to carry out a specialized task, rather than risk causing more issues. The cost to hire an electrician in the scenario above would have been much less than the $15,000 lost. During pump replacement, and other technical repairs, it is always best practice to contact a licensed electrician to perform the initial work. Contacting the primacy agency may also be required in this situation, depending on your state's regulations, which also could have prevented the situation. Operators should read (and follow) manufacturer specifications regarding maintenance. Pump selection is also a very case-specific issue, and an engineer should be consulted before switching pump models.

The operator, having no experience as an electrician, should not have tried to wire the pump on his own, or order pumps without knowing the system specifications. Moreover, the town council should not have asked the operator to perform duties for which he was not qualified. It is ok to ask for help, speak up when uncomfortable with an assigned task, and hire outside expertise. Not only can working outside of your area of expertise waste time and money, it can be dangerous to you, as an operator, your customers, and your utility. Working with electricity, confined spaces, toxic chemicals, etc. without the proper training, puts the worker unnecessarily at risk. If faulty work leads to interrupted service, or a low-quality product, customers may suffer. If it leads to, say, permit and regulation violations or lack of customer trust, it could hurt the utility as a whole.

Some of the pressure to rush and fix issues can come from a lack of preparedness. Planning ahead can give utilities the time to do things right. It is recommended to have access to spare parts as much as possible. Many systems keep a spare pump on hand so they can immediately swap out a faulty one. They can then focus on getting the old pump repaired or replaced without having to worry about disruption to service. It can be prohibitively expensive to keep spare parts. Consider reaching out to nearby systems that have similar equipment needs (same pumps, same chemicals, same pipe fittings, etc.) and see if they would be willing to jointly invest in spare supplies. This is an informal but very important form of regional utility collaboration. Having updated contact lists detailing who to call to help respond to issues with any of your system components is another vital tool to have on hand. This simple preplanning can really make things go more smoothly when you are trying to deal with an issue. Do you know where you will get a replacement pump from and how long it will take to get there? Do you know who to call to wire the pump?

Wastewater Operator Lesson 3:

The Value of Controlling What Goes into Your System

The festival came through, as it does each year, swelling the city's population from fewer than 1,000 residents to more than 20,000 for three days. This was great for business, but hard on the city's infrastructure. The festival ended, and per a verbal agreement with the town, the portable toilet company dumped everything into the town's brand-new lagoon. It was soon clear that the lagoon could not process the large slug of high-strength waste. Strange odors formed, colors changed,

A wastewater operator describing treatment works in Texas. Photo by RCAP.

and it was soon obvious that the entire lagoon system had turned septic. Apparently, the chemicals that are so useful in reducing odors in the portable toilets killed the bacteria that are so essential for proper lagoon function. This was not considered when the agreement was originally made. The lagoon was functionally dead. The system had to operate without discharging for more than a month and had to invest in a variety of strategies to revitalize the system, including additional aeration and bacteria seeding. A year and a lot of effort later, the lagoon is finally healthy and returning to normal operation.

Because this community's lagoon was new, its bacterial community could not cope with the large volume of concentrated waste and chemicals disposed after the festival. Wastewater systems should not allow outside waste to be discharged into their lagoon, unless they absolutely know what it contains and that their system can handle it. Although they look simple, lagoons depend on a balance of proper inputs. A shock to the system can have long lasting effects. In this case, the community was stuck with the burden of dealing with the aftermath of the festival, long after the guests left.

Know what is coming into your system. This includes properly vetting any pumping service that wants to discharge to your system and assessing your system's ability to treat their input. Make sure it won't throw the system out of balance. It is also best practice to be aware of any new businesses or industries that are coming to town and their potential impacts. Reach out to find out what effect the new businesses will have on the loading rate and composition of your system. Make sure they have proper pre-treatment systems set up, and that they use and maintain them. Additionally, check that you have proper security measures at your lagoon or points of access, such as manholes, lift stations and cleanouts to prevent illegal dumping. If there is easy access, people will often dispose of old paints, chemicals, or even drug paraphernalia, all of which can throw a system out of balance. A simple lock or sealed cap can make a big difference. The more control you have of what enters your wastewater system, the better. Putting this extra effort towards preventative measures is well worth it. Again, be proactive rather than reactive. Keeping the lagoon healthy will allow operation within permit limits.

Ideally, costs should be spread proportionately to use, considering both volume and the chemical make-up of waste. The community, especially, should not have to bear a disproportionate portion of costs. Don't let businesses such as portable toilet providers or RV pump stations dump to your system free of charge. Consider rate structures that charge based on waste strength, as well as volume so that the extra needs of treating industrial waste is covered by the industry itself. Areas that have large influxes of tourists, year-round or seasonally, can consider implementing resort taxes, or some such tax on "luxury goods," such as hotel rooms and car rentals. The town can then use the tax revenue, collected largely from tourists, to cover the extra infrastructure needs necessitated by the tourist population.

Feature Article

Marie, Arkansas: A Story of Wastewater System Collaboration

by Dave Miller,
Source Water Coordinator, Communities Unlimited, Inc.

Named after the youngest daughter of property owner Robert E. Lee Wilson, Marie is located in the northeast corner of the state near the Tennessee border along State Highway 14 two miles east of Interstate 55. The town is periodically flooded due to the proximity of the Mississippi River. Originally, Marie and much of the surrounding Mississippi County consisted of primarily lowland timber, which contributed to the late incorporation of the area.

Marie has transitioned from timber harvesting to primarily cotton farming. During the peak of economic activity in 1980, the population reached nearly 300 before starting a population decline continuing today. However, the Rivercrest School District, located within the community, has seen rapid growth. The District serves around 1,400 K-12 students in the rural area around Marie, and also produces the vast majority of local wastewater.

Rivercrest School District and the Town of Marie were initially referred to Communities Unlimited (CU), the Southern RCAP, for assistance by the Arkansas Department of Environmental Quality (ADEQ) after a Consent Administrative Order (CAO) was executed by ADEQ on October 21, 2016, which named both the Rivercrest School District and the Town of Marie as responsible for the unpermitted discharge of wastewater and assessed a civil penalty of $7,200.

Several years passed before ADEQ recognized this treatment system as being not only unpermitted but also a significant threat to the environment. As time went on, it was quickly realized that the capacity of Marie's wastewater system was not sufficient to treat the wastewater being produced by the school district. The result has been a continuance of untreated wastewater discharged to the receiving streams and ongoing compliance issues with .

As the number of issues increased, multiple enforcement amendments were executed to alter the agreement and continue the operation of the system. Marie's issues continued to grow as a result of expansion and construction projects at the Rivercrest School District. A new elementary building and football stadium were constructed as a result of increased enrollment from neighboring communities and rural areas. This expansion in student population and facilities only increased the wastewater produced by the school, which made treatment and containment in the current lagoon system a significant issue.

The Marie and Rivercrest School District started discharging wastewater into a small oxidation pond around 1970. During that time, there were very few students and the single-cell treatment lagoon was sufficient. Now, with nearly 1,400 students, the system not only cannot adequately treat wastewater but also routinely fails to meet the capacity of influent, resulting in unpermitted discharges. While Marie tried to receive a state permit for the facility in 2009, ADEQ determined that the system would not provide adequate treatment or meet the sanitary standards set forth by the U.S. Environmental Protection Agency (EPA), funding from which ultimately allowed RCAP to assist Marie.

After Communities Unlimited staff Dave Miller met with ADEQ, he began to understand the majority of the issues surrounding the wastewater system were contingent on the ability to finance capital improvements. The town's ability to pay for system improvements over time had diminished because rates stagnanted. Marie's wastewater rates were $5.00 flat rate per customer per month, and further analysis showed that the rate increases required to fund necessary improvements would not be feasible for the town's small customer base. Therefore, an approach involving a partnership with another system, with a larger rate base and/or additional treatment capacity seemed like the most realistic option.

Upon traveling to the Marie and Wilson areas in Mississippi County, Miller found the primary industry to be agriculture, which is what is typically thought of in the Mississippi Delta. Row crop agriculture dominates the local economy. With few other thriving industries, small towns such as Marie have seen declining populations.

After discussing project specifics and treatment system issues, Miller, along with Otto Warhurst, Marie' wastewater operator, and Jerome Alford, a consulting engineer, began to understand several contributing factors to the wastewater treatment and compliance issues. The first was the apparent issue of capacity, where wastewater production from the continually growing school system is routed to an unpermitted lagoon treatment system, for which no one seems to have records of design. This, paired with an aging system that is currently experiencing a flow of influent 40 times larger than what it was a designed for, was a longstanding environmental and health concern.

The school district had no interest in building and maintaining a treatment plant; meanwhile Marie lacked financial resources to address the issue. Working with Bond Engineering and ADEQ, Miller and the Town of Marie searched for feasible alternatives ranging from the construction of a new treatment plant in Marie to designing a decentralized system just for the school. In reviewing these alternatives, it was clear that even after one of these multi-million dollar projects was completed, the financial and managerial capacity over time would continue to diminish, presenting a clear challenge.

A Partnership Opportunity Emerges

The City of Wilson was identified as the nearest treatment system that could accept this growing volume of wastewater. This would also mean accepting a portion of the debt service for the facilities development, as both the school district and Town of Marie lacked the resources to fund this project.

While Marie and much of the surrounding areas are experiencing population decline and a weak economy, Wilson is the complete opposite. Just five miles southeast of Marie, Wilson has a stable local economy with substantial private investment. Wilson's Median Household Income (MHI) is nearly double that of Marie ($51k versus $27k) as a result of business growth alongside a robust agricultural industry. With a population of nearly 1,000 residents, Wilson can expand and manage the existing treatment system to accept the additional volume of influent from Marie and Rivercrest School District.

Root Causes Become Clear

After identifying this potential opportunity for regionalizing the wastewater systems, the first milestone in resolving Marie's longstanding wastewater issues involved establishing multiple agreements and contracts. For the interconnection of these systems to work, the City of Wilson had to be approached with the request to accept all wastewater from the Rivercrest School District and the Town of Marie. The volume of effluent from these two additional wastewater sources would reach the current maximum design flow for the Wilson treatment plant and would, therefore, raise future capacity issues as Wilson continues to expand.

It was back to the drawing board. Bond Engineering was able to incorporate treatment system and lagoon expansions to increase the design flow for additional influent, along with adding a buffer for future growth. Wilson then agreed to accept the additional influent if their facility expansions did not exceed 10 percent of the debt service agreement.

With this information, a $750,000 wastewater extension pipeline project was proposed as the most feasible option to treat wastewater from both the school and the town. The Board of Directors for the Rivercrest School District were

Incorporated on June 14, 1968, the Town of Marie is a community of only 78 people located in Mississippi County, Arkansas.

then approached with this proposal. During the March 2019 School Board meeting, a resolution was passed, and the debt service agreement was reached between the Rivercrest School District and the City of Wilson to cover the financing of a wastewater system pipeline and treatment plant expansion. The agreement dictates that the Rivercrest School District will be responsible for 90 percent of loan funding and debt payments for the wastewater pipeline, while Wilson is responsible for 10 percent and the treatment plant, design, flow, and lagoon expansions.

Through this approach, the Rivercrest School District will be responsible for a major portion of the debt service from loan funding. The Town of Marie will contribute all funding received through a state grant application. This arrangement was based on Marie's historical population data. At the time this was written, the town consisted of only 20 residential customers with an MHI of $26,250.

Resources Combined for a Solution

In these agreements, it states that a maximum of $600,000 in loan funds will be used for the financing of this project. However, preliminary plans estimate the total cost to be $750,000. It was necessary to pursue additional funding, but several factors made this a difficult task. Wilson's MHI is too high to be considered for wastewater grant funding, and State Revolving Fund wastewater grant funding is limited to municipalities, which excludes the Rivercrest School District. Pursuing Arkansas Department of Education funds reserved for school facilities was discussed. However, with this involving two municipalities, CU learned that these plans were out of the scope for that money as well.

The last option was to have Marie apply to receive grant funding through the Arkansas Economic Development Commission (AEDC) for the remaining portion of the project cost. This was a difficult task. Marie's leadership consists of a part-time mayor. The town has no municipal building nor computer for the mayor's use. Utilizing Wilson's offices, Miller worked with Mayor Chandler and Otto Warhurst to begin the process for the funding application.

They created a System for Award Management (SAM) Registration account and applied for a Data Universal Number System (DUNS) account number. This portion of the process took about 60 days because of the many steps of submitting notarized letters and authorizations to qualify for state and federal funding.

After the DUNS number was issued, Miller worked closely with the consulting engineer and submitted a funding application requesting $150,000 in grant funding from the AEDC.

In May 2019, Marie was notified of award approval along with an additional $22,000, totaling $172,000, from State Revolving Fund grant money. The increase in award amount was well-received news, as projects of this size often go over budget.

Finally, with a total amount of $772,000 of project financing secured, Miller continues to assist Marie, Wilson, and the Rivercrest School District with maintaining these agreements and fulfilling loan obligations. Miller remains available to facilitate construction along with providing regular updates to ADEQ as the Town of Marie and the Rivercrest School District work towards compliance.

As of the time this article was written, the site map was being updated with information to include locations for wastewater force main lines, which will need to cross state highways to reach the Wilson treatment plant. The majority of the necessary agreements to implement the project are already within the city's right of way. However, additional permitting sections of the pipeline will be required to complete the project. This will be determined by the end of the Environmental Review Process, which has been submitted for regulatory agency comment and should be completed with every effort to prevent project delay.

With the goal of a regional system with increased technical, managerial, and financial capacity, Wilson will create a separate operation and maintenance agreement to manage an entire wastewater pipeline and treatment system. CU anticipates overall system capacity improvements, regulatory compliance, and environmental and public health improvements with this regional approach for wastewater treatment.

Otto Warhurst now acts as the system operator for all wastewater conveyance lines connecting Marie, Rivercrest School District, and Wilson. He said, "As the previous operator for Marie and Mayor for Wilson, I have witnessed firsthand the issues that these towns have faced," he says. "Consolidating these systems will ensure proper attention is given to managing wastewater effectively."

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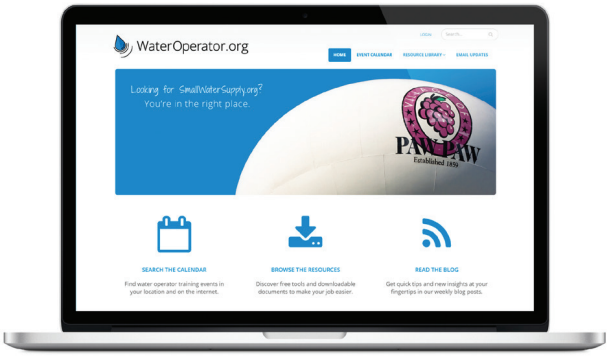

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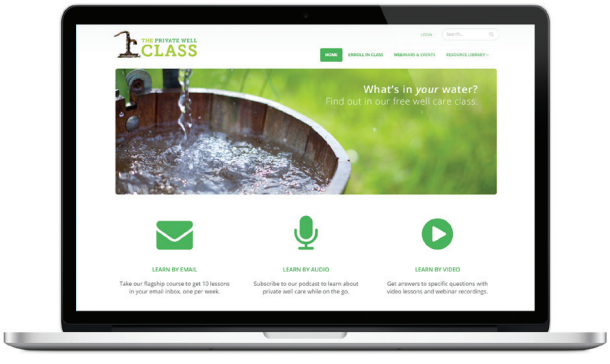

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Photo Credit

TAP Perspective:

Evarts, Kentucky, Utilizing RCAP Assistance for Wastewater Compliance

Chris Wells, Technical Assistance Provider, Great Lakes Community Action Partnership

I have the privilege to live in one of, if not the most, beautiful states in the country. From our pristine lakes in the west to our rugged mountains in the east, I believe only very few very few can hold a candle to Kentucky when it comes to the great outdoors. The only thing that eclipses our stunning terrain is the quality of our residents. I have been told time and again that Kentucky is not a Southern state, and while our geography may not place us in the deep South, we certainly practice Southern hospitality or as I like to call it: Kentucky hospitality. For the last 18 years, I have been blessed to have assisted several rural communities across this great Commonwealth of Kentucky as a RCAP Technical Assistance Provider and have experienced Kentucky hospitality throughout. While I have worked with great people everywhere, I hold a special place in my heart for the residents in southeastern Kentucky. The mountain folk in these small rural communities are proud, hardworking people rich in tradition and heritage. They care deeply for their families, their neighbors, and the communities in which they live. They exude Kentucky hospitality in every sense by making you feel welcome and part of their family. Nowhere is this more evident than in Evarts, Kentucky.

The small city of Evarts is in Harlan County in the southeastern corner of the state on the Virginia border. Four mountain ranges run across the county: Pine, Black, Little Black, and Stone. A spur of Black Mountain near the small city of Lynch is the highest point in the state, at 4,145 feet. Except for the northernmost corner, Harlan County lies in the Cumberland River watershed; Martin's Fork, Clover Fork, and Poor Fork converge at the county seat of Harlan to form the Cumberland. Evarts, along with several other cities and counties in the Eastern Coal Field region, has felt the economic impact of the decline in the coal industry. Jobs are harder to come by, causing some residents to emigrate looking for opportunities to work. Over a decade ago, Evarts was a participating community in RCAP's Project Good START - a U.S. Department of Agriculture Rural Community

Development Initiative involving community leadership training and developing ideas to improve the community. Through Project Good START, some of Evarts's resourceful, forward thinkers came up with ideas to boost the local economy. The city converted old strip-mining sites into trail rides as an off-road adventure area for ATV's. Over the years, the city has added two RV/campground parks and a zipline that is touted as the fastest and highest zipline east of the Mississippi River. In addition, the city passed an ordinance that allows you to legally ride your off-road vehicle within Evarts city limits by obeying all Kentucky traffic laws so you can go directly from the trails in your ATV to get food, gas, groceries, and trail supplies. As a result, welcome signs in Evarts tout the city as "The Birthplace of Adventure Tourism."

Photo Credit: Chris Wells, GLCAP

Tourism aside, Evarts is dealing with issues like many other small, rural communities including aging water and wastewater infrastructure and the challenge of maintaining and ultimately replacing that infrastructure. In accordance with state regulation 401 KAR 5:006, the Kentucky Energy and Environment Cabinet (EEC) requires regional planning agencies to submit a wastewater asset inventory report to the EEC if it has been 10 years since the regional planning agency last submitted a regional facility plan or wastewater asset inventory report. This report requires that agencies take inventory of the physical assets of their wastewater system, assess their condition, prioritize capital needs, and develop a plan for funding those needs. By incorporating this planning tool into their daily operations, the EEC expects agencies to achieve the following benefits:

- **Reduce overall cost of system operation and maintenance**
- **Target capital investments toward critical assets**
- **Improve compliance and remediate or correct illegal overflows or bypasses**
- **Acquire a better understanding of treatment and/or collection components**
- **Reduce borrowing costs—Funding agencies prefer lending to municipalities that properly manage and operate their assets**
- **Potentially improve bond credit ratings**
- **Make a sound case for rate increases to local governing boards and rate payers**
- **Prolong the useful life of their assets – knowing the condition of assets allows regional planning agencies to make timely repairs**
- **Reduce duplication of efforts and improve the allocation of staff time and other resources**

The City of Evarts is required to submit a wastewater asset inventory report to the EEC and they requested RCAP's assistance in completing that report to comply with the EEC requirement.

The wastewater asset inventory report consists of seven (7) sections: regional planning agency data, revenues and expenses, asset inventory, project prioritization, funding plan, copies of supporting documentation and certification.

The data in the revenues and expenses section are necessary to understand the financial condition of the Evarts wastewater system. This section contains median household income, user rates, and broken out wastewater revenues and expenses for the current year and projected out for the next five (5) years. The asset inventory is the most extensive section of the report. The city must provide detailed information on their existing wastewater assets (gravity pipes and manholes, force mains and air release valves, lift stations, and wastewater treatment units) including assessment ratings on current condition, performance, and reliability; consequence and probability of failure and current redundancy

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Photo Credit: Chris Wells, GLCAP

assessment; and the renewal and maintenance strategies that the system utilizes and the estimated cost of those strategies. In addition, Evarts is required to provide details on any proposed wastewater assets for proposed projects including the year(s) planned, manufacturer's predicted life, estimated project cost and if plans and specifications have been approved and funding is in place. The project prioritization and funding plan tables require project title, location, brief description, scheduled start/end dates, cost estimate, and source(s) of funding.

Wastewater asset inventory report supporting documentation includes: the regional planning agency's organizational chart, copy of the sewer use ordinance, current user rate schedule, and two (2) separate wastewater system maps indicating items such as boundaries, cities/towns, surface waterbodies, and drinking water supply areas as well as wastewater treatment facilities, effluent discharge location, collection lines, and lift stations. Once the report is completed, both the mayor and the city's wastewater supervisor must certify that the information entered in the report is accurate to the best of their knowledge.

Over the past year, RCAP has been diligently assisting Evarts wastewater and city office staff with their wastewater asset inventory report. We are currently in the process of completing the asset inventory section of the report. While the city's wastewater staff have a working knowledge of the condition of their assets, it takes on a whole new meaning when you are physically documenting assessment ratings and consequence and probability of failure for all your wastewater assets. Seeing this information in writing communicates a heightened urgency to prioritize wastewater needs. Evarts does have proposed projects scheduled in the next three to 10-year time frame, but the most critical appears to be a new proposed project that would extensively rehab all the existing lift stations in the Evarts wastewater system. The need for the lift station rehab proposed project is confirmed by the documentation in the wastewater asset inventory.

"Whenever an issue arises, we know that RCAP is willing and able to assist us with whatever we need. They actually care about our city."

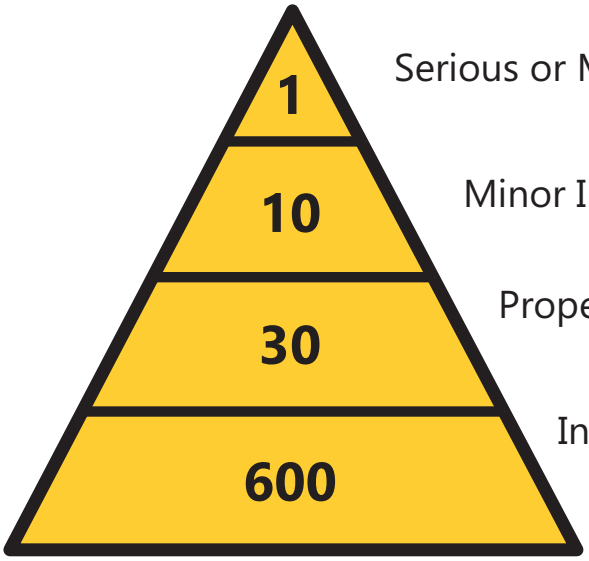
As a result of Kentucky RCAP's assistance, not only will Evarts achieve compliance with the Kentucky Energy and Environment Cabinet, but they are gaining a better understanding of the condition and priority needs of their wastewater system. The city is pleased with Kentucky RCAP's efforts. "We greatly appreciate Kentucky RCAP," said Evarts Wastewater Supervisor Cledo Powers. "Whenever an issue arises, we know that RCAP is willing and able to assist us with whatever we need. They actually care about our city." Rural utility systems will always have challenges. RCAP will be there to assist these systems as they face the challenges head on. By the way, if you enjoy outdoor adventure, you owe it to yourself to check out Evarts. Kentucky hospitality awaits!

Feature Article

Wastewater System Safety is Critical

Mike Novac, Senior Rural Development Specialist,
Great Lakes Community Action Partnership

Wastewater treatment plants are among the most hazardous places to work. Workers are commonly exposed to risks associated with heavy equipment, as well as exposure to toxic chemicals and other hazardous materials. Work-related afflictions vary from minor injuries like sprained ankles and pulled muscles to more serious ailments like lung infections, blindness, and even death. The consequences of inaction or negligence in the management of wastewater facilities can be severe. In 1969, Frank E. Bird Jr. examined industrial accidents, building on previous safety research and developed the accident relational triangle shown on the next page. A recent accident ratio study done by Occupational Safety and Health Administration (OSHA) has shown the following:



THE WASTEWATER-TREATMENT INDUSTRY HAS THREE MAJOR SAFETY CATEGORIES:

1. Confined-space entry: "Confined spaces have limited means of entry or exit, are large enough to bodily enter, and may contain physical or atmospheric hazards."[1]

EXAMPLES:

- Aeration basins
- Digesters
- Primary tanks
- Manholes
- Vaulted sampling pits

2. Lockout/tagout: "Proper lockout/tagout (LOTO) practices and procedures safeguard workers from the release of hazardous energy."[1]

EXAMPLES:

- Pumps
- Electrical motors
- Valves
- Mixing systems

3. Personal Protective Equipment (PPE): "Personal protective equipment is worn to minimize exposure to hazards that cause serious workplace injuries and illnesses."[1]

EXAMPLES:

- Protective safety glasses, goggles and face shields
- Head Protection (Helmets)
- Foot Protection (Steel toed or metatarsal shoes)
- Hand Protection (Appropriate gloves)
- Proper Clothing
- Respiratory Protection (For emergencies or instances where exposure levels are unknown, use a full-face piece, pressure-demand supplied-air respirator with an egress bottle. A self-contained breathing apparatus can be used when appropriate.)

All three safety concerns cover specific issues, and all are equally important. Methods of defense against some life-threatening conditions include air monitoring, proper ventilation, respiratory protection and fall protection.

Footnotes

1 U.S. Department of Labor, Occupational Safety & Health Administration

ELEMENTS TO CONSIDER WHEN IMPLEMENTING A WASTEWATER FACILITY SAFETY PROGRAM

- Develop a response plan that considers all types of in-plant risk. This includes, but is not limited to: exposure to chemicals, disease and weather events such as tornadoes; handling, transportation, and storage of materials; falls, slips, and other injuries; overflows and spills. The development of log-out and tag-out procedures should be included in your response plan as well.

- Put a comprehensive plan in place that calls for documenting all procedures in every situation. Each step should be detailed in chronological order, and address the "who, what, where, when, and how" factors to ensure there are no questions left unanswered.

- Employees must be aware of the safety plan and be properly trained. In addition to these criteria, the plan should be practiced on a consistent basis. Consistency depends on the facility and number of personnel. Typically, a monthly safety meeting is encouraged. Policies and procedures should be regularly reviewed in detail. Don't forget to introduce newly hired employees to the plan.

- Visibility is key. Post response plan procedures in public areas of the facility so that the information is easily accessible and is a constant reminder.

- Conduct drills on a regular basis. This schedule should be dependent on the system, but monthly safety meetings are very helpful. A treatment plant manager can select a certain piece of equipment each month, and employees can practice the safety procedures. This will help keep information fresh.

- Make sure employees have access to the proper personal protective equipment (PPE) and are using it for all areas of the plant, including the lab.

- Encourage visitors to follow all safety procedures. Know that they may not be familiar with safety procedures or even aware of the potential hazards. To that end, a brief discussion of the basics will suffice. Make sure visitors are always escorted by a qualified employee during a visit.

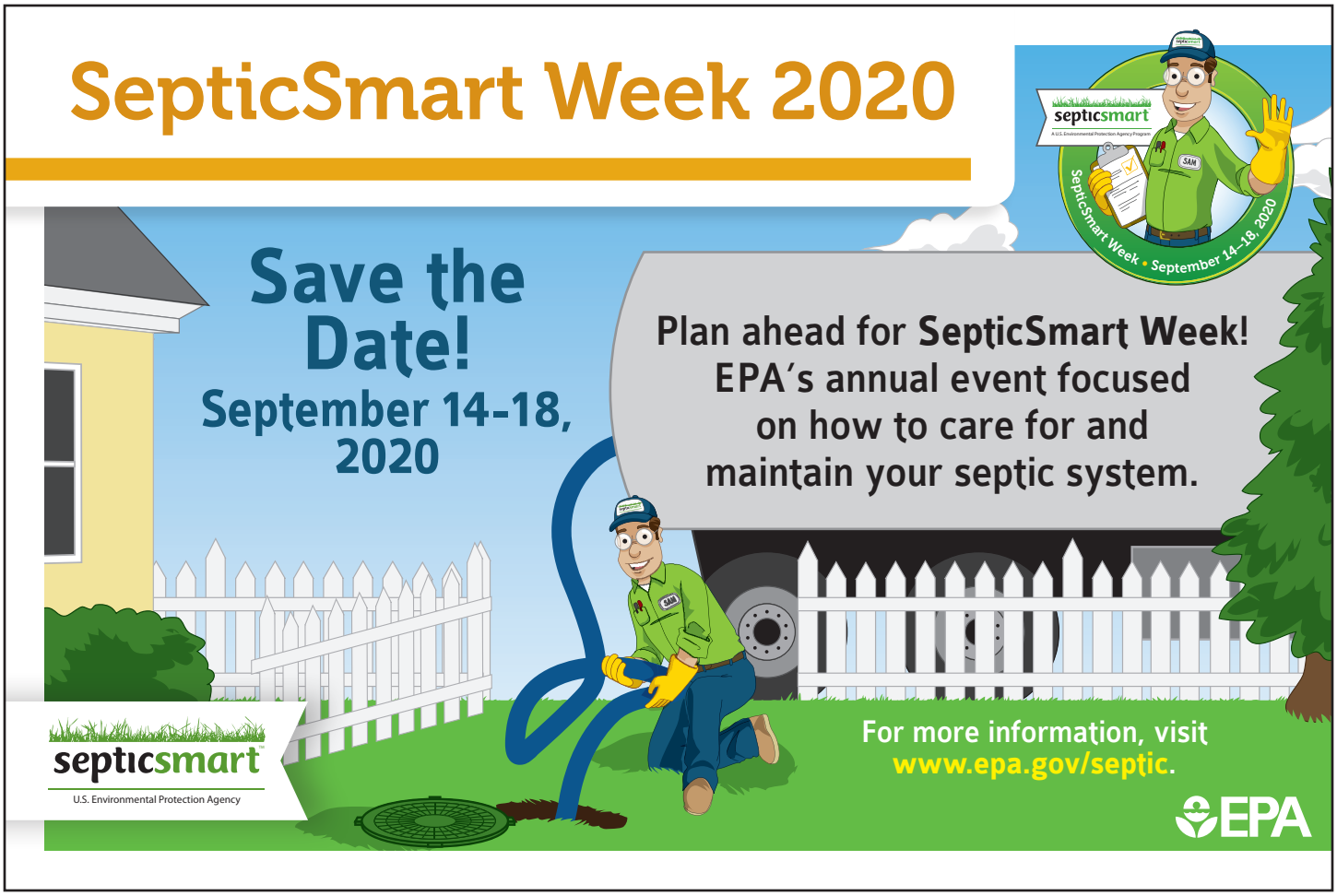
- Assign one person to take charge of executing the safety program. This ensures that there is no question about who is responsible. Then create safety teams across all shifts to encourage ownership of the safety initiative.

- Bring in consultants or a technical assistance provider. This might not seem like a good use of money initially but consider the risks against the rewards. When your internal message is coupled with an external one, it can carry more weight. It's far more expensive to clean up a toxic mess, than to prevent it in the first place. In addition, experts in the field of industrial safety can bring new ideas and best practices to you that will pay off when crises are averted. Some technical assistance providers like RCAP may be able to provide some expertise during operations and maintenance planning to certain eligible communities at no cost to the community.

- Stay current on best practices. Managers and other stakeholders should regularly attend seminars and conferences devoted to facility safety and compliance to sharpen their knowledge. As they say, knowledge is power!

It is critical for wastewater treatment plant managers to implement a thorough and consistent strategy to promote and maintain safety. As they say, an ounce of prevention is worth a pound of cure. This adage is especially relevant in industrial settings.

There is no argument that a well-executed safety program can reduce the potential for injury and even death at your wastewater facility. Safe and compliant facilities are known to have healthier and happier employees, thus reducing turnover, absences, and insurance claims. These benefits can be quantified. It pays to invest in a plant safety and compliance program. State regulatory agencies offer many publications on safety.



Feature Article

Cross Connection and Backflow Prevention

Underutilized Protection for Potable Water

By Jean Holloway, Delaware & Maryland State Lead, SERCAP

Cross connections and accompanying backflow are a common occurrence in plumbing and piping systems of every kind, and one of the most frequently overlooked hazards to potable water and therefore, to public health. Backflow is a common occurrence because there are so many everyday opportunities to cross connect potable and non-potable water supplies.

A cross connection is any direct, unprotected contact of a potable water supply with a non-potable or potentially contaminated liquid, solid or gas supply. Defined, it would seem a simple matter to prevent such cross connection and thus prevent contamination and resulting illness – just don't connect the pipes. The reason it's not that simple is that cross connections and backflow events can occur in everyday situations that are as common as garden hoses, sink sprayers and other mundane items that don't appear to present any hazard at all. They also don't have to be the result of one line being directly connected to the wrong supply or outlet, as the name "cross connection" may imply.

Anytime a potable water line or fixture is in close enough proximity to a non-potable material source or

Photo Credit: RCAP Network

container it could be an opportunity for cross connection. If a garden hose (the most common source of all backflow) is left on and dropped into a bucket, chemical sprayer, child's swimming pool or any other vessel containing non-drinkable material, there is the potential for backflow into the potable water supply. The key is a difference in pressure between the two connections, flows or vessels.[1]

There are two types of backflow – *backpressure* and *backsiphonage*. *Backsiphonage* occurs when the supply side pressure is less than atmospheric pressure, and non-potable materials are sucked into the potable water system in much the same way that a beverage is sucked through a drinking straw. Backpressure occurs when pressure on the discharge side of a connection is greater than the supply side, and non-potable substances are pushed back into the potable water system in the same way blowing back through that same drinking straw pushes liquid back into the glass.

Events like water line breaks that cause a sudden drop in supply pressure can cause backsiphonage. The sudden drop in water supply pressure sucks whatever is available into the line and back into the water system. If whatever is available happens to be toxic or disease-causing, the potential exists to contaminate the potable water system.

Elevated storage tanks or high-rise buildings with inadequate backflow protection can cause backpressure. The greater pressure caused by a taller "column of water" pushes back on the supply line and causes potential contamination to flow back into the potable water system. Firefighting water demand or the use of booster pumps can also cause backflow, along with a host of other everyday opportunities to draw or force non-potable material into a potable water supply. This potential is just as true for a single house using an on-site well as it is for a public community water supply, such as those owed by municipalities. "Backflow situations have undoubtedly affected health since the origin of plumbing."[1] From 1981 to 1998, the Centers for Disease Control documented 57 waterborne disease outbreaks directly related to cross connections. These outbreaks resulted in 9,734 illnesses. EPA's issue paper on the topic of cross connection and backflow further estimates that outbreaks related to cross connection are under-reported, in large part because the resulting illnesses are not recognized as backflow-related.[2]

Given the potential for poisoning an entire population or contaminating an entire community's water supply indefinitely, why isn't the value of cross connection and backflow prevention programs more recognized and why aren't such programs more prevalent? One reason may be that the topic is not a "hot button" health issue. Another reason is that the usual resulting waterborne illness presents as gastro-intestinal upset that can be mistaken for everything from food poisoning to a seasonal flu. It often takes multiple cases presented in a short time span and a good deal of investigation before an outbreak of illness is even traced back to a drinking water cross connection point of origin.[2]

A third reason is that "…the value of cross-connection control may not be readily apparent"[1] when the magnitude of potential illness is not recognized or the drinking water as the source of the illness is not even considered. When public officials consider the cost-benefit value of establishing a cross connection control and backflow prevention program, they are hard pressed to spend public funds on something that doesn't have readily apparent "bang for the buck" in benefits to public health and welfare. This reluctance is even more likely if it is hard to demonstrate a direct connection between contamination, illness outbreak and cross connection.

Cross connections are not only hard to prove as a source of illness, they are often unreported or at least under-reported. One state official estimated that about 1,200 backflow incidents occur in his state per year, yet his state only reported 15 such incidents from 1970 to 2002.[3] Another official estimated that the incidence of actual backflow events may be greater than reported by a factor of 10.[4] When the University of Southern California Foundation for Cross Connection Control and

Hydraulic Research (USC FCCCHR) prepared a "Summary of Case Histories" in 1993, they covered 397 incidents over a period of 90 years from 1903 to 1993. The Chief Engineer of the foundation estimated that 90 percent of incidents were not documented sufficiently to their standards to even be included in the study.[2] This lack of enough documentation usually results from the fact that many illnesses are not directly attributable to cross connection and resulting backflow.

"Backflow situations have undoubtedly affected health since the origin of plumbing."

Besides detrimental health effects, cross connections can cause operational problems and additional costs that negatively affect all water system customers and drinking water consumers. Cross connection can allow corrosive materials like acids or carbon dioxide to enter a drinking water system. Even if not present in sufficient levels to cause illness, corrosive substances in the distribution system can cause many problems and associated costs by hastening the deterioration of pipes and connections, leaching toxic metals like lead and copper from pipes, causing taste, odor and color problems, increasing scaling and precipitate in pipes and bringing on any number of public relations problems associated with all those things.[5]

Backflow from cross connection, regardless of source, can introduce microbes into the water distribution system, where they can attach to pipe walls and multiply into biofilm. These biofilms are often impervious to the usual disinfectants. Even if the microbes are not disease-causing in and of themselves, the biofilms they form can trap and concentrate nutrients, which promote the growth of pathogenic organisms. Backflow can also introduce such nutrients that promote the proliferation of existing biofilms.[6]

Once the dangers of cross connection and backflow are recognized, there are some signs to look for in identifying a backflow incident before it causes widespread illness or becomes a wider operational problem. Some possible signs include an increase in customer complaints, drops in system operating pressure, drops in disinfectant residual, water meters running backward and a number of coliform detects. An increase in customer complaints of taste, odor and/or color can be a primary indicator of a possible backflow incident, but like a drop in operating pressure, it can mean that the event has already occurred rather than something that can aid in preventing an incident before it happens.[7]

Entry into the system from a backflow incident can also cause an atypical drop in disinfection residual by introducing organic carbons or other "reducing" agents that use up available disinfectant. A sudden increase in total coliforms can be an indication that such contaminants have entered the system, possibly through a backflow event. Likewise when check valves or similar apparatus fail, water meters can run in reverse, indicating a change in the direction of water flow (backflow). All these indicators are signs that an incident has already occurred, and no one will help prevent those incidents unless the signs are used to detect and remedy the source of the backflow or cross connection before future incidents can occur.

The best protection from cross connection is a systematic program of identification, prevention and testing to ensure that events are stopped BEFORE they happen rather than after the problems occur. This program can incorporate plumbing standards and codes, local laws and ordinances, construction inspection, backflow device and assembly testing, training, and most of all, diligence and alertness on the part of system personnel for any indications of potential or actual backflow incidents. Documentation can help to ensure proper reporting, but more importantly, proper recognition and prevention of this very common and potentially dangerous threat to public health and safety. Local officials as a body may not recognize the potential for a public health crisis presented by backflow, but any individual who becomes ill after a backflow incident can attest to the value of preventive measures.

Other References and Sources

Recent RCAP Videos on Cross Connections:

- How To: Identify and Avoid Possible Cross-Connections https://vimeo.com/344613493
- How It Works: Backflow Control Methods, Devices, and Assemblies https://vimeo.com/344624491
- How To: Develop a Cross-Connection Control Plan https://vimeo.com/344624121

AWWA Website – www.awwa.org

US EPA Website – www.epa.gov/safewater

University of Florida TREEO Website – www.treeo.ufl.edu/backflow

DRWA – Hydro Designs, Inc. Training Course – "Certified Cross Connection Surveyor"

AWWA Distribution Systems Symposium Paper – "Managing Complex High Hazard Facilities"; presented by Glenn Adamus, Vice President, Hydro Designs, Inc.; Sept. 21, 2010

University of Southern California – Foundation for Cross Connection Control and Hydraulic Research website – www.usc.edu/dept/fccchr

Footnotes

1"Recommended Practice for Backflow Prevention and Cross Connection Control;" AWWA; Manual of Water Supply Practices series, M14; 2nd ed., 1990. | 2 US EPA Issue Paper – "Potential Contamination Due to Cross Connections and Backflow and the Associated Public Health Risks;" Section 5.1. | 3 Koenig, R. 2002 Personal Communication reported in US EPA Issue Paper (above). | 4 Fauver, P. 2002 Personal Communication reported in US EPA Issue Paper (above). | 5 AWWA Pacific North West Section – "Summary of Backflow Incidents," 4th ed., December 1995. | 6 US EPA, 1992; "Control of Biofilm in Drinking Water Distribution Systems;" Office of Research and Development. | 7 US EPA Issue Paper – "Potential Contamination Due to Cross Connections and Backflow and the Associated Public Health Risks;" Section 9.0.

Upcoming Events & Trainings

SPONSOR	EVENT	DATE
Rural Community Assistance Corporation (RCAC)	Water System Workforce Development	March 11, 2020
Midwest Assistance Program (MAP) & NAWMA	Native American Water Masters Gathering	March 11, 2020
Indian Health Service (IHS)	Cross Connection Control	March 17, 2020
American Water Works Association (AWWA)	Sustainable Water Management Conference	March 29, 2020
Wastewater Training Solutions (WWTS)	Biological Treatment – Attached Growth	March 31, 2020
Water Environment Federation (WEF)	Residuals and Biosolids	March 31, 2020
New England Water Works Association (NEWWA)	Knowing, Operating, & Troubleshooting your Chemical Feed Pumps	April 15, 2020
Midwest Assistance Program (MAP)	Tribal Drinking Water Operator Rules & Regulations	April 22, 2020

For more events and trainings, visit rcap.org/training and wateroperator.org.

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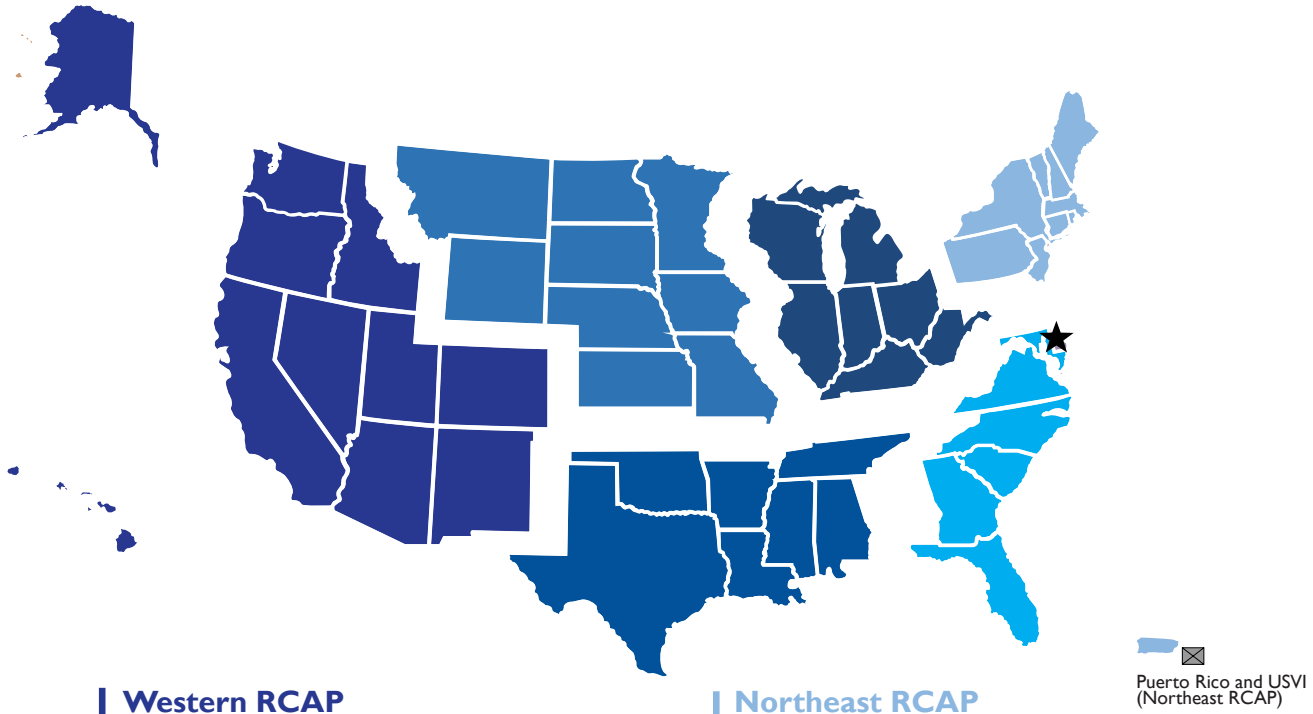

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Rural Community
Assistance Corporation (RCAC)
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West Sacramento, CA 95691
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www.rcac.org

Midwest RCAP
Midwest Assistance Program (MAP)
303 N. Market St., Suite 2
Maryville, MO 64468
(660) 562-2575
www.map-inc.org

Southern RCAP
Communities Unlimited
3 East Colt Square Drive
Fayetteville, AR 72703
(479) 443-2700
www.communitiesu.org

Northeast RCAP
RCAP Solutions
191 May St
Worcester, MA 01602
(800) 488-1969
www.rcapsolutions.org

Great Lakes RCAP
Great Lakes Community Action Partnership
P.O. Box 590
127 S. Front St., 2nd Floor
Fremont, OH 43420
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www.glrcap.org

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