JUNE 2017

ServiceLine

The Official Publication of the South Dakota Association of Rural Water Systems

FISHING TOURNAMTENT HIGHLIGHTS | ASSET MANAGEMENT

President's Message

Ron Gillen, SDARWS President

NRWA In-Service

In June, most of the Association staff will travel to New Orleans, Louisiana for the National Rural Water In-Service Training. At In-Service, rural water professionals from around the nation gather together to train and discuss their work with others in their peer group. The goal of in-service is to learn about new techniques unique to each position, share expertise, and learn about new funding sources.

Golf Tournament

Join us on July 18th for the 31st Annual SDARWS 4-Person Scramble Golf Tournament at Elmwood in Sioux Falls. The tournament is a great opportunity to gather together with other Rural Water folks for a day of camaraderie and fun. You can register your four-person team online at www.sdarws.com/golf.html. All golfers need to be registered at the course by 8:30am. Shotgun start is at 9:00am. We hope to see you on the course!

Water Pro

It isn't too early to start thinking about attending this year's WaterPro Conference in Reno, Nevada September 18-20, 2017. NRWA puts on a fantastic show which brings in hundreds of vendors and hosts informative training sessions in operations, management, boardsmanship and governance for those involved in water and wastewater utility systems – large and small, municipal and rural. WaterPro features expert speakers from across the water/wastewater industry. Want to hear about new USDA projects or EPA priorities? You can find out at the WaterPro Conference. The WaterPro exhibit hall is filled with vendors and service-providers dedicated to offering high-quality solutions for small and rural water utilities. Find out about all the best solutions for rural water today and tomorrow. For more information on this conference, including registration and hotel reservations, please visitwaterproconference.org.

IN THIS ISSUE

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P.O. Box 287, Madison, SD 57042
Phone 605.556.7219, Fax 605.556.1497
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Training Calendar

JULY

11-13 – BASIC WATER TREATMENT

Aberdeen Ramkota
1400 8th Avenue NW • Aberdeen, SD 57401

This course is designed to assist those who will be attempting a class I Water Treatment Exam. This is a multiple day course starting a 8:00 a.m. on Tuesday and ending at Noon on Thursday (all times are local time). A minimum of 18 contact hours will be awarded for full attendance. Material covered is based on the ABC Need to Know Requirements for Class I Water Treatment.

AUGUST

8-10 – WATER DISTRIBUTION

Huron Crossroads Hotel
100 4th Street SW • Huron, SD 57350

This course is designed to assist those who will be attempting a class I through IV Water Distribution Exam. This is a multiple day course starting a 8:00 a.m. on Tuesday and ending at Noon on Thursday (all times are local time). A minimum of 18 contact hours will be awarded for full attendance. Material covered is based on the ABC Need to Know Requirements for Class I – IV Water Distribution.

29-31 – WASTEWATER COLLECTION

Watertown Events Center
1901 9th Avenue SW • Watertown, SD 57201

This course is designed to assist those who will be attempting a class I through IV Wastewater Collection Exam. This is a multiple day course starting a 8:00 a.m. on Tuesday and ending at Noon on Thursday (all times are local time). A minimum of 18 contact hours will be awarded for full attendance. Material covered is based on the ABC Need to Know Requirements for Class I – IV Wastewater Collection.

SEPTEMBER

26-28 – INTERMEDIATE WATER TREATMENT

Rapid City Ramkota
2111 N. LaCrosse Street • Rapid City, SD 57701

This course is designed to assist those who will be attempting a class II & III Water Treatment Exam. This is a multiple day course starting a 8:00 a.m. on Tuesday and ending at Noon on Thursday (all times are local time). A minimum of 18 contact hours will be awarded for full attendance. Material covered is based on the ABC Need to Know Requirements for Class II & III Water Treatment.

OCTOBER

3-5 – BASIC WASTEWATER TREATMENT

Spearfish Holiday Inn
305 N. 27th Street • Spearfish, SD 57783

This course is designed to assist those who will be attempting a class I Water Treatment Exam. This is a multiple day course starting a 8:00 a.m. on Tuesday and ending at Noon on Thursday (all times are local time). A minimum of 18 contact hours will be awarded for full attendance. Material covered is based on the ABC Need to Know Requirements for Class I Water Treatment.

NOVEMBER

14-16 – WATER DISTRIBUTION

Sioux Falls Ramkota
3200 W. Maple Street • Sioux Falls, SD 57107

This course is designed to assist those who will be attempting a class I through IV Water Distribution Exam. This is a multiple day course starting a 8:00 a.m. on Tuesday and ending at Noon on Thursday (all times are local time). A minimum of 18 contact hours will be awarded for full attendance. Material covered is based on the ABC Need to Know Requirements for Class I – IV Water Distribution.

REGISTER FOR CLASSES ONLINE AT: go.activecalendar.com/sdarws

Course agendas, maps and registration are all available online at www.sdarws.com. All classes are free unless otherwise noted. For more info on these and other events, visit www.sdarws.com or call 605-556-7219.

You can find the "Need to Know" document along with other information @ http://www.abccert.org/testing_services/2017WaterTreatmentExams.asp

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31ST ANNUAL RURAL WATER OPEN

July 18, 2017

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ASSET MANAGEMENT 2.0:
Incorporating Risk into the Planning Process

By Miranda Kleven, PE and Delvin DeBoer, PhD, PE, Advanced Engineering and Environmental Services, Inc. (AE2S)

Water system personnel have likely heard a lot about Asset Management over the last decade. The basics of Asset Management have been well-communicated, are generally widely understood, and many systems have moved well beyond the point of understanding into some phase of implementation. Asset Management is not a singular activity, but a change in mindset that spans across the water system from the board level all the way down to the operator level. This article provides guidance as to how to use the data you have to understand risk within your system and how to incorporate it into your overall planning of resources. In a second article in a subsequent edition of SERVICELINE, practical completion of condition assessment will be addressed, and a third article in a future edition of this publication will feature an Asset Management approach that has been successfully implemented by a South Dakota rural water system.

THE PATH FORWARD WILL BE AS GOOD AS YOUR DATA

Many systems have implemented Geographical Information Systems (GIS) to catalog assets and asset location. Some have used hydraulic modeling to better understand system operations and identify priority improvements, and a few have deployed Computerized Maintenance Management Systems (CMMS) to track maintenance and conditions of assets. These have generally been the first tools implemented in a path towards Asset Management within a system. Whether your utility has implemented state-of-the-art GIS, hydraulic modeling, and CMMS applications or is tracking these items using an existing spreadsheet, paper records, or by some other means, the point is to use the data to make better informed financial and management decisions. These decisions could be related to the allocation of financial resources associated with a capital budget and the allocation of both human and financial resources within the operation and maintenance (O&M) budget.

Knowledge related to the age and condition of the assets, along with an understanding risk of each asset, can be used to streamline system management/operations and develop a budget and capital improvement plan (CIP) designed to make sure your money and time is spent on maintenance activities and asset repair/replacement (R&R) that will prolong the life and enhance performance of the system. The discussion below outlines the terminology and concepts associated with this process.

USING SYSTEM KNOWLEDGE AND DATA TO ASSIGN RISK

In Asset Management terms, Risk is defined as the product of the likelihood of failure associated with a negative event and the consequence of failure associated with that negative event. Risk Assessment is an evaluation of the likelihood and a consequence of failure associated with water system assets, and is used to help water systems understand the components of risk before making important decisions and choices. Figure 1 illustrates the concept of risk assessment by use of risk factors developed to allow water system personnel to make comparisons of risk associated with individual water system assets. Particular considerations can vary by system, but this article provides some suggestions as to where to start.

Figure 1. Calculating Risk – Simplified

Based on the water system's service expectations, specific Consequence of Failure and Likelihood of Failure considerations can then be developed that are applicable to the assets considered for the risk assessment. These considerations are system-specific and can be tailored to the needs, operational practices, and constraints of the water system.

We will begin by covering the Consequence of Failure. Loss of public confidence, negative health and safety effects, regulatory compliance issues, redundancy, and financial impact, are practical considerations for determining consequence of failure. While all assets could be considered critical, some are likely more critical to overall system performance than others. For example, a service line to one user is very important for that one

Table 1. Example Consequence of Failure Considerations and Consideration Weights

Consideration	Consideration Description	Consideration Weight
Service	To what extent is service impacted during a failure?	3.0
Redundancy	To what level is redundant equipment in place to provide service during a failure?	2.0
Public Health	To what degree is public health affected during a failure?	5.0
Regulatory	To what degree is the system regulatory compliant during a failure?	4.0
Financial	To what extent is the utility's financial situation is impacted during a failure?	1.0

Table 2. Example Consequence of Failure Asset Scale

Consideration	Low Consequence	Moderate Consequence	High Consequence
	1.0	3.0	5.0
Service	Minor Loss of Service, not noticeable	Users inconvenienced but loss of service less than one day	Significant Loss of Service
Redundancy	Redundant components in place	Emergency backup components available	No backup in place
Public Health	No illness	Boil Water Notice	Occurrence of illness
Regulatory	Compliant	Non-Compliant; but major fines unlikely	Non-Compliant; major fines likely
Financial	In Budget or can be covered by Reserves	Can be covered by shifting spending priorities or using Reserves	Requires unplanned and immediate rate increase

Table 3. Example Likelihood of Failure Considerations and Consideration Weights

Consideration	Consideration Description	Consideration Weight
Age	How many years has the asset been in service compared to the estimated useful life?	1.0
Condition	To what level is the asset's condition?	5.0
History of Failure	How frequently has failure occurred (i.e number of failures per year)?	3.0
Maintenance History	To what degree has the asset been regularly maintained?	4.0
Performance	To what extent does the asset perform in relation to performance expectations?	2.0

Table 4. Example Likelihood of Failure Asset Scale

Consideration	Low Likelihood	Moderate Likelihood	High Likelihood
	1.0	3.0	5.0
Age	New / Installed in past few years	Half-way through estimated useful life	At or past estimated useful life
Condition	Excellent condition / Functioning as intended	Fair condition / Functioning as intended	Poor condition / Not functioning as intended
History of Failures	Extremely low failure history	Failure only when not regularly maintained	Frequent failure even with regular maintenance
History of Maintenance	Regular maintenance	Maintenance only when needed	Little or no maintenance performed
Performance	Adequately sized for current and future users	Adequately sized for current users but no considerations for future users	Undersized for current or future users

customer, but does not necessarily impact the ability for service to be provided to the majority of the system. On the other hand, a raw water transmission line with no redundancy is extremely critical to the operational ability of the system in its entirety, and would have a very high consequence of failure. By understanding the criticality of your assets, resources can be prioritized for assets that are most critical to system operations.

Some consequence of failure considerations that are developed will likely be more important, or more critical than other considerations. For example, upholding public health, safety, and welfare is probably more important than system redundancy. To properly account for this, weights are assigned to each consideration so each asset can be uniquely addressed. Table 1 presents example considerations, consideration descriptions, and consideration weights (5.0 = most important) for assessing consequence of failure.

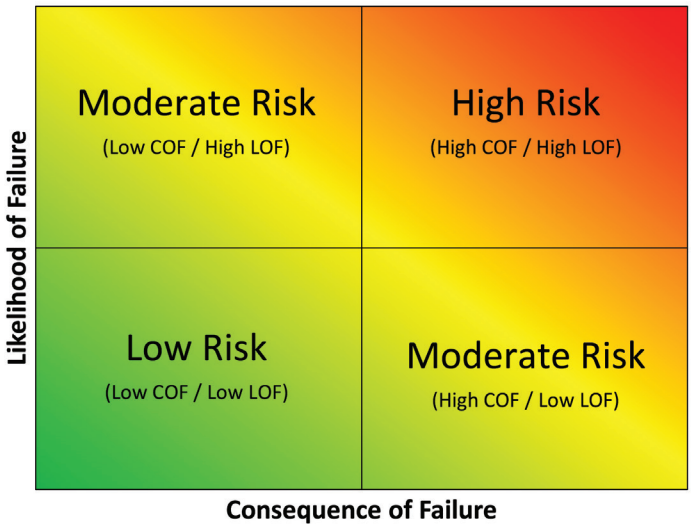
As you probably noticed in Table 1, all of the consideration descriptions consist of open-ended style questions. This is an important component to the process if your water system desires weighted considerations. The open-ended style descriptions help "trigger" thought processes necessary when assigning appropriate consideration weights. Without the open-ended descriptions, it can be difficult to understand what the consideration truly means, or is intended to describe. It should be noted that weighted considerations are not required, but are recommended if the water system does not believe "all considerations are created equal."

Once the considerations are established and weighted, assets can be individually scored based on consequence of failure. Table 2 provides an example consequence of failure asset scale, where a higher score of 5.0 deems the asset a "high consequence," and a lower score of 1.0 deems the asset a "low consequence."

The second component in calculating risk is Likelihood of Failure. This can be related to the type of asset, age, asset condition, manufacturer, scheduled

...continued on page 13

Figure 2. Example Risk Assessment Graphic



maintenance, etc. There are endless potential likelihood of failure considerations, and similar to consequence of failure, a system should weigh the risk in terms of its level of service and practices. Table 3 provides examples of some considerations, along with potential measures for each. Like consequence of failure, these are not standard considerations, but serve as a good starting point when setting your water system's parameters. Table 4 provides an example likelihood of failure asset scale, which utilizes the same 5.0 – 1.0 scale as the consequence of failure considerations. Ultimately, the asset consequence and likelihood of failure scores will be calculated alike.

Figure 2 is a standard risk assessment graphic you have likely seen before. Using the operational knowledge and review of water system available data (i.e. GIS, hydraulic modeling, CMMS), you can complete a high-level assessment of where your assets fall within this graphic. The bullets below add some context to the low, moderate, and high-risk quadrants depicted in Figure 2.

- Low Consequence of Failure / Low Likelihood of Failure (Low Risk)
  - Failure causes minimal issues and failure unlikely.
- Low Consequence of Failure / High Likelihood of Failure (Moderate Risk)
  - Failure causes minimal issues, but failure likely
- High Consequence of Failure / Low Likelihood of Failure (Moderate Risk)
  - Failure causes major issues, but failure unlikely
- High Consequence of Failure / High Likelihood of Failure (High Risk)
  - Failure causes major issues and failure likely

To provide an example of how risk scores can be calculated, three assets (Asset A, B, and C) have been conceptualized and assigned arbitrary consequence and likelihood of failure scores. The weighted considerations that were shown previously in Tables 1 and 3 have been applied to this example. Tables 5 and 6 show how the final consequence and likelihood of failure scores were calculated, respectively. The final scores are calculated using a sum-product formula, which accounts for individual asset score, as well as consideration weight. An example of the equation working is provided below:

Final COF Score $_{(\text{Asset A})}$=(3*3)+(2*1)+(5*3)+(4*3)+(1*5)=**43**

Once the consequence and likelihood scores are finalized for all assets, a risk score can be quickly calculated by multiplying the two together. The numbers can get larger depending on the scale used (this example utilizes a 1-5 scale), but once the risk score is complete, the numbers can be scaled down into a more workable form. Table 7 on the next page provides the final risk scores from our arbitrary example.

Table 5. Arbitrary Example of Calculating Consequence of Failure

Asset ID	Consequence of Failure (COF)					Final COF Score
	Service	Redundancy	Public Health	Regulatory	Financial	
	3	2	5	4	1	
A	3	1	3	3	5	43
B	1	1	1	3	1	23
C	5	5	5	5	5	75

Table 6. Arbitrary Example of Calculating Likelihood of Failure

Asset ID	Likelihood of Failure (LOF)					Final LOF Score
	Age	Condition	History of Failure	Maintenance History	Performance	
	1	5	3	4	2	
A	3	5	1	1	1	37
B	1	1	1	1	1	15
C	3	5	5	5	3	69

Table 7. Arbitrary Example of Calculating Risk

Asset ID	Final COF Score	Final LOF Score	Final Risk Score
A	43	37	1,591
B	23	15	345
C	75	69	5,175

You may have noticed in Tables 5 and 6, that Asset C, was receiving a score of five (5) for the majority of the considerations. Think of this asset as a large pump station that services over 75 percent of your customers. The consequence of failure is large because it has a large user base, and the likelihood of failure is large because ever since it was installed in 2000, you have had countless issues with the pumps and process piping. It was likely known that this asset was going to rank high on the priority list, but prior to conducting this assessment there was not a systematic and documented process used to prove this. The results in Table 7 reinforce that Asset C is in need of critical investment and should be receive higher priority than Assets A and B. Viewed relative to Figure 2, Asset C would plot in the upper right, High Risk category.

The level of detail put into a risk assessment should be driven around water system needs and service expectations. Risk assessment can be simple and high-level, such as the example above, or can be meticulous and complex. Regardless of complexity, the end goal of assessing the risks of your assets is simple: Strive to best determine what projects to do, when to do them, and understand why you're doing them. Unfortunately, there is still no crystal ball that will tell us when equipment or assets are going to fail, but a systematic risk assessment process will provide a logical basis for where to invest resources based on risk of that asset failing.

CONCLUSION

Every day, rural water system managers and operators have to make decisions regarding both today's priorities and tomorrow's investments. A significant consideration in those decisions includes managing risk, both operational and financial. The processes and examples discussed in this article provide a framework that your system can utilize to help manage risks and make more cost-effective decisions.

Del and Miranda are Special Projects Engineers with AE2S and can be reached at (605) 275-5620 or (701) 746-8087.

RURAL WATER Q&A

Q: How do I take a SD Certification Exam?

A: Operator Certification Exams are offered through the South Dakota Department of Environment and Natural Resources (SD DENR). Current exam dates can be found online at https://denr.sd.gov/des/dw/exam.aspx. Certification exam applications must be submitted for ALL exams including retakes. Applications MUST be received by the Department of Environment and Natural Resources (DENR) at least two weeks before the exam date, as required by the Operator Certification Rules (ARSD 74:21:02:40). Applicants will receive a confirmation of their exam receipt by the Department. Applications will be accepted via fax at 773-5286. Check or money orders made out to "DENR-Operator Certification" are required. Applications must be filled out completely as they are the sole source of information used to determine operator eligibility to take an exam. The cost of the exam is $10, and there are no free retake exams. Certification renewals are $6.00 per certificate. Questions about operator certification should be directed to Rob Kittay at the Drinking Water Program in Pierre at 605-773-4208, or email: SDDrinkingWater@state.sd.us.

Q: Where can I find my Operator Contact Hours?

A: You can look up your contact hours online at SD DENR's website at https://denr.sd.gov/des/dw/dbopcertsearch.aspx, or you can call Rob Kittay at the Drinking Water Program in Pierre at 605-773-4208, or email SDDrinkingWater@state.sd.us.

Q: Which water and wastewater systems need certified operators?

A: Any wastewater treatment facility or wastewater collection facility that serves 500 or more people must employ a certified operator. All community and nontransient noncommunity systems must have a certified water treatment and distribution operator. All transient water systems using surface water, using disinfection equipment, or that serve more than 500 people per day must have a certified operator.

Q: Can a water or wastewater system contract for a certified operator?

A: Yes! Contracting for a certified operator can satisfy the state requirements for a certified operator. The Board of Operator Certification can approve a contract where a certified operator not under the direct employment of a system can work as a system's certified operator. The contract operator must work a minimum number of hours per week on-site and be in direct responsible charge of the water/wastewater system.

Q: Does a person have to be certified to take water or wastewater samples?

A: No! Anyone can take samples. Certain water and wastewater systems are required to have a certified operator be in direct responsible charge of its operation and maintenance in order to be in compliance with the Operator Certification rules. Sampling is just one task for the operator of a system. Non-certified personnel are allowed to work under a certified operator doing certain tasks. Also it should be noted that for a water system, only an operator certified at any level can make water quantity and quality decisions. A water or wastewater system must still take Safe Drinking Water Act and Clean Water Act compliance samples even if it is currently operating without a certified operator.

Q: When does the Board of Operator Certification meet?

A: The board usually meets twice per year - in September during the SD Water and Wastewater Association (SDWWA) Conference and during the winter or spring. The public is always welcome at all meetings.

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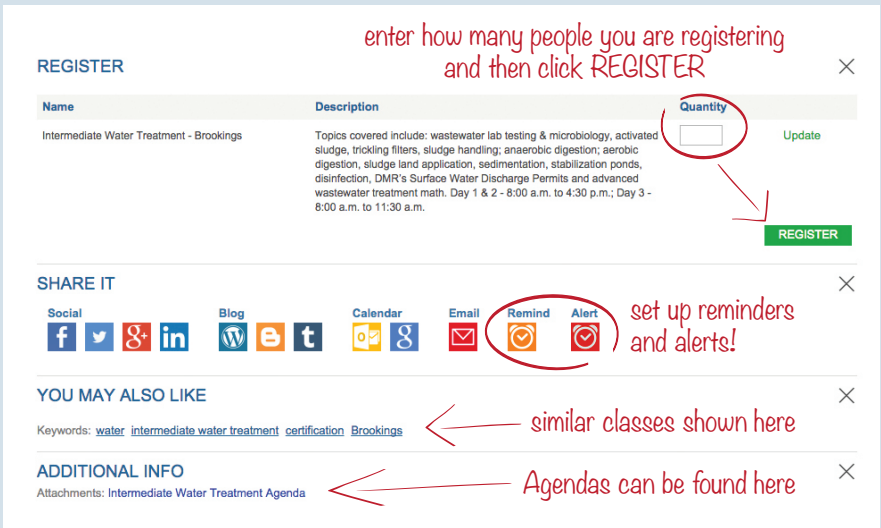

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2017 WATER TECHNOLOGY EXPO RECAP

By Jeremiah Corbin,
SDARWS Source Water Protection Specialist

South Dakota Rural Water recently conducted the 6th Annual Water Technology EXPO. This event, held in Rapid City on April 26-27, is designed to provide training opportunities for municipal, small, and rural water systems located throughout western South Dakota.

The EXPO objectives are to provide opportunities for water system personal to network with manufacturers, suppliers, and each other to exchange ideas on how to properly operate and maintain their systems. Over the course of this day and a half training event, attendees were provided ample opportunity to network with EXPO exhibitors. Many of the 31 exhibitors in attendance were pleased to offer their expertise to the 60 water systems represented. Total attendance topped out at 125.

Dean Aurand with Midcontinent Testing Lab started the EXPO with a presentation on a system that allows their customers to access lab information over the internet. He demonstrated several common reports that systems need to generate and the ease of creating these reports with data stored with Midcontinent Testing.

The second presentation of the EXPO provided the attendees with information and a demonstration on ice pigging. Nichole Grasma with SUEZ Water Advanced Solutions brought ice pigging equipment to the EXPO for the outdoor demonstration. This unique operation utilizes slushed ice to clean water and wastewater force mains. Vern Thorson with Fort Pierre assisted with the demonstration as that community has utilized this process recently with positive results.

WATER TECHNOLOGY EXPO

Following a break that provided attendees with a good opportunity to meet with exhibitors, Al Hansen with Hawkins Water Treatment spoke. Mr. Hansen's presentation covered the topic of how chlorine storage and heaters don't mix. Al described the conditions that are required for chlorine to freeze and exposed the dangers of gas chlorine canisters being located near heaters. Al provided recommendations and best practices for addressing gas chlorine storage in cold climates.

Next, Erin Dreis explained how DENR is addressing challenges with the Lead and Copper Rule. Additionally, she offered an overview of the requirements and challenges associated with the Lead and Copper Rule. Erin works out of the Rapid City DENR office and is the point of contact for Lead and Copper Rule issues in South Dakota.

Our final presentation for the morning of the first day came from Bruce Barnett with Regal Chlorinator. Bruce provided a hands-on demonstration directed at systems that utilize gas chlorine and want to understand how to maintain the head and ejector.

After lunch, Rob Gravatt of Great Plains Structures offered insight into the importance of maintaining your ground storage tank. Rob provided the attendees with many great

...continued on page 21

EXPO: continued from page 19...

examples of things to watch for that may indicate problems with storage tanks and cautioned attendees not to neglect these crucial pieces of infrastructure.

Rick Kemmis with Maguire Iron put his years of experience to work for attendees on the next presentation and gave us insight on elevated storage maintenance. Rick discussed and identified several issues to watch and provided sound advice on maintaining and getting the most out of elevated storage.

In a bit of a change up in pace, Lona Christensen of the Employment Support of the Guard and Reserve. She discussed the resources available to employers that are interested in or currently employee reserve and guard members. She highlighted interesting facts and pointed out the many advantages of hiring Guardsmen and Reservists.

Following the afternoon break, Bob Reinmund of Grondfos discussed the basics of submersible pumps. Bob provided a great demonstration on the importance of understanding pump curves and matching pumps with applications and matching pumps with motors.

The field of GIS continues to evolve and become a more common component at smaller systems. Justin Huntley with Banner Associates demonstrated how to access your GIS data in the field. Justin focused on the ESRI family of software, while providing a general description of the options available for field staff and engineers to collaborate on system attributes that are saved in the cloud.

The final presentation of the first day was a demonstration of leak detection equipment. Michael Carothers of Leak Locators of Montana described the different leak sounding equipment that is available today and provided the advantages and disadvantages of each piece.

Day two of the EXPO started with a presentation by Rural Development community programs director Tim Potts. Mr. Potts reviewed requirements of RD funding and gave insight to the funding that is available in South Dakota for water and wastewater projects.

The second presentation of day two was an overview of the ever-changing trenchless rehabilitation industry. Michelle Barrett of Hydro Klean provided this presentation which demonstrated no dig technology for wastewater collection lines and manhole restoration techniques.

After the morning break, Ted Schultz with AE2S discussed radio nuclei treatment options. Radio Nuclei can be a problem in for water systems in the Black Hills area. Ted provided options for removing this contaminant for systems small to mid-sized.

The ability to mix water in a storage tank has emerged as a priority for several systems recently. Darrin Tessier with Medora provided a demonstration on the benefits of tank mixers for water quality and to minimize tank maintenance.

Our final presentation of the EXPO was Justin Petersen with Clark Engineering. Justin provided information on an alternative wastewater treatment system that offers options for small developments or municipalities that may face challenges with quickly and affordably addressing wastewater issues.

Many of the EXPO attendees are certified operators and interested in attaining mandatory contact hours to renew their certification license. With the approval of ten contact hours by Certification Secretary Rob Kittay, attendees gained valuable knowledge and assisted with the regulatory requirement for maintaining their certification status.

The EXPO would not be possible without the support from the 31 table top exhibitors. We offer special thanks for their support in bringing valuable training and professional resources that truly benefited EXPO attendees.

The 2018 Technology EXPO is scheduled for April 25 and 26 at the Rapid City Ramkota, so don't forget to mark your calendar!

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  - *9.1.17 deadline*
- **December 2017**
  - *11.1.17 deadline*
- **February 2018**
  - *1.1.18 deadline*

If you are interested in advertising in *ServiceLine*, please contact Jennifer Bame by calling 605-556-7219, email: info@sdarws.com, or go online and visit: www.sdarws.com/ad-rates.html

THE IMPORTANCE OF FLUSHING WATER LINES

Distribution system flushing should be performed on a routine basis to avoid water quality deterioration within the system. Systems should be flushed at least yearly, more often if water quality is poor. If the system is to be flushed yearly, the best time is in the spring. Studies have reported that 25% of waterborne disease outbreaks can be attributed to distribution system deficiencies. Most distribution systems contain dead ends or oversized pipes where low or no flow conditions can cause poor water quality. Other reasons for poor water quality can be attributed to, age/condition of system piping, water quality, and the amount of water treatment performed prior to distribution. Some of the water quality concerns that can be addressed through flushing include:

- Removal of accumulated silt/sediment from piping
- Reduction of chlorine demand throughout the distribution system
- Reduction of disinfection by-product precursor material
- Removal of accumulated biofilm
- Removal of contaminated water from portions of the system
- Remove older water to improve chlorine residual
- Prevention of nitrification episodes
- Reduction of customer complaints

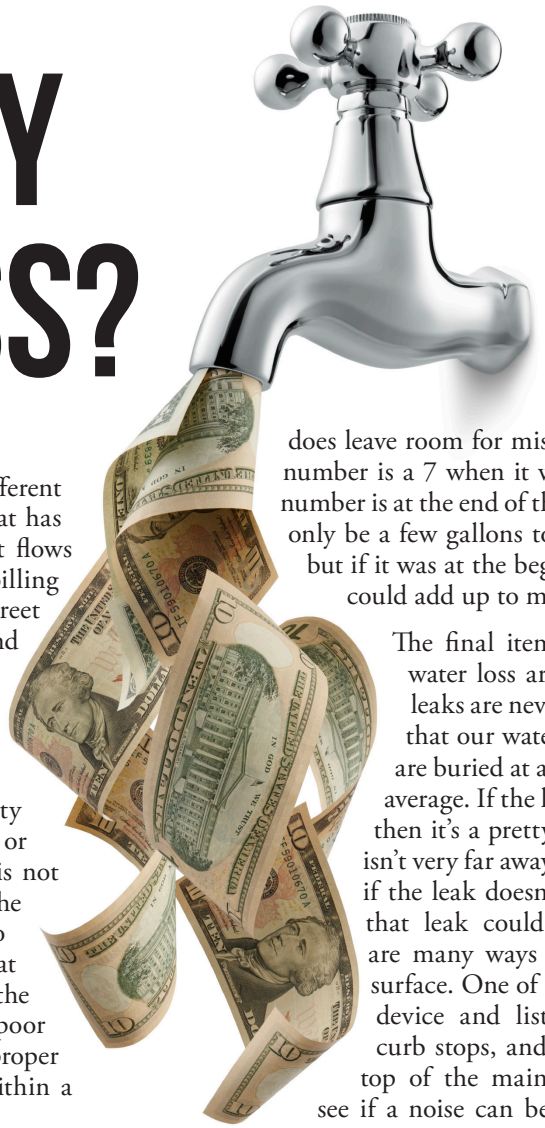
Other benefits of scheduled flushing are that it provides the system with valuable information regarding flow rates in different areas, and it provides the system personnel the ability to see how the system is working in a non-emergency situation. Valves and hydrants work can be evaluated and repairs and maintenance can be performed accordingly. Fire hydrants, like valves, are installed essentially for emergency use and should be checked during the flushing program. Hydrant inspections should include these steps:

- Check the hydrant for leaks
- After flushing, the ease or difficulty of operation should be noted, if needed worn parts should be replaced
- The condition of the drain valve, operating nut, nozzles, caps, chains, packing, gaskets, and paint should be noted
- After closing the hydrant, be sure the barrel drains properly
- Check the location of the hydrant for distance of the nozzles from the ground and the curb line, plan for corrections if not acceptable
- Lubricate the hydrant
- Make sure utility poles, etc. do not interfere with hydrant operation

The fire hydrant is the only portion of the distribution system that is visible to the public, and frequent painting can be an excellent public relations tool.

Another factor concerning a successful flushing program is the maintenance of storage facilities. Accumulated sediment, water that is too old, or other bacteriological problems can be released to the distribution system during flushing. Water quality in the distribution system will deteriorate as flushing continues. Many factors come into play for a system to maintain a successful distribution program, if even one facet is neglected, the water quality will be diminished. For assistance in setting up a flushing program, please call SDARWS at 605-556-7219.

IS IT REALLY WATER LOSS?



By Mike Moeller, SDARWS Circuit Rider

Water utilized by utilities can be looked at in two different ways; water that has been accounted for and water that has been lost. Water that has been sold is the water that flows through water meters and is billed for at the end of the billing cycle, or is water that is accounted for by use in street sweepers, flushing fire hydrants, watering of parks and ball fields ect.

Lost water is what utilities are most concerned with because that tells them that they have a leak. Water leaks add cost to not only the utility but also the consumer. The reason for this is whether the utility is purchasing the water from a rural water system or treating it themselves, there is expense involved that is not being captured at the time of the water sale since the total gallons purchased or treated are not being sold to consumers. Leaks are most commonly found in pipe that is aging, but in some cases the age of the pipe isn't the factor causing the leak. We are seeing more and more poor installation practices in the water industry such as improper bedding which can cause new installations to leak within a just few years.

Another factor that may contribute to water loss is aging water meters. A lot of water systems around the state have infrastructure that has been in place for many years. Water meters are one item that seems to get overlooked since every month they are read, and if the gallons keep going up, then everyone just assumes that the meter is doing its job. As they age, ater meters tend to "slow down" or not catch all the gallons that are going through them – especially in low flow times. Consumers will never come to a utility and tell them that their normal usage for a month is 5,000 gallons, but in the past few years it has dropped to 3,500 gallons. Doing an audit of meter readings over a few years' time may catch this issue for utilities. Technology is changing all the time, and meter companies now have software that is utilized for billing purposes which automatically looks for changes in usage by consumers and will let systems and even users know if the water usage has gone up or down.

Another item that shows up as water loss is what I like to call human error. These are just simple mistakes are made when numbers are taken from meter readings and put into the billing process. A lot of systems now have newer automatic reading systems that take the readings and put them directly into the billing software and water bills are generated. On the other hand, there are still many systems out there who don't have the latest and greatest technology, and they use the old way and enter the numbers in manually. This isn't a bad way to do it, but does leave room for mistakes such as thinking a number is a 7 when it was a 1. If that mistaken number is at the end of the meter reading, it could only be a few gallons to a few hundred gallons, but if it was at the beginning of the reading, it could add up to millions of gallons.

The final item that could be causing water loss are of course leaks. Water leaks are never easy for the simple fact that our water pipes in South Dakota are buried at a depth of six feet deep on average. If the leak comes to the surface, then it's a pretty good sign that the leak isn't very far away from the surfacing area; if the leak doesn't surface then detecting that leak could be troublesome. There are many ways to find leaks that don't surface. One of them is to use a listening device and listen to valves, hydrants, curb stops, and even walking along the top of the main with a ground mic to see if a noise can be heard. Another way to find leaks is to put pressure gauges on a zoned off section of the system and watch for a pressure drop. If there is a constant drop in pressure, then there is a pretty good chance that there is a possible leak is in the zoned off area. The final way to locate leaks is to use correlation equipment which works very well on asbestos cement pipe as well as any metallic pipe. The correlator does not work as well on PVC pipe since the plastic pipe absorbs the noise being made by the leak, and the noise and does not travel very far from the leak.

SDARWS always likes to confirm leaks in an area with its leak detection trailer. The leak detection trailer doesn't tell where the leak is but does tell us if there is a leak and exactly how many gallons per minute the leak is. The trailer is made up of a water tank, pump and a control panel set up to maintain constant pressure in a system. In most cases the trailer can be used and consumers won't even know the water system is being tested because they are never without water.

As you have just read, water loss can be tricky business and there can be multiple things that can cause what seems like water loss or is actually water loss. SDARWS has been dealing with water loss in systems for many years and is always willing to help with your situation. Sometimes the outcome isn't always what a system wants to hear but it's better to know than to just put up with the numbers not working out right at the end of the billing cycle.

QUALITY MANAGEMENT IN THE WATER/WASTEWATER INDUSTRY

Think about how you define quality in your water or wastewater system. Chances are that the first thing that comes to mind is compliance within the maximum contaminant level or South Dakota Discharge Permit guidelines. The fact of the matter is that most systems not only meet those requirements on an annual basis, but are often well below those limits.

So what makes your final product better than the neighboring system? The fact is that without benchmarking you have no idea. Benchmarking is the process of quantifying various measures of quality so that company A can be compared to companies B through J. It can also be compared to historical data from your own company, or a company in a different industry – it doesn't always have to be done with a comparable system.

Quality can be broken down into statistical and perceived quality. Statistical quality is based upon scientific data your system collects about water quality; the results should be the same regardless of who measures it. Your water quality tests are a good example of your statistical quality. But you should look deeper than annual compliance. In manufacturing, quality is a measure not only of compliance within a range, but also the variation from the normal. Ground water systems have a distinct advantage when it comes to producing consistent water quality. Is it economically feasible to produce consistent water quality to the consumer, when your source varies greatly? You may find it's best to define acceptable ranges.

Perceived quality is based upon subjective judgment. Two people living right across the road from each other may view your water differently based upon their experience and attitudes. Perceived quality can still be measured based upon surveys which convert answers into numbers. These surveys generally ask respondents to answer on a scale of 1-10 with 10 being the best, or from strongly disagree to strongly agree (this is called a Likert scale).

The perception of water quality within your system can be affected by a wide range of things. A customer who has had a bad customer service response is more likely to perceive bad water quality. Or has your population changed from the original customers who were used to private well water, to consumers who have moved in from larger cities? Consumer surveys need to include enough information to group your customers so you can understand the trends. Which tells you more: 10% of our customers feel the water is of poor quality? Or that 80% of our customers who felt our water was of poor quality failed to read their meter at least once this past year? Or perhaps 75% of the poor water quality responses came from an area served by this reservoir.

Another interesting question you might want to ask your customers after you ask them to rate the water quality is, "Did you read the annual Consumer Confidence Report (CCR) published by our system in June 2017?"

Don't be afraid to ask your customers to rate different aspects of your system, or to make an estimate on their perception of the need for infrastructure replacement. A couple sentences explaining projected design life and current age, followed by a question about modest rate increases over the next five years may be a good way to soften them for when you increase rates. Public education through publications, fliers, and news articles can help your perceived quality if well written.

Surveys should be kept to less than one page front and back – less is best, and be sure to include a prepaid return envelope. Don't send the survey out with the bill – that way you can get the truest picture from your consumers.

Once you've collected your data, what do you compare it to? Has another system completed a similar survey recently? Has your system collected the same data in the past? A number of well run systems do conduct consumer surveys on a regular basis (say every five years). The initial survey gave them a feeling of how their consumers viewed their system, but now when they compare it over time, they are able to get a better idea of where they have improved, or possibly lost ground. It also gives them an idea as to when a question may no longer be needed.

Consider comparing your results, rates, and compensation outside of the water industry as well. How do your rates and customer satisfaction compare with electric, telephone, and gas utilities? Are your customers willing to pay more for other utilities, and why? Or go even further, is there another industry that does something similar. For instance FedEx might compare delivery times with Domino's (30 minutes or less) in an effort to not only stack up to UPS and the U.S. Postal Service, but surpass them. Maybe water utilities should compare response times and satisfaction for customer service with Sears appliance repair.

Just because you have improved since last time, did you gain ground against other companies in your industry, or are they out-pacing you? How will you know your water system is ready for the future if you are only judging against yourself? As the stock brokers always remind customers, "past performance is not necessarily an indicator of future performance."

SOUTH DAKOTA RURAL WATER WARRIORS FISHING TOURNAMENT

The first SDARWS Water Warriors fishing tournament was held April 30th at the Cedar Shore Resort and Marina. Twenty-three 2-3 man teams participated in the event. This year the fishermen (and women) were treated to some great weather and brought in 92 walleye, and 151.17 pounds of fish.

The Pierre Wack'em Eyes came in as the winning team with a combined weight of 14.21 lbs., which netted them $615.57. The largest fish caught was a 3.25 pounder by Rob Ganschow of the Happy Hookers team from Clay Rural Water.

Perkins County RW came in second place with a total of six fish for a combined weight of 8.13 lbs – which was good enough earn them $500.

After the fishing tournament, a burger and brat buffet was enjoyed by everyone during the awards ceremony. Thanks to our generous sponsors, every fisherman went home with a prize.

Plans are currently underway to hold the Third Annual SDARWS Water Warriors Fishing Tournament the last Saturday in April 2018 at the Cedar Shore Resort and Marina. Look for more information at our Annual Technical Conference in January.

TOURNAMENT PRIZE SPONSORS

Micro-Comm, EFI & ESI – $1,000
Engineering America – $300
Gransel/Trio Sales – $100
SUEZ – 4-$25 Scheels Gift Cards
Metering Technology – $100
Hawkins Chemical – $200
Casey's (Chamberlain) – 2-$25 Gift Cards; 8 Pizza Cards
Scheels (Sioux Falls) – $25 Gift Card
Runnings (Pierre) – Assorted Prizes
Northwest Pipe – $250
DSG – $100 Cabelas Card
Howalt+McDowell – $250
Cabelas (Mitchell) – 2 Rods & Reels
The Bottle Shop (Chamberlain) – $100 and Minnow Bucket
AE2S – $200
Dick's Sporting Goods – 3-$50 Gift Cards
Chamberlain Ice Tournament – 2 Rods, Reels, & Plugs
Ferguson Water – $300

2017 FISHING TOURNAMENT WINNERS

1ST Pierre Wack em Eyes – $615.57
2ND Dry Dock – $492.45
3RD Happy Hookers – $369.34
4TH Gillen Farms – $246.23
5TH Big Sioux – $184.67
6TH Larry Sterling – $147.74
7TH Gavin Graverson – $123.11
8TH NorthWest Pipe Fittings – $110.80
9TH DuVall – $98.49
10TH Team Brainard – $73.87

Test Your Knowledge

Certification Practice Questions

1 **A calm area within a settling basin necessary for suspended materials to settle is the _____ zone.**

a. inlet
b. outlet
c. settling
d. sludge

2 **How many pounds of a chemical must be added to 50,000 gal of water to produce a dosage of 75 mg/L?**

a. 15 lb
b. 31 lb
c. 60 lb
d. 150 lb

3 **How many milligrams per liter of chlorine will be added when 10 lb. of chlorine gas is added to 333,000 gal of water?**

a. 8.34 mg/L
b. 4.17 mg/L
c. 3.6 mg/L
d. 0.5 mg/L

4 **Five grains per gallon is _____ mg/L.**

a. 35
b. 58
c. 86
d. 506

5 **A rectangular ground storage tank is 60-ft wide, 120-ft long, and 12-ft deep. The tank holds _____ gallons.**

a. 86,400
b. 646,272
c. 720,576
d. 800,000

6 **Hydrogen sulfide in well water will cause the water to have an odor similar to**

a. ammonia.
b. chlorine gas.
c. rotten eggs.
d. fish eggs.

7 **The indicator methyl orange is used in the test for**

a. alkalinity.
b. chlorine residual.
c. pH.
d. total hardness.

8 **Hardness in water is caused mainly by the presence of**

a. calcium and magnesium compounds.
b. iron and manganese compounds.
c. lime and soda ash.
d. turbidity and suspended solids.

9 **The effluent weir of a clarifier is located along the rim of a 60-ft-diameter tank. The length of the weir is _____ ft.**

a. 188
b. 201
c. 248
d. 300

10 **If the flow rate through the above clarifier is 1800 gpm, what is the weir overflow rate in gpd/ft?**

a. 6800 gpd/ft
b. 9300 gpd/ft
c. 4750 gpd/ft
d. 13,800 gpd/ft

Answer Key 1) C 2) B 3) C 4) C 5) B 6) C 7) A 8) A 9) A 10) D

CURRENT BUDGET TO FUND RURAL WATER PRIORITIES

DENNIS N. DAVIS, EXECUTIVE DIRECTOR

On Friday, May 5th, the President signed the $1.07 billion omnibus spending bill approved by the House and Senate earlier this week. The bill, which will fund the government through September, includes full funding for all rural water technical assistance initiatives including Circuit Riders, Wastewater Technicians, Sourcewater Specialists, and EPA technical assistance. The bill also includes funding for both the USDA and EPA water infrastructure funding initiatives – over $570 million for USDA's "Rural Utilities Service" rural development water grant and loan initiative. NRWA has been conducting a year-long grassroots campaign in Congress to have this funding increased – and continues the current campaign to persuade Congress to reject the proposed elimination of the initiative in the coming fiscal year.

"We are thankful for the strong support of Congress for this vital public health, environmental and economic development initiative that was demonstrated in the final Congressional budget agreement. Rural and small communities must continue to support their rural water associations that allow us to be heard in Congress on critical issues like funding for USDA rural water infrastructure," said NRWA President Steve Fletcher, General Manager of the Washington Country Water Company in Nashville, Illinois.

- **USDA Water & Waste Disposal Program: $571,190,000** ***($522,365,000 last year)***
- **EPA Clean Water State Revolving Fund: $1,393,887,000** ***(level funding from last year)***
- **EPA Drinking Water State Revolving Fund: $863,233,000** ***(level funding from last year)***

THE POWER OF AN ASSOCIATION

Everything NRWA accomplishes, from securing many millions of dollars in technical assistance funding, reducing the regulatory burden from the federal rules, or successfully petitioning Congress for billions of dollars in water infrastructure grants each year, only happens because of your grassroots involvement. Our grassroots network is our greatest strength. And only by all of us acting together can we manifest that strength. By organizing together with a common agenda, we can accomplish what none of us could achieve on our own.

FY17 FUNDING AGREEMENT SUPPORTS AGRICULTURE, RURAL COMMUNITIES

The following is an excerpt from Chairman of the Agriculture, Rural Development and Food and Drug Administration Appropriations Committee, Senator Hoeven of North Dakota's press release following the passage of the Omnibus spending bill:

Senator John Hoeven, chairman of the Senate Agriculture, Rural Development and Food and Drug Administration Appropriations Committee, announced on May 2, 2017 that the Fiscal Year 2017 funding agreement provides strong support for North Dakota's and the nation's farmers, ranchers and rural communities.

"As chairman of the Senate Agriculture Appropriations Committee, I worked to ensure that our farmers and ranchers have the support they need given the challenges facing farm country due to low commodity prices," said Hoeven. "This funding legislation supports our producers, provides strong funding for agriculture research and invests in our rural communities."

NRWA MEETS WITH EPA ADMINISTRATOR PRUITT

On Friday May 5th, National Rural Water Association officers and staff met with EPA Administrator Scott Pruitt in Tulsa, Oklahoma. The purpose of the meeting was to introduce the association to the Administrator and offer the association's expertise and experience as a resource in regulatory affairs as they relate to rural and small community water and wastewater systems.

The discussion centered around regulatory fixes as identified by NRWA membership to include consecutive system issues and Total Maximum Daily Load regulations. The Administrator stressed that the agency was in the review process of regulatory issues and encouraged the association to formally submit comments. The NRWA representatives encouraged the agency to view rural and small systems as protectors of public health and the environment as opposed to a regulatory burden.

"The meeting was very informative and the open discussion was very meaningful," said NRWA President Steve Fletcher, who manages Washington County Water company. "Hopefully this meeting is the start of a collaborative process that results in more affordability consideration in the regulatory review and processes."

REGISTER TODAY!

SDARWS 31ST ANNUAL RURAL WATER OPEN

JULY 18, 2017
Elmwood Golf Course
SIOUX FALLS, SD

Registration includes: 18 holes of golf, riding cart, luncheon & prizes!

REGISTER ONLINE AT SDARWS.COM

or: tinyurl.com/SDARWSGOLF

9:00 Shotgun Start (Must register at course by 8:30 am)

TEE BOX SPONSORSHIPS TO BENEFIT RURAL WATER CENTER

Tee Box Sponsorships come in 3 levels - Gold ($500), Silver ($250), and Bronze ($100). All proceeds from Tee Box Sponsorships benefit the Rural Water Center and are TAX DEDUCTIBLE! Sponsorship includes signage at Tee Box, and recognition on electronic signage at registration and during luncheon/awards. This sponsorship can be reserved at the online golf registration page, or by emailing golf@sdarws.com

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