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



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President's Message

Ron Gillen, SDARWS President



Leadership Seminar

Association staff are busy getting ready for our Annual Leadership Seminar which will be held at the Best Western Ramkota Hotel in Pierre November 15-16th. This seminar is geared towards Rural Water System Directors and Board Members and includes informational sessions on water rates, asset management, sustainability, financing, and director and manager panels. The cost to attend Leadership is \$140, and includes a meal at the President's Reception on the evening of November 15th. Members of WaterPro will receive a \$15 discount. Registration for this event will be available on our website at www.sdarws.com, or by calling the SDARWS office at 605-556-7219.

Mark Your Calendar for the 2018 ATC

While the 43rd Annual Technical Conference is still a few months away, the staff at South Dakota Rural Water are already busy behind the scenes gearing up for the event which kicks off Tuesday, January 9th at the Best Western Ramkota in Pierre.

Online registration is now open, so check sdarws.com for everything you need to know – agendas, hotel information, and news regarding the upcoming conference. For those with smartphones, once you are registered online you will have access to our mobile app where you can manage your event registration, access event information on-the-go, and improve networking opportunities. The early bird registration deadline for this year's conference is December 15, 2017.

For our exhibitors, we will be offering two types of booth registrations: Full Conference Hallway (Tuesday and Wednesday) for \$450, and Wednesday Night at our Exhibit Hall for \$350, just like we've been doing for the past few years. Booth spaces are limited – so make sure to register soon to reserve your space! Make sure to reserve your booth space before December 15, 2017 to be eligible for the Early Bird pricing; exhibit booth prices will go up an extra \$50 after that date.

This year's awards brunch will feature a public judging of the top three finalists in the SD Rural Water Taste Test. The winner chosen at this taste test will go on to represent South Dakota in the National Rural Water Taste Test held at the Rural Water Rally in Washington, DC in February. If your water system is interested in participating in the taste test, please make sure that they bring a quart-sized glass jar filled with water from your water system to the Registration Desk by 2:00pm on Tuesday, January 9th.

Exhibitors can again look forward to participating in various advertising sponsorships at this year's conference. Please visit www.sdarws.com/annual-conference.html to see what we still have available. ♦

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Send Correspondence to:
South Dakota Association of Rural Water Systems
P.O. Box 287, Madison, SD 57042
Phone 605.556.7219, Fax 605.556.1497
email: info@sdarws.com



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Training Calendar

NOVEMBER

1 – SUSTAINABLE MANAGEMENT OF RURAL AND SMALL SYSTEMS WORKSHOP

Mobridge Public Library

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This workshop focuses on ten key management areas of effectively managed utilities, which make up a framework for a complete and well-rounded management approach. By making operational improvements in any of these areas, your utility will be able to deliver increasingly efficient, high quality services to your community. This workshop is geared towards small water and wastewater systems and finance officers, mayors, city council members, and water/wastewater management are all encouraged to attend.

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.

DECEMBER

5 – WASTEWATER COLLECTION

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 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.

13 – SUSTAINABLE MANAGEMENT OF RURAL AND SMALL SYSTEMS WORKSHOP

Arlington City Hall

202 West Elm Street • Arlington SD 57212

This workshop focuses on ten key management areas of effectively managed utilities, which make up a framework for a complete and well-rounded management approach. By making operational improvements in any of these areas, your utility will be able to deliver increasingly efficient, high quality services to your community. This workshop is geared towards small water and wastewater systems and finance officers, mayors, city council members, and water/wastewater management are all encouraged to attend.

JANUARY

23-25 – BASIC WATER TREATMENT

Spearfish Holiday Inn

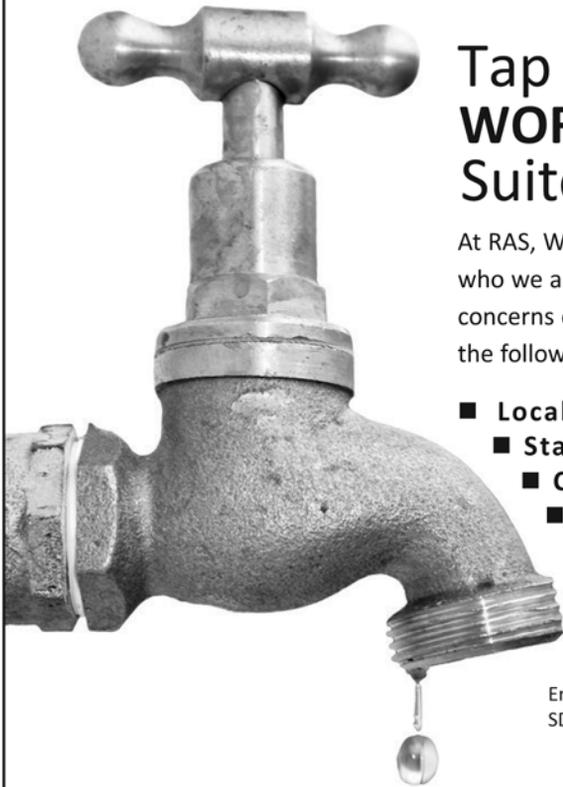
305 N. 27th Street • Spearfish, SD 57783

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.

**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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SDARWS STAFF DIRECTORY



DENNIS DAVIS

Executive Director
dndavis@sdarws.com
605-201-0166



NICK JACKSON

West River Circuit Rider
njackson@sdarws.com
605-641-4557



JIM ZECK

Training Specialist
jzeck@sdarws.com
605-201-9568



MIKE MOELLER

West River Circuit Rider
mmoeller@sdarws.com
605-270-4989



STEVE ATTEMA

Training Specialist
sattema@sdarws.com
605-270-1766



BRANT AGER

West River Circuit Rider
bager@sdarws.com
605-641-1923



MORRIS ELCOCK

East River Circuit Rider
morrisre@sdarws.com
605-201-9561



JEREMIAH CORBIN

*Source Water
Protection Specialist*
jcorbin@sdarws.com
605-270-3894



GREG GROSS

East River Circuit Rider
ggross@sdarws.com
605-201-6026



ROBYN BROTHERS

Office Manager
rbrothers@sdarws.com
605-556-7219



JERRY HEMEIER

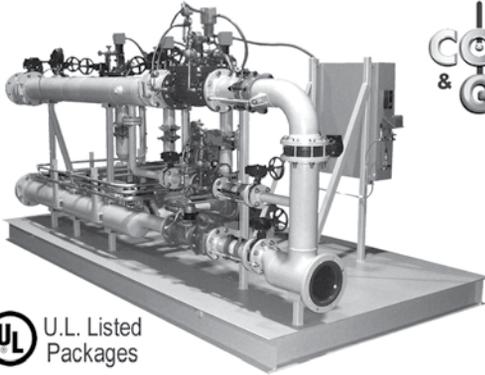
Wastewater Technician
dndavis@sdarws.com
605-201-0170



JENNIFER BAME

*Communications &
Marketing Coordinator*
jbame@sdarws.com
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NOVEMBER 15-16, 2017

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SDARWS Named Rural Water Association of the Year!

The South Dakota Association of Rural Water Systems (SDARWS) was named "State Association of the Year" at the annual Tribute to Excellence awards ceremony, held on Sept. 18 at the National Rural Water Association's (NRWA) WaterPro Conference in Reno, NV.

"The most prestigious and most honored award is the State Association of the Year," said Ed Savage, chair of the NRWA Awards Committee. "It is presented to the state association that projects a team effort in all areas of professional association operations and membership service. The State Association of the Year has excelled in all categories of the award and this is only accomplished by teamwork, strong leadership and member support."

"For 45 years, SDARWS has been well-respected for the high-quality training, services, publications and advocacy they provide their members," Savage said. "With 12 employees and a combined total of 147 years of experience in the industry, this association trains thousands of individuals in all aspects of water/wastewater management through workshops, training classes, and conferences each year."

The association supports research programs like the Regional Water Research Consortium and the Water & Environmental Engineering Research Center, and are committed to the long-term sustainability of rural water systems. They have also lobbied successfully against sales taxes on water and other pertinent issues while also supporting issues that are important to rural water systems such as the railroad bill, battling the Corps of Engineers over water rights, and supporting continued funding of the Water Omnibus bill.

SDARWS also produces the consumer magazine, Quality on Tap! The magazine is a cooperative effort between 17 rural water systems and the Association, and reaches over 38,000 rural water households throughout South Dakota. ♦





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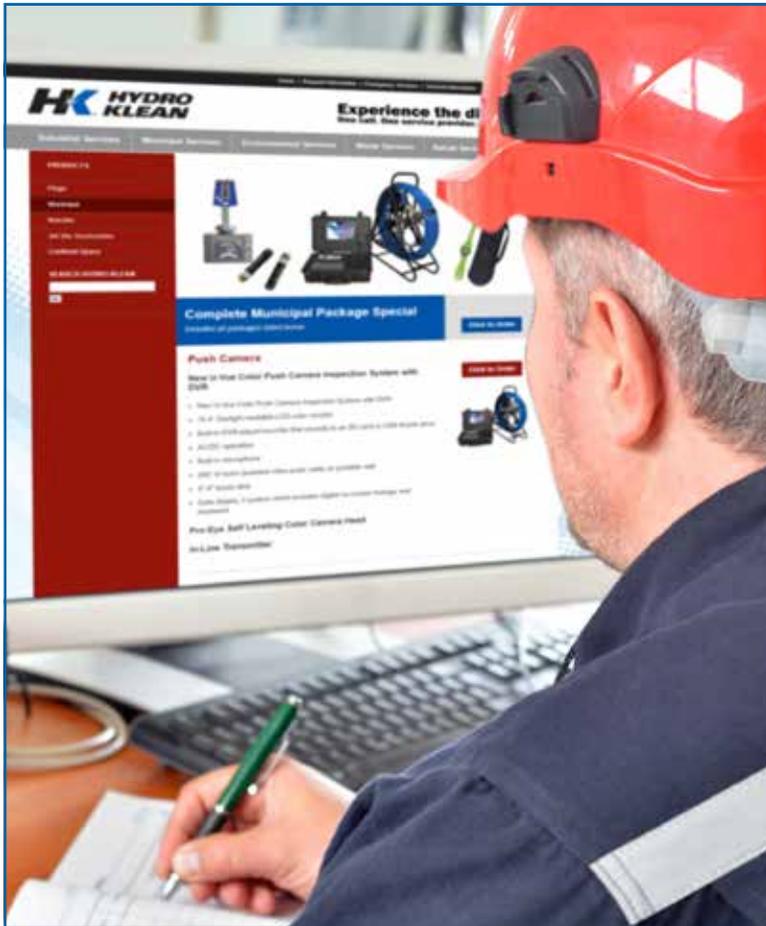
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Association staff are busy getting ready for our Annual Leadership Seminar which will be held at the Best Western Ramkota Hotel in Pierre November 15-16th. This seminar is geared towards Rural Water System Directors and Board Members. The cost to attend Leadership is \$140, and includes a meal at the President's Reception on the evening of November 15th. There will be a \$15 discount for WaterPro

members. Registration for this event will be available on our website at sdrws.com. The tentative agenda is below:

If you haven't attended a leadership training in the past, we highly suggest you register to attend this one. Registration for this event is available on our website at sdrws.com/leadership.html. The tentative agenda topics are shown below:

- 1. Key Leadership Traits of successful organizations**
- 2. Key Governance Documents**
- 3. What does non-profit mean?**
- 4. The importance of Strategic Planning**
- 5. The roles of the Board and Management**
- 6. Tips for running a productive meeting**
- 7. 10 key responsibilities of a board member**
- 8. Fiduciary Responsibility**
 - a. Internal Controls
 - b. Role of Board & Staff
 - c. Know the Revenue Sources
 - d. Understanding Financials

9. Financials: Reports and Reserves

- a. Reserves
- b. Audit Basics
- c. Keys to financial success

10. Legislative

- a. Responsibilities
- b. How the process works
- c. Creating a Legislative Plan
 - i. Rural Water Rally
 - ii. WaterPac
 - iii. Measuring success

11. Tying this back to you!!

- a. System Director - System - State Association - NRWA



FINANCIAL COMPONENTS OF PRACTICAL ASSET MANAGEMENT

By Miranda Kleven, PE, and Kevin Smith, AICP, Advanced Engineering and Environmental Services, Inc. (AE2S)

The June and August editions of *ServiceLine* contained articles that presented examples of how to incorporate risk assessment and infrastructure condition in a rural water Asset Management program. Understanding risk and consequence of asset failure can be used to develop operating budgets and capital improvement plans, which in turn assist rural water systems in prioritizing maintenance activities that can prolong the life and enhance the performance of the system. This article outlines the next step in the Asset Management strategy: capturing detailed operating and capital requirements.

Figure 1 illustrates how financial resources fit into an Asset Management plan. Implementation of operation and maintenance activities, repair and replacement, and capital investment is dependent upon system finances. Financial management is a key to implementing a successful asset management program. This article will explore what that means for a rural water system and provide guidance for the development of system Revenue Requirements (total annual costs for operating and funding of capital and reserves). Prior to exploring system revenue requirements in detail, it is important to first introduce the concept of life cycle cost (LCC) and how it relates to the development of operational budgets and capital planning.

Understanding Life Cycle Cost

There are four general categories of activity and cost associated with managing system assets: 1) operate and maintain, 2) repair upon failure, 3) rehabilitate, and 4) replace. Lifecycle Asset Management is a term used to describe how systems determine how much time and financial resources to invest on each category, based on achieving the longest life at the desired level of service for the lowest cost.

The LCC is defined as the total cost of owning and maintaining an asset, from original purchase date to disposal. The LCC is

often used when comparing project alternatives to determine the lowest cost of ownership between similar options. In Asset Management, evaluation of the LCC is typically triggered as a result of one of two situations: 1) the cost of operating the current asset is increasing, thereby decreasing cost-effectiveness, or 2) information becomes available that identifies a better/more

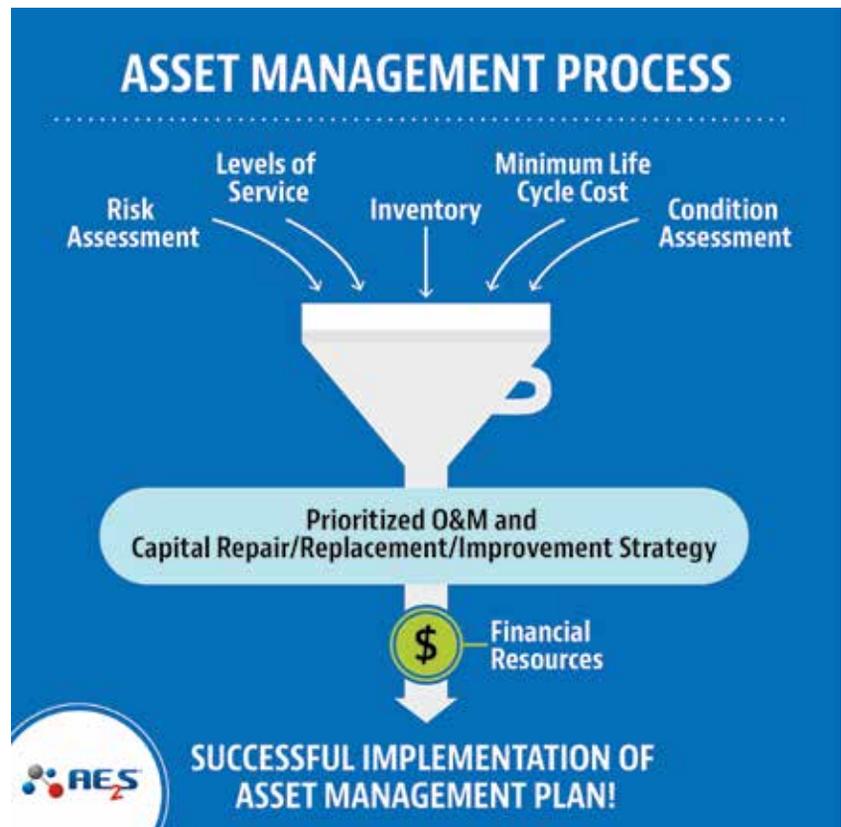


Figure 1: Illustration of Financial Role within Successful Asset Management Approach

cost-effective asset or approach to a particular system operation. Either trigger warrants the completion of an LCC analysis to determine whether the asset should be replaced and/or whether making a change from current operations is economical. A straight-forward approach to estimating the LCC is shown in Figure 2.

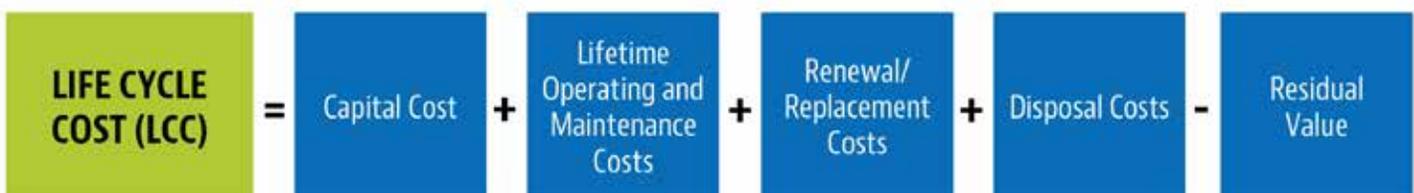


Figure 2: Life Cycle Cost Analysis Equation



The LCC is evaluated in the present worth. The costs shown in Figure 2 are estimated for each year of anticipated life of the asset and then discounted back to the present using a discount factor. The discount factor represents the cost of obtaining new capital, commonly set at the interest rate associated with obtaining new debt. Figure 3 illustrates the annual LCC for an asset, showing that optimal time for replacement, in financial terms, is year 20. In Figure 3, the residual value of the asset at the time of disposal is assumed to be zero. Understanding the LCC can help frame the budget, including repair and replacement activities, as well as the Capital Improvements Plan (CIP). This is discussed next.

O&M Budget Considerations

Support of general operations, including asset management activities, is reflected in the annual system operating budget. Some important considerations that can help increase cost-effectiveness are shown below:

1. Develop formalized operating and maintenance procedures. The life and performance of system assets can be maximized when they are operated and maintained in a consistent manner. The use of documented practices can also streamline training for new employees. Types of Operation and Maintenance (O&M) procedures to consider include:
 - a. Standard Operating Procedures
 - b. Alternate Operating Procedures
 - c. Emergency Operating Procedures
 - d. Preventative Maintenance Procedures

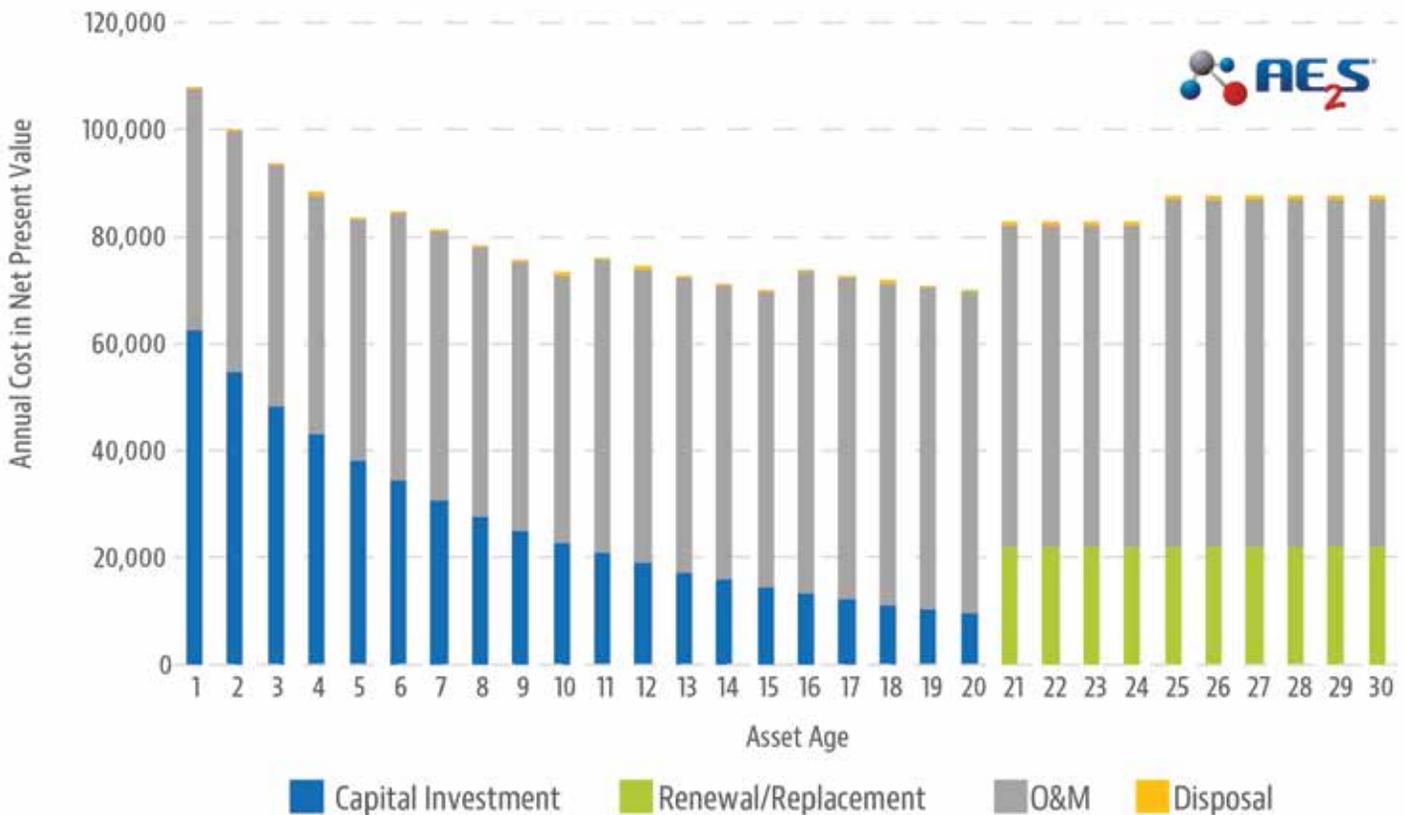
- e. Corrective Maintenance Procedures
2. For ongoing condition assessment purposes as well as to assist in the budget process, it can be helpful to keep a record of specific O&M required by system asset.
3. Complete ongoing maintenance in a timely manner to receive the most benefit.

Budgeting for Repair and Replacement

In addition to O&M costs, total annual system revenue requirements should account for programmed Repair and Replacement items. The identification of these items can be made based on the results of the risk and condition assessment activities described in the June and August Asset Management articles in *ServiceLine*.

The list of items for repair or refurbishment commonly includes larger assets such as pumps and storage tanks. Assets that are typically replaced on a regular schedule include items such as meters and chemical feed pumps. Table 1 provides an example of pertinent information to document when assembling a schedule to support budgeted repair and replacement, along with examples of other data that can be obtained. The repair/replacement items and associated costs in Table 1 are for illustrative purposes only. Estimated costs can either be provided in present value or future value associated with the programmed date for the expenditure. It is helpful to provide the estimated cost in terms of the present value. When the annual budget is assembled, these items then need to be re-evaluated and indexed to the budget year, if appropriate.

Figure 3: Example of Annual Life Cycle Cost



...continued on page 18



Table 1: Five-Year Schedule for Repair and Replacement

YEAR	ITEM	DESCRIPTION	ESTIMATED COST (\$)	YEAR OF EST. COST	FUNDING SOURCE	TIME PERIOD IF RECURRING
2018	Well Pump #1	Rehabilitation	\$15,000	2018	User Fees	Every 5 Years
2019	Meter Replacement	Replace 1/4 of meters	\$25,000	2018	User Fees	Every 5 Years
2019	Well Pump #2	Rehabilitation	\$15,000	2018	User Fees	Every 5 Years
2020	Chlorine Pump	Replacement	\$3,000	2018	User Fees	Every 10 Years
2021	High Service Pump #1	Rehabilitation	\$25,000	2018	User Fees	Every 5 Years
2021	Well Pump #3	Rehabilitation	\$15,000	2018	User Fees	Every 5 Years
2022	Well Pump #4	Rehabilitation	\$15,000	2018	User Fees	Every 5 Years

Budgeting for Capital Investment/Reinvestment

A comprehensive CIP that considers capital requirements five to 10 years in the future can be useful and should capture major repair events for existing assets, as well as anticipated replacement. This is where the LCC evaluation can be handy. It is also important to account for projects associated with anticipated increased service levels as a result of projected growth. Table 2 summarizes a general format for setting up a CIP.

An important component of a comprehensive CIP is the identification of funding sources. By studying future growth and capacity needs, a system can identify major improvements with enough time in advance to seek potential funding sources, or to adjust user rates to the level necessary to support individual capital projects. The importance of prudent capital expenditures and the impact of capital expenditures on revenue requirements for the utility are primary reasons to consider periodic review of rates. Updating rates through a detailed analysis provides support for O&M, capital, and reserve needs, as well as providing information to educate board members and customers.

A comprehensive capital improvement plan is key for system sustainability. Already a goal for most systems, an Asset Management program that includes a sustainable O&M, Replacement, and Capital Plan is also becoming a requirement

for some government funding agencies as part of funding requests.

Determining Adequate Reserve Levels

The majority of water systems costs are fixed, and occur evenly throughout the year. Water system revenues, on the other hand, often fluctuate throughout the course of the year based on water sales and billing practices. As a result, most systems fund an Operating Reserve with a minimum balance ranging from 30 to 120 days of operating expense. In addition, to address unplanned capital expenditures, systems also commonly fund a reserve account targeted for capital improvements. Target levels for such a reserve vary widely and are based on individual utility circumstances. Typically, a minimum target balance is set at one to two times the value of the annual CIP. As asset management programs are developed, inputs such as replacement schedules can be used to better define capital reserve needs.

In cases where water supply is limited or at risk, a system may elect to fund a reserve equivalent to the cost of obtaining an additional water supply. For systems with existing debt, a minimum reserve is typically specified within the bond documents, and may be required to be held in a restricted account. As part of comprehensive financial planning, system managers and boards can establish reserve guidelines, and gradually build annual contributions to reserves into the overall rate revenue requirements.

Table 2: Five-Year Capital Improvements Plan

PROJECT YEAR (YEAR OF CONSTRUCTION)	PROJECT NAME	PROJECT DESCRIPTION	ESTIMATED PROJECT COST (INDEXED TO YEAR OF CONSTRUCTION)	FUNDING SOURCE
2018	Storage Tank	New Tank in South System	\$500,000	50% Grant, 50% Loan
2019	Transmission Replacement	Replace 6 miles	\$2,000,000	Loan
2021	Well	New Well	\$800,000	User Fees/Reserves



Figure 4: Components of Total Annual Revenue Requirements

TOTAL REVENUE REQUIREMENTS	
O&M	
Repair/Replacement	
CIP	
Contribution to Reserves	



Figure 5: Cost of Service Process



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- Pumping
- Billing
- Meters
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- Administration

- Capacity
- Commodity
- Customer
- Meter
- Assigned

- Rural Residential
- Commercial
- Industrial
- Bulk User 1
- Bulk User 2

...continued on page 21

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Proactive Rate Planning

Another objective of successful asset management is to be proactive. This applies to financial management as well as physical operation/management of the system. The product of the O&M, repair/replacement, and capital planning efforts discussed previously results in total revenue requirements for the system, illustrated in Figure 4.

The water industry has long promoted full cost recovery in rate planning. By necessity, most rural and regional water systems can operate no other way, as they typically do not have the ability to borrow or receive transfers from other types of accounts, such as a City's General Fund. The configuration of a system's rate schedule should reflect the user base, and as a result, approaches to cost recovery vary widely.

In general, regional systems have historically set fixed monthly user charges based on debt associated with the system to ensure the generation of revenue needed to cover annual debt service requirements, including coverage. In many cases, the bulk of annual revenue requirements are also fixed costs that will not vary based on the amount of water produced and sold. For that reason, regional systems also regularly set a fixed monthly charge to include a portion of fixed O&M charges. The remainder of the required rate revenue is generated through a volumetric charge, which is subject to the amount of water sold. This is where having an Operating Reserve provides the system with adequate cash to implement the operating and capital plans through times of negatively fluctuating water sales and resulting revenue shortfalls.

A Cost of Service Analysis (COSA) identifies the cost associated with providing service to each specific user type and can be useful when a utility has distinctly different user classes. For instance, the cost of providing service to a municipality as a wholesale user is vastly different from the cost associated with an individual rural farmstead, which is different from the cost to serve a water-intensive industrial user. The results of a COSA for such a case can provide support for setting rates for each type of user. Figure 5 illustrates the typical steps of a COSA. Regardless of whether COSA-based rate setting is employed, a water system should strive to set rates that address all revenue requirements shown in Figure 4, even if it takes a multi-year rate plan to do so.

Conclusion

Previous editions of *ServiceLine* contained articles that presented guidance on how to incorporate the assessment of risk and infrastructure condition into a rural water Asset Management program. Identifying and generating the necessary financial resources are an important aspect of successful implementation of the Asset Management program.

In the day to day management of a regional water system, it is suggested that utilities strive to meet the following objectives:

- Improve the budget process by documenting and quantifying time spent on specific infrastructure;
- Implement consistent O&M practices and train employees to actively record feedback on asset operations that would indicate a potential reduction in level of service;
- Utilize LCC in evaluating new or improved system components;
- Develop an annual line item for capital replacement supported by an infrastructure condition assessment;
- Determine appropriate reserve goals and strive to meet and maintain target balances;
- If appropriate, evaluate the cost of service associated with user classes to measure the suitability of existing rates in terms of assigning cost to those causing cost;
- Evaluate the performance of the existing rate structure in terms of meeting annual revenue requirements and develop a rate plan designed to continue meeting annual revenue requirements.

Implementation of a successful asset management program involves both human and capital resources, and requires the support of stakeholders and decision-makers. In a fourth and final article in this Asset Management series, key components of a successful asset management program implemented by a South Dakota rural water system will be highlighted.💧

Miranda is a Special Projects Engineer with AE2S and can be reached at (701) 746-8087. Kevin is an Operations Manager with expertise in Asset Management and can be reached (605) 275-5620.

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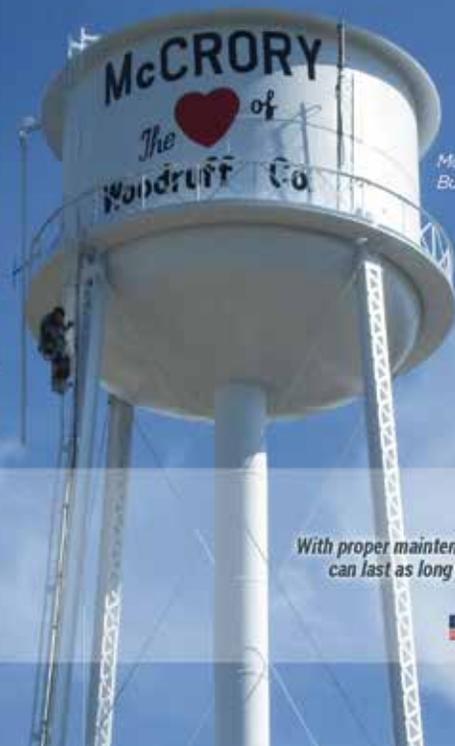
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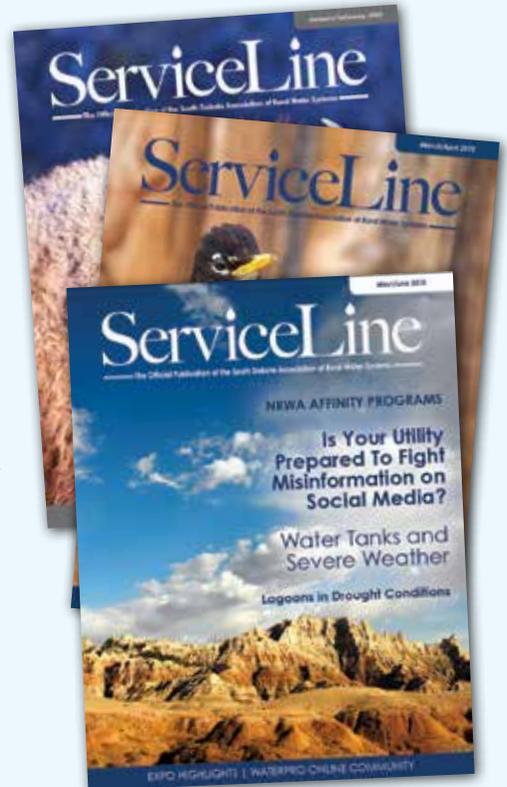
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What was your first job? Pick up, Delivery of campers and working in the shop at Spader's RV in Sioux Falls

What was your first water related job? Water Superintendent for the City of Viborg

What does your typical day as a Circuit Rider entail? Travel away from your family, helping systems that for some reason or another are letting the system control them instead of them controlling the system.

What's your favorite thing about being a Circuit Rider? Helping small water systems.

What's the most challenging job you've ever undertaken as a Circuit Rider? Missouri River flood.

How do you think rural water systems could operate more effectively? By keeping up with the changes in technology but don't forget the basics and rely on the experience of their water operations specialist.

What's the best advice you could give to rural water systems? Communicate and listen to their member needs, long range planning is vital to turn success. Also communicate and listen to their employees, take care of them with the best benefits possible for long term retention because it is the employee that will help you meet the demands of your members.

What advice would you give to a young person who wants to embark on a water career? Stay out of the politics as much as possible, keep up with the regulations, keep an open mind on any issue, listen and try to be best friends with a retired operator from any system. ♦



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POLY-PIGGING FORCE MAINS



South Dakota Association of Rural Water Systems will assist your community with poly-pigging your force main from the lift station to the stabilization pond. This procedure should be added to your maintenance plan to help maintain the lift station's performance

When the lift station pushes solids through the line, the water travels about 200 feet, and then the lift station pump turns off. Since the water has stopped flowing this allows some of those solids to settle. These settled solids remain in the force main when the pump cycles back on but are not pushed further down the main due to their weight. This procedure, which happens many times each day, will eventually create a buildup of solids that can only be removed by pigging the line.

In June, we poly pigged the force main for Frankfort, SD. The poly-pigging procedure is performed by inserting a foam cylinder called a "pig" into the pipe. To push the "pig" through the pipe we cannot utilize the pumps from the main lift station. Lift station pumps are built to move solids, not pressure, so we used a fire truck to force the pig through the main. Since the distance from the lift station to the lagoon was approximately 3,300 feet, and the force main was a 4-inch diameter pipe, the velocity of the "pig" was calculated to be around 2.5 feet per second.

Prior to the pigging procedure, the lift station pump #1 was pumping 23.6 gallons per minute (GPM). This number was derived by calculating the volume of the wet well and measuring the drop-in water while the pumps were operating. Pump #2 was pumping 9.8 GPM.

After the pigging procedure, the flow from Pump #1 was 117.43 GPM and pump #2 was 103.1 GPM. This shows an increase of 400% on Pump #1 and 952% on Pump #2.

The city was paying approximately \$76.00 per month for electricity. After the pigging the electric bill was lowered to around \$36.00. Pigging out in this case was a good idea. If your system would like our assistance with poly pigging, please call our Madison office at 605-556-7219. ♦

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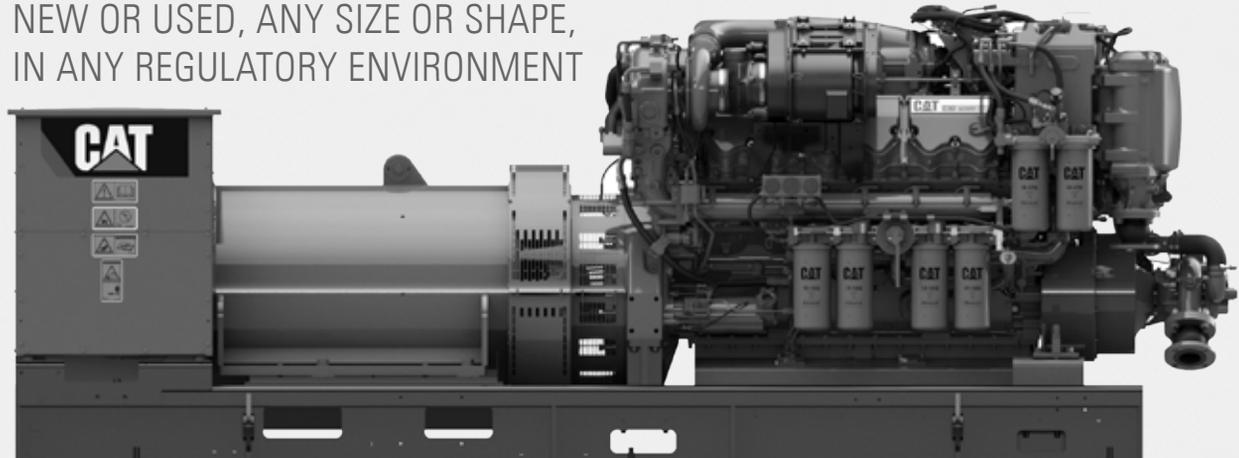
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Ends: 9/3/2015 11:30 AM (CT)

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Tuesday, September 29, 2015

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9/29/2015, 8:30 AM - 4:00 PM (MT)

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Wednesday, September 30, 2015

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South Dakota Rural Water AWARD NOMINATIONS

Do you know someone who is doing a great job? Goes above and beyond the call of duty? Has your water system achieved excellence this year – or has overcome some amazing challenges?

Give recognition where it is due by completing our Awards Nomination Form. Awards will be presented at the Awards Brunch at the ATC – January 11, 2018. **Application deadline is October 27, 2017.** Eligible nominees must be affiliated with a system member in good standing. The online form can be found at www.surveymonkey.com/r/ATCAwards, or through a link on our website at: www.sdarws.com/annual-conference.html.

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RURAL WATER OFFICE PERSON OF THE YEAR: Recognition for an administrative employee of a Rural Water System for outstanding performance in office management and procedures

RURAL WATER SYSTEM OPERATIONS SUPERVISOR OF THE YEAR: Recognition for a State of South Dakota Certified Operator who is actively working a supervisory role for a Rural Water System, and has demonstrated outstanding leadership ability and/or accomplishments in drinking water.

RURAL WATER SYSTEM OPERATIONS SPECIALIST OF THE YEAR: Recognition for a State of South Dakota Certified Operator who is actively working for a Rural Water System with outstanding leadership ability and/or accomplishments in drinking water.

MUNICIPAL MANAGER OF THE YEAR: Recognition for a municipal manager for outstanding performance in managing a municipality.

MUNICIPAL OFFICE PERSON OF THE YEAR: Recognition for an administrative employee of a municipality (i.e. clerk, finance officer, etc.) for outstanding performance in office management and procedures.

MUNICIPAL OPERATIONS SPECIALIST OF THE YEAR: Recognition for a State of South Dakota Certified Operator who is actively working for a municipality with outstanding leadership ability/accomplishments in water.

FRIEND OF RURAL WATER: This distinguished honor is awarded to agencies, organizations, or individuals who have lent a hand in supporting this fantastic phenomenon we call Rural Water. The ability to provide life's essential need, water, to all the citizens of South Dakota was not done by one person or organization; it is a collective effort encompassing many.

SPIRIT OF RURAL WATER: This award is presented to an individual, business or group that goes above and beyond for a rural water system or rural water cause. South Dakota Rural Water wants to recognize exceptional rural water advocates that stand out from the pack because of their commitment to rural water issues and/or their passion for the job. Eligible candidates include rural and community water consumers, employees, directors, as well as lawmakers, businesses, or any person or group that puts forth a noble effort to advance rural water.

DONALD B. POSPISHIL: This award honors the work of Don Pospishil who dedicated many years of his life to helping small water systems across South Dakota. The Donald B. Pospishil Award is awarded to individuals who demonstrate leadership abilities in the water supply field, provide quality services to consumers, and exhibits professionalism and dedication while operating and maintaining a small water system.💧

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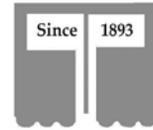
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1 Centrifugal, positive displacement and turbine are all:

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- d. Types of pumps

2 Water hammer is most likely to be caused by

- a. Dissolved gases in the water
- b. Closing a valve to fast
- c. Tuberculation
- d. Ruptured water lines

3 Positive displacement pumps should be operated when

- a. Suction and discharge line valve are closed
- b. Suction and discharge line valves are open
- c. Suction line valve are close and discharge line valves are open
- d. Suction line valves are open and discharge line valve are closed

4 Pump seals can be classified as

- a. Balanced and unbalanced
- b. Packing ring or mechanical
- c. Flat and smooth faced or round faced
- d. Factory or custom

5 What is the most probable cause of a pinging sound coming from a pump?

- a. Descaling
- b. Cavitation
- c. Corrosion
- d. Hardness

6 Which of the following parts in a centrifugal pump restricts flow between the impeller discharge and suction areas?

- a. Wear rings
- b. Shaft rings
- c. Packing rings
- d. Lantern rings

7 Determine the brake horsepower (bhp) if the motor has an efficiency of 91% and the horsepower (hp) is 40.

- a. 30 bhp
- b. 36 bhp
- c. 44 bhp
- d. 67 bhp

8 A 0.250 MG clear well needs to have chlorine added to a dosage of 2.5 mg/L, how many lbs of chlorine gas (100% purity) will be needed?

- a. 2.36 lbs
- b. 3.46 lbs
- c. 4.85 lbs
- d. 5.21 lbs

9 Your system installs a new sodium hypochlorite (bleach) generator that produces a 0.8 % solution of sodium hypochlorite. In the past 24 hours you used 300 gallons of this hypochlorite solution and pumped an average of 900 gpm. What is your chlorine dosage (mg/L)? (Assume the hypochlorite solution has a specific gravity of 1)

- a. 1.9 mg/L
- b. 2.35 mg/L
- c. 0.85 mg/L
- d. 3.55 mg/L

10 Specifications allow for a maximum of 0.5 gallons/hr/1000 feet of leakage in a new water main during hydrostatic testing. What would be the maximum allowable leakage (in gph) for 1 mile of new water main?

- a. 1.85 gph
- b. 2.32 gph
- c. 8.3 gph
- d. 2.6 gph

Answer Key

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



MAKE PLANS TO ATTEND THE 2018 ATC

DENNIS N. DAVIS, EXECUTIVE DIRECTOR

While the Annual Technical Conference is still a few months away, the staff at South Dakota Rural Water are already busy behind the scenes gearing up for the event which kicks off Tuesday, January 9th at the Best Western Ramkota in Pierre.

Registration will be available soon on our website at sdarws.com which aims to improve communication for both exhibitors and attendees, and should also ease the registration process. Our website will contain up-to-date agendas and news regarding the conference and the ability to register online. For those with smartphones – once you are registered online you will have access to our mobile app where you can manage your event registration, access event information on-the-go, and improve networking opportunities. Our Early Bird registration discount will be available until December 15, 2017 – so be sure to register early!

This year's keynote speaker is Joe Schmit. A winner of 17 Emmys from the National Television Academy, as well as a prestigious National Headliner Award, Joe has interviewed over ten thousand athletes and covered every major sporting event from the Super Bowl to the World Series. Currently the Sports Director of KSTP-TV, an ABC-affiliate in a top 15 market, Joe is also a regular on 1500 ESPN Radio and hosts the Minnesota

Twins Post-game Show. Even Hollywood recognizes his award-winning style, garnering his broadcast talent for an appearance in the major motion picture, *Untamed Heart*.

In his keynote address, Joe tells stories of real people and the ways in which they had profound influence on others in daily life. He points to simple, powerful lessons in the stories, and will inspire you to recognize your daily opportunities to make an intentional impact on others, including stories on famous athletes like Joe Mauer, Paul Molitor, and Larry Fitzgerald, Jr., and some not-so-famous people whose stories will have an impact on you as well.

This year's awards brunch will feature a public judging of the top three finalists in the SD Rural Water Taste Test. The winner chosen at this taste test will go on to represent South Dakota in the National Rural Water Taste Test held at the Rural Water Rally in Washington, DC in February. If your water system is interested in participating in the taste test, make sure that they bring a quart-sized glass jar filled with water from your water system to the Registration Desk by 2pm on Tuesday, January 9th.

We will again be hosting a spouse program – so be sure to bring along your significant other. Hotel room blocks are also open until December 5th.

We look forward to seeing you in Pierre! ♦

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