

Summer 2023

Renaissance People

The State of Wyoming's Water and Wastewater Infrastructure

Midnight Dumps





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The Association

Wyoming Association of Rural Water Systems is a non-profit association that provides on-site, one-on-one technical assistance and training to small municipalities under 10,000 population and all water and wastewater systems throughout the state. Equal Opportunity Provider.

Cover Photo – near Dixon, on the county road. Photo by Michelle Christopher



WARWS' Mission:

To provide the assistance necessary to meet the needs of our membership and to ensure the protection of Wyoming's water ~ our most precious resource.

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2023 Addressing Aging Infrastructure and Member Benefit

It is budget season in Wyoming. All governmental units must have their budgets in place by June 30 for fiscal year 2023-24 which starts on July 1, 2023. There has been a lot of money made available from Congress in the last couple years to help address the aging infrastructure needs of every public water system in Wyoming. Irrigation Districts and any other entities dealing with water also have access to more funding than typical.

10 years ago, Kathy Weinsaft and I were driving from one end of the state to the other doing rate analysis for systems who way back then knew they needed to address rates to generate revenue to operate their systems efficiently. We were doing rate analysis before that as well and continue to do rate analysis today to help systems produce affordable rates that actually help fund utility operations and improvements.

We were contacted by a gentleman that Kathy had worked with in Missouri who had been contacted by a municipality here in Wyoming. The result of the conversations gave rise to The Wyoming Rates Program.

The program is going strong. Carl Brown was doing rate studies and looking to grow his business and Kathy and I looked at his work and saw a very viable partnership. She and I could assess current rates, do raw drafts and analysis and for many systems (about 10-15 a year) that is enough for them to get rates back on a growth track and generate much needed additional revenue while continuing to provide valuable, affordable services. We also help them assess water loss and accounts that might be getting service but never got set up as a customer or a myriad of utility management items.

What made the program really succeed is that many utilities want an in-depth independent study and someone who can help explain the issues to their customers, hence, Getting Great Rates and the Wyoming Rates Program was forged. Over the last 10 years, Carl has done 39 utility studies for 19 municipalities or special districts. Carl has done water, wastewater, trash and electricity analysis for those governmental entities. His presentations are done from the specialist perspective that he is. It has been a great asset for Wyoming utilities. In addition to his rate studies, he does training sessions for us and has done a couple a year for those 10 years. He has a lot of free info on his website and coupled with the training sessions, many systems have done DIY analysis. Our field staff are trained in these tools and

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each column, and each 3x3 block contains the numbers 1-9 with no repeats.

can "double check" your math or assist with an internal analysis you take on.

In true transparency, Carl had offered us a "fee share" program initially but we wanted full transparency in being "neutral" and recommending Carl based on his expertise, not the potential fee we may get. So, I asked Carl if he would be willing to "discount" his fees for systems that are members of the Association instead of sharing with us.

We wanted the membership to benefit from being loyal members of the Association. It has worked out well for all concerned. We have a very trusted expert in rate structure and analysis, members are getting very in depth and independent rate analysis while saving money and Carl has grown his business over the years.

Here are some fun facts about RATES:

- Over the first five years after Carl's analysis and the utilities have adopted new rates, utilities in Wyoming have generated more than \$63,600,000 in increased revenue. And that's just the first five years' worth. The extra revenue keeps on coming if you "stick with the program."
- The average increase per utility works out to \$335,000 per year. Depending on how much you

needed, "Your mileage may vary."

- Looking at what the annual increase can support over a 20-year, 2% loan, over \$5,495,000 in needed improvements can be financed with that savings.
- If you do the math, the return on investment of how long it takes to pay for Carl's service averages less than two days of the <u>extra</u> revenue generated by the new rates. Again, "your mileage may vary."
- WARWS members have enjoyed over \$80,000 in discounts from Carl's retail fee structure.

Carl has similar programs with the rural water associations in Arizona, Colorado, Kansas, Nevada, New Mexico, North Dakota and Virginia.

A big jump in revenue for Wyoming utilities at little cost to get it. Those are some fun facts, Wyoming.

Now, Carl has teamed up with Arnab (Arnie) Bhowmick from Aktivov Asset Management to provide a one stop partnership and approach to meet any new asset management needs for our membership that fully integrates with GettingGreatRates.

You can reach Carl at: <u>https://gettinggreatrates.com/</u> or carl1@gettinggreatrates.com

Contact Arnab at: <u>https://www.aktivov.com/</u> arnab@aakavs.com

Or give Kathy or me a call. Charging affordable rates while generating revenue to fund your utility operations are just a call away. Mr. P







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Michelle Christopher

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Renaissance People

Once upon a time, there was an "awakening" in Europe. No, they weren't "woke", that came several centuries later. Rather, these folks renewed society's interest in culture, art, politics and economics. Basically, they tried to be good at everything. This time period was called the Renaissance, French for rebirth. It came after the Dark Ages when superstitions and the bubonic plague reigned supreme.

The ideal European "Renaissance Man" excelled in a variety of areas. He was well educated, charming, witty, able to dance, write poetry, sing, play music, wrestle, ride horses, and be able to fight as a swordsman. Not sure what proper Renaissance Ladies were doing, probably learning to walk in heels, write poetry and overthrow the aristocracy without anybody realizing it.

Working with water and wastewater operators for the past 17 years (has it really been that long? GASP!), I've learned that many of them are true renaissance people as well. In small communities, not only does the water operator also take care of the wastewater system, but they also take care of the streets, parks, spray mosquitoes, catch dogs and other stray animals, as well as duties as otherwise assigned – a dangerous phrase to be sure! In addition to their multiple on-the-job hats, many operators are volunteer firefighters, EMTs and search and rescue personnel or operate small businesses with their families.

How do we cultivate a renaissance culture in our industry? What are the variety of areas that we should be excelling in? While there are many technical aspects of our industry that operators need to excel at; treatment, disinfection, maintenance, pumps, heavy equipment operation, etc; there are several "soft skills" that I think are necessary for renaissance operators. These soft skills foster not only proficiency in required tasks, but excellence and innovation.

The first skill is passion. Do family members avoid sitting next to you at holiday meals because they know that poop is going to be brought up? Have you ever been referred to as "the Water Lady (or Guy)" in your community? Do you point out wastewater facilities and fire hydrants on family vacations? Would you consider taking a tour of the local water or wastewater treatment facility a highlight of that vacation? Yep, you have passion for your industry, and everyone around you knows it. If they don't know it, it's only because they haven't had a long enough conversation with you to bring it up.

The next skill is curiosity. It's not enough to know that you need to check and record the hours on a lift station pump, but what do those hours mean? Does fewer hours mean that there is less demand, or does it mean that there's a plug in the collection line preventing flow? Do rapid on-off cycles mean that a sensor is going bad, or that there's high inflow and infiltration? Curiosity leads to furthering your knowledge of your system, or just the art and science of the industry in general. This increased knowledge improves the operations of your system, be it through repairs and maintenance, improving efficiency, or improving treatment techniques.

A third skill is transferable skills. Basically, what happens is you learn some cool thing that has absolutely nothing to do with the water and wastewater industry and apply it to your system. As many operators enter the industry as a second career, transferable skills are paramount. Bringing knowledge in from different industries brings new ideas and resilience. It also helps when studying for exams!

Back to that whole neural network bit. One interesting example of transferable skills is home brewing. Brewing beverages relies on water chemistry. Varying levels of hardness and minerals changes the flavor profile of beer. Depending on if you're brewing a stout or an IPA, you may need to adjust the chemistry of your water source. It's handy to have the annual CCR readily available during times like this.

The final skill we'll discuss today is interconnectedness. This is where small systems operators truly shine. We get to see everything. From drinking water source to outfall, we see how everything interacts with each other. When the correspondence class tells you to notify the water plant that there may be increased demand because the distribution crew will be flushing hydrants next week, you might be having this conversation with yourself. Understanding the interconnectedness of our industry can prevent unintended consequences.

Before you begin adding phosphate to your drinking water, understanding how it may affect the wastewater treatment will allow you to make plans on the wastewater side, or try a different corrosion control method. We also know that our duties, as otherwise assigned, such as weed spraying, can affect water quality or wastewater treatment and use appropriate techniques. It's not only within our small communities. Understanding what is happening on a watershed or landscape scale will improve treatment, drive development and keep our tiny communities resilient.

What other qualities define a renaissance operator? Who do you know that embodies these qualities? How do we as operators challenge each other to become renaissance operators? What can we do at WARWS to help? Let me know. When I grow up, I want to be a renaissance operator, and perhaps throw in a few of the original renaissance man qualities to boot.

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Mitch Godwin – Who am I?

Born in Casper and raised in Sheridan, I'm a Wyomingite through and through. What better way to give back to the great state that formed me as a person than to work with our most precious resource? But my mentality wasn't always that way...

From a small child, I always had the big city dream of becoming a professional athlete, specifically football. I was obsessed. I worked hard, studied every level of play, got big and strong and even managed to earn myself a scholarship to Dickinson State University for a degree in Kinesiology. I wanted to play, coach, train, anything to keep me involved in the sport, so I figured I would learn how the human body moves.

What they forget to tell you when you get to college is STU-DENT comes first in Student-athlete. I was never a great student, then I thrusted myself into so many adult responsibilities on top of trying to go to class and still maintain the rigorous schedule college football demands. I quickly burnt out, stopped going to class and faced academic probation and a redaction of my scholarship. Football was gone, college degree was gone, so what does a Wyoming boy do? I came home and went to work.

For the first 6 months after I came home, I job hopped a bit; drywall, car sales, new home construction, plumbing, then a position came open in the quality control/palleting department at a local carwash vacuum manufacture. After 6 months of packing orders and sending hundreds of projects back to get repainted, I decided I wanted to learn how to weld in the fabrication department. After 6 months of bending pipe instead of learning how to weld, I decided I had enough and applied for an open position at the water treatment plant for the City of Sheridan.

After I was hired on as an operator, a whole new obsession boiled to the top. I wanted to be the best operator I could be, even if it meant spending long nights chasing chlorine vacuum leaks or the monotonous back and forth of sludge management.

During my 7 ½ years as an operator for the City of Sheridan and its two level 4 treatment plants, I received my level 4 Water and level 1 distribution licenses from Wyoming DEQ and took a special disposition toward maintenance and upgrading the plants. This included equipment upgrades, PLC upgrades and programming, preventative maintenance, rebuilding neglected electric motors and plumbing in chemical feed systems. Even with taking this route, I never lost sight of the main goal as a operator of making clean, safe drinking water for my community, still doing daily water quality assessments, optimizing treatment and fixing plant crashes before diving into projects. As many of our fine operators of this state, I was a do it all kind of guy.

Also, while I was an operator at the City of Sheridan, I found another obsession out of necessity, Strongman. In May of 2017, I was 400 pounds in body weight and needed a major surgery. During the consultations and recovery process, my surgeon was very adamant about me finding a way to lose weight or I could run into problems with my body I couldn't come back from. Being only 21 years old this scared me to death. I began going to the gym to lift weights and figuring out a healthy diet.

After 4 years of the same cycle every day, I had successfully lost 60 pounds, but I was bored.

I came across a new TV show called "Strongest Man in History" and after seeing one of the gentlemen deadlifting a car in Times Square, I thought to myself "I can do that someday". I immediately dove headfirst into researching the sport and how to train for it. I was quickly obsessed and found a new gym that had all the equipment to train for the events.

One year after specifically training strongman, I competed in my first event in the fall of 2020 and placed 1st in my division. In the almost three years since my first competition, I have competed four times, one of them being an appearance at Strongman Corporation North American Nationals in 2021. I am now at the level of competing in Pro/Am divisions for a chance to become a Pro-Strongman, hopefully completing the dream of becoming a professional athlete someday.

During those 7 ¹/₂ years of becoming obsessed with water treatment, Strongman and taking all my certification test, I began working with WARWS to get enough hours and learn the various topics involved in water treatment. I also began meeting members of the staff and figuring out what they did for all the small water systems in the state. From the very beginning of this relationship with WARWS, I thought it could be a very rewarding and entertaining job. When I felt my time coming to a close with the City of Sheridan, there just so happened to be an open position at WARWS for a new Circuit Rider. I jumped on the opportunity to work with is association I became so fond of and took the step to further advance my career in the drinking water industry.

Being accepted into this very tight-knit group, not only locally in the state, but also nationally, has been everything I wanted and more. I didn't expect the relationships I would quickly build and the deep dive into my knowledge bank I would have to take to fix some of the problems I have faced in my short time here. I have already learned so much more about water, wells, distribution, etc. than I ever thought I could, and I'm excited to continue to learn.

From the self-proclaimed Strongest Traveling Water Nerd, I can't wait to continue to meet all of the operators in this fine state and assist in any way I can!



The State of Wyoming's Water and Wastewater Infrastructure

It could certainly be better. The Wyoming Society of Civil Engineers gave our drinking water infrastructure a C and our wastewater infrastructure a D+ on their 2023 report card.

As someone who spends a great deal of her work life in the field, I believe these grades are charitable, at best.

Wyoming has 351 community water systems, 362 transient and 89 non-community non-transient, give or take a few. These numbers are constantly in flux. There are very few of these systems that don't need some significant capital improvements, better O & M and/or more technical capacity.

There is currently over 1 billion dollars of requests on the Intended Use Plan for water system improvements, which is a 20% increase from last year. The amount of funds requested from the Clean Water SRF is also up by more than 100%. Last year there were requests of 448 million. This year the requests are for more than a billion dollars. When you add the amount of money for Non-point source pollution projects, it rivals the needs on the Safe Drinking Water IUP. Considering the abysmal condition of many of our wastewater systems, it is probably a good thing that at least the needs are being recognized.

Not all of this money is being requested for wastewater. The Clean Water SRF also funds non-point source requests, most of which are landfills that need help in closure or remediation. The total combined needs for water and wastewater and solid waste infrastructure is more than 2 billion dollars. That is just for the needs registered on the State Revolving Fund Intended Use Plan. If the truth be told our needs are probably in the 5 billion dollar range.

Everyone has heard how much money nationally has been allocated for infrastructure improvements. It sounds like a lot of money. It really is just a drip in the bucket. For Wyoming this year, we have \$445 million to address over 2 billion dollars in requested needs. It hurts my head to think what the unmet needs are nationally. It is staggering. So how did we get into this pitiful state of infrastructure needs? The last major infusion of money was in the 1970's. That money built many if not most of our water and wastewater systems. Very few systems thought about putting money away to replace the system when it was used up. The thing about water and wastewater systems is that most of them are underground and we don't see them daily. As long as water comes out of the tap and the toilet flushes, we figure we are in good shape. We have also been victims of our own success. We are nothing if not resourceful and we have managed to keep our systems going with chewing gum and bungee cords.

There are commonalities between all of our water and wastewater systems. Not only are they aging, but our rates are not sufficient to make them sustainable. Setting sustainable rates is a difficult task. It has been made more difficult by the press coverage given to things like lead and copper, PFAS and other contaminants. Nobody wants to pay more for something that they think is killing them. We make great water in Wyoming, but you would never know it. We do not do a very good job of telling our own story. People just have not got the memo that the tap water we work so hard to provide is of much higher quality than the bottled water that they throw down a couple of bucks to buy without even thinking about it. If you try to raise their per thousand gallon costs by a couple of cents, you sure will hear the howls. This is only going to get worse with a very tight labor force and increasing material costs. When you add in new regulatory requirements, it is more than daunting to think about sustainability.

I am from Wyoming, and any good Wyomingite knows that complaining without giving a solution is nothing more than whining. I am not a whiner, so here are some concrete steps we can take to improve our situation. Do an Asset Management Plan. Your systems rates should be set based upon this plan. An Asset Management Plan will help you become proactive rather than reactive. It is always less expensive to



do planned repairs and maintenance than trying to get things done in the middle of an emergency. A good Asset Management Plan may cost you up front, but it will save you money in the long run. Did I mention that many funders are now requiring an Asset Management Plan as a condition of funding?

Getting started is always the hardest part of almost everything we do, and an Asset Management Plan is no different. Begin with an inventory. Take pictures. Document the condition of each piece. Decide if it is in great, fair or poor condition. Think about how important that piece is to your system in providing services. If the piece fails, are you still able to provide services? Is it easy to procure? Make a list of all those things that are in poor condition and of high criticality in providing services. Those are the things that you will want to budget for in the coming year, and now you have documentation to take to your decision-makers. This is not the end all of an Asset Management Plan, but it sure is a great start.

Rates and asset management are linked. Your rates should be set on the cost of providing services, not on what the town down the road is charging. The thing is it is impossible to know the cost of providing services without knowing what the condition of your assets are and what it is going to cost to replace them. The truth of the matter is that most small systems do not know what the cost of providing services are and these costs should include repair, replacement and reserves. Unfortunately rates are almost set where they are for political reasons not technical realities. Many systems in Wyoming don't have meters, or if they do they don't meter all water use. Even if they do have meters they often don't get read. If you don't know how much water you are using, how do you know what a gallon of water costs for you to produce?

Setting good rates require good data, and much of the data that systems collect is not in a useable format to actually analyze the cost of producing water or treating wastewater. Can you really blame your customers for not understanding why you are raising their rates if you can't provide them with information on why it is necessary to cover costs?

It is also difficult for your customers to understand why they are paying more than their friends in an urban area. They often believe that if the system is small, the cost should be small as well. Unfortunately, it doesn't work that way. The lack of an economy of scale, because we have so few people, make almost everything more expensive in Wyoming, including our water and wastewater services. Glenrock Wyoming has to meet the same requirements that Denver Colorado does, but we have a lot fewer taps to spread that cost across.

I believe that many of our decision-makers have tried to quiet those complaints by including large amounts of water in the base rate. I have seen as much as 100,000 gallons covered by the base rate. I am not sure what this community is growing, but whatever it is, must take a whole lot of water. This is not only not sustainable, but it sends the totally wrong message about the worth of the water we provide our community. People do not value things that are free. It is human nature. As you figure out what the cost of the water you provide is, do not forget to add in reserves. No system is sustainable without them. Try to put away 1% of the total replacement cost of your system, an 1/8 of your total operating costs and one fifth of your most expensive or critical piece of equipment a year.

Nobody said this was going to be easy but it is attainable. This state as well as a country as whole is never going to get out of this infrastructure crisis without doing the hard work. If you want help, Wyoming Rural Water is here. If you need us to look at your rates, talk to your council or board don't hesitate to ask. That is why you are members of the association and why Rural Water is here. We can do this.







307-439-9065

Midnight Dumps

Once again, the issue of illegal dumping rears it's ugly head in a small town In Wyoming as I take over for a Legend in the wastewater industry, my mentor, Mark Court. I was thrown into the wonderful world of people taking unidentified waste and dumping these chemicals into the town's sewer system. These illegal dumps happen more often than some people know. It seems that the I-80 & I-25 corridors take the brunt of the hits. However, any town may be affected.

Originally, when I worked for a small town, who also were on receiving end of a illegal dump: a meth hit. This hit took out two cells over a weekend. Thanks to Mark Court and Biolynceus, we were back up and running in just over two weeks. We added a mixture of Biolynceus Probiotics II, and potassium permanganate. In that case, daily checks on the lagoon were also hindered because of the winter ice cover. The smell coming off the transfer gate was the dead giveaway, the green milky color coupled with a sulfur odor was a sure sign of issues. These issues are a big problem, and happen fast!

When I was off making the rounds mid May, I ran into a similar issue. This town has two new operators and recently ran into an issue of their own. Being iced over this problem went undiscovered for a while, because of the great winter most of Wyoming was blessed with this year. As best as we could tell, the illegal dump happened sometime in early April. Some of the actions we came up with included taking a sample in several locations around the first cell, then sending them off to the lab for examination. At least the lab may be able tell them what kind of chemicals they are dealing with.

We Pulled out the as builts, and found the valves needed to bypass the cell that was most affected. Being new operators for the town, this turned into a bit of a hassle. Going around town, and popping manholes to see if any signs of the dump may be lingering in the manholes. At this point the town will never know who may be responsible but has started implementing a more vigilante program for catching these people. Some of the recommendations proposed are asking people in town to "See something Say something". Possibly adding some hidden video cameras in the more isolated areas of the system. These days, the cost has now become more affordable than ever. Putting up signage in the area prohibiting the already illegal dumps. Informing



the Town Council and Mayor of the importance of illegal dumps. Educating them that the Town now owns whatever chemicals/ oils were introduced into the Lagoons. Some point down the road, if untreated the sludge will be harder, and more costly to be removed at the towns expense.



This picture does not do justice to the cell that has been affected. Along with a thin layer of that brownish scum, a very strong odor of diesel is present. The oil sheen can be seen just off the edge as well. All in all, the cell is looking pretty good in part due to being dosed with bugs over the winter. The town has been using Biolynceus ProBiotic Scrubber II to help with their sludge reduction plan. They inject the bugs with a chlorine injection pump, right into their service line. This set up protects the bugs from freezing and sets a desired dose of bugs to be added daily. Other towns in Wyoming are reporting good sludge reduction using their products. The town will be in contact with Biolynceus to see if they can do a site visit, to get a handle on what bugs may be beneficial with this hit. Thankfully for this town, they do not discharge from this system. They also have a cell they do not even use, and have plenty of room to grow if needed. They are lucky, just picture your town getting hit with an illegal dump.

Does the town have SOP in place to deal with these issues? Is there money set aside to buy the necessary chemicals / bugs to treat the issue? Does your town have ordinances in place to prohibit illegal dumping? Do you have any marks / set points on the manholes to monitor if they have been accessed by other people? Is there an updated contact list in your sewer O&M manual to call when this issue rears its ugly head? If your town ever does run into any of these issues, contact WARWS any time. My contact info: Joe Dankelman 307-439-9065 joed@warws.com or any of our great staff any time. I would like to thank my mentor, Mark Court, for all of wisdom he passed along to me. He will be missed on so many levels, not just for his knowledge, but the never-ending humor he always brings to any situation. I'm blessed to have known him, and even more blessed to take over for him.



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2. Tank dimensions: diameter = 25

Height - here's where you must read the problem

tank

So: 37' - 5' = 32 ft of tank you need to fill

Volume = diameter squared x $\frac{785}{100}$ x height

teet of 00^{7} , $21 = 25 \times 287$. $x \times 22 \times 25$

3. Convert cubic feet to gallons (cubic feet x /.48)

Operator's Corner

1. What physical connection, whether direct or indirect provides the opportunity for non-potable water

2. What are two of the greatest concerns when enter-

b. Extreme air temperatures and slippery

c. Reduced oxygen and hazardous gases

3. Which is the most favorable condition for coagula-

a. Bad odors and claustrophobia

Water Questions by Michelle Christopher:

to enter a potable water system? a. Sanitary Seal b. Cross Connection c. Solid Sleeve d. Well Injector

ing a confined space?

surfaces

tion?

d. Spiders and snakes

a. Low pH, low alkalinity b. High pH, low alkalinity

c. High pH, high alkalinity

d. Low pH, high alkalinity

seal be appropriate on a pump?

a. High suction head b. Low suction head

c. High pressure head

d. Low pressure head

a. 4.6 hours

b. 6.5 hours

c. 19.6 hours

d. 5.8 hours

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4. Under which circumstances would a mechanical

5. A tank is being filled by a pump delivering 425

gpm. The system demand from the tank is 125

gpm. If the cylindrical tank is 25' in diameter, 40'

high with an overflow height of 37', how long will

the tank take, in hours, to fill, assuming there is 5'

of water in the tank when the pump is started?

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Information, Motivation and Locomotion; Making Projects Happen

System Development Fees and Surcharges. Part 2

Carl Brown, President GettingGreatRates.com

Author's Note: Those who calculate and set rates (management staff, boards and councils) are the target audience for this article, and one published in the previous edition. If you are not a rate setter or calculator, I hope you will pass this article series along to those who are.

In the last edition, I covered many concepts surrounding system development costs and how to recover them, mainly with system development fees (SDFs) and minimum charge surcharges (surcharges). In this discussion, I use water as the example utility, but with some tweaking, such fees are useful to any type of utility service.

In this edition, we get into the math of such fees. While this knowledge would be good for anyone who sets rates, if you want to avoid it entirely, contact Kathy Weinsaft of the Association. If your situation is simple, she can advise you and even help you with some math. If your situation is more complex, know that the Association initiated the Wyoming RATES Program to do the difficult math for you. Disclosure: I am the analyst for the Program, so I would do that math. To learn more, visit https://gettinggreatrates.com/consulting/ WyRATES.pdf.

Definitions:

Cost-of-service or cost-to-serve rates - rates that recover costs from new customers and existing customers in proportion to the costs that each one causes.

System Development Costs - those incurred to build capacity-to-serve.

- System Development Fees (SDFs) recover • those costs proportionately and "up front" at the time a new connection is made.
- System Development Surcharges (surcharges) • recover those costs proportionately, over time, as an addition to each customer's minimum charge.

Now, let's do math.

Tables that follow come straight out of a recent rate analysis model and report to a water district. The first is numbered Table 11. Tables have been truncated to fit the length and format of this magazine.

System Development Fee Calculations

SDF and surcharge calculations aim at recovering capacity costs, up front or over time, respectively. Thus, the math for both is similar. SDF calculations will be illustrated first,

surcharge calculations second.

1. Establish the System Development Cost Basis

You need to establish the cost to be recovered, as shown in Table 11.

In this case, the original value of the assets, which came out of the balance sheet, was used as the cost basis. This value was broken into peak flow and base flow capacity costs, each to be recovered appropriately. An alternative cost basis could be debt for a new system or major upgrade, especially an upsizing.

The next thing you need is the "share" value of each meter size, so you know how to divvy up peak flow capacity costs.



2. Establish "Share" Values

The American Water Works Association (AWWA) has done studies of the sustainable peak flow capacity of different meter sizes and types. From those flow capacities, you can calculate the capacity "share" of each meter size. That has been done in Table 12.

As shown in that table, in the right-most column, a fiveeighths inch meter is the starting place for assigning share values. That meter size gets one share. A three-inch meter gets 16 shares (320 divided by 20). That means, a three-inch meter customer will pay for 16 shares of peak flow capacity costs and one share of base flow capacity costs, both of which are calculated in Table 13.

Table 12 - Safe Operating Capacities by Meter Size

Data source: Table VII.2-5, page 338, AWWA Manual M1 Principles of Water Rates, Fees and Charges, Seventh Edition

This table calculates the meter equivalent ratio, which is used for calculating peak flow capacity-based system development fees and system development surcharges in Table 13.

Meter Size, in Inches	Meter Type	Maximum-Rated Safe Operating Flow, in Gallons per Minute	Meter Equivalent Ratio (Capacity Shares)
5/8	Displacement	20	1.0
3/4	Displacement	30	1.5
1	Displacement	50	2.5
1.5	Displacement	100	5.0
2	Displacement	160	8.0
3	Singlet	320	16.0

Table 13 - System Development Fees Based on Meter Size

This table calculates system development fees to charge each meter size. Based on growth during the "Analysis Year," it also calculates total fee revenues that would be generated during one full year at these fees.

'	Meter Size, in Inches	Mix of New Taps in a Typical Year	Projected Annual Growth in Capacity Shares	Peak System Development Fee, Each Meter Size	Base Capacity Cost to Recover With Each New Connection	System Development Fee for Each Meter Size	Grand Total System Development Fees for One Full Year
	5/8	0.0000	0.0000	\$1,350	\$150	\$1,500	\$0
	3/4	8.9211	8.9211	\$1,350	\$150	\$1,500	\$14,721
	1	0.0123	0.0308	\$3,375	\$150	\$3,525	\$45
	1.5	0.0031	0.0154	\$6,751	\$150	\$6,901	\$22
	2	0.0573	0.4586	\$10,801	\$150	\$10,951	\$636
	3	0.0031	0.0494	\$21,603	\$150	\$21,753	\$68
	Totals	9.0000	9.6295				\$15,701
3	This is the amount used to calculate the "Meter Size-based System Development Fees" income in Table 3 (the projected incomes table of the analysis model).						

A note about the "Base Capacity Cost to Recover With Each New Connection" item in Table 13. This water district decided not to recover any base capacity costs in the SDF, to keep their small-meter (residential) SDF competitive. However, they did want to recover out of pocket costs for permitting, connection inspection and administration of the SDF program, estimated at \$150 per new connection.

3. Calculate SDF Rates and Revenues to be Generated

Table 13 performs the calculations. Highlights:

• Second column – the utility expects to hook up an average of nine new customers annually and expects meter sizes to be in the same proportions as the current customer base. That is why new taps in some meter sizes is only a small part of a full new customer – they will only connect one of those size meters every few years, or very rarely.

• Third column – the nine new customers will have total capacity shares of 9.6295. Again, most of this utility's customers are small-meter customers so the shares count almost matches the new customers count.

• Sixth column – the total SDF for a 5/8 or 3/4-inch meter (mainly residential customers) works out to \$1,500. A three-inch meter (a strip shopping center, a garden center?) is

just shy of 16 times that amount. Why? Such a customer accounts for much more peak capacity cost than a residential customer.

• Last column – the 3/4-inch meter fee is the lowest fee, but fees for that size meter will generate the most SDF revenue. That is because most new connections will be made with 3/4-inch meters.

• I recommended, and this district opted to assess the same fees to 5/8 and 3/4-inch meters because there is little capacity (cost) difference between these sizes and both are commonly used for single family and small business connections. That markedly simplifies the SDF and surcharge fees program. Remember, sometimes simple trumps mathematically fair.

•Again, last column – The \$15,701 in total annual SDF revenues is not much revenue, but it is an important start.

Note: In the three columns in Table 13 that have sums, if you added the values above them you would not get those sums. That is because, many rows and columns of the original table have been hidden to get the table onto this page.

Surcharge Fee Calculations

• In the example situation, we modeled recovering the balance of peak capacity costs (93.5 percent) over time with surcharge fees, and no base capacity costs. Base costs will be passed through to the regular user charge fees. Part of the calculations were done on the bottom of Table 11:

• The 93.5 percent of peak capacity costs works out to \$188,258 to recover from surcharges each year.

• Dividing that by the number of capacity shares on the system, shown at the bottom of the third column of Table 14, gives a per share annual cost of \$60.30.

Table 14 - Capacity Surcharges Based on Meter Size								
This table depicts minimum charges that are commensurate with the potential of each customer, based on their connection or meter size, to place flow demands on the system.								
Meter S in Incl	Size, hes	Current Number Meters This Size	Total Capacity Shares Each Meter Size Group	Annual Capacity Cost per Share, From Table 11	Capacity Cost per Meter per Month	Base Minimum Charge	Total Surcharged Minimum per Month	Total Annual Capacity Surcharges for Each Meter Size
5/8	3	0	0	\$80.30	\$5.03	\$13.61	\$18.63	\$0
3/4	Ļ	2,892	2,892	\$80.30	\$5.03	\$13.61	\$18.63	\$174,409
1		4	10	\$80.30	\$12.56	\$13.61	\$26.17	\$603
1.5	j	1	5	\$60.30	\$25.13	\$13.61	\$38.73	\$302
2		19	149	\$60.30	\$40.20	\$13.61	\$53.81	\$8,965
3		1	16	\$80.30	\$80.40	\$13.61	\$94.01	\$965
		2,918	3,122		Full Year o	f Capacity	Surcharges:	\$188,258

• Continuing in Table 14:

• Because this water district bills monthly, we need the monthly surcharge amount for each meter size. That appears in the column called, "Capacity Cost per Meter per Month." We got the 5/8 and 3/4-inch meter cost by

dividing the \$60.30 annual cost from Table 14, by 12. That is \$5.03. Surcharges for the other meter sizes are multiples of that amount, based on the "share" values in the last column of Table 12.

• Next appears the "Base Minimum Charge" amount of \$13.61. That came from elsewhere in the rate analysis. Add that to the previous column's values and you get the "Total Surcharged Minimum per Month" for each meter size. Notice that the 3-inch meter minimum charge is much higher than the 5/8-inch meter minimum charge. If this district assessed the lowest minimum charge to the "big" customers, too, it would be "leaving a lot of money on the table," under-charging big customers. That would not be fair.

• The surcharges bottom line, the "Total Annual Capacity Surcharges for Each Meter Size," is this: the "Current Number Meters This Size," times, the "Capacity Cost per Meter per Month," times, 12 (months).

SDF and Surcharge Revenues

• Except for a premium on out of district customers, which was hidden to save space, the annual SDF and surcharge revenues will be the \$201,259, the amount targeted for recovery from Table 11.

• For this water district, the total SDF and surcharge fees amounted to 12 percent of total user charge revenues. That is important money.

• In your case, the total might amount to five percent, or it might be 25 percent of your system's total revenue. The sum depends on your growth rate, meter sizes on the system (bigger meters means higher cost recovery), the capacity costs that should be recovered and how aggressive you are at recovering those costs.

Closing

Meter size-based system development fees and surcharges are great tools for recovering infrastructure costs. They enable adequate rates and fairly structured rates. "Promote" them by describing the math. Better yet, have your rate analyst describe the math, and take the "blame" for it. Then, quickly adopt those rates and fees. Yes, you will get some complaints. But, in about two billing cycles, most folks realize that everything is OK, they didn't go broke. It might even mean a bill reduction for small-meter customers. Pretty soon, you can start making announcements folks like: "The system is becoming sustainable. Service is going to improve because we are preparing to do the '1, 2, 3, A, B, C' infrastructure improvement projects next year. And, the money to build those projects is included in your current rates."

There are other ways of recovering capacity costs. In my experience, they are all harder to convincingly explain as being fair. And some simply aren't.

The point of this detailed description of SDFs and surcharges is not to turn you into a rate analyst. It is to show you there is a logical, mathematical way to arrive at fairly structured fees to recover capacity costs. In my opinion, the lack of such fees may be the main reason we have such a large infrastructure construction and renewal funding gap. SDFs and surcharges are tools that can help you close your gap and do it fairly.

Use these tools and they will serve your customers, and your utility, well.

Carl Brown is President of GettingGreatRates.com, which specializes in rate analysis for water, sewer and other utilities. The firm serves as the RATES Program rate analyst for the Colorado, Kansas, New Mexico, North Dakota, Virginia and Wyoming rural water associations. Contact: (573) 619-3411; Carl1@ gettinggreatrates.com







Cell (307) 259-0393 (800) 442-3023 dpaulson@DanaKepner.com



Our Western Heritage

by Kathy Weinsaft

Manic Yet?

I am. That can mean only one thing. It is summer in Wyoming. Through this long brutal winter I tried to keep sane by making a list of all the things I was going to do when the snow melted and I could get back out on the road and on with my life. The list got mighty long and summer is way too short to get to all the places but I am going to make a mighty effort. I can sleep when it is snowing again.

The first spot on my list is the Medicine Wheel, but it will be one of the last places I will visit. It is situated at over 9,000 feet, and even during more moderate years it is not accessible until the end of June or the first of July. I am planning this trip for August. It is well worth the wait. I try to make it up to the wheel every year. I haven't been able to the last couple of years, but it is a wonderful place for mediation. This stone circle was constructed by Native Americans. When it was constructed is up for debate, but it is sacred to many tribes. The significance and interpretation of the Medicine Wheel vary among different tribes. It is generally believed to have served as a ceremonial and astronomical site, with various spiritual and cultural meanings attached to it. The circle's design and alignment with the sun, stars and cardinal directions reflect the tribes connection to the natural world and their spiritual beliefs. You have to hike up to the wheel, and be forewarned it defies the laws of physics and is uphill both ways. There are benches along the way, and the views are second to none. Be quiet and you can hear the wisdom of the ages in your heart and head.



From the Medicine Wheel I am going to head to Cody. I have been to Cody untold times in the last 26 years, but I just read about something I have never seen in the area. It is the Smith Mansion. It is the work of a man who simply could not stop building. The former home of the builder and Engineer, Lee Smith, is said to rise out of landscape in a seemingly random collection of wooden terraces and staircases. Smith began building the home for his wife, but it ultimately led to their divorce. He finished a pretty mundane home built out of locally harvested logs and wood. He just

couldn't stop. He kept adding extra floors and seemingly tacked on balconies. He built winding organic staircases and terraces on the upper floor. This adventure not only led to Smith's divorce, but also to his untimely death. While working on one of the upper balconies untethered, he fell. The Mansion is on private property and can't be visited, but supposedly you can see it from the road. It is on the left side up on a hill you drive from Cody to the eastern entrance to Yellowstone in the Wapitia Valley. It sound like it is worth a drive-by.



While I am in the area I am going to visit Heart Mountain. It got its name from the Crow for resembling a buffalo heart. The limestone summit is almost 300 million years older than the rocks at the base, but geologists have found no explanation as to how this occurred. The mountain is also one of the recognizable features on the maps created by Lewis and Clark. One of ten relocation camps for Japanese-Americans was located on the mountain beginning in August 1942. Over 13,000 Japanese-Americans were relocated here from California and it became Wyoming's 3 largest city almost overnight. The camp consisted of hundreds of buildings, including residential barracks, mess halls, administrative offices, schools, hospital and recreational facilities. Today there is an interpretive center at the site, which through photographs, artifacts, oral histories and interactive exhibits, which allow visitors to experience what life at the camp must have been like through the eyes of the Japanese and Japanese Americans who were confined there during the second world war. There is still a barrack, hospital, and root cellar on site. In addition, there is an honor roll and memorial park, walking trails and a victory garden.



While I am waiting to make this trip, there are plenty of sites near me that are just waiting to be re-explored. How about Hell's Half Acre? It is actually about 300 acres of canyon and wrinkly landscape located about 40 miles from Casper on highway 20/26. It was named such by a lost cowboy and the name stuck. It had previously been called the Devil's Kitchen, the Pits of Hades, and most charitably, the Baby Grand Canyon. The ravine was originally used by native Americans as a buffalo jump. In its hay day, it became a roadside tourist attraction with a hotel and diner. That was all closed down in 2005, but it is still a great hiking destination. The area was formed by erosion over thousands of years, resulting in a complex network of deep gullies, dry washes and spires. The terrain is composed of sandstone, clay and shale, creating a striking and desolate landscape. There are trails winding through the area and even a couple of boardwalks. There are no amenities and very little shade, so bring water and wear a hat.

Also close to home is Independence Rock. I walk around this monument every year at some point. How can you not? I think about all the pioneers and what they must have thought about this big old rock in the middle of nowhere. It is 136 feet tall and just rises up out of the otherwise flat terrain. It is hard to miss, which is why it became such a landmark for pioneers as they made their way west. It got it's name because the pioneers believed you need to get to the rock before July 4th to avoid getting caught in potentially devastating winter weather on their way west. They climbed up the rock and left their initials and/or names and you can still see their graffiti. There are really interesting markers and gifts from all sorts of organizations on the backside of the monument. Take notice, though, I often seen rattlesnakes on my way around the rock. Stay on the path.



So you just know if I am going to Independence Rock I am going to go the extra 57 miles to Sweetwater Station and visit the best bookstore in Wyoming, Mad Dog and Pilgram. It puts those big old box book stores to shame. You will see a weathered sign on 287 advertising, "old Books. Fresh Eggs. For sale." You will be greeted by clucking chickens, peacocks, a donkey and a llama. There are over 70,000 books inside the two-story climate controlled book barn. There are all sorts of other cool stuff to look at. The store is crammed with farm shears, pith helmets, fertility statues and a stuffed Syrian lion taxidermied in 1900. Fugitive sheep sometimes wander the bookstore. The books topics range from military history to children's titles and western americana. They don't advertise knowing that real book lovers will find them. They do however have a facebook page that I follow.

New on my list this year is Fossil Bone Cabin. I have been reading articles about it all winter. The reason it is currently in the news is that it is going to be moved. The current owners of the building have donated it to the Medicine Bow Museum. It hasn't been moved yet though. Right now it is at the base of Como Cliff on Highway 30. I have been told to use Rock River, WY instead of Medicine Bow for the Google Map Location. That is very important information for a woman that can get lost in a shoebox. The cabin was discovered in 1897 by paleontologist Walter Granger. He was shocked to realize that the cabin was constructed from Dinosaur bones. To his further surprise, he discovered the bones came from a nearby hill. He immediately set up a dig to excavate the site, which he appropriately named "Bone Cabin Quarry." The cabin has actually been featured in Riplev's Believe or not.

Off the beaten path is the Hole-in-the-wall. It is off the beaten path for good reason. It was the remote outlaw hideout of Jesse James, Butch Cassidy and the Sundance Kid. And though it is the last adventure on this list it will be my first trip. On May 27th, there will be a tour where you can walk the 1.500 year old Indian Trail and see the Teepee rings. There is also going to be a presentation about the Hole-in-the-Wall fight and the Johnson County War. The tour is sponsored by Clay Gibbons, a Wyoming Historian. He has a Facebook Page and he does all sorts of interesting Wyoming things. If you can't make the tour, you can still visit. The Hole-in-the-Wall is located on Williow Creek Ranch. For more information about how to visit Google willowcreekranch.com. Back in the time of Butch Cassidy and the Sundance Kid, it was at least a day's journey by horseback from any semblance of civilization. Even today, it is a remote and secluded and hard to reach spot. The scenery is fabulous, and it's history is deep. Take the time to make arrangements and go explore. Now, you will have to excuse me. Summer is short and if I don't get a move on, I am not going to make to any of these fascinating places.

Don't you let that happen to you. Get out there, enjoy the beautiful weather and our incredible state.



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