Business Member Spotlight: 120Water - Don’t Wait to Start Your Inventory

No Salt Please.

Safety

Rhinelander’s Response to PFAS Contamination

A Different Way to Think About Aeration & Mixing

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OFFICIAL PUBLICATION OF THE WISCONSIN RURAL WATER ASSOCIATION

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Address all letters to the editor, advertising inquiries and correspondence to:
Wisconsin Rural Water Association, 350 Water Way, Plover, WI 54467.
As I am writing this letter, I am thinking about how we are nearing the end of 2021. I am hoping everyone had a Happy Holiday and I would like to wish everyone a Happy New Year. As 2022 is upon us, let’s hope this upcoming year can get back to a brighter and healthier year for everyone from all the challenges we had in 2020 and 2021. I am hopeful everyone was able to get their projects buttoned up before the Wisconsin winter weather approached. As a reminder, we have very knowledgeable and experienced Circuit Riders that are available at WRWA to assist you with any issues you may be experiencing. We also have the loaner trailer and equipment for use if you don’t have access to the equipment yourselves. If you find yourself in need of the loaner trailer or equipment please contact your Circuit Rider, they will be more than willing to help you in getting what is needed and offer any additional help. It’s hard to believe that 2022 WRWA Technical Conference is just around the corner on March 15-18, 2022. Again, the conference will be held in La Crosse at the convention center. We are hoping this year will be bigger and better than we have had in the past. As every year, if you are interested in being part of the board of directors for WRWA, please contact our Chief Financial Officer, Sue at 715-344-7778, to see what districts have openings. In order to get your name on the ballot, you will have to get permission from your City, Town, or Village to allow you to be on the board. I have found being part of the WRWA board of directors is very rewarding and is a great way to give back to a great organization. I look forward to seeing all of you at the conference. Stay warm and stay safe, until next time.

Dean
It seems lately that Rural America is getting money for infrastructure and water and wastewater systems brought in by the truckload! This puts us in a peculiar position of suddenly being able to plan some replacement and upgrades to our municipal systems. Programs like ARPA, WIFIA, and Build Back Better has dangled funding out in front of our members for us to apply for and use for long “put off” repairs, maintenance and upgrades. Secretary of Agriculture Tom Vilsack just this week announced over 840 million dollars of funding that is going to be available through Build Back Better at an event in Bloomer, Wisconsin where USDA Rural Development awarded Bloomer over 27 million dollars in loans and grants for removal and replacement of lead water lines in the city. This money will also be used for the replacement and maintenance of the sewer collection system in the city where the streets are open for the water line replacements. Lead services from a major part of the city will be replaced up to the water meters of Bloomer water customers that have lead lines in their services. This award is on top of several other major awarded loans and grants for several more systems in the state. Major increases in funding for both USDA Rural Development and EPA (State Revolving Funds such as Clean Water Fund Program and Safe Drinking Water Loan Program through DNR) are coming in amounts that will finally make a big difference in our Water and Wastewater systems across the state.

Wow, that sure has changed since I started this position 4 years ago. About a week into my job the USDA RD program was totally defunded. No more loans or grants for rural America. No more RD, no more WRWA. (Note: The US Congress did not let this zero funding happen.) But this wasn’t the first time this had happened. Several times over the last twenty years the funding going to rural America has been threatened. Reinstatement of the funding was not always easily wrestled back. I made a comment from the round table discussion at the Bloomer presentation with Secretary Vilsack that our little Association serves over 4 million Wisconsin Residents. All rural and all very important. It seems that rural America didn’t count. We feel like rural America counts again with this very important funding. That comment brought Secretary Vilsack to his feet and he made the additional comments that rural America has a disproportionate number of individuals in the armed forces. They bring their efforts and patriotism along with them to this service. Rural America teaches more children than urban areas. This leads to smarter adults to lead us in the future and they will have that rural attitude. Removing lead and it’s affects from children will be very important to schools, as well as homes, and will be a great help in keeping child development safe, healthy and strong. Rural America will be a stronger source for jobs and business locations.

I think we all agreed that indeed; Rural America counts again. Please believe along with us and start looking at the upgrades and system needs that you have been waiting to do. Rural Development and WRWA will be right there to help.

Have a great Winter.

Chris
I would like to thank Jeff Labelle and the rest of the Rural Water staff for all the help they have been for the Village of Boyd over the years.

Also the use of the equipment helps our small town out greatly.

Thanks again,
Bob LaMarche, Water Operator

Dear Mr. Groh

I would like to take the time to say “Thank You” from Eric Bierman and myself.

First I would like to say Thank You for naming the Bloomington Water Department with the Best Tasting Water in Wisconsin, it gives the Village of Bloomington great honor to be bestowed this title again.

Second, I would like to tell the staff and board from the Wisconsin Rural Water Association, what a good job was done on having the conference this year in La Crosse, WI. It was great to see everyone again and to have such an important part of our training and networking done in such a safe and professional matter.

Lastly, it gives me great pleasure to be a part of this organization and to participate with such a group that truly believes in what they stand for. Please tell all the WRWA Staff Thank you, for everything you do for our association.

It was also great to win the prize donated by the WRWA Staff and Board members, at the Sportsmen Raffle.

Thanks Again,
Ronnie Mumm and Eric Bierman, Village of Bloomington

Good day Kelly,

The well pump and maintenance training yesterday in Hilbert was excellent. I took so much away from it. It was also helpful to meet and hear from the various operators.

Thank you also for your kindness and gracious hospitality.

I am looking forward to even more training that WRWA is putting on...I gained so much from yesterday’s.

Liz Johnson, Public Water Supply Specialist – Bureau of Drinking Water & Groundwater Wisconsin Department of Natural Resources Oshkosh Service Center

Dear WRWA,

I am writing to thank and recognize Todd Weich for all the time he spent working with me on the Risk and Resilience plan and the Emergency response plan. He spent time working with me one on one to navigate through all the paperwork and I thank him for that.

Another person I would like to thank is Andrew Aslesen. He put together a new wellhead protection plan for us for a new well that we are in the process of building. The information he put together was very thorough. The operators and I learned about where the water we pump every day comes from underground and how the aquifer we use was created. Then after Andrew completed the report he visited us, explained everything in the report, and answered all the questions we had for him.

I thank WRWA for everything they do to help all the small municipalities like ours. It is a great feeling knowing that there is an organization geared to help support all the smaller utilities with educational classes and services.

Thank you,
Eric Carley, City of Omro Utilities
Dear Chris Groh,

I wanted to take a moment to thank you for your assistance last winter, to update you on the changes we made, and our plans for this winter. If you remember, we were experiencing elevated levels of ammonia in our treated effluent. While we don’t currently have an ammonia limit in our permit, we don’t want to get one if we can help it, so staying on top of things like this is important to us.

We investigated all of the items you recommended we look at including microscopic examination, settleability, BOD levels, MLSS concentration, F/M ratios, temperature, excessive flows, excessive loadings, and evidence of toxicity. Long story short, we identified the problem to be excessive loadings combined with a reduction in treatment efficiency due to low temperatures, and an alkalinity deficit.

We were able to get back to near zero effluent ammonia levels by significantly cutting back on the ammonia loadings from our local waste haulers. We developed a long-term plan to reduce loadings by accepting hauled-in-waste only from POWTS that are regularly serviced. By eliminating the tanks that are pumped infrequently, we hope to keep our loadings low. We were successful all summer and will keep a close eye on things this winter as temperatures drop.

Your help was of particular importance to us as the advice we received from other sources was all over the map, from suggestions of COVID related disinfectants, to hydrogen sulfide toxicity, to nitrification lock, to sales people trying to sell us freeze dried bacteria. While no single piece of advice was necessarily bad, yours was most helpful as it walked us through the biology step by step in a way that allowed us to eliminate all of the “noise” and focus on the basics. We were then able to identify how each part of our system was operating and identify the problems at a significant cost savings to the Village.

Rural Water is an invaluable resource for a small community like Spencer. As always, you will be at the top of our list the next time we run into a problem like this.

Thank you,

Christopher Helgestad, Operator
Spencer Wastewater Treatment Plant

Good Morning,

I wanted to take time to thank the WRWA members for the time they take to help us when we are in need of some help.

All the seminars and in house training classes are very nice to be able to send our guys to for training.

Hope to see you again next year. Thanks again,

Brandy Leis, City of Tomah Wastewater Treatment Plant

Mr. Roche,

I wanted to take the opportunity to thank you for the assistance you provided us in September of this year.

We were having some treatment issues and after trying countless control measures, we were getting frustrated. After reviewing all of our operational data and control strategies with you, you were able to give us a few suggestions on things to try. These suggestions and the review of data were helpful to us. Having a person with a strong operational background to discuss our issues with helped us to wade through the piles of data we had collected and try to come up with a few strategies to get our process back on track.

Thank you for the time you spent with us and the suggestions you gave us. We appreciate it.

Jenny Pagel, Wastewater Foreman,
Clintonville Wastewater Utility
As winter is here, and along with winter, precipitation arrives in the solid state commonly called snow. Which has to be removed from places of travel, roads, sidewalks and driveways. As early as the 1950’s, a faster, convenient, and cheap way to rid of snow and ice was discovered. Sodium Chloride, best known as salt.

The salt being put down is a permanent pollutant to our water. It only takes one teaspoon of salt to pollute 5 gallons of water that is toxic for freshwater ecosystems. After applying salt to the roads year after year, decade after decade, salt in our groundwater, rivers, lakes and streams is building up.

Salted water is denser than freshwater, when it flows into a lake from a stream or creek, it settles to the bottom. This dense, salty layer at the bottom of the lake prevents seasonal turnover. The natural movement of turnover helps circulate oxygen and nutrients throughout the water column. Microscopic zooplankton, which feed on algae, are predominantly impacted by high levels of salt in the water. Water becomes murkier as it becomes saltier. It stresses out freshwater organisms. Just as we need to drink fresh water, these organisms need to be moving through fresh water to live. The saltier the water gets, the more it stresses out their systems. Reduced growth and reproduction rates in fish is another impact, resulting from too

No salt please.

A

Annetta Von Rueden,
WRWA Water Circuit Rider

We are salting our freshwater.
much salt in the rivers, lakes and streams. When water gets too salty, lake turnover does not happen. We are salting our freshwater. Once salt is in the environment is doesn’t go away.

Groundwater is now being impacted as well. In some cities, yes, in the state, water utilities are considering shutting down drinking water wells after high levels of sodium chloride have been found in the water people are drinking and cooking with.

Salt can be avoided altogether by early snow removal. To avoid ice from forming, shovel, sweep the snow off your sidewalk or driveway first before it gets packed by walking or driving. Try spreading sand on the ice for traction.

When you do have to apply salt, you would be surprised how little is actually needed to melt ice, and the ways to make smaller amounts of salt stretch longer. Did you know a 20oz cup is all that is needed for a 20 ft sidewalk (10 sidewalk squares) or driveway? Scattering the salt more widely works effectively, giving the salt plenty of time to work. When it comes to de-icing, more is not always the best practice. If there is excess, or a pile is spilled, sweep up the excess with a broom and add back to the storage container.

Ways to cut back. There is an increasing number of counties, cities and towns is the state working to cut down on the amount of salt they are using in the winter months. The equipment used to spread the salt is calibrated correctly, or switching to a brine solution. As rock salt can bounce off the road into grass ways. Each year, an estimated 30% of rock salt bounces off the road during application.

We are all in Public Safety. That is our number one priority. In the last decades of our fast-paced world, expectations for perfect driving conditions have caused us to use excess de-icing materials every year. Motorists have to be convinced that winter driving conditions are not the same as summer driving conditions. As motorists, we need to accept the fact that Wisconsin winters involves snow and ice, and should slow down. Account for extra travel time. There are different de-icing products available that work better in specific conditions. Look at the product description and directions for application.

Cut down on de-icing salt this winter to protect the state’s groundwater, surface waters, and drinking water for our future and future generations.

Stay safe, and keep it local. Annie
Rhinelander’s Response to PFAS Contamination

There are few topics garnering as much attention right now as PFAS (per- and poly-fluoroalkyl substances). Here at WI Rural Water it’s an issue that we want to stay on top of and keep utilities informed about. The City of Rhinelander in Oneida County Wisconsin has been at the center of the issue since PFAS was first detected in several city wells during UCMR sampling in 2013. To deal with the issue, the city has taken a bold and innovative approach that is worth sharing and may become a roadmap for other communities. This article summarizes the PFAS issue facing the city and how Rhinelander is dealing with it.

PFAS is a general term used for a broad group of human-made chemicals that do not occur naturally and have been manufactured since the 1940’s. They are used in a variety of products including non-stick cookware, food wrappers, stain-resistant sprays and some firefighting foams. They are designed to be stable meaning they don’t react with water, grease, heat or soil which has earned them the nickname “forever chemicals”. Studies have linked PFAS to various cancers, thyroid problems, low birth weights as well as being found to affect other health issues including cholesterol levels, the auto immune system, fertility and childhood behavior. There are currently no national drinking water standards for PFAS, however some individual states have adopted their own drinking water standards. Wisconsin has not yet adopted a drinking water standard for PFAS, although they are in the process of doing so. Currently the Wisconsin DNR is recommending a limit of 20 parts per trillion (ppt).

The City of Rhinelander has five municipal wells. The two newest wells are Well #7 & Well #8. Well #7 was constructed in 2007 on the south side of the Rhinelander-Oneida County Airport on the city’s west side. Well #8 was constructed in 2014, 500 feet west of Well #7. PFAS was first discovered in the city’s water supply when the first round
of UCMR 3 (Unregulated Contaminant Monitoring Rule) sampling was done in 2013. Results were listed on the city's CCR (Consumer Confidence Report) as an "unregulated contaminant." In March of 2019 the city voluntarily tested Well #7 for PFAS and found 590 ppt. The city decided to remove the well from service within two days of getting the results. After well #7 was shut down, it took about three months before PFAS showed up in Well #8, which the city decided to shut down as well. With both wells out of service the city has lost about 25% of their water supply. With that much of the water supply off line they had to do something.

Mayor Chris Fredrickson decided to work on finding a way to get the PFAS out of the water or find an alternative water source. There are several reasons why the city decided to take this approach. First, finding and proving responsibility by a single party would likely be impossible. With the wells location close to the airport, the intuitive potential source of the PFAS is firefighting foam; however the situation in Rhinelander is more complicated than that. There were several businesses in town including a food wrapping business and a paper mill which have historically used substances containing PFAS. PFAS containing byproducts or waste products from these businesses have ended up in the City's landfill. The landfill is sand lined and sand capped and produces a lot of leachate. For many years, the city has pumped landfill leachate out of collection wells and sent the leachate to the wastewater treatment plant. PFAS from the landfill leachate along with PFAS in the wastewater from other diffuse sources accumulated in the wastewater treatment plant sludge. Sludge from the wastewater treatment plan was regularly spread on the airport property near where the wells would later be drilled for a number of years during the late 1980's and early 1990's. Based on the history of the area, it is likely that the PFAS contamination in the groundwater came from a variety of sources, and Mayor Fredrickson thinks that a better use of the city's money and effort should be spend on finding a way to get clean, safe drinking water to city residents.

The city and residents have taken several important steps towards mitigating their PFAS issue. In 2020 Water Action Team Rhinelander (WATR) was formed as an independent group of experienced citizens to advise the mayor on PFAS issues. Next, the city sent out a Request for Qualifications (RFQ), looking for companies who can provide treatment solutions for PFAS. The city received 14 replies from individual companies or sets of companies doing joint submissions. In addition to these efforts, the city has been exploring potential state and federal funding that can be leveraged to implement solutions. The city's efforts have even been noticed by regulators and legislators with Senator Tammy Baldwin visiting the city in September 2021 to visit one of the contaminated wells and talk about funding opportunities.

Mayor Fredrickson believes that Rhinelander’s approach to solving their PFAS issue will help advance the knowledge, research and technologies surrounding PFAS. The things learned by Rhinelander should help other communities around the country who may be dealing with their own PFAS issues.

Andrew
Hello Everyone,

Today, I want to talk with you about some of the Training Needs and Technical Assistance we provide through our EPA program. We provide Training and Technical Assistance for Tribal Water Systems and Overburdened Community Water Systems.

Most of my travels I’ve been reaching out to Tribal Water Systems and Overburdened Community Water Systems and seek out the best trainings for water operators. Every water system has different training needs. So getting all the information from each different system helps me decide the best trainings that suit the operators. If your needs are out in the field or basic water sampling assistance I am here to help train you. If you’re having any issues please give me call. I would like to hear from you. Here is a list of just some of the topics we will cover through the EPA program:

- Top compliance training needs
- Operator training to assist with implementing the Lead and Copper Rule including preparing for proposed changes and increasing sampling reliability for small systems, schools and childcare facilities
- Revised Total Coliform Rule
- Risk and resilience assessments using VSAT
- Decision-maker and board member training on SDWA requirements and their responsibilities under the SDWA
- Operator certification and continuing education training
- AWIA Training

Any other trainings you may seek please contact me or any of the WI- Water Circuit riders. The Technical assistance always varies. I’ve been called out to do leak detection, Hydrant repair and just some guidance to help keep their water system in compliance. Remember, we are here to help with any kind of water issues you may have. If you would like to schedule a visit, please give me a call. We would be more than happy to help.

Thanks for reading everyone. Hope to see you soon.

George Taylor,
Small Water System Circuit Rider
715-321-4145 • Gtaylor@wrwa.org
### PSC WATER RATE INCREASE ORDERS ISSUED
**MARCH 1, 2021 – JUNE 29, 2021**

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<td>Melien Municipal Water Utility</td>
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<td>City of Hurley Water Utility</td>
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### PSC CONSTRUCTION AUTHORIZATIONS ISSUED
**MARCH 1, 2021 – JUNE 29, 2021**

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<td>Marion Municipal Water Utility</td>
<td>11/29/21</td>
<td>$1,144,180</td>
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Transient $65
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Septage Haulers/Plumbing Co. $155
Less than 1,000 people served $330
1,001 – 2,500 $410
2,501 – 6,000 $480
6,001 – 10,000 $550
Over 10,000 $615
Associate $550
Corporate $1,540
Corporate Gold $2,880

JOURNAL ADVERTISING RATES

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For information on advertising & the benefits of membership at the different levels, please contact Renee at the WRWA office: 715-344-7778 or rkoback@wrwa.org. *Must be employed by a WRWA system, associate, or corporate member, retired and state or federal employees

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Hardly a week goes by that one of us at WRWA receives a call concerning either FOG (fats, oils, and grease) or wipes are making operators lose their minds and asking for help with dealing with the public on these issues. In even more serious cases, plants are wiped out by benzene products or other mystery toxins. If I had a magic wand, I’d swipe it over everyone’s influent and (voila!) leave you with nice easily treated influent. Unfortunately, I’m not quite that talented, so I’ve come up with a fill-in-the-blank template for you to use. It’s mainly to give you some ideas for talking points in newspaper articles or mailers. Edit it to your heart’s content. I’ve found over the years that people will ignore requests unless it hits them in the wallet, or at least threatens to do so. Even though you may not need to raise water rates, implement fines, etc., the thought of having to pay will sometimes change behaviors. So, here goes…

Dear ______ Utility Member,

We know that you do not want to pay higher water and sewer rates. The purpose of this letter is to let you know ways that you can help us reduce our operating costs to avoid those higher rates. We are going to discuss what should and should not be put down into your municipal sewer system.

Three of the worst things that you can do are (1) flush “disposable” wipes, (2) put fats, grease and oil down a drain, and (3) put any type of gasoline or other toxin into a sewer system or storm sewer.

Sewers are designed to take away used dirty water from sinks, baths, showers, laundries, and toilets. Flushing away unflushables adds to the cost of operating and maintaining your sewers and the treatment plant. Putting trash down the toilet does cause blockages in sewers and possible damage to the environment. “Disposable” doesn’t mean flushable! Disposable means you should bag it and trash it… don’t flush it! Most baby wipes and adult wipes are not flushable. These clog pumps and sewers, adding maintenance and equipment costs.

The same is true for fats, oils, and greases. Grease does not easily break down, and ends up clogging sewers or impairing treatment at the wastewater plant. Toxics such as gasoline, ammonia or solvents kill the microorganisms that enable the treatment plant to work properly at breaking down waste, and also create a hazardous environment for the workers. Many toxins and pharmaceuticals cannot be treated with current wastewater treatment technology and will end up in your local lakes, rivers, or groundwater.

If these conditions prevent the wastewater treatment plant from meeting its Department of Natural Resources permit limits, fines may be imposed on the utility. In a worst-case scenario, the state may even issue building moratoriums until the problems have been corrected. This is why we take the situation very seriously.

We will be sampling throughout the utility to pin down areas that are problematic, and residents or commercial establishments that continue to violate these ordinances will be fined.

Help us keep our cost down and protect our workers and assets by following these simple rules. Be aware of what you put down your drain.

Respectfully,

_______ Utility
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If you are interested in having us as your partner, feel free to contact one of our department representatives below.

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SANITARY SURVEY

Sanitary Surveys are something every operator has to deal with every three years, so I thought I would write about some of the issues that DNR look at when one is conducted.

Water Source is one of the items that will be looked at. Capacity, Protection, Components that make up the piping etc. Capacity: is looking at present and future ability to provide water. Protection: is looking at setbacks from contaminant sources, wellhead protection plans in place, protected against unauthorized entry to facilities, protected from flooding, meets construction standards, Waivers up to date and so on. Components: Pump base meet requirements, Vents adequate and proper screens in place, all lines through the well cap sealed, sample taps properly installed, anything else to do with piping, pumps, controls.

The distribution system is another area of interest during a Survey. Some of the items needed here are updated maps if additions to system have occurred, up to date cross connection control program, hydrant flushing & maintenance program, water loss leak detection <10%, maintenance schedules, valve exercising program, adequate system pressure, adequate fire flow data, completed recordkeeping. Other items can be found in NR 811.

Pumps are another part of the inspection. This will cover all pumps throughout the system. Are the pumps proper and adequate for designated use, condition of pump, emergency power available and adequate, pump controls, buildings above flood levels, meet code requirements, discharge piping meet NR 811 requirements. Housekeeping includes cleanliness of buildings, maintenance of facilities and grounds, fences, gates, lighting.

Storage facilities will also be inspected. Do they meet system needs, are they well maintained, proper protective coatings used, emergency power for reservoirs if needed, hydro-pneumatic tanks would also be included in this section of sanitary survey.

Monitoring and reporting will also be addressed during a survey. Sampling site plans on file with DNR and updated. Sample locations adequate to

To see a complete list of every aspect of a sanitary survey you can go to NR 811 of the DNR code.

Jeff LaBelle, WRWA Technical Assistance Director
cover system, sample faucets, sample procedures, monitoring and water quality compliance, public notification, consumer confidence reports, monthly pumping records, emergency chlorination abilities.

Operator certification will be looked at also, are you properly certified, getting continuing education, Operator in charge.

A look at system operation and maintenance issues will also take place. Operation & Maintenance manuals up to date and accessible to operator, list responsibilities of operator, DNR office locations listed. Operators knowledgeable about system needs and inadequacies, past survey deficiencies addressed, system efforts to stay in compliance, operator support and training adequate emergency response planning, long and short term system operations planning, adequate revenue for repairs and savings margin for future needs.

Finally water treatment, are facilities maintained, treatment O&M manuals schematics available & up to date, treatment adequate for system, chemical testing equipment on hand and calibrated, water quality testing equipment, chemical storage, operator have proper training and certifications, facilities secure. The treatment segment of a survey would be treatment specific. This survey segment in NR 811 covers quite lot information I'm not going to list here.

I tried to cover what I consider the main points of each segment of a Sanitary Survey. To see a complete list of every aspect of a sanitary survey you can go to NR 811 of the DNR code.

Just a friendly reminder that the job is not done until the paperwork is complete. Jeff
Some WWTPs are prone to producing unwanted struvite, especially plants utilizing biological phosphorus removal and anaerobic digestion.

Traditionally considered a problem in most WWTPs, the spontaneous occurrence of struvite has been seen and recorded by many. First documented in 1937, struvite scaling as a precipitate adhering to pipes and other equipment has been a nuisance in the wastewater treatment industry. Under certain pH conditions (7-11), struvite has the potential to precipitate and adhere to metal surfaces whenever magnesium, NH4+, and phosphate are present in the molar ratios of 1:1:1. Since struvite favors adhering to metal surfaces, pipes and valves can become clogged with the precipitate, leading to costly repairs (e.g., Sacramento Regional Wastewater Treatment Plant replacing 5.6 km of piping; Ohlinger et al., 1998).

Some WWTPs are prone to producing unwanted struvite, especially plants utilizing biological phosphorus removal and anaerobic digestion. Phosphorus accumulating organisms (PAOs) take up phosphates (e.g., PO43-), creating a negative charge within the cell, and counteract this by accumulating positively charged magnesium ions to gain a stable, neutral charge. A portion of these PAOs are settled out of solution and are wasted from the biological treatment system by being routed to digesters, and consequently, high amounts of phosphorus and magnesium are added to digesters. Any nitrogenous matter that is biologically degraded in the digester will form NH4+ and coupling this with the magnesium and phosphorus added from the wasted PAOs, an environment very suitable for struvite precipitation is created. As well as this, liquors present in digesters are supersaturated with CO2, resulting from the acetogenesis stage of anaerobic digestion. When these liquors are removed from the digester the CO2 is stripped, from pumping turbulence, and pH levels rise creating an even more favorable environment for struvite to form.

Bottom line – struvite precipitation is very interesting, but it can be a major pain. I wish everyone out there a safe and happy new year!

Tony
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WRWA Mission:
Assisting, educating and representing our members in the Water & Wastewater Industries.
Recently an operator contacted me after attending one of Rural Water’s excellent training sessions and asked me for recommendations implementing a confined space and safety plan. After attending the confined space class the operator realized some of the places he regularly conducted work in were classified as confined spaces. The operations specialist works for a small city and is the only person employed by the city. One or two man crews are common in Wisconsin because Wisconsin is a water rich state which has allowed many small cities and villages to build and operate their own water and wastewater systems. Small town operators maintain parks, streets, distribution systems, wastewater systems among many other things. Wearing many hats while working on small crews poses potential safety risks for operators. There are many considerations for all operators when deciding how to repair or maintain a system. What may seem convenient may not always be safe. Remember even though some tasks may take longer and be more cumbersome by following proper safety protocols, no task is worth not coming back home to your family.

The first step to developing a plan is identifying all the areas where your working environment could become compromised or where work conditions may be dangerous. As a municipal worker this pertains to many more areas than one probably realizes. Working in confined spaces, working in the street, or dealing with wastewater all are tasks that present different risks. Think about what procedures you currently follow when you are working in potentially dangerous areas. After you have identified and thought about your safety procedures, you should start researching proper steps for safety compliance. There are many resources online from OSHA to read over and look through. After doing some research it is also a good idea to sign up for a class or two. WRWA offers many different safety classes in conjunction with Advanced Safety Technology. These classes will point you in the right direction of maintaining a safe work environment.

Once you have identified possible unsafe areas, researched safety protocols, and attended some classes you should start developing a plan. Safety templates can be found online, one place to look for one is the Department of Safety and Professional Services (DSPS). Along with making a plan, an operator will need proper safety equipment. Including but not limited to, a gas detection meter, tripod, harness, barriers, street signs, proper clothing and many other things to keep you safe. Also for small crews you will need others people who are properly trained to assist when you enter spaces and rescue teams available who are readily available to assist. Some small towns will call in professionals for confined space work since maintaining a proper crew from volunteers is not always feasible.

Once you have a plan made up, have all interested parties look over and acknowledge the plan. Discuss and review the plan often. Safety should be your greatest concern at work. Another consideration is partnering with surrounding communities to assist in properly entering confined spaces. There is a lot to think about in regards to safety. Many of you may be unknowingly putting yourselves at risk. Watch videos, read about procedures, attend classes, follow proper protocols and always be safe. Jesse

Jesse Hass, WRWA Wastewater Technician/Trainer
Wastewater Specialist
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**Are you Prepared?**

**Emergency Response Planning (ERP)**

By Todd Weich

Now a days there are so many hazards that we are unaware of that pose a threat to lives and property.

Happy winter! Now that winter is among us and you “may” have a little more office time, this is a wonderful opportunity to stay warm in your office and take a look at your Emergency Response Plan. It would provide a lot of the newer operators with some very useful information as well as give you time to update any outdated or inaccurate information. I know, as a veteran operator, that this is something that tends to get over looked and left on the back burner however it serves a huge purpose incase of an emergency.

During emergencies, a person’s brain may get a boost of adrenaline causing them not to think properly or effectively. An ERP is a plan that is developed to provide procedures for your municipality’s government agencies to respond to various types of emergencies or disasters (ie; tornados, lightning storm, flooding, ice/snow storm, pandemics, large scale fires, a hazardous material incident, droughts, earthquakes (rare but a possibility), cyber-attacks, terrorist attacks, or the unfortunate loss of an operator) that can affect your community. Now a days there are so many hazards that we are unaware of that pose a threat to lives and property. It also provides a direct link to procedures that can be used by the County government in case of a large-scale incident. Check with your County office to see if you can get access to the county’s hazard analysis.

**I would like to hit on the breakdown of an ERP:**

An ERP starts out with information about your system such as who is reasonable for the safe operations of the system. If the lead operator is unavailable, who’s second in-line? Is there a chain of command established with all that maybe involved? When I say chain of command it could be as extensive as including City and Village elected officials all the way up to the county elected officials depending on the emergency. This section of an ERP will establish who has the authority to do what to mitigate the emergency and who is authorized to spend the needed funds to minimize the emergency without approval from a council or board. Once you have established this make sure you have a current contact list of those involved.

Another partner for municipalities is the media and social media. What media covers your area; such as TV (news stations) or radio. As much as I hate to say it Facebook, Twitter and other platforms of social media can be a useful means of getting the word out of your emergency and the progress you are make to get things back to “normal”.

Have an up-to-date list of repair contracts such as pump installers, electricians, chemical suppliers, telephone companies, equipment rental, plumbers, gas companies (weather it’s natural gas or a company that delivers fuel to run your equipment), and back up generators that can run your water and wastewater systems. Speaking of backup generators did you know that NR810.13(1)d(d) states the following: “Emergency generators and auxiliary engines shall be exercised a minimum of once per month and quarterly under full load. A log shall be kept that documents when the unit was operated and maintenance that was performed on the unit.”

If your emergency has contaminated water or a loss of system pressures you may want to contact your DNR rep and WRWA for assistance. Your water department can also be prepared by having a preplan with grocery stores or gas station that could supply bottle water in a short notice. If the water problem is going to be long term situation, consider having contacts with bulk water haulers such as a milk truck company. If the bulk water becomes an option have a pre agreement with a neighboring water department to supply the water needed. Once the emergency is stable and returning back to normal you may need to consider your emergency chlorination plan. NR 810.26(8) states the following: “An emergency chlorination plan is required for each community water system. Each municipal water system shall have appropriate chlorination infrastructure and chlorine available to obtain 0.5 mg/l free chlorine throughout its distribution system within 4 hours. A working chlorine meter shall also be available to measure chlorine concentrations. To ensure water systems are capable of emergency chlorination, the department may ask that an emergency chlorination test be conducted by the water supplier for a municipal water system”. Don’t forget that you will need to take water samples as directed by your DNR rep.

And finally, the last thing I would like to talk about is having Mutual Aid agreements with neighboring municipalities. The agreement can help you obtain equipment or personnel as needed. One thing to keep in mind is that down the road, you could also be the main source of helping another municipality in a tough time. As a member of WRWA, you are a piece of a statewide mutual aid agreement if needed. Also, WRWA likes to keep an updated list of municipalities and equipment that could be utilized in emergencies to help assist other municipalities in need. Please consider completing the equipment update or availability form in this article and return to WRWA for their records. Or if you want to meet with a Circuit Rider to complete the form, that could also be arranged. The more that we are all prepared can result in a faster and safer resolution and your system can be returned back to its normal operational state.

If there are any questions or any assistance is needed, please reach out to you WRWA Circuit Rider. – Todd
EMERGENCY EQUIPMENT SURVEY

COUNTY: ____________________________          DISTRICT: __________

NAME OF UTILITY: _______________________________________________________

ADDRESS: ________________________________________________________________________________________________

CONTACT: __________________________________________ EMAIL: ________________________________

WORK PHONE: ___________________________ ALTERNATE PHONE: ___________________________

ALTERNATE CONTACT: __________________________ EMAIL: _______________________________________

WORK PHONE: ___________________________ ALTERNATE PHONE: ___________________________

# Available                  EQUIPMENT                          # Available

___Backhoe                   Portable Generator(s)               ___Utility Saw (Gas)

___Dump Truck                How Many / Size

___Boom Truck                __________ ______________

___Utility Truck             __________ ______________

___Jet-Vac                   __________ ______________

___Water Tanker              Portable Pump(s)                   ___Leak Detector

___Equipment Trailer         How Many / Size

___Front End Loader          __________ ______________

___Air Compressor            __________ ______________

___Chain Saw (Gas)           __________ ______________

Other Equipment Available:

________________________________________________________________________________________

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Don’t Wait to Start Your Inventory

Why Creation & Validation Should Be Your Top Priority

Your Lead Service Line Inventory is foundational to Lead and Copper Rule Compliance—and while it may be tempting to put off this project until further legislative steps are taken, systems should begin the process now to keep up with compliance deadlines.

Inventory Deadline: 2024

LCR will go into effect in 2024, and we believe it will only get more complex.

The Biden administration has placed a freeze on the legislation for review, however, the primary content of the revised Rule is likely to remain largely the same, with any updates making it more strict than its current form. Legislation will go into effect in October 2024.

At that time, systems will need to submit the first draft of their inventories—inventories that not only show where lead can be found in your communities, but have been validated to confirm its presence. The validation process is essential to verify your current data set and fill in gaps. For tips on what validation techniques make sense for your system, check out our Inventory Validation Guide.

Understanding the requirements of the Revisions, progress toward compliance should begin now to allow ample time.

A Validated Inventory Leads to LCR Compliance

Knowing where the lead is—and having that location verified—will be the basis for the majority of the LCR compliance requirements. For a full list of requirements and due dates as they stand, view our LCR Pipeline. The revisions introduce numerous new mandates that will be based around this validated inventory—without it, your system could use up valuable resources trying to make up for lost time.

Your inventory will be the basis of the LSL Replacement plan required by the revisions, providing the foundation for the next several years of work as lead pipes are removed. You’ll also need to notify all customers served by LSLs or unknown materials in 2024, a significant communication challenge that won’t happen without accurate inventory data.

The inventory will also dictate your Tier Site Monitoring, where utilities will soon be required to provide 1st and 5th liter sampling at any home with a known LSL. Accurate Tier Lists can only come from an accurate inventory.
A Project of Unprecedented Scale

The scope of the LSL inventory project will require years of planning and collaboration.

Inventory is a massive project, and utilities need time to unravel all the moving pieces. In what is essentially a large-scale data puzzle, gathering and validating the numerous relevant parts will be a big undertaking. According to polls conducted during 120Water webinar sessions, 82.7% percent of utilities are missing complete data on private-side line materials. Tools such as 120Water’s Inventory Management Solution can expedite this process but performing an audit of the current data in your utility will help to build a realistic timeline.

In addition to data complications, you’ll need to bring together multiple departments to collaborate on this project, including contractors and third-party services to empower your team. Building the inventory, validating materials, and completing replacement efforts is potentially a decades-long process, and postponing the process is one more day your community has to live with the possibility of lead in their drinking water.

Take Advantage of Federal Funding

Make yourself eligible for funding opportunities with a “shovel-ready” inventory. Numerous funding sources have been made available to systems for infrastructure, including water quality and LSL-related projects. Utilities should focus efforts on LSL inventorying if they hope to capture a piece of this funding pie.

Many of the sources will prioritize “shovel-ready” projects, which implies at the very least an estimation of lines, and most likely a complete inventory. Replacing service lines will be a costly endeavor, and you’ll likely need to utilize funding that’s been made available waiting to begin your inventory will not put your system in a position to capitalize on those opportunities.

Save Time & Money

The Lead and Copper Rule Revisions are certainly the most important legislative changes in the world of drinking water in decades, however, regulations will continue to evolve as we learn more and as public pressure to remove all lead from the ground mounts. We recommend operating under a future-proof definition of what constitutes a lead service line, collecting public and private information on the following up front:

- Lead Pipes
- Lead Fittings
- Copper with Lead Solder
- Galvanized Lines
- Unknown Materials

This is a project large enough you don’t want to have to do it twice. Approaching it with a broader mentality of what may constitute a replaceable service line will save your utility valuable time and money down the road as regulations evolve.

Where to Begin

Systems are juggling a lot of priorities right now, and it can be easy to assume that with no immediate deadlines, this project can wait until next year. We hope you’ll consider the reasons it’s important to start now so your system is set up for success in the future.

If you’re wondering exactly how to get started, visit www.120Water.com and we’ll work with you to assess the best next steps for your system.
### WRWA System Member List

**DISTRICT 1 (Northeast)**
- **2YK, LLC**
- Algoma
- Antigo
- *Ashwaubenon*
- Bailey's Harbor WWTP
- Bear Creek
- Bellevue
- Birnamwood
- Black Creek
- Bonduel
- Bowler
- Brazeau Sanitary System #1
- Cecil
- Clintonville
- Coleman
- Combined Locks
- **Conserve School**
- Crandon
- Crivitz
- Darboy Sanitary District
- Denmark
- *De Pere*
- Eagle River
- Egg Harbor
- Elcho Sanitary District
- Embarrass
- Ephraim
- Fish Creek Sanitary District
- *Florence*
- Forest County Potawatomi
- Freedom Sanitary District #1
- *Geiss Inc*
- Gillett
- Goodman Sanitary District
- Grand Chute
- *Green Bay*
- Greenfield
- Gresham
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- Holland Sanitary District #1
- Hortonville
- *Howard*
- Iola
- *Kaukauna*
- Kewaunee
- Kimberly
- Lakeland Sanitary District
- **Lakeland Village**
- Lakewood Sanitary District #1
- Laona Sanitary District
- Lawrence Utility District
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- Treatment Facility
- Manawa
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- Shawano
- Shawano County Utilities
- Shawano Lake Sanitary District
- Shiocton
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- Sturgeon Bay
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- Suring
- Three Lakes Sanitary District
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- Wabeno Sanitary District
- Waupaca
- Wausaukee
- Weyauwega
- White Lake
- Wisconsin Veterans Home
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- Wrightstown
- Wrightstown Sanitary District #1

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- East Troy Village of
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- Edgerton
- Elkhart Lake
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- *Greendale*
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- Hartford
- Hartland
- **HB Performance Systems Inc.**
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- Horicon
- Hustisford
- Ionia Sanitary District #1
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- *Janesville*
- Jefferson
- Johnson Creek
- Juneau
- Kellnersville
- Kewaskum
- Kiel
- **Kikkoman Foods Inc.**
- Kohler
- **Lad Lake Inc.**
- Lake Como Sanitary District #1
- Lake Geneva
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- Lannon
- LeRoy
- Lodi
- Lomira
- Lowell
- *Madison*
- Maple Bluff
- Maribel
- Marshall
- Mary Hill Park Sanitary District
- Mayville
- Mazomanie
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Change can be unnerving. People often stick to the adage “we've always done it this way” as a justification to avoid progressing towards an unknown.

It came to my attention during the 9-day gun-deer season that we do things a certain way because of the fear of change. The group of hunters I drive with has a gathering each morning to discuss which drives to complete. This group includes three generations of hunters. One of the hunters in the second generation suggested of walking a drive in a completely different direction that we had previously done for years. Everyone his age-range and under nodded in agreement. Those in the older generation rolled their eyes. “This is the way we have done this drive for years, even when we were your age 40 years ago!” spouted one of our leaders. Calmly, my buddy responded simply, “How do you know if you don't try something new? We could be missing out on a great drive.”

Now this debate did continue for some time but eventually the elders gave in to the idea of attempting this new idea. Now the pressure is on. We all know this is the “make or break” moment. Either the drive is successful, and we could continue to make further suggestions to move forward, or it was a complete flop, and we would never hear the end of it. Our credibility would be lost for good.

How does any of this pertain to our work in water and wastewater? For years we have all known about positive displacement for aeration, but have you ever considered a different type of aeration and mixing? This is not new technology, but in my experience, it is not extremely well known or understood. Solar Bees (SB) and Grid Bees (GB) may be used to help reduce electrical consumption exponentially. For many, the changes aren’t something that comes easy, but you may find this to be a great informational start to saving copious amounts of energy and ease your overall budget.

By Dan Wundrow
First, let us explore the positive displacement blowers. Blower motors in most municipalities are older and may even be the same blowers from when the plant was built decades before. At that time, energy efficiency was not even on the radar for public works. The options of blower motors are limitless, and some are more efficient than others. For an example, we have a large motor that drives a blower that conveys the compressed air through pipes to either fine or coarse bubbler diffusers. Most of these setups run at 100% speed, with a few running at 80%. If you have a variable frequency drive (VFD) there are ways to reduce your electrical consumption by adjusting the run speed. I would be happy to discuss your specific system directly to develop potential savings.

Positive displacement is currently the most used method for aeration. Solar and Grid Bees are a newer process for aeration. I have had the opportunity to view SB and GB in action firsthand. Now I will be the first to admit I was a bit skeptical of the setup because I didn’t understand it fully. After speaking with the operator of the wastewater plant, and asking a ton of questions, I began to see how this could and will change a lot of systems electrical consumption for the better. If you ever get the chance to view SB and GB in action, please do! This technology is the future of water and wastewater energy efficiency.

SB is a small-framed pump that floats within the pond or basin. As the name states, they run on solar power and may have battery backups available for overnight operation or when there is little to no sunlight available. They can replace conventional 30-50 HP blowers. Size and number of SB needed for your pond or basin would need to be calculated to determine the best results. See the diagram below for the operation of a SB.

The water is drawn from the J-hose and push horizontally, which in turn helps with vertical mixing as the water passes. The combination of the two mixing directions aids in distribution of oxygen, algae, bacteria, and nutrients. GB function the same for aeration. They are tethered to the bottom of the pond or basin to prevent them from free-floating to one side or the other. The difference from a GB to a SB is that a GB uses approximately 120 volts and draws about 58 watts. In a 24-hour period this would equate to 1.392 kWh used. The option for SB and GB set ups is numerous and add-ons are available.

Maintenance of SB and GB is quite simple and mostly involves preventative maintenance in the spring and fall. Parts have been easy to get, and the units are made of stainless steel. Most of the framing parts can be purchased at a local metal shop and installation managed by the operator. The one issue, if you wish to call it an issue, mentioned is that sometimes the J-hose will get air trapping causing it to float to the surface. The operator and vendors I spoke with reported this is an easy fix by punching a few small holes into the J-hose to release the air. Once this was done, they have not had any issues with floating since.

Winter operations are pretty simple from the operator’s standpoint. The GB seem to keep about a 10-foot diameter of open water around them. The SB have a smaller space around the unit, but it did not affect the operation of the SB. Some slight freeze-ups to the motor shaft are possible. The shaft break-away is a pretty cool set up. The shaft itself is enclosed in a small reservoir of oil and when it starts to freeze the oil will push the shaft up and disconnect. The way to correct this is to either wait for the temperature to naturally rewarm the oil or to apply heat to re-warm the oil. Once rewarmed, the shaft will drop back into place and reconnect itself. The operator reported this is not a common thing but may happen occasionally.

Low-light or no-light conditions do happen with any solar energy. The SB battery backup can be installed on the units to power them through these times. The operator I spoke with stated if they have a few days of low-light or no-light the SB will slow down but not completely stop working.

Cost of these units will vary from the size needed, to setup, to add-ons such as the SB battery backups. Average per the vendor is approximately $45,000 per unit. Don’t let this price scare you. The payback is fairly fast depending on the kWh cost for your community. Most would be in the range of 5-10 years. If you are looking for more precise numbers, please reach out to WRWA to request an energy assessment and I will be able to provide you with more finite numbers.

Trying new things is not as frightening as we make it out to be. Making a few changes can result in positive long-term impacts. It worked for our deer drive group. The new suggested drive was easier on the deer drivers and produced the same number of deer at the end. After that we were able to suggest additional ideas with more confidence and show the elders that we had been listening to their lessons for all these years. The students were now leading the class.

I want to wish you all a happy holiday season, a wonderful new year, and fantastic winter. My hope is you all may get out and enjoy what Wisconsin has to offer during the winter season. You’ll find me on a frozen lake any chance I get!

Dan
It happens to all of us. We run into a situation where we don’t have the proper tool for the job. Or we create an unsafe situation by not having the proper safety equipment. Having the correct tools on hand for every possible ‘what if’ situation that may arise is virtually impossible.

Do not be too proud to ask for help. Whether you need manpower or equipment, mutual aid is a wonderful thing. Mutual aid is neighbors helping neighbors. Mutual aid has been around for decades. It is a fancy way of asking for help or equipment. If you are worried about liability, WRWA has boilerplate mutual aid agreements on our website. Community A and Community B can borrow and loan out equipment to each other without worry. All you need to do is fill in the blanks on the forms, have them signed, and you can borrow tools worry free.

But wait, there's more.

Did I mention WRWA’s loaner equipment program? Our loaner equipment inventory is ready-to-use. Our library of equipment was built through donations from utilities, corporate members, and the Sportsman’s Raffle. Similar to mutual aid, you can borrow some of our equipment for as long as you need. That’s what it’s for...for you! Just go to our website (WRWA.org) and find our loaner equipment list to see if there is something that could be of use to you. Then contact your Circuit Rider to see when the equipment is available. In many cases, we will deliver the equipment to your community.

As many of you know, WRWA will assist you in any way that we can in many scenarios. We can assist in paperwork, fire flow testing, hydrant repair, or help troubleshoot any drinking water issue. Our staff has talent and experience in many respects. WRWA’s staff is not only focused on drinking water, but we have staff with an aptitude for wastewater as well. From the manhole to the laboratory, our experienced staff can assist and/or troubleshoot many situations.

Technical assistance does not just end with WRWA staff. Our extensive membership carries all the knowledge you will need to help you through any possible situation. Again, please refer to our website to see the list of our members. The years of experience of our members in the industry are too large to comprehend, and they are all waiting for your call. They are here to help. WE are here to help.

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Let there be no mistake, the finest words ever penned on the principled value of burning firewood to heat a home was by Aldo Leopold in his A Sand County Almanac essay, “Good Oak”.

Thoughtfully he supposed, “If one has cut, split, hauled and piled his own good oak, and let his mind work the while, he will remember much about where the heat comes from – while a February blizzard tosses the trees outside.”

He then described the process – from the bolt of lightning that “put an end to wood-making by this particular oak”, to laying “a newly filed saw to its bastioned base – on a crisp winter’s day”.

His brilliant essay then takes the reader on a historical journey, as the saw blade cuts through a century of growth rings – “stroke by stroke, decade by decade, into a chronology of a lifetime, written in concentric annual rings of good oak.”

I read the essay each year, about this time to remind myself of the worth of wood as fuel. Back in the 1940s, the Leopold family used saws with teeth to make “a split of good oak for the andirons”. These days, a saw with chains is the tool of choice. But the end product is the same – firewood. Now classified as a biofuel, firewood makes a woodburner worthy of tax credits.

Oak trees grow along the creek out back, but fall far short of “good oak” status, so we have taken to purchasing dried oak by the truckload. Mix hardwoods like maple and elm, along with an abundant supply of aspen, are added to the mix, and together will keep our dwelling toasty warm when winter winds grip the land. With chainsaw in hand and help from family and friends we put up winter supplies of fuel for our living room wood stove. Using saws, trailers and strong backs we cut, haul and stack our biosolid investment to dry in several wood sheds.

On the job of making wood, Leopold continued, “There is an allegory for historians in the diverse functions of saw, wedge and axe. The saw works only across the years – one by one, in sequence. The wedge, on the other hand, yields a collective view of all the years at once. The axe functions only at an angle diagonal to the years – the three tools are requisite to good oak, and to good history.”
So, on occasion, we examine our cut wood and count the annual rings. Not much history to be found in the cross-section of a twelve-inch elm, life cut short by Dutch disease. Or a short lived aspen, which at thirty years old is considered past its prime. The birch and maple that were felled alongside the aspen make room for a new generation of trees that sprout from the stumps and roots of their parents.

But short-lived as they are, they reflect the history of our time on this land we call home along the creek. And opposed to fossil fuels, they become a source of energy to heat our buildings.

That, in itself, makes these words from Leopold hit close to home as we sit by our woodstove, “These things I ponder as the kettle sings, and the good oak burns to red coals on white ashes.”

In March, Wisconsin will celebrate the life and times of Aldo Leopold on a very special annual weekend dedicated forever to his legacy. Our inheritance is his words – inspirational thoughts which he left in trust to us all - on nature, conservation and the concept of a land ethic.

His classic work, A Sand County Almanac - first published in 1949 – contains a series of essays describing time spent at a weekend retreat from his home and work in Madison. The family “shack” and a worn-out farm, located along the Wisconsin River, became the setting for his beautifully motivated prose. Beyond the seasonal shack essays, he reflected on over forty years of conservation related experiences and finished with a series of philosophical questions that concluded in a land ethic. The final product took him twelve years to write - its impact felt across the globe - with over two million copies printed and translated into nine languages.

Leopold observed “a drama in every bush”…and noted “stories available to any person with ears to hear and eyes to see.” He was a wordsmith and a poet, a hunter and an ornithologist, a scholar and a teacher. It was Leopold’s quest to bring people and nature together.

Connecting people with the outdoor world, Leopold truly believed that conservation was “a state of harmony between man and land”. It was not simply restoring and protecting land – it was about improving people and changing a culture. To this insightful man, it was more about the banker, the plumber, the farmer, the voter and the consumer. Then and only then, he concluded, will the problems disappear when folks are connected to the land. “Once you learn to read the land, I have no fear of what you will do to it, or with it.”

He ended the Almanac with the concept of a land ethic - a product of social evolution and man’s relationship, or lack of, to land and to the animals and plants which grow upon it. Unfortunately, he notes, man had lost his relation to the land. To most people, “It is the space between cities on which crops grow”.

Leopold felt that if we quit thinking about land-use in a purely economic sense and balance what’s ethically and economically right – our educational and economic system might head towards a more conscious use of the land. Leopold declared, “A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.”

Seventy-some years ago next month, Leopold penned the following words while introducing A Sand County Almanac; “When we see land as a community to which we belong, we may begin to use it with love and respect.”

These many years later – his words still ring true.
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