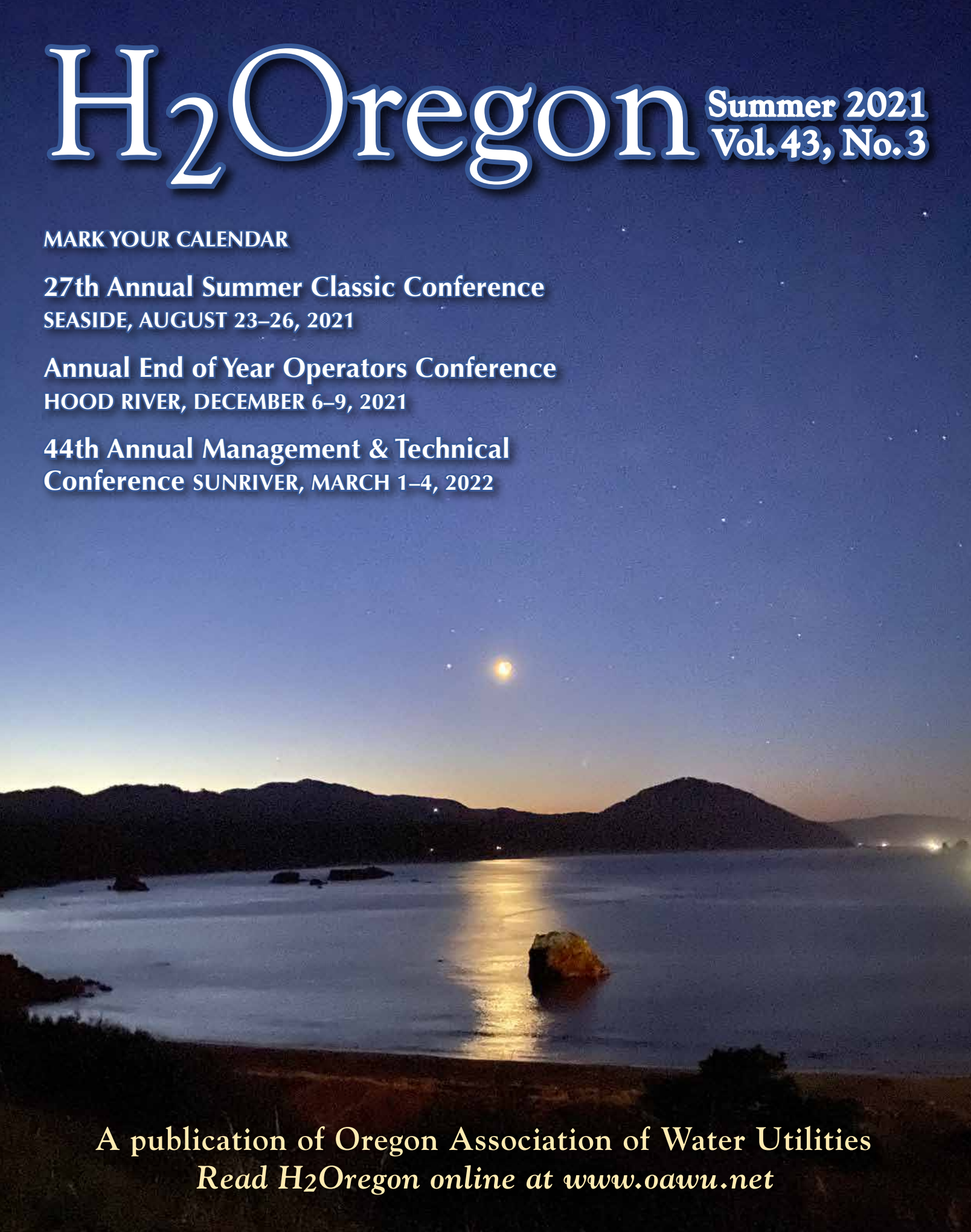
H_2Oregon

Summer 2021
Vol. 43, No. 3



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SEASIDE, AUGUST 23–26, 2021

Annual End of Year Operators Conference
HOOD RIVER, DECEMBER 6–9, 2021

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A publication of Oregon Association of Water Utilities
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H2Oregon

Summer 2021
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CONTENTS

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H2Oregon is the official publication of the Oregon Association of Water Utilities, and is published quarterly for distribution to representatives of rural and municipal suppliers. Issues are mailed free of charge to member and nonmember rural water/wastewater associations. Articles and photos are encouraged with payment in complimentary copies.

H2Oregon is published for the Oregon Association of Water Utilities by
Mt. Angel Publishing, Inc.
135 N. Main St., Mt. Angel, OR 97362
503-845-9499 fax: 503-845-9202
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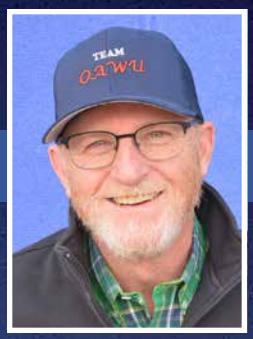
OAWU's mission is to provide service, support and solutions for Oregon water & wastewater utilities to meet the challenges of today & tomorrow.

What to Believe



by Hans Schroeder, Circuit Rider

How do we decipher what to believe in this world of technology? There are so many filters that can be added while doing research on the internet and trying to search for the truth, but how do we know it hasn't been manipulated from one side or another, or is just plain deceptive, fake news, or censored.

There *is* truth to be found in research—we have to look for it. Finding the truth takes a personal effort! We need to go to reliable sources, such as talking to a mentor that has been in the industry, attending proper classes, or calling OAWU and getting a circuit rider out to help with the questions. Also, looking at past articles in our magazine maybe helpful, or contacting the proper state or local authority.

Any member or nonmember can contact OAWU, and we will help to assist any way we can whether it be in the sewer or water industry. We have many tools we have invested in to help systems that need it, this can be especially useful if the system cannot justify the cost of the equipment. Some of our tools include drones to fly your system, leak detectors, a vacuum trailer, sonar to test your wells—we even can do rate studies if you are seeking to get a grant or other loan through the many programs available out there.

There are many questions that go unanswered when seeking the truth, but we can make sure to go to the proper resources and do our due diligence in seeking them. There is one truth that *is* answered: we are passionate about our industry. We try to be the best every day and your OAWU family is always here to help out any way we can.

For more information about services and professional training, visit www.oawu.net

The Best Laid Plans of Mice and Men Can Still Go Wrong

by Keith Bedell, Wastewater Technician

As you all know when you get up in the morning it can be a good day, or a bad day. The time that we will know the answer to this is when the day is over. I started out a Friday with everything going nicely, needed to be at a town 2 hours away to pick up water samples at noon. Leisurely drive with our small dog (Tilly) with a few stops to walk around and enjoy the nice weather. Then I got a call that the crew was running behind so, closer to 1pm. Perfect opportunity to go a little further and visit friends while I am waiting. With a two-hour drive back and the lab closing at 5pm, I had plenty of time to visit and pick up the samples. Picked up the samples at 2pm and headed out, construction on the road with flaggers and pilot car. The construction crew was working on a bad spot, so both lanes were shut down for about 20 minutes, long enough for a good mile or more of traffic backed up waiting to go in both directions. Ok, cutting it close, but still, plenty of time. Make it on time to make sure the samples are correctly labeled, and chain of custody are filled out proper. Tilly was visiting and having a good time with the lab employees when we notice she had a red spot on here belly, looked like the incision from when she had gotten spayed opened up. Perfect, 4:45pm and the vet is probably busy, emergency visit. They checked her in and figured she had crawled over something, possibly barbed wire, making a 2-inch cut and it was a day or more old (sure did not seem to slow her down). So, 2 hours and $580.00 later, stitches, a drain and cone, made it home at 7pm.

Just like going into the office and having city hall call, saying there looks to be a water leak over on 1st Street. Drive over to check, not a bad leak, just some water standing with a little flow. Looks like it is coming from some brush along the side of the road. Then think maybe a service leak or valve. We go over there to see it is a hidden manhole with sewage coming out of the pick holes, perfect, now things have gotten a little "crappy." Nobody has called in with a backed-up service (yet), so we think, get the crew and get it unplugged quick and everything is golden. Nothing in the down-stream manhole, so it is between the two or in the overflowing manhole, luckily, it is only 200 feet between the two, short run. Vacuum truck will not start so we grab the 3-inch trash pump and plenty of hose, and don't forget the gas. Get the pump set up and the hose laid to the downstream manhole and the level is dropping, now we are getting somewhere. Vacuum truck is running, it needed jumped, and pulls up to the site just as the pump loses suction. Get the rodder set up and run it up to the plugged manhole, break the plug loose and everything drains out. Appears to be a grease buildup with some rags and wipes thrown in. Have one of the crew check all of the downstream manholes to make sure that there aren't any plugged with the debris that are flowing. We started work at 7am and have a full day in by 10am. Now look on the bright side, we have taken care of the problem quickly and there weren't any homes backed up with damage, it could have been worse. So, are we the optimistic type or pessimistic? Things may look bad while you are working on a project or problem, but when we are done and have taken care of it do we say "that went pretty well" or "that was crappy, why does everything have to happen to us." Setting a good attitude for our crew will make things go smoother and keep people motivated. Attitude is everything!

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Lagoons

by Tim Tice, Projects Manager

Wastewater lagoons (ponds) are used around Oregon to treat municipal wastewater. Pond treatment is reliant on surface area and available volume, both of which are impacted by the steady accumulation of sludge at the pond bottom and surface.[1]

Wastewater treatment plants (WWTP) are facilities that utilize biological, chemical, and physical processes that reduce organic and inorganic loads in wastewater. Managing these facilities is important as a discharge of untreated wastewater poses a risk to the environment and public health.

Rural Oregon and regional areas provide effective wastewater treatment in such a way to keep operational and maintenance cost to a minimum, and this can be accomplished a pond or lagoon system.

Treatment lagoons simplify the process of removing total suspended solids (TSS) and biological oxygen demand (BOD). Using a natural process of oxygen and sunlight to photosynthesize algae, but some solids are not easily reduced and will begin to accumulate over time.

As accumulation of sludge begins to increase, the volume of sludge displaces some water that is needed for additional aerobic bacteria. If aerobic conditions are diminished, anaerobic conditions begin to form in the bottom sludge bed. Also, floating surface sludge, which reduces photosynthesis of the algae, can occur furthering the negative impacts on the treatment of the pond wastewater.

As wastewater lagoon sludge volumes reach 15 percent, (percentage of total operating depth) which does not include the free-board area, operational concerns may begin. However, most of the problems that come from an increase in sludge are not visibly noticeable at the time. After sludge levels reach 33 percent, it becomes a challenge to remain in compliance with the NPDES permit. Once sludge levels reach 50 percent, the lagoon ceases to function properly.

The rate of sludge accumulation is not consistent, and depends on the design, wastewater strength (high BOD and TSS), the age of the lagoon, if the lagoon has been dredged and the climate conditions in which it operates. Aerobic lagoons can breakdown solids faster than anaerobic conditions.

There are a number of methods used to profile a wastewater lagoon which should include a base survey to establish both the total capacity of the lagoon and the sludge volume usually defined as a percentage of total volume. If requested, grab samples from the sample tube at various locations can be combined to determine sludge contents. Timeframes associated with lagoon profiling may or may not be part of the permit assigned to the facility.

The best-known profiling methods require either staff personnel or contracted services to complete. These techniques can place personnel in potentially risky situations. The first techniques are essentially a mechanical means which lowers a gauged tube (sludge judge) at numerous locations using a boat. This method documents the sludge depth to the bottom of the lagoon at the numbered

locations. Another process uses a disk on a rope, which allows a twelve-inch disk to settle through the water and rest on the settled sludge, thus measuring the distance from the top of the sludge layer to the top of the water, subtracting the figure from the total lagoon depth. An Electronic sonar depth finder simply measures the lagoon's liquid surface to the sludge layer (fish finder), yet equipment set-up and operation may need adjustment since lagoon wastewater is more complicated than the intended purpose of the equipment.[2] A non-entry technique uses a remote-control boat with the sonar equipment attached accompanied with a global positioning system. If samples need to be taken for further analysis, additional steps will be required. Most methods provide a contour image map that indicates any areas of accumulation, as well as the average depth of the lagoon(s). Additional information can be gathered i.e., the plant growth (surface, subsurface), operating levels at the time of profiling and any anomalies while profile is measured.

Samples can be sent to the laboratory for further analysis, but this is usually completed if the sludge is nearing capacity and should be removed. Generally, dredging or some type of bioremediation is used to mitigate the levels of sludge.

If you live in Oregon, use wastewater lagoons to process the municipal waste, and would like assistance to determine the functionality of your lagoon system, or for your permit, contact OAWU for assistance. *The best that life has to offer!*

1 - https://www.researchgate.net/publication/253234355

2 - http://www.ncagr.gov/SWC/tech/documents/sludge_survey.pdf

Are You Ready?

by Scott Berry, Operations Manager

One of the many lessons we learned from 2020 is that no community is safe from the dangers of wildfire. Whether we in a small community surrounded by mountains and forests or in a busy suburban city setting, it can happen to us.

Are you ready?

In a past professional life, I was a Forest Officer for Oregon Department of Forestry. In fact, the office that I used to work out of was one of the many buildings that burned to the ground in the three days following Labor Day 2020. When the conditions are just right, it can happen anywhere, but there are some things we can all do to prepare for the worst-case scenario like we witnessed in September 2020.

Resilient Construction

- Use fire resistant materials to build the facilities.
- Use construction materials that are fire-resistant or non-combustible whenever possible.
- For roof construction, consider using materials such as Class-A asphalt shingles, slate or clay tile, metal, cement and concrete products, or terra-cotta tiles.
- Constructing a fire-resistant sub-roof can add protection as well.
- On exterior wall facing, fire resistive materials such as stucco or masonry are much better choices than vinyl which can soften and melt. Another interesting type of construction that we've seen in Detroit is a home sided with charred cedar paneling. The charred surface acted as a flame-resistant surface and it survived when many of the other homes in the area did not.
- Window materials and size are important. Smaller panes hold up better in their frames than larger ones. Double pane glass and tempered glass are more reliable and effective heat barriers than single pane glass. Plastic skylights can melt.
- Install non-flammable shutters on windows and skylights.
- To prevent sparks from entering the home through vents, cover exterior attic and underfloor vents with wire screening no larger than 1/8 of an inch mesh. Make sure undereave and soffit vents are as close as possible to the roof line. Box in eaves but be sure to provide adequate ventilation to prevent condensation.
- Include a driveway that is wide enough to provide easy access for fire engines (12 feet wide with a vertical clearance of 15 feet and a slope that is less than 5 percent). The driveway and access roads should be well-maintained, clearly marked, and include ample turnaround space near the facilities. Also, provide easy access to fire service water supplies, whenever possible.
- Provide at least two ground level doors for easy and safe exit and at least two means of escape (i.e., doors or windows) in each room so that everyone has a way out. The exception would be if you are designing a space specifically for the purpose of sheltering in place.
- Keep gutters, eaves, and roofs clear of leaves and other debris.
- Make periodic inspections of your facilities, looking for deterioration such as breaks and spaces between roof tiles, warping wood, or cracks and crevices in the structure.
- Periodically inspect your property, clearing dead wood and dense vegetation at distance of at least 30 feet from structures. Move firewood, lumber, or other stored

flammable material away from the structure or attachments like fences or decks.

Any structures attached to the house, such as decks, porches, fences, and outbuildings should be considered part of the house. These structures can act as fuel bridges, particularly if constructed from flammable materials. Therefore, consider the following:

- If you wish to attach an all-wood fence to your structure, use masonry or metal as a protective barriers between the fence and structure.
- Use metal when constructing a trellis and cover it with high-moisture, low flammability vegetation.
- Prevent combustible materials and debris from accumulating beneath patio decks or elevated porches. Screen or box-in areas below patios and decks with wire screen no larger than $^{1}/_{8}$-inch mesh.
- Make sure an elevated wooden deck is not located at the top of a hill where it will be in direct line of a fire moving up slope. Consider a terrace instead.

Create A Defensible Space

Clear trees, brush, and debris away from all structures. Ideally, initiate a "zoned" landscaping plan as follows:

- **Zone 1** This well-irrigated or non-flammable plantings area encircles the structure for at least 30' on all sides, providing space for fire suppression equipment in the event of an emergency. Plantings should be limited to carefully spaced low flammability species.
- **Zone 2** Low flammability plant materials should be used here. Plants should be low-growing, and the irrigation system should extend into this section.
- **Zone 3** Place low-growing plants and well-spaced trees in this area, remembering to keep the volume of vegetation (fuel) low.
- **Zone 4** This furthest zone from the structure is a natural area. Selectively prune and thin all plants and remove highly flammable vegetation.

Additionally, make sure to:

- Leave a minimum of 30' around the house to accommodate fire equipment, if necessary.
- Widely space and carefully situate the trees you plant.
- Take out the "ladder fuels" — vegetation that serves as a link between grass and tree tops.
- This arrangement can carry fire to a structure or from a structure to vegetation.
- Give yourself added protection with "fuel breaks" like driveways, gravel walkways, and lawns.

Because we don't know when the next "perfect storm" will be, this type of *firewise* planning will require yearly maintenance to stay ready.

Calm Before the Storm

Heath Cokeley, Programs Manager/Circuit Rider

We are well over one year now since the beginning of the Coronavirus, which I know for some has been very life altering. We are coming up on one year since the fires that ravaged many communities in Oregon during September of 2020 (which for me personally, has had a greater impact on my day-to-day life than the Coronavirus) and we had a fun little ice storm a few months ago that has prompted me to write this article and a handful of others to follow on emergency response. This article "Calm Before the Storm" will simply deal with some things to do before an event happens, and I will be honest, I plan to keep this short as I have written articles on disaster preparedness before and there is an abundance of information out there on it. Hopefully, I can provide a few resources in this article that you will find helpful and if it does nothing else, I hope it gets you talking to the right people so when something bad does happen a relationship with those resources has already begun.

Being prepared for any disaster that could befall the utility can seem totally overwhelming when stepping back and looking at the whole picture all at once. What we need to do is break it down into smaller more reasonable sections. I think it was Creighton Abrams that said, "when eating an elephant, take one bite at a time." I would start with our system Emergency Response Plan (ERP). All utilities should have this document somewhere and hopefully it is up to date and usable, but if not, now is a good time to get it up to date and let it be a guide to what information we will need to be better prepared. The first part of our ERP should have all the emergency contacts listed in it. Start by updating the numbers as this is likely the part of an ERP to be used in the event of a disaster. Some of these contact numbers we should call and start building a relationship with the people on the other end if we do not already have one. If we don't know who our county's Emergency Manager is, find out, call them, and have a talk. These individuals tend to be particularly good at what they do and want to form good relationships before a disaster happens because they realize how important those relationships are when large scale events happen. These people are charged with looking at the big picture for their counties they serve, so it is not surprising that they don't always think about drinking water or know where every water entity is in the county because they have many things they are looking at, but my experience is having the water systems on there radar is a very beneficial thing. If we do nothing else after reading this article but pick up the phone and call our county's Emergency Manager, I will consider this article a success.

If we don't know how to find the contact information for our county's Emergency Manager, that brings me to my next part of the article. Utilize technology for these resources. I have a number of Apps and websites that I use to try and stay up to date on information and one of those is RAPTOR or Real-Time Assessment and Planning Tool for Oregon. Normally, I would say that in RAPTOR we can click on any county and it will show your Emergency Managers direct line number, but unfortunately it did not show me that information when I just tried to use it. This is a good point to make, to have this type of information written down as the internet may be down and you can't look it up during a disaster. Of course, the phones may be down as well so we can't call the number even if we had it, but we will talk about communications in a bit. If we just look up the Emergency Manager for our county, we should find the direct contact number for our Emergency Manager and I would just call and introduce myself and discuss what kind of resources they may have to lend or what kind of resources we may

have to give during a disaster. This is also a very good relationship to have with other water systems or cities in the area.

Let's talk communications. In the event of an emergency, it will break down. I have seen this happen even in tabletop exercises with all parties involved sitting at the table, thinking it won't happen when everyone is scattered across a large area with limited or no communications between them would be irresponsible. What we can do is do the best we can to prepare for that inevitability. The relationships with other entities will play into that, but technology will as well. How do we intend on communicating with our crew during an emergency? Cell phones work great for day-to-day operations, but in emergencies the grid may go down or leave us with limited communications like text messaging. I would have some kind of backup for ourselves and our crew. I'm not saying we need to invest in the highest end radios money can buy, but some kind of communications system other than just cell phones would be good and can be tailored to our systems size and complexity.

The last thing I will talk about is having some resources set aside for the system personnel who will be responding to the event. It would be great if every system had a fall out shelter that can house each employee's whole family in the event of a major disaster, but I recognize that is not realistic for every system. What I am talking about is having at least some basic food and water previsions set aside and the extent of that will depend on what kind of event we are preparing for. Again, I am not saying we need to try and eat the whole elephant all at once with this, but I think setting aside some things to get you and the crew through the first 72 hours if they are required to work hard and heavy is reasonable and if we have the ability and resources to do more than that, then great. I hope you are able to find something useful in this article, but even if it just gets us thinking about dusting off the ERP or looking up our county's Emergency Manager's number to give them a quick call introduce ourself and our utility then I am good with the time I spent writing it. My next article will likely be about the day of a disaster, also known as the longest day, and with that *I will see you down the road.*

Hydrogen Sulfide (H_2S):

by Bob Waller, Water Circuit Rider

I am a Circuit Rider for OAWU and many of my ideas for magazine articles come from questions from system operators. Systems using ground water will often have hydrogen sulfide gas, the rotten egg smell, in the water. For some systems this is an ongoing problem, for others it's seasonal.

The system I ran for several years had two main wells. The well that had been in use for years had a lot of hydrogen sulfide in the water. There were times of the year we would get more complaints than others, but that rotten egg odor was always there. Many people just got used to the smell, but If we had a particular area of complaints, we would normally flush hydrants in those areas and the problem would go away for a while.

After all the telemetry was installed, our new well was then put online, the hydrogen sulfide problem nearly went away. If we had a complaint, it was only in areas where there might have been a high spot in the water mains, and we installed air relief valves where needed. Life was good until we needed to take the new well offline and use the old well. The complaints would come in hard and heavy; they were not used to the smell. I knew the complaints were coming and we did our best to get the new well online as quick as possible. So, when I hear of problems at systems with H2S I know what they're talking about.

While doing research for systems that don't have the option of going to another well, I found a few solutions that may help.

Hydrogen sulfide (H2S) is a dissolved gas that gives water a characteristic rotten egg taste and odor, it corrodes pipes and can turn water black and is also known to cause havoc obtaining free chlorine residual levels. Hydrogen sulfide often occurs naturally in well water and can be caused by the presence of sulphate reducing bacteria in the well system. Hydrogen sulfide can also be caused by decomposing weeds and algae and is caused by a lack of dissolved oxygen in the water. Since sulphate reducing bacteria are the most common cause, treatment to control the bacteria should be tried first. Shock chlorination is a standard treatment for controlling sulphate reducing and iron bacteria in a well. Shock chlorination at 50 mg/L is a good dose and there are many good YouTube links to show very good ways to get the best results by continuous mixing during the process.

I have seen some other inexpensive gadgets like "the Sulfur Eliminator", and some that spray atomized water back into your well which is supposed to add O2 to the well water. (**https://wendellleewellservices.com/product/aeration-nozzle-kit/**)

Other Treatment Methods

One method is to install a chlorine feeder and an activated carbon filter. The hydrogen sulfide is oxidized by the chlorine and the insoluble sulphide particles are removed by the activated carbon filter. This filter also removes any residual chlorine that is left after oxidization of the hydrogen sulphide. An activated carbon filter requires a lower backwash rate than a sand filter, but a sand filter has a higher maximum service flow rate. This system is most appropriate in situations

My Water Stinks!

where there is only hydrogen sulfide present and no significant amount of iron.

Another method is aeration which is accomplished by spraying water into a ventilated storage tank. The hydrogen sulfide is gas separated from the water as it is sprayed and drawn off as a gas by the ventilation system. Aeration will remove most of the hydrogen sulfide, but chlorination may still be necessary. Other oxidizing agents besides chlorine can be added to the water to oxidize hydrogen sulfide. These include hydrogen peroxide, potassium permanganate, and ozone. Filtration will still be required after any of these have been added.

I hope this information helps and keep OAWU in mind if you need further assistance.

2021 TRAINING & EVENTS

Date	Class Title	Location	CEU Information	ESAC#	Fee/Free
July 20-21	Water Treatment, Water Distribution Certification Review	Redmond	1.4 Water/0.5 Wastewater/Onsite	4036	Fee
August 4	Lock Out Tag Out	Bend	0.3 Water/Wastewater/Onsite	TBA	Fee
August 5	Hazardous Communication Standard (Global Harmonization)	Bend	0.3 Water/Wastewater	4193	Fee
August 5	Confined Space	Bend	0.3 Water/Wastewater/Onsite	3841	Fee
August 10-11	Wastewater Treatment/Collections Certification Review	Salem	1.4 Wastewater/0.7 Water	4227	Fee
August 23	Effective Utility Management	Seaside	0.6 Water/Wastewater	TBA	FREE
August 23-26	27th Annual Summer Classic Conference	Seaside	2.3 Water/Wastewater	TBA	Fee
September 22	Confined Space	Baker City	0.3 Water/Wastewater/Onsite	3841	Fee
September 22	Job Site Safety	Baker City	0.3 Water/Wastewater	3890	Fee
November 16	Distribution Basics	Salem	0.6 Water	4117	Fee
November 17	Developing Your Operations & Maintenance Manual	McMinnville	0.4 Water/Wastewater/0.2 Onsite	4032	Fee
November 17	Leak Detection	McMinnville	0.2 Water/Wastewater	TBA	Fee
December 6	Effective Utility Management	Hood River	0.6 Water/Wastewater	TBA	FREE
December 6-9	23rd Annual End of Year Operators Conference	Hood River	2.7 Water/Wastewater	TBA	Fee

Levels 1–4 Water Operator Exams

Trained and certified operators are necessary to ensure that the systems are managed in a manner that fully protects public health and the environment. The OARs for certification stipulate that the qualifying experience for applicants for certification as a water treatment plant operator must attain at least half the required operating experience at a public water purification plant that uses complex filtration technology and is not more than one classification lower than the level of certification they are seeking. In other words, if you have only worked for a Class 2 treatment plant, we allow you to apply for a Level 3 certification but not a Level 4 certification. If you move on to a Class 3 plant, then you must have ½ the qualifying experience (at the Level 3 plant) before allowing to apply for a Level 4 certification. Reciprocity from state-to-state ensures that the operator have the operating experience for which they are certified.

For additional information, please visit http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/OperatorCertification/Levels1-4/Pages/exams.aspx

Drinking Water Data Online https://yourwater.oregon.gov
Drinking Water Services https://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/DRINKINGWATER/Pages/index.aspx

Training class dates, class topic and/or locations may be subject to change as needed.

For more information on any class by OAWU, please contact the office at 503-837-1212, office@oawu.net or visit www.oawu.net.

Herbicide Use in Watersheds

Oceanside, Oregon derives its municipal drinking water from a coastal mountain stream: Short Creek (Fig.1). The watershed itself is industrial forestland owned and operated by Stimson Lumber. Logging roads within the watershed that provide access for logging operations and forest fire mitigation (Fig. 2) must be kept clear of obstructing weeds. This is commonly accomplished through herbicide application via a truck-mounted sprayer. In our watershed, there are two places where the roads cross tributaries which are active during the summer months. These two tributary crossings are particularly susceptible to contamination by accidental over-spraying, aerial drift, or simply failing to shut off the sprayer as it crosses the tributary. The issues that we, the water district face, are how to protect and properly monitor our water source from potential contamination, while allowing the forest owner to carry out their forestry management procedures.Road spray applications of herbicides are transient events. At critical junctures with the creek, inadvertent overspray may introduce contaminants as a short duration pulse. This pulse moves down the creek, diminishes in height, and broadens out (Fig. 3). By contrast, monitoring methods as required by the State of Oregon are not adequate for dealing with these types of events. Currently monitoring of streams subject to nearby spray applications are 1) A "grab sample" taken at a random time once every three years which is analyzed for Synthetic Organic Compounds, which may not include the chemicals being sprayed, and 2) A visual inspection by the Oregon Dept. of Forestry examining the roadside vegetation to observe color changes. This latter process will indicate where the herbicide has fallen at levels sufficient to kill the weeds, but not where aerosols have migrated and are below that level and still have the potential to contaminate the tributary.

In order to capture and measure a pulse of contaminants moving down the creek, it is essential to either accurately determine the time-of-transit between the spraying point, and the downstream sampling point, or sample for a sufficient amount of time after the event, to accommodate an estimated time-of transit. Sampling at a random time, weeks, months or even years after the event, will have little to no chance of observing a short-term pulse of contamination.

A recent (August 2020) experiment carried out jointly by the Oceanside Water District, and Stimson Lumber Company, shows that with the proper use of forest management practices and communications between the timber company and the water district, the quality of surface-derived drinking water may in fact, be maintained and monitored during an herbicide application.

The timing and communication between the forest owner and the water district are crucial. The landowner is required to file an NOAP (Notification/Application to Operate Power Machinery) for a spraying operation. This notification lets the public know that spraying will occur sometime in the coming year after filing, but there is no requirement to notify the public of the exact day. More recent changes to Oregon State Law OAR 629-620-800, require the operator to notify the water plant operator 15 days in advance of the actual operation and then to provide the following information: 1) The application chemicals and methodology that will be used; 2) Practices that will be followed to minimize drift toward the stream; 3) Any monitoring efforts that will be conducted by the landowner; and 4) The planned time schedule for the application. This last point is crucial to allow the water district to carry out preventive action and monitoring measurements. In this case, the timber company provided notice two weeks in advance of the event, and again the day before. This allowed us to do several things: 1) Charge the community drinking water reservoirs to maximum capacity; 2) monitor the creek using time sensitive techniques that were synchronized to the spraying.

Charging the reservoirs to their maximum capacity allowed us to enhance the protection of the drinking water, by closing the raw water intake to the plant on the day of the event. Water was then supplied to the community from the reservoirs for a little over 3 days. This is presumed to be sufficient to allow the creek to cleanse itself of any accidental contamination.

Fig. 1 *View of Short Creek showing the raw water intake in the lower left.*

Because of the time-dependent nature of the events we were attempting to observe, we applied two different techniques: 1) Polar Organic Chemical Integrated Sampling (POCIS) and; 2) repetitive grab sampling using an automated sampler. We began by placing the POCIS system into the stream two weeks in advance to establish a baseline. Then, on the day of the event, the POCIS filters were changed, and an automated grab sampler was set up and started immediately post spraying. The POCIS filters we left in for 2 weeks after the event, while the automated sampler took samples every 90 minutes for a total of 48 hours. All samples were kept chilled and shipped to Anatek Laboratories of Moscow, Idaho for analysis. The results show that down to an experimental level of ppB, there were no detectable levels of the two herbicides that were used (trychlopyr and 2.4.D).

In conclusion, current state regulatory practices for measuring herbicide contamination in municipal watersheds are infrequent and too simple to protect community water systems from risk of herbicide contamination. This experiment was conducted to challenge these regulatory practices and present an effective and comprehensive way to protect source

Fig. 2 *Short Creek Watershed showing the two tributary crossings.*

water intakes by monitoring an herbicide application through synchronous chemical testing. Actively communicating with the herbicide applicators and private landowners proved to be a viable way to significantly decrease the risk of municipal water, while also allowing meaningful monitoring measurements.

ACKNOWLEDGEMENTS

Major contributions to this work were made by: David Nordman- Plant Manager, Christian Anderson- Plant Operator, and Charles Ansorge- Commissioner and participant in experiment

We gratefully acknowledge the assistance in carrying out this research program of the following: The program was funded by a DEQ/OHA grant no. U15003 Oceanside Herbicide Assessment, A contribution from the Oceanside Neighbors Association, David Alvarez, Ph.D. Chief, Environmental Chemistry Branch USGS Columbia Environmental Research Center, Columbia, MO, Josh Seeds, Nonpoint Source Specialist, DEQ, Portland, OR, York Johnson, DEQ, York Johnson DEQ/TEP (Tillamook Estuaries Partners) , Phil Chick, District Manager, Arch Cape, OR, Mark Mains, ODF Regional Forester for Tillamook, and the Oceanside Water District.

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Municipal Water Rights: The Persistence of Persistent

Last winter, this publication included Part 1 of this article, explaining how municipalities may "speculate" water development under the "growing communities" doctrine. Municipal water right permits include longer development deadlines than typical water use permits (twenty years rather than five), and extensions of time for development require submission of Water Management and Conservation Plans ("WMCPs") to the Oregon Water Resources Department ("OWRD"). In Part 2, we will discuss partial perfection of municipal water use permits and the imposition of fish persistence conditions.

Oregon municipal water right permits have the unique ability to be developed and perfected in phases. Unlike all other water rights in the State, municipal water right holders may obtain water right certificates for portions of water right permits, developing the remainder in the future. This process typically involves perfection of a portion of the municipal permit, and at least one extension of time to perfect the undeveloped portion of the municipal permit.

The method for obtaining a water right certificate depends on the vintage of the water right permit. OWRD is responsible for completing Final Proof surveys of water right permits with priority dates prior to July 9, 1987. Holders of such permits have the opportunity to submit Claims of Beneficial Use ("COBUs") but are not required to do so. Holders of permits with priority dates of July 9, 1987 or later must submit COBUs to OWRD to evidence that construction and beneficial use is complete according to the terms and conditions of the permit. Additionally, later-issued extensions of time may impose COBU requirements when the original permit did not include that condition. Municipalities may partially perfect not less than 25 percent of the water authorized under their permits without loss of priority or cancellation of the remainder of the water authorized under the permit. Oregon Revised Statute ("ORS") 537.260(4). In this way, multiple certificates may be issued for different portions of the same municipal water use permit.

In 2005, the Oregon State Legislature increased the amount of time to complete beneficial use under municipal permits from five to twenty years. At the same time, the State Legislature imposed fish persistence conditions for extensions of time to perfect the undeveloped portions of municipal permits. Thus, a municipality may develop only a portion of its municipal water use right, seeking an extension of time to perfect the remainder. Such extensions of time must be conditioned upon OWRD's approval of a Water Management and Conservation Plan ("WMCP") that includes conditions related to the amount of water that may be developed in the next stage (often called "greenlight water"), and fish persistence.

WMCPs may also be required to extend the development and beneficial use deadlines for "quasi-municipal" water use permits.

Conditions Part Two: Fish Persistence *by Sarah Liljefelt*

Oregon Administrative Rule ("OAR") 690-315-0090(3). Quasi-municipal permit holders who serve populations of less than 1,000 people, or can reasonably demonstrate that fewer than five years are needed to complete construction and apply water to beneficial use are not required to prepare WMCPs. OAR 690-315-0090(4)-(5). However, OWRD may still require WMCPs for extensions of such quasi-municipal permits if the agency finds it necessary based on the criteria under OAR 690-315-0080(1)&(2).

The undeveloped portion of the permit—the amount of water that was not developed by the beneficial use deadline or the latest extension of time—may only be diverted upon approval of the WMCP. Additionally, for the first extension issued after June 29, 2005, for a permit for municipal use issued before November 2, 1998, OWRD must impose a condition on the undeveloped portion of the permit to "maintain, in the portions of waterways affected by water use under the permit, the persistence of fish species listed as sensitive, threatened or endangered under state or federal law." ORS 537.230(3)(b)-(d).

OWRD makes findings related to impacts on streamflow that would result from use of the undeveloped portion of the permit. OWRD consults with the Oregon Department of Fish and Wildlife ("ODFW") to determine what such impacts might be as related to listed fish species. ODFW may request fishery resource protection conditions that may be included in the proposed and final orders granting the extension of time. OAR 690-315-0080(2). These conditions may also be imposed on groundwater use permits that are hydraulically connected and have the potential for substantial interference with surface water sources. OAR 690-315-0080(2)(a).

Fish persistence conditions can take many forms, depending on the streamflow needs of listed fish species as determined by ODFW, and the options available to the municipal water right holder. For example, OWRD may require the water user to divert water above a certain rate further downstream to leave water in the river for a longer stretch for fish purposes. OWRD may require proportional reductions in water diversion when stream flows are not met for a certain period of time. OWRD may also require that water diversions be coordinated with upstream stored water releases. Many additional types of

conditions may also be imposed as part of OWRD's order granting an extension for a municipal water right permit.

Finally, the sufficiency of fish persistence conditions can be the subject of litigation if challenged by the municipal permit holder or an interested third party. OWRD will include fish persistence conditions in the proposed final order granting a municipal permit extension of time. The permit holder or third party can protest the proposed final order, in which case the protest will be referred to a contested case hearing before the Office of Administrative Hearings and an assigned Administrative Law Judge ("ALJ"). At the conclusion of the evidentiary hearing the ALJ will issue an order, and the parties can then file exceptions. OWRD issues the final order, and that final order may be appealed to the Oregon Court of Appeals. If fish persistence conditions are challenged, litigation can last many years and require substantial technical expert support to determine what streamflows are necessary to support the long-term maintenance of listed fish species.

ABOUT THE AUTHORS

Schroeder Law Offices, P.C. represents water rights clients in six western states and consults internationally. Sarah Liljefelt is a shareholder and the Managing Attorney in the Portland office. You can read more about this topic and other water rights issues at Schroeder Law Offices' Water Law Blog, **http://water-law.com/home/blog/**.

Pumping System With Integrated Intelligence Eliminates Chronic Clogging and Debris Buildup In Pump Station

Although Sublimity, Oregon, relies on a nearby municipality for wastewater treatment, the city utilizes its own sewer collection system. By 2020, the 45-year-old system had exceeded its expected lifespan, and had become inefficient with growing maintenance needs. Additionally, with the recent approval of three new sub-developments, the city's population is expected to grow well into the future.

The existing lift station relied on a failing duplex pump station with 15 and 20 horsepower (hp) vortex pumps. The technology had become obsolete and inefficient, and continued residential growth resulted in an increased volume of flushables, also known as modern trash, and a significant increase in daily pump run times. These factors contributed to regular pump clogs, which resulted in a significant increase in onsite labor costs. Each incident required a two-man crew to remove the clog and reset the equipment.

The Sublimity DPW team realized they had a two-fold challenge on their hands: address the time-consuming nature and inefficiencies of a failing pump system and improve capacity to address the current and future needs of a growing residential area.

Like many municipalities nationwide, the Sublimity DPW works under tight budget constraints. To resolve this issue, DPW leadership worked directly with Xylem representatives to engineer a complete design-build solution with full technical support. Direct procurement saved Sublimity nearly $50,000 and allowed the city to work directly with Xylem experts during the entire process.

Xylem's application engineer team designed a solution using Concertor XPC pumps, a controls building, TOPS (the optimum pump station) insert and new valve vault. The centerpiece of the design was the introduction of the Concertor XPC pumps, which integrate the advanced controls of a traditional pump controller into the traditional mechanical pump for a state-of-the-art intelligent pumping system.

Concertor XPC pumps sense the operating conditions of the environment and adapt performance in real time. When debris of any kind is present, the pumps are able to self-adjust the impeller, allowing larger objects to simply pass through. For tougher solids, the system automatically stops pumping and initiates a self-cleaning sequence, which repeatedly changes the rotation direction with high torque until the debris passes. This advanced technology helps sustain high-operating efficiencies during peak times without backups or clogs, an in turn, reduces costly and time-consuming service calls.

The efficiencies provided by the pumps are allowing Sublimity to operate the pumps at 3.5 hp with improved results, leaving 6.5 hp untapped until needed. In future years, when new homes are added to the area, DPW staff will be able to tap into the additional installed capacity to address future needs without expensive upgrades or retrofits.

Once the Concertor XPC upgrade was complete and fully commissioned, the Sublimity DPW saw immediate improvement in efficiencies, cost reductions and improved operations for the existing lift station. The lift station has experienced zero clogs since the pumps were placed into use. By partnering with Xylem on a design-build solution, the city of Sublimity was able to procure all the equipment that provided them the best value and did so on a shorter timeline and for less overall cost. These upgrades not only provided an immediate solution to an ongoing, chronic and costly problem for the Sublimity DPW, but will also provide years of service as the city's population continues to grow.

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Where is the Water?

By Laura Schroeder and Caitlin Skulan

When a drought is declared, a drinking water entity may find itself "high and dry" on a source where its water right priority is at the end of the line. What is there to do when there is no water to divert or appropriate?

Obtaining a Drought Declaration

In Oregon, we can look to drought declarations as support for emergency water management. Drought declarations typically require a four-part process prior to issuance. First, a county commission submits a request for a state drought declaration to the Office of Emergency Management. Second, the Water Resources Department's Water Availability Committee meets to evaluate the information on weather and water supply conditions and makes recommendations to the Oregon Drought Council. Third, the Oregon Drought Council assesses the impact of drought conditions and makes recommendations to the Governor's office on whether to declare drought in the requested area. The Oregon Drought Council is co-chaired by the Water Resource Department and the Office of Emergency Management. Lastly, the Governor chooses to issue an Executive Order declaring a drought emergency. See Oregon Revised Statutes ("ORS") 536.740.

Drought declarations are typically issued on a county scale. These declarations not only create awareness of drought conditions, but provide water right holders, including drinking water entities, access to a host of emergency management tools.

Emergency Drought Tools

Drought declarations allow the Water Resources Department to offer certain emergency management tools with expedited review and reduced fee schedules. These tools are meant as short-term emergency authorizations and are not permanent solutions. The tools include:

1. Temporary Emergency Water Use Permits

The Department of Water Resources can issue a temporary permit for an emergency use of water without conducting a hearing. See ORS 536.750(1)(a); see also Oregon Administrative Rules ("OAR") 690-019-0030(1)(a). An approved emergency water use drought permit allows a water user to temporarily replace water not available under an existing right. The most common drought permits allow use of groundwater as an alternative to existing surface water rights. Applications are typically processed in ten days, according to the Department, and are valid for one year or the term of the drought declaration, whichever is shorter. See ORS 536.760.

2. Temporary Transfers

A water user can apply to change the type of use, place of use, or point of diversion of an existing water right without complying with the notice and wait requirements under ORS 540.520. See ORS 536.750(1)(b); see also OAR 690-019-0030(1)(e). This includes converting all or a portion of a water right to an instream use. See OAR 690-019-0058. Temporary drought transfers are valid for one year or the term of the drought declaration, whichever is shorter. See ORS 536.7960.

3. Temporary Exchanges and Substitutions

Under drought conditions, water users can temporarily exchange existing rights, using stored-water instead of a direct-flow water right. See ORS 536.750(1)(e); see also OAR 690-019-0030(1)(c). Additionally, a water user holding a primarily right originating from a surface water source and supplemental right from a groundwater source may apply to temporarily use the supplemental right instead of the primary right without providing the notice required by ORS 540.535. See ORS 536.750(1)(f); see also OAR 690-019-0059. Like their counterparts, temporary exchanges and substitutions are valid for one year or the term of the drought declaration, whichever is shorter. See ORS 536.760.

4. Renewals

All of the special permits, exchanges, and substitutions authorized under a drought declaration may be extended past one year if drought conditions continue. See OAR 690-019-0085(1-2). The water user must submit a request for renewal, outlining any changes from the original request. See OAR 690-019-0085(2)(b). However, if the renewal request is substantially different from the original request, the Water Resources Department may require a new application. See OAR 690-019-0085(5).

Conservation and Curtailment

In addition to the tools outlined above, the Governor has additional authority to manage water during drought conditions. For example, the Governor may order individual state agencies or political subdivisions within a drainage basin to implement a water conservation or curtailment plan under ORS 536.780. See ORS 536.720(2); see also OAR 690-019-0090. However, these adjustments or curtailments only last as long as the drought declaration is in place. See ORS 536.720(4).

Preferred Water Uses

In times of drought, the Water Resources Department can grant temporary preferences to water rights for human consumption and stock watering. The preference discounts priority dates of other uses, preserving limited water resources

for humans and livestock sustenance. See ORS 536.750(1)(c); see also OAR 690-019-0030(1)(d).

Special Option Agreements

Lastly, a local government, public corporation, or water right holder may propose or purchase an option or enter an agreement to use an existing permit or water right during a drought declaration. See ORS 536.770; see also OAR 690-019-0080(1). These agreements allow the water users to use the water at locations, from points of diversion, and for uses other than those described in the water right. See OAR 690-019-0080(2). Typically, the agreement remains in place until terminated by the parties and provides additional water in times of drought. See ORS 36.770(3)(b); see also OAR 690-019-0080(8)(c).

Conclusion

While fluctuating water conditions and droughts are nothing new in the West, Oregon has developed numerous drought tools. These tools allow both water users and water managers alike to mitigate the effects of water shortages and to ensure that human water consumption is prioritized.

ABOUT THE AUTHORS

Schroeder Law Offices, P.C., was founded by Laura A. Schroeder and represents water-rights clients in six western states and consults internationally. This article was drafted with the assistance of Caitlin Skulan. Caitlin is an Associate Attorney with Schroder Law Offices and is licensed in Nevada and Idaho. You can read more about this topic and other water rights issues at Schroeder Law Offices' Water Law Blog, http://water-law.com/home/blog/.

A Fine Day for A Bike Ride *by Bruce Hemenway*

My childhood was filled with many experiences. Some good and some not so good.

It was Memorial Day, 1955. I grew up in a small town of 500 in the foothills of the Sierra Nevadas. My friend Butch rode his bicycle to our place that day and asked if I could go on a bicycle ride with him. My dad was reluctant to say yes, because of the heavy Memorial Day traffic on SR 88, which is the Kit Carson Pass highway, that runs through that community.

Dad gave me permission to go, but said he wanted me home in one hour. Butch and l rode to the East end of town, then turned North on a dirt path. The path paralleled the volcano road. Pine Grove Hill, as it was called, as it left our little town of Pine Grove, it was a very steep hill. The path stayed level for about 150 yards then, at that point, it made an even steeper decent than the road, as it met up with Volcano road again at the bottom of the hill.

I remember we stopped at the top of the grade, Butch said to me, "why don't you go first?" So away I went. Almost instantly, I was aware I was going way to fast, and with my brakes applied to the maximum, it seemed I was still gaining speed.

My friend Butch was a full blood Washoe Indian. In fact, his dad, Mamo, was at that time, the Chief of that tribe. Mamo had told Butch that he was never to ride his bike down that hill because it was too steep.

Meanwhile, as I was flying down the steep grade, I remember seeing the colors from the sunlight flashing through the tree leaves. I also was aware of the fact, that the brakes on my Hawthorn bicycle were not going to stop me.

So, I did the only thing I could think of, I headed straight for something ahead of me that was big, round, and brown. Nice! It turned out to be a cedar tree that was approximately 4' in diameter. Well, it did stop me. I came to an abrupt halt.

When I regained consciousness, about a half hour later, Butch was trying to get me to stand up. He was concerned that he couldn't get me and my bicycle back up the hill. I remember telling him to just forget my bike and get me back up the hill.

Butch got me back to the top of Pine Grove Hill and then he left me. I was all bloody, my clothes were a mess, and l was also embarrassed. At that point l was a half mile from home. I decided I would take the trail behind town so that no one would see me like that.

I had just crossed the road and was entering the trail when I heard a horn honk. It was my 5th grade teacher. She had been at school grading papers. As she left the school, she had spotted me. She asked me what had happened, I told her that I'd wrecked my bicycle. She got me into the back seat of her yellow Studebaker and drove me home.

Because I was so late getting back home, my father was watching for me. When he saw me in the back seat of my teacher's car, all bloody, he actually hurdled our 3′ high picket fence. He and my mother then drove me to the hospital, 9 miles away.

The impact from the tree and my face colliding at a relatively fast pace, had pushed my nose over to the right under my right eye. I was told later that the nurse had worked on me for about 2½ hours removing bark splinters from my face. But I had no broken bones.

My father went back down the hill latter that day to retrieve my bicycle. He told the same story to everyone who asked how I was doing. With my brakes fully applied, I was actually skipping down the hill. Dad said that my bicycle was only hitting the ground about once every 15 feet. I had snapped off a small oak tree of about two inches in diameter with my right leg, thus the huge bruise. The frame of my bicycle was literally bent in a horseshoe shape that matched the size of the tree.

My friend Butch had left me because he knew he would be in serious trouble when his dad found out what had happened. Butch spent the night in the woods, by himself, and didn't return home until the next day.

Please don't think poorly of Butch. I had hiked that trail many times and l realized how steep it was. And I was also aware of the fence. What l was not aware of was the fact that I was going to be out of control as l was riding down that hill.

What has this story to do with anything you might be wondering. Well, first of all, bicycle helmets hadn't yet become popular, if they even existed, so I wasn't wearing one. I was still alive, another interesting aspect of my story. But I'll tell you what l believe to be the greatest evidence that God was guiding me to hit that tree. On the other side of that tree was 4 strands of barbed wire. The tree had been used as a fence post at that point. Can you even imagine what four strands of barbed wire would do to the body of a human at that speed? One more evidence that God was there with me that day, was for my teacher to have left school at the exact time to find me crossing the road, or the fact that she was even at school on Memorial Day, was another miracle.

The doctor made the statement, that as bad of shape that l was in, had I taken that trail behind town, I probably would have passed out before I reached home.

I don't think much about what could've happened. Rather, when l do remember my bike ride that day, I just know God was there.

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QUIZ CORNER

1. If the flow through a 7-inch pipe is traveling at 4.75cfs, how many gallons will travel through the pipe in 5 months?
   A. 460,468,800 gallons
   B. 4,646,800 gallons
   C. 465,806,452 gallons
   D. 46,460,800 gallons

2. If the velocity of the water traveling through a 12-inch pipe is 3.75 ft/sec, what is the flow?
   A. 4.8 cfs
   B. 2.9 cfs
   C. 0.2 cfs
   D. 3.1 cfs

3. According to the World Health Organization, _____ people die every year because of water related diseases.
   A. 1 million
   B. 2.2 million
   C. 3.4 million
   D. None

4. On average, Tuberculosis kills more than _____ people worldwide every year.
   A. 100,000
   B. 1,000,000
   C. None
   D. 1,000

5. What was the first word that Helen Keller learned, and the last word spoken by President Ulysses S. Grant?
   A. Love
   B. Water
   C. Mother
   D. Apple

6. What is the second largest energy user in the home?
   A. Entertainment
   B. Heating water
   C. Cooking
   D. Heating the home

7. Each day the sun evaporates how much water?
   A. 1,000,000,000,000 (a trillion) tons of water.
   B. 1,000,000,000,000 (a trillion) lbs of water.
   C. 1,000,000,000 (a billion) tons of water.
   D. 1,000,000 tons of water

ANSWERS: 1-A, 2-B, 3-C, 4-B, 5-B, 6-B, 7-A

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2. After cleaning, active leaks are stopped, high strength restoration mortar is applied using a shot-crete nozzle or centrifugally using the Mainstay Mortar Spinner.

3. While the mortar is still soft, epoxy is applied. The simultaneous application of the mortar and epoxy results in a structural lining that is resistant to corrosion, with exceptional adhesion to the substrate even in damp environments.

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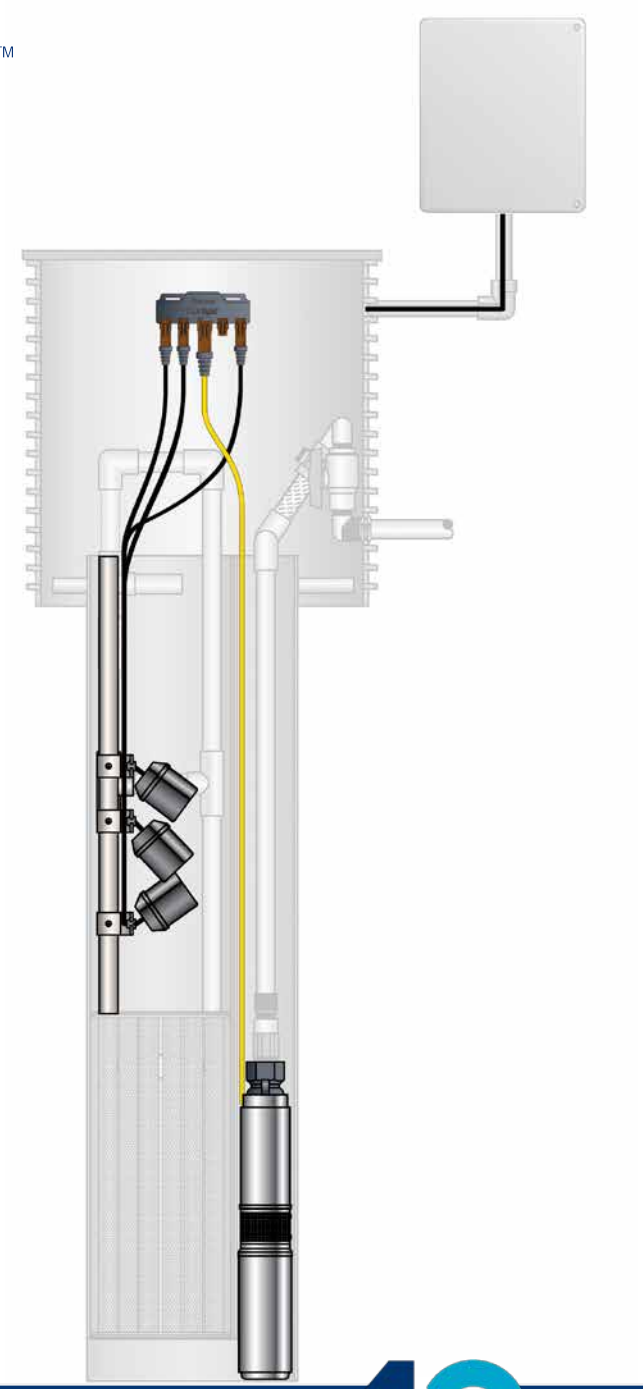

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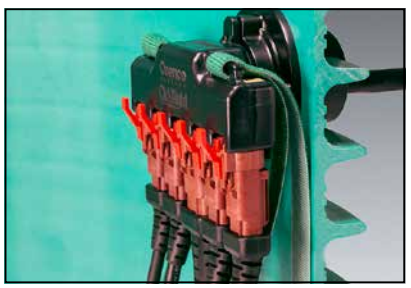

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2021 OREGON ASSOCIATION OF WATER UTILITIES

MEMBERSHIP APPLICATION

Member Name: _____

Mailing Address: _____

City/State: _____

County: _____ ZIP: _____

Email: _____

Phone: _____

Contact Person: _____

Number of Hook-ups: _____

Were you referred? By whom _____

Type of System:

❑ Water ❑ Wastewater ❑ Both

Membership Category	Membership Dues
❑ Regular Member	$_____ See schedule below
❑ Associate Member	$500.00
❑ Individual Member	$100.00

Regular Member Dues Schedule

1 to 100	$75 + 40 cents per connection
101 to 500	$85 + 40 cents per connection
501 to 1,000	$90 + 40 cents per connection
1,000 and up	$100 + 40 cents per connection
Maximum dues is	$1,150.00

Mail payment to: **OAWU**
935 N. Main Street
Independence, OR 97351

If paying by credit card, please call the OAWU office at 503-837-1212 for processing and receipt.

MB21

Membership Types

Regular Member

A Regular Member shall be any water or wastewater utility, public or private, engaged in the production, distribution or reclamation of water. A Regular Member shall have one vote.

Annual Dues: See Regular Member Dues Schedule

Associate Member

An Associate Member shall be any organization individual or corporation, supplying services or equipment to water and wastewater utilities. An Associate Member shall have one vote.

Annual Dues $500.00 per year

Individual Member

An Individual Member shall be an individual involved in the water/wastewater industry or a user of such utilities. The membership is informational in nature and shall be non-voting.

Annual Dues $100.00 per year

Benefits of Membership

- On-site technical assistance
- Various free training programs
- Discounts on training courses
- Discounts on Annual Conference registration
- Access to on-site training program
- Subscription to quarterly *H2Oregon* magazine
- Direct mailings in your area about upcoming training courses
- Summaries of legislative issues
- Legislative representation at state and federal level
- Associate Member Services and Products Guide
- Access to technical assistance library
- Access to technical and testing equipment for loan
- Voting rights in Association affairs (Regular & Associate Members)
- Positive contacts with other organizations
- Camaraderie with water and wastewater professionals
- Operator Of Record services
- Job referrals, announcements and searches
- Well testing
- Plan review
- System performance evaluation and options
- Additional programs and services
- Disaster response assistance and planning

Please return to OAWU:
935 N. Main St., Independence, OR 97351
or email: office@oawu.net or fax: 503-837-1213

MEMBERS

62nd Court Mutual Water Company
Adair Village, City of
Adams, City of
Adrian, City of
Agate Water System
Albany Rifle & Pistol Club
Alfalfa Water LLC
Alpine Crest Improvement Dist.
Amigo Villa Water Service, Inc.
Amity, City of
Ananda Center at Laurelwood, Inc.
Arch Cape Water & Sanitary District
Arlington, City of
Arrah Wanna Water Company
Arrowhead Mobile Home Park
Aspen Lakes Utility Company, L.L.C.
Astoria, City of
Athena, City of
Aumsville, City of
Aurora, City of
Avion Water Company
Baker City, City of
Bandon Dunes Resort
Bandon, City of
Banks, City of
Barlow Water Improvement District
Barlow, City of
Bay City, City of
Bay Hills Water Association
Bayou Water Improvement District
Beaver Water District
Beaverton, City of
Bend Research Inc.
Bend, City of
Benton County Service District
Bents Court Water Co.
Berndt Creek Water Corp.
Beverly Beach Water District
Biggs Service District
Black Butte Ranch
Black Mountain Water District
Blue River Water District
Blue Spruce Estates
Bly Water & Sanitary Dist.
Boardman, City of
Bonanza, Town of
Boring Water District #24
Brandy Bar Landing, Inc.
Breitenbush Hot Springs
Bridge Water District
Brightwood Water Works
Brooks Community Service District
Brownsville, City of
Buell-Red Prairie Water District
Bunns Village Properties, LLC
Burlington Water District
Burns, City of
Burnside Water Association
Butte Falls, Town of
Camp Rilea
Canby, City of
Canby Utility
Cannon Beach, City of
Canyon City, Town of
Canyonville, City of
Carlton, City of
Cascade Locks, City of
Cave Junction, City of
Cedarhurst Improvement Club, Inc.
Central Coast Clean Water Company
Century Meadows Sanitary System, Inc
Century Meadows Water System, Inc.
Charles Tracts Water Company
Chart Water Supply, Inc.
Chehalem Mt. Sun Ridge Association
Chenowith Water PUD
Chiloquin, City of
CHR Dist. Improvement Co.
Christmas Valley Domestic Water
Cimmarron City Water Co., Inc.
Circle C Improvement Dist.
Clarks Branch Water Associatioin
Clatskanie, City of
Clayton Creek Water Association
Clean Water Services
Cline Falls MHP
Cloverdale Sanitary District
Cloverdale Water District
Coburg, City of
Colorado Lake Co-Op
Colton Water District
Columbia City, City of
Columbia Hills Homeowners Association
Columbia River PUD
Condon, City of
Coquille, City of
Corbett Water District
Cornelius, City of
Corvallis Waldorf School
Cottage Grove, City of
Country Club Water District
Country View Mobile Estates
Covanta Marion, Inc.
Cove Orchard Water Association
Cove, City of
Crater Lake National Park
Crescent Water Supply & Improvement District
Creswell, City of
Crooked River Ranch Water Co-Op
Crystal Springs Water District
Culver, City of
Dallas, City of
Dayton, City of
Dayville, City of
Deception Creek Mobile Park
Deer Creek Estates Water Association
Deerhorn Community Water Association
Depoe Bay, City of
Deschutes Valley Water District
Detroit, City of
Dexter Oaks Mobile Home Park
Dexter Sanitary District
Diamond Peaks at Leisure Woods I & II
Diamond Summit Association
Dietz Airpark Water System
Donald, City of
Drain, City of
Drifter's MHP
Dry Creek Airpark HOA, Inc.
Dufur, City of
Dundee, City of
Eagle Point, City of
East Yamhill Rural Water Company
Eastmont Water Company
Eastshore Water Improvement District
Echo, City of
Elgin, City of
Elkton, City of
Emerald Meadows HOA
Emerald Valley Wastewater Co.
Enterprise, City of
Estacada, City of
Eugene Mobile Village
Fairview Water District
Fairview, City of
Falcon Cove Beach Water District
Falcon Heights Water & Sewer District
Fall Creek Water District
Falls City, City of
Fern Ridge School Dist. 28J-10
Fern Valley Estates Improvement Dist
Fernridge Mobile Estates
Fir Grove HOA
Fir View Water Company
Fishhawk Lake Recreation Club, Inc.
Florence, City of
Forest Park Mobile Village
Fossil, City of
Garden Valley Water Association
Garibaldi, City of
Gaston, City of
Gates, City of
Gearhart, City of
Georgia Pacific-Wauna
Gervais, City of
Gilchrist Water Co., LLC
Gladstone, City of
Glendale, City of
Gleneden Sanitary District
Glenmorrie Co-op Association
Glide Water Association
Goble Water Association
Gold Beach, City of
Gold Hill, City of
Government Camp Water Company
Grand Prairie Water Supply Company
Grand Ronde Community Water Association
Grand Ronde Sanitary District
Grants Pass, City of
Grass Valley, City of
Green Oaks Mobile Ranch
Greenhoot Properties
Haines, City of
Halfway, City of
Hall's Trailer Court
Halsey, City of
Harbor Water PUD
Harrisburg, City of
Hebo Joint Water/Sanitary Authority
Heceta Water PUD
Helix, City of
Heppner, City of
Hermiston, City of
Hidden Valley Improvement District
High Lostine Owners Association
Highland Subdivision Water District
Hiland Water Corporation
Hillsboro, City of
Hines, City of
Hood River, City of
Hopewell Water Company
Hubbard, City of
Hunnell Hills Community Water System
Huntington, City of
Ice Fountain Water District
Idanha, City of
Idleway Improvement District, Inc.
Imbler, City of
Independence, City of
Indian Meadow Water Company
Inn at Otter Crest
Interlachen Water PUD
Ione, City of
Irrigon, City of
Island City, City of
Jackson County Parks
Jacksonville, City of
Jasper Knolls Water District
Jewell School District
John Day Water District
John Day, City of
Johnson Creek Water Services Company
Johnson Park & Water Co.
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Junction City, City of
Keizer, City of
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Keno Water Company, Inc.
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Kilchis Water District
Kingswood Heights Water Association
Klamath Falls, City of
Klippel Water System
Knappa Water Association
Knoll Terrace Park
L.A. Water Cooperative
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Labish Village Water Commission
Lady Creek Water System
Lafayette, City of
Laidlaw Water District
Lake Grove Water District
Lake of the Woods Resort, LLC.
Lake Oswego, City of
Lakeside Water District
Lakeside, City of
Lakeview, Town of
Lakewood Homeowner's, Inc.
Lamb Weston
Lamontai Improvement District
Lamplighter Water Association
Lane County Parks
Langlois Water District
Laurelwood Water User's Co-op
Lawrence Subdivision Water Association, Inc
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Lexington, Town of
Lincoln City, City of
Little Beaver School, Inc.

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Lostine, City of
Lowell, City of
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Lyons-Mehama Water District
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Madsen Springs Water Assn.
Malin, City of
Manzanita, City of
Mapleton Water District
Maupin, City of
McKay Acres Improvement District
McKenzie Palisades Water
McNulty Water PUD
Merrill, City of
Metolius Meadows Prop. Owners Assn.
Metolius, City of
Midland Water Association
Mill City, City of
Milo Adventist Academy
Minikahda Water District, Inc.
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Molalla, City of
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Monroe, City of
Monument, City of
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Morrow Commission, Port of
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Mt. Bachelor, Inc.
Mt. Shadows HOA
Mt. Vernon, City of
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Myrtle Creek, City of
Myrtle Point, City of
Nantucket Shores Water Company
NeahKahNie Water District
Nehalem, City of
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Neskowin Regional Sanitary Authority
Neskowin Regional Water District
Netarts Water District
Netarts-Oceanside Sanitary Dist.
Newberg, City of
Newport, City of
North Corvallis Mobile Home Park
North Hill Water Corporation
North Powder, City of
Northwest Newberg Water Association
Nyssa, City of
Oak Lodge Water District
Oakland, City of
Oakridge, City of
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Oceanside Water District
Ochoco West Water & Sanitary Authority
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Odell Water Company
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Oregon Shores II
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Oregon Water Utilities-Mtn. Lakes
Oregon Water Utilities-Southview
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Phoenix, City of
Pilot Rock, City of
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Pleasant View Water Company
Polehn Heights Water Association
Ponderosa Pines Water Company
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Powers, City of
Prairie City, City of
Prineville, City of
Quincy Water Association
Rainier, City of
Redmond, City of
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Reeder Ranch, Inc.
Reedsport, City of
Rhododenron Water Association
Richland, City of
Rickreall Community Water Association
Riddle, City of
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Rimrock West Improvement District
River Meadows Improvement District
River Point Farms, LLC
Riverbend-Riverbank Water District
Rivergrove Water District
Riverside Water District
Riverview RV Park
Roats Water System, Inc.
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Rock Creek Water District
Rockaway Beach, City of
Rockwood Water PUD
Rocky Pointe Marina
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Rogue Lea Estates MHP LLC
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Rogue River – Siskiyou National Forest
Roseburg Forest Products Company
Round Lake Water Utilities
Rufus, City of
Salem, City of
Salmon River Mobile Village
Salmon Valley Water Company
Sandy, City of
Scappoose, City of
Scio, City of
Scotts Mills, City of
Scravel Hill Water Co-op
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Seaside, City of
Seneca, City of
Shadow Hills Park Water Cooperative
Shangri-La Water District
Shelley Road Crest Acres W.D.
Sheridan, City of
Sherwood, City of
Siletz Community Water System
Siletz, City of
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Sisters, City of
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Skyview Acres Water Company
Sleepy Hallow Phase 1 Water
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South Umpqua Water Assn.
Southview Improvement District
Southwest Lincoln County Water PUD
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Stahlman Summer Homes Assn.
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Stayton, City of
Steeves Mobile City
Storlie Water Company Inc.
Sublimity, City of
Suburban East Salem Water District
Sumpter, City of
Sun Mountain Water System
Sunridge Estates
Sunrise Water Authority
Sunriver Water LLC/Sunriver Utilities
Sunset Acres Water Company
Sunset Lake RV Park
Sunset Water Systems, Inc.
Sunshine Village Water Association
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Sweet Home, City of
Talent, City of
Terrace Mobile Plaza
Terrebonne Domestic Water District
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Tillamook County Creamery Association
Tillamook, City of
Timber Water Association
Toledo, City of
Tollgate Water Company
Tone Water
Trappist Abbey
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Turner, City of
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Twin Rocks Sanitary District
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Umatilla, City of
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Umpqua Indian Utility Co-op
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Vale, City of
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Valley View Water District
Valley Vista Estates Water Improv. Dist.
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Vernonia, City of
VIDA-LEA Community Co-op
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Wallowa, City of
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Weston, City of
Westport Water Association
Wheeler, City of
Wickiup Water District
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Winchester Bay Sanitary
Wi-Ne-Ma Christian Camp, Inc.
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Woodburn, City of
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Yamhill, City of
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Young's River Lewis & Clark WD
Zig Zag Water Cooperative, Inc.

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Howell, Roy Andy
Laetzsch, Dawna
Rogers, Dean

Strassel, Kristal
Crum, Dale
Kirchmann, Russell
Moore, Tom

Metron Farnier
Power Systems West
Western Water Works Supply Co.
City of Grass Valley

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Benzel, Corey
Bidwell, John
Blake, Mike
Boyles, Blake
Braden, Larry
Brenneman, Scott
Brown, Joshua
Brown, Rick
Buckley, John
Burton, Howard
Buskirk, Jeff
Caldwell, Kevin
Campbell, Mike
Carlson, Rob
Carter, Roy
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Chipman, Kenneth
Christensen, Matthew
Clark, Harvey
Clark, Jamie
Clark, Joshua
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Elder, Dave
Evans, Peter
Fery, Michael
Fitzwater, Jim
Free, Derek
Gil, Riley
Glanz, Jared
Gott, Craig
Grudzinski, Matthew
Halverson, Bruce
Hand, Eric
Hanks, Kevin
Hart, Steven
Harvey, John
Hatcher, James
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Turner, Keith
Turner, Susan
Vanderkin, Rick
Vangrunsven, Tom
Vollmer, Jodi
Vorpahl, Mike
Wabschall, Steve
Wahle, Lynn
Wainwright, Timothy
Warrick, Logan
Welch, Dennis
Whittenburg, Gregory
Williams, Benjamin
Wimberley, John
Winders, Kristal
Winterton, Robbie
Woodward, Steve
Woody, Jonathan
York, Gary
Zuniga, Antonio

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Adkins Engineering & Surveying
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Cascade Waterworks
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CIMCO-GC Systems, Inc.
Civil West Engineering Services
Clow Valve Company
CoBank
Columbia Food Laboratories
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CUES
Ditch Witch West
DN Tanks
Edge Analytical Laboratories
EJ
Enviro-Clean Environment, Inc.
Ferguson Enterprises
FloHawks
Frank J. Martin Company
Frost Engineering Service Company NW
Furrow Pump, Inc.
G.T. Gordon & Associates, Inc.
General Pacific, Inc.
Harmsco Filtration Products
Harrang Long Gary Rudnick PC
HASA Inc.
HD Fowler Company, Inc.
Heard Farms, Inc.
Honeywell Smart Energy
Hurley Engineering Company
HYMAX by Mueller
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Instrument Technology Corporation
Jacobs
Kamstrup Water Metering
Lakeside Industries/EZ Street
League of Oregon Cities
Madewll Products Crop.
Master Meter, Inc.
Mueller Company
Neptune Technology Group
NLine Energy
Nurnberg Scientific
Olson Engineering
One.7, Inc.
Optimal Control Systems
Oregon Meter Repair
Oregon Public Utility Commission
Orenco Composites
Owen Equipment Company
Owens Pump & Equipment
PACE Engineers, Inc.
Pacific NW Sales
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Pittsburg Tank & Tower Co.
Process Engineered Water Equipment, LLC
PumpTech Inc
Puttman Infrastructure, Inc.
RDO Equipment
Reiner Pump
Romac Industries, Inc.
Schneider Water Services
Schroeder Law Offices, PC
Sensus USA
SHN Consulting Engineers & Geologists
Special Districts Assn of Oregon
SUEZ Water Advanced Solutions
Taurus Power and Controls, Inc.
Tesco Controls, Inc.
The Automation Group
The Ford Meter Box Co., Inc.
TMG Services
Tripac
Trumbull Industries
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