Founded in 1964, Western Nevada Supply has grown successfully over the past four decades by adhering to the philosophy that good service is people-oriented, loyal to its customers and proactive in the community. We’re here to make a positive difference in people’s lives – whether that means supporting local kids and charitable organizations or providing the highest quality service as a one-stop supplier for contractors and builders throughout Nevada and California.
A Note From Our Executive Director:

Bob Foerster, NvRWA Executive Director

As a membership organization taking technical programs out to communities, including our own communities, NvRWA lends depth to utility staff and provides resources on demand. Over the past decades, our National Rural Water affiliate, of which NvRWA is a member, has been working at the federal level to make sure small and rural utilities are at the table when decisions are made. Those decisions, especially ones around wastewater and water quality will impact all of us. What we need from members is your inputs and feedback to make sure advocacy matches your point of view.

Over the past many years, the modeling of successful utilities has been promoted in the form of technical / managerial / financial capacities, planned asset management, maintenance and management other formulas. NvRWA can help your system get up to speed with these. In our experience, using them really does make work life easier. Sustainability formulas. NvRWA can help your system get up to speed with these. In our experience, using them really does make work life easier.

Sustainability has become a mantra in the industry and rightly so; if not sustainable then what? We have a tool box of plans and programs to help address those needs: vulnerability assessment and emergency response planning; flow control; cross-connection control plans and implementation know-how; conservation operation and maintenance documents with standard operating procedures; real needs: vulnerability assessment and emergency response planning; then what? We have a tool box of plans and programs to help address those needs.

Bob Foerster, NvRWA Executive Director

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Joe Manzi  |  Joe Pappo  |  Mark Moore  |  Randy Smith  |  Adam Basner

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Operators might look at their water system as a marriage. The operator first hires on to the system without any knowledge of where the future is going to take the relationship. Except, the operator knows there is a deadline for commitment. Often, one of the requirements of employment is to be certified before one year of employment has elapsed. The operator has to work with the systems to get to know the system and commit to the system before one year.

Time will show the current operators that the system is temporary, unpredictable, and annoying at times. What the operators don’t want is for the system to become unhealthy.

The operators need to know that once the water passes through a meter, that water is ‘used water’. Your healthy system cannot endure used water being introduced into the system. Backflow preventers have proven their commitment to safeguarding drinking water systems. Similar to a brother protecting his sister.

Storage tank water is another place where unhealthy water could be introduced. Water flows into the tank with a certain residual level that helps to keep the water healthy and free from disease causing bacteria. SCADA stops the introduction of water when the water level has reached its maximum height before overflowing. Then the system uses as much water as practical before SCADA calls up the pump to deliver more water.

This repeated action allows the water in the tank to be mixed and circulated. During the summer months, this action may be repeated a couple of times in a day. But during the winter, the pump may not be called for a couple of days. Eventually, over time, the top water level will start to low residuals, may stratify so it remains separate, and taste and odor problems of the water might increase making stale water. Testing of the water should be done to find any necessary repairs. Once the water is tested in the laboratory, the operator should advise the consumer about the problem.

As an operator, you are trained to get in and fix a leak as quickly as possible. If a water main leak is found, you isolate the leak and call for help from a vac-truck or trailer. This one truck can not only jet a sewer but repair the leak as well. The vac-truck is not the only tool that can cause this to happen. Back-hoes, shovels, wrenches, screw drivers, valve keys, digging bars, hammers, trench box or anything else that is used for repairs. These disease-ridden tools will cause an introduction of contaminants into the water pooled around the leak. All it takes is a fire hydrant, yard hydrant, or faucet to be opened up on the main to siphon in this water.

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The problem here is that it can be used for vacuuming a hole for sewer and water. Once the tubes come into contact with wastewater, these tubes can’t be used on a water leak. These disease-ridden tools will cause an introduction of contaminants into the water pooled around the leak. All it takes is a fire hydrant, yard hydrant, or faucet to be opened up on the main to siphon in this water.

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Every operation should strive to run as efficiently as possible. One of the ways to assist in this is to establish policy for situations and scenarios that may or will take place. Policies are the framework for how an organization will conduct itself under repetitive conditions and unusual ones. This allows consistency in actions even when there is a change of leadership and it helps to ensure that all parties are treated fairly and equally. Well written policy gives a reference to prove that actions taken were correct and allows people to know what to expect.

How would you approach policy formation? It is likely that your organization has an extensive collection of existing policies. A good start would be to review those and determine if they cover the intended items clearly and thoroughly. If they seem to need more information or to be made more specific, make notes and look into performing updates. Do the same for any policies that were not found to be adequate in application or some that may not have been addressed at all.

Make a list of goals that are pertinent to the utility. Responsibilities include maintaining regulatory compliance, serving the public, maintaining technical managerial, financial capacity, adhering to proper treatment of personnel and so forth. Some policies will be more obvious than others such as the need to establish a cross connection control policy vs a bulk water sales policy.

Write down a list of tasks and procedures that will need to take place. This would include things like policy regarding preventative maintenance of the system, how the manager will report to the board, disciplinary action, customer billing, formation of outside contract, enforcement of policy and such.

Create a list of possible problems and solutions that the utility may face. Has the utility ever had a request for forgiveness of a delinquent water bill? If so, was the decision based on policy or made on the fly? If the bill was forgiven is the utility ready to forgive others who will likely follow suit? Has the utility ever had an issue with a contracted party not holding up their end of the agreement? How would this be addressed? Has there ever been a dispute regarding a contract that did not address the issue in question at all? Discuss prior issues that were not well defined and try to predict others that may be faced in the future.

Though an organization may have a robust collection of policies there will always be the possibility of running into a new situation. When an unforeseen challenge takes place, be ready to address it in a methodical manner. While attempting to keep ahead of issues there will also be many bumps in the road along that way that prompt further policy formation so be ready to learn and adapt to new situations.

Addressing this could begin with a system manager, admin, operators, or the board may form a committee. It may also prove helpful to research how other organizations may have face the same issue. Reach out to technical service providers who may be well networked with other utilities and could provide advice.

When forming policy, be as specific as possible and avoid ambiguous language. Make sure all parties duties and responsibilities are clearly spelled out. Also cover what will take place if any party does not fulfill their end of a contract or agreement. These things are best addressed up front to avoid disputes at a later time. When a change is being made you must ask what it can effect. For example if a contractor wishes to purchase bulk water drawn from a hydrant, how could this effect the utility? Are you ensuring backflow protection, liability for damages due to mis-operation of the hydrant, time of day demand concerns, site security, measurement of usage? However this is approached you would need to protect system components, protect it from loss/theft, ensure regulatory compliance, and receive proper financial compensation for the sale. Be sure the policy reflects these goals.

Finally when everything has been considered and put to paper have legal counsel look it over. You have advocated system needs based on operational knowledge, have them review it for legality. Discuss any needed changes to be sure the intent is still carried out once the finished product is enacted. Once it has been legally vetted the remaining step would be to submit it for board review and approval to go into effect. It would be best of the party that worked on forming the policy was present to answer questions to the board and public so the need and benefits would be well represented.
Wastewater Lagoon Seasonal Turnover

Jon Colbert, NVRWA Training and Technical Assistance Specialist

What is lagoon turnover?
Lagoon turnover is when the sludge and water from the bottom of the lagoon rise to the top. Since the bottom of the lagoon is often where solids and less-oxygenated water tend to be, this can create a problematic situation. An untreated wastewater lagoon will settle into layers, with denser, cooler water at the bottom and lighter, warmer water at the top. This is known as thermal stratification. In a winter that's cold enough to freeze the surface, the colder water will be at the top and the warmer water will be at the bottom. This keeps the bacteria at the bottom working through the winter. In spring the change in ambient temperatures causes the layers to mix and eventually create a uniform temperature. As the water begins to de-stratify and mix, the settled solids become resuspended and the odorous gases trapped at the bottom are released to the surface.

What makes spring lagoon turnover so severe?
Spring is usually the time of highest BOD loads in a wastewater lagoon. You've got the BOD that's been stored over the winter, new influent BOD, and the BOD demands of the accumulated sludge at the bottom of the lagoon. In the spring, increased sunlight warms the top layer of the lagoon, melting the surface ice and allowing sunlight to penetrate. The sinking of the cold, dense ice melt, along with heat from the sun and energy from winds create convection currents.
Gradually, with the sun's warmth and wind, the entire lagoon reaches the change in ambient temperatures causes the layers to mix and become more uniform. As a result, the oxygen in the atmosphere, as well as algae, while the bottom layer is left without any oxygen, where anaerobic bacteria treat the suspended solids and nutrients. As the heat begins to warm the lagoon with seasonal changes, and as winds can now disturb the surface of the lagoon, the layers can mix and become more uniform. As a result, the oxygen in the upper layer becomes diluted into the total volume of the lagoon during lagoon turnover.

Problems Caused by Lagoon Turnover
Without sufficient dissolved oxygen, DO, anaerobic digestion increases as anaerobic bacteria predominate. This can cause:

1. Floating sludge: As the increasing sunlight and wind circulate the water, the solids at the bottom, which have been quietly anaerobically digesting, can be churned up. The anaerobic digestion process releases gas as a byproduct, which becomes entrained in the sludge. The gas trapped in the sludge causes it to rise from the bottom of the lagoon and float, this is called "popping". With the rising gas byproduct of anaerobic digestion, unpleasing lagoon odors are released into the atmosphere. These odors, coupled with those of the floating sludge, are strong during lagoon turnover. If picked up by the wind, these odors can cause complaints.

2. Lagoon Treatment Suffers: Lagoon turnover can be a sign that your lagoon is septic. In other words, it can be an indication that your lagoon contains a lower DO concentration, and is breaking down nutrients via anaerobic digestion. Expect a spike in effluent BOD, TSS and other treatment parameters if this occurs.

Why lagoon turnover happens in the summer:

1. Low levels of DO (dissolved oxygen): As the water temperature increases, aerobic bacteria in your wastewater lagoon become increasingly active, and as a result, consume more oxygen. Also, warm water doesn't hold as much oxygen as cold water. This leads to lower lagoon DO. With less dissolved oxygen, anaerobic bacteria can increase and anaerobic digestion increases.

2. Thermal Stratification: Unmixed lagoons can experience "thermal stratification," wherein three distinct layers form within the water column, separated by temperature and water density. This is the character of a facultative pond. The top layer contains the majority of the DO because of contact between the lagoon’s surface and the atmosphere, as well as algae, while the bottom layer is left without any oxygen, where anaerobic bacteria treat the suspended solids and nutrients. As the heat begins to warm the lagoon with seasonal changes, and as winds can now disturb the surface of the lagoon, the layers can mix and become more uniform. As a result, the oxygen in the upper layer becomes diluted into the total volume of the lagoon during lagoon turnover.

What happens to your wastewater lagoon because of lagoon turnover:

1. Floating Bio-Solids: When you experience turnover, anaerobic digestion in the sludge biomass releases gas as a byproduct. This gas becomes entrained in the sludge, increasing its buoyancy and causing it to rise from the bottom of the lagoon. These odors, coupled with those of the floating sludge, are strong during lagoon turnover. If picked up by the wind, these odors can cause complaints.

2. Intense Odors: They smell bad. With the rising gas byproduct of anaerobic digestion, most notably H2S—a malodorous sulfur, nosous lagoon odors are released into the atmosphere. These odors, coupled with those of the floating sludge, are strong during lagoon turnover. If picked up by the wind, these odors can cause complaints.

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Remember lagoon turn over is a natural process in your lagoon caused by the change of seasons and temperatures and isn’t necessarily a problem. Though it can cause problems, don’t fix it if it isn’t broken! You can possibly get ahead of turnover problems by keeping the dissolved oxygen high as seasonal changes occur. Monitoring the oxidation-reduction potential using a simple meter can provide more data to help anticipate changes. Carefully observing your lagoon to look for changes in color, watching ice melt progress, and noting odors will also give you a head start.
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Public Lands in the U.S. Part I: The Early Years

By Teresa Taylor, Ph.D., Watershed Specialist

The vast acreage of federal public lands in Nevada is part of the mystique of our state, adding to its remote character and beauty. But this unique situation also results in problems associated with limited land availability for development and tax revenue, conflicts between desired uses, and a host of other issues.

The figure below strikingly illustrates that Nevada’s public lands represent the largest percentage of public lands of any state, and by a fairly substantial margin.

![Figure 1: Public lands as percent of land area in state, excluding trust lands. Source: U.S. General Services Administration, Federal Real Property Profile 2004.](image1)

Although the above figure was prepared in 2004, most of the values shown in the figure remain essentially the same, as public land distributions have changed little for the past several decades. But that was not always the case.

The historical evolution of federal public lands in this country provides interesting insight into some of the challenging and competing issues surrounding their management. Decisions made by Federal agencies can sometimes be at odds with local interests, including those of many rural utilities whose drinking water wells or transportation pipelines may be sited within public lands.

How were federal lands acquired in the first place? By a combination of relinquishment from original colonies, purchases from other countries, and conquests and treaty settlements. The major land acquisitions and dates are illustrated in Figure 2.

By 1802, federal lands constituted 233 million acres; this amount was virtually doubled with the Louisiana Purchase in 1803. Many other major acquisitions also occurred throughout the mid-1800s, as Figure 2 illustrates.

But by the late 1800s, most of the public lands, or public domain was relinquished from Federal control. This came about through several different mechanisms. Some transfer of Federal lands began as early as 1763 at the close of the Revolutionary War, when veterans were provided with land grants in compensation for their service. Similar accommodations were made for veterans of the War of 1812.

As new states joined the union, land grants were provided for schools and other public institutions.

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As new states joined the union, land grants were provided for schools and other public institutions.

And finally, beginning in the mid-1800s, railroads and wagon roads were granted 170 million acres—an amount equivalent to today’s land area of Nevada and California combined. This effort to promote westward expansion via support of transportation routes was extended to individuals with Congress’s introduction of several laws to promote settlement west of the Mississippi River. The Homestead Act of 1862, which granted up to 160 acres to heads of families for a minimal filing fee, is one of the better-known of these.

Other lesser-known acts promoting western settlement were the Timber culture Act of 1873 (which granted homesteaders an additional 160 acres if they planted 40 acres in trees) and the Desert Law Act (which allowed land claims for the purpose of irrigating and cultivating land).

The General Mining Act of 1872 was passed by Congress to promote mineral exploration and further development and settlement of lands in the western U.S. This effort was furthered by the Timber and Stone Act of 1878, which allowed sales of public land not suitable for farming to individuals for harvesting trees or developing mineral resources.

Cumulatively, some 640 million acres of federal lands were transferred to individuals from these various acts during the 1800’s.

During most of this time period, the General Land Office, established in 1812, was the federal agency responsible for managing and administering the sale of public lands. And this effort required major investment in surveys to define land boundaries. One such survey, “The Geological Exploration of the 40th Parallel”, authorized by acts of Congress in 1867 and 1869, included fieldwork from California, through Nevada and into Wyoming. Figure 7 shows a support wagon rolling across sand dunes in the Carson Desert during this survey.

Figure 3: First Building at State Normal and Industrial School, now Alabama Agricultural and Mechanical University (historical archive photo). First

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Between 1890 and 1945, the General Land Office transferred responsibility for over 200 million acres of public lands to the purview of other federal agencies. For example, in 1872, Yellowstone National Park was designated by then President Ulysses S. Grant. This was the first of the country’s national parks, and led to establishment of the National Park Service (NPS) in 1916, an agency that now oversees sixty national parks, monuments, and other national areas totaling over 84 million acres.

Forest Reserves were established beginning in 1891, ultimately leading to creation of the U.S. Forest Service (USFS) in 1905, which is now responsible for 193 million acres of public land. Administration of other remaining Federal land (47% of all land in the west) plus that administered by NPS and USFS is shown in Figure 8:

This federally-dominant distribution of land in Nevada has led to many unique challenges in the state. Not surprisingly, the lands administered by the BLM can be a big part of these challenges, since 68% of the state falls under its jurisdiction.

The mission of the BLM has evolved over time. How it evolved, and how it is continuing to evolve in ways that may result in different impacts to the state, in general, and rural water systems, in particular, is the subject of Part II in this series. Look for it in the next issue of Water Logged.