NewsLeaks

WINTER 2007

Vermont Rural Water Association

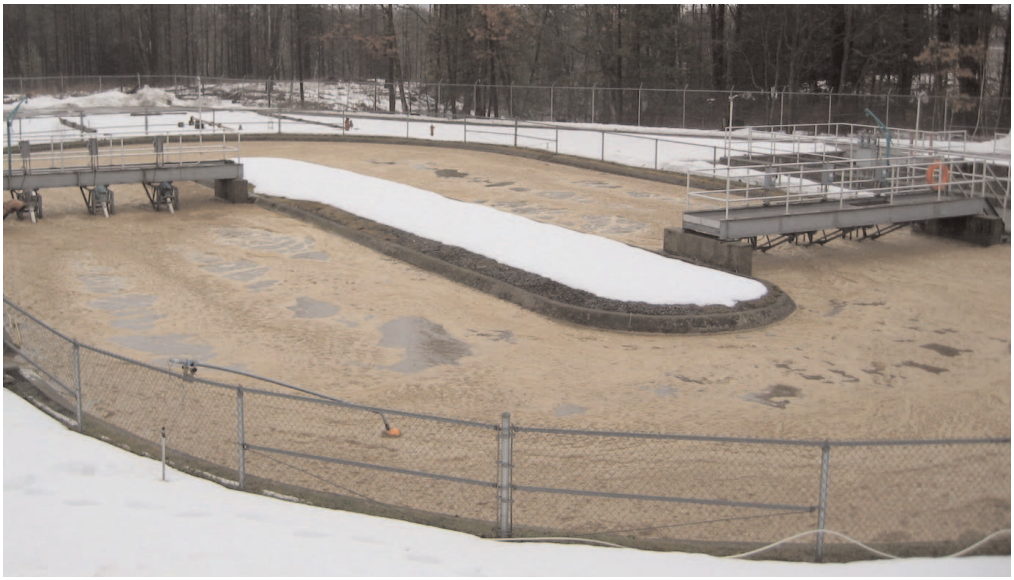
Vermont Rural Water Association....Supporting Water and Wastewater Systems since 1982

Fair Haven's Energy-Saving Success

Motor controls cut electricity use in half, save $17,000 per year

by Amy Rubin, Efficiency Vermont

In the summer of 2006, Fair Haven wastewater plant Head Operator Peter Laramie was faced with a challenge. The facility's oxidation canal pH was too acidic and the process of adding soda ash had become costly. What Laramie did to solve the problem not only balanced canal pH and eliminated soda ash expenses, but also reduced the facility's electricity costs by nearly a quarter.



The ditch at the Fair Haven wastewater plant.

Inspired by these results, Laramie and his staff went on to find other ways to reduce electrical use. Today, after completing energy-saving upgrades, the plant will use 50% less electricity and will pay $17,000 less in annual energy costs.

It all began when Laramie consulted with Vermont DEC process engineer Paul Olander about the canal's pH imbalance. At Olander's suggestion, Laramie and Assistant Operators Peter Root and James Heller started experimenting with run times on the canal's aerators, which typically had been running around-the-clock.

Knowing that the canal could naturally restore its pH balance while aerators were off, the team put formerly idle timers into service on the canal's six 15-horsepower aerator motors.

In the end, by setting timers to cycle on every three hours in winter months and every 90 minutes in summer months, the team restored pH balance. They also found that they could drastically reduce the amount of alum they needed to remove phosphorous. And, because the motors now ran half as often, Laramie saw the plant's electricity bills drop.

"They didn't stop there," says George Lawrence of Efficiency Vermont. "This was a facility that had steadily increasing

Continued on page 4.

Water System Audits:
Accounting for Lost Water

by Paula Jackson, VRWA

Due to aging infrastructure, water loss from distribution system leakage is a common occurrence in Vermont. By conducting an audit of your water system, you can determine how much water is lost due to leakage in your system's distribution piping.

AWWA standards say that 10% leakage is normal in water systems. What percentage of the water in your system is unaccounted for? 20-30% ?

By first identifying and then fixing the causes of the missing water, water systems can lower electricity bills and other operating costs, lower the risk of contamination hazards and backflow into the system, reduce wear on equipment, and set a good example of water conservation for consumers.

What is a water audit? A water audit is like balancing a check book; you measure the amount of water produced by your master meter and subtract the total of customer meter readings to reveal the amount of unaccounted for water.

Audits must also take into account unmetered water such as that used for firefighting and water main flushing, leaks that have been repaired, and unmetered service connections such as town offices and schools.

Meter inaccuracy is another area that should be addressed for a more accurate audit.

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Who We Are

Since 1982, Vermont Rural Water Association has supported water and wastewater systems across the state. We provide many services, including training, source water protection planning, and onsite assistance.

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News Leaks is the official publication of VRWA. It is published quarterly for distribution to operators, owners, managers and board members of water and wastewater systems in Vermont, as well as to association members, water and wastewater service providers, regulators, and other friends. Opinions expressed in the newsletter do not necessarily reflect the views and policies of VRWA.

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Vermont Rural Water Association

Letters

The Proctor Water and Wastewater Departments have gone through a difficult transition this summer. The Chief Operator for both the water and wastewater departments resigned in June 2007. From June 2007 until mid-September 2007 both departments were operated by a single assistant operator-in-training.

Despite our staffing constraints, the water department needed to complete a special data collection effort as part of a Comprehensive Preliminary Engineering Study designed to determine the most effective ways to address disinfection byproducts in our drinking water. Our engineer required that the sampling be completed during the summer months. It involved collecting over 70 samples at eight different sampling locations throughout our public drinking water system. It also required that the samples be hand-delivered to the Endyne Laboratory in Williston due to the 24-hour hold time on some of the samples. This is a minimum 4-hour trip from Proctor.

Nearing the end of the summer, we were very concerned about how this project was going to get completed. Coincidently, in early September, Paula Jackson stopped by the Town Office to inform us of her new position with VRWA and to ask if there was anything going on in the water and/or wastewater departments that she could help with. I immediately asked if she could help us complete this special data collection effort. On September 10, 2007, Ms. Jackson made herself available for the entire day to help with collecting the samples and completing the lab paperwork, and then she hand-delivered the samples to the Endyne Laboratory in Williston.

On behalf of the Proctor Water Department, I would like to extend our sincere appreciation to Ms. Jackson for assisting us with this project. I am doubtful that it would have been completed on time without her help. Thank you to Ms. Jackson and VRWA for really helping us in a pinch!

Sincerely yours,

Steffanie Bourque
Administrative Assistant, Town of Proctor

News on Tap

Are You Selling the Value of Your System?

by Shaun Fielder, Executive Director, VRWA

At the Vermont League of Cities and Towns Town Fair this October, we spoke with many Vermont community officials at our display booth. These individuals included many managers, selectboard members, superintendents, and operators of water and wastewater systems.

The conversations at these events are a constant reminder of the importance of the industry we support. Many cities and towns were represented and it was evident that VRWA has offered some type of service, whether technical assistance or continuing education, to many in attendance.

In addition, a key theme discussed with many was the value of a properly functioning public water and wastewater system. I spoke briefly with an elderly lady from a northwestern Vermont town. She put it well: "We have nothing to offer in our community if we don't have a properly functioning water and wastewater system. These systems serve as the foundation for our towns."

In order to keep these foundations in good order, we need to keep investing in them. This is quite a challenge with the ever-increasing financial hurdles our country and state face. The belt is getting tighter for all of us.

That being said, we all need to continue to promote the value of public water and wastewater service. Safe potable water and a properly functioning wastewater system are key to a given community's vitality.

I well know that many working in our industry are very humble and take great pride in keeping a low profile, but don't be afraid to promote your system and good work when you have an opportunity. You continue to keep up with very stringent federal and state regulations to ensure that both public health and the environment are protected. There is no doubt you are a significant part of the foundation that holds your community together.

I prepare this article in late October and we are into a nice period of Indian summer. I am sure the snowflakes will be in the air as you receive this issue of News Leaks. Best wishes to all of you, and have a safe and enjoyable holiday season!

Nominations Sought

The **Tony Torchia VRWA Special Recognition Award** honors a person affiliated with the water-wastewater industry for extraordinary effort or accomplishment during the previous year or over the course of a career. All members are invited to submit nominations.

VRWA will also have one seat on the **Board of Directors** up for election this spring. Our all-volunteer board meets quarterly to direct and oversee the association.

Directors are representatives of VRWA-member water/wastewater systems and they are elected to the board for three-year terms by the membership. Self nominations are common.

Nominations for the 2008 Tony Torchia Award or a board seat must be received by January 31, 2008. For a nomination form, visit www.vtruralwater.org or call the office at 800-556-3792.

Water System Audits, *continued from page 1.*

A typical water audit includes these steps:

- Collect source meter readings for a one year period
- Collect and add up customer meter readings for the year
- Test master and customer meter accuracy
- Calculate the volume and cost of unaccounted for water
- Analyze the data and develop a leak detection plan

For more information about water audits or for technical assistance with audits and leak detection, contact VRWA at 800-556-3792.

Save the Date

VRWA Annual Conference
May 7-8, 2008

Fair Haven's Success, *continued from page 1.*

electricity use prior to these changes. When they saw the reduction in their electric bills after using the timers, they gave us a call to investigate further opportunities. We took a look at their operations and agreed with their assumption that the most cost-effective energy-saving investment would be in variable frequency drives for their aerator motors."

By the end of July 2007, the facility had installed variable frequency drives (vfds) to work in conjunction with the timers. By matching motor speed to oxygen needs in the canal, the vfds maintain a dissolved oxygen level of two milligrams per liter.

Prior to vfd installation, the canal's dissolved oxygen levels varied. With a financial incentive of $3,000 from Efficiency Vermont, plant operators expect the new $9,745 worth of vfd equipment to pay for itself in energy savings in less than a year.

This bank of timers controls the aerators.

As a result of the timer and vfd projects combined, the plant is expected to lower its facility-wide electricity costs by $17,000 per year ($8,000 from timer use and $9,000 from vfd savings). Compared to the final full year of operation without energy-saving motor controls, the plant's 2008 electricity use is expected to be reduced by 50%.

"We didn't know if we'd save any energy initially," says Peter Laramie. "It wasn't the reason we started working with timers. The energy savings were just a wonderful surprise."

To learn about energy-saving opportunities in your treatment facility, contact Efficiency Vermont, toll-free, at 888-921-5990.

Bylaws & Your Inspection Program

by Brent Desranleau, VRWA

Every public water system, no matter how small, should follow some basic type of review/inspection procedures and guidelines to ensure proper installation of their water mains, service lines, meter pits and any other mechanical apparatus.

The issue of review/inspection and the complexity of it can vary based on system size, percentage of yearly growth, and existing operational and maintenance programs, as well as ordinances and construction standards that are in place.

As you develop inspection procedures, the most important step you can take is to review your bylaws or water ordinance. Most public water systems have bylaws or an ordinance in place; however, these are often out of date and have not been changed to keep stride with updated legal terminology, practices, and procedures in the industry, not to mention all of the technological advances in regard to material standards.

Many water systems use their bylaws in one of two different ways. One way is as a legal document to govern and indemnify. The second is as a guideline for practices and procedures, with specifications for material standards also included. This is more common with small systems, while larger water departments often have two separate documents, an ordinance and a public works construction standards and specifications handbook.

Either way, these documents are the foundation for the day-to-day operation of your water system and enforcement of its policies. It takes a lot of time and effort to perfect a good program, and it takes a well-written set of bylaws to be able to back up your responses and verbal policies to the public, engineering firms, general contractors and attorneys alike. Listed below are some of the content headers you should have in your bylaws/ordinance:

- Extension of the public water system
- Powers & authority of inspectors
- Use of the public water supply system
- Water service connections
- Application for residential or commercial service
- Disconnection Policy
- Rates, fee schedule, and penalties
- Protection from damage
- Ordinance in force
- Validity
- Construction material standards
- Hydrant use policy
- Cross connection policy
- Definitions & abbreviations

It is essential to review the past and present policies of the water board when updating your bylaws. One way is to look back at past board meeting minutes.

Some water systems use a lot of verbal policies in the day-to-day operation of their water system. However, being consistent from one day to the next over time can be hard to do. Written policies hold up much better in a court of law.

Now that you have this new and improved set of bylaws you can put them to work for you. This is where you can enforce your inspection program and have it backed up in writing and signed off by the board. Water operators need to look at this like a new tool in the shed and use it as needed. With it you can't lose, but without it you're sure to end up in trouble sooner or later.

If an operator has questions or would like help rewriting their water ordinance, please call Brent Desranleau at 802-660-4988 x322.

Five Steps to Include in Your Inspection Program

1. Review your entire system carefully whenever changes are proposed. When preliminary plans to extend the water main are submitted to your system, review all relevant drawings to make sure everything meets state and local standards. Conduct a review anytime a new apparatus is installed.

2. Always document your changes in writing. After you review any proposed changes, send your comments to the design engineer and owner in writing and follow up with a phone call. Send copies of your letter to appropriate officials.

3. Inspect the site during the final review. Before construction begins, make a final review of the plan. This should include a site walk of the area.

4. Have an operator & engineer perform regular quality control inspections. During construction, a qualified person from the water department should make scheduled inspections. The engineer should also perform inspections and be present during the hydrostatic pressure testing of the water mains and the bacteriological sampling.

5. Resolve outstanding issues. Once the project is complete and the two-year warranty period has ended, make a final site inspection with the engineer, contractor, and owner. Make a written list of any outstanding issues to resolve before the water mains are turned over to the municipality.

Maintaining Water Quality in Private Wells

by Liz Royer, VRWA

Many of us work with public water systems and drinking water sources on a regular basis, but how often do we think about private water sources? Whether at our own home or those of relatives, friends, or small local businesses, private wells are the source of drinking water for many households and communities throughout Vermont.

Private water sources include drilled wells, dug wells and springs. Drilled wells draw water from deep below the ground and are the most common. Dug wells draw from shallow water tables and are generally more vulnerable than drilled wells to surface water contamination. However, a properly constructed dug well in a good location can produce high-quality water.

A spring is a place where ground water emerges naturally from the earth's surface, usually along hillsides, at the base of slopes, or in low areas. Springs should be constructed in a way that protects against surface water contamination and prevents rodents and insects from entering.

In contrast to the regulations which govern public drinking water sources, the Vermont Department of Health (VDH) has no requirements for testing private residential wells. However, to ensure that drinking water is safe, the Vermont Department of Health recommends the following testing schedule:

- Total coliform bacterial test every year
- Inorganic chemical test every five years
- Gross alpha radiation screening test every five years
- Fluoride test if young children or infants regularly drink the water

The Vermont Department of Health Lab, along with several private certified labs, provides information and analysis for testing private residential wells. For more information, including a list of certified labs, please refer to the VDH website at http://healthvermont.gov/.

The table on page 7 provides information on individual parameters included in the VDH private well testing recommendations. This may include the recommended Maximum Contaminant Level (MCL), the source of the contaminant, the health effects of the contaminant, and recommendations for further testing and/or investigation.

Sources

VDH Safe Water Guide
http://healthvermont.gov/enviro/water/safe_water.aspx

NSF Drinking Water Website
http://www.nsf.org/consumer/drinking_water/

For more information

EPA Private Drinking Water Wells
http://www.epa.gov/safewater/privatewells

NGWA Well Owner
http://www.wellowner.org/

Happy Holidays from Vermont Rural Water

Test	Vermont Recommended Maximum Level	Comments	Treatment Options
CHLORIDE	250 mg/L (Milligrams per Liter = parts per million)	Chlorides do not cause health problems, but high chloride levels in drinking water may be a sign of other problems. For example, road salt can contaminate water supplies causing high chloride levels. High levels of chlorides in drinking water may also give water an unpleasant taste.	Generally not necessary. (Reverse osmosis and distillation may be effective.)
NITROGEN, NITRATE	10 mg/L	Nitrate in elevated levels is linked with two known health problems. Methemoglobinemia or "blue baby syndrome" is caused by an oxygen deficiency in the blood. This causes bluish skin tone in infants. In adults, nitrates can form chemicals called nitrosamines that have been linked to cancer. These may pose long-term health risks. Elevated nitrate levels in well water may also indicate other problems such as contamination from sources such as septic systems or fertilizers. When levels exceed 5 mg/L, the source of nitrate should be investigated.	Anion exchange Reverse osmosis
TOTAL COLIFORM	No max level; Results >1 MPN should shock* & retest	Coliform bacteria are a large group of soil and intestinal bacteria that indicate potential well contamination and may cause health problems. However, coliform bacteria do not necessarily make you sick. High coliform levels may indicate presence of E coli bacteria or other pathogens. All wells with coliform presence should be "shocked" and retested.	"Shocking" with bleach Ultraviolet disinfection
E. COLI	<1 MPN/100mL (Most Probable Number of Colonies per 100 mL)	This result indicates whether recent animal or human waste has entered the water. Do not drink water that has tested positive for E. coli bacterial contamination. Boiling drinking water for one minute will kill bacteria so that it can be used for drinking.	"Shocking" with bleach Ultraviolet disinfection
ARSENIC	0.010 mg/L	Arsenic has been linked to increased lifetime risk for bladder, lung, or skin cancer. Potential links between arsenic and cardiovascular disease, diabetes and other cancers are being studied, but the evidence to date is not conclusive. Sources include naturally-occurring deposits, orchards, and industrial wastes.	Adsorptive filters Distillation units Anion exchange Reverse osmosis Carbon block
COPPER	1.3 mg/L	Copper is an important mineral for the formation of red blood cells. However, high amounts of copper in water can cause stomachaches and vomiting. Young children are more sensitive to high levels of copper than adults. Water with large amounts of copper can stain plumbing fixtures and give the water a metallic taste. Sources can be naturally-occurring or from copper plumbing fixtures.	Adsorption (carbon/charcoal) Reverse osmosis Distillation
TOTAL HARDNESS	None	Hardness causes no known health risks and is due to natural calcium and magnesium deposits. However, very hard water can cause reduced lathering of soap, and buildup of scale in water heaters, cookware and plumbing fixtures and valves. No limits are established for water hardness. Water <75 mg/L is considered "soft" while >75 mg/L is considered "hard."	Cation exchange softeners
IRON	0.3 mg/L	Iron is an essential element and does not generally cause negative health effects. However, in large quantities it can cause staining of clothing, sinks, toilets and bathtubs. As with copper, iron can give water a metallic taste. Naturally-occurring.	Adsorption (carbon/charcoal)
LEAD	0.015 mg/L	Lead is a highly toxic metal that can cause serious health problems, especially for infants, children, and pregnant women. Nervous system, kidney, and red blood cell problems may be effects of exposure to high lead levels. In children, lead may have harmful effects on nervous system and brain development. Lead can be naturally-occurring and has been used in making solder, fittings and fixtures found in household plumbing.	Adsorption (carbon/charcoal) Reverse osmosis Distillation
MANGANESE	0.050 mg/L	Manganese does not cause health problems at levels typically found in drinking water since it is an essential element for human metabolism. However, manganese can discolor water; stain clothing, sinks, toilets and bathtubs; and can cause undesirable tastes in water.	Softeners Oxidation/Filtration
SODIUM	250 mg/L	Sodium is a necessary dietary element and occurs naturally in water. High levels of sodium in drinking water may cause an unpleasant taste. For people with sodium restricted diets it may cause health problems by contributing to high blood pressure. Salt from septic systems or from road de-icing may elevate levels in wells and indicate other water problems.	Reverse osmosis Distillation
GROSS ALPHA	5 pCi/L	Alpha radiation is measured in picocuries per liter (pCi/L). This level is calculated as the total alpha radiation minus uranium and radon. If alpha radiation is detected at or above 5 pCi/L in your home well, additional testing is needed to pinpoint the source. There are no immediate health risks from drinking water that contains alpha radiation. However, it may cause health problems over time.	Cation exchange Reverse osmosis Aeration (radon only)

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