



# SUPPLY LINES WITH THE SOURCE



Newsletter of the NHDES Drinking Water & Groundwater Bureau  
on the web at [www.des.nh.gov](http://www.des.nh.gov)

Spring 2012

## A Salt Diet for New Hampshire's Groundwater?

Salt is everywhere—road runoff, brine discharges, seawater intrusion, among others, though food still accounts for the highest salt contribution to our diets. The objective of this article is to:

- Increase awareness of salt (sodium and chloride) in drinking water.
- Emphasize the importance of well setbacks from roads and parking areas.
- Begin a discussion on treatment alternatives for iron and manganese to reduce brine discharges.

It is essential to understand that while there are many kinds of salt, both road salt and table salt are made up of sodium and chloride, which is the form that chlorine takes when it is in salt.

### Current Standards

Neither the EPA nor New Hampshire has a health-based limit for either sodium or chloride in drinking water. When it was considering setting limits on sodium and chloride in drinking water, EPA assumed that water users consume two liters of water per day and found that 10 percent or less of a person's daily sodium intake comes from drinking water. The rest is usually from food. *Persons on a sodium-restricted diet* should evaluate all sources of sodium when attempting to reduce overall sodium intake. It is often much easier, and less expensive, to make a dietary change than to remove sodium from drinking water. EPA has recommended that sodium levels not exceed 20 mg/L for persons on a physician-prescribed "no salt diet." New Hampshire's secondary (taste) standard for sodium is 100 to 250 mg/L. The national secondary standard for chloride in drinking water is 250 mg/L.

### Sanitary Protective Areas and Road Setbacks

One way to reduce the likelihood that a well will be affected by salt is to maintain distance between the well and areas that receive road salt such as roads, parking areas and driveways. For non-community public water systems, the minimum setback from roads or parking areas is 50 feet. For community water systems, the setback is 75 to 400 feet (the sanitary protective area), depending on the well's production volume. A plot of historical chloride occurrence at 249 public water supply wells with roads, driveways or parking lots in their sanitary protective areas shows how a well's proximity to roads and parking can impact its water quality (Figure 1 on page 3). From this plot, greater than 90 percent of the wells installed 50 feet or more from roads, driveways or parking areas have chloride levels less than 250 mg/L.

### Brine Discharges

Ion-exchange water softening is one of the most common treatment processes used for both private and public wells in New Hampshire. This treatment relies on periodic use of brine to regenerate or recharge the water softener's ion exchange capacity. Brine waste is discharged to the ground as long as no primary contaminants are present; however, this practice impacts groundwater because both chloride and sodium are highly mobile in groundwater.

For public water systems, roughly 60 percent of softeners are installed to reduce levels of iron or manganese, while 40 percent are installed to control hardness (calcium and magnesium). "Hard water" is generally 150 mg/L as CaCO<sub>3</sub> (9 grains

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## SPOTLIGHT ON MEREDITH (LAKE WAUKEWAN)

# High School Students Help Protect Meredith's Drinking Water Supply

by Robie Parsons and Andrea LaMoreaux, New Hampshire Lakes Association

Last summer the New Hampshire Lakes Association, in partnership with the Waukeewan Shore Owners Association, the Waukeewan Association, the Winona Forest Association, the town of Meredith and the Hidden Cove Association, hired a crew of local high school students to install six lake-friendly landscaping projects along the shores of Lake Waukeewan. The projects will reduce the amount of stormwater runoff discharging directly into the lake during rainstorms while improving the natural landscape along these sensitive shoreland areas. This is good news for Meredith residents who care about the lake and rely on it as a source of drinking water.

The projects included installing infiltration trenches and infiltration steps filled with crushed stone to slow down runoff, rubber razors and waterbars to divert runoff away from the lake, and rain gardens and vegetated buffers to soak up diverted runoff. Together, NH LAKES estimates that the projects will prevent approximately 96 tons of sediment and 97 pounds of phosphorus from polluting the lake each year.

Phosphorus is a nutrient contained in many lawn fertilizers, septic system effluent and soil.

While nutrients are often good things, too much phosphorus in a lake can cause aquatic plants and algae to flourish. Excessive plant and algal growth can make boating, fishing and swimming unpleasant and dangerous. Excessive phosphorus can also create conditions that are conducive to algae blooms, which in some cases release harmful toxins, contribute to taste and odor issues and produce disinfection byproduct precursors. Because Lake Waukeewan serves as a drinking water source for approximately 45 percent of the residents in Meredith, efforts to reduce the amount of phosphorus and other contaminants from flowing into the lake are critical.

The NH LAKES 2011 Lake Conservation Corps Program at Lake Waukeewan was funded by a grant from DES's Local Source Water Protection Program. The program was also supported by generous donations and discounts from local businesses including Belknap Landscape Company Inc., and Realgreen Lawn Care, LLC of Meredith. Of course, the project would not have come together if the students and teacher from Inter-Lakes High School hadn't given up some of their free time during the summer. •

### Attend the Drinking Water Source Protection Workshop—May 2

Mark your calendars for DES's 2012 Drinking Water Source Protection Workshop on Wednesday, May 2, from 8:30 a.m. to 4:00 p.m. at the Grappone Conference Center, Concord, N.H. The event will celebrate progress made in the last 25 years in New Hampshire to protect drinking water resources. A "roadmap" to improve protection in the future will be presented.

Topics will include emerging contaminants, innovative low impact development regulations, the role of forests in protecting drinking water, DES guidance for local permitting of private wells and case studies of successful source water protection projects.

Registration and a full agenda are available at the American Ground Water Trust's website [www.agwt.org](http://www.agwt.org) (click on "Conferences, Workshops" tab at the top of the page). Continuing education credits (5.25 technical credit hours) are being offered through the N.H. Water Works Operator Program. American Planning Association continuing education credits are expected to be offered. •

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## Salt, continued from page 1

per gallon) or higher. However, softeners are often installed for much lower hardness levels or to control iron or manganese alone, creating potentially unnecessary brine discharges when processes other than salt-based softening would be just as effective.

A recent case study shows how inappropriate use of salt-based softening can be counter-productive. A small community system installed a softener to deal with manganese and hardness. The softener had to be regenerated with brine more and more frequently over the years because of deteriorating raw water quality. The operators eventually recognized that the brine discharge was contaminating the system's wells because chloride concentrations in the well water increased more than 10-fold, from 65-85 mg/L in 2002 to 850 mg/L in 2011. Making matters worse, manganese in the well water increased from 0.5-0.6 mg/L to 2.5 mg/L over the same period (Figure 2), presumably as a result of the reaction of sodium with manganese in the aquifer. Similar spikes were observed for hardness and sodium. The system implemented strict water conservation practices, is developing a new well and is reviewing its irrigation needs. Future measures may include installing a used-brine tank for off-site disposal and/or changing treatment technology to avoid brine altogether.

### Recommendations

DES has several recommendations for water systems to consider.

- Reduce water treatment residuals by using non-potable water for irrigation and implementing water conservation practices where possible.
- Review treatment needs and non-brine treatment alternatives for iron and manganese.
- Review the threshold for implementing treatment for hardness. DES suggests no treatment for hardness unless it is 150 mg/L or higher.
- Sample raw water quality at least once per year and adjust treatment needs accordingly.
- When ion exchange treatment is used, review regeneration frequency, salt and rinse settings to reduce brine discharge volume.
- Maintain an operating log of salt use to

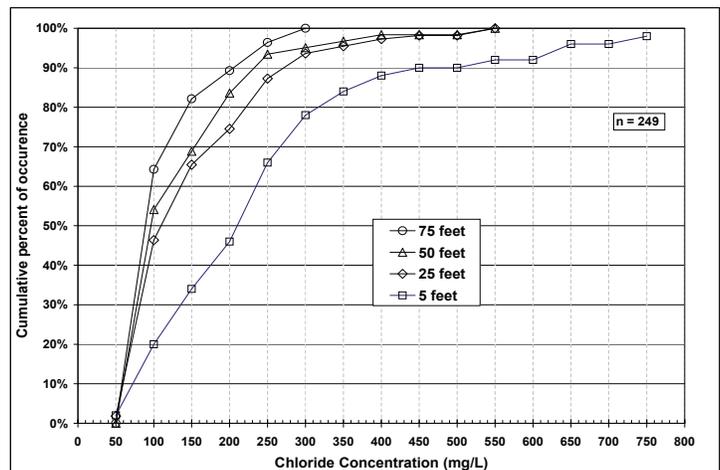


Figure 1: Source separation distance from road, driveway or parking lot. Chloride occurrence plot.

alert to changes in operations.

- Maintain filter backwash discharge outside of the sanitary protective area even if additional piping is required.
- Honor well setbacks from roads and parking.
- Review road salt application ratios and rates on town or internal private roads with your town public works department or association and consider "Low Salt" road postings.
- Consider winter closing of redundant internal private roads in the wellhead protection area.
- Note that all treatment changes at public water systems, including transient water systems, such as restaurants and others, require approval by DES.

Questions and comments on this article may be directed to [cynthia.klevens@des.nh.gov](mailto:cynthia.klevens@des.nh.gov) or (603) 271-3108, or [stephen.roy@des.nh.gov](mailto:stephen.roy@des.nh.gov) or (603) 271-3918. •

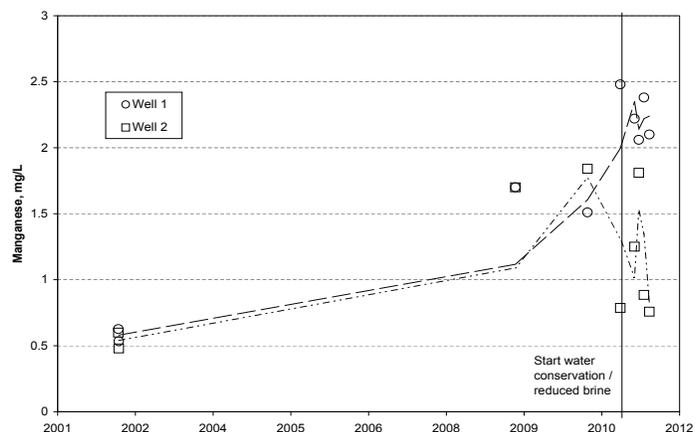


Figure 2: Raw water manganese levels found in one small community system.

# Save the Date: Financing Energy Efficiency Improvements in Water and Wastewater Systems

DES, Public Service of New Hampshire and other partners will hold a workshop on financial mechanisms and incentives to improve energy efficiency in water and wastewater systems on Tuesday, May 22, at the PSNH offices at 780 North Commercial Street in Manchester. A variety of topics will be covered including utility rebates, utilization of off-peak/standby power, performance contracting and financing onsite power production.

Studies suggest that water utilities can reasonably achieve energy savings between 15 and 30 percent. This translates into a direct cost savings to operate your system. In a recent DES survey of New Hampshire water and wastewater utilities, 46 percent of respondents indicated they had implemented some type of energy efficiency improvements. Of those that implemented improvements, only about half utilized one of the financial incentives available to complete the work.

Please plan on attending this important event. Additional information and resources on energy are available in the guidance document "Energy

Utility	Website	Phone
National Grid	<a href="http://www.nationalgrid.com">www.nationalgrid.com</a>	1-800-322-3223
New Hampshire Electric Cooperative	<a href="http://www.nhec.com">www.nhec.com</a>	1-800-698-2007
Public Service of New Hampshire	<a href="http://www.psnh.com">www.psnh.com</a>	1-800-662-7764
Unitil	<a href="http://www.unitil.com">www.unitil.com</a>	1-800-852-3339

Efficiency Planning, Funding and Improvements for New Hampshire's Drinking Water and Wastewater Systems," which is [available online](#).

You can also contact your utility at one of the numbers above for more information about financial incentives to improve energy efficiency.

Contact Derek Bennett at (603) 271-6685 for additional information or to register for this event. The final agenda will be [posted online](#). •

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## Record Drawings for Community Water Systems

In accordance with N.H. Administrative Rules Env-Ws 372.33 and 373.26, all community and non-transient/non-community water systems are required to develop record drawings for all buried distribution piping and related service connections, gate valves and blow-offs. Effective March 1, 2009, DES small system sanitary surveyors began citing the lack of record drawings as a minor deficiency and notified owners that they were expected to develop them in time for the next emergency plan update and their next sanitary survey. For community systems, this allowed a three-year period to complete their record drawings. **Accordingly, effective April 1, 2012, all community water systems failing to have record drawings will be cited with a significant deficiency during their next sanitary survey.**

Required information to be included in record drawings is listed in Env-Ws 372.33 and should

include, **at a minimum:**

- A general site plan showing the water system service area with road names.
- The well and pumphouse location.
- All service connections.
- The distribution pipe network and blow-offs.
- Approximate locations of valve boxes.

Precisely measured dimensions from fixed features should be recorded wherever possible.

DWGB offers the Record Drawing Grant Program, which includes a matching grant of up to \$1,500. For more information about the grant program, contact Adam Torrey at (603) 271-2950.

Water system owners may contact David Kelly at (603) 271-2472 or [david.kelly@des.nh.gov](mailto:david.kelly@des.nh.gov) for more information about record drawings. •

# Occurrence of 1,4-Dioxane in New Hampshire's Drinking Water

1,4-Dioxane has historically been used as a stabilizer for chlorinated solvents, especially trichloroethane. This compound is also present in some consumer products such as shampoos, toothpastes, deodorants and other personal care products. Despite being detected in some personal care products, 1,4-dioxane is generally not listed as an ingredient. It forms in these products through a secondary reaction that occurs when ethylene oxide is added during the manufacturing process.

Recently, 1,4-dioxane was detected at a concentration of approximately 1 part-per-billion, or 1 microgram per liter ( $\mu\text{g/L}$ ), in treated wastewater effluent from two municipal wastewater plants in New Hampshire, possibly due to its presence in personal care products.

In March 2011, DES sent a letter to all community and non-transient public water systems recommending testing of their sources of drinking water for 1,4-dioxane using analytical methods with a reporting limit of  $0.3 \mu\text{g/L}$  or less. This recommendation was made to water systems because:

1. Traditional remediation technologies used to remove chlorinated solvents do not efficiently remove 1,4-dioxane.
2. This contaminant has been detected in groundwater at concentrations above  $3 \mu\text{g/L}$  at more than 60 sites contaminated by releases from landfills or industrial sites throughout New Hampshire.
3. EPA's recent toxicological review of 1,4-dioxane indicates that this contaminant poses a one-in-one-million cancer risk when present in drinking water at a concentration of  $0.35 \mu\text{g/L}$ .

In response to this recommendation, approximately 215 sources of drinking water were sampled throughout New Hampshire. Ten of the drinking water sources exhibited detectable concentrations of 1,4-dioxane. Seven of the ten water sources exceeded  $0.35 \mu\text{g/L}$  and four of these sources exceeded  $3 \mu\text{g/L}$ . There are several other drinking water sources in close proximity to waste sites that were previously identified as being impacted by elevated concentrations of 1,4-dioxane.

DES is working on separate projects with the University of New Hampshire and Secondwind

Water Systems to test treatment technologies for removing 1,4-dioxane from drinking water. This work has shown that carbon-based filtration systems can reduce the concentration of 1,4-dioxane to a concentration below  $3 \mu\text{g/L}$ , but that the removal efficiency is somewhat inconsistent and the carbon requires frequent change-out to remain effective. Additionally, a basic point-of-use reverse osmosis treatment system obtained from a retail store effectively reduces the concentration of 1,4-dioxane by over 70 percent in groundwater exhibiting high concentrations of inorganic compounds.

1,4-Dioxane is highly mobile, can be released to the environment by various sources and activities and is potentially a significant health concern even at a low concentration. This contaminant warrants the attention of drinking water professionals. DES continues to recommend that water systems test their water sources for this contaminant if they have not done so already. DES strongly recommends that sources of water potentially impacted by septic systems or with existing or historical detections of trichloroethane, 1,1-dichloroethylene or cis-1,2-dichloroethylene be tested for 1,4-dioxane.

To obtain a list of laboratories that are accredited or are in the process of becoming accredited to complete 1,4-dioxane analysis using analytical methods with reporting limits of  $0.30 \mu\text{g/L}$  or less, or for more information regarding 1,4-dioxane, please contact Brandon Kernen at (603) 271-0660 or [brandon.kernen@des.nh.gov](mailto:brandon.kernen@des.nh.gov). •

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## Salmon Falls Watershed Collaborative Wins U.S. Water Prize

The Salmon Falls Watershed Collaborative, a joint effort to protect drinking water supplies for more than 28,000 residents in Maine and New Hampshire, has been awarded a 2012 U.S. Water Prize by The Clean Water America Alliance. For more information about the collaborative, see the Winter 2012 spotlight article in [The Source](#) or visit [www.prep.unh.edu/sfwc.htm](http://www.prep.unh.edu/sfwc.htm). •

# Notes from a Radiological Emergency Workshop for Water and Wastewater Facilities

On September 14, 2011, DWGB, with support from EPA and New England Water Works Association, held what is believed to be the first radiological emergency workshop specifically for drinking water and wastewater facilities. Nearly 100 people attended, representing drinking water and wastewater utilities, state public health programs, state drinking water programs, EPA Region 1 and FEMA.

The workshop provided information to drinking water and wastewater utilities on radiological emergencies and provide a basic understanding of how these events could affect their facilities. The workshop also reviewed what response efforts to expect at the local, state and federal levels. DWGB invited community water systems and wastewater facilities within 50 miles of Seabrook Station and Vermont Yankee nuclear plants and drinking water and wastewater systems in Massachusetts and Vermont within 10 miles of the two nuclear plants.

The workshop began with a presentation from Anthony Honnellio, Radiation Program Manager from EPA Region 1, to provide basics on radiation, and EPA's response to the Fukushima, Japan, nuclear incident. Then, N.H. Public Health Physicist and Manager of the Emergency Planning and Response Program, Jerry Kwasnik, Ph.D., provided information on the state role as the lead agency in a radiological event and provided a presentation on basic nuclear power plant operations.

Mark Parsons, Regional Response Coordinator with the U.S. Department of Energy described how DOE can provide first response capabilities, including consultation on health problems, aviation based equipment and real-time prediction of atmospheric transport of radioactivity. Don Keeler, section chief at N.H. Homeland Security and Emergency Management, finished up by walking participants through WebEOC, which is the state's crisis information management program used to track all activities during emergency events.

Attendees split into groups to consider groundwater, surface water and wastewater issues related to a radiological event. Each group was provided a radiological event scenario and a list of questions for discussion. While many utilities have experienced power outages, flooding and debris

removal from natural disasters, a radiological event is different in many ways. Participants discussed various issues including local actions being subject to state direction and coordination and understanding the importance of coordination with local emergency management directors.

The questions included: What type of sampling will need to be done short term and long term and who will take the samples? What would happen with all the runoff and wash water from contaminated buildings entering the ground, surface waters and wastewater treatment plants? Could storage tanks be contaminated through vents? Will there be enough staff to respond? Will people not show up to work because they are afraid of radiation exposure? What treatment modifications are there to remove radiological contaminants?

Participants learned that resources are available to determine contamination levels, sampling assistance and guidance with decision making. DWGB hopes to gather information for another workshop that would delve into the specific impacts to drinking water and wastewater, including treatments or processes to deal with radiological contamination. •

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## Local Source Water Protection Grants Are Available Again

Local Source Water Protection grant applications for 2013 can be found on DES's website at [www.des.nh.gov](http://www.des.nh.gov) by searching for "lswp grants." The deadline to apply is November 1, 2012, but significant lead time may be needed to garner the support of project partners.

Grants are available to public water suppliers, municipalities, regional planning agencies, non-profit organizations, educational institutions, conservation districts and state agencies. Grantees can receive up to \$20,000 to protect public drinking water sources through improved watershed planning, delineation of protection areas, assessment of threats to water supply sources, implementation, source security and conservation-related expenses.

For more information, contact Johnna McKenna at (603) 271-7017 or [johnna.mckenna@des.nh.gov](mailto:johnna.mckenna@des.nh.gov). •

## Water Utilities' Vision for 2025: Source Water Protection

Source water protection is essential for providing a reliable supply of high quality drinking water. By 2025, every public community water supply will be protected by an active source water protection program." That is the vision described in *Source Water Protection Vision and Roadmap*, released in early 2012 by the Water Research Foundation. The document identifies obstacles to developing and implementing source water protection programs and offers recommendations to overcome those obstacles. On a broader level, this policy research represents a further step in the mainstreaming of source water protection within the water supply industry.

The *Vision and Roadmap* came out of an effort in 2007 by the Water Research Foundation (then the American Water Works Association Research Foundation) and the Water Environment Research Foundation to develop a source water protection research agenda. Readers might recall that AWWA issued its first Standard for Source Water Protection (ANSI/AWWA G300-07) in 2007. The *Vision and Roadmap* seeks to address the "need for common, agreed-upon goals and objectives for source water protection among the water industry."

Together with a companion document, the *Vision and Roadmap* is meant to help water utilities move forward with their source water protection efforts and proactively improve and/or maintain the quality of their drinking water resources. As stated by the authors, "The roadmap ... is not intended to serve as an official directive, but rather is a collection of observations and recommendations organized to form a path to achieving the vision.

"In order to ensure the various actions recommended in the roadmap can be carried out, it is recommended that both a top-down and a bottom-up approach be taken. A top-down approach would establish a flexible framework to guide local entities (e.g., water systems, watershed organizations and regional planning agencies) to work together to protect source water. Due to the variability of source waters and the areas from which they are derived, along with technical, social, political, financial and regulatory differences across jurisdictions, it is unlikely that two [source water protection] programs would be the same. A

bottom-up approach is therefore also needed, which would use local information and broad stakeholder involvement to produce a 'tailored' [source water protection] program that addresses unique issues at the local level."

A 240-page companion document, *Developing a Vision and Roadmap for Drinking Water Source Protection*, includes resources for source water protection practitioners: an annotated bibliography, literature review and case studies. Both reports are available on the Water Research Foundation's website at [www.waterrf.org](http://www.waterrf.org). •

If you are interested in learning more about the Water Research Foundation's *Vision and Roadmap* for source water protection, register now for DES's Source Water Protection Workshop on May 2. Chi Ho Sham and Karen Sklenar, the reports' authors, will provide an in-depth look at the process, the reports and their recommendations.

### Grant and Loan News from the DWGB Engineering & Survey Section

The 2012 Drinking Water State Revolving Loan Fund recently received 63 pre-applications representing a total of \$57.3 million in infrastructure projects. Approximately \$16 million was available during the 2012 fiscal year. The grant will be awarded by EPA within the next month at which time DES will enter into loan agreements.

New in 2012, very small systems serving populations fewer than 250 may be eligible to receive significant subsidy for infrastructure improvements to address public health issues.

Also new in 2012, a matching grant up to \$15,000 is available for eligible water systems to develop and implement an asset management program and financial plan.

The record drawings matching grant is again available. As of April 1, 2012, applicable systems that do not have one will be cited with a significant deficiency (see story on page 4). Awards of up to \$1,500 matching funds are available to develop record drawings.

For more information, contact Adam Torrey at (603) 271-2950. •

# Land Conservation Grants Available within the Southern I-93 Corridor and Lake Massabesic Watershed

DES has \$2.4 million in federal funds available for the conservation of critical drinking water supply lands in the Lake Massabesic watershed and Interstate 93 corridor communities of Salem, Windham, Derry, Londonderry and Manchester as well as portions of Auburn, Hooksett, Candia and Chester. The funding will better protect public water supplies within the I-93 corridor, including Lake Massabesic, which serves 160,000 people in the Manchester area.

Grants will be administered by DES's Water Supply Land Protection Grant Program. Municipalities and non-profit land trusts may apply for grants to cover up to 25 percent of the cost of purchasing land or conservation easements critical to the quality of their public drinking water supply.

The funding is available through an agreement between DES and the N.H. Department of Transportation to help offset impacts to wetlands associated with the widening of I-93 between the Massachusetts border in Salem and the I-93/I-293 interchange in Manchester.

Eligibility applications are due June 1, 2012. Grants will be awarded based on priority ranking and availability of funding.

A map of the eligible areas, copies of application forms and other information are [available online](#) or by contacting Holly Green at (603) 271-3114 or [holly.green@des.nh.gov](mailto:holly.green@des.nh.gov).

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