



SUPPLY LINES WITH THE SOURCE



Newsletter of the NHDES Drinking Water & Groundwater Bureau
on the web at www.des.nh.gov

Spring 2010

Cyanobacteria and Their Toxins: A Growing Concern

Cyanobacteria, also known as blue-green algae, have received a great deal of attention in New Hampshire and neighboring states in recent years due to an increasing number of incidents in which cyanobacteria quickly multiply and form “blooms,” or high concentrations of cyanobacteria cells, which may be unsightly, smelly, and even toxic. There are more than 150 different types of cyanobacteria and literally thousands of species, about 50 of which produce toxins, collectively referred to as “cyanotoxins” or “algal toxins,” that are harmful to vertebrates. Some of these toxins affect the liver and kidney, some affect the central nervous system, and some are skin irritants. Cyanobacteria blooms in recreational waters have been known to cause adverse health affects, even death, in livestock, pets, and even humans who come in contact with the water. Cyanotoxins are not currently regulated as contaminants under federal or state rules. They are, however, considered candidates for regulation in the future.

At this time it is not known whether cyanobacteria are a significant problem for New Hampshire water systems, other than as a source of taste and odor problems. Microcystins are the most common class of toxins produced by cyanobacteria and have been found in all of the 62 New Hampshire lakes tested. Based on the results of that study, it is believed that potentially dangerous levels of cyanotoxins could develop in many New Hampshire water bodies. Cyanobacterial blooms have been reported recently in at least 30 lakes, ponds, and reservoirs in the state. DES knows of no studies of cyanotoxins in New Hampshire rivers, but cyanotoxins do occur in rivers around the world. Blooms are most noticeable in late summer and early autumn, but may occur any time of year.

Factors contributing to cyanobacteria blooms include nutrient availability, sunlight, and temperature. Water suppliers can help keep cyanobacteria blooms from forming through source water protection efforts that limit phosphorus and sediment loads to source waters. Controlling phosphorus and sediment loads can also

help minimize problems with taste and odor and disinfection byproducts.

While many cyanobacteria blooms are recognizable by appearance alone, the absence of an obvious bloom does not rule out significant concentrations of cyanobacteria and their toxins in the raw water. Monitoring raw and finished water is the surest way to determine whether cyanobacteria and their toxins are present in harmful concentrations.

While not practical for all sources, some systems can reduce the concentrations of cyanobacteria and toxins reaching their intakes by drawing water from locations or depths with lower concentrations of cyanobacteria and by diverting high-concentration surface scums away from the intake. In-reservoir techniques that focus on

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New Video Focuses on Arsenic Risk

A ten-minute video released this fall by Dartmouth College’s Toxic Metals Research Program makes a strong case for testing of private wells. “In Small Doses: Arsenic” features scientists from the program, Dartmouth Medical School, Harvard University, and the U.S. Geological Survey, and drinking water officials from DES and the U.S. Environmental Protection Agency. These experts explain the geologic origin of arsenic in groundwater, the health effects of low-dose exposure, the need for private well testing, and the types of treatment systems available for use in homes. While the video mentions the global scope of the arsenic problem, its focus is on New England and New Hampshire in particular. The video ends with the message, “Protect Your Family, Test Your Well.” The video can be viewed at www.dartmouth.edu/~toxmetal/InSmallDoses/index.html. •



Spotlight on ... Canaan

Moving Forward to Protect Canaan Street Lake

Like many lakes in New Hampshire, Canaan Street Lake offers residents and visitors recreational opportunities, such as swimming, fishing, boating, water-skiing, ice fishing, ice-skating, snowmobiling, and the occasional seaplane landing. In addition, the lake is the town's largest public water supply and Canaan's Source Water Protection Committee is completing a number of initiatives to minimize activities that may negatively affect the lake's water quality. David Shinnlinger, the committee's chair and a teacher at Mascoma Valley Regional High School, believes protecting Canaan Street Lake's watershed is important. "We need to preserve what we have. If something happens to the lake and it couldn't be used to supply drinking water anymore, it will be extremely costly for the town to change water supply sources."

In 2006 the committee, with assistance from the Granite State Rural Water Association, completed a comprehensive watershed protection plan identifying three primary threats to water quality: roads, septic systems, and land use/land conversion. The plan summarizes historical lake water quality data and notes

that "increasing conductivity levels signify that human induced pollution is degrading Canaan Street Lake. Conductivity levels increased annually from 1998 to 2004, with a total increase of nearly 65 percent from original levels."

With a clear set of objectives, strategies, and actions identified in the plan, the committee applied for a DES Source Protection Grant in 2007 to implement the plan's key recommendations. These include the development of a comprehensive water quality testing program, survey of nearby high-risk (older) septic systems, better management of recreational uses, development of land use regulations to reduce salt and sediment entering the lake, and increased public education. Significant contributions have been made by various partners, including Plymouth State University through land use regulation recommendations; Cardigan Mountain School through facilities, manpower, and funding; and Mascoma High School through a series of educational brochures regarding pollution prevention; as well as many committed volunteers and financial contributions.

Public education and outreach to landowners, contractors, town employees, and visitors has made everyone think about how some of their activities may affect the lake's water quality. For example, information concerning septic system care and pollution impacts, distributed through a survey to lakefront property owners, has resulted in property owners performing an increased level of septic system maintenance. In 2010, educational efforts will focus on how property owners can minimize stormwater runoff. The committee also plans to champion new stormwater and land use regulations, promote land conservation, and work on resolving existing road and recreational management issues.

To download a copy of the watershed source protection plan, visit the Canaan Street Source Water Protection Committee website at [www.townofcanaannh.us/stories/storyReader\\$128](http://www.townofcanaannh.us/stories/storyReader$128). For more information concerning the committee's activities and work, contact John Bergeron at bergeronjh@gmail.com or 603-523-9621. •

Coming Soon - Generator Needs Assessment Grant Program

If your water system does not have a backup generator and can't afford to purchase one, the new generator needs assessment may be the program for you. DES will be developing a grant program that at a minimum will provide community water systems with resources to determine backup power and generator needs. DES will be soliciting interest through the mail soon. Community systems will be able to contact a specific electrical or generator contractor to conduct a complete assessment of backup power required to maintain critical operations. Water systems can work directly with contractors to determine electrical demands and the proper capacity of a generator before it is necessary to rent or purchase one. For more information, contact Johnna McKenna at 603-271-7017 or johnna.mckenna@des.nh.gov. •

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Five Start-up Procedures for Seasonal Systems

In New Hampshire, 748 public water systems are classified as “seasonal” and typically include businesses such as campgrounds, youth camps, motels, and schools. Here are five start-up procedures seasonal water systems should follow prior to opening:

1. About a month before opening up for business, inspect all components of the water system. If you find something in need of repair, there will still be time to schedule a contractor or, if you are handy, to repair it yourself.
2. Once you have inspected the system and made all the necessary repairs, turn on the power to the pump and any treatment equipment. If you have a source meter, be sure to record the reading. It is also a good idea to check the water level with a probe. For systems that
3. With the system now operational, run water through the entire water system by opening blow-off valves and faucets. Make sure all pressure tanks are pressurized. Check for leaks and make repairs as needed.
4. At a time when no one will be using the water, disinfect and flush all sources, pressure tanks, storage tanks, and distribution lines. NSF-approved household bleach can be used at a dose of five parts per million or approximately 1.5 cups for every 1,000 gallons of water. Leave the chlorinated water in the lines for a minimum of 24 hours. Flush all lines



thoroughly beginning with the closest tap to the source and be sure to maintain a pressure of at least 30 pounds per square inch in the storage tank.

5. Measure the chlorine residual and take bacteria samples. A chlorine residual test kit can be purchased to measure the amount of chlorine in the water. Collect several bacteria samples at different locations in the distribution system using the General System Evaluation Forms found on the DES One Stop website. Collect the bacteria samples prior to the scheduled samples listed on the Master Sampling Schedule, also found on the DES One Stop website. Collecting samples prior to opening will allow you an opportunity to identify and correct any problems before the water is consumed by the public.

For more information, refer to fact sheet WD-DWGB-7-10, “Seasonal Water System Operation and Maintenance,” which can be found at www.des.nh.gov. •

This article was adapted from the Washington State Department of Health fact sheet titled “Start-up Procedures,” April 2006.

Assessing the Health of a Public Water System

In an effort to further protect public health when public water systems exceed the Maximum Contaminant Level (MCL) for bacteria, DES is now sending out a Public Water System Assessment Form (SAF) and a fact sheet on shock chlorination with every violation letter. The assessment form will assist the system to follow a standard set of procedures to identify all sources of contamination so that the appropriate corrections can be made. Currently, systems are only required to carry out public notice after receiving an MCL violation.

In 2009, 277 MCL violation letters were issued to systems found to have bacteria contamination in their distribution system. One hundred-seventy-seven of those violations were received by systems that had repeat violations, typically because no corrective measures were taken after the initial violation. If systems complete the SAF and conduct shock chlorination, DES expects to see fewer repeat violations.

While currently voluntary for water systems, the new assessment form process has been proposed in the revised Total Coliform Rule that will be adopted within the next several years. More information about the revised rule can be found on EPA’s revised total coliform rule website at www.epa.gov/OGWDW/disinfection/tcr/regulation_revisions.html. The assessment form can be found at www.des.nh.gov/organization/divisions/water/dwgb/categories/forms.htm. •

Monitoring and Maintaining Your Water Supply Well

A water supply well requires regular checks and maintenance to function at optimum efficiency and prolong its life. DES recommends that a water supply operator regularly measure and keep the following records:

1. The static (stabilized non-pumping) water level.
2. Relatively stabilized pumping water level and pumping rate in each water supply well.
3. Static water levels in any nearby monitoring wells.
4. Daily production volumes and pump run times.

Neglecting to collect this information is similar to driving your vehicle without conducting regular safety inspections or without operational warning lights. The production capacity of the well may be exceeded or the pump may be on the brink of failure unbeknownst to the water system operator without this information. If a water system operator collects this information and finds that the yield or water level in a well is declining, it is important to determine whether this is a result of any of the following:

1. Lowering yield and/or increasing drawdown, meaning the specific capacity of the well is declining due to low recharge; clogging of the well screens, aquifer pores, or borehole fractures; or increased water withdrawals from the well itself or from nearby water users.
2. Lower yield and a corresponding decrease in drawdown, meaning the performance of the pump and associated piping may be decreasing.
3. Lower static water level that could be caused by reduced rainfall and aquifer recharge, increase in water use in the aquifer, or well interference from other water wells.

In order to avoid entanglement of water level monitoring probes with wires and materials in a well, it is recommended that a stilling tube be installed in the well. State regulations require that a stilling tube be installed in all new community water supply wells and in any existing (older) community water supply well at the time its pump is serviced.

In some instances, small community water systems have experienced relatively minor leaks of less than two gallons a minute. While a leak of this magnitude is often considered small by industry standards, it can increase the daily extraction volume of a well for a small water system by over 20 percent. Depending on the sustainable yield of the well, even a small water leak could cause daily extraction volumes to increase over time and cause the well to dewater due to increased use.

When a water supply shows a decrease in specific capacity, but the static water levels in the aquifer do not

decrease, it is likely that the well screen, aquifer pore spaces, or fractures are clogged with fine sediments, chemical precipitates, or a bacterial mat. Well drillers licensed in New Hampshire can be contracted to rehabilitate the well using a variety of treatment methods. Various drillers use different approaches to rehabilitating a well. Some drillers attempt to specifically diagnose the clogging problem and design the optimal rehabilitation treatment remedy. Other drillers will attempt to rehabilitate the well using a treatment course that they have found to be generally successful in other similar settings without comprehensively diagnosing the problem. A water system operator must assess the cost-benefit analysis of how to proceed with well rehabilitation. It is recommended that an operator obtain multiple written proposals, quotes, and references from prospective contractors that may rehabilitate their well.

DES maintains a file of historic well development documents. If a water system is missing its original well development records, DES can review a water system's records to determine what information is available. For more information, contact Brandon Kernen at 603-271-0660 or brandon.kernen@des.nh.gov. •

Attend the Largest Source Water Protection Workshop in New England

Mark your calendars and register to attend DES's 2010 Drinking Water Source Protection Workshop on Friday, April 30, from 9 a.m. to 4 p.m. at the Grapevine Conference Center in Concord, New Hampshire. The event will feature experts, consultants, and vendors from across New Hampshire who will discuss how to minimize impacts associated with certain land uses (including forestry and excavation), reduce salt use on local roads, work with local schools to collect water quality data, and engage the media in order to pass local ordinances. The American Ground Water Trust is again partnering with DES to organize this event. Check out the workshop's agenda and register at the Trust's website at www.agwt.org. This year's event will cost \$30 (includes lunch) and will offer New Hampshire Water Operator certification credits. For more information contact Pierce Rigrod at 603-271-0688 or pierce.rigrod@des.nh.gov. •

Water Suppliers Can Help Prevent Pollution, Poisonings and Drug Abuse

Over the last two years, alarms have been sounded by scientists and the national media, alerting the public to the potential dangers related to trace amounts of pharmaceuticals and personal care products (PPCPs) in water resources. It is anticipated that studies in New Hampshire measuring the occurrence of PPCPs in the environment (not necessarily drinking water) will be released over the next year that will show results similar to the national studies. While this information is certainly a reason for concern, it is not a reason for panic nor does it represent breaking news. DES recently prepared a fact sheet to answer frequently asked questions about the occurrence of pharmaceuticals and personal care products in the environment (see www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/documents/dwgb-22-28.pdf). The information in this document is useful to public water suppliers receiving inquiries from their

customers on this topic.

With respect to PPCPs, the “flush it and forget it” approach has proven not to be a sustainable disposal practice. However, in determining proper disposal practices for PPCPs, the disposal process should address the potential for drug abuse and accidental poisonings. DES has worked with over 80 stakeholders to begin developing medicine disposal recommendations for various settings. The stakeholder group developed a website (www.nh.gov/medsafety) to provide guidance on medicine disposal to the public. Within a residential setting, the group developed a six-step process for managing and disposing of unneeded PPCPs. This process is available from the website listed above. Water suppliers can assist with promoting proper PPCP disposal practices by including the “Six Steps to Safety” disposal information below or a link to the website within utility bills or consumer confidence reports that are distributed to its customers. For more information, contact Brandon Kernen at 603-271-0660 or brandon.kernen@des.nh.gov. •



Help Prevent Pollution, Poisonings and Drug Abuse!

Dispose of your Unneeded Medication – 6 Steps to Safety

- 1) Pour medicine into a sealable plastic bag.
- 2) If the medicine is a solid, add a small amount of water to dissolve it.
- 3) Add any undesirable substance (such as dirt, coffee grounds or kitty litter) to the liquid medicine in the plastic bag.
- 4) Seal the bag and immediately dispose of it in the trash for regular pick-up.
- 5) Use marker to black out any personal contact information on the empty medicine container prior to disposing of it in the trash.
- 6) For more information, consult www.nh.gov/medsafety.

Do NOT flush medicine down the toilet unless accompanying product information instructs that it is safe to do so. Don't keep unneeded medications in the home.

For more information or in case of an accidental poisoning, call the poison center at 1-800-222-1222.

Local Source Water Protection Grants: Apply to Protect Your Source

In November 2009, the Local Source Water Protection Grant Program received 16 proposals requesting funds to improve source protection for public water supplies. Nearly all of the grant proposals submitted will be funded, providing over \$180,000 to improve local source protection. Several of the 2010 grant projects involve convening a Salmon Falls River collaborative, installing fencing around drinking water supplies, developing community zoning and source protection plans, and protecting riparian buffers.

The 2011 grant applications will be available this summer. Applications must be submitted to DES no later than November 1, 2010.

To find out more about this grant program, contact Johnna McKenna at 603-271-7017 or johnna.mckenna@des.nh.gov. Grant applications and related materials are posted online at www.des.nh.gov/organization/divisions/water/dwgb/dwspp/lswp_grants.htm. •

Drinking Water Enforcement Activity in 2009

The Drinking Water and Groundwater Bureau offers many types of assistance to aid public water systems in maintaining compliance with federal and state drinking water regulations. Such assistance takes the form of capacity development training, technical seminars, telephone and field technical assistance, monitoring reminder e-mails, financial assistance, maintenance of an informative website, and more. Despite this assistance, contamination issues and/or repeated violations of regulations sometimes require DWGB to undertake enforcement actions.

DWGB generally employs a hierarchy of enforcement actions beginning with a Letter of Deficiency (LOD). An LOD is a formal letter, sent by registered mail, which identifies violations of specific regulations and requests the water system owner to bring the system back into compliance by taking certain actions within specified time periods. During 2009, DWGB issued 255 LODs. Bacteria and chemical monitoring violations, maximum contaminant level violations, public notice violations, and the failure to submit emergency plans accounted for approximately two-thirds of the LODs issued in 2009.

An Administrative Order (AO) is generally issued in response to particularly serious violations or when a system continues to commit violations after receiving an LOD. An AO is a legally enforceable document that requires the water system owner to correct violations by completing certain actions by specified deadlines. Most AOs are recorded at the appropriate county registry of deeds to alert prospective property buyers and financial institutions of compliance issues at a water system. Failure to comply with an AO may result in an Administrative Fine or referral of the case to the Attorney General's office for imposition of criminal or civil penalties. DWGB issued 16 AOs in 2009. About half of these AOs were issued to address serious chemical contamination of water systems and required the development of a new source or the installation of DES-approved treatment.

An Administrative Fine (AF) imposes a monetary penalty for regulatory violations. Two AF hearings were held in 2009 for AFs proposed in late 2008. In one case, the owner of a commercial business was fined \$3,800 for nitrate monitoring and public notice violations and for failing to properly maintain treatment equipment. In the second case, a restaurant owner was fined \$45,600 for numerous bacteria and chemical monitoring violations over several years, public notice violations, and failing to comply with an AO. In a 2009 proposed AF case involving several monitoring and public notice violations, a settlement agreement was reached requiring the owner of a commercial property to pay a fine of \$1,500 with another \$1,000 suspended contingent upon the owner not incurring any additional violations for two years.

On occasion, a violation is considered by DWGB to be so serious and/or intentional that the case is referred directly to the Attorney General's office for enforcement without a previous LOD, AO, or AF having been issued. Such a case that began in 2007 was resolved in 2009. It was determined that despite repeated written assurances that a contaminated well had been severed from a community water system, the well was in fact on-line. The case resulted in the criminal conviction of the company involved and the imposition of a \$100,000 fine with another \$100,000 suspended conditioned upon three years compliance with DES and PUC regulations.

A new case was referred to the Attorney General's office in 2009. This matter, which involves continuing non-compliance by a system owner who has previously been issued two AOs and an AF, is scheduled for trial in March 2010.

DES is also empowered to seek the suspension or revocation of a New Hampshire water system operator's license for failing to fulfill the duties of an operator as set forth in New Hampshire Administrative Rule Env-Dw 502.22, previously Env-Ws 367.15. After initiating such an action against an operator in late 2008, DES accepted the permanent surrender of the operator's license after informing him of the alleged violations of an operator's duties that DWGB staff believed the operator had committed.

DWGB also has the authority to require a public water system to issue a boil water order for a variety of health-related reasons, the most common of which is the discovery of *E. coli* or fecal bacteria in a water sample. In 2009, DWGB required a total of 24 boil orders to be instituted. Ten of these boil orders were the result of *E. coli* being found in source samples collected during Investigative Monitoring required by the new Groundwater Rule.

For more information on enforcement issues, contact Alan Leach at (603) 271-2854 or alan.leach@des.nh.gov, or Emily Jones at (603) 271-0713 or emily.jones@des.nh.gov. LODs, AOs, and AFs issued by DES programs can be viewed online at www2.des.state.nh.us/Legal/documents/. •



American Recovery and Reinvestment Act of 2009: Improving Water Infrastructure and Generating Jobs

On February 17, 2009, President Obama signed into law the American Recovery and Reinvestment Act of 2009 (ARRA), providing additional funds for water-related infrastructure improvements. In April 2009, New Hampshire's Drinking Water State Revolving Fund (DWSRF) program was awarded a \$19.5 million capitalization grant, effectively doubling the amount of funds available to finance water and wastewater infrastructure improvements. As of February 2010, the DWSRF provided 51 loans totaling \$37.4 million to complete a range of water related capital improvements.

As a first step to receiving a DWSRF loan, water systems must submit a pre-application summarizing the project. The response to an initial solicitation for projects was overwhelming, as DES received 265 pre-applications for a total request of more than \$246.2 million. Each pre-application was reviewed and ranked according to a formula evaluating compliance with the Safe Drinking Water Act, affordability,

capacity development, and incorporation of "green infrastructure," e.g., leak detection, automated water meters, clean energy production, etc., among other factors. At least 20 percent of the ARRA funds disbursed as loans through the DWSRF have been invested in green infrastructure projects. For more information on Green Infrastructure projects, download DES's DWSRF Guidance for Green Infrastructure Applications at www.des.nh.gov/recovery/documents/dwsrf_greenguidance.pdf.

The infrastructure projects funded to date range in size from \$19,000 for the interconnection of a mobile home park to the Rochester municipal water system, to \$5 million to partially fund the construction cost of a new arsenic and iron and manganese treatment facility for the town of Seabrook. For a complete list of projects and to learn more about ARRA resources used to improve water infrastructure, visit the DES website at www.des.nh.gov/recovery/drinking_water_funding.htm. •



Reduce Costly Leaks Through DES's Leak Detection Program

Leak detection and repair play a fundamental role in reducing water loss and energy costs related to the treatment and delivery of drinking water. In the coming months, DES will solicit requests for assistance to complete leak detection projects from all New Hampshire public water systems. The work will be fully funded by DES, conducted by a professional leak detection firm selected through a competitive bid process, and completed during the 2011 and 2012 field seasons. It is anticipated that all water systems serving fewer than 33,000 people will be eligible for this funding.

DES has offered financial assistance for leak detection surveys over the previous three years. In 2008, 29 water systems received leak detection surveys funded by DES. Forty-four leaks were identified through that effort

with a total estimated loss rate of 251 gallons per minute, equating to 1.3 billion gallons of water and almost \$100,000 in energy savings per year. In 2009, 27 water systems applied for leak detection assistance funded by DES through the American Recovery and Reinvestment Act. The surveys will be completed in 2010 and 2011. A list of the water systems scheduled to receive leak detection surveys can be found at www.des.nh.gov/recovery/documents/dwarra_lkdetect.pdf.

To learn more about available funding or leak detection in general, contact the Water Use and Conservation program at 603-271-6685. •

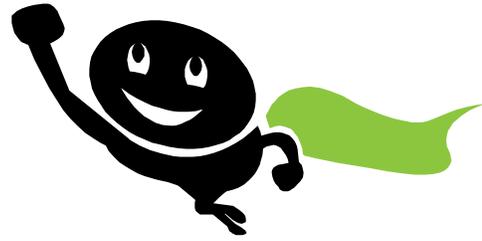
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manipulating the conditions that affect cyanobacteria growth include destratification (vertical mixing), aeration, and sediment removal or covering.

Conventional treatment is often effective in reducing cyanotoxin concentrations. The best overall strategy is to optimize the removal of intact cyanobacteria cells through coagulation and filtration, *and* removal or destruction of the dissolved toxin through adsorption and/or post-filtration oxidation, except that oxidation with chloramines, chlorine dioxide, hydrogen peroxide, or ultraviolet radiation does not seem to be effective at removing cyanotoxins.

For more information, see the DES fact sheet WD-DWGB-4-15 "Cyanobacteria and Drinking Water: Guidance for Public Water Systems" on the DES web page at www.des.nh.gov. Or from an online search engine, search for "nh cyanobacteria drinking." If you have questions or require more information, call (603) 271-7061. •

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Thank you Laconia Water Works and Pennichuck Water Works labs for sending data and helping us test the system.

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