December 2011
Quarterly Newsletter
for Public Water Systems

In The Main

Confined Spaces - Potentially Deadly Spaces

By Nancy Pearce – Department of Labor Standards

Water departments are filled with confined spaces and with them the potential hazards of serious injury or death. Manholes, meter pits, pumping stations, water tanks, tunnels, water pipes; all are capable of conditions that could kill an unsuspecting worker. A National Institute of Occupational Safety and Health (NIOSH) publication entitled *Worker Deaths in Confined Spaces* describes the fatalities of 480 workers between the years of 1983-1993. Many of these deaths involved public employees and occurred in spaces where public employees routinely work. These include:

-A meter reader died due to toxic methane and carbon monoxide exposures in a meter vault.

-A worker died when he collapsed after entering an eight-foot deep valve chamber to open and bleed a water line.

-A worker died from asphyxiation while entering a valve vault at a municipal water plant.

-Three workers died from asphyxiation while trying to close a gate valve in a manhole.

-A municipal worker drowned while cleaning a sewer wet well.

All of these fatalities could have been prevented if the appropriate precautions been taken.

What is a confined space?

There is sometimes confusion about what constitutes a permit-required confined space (PRCS). OSHA defines a PRCS as one that is *large enough to enter and perform work, has limited and restricted means of entry and exit, is not designed for continuous human occupancy, and has a hazard that is capable of causing serious injury or death.* Any space that is located below grade, is entered by a ladder, requires you to contort your body to enter it, and is *not* a space that you would sit at a desk and work, is potentially a confined space. Spaces that you enter by a standard staircase, or standard doorway, are well-ventilated and designed for human occupancy, are *not* permit-required confined spaces, although hazards may still exist in these spaces.

Photo by Nancy Pearce

Proper equipment for entering confined spaces

What are the hazards?

Both atmospheric and physical hazards may exist in confined spaces. The vast majority of fatalities that occur in confined spaces are due to hazardous atmospheres. Hazardous atmospheres are particularly dangerous because you cannot necessarily *see* or *smell* the hazard.

Confined spaces often lack sufficient oxygen. Just plain old rusting can create an oxygen-deficient environment. Decaying leaves can create dangerous levels of hydrogen sulfide. Confined spaces may also contain toxic vapors such as hydrogen sulfide or explosive vapors such as methane.

See "Confined" on page 2

"Confined" continued from page 1

Atmospheres that are safe one minute may become fatal the next. Just because you have entered a space safely a hundred times before does not mean that it will be safe the 101st time you enter it. History is meaningless with confined spaces. Gas monitoring must be done *every* time you enter a confined space. Underground gas leaks may occur a mile or more away and the gases pass through soil and enter vaults and manholes that were safe the day or even the hour before.

Hazardous atmospheres can occur in relatively innocuous-looking environments. To demonstrate this point, you simply need to take a large clean drinking-water bottle and put a small handful of leaves and dirt in the bottom. Add a few metallic items such as a spring or nails to represent pipes, ladders, and other metal components in a confined space. Then add a few sprays of water to the bottle and cap it for several months. When you retest the atmosphere with a four-gas meter (which tests for oxygen, combustibles, carbon monoxide, and hydrogen sulfide), you will likely find levels of hydrogen sulfide and an oxygen-deficient environment. Think of any vaults or pits you have that could have similar levels of debris in them and you will realize how little it takes to create a hazardous atmosphere.

Physical hazards such as electrocution, entrapment, or engulfment are also common in confined spaces. Workers can quickly be engulfed and drown in confined spaces that become flooded. Several drowning deaths have occurred when inflatable pipe plugs failed and workers were not attached to retrieval systems.

Photo by Nancy Pearce

What equipment do I need to safely enter?

Most water departments will need a fully-calibrated four-gas meter that monitors for oxygen, flammables, carbon monoxide, and hydrogen sulfide. Full PRCS entries into vertical spaces, such as manholes, require a tripod or davit-arm retrieval system, harness, and winch. A second line for fall protection may be required if individuals are being lowered into the space rather than climbing down a ladder. A ventilation blower is often needed to insure and maintain a safe atmosphere. Electric blowers are preferred since they do not have the added hazard of carbon monoxide that may be of concern with gasoline-powered blowers.

What procedures are needed to safely enter?

Each workplace should have a permit used for entry along with proper equipment. The permit is simply an internal "checklist" that is generated and signed by the entry supervisor. There are alternative methods that can sometimes be used for entry if the only hazard in a space is a potentially hazardous atmosphere and ventilation is used to control the

In The Main

Commonwealth of Massachusetts
Deval L. Patrick, Governor
Timothy P. Murray, Lt. Governor

Executive Office of Energy & Environmental Affairs
Richard K. Sullivan, Jr., Secretary

Department of Environmental Protection
Kenneth Kimmell, Commissioner

Bureau of Resource Protection
Bethany Card, Asst. Commissioner

Drinking Water Program
David Y. Terry, Program Director

Marie Tennant - Editor/Designer 617-292-5885
Marie.Tennant@state.ma.us

Department of Environmental Protection
1 Winter St. - Boston, MA 02108

www.mass.gov/dep

hazard. However, the minimum that must be done prior to entering is gas monitoring. If there are electrical hazards, engulfment hazards, etc., then a lockout/tagout or isolation of lines may be required prior to entry.

Confined-space entry requires training. All employees should be trained as authorized entrants, attendants, and/or entry supervisors in accordance with the OSHA standard 1910.146. All workplaces should have a written confined-space-entry program with a list of the confined spaces at the workplace and the procedures that are to be used for each particular entry.

Where can I get more information?

More information on workplace health and safety can be found at www.mass.gov/dols. Click on "Workplace Safety and Health Program" on the left. Hazard information bulletins and other information for public employees can be found on the website. The Department of Labor Standards has a model confined-space-entry program that can be used as an outline and can be modified for your workplace. The program can be found at http://www.mass.gov/Elwd/docs/dos/mwshp/modelconfspace.pdf.

OSHA also has excellent resources for confined space entry. See www.osha.gov and search for "Confined Spaces" or go directly to the confined-space home page at http://www.osha.gov/SLTC/confinedspaces/index.html.

If you would like further information or assistance please contact Nancy Pearce, Workplace Safety and Health Program Supervisor at 617-969-7177 ext 325 or email nancy.pearce@state.ma.us . ITM

Photo by Nancy Pearce

Virus Removal Credit for Membrane Systems

Is your system looking for 4-log treatment options for compliance with the GWR?

By Frank Niles

Under the provisions of the Groundwater Rule (GWR), 310 CMR 22.26, compliance may be achieved by: (a) successfully conducting triggered or required source water fecal indicator monitoring or b) providing MassDEP-approved 4-logs of treatment for viruses. For systems providing 4-logs of treatment, a portion of that treatment can be provided with membrane filters that MassDEP has approved as capable of removing viruses. The use of these membrane filters will reduce the level of disinfectant used by the system, thus providing a barrier against viruses as well as a reduction in disinfection by-products in the treatment process. For a list of approved new technologies please see http://www.mass.gov/dep/water/drinking/systems.htm#newtech. For detailed information on the MassDEP-approved membranes and conditions of approval, please contact the appropriate staff below:

Jim Bumgardner	413-755-2270	Western
Jim Dillon	978-694- 3231	Northeast
Kelly Momberger	508-849-4023	Central
Mike Quink	508-946-2766	Southeast
Scott Sayers	508-946-2780	Southeast
Terry Dayian	508-946- 2765	Southeast
Frank Niles	617-574-6871	Boston

ITM

Will Your Utility Be Prepared When Your Licensed Operator Retires?

New Jersey's Licensed Operator Internship Program 2011-2012

New Jersey's Joe duRocher, that state's Operator Certification Coordinator, prepared the article below to be published earlier this year in the NJAWWA Pipeline. Joe has agreed to share it with all of you as well.

Licensed operators are responsible for the operation, maintenance, and effectiveness of a public water system. The NJDEP believes that licensed operators are vital to protecting public health and ensuring the long-term sustainability of our public water systems. An aging workforce, an insufficient number of replacement operators entering the field, and a greater need for qualified personnel due to increasingly sophisticated and technology-driven treatment processes, have all contributed to the likelihood that utilities will face a dangerous operator shortage in the near future. The AWWA and other professional associations estimate that nearly half of water utility workers could retire in the next ten years. Budgetary shortfalls amidst a harsh economic climate have only further hindered systems' ability to recruit, hire, train, and retain qualified persons to serve as operators. In New Jersey, we are beginning to witness the departure of many talented individuals and quite often there is no one readily available to fill those vacancies. In response to a potential workforce shortage, the AWWA New Jersey Section has initiated steps to promote the water sector as a career choice and to attract young people to the profession.

The NJDEP believes there is a critical need for utilities to employ adequate succession-planning measures to ensure the transfer of operators' knowledge and expertise to the next generation so that there is no potential interruption in public health protection for the citizens of New Jersey. Therefore, by means of a USEPA grant, NJDEP has developed an internship program in an effort to recruit operators for New Jersey's public water systems. The program requires the assistance of water utilities to serve as host agencies to train and provide a work environment for individuals to serve in one-year internship positions so that they may obtain the experience needed to become New Jersey licensed Water Treatment (T) and/or Water Distribution (W) operators. The program would serve to defray personnel costs incurred by participating utilities.

NJDEP is awaiting final USEPA approval to launch this program. We hope to be able to reimburse water systems for personnel costs up to $35,000 per position. The goal is to provide for as many as sixty positions, for a period of one year from July 1, 2011 to June 30, 2012. Applicants must possess a high-school diploma or equivalent. As part of their internship, applicants will be required to take and pass an introductory or advanced water course at an approved New Jersey educational institution. Individuals who successfully complete the training course and one year of employment will qualify to take a State examination for a T and/or W license. For utilities to serve as host agencies, preference will be given to 1) those systems that require a full-time operator, 2) systems that can demonstrate need for an intern position in order to achieve adequate succession planning, 3) more complex treatment systems with an increased level of sophistication, as indicated by their license classification, 4) publicly owned water systems, and 5) systems with a training program in place for operators. NJDEP also reserves the right to deny participation to those systems that are in significant noncompliance with the Safe Drinking Water Act.

More information regarding this program will be available shortly. We are pleased to be able to make this opportunity available and we welcome your interest to participate in this program. If you represent a utility that is interested in serving as a host agency, please contact me at 609-292-5550 or by email at joseph.durocher@dep.state.nj.us.

Joseph duRocher is a Principal Environmental Specialist with NJDEP's Bureau of Safe Drinking Water Technical Assistance.

Editor's Note: Please support Massachsetts' operator internship initiative by taking on an intern at your PWS! Call MWWA's Jen Pederson at 978-263-1388 for the details. ITM

Grafton Proposes Solar Array on Well Site Land

Excerpts from Matthew Pearson's Solar Energy Press Release, Grafton Water District

The Grafton Water District (GWD) recently requested proposals from renewable-energy developers who are interested in implementing a renewable-energy system on GWD's land. This solar system will guarantee onsite electricity generation to supply electricity to GWD. The developer will lease GWD land to develop, own, and operate a solar-energy project and enter into a long-term agreement to sell the energy output to GWD. There will be an offer at the end of the agreement for GWD to buy back ownership of the system.

With direct oversight by GWD, the developer will construct, own and operate the solar-energy project. Due to the fact that the solar array will be located within the Zone I, GWD and the developer are required to demonstrate to MassDEP that this proposed land use will have no significant impact on water quality during the construction or operational phases of the project.

It is estimated that with the solar array, GWD's first-year electrical payment will be 68% less. Over the life of the 20-year project it is projected that GWD will save around $3 to $3.5 million in electricity costs. Besides this being a wonderful "green" initiative, this is virtually a no-cost project for the town of Grafton, other than some minor upfront costs.

GWD is excited about closing the deal with the final candidate and constructing the solar array over the next year, with ultimate solar energy production to take place before the fall of 2012.

Typical solar array

Wind and Solar Projects on Source Protection Lands

By Kathy Romero

MassDEP adopted a new policy and guidance on September 1, 2011, which allows public water systems (PWS) to install and operate/lease small wind and solar projects on lands that they own to protect public drinking water wells and reservoirs. MassDEP must approve uses of PWS lands to ensure that the uses are protective of public drinking water. Some of these projects will be located in the Zone I, the most protective water supply area. The new policy and guidance maintain stringent protection at public water supplies.

MassDEP will approve wind and solar projects on PWS lands if the water supplier submits written certification to MassDEP that protective measures, consistent with the new guidance, will be implemented during and after the project. With the certification, the supplier must document that the wind or solar project will not have an adverse impact on the water supply now or in the future. For projects within the Zone I, the new policy requires that suppliers also demonstrate that the energy generated by the facility will be used to benefit, either by direct consumption or by other means, the operation of the public water system. For more information, see http://www.mass.gov/dep/water/laws/policies.htm#dwpol for Policy #11-01 and http://www.mass.gov/dep/water/laws/policies.htm#dwguid for the Energy Project Guidance.

Quotable Quotes

"Water is the most critical resource issue of our lifetime and our children's lifetime. The health of our waters is the principal measure of how we live on the land."

- Luna Leopold

MassDEP Training Programs Online

By Ken Pelletier

MassDEP's Drinking Water Program (DWP) has prepared a training program for all operators covering recent (and proposed) updates to various DWP rules, guidelines, and programs. The training is being made available for the first time using a recorded webinar. This option allows MassDEP to provide you training remotely in your office, at your plant, or anywhere you have a computer and access to the Internet (to download the training material). This option saves the DWP and the PWS energy, time, and money by not having to drive to fixed training locations.

The training material is available on MassDEP's training web site at: http://www.mass.gov/dep/water/drinking/systems.htm#training. The training webinar can be taken in two ways. In order to accrue training contact hours (TCH) which are issued by the Board of Certification, you must contact Ken Pelletier by email at Kenneth.pelletier@state.ma.us to receive a training packet including the necessary Board of Certification application and attachments. If you do not wish to receive TCHs, simply go to the training site listed above to download the recording, agenda, PowerPoint slides, and other attachments to take the training at your leisure. The recorded webinar is set up so that you can view it in one sitting (3 hours) or over several sessions (see the agenda to assist you when using this method).

Some PWSs and technical assistance providers will be "hosting" training sessions, which will be offering TCHs and will be open to all operators. As MassDEP becomes aware of these webinar sessions we will post them on the training website (listed above).

MassDEP kindly requests that all operators viewing the webinar submit a training evaluation form (also found on the website) to Ken Pelletier. There will also be a Question-and-Answer form on the training website for all questions submitted by the training participants. Any additional questions can be sent to Ken Pelletier at 617-348-4014 or Kenneth.pelletier@state.ma.us.

Lead in Schools and Childcare Facilities

By Ken Pelletier

MassDEP and its partners continue to work with schools and child-care facilities to eliminate sources of lead in drinking water at their facilities. MassDEP and the Massachusetts Departments of Public Health, Department of Elementary and Secondary Education, and the Department of Early Education and Care are working together to inform and educate school officials and child-care facilities on how to identify, evaluate, and eliminate the sources of lead contamination in school/child-care drinking water. The Massachusetts lead action level is 15 ug/l (0.015 ppm).

Schools and child-care facilities have two unique features that make them susceptible to lead-in-drinking-water problems: the sub-populations they serve are very sensitive to lead and their buildings have long periods of time when water sits in the internal plumbing (overnight, weekends, and vacations), potentially increasing the contaminant levels.

MassDEP sent letters to all school and child-care facilities (summer of 2010) asking them to complete an evaluation of their plumbing systems for susceptibility to contamination and to submit their checklist to MassDEP.

The facilities were reminded to contact their local public water system, board of health, and plumbing inspector for assistance. *BOHs and PWSs are encouraged to work with their local schools and child-care*

Staff Spotlight

Hi, my name is Karen Dube. I am an Environmental Analyst in the Drinking Water Program (DWP) at MassDEP's Southeast Regional Office in Lakeville. I grew up in the southeast region (Somerset High, Class of 1984), and am very happy to be working in the Lakeville office. I oversee and coordinate the SERO Bacteriological Program (a.k.a. Total Coliform Rule/TCR) and coordinate with regional staff on the Ground Water Rule. I serve on DWP's Bacteria Subcommittee and as the SERO contact for the TCR, and one of the SERO Public Notification & Emergency Contacts. My phone number is 508-946-2720 if you need assistance regarding a total coliform detect, violation or emergency.

I was introduced to MassDEP through an internship program while attending Clark University, and worked twice as a paid intern (1993-1995) at the Central Regional Office in Worcester. After graduating from Clark (B.A., 1995), I worked at Karl Storz Endoscopy-America, Inc. in the Inspection Department, and in the Office of Community Programs at the UMass Medical School.

In 1999, I joined the Drinking Water Program staff in CERO, where I worked until 2003. While there, I received a Commonwealth of MassDEP Citation for Outstanding Performance (2001). I worked as the Quality Assurance Officer for Microbac Laboratories, Inc. from 2003-2005, and rejoined MassDEP in 2005.

I have presented at several DWP trainings, and look forward to seeing you at future events! I want to thank you for the daily work you do to balance the TCR, LCR, and THM/HAA5 rules (not to mention all the other rules)!

Editor's note: Karen was recommended by the Southeast Regional Drinking Water Chief to be recognized in this spotlight article because of her hard work and diligence as lead person in resolving the hydro-seeding cross-connection issue earlier this year. Please see the related article in this issue titled "Cross Connection Incident". ITM

---

facilities to evaluate and provide technical assistance to correct any lead in drinking water problems.

Please encourage schools and child-care facilities that you are associated with to submit their 2010 Checklist to MassDEP and to test their water from taps used for drinking water and food/beverage preparation areas. If you or they have any questions, please go to http://www.mass.gov/dep/water/drinking/leadothe.htm#leadcop for more information or contact Kenneth Pelletier at 617-348-4014 or at kenneth.pelletier@state.ma.us. ITM

Innovative Watering Technology

Reprint - Courtesy of ASDWA Weekly Update – Nov. 11, 2011

EPA's WaterSense program announced that irrigation controllers will soon be the first outdoor product eligible to earn the WaterSense label. The most efficient irrigation controllers, which operate like a thermostat for your sprinkler system by telling it when to turn on and off, may provide home and building owners the ability to save 110 billion gallons of water and roughly $410 million per year on utility bills.

Residential outdoor watering in the United States accounts for more than 7 billion gallons of water each day, mainly for landscape irrigation. Controllers with the WaterSense label could be available in spring 2012. As with all WaterSense labeled products, WaterSense-labeled irrigation controllers must be independently certified to meet EPA's criteria for water efficiency and performance. More information on WaterSense can be found at the following website: http://www.epa.gov/watersense. ITM

Tank Inspections Protect Public Health

By Fred Barker

Why should you inspect your finished-drinking-water storage tank? Water quality can be maintained, thousands of dollars can be saved, consumer complaints can be reduced, and public health is protected when a public water system has a comprehensive tank-inspection program. The AWWA Manual M42 (1998) titled "Steel Water-Storage Tanks" states that "A good, comprehensive preventive maintenance program can extend the life of an existing tank indefinitely."

MassDEP recently updated its guidelines in May 2011 on the frequency of finished-water-storage tanks inspections (see: http://www.mass.gov/dep/water/laws/glchpt8.pdf). Some of the updates now include three different types of required tank inspections on the distribution system. It also states that all tank inspection reports must be kept on file by the PWS for MassDEP inspection at any time for a minimum of five years.

Looking back at some of the latest boil-order situations, tank maintenance was identified as a contributing factor leading to bacteria entering the distribution system. Several other systems, already heedful of the new guidelines, have identified situations that would have been unaddressed prior to the guideline revisions. Thus they have averted potential water quality problems.

If you are not familiar with the frequency of inspections, check out the on-line training (refer to training modules 4-6) at: http://www.mass.gov/dep/water/drinking/systems.htm#training. Below is the summary:

1. **Monthly ground-level inspections** of 21 security, structural, safety, sanitary, and coating check items as described in a one-page checklist found at: http://www.mass.gov/dep/water/approvals/tanklog.pdf. No paperwork has to be submitted to MassDEP. All forms are to be kept on-site for review during MassDEP inspections. No tank climbing is required on monthly inspections; however, PWSs are encouraged to check the top of all tanks if possible. Photographs and even videos can be attached to validate and track the results for all required inspections.

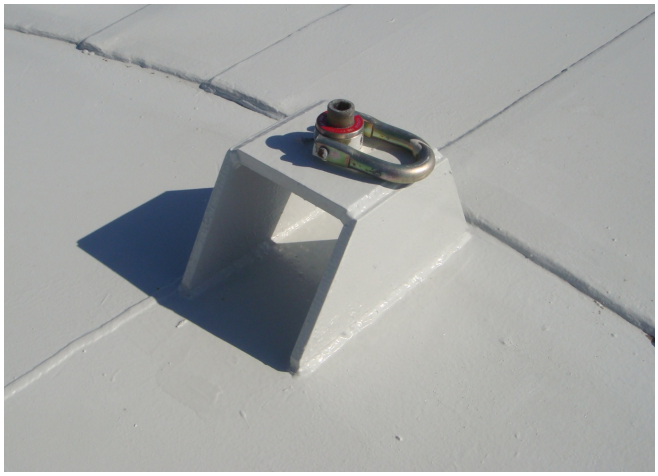
Typical Small Roof Vent with Unacceptable Broken Screen

2. **Annual (roof) top inspections** to ensure sanitary and security conditions are maintained. There are many instances where unsanitary conditions are created on a water-storage tank, and in the past have gone undetected for long periods of time. These could include vent screens that are poorly designed (see photo on this page); screens that are damaged or completely missing, which allow the entry of rodents or most often birds; and situations where contaminated rainwater can enter through improperly-designed vents, openings in the roof that develop due to corrosion activity, openings that were not properly sealed, and improperly closed and/or unlocked hatches and overflow-box covers. These conditions can lead, if left unchecked, to coliform-bacteria hits and even boil-water orders. It has been reported to MassDEP by a local engineering firm that three of the tanks inspected during a recent two-week period had vent deficiencies that could easily have lead to the entry of birds that are keen on entering warm water tanks once the weather becomes cold, and in most cases cannot find their way out.

The only way to insure that your tank is secure from a sanitary and security prospective is to visually observe the conditions on an annual basis, either by safely climbing the tank or by observing these conditions from an adjacent aerial lift/bucket truck. It is always best to schedule top inspections around the weather and avoid windy, rainy, and snowy conditions.

3. **A thorough interior and exterior structural and coating inspection** must be conducted every three to five years by

Fall Restraint/Arrest Roof Anchor Rated at 5,000 Pounds for All Tanks over Six Feet Tall



qualified and experienced personnel. Such individuals will be experienced in tank climbing safety, coating and corrosion assessment, and concrete assessment. Interior inspections could be accomplished by a diver with the necessary vacuuming equipment or robotic equipment, or by draining the tank to remove any bottom sediment. Such accumulating bottom sediments can lead to bacterial growth, taste and odor, and turbidity problems. Direct monitoring may not detect all potential water quality problems. For example, tank effluent water sampling can result in zero coliform bacteria counts but microorganisms can still be present as biofilms on tank surfaces, in tank bottom sediment, or in the water in the upper portion of the tank (in the summer months when thermal stratification may exist if a mixing system is not utilized). Remember the moment the tank hatch is opened, special OSHA confined space requirements become effective. See Confined Space article on page one.

Accessing the top of the tanks over 6 feet tall can be risky. Special training is needed for all climbers, maintenance workers, and inspectors. Climbers should always be tied off to properly designed roof anchors, such as a steel swivel shackle bracket (See photo on this page). Other fabrications specifically designed as anchor points may be needed to properly secure a lanyard or a safety cable for easier roof access and to ensure that a worker is never unattached. The safest and best design would include a standard roof guardrail installed around the entire perimeter of the tank.

For additional training on tank maintenance visit NEWWA at http://www.newwa.org/NetCode/courseDescUpdate.aspx?dID=190 For more information, or if you have any questions, please contact:

Boston
Frederick Barker 617-292-5866
Frederick.Barker@state.ma.us

Northeast
Sean Griffin 978-694-3404
Sean.Griffin@state.ma.us

Southeast
Mike Quink 508-946-2766
Michael.Quink@state.ma.us

Western
Mike McGrath 413-755-2202
Michael.McGrath@state.ma.us

Central
Purna Rao 508-767-2784
Purnachander.Rao@state.ma.us

Healthy Forests Linked to Healthy Drinking Water

Reprint - Courtesy of ASDWA Weekly Update Nov. 18, 2011

The U.S. Forest Service (USFS) has published a comprehensive series of interactive maps that illustrate the crucial role forests play in sustaining watersheds and protecting drinking water. These maps entitled "Forests to Faucets" help identify where watersheds are threatened by development, fire, insects, and disease and where a payment for a watershed-services project may be an option for financing conservation on forest lands. Watersheds on national forests and grasslands are the source of 20 percent of the nation's water supply, and it's estimated that the cost of treating drinking water increases 20 percent for every 10 percent loss of forest land in a watershed.

For more information and to view the maps visit the Forests to Faucets web site at: http://www.fs.fed.us/ecosystemservices/FS_Efforts/forests2faucets.shtml.

Cross-connection Incident

By Otavio de Paula-Santos

On June 30, 2011, the residents of Somerset, MA, found that their drinking water had been contaminated by hydro-seeding material. The water contamination was a result of an unauthorized use of a fire hydrant by a hydro-seeding lawn care company.

The lawn care company's truck contained some inert materials, such as sawdust and grass seed, which are part of the composition of hydro-seeding products, and in this case the product also contained guar gum and a water-soluble 19-19-19 fertilizer. When they illegally hooked up to a fire hydrant to fill the truck with water, a back flow situation occurred and the lawn materials were sucked into the public-drinking-water-supply lines.

As soon as the Somerset Water Department was notified that the drinking water quality had been compromised, the water system issued a "Do Not Use" order to the population, started to contain the affected area, and flushed the water main lines within the affected area. The town of Somerset also started the distribution of bottled water to local residents. These are the recommended steps and procedures to be followed in an event of a backflow incident caused by a cross-connection within the distribution system.

The best away to eliminate, or minimize, any potential and actual risks of a backflow incident caused by cross-connections, is to have a MassDEP-approved cross-connection control program (CCCP). A CCCP is one of the components of a distribution system protection program that also includes, but is not limited to, the following components: lead pipe removal, valve exercise, hydrant flushing, pipe replacement, and water-meter-replacement program.

A well-implemented CCCP will include the following components:

- A cross-connection survey of all non-residential service connections
- An active backflow-device testing program
- A cross-connection educational program for all water customers
- A fire-hydrant use program that includes permit fees for the lease and maintenance of meters and backflow preventers
- An Emergency Response Plan that includes steps for responding to a backflow incident
- A penalty-assessment program and fees

Below are some steps to be followed after a backflow incident:

- Isolate the affected plumbing system or water main area and immediately stop the backflow by stopping the pressure differential, keeping the water pressure at optimum levels.
- Identify the location where the cross-connection occurred and eliminate or properly protect the cross-connection by creating an air-gap or installing the proper backflow preventer. This step ensures that a backflow event does not recur.
- Notify the public about the event by providing reliable information and guidance regarding the consumption and use of water, as well as details of the steps that have been taken to assure public safety.
- Contact the proper local and state authorities to report the incident after all the facts and information have been gathered and verified.
- Follow the steps and procedures established in your Emergency Response Plan.
- Activate emergency response procedures:
  - □ If the contamination is already known and if it is restricted to a facility or a small area: stop the backflow, isolate the site, flush and disinfect the domestic line and any other service lines such as the fire protection lines.
  - □ If the contamination is unknown and/or if the affected area is a large one: stop the backflow, isolate the area and take samples. After the water quality analysis is done and the type of contaminant is known, start flushing and disinfecting the distribution system in the affected area.
  - □ Instruct consumers how to flush their domestic lines. Continue to take water samples to determine if the water is safe to be used.

- Continue taking samples until test results show that the lines are clean and the contaminant(s) have been removed.
- Conduct a new cross-connection survey on the affected facility or re-survey the affected area.
- Notify the public about the actions that were taken to control and remediate the cross-connection incident. The public must also be kept informed about water-quality improvements as a way to restore confidence in your water system. Be pro-active and do not hesitate to communicate with your customers.

The Massachusetts Drinking Water Program's Guidelines provide minimum requirements, and steps, for the implementation of a hydrant program. Below is an excerpt from these guidelines.

9.10.8 Use of Fire Hydrants for Unauthorized Non-Firefighting Activities

Public water systems are vulnerable to contamination through the unauthorized use of fire hydrants from a variety of sources such as, but not limited to, hydro-seed companies, street sweepers, swimming-pool fill trucks, etc. If, for example, the water pressure should fall while a hydro-seed tank truck is being filled, chemicals and seeds inside the tank could be sucked backwards through the hydrant and into the water supply. That could happen, for instance, if there was a break in a nearby water pipe.

Public water systems should establish a system for controlling the hook-up to a fire hydrant by persons other than a water department employee or a member of the fire department without a written permit from the public water system. The mechanism for controlling this use could include:

1. *Locally-mandated regulation, ordinance or bylaw;*
2. *Permit with associated fee which would require an individual or company using water from a hydrant for purposes other than extinguishing fires to obtain a hydrant permit obtained from the public water system;*
3. *Damage deposit that should be refundable after payment of account in full and final inspection with no damage to backflow device, meter, piping, valves, box, or hydrant;*
4. *Hydrant meter and a wrench for the proper operation of the hydrant should be provided upon payment of a deposit in an amount established by the public water system. All authorized hydrant users should use an appropriate backflow/meter assembly (BMA) unit or a meter assembly (MA) with an approved air gap. A rate structure could be established for the rental of the BMA unit or the MA unit;*
5. *Fine for using a fire hydrant without the appropriate permit and deposit.*

Be aware that Title XIV, Section 1432 of the Federal Safe Drinking Water Act P.L. 99-339 states that "...the sabotage of a public water system, or even the threat to do so, is a federal offense." Section 1432 of the Safe Drinking Water Act "provides for civil and criminal penalties against any person who tampers, attempts to tamper, or makes a threat to tamper with a public water system."

The penalties for such actions are:

- Tampering – the maximum prison sentence for tampering increased to 20 years and the maximum fine that may be imposed increase to up $1,000,000.00.
- Attempt or threat – the maximum fine for attempting to tamper, threatening to tamper increased to up $100,000.00.

Source: Congressional Research Service Report for Congress, "Safe Drinking Water Act (SDWA): A Summary of the Act and Its Major Requirements," Updated November 20, 2008. ITM

Photo by Bruce Bouck

The Mill River, Norfolk

MassDEP
Drinking Water Program
One Winter St
Boston, MA 02108

New EPA Method 334.0

By Frank Niles

Twenty-five alternative analytical methods for testing drinking water samples were approved by EPA in November 2009. One of these is Method 334.0, which tests for free and total chlorine with electrodes on on-line analyzers instead of using chemical reagents and buffers. EPA has approved Method 334.0 to accommodate this new mode of on-line analyzing.

It is expected that the approval of Method 334.0 will promote the use of reagentless-chlorine analyzing and result in more timely access to results and a significant reduction of waste associated with traditional reagent chlorine analyzing. In addition, on-line analyzers have no moving parts to repair and maintain, so the cost of ownership is low and maintenance is simple. EPA Method 334.0 can be used with any type of on-line chlorine analyzer.

EPA Method 334.0 is a "performance-based" method, which means it establishes quality control (QC) criteria to benchmark the performance of the on-line chlorine analyzer against the performance of approved grab-sample methods. The accuracy of the on-line chlorine analyzer is verified about every 5 days (and adjustments made when necessary) and is based on results from grab-sample analyses.

Method 334.0 is not mandatory for public water suppliers. It is an option that now exists, allowing wider choices in the selection of chlorine analyzers. The most powerful advantage of reagent free chlorine analyzers is that there are no waste streams.

As long as the on-line analyzer meets the QC criteria in EPA Method 334.0, the data is deemed equivalent to data obtained using the approved grab-sample methods.

Please go to EPA's website http://water.epa.gov/scitech/drinkingwater/labcert/upload/met334_0.pdf to view *Method 334.0, Determination of Residual Chlorine in Drinking Water Using an On-line Chlorine Analyzer* (USEPA 2009b).