Northern Flows

Alaska's Drinking Water Program Newsletter

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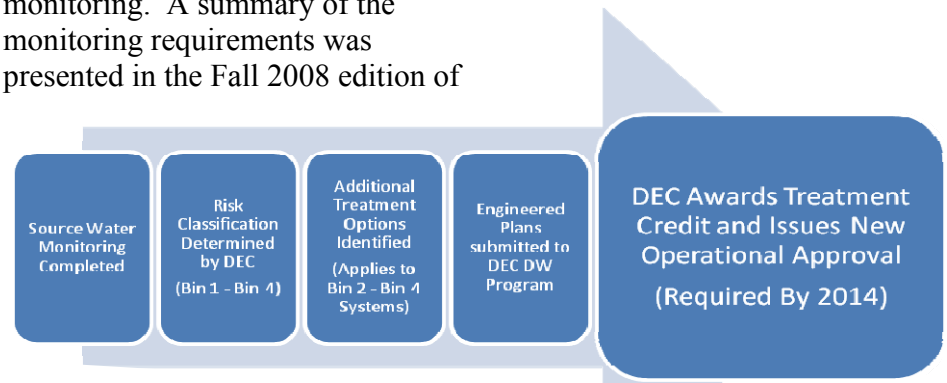
# Water Treatment Options and the Long Term (LT2) Enhanced Surface Water Treatment Rule

By Vanessa Wike

The Long Term 2 (LT2) Enhanced Surface Water Treatment Rule addresses the risk of *Cryptosporidium* in surface water by matching the quality or risk of the source water with the level of required treatment. Poorer quality source water, with a higher risk of *Cryptosporidium* contamination, requires a higher level of treatment than high quality, low risk, source water. The source water risk level is based on *E. coli* or *Cryptosporidium* monitoring. A summary of the monitoring requirements was presented in the Fall 2008 edition of *Northern Flows*. This article will provide a short summary of water treatment options and a brief discussion of the engineering approval process for systems seeking LT2 approval. EPA's final LT2 Enhanced Surface Water Treatment Rule is available online at: → http://www.epa.gov/safewater/disinfection/lt2/index.html

Also, compliance with the LT2 assumes that systems are already in full compliance with the EPA final Long Term 1 (LT1) Enhanced Surface Water Treatment Rule which became effective January 14, 2002. You can view the final LT1 Rule at: → http://www.epa.gov/fedrgstr/EPA-WATER/2002/January/Day-14/w409.pdf




After completing the initial monitoring, source water will be ranked based on risk into one of four defined "bins". The lowest risk source water is classified as "Bin 1", the highest risk source water is classified as "Bin 4" (also commonly referred to as "max treatment" systems). Any additional required treatment for *Cryptosporidium* is based on the bin classification and the water system filtration type. A full description of bin classification and bin treatment requirements is provided in LT2, specifically in *Table IV. B-1.-Bin Classification Table for Filtered PWSs* and *Table IV. B-2.-Treatment Requirements for LT2ESWTR Bin Classifications*. In general, those systems in "Bin 1" do not have to provide any additional treatment for *Cryptosporidium* beyond what was required under the Long Term 1 (LT1) Enhanced Surface Water Treatment Rule. Those systems in "Bins 2 - 4" will require additional treatment credits. The options for these credits are fully outlined in the Microbial Toolbox Section of the LT2 Rule, found under Section IVD of the rule. Unlike previous rules, the LT2 microbial toolbox offers many different options to obtain credit, including operational and managerial strategies that can receive a "filter credit" which can be applied against required treatment. These credits can be additive and are typically awarded 0.5 log *Cryptosporidium* removal credit each. Many systems that are required to include additional treatment may be able to address this requirement without adding any significant infrastructure or equipment to their existing water treatment plant by using one of these strategies.

However, the higher risk source waters which are classified in Bins 3 or 4 must include at

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## Message from the Manager *By James Weise*

The winter season came upon us quickly here in south central Alaska. The snow began in mid October, with more snow in November, and even more snow in December. How thought provocative it has been to see the temperatures plunge below zero for much of the state for the latter part of December and early January. We had an unusually cool (actually cold) overcast and wet summer and now we are following that summer with a numbingly cold and white winter. It has been the cold, calm, and ice fog shrouded days over the past two weeks that have made me think about the concept of "global cooling" rather than "global warming". For the Alaska public water system owners and operators, as well as the City and Utility Managers, these bitterly cold days increase the challenge for providing a reliable and safe supply of drinking water to customers and residents to the State of Alaska. This makes me appreciate these professionals even more than I already do. I truly hope they have been as proactive as possible during the summer to best prepare their water systems for our frigid Alaskan winters.

On a national perspective, some interesting events are developing as a new Administration takes office. President Obama and his transition team have been working with Congressional members on an "Economic Stimulus Bill" to help in the economic recovery from the recession sweeping the nation. With the national unemployment rate at 7%+, the relief from the planned "Economic Stimulus Bill" is projected to add several million new jobs across the nation over the next few years. From a drinking water perspective, the planned "Economic Stimulus Bill" is projected to add millions of dollars of additional funding to primacy states for both infrastructure projects and non-project activities (set-asides) through their Drinking Water State Revolving Fund (DWSRF). The DEC, Division of Water through the Municipal Grants and Loans Program and the Division of Environmental Health, Drinking Water Program, are actively preparing to utilize and distribute these funds provided to the State of Alaska.

At the local level and continuing with a focused theme for *Northern Flows*, this newsletter contains the second article in the series for the Long Term 2 (LT2) Enhanced Surface Water Treatment Rule written by Vanessa Wike, P.E., and the Drinking Water Program's Engineering Coordinator. This LT2 article focuses on "Water Treatment Options and Engineering Credits". The previous LT2 article in the Fall 2008 Issue of *Northern Flows*, written by Cindy Christian, Manager of the Compliance and Monitoring Section, provided a "Compliance Overview for LT2". It would be very beneficial for PWS operators, owners, utility managers, technical assistance providers, and consulting engineers to review and retain these LT2 articles. Just imagine that a New Year's Resolution of focused acts of proactive behavior now may save you time and money later as your system works towards LT2 compliance.

We are pleased to announce the following new staff to the DEC Drinking Water Program: Joshua Brewer, Environmental Program Technician in the Compliance and Monitoring Section in the Fairbanks office; and Darryl Gillespie, Environmental Program Specialist in the Compliance and Monitoring Section in the Wasilla office. When you visit the Fairbanks or Wasilla DEC offices, please stop in and introduce yourself to Joshua or Darryl. The Drinking Water Program is actively recruiting for several positions at this time. If you have interest in working for the State of Alaska, Drinking Water Program in a progressive, challenging, and "never a dull moment" job that could be the "Career of a Lifetime", please check Workplace Alaska recruitment notices for job postings in your area at: →

http://notes4.state.ak.us/wa/mainentry.nsf/WebData/1hp1HomePage/?Open

I hope everyone had a wonderful holiday season and are enjoying our refreshingly cool and white winter. Have fun, be careful, and let it snow!

James R. Weise

James Weise
Manager
Drinking Water Program

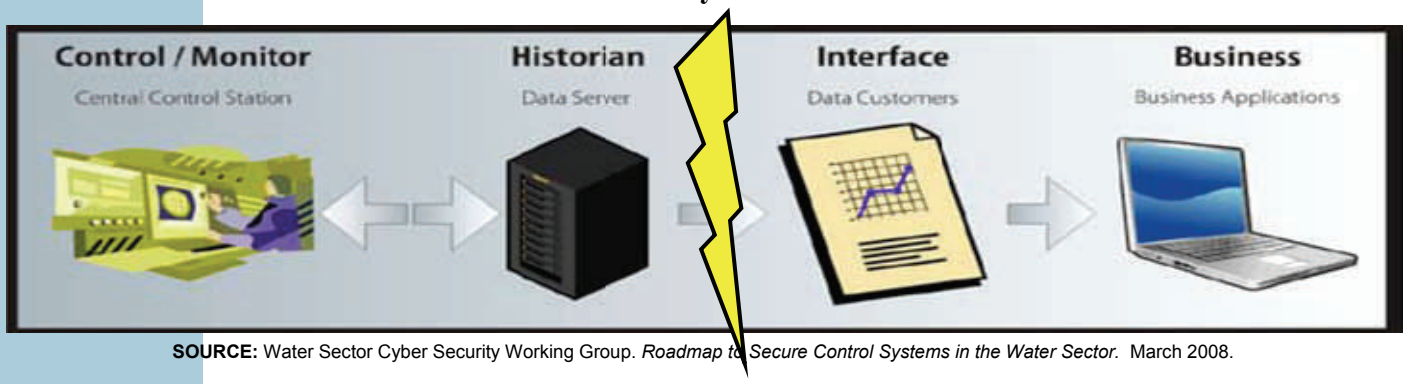
## Cyber Security

*By Leslie Shurtleff*

Modern control systems and communications technologies have greatly contributed to the increased efficiency, capacity, and reliability of water utilities. While the benefits of advanced technologies within the water sector are numerous, they are not without associated risks, namely potential vulnerability to targeted cyber attacks or accidental cyber events. The Director of National Intelligence, J. Michael McConnell, recently confirmed that control systems, including those in the water sector, are "...increasingly being targeted for exploitation and potentially for disruption or destruction." There are over a dozen documented cyber incidents at water utilities which have posed detrimental risks to public health. The nature of the threats include disgruntled employees, equipment malfunction, the installation of malicious software by an intruder, and virus 'fixes' which can erase licensing keys. Most recently, in Harrisburg, Pennsylvania, a hacker planted malicious software capable of altering operations at a water filtering plant.

The concept of cyber security is extremely vague as rapid industrial advances continue to alter the technological terrain of our daily lives. Water system personnel are challenged by the increased connectivity among physical and cyber infrastructures due to a growing dependency on automation. However, maintaining a comprehensive approach to mitigating cyber vulnerabilities at your water system is realistic and manageable. Integrating a few standard practices into one's business and operational procedures may greatly reduce the risk of deleterious cyber events. The following are feasible measures a water utility should implement to ensure a more secure system.

- **Limited/protected connections to the control system network.**
- **Periodic vulnerability assessments:** Revisit assessments following significant updates to the system.
- **Network monitoring/ protection:** Address intrusion detection, intrusion prevention, and auditing/logging activities.
- **Hardened configuration for control system components:** Turn off unneeded services and protocols, and establish standard configurations.
- **Strong authentication methods:** Limit access, install strong and expiring passwords, and utilize biometrics; however, consider the risk of the operator unintentionally not being able to access the system.
- **Regular computer hardware and software antivirus updates and patch management:** Incorporate routine software update activities as a standard operating procedure.
- **Testing and backup practices for control system:** Ensure that staff are well trained, develop formal test plans, perform applicable failure analysis, establish off-site backups, and practice disaster recovery.
- **Strong physical security for control system components:** Consider fences and closed circuit cameras to restrict access to critical areas such as control rooms and Programmable Logic Controllers.
- **Background checks on employees and individuals in contact with the control system:** Temporary staff, consultants/sub consultants, SCADA vendors, and internal staff should be included as part of a systems security review.
- **Knowledgeable counterparts and resources working collaboratively**




**SOURCE:** Water Sector Cyber Security Working Group. *Roadmap to Secure Control Systems in the Water Sector.* March 2008.

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# The First Barrier (Drinking Water Protection)

By Charley Palmer

*Protecting your source of drinking water from potential contamination is the first step in a multi-barrier approach to maintaining clean and safe drinking water.*

## Current Events

### Source Water Assessments

Drinking Water Protection (DWP) staff continues to work on completing Source Water Assessments (SWA) for new Community Water Systems (CWS) and Non-Transient Non-Community Water Systems (NTNCWS) (both formerly known as Class A public water systems). URS Corporation, a consultant working under contract with the DEC Drinking Water Program, continues to work on completing SWAs for Transient Non-Community Water Systems (TNCWS) (formerly known as Class B public water systems). As of December 8, 2008, URS had completed 19 SWAs out of the contracted 226 TNCWS sources. DWP staff are reviewing the SWAs completed by URS and also continue to perform field-verifications whenever possible for *all* regulated systems across the state, usually in conjunction with workshops and other travel opportunities. I recently traveled to Dillingham in December and while there, field-verified PWS Source Water Assessment data.

### 2008-2010 SOC Monitoring Waiver applications

Many of you continue to ask Drinking Water Program staff about the status of SOC Monitoring Waiver applications for the 2008-2010 compliance period. **Unfortunately, the new application is not available at this time.** The general reason is that it is associated with our new regulations package (DW 2008-1) which has been put through a rigorous review process. Please refer to the *Regulations Corner* section of this issue for more details on the current status of the updated regulations package. Unfortunately, we still do not have a firm date for availability of the application but we are hopeful that the new application will be available within the next couple of months. Please continue to check our website: http://www.dec.state.ak.us/eh/dw/ and future issues of *Northern Flows* for updates. If you would like to be contacted once the SOC Monitoring Waiver application is available, please contact Chris Miller at:
Toll-free # 1-866-956-7656,
Direct # (907) 269-7549, or
E-mail: Chris.Miller@alaska.gov.

### Incentives

We have listened to your concerns regarding the difficulty to allocate funding and time for Drinking Water Protection. As you may have heard from us at various workshops and conferences over the past year, we are currently working on developing tangible incentives. Some incentives are already in place but may not be obvious, such as maintaining clean and safe drinking water for your customers and avoiding illness caused by preventable contamination. Implementing and maintaining a Drinking Water Protection Plan will help you avoid being in the position of explaining why you did not plan ahead. Additionally, providing additional treatment, cleaning up contamination, and/or finding a new source of drinking water can be very costly. Remember, prevention is cheap! Following are some other incentives that we have developed or are currently working on for systems that have a Drinking Water Protection Plan endorsed by DEC:

- Grant funding for Community Water Systems (CWSs) conducting drinking water source protection activities is now available. The Department's Alaska Clean Water Actions (ACWA) grant process is expected to request proposals for projects that will protect drinking water systems. For more information on this funding opportunity, see: http://www.dec.state.ak.us/water/acwa/acwa_index.htm

**NOTE: Applications for ACWA grants are due February 19, 2009.**

- 0.5-log treatment credit for *Cryptosporidium* removal in compliance with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). We are currently working with DEC Drinking Water Program engineers to develop the criteria that systems will need to meet in order to receive the credit if it is an applicable option for the system.
- The possibility of a decreased frequency for sanitary surveys.

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## The First Barrier (Drinking Water Protection) (cont.)

By Charley Palmer

- Increased consideration for Separation Distance Waivers.
- Recognition for proactive efforts when DEC evaluates future SOC Monitoring Waiver applications.
- Qualification criteria for other future funding sources. We are currently working with the Division of Water's Municipal Grants and Loan Program to consider an endorsed Drinking Water Protection Plan as one of the qualifying criteria for Municipal Grants.

We are also interested in trying to develop other incentives for developing and implementing a Drinking Water Protection Plan so please contact us with your ideas.

Additionally, if you are interested in getting a jumpstart on developing a Drinking Water Protection Plan that meets our criteria for endorsement, please do not hesitate to call the Drinking Water Protection group, Chris Miller or Charley Palmer, with questions. You can contact Charley Palmer at:

Toll-free # 1-866-956-7656, or
Direct # (907) 269-0292, or
E-mail: Charley.Palmer@alaska.gov

## Water Treatment Options and the Long Term (LT2) Enhanced Surface Water Treatment Rule (cont.)

By Vanessa Wike

least 1 log of additional treatment that is achieved through either inactivation or filtration.

*Cryptosporidium* is very resistant to many types of disinfectants. Chlorine, the most prevalent form of disinfectant in use in Alaskan Water Treatment Plants, is not effective against *Cryptosporidium*. The three inactivation options for *Cryptosporidium* which may be considered are Chlorine Dioxide, Ozone, and Ultraviolet (UV). Chlorine Dioxide and Ozone treatment designs are based on the needed (required) contact time for inactivation. UV inactivation dosages are more complicated and are based on UV reactor validation testing, specific source water quality, and operational parameters for individual systems. UV design information can be found in EPA's "Ultraviolet Disinfection Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule".

Log removal credit of *Cryptosporidium* is more easily achieved through filtration. Filtration options may include bag and cartridge filtration, membranes or bank filtration (up to 0.5 log maximum credit). Approval of each of these treatment types is based on challenge test results of the filter and its effectiveness at removing *Cryptosporidium*. Currently, there are no cartridge/bag filters that meet the challenge test requirements for LT2; however, this is a new rule and manufacturers are actively working toward product approval of newer bag and cartridge filters to meet the required system installation deadline of 2014. Membrane systems are generally more capable of meeting the added filtration requirements of LT2; however, membranes must be capable of meeting ongoing integrity test requirements. Design information for membranes can be found in EPA's "Membrane Filtration Guidance Manual".

LT2 was finalized by EPA January 2006. Currently, DEC has authority for LT1 but does not have authority for the LT2 Rule. DEC Drinking Water Program is expecting to obtain LT2 authority in 2010. The DEC Drinking Water Program engineering section is currently reviewing water system engineered plans for LT2 approval in an attempt to assist communities in bridging the gap between federal and state authority. If engineered plans submitted for LT2 approval meet all minimum federal criteria, the system is approved on that basis. However, in some circumstances, for the more complicated systems, full compliance with federal criteria is not clear or specific. In these cases, where discretion is needed to determine whether the system meets the intent of LT2, EPA has full regulatory authority. DEC is currently developing policies, procedures, and guidelines that will enable us to provide predictable and consistent engineering reviews in implementing LT2 in those cases where state discretion will be possible.

For more information on engineering issues for your specific water system, please contact your local DEC Drinking Water Program engineer. Contact information and checklists to assist in engineering submittals can be found online at: http://www.dec.state.ak.us/eh/dw/dwmain/engineering.html

## Cyber Security (cont.) By Leslie Shurtleff

**are essential for an effective and secure system.**

While complete immunity from cyber events may be unattainable, adopting the security measures reviewed in this article will establish a reasonable buffer substantially decreasing the vulnerability of your water system. Due to the evolving nature of control systems and communication technologies, extensive guidance on hardening cyber security measures can be

challenging to come by; however, the Water Sector Coordinating Council (WSCC) Cyber Security Working Group is striving to ameliorate the lack of practical assistance. Recently, the work group released the "Roadmap to Secure Control Systems in the Water Sector" which is available on the American Water Works Association (AWWA) webpage:

http://www.awwa.org/files/GovtPublicAffairs/PDF/WaterSecurityRoadmap031908.pdf#

For further information, please contact Leslie Shurtleff at: Leslie.Shurtleff@alaska.gov or (907) 269-8924.

### *How Can Cyber Events Affect Water Systems?*

- Interfere with the operation of water treatment equipment which can, and has caused, chemical over or under-dosing.
- Make unauthorized changes to programmed instructions in local processors (process controllers) to take control of water distribution or wastewater collection systems, resulting in disabled service, reduced pressure flows of water into fire hydrants, or overflow of untreated sewage into public waterways.
- Modify the control systems software producing unpredictable results in overall system performance.
- Block data or send false information to operators to prevent them from being aware of water system conditions or to initiate inappropriate actions for water system operation.
- Change alarm thresholds or disable them.
- Prevent access to customers or the water systems account or service information.
- Although many facilities have manual backup procedures in place, failures of multiple systems may overtax staff resources, even if each failure is manageable in itself.
- Be used as ransomware.

Water Sector Cyber Security Working Group. *Roadmap to Secure Control Systems in the Water Sector.* March 2008.

## Regulations Corner By Gloria Collins

The New Year is on its way and that is a good time to review what is ahead for Alaska's drinking water regulations.

The Drinking Water Program has received extensions from EPA for adoption of three federal rules: the Long Term 2 (LT2) Enhanced Surface Water Treatment Rule, the Stage 2 Disinfectants and Disinfection Byproducts (Stage 2 D/DBP) Rule, and the Ground Water (GW) Rule. LT2 and Stage 2 D/DBP had compliance dates starting in January 2008. Because Alaska does not yet have primacy for LT2 and Stage 2 D/DBP, the EPA is currently following up on compliance and enforcement activities with state assistance for some of the Alaska PWS compliance -related activities.

For the GW Rule, the effective PWS compliance date is December 1, 2009, at which time the EPA will begin compliance and enforcement. The Alaska Drinking Water Program will assist with many of the PWS Compliance and Enforcement activities depending on available resources.

A fourth federal rule that the Drinking Water Program plans to adopt is the Lead and Copper Short-term Regulatory Revisions and Clarifications Rule (LCRSRRC). The compliance date for this rule is the earlier of the following:

- The date the primacy state adopts the rule; or
- December 10, 2009.

Changes to our state Drinking Water Regulations are forthcoming. The most recent set of proposed regulations changes (DW 2008-1) is in the final stage of review before being filed by the Lieutenant Governor. The regulations will become effective 30 days after they are filed. We anticipate that these regulations changes should

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## Regulations Corner (cont.)

By Gloria Collins

become effective in about two months.

These proposed changes, which were public noticed from May 7, 2008 to June 9, 2008, incorporate the following major revisions to 18 AAC 80:

- Articles 3 and 6 have been significantly rewritten to adopt by reference the corresponding federal regulations in 40 Part C.F.R. 141.
- Clarifications of role and responsibilities have been made in many of the "owner or operator" provisions;
- Alaska's "Class A" and "Class B" categories of public water systems have been reworded to the federal terminology; that is, Class A systems will be termed Community Water Systems (CWS) or Non-Transient Non-Community Water Systems (NTNCWS), and Class B systems will be termed Transient Non-Community Water Systems.
- The SOC/OOC Monitoring Waiver Application will no longer be a publication adopted by reference and this will allow the Drinking Water Program to provide updated applications without going through a regulations revision process.

(Please note that changes to separation distances that had been initially proposed have been omitted from the changes in DW 2008-1. Revisions to separation distances and other engineering issues will be addressed in a future regulations revisions change project.)

As we end one year and begin a new one, the anticipated changes in Alaska's drinking water regulations continue our mission: To see that public water systems supply the public with safe drinking water that meets federal health-based standards. For further information, please contact Gloria Collins at: Gloria.Collins@alaska.gov or (907) 269-3075.



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| David Litchfield | DW Compliance | x224 |
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