



How will the Groundwater Rule Affect You?

Yann Le Gouellec, Bruce Whitteberry, Ramesh Kashinkunti, and Debbie Metz
 Greater Cincinnati Water Works, Water Quality and Treatment Division

Introduction

Did you know that 92% of drinking water systems in Ohio are groundwater (GW) systems? The Groundwater Rule (GWR) was signed October 11, 2006 and will take effect December 1, 2009. This Rule concerns all GW systems, including consecutive systems using GW and systems with a mix of GW and treated surface water.

In short, nearly all drinking water systems in Ohio will be impacted by the GWR, therefore it is critical to understand it and start considering compliance strategies now. Compliance is only two years away!

This article discusses the highlights of the Rule and then presents some compliance strategy ramifications.

Highlights of the GROUNDWATER RULE

Sanitary Surveys

The State will conduct periodic sanitary surveys to evaluate critical elements of a public water system and identify “significant deficiencies”. Large systems are on a 3-year cycle and the first cycle must be completed by 2012. The format of these sanitary surveys is anticipated to be similar to the ones described in the 1991 SWTR Guidance Manual.

Significant “deficiencies” include defects in design, operation, or maintenance, or a failure or

malfunction of the source, treatment, storage, or distribution system that the State determines to be causing or having the potential to cause contamination of delivered water. Table 1 below presents the 8 components of a sanitary survey.

Table 1 Sanitary Survey Components

Source	Pumps and related facilities and equipment
Treatment	Monitoring, reporting, and recordkeeping
Finished water storage	System management and operation
Distribution system	Operator compliance

The following examples could be considered or interpreted as significant deficiencies:

- Potential of surface water intrusion during flooding
- Pump stations located in a flood plain; inadequate pump capacity, maintenance, and control systems, etc.
- Deficiencies in the storage tanks: leaking roofs, absence of overflow screens, no air-gap between the overflow and discharge point, inadequate cleaning and maintenance of tanks, etc.
- Lack of auxiliary power in the system, lack of approved emergency response plan, etc.
- Uncertified operators per State requirements, lack of operator training, etc.



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Straight From The Chair



**Cliff Shrive,
Ohio Section Chair**

Happy Holidays! As you read this, visions of Sugar Plums are likely to be dancing in your head...as this article is being typed ghosts, goblins and witches are running amongst the living. So please excuse me if my mind wanders – I'm on a sugar high.

I'm finding that being Chair of the Ohio Section is not so easy after all. What's difficult is that there's only one year, and so many important tasks to accomplish. I now truly understand the significance of our Committees. As well as having

active volunteers within the Section. They are the true lifeblood of this organization. Not me, not the Governing Board.

Now don't get me wrong, the Governing Board is an important part of OAWWA. However, we as a Board have a responsibility above all else to work closely with the Committees, Councils and Districts and provide direction and support for their goals and tasks. They do the work. We help them. One year...so much to do...

January will be here before we know it, which means the 2008 Budget will be reviewed and approved at our January 11 Governing Board Meeting. It is imperative that Committee and Council chairs discuss their requests with their liaison, prior to this meeting. As a Section, we are increasingly being asked to assist our membership with regulatory issues, as well as training and many other needs. It is our role as a Board to make sure that we spend our money appropriately. Additionally, discussions prior to the actual meeting will help to expedite the overall process.

There are a few Committees I'd like to mention briefly, because of changes that have taken place over the past months. The Public Outreach Committee has been asked to work with the Small Systems Committee, with the outcome being a recommendation on what the Section should be providing to our smaller utilities. Acting more like a task force over the next year, we anticipate changes being made to both of these committees in order to provide top notch service to those utilities.

WARN – also known as the Water/Wastewater Agency Response Network – is moving ahead full steam. The Ohio Section has been working on an Ohio Warn document since the spring of 2007, and already has members. Check out the article in this newsletter to see how you can be a Utility helping Utilities.

A new committee is being investigated. We are currently discussing the mission and goals of a Human Resources Committee; if you are interested in being part of this group please let one of the Governing Board know and we'll find a spot for you.

As a final note, the Regional Meeting of Section Officers was hosted by the Ohio Section in late October. The one item that I'd like to comment on from that meeting is our membership numbers. As an Association, they are down. And we have experienced that drop as well within the Section. Why is this happening? We all know the benefits of AWWA; why aren't we growing? I'll tell you one reason why...we need to make more of an effort to get others involved as volunteers. Active volunteers. Go find your Fred McGowski, and introduce him to other volunteers. Make him feel a part of the organization. From past experience, he's just waiting for a nudge.



Brian Bisson Elected Association Director

Brian Bisson was elected Association Director at the Ohio Section Annual Meeting in Cincinnati. His three year term will begin at the AWWA ACE in Atlanta in June, 2008. He will succeed Marvin Gnagy. Brian says he is honored to be elected and is committed to serve in the office to the best of his ability.

Brian is Vice President of Engineering for Aqua Ohio, Inc. As VP and Chief Engineer, he is responsible for planning, design, construction administration, department staffing, and managing the capital budget for Aqua Ohio and the Shenango Division of Aqua PA. Brian's department is Ohio EPA self-certified for distribution designs, one of only a few in the state. His group designs more than 20 miles of water main per year. In the past 16 years his department has designed more than 40 booster stations, six water storage

tanks, and numerous water treatment projects. Capital budgets are averaging more than \$20 million per year. Aqua serves more than 350,000 people in Ohio and western PA with systems ranging from one serving 250 people to two each serving nearly 100,000 people.

Brian has BS and MS Degrees, both in Civil Engineering from the University of Maine at Orono. He is a registered Professional Engineer in Ohio, PA, and Maine.

Brian has been a member of AWWA for more than 25 years. He is a past Chair of the Ohio Section Board. Brian has served on several AWWA Ohio Section and Association level committees. He is currently on the Technology Committee for which he was one of the original members, and he is Chair of the Water For People Committee. He is



also a member of the American Society of Civil Engineers and the Ohio Water Environment Association.

Brian and Ricki have been married for 32 years and have two children, Ben and Alex. Still living at home are two rambunctious schnoodles (dogs), Abby and Johnny. Brian is also active in his church, and loves to play golf.



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Karen Hawkins Elected SW District Trustee

Karen Hawkins began her involvement with the Ohio Section when she was drafted by her boss to man the microphone for the annual water main tapping contest. Since that time, she has served as the Ohio Section's Secretary, Assistant Secretary/Treasurer, and on the education and tapping committees. She spent five years as a Southwest District officer, initiated and coordinated the district's Expo tours for the first two years, and continues to be an active participant in their activities. For six years, she served as OAWWA's representative to the OTCO Board of Trustees including serving as Board President and remains involved with the organization as a backflow instructor. She looks forward to continuing to serve her district and the Section as the SW trustee.

Karen has been employed by the City of Fairborn for 20 years where she started as a police dispatcher and jailer before switching to the Division of Water. She has been with the division for 17 years. Currently, she is the Utilities Superintendent overseeing water treatment and distribution, sewer collection and storm water. She holds Class III Water and Class II Wastewater Collection licenses as well as being certified by the Ohio Department of Commerce as a Certified Backflow Tester.

Karen is married to Roy and has two children, Amanda and Stephen. She spends most of her leisure time with her family including traveling, gardening, and cheering on her son's baseball team.



Lorrie Brown Elected At Large Trustee



Lorrie Brown has 17 years of experience in the water and wastewater industry. She started with the City of Dayton as a Bacteriologist/Chemist and is currently the Water Supply and Treatment (WS&T) Research and Control Specialist. Lorrie researches and investigates treatment technology and regulatory changes. She works to allocate City resources for reliable, cost effective water treatment and ensures treatment optimization and compliance. Lorrie received City recognition for exemplifying "Safety Leadership" and helped the WS&T Division to achieve the 2005 City of Dayton "Safety Leadership" recognition.

Lorrie participates on many city committees and promotes the city of Dayton WS&T Division through a biannual newsletter.

Lorrie has a BS in Biological Sciences from Wright State University, is a member of AWWA, Past Chair of the Ohio Section Southwest District, SW EXPO tour coordinator for 2007 and a Past Chair of the OAWWA Safety Committee. Lorrie holds a Wastewater Laboratory Analyst III certification, a Class I Wastewater Operator license and a Class III Water Operator license.



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Triggered Monitoring

Monitoring of the source water is triggered when total coliforms are detected in the distribution system (Total Coliform Rule – TCR). Within 24 hours, a sample must be taken at each source (e.g., for each operating well).

If a source is fecal positive, then the test must be repeated 5 times at each well within the next 24 hours. If a fecal-positive is confirmed, then “Corrective Action” must be taken. These tasks can become complex with consecutive systems.

In the case of a ‘mixed’ system (i.e., a system served by groundwater and surface water), source water monitoring is avoided if the State documents in writing that the trigger (i.e., the positive total coliform) was in the part of the system served by the surface water treatment plant.

Corrective Action

Corrective action is required by the State if a significant deficiency was noted during the sanitary survey, or if a source sample (from triggered monitoring) is positive for a fecal indicator. In the case of a significant deficiency, the public water system (PWS) must, within 120 days of receiving notification, complete the corrective actions or be in compliance with a State approved corrective action plan and schedule. Failure to do so is considered a “Treatment Technique” violation (see Public Notification, below). A corrective action will likely involve the implementation of one, or a combination, of the following:

- Correct all significant deficiencies
- Provide an alternate source of water
- Eliminate the source of contamination
- Provide treatment to reliably achieve 4-log virus removal/inactivation

4-Log Virus Inactivation

If the PWS achieves 4-log inactivation of viruses then triggered monitoring of the source water is not needed. For reliably and continuously providing 99.99% (4-log) inactivation of viruses, the following specific Performance Criteria must be met:

- Meet appropriate C·T each day prior to the first customer. C·T tables provided in the IESWTR for viruses can be used.
- Maintain State determined residual disinfectant levels each day.
- (For systems over 3,300 in population) Continuously monitor for chlorine residual and record the lowest residual disinfectant level each day. If continuous monitoring equipment fails, grab samples must be collected at every 4-hour interval. Systems have 14 days to resume continuous monitoring.
- Failure to maintain C·T or residual monitoring constitutes a “Treatment Technique” violation (see Public Notification, below)

Public Notification

Under GWR, there will be essentially two tiers for public notification:

- Tier 1 (public informed within 24 hr) if the source water is fecal-positive (initiated with a total coliform positive in the distribution system)
- Tier 2 (public informed within 30 days) if:
 - A significant deficiency is not corrected (in addition, the system must inform the public through CCR)
 - 4-log treatment not restored within 4 hours
 - There is a “treatment technique” violation (see conditions above)

Groundwater Rule

Unresolved Issues

USEPA has just issued three guidance manuals, but some specific implementation, interpretation, and enforcement issues have yet to be determined by OEPA. Some unknowns that need to be addressed are:

- If a Hydrogeologic Sensitivity Assessment (HAS) will be required.
- If Ohio will require analysis of E-coli, Enterococci, or (somatic) coliphage as indicators for fecal contamination.
- What additional elements in the sanitary survey or defined as “significant deficiencies” will be included in the State’s version of GWR.
- Required disinfectant residual concentration.
- If OEPA will take a more stringent approach on any component of the rule.
- If any C·T credit would be available for softening plants (i.e., high pH and filtration).
- If virus removal credit would be given for plants that filter for softening.

RAMIFICATIONS OF Compliance Strategies

There are two compliance strategies for GWR: operate under triggered source water monitoring or achieve 4-log virus inactivation/removal. The following should be considered when deciding which strategy to adopt:

1. The degree of pollution in the [recharge water](#) will influence the ultimate water quality (i.e., more polluted recharge sources will require more physical removal or chemical inactivation to achieve the same results than a less polluted recharge source).
2. The [aquifer type](#) can affect the attenuation of microbes (e.g., sand aquifers are more suited to filtration than fractured bedrock)
3. The advantages of an affordable microbiological [multi-barrier approach](#) to maintain public confidence in the drinking water system

4. The need for [operational flexibility](#). C·T requirements may dictate maintaining a minimum water depth in the clearwell

5. The need to evaluate and improve [plant C·T](#): Account for chlorinated segments before and after the clearwell (e.g., pipe volume from reservoir to first customer); conduct tracer studies to evaluate C·T; or install baffles in the clearwell.

6. Ability to reduce the required C·T by lowering [finished water pH](#). This approach should be balanced with the possible corrosion impact in the distribution system (including compliance with the Lead and Copper Rule).

7. [Capital costs](#) (“bang for your buck”), especially in evaluating your plant’s C·T capability. These costs could be lowered if virus removal credit could be granted (e.g., lime softening plants) or if interpolation of C·T values based on actual plant temperature and pH is approved by regulators.

8. A consecutive system plan: All sources from a [consecutive system](#) do not have to be monitored under “triggered” monitoring if a plan is approved by State, which clearly identifies portions of the system that are served by only one source (e.g., water quality data, pressure zones, valve maps, etc.).

9. Any problems associated with triggered monitoring: If the [wholesaling](#) system provides 4-log treatment of viruses, it will not be subject to “triggered” source water monitoring.

10. The advantages of a [demonstration study](#): Demonstration studies may be acceptable to the State and help reduce requirements; however, viruses are very small (i.e., smaller than bacteria or spores) and the search for surrogates is still ongoing.

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Conclusion

The initial sanitary survey to be performed by OEPA, should take place within three years after the rule is in effect (i.e., before December 31, 2012). However, the decision between operating under triggered source water monitoring or achieving 4-log virus inactivation will need to be reported to the State by December 1, 2009, when the GWR starts taking effect. Figure 1 below shows the timeline associated with the GWR.

From a water quality standpoint, achieving 4-log virus inactivation is beneficial, but costs and operational flexibility must be considered. To understand all ramifications OEPA's version of the GWR must be considered after it is issued (e.g., additional elements in "Significant Deficiencies", specific requirements in the Sanitary Survey, etc.)

Table 2 below summarizes some of the benefits and challenges of either approach.

In summary, the GWS must be aware of the implied coupling between the GWR and the TCR. Wholesale/consecutive systems should refer to the federal Guidance Manual and collaborate with State regulators if adopting a "triggered" source water monitoring plan. Utilities should perform an evaluation of the plant C-T capabilities and identify needed capital upgrades.

Regardless of the strategic option chosen, there will be some impact to PWS. A roadmap should be created now to avoid being caught off-guard December 1, 2009 (deadlines "may be closer than they appear"). There are only 2 years left. Good luck!

Figure 1 GWR Timeline

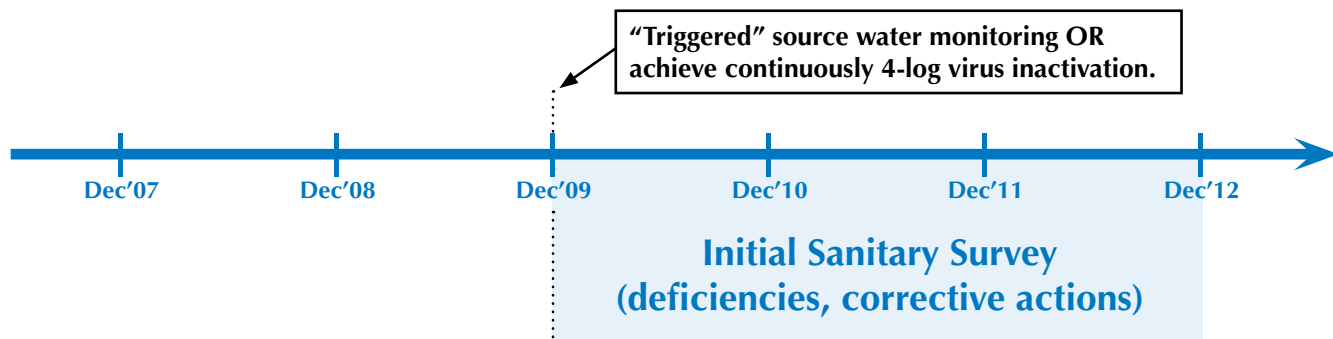


Table 2 Benefits and Challenges of Compliance Strategies

Strategy	Benefits	Challenges
Triggered Monitoring	No capital improvements needed. Same <i>routine</i> monitoring. Keep current system operation.	Tied to Total Coliform Rule. No control over consecutive system monitoring. Risk of State-imposed corrective action plan. Risk of Tier 1 public notification if source is fecal positive. Possible increased analyses. Develop "trigger" methodology.
4-Log Virus Inactivation	Uncouples link with TCR. Additional microbiological barrier. Simplifies ties with consecutive systems. Built-in corrective action*.	May require capital costs for C-T conditions improvement. Less operational flexibility. Continuous Cl2 residual monitoring/reporting required (population over 3,300).

(*Achieving 4-log virus inactivation is one of the corrective actions recommended by GWR)

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Chair's Award



Larry Valentine was awarded the Chair's Award for his service to the Ohio Section AWWA and the Ohio water community by giving graciously of his time and talents to compile, edit and continually improve the Ohio Section newsletter.

Membership Award



Membership Chair Rick Griffing presented the Larry Valentine Membership Award to Melinda Raimann for recruiting the most new members in the previous year. Great job Melinda!