

Issue Paper: Special Primacy Requirements for the Safe Drinking Water Act - Ground Water Rule

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1. Special Primacy Requirement Regarding Legal Authority to Ensure That Owners of Ground Water Systems Conduct Source Water Monitoring

40 CFR 142.16 *Special primacy requirements.* (o) (1) *Legal authority.* The application for primacy must demonstrate the State has: (i) The authority contained in statute or regulation to ensure that ground water systems conduct source water monitoring under 40 CFR 141.402(a)(2), 40 CFR 141.402(a)(3) and 40 CFR 141.402(a)(4)(ii)(A).

Guidance

This Special Primacy Requirement addresses a state's rules or other authority to ensure that owners of a Ground Water Source (GWS) conduct monitoring at the ground water source(s) for a fecal indicator in response to a total coliform-positive sample result obtained in compliance with the Total Coliform Rule (TCR). This requirement also addresses the state's authority to require the operators of a GWS to collect five additional source water samples from a ground water source that has a fecal indicator-positive test result. In addition, this primacy requirement addresses the state's authority to require the owners of a wholesale system to test its ground water source(s) for a fecal indicator in response to a total coliform-positive result obtained in compliance with the TCR by a consecutive system that receives water from that wholesale system. In response to this primacy requirement the state should demonstrate it has the authority to require ground water systems to comply with the requirements of 40 CFR 141.402(a)(2), 40 CFR 141.402(a)(3) and 40 CFR 141.402(a)(4)(ii)(A). States that adopt the federal Ground Water Rule (GWR) by reference can make this demonstration by showing they have adopted the federal rule. In addition, the state should provide an explanation for its choice of fecal indicator. States may want to refer to regional ground water occurrence studies or applicable studies comparing the presence of indicators under various wellhead or hydrogeological conditions. States should also consider the availability of laboratories that can perform the EPA-approved analytical method for the fecal indicator that is selected.

DEQ's Position: DEQ meets this primacy requirement as a result of adopting the Safe Drinking Water Act - Ground Water Rule by reference. Under this procedure, all requirements of the federal rule become part of the *Idaho Rules for Public Drinking Water Systems*. There is nothing to negotiate because this primacy requirement does not provide flexibility or decision-making authority to the primacy agency.

DEQ will use *E. coli* as the fecal indicator organism for source water monitoring. This choice is based on the following points:

1. *E. coli* is a definitive indicator of recent fecal contamination. At least in temperate climates, it does not live for extended periods outside the gut of a warm-blooded animal.
2. Laboratory capacity for processing *E. coli* samples is well established within the state. Cost of sample analysis is affordable for owners of small water systems.
3. Water system operators are accustomed to the collection and handling of *E. coli* samples.
4. It is not necessary to select a smaller indicator like coliphage because most Idaho aquifers have the ability to transmit larger organisms that may be introduced to the aquifer from fecal contamination sources. DEQ may require owners of water systems to sample for coliphage on a case by case basis, but this would be based on lines of evidence other than a lack of *E. coli* detections resulting from triggered monitoring. Such lines of

evidence could include, but are not limited to; a) if there is credible documentation that the source draws from a semi-consolidated aquifer or an aquifer with homogeneous particle dimensions that would tend to exclude the movement of larger organisms; b) the presence of unexplained endemic disease; or c) an outbreak of gastrointestinal disease that occurs in the absence of coliform-positive distribution samples and cannot be traced to food or other sources of infection. Alternative indicators may also be used where hydrogeologic sensitivity assessments under 40 CFR 141.400(c)(5) or assessment monitoring under 40 CFR 141.402(b) are needed and site specific information indicates that an alternative indicator organism would be more likely to reveal source contamination.

Persons who have expertise regarding occurrence of and the fate and transport of pathogenic organisms in ground water are invited to advise DEQ in regard to the choice of *E. coli* as a fecal indicator organism.

Reference: US EPA 1991. *Regional Assessment of Aquifer Vulnerability and Sensitivity in the Conterminous United States*. EPA 600/2-91-043

2. Special Primacy Requirement Regarding Legal Authority to Ensure That Owners of Ground Water Systems Address Significant Deficiencies

40 CFR 142.16 Special primacy requirements. (o) (1) Legal authority. The application for primacy must demonstrate the State has: (ii) The authority contained in statute and regulation to ensure that owners of ground water systems take the appropriate corrective actions including interim measures, if necessary, needed to address significant deficiencies.

Guidance

States that adopt the federal GWR by reference can make this demonstration by showing they have adopted the federal rule (i.e., 40 CFR 141.403).

In addition, states may wish to address their authority to take administrative or legal actions and assess penalties. Also, states may wish to include a description of how the appropriate rules or other authority, including formal enforcement actions, will be used to ensure that the owners of ground water systems take the steps necessary to correct significant deficiencies.

EPA believes many states have existing authorities that are adequate to comply with the intent of this Special Primacy Requirement. These authorities can often be found in broad statutory language designed to provide public health protection. However, EPA does not believe that the state's existing authority to address imminent and substantial endangerment is sufficient to meet this Special Primacy Requirement. The authority must be specific enough to allow the state to require correction of conditions that have the potential for causing the introduction of contamination into the water delivered to consumers.

Some states may wish, in the rule-making process, to specifically identify significant deficiencies and provide authority to require correction of each. This has the added benefit of establishing a transparent process that ensures the state's administrative procedures requirements are met.

DEQ's Position: DEQ satisfies this primacy requirement by adopting the Safe Drinking Water Act - Ground Water Rule by reference. There is nothing to negotiate because this primacy requirement does not provide flexibility or decision-making authority to the primacy agency.

3. Special Primacy Requirements to Ensure That Owners of Ground Water Systems Address Source Water Fecal Contamination.

40 CFR 142.16 Special primacy requirements. (o) (1) Legal authority. The application for primacy must demonstrate the State has: (iii) The authority contained in statute and regulation to ensure that owners of ground water systems take the appropriate corrective actions, including interim measures, if necessary, to address any source water fecal contamination identified during routine or triggered source water monitoring.

Guidance

This Special Primacy Requirement addresses a state's rules or other authority to ensure that owners of a ground water system respond to fecal contamination (identified during source water monitoring that has been triggered by a total coliform-positive sample result obtained in compliance with the TCR or additional source water monitoring).

States that adopt the federal GWR by reference, can make this demonstration by showing they have adopted the federal rule (i.e., 40 CFR 141.403).

DEQ's Position: DEQ satisfies this primacy requirement by adopting the Safe Drinking Water Act - Ground Water Rule by reference. There is nothing to negotiate because this primacy requirement does not provide flexibility or decision-making authority to the primacy agency.

4. Special Primacy Requirement Regarding Legal Authority to Ensure That Owners of Ground Water Systems Consult with the State Prior to Implementing Corrective Action

40 CFR 142.16 Special primacy requirements. (o) (1) Legal authority. The application for primacy must demonstrate the State has: (iv) The authority contained in statute or regulation to ensure that owners of a ground water systems consult with the State regarding corrective action(s).

EPA's Guidance

This Special Primacy Requirement addresses a state's rules or other authority to ensure that owners of a system with significant deficiencies or source water fecal contamination consults with the state prior to taking corrective action as required by 141.403(4). System owners and states should have the flexibility and authority to determine and require the most appropriate corrective action to address site-specific conditions.

This consultation is intended to allow the state the ability to provide an initial review and engage in a discussion with the system owner to ensure that, when appropriate, state plan

review/permitting requirements are met and corrective actions are conducted that are appropriate and protective of public health.

States that adopt the federal GWR by reference can demonstrate authority to require consultation by showing they have adopted the federal rule (i.e., 141.403).

DEQ's Position: DEQ satisfies this primacy requirement by adopting the Safe Drinking Water Act - Ground Water Rule by reference. To assist the regulated community in identifying this requirement, it is repeated in *Idaho Rules for Public Drinking Water Systems* in Section 303.04. There is nothing to negotiate because this primacy requirement does not provide flexibility or decision-making authority to the primacy agency.

5. Special Primacy Requirements Regarding Sanitary Surveys

40 CFR 142.16 Special primacy requirements. (o) (2) State practices or procedures for sanitary surveys. In addition to the general requirements for sanitary surveys contained in 40 CFR 142.10(b)(2) a primacy application must describe how the State will implement a sanitary survey program that meets the requirements of paragraph (o)(2)(i) of this section.

EPA's Guidance

The Special Primacy Requirements of 40 CFR 142.16(o)(2) describe several additional provisions states must apply to their sanitary survey programs for ground water systems. These provisions address the aspects of ground water systems that must be evaluated during the sanitary survey, minimum frequencies for conducting the sanitary surveys, and identification of “significant deficiencies” that require immediate corrective action. It also offers states the flexibility to reduce the frequency of sanitary surveys necessary for community water systems with 4-log virus treatment or those deemed by the state to have outstanding performance and to conduct sanitary surveys in a phased or staged manner.

The following guidance addresses each subsection of 40 CFR 142.16(o)(2)(i) through (v) in order; however, the arrangement and structure of the state’s description are discretionary provided the state gives sufficient detail to demonstrate that its strategy and capacity are adequate for meeting the Special Primacy Conditions.

For more detailed guidance see Guidance Manual for Conducting Sanitary Surveys of Public Water Systems; Surface Water and Ground Water Under the Direct Influence (GWUDI). April 1999 (EPA 815-R-99-016). This publication is available from the Internet at www.epa.gov/safewater/mbdp/pdf/sansurv/sansurv.pdf and from the Safe Drinking Water Hotline (800) 426-4791. Draft guidance on sanitary surveys of ground water systems can be obtained on the Internet at <http://www.epa.gov/safewater/disinfection/gwr/compliancehelp.html>.

5. A. Frequency and scope of sanitary surveys

(i) The State must conduct sanitary surveys that address the eight sanitary survey components listed in this section no less frequently than every three years for community water systems (CWS), except as provided in paragraph (o)(2)(iii) of this section, and every five years for noncommunity water systems (NCMS). The State may conduct more frequent sanitary surveys for

any system. The initial sanitary survey for each community water system must be conducted by December 31, 2012, unless the system meets the requirements of paragraph (o)(2)(iii) of this section. The initial sanitary survey for each community water system that meets the requirements of paragraph (o)(2)(iii) of this section and for each noncommunity water system must be conducted by December 31, 2014. The sanitary survey must include an evaluation of each of the following elements as applicable:

- (A) Source,*
- (B) Treatment,*
- (C) Distribution system,*
- (D) Finished water storage,*
- (E) Pumps, pump facilities, and controls,*
- (F) Monitoring, reporting, and data verification,*
- (G) System management and operation, and*
- (H) Operator compliance with State requirements.*

EPA's Guidance

This Special Primacy Requirement addresses the scope of the state's sanitary surveys (eight components must be included), the minimum frequency for conducting surveys, and the capacity of the state to conduct these required surveys. States should have adequate resources to comply with these requirements. States must address scope and frequency of sanitary surveys in their primacy revision application and are encouraged to address capacity and implementation as well. Some states may have already adopted relevant authority for these requirements when they adopted the Interim Enhanced Surface Water Treatment Rule (IESWTR).

Frequency of sanitary surveys

In a state's description of how it will implement a sanitary survey program, the state should demonstrate that sanitary surveys will address, at a minimum, the eight components listed above. In cases where the state is currently performing sanitary surveys that meet these minimum requirements, example sanitary survey forms and completed reports can be used to demonstrate that all eight elements are addressed. If the state does not believe that it currently performs sanitary surveys that meet the minimum requirements, the revision application should include details of a plan for upgrading the state's procedures, as necessary, including examples of sanitary survey forms that will be used and a description of training for staff performing sanitary surveys. The state must show that sanitary surveys will be conducted no less frequently than every 3 years for CWSs that are not providing at least 4-log treatment of viruses and have not been determined by the state to have an outstanding performance record. The state must show that sanitary surveys will be conducted no less frequently than every 5 years for NCWSs and CWSs providing at least 4-log treatment of viruses or that have been determined by the state to have an outstanding performance record.

In order to ensure these surveys will be an effective preventive tool for identifying and correcting water system deficiencies that could pose a threat to public health, states should conduct surveys 3 (or 5) years from the year the survey was last conducted. Thus, if a sanitary survey for a system on a 3-year cycle is conducted on June 11, 2008, the next survey should be completed by December 2011. EPA encourages more frequent sanitary surveys than stated if that is the current practice, or requirement of the state.

Capacity

The state's revision application should address capacity for conducting appropriate sanitary surveys at, or in excess of, the frequency outlined in 40 CFR 142.16(o)(2)(i). When such capacity exists and the above requirements are being met or exceeded by an existing program, a summary of the state's sanitary survey program, including a brief description of past and future schedules, should be sufficient to demonstrate adequate capacity. The state should also demonstrate that personnel performing the sanitary surveys will have the professional qualifications and training necessary to assure sanitary surveys are conducted by appropriately skilled and adequately trained professionals.

A state that does not have an existing sanitary survey program that meets these requirements should describe its proposed program and estimate the resources directed toward sanitary surveys. The state should explain how the new requirements will affect its program and whether existing resources will be adequate. When existing resources are clearly inadequate, the state should provide EPA with a plan for obtaining additional support before the compliance dates of the rule.

Implementation

Finally, the state should provide EPA with a brief description of its plan for meeting the requirements of 40 CFR 142.16(o)(2)(i) given existing or planned resources, the number of affected ground water systems, anticipated follow-up technical assistance and enforcement needs, and other program demands.

DEQ's Position: DEQ addresses frequency of sanitary surveys in rule at IDAPA 58.01.08.303. This rule section also describes the criteria which must be met if a system is to qualify for sanitary surveys at a five-year interval instead of every three years. DEQ and District Health Departments have been conducting sanitary surveys that address the eight elements specified in this special primacy requirement since 2000. This practice is formalized in a definition of sanitary surveys at 58.01.08.003. DEQ is adopting the Safe Drinking Water Act - Ground Water Rule by reference, which specifies in 40 CFR 141.400(5) that, if requested, ground water systems must provide any existing information that would assist DEQ in performing a hydrogeological assessment. It also specifies in 40 CFR 141.401 that ground water systems must provide any existing information needed to assist DEQ in completing an eight-element sanitary survey, including onsite examination of potential contamination sources in the vicinity of ground water wells. There is nothing to negotiate regarding these requirements, as the rule does not provide flexibility or decision-making authority to DEQ.

DEQ is concerned about the capacity of existing staff to complete sanitary surveys of ground water systems on a three-year schedule instead of every five years. There are 752 community ground water systems that currently are surveyed at five-year intervals. Assuming as a worst case scenario that few of these systems can qualify for a longer survey interval on the basis of either providing 4-logs virus treatment or meeting the criteria for "outstanding performance," this means that DEQ and Health Districts will have to increase the number of sanitary surveys from ~150 per year to ~250 per year (an increase of about nine surveys per month statewide). This accelerated frequency will begin in 2012 and the full increase in workload will be reached two years later. There will be no change in workload in respect to non-community ground water systems, which are already being surveyed on a five-year schedule. The Drinking Water Program has quantified the impact of this increase in workload and is working with DEQ management to obtain resources without exceeding the existing cap on agency-wide personnel.

5. B. Phased sanitary survey process

(ii) The State may use a phased review process to meet the requirements of (o)(2)(i) of this section if all the applicable elements of paragraphs (o)(2)(i)(A) through (o)(2)(i)(H) of this section are evaluated within the required interval.

EPA's Guidance

In view of the fact that states often conduct inspections of one or more of the eight components of a sanitary survey as part of program efforts separate from the sanitary surveys, the rule allows for those evaluations and inspections to be used in a staged or phased review process as long as all eight components are addressed within the required frequency. Other programs whose activities may serve to address one or more of the components include:

- Source Water Assessment and Protection Program

- Wellhead Protection Program
- Operator Training and Certification Program
- Technical Assistance Programs
- Capacity Development Programs

In addition, some systems are too large or complex to complete a sanitary survey in a single visit. If a state wishes to conduct sanitary surveys in a staged or phased process, the primacy revision application should contain a description of relevant programs and activities, how they will be coordinated, the timeframe, and who the responsible parties will be for follow-up enforcement in response to deficiencies. A justification is not required if a state chooses not to use the phased approach.

DEQ's Position: DEQ believes that the phased approach described in this primacy provision would needlessly complicate tracking of deficiencies and follow-up actions. DEQ will not exercise this option, at least in terms of delegating portions of the sanitary survey to other program groups. Information may be solicited from these groups on a case by case basis, but the task of completing and integrating the survey results will reside with the Drinking Water Program. Interested persons who disagree with this position are invited to attend negotiations and advise the agency on this issue.

5. C. Reduced frequency of sanitary surveys for community water systems

(iii) The State may conduct sanitary surveys once every five years for community water systems if the system either provides at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log inactivation and removal) before or at the first customer for all its ground water sources, or if it has an outstanding performance record, as determined by the State and documented in previous sanitary surveys and has no history of total coliform Maximum Contaminant Limits (MCL) or monitoring violations under § 141.21 of this chapter since the last sanitary survey. In its primacy application, the State must describe how it will determine whether a community water system has an outstanding performance record.

EPA's Guidance

This Special Primacy Requirement allows the state to decrease the frequency of sanitary surveys for some community ground water systems from once every 3 years to once every 5 years. The provision is designed to allow states to direct their limited resources toward systems that have the greatest potential for posing public health risks, i.e., those not achieving outstanding performance. States must have a procedure for determining whether a system should be considered to have outstanding performance. States should also consider integrating this procedure into the sanitary survey process. The procedure and policy for making these determinations should provide inspectors with enough direction to ensure consistent implementation. The policy should also describe who will make the final decision to reduce survey frequency.

In general, outstanding performance means that a system is well-operated and managed, has a good record of performance in past sanitary surveys, and has not had any violations in recent years. A state's specifications for outstanding performance may include factors such as the following:

- No violations of MCLs since the last sanitary survey.
- No violations of monitoring and reporting requirements since the last sanitary survey.
- No violations of primary drinking water regulations during the past 5 years (or similar time period).
- No waterborne disease outbreaks attributable to the water system during a specified period.
- The last sanitary survey contained no significant deficiencies.
- Existence of emergency preparedness measures and backup facilities.
- Expert management of system (e.g., managers are knowledgeable about providing quality drinking water; low staff turnover and positive staff morale; well-established water quality goals).
- Expert operation of the system (e.g., skilled, certified personnel in adequate numbers).
- Existence of quality operations and maintenance (O&M) manuals that are used by the staff.
- Adequate budget and revenues.
- Development and implementation of an effective cross-connection control program.
- Active public outreach programs (e.g., citizen participation committees).
- Stable water source (no interruptions in supply).
- Source water supply drawn from well(s) with sanitary construction, available documentation (e.g. driller's logs), and protected wellhead areas.
- No identified significant risk of future violations or problems (e.g., equipment past its service life).
- System capacity sufficient to meet anticipated growth.

As noted above, each state should have its own specifications for determining if a system has outstanding performance. The state may choose to use some or all of the above factors, different factors that have been developed by the state, or a combination of both.

DEQ's Position: DEQ established criteria for “outstanding performance” at the time the Interim Enhanced Surface Water Treatment Rule was adopted. A few surface water systems have qualified for this status and the result has been reduced pressure on limited state resources without any demonstrated loss in public health protection. DEQ proposes to use these criteria (slightly modified) to determine which ground water systems may qualify for a longer interval between sanitary surveys. DEQ believes that these criteria accurately reflect overall excellence in water system facilities, operation and management.

- 1) Deficiencies noted in the current survey have been corrected in accordance with a schedule acceptable to DEQ.
- 2) No Total Coliform Rule MCL violations since the last survey, unless it can be shown that any MCL violations that do exist are unrelated to deficiencies in system construction, treatment practices, operation, or management.
- 3) No monitoring or reporting violations during the past five years.
- 4) No waterborne disease outbreaks attributable to the system during the past five years.
- 5) Evidence of expert operation, such as an active cross-connection control program, O & M manuals current and accessible, and operator up to date on training and other licensing requirements.

Persons who would like to advise DEQ regarding the appropriateness of these criteria are invited to attend negotiations.

5. D. What constitutes a significant deficiency

(iv) The State must define and describe in its primacy application at least one specific significant deficiency in each of the eight sanitary survey elements in paragraphs (o)(2)(i)(A) through (o)(2)(i)(H) of this section. Significant deficiencies include, but are not limited to, defects in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that the State determines to be causing, or have potential for causing, the introduction of contamination into the water delivered to consumers.

EPA's Guidance

During sanitary surveys, inspectors often discover a wide range of deficiencies. Some are minor and have little near-term potential to pose risks to public health or safety. At the other end of the spectrum are deficiencies that provide the near-term potential for drinking water to be unsafe or the water system to be operated in a manner that threatens the safety of operators or the public. States must establish procedures for inspectors to use to determine the point at which deficiencies become “significant.” The first step in this process is to define what characteristics constitute “significant deficiencies.” Many public health professionals believe that any aspect of a GWS (source, transmission, pumping, treatment, storage, distribution, operation, maintenance, management, etc.) that may cause, or have potential to cause, risks to public health or safety should be considered a significant deficiency. EPA does not specify the definition that a state

must use; rather, the EPA suggests that states use their best professional judgment and expertise to develop and apply their own definitions.

The second step is for the state to develop a procedure whereby inspectors can evaluate system defects and determine their significance (i.e., whether it meets the state definition of significant deficiency). The procedure could begin with questions to be asked about each defect. As much as possible, states are encouraged to develop technically specific definitions of significant deficiencies. A few more general examples (not intended to be complete) of questions that may help inspectors in making determinations are the following:

- Is there the potential for contaminants to be introduced to the drinking water due to the deficiency?
- Would the conditions causing the deficiency be a violation of current state design, construction, treatment, or operating standards?
- If left uncorrected will the deficiency cause the potential for the introduction of contaminants at some point in the future?
- Does the deficiency affect treatment in an unacceptable manner?
- Does the deficiency pose risks to the safety of the public or operators?

States are encouraged to go beyond the minimum Special Primacy Requirement of providing at least one specific significant deficiency in each of the eight sanitary survey elements, and develop a more comprehensive list of deficiencies that meet the definition of “significant” that require immediate corrective actions. Such a list may be modified over time based upon state experience, and it is not likely that all deficiencies will be identified. By establishing its own definition of a significant deficiency and a list of what deficiencies it considers significant, a state provides consistency throughout all surveys and among inspectors.

The list below includes examples of deficiencies that may be considered significant public health issues. This list is not intended to be comprehensive, but serves as a guide to states for categorizing significant deficiencies. Other deficiencies could be deemed significant public health issues.

- Source
 - Not having a secured protective radius around a well.
 - Wells of improper construction.
- Treatment
 - Chemical feed rates not adjusted for changes in flow rate.
 - Inadequate disinfection Contact Time (CT).
 - Inadequate application of treatment chemicals.
- Distribution Systems
 - TCR sampling plan not representative of distribution system.
 - Negative pressures at any time.
 - Inadequate cross connection controls, either at the treatment facility or in the distribution system (or failure to have a cross connection control program, when one is required).
 - Unacceptable system leakage that could result in entrance of contaminants.
- Finished Water Storage
 - Inadequate internal cleaning and maintenance of storage tank.

- Improper venting of tank.
 - Lack of proper screening of overflow pipe and drain.
 - Inadequate roofing (e.g., holes in the storage tank, improper hatch construction).
 - Uncovered finished water reservoir.
- Pumps/Pump Facilities and Controls
 - Ponding of water in pump housing.
 - Inadequate pump capacity.
- Monitoring/Reporting/Data Verification
 - Failure to properly monitor water quality.
 - TCR sampling plan not available or not being followed.
 - Chronic TCR coliform detections with inadequate remediation.
- Water System Management/Operation
 - Lack of properly trained or licensed staff as required by the state.
 - Lack of approved emergency response plan.
 - Failure to meet water supply demands/interruptions to service (inadequate pump capacity, unreliable water source, lack of auxiliary power).
 - Inadequate follow-up to deficiencies noted in previous inspection/sanitary surveys.
- Operator Compliance with State Requirements
 - Operator does not have the correct level of certification as required by the state.

States should make this information available to inspectors performing the sanitary surveys so they can have guidelines available on which deficiencies meet the state's definition of significant. Inspectors can also use their state's definition of "significant deficiency" as guidance when they encounter other deficiencies that may pose a serious public health threat. If the state determines that a significant public health issue exists, corrective action must be required. State inspectors may judge other problems as significant enough from a public health viewpoint to require establishment of a compliance schedule with follow-up action.

DEQ's Position: DEQ has included, or is including as part of rulemaking associated with adoption of the Safe Drinking Water Act - Ground Water Rule, the following:

In Section 303—a list of deficiencies, one for each of the eight sanitary survey elements that will always be considered significant for regulatory purposes.

In Section 003 (Definitions)—a definition of "health hazards" and "significant deficiency." The first of these has been in the *Idaho Rules* for many years and has frequently been used to require correction of health hazards and significant deficiencies in ground water systems. The second of these two closely related definitions is specific to sanitary surveys.

52. Health Hazards. Any condition which creates, or may create, a danger to the consumer's health. Health hazards may consist of, but are not limited to, design, construction, operational, structural, collection, storage, distribution, monitoring, treatment or water quality elements of a public water system. See also the definition of Significant Deficiency, which refers to a health hazard identified during a sanitary survey.

101. Significant Deficiency. As identified during a sanitary survey, any defect in a system's design, operation, maintenance, or administration, as well as any failure or malfunction of any system component, that the Department or its agent determines to cause, or have potential to cause, risk to health or safety, or that could affect the reliable delivery of safe drinking water. See also the definition of Health Hazards.

In addition, DEQ uses a standard sanitary survey form which specifies which deficiencies are significant and which deficiencies may or may not be significant, depending on site specific circumstances. DEQ feels that this approach is protective of public health while also respecting the professional judgment of inspectors who conduct sanitary surveys in the state.

Persons who wish to advise the agency on this point are invited to attend negotiations.

Sanitary Survey Element	Candidate "Significant Deficiencies"
1) Source	No sanitary cap on well casing. (IDAPA 58.01.08.511.06.b.)
2) Treatment	Chemical addition not flow proportioned, including emergency shut-off. (IDAPA 58.01.08.531.02.b.ii.)
3) Distribution system	No means for flushing dead end main. (IDAPA 58.01.08.542.09)
4) Finished water storage	Roof of storage leaking. (IDAPA 58.01.08.544.09 and 09.c.)
5) Pumps, pump facilities, and controls	No accessible check valve between pump and shut-off valve. (IDAPA 58.01.08.511.04)
6) Monitoring, reporting, and data verification	Overdue TCR samples. (IDAPA 58.01.08.100.01.a.)
7) System management and operation	Operation and Maintenance (O & M) manual lacking (IDAPA 58.01.08.501.12)
8) Operator compliance with State licensing requirements	Responsible charge operator lacks license appropriate to system classification. (IDAPA 58.01.08.554.02)

5. E. Notice to system of significant deficiencies

(v) As a condition of primacy, the State must provide ground water systems with written notice describing any significant deficiencies no later than 30 days after the State identifies the significant deficiency. The notice may specify corrective actions and deadlines for completion of corrective actions. The State may provide the written notice at the time of the sanitary survey.

EPA's Guidance

States must describe their process of how they will inform systems of identified significant deficiencies. The GWR requires states to provide ground water systems with written notice describing any significant deficiencies no later than 30 days after the state identifies the significant deficiency. If the significant deficiency is identified during a sanitary survey, the state may provide the written notice at the time of the sanitary survey. For example, some states use forms that are completed during the sanitary survey identifying significant deficiencies found during the survey. The forms can be carbon copies; the state inspector and water system representative should both sign the form at the end of the sanitary survey, and each person should receive a copy of the signed form. EPA believes such an approach would qualify as written notification for the state and satisfy this notification requirement.

DEQ's Position: DEQ satisfies this primacy requirement by providing the following rule language in Section 303 of the *Idaho Rules for Public Drinking Water Systems*.

As part of the sanitary survey report or as an independent action, the Department shall provide written notice to the water system describing any significant deficiency within 30 days after the Department identifies the significant deficiency. The notice may specify corrective actions and deadlines for completion of corrective actions.

DEQ does not believe there is anything to negotiate because this primacy requirement does not provide flexibility or decision-making authority to the primacy agency.

6. Special Primacy Requirements Regarding Routine Source Water Microbial Monitoring

40 CFR 142.16 Special primacy requirements. (o)(3) State practices or procedures for source water microbial monitoring. The state's primacy application must include a description of the four criteria described in sections 6a, 6b, 6c, and 6d.

EPA's Guidance

The Special Primacy Requirements of 40 CFR 142.16(o)(3) address the rationales the state used when determining source water monitoring criteria.

The following guidance addresses each subsection of 40 CFR 142.16(o)(3)(i) through (iv) in order; however, the arrangement and structure of the state's description are discretionary provided the state gives sufficient detail to demonstrate that its strategy and capacity are adequate for meeting the Special Primacy Conditions.

6. A. Extending 24-hour time limit to collect a triggered source water sample

(i): Criteria that will be used under 40 CFR 141.403(a)(2)(i) and 141.402(d)(2) for extending the 24-hour time limit for a system owner to collect a ground water source sample to comply with the source water monitoring requirements.

EPA's Guidance

In this Special Primacy Requirement, states must address allowable situations that would prevent a GWS owner or operator from collecting a required triggered source water sample within the 24-hour time limit. Factors may include lab availability (e.g., lab closed on the weekend) and mail service. States may allow a delay in triggered source water sampling when an extreme condition or circumstance would put the sample collector in danger (e.g., severe weather conditions) or the delay cannot be avoided. If additional time is allowed for sampling, the system owner or operator should sample as close to the 24-hour window as possible. EPA suggests that states require systems to call for pre-approval of the delay.

DEQ's Position: DEQ is satisfied with EPA's guidance on this issue. DEQ's *Implementation Guidance for the Safe Drinking Water Act - Ground Water Rule* contains a description of criteria that will be used to determine when the 24-hour time limit for a system to collect a ground water source sample may be extended. These criteria include:

- 1) Lab unavailable—lab is closed for weekend or holiday.
- 2) Mail service—unable to ship on time, or arrival at lab will be delayed.
- 3) Severe weather or other extreme circumstances—sample can't be taken without personal danger, or weather will cause delay in sampling or shipping.

Interested persons who would like to advise DEQ on these criteria, or suggest additional criteria, are invited to attend negotiations.

6. B. Total coliform-positive sample solely the result of a distribution system deficiency

(ii): Criteria that will be used under 40 CFR 141.402(a)(5) and 141.402(a)(5)(ii) to determine whether the cause of a total coliform-positive sample taken under 40 CFR 141.21 (Total Coliform Rule) is directly related to the distribution system.

EPA's Guidance

Triggered source water monitoring is required after a total coliform-positive sample is collected from the distribution system in compliance with the TCR. The state may waive the triggered source water monitoring requirement if the state determines and documents, in writing, that the total coliform-positive sample is solely a result of a documented distribution system deficiency.

To meet this Special Primacy Requirement, states must describe how a determination to waive triggered source monitoring would be made. States may consider that samples constitute documentation of a distribution system deficiency. For example, follow-up distribution sampling or system repair records may be useful. Some examples are:

- If the water system is known to have recurring documented biofilm problems and the total coliform-positive sample is convincingly related to biofilm growth in the distribution system.
- After a storage tank inspection where contamination is evident.
- After main repair or repair of a storage tank.
- In a zone of the distribution system where water pressure is negative or low (e.g., less than 20 psi).
- When it is likely that contamination is the result of a cross connection in the distribution system.
- The reasons for triggered source water samples not being taken should be valid and defensible, and past distribution system problems supporting the total coliform-positive result should have been documented before the positive coliform sample result was received.

DEQ's Position: DEQ believes that criteria suggested by EPA are valid and these will be included in DEQ's implementation guidance for the Safe Drinking Water Act - Ground Water Rule. However, it is possible that a wider range of circumstances should be considered when making this determination. Persons who have experience in water system distribution operations are invited to attend negotiations and advise DEQ on this issue.

6. C. Invalidation of fecal indicator-positive samples

(iii): *Criteria for determining whether to invalidate a fecal indicator-positive sample under 40 CFR 141.402(d)(1).*

EPA's Guidance

For this Special Primacy Requirement, states must describe criteria they will use to determine whether a fecal indicator-positive sample does not reflect the true source water quality and should therefore be invalidated. Criteria may not be based solely on a belief that improper sample collection procedures were used. Suspected improper sample collection procedures are not considered adequate cause because sample collector handling error is rarely a cause of fecal contamination.

States must use the provisions for sample invalidation criteria reported in the TCR at 40 CFR 141.21(c). In summary, these criteria are:

- If the laboratory establishes that improper sample analysis caused the fecal indicator-positive result.
- If the state has substantial grounds to believe that a fecal indicator-positive result is due to a circumstance or condition that does not reflect water quality in the ground water source. In this case, the system must collect another source water sample within 24 hours of being notified by the state of its invalidation decision, and have that sample analyzed for the same fecal indicator that was analyzed in the invalidated sample. The state may extend the 24-hour time limit on a case-by-case basis if the system cannot collect the source water sample within 24 hours due to circumstances beyond its control. In the case

of an extension, the state must specify how much time the system has to collect the sample.

- The state should document its decision to invalidate a sample, along with the rationale for the decision, in writing. The decision should be approved and signed by the supervisor or the state official who recommended the decision, and the document should be made available to EPA and the public. The written documentation should state the specific cause of the fecal indicator positive sample, and what action was taken by the system in response.
- The state should not invalidate a fecal indicator-positive sample solely on the grounds that repeat samples were fecal indicator negative.

DEQ's Position: Again, DEQ will follow EPA's guidance and the language in the federal rule. For convenient access by system operators, criteria will be described in DEQ's implementation guidance for the Safe Drinking Water Act - Ground Water Rule. Given the importance of these samples in terms of public health protection, and considering the implications that positive results could have for water system treatment requirements, DEQ believes that improper sampling technique or careless handling of samples is unlikely to occur with well trained operators and should not serve as the basis for a decision to invalidate. Persons with expertise in microbial sampling and laboratory analysis for fecal indicators are invited to attend negotiations and advise DEQ if additional criteria should be taken into account when considering sample invalidation.

6. D. Monitoring at a Location After Treatment

(iv): Criteria the State will use to allow source water microbial monitoring at a location after treatment under 40 CFR 141.402(e)(1).

EPA's Guidance

Systems must collect source water samples at a location prior to any treatment. The state may, however, allow systems to collect samples after chemical treatment if the state determines that collecting a sample before treatment is not feasible and if the treatment is unlikely to have an adverse effect on sample analysis. In general, any preceding treatment should not interfere with the analytical method used to measure the fecal indicator, nor should the treatment provide any inactivation or removal of the fecal indicator being tested. For example, ground water treatment with greensand filters frequently uses potassium permanganate to oxidize iron and manganese before filtering those metals out. Potassium permanganate may provide some inactivation of, and filtration is likely to remove, viruses and bacteria. Therefore, it would not be appropriate for a system to collect a triggered source water sample after its greensand filters. On the other hand, wells that pump sand are often equipped with sand separators that are unlikely to have an impact on the microbial quality of the water.

States could meet this requirement by stating that sampling locations after treatment will only be allowed if a system meets two conditions are shown to be met: 1) the treatment will have no impact on microbial quality of the water, and 2) it is not possible to directly sample the untreated water.

DEQ's Position: DEQ will follow EPA guidance on this question. Water systems that want to take source samples following any treatment process will have the burden of demonstrating that the treatment will not interfere with the detection of microbial organisms in the raw water. In general, this will be difficult to do for most types of treatment, because any filtering or chemical changes that may occur have the potential to alter the abundance and distribution of organisms if any are present in the raw source water. Persons with experience in the effects of drinking water treatment processes on microbial occurrence or concentration are invited to attend negotiations and advise DEQ on this topic.

7. Special Primacy Requirements Regarding Treatment Technique Requirements.

40 CFR 142.16 Special primacy requirements. (o)(4) State practices or procedures for treatment technique requirements. As a condition of primacy, the State must verify that significant deficiencies or source water fecal contamination have been addressed. The State must verify within 30 days after the ground water system has reported to the State that it has completed corrective action. The State must verify either through written confirmation from the GWS or a site visit by the State. Written notice from the GWS under 141.405(a)(2) of this chapter may serve as this verification. The State's primacy application must include the following:

7. A. Confirmation of system achieving at least 4-log treatment of viruses.

(i): The process the state will use to determine that the operators of a ground water system are able to achieve at least a 4-log treatment of viruses (using inactivation, removal, or a combination of inactivation and removal) before or at the first customer for a ground water source for systems that are not subject to the source water monitoring requirements of 141.402(a) because the owner of a ground water system has informed the State that it provides at least 4-log treatment of viruses.

EPA's Guidance

The state must explain the criteria that will be used for determining when an owner of a ground water system has met the 4-log inactivation requirements. The state should be explicit in its explanation as to how it will confirm that the system owners are achieving 4-log treatment of viruses. Criteria may include determination of the appropriate treatment technology, treatment design and specifications constituting sufficient inactivation and or removal, the minimum contact time required for compliance to be achieved at the minimum disinfectant residual, and submission of records of contact time calculations or records documenting maintenance of a minimum disinfectant residual.

EPA recommends that the state use applicable EPA-developed virus CT (the product of disinfection concentration in mg/L and time in minutes) tables to determine the concentration and contact time requirements necessary to achieve 4-log virus inactivation using chemical disinfection. If alternative criteria will be used by ground water systems or compliance, the state must describe the treatment and compliance monitoring basis for the specified 4-log virus inactivation method. The description should include how the state will factor into its determination contact time correction factors (e.g., baffling factors), pH, temperature, flow, and minimal residuals.

While the GWR does not include CT tables for 4-log inactivation of viruses, states are encouraged to consider CT tables developed for the Surface Water Treatment Rule as helpful references when developing minimum disinfection requirements. Table 4-4 provides CT values for inactivation of viruses by free chlorine in waters with pH values falling within the range of 6.0 to 9.0. Table 4-5 provides CT values for inactivation of viruses by chlorine dioxide in waters with pH values falling between 6.0 and 9.0. Table 4-6 provides CT values for inactivation of viruses by ozone. The CT tables provided in Tables 4-4 through 4-6 have been adapted from tables provided in EPA's *Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources*, March 1991 Edition. No CT table is provided for chloramines because EPA anticipates that CT values needed to achieve 4-log virus inactivation using chloramines will be prohibitively high for most ground water systems.

States should describe criteria for determining effective contact times provided by typical configurations for hydropneumatic tanks and other storage facilities that owners of Ground water systems will use to obtain disinfectant contact time. For example, hydropneumatic pressure tanks and storage tanks that "ride" or "float" on the distribution system should not typically be considered for provision of contact time because the chemically treated water is not obliged to pass through them under all conditions of flow. States should also explain their approach to making baffling factor determinations. Owners of larger Ground water systems with gravity storage can obtain guidance for determining the effectiveness of chemical disinfection in EPA's 1991 edition of *Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources*. Also, Appendix D in EPA's *Disinfection Profiling and Benchmarking Guidance Manual* (EPA-815-R-99-013, August 1999) provides information on baffling factors, tracer studies and other issues related to determining the amount of disinfectant contact time provided by water systems.

While the above referenced guidance manuals are especially helpful to surface water systems, they should not be expected to provide all the information necessary for ground water systems. This is true for a few reasons. First, while both ground and surface water systems are most likely to use free chlorine as a chemical disinfectant, the target organisms of most concern are very different. In the case of surface water systems, the target organism is *Giardia lamblia*. Ground water systems, on the other hand, target viruses. In comparing the disinfection requirements for two systems with the same temperature (15 degrees C), pH (7) and chlorine residual (1.0 mg/L), the respective CT requirements can be very different. For a surface water system the requirements would be 25 mg/L-min. for 1-log and 75 mg/L-min. for 3-log *Giardia lamblia* inactivation; therefore requiring 25 minutes contact time in one case and 75 minutes in the other. For a ground water system the requirement would be 4 mg/L-min. for 4-log virus inactivation. Thus, 4 minutes of contact time.

Therefore, while the surface water guidance recommends consideration of a worst-case scenario at daily peak hourly flow, this may not be appropriate for all ground water systems. The second major difference between ground and surface water systems is also related to water production rates. While most surface water plants generally produce water at constant rates and have clearwells to provide contact time, this is not true for many Ground water systems, particularly the smaller Ground water systems (i.e., those serving less than 100 people). Small Ground water systems typically have wells that pump into the distributions system and are equipped with hydropneumatic tanks intended to limit the cycling of the well pumps. For these systems a

Table 4-4. CT Values for Inactivation of Viruses by Free Chlorine, pH 6.0-9.0

Degrees C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Inactivation (log)																									
2	5.8	5.3	4.9	4.4	4.0	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.2	2.0	1.8	1.6	1.4	1.2	1.0	1.0	1.0	1.0	1.0	1.0
3	8.7	8.0	7.3	6.7	6.0	5.6	5.2	4.8	4.4	4.0	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.2	2.0	1.8	1.6	1.4	1.2	1.0
4	11.6	10.7	9.8	8.9	8.0	7.6	7.2	6.8	6.4	6.0	5.6	5.2	4.8	4.4	4.0	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.2	2.0

CT values provided in the tables are modified by linear interpolation between 5°C increments.

Table 4-5. CT Values for Inactivation of Viruses by Chlorine Dioxide, pH 6.0-9.0

Degrees C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Inactivation (log)																									
2	8.4	7.7	7.0	6.3	5.6	5.3	5.0	4.8	4.5	4.2	3.9	3.6	3.4	3.1	2.8	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.5	1.4
3	25.6	23.5	21.4	19.2	17.1	16.2	15.4	14.5	13.7	12.8	12.0	11.1	10.3	9.4	8.6	8.2	7.7	7.3	6.8	6.4	6.0	5.6	5.1	4.7	4.3
4	50.1	45.9	41.8	37.6	33.4	31.7	30.1	28.4	26.8	25.1	23.4	21.7	20.1	18.4	16.7	15.9	15.0	14.2	13.3	12.5	11.7	10.9	10.0	9.2	8.4

CT values provided in the tables are modified by linear interpolation between 5°C increments.

Table 4-6. CT Values for Inactivation of Viruses by Ozone

Degrees C	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Inactivation (log)																									
2	0.90	0.83	0.75	0.68	0.60	0.58	0.56	0.54	0.52	0.50	0.46	0.42	0.38	0.34	0.30	0.29	0.28	0.27	0.26	0.25	0.23	0.21	0.19	0.17	0.15
3	1.40	1.28	1.15	1.03	0.90	0.88	0.86	0.84	0.82	0.80	0.74	0.68	0.62	0.56	0.50	0.48	0.46	0.44	0.42	0.40	0.37	0.34	0.31	0.28	0.25
4	1.80	1.65	1.50	1.35	1.20	1.16	1.12	1.08	1.04	1.00	0.92	0.84	0.76	0.68	0.60	0.58	0.56	0.54	0.52	0.50	0.46	0.42	0.38	0.34	0.30

CT values provided in the tables are modified by linear interpolation between 5°C increments.

pressure switch turns the well pump on at a minimum distribution system pressure (e.g., 35 psi), then the well pumps water until an upper pressure is reached, perhaps 65 psi, and the pressure switch turns the pump off. As shown by the example pump curve in Figure 4-2, the flow rate from the well varies greatly as the pressure changes during the pump cycle. At the turn-on pressure of 35 psi, the well production rate is 58 gpm or about 145% of the flow rate at shut-off pressure (65 psi). In a typical small hydropneumatic tank system, the well may often pump at this higher rate for several minutes during peak demand periods. Therefore, it is appropriate for states to consider these momentary peaks in water demand for determining the provisions necessary to ensure adequate contact time.

Figure 4-2. Example Pump Curve for A Ground Water Well

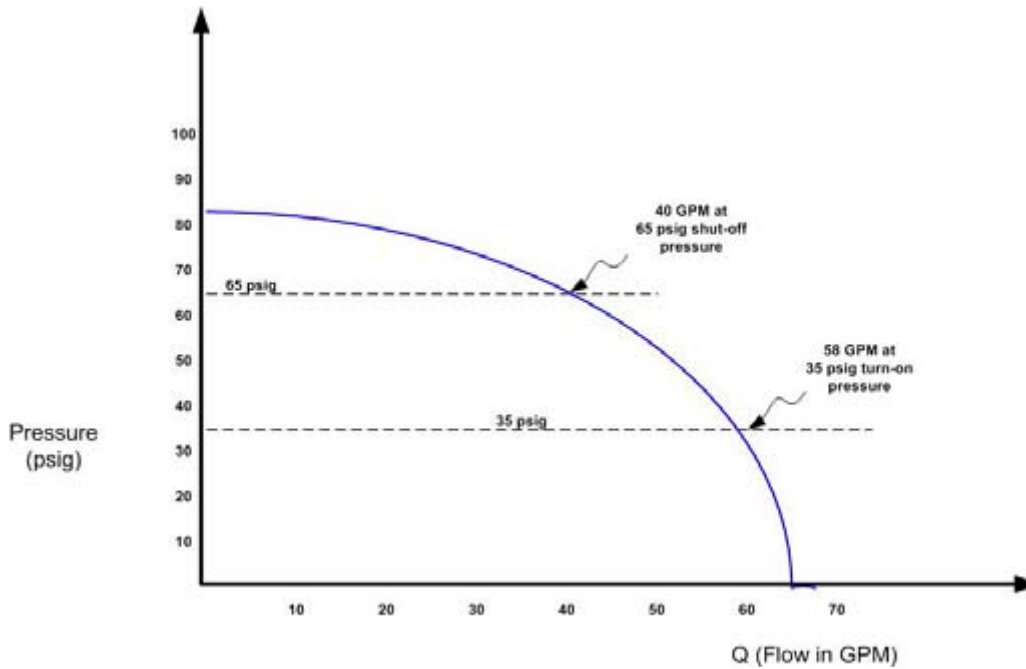
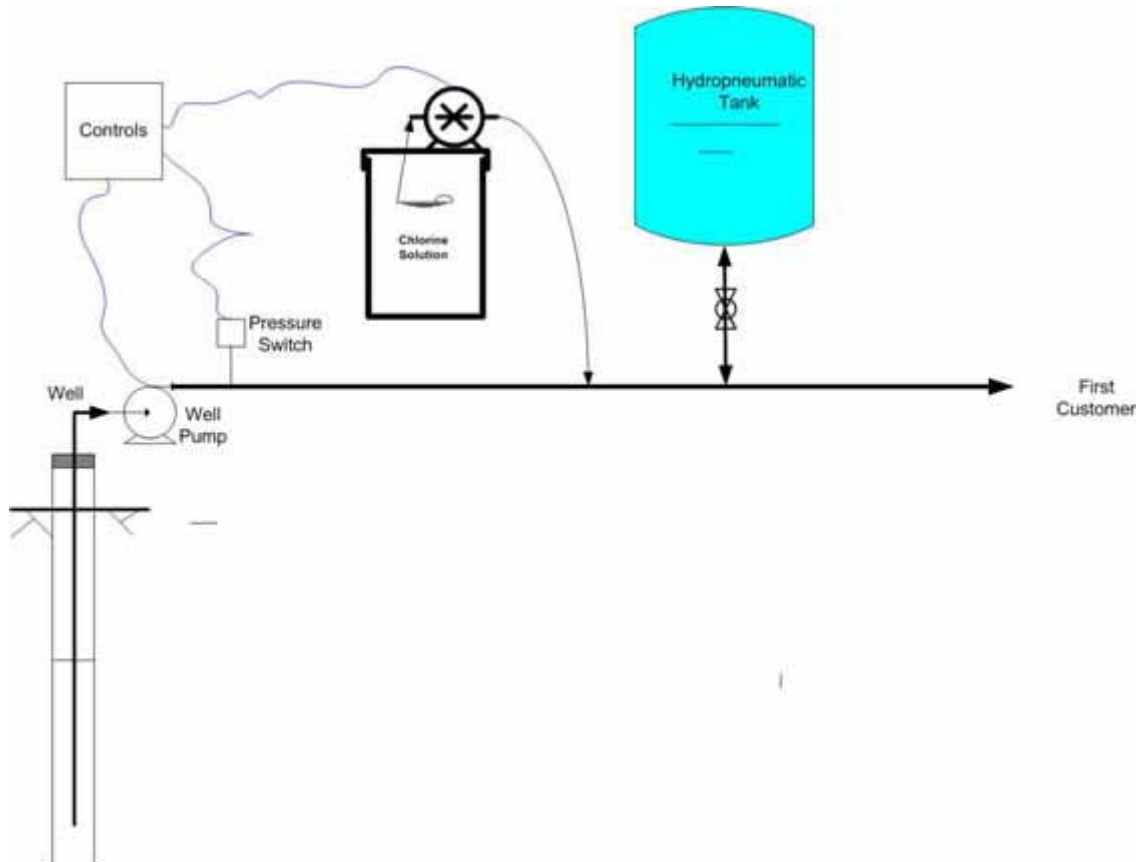


Figure 4-3 shows a schematic drawing of a typical small GWS well equipped with a shallow well pump and a hydropneumatic tank for limiting the pump's cycling. As shown, the chlorine solution is injected into the discharge line ahead of the hydropneumatic tank. However, the volume of the tank cannot be considered for contact time because, when turn-on pressure occurs, the tank is effectively empty. At this point the pump is producing 58 gpm and, during peak demand times, all water will be bypassing the hydropneumatic tank and entering the distribution system to satisfy demand. Therefore, there should be provisions to provide the minimum contact time between the point of chlorine injection and the first customer. In this example, that means a minimum effective volume of 232 gallons (58 gpm X 4 min. = 232 gallons). Assuming the pipe between the discharge chlorine injection point and the first customer is all 2-inch diameter, 1,422 feet of pipe would be necessary to provide 4 minutes of contact time at 58 gpm (i.e., $\frac{\pi}{4} (2/12')^2 \times 1,422' \times 7.48 \text{ gallons/ft}^3 = 232 \text{ gallons}$). For most small systems, it is unlikely that there is that much pipe between the well and the first customer. As a result, provisions for contact time will often have to be added to ensure 4-log virus inactivation. There are a variety of ways contact time can be added in small ground water systems where possible, it is best and least expensive to try and add the contact time without the need for re-pumping the treated water. In this example, one could put 40 feet of 12-inch water main between the chlorine injection point and the first customer (i.e., $\frac{\pi}{4} (1')^2 \times 40' \times 7.48 \text{ gallons/ft}^3 = 235 \text{ gallons}$).

and, assuming plug flow, there would be a minimum of 4 minutes contact time at 58 gpm, thus, a CT of 4 mg/L-min. with a free chlorine residual of 1.0 mg/L.

Figure 4-3. Schematic of Hydropneumatic System



In some cases where there is adequate above-ground, heated storage, pressure vessels with a high length to diameter ratio can be useful tools for adding contact time without the need for pumping to storage and re-pumping. For example, five vessels in series, with each vessel having a diameter of 1.5 feet and a length of 8 feet, would have a gross volume of 528 gallons. If the state granted a baffling factor of 0.7, this would provide an effective volume of 370 gallons, more than enough to ensure 4 minutes contact time.

Unlike chemical disinfectants, Ultra Violet (UV) light leaves no residual that can be monitored to determine UV dose and inactivation credit. The UV dose depends on UV intensity (measured by UV sensors), flow rate, and UV transmittance (UVT). UV intensity measurements may account for UVT depending on sensor locations.

For systems using UV light, a relationship between the required UV dose and these parameters should be established and then monitored at the water treatment plant to ensure sufficient disinfection. EPA has developed a UV dose table (Table 4-7) for inactivation of viruses. Data published subsequent to the GWR proposal has indicated that some viruses, particularly adenoviruses, are more resistant than other viruses to UV light. Therefore, the final GWR does not include an explicit reference to UV light as a stand-alone technology to achieve 4-log virus

inactivation. EPA is concerned that fecal-contaminated ground water may contain adenoviruses, or other viruses, that are resistant to UV inactivation.

Table 4-7. Virus Inactivation from UV dose (mJ/cm²)¹

Target Pathogen	Log Inactivation							
	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Viruses	39	58	79	100	121	143	163	186

1. 40 CFR 141.720(d)(1).

Any UV reactors used for virus inactivation should undergo challenge testing to validate the dose level delivered so that effective public health protection is provided by systems using UV light disinfection. At present, EPA is unaware of available challenge testing procedures that can be used to validate the performance of UV reactors at dose levels needed for a 4-log inactivation of adenovirus.

The UV technology can, however, be used in a series configuration or in combination with other inactivation or removal technologies to provide a total 4-log treatment of viruses to meet the GWR's requirements. EPA believes that a UV reactor dose verification procedure for 4-log inactivation of a range of viruses may be developed in the future. With the future development of UV validation procedures, it may become feasible for systems to demonstrate that they can achieve 4-log inactivation of viruses with a single UV light reactor. Therefore, the GWR allows states to approve and set compliance monitoring and performance parameters for any alternative treatment, including UV light or UV light in combination with another treatment technology that will ensure that systems continuously meet the 4-log virus treatment requirements.

The UV doses provided in Table 4-7 account for uncertainty in the UV dose-response relationships of viral pathogens but do not address other significant sources of uncertainty in full-scale UV disinfection applications. These other sources of uncertainty are due to the hydraulic effects of the UV installation, the UV reactor equipment (e.g., UV sensors), and the monitoring approach. Due to these factors, Ground water systems installing UV should use UV reactors that have undergone validation testing. This validation testing should determine the operating conditions under which the reactor delivers the required UV dose for treatment credit. Operating conditions should include flow, UV intensity as measured by a UV sensor, and UV lamp status. For more information on UV validation testing, refer to *EPA's Ultraviolet Disinfection Guidance Manual* (EPA 815-R-06-007, November 2006).

To receive inactivation credit, the UV reactors should be operated within the validated limits. When a UV reactor is operating outside of these limits, the UV reactor is operating off-specification. Ground water systems that use UV disinfection to provide inactivation of viruses for GWR compliance should demonstrate that at least 95 percent of the water delivered to the public during each month is treated by UV reactors operating within validated limits. Guidance on determining validated operating conditions is provided in *EPA's Ultraviolet Disinfection Guidance Manual* (EPA 815-R-06-007, November 2006).

DEQ's Position: DEQ will use EPA's guidance, along with past experience gained in evaluating surface water treatment facilities, to determine when a ground water system is achieving 4-logs treatment of viruses through disinfection or a combination of disinfection and removal. In general, this decision will be based on standard engineering analyses of retention time, baffling factors, flow characteristics, disinfectant concentration, pH and temperature of the water being treated (where applicable), CT calculations, and removal efficiencies for specific membrane technologies. DEQ believes that the language in 40 CFR 141.403(b) and in the facility standards sections of the *Idaho Rules for Public Drinking Water Systems* provide DEQ with authority to require submission of engineering data to support the determination by the Department of the level of virus treatment that is being achieved prior to or at the first customer for each ground water source in use by the water system. A discussion of the Department's expectations in this regard is provided in the *Implementation Guidance for the Safe Drinking Water Act - Ground Water Rule*.

Persons who wish to advise DEQ on the criteria that should be used to demonstrate 4-log virus treatment of ground water are invited to attend negotiations.

7. B. Determine the minimum residual disinfectant concentration

(ii): *The process the state will use to determine the minimum residual disinfectant concentration the system must provide prior to the first customer for systems using chemical disinfection.*

EPA's Guidance

Residual disinfectant concentration is the concentration of the disinfectant (in mg/L) at a point before or at the first customer. Systems conducting compliance monitoring and providing chemical disinfection must maintain a minimum residual disinfectant concentration at or before the first customer. The state primacy application must include an explanation and rationale for how the state will decide what that minimum residual disinfectant concentration will be for each system. If the state sets the minimum residual disinfectant concentration level on a system-by-system basis, the application will need to explain the rationale and information that will be required from systems in order to make the determination.

States may consider setting minimum residual disinfectant concentrations on a system-by-system basis in accordance with CT requirements. Systems with substantial contact time before their first customers can achieve the required CT at a lower disinfectant residual concentration than systems with limited contact time. Therefore, states may determine it is appropriate to have different minimum residual disinfectant concentrations depending on the contact time available before the first customer. Alternatively, states may decide to require a uniform minimum residual disinfectant concentration that will apply to all systems using chemical disinfectant. In this case, states would have to take measures in their permitting process to ensure that adequate contact is available in each system to achieve 4-log virus inactivation. For either requirement, the state must explain in its primacy application the basis for its approach.

One approach for meeting this primacy requirement would be to point out that the state through its permitting (plant and specification approval) process, would address each system's specific configuration, water quality (e.g., temperature, pH), and require conditions of chlorine residual

and contact time at peak momentary demand that would result in a minimum CT capable of inactivating 4-log viruses in accordance with EPA's CT tables.

DEQ's Position: DEQ will first establish operating conditions under which adequate treatment is achieved by the ground water system. This decision will be based on the submittal of engineering data by the water system as discussed under the previous primacy requirement. After this step is complete, DEQ will determine what parameters must be monitored and on what frequency in order to demonstrate that continuous compliance with the treatment technique requirement is achieved. For most systems, this will probably be limited to measuring and recording disinfectant residual concentration on a daily basis prior to the first customer. Additional reporting may be required for systems practicing a combination of removal and disinfection, or systems using UV disinfection as part of the treatment train. DEQ will develop monitoring and reporting protocols for these last two treatment strategies if water systems in Idaho decide to use them. Due to the ease and quickness of chlorination as a means of achieving virus treatment, DEQ believes that this will be the treatment of choice for systems that decide to treat voluntarily, or systems that are required to treat as a result of fecal contamination in a ground water source or sources.

Persons having expertise in drinking water treatment who wish to advise DEQ on this topic are encouraged to attend negotiations.

7. C. State-approved alternative technologies

(iii): The state-approved alternative technologies that ground water systems may use alone or in combination with other approved technologies to achieve at least 4-log treatment of viruses (using inactivation, removal, or a state-approved combination of inactivation and removal) before or at the first customer for a ground water source.

EPA's Guidance

Under this Special Primacy Requirement states must identify the state-approved alternative technologies that the ground water system may use alone or in combination with other approved technologies to achieve at least 4-log virus inactivation, removal, or a state-approved combination of these technologies before or at the first customer. The application should include a list of the approved alternative technologies and the rationale for allowing the use of the alternative technologies.

States may want to allow themselves flexibility to address technologies that may emerge in the future by obtaining the authority to review and approve all treatment/disinfection technologies that have potential to be applied for removal and inactivation of microbial contaminants. If they do this, they should ensure in their permitting/approval process that there is adequate evidence confirming the long-term ability of the process(s) to achieve at least 4-log virus treatment. Systems may claim credit for UV processes for inactivation of viruses. Earlier sections of this guidance have explained EPA's concerns about current limitations of challenge testing of UV reactors with respect to adenoviruses (and perhaps other viruses) and EPA's recommendations to states regarding the application of UV treatment.

DEQ's Position: DEQ has sufficient authority in its rules governing facility and design standards to require submittal of engineered plans and specifications demonstrating the effectiveness of alternative technologies, both in the present and those that might emerge in the future. Due to the current assessments of the ability of UV disinfection to inactivate certain types of pathogenic viruses, DEQ believes that this technology will have little applicability in the treatment of ground water. A better application for UV disinfection is in surface water systems where inactivation of protozoans like Crypto and Giardia is needed.

7. D. Monitoring and compliance criteria

(iv): The monitoring and compliance requirements the state will require for GWSs treating to at least 4-log treatment of viruses (using inactivation, removal, or a state-approved combination of inactivation and removal) before or at the first customer for state approved alternative treatment technologies.

EPA's Guidance

State primacy applications should include an explanation of the monitoring requirements and compliance criteria the state will require for owners of systems using alternative treatment technologies. This includes an explanation of the types of monitoring and reporting that owners of systems will have to complete and submit to the state.

For example, EPA recommends that operators of PWSs check their UV units daily to ensure they are operating properly. PWSs operators should monitor their UV reactors to determine if the reactors are operating within validated conditions. This monitoring should include UV intensity as measured by a UV sensor, flow rate, lamp status, and other parameters designated by the state. UV reactors should also be regularly monitored to diagnose operating problems, determine when maintenance is necessary, and maintain safe operation.

In addition to monitoring operational parameters, owners of PWSs should verify the calibration of UV sensors in accordance with a protocol that the state approves. States are encouraged to refer to EPA's *Ultraviolet Disinfection Guidance Manual Final* (EPA 815-R-06-007, November 2006) for more information on routine monitoring and calibration of UV units.

States are encouraged to require owners of GWSs using UV to prepare and submit monthly reports to the state. The monthly report should include the percentage of off-specification water for the UV facility and the UV sensor calibration monitoring. The percentage of UV sensors checked for calibration should also be reported monthly. All UV sensors in operation that month should be checked. Additionally, the daily low validated dose or daily low UV intensity, depending on the dose-monitoring strategy, should be reported to the state monthly.

Example 4-4 provides an example of a summary report that could be completed by the owner of a PWS and submitted to the state on a monthly basis. Examples 4-5 and 4-6 are example operating logs that would be completed on a daily basis for the calculated dose and UV Intensity Setpoint Approach, respectively. The forms would be used to record the operating status of the UV equipment and to record the volume of water discharged during off-specification operation each

day. Additional examples of operating logs for UV are provided in EPA's *Ultraviolet Disinfection Guidance Manual* (EPA 815-R-06-007, November 2006).

Additional items states may want systems using UV disinfection to report on periodically include:

- Date the UV tube was last replaced;
- If UV unit is preceded by filtration (e.g. a 5-micron cartridge filter), date the filter was last changed;
- If additional water quality monitoring is required (e.g. turbidity, coliform, iron, manganese), most recent analytical results; and,
- Whether a spare UV tube and other necessary equipment are available on site. States may want to consider each technology, or combination of technologies, on a case-by-case basis and require appropriate monitoring for ensuring that a minimum of 4-log virus removal/inactivation would be achieved during peak momentary demand.

DEQ's Position: As stated above, DEQ doubts that UV disinfection will be useful or affordable in ground water disinfection applications. Should a system choose to specify UV treatment, DEQ will use criteria presented in *Ultraviolet Disinfection Guidance Manual for the Final Long Term 2 Enhanced Surface Water Treatment Rule*, EPA 815-R-06-007, November 2006, which is available on the Internet at <http://www.epa.gov/safewater/disinfection/lt2/compliance.html>. Persons with expertise in UV disinfection are invited to attend negotiations and advise DEQ on this topic.

7. E. Monitoring, compliance, and membrane integrity testing requirements

(v): The monitoring, compliance and membrane integrity testing requirements the state will require to demonstrate virus removal for GWSs using membrane filtration technologies.

The owner of a GWS that uses membrane filtration to meet the treatment technique requirements must monitor the membrane filtration process in accordance with state-specified monitoring requirements. A GWS that uses membrane filtration is in compliance with the treatment requirement to achieve at least 4-log removal of viruses when:

- The membrane has an absolute molecular weight cut-off or an alternate parameter that describes the exclusion characteristics of the membrane and can reliably achieve at least 4-log removal of viruses;
- The membrane process is operated in accordance with state-specified compliance requirements; and,
- The integrity of the membrane is intact.

Because removal of viruses by membrane filtration does not enable measurement of a residual or measurable turbidity breakthrough to ensure treatment performance, states must provide alternative compliance monitoring criteria. Criteria must ensure maintenance of the integrity of the membrane to prevent passage of virus particles. Criteria may include routine pressure testing and reporting of the results as prescribed by the membrane manufacturer, turbidity monitoring, monitoring of an associated chemical parameter, or other site-specific variables.

To grant removal credit to systems using membrane filtration, states should ensure that the membrane technology is a pressure- or vacuum-driven separation process in which particulate matter is rejected by a nonfibrous, engineered barrier, primarily through a size exclusion

mechanism. The membrane technology should also allow for routine direct integrity testing while in operation, to verify that the removal efficiency demonstrated through challenge testing is being achieved.

The removal efficiency demonstrated during challenge testing establishes the maximum removal credit that an owner of a membrane filtration process is eligible to receive, provided this value is less than or equal to the maximum log removal value that can be verified by the direct integrity test (a physical test applied to a membrane unit to identify and isolate integrity breaches such as leaks).

The state may use its discretion when considering data from challenge studies conducted prior to promulgation of the GWR in lieu of requiring additional testing. Additional requirements and guidance on membrane filtration is provided in EPA's Membrane Filtration Guidance Manual: Overview and Summary Factsheet and EPA's Membrane Filtration Guidance Manual (EPA 815-R-06-009, November 2005).

DEQ's Position: DEQ will require submittal of engineering plans and specifications that demonstrate the specific log removal capabilities for a given membrane technology. This will in most cases be drawn from manufacturer's data regarding the absolute size characteristics of the membrane fibers. DEQ will require direct integrity testing on a weekly basis for all banks of membranes, which dictates that a level of redundancy sufficient to allow this testing to occur under peak flow conditions is required. These requirements are specified in IDAPA 58.01.08.323.01.

Persons with expertise and experience in the use of membranes for drinking water treatment to remove viruses are encouraged to attend negotiations and advise DEQ on this issue.

7. F. Discontinuation of 4-log virus inactivation, removal, or a state-approved combination of these technologies

(vi): The criteria, including public health-based considerations and incorporating on-site investigations and source water monitoring results, the state will use to determine if a GWS may discontinue 4-log treatment of viruses (using inactivation, removal, or a state approved combination of inactivation and removal) before or at the first customer.

EPA's Guidance

The owner of a GWS may discontinue 4-log treatment of viruses if the state determines and documents in writing that 4-log treatment of viruses is no longer necessary for that ground water source. The state primacy application must include an explanation of what criteria the state will use to determine whether the owner of a water system may discontinue its 4-log treatment of viruses. These criteria should be strict enough to not compromise public health protection if the 4-log treatment were to be discontinued. EPA encourages states to set rigorous requirements for discontinuing treatment.

Criteria may include results of on-site investigations, source water monitoring, and documentation of well rehabilitation.

Examples of when it may be appropriate to discontinue treatment are:

- The previous source is replaced by a source that has been shown to be less sensitive hydrogeologically and free from contamination based on source water monitoring;
- A well with structural conditions resulting in impairment of its water quality (e.g., not terminated above grade, inadequate well cap, lack of sanitary seal, improper grouting) is rehabilitated and conditions no longer exist; and,
- A year of monthly source water monitoring for a fecal indicator and detailed evidence that the well is drawing water from a protected confined or semi-confined aquifer.

DEQ's Position: DEQ believes that EPA has provided good common sense criteria for making this determination. DEQ will describe the criteria for obtaining Department approval to discontinue treatment of a ground water source in IDAPA 58.01.08.323.02 and in *Implementation Guidance for the Safe Drinking Water Act - Ground Water Rule*.

Persons who believe that additional criteria are valid and would be useful in making this determination are invited to attend negotiations and advise DEQ on this matter.