
Confirmed *E. coli* Positive in Groundwater Sources



Drinking Water Services
Fall Training in Wilsonville
October 17, 2017

Let's review...

- Purpose of groundwater monitoring
- If source sample is *E. coli* positive
- If confirmation samples is *E. coli* positive
- Corrective action options
- Investigating confirmed *E. coli*
- Documenting corrective action
- Coliform resources on website



Purpose of groundwater monitoring

- To evaluate source water for microbiological contaminants
 - Looking at wells and spring sources
- Health effects associated with *E. coli* (fecal contamination)
 - Acute gastrointestinal illness
 - Risk to infants, children, elderly, immunocompromised
- When are groundwater source samples collected?
 - Routine sample is coliform positive
 - Triggers sampling at every source in use at the time of routine coliform positive
 - Source Assessment sampling (yearly or monthly)

If a source sample is *E. coli* positive

- An alert is emailed to regulatory staff and hydrogeologist
- Regulator notifies PWS of *E. coli* positive source sample
- PWS must collect 5 source samples within 24 hours of *E. coli* positive
 - Use same tap as initial *E. coli* positive
 - Samples are collected consecutively
 - All samples labeled confirmation
- Exception: Single service connection sampling (hand pumps)
- DMCE will mail PWS letter about initial *E. coli* positive source sample and to collect confirmation source samples

Collect confirmation samples before corrective action measures are taken!

If confirmation sample is *E. coli* positive

- An alert is emailed to regulatory staff and hydrogeologist
- Regulator notifies PWS of confirmed *E. coli* source sample and boil water requirement
- DMCE will mail PWS letter with corrective action requirements
 - PWS has **30 days** to discuss corrective action options with regulator
 - Problem must be corrected in **120 days (18 weeks)** or PWS has an approved Corrective Action Plan (CAP)
- Regulator documents CAP and due date in a contact report or Boil Water Advisory webpage and emails it to DMCE
 - Send to compliance.dw@state.or.us

E. Coli Confirmation Letter

Re: Confirmation of E. coli in source water at SPRING (SRC-AA) on 9/6/2017 and 9/8/2017

Dear DAVID LOCKE:

Recent source water samples confirm the presence of E. coli, an indicator of fecal contamination in the source water. Fecal contamination includes harmful bacteria and viruses that have the potential to cause serious gastrointestinal illness. Water containing E. coli is considered unsafe to drink.

Unless you are able to immediately verify that disinfection requirements have been met, you must issue a boil water public notice within 24 hours. A copy of the public notice must be received by the State Drinking Water Services by 09/22/2017. This notice will be in place until the microbiological contamination issue has been resolved or interim disinfection meeting 4-log inactivation of viruses has been verified.

You now have the following four options for corrective action, upon approval of your Regulating Agency - LANE COUNTY:

1. Inspect the groundwater source (wellhead or spring collector) and surrounding area for pathways of fecal contamination and correct any significant deficiencies;
2. Disconnect the groundwater source from the water system and provide an approved alternate source of water;
3. Identify and eliminate the cause of fecal contamination by documenting the contaminant type, its proximity to the groundwater source and the process of removal; or

Compliance schedules in Data Online

- Tracking compliance schedule, due dates and closed dates
- Go to compliance and enforcement link on PWS's inventory page
- DMCE will send regulator email when due date is approaching

Compliance and Enforcement Schedules

Schedule Type: Schedule Status: Open Closed

Type of Action	Date Issued	Due Date	Closed Date
Confirmed Source E. coli			Open
ISSUE PUBLIC NOTICE		May 16, 2016	May 06, 2016
CORRECT ALL DEFICIENCIES/SUBMIT PLAN-CO		Jun 30, 2018	
Coliform Investigation	May 02, 2016		May 06, 2016
COMPLETE LEVEL 2 INVESTIGATION		Jun 01, 2016	May 06, 2016

Public notice requirements (Tier 1)

- Boil water notice to customers within 24 hours
- Applies to groundwater systems without 4-log viral treatment
- Public notice template is available on DWS website



DRINKING WATER WARNING
[Water system name] water is contaminated with *E. coli* bacteria
BOIL YOUR WATER BEFORE USING

What happened?

E. coli bacteria were found in our water system on [date]. These bacteria can make you sick, and are a particular concern for people with weakened immune systems. As our customers, you have a right to know what happened and what we are doing to correct this situation. [Provide specific information about the situation here].

What should I do?

DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST. Bring all water to a boil, let it boil for one minute and let it cool before using, or use bottled water. Boiled or bottled water should be used for drinking, making ice, brushing teeth, washing dishes, and food preparation **until further notice**. Boiling kills bacteria and other organisms in the water.

People with severely compromised immune system, infants, or the elderly may be at increased risk and should seek advice about drinking water from their health care providers. General guidelines on ways to lessen the risk of infection by microbes are available from EPA's Safe Drinking Water Hotline at (800) 426-4791, or contact Oregon Health Authority, Drinking Water Services at (971) 673-0405. If you have specific health concerns, consult your doctor.

<http://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/DRINKINGWATER/OPERATIONS/Documents/publicnotices/pnfecal.pdf>

Interim 4-log disinfection for viruses

If PWS has ability to continuously chlorinate, 4-log disinfection may be an option:

- PWS can fill out the Disinfection Verification Form with assistance from regulatory staff
- Data needed to calculate chlorine contact time (CT) includes:
 1. Peak demand flow
 2. Storage and pipe volumes (baffling factor considered)
 3. Location of first customer served
- Regulator will set a minimum chlorine residual if CT can be met at or before first user

Boil water notice in effect until 4-log disinfection of source water can be verified!

Disinfection Verification Form on website

**Oregon Health Authority – Drinking Water Program
Disinfection Verification Form – Groundwater Systems**

PWSID Number: _____ County: _____

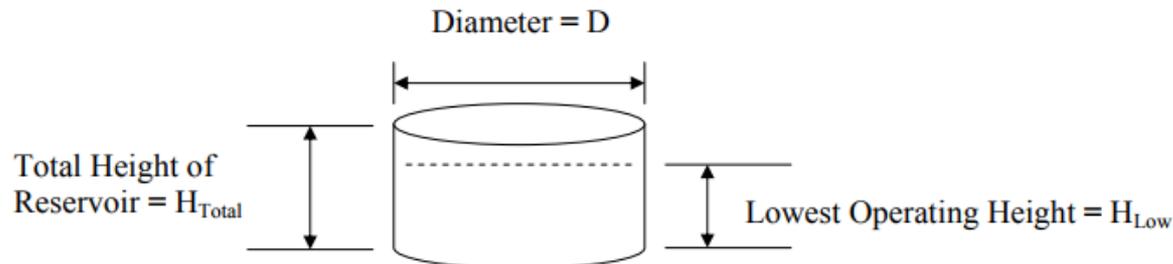
System Name: _____

Step 1: Determine the actual CT at your water system

Note that the actual CT for your system is derived by calculating the individual CT values for all segments of your system where water is in contact with chlorine before the 1st user. While the steps below are available for systems to calculate the actual CT, an automated, interactive electronic tool to calculate CT achieved at your water system is provided on U.S. EPA's Groundwater Rule Compliance Help Webpage at:

<http://water.epa.gov/lawsregs/rulesregs/sdwa/gwr/compliancehelp.cfm>.

- A. If your system disinfects with chlorine and intends to claim contact time for viral inactivation based on clearwell (reservoir) storage **only**, use the formulas below to determine the actual CT (Cylindrical Storage Reservoirs) *Note for rectangular shaped reservoirs, enter the lowest total volume in Line 2, and follow steps 3 and 4 to determine lowest operating volume in Line 4:*



perform Compliance Monitoring, please contact your Regulating Agency (Drinking Water Program or Department of Agriculture contact). Please ensure your system uses. Additional copies of this form are available at [http://www.oregon.gov/Health/HealthyEnvironments/DrinkingWater/Forms/DisinfectionVerificationForm.pdf](#), under the Rules & Regulations-Forms section. Please retain a copy of the completed form.

Documenting approved 4-log disinfection

- Regulator sends DMCE treatment change request on Entry Structure Diagram Form
 - D-361(Permanent) or Z-361(Interim)
 - Include approved minimum chlorine residual
 - No additional source water monitoring is required
- Regulator sends PWS a letter outlining 4-log monitoring requirements
 - PWS must verify minimum chlorine residual is met daily at or before first customer
 - Data is submitted to DMCE on monthly reporting form

Treatment			
<u>State ID</u>	<u>Facility Name</u>	<u>Treatment Process</u>	<u>Treatment Objective</u>
WTP-A	TP FOR SPRINGS (1, 2 & 3)	RESID. MAINT. GAS CHLORINATION	OTHER
WTP-A	TP FOR SPRINGS (1, 2 & 3)	GWR 4-LOG VIRUS COMPLIANCE MON	DISINFECTION

Corrective action options

PWS implements one or more of the following options:

- Correct all significant deficiencies
- Disconnect groundwater source and provide alternate water source
 - If disconnected well is within 100 feet from PWS well, it must be abandoned to WRD requirements.
- Eliminate the source of contamination
- Provide treatment that reliably achieves 4-log removal and/or inactivation of viruses at or before first customer
- Source must meet current DWS construction standards if option of permanent 4-log disinfection is considered

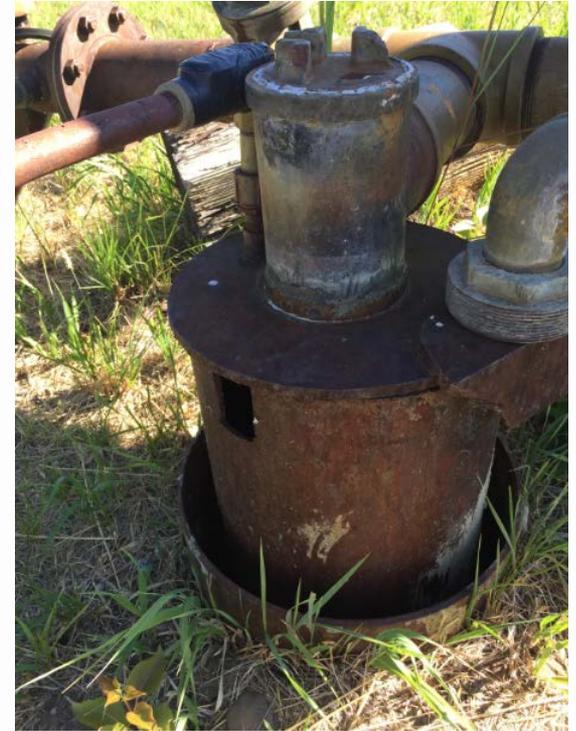
Investigating the confirmed *E. coli*

- Visually inspect water source and surrounding area
 - Look for direct pathways for contaminant entry
 - Identify nearby surface water sources
- Determine if contaminant source is obvious or temporary
- Remove temporary contaminant source and direct pathway
- Proceed with corrective action (repairs, shock chlorination)
- Conduct follow-up sampling to verify problem is corrected
- Other factors to consider:
 - PWS has completed 12 months of source monitoring
 - Additional monthly source monitoring may be needed
- Document investigation findings and corrective action

Investigating the confirmed *E. coli*

When is a groundwater source evaluation required?

- No temporary or obvious contaminant source is found
- Request source evaluation by hydrogeologist (cc: tech staff)
- Hydrogeologist will evaluate source construction and groundwater characteristics
- GWUDI evaluation may be needed
- Groundwater Source Evaluation form is available on partner's page



Groundwater Source Evaluation

- Provide background information and request type on form
- Include supporting documentation
- Regulator will discuss hydrogeologist's findings with PWS

GROUNDWATER SOURCE EVALUATION REQUEST	
OHA – Drinking Water Services	
Background Information:	
Requested by: <u>M. Byrd</u>	Date of Request: <u>10/9/17</u>
County: <u>Deschutes</u>	
System Name: <u>Lily Cat Farms</u>	PWS ID #: <u>41 01234</u>
Source Name: <u>Paws Well</u>	Entry Point/Source ID: <u>EP-A/SRC-AA</u>
Water Source Location:	
Lat: _____ Long: _____	(<input type="checkbox"/> Handheld GPS <input type="checkbox"/> Google)
Property Address: <u>4321 Feral Cat Road</u>	
Required Water Source Construction Information:	
<input type="checkbox"/> Construction plans attached	<input checked="" type="checkbox"/> Site map attached
Surface water observed within 500 ft? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Date Water Source Constructed: <u>10/10/61</u>	County Well ID: _____
Well Tag: <u>L01234</u>	Start Card: _____
Type of Request	
<input checked="" type="checkbox"/> Confirmed E. Coli Review	

Documenting corrective action

- Ask PWS to send information in writing of how each corrective active items was addressed and when
- Regulator fills out contact report to document corrective action items that are completed or in progress
- Use PDF or fillable MS Word files available on website
- Fill in compliance schedule update section
- Be sure action completed or revised due dates are included
- Review changes in Data Online

Compliance Schedule Update, if applicable:

Compliance schedule type: **Significant Deficiency**

Activity: **Significant deficiency related to confirmed E. coli in well.**

Date Action Completed: or Revised Date Due: **10/30/17**

Data Online Tools

- Search compliance/enforcement schedules by county

Oregon Public Health
Drinking Water Data Online

[Introduction](#) :: [Data Search Options](#) :: [WS Name Look Up](#) :: [WS ID Look Up](#) :: [DWS Home](#)

Compliance and Enforcement Schedules

Regulating Agency
All Agencies ▼

County
All Counties ▼

System Type
All System Types ▼

Schedule Status
 Open
 Closed

Schedule Type

Compliance Schedules

- Lead Action Level Exceedance
- Copper Action Level Exceedance
- Confirmed Source *E. coli*
- Coliform Investigation
- Microscopic Particulate Analysis (MPA) Required
- Other Compliance Schedule
- Bilateral Compliance Agreement

Formal Enforcement

- Notice of Non-Compliance
- Administrative Order
- Extension to Administrative Order
- Administrative Order Settlement
- Civil Penalty Order
- Civil Penalty Settlement Agreement
- Court Filing

Show Schedules

Information by county:
[Inventory](#) :: [Surface Water Systems](#) :: [Water System Surveys](#) :: [Outstanding Performers](#) :: [Plan Reviews](#) :: [System Scores](#) :: [Alerts](#) :: [Violations](#) :: [Compliance & Enforcement](#) :: [Significant Deficiencies](#) :: [Cross Connection ASRs](#) :: [Treatment Plant Insp](#)

Data Online Tools

- Confirmed *E. coli* compliance/enforcement summary

Compliance and Enforcement Schedules							
Regulating Agency: All Regulating Agencies County: All Counties Schedule Type: Confirmed Source E. coli Schedule Status: Open Schedules			Sorted by Regulating Agency Click on a column header to sort by that field, or sort by activity due date (systems with the earliest open due date or no scheduled activities will be at				
10 schedules found for 10 systems. Hide scheduled activities							
Regulating Agency	County Served	PWS	PWS Name	System Type	System Score		
			Schedule Type			Date Issued	Closed Date
BENTON COUNTY	Benton	00231	VINEYARD MOUNTAIN WATER	C	0		
			CONFIRMED SOURCE E. COLI			Nov 28, 2016	Open
			<u>Scheduled Activity</u>			<u>Due Date</u>	<u>Date Completed</u>
			CORRECT ALL DEFICIENCIES/SUBMIT PLAN-CO			Mar 29, 2017	Mar 16, 2017
			COMPLETE CONSTRUCTION			Mar 01, 2019	
CLACKAMAS COUNTY	Clackamas	00163	CANBY REGENCY	C	1		
			CONFIRMED SOURCE E. COLI			Oct 05, 2017	Open
			<u>Scheduled Activity</u>			<u>Due Date</u>	<u>Date Completed</u>
			ISSUE PUBLIC NOTICE			Oct 18, 2017	
			CORRECT ALL DEFICIENCIES/SUBMIT PLAN-CO			Feb 07, 2018	
CROOK COUNTY	Crook	05998	WESTRIDGE SUBDIVISION	C	6		
			CONFIRMED SOURCE E. COLI				Open
			<u>Scheduled Activity</u>			<u>Due Date</u>	<u>Date Completed</u>
			ISSUE PUBLIC NOTICE			May 16, 2016	May 06, 2016
			CORRECT ALL DEFICIENCIES/SUBMIT PLAN-CO			Jun 30, 2018	

Confirmed *E. coli* positive source procedure

Confirmed *E. coli* Positive in a Groundwater Source

Subject:	Investigation and correction of confirmed <i>E. coli</i> positive in a groundwater source	Date:	4/5/12
Unit:	Technical services (jn, tp, ss, cm, cl)	Revised:	6/22/16
Purpose & Scope: This procedure provides DWS technical services staff and partner regulating agencies with a consistent procedure when <i>E. coli</i> has been confirmed in the ground water source.			
Procedure/Process: Describes the chronological process for compliance with the Groundwater Rule (GWR) when <i>E. coli</i> is confirmed in a groundwater source, including source evaluation and selecting applicable corrective action options.			

1. Initial contact with PWS

- A. If notified of the presence of *E. coli* by a water quality alert based on a triggered or an assessment monitoring source sample, the PWS is required to collect five (5) confirmation samples within 24 hours of notification of the initial *E. coli* lab results.
- B. Interim corrective action measures may be taken any time after collection of confirmation samples. Water systems should not shock chlorinate the source prior to collecting the 5 confirmation samples.
- C. Regulating agency staff will notify the PWS of the *E. coli* positive detection and the requirement of the 5 confirmation samples required by OAR 333-061-0036 (6)(s). In addition, a letter will also be sent by the DMCE unit informing the PWS of the requirement in writing. A copy of this letter will be sent to the regulating agency via email.

Coliform resources on website

- County & Dept. of Agriculture Resources Page

Coliform Resources

Drinking Water Services

County & Dept. of
Agriculture Resources

Water System Surveys

Conferences and Training

Document Library

Inventory Updates

EPA Staff Resources

Coliform Resources

Monitoring Resources

Compliance Resources

Contact Us

The information on this page is designed for and intended for use by Drinking Water Services County and Department of Agriculture partners who have specialized training and are registered as environmental health specialists. If you have questions regarding this material please contact Drinking Water Services at (971) 673-0405.

On this page:

- Coliform Monitoring Resources
- Groundwater Rule procedures following a positive routine coliform sample
- Resources for addressing confirmed *E. coli*-positive sources under the Groundwater Rule
- Representative and combined source monitoring

The Groundwater Rule (GWR), which took effect December 1st, 2009, applies to all public water systems that use groundwater sources or purchase groundwater. The primary purpose of the rule is to protect the public from fecal-related bacterial and viral pathogens in public groundwater systems. *E. coli* is used as the indicator of fecal contamination. If a groundwater source (well or spring) is found to be fecally contaminated, or a significant deficiency or rule violation is identified during a water system survey, the public water system must take corrective action to assure that their consumers are adequately protected. See the following resources for more information on implementing the rule.

See partner's webpage for these resources

- Confirmed E. coli Positive Source Procedure
- Ongoing Verification that PWS is Meeting Compliance Monitoring Requirements
- Response Flow Chart for E. coli Contaminated Groundwater Source
- Source Evaluation Request Form
- Disinfection Verification Form for Groundwater Systems
- Cover Letter Template for Requiring GWR Compliance Monitoring (entry point chlorine residual monitoring)
- Compliance Monitoring Monthly Reporting Form
- Template Follow Up Letter When Corrective Action is Not Completed on Schedule
- Hydrogeologist responsibilities for confirmed E. coli and GWUDI evaluation procedure

Summary

- Since December 2009, groundwater source monitoring has helped identify water systems with confirmed *E. coli* sources reducing the risk to human health
- Maintaining communication with water system is key to keep them on track to correct the problem
- Circuit rider technical assistance may be available to help water systems resolve the source contaminant issue
- Not every case is the same. Consult with DWS staff. We are here to help!

Let us know if you have questions...

Drinking Water Services
Phone Duty: 971-673-0405
dwp.dmce@state.or.us

Rebecca Templin, PE
541-726-2587, ext. 29
rebecca.a.templin@state.or.us

Michelle Byrd
971-673-0425
michelle.p.byrd@state.or.us

