# The Ground Water Rule and You

Advanced Small Water System Course

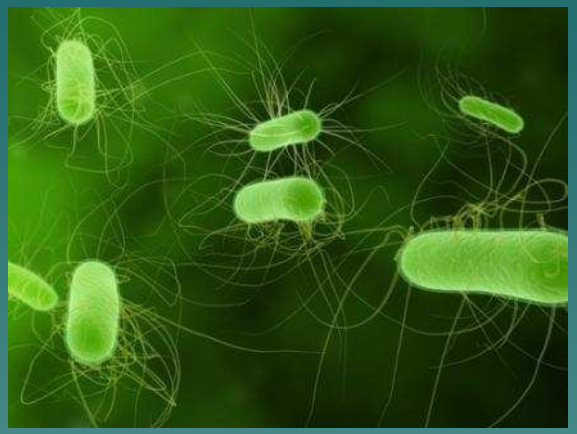
PUBLIC HEALTH DIVISION
Center for Health Protection, Drinking Water Services

# GWR – Presentation Outline

- Its purpose
- Key provisions (required sampling, terminology, compliance actions, etc.)
- Results of Source Monitoring to Date
- Tools for Water Systems
- Class Exercise

# Groundwater Rule Purpose

***Escherichia coli***



http://www.foodpoisonjournal.com/

***Norovirus***

http://norocore.ncsu.edu/

To protect the public from pathogen contamination in water systems that use groundwater.

*Norwalk & Norwalk-like viruses are recognized as major causes of waterborne illnesses world-wide. Symptoms include watery diarrhea & vomiting*

# Groundwater Rule (GWR) specifically looks for:

- **Fecal** contamination (not total coliform)
- in the **source** water (that is, at the well or spring)

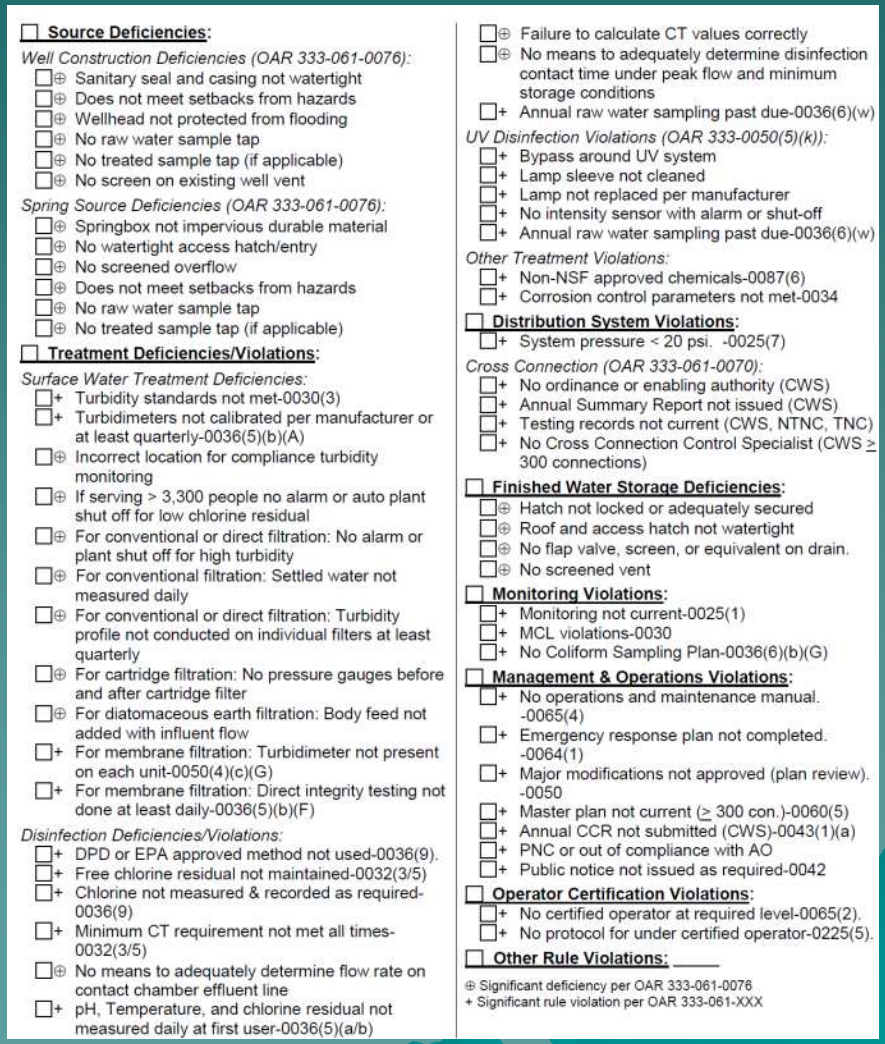
# GWR – Significant Deficiencies

Requirements:

- Systems using groundwater must correct significant deficiencies & rule violations
- Timeline is set for correcting deficiencies identified during a water system survey

# GWR –Deficiencies Categories

- Source Water
- Treatment
- Distribution System
- Water Storage
- Monitoring Violations
- Management & Operations
- Operator Certification



☐ **Source Deficiencies:**

*Well Construction Deficiencies (OAR 333-061-0076):*
- ☐⊕ Sanitary seal and casing not watertight
- ☐⊕ Does not meet setbacks from hazards
- ☐⊕ Wellhead not protected from flooding
- ☐⊕ No raw water sample tap
- ☐⊕ No treated sample tap (if applicable)
- ☐⊕ No screen on existing well vent

*Spring Source Deficiencies (OAR 333-061-0076):*
- ☐⊕ Springbox not impervious durable material
- ☐⊕ No watertight access hatch/entry
- ☐⊕ No screened overflow
- ☐⊕ Does not meet setbacks from hazards
- ☐⊕ No raw water sample tap
- ☐⊕ No treated sample tap (if applicable)

☐ **Treatment Deficiencies/Violations:**

*Surface Water Treatment Deficiencies:*
- ☐+ Turbidity standards not met-0030(3)
- ☐+ Turbidimeters not calibrated per manufacturer or at least quarterly-0036(5)(b)(A)
- ☐⊕ Incorrect location for compliance turbidity monitoring
- ☐⊕ If serving > 3,300 people no alarm or auto plant shut off for low chlorine residual
- ☐⊕ For conventional or direct filtration: No alarm or plant shut off for high turbidity
- ☐⊕ For conventional filtration: Settled water not measured daily
- ☐⊕ For conventional or direct filtration: Turbidity profile not conducted on individual filters at least quarterly
- ☐⊕ For cartridge filtration: No pressure gauges before and after cartridge filter
- ☐⊕ For diatomaceous earth filtration: Body feed not added with influent flow
- ☐+ For membrane filtration: Turbidimeter not present on each unit-0050(4)(c)(G)
- ☐+ For membrane filtration: Direct integrity testing not done at least daily-0036(5)(b)(F)

*Disinfection Deficiencies/Violations:*
- ☐+ DPD or EPA approved method not used-0036(9).
- ☐+ Free chlorine residual not maintained-0032(3/5)
- ☐+ Chlorine not measured & recorded as required-0036(9)
- ☐+ Minimum CT requirement not met all times-0032(3/5)
- ☐⊕ No means to adequately determine flow rate on contact chamber effluent line
- ☐+ pH, Temperature, and chlorine residual not measured daily at first user-0036(5)(a/b)
- ☐⊕ Failure to calculate CT values correctly
- ☐⊕ No means to adequately determine disinfection contact time under peak flow and minimum storage conditions
- ☐+ Annual raw water sampling past due-0036(6)(w)

*UV Disinfection Violations (OAR 333-0050(5)(k)):*
- ☐+ Bypass around UV system
- ☐+ Lamp sleeve not cleaned
- ☐+ Lamp not replaced per manufacturer
- ☐+ No intensity sensor with alarm or shut-off
- ☐+ Annual raw water sampling past due-0036(6)(w)

*Other Treatment Violations:*
- ☐+ Non-NSF approved chemicals-0087(6)
- ☐+ Corrosion control parameters not met-0034

☐ **Distribution System Violations:**
- ☐+ System pressure < 20 psi. -0025(7)

*Cross Connection (OAR 333-061-0070):*
- ☐+ No ordinance or enabling authority (CWS)
- ☐+ Annual Summary Report not issued (CWS)
- ☐+ Testing records not current (CWS, NTNC, TNC)
- ☐+ No Cross Connection Control Specialist (CWS ≥ 300 connections)

☐ **Finished Water Storage Deficiencies:**
- ☐⊕ Hatch not locked or adequately secured
- ☐⊕ Roof and access hatch not watertight
- ☐⊕ No flap valve, screen, or equivalent on drain.
- ☐⊕ No screened vent

☐ **Monitoring Violations:**
- ☐+ Monitoring not current-0025(1)
- ☐+ MCL violations-0030
- ☐+ No Coliform Sampling Plan-0036(6)(b)(G)

☐ **Management & Operations Violations:**
- ☐+ No operations and maintenance manual. -0065(4)
- ☐+ Emergency response plan not completed. -0064(1)
- ☐+ Major modifications not approved (plan review). -0050
- ☐+ Master plan not current (≥ 300 con.)-0060(5)
- ☐+ Annual CCR not submitted (CWS)-0043(1)(a)
- ☐+ PNC or out of compliance with AO
- ☐+ Public notice not issued as required-0042

☐ **Operator Certification Violations:**
- ☐+ No certified operator at required level-0065(2).
- ☐+ No protocol for under certified operator-0225(5).

☐ **Other Rule Violations:** ____

⊕ Significant deficiency per OAR 333-061-0076
+ Significant rule violation per OAR 333-061-XXX

# GWR – Significant Deficiencies

Once notified of deficiencies, systems must:

- Consult with regulating agency
  - Send written notice within 30 days
  - Explain how deficiencies will be corrected
- Deficiencies must be corrected or be on an approved schedule to correct deficiencies within 120 days (about 4 months)

# GWR – Public Notification

Failure to correct deficiencies:

- Violation is incurred
- Must provide public notice to customers within 30 days

**IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER**

**[Water System Name] Failed to Correct a Significant Deficiency *OR* Address a Fecal Indicator - Positive Source Sample Within Required Time Frame**

Our water system recently violated a drinking water requirement. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did ***OR*** are doing to correct this situation.

A routine inspection conducted on [date] by the [primacy agency] i.e. DWP, county, Department of Agriculture, etc. found [describe significant deficiency] in our water system. ***OR***

Sampling conducted at our groundwater source on [date] verified fecal contamination of our source(s).

As required by the Ground Water Rule [OAR 333-061-0032(6)(f)], we were required to take action to correct this deficiency ***OR*** address the fecal-indicator positive source sample. However, we failed to take this action by the deadline established by the [primacy agency] i.e. DWP, county, Department of Agriculture, etc..

**What should I do?**

- There is nothing you need to do. **You do not need to boil your water or take other corrective actions**. However, if you have specific health concerns, consult your doctor.
- If you have a severely compromised immune system, have an infant, are pregnant, or are elderly, you may be at increased risk and should seek advice from your health care providers about drinking this water. General guidelines on ways to lessen the risk of infection by microbes are available from EPA's Safe Drinking Water Hotline at 1-800-426-4791, or OHA's Drinking Water Program at (971) 673-0405.

**What does this mean?**

This is not an emergency. If it had been, you would have been notified within 24 hours.

**Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.**

These symptoms, however, are not caused only by organisms in drinking water, but also by other factors. If you experience any of these symptoms and they persist, you may want to seek medical advice.

**What is being done?**

[Describe corrective action.] We anticipate resolving the problem within [estimated time frame] OR the problem was resolved on [date].

For more information, please contact [contact name] at [phone number] or [mailing address].

**Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.**

This notice is being sent to you by [Water System Name]. State Water System ID# 41 .

Date distributed: [date]

# GWR – Source Monitoring

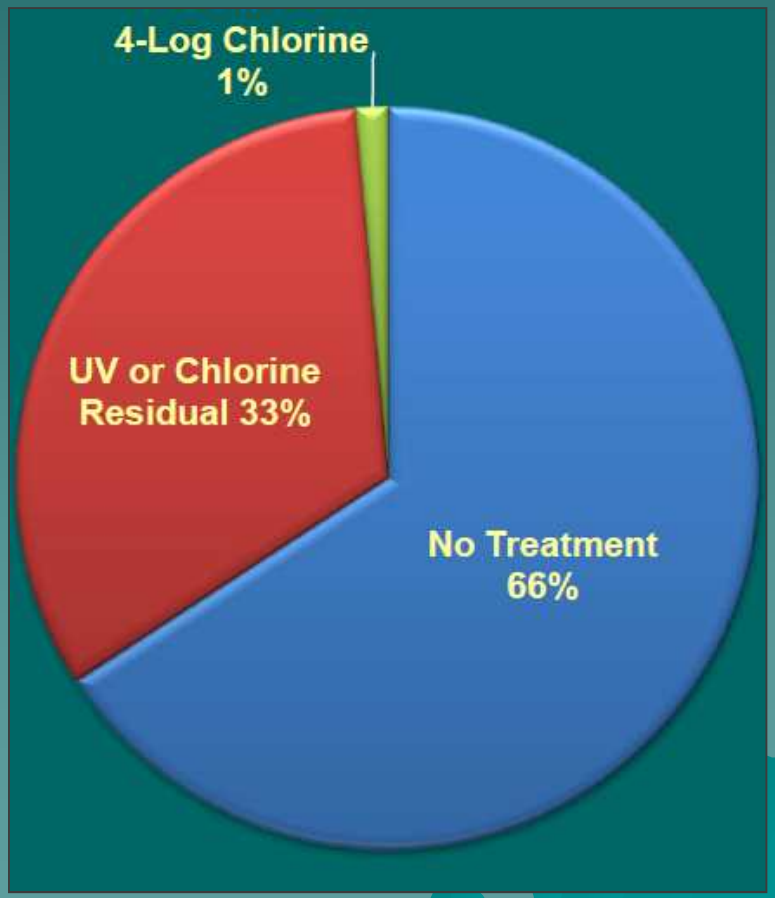
How systems evaluate source water quality to meet this rule depends on the treatment level:

- No treatment
- Disinfection with UV light or by chlorine residual
- Disinfection using chlorine to achieve 4-log (or 99.99%) inactivation of viruses

# GWR – Source Monitoring

## ~3,155 groundwater systems in Oregon

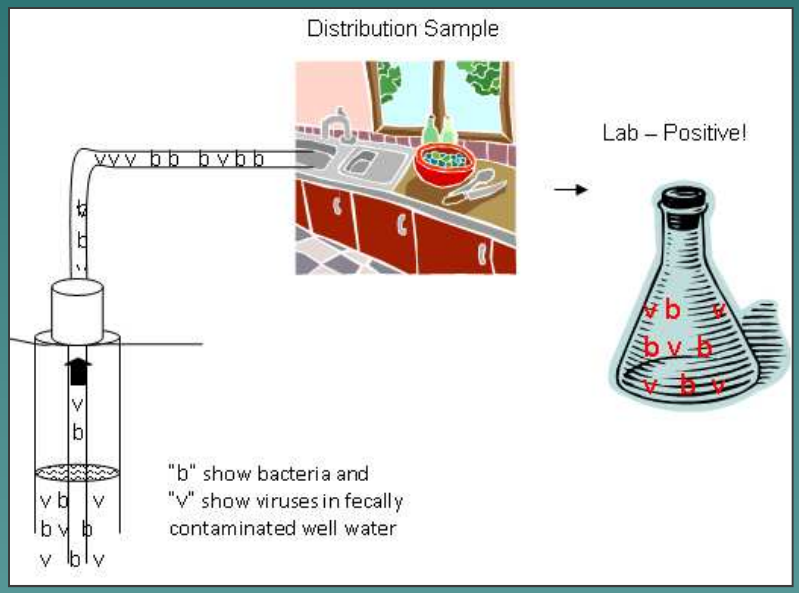
- 66% - No treatment
- 33% - Disinfection with UV or chlorine residual
- 1% - Chlorine with 4-log disinfection



# Source Monitoring – No Treatment

## If routine distribution sample is coliform positive

- Sample must be collected from each source in use at time of coliform positive

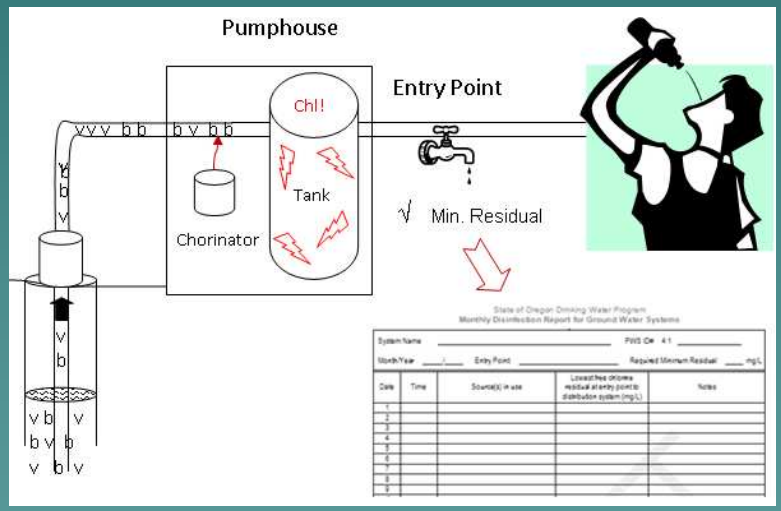



Distribution samples reflect what is happening in source water

# Source Monitoring – Disinfection

## 4-Log Virus Inactivation

- System that verify chlorine contact time
- A minimum chlorine residual before 1st customer is set and measured daily
- Daily measurements are reported monthly to state




Systems achieving 4-log are not required to collect source water samples

# Source Monitoring – Disinfection

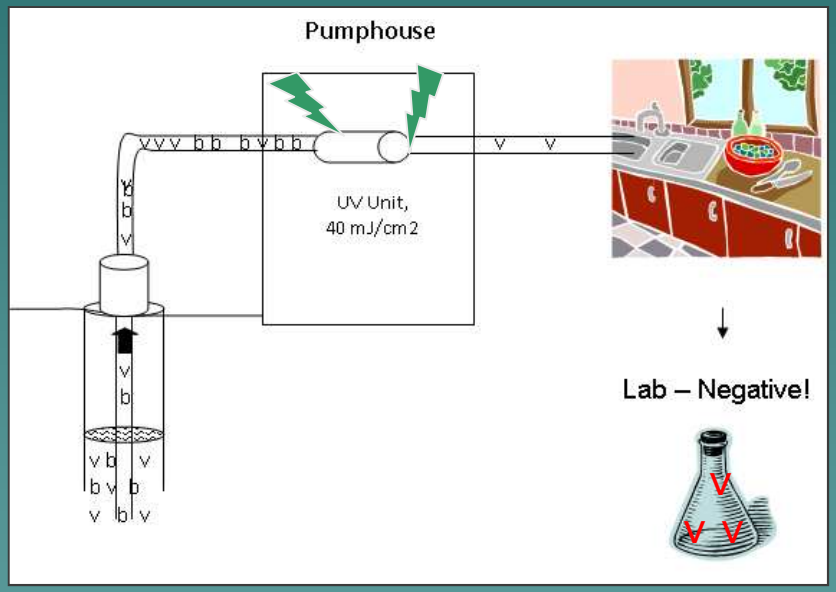
## Treatment not 4-log verified

If treatment is either:

a) **Residual Maintenance chlorine** (not required to meet 4-log inactivation) **or**

b) **Ultra-Violet light** (i.e., NSF Standard 55)

Viruses can potentially survive these treatments.




Source water monitoring evaluates exposure and potential health risk to viruses and fecal contamination

# Source Monitoring – Disinfection

## Routine water samples show no viruses or fecal bacteria

- *E. coli* is an indicator for fecal contamination
- Standard method used to evaluate total coliform and *E. coli* presence is best
- Method is commonly used by systems

# GWR – Presentation Outline

- Its purpose
- Key provisions:
  - Surveys Significant Deficiencies
  - Finding Fecal Bacteria & Viruses in Source Water
  - Source Water Monitoring Terminology
  - Fecal Contamination in Source - Public Notice & Corrective Action

# Source Water Monitoring

Sample Types:

- Assessment (AS)
- Triggered (TG)
- Confirmation (CO)

Wellhead with sample tap

# Assessment Monitoring

Systems not achieving 4-log viral inactivation need to evaluate source water quality.

Two types of source assessment samples:

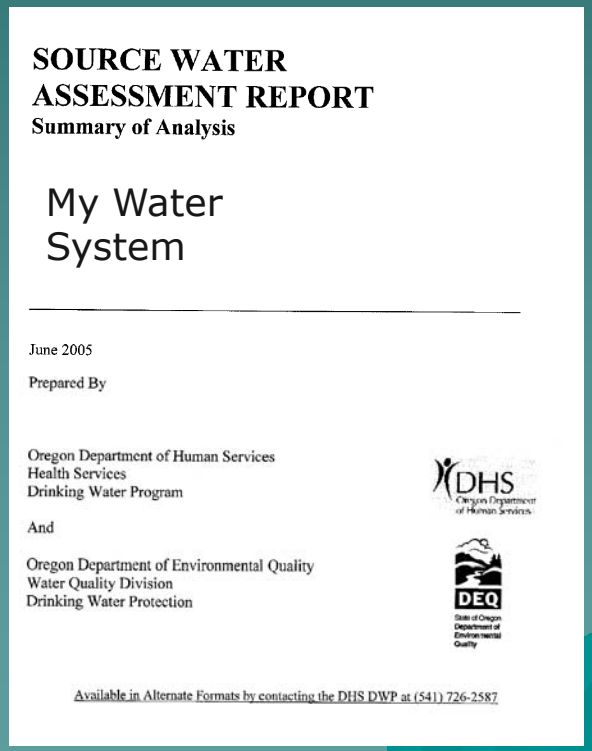
- Once per year (Everyone)
- Monthly -
  - Only if source is susceptible to fecal contamination
  - System will be notified of this requirement
  - Occurs over short period of time

# Assessment Monitoring

Review of water system data determines whether monthly source monitoring is needed.

Data review includes:

- Source Water Assessment Reports
- Monitoring history
- Staff knowledge of GW source



**SOURCE WATER ASSESSMENT REPORT**
**Summary of Analysis**

My Water System

June 2005

Prepared By

Oregon Department of Human Services
Health Services
Drinking Water Program

And

Oregon Department of Environmental Quality
Water Quality Division
Drinking Water Protection

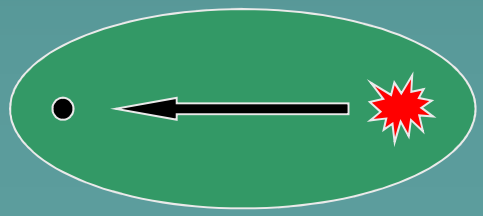
Available in Alternate Formats by contacting the DHS DWP at (541) 726-2587

# Assessment Monitoring

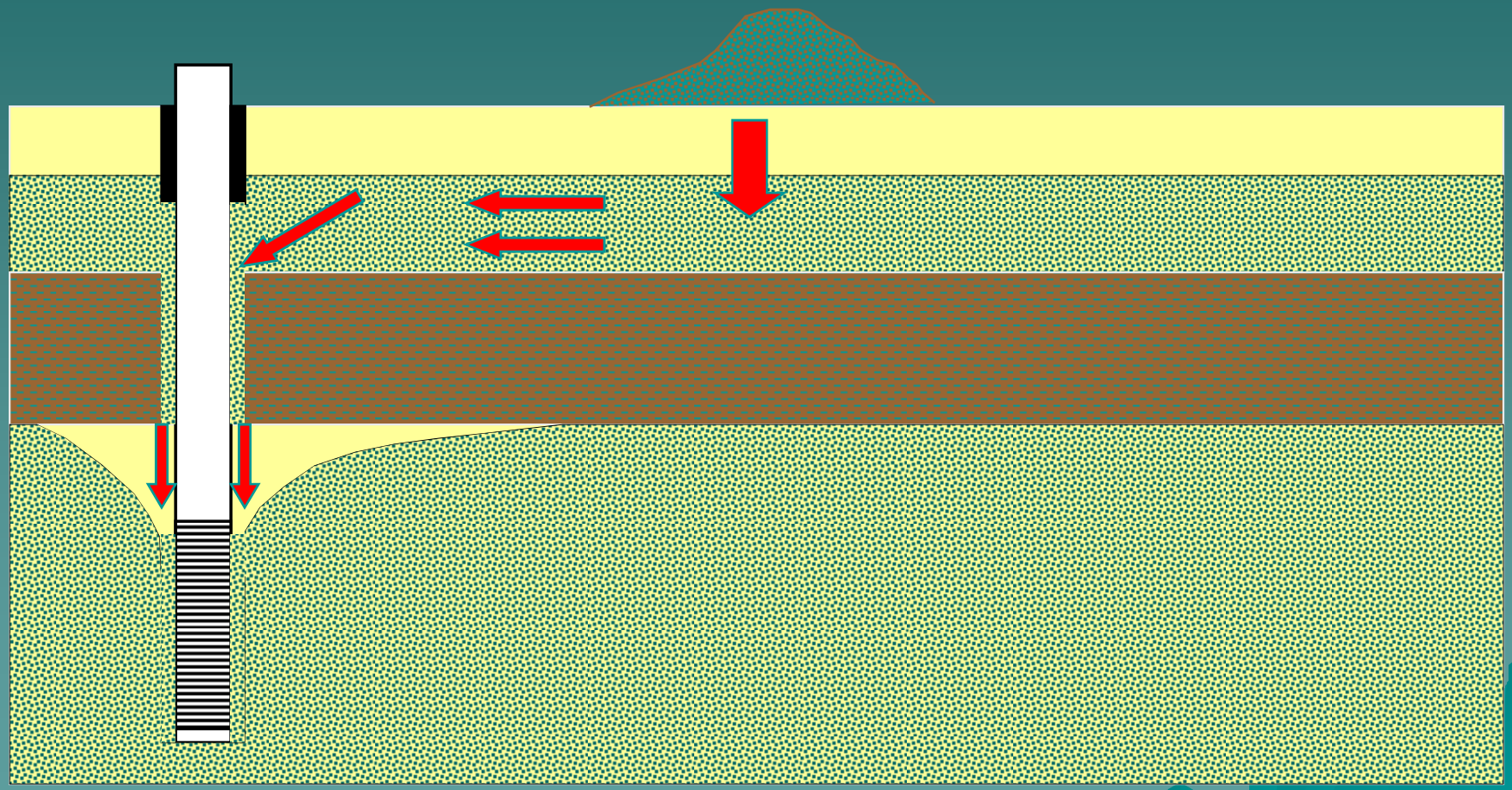
## Source Water Assessment Report identifies:

- Inadequate source construction
- Highly sensitive aquifer characteristics, and
- Fecal contaminant sources within the 2-year Time-of-Travel Zone

*Well*
*Time-of-Travel*



# Poorly Constructed Well Susceptible to Fecal Contamination



# Assessment Monitoring Results

Recent Coliform Test Results - PWS ID:

| Sample Date | # Samples | Sample Type | Coliform Type | Results ID | Repeat of Sample ID | Sample Site | Facility | Cl Residual | Receive Date |
|---|---|---|---|---|---|---|---|---|---|
| Sep 21, 2010 | 1 | AS | Total | POSITIVE--496487 | | well house | SRC-AA | | Sep 23, 2010 |
| Sep 21, 2010 | 1 | AS | E.Coli | Absent--496487 | | well house | SRC-AA | | Sep 23, 2010 |
| Aug 26, 2010 | 1 | AS | Total | POSITIVE--494912 | | well | SRC-AA | | Aug 30, 2010 |
| Aug 26, 2010 | 1 | AS | E.Coli | Absent--494912 | | well | SRC-AA | | Aug 30, 2010 |
| Jul 21, 2010 | 1 | AS | Total | Absent--492445 | | well house pump | SRC-AA | | Jul 22, 2010 |
| Jul 21, 2010 | 1 | RT | Total | Absent--492446 | | main bathroom | DIST-A | 0.35 | Jul 22, 2010 |
| Jun 17, 2010 | 1 | AS | Total | Absent--490277 | | SRC AA | SRC-AA | | Jun 28, 2010 |
| May 20, 2010 | 1 | AS | Total | Absent--488469 | | Well | SRC-AA | | Jun 10, 2010 |
| Apr 22, 2010 | 1 | RT | Total | Absent--486733 | | N/A | DIST-A | 2.20 | May 03, 2010 |
| Apr 22, 2010 | 1 | AS | Total | Absent--486734 | | well | SRC-AA | | May 03, 2010 |
| Mar 25, 2010 | 1 | RT | Total | Absent--485025 | | well | SRC-AA | | Apr 08, 2010 |
| Feb 24, 2010 | 1 | RT | Total | POSITIVE--483288 | | well | SRC-AA | | Mar 08, 2010 |
| | | RT | E.Coli | Absent--483288 | | well | SRC-AA | | Mar 08, 2010 |
| Jan 21, 2010 | 1 | RT | Total | POSITIVE--481236 | | well | SRC-AA | | Jan 22, 2010 |
| | | RT | E.Coli | Absent--481236 | | well | SRC-AA | | Jan 22, 2010 |
| Jan 21, 2010 | 1 | RT | Total | Absent--481238 | | N/A | DIST-A | 0.30 | Feb 04, 2010 |
| Dec 04, 2009 | 1 | SP | Total | POSITIVE--478708 | | SRC-AA | DIST-A | | Dec 07, 2009 |
| | | SP | E.Coli | Absent--478708 | | SRC-AA | DIST-A | | Dec 07, 2009 |

Data Online - https://yourwater.oregon.gov/

# Triggered Source Monitoring

## Triggered source samples are needed:

- When routine coliform distribution sample is positive
- Because coliform bacteria in distribution system may be coming from source water

| Sample Date | # Samples | Sample Type | Coliform Type | Results--ID | Repeat of Sample ID | Sample Site | Facility | Cl Residual |
|---|---|---|---|---|---|---|---|---|
| Oct 18, 2010 | 1 | RT | Total | Absent--102911030SQ | | N/A | DIST-A | 0.38 |
| Oct 18, 2010 | 1 | RT | Total | Absent--102911045SQ | | N/A | DIST-A | 0.60 |
| Oct 12, 2010 | 1 | TG | Total | Absent--102850140SQ | 102840850SQ | well 14 | SRC-HA | |
| Oct 12, 2010 | 1 | TG | Total | Absent--102850200SQ | 102840850SQ | WELL 1 BYERS | SRC-BA | |
| Oct 12, 2010 | 1 | RP | Total | Absent--102850215SQ | 102840850SQ | MT HERBRON BOOSTER | DIST-A | |
| Oct 12, 2010 | 1 | RP | Total | Absent--102850230 | 102840850SQ | Hdy Mt Hebron | DIST-A | 0.42 |
| Oct 12, 2010 | 1 | RP | Total | Absent--102850245SQ | 102840850SQ | Hdy nursery line | DIST-A | 0.64 |
| Oct 11, 2010 | 1 | RT | Total | POSITIVE--102840850SQ | | mt hebron booster | DIST-A | 0.46 |
| | | RT | E.Coli | Absent--102840850SQ | | mt hebron booster | DIST-A | 0.46 |
| Oct 11, 2010 | 1 | RT | Total | Absent--102840905SQ | | N/A | DIST-A | 0.41 |

# Triggered Source Monitoring

## Purchasing Systems:

- Notify wholesale system of coliform positive sample in distribution system

## Wholesale Systems *when notified*:

- Collect samples from GW sources in use at the time of positive sample serving the purchaser (with 24 hrs)
- If source sample is *E. coli* positive, consecutive systems served by that GW source must be notified

# Source Water Monitoring

What actions would be required if?

1. No disinfection and distribution sample is coliform positive?

   4 repeats (1 can be at the well)

2. UV or chlorine disinfection (non 4-Log) and distribution sample is positive?

   4 repeats from distribution + source sample(s)

3. Assessment source sample is positive for total coliform?

   If not *E. coli*, no fecal contamination

# GWR – Presentation Outline

- Its purpose
- Key provisions:
  - Surveys & Significant Deficiencies
  - Finding Fecal Bacteria & Viruses in Source Water
  - Source Water Monitoring Terminology
  - Fecal Contamination in Source - Public Notice & Corrective Action

# Confirmation Source Monitoring

If source sample is *E. coli* positive, system must confirm result by collecting:

- 5 confirmation samples at the source
- Collected within 24-hours of being notified of initial *E. coli* positive
- If any confirmation samples are *E. coli* positive, the water system must take corrective action.

# Confirmation Source Monitoring

| Recent Coliform Test Results - PWS ID: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sample Date | # Samples | Sample Type | Coliform Type | Results ID | Repeat of Sample ID | Sample Site | Facility | Cl Re |
| Jan 27, 2011 | 1 | RT | Total | Absent--504348 | | N/A | DIST-A | |
| Dec 16, 2010 | 1 | RT | Total | Absent--502009 | | N/A | DIST-A | |
| Dec 16, 2010 | 1 | CO | Total | POSITIVE--502010 | 501811 | Well | SRC-AA | |
| | | CO | E.Coli | POSITIVE--502010 | 501811 | Well | SRC-AA | |
| Dec 16, 2010 | 1 | CO | Total | POSITIVE--502011 | 501811 | Well | SRC-AA | |
| | | CO | E.Coli | POSITIVE--502011 | 501811 | Well | SRC-AA | |
| Dec 16, 2010 | 1 | CO | Total | POSITIVE--502012 | 501811 | Well | SRC-AA | |
| | | CO | E.Coli | POSITIVE--502012 | 501811 | Well | SRC-AA | |
| Dec 16, 2010 | 1 | CO | Total | POSITIVE--502013 | 501811 | Well | SRC-AA | |
| | | CO | E.Coli | POSITIVE--502013 | 501811 | Well | SRC-AA | |
| Dec 16, 2010 | 1 | CO | Total | POSITIVE--502014 | 501811 | Well | SRC-AA | |
| | | CO | E.Coli | POSITIVE--502014 | 501811 | Well | SRC-AA | |
| Dec 14, 2010 | 1 | AS | Total | POSITIVE--501811 | | Well | SRC-AA | |
| | | AS | E.Coli | POSITIVE--501811 | | Well | SRC-AA | |
| Nov 15, 2010 | 1 | AS | Total | POSITIVE--500103 | | Well 1 | SRC-AA | |
| | | AS | E.Coli | Absent--500103 | | Well 1 | SRC-AA | |
| Oct 20, 2010 | 1 | AS | Total | Absent--498487 | | well | SRC-AA | |

Data Online - https://yourwater.oregon.gov/

# Confirmation Source Monitoring

Notify regulator of confirmed *E. coli* to discuss options:

- Evaluate effectiveness of disinfection
  - No treatment, 4-log, or treatment that does not meet 4-log
- Discuss interim water system operations
  - For example, discontinue use of contaminated source
- Public notice requirement
  - Inform customers of drinking water contamination
  - Deliver within 24 hrs
  - Boil water notice may be required!

# Public Notice Example

**DRINKING WATER WARNING**

[System] water is contaminated with [fecal coliform] or [*E. coli*]
BOIL YOUR WATER BEFORE USING

Fecal coliform [or *E. coli*] bacteria were found in the water supply on [date]. These bacteria can make you sick, and are a particular concern for people with weakened immune systems.

**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.

- *Fecal coliforms and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, and people with severely compromised immune systems.*

- The symptoms above are not caused only by organisms in drinking water. If you experience any of these symptoms and they persist, you may want to seek medical advice. People at increased risk should seek advice about drinking water from their health care providers.

# Interim Conditions

Increased vigilance until long-term corrections are completed, such as:

- More frequent coliform sampling in the distribution system (e.g., from once to twice per month)
- If already chlorinating, increase the minimum residual level, to be measured daily at the entry point. If too low, correct within four hours.

# Corrective Action

Implement one or more of the following corrective action alternatives:

1. Eliminate source of contamination
2. Correct all significant deficiencies & rule violations
3. Provide an alternate source of water
4. Provide treatment that reliably achieves 4-log inactivation and/or removal of viruses

Corrective action plan must be approved by your regulating agency

# Corrective Action

## Eliminate Source of Contamination

What is source of fecal contamination?

- Animals in or near source
- Repairs not properly disinfected
- Cross connection issue
- Review SWA report for other possible contaminant sources to rule out

Corrective action options?

- Inspect for animal activity
- Reduce density of animals near source
- Relocate/improve septic systems
- Abandon improperly constructed well or UIC wells near existing source
- Test backflow devices

# Corrective Action

## Eliminate Contamination For Spring Sources

- Physical cleaning
- Improve seal on spring box
- Prevent animal access
- Prevent surface water intrusion

# Time for Spring Cleaning


*E. coli* detected in springs in 2010


Overgrown brush around spring provides cover for deer and other animals

# Corrective Action

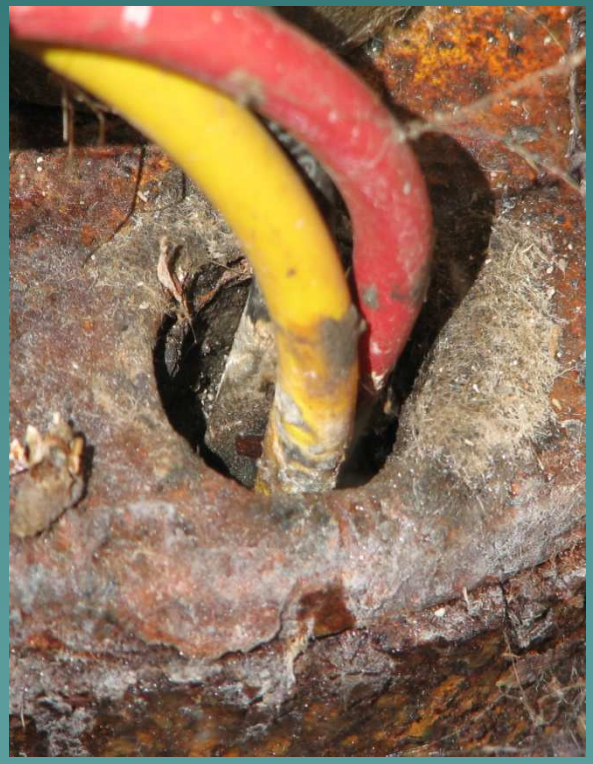
## Could the source be surface water influenced? (GWUDI)

- All *E. coli* positive source samples are evaluated by DWS geologists
- Surface water within 500 feet of source may be cause of contamination
- To evaluate surface water influence, Microscopic Particulate Analysis (MPA) testing may be needed

# Corrective Action

## Correct Significant Deficiencies & Rule Violations

May be source of *E. coli* contamination



# Corrective Action

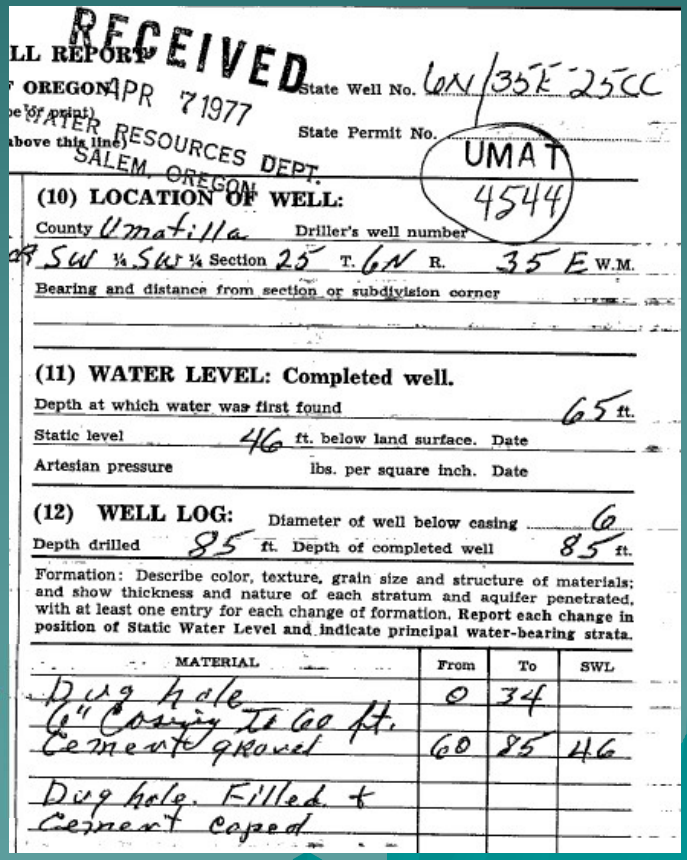
## Correct Significant Deficiencies & Rule Violations

- Well did not meet construction standards
- May need to reconstruct/obtain new

# Corrective Action

## Provide an Alternate Source of Water

- If system has more than one well, contaminated source can be physically disconnected.
- If not, system may need to drill a new well, or connect to another well or public water system



RECEIVED
APR 7 1977
WATER RESOURCES DEPT.
SALEM, OREGON

LL REPORT
OREGON
State Well No. 6N/35E-25CC
State Permit No. UMAT 4544

(10) LOCATION OF WELL:
County Umatilla Driller's well number
SW ¼ SW ¼ Section 25 T. 6N R. 35 E W.M.
Bearing and distance from section or subdivision corner

(11) WATER LEVEL: Completed well.
Depth at which water was first found 65 ft.
Static level 46 ft. below land surface. Date
Artesian pressure lbs. per square inch. Date

(12) WELL LOG: Diameter of well below casing 6
Depth drilled 85 ft. Depth of completed well 85 ft.
Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level and indicate principal water-bearing strata.

| MATERIAL | From | To | SWL |
|---|---|---|---|
| Dug hole | 0 | 34 | |
| 6" Casing to 60 ft. Cement grouted | 60 | 85 | 46 |
| Dug hole. Filled & Cement Capped | | | |

Initially a hand dug well

# Corrective Action

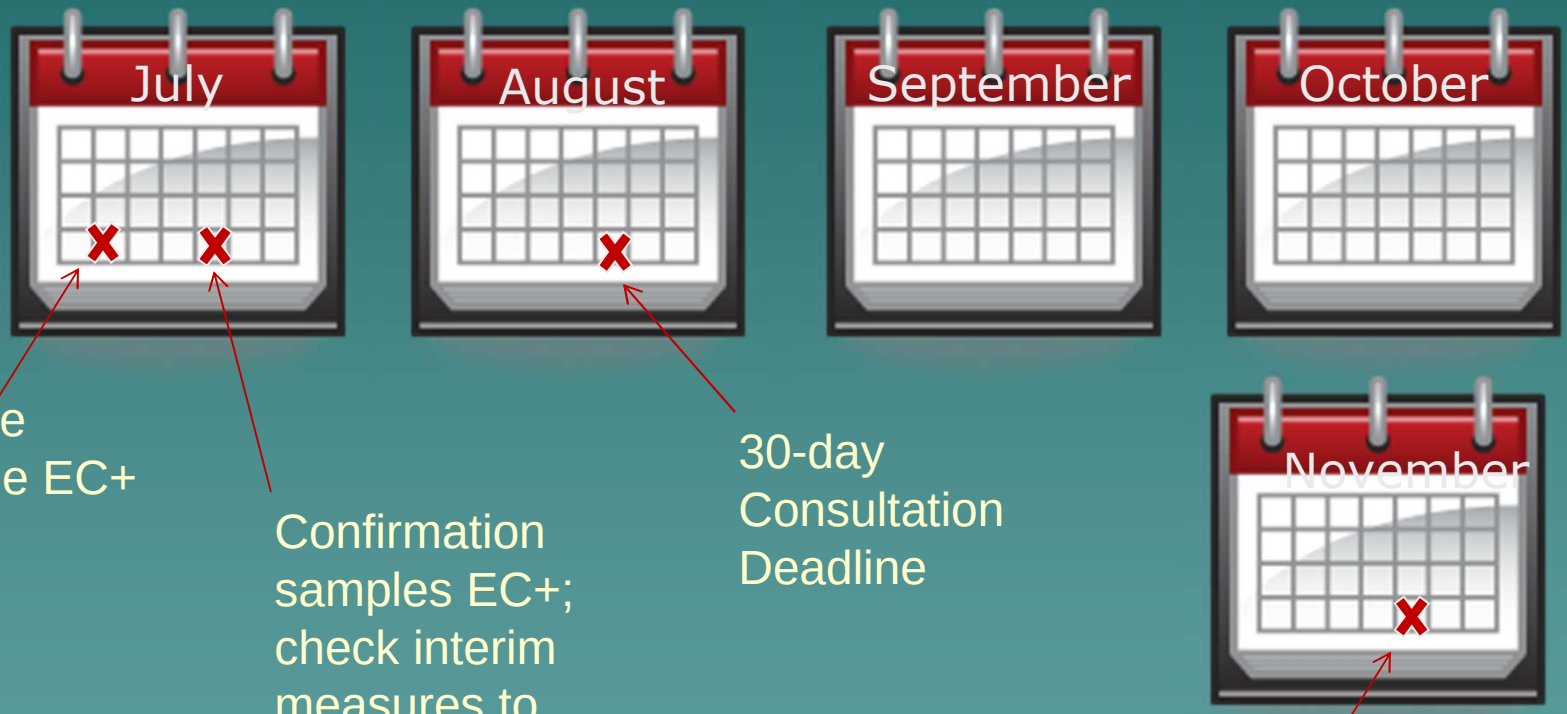
## Last Resort: Provide 4-Log Inactivation of Viruses

- Source of contamination not found
- Well met construction standards
- 4-log disinfection may be only option to provide safe drinking water

Chlorine and contact time tanks

# Corrective Action

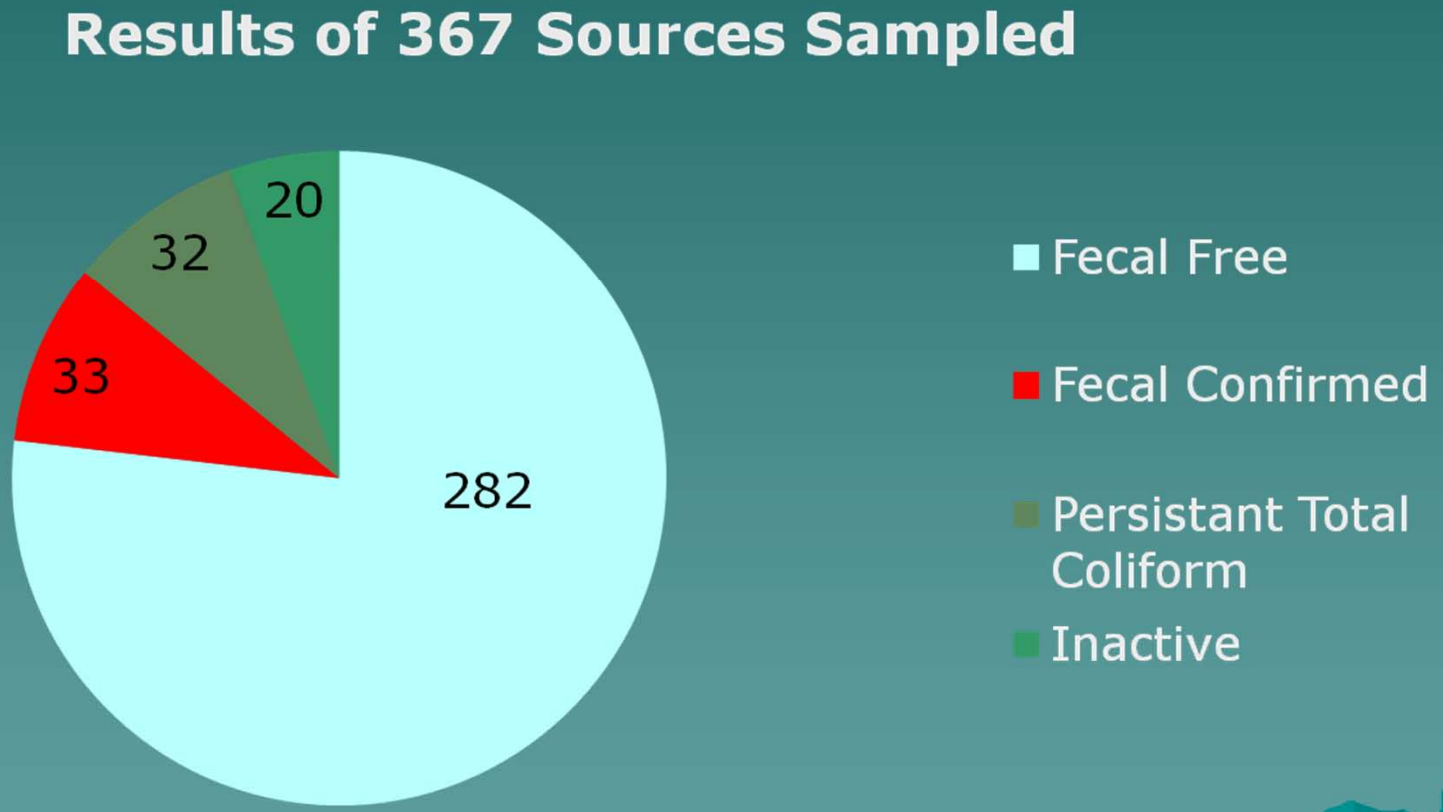
## "Find & Fix" Timeframe for Confirmed *E. coli*



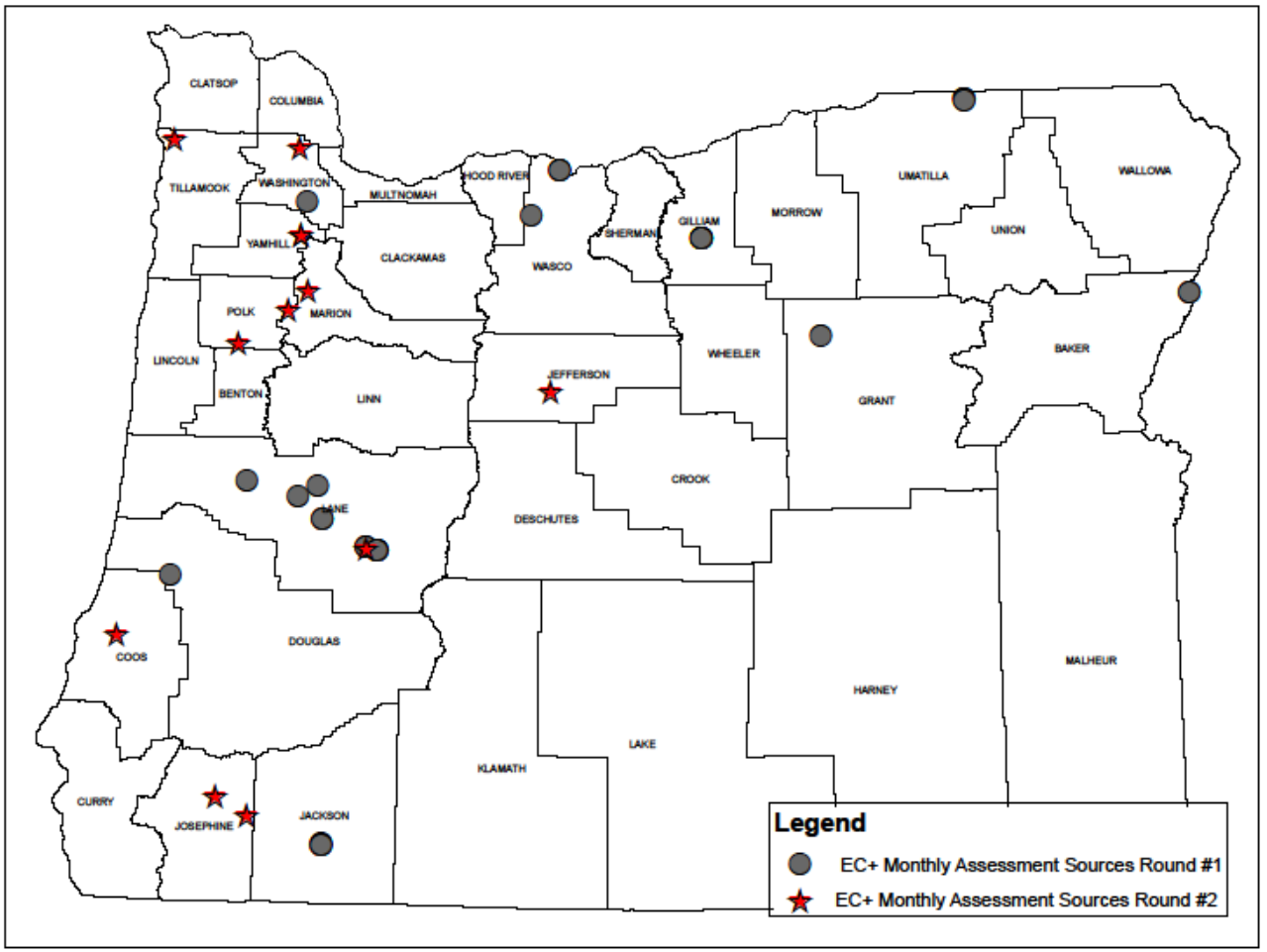
# GWR – Presentation Outline

- Its purpose
- Key provisions (required sampling, terminology, compliance actions, etc.)
- Results of Source Monitoring to Date
- Tools for Water Systems
- Class Exercise

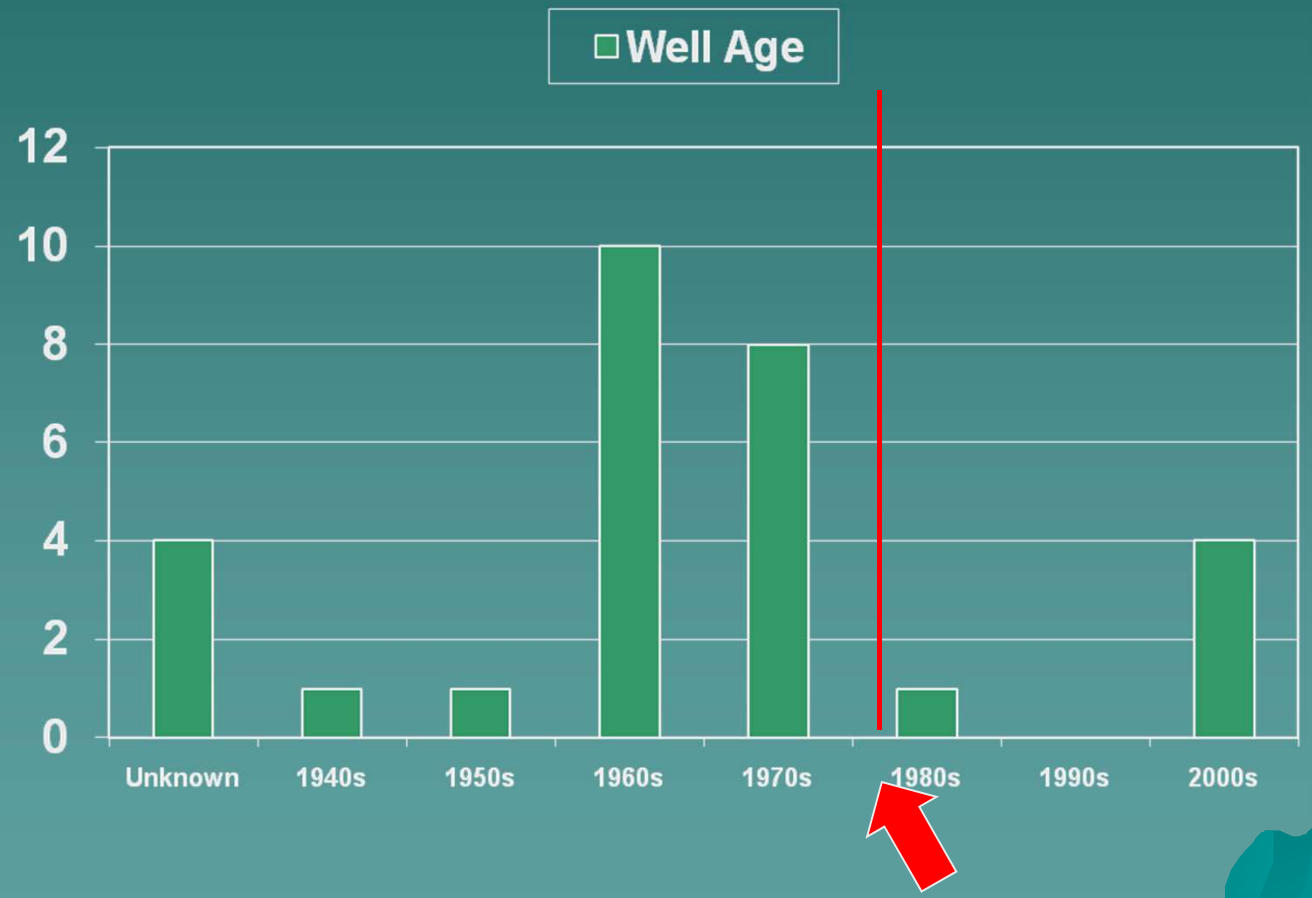
# Results of Monthly Source Monitoring (after 3rd year)



# Where are the fecally contaminated sources?



# What do *E. coli* Contaminated Wells have in Common?



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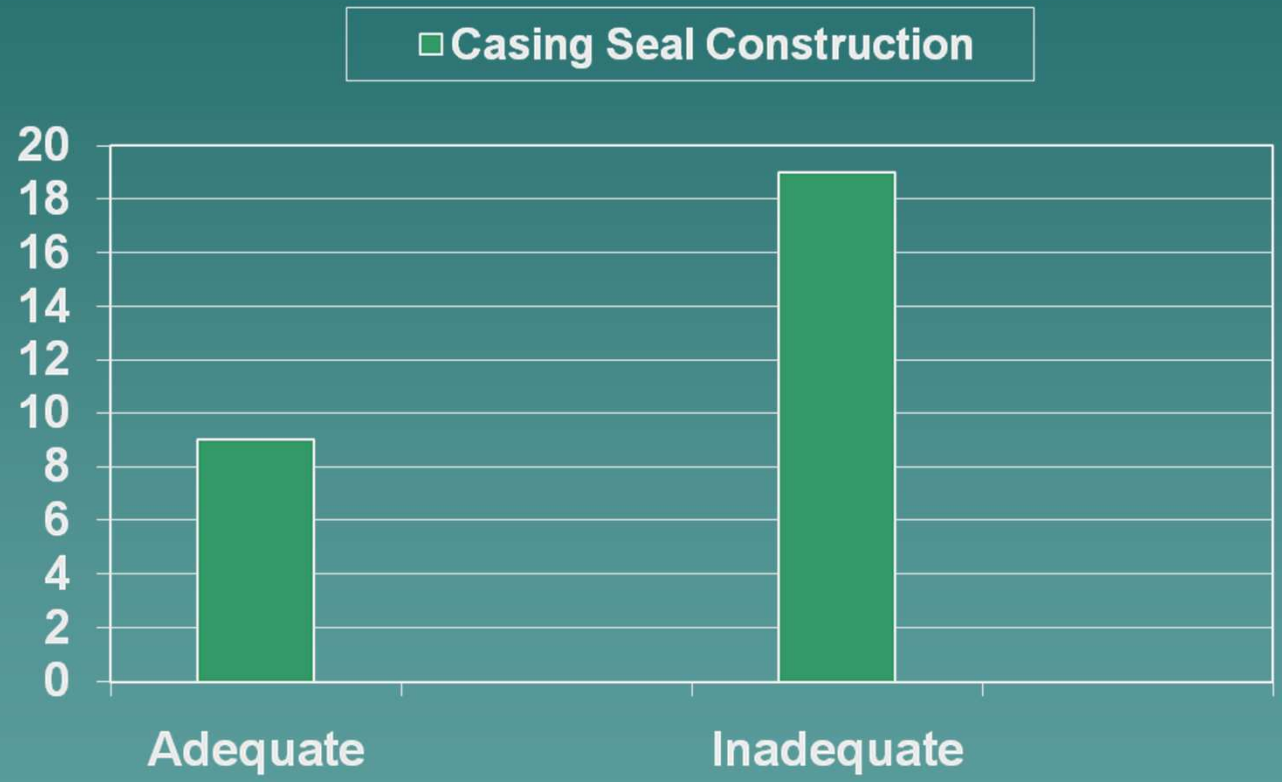

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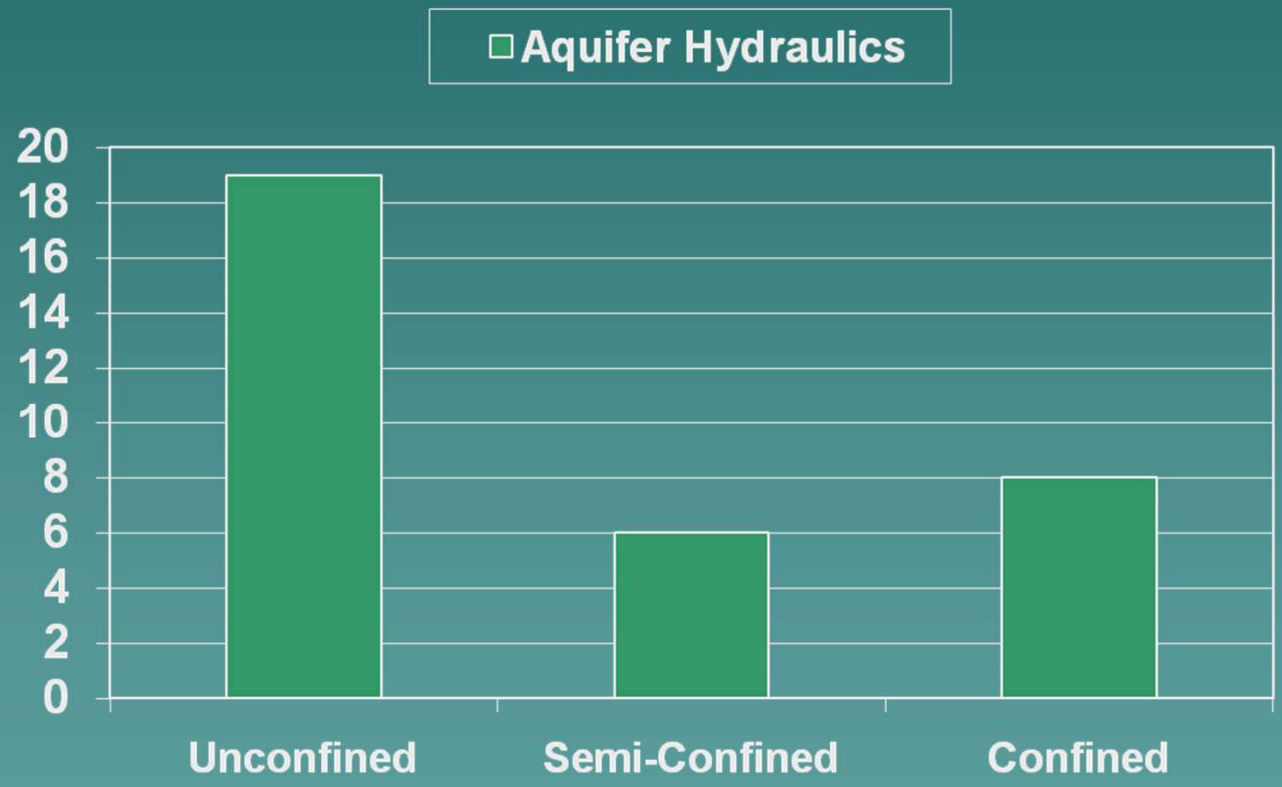


# Implications from Data

## Factors Most Related to Groundwater Fecal Contamination

1. **Inadequate casing seal construction**
2. **Aquifer materials**
   Mixed sand & gravel and fractured bedrock
3. **Water from unconfined aquifers**

# Early Implications from Data

## Most Common Fecal Sources

- Septic system components
- Nearby surface water

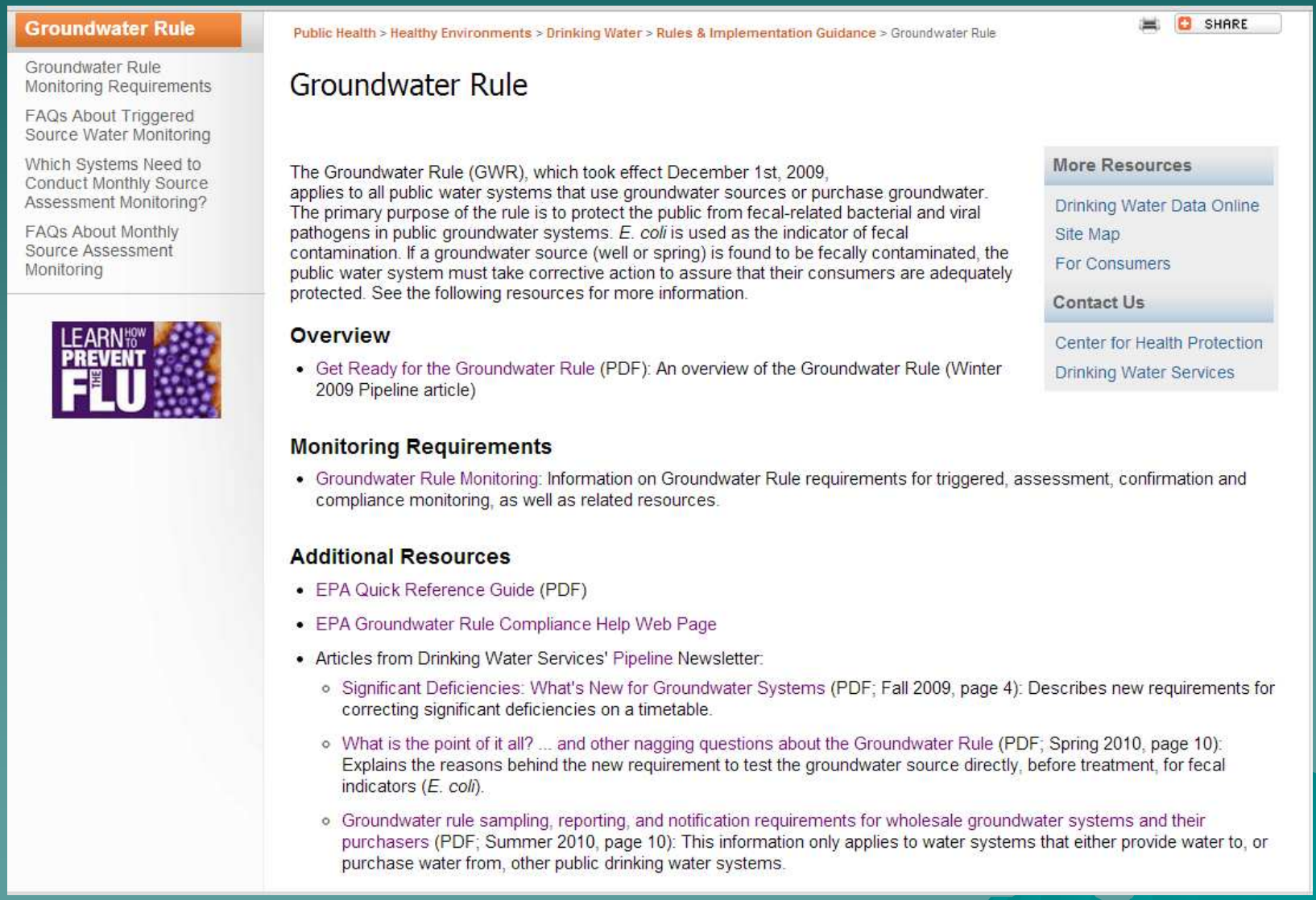
# GWR – Presentation Outline

- Its Purpose
- Key provisions (required sampling, terminology, compliance actions, etc.)
- Results of Source Monitoring to Date
- Tools for Water Systems
- Class Exercise

# GW Rule Page on DWS Website


http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Pages/gwr.aspx

# GW Rule Page on DWS Website



**Groundwater Rule**

- Groundwater Rule Monitoring Requirements
- FAQs About Triggered Source Water Monitoring
- Which Systems Need to Conduct Monthly Source Assessment Monitoring?
- FAQs About Monthly Source Assessment Monitoring



Public Health > Healthy Environments > Drinking Water > Rules & Implementation Guidance > Groundwater Rule

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## Groundwater Rule

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, the public water system must take corrective action to assure that their consumers are adequately protected. See the following resources for more information.

**More Resources**

- Drinking Water Data Online
- Site Map
- For Consumers

**Contact Us**

- Center for Health Protection
- Drinking Water Services

### Overview

- Get Ready for the Groundwater Rule (PDF): An overview of the Groundwater Rule (Winter 2009 Pipeline article)

### Monitoring Requirements

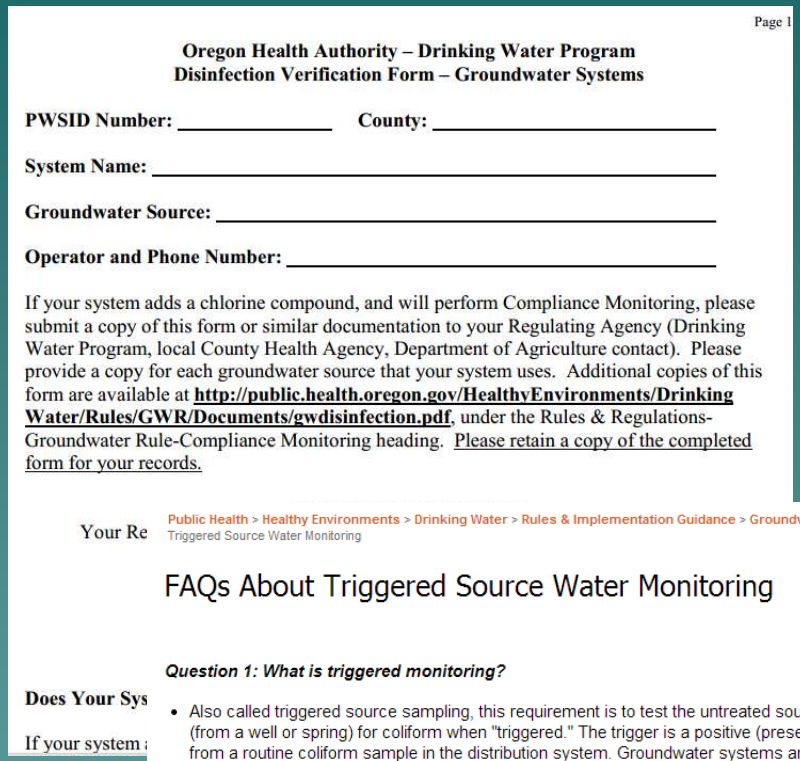
- Groundwater Rule Monitoring: Information on Groundwater Rule requirements for triggered, assessment, confirmation and compliance monitoring, as well as related resources.

### Additional Resources

- EPA Quick Reference Guide (PDF)
- EPA Groundwater Rule Compliance Help Web Page
- Articles from Drinking Water Services' Pipeline Newsletter:
  - Significant Deficiencies: What's New for Groundwater Systems (PDF; Fall 2009, page 4): Describes new requirements for correcting significant deficiencies on a timetable.
  - What is the point of it all? ... and other nagging questions about the Groundwater Rule (PDF; Spring 2010, page 10): Explains the reasons behind the new requirement to test the groundwater source directly, before treatment, for fecal indicators (*E. coli*).
  - Groundwater rule sampling, reporting, and notification requirements for wholesale groundwater systems and their purchasers (PDF; Summer 2010, page 10): This information only applies to water systems that either provide water to, or purchase water from, other public drinking water systems.

http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Pages/gwr.aspx

# Pipeline articles & Other Resources



Page 1

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

**PWSID Number:** _____ **County:** _____

**System Name:** _____

**Groundwater Source:** _____

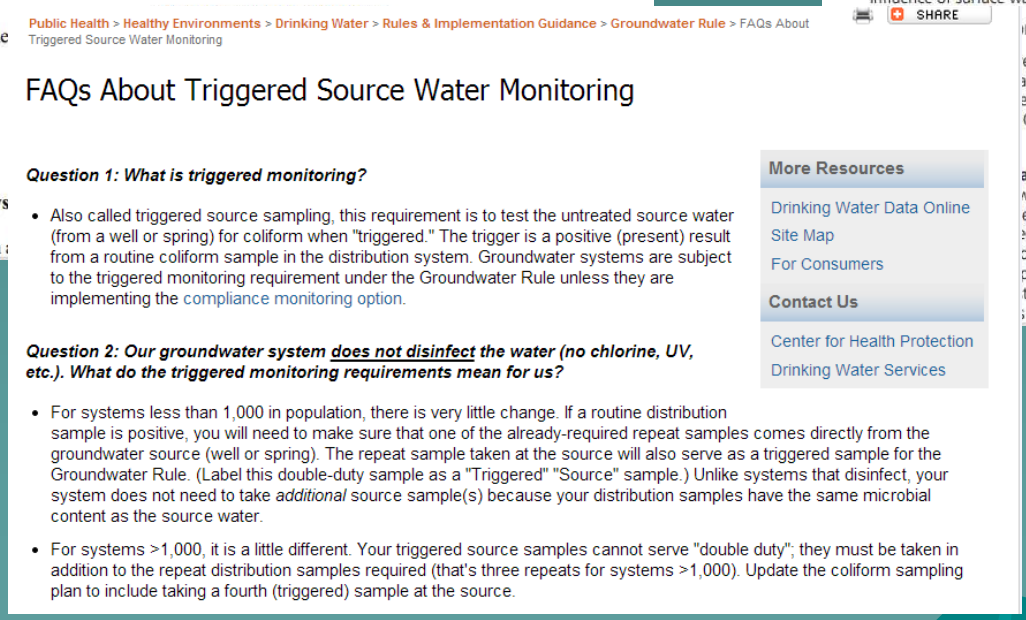
**Operator and Phone Number:** _____

If your system adds a chlorine compound, and will perform Compliance Monitoring, please submit a copy of this form or similar documentation to your Regulating Agency (Drinking Water Program, local County Health Agency, Department of Agriculture contact). Please provide a copy for each groundwater source that your system uses. Additional copies of this form are available at **http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/Rules/GWR/Documents/gwdisinfection.pdf**, under the Rules & Regulations-Groundwater Rule-Compliance Monitoring heading. Please retain a copy of the completed form for your records.

Your Re

**Does Your Sys**

If your system



Public Health > Healthy Environments > Drinking Water > Rules & Implementation Guidance > Groundwater Rule > FAQs About Triggered Source Water Monitoring

## FAQs About Triggered Source Water Monitoring

***Question 1: What is triggered monitoring?***

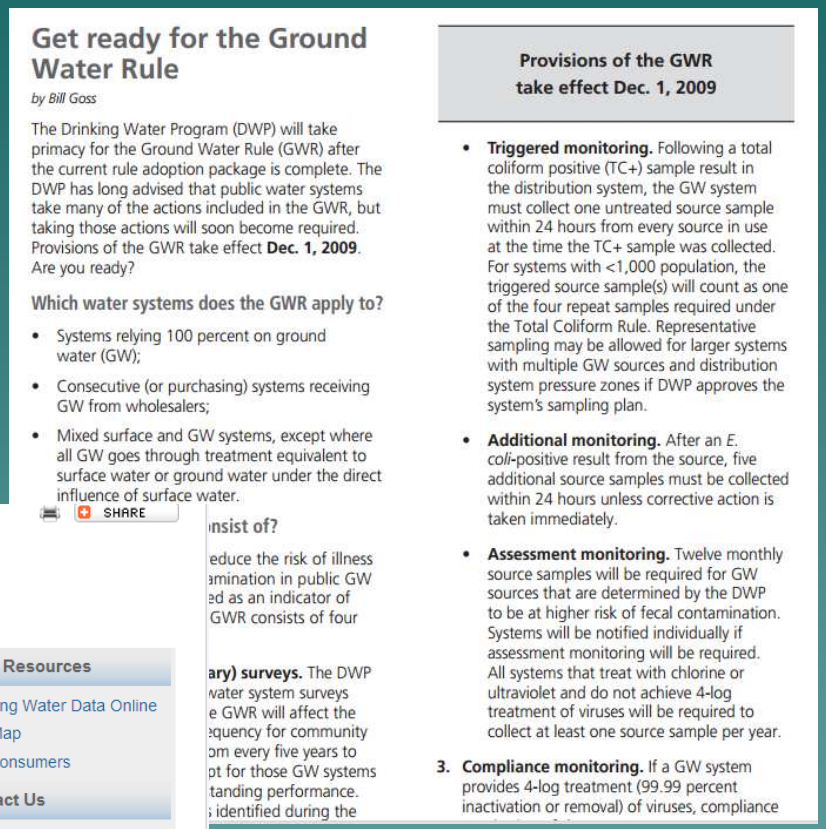
- Also called triggered source sampling, this requirement is to test the untreated source water (from a well or spring) for coliform when "triggered." The trigger is a positive (present) result from a routine coliform sample in the distribution system. Groundwater systems are subject to the triggered monitoring requirement under the Groundwater Rule unless they are implementing the compliance monitoring option.

***Question 2: Our groundwater system does not disinfect the water (no chlorine, UV, etc.). What do the triggered monitoring requirements mean for us?***

- For systems less than 1,000 in population, there is very little change. If a routine distribution sample is positive, you will need to make sure that one of the already-required repeat samples comes directly from the groundwater source (well or spring). The repeat sample taken at the source will also serve as a triggered sample for the Groundwater Rule. (Label this double-duty sample as a "Triggered" "Source" sample.) Unlike systems that disinfect, your system does not need to take *additional* source sample(s) because your distribution samples have the same microbial content as the source water.
- For systems >1,000, it is a little different. Your triggered source samples cannot serve "double duty"; they must be taken in addition to the repeat distribution samples required (that's three repeats for systems >1,000). Update the coliform sampling plan to include taking a fourth (triggered) sample at the source.

More Resources
Drinking Water Data Online
Site Map
For Consumers

Contact Us
Center for Health Protection
Drinking Water Services



## Get ready for the Ground Water Rule

*by Bill Goss*

The Drinking Water Program (DWP) will take primacy for the Ground Water Rule (GWR) after the current rule adoption package is complete. The DWP has long advised that public water systems take many of the actions included in the GWR, but taking those actions will soon become required. Provisions of the GWR take effect **Dec. 1, 2009**. Are you ready?

### Which water systems does the GWR apply to?

- Systems relying 100 percent on ground water (GW);
- Consecutive (or purchasing) systems receiving GW from wholesalers;
- Mixed surface and GW systems, except where all GW goes through treatment equivalent to surface water or ground water under the direct influence of surface water.

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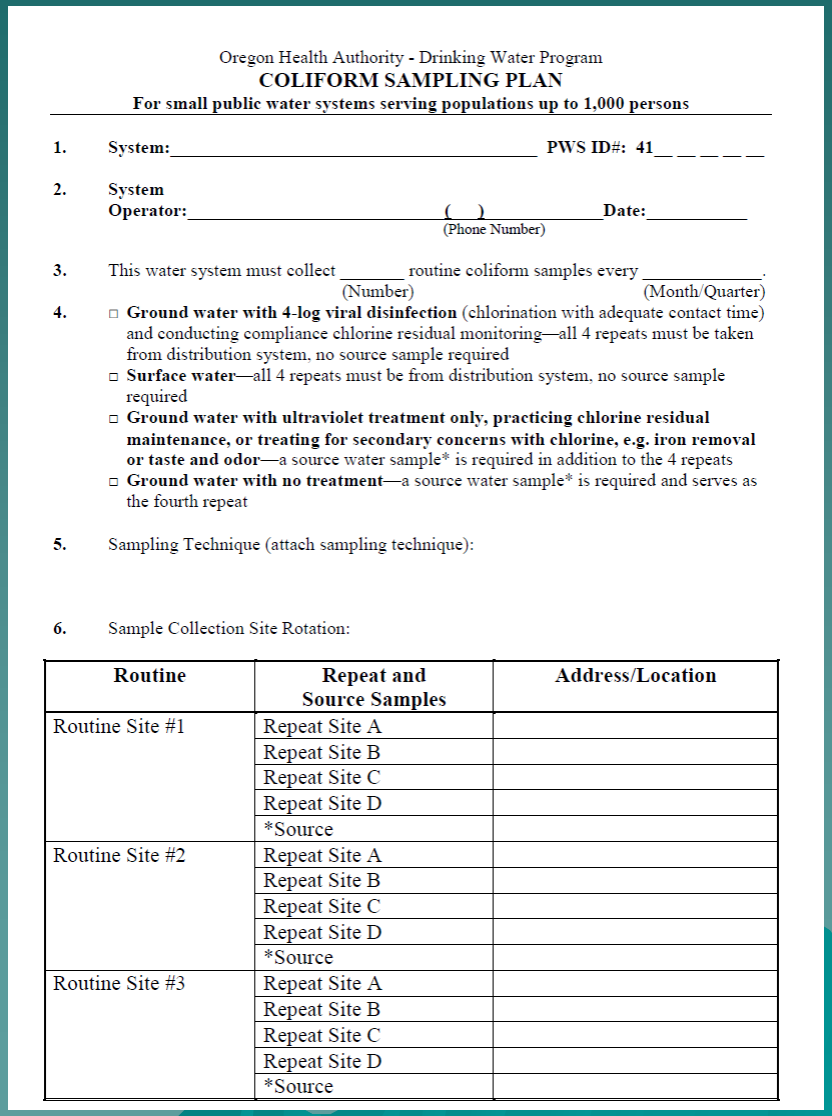
**Provisions of the GWR take effect Dec. 1, 2009**

- **Triggered monitoring.** Following a total coliform positive (TC+) sample result in the distribution system, the GW system must collect one untreated source sample within 24 hours from every source in use at the time the TC+ sample was collected. For systems with <1,000 population, the triggered source sample(s) will count as one of the four repeat samples required under the Total Coliform Rule. Representative sampling may be allowed for larger systems with multiple GW sources and distribution system pressure zones if DWP approves the system's sampling plan.
- **Additional monitoring.** After an *E. coli*-positive result from the source, five additional source samples must be collected within 24 hours unless corrective action is taken immediately.
- **Assessment monitoring.** Twelve monthly source samples will be required for GW sources that are determined by the DWP to be at higher risk of fecal contamination. Systems will be notified individually if assessment monitoring will be required. All systems that treat with chlorine or ultraviolet and do not achieve 4-log treatment of viruses will be required to collect at least one source sample per year.

3. **Compliance monitoring.** If a GW system provides 4-log treatment (99.99 percent inactivation or removal) of viruses, compliance

# Coliform Sampling Plan Template

- Include PWS information
- System type, treatment and sample frequency
- Sampling procedures
- Identify routine and repeat sampling sites in distribution system
- Include source water sites
- Easy to fill out MS Word file available on website



Oregon Health Authority - Drinking Water Program

**COLIFORM SAMPLING PLAN**

**For small public water systems serving populations up to 1,000 persons**

1. **System:**_____ **PWS ID#: 41**__ __ __ __ __

2. **System Operator:**_____**(** **)**_____**Date:**_____
(Phone Number)

3. This water system must collect _____ routine coliform samples every _____.
(Number) (Month/Quarter)

4. ☐ **Ground water with 4-log viral disinfection** (chlorination with adequate contact time) and conducting compliance chlorine residual monitoring—all 4 repeats must be taken from distribution system, no source sample required
☐ **Surface water**—all 4 repeats must be from distribution system, no source sample required
☐ **Ground water with ultraviolet treatment only, practicing chlorine residual maintenance, or treating for secondary concerns with chlorine, e.g. iron removal or taste and odor**—a source water sample* is required in addition to the 4 repeats
☐ **Ground water with no treatment**—a source water sample* is required and serves as the fourth repeat

5. Sampling Technique (attach sampling technique):

6. Sample Collection Site Rotation:

| Routine | Repeat and Source Samples | Address/Location |
|---|---|---|
| Routine Site #1 | Repeat Site A | |
| | Repeat Site B | |
| | Repeat Site C | |
| | Repeat Site D | |
| | *Source | |
| Routine Site #2 | Repeat Site A | |
| | Repeat Site B | |
| | Repeat Site C | |
| | Repeat Site D | |
| | *Source | |
| Routine Site #3 | Repeat Site A | |
| | Repeat Site B | |
| | Repeat Site C | |
| | Repeat Site D | |
| | *Source | |

# Coliform Sampling Plan Template

## Follow up sampling points:

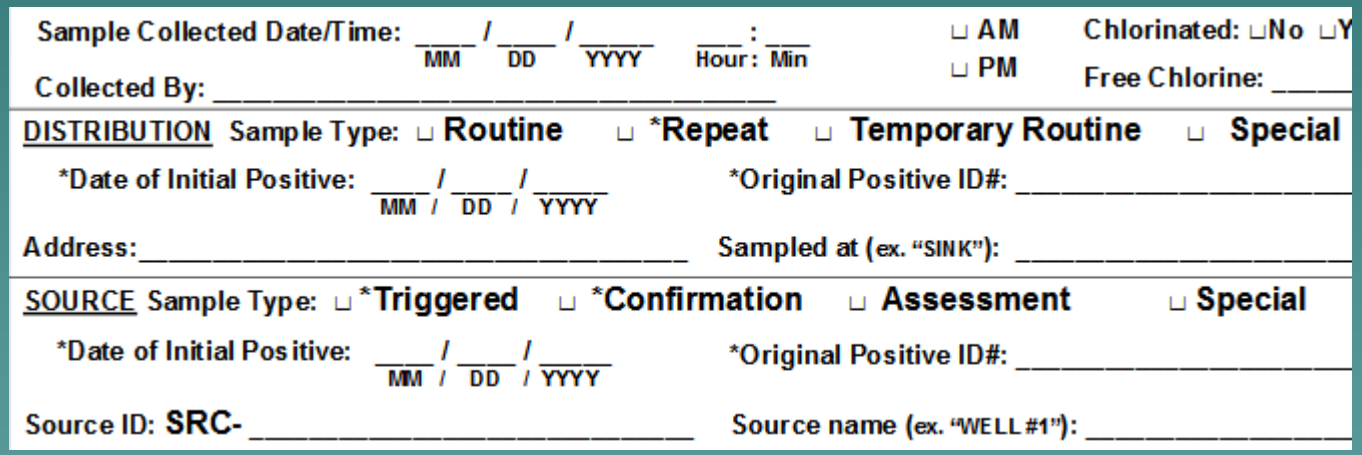
- Systems with no treatment can use source sample as 4$^{th}$ repeat
- All sources in use at time of initial positive distribution sample must be sampled.
- Systems using chlorine for residual maintenance or UV cannot use the source as repeat sample.
- Systems applying 4-Log disinfection must collect all 4 repeats in distribution.
- Applies to systems serving ≤ 1000 population

# Coliform Lab Form Sections

## Sample types:

Distribution – Routine, Repeat, Temporary Routine, Special

Source – Triggered, Confirmation, Assessment, Special



Sample Collected Date/Time: ____ / ____ / _____ ___ : ___ ⊔ AM Chlorinated: ⊔No ⊔Y
MM DD YYYY Hour: Min ⊔ PM
Collected By: _____ Free Chlorine: _____

DISTRIBUTION Sample Type: ⊔ Routine ⊔ *Repeat ⊔ Temporary Routine ⊔ Special

*Date of Initial Positive: ____ / ____ / _____ *Original Positive ID#: _____
MM / DD / YYYY

Address:_____ Sampled at (ex. "SINK"): _____

SOURCE Sample Type: ⊔ *Triggered ⊔ *Confirmation ⊔ Assessment ⊔ Special

*Date of Initial Positive: ____ / ____ / _____ *Original Positive ID#: _____
MM / DD / YYYY

Source ID: SRC- _____ Source name (ex. "WELL #1"): _____

Be sure to mark sample types correctly!

# Questions?

# Class Exercises

- Coliform Sampling Plan
- Lab Slip Labeling Handouts
- Demonstration of GWR web resources