



*Florida Department of
Environmental Protection*

GROUND WATER RULE (GWR)

Overview

◆ Introduction

◆ GWR Basics

◆ Sanitary Surveys; Significant Deficiencies

◆ Ground Water Microbial Monitoring

- Triggered Source Water Monitoring
- Assessment Source Water Monitoring
- New Sources; Source Water Sampling Location; Etc.
- Assessment **Finished Water** Monitoring

◆ Treatment Technique (TT) Requirements

- Corrective Action
- Compliance Monitoring

◆ Monitoring or TT Violations; Reporting; Recordkeeping

◆ Public Notification; Consumer Confidence Reports; Special Notices

◆ Conclusion



INTRODUCTION



Acronyms/Abbreviations & Definitions

μm	Micron
AwwaRF	American Water Works Association Research Foundation (now Water Research Foundation)
ACHD	Approved County Health Department
BF	Baffling factor
CCR	Consumer Confidence Report
CFE	Combined Filter Effluent
CFR	Code of Federal Regulations
Consecutive System	PWS that receives some or all of its finished water from 1 or more wholesale systems
CT	Product of "residual disinfectant concentration" (C), in mg/L, determined before or at first customer & corresponding "disinfectant contact time" (T), in minutes
CWS	Community Water System
DEP	Florida Department of Environmental Protection
DOH	Florida Department of Health



Acronyms/Abbreviations & Definitions (cont'd)

DPD	<i>N,N</i> -diethyl- <i>p</i> -phenylenediamine
<i>E coli</i>	<i>Escherichia coli</i>
EC+	<i>E- coli</i> -positive
EPA	United States Environmental Protection Agency
FAC	Florida Administrative Code
FI-	Fecal-Indicator-Negative
FI+	Fecal-Indicator-Positive
FRWA	Florida Rural Water Association
GWR	Ground Water Rule
GWS	Ground Water System
ITS	Industrial Test Systems
L&CR	Lead & Copper Rule
LT1ESWTR	Long-Term 1 Enhanced Surface Water Treatment Rule
MCL	Maximum Contaminant Level
MF	Microfiltration



Acronyms/Abbreviations & Definitions (cont'd)

mg/L	Milligrams/Liter
MOR	Monthly Operation Report
MWCO	Molecular Weight Cutoff
NCWS	Non-Community Water System
NF	Nanofiltration
NTU	Nephelometric Turbidity Unit
PE	Professional Engineer
PN	Public Notification
PWS	Public Water System
RO	Reverse Osmosis
SDWA	Safe Drinking Water Act
SP	Salt Passage
SWTR	Surface Water Treatment Rule
TC+	Total-Coliform-Positive
TCR	Total Coliform Rule



Acronyms/Abbreviations & Definitions (cont'd)

TT	Treatment Technique
UF	Ultrafiltration
UV	Ultraviolet
UVT	UV Transmittance
Wholesale System	PWS that treats source water as necessary to produce finished water & then delivers some or all of that finished water to another PWS
WTP	Water Treatment Plant



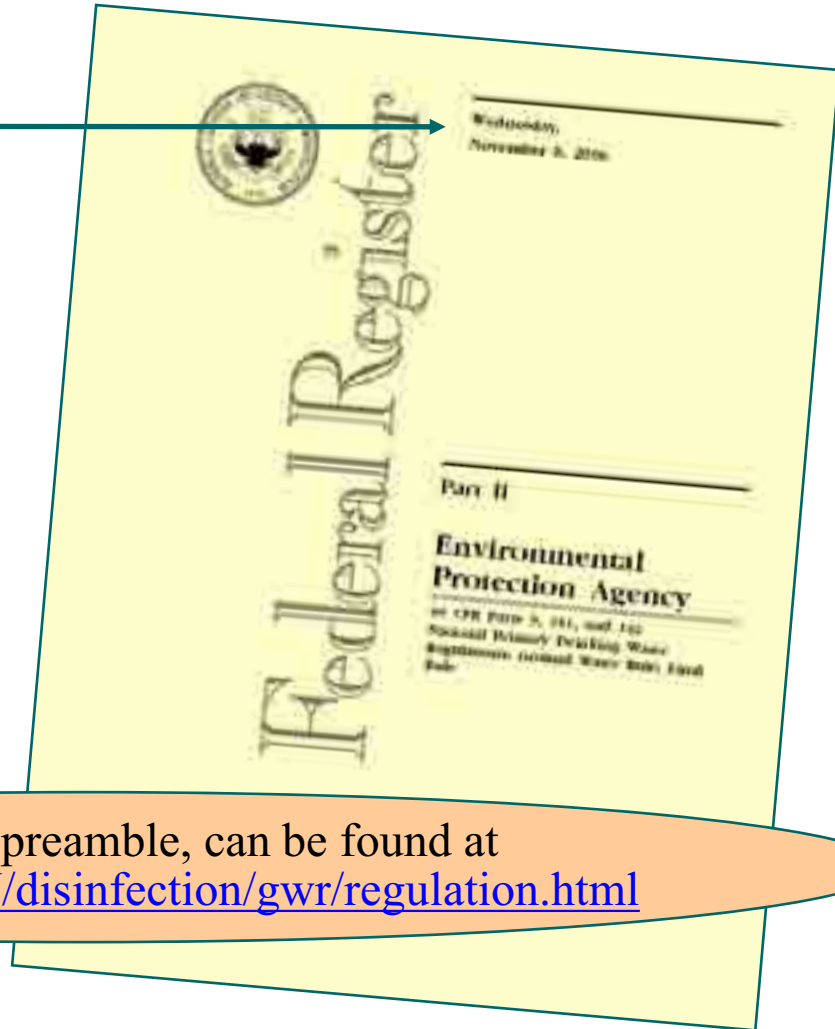
Resources

- ◆ **Slides**
- ◆ **GWR**
- ◆ **GWR quick reference guides**
- ◆ **GWR factsheets**
- ◆ **GWR guidance manuals**
- ◆ ***The GWR Implementation Guidance***
- ◆ **DEP's draft "Guidelines for 4-Log Virus Treatment of Ground Water"**
- ◆ **Additional resources**
- ◆ **DEP or ACHD contacts for GWR**



GWR

GWR was published
in *Federal Register* on
November 8, 2006

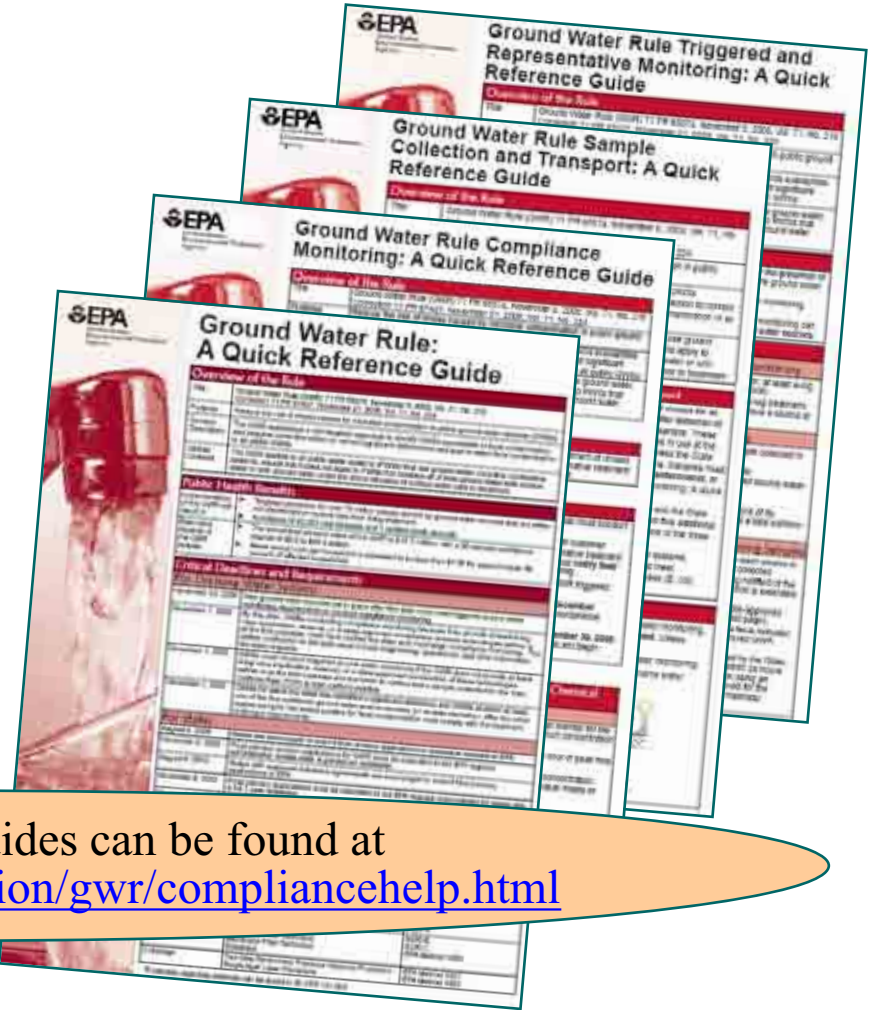


GWR, including preamble, can be found at
www.epa.gov/OGWDW/disinfection/gwr/regulation.html



GWR Quick Reference Guides

- ◆ **GWR: A Quick Reference Guide**
- ◆ **GWR Compliance Monitoring: A Quick Reference Guide**
- ◆ **GWR Sample Collection & Transport: A Quick Reference Guide**
- ◆ **GWR Triggered & Representative Monitoring: A Quick Reference Guide**



GWR quick reference guides can be found at
www.epa.gov/OGWDW/disinfection/gwr/compliancehelp.html



GWR Factsheets

- ◆ **GWR Factsheet: General Rule Requirements**
- ◆ **GWR Factsheet: Monitoring Requirements**
- ◆ **GWR Factsheet: Sanitary Surveys**
- ◆ **GWR Factsheet: PN, CCR, & Special Notice Requirements for CWSs**
- ◆ **GWR Factsheet: PN & Special Notice Requirements for NCWSs**

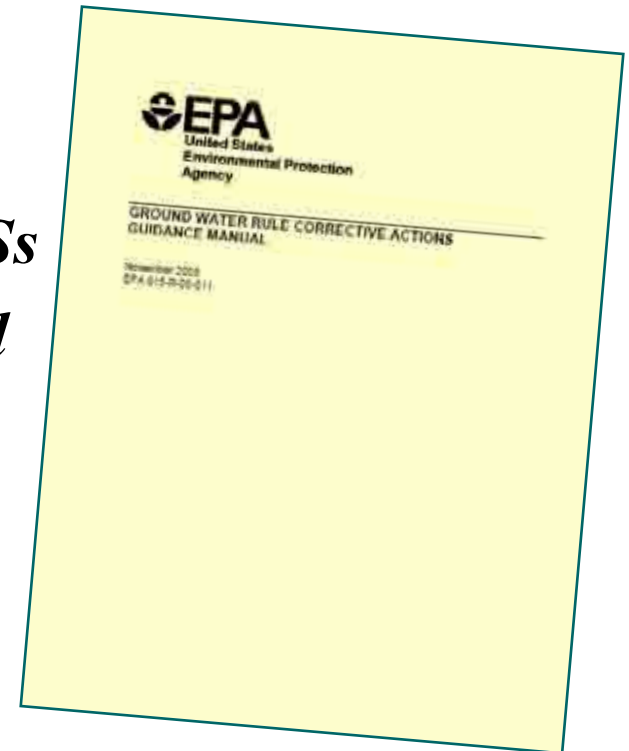


GWR factsheets can be found at
www.epa.gov/OGWDW/disinfection/gwr/compliancehelp.html



GWR Guidance Manuals

- ◆ *GWR Triggered & Representative Source Water Monitoring Guidance Manual*
- ◆ *GWR Corrective Actions Guidance Manual*
- ◆ *Sanitary Survey Guidance Manual for GWSs*
- ◆ *GWR Source Assessment Guidance Manual*
- ◆ *GWR Source Water Monitoring Methods Guidance*
- ◆ *Consecutive System Guide for the GWR*
- ◆ *Complying with the GWR: Small Entity Compliance Guide*

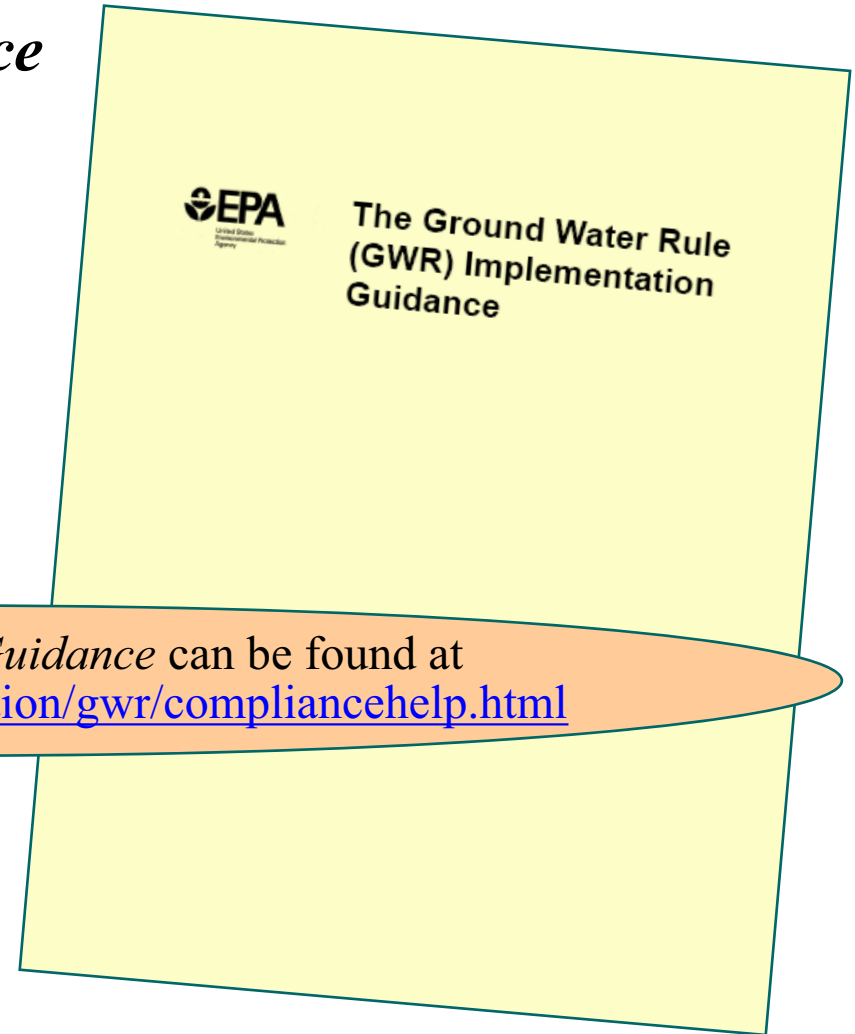


GWR guidance manuals can be found at
www.epa.gov/OGWDW/disinfection/gwr/compliancehelp.html



The GWR Implementation Guidance

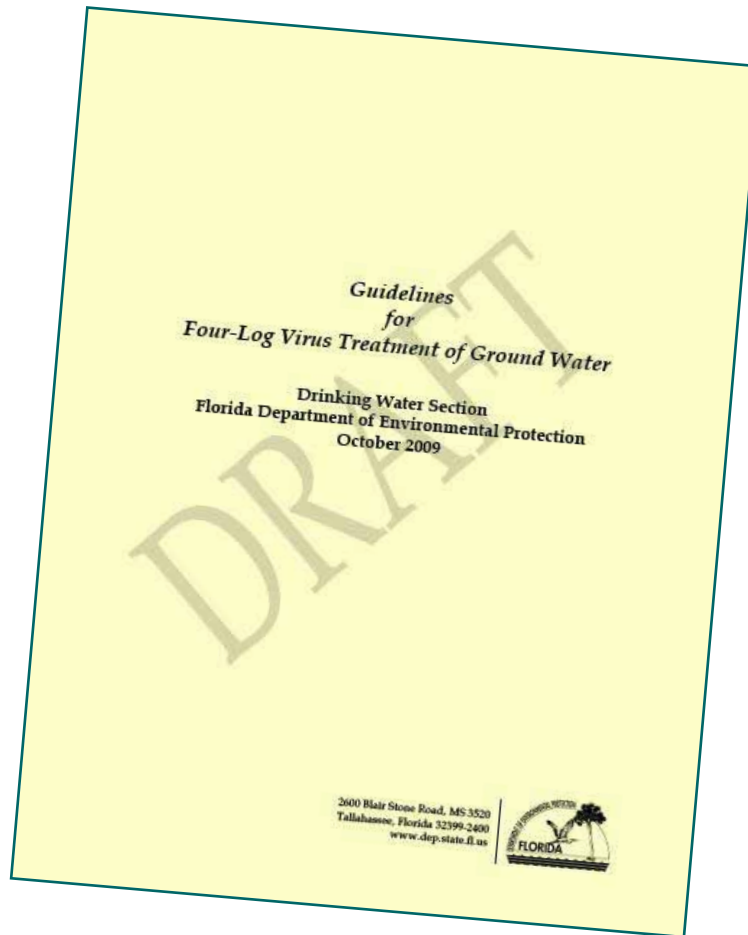
- ◆ ***The GWR Implementation Guidance*** is intended to provide guidance to states exercising primary enforcement responsibility under SDWA



The GWR Implementation Guidance can be found at
www.epa.gov/OGWDW/disinfection/gwr/compliancehelp.html

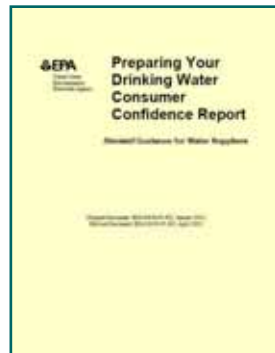
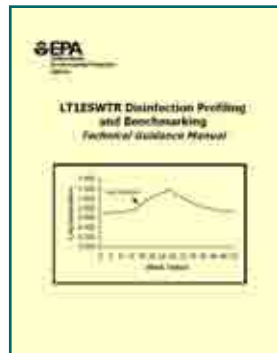


DEP's Draft "Guidelines for 4-Log Virus Treatment of Ground Water"



Additional Resources

- ◆ EPA's *Guidance Manual for Compliance with the Filtration & Disinfection Requirements for PWSs Using Surface Water Sources*
- ◆ EPA's *Alternative Disinfectants & Oxidants Guidance Manual*
- ◆ EPA's *LT1ESWTR Disinfection Profiling & Benchmarking Technical Guidance Manual*
- ◆ EPA's *Preparing Your Drinking Water CCR: Revised Guidance for Water Suppliers*
- ◆ EPA's *Ultraviolet Disinfection Guidance Manual*
- ◆ EPA's *Membrane Filtration Guidance Manual*



DEP or ACHD Contacts for GWR

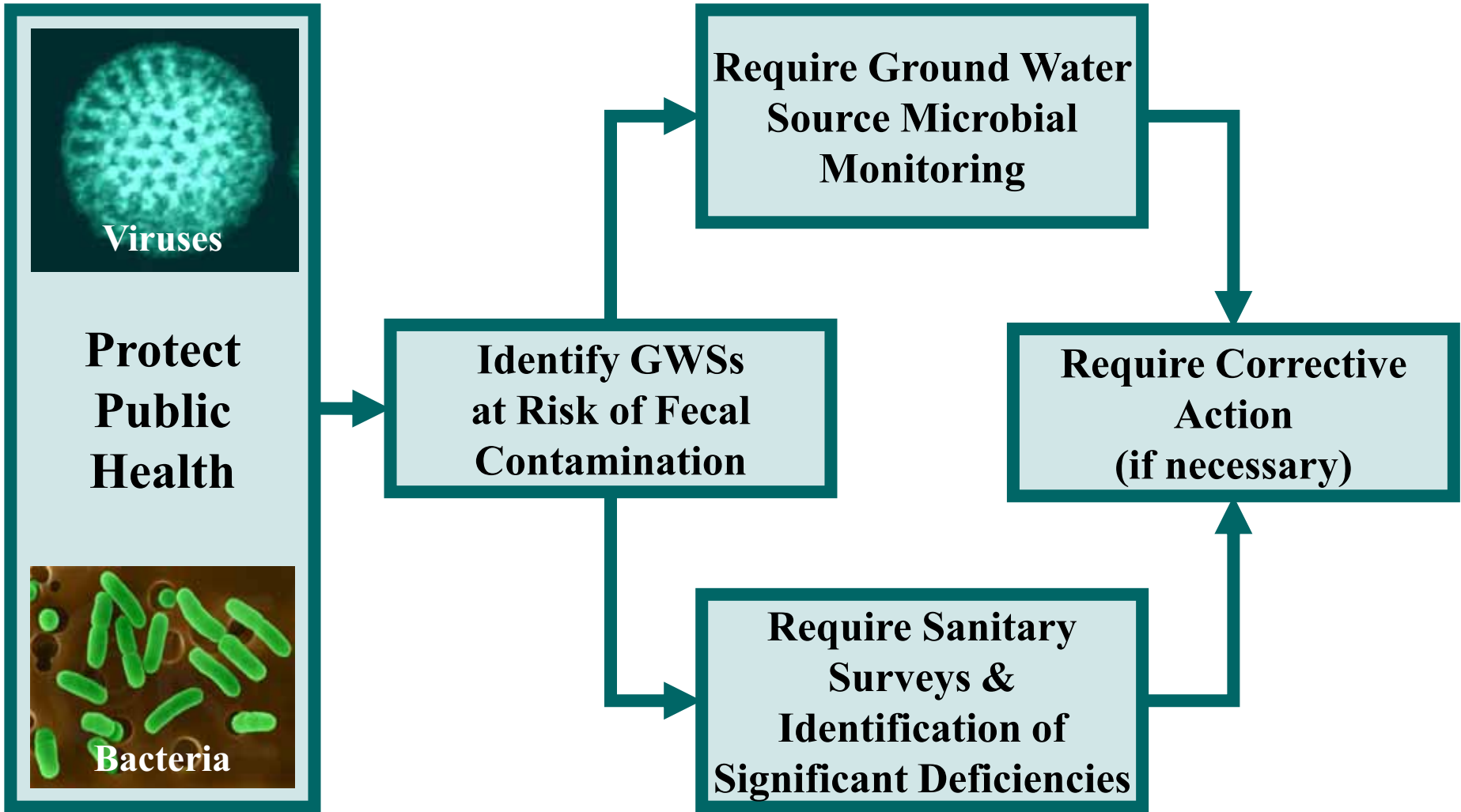
Office	GWR Contact		
	Name	Telephone #	E-Mail Address
DEP Headquarters	John Sowerby, PE	850/245-8637	john.r.sowerby@dep.state.fl.us
DEP NW District	Kevin Holler	850/595-8300, x1200	kevin.holler@dep.state.fl.us
DEP NE District	Blanche Waller, PE	904/807-3307	blanche.waller@dep.state.fl.us
DEP Central District	Reggie Phillips	407/893-3319	reggie.phillips@dep.state.fl.us
Volusia CHD	Ronald Freeman, PE	386/736-5158	ronald_freeman@doh.state.fl.us
DEP SE District	Jose Calas, PE	561/681-6693	jose.calas@dep.state.fl.us
Broward CHD	Ewa Leczynski	954/467-4910	ewa_leczynski@doh.state.fl.us
Dade CHD	Paul André, PE	305/623-3500	paul_andre@doh.state.fl.us
Palm Beach CHD	Curtis Mitchell	561/837-5958	curtis_mitchell@doh.state.fl.us
DEP South District	Patty Baron	239/332-6975, x128	patty.baron@dep.state.fl.us
Lee CHD	Charles Walther, PE	239/274-2204	charles_walther@doh.state.fl.us
DEP SW District	Gwen Shofner, PE	813/632-7600, x306	gwen.shofner@dep.state.fl.us
Hillsborough CHD	Therese LaDouceur	813/307-8015, x5934	therese_ladouceur@doh.state.fl.us
Manatee CHD	Brian Dietz, PE	941/748-0747, x1340	brian_dietz@doh.state.fl.us
Polk CHD	Rafael Reyes	863/519-7900, x1134	rafael_reyes@doh.state.fl.us
Sarasota CHD	Rich Cantin	941/861-6670	rich_cantin@doh.state.fl.us



GWR BASICS



Primary Purpose of GWR



Key Provisions of GWR

**Sanitary Surveys
of all GWSs**

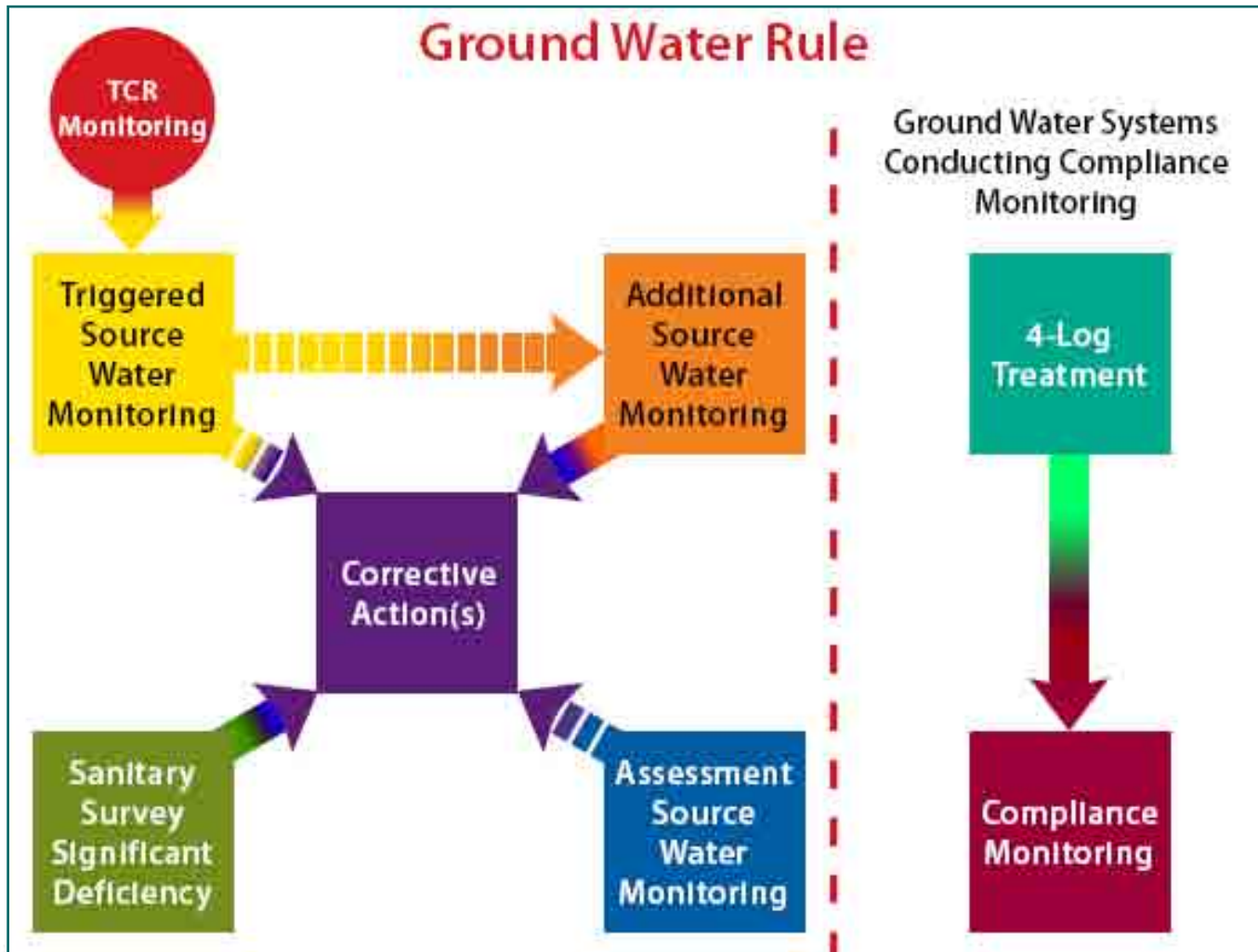
**Ground Water
Source Microbial
Monitoring**

TT Requirement:
Corrective Action for
Significant Deficiencies
& Fecal Contamination

TT Requirement:
Compliance Monitoring



GWR Compliance Tracks



To Whom Does GWR Apply (i.e., which PWSs are considered GWSs)?

**PWSs that
Use Only
Ground
Water
Sources**

**Consecutive
PWSs**
that receive
finished ground
water or that use
their own ground
water source(s)

**PWSs that
Use Both
Surface &
Ground
Water
Sources***

* Except systems that combine all of their ground water with surface water **prior to treatment of surface water under SWTRs**

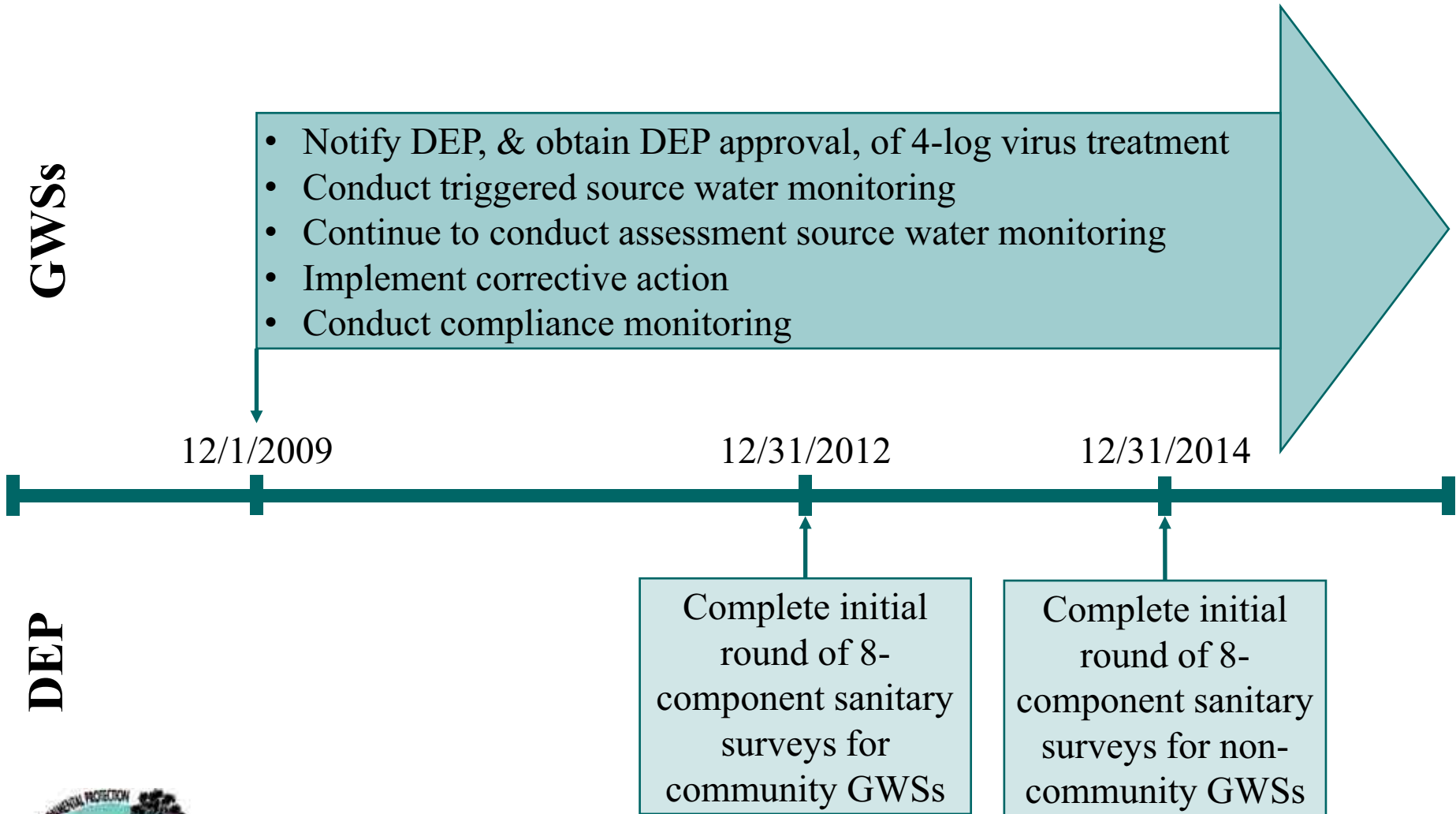


GWR Compliance Dates

GWS Requirement	Required by:
Notify DEP, & obtain DEP approval, of 4-log virus treatment if GWS chooses to provide 4-log virus treatment in lieu of conducting triggered or assessment source water monitoring	12/1/2009 (or after 12/1/2009 but before GWS may discontinue triggered or assessment source water monitoring)
GWS Requirement	Required Beginning:
Conduct triggered source water monitoring if GWS does <u>not</u> provide DEP-approved 4-log virus treatment	12/1/2009
Continue to conduct assessment source water monitoring if GWS does <u>not</u> provide DEP-approved 4-log virus treatment	
Implement corrective action for significant deficiencies or for source water fecal contamination	
Conduct compliance monitoring if GWS provides DEP-approved 4-log virus treatment as corrective action or in lieu of conducting triggered or assessment source water monitoring	12/1/2009 (or after 12/1/2009 but before GWS may discontinue triggered or assessment source water monitoring)
DEP Requirement	Required By:
Complete initial round of 8-component sanitary surveys for community GWSs	12/31/2012
Complete initial round of 8-component sanitary surveys for non-community GWSs	12/31/2014



Implementation Timeline



Relationship Between GWR & TCR

- ◆ GWR & TCR work together
- ◆ Samples from distribution system may indicate problem at source
- ◆ TC+ routine distribution sample taken under TCR triggers source water monitoring under GWR

More information about TCR can be found at
www.epa.gov/OGWDW/disinfection/tcr/index.html



Relationship Between GWR & L&CR

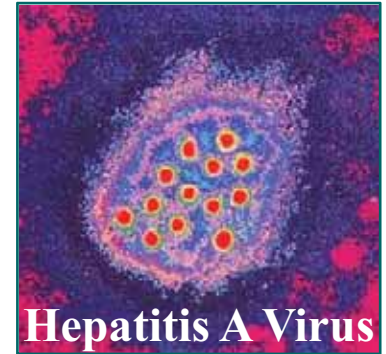
- ◆ Water treatment changes to achieve 4-log virus treatment under GWR could affect compliance with L&CR
- ◆ Per 141.86(d)(4)(vii) in L&CR, when permitting addition of new source or permitting change in water treatment, DEP may require CWSs & NTNCWSs to do 1 or more of following:
 - Resume lead & copper sampling in tap water during each 6-month monitoring period & collect number of samples specified for standard monitoring
 - Increase water quality parameter monitoring
 - Re-evaluate system's corrosion control treatment

More information about L&CR can be found at www.epa.gov/OGWDW/lcrmr/index.html



Understanding "4-Log Virus Treatment"

- ◆ Virus "treatment" means virus "removal or inactivation"
- ◆ Removal/inactivation of microorganisms, including viruses, generally is measured on logarithmic scale (i.e., in terms of orders of magnitude)
- ◆ Log removal/inactivation of viruses relates to % removal/inactivation of viruses
 - Removal/inactivation of 90% = 1-log removal/inactivation
 - Removal/inactivation of 90% of what is left after 1-log removal/inactivation = another 1-log removal/inactivation, or total of 2-log removal/inactivation
 - $90\% + (10\%)(90\%) = 99\%$



Understanding "4-Log Virus Treatment" (cont'd)

◆ Log removal/inactivation of viruses relates to % removal/inactivation of viruses (cont'd)

- Removal/inactivation of 90% of what is left after 2-log removal/inactivation = another 1-log removal/inactivation, or total of 3-log removal/inactivation
 - $99\% + (1\%)(90\%) = 99.9\%$
- Removal/inactivation of 90% of what is left after 3-log removal/inactivation = another 1-log removal/inactivation, or total of 4-log removal/inactivation
 - $99.9\% + (0.1\%)(90\%) = 99.99\%$

Log Removal/Inactivation	% Removal/Inactivation
1-log	90%
2-log	99%
3-log	99.9%
4-log	99.99%



Understanding "CT"

💧 **CT is used to determine effectiveness & reliability of chemical disinfection**

💧 **CT = C x T**

- C = residual disinfectant concentration in mg/L determined before or at first customer
 - In many cases, first customer is WTP itself
- T = disinfectant contact time in minutes = time in minutes that it takes for water to move from point of disinfectant application to **point where C is measured**
 - T in pipelines is calculated by dividing internal volume of pipe by flow rate through pipe
 - T in tanks is determined by...
 - Tracer study; or
 - Dividing water volume in tank by flow rate out of tank to determine theoretical detention time & then multiplying theoretical detention time by BF



💧 **CT is expressed in mg-min/L**



Calculating CT

◆ To determine/demonstrate effectiveness & reliability of chemical disinfection, PWSs using chemical disinfection must...

- Calculate minimum CT **during peak flow** & under worst-case conditions
 - Worst-case conditions:
 - Minimum water volume in tanks during any peak flow period
 - Minimum C during peak flow
- Evaluate minimum CT provided versus required CT **at minimum water temperature**



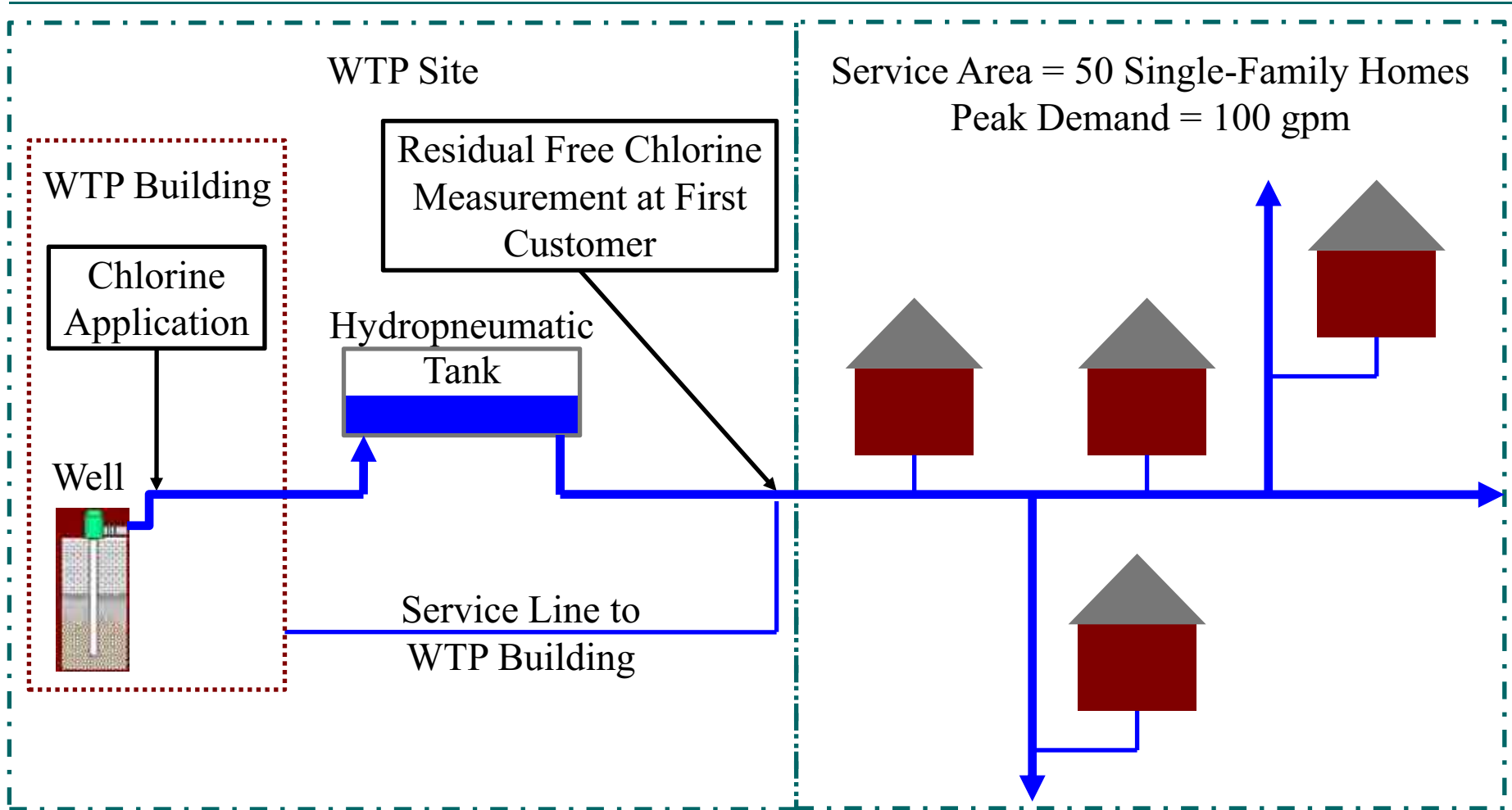
Calculating CT (cont'd)

♦ PWS will need to know following:

- Peak flow rate(s)
 - Some WTPs will have single peak flow rate across WTP, while at other WTPs, peak flow rate will vary across WTP
 - Peak flow rate(s) can be determined from design or pump data
- Water pH & minimum water temperature
- Minimum C during peak flow
- Diameter & length of piping between point of disinfectant application & point where C is measured
- For any tank used to provide T...
 - Minimum water volume in tank during any peak flow period
 - BF for tank



Example CT Calculation



Example CT Calculation (cont'd)

- ◆ Normal working pressure in hydropneumatic tank = 40 to 60 psig; well pump capacity = 100 gpm at 40 psig
- ◆ Water pH = 7.5 & minimum water temperature = 20 C
- ◆ Minimum free chlorine residual concentration (C) at point of measurement at first customer = 1.0 mg/L

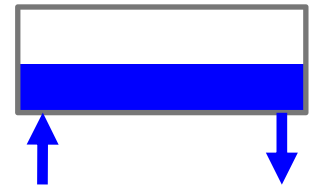


◆ Piping

- 30 feet of 4-inch-diameter pipe between point of chlorine application & hydropneumatic tank
- 100 feet of 4-inch-diameter pipe between hydropneumatic tank & point of residual free chlorine measurement at first customer

◆ Hydropneumatic tank

- Gross volume = 1,200 gallons
- Minimum water volume at pump-on pressure of 40 psig = 240 gallons
- BF = 0.1



Example CT Calculation (cont'd)

💧 BFs

Baffling Condition	BF	Baffling Description
Unbaffled (mixed flow)	0.1	No baffling, agitated basin, very low length-to-width ratio, high inlet & outlet flow velocities
Poor	0.3	Single or multiple unbaffled inlets & outlets, no intra-basin baffles
Average	0.5	Baffled inlet or outlet with some intra-basin baffles
Superior	0.7	Perforated inlet baffle, serpentine or perforated intra-basin baffles, outlet weir or perforated launders
Perfect (plug flow)	1.0	Very high length-to-width ratio (pipeline flow), perforated inlet & outlet, & intra-basin baffles

Source: Table C-5 in Appendix C to EPA's *Guidance Manual for Compliance with the Filtration & Disinfection Requirements for PWSs Using Surface Water Sources*

- Per AwwaRF's *Improving Clearwell Design for CT Compliance*, **BF for clearwell or storage tank with separate inlet & outlet & no intra-tank baffling \approx 0.1**

FRWA currently is conducting DEP special study consisting of tracer studies for typical hydropneumatic tanks.



Example CT Calculation (cont'd)

💧 T at peak flow

- T in piping at peak flow:

- Pipe Cross-Sectional Area = $(\pi/4) \text{ (diameter)}^2 = (3.14/4) \text{ (4/12 ft)}^2 = 0.087 \text{ ft}^2$

- Pipe volume = (pipe cross-sectional area) (pipe length) = $(0.087 \text{ ft}^2) (130 \text{ ft}) = 11.3 \text{ ft}^3$; $11.3 \text{ ft}^3 \cdot 7.48 \text{ gallons/ft}^3 = 84.5 \text{ gallons}$

- $T = (\text{volume of pipe}) / (\text{peak flow rate}) = (84.5 \text{ gallons}) / (100 \text{ gpm}) = 0.845 \text{ minutes}$

- T in hydropneumatic tank at peak flow:

- $T = (\text{minimum water volume in tank}) / (\text{baffling factor}) / (\text{peak flow rate}) = (240 \text{ gallons}) / (0.1) / (100 \text{ gpm}) = 0.24 \text{ minutes}$

- Total T at peak flow = 0.845 minutes + 0.24 minutes = 1.09 minutes

💧 $CT = 1.0 \text{ mg/L} \cdot 1.09 \text{ minutes} = 1.09 \text{ mg-min/L}$



Example CT Calculation (cont'd)

◆ Compare CT calculated with CT required

CT Values for Inactivation of Viruses by Free Chlorine at pH 6.0-9.0 (mg-min/L)						
Inactivation (log)	Water Temperature (C)					
	5	10	15	20	25	30
2	4	3	2	1.5	1	0.8
3	6	4.5	3	2.3	1.5	1.1
4	8	6	4	3	2	1.5

Source: Table E-7 in Appendix E to EPA's *Guidance Manual for Compliance with the Filtration & Disinfection Requirements for PWSs Using Surface Water Sources*. = CT values adjusted & determined by assuming twofold decrease in CT for every 10- C increase in water temperature above 5 C (per Appendix F to EPA's *Guidance Manual for...PWSs Using Surface Water Sources*)

- CT calculated (1.09 mg-min/L) is < CT required to achieve 4-log virus treatment at 20 C (3 mg-min/L)
- CT calculated (1.09 mg-min/L) provides < 2-log virus treatment at 20 C



Example CT Calculation (cont'd)

Options to achieve 4-log virus treatment:

- Increase C by increasing chlorine dose to...
 - Maintain minimum free chlorine residual at point of measurement of 2.8 mg/L ($C = CT \quad T = 3 \text{ mg-min/L} \quad 1.09 \text{ minutes} = 2.8 \text{ mg/L}$) during months when minimum water temperature is $\geq 20 \text{ }^\circ\text{C}$ but $< 25 \text{ }^\circ\text{C}$
 - Maintain minimum free chlorine residual of 1.9 mg/L ($C = CT \quad T = 2 \text{ mg-min/L} \quad 1.09 \text{ minutes} = 1.9 \text{ mg/L}$) during months when minimum water temperature is $\geq 25 \text{ }^\circ\text{C}$
 - Increased chemical costs & possible costs for modification of chemical feed or storage facilities
- Increase T by adding contact/retention tank (or additional piping) between point of chlorine application & point of free chlorine residual measurement
 - Cost for contact/retention tank (or additional piping)



QUESTIONS?



SANITARY SURVEYS; SIGNIFICANT DEFICIENCIES



Sanitary Surveys

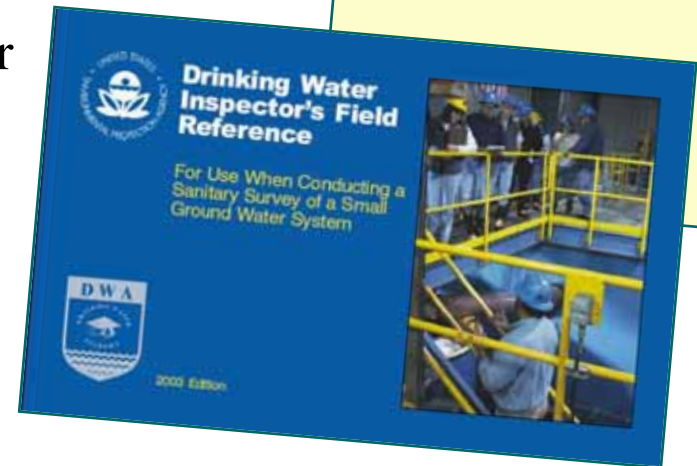
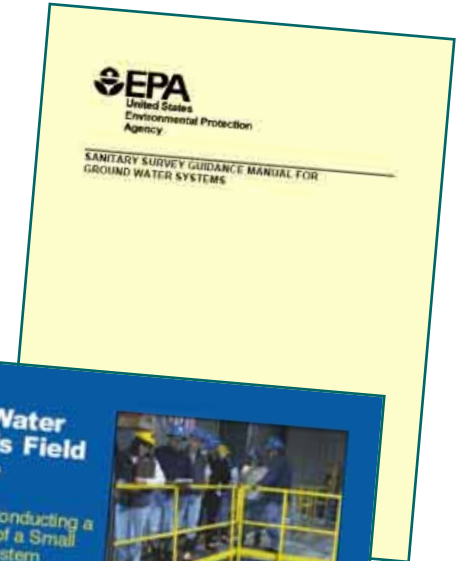
◆ Sanitary survey...

- Is conducted by DEP
- Consists of onsite review of water source, facilities, equipment, operation, & maintenance of PWS to evaluate their adequacy for producing & distributing safe drinking water

◆ DEP must conduct sanitary surveys of all GWSs

- Community GWSs
- Non-community GWSs
- Consecutive GWSs

◆ GWSs must provide DEP with any existing information that is requested by DEP & that will enable DEP to conduct sanitary



Sanitary Surveys (cont'd)

◆ Per GWR, sanitary surveys must include evaluation of following 8 components as applicable



(1) Source



(2) Treatment



(3) Distribution System



(4) Finished Water Storage



(5) Pumps, Pump Facilities, & Controls



(6) Monitoring, Reporting, & Data Verification



(7) GWS Management & Operation



(8) Operator Compliance with DEP Requirements



Sanitary Surveys (cont'd)

♦ Sanitary survey frequencies & compliance dates:

GWS Type	Minimum Frequency of 8-Component Sanitary Surveys	Compliance Date for Completing Initial Round of 8-Component Sanitary Surveys
Community GWSs	Every 3 years	12/31/2012
Non-community GWSs	Every 5 years	12/31/2014

♦ DEP may, **but will not**, reduce sanitary survey frequency to once every 5 years for community GWSs that meet 1 of following conditions:

- GWS provides DEP-approved 4-log virus treatment for all its ground water sources
- GWS has outstanding performance record, as determined by DEP & documented in previous sanitary surveys, & has no history of TCR MCL or monitoring violations since last sanitary survey



Significant Deficiencies

◆ Significant deficiency...

- Includes any design, operation, or maintenance defect, or any source, treatment, storage, or distribution facility failure or malfunction, that DEP determines is causing, or has potential to cause, contamination of water delivered to customers
- Is typically identified by DEP during sanitary survey but can be identified by DEP at any time



◆ DEP must define & describe at least 1 specific significant deficiency in each of 8 sanitary survey components

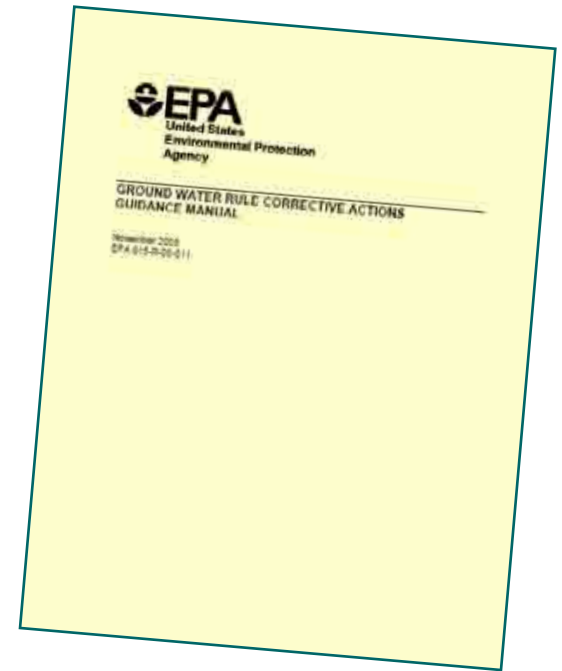
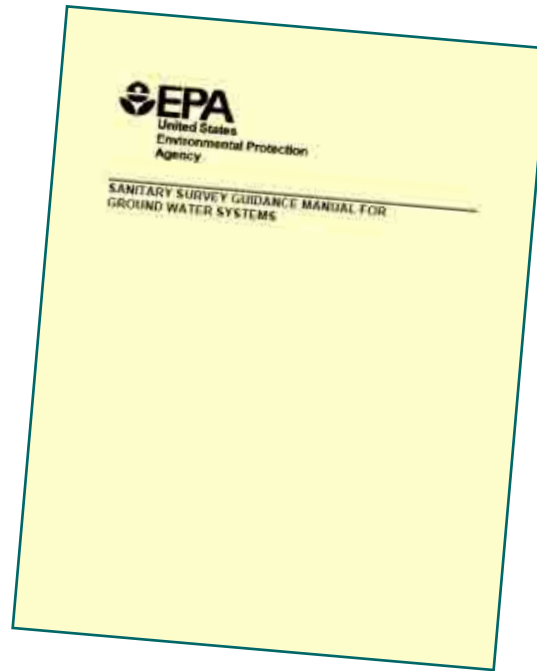
DEP will define & describe specific, significant deficiencies when DEP incorporates GWR into FAC in 2010.



Significant Deficiencies (cont'd)

◆ Lists of example significant deficiencies can be found in...

- Preamble to GWR
- EPA's *Sanitary Survey Guidance Manual for GWSs*
- EPA's *GWR Corrective Actions Guidance Manual*



Examples of Significant Deficiencies

◆ Source

- Unpermitted source is being used
- Well does not meet DEP-specified setback distances from hazards or there are activities or pollution sources in immediate wellhead area that will cause sanitary risks
- Top of well casing is not elevated to prevent contamination from flooding, or well is vulnerable to surface water runoff
- Well is improperly constructed
- Well casing is cracked
- Well does not have proper sanitary seal
- Vent for well is not screened & turned downward
- Well is not secure & is susceptible to vandalism & tampering
- There are cross-connections to storm or sanitary sewers, surface water bodies, etc.



Examples of Significant Deficiencies (cont'd)

💧 Treatment

- Disinfection is not continuous
- Water treatment chemicals do not conform to NSF Standard 60 are used
- Application of treatment chemicals is inadequate (application is not paced to flow)
- There are no provisions to prevent chemical overfeed or to notify of chemical feed failure
- There are unprotected cross-connections at chemical tanks, filter backwash, etc.
- There is lack of redundant components
- There is lack of treatment process monitoring, failure alarms, or automatic process shutdown
- Standby power is not available



Examples of Significant Deficiencies (cont'd)

◆ Distribution System

- Pressure falls below 20 psig during high demand
- Required disinfectant residual levels are not maintained, or disinfectant residual monitoring is inadequate
- Cross-connection control program is inadequate, or there are unprotected cross-connections
- There is high leakage rate that poses risk of backsiphonage
- Separation between water mains & other pipelines is inadequate
- There are numerous complaints about colored or odorous water



Examples of Significant Deficiencies (cont'd)

◆ Finished Water Storage

- Storage capacity is inadequate
- Storage tank needs repair
- Internal cleaning or inspection of storage tanks is inadequate
- Storage tank vent or overflow is inadequately screened or protected
- Storage tank drain or overflow is subject to flooding
- Storage tank access manhole is not watertight
- Storage tank access manhole or access ladder is not secure & is susceptible to vandalism & tampering



Examples of Significant Deficiencies (cont'd)

💧 Pumps, Pump Facilities, & Controls

- Pump capacity is inadequate
- There is lack of redundant pumps
- Pump inspection & maintenance are inadequate
- Pump control system is inoperable
- Oil used for pump lubrication does not conform to NSF Standard 61
- There are cross-connections to floor drains, etc.
- Standby power is not available



Examples of Significant Deficiencies (cont'd)

◆ Monitoring, Reporting, & Data Verification

- Water quality is inadequately monitored
- Operators or staff are using improper procedures when collecting samples or taking measurements
- Microbiological, lead & copper, disinfectant byproduct, or source water monitoring plan is inadequate
- Reporting does not meet requirements
- Records are being falsified, or recordkeeping is inadequate



Examples of Significant Deficiencies (cont'd)

◆ System Management & Operation

- System cannot meet water demands
- Interruptions to water service are excessive
- Technical, managerial, or financial resources are inadequate to operate system
- System does not have adequate emergency response plan
- System has not addressed deficiencies noted in previous sanitary survey
- System security is inadequate



◆ Operator Compliance with DEP Requirements

- Operator is not certified as required by DEP
- Operator staffing is inadequate



Notification of Significant Deficiencies

- **DEP must provide GWSs with written notice describing significant deficiency no later than 30 days after DEP identifies significant deficiency**
 - Notice may specify corrective actions & deadlines for completion of corrective actions
 - DEP may provide written notice at time of sanitary survey



QUESTIONS?



GROUND WATER MICROBIAL MONITORING



Ground Water Source Microbial Monitoring

- ◆ Ground water source microbial monitoring is used to determine if fecal contamination is present in ground water sources/wells
- ◆ 2 types of ground water source microbial monitoring:

Triggered Source Water Monitoring

Assessment Source Water Monitoring



TRIGGERED SOURCE WATER MONITORING



Triggered Source Water Monitoring

◆ GWS must conduct triggered source water monitoring if...

GWS is not providing DEP-approved 4-log virus treatment for each ground water source

&

GWS is notified that routine distribution sample collected under TCR (FAC Rule 62-550.518) is TC+



Triggered Sampling Requirements

◆ GWSs must...

- Collect at least **1 source water sample per TC+ routine distribution sample** from each ground water source/well in use at time TC+ routine distribution sample was collected
- Collect ground water source sample(s) within 24 hours of learning of TC+ routine distribution sample

GWSs must analyze triggered samples for 1 of 3 fecal indicators as discussed on later slides.

If triggered sample is FI+, GWS must issue Tier 1 public notice & collect 5 additional triggered samples as discussed on later slides.

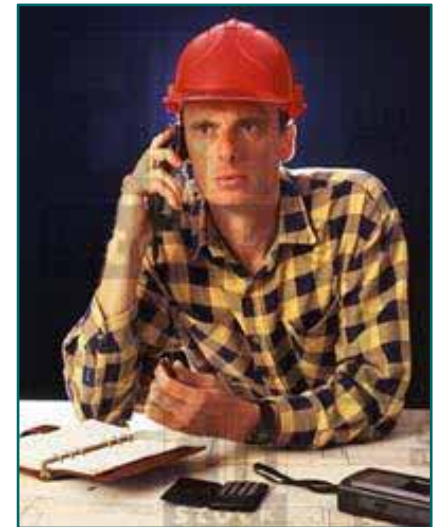


Time Extensions for Triggered Sampling

◆ **DEP may, & will, extend 24-hour time limit if GWS cannot collect sample(s) within 24 hours due to circumstances beyond GWS's control**

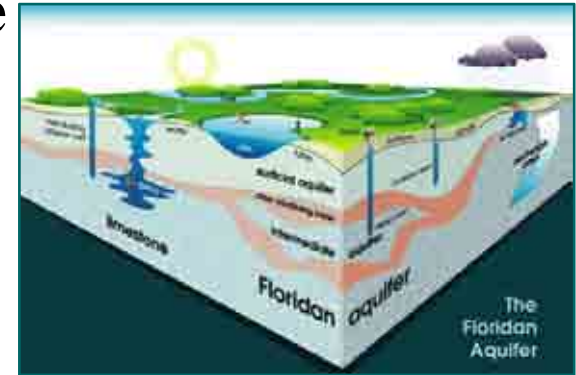
- Circumstances under which DEP will extend time limit:
 - Lab unavailable (i.e., lab closed on weekend)
 - Severe weather makes sampling dangerous or causes delay in mail service
- In case of time extension, DEP must specify how much time GWS has to collect sample
 - GWS should sample as close to 24-hour window as possible

◆ **GWSs should call DEP District or ACHD for pre-approval of time extension**



Representative Triggered Sampling

DEP may, **& will**, allow GWSs with multiple ground water sources/wells to sample 1 or more **representative** sources/wells or locations (instead of sampling each source/well in use at time TC+ distribution system sample was collected)



3 types of representative sampling

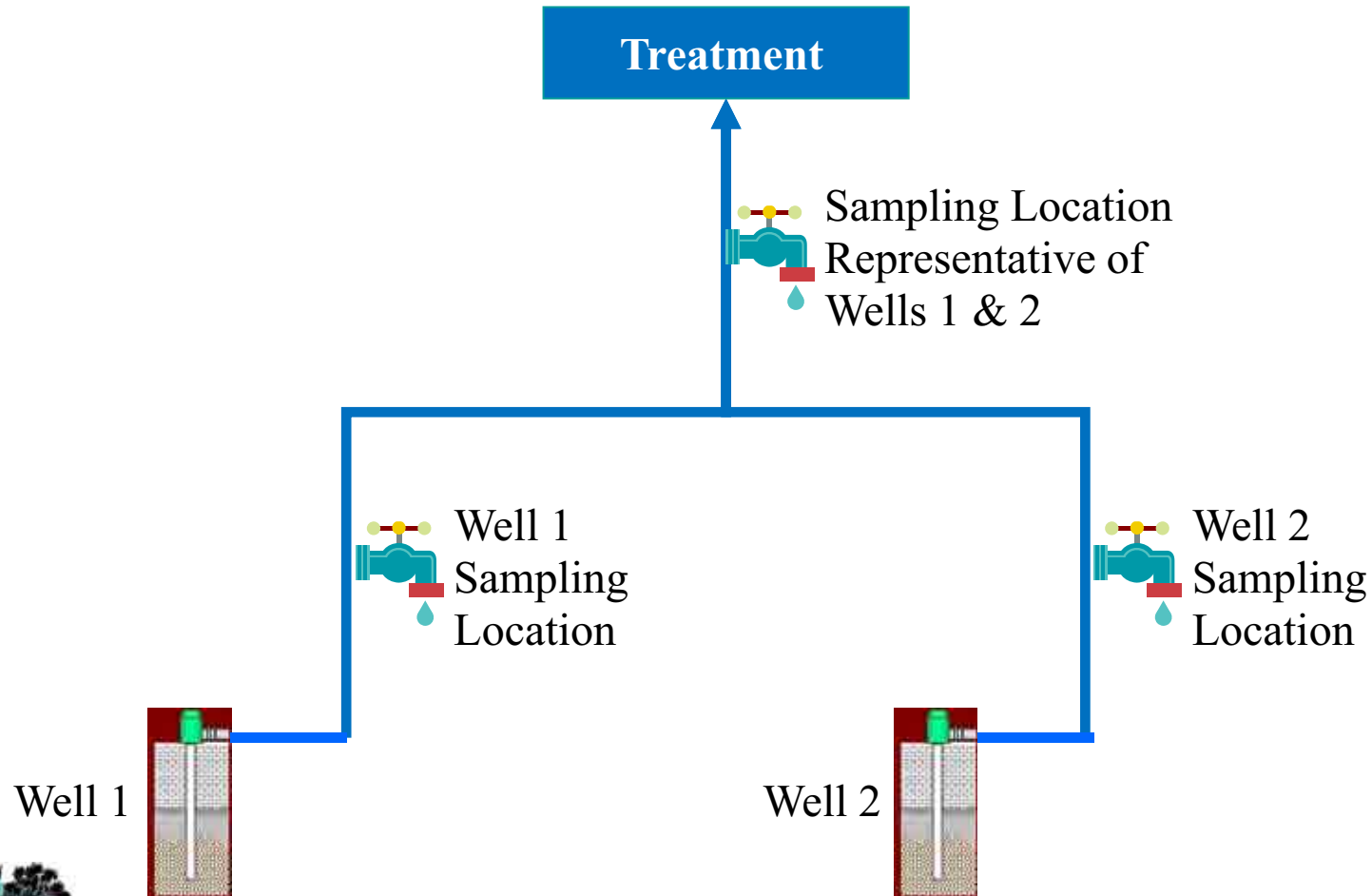
- Sampling 1 location that is representative of multiple sources/wells
 - Where multiple sources/wells are combined prior to treatment
- Sampling sources/wells that are representative of TCR sampling sites in distribution system
 - Based on distribution system hydraulics
- Sampling sources/wells that are representative of other sources/wells
 - Based on physical & hydrogeologic similarity of wells

DEP discourages this.



Representative Triggered Sampling (cont'd)

- ◆ Sampling 1 location that is representative of multiple sources/wells



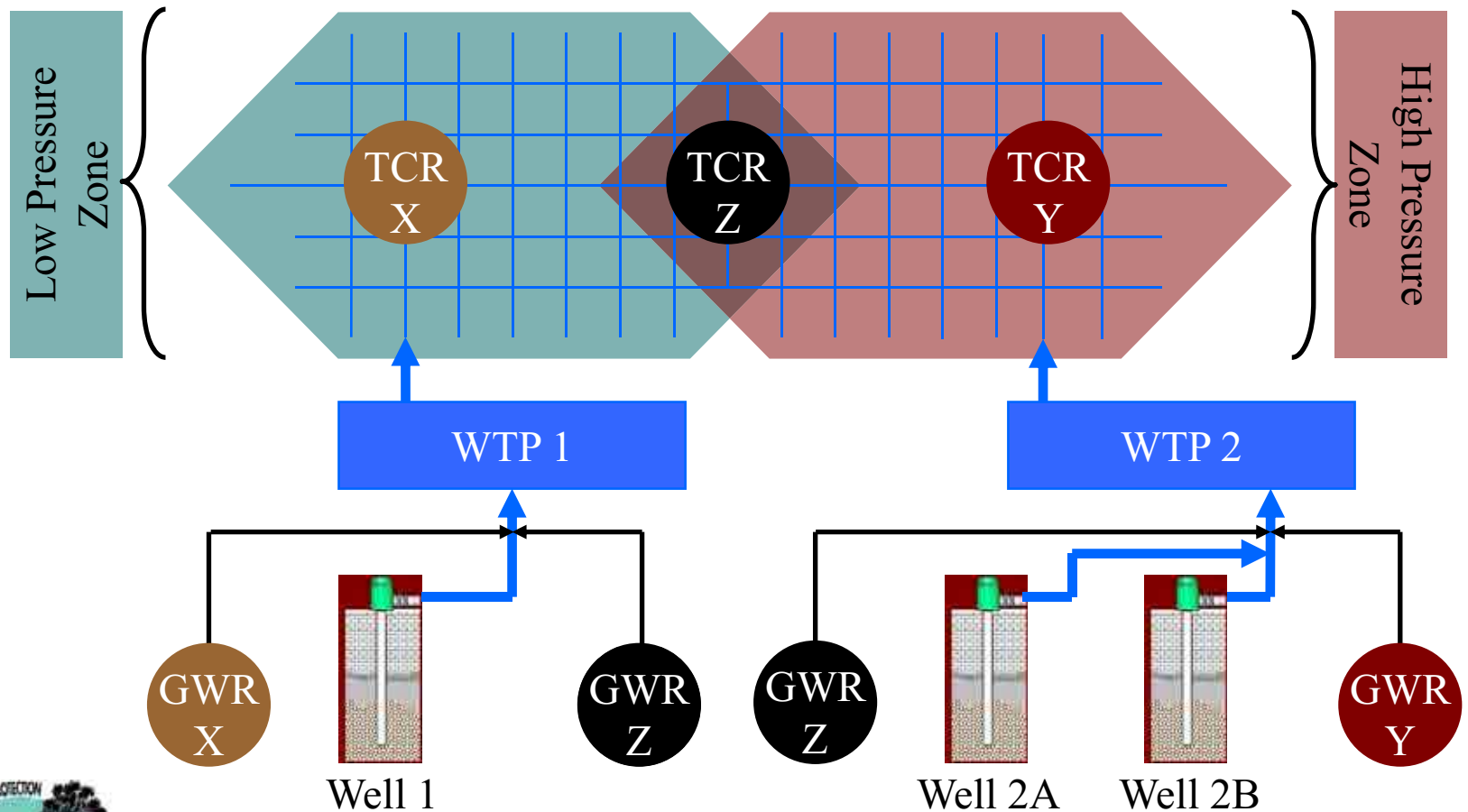
Representative Triggered Sampling (cont'd)

- ◆ **Sampling 1 location that is representative of multiple sources/wells**
 - Offers cost savings but also provides less information if sample is FI+
 - If sample is FI+, which 1 or more wells might be, or are, fecally contaminated?
 - Samples are representative of only those sources/wells that are being pumped at time sample is collected



Representative Triggered Sampling (cont'd)

- Sampling 1 location that is representative of multiple sources/wells & sampling sources/wells that are representative of TCR sampling sites in distribution system



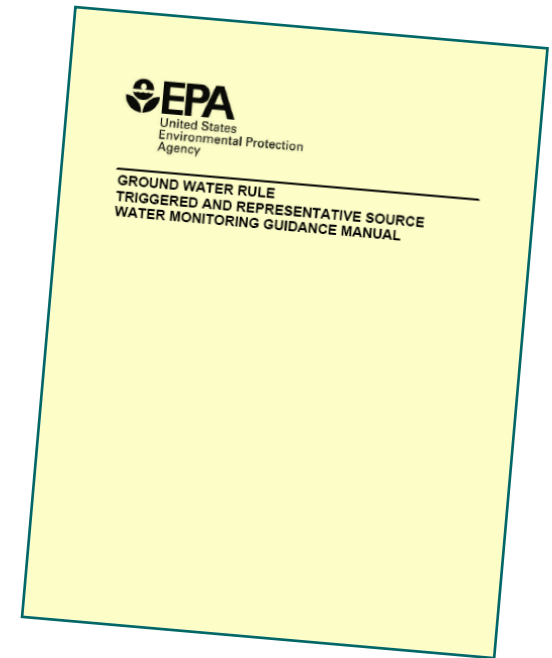
Triggered Source Water Monitoring Plan

◆ Representative triggered sampling must be approved by DEP

- DEP may, **& will**, require that GWSs choosing to conduct representative triggered sampling first submit, & obtain DEP approval of, triggered source water monitoring plan

◆ Triggered source water monitoring plans should be prepared, reviewed, & approved in accordance with EPA's *GWR Triggered & Representative Source Water Monitoring Guidance Manual*

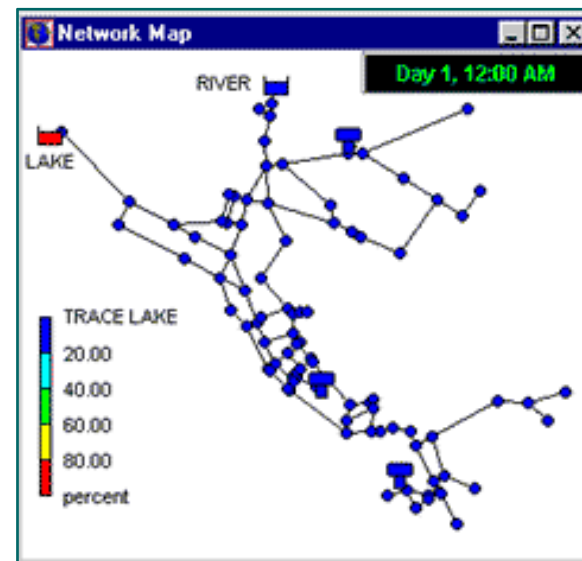
- Manual contains...
 - Triggered source water monitoring plan template
 - Example triggered source water monitoring plans



Triggered Source Water Monitoring Plan (cont'd)

◆ Triggered source water monitoring plans should include:

- Map or schematic of GWS showing sources & TCR sampling sites
- Source type (ground water, surface water, emergency, seasonal, etc.) & level of treatment for each source
- Source/well sampling locations representing multiple sources/wells
- Sources representing each TCR sampling site & basis for determination, such as...
 - Distribution system map
 - TCR sampling plan
 - Operation records
 - Hydraulic model
 - Tracer study
 - Customer complaint records
 - Water quality data



Triggered Source Water Monitoring Plan (cont'd)

◆ Triggered source water monitoring plans should include: (cont'd)

- Sources/wells representing other sources/wells & basis for determination, such as...
 - Well proximity
 - Well construction
 - Water chemistry
 - Aquifer type & well log
- For wholesale systems, consecutive systems served & sources serving each consecutive system
- Any changes or variations expected due to use of seasonal sources, rotating sources, etc.

DEP discourages this.

If used, GWS should alternate sources/wells sampled.

◆ Triggered source water monitoring plans may be stand-alone plan or may be combined with TCR sampling plan

- TCR sampling plan is required under FAC Rule 62-550.518(1)



Transient Non-Community GWSs Serving \leq 1,000 People

- ◆ If transient non-community GWS serving \leq 1,000 people has TC+ routine distribution sample under TCR (FAC Rule 62-550.518), GWS must collect set of 4 repeat distribution samples under TCR
- ◆ Transient non-community GWS serving \leq 1,000 people may use sample collected from ground water source/well to serve as both of following:
 - 1 of 4 repeat distribution samples required under TCR
 - Triggered source water sample required under GWR
- ◆ But, to meet both TCR & GWR, sample must be analyzed for *E coli* using analytical method approved under GWR



E coli

GWR analytical methods are discussed on later slides.



Additional Triggered Sampling Requirements

- DEP may, **but will not**, require corrective action if **initial** triggered sample is FI+
- Instead, if initial triggered sample is FI+, GWS must collect **5 additional** triggered samples from same source/well



- GWS must collect 5 additional samples within 24 hours of being notified of FI+ initial triggered sample

GWS must analyze additional triggered samples for 1 of 3 fecal indicators as discussed on later slides.

If 1 or more of 5 additional triggered samples is FI+, GWS must issue Tier 1 public notice & implement corrective action as discussed on later slides.



Consecutive & Wholesale GWSs

◆ Consecutive GWSs must...

- Notify wholesale GWSs of any TC+ routine distribution sample collected under TCR (FAC Rule 62-550.518) **unless wholesale GWSs provide DEP-approved 4-log virus treatment for all their ground water sources/wells**
 - Notification to wholesale GWSs must be made within 24 hours after consecutive GWS receives notification of TC+ sample

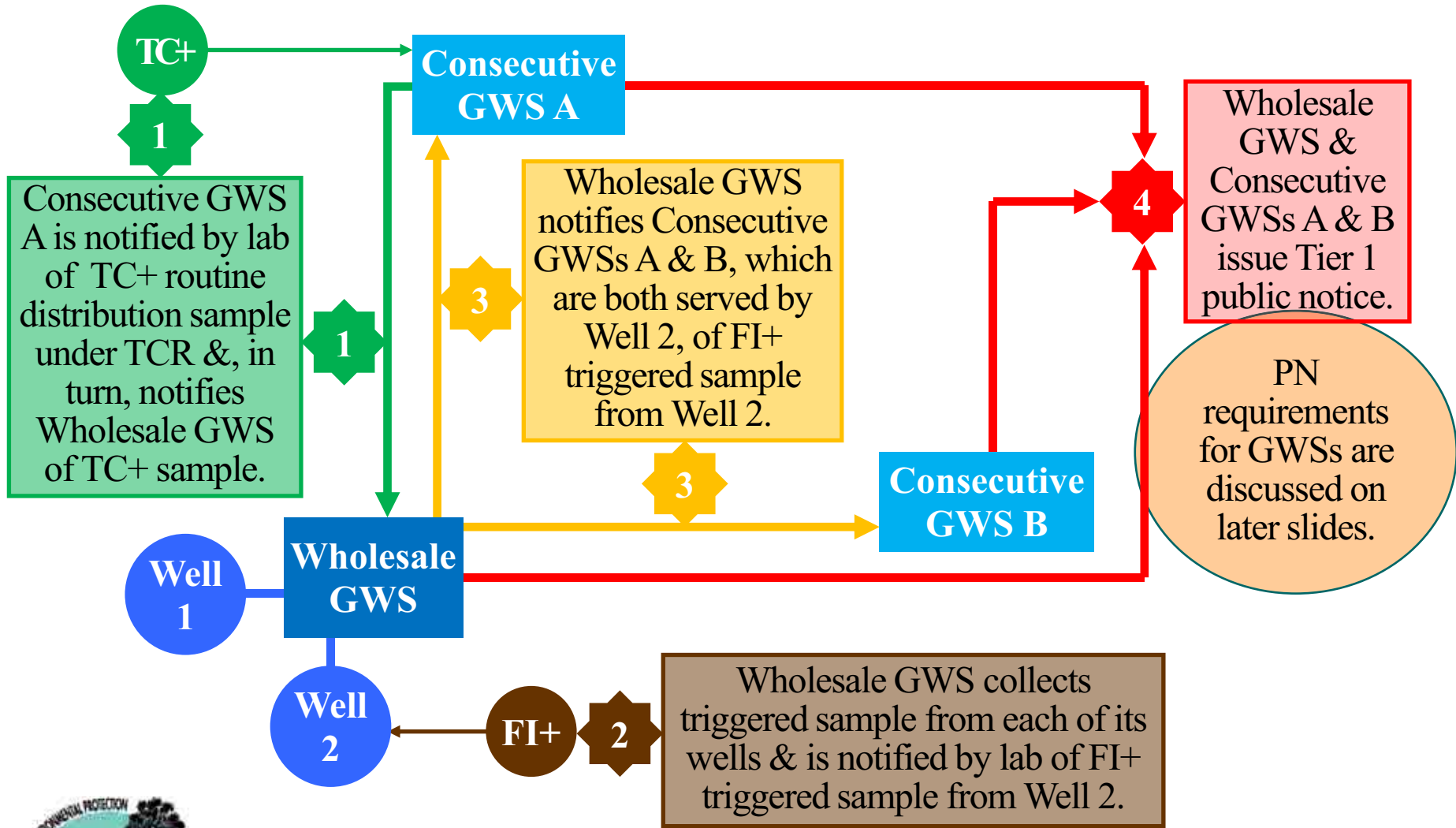


◆ Wholesale GWSs must...

- Within 24 hours after receiving notification from consecutive GWS of TC+ routine distribution sample, collect triggered sample from those ground water sources/wells for which wholesale GWS does not provide DEP-approved 4-log virus treatment
- For any FI+ triggered sample, notify all consecutive GWSs served by that ground water source/well
 - Notification to consecutive GWSs must be made within 24 hours after wholesale GWS receives notification of FI+ sample



Consecutive & Wholesale GWSs (cont'd)



Consecutive & Wholesale GWSs (cont'd)

- ◆ **There is no prescribed method for consecutive or wholesale GWSs to use when notifying wholesale or consecutive GWSs of TC+ distribution samples or FI+ ground water source samples**
 - Wholesale & consecutive GWSs are encouraged to establish communication process
 - Identify contacts for each GWS
 - Identify labs used by consecutive GWSs & identify contacts at those labs
 - Develop communication procedures (phone, e-mail, etc.)
 - Have labs notify both wholesale & consecutive GWSs of TC+ distribution samples in consecutive GWSs
 - Develop procedures for documenting all communications



Consecutive GWSs must keep records of notification to wholesale GWSs of TC+ routine distribution samples as discussed on later slide.



Exceptions to Triggered Monitoring

◆ DEP may, & will, grant exception to triggered monitoring requirements on sample-by-sample basis if...

- TC+ routine distribution sample collected under TCR (FAC Rule 62-550.518) meets DEP criteria for determining that TC+ sample was caused by distribution system conditions

◆ DEP criteria for determining that TC+ routine distribution sample was caused by distribution system conditions:

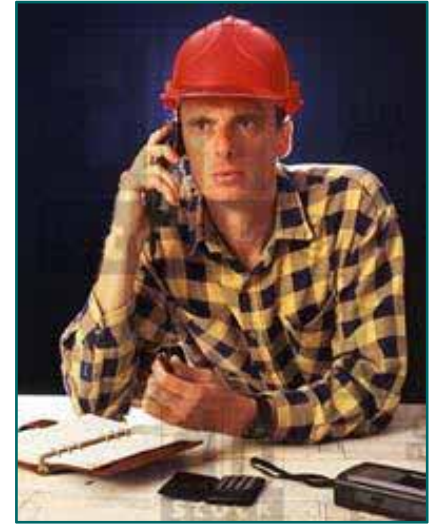
- Sample was collected in vicinity of, & shortly after, documented water main repair or storage tank cleaning or inspection
- Sample was collected in vicinity of, & shortly after, documented water main flushing, or firefighting event, that might have caused low or negative water pressure
- Sample was collected in vicinity of, & shortly after, documented discovery of cross-connection



Exceptions to Triggered Monitoring (cont'd)

◆ GWSs that believe they qualify for exception to triggered monitoring requirements...

- Should call DEP District or ACHD to confirm whether TC+ routine distribution sample meets DEP criteria
- Must provide written documentation to DEP District or ACHD within 30 days of TC+ sample showing that TC+ sample meets DEP criteria

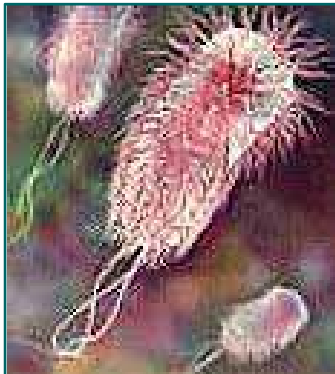


Reporting & recordkeeping requirements for GWSs are discussed on later slides.

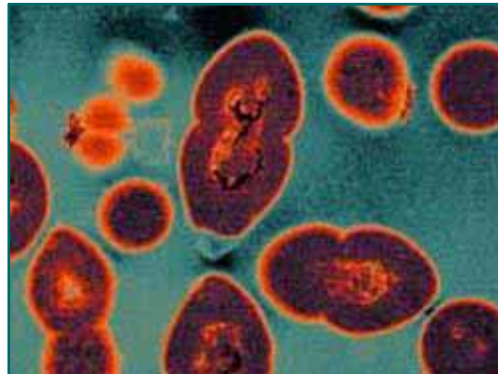


Analytical Methods for Triggered Samples

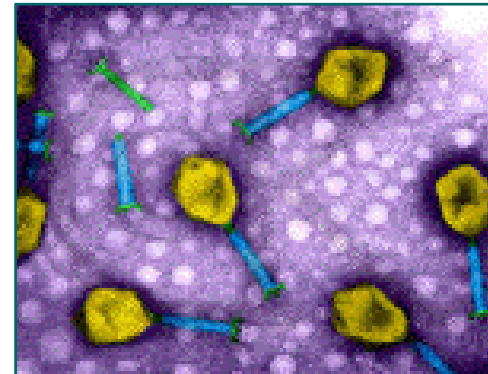
- ◆ **Triggered samples must be at least 100 mL in volume**
 - GWSs are encouraged, but not required, to hold samples below 10 °C during transit
- ◆ **GWSs must analyze all triggered samples for 1 of 3 following fecal indicators:**



E coli



Enterococci



Coliphage

- Time from sample collection to initiation of analysis may not exceed 30 hours
- GWSs may analyze **additional** triggered samples for different fecal indicator than used for **initial** triggered sample

Analytical Methods for Triggered Samples (cont'd)

◆ Most GWSs probably will analyze for *E coli* because of familiarity & cost

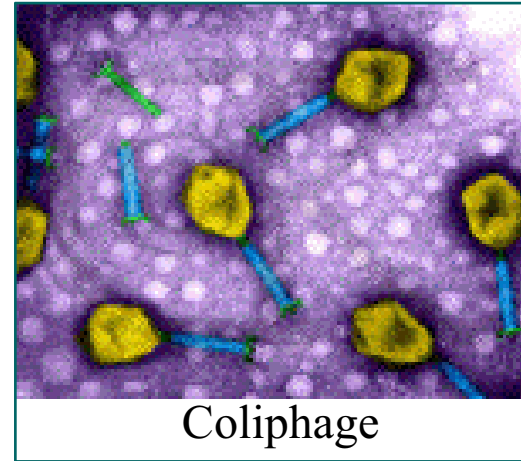
- Costs about \$20/analysis

◆ Enterococci...

- Costs about \$30/analysis

◆ Coliphage...

- Might be better fecal indicator than *E coli* or enterococci because...
 - Coliphage more closely resembles viruses in size & shape &, thus, might be transported through aquifer similar to viruses
 - It is unlikely that coliphage can grow in environment, whereas *E coli* & enterococci might grow in subtropical environment such as FL &, thus, *E coli* & enterococci might not always be indicative of fecal contamination
- Might cost about \$150-300/analysis when analyzing for both male-specific & somatic coliphage

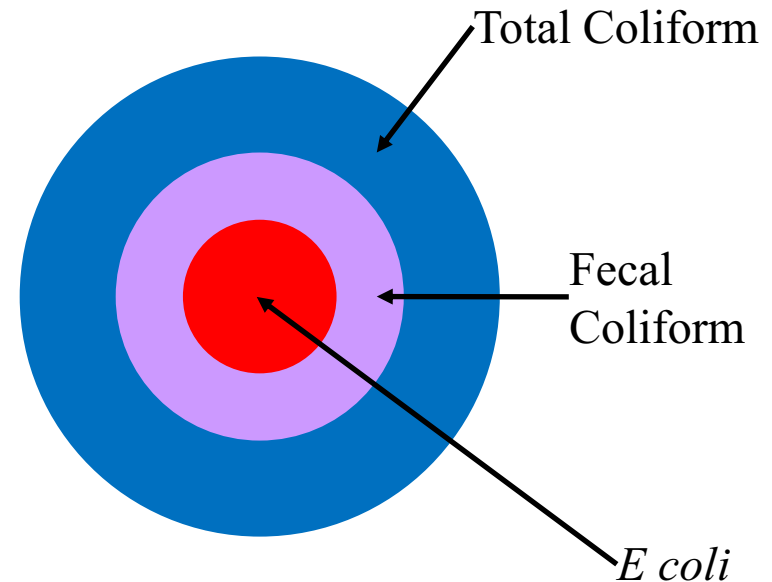


Coliphage

Analytical Methods for Triggered Samples (cont'd)

◆ Fecal coliform is not used as fecal indicator under GWR

- Fecal coliform group is subset of total coliform group that is capable of growth & lactose fermentation at elevated incubation temperatures (44.5 °C)
- Fecal coliform group consists mostly of *E coli* **but also includes other environmental bacteria not typically associated with disease in humans**
- Occurrence of environmental bacteria in fecal coliform group diminishes correlation of this group with fecal contamination



Analytical Methods for Triggered Samples (cont'd)

◆ GWSs must analyze triggered samples using method listed below

Fecal Indicator	Methodology	Method Citation
<i>E coli</i>	Colilert.....	Standard Method 9223 B
	Colilert-18.....	Standard Method 9223 B
	Colisure.....	Standard Method 9223 B
	Membrane Filter Method with MI Agar.....	EPA Method 1604
	m-ColiBlue24 Test	
	E*Colite Test	
	EC-MUG.....	Standard Method 9221 F
NA-MUG.....	Standard Method 9222 G	
Enterococci	Multiple-Tube Technique.....	Standard Method 9230 B
	Membrane Filter Technique.....	Standard Method 9230 C
	Membrane Filter Technique.....	EPA Method 1600
	Enterolert	
Coliphage	2-Step Enrichment Presence-Absence Procedure..	EPA Method 1601
	Single Agar Layer Procedure.....	EPA Method 1602

- Some *E coli* analytical methods approved under TCR—Chromocult, Colitag, & ReadyCult/Fluorocult—are not approved under GWR
 - DOH labs currently use ReadyCult for analysis of TCR samples!



QUESTIONS?



ASSESSMENT SOURCE WATER MONITORING



Assessment Source Water Monitoring

◆ DEP may, & does, require GWSs to conduct assessment source water monitoring

- Assessment source water monitoring is source water monitoring that...
 - Is in addition to triggered source water monitoring
 - Is used to determine if fecal contamination is present in ground water source/well
- Each state has flexibility to determine...
 - Whether assessment source water monitoring is needed
 - Its own assessment source water monitoring requirements



Assessment Source Water Monitoring (cont'd)

◆ For purposes of GWR, raw water monitoring currently required & discussed under FAC Rules 62-550.518 & 62-555.315(6)(f) is considered assessment source water monitoring

- FAC Rule 62-550.518 requires that...
 - Community GWSs, non-transient non-community GWSs, & transient non-community GWSs that are subpart H systems or that serve > 1,000 people shall take 1 **monthly** raw water sample representative of each ground water source/well & shall analyze it for total coliform & **E coli**
 - Transient non-community GWSs that serve ≤ 1,000 people shall take 1 **quarterly** raw water sample representative of each ground water source/well & shall analyze it for total coliform & **E coli**

When DEP incorporates GWR into FAC in 2010, DEP...

- Intends to revise FAC to allow GWSs to analyze assessment source water samples for any 1 of 3 fecal indicators specified in GWR.
- **Might** revise FAC to require that all GWSs take assessment source water samples only **quarterly**.



Assessment Source Water Monitoring (cont'd)

◆ For purposes of GWR, raw water monitoring currently required & discussed under FAC Rules 62-550.518 & 62-555.315(6)(f) is considered assessment source water monitoring (cont'd)

- GWSs shall continue conducting assessment source water monitoring under FAC Rule 62-550.518 **unless GWS is providing DEP-approved 4-log virus treatment for source/well**
 - GWSs may use **representative** assessment source water sampling but should have DEP-approved assessment source water monitoring plan
 - GWS may analyze assessment source water samples for any 1 of 3 fecal indicators, & using any analytical method, specified in GWR

When DEP incorporates GWR into FAC in 2010, DEP intends to revise FAC to...

- Make GWSs exempt from assessment source water monitoring if they are providing DEP-approved 4-log virus treatment.
- Allow GWSs to analyze assessment source water samples for any 1 of 3 fecal indicators, & require that GWSs use analytical method, specified in GWR.



Assessment Source Water Monitoring (cont'd)

- GWSs shall continue conducting assessment source water monitoring under FAC Rule 62-550.518 **unless GWS is providing DEP-approved 4-log virus treatment for source/well** (cont'd)
 - If initial assessment source water sample is FI+, GWS...
 - **Shall issue Tier 1 public notice per GWR**
 - May, instead of immediately implementing corrective action, take 5 additional assessment samples from same source/well/location within 24 hours of being notified of FI+ initial assessment source water sample
 - If 1 or more of 5 additional assessment source water samples are FI+, GWS **shall issue Tier 1 public notice per GWR** & shall implement corrective action per FAC Rule 62-555.315(6)(f) & GWR

When DEP incorporates GWR into FAC in 2010, DEP intends to revise FAC to have GWSs take 5 additional assessment source water samples after initial assessment source water sample is FI+ & before corrective action is required.

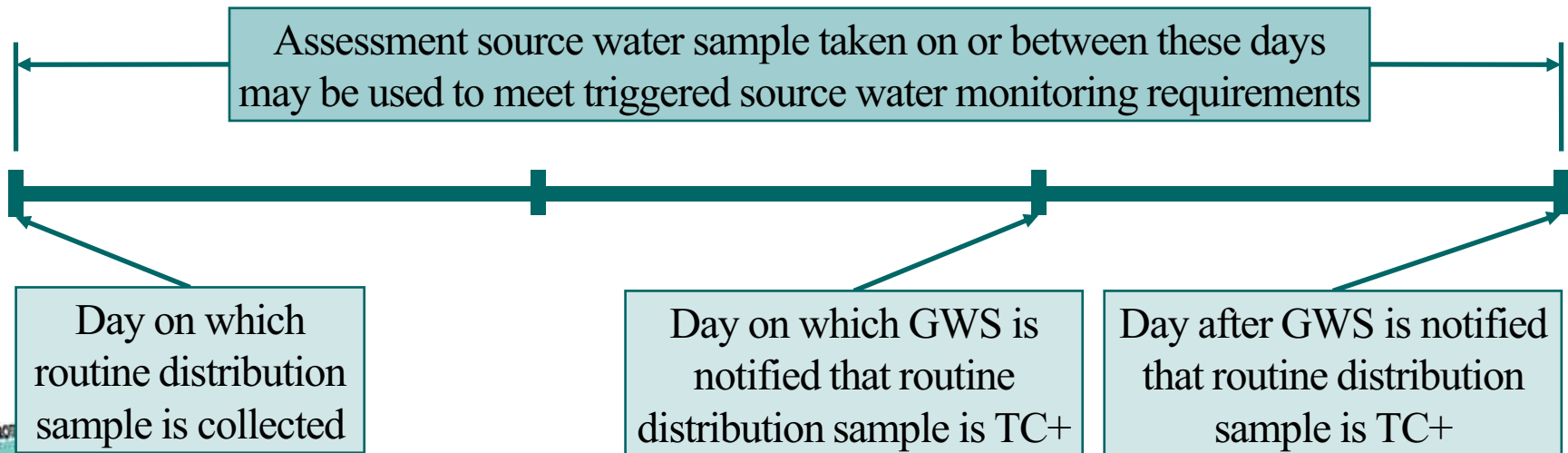
PN & corrective action requirements under GWR are discussed on later slides.



Assessment Source Water Monitoring (cont'd)

◆ GWSs may use...

- Triggered sample to meet assessment source water monitoring requirements under FAC Rule 62-550.518
- Assessment source water sample taken under FAC Rule 62-550.518 to meet triggered source water monitoring requirements **if assessment sample was collected on same day TC+ routine distribution sample was collected or on any day thereafter up until day after GWS is notified of TC+ routine distribution sample**



Assessment Source Water Monitoring (cont'd)

- ◆ So, for transient non-community GWSs serving $\leq 1,000$ people...
 - If assessment source water sample was collected on same day TC+ routine distribution sample was collected or on any day thereafter up until day after GWS is notified of TC+ routine distribution sample, assessment sample may...
 - Be used as triggered sample; &
 - Serve as 1 of 4 repeat distribution samples required under TCR (FAC Rule 62-550.518)
 - But, to meet both TCR & GWR, sample must be analyzed for *E coli* using analytical method approved under GWR

Refer back to Slide 66 for more details.



QUESTIONS?



NEW SOURCES; SOURCE WATER SAMPLING LOCATION; ETC.



New Sources

◆ **DEP may, & does, require GWSs to conduct microbial monitoring for new sources/wells before they are used to provide water to public**

- FAC Rule 62-555.315(6) requires that GWSs conduct **20-sample** bacteriological survey of new or altered wells, & wells out of operation for > 6 months, before such wells are placed into, or returned to, operation

When DEP incorporates GWR into FAC in 2010, DEP **might** revise FAC to require only **12-sample** microbial survey of new or altered wells & wells out of operation for > 6 months.



New Sources (cont'd)

◆ DEP may, & does, require GWSs to conduct microbial monitoring for new sources/wells before they are used to provide water to public (cont'd)

- GWSs shall continue conducting bacteriological surveys of new or altered wells, & wells out of operation for > 6 months, per FAC Rule 62-555.315(6)

- GWSs may analyze well survey samples for any 1 of 3 fecal indicators, & use any analytical method, specified in GWR
- If any well survey sample is FI+, GWS may, instead of immediately implementing corrective action, take 5 additional well survey samples within 24 hours of being notified of FI+ survey sample
 - Then, if 2 or more of total well survey samples are FI+, GWS shall take action per FAC Rule 62-555.315(6)(b)2

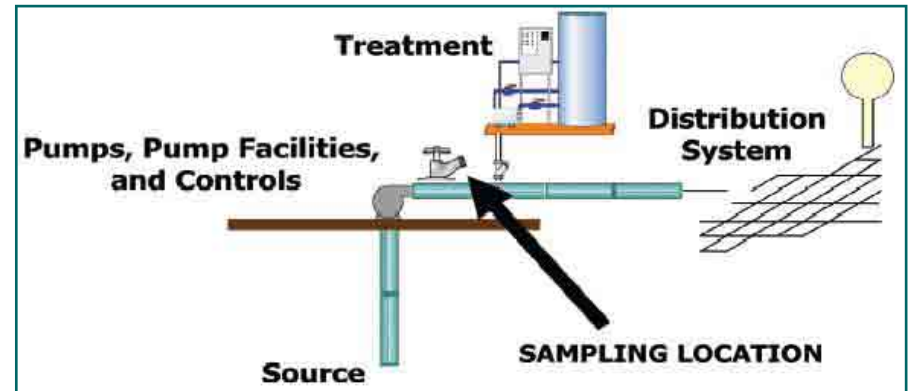
When DEP incorporates GWR into FAC in 2010, DEP intends to revise FAC to...

- Allow GWSs to analyze well survey samples for any 1 of 3 fecal indicators, & require that GWSs use analytical method, specified in GWR.
- Require 5 additional survey samples within 24 hours after notification of FI+ sample during well survey.
- Require action only if 2 or more of total samples are FI+ during well survey.



Source Water Sampling Location

- ◆ Triggered or assessment source water samples & well survey samples must be collected at location prior to any treatment
- ◆ DEP may, **but will not**, approve ground water source/well sampling location after treatment



Invalidation of FI+ Source Water Sample

◆ GWSs may obtain DEP invalidation of FI+ source water sample under 1 of following conditions:



- GWS provides DEP with written notice from lab that improper sample analysis occurred; or
- GWS provides DEP with written documentation & evidence that sample is not related to source water quality
 - Written documentation must state specific cause of FI+ sample & what action GWS is taking to correct problem
 - DEP will not invalidate sample solely on belief that improper sample collection procedures were used
 - DEP will not invalidate sample solely on grounds that other triggered or assessment source water samples, or other survey samples, for source/well are FI-



Invalidation of FI+ Source Water Sample (cont'd)

💧 If DEP invalidates source water sample, GWS must...

- Collect another source water sample within 24 hours of being notified by DEP of its invalidation decision
 - DEP may, **& will**, extend 24-hour time limit if GWS cannot collect sample within 24 hours due to circumstances beyond GWS's control
- Analyze replacement source water sample for same fecal indicator as used for invalidated sample

Refer back to Slide 58 for more details.



QUESTIONS?



ASSESSMENT FINISHED WATER MONITORING



FAC Rule 62-555.320(12)(b)

- ◆ **FAC Rule 62-555.320(12)(b) currently requires that GWSs exposing ground water to open atmosphere during treatment shall provide 4-log virus treatment after water is last exposed to open atmosphere & before first customer**
 - Water treatment facilities that are covered by impervious roof & enclosed within impervious sidewalls or sidewalls of at least 20-mesh screen are not considered to be exposing water to open atmosphere
 - DEP is delaying enforcement of this rule requirement until DEP incorporates alternative compliance options into FAC



Assessment Finished Water Monitoring

When DEP incorporates GWR into FAC in 2010, DEP intends to revise FAC to allow GWSs that are exposing ground water to open atmosphere during treatment to conduct assessment finished water monitoring in lieu of providing 4-log virus treatment after water is last exposed to open atmosphere & before first customer.



Assessment Finished Water Monitoring (cont'd)

Assessment finished water monitoring might include following:

- 1 of 2 or more routine distribution samples required each monitoring period under TCR (FAC Rule 62-550.518) shall be collected before or at first customer.
- GWS shall collect 1 finished water sample per quarter before or at first customer & analyze it for coliphage.

If routine distribution sample before or at first customer violates MCL for fecal coliform or *E coli*, or if quarterly finished water sample before or at first customer is positive for coliphage, GWS would have to provide Tier 1 public notice & implement corrective action for this significant deficiency.

Coliphage response to water treatment might be more similar to virus response to water treatment than is *E coli* response to water treatment. However, possible fecal contamination of water treatment units open to atmosphere should be evaluated using appropriate combinations of indicators, such as coliphage & *E coli*, because of variation in survival of different indicators under different conditions.



Assessment Finished Water Monitoring (cont'd)

For assessment finished water monitoring, DEP might...

- Allow GWSs to analyze coliphage samples only for somatic coliphage (instead of for both male-specific & somatic coliphage).
- Allow GWSs to analyze coliphage samples using EasyPhage 1602A (instead of EPA Method 1601 or 1602).

Somatic coliphage might be more common in bird feces than is male-specific coliphage, & birds are probably most significant potential source of fecal contamination for water treatment units open to atmosphere.

EasyPhage 1602A...

- Could be considered allowable modification of EPA Method 1602.
- Is similar in accuracy to EPA Method 1602.
- Is simpler than EPA Method 1602.
- Might cost 33-67% of cost for using EPA Method 1602.



QUESTIONS?



TT REQUIREMENTS



TT Requirements

- ◆ **TT requirement is required treatment & treatment monitoring, or required action, intended to reduce level of contaminant in drinking water**
- ◆ **2 types of TT requirements under GWR:**

Corrective Action (including 4-log virus treatment)

Compliance Monitoring (for 4-log virus treatment)



CORRECTIVE ACTION



Corrective Action

◆ GWSs must implement corrective action when either of following occur:

- Significant deficiency is identified by DEP
- Additional triggered source water sample is FI+



◆ Also, DEP may, & will, require that GWSs implement corrective action when additional assessment source water sample is FI+

◆ DEP may, but will not, require that GWSs implement corrective action when initial triggered source water sample or initial assessment source water sample is FI+



FI+ Source Water Samples for Which Corrective Action Is Required

FI+ Additional Triggered Source Water Sample

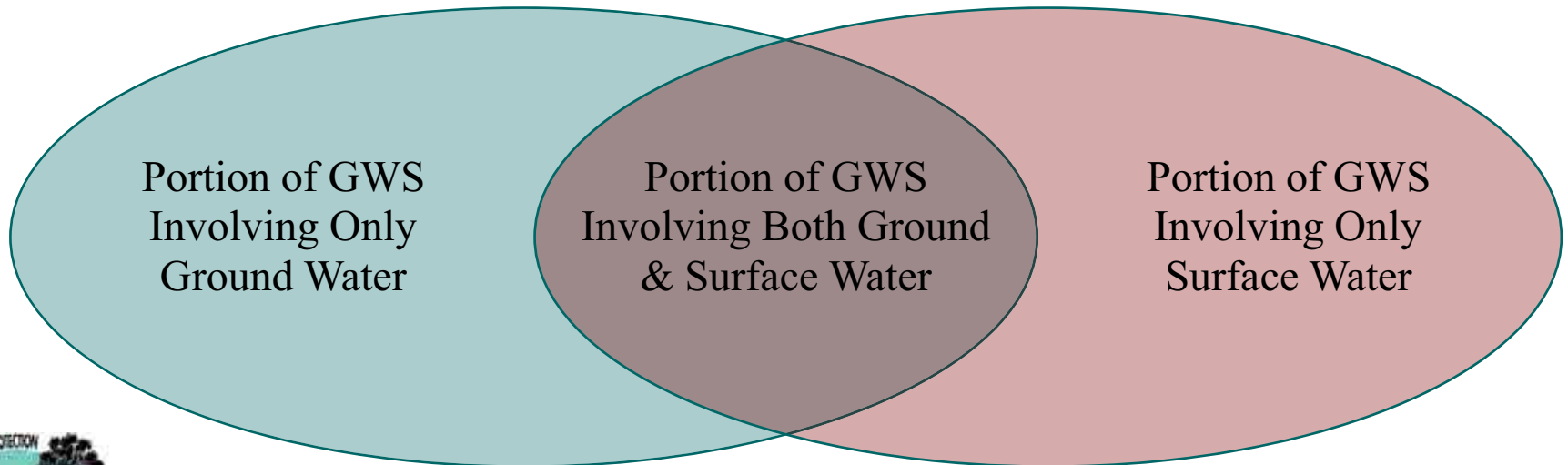
or

FI+ Additional Assessment Source Water Sample



Significant Deficiencies at GWSs Using Both Ground & Surface Water

- ◆ When significant deficiency is identified by DEP at GWSs that use both ground & surface water, GWSs must take corrective action under GWR except...
 - In cases where DEP determines that significant deficiency is in portion of GWS involving only surface water



Corrective Action Alternatives

◆ GWSs that must implement corrective action must implement 1 or more of following 4 corrective action alternatives:

- Correct all significant deficiencies
- Provide alternate source of water
- Eliminate source of contamination
- Provide at least 4-log virus treatment before or at first customer for ground water source(s), or if applicable, provide at least 4-log virus treatment after water is last exposed to open atmosphere & before or at first customer

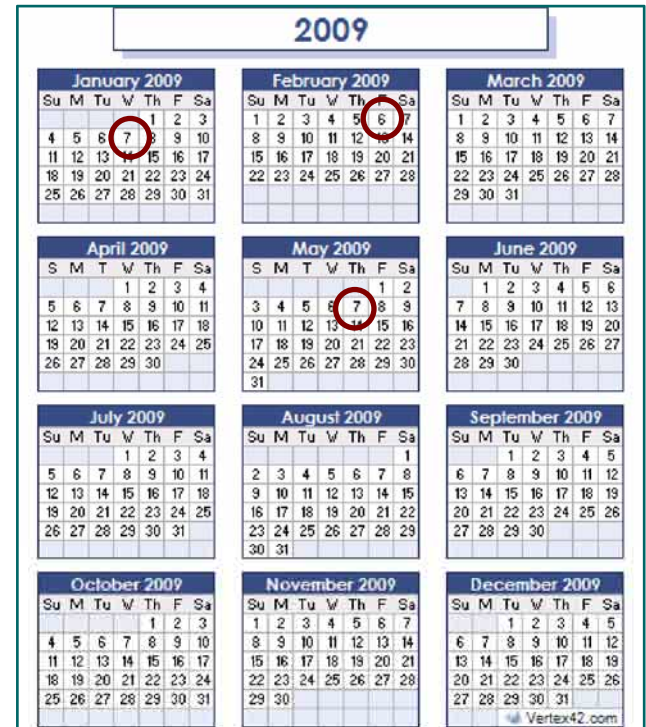


Corrective Action Schedule

• Within **30 days** of receiving written notification from DEP of significant deficiency or written notice from lab of FI+ **additional** triggered or assessment source water sample, GWS must consult with DEP regarding appropriate corrective action

• Within **120 days** of receiving written notification from DEP of significant deficiency or written notice from lab of FI+ **additional** triggered or assessment source water sample, GWS must do 1 of following:

- Complete corrective action
- Be in compliance with DEP-approved corrective action plan & schedule



Interim Measures

- DEP may specify interim measures for protection of public health pending completion of corrective action, pending DEP approval of corrective action plan & schedule, or as part of corrective action plan & schedule
- Interim measures might include:
 - Temporarily shutting down well
 - Providing temporary 4-log virus treatment for ground water source/well
 - Issuing precautionary boil water notice

ATTACHMENT A

(DATE)

PRECAUTIONARY BOIL WATER NOTICE

TO: RESIDENTS OF (NAME OF CITY, TOWN, TRAILER PARK, SUBDIVISION OR COUNTY) LIVING IN THE AREA BOUNDED BY (STREET, AVENUE, CANAL OR OTHER DESCRIPTIVE BOUNDARY)

(BRIEF DESCRIPTION OF EVENT SUCH AS: BACTERIOLOGICAL ANALYSES OF SAMPLES OBTAINED FROM YOUR WATER DISTRIBUTION SYSTEM HAVE SHOWN POSSIBLE CONTAMINATION OF THE WATER, OR A WATER MAIN BREAK HAS OCCURRED AT _____, OR A LOSS OF WATER PRESSURE HAS BEEN EXPERIENCED DUE TO _____)

THEREFORE, AS A PRECAUTION, WE ADVISE THAT ALL WATER USED FOR DRINKING, COOKING, MAKING ICE, BRUSHING TEETH, OR WASHING DISHES BE BOILED. A ROLLING BOIL OF ONE MINUTE IS SUFFICIENT. AS AN ALTERNATIVE BOTTLED WATER MAY BE USED.

(* WHERE THERE IS A LOSS OF POWER, DRINKING WATER UTILITIES SHOULD INCLUDE LANGUAGE OUTLINED IN PARAGRAPH IV D. OF THESE GUIDELINES DESCRIBING THE CHEMICAL DISINFECTION OF DRINKING WATER.)

THIS "PRECAUTIONARY BOIL WATER NOTICE" WILL REMAIN IN EFFECT UNTIL THE PROBLEM HAS BEEN CORRECTED AND A BACTERIOLOGICAL SURVEY SHOWS THAT THE WATER IS SAFE TO DRINK.

IF YOU HAVE ANY QUESTIONS YOU MAY CONTACT (NAME OF PERSON, AGENCY) AT (PHONE NUMBER).

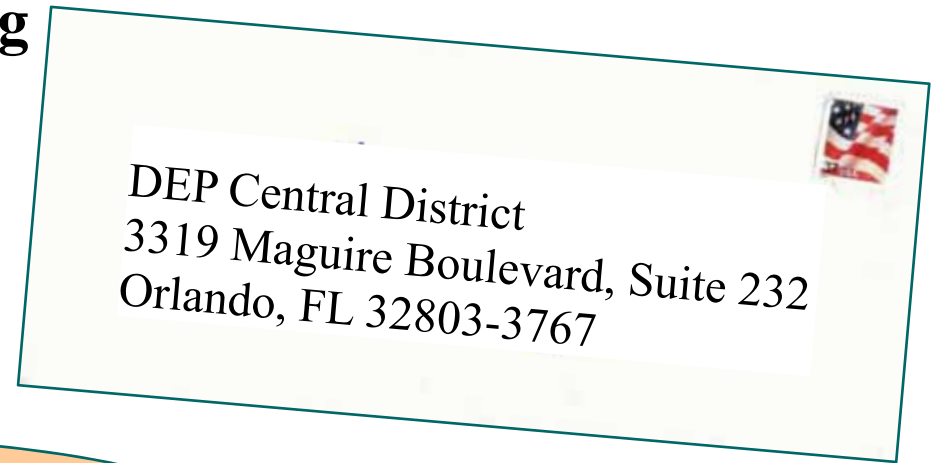
(NAME, TITLE AND AGENCY OF OFFICIAL ISSUING THE NOTICE)



Completed Corrective Action

◆ Within 30 days after completing corrective action, GWS must report to DEP

- GWS shall submit written notice confirming completion of corrective action



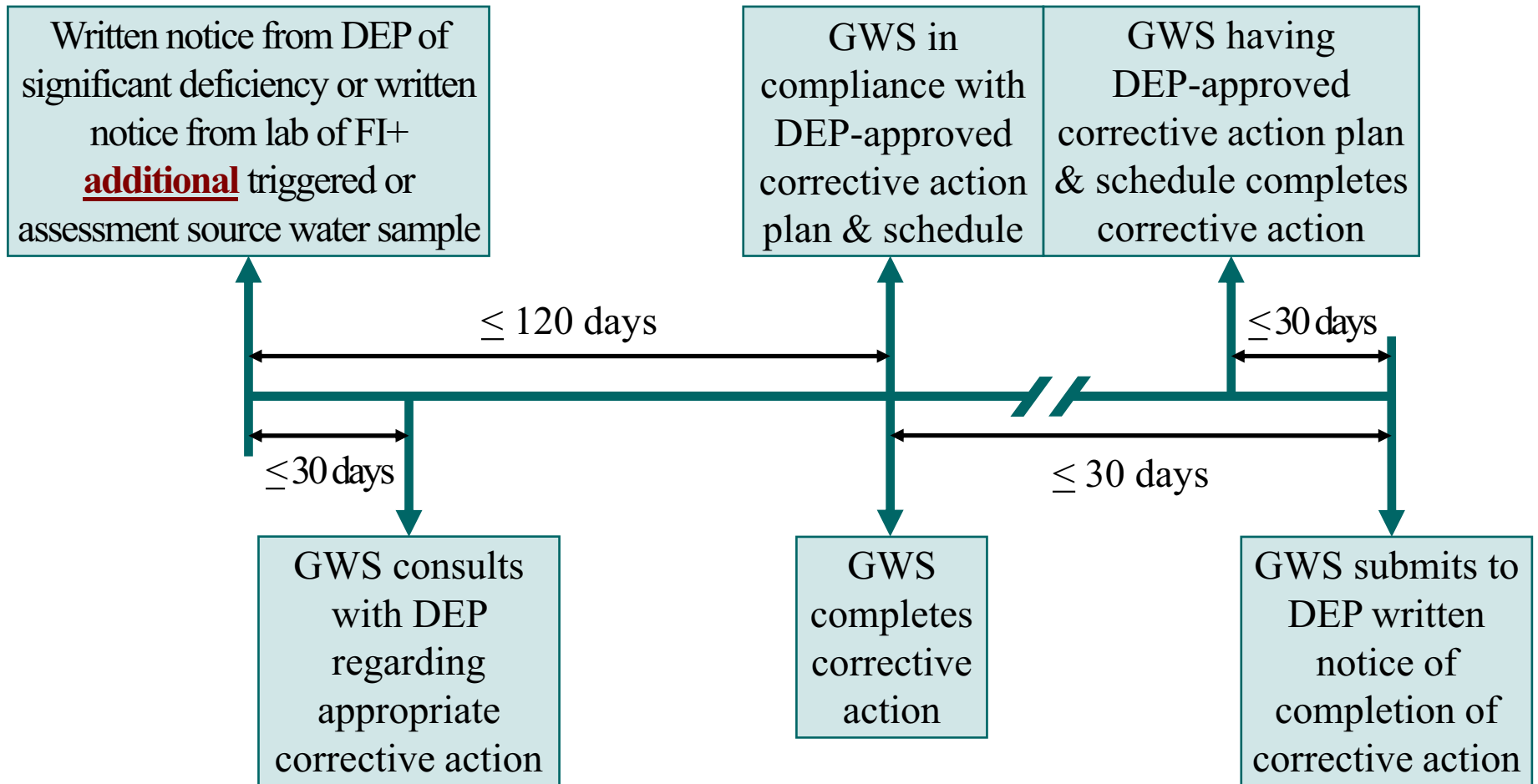
Reporting requirements for GWSs are discussed on later slides.

◆ Within 30 days after GWS has reported to DEP, DEP must verify that GWS has completed corrective action

- Written notice from GWS may, **& will**, serve as verification
- DEP also might conduct site visit in some cases



Completed Corrective Action Timeline



QUESTIONS?



COMPLIANCE MONITORING



Compliance Monitoring Requirements

GWSs that Provide 4-Log Virus Treatment for Ground Water Sources in Lieu of Conducting Triggered or Assessment Source Water Monitoring

GWSs that Provide 4-Log Virus Treatment After Ground Water Is Last Exposed to Open Atmosphere in Lieu of Conducting Triggered or Assessment Source Water Monitoring & in Lieu of Conducting Future Assessment Finished Water Monitoring

GWSs that Provide 4-Log Virus Treatment as Corrective Action

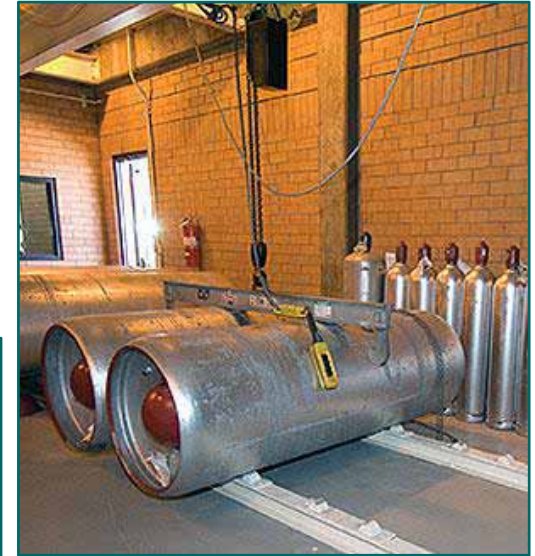
Conduct Compliance Monitoring
(to monitor effectiveness & reliability of 4-log virus treatment)



4-Log Virus Treatment

4-log virus treatment can be provided using...

- Inactivation (disinfection)
- Removal (filtration)
- Combination of removal & inactivation



4-Log Virus Treatment (cont'd)

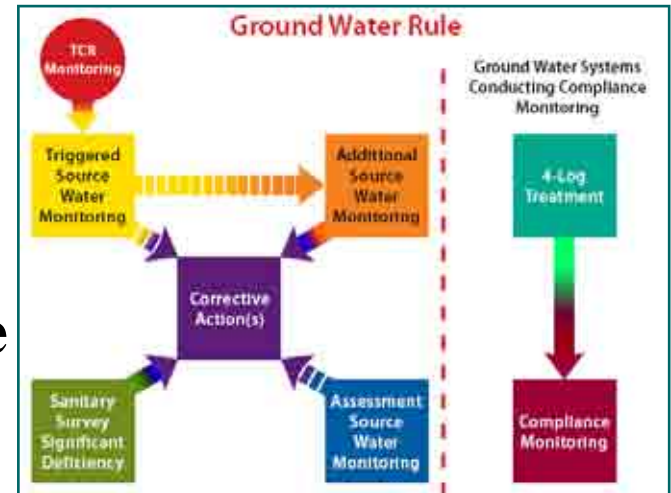
◆ GWSs that are exposing ground water to open atmosphere during treatment may...

- Provide 4-log virus treatment **after water is last exposed to open atmosphere**, in which case GWSs would be exempt from both of following:
 - Triggered & assessment source water monitoring; &
 - Future assessment **finished water** monitoring
- Just provide 4-log virus treatment **for their ground water sources**, in which case GWSs would be exempt from triggered or assessment source water monitoring but would still have to conduct future assessment **finished water** monitoring



4-Log Virus Treatment (cont'd)

◆ GWS that intends to provide 4-log virus treatment—& conduct compliance monitoring—in lieu of conducting triggered or assessment source water monitoring &, if applicable, future assessment finished water monitoring must...



- Notify DEP in writing, & obtain written DEP approval, of 4-log virus treatment
- Begin conducting compliance monitoring for 4-log virus treatment
- Do both of above **by 12/1/09 or, if after 12/1/09, before GWS may discontinue triggered or assessment source water monitoring** & before GWS will be exempt from future assessment finished water monitoring if applicable



4-Log Virus Treatment (cont'd)

- For GWSs that intend to provide 4-log virus treatment by **using existing treatment facilities** (i.e., doing nothing more than providing necessary uninstalled standby equipment or installing or altering necessary alarm, or continuous monitoring, equipment)...
 - Written notification of 4-log virus treatment shall consist of following:
 - 4-log virus treatment demonstration prepared under responsible charge of PE licensed in FL; &
 - Description of any uninstalled standby equipment being provided & any alarm, or continuous monitoring, equipment installation or alteration work
 - Written DEP approval shall consist of letter or order

At WTPs using chemical disinfection for virus inactivation, GWSs must provide standby equipment, automatic switch-over of gas containers, & alarm systems in accordance with FAC Rule 62-555.320(13) & "10-State Standards."



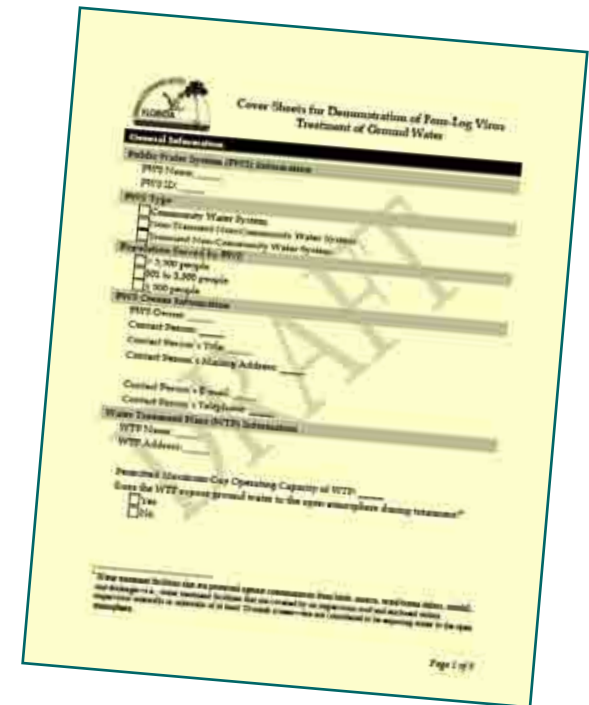
4-Log Virus Treatment (cont'd)

- ◆ For GWSs that intend to provide 4-log virus treatment by **constructing or altering treatment facilities** (i.e., constructing, installing, or altering structures, piping, or equipment other than uninstalled standby equipment or alarm, or continuous monitoring, equipment)...
 - Written notification of 4-log virus treatment shall consist of construction permit application & supporting documents, including 4-log virus treatment demonstration prepared under responsible charge of PE licensed in FL
 - Written DEP approval shall consist of construction permit **&** letter or order



4-Log Virus Treatment Demonstrations

- 4-log virus treatment demonstrations shall be prepared consistent with DEP's draft "Guidelines for 4-Log Virus Treatment of Ground Water"
- 4-log virus treatment demonstrations shall include following information:
 - DEP's draft "Cover Sheets for Demonstration of 4-Log Virus Treatment of Ground Water"
 - Whether WTP is exposing ground water to open atmosphere during treatment, & if so, whether demonstration is for 4-log virus treatment after water is last exposed to open atmosphere or is just for 4-log virus treatment of ground water source(s)
 - Technology(ies) used for virus treatment & virus inactivation or removal credit claimed for each technology
 - Schematic diagram of WTP



The image shows a yellow cover sheet form titled "Cover Sheets for Demonstration of Four-Log Virus Treatment of Ground Water". The form is divided into several sections with input fields and checkboxes. The sections include:

- General Information:** Fields for "Public Water System (PWS) Information", "PWS Name", "PWS ID", and "PWS Type".
- Water Treatment Plant (WTP) Information:** Fields for "Community Water System", "Non-Community Water System", "Population Served by WTP", "PWS to 2,500 people", and "PWS to 100 people".
- WTP Contact Information:** Fields for "PWS Owner", "Contact Person", "Contact Person's Title", "Contact Person's Mailing Address", "Contact Person's E-mail", and "Contact Person's Telephone".
- Water Treatment Plant (WTP) Information:** Fields for "WTP Name" and "WTP Address".
- Operational Information:** A field for "Estimated Maximum Day Operating Capacity of WTP" and a checkbox for "Does the WTP expose ground water to the open atmosphere during treatment?".

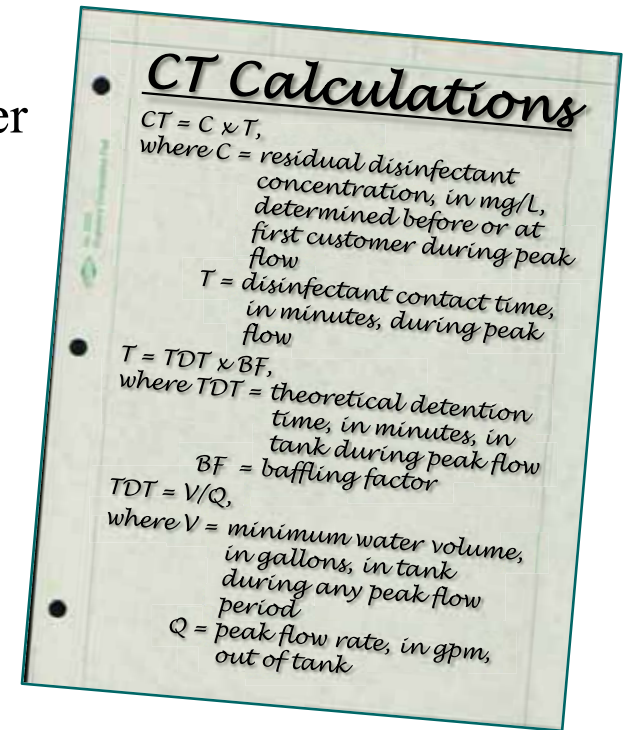
At the bottom of the form, there is a disclaimer: "This document contains information that is proprietary to the State of Florida. It is intended for use only by the State of Florida and its agencies. It is not to be distributed or used for any other purpose without the express written consent of the State of Florida." The page number "Page 1 of 1" is visible in the bottom right corner.



4-Log Virus Treatment Demonstrations (cont'd)

4-log virus treatment demonstrations shall include following information: (cont'd)

- For chemical disinfection...
 - CT calculations
 - Identification of standby equipment, switch-over devices for gas containers, & alarm systems as required by FAC Rule 62-555.320(13) & "10-State Standards"
 - Disinfectant residual monitoring frequency & any continuous monitoring equipment
 - Disinfectant residual monitoring location(s)
 - Proposed minimum residual disinfectant concentration(s) for each disinfectant residual monitoring location



4-Log Virus Treatment Demonstrations (cont'd)

◆ 4-log virus treatment demonstrations shall include following information: (cont'd)

- For NF or RO...
 - MWC0 of membranes
 - Direct integrity testing frequency, method, resolution, sensitivity, & control limit for membrane units if 4-log virus treatment is claimed
 - Continuous monitoring equipment for membrane units
 - Proposed operating requirement—i.e., maximum % SP—for each membrane unit



4-Log Virus Treatment Demonstrations (cont'd)

◆ 4-log virus treatment demonstrations shall include following information: (cont'd)

- For conventional filtration treatment, including lime softening...
 - CFE turbidity monitoring frequency & any continuous CFE turbidity monitoring equipment
 - CFE turbidity monitoring location
 - Operating requirement—i.e., CFE turbidity ≤ 1 NTU—for treatment
- For other treatment technologies...
 - Information listed on draft "Cover Sheets for Demonstration of 4-Log Virus Treatment of Ground Water"



DEP Approvals of 4-Log Virus Treatment

◆ DEP letters or orders approving 4-log virus treatment shall...

- For WTPs exposing ground water to open atmosphere during treatment, indicate whether 4-log virus treatment is for water after it is last exposed to open atmosphere or is just for ground water source(s)
- Identify technologies being used to provide 4-log virus treatment & identify virus inactivation or removal credit granted for each technology
- Identify or establish compliance monitoring & operating requirements for each virus treatment technology
- Indicate that failure to meet operating requirements for > 4 hours after first determining failure will constitute TT violation under GWR

TT violations are discussed on later slides.

- Include notice of right to administrative hearing

Refer to FAC Rule
62-110.106(12).



DEP Approvals of 4-Log Virus Treatment (cont'd)

- ◆ **DEP might need to revisit past approvals of 4-log virus treatment, request additional information as necessary, & reissue approval if...**
 - Past approval did not identify compliance monitoring & operating requirements, such as disinfectant residual monitoring location & minimum residual disinfectant concentration for GWSs using chemical disinfection

**RE
APPROVED**



Virus Treatment Technologies Identified in GWR

◆ GWR identifies following virus treatment technologies:

- Chemical disinfection, which includes...
 - Disinfection using free chlorine, chloramines, chlorine dioxide, or ozone
- Membrane filtration, which includes...
 - RO or NF
 - UF
 - UF will receive virus removal credit only if membranes meet 1 of following 2 criteria:
 - Membranes have absolute (i.e., maximum) pore size $< 0.01 \mu\text{m}$; or
 - Membranes are identical in material, & similar in construction, to membranes that have been shown via challenge testing to have at least 4-log virus removal capability



Virus Treatment Technologies Identified in GWR (cont'd)

💧 Virus treatment credit for technologies listed in GWR:

Treatment Technology	Virus Treatment Credit
Chemical disinfection using free chlorine, chloramines, chlorine dioxide, or ozone	1 to 4 logs based on calculated CT in relation to applicable CT table
UF, NF, or RO	2 logs if GWS conducts continuous indirect integrity monitoring
	4 logs if GWS conducts continuous indirect integrity monitoring & daily direct integrity testing using test method having resolution of 0.01 μm or less & having sensitivity of at least 4 logs



DEP-Accepted Alternative Treatment Technologies for Virus Treatment

◆ DEP-accepted alternative treatment technologies for virus treatment:

Treatment Technology	Virus Treatment Credit
UV disinfection	1 to 4 logs based on validated UV dose in relation to UV dose table
Conventional filtration treatment, including lime softening	2 logs
Slow sand filtration	2 logs
Direct filtration; or MF preceded by coagulation	1 log
Diatomaceous earth filtration	1 log



Compliance Monitoring for GWSs Using Chemical Disinfection

- ◆ **Each day they serve water to public, GWSs using chemical disinfection must...**
 - Monitor residual disinfectant concentration at location(s) specified by DEP
 - DEP-specified location(s) will be at end of disinfection segment(s) identified in CT calculations
 - Maintain DEP-specified minimum residual disinfectant concentration at each DEP-specified monitoring location
 - DEP-specified minimum residual disinfectant concentration for each monitoring location will be determined on WTP-by-WTP, & disinfection-segment-by-disinfection-segment, basis using CT calculations
 - Record daily lowest residual disinfectant concentration measured at each DEP-specified monitoring location

Recordkeeping requirements for GWSs are discussed on later slides.



Compliance Monitoring for GWSs Using Chemical Disinfection (cont'd)

◆ GWSs using chemical disinfection & serving > 3,300 people must...

- Monitor residual disinfectant concentration continuously
 - Using on-line chlorine analyzer meeting EPA Method 334.0 or using analytical method specified in 40 CFR 141.74(a)(2) or in Appendix A to Subpart C of 40 CFR 141
- If there is failure in continuous disinfectant residual monitoring equipment,...
 - Conduct grab sampling every four hours until continuous monitoring is resumed
 - Resume continuous monitoring within 14 days



Compliance Monitoring for GWSs Using Chemical Disinfection (cont'd)

◆ GWSs using chemical disinfection & serving $\leq 3,000$ people must...

- Monitor residual disinfectant concentration **by taking daily grab sample during peak flow**
 - Using analytical method specified in 40 CFR 141.74(a)(2) or in Appendix A to Subpart C of 40 CFR 141 **or using DPD colorimetric test kit or ITS free chlorine test strip**
- If any daily grab sample measurement is $<$ DEP-specified minimum residual disinfectant concentration, take follow-up samples every 4 hours until residual disinfectant concentration is \geq DEP-specified minimum



◆ Alternatively, GWSs serving $\leq 3,300$ people may monitor residual disinfectant concentration continuously like GWSs serving $> 3,300$ people



Compliance Monitoring for GWSs Using Membrane Filtration

- ◆ GWSs using membrane filtration must meet DEP-specified monitoring, operating, & recordkeeping requirements

Type of Membrane Filtration	Monitoring Requirements	Operating Requirements	Recordkeeping
UF	Conduct continuous filtrate turbidity monitoring for each membrane unit*	Maintain filtrate turbidity \leq 0.15 NTU	Record daily maximum filtrate turbidity for each membrane unit
NF or RO	Conduct continuous % SP monitoring for each membrane unit*	Maintain % SP \leq FDEP-specified maximum, which generally will be no $>$ 25% for NF & no $>$ 5% for RO	Record daily maximum % SP for each membrane unit

* & conduct daily direct integrity testing, using test method having resolution of 0.01 μ m or less & having sensitivity of at least 4 logs, for each membrane unit **if 4-log virus removal credit is claimed**



Compliance Monitoring for DEP-Accepted Alternative Treatment Technologies

- ◆ **GWSs using DEP-accepted alternative treatment technologies must meet DEP-specified monitoring, operating, & recordkeeping requirements**

Alternative Treatment Technology	Monitoring Requirements	Operating Requirements	Recordkeeping
UV disinfection	Monitor each UV reactor continuously for flow rate, UV intensity, UV lamp status, & if applicable, UVT	Operate each UV reactor within validated operating conditions for flow rate, UV intensity, UV lamp status, & if applicable, UVT	Record daily maximum flow rate & daily minimum UV intensity or, daily minimum validated dose, for each reactor



Compliance Monitoring for DEP-Accepted Alternative Treatment Technologies (cont'd)

- ◆ **GWSs using DEP-accepted alternative treatment technologies must meet DEP-specified monitoring, operating, & recordkeeping requirements (cont'd)**

Alternative Treatment Technology	Monitoring Requirements	Operating Requirements	Recordkeeping
Conventional filtration treatment	Perform CFE turbidity measurements at least every 4 hours if serving > 500 people or at least daily if serving ≤ 500 people	Maintain CFE turbidity ≤ 1 NTU*	Record daily maximum CFE turbidity
Direct filtration; or MF preceded by coagulation		Maintain CFE turbidity ≤ 1 NTU	
Diatomaceous earth filtration		Maintain CFE turbidity ≤ 5 NTUs	
Slow sand filtration	Perform CFE turbidity measurements at least daily	Maintain CFE turbidity ≤ 5 NTUs	

* GWSs using lime softening may acidify CFE turbidity samples prior to analysis of samples



Discontinuing DEP-Approved 4-Log Virus Treatment

◆ GWSs that intend to discontinue DEP-approved 4-log virus treatment shall...

- Notify DEP in writing, & obtain written DEP approval, before discontinuing 4-log virus treatment
 - Written notification shall document that 4-log virus treatment is not necessary
 - Documentation could include following:
 - Fecally contaminated wells have been replaced by new wells that have passed well survey
 - Fecally contaminated wells have been rehabilitated & have passed well survey
 - Sources of fecal contamination have been identified & removed, & wells have passed well survey
 - 1 year of monthly, or 3 years of quarterly, source water monitoring showing no fecal contamination of wells
 - Written DEP approval shall consist of letter or order



Discontinuing DEP-Approved 4-Log Virus Treatment (cont'd)

- ◆ GWSs that obtain DEP approval to discontinue 4-log virus treatment are then subject to...
 - Triggered source water monitoring
 - Assessment source water monitoring
 - Future assessment finished water monitoring if WTP exposes ground water to open atmosphere during treatment



QUESTIONS?



MONITORING OR TT VIOLATIONS; REPORTING; RECORDKEEPING



Monitoring Violations

💧 Monitoring violations:

Failure to meet **triggered or assessment** source water monitoring requirements (by GWSs that are not providing DEP-approved 4-log virus treatment)

Failure to meet future assessment **finished water** monitoring requirements (by GWSs that are exposing ground water to open atmosphere during treatment & are not providing DEP-approved 4-log virus treatment after ground water is last exposed to open atmosphere)

Failure to meet compliance monitoring requirements (by GWSs that are providing DEP-approved 4-log virus treatment)

💧 GWSs must issue Tier 3 public notice for monitoring violations

PN requirements are discussed on later slides.



TT Violations

◆ **GWS with significant deficiency or with FI+ additional triggered or assessment source water sample is in violation of TT requirements if...**

- After 120 days of receiving written notice of significant deficiency or FI+ sample, GWS does not fall into 1 of following 2 categories:

GWS has
completed
corrective action

or

GWS is in
compliance with
DEP-approved
corrective action
plan & schedule



TT Violations (cont'd)

- ◆ **GWS that is providing DEP-approved 4-log virus treatment & conducting compliance monitoring is in violation of TT requirements if...**

GWS fails to maintain 4-log virus treatment (by failing to meet operating requirements)

&

Failure to maintain 4-log virus treatment is not corrected within 4 hours after determining failure

- ◆ **GWSs must issue Tier 2 public notice for TT violations**

PN requirements are discussed on later slides.



Reporting Requirements for GWSs

Reporting Requirement	Due Date
GWSs must report to DEP results of analyses of triggered or assessment source water samples*	Within 10 days following month in which results were received
GWSs must report to DEP results of analyses of future assessment finished water samples*	
GWSs conducting compliance monitoring must report to DEP daily lowest residual disinfectant concentration & must report to DEP any DEP-specified membrane filtration, or alternative treatment, monitoring results (report results on or with MOR)	

* GWSs are not required to report results to DEP in cases where DOH lab performs analysis & reports result to DEP

When DEP incorporates GWR into FAC in 2010, DEP intends to revise Form 62-555.900(3), "MOR for PWSs Treating Raw Ground Water or Purchased Finished Water," to facilitate reporting of DEP-specified membrane filtration, or alternative treatment, monitoring results.



Reporting Requirements for GWSs (cont'd)

Reporting Requirement	Due Date
GWSs must report to DEP failure to comply with GWR	Within 48 hours
GWSs must submit to DEP completed Form 62-555.900(22), "Certification of Delivery of Public Notice"	Within 10 days after completing each PN requirement
GWSs conducting compliance monitoring must notify DEP any time GWS fails to meet any DEP-specified operating requirements (including minimum residual disinfectant concentration & any membrane filtration, or alternative treatment, operating requirement) if operation in accordance with requirements is <u>not</u> restored within 4 hours	As soon as possible, but no later than end of next business day
GWSs must submit to DEP written notice confirming completion of any corrective action under GWR	Within 30 days after completion of corrective action
GWSs that do <u>not</u> conduct triggered source water monitoring because GWS meets DEP criteria for determining TC+ routine distribution sample was caused by distribution system conditions must provide to DEP written documentation showing that TC+ sample meets DEP criteria	Within 30 days after TC+ routine distribution sample



Recordkeeping Requirements for All GWSs

Records	Recordkeeping Period
Records of analyses of triggered or assessment source water samples	At least 5 years
Records of analyses of future assessment finished water samples	
Written reports, summaries, or communications relating to sanitary surveys of GWS	At least 10 years after completion of sanitary survey
Public notices & "Certifications of Delivery of Public Notice"	At least 3 years after issuance of public notice
Triggered or assessment source water monitoring plans	Same as records of analyses of samples taken under plan
Documentation of corrective actions	At least 10 years
Documentation of special notices to public	At least 3 years
Documentation for exception to triggered source water monitoring—i.e., documentation showing that TC+ routine distribution sample meets DEP criteria for determining that TC+ sample was caused by distribution system conditions	At least 5 years
Records of invalidation of FI+ triggered or assessment source water samples	

PN & special notice requirements are discussed on later slides.



Recordkeeping Requirements for Consecutive GWSs

Records	Recordkeeping Period
Documentation of notification to wholesale GWSs of TC+ routine distribution samples	At least 5 years



Recordkeeping Requirements for GWSs Conducting Compliance Monitoring

Records	Recordkeeping Period
Record of DEP-specified operating requirements (including minimum residual disinfectant concentration & any membrane filtration, or alternative treatment, operating requirements)	At least 10 years
Records of daily lowest residual disinfectant concentration & records of any DEP-specified membrane filtration, or alternative treatment, monitoring results (records on or with MOR)	At least 5 years
Records of date & duration of any failure to maintain DEP-specified operating requirements (including minimum residual disinfectant concentration & any membrane filtration, or alternative treatment, operating requirements) for > 4 hours (records on or with MOR)	

When DEP incorporates GWR into FAC in 2010, DEP...

- Intends to revise Form 62-555.900(3), "MOR for PWSs Treating Raw Ground Water or Purchased Finished Water," to facilitate recording of monitoring results & recording of failures for > 4 hours.
- **Might** revise FAC to require that MORs be kept for only 5 years instead of 10 years.



QUESTIONS?



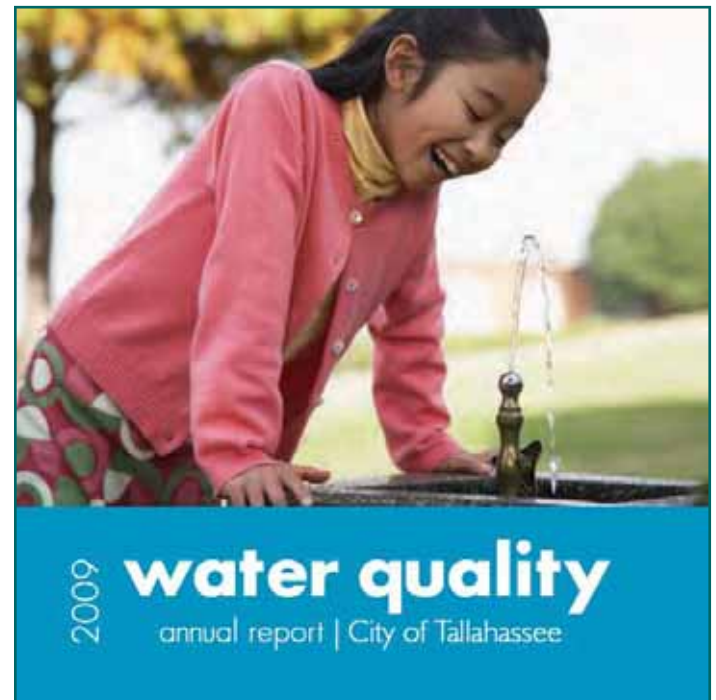
PN; CCRs; SPECIAL NOTICES



Required Notices to Public

◆ 3 types of notices to public

- PN (Tier 1, 2 , or 3 public notices)
 - Community GWSs
 - Non-community GWSs
- CCR
 - Community GWSs
- GWR special notices
 - Community GWSs (included in CCR)
 - Non-community GWSs



PN Requirements

💧 Tier 1 public notice

- Required for...
 - FI+ **initial or additional triggered or assessment** source water sample
 - FI+ future assessment **finished water** sample
- Must be provided no later than 24 hours after GWS learns of FI+ sample
- Must be provided via radio & TV or...
 - By hand delivery **&** by posting in conspicuous places (community or non-transient non-community GWS)
 - By hand delivery **or** by posting in conspicuous places (transient non-community GWS)



PN Requirements (cont'd)

◆ Example Tier 1 public notice for FI+ triggered source water sample

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER System A Well 1 Tested Positive for Fecal Contamination

Our water system detected fecal indicators (*E. coli*) in one of our two wells. As our customers, you have a right to know what happened and what we are doing to correct this situation. On April 4, we learned that one of our routine samples collected April 2 was total coliform positive. As required by EPA's Ground Water Rule, one of our follow-up steps was to collect samples from both of our wells. The sample from Well 1 collected on April 5 tested positive for a fecal indicator (*E. coli*). We are now conducting additional sampling of the well to determine the extent of the problem and are conducting a thorough investigation to determine the source of the contamination.

What should I do?

DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST. Bring all water to a rolling boil, let it boil for one minute, and let it cool before using it. Boiling kills bacteria and other organisms in the water. You may also use bottled water. Use boiled or bottled water for drinking, making ice, preparing food, and washing dishes until further notice.

Also, if you have a severely compromised immune system, have an infant, or are elderly, you may be at increased risk and should seek advice about drinking water from your 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. If you have specific health concerns, consult your doctor. We are also providing regular updates on this situation on Channel 22 or Radio Station KMMM (97.3 FM).

What does this mean?

Inadequately treated or inadequately protected water may contain disease-causing organisms. These organisms can cause symptoms such as diarrhea, nausea, cramps, and associated headaches. *Fecal indicators are microbes whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.* These symptoms 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.

What is being done?

We are conducting a thorough investigation to determine the source of the contamination and will be working with the State Department of Public Health to implement corrective actions to ensure that our water supplies are protected against contamination. We will keep you informed of the steps we are taking to protect your drinking water and will provide information on any steps you should be taking, until this problem is corrected.

Example can be found in *The GWR Implementation Guidance*
at www.epa.gov/OGWDW/disinfection/gwr/regulation.html

This notice is being sent to you by System A.

State Water System ID# TM 1234582. Sent: 4/7/2010



PN Requirements (cont'd)

💧 Tier 2 public notice

- Required for TT violations
 - Failure to complete corrective action, or be in compliance with DEP-approved corrective action plan & schedule, within 120 days of receiving written notice of significant deficiency or FI+ **additional triggered or assessment** source water sample
 - Failure to maintain DEP-approved 4-log virus treatment for > 4 hours after determining failure
- Must be provided no later than 30 days after GWS learns of violation
- Must be provided by mail or hand delivery **&** by publication in newspaper or...
 - By hand delivery **&** by posting in conspicuous places (community or non-transient non-community GWS)
 - By hand delivery **or** by posting in conspicuous places (transient non-community GWS)



PN Requirements (cont'd)

◆ Example Tier 2 public notice for failure to maintain 4-log virus treatment for > 4 hours

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER System D Failed to Maintain Required Treatment of Viruses at Well 1

From December 27, 2010 to January 12, 2011, our water system did not provide chlorine in the water being used from Well 1 due to a malfunctioning chlorine feed pump. As a result, our water was not as disinfected as the state requires it to be. Our water system violated a treatment technique standard for maintaining adequate disinfection for water delivered to customers from Well 1. As our customers, you have a right to know what happened and what we are doing to correct this situation. After this problem was identified during a state inspection of our treatment facilities, we took immediate steps to repair the malfunctioning chlorine pump. The treatment system has been repaired and is now operating properly.

What should I do?

There is nothing you need to do unless you have a severely compromised immune system, have an infant, or are elderly. These people may have been at increased risk when our system failed to provide adequate disinfection 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. If you have specific health concerns, consult your doctor.

You do not need to boil your water or take other corrective actions. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will announce any emergencies on Channel 22 or Radio Station KMMM (97.3 FM).

What does this mean?

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

Inadequately treated or inadequately protected water may contain disease-causing organisms. These organisms can cause symptoms such as diarrhea, nausea, cramps, and associated headaches. While we have not detected any evidence of contamination in, or other health threats to, our source water, we are still committed to restoring the required level of treatment to the water from Well 1 to eliminate the threat of contamination.

What is being done?

We have replaced the malfunctioning chlorine pump and regular sampling has shown that we are once again providing adequate disinfection of water from Well 1.

Example can be found in *The GWR Implementation Guidance*
at www.epa.gov/OGWDW/disinfection/gwr/regulation.html

This notice is being sent to you by System D.

State Water System ID# TM 1234584. Sent: 2/10/2011



PN Requirements (cont'd)

◆ Tier 3 public notice

- Required for monitoring violations
 - Failure to meet **triggered or assessment** source water monitoring requirements
 - Failure to meet future assessment **finished water** monitoring requirements
 - Failure to meet compliance monitoring requirements
- Must be provided within 3 months after GWS learns of violation (per FAC Rule 62-560.410(3))
- Must be provided by mail **&** by publication in newspaper or...
 - By mail **&** by posting in conspicuous places (community or non-transient non-community GWS)
 - By hand delivery **or** by posting in conspicuous places (transient non-community GWS)



PN Requirements (cont'd)

◆ Example Tier 3 public notice for failure to collect triggered source water samples following TC+ routine distribution sample

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER
Monitoring Requirements not Met for System E

Our water system recently failed to collect source water samples for fecal indicators following a total coliform-positive routine distribution system sample. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did to correct the situation.

What should I do?
There is nothing you need to do. You do not need to boil your water or take other corrective actions. You may continue to drink the water. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will also announce any emergencies on Channel 22 and Radio Station KMMM (97.3 FM).

What was done?
We collected samples from all four wells and had them tested for fecal indicators on January 4, 2012. None of the samples was positive for fecal indicators.

For more information, please contact John Johnson, manager of System E, at (555) 555-1234 or write to 2600 Winding Rd., Townsville, TM 12345.

Please check this information against the actual notice. [Click here to view the actual notice.](#)

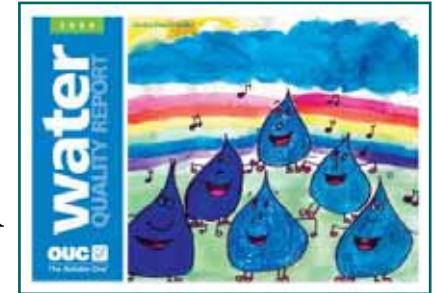
State Water System ID# TM 1234585. Sent: 2/5/2012

Example can be found in *The GWR Implementation Guidance* at www.epa.gov/OGWDW/disinfection/gwr/regulation.html



CCR Requirements for Community GWs

◆ **FI+ initial or additional triggered or assessment source water sample results, & FI+ future assessment finished water sample results, must be added to regulated contaminant table in CCR**



◆ **CCR must contain notice of any TT violations**

- Failure to complete corrective action, or be in compliance with DEP-approved corrective action plan & schedule, within 120 days of receiving written notice of significant deficiency or FI+ additional triggered or assessment source water sample
- Failure to maintain DEP-approved 4-log virus treatment for > 4 hours after determining failure

◆ **CCR must contain notice of any monitoring violations**

- Failure to meet triggered or assessment source water monitoring requirements
- Failure to meet future assessment finished water monitoring requirements
- Failure to meet compliance monitoring requirements



CCR Requirements for Community GWSs (cont'd)

- ◆ Example of regulated contaminant table & special notice in CCR for FI+ triggered source water sample

Source Water Quality Data						
Contaminant	MCL/MRDL/TT	MCLG	Value	Date	Violation	Typical Sources
Fecal indicators (<i>E. coli</i>)	TT	N/A	Positive (<i>E. coli</i>)	April 5, 2010	No	Human and animal fecal waste

*System A detected *E. coli* in their source water sample; the sample was collected in response to a total coliform-positive routine sample collected on April 2, 2010. More information about this situation is provided in the Situation section.

Situation

- On April 4, 2010 we were informed that one of our routine total coliform samples collected on April 2 was total coliform-positive. As required by the Ground Water Rule, we collected samples from both of our sources, Wells 1 and 2, and had them analyzed for fecal contamination. The sample for Well 1 was positive for fecal contamination (*E. coli*).

... or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.

Example can be found in *The GWR Implementation Guidance* at www.epa.gov/OGWDW/disinfection/gwr/regulation.html

Special notice requirements for community GWSs are discussed on later slides.



CCR Requirements for Community GWSs (cont'd)

◆ Example of notice in CCR for failure to maintain 4-log virus treatment for > 4 hours

Violation

On January 10, 2011 state inspection of our water system identified a malfunctioning chlorine pump. As a result, the water from one of our wells (Well 1) was not adequately disinfected for 2 weeks.

As directed by the Department of Public Health, we took immediate action to resolve this problem by repairing the malfunctioning chlorine pump. Regular testing since the pump was repaired has demonstrated that we are once again providing water that meets the State's standards for disinfection to our customers.

Example can be found in *The GWR Implementation Guidance*
at www.epa.gov/OGWDW/disinfection/gwr/regulation.html



CCR Requirements for Community GWSs (cont'd)

◆ Example of notice in CCR for failure to collect triggered source water sample following TC+ routine distribution sample

Violation

On December 15, 2011, we were informed by our laboratory that one of our routine bacteriological samples for December tested positive for total coliforms.

We were required to collect follow-up samples within 24 hours of learning of the total coliform-positive sample. Follow-up samples needed to be tested for fecal indicators from all sources that were active at the time the total coliform-positive sample was collected. Since we were notified of the total coliform-positive sample on December 15, 2011, we were required to collect the follow-up samples December 16, 2011. Source water samples were instead collected on January 4, 2012, and all of the samples were negative for fecal indicators.

Failure to conduct source water monitoring within the required 24 hour period is a monitoring and reporting violation.

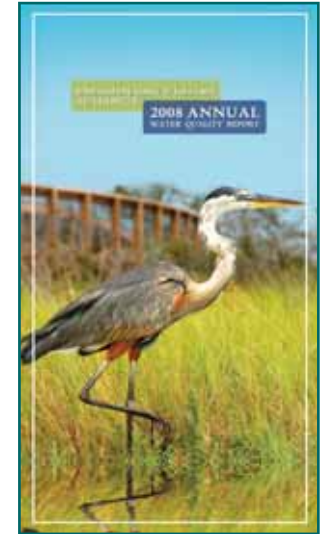
Example can be found in *The GWR Implementation Guidance* at www.epa.gov/OGWDW/disinfection/gwr/regulation.html



Special Notice Requirements

◆ Special notice for community GWSs

- Included in CCR
- Required for...
 - FI+ triggered or assessment source water sample
 - Significant deficiency that was identified during calendar year covered by CCR & that is either...
 - Uncorrected at time CCR is issued; or
 - Involves FI+ future assessment finished water sample (at WTP exposing ground water to open atmosphere during treatment)
 - DEP may require special notice for significant deficiencies that have been corrected before CCR is issued but will do so only for those involving FI+ future assessment finished water samples
- Required annually until any fecal contamination in ground water source/well is addressed or significant deficiency is corrected



Special Notice Requirements (cont'd)

◆ Special notice for community GWSs (cont'd)

- Must include following elements:
 - Dates of FI+ triggered or assessment source water samples & source of any fecal contamination (if known); or date significant deficiency was identified by DEP & nature of significant deficiency
 - Whether any fecal contamination in ground water sources/wells has been addressed & date of such action; or whether significant deficiency involving FI+ future assessment finished water sample has been corrected & date of correction
 - For any ground water source/well fecal contamination that has not been addressed & for each uncorrected significant deficiency, DEP-approved plan & schedule for correction, including any interim measures & progress to date, including any interim measures completed
 - For FI+ triggered or assessment source water samples & for significant deficiencies involving FI+ future assessment finished water sample, health effects language from Appendix A to Subpart O of 40 CFR 141



Special Notice Requirements (cont'd)

◆ Fecal indicator health effects language, from Appendix A to Subpart O of 40 CFR 141:

"Fecal indicators are microbes whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, & people with severely compromised immune systems."



Special Notice Requirements (cont'd)

◆ Example of regulated contaminant table & special notice in CCR for FI+ triggered source water sample

Source Water Quality Data						
Contaminant	MCL/MRDL/TT	MCLG	Value	Date	Violation	Typical Sources
Fecal indicators (<i>E. coli</i>)	TT	N/A	Positive (<i>E. coli</i>)	April 5, 2010	No	Human and animal fecal waste

*System A detected *E. coli* in their source water sample; the sample was collected in response to a total coliform-positive routine sample collected on April 2, 2010. More information about this situation is provided in the Situation section.

Situation

- On April 4, 2010 we were informed that one of our routine total coliform samples collected on April 2 was total coliform-positive. As required by the Ground Water Rule, we collected samples from both of our sources, Wells 1 and 2, and had them analyzed for fecal contamination. The sample for Well 1 was positive for fecal contamination (*E. coli*).
- Inadequately treated or inadequately protected water may contain disease-causing organisms. These organisms can cause symptoms such as diarrhea, nausea, cramps, and associated headaches. *Fecal indicators* are microbes whose presence indicates that the water may be contaminated with human or animal wastes. *Microbes* in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.

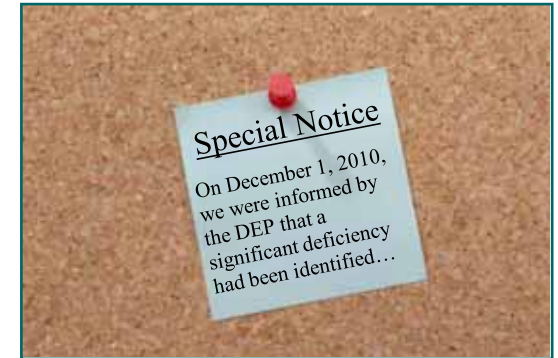
Example can be found in *The GWR Implementation Guidance* at www.epa.gov/OGWDW/disinfection/gwr/regulation.html



Special Notice Requirements (cont'd)

◆ Special notice for non-community GWSs

- Posted in conspicuous place
- Required for...
 - Significant deficiency that has not been corrected within 12 months of written notification from DEP
 - DEP may, **but will not**, require special notice for significant deficiencies that have been corrected
- Required until significant deficiency is corrected
- Must include following elements:
 - Date significant deficiency was identified by DEP & nature of significant deficiency
 - DEP-approved plan & schedule for correction of significant deficiency, including any interim measures & progress to date, including any interim measures completed
 - For GWSs with > 20% non-English-speaking customers, information in appropriate language(s) regarding nature & importance of notice or phone # or address where customers may contact GWS to obtain translated copy of notice or assistance in appropriate language



PN, CCR, & Special Notices for Community GWSs

Issue		Notification Required
FI+ initial or additional triggered or assessment source water sample ¹		Tier 1 public notice, CCR, special notice in CCR ²
FI+ future assessment finished water sample ¹		Tier 1 public notice, CCR, special notice in CCR ³
TT Violation	Failure to complete corrective action, or be in compliance with DEP-approved corrective action plan & schedule, within 120 days	Tier 2 public notice, CCR
	Failure to maintain DEP-approved 4-log virus treatment for > 4 hours after determining failure	
Monitoring Violation	Failure to meet triggered or assessment source water monitoring requirements	Tier 3 public notice, CCR
	Failure to meet future assessment finished water monitoring requirements	
	Failure to meet compliance monitoring requirements	
Significant deficiency that was identified during calendar year covered by CCR & that is uncorrected at time CCR is issued		Special notice in CCR ³

¹ Consecutive GWSs served by source/well also must notify public.

² GWSs must put special notice in CCR annually until any fecal contamination of source/well has been addressed.

³ GWSs must put special notice in CCR annually until significant deficiency has been corrected.



PN & Special Notices for Non-Community GWSs

Issue		Notification Required
FI+ initial or additional triggered or assessment source water sample ¹		Tier 1 public notice
FI+ future assessment finished water sample ¹		
TT Violation	Failure to complete corrective action, or be in compliance with DEP-approved corrective action plan & schedule, within 120 days	Tier 2 public notice
	Failure to maintain DEP-approved 4-log virus treatment for > 4 hours after determining failure	
Monitoring Violation	Failure to meet triggered or assessment source water monitoring requirements	Tier 3 public notice
	Failure to meet future assessment finished water monitoring requirements	
	Failure to meet compliance monitoring requirements	
Significant deficiency that has <u>not</u> been corrected within 12 months		Special notice ²

¹ Consecutive GWSs served by source/well also must notify public.

² GWSs must post special notice until significant deficiency has been corrected.



QUESTIONS?



CONCLUSION



Key Provisions of GWR

**Sanitary Surveys
of all GWSs**

**Ground Water
Source Microbial
Monitoring**

TT Requirement:
Corrective Action for
Significant Deficiencies
& Fecal Contamination

TT Requirement:
Compliance Monitoring



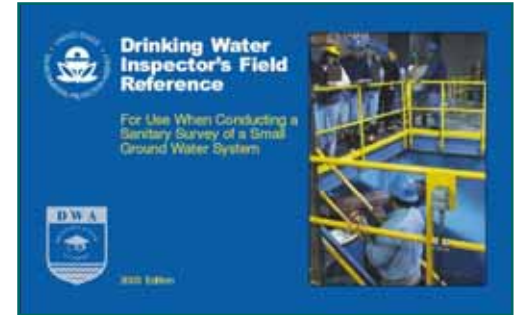
Sanitary Surveys

DEP must conduct sanitary surveys no less frequently than...

- Every 3 years for community GWSs
- Every 5 years for non-community GWSs

Sanitary surveys must evaluate 8 components

- Source
- Treatment
- Distribution system
- Finished water storage
- Pump facilities & controls
- Monitoring, reporting, & data verification
- GWS management & operation
- Operator compliance with DEP requirements



DEP must notify GWSs in writing of significant deficiencies no later than 30 days after DEP identifies significant deficiencies

- When DEP incorporates GWR into FAC in 2010, DEP will define & describe at least 1 specific significant deficiency in each of 8 sanitary survey components



Ground Water Source Microbial Monitoring

- ◆ GWSs that are not providing DEP-approved 4-log virus treatment, & not conducting compliance monitoring, must conduct ground water source microbial monitoring
- ◆ 2 types of ground water source microbial monitoring:
 - **Triggered** source water monitoring
 - Triggered by TC+ routine distribution samples under TCR (FAC Rule 62-550.518)
 - **Assessment** source water monitoring
 - Currently required under FAC Rule 62-550.518
- ◆ Ground water source samples must be analyzed for 1 of 3 fecal indicators
 - **E coli**
 - Enterococci
 - Coliphage
- ◆ When DEP incorporates GWR into FAC in 2010, DEP intends to require assessment **finished water** monitoring for GWSs that are...
 - Exposing ground water to open atmosphere during treatment; **&**
 - Not providing 4-log virus treatment after water is last exposed to open atmosphere



TT Requirement: Corrective Action

◆ GWSs must implement corrective action when...

- Significant deficiency is identified by DEP; or
- Any 1 of 5 **additional** triggered or assessment source water samples is FI+
 - 5 additional triggered or assessment source water samples are taken after initial triggered or assessment source water sample is FI+

◆ Corrective action alternatives:

- Correct all significant deficiencies
- Provide alternate source of water
- Eliminate source of contamination
- Provide at least 4-log virus treatment before or at first customer for ground water source(s), or if applicable, provide at least 4-log virus treatment after water is last exposed to open atmosphere & before or at first customer

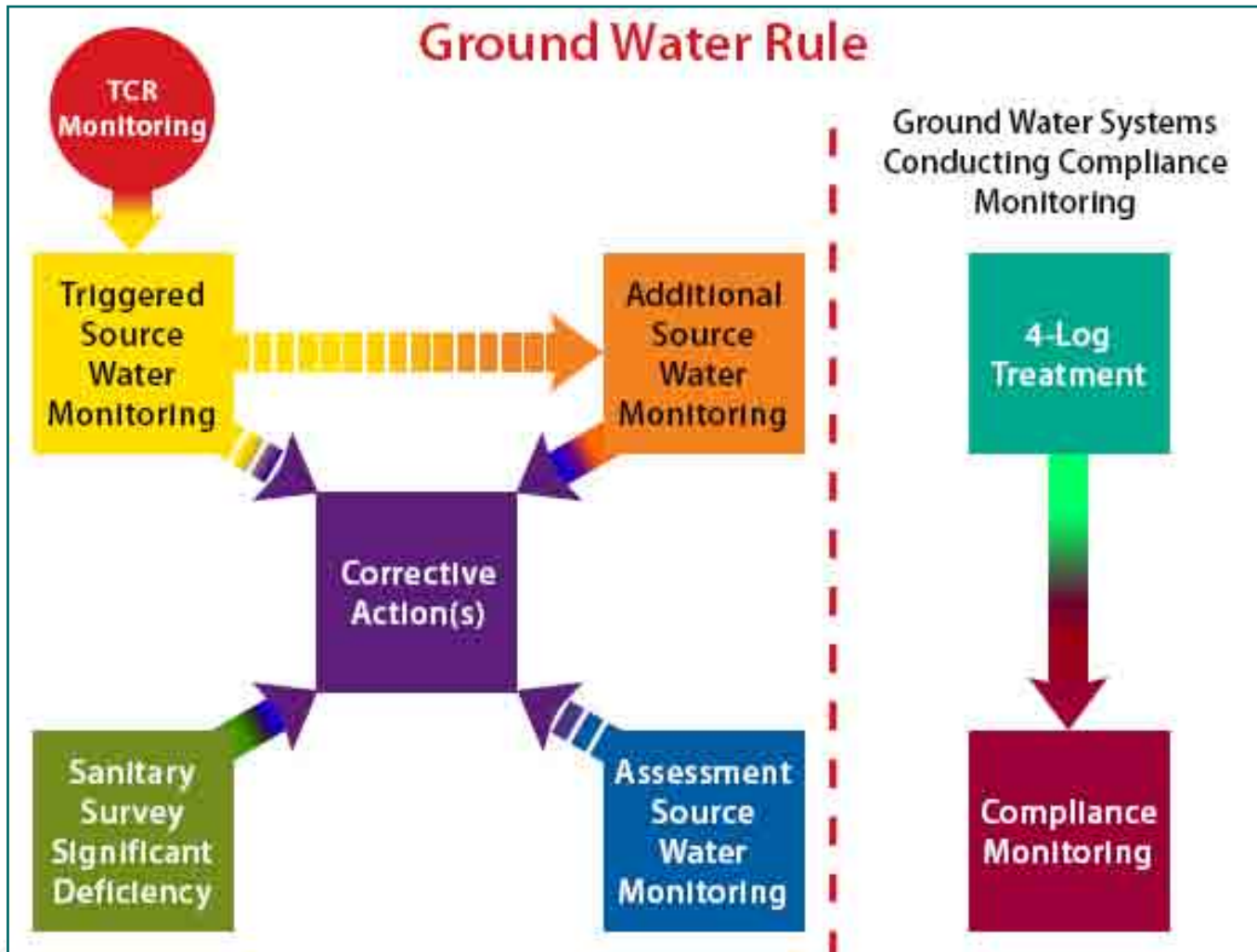


TT Requirement: Compliance Monitoring

- ◆ **GWSs that are providing DEP-approved 4-log virus treatment, either as corrective action or in lieu of conducting triggered or assessment source water monitoring (& future assessment finished water monitoring if applicable) must conduct compliance monitoring**
- ◆ **Compliance monitoring varies depending on...**
 - Technology(ies) used to provide virus treatment
 - Population served
- ◆ **Compliance monitoring for GWSs using chemical disinfection:**
 - Monitor disinfectant residual at DEP-specified location(s) & maintain DEP-specified minimum residual disinfectant concentration(s)
 - DEP determines monitoring location(s) & minimum concentration(s) on WTP-by-WTP basis using CT calculations
 - GWSs serving > 3,300 people monitor disinfectant residual continuously
 - GWSs serving \leq 3,300 people monitor disinfectant residual by taking daily grab sample during peak flow



GWR Compliance Tracks



CONCLUSION

Choosing Ground Water Source Monitoring

◆ Reasons for choosing to conduct ground water source monitoring (instead of choosing to provide DEP-approved 4-log virus treatment & conduct compliance monitoring):

- Routine distribution samples will not be TC+ very often (hopefully)
- Compliance monitoring is burdensome
- 4-log virus treatment & compliance monitoring create opportunity for monitoring violations & TT violations

Only about 11% of PWSs in FL have 1 or more TC+ routine distribution samples during any calendar year.



Choosing Ground Water Source Monitoring (cont'd)

• Types of GWSs that probably should choose to conduct ground water source monitoring (instead of choosing to provide DEP-approved 4-log virus treatment & conduct compliance monitoring):

- GWSs serving $\leq 4,900$ people & serving no consecutive systems
- GWSs serving $> 4,900$ people but serving no consecutive systems & using few wells

About 95% of GWSs in FL are in this category.



Ways to Minimize Ground Water Source Monitoring

◆ Collect all TCR routine distribution samples & assessment source water samples on same day if serving $\leq 4,900$ people

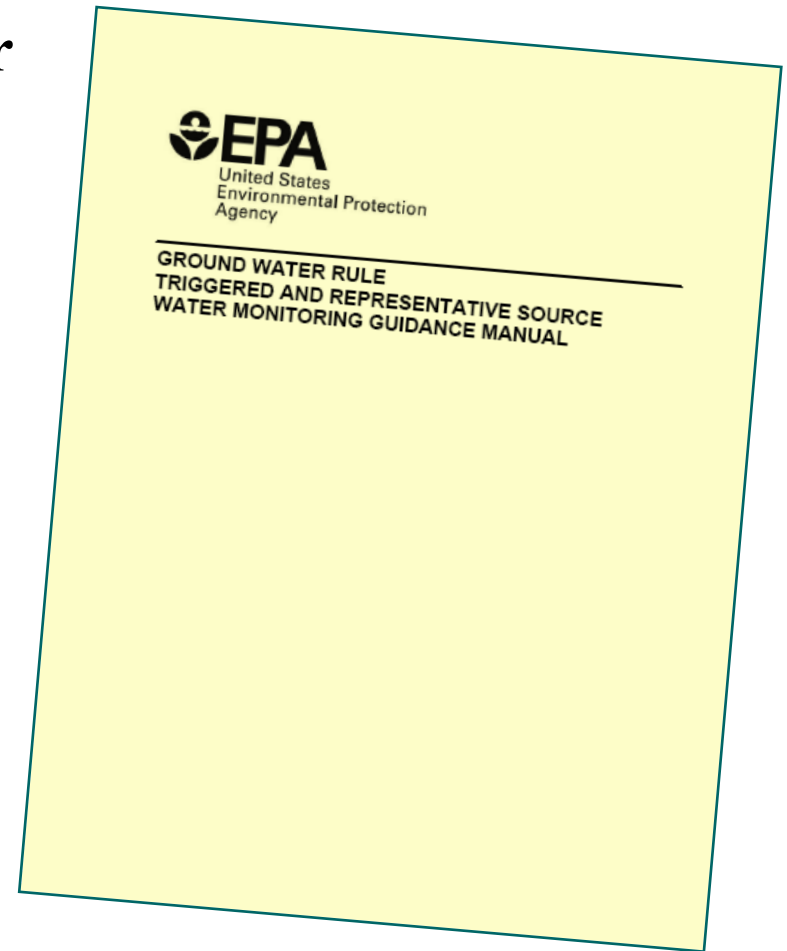


- GWSs serving $\leq 4,900$ people may collect all their TCR routine distribution samples on same day per FAC Rule 62-550.518(4)
- GWSs serving $\leq 4,900$ people should collect all their TCR routine distribution samples **& assessment source water sample(s)** on same day
 - Then, if 1 distribution sample is TC+, assessment source water sample(s) already collected also may be used as triggered source water sample(s)
 - However...
 - If > 1 distribution sample is TC+, GWS will have to collect additional triggered source water sample(s) within 24 hours so that, for each TC+ distribution sample, there is at least 1 triggered source water sample from each well in use at time TC+ distribution sample was collected
 - If any assessment or triggered source water sample is FI+, GWS will have to take 5 additional samples from same source within 24 hours



Ways to Minimize Ground Water Source Monitoring (cont'd)

- ◆ Obtain DEP approval of triggered or assessment source water monitoring plan for representative triggered or assessment source water sampling



Choosing 4-Log Virus Treatment & Compliance Monitoring

◆ Reasons for choosing to provide DEP-approved 4-log virus treatment & conduct compliance monitoring (instead of choosing to conduct ground water source monitoring):



- Avoid complications of triggered source water monitoring for wholesale GWSs serving consecutive GWSs
 - Frequency of triggered source water monitoring for wholesale GWSs could depend on consecutive GWS management practices
- Avoid complications of triggered source water monitoring for GWSs using many wells
 - Determining which wells were in use at time TC+ routine distribution sample was collected could be difficult
 - Justifying **representative** triggered source water sampling could be difficult



Choosing 4-Log Virus Treatment & Compliance Monitoring (cont'd)

- **Types of GWSs that might want to choose to provide DEP-approved 4-log virus treatment & conduct compliance monitoring (instead of choosing to conduct ground water source monitoring):**

- Wholesale GWSs serving consecutive GWSs
- GWSs using many wells

There are only 200 - 300 GWSs in FL that are in 1 or both of these categories.



QUESTIONS?



CONCLUSION

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FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

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