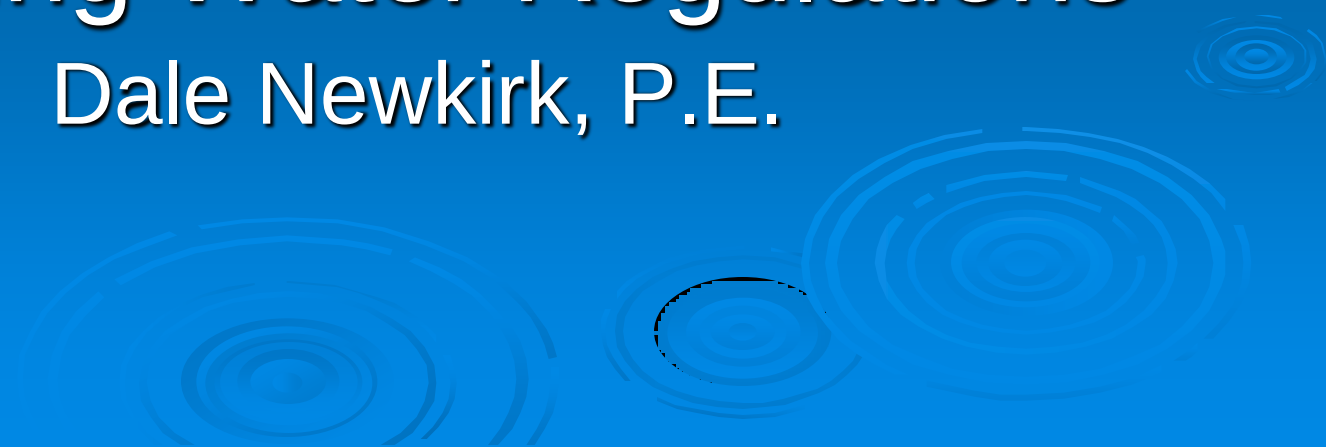


California Department of Public Health Webcast

Evaluation and Design of Small Water Systems

Drinking Water Regulations

Dale Newkirk, P.E.

The background of the slide is a solid blue color. In the bottom right corner, there are several concentric white circles of varying sizes, resembling ripples in water. These ripples are positioned in the lower right quadrant of the slide, with one set of ripples being the most prominent and largest.

Lecture Objectives

- To learn about the regulations and rules affecting SWSs on the Federal and State levels

An Overview of the Regulations

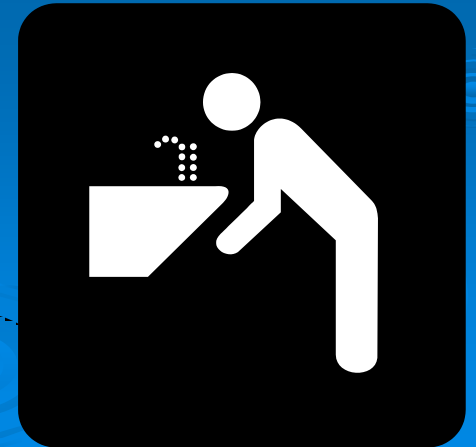


Safe Drinking Water Act

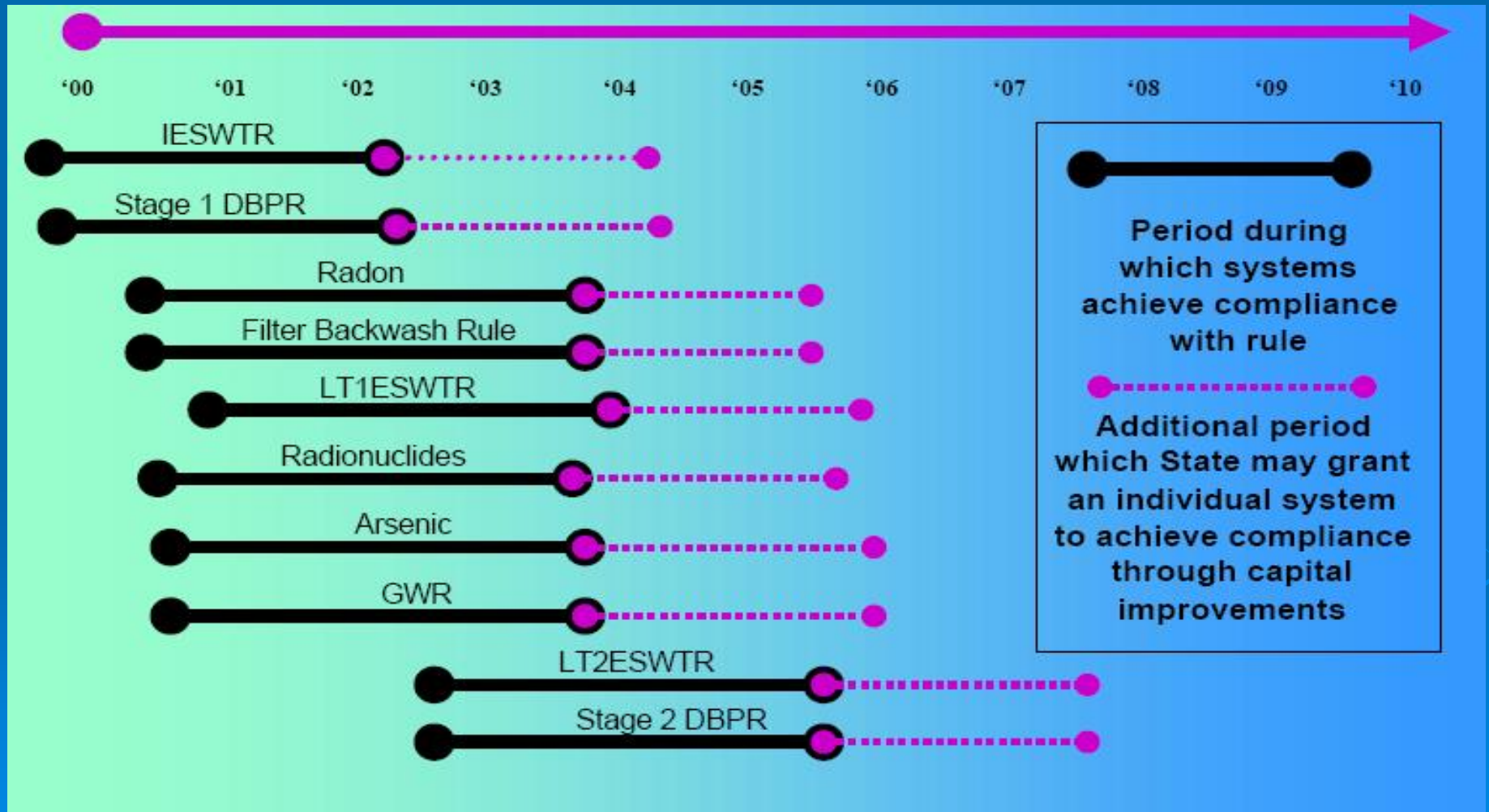
- Enacted In 1974 and amended in 1986 and 1996
- Is the foundation which lays the ground work for determining, regulating, and enforcing MCLs, MCLG, DBPs, TT, etc...
- This is a national regulation which states are expected to achieve at a minimum

Purpose of Requirements

- Determine if water quality is acceptable
- Monitoring depends on classification
- Primaries vs. Secondary
- Acute vs. chronic exposure
- Notify health dept. and users of any MCL exceedance



Timeline for Implementation of Regulations by PWS

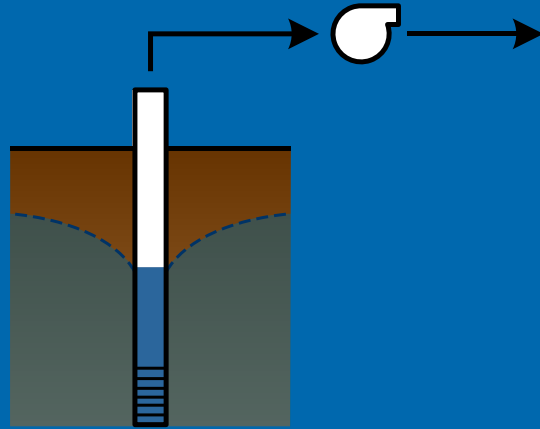


Schedule of Recently Adopted Regulations

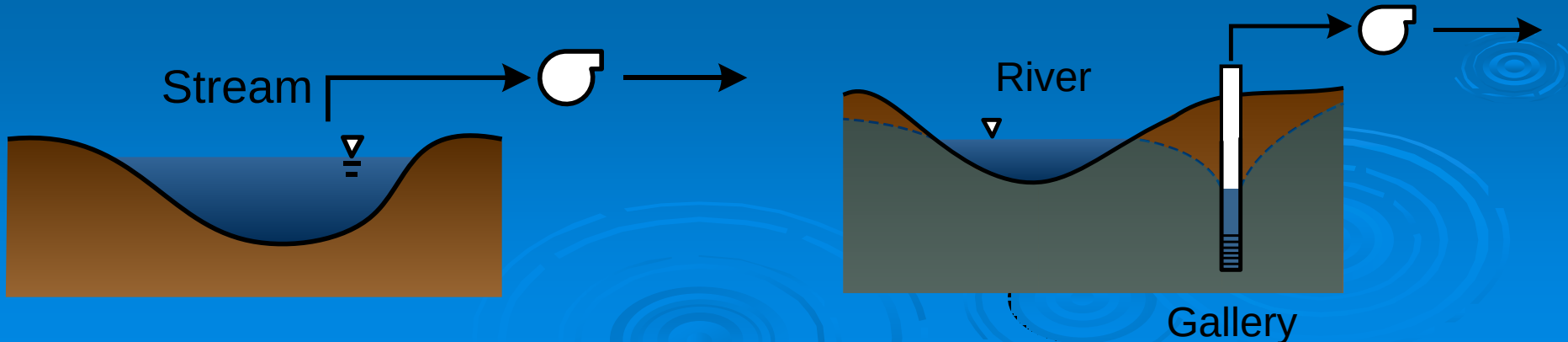
Regulation	Date Effective
Arsenic Rule	January 23, 2006
Public Notification	September 1, 2006
Secondary Maximum Contaminant Levels	September 27, 2006 (in California)
Primary Maximum Contaminant Level for Perchlorate	October 18, 2007 (in California)
Interim Enhanced Surface Water Treatment Rule	January 12, 2008 (in California)
California Code of Regulations Title 22: Waterworks Standards	March 9, 2008

Types of Source Water

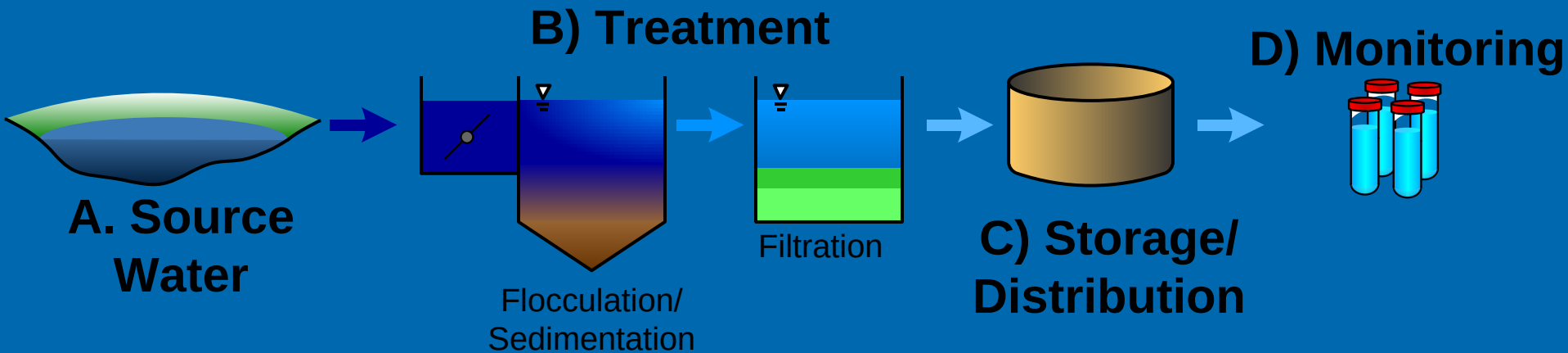
➤ Ground Water



➤ Surface Water and Ground Water under the Influence of Surface Water



Multi-Barrier Approach



California Drinking Water Regulations

- State of California has Primacy to regulate and monitor the PWS within its State
- Can be more stringent than federal regulations, however not less stringent (California tends to be more stringent)
- **Title 22 - California Code of Regulations**
- To learn the EPA regulations alone is not enough!

Regulations Affecting SWSs

Regulations	Summary	Systems Affected
Microbiological TC rule	Coliform MCL	All types and sizes
Volatile Organic Chemicals	MCLs	All CWSs and NTNCWs
Radionuclide	MCLs	All types and sizes
Radon	MCLs	All types and sizes
Inorganic Chemicals	MCLs	All CWSs and NTNCWs; transient systems exempt except for nitrates, nitrites
Total Coliform Rule	No more than 5% of samples positive for Coliform; Distribution system sampling	All types and sizes
Consumer Confidence Report	Annual summary of water quality and exceptions to consumer	All CWSs and NTNCWs
Public Notification Requirements	Notify public of tiered violations	All PWS

Regulations Affecting SWSs

Regulations	Summary	Systems Affected
Surface Water Treatment Rule	3 Log (99.9%) removal of Giardia, 4 Log (99.99%) virus inactivation Filtration treatment specified	All surface water and ground water under the direct influence of surface water
Lead and Copper Rule	Distribution System Action Levels	All CWSs and NTNCWs
Arsenic	MCLs	All CWSs and NTNCWs
Ground Water Rule	Appropriate use of disinfectants, multi-barrier approach	All systems using ground water as source
Long Term 1 Enhanced Surface Water	2 Log removal (99%) of Cryptosporidium, 0.3 NTU for Turbidity; TOC reductions for precursor removal	All surface water and ground water under the direct influence of surface water

Regulations Affecting SWSs

Regulations	Summary	Systems Affected
Filter Backwash Rule	Recycling filter backwash with treatment	All conventional (flocculation/coagulation/sedimentation) and direct filtration systems
Stage 1 Disinfectants/disinfection By-Products Rule (D/DBP)	Reduction in DBP MCL and maximum residual disinfectants levels set	CWSs and NTNCWSs that use a chemical disinfectant
Long Term 2 Enhanced Surface Water Rule and Stage 2 D/DBP Rules	To be enacted together to balance microbial and DBP formation; Possible lowering of current MCLs and distribution system requirements	All types and sizes
Contaminate Candidate List (CCL)	Possible new MCLs	All types and sizes

General Monitoring Frequency for SWSs

Contaminate	Minimum Monitoring Frequency
Acute Contaminates - Immediate risk to Human Health	
Bacteria	Monthly or quarterly depending on system size and type
Nitrate	Annually
Protozoa/viruses	
Chronic Contaminates - Long-term health effects	
Volatile organics	GWS - quarterly for the first year, annually for the 2 and 3, after that depending on results; SW annually
Synthetic organics	Larger systems twice in 3 years; smaller systems once in 3 years
Inorganics/metals	GWS - once every 3 years; SW systems annually
Lead and Copper	annually
Radionuclide	once every 4 years

Description of Important Rules



Arsenic Rule: Background

- Rule proposed June 22, 2000
- Final Rule Published in January 2001
- Effective January 23, 2006
- Goal
 - Establish an updated regulation to protect the public from health risks caused by arsenic in drinking water
- Applies to CWS and NTNCs



Arsenic Rule: Key points

- MCLG = 0 $\mu\text{g/L}$
- Feasible MCL = 3 $\mu\text{g/L}$
- Final Rule MCL = 10 $\mu\text{g/L}$
 - MCL was adjusted upwards to where the cost is justified by the benefits
- Best Available Technology
- Compliance Monitoring and Reporting

Arsenic Rule: Monitoring Compliance

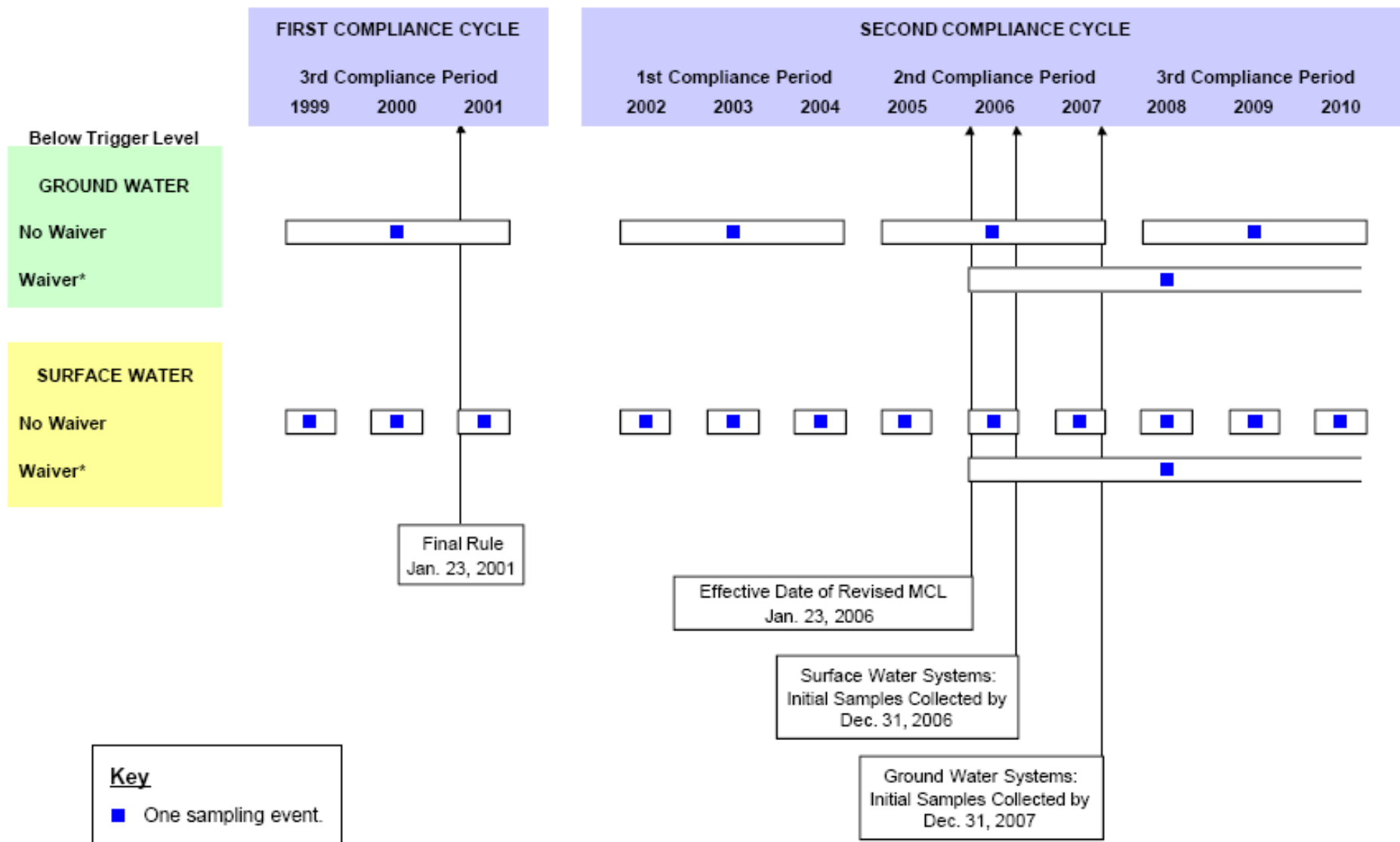
➤ Initial Monitoring

- One sample must be collected after effective date of new rule (January 23, 2006)

➤ Monitoring

- If initial monitoring results is $<10 \mu\text{g/L}$
 - Ground water system must collect one sample every 3 years
 - Surface water systems must collect annual samples
- If initial monitoring result is $>10 \mu\text{g/L}$
 - System must collect quarterly samples until the systems is reliably and consistently below MCL

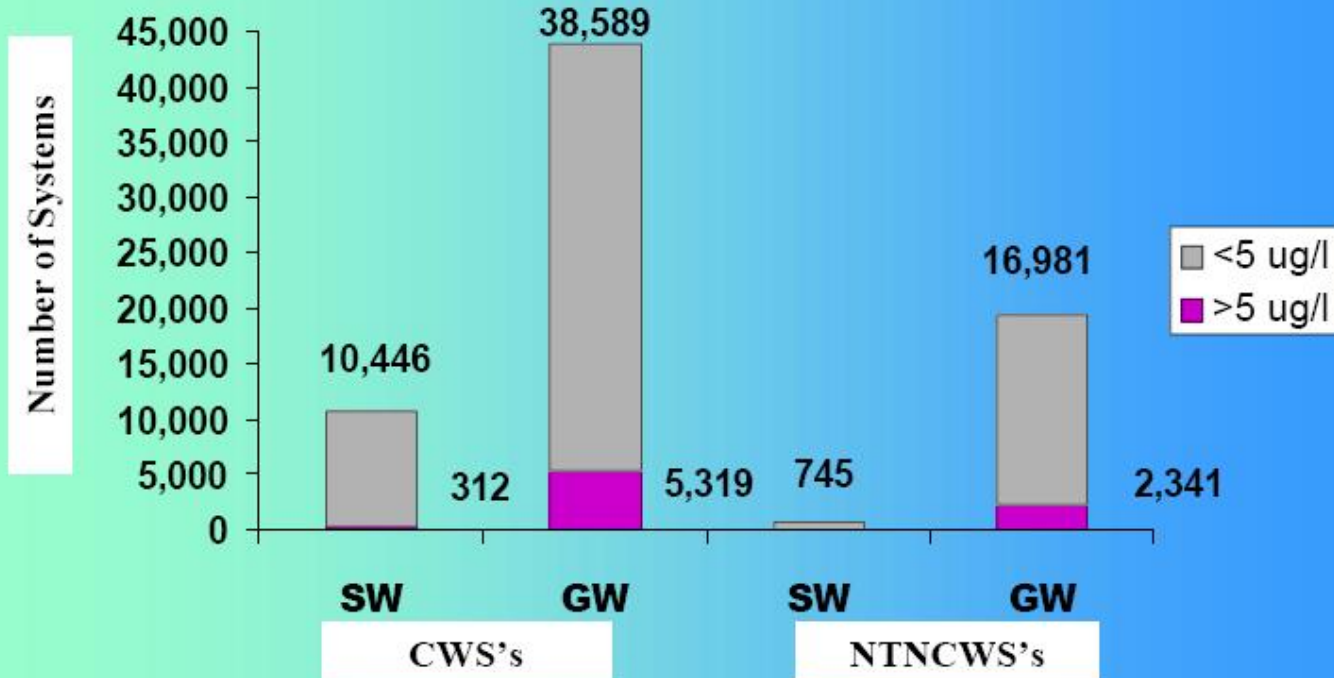
Applicability of the Standardized Monitoring Framework to Arsenic



*Waivers are not permitted under the current arsenic requirements. States may issue 9 year monitoring waivers under the revised final arsenic rule. To be eligible for a waiver, surface water systems must have monitored annually for at least 3 years. Ground water systems must conduct a minimum of 3 rounds of monitoring with detection limits below 10 µg/L.

Arsenic in U.S.

Proposed Arsenic Rule - System Impacts



Lead and Copper Rule: Background

- Final Rule Published in January 1991
- Goal
 - Protect public health by minimizing Pb and Cu levels in drinking water, primarily by reducing water corrosivity. Pb and Cu enter drinking water from corrosion of plumbing materials
- Applies to All CWSs and NTNCWs
- TT based on Action Levels



Lead and Copper Rule: Monitoring

- Samples must be collected by all CWSs & NTNCWSs at cold water taps in homes/buildings that are at high risk of Pb/Cu contamination

Pb and Cu Tap and WQP Tap Monitoring					
Size	Population	Number of Pb/Cu Tap Sample Sites		Number of WQP Tap Sampling Sites	
		Standard	Reduced	Standard	Reduced
Large	>100 K	100	50	25	10
	50,001 - 100K	60	30	10	7
Medium	10,001 - 50 K	60	30	10	7
	3,301 - 10K	40	20	3	3
Small	501 - 3,300	20	10	2	2
	101 - 500	10	5	1	1
	≤ 100	5	5	1	1

Lead and Copper Rule: Monitoring Frequency

<u>Frequency</u>	<u>Criteria for Reduced Pb/Cu Monitoring Frequency</u>
Bi-annually	N/A
Annual	Serves $\leq 50,000$ and is $\leq$ both ALs for 2 consecutive 6 month monitoring periods OR Meets Optimal Water Quality Parameter (OWQP) specifications for 2 consecutive 6 month monitoring periods
Triennial	Serves $\leq 50,000$ and is $\leq$ both ALs for 3 consecutive years of monitoring OR Meets Optimal Water Quality Parameter (OWQP) specifications for 3 consecutive years of monitoring OR Has 90th percentile Pb levels ≤ 0.005 mg/L & 90th percentile Cu levels ≤ 0.65 mg/L for 2 consecutive 6 month periods OR Meets monitoring waiver criteria
Every 9 years	Serves $\leq 3,300$ and meets monitoring waiver criteria

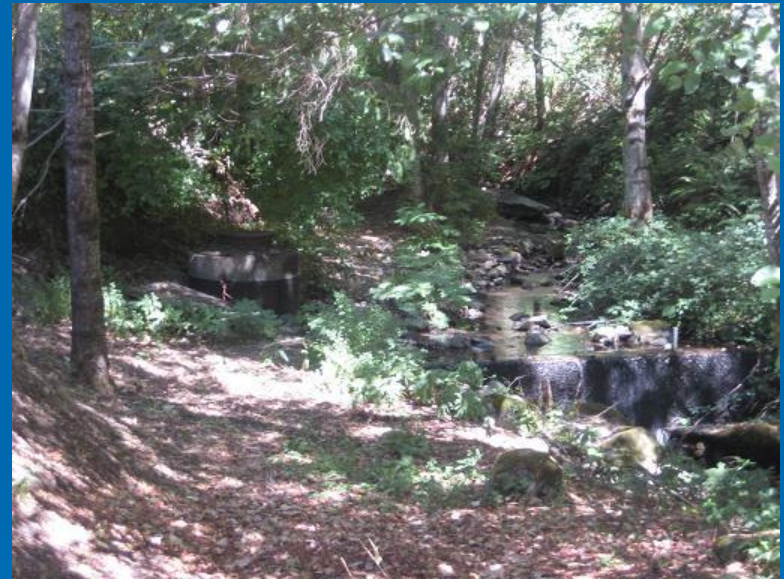
Lead and Copper Sampling

- Choose tap typically used for consumption
- Flush line
- Let water sit undisturbed for minimum 6 hrs
- Sample first draw



Surface Water Treatment Rule: Background

- Proposed on June 22, 2000
- Final Rule Published in January 2001
- Goal
 - Improves public health protection through the control of microbial contaminants, particularly viruses, *Giardia*, and *Cryptosporidium*
- Applies to all public water systems (PWSs) using surface water or ground water under the direct influence of surface water (GWUDI)
- IESWTR and LT1ESWTR build on the existing requirements established in the original SWTR



Surface Water Treatment Rule

		SWTR 1999	IESWTR 1998	LT1ESWT R 2002	FBRR 2001
Population Served	≥ 10,000	X	X		X
	< 10,000	X	Sanitary Survey Provisions only	X	X
Regulated Pathogen	99.99% (4 log) removal of viruses	X	SWTR	SWTR	SWTR
	99.9% (3 log) removal of Giardia Lamblia	X	SWTR	SWTR	SWTR
	99% (2 log) removal of Cryptosporidium		X	X	IESWTR LT1ESWTR

Surface Water Treatment Rule

		SWTR 1999	IESWTR 1998	LT1ESWTR 2002	FBRR 2001
Residual Disinfectant Requirements	Distribution System Inlet (≥ 0.2 mg/L)	X	SWTR	SWTR	
	Distribution System	X	SWTR	SWTR	
Turbidity	Combined Filter Effluent	X	X	X	
	Individual Filter Effluent		X	X	
Disinfection Profiling & Benchmarking			X	X	
Sanitary Surveys	CWS: Every 3 years NCWS: Every 5 years		X	IESWTR	
Covered Finished Water Storage			X	X	
Operated by Qualified Personnel		X	SWTR	SWTR	SWTR

Surface Water Treatment Rule

Turbidity: Monitoring and Reporting Requirements (due each month)	Monitoring Frequency	SWTR (1993)	LT1ESWTR (2005)
CFE 95%	At least every 4 hours*	≤ 0.5 NTU	≤ 0.3 NTU
CFE Max Value	At least every 4 hours*	5 NTU	1 NTU
IFE Monitoring	Monitor continuously every 15 minutes	None	Monitor-exceedance require follow-up action. Systems with 2 or fewer filters may monitor CFE continuously in lieu of IFE.

* Monitoring frequency may be reduced by the state to once per day for system serving less 500 people

Surface Water Treatment Rule

IFE Follow-Up and Reporting Requirements (Jan. 1, 2005)

LT1ESTR (<10,000)

Condition	Action	Report	By
2 Consecutive recordings > 1.0 NTU taken 15 mins apart	Report to State	Filter Turbidity value Date Cause	30 days
2 consecutives recordings > 1.0 NTU taken 15 mins apart at the same filter for 3 months in a row	Report to State and conduct a filter self-assessment with 14 days	Date filter self-assessment triggered and completed	30 days to report to state and self-assessment within 14 days
2 consecutive recordings > 2.0 NTU taken 15 mins apart at the same filter for 2 months in a row	Report to State, arrange for CPE and submit CPE report	Date CPE triggered Submit CPE Report	30 days to report to state, 60 days to arrange CPE and 120 days to submit CPE report

Surface Water Treatment Rule

Residual Disinfectant Monitoring and Reporting Requirements

Location	Concentration	Monitoring Frequency	Report (once a month)
Distribution system inlet	Residual disinfectant cannot be < 0.2 mg/L for more than 4 hours	Continuous , but may allow systems serving 3,300 or fewer persons to take grab samples from 1 to 4 times per day	Lowest daily value for each day, date, duration Times when < 0.2 mg/L
Distribution system total coliform sample locations	Residual disinfectant concentration cannot be undetectable in greater than 5% of samples in a month for 2 consecutive months. $\text{HPC} \leq 500/\text{mL}$	Same time as total coliform samples	Number of residual disinfectant or HPC measurement taken in the month resulting in no more than 5% of the measurement as being undetectable in any 2 consecutive months.

Consumer Confidence Report Rule: Background

➤ Goal

- Improves public health protection by providing educational material to allow consumers to make educated decisions regarding any potential health risks pertaining to the quality, treatment, and management of their drinking water supply.

➤ Applies to all CWSs and NTNCWSs

Consumer Confidence Report Rule

➤ Requires annual consumer confidence report

➤ Critical Dates

- July 1 – Deadline for annual distribution of CCR to customers and State agency for report of previous year (Jan. – Dec.)
- October 1 – Deadline for annual submission of proof of distribution to State agency

➤ Small Water System Flexibility

- PWSs with <10,000 people may publish their CCR in a local newspaper
- PWSs with <500 people may provide notice stating the report is available upon request

Consumer Confidence Report Rule

- Mandatory Information in CCR
 - Contact information
 - Source of water
 - Definitions
 - Detected Contaminates
 - Explanation of Violations
 - Explanation of Variance/Exemption
 - Required Education Information

Public Notification Rule

- Requires PWSs to notify the public in the event of contamination violation based on the potential severity of the situation
- Classifies violations into Tiers
 - Tier 1 – 24 hours → Immediate notice
 - Tier 2 – 30 days → As soon as possible
 - Tier 3 – 1 year → Annual notice
- Amends Consumer Confidence Report (CCR) regulations to conform to changes made in public notification regulations

Public Notification Rule:

Breakdown of Tiers 1, 2, and 3

Tier 1	Tier 2	Tier 3
Notice within 24 Hours	Notice within 30 days	Notice within 1 Year
Fecal Coliform Violations	All MCL, MRDL not already covered by Tier 1	Monitoring or testing procedure violations (not covered by Tier 1 or Tier 2)
Nitrate/Nitrite Violations	Monitoring and testing Violations when Tier 2 notice required	Operation under a variance and exemption
MRDL Violations	Failure to comply with variance and exemption conditions	Special Public Notices (i.e. Fluoride SMCL)
Turbidity		
Waterborne disease outbreak		

Total Coliform Rule: Background

- Final Rule Published June 1999
- Goal
 - Improve public health protection by reducing fecal pathogens to minimal levels through control of total coliform bacteria, including fecal coliforms and E. coli.
- Acute public health effect
- Applies to all public water systems (PWSs)

Total Coliform Rule: Sampling

- Total coliform samples must be at sites which are representative of WQ throughout the distribution system
- Samples must be collected at regular times throughout a month **except** for GWSs serving $\leq 4,900$ persons may collect them on the same day
- Reduced monitoring may be available for PWSs serving $\leq 1,000$ and using GW

California Minimum # of Routine Total Coliform Samples

Monthly Population Served	Service Connections	Minimum Number of Samples
25 to 1000	15 to 400	1 per month
1,001 to 2,500	401 to 890	2 per month
2,501 to 3,300	891 to 1,180	3 per month

Total Coliform Rule: Sampling

- If a **routine** sample is **POSITIVE** then
 - One **repeat** sample must be collected from source again
 - One **repeat** sample must be collected within five service connections upstream and downstream
- Systems that collect ≤ 1 sample/month must collect a 4th **repeat** sample
- If any repeat sample is **POSITIVE**
 - The system must analyze the total coliform positive culture for fecal coliforms or E.coli.
 - The system must collect another set of **repeat** samples unless the MCL has been violated and the system has notified the state.
- A **POSITIVE routine** or repeat result requires a minimum of 5 routine samples be collected next month

Total Coliform Rule: Sampling

- If any repeat sample is **POSITIVE**
 - The system must analyze the total coliform positive culture for fecal coliforms or E.coli.
 - The system must collect another set of **repeat** samples unless the MCL has been violated and the system has notified the state.
- A **POSITIVE routine** or repeat result requires a minimum of 5 routine samples be collected next month

Any of the following criteria shall indicate a possible **significant rise** in bacterial count:

- A system collecting at least 40 samples per month has a total coliform-positive routine sample followed by two total coliform-positive repeat samples in the repeat sample set;
- A system has a sample which is positive for fecal coliform or E. coli;
- A system fails the total coliform MCL

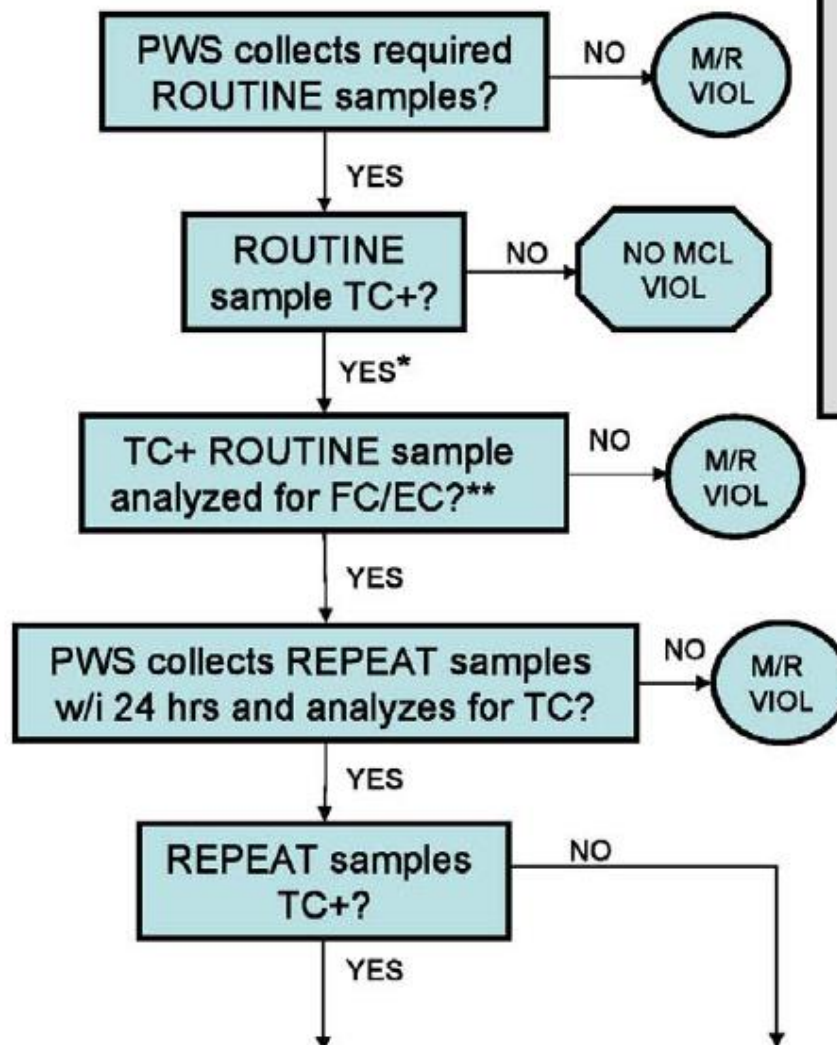
Definitions:

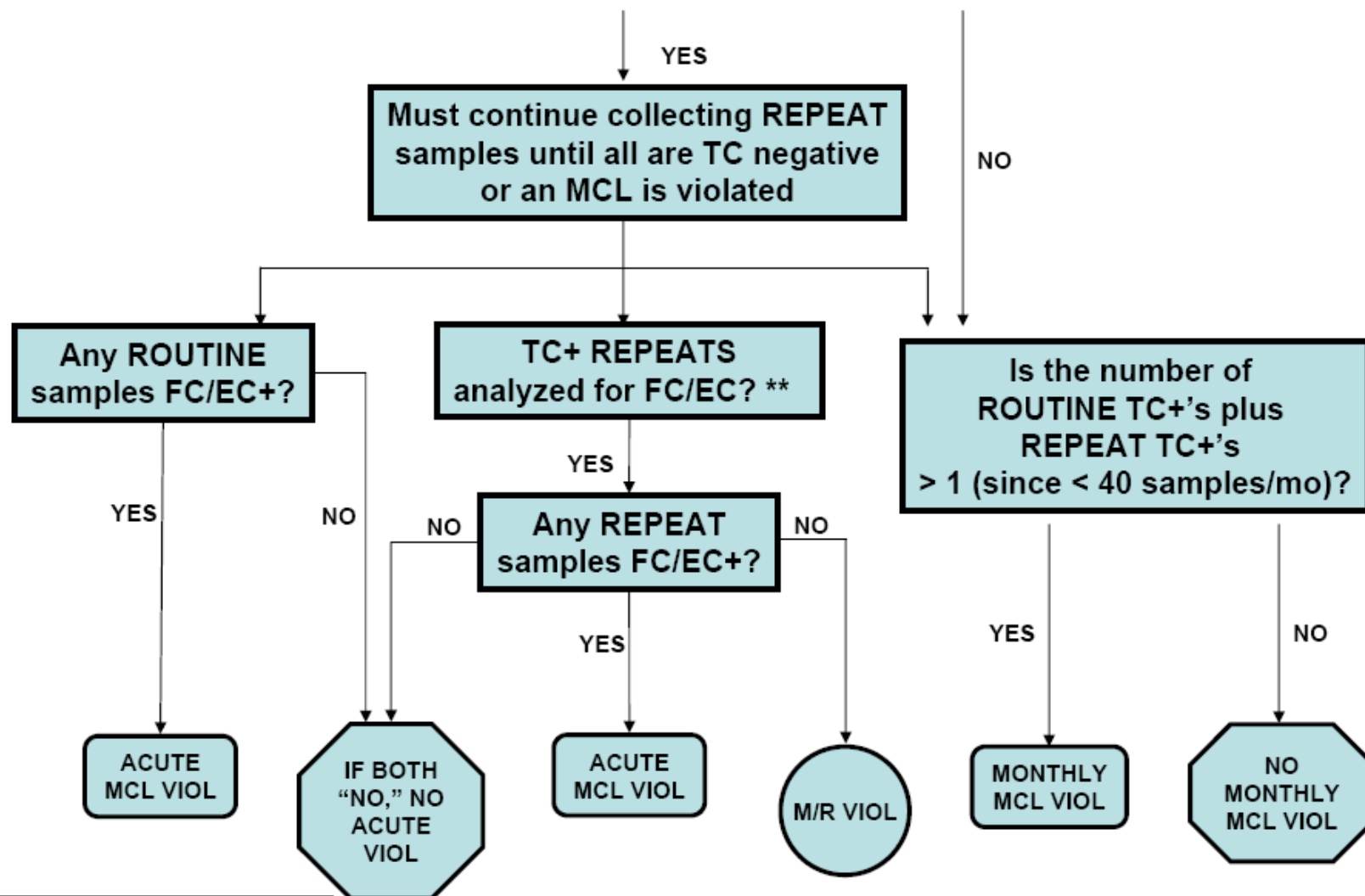
PWS= Public Water System
TC= Total Coliform
TC+ = Total Coliform Positive
FC= Fecal Coliforms
EC = *E. Coli*
M/R= Monitoring/Reporting
MCL= Maximum Contaminant Level
VIOL= Violation

Footnotes:

*Must collect 5 ROUTINE samples next month, even if on quarterly monitoring. Failure to collect 5 ROUTINE samples the next month is an M/R violation.

**May forego FC/EC testing if system follows-through as if the sample was positive for either one.





Reminder: Sample collection and transport must enable the laboratory to begin analysis within 30 hrs of collection.

NOTE: This table is for information only and is not intended to be a substitute for federal or state regulations.

Total Coliform Rule: California Specific Regulation

From §64426. Significant Rise in Bacterial Count the CA regulation states,

When the coliform levels specified in subsection (a) are reached or exceeded, the water supplier shall:

- Contact the Department by the end of the day on which the system is notified of the test result or the system determines that it has exceeded the MCL, unless the notification or determination occurs after the Department office is closed, in which case the supplier shall notify the Department within 24 hours; and
- Submit to the Department information on the current status of physical works and operating procedures which may have caused the elevated bacteriological findings, or any information on community illness suspected of being waterborne.

Total Coliform Rule: Violations

A Monthly MCL Violation is Triggered if:

A system collecting fewer than 40 samples per month...	Has greater than 1 ROUTINE/REPEAT samples per month which is total coliform-positive
A system collecting at least 40 samples per month...	Has greater than 5.0% percent of the ROUTINE/REPEAT SAMPLES in a month total coliform-positive

An Acute MCL Violation is Triggered if:

Any public water system....	Has any fecal coliform or E. coli-positive REPEAT sample OR has a fecal coliform or E. coli-positive sample followed by total coliform-positive REPEAT sample
-----------------------------	--

Total Coliform Rule: Other Requirements

- Systems collecting fewer than 5 **routine** samples/month
 - Must have a sanitary survey every 5 years
 - 10 years if it is a NCWS using GW

- Systems using SW or GWUDI
 - Must collect and have analyzed one coliform sample each day the turbidity of the source water exceeds 1 NTU.

Stage 1 DBP Rule: Background

- Final Rule Published December 1998
- Goal
 - Improve public health protection by reducing exposure to disinfection byproducts
- Applies to all CWSs and NTNCWs that add a disinfectant to the drinking water during any part of the treatment process and TNCWSs that use chlorine dioxide (ClO_2)

Stage 1 DBP Rule: Regulations

Contaminant	MCL (mg/L)	MCLG (mg/L)
Total Trihalomethanes (TTHM)	0.08	N/A
Five Haloacetic Acids (HAA5)	0.06	N/A
Bromate (plants that use ozone)	0.01	0
Chlorite (plants that use ClO_2)	1.0	0.8

Disinfectant	MRDL (mg/L)	MRDLG (mg/L)
Chlorine	4.0 as Cl_2	4.0 as Cl_2
Chloramine	4.0 as Cl_2	4.0 as Cl_2
Chlorine dioxide	0.8	0.8

Stage 1 DBP Rule

Required % Removal of TOC			
Source Water TOC (mg/L)	Source Water Alkalinity (mg/L as CaCO ₃)		
	0 - 60	> 60 - 120	> 120
> 2.0 to 4.0	35.0%	25.0%	15.0%
> 4.0 to 8.0	45.0%	35.0%	25.0%
> 8.0	50.0%	40.0%	30.0%

Stage 1 DBP Rule: Monitoring

Regulation	Regulation Coverage	Monitoring Frequency	Compliance
TTHM/HAA5	SW and GWUDI serving 500-9,999	1/plant/quarter	Running annual average
	SW and GWUDI serving <500	1/plant/year in month of warmest water temperature	Running annual average of increased monitoring
	GW serving <10,000	1/plant/year in month of warmest water temperature	Running annual average of increased monitoring
Bromate	Ozone plants	Monthly	Running annual average
Chlorite	Chlorine dioxide plants	Daily at distribution system entrance; monthly in distribution system	Daily/follow-up monitoring
Chlorine dioxide	Chlorine dioxide plants	Daily at distribution system entrance	Daily/follow-up monitoring
Chlorine/Chloramines	All systems	Same location and frequency as TCR sampling	Running annual average
DBP Precursors	Conventional filtration	Monthly for TOC and alkalinity	Running annual average

Radionuclides Rule: Background

- Final Rule Published December 2000
- Goal
 - Protect the public against the harmful effects of radionuclides in drinking water
- Applies to CWSs and NTNCWSs

Radionuclide Maximum Contaminant Levels (MCLs)

Radionuclide	MCL	DLR
Radium-226	5 pCi/L (combined radium-226 & -228)	1 pCi/L
Radium-228		1 pCi/L
Gross Alpha particle activity (excluding radon and uranium)	15 pCi/L	3 pCi/L
Uranium	20 pCi/L	1 pCi/L

Radiological Compounds

Regulated Contaminates			
Regulated Radionuclide	USEPA		CDPH
	MCL	MCLG	MCL
Beta/photon emitters	4 mrem/yr	0	4 mrem/yr
Gross alpha particle	15 pCi/L	0	5 pCi/L
Combined Radium (226/228)	5 pCi/L	0	5 pCi/L
Uranium	30 µg/L	0	20 µg/L

RADIOLOGICAL COMPOUNDS

cont.

➤ New rule-Initial compliance

- Four quarterly samples – collect 1 gallon each
 - Analyze samples for gross alpha first.
 - If $GA > 5$ pCi/L, analyze for uranium.
 - If the $GA - \text{uranium} > 5$ pCi/L, analyze for rad-226.
 - If the $\text{rad-226} > 3$ pCi/L, analyze for rad-228.
 - Can analyze Rad 226 + 228 combo, but all community ws must analyze 4 quarterly samples for Radium-228 by Dec. 2007
 - MCLs (pCi/L) : $GA=15$ Uranium=20 Rad 226+228=5

RADIOLOGICAL COMPOUNDS

cont.

➤ New rule-Initial compliance

- Based on average of 4 consecutive quarterly samples.
 - If required to analyze for uranium and/or radium, need four consecutive quarters
 - Can use data back to 2001
- Dept. may waive final 2 quarters if results from the first 2 quarters are below the DLR.
- Worksheet available

RADIOLOGICAL COMPOUNDS

cont.

➤ New Rule - Reduced monitoring

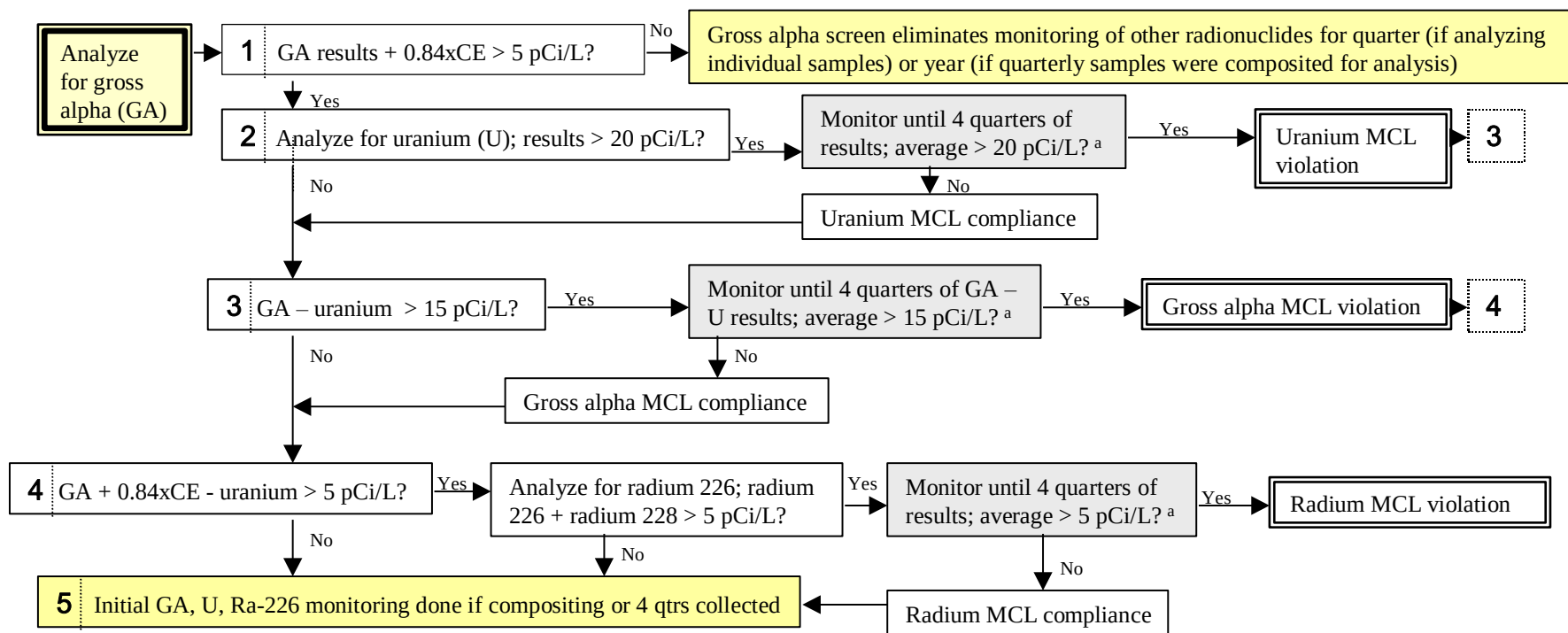
- Based on the average of initial 4 quarterly samples. Sample during quarter w/highest result.
 - One sample every 9 years if:
 - average < 3 pCi/L
 - One sample every 6 years if:
 - $3 \text{ pCi/L} \leq \text{average} \leq 7.5 \text{ pCi/L}$
 - One sample every 3 years if:
 - $7.5 \text{ pCi/L} < \text{average} \leq 15 \text{ pCi/L}$
 - Quarterly if:
 - average $> 15 \text{ pCi/L}$.

INITIAL California Drinking Water Radionuclide Monitoring under New Regulations (Alpha Emitters)

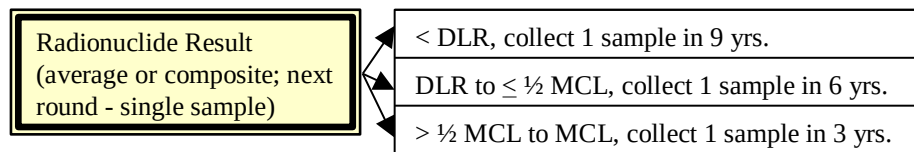
Systems must complete by 12/31/07

Initial Monitoring and MCL compliance determination flow chart

- Community water systems must collect and analyze 4 quarters of radium-228 samples by December 31, 2007
- For required radionuclides, each system must collect and analyze 4 individual quarterly samples OR, if approved by Department, collect 4 quarters, composite and analyze; if a composited result is $> \frac{1}{2}$ MCL, at least 1 additional quarterly sample must be collected and analyzed. If approved by the Department, historical data (from 1/1/01-12/31/04) may be used to satisfy the initial monitoring.
- If analyzing quarterly samples individually and the first 2 samples are $<$ DLR for a radionuclide, no more samples are required for that radionuclide.



Monitoring Frequency based on Initial or Historical Monitoring Results



Radionuclide	DLR	MCL
Gross Alpha	3 pCi/L	15 pCi/L
Uranium	1 pCi/L	20 pCi/L
Ra 226, Ra 228	1 pCi/L ea	5 pCi/L total

^a If compositing, compliance is based on composite result

NOTES: Use same # of significant figures as MCLs; CE= counting error

Ground Water Rule: Background

- Final Rule Published in Fall 2000
- Goal
 - Establish a targeted strategy to identify ground water systems susceptible to microbial contamination
 - Establish a protective barrier to prevent microbial illness in ground water system



Ground Water Rule: Requirements

- Sanitary Surveys by State to identify significant deficiencies
- Corrective Action
- Compliance Monitoring for systems that disinfect
- For systems that **DO NOT** disinfect
 - Hydrogeologic sensitivity assessments
 - Source water monitoring from sensitive aquifers or by systems that have detected fecal indicators in the distribution system

Long Term 1 Enhanced Surface Water Treatment Rule: Background

- Final Rule Published in January 2002
- Goal
 - Improve public health protection through the control of microbial contaminants, particularly *Cryptosporidium*.
 - Prevent Significant increases in microbial risk that might otherwise occur when systems implement the Stage 1 D/DBP Rule
- Applies to all PWSs that serve surface water or GWUDI to <10,000 people

LT1ESWTR: Requirements

- 2-log Crypto. removal
 - Treatment Technique based
- Changes to Conventional/Direct Filtration
 - Lower turbidity performance standard
 - 0.3 NTU in 95% & never exceed 1 NTU
 - Continuous turbidity of individual filters
 - Disinfection profiles
 - Giardia inactivation is the benchmark
- Slow sand filtration must meet 1 NTU in 95% of samples
- New finished water reservoirs need covers

LT1ESWTR: Requirements

➤ Turbidity requirement

- Perform turbidity measurement of CFE at least one every 4 hours
- Continuous on-line measurement of IFE unless two or fewer filters
- Follow up actions required if IFE has two readings > 1 NTU

➤ Disinfection Benchmarking

- Conduct one year of calculation for weekly removal of *Giardia* *Lambli*a
- Calculate virus removal if disinfectant used is other than chlorine
- Results must be available for LPA to review during sanitary survey
- Can not change disinfection practices without LPA approval

Filter Backwash Recycling Rule (FBR): Background

- Final Rule Published June 2001
- Goal
 - Improved public health protection by assessing and changing where needed, recycle practices for improved contaminant control, particularly microbial contaminants
- Application
 - Applies to public water systems that use surface water or ground water under the direct influence of surface water

FBR: Key Terms

➤ Spent Filter Backwash Water

- A stream containing particles that are dislodged from filter media when water is forced back through a filter to clean the filter

➤ Thickener Supernatant

- A stream containing the decant from a sedimentation basin, clarifier or other unit that is used to treat water, solids, semi-solids from the primary treatment processes

➤ Liquids from Dewatering Processes

- A stream containing liquids generated from a unit used to concentrate solids for disposal

FBR: Requirements

- Recycle stream returned to the point of primary coagulant addition (State may modify)
- Direct filtration systems must provide information to State
- One-month, one-time recycle self assessment for certain systems



Stage 2 D/DBP Rule: Background

- Final Rule Published January 2006
- Goal
 - To increase public health protection by reducing the potential risk of adverse health effects associated with DBPs through the distribution system.
- Applies to all PWS that either add a primary or residual disinfectant other than Ultra Violet Light

Stage 2 D/DBP Rule

Stage 2 DBPR Regulated Contaminants

Regulated Contaminants		MCLG (mg/L)	MCL (mg/L)
Total Trihalomethanes (TTHM)			0.080 LRAA
	Chloroform	0.07	
	Bromodichloromethane	zero	
	Dibromochloromethane	0.06	
	Bromoform	zero	
Five Haloacetic Acids (HAA5)			0.060 LRAA
	Monochloroacetic acid	0.07	
	Dichloroacetic acid	zero	
	Trichloroacetic acid	0.02	
	Bromoacetic acid	-	
	Dibromoacetic acid	-	

Stage 2 D/DBP Rule: Monitoring

Source Water Type	Population Size Category	Monitoring Frequency	Total Distribution System Monitoring Locations per Monitoring Period
SW/GWUDI	<500	per year	2
SW/GWUDI	500-3,300	per quarter	2
SW/GWUDI	3,301-9,999	per quarter	2
GW	<500	per year	2
GW	501-9,999	per year	2

ASBESTOS Rule: Background

➤ Applies to CWSs/NTNCWSs only

➤ Sample every 9 years

- Source
- Distribution system

➤ Sources of asbestos

- Source-serpentine formations
 - All SW vulnerable
- Distribution system-AC/transite pipe

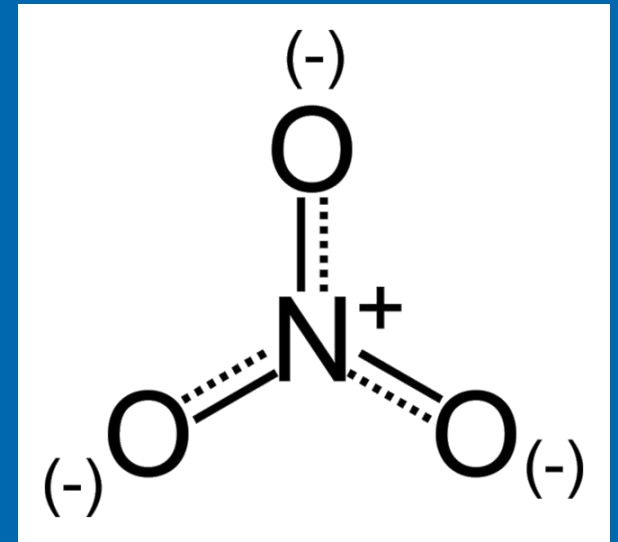


ASBESTOS Rule

- New Federal standard = 7 million fibers/liter (longer than 10 micrometers)
 - Takes effect January 2006
 - Compliance based on average 4 quarterly samples
 - Can grandfather data, but no average
- State still needs to adopt a new standard
- Treatment issues
- Waivers available to non-vulnerable systems
 - Apply to Health Dept.

NITRATES: Key Points

- Acute health effects
- May increase over time
- Sources of contamination
- MCL = 45 ppm as NO_3
- All water system classifications must test annually
- Nitrites/Nitrate+Nitrite = every 3 years



NITRATES: Key Points

- $\frac{1}{2}$ of MCL = quarterly monitoring
- Confirmation Sampling
 - Resample w/in 24 hrs and average them, or
 - Notify users and resample w/in 2 weeks
- Resolving nitrate contamination

Primary Inorganics: Key Points



- Chronic health effects (except nitrate)
- CWSs/NTNCWSs must comply with all constituents
- TNCs must test for Fluoride (F) only
- GW-Sample every 3 years
- SW-Sample every year
- Increased levels = increase sampling
- Compliance based on annual average of 4 quarterly samples



Maximum Contaminant Levels of Inorganic Chemicals

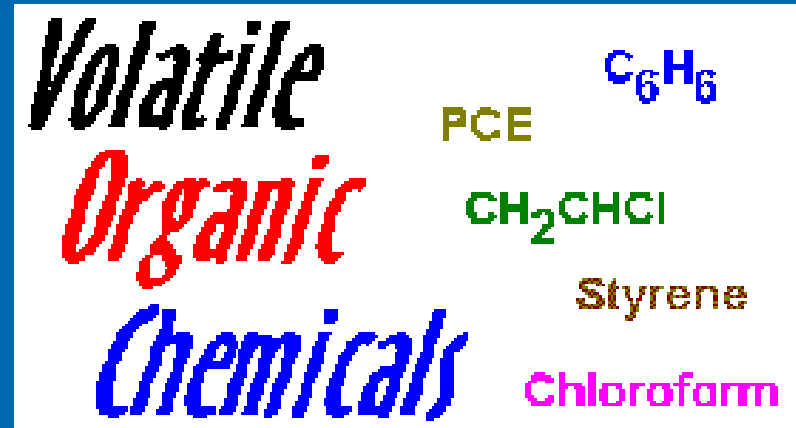
Chemical	Maximum Contaminant Level (mg/L)	Chemical	Maximum Contaminant Level (mg/L)
Aluminum	1	Fluoride	2
Antimony	0.006	Mercury	0.002
Arsenic	0.05	Nickel	0.1
Asbestos	7 MFL*	Nitrate (as NO ₃)	45
Barium	1	Nitrate+Nitrite (sum N ₂)	10
Beryllium	0.004	Nitrite (as N ₂)	1
Cadmium	0.005	Selenium	0.05
Chromium	0.05	Thallium	0.002
Cyanide	0.15		

Primary Inorganics: Waivers

- Available after 3 rounds of testing and no chemicals exceed MCL
 - GW - every 9 years
 - SW – every 3 years
- Must apply to Health Department

VOLATILE & SYNTHETIC ORGANIC COMPOUNDS (VOCs, SOCs)

- Chronic health effects
- CWSs/NTNCWSs must comply with all constituents
- GW-sample every 3 years after initial compliance
- SW-sample every year after initial compliance





VOCs and SOCs: Key Points

- If chemical is detected
 - SWS may do 1 or 2 confirmation samples
 - If chemical is absent in both samples, the positive detection can be disregarded
 - Compliance based on average of 4 quarterly samples
 - $< \text{MCL}$ = quarterly monitoring
 - $> \text{MCL}$ = contact Health Dept.



VOCs and SOCs

- If heptachlor and/or heptachlor epoxide are detected
 - Then analyze for both chemicals until there has been no detection of either chemical for one compliance period.

- If trichloroethylene, tetrachloroethylene, 1,2-dichloroethane, 1,1,1-trichloroethane, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, or 1,1-dichloroethylene are detected in GW sample
 - Then quarterly monitoring for vinyl Chloride
 - If vinyl chloride is not detected in the first quarterly monitoring sample, monitor once for vinyl chloride during each compliance period.

VOCs and SOCs

- **If >10 times MCL**
 - Notify the Department within 48 hours of the receipt of the results
 - Re-sample within 48 hours to confirm the result.
 - notify the Department of the confirmation result within 24 hours
- If the average concentration <10 times the MCL start quarterly monitoring
- If the average concentration >10 times the MCL, use of the contaminated water source shall immediately be discontinued.
- Requires Department approval to return water source

VOCs and SOC: Waivers

- Waivers are available to non-vulnerable sources
 - VOC: GW – every 6 years
 - VOC: SW – every 6 years
 - SOC: waive all testing or some panels
 - Must apply to Health Dept.

SECONDARY COMPOUNDS

- Aesthetic problems-not health concern
 - Affect taste, odor, appearance

- CWSs – no exceed MCL in:
 - New systems must not exceed MCLs
 - New sources must not exceed MCLs
 - Existing systems – require investigation/feasibility study
 - Consumer acceptance and economic considerations
 - GW – sample every 3 years
 - SW – sample every year

Secondary Maximum Contaminant Levels

Constituents	Maximum Contaminant Levels/Units	Constituents	Maximum Contaminant Levels/Units
Aluminum	0.2 mg/L	Methyl-tert-butyl ether (MTBE)	0.005 mg/L
Color	15 Units	Odor--Threshold	3 Units
Copper	1.0 mg/L	Silver	0.1 mg/L
Corrosivity	Non-corrosive	Thiobencarb	0.001 mg/L
Foaming Agents (MBAS)	0.5 mg/L	Turbidity	5 Units
Iron	0.3 mg/L	Zinc	5.0 mg/L
Manganese	0.05 mg/L		

Secondary Maximum Contaminant Levels Ranges

Maximum Contaminant Level Ranges

Constituent, Units	Recommended	Upper	Short Term
Total Dissolved Solids (mg/L)	500	1,000	1,500
Specific Conductance (micromhos)	900	1,600	2,200
Chloride (mg/L)	250	500	600
Sulfate (mg/L)	250	500	600

SECONDARY COMPOUNDS

➤ Waivers

- Available after 3 rounds of testing and no chemicals exceed MCL
- Lasts for 9 years
- Apply to Health Dept.

➤ NTNCWSs/TNCWSs

- Monitor once
- Surface sources serve >1000 people = every 3 years

Last Point: Standby Sources

- Can only be used for short-term emergencies of 5 consecutive days or less, and for less than a total of 15 calendar days/year
- Sample every 9 years for inorganic/organic/radiological compounds
- Nitrates $\geq \frac{1}{2}$ MCL – sample annually and w/in 24 hours when source is activated

Questions and Quiz

