

Chemical Phase II/IV Rules

**Key Requirements, Maintaining
Compliance, Best Sampling Practices,
and Resources**

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Chemical Phase II/V Rules

Establish MCLs for 65 chemical contaminants:

- **Inorganic chemicals (IOCs)** [40 CFR 141.23]
- **Volatile organic chemicals (VOCs)** [40 CFR 141.24(f)]
- **Synthetic organic chemicals (SOCs)** [40 CFR 141.24(h)]

Chronic contaminants, except for nitrate, which is an acute contaminant.

Applicability:

- Community water systems (CWS)
- Non-transient non-community water systems (NTNC)





Where to Sample?

Entry point to the distribution system, representative of each source after treatment, but prior to the first customer.

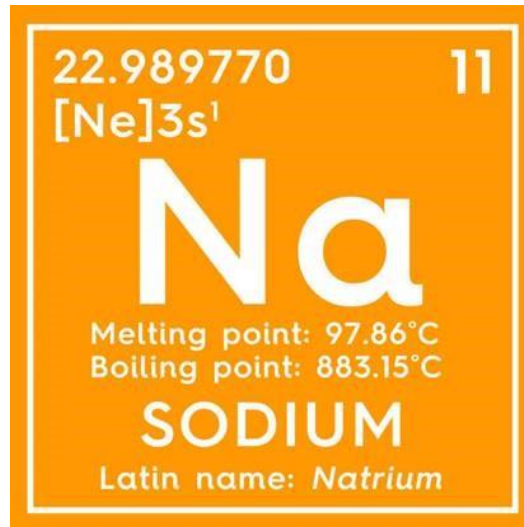
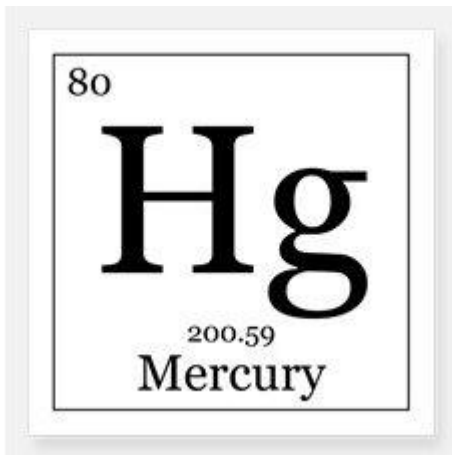
Chain of Custody?

Facility ID and Sample Point ID



15 Inorganic Chemicals (IOCs)

- Mineral-based compounds; typically do not contain carbon
- Sources: natural occurrence, farming practices, industrial processes, and other human activities



Inorganics
Antimony
Arsenic
Asbestos
Barium
Beryllium
Cadmium
Chromium
Cyanide
Fluoride
Mercury
Nickel
Nitrate and Nitrite
Selenium
Sodium
Thallium

21 Volatile Organic Compounds (VOCs)

- VOCs contain carbon and volatilize (vaporize) readily into the atmosphere
- Sources: improper waste disposal and leaking underground storage tanks



Volatile Organics	
1,1,1-Trichloroethane	Ethylbenzene
1,1,2-Trichloroethane	o-Dichlorobenzene
1,2,4-Trichlorobenzene	p-Dichlorobenzene
1,2-Dichloroethane	Styrene
1,2-Dichloropropane	Tetrachloroethylene
Benzene	Toluene
Carbon Tetrachloride	Total Xylenes
Chlorobenzene	Trans-1,2-Dichloroethylene
Cis-1,2-Dichloroethylene	Trichloroethylene
Dichloroethene	Vinyl Chloride
Dichloromethane	

28 Synthetic Organic Chemicals (SOCs)

- Synthesized (man-made) from carbon and other elements like hydrogen, nitrogen, or chlorine; they do not occur naturally
- Sources: used as pesticides, herbicides, defoliants, and fuel additives and can enter water through runoff, industrial waste discharges, improper disposal of chemicals, and accidental releases



Synthetic Organic Chemicals (SOCs)

Synthetic Organics		
2,4,5-TP (Silvex)	Dibromochloro- propane	Hexachlorobenzene
2,4-D	Dinoseb	Hexachlorocyclo- pentadiene
Alachlor (Lasso)	Dioxin	Lindane
Atrazine	Diquat	Methoxychlor
Benzo(a)pyrene	Endothall	Oxamyl (Vydate)
Bis(2-ethylhexyl) Adipate	Endrin	Polychlorinated Biphenyls (PCBs)
Bis(2-ethylhexyl) Phthalate	Ethylene Dibromide	Pentachlorophenol
Carbofuran	Glyphosate	Picloram
Chlordane	Heptachlor	Simazine
Dalapon	Heptachlor Epoxide	Toxaphene





Chronic Health Effects

- IOCs can cause cancer, organ damage, and circulatory, nervous and reproductive system disorders
- VOCs may cause central nervous system damage, kidney or liver disease, and respiratory tract irritation; some are carcinogens or possible carcinogens
- SOCs may cause injury to lungs, liver, or kidneys, reproductive difficulties, genetic mutation or fetal deformity, or cancer

Chemical Monitoring Requirements

IOCs (except asbestos) - Based on **source water type**

- Groundwater - sample once every 3 years (triennial)
- Surface water - sample annually



VOCs – Based on **source water type**

- Groundwater - sample annually; after 3 years of non-detects, EPA may allow sampling once every 3 years
- Surface water - sample annually

SOCs – Based on **population served**

- $\leq 3,300$ persons - sample once every 3 years
- $> 3,300$ persons - sample twice in one year during each 3-year compliance period (in 2 different quarters)



Asbestos Monitoring Requirements

New Water System or New Water Supply –

- Collect single sample at the entry point to the distribution system representative of the source after treatment

Presence of Asbestos Cement (AC) Pipe –

- Systems with AC pipe are required to monitor for asbestos during the first 3-years of each 9-year compliance cycle
- Sample is collected in the distribution system at a location served by the AC pipe



New Water System or New Water Source Monitoring Requirements

IOCs (except asbestos)

- Sample in the 1st quarter of the 3-year monitoring schedule

Asbestos

- Single sample representative of the source after treatment

VOCs

- Sample 4 consecutive quarters

SOCs

- Sample 4 consecutive quarters





Triggers for Increased Monitoring



IOCs and Asbestos

- Trigger = exceed MCL
 - ▶ No violation assessed
 - ▶ Increase to quarterly monitoring in the quarter following the exceedance for that inorganic

VOCs

- Trigger = exceed federal **method detection limit 0.5 µg/L**
 - ▶ Increase to quarterly monitoring in the quarter following the exceedance for that chemical
- Trigger = exceed MCL
 - ▶ No violation assessed
 - ▶ Increase to quarterly monitoring in the quarter following the exceedance for that chemical



Triggers for Increased Monitoring



SOCs

- Trigger = equal or exceed federal **method detection limits (varies)**
 - ▶ Increase to quarterly monitoring in the quarter following the exceedance for that chemical
- Trigger = exceed the MCL
 - ▶ No violation assessed
 - ▶ Increase to quarterly monitoring in the quarter following the exceedance for that chemical

All Chemicals (IOCs, VOCs, SOCs)

- GW systems must monitor at least 2 quarters
- SW systems must monitor at least 4 quarters following increased monitoring.

How is Compliance Determined and What Can Happen?

- In general, compliance is based on the running annual average (RAA) of the concentration of a contaminant that is on increased monitoring
 - i.e. RAA for 4 quarters of data
- If the public water system has a $RAA > MCL$, EPA will issue a notice of violation (NOV) letter
- EPA will also issue a notice of violation for failures to monitor



Determinations for Reducing Monitoring

A public water system can only return to routine monitoring when EPA determines that the concentrations are **reliably and consistently (R&C) below the corresponding MCLs.**

- Determined on a case-by-case basis
- GW systems must monitor at least 2 quarters and SW systems must monitor at least 4 quarters
- EPA may also consider the following factors: quality of data, amount of data, length of monitoring, variations in sample results, variations in the RAA
 - At a minimum, the results or RAA must be less than half the MCL to obtain an R&C determination



Importance of Best Sampling Practices

- Make sure you do not handle chemicals before sampling, or store chemicals like gasoline, pesticides, oils, etc. near the sampling location = **POTENTIAL FOR CROSS CONTAMINATION**

- EPA may ask for confirmation samples if a detection is suspicious
- EPA will also review laboratory quality assurance/quality control data to verify the validity of suspicious results



Case Examples:

- ❖ Pesticides detections
- ❖ Total xylenes detections
- ❖ Di(2-ethylhexyl) phthalate detections

Importance of Best Sampling Practices

- Plastic, clear glass, or amber glass bottles will be used for chemical sampling.
- Check with the lab and follow instructions.
 - VOCs require the absence of air space in VOA (volatile organic analysis) glass bottles
- If the bottle contains a preservative, **do not rinse** the bottle.
- Wear gloves and eye protection when handling acids and other preservatives
- Ship samples to the lab as instructed as soon as they are collected.
 - Delays may necessitate re-sampling due to sample holding times being exceeded during storage and shipment.



What's Next?

- The Phase II/V rules are not currently scheduled for review or revision
- EPA has a regulatory process that determines whether a contaminant will be regulated or not
 - Unregulated Contaminant Monitoring Rule (UCMR)
- Perchlorate (ClO_4^-) is currently the only chemical for which a new drinking water standard may be developed.
 - Public notice will be issued at the end of May.



Contact Information and Additional Resources

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- List of regulated chemicals and other useful information:
<https://www.epa.gov/region8-waterops>
- EPA's website on the chemical rules:
<https://www.epa.gov/dwreginfo/chemical-contaminant-rules>
- *Quick Guide to Drinking Water Sample Collection*
(September 2016)