

# 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.

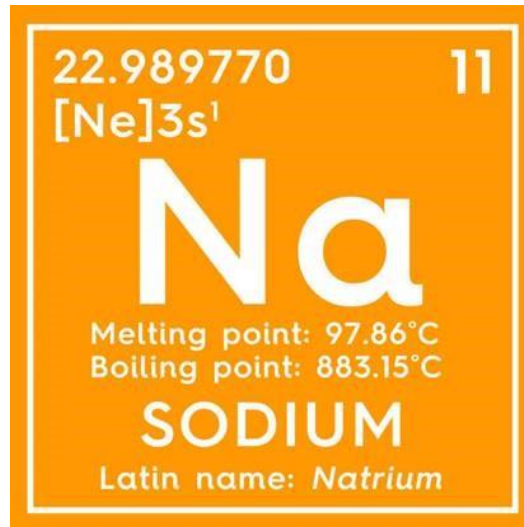
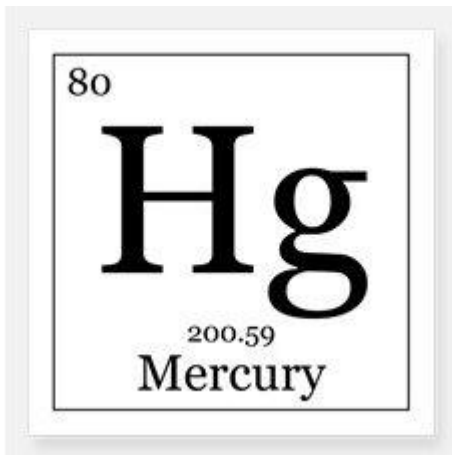
## Chain of Custody?

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 1<sup>st</sup> 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 ( $\text{ClO}_4^-$ ) 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)