Proposed National Primary Drinking Water Regulation for Perchlorate

NDWAC Consultation Meeting
January 10, 2025

EPA United States Environmental Protection Agency

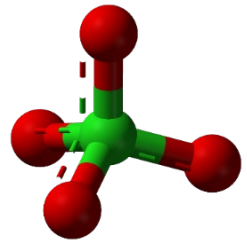
Office of Water

Purpose and Overview

- To provide the National Drinking Water Advisory Council (NDWAC) with information on the development of the proposed perchlorate National Primary Drinking Water Regulation (NPDWR).
- Discuss background of perchlorate in drinking water
- Discuss potential provisions of a proposed perchlorate NPDWR
- Discuss cost information
- Solicit input from NDWAC members on key areas of the development of the proposed perchlorate NPDWR
- Provide information about next steps

Background

Sources of Perchlorate



- Perchlorate (ClO_4^-) is an anion that is highly stable and mobile in the aqueous environment.
- Perchlorate occurs naturally and is also manufactured. Perchlorate is commonly used in solid rocket propellants, munitions, fireworks, airbag initiators for vehicles, matches, and signal flares.
- Perchlorate has also been associated with imported fertilizer that was widely applied in the United States.
- Trace amounts of perchlorate can result from improper handling and degradation of hypochlorite solutions that are used for drinking water treatment.

Perchlorate Health Effects

- EPA has determined that exposure to perchlorate may cause effects on human health.
- At certain levels, perchlorate interferes with the thyroid gland by inhibiting iodide uptake, which can affect thyroid hormone production.
- Thyroid hormones help regulate metabolism and are critical for normal growth and development. Impairment of thyroid function in pregnant people is linked to delayed development and decreased learning capability in their children.

Regulating Perchlorate in Drinking Water

- On February 11, 2011, EPA issued a final determination to regulate perchlorate in drinking water under SDWA.
- EPA completed peer reviewed scientific analyses on perchlorate as recommended by the agency's Science Advisory Board (SAB).
- In 2019, EPA proposed an NPDWR for perchlorate. EPA proposed an MCLG/MCL of 56 µg/L and requested comment on 18 µg/L and 90 µg/L. EPA also requested public comment on withdrawing the regulatory determination for perchlorate based on low occurrence at levels of health concern.
- In July 2020, EPA withdrew the regulatory determination for perchlorate and did not promulgate a final NDPWR for perchlorate.
- In 2023, the D.C. Circuit vacated and remanded EPA's July 2020 withdrawal of its determination to issue drinking water regulations for perchlorate.
- As a result of this decision, EPA has committed to proposing an NPDWR for perchlorate by November 21, 2025, and promulgating a final rule by May 21, 2027, per consent decree.

SDWA: Proposing an NPDWR

- An NPDWR establishes requirements applicable to public water systems (PWSs).
- A PWS provides water for human consumption to at least 15 service connections or serves an average of at least 25 people for at least 60 days a year.
- EPA defines three types of PWSs:
  - *Community Water System* (CWS): Serves the same population year-round.
  - *Non-Transient Non-Community Water System* (NTNCWS): Regularly supplies water to at least 25 of the same people at least 6 months per year (e.g., school).
  - *Transient Non-Community Water System* (TNCWS): Serves water where people do not remain for long periods of time (e.g., gas station).
    - EPA does not anticipate that the perchlorate NPDWR will affect TNCWSs.

SDWA: Proposing an NPDWR

- A *maximum contaminant level goal* (MCLG) is a non-enforceable health-based level at which no known or adverse effects on the health of persons occur and allows for an adequate margin of safety. An MCLG does not account for limits of detection and treatment technology effectiveness.
- An enforceable *maximum contaminant level* (MCL) is set as close as feasible to the MCLG (taking costs and benefits into consideration).
- The agency is currently evaluating information to develop a proposed MCL and MCLG for the forthcoming proposed perchlorate NPDWR.
- EPA is also currently evaluating occurrence and treatment information to inform development of regulatory options.

Potential NPDWR Requirements

Opportunities for Input on Potential NPDWR Requirements

- EPA is considering monitoring options, treatment technology feasibility, and public notification as part of developing perchlorate MCL requirements.
- EPA is interested in input related to implementation challenges and ways to reduce water system burden in complying with a perchlorate MCL.
- EPA is specifically interested in input related to the following areas:
  - Monitoring and reporting requirements, including eligibility and criteria for reduced monitoring and waivers
  - Treatment and compliance options
  - Public notification requirements

Monitoring Considerations

- EPA is evaluating requirements for PWSs to conduct initial water quality monitoring to determine future compliance monitoring requirements.
- In the 2019 proposal, EPA proposed the following:
  - Systems collect four quarterly samples at each entry point to the distribution system.
  - States can approve use of recent, previously acquired perchlorate drinking water data to satisfy initial monitoring requirements.
  - State can waive final two quarters of initial monitoring at a sampling point if results from previous two quarters are below the detection limit.
  - Staggered sampling schedule based on system size.
- EPA is interested in additional ways to streamline initial monitoring.

Monitoring Considerations

- Based on initial monitoring results, regulated inorganic contaminants are frequently monitored under the Standardized Monitoring Framework (SMF).

	1st Period			2nd Period			3rd Period		
	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Ground Water Source									
Waiver	*								
≤ MCL and no Waiver		*			*			*	
Reliably and Consistently (R&C) < MCL		*			*			*	
> MCL or not R&C < MCL	****	****	****	****	****	****	****	****	****
Surface Water Source									
Waiver	*								
≤ MCL and no Waiver	*	*	*	*	*	*	*	*	*
Reliably and Consistently (R&C) < MCL	*	*	*	*	*	*	*	*	*
> MCL or not R&C < MCL	****	****	****	****	****	****	****	****	****

Treatment

- Systems that exceed drinking water standards must select a treatment or non-treatment option to bring their water systems into compliance.
- EPA has identified the following technologies as potential treatments to remove perchlorate from drinking water:
  - Ion Exchange
  - Biological Treatment
  - Centralized Reverse Osmosis
- EPA has also identified potential non-treatment options in lieu of installing and operating treatment technologies, including blending existing water sources, replacing a contaminated source with a new source, or purchasing water from another system.
- Point-of-Use (POU) Reverse Osmosis is also a potential small system compliance option for systems serving 3,300 or fewer persons.

Treatment

- *Ion Exchange*: a technology where ion contaminants (such as perchlorate) present in liquids are exchanged with non-contaminant ions (typically chloride) bound to an exchange media; when exhausted, media must be replaced or activated; shown to achieve high removal efficiency for perchlorate especially with perchlorate-selective resin.
- *Biological treatment*: process by which bacteria are used to reduce perchlorate to chlorate, chlorite, chloride, and oxygen; offers complete destruction of the perchlorate ion; may need to be used with other treatment processes to ensure finished water quality.
- *Reverse Osmosis*: high-pressure separation process where some water (a permeate) is forced across a membrane while dissolved and suspended solids are removed as concentrate; does not destroy the perchlorate ion; large volumes of concentrate may restrict application on a system-specific basis.
- *Point-of-Use Reverse Osmosis*: a water filtration device connected to a single fixture (e.g., under a kitchen sink) that uses the process of reverse osmosis to remove contaminants from the water supplied to that fixture.

Public Notification and Education Considerations

- PWSs may be required to issue public notification (PN) of a violation to customers at risk of elevated perchlorate in drinking water if the system exceeds regulatory standards.
- Under the PN Rule, there are three tiers of PN:
  - Tier 1: Immediate notice where there is potential for human health to be immediately impacted; water suppliers have 24 hours to notify consumers
  - Tier 2: Notice as soon as possible where does not pose immediate risk to human health; within 30 days of violation
  - Tier 3: Annual notice, does not have direct impact on public health
- EPA is currently considering which tier of PN will be required for the proposed perchlorate NPDWR.
- CWSs conducting monitoring would also be required to include perchlorate monitoring results in their annual Consumer Confidence Report (CCR).

Cost Information and Funding Considerations

Cost Information

- The proposed perchlorate NPDWR will not uniformly impact every PWS.
  - A perchlorate NPDWR will likely require PWSs to conduct initial and routine monitoring to determine the level of perchlorate in drinking water.
  - Costs will vary depending on monitoring results.
  - Some PWSs may have to take action as necessary to reduce perchlorate concentrations in drinking water to comply with an MCL, provide information about perchlorate in the system's CCR, and issue public notifications about perchlorate violations.
  - Point-of-use (POU) treatment options may be more cost effective for some small systems than centralized treatment.
- EPA has estimated some preliminary costs associated with potential requirements.

Cost Information

- The preliminary costs presented in the following slides will be further revised prior to proposal.
- These preliminary cost estimates give a sense of the cost associated with potential requirements.
- The purpose of providing these preliminary cost estimates is to request input/data on costs that systems and States have experienced.

Monitoring Cost Information

- EPA preliminarily estimates that monitoring would cost systems $124 per sampling event (2023$ updated from 2017$). This includes sample collection and analysis.
- The actual costs to systems would be dependent on perchlorate monitoring results, number of sampling points, and the extent to which systems must conduct and pay for monitoring.
- EPA preliminarily estimates that the average annualized monitoring and administration would be $104* for systems serving fewer than 10,000 people and $267* for large systems.

*updated from the 2019 proposal to 2023$ and 2% discount rate.

Treatment Cost Information

Preliminary Annual Cost per System for Perchlorate Treatment (2023$, 2% discounting)[a]

Population Served	Ion Exchange[b]	Biological Treatment[c]	Reverse Osmosis (RO)[d]	Point-of-Use RO[e]
≤500	$24,200 ($20,800 - $28,800)	Not Applicable	Not Applicable	$29,800 ($3,700 - $55,600)
501 to 3,300	$84,900 ($77,000 - $100,400)	$331,400 ($293,600 - $365,900)	$494,400 ($461,400 - $492,000)	$207,700 ($55,700 - $359,000)
3,301 to 10,000	$333,000 ($311,300 - $380,400)	$710,300 ($656,200 - $788,400)	$1,131,600 ($1,085,800 - $1,135,200)	Not Applicable
10,001 to 50,000	$835,900 ($800,000 - $941,200)	$1,541,900 ($1,432,400 - $1,674,900)	$3,923,000 ($3,859,900 - $3,929,600)	Not Applicable
50,001 to 100,000	$2,254,400 ($2,237,900 - $2,469,700)	$3,434,500 ($3,377,900 - $3,756,600)	$11,387,200 ($11,345,200 - $11,415,100)	Not Applicable
100,001 to 500,000	$7,047,100 ($6,996,000 - $7,687,300)	$8,516,700 ($8,292,600 - $8,982,900)	$34,749,300 ($34,675,600 - $34,794,900)	Not Applicable

Source of cost functions: *Technologies and Costs for Treating Perchlorate-Contaminated Waters* (2019) for ground water scenarios. Values are rounded to nearest $100. Range in costs reflect variations in component cost levels (low, mid, high). Number of entry points was assumed to be one (1) for systems serving 500 or fewer people and two (2) for systems serving 501 or more people. Assumed treatment at all entry points for each system. Actual costs would depend on number of entry points exceeding the MCL. Costs include indirect costs (e.g., construction management, administration) and add-on costs (e.g., permitting, pilot study, land). Costs assume all water is treated. Blending would reduce costs.

b. Assumed use of disposable perchlorate-selective resin with average capacity of 170,000 bed volumes for two pressure vessels in series. Assumes 90% removal at all entry points.

c. Assumed fixed-bed gravity basins, electron donor dose of 10 mg/L acetic acid, and nutrient addition of 1 mg/L phosphorus.

d. Assume low-pressure RO membranes to treat high-quality water (i.e. otherwise deliverable).

e. Assumes systems would purchase, install, and maintain certified point-of-use (POU) devices for all customers. The costs also include development of a public education program and monitoring of POU devices. Estimates based on the minimum, median, and maximum population served divided by average household size of 2.58 people to approximate the number of connections requiring an RO device. In the 2019 proposal, EPA determined that implementing and maintaining this option for perchlorate for systems larger than 3,300 people (greater than 1 MGD design flow) is likely to be impractical.

Treatment Cost Information

Preliminary Annual Cost per System for Perchlorate Non-Treatment Options (2023$, 2% discounting)[a]

Population Served	New Well Construction[b]	Interconnection[c]
≤500	$35,500 ($33,100 - $36,000)	$53,300 ($52,700 - $53,700)
501 to 3,300	$96,300 ($92,700 - $97,500)	$251,300 ($250,300 - $251,500)
3,301 to 10,000	$255,100 ($245,400 - $257,900)	$850,800 ($849,800 - $851,400)
10,001 to 50,000	N/A[d]	N/A
50,001 to 100,000	N/A	N/A
100,001 to 500,000	N/A	N/A

a. Source of cost functions: *Technologies and Costs for Treating Perchlorate-Contaminated Waters* (2019) for ground water scenarios. Values are rounded to nearest $100. Range in costs reflect variations in component cost levels (low, mid, high). Cost estimates assume that systems choosing nontreatment options have an alternative source that will not require additional treatment to address raw water quality. Costs include indirect costs (e.g., construction management, administration) and add-on costs (e.g., permitting, pilot study, land). Costs assume all water is treated. Blending would reduce costs.

b. New well construction cost estimates assume a 250-ft well depth. This option depends on the availability of an uncontaminated ground water source.

c. Interconnection cost estimates assume an interconnection distance of 10,000 feet, that no booster pumps will be necessary, and a unit cost of $2.00 per thousand gallons. This option depends on the availability of a wholesale water system.

d. Nontreatment options are less likely to be available for larger systems because of the quantity of water required. EPA's nontreatment cost model is only applicable for systems serving less than 10,000 people.

Funding Considerations

- The Drinking Water State Revolving Fund (DWSRF) provides below market rate loans to fund infrastructure improvements to water systems to protect public health and ensure compliance with the Safe Drinking Water Act.
  - Eligible projects related to addressing perchlorate in drinking water may include the installation, upgrade, and replacement of treatment technologies and/or facilities, finished water storage facilities, transmission and distribution systems, and any associated planning and design activities.
- The Infrastructure Investment and Jobs Act (IIJA) provides $9 billion to invest in communities with drinking water impacted emerging contaminants like perchlorate. This includes $4 billion to the Drinking Water State Revolving Fund (DWSRF) and $5 billion through the EPA's Emerging Contaminants in Small or Disadvantaged Communities Grant Program. Utilities may also use the additional nearly $12 billion in the DWSRF dedicated under IIJA, and funds Congress annually has provided to fund DWSRF loans.
- Established by the Water Infrastructure Improvements for the Nation (WIIN) Act, the Small, Underserved, and Disadvantaged Communities (SUDC) grant awards funding to States, territories, and Tribes to support water systems in meeting SDWA requirements.
  - Since 2019, the program has allocated over $130 million to States, territories and Tribes. On May 21, 2024, EPA announced the availability of $25 million in funding for FY24.

Discussion and Key Areas for Input

Monitoring Considerations

- What input do NDWAC members have related to monitoring requirements for perchlorate?
  - What levels of perchlorate are you aware of systems experiencing?
  - What are some advantages and disadvantages of applying the Standardized Monitoring Framework for inorganic contaminants to perchlorate?
  - How should previously acquired perchlorate drinking water monitoring data be considered in the initial monitoring requirements and should there be a cut-off date?
  - What are some ways to streamline monitoring requirements and reduce burden on systems and States?

Treatment Considerations

- What input do NDWAC members have related to treatment for perchlorate?
  - Is there information on the cost and availability of perchlorate treatment technologies?
  - Is there any additional information on the effectiveness of the identified technologies in reducing levels of perchlorate in drinking water?
  - Are there additional technologies that have been demonstrated to reduce perchlorate levels?
  - Is there any information on the impact of co-occurring contaminants on treatment efficacy or operating costs?

Public Notification and Education Considerations

- What input do NDWAC members have related to potential perchlorate public notification and education requirements?
  - How quickly should water systems be required to notify the public following a violation of the perchlorate standard?
  - What information should be included in Consumer Confidence Reports regarding perchlorate in drinking water?

Next Steps

Next Steps

- In addition to this consultation, EPA is seeking input from other key stakeholders to inform the proposed perchlorate NPDWR.
  - Federalism, Small Business Advocacy Review Panel, tribal officials, and other stakeholders.
  - EPA will also provide for a public comment period following the development of the rule proposal.
- EPA anticipates publishing the proposed rule for public comment by November 21, 2025.
- EPA will consult with the NDWAC following the proposed rule.
- EPA expects to promulgate a final rule by May 21, 2027.