



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

WSG# 213
Date Signed: November 30, 2020

OFFICE OF WATER

November 30, 2020

MEMORANDUM

SUBJECT: Use of Total Nitrate and Nitrite Analysis for Compliance Determinations with the Nitrate Maximum Contaminant Level – 40 CFR §141.23

FROM: Anita M. Thompkins, Director
Drinking Water Protection Division
Office of Ground Water and Drinking Water

ANITA THOMPKINS
Digitally signed by ANITA THOMPKINS
Date: 2020.11.30 18:44:00 -05'00'

TO: EPA Regional Water Division Directors, Regions I-X

The goal of this memorandum is to provide a consistent approach for compliance determination of the National Primary Drinking Water Regulations (NPDWRs) nitrate maximum contaminant level (MCL) when using a total nitrate and nitrite analysis to ensure public health protection. This memorandum clarifies nitrate monitoring requirements; provides information on analytical methods when using total nitrate and nitrite analysis to comply with the nitrate MCL; and clarifies reporting requirements when using total nitrate and nitrite analysis to comply with the nitrate MCL.

Background

Under the authority of the Safe Drinking Water Act (SDWA), EPA established the MCL for nitrate of 10 milligrams per liter (mg/L) in 1991 at a level that avoids methemoglobinemia (blue baby syndrome). Based on review of Safe Drinking Water Information System (SDWIS) compliance data, EPA is aware that at least half of the primacy agencies allow the use of a total nitrate and nitrite analysis to determine compliance with the nitrate MCL. Data from the last 25 years indicate that nitrate MCL violations occur. In 2018, there were 1,029 nitrate MCL violations issued to 507 systems, representing 7 percent of all of the health-based violations reported that year and impacting 0.3 percent of all systems.¹

Monitoring

Under 40 CFR §141.23, with the exception of certain consecutive systems [see 40 CFR §141.29], all public water systems (PWSs) are required to monitor at least annually to determine compliance with the nitrate MCL of 10 mg/L listed in 40 CFR §141.62, which also lists an MCL of 10 mg/L for total nitrate and nitrite.

¹ Based on EPA Government Performance and Results Act (GPRA) report of systems in violation report in FY 2018, <https://www.epa.gov/ground-water-and-drinking-water/drinking-water-performance-and-results-report>.

Analytical Methods

Title 40 CFR §141.23(k) lists the EPA-approved methods for the analysis of nitrate, along with preservation and holding time requirements. The monitoring requirements for total nitrate and nitrite are not specified and are at the discretion of primacy agencies. While the CFR does not list approved methods for compliance with the total nitrate and nitrite MCL, several methods promulgated for the analysis of nitrate and/or nitrite can provide this information.²

Sample handling requirements are specified in the NPDWRs. Samples being analyzed for total nitrate and nitrite must be preserved with sulfuric acid and be analyzed within 28 days [40 CFR §141.23(k)(2)]. In contrast, nitrate methods require the sample to be kept at 4°C and to be analyzed within 48 hours or 14 days for certain chlorinated samples. With the extended holding time for total nitrate and nitrite, in the event of a high result (e.g., exceeds 5 mg/L), there could be a delay in notifying the public and could prolong possible risks for infants exposed to elevated nitrate levels through drinking water.

Because nitrate, nitrite, and total nitrate and nitrite are considered acute contaminants, it is especially critical when using a total nitrate and nitrite method for compliance with the nitrate MCL that samples be analyzed as soon after collection as possible [40 CFR §141.23(k)(2)].³ Once a sample exceeds 5 mg/L according to a total nitrate and nitrite analysis, the PWS's source has shown a potential for nitrate contamination. Though not required by regulation, EPA encourages that future analyses following an exceedance of 5 mg/L using a total nitrate and nitrite analysis be conducted using a nitrate method specified in 40 CFR §141.23(k), table item 18, rather than a total nitrate and nitrite method.

Public Notice and Reporting

Exposure to elevated nitrates can cause methemoglobinemia in infants, and even short-term exposures can result in severe illness or death. Due to the concern over acute health effects for infants, exceedance of either the nitrate MCL or total nitrate and nitrite MCL requires a Tier 1 public notification (i.e., notification to consumers as soon as practical but no later than 24 hours after the PWS learns of the violation) [40 CFR §141.202].

The federal Consumer Confidence Rule is the cornerstone of the 1996 SDWA “right-to-know” amendments, based on the principle that consumers have a right to know what is in their drinking water. Community water systems using a total nitrate and nitrite analysis must report their results in their Consumer Confidence Reports’ detected contaminant table and, where applicable, include information for violations [40 CFR §141.153]. Systems which detect nitrate or total nitrate and nitrite at levels above 5 mg/L, but equal to or below the MCL, must also provide additional health information in their Consumer Confidence Report to ensure that the public is informed of possible risks to infants from drinking water containing elevated concentrations of nitrate [40 CFR §141.154(c)].

If a primacy agency allows the use of total nitrate and nitrite analysis for compliance with the nitrate MCL, the correct reporting code for results under total nitrate and nitrite is SDWIS code 1038.

² Methods include ion chromatography (EPA Method 300.0), automatic cadmium reduction (EPA Method 353.2, ASTM D3867-90A and SM 4500-NO3- F), manual cadmium reduction (ASTM D3867-90 B and SM 4500-NO3- E), and reduction/colorimetric (Systea Easy (1-Reagent) and NECi Nitrate-Reductase). Analytical values must be generated with the approved test method within the appropriate holding times. Approved versions of these methods are listed in 40 CFR 141.23 (k)(1) and Appendix A to Subpart C of Part 141.

³ As stated in 40 CFR § 141.23(k)(2): “In all cases samples should be analyzed as soon after collection as possible.”

Summary

PWSs are generally required to monitor at least annually to determine compliance with the nitrate MCL. Several analytical methods for nitrate and/or nitrite are available for total nitrate and nitrite. Once a sample exceeds 5 mg/L with a total nitrate and nitrite analysis, EPA encourages subsequent analysis for nitrate be conducted using nitrate methods. Exceedance of either the nitrate MCL (10 mg/L) or total nitrate and nitrite MCL (10 mg/L) requires a Tier 1 public notification. Systems that detect total nitrate and nitrite must report these results in their Consumer Confidence Reports. If the levels are above 5 mg/L, but equal to or below the MCL, the system must provide additional health information in their Consumer Confidence Reports. The correct reporting code for results under total nitrate and nitrite is SDWIS code 1038.

Please share these clarifications and recommendations concerning nitrate and total nitrate and nitrite with your primacy agencies. If you have any additional questions or concerns regarding this document or other regulatory requirements, please contact Cathy Davis, Manager, Protection Branch at (202) 564-2703 or Davis.CatherineM@epa.gov.