

US EPA ARCHIVE DOCUMENT



June 26, 2017

Dr. Michael Shapiro
Deputy Assistant Administrator, Office of Water
United States Environmental Protection Agency
Ariel Rios Building (MD 4101M)
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460

RE: Recommendations for Drinking Water Cyanide Testing

Dear Dr. Shapiro:

The Environmental Laboratory Advisory Board (ELAB), a standing Federal Advisory Committee Act board that advises the U.S. Environmental Protection Agency (EPA), has examined the difficulties of testing drinking water for cyanide and offers the attached recommendations for EPA's consideration and action.

Although "everyone knows" that cyanide is toxic, this regulated contaminant is not known to be carcinogenic, does not bioaccumulate, and has a relatively high maximum contaminant level goal of 200 $\mu\text{g}/\text{L}$. The determination of cyanide presence in drinking water is confounded by its diverse chemical forms and reactions, as cyanide can be formed and destroyed by a variety of chemical reactions. In fact, it has been demonstrated that the significant possibility of false positives exists as a result of cyanide forming in treated drinking water after samples are collected and preserved for testing using required, prescriptive procedures. ELAB has concluded that the drinking water preservation techniques, treatment and laboratory methods need to be improved to avoid these false cyanide positives. Because these procedures are prescriptive, an interim improvement would be for EPA to clarify for states and public water systems (PWSs) how cyanide results should be reported and qualified.

A PWS is required to report the results of all regulatory laboratory tests to the permitting authority (e.g., state or EPA) on a regular basis. All regulatory laboratory results are public records, and it is important to keep members of the public informed of any issues with their drinking water without censoring the test results. The annual Consumer Confidence Report (CCR) is a brief summary of the required monitoring, which is required to include *"the levels of any detected contaminants, compliance with drinking water rules...and some educational language"* (USEPA 2010). The CCR is expected to be informative to the general public without being needlessly technical: *"A report that contains too much information or is full of technical jargon can discourage consumers from learning about their drinking water"* (USEPA 2010).

For PWSs, cyanide concentrations below 100 $\mu\text{g}/\text{L}$ in drinking water resulting from treatment or sample preservation technique is problematic because detected contaminants must be reported in

the CCR. EPA's terminology of detection and quantitation is too often ambiguous and confusing to the consumer, which results in CCR reports being less transparent.

ELAB has discussed the issue and is providing EPA with specific recommendations to address these issues in the attached document. Although EPA should continue to require that a PWS report all regulatory results to its permitting authority, CCRs should be allowed to include qualifiers/ comments to explain suspect results and should require that cyanide results only be reported down to a reporting limit of 100 µg/L in CCRs to avoid needless public concern regarding cyanide results that are likely to be false positives.

Please let us know if you need additional information or clarification.

Respectfully,



Henry Leibovitz, Ph.D.
Chair, Environmental Laboratory Advisory Board

cc: ELAB Board
Lara Phelps, ELAB Designated Federal Official

Attachment in this document: ELAB Recommendations to EPA on Drinking Water Cyanide Testing
Separate attachment: *Testing for Cyanide in Drinking Water* Technical Report (75 pages)

ELAB Recommendations to EPA on Drinking Water Cyanide Testing

Based on a review of the available technical documentation, ELAB is providing the following recommendations to EPA relative to drinking water testing for cyanide.

1. **ELAB concurs with EPA's conclusion stated in a recent *Federal Register* announcement¹ that based on the assessments in EPA's Third 6-Year Review, there is only a "low priority or no meaningful opportunity" to lower the cyanide maximum contaminant level (MCL) or maximum contaminant level goal from 200 µg/L.**

This is primarily because of the limitation of lowering the Practical Quantitation Limit (PQL) below 100 µg/L, even though 40 CFR 141.23 lists much lower "detection limits," and these detection limits are stated in the context of sample compositing. It should also be noted that there are no detection limits listed for the Alternative Testing Methods approved in Appendix A to Subpart C of Part 141, leading to additional confusion.

In support of this comment, the Board offers these additional suggestions specifically regarding cyanide, which EPA should consider when it proposes revisions to 40 CFR 141.

2. **EPA should acknowledge that false positives are possible when testing for cyanide using required methods and sample preservation.** The detailed basis for this recommendations is supported by the technical report, *Testing for Cyanide in Drinking Water*, by Michael F. Delaney, Ph.D. (2017). As demonstrated in this technical report using a simple model system, there is a problem with cyanide testing in drinking water. False positives are a distinct possibility. This report demonstrated that deionized water, having undergone a typical drinking water treatment approach, will form detectable levels of free cyanide when collected, preserved and analyzed according to the available determinative methods. The lack of flexibility in prescriptive, approved drinking water preservation and testing methods for cyanide, however, does not allow this problem to be effectively avoided.

A total of 1,108 cyanide detects were reported from finished or raw water in EPA's Third 6-Year Review. It was four times more likely that a detect was from finished water than from raw water. Of these, the 887 finished water samples had an average cyanide concentration of 44.8 µg/L, and the 221 raw water samples had an average cyanide concentration of 30.2 µg/L. This supports the hypothesis that drinking water treatment and required cyanide sample preservation contributes to falsely elevated levels of cyanide.

3. **EPA should clarify reporting requirements for detected contaminants in Consumer Confidence Reports (CCRs).** Although very few cyanide detections were reported above the current MCL (0.07%) in the Third 6-Year Review, there were many detections at lower concentrations (1.8%). The reporting limits reported by laboratories for cyanide testing vary widely, from < 1 µg/L to > 100 µg/L, and the requirements for required minimum reporting

¹ National Primary Drinking Water Regulations; Announcement of the Results of EPA's Review of Existing Drinking Water Standards and Request for Public Comment and/or Information on Related Issues, 82 *Fed. Reg.* 3518 (January 11, 2017).

levels are unclear and ambiguous. Clarifying guidance to states, laboratories and public water systems (PWSs) is needed and should not be “If you are unsure of the MDL for a contaminant, and your laboratory reports a value greater than zero, include that in your CCR” (USEPA 2010).

4. **EPA should clarify the meaning of the cyanide PQL of 100 µg/L.** Different states have different stated or unstated requirements for drinking water cyanide testing to show compliance with the MCL, which is probably a result of the ambiguity in the regulations and the lack of clear guidance from EPA. When EPA first began regulating free cyanide in drinking water in 1992, it determined that a PQL of 100 µg/L was reasonable, though the regulatory use of a PQL is unclear. When this was reexamined in the 2017 Third 6-Year Review, EPA concluded that based on proficiency test (PT) data, a PQL lower than 100 µg/L was not justifiable. EPA then examined method detection limit (MDL) data and concluded that an estimated quantitation limit (EQL) of 50 µg/L was possible. It should be noted, however, that MDL determinations are based on analysis of standards, which does not involve real sample matrices or interferences. Moreover, it should be noted that the validation studies used to support approval of regulatory drinking water cyanide methods generally did not evaluate or address preservation and treatment for interferences.
5. **EPA should require that free cyanide results only be reported down to 100 µg/L in CCRs.** EPA should instruct states to only require cyanide reporting in drinking water down to 100 µg/L and that only detected results above 100 µg/L should be reported in CCRs. EPA should clarify in 40 CFR 141.23, as it has in 40 CFR 141.62, that free cyanide is the regulated form of cyanide. “Total cyanide” and “available cyanide” are screening tests for free cyanide.
6. **EPA should clarify that PT samples can be used for all forms of cyanide.** EPA should encourage states to offer certification for free cyanide in drinking water. Also, EPA should clarify that cyanide PT samples required for cyanide certification or accreditation are suitable for free, total and available cyanide testing.
7. **To minimize the possibility of obtaining false positive results caused by testing issues, EPA should encourage reduced monitoring for cyanide when the PWS has no industrial sources of cyanide.** States should approve reduced monitoring waiver requests as allowed in 40 CFR 141.23.
8. **EPA should clarify the terminology regarding detection and quantitation.** EPA should clarify the requirements involving the various detection and quantitation terms: PQL, EQL, detection limit, MDL, method reporting limit, lowest concentration method reporting limit, limit of detection, limit of quantitation, and so forth.

References:

Delaney MF. 2017. *Testing for Cyanide in Drinking Water*. Boston, MA: Massachusetts Water Resources Authority. March.

USEPA. 2010. *Preparing Your Drinking Water Consumer Confidence Report: Guidance for Water Suppliers*, Second Revision. EPA 816-R-09-011. Washington, D.C.: Office of Water, USEPA. April