



Fact Sheet: Proposed Revisions to Ambient Water Quality Criteria for Beryllium

Proposed Regulation R114-22: Updated Criteria for Beryllium in Surface Waters and Revision of Language in NAC 445A.1236 (1)(c)

The Clean Water Act requires the U.S. Environmental Protection Agency (EPA) to periodically update all ambient water quality criteria, including numeric criteria for toxic metals such as beryllium. Nevada's current criteria for beryllium are limited to the beneficial uses of municipal or domestic supply (MDS) and irrigation (IRR). The current values for these uses (0 micrograms per liter [$\mu\text{g}/\text{L}$] and 100 $\mu\text{g}/\text{L}$) are based on EPA's criteria from 1986 and 1976, respectively.

In its planning documents, the Nevada Division of Environmental Protection (NDEP) specifically states that drinking water standards will be adopted into the State's water quality standards to protect the beneficial use of MDS. For this reason, and because it is not feasible to measure "zero," NDEP proposes to adopt EPA's current drinking water standard (EPA 1992) of 4 $\mu\text{g}/\text{L}$ into **NAC 445A.1236**. The standard for IRR remains the same in EPA's current criteria document. The most restrictive value for beryllium is for the beneficial use of MDS, with a primary drinking water standard of 4 $\mu\text{g}/\text{L}$.

NDEP also proposes a minor change in language under **NAC 445A.1236(1)(c)**, changing the text as follows: "(c) If a criterion is less than the ~~[detection]~~ reporting limit of a method that is acceptable to the Division, laboratory results which show that the substance was not detected **at quantifiable levels** shall be deemed to show compliance with the standard..." This change will align the regulatory language with how laboratories typically report data. Unless requested by a client, most laboratories censor data at a reporting limit (RL), which is typically a quantitation limit. A client can request that the laboratory report data censored at the method detection limit (MDL), with appropriate qualifiers for results detected above the MDL, but below the RL. However, EPA recommends that permit limits be written at a quantitation limit, making the RL a more appropriate choice for use in permits and other regulatory applications.

Geochemistry and Occurrence of Beryllium

Beryllium is a naturally occurring trace metal that is found in minerals such as bertrandite or beryl; these minerals are largely insoluble under neutral or near-neutral pH conditions. As noted, U.S. Geological Survey (USGS) Professional Paper 1802-E, *"The behavior of beryllium in the environment is dominated by its low solubility in water and that it is commonly found in solid form. Natural beryllium in the atmosphere is mostly from dust sources, including windblown dust and volcanic eruptions. The main anthropogenic source of beryllium in the atmosphere is from the combustion of coal and fuel oil, followed by beryllium processing and municipal waste combustion"* (Schulz and others, 2017)

Beryllium has been measured in Nevada's surface waters at concentrations generally in the tenths of $\mu\text{g}/\text{L}$. Data for total beryllium detected in Nevada's surface waters from 2000 to 2020 show a median concentration of 0.15 $\mu\text{g}/\text{L}$ and a 99th percentile of 2.72 $\mu\text{g}/\text{L}$. These low levels are well below criteria values protective of drinking water sources and agricultural crops.

Summary

The current value of 0 µg/L for MDS use in NAC 445A.1236 is outdated and fails to account for the feasibility of analytical detection and quantitation limits. In 2003, and again in 2009, EPA published the Analytical Feasibility of Drinking Water Standards. Beryllium was evaluated in both documents, and EPA found that the method detection limit (MDL) ranged from 0.02 µg/L (Method 200.9) to 0.3 µg/L (Methods 200.7 and 200.8) in 2003; these values remained the same in EPA's 2009 evaluation. The practical quantitation limit (PQL) was reported as 1.0 µg/L. EPA (2009) concluded that *"No new or revised methods that may be expected to improve analytical performance in the vicinity of the current PQL."*

Consistent with Nevada's *Continuing Planning Process* document, NDEP proposes to adopt the current beryllium drinking water standard of 4 µg/L to replace the value of 0 µg/L as the criterion value for MDS in NAC 445A.1236 and retain the 100 µg/L standard for IRR. MDS is the most sensitive beneficial use, with a water quality standard of 4 µg/L.

References

- U.S. Environmental Protection Agency (EPA). 1976. Quality Criteria for Water. ("Red Book"). October, 1976. EPA 440-9-76-023. 533 pp.
- EPA. 1986. Quality Criteria for Water. ("Gold Book"). October, 1986. EPA 440/5-86-001. 395 pp.
- EPA. 1992. 40 CFR, Parts 141 and 142, National Primary Drinking Regulations; Synthetic Organic Chemicals and Inorganic Chemicals. Final Rule EPA 811-Z-92-002. July, 1992. Table 1. Maximum contaminant level for beryllium.
- EPA. 2003. Analytical Feasibility Support Document for the Six-Year Review of Existing National Primary Drinking Water Regulations. EPA 815-R-03-003. March, 2003.
- EPA. 2009. Analytical Feasibility Support Document for the Second Six-Year Review of Existing National Primary Drinking Water Regulations. EPA 815-B-09-003. October, 2009.
- Schulz, Klaus J., DeYoung, John H. Jr, Seal, Robert R., and Dwight C. Bradley. 2017. Critical mineral resources of the United States—Economic and environmental geology and prospects for future supply. USGS Professional Paper 1802.

NDEP Contact for this Fact Sheet:

Dave Simpson, Supervisor
Division of Environmental Protection
Bureau of Water Quality Planning
901 South Stewart Street, Suite 3001
Carson City, NV 89701
(775) 687-9548 or dsimpson@ndep.nv.gov