STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

Summary: Revision to Idaho's Ammonia Criteria for Cold Water Aquatic Life

A recalculation of EPA's 2013 recommendations for new ammonia criteria for the protection of Idaho's resident species.

Background

DEQ is initiating negotiated rulemaking to update the ambient water quality criteria for ammonia in accordance with prioritization in the agency's recent triennial reviews, CWA obligations, and EPA's recommendations regarding the constituent. The agency is proposing a recalculation of EPA's criteria based on newly available toxicity data for western mussel species.

This recalculation will more adequately protect Idaho's sensitive species than Idaho's current criteria without being overly burdensome to permitted entities. The criteria are expressed as two equations, which decrease the allowable ammonia as pH and temperature increase, to reflect the increased toxicity to aquatic life when either parameter increases.

What is ammonia?

Ammonia is a form of nitrogen that occurs naturally in the environment, typically as a waste product from animal and bacterial digestive processes. It is also produced at an industrial scale for fertilizer application, use in cleaning products, and as a chemical precursor.

Typical sources for ammonia in surface waters are effluent discharges from wastewater plants, excretions from animals, and runoff from agricultural lands. The concentrations of ammonia typically found in surface waters are not typically harmful to humans, but unlike other forms of nitrogen, ammonia can be directly toxic to other organisms at those low concentrations.

How does ammonia affect aquatic life?

Aquatic organisms release ammonia directly into the water, a process which is impeded when environmental ammonia is present. This causes toxic buildup in the blood and organs which can lead to adverse effects including death. Some salmonid, mussel, and snail species are especially vulnerable to these effects.

The pH and temperature of the water can significantly change the toxicity of ammonia to aquatic life through changes to the behavior of the organisms, the properties of ammonia, and overall tolerance to distress for aquatic life.

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What are EPA's recommendations for ammonia criteria?

EPA recommends dynamic acute and chronic criteria which are represented by two pH and temperature dependent equations. Those equations are not reproduced here, but the resulting criterion at pH 7 and 20° C are shown in Table 1, with the agency's 1999 criteria for comparison.

Table 1. A comparison of EPA's 1999 recommendations for ammonia criteria (DEQ's current criteria) and EPA's 2013 recommendations at pH 7 and 20° C.

	Acute Criteria (1-hour average)	Chronic Criteria (30-day average)
EPA 1999 (DEQ Current)	24 mg TAN/L	4.5 mg TAN/L
EPA 2013	17 mg TAN/L	1.9 mg TAN/L

These criteria are considered protective of US fresh water by nature of protecting for the most sensitive species, as well as for an array of species considered representative of typical resident species in most US waters. The criteria were developed by including toxicity data indicating that certain unionid mussels and gill-bearing snails are significantly more sensitive to ammonia than was previously known.

What are DEQ's proposed changes to the criteria?

DEQ is presenting recalculated criterion equations for negotiated rulemaking that are based on new toxicity studies demonstrating that Idaho's unionid mussels are not as sensitive as those used in EPA's criterion development process. DEQ followed EPA approved recalculation processes and guidance documents to arrive at the criteria shown in Table 2.

Table 2. DEQ's proposal for ammonia criteria at pH 7 and 20° C.

	Acute Criteria (1-hour average)	Chronic Criteria (30-day average)
DEQ 2026	24 mg TAN/L	3.3 mg TAN/L

These criteria are expected to be protective of Idaho's resident species, but not more restrictive than necessary. Updating Idaho's criteria in this way should provide protection to the vulnerable species not protected by Idaho's current ammonia criteria, including by updating the acute criteria to be both pH and temperature dependent.

How will this affect stakeholders?

Wastewater treatment plants may be affected by this update to ammonia criteria by having more stringent permit limits in some cases. DEQ does not anticipate the changes to these permits to cause any permittees to require accelerated plant upgrades, nor does it anticipate any plants which currently meet their ammonia limits regularly to be in jeopardy of violating the new permit limits. Plants which currently violate their ammonia limits will likely remain in violation and may wish to seek a compliance schedule, variance, or site-specific criteria to avoid enforcement actions.