

Missouri Clean Water Commission
Department of Natural Resources
Lewis and Clark State Office Building
LaCharrette/Nightingale Conference Rooms
1101 Riverside Drive
Jefferson City, Missouri
January 8, 2014

2013 Aquatic Life Protection Criteria for Ammonia

Issue: In 2013 the Environmental Protection Agency (EPA) published new aquatic life protection criteria, and these will be incorporated in the water quality standards by all states. As these criteria are added to the Missouri standards, there is an opportunity to design the process through which this and other standards changes would be implemented. The rulemaking can tailor the criteria to match Missouri conditions on presence or absence of sensitive species, apply mixing zone and other considerations in developing permit limits, and stage implementation to allow planning, financing, construction and operation to proceed with predictability.

Background: Many treatment facilities in Missouri are currently scheduled to be upgraded to comply with the current water quality standards for ammonia adopted in 2005. However, the new criteria will result in new standards that may require a different treatment technology than those being considered by permit holders. The Department encourages permit holders to construct treatment technologies that can attain effluent quality that support the new EPA ammonia criteria. Most facilities have not yet begun the process of upgrading to meet the current ammonia standards, and this allows an opportunity to avoid sequential upgrades. There are technologies that are capable of meeting the new standards, and those facilities needing upgrading should be cognizant of the standards they will ultimately need to meet. It is important that permit holders discuss any new and upcoming requirements with their consulting engineers to ensure their treatment systems will comply with the new requirements. Consulting engineers are responsible for designing treatment systems that will perform as required. The Department developed a fact sheet that describes this situation and contains a list of treatment technologies and their possible treatment capabilities. This will be a longer-term activity as it will involve significant changes to many but not all treatment systems across the state.

Recommended Action: Information only.

Suggested Motion: None.

Attachments:

- Fact Sheet: Changes to the Water Quality Standard for Ammonia



Changes to the Water Quality Standard for Ammonia

Water Protection Program fact sheet

10/2013

Division of Environmental Quality, Leanne Tippet Mosby, Director

On Aug. 22, 2013, the U.S. Environmental Protection Agency finalized new water quality criteria for ammonia, based on toxicity studies of mussels. Missouri's current ammonia criteria are based on toxicity testing of several species, but not mussels or gill breathing snails. Missouri is home to 69 mussel species. According to the Missouri Department of Conservation, nearly two-thirds are of concern for their survival considering water quality conditions and other impacts to streams. Nine mussel species are listed as federally endangered, one is currently proposed as endangered and another proposed as threatened.

The adult forms of mussels seen in rivers, lakes, and streams are sensitive to pollutants because they are sedentary filter feeders. They vacuum up many pollutants with the food they bring in and cannot escape to new habitats, so they can accumulate toxins in their bodies that may ultimately prove fatal. Very young mussels, called glochidia, are exceptionally sensitive to ammonia in water.

EPA conducted toxicity testing and developed ammonia water quality criteria that would be protective if young mussels may be present in a waterbody. These new criteria will apply to any discharge of ammonia that may pose a reasonable potential to violate the standards. Nearly all discharging domestic wastewater treatment facilities (cities, subdivisions, mobile home parks, etc.), as well as certain industrial and stormwater dischargers with ammonia in their effluent, will be affected by this change in the regulations.

When new water quality criteria are established by EPA, states must adopt them into their regulations in order to keep their authorization to issue permits under the National Pollutant Discharge Elimination System. States are required to review their water quality standards every three years, and if new criteria have been developed they must be adopted. States may develop their own standards but they cannot be less protective. At this time Missouri is opting to move forward with adopting the federal standards while allowing any available flexibility based on actual species of mussels native to Missouri and their sensitivity to ammonia.

Many treatment facilities in Missouri are currently scheduled to be upgraded to comply with the current water quality standards. But these new standards may require a different treatment technology than the one being considered by the permit holder. A list of treatment technologies and their possible treatment capabilities is included in this fact sheet.

It is important that permit holders discuss any new and upcoming requirements with their consulting engineers to ensure their treatment systems will comply with the new requirements. Consulting engineers are responsible for designing treatment systems that will perform as required and will certify the design will work in the setting it is proposed. The department encourages permit holders to construct treatment technologies that can attain effluent quality that support the new EPA ammonia criteria.

Ammonia toxicity varies by temperature and by pH of the water. Assuming a stable pH value, but taking into account winter and summer temperatures, Missouri includes two seasons of ammonia effluent limitations. Typical ammonia effluent limitations for a facility discharging to a stream with no dilution allowances, under the current water quality standard, are:

- Summer – 3.6 mg/L daily maximum, 1.4 mg/L monthly average.
- Winter – 7.5 mg/L daily maximum, 2.9 mg/L monthly average.

Under the new EPA criteria, where mussels are present or expected to be present, typical effluent limitations for a facility discharging to a stream with no dilution allowance would be:

- Summer – 1.7 mg/L daily maximum, 0.6 mg/L monthly average.
- Winter – 5.6 mg/L daily maximum, 2.1 mg/L monthly average.

Operating permits for facilities in Missouri must be written based on current statutes and regulations. It is expected the new ammonia criteria will be adopted in the next review of our standards. Therefore permits will be written with the existing effluent limitations until the new standards are adopted. To aid permit holders in decision making, an advisory will be added to permit fact sheets notifying permit holders about the expected effluent limitations for ammonia. When setting schedules of compliance for ammonia effluent limitations, consideration will be given to facilities that have recently constructed upgrades to meet the current ammonia limitations.

For more information about this topic, contact the Missouri Department of Natural Resources, Water Protection Program at 573-751-1300. Additional guidance is available at water.epa.gov/scitech/swguidance/standards/criteria/aqlife/ammonia/index.cfm.

Disclosure required by Section 640.026, RSMo: Nothing in this document may be used to implement any enforcement action or levy any penalty unless promulgated by rule under chapter 536 or authorized by statute.

The attached chart is not a comprehensive list of technologies. It assumes facilities are designed, operated and maintained to effectively remove ammonia. Consulting engineers must address each facility's particular capabilities and needs. Consulting engineers must certify that any design selected for a specific facility will meet the relevant permit limitations.

Wastewater Treatment Technologies

Key:

A – Preferred when feasible

B – Has demonstrated capability in meeting ammonia when designed appropriately

C – Shows potential for meeting ammonia limitations.

D – Unlikely to meet ammonia limitations, or data inconclusive

Wastewater Technology	Ammonia Effluent Limit (mg/L)			
	< 0.7	0.7 - 1.4	1.5 - 2.5	2.5 - 5.0
Land Application	A	A	A	A
Wetland	D	D	D	D
Facultative Lagoon	D	D	D	C
Aerated, Partial Mix Lagoon	D	D	D	C
Lagoons with Approved Retrofits	C	C	C	B
Recirculating Sand Filter	C	C	C	B
Trickling Filter	D	D	C	B
Oxidation Ditch	B	B	B	B
Extended Aeration Package Plant	D	C	B	B
Sequencing Batch Reactor	B	B	B	B
Biological Nutrient Removal	B	B	B	B
Enhanced Biological Nutrient Removal	B	B	B	B
Membrane Bioreactors	B	B	B	B
Breakpoint Chlorination	D	D	C	C
Moving Bed Biofilm Reactor	B	B	B	B
Integrated Fix Film Activated Sludge	B	B	B	B
Side Stream Nutrient Removal	B	B	B	B

For More Information

Missouri Department of Natural Resources

Water Protection Program

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