

Ammonia Criteria Implementation Stakeholders Meeting **Municipal Discharger Concerns**

October 29, 2014

Overview

- State of the science and the revised water quality criteria for ammonia
- Compliance challenges for municipalities
- Costs associated with compliance
 - Treatment
 - Site-specific handling of criteria
- Implementation questions and need for common framework

Engagement in Criteria Revision Process

- NACWA, clean water community following revision efforts since 2004
- Raised numerous concerns with data and methodologies
- Many concerns not addressed when EPA released draft revision in 2009 (which used bifurcated approach)
- NACWA supported bifurcated approach, but raised a number of technical and policy concerns

Revised Criteria

- Generally address NACWA/clean water community's most pressing technical concerns
- Bifurcated approach, as drafted in 2009, is abandoned
- EPA reaffirms that a recalculation procedure can be used to "correct" the objectives where mussels are absent
- EPA concurrently releases implementation guidance – addressing one of the clean water community's top concerns

Revised Criteria (cont'd)

- Revised criteria values are about half of the 1999 criteria.
- Where unionid mussels are found to be absent and a recalculation is done, the resulting criteria are less stringent (about two times higher) than the 1999 criteria
- So mussels present or absent remains a major issue, but is now left in the hands of utility and/or state to determine if/how to implement

Compliance Challenges

- Different parts of the country likely to experience varying impacts
 - California – Where reuse and GW recharge are prevalent
 - Free chlorine not used to avoid THMs and NDMA
 - Ammonia is added at 1-1.5 parts for chloramination to achieve proper disinfection and reduce formation of DBPs
 - Meeting mussels present criteria will be difficult if not impossible (unless UV or ozone disinfection employed)
 - Midwest/Nationwide – prevalence of lagoon/mechanical plants, especially at smaller utilities, will present major challenges

Compliance Challenges (cont'd)

- Conflicts with other permit requirements
 - Temperature
 - Compliance with temperature standards in winter months could require choice between meeting ammonia criteria or achieving temperature requirements or costly efforts to meet simultaneously
 - Overall nutrient reduction requirements
 - Utilities will need to address challenges of achieving more stringent ammonia criteria in parallel with nutrient reduction requirements

Compliance Challenges (cont'd)

- Some utilities are just installing treatment technologies to meet the 1999 criteria
 - Need time to evaluate the effectiveness of these technologies
- New criteria and resulting permit limits for wastewater facilities will demand new pretreatment permit limits and controls for specific industries discharging to these facilities.
- Need to employ a 'holistic approach' to ensure all environment endpoints are met
 - For example – ammonia requirements likely to impact disinfection (including for reuse purposes), nutrient control, other endpoints
 - Cannot simply look at ammonia in isolation
 - Opportunity for stochastic permitting?

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

Cost of Compliance

- Not a consideration for WQC development, but there are real implications...
 - Costs associated with treating to meet the new limits
 - Costs for any effort involving site-specific criteria development/recalculation (including mussel surveys and associated expenses)

Cost

- Cost impact will be moderate where dilution is high, pH and temperature is moderate – expansion of existing unit processes at secondary or BNR plants may be adequate
- Cost will be very high, where dilution is low, pH, temperature and background are high; resulting very low numeric limits may require two step nitrification process
- Costs will be high to small systems/lagoons and other treatment systems not easily upgraded.

Implementation Considerations/Questions

- Could we remove the aquatic life use in a reasonably sized mixing zone? We do this for pathogens now. For example, the areas immediately surrounding a discharge.
- Need to account for synergistic/antagonistic effects (or physical conditions) – combinations of stressors for mussels in their environment other than ammonia...potentially providing offsets for ammonia's true effect

Implementation Considerations

- Implementation should allow an adequate timeframe/schedule for response and rollout:
 - Consider providing training to utilities for implementation guidance, e.g., sampling/research, sampling location, certification, custody transfer, analysis, temperature
 - Regulatory guidance training for state, regional regulators including interpretive flexibility where necessary
 - Consider a regional/watershed approach where local agencies can pool resources
- A framework, with an agreed upon pathway for addressing presence/absence, could reduce POTW, state regulator burden

Implementation Concerns

- States Typically use 90-99 Percentile coincident conditions for
 - pH
 - Temperature
 - Background
- Extremely low numbers (0.1 mg/l) can result – consider
 - Reaching 0.1 ppm ammonia is not simple or cheap and usually requires polishing of effluent following aeration basin treatment.
 - There will be uncertainty in compliance at this concentration
 - Needs to be addressed in the averaging period/Correct Averaging Times
 - Consideration that the use does not exist at extreme temperature/pH and the background is likely low when temperature is high

Implementation Concerns

- Waters subject to eutrophication – including estuaries may have diurnal high pH driving CCC below 0.1 mg/l
- Lakes and other waters with high temperature
- Background was a moderate issue with old criteria with new criteria
 - Background could reduce or eliminate benefit of dilution resulting in current limits dropping much more than anticipated

Background is Much More Important Now

- Consider a Eutrophication water with 90%
 - pH 8.6
 - Temperature 88
 - Background ammonia 0.12 mg/l

At a Dilution Ratio of 10/1 the Permit Limits are:

- Old Criteria – 2.3 mg/l
- New Criteria – 0.37 mg/l
- NEW CRITERIA DROPS by 6/1

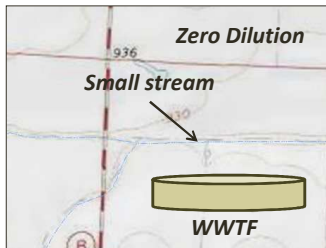
Implementation Considerations

- Use coincident temperature, background and pH statistics
- Determine if the use can exist at the conditions used to determine the permit limit
 - Are mussels reproducing at :
 - pH 8.6 - Temperature 88?

Heavy Burden on Small/Tiny Plants

- Relative burden on very small plants could be a shock
 - A state with 600 NPDES permits may have 500 small plants in this category.
 - There are small plants at most rural schools and many trailer parks, Golf courses and remote retirement communities.

Potential Permit Limits

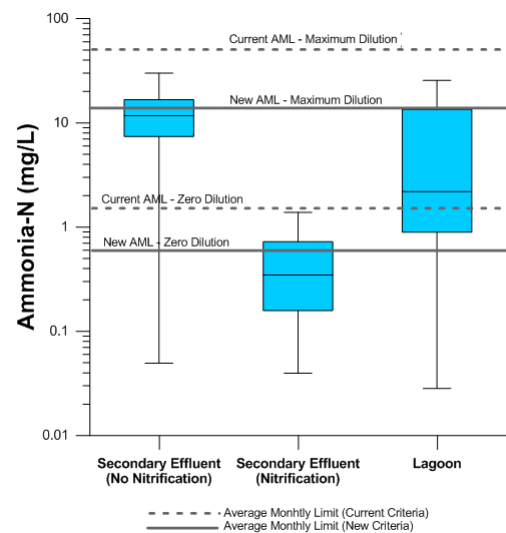


	Average Monthly Limit (mg/L)	
	Summer	Winter
Existing Criteria	1.4	2.9
2013 Mussels Present	0.6	2.2
2013 Mussels Absent	2.4	3.2

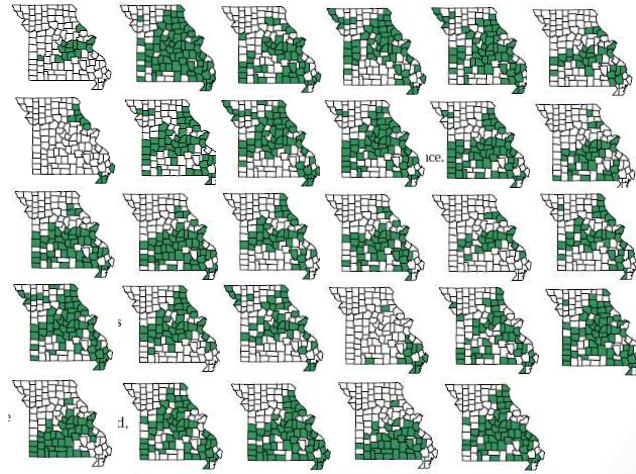


	Average Monthly Limit (mg/L)	
	Summer	Winter
Existing Criteria	50.8	50.8
2013 Mussels Present	14.3	53.4
2013 Mussels Absent	38.7	53.4

Typical Ammonia Effluent



Distribution of 29 Common Mussel Species from Order Unionoida



Source: MDC (1999), *Missouri's Freshwater Mussels*

Missouri DNR Publication 2481 (Issued prior to decision to delay rulemaking)

- Land application preferred
- Other treatment options
 - Oxidation ditch
 - Sequencing batch reactors
 - Biological nutrient removal
 - Enhanced BNR
 - Membrane bioreactors
 - Moving bed fixed film activated sludge
 - Side stream nutrient removal
- Shows potential
 - Lagoons with approved retrofits
 - Recirculating sand filters
- Unlikely to comply
 - Wetlands
 - Facultative lagoons
 - Aerated, partial mix lagoon
 - Trickling filters
 - Extended aeration package plant
 - Breakpoint chlorination

Perryville, MO

- New permit includes wording that future standards may be unobtainable with existing plant
- Study to determine whether to rehabilitate plant or build new plant (~\$15 to \$25M)
 - “biggest thing to happen to Perryville in 50 years”

Season	Current permit	EPA criteria
Summer	5.2 / 1.5	1.7 / 0.6
Winter	10.1 / 3.0	5.6 / 2.1

Milligrams per liter. Daily maximum / monthly average.



Photo by Crystal Lyeria, PerryvilleNews

Tricking filter with UV
1.0 MGD / 1.8 MGD DAF

http://www.perryvillenews.com/news/article_43a0132-3eaa-11e4-b2d2-0017243b1370.html#mode=story