Missouri Department of Natural Resources

Notes from Nutrient Criteria Stakeholders – August 13, 2012

In Attendance: Karen Bataille, MDC; Nick Bauer, St Louis MSD; Dorris Bender, City of Independence; Kurt Bordewick, Kansas City WSD; Robert Brundage, Norman, Comley & Ruth, PC; Mary West Calcagno, Jacobs Engineering; Ed Galbraith, Barr Engineering; John Hoke, MDNR-WPP; Soojung Lim, MDNR-WPP; Rebecca O'Hearn, MDC; Mark Osborn, MDNR-WPP; Kevin Perry, REGFORM; John Rustige, MDNR-WPP; Trent Stober, Geosyntec; Steve Taylor, MO-AG; Phil Walsack, MPUA; Chris Zell, Geosyntec.

On Conference Telephone: Gopala Borchelt, Table Rock Water Quality, Inc., David Casaletto, Ozarks Water Watch; Peter Goode, Washington U/MCE; Leslie Holloway, MO Farm Bureau; Mike Pessina, HDR.

Proposed Rule Overview

Mark reviewed the proposal for lake nutrient criteria that had been presented at the July Technical Subcommittee meeting. There were comments at that meeting that are still being reviewed, thus the proposed criteria presented may undergo further revision. Mark requested that follow-up discussion should focus more on RIR revisions then the actual criteria numbers that were presented.

The previously proposed criteria are outlined in Table 1. These criteria had been derived from lines of evidence that had been developed by EPA, MDNR, and the Regional Technical Assistance Group (RTAG) that had made benchmark recommendations for EPA Region VII (IA, KS, MO, NE).

Table 1: Previously Proposed Criteria.

	TP (µg/L)	TN (µg/L)	Chl-a (µg/L)
Plains	50	1000	10.0
Ozarks	20	500	6.0

There had been objections to these criteria raised by UMC and MDC staff, among others, due to concerns on impact to lake fisheries. Recent research showed that in Missouri reservoirs, higher nutrient concentrations are needed to support healthy fish populations. Therefore MDNR requested specific recommendations from these entities, and specified that response criteria (Chl-a and Secchi depth) were of primary concern. UMC and MDC staff obliged and provided the recommendations as shown in Table 2.

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Table 2: UMC and MDC recommendations.

	Chl-a (µg/L)	Secchi Depth
Plains	30.0	0.6
Ozark Border	22.0	0.7
Ozark Highland	15.0	0.9

Rationale for these numbers were based on a number of factors, including findings that fish biomass and production increase with higher concentrations of TP and Chl-a, and that nutrient reductions have led to declines in sport fisheries. A central component of these findings was a 2012 study by Michaletz, Obrecht, and Jones that supported these findings for small impoundments (<1000 acres). It determined a threshold range of 40-60 µg/L Chl-a, beyond which sport fishery growth and structure ceased to benefit.

However, it must be kept in mind that sport fishing, while important, is not the only designated or existing use for these water bodies. Other types of recreation, such as whole body contact, are more optimal when Chl-a levels are lower and Secchi depth readings are greater than what is suggested in Table 2. Also, the frequency and intensities of algae blooms that are associated with higher Chl-a levels can pose a risk to drinking water systems.

Mark determined that the most practical way to resolve this conflict was to utilize lake classification in assigning criteria. The State has assigned three classifications to lakes. L1 lakes are used as sources for drinking water. L2 are the large reservoirs, generally with an area greater than 1,000 acres. L3 are the remaining lakes, most of which are smaller in size, and which are managed primarily for recreational fishing.

Drinking water supplies need to be protected against conditions that can lead to taste and odor problems, potential health problems, and strains on water treatment systems. L1 lakes were therefore assigned more conservative limits for Chl-a, as well as TN and TP.

L2 lakes, due to their size, have more complex morphologies than other lakes, as well as a broader variety of common existing uses, including whole body and secondary contact. The area near the dam, being the deepest part of the lake, tends to be at relatively low trophic levels when compared with the upper reaches of the lake. Since water quality samples that are used for assessment purposes are taken at the deeper end, a conservative criterion for these lakes, based on the aforementioned lines of evidence, is appropriate.

For the L3 lakes, which are generally smaller and managed primarily for the optimization of fisheries, the recommendations from UMC and MDC were considered to be the most appropriate. There would be more latitude given for nutrient concentrations, but not so much as to run the risk of hyper-eutrophic conditions.

Criteria for TN and TP are based on their relationship to the desired levels of Chl-a. The model that EPA used for the development of nutrient criteria in Florida was employed for this purpose. This involves the

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regression relationship between the nutrient (x-axis) and Chl-a (y-axis). With the Chl-a criteria set for each of the lake classifications within each eco-region, the standard criteria for TN and TP is the point on the x-axis that corresponds where the 75th percentile of the prediction interval of the regression line is equal to the Chl-a criterion.

This results in a conservative value for the nutrient (TN or TP), which can be allowed an alternative criteria if and only if the lake in question has been in compliance with the Chl-a criteria for the previous three years. The alternative criterion is a range that spans from the standard criterion to the point on the x-axis that corresponds to where the Chl-a limit meets the 25th percentile of the prediction interval. Nutrient criteria that are derived from this model are in Table 3.

Table 3: General Ecoregional Nutrient Criteria [Alternative Criteria in Brackets]

Lake Ecoregion	Lake Class	Chl-α	TP	TN
Plains	**L1**	**10.0**	**20 [20-34]**	**490 [490-660]**
	L2	**12.0**	**29 [29-45]**	**600 [600-900]**
	L3	**30.0**	**58 [58-101]**	**900 [900-1400]**
Ozark Border	**L1**	**10.0**	**20 [20-34]**	**490 [490-660]**
	L3	**22.0**	**42 [42-76]**	**700 [700-1100]**
Ozark Highlands	**L1 & L2**	**6.0**	**13 [13-21]**	**370 [370-500]**
	L3	**15.0**	**29 [29-50]**	**550 [550-850]**

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RIR Update

Mark reminded the group of the reasoning for developing the RIR, citing 640.014 RSMo, and stated that the RIR update is the current priority for meeting the rulemaking schedule. Further discussion of the nutrient rule would be deferred until after RIR updating is complete. Mark had sent out copies of the previous RIR for review to provide context to the discussion. Updates were proposed for questions # 2 ("A report on the peer-reviewed scientific data used to commence the rulemaking process"), 3("A description of the persons who will most likely be affected by the proposed rule, including persons that will bear the costs of the proposed rule and persons that will benefit from the proposed rule"), and 4("A description of the environmental and economic costs and benefits of the proposed rule").

For question #2, Mark informed the group that a narrative had been added that describes events and analyses used after the denial of the previous rule by EPA. This included consultations with EPA, technical subcommittee meetings, and the resulting revisions to the rule.

For question #3, there was an upward revision for the number of permitted facilities located in lake watersheds, based on the assumption that the revised classification system for waters of the State would include several additional lakes that would be affected by the rule.

Proposed revisions for question #4 included changes to the numbers of lakes estimated to be in violation of the proposed criteria and adjustments to the costs for upgrades of wastewater treatment plants that would result. The compilation of lake numbers for possible 303(d) listing is tentative, and based on listing methodology from 2010. The total number of affected lakes went from 55 to 39, most of which would be listed for all three parameters: TP, TN, and Chl-a. The remainder would be listed for one or two of the parameters. Significantly, there were none that would listed for Chl-a alone, which was an issue from listing that resulted from the previous rule.

In estimating costs for treatment facilities, the following assumptions were made:

- Upgrades would be required only for facilities located within the watersheds of lakes that are listed as impaired.
- Lagoons would be converted to mechanical plants.
- Mechanical plants would have chemical and/or biological nutrient removal technology installed.
- Costs were derived from a cost/benefit study that had been presented by the Colorado Water Resources and Power Development Authority at the MPUA nutrient conference in 2011.

The Colorado study included a range of costs based in part on facility design flow. The lowest bin in this category is less than 0.5 MGD, which is a range that includes most of the facilities that would be affected by this rule. A more detailed cost gradient for this range may be needed. Projected costs that are based on this study are in Tables 5a and 5b.

Table 5a: Capital Costs (per gallon of daily design flow).

Design Flow (MGD)	<0.5	>0.5
Mechanical Plant Installation	$6.92	$2.83
Mechanical Plant Upgrade	$2.72	$1.46

Table 5b: Operation and Maintenance Costs (per gallon of daily design flow).

Design Flow (MGD)	<0.5	>0.5
Mechanical Plant Installation	$0.44	$0.44
Mechanical Plant Upgrade	$0.26	$0.11

The number of facilities that may require an upgrade is considerably higher than what was reported in the previous RIR. This is probably due to the inclusion of facilities that discharge toward the Lake of the Ozarks. The previous analysis only included the Niangua Arm of that water body. This includes 140 public and 566 private facilities for a total of 706.

Total costs for capital improvements as well as operation and maintenance on a yearly basis were estimated by first classifying these facilities by need of replacement or upgrade, then multiplying the

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design flows by the corresponding figures in Tables 5a and 5b. The resulting total capital and yearly operation and maintenance costs were then summed up. The public sector cost was estimated at just over $100M, and the private sector cost was just over $37M. Calculation of capital costs in terms of amortization on a yearly basis would result in a lower estimate.

Comments and Discussion

- The numbers that were presented were brought into question. Mark acknowledged that the use of the information from the Colorado study was only intended as a "broad brush" guide. If any of the participants had more specific information concerning upgrade costs, they could share this with Mark. John Rustige informed the group that the Permits Section of the Water Protection Program has been using a spreadsheet model (CAPDET) to estimate costs for facility upgrades, and he would share it with Mark.
- Steve Taylor expressed concern that the RIR may not be adequately addressing the nonpoint component of nutrient impairment. He mentioned a letter that he had written on behalf of MO-AG to the US ACE, and had presented to the Clean Water Commission that may be of use in completion of the RIR, and he forwarded it to Mark.
- Robert Brundage objected to the chlorophyll-a criteria for drinking water lakes, saying that reliance on general literature values is not sufficient. He would like to see specific evidence that chl-a levels higher than 10 µg/L has led to drinking water problems in Missouri. Mark replied that a request for such information has been submitted to the Public Drinking Water Program.
- There is a question as to whether TP and TN criteria will be used. Chlorophyll-a is the primary criteria, but the nutrient criteria are considered as necessary to support that. Further discussion of this question will be pursued.

Follow-up

- Mark will provide a list and corresponding data for the 39 lakes that are currently estimated to be out of compliance with the proposed criteria.
- Mark will continue investigating costs the most current costs for construction and operation of wastewater facilities and incorporate them in the RIR.

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