



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7**

11201 Renner Boulevard
Lenexa, Kansas 66219

29 MAR 2017

Mr. John Mitchell
Director, Division of Environment
Kansas Department of Health and Environment
1000 SW Jackson Street, Suite 540
Topeka, Kansas 66612-1368

Dear Mr. Mitchell:

On April 16, 2015, the U.S. Environmental Protection Agency received a submittal of new and revised water quality standards from the Kansas Department of Health and Environment. These WQS were approved by the Secretary of Health and Environment on February 12, 2015, became effective under state law on March 20, 2015, and were transmitted to the EPA under a cover letter dated March 27, 2015. The submittal package included a certification letter from the Kansas Attorney General's Office, dated February 3, 2015.

Today, the EPA is acting on an important component of the state's WQS submittal. Specifically, it is approving 81 site-specific chlorophyll-*a* criteria established for the protection of the domestic water supply use. The EPA will act on other components of the state's WQS submittal at a later date.

DESCRIPTION OF CRITERIA

The Kansas WQS at K.A.R. 28-16-28e(e) adopt the following document by reference: *Kansas Surface Water Quality Standards: Tables of Numeric Criteria* (January 21, 2015). This document contains two new tables bearing directly on the establishment of chlorophyll-*a* criteria: Table 1k ("Chlorophyll-*a* Criteria for Lakes and Reservoirs with Active or Reserve Domestic Water Supply Use") and Table 1l ("Current Lakes or Reservoirs Serving as Active or Reserve Domestic Water Supply").

Table 1k is referenced at two locations in the WQS: K.A.R. 28-16-28b(uu) and K.A.R. 28-16-28e(e). This table establishes a default chlorophyll-*a* criterion of 10 µg/L for water supply lakes and reservoirs with insufficient monitoring data (i.e., with fewer than four chlorophyll-*a* observations over the most recent 12-year sampling period). It also specifies that chlorophyll-*a* criteria for lakes/reservoirs with sufficient monitoring data shall be the lesser value of either 10 µg/L or the running long-term (12-year) average concentration. Table 1k is reproduced in its entirety in Enclosure A. A memorandum from KDHE clarifying the state's intended application of this table is provided in Enclosure B.

Table 1l identifies 82 public water supply systems by name and waterbody number under the heading "Current Lakes or Reservoirs Serving as Active or Reserve Domestic Water Supply." Table 1k explicitly links chlorophyll-*a* criteria to "Lakes or Reservoirs with Active or Reserve Domestic Water Supply Use." During a February 14, 2017, conference call with the EPA, KDHE confirmed that criteria



presented in Table 1k apply only to waters listed in Table 1l. The department subsequently provided an Excel spreadsheet that calculated site-specific chlorophyll-*a* criteria for all waters listed in Table 1l using the methodology described in Table 1k. These site-specific criteria are presented in Enclosure C.

BASIS FOR TODAY'S DECISION

Pursuant to Section 303(c) of the Clean Water Act (33 U.S.C. § 1313(c)), and 40 CFR §§ 131.20 and 131.21, states must review their WQS at least every three years and submit any new or revised WQS to the EPA for review and approval or disapproval. Water quality standards submittals containing new or revised site-specific criteria must include the methodologies and analyses used to develop these criteria (40 CFR §§ 131.6(b) and 131.20(c)). The EPA must determine whether the criteria are based on sound science and protect the designated use, pursuant to 40 CFR §§ 131.5(a), 131.6, 131.11 and 131.21(b).

KDHE's WQS submittal contains an 11-page technical report: *Water Quality Standards White Paper: Chlorophyll-A Criteria for Public Water Supply Lakes and Reservoirs* (January 10, 2011). This report discusses applicable EPA guidance and various scientific studies focusing on the development and application of chlorophyll-*a* criteria. The department's maximum allowable site-specific criterion for chlorophyll-*a* (10 µg/L) is supported by the following lines of evidence:

- This criterion equals the 75th percentile mean chlorophyll-*a* value calculated previously for the state's entire population of reference lakes and reservoirs. Ecoregions were combined in this analysis, because they exerted no significant effect on mean chlorophyll-*a* concentration (Dodds *et al.* 2006; see also Gibson *et al.* 2000).^{1,2}
- This criterion approaches the 8 µg/L "benchmark" chlorophyll-*a* value derived previously for lakes/reservoirs in EPA Region 7 (RTAG 2011).³ It also is in line with mean chlorophyll-*a* values calculated previously for specific ecoregions using a regression based methodology that expressed chlorophyll-*a* as a function of anthropogenic land use (Dodds *et al.* 2006). Only two ecoregions in Kansas yielded significant regression models: Flint Hills (intercept = 9 µg/L); Central Irregular Plains (intercept = 11 µg/L).
- This criterion value is supported by scientific studies showing that Cyanobacteria relative biomass and the potential for nuisance algal blooms tend to increase in a geometric manner as chlorophyll-*a* concentrations increase beyond 10 µg/L (Walker 1985; Downing *et al.* 2001).^{4,5}

¹ Dodds *et al.* 2006. Determining ecoregional reference conditions for nutrients, Secchi depth and chlorophyll-*a* in Kansas lakes and reservoirs. *Lake and Reservoir Management* 22(2):151–159.

² Gibson *et al.* 2000. *Nutrient Criteria Technical Guidance Manual: Lakes and Reservoirs*. EPA-822-B00-001. U.S. Environmental Protection Agency, Office of Water/Office of Science and Technology, Washington, DC.

³ RTAG. 2011. *Nutrient Reference Condition Identification and Ambient Water Quality Benchmark Development Process: Freshwater Lakes and Reservoirs within USEPA Region 7*. Regional Technical Advisory Group. Report accessible at http://biosurvey.ku.edu/sites/biosurvey.ku.edu/files/docs/cpcb/workgroups/nutrient/Lake_RTAG_2011Jun.pdf.

⁴ Walker. 1985. Statistical basis for mean chlorophyll-*a* criteria. Pages 57–62 in: *Lake and Reservoir Management: Practical Applications*. Proceedings of the Fourth Annual Conference and International Symposium, McAfee, NJ, October 16–19, 1984. North American Lake Management Society.

⁵ Downing *et al.* 2001. Predicting Cyanobacteria abundance in lakes. *Canadian Journal of Fisheries and Aquatic Sciences* 58:1905–1908.

Collectively, the above considerations indicate that the state's maximum allowable chlorophyll-*a* criterion (10 µg/L) is consistent with (a) applicable federal guidance, (b) scientific studies addressing the ecoregional reference condition and (c) scientific studies addressing the relationship between chlorophyll-*a* and the potential for algal blooms and related water quality issues. The EPA finds that the 10 µg/L criterion and other, more protective site-specific criteria described in Enclosure A are scientifically defensible and supportive of the domestic water supply use. With one exception discussed in the following paragraph, the EPA approves Table 1k, the two references to this table (K.A.R. 28-16-28b(uu) and -28e(e)), and Table 1l.

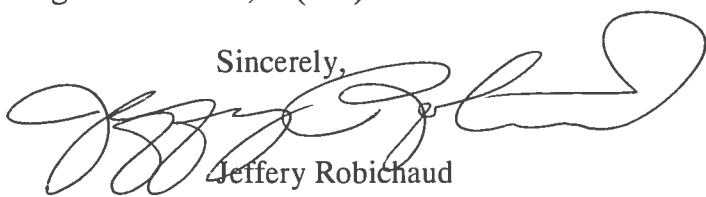
Footnote c in Table 1k establishes an 11 µg/L chlorophyll-*a* criterion for Cheney Reservoir (LM017001) based on the findings of Smith *et al.* (2001).⁶ However, during a February 7, 2017, conference call with the EPA, KDHE indicated that this criterion should have been set at 10 µg/L based on the revised recommendations of Smith *et al.* (2002).⁷ The EPA is deferring action on footnote c, which will provide KDHE an opportunity to revise the chlorophyll-*a* criterion for Cheney Reservoir.

ADDITIONAL COMMENTS

The department is reminded that, ultimately, it must adopt criteria that are protective of all surface waters falling under the jurisdiction of the Clean Water Act. Pursuant to 40 CFR §§130.3 and 131.11, criteria must be based on a sound scientific rationale and must contain sufficient parameters to protect the designated use. For waters with multiple use designations, criteria must support the most sensitive use.

The EPA appreciates KDHE's continuing efforts to protect and restore water quality and its overall commitment to the triennial WQS review and revision process. The Agency looks forward to working with the department on future WQS revisions, including the establishment of numeric nutrient criteria for other waters, other designated uses, and other water quality parameters such as total phosphorus and total nitrogen. Should you have any questions or comments regarding today's action, please contact John DeLashmit, Chief, Water Quality Management Branch, at (913) 551-7821.

Sincerely,



Jeffery Robichaud
Acting Director
Water, Wetlands and Pesticides Division

Enclosures

cc: Tom Stiles, KDHE
Corey Buffo, EPA HQ

⁶ Smith *et al.* 2001. *A Comparative Water Quality Study of Cheney Reservoir, Kansas*. Final Report to the City of Wichita Water and Sewer Department.

⁷ Smith *et al.* 2002. Managing taste and odor problems in a eutrophic drinking water reservoir. *Lake and Reservoir Management* 18(4):319-323.

ENCLOSURE A
 TABLE 1K, FROM "KANSAS SURFACE WATER
 QUALITY STANDARDS: TABLES OF NUMERIC CRITERIA" (JANUARY 21, 2015)

Table 1k. Chlorophyll-a Criteria For Lakes Or Reservoirs With Active^a Or Reserve^b Domestic Water Supply Use.

	Lakes or Reservoirs with Domestic Water Supply Use
Chlorophyll-a	The lesser value ^c of 10 µg/L or long-term average ^d

- a. These lakes or reservoirs are currently being used as domestic water supply sources.
- b. These lakes or reservoirs are not currently being used as domestic or public water supply sources, but they are listed as backup supplies by municipalities and other public water suppliers, or the active water rights for water supply uses are still being held by the municipalities and other public water suppliers.
- c. With an exception for Cheney Lake, the criterion for Cheney Lake is set at the action level of 11 µg/L according to "A Comparative Water Quality Study of Cheney Reservoir, Kansas" by Smith et al, 2001.
- d. Running average of a minimum of 4 samples over a 12-year period. For any lake or reservoir with insufficient data, the criterion is set at 10 µg/L until a long-term average can be calculated, and the new criterion will be the lesser value of 10 µg/L or the long-term average.

ENCLOSURE B
MEMORANDUM FROM KDHE ADDRESSING
CHLOROPHYLL-A CRITERIA ESTABLISHED IN TABLE 1K

From: Trevor Flynn
To: Angelo, Robert
Cc: Sena, Angela; Leavitt, Ann; Julia Young
Subject: chlorophyll data clarification
Date: Tuesday, February 21, 2017 3:40:40 PM
Attachments: Chlorophyll Lake data.xlsx

Bob,

I have attached an updated chlorophyll data file with all the lakes listed in Table 1I, the only edit from the previous version is I added the three lakes that do not have any chlorophyll data. By default, these three lakes are assigned a criteria of 10 ug/L.

Per our conversation today we would like to clarify that the proposed chlorophyll-a criteria is a seasonal criteria based on how our program samples lakes. Therefore the 10ug/L criteria would be applied as a seasonal average. If the long term average is less than 10 ug/L, based on the most recent 12 year period of sampling data with a minimum of 4 samples, this value would be utilized as the criteria. We recognize that this value would change with additional samples, but it would never exceed 10ug/L.

Please let me know if you have any additional questions or require any further clarification. Thanks.

Trevor

R. Trevor Flynn

Watershed Planning, Monitoring, and Assessment Section
Bureau of Water, Kansas Department of Health and Environment
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ENCLOSURE C
KANSAS SITE-SPECIFIC CRITERIA FOR CHLOROPHYLL-A

Waterbody Number	Waterbody Name	Criterion Conc. (µg/L)
LM050001	Alma City Lake	10
LM040001	Augusta City Lake	10
LM041601	Augusta Santa Fe Lake	10
LM032001	Banner Creek Lake	10
LM031001	Big Hill Lake (Pearson-Skubitz Big Hill Lake)	10
LM046401	Blue Mound City Lake	10
LM043901	Bone Creek Lake	6.58
LM046201	Bronson City Lake	10
LM072601	Caney City Lake (Timber Hill Lake)	10
LM013001	Cedar Bluff Lake	6.85
LM044101	Cedar Creek Reservoir	6.68
LM040701	Cedar Valley Lake	10
LM073701	Centralia Lake	10
LM017001	Cheney Lake	10
LM030001	Clinton Lake	10
LM043001	Council Grove City Lake	8.53
LM022001	Council Grove Lake	9.34
LM051301	Critzer Lake	10
LM064901	Crystal Lake	10
LM071701	Edna City Lake	10
LM033001	El Dorado Lake	10
LM025001	Elk City Lake	10
LM040201	Eureka Lake (Eureka Old City Lake)	10
LM023001	Fall River Lake	10
LM045001	Fort Scott City Lake	10
LM040401	Gardner City Lake	10
LM040601	Garnet North City Lake	10
LM040801	Harveyville Lake (Harveyville City Lake)	10
LM069701	Herington City Lake	10
LM047201	Herington Reservoir	10
LM035001	Hillsdale Lake	10
LM073901	Jetmore Lake	10
LM026001	John Redmond Lake	10
LM016001	Kanopolis Lake	10
LM043401	Lake Kahola	10
LM041201	Lebo City Lake	10
Not assigned	Linn Valley Lake	10

Waterbody Number	Waterbody Name	Criterion Conc. (µg/L)
LM065701	Louisburg Old Lake	10
LM043801	Louisburg SFL (Louisburg Middle Creek SFL)	10
LM065901	Lyndon City Lake	10
LM051801	Madison City Lake	10
LM020001	Marion Lake	10
LM027001	Melvern Lake	5.35
LM019001	Milford Lake	10
LM051001	Miola Lake (Lake Miola)	10
LM013601	Mission Lake	7.76
LM071901	Moline Reservoir	10
LM051401	Mound City Lake	10
LM048701	Murray Gill Lake (Quivira Boy Scout Lake)	4.68
LM049901	New Alma City Lake	10
LM061301	New Olathe Lake	10
LM053801	New Yates Center Lake (Yates Center Reservoir)	6.80
LM010001	Norton Lake (Sebelius Lake)	10
LM066101	Osage City Reservoir	10
LM053901	Otis Creek Lake (Eureka)	10
LM066301	Parker City Lake	10
LM041401	Parsons Lake	9.45
LM029001	Perry Lake	10
LM044201	Pleasanton Reservoir (Pleasanton City Lake East)	10
LM012701	Polk Daniels Lake (Elk Co. SFL)	10
LM028001	Pomona Lake	10
LM073001	Pony Creek Lake	10
LM061901	Prairie Lake	10
LM066601	Prescott City Lake	10
LM022501	Quarry Lake	10
LM046801	Richmond City Lake	10
LM011501	Sabetha City Lake	10
LM072001	Sedan City South Lake	10
LM072101	Severy City Lake	10
LM073501	Spring Hill City Lake	10
LM051201	Stowbridge Reservoir (Carbondale East Lake)	10
LM049601	Thayer New City Lake	10
LM069101	Timber Lake	10
LM024001	Toronto Lake	10
LM021001	Tuttle Creek Lake	10
LM042001	Wabaunsee Co. Lake	10
LM018001	Waconda Lake	10
LM042201	Wellington Lake (Wellington Old City Lake)	6.33
LM042301	Wellington New City Lake	10

Waterbody Number	Waterbody Name	Criterion Conc. (µg/L)
LM050801	Winfield City Lake	10
LM074401	Xenia Lake	10
LM069201	Yates Center Reservoir (South Owl Lake)	10