KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT

DIVISION OF ENVIRONMENT

REGULATORY IMPACT STATEMENT

PURSUANT TO K.S.A. 2016 SUPP. 77-416

Proposed Amendments to Regulations K.A.R. 28-16-28b, 28-16-28d, 28-16-28e, 28-16-28f

Proposed New Regulations 28-16-28h

JUNE 19, 2017

Regulatory Impact Statement
K.A.R. 28-16-28b, K.A.R.28-16-28d, K.A.R. 28-16-28e, K.A.R. 28-16-28f and 28-16-28h

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I. Executive Summary of Proposed Amendments

A. Introduction

K.A.R. 28-16-28b through 28-16-28h comprise what is referred to as the Kansas Surface Water Quality Standards (KSWQS). In accordance with section 303 of the Clean Water Act (CWA), states must review and revise their surface water quality standards (WQS) once every three years, which is referred to as the triennial review. According to the CWA, the public must be involved in the triennial review process. The CWA does not state how this is to be done, but it was the intent of Kansas Department of Health and Environment (KDHE) to get the most public involvement as possible.

In 2014, Kansas entered into a pilot project with the Environmental Protection Agency (EPA) for the development of a multiple-discharger variance (MDV) project to address the problems lagoons throughout Kansas would have when implementing the new ammonia criteria limits released by EPA in 2013. On August 21, 2015, EPA released the Water Quality Standards Regulatory Revisions; Final Rule, which included new regulations for water quality criteria variances. Due to the release of the Final Rule, KDHE identified the need to revise the variance regulation K.A.R. 28-16-28f(d) and all other associated regulations affected by the revisions to K.A.R. 28-16-28f(d). A new regulation, K.A.R. 28-16-28h, is being proposed to document adopted and approved variances and as a venue to make variances available for public review. KDHE and EPA representatives conducted monthly conference calls that gradually changed to bimonthly calls to work through the details of the MDV and the regulation package.

Another proposed regulatory update being presented is the revision of the acute and chronic aquatic life criteria for ammonia as presented in the "Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater 2013" guidance, released by EPA in 2013 as a national recommended criteria.
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B. Summary of Proposed Amendments

There are many style and editorial changes to the regulations. The major amendments proposed are the:

- revision of K.A.R. 28-16-28b Definitions;
- revision of K.A.R. 28-16-28d(c), 28-16-28d(d)(1) and 28-16-28d(d)(3);
- revision of K.A.R. 28-16-28e(c)(1), 28-16-28e(c)(2), 28-16-28e(d)(2)(D)(ii), and 28-16-28e(e)
- revision of K.A.R. 28-16-28f(d) Variances;
- creation of a new regulation K.A.R. 28-16-28h, Kansas surface WQS variance register; and

- adoption of the 2013 chronic and acute aquatic life ammonia criteria in the Kansas Surface Water Quality: Standards Tables of Numeric Criteria.

II. Economic Impact Statement

1. Are the proposed regulations or amendments mandated by federal law as a requirement for participating in or implementing a federally subsidized or assisted program?

Yes. Section 303 of the Clean Water Act (CWA) requires States that have assumed authority and responsibility for water quality programs from the Environmental Protection Agency (EPA) to conduct a review of existing WQS from time to time, but at least once every three years. States are to amend their WQS following the triennial review in response to public participation, new available science, and/or newly adopted federal requirements. Following the adoption of the revised WQS, they must be submitted to the EPA for approval.

2. Do the proposed regulations or amendments exceed the requirements of applicable federal law?

No. The proposed WQS are set by federal regulations and EPA guidelines authorized by the CWA.

3. Description of costs to agencies, to the general public and to persons who are affected by, or are subject to, the regulations:

The core requirements of the WQS have not been changed substantially. Adoption of the 2013 ammonia criteria may have a potential cost associated with implementation. The majority of mechanical wastewater facilities can meet the proposed 2013 ammonia criteria with current technology. A large number of (~327) municipal wastewater lagoons may not be able to meet the 2013 ammonia criteria, which is 52-56% lower than the current criteria. When implemented, the water quality standards variance regulations will aid NPDES facilities in attaining the highest attainable condition at a minimal or no cost to the facility. Without the variance, municipalities with lagoon wastewater systems would be subject to incurring significant costs to implement technology to meet the 2013 ammonia criteria.

The cost of implementation would mostly be incurred by KDHE for the regulations pertaining to water quality standards variances and other revised regulations.

a. Capital and annual costs of compliance with the proposed regulations or amendments and the persons who will bear those costs.

Amendments to K.A.R. 28-16-28b Definitions: No additional capital cost is expected for the regulated communities. The cost of implementation will be borne by KDHE.

Amendments to K.A.R. 28-16-28d(c), 28-16-28d(d)(1) and 28-16-28d(d)(3): No additional capital cost is expected for the regulated communities. The cost of implementation will be borne by KDHE.

Amendments to K.A.R. 28-16-28e(c)(1), 28-16-28e(c)(2), 28-16-28e(d)(2)(D)(ii), and 28-16-28e(e): No additional capital cost is expected for the regulated communities. The cost of implementation will be borne by KDHE.

K.A.R. 28-16-28f(d) Variances: No additional capital cost is expected for the regulated communities. The cost of implementation will be borne by KDHE. This regulation could aid NPDES facilities that cannot afford facility modifications required to meet criteria limits set forth in the water quality standard regulations.

New regulation K.A.R. 28-16-28h, Kansas surface water quality standards variance register: No additional capital cost is expected for the regulated communities. The cost of implementation will be borne by KDHE.

Amendments to the Kansas Implementation Procedures - Surface Water Quality Standards: Section 4, Surface Water Quality Standards Variances, was added to the *Kansas Implementation Procedures - Surface Water Quality Standards* to address the implementation of K.A.R. 28-16-28f(d). The cost of implementation will be borne by KDHE.

New Kansas Surface Water Quality Standards Variance Register: The "Kansas Surface Water Quality Standards Variance Register" is the mechanism to document surface water quality standard variances that have been adopted by the State and made available to the public. The cost of implementation will be borne by KDHE.

Amendments to the Kansas Surface Water Quality: Numeric Criteria Tables 1a, 1c, 1d and 1e - Adopting the 2013 chronic and acute aquatic life ammonia criteria: Numeric Table 1a was revised to reference the appropriate numeric tables for proposed ammonia criteria. Numeric Table 1c has been revised to meet new total ammonia acute criteria and Table 1d has been revised to meet the new total ammonia chronic criteria.

Numeric Table 1e has been deleted. The regulated community may incur additional costs with the implementation of the new criteria limits. Recommended revisions to Table 1a, 1c and 1d can be found in Appendix A.

b. Initial and annual costs of implementing and enforcing the proposed regulations or amendments, including the estimated amount of paperwork, and the state agencies, other governmental agencies or other persons or entities who will bear the costs.

KDHE will bear sole responsibility for implementing and enforcing the proposed regulations. The anticipated fiscal impact for SFY 14 through SFY 17 by the amended KSWQS will be negligible since the additional workload will be absorbed by existing KDHE Bureau of Water staff.

c. Costs which would likely accrue if the proposed regulations or amendments were not adopted; the persons who will bear the costs and those who will be affected by the failure to adopt the regulations.

For the proposed surface water quality standards variance regulatory amendments, adopting the proposed regulations allows the regulated community the ability to request and the state the ability to adopt a variance for a designated use or criteria or waterbody with the intent of improving water quality. A WQS variance is a flexible mechanism of water quality protection that may be requested by an individual or group of dischargers who believe they cannot meet their current permit limit and are also uncertain whether the permit limit can ultimately be achieved. WQS variances are a time-limited designated use and/or criteria that reflects the highest attainable condition (HAC) as an alternative to one or more of the criteria of K.A.R. 28-16-28e while maintaining all other applicable WQS standards. When a WQS variance is adopted the HAC will be the National Pollutant Discharge Elimination System (NPDES) permit limits where a designated use(s) and/or criteria cannot currently be met due to one of the factors cited in the proposed K.A.R. 28-16-28f(d)(5). A WQS variance may also be appropriate when a facility has opportunities to improve water quality, but the timeframe is uncertain as to when the criteria will be consistently met.

For the ammonia and other numeric criteria, adopting the National Recommended Criteria (304(a)) is always recommended by EPA since the 304(a) criteria reflect the latest available data and scientific knowledge. EPA also recommends the 304(a) criteria be adopted within two Triennial Review cycles after the publication dates of the criteria. With consideration of potential costs to the regulated communities, at this time KDHE has proposed to adopt the 2013 ammonia criteria of the National Recommended Criteria.

If a state is taking too long to adopt the 304(a) criteria, EPA may promulgate the criteria on behalf of the state. For example, EPA promulgated the National Toxics Rules which applies to Kansas and a few other states. If EPA promulgates the 2013 ammonia criteria without the ammonia variance language, lagoon wastewater treatment plants would incur a significant financial burden to meet the promulgated criteria limits by having to upgrade their treatment facilities.

If the WQS variance regulations are not adopted significant costs could be placed upon the regulated community because they would not have the flexibility to request a WQS variance if needed. For example, if the ammonia criteria is approved without the accompanying variance provisions the financial burden of implementation would significantly impact municipalities with wastewater lagoons that cannot meet the new proposed ammonia criteria. The state will be able to implement the proposed ammonia criteria with minimal financial impact on the regulated community with the concurrent adoption of the proposed WQS variance regulations and the "Multiple-discharger Wastewater Lagoon Ammonia Variance" as written in the "Kansas Surface Water Quality Standards Variance Register." There may be costs incurred by larger waste water treatment lagoon systems that do not meet the proposed ammonia criteria and are not eligible to receive a variance.

d. A detailed statement of the data and methodology used in estimating the costs used in the statement.

The data used to estimate cost was based on current employee salaries, laboratory costs, and contractual obligations. The method used to determine cost was a simple estimation based on past experiences and costs incurred.

e. Description of any less costly or less intrusive methods that were considered by the agency and why such methods were rejected in favor of the proposed regulations.

KDHE is aware of the current economic conditions and has only proposed changes that are considered the most important and cost effective. Overall, the costs to implement the changes are considered minimal. KDHE bears the majority of the potential costs for implementation.

f. Consultation with League of Kansas Municipalities, Kansas Association of Counties, and Kansas Association of School Boards.

Copies of the proposed regulations, regulatory impact statement and notice of hearing were mailed electronically to these groups at the beginning of the public comment period.

III. Environmental Benefits Statement

1. Need for proposed amendments and environmental benefit likely to accrue.

a. Need

These regulations are being proposed as a partial submission of the triennial review process to be in in compliance with section 303 of the CWA. The need for this partial submission is to provide the regulated community with the most current mechanism to obtain a water quality standards variance if they are unable to immediately meet the current water quality criteria and use due to one of the reasons listed in the proposed K.A.R. 28-16-28f(d)(5). Adopting the proposed regulations in K.A.R. 28-16-28f(d) concurrently with the 2013 ammonia criteria and the "Multiple-discharger Wastewater Lagoon Ammonia Variance" is needed to minimize the impact on the regulated community while improving the quality of the waters of the State.

b. Environmental benefit

A variance is a mechanism that provides time for individual or a group of regulated facilities to implement adaptive management approaches that will improve water quality where the designated use and criteria currently in place are not being met, but still retain the designated use as a long term goal. When a time-limited water quality standards variance is adopted it allows for the flexibility to temporary modify the water quality standards to the highest attainable use and criteria when one of the criteria listed in the proposed K.A.R. 28-16-28f(d)(5) . These varied use and criteria then serve as the basis for the permit limits that a discharger can meet for the duration of the variance. Since variances are criteria and use specific, all other applicable criteria for other pollutants will be retained to meet the goals of the water body or waterbody segments.

In accordance with section 304 of the CWA, EPA must from time to time develop, revise, and publish water quality criteria that accurately reflect the latest scientific knowledge. In 2013, EPA published a new aquatic life criteria for ammonia. KDHE is recommending the adoption of the new aquatic life criteria for ammonia and is committed to protecting the environment and public health. Concurrent adoption of the "Multiple-discharger Wastewater Lagoon Ammonia Variance" and 2013 ammonia criteria maximizes the environmental benefits with consideration to costs.

2. When applicable, a summary of the research or data indicating the level of risk to the public health or the environment being removed or controlled by the proposed regulations or amendments.

The U.S. EPA in accordance with section 304(a) of the CWA published the first national recommended water quality criteria with the "Blue Book" in 1973. Since that time, the EPA has made periodic updates to the national criteria through the "Red Book" in 1976, "Gold Book" in 1986, the 1998 Update, the 2002 update, and the latest update in 2009. The recommendation to adopt the latest aquatic life ammonia criteria is premised on the science presented in the "2013 Aquatic Life Ambient Water Quality Criteria for Ammonia-Freshwater." In addition, KDHE conducted an analysis on data submitted by NPDES permittees authorized to discharge ammonia and found that the majority of mechanical facilities could meet the 2013 ammonia criteria.

3. If specific contaminants are to be controlled by the proposed regulation or amendment, a description indicating the level at which the contaminants are considered harmful according to current available research.

Appendix A is a table of KDHE's proposed changes to the numeric criteria 1c, 1d and 1e based on EPA's 2013 Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater criteria.

Appendix A

KANSAS SURFACE WATER QUALITY STANDARDS

Tables of Numeric Criteria

Kansas
Department of Health and Environment

Prepared by The Kansas Department of Health and Environment

Bureau of Water

March 2, 2017

Kansas Surface Water Quality Standards Tables of Numeric Criteria

Table 1a. Aquatic Life, Agriculture, And Public Health Designated Uses Numeric Criteria

PARAMETER	CAS NUMBER	Use Category					
		AQUATIC LIFE		AGRICULTURE		PUBLIC HEALTH	
		ACUTE	CHRONIC	LIVESTOCK	IRRIGATION	FOOD PROCUREMENT	DOMESTIC WATER SUPPLY
RADIONUCLIDES (pCi/L)							
beta / photon emitters	a	a	a	a	a	a	50
gross alpha particles including radium-226,but not radon or uranium	a	a	a	a	a	a	15
radium 226 and 228 combined	a	a	a	a	a	a	5
strontium 90	a	a	a	a	a	a	8
tritium	a	a	a	a	a	a	20,000
METALS (µg/L)							
antimony, total	7440360	88	30	a	a	640	6
arsenic, total	7440382	340	150	200	100	20.5	10
arsenic (III)	a	360	50	a	a	0.14	0.018
arsenic (V)	a	850	48	a	a	a	a
barium, total	7440393	a	a	a	a	a	2,000
beryllium, total	7440417	a	a	a	a	a	4
boron, total	7440428	a	a	5,000	750	a	a
cadmium, total	7440439	table 1b	table 1b	20	10	170	5
chromium, total	7440473	a	40	1,000	100	a	100
chromium (III)	16065831	table 1b	table 1b	a	a	3,433,000	50
chromium (VI)	18540299	16	11	a	a	3,400	50
copper, total	7440508	BLM[d]	BLM[d]	500	200	a	1,000
lead, total	7439921	table 1b	table 1b	100	5,000	a	15
mercury, total	7439976	1.4	0.77	10	a	0.146	2
nickel, total	7440020	table 1b	table 1b	500	200	4,600	610
silver, total	7440224	table 1b	a	a	a	a	100
thallium, total	7440280	1,400	40	a	a	6.3[b]	2
zinc, total	7440666	table 1b	table 1b	25,000	2,000	26,000	5,000
OTHER INORGANIC SUBSTANCES (µg/L)							
ammonia	7664417	table 1c	table 1c[d]	a	a	a	a
asbestos (fibers>10µm) (million fibers/L)	12001295	a	a	a	a	a	7
chloride	16887006	860,000	c	a	a	a	250,000
chlorine, total residual	7782505	19	11	a	a	a	a
cyanide (free)	57125	22	5.2	a	a	220,000	200
fluoride	16984488	a	a	2,000	1,000	a	2,000
nitrate (as N)	14797558	a	a	a	a	a	10,000
nitrite + nitrate (as N)	a	a	a	100,000	a	a	10,000
selenium, total	7782492	20	5	50	20	4,200	50
selenium, (V)	a	11.2	a	a	a	a	a
sulfate	14808798	a	a	1,000,000	a	a	250,000

Table 1a. Aquatic Life, Agriculture, And Public Health Designated Uses Numeric Criteria

PARAMETER	CAS NUMBER	Use Category: AQUATIC LIFE ACUTE	AQUATIC LIFE CHRONIC	AGRICULTURE LIVESTOCK	AGRICULTURE IRRIGATION	PUBLIC HEALTH FOOD PROCUREMENT	PUBLIC HEALTH DOMESTIC WATER SUPPLY
ORGANIC SUBSTANCES (µg/L) (EXCEPT PESTICIDES)							
A. Halogenated Ethers.....							
chloroalkyl ethers, total	a	238,000	a	a	a	a	a
bis(2-chloroethyl) ether	111444	238,000	a	a	a	0.53	0.03
2-chloroethyl vinyl ether	110758	360	120	a	a	a	a
bis(2-chloroisopropyl) ether	108601	238,000	a	a	a	65,000	1400
bis(chloromethyl) ether	542881	238,000	a	a	a	0.00029	0.0001
chloromethyl methyl ether	107302	238,000	a	a	a	0.00184	a
4,4-dibromodiphenyl ether	2050477	360	120	a	a	a	a
halogenated ethers, total	a	360	122	a	a	a	a
hexabromodiphenyl ether	36483600	360	120	a	a	a	a
nonabromodiphenyl ether	63936561	360	120	a	a	a	a
pentabromodiphenyl ether	32534819	360	120	a	a	a	a
tetrabromodiphenyl ether	40088479	360	120	a	a	a	a
tribromodiphenyl ether	49690940	360	120	a	a	a	a
B. Halogenated Aliphatic Hydrocarbons.....							
Chlorinated ethanes							
1,2-dichloroethane	107062	18,000	2,000	a	a	99[b]	0.38[b]
hexachloroethane	67721	980	540	a	a	3.3	1.9[b]
pentachloroethane	76017	7,240	1,100	a	a	a	a
1,1,1,2-tetrachloroethane	630206	9,320	a	a	a	a	a
1,1,2,2-tetrachloroethane	79345	9,320	2,400	a	a	4	0.17
tetrachloroethanes, total	a	9,320	a	a	a	a	a
1,1,1-trichloroethane	71556	18,000	a	a	a	173,077	200
1,1,2-trichloroethane	79005	18,000	9,400	a	a	16	0.6[b]
Chlorinated ethenes							
chlorinated ethylenes, total	a	11,600	a	a	a	a	a
chloroethylene (vinyl chloride)	75014	a	a	a	a	2.4	2
1,1-dichloroethylene	75354	11,600	a	a	a	7,100	7
cis-1,2-dichloroethylene	156592	11,600	a	a	a	a	70
trans-1,2-dichloroethylene	156605	11,600	a	a	a	10,000	100
tetrachloroethylene (PCE)	127184	5,280	840	a	a	3.3	0.8[b]
trichloroethylene (TCE)	79016	45,000	21,900	a	a	30	2.7[b]
Chlorinated propanes/propenes							
1,2-dichloropropane	78875	23,000	5,700	9	a	15	5
1,3-dichloropropene	542756	6,060	244	a	a	14.1	10[b]
Halogenated methanes							
bromochloromethane	74975	11,000	a	a	a	15.7	a
bromodichloromethane (dichlorobromomethane)	75274	11,000	a	a	a	17	0.55
bromotrichloromethane	75627	11,000	a	a	a	15.7	a
bis(2-chloroethoxy)methane	111911	11,000	a	a	a	15.7	a

Table 1a. Aquatic Life, Agriculture, And Public Health Designated Uses Numeric Criteria

PARAMETER	CAS NUMBER	Use Category: AQUATIC LIFE ACUTE	AQUATIC LIFE CHRONIC	AGRICULTURE LIVESTOCK	AGRICULTURE IRRIGATION	PUBLIC HEALTH FOOD PROCUREMENT	PUBLIC HEALTH DOMESTIC WATER SUPPLY
dibromochloromethane (chlorodibromomethane)	124481	11,000	a	a	a	13	0.4
dibromodichloromethane	594183	11,000	a	a	a	15.7	a
dichlorodifluoromethane	75718	11,000	a	a	a	15.7	a
dichloromethane (methylene chloride)	75092	11,000	a	a	a	590	5
halogenated methanes, total	a	11,000	a	a	a	15.7	100
tetrachloromethane (carbon tetrachloride)	56235	35,200	a	a	a	4.4[b]	0.25[b]
tribromochloromethane	594150	11,000	a	a	a	15.7	a
tribromomethane (bromoform)	75252	11,000	a	a	a	140	4.3
trichlorofluoromethane	75694	11,000	a	a	a	15.7	a
trichloromethane (chloroform)	67663	28,900	1,240	a	a	470	5.7
Other halogenated aliphatic hydrocarbons							
hexachlorobutadiene	87683	90	9.3	a	a	18	0.44
hexachlorocyclopentadiene	77474	7	5.2	a	a	1,100	50
C. Monocyclic Aromatic Hydrocarbons except Phenols and Phthalates.....							
Benzenes							
aminobenzene (aniline)	62533	14	6.7	a	a	a	a
benzene	71432	5,300	a	a	a	51	1.2[b]
ethylbenzene	100414	32,000	a	a	a	2,100	700
nitrobenzene	98953	27,000	a	a	a	690	17
vinylbenzene (styrene)	100425	a	a	a	a	a	100
Chlorinated benzenes							
chlorobenzene	108907	250	50	a	a	1,600	100
dichlorobenzenes, total	25321226	1,120	763	a	a	2,600	a
1,2-dichlorobenzene (o-dichlorobenzene)	95501	1,120	763	a	a	1,300	600
1,3-dichlorobenzene (m-dichlorobenzene)	541731	1,120	763	a	a	960	400[b]
1,4-dichlorobenzene (p-dichlorobenzene)	106467	a	a	a	a	190	75
hexachlorobenzene	118741	6	3.7	a	a	0.00029	0.00075[b]
other chlorinated benzenes, total	a	250	50	a	a	a	a
pentachlorobenzene	608935	250	50	a	a	1.5	1.4
1,2,4,5-tetrachlorobenzene	95943	250	50	a	a	1.1	0.97
1,2,4-trichlorobenzene	120821	250	a	a	a	70	70
Toluenes and xylenes							
2,4-dinitrotoluene	121142	330	230	a	a	3.4	0.11
dinitrotoluenes, total	25321146	330	230	a	a	9.1	a
toluene	108883	17,500	a	a	a	15,000	1,000
xylenes, total	1330207	a	a	a	a	a	10,000

Table 1a. Aquatic Life, Agriculture, And Public Health Designated Uses Numeric Criteria

PARAMETER	CAS NUMBER	Use Category: AQUATIC LIFE ACUTE	AQUATIC LIFE CHRONIC	AGRICULTURE LIVESTOCK	AGRICULTURE IRRIGATION	PUBLIC HEALTH FOOD PROCUREMENT	PUBLIC HEALTH DOMESTIC WATER SUPPLY
D. Nitrogen Compounds Except Monocyclic Aromatics.....							
acrylonitrile	107131	7,550	2,600	a	a	0.25	0.059[b]
benzidine	92875	2,500	a	a	a	0.0002	0.00012[b]
3,3-dichlorobenzidine	91941	a	a	a	a	0.028	0.04[b]
1,2-diphenylhydrazine	122667	270	a	a	a	0.2	0.04[b]
nitrosamines, total	a	5,850	a	a	a	1.24	0.0008
N-nitrosodibutylamine	924163	5,850	a	a	a	0.22	0.0063
N-nitrosodiethanolamine	1116547	5,850	a	a	a	1.24	a
N-nitrosodiethylamine	55185	5,850	a	a	a	1.24	0.0008
N-nitrosodimethylamine	62759	5,850	a	a	a	3	0.00069
N-nitrosodiphenylamine	86306	5,850	a	a	a	6	5[b]
N-nitrosodi-n-propylamine	621647	a	a	a	a	0.51	0.005
N-nitrosopyrrolidine	930552	5,850	a	a	a	34	0.016
E. Phenolic Compounds.....							
2,4-dimethyl phenol	105679	1,300	530	a	a	850	380
2,4-dinitrophenol	51285	a	a	a	a	5,300	69
nitrophenols, total	a	230	150	a	a	a	a
phenol	108952	10,200	2,560	a	a	860,000	10,000
Chlorinated phenols							
2-chlorophenol	95578	4,380	2,000	a	a	150	81
3-chlorophenol	108430	a	a	a	a	29,000	a
2,4-dichlorophenol	120832	2,020	365	a	a	790[b]	93[b]
3-methyl-4-chlorophenol	59507	30	a	a	a	a	a
2,4,5-trichlorophenol	95954	100	63	a	a	3,600	1,800
2,4,6-trichlorophenol	88062	a	970	a	a	2.4	2.1[b]
F. Phthalate Esters							
butylbenzyl phthalate	85687	a	a	a	a	1,900	1,500
dibutyl phthalate (di-n-butyl phthalate)	84742	940	3	a	a	4,500	2,000
diethyl phthalate	84662	a	a	a	a	44,000	17,000
dimethyl phthalate	131113	940	3	a	a	1,100,000	270,000
bis(2-ethylhexyl) phthalate (DEHP)	117817	400	360	a	a	5.9[b]	1.8[b]
phthalates, total	a	940	3	a	a	a	a
G. Polynuclear Aromatic Hydrocarbons (PAHs)……							
acenaphthene	83329	1,700	520	a	a	990	670
acenaphthylene	208968	a	a	a	a	0.0311	a
anthracene	120127	a	a	a	a	40,000	9,600[b]
benzo(a)anthracene	56553	a	a	a	a	0.018	0.0038
benzo(a)pyrene	50328	a	a	a	a	0.018	0.0028[b]
benzo(b)fluoranthene	205992	a	a	a	a	0.018	0.0038
benzo(g,h,i)perylene	191242	a	a	a	a	0.0311	a
benzo(k)fluoranthene	207089	a	a	a	a	0.018	0.0038
2-chloronaphthalene	91587	a	a	a	a	1,600	1,000

Table 1a. Aquatic Life, Agriculture, And Public Health Designated Uses Numeric Criteria

PARAMETER	CAS NUMBER	Use Category					
		AQUATIC LIFE		AGRICULTURE		PUBLIC HEALTH	
		ACUTE	CHRONIC	LIVESTOCK	IRRIGATION	FOOD PROCUREMENT	DOMESTIC WATER SUPPLY
chrysene	218019	a	a	a	a	0.018	0.0038
dibenzo(a,h)anthracene	53703	a	a	a	a	0.018	0.0038
fluoranthene	206440	3,980	a	a	a	370[b]	300[b]
fluorene	86737	a	a	a	a	5,300	1,300[b]
indeno(1,2,3-cd)pyrene	193395	a	a	a	a	0.018	0.0038
naphthalene	91203	2,300	620	a	a	a	a
phenanthrene	85018	30	6.3	a	a	0.0311	a
pyrene	129000	a	a	a	a	4,000	960[b]
Polynuclear Aromatic Hydrocarbons, total (PAHs)	a	a	a	a	a	0.0311	0.2
H. Other Organics (Except Pesticides).....							
di(2-ethylhexyl) adipate	103231	a	a	a	a	a	400
isophorone	78591	117,000	a	a	a	960	35
polychlorinated biphenyls, total (PCBs)	a	2	0.014	a	a	0.000064	0.00017[b]
2,3,7,8-TCDD (dioxin)	1746016	0.01	0.00001	a	a	5.00E-09	1.3E-8[b]
PESTICIDES (µg/L)							
acrolein	107028	68	21	a	a	290	190
acrylamide	79061	a	a	a	a	a	0.01
alachlor (Lasso)	15972608	760	76	100	a	a	2
aldicarb	116063	a	a	a	a	a	3
aldicarb sulfone	1646884	a	a	a	a	a	2
aldicarb sulfoxide	1646873	a	a	a	a	a	3
aldrin	309002	3	0.001	1	a	0.00005	0.00013[b]
atrazine (Aatrex)	1912249	170	3	a	a	a	3
bromomethane (methyl bromide)	74839	11,000	a	a	a	1,500	47
bromoxynil (MCPA)	1689845	a	a	20	a	a	a
carbaryl (Sevin)	63252	a	0.02	100	a	a	a
carbofuran (Furadan)	1563662	a	a	100	a	a	40
chlordane	57749	2.4	0.0043	3	a	0.00081	0.00057[b]
chlorpyrifos	2921882	0.083	0.041	100	a	a	a
2,4-D	94757	a	a	a	a	a	70
dacthal (DCPA)	1861321	a	14,300	a	a	a	a
dalapon	75990	a	110	a	a	a	200
4,4-DDD (p,p=-DDD)	72548	a	a	a	a	0.00031	0.00031
4,4-DDE (p,p=-DDE)	72559	1,050	a	a	a	0.00022	0.00022
DDT, total	50293	1.1	0.001	50	a	0.00022	0.00022
diazinon (spectracide)	333415	0.17	0.17	100	a	a	a
dibromochloropropane (DBCP)	96128	a	a	a	a	15.7	0.2
1,2-dibromethane	106934	a	a	a	a	a	0.05
dieldrin	60571	0.24	0.056	1	a	0.000054	0.00014[b]
4,6-dinitro-o-cresol	534521	a	a	a	a	280	13
dinoseb (DNBP)	88857	a	a	a	a	a	7

Table 1a. Aquatic Life, Agriculture, And Public Health Designated Uses Numeric Criteria

PARAMETER	CAS NUMBER	Use Category					
		AQUATIC LIFE		AGRICULTURE		PUBLIC HEALTH	
		ACUTE	CHRONIC	LIVESTOCK	IRRIGATION	FOOD PROCUREMENT	DOMESTIC WATER SUPPLY
diquat	85007	a	a	a	a	a	20
disulfoton (Di-syston)	298044	a	a	100	a	a	a
endosulfan, total	115297	0.22	0.056	a	a	159	a
alpha-endosulfan	959998	0.22	0.056	a	a	89	62
beta-endosulfan	33213659	0.22	0.056	a	a	89	62
endosulfan sulfate	1031078	a	a	a	a	89	62
endothall	145733	a	a	a	a	a	100
endrin	72208	0.086	0.036	0.5	a	0.06	2
endrin aldehyde	7421934	a	a	a	a	0.3	0.76[b]
epichlorohydrin	106898	a	a	a	a	a	4
ethylene dibromide	106934	a	a	a	a	a	0.05
fenchlorfos (Ronnel)	299843	a	a	100	a	a	a
glyphosate (Roundup)	1071836	a	a	a	a	a	700
guthion	86500	a	0.01	100	a	a	a
heptachlor	76448	0.52	0.0038	0.1	a	0.000079	0.00021[b]
heptachlor epoxide	1024573	0.52	0.0038	0.1	a	0.00011[b]	0.00010[b]
hexachlorocyclohexane (HCH or BHC)	61876	100	a	a	a	0.0414	0.0123
alpha-HCH (alpha-BHC)	319846	100	a	a	a	0.0049	0.0039[b]
beta-HCH (beta-BHC)	319857	100	a	a	a	0.046[b]	0.014[b]
delta-HCH (delta-BHC)	319868	100	a	a	a	a	a
gamma-HCH (gamma-BHC, lindane)	58899	0.95	0.08	5	a	1.8	0.2
technical-HCH (technical-BHC)	608731	a	a	a	a	0.0414	a
malathion	121755	a	0.1	100	a	a	a
methoxychlor	72435	a	0.03	1,000	a	a	40
methyl parathion	298000	a	a	100	a	a	a
metribuzin (Sencor)	21087649	a	100	a	a	a	a
mirex	2385855	a	0.001	a	a	0.000097	a
oxamyl (Vydate)	23135220	a	0.001	a	a	a	200
parathion	56382	0.065	0.013	100	a	a	a
pentachloronitrobenzene	82688	250	50	a	a	a	a
pentachlorophenol (PCP)	87865	table 1b	table 1b	a	a	3	0.28[b]
picloram (Tordon)	1918021	a	a	a	a	a	500
propachlor (Ramrod)	1918167	a	8	a	a	a	a
simazine (Princep)	122349	a	a	10	a	a	4
2,4,5-T	93765	a	a	2	a	a	a
tributyltin (TBT)	56359	0.46	0.072	a	a	a	a
toxaphene	8001352	0.73	0.0002	5	a	0.00028	0.00073[b]
2,4,5-TP (Silvex)	93721	a	a	a	a	a	50

a - Not available

b - US EPA has promulgated this criterion for Kansas under the Code of Federal Regulations, Title 40, part 131.36.

c - Criterion under investigation

d - The Biotic Ligand Model (BLM) as in the “Aquatic Life Ambient Freshwater Quality Criteria-Copper 2007 Revision (EPA-822-R-07-001, February 2007)”, which is adopted by reference.

Table 1b. Hardness-Dependent Aquatic Life Support Criteria

Formulae for calculation of hardness-dependent aquatic life support criteria for chromium III and total cadmium, total lead, total nickel, total silver and total zinc and pH-dependent aquatic life support criteria for pentachlorophenol. A WER value of 1.0 is applied in the hardness-dependent equations for total metals unless a site-specific WER has been determined and adopted by the department in accordance with K.A.R. 28-16-28e(a) and K.A.R. 28-16-28f(f). Hardness values in metal formulae are entered in units of mg/L as $CaCO_3$. Pentachlorophenol formulae apply only over the pH range 6.5-8.5.

CADMIUM (ug/L):
acute criterion = WER[EXP[(1.0166(LN(hardness)))-3.924]]
chronic criterion = WER[EXP[(0.7409(LN(hardness)))-4.719]]

CHROMIUM III (ug/L):
acute criterion = WER[EXP[(0.819*(LN(hardness)))+3.7256]]
chronic criterion = WER[EXP[(0.819*(LN(hardness)))+0.6848]]

LEAD (ug/L):
acute criterion = WER[EXP[(1.273*(LN(hardness)))-1.460]]
chronic criterion = WER[EXP[(1.273*(LN(hardness)))-4.705]]

NICKEL (ug/L):
acute criterion = WER[EXP[(0.846*(LN(hardness)))+2.255]]
chronic criterion = WER[EXP[(0.846*(LN(hardness)))+0.0584]]

PENTACHLOROPHENOL (ug/L):
acute criterion = EXP[(1.005*pH)-4.830]
chronic criterion = EXP[(1.005*pH)-5.290]

SILVER (ug/L):
acute criterion = WER[EXP[(1.72*(LN(hardness)))-6.59]]

ZINC (ug/L):
acute criterion = WER[EXP[(0.8473*(LN(hardness)))+0.884]]
chronic criterion = WER[EXP[(0.8473*(LN(hardness)))+0.884]]

Table 1c. pH- and Temperature-Dependent Values Aquatic Life Criteria For Total Ammonia Acute Criterion

Total ammonia as N, mg/L.

pH	Temperature, °C																				
	0-10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	51.0	48.0	44.0	41.0	37.0	34.0	32.0	29.0	27.0	25.0	23.0	21.0	19.0	18.0	16.0	15.0	14.0	13.0	12.0	11.0	9.9
6.6	49.0	46.0	42.0	39.0	36.0	33.0	30.0	28.0	26.0	24.0	22.0	20.0	18.0	17.0	16.0	14.0	13.0	12.0	11.0	10.0	9.5
6.7	46.0	44.0	40.0	37.0	34.0	31.0	29.0	27.0	24.0	22.0	21.0	19.0	18.0	16.0	15.0	14.0	13.0	12.0	11.0	9.8	9.0
6.8	44.0	41.0	38.0	35.0	32.0	30.0	27.0	25.0	23.0	21.0	20.0	18.0	17.0	15.0	14.0	13.0	12.0	11.0	10.0	9.2	8.5
6.9	41.0	38.0	35.0	32.0	30.0	28.0	25.0	23.0	21.0	20.0	18.0	17.0	15.0	14.0	13.0	12.0	11.0	10.0	9.4	8.6	7.9
7.0	38.0	35.0	33.0	30.0	28.0	25.0	23.0	21.0	20.0	18.0	**17.0**	15.0	14.0	13.0	12.0	11.0	10.0	9.3	8.5	7.9	7.3
7.1	34.0	32.0	30.0	27.0	25.0	23.0	21.0	20.0	18.0	17.0	15.0	14.0	13.0	12.0	11.0	10.0	9.3	8.5	7.9	7.2	6.7
7.2	31.0	29.0	27.0	25.0	23.0	21.0	19.0	18.0	16.0	15.0	14.0	13.0	12.0	11.0	9.8	9.1	8.3	7.7	7.1	6.5	6.0
7.3	27.0	26.0	24.0	22.0	20.0	18.0	17.0	16.0	14.0	13.0	12.0	11.0	10.0	9.5	8.7	8.0	7.4	6.8	6.3	5.8	5.3
7.4	24.0	22.0	21.0	19.0	18.0	16.0	15.0	14.0	13.0	12.0	11.0	9.8	9.0	8.3	7.7	7.0	6.5	6.0	5.5	5.1	4.7
7.5	21.0	19.0	18.0	17.0	15.0	14.0	13.0	12.0	11.0	10.0	9.2	8.5	7.8	7.2	6.6	6.1	5.6	5.2	4.8	4.4	4.0
7.6	18.0	17.0	15.0	14.0	13.0	12.0	11.0	10.0	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5
7.7	15.0	14.0	13.0	12.0	11.0	10.0	9.3	8.6	7.9	7.3	6.7	6.2	5.7	5.2	4.8	4.4	4.1	3.8	3.5	3.2	2.9
7.8	13.0	12.0	11.0	10.0	9.3	8.5	7.9	7.2	6.7	6.1	5.6	5.2	4.8	4.4	4.0	3.7	3.4	3.2	2.9	2.7	2.5
7.9	11.0	9.9	9.1	8.4	7.7	7.1	6.6	6.0	5.6	5.1	4.7	4.3	4.0	3.7	3.4	3.1	2.9	2.6	2.4	2.2	2.1
8.0	8.8	8.2	7.6	7.0	6.4	5.9	5.4	5.0	4.6	4.2	3.9	3.6	3.3	3.0	2.8	2.6	2.4	2.2	2.0	1.9	1.7
8.1	7.2	6.8	6.3	5.8	5.3	4.9	4.5	4.1	3.8	3.5	3.2	3.0	2.7	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4
8.2	6.0	5.6	5.2	4.8	4.4	4.0	3.7	3.4	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2
8.3	4.9	4.6	4.3	3.9	3.6	3.3	3.1	2.8	2.6	2.4	2.2	2.0	1.9	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.96
8.4	4.1	3.8	3.5	3.2	3.0	2.7	2.5	2.3	2.1	2.0	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79
8.5	3.3	3.1	2.9	2.7	2.4	2.3	2.1	1.9	1.8	1.6	1.5	1.4	1.3	1.2	1.1	0.98	0.90	0.83	0.77	0.71	0.65
8.6	2.8	2.6	2.4	2.2	2.0	1.9	1.7	1.6	1.5	1.3	1.2	1.1	1.0	0.96	0.88	0.81	0.75	0.69	0.63	0.58	0.54
8.7	2.3	2.2	2.0	1.8	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.94	0.87	0.80	0.74	0.68	0.62	0.57	0.53	0.49	0.45
8.8	1.9	1.8	1.7	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37
8.9	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.93	0.85	0.79	0.72	0.67	0.61	0.56	0.52	0.48	0.44	0.40	0.37	0.34	0.32
9.0	1.4	1.3	1.2	1.1	1.0	0.93	0.86	0.79	0.73	0.67	0.62	0.57	0.52	0.48	0.44	0.41	0.37	0.34	0.32	0.29	0.27

Table 1d. pH- and Temperature-Dependent Values Aquatic Life Criteria For Total Ammonia Chronic Criterion

Total ammonia as N, mg/L.

pH	Temperature, °C																							
	0-7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
6.5	4.9	4.6	4.3	4.1	3.8	3.6	3.3	3.1	2.9	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.6	1.5	1.5	1.4	1.3	1.2	1.1
6.6	4.8	4.5	4.3	4.0	3.8	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1
6.7	4.8	4.5	4.2	3.9	3.7	3.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1
6.8	4.6	4.4	4.1	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1
6.9	4.5	4.2	4.0	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0
7.0	4.4	4.1	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.3	2.2	2.0	**1.9**	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	0.99
7.1	4.2	3.9	3.7	3.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95
7.2	4.0	3.7	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.0	0.96	0.90
7.3	3.8	3.5	3.3	3.1	2.9	2.7	2.6	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.0	0.97	0.91	0.85
7.4	3.5	3.3	3.1	2.9	2.7	2.5	2.4	2.2	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3	1.3	1.2	1.1	1.0	0.96	0.90	0.85	0.79
7.5	3.2	3.0	2.8	2.7	2.5	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95	0.89	0.83	0.78	0.73
7.6	2.9	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8	1.6	1.5	1.4	1.4	1.3	1.2	1.1	1.1	0.98	0.92	0.86	0.81	0.76	0.71	0.67
7.7	2.6	2.4	2.3	2.2	2.0	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.94	0.88	0.83	0.78	0.73	0.68	0.64	0.60
7.8	2.3	2.2	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95	0.89	0.84	0.79	0.74	0.69	0.65	0.61	0.57	0.53
7.9	2.1	1.9	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.2	1.1	1.0	0.95	0.89	0.84	0.79	0.74	0.69	0.65	0.61	0.57	0.53	0.50	0.47
8.0	1.8	1.7	1.6	1.5	1.4	1.3	1.2	1.1	1.1	1.0	0.94	0.88	0.83	0.78	0.73	0.68	0.64	0.60	0.56	0.53	0.50	0.44	0.44	0.41
8.1	1.5	1.5	1.4	1.3	1.2	1.1	1.1	0.99	0.92	0.87	0.81	0.76	0.71	0.67	0.63	0.59	0.55	0.52	0.49	0.46	0.43	0.40	0.38	0.35
8.2	1.3	1.2	1.2	1.1	1.0	0.96	0.90	0.84	0.79	0.74	0.70	0.65	0.61	0.57	0.54	0.50	0.47	0.44	0.42	0.39	0.37	0.34	0.32	0.30
8.3	1.1	1.1	0.99	0.93	0.87	0.82	0.76	0.72	0.67	0.63	0.59	0.55	0.52	0.49	0.46	0.43	0.40	0.38	0.35	0.33	0.31	0.29	0.27	0.26
8.4	0.95	0.89	0.84	0.79	0.74	0.69	0.65	0.61	0.57	0.53	0.50	0.47	0.44	0.41	0.39	0.36	0.34	0.32	0.30	0.28	0.26	0.25	0.23	0.22
8.5	0.80	0.75	0.71	0.67	0.62	0.58	0.55	0.51	0.48	0.45	0.42	0.40	0.37	0.35	0.33	0.31	0.29	0.27	0.25	0.24	0.22	0.21	0.20	0.18
8.6	0.68	0.64	0.60	0.56	0.53	0.49	0.46	0.43	0.41	0.38	0.36	0.33	0.31	0.29	0.28	0.26	0.24	0.23	0.21	0.20	0.19	0.18	0.16	0.15
8.7	0.57	0.54	0.51	0.47	0.44	0.42	0.39	0.37	0.34	0.32	0.30	0.28	0.27	0.25	0.23	0.22	0.21	0.19	0.18	0.17	0.16	0.15	0.14	0.13
8.8	0.49	0.46	0.43	0.40	0.38	0.35	0.33	0.31	0.29	0.27	0.26	0.24	0.23	0.21	0.20	0.19	0.17	0.16	0.15	0.14	0.13	0.13	0.12	0.11
8.9	0.42	0.39	0.37	0.34	0.32	0.30	0.28	0.27	0.25	0.23	0.22	0.21	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.12	0.11	0.10	0.09
9.0	0.36	0.34	0.32	0.30	0.28	0.26	0.24	0.23	0.21	0.20	0.19	0.18	0.17	0.16	0.15	0.14	0.13	0.12	0.11	0.11	0.10	0.09	0.09	0.08

Table 1f. Surface Water Segments Where Early Life Stages of Fish Present Chronic Ammonia Aquatic Life Criteria Are Applicable.

Surface Water	Basin	Subbasin	Hydrologic Unit Code	Segment Number
Kansas River	Kansas Lower Republican	Lower Kansas	10270104	1
Kansas River	Kansas Lower Republican	Lower Kansas	10270104	2
Kansas River	Kansas Lower Republican	Lower Kansas	10270104	3
Kansas River	Kansas Lower Republican	Lower Kansas	10270104	4
Kansas River	Kansas Lower Republican	Lower Kansas	10270104	5
Kansas River	Kansas Lower Republican	Lower Kansas	10270104	18
Kansas River	Kansas Lower Republican	Lower Kansas	10270104	19
Kansas River	Kansas Lower Republican	Lower Kansas	10270104	21 From Bowersock dam east to segment 19
Missouri River	Missouri	Tarkio-Wolf	10240005	1
Missouri River	Missouri	Tarkio-Wolf	10240005	2
Missouri River	Missouri	Tarkio-Wolf	10240005	19
Missouri River	Missouri	Tarkio-Wolf	10240005	20
Missouri River	Missouri	Tarkio-Wolf	10240005	21
Missouri River	Missouri	Independence-Sugar	10240011	1
Missouri River	Missouri	Independence-Sugar	10240011	2
Missouri River	Missouri	Independence-Sugar	10240011	4
Missouri River	Missouri	Independence-Sugar	10240011	5
Missouri River	Missouri	Independence-Sugar	10240011	7
Missouri River	Missouri	Independence-Sugar	10240011	9
Missouri River	Missouri	Independence-Sugar	10240011	11
Missouri River	Missouri	Independence-Sugar	10240011	13
Missouri River	Missouri	Independence-Sugar	10240011	15
Missouri River	Missouri	Independence-Sugar	10240011	19

Table 1g. Temperature, Dissolved Oxygen, And pH Numeric Aquatic Life Criteria.

Aquatic Life Use	Dissolved Oxygen (DO)	pH	Temperature
Special	5.0 mg/L[a]	6.5-8.5[b]	32°C[c]
Expected	5.0 mg/L[a]	6.5-8.5[b]	32°C[c]
Restricted	5.0 mg/L[a]	6.5-8.5[b]	32°C[c]

a - (1) The concentration of dissolved oxygen in surface waters shall not be lowered by the influence of artificial sources of pollution. (2) Dissolved oxygen concentrations can be lower than 5.0 mg/L when caused by documented natural conditions specified in the "Kansas Implementation Procedures: Surface Water Quality Standards". (3) For lakes or reservoirs experiencing thermal stratification, the dissolved oxygen criterion is only applicable to the top layer or epilimnion of the waterbody.

b - pH range outside the zone of initial dilution.

c - (1) Beyond the zone of initial dilution a discharge shall not elevate the temperature of a receiving surface water above this temperature, except as provided in paragraph 28-16-28e(c)(2)(C)(ii). (2) Additional requirements in paragraph 28-16-28e(c)(2)(C)(i).

Table 1h. Natural Background Concentrations

BASIN	HUC 8	SEGMENT / LAKE NUMBER	WATERBODY	POLLUTANT	NATURAL BACKGROUND CONCENTRATION (mg/L)
Cimarron	11040006	1	Cimarron River	Chloride	1,010
Cimarron	11040007	1	Crooked Creek	Chloride	1,200
Cimarron	11040008	2	Bluff Creek	Sulfate	350
Cimarron	11040008	5	Cimarron River	Chloride	900
Cimarron	11040008	5	Cimarron River	Sulfate	465
Kansas Lower Republican	10250017	29	Buffalo Creek	Chloride	590
Kansas Lower Republican	10270701	6	Kansas River	Chloride	275
Kansas Lower Republican	10270101	6	Kansas River	Sulfate	300
Lower Arkansas	11030009	1	Rattlesnake Creek above the Little Salt Marsh in Quivira National Wildlife Refuge	Chloride	1,400
Lower Arkansas	11030009	1	Rattlesnake Creek below the Little Salt Marsh in Quivira National Wildlife Refuge	Chloride	3,660
Lower Arkansas	11030009	1	Rattlesnake Creek above and below the Little Salt Marsh in Quivira National Wildlife Refuge	Sulfate	455
Lower Arkansas	11030010	1	Arkansas River	Chloride	620
Lower Arkansas	11030010	3	Arkansas River	Chloride	650
Lower Arkansas	11030010	4	Arkansas River	Chloride	650
Lower Arkansas	11030010	6	Peace Creek	Chloride	1,800
Lower Arkansas	11030010	7	Salt Creek	Chloride	1,300
Lower Arkansas	11030011	1	Cow Creek near Willowbrook	Chloride	300
Lower Arkansas	11030011	2	Little Cow Creek	Chloride	300
Lower Arkansas	11030011	3	Cow Creek near Lyons	Chloride	460
Lower Arkansas	11030011	1755	Cow Creek	Chloride	300
Lower Arkansas	11030013	1	Arkansas River	Chloride	345
Lower Arkansas	11030013	2	Arkansas River	Chloride	265
Lower Arkansas	11030013	3	Arkansas River	Chloride	385
Lower Arkansas	11030013	3	Arkansas River	Sulfate	350
Lower Arkansas	11030013	LM014201	Slate Creek W.A. Watershed	Chloride	27,590

Table 1h. Natural Background Concentrations

BASIN	HUC 8	SEGMENT / LAKE NUMBER	WATERBODY	POLLUTANT	NATURAL BACKGROUND CONCENTRATION (mg/L)
Lower Arkansas	11030013	LM014201	Slate Creek W.A. Watershed	Sulfate	2,500
Lower Arkansas	11030015	3	Ninnescha River, South Folk	Chloride	265
Lower Arkansas	11060002	4	Arkansas River, Salt Folk	Chloride	305
Lower Arkansas	11060002	4	Arkansas River, Salt Folk	Sulfate	730
Lower Arkansas	11060002	7	Mule Creek	Sulfate	310
Lower Arkansas	11060003	2	Medicine Lodge River	Sulfate	450
Lower Arkansas	11060003	6	Medicine Lodge River	Sulfate	525
Lower Arkansas	11060003	8	Medicine Lodge River	Sulfate	300
Lower Arkansas	11060003	27	Soldier Creek	Sulfate	300
Neosho	11070202	5	Clear Creek	Sulfate	290
Neosho	11070202	16	French Creek	Sulfate	1,045
Neosho	11070202	17	Cottonwood River, South	Sulfate	840
Neosho	11070202	21	Doyle Creek	Sulfate	370
Neosho	11070205	LM035901	Mined Land Lake 12	Sulfate	1,000
Neosho	11070205	LM036801	Mined Land Lake 22	Sulfate	1,000
Neosho	11070205	LM036901	Mined Land Lake 23	Sulfate	1,000
Neosho	11070205	LM037301	Mined Land Lake 27	Sulfate	1,000
Neosho	11070205	LM037601	Mined Land Lake 30	Sulfate	1,000
Neosho	11070205	LM038841	Mined Land Lake W.A.	Sulfate	1,000
Neosho	11070205	LM048201	Mined Land Lake 17	Sulfate	1,000
Neosho	11070205	LM048401	Mined Land Lake 44	Sulfate	1,000
Neosho	11070207	LM047601	Mined Land Lake 6	Sulfate	1,000
Neosho	11070207	LM047801	Mined Land Lake 7	Sulfate	1,000
Smoky Hill-Saline	10260003	9	Smoky Hill River	Sulfate	500
Smoky Hill-Saline	10260003	17	Smoky Hill River	Sulfate	700
Smoky Hill-Saline	10260003	21	Smoky Hill River	Sulfate	700
Smoky Hill-Saline	10260003	LM013001	Cedar Bluff Lake	Sulfate	452
Smoky Hill-Saline	10260006	5	Smoky Hill River	Chloride	435

Table 1h. Natural Background Concentrations

BASIN	HUC 8	SEGMENT / LAKE NUMBER	WATERBODY	POLLUTANT	NATURAL BACKGROUND CONCENTRATION (mg/L)
Smoky Hill-Saline	10260006	9	Smoky Hill River	Chloride	625
Smoky Hill-Saline	10260006	15	Smoky Hill River	Chloride	820
Smoky Hill-Saline	10260006	15	Smoky Hill River	Sulfate	411
Smoky Hill-Saline	10260006	21	Smoky Hill River	Sulfate	464
Smoky Hill-Saline	10260008	3	Chapman Creek	Sulfate	370
Smoky Hill-Saline	10260008	6	Smoky Hill River	Chloride	265
Smoky Hill-Saline	10260008	6	Smoky Hill River	Sulfate	325
Smoky Hill-Saline	10260008	8	Mud Creek	Sulfate	400
Smoky Hill-Saline	10260008	18	Gypsum Creek	Sulfate	325
Smoky Hill-Saline	10260008	25	Holland Creek	Sulfate	1,200
Smoky Hill-Saline	10260008	28	Turkey Creek	Sulfate	1,200
Smoky Hill-Saline	10260008	35	Carry Creek	Sulfate	400
Smoky Hill-Saline	10260009	5	Paradise Creek	Chloride	860
Smoky Hill-Saline	10260009	5	Paradise Creek	Sulfate	630
Smoky Hill-Saline	10260009	8	Saline River	Chloride	860
Smoky Hill-Saline	10260009	8	Saline River	Sulfate	500 or 780 *
Smoky Hill-Saline	10260009	9	Saline River	Sulfate	390
Smoky Hill-Saline	10260009	LM014001	Wilson Lake	Chloride	680
Smoky Hill-Saline	10260009	LM014001	Wilson Lake	Sulfate	480
Smoky Hill-Saline	10260010	1	Saline River	Chloride	300
Smoky Hill-Saline	10260010	1	Saline River	Sulfate	375
Smoky Hill-Saline	10260010	3	Saline River	Chloride	370
Smoky Hill-Saline	10260010	3	Saline River	Sulfate	390

Table 1h. Natural Background Concentrations

BASIN	HUC 8	SEGMENT / LAKE NUMBER	WATERBODY	POLLUTANT	NATURAL BACKGROUND CONCENTRATION (mg/L)
Smoky Hill-Saline	10260010	10	Wolf Creek	Chloride	390
Smoky Hill-Saline	10260010	10	Wolf Creek	Selenium	7**
Smoky Hill-Saline	10260010	10	Wolf Creek	Sulfate	450
Smoky Hill-Saline	10260010	14	Bullfoot Creek	Sulfate	300
Smoky Hill-Saline	10260010	17	Elkhorn Creek	Sulfate	425
Solomon	10260012	2	Oak Creek	Selenium	12
Solomon	10260012	10	Beaver Creek	Selenium	16
Solomon	10260012	23	Deer Creek	Selenium	9
Solomon	10260014	18	Kill Creek	Selenium	9
Solomon	10260014	18	Kill Creek	Sulfate	540
Solomon	10260014	19	Covert Creek	Selenium	6
Solomon	10260014	19	Covert Creek	Sulfate	610
Solomon	10260014	20	Twin Creek	Selenium	12
Solomon	10260014	20	Twin Creek	Sulfate	730
Solomon	10260014	21	Carr Creek	Selenium	8
Solomon	10260014	21	Carr Creek	Sulfate	690
Solomon	10260015	1	Solomon River	Chloride	370
Solomon	10260015	12	Solomon River	Chloride	400
Solomon	10260015	18	Limestone Creek	Selenium	6.6
Solomon	10260015	18	Limestone Creek	Sulfate	300 **
Solomon	10260015	27	Salt Creek	Chloride	650
Solomon	10260015	27	Salt Creek	Sulfate	310
Upper Arkansas	11030001	1	Arkansas River	Sulfate	1,875
Upper Arkansas	11030001	3	Arkansas River	Selenium	7 or 10 ***
Upper Arkansas	11030001	9	Arkansas River	Selenium	7 or 10 ***
Upper Arkansas	11030003	1	Arkansas River	Selenium	7 or 10 ***
Upper Arkansas	11030003	1	Arkansas River	Sulfate	350
Upper Arkansas	11030004	1	Arkansas River	Sulfate	1,000
Upper Arkansas	11030004	10	Arkansas River	Fluoride	1.45
Upper Arkansas	11030004	10	Arkansas River	Sulfate	550

Table 1h. Natural Background Concentrations

BASIN	HUC 8	SEGMENT / LAKE NUMBER	WATERBODY	POLLUTANT	NATURAL BACKGROUND CONCENTRATION (mg/L)
Upper Arkansas	11030004	11	Arkansas River	Sulfate	350
Upper Republican	10250001	1	Arikaree River	Selenium	9
Upper Republican	10250003	2	Republican River, South Fork	Fluoride	1.45
Upper Republican	10250003	9	Republican River, South Fork	Fluoride	1.20
Walnut	11030017	18	Whitewater River	Sulfate	390
Walnut	11030018	30	Eightmile Creek	Sulfate	520

* 780 mg/L applies when stream flows are above the normal flow

** Only applies when stream flows are above the median (50 percentile) flow

*** From April to October, 7 mg/L applies; from November to March, 10 mg/L applies.

Table 1i. *Escherichia coli* Criteria For Classified Stream Segments

Use	Colony Forming Units (CFUs)/100mL	
Primary Contact Recreation	Geometric Mean Apr. 1 – Oct. 31	Geometric Mean Nov. 1 – Mar. 31
Class A	160	2358
Class B	262	2358
Class C	427	3843
Secondary Contact Recreation	Geometric Mean Jan. 1 – Dec. 31	
Class a	2358	
Class b	3843	

Table 1j. *Escherichia coli* Criteria For Classified Surface Waters Other Than Classified Stream Segments

Use	Colony Forming Units (CFUs)/100mL			
Primary Contact Recreation	Geometric Mean Apr. 1 – Oct. 31	Geometric Mean Nov. 1 – Mar. 31	Single Sample Maximum Apr. 1 – Oct. 31	Single Sample Maximum Nov. 1 – Mar. 31
Swimming Beach	160	800	732	3655
Public Access	262	1310	1198	6580
Restricted Access	427	2135	1950	9760
Secondary Contact Recreation	Geometric Mean Jan. 1 – Dec. 31		Single Sample Maximum Jan. 1 – Dec. 31	
Public Access	2135		9760	
Restricted Access	2135		9760	

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.

Table 1l. Current Lakes Or Reservoirs Serving As Active Or Reserve Domestic Water Supply

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

Table 1l. Current Lakes Or Reservoirs Serving As Active Or Reserve Domestic Water Supply

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

Table 1l. Current Lakes Or Reservoirs Serving As Active Or Reserve Domestic Water Supply

Lake Number	Register Name (with Local Name)
LM042001	Wabaunsee Co. Lake
LM018001	Waconda Lake
LM042201	Wellington Lake (Wellington Old City Lake)
LM042301	Wellington New City Lake
LM050801	Winfield City Lake
LM074401	Xenia Lake
LM069201	Yates Center Reservoir (South Owl Lake)