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# **KANSAS IMPLEMENTATION PROCEDURES**

## **Surface Water Quality Standards**



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*Prepared by The Kansas Department of Health and Environment*

*Bureau of Water*

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These written procedures provide a uniform mechanism for interpreting Kansas Surface Water Quality Standards in waters of the state.

**I. Surface Water Classification**

Applicable Regulations: 28-16-28d(b)

**A. Classified Stream Segments**

Classified stream segments are all stream segments that:

1. Are waters of the state as defined in subsection (a) of K.S.A. 65-161, and amendments thereto, and waters described in subsection (d) of K.S.A. 65-171d, and amendments thereto,

and

2. Meet one of the following criteria:

- a. Stream segments indicated on the federal environmental protection agency's Reach File 1 (RF1) (1982) and have the most recently available 10-year median flow of equal to or in excess of 1 cubic foot per second (cfs) based on data collected and evaluated by the United States Geological Survey. In the absence of measured stream segment flow data, calculations of flow conducted by extrapolation methods provided by the United States Geological Survey may be used.

or

- b. Stream Segments not indicated on RF1 and have the most recently available 10-year median flow of equal to or in excess of 1 cubic foot per second based on data collected and evaluated by the United States Geological Survey or in the absence of stream segment flow data, calculations of flow conducted by extrapolation methods provided by the United States Geological Survey may be used.

or

- c. Stream segments actually inhabited by threatened or endangered aquatic species listed in rules and regulations promulgated by the Kansas Department of Wildlife and Parks or the United States Fish and Wildlife Service. The Kansas Department of Wildlife and Parks and the United States Fish and Wildlife Service will be consulted in order to determine the presence of threatened and endangered species.

or

- d. Stream segments where scientific studies conducted by the department show that pooling of water during periods of flow below 1 cfs provides important refuges for aquatic life and permits biological recolonization during periods of intermittent flow. Additionally, a cost/benefit analysis taking into account the economic and social impact of classifying the stream segment will be undertaken by the department. The results of the cost/benefit analysis **must** indicate the benefits of classifying the stream segment outweigh the costs of classifying the stream segment.

or

- e. Stream segments at the point of, and downstream from the point of discharge from a facility permitted under the National Pollutant Discharge Elimination System (NPDES). Note: confined animal feeding operations (CAFOs) are not permitted to have a continuous discharge. Therefore, this provision does not apply to NPDES-permitted CAFOs as defined in K.S.A. 65-171d, and amendments thereto.

A schematic depiction of the process is provided in Figure 1 on the following page.

#### **B. Classified Lakes**

All lakes managed by federal, state, county, or municipal entities and those private lakes used for public drinking water supply or open to the general public for secondary contact recreation, are classified lakes and a portion of those lakes are listed in the Kansas Surface Water Register.

#### **C. Classified Wetlands**

All wetlands managed by federal, state, county, or municipal entities, those wetlands classified as outstanding national resource waters, exceptional state waters, or designated as special aquatic life use waters, are classified wetlands and a portion of those wetlands are listed in the Kansas Surface Water Register. Those privately owned wetlands open to the general public for hunting, trapping, or other secondary contact recreational activities are also classified wetlands. Artificially created wetlands for wastewater treatment are not considered classified wetlands.

#### **D. Classified Ponds**

All ponds owned by federal, state, county, or municipal authorities and all privately owned ponds that impound water from a classified stream segment are classified ponds and a portion of those ponds are listed in the Kansas Surface Water Register.

# Stream Segment Classification Scheme

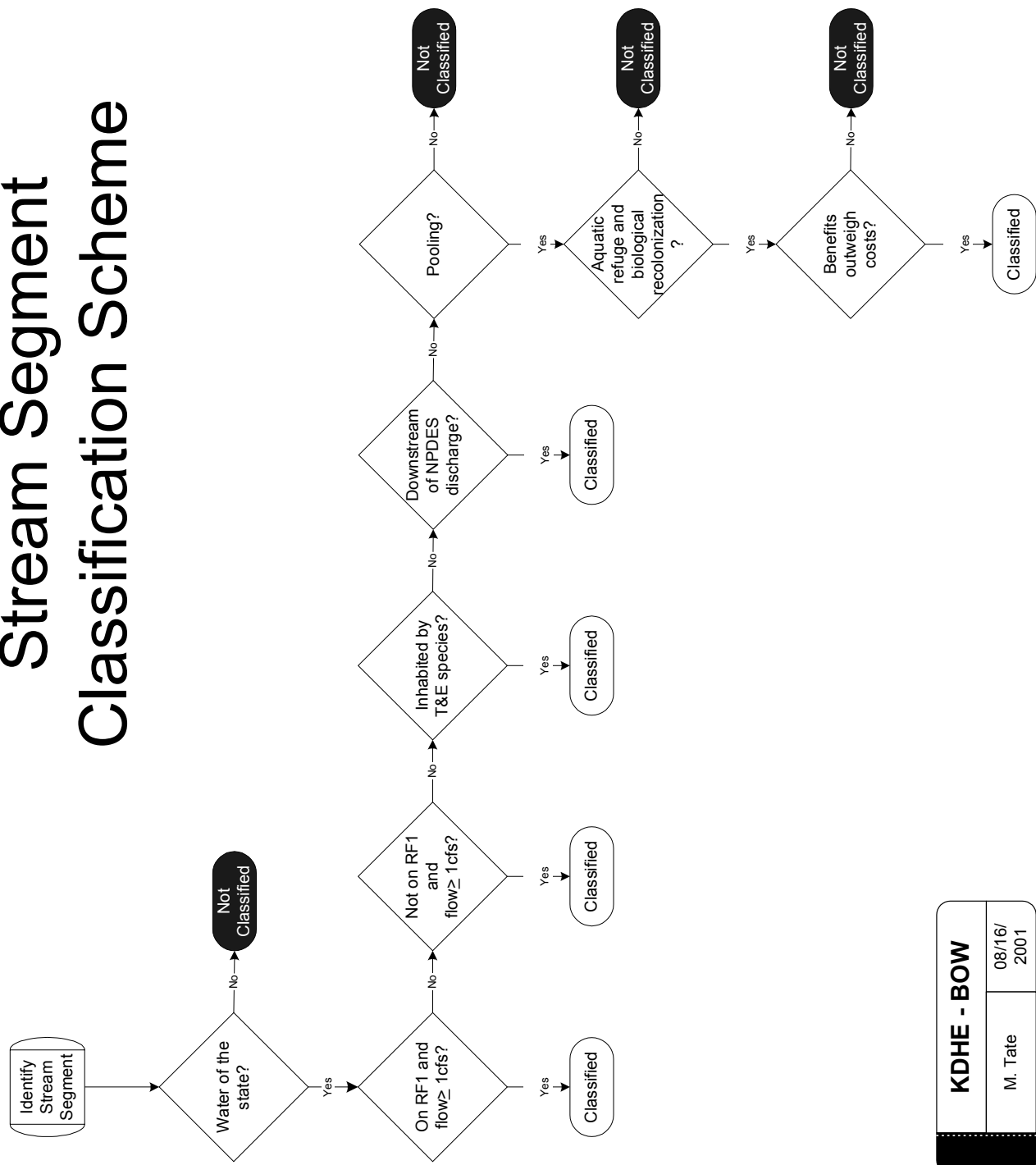


Figure 1

KDHE - BOW	
M. Tate	08/16/2001

## **II. Designated Uses**

The Department will assign designated uses to state surface waters by conducting a use attainability analysis following the standardized procedures developed by the Department's Bureau of Environmental Field Services. A use attainability analysis may also be conducted by another party following the Department's standardized procedure. If conducted by another party, the use attainability analysis must be submitted to the Department for review and approval.

### **A. Agricultural Water Supply Use**

Surface waters used for agricultural purposes.

1. Livestock watering. Surface waters may be used for consumption of water by livestock.
2. Irrigation. Surface waters may be withdrawn and used for application onto crop land.

### **B. Aquatic Life Support Use**

Waters used for the maintenance of the ecological integrity of streams, lakes and wetlands including the aquatic, semi-aquatic, or terrestrial species dependent on surface water for survival.

1. Special Aquatic Life Use. Surface waters that contain unique habitats or biota that are not commonly found in the state. Surface waters that contain populations of threatened or endangered species will be designated as special aquatic life use waters listed in rules and regulations by the Kansas Department of Wildlife and Parks or the United States Fish and Wildlife Service. The Kansas Department of Wildlife and Parks and the United States Fish and Wildlife Service will be consulted in order to determine the presence of threatened and endangered species.

If the receiving stream is designated as a special aquatic life use water, the permit limits derived will maintain existing uses and where attained, designated uses.

If the receiving surface water is designated by the State as critical habitat for threatened or endangered species, the permit limits derived will maintain water quality considered acceptable for continued propagation of the species and maintenance of its habitat.

2. Expected Aquatic Life Use. Surface waters that contain habitats or biota found commonly in the state.
3. Restricted Aquatic Life Use. Surface waters that contain biota in limited abundance or diversity due to the physical quality or availability of habitat compared to more productive habitats in adjacent waters.

**C. Domestic Water Supply Use**

Surface waters that are used, after appropriate treatment, for a potable water resource. As used in these regulations, "point of diversion" is the location of a surface water intake structure used for domestic water supply or at the point of water removal from the alluvial aquifer by a well utilizing "groundwater under the influence of surface water" as defined under K.A.R. 28-15-11(cc).

**D. Food Procurement Use**

Surface waters that are used for obtaining edible aquatic or semi-aquatic life for human consumption.

**E. Groundwater Recharge Use**

Surface waters used for replenishing useable groundwater resources.

**F. Industrial Water Supply Use**

Surface water used for non potable purposes including cooling or process water.

**G. Recreational Use**

Surface water used for primary or secondary contact recreation.

1. Primary Contact Recreation. Primary contact recreational use is evaluated differently for each of two main categories of waters: 1) surface waters other than classified stream segments, and 2) classified stream segments. For each category, the determining factor for primary contact recreation is body immersion in the water to the extent that some inadvertent ingestion of water is probable.

The primary contact recreation season is from April 1 through October 31 of each year. During the non-recreation season, secondary contact recreation standards apply.

- a. Surface Waters Other Than Classified Stream Segments. Uses supported in this category include boating, mussel harvesting, swimming, skin diving, water skiing, and wind surfing.
- b. Classified Stream Segments. There are three classes of primary contact recreation for classified stream segments that include:
  - i) Primary contact recreational use-Class A. This class applies to those classified stream segments that have been designated as public swimming areas. Uses supported in this category include activities such as; kayaking, mussel harvesting, swimming, skin diving, water skiing, and wind surfing.

- ii) Primary contact recreational use-Class B. A classified stream segment that is designated as primary contact recreational use-Class B is expected to have moderate full body contact from activities that include kayaking, mussel harvesting, swimming, skin diving, water skiing, and wind surfing. A classified stream segment under this classification must be by law or written permission of the landowner open to and accessible by the public.
  - iii) Primary contact recreational use-Class C. A classified stream segment that is designated as primary contact recreational use-Class C is capable of supporting boating, mussel harvesting, swimming, skin diving, water skiing, wind surfing, wading, or fishing and has infrequent full body contact. Under Kansas's law, a classified stream segment in this classification is not open to and accessible by the public.
- 2. Secondary Contact Recreational Use. There are two categories for secondary contact recreational use: 1) surface waters other than classified stream segments and 2) classified stream segments. The determining factor for secondary contact recreation is a lack of body immersion to the extent ingestion of surface water is not probable. The secondary contact recreation standards apply year round for streams designated for secondary contact recreation.
  - a. Surface Waters Other Than Classified Stream Segments. This use shall include wading, fishing, trapping, and hunting.
  - b. Classified Stream Segments. Secondary recreational uses for classified stream segments are capable of supporting the recreational activities of wading, fishing, canoeing, motor boating, rafting or other types of boating. There are two classes for secondary recreational use for classified stream segments that include:
    - i) Secondary contact recreational use-Class A. A classified stream segment supporting this use must be by law or written permission of the landowner open to and accessible by the public.
    - ii) Secondary contact recreational use-Class B. Under Kansas law, a classified stream segment supporting this use is not open to and accessible by the public.

If opposite sides of a classified stream segment have differing public access status, the designated use of the entire classified stream segment will be the assigned the highest attainable recreational use. Assignment of the higher use, however, does not grant *de facto* public access to both sides of such segment.



Neither primary nor secondary recreational use designations will apply to stream segments where the natural, ephemeral, intermittent or low flow conditions or water levels prevent primary or secondary recreational activities.

### **III. Criteria**

#### **A. Background Concentrations**

Applicable regulation: K.A.R. 28-16-28e (b)(9)  
K.A.R. 28-16-28e (c)(3)(B)

In surface waters where naturally occurring concentrations of elemental substances such as chlorides or sulfates exceed the numeric criteria given in Tables 1a, 1b, and 1c in the KWQS, the newly established numeric criteria will be the background concentration in the receiving water. Background concentrations applied as criteria will be determined only for those substances incorporated into surface waters that are released from geologic deposits and formations as a result of erosional processes or groundwater intrusions.

The background concentration of a receiving water may be established using data from STORET or data from other data bases with adequate and documented quality assurance procedures acceptable to KDHE. The background concentration will be determined using existing instream chemical parameter measurements and stream flow measurements.

In instances where background concentration is approximately proportional to the flow, the background concentration will be determined using the mean concentration of instream measurements. Only those measurements gathered when stream flow is at or below 50<sup>th</sup> percentile of all stream flow values will be used to determine background concentrations. A minimum of five data points will be required to make a background concentration determination. If sufficient data is not available, then the background concentration will be established through monitoring. Samples will be collected in upstream areas representative of the receiving water, including various habitat types, and unaffected by the discharge being permitted, or other identifiable anthropogenic influences. Samples from streams will be collected as close as possible to low flow conditions. Samples from lakes will be collected outside of the regulatory mixing zone. The mean of at least five concentration observations is required to establish the background concentration. Hardness and pH data will also be gathered if the criterion is hardness or pH dependent. In instances where background concentration is not proportional to flow, a scientifically based analysis approved by the department will be required.

#### **B. Site-Specific Criteria**

Applicable regulation: K.A.R. 28-16-28f(f)

A site-specific criteria determination can change the water quality aquatic life criteria for a parameter(s) in a given stream segment. A change in criteria based on a site-specific determination will not be granted to allow technology-based limits to be exceeded. The discharger requesting a site-specific determination from the criteria set via K.A.R. 28-16-28e must specifically state, in writing to KDHE, the parameters for which a site-specific determination is being sought. The request must include the scope, content and time frame for a study to gather data in support of the site-specific determination being requested.

The site-specific determination study must be conducted in accordance with one of the three methods outlined in USEPA's Interim Guidance on Determination and Use of Water Effect Ratios for Metals, EPA-823-B-94-001, or other acceptable methods (background concentration determination or winter time ammonia criteria). The study may also provide supporting data establishing the chemical, physical and biological condition of the receiving water, including the number, diversity, and health of the biological resources in the stream. Studies to make a site-specific determination may also use guidelines provided in EPA's Technical Support Document for Water Quality-based Toxics Control.

KDHE will require the study be conducted by persons skilled in developing the information required in the site-specific determination report. Such skills will include appropriate techniques for conducting the approved EPA methods and relevant biological studies. KDHE approval of the scope, content, and time frame of the study is required.

KDHE will conduct a forum for the public to participate in the establishment of site-specific aquatic life criteria. KDHE will invite interested parties, regional experts, and the general public to assist in the construction of the scope and content of any studies used for support or development of site-specific criteria. The public will also be invited to comment on proposed criteria through the public notice process and if deemed necessary, through a public hearing.

Normally, KDHE will allow 12 months to gather the necessary data and three additional months to assimilate and present the report. This time frame may be extended or reduced based upon the complexity of the study, weather induced delays and other contingencies outside the control of the discharger. During this time, monitoring requirements will be placed in the permit for the parameters which will be affected by the site-specific determination. The requirements in the original permit issued prior to allowing the site-specific criteria study will remain in effect until the permit is renewed or until a final decision is made on the site-specific criteria request.

The decision and appropriate permit modifications will be public noticed and subject to review and appeal. If the request to change the site-specific criteria is not granted and the permittee is unable to meet the required limitations, the permit will be modified with a schedule of compliance.

**C. State/Federal Water Quality Criteria**

Table 1a. Numeric Criteria

Parameter	USE CATEGORY					
	AQUATIC LIFE		AGRICULTURE		PUBLIC HEALTH	
	Acute	Chronic	Livestock	Irrigation	Food Procurement	Water Supply
<b>RADIONUCLIDES (pCi/L)</b>						
gross beta radioactivity	a	a	a	a	a	50
gross alpha particles including radium-226, but not radon or uranium	a	a	a	a	a	15
radium 226 and 228 combined	a	a	a	a	a	5
strontium 90	a	a	a	a	a	8
tritium	a	a	a	a	a	20,000
<b>METALS (µg/L)</b>						
antimony, total	88	30	a	a	4,300	6
arsenic, total	340	50	200	100	20.5	b
arsenic (III)	360	50	a	a	b	b
arsenic (V)	850	48	a	a	a	a
barium	a	a	a	a	a	2,000
beryllium, total	130	5.3	a	100	0.13	4
boron, total	a	a	5,000	750	a	a
cadmium, total	table 1b	table 1b	20	10	170	5
chromium, total	a	40	1,000	100	a	100
chromium (III)	table 1b	table 1b	a	a	3,433,000	50
chromium (VI)	15	10	a	a	3,400	50
copper, total	table 1b	table 1b	500	200	a	1,300
lead, total	table 1b	table 1b	100	5,000	a	15
mercury, total	2.1	0.012	10	a	0.146	b
nickel, total	table 1b	table 1b	500	200	100	100
selenium, total	20	5	50	20	6,800	50
selenium (V)	11.2	a	a	a	a	a
silver, total	table 1b	a	a	a	a	50
thallium, total	1,400	40	a	a	b	2
zinc, total	table 1b	table 1b	25,000	2,000	a	a
<b>OTHER INORGANIC SUBSTANCES (µg/L)</b>						
ammonia	table 1c	table 1d or 1e	a	a	a	a
asbestos (µfibers/L)	a	a	a	a	a	7,000,000
chloride	860,000	352,000	a	a	a	250,000
chlorine, total residual	19	11	a	a	a	a
cyanide (free)	22	5.2	a	a	220,000	200
fluoride	a	a	2,000	1,000	a	2,000
nitrate (as N)	a	a	a	a	a	10,000
nitrite + nitrate (as N)	a	a	100,000	a	a	10,000
phosphorus, elemental (white)	a	0.1	a	a	a	a
sulfate	a	a	1,000,000	a	a	250,000
<b>ORGANIC SUBSTANCES (µg/L)</b>						
<b>Benzenes .....</b>						
aminobenzene (aniline)	14	6.7	a	a	a	a
benzene	5,300	a	a	a	40	b
chlorobenzene	250	50	a	a	21,000	100
dichlorobenzenes, total	1,120	763	a	a	2,600	a
o-dichlorobenzene	1,120	763	a	a	2,600	600
m-dichlorobenzene	1,120	763	a	a	2,600	b
p-dichlorobenzene	a	a	a	a	2,600	75

Table 1a. Numeric Criteria

Parameter	USE CATEGORY					
	AQUATIC LIFE		AGRICULTURE		PUBLIC HEALTH	
	Acute	Chronic	Livestock	Irrigation	Food Procurement	Water Supply
ORGANIC SUBSTANCES (µg/L)						
Benzenes (cont.d).....						
other chlorinated benzenes, total	250	50	a	a	a	a
1,2,4-trichlorobenzene	250	a	a	a	940	70
1,2,4,5-tetrachlorobenzene	250	50	a	a	48	a
pentachlorobenzene	250	50	a	a	85	a
hexachlorobenzene	6.0	3.7	a	a	0.00074	b
ethylbenzene	32,000	a	a	a	28,718	700
nitrobenzene	27,000	a	a	a	1,900	b
pentachloronitrobenzene	250	50	a	a	a	a
vinylbenzene (styrene)	a	a	a	a		100
Ethers .....						
chloroalkyl ethers, total	238,000	a	a	a	a	a
bis(2-chloroethyl)ether	238,000	a	a	a	1.36	b
bis(2-chloroisopropyl)ether	238,000	a	a	a	0.00184	b
bis(chloromethyl)ether	238,000	a	a	a	0.00184	a
2-chloroethyl vinyl ether	360	120	a	a	a	a
halogenated ethers, total	360	122	a	a	a	a
chloromethyl methyl ether	238,000	a	a	a	0.00184	a
4,4'-dibromodiphenyl ether	360	120	a	a	a	a
hexabromodiphenyl ether	360	120	a	a	a	a
nonabromodiphenyl ether	360	120	a	a	a	a
pentabromodiphenyl ether	360	120	a	a	a	a
tetrabromodiphenyl ether	360	120	a	a	a	a
tribromodiphenyl ether	360	120	a	a	a	a
Halogenated Hydrocarbons .....						
chlorinated ethanes						
1,2-dichloroethane	18,000	2,000	a	a	b	b
1,1,1-trichloroethane	18,000	a	a	a	173,077	200
1,1,2-trichloroethane	18,000	9,400	a	a	41.8	b
tetrachloroethanes, total	9,320	a	a	a	a	a
1,1,1,2-tetrachloroethane	9,320	a	a	a	a	a
1,1,2,2-tetrachloroethane	9,320	2,400	a	a	10.7	b
pentachloroethane	7,240	1,100	a	a	a	a
hexachloroethane	980	540	a	a	8.74	b
chlorinated ethylenes, total						
1,1-dichloroethylene	11,600	a	a	a	1.85	a
cis-1,2-dichloroethylene	11,600	a	a	a	1.85	b
trans-1,2-dichloroethylene	11,600	a	a	a	1.85	70
trichloroethylene	45,000	21,900	a	a	140,000	100
tetrachloroethylene	5,280	840	a	a	80.7	b
chlorinated propanes/propenes					8.85	b
1,2-dichloropropane	23,000	5,700	9.0	a	39	5
1,3-dichloropropene	6,600	244	a	a	14.1	b

Table 1a. Numeric Criteria

Parameter	USE CATEGORY					
	AQUATIC LIFE		AGRICULTURE		PUBLIC HEALTH	
	Acute	Chronic	Livestock	Irrigation	Food Procurement	Water Supply
Other Halogenated Hydrocarbons ....						
halogenated methanes, total	11,000	a	a	a	15.7	100
bromomethane	11,000	a	a	a	15.7	b
1,2-dibromoethane	a	a	a	a	a	0.05
tribromomethane (bromoform)	11,000	a	a	a	15.7	b
bis(2-chloroethoxy) methane	11,000	a	a	a	15.7	a
bromodichloromethane	11,000	a	a	a	15.7	b
bromochloromethane	11,000	a	a	a	15.7	a
bromotrichloromethane	11,000	a	a	a	15.7	a
dibromochloromethane	11,000	a	a	a	15.7	b
dibromochloropropane	a	a	a	a	15.7	0.2
dibromodichloromethane	11,000	a	a	a	15.7	a
dichlorodifluoromethane	11,000	a	a	a	15.7	a
dichloromethane (methylene chloride)	11,000	a	a	a	1,600	4.7
trichloromethane (chloroform)	28,900	1,240	a	a	15.7	b
tribromochloromethane	11,000	a	a	a	15.7	a
trichlorofluoromethane	11,000	a	a	a	15.7	a
tetrachloromethane (carbon tetrachloride)	35,200	a	a	a	b	b
di(2-ethylhexyl)adipate	a	a	a	a	a	500
hexachlorobutadiene	90	9.3	a	a	50	b
hexachlorocyclopentadiene	7	5.2	a	a	206	50
vinyl chloride	a	a	a	a	525	2
Miscellaneous Organics .....						
dioxin (2,3,7,8 TCDD)	0.01	0.00001	a	a	0.000000014	b
isophorone	117,000	a	a	a	b	b
polychlorinated biphenyls, total	2	0.014	a	a	0.0000079	b
tributyltin oxide	0.149	0.026	a	a	a	a
Nitrogen Compounds .....						
nitrosamines, total	5,850	a	a	a	1.24	a
N-nitrosodibutylamine	5,850	a	a	a	0.587	a
N-nitrosodiethanolamine	5,850	a	a	a	1.24	a
N-nitrosodiethylamine	5,850	a	a	a	1.24	a
N-nitrosodimethylamine	5,850	a	a	a	1.6	b
N-nitrosodiphenylamine	5,850	a	a	a	16.0	b
N-nitrosodi-n-propylamine	a	a	a	a	1.24	.005
N-nitrosopyrrolidine	5,850	a	a	a	91.9	a
acrylonitrile	7,550	2,600	a	a	0.65	b
benzidine	2,500	a	a	a	0.000535	b
3,3'-dichlorobenzidine	a	a	a	a	0.02	b
1,2-diphenyl hydrazine	270	a	a	a	0.54	b
Polynuclear Aromatic Hydrocarbons, total	a	a	a	a	0.0311	0.2
acenaphthene	1,700	520	a	a	2,700	1200
acenaphthylene	a	a	a	a	0.0311	a
anthracene	a	a	a	a	0.0311	b
benzo(a)anthracene	a	a	a	a	0.0311	b
benzo(a)pyrene	a	a	a	a	0.0311	b
benzo(b)fluoranthene	a	a	a	a	0.0311	b
benzo(g,h,i)perylene	a	a	a	a	0.0311	a
benzo(k)fluoranthene	a	a	a	a	0.0311	b
2-chloronaphthalene	a	a	a	a	4,300	1,700
chrysene	a	a	a	a	0.0311	b
dibenzo(a,h)anthracene	a	a	a	a	0.0311	b
fluoranthene	3,980	a	a	a	b	b
fluorene	a	a	a	a	0.0311	b
ideno(1,2,3-cd)pyrene	a	a	a	a	0.0311	b
naphthalene	2,300	620	a	a	a	a
phenanthrene	30	6.3	a	a	0.0311	a
pyrene	a	a	a	a	0.0311	b

Table 1a. Numeric Criteria

Parameter	USE CATEGORY					
	AQUATIC LIFE		AGRICULTURE		PUBLIC HEALTH	
	Acute	Chronic	Livestock	Irrigation	Food Procurement	Water Supply
Phthalate Esters .....						
phthalates, total	940	3	a	a	a	a
butylbenzyl phthalate	a	a	a	a	5,200	100
di(2-ethylhexyl)phthalate	400	360	a	a	b	b
dibutyl phthalate	940	3	a	a	b	b
diethyl phthalate	a	a	a	a	b	5
dimethyl phthalate	940	3	a	a	2,900,000	b
Phenolic Compounds .....						
phenol	10,200	2,560	a	a	4,600,000	b
2,4-dimethyl phenol	1,300	530	a	a	2,300	540
chlorinated phenols						
2-chlorophenol	4,380	2,000	a	a	400	120
3-chlorophenol	a	a	a	a	29,000	a
2,4-dichlorophenol	2,020	365	a	a	b	b
2,4,5-trichlorophenol	100	63	a	a	a	a
2,4,6-trichlorophenol	a	970	a	a	3.6	b
pentachlorophenol	table 1b	table 1b	a	a	8.2	b
3-methyl-4-chlorophenol	30	a	a	a	a	a
nitrophenols, total	230	150	a	a	a	a
2,4-dinitrophenol	a	a	a	a	765	b
4,6-dinitro-o-cresol	a	a	a	a	765	b
Toluenes.....						
toluene	17,500	a	a	a	b	1,000
dinitrotoluenes, total	330	230	a	a	9.1	a
2,4-dinitrotoluene	330	230	a	a	9.1	b
xylene	a	a	a	a	a	10,000
PESTICIDES (µg/L)						
acrolein	68	21	a	a	780	320
acrylamide	a	a	a	a	a	0.01
alachlor (lasso)	760	76	100	a	a	2
aldicarb	a	a	a	a	a	3
aldicarb sulfone	a	a	a	a	a	2
aldicarb sulfoxide	a	a	a	a	a	3
aldrin	3	0.001	1	a	0.000079	b
atrazine (aatrex)	170	3	a	a	a	3
bromoxynil (MCPA)	a	a	20	a	a	a
carbaryl (sevin)	a	0.02	100	a	a	a
carbofuran (furadan)	a	a	100	a	a	40
chlordane	2.4	0.0043	3	a	0.00048	b
chlorpyrifos	0.083	0.041	100	a	a	a
2,4-D	a	a	a	a	a	70
dacthal (DCPA)	a	14,300	a	a	a	a
dalapon	a	110	a	a	a	200
diazinon (spectracide)	a	0.08	100	a	a	a
DDT and Metabolites .....						
4,4'-DDE (p,p'-DDE)	1,050	a	a	a	0.00059	b
4,4'-DDD (p,p'-DDD)	a	a	a	a	0.00084	b
DDT, total	1.1	0.001	50	a	0.000024	b
dieldrin	1.0	0.0019	1	a	0.000076	b
dinoseb (DNBP)	a	a	a	a	a	7
diquat	a	a	a	a	a	20
disulfoton (disyston)	a	a	100	a	a	a
endosulfan, total	0.22	0.056	a	a	159	b
alpha-endosulfan	0.22	0.056	a	a	240	110
beta-endosulfan	0.22	0.056	a	a	240	110
endosulfan sulfate	a	a	a	a	b	b
endothall	a	a	a	a	a	100
endrin	0.18	0.0023	0.5	a	0.81	0.76
endrin aldehyde	a	a	a	a	0.81	b
epichlorohydrin	a	a	a	a	a	4
ethylene dibromide	a	a	a	a	a	0.05
fenchlorfos (ronnel)	a	a	100	a	a	a
glyphosate (roundup)	a	a	a	a	a	700
guthion	a	0.010	100	a	a	a
heptachlor	0.52	0.0038	0.1	a	0.00021	b
heptachlor epoxide	0.52	0.0038	0.1	a	b	b

Table 1a. Numeric Criteria

Parameter	USE CATEGORY					
	AQUATIC LIFE		AGRICULTURE		PUBLIC HEALTH	
	Acute	Chronic	Livestock	Irrigation	Food Procurement	Water Supply
PESTICIDES (contd.) (µg/L)						
hexachlorocyclohexane	100	a	a	a	a	a
alpha-HCH	100	a	a	a	0.0031	b
beta-HCH	100	a	a	a	b	b
delta-HCH	100	a	a	a	a	a
gamma-HCH (lindane)	2	0.08	5	a	0.0625	b
technical-HCH	a	a	a	a	0.0414	a
malathion	a	0.10	100	a	a	a
methoxychlor	a	0.03	1000	a	a	40
methyl parathion	a	a	100	a	a	a
metribuzin (sencor)	a	100	a	a	a	a
mirex	a	0.001	a	a	0.000097	a
oxamyl (vydate)	a	a	a	a	a	200
parathion	0.065	0.013	100	a	a	a
picloram (tordon)	a	a	a	a	a	500
propachlor (ramrod)	a	8	a	a	a	a
simazine (princep)	a	a	10	a	a	4
toxaphene	0.73	0.0002	5	a	0.00073	b
2,4,5-T	a	a	2	a	a	a
2,4,5-TP (silvex)	a	a	a	a	a	50

a - criterion not available

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

Table 1b. Formulae for calculation of hardness-dependent aquatic life support criteria for chromium III and total cadmium, total copper, 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<sub>3</sub>. Pentachlorophenol formulae apply only over the pH range 6.5-8.5.

**CADMIUM (ug/L):**

acute criterion =  $WER[EXP[(1.1280 * (LN(hardness))) - 3.6867]]$

chronic criterion =  $WER[EXP[(0.7852 * (LN(hardness))) - 2.715]]$

**CHROMIUM III (ug/L):**

acute criterion =  $WER[EXP[(0.819 * (LN(hardness))) + 3.7256]]$

chronic criterion =  $WER[EXP[(0.819 * (LN(hardness))) + 0.6848]]$

**COPPER (ug/L):**

acute criterion =  $WER[EXP[(0.9422 * (LN(hardness))) - 1.700]]$

chronic criterion =  $WER[EXP[(0.8545 * (LN(hardness))) - 1.702]]$

**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 =  $WER[EXP[(1.72 * (LN(hardness))) - 6.52]]$

**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 dependent acute aquatic life criteria for total ammonia (total ammonia as N, mg/l).

<b>Acute Aquatic Life Criteria for Ammonia, mg/l</b>	
<b>pH</b>	<b>Criteria</b>
6.5	48.8
6.6	46.8
6.7	44.6
6.8	42.0
6.9	39.1
7.0	36.1
7.1	32.8
7.2	29.5
7.3	26.2
7.4	23.0
7.5	19.9
7.6	17.0
7.7	14.4
7.8	12.1
7.9	10.1
8.0	8.40
8.1	6.95
8.2	5.72
8.3	4.71
8.4	3.88
8.5	3.20
8.6	2.65
8.7	2.20
8.8	1.84
8.9	1.56
9.0	1.32

Table 1d. pH and temperature dependent chronic aquatic life criteria for total ammonia (total ammonia as N, mg/l) with early life stages of fish present.

Chronic Aquatic Life Criteria for Ammonia, Early Life Stages Present, mg/l										
pH	Temperature, °C									
	0	14	16	18	20	22	24	26	28	30
6.5	6.67	6.67	6.06	5.33	4.68	4.12	3.62	3.18	2.80	2.46
6.6	6.57	6.57	5.97	5.25	4.61	4.05	3.56	3.13	2.75	2.42
6.7	6.44	6.44	5.86	5.15	4.52	3.98	3.50	3.07	2.70	2.37
6.8	6.29	6.29	5.72	5.03	4.42	3.89	3.42	3.00	2.64	2.32
6.9	6.12	6.12	5.56	4.89	4.30	3.78	3.32	2.92	2.57	2.25
7.0	5.91	5.91	5.37	4.72	4.15	3.65	3.21	2.82	2.48	2.18
7.1	5.67	5.67	5.15	4.53	3.98	3.50	3.08	2.70	2.38	2.09
7.2	5.39	5.39	4.90	4.31	3.78	3.33	2.92	2.57	2.26	1.99
7.3	5.08	5.08	4.61	4.06	3.57	3.13	2.76	2.42	2.13	1.87
7.4	4.73	4.73	4.30	3.78	3.32	2.92	2.57	2.26	1.98	1.74
7.5	4.36	4.36	3.97	3.49	3.06	2.69	2.37	2.08	1.83	1.61
7.6	3.98	3.98	3.61	3.18	2.79	2.45	2.16	1.90	1.67	1.47
7.7	3.58	3.58	3.25	2.86	2.51	2.21	1.94	1.71	1.50	1.32
7.8	3.18	3.18	2.89	2.54	2.23	1.96	1.73	1.52	1.33	1.17
7.9	2.80	2.80	2.54	2.24	1.96	1.73	1.52	1.33	1.17	1.03
8.0	2.43	2.43	2.21	1.94	1.71	1.50	1.32	1.16	1.02	0.897
8.1	2.10	2.10	1.91	1.68	1.47	1.29	1.14	1.00	0.879	0.773
8.2	1.79	1.79	1.63	1.43	1.26	1.11	0.973	0.855	0.752	0.661
8.3	1.52	1.52	1.39	1.22	1.07	0.941	0.827	0.727	0.639	0.562
8.4	1.29	1.29	1.17	1.03	0.906	0.796	0.700	0.615	0.541	0.475
8.5	1.09	1.09	0.990	0.870	0.765	0.672	0.591	0.520	0.457	0.401
8.6	0.920	0.920	0.836	0.735	0.646	0.568	0.499	0.439	0.386	0.339
8.7	0.778	0.778	0.707	0.622	0.547	0.480	0.422	0.371	0.326	0.287
8.8	0.661	0.661	0.601	0.528	0.464	0.408	0.359	0.315	0.277	0.244
8.9	0.565	0.565	0.513	0.451	0.397	0.349	0.306	0.269	0.237	0.208
9.0	0.486	0.486	0.442	0.389	0.342	0.300	0.264	0.232	0.204	0.179

Table 1e. pH and temperature dependent chronic aquatic life criteria for total ammonia (total ammonia as N, mg/l) with early life stages of fish absent.

Chronic Aquatic Life Criteria for Ammonia, Early Life Stages Absent*, mg/l								
pH	Temperature, °C							
	0-7	8	9	10	11	12	13	14**
6.5	10.8	10.1	9.51	8.92	8.36	7.84	7.35	6.89
6.6	10.7	9.99	9.37	8.79	8.24	7.72	7.24	6.79
6.7	10.5	9.81	9.20	8.62	8.08	7.58	7.11	6.66
6.8	10.2	9.58	8.98	8.42	7.90	7.40	6.94	6.51
6.9	9.93	9.31	8.73	8.19	7.68	7.20	6.75	6.33
7.0	9.60	9.00	8.43	7.91	7.41	6.95	6.52	6.11
7.1	9.20	8.63	8.09	7.58	7.11	6.67	6.25	5.86
7.2	8.75	8.20	7.69	7.21	6.76	6.34	5.94	5.57
7.3	8.24	7.73	7.25	6.79	6.37	5.97	5.60	5.25
7.4	7.69	7.21	6.76	6.33	5.94	5.57	5.22	4.89
7.5	7.09	6.64	6.23	5.84	5.48	5.13	4.81	4.51
7.6	6.46	6.05	5.67	5.32	4.99	4.68	4.38	4.11
7.7	5.81	5.45	5.11	4.79	4.49	4.21	3.95	3.70
7.8	5.17	4.84	4.54	4.26	3.99	3.74	3.51	3.29
7.9	4.54	4.26	3.99	3.74	3.51	3.29	3.09	2.89
8.0	3.95	3.70	3.47	3.26	3.05	2.86	2.68	2.52
8.1	3.41	3.19	2.99	2.81	2.63	2.47	2.31	2.17
8.2	2.91	2.73	2.56	2.40	2.25	2.11	1.98	1.85
8.3	2.47	2.32	2.18	2.04	1.91	1.79	1.68	1.58
8.4	2.09	1.96	1.84	1.73	1.62	1.52	1.42	1.33
8.5	1.77	1.66	1.55	1.46	1.37	1.28	1.20	1.13
8.6	1.49	1.40	1.31	1.23	1.15	1.08	1.01	0.951
8.7	1.26	1.18	1.11	1.04	0.976	0.915	0.858	0.805
8.8	1.07	1.01	0.944	0.885	0.829	0.778	0.729	0.684
8.9	0.917	0.860	0.806	0.456	0.709	0.664	0.623	0.584
9.0	0.790	0.740	0.694	0.651	0.610	0.572	0.536	0.503

\* Early life stage absent criteria will apply to all Kansas surface waters during the months November through February except in surface water segments listed in Table 1f. The application of early life stage absent criteria outside of the months November through February will require a segment-specific examination of the surface water for the presence of early life stages of fish.

\*\* At 15 ° C and above, the criterion for early life stages absent is equivalent to the criterion for early life stages present.

Table 1f. Surface Water Segments where early life stages absent chronic aquatic life criteria are not 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(partial)
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	102400115	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

<b>National Toxics Rule (NTR) Criteria footnoted in Table 1a. of K.A.R. 28-16-28e with a “b”</b>		
<b>Parameter</b>	<b>NTR Domestic H<sub>2</sub>O Supply (µg/l )</b>	<b>NTR Food Procurement (µg/l )</b>
arsenic, total	0.018	-
mercury, total	0.14	-
benzene	1.2	-
m-dichlorobenzene	400	-
hexachlorobenzene	0.00075	-
nitrobenzene	17	-
bis(2-chloroethyl)ether	0.031	-
bis(2-chloroisopropyl)ether	1,400	-
1,2-dichloroethane	0.38	99
1,1,2-trichloroethane	0.6	-
1,1,2,2-tetrachloroethane	0.17	-
hexachloroethane	1.9	-
1,1-dichloroethylene	0.057	-
trichloroethylene	2.7	-
tetrachloroethylene	0.8	-
1,3-dichloropropene	10	-
bromomethane	48.0	-
tribromomethane (bromoform)	4.3	-
bromodichloromethane (dichlorobromomethane)	0.27	-
dibromochloromethane (chlorodibromomethane)	0.41	-
trichloromethane (chloroform)	5.7	-
tetrachloromethane (carbon tetrachloride)	0.25	4.4
hexachlorobutadiene	0.44	-

Parameter	NTR Domestic H <sub>2</sub> O Supply (μg/l )	NTR Food Procurement (μg/l )
dioxin (2,3,7,8)	1.3x10 <sup>-8</sup>	-
isophorone	8.4	600
polychlorinated biphenyls, total (PCBs)	0.00004	-
N-nitrosodimethylamine	0.00069	-
N-nitrosodiphenylamine	5	16
acrylonitrile	0.059	-
benzidine	0.00012	-
3,3'-dichlorobenzidine	0.04	-
1,2-diphenyl hydrazine	0.04	0.54
anthracene	9,600	-
benzo(a)anthracene	0.0028	-
benzo(a)pyrene	0.0028	-
benzo(b)fluoranthene	0.0028	-
benzo(k)fluoranthene	0.0028	-
chrysene	0.0028	-
dibenzo(a,h)anthracene	0.0028	-
fluoranthene	300	370
flourene	1,300	-
ideno(1,2,3-cd)pyrene	0.0028	-
pyrene	960	-
di(2-ethylhexyl)phthalate	1.8	5.9
dibutyl phthalate (di-n-butyl phthalate)	2,700	12,000
diethyl phtalate	-	120,000
dimethyl phthalate	313,000	-
phenol	21,000	-

Parameter	NTR Domestic H <sub>2</sub> O Supply (μg/l)	NTR Food Procurement (μg/l)
2,4-dichlorophenol	93	790
2,4,6-trichlorophenol	2.1	-
pentachlorophenol	0.28	-
2,4-dinitrophenol	70	-
4,6-dinitro-o-cresol	13.4	-
toluene	-	200,000
2,4-dinitrotoluene	0.11	-
aldrin	0.00013	-
chlordane	0.00057	-
4,4'DDE (p,p'-DDE)	0.00059	-
4,4'-DDD (p,p'-DDD)	0.00083	-
DDT, total	0.00059	-
dieldrin	0.00014	-
endosulfan, total	0.93	2
endosulfan sulfate	0.93	2
endrin	0.76	-
endrin aldehyde	0.76	-
heptachlor	0.00021	0.00021
heptachlor epoxide	0.0001	0.00011
alpha-HCH	0.0039	-
beta-HCH	0.014	0.046
gamma-HCH (lindane)	0.019	-
toxaphene	0.00073	-