February 25, 2003

Ms. Christine Todd Whitman
Administrator
U.S. Environmental Protection Agency
Ariel Rios Building, Room 3000
1200 Pennsylvania Avenue N.W.
Washington, D.C. 20460

Re: Petition to Set Consistent and Adequate Interstate Water Quality Standards

Dear Administrator Whitman:

Enclosed please find a petition submitted by the Ozark Chapter of the Sierra Club to the U.S. Environmental Protection Agency. The petition requests that the EPA set consistent and adequate water quality standards for defined portions of the Mississippi and Missouri Rivers. The petition is being submitted pursuant to paragraph 9 in the Settlement Agreement in American Canoe Ass'n v. Browner, 98-1195-CV-W and 98-482-CV-W (W.D.Mo.) (effective date 2-27-01).

Sincerely yours,

Maxine I. Lipeles, J.D., Director
Interdisciplinary Environmental Clinic

Attorneys for Ozark Chapter of the Sierra Club

PETITION TO THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY FOR RULEMAKING TO PROTECT INTERSTATE WATERS UNDER THE CLEAN WATER ACT

I. Introduction

The Ozark Chapter of the Sierra Club petitions the U.S. Environmental Protection Agency (EPA) to exercise its authority under section 303(c)(4) of the Clean Water Act to promulgate water quality standards applicable to the Mississippi and Missouri rivers in an eight-state region in the vicinity of the rivers' confluence. The EPA should set standards that are (1) consistent among the states along each of these interstate rivers, and (2) adequate to achieve the Act's fishable/swimmable requirements. In addition, the standards should include monitoring provisions and a uniform, statistically based method for determining whether the rivers are, in fact, meeting applicable standards.[1]

While the Clean Water Act requires the states to set water quality standards for waters within their boundaries, the Act also imposes duties on the EPA to ensure that the standards promote and achieve the Act's objectives. For example, the states' standards may not take effect under the Act without the approval of the EPA, and the Act directs the EPA to prepare standards for a state that fails to submit acceptable standards. CWA § 303(c)(3) and (4)(A), 33 U.S.C. § 1313(c)(3) and (4)(A). In addition, the Act instructs the EPA to "encourage … so far as

[1] The Ozark Chapter files this petition pursuant to paragraph 9 of the Settlement Agreement (See Addendum 1) entered into between the Sierra Club and the USEPA in American Canoe Ass'n v. Browner, 98-1195-CV-W and 98-482-CV-W (W.D.Mo.) (Settlement Agreement effective February 27, 2001). Paragraph 9 provides as follows:

> "Plaintiffs expect to petition EPA to undertake actions to ensure that there are adequate and consistent water quality standards for those portions of (a) the Mississippi River (1) adjacent to Missouri waters in Illinois, Kentucky and Tennessee, (2) upstream of Missouri waters (in Illinois and Iowa) to Burlington, Iowa, and (3) downstream of Missouri waters (in Tennessee and Arkansas) to Memphis, Tennessee, and (b) the Missouri River (1) adjacent to Missouri waters in Kansas and Nebraska, and (2) upstream of Missouri waters (in Nebraska and Iowa) to Omaha, Nebraska. Plaintiffs expect the petition to address: chlordane, atrazine, polychlorinated biphenyls; e coli; enterococci; conventionals (dissolved oxygen, ammonia); nutrients; sediments; and an index of biological integrity for the aquatic community. Plaintiffs also expect to petition EPA to ensure that there is a uniform statistically based method for determining whether any water meets applicable water quality standards. If Plaintiffs submit such a petition after 180 days from the Effective Date of the Settlement Agreement, but not later than two years from the Effective Date of the Settlement Agreement, and the petition requests no broader action than that described in this paragraph, EPA will grant or deny (or grant in part and deny in part) Plaintiffs' petition within one year of receipt of the petition."

practicable, uniform State laws relating to the prevention, reduction, and elimination of pollution." CWA § 103(a), 33 U.S.C. § 1253(a).

The state-by-state approach to setting water quality standards faces probably its greatest challenge in the context of interstate rivers, where there are typically different states on opposite shores of the river and numerous states along the river as it flows from headwaters to mouth. The EPA has attempted, through regulations, to require states to take account of downstream states' standards in setting their own standards, 40 C.F.R. §§ 131.10(b), and in making permit decisions, 40 C.F.R. § 122.4(d). In an analogous situation, the Clean Water Act and EPA regulations require Native American Tribes and States to attempt to reconcile inconsistencies among their water quality standards where different jurisdictions impose different standards upstream or downstream of each other on the same river. CWA § 518 (33 U.S.C. § 1377); 40 C.F.R. § 131.7. In addition, efforts to set consistent water quality standards in specific regions (e.g. Great Lakes, Chesapeake Bay) are in various phases of implementation. Unfortunately, existing efforts have not proven sufficient to achieve acceptable water quality along the Mississippi and Missouri Rivers.

This petition requests that the EPA utilize its authority under the Clean Water Act and implementing regulations to set consistent and adequate water quality standards for those portions of the Mississippi and Missouri Rivers within the states of Iowa, Illinois, Missouri, Arkansas, Kentucky, Tennessee, Nebraska, and Kansas. Specifically, the petition addresses the Mississippi River from Burlington, Iowa to Memphis, Tennessee, and the Missouri River from Omaha, Nebraska to its confluence with the Mississippi River at St. Louis, Missouri ("the petition area"). **Pursuant to the Settlement Agreement, the Ozark Chapter requests that, within one year of receipt of this petition, the EPA publish water quality standards for the Mississippi and Missouri Rivers within the petition area states. Such standards should be:**

1. **Consistent among the states on each river, such that no state impairs the ability of any other affected state (whether across-stream or downstream) to achieve its water quality standards; and**
2. **Adequate:**
    a. **including numeric criteria for chlordane, atrazine, polychlorinated biphenyls, e coli, enterococci, conventionals (including dissolved oxygen and ammonia), nutrients, sediments, and an index of biological integrity for the aquatic community ("the petition pollutants"), among other criteria; and**
    b. **reflecting criteria sufficient to achieve and maintain fishable/swimmable water quality.**
3. **In addition, such standards should include monitoring requirements sufficient to support a uniform, statistically based method for determining whether the rivers are meeting their water quality standards.**

The balance of this petition will address the need for interstate water quality standards within the petition area that are (1) consistent; (2) adequate; and (3) effectively monitored.

II. Background

A. Water Quality Standards Play a Crucial Role Under the Clean Water Act

The EPA has repeatedly emphasized the significance of water quality standards to the nation's water pollution efforts. For example:

> Water quality standards serve as the foundation for the water-quality based approach to pollution control and are a fundamental component of watershed management. … [W]ater quality standards should: 1) include provisions for restoring and maintaining chemical, physical, and biological integrity of State waters, 2) provide, wherever attainable, water quality for the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water ("fishable/swimmable"), and 3) consider the use and value of State waters for public water supplies, propagation of fish and wildlife, recreation, agricultural and industrial purposes, and navigation. http://www.epa.gov/waterscience/standards/about/history.htm (last visited Feb. 24, 2003).

The defining ingredients of water quality standards are designated uses and water quality criteria. Designated uses "specify appropriate water uses to be achieved and protected." 40 C.F.R. § 131.10(a). Water quality criteria must be adopted to protect each designated use. They must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use." 40 C.F.R. § 131.11(a)(1). In addition, standards must incorporate antidegradation policies to maintain and protect all existing water uses. 40 C.F.R. § 131.12(a)(1). Moreover, for purposes of the concerns expressed in this petition, each state "shall

ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream states." 40 C.F.R. § 131.10(b).

The Clean Water Act puts the initial responsibility for developing water quality standards on states, but assigns to the EPA the critical role of reviewing and approving – or rejecting – each state's proposed standards. CWA § 303(b) and (c)(3)-(4) (33 U.S.C. § 1313(b) and (c)(3)-(4)). When a state fails to submit a water quality standard, or submits one that does not satisfy the requirements of the Clean Water Act, and the state fails to correct the deficiency, the Act requires the EPA to prescribe an appropriate standard for the state. Ibid. In implementing these and other requirements of the Clean Water Act, the EPA is directed by Congress to promote interstate cooperation and uniform laws. CWA § 103(a) (33 U.S.C. § 1253(a)).

After states and the EPA establish and implement water quality standards, they must ensure that the standards are met and that uniform statistically based methods are used for this determination. The Clean Water Act and implementing regulations require that states biennially identify and list those waters not meeting water quality standards, and establish a total maximum daily load (TMDL) of pollutants that could enter each listed water without exceeding the standards. CWA § 303(d) (33 U.S.C. § 1313(d)); 40 CFR § 130.7. As with the underlying water quality standards, the states' lists and TMDLs are subject to the EPA's review and approval. Ibid.

B. Water Quality Problems in the Petition Area

The Mississippi and Missouri Rivers are central to the freshwater ecosystems that shape the culture, economy, and environment of the areas through which they flow.[2] The rivers serve an important role as a water source for human and other life, and provide economic support to

[2] Scott Siff & David Mears, *Mississippi River Symposium: The Mississippi River Basin: A National Treasure, a National Challenge*, 12 TUL. ENVTL. L.J. 293, 294 (1999). *See also* United States Environmental Protection Agency Office of Water, *Mississippi River Basin at* http://www.epa.gov/mbasin (last visited November 26, 2002) [*hereinafter Mississippi River Basin*].

bordering states through tourism, fishing, industrial uses, and transportation.[3] Both rivers also support hundreds of fish, mammal, and amphibian species.[4]

The Mississippi River originates in northern Minnesota and, before it empties into the Gulf of Mexico, drains all or part of 31 states.[5] See Figure 1.

Figure 1: Mississippi River[6]

With its tributaries, it serves as a drinking water supply for 70 cities and towns.[7] Also, the river provides habitat for a variety of aquatic life and for 40 percent of the nation's migratory

[3] Missouri Department of Natural Resources, *Integrated Strategic Plan – October 1, 2000 at* http://www.dnr.state.mo.us/s_plan/fy2002/issue1.htm (last visited October 11, 2002). *See also* United States Environmental Protection Agency Office of Water, *Mississippi River Basin at* http://www.epa.gov/mbasin (last visited November 26, 2002). The Mississippi River serves as a means of transportation for cargo. *Id.*

[4] *Id*. More than 400 wildlife species live in the Mississippi River Basin. *Id.* There are approximately 241 fish species, 50 mammal species, 45 reptile species, and 37 mussel species in the Mississippi River Basin. Rose Lew, "The Mississippi River: The Challenge of Sustainability (1995) at 3 (unpublished paper on file with author).

[5] United States Environmental Protection Agency Office of Water, *Mississippi River Basin at* http://www.epa.gov/mbasin (last visited November 26, 2002).

[6] World Atlas, *Mississippi River at* http://www.worldatlas.com/webimage/country/namerica/usstates/artwork/rivers/mississp.htm (last visited December 18, 2002).

[7] Robert M. Hirsch, "Introduction", in "Contaminants in the Mississippi River", U.S. Geological Survey Circular 1133 (Robert H. Meade ed., 1995).

birds.[8] The Mississippi River draws over 12 million visitors a year to the states alongside it, and generates approximately $2 million a year in commercial fishing.[9]

The construction of locks and dams and the loss of wetlands to agricultural use have altered the Mississippi River from its original state.[10] Nutrients from agriculture, domestic waste, and industrial waste have contaminated the river.[11] The Mississippi River receives a variety of organic contaminants and compounds from the urban areas, farms, and factories bordering the river.[12] The EPA has concluded that there is an "unprecedented amount of pollution currently contaminating the river."[13] The Missouri River is the largest tributary in the Mississippi River Basin. It begins in Montana and flows through ten states before meeting the Mississippi River in Missouri. See Figure 2.

Figure 2: Missouri River[14]

[8] *Mississippi River Basin, United States Environmental Protection Agency Office of Water, Mississippi River Basin at http://www.epa.gov/mbasin (last visited November 26, 2002).* note 22.
[9] *Id.*
[10] *Id.*
[11] Robert M. Hirsch, "Introduction," in "Contaminants in the Mississippi River," U.S. Geological Survey Circular 1133 (Robert H. Meade ed., 1995).
[12] *Id.*
[13] Environmental Protection Agency, *National Water Quality Inventory: 1998 Report to Congress – August 2, 2002 at* http://www.epa.gov/305b/98report/index.html (last visited at November 30, 2002).
[14] World Atlas, *Missouri River* at http://www.worldatlas.com/webimage/countrys/namerica/usstates/artwork/rivers/missouri.htm (last visited December 18, 2002).

The watershed of the Missouri River drains one-sixth of the United States,[15] and more than ten million people annually use the river for recreation.[16] In the last century, the Missouri River has undergone dramatic, anthropogenic changes,[17] resulting in the loss of many natural river formations, bank erosion, and pollution.[18] Because of these alterations and other human activities, "degradation of the natural Missouri River ecosystem is clear and is continuing."[19]

Neither the Mississippi nor the Missouri River is meeting the states' existing water quality standards, and neither has achieved the Clean Water Act's goal that all waters be suitable for fishing and swimming by 1983. CWA § 101(a)(2) (33 U.S.C. § 1251(a)(2)). This is shown most vividly in the section 303(d) listings[20] and fish advisories[21] of the states bordering these great rivers.

Petition area states have listed both rivers on section 303(d) lists as impaired due to a range of pollutants, including several of the petition pollutants. See Addenda 2 and 3. In 1998, the most recent year for which final listing data are available, the states of Iowa, Illinois, Missouri, and Tennessee listed the Mississippi River.[22] Missouri listed the entire portion of the Mississippi River bordering that state due to habitat loss.[23] Illinois listed the river due to excessive concentrations of suspended solids, metals, nutrients, and priority organics.[24]

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[15] United States Geological Service, *Missouri River InfoLINK 1999 Report at* http://infolink.cr.usgs.gov/AboutInfoLINK/99Report.pdf (last visited December 18, 2002).

[16] American Rivers, *The River Today at* http://www.americanrivers.org/missouririver/motoday.htm (last visited December 18, 2002).

[17] The Army Corps of Engineers built six damns in the 1930s, and changed the lower river to increase navigation. *Mississippi River Basin, United States Environmental Protection Agency Office of Water, Mississippi River Basin at http://www.epa.gov/mbasin (last visited November 26, 2002).* note 22.

[18] *Id.*

[19] The National Academies Press, *The Missouri River Ecosystem: Exploring the Prospect for Recovery – 2002 at* http://www.nap.edu/books/0309083141/html/ (last visited November 30, 2002.)

[20] *See* Addendum 2: 303(d) Listings for the Mississippi River, and Addendum 3: 303(d) Listings for the Missouri River.

[21] *See* Addendum 4: Fish Advisories for the Mississippi River, and Addendum 5: Fish Advisories for the Missouri River.

[22] *See* Addendum 2: 303(d) Listings for the Mississippi River.

[23] *Id.*

[24] *Id.*

Tennessee listed the entire portion of the river bordering the state because of pesticides, dioxin, PCBs, and siltation.[25]

Similarly, the states of Iowa, Missouri, and Nebraska placed the Missouri River on their 303(d) lists in 1998.[26] Missouri listed the Missouri River for habitat loss,[27] Iowa listed it for siltation, and Nebraska listed it in three locations because of pathogens.[28] Although the various states pinpoint different causes, most of the states in the petition area consider the Mississippi and Missouri Rivers to be substantially degraded, with water quality falling short of existing standards.

The fish advisories issued by the states bordering the rivers underscore that water quality is not yet "fishable/swimmable." The states of Illinois, Kentucky, Missouri, and Tennessee have issued fish advisories applicable to the Mississippi River.[29] The pollutants causing these fish advisories are PCBs, mercury, and chlordane. Some of the advisories warn against the consumption of specific types of fish, such as carp, sturgeon, or largemouth bass for either the general population or for subpopulations.[30] Both Missouri and Nebraska have fish advisories in place for the Missouri River,[31] and Kansas recommends following Missouri's consumption advisories for shared portions of the Missouri River. The pollutants listed in advisories are chlordane, PCBs, mercury, and dieldrin.[32] Advisories include warnings to avoid the consumption of largemouth bass, sturgeon, and sturgeon eggs,[33] and to restrict the consumption of channel catfish.[34]

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[25] *Id.*
[26] *See* Addendum 3: 303(d) Listings for the Missouri River.
[27] *Id.*
[28] *Id.*
[29] See Addendum 4: Fish Advisories for the Mississippi River.
[30] *Id.*
[31] *See* Addendum 5: Fish Advisories of the Missouri River.
[32] *Id.*
[33] *Id.*
[34] *Id.*

In short, existing efforts to protect and improve the water quality of the Mississippi and Missouri Rivers within the petition area are plainly inadequate.

III. The States Bordering the Mississippi and Missouri Rivers Employ Inconsistent Water Quality Standards for These Interstate Rivers

The Clean Water Act directs the EPA to encourage states to enact "uniform State laws relating to the prevention, reduction, and elimination of pollution." CWA § 103(a) (33 U.S.C. § 1253(a)). The EPA's regulations require:

> In designating uses of a water body and the appropriate criteria for those uses, the State shall take into consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters.

40 C.F.R. § 131.10(b).

Notwithstanding these requirements, water quality standards for the Mississippi and Missouri Rivers are inconsistent from state to state within the petition area. For example, each state has independently established a variety of designated uses and sub-uses for these rivers. The designated uses vary as one moves up and down the rivers, and are frequently inconsistent between states on opposite shores of the same section of river. Because water quality criteria are keyed to designated uses, inconsistent designated uses are one way to lead to inconsistent water quality standards.

A. Designated Uses

Designated uses frame the goals of a state's water quality standards. For example, water may be designated for public water supply use, propagation of aquatic life, irrigation purposes, recreation, or a variety of other uses. After choosing designated uses for a water body, states then adopt the appropriate criteria for various pollutants designed to meet those uses.

Although variations in designated uses are acceptable in some circumstances, the EPA has apparently acknowledged that "[i]nappropriate variations may arise if states with shared or

immediately adjacent water bodies designate them for different uses."[35] Such inappropriate variations are evident throughout the petition area.

For example, along the Mississippi River, Arkansas, Iowa, Illinois, Missouri, and parts of Tennessee have designated the river for drinking water supply. Yet although Kentucky shares portions of the river with Missouri, and it is upstream of Tennessee and Arkansas, Kentucky does not designate the Mississippi River for use as drinking water supply.[36] Furthermore, while Arkansas, Illinois, Kentucky, Missouri, and Tennessee have designated the river for fishing use, Iowa has not, although it shares portions of the river with Illinois.[37] Designated uses also vary with respect to recreation. Although all of the states have designated the river for recreational use, the sub-uses vary from primary contact recreation, in portions of the Mississippi River bordering Illinois and Arkansas, to secondary contact recreation in Missouri. This inconsistency exists notwithstanding the fact that Missouri, with more lax standards, is directly upstream from Arkansas and shares portions of the river with Illinois.[38] See Figure 3.

[35] General Accounting Office, Water Quality: Inconsistent State Approaches Complicate Nation's Efforts to Identify Its Most Polluted Waters, GAO-02-186, January 2002, at 7.
[36] *See* Addendum 6: Designated Uses of the Mississippi River.
[37] *Id.*
[38] *Id.*

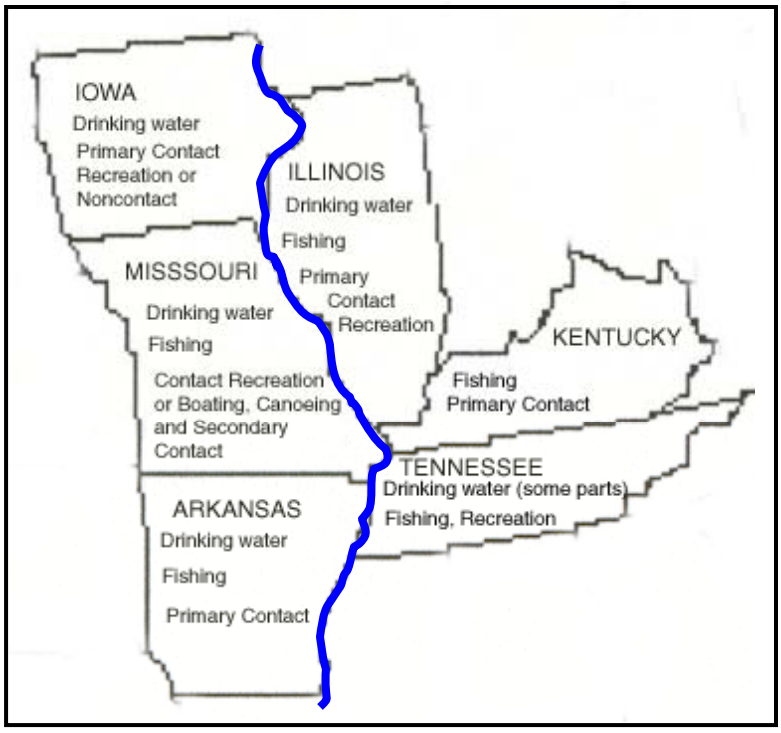

Figure 3: Designated Uses of the Mississippi River in the Petition Area[39]

Similar inconsistencies exist along the Missouri River. Kansas, Missouri, and Nebraska have designated the river for fishing; Iowa has not,[40] although Iowa shares a portion of the river with Nebraska and is directly upstream from Missouri. As with the Mississippi River, all of the states in the petition area classify the Missouri River for use as recreation, but specify different sub-uses. Kansas and Nebraska have designated the river for primary contact recreation, while Missouri, which borders both Nebraska and Kansas, has classified the river only for boating, canoeing, and secondary contact. Furthermore, one portion of the river in Iowa is classified for non-contact recreation, while stretches both up and downstream are classified for primary contact.[41] See Figure 4.

[39] This does not include all of the designated uses for each state. For more information see Addendum 6: Designated Uses of the Mississippi River.
[40] See Addendum 7: Designated Uses of the Missouri River.
[41] *Id.*

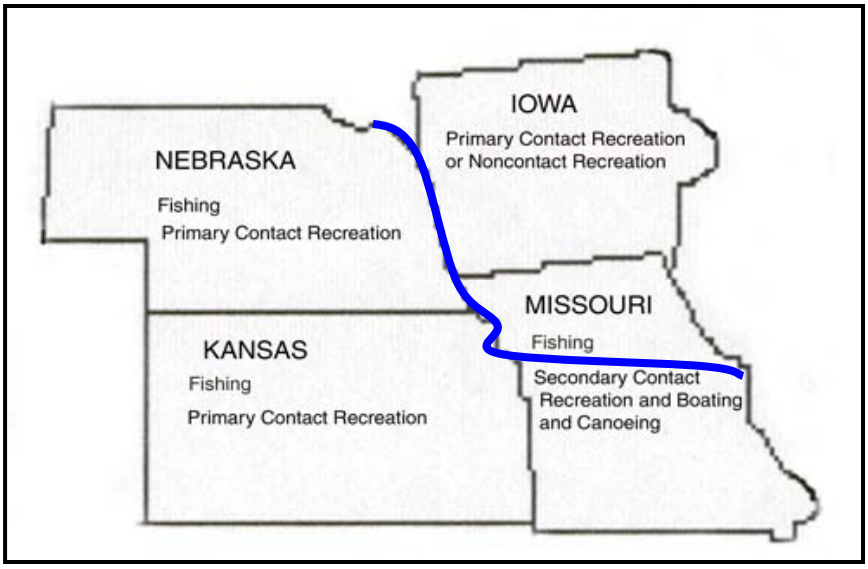

Figure 4: Designated uses of the Missouri River in the Petition Area[42]

In sum, the uses designated by states within the petition area are inconsistent between upstream and downstream states as well as between states on opposite sides of the rivers. Water quality does not change from one bank of a river to the other or at state lines. Therefore, when downstream states designate these interstate rivers for uses such as drinking water, fishing, and contact recreation, but upstream states do not protect for those uses, downstream states may be unable to achieve their water quality standards.

B. Water Quality Criteria

States apply numeric or narrative water quality criteria based on the designated uses or sub-uses of the water body. In the case of multiple designated uses for a water body, states must rely on the most stringent, or limiting, criteria in order to protect all designated uses. 40 C.F.R. § 131.11(a)(1). Compounding the inconsistencies among designated uses for the Mississippi and Missouri Rivers, the states also apply different criteria to protect their designated uses.

For example, on the Mississippi River, Kentucky is the only state in the petition area not to designate any part of the river for drinking water.[43] In Kentucky, the maximum concentration for atrazine is a narrative criterion,[44] whereas in Missouri and parts of Tennessee it is numerical (3 µg/L).[45] Yet, Kentucky shares part of the river with Missouri and is directly upstream from Tennessee. Additionally, the nitrogen standard in Kentucky is narrative,[46] whereas in Missouri, which shares a portion of the river with Kentucky, the standard is 10 mg/L as nitrate.[47]

Iowa does not classify the Mississippi or Missouri River for fishing use.[48] Thus, its criteria for substances that bioaccumulate in fish tissue are far less protective than in neighboring states. The criteria for PCBs in Iowa range from 0.0004 to 0.0017 µg/L, whereas in Missouri, where fishing is a designated use, the criterion is 0.000045 µg/L.[49] Missouri's criterion is ten times lower than Iowa's, even though Iowa is directly upstream from Missouri. Similarly, Iowa's criteria for chlordane range from 0.004 to 0.021 µg /L, while Missouri's criterion is 0.00048 µg/L.[50] Again, Missouri's criterion is ten times lower than Iowa's. Because Iowa is upstream from Missouri and has less stringent criteria, it undermines Missouri's ability to meet its water quality criteria or to ensure that its residents can safely eat the fish that they catch.

Another example of this problem occurs regarding the various designated sub-uses of recreation. Along the Missouri River, Missouri has designated the river for the recreational uses

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[42] This does not include all of the designated uses for each state, for more information see Addendum 7: Designated Uses of the Missouri River.
[43] *See* Addendum 6: Designated uses of the Mississippi River.
[44] This criterion reads, "the allowable instream concentration shall not exceed LC_1 or one-third (1/3) LC_{50} concentration derived from toxicity tests on representative indigenous or indicator aquatic organisms or exceed three-tenths (0.3) acute toxicity units." "Surface Water Standards." (401 KAR 5:031 Section 4(h)(3).)
[45] *See* Addendum 8: Water Quality Criteria on the Mississippi River for Atrazine (microg/L).
[46] This criterion reads, "the allowable instream concentration shall not exceed LC_1 or one-third (1/3) LC_{50} concentration derived from toxicity tests on representative indigenous or indicator aquatic organisms or exceed three-tenths (0.3) acute toxicity units." "Surface Water Standards." (401 KAR 5:031 Section 4(h)(3).)
[47] *See* Addendum 9: Water Quality Criteria on the Mississippi River for Nitrogen (mg/L).
[48] *See* Addendum 6: Designated Uses of the Mississippi River; Addendum 7: Designated Uses of the Missouri River.
[49] *See* Addendum 10: Water Quality Criteria on the Mississippi River for PCBs (microg/L); Addendum 11: Water Quality Criteria on the Missouri River for PCBs (microg/L).
[50] *See* Addendum 12: Water Quality Criteria on the Mississippi River for Chlordane (microg/L); Addendum 13: Water Quality Criteria on the Missouri River for Chlordane (microg/L).

of boating and canoeing, whereas Nebraska and Kansas have designated it for primary contact.[51] In this case, Missouri's narrative criterion for fecal coliform[52] could be less protective than the Nebraska and Kansas criterion of 200 organisms per 100 milliliters,[53] notwithstanding that Missouri shares portions of the river with both states.[54]

Even when designated uses are consistent, the water quality criteria frequently differ. For example, along both rivers, the criteria for phosphorous vary.[55] In fact, while all of the states in the petition area designate the Mississippi River for protection of aquatic life, and a phosphorous criterion is designed to support that use, Arkansas is the only state in the petition area with numeric phosphorous criteria for the Mississippi River.[56] Similarly, even though every state in the petition area also designates the Missouri River for protection of aquatic life, the only state with a numeric phosphorous criterion specifically for protection of aquatic life is Kansas.[57] In another example, the criteria for chlordane and PCBs in the Missouri River vary dramatically between Missouri and Nebraska, though in both cases the limiting criteria are based on fishing as the designated use. Missouri's criteria for chlordane and PCBs are 0.00048 and 0.00045 μg/L, whereas Nebraska's are 0.0043 and 0.0017 μg/L, respectively.[58] Nebraska's criteria are nearly ten times less stringent than Missouri's, even though the two states share portions of the Missouri River.

In short, water quality often criteria vary from state to state. First, criteria vary when designated uses vary. Second, criteria vary even for the same designated uses. This variation

[51] *See* Addendum 7: Designated Uses for the Missouri River.
[52] This criterion reads, "waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal, or aquatic life." "Division 20-Clean Water Commission, Chapter 7 – Water Quality." (10 CSR 20-7.031(3)(D)).
[53] In Nebraska this standard is from May 1 to September 30. In Kansas, it is from April 1 – October 31.
[54] *See* Addendum 14: Water Quality Criteria on the Missouri River for Fecal Coliform (col/ml).
[55] *See* Addendum 15: Water Quality Criteria on the Mississippi River for Phosphorous (μg/L); Addendum 16: Water Quality Criteria on the Missouri River for Phosphorous (μg/L).
[56] *See* Addendum 15: Water Quality Criteria on the Mississippi River for Phosphorous (μg/L).
[57] *See* Addendum 16: Water Quality Criteria on the Missouri River for Phosphorous (microg/L).
[58] See Addendum 11: Water Quality Criteria on the Missouri River for PCBs (microg/L); Addendum 13: Water Quality Criteria on the Missouri River for Chlordane (microg/L).

pits one state's interests against another's when states share a river section and when upstream states have less stringent criteria than downstream states.

IV. Existing Water Quality Standards for the Mississippi and Missouri Rivers in the Petition Area Are Inadequate

The Clean Water Act and the EPA's implementing regulations require states to develop water quality standards adequate to "protect public health or welfare, enhance the quality of water and serve the purposes" of the Act – including the maintenance of waters suitable for fishing and swimming. CWA § 303(c)(2)(A) (33 U.S.C. § 1313(c)(2)(A)); 40 C.F.R. §§ 131.2, 131.5(a), 131.6(a), and 131.20(a).

Existing water quality standards for the Mississippi and Missouri Rivers in the petition area are inadequate in several respects.

First, inconsistencies among the standards make it difficult for downstream or across-stream states with more protective standards than their neighboring states to achieve their water quality standards. Both inconsistent uses and inconsistent criteria contribute to the problem. Inconsistencies that reflect themselves in differences (e.g., primary versus secondary contact recreation, or different values for applicable criteria for the same parameter), as well as inconsistencies reflected in gaps (e.g. absence of criteria for key parameters in upstream state) can hamper affected states' abilities to achieve and maintain their water quality standards.

Second, water quality standards do not cover, or do not cover adequately, the breadth of parameters necessary to support fishable and/or swimmable waters. The petition pollutants, while only a subset of pollutants that degrade water quality, exemplify the need for adequate water quality standards. As indicated in the attached Addenda 2 - 16, the petition area states do not all include criteria for the petition pollutants. Even where they do include applicable criteria, inexplicable inconsistencies exist. According to a recent report of the General Accounting Office, four of the petition pollutants – sediments, nutrients, and pathogens (including E. coli and

enterococci) – account for fifty percent of the impaired waters nationwide.[59] Not surprisingly, numeric water quality criteria do not yet exist for two of these pollutants. "EPA has not developed criteria for sedimentation and is currently in the process of developing the complex criteria needed for nutrients."[60] As to pathogens, the GAO reports that criteria need to be revised.[61] The GAO further reports that states want the EPA to take the lead in publishing numeric criteria for these pollutants of concern so that adequate water quality standards can be established.[62]

Addenda 2 – 16 indicate that, even as to parameters for which criteria currently exist, the petition area states vary considerably in the criteria they adopt to protect the same uses. Given the proximity of the states' waters to one another – including shared stretches of river – the variations do not appear to be related to differences in natural conditions.

As highlighted in Addendum 17, the petition pollutants pose considerable potential threat to human health and the environment. Therefore, inconsistencies and gaps in applicable water quality standards render the standards inadequate under the Clean Water Act and implementing regulations. They do not adequately protect human health and the environment, and they do not ensure fishable/swimmable waters. CWA § 303(c)(2)(A) (33 U.S.C. § 1313(c)(2)(A)); 40 C.F.R. §§ 131.2, 131.5(a), 131.6(a), and 131.20(a).

A graphic demonstration of the inadequacy of current water quality standards in the vicinity of the petition area is the "dead zone" in the northern Gulf of Mexico. The dead zone is an area of approximately 5,454 square miles (five-year running average) that lacks sufficient oxygen to support most marine life. The existence of this dead zone can be attributed in part to a series of "complicated interactions involving excessive nutrients, primarily nitrogen, carried to

[59] General Accounting Office, "Water Quality: Improved EPA Guidance and Support Can Help States Develop Standards That Better Target Cleanup Efforts," GAO-03-308 (2003) at 37-38.
[60] Id. at 5.
[61] Id. at 37.
[62] Id. at 37-39.

the Gulf by the Mississippi and Atchafalaya Rivers…"[63] Adequate water quality standards are standards that are sufficiently strict such that the cumulative effects of the impacts of pollutants from various states would not create or contribute to a "dead zone."

V. Inconsistent and Inadequate Monitoring Hinders States' Abilities to Ensure Compliance with Water Quality Standards

It is no secret that water quality monitoring is a weak link in this system. Most of the states in the petition area do not conduct routine water quality monitoring. Nationwide, only 0.2 percent of the federal and state funding for water quality management programs is devoted to ambient water quality monitoring.[64] Moreover, the meager work done in this area lacks consistency in approach and methodology, compromising the reliability and value of the results in assessing whether waters are meeting applicable water quality standards.[65]

One consequence of the limited and inconsistent monitoring is the wide variety in the petition area states' approaches to the listing of impaired waters. Section 303(d) of the Clean Water Act and implementing regulations mandate that every two years, states list their waters that are not meeting water quality standards. 33 U.S.C. § 1313(d); 40 CFR § 1310.7. Both the Mississippi and Missouri Rivers are currently on the section 303(d) lists of several petition area states. The listings vary, however, regarding the source as well as the location of impairment for states that share portions of the river. These inconsistencies exist even though the EPA has encouraged state and regional awareness of potential inconsistencies.[66] They reflect the lack of a uniform,

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[63] http://www.epa.gov/msbasin/actionplan.htm (last visited February 3, 2003)

[64] National Research Council, "Assessing the TMDL Approach to Water Quality Management," National Academy Press (2001) at 38.

[65] General Accounting Office, "Water Quality: Inconsistent State Approaches Complicate Nation's Efforts to Identify Its Most Polluted Waters," GAO-02-186 (2002) at 9-15. See also United States Environmental Protection Agency, Office Of Wetlands, Oceans And Watersheds, Consolidated Assessment And Listing Methodology: Towards A Compendium Of Practices, Chapter 3 (2002).

[66] "EPA has encouraged States to develop and use their own methods to set priorities and target water bodies for TMDL development. Water bodies may therefore be proposed for inclusion on the section 303(d) list that flow through multiple States. Consequently, in some cases, inconsistent listings may be proposed. [EPA] Regions should, if necessary, address any inconsistencies that occur within their jurisdictions among States' section 303(d) lists." Memorandum from United States Environmental Protection Agency, Guidance for 1994 Section 303(d) Lists (Nov. 26, 1993), available at http://www.epa.gov/owow/tmdl/1994guid.html. (last visited October 8, 2002).

statistically-sound approach to monitoring, as well as underlying inconsistencies in the water quality standards.

Inconsistent 303(d) listings for both the Mississippi and Missouri Rivers are commonplace. For example, the states of Iowa, Illinois, Missouri, and Tennessee list the Mississippi River as water quality impaired under section 303(d), but the downstream states of Arkansas and Kentucky do not. Among the states listing the Mississippi River, discrepancies exist as to what is causing the impairment. In one location, Illinois lists the river as impaired due to priority organics, nutrients, other habitat alterations, and siltation. Missouri lists this same portion of the Mississippi River as impaired due only to habitat loss. In the Apple-Plum watershed, which runs through both Iowa and Illinois, Iowa lists the Mississippi River for impairment due to organic enrichment and fecal coliform, whereas Illinois does not list this portion of the Mississippi River.[67] Such inconsistencies cannot be explained by different circumstances, particularly the same stretch of the river is involved and the states' respective jurisdictions are distinguished only by imaginary lines in the middle of the riverbed.

Section 303(d) lists for the Missouri River reveal similar conflicts. Kansas does not list the Missouri River for any impairment, while Iowa, Nebraska, and Missouri all include it in their § 303(d) lists. In the Nisnabotna watershed, Iowa lists the Missouri River as impaired due to siltation, Missouri lists it for habitat loss, and Nebraska for pathogens. In another location, neither Iowa nor Nebraska lists the river as impaired, while Missouri again lists it as impaired due to habitat loss.[68]

With a uniform, statistically-based method for water quality monitoring – as well as adequate funding for monitoring activities, the states can make far more progress in achieving and maintaining water quality standards.

[67] *See* Addendum 6: Designated Uses of the Mississippi River.
[68] *See* Addendum 7: Designated Uses of the Missouri River.

VI. Coordinated Approaches Represent an Established Means of Addressing Interstate Water Quality

The EPA and states have worked together in various contexts to protect the water quality of interstate waters. In some cases, states request EPA's assistance in developing interstate programs. For example, regarding the Mississippi River, Tennessee's 1998 TMDL report stated, "EPA should develop [a] TMDL for this large, interstate water."[69] The Missouri Department of Natural Resources stated in its 2000 strategic plan that "[s]uccessful implementation of water quality improvements will depend on support and coordination with all affected parties."[70] The states do not have the resources[71] or the authority that the EPA has to take meaningful steps towards the development of consistent water quality standards or the establishment of uniform, statistically based methods for evaluating water quality criteria against such standards.

In 1996, EPA stated its intention to implement interstate TMDLs where such programs were appropriate. In a Draft Implementation Strategy, EPA noted that "[a]n interstate TMDL may also be appropriate for the Mississippi River Watershed as a component of EPA and State strategies to address hypoxia problems identified in the Gulf of Mexico."[72] Some examples of state and EPA efforts toward coordinated water quality management programs include programs for the Great Lakes Basin, Chesapeake Bay, and Delaware Water Basin. Some coordinated programs are highlighted below. Additionally, there is already some infrastructure in place for coordinated efforts along the Mississippi River.

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[69] United States Environmental Protection Agency, *Total Maximum Daily Loads, Listed Water Information, Cycle: 1998 available at* http://oaspub.epa.gov/pls/tmdl/enviro.control?p_list_id=TN0801010000102%2E3&p_cycle=1998 (last visited November 25, 2002). The area referenced was the Memphis area of the Mississippi River. *Id.*

[70] Missouri Dep't of Natural Resources, *Integrated Strategic Plan – October 1, 2000 at* http://www.dnr.state.mo.us/s_plan/fy2002/issue1.htm (last visited October 11, 2002).

[71] With regard to the TMDL program, for example, "[s]tates have reported having insufficient funds, inadequate monitoring programs, and limited staff to collect and analyze such data." National Research Council, "Assessing the TMDL Approach to Water Quality Management," National Academy Press (2001) at 12.

[72] Environmental Protection Agency, *Draft Implementation Strategy on Total Daily Maximum Loads Program*, DAILY ENVTL. REP., Nov. 18, 1996, *available in* Westlaw, BNA-DEN database, 224 DEN E-1, 1996.

a. Great Lakes Basin

The Great Lakes Basin is a unique freshwater system located in the northern United States and Canada. Spanning 750 miles across seven states and one Canadian province, it has many uses and is home to hundreds of species.[73] In response to an increase in nutrients and other pollutants in the Great Lakes and inconsistent state responses to these environmental concerns, the EPA and states coordinated the Great Lakes Water Quality Initiative, which was signed in 1986 by the governors of the Great Lakes states.[74]

Shortly after the implementation of the Great Lakes Water Quality Initiative, Congress amended section 118 of the Clean Water Act in order to further protect the Great Lakes.[75] Section 118(c)(2) mandates that EPA develop water quality guidance for the states in the region. EPA did so, setting forth minimum, consistent water quality standards for the Great Lakes states. 40 C.F.R. Part 132

b. Chesapeake Bay

After finding a "decline in the living resources of the Chesapeake Bay" in 1983, the EPA and Maryland, Pennsylvania, Virginia, and the District of Columbia agreed to establish the Chesapeake Executive Council. The purpose of the council is to "assess and oversee the implementation of coordinated plans and protect the water quality and living resources of the Chesapeake Bay estuarine systems."[76]

c. Delaware Water Basin

In 1961, New Jersey, New York, Pennsylvania, Delaware, and the federal government entered into the Delaware River Basin Compact and created the Delaware River Basin Commission. The purpose of the Commission is to implement a "unified approach to managing

[73] Final Water Quality Guidance for the Great Lakes System, 60 Fed. Reg. 15366, 15367 (Mar. 23, 1995).
[74] Final Water Quality Guidance for the Great Lakes System, 60 Fed. Reg. at 15367.
[75] Clean Water Act § 118.
[76] 1983 Chesapeake Bay Agreement *available at* http://www.chesapeakebay.net/pubs/1983ChesapeakeBayAgreement.pdf (last visited November 25, 2002).

a river system without regard to physical boundaries."[77] Whereas the basin was previously administered by more than sixty state, federal, and interstate agencies,[78] water quality standards are reportedly now uniform throughout the interstate river basin.[79] Furthermore, the promoters of this effort claim that the Delaware, "once foul smelling and oxygen starved," now supports year-round fish populations and is "the cleanest it's been in 100 years."[80]

d. St. Louis Compact

The St. Louis Compact is an agreement implemented by the Mississippi River Basin System Team, an interagency effort seeking water quality improvements for the Mississippi River basin. The Team, Formed in 1997, includes EPA representatives from the Office of Water, the Gulf of Mexico Program, and Regions 3 through 8.[81] The Team works with other agencies to improve the water quality in the basin through a variety of programs.[82] The existence of the St. Louis Compact demonstrates EPA's recognition that the Mississippi River basin requires a coordinated, interstate approach in order to improve water quality in the region. Although it has not (yet) focused on water quality standards, it provides one mechanism for addressing that challenge on a coordinated basis, at least at to the Mississippi River portion of the petition area.

VII. The EPA has the Authority and Duty to Establish Consistent and Adequate Water Quality Standards for the Mississippi and Missouri Rivers Within the Petition Area

When Congress overhauled the Clean Water Act in 1972, it set two national goals for cleaning up the nation's waters:

- The discharge of pollutants into the navigable waters should be eliminated by 1985;

[77] Delaware river Basin Compact, 7 (1961).
[78] Delaware River Basin Compact 2 (1961).
[79] *Listing of DRBC Milestones and Accomplishments at* http://www.state.nj.us/brbc/milestones.htm (last visited November 26, 2002).
[80] *The Delaware River Is Not What it Used to Be – That's the Good News at* http://www.state.nj.us/drbc/pollution_op-ed.htm (last visited December 20, 2002).
[81] St. Louis Compact, *available at* http://www.epa.gov/owow/watershed/compact/html (last visited November 22, 2000).
[82] 2000 MISSISSIPPI RIVER BASIN TEAM FY00 ANN. REP. (2000) *available at* http://www.epa.gov/mbasin.team.htm (last visited November 25, 2002).

- In the interim, wherever attainable waters should be safe for fishing and recreation ("fishable/swimmable") by July 1, 1983.

CWA § 101(1) and (2) (33 U.S.C. § 1251(1) and (2)). Although Congress has amended the Act on several occasions since 1972, it has not wavered from those overarching goals.

Indeed, in pursuit of those ambitious goals, Congress gave the EPA broad authority to achieve them. For example:

- The EPA "shall…prepare or develop comprehensive programs for preventing, reducing, or eliminating the pollution of the navigable waters." CWA § 102(a) (33 U.S.C. § 1252(a)).
- The EPA "shall encourage cooperative activities by the States for the prevention, reduction, and elimination of pollution, encourage the enactment of improved and, so far as practicable, uniform State laws relating to the prevention, reduction, and elimination of pollution; and encourage compacts between States for the prevention and control of pollution." CWA § 103(a) (33 U.S.C. § 1253(a)).

The EPA has taken the first steps toward fulfilling those statutory duties by promulgating regulations that, on paper, prohibit one state from undermining another's water quality standards. For example, the EPA's regulations bar one state from issuing a discharge permit that would violate another state's water quality standards:

> No permit may be issued…(d) When the imposition of conditions cannot ensure compliance with the applicable water quality requirements of all affected states…40 C.F.R. § 122.4. See also Arkansas v. Oklahoma, 503 U.S. 91 (1992).

Moreover, existing regulations require states to protect other states' water quality standards when setting their own standards:

> In designating uses of a water body and the appropriate criteria for those uses, the State shall take into consideration the water quality standards of downstream waters and shall ensure that its water quality standards provide for the attainment and maintenance of the water quality standards of downstream waters." 40 C.F.R. § 131.10(b).

The information cited in and appended to this petition amply demonstrates that the states in the petition area have largely honored those requirements in the breach. The Mississippi and Missouri Rivers within the petition area are far from meeting the fishable/swimmable and no pollution goals of the Clean Water Act. In addition, the states in the petition area are, in many respects, working at cross-purposes from one another in their implementation of the Act as to interstate waters. Acting one by one, they have collectively – albeit inadvertently – created a patchwork of inconsistent and uncoordinated designated uses, water quality criteria, and section 303(d) listings.

The Clean Water Act empowers the EPA to redress this situation. The Act directs the EPA to prepare water quality standards when necessary. CWA § 303(c)(4)(B) (33 U.S.C. § 1313(c)(4)(B)). With respect to interstate waters, the states have been submitting water quality standards for the EPA's review and approval since at least the 1972 enactment of the Clean Water Act. Thirty years later, the states in the petition area have failed to establish water quality standards for the Mississippi and Missouri Rivers that protect downstream and across-stream states' water quality standards. Thirty years later, the water quality in these great rivers is far from fishable/swimmable throughout much of the petition area. The fact that states are asking the EPA to take a leadership role in addressing interstate water quality, and the existence of other multi-state or EPA-driven approaches to interstate water quality challenges, suggest that the task of establishing consistent and adequate water quality standards for these interstate waters simply cannot be accomplished by the states acting alone. The EPA's authority to develop "comprehensive programs," 33 U.S.C. § 1252(a), "uniform State laws," 33 U.S.C. § 1253(a), and necessary water quality standards, 33 U.S.C. § 1313(c)(4)(B), is nowhere more compelling invoked than with respect to these interstate waters – the Mississippi and Missouri Rivers.

As the nation prepares to celebrate the 200th year anniversary of the launch of the Lewis and Clark Expedition, up the Missouri River from its confluence with the Mississippi at St.

Louis, it would be especially fitting for the EPA to fulfill its statutory mandate and establish an effective system for addressing and improving the water quality of the Mississippi and Missouri Rivers in the petition area.

VI. Conclusion

Water quality in the Mississippi and Missouri rivers in the petition area is impaired in many respects. Applicable water quality standards are inconsistent in their designated uses, water quality criteria, and monitoring approaches. Applicable water quality standards are not adequate to achieve the fishable/swimmable goals of the Clean Water Act, in part because of such inconsistencies and in part because they fail to cover, or to cover effectively, some of the principal pollutants that degrade water quality. The EPA has the authority and the duty to develop consistent and adequate water quality standards for these interstate rivers. The EPA already has in place a structure which could be adapted to address this pressing task.

In accordance with paragraph 9 of the Settlement Agreement in American Canoe Ass'n v. Browner, 98-1195-CV-W and 98-482-CV-W (W.D.Mo.), the Ozark Chapter of the Sierra Club respectfully requests that, within one year of the receipt of this petition, the EPA publish water quality standards for the Mississippi River from Burlington, Iowa to Memphis, Tennessee, and for the Missouri River from Omaha, Nebraska to the river's confluence with the Mississippi River at St. Louis, Missouri. Such standards should be (1) consistent and (2) adequate to achieve the fishable/swimmable requirements of the Clean Water Act. Such standards should also include monitoring provisions and a uniform, statistically-based method for determining whether the rivers are actually meeting their water quality standards.

Respectfully submitted,

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Addendum 1

Settlement Agreement:

American Canoe Ass'n v. Browner,
98-1195-CV-W and 98-482-CV-W (W.D.Mo.)
(effective date 2-27-01)

Addendum 2: 303(d) Listings for the Mississippi River

Watershed	Bordering States	Listing State	Specific Location	Impairment Source	Impairment
Apple-Plum	IA, IL	IA	Wapsipnicon R. to L&D 13 at Clinton	industry	organic enrichment
			L&D 15 to L&D 14	unknown*	fecal coliform
		IL	not listed		
Copperas-Duck	IA, IL	IA	Wapsipnicon R. to L&D 13 at Clinton	industry	organic enrichment
		IL	not listed		
Flint-Henderson	IA, IL	IA	IA/MO line to Ft. Madison WWTP	over allocation of capacity,*	ammonia
				unknown	fecal coliform
		IL	not listed		
Bear-Wyaconda	IA, IL, MO	IA	not listed		
		IL	Adams County	hydrologic/habitat modification	nutrients
					other habitat alterations
					siltation
		MO	entire river*	channelization*	habitat loss
The Sny	IL, MO	IL	Pike and Calhoun Counties	hydrologic/habitat modification	priority organics
					nutrients
					other habitat alterations
					siltation
		MO	entire river*	channelization*	habitat loss
Upper Mississippi-Cape Girardeau	IL, MO	IL	Randolph County	combined sewer overflows, hydrologic/habitat modification	suspended solids
			Randolph, Jackson, and Union Counties	combined sewer overflows, hydrologic/habitat modification	priority organics
					metals
					nutrients
					other habitat alterations
					siltation
			Jackson, Union, Alexander and Pulaski Counties	hydrologic/habitat modification	priority organics
					metals
					nutrients
					other habitat alterations
					siltation
		MO	entire river*	channelization*	habitat loss
Lower Illinois	IL, MO	IL	Calhoun and Jersey County	hydrologic/habitat modification	nutrients
					flow alteration(s)
					other habitat alterations
					siltation
		MO	entire river*	channelization*	habitat loss
Peruque-Piasa	IL, MO	IL	Calhoun and Jersey Counties	hydrologic/habitat modification	nutrients
					flow alteration(s)
					other habitat alterations
					siltation
			Calhoun, Jersey and Madison Counties	hydrologic/habitat modification	priority organics
					nutrients
					suspended solids
					other habitat alterations
					siltation
			Madison County	hydrologic/habitat modification	priority organics
					metals
					nutrients
					suspended solids
					other habitat alterations
					siltation
		MO	entire river*	channelization*	habitat loss

Addendum 2: 303(d) Listings for the Mississippi River

Watershed	Bordering States	Listing State	Specific Location	Impairment Source	Impairment
Cahokia-Joachim	IL, MO	IL	Madison, St. Clair, and Monroe Counties	combined sewer overflows, hydrologic/habitat modification	priority organics
					metals
					nutrients
					other habitat alterations
					siltation
			Madison, St. Clair, Monroe and Randolph Counties	combined sewer overflows, hydrologic/habitat modification	priority organics
					metals
					nutrients
					suspended solids
					other habitat alterations
					silatation
		MO	entire river*	channelization*	habitat loss
Lower Mississippi-Memphis	AK, KY, MO, TN	AK	not listed		
		KY	not listed		
		MO	entire river*	channelization*	habitat loss
		TN	from MS state line to KY state line	source in other state	pesticides
					dioxin
					PCBs
					siltation

Notes:

Only listings bordering on 2 or more states including Arkansas, Iowa, Illinois, Kentucky, Missouri, and Tennessee were included.

All information, unless noted otherwise, was obtained from:

"Total Maximum Daily Load Program." 1998 data. USEPA Office of Water. 20 May 2002.
http://www.epa.gov/owow/tmdl (16 October 2002).

*This information was obtained from one of the following sites:

"Iowa's Impaired Waters." Iowa Department of Natural Resources. 2000.
http://www.state.ia.us/dnr/organiza/epd/wtresrce/303dnotc.htm (17 October 2002).

"Section 303(d) Waters." Missouri Department of Natural Resources. 3 September 1998.
http://www.dnr.state.mo.us/wpscd/wpcp/tmdl/tmdl_list.pdf (17 October 2002).

No further information was found, though these sites were checked:

"Arkansas' Water Quality Limited Waterbodies - 303(d) List." State of Arkansas Department of Environmental Quality. 16 September 2002.
http://www.adeq.state.ar.us/water/303drprt.htm (17 October 2002).

"Section 303(d) List." Illinois Environmental Protection Agency. 2002.
http://www.epa.state.il.us/water/watershed/reports/303d-report/index.html (17 October 2002).

"1998 303(d) List of Waters for Kentucky." Kentucky Department of Environmental Protection. 22 June 1998.
http://water.nr.state.ky.us/303d/#rec (17 October 2002).

"Total Maximum Daily Load (TMDL.)" Tennessee Department of Environment and Conservation. 5 April 2002.
http://www.state.tn.us/environment/wpc/tmdl.htm (17 October 2002).

Addendum 3: 303(d) Listings for the Missouri River

Watershed	Bordering States	Listing State	Specific Location	Impairment	Impairment Source
Blackbird-Soldier	IA, NE	IA	Boyer R. to Big Sioux R.	siltation, unknown	hydrological modification of channel*
		NE	Sarpy and Cass Counties	pathogens	unspecified
Big Papillion-Mosquito	IA, NE	IA	Boyer R. to L. Sioux R.	siltation, unknown	hydrological modification of channel*
		IA	Platte R. to Council Bluffs	siltation, unknown	hydrological modification of channel*
		NE	Sarpy and Cass Counties	pathogens	unspecified
Keg-Weeping Water	IA, MO, NE	IA	IA-MO line to Platte R.	siltation, unknown	hydrological modification of channel*
		MO	Jackson county	habitat loss	channelization*
		NE	Otoe and Nemaha Counties	pathogens	unspecified
Nisnabotna	IA, MO, NE	IA	not listed		
		MO	Jackson county	habitat loss	channelization*
		NE	not listed		
Tarkio-Wolf	IA, KS, MO, NE	IA	not listed		
		KS	not listed		
		MO	Jackson county	habitat loss	channelization*
		NE	Otoe and Nemaha Counties	pathogens	unspecified
Independence-Sugar	KS, MO	KS	not listed		
		MO	Jackson county	habitat loss	channelization*
Lower-Missouri Crooked	KS, MO	KS	not listed		
		MO	Gasconade county	habitat loss	channelization*

Notes:
Only listings bordering on 2 or more states including Iowa, Kansas, Missouri, and Nebraska were included.
All information, unless noted otherwise, was obtained from:
"Total maximum Daily Load Program." 1998 data. USEPA Office of Water. 20 May 2002.
http://www.epa.gov/owow/tmdl (28 September 2002).
* This information was obtained from one of the following sites:
"Iowa's Impaired Waters." Iowa Department of Natural Resources. 2000.
http://www.state.ia.us/dnr/organiza/epd/wtresrce/303dnotc.htm (10 October 2002).
"Section 303(d) Waters." Missouri Department of Natural Resources. 3 September 1998.
http://www.dnr.state.mo.us/wpscd/wpcp/tmdl/tmdl_list.pdf (10 October 2002).
No further information was found, though these sites were checked:
"1998 Kansas Water-Quality Limited Segments (303(d) List)" Kansas Department of Health and the Environment. 1998.
http://www.kdhe.state.ks.us/befs/303d/#tables (10 October 2002).
"Nebraska Department of Environmental Quality Reports." Nebraska Department of Environmental Quality. 2002.
http://www.deq.sttae.ne.us/ (10 October 2002).

Addendum 4: Fish Advisories for the Mississippi River

Location	Bordering States	Listing State	Pollutant	Species	Population*
Stretch of Mississipi in IL	IA, IL, MO	IA	not listed		
		IL	PCBs	carp-common	RGP
			Mercury	predator fish***	RSP
		MO	Chlordane	sturgeon and sturgeon eggs**	NCGP
			PCBs	sturgeon and sturgeon eggs**	NCGP
			Mercury	bass-largemouth	NCSP
Waters near St. Louis	IL, MO	IL	PCBs	carp-common	RGP
			Mercury	predator fish***	RSP
		MO	Chlordane	all fish	RGP
				sturgeon and sturgeon eggs**	NCGP
			PCBs	all fish	RGP
				sturgeon and sturgeon eggs**	NCGP
			Mercury	bass-largemouth	NCSP
Lock and Dam 22 to Cairo, IL	IL, KY, MO	IL	PCBs	sturgeon-shovelnose and these eggs	RGP
			Mercury	predator fish***	RSP
		KY	Mercury	all fish	RSP
		MO	Chlordane	sturgeon and sturgeon eggs**	NCGP
			PCBs	sturgeon and sturgeon eggs**	NCGP
			Mercury	bass-largemouth	NCSP
Mississippi River in MO	IL, KY, MO, TN	IL	PCBs	carp-common	RGP
			Mercury	predator fish***	RSP
		KY	Mercury	all fish	RSP
		MO	Mercury	bass-largemouth	NCSP
			PCBs	sturgeon and sturgeon eggs**	NCGP
		TN	Chlordane	all fish	CFB
					NCGP
Mississippi River, MS state line to mile 745	AR, MO, TN	AR	not listed		
		MO	Mercury	bass-largemouth	NCSP
			PCBs	sturgeon and sturgeon eggs**	NCGP
		TN	Chlordane	all fish	CFB
					NCGP

Notes:

*RGP is Restricted Consumption - General Population: Advises the general population to restrict the size of the organism and/or the frequency of meals consumed.
NCGP is No Consumption - General Population: Advises against consumption by the general population.
NCSP is No Consumption - Subpopulation(s): Advises against consumption for populations that are potentially at greater risk, e.g., prenant or nursing women, and small children.
RSP is Restricted Consumption - Subpopulation(s): Advises against subpopulations potentially at greater risk, e.g;, pregnant or nursing women, and/or small children, to restrict the size of the organism and/or frequency of meals consumed.
Only listings bordering on 2 or more states including Iowa, Kansas, Missouri, and Nebraska were included.
All information, unless noted otherwise, was obtained from:
"Listing of Fish and Wildlife Advisories." USEPA. May 2002.
http://map1.epa.gov (11 November 2002).

** Information was obtained from:
"2002 Fish Advisory." Missouri Department of Health and Senior Services. 25 July 2002.
http://www.health.state.mo.us/NewsReleases/02FishAdvisory.htm (11 November 2002).
***Information was obtained from:
"Illinois Fish Advisory." Illinois Department of Public Health. (2002).
http://www.idph.state.il.us/envhealth/fishadv/fishadvisory02.htm (25 February 2003).
No further information was found, though these resources were checked:
"Fish Consumption Advisory." Iowa Department of Natural Resources. 2001.
http://www.state.ia.us/dnr/organiza/fwb/fish/news/consump.htm (11 November 2002).
"Illinois Fish Advisory." Illinois Department of Public Health. (2002).
http://www.idph.state.il.us/envhealth/fishadv/mississippiriver.htm (11 November 2002).
"Kentucky Fish Consumption Advisories." Kentucky Division of Water. (29 July 2001).
http://water.nr.state.ky.us/dow/dwfish.htm (11 November 2002).
"Current Fish Tissue Advisories." Tennessee Department of Environment and Conservation. (9 November 2002).
http://www.state.tn.us/environment/wpc/advisory.htm

Addendum 5: Fish Advisories for the Missouri River

Location	Bordering States	Listing State	Pollutant	Species	Population*
From Big Sioux R. near S. Sioux City to NE/KS border	IA, MO, NE	IA	not listed		
		MO	Chlordane	all fish	RGP
			PCBs (total)	all fish	RGP
			mercury	largemouth bass	NCSP
		NE	Dieldrin	channel catfish	RGP
			PCBs (Total)	channel catfish	RGP
Waters near Kansas City	KS, MO	KS	not listed		
		MO	Chlordane	all fish	RGP
				sturgeon and sturgeon eggs**	NCGP
			PCBs (total)	all fish	RGP
				sturgeon and sturgeon eggs**	NCGP
			mercury	largemouth bass	NCSP
Stretch of Missouri River in MO	KS, MO, NE	KS	not listed		
		MO	Chlordane	sturgeon and sturgeon eggs**	NCGP
			PCBs (total)	sturgeon and sturgeon eggs**	NCGP
			mercury	largemouth bass	NCSP
		NE	not listed		

Notes:

*RGP is Restricted Consumption - General Population: Advises the general population to restrict the size of the organism and/or the frequency of meals consumed.

NCGP is No Consumption - General Population: Advises against consumption by the general population.

NCSP is No Consumption - Subpopulation(s): Advises against consumption for populations that are potentially at greater risk, e.g., prenant or nursing women, and small children.

Only listings bordering on 2 or more states including Iowa, Kansas, Missouri, and Nebraska were included.

All information, unless noted otherwise, was obtained from:

"Listing of Fish and Wildlife Advisories." USEPA. May 2002. http://map1.epa.gov (10 October 2002).

** Information was obtained from:

"2002 Fish Advisory." Missouri Department of Health and Senior Services. 25 July 2002. http://www.health.state.mo.us/NewsReleases/02FishAdvisory.htm (11 November 2002).

No further information was found, though these resources were checked:

"Fish Consumption Advisory." Iowa Department of Natural Resources. 2001. http://www.state.ia.us/dnr/organiza/fwb/fish/news/consump.htm (10 October 2002).

"Fish Consumption Advisories." Kansas Department of Health and Environment. (785)296-5571 (24 October 2002).

"2002 Fish Advisory." Missouri Department of Health and Senior Services. 25 July 2002. http://www.health.state.mo.us/NewsReleases/02FishAdvisory.htm (10 October 2002).

"Nebraska Fishing Guide Consumption Advisories." Nebraska Game and Parks Commission. 2002. http://www.ngpc.state.ne.us/fish/fishguide/Fgadvisories.htm#advisories (10 October 2002).

Addendum 6: Designated Uses of the Mississippi River

Use	AR	IA (excluding Municipal Water Works Intakes)	IA (Keokuk and Fort Madison MWW Intakes)	IL	KY	MO (excluding stretch from Missouri R. to Des Moines R.)
Aesthetic	NA	NA	NA	✓ General Use Criteria	✓ General Use Criteria	NA
Agricultural	✓	✓ General Use Criteria	✓ General Use Criteria	✓ General Use Criteria	✓ Warm Water Aquatic Habitat (WAH)	NA
Aquatic Life	✓ Fisheries	✓ Warm Water, Class B(WW)	✓ General Use Criteria	✓ General Use Criteria	✓ Warm Water Aquatic Habitat (WAH)	✓ Class AQL
Aquatic Life (special)	NA	✓ Sensitive Species	NA	NA	NA	NA
Drinking Water Supply	✓	✓ General Use Criteria, Domestic Withdrawl	✓ Class C	✓ Public Water Supply Standards	NA	✓ Class DWS
Fishing	✓	NA	NA	NA	✓ General Use Criteria	✓ Class HHP
General	✓	✓	✓	✓	✓	✓
Industrial	✓	✓ General Use Criteria	✓ General Use Criteria	✓ General Use Criteria	✓ Warm Water Aquatic Habitat (WAH)	✓ Class IND
Irrigation	✓	✓ General Use Criteria	✓ General Use Criteria	NA	NA	✓ Class IRR
Navigation	NA	NA	NA	NA	NA	NA
Livestock Watering	✓	✓ General Use Criteria	✓ General Use Criteria	NA	NA	✓ Class LWW
Recreation	✓ Primary Contact and Secondary Contact	✓ Primary Body Contact, Class A and noncontact, General Use Criteria secondary contact uses	✓ General Use Criteria, noncontact	✓ General Use Criteria Primary and Secondary Contact	✓ Primary Contact and Secondary Contact	✓ Class BTG (boating and canoeing) and Class HHP (Secondary Contact Recreation)
Wildlife Watering	NA	✓ General Use Criteria	✓ General Use Criteria	✓ General Use Criteria	NA	✓ Class LWW

Notes:
Information pertaining to Arkansas is from:
State of Arkansas Department of Environmental Quality, *Designated Uses: Delta Ecoregion at* http://www.adeq.state.ar.us/regs/files/reg02_final_010917.pdf (last visited October 2002).
Information pertaining to Iowa is from:
State Water Quality Standards, Environmental Protection [567], Chapter 6.
Information pertaining to Illinois is from:
United States Environmental Protection Agency, *Illinois Designated Use Information at* http://oaspub.epa.gov/wqstdatabase/wqsi_wb_du.report_control (last visited October, 2002).
Information pertaining to Kentucky is from:
Kentucky Administrative Regulations, *Designation of uses of surface waters* , 401 KAR 5:026.

Addendum 6: Designated Uses of the Mississippi River

Use	MO (stretch from Missouri R. to Des Moines R.)	TN (KY-TN state line to Upstream end of Loosahatachie Bar)	TN (Upstream end of Loosahatchie Bar to MS-TN state line)
Aesthetic	NA	✓ General Use Criteria	✓ General Use Criteria
Agricultural	NA	NA	NA
Aquatic Life	✓ Class AQL	✓	✓
Aquatic Life (special)	NA	NA	NA
Drinking Water Supply	✓ Class DWS	✓ Domestic Water Supply	NA
Fishing	✓ Class HHP	✓ Recreation includes consumption of fish	✓ Recreation includes consumption of fish
General	✓	✓	✓
Industrial	✓ Class IND	✓	✓
Irrigation	NA	✓	✓
Navigation	NA	✓	✓
Livestock Watering	✓ Class LWW	✓	✓
Recreation	✓ Whole Body Contact Recreation and Class BTG (boating and canoeing) and Class HHP (Secondary Contact Recreation)	✓ Class REC	✓ Class REC
Wildlife Watering	✓ Class LWW	✓	✓

Notes:
Information pertaining to Arkansas
State of Arkansas Department o
http://www.adeq.state.ar.us/regs
Information pertaining to Iowa is fr
State Water Quality Standards,
Information pertaining to Illinois is
United States Environmental Prot
http://oaspub.epa.gov/wqstdataba
Information pertaining to Kentucky
Kentucky Administrative Regulati

Addendum 7: Designated Uses of Missouri River

Use	IA (excluding City of Council Bluffs Water Works Intake)	IA (City of Council Bluffs Water Works Intake)	KS*	MO	NE
Aesthetics	NA	NA	NA	NA	✓
Agricultural	✓ General Use Criteria	✓ General Use Criteria	✓	NA	✓ Class A
Aquatic Life	✓ Warm Water, Class B(WW)	✓ General Use Criteria	✓	✓ Class AQL	✓ Warm Water, Class A
Aquatic Life (special)	✓ Sensitive Species	NA	✓	NA	✓ Endangered, Threatened Species
Drinking Water Supply	✓ General Use Criteria, Domestic Withdrawal	✓ Class C	✓	✓ Class DWS	✓
Fishing	NA	NA	✓ Food Procurement	✓ Class HHP	✓ Warm Water, Class A
General	✓	✓	✓	✓	NA
Ground Water Recharge	NA	NA	✓	NA	NA
Industrial	✓ General Use Criteria	✓ General Use Criteria	✓	✓ Class IND	✓
Irrigation	✓ General Use Criteria	✓ General Use Criteria	✓	✓ Class IRR	✓ Class A Agricultural
Livestock Watering	✓ General Use Criteria	✓ General Use Criteria	✓	✓ Class LWW	✓ Class A Agricultural
Recreation	✓ Primary Contact, Class A and noncontact, General Use Criteria	✓ General Use Criteria, noncontact	✓ Primary Contact Recreation	✓ Class BTG (Boating and Canoeing) and Class HHP (Secondary Contact Recreation)	✓ Primary Contact
Wildlife Watering	✓ General Use Criteria	✓ General Use Criteria	NA	✓ Class LWW	NA

Notes:
Information pertaining to Iowa is from:
State Water Quality Standards, Environmental Protection [567], Chapter 6.
Information pertaining to Kansas is from:
Kansas Department of Health and Environment, Kansas Surface Water Register, *Designated Uses of Major Classified Streams, May 23, 2002*
Information pertaining to Missouri is from:
Missouri Department of Natural Resources, *Chapter 7-Water Quality* , 10 CSR 20-7.
Information pertaining to Nebraska is from:
Nebraska Department of Environmental Quality, Title 117, Chapter 5.

Addendum 8: Water Quality Criteria on the Mississippi River for Atrazine (microg/L)

Use	AR	IA (excluding Municipal Water Works Intakes)	IA (Keokuk and Fort Madison MWW Intakes)	IL
Aesthetic	NA	NA	NA	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Agricultural	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Aquatic Life	✓ Fisheries none	✓ Warm Water, Class B(WW) none	✓ General Use Criteria none	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Aquatic Life (special)	NA	✓ Sensitive Species none	NA	NA
Drinking Water Supply	✓ none	✓ General Use Criteria, Domestic Withdrawal waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ Class C 3	✓ Public Water Supply Standards none
Fishing	✓ none	NA	NA	✓ Secondary Contact Recreation Any substance toxic to aquatic life shall not exceed one half of the 96-hour median tolerance limit for native fish or essential fish food organisms (Title 35, Part 302, Section 302.410)
General	✓ toxic substances shall not be present in such quantities as to be toxic to human, animal, plant, or aquatic life (Regulation 2, Chapter 5, 2.508)	✓ waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Industrial	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Irrigation	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	NA
Navigation	NA	NA	NA	NA
Livestock Watering	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	NA
Recreation	✓ Primary Contact and Secondary Contact none	✓ Primary Body Contact, Class A and noncontact, General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria, noncontact waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria Primary and Secondary Contact waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)
Wildlife Watering	NA	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)
Limiting Values	**toxic substances shall not be present in such quantities as to be toxic to human, animal, plant, or aquatic life (Regulation 2, Chapter 5, 2.508)**	**waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)**	**3**	**waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)**

Notes:
Information pertaining to Arkansas is from:
State of Arkansas Department of Environmental Quality, *Chapter 5: Specific Standards at* http://www.adeq.state.ar.us/regs/files/reg02_final_010917.pdf (last visited October 2002).
Information pertaining to Iowa is from:
State Water Quality Standards, Environmental Protection [567], Section 2, Chapter 61.
Information pertaining to Illinois is from:
Title 35: Environmental Protection, Subtitle C: Water Pollution, Chapter I: Pollution Control Board, Subparts B and C.
Information pertaining to Kentucky is from:
Kentucky Administrative Regulations, *Surface Water Standards* , 401 KAR 5:031.

Addendum 8: Water Quality Criteria on the Mississippi River for Atrazine (microg/L)

Use	KY	MO (excluding stretch from Missouri R. to Des Moines R.)	MO (stretch from Missouri R. to Des Moines R.)	TN (KY-TN state line to Upstream end of Loosahatachie Bar)
Aesthetic	✓ General Use Criteria waters shall not be degraded by substances that are chronically or acutely toxic in humans, animals, fish and other aquatic life (401 5:031 Section 2(d))	NA	NA	✓ General Use Criteria none
Agricultural	✓ Warm Water Aquatic Habitat (WAH) allowable instream concentration shall not exceed LC1 or (1/3)LC50 concentration (401 5:031 Section 4(h)3)	NA	NA	NA
Aquatic Life	✓ Warm Water Aquatic Habitat (WAH) allowable instream concentration shall not exceed LC1 or (1/3)LC50 concentration (401 5:031 Section 4(h)3)	✓ Class AQL none	✓ Class AQL none	✓ waters shall not contain substances which may cause death, disease, cancer, or restrict or impair growth of fish or aquatic life (Rule 1200-4.3-.03(3)(g))
Aquatic Life (special)	NA	NA	NA	NA
Drinking Water Supply	NA	✓ Class DWS 3	✓ Class DWS 3	✓ Domestic Water Supply 3
Fishing	✓ General Use Criteria waters shall not be degraded by substances that are chronically or acutely toxic in humans, animals, fish and other aquatic life (401 5:031 Section 2(d))	✓ Class HHP none	✓ Class HHP none	✓ Recreation includes consumption of fish waters shall not contain toxic substances that will propose toxic conditions that will adversely affect man, animal, aquatic life, or wildlife (Rule 1200-4.3-.03(4)(h))
General	✓ waters shall not be degraded by substances that are chronically or acutely toxic in humans, animals, fish and other aquatic life (401 5:031 Section 2(d))	✓ waters shall be free from substances in sufficient amounts to result in toxicity to human, animal, or aquatic life (10 CSR 20-7.031(3)(D))	✓ waters shall be free from substances in sufficient amounts to result in toxicity to human, animal, or aquatic life (10 CSR 20-7.031(3)(D))	✓ none
Industrial	✓ Warm Water Aquatic Habitat (WAH) allowable instream concentration shall not exceed LC1 or (1/3)LC50 concentration (401 5:031 Section 4(h)3)	✓ Class IND none	✓ Class IND none	✓ waters shall not contain toxic substances which will adversely affect industrial processing (Rule 1200-4-3-.03(2)(i))
Irrigation	NA	✓ Class IRR none	NA	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for irrigation (Chapter 1200-4.3-.03(5)(f))
Navigation	NA	NA	NA	✓ none
Livestock Watering	NA	✓ Class LWW none	✓ Class LWW none	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for livestock watering and wildlife (Chapter 1200-4.3-.03(6)(f))
Recreation	✓ Primary Contact and Secondary Contact none	✓ Class BTG (boating and canoeing) and Class HHP (Secondary Contact Recreation) none	✓ Whole Body Contact Recreation and Class BTG (boating and canoeing) and Class HHP (Secondary Contact Recreation) none	✓ Class REC waters shall not contain toxic substances that will propose toxic conditions that will adversely affect man, animal, aquatic life, or wildlife (Rule 1200-4.3-.03(4)(h))
Wildlife Watering	NA	✓ Class LWW none	✓ Class LWW none	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for livestock watering and wildlife (Chapter 1200-4.3-.03(6)(f))
Limiting Values	**allowable instream concentration shall not exceed LC1 or (1/3)LC50 concentration (401 5:031 Section 4(h)3)**	**3**	**3**	**3**

Information pertaining to Missouri is from:
Missouri Department of Natural Resources, *Chapter 7 - Water Quality 10 CSR 20-7*
Information pertaining to Tennessee is from:
Rules of Tennessee Department of Environment and Conservation
Use Classifications for Surface Waters Chapter 1200-4-4

Addendum 8: Water Quality Criteria on the Mississippi River for Atrazine (microg/L)

Use	TN (Upstream end of Loosahatchie Bar to MS-TN state line)
Aesthetic	✓ General Use Criteria none
Agricultural	NA
Aquatic Life	✓ waters shall not contain substances which may cause death, disease, cancer, or restrict or impair growth of fish or aquatic life (Rule 1200-4.3--.03(3)(g))
Aquatic Life (special)	NA
Drinking Water Supply	NA
Fishing	✓ Recreation includes consumption of fish waters shall not contain toxic substances that will propose toxic conditions that will adversely affect man, animal, aquatic life, or wildlife (Rule 1200-4.3-.03(4)(h))
General	✓ none
Industrial	✓ waters shall not contain toxic substances which will adversely affect industrial processing (Rule 1200-4-3-.03(2)(i))
Irrigation	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for irrigation (Chapter 1200-4.3-.03(5)(f))
Navigation	✓ none
Livestock Watering	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for livestock watering and wildlife (Chapter 1200-4.3-.03(6)(f))
Recreation	✓ Class REC waters shall not contain toxic substances that will propose toxic conditions that will adversely affect man, animal, aquatic life, or wildlife (Rule 1200-4.3-.03(4)(h))
Wildlife Watering	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for livestock watering and wildlife (Chapter 1200-4.3-.03(6)(f))
Limiting Values	**waters shall not contain toxic substances that will propose toxic conditions that will adversely affect man, animal, aquatic life, or wildlife (Rule 1200-4.3-.03(4)(h))**

Addendum 9: Water Quality Criteria on the Mississippi River for Nitrogen (mg/L)

Use	AR	IA (excluding Municipal Water Works Intakes)	IA (Keokuk and Fort Madison MWW Intakes)	IL
Aesthetic	NA	NA	NA	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Agricultural	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Aquatic Life	✓ Fisheries none	✓ Warm Water, Class B(WW) waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Aquatic Life (special)	NA	✓ Sensitive Species none	NA	NA
Drinking Water Supply	✓ none	✓ General Use Criteria, Domestic Withdrawal waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ Class C Nitrate as N: 10 Nitrate + Nitrite as N: 10 Nitrite as N: 1	✓ Public Water Supply Standards Nitrate-Nitrogen: 10
Fishing	✓ none	NA	NA	✓ Secondary Contact Recreation Any substance toxic to aquatic life shall not exceed one half of the 96-hour median tolerance limit for native fish or essential fish food organisms (Title 35, Part 302, Section 302.410)
General	✓ materials stimulating algal growth shall not be present in concentrations sufficient to cause objectionable algal densities or other nuisance aquatic vegetation (Regulation 2, Chapter 5, 2.509)	✓ waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Industrial	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Irrigation	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	NA
Navigation	NA	NA	NA	NA
Livestock Watering	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	NA
Recreation	✓ Primary Contact and Secondary Contact none	✓ Primary Body Contact, Class A and noncontact, General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria, noncontact waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria Primary and Secondary Contact Any substance toxic to aquatic life shall not exceed one half of the 96-hour median tolerance limit for native fish or essential fish food organisms or waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Wildlife Watering	NA	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Limiting Values	**toxic substances shall not be present in such quantities as to be toxic to human, animal, plant, or aquatic life (Regulation 2, Chapter 5, 2.508)**	**waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)**	**Nitrate as N: 10 Nitrate + Nitrite as N: 10 Nitrite as N: 1**	**Nitrate-Nitrogen: 10**

Notes:
Information pertaining to Arkansas is from:
State of Arkansas Department of Environmental Quality, *Chapter 5: Specific Standards at* http://www.adeq.state.ar.us/regs/files/reg02_final_010917.pdf (last visited October 2002).
Information pertaining to Iowa is from:
State Water Quality Standards, Environmental Protection [567], Section 2, Chapter 61.
Information pertaining to Illinois is from:
Title 35: Environmental Protection, Subtitle C: Water Pollution, Chapter I: Pollution Control Board, Subparts B and C.

Addendum 9: Water Quality Criteria on the Mississippi River for Nitrogen (mg/L)

Use	KY	MO (excluding stretch from Missouri R. to Des Moines R.)	MO (stretch from Missouri R. to Des Moines R.)
Aesthetic	✓ General Use Criteria waters shall not be degraded by substances that produce undesirable aquatic life or result in the dominance of nuisance species (401 5:031 Section 2(d))	NA	NA
Agricultural	✓ Warm Water Aquatic Habitat (WAH) allowable instream concentration shall not exceed LC1 or (1/3)LC50 concentration (401 5:031 Section 4(h)3)	NA	NA
Aquatic Life	✓ Warm Water Aquatic Habitat (WAH) allowable instream concentration shall not exceed LC1 or (1/3)LC50 concentration (401 5:031 Section 4(h)3)	✓ Class AQL none	✓ Class AQL none
Aquatic Life (special)	NA	NA	NA
Drinking Water Supply	NA	✓ Class DWS Nitrate-N: 10	✓ Class DWS Nitrate-N: 10
Fishing	✓ General Use Criteria waters shall not be degraded by substances that produce undesirable aquatic life or result in the dominance of nuisance species (401 5:031 Section 2(d))	✓ Class HHP none	✓ Class HHP none
General	✓ waters shall not be degraded by substances that produce undesirable aquatic life or result in the dominance of nuisance species (401 5:031 Section 2(d))	✓ waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life (10 CSR 20-7.031(3)(D)	✓ waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life (10 CSR 20-7.031(3)(D)
Industrial	✓ Warm Water Aquatic Habitat (WAH) allowable instream concentration shall not exceed LC1 or (1/3)LC50 concentration (401 5:031 Section 4(h)3)	Class IND none	Class IND none
Irrigation	NA	✓ Class IRR none	NA
Navigation	NA	NA	NA
Livestock Watering	NA	✓ Class LWW none	✓ Class LWW none
Recreation	✓ Primary Contact and Secondary Contact none	✓ Class BTG (boating and canoeing) and Class HHP (Secondary Contact Recreation) none	✓ Whole Body Contact Recreation and Class BTG (boating and canoeing) and Class HHP (Secondary Contact Recreation) none
Wildlife Watering	NA	✓ Class LWW none	✓ Class LWW none
Limiting Values	**allowable instream concentration shall not exceed LC1 or (1/3)LC50 concentration (401 5:031 Section 4(h)3)**	**Nitrate-N: 10**	**Nitrate-N: 10**

Information pertaining to Kentucky is from:
Kentucky Administrative Regulations, *Surface Water Standards* , 401 KAR 5:031.
Information pertaining to Missouri is from:
Missouri Department of Natural Resources, *Chapter 7 - Water Quality 10 CSR 20-7*

Addendum 9: Water Quality Criteria on the Mississippi River for Nitrogen (mg/L)

Use	TN (KY-TN state line to Upstream end of Loosahatachie Bar)	TN (Upstream end of Loosahatchie Bar to MS-TN state line)
Aesthetic	✓ General Use Criteria none	✓ General Use Criteria none
Agricultural	NA	NA
Aquatic Life	✓ waters shall not contain substances which may cause death, disease, cancer, or restrict or impair growth of fish or aquatic life (Rule 1200-4.3--.03(3)(g))	✓ waters shall not contain substances which may cause death, disease, cancer, or restrict or impair growth of fish or aquatic life (Rule 1200-4.3--.03(3)(g))
Aquatic Life (special)	NA	NA
Drinking Water Supply	✓ Domestic Water Supply waters shall not contain other pollutants in quantities that my be detrimental to public health (Rule 1200-4.3-,03(1)(k))	NA
Fishing	✓ Recreation includes consumption of fish waters shall not contain other pollutants in quantities which may have a detrimental effect on recreation (Rule 1200-4.3-.03(4)(i))	✓ Recreation includes consumption of fish waters shall not contain other pollutants in quantities which may have a detrimental effect on recreation (Rule 1200-4.3-.03(4)(i))
General	✓ none	✓ none
Industrial	✓ waters shall not contain other pollutants that may adversely affect industrial processing (Rule 1200-4-3-.03(2)(j))	✓ waters shall not contain other pollutants that may adversely affect industrial processing (Rule 1200-4-3-.03(2)(j))
Irrigation	✓ waters shall not contain other pollutants in quantities which may be detrimental to the waters used for irrigation (Rule 1200-4.3-.03(5)(g))	✓ waters shall not contain other pollutants in quantities which may be detrimental to the waters used for irrigation (Rule 1200-4.3-.03(5)(g))
Navigation	✓ none	✓ none
Livestock Watering	✓ waters shall not contain other pollutants in quantities which may be detrimental to the waters used for livestock watering and wildlife (Rule 1200-4.3-.03(6)(g))	✓ waters shall not contain other pollutants in quantities which may be detrimental to the waters used for livestock watering and wildlife (Rule 1200-4.3-.03(6)(g))
Recreation	✓ waters shall not contain other pollutants in quantities which may have a detrimental effect on recreation (Rule 1200-4.3-.03(4)(i))	✓ waters shall not contain other pollutants in quantities which may have a detrimental effect on recreation (Rule 1200-4.3-.03(4)(i))
Wildlife Watering	✓ waters shall not contain other pollutants in quantities which may be detrimental to the waters used for livestock watering and wildlife (Rule 1200-4.3-.03(6)(g))	✓ waters shall not contain other pollutants in quantities which may be detrimental to the waters used for livestock watering and wildlife (Rule 1200-4.3-.03(6)(g))
Limiting Values	**waters shall not contain substances which may cause death, disease, cancer, or restrict or impair growth of fish or aquatic life (Rule 1200-4.3--.03(3)(g))**	**waters shall not contain substances which may cause death, disease, cancer, or restrict or impair growth of fish or aquatic life (Rule 1200-4.3--.03(3)(g))**

Information pertaining to Tennessee is from:
Rules of Tennessee Department of Environment and Conservation
Use Classifications for Surface Waters Chapter 1200-4-4

Addendum 10: Water Quality Criteria on the Mississippi River for PCBs (microg/L)

Use	AR	IA (excluding Municipal Water Works Intakes)	IA (Keokuk and Fort Madison MWW Intakes)	IL
Aesthetic	NA	NA	NA	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Agricultural	✓ none	✓ General Use Criteria none	✓ General Use Criteria none	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Aquatic Life	✓ Fisheries Chronic: 0.0140 HHF 0.0004	✓ Warm Water, Class B(WW) Acute: 2 Chronic: 0.014 Human Health - Fish: 0.0004	✓ General Use Criteria none	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Aquatic Life (special)	NA	✓ Sensitive Species Acute: 2 Chronic: 0.014 Human Health - Fish: 0.0004	NA	NA
Drinking Water Supply	✓ none	✓ General Use Criteria, Domestic Withdrawal none	✓ Class C Human Health - Fish and Water: 0.0017	✓ Public Water Supply Standards none
Fishing	✓ none	NA	NA	✓ Secondary Contact Recreation Any substance toxic to aquatic life shall not exceed one half of the 96-hour median tolerance limit for native fish or essential fish food organisms (Title 35, Part 302, Section 302.410)
General	✓ 0.0004	✓ none	✓ none	✓ waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Industrial	✓ none	✓ General Use Criteria none	✓ General Use Criteria none	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Irrigation	✓ none	✓ General Use Criteria none	✓ General Use Criteria none	NA
Navigation	NA	NA	NA	NA
Livestock Watering	✓ none	✓ General Use Criteria none	✓ General Use Criteria none	NA
Recreation	✓ Primary Contact and Secondary Contact none	✓ Primary Body Contact, Class A and noncontact, General Use Criteria none	✓ General Use Criteria, noncontact none	✓ General Use Criteria Primary and Secondary Contact Any substance toxic to aquatic life shall not exceed one half of the 96-hour median tolerance limit for native fish or essential fish food organisms or waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Wildlife Watering	NA	✓ General Use Criteria none	✓ General Use Criteria none	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)
Limiting Values	**Chronic: 0.0140**	**Human Health - Fish: 0.0004**	**Human Health - Fish and Water: 0.0017**	**Any substance toxic to aquatic life shall not exceed one half of the 96-hour median tolerance limit for native fish or essential fish food organisms or waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)**

Notes:
Information pertaining to Arkansas is from:
State of Arkansas Department of Environmental Quality, *Chapter 5: Specific Standards at* http://www.adeq.state.ar.us/regs/files/reg02_final_010917.pdf (last visited October 2002).
Information pertaining to Iowa is from:
State Water Quality Standards, Environmental Protection [567], Section 2, Chapter 61.
Information pertaining to Illinois is from:
Title 35: Environmental Protection, Subtitle C: Water Pollution, Chapter I: Pollution Control Board, Subparts B and C.
Information pertaining to Kentucky is from:
Kentucky Administrative Regulations, *Surface Water Standards* , 401 KAR 5:031.

Addendum 10: Water Quality Criteria on the Mississippi River for PCBs (microg/L)

Use	KY	MO (excluding stretch from Missouri R. to Des Moines R.)	MO (stretch from Missouri R. to Des Moines R.)	TN (KY-TN state line to Upstream end of Loosahatachie Bar)	TN (Upstream end of Loosahatchie Bar to MS-TN state line)
Aesthetic	✓ General Use Criteria 0.000079	NA	NA	✓ General Use Criteria none	✓ General Use Criteria none
Agricultural	✓ Warm Water Aquatic Habitat (WAH) Chronic: 0.0014	NA	NA	NA	NA
Aquatic Life	✓ Warm Water Aquatic Habitat (WAH) Chronic: 0.0014	✓ Class AQL none	✓ Class AQL none	✓ Chronic: 0.014	✓ Chronic: 0.014
Aquatic Life (special)	NA	NA	NA	NA	NA
Drinking Water Supply	NA	✓ Class DWS none	✓ Class DWS none	✓ Domestic Water Supply 0.5	NA
Fishing	✓ General Use Criteria 0.000079	✓ Class HHP 0.000045	✓ Class HHP 0.000045	✓ Recreation includes consumption of fish Water and Organisms: 0.00044 Organisms Only: 0.00045	✓ Recreation includes consumption of fish Water and Organisms: 0.00044 Organisms Only: 0.00045
General	✓ 0.000079	✓ waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life (10 CSR 20-7.031(3)(D)	✓ waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life (10 CSR 20-7.031(3)(D)	✓ none	✓ none
Industrial	✓ Warm Water Aquatic Habitat (WAH) Chronic: 0.0014	✓ none	✓ none	✓ waters shall not contain toxic substances which will adversely affect industrial processing (Rule 1200-4-3-.03(2)(i))	✓ waters shall not contain toxic substances which will adversely affect industrial processing (Rule 1200-4-3-.03(2)(i))
Irrigation	NA	✓ Class IRR none	NA	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for irrigation (Chapter 1200-4.3-.03(5)(f))	✓
Navigation	NA	NA	NA	✓ none	✓ none
Livestock Watering		✓ Class LWW none	✓ Class LWW none	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for livestock watering and wildlife (Chapter 1200-4.3-.03(6)(f))	✓
Recreation	✓ Primary Contact and Secondary Contact none	✓ Class BTG (boating and canoeing) and Class HHP (Secondary Contact Recreation) 0.000045	✓ Whole Body Contact Recreation and Class BTG (boating and canoeing) and Class HHP (Secondary Contact Recreation) 0.000045	✓ Water and Organisms: 0.00044 Organisms Only: 0.00045	✓ Water and Organisms: 0.00044 Organisms Only: 0.00045
Wildlife Watering	NA	✓ Class LWW none	✓ Class LWW none	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for livestock watering and wildlife (Chapter 1200-4.3-.03(6)(f))	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for livestock watering and wildlife (Chapter 1200-4.3-.03(6)(f))
Limiting Values	**0.000079**	**0.000045**	**0.000045**	**Water and Organisms: 0.00044**	**Water and Organisms: 0.00044**

Notes:
Information pertaining to Missouri is from:
Missouri Department of Natural Resources,
Information pertaining to Tennessee is from:
Rules of Tennessee Department of Environment
Use Classifications for Surface Waters, Chapter

Addendum 11: Water Quality Criteria on the Missouri River for PCBs (microg/L)

Use	IA (excluding City of Council Bluffs Water Works Intake)	IA (City of Council Bluffs Water Works Intake)	KS*	MO	NE
Aesthetics	NA	NA	NA	NA	✓ none
Agricultural	✓ General Use Criteria none	✓ General Use Criteria none	✓ none	NA	✓ Class A Wastes or toxic substances introduced directly or indirectly by human activity in concentrations that would degrade the use shall not be allowed. (117:004.02A)
Aquatic Life	✓ Warm Water, Class B(WW) Acute: 2 Chronic: 0.014 Human Health - Fish: 0.0004	✓ General Use Criteria none	✓ Acute: 2 Chronic: 0.014	✓ Class AQL none	✓ Warm Water, Class A Acute: 2.0 Chronic: 0.0017
Aquatic Life (special)	✓ Sensitive Species Acute: 2 Chronic: 0.014 Human Health - Fish: 0.0004	NA	✓ Acute: 2 Chronic: 0.014	NA	✓ Endangered, Threatened Species Acute: 2.0 Chronic: 0.0017
Drinking Water Supply	✓ General Use Criteria, Domestic Withdrawal none	✓ Class C Human Health - Fish and Water: 0.0017	✓ Water and Organisms: 0.00017	✓ Class DWS none	✓ 0.5
Fishing	NA	NA	✓ Food Procurement 0.0000079	✓ Class HHP 0.000045	✓ Warm Water, Class A Acute: 2.0 Chronic: 0.0017
General	✓ none	✓ none	✓ waters shall be free from the harmful effects of substances that originate from artificial sources of pollution and produce any public health hazard (Article 16. 28-16-28e(b)(1))	✓ waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life (10 CSR 20-7.031(3)(D)	NA
Ground Water Recharge	NA	NA	✓ Degradation of ground water, any statistically significant increase in the concentration of any chemical, may not occur (Article 16. 28-16-28e(c)(5))	NA	NA
Industrial	✓ General Use Criteria none	✓ General Use Criteria none	✓ none	✓ Class IND none	✓ none
Irrigation	✓ General Use Criteria none	✓ General Use Criteria none	✓ none	✓ Class IRR none	✓ Class A Agricultural Wastes or toxic substances introduced directly or indirectly by human activity in concentrations that would degrade the use shall not be allowed. (117:004.02A)
Livestock Watering	✓ General Use Criteria	✓ General Use Criteria	✓ none	✓ Class LWW	✓ Class A Agricultural Wastes or toxic substances introduced directly or indirectly by human activity in concentrations that would degrade the use shall not be allowed. (117:004.02A)
Recreation	✓ Primary Contact, Class A and noncontact, General Use Criteria none	✓ General Use Criteria, noncontact none	✓ Primary Contact Recreation	✓ Class BTG (Boating and Canoeing) none	✓ Primary Contact none
Wildlife Watering	✓ General Use Criteria none	✓ General Use Criteria none	NA	✓ Class LWW none	NA
Limiting Values	**0.0004**	**0.0017**	**0.0000079**	**0.000045**	**0.0017**

Information pertaining to Iowa is from:
State Water Quality Standards, Environmental Protection [567], Section 2, Chapter 61.
Information pertaining to Kansas is from:
Kansas Register 1264, *Surface Water Use Designation and Classification*, 28-16-28d.

Information pertaining to Missouri is from:
Missouri Department of Natural Resources, *Chapter 7-Water Quality* , 10 CSR 20-7.
Information pertaining to Nebraska is from:
Nebraska Department of Environmental Quality, Title 117, Chapter 4.

Addendum 12: Water Quality Criteria on the Mississippi River for Chlordane (microg/L)

Use	AR	IA (excluding Municipal Water Works Intakes)	IA (Keokuk and Fort Madison MWW Intakes)	IL	KY
Aesthetic	NA	NA	NA	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal, plant or aquatic life (Title 35, Part 302, Section 302.210)	✓ General Use Criteria 0.0022
Agricultural	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal , plan or aquatic life (Title 35, Part 302, Section 302.210)	✓ Warm Water Aquatic Habitat (WAH) Acute: 2.4 Chronic: 0.0043
Aquatic Life	✓ Fisheries Chronic: 0.0043 Acute: 2.4	✓ Warm Water, Class B(WW) Chronic: 0.004 Acute: 2.5 Human Health - Fish: 0.006	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal , plan or aquatic life (Title 35, Part 302, Section 302.210)	✓ Warm Water Aquatic Habitat (WAH) Acute: 2.4 Chronic: 0.0043
Aquatic Life (special)	NA	✓ Sensitive Species Chronic: 0.004 Acute: 2.5 Human Health - Fish: 0.006	NA	NA	NA
Drinking Water Supply	✓ none	✓ General Use Criteria, Domestic Withdrawal waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ Class C Human Health - Fish and Water: 0.021	✓ Public Water Supply Standards 0.003	NA
Fishing	✓ Chronic: 0.0043 Acute: 2.4	NA	NA	✓ Secondary Contact Recreation waters shall be free from any substances in concentrations toxic or harmful to human health, or animal , plan or aquatic life (Title 35, Part 302, Section 302.210)	✓ General Use Criteria 0.0022
General	✓ 0.005 (Human Health Criteria)	✓ waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ waters shall be free from any substances in concentrations toxic or harmful to human health, or animal , plan or aquatic life (Title 35, Part 302, Section 302.210)	✓ 0.0022
Industrial	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal , plan or aquatic life (Title 35, Part 302, Section 302.210)	✓ Warm Water Aquatic Habitat (WAH) Acute: 2.4 Chronic: 0.0043
Irrigation	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	NA	NA
Navigation	NA	NA	NA	NA	NA
Livestock Watering	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	NA	NA
Recreation	✓ Primary Contact and Secondary Contact none	✓ Primary Body Contact, Class A and noncontact, General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria, noncontact waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria Primary and Secondary Contact waters shall be free from any substances in concentrations toxic or harmful to human health, or animal , plan or aquatic life (Title 35, Part 302, Section 302.210)	✓ Primary Contact and Secondary Contact none
Wildlife Watering	NA	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from any substances in concentrations toxic or harmful to human health, or animal , plan or aquatic life (Title 35, Part 302, Section 302.210)	NA
Limiting Values	**0.0043**	**0.004**	**0.021**	**0.003**	**0.0022**

Notes:
Information pertaining to Arkansas is from:
State of Arkansas Department of Environmental Quality, *Chapter 5: Specific Standards at* http://www.adeq.state.ar.us/regs/files/reg02_final_010917.pdf (last visited October 2002).
Information pertaining to Iowa is from:
State Water Quality Standards, Environmental Protection [567], Section 2, Chapter 61.
Information pertaining to Illinois is from:
Title 35: Environmental Protection, Subtitle C: Water Pollution, Chapter I: Pollution Control Board, Subparts B and C.
Information pertaining to Kentucky is from:
Kentucky Administrative Regulations, *Surface Water Standards* , 401 KAR 5:031.

Addendum 12: Water Quality Criteria on the Mississippi River for Chlordane (microg/L)

Use	MO (excluding stretch from Missouri R. to Des Moines R.)	MO (stretch from Missouri R. to Des Moines R.)	TN (KY-TN state line to Upstream end of Loosahatachie Bar)	Bar to MS-TN state line)
Aesthetic	NA	NA	✓ General Use Criteria none	✓ General Use Criteria none
Agricultural	NA	NA	NA	NA
Aquatic Life	✓ Class AQL none	✓ Class AQL	✓ Acute: 2.4 Chronic: 0.0043	✓ Acute: 2.4 Chronic: 0.0043
Aquatic Life (special)	NA	NA	NA	NA
Drinking Water Supply	✓ Class DWS 2	✓ Class DWS 2	✓ Domestic Water Supply 2	NA
Fishing	✓ Class HHP 0.00048	✓ Class HHP 0.00048	✓ Recreation includes consumption of fish Water and Organisms: 0.0057 Organisms Only: 0.0059	✓ Recreation includes consumption of fish Water and Organisms: 0.0057 Organisms Only: 0.0059
General	✓ waters shall be free from substances in sufficient amounts to result in toxicity to human, animal, or aquatic life (10 CSR 20-7.031(3)(D))	✓ waters shall be free from substances in sufficient amounts to result in toxicity to human, animal, or aquatic life (10 CSR 20-7.031(3)(D))	✓ none	✓ none
Industrial	✓ none	Class IND none	✓ waters shall not contain toxic substances which will adversely affect industrial processing (Chapter 1200-4-3-.03(2)(i))	✓ waters shall not contain toxic substances which will adversely affect industrial processing (Chapter 1200-4-3-.03(2)(i))
Irrigation	✓ Class IRR none	NA	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for irrigation (Chapter 1200-4.3-.03(5)(f))	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for irrigation (Chapter 1200-4.3-.03(5)(f))
Navigation	NA	NA	✓ none	✓
Livestock Watering	✓ Class LWW none	✓ Class LWW none	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for livestock watering and wildlife (Chapter 1200-4.3-.03(6)(f))	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for livestock watering and wildlife (Chapter 1200-4.3-.03(6)(f))
Recreation	✓ Class BTG (Boating and Canoeing) and Class HHP (Secondary Contact Recreation) 0.00048	✓ Whole Body Contact Recreation, Class BTG (boating and canoeing), and Secondary Contact Recreation 0.00048	✓ Water and Organisms: 0.0057 Organisms Only: 0.0059	✓ Water and Organisms: 0.0057 Organisms Only: 0.0059
Wildlife Watering	✓ Class LWW none	✓ Class LWW none	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for livestock watering and wildlife (Chapter 1200-4.3-.03(6)(f))	✓ waters shall not contain toxic substances which will produce toxic conditions that adversely affect the quality of the waters for livestock watering and wildlife (Chapter 1200-4.3-.03(6)(f))
Limiting Values	**0.00048**	**0.00048**	**0.0043**	**0.0043**

Notes:
Information pertaining to Missouri is from:
Missouri Department of Natural Resources, *Chapter 7-Water Quality* , 10 CSR 20-7.
Information pertaining to Tennessee is from:
Rules of Tennessee Department of Environment and Conservation,
Use Classifications for Surface Waters, Chapter 1200-4-4.

Addendum 13: Water Quality of the Missouri River for Chlordane (mg/L)

Use	IA (excluding City of Council Bluffs Water Works Intake)	IA (City of Council Bluffs Water Works Intake)	KS	MO	NE
Aesthetics	NA	NA	NA	NA	✓ none
Agricultural	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ Livestock: 3	NA	✓ Class A Wastes or toxic substances introduced directly or indirectly by human activity in concentrations that would degrade the use shall not be allowed. (117:004.02A)
Aquatic Life	✓ Warm Water, Class B(WW) Chronic: 0.004 Acute: 2.5 Human Health - Fish: 0.006	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ Acute: 2.4 Chronic: 0.0043	✓ Class AQL none	✓ Warm Water, Class A Acute: 2.4 Chronic: 0.0043
Aquatic Life (special)	✓ Sensitive Species Chronic: 0.004 Acute: 2.5 Human Health - Fish: 0.006	NA	✓ Acute: 2.4 Chronic: 0.0043	NA	✓ Endangered, Threatened Species Acute: 2.4 Chronic: 0.0043
Drinking Water Supply	✓ General Use Criteria, Domestic Withdrawal waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ Class C Human Health - Fish and Water: 0.021	✓ Water and Organisms: 0.00057	✓ Class DWS 2	✓ 2
Fishing	NA	NA	✓ Food Procurement 0.00048	✓ Class HHP 0.00048	✓ Warm Water, Class A Acute: 2.4 Chronic: 0.0043
General	✓ waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ waters shall be free from the harmful effects of substances that originate from artificial sources of pollution and produce any public health hazard (Article 16. 28-16-28e(b)(1))	✓ waters shall be free from substances in sufficient amounts to result in toxicity to human, animal, or aquatic life (10 CSR 20-7.031(3)(D))	NA
Ground Water Recharge	NA	NA	✓ Degradation of ground water, any statistically significant increase in the concentration of any chemical, may not occur (Article 16. 28-16-28e(c)(5))	NA	NA
Industrial	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ none	✓ Class IND none	✓ none
Irrigation	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ none	✓ Class IRR none	✓ Class A Agricultural Wastes or toxic substances introduced directly or indirectly by human activity in concentrations that would degrade the use shall not be allowed. (117:004.02A)
Livestock Watering	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ 3	✓ Class LWW none	✓ Class A Agricultural Wastes or toxic substances introduced directly or indirectly by human activity in concentrations that would degrade the use shall not be allowed. (117:004.02A)
Recreation	✓ Primary Contact, Class A, Secondary Contact and noncontact, General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria, noncontact waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ Primary Contact Recreation none	✓ Class BTG (Boating and Canoeing) and Class HHP (Secondary Contact Recreation) 0.00048	✓ Primary Contact none
Wildlife Watering	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in concentrations which are acutely toxic to human, animal, or plant life (567 - 61.3(2)d.)	NA	✓ Class LWW none	NA
Limiting Values	**0.004**	**0.021**	**0.00048**	**0.00048**	**0.0043**

Notes:
Information pertaining to Iowa is from:
State Water Quality Standards, Environmental Protection [567], Section 2, Chapter 61.
Information pertaining to Kansas is from:
Kansas Register 1264, *Surface Water Use Designation and Classification* , 28-16-28e.
Information pertaining to Missouri is from:
Missouri Department of Natural Resources, *Chapter 7-Water Quality* , 10 CSR 20-7.
Information pertaining to Nebraska is from:
Nebraska Department of Environmental Quality, Title 117, Chapter 4.

Addendum 14: Water Quality Criteria on the Missouri River for Fecal Coliform (col/ml)

Use	IA (excluding City of Council Bluffs Water Works Intake)	IA (City of Council Bluffs Water Works Intake)	KS*
Aesthetics	NA	NA	NA
Agricultural	✓ General Use Criteria in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	✓ General Use Criteria in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	✓ none
Aquatic Life	✓ Warm Water, Class B(WW) waters shall contain no substances in concentrations which will make fish or shellfish inedible due to undesirable tastes or cause a hazard to humans after consumption (567-61.3(3)(b)(4))	✓ General Use Criteria in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	✓ conditions of acute or chronic toxicity shall not occur outside of zones of initial dilution or mixing zones (Article 16. 28-16-28e(b)(2)(F)(i)
Aquatic Life (special)	✓ Sensitive Species waters shall contain no substances in concentrations which will make fish or shellfish inedible due to undesirable tastes or cause a hazard to humans after consumption (567-61.3(3)(b)(4))	NA	✓ conditions of acute or chronic toxicity shall not occur outside of zones of initial dilution or mixing zones (Article 16. 28-16-28e(b)(2)(F)(i)
Drinking Water Supply	✓ General Use Criteria, Domestic Withdrawal in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	✓ Class C all substances detrimental to humans shall be limited to nondetrimental concentrations (567-61.3(3)(c)(2))	✓ none
Fishing	NA	NA	✓ Food Procurement none
General	✓ in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	✓ in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	✓ none
Ground Water Recharge	NA	NA	✓ Degradation of ground water, any statistically significant increase in the concentration of any infectious microorganism, may not occur (Article 16. 28-16-28e(c)(5))
Industrial	✓ General Use Criteria in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	✓ General Use Criteria in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	✓ none
Irrigation	✓ General Use Criteria in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	✓ General Use Criteria in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	✓ none
Livestock Watering	✓ General Use Criteria in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	✓ General Use Criteria in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	✓ none
Recreation	✓ Primary Contact, Class A, Secondary Contact and noncontact, General Use Criteria April 1 - October 31: 200/100 (except when waters materially affected by surface runoff) in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	✓ General Use Criteria, noncontact in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	✓ Primary Contact Recreation artificial sources of pollution shall not cause concentrations to exceed a geometric mean of 200/100 beyond the mixing zone from April 1 - October 31 or 2000/100 from November 1 - March 31
Wildlife Watering	✓ General Use Criteria in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	✓ General Use Criteria in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))	NA
Limiting Values	**April 1 - October 31: 200/100 (except when waters materially affected by surface runoff) in no case shall fecal coliform levels downstream from an existing source which may contain pathogens to humans be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))**	**in no case shall fecal coliform levels downstream om an existing source which may contain pathogens to human be more than 200/100 higher than the background level upstream from the discharge (567-61.3(2)(h))**	**artificial sources of pollution shall not cause concentrations to exceed a geometric mean of 200/100 beyond the mixing zone from April 1 - October 31 or 2000/100 from November 1 - March 31**

Notes:
Information pertaining to Iowa is from:
State Water Quality Standards, Environmental Protection [567], Section 2, Chapter 61.
Information pertaining to Kansas is from:
Kansas Register 1264, *Surface Water Use Designation and Classification*, 28-16-28d.

Addendum 14: Water Quality Criteria on the Missouri River for Fecal Coliform (col/ml)

Use	MO	NE
Aesthetics	NA	✓ none
Agricultural	NA	✓ Class A Wastes or toxic substances introduced directly or indirectly by human activity in concentrations that would degrade the use shall not be allowed. (117:004.02A)
Aquatic Life	✓ Class AQL none	✓ Warm Water, Class A none
Aquatic Life (special)	NA	✓ Endangered, Threatened Species none
Drinking Water Supply	✓ Class DWS none	✓ none
Fishing	✓ Class HHP none	✓ Warm Water, Class A none
General	✓ waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life (10 CSR 20-7.031(3)(D)	NA
Ground Water Recharge	NA	NA
Industrial	✓ Class IND none	✓ none
Irrigation	✓ Class IRR none	✓ Class A Agricultural Wastes or toxic substances introduced directly or indirectly by human activity in concentrations that would degrade the use shall not be allowed. (117:004.02A)
Livestock Watering	✓ Class LWW none	✓ Class A Agricultural Wastes or toxic substances introduced directly or indirectly by human activity in concentrations that would degrade the use shall not be allowed. (117:004.02A)
Recreation	✓ Class BTG (Boating and Canoeing) and Class HHP (Secondary Contact Recreation) none	✓ Primary Contact not exceed 200/100 nor equal or exceed 400/100 in more than 10% of samples from May 1 - September 30
Wildlife Watering	✓ Class LWW none	NA
Limiting Values	**waters shall be free from substances or conditions in sufficient amounts to result in toxicity to human, animal or aquatic life (10 CSR 20-7.031(3)(D))**	**not exceed 200/100 nor equal or exceed 400/100 in more than 10% of samples from May 1 - September 30**

Information pertaining to Missouri is from:
Missouri Department of Natural Resources, *Chapter 7-Water Quality*, 10 CSR 20-7.
Information pertaining to Nebraska is from:
Nebraska Department of Environmental Quality, Title 117, Chapter 4.

Addendum 15: Water Quality Criteria on the Mississippi River for Phosphorous (microg/L)

Use	AR	IA (excluding Municipal Water Works Intakes)	IA (Keokuk and Fort Madison MWW Intakes)
Aesthetic	NA	NA	NA
Agricultural	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))
Aquatic Life	✓ Fisheries none	✓ Warm Water, Class B(WW) none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))
Aquatic Life (special)	NA	✓ Sensitive Species none	NA
Drinking Water Supply	✓ none	✓ General Use Criteria, Domestic Withdrawal waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ Class C all substances detrimental to humans shall be limited to nondetrimental concentrations (567-61.3(3)(c)(d))
Fishing	✓ none	NA	NA
General	✓ Total Phosphorous: 100	✓ waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))
Industrial	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))
Irrigation	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))
Navigation	NA	NA	NA
Livestock Watering	✓ none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))
Recreation	✓ Primary Contact and Secondary Contact none	✓ Primary Body Contact, Class A and noncontact, General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ General Use Criteria, noncontact waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))
Wildlife Watering	NA	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))
Limiting Values	Total Phosphorous: 100	waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d)) or all substances detrimental to humans shall be limited to nondetrimental concentrations (567-61.3(3)(c)(d))

Notes:

Information pertaining to Arkansas is from:

State of Arkansas Department of Environmental Quality, *Chapter 5: Specific Standards at* http://www.adeq.state.ar.us/regs/files/reg02_final_010917.pdf (last visited October 2002).

Information pertaining to Iowa is from:

State Water Quality Standards, Environmental Protection [567], Section 2, Chapter 61.

Addendum 15: Water Quality Criteria on the Mississippi River for Phosphorous (microg/L)

Use	IL	KY
Aesthetic	✓ General Use Criteria none	✓ General Use Criteria waters shall not be degraded by substances that produce undesirable aquatic life or result in the dominance of nuisance species (401 5:031 Section 2(d))
Agricultural	✓ General Use Criteria none	✓ Warm Water Aquatic Habitat (WAH) allowable instream concentration shall not exceed LC1 or (1/3)LC50 concentration (401 5:031 Section 4(h)3)
Aquatic Life	✓ General Use Criteria none	✓ Warm Water Aquatic Habitat (WAH) allowable instream concentration shall not exceed LC1 or (1/3)LC50 concentration (401 5:031 Section 4(h)3)
Aquatic Life (special)	NA	NA
Drinking Water Supply	✓ Public Water Supply Standards none	NA
Fishing	✓ Secondary Contact Recreation Any substance toxic to aquatic life shall not exceed one half of the 96-hour median tolerance limit for native fish or essential fish food organisms (Title 35, Part 302, Section 302.410)	✓ General Use Criteria waters shall not be degraded by substances that produce undesirable aquatic life or result in the dominance of nuisance species (401 5:031 Section 2(d))
General	✓ none	✓ waters shall not be degraded by substances that produce undesirable aquatic life or result in the dominance of nuisance species (401 5:031 Section 2(d))
Industrial	✓ General Use Criteria none	✓ Warm Water Aquatic Habitat (WAH)
Irrigation	NA	NA
Navigation	NA	NA
Livestock Watering	NA	
Recreation	✓ General Use Criteria Primary and Secondary Contact none	✓ Primary Contact and Secondary Contact none
Wildlife Watering	✓ General Use Criteria none	NA
Limiting Values	Any substance toxic to aquatic life shall not exceed one half of the 96-hour median tolerance limit for native fish or essential fish food organisms (Title 35, Part 302, Section 302.410)	allowable instream concentration shall not exceed LC1 or (1/3)LC50 concentration (401 5:031 Section 4(h)3)

Information pertaining to Illinois is from:
Title 35: Environmental Protection, Subtitle C: Water Pollution, Chapter I: Pollution Control Board, Subparts B and C.
Information pertaining to Kentucky is from:
Kentucky Administrative Regulations, *Surface Water Standards* , 401 KAR 5:031.

Addendum 15: Water Quality Criteria on the Mississippi River for Phosphorous (microg/L)

Use	MO (excluding stretch from Missouri R. to Des Moines R.)	MO (stretch from Missouri R. to Des Moines R.)	TN (KY-TN state line to Upstream end of Loosahatachie Bar)
Aesthetic	NA	NA	✓ General Use Criteria none
Agricultural	NA	NA	NA
Aquatic Life	✓ Class AQL none	✓ Class AQL none	✓ waters shall not contain substances which may cause death, disease, cancer, or restrict or impair growth of fish or aquatic life (Rule 1200-4.3-.03(3)(g))
Aquatic Life (special)	NA	NA	NA
Drinking Water Supply	✓ Class DWS none	✓ Class DWS none	✓ Domestic Water Supply waters shall not contain other pollutants in quantities that my be detrimental to public health (Rule 1200-4.3-.03(1)(k))
Fishing	✓ Class HHP none	✓ Class HHP none	✓ Recreation includes consumption of fish waters shall not contain other pollutants in quantities which may have a detrimental effect on recreation (Rule 1200-4.3-.03(4)(i))
General	✓ none	✓ none	✓ none
Industrial	Class IND none	Class IND none	✓ waters shall not contain other pollutants that may adversely affect industrial processing (Rule 1200-4-3-.03(2)(j))
Irrigation	✓ Class IRR none	NA	✓ waters shall not contain other pollutants in quantities which may be detrimental to the waters used for irrigation (Rule 1200-4.3-.03(5)(g))
Navigation	NA	NA	✓ none
Livestock Watering	✓ Class LWW none	✓ Class LWW none	✓ waters shall not contain other pollutants in quantities which may be detrimental to the waters used for livestock watering and wildlife (Rule 1200-4.3-.03(6)(g))
Recreation	✓ Class BTG (boating and canoeing) and Class HHP (Secondary Contact Recreation) none	✓ Whole Body Contact Recreation and Class BTG (boating and canoeing) and Class HHP (Secondary Contact Recreation) none	✓ Class REC waters shall not contain other pollutants in quantities which may have a detrimental effect on recreation (Rule 1200-4.3-.03(4)(i))
Wildlife Watering	✓ Class LWW none	✓ Class LWW none	✓ waters shall not contain other pollutants in quantities which may be detrimental to the waters used for livestock watering and wildlife (Rule 1200-4.3-.03(6)(g))
Limiting Values	none	none	waters shall not contain substances which may cause death, disease, cancer, or restrict or impair growth of fish or aquatic life (Rule 1200-4.3-.03(3)(g))

Notes:
Information pertaining to Missouri is from:
Missouri Department of Natural Resources, *Chapter 7-Water Quality* , 10 CSR 20-7.
Information pertaining to Tennessee is from:
Rules of Tennessee Department of Environment and Conservation,
Use Classifications for Surface Waters, Chapter 1200-4-4.

Addendum 15: Water Quality Criteria on the Mississippi River for Phosphorous (microg/L)

Use	TN (Upstream end of Loosahatchie Bar to MS-TN state line)
Aesthetic	✓ General Use Criteria
Agricultural	NA
Aquatic Life	✓ waters shall not contain substances which may cause death, disease, cancer, or restrict or impair growth of fish or aquatic life (Rule 1200-4.3--.03(3)(g))
Aquatic Life (special)	NA
Drinking Water Supply	NA
Fishing	✓ Recreation includes consumption of fish waters shall not contain other pollutants in quantities which may have a detrimental effect on recreation (Rule 1200-4.3-.03(4)(i))
General	✓ none
Industrial	✓ waters shall not contain other pollutants that may adversely affect industrial processing (Rule 1200-4-3-.03(2)(j))
Irrigation	✓ waters shall not contain other pollutants in quantities which may be detrimental to the waters used for irrigation (Rule 1200-4.3-.03(5)(g))
Navigation	✓ none
Livestock Watering	✓ waters shall not contain other pollutants in quantities which may be detrimental to the waters used for livestock watering and wildlife (Rule 1200-4.3-.03(6)(g))
Recreation	✓ Class REC waters shall not contain other pollutants in quantities which may have a detrimental effect on recreation (Rule 1200-4.3-.03(4)(i))
Wildlife Watering	✓ waters shall not contain other pollutants in quantities which may be detrimental to the waters used for livestock watering and wildlife (Rule 1200-4.3-.03(6)(g))
Limiting Values	waters shall not contain substances which may cause death, disease, cancer, or restrict or impair growth of fish or aquatic life (Rule 1200-4.3--.03(3)(g))

Addendum 16: Water Quality Criteria on the Missouri River for Phosphorous (microg/L)

Use	IA (excluding City of Council Bluffs Water Works Intake)	IA (City of Council Bluffs Water Works Intake)	KS	MO	NE
Aesthetics	NA	NA	NA	NA	✓ waters shall be free from human-induced pollution which causes the occurrence of undesirable or nuisance aquatic life (Title 117, Chapter 4, 005)
Agricultural	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ none	NA	✓ Class A Wastes or toxic substances introduced directly or indirectly by human activity in concentrations that would degrade the use shall not be allowed. (117:004.02A)
Aquatic Life	✓ Warm Water, Class B(WW) none	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ elemental (white): 0.1	✓ Class AQL none	✓ Warm Water, Class A none
Aquatic Life (special)	✓ Sensitive Species none	NA	✓ elemental (white): 0.1	NA	✓ Endangered, Threatened Species none
Drinking Water Supply	✓ General Use Criteria, Domestic Withdrawal waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ Class C all substances detrimental to humans shall be limited to nondetrimental concentrations (567-61.3(3)(c)(d))	✓ none	✓ Class DWS none	✓ none
Fishing	NA	NA	✓ Food Procurement none	✓ Class HHP none	✓ Warm Water, Class A none
General	✓ waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ none	✓ none	NA
Ground Water Recharge	NA	NA	✓ Degradation of ground water, any statistically significant increase in the concentration of any chemical, may not occur (Article 16. 28-16-28e(c)(5))	NA	NA
Industrial	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ none	✓ Class IND none	✓ none
Irrigation	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ none	✓ Class IRR none	✓ Class A Agricultural Wastes or toxic substances introduced directly or indirectly by human activity in concentrations that would degrade the use shall not be allowed. (117:004.02A)
Livestock Watering	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ The introduction of plant nutrients into streams, lakes, or wetlands from artificial sources shall be controlled to prevent the accelerated succession or replacement of aquatic biota or the production of undesirable quantities or kinds of aquatic life (28-16-28e (c)(2)(B))	✓ Class LWW none	✓ Class A Agricultural Wastes or toxic substances introduced directly or indirectly by human activity in concentrations that would degrade the use shall not be allowed. (117:004.02A)
Recreation	✓ Primary Contact, Class A, Secondary Contact and noncontact, General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or	✓ General Use Criteria, noncontact waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ Primary Contact Recreation The introduction of plant nutrients into surface waters designated for primary or secondary contact recreation shall be controlled to prevent the development of objectionable concentrations of algae or algal byproducts or nuisance growths of submersed, floating or emergent aquatic vegetation. (28-16-28e (c)(7)(A))	✓ Class BTG (Boating and Canoeing) none	✓ Primary Contact none
Wildlife Watering	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	✓ General Use Criteria waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))	NA	✓ Class LWW none	NA
Limiting Values	**waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d))**	**waters shall be free from substances attributable to agricultural practices in quantities which would produce undesirable or nuisance aquatic life (567-61.3(2)(d)) or all substances detrimental to humans shall be limited to nondetrimental concentrations (567-61.3(3)(c)(d))**	**elemental (white): 0.1**	**none**	**waters shall be free from human-induced pollution which causes the occurrence of undesirable or nuisance aquatic life (Title 117, Chapter 4, 005)**

Notes:
Information pertaining to Iowa is from:
State Water Quality Standards, Environmental Protection [567], Section 2, Chapter 61.
Information pertaining to Kansas is from:
Kansas Register 1264, *Surface Water Use Designation and Classification* , 28-16-28d.
Information pertaining to Missouri is from:
Missouri Department of Natural Resources, *Chapter 7-Water Quality* , 10 CSR 20-7.
Information pertaining to Nebraska is from:
Nebraska Department of Environmental Quality, Title 117, Chapter 4.

Addendum 17: Petition Pollutants

Pollutant		Sources	Potential Health/Ecological Effects
Chlordane[1]		Residue of banned termiticide	Liver or nervous system problems; increased risk of cancer
Atrazine[2]		Runoff from herbicide used on row crops	Cardiovascular system or reproductive problems
Polychlorinated Biphenyls[3]		Runoff from landfills; discharge of waste chemicals	Skin changes; thymus gland problems; immune deficiencies; reproductive or nervous system difficulties; increased risk of cancer
E. Coli[4]		Human or animal wastes (along with Enterococci – best bacterial indicator of water quality)	Disease-causing microbes (pathogens) in the wastes whose presence is indicated by the presence of E. Coli can cause gastrointestinal illnesses (diarrhea, cramps, nausea), headaches, or other symptoms.
Enterococci[5]		Human or animal wastes (along with E. Coli – best bacterial indicator of water quality – particularly marine)	Disease-causing microbes (pathogens) in the wastes whose presence is indicated by the presence of Enterococci can cause gastrointestinal illnesses (diarrhea, cramps, nausea), headaches, or other symptoms.
Conventionals	Dissolved Oxygen.[6]	Increases in water temperature, algal blooms, and the presence of human waste, and animal waste.	Adequate oxygen levels are necessary to provide for aerobic life forms that carry on natural stream purification processes. Low dissolved oxygen levels can stress the aquatic environment and result in fish kills
	Ammonia[7]	Fertilizer runoff, industrial and domestic wastewater	Plants are more tolerant of ammonia than animals, and invertebrates are more tolerant than fish. Hatching and growth rates of fishes may be affected. In the structural development, changes in tissues of gills, liver, and kidneys may also occur. Toxic concentrations of ammonia in humans may cause loss of equilibrium, convulsions, coma, and death.

[1] http://www.epa.gov/safewater/mcl.html (last visited 02/03/03)
[2] http://www.epa.gov/safewater/mcl.html (last visited 02/03/03)
[3] http://www.epa.gov/safewater/mcl.html (last visited 02/03/03)
[4] http://www.epa.gov/safewater/mcl.html (last visited 02/03/03)
[5] "Implementation Guidance for Ambient Water Quality Criteria for Bacteria" EPA, May 2002 Draft, EPA-823-B-02-003
[6] http://water.nr.state.ky.us/ww/ramp/rmdo2.htm (last visited 02/03/03)
[7] http://water.nr.state.ky.us/ww/ramp/rmnh4.htm (last visited 02/03/03)

Pollutant	Sources	Potential Health/Ecological Effects
Nutrients[8]	Soil Runoff	Cultural Eutrophication - low dissolved oxygen, fish kills. Increase in algae and turbidity can lead to need for increased chlorination which can lead to higher levels of disinfection byproducts
Sediments[9]	Soil runoff	An indicator of water quality and filtration effectiveness (e.g., whether disease-causing organisms are present). Higher turbidity levels are often associated with higher levels of disease-causing microorganisms such as viruses, parasites and some bacteria that can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.
Index of Biological Integrity[10]	Not applicable	Measure of biological integrity helps determine the extent of impairment of the water body and the ability of that water body to withstand natural or anthropogenic disturbances

[8] WQSP-01-01 Memorandum on Development and Adoption of Nutrient Criteria into Water Quality Standards, from Geoffrey Grubbs, Director, EPA Office of Science and Technology, November 14, 2001
[9] http://www.epa.gov/safewater/mcl.html (last visited 02/03/03)
[10] The H. John Heinz Center for Science, Economics and the Environment, "The State of the Nation's Ecosystems," Cambridge University Press, 2002.