



Missouri Department of Natural Resources
Total Maximum Daily Load Information Sheet

Mississippi River

Waterbody Segment at a Glance:

Counties:	Sixteen counties
Nearby Cities:	Numerous cities and towns
Length of impairment:	490 miles (highlighted on map)
Pollutant:	Chlordane and PCBs (polychlorinated biphenyls) in fish
Source:	Many point/nonpoint sources



TMDL Priority Ranking: TMDL Approved November 3, 2006

Description of the Problem

Beneficial uses of Mississippi River

- Livestock and Wildlife Watering
- Protection of Warm Water Aquatic Life and Human Health associated with Fish Consumption
- Whole Body Contact Recreation, Category B
- Secondary Contact Recreation
- Irrigation
- Boating and Canoeing
- Drinking Water Supply
- Industrial

Use that is impaired

- Protection of Human Health associated with Fish Consumption

Standards that apply

- The action level for technical chlordane in fish tissue, established by the U.S. Food and Drug Administration (FDA), is 0.3 milligrams per kilogram (mg/kg) or parts per million (ppm). The department, however, uses sum of the isomers of chlordane, which carries a 0.1 mg/kg action level.
- The FDA sets a 2.0 mg/kg PCBs limit on interstate shipment of fish for human consumption. The department currently uses this level for judging impairment of the fish consumption use.

Background information and Water Quality Data

Chlordane is a pesticide that was commonly used in the past for termite control. It was also used at nurseries, on golf courses and in agriculture. Chlordane was banned for agricultural use in 1975 and for all uses in 1988. PCBs are a mixture of up to 200 different chlorinated compounds and are stable

under conditions of high pressure and high temperature. PCBs were commonly used in transformers and other electrical equipment (such as fluorescent light fixtures) as coolants and lubricants and were also used as hydraulic oils. U.S. production ended in 1977 due to concerns about the persistence of PCBs in the environment.

The problem is that both chlordane and PCBs degrade very slowly and bio-accumulate in fish tissue, particularly in bottom-feeding/dwelling fish. This is because they are not soluble in water but bind to the soil. Due to their persistence, eroding contaminated soil can provide a continuing source of chlordane and PCBs to streams and lakes. Human exposure to chlordane has been associated with liver cancer and nervous system disorders. The health effects associated with exposure to PCBs include acne-like skin conditions in adults and neurobehavioral and immunological changes in children.

The Missouri Department of Conservation (MDC) has monitored levels of toxic contaminants in fish from Missouri lakes and rivers since 1984. At that time, MDC discovered elevated levels of chlordane in fish in the Missouri, Mississippi and Meramec rivers. MDC, the U.S. Environmental Protection Agency (EPA) and the department all provide fish tissue sample results to the Missouri Department of Health and Senior Services (DHSS) for use in determining health risks to fish consumers. DHSS, in turn, issues fish consumption advisories. DHSS has issued advisories based on pesticide contaminants in fish since 1985. Past DHSS fish advisories instructed anglers to limit consumption of fatty fish (carp, catfish, buffalo, drum, suckers and paddlefish) to one meal per week. This advisory was rescinded in 2001. Trout also have a high level of fat, but are considered safe to eat from anywhere in the state. In 2002, sturgeon eggs were added to the only existing PCB advisory, which has been in place for sturgeon meat from the Missouri River since 1997.

DHSS issues its fish advisory every year around March or April. The advisory is made available to the public through press releases and may be accessed by calling DHSS at 1-866-628-9891. These advisories are also distributed to all Missouri county health departments and are posted on the Internet. The 2006 advisory may be found at www.dhss.mo.gov/NewsAndPublicNotices/06FishAdvisory.pdf.

The table below gives information on the levels of chlordane and PCBs in fish fillets in the Mississippi River where it borders the State of Missouri.

**Chlordane as Sum of the Isomers and PCBs (in mg/kg) in the Mississippi River
Bordering the State of Missouri**

Org	Site	Site Name	Year	Species	No. in Sample	Wt. Lbs	Fat	Chlor	PCB
ILLEPA	1/145.6	Mississippi R. ab. Canton	2002	CARP	5	6.4	1		0.11
ILLEPA	1/145.6	Mississippi R. ab. Canton	2002	CARP	5	3.9	1		0.0499
ILLEPA	1/145.6	Mississippi R. ab. Canton	2003	CARP	3	4.6	3		0.18
ILLEPA	1/145.6	Mississippi R. ab. Canton	2003	CH CAT	4	1.3	2		0.13
ILLEPA	1/145.6	Mississippi R. ab. Canton	2003	CARP	4	5.4	1		0.13
MDC	1/106.2	Mississippi R. @ Saverton	2004	SHSTUR	5	3.1	10	0.0218	0.221
MDC	1/106.2	Mississippi R. @ Saverton	2004	SHSTUR	5	2.1	10	0.0173	0.179
MDC	1/106.2	Mississippi R. @ Saverton	2004	SHSTUR	5	1.6	5	0.014	0.189
MDC	1/87.7	Mississippi R. @ Louisiana	1999	CARP	25	4.6	6	0.025	0.025
ILLEPA	1/32.4	Mississippi R. @ Golden Eagle, IL	1999	PADDLE	4	8.8	3		0.0499
ILLEPA	1/32.4	Mississippi R. @ Golden Eagle, IL	1999	PADDLE	5	13.8	2		0.0499

MDC	1707/158.5	Mississippi R. @ Kimmswick	1999	CARP	25	6.5	8	0.084	0.14
MDC	1707/158.5	Mississippi R. @ Kimmswick	2001	CARP	25	3.6	6	0.04	0.1
EPA/MDNR	1707/153.5	Mississippi R. 2.5 mi.ab. Herculaneum	2002	W BASS	5	0.6		0.004	0.051
EPA/MDNR	1707/153.5	Mississippi R. 2.5 mi.ab. Herculaneum	2002	CARP	5	3.6		0.044	0.201
EPA/MDNR	1707/153.5	Mississippi R. 2.5 mi.ab. Herculaneum	2003	CARP	5	23.5		0.037	0.278
EPA/MDNR	1707/153.5	Mississippi R. 2.5 mi.ab. Herculaneum	2003	CH CAT	3	13.6		0.02	0.132
EPA/MDNR	1707/153.5	Mississippi R. 2.5 mi.ab. Herculaneum	2004	W BASS	5	0.4		0.0158	0.16
EPA/MDNR	1707/153.5	Mississippi R. 2.5 mi.ab. Herculaneum	2004	CARP	5	5.6		0.0343	0.31
MDC	1707/149	Mississippi R. @Crystal City	1999	SHSTUR	15	1.8	6	0.035	0.14
MDC	1707/149	Mississippi R. @Crystal City	2000	FH CAT	17	2.8	1	0.017	0.089
MDC	1707/149	Mississippi R. @Crystal City	2001	CARP	25	3.4	6	0.044	0.119
EPA/MDNR	1707/149	Mississippi R. @Crystal City	2002	CARP	5	4.2		0.029	0.47
EPA/MDNR	1707/149	Mississippi R. @Crystal City	2002	W BASS	5	0.8		0.008	0.056
EPA/MDNR	1707/149	Mississippi R. @Crystal City	2003	CARP	5	18.7		0.039	0.278
EPA/MDNR	1707/149	Mississippi R. @Crystal City	2003	SAUGER	3	2.5		0.0084	0.1
EPA/MDNR	1707/149	Mississippi R. @Crystal City	2004	CARP	5	4.1		0.0752	0.66
EPA/MDNR	1707/149	Mississippi R. @Crystal City	2004	W BASS	5	1		0.0454	0.29
MDC	1707/149	Mississippi R. @Crystal City	2004	SHSTUR	5	2.1	7	0.0508	0.79
MDC	1707/149	Mississippi R. @Crystal City	2004	SHSTUR	5	1.5	7	0.0368	0.397
MDC	1707/149	Mississippi R. @Crystal City	2004	SHSTUR	5	1.8	4	0.0384	0.472
MDC	1707/53.0	Mississippi R. @ Cape Girardeau,MO.	2004	SHSTUR	5	2.4	7	0.0453	0.485
MDC	1707/53.0	Mississippi R. @ Cape Girardeau,MO.	2004	SHSTUR	5	2.2	7	0.0482	0.513
MDC	1707/53.0	Mississippi R. @ Cape Girardeau,MO.	2004	SHSTUR	5	2.4	4	0.0486	0.771
MDC	3152/15.5	Mississippi R. @Caruthersville	2002	FH CAT	15	2.2	1	0.0079	0.07
MDC	3152/15.5	Mississippi R. @Caruthersville	2002	BL CAT	15	3.4	2	0.013	0.061
MDC	3152/15.5	Mississippi R. @Caruthersville	2004	SHSTUR	5	1.8	8	0.0382	0.366
MDC	3152/15.5	Mississippi R. @Caruthersville	2004	SHSTUR	5	2.4	7	0.033	0.305
MDC	3152/15.5	Mississippi R. @Caruthersville	2004	SHSTUR	5	2.8	12	0.0733	0.666

No. in Sample = number of fish in sample; BL CAT = blue catfish; CH CAT = channel catfish; FH CAT = flathead catfish; PADDLE = paddlefish; SHSTUR = shovel nose sturgeon; W BASS = white bass;

Data in the table above are from 1999 to 2005, for fillets of fish only. These are the data used in the most recent assessment of the Mississippi River for impairment due to chlordane and PCBs. A more complete chart of all data for chlordane as sum of the isomers and PCBs (including whole fish and fish eggs) is appended to the TMDL.

As mentioned, these pollutants degrade slowly and are extremely persistent in the environment. However, since they are no longer produced, a downward trend is inevitable and the department recommends the development of a consistent protocol for measurement of the pollutants in fish tissue and continued sampling.

For more information call or write:

Missouri Department of Natural Resources, Water Protection Program
P.O. Box 176, Jefferson City, MO 65102-0176
Office 1-800-361-4827 or (573) 751-1300 or fax (573) 522-9920
Program Home Page: www.dnr.mo.gov/env/wpp/index.html