Illinois
Environmental
Protection Agency

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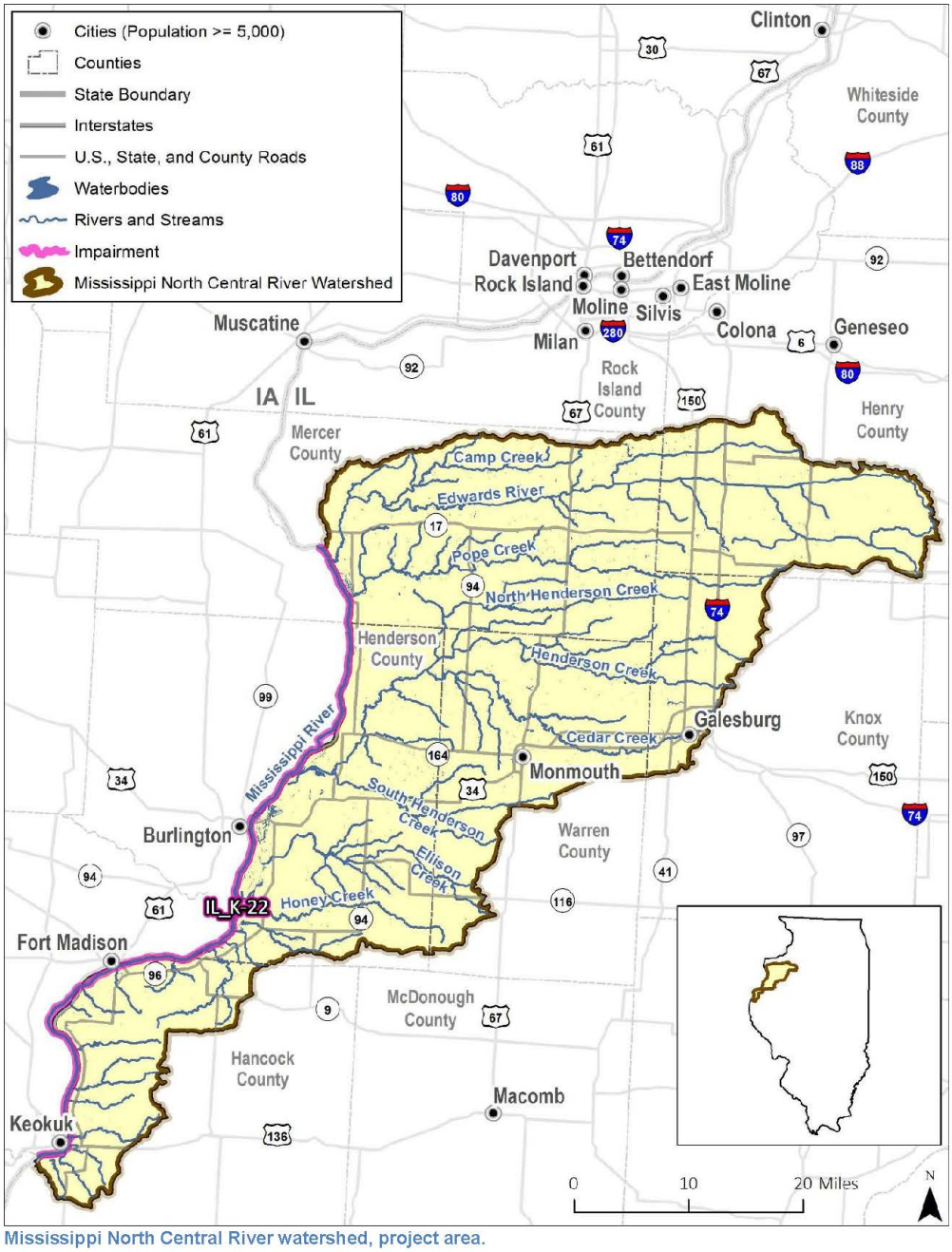
Mississippi River Watershed Protection Plan

(Waterbody Segment IL_K-22) - Atrazine



Mississippi North Central River watershed, project area.

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Mississippi River Watershed Protection Plan

(Waterbody Segment IL_K-22) - Atrazine

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Acronyms and Abbreviations

a.i.	active ingredient
AWQMN	Ambient Water Quality Monitoring Network
CAFO	confined animal feeding operation
COC	crop oil concentrate
CWA	Clean Water Act
HHS	Health and Human Services
HSG	hydrologic soil group
Illinois EPA	Illinois Environmental Protection Agency
ISGS	Illinois State Geologic Survey
IPCB	Illinois Pollution Control Board
Lbs	pounds
MCL	maximum contaminant level
MOS	margin of safety
NASS	National Agricultural Statistics Survey
NAWQA	National Water-Quality Assessment
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
TMDL	total maximum daily load
U.S. EPA	United States Environmental Protection Agency
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WQS	water quality standards

Executive Summary

The Clean Water Act and U.S. Environmental Protection Agency (EPA) regulations require that Total Maximum Daily Loads (TMDLs) be developed for waters that do not support their designated uses. In simple terms, a TMDL is a plan to attain and maintain water quality standards in waters that are not currently meeting them.

This study addresses the approximately 1,753 square mile Mississippi North Central River watershed area (portion included in Illinois only) located in northwestern Illinois. The Mississippi River in this watershed is a large river with contributing drainage area in Minnesota, Wisconsin, Iowa, and Illinois. The Mississippi River (IL_K-22) was placed on the State of Illinois §303(d) list for not supporting Public and Food Processing Water Supplies due to elevated levels of atrazine.

Atrazine is an herbicide typically applied to row crops and is widely used in the United States. Sources of atrazine identified in the Draft 2014 and 2016 Illinois Integrated Reports include unknown sources.

The data summaries provided in this report indicate that the Mississippi River at K-22 is no longer impaired for atrazine and therefore a TMDL was not developed for this segment. A protection plan was instead developed to guide implementation of recommended practices to protect the watershed from increases in atrazine levels and to maintain acceptable levels of atrazine in the Mississippi River in the future.

The State of Illinois typically uses a three-stage approach to develop TMDLs for a watershed:

Stage 1 – Watershed characterization, historical dataset evaluation, data analysis, methodology selection, data gap identification
Stage 2 – Data collection to fill in data gaps, if necessary
Stage 3 – Model calibration, TMDL scenarios, and implementation plan

This final protection plan represents a compilation of Stage 1 and Stage 2 and a protection plan. Stage 3 was not required as the data summaries in the previous stages indicate that the Mississippi River at K-22 is no longer impaired for atrazine.

1. Introduction

The Clean Water Act and U.S. Environmental Protection Agency (U.S. EPA) regulations require that Total Maximum Daily Loads (TMDLs) be developed for waters that do not support their designated uses. In simple terms, a TMDL is a plan to attain and maintain water quality standards in waters that are not currently meeting them.

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1.1 TMDL Development Process

The TMDL process typically establishes the allowable loading of pollutants or other quantifiable parameters for a water body based on the relationship between pollution sources and instream conditions. This allowable loading represents the maximum quantity of the pollutant that the waterbody can receive without exceeding water quality standards. The TMDL also takes into account a margin of safety, which reflects scientific uncertainty, as well as the effects of seasonal variation. By following the TMDL process, States can establish water quality-based controls to reduce pollution from both point and nonpoint sources and restore and maintain the quality of their water resources (U.S. EPA 1991).

Illinois EPA typically uses a three-stage approach to develop TMDLs for a watershed:

Stage 1 – Watershed characterization, data analysis, methodology selection, data gap identification
Stage 2 – Data collection to fill in data gaps, if necessary
Stage 3 – Model development, TMDL scenario, and implementation plan

The purpose of Stage 1 is to characterize the watershed background; verify impairments in the listed waterbody by comparing observed data with water quality standards or appropriate targets; evaluate spatial and temporal water quality variation; provide a preliminary assessment of sources contributing to impairments; and describe potential TMDL development approaches. The Stage 1 report was completed in January 2017. Additional data were collected on segment (IL K-22) of the Mississippi River in response to comments received on the Stage 1 document (see Appendix A for Stage 1 comments). These additional data indicated that K-22 is no longer impaired for atrazine (see Section 5); therefore, the Mississippi River Watershed Protection Plan was developed in place of a formal Stage 3 document. This report includes components of the original Stage 1 report and provides documentation needed to delist segment K-22 for atrazine.

1.2 Public Participation

A public meeting was held on October 25, 2016 at the Warren Henderson Farm Bureau in Monmouth, IL to present the Stage 1 report and findings. A public notice was sent out and the public comment period closed on November 25, 2016. One set of written comments were provided by Syngenta Crop Protection, LLC. These comments are provided in Appendix A. Based on the comments received, additional sampling was conducted (see Section 5).

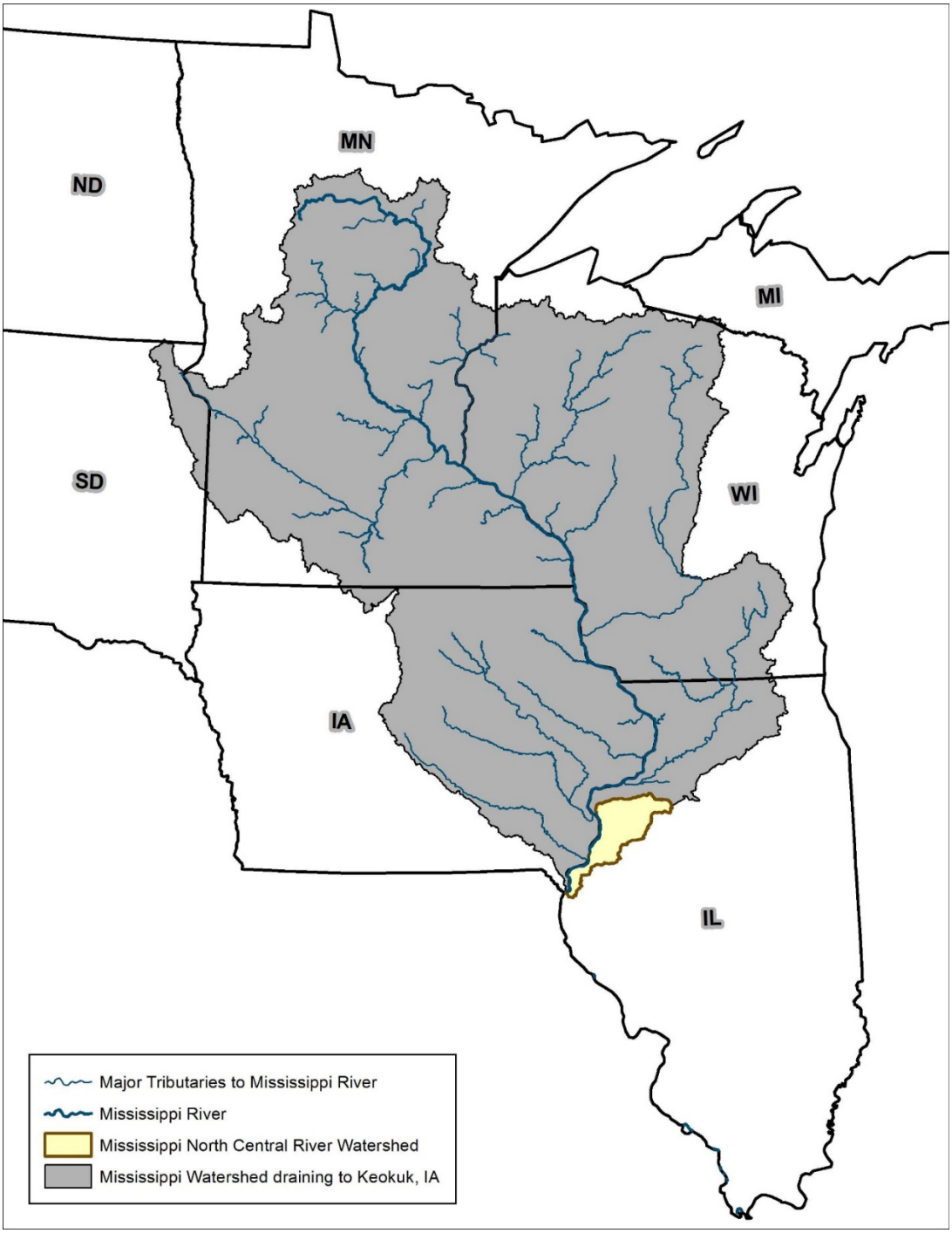

Figure 1. Mississippi River watershed draining to segment IL K-22.

2. Watershed Characterization

The Illinois portion of the Mississippi North Central River watershed is located in northwestern Illinois and is a very small part of the overall Mississippi River watershed that encompasses portions of Minnesota, South Dakota, Wisconsin and Iowa in addition to Illinois (Figure 1). This report will focus on the watershed in Illinois (Figure 2). The western border of the watershed area stretches along the length of the Mississippi River in Illinois from New Boston to just south of Hamilton. The eastern boundary of the watershed, at the headwaters of incoming tributaries to the Mississippi, lies along the boundary of the Spoon River watershed. Covering nearly 1,754 square miles, the watershed includes land within Hancock, Henderson, Henry, Knox, Mercer and Warren Counties in Illinois. Major tributaries from the Illinois portion of the river include Pope Creek, Henderson Creek, Ellison Creek, Honey Creek, and Camp Creek.

2.1 Jurisdictions and Population

Counties with land located in the watershed include Hancock, Henderson, Henry, Knox, Mercer, and Warren in Illinois. The approximate total population for the six counties in Illinois is nearly 164,000. Population is area weighted for the watershed in Table 1.

Table 1. Area weighted county populations within project area

County	2000	2010	Percent Change
Hancock	5,098	4,841	-5%
Henderson	7,685	6,859	-11%
Henry	16,189	16,019	-1%
Knox	10,494	9,946	-5%
Mercer	15,535	13,118	-3%
Warren	11,141	10,530	-5%
TOTAL	***64,142***	***61,313***	***-4%***

Source: U.S. Census Bureau (2000 and 2012)

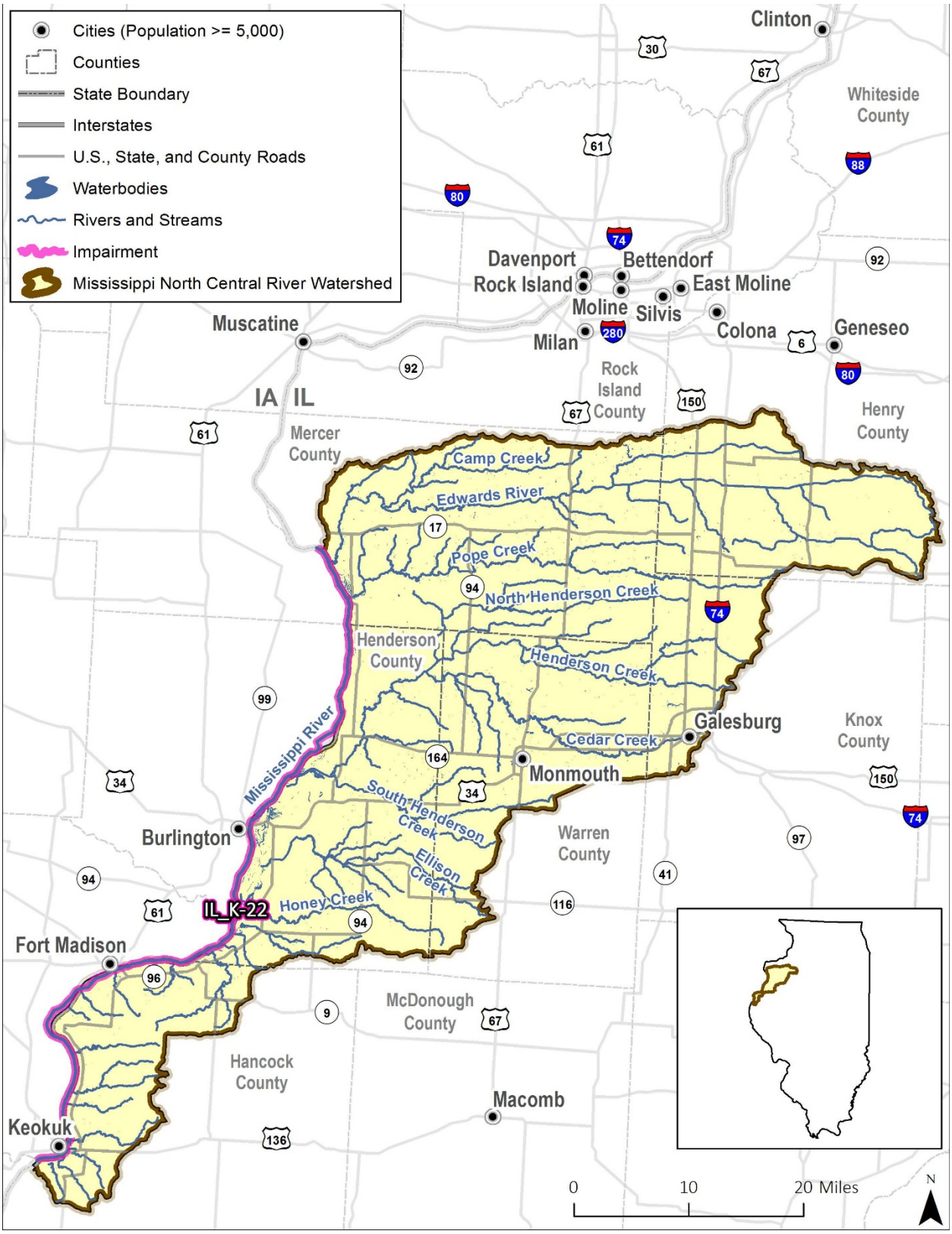

Figure 2. Mississippi North Central River watershed, project area.

2.2 Climate

Climate data are available from the National Oceanic and Atmospheric Administration Global Historical Climatology Network Database; Station USC00114823 is located in La Harpe, IL in the central portion of the Mississippi North Central River watershed and was used for analysis within this report. Monthly data from 1892-2014 for precipitation, snowfall and temperature were available at the time of report development. In general, the climate of the region is continental with hot, humid summers and cold winters. Table 2 contains historical temperature data collected at the La Harpe climate station. From 1895–2014 the average high winter temperature in La Harpe was 36.2 °F and the average high summer temperature was 85.2 °F (Table 2).

Table 2. Climate summary for La Harpe (1895–2014)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average High °F	34	38	50	63	74	83	87	85	78	67	51	37
Average Low °F	15	18	29	40	50	60	64	62	54	43	31	20
Mean Temperature °F	24	28	39	52	62	71	76	74	66	55	41	29
Average Precipitation (in)	1.8	1.6	2.7	3.7	4.2	4.8	4.0	3.6	4.0	2.8	2.3	1.9
Average snow fall (in)	6.6	5.4	4.3	1.1	0.3	0.3	0.2	0.3	0.3	0.4	1.6	5.1

From 1895–2014, the annual average precipitation in La Harpe was approximately 37.3 inches, including approximately 24.5 inches of snowfall. In general, larger volumes of precipitation tend to occur between the months of April and September.

2.3 Land Use and Land Cover

Land use in the watershed is heavily influenced by agriculture. There is a small amount of urban area surrounding the town of Galesburg and Monmouth, and several other small towns in the watershed. Specific land use across the watershed includes agriculture (approximately 77 percent), forest (approximately 11 percent) and urban (approximately 7 percent). Corn is the primary crop in the Mississippi North Central River watershed, followed closely by soybeans. Figure 3 shows land use in the Mississippi North Central River watershed. Table 3 presents area and percent cover by land use type as provided in the 2013 Cropland Data Layer (USDA 2013).

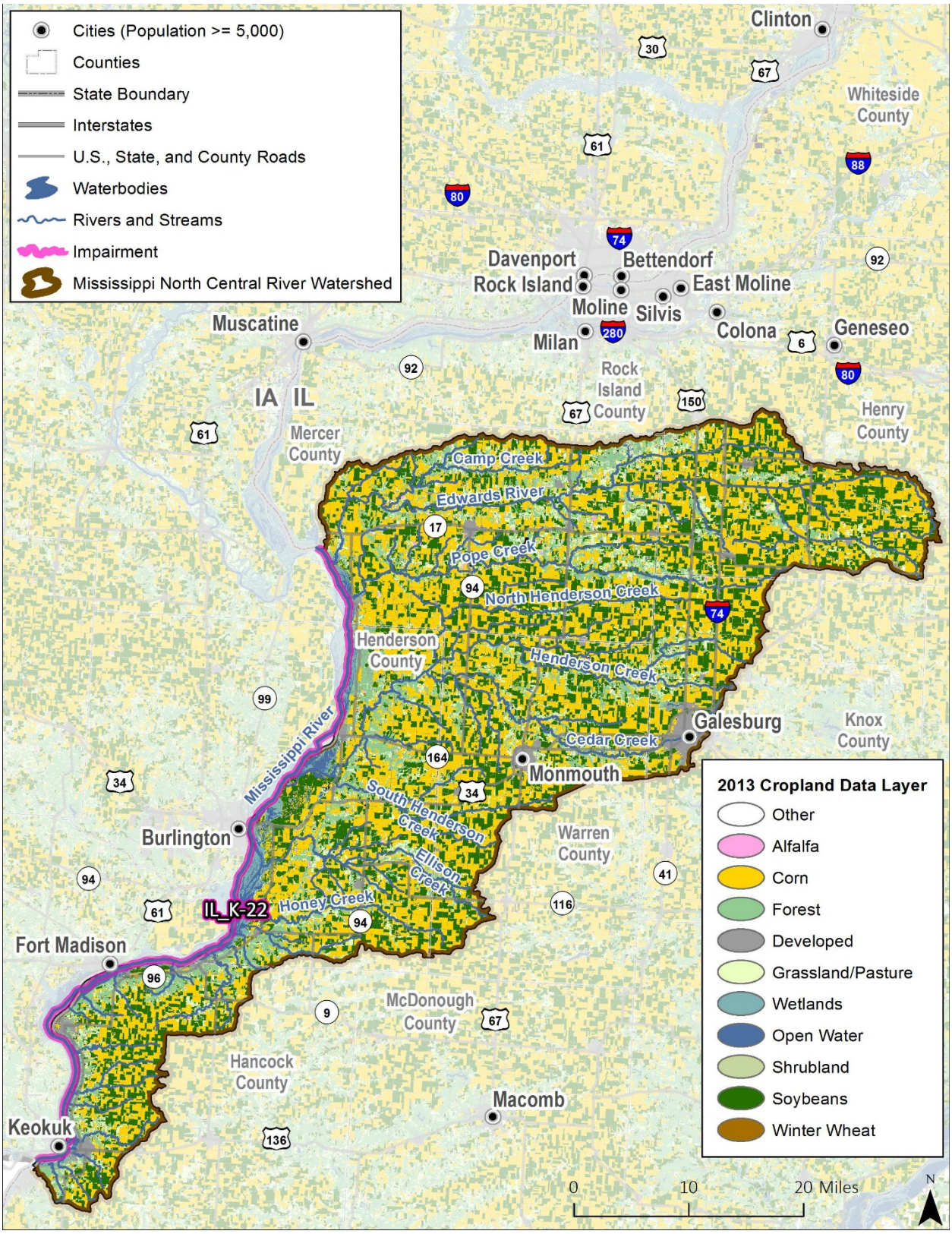

Figure 3. Mississippi North Central River watershed land use (2013 Cropland Data Layer, USDA 2013).

Table 3. Watershed land use summary

Land Use / Land Cover Category	Acreage	Percentage
Corn	436,005	38.9%
Soybeans	316,303	28.2%
Deciduous Forest	124,803	11.1%
Grass/Pasture	117,946	10.5%
Developed, Open Space	35,082	3.1%
Developed, Low-Intensity	34,481	3.1%
Open Water	23,714	2.1%
Woody Wetlands	12,304	1.1%
Developed, Medium Intensity	6,619	0.6%
Alfalfa	4,758	0.4%
Herbaceous Wetlands	3,631	0.3%
Winter Wheat	2,127	0.2%
Developed High Intensity	1,898	0.2%
Evergreen Forest	836	0.1%
Other (remaining land use types)	1,588	0.1%
Total	**1,122,093**	**100.0%**

Source: 2013 Cropland Data Layer (USDA 2013)

2.4 Topography

Topography is an important factor in watershed management because stream types, precipitation, and soil types can vary dramatically by elevation. The Mississippi North Central River watershed in Illinois varies in elevation from 471 to 880 feet (Figure 4). Highs occur at the headwaters of the Edwards River, near Kewanee, IL, and in the headwaters of Henderson Creek, near Wataga, IL; both on the eastern boundary of the watershed. Lows occur along the Mississippi River and adjacent floodplain; along the entire length of the eastern boundary of the watershed. The Mississippi River water elevation varies from 525 feet to 480 feet and is approximately 74 miles long in Illinois, resulting in an average stream gradient of 0.6 feet per mile.

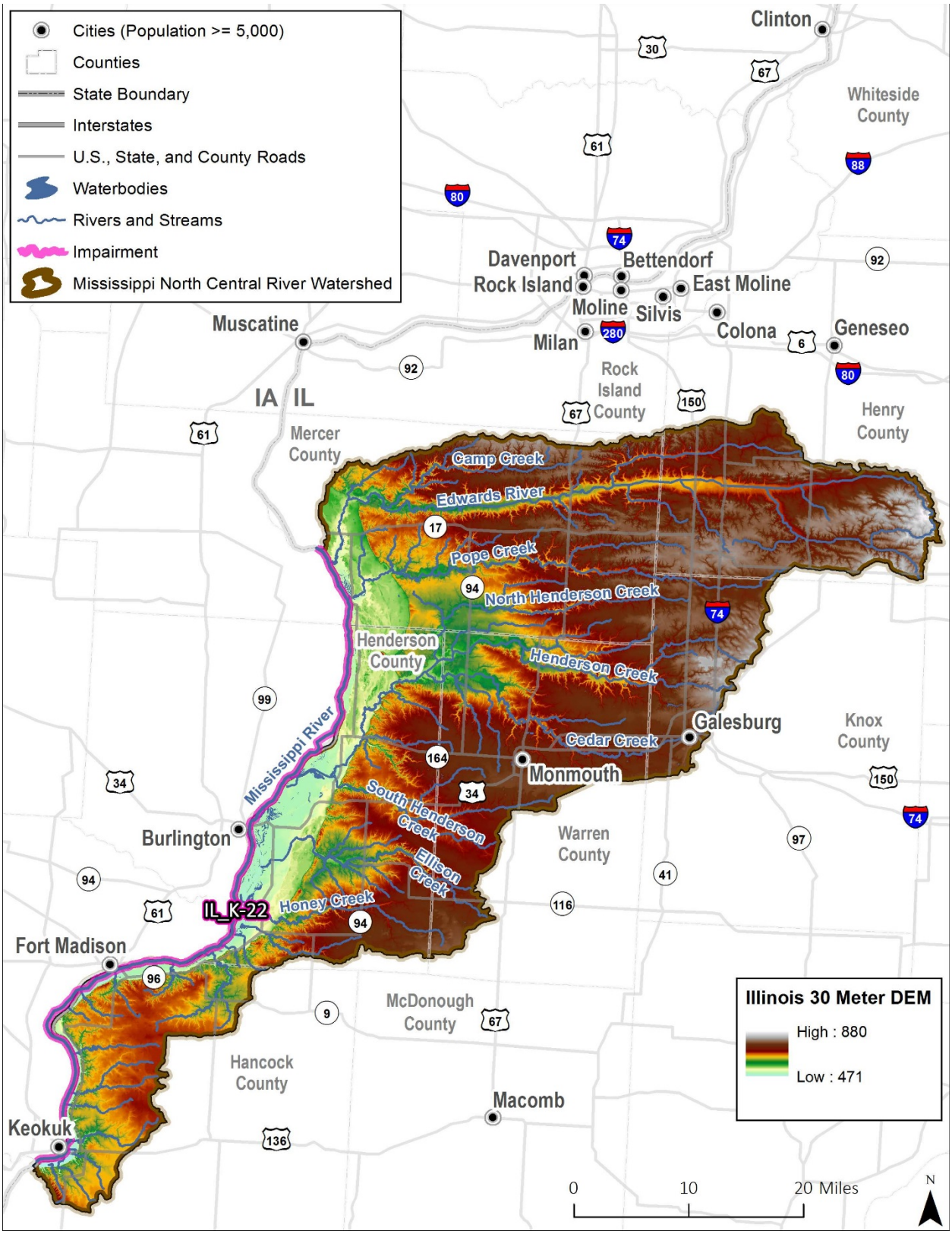

Figure 4. Mississippi North Central River watershed land elevations (Illinois 30-meter digital elevation model, ISGS 2003, elevations are in feet).

2.5 Soils

The National Cooperative Soil Survey publishes soil surveys for each county within the U.S. These soil surveys contain predictions of soil behavior for selected land uses. The surveys also highlight limitations and hazards inherent in the soil, general improvements needed to overcome the limitations, and the impact of selected land uses on the environment. The soil surveys are designed for many different uses, including land use planning, the identification of special practices needed to ensure proper performance, and mapping of hydrologic soil groups (HSGs) (NRCS 2007).

HSGs refer to the grouping of soils according to their runoff potential. Soil properties that influence the HSGs include depth to seasonal high water table, infiltration rate and permeability after prolonged wetting, and depth to slow permeable layer. There are four groups of HSGs: Group A, B, C, and Group D. Table 4 describes those HSGs found in the Mississippi North Central River watershed area. The dominant soils types in the watershed include: B/D (32%), B (29%), and C/D (25%). Figure 5 further summarizes the composition of HSGs in the watershed.

Table 4. Hydrologic soil group descriptions

HSG	Group Description
A	Sand, loamy sand or sandy loam types of soils. Low runoff potential and high infiltration rates even when thoroughly wetted. Consist chiefly of deep, well to excessively drained sands or gravels with a high rate of water transmission.
B	Silt loam or loam. Moderate infiltration rates when thoroughly wetted. Consist chiefly or moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures.
C	Soils are sandy clay loam. Low infiltration rates when thoroughly wetted. Consist chiefly of soils with a layer that impedes downward movement of water and soils with moderately fine to fine structure.
D	Soils are clay loam, silty clay loam, sandy clay, silty clay or clay. Group D has the highest runoff potential. Low infiltration rates when thoroughly wetted. Consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface and shallow soils over nearly impervious material.
A-C/D	Dual Hydrologic Soil Groups. Certain wet soils are placed in group D based solely on the presence of a water table within 24 inches of the surface even though the saturated hydraulic conductivity may be favorable for water transmission. If these soils can be adequately drained, then they are assigned to dual hydrologic soil groups (A/D, B/D, and C/D) based on their saturated hydraulic conductivity and the water table depth when drained. The first letter applies to the drained condition and the second to the undrained condition.

A commonly used soil attribute is the K-factor. The K-factor:

> *indicates the susceptibility of a soil to sheet and rill erosion by water. (The K-factor) is one of six factors used in the Universal Soil Loss Equation to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water (NRCS 2005).*

The distribution of K-factor values in the Mississippi North Central River watershed range from 0.02 to 0.64, with an average value of 0.34 (Figure 6).

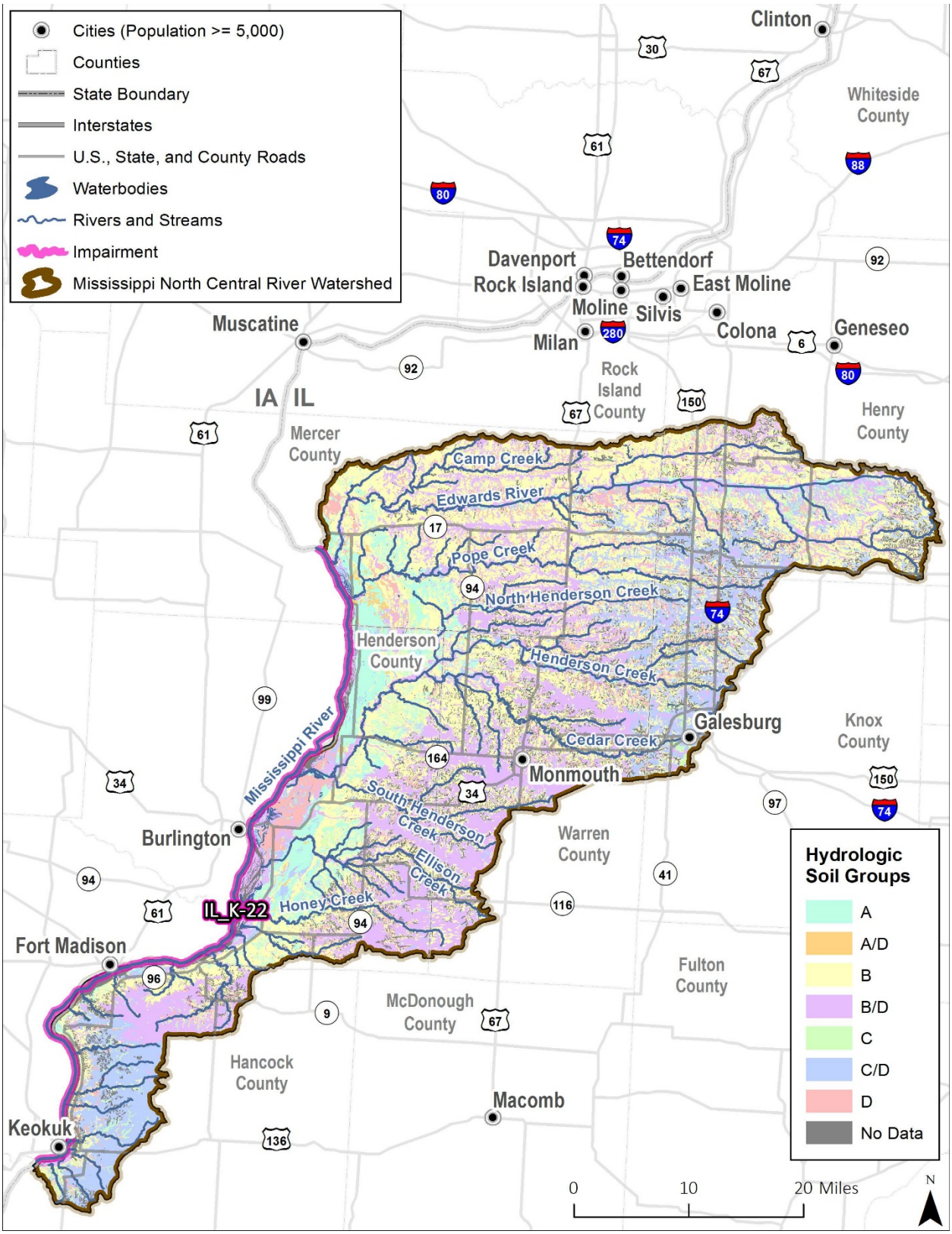

Figure 5. Mississippi North Central River watershed hydrologic soil groups.

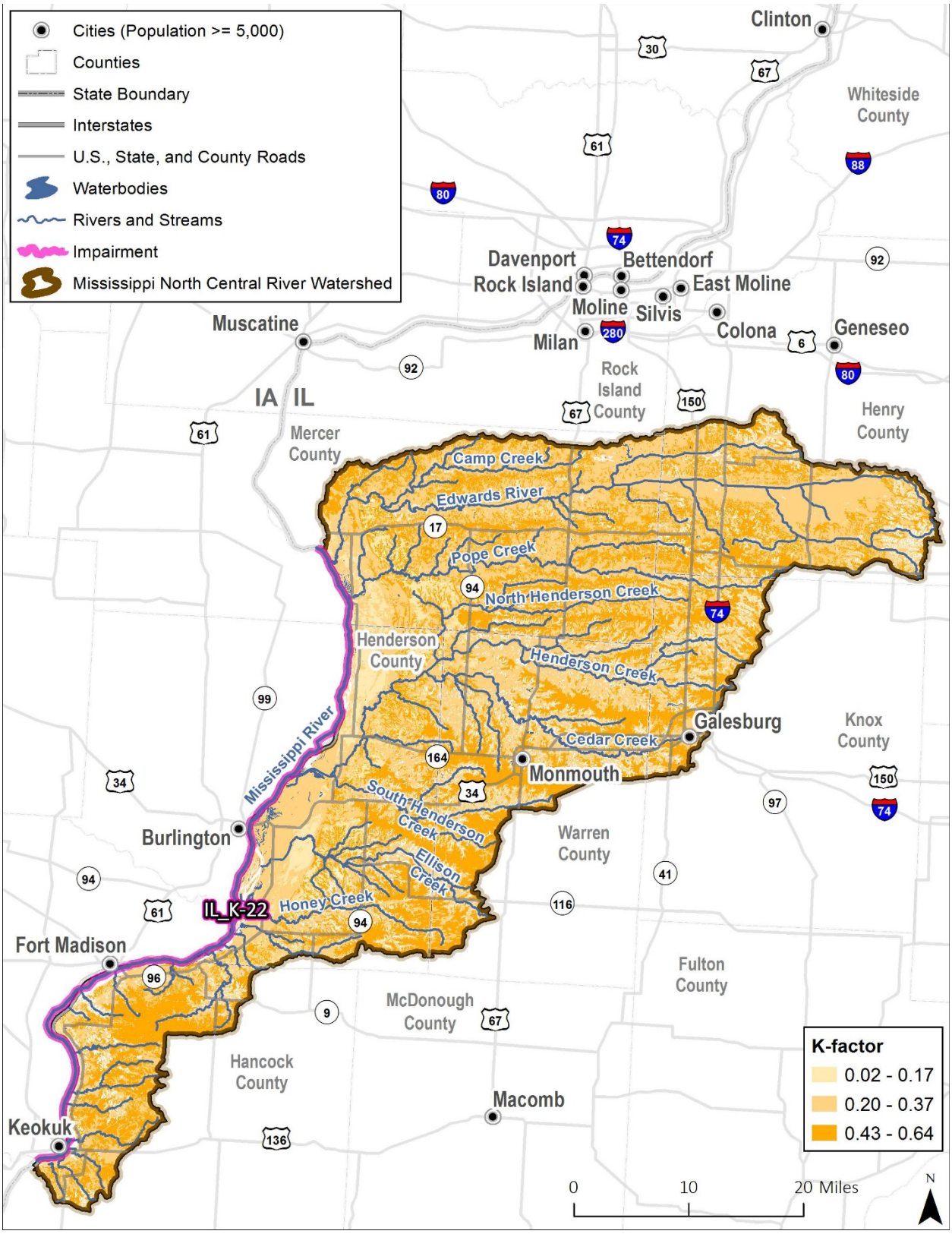

Figure 6. Mississippi North Central River watershed soil K-factor values.

2.6 Hydrology and Water Quality

2.6.1 USGS Flow Data

The U.S. Geological Survey (USGS) has monitored flow at several locations in the watershed (Table 5 and Figure 7). Two USGS gages are located on the mainstem of the Mississippi River at Clinton, Iowa and Keokuk, Illinois. Several other gages are located on tributaries to the Mississippi River in Illinois.

The daily average, peak history, and monthly flow data show the inherent variability associated with hydrology. Flow duration curves provide a way to address that variability and flow related water quality patterns. Duration curves describe the percentage of time during which specified flows are equaled or exceeded. Flow duration analysis looks at the cumulative frequency of historic flow data over a specified period, based on measurements taken at uniform intervals (e.g., daily average or 15-minute instantaneous). Duration analysis results in a curve that relates flow values to the percent of time those values have been met or exceeded. Low flows are exceeded a majority of the time, whereas floods are exceeded infrequently. Flow duration curves for the select USGS gages are presented in Figure 8 and Figure 9.

Table 5. USGS stream gages within watershed area

Gage ID	Watershed Area (mi.^{2})	Location	Period of Record
05420500	**85,600**	**Mississippi River at Clinton, IL[a]**	**1873-2015**
05466000	**155**	**Edwards River near Orion, IL**	**1940-2015**
05466500	**445**	**Edwards River near New Boston, IL**	**1934-2015**
05467000	**174**	**Pope Creek near Keithsburg, IL**	**1934-2015**
05467500	151	Henderson Creek near Little York, IL	1940-1958
05468500	132	Cedar Creek at Little York, IL	1940-1971
05469000	**432**	**Henderson Creek near Oquawka, IL**	**1934-2015**
05469500	83	South Henderson Creek at Biggsville, IL	1939-1971
05474500	**119,000**	**Mississippi River at Keokuk, IL**	**1878-2015**

BOLD – indicates active USGS gage

a. Nearest continuous flow record gauge upstream of watershed area on the Mississippi River

Figure 7. USGS stream gages within watershed.

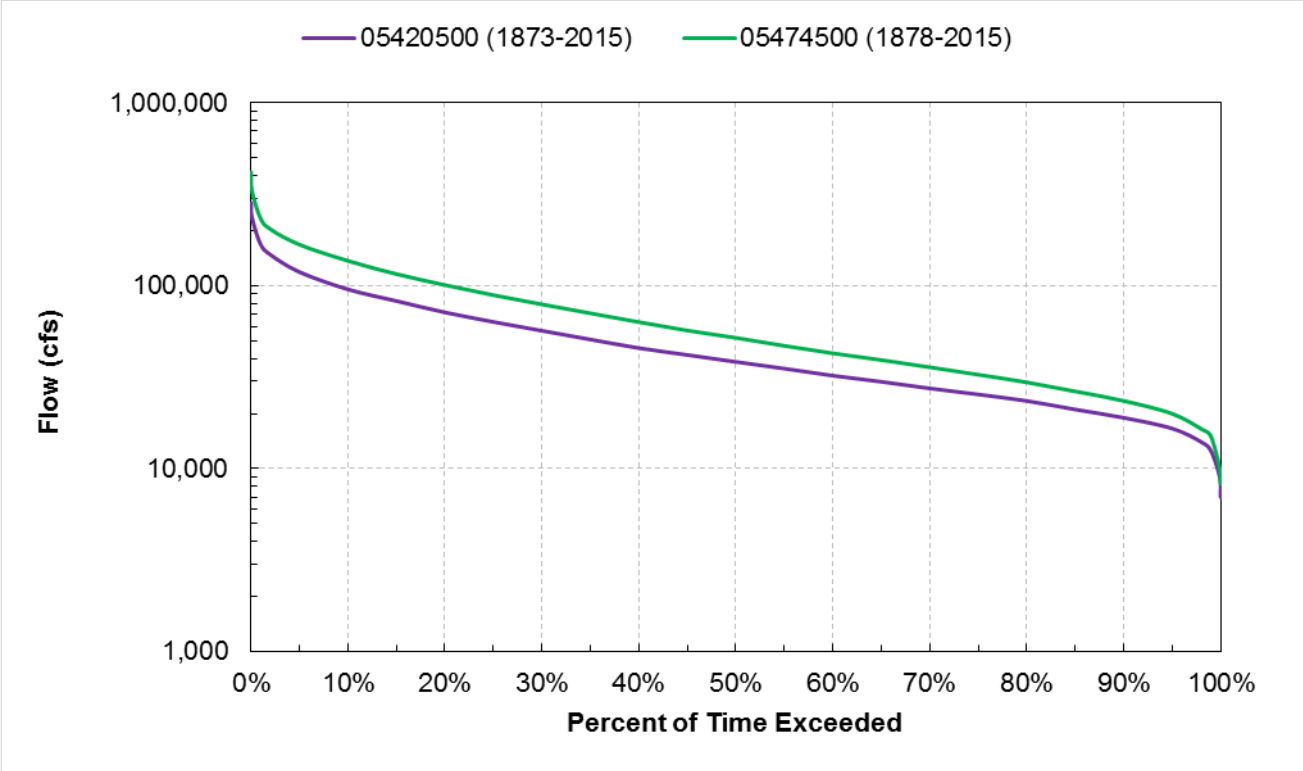

Figure 8. Flow duration curves for active USGS gages on the Mississippi River near the Mississippi North Central River watershed.

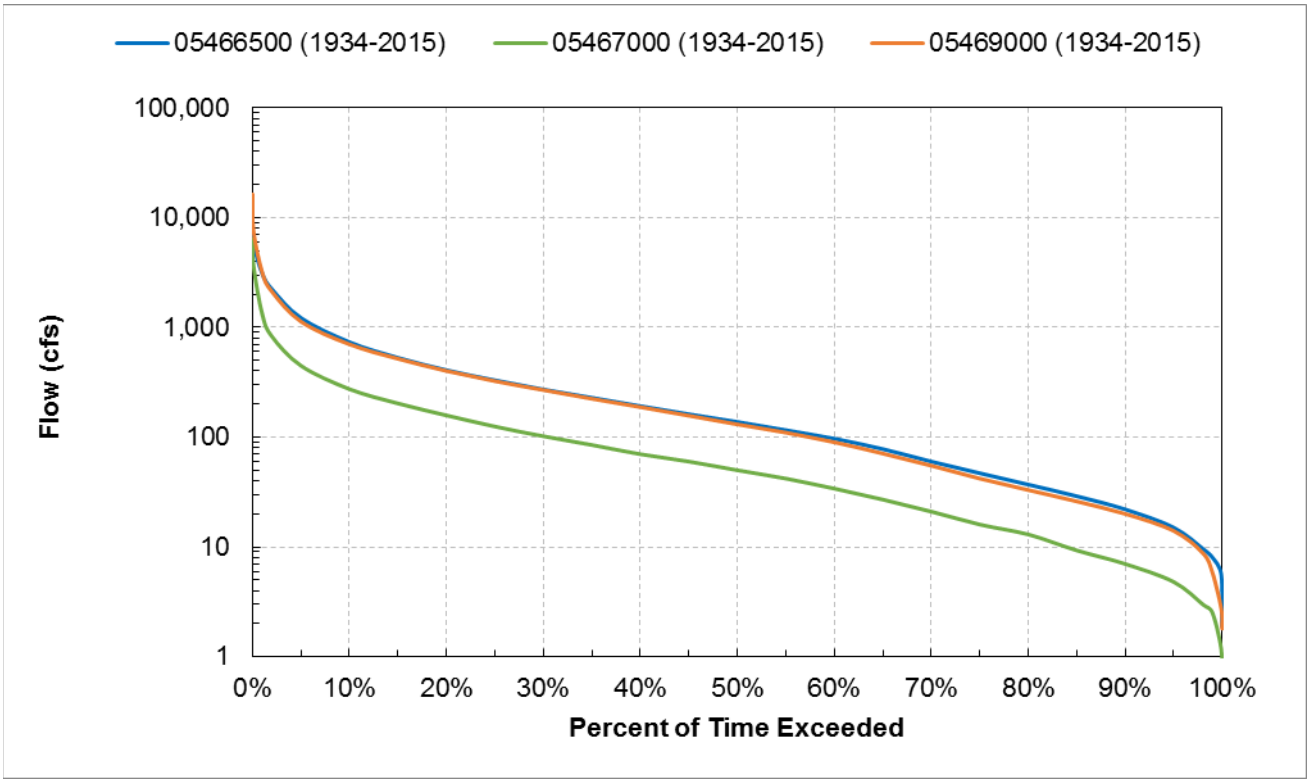

Figure 9. Flow duration curves for active USGS gages on major tributaries to the Mississippi River within the Mississippi North Central River watershed.

2.6.2 Illinois EPA Water Quality Monitoring

Routine water quality monitoring is a key part of the Illinois EPA assessment program. The goals of Illinois EPA surface water monitoring programs are to determine whether designated uses are supported, identify causes of pollution (toxics, nutrients, sedimentation) and sources (point or nonpoint) of surface water impairments, determine the overall effectiveness of pollution control programs, and identify long term resource quality trends. Illinois EPA has operated a widespread, active long-term monitoring network in Illinois since 1977, known as the Ambient Water Quality Monitoring Network (AWQMN). The AWQMN is utilized by the Illinois EPA to provide baseline water quality information, to characterize and define trends in the physical, chemical and biological conditions of the state's waters, to identify new or existing water quality problems, and to act as a triggering mechanism for special studies or other appropriate actions.

Additional uses of the data collected by the Illinois EPA through the AWQMN program include the review of existing water quality standards and establishment of water quality based effluent limits for National Pollutant Discharge Elimination System (NPDES) permits. The AWQMN is integrated with other Illinois EPA chemical and biological stream monitoring programs including Intensive River Basin Surveys, Facility –Related Stream Surveys, Fish Contaminant Monitoring, Toxicity Testing Program and Pesticide Monitoring Subnetwork which are more regionally based (specific watersheds or point source receiving stream) and cover a shorter span of time (e.g. one year) to evaluate compliance with water quality standards and determine designated use support. Information from this program is compiled by Illinois EPA into a biennial report required by the Federal Clean Water Act.

In the Mississippi River project area, atrazine data were collected by Illinois EPA as part of the AWQMN at one station on the impaired segment and in two tributaries to the impaired segment (Figure 10 and Table 6). Illinois EPA collected additional atrazine data in 2018 to confirm impairment. In addition the USGS has collected atrazine data at Clinton, Iowa, upstream of the impaired segment (Figure 7 and Table 6).

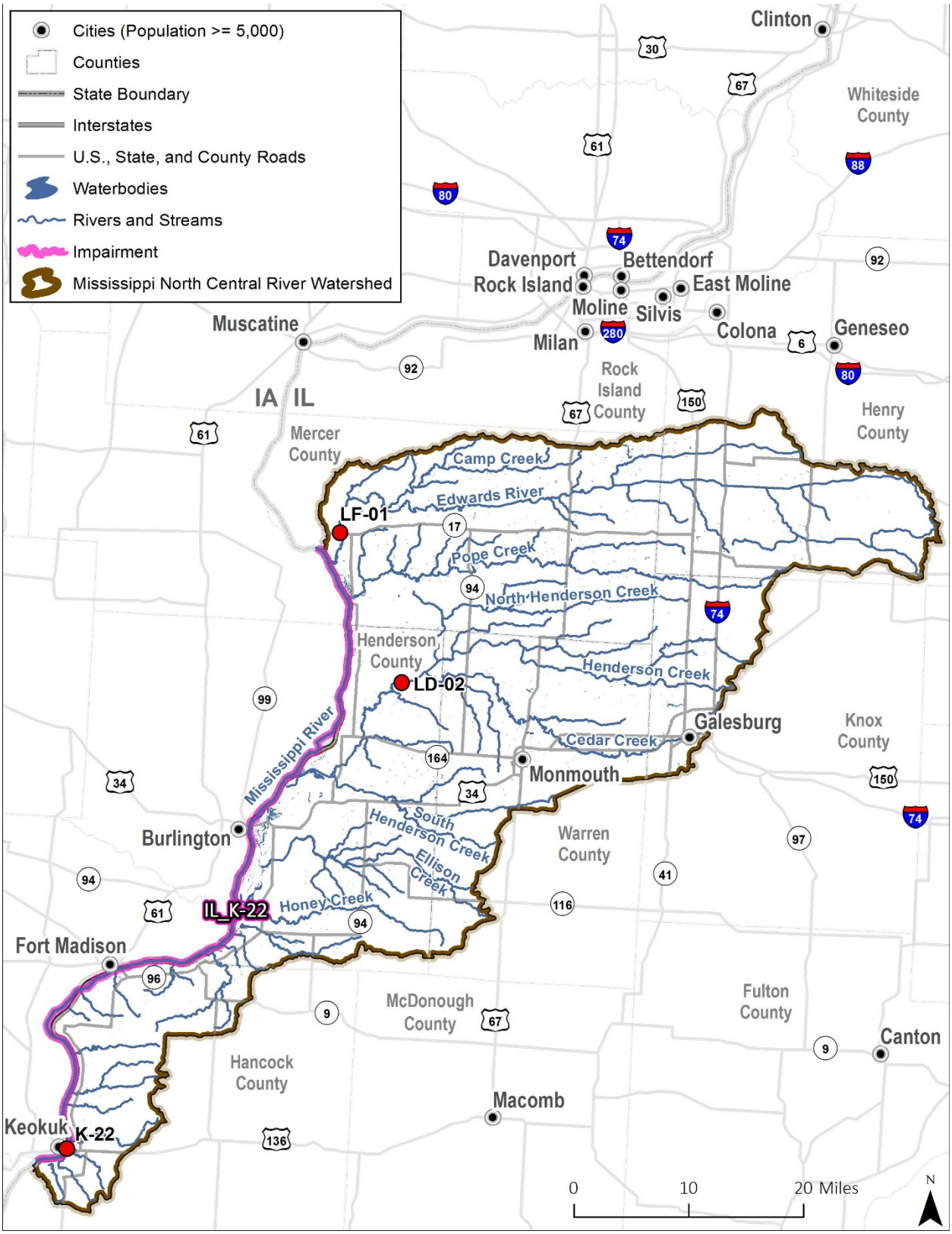

Figure 10. Illinois EPA water quality sampling sites within the watershed.

Table 6. Mississippi River watershed water quality data

AWQMN Sites	USGS Gage	Water Body	Location	Period of Record
--	05420500	Mississippi River	At Clinton, IA*	*1991-1993, 1996-2010*, 2011-2012
K-22	05474500		At Keokuk, IA	*1999-2001*, *2007-2010*, 2011-2013, 2018
Tributary sampling sites				
LF-01	--	Edwards River	RT 17 Br. 1.9 Mi. NE of New Boston	*1999, 2004*
LD-02	--	Henderson Creek	RT 94 Br. 1 Mi. S Bald Bluff	*1999, 2004*

*Data collection at Clinton, IA outside project watershed, but included here as potential reference point in determining upper watershed conditions.
Italics – samples collected outside the most recent three years of data collection used to determine impairment.

3. Watershed Source Assessment

Understanding potential sources of pollutant is an important component of protection plans. This section provides a summary of potential sources that contribute atrazine to the Mississippi North Central River watershed.

Atrazine is an herbicide that is commonly used in the U.S. to control broadleaf weeds. In the Mississippi North Central River watershed, atrazine is applied on most corn fields. In Illinois, the use of atrazine is common, being applied on 67 percent of corn crops in 2014 for a total of 8,622,000 lbs (USDA 2015). Atrazine is typically applied in the spring or summer and can be applied pre- or post-emergent. Transport mechanisms include overland runoff, discharge from drainage tiles and contaminated dust that is delivered to the waterway through wet and dry atmospheric deposition. Atrazine is also transported easily in water, in the dissolved phase.

The 2014 and 2016 impaired waters lists identify unknown sources as the cause of impairment.

3.1 Point Sources

Point source pollution is defined by the Federal Clean Water Act (CWA) §502(14) as:

> *"any discernible, confined and discrete conveyance, including any ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation [CAFO], or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agriculture storm water discharges and return flow from irrigated agriculture."*

Point sources can include facilities such as municipal wastewater treatment plants, industrial facilities, CAFOs, or regulated storm water including municipal separate storm sewer systems. Under the CWA, all point sources are regulated under the NPDES program. Atrazine is not found in point source discharges, therefore NPDES permitted facilities are not considered a source.

3.2 Nonpoint Sources

The term nonpoint source pollution is defined as any source that does not meet the legal definition of point sources. In the case of atrazine, all sources of atrazine are assumed to be nonpoint sources, resulting from application to cropland. It is possible that atrazine can be released from manufacturing, formulation, transport and disposal. In most cases, atrazine will be broken down in the soil over one growing season following application (HHS 2003). However, the overall breakdown and transmittal of atrazine after application is dependent on a variety of factors. The half-life of atrazine in soil ranges from 60 to 150 days, depending on the total oxygen and water content within soils. Soils with no oxygen (anaerobic) or varying oxygen with depth can greatly influence the breakdown of atrazine with a potential half-life increase to several years. Further, atrazine readily dissolves in water and weakly bonds to soil particles resulting in transmittal in environments with high runoff potential or persistence and transport to groundwater within soils with high water content (USDA 1994). Atrazine in water degrades much slower.

The Mississippi North Central River watershed is 68 percent cultivated crops; 40 percent in corn and 28 percent in soybeans in 2013 based on the Cropland Data Layer (USDA 2013). Atrazine application on these cultivated areas contributes loading by runoff and through infiltration into shallow groundwater or drain tiles. Therefore, the location and quantity of atrazine applied to the landscape can greatly affect the resulting concentrations within nearby waterbodies.

The USGS, as part of the Pesticide National Synthesis Project established in 1992, has developed county-level application estimates nationally for a large variety of pesticides. Annual agricultural pesticide use is estimated through a combination of pesticide use data collected during proprietary surveys of farm operations within crop reporting districts and annual harvested-crop acreages reported by the U.S. Department of Agriculture National Agricultural Statistics Service (NASS). County-level application estimates are available from the USGS in map and tabular form for 1992-2014 (NAWQA 2014). Atrazine application estimates for counties within the Mississippi North Central River watershed are presented within Table 7 and Figure 11.

Table 7. Total atrazine application by county, Mississippi River K-22 (NAWQA 2014)

County	Year	Total Application (tons/yr)	Average (2008-2014) (tons/yr)
Hancock	2008	71	83
	2009	85	
	2010	92	
	2011	78	
	2012	82	
	2013*	90	
	2014*	84	
Henderson	2008	40	47
	2009	50	
	2010	53	
	2011	47	
	2012	43	
	2013*	50	
	2014*	47	
Henry	2008	73	91
	2009	73	
	2010	106	
	2011	103	
	2012	113	
	2013*	87	
	2014*	80	
Knox	2008	74	83
	2009	85	
	2010	95	
	2011	80	
	2012	83	
	2013*	85	
	2014*	76	
Mercer	2008	44	52
	2009	45	
	2010	60	
	2011	61	
	2012	52	
	2013*	52	
	2014*	48	
Warren	2008	72	82
	2009	83	
	2010	90	
	2011	78	
	2012	97	
	2013*	82	
	2014*	74	

*Preliminary estimates

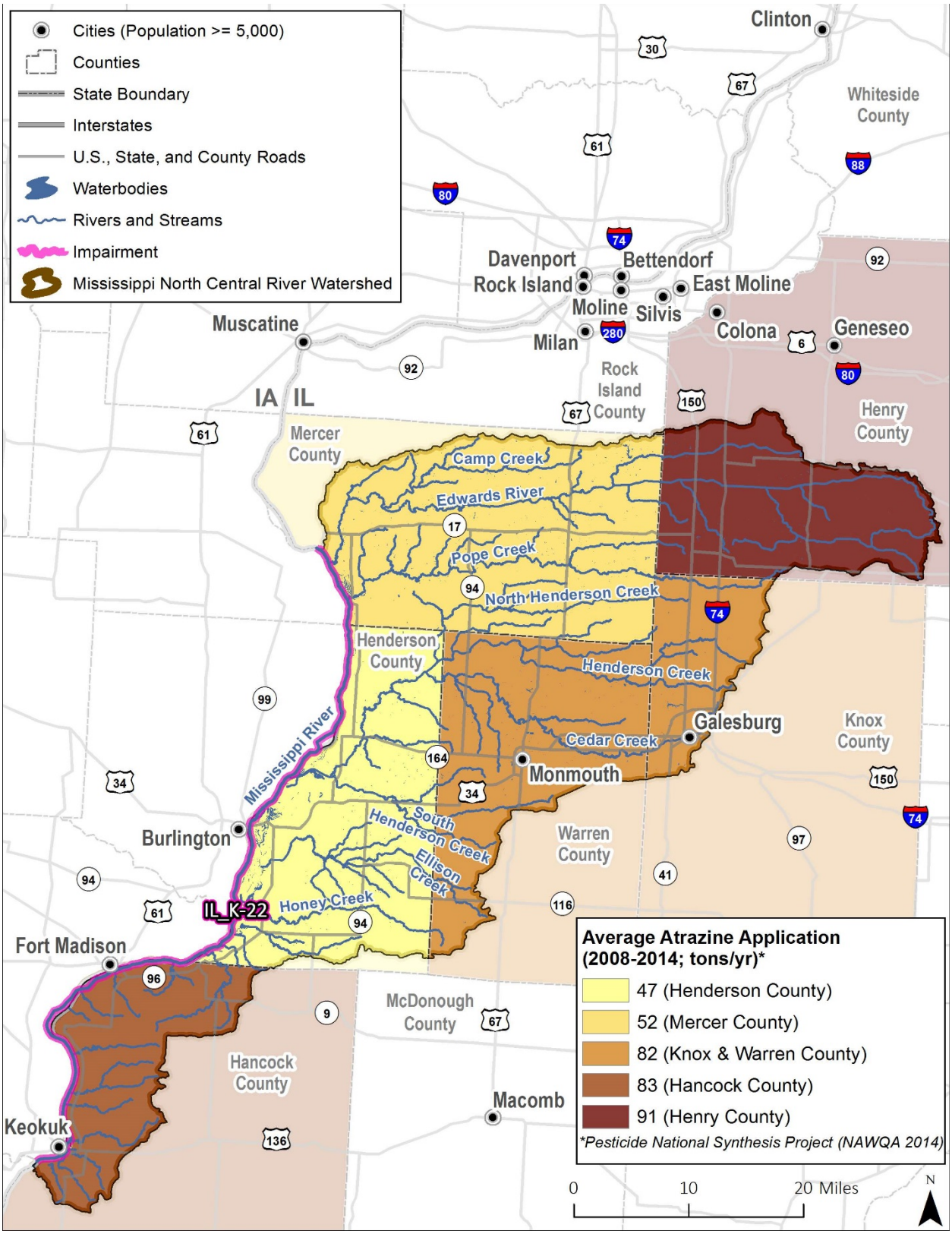

Figure 11. Average atrazine application by county, Mississippi River K-22.

4. Water Quality Standards

Water quality standards (WQS) are designed to protect beneficial uses. The authority to designate beneficial uses and adopt WQS is granted through Title 35 of the Illinois Administrative Code. Designated uses to be protected in surface waters of the state are defined under Section 303, and applicable WQS are designated under Section 302 (Water Quality Standards) and Section 611 (Primary Drinking Water Quality Standards). Designated uses and WQS are discussed below.

4.1 Designated Uses

Illinois EPA uses rules and regulations adopted by the Illinois Pollution Control Board (IPCB) to assess the designated use support for Illinois waterbodies. The following are the use support designations provided by the IPCB that apply to water bodies in the Mississippi North Central River watershed:

General Use Standards – These standards protect for:

- Aquatic life
- Wildlife
- Agricultural uses
- Primary contact where physical configuration of the waterbody permits it, any recreational or other water use in which there is prolonged and intimate contact with the water involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard, such as swimming and water skiing
- Secondary contact that is any recreational or other water use in which contact with the water is either incidental or accidental and in which the probability of ingesting appreciable quantities of water is minimal, such as fishing, commercial and recreational boating, and any limited contact incident to shoreline activity
- Most industrial uses

These standards are also designed to ensure the aesthetic quality of the state's aquatic environment.

Public and food processing water supply standards – These standards are cumulative with the general use standards and apply to waters of the state at any point at which water is withdrawn for treatment and distribution as a potable supply to the public or for food processing.

4.2 Assessment Guidelines

Attainment of public and food processing water supply use is assessed only in waters in which the use is currently occurring, as evidenced by the presence of an active public-water supply intake. The assessment of public and food processing water supply use is based on conditions in both untreated and treated water. By incorporating data through programs related to both the federal Clean Water Act and the federal Safe Drinking Water Act, Illinois EPA believes that these guidelines provide a comprehensive assessment of public and food processing water supply use. Assessments of public and food processing water supply use recognize that characteristics and concentrations of substances in Illinois surface waters can vary and that a single assessment guideline may not protect sufficiently in all situations. Using multiple assessment guidelines helps improve the reliability of these assessments. When applying these assessment guidelines, Illinois EPA also considers the water-quality substance, the level of treatment available for that substance, and the monitoring frequency of that substance in the untreated water. Table 8 includes the assessment guidelines for waters with public and food processing water supply designated uses.

Table 8. Guidelines for assessing public water supply in waters of the State (IEPA 2014 and 2016)

Degree of Use Support	Guidelines
Fully Supporting (Good)	For each substance in untreated water[a], for the most-recent three years of readily available data or equivalent dataset, a) < 10% of observations exceed an applicable Public and Food Processing Water Supply Standard[b]; and b) for which the concentration is not readily reducible by conventional treatment, i) no observation exceeds by at least fourfold the treated-water Maximum Contaminant Level threshold concentration[c] for that substance; and ii) no quarterly average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[c] for that substance; and iii) no running annual average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[d] for that substance; and[d] For each substance in treated water, no violation of an applicable Maximum Contaminant Level[c] occurs during the most recent three years of readily available data.
Not Supporting (Fair)	For any single substance in untreated water[a], for the most-recent three years of readily available data or equivalent dataset, a) > 10% of observations exceed a Public and Food Processing Water Supply Standard[b];or b) for which the concentration is not readily reducible by conventional treatment, i) at least one observation exceeds by at least fourfold the treated-water Maximum Contaminant Level threshold concentration[c] for that substance; or ii) the quarterly average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[c] for that substance; or iii) the running annual average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[c] for that substance. or, For any single substance in treated water, at least one violation of an applicable Maximum Contaminant Level[3] occurs during the most recent three years of readily available data.
Not Supporting (Poor)	Closure to use as a drinking-water resource (cannot be treated to allow for use).

a. Includes only the untreated-water results that were available in the primary computer database at the time data were compiled for these assessments
b. 35 I11. Adm. Code 302.304, 302.306 (https://pcb.illinois.gov/documents/dsweb/Get/Document-33354/)
c. 35 I11. Adm. Code 611.300, 611.301, 611.310, 611.311, 611.325.
d. Some waters were assessed as Fully Supporting based on treated-water data only.

One of the assessment guidelines for untreated water relies on a frequency-of-exceedance threshold (10 percent) because this threshold represents the true risk of impairment better than does a single exceedance of a water quality criterion. Assessment guidelines also recognize situations in which water treatment that consists only of "*...coagulation, sedimentation, filtration, storage and chlorination, or other equivalent treatment processes*" (35 Ill. Adm. Code 302.303; hereafter called "conventional treatment") may be insufficient for reducing potentially harmful levels of some substances. To determine if a Maximum Contaminant Level (MCL) violation in treated water would likely occur if treatment additional to conventional treatment were not applied (see 35 Ill. Adm. Code 302.305), the concentration of the potentially harmful substance in untreated water is examined and compared to the MCL threshold concentration. If the concentration in untreated water exceeds an MCL-related threshold concentration, then an MCL violation could reasonably be expected in the absence of additional treatment.

Compliance with an MCL for treated water is based on a running 4-quarter (i.e., annual) average, calculated quarterly, of samples collected at least once per quarter (Jan.-Mar., Apr.-Jun., Jul.-Sep., and

Oct.-Dec.). However, for some untreated-water intake locations sampling occurs less frequently than once per quarter; therefore, statistics comparable to quarterly averages or running 4-quarter averages cannot be determined for untreated water. Rather, for substances not known to vary regularly in concentration in Illinois surface waters (untreated) throughout the year, a simple arithmetic average concentration of all available results is used to compare to the MCL threshold. For substances known to vary regularly in concentration in surface waters during a typical year (e.g., atrazine), average concentrations within the relevant sub-annual (e.g., quarterly) periods are used.

4.3 Water Quality Endpoint

Environmental regulations for the State of Illinois are contained within the Illinois Administrative Code, Title 35. Specifically, Title 35, Part 611, Subpart F contains MCLs for various contaminants. The endpoint for atrazine will be the MCL for drinking water protection, 3.0 µg/L.

5. Data Analysis

This section provides a brief review of available water quality information. All relevant available data are presented below; however, data that are greater than 3 years old are not used when evaluating impairment status. Each data point was reviewed to ensure the use of quality data in the analysis below.

Table 9 and Figure 12 provide a summary of the atrazine data for monitoring site K-22 at the downstream end of the impaired segment. There were minimal quarterly data available at K-22, and the average of collected data was below the 3 µg/L drinking water protection MCL. However, one sample and quarterly average during the assessment period (2008–2010) and one sample and quarterly average during the last three years of data collection (2011–2013) were above the MCL. Monitoring stations along tributaries to the impaired segment show a similar trend with the average below the MCL, although one exceedance was observed within older data at LF-01 along Edwards River.

Additional data were collected on segment (IL K-22) of the Mississippi River in response to comments received on the Stage 1 document. As part of the Stage 2 effort, Illinois EPA collected additional atrazine data during spring 2018 at monitoring site K-22 to confirm impairment during critical conditions. The spring months were chosen for additional monitoring based on the highest concentrations historically found during May, following spring application. All samples collected were below the drinking water protection MCL (Table 10 and Figure 13). These data do not indicate impairment, and the segment is recommended to be delisted for Public and Food Processing Water Supplies use.

Table 9. Atrazine data summary (pre-2018)
Italics – samples not used to determine impairment (greater than 3 years old).
Red values indicate samples above the MCL

Sample Site	Date	Result (µg/L)	Quarterly Average (µg/L)
Mississippi River			
K-22	*1/18/2007*	*0.13*	*0.13*
	3/19/2007	*0.13*	
	5/9/2007	*1.5*	*1.5*
	8/14/2007	*0.13*	*0.27*
	9/24/2007	*0.4*	
	5/7/2008	*0.061*	*0.061*
	7/9/2008	*0.77*	*0.36*
	8/25/2008	*0.16*	
	9/24/2008	*0.14*	
	11/13/2008	*0.16*	*0.16*
	5/28/2009	*6.4*	*6.4*
	7/22/2009	*0.18*	*0.12*
	8/27/2009	*0.067*	
	2/24/2010	*0.049*	*0.049*
	11/15/2010	0.02	0.0195
	3/23/2011	0.061	0.061
	5/19/2011	1.9	1.9
	9/15/2011	0.044	0.044
	12/1/2011	0.06	0.06
	3/7/2012	0.04	0.04
	5/29/2012	0.16	0.16
	9/25/2012	0.057	0.057
	12/4/2012	0.02	0.0195
	3/14/2013	0.044	0.044
	5/28/2013	8.3	8.3
	9/18/2013	0.078	0.078
	12/10/2013	0.096	0.096
Tributaries			
LF-01 (Edwards River)	*4/27/1999*	*1.3*	*6.2*
	6/8/1999	*11*	
	7/13/1999	*0.58*	*0.45*
	9/1/1999	*0.31*	
	4/7/2004	*0.017*	*0.20*
	6/30/2004	*0.38*	
	8/23/2004	*0.15*	*0.15*

Sample Site	Date	Result (µg/L)	Quarterly Average (µg/L)
Tributaries			
LD-02 (Henderson Creek)	*4/27/1999*	*0.41*	*1.5*
	6/8/1999	*2.6*	
	9/1/1999	*0.27*	*0.27*
	4/7/2004	*0.017*	*0.073*
	6/30/2004	*0.13*	
	8/23/2004	*0.017*	*0.017*

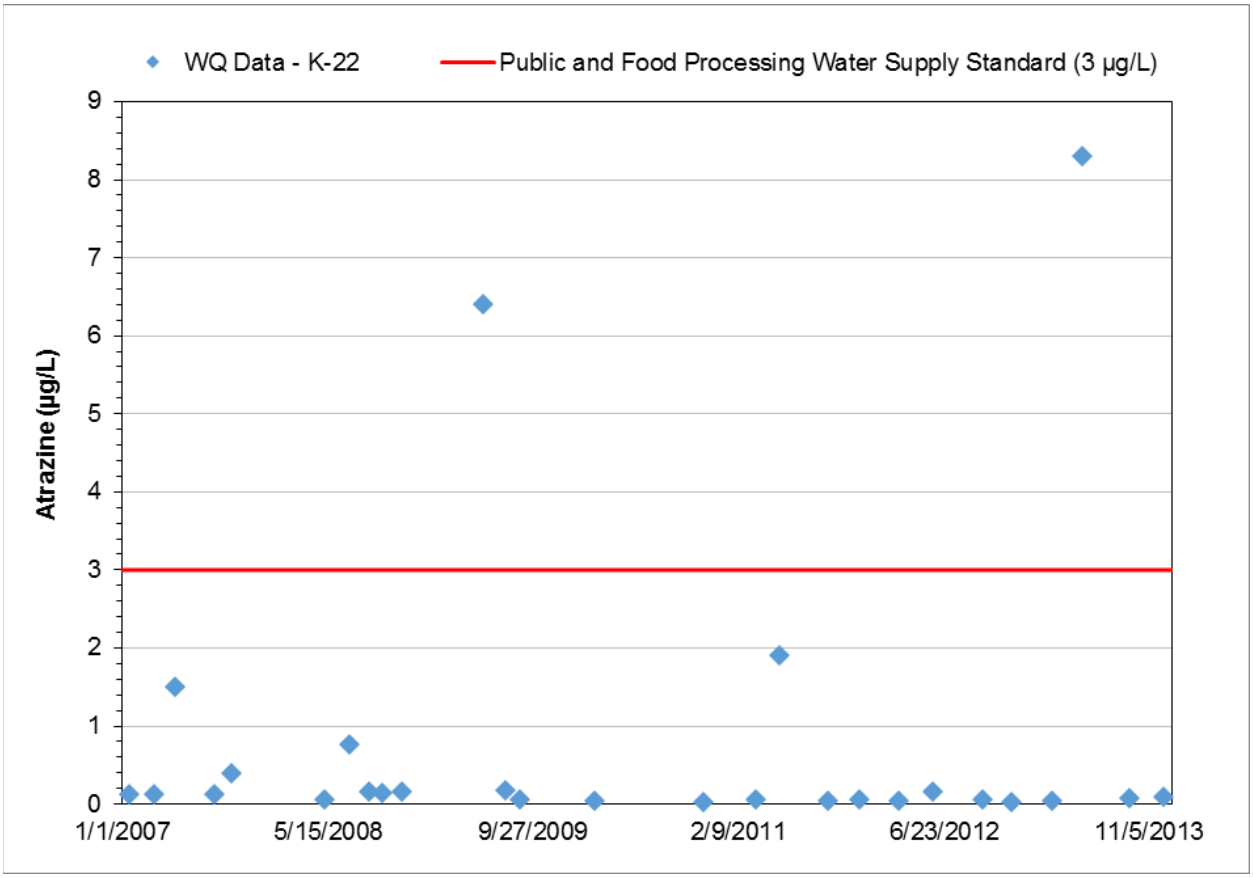

Figure 12. Atrazine water quality time series, Mississippi River K-22 (pre-2018).

Table 10. Summary of atrazine sampling completed by IEPA spring 2018

Sample Site	Date	Result (µg/L)	Quarterly Average (µg/L)
Atrazine			
K-22	3/6/2018	0.081	0.081
	4/23/2018	0.1	0.52
	5/8/2018	0.94	
	5/22/2018	0.47	
	6/6/2018	0.57	

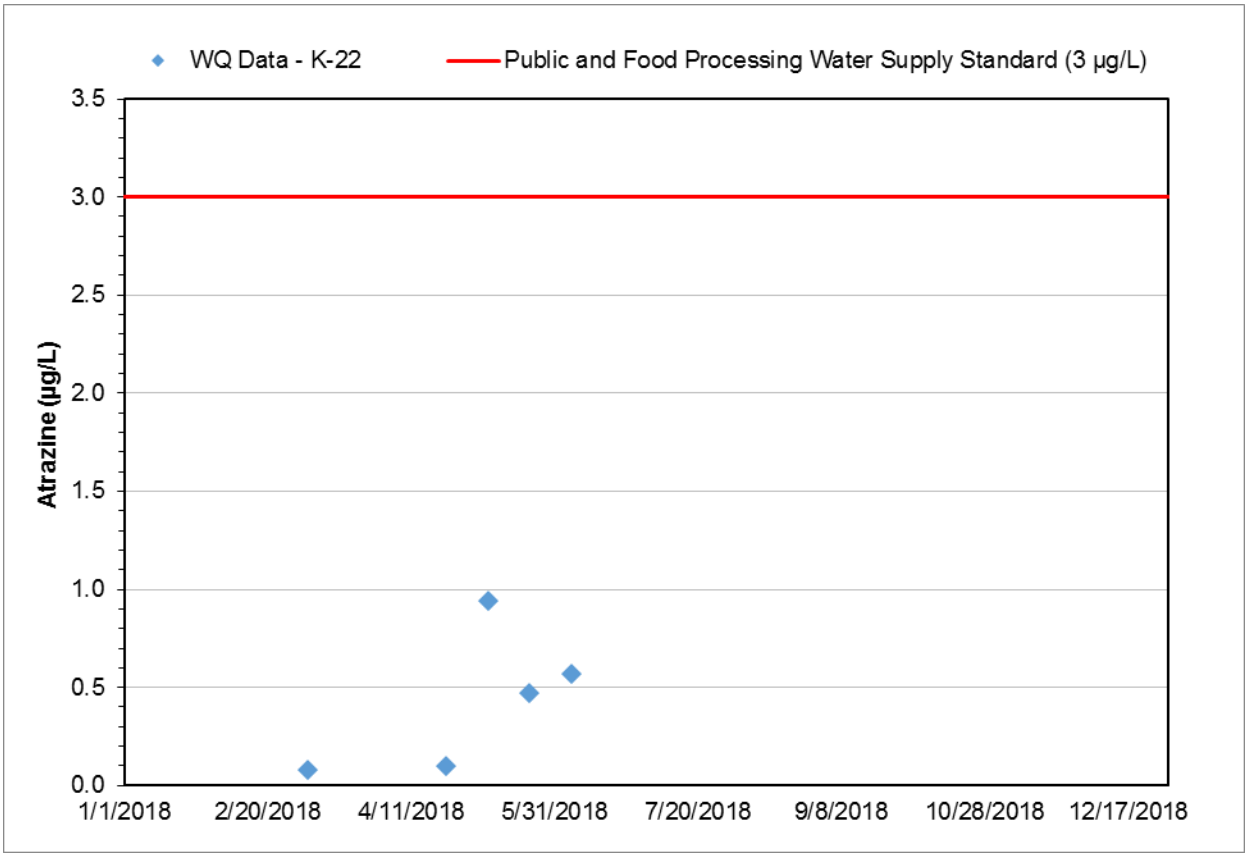

Figure 13. Atrazine water quality time series of sampling completed by IEPA in spring 2018.

6. Protection Plan

The data summaries provided in Section 5 indicate that the Mississippi River at K-22 is no longer impaired for atrazine and therefore a TMDL was not developed. A protection plan was instead developed to guide implementation of recommended practices to protect the watershed from increases in atrazine levels. Not only will these activities help to maintain atrazine levels below water quality standards, these activities will also result in a cleaner, healthier watershed for the people who depend on the resources for their livelihood now and in the future.

Illinois's Mississippi River segment K-22 is affected by activities occurring within portions of Minnesota, South Dakota, Wisconsin and Iowa in addition to Illinois (Figure 1). Water quality in this segment is also, therefore, reliant on agricultural activities and best management practices within these other states. This protection plan focused on the watershed in Illinois (Figure 2), however coordination with upstream states and stakeholders is necessary to ensure the River continues to meet water quality standards for atrazine.

6.1 Recommended Management Practices

To maintain acceptable levels of atrazine in the Mississippi River in the future, a series of practices should be followed. Since atrazine is highly soluble in water, maintaining and/or reducing current levels in the Mississippi River will largely depend on source control, application, handling, and disposal practices, outlined below. Continued education and training is also important to maintaining good practices.

6.1.1 Application (Timing, Rates, and Restrictions)

Researchers at Kansas State have found that 90 percent of atrazine losses occur in the dissolved form during runoff events (Kansas State University, 2007; University of Nebraska, 1996). According to US Code of Federal Regulations Title 40 Section 156.10, it is a violation of federal law to use atrazine in a manner inconsistent with its labeling. In addition to following labeling instructions, several other practices are recommended for the application of atrazine to further protect water resources and improve pesticide effectiveness.

- The 2008 Illinois Agricultural Pest Management Handbook (University of Illinois Extension 2008) recommends:
    - Application between 0.5 to 2.0 lb active ingredient (a.i) atrazine/acre
    - Application to soils with pH less than 7.2 in order to reduce risk of carry over (persistence in the soil longer than anticipated)
    - Post application that includes crop oil concentrate (COC)
    - Broadcast application of atrazine prior to corn maximum height of 12 inches.

- The Minnesota Department of Agriculture developed a list of voluntary water quality best management practices for atrazine (2011) and all agricultural herbicide (2018) application, they include:
    - Evaluate surface drainage patterns on your field to identify points where surface runoff leaves the field. Consider protective practices such as filter strips and buffer zones in the vulnerable areas including tile drains and stream shorelines.
    - Implement conservation tillage practices to control soil erosion that can contribute to losses of atrazine attached to soil particles
    - Limit the total use of atrazine with split or sequential application and by rotating atrazine with herbicides from different chemical classes

- Kansas State University (2007) recommends the following practices for atrazine application:
  - Incorporate atrazine into the top two inches of soil
  - Apply between November 1 and April 15 when rainfall events are less frequent and intense
  - Consider post emergence application as they require 60 to 70% less product than application to soil in addition to being more successful for weed control
  - Apply one-half to two-thirds of the application prior to April 15 and the remainder before or immediately following planting
  - Used integrated pest management strategies by employing variable rate herbicide applications, crop rotation, pre-plant tillage, cover crops, row cultivation, hybrid selection, planting techniques, etc.
  - Use band application of atrazine with ridge till cultivation
  - Use proper mixing, application, and disposal practices per product label and regulations

Atrazine is a restricted use pesticide with ground water contamination and worker exposure criteria. Application requires proper record keeping and an applicator licensing. Working with crop consultants, agricultural professionals, the University of Illinois Extension and other pesticide application experts is also recommended.

6.1.2 Storage and Disposal of Atrazine

Proper storage of pesticides, including atrazine is regulated through Title 8 Illinois Administration Code 255 (https://www2.illinois.gov/sites/agr/Environment/Agrichemicals/Documents/8iac255.pdf). Section 255.10 of the administration code defines an agrichemical facility as:

> …a site used for commercial purposes, where bulk pesticides are stored in a single container in excess of 300 gallons of liquid pesticide or 300 pounds of dry pesticide for more than 30 days per year or where more than 300 gallons of liquid pesticide or 300 pounds of dry pesticide are being mixed, repackaged or transferred from one container to another within a 30-day period or a site where bulk fertilizers are stored, mixed, repackaged or transferred from one container to another.

Administrative Code 255 lists requirements for agrichemical facilities that include requirements on: registration, permits, compliance schedules, containment, storage, reporting, inspection, and maintenance. Continued compliance will help to maintain and/or reduce future atrazine levels in the watershed.

Proper disposal practices also help to protect water resources from potential detrimental impacts of atrazine. The Illinois Department of Agriculture in cooperation with the Illinois Department of Public Health hold annual Pesticide Clean Sweep Program collection days, funded through USEPA funds. The program responsibly collects waste pesticides in addition to crop oil, surfactants, stickers, and foaming agents. More information can be found here: https://www2.illinois.gov/sites/agr/Pesticides/Pages/Pesticide-Clean-Sweep-Program.aspx.

Recommended disposal practices include:

- Triple rinse or pressure rinse containers and pour the rinse water into the spay tank
- Follow disposal recommendations on labels exactly
- Do not drain rinse water from equipment near or into water sources (ditches, ponds, streams, etc.)

6.1.3 Training and Communication

Training programs for pesticide applicators and effective communication channels between applicators, farmers, and neighboring areas can help support successful implementation of the protection plan. Examples in the watershed include:

Pesticide Safety Education Program: The University of Illinois Extension trains and certifies commercial and private pesticide applicators on behalf of the Illinois EPA through the Pesticide Safety Education Program. The program works to ensure the health and safety of humans and the environment in accordance to state and federal law. This program is run throughout the state of Illinois. More information is available here: https://web.extension.illinois.edu/psep/

Drift Watch: Drift Watch is a free, online and voluntary mapping program that helps to establish communication between pesticide applicators, specialty crop producers, and beekeepers to work together to protect specialty crops in the Midwest. It promotes both the freedom to operate and growing good neighbors in the pesticide industry. It was developed out of Purdue University and is maintained by non-profit Field Watch. More information is available here: https://il.driftwatch.org/

6.2 Critical Areas for Implementation

Critical areas represent those areas where there is the greatest potential for atrazine to negatively impact water quality. These areas include those on which atrazine is most typically applied, areas with less than ideal soil properties for effective use of the pesticide, and areas that are highly connected to water resources.

In the Mississippi North Central River watershed, atrazine is applied on most corn fields. In Illinois, the use of atrazine is common, being applied on 67 percent of corn crops in 2014 for a total of 8,622,000 lbs (USDA 2015). As such, corn producers and corn fields should be a focus of implementation.

According to the Agricultural Pest Management Handbook (University of Illinois Extension 2008), atrazine degradation and uptake is particularly affected by soil pH. In soils with high pH, atrazine is often less readily broken down and remains in the soil solution for longer period of times, creating a longer opportunity for the chemical to be washed away via surface runoff or tile drainage. While it is not typically recommended that atrazine be applied to soils with a pH greater than 7.2, these areas present a greater risk of atrazine runoff into water ways and should be a focus for implementation.

In addition, due to the highly soluble nature of atrazine in water, fields that are heavily tiled, and or highly connected to shallow groundwater sources should be a focus of implementation. Atrazine has a groundwater advisory for application on sandy soils and application requires additional precautions.

6.3 Monitoring

The ultimate measure of success of the protection plan will be documented maintained or improved water quality over time. Monitoring will help determine whether the recommended practices have maintained water quality levels or if further action is needed.

Atrazine levels will be determined through ambient monitoring by Illinois EPA (e.g., AWQMN). The state conducts routine water quality monitoring (see section 2.6.2) by evaluating watersheds on a rotating basis, collecting measurements of physical, chemical, and biological parameters (see Figure 10). This ambient monitoring program will continue throughout implementation of the protection plan. In addition

to the ambient monitoring program conducted by Illinois EPA, monitoring is conducted by the U.S. Geological Survey (see section 2.6.1).

Within the Mississippi North Central River watershed, additional monitoring is recommended along the tributaries to the Mississippi River: Edwards River (LF-01) and Henderson Creek (LD-02). Characterizing these tributaries will allow Illinois to better understand Illinois's contribution to atrazine levels in the Mississippi River. For all future monitoring, a focus on the second quarter of the year (April, May, and June) is needed to ensure that critical conditions are being monitored (i.e., spring).

6.4 Adaptive Management

Adaptive management is a commonly used strategy to address natural resource management that involves a temporal sequence of decisions (or implementation actions), in which the best action at each decision point depends on the state of the managed system. As a structured iterative implementation process, adaptive management offers the flexibility for responsible parties to monitor implementation actions, determine the success of such actions and ultimately, base management decisions upon the measured results of completed implementation actions and the current state of the system. This process, depicted in Figure 14, enhances the understanding and estimation of predicted outcomes and ensures refinement of necessary activities to better guarantee desirable results. In this way, understanding of the resource can be enhanced over time, and management can be improved.

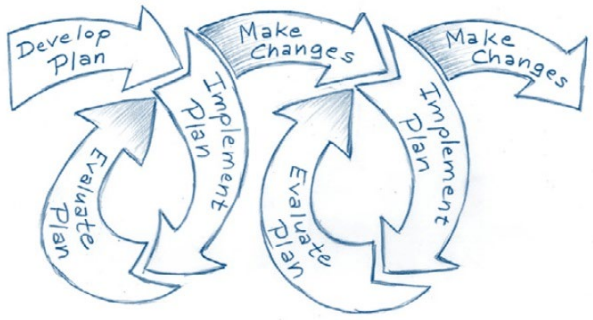

Figure 14. Adaptive management iterative process (U.S. EPA 2008).

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Appendix A – Stage 1 Comments

November 23, 2016

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Subject: Comments on Draft Stage 1 Report for the Mississippi River Watershed Total Maximum Daily Load and Load Reduction Strategies dated August 2016.

Mr. Haile:

Syngenta Crop Protection would like to thank the Illinois Environmental Protection Agency (IEPA) for the opportunity to provide comments on the draft Stage 1 Report for the Mississippi River Watershed Total Maximum Daily Load and Load Reduction Strategies (draft TMDL). The Stage 1 draft TMDL characterizes the watershed, verifies impairment(s), evaluates spatial and temporal water quality variation, identifies sources of impairment, describes TMDL development approaches, and determines if sufficient water quality data have been collected for omitting the Stage 2 TMDL development process.

Syngenta's comments focus on the affirmative determination of data adequacy, Illinois EPA SDWA monitoring frequency of CWS drawing from the Mississippi River that are in the watershed, and the Illinois water quality guidelines as they pertain to the Mississippi River.

Seasonal water quality guidelines should not be used to determine impairment since twelve consecutive quarters of monitoring at site K-22 show the maximum 4-quarter running average for atrazine is 2.11 ppb. This concentration is below the finished drinking water atrazine MCL (maximum contaminant level). Waterbody segment K-22 should not be listed as an atrazine impaired water based on monitoring at the K-22 station as well as at other monitoring locations not included in the TMDL assessment.

Monitoring of Atrazine in the Mississippi River from Clinton, IA to below Grafton, IL from 2007 to 2016.

The draft TMDL includes two monitoring stations on the Mississippi River that have atrazine data (USGS-NAWQA_05420500 at Clinton IA and IEPA K-22 at Keokuk, IA). Only atrazine monitoring data from IEPA K-22 were reported. USGS and IEPA have four additional monitoring stations immediately downstream of Keokuk, IA. There are three Illinois Community Water Supplies in the K-22 watershed drawing from

the Mississippi River which have monitored for atrazine. There are four Iowa Community Water Supplies across the Mississippi River or near the K-22 watershed drawing from the Mississippi River which have monitored for atrazine. The Stage 1 draft TMDL should include the atrazine monitoring results from the additional five river monitoring stations and the seven Community Water Supplies (Table 1 and Attachments 1 and 2). These data should be used to determine sufficiency of available water quality data for a Stage 2 report/investigation in the K-22 watershed.

Table 1. Monitoring at Thirteen Mississippi River Monitoring Sites from Clinton, IA to Grafton IL from 2007 to 2016

Mississippi River Monitoring Station	Agency Monitoring	Samples (n)	Samples >3 ppb	Samples > 3.49 ppb	Maximum Atrazine (ppb)	Percent >3 ppb	Percent >3.49 ppb
Clinton	USGS	45	0	0	0.2	0	0
Davenport	IEPA (M-02)	26	0	0	0.4	0	0
Davenport, IA	Davenport CWS	18	0	0	0.5	0	0
Burlington, IA	Burlington CWS	3	0	0	0	0	0
Fort Madison, IA	Fort Madison CWS	2	0	0	0.2	0	0
Nauvoo	Nauvoo CWS	30	0	0	1.4	0	0
Hamilton	Hamilton CWS	13	0	0	0.0	0	0
Keokuk	IEPA (K-22)	27	2	2	8.3	7	7
Keokuk, IA	Keokuk CWS	8	0	0	0.9	0	0
Warsaw	Warsaw CWS	24	0	0	1.0	0	0
Thebes	USGS	31	1	0	3.0	3	0
Alton	IEPA (J-98)	28	2	1	4.4	7	4
Below Grafton	USGS	33	1	0	3.3	3	0
TOTALS		288	6	3	8.3	2	1

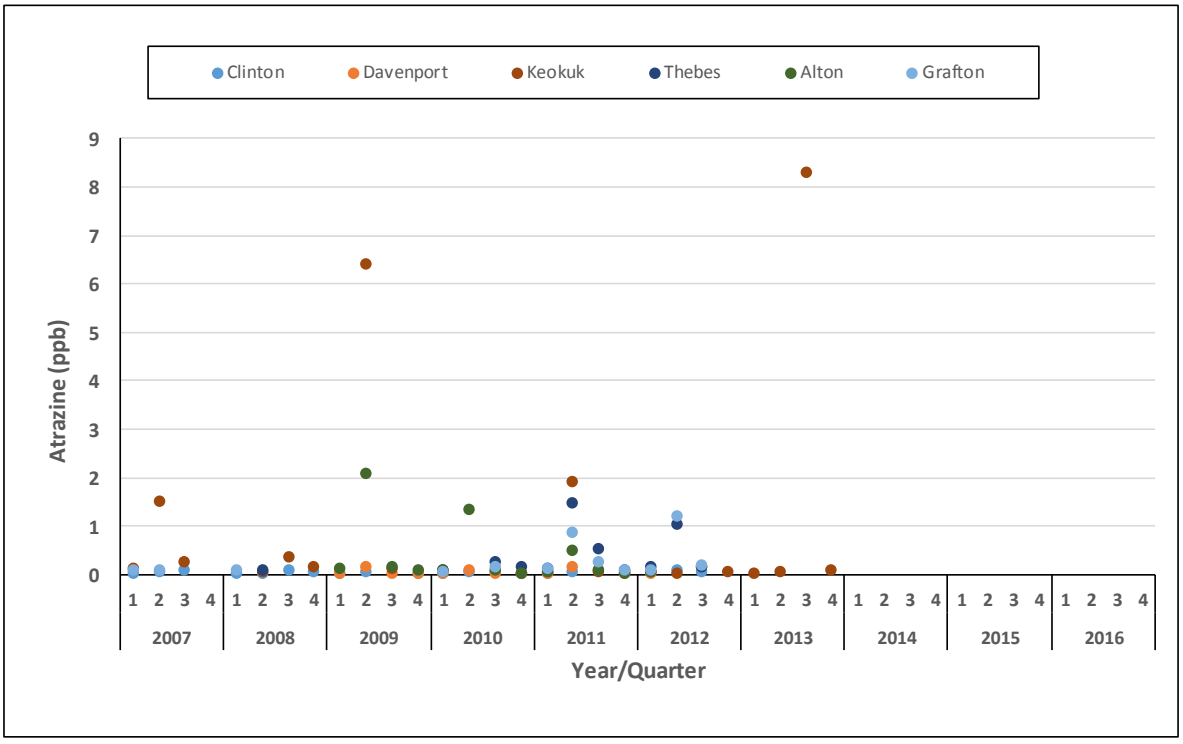
The draft TMDL indicates that only one of five water quality guidelines for atrazine were exceeded at K-22. Individual sample results did not exceed 3 ppb in over 10% of all samples, sample results were not greater than fourfold the MCL, 4-quarter running averages were not greater than the MCL, and a violation of the MCL did not occurr over the most recent three years of readily available data. Single samples that were the only samples collected in their respective quarters in 2007 and 2013 were above 3 ppb at K-22.

Atrazine quarterly average concentrations from 2007 to 2016 at the five Mississippi River monitoring stations did not exceed 2.1 ppb (Alton 2.09 ppb). Although atrazine concentrations in individual samples did exceed 3 ppb, quarterly average concentrations did not (Figure 1). A second sample collected in the second quarter dropped the average concentrations well below 3 ppb. It is Syngenta's contention, based on historic monitoring on the Mississippi River, that atrazine quarterly concentrations will not exceed 3 ppb if a sampling frequency of more than once per quarter (if seasonally monitoring) or in each

of four consecutive quarters (if monitoring annually) is incorporated. Monitoring at the five additional USGS and IEPA monitoring stations clearly show that with a slightly increased monitoring frequency, quarterly average concentrations of atrazine drop well below 3 ppb and are not impaired (Figure 1). The draft TMDL concluded that adequate sample frequency existed at K-22 to document the impairment and the need to draft a TMDL with atrazine restrictions.

Additional monitoring should be included to determine impairment within the K-22 watershed since five other monitoring locations on the Mississippi River show there are no IEPA water quality guideline exceedances. Syngenta recommends that a negative determination of adequate water sampling should be made and that additional year(s) of sampling (with an adequate frequency) for a Stage 2 study and findings should be conducted prior to development of a final TMDL.

Figure 1. Quarterly Atrazine Concentrations in Ambient Water from Six Mississippi River Monitoring Stations Between Clinton, IA and Grafton, IL from 2007 to 2016



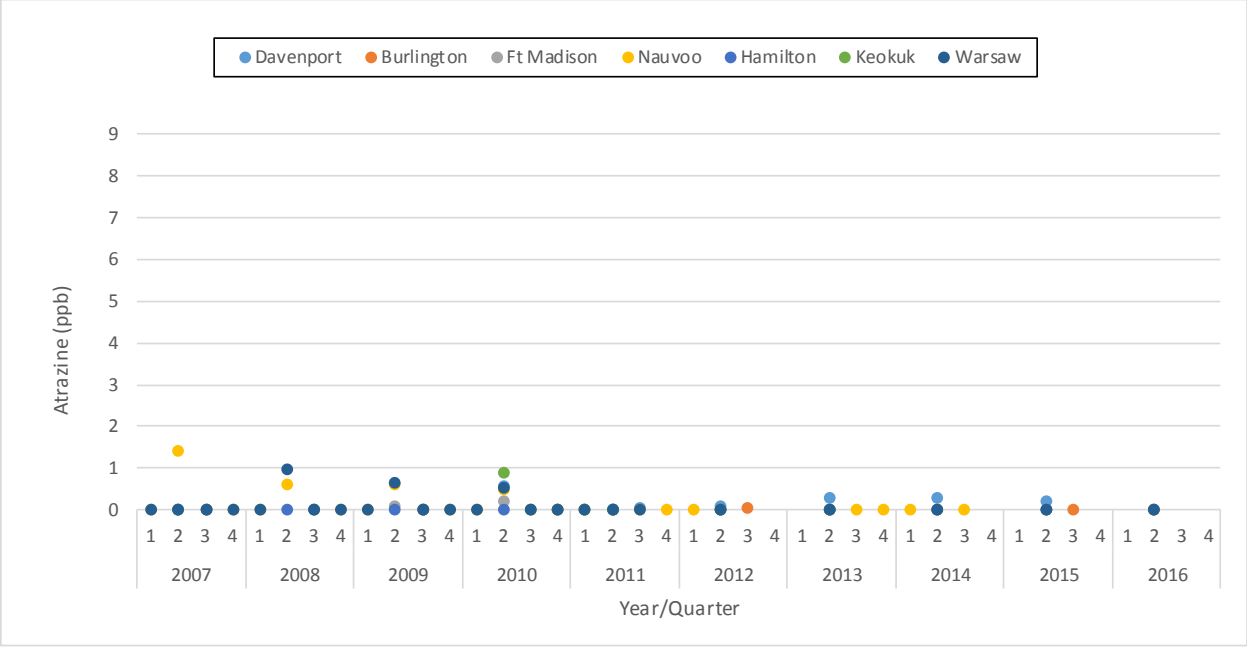
Atrazine Monitoring at Community Water Supplies Drawing Raw Water from the Mississippi River within the K-22 Watershed

The Community Water Supplies (CWS) of Nauvoo, Hamilton and Warsaw all draw raw water from the Mississippi River and are within the K-22 watershed. The SDWA compliance monitoring data from the three IL CWS have not been included in the draft TMDL nor have they been discussed. Syngenta requests that the CWS and their respective SDWA compliance monitoring data be incorporated into the draft TMDL. These data are readily available. Syngenta downloaded them from the IEPA Drinking Water

Watch website (http://water.epa.state.il.us/dww/) and has provided them in Attachment 1. Four Iowa CWS also have a history of drawing raw water from the Mississippi River between Davenport and Keokuk (Attachment 2). Their atrazine monitoring data should also be included in the draft TMDL (would not be unprecedented since the K-22 monitoring location is on the Iowa side of the river).

Quarterly average atrazine concentrations at the seven CWS drawing water from the Mississippi River between Davenport and Keokuk are well below the MCL for atrazine. The majority of results are non-detection (Figure 2).

Figure 2. Quarterly Atrazine Concentrations from Seven CWS Drawing Raw Water from the Mississippi River Between Davenport, IA and Warsaw, IL from 2007 to 2016



An interesting observation of the Illinois SDWA data is the required monitoring frequency. By Illinois and SDWA rules a surface water source CWS is required to monitor for atrazine on a quarterly basis. If atrazine is not detected a CWS may receive a monitoring waiver to reduce monitoring to once per year, as probability of impairment is low. If the CWS has three consecutive years of non-detections a further waiver may be granted to the CWS to sample once per three years. These waivers are granted based on a history of non-detections and that the probability of impairment is low.

The Illinois EPA Bureau of Water have set a sampling frequency of once per year for each of the three CWS in the K-22 watershed that draw raw water from the Mississippi River. The IEPA does not expect nor has it documented any recent detections of atrazine in drinking water at each of the three CWS. Yet, the IEPA Bureau of Water, Watershed Division has determined, based on two samples over 10 years, that the Mississippi River is impaired by atrazine for drinking water and atrazine reductions are necessary. Four Iowa CWS (between Davenport and Keokuk) use the Mississippi River as source water. Burlington is on a one sample per three-year compliance monitoring schedule. Davenport, Ft Madison

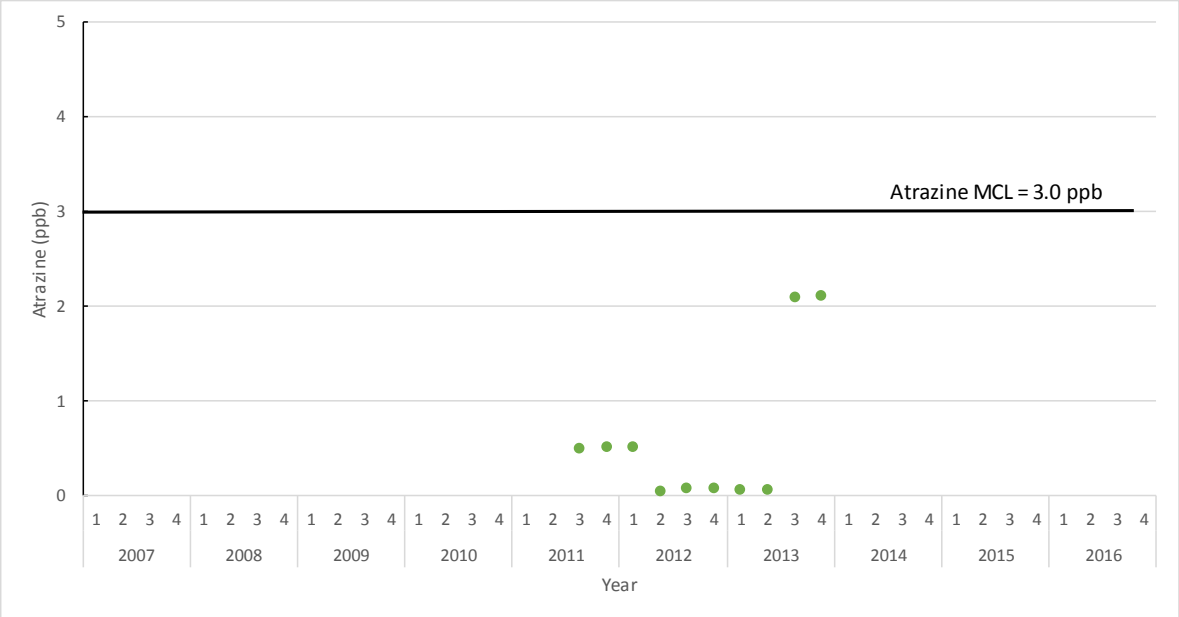
and Keokuk are all on one sample per year compliance monitoring schedule. There is a contradiction of water quality guidelines and health standards and regulations within the Illinois EPA Bureau of Water which effects Community Water Suppliers, agricultural producers and watershed stakeholders. The IEPA should not waive CWS monitoring requirements because of a lack of expected impairment but then list the water body as impaired and require a TMDL because atrazine seemingly exceeded a state drinking water guideline because of low sample frequency.

IEPA should reconsider their current water quality guidelines for Drinking and Food Processing waters (as they pertain to atrazine) and make them compatible with SDWA drinking water standards for atrazine. There are highly protective margins of safety (1000 fold) built in to the MCL for atrazine which serves to protect human health in drinking waters of Illinois and the Mississippi River.

Four Quarter Rolling Average Atrazine Concentrations at K-22 and Five Additional Mississippi River Monitoring Locations

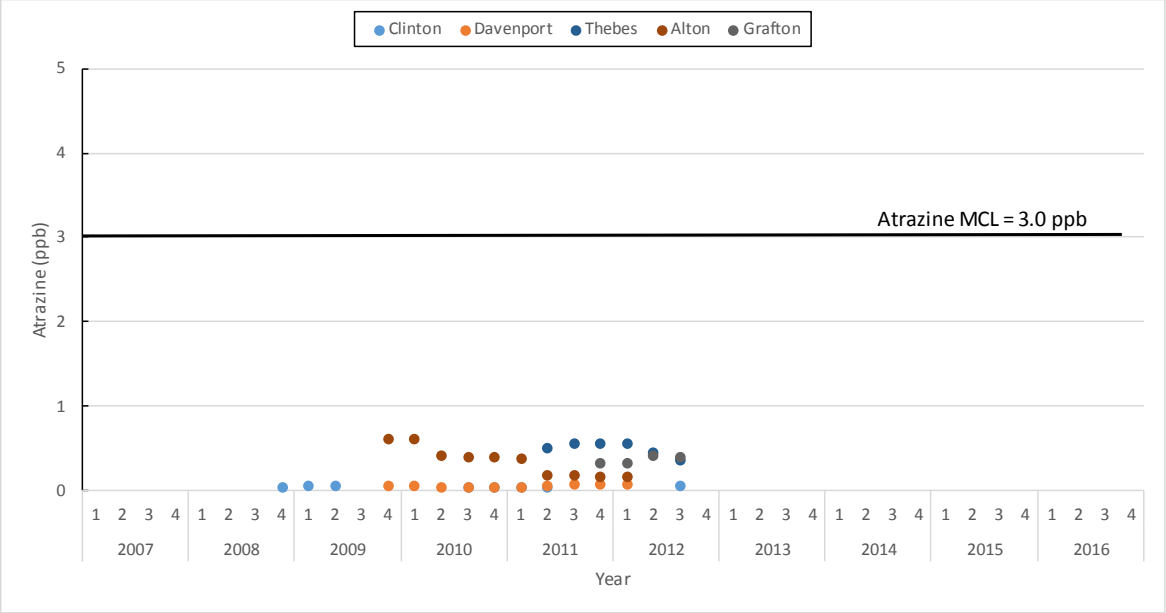
The draft TMDL states - drinking water compliance for atrazine is based on a running 4-quarter average. When an adequate sampling frequency is not available (as is the case with atrazine) seasonal water quality guidelines are implemented. Adequate sampling frequency is available from five river sampling stations up and down the Mississippi River from K-22, including K-22. IEPA Station K-22 was monitored quarterly from February 2010 to December 2013. The maximum 4-quarter running average was 2.11 ppb. Adequate sampling shows that raw water concentrations in the Mississippi River are below SDWA drinking water MCL of 3 ppb. Seasonal water quality guidelines do not need to be implemented since there is adequate yearly monitoring data on a quarterly basis.

Figure 3. Four Quarter Running Average Atrazine Concentrations from IEPA Mississippi River Monitoring Station K-22 at Keokuk from 2007 to 2016



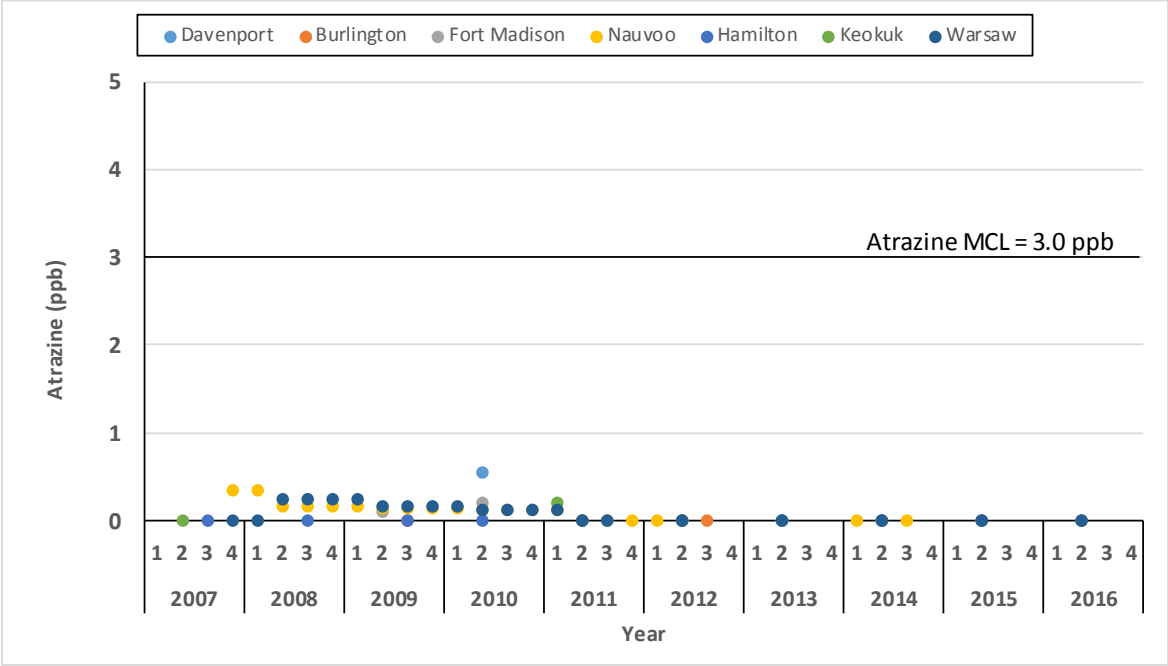
To illustrate this point, four quarter rolling averages were calculated for the five other Mississippi river monitoring stations (Figure 4). The maximum 4-quarter running average on the Mississippi River was 0.62 ppb at IEPA Station J-98 at Alton, IL. These concentrations are below the atrazine MCL of 3 ppb.

Figure 4. Four-Quarter Running Average Atrazine Concentrations from Five Additional Mississippi River Monitoring Stations Between Clinton, IA and Grafton, IL from 2007 to 2016



This is further supported by monitoring at the seven CWS drawing raw water from the Mississippi River between Davenport and Warsaw. The maximum 4-quarter running average at the seven CWS was 0.55 ppb at Davenport, IA (Figure 5).

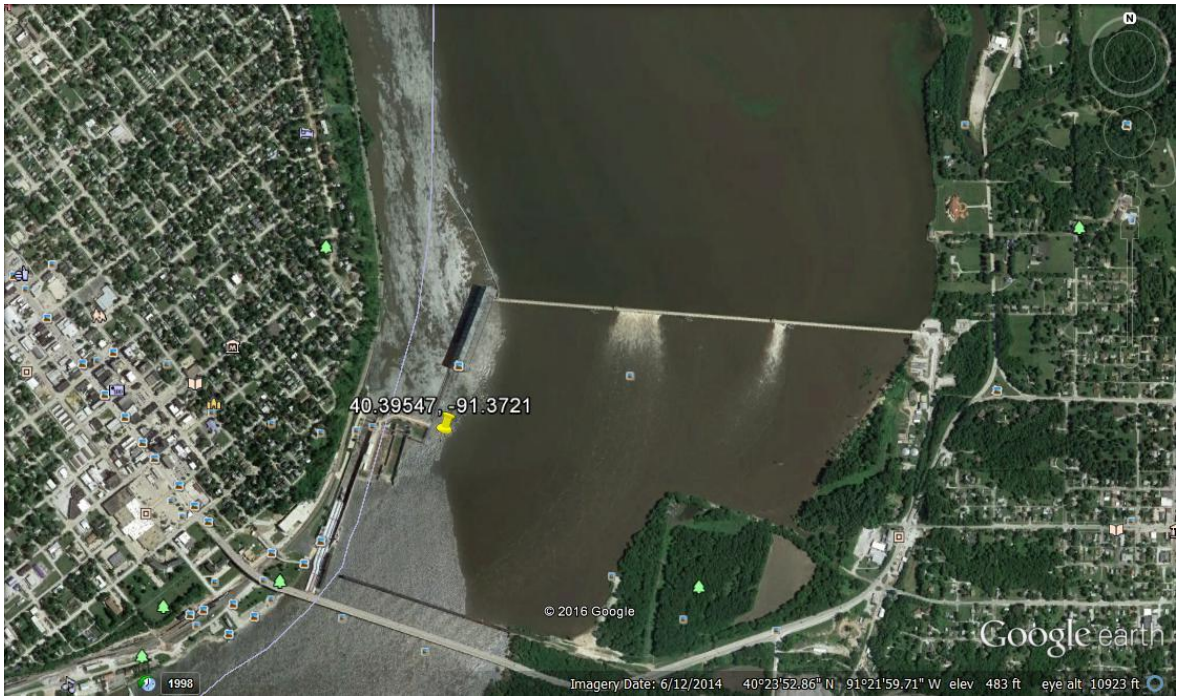
Figure 5. Annual and Four-Quarter Running Average Atrazine Concentrations from Seven CWS Drawing Raw Water from the Mississippi Between Davenport, IA and Warsaw, IL from 2007 to 2016



Conflict of IEPA Water Quality Guidelines Compared to State and Federal Agencies Standards Regulating Water in the Mississippi River.

During Syngenta's investigation of the atrazine monitoring data for IEPA Site K-22, data from the Federal EPA water quality clearing house STORET (STOrage and RETrevial) were downloaded. As part of this dataset the latitude and longitude coordinates for the sampling location were provided (not provided in the draft TMDL). This location was pinned to a Google Earth map (Figure 6). For reference, the Mississippi River is in the middle of the photo, Iowa on the left, Illinois on the right. The pinned sample collection point is at the lock and dam on the Iowa side of the river. Technically, the samples collected at this point were collected in Iowa. The atrazine water quality standard in Iowa is: the 4-quarter running average not to exceed 3 ppb. Data from site K-22 shows that the maximum 4-quarter running average was 2.11 ppb. This river segment would not be considered impaired by atrazine in Iowa. For the fourteenth time (13 prior draft atrazine TMDLs), Syngenta is requesting the IEPA to modify its water quality guidelines for determining impairment to match water quality standards of the Safe Drinking Water Act.

Figure 6. IEPA Monitoring Site K-22 on Google Earth Map



Conclusions

Seasonal water quality guidelines should not be used to determine impairment as twelve consecutive quarters of monitoring at site K-22 show the atrazine maximum 4-quarter running average was 2.11 ppb. This concentration is below the finished drinking water atrazine MCL. Waterbody segment K-22 should not be listed as an atrazine impaired water in need of a TMDL. The finding of impairment should be reversed and the draft TMDL discontinued or a negative determination of adequate water sampling should be made and that additional year(s) of sampling (with an adequate frequency) for a Stage 2 study and findings should be conducted prior to development of a final TMDL.

Syngenta requests the IEPA to modify its water quality guidelines for determining impairment to match that of the Safe Drinking Water Act.

Your consideration of the above comments and requests are appreciated. Should you have questions, please contact me at the email or telephone number listed below.

Respectfully,Mark White
Sr. Regulatory Stewardship Manager
Syngenta Crop Protection, LLC
1-660-292-2862
mark.white@syngenta.com

Attachment 1

Atrazine Monitoring on the Mississippi River up and downstream of Keokuk, IA from 2007 to 2016

(all atrazine concentrations are reported in ppb)

USGS Station 05420500 Mississippi River at Clinton, IA

Agency	Monitoring Site	Stream position	lat	long	Date	Atrazine
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	6/12/2012	0.1503
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	6/2/2010	0.136
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	5/21/2007	0.0996
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	7/23/2012	0.0972
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	8/28/2007	0.0963
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	6/7/2011	0.0949
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	9/3/2008	0.0867
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	3/28/2012	0.0736
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	5/11/2009	0.0675
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	8/17/2010	0.0576
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	5/9/2012	0.0553
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	4/30/2012	0.0527
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	10/26/2009	0.0507
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	10/21/2008	0.0501
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	5/9/2007	0.0494
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	8/20/2012	0.0476
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	4/11/2012	0.0465
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	3/5/2009	0.0447
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	4/29/2008	0.0418
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	11/28/2011	0.0391
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	5/19/2011	0.0379
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	3/6/2007	0.0376
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	10/31/2011	0.0373
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	4/16/2007	0.0343
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	3/22/2011	0.0333
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	4/5/2011	0.0329
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	9/28/2010	0.0324
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	5/22/2008	0.0319
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	3/7/2011	0.0317
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	3/27/2007	0.0316
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	11/24/2008	0.0315
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	4/8/2009	0.0308
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	3/30/2009	0.0306
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	3/7/2012	0.0303
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	10/4/2010	0.0286
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	11/30/2009	0.0276
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	4/21/2010	0.0257
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	3/8/2010	0.0255
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	4/8/2010	0.0249
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	4/2/2008	0.0237
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	11/30/2010	0.0224
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	3/11/2008	0.0221
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	4/23/2008	0.0216
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	5/3/2011	0.0207
USGS	USGS-NAWQA_05420500	MISSISSIPPI_RIVER_AT_CLINTON_IA	41.78	-90.252	4/21/2011	0.0189

Illinois EPA Station M-02 Mississippi River At Davenport, IA

Agency	Monitoring Site	Stream position	lat	long	Date	Atrazine
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	6/23/2009	0.38
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	5/17/2011	0.23
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	6/23/2010	0.18
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	8/9/2011	0.14
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	7/12/2011	0.13
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	6/7/2011	0.081
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	5/27/2009	0.058
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	8/11/2009	0.048
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	5/11/2010	0.046
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	8/10/2010	0.039
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	2/18/2009	0.0195
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	3/24/2009	0.0195
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	4/28/2009	0.0195
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	9/9/2009	0.0195
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	10/20/2009	0.0195
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	12/3/2009	0.0195
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	1/20/2010	0.0195
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	3/16/2010	0.0195
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	4/20/2010	0.0195
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	11/4/2010	0.0195
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	12/15/2010	0.0195
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	3/9/2011	0.0195
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	9/7/2011	0.0195
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	10/26/2011	0.0195
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	12/6/2011	0.0195
IEPA	IL_EPA_WQX-M-02	MISSISSIPPI_RIVER_AT_DAVENPORT_IA	41.5192	-90.567	1/11/2012	0.0195

IEPA SDWA Compliance Monitoring Mississippi River Drinking Water at Nauvoo, IL

Agency	Monitoring Site	Stream position	lat	long	Date	Atrazine
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	6/26/2007	1.4
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	6/30/2008	0.62
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	5/27/2009	0.61
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	6/24/2010	0.48
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	5/24/2013	0.35
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	2/27/2007	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	9/26/2007	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	12/31/2007	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	3/25/2008	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	9/22/2008	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	11/17/2008	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	2/4/2009	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	9/16/2009	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	12/22/2009	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	3/10/2010	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	9/23/2010	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	12/16/2010	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	3/8/2011	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	5/13/2011	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	9/20/2011	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	12/15/2011	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	3/6/2012	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	4/24/2012	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	9/23/2013	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	11/13/2013	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	3/6/2014	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	6/3/2014	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	9/9/2014	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	4/13/2015	0
SDWA	IL0670500	MISSISSIPPI_RIVER_AT_NAUVOO_CWS_IL	40.3254	-91.2411	5/10/2016	0

IEPA SDWA Compliance Monitoring Mississippi River Drinking Water at Hamilton, IL

Agency	Monitoring Site	Stream position	lat	long	Date	Atrazine
SDWA	IL0670400	MISSISSIPPI_RIVER_AT_HAMILTON_CWS_IL	40.2439	-91.2123	4/16/2007	0
SDWA	IL0670400	MISSISSIPPI_RIVER_AT_HAMILTON_CWS_IL	40.2439	-91.2123	7/25/2007	0
SDWA	IL0670400	MISSISSIPPI_RIVER_AT_HAMILTON_CWS_IL	40.2439	-91.2123	5/6/2008	0
SDWA	IL0670400	MISSISSIPPI_RIVER_AT_HAMILTON_CWS_IL	40.2439	-91.2123	7/9/2008	0
SDWA	IL0670400	MISSISSIPPI_RIVER_AT_HAMILTON_CWS_IL	40.2439	-91.2123	4/13/2008	0
SDWA	IL0670400	MISSISSIPPI_RIVER_AT_HAMILTON_CWS_IL	40.2439	-91.2123	8/5/2009	0
SDWA	IL0670400	MISSISSIPPI_RIVER_AT_HAMILTON_CWS_IL	40.2439	-91.2123	4/26/2010	0
SDWA	IL0670400	MISSISSIPPI_RIVER_AT_HAMILTON_CWS_IL	40.2439	-91.2123	4/4/2011	0
SDWA	IL0670400	MISSISSIPPI_RIVER_AT_HAMILTON_CWS_IL	40.2439	-91.2123	4/3/2012	0
SDWA	IL0670400	MISSISSIPPI_RIVER_AT_HAMILTON_CWS_IL	40.2439	-91.2123	4/8/2013	0
SDWA	IL0670400	MISSISSIPPI_RIVER_AT_HAMILTON_CWS_IL	40.2439	-91.2123	4/14/2014	0
SDWA	IL0670400	MISSISSIPPI_RIVER_AT_HAMILTON_CWS_IL	40.2439	-91.2123	4/13/2015	0
SDWA	IL0670400	MISSISSIPPI_RIVER_AT_HAMILTON_CWS_IL	40.2439	-91.2123	4/4/2016	0

IEPA SDWA Compliance Monitoring Mississippi River Drinking Water at Warsaw, IL

Agency	Monitoring Site	Stream position	lat	long	Date	Atrazine
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	6/8/2009	0.66
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	6/24/2008	0.97
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	5/6/2010	0.51
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	3/19/2007	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	5/21/2007	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	7/24/2007	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	11/28/2007	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	3/17/2007	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	9/23/2008	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	12/10/2008	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	3/23/2009	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	8/13/2009	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	11/17/2009	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	3/2/2010	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	9/7/2010	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	11/16/2010	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	2/16/2011	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	5/18/2011	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	7/19/2011	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	5/21/2012	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	5/20/2013	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	4/22/2014	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	4/20/2015	0
SDWA	IL0670650	MISSISSIPPI_RIVER_AT_WARSAW_CWS_IL	40.2146	-91.263	4/18/2016	0

Illinois EPA Station K-22 Mississippi River at Keokuk, IA

Agency	Monitoring Site	Stream position	lat	long	Date	Atrazine
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	9/18/2013	8.3
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	5/28/2009	6.4
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	5/19/2011	1.9
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	5/9/2007	1.5
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	7/9/2008	0.77
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	9/24/2007	0.4
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	7/22/2009	0.18
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	8/25/2008	0.16
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	11/13/2008	0.16
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	9/25/2012	0.16
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	9/24/2008	0.14
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	1/18/2007	0.13
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	3/19/2007	0.13
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	8/14/2007	0.13
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	12/10/2013	0.078
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	8/27/2009	0.067
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	5/7/2008	0.061
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	3/23/2011	0.061
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	12/1/2011	0.06
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	3/7/2012	0.06
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	12/4/2012	0.057
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	2/24/2010	0.049
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	9/15/2011	0.044
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	5/28/2013	0.044
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	5/29/2012	0.04
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	11/15/2010	0.0195
IEPA	IL_EPA_WQX-K-22	MISSISSIPPI_RIVER_AT_KEOKUK_IA	40.39547	-91.3721	3/14/2013	0.0195

USGS Station 0702000 Mississippi River at Thebes, IL

Agency	Monitoring Site	Stream position	lat	long	Date	Atrazine
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	5/26/2011	3.02
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	6/7/2011	2.53
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	5/14/2012	2.05
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	6/21/2011	1.88
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	4/17/2012	1.74
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	5/1/2012	1.71
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	4/26/2011	0.95
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	7/12/2011	0.73
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	6/5/2012	0.646
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	6/25/2012	0.549
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	6/25/2012	0.4695
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	5/10/2011	0.349
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	8/2/2011	0.329
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	8/11/2010	0.258
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	9/1/2010	0.246
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	7/24/2012	0.245
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	4/3/2012	0.216
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	12/6/2010	0.175
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	3/22/2012	0.162
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	8/21/2012	0.155
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	7/24/2012	0.1502
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	2/7/2012	0.129
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	2/15/2011	0.116
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	10/25/2010	0.113
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	3/8/2011	0.11
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	8/21/2012	0.1027
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	10/4/2011	0.0988
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	12/6/2011	0.0954
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	3/16/2010	0.0808
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	4/7/2008	0.0759
USGS	USGS-NAWQA_07022000	MISSISSIPPI_RIVER_AT_THEBES,_IL	37.221	-89.462	4/5/2011	0.0617

Illinois EPA Station J-98 Mississippi River At Alton, IL

Agency	Monitoring Site	Stream position	lat	long	Date	Atrazine
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	5/27/2009	4.4
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	5/24/2010	3.2
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	6/18/2009	1.7
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	5/17/2011	1.2
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	6/28/2010	0.71
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	6/29/2011	0.24
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	7/29/2009	0.22
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	4/16/2009	0.16
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	8/9/2011	0.15
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	3/3/2009	0.14
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	8/3/2010	0.13
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	2/10/2009	0.12
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	10/14/2009	0.11
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	3/8/2010	0.11
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	4/12/2011	0.093
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	12/1/2009	0.084
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	9/14/2009	0.078
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	4/20/2010	0.072
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	2/23/2011	0.069
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	1/20/2010	0.065
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	9/15/2010	0.059
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	9/13/2011	0.057
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	12/1/2010	0.053
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	1/10/2012	0.043
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	10/19/2010	0.0195
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	1/28/2011	0.0195
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	10/17/2011	0.0195
IEPA	IL_EPA_WQX-J-98	MISSISSIPPI_RIVER_AT_ALTON,_IL	38.86394	-90.1414	11/29/2011	0.0195

USGS Station 05587455 Mississippi River Below Grafton, IL

Agency	Monitoring Site	Stream position	lat	long	Date	Atrazine
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	1/10/2007	0.0906
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	3/26/2007	0.0921
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	4/12/2007	0.0968
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	3/10/2008	0.0846
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	3/26/2008	0.0636
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	2/25/2010	0.0772
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	3/17/2010	0.0645
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	8/10/2010	0.189
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	8/31/2010	0.121
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	10/26/2010	0.0695
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	11/8/2010	0.0614
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	12/7/2010	0.0704
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	1/18/2011	0.0941
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	2/16/2011	0.149
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	3/9/2011	0.0938
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	4/11/2011	0.102
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	5/11/2011	0.196
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	6/8/2011	2.32
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	7/13/2011	0.424
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	8/3/2011	0.237
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	9/14/2011	0.0742
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	10/5/2011	0.0819
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	11/2/2011	0.0934
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	12/7/2011	0.0799
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	1/24/2012	0.0623
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	2/8/2012	0.186
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	3/14/2012	0.0605
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	4/4/2012	0.0737
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	5/2/2012	3.28
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	6/6/2012	0.288
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	7/25/2012	0.347
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	8/22/2012	0.0999
USGS	USGS-NAWQA_05587455	MISSISSIPPI_RIVER_BELOW_GRAFTON,_IL	38.951	-90.371	9/12/2012	0.0941

Attachment 2

Iowa DNR Atrazine Monitoring on the Mississippi River upstream of Keokuk, IA from 2007 to 2016

(all atrazine concentrations are reported in ppb)

Iowa DNR SDWA Compliance Monitoring Mississippi River Drinking Water at Davenport, IA

Agency	Monitoring Site	Stream position	lat	long	Date	Atrazine
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			13-May-10	0.1
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			13-May-10	1
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			02-Dec-10	0
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			02-Dec-10	0
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			28-Feb-11	0
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			16-Mar-11	0
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			11-May-11	0
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			10-Aug-11	0.1
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			10-Aug-11	0
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			24-Jul-12	0.1
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			24-Jul-12	0.1
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			15-May-13	0.1
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			28-May-13	0.5
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			24-Jul-13	0.2
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			24-Jul-13	0.3
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			21-Jul-14	0.3
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			21-Jul-14	0.3
SDWA	IA8222001	MISSISSIPPI_RIVER_AT_DAVENPORT_CWS_IA			14-Jul-15	0.2

Iowa DNR SDWA Compliance Monitoring Mississippi River Drinking Water at Burlington, IA

Agency	Monitoring Site	Stream position	lat	long	Date	Atrazine
SDWA	IA2909053	MISSISSIPPI_RIVER_AT_BURLINGTON_CWS_IA			31-Aug-09	0
SDWA	IA2909053	MISSISSIPPI_RIVER_AT_BURLINGTON_CWS_IA			13-Aug-12	0
SDWA	IA2909053	MISSISSIPPI_RIVER_AT_BURLINGTON_CWS_IA			16-Jul-15	0

Iowa DNR SDWA Compliance Monitoring Mississippi River Drinking Water at Fort Madison

Agency	Monitoring Site	Stream position	lat	long	Date	Atrazine
SDWA	IA5625062	MISSISSIPPI_RIVER_AT_FT MADISON_CWS_IA			06-Apr-09	0.1
SDWA	IA5625062	MISSISSIPPI_RIVER_AT_FT MADISON_CWS_IA			29-Jun-10	0.2

Iowa DNR SDWA Compliance Monitoring Mississippi River Drinking Water at Keokuk, IA

Agency	Monitoring Site	Stream position	lat	long	Date	Atrazine
SDWA	IA5640019	MISSISSIPPI_RIVER_AT_KEOKUK_CWS_IA			17-Apr-07	0
SDWA	IA5640019	MISSISSIPPI_RIVER_AT_KEOKUK_CWS_IA			27-Apr-10	0.9
SDWA	IA5640019	MISSISSIPPI_RIVER_AT_KEOKUK_CWS_IA			13-Sep-10	0
SDWA	IA5640019	MISSISSIPPI_RIVER_AT_KEOKUK_CWS_IA			13-Oct-10	0
SDWA	IA5640019	MISSISSIPPI_RIVER_AT_KEOKUK_CWS_IA			25-Jan-11	0
SDWA	IA5640019	MISSISSIPPI_RIVER_AT_KEOKUK_CWS_IA			18-Apr-11	0
SDWA	IA5640019	MISSISSIPPI_RIVER_AT_KEOKUK_CWS_IA			18-Jun-12	0
SDWA	IA5640019	MISSISSIPPI_RIVER_AT_KEOKUK_CWS_IA			13-May-13	0

Appendix B– Stage 2 Laboratory Results

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: K-22
Received : 06/06/18 14:35 by James Stone
Waterbody Name: MISSISSIPPI RIVER
County: LEE, IA
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: Central
Trip ID: 20180501GPSI
Visit Number: 001
Monitoring Program: Ambient WQMN

Client Sample ID: TOTAL W/ORGANIC
Collected By: MS/TK
Lab Sample ID: **18F0199-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 06/06/18 10:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Chlorinated Acids by GC

Method: 515.4
Prepared: 06/13/18 08:52
Units: ug/L
Analyzed: 06/16/18 08:16

Analyte	Result	Qualifier	Reporting Limit	MDL
Dalapon	ND		5.0	1.4
Dicamba	ND		0.25	0.067
2,4-D	ND		1.0	0.26
Pentachlorophenol	ND	J3	0.40	0.022
Silvex	ND		1.0	0.083
Dinoseb	ND		1.0	0.052
Picloram	ND		1.0	0.11
Acifluorfen	ND	J3	0.50	0.098

Glyphosate by HPLC *

Method: 547
Prepared: 06/18/18 08:10
Units: ug/L
Analyzed: 06/18/18 18:28

Analyte	Result	Qualifier	Reporting Limit	MDL
Glyphosate	ND		30	5

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Reported:
07/31/18 15:17

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: K-22
Received : 06/06/18 14:35 by James Stone
Waterbody Name: MISSISSIPPI RIVER
County: LEE, IA
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: Central
Trip ID: 20180501GPSI
Visit Number: 001
Monitoring Program: Ambient WQMN

Client Sample ID: TOTAL W/ORGANIC
Collected By: MS/TK
Lab Sample ID: **18F0199-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 06/06/18 10:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Pesticides by ECD

Method: 8081
Prepared: 06/11/18 12:59
Units: ug/L
Analyzed: 06/26/18 09:37

Analyte	Result	Qualifier	Reporting Limit	MDL
Trifluralin *	ND		0.010	0.0026
Hexachlorobenzene *	ND		0.010	0.0013
alpha-BHC	ND		0.010	0.0011
gamma-BHC	ND		0.010	0.0021
Heptachlor	ND		0.010	0.0016
Acetochlor *	**0.21**		0.10	0.017
Alachlor *	ND		0.020	0.014
Aldrin	ND		0.010	0.0011
Metolachlor *	**0.29**		0.10	0.055
Metribuzin *	**0.0098**	J	0.050	0.0083
Pendimethalin *	ND		0.050	0.0038
Heptachlor epoxide	ND		0.010	0.0015
gamma-Chlordane	ND		0.010	0.0013
Cyanazine *	ND		0.15	0.080
alpha-Chlordane	ND		0.010	0.0013
p,p'-DDE	ND		0.010	0.0024
Dieldrin	ND		0.010	0.0039
Captan *	ND		0.10	0.014
Endrin	ND		0.010	0.0024
p,p'-DDD	ND		0.010	0.0026
p,p'-DDT	ND		0.010	0.0029
Methoxychlor	ND		0.050	0.0049

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LABORATORY RESULTS

Station Code: K-22
Received : 06/06/18 14:35 by James Stone
Waterbody Name: MISSISSIPPI RIVER
County: LEE, IA
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: Central
Trip ID: 20180501GPSI
Visit Number: 001
Monitoring Program: Ambient WQMN

Client Sample ID: TOTAL W/ORGANIC
Collected By: MS/TK
Lab Sample ID: **18F0199-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 06/06/18 10:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Pesticides by ECD

Method: 8081
Prepared: 06/11/18 12:59
Units: ug/L
Analyzed: 06/26/18 09:37

Analyte	Result	Qualifier	Reporting Limit	MDL
Toxaphene	ND		1.0	0.11

PCBs by ECD

Method: 8082
Prepared: 06/11/18 12:59
Units: ug/L
Analyzed: 06/26/18 09:37

Analyte	Result	Qualifier	Reporting Limit	MDL
Total PCBs	ND		0.10	0.04

Pesticides by NPD

Method: 8141
Prepared: 06/11/18 12:59
Units: ug/L
Analyzed: 06/13/18 01:00

Analyte	Result	Qualifier	Reporting Limit	MDL
EPTC *	ND		0.50	0.031
Butylate *	ND		0.20	0.022
Phorate	ND		0.25	0.012
Terbufos	ND		0.10	0.010
Diazinon	ND		0.050	0.0050

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07/31/18 15:17

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: K-22
Received : 06/06/18 14:35 by James Stone
Waterbody Name: MISSISSIPPI RIVER
County: LEE, IA
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: Central
Trip ID: 20180501GPSI
Visit Number: 001
Monitoring Program: Ambient WQMN

Client Sample ID: TOTAL W/ORGANIC
Collected By: MS/TK
Lab Sample ID: **18F0199-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 06/06/18 10:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Pesticides by NPD

Method: 8141
Prepared: 06/11/18 12:59
Units: ug/L
Analyzed: 06/13/18 01:00

Analyte	Result	Qualifier	Reporting Limit	MDL
Atrazine	**0.57**		0.10	0.022
Simazine	ND		0.10	0.025
Fonofos	ND		0.10	0.0080
Methyl parathion	ND		0.10	0.020
Chlorpyrifos	ND		0.10	0.016
Malathion	ND		0.15	0.023
Ethyl parathion	ND		0.10	0.011

Alkalinity by Standard Method 310.2

Method: 310.2
Prepared: 06/13/18 10:45
Units: mg/L
Analyzed: 06/14/18 13:19

Analyte	Result	Qualifier	Reporting Limit	MDL
Alkalinity	**188**		10.0	7.48

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Illinois Environmental Protection Agency Laboratory
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LABORATORY RESULTS

Station Code: K-22
Received : 06/06/18 14:35 by James Stone
Waterbody Name: MISSISSIPPI RIVER
County: LEE, IA
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: Central
Trip ID: 20180501GPSI
Visit Number: 001
Monitoring Program: Ambient WQMN

Client Sample ID: TOTAL W/ORGANIC
Collected By: MS/TK
Lab Sample ID: **18F0199-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 06/06/18 10:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Chloride by Ion Chromatography 300.0

Method: EPA 300.0
Prepared: 06/14/18 08:04
Units: mg/L
Analyzed: 06/15/18 11:15

Analyte	Result	Qualifier	Reporting Limit	MDL
Chloride	**21.5**		1.00	0.02

Available Cyanide by ASTM Method D6888-09

Method: ASTM D6888-09
Prepared: 06/14/18 13:43
Units: ug/L
Analyzed: 06/15/18 13:12

Analyte	Result	Qualifier	Reporting Limit	MDL
Available Cyanide	**0.68**	J	2.00	0.25

Fluoride by Ion Chromatography 300.0

Method: 300.0
Prepared: 06/14/18 08:04
Units: mg/L
Analyzed: 06/15/18 11:15

Analyte	Result	Qualifier	Reporting Limit	MDL
Fluoride	**0.20**		0.10	0.003

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LABORATORY RESULTS

Station Code: K-22
Received : 06/06/18 14:35 by James Stone
Waterbody Name: MISSISSIPPI RIVER
County: LEE, IA
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: Central
Trip ID: 20180501GPSI
Visit Number: 001
Monitoring Program: Ambient WQMN

Client Sample ID: TOTAL W/ORGANIC
Collected By: MS/TK
Lab Sample ID: **18F0199-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 06/06/18 10:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Metals by EPA 200 Series Methods ICP/MS

Method: 200.8
Prepared: 07/26/18 09:26
Units: ug/L
Analyzed: 07/27/18 14:50

Analyte	Result	Qualifier	Reporting Limit	MDL
Aluminum	**718**		50.0	47.5
Arsenic	**1.82**	J	2.00	0.10
Barium	**84.2**		5.00	0.15
Beryllium	ND		1.00	0.62
Boron	**29.9**		10.0	1.83
Cadmium	ND		3.00	0.09
Calcium	**54800**		300	104
Chromium	**1.17**	J	5.00	0.39
Cobalt	**0.66**	J	5.00	0.06
Copper	**2.15**	J	5.00	0.14
Iron	**1170**		50.0	8.08
Lead	**1.19**	J	5.00	0.12
Magnesium	**21000**		300	11.0
Manganese	**136**		5.00	2.90
Nickel	**2.15**	J	5.00	0.14
Potassium	**3040**		1400	18.2
Selenium	**1.85**	J	5.00	1.16
Silver	ND		3.00	0.02
Sodium	**10900**		300	84.5
Strontium	**133**		5.00	0.23
Vanadium	**3.70**	J	5.00	0.29
Zinc	**6.42**		5.00	3.04

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Illinois Environmental Protection Agency Laboratory

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LABORATORY RESULTS

Station Code: K-22
Received : 06/06/18 14:35 by James Stone
Waterbody Name: MISSISSIPPI RIVER
County: LEE, IA
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: Central
Trip ID: 20180501GPSI
Visit Number: 001
Monitoring Program: Ambient WQMN

Client Sample ID: TOTAL W/ORGANIC
Collected By: MS/TK
Lab Sample ID: **18F0199-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 06/06/18 10:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Metals by EPA 200 Series Methods ICP/MS

Method: 200.8
Prepared: 07/26/18 09:26
Units: ug/L
Analyzed: 07/27/18 14:50

Analyte	Result	Qualifier	Reporting Limit	MDL
Hardness	**223000**			

Nitrate-Nitrite, Colorimetric, Automated Cadmium by EPA Method 353.2

Method: 353.2
Prepared: 06/07/18 10:08
Units: mg/L
Analyzed: 06/07/18 11:49

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Nitrite (NO2) + Nitrate (NO3) as N	**3.40**		0.100	0.0247

Nitrogen, Ammonia, Colorimetric, Automated Phenate by EPA Method 350.1

Method: EPA 350.1
Prepared: 06/08/18 08:43
Units: mg/L
Analyzed: 06/11/18 14:49

Analyte	Result	Qualifier	Reporting Limit	MDL
Ammonia as N	**0.12**		0.10	0.05

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Reported:
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Illinois Environmental Protection Agency Laboratory

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LABORATORY RESULTS

Station Code: K-22
Received : 06/06/18 14:35 by James Stone
Waterbody Name: MISSISSIPPI RIVER
County: LEE, IA
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: Central
Trip ID: 20180501GPSI
Visit Number: 001
Monitoring Program: Ambient WQMN

Client Sample ID: TOTAL W/ORGANIC
Collected By: MS/TK
Lab Sample ID: **18F0199-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 06/06/18 10:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Nitrogen, Kjeldahl, Total, Colorimetric, Semi- by EPA Method 351.2

Method: 351.2
Prepared: 06/20/18 08:00
Units: mg/L
Analyzed: 06/28/18 15:00

Analyte	Result	Qualifier	Reporting Limit	MDL
Nitrogen, Kjeldahl	**0.74**		0.50	0.37

Phenols by EPA Method 420.4

Method: EPA 420.4
Prepared: 06/19/18 09:09
Units: ug/L
Analyzed: 06/19/18 15:37

Analyte	Result	Qualifier	Reporting Limit	MDL
Phenol	**2.32**	J	10.0	1.66

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 06/25/18 08:00
Units: mg/L
Analyzed: 06/26/18 17:10

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.185**		0.0050	0.0042

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Reported:
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Illinois Environmental Protection Agency Laboratory
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LABORATORY RESULTS

Station Code: K-22
Received : 06/06/18 14:35 by James Stone
Waterbody Name: MISSISSIPPI RIVER
County: LEE, IA
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: Central
Trip ID: 20180501GPSI
Visit Number: 001
Monitoring Program: Ambient WQMN

Client Sample ID: TOTAL W/ORGANIC
Collected By: MS/TK
Lab Sample ID: **18F0199-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 06/06/18 10:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Sulfate by Ion Chromatography 300.0

Method: 300.0
Prepared: 06/14/18 08:04
Units: mg/L
Analyzed: 06/15/18 11:15

Analyte	Result	Qualifier	Reporting Limit	MDL
Sulfate	**33.6**		10.0	0.02

Total Dissolved Solids, Gravimetric, Dried at 180oC by Std. Method 2540C

Method: 2540C
Prepared: 06/07/18 13:00
Units: mg/L
Analyzed: 06/11/18 08:42

Analyte	Result	Qualifier	Reporting Limit	MDL
Total Dissolved Solids	**322**		10	

Total Organic Carbon by Standard Method 5310C

Method: 5310C
Prepared: 06/12/18 08:00
Units: mg/L
Analyzed: 06/12/18 12:27

Analyte	Result	Qualifier	Reporting Limit	MDL
Total Organic Carbon	**4.65**		0.40	0.17

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Reported:
07/31/18 15:17

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: K-22
Received : 06/06/18 14:35 by James Stone
Waterbody Name: MISSISSIPPI RIVER
County: LEE, IA
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: Central
Trip ID: 20180501GPSI
Visit Number: 001
Monitoring Program: Ambient WQMN

Client Sample ID: TOTAL W/ORGANIC
Collected By: MS/TK
Lab Sample ID: **18F0199-01**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 06/06/18 10:00
Sample Fraction: Total
Chlorophyll volume filtered (ml):
Sample Depth:

Total Suspended Solids by Standard Method 2540D

Method: SM 2540D
Prepared: 06/08/18 15:00
Units: mg/L
Analyzed: 06/08/18 15:00

Analyte	Result	Qualifier	Reporting Limit	MDL
Total Suspended Solids	**64**		4	

Volatile Suspended Solids by USEPA Method 160.4

Method: 160.4
Prepared: 06/08/18 15:00
Units: mg/L
Analyzed: 06/12/18 14:06

Analyte	Result	Qualifier	Reporting Limit	MDL
Volatile Suspended Solids *	**10**		4	

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Reported:
07/31/18 15:17

Illinois Environmental Protection Agency Laboratory

825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: K-22
Received : 06/06/18 14:35 by James Stone
Waterbody Name: MISSISSIPPI RIVER
County: LEE, IA
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: Central
Trip ID: 20180501GPSI
Visit Number: 001
Monitoring Program: Ambient WQMN

Client Sample ID: DISSOLVED
Collected By: MS/TK
Lab Sample ID: **18F0199-02**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 06/06/18 10:00
Sample Fraction: Dissolved
Chlorophyll volume filtered (ml):
Sample Depth:

Metals by EPA 200 Series Methods ICP/MS

Method: 200.8
Prepared: 07/06/18 08:28
Units: ug/L
Analyzed: 07/06/18 12:52

Analyte	Result	Qualifier	Reporting Limit	MDL
Aluminum	**294**		50.0	19.8
Arsenic	**1.70**	J	2.00	0.13
Barium	**70.9**		5.00	0.20
Beryllium	ND		1.00	0.68
Boron	**27.4**		10.0	2.27
Cadmium	ND		3.00	0.23
Calcium	**51300**		300	57.2
Chromium	**0.63**	J	5.00	0.21
Cobalt	**0.42**	J	5.00	0.16
Copper	**1.57**	J	5.00	0.27
Iron	**528**		50.0	3.38
Lead	**0.62**	J	5.00	0.17
Magnesium	**20000**		300	23.8
Manganese	**84.9**		5.00	0.13
Nickel	**1.42**	J	5.00	0.56
Potassium	**2880**		1400	23.6
Selenium	ND		5.00	1.18
Silver	ND		3.00	0.04
Sodium	**10400**		300	42.7
Strontium	**120**		5.00	0.21
Vanadium	**2.72**	J	5.00	0.17
Zinc	ND		5.00	4.33

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Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code: K-22
Received : 06/06/18 14:35 by James Stone
Waterbody Name: MISSISSIPPI RIVER
County: LEE, IA
Temperature C: 2.00
Funding Code: WP06
Monitoring Unit: Central
Trip ID: 20180501GPSI
Visit Number: 001
Monitoring Program: Ambient WQMN

Client Sample ID: DISSOLVED
Collected By: MS/TK
Lab Sample ID: **18F0199-02**
Sample Medium: Water
PWS Intake:
Date/Time Collected: 06/06/18 10:00
Sample Fraction: Dissolved
Chlorophyll volume filtered (ml):
Sample Depth:

Phosphorus, All Forms, Colorimetric, Automated, by EPA Method 365.1

Method: EPA 365.1
Prepared: 06/25/18 08:00
Units: mg/L
Analyzed: 06/26/18 17:11

Analyte	Result	Qualifier	Reporting Limit	MDL
Phosphorus as P	**0.150**		0.0050	0.0042

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety. Test results meet all requirements of NELAC (accredited by Florida DOH #E37645). If you have any questions about this report, please contact Tom Weiss, Laboratory Manager, at 217.782.9780.

Reported:
07/31/18 15:17

Illinois Environmental Protection Agency Laboratory
825 N. Rutledge Springfield, Illinois 62702 217.782.9780

LABORATORY RESULTS

Station Code:	K-22			Received :	06/06/18 14:35 by James Stone
Waterbody Name:	MISSISSIPPI RIVER	County:	LEE, IA	Temperature C:	2.00
Funding Code:	WP06			Monitoring Unit:	Central
Trip ID:	20180501GPSI	Visit Number:	001	Monitoring Program:	Ambient WQMN

Notes and Definitions

J3	The reported value failed to meet the established quality control criteria for either precision or accuracy possibly due to matrix effects.
J	Estimated value. The laboratory cannot support the validity of this number. The result is between the method detection limit and the reporting limit.
ND	Analyte NOT DETECTED at or above the method detection limit
*	Non-NELAP accredited

Report Authorized by:

Tom Weiss
Laboratory Manager

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