FINAL REPORT

Lake Carlinville Atrazine Total Maximum Daily Load (TMDL)

IEPA/BOW/13-003

September 2015

Illinois EPA High Priority TMDL Watershed

Public Water Supply Designated Use Impairment

Illinois EPA/ Bureau of Water/Watershed Management Section/Planning Unit

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:

WW-16J

SEP 28 2016

Sanjay Sofat, Chief
Bureau of Water
Illinois Environmental Protection Agency
P.O. Box 19276
Springfield, Illinois 62794-9276

Dear Mr. Sofat:

The U.S. Environmental Protection Agency has conducted a complete review of thirteen final Total Maximum Daily Loads (TMDLs) for eleven atrazine/simazine impaired waters, including supporting documentation and follow up information. The waterbodies are located in southern and west-central Illinois. The TMDLs for atrazine/simazine submitted by the Illinois Environmental Protection Agency address the impaired designated General Use for the waterbodies.

The TMDLs meet the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations at 40 C.F.R. Part 130. Therefore, EPA hereby approves Illinois's thirteen TMDLs for atrazine/simazine as noted in Table 1 of the enclosed decision document. The statutory and regulatory requirements, and EPA' s review of Illinois's compliance with each requirement, are described in the enclosed decision document.

We wish to acknowledge Illinois's effort in submitting these TMDLs and look forward to future TMDL submissions by the State of Illinois. If you have any questions, please contact Mr. Peter Swenson, Chief of the Watersheds and Wetlands Branch, at 312-886-0236.

Sincerely,

Tinka G. Hyde
Director, Water Division

Enclosure

cc: Abel Haile, IEPA

TMDL: Illinois Atrazine/Simazine TMDLs (13)
Date: SEP 28 2016

DECISION DOCUMENT FOR THE APPROVAL OF THE ILLINOIS ATRAZINE/SIMAZINE TMDLS

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. Part 130 describe the statutory and regulatory requirements for approvable TMDLs. Additional information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable. These TMDL review guidelines are not themselves regulations. They are an attempt to summarize and provide guidance regarding currently effective statutory and regulatory requirements relating to TMDLs. Any differences between these guidelines and EPA's TMDL regulations should be resolved in favor of the regulations themselves.

1. Identification of Waterbody, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the waterbody as it appears on the State's/Tribe's 303(d) list. The waterbody should be identified/georeferenced using the National Hydrography Dataset (NHD), and the TMDL should clearly identify the pollutant for which the TMDL is being established. In addition, the TMDL should identify the priority ranking of the waterbody and specify the link between the pollutant of concern and the water quality standard (see section 2 below).

The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the NPDES permits within the waterbody. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of the natural background. This information is necessary for EPA's review of the load and wasteload allocations, which are required by regulation.

The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as:

(1) the spatial extent of the watershed in which the impaired waterbody is located;
(2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;
(4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and
(5) an explanation and analytical basis for expressing the TMDL through *surrogate*

measures, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comment:
Location Description: The Illinois Environmental Protection Agency (IEPA) developed thirteen TMDLs for atrazine or simazine in eight lakes and three rivers in southern and western Illinois. By implementing measures to reduce pollutant loadings, the TMDLs will address impairments of the Public Water Supply Use. Table 1 of this Decision Document identifies the waterbodies addressed by the TMDLs as they appear on the partially approved Illinois 2008 303(d) list, Table 2 of this Decision Document contains the locations of the waterbodies, and Table 3 of this Decision Document contains the waterbody characteristics.

As noted in Table 1 of this Decision Document, the TMDL developed for Farina Lake includes a segment of the East Fork Kaskaskia River; water from the East Fork Kaskaskia River is pumped from the river into Farina Lake to stabilize flows for the drinking water system. IEPA explained that both waterbodies are treated as one integrated system. For the Skillet Creek TMDL, IEPA noted that water is pumped from Skillet Fork into the Wayne City Reservoir, where it is used for the drinking water system. In this situation, IEPA determined that a separate atrazine load would be determined for Skillet Creek and Wayne City Reservoir.

Table 1. Atrazine/Simazine TMDL waterbodies

Waterbody	Segment ID #	Pollutant	Previous TMDL	Previous pollutants addressed
Lake Carlinville	RDG	Atrazine	Macoupin River/Lake Carlinville	Manganese, Phosphorus
Salem City Reservoir	ROR	Simazine	Crooked Creek	Manganese, Phosphorus
Nashville City Reservoir	ROO	Atrazine, Simazine	Crooked Creek	Manganese, Phosphorus
Washington County Lake	RNM	Atrazine, Simazine	Beaucoup Creek	Phosphorus
Farina Lake*	SOB	Simazine	East Fork Kaskaskia River	Manganese, Fecal coliform
Lake Mattoon	RCF	Simazine	Little Wabash River	Phosphorus
Lake Paradise	RCG	Simazine	Little Wabash River	Phosphorus
Wayne City Reservoir	RCT	Atrazine	Skillet Fork	Manganese
Shoal Creek	OI-08	Atrazine	Shoal Creek	Manganese, Fecal coliform
Skillet Fork	CA-05	Atrazine	Skillet Fork	Manganese, Fecal coliform
North Fork Vermilion River	BPG-05	Atrazine	North Fork Vermilion River	Nitrates

* - includes a segment of the East Fork Kaskaskia River (OK 03)

Table 2 Location of the Atrazine/Simazine waterbodies

Waterbody	Location	
Lake Carlinville	Macoupin County,	impoundment of Honey Creek
Salem City Reservoir	Marion County	impoundment of Town Creek
Nashville City Reservoir	Washington County	impoundment of Nashville Creek
Washington County Lake	Washington County	impoundment of Locust Creek
Farina Lake	Fayette and Marion Counties	impoundment of East Fork Kaskaskia River
Lake Mattoon	Coles, Cumberland and Shelby Counties	impoundment of Little Wabash River
Lake Paradise	Coles, Cumberland and Shelby Counties	impoundment of Little Wabash River (upstream of Lake Mattoon)
Shoal Creek	Clinton, Bond and Montgomery Counties	
Skillet Fork/Wayne City Reservoir	Wayne, Clay, Marion and Jefferson Counties	Skillet Fork water pumped into Wayne City Reservoir
North Fork Vermilion River	Vermilion and Iroquois Counties	

Table 3 Atrazine/Simazine TMDL waterbody characteristics

Waterbodies	Surface area (acres)	Average depth (feet)	Maximum depth (feet)	Maximum storage (acre-feet)	Normal storage (acre-feet)	Watershed area (acres)
Lake Carlinville	168	9	17	1,467		15481
Salem City Reservoir	74	10.4	14	900	388	2582
Nashville City Reservoir	42	9.5	12.4	701	400	1007
Washington County Lake	242	13		4232	1404	6188
Farina Lake	4.5		30		108	2903
Lake Mattoon	1010	10.5	35	22,569	11,820	35140
Lake Paradise	176	7.5	19	2834	1350	11494
Wayne City Reservoir*	8	15		201	167	
Shoal Creek						477,000
Skillet Fork/Wayne City Reservoir						387,000
North Fork Vermilion River						149,000

* - lake-specific data

Distribution of land use: The land use for the waterbodies is mainly agricultural in nature, with most of the agricultural land use in row crop (corn/soybean). Rural grasslands and upland forest make up most of the remaining land use (Section 4.1 of each of the TMDLs). Table 4 of this Decision Document contains the land use for the waterbodies.

Table 4 Land use percentage in the Atrazine/Simazine TMDL waterbodies

Waterbody	Agricultural lands	Rural grasslands	Upland forest	Developed	other
Lake Carlinville	65	5	22	1	7
Salem City Reservoir	65		14	6	15
Nashville City Reservoir	81	1	7	7	4
Washington County Lake	64	3	22	5	6
Farina Lake	77			20	3
Lake Mattoon	77		5	7	11
Lake Paradise	77		5	7	11
Shoal Creek	66	3	21	10	
Skillet Fork/Wayne City Reservoir	56	13	25	6	
North Fork Vermilion River	88		5	7	

Population and future growth trends: The population for each of the lake watersheds is fairly small, less than 10,000 people. As the land use in the watersheds is mainly row crop agricultural in nature with little or no urbanization, IEPA does not expect any future growth in the watersheds.

Pollutants of concern: The TMDL submittals state the pollutants addressed in these thirteen TMDLs are atrazine and/or simazine (Table 1 of this Decision Document). Table 5 of this Decision Document lists the exceedances of atrazine and/or simazine.

Table 5 Water quality exceedences in the Atrazine/Simazine TMDL waterbodies

Waterbody	Raw water exceedances	Finished water exceedances	Raw water quarterly exceedances
Lake Carlinville	6 exceedences/84 total samples	16/91	
Salem City Reservoir	1/6		
Nashville City Reservoir Washington County Lake	2/22	0/22	
Farina Lake	28/119	30/119	
Lake Mattoon Lake Paradise	16/97	14/97	
Shoal Creek			1 quarterly exceedance
Skillet Fork/Wayne City Reservoir	17/61		4 quarterly exceedances
North Fork Vermilion River	11/101	5/101	

Sources: Atrazine and simazine are widely used herbicides, used in particular on corn to control broadleaf and grassy weeds. It is sprayed on crops during the spring and summer months, where it is absorbed into weeds and stops photosynthesis. It generally breaks down in soil, but moisture delays the degradation. The half-life of atrazine in soils is about 146 days and the half-life of simazine is about 91 days. In water, atrazine has a half-life of 742 days, and simazine has a half-life of 664 days. Although there are strict requirements for usage, atrazine and simazine can still wash off the plants and soil during rain events and enter local waterbodies. This runoff can be exacerbated by agricultural drainage tiles. Research into the health effects of atrazine and simazine is ongoing, but they are regulated contaminants under the Safe Drinking Water Act. IEPA determined that the source of atrazine and simazine for all the waterbodies is nonpoint runoff from agricultural fields, and that none of the point sources in the watersheds are a source of atrazine and simazine.

Priority Ranking: Since these waterbodies are used as drinking water sources, these TMDLs have been given a high priority ranking by IEPA.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this first element.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. (40 C.F.R. §130.7(c)(1)). EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

The TMDL submittal must identify a numeric water quality target(s) - a quantitative value used to measure whether or not the applicable water quality standard is attained. Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as Dissolved Oxygen (DO) criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

Comment:
Designated Use/Standards: Section 4 of each of the TMDLs states that the waterbodies are drinking water sources and are not meeting the Public and Food Processing Water Supplies designation. The applicable water quality standards (WQS) for these waterbodies are established in Illinois Administrative Rules Title 35, Environmental Protection; Subtitle C, Water Pollution; Chapter I, Pollution Control Board; Part 302, Water Quality Standards, Subpart C for Public and Food Processing Water Supplies.

IEPA does not have an in-stream criterion for atrazine. The Maximum Contaminant Level (MCL) for atrazine is **3 µg/L** and for simazine is **4 µg/L**. The MCLs apply to finished water (i.e., water that has been treated and is ready for consumption) and is based upon a rolling 4-quarter average. Since there is only limited removal of atrazine or simazine from raw water, IEPA uses an assessment guideline for raw water to determine impairment of the Public and Food Processing Water Supplies use. Since atrazine and simazine are used in the spring and summer months, a rolling spring-summer quarterly average is used, and is compared to the

MCL. In addition, any exceedence greater than 4 times the MCL (i.e., 12 µg/L for atrazine) will also indicate an impairment (Section 4 of the TMDLs).

Target: The water quality target for atrazine for these TMDLs is **3 µg/L,** and for simazine is **4 µg/L**. These targets apply to either the finished water (end of pipe) or as a quarterly average for raw water.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this second element.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a waterbody for the applicable pollutant. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

The pollutant loadings may be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. §130.2(i)). If the TMDL is expressed in terms other than a daily load, e.g., an annual load, the submittal should explain why it is appropriate to express the TMDL in the unit of measurement chosen. The TMDL submittal should describe the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

The TMDL submittal should contain documentation supporting the TMDL analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

TMDLs must take into account *critical conditions* for steam flow, loading, and water quality parameters as part of the analysis of loading capacity. (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable *critical conditions* and describe their approach to estimating both point and nonpoint source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

Comment:
Loading capacity: The loading capacities were calculated for each of the waterbodies, and are found in Section 6 of the TMDL documents and Table 4 below.

Lakes:
For the lakes listed in Table 1 of this Decision Document, the process used to determine the loading capacity for atrazine and simazine was a simple loading capacity calculation. The volume of each lake was multiplied by the target for atrazine (3 µg/L) or simazine (4 µg/L) to calculate the loading capacity of the lake. For example, the Lake Mattoon loading capacity was calculated using the equation below:

Load Capacity = maximum storage (7335 MG) x 0.0004 mg/L simazine x 2.2 lbs/kg x 3.785 L/gal

After converting the units, the loading capacity is 245 lbs. Table 8 of this Decision Document shows the lake volume used for each lake and the resulting lake loading capacity.

Table 6 Atrazine/Simazine Lake TMDL Summary

		Lake Carlinville	Salem City Reservoir	Nashville City Reservoir	Washington County Lake	Farina Lake	Lake Mattoon	Lake Paradise	Wayne City Reservoir
Maximum lake storage (MG)*		478 MG	293 MG	228 MG	1379 MG	35 MG	7355 MG	924 MG	53.4
Load allocation	atrazine	12 lbs/d	**	5.7 lbs/d	34 lbs/d	**	**	**	1.3 lbs/d
	simazine	**	9.8 lbs/d	7.6 lbs/d	46 lbs/d	1.2 lbs/d	245 lbs/d	31 lbs/d	**
Wasteload allocation		0	0	0	0	0	0	0	0
Margin of Safety (MOS)		Implicit							
Loading capacity (maximum)	atrazine	**12** lbs/day	**	**5.7** lbs/d	**34** lbs/d	**	**	**	**1.3** lbs/d
	simazine	**	**9.8** lbs/d	**7.6** lbs/d	**46** lbs/d	**1.2** lbs/d	**245** lbs/d	**31** lbs/d	
Estimated reduction from existing loads		74.9%	55%	79% atrazine 76% simazine	79% atrazine 76% simazine	43%	52%	52%	70%

* MG = million gallons
** - no TMDL

Rivers:
For the rivers listed in Table 1 of this Decision Document, IEPA calculated loads based upon the in-stream atrazine concentrations. The concentration (mg/L), multiplied by the flow (mgd) and the standard conversion factor of (8.34), resulted in loads of atrazine (Page 19 of the TMDL). These loads were then compared to the load based upon the WQS of 3 μg/L (Tables 7, 9, 11 below). The needed reduction was calculated for each impaired river. The TMDL is based upon the atrazine criteria of 3 μg/L; the loads depend upon the waterbodies flows as noted below. IEPA calculated loads using the load duration curve process (USEPA, 2007), and Purdue University Web-Based calculation tool (refer to: https://engineering.purdue.edu/wldc/. The data used for the load duration curve calculation is presented in Appendix A of this report. To clarify the loading capacity presented in the report (Table 8 of the TMDLs), the EPA is providing calculations in Table 8 demonstrating what the loading capacity is at additional river flows. This is also repeated for the other two river TMDLs (Tables 10 and 12).

Table 7 North Fork Vermilion River Atrazine TMDL summary

Date	Atrazine Actual conc. (µg/L)	River flow (adjusted) cf/s	Actual Load (lbs/day)	Waste-load Allocation	Load Allocation (lbs/day)	TMDL (lbs/day)	Reduction (%)
05/20/09	10.4	760	42.5	0	12.3	12.3	71
6/9/09	3.94	256	5.4	0	4.1	4.1	24
04/25/11	5.38	1122	32.5	0	18.1	18.1	44
05/16/11	10.48	503	28.4	0	8.1	8.1	71
05/31/11	4.95	1058	28.2	0	17.1	17.1	39
05/20/09	11.2	760	45.8	0	12.3	12.3	73
05/27/09	6.25	257	8.6	0	4.1	4.1	52
06/01/09	4.59	175	4.3	0	2.8	2.8	35
06/09/09	9.3	256	12.8	0	4.1	4.1	68
06/15/09	4.84	214	5.6	0	3.5	3.5	38
04/25/11	4.69	1122	28.3	0	18.1	18.1	36
05/10/11	13.08	281	19.7	0	4.5	4.5	77
05/16/11	10.67	503	28.9	0	8.1	8.1	72
05/24/11	6.08	213	7.0	0	3.4	3.4	51
05/31/11	8.4	1058	47.8	0	17.1	17.1	64
06/06/11	4.64	330	8.2	0	5.3	5.3	35
					Average Reduction		53
					Maximum Reduction		77

Table 8 Additional Atrazine flow/load calculations for North Fork Vermilion River

Flow cf/s	Load capacity lbs/d
1	0.016
10	0.161
25	0.405
50	0.809
100	1.62
175	2.83
250	4.05
500	8.09
1000	16.2
1250	19.5

Table 9 Skillet Fork Atrazine TMDL summary

Date	Atrazine Actual conc. (ug/L)	River flow (adjusted) cf/s	Actual Load (lb/day)	Waste-load Allocation	Load Allocation (lb/day)	TMDL (lb/day)	Reduction (%)
05/04/09	3.30	1260	22.4	0.0	20.3	20.3	9.4
05/26/09	20.50	1840	203.0	0.0	29.7	29.7	85.4
06/01/09	4.07	159	3.5	0.0	2.6	2.6	26.3
06/03/09	7.6	491	20.1	0.0	7.9	7.9	60.5
06/15/09	8.95	508	24.5	0.0	8.2	8.2	66.5
06/29/09	3.68	21	0.4	0.0	0.3	0.3	18.5
07/06/09	20.60	160	17.7	0.0	2.6	2.6	85.4
07/08/09	4.2	52	1.2	0.0	0.8	0.8	28.6
07/13/09	5.16	1430	39.7	0.0	23.1	23.1	41.9
04/26/10	17.02	315	28.9	0.0	5.1	5.1	82.4
06/07/10	31.70	78	13.3	0.0	1.3	1.3	90.5
06/14/10	8.34	88	3.9	0.0	1.4	1.4	64.0
06/21/10	4.59	267	6.6	0.0	4.3	4.3	34.6
06/28/10	3.88	8.9	0.2	0.0	0.1	0.1	22.7
05/26/11	27	1930	280.4	0.0	31.2	31.2	88.9
05/31/11	9.23	128	6.4	0.0	2.1	2.1	67.5
06/06/11	5.81	24	0.8	0.0	0.4	0.4	48.4
06/13/11	32.83	657	116.1	0.0	10.6	10.6	90.9
06/20/11	5.09	5310	145.5	0.0	85.7	85.7	41.1
06/27/11	4.79	2820	72.7	0.0	45.5	45.5	37.4
					Average Reduction		55
					Maximum Reduction		90.9

Table 10 Additional Atrazine flow/load calculations for Skillet Fork

Flow cf/s	Load capacity lbs/d
10	0.161
25	0.405
50	0.809
100	1.62
175	2.83
250	4.05
500	8.09
1000	16.2
1250	19.5
1500	24.3
2000	32.4
5000	80.9

Table 11 Shoal Creek Atrazine TMDL summary

Date	Atrazine Actual conc. (ug/L)	River flow (adjusted) cf/s	Actual Load (lb/day)	Waste-load Allocation	Load Allocation (lb/day)	TMDL (lb/day)	Reduction (%)
05/27/09	19	2190	223	0	35	35	84
05/24/10	4.7	591	15	0	10	10	33
					Average Reduction		59
					Maximum Reduction		84

Table 12 Additional Atrazine flow/load calculations for Shoal Creek

Flow cf/s	Load capacity lbs/d
10	0.161
25	0.405
50	0.809
100	1.62
175	2.83
250	4.05
500	8.09
1000	16.2
1250	19.5
1500	24.3
2000	32.4

Critical condition:
The critical condition for atrazine was identified as the spring/summer growing season, based upon analysis of the sampling data. This would correspond to the time period when application of atrazine to the farm fields would occur.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this third element.

4. Load Allocations (LAs)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Where possible, load allocations should be described separately for natural background and nonpoint sources.

Comment:
The LAs for the waterbodies are found in Tables 6, 7, 9, and 11 of this Decision Document. Since IEPA determined there are no point sources of atrazine or simazine, all the loading capacity was allocated to the load allocation. The source of atrazine in the two watersheds is nonpoint source runoff from row crop agricultural fields.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this fourth element.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit.

The individual WLAs may take the form of uniform percentage reductions or individual mass based limitations for dischargers where it can be shown that this solution meets WQSs and does not result in localized impairments. These individual WLAs may be adjusted during the NPDES permitting process. If the WLAs are adjusted, the individual effluent limits for each permit issued to a discharger on the impaired water must be consistent with the assumptions and requirements of the adjusted WLAs in the TMDL. If the WLAs are not adjusted, effluent limits contained in the permit must be consistent with the individual WLAs specified in the TMDL. If a draft permit provides for a higher load for a discharger than the corresponding individual WLA in the TMDL, the State/Tribe must demonstrate that the total WLA in the TMDL will be achieved through reductions in the remaining individual WLAs and that localized impairments will not result. All permittees should be notified of any deviations from the initial individual WLAs contained in the TMDL. EPA does not require the establishment of a new TMDL to reflect these revised allocations as long as the total WLA, as expressed in the TMDL, remains the same or decreases, and there is no reallocation between the total WLA and the total LA.

Comment:
IEPA stated there are no known point sources of atrazine in the watersheds. The WLA is 0 for all of the atrazine/simazine TMDLs.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this fifth element.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

Comment:
IEPA uses an implicit MOS for the atrazine/simazine TMDLs. The MOS is provided within the TMDL calculation. The ultimate goal of these TMDLs is to reduce the levels of atrazine/simazine in drinking water.

In addition to the reduction of atrazine/simazine into the waterbodies, atrazine/simazine can be partially removed from raw drinking water as part of the drinking water treatment process. Several of the drinking water facilities (i.e., Carlinville, Mattoon) use activated carbon to remove/reduce atrazine/simazine in finished water. This treatment process will be used until attainment of the TMDL reductions and the raw water atrazine levels attain the TMDL goals. Thus, basing the TMDL on meeting the atrazine MCL in raw water prior to treatment, should ensure that the MCL is met following treatment. In addition, the atrazine/simazine loads are likely overestimated based upon the procedure used to assess drinking water use (rolling quarterly average) as compared to the concentration times flow loading calculation. An average by definition includes values above and below the final average value. IEPA applied the WQS for atrazine and simazine as "not to exceed" values, which is more restrictive when calculating load reductions.

EPA finds that the TMDL document submitted by IEPA has an appropriate implicit MOS satisfying all requirements concerning this sixth element.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variations. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

Comment:
The sampling data shows that exceedences occur in the spring and summer, when atrazine/simazine are applied in the fields. IEPA properly accounted for seasonality for the TMDLs by using the spring-summer rolling average in calculating the TMDL, when atrazine and simazine values are at their highest, and exceedences most common.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this seventh element.

8. Reasonable Assurances

When a TMDL is developed for waters impaired by point sources only, the issuance of a National Pollutant Discharge Elimination System (NPDES) permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with "the assumptions and requirements of any available wasteload allocation" in an approved TMDL.

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur, EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

EPA's August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by nonpoint sources. However, EPA cannot disapprove a TMDL for nonpoint source-only impaired waters, which do not have a demonstration of reasonable assurance that LAs will be achieved, because such a showing is not required by current regulations.

Comment:
Section 9 of the TMDL documents discusses the reasonable assurance. Reasonable assurance does not strictly apply to the atrazine/simazine TMDLs, as there are no point sources

contributing to the impairment. However, IEPA provided information on potential controls of atrazine that will be targeted to the watersheds.

Atrazine is a restricted use pesticide, which can only be applied by certified applicators. The Illinois Department of Agriculture (IDA) administers the certification process, which includes training and testing for both private and commercial applicators. IDA maintains a list of best management practices (BMPs) for the use of atrazine/simazine to minimize the runoff and loss.

All of the waterbodies have TMDLs already approved for other pollutants, mainly total phosphorus (TP) and fecal coliform. Many of the BMPs for controlling TP and fecal coliform will also help control atrazine and simazine. For all these pollutants, controlling field runoff is critical to reduce pollutant loading into the waterbodies. Such BMPs as no-till cultivation, buffer strips, and riparian buffers will slow water movement and allow TP, fecal coliform, and atrazine/simazine to either settle out or degrade before entering a waterbody.

As noted previously in the Margin of Safety section of this Decision Document, the ultimate goal of these TMDLs is to reduce the levels of atrazine and simazine in drinking water. As part of the drinking water treatment process, atrazine can be partially removed from raw drinking water. In 2012, the maker of atrazine, Syngenta, settled a lawsuit regarding atrazine in numerous drinking water sources in the Midwest. (Section 7 of the TMDLs). A Settlement Fund of $15 million was set up for Illinois water suppliers that were part of the class-action suit. These funds are available for water systems to upgrade water treatment systems.

EPA finds that this criterion has been adequately addressed.

9. Monitoring Plan to Track TMDL Effectiveness

EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur. Such a TMDL should provide assurances that nonpoint source controls will achieve expected load reductions and, such TMDL should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring and leading to attainment of water quality standards.

Comment:
The TMDL submittals contain discussion on future monitoring (Section 7.3 of the TMDLs). Monitoring will occur as part of the drinking water program, which requires quarterly monitoring of finished water. Although not required, raw water is also monitored by the drinking water systems, to determine the necessary level of treatment. IEPA also monitors the lakes at least every three years to determine if the lakes are meeting the Public and Food Processing Water Supply use.

EPA finds that this criterion has been adequately addressed.

10. Implementation

EPA policy encourages Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired by nonpoint sources. Regions may assist States/Tribes in developing implementation plans that include reasonable assurances that nonpoint source LAs established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. In addition, EPA policy recognizes that other relevant watershed management processes may be used in the TMDL process. EPA is not required to and does not approve TMDL implementation plans.

Comment:
A summary of potential implementation activities are in the TMDL submittals. IEPA has already developed implementation plans for TP and fecal coliform for these waterbodies from previous TMDL efforts. As discussed previously, many of these BMPs will address atrazine and simazine as well. IEPA provided a number of programs that could be used to address the reductions needed, primarily through support of BMPs to control TP and TSS. These include the Clean Water Act Section 319 grants. Numerous programs administered by the US Department of Agriculture are also available, including the Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP), and Environmental Quality Incentive Program (EQIP). IEPA provided the contacts for various local offices that administer the programs.

EPA reviews, but does not approve, implementation plans. EPA finds that this criterion has been adequately addressed.

11. Public Participation

EPA policy is that there should be full and meaningful public participation in the TMDL development process. The TMDL regulations require that each State/Tribe must subject calculations to establish TMDLs to public review consistent with its own continuing planning process (40 C.F.R. §130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval should describe the State's/Tribe's public participation process, including a summary of significant comments and the State's/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R. §130.7(d)(2)).

Provision of inadequate public participation may be a basis for disapproving a TMDL. If EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

Comment:
The public comment period for the draft TMDLs opened on the dates as listed in Table 13 of this Decision Document. In general, the public comment periods were held in late 2013 and early 2014. Public meetings were held for all the draft TMDLs, on the dates listed below. The public notices were published in local newspapers as appropriate, and interested individuals and organizations received copies of the public notice. A hard copy of the TMDLs were made available at public locations in the TMDL watershed (i.e., local library, City Hall), and was also

available upon request. The draft TMDLs were also made available at the website http://www.epa.state.il.us/water/tmdl/.

Table 13 Public notice dates

TMDL	Public Notice period	Public Meeting date
Lake Carlinville	September 10-October 10, 2013	September 10, 2013
Salem City Reservoir	September 19-Oct. 21, 2013	September 19, 2013
Nashville City Reservoir	October 16 – Nov. 15, 2013	October 16, 2013
Washington County Lake	October 16 – Nov. 15, 2013	October 16, 2013
Farina Lake/ East Fork Kaskaskia River	November 7-Dec 9, 2013	November 7, 2013
Lake Mattoon	September 26 - October 30, 2013	September 26, 2013
Lake Paradise	September 26 - October 30, 2013	September 26, 2013
Shoal Creek	November 19-Dec. 19, 2013	November 19, 2013
Skillet Fork/ Wayne City Reservoir	January 28-February 28, 2014	January 28, 2014
North Fork Vermilion River	November 6-Dec 6, 2013	November 6, 2013

Comments were submitted by Syngenta and the Illinois Farm Bureau (IFB) on all of the TMDLs. Most of the Syngenta comments were technical in nature, and involved the adequacy of the sampling data or the health risks from atrazine. The IFB comments were also similar for each waterbody, and concerned how existing BMPs were considered in the TMDL.

Syngenta: Syngenta questioned the accuracy of the MCL for atrazine, and questioned how the MCL was developed. IEPA stated that the MCL is not only set by the State but also by the EPA, and that there are more appropriate venues to update MCLs. Several questions were raised regarding the amount and age of the atrazine sampling data, and that the data used in the TMDL did not reflect current conditions in the waterbodies. IEPA responded that the TMDLs used the latest data available that had been reviewed for quality assurance procedures. IEPA also noted that data from 2012 was informally reviewed, and did not indicate a change in the impairment status of the waterbodies. Syngenta also noted that the MOS was actually extremely high, based upon numerous conservative assumptions in the frequency of exceedence criterion, single sample concentration loading criterion, average of exceedences, and rounding of results, as well as the inherent safety factor incorporated by the USEPA in the development of the MCL. IEPA noted that the MCL is not subject to change in the TMDL, and other avenues are available for pursue a change in the MCL. As cited by both IEPA and Syngenta, there is ongoing work by the USEPA Drinking Water program, as well as atrazine and simazine reregistration by the USEPA. Additional information is also available from the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), as well as the Scientific Advisory Panel, atrazine and simazine toxicity from the Agency for Toxic Substances and Disease Registry (ATSDR) and atrazine and simazine studies by the United States Geological Survey.

IFB: Comments were also received from the IFB questioning whether implementation activities that were developed after the 2007 approval of the existing TMDLs were accounted for in the atrazine and simazine TMDLs. The IFB requested IEPA assess the impacts of the various phosphorus and sediment BMPs used in the watersheds, and include the effects of these BMPs on atrazine and simazine loads to determine if the TMDLs were actually needed. IEPA noted that several BMPs have been implemented in the watersheds, and were discussed in the TMDL documents. IEPA also noted that while these BMPs should have an impact on atrazine and simazine levels in the waterbodies, the impacts cannot be quantified until the next assessment cycle, and therefore the TMDLs will proceed.

EPA carefully reviewed the comments and IEPA's responses, and finds that IEPA appropriately addressed the submitted comments. EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this eleventh element.

12. Submittal Letter

A submittal letter should be included with the TMDL submittal, and should specify whether the TMDL is being submitted for a *technical review* or *final review and approval*. Each final TMDL submitted to EPA should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the waterbody, and the pollutant(s) of concern.

Comment:
On September 9, 2015, EPA received the Illinois atrazine/simazine TMDLs as noted in Table 1 of this Decision Document, and a submittal letter. In the submittal letter, IEPA stated it was submitting the TMDL reports for EPA's final approval. The submittal letter included the names and locations of the waterbodies and the pollutants of concern.

EPA finds that the TMDL document submitted by IEPA satisfies all requirements concerning this twelfth element.

Conclusion
After a full and complete review, EPA finds that the TMDLs for the waters listed in Table 1 of this Decision Document satisfy all of the elements of approvable TMDLs. This approval is for a total of thirteen atrazine and/or simazine TMDLs for eleven waterbodies (eight lakes and three rivers).

EPA's approval of this TMDL does not extend to those waters that are within Indian Country, as defined in 18 U.S.C. Section 1151. EPA is taking no action to approve or disapprove TMDLs for those waters at this time. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.

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EXECUTIVE SUMMARY

The objective of this draft report is to provide information that will be used to support a Total Maximum Daily Load (TMDL) development process for Atrazine in Lake Carlinville watershed.

Background

Section 303(d) of the 1972 Clean Water Act requires States to define impaired waters and identify them on a list which is referred to as the 303(d) list. The State of Illinois recently issued the 2012 303(d) list, which is available on the web at: http:// www.epa.state.il.us/water/tmdl/303d-list.html. Section 303(d) of the Clean Water Act and EPA's Water Quality Planning and Management Regulations (40 CFR Part 130) require states to develop Total Maximum Daily Loads (TMDLs) for water bodies that are not meeting designated uses under technology-based controls. The Clean Water Act requires that a TMDL be completed for each pollutant listed for an impaired waterbody. A TMDL is a report that is submitted by the States to the EPA.

TMDL Process

The TMDL process 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 (USEPA, 1991).

The Illinois EPA will be working with stakeholders to implement the necessary controls to improve water quality in the impaired waterbodies and meet water quality standards. It should be noted that the controls for nonpoint sources (e.g., agriculture) will be strictly voluntary.

Methods

The information presented in this report was gathered from previously approved TMDL Report (2007 Report) for the watershed, and includes: 1) collection of information for detailed watershed characterization; 2) development of a water quality database and data analyses; and 3) synthesis of the watershed characterization information and the data analysis results to confirm the sufficiency of the data to support both the listing decision and the sources of impairment that are included on the 2014 303(d) list of impaired waterbodies.

Results

Based on work completed to date, Illinois EPA has concluded that TMDL is warranted for Lake Carlinville to address Atrazine impairment in the watershed as discussed below:

- For **Carlinville Lake (RDG),** data are sufficient to support the causes listed on the 2014 303(d) list for Atrazine and TMDL is warranted. Potential sources of Atrazine impairment include agricultural runoff, and crop production.

Section 1. Goals and Objectives for Lake Carlinville Watershed

1.1 Total Maximum Daily Load (TMDL) Overview

A Total Maximum Daily Load, or TMDL, is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards. TMDLs are a requirement of Section 303(d) of the Clean Water Act (CWA). To meet this requirement, the Illinois Environmental Protection Agency (Illinois EPA) must identify water bodies not meeting water quality standards and then establish TMDLs for restoration of water quality. Illinois EPA lists water bodies not meeting water quality standards every two years. This list is called the 303(d) list and water bodies on the list are then targeted for TMDL development.

In general, a TMDL is a quantitative assessment of water quality problems, contributing sources, and pollution reductions needed to attain water quality standards. The TMDL specifies the amount of pollution or other stressor that needs to be reduced to meet water quality standards, allocates pollution control or management responsibilities among sources in a watershed, and provides a scientific and policy basis for taking actions needed to restore a water body.

Water quality standards are laws or regulations that states authorize to enhance water quality and protect public health and welfare. Water quality standards provide the foundation for accomplishing two of the principal goals of the CWA. These goals are:

- Restore and maintain the chemical, physical, and biological integrity of the nation's waters
- Where attainable, to achieve water quality that promotes protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water

Water quality standards consist of three elements:

- The designated beneficial use or uses of a water body or segment of a water body
- The water quality criteria necessary to protect the use or uses of that particular water body
- An antidegradation policy

Examples of designated uses are recreation and protection of aquatic life. Water quality criteria describe the quality of water that will support a designated use. Water quality criteria can be expressed as numeric limits or as a narrative statement. Antidegradation policies are adopted so that water quality improvements are conserved, maintained, and protected.

1.2 TMDL Goals and Objectives for Lake Carlinville Watershed

The Illinois EPA has a three-stage approach to TMDL development. The stages are:

- Stage 1 – Watershed Characterization, Data Analysis, Methodology Selection
- Stage 2 – Data Collection (optional)
- Stage 3 – TMDL Analysis, TMDL Scenarios, Implementation Plan

The impaired water body in the watershed is Lake Carlinville (RDG). This impaired water body segment is shown on Figure 1. Table 1. lists the water body ID, water body size, and potential causes of impairment for the water body (IEPA 2014).

Table 1. Impairments in Lake Carlinville

Water Body ID	Water Body Name	Size	Causes of Impairment with Numeric Standards/ MCL	Causes of Impairment with Assessment Guidelines
RDG	Lake Carlinville	168 acres	**Atrazine**	Mercury

This TMDL applies to atrazine only

A previous TMDL for aquatic algae, manganese, total phosphorus and total suspended solids was approved in September of 2007. The final TMDL for the Macoupin River/ Lake Carlinville Watershed is available at http://www.epa.state.il.us/water/tmdl/report/macoupin/macoupin-final-report2.pdf. Information from the approved TMDL was used for this TMDL. Data and information is also taken from the *Watershed Plan and Phase 1 Diagnostic/Feasibility Study of Lake Carlinville, Macoupin County, Illinois* (IEPA 2007). This study was prepared using 319 Nonpoint Source funds and can be found at this website- http://www.epa.state.il.us/water/tmdl/implementation/macoupin-creek/lake-carlinville-phase1-study.pdf. This current TMDL report will focus on atrazine only. Atrazine has been listed in the Draft 2012 Illinois Integrated Water Quality Report (IR) as a potential cause of impairment in Lake Carlinville.

The TMDL for the segments listed above will specify the following elements:

- Loading Capacity (LC) or the maximum amount of pollutant loading a water body can receive without violating water quality standards
- Waste Load Allocation (WLA) or the portion of the TMDL allocated to existing or future point sources
- Load Allocation (LA) or the portion of the TMDL allocated to existing or future nonpoint sources and natural background
- Margin of Safety (MOS) or an accounting of uncertainty about the relationship between pollutant loads and receiving water quality

These elements are combined into the following equation:

$$\textbf{TMDL} = \textbf{LC} = \Sigma\textbf{WLA} + \Sigma\textbf{LA} + \textbf{MOS}$$

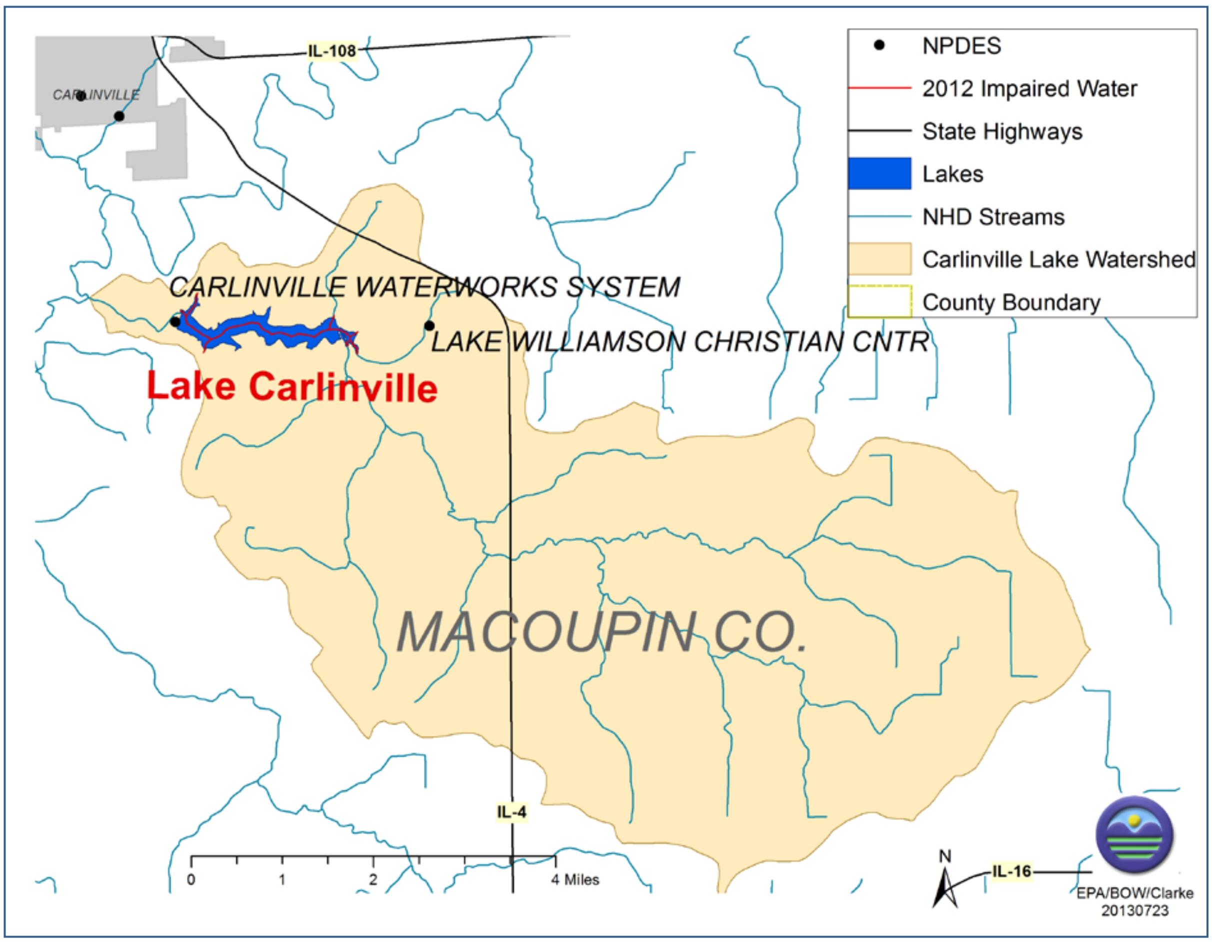
The TMDL developed must also take into account the seasonal variability of pollutant loads so that water quality standards are met during all seasons of the year. An allowance for increased atrazine loading (reserve capacity) was not included in this TMDL. Lake Carlinville is a drinking water source and atrazine is a chemical of concern; therefore, it is unlikely that changes to Lake Carlinville would result in an increased assimilative capacity of the lake. Reasonable assurance that the TMDL will be achieved is described in the implementation plan. The implementation plan for Lake Carlinville watershed describes how water quality standards will be attained. This implementation plan includes recommendations for implementing best management practices (BMPs) and cost estimates.

Section 2. Lake Carlinville Watershed Description

2.1 Lake Carlinville Watershed Location

Lake Carlinville watershed (Figure 1) is located in southwestern Illinois, trends in a northwesterly direction, and drains approximately 15,481 acres within the state of Illinois. The watershed covers land within Macoupin County.

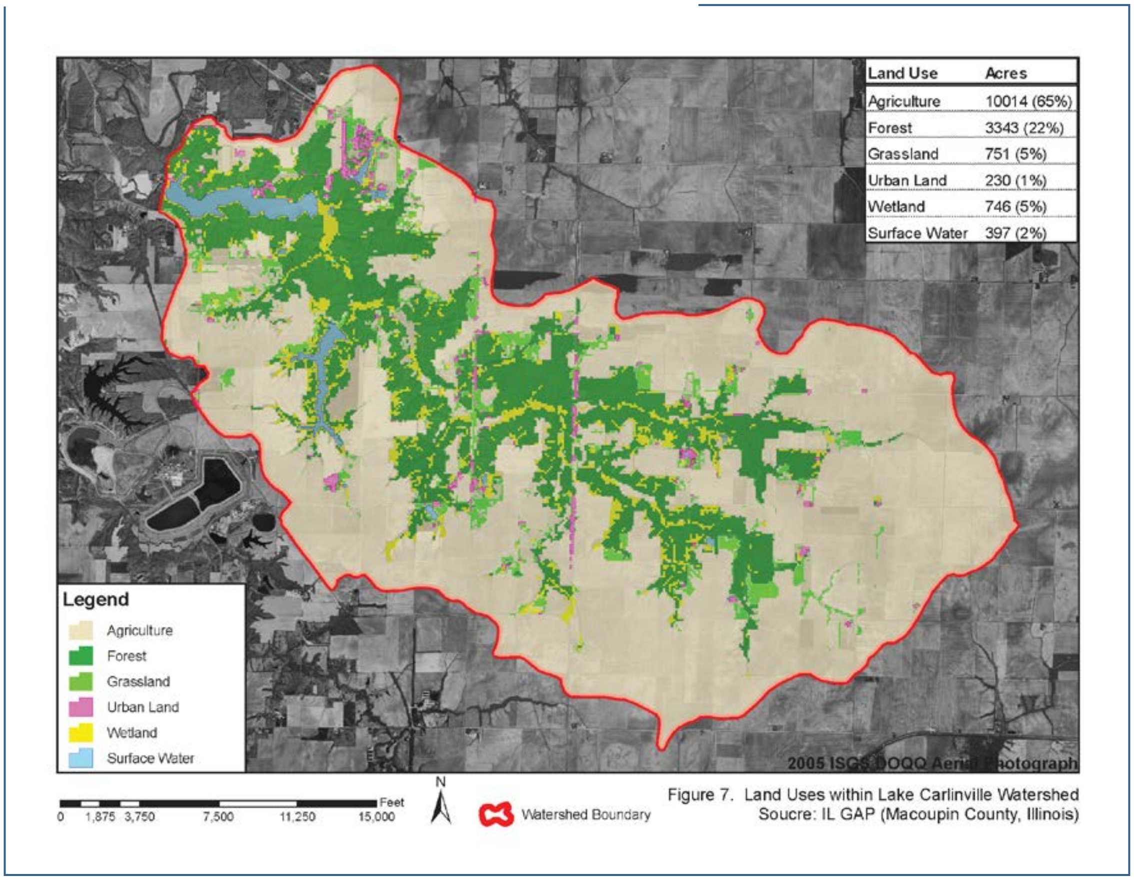
Figure 1. Lake Carlinville Watershed



2.2 Land Use

Land use information was taken from the 319 watershed plan and phase 1 study (IEPA 2007). The land cover (Figure 2.) data reveal that approximately 65 percent are devoted to agricultural activities. Other land uses include forest (22%), grassland (5%), wetland (5%), surface water (2%) and urban (1%). Using the 2002 USGS Landsat shapefile, approximately 30 percent of the agricultural landuse is corn cropland. According to the 2013 Illinois Cropland Data layer produced by the USDA National Agricultural Statistics Service (http://www.nass.usda.gov/research/Cropland/metadata/metadata_il11.htm), 39% of the crops in Lake Carlinville watershed are corn.

Figure 2. Landuse in the Carlinville Lake Watershed (IEPA 2007)



Tillage practices can be categorized as conventional till, reduced till, mulch-till, and no-till. The percentage of each tillage practice for corn, soybeans, and small grains by county are generated by the Illinois Department of Agriculture from County Transect Surveys. The most recent survey with county statistics was conducted in 2013 (IDOA 2013). Past survey information was also included from the 2004 and 2011 surveys (IDOA 2004 and 2011). Data specific to Lake Carlinville watershed were not available; however, the Macoupin County practices were available and are shown in the following table.

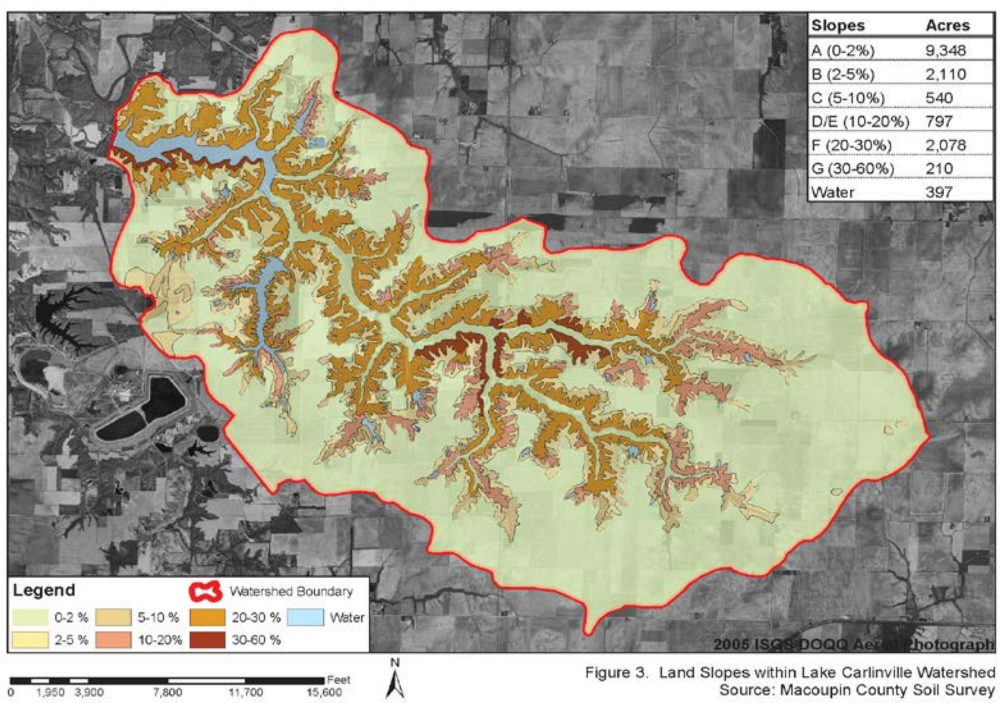
Table 2. Corn Crop Tillage Practices in Macoupin County

	Corn		
Tillage System	**2004**	**2011**	**2013**
Conventional	72%	74%	75%
Reduced - Till	19%	17%	20%
Mulch - Till	8%	6%	2%
No - Till	2%	4%	2%

2.4 Soils

Soil information (Figure 3.) was taken from the 319 watershed plan (IEPA 2007). The major soil types in the watershed are Hickory-Marine Hosmer and Herrick-Piasa-Virden Associations. The Hickory-Marine-Hosmer Association consist of nearly level to steep, well drained to somewhat poorly drained, moderately permeable, slowly permeable or very slowly permeable soils formed in glacial till or in loess; on uplands. The Herrick-Piasa-Virden Association consist of nearly level, somewhat poorly drained and poorly drained, moderately permeable soils formed in alluvium; on flood plains.

Figure 3. Land Slopes in Lake Carlinville Watershed (IEPA 2007)



Section 3. Public Participation and Involvement

3.1 Lake Carlinville Watershed Public Participation and Involvement

Public knowledge, acceptance, and follow through are necessary to implement a plan to meet recommended TMDLs. It is important to involve the public as early in the process as possible to achieve maximum cooperation and counter concerns as to the purpose of the process and the regulatory authority to implement any recommendations.

Illinois EPA held a public meeting to present the TMDL for Lake Carlinville watershed on September 10, 2013 in Carlinville. The public comments have been addressed and included in Appendix A. of this document.

Section 4. Lake Carlinville Watershed Water Quality Standards

4.1 Illinois Water Quality Standards

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. See Table 3. for assessment guidelines.

Table 3. Guidelines for Assessing Public Water Supply in Waters of the State (IEPA 2012)

Degree of Use Support	**Guidelines**
Fully Supporting (Good)	For each substance in untreated water [(1)], 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 [(2)]; 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[(3)] for that substance; and ii) no quarterly average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[(3)] for that substance; and iii) no running annual average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[(4)] for that substance. and [(4)], For each substance in treated water, no violation of an applicable Maximum Contaminant Level [(3)] occurs during the most recent three years of readily available data.
Not Supporting (Fair)	For any single substance in untreated water, [(1)] 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 [(2)]; 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[(3)] for that substance; or ii) the quarterly average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[(3)] for that substance; or iii) the running annual average concentration exceeds the treated-water Maximum Contaminant Level threshold concentration[(3)] 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).

One of the assessment guidelines for untreated water relies on a frequency-of-exceedance threshold (10%) 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.

Table 3 present the MCL for the cause of impairment for Lake Carlinville. EPA has set an enforceable regulation for atrazine at 0.003 mg/L or 3µg/L. MCLs are from 35 Ill. Adm. Code 611, Subpart F: MCLs and Maximum Residual Disinfectant Levels (MRDLs). The MCL is the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology. If a facility exceeds the MCL, the facility must immediately investigate treatment options to reduce the level of the contaminant in the water supply. The MCLG or maximum contaminant level goal is the level of a contaminant in drinking water below which there is no known or expected risk to health. Some people who drink water containing atrazine well in excess of the MCL for many years could experience problems with their cardiovascular system or reproductive difficulties. For more information see the EPA website at http://water.epa.gov/drink/contaminants/basicinformation/atrazine.cfm. One of the primary ways that atrazine can affect your health is by altering the way that the reproductive system works (ATSDR 2003). Data regarding the health effects of atrazine in humans are limited and the bulk of the available toxicity data is from oral exposure studies in animals (ATSDR 2003).

Table 4. MCL for Lake Carlinville Impairment

Parameter	Units	Public and Food Processing Water Supplies
Atrazine	µg/L	3 µg/L (Maximum Contaminant Level)

µg/L = micrograms per liter

4.2 Designated Uses

The waters of Illinois are classified by designated uses, which include: General Use, Public and Food Processing Water Supplies, Lake Michigan, and Secondary Contact and Indigenous Aquatic Life Use. The designated use applicable to the Lake Carlinville Watershed is the Public and Food Processing Water Supplies Use. Water from Lake Carlinville is used as the water supply for the town of Carlinville.

The Public and Food Processing Water Supplies Use is defined by IPCB as standards that "are cumulative with the general use standards of Subpart B and must be met in all waters designated in Part 303 at any point at which water is withdrawn for treatment and distribution as a potable supply or for food processing."

4.3 Potential Pollutant Sources

In order to properly address the conditions within Lake Carlinville watershed, potential pollution sources must be investigated for the pollutants where TMDLs will be developed.

Table 5. shows the potential source associated with the listed cause for the 303(d) listed segment in this watershed.

Table 5. Summary of Potential Sources for Lake Carlinville Watershed

Segment ID	Segment Name	Potential Causes	Potential Sources
RDG	Lake Carlinville	Atrazine	Crop production

Section 5. Lake Carlinville Watershed Characterization

Data were collected and reviewed from many sources in order to further characterize Lake Carlinville watershed. Data has been collected in regards to water quality, reservoirs, and both point and nonpoint sources. This information is presented and discussed in further detail in the remainder of this section.

5.1 Water Quality Data

IEPA Water quality data from station RDR-1 was analyzed for atrazine (Table 6). Data is summarized by impairment and discussed in relation to the maximum contaminant level.

Table 6. Inventory of IEPA Atrazine Data for Lake Carlinville

RDR-1	Period of Record	Number of Samples	Exceedences
Atrazine	2002-2009	19	4

The maximum contaminant level for atrazine is 3 ug /L. Four out of 19 samples exceeded the maximum contaminant level. Table 7 contains only data from IEPA.

Table 7. Atrazine Data at Station RDG-1

Station	Collection Date	Result	Unit
RDG-1	10/1/2009	0.96	ug/l
RDG-1	8/5/2009	1.2	ug/l
RDG-1	7/14/2009	1	ug/l
RDG-1	6/8/2009	9.8	ug/l
RDG-1	4/22/2009	ND	ug/l
RDG-1	10/17/2006	0.68	ug/l
RDG-1	8/24/2006	1.4	ug/l
RDG-1	7/19/2006	1.7	ug/l
RDG-1	6/20/2006	1.5	ug/l
RDG-1	5/4/2006	0.48	ug/l
RDG-1	10/16/2002	1.7	ug/l

RDG-1	10/16/2002	1.9	ug/l
RDG-1	08/01/2002	2.9	ug/l
RDG-1	08/01/2002	3.1	ug/l
RDG-1	07/08/2002	1.8	ug/l
RDG-1	07/08/2002	2.3	ug/l
RDG-1	06/10/2002	3.6	ug/l
RDG-1	06/10/2002	3.8	ug/l
RDG-1	04/17/2002	0.19	ug/l

Illinois EPA assessment for public water supply use considers both the raw and finished water quality data for the last three years of data. No more than 10 percent of the raw water samples exceed the MCL or there can be no exceedances of the MCL for the quarterly average concentration. For the finished water, no sample can be over the MCL. Syngenta provided IEPA atrazine data from 2003 through 2011 for Lake Carlinville for both raw and finished water. In order to reflect the most current and robust data analysis for the load allocation calculation, the selected dataset range chosen for this TMDL was from 2009 through 2011(see Attachment 1 for Syngenta data).

Table 8. Atrazine Statistics for Lake Carlinville (Syngenta Dataset- Attachment 1)

Water	Count	Average	Median	Highest	Exceedences	Percentage Exceedences	Average of Exceedences
Finished	84	1.09	0.48	11.37	6	7.1	8.47
Raw	91	2.82	0.98	42.5	16	17.6	12.05

5.2 Reservoir Characteristics

Lake Carlinville is an impoundment of Honey Creek. Honey Creek flows approximately 12 miles before entering Lake Carlinville. The lake was originally constructed in 1939 as a municipal water supply for the town of Carlinville. The current storage capacity is approximately 1,467 acre-feet (IEPA 2007).

Lake Carlinville is located south of the city of Carlinville, in Macoupin County. The lake has a surface area of 168 acres and a shoreline length of approximately six miles. Lake Carlinville provides drinking water to the city of Carlinville. Table 9 shows dam information for Lake Carlinville.

Table 9. Lake Carlinville Dam information (IEPA 2007)

Dam Length	785 feet
Spillway Length	150 feet
Maximum Storage	1.467 acre-feet
Maximum Depth	17 feet
Mean Depth	9 feet
Retention Time	0.110 years
Shoreline Length	5.5 miles

5.3 Point Sources

Permitted facilities must provide Discharge Monitoring Reports (DMRs) to Illinois EPA as part of their NPDES permit compliance. DMRs contain effluent discharge sampling results that are then maintained in a database by the state. There are two point source located within the Lake Carlinville watershed. Figure 1 shows the permitted facility whose discharge potentially reaches impaired segments. Table 10 contains a summary of available NPDES permit information for these point sources. Carlinville Waterworks System discharges filter backwash and clarifier sludge blowdown. Lake Williamson Christian Center discharges treated wastewater. It is assumed that these facilities do not use atrazine and is not a source.

Table 10. Effluent Data from Point Sources Discharging to Lake Carlinville Watershed

Facility Name Permit Number	Receiving Water/ Downstream Waterbody	Constituent	Average Value	Load (lb/d)
Carlinville Waterworks System IL0051390	Honey Creek/ downstream of Lake Carlinville	Design average Flow	0.02 mgd	NA
Lake Williamson Christian Center IL0045373	Tributary of Lake Carlinville	Design Average Flow	0.032 mgd	NA

5.4 Nonpoint Sources

Atrazine is an herbicide that is widely used to kill weeds mostly on farms. It is used on crops such as sugarcane, corn, pineapples sorghum and macadamia nuts. Out of the 60-80 million pounds of atrazine used annually in the United States, 85% are used for corn fields (Sass and Colangelo 2006). It is a Restricted Use Pesticide (RUP) and can only be purchased or used by certified herbicide users. Atrazine is usually used in the spring and summer months (ATSDR 2003). To be effective if applied preemergence, atrazine must enter through the roots and acts in the shoots and leaves of the weed to stop photosynthesis. Atrazine adsorbs into the leaves and roots when applied postemergence. Corn can detoxify atrazine and are not affected. The application of atrazine to crops as an herbicide accounts for almost all of the atrazine that enters the environment, but some may be released from manufacture, formulation, transport and disposal (ATSDR 2003). In most cases atrazine will be broken down in the soil over one growing season but if carried by runoff into waterways, the breakdown is slowed. The more moisture in soil, the longer it takes to degrade. The approximate half-life in aerobic soil is 146 days but in water the half-life is 742 days. Atrazine weakly adsorbs to soil particles. Refer to section 6.2 for pollutant sources and linkages.

5.5 Watershed Planning Information

In 2003, the City of Carlinville obtained a Priority Lake and Watershed Implementation Program (PLWIP) grant from the IEPA to stabilize 275 feet of eroded shoreline near the boat ramp. In 2007, the City of Carlinville obtained a grant through the 319 Nonpoint Source Program that partially funded a watershed based plan for Lake Carlinville. The Phase I Diagnostic/Feasibility Study of Lake Carlinville was designed to improve water quality by controlling nonpoint source pollution.

The Honey Creek Stewardship Project is a partnership between various local, state, federal and private partners that is being used to do landscape management in the Honey Creek Watershed. Information for this project was provided from the IDNR Recreational Access Program (IRAP) (IDNR 2013). A poster for this project has been included in Attachment 3. Through use of several grants, the grant recipients are installing BMPs to reduce sedimentation and agricultural runoff that reaches Carlinville Lake. IDNR-IRAP enrolls landowners in a program that provides access for outdoor hunting and recreation. IRAP will increase public outdoor recreational opportunities on private lands through payments to eligible land owners who agree to a three-year lease for IRAP activities (http://www.dnr.illinois.gov/conservation/IRAP/Pages/default.aspx). Landowners receive lease payments if they agree to allow access and DNR helps connect landowners with resources to maintain the woods and prairies enrolled (Young 2013).

IDNR forestry and natural heritage have assisted in marking the Carlinville Lake Timber for harvest and ensuring a timber harvest will ensure a viable forest into the future. District foresters marked the timber for harvest, bringing lots of technical assistance to the project to aid the citizens of Carlinville. The USFWS has provided technical assistance and guidance in proceeding with various habitat restoration initiatives. The IEPA has awarded the City of Carlinville with a 319 Grant that allows BMPs to reduce sedimentation be installed within the watershed. Through Phase I of the project, nearly 25% of the yearly sediment loading has been reduced by BMPs installed. The Nation Wild Turkey Federation has provided a Il St Habitat Stamp fund grant that has been used to manage for native species regeneration within the watershed on private property. Quail Forever has organized and helped provide native grass/forb seed for several landowners within the watershed as well as planting habitat.

Macoupin Energy LLC has joined in by voluntarily planting 65 acres of native grasses as buffer zones around their crop fields (Young 2013). Jay Greenwalt is just one of the landowners that have made conservation efforts such as earthen berms for erosion control and setting aside land for quail habitat. Conservation efforts such as removal of invasive species and construction of earthen berms are being completed in the watershed and when put in place in conjunction with each other; greatly reduce the amount of runoff in the watershed. By reducing runoff (sediment and chemicals) the citizens of Carlinville benefit from a cleaner drinking water supply as well as a managed woodland.

Section 6. TMDL Development

6.1 TMDL Calculations

TMDL atrazine loads are based on the atrazine maximum contaminant level of .003 mg/L. Normal level of the lake is 1,467 acre feet or 478 million gallons (MG).

6.2 Pollutant Sources and Linkages

Atrazine is a widely used product for selective control of broadleaf weeds in crops, specifically corn for this watershed. Atrazine is an inexpensive, effective herbicide for weeds and no alternative herbicide is as economical. Refer to Section 5.4 for more information on atrazine. Transport mechanisms include overland runoff, discharge from drainage tiles and contaminated dust that is delivered to the lake through wet and dry atmospheric deposition. No known point sources of atrazine occur within the watershed and point source discharges of atrazine are assumed not to occur. According to the 2011 Illinois Cropland Data layer produced by the USDA National Agricultural Statistics Service (http://www.nass.usda.gov/research/Cropland/metadata/metadata_il11.htm), 39% of the crops in the Carlinville watershed are corn. Water from Lake Carlinville is used by the water plant for human consumption. This water is impaired for public water supply use with atrazine as a cause.

6.3 TMDL Allocations for Lake Carlinville

As explained in Section 1, the TMDLs for Lake Carlinville address the following equation:

$$\textbf{TMDL} = \textbf{LC} = \Sigma\textbf{WLA} + \Sigma\textbf{LA} + \textbf{MOS}$$

where	LC	=	Maximum amount of pollutant loading a water body can receive without violating water quality standards
	WLA	=	The portion of the TMDL allocated to existing or future point sources
	LA	=	Portion of the TMDL allocated to existing or future nonpoint sources and natural background
	MOS	=	An accounting of uncertainty about the relationship between pollutant loads and receiving water quality

Each of these elements will be discussed in this section as well as consideration of seasonal variation in the TMDL calculation.

Loading Capacity

The loading capacity (LC) of the waterbody is the amount of atrazine that can be allowed in the lake and still meet the water quality standard of 0.003 mg/L atrazine. The allowable atrazine loads that can be generated in the watershed and still maintain water quality standards were determined to be 12 pounds at full storage capacity. The storage capacity is 478 million gallons. Using conversion factors, the loads were calculated. If there are any levels of atrazine beyond the 0.003 mg/L in the lake samples, this will exceed the maximum storage capability of 12 lb/day at normal storage.

Load Capacity = Normal Storage: 478 MG * 0.003 mg/l atrazine * 2.2 lb/mg * 3.785 l/gal = 12 lb atrazine

Seasonal Variation

A season is represented by changes in weather; for example, a season can be classified as warm or cold as well as wet or dry. Since the pollutant source can be expected to contribute loadings in different quantities during different time periods (e.g., various portions of the growing season resulting in different runoff characteristics), the loadings for these TMDLs will focus both on normal and maximum storage. Atrazine runoff from upstream is expected in spring and early summer when flows are higher. This critical period corresponds with normal to maximum water levels.

Margin of Safety

A margin of safety (MOS) is required in a TMDL to account for uncertainty about the relationship between pollutant loads and attainment of water quality standards. The margin of safety (MOS) can be implicit (incorporated into the TMDL analysis through conservative assumptions) or explicit (expressed in the TMDL as a portion of the loadings).

The Illinois EPA public water supply assessment methodology guidelines takes into account the water-quality substance, the level of treatment provided for finished water (conventional treatment, per 35 Ill. Adm. Code 302.303) for that substance, and the monitoring frequency of that substance in the untreated water, and this approach provides a conservative assumption for the implicit margin of safety. 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 (IEPA 2014). With this conservative approach, lower levels of atrazine in raw water will reduce the cost of extra treatment in finished water.

IEPA uses an implicit MOS for the Carlinville Lake TMDL. The MOS is provided within the TMDL calculation. The ultimate goal of this TMDL is to reduce the levels of atrazine in drinking water. In addition to the reduction of atrazine in the lake, atrazine can be partially removed from raw drinking water as part of the drinking water treatment process. The City of Carlinville uses activated carbon to remove/reduce atrazine in finished water. This treatment process will be used until attainment of the TMDL reductions and the raw water atrazine levels attain the TMDL goals. Thus, basing the TMDL on meeting the atrazine MCL in raw water prior to treatment should ensure that the MCL is met following treatment.

Additional MOS is provided by how the TMDL is calculated. The loading capacity is calculated as the lake volume multiplied by the MCL of 0.003 mg/L which results in the daily load of atrazine. However, the public water supply assessment process uses a rolling annual average of quarterly samples for raw water (as does the EPA for finished water compliance). Use of an average will by definition have some values above the mean. By using the daily load calculation, the TMDL loading capacity is more protective.

Waste Load Allocation

There are no point sources within the Lake Carlinville watershed that discharge atrazine. Therefore, the waste load allocations (WLA) were set to zero for these TMDLs.

Load Allocation and TMDL Summary

Table 11 shows a summary of the TMDL for Lake Carlinville. On average, a total reduction of 74.9 percent of atrazine loads to Lake Carlinville would result in compliance with the water quality standard of 0.003 mg/L atrazine. The 74.9 percent reduction would need to come from nonpoint sources. The current load was calculated using data from Table 7. The average of the exceeded values for the raw water is 12.05 micrograms per liter or 0.012 mg/L. This value was used in the loading capacity equation to calculate the current load.

Table 11. TMDL Summary for Lake Carlinville

Load Source	LC (lb/day)	WLA (lb/day)	LA (lb/day)	MOS (lb/day)	Current Load (lb/day)	Reduction Needed (lb/day)	Reduction Needed (percent)
Lake Capacity	12	0	12	Implicit	47.8	35.8	74.9

Section 7. Implementation Plan for Lake Carlinville

According to the TMDL summary in Table 10, there needs to be a 74.9 percent reduction of atrazine in the lake. Implementation actions, management measures, or best management practices (BMPs) in the watershed are used to control the generation or distribution of pollutants. BMPs are either structural, such as filter strips; or managerial, such as conservation tillage, public outreach and education. The remainder of this section will discuss implementation actions and management measures for atrazine sources in the watershed.

7.1 Nonpoint Sources of Atrazine

Atrazine is applied to agricultural land, specifically corn in this watershed. Surface runoff, tile drainage and atmospheric deposition deliver atrazine to the lake. BMPs evaluated that could be utilized to treat these nonpoint sources are careful pesticide application practices and controlling runoff. Fields closer to surface water can be targeted for BMPs. Another option is filtering water at the treatment plant.

Pesticide Application Practices

Delay herbicide application if heavy rain is in the forecast. Pesticides are most susceptible to runoff during the first several hours after application. Atrazine is highly soluble in water and applications should be delayed as long as the soils are saturated and more rain is predicted (Purdue 2004). Atrazine should not be applied within 50 feet of abandoned/current wells, drainage wells or sinkholes. This applies to drinking water wells, irrigation wells, livestock water wells, abandoned wells and agricultural drainage wells. Figure 4 displays the wells in the Lake watershed. Sinkholes refer to surface depressions that permit direct runoff of surface water into groundwater. Atrazine should not be applied within 66 feet of the points where field surface water runoff enters streams or rivers. This applies to both perennial and intermittent streams. The USGS topographic maps (http://topomaps.usgs.gov/) show perennial streams as solid blue lines and intermittent streams as dashed blue lines. Atrazine should not be applied within 200 feet around a lake or reservoir. Filter strips are recommended around lakes. Atrazine should not be mixed or loaded within 50 feet of any waterbody, nor applied within 66 feet of a tile inlet in terraced fields unless it is incorporated and or greater than 30 percent residue is present. A 66 foot filter strip is recommended around the outlet.

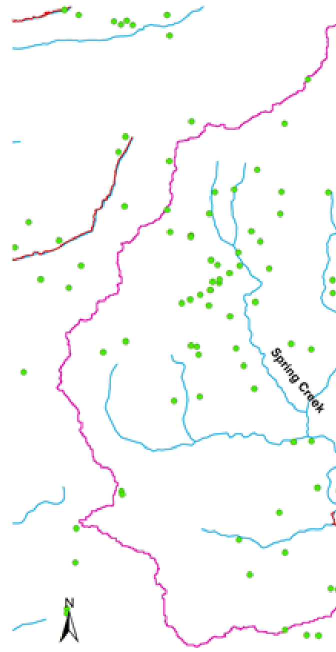
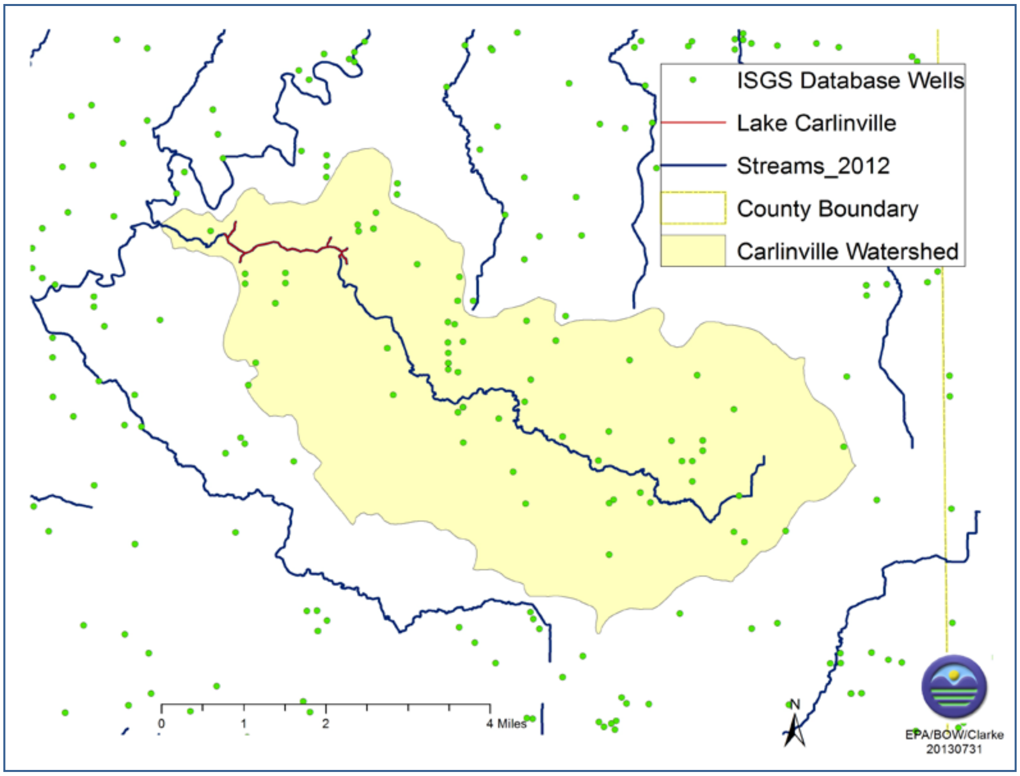


Figure 4. Wells in the Lake Carlinville Watershed



For pre-emergent application in highly erodible soils, a maximum of 2 pounds per acre of atrazine can be sprayed on fields with 30 percent or more of plant residue or 1.6 pounds where there is less than 30 percent plant residue. For pre-emergent application on soils not highly erodible, a maximum of 2 pounds of atrazine can be used. For post-emergent application, if there was no pre-application, a maximum of 2 pounds can be used per acre. The total amount of atrazine applied to a field may not exceed 2.0 pounds of active ingredient in a single pre- or post-emerge application or 2.5 pounds (pre- and post-emergence combined) per acre per calendar year. Applying post emergent can reduce rates up to 75 percent (McKenna and Czapar 2009). Atrazine rates are reduced 30 to 75 percent if application is delayed until the weeds emerge because the herbicide can be placed directly on the weed foliage, which is preferable to relying on uptake from the soil (Purdue 2004). Because there is a narrower window of opportunity for application, fields with greatest runoff potential can be targeted for postemergence application. For more information on atrazine application information, refer to *Using Atrazine and Protecting Water Quality* (http://www.atrazine.com/Atrazine/images/using_atrazine_protecting_water.pdf).

Controlling Runoff

Leaving crop residue on the fields and No-till agriculture can reduce pesticide runoff over conventional tillage. The residue slows the movement of water across the field and can increase infiltration. According to county wide statistics, almost half of the corn crops are farmed conventionally. The Lake Carlinville Watershed Plan mentions changing from conventional to no- till will have a reduction in erosion and phosphorus for the watershed. So this practice could not only reduce phosphorus and total suspended solids, but atrazine also. This practice has the lowest costs of any practice in the watershed. Other practices to control runoff are terraces, contour farming and grade stabilization. Also allowing soils to dry before tilling or other operations can help reduce compaction and allow better infiltration.

Conservation practices such as buffers and riparian corridors can be used to control runoff. The ground has the filtering capacity to drain water and absorb atrazine. Buffers implemented along stream segments and around waterbodies slow and filter nutrients, pesticides and sediment out of runoff. Greater biological activity in a soil improves its ability to effectively deal with pesticides and pollutants, and that is more prevalent in a soil rich in plant roots and organisms (Grismer 2006). A recent study in Iowa indicated a 28 to 35 percent removal for the pesticide atrazine for a 15-foot long filter, compared to a 51 to 60 percent removal for a 30-foot filter (Leed et all 1994).

Riparian buffers, including both the stream channel and adjacent land areas, are important components of watershed ecology. Preserving natural vegetation along stream corridors and around waterbodies can effectively reduce water quality degradation associated with development. The root structure of the vegetation in a buffer enhances infiltration of runoff and subsequent trapping of nonpoint source pollutants. However, the buffers are only effective in this manner when the runoff enters the buffer as a slow moving, shallow "sheet;" concentrated flow in a ditch or gully will quickly pass through the buffer offering minimal opportunity for retention and uptake of pollutants.

Table 12. Filter Strip Flow Lengths Based on Land Slope

Percent Slope	**0.5%**	**1.0%**	**2.0%**	**3.0%**	**4.0%**	**5.0% or greater**
Minimum (feet)	36	54	72	90	108	117
Maximum (feet)	72	108	144	180	216	234

Table 12 above outlines the guidance for filter strip flow length by slope (NRCS 1999). There are areas within the watershed that could be converted to buffer strips. Landowners and property managers should evaluate the land near tributaries and surrounding the lakes and consider installation of filter strips according to the NRCS guidance. Programs available to fund the construction of these filter strips are discussed in Section 7.2. According to the atrazine label, atrazine should not be applied within 66 feet of where field surface water runoff enters streams or rivers or within 50 feet of a waterbody. Using GIS, a buffer can be geoprocessed around the stream shapefile. Figure 5 is an example of using the buffer tool in the Lake Carlinville watershed to put a 66 foot buffer around an NHD streams. This buffer area could be used as a filter strip or riparian corridor.

Figure 5. Buffer Strip Around NHD Stream Coverage Using ArcGIS Geoprocessing Tool

Buffers also provide streambank protection along with their filtering capacity. This is relevant to this waterbody since it is impaired for phosphorus and total suspended solids, for which a TMDL was developed (IEPA 2007). The rooting systems of the vegetation serve as reinforcements in streambank soils, which help to hold streambank material in place and minimize erosion. Due to the increase in stormwater runoff volume and peak rates of runoff associated with agriculture and development, stream channels are subject to greater erosional forces during stormflow events. Thus, preserving natural vegetation along stream channels minimizes the potential for water quality and habitat degradation due to streambank erosion and enhances the pollutant removal of sheet flow runoff from developed areas that passes through the buffer. The increased organic matter in these corridors should increase degradation of atrazine.

Converting land adjacent to waterbodies for the creation of riparian buffers will provide stream bank stabilization, stream shading, and nutrient uptake and trapping from adjacent areas. Minimum buffer widths of 25 feet are required for water quality benefits. Higher removal rates are provided with greater buffer widths. Riparian corridors typically treat a maximum of 300 feet of adjacent land before runoff forms small channels that short circuit treatment. In addition to the treated area, any land converted from agricultural land has the potential to reduce the amount of atrazine needed. Erosion prone areas buffer strips in the wastershed are shown in Figures 6 and 7 below.

The following information is taken from the website- *The Value of Buffers for Pesticide Stewardship and Much More* (http://pesticidestewardship.org/Documents/Value%20of%20Buffers.pdf).

Permanent within-field buffers include grassed waterways, contour buffer strips and wind buffers. Grassed waterways are strategically placed where they intercept the water and slow it down, thus preventing gully and rill erosion. Contour buffer strips are planted to perennial vegetation alternated with cultivated strips and placed along the contour. These reduce the risk of concentrated flow, gully erosion and pesticide runoff. Wind buffers are a single or multiple rows of trees to protect crops from winds. They can also reduce pesticide drift and reduce runoff if they are planted dense enough. Wind buffers can also consists of tall grasses planted in thin rows perpendicular to prevailing winds.

Permanent edge-of-field buffers include field borders, filter strips and riparian forest buffers. Field borders are permanent perennial vegetation established on the edge of a crop field. It reduces the movement of pesticides and nutrients, traps eroding soils and reduces pesticide drift. Filter strips are areas of grass or other permanent vegetation located between crop field and a body of water and intended to reduce runoff. Riparian forest buffers are areas planted in trees and shrubs and located adjacent to waters.

Constructed wetlands provide additional benefits when implemented in combination with buffers. In fields that are tile drained, runoff bypasses buffers and may deliver subsurface drainage directly to streams. Wetlands can effectively degrade pesticides and denitrify nitrates when strategically located at tile outlets.

Figure 6. Erosion Prone Areas

Figure 7. Buffer Strips in Watershed

Treatment Plant Upgrade

Removal of atrazine at the water treatment plant requires expensive chemical absorption procedures. Filters with activated carbon are used to absorb the atrazine. At most water plants, sand filters are used because they are cheaper and last longer, but they do not remove organics such as PCBs, pharmaceuticals and pesticides.

The Aquilla Water Supply District began additional treatment to remove atrazine by installing a powder-activated carbon hopper at the water treatment plant in 1999. This system came at a cost of $434,169. Information on the Aquilla Water Supply District is taken from the Implementation Plan for the TMDL for Atrazine in Aquilla Reservoir (TNRCC 2002). At the Ohio Bowling Green water plant, they have a granular activated carbon (GAC) pressure system. They have twelve GAC vessels and change out six vessels each year at a cost of $117,000. Total costs for installation was 4.5 million in the year 2000.

Atrazine Reduction Success Stories

Following high atrazine levels in 1994, the local watershed committee for Lake Springfield encouraged practices such as buffer zones of plants and vegetation along stream banks, taking farmland out of production, rotating corn and soybeans and improved chemical-application practices. The treatment plant spent more than $600,000 on powdered activated carbon from 1994 to 2003 to reduce atrazine. The yearly amount for treatment has decreased since atrazine levels in the watershed have decreased. The Lake Springfield Watershed Resources Planning Committee is made up of water treatment plant staff, farmers, conservation and environmental advocates, business people and lake residents.

Atrazine Settlement Fund

On May 30, 2012, District Judge J. Phil Gilbert of the United States District Court for the Southern District of Illinois approved a $105 million class-action settlement the City of Greenville brought against Syngenta Crop Protection, Inc., and Syngenta AG (collectively, Syngenta) for the alleged contamination of community water supplies with atrazine. Information from the settlement is available in the court order-
http://www.ilsd.uscourts.gov/opinions/ilsd_live.3.10.cv.188.2065985.0.pdf.
Through the agreement between the parties, a Settlement Fund was created to allocate a fixed payment to the 2,000 U.S. Community Water Systems and then allocates the remainder of the Settlement Fund on a *pro-rata* basis based on evidence of the significance of the history of atrazine detection, size, and the age of each claim. The settlement ensures that each class member receives a portion of the settlement, while providing a proportionally larger share to those who are most affected by the presence of atrazine. The Settlement Fund is intended to be used to cover the costs associated with the purchase and operation of appropriate filtration systems to properly treat atrazine. Illinois' 143 water supplies that were part of the class-action settlement received a total of $15 million (http://www.huffingtonpost.com/huff-wires/20130125/us-herbicide-settlement-money/). The $15 million was not allocated to all Illinois water supplies to share, but that the total of each Illinois public water supply claim added up to $15 million, per the settlement agreement. The settlement does not interfere with the jurisdiction of any regulatory agency,

and it preserves any claims from future point-source contamination and off-label use. Syngenta acknowledges no liability and continues to stand by the safety of atrazine. Settlement funds have been used for water treatment plant upgrades to reduce atrazine. In one small community, the funds were used to install a water pipe to a nearby non-impaired source, which was more cost effective than a plant upgrade.

7.2 Reasonable Assurance

Reasonable assurance means that a demonstration is given that nonpoint source reductions in this watershed will be implemented. It should be noted that all programs discussed in this section are voluntary and some may currently be in practice to some degree within the watershed. The discussion in Section 7.1 provided information on suggested BMPs for nonpoint sources. The remainder of this section discusses an estimate of costs to the watershed for implementing these practices and programs available to assist with funding.

Available Cost-Share Programs

There are several voluntary conservation programs established through the 2008 U.S. Farm, which encourage landowners to implement resource-conserving practices for water quality and erosion control purposes. These programs would apply to agricultural land and rural grasslands in the watershed. In addition, Illinois EPA has grant programs that can assist in implementation of nonpoint source controls. Each program is discussed separately in the following paragraphs.

Conservation Reserve Program (CRP)

http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=crp
The CRP is a voluntary program for agricultural landowners. Through CRP, landowners can receive annual rental payments and cost-share assistance to establish long-term, resource conserving covers on eligible farmland.

The Commodity Credit Corporation (CCC) makes annual rental payments based on the agriculture rental value of the land, and it provides cost-share assistance for up to 50 percent of the participant's costs in establishing approved conservation practices. Participants enroll in CRP contracts for 10 to 15 years.

CRP protects millions of acres of American topsoil from erosion and is designed to safeguard natural resources. By reducing water runoff and sedimentation, CRP protects groundwater and helps improve the condition of lakes, rivers, ponds, and streams. Acreage enrolled in the CRP is planted to resource-conserving vegetative covers, making the program a major contributor to increased wildlife populations in many parts of the country.

The Farm Service Agency (FSA) administers CRP, while technical support functions are provided by NRCS, USDA's Cooperative State Research, Education, and Extension Service, State forestry agencies, local soil and water conservation districts, and private sector providers of technical assistance. Producers can offer land for CRP general sign-up enrollment only during designated sign-up periods. Environmentally desirable land devoted to certain conservation practices may be enrolled at any time under CRP continuous sign-up. Certain eligibility requirements still apply, but offers are not subject to competitive bidding. Further information on CRP continuous sign-up is available in the FSA fact sheet "Conservation Reserve Program Continuous Sign-up."

To be eligible for placement in CRP, land must be either:

- Cropland (including field margins) that is planted or considered planted to an agricultural commodity 4 of the previous 6 crop years, and which is physically and legally capable of being planted in a normal manner to an agricultural commodity; or

- Certain marginal pastureland that is suitable for use as a riparian buffer or for similar water quality purposes.

In addition to the eligible land requirements, cropland must meet one of the following criteria:

- Have a weighted average erosion index of 8 or higher;
- Be expiring CRP acreage; or
- Be located in a national or state CRP conservation priority area.

FSA provides CRP participants with annual rental payments, including certain incentive payments, and cost-share assistance:

- Rental Payments – In return for establishing long-term, resource-conserving covers, FSA provides annual rental payments to participants. FSA bases rental rates on the relative productivity of the soils within each county and the average dry land cash rent or cash-rent equivalent. The maximum CRP rental rate for each offer is calculated in advance of enrollment. Producers may offer land at that rate or offer a lower rental rate to increase the likelihood that their offer will be accepted.

- Maintenance Incentive Payments – CRP annual rental payments may include an additional amount up to $4 per acre per year as an incentive to perform certain maintenance obligations.

- Cost-share Assistance – FSA provides cost-share assistance to participants who establish approved cover on eligible cropland. The cost-share assistance can be an amount not more than 50 percent of the participants' costs in establishing approved practices.

- Other Incentives – FSA may offer additional financial incentives of up to 20 percent of the annual payment for certain continuous sign-up practices.

Conservation practices eligible for CRP funding which are recommended BMPs for this watershed TMDL include but are not limited to filter strips, grass waterways, riparian buffers, wetland restoration, and tree plantings.

Clean Water Act Section 319 Grants

Section 319 was added to the CWA to establish a national program to address nonpoint sources of water pollution. Through this program, each state is allocated Section 319 funds on an annual basis according to a national allocation formula based on the total annual appropriation for the section 319 grant program. The total award consists of two categories of funding: incremental funds and base funds. A state is eligible to receive EPA 319(b) grants upon USEPA's approval of the state's Nonpoint Source Assessment Report and Nonpoint Source Management Program. States may reallocate funds through subawards (e.g., contracts, subgrants) to both public and private entities, including local governments, tribal authorities, cities, counties, regional development centers, local school systems, colleges and universities, local nonprofit organizations, state agencies, federal agencies, watershed groups, for-profit groups, and individuals.

USEPA designates incremental funds for the restoration of impaired water through the development and implementation of watershed-based plans and TMDLs for impaired waters. Base funds, funds other than incremental funds, are used to provide staffing and support to manage and implement the state Nonpoint Source Management Program. Section 319 funding can be used to implement activities which improve water quality, such as filter strips, streambank stabilization, etc.

Illinois EPA receives federal funds through Section 319(h) of the CWA to help implement Illinois' Nonpoint Source (NPS) Pollution Management Program. The purpose of the program is to work cooperatively with local units of government and other organizations toward the mutual goal of protecting the quality of water in Illinois by controlling NPS pollution. The program emphasizes funding for implementing cost-effective corrective and preventative BMPs on a watershed scale; funding is also available for BMPs on a non-watershed scale and the development of information/education NPS pollution control programs.

The Maximum Federal funding available is 60 percent, with the remaining 40 percent coming from local match. The program period is two years unless otherwise approved. This is a reimbursement program.

Section 319(h) funds are awarded for the purpose of implementing approved NPS management projects. The funding will be directed toward activities that result in the implementation of appropriate BMPs for the control of NPS pollution or to enhance the public's awareness of NPS pollution. Applications are accepted June 1 through August 1. Proposed 319 projects in TMDL watersheds receive high prioritization as long as they contain the required elements.

Environmental Quality Incentive Program (EQIP)

http://www.il.nrcs.usda.gov/programs/eqip/index.html
EQIP is a voluntary conservation program that provides financial and technical assistance to farmers and ranchers who face threats to soil, water, air, and related natural resources on their land. Through EQIP, the NRCS develops contracts with agricultural producers to implement conservation practices to address environmental natural resource problems. Payments are made to producers once conservation practices are completed according to NRCS requirements.

Persons engaged in livestock or agricultural production and owners of non-industrial private forestland are eligible for the program. Eligible land includes cropland, rangeland, pastureland, private non-industrial forestland, and other farm or ranch lands. Persons interested in entering into a cost-share agreement with the USDA for EQIP assistance may file an application at any time.

NRCS works with the participant to develop the EQIP plan of operations. This plan becomes the basis of the EQIP contract between NRCS and the participant. NRCS provides conservation practice payments to landowners under these contracts that can be up to 10 years in duration.

The EQIP objective to optimize environmental benefits is achieved through a process that begins with National priorities that address: impaired water quality, conservation of ground and surface water resources improvement of air quality reduction of soil erosion and sedimentation, and improvement or creation of wildlife habitat for at-risk species. National priorities include: reductions of nonpoint source pollution, such as nutrients, sediment, pesticides, or excess salinity in impaired watersheds consistent with TMDLs where available as well as the reduction of groundwater contamination and reduction of point sources such as contamination from confined animal feeding operations; conservation of ground and surface water resources; reduction of emissions, such as particulate matter, nitrogen oxides (NOx), volatile organic compounds, and ozone precursors and depleters that contribute to air quality impairment violations of National Ambient Air Quality Standards reduction in soil erosion and sedimentation from unacceptable levels on agricultural land; and promotion of at-risk species habitat conservation.

EQIP provides payments up to 75 percent of the incurred costs and income foregone of certain conservation practices and activities. The overall payment limitation is $300,000 per person or legal entity over a 6-year period. The Secretary of Agriculture may raise the limitation to $450,000 for projects of special environmental significance. Payment limitations for organic production may not exceed an aggregate $20,000 per year or $80,000 during any 6-year period for installing conservation practices.

Conservation practices eligible for EQIP funding which are recommended BMPs for this watershed TMDL include field borders, filter strips, cover crops, grade stabilization structures, grass waterways, riparian buffers, streambank shoreline protection, terraces, and wetland restoration.

The selection of eligible conservation practices and the development of a ranking process to evaluate applications are the final steps in the optimization process. Applications will be ranked based on a number of factors, including the environmental benefits and cost effectiveness of the proposal. More information regarding State and local EQIP implementation can be found at www.nrcs.usda.gov/programs/eqip.

Wildlife Habitat Incentives Program (WHIP)

http://www.il.nrcs.usda.gov/programs/whip/index.html
WHIP is a voluntary program for people who want to develop and improve wildlife habitat primarily on private lands and nonindustrial private forest land. It provides both technical assistance and cost share payments to help:

- Promote the restoration of declining or important native fish and wildlife species.
- Protect, restore, develop, or enhance fish and wildlife habitat to benefit at-risk species.

- Reduce the impacts of invasive species in fish and wildlife habitat.
- Protect, restore, develop, or enhance declining or impaired aquatic wildlife species habitat.

Participants who own or control land agree to prepare and implement a wildlife habitat development plan. The NRCS provides technical and financial assistance for the establishment of wildlife habitat development practices. In addition, if the landowner agrees, cooperating State wildlife agencies and nonprofit or private organizations may provide expertise or additional funding to help complete a project.

Participants work with the NRCS to prepare a wildlife habitat development plan in consultation with the local conservation district. The plan describes the participant's goals for improving wildlife habitat, includes a list of practices and a schedule for installing them, and details the steps necessary to maintain the habitat for the life of the agreement. This plan may or may not be part of a larger conservation plan that addresses other resource needs such as water quality and soil erosion.

The NRCS and the participant enter into a cost-share agreement for wildlife habitat development. This agreement generally lasts from 5 to 10 years from the date the agreement is signed for general applications and up to 15 years for essential habitat applications. Cost-share payments may be used to establish new practices or replace practices that fail for reasons beyond the participant's control.

WHIP has a continuous sign-up process. Applicants can sign up anytime of the year at their local NRCS field office. Conservation practices eligible for WHIP funding which are recommended BMPs for this watershed TMDL include but are not limited to filter strips, field borders, riparian buffers, streambank and shoreline protection, and wetland restoration.

Local Program Information

Local contact information for Macoupin County is listed in the Table 13 below. The USDA Service Center is at 300 Carlinville Plaza in Carlinville.

Table 13.. Macoupin County USDA Service Center Contact Information

Contact	Email Address	Phone
Local SWCD Office		
Dan McCandless	Dan.mccandless@il.usda.gov	217/854-2626 x 3
Local FSA Office		
John Nolan Larry Miller	John.nolan@il.usda.gov Larry.miller@il.usda.gov	217/854-2626 x 2 217/854-2626
Local NRCS Office		
Jeremy Jackman	Jeremy.jackman@il.usda.gov	217/854-2626 x 3

Cost Estimates of BMPs

Costs have been updated from their original sources, based on literature citations, to 2006 costs using the Engineering News Record Construction Cost Index, as provided by the Natural Resource Conservation Service (NRCS) (http://www.economics.nrcs.usda.gov/cost/priceindexes/index.html).

A wide range of costs has been reported for conservation tillage practices, ranging from $12/acre to $83/acre in capital costs (EPA, 2003). For no-till, costs per acre provided in the Illinois Agronomy Handbook for machinery and labor range from $36 to $66 per acre, depending on the farm size and planting methods used (UIUC, 2005). In general, the total cost per acre for machinery and labor decreases as the amount of tillage decreases and farm size increases (UIUC, 2005).

Costs of conservation buffers vary from about $200/acre for filter strips of introduced grasses or direct seeding of riparian buffers, to approximately $360/acre for filter strips of native grasses or planting bare root riparian buffers, to more than $1,030/acre for riparian buffers using bare root stock shrubs (NRCS, 2005). Grassed waterways cost approximately $1,800/acre, not including costs for tile or seeding (MCSWCD, 2006).

Illinois EQIP (http://www.nrcs.usda.gov/PROGRAMS/EQIP/)was used to provide filter strip and riparian buffer cost estimates. Filter strip implementation that includes seedbed preparation and native seed was estimated at $88/acre while riparian buffers ranged from $130/acre for herbaceous cover up to $800/acre for forested buffers.

Table 14 summarizes the alternatives identified for the Glenn Shoals/Hillsboro TMDLs. These alternatives should be evaluated by the local stakeholders to identify those most likely to provide the necessary load reductions, based on site-specific conditions in the watersheds. Total watershed costs will depend on the combination of BMPs selected to target non-point sources within the watershed. Regular monitoring will support adaptive management of implementation activities to most efficiently reach the TMDL goals.

Table 14. Summary of Implementation Alternatives

Alternative	**Estimated Cost**
Conservation Tillage	$12 to $83/acre
Conservation Buffers	$200 - $360/acre
Filter Strip- Seeded	$88/acre
Riparian Buffer	$130- $800/acre
Grassed Waterways	$1,800/acre

7.3 Monitoring Plan

The purpose of the monitoring plan for Lake Carlinville is to assess the overall implementation of management actions outlined in this section. This can be accomplished by conducting the following monitoring programs:

- Track implementation of management measures in the watershed
- Estimate effectiveness of management measures
- Continued monitoring of Lake Carlinville
- Storm-based monitoring of high flow events
- Tributary monitoring

Tracking the implementation of management measures can be used to address the following goals:

- Determine the extent to which management measures and practices have been implemented compared to action needed to meet TMDL endpoints
- Establish a baseline from which decisions can be made regarding the need for additional incentives for implementation efforts
- Measure the extent of voluntary implementation efforts
- Support work-load and costing analysis for assistance or regulatory programs
- Determine the extent to which management measures are properly maintained and operated

Estimating the effectiveness of the BMPs implemented in the watershed could be completed by monitoring before and after the BMP is incorporated into the watershed. Additional monitoring could be conducted on specific structural systems such as a constructed wetland. Inflow and outflow measurements could be conducted to determine site-specific removal efficiency.

Illinois EPA monitors lakes every three years and conducts Intensive Basin Surveys every five years. Continuation of this state monitoring program will assess lake water quality as improvements in the watersheds are completed. Any available future sampling data can be used to assess whether water quality standards in Lake Carlinville are being attained.

Section 8. Acronyms and Abbreviations

BMP	Best Management Practices
CCC	Commodity Credit Corporation
CRP	Conservation Reserve Program
CWA	Clean Water Act
CWS	Community Water Supply
DMR	Discharge Monitoring Report
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentive Program
FSA	Farm Service Agency
GIS	Geographic Information Systems
IDNR	Illinois Department of Natural Services
IEPA	Illinois Environmental Protection Agency
IPCB	Illinois Pollution Control Board
ISGS	Illinois State Geological Survey
LA	Load Allocation
LC	Loading Capacity
MCL	Maximum Contaminant Level
MG	Million Gallons
MGD	Million Gallons per Day
MOS	Margin of Safety
MRDL	Maximum Residual Disinfectant Level
NHD	National Hydrography Dataset
NPDES	National Pollution Discharge Elimination System
NPS	Nonpoint Source
NRCS	Natural Resources Conservation Service
NWTF	National Wild Turkey Federation
PCB	Polychlorinated Biphenyls
RUP	Restricted Use Pesticide
SWCD	Soil and Water Conservation District
TMDL	Total Maximum Daily Load
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WASCOB	Water and Sediment Control Basins
WHIP	Wildlife Habitat Incentives Program
WLA	Wasteload Allocation

Section 9. References

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Attachment 1. Syngenta Atrazine Data

Reported By	CWS Source	Water	Date	Analyte	Result	Unit
Syngenta/USEPA	Carlinville Water Works	Finished	01/27/09	Atrazine	0.07	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	02/09/09	Atrazine	No Data	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	02/23/09	Atrazine	No Data	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	03/10/09	Atrazine	No Data	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	03/24/09	Atrazine	0.06	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	04/07/09	Atrazine	No Data	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	04/21/09	Atrazine	0.11	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	04/27/09	Atrazine	0.09	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	05/07/09	Atrazine	0.35	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	05/11/09	Atrazine	0.75	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	05/22/09	Atrazine	1.18	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	05/26/09	Atrazine	1.18	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	06/03/09	Atrazine	11.37	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	06/09/09	Atrazine	9.30	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	06/19/09	Atrazine	0.51	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	06/22/09	Atrazine	0.92	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	07/06/09	Atrazine	2.80	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	07/13/09	Atrazine	2.05	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	07/22/09	Atrazine	0.57	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	07/31/09	Atrazine	0.57	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	08/14/09	Atrazine	0.56	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	09/08/09	Atrazine	0.59	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	09/21/09	Atrazine	0.84	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	10/09/09	Atrazine	0.51	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	10/21/09	Atrazine	0.50	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	11/06/09	Atrazine	0.11	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	11/30/09	Atrazine	0.12	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	12/17/09	Atrazine	0.12	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	01/27/10	Atrazine	0.07	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	02/09/10	Atrazine	No Data	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	02/26/10	Atrazine	No Data	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	03/08/10	Atrazine	0.05	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	03/23/10	Atrazine	0.07	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	04/07/10	Atrazine	No Data	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	04/15/10	Atrazine	No Data	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	04/19/10	Atrazine	0.07	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	04/29/10	Atrazine	0.63	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	05/03/10	Atrazine	0.76	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	05/10/10	Atrazine	0.87	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	05/18/10	Atrazine	1.81	ug/l

Syngenta/USEPA	Carlinville Water Works	Finished	05/25/10	Atrazine	1.14	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	06/01/10	Atrazine	1.60	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	06/09/10	Atrazine	1.78	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	06/14/10	Atrazine	0.61	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	06/24/10	Atrazine	0.92	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	06/29/10	Atrazine	0.69	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	07/06/10	Atrazine	0.49	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	07/15/10	Atrazine	0.27	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	07/21/10	Atrazine	0.19	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	07/26/10	Atrazine	0.25	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	08/02/10	Atrazine	0.15	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	08/17/10	Atrazine	0.23	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	09/01/10	Atrazine	0.34	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	09/13/10	Atrazine	0.20	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	09/29/10	Atrazine	0.11	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	10/12/10	Atrazine	0.10	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	10/26/10	Atrazine	0.07	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	11/09/10	Atrazine	0.21	ug/l
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Syngenta/USEPA	Carlinville Water Works	Finished	12/06/10	Atrazine	0.18	ug/l
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Syngenta/USEPA	Carlinville Water Works	Finished	01/24/11	Atrazine	0.11	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	02/08/11	Atrazine	0.13	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	02/25/11	Atrazine	0.12	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	03/07/11	Atrazine	0.10	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	03/21/11	Atrazine	0.09	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	04/14/11	Atrazine	0.11	ug/l
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Syngenta/USEPA	Carlinville Water Works	Finished	05/16/11	Atrazine	0.27	ug/l
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Syngenta/USEPA	Carlinville Water Works	Finished	06/06/11	Atrazine	9.04	ug/l
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Syngenta/USEPA	Carlinville Water Works	Finished	07/07/11	Atrazine	0.24	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	07/11/11	Atrazine	0.40	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	07/18/11	Atrazine	0.59	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	07/25/11	Atrazine	0.61	ug/l

Syngenta/USEPA	Carlinville Water Works	Finished	08/15/11	Atrazine	0.69	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	08/30/11	Atrazine	0.75	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	09/14/11	Atrazine	0.64	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	10/11/11	Atrazine	0.71	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	10/24/11	Atrazine	0.48	ug/l
Syngenta/USEPA	Carlinville Water Works	Finished	11/10/11	Atrazine	0.29	ug/l
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Syngenta/USEPA	Carlinville Water Works	Raw	02/09/09	Atrazine	0.25	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	02/23/09	Atrazine	0.14	ug/l
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Syngenta/USEPA	Carlinville Water Works	Raw	03/24/09	Atrazine	0.15	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	04/07/09	Atrazine	0.16	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	04/21/09	Atrazine	0.18	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	04/27/09	Atrazine	0.11	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	05/07/09	Atrazine	0.67	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	05/11/09	Atrazine	1.05	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	05/22/09	Atrazine	1.72	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	05/26/09	Atrazine	1.46	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	06/03/09	Atrazine	19.39	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	06/09/09	Atrazine	16.5	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	06/19/09	Atrazine	0.82	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	06/22/09	Atrazine	1.73	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	07/06/09	Atrazine	4.95	ug/l
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Syngenta/USEPA	Carlinville Water Works	Raw	07/22/09	Atrazine	1.56	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	07/31/09	Atrazine	0.65	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	08/14/09	Atrazine	1.31	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	09/08/09	Atrazine	1.28	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	09/21/09	Atrazine	1.97	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	10/09/09	Atrazine	1.19	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	10/21/09	Atrazine	0.44	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	11/06/09	Atrazine	No Data	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	11/30/09	Atrazine	0.20	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	12/17/09	Atrazine	0.26	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	01/27/10	Atrazine	0.12	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	02/09/10	Atrazine	0.06	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	02/26/10	Atrazine	0.06	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	03/08/10	Atrazine	0.08	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	03/23/10	Atrazine	0.08	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	04/07/10	Atrazine	0.06	ug/l

Syngenta/USEPA	Carlinville Water Works	Raw	04/15/10	Atrazine	0.07	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	04/19/10	Atrazine	0.11	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	04/29/10	Atrazine	3.30	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	05/03/10	Atrazine	4.16	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	05/10/10	Atrazine	9.08	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	05/18/10	Atrazine	10.14	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	05/25/10	Atrazine	6.87	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	06/01/10	Atrazine	42.50	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	06/09/10	Atrazine	10.74	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	06/14/10	Atrazine	1.81	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	06/24/10	Atrazine	3.44	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	06/29/10	Atrazine	2.70	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	07/06/10	Atrazine	2.50	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	07/15/10	Atrazine	2.16	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	07/21/10	Atrazine	1.82	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	07/26/10	Atrazine	1.22	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	08/02/10	Atrazine	0.93	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	08/17/10	Atrazine	1.09	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	09/01/10	Atrazine	0.97	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	09/13/10	Atrazine	0.60	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	09/29/10	Atrazine	0.62	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	10/12/10	Atrazine	0.47	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	10/26/10	Atrazine	0.59	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	11/09/10	Atrazine	0.50	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	11/22/10	Atrazine	0.49	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	12/06/10	Atrazine	0.28	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	12/21/10	Atrazine	0.30	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	01/13/11	Atrazine	0.26	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	01/24/11	Atrazine	0.32	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	02/08/11	Atrazine	0.25	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	02/25/11	Atrazine	0.18	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	03/07/11	Atrazine	0.20	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	03/21/11	Atrazine	0.15	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	04/14/11	Atrazine	0.18	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	04/20/11	Atrazine	0.18	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	04/28/11	Atrazine	1.38	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	05/02/11	Atrazine	1.14	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	05/10/11	Atrazine	1.03	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	05/16/11	Atrazine	0.98	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	05/23/11	Atrazine	0.92	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	06/03/11	Atrazine	21.9	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	06/06/11	Atrazine	17.2	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	06/13/11	Atrazine	13.43	ug/l

Syngenta/USEPA	Carlinville Water Works	Raw	06/22/11	Atrazine	6.13	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	06/27/11	Atrazine	3.10	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	07/07/11	Atrazine	0.77	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	07/11/11	Atrazine	1.06	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	07/18/11	Atrazine	1.32	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	07/25/11	Atrazine	1.25	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	08/15/11	Atrazine	1.52	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	08/30/11	Atrazine	1.50	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	09/14/11	Atrazine	1.39	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	10/11/11	Atrazine	1.27	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	10/24/11	Atrazine	1.30	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	11/10/11	Atrazine	0.85	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	11/22/11	Atrazine	1.13	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	12/05/11	Atrazine	0.98	ug/l
Syngenta/USEPA	Carlinville Water Works	Raw	12/28/11	Atrazine	0.93	ug/l

Attachment 2. Lake Carlinville Watershed Photographs

Figure 8. Lake Carlinville Spillway

Figure 9. Lake Carlinville Spillway and Honey Creek

Figure 10. Lake Carlinville

Figure 11. Lake Williamson

Figure 12. Lake Carlinville Watershed Farmland

Figure 13. Lake Carlinville Watershed Farmland

Appendix A

Responsiveness Summary

This responsiveness summary responds to substantive questions and comments on Lake Carlinville Atrazine Total Maximum Daily Load (TMDL) Report received during the public comment period through October 10, 2013 (determined by postmark). The summary includes questions and comments from the September 10, 2013 public meeting as discussed below.

What is a TMDL?

A Total Maximum Daily Load (TMDL) is the sum of the allowable amount of a pollutant that a water body can receive from all contributing sources and still meet water quality standards or designated uses. Each contributing source of the pollutant will be assigned an amount of pollutant which it cannot exceed if the TMDL is to be met. This amount is called an "allocation." A TMDL is developed for each waterbody segment that is impaired by pollutants that have numeric water quality standards.

This TMDL is for atrazine in Lake Carlinville. The report details the watershed characteristics, impairments, pollutant sources, load allocations, and reductions for the impaired lake in the watershed. The Illinois EPA implements the TMDL program in accordance with Section 303(d) of the Federal Clean Water Act and regulations there under.

Background

Lake Carlinville watershed is located in southwestern Illinois, trends in a northwesterly direction, and drains approximately 15,481 acres within the state of Illinois. The watershed covers land within Macoupin County.

A previous TMDL for aquatic algae, manganese, total phosphorus and total suspended solids was approved in September of 2007. The final TMDL for the Macoupin River/ Lake Carlinville Watershed is available at http://www.epa.state.il.us/water/tmdl/report/macoupin/macoupin-final-report2.pdf. Information from the approved TMDL was used for this TMDL. Data and information is also taken from the *Watershed Plan and Phase 1 Diagnostic/Feasibility Study of Lake Carlinville, Macoupin County, Illinois* (IEPA 2007). This study was prepared using 319 Nonpoint Source funds and can be found at this website- http://www.epa.state.il.us/water/tmdl/implementation/macoupin-creek/lake-carlinville-phase1-study.pdf. This current TMDL report will focus on atrazine only. Atrazine has been listed in the Draft 2012 Illinois Integrated Water Quality Report (IR) and the 2014 Draft IR as a potential cause of impairment in Lake Carlinville.

Public Meeting

A public meeting was held at Carlinville City Hall at 6 p.m. on September 10, 2013. The purpose of the meeting was to provide the public with an opportunity to comment on Lake Carlinville TMDL and to request data that may be included in the TMDL development process. The Illinois EPA announced the public notice by placing a display ad in the local newspaper in the watershed; Macoupin County Enquirer-Democrat (Carlinville). The public notice gave the date, time, location, and purpose of the meeting. It also provided references to obtain additional information about this specific site, the TMDL Program, and other related issues. The public notice was also mailed to citizens and organizations in the watershed by first class mail. The draft TMDL Report was available for review at the Carlinville City Hall and on the Agency's web page at http://www.epa.state.il.us/public-notices/general-notices.html. Approximately 6 people attended the meeting

Questions/Comments

1. The draft Carlinville Lake Atrazine Total Maximum Daily Load (TMDL) is based on multiple conservative elements that result in a large and unreasonable cumulative margin of safety (MOS). These include the use of: frequency-of-exceedance criterion, unbalanced quarterly surface water sampling frequency, single sample concentration loading criterion, load calculations based on average of exceedances, and rounding of results to one significant figure. Cumulatively, these elements result in as high as 215% implicit margin of safety incorporated into this draft atrazine TMDL. This is in addition to the 1000 fold safety factor the US EPA has incorporated into the atrazine MCL.

   Current atrazine water quality criteria are outdated based upon current science for protection of human health in drinking water. Discussion in the TMDL related to atrazine and human health do not reflect the most recent science and reviews by multiple authorities including USEPA and the World Health Organization. The TMDL should be updated to reflect current research and reviews. An update of IEPA atrazine criteria is requested.

   Response: Illinois EPA currently uses the Maximum Contaminant Level (MCL) of 3 ug/L of atrazine as the water quality standard. There has been no change to the IPCB rules and regulations and the Federal MCL as of today. Please visit the Agency's website: (http://www.epa.state.il.us/water/tmdl/atrazine-simazine.html) that includes links to information on atrazine in drinking water (USEPA), atrazine reregistration (USEPA), atrazine information from the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and Scientific Advisory Panel (SAP), atrazine toxicity from the Agency for Toxic Substances and Disease Registry (ATSDR) and atrazine studies by the USGS.

2. Information on the Carlinville CWS treatment plant processes and historic Safe Drinking Water Act (SDWA) atrazine compliance monitoring results should be incorporated into the TMDL. The CWS has been in compliance with the SDWA.The incorporation of a single first quarter sample in the IEPA sampling program would eliminate sampling bias and a significant amount of the implicit MOS. Running 4-quarter averages are the basis for SDWA compliance and the protection of human health. This basis should be reflected in TMDL development and implementation. Three years of additional Syngenta atrazine monitoring data are re-submitted to Illinois EPA for use in the Carlinville Lake TMDL. A total of ten years of intensive atrazine monitoring are available for Carlinville Lake.

   For 10 consecutive years (2003 to 2012) atrazine running 4-quarter averages in Lake Carlinville have been below the finished drinking water MCL of 3 ppb.
   The 10 years of intensive atrazine monitoring data show the large and unrealistic margins of safety applied to Lake Carlinville Atrazine draft TMDL actually creates an atrazine problem that does not exist.

   Response: Lake Carlinville was listed for atrazine impairment in the Draft 2012 Illinois Integrated Water Quality Report. The latest assessment for Lake Carlinville was done for the 2014 Draft Integrated Water Quality Report using assessment data through 2011. The TMDL report includes data from 2002 through 2012. The 2012 assessment data was not available for use when the 2014 Integrated Water Quality Report was developed. The IEPA and Syngenta assessment data from 2009 to 2011 was used for developing the atrazine TMDL for Lake Carlinville.

3. An implicit margin of safety is defined as “incorporated into the analysis through conservative assumptions” (draft Spring Lake Atrazine TMDL, July 2013). The implicit margin of safety incorporated into the draft Carlinville Lake atrazine TMDL ranges from 156% to 215%, is overly conservative and unreasonable. Syngenta requests the Illinois EPA define and reduce the cumulative implicit (215%) margin of safety to be equal to or similar to the implicit (0%) + explicit (10%) margins of safety applied to the approved Carlinville Lake total phosphorous and manganese TMDL (Illinois EPA, 2006 Macoupin Creek Watershed TMDL, Final Approved TMDL, September 2006, Carlinville Lake (IL-RDG). The current atrazine MCL set by EPA Office of Water (USEPA/OW) and adopted by Illinois EPA is 3 ppb. For SDWA MCL compliance, the USEPA and Illinois EPA Drinking Water unit utilize results that are rounded to one significant figure (the same number of significant digits as the MCL) as directed by USEPA guidance (USEPA WSG 21, 1981; Attachment 1). In the case of atrazine, compliance concentrations of 3.01 to 3.49 should be rounded to 3.0 ppb. By not incorporating the rounding guidance, a **16%** implicit margin of safety (MOS) is incorporated into the TMDL allocation equation (0.49/3 = 0.16 * 100 = 16 percent).

   Response: IEPA used an implicit MOS for the Carlinville Lake TMDL. The MOS is provided within the TMDL calculation.

4. The IEPA surface water monitoring program frequency decreases (or ceases) in the quarter's atrazine concentrations are expected to be below or approaching the limits of analytical detection. It is twice as frequent in the quarters atrazine is expected to occur. To calculate an implicit MOS range based on this practice, a first quarter result equal to the fourth quarter result was used. (I.e. for 2009 the fourth quarter result was 0.96 ppb, this same value was used for first quarter 2010 and a R4-QA was calculated). The 2009 running 3-quarter average was compared to the calculated 2009 R4-QA, the difference was calculated and a percent margin of safety determined. In 2009 the difference was 0.34 ppb or 11% margin of safety (2.32 ppb – 1.98 ppb = 0.34 ppb; (0.34/3)*100 = 11%).
   In 2006 the difference was 0.095 ppb or 3%, and in 2003 0.07 ppb or 7%. By skipping collection of samples in the first quarter, a range of 3 to 11% implicit MOS was incorporated into the Carlinville Lake TMDL.

   Response: IEPA does not sample lakes during the winter period due to no boat access from ice on the lake. This accounts for the raw water sampling used for assessments. IEPA also uses the Drinking Water Program assessment. This program uses finished water data provided by the water plant. Water treatment plants are required to send in at least one data analysis from all quarters of the year. The IEPA and Syngenta assessment data from 2009 to 2011 was used for developing the atrazine TMDL for Carlinville Lake.

5. "Loading capacity (LC) is defined in the TMDL as the amount of atrazine that can be allowed in the lake and still meet the water quality standard of 0.003 mg/L atrazine. A mixing of water quality "standards" and "assessment guidelines" is occurring in defining loading capacity and margin of safety. A water quality "standard" based on a R4-QA, applied to a single sample concentration, can introduce an implicit Margin of Safety of 75% (e.g. 3 + 0 + 0 + 0 = 3; R4-QA 3ppb/4quarters = 0.75ppb R4-QA; 0.75ppb-3.0ppb = 2.25 ppb; 2.25ppb/3ppb = 0.75; 0.75*100 = 75 percent). As an example of the impact of this methodology, Table 1 presents 2009 IEPA Carlinville Lake atrazine monitoring results. A 3 ppb single sample concentration and/or a 3 ppb quarterly average concentration maximum is proposed in the Carlinville Lake TMDL. Using existing data the 2009 R3-QA is 2.32 ppb. Switching the 9.8 ppb single data point (second quarter) to a 3 ppb (proposed criteria) results in a R3-QA of 1.18 ppb (Table 1). By instituting the single sample substitution criteria an implicit Margin of Safety of **60%** is incorporated into the TMDL. Switching the 4.9 ppb second quarter average to 3.0 ppb (proposed criteria) results in a R3-QA of 1.68 ppb. (Table 1) By instituting the quarterly average criteria an implicit Margin of Safety of 43% is incorporated into the TMDL. Single sample substitution results in a **60%** implicit MOS and quarterly average substitution results in a **43%** implicit MOS. Both of which are unreasonably high compared to the 10% which is more typical to Illinois TMDL calculations. The atrazine load in the TMDL was calculated using the average of "exceeded values" (10.0 ppb). Atrazine concentrations from samples with results greater than 3 ppb were added together and averaged. This average concentration was then multiplied by 1) the volume of water in Carlinville Lake, 2) a conversion factor (mg to lb.), and 3) a liter to gallons conversion factor. This yields a load to Lake Carlinville. Using the

average of "all second quarter values" results in an average concentration of 3.6 ppb. This difference (10 ppb – 3.6 ppb) is 6.4 ppb and would yield a current load of 14.3 lbs., rather than the 40 lbs. identified in the TMDL. Use of "picking and choosing" select data rather than using available data represents a **64%** implicit MOS in calculating atrazine load for the Lake Carlinville TMDL. (10 – 3.6 = 6.4; 6.4/10 = 0.64; 0.64 * 100 = 64%)

Response: IEPA used the critical period assessment data for implicit margin of safety. The critical period is when rainfall/runoff is highest usually during spring periods after herbicide application takes place and not all of the herbicide applied is adsorbed by the plants. Averaging the exceedances is accounting for that critical period of time. Implementation actions devoted to this critical period will reduce impairment of atrazine in the waters of the state.

6. The MCL published in 1991 (USEPA, 1991) does not include the research and assessments conducted since that time. The MCL was based on a reference dose of 0.0048 mg/kg/day (rounded to 0.005 mg/kg/day) which was set from a mode of action that has since been proven to be not relevant to humans. In 2006, USEPA/OW published an updated reference dose of 0.018 mg/kg/day, rounded to 0.02 mg/kg/day (USEPA, 2006a), a value 4 fold greater than the value used to set the 1991 MCL. USEPA/OW has yet to revise the MCL, stating in the federal register in 2010 that it would consider revision after USEPA completed its re-evaluation of the risk assessment begun by the Office of Pesticide Programs in 2009 (USEPA, 2010). A few other aspects related to the extreme conservatism of the current 3 ppb lifetime MCL are;
   - In calculating the 3 ppb MCL, EPA/OW included the assumption that 80% of the exposure would be from food items. However, atrazine residues do not occur in food items. EPA/OPP stated in 2006 that "Monitoring data from USDA's Pesticide Data Program and Food Safety Inspection Service, and registrant supplied laboratory and field data confirm that exposures to triazine residues in or on foods are negligible." (USEPA 2006b). EPA/OW has in essence included a 5 fold safety margin by assigning 80% exposure as coming from the diet when in reality residues from food items are negligible.
   - The current 3 ppb MCL included a 1000 fold safety factor, which included a standard 100x safety factor generally applied to all pesticides, plus an extra 10x safety factor. In discussing the extra 10X safety factor, the FIFRA Scientific Advisory Panel of 2011 stated, "An extensive hazard database, spanning all life stages from conception to adulthood for atrazine, indicates no unique susceptibility in the developing organism. Additionally, the proposed point of departure, based upon attenuation of the LH surge, appears to be protective against adverse reproductive/developmental outcomes such as delays in onset of puberty, disruption of ovarian cyclicity and inhibition of suckling-induced prolactin release." (USEPA, 2011) The SAP further stated that the FQPA safety factor that addresses hazard potential should be removed (i.e. reduced to 1X), and also gave the option that "...that the FQPA Safety Factor component addressing the hazard potential could be reduced not just to 1X, but further by at least five-fold (i.e., to 0.2X or less)."

At the same FIFRA Scientific Advisory Panel meeting, EPA/OPP proposed that the 1.8 mg/kg/day No Observable Effect Level (NOEL) should be revised to 2.56 mg/kg/day (a 40% higher value). Additionally, the SAP stated that adverse impacts are not expected even at higher levels, stating that "the spontaneous LH surge is highly resistant to atrazine given that 10 mg/kg for 4 days was without effect. Furthermore, it is reasonable to conclude that a 4-day exposure to 100 mg/kg is unlikely to have adverse effects on ovarian cyclicity or puberty" (USEPA, 2011).

In summary, the IEPA criterion not only carries an unusually large implicit margin of safety, the MCL used in the draft TMDL uses outdated and inaccurate science that leads to additional large and unreasonable margins of safety.

A review of the most recent US EPA Human Health Atrazine Risk Assessment clearly shows that the CWA atrazine assessment criteria used by IEPA are outdated. An update of the IEPA CWA atrazine assessment criteria is requested.

Response: See Response #1.

7. The draft Lake Carlinville Atrazine Total Maximum Daily Load (TMDL) is based on multiple elements that result in an overly conservative and unreasonable range of cumulative implicit margin of safety as high as 215%. Using a frequency-of-exceedance criteria rather than the SDWA MCL standard incorporates a 23 to 64 % implicit MOS. An unbalanced quarterly surface water sampling frequency adds a 3 to 11% increase in the implicit MOS. Use of single sample concentration as a loading criteria rather than a running quarterly average adds a 60% implicit MOS. Load calculations based on average of exceedance rather than all samples in the second quarter introduces a 64 % implicit MOS. Rounding of results to one significant figure will reduce the implicit MOS by 16%. The incorporation of the overly conservative and unreasonable margin of safety into the draft TMDL creates an atrazine problem that does not exist.

   Response: The Clean Water Act requires that a TMDL be developed for each pollutant listed for an impaired waterbody.

8. Illinois Farm Bureau (IFB) and the Macoupin County Farm Bureau (CFB) understand that the TMDL process takes time; however, the proposed TMDL is based on Illinois EPA data that is not current and does not accurately reflectthe current water quality of Carlinville Lake. Specifically, the most recent Illinois EPA data relied upon for the draft TMDL is from 2009 and is, therefore, four years old.

   In addition, the Illinois EPA data is limited in scope in that it is comprised of only 19 samples from 1 location. There is also no Illinois EPA data from the first quarter in any year.

The Illinois EPA data set also includes at least one sample result that is questionable. The result for the sample taken on June 8, 2009 was 9.8 µg/L. The next highest result in the data set is 1 µg/L on July 14, 2009. If such a high result was observed on June 8, 2009, one would expect to see a high result in the next sampling round, but the next sampling round, which occurred a little over a month later, was far lower. Thus, Illinois EPA should revisit the sample result from June 8, 2009.

Response: See Response #4.

9. IFB and Macoupin CFB are also concerned that the BMPs currently in place in the Carlinville Lake watershed are not being considered by Illinois EPA in its determination regarding whether a TMDL is necessary, nor are they considered in the draft TMDL implementation plan.

   The watershed planning section of the draft TMDL report discusses several 319 grants, but the history is difficult to follow. For instance, the draft report mentions a 2007 Section 319 grant awarded to the City of Carlinville. What actions were taken by the City of Carlinville pursuant to that grant? Is that the same grant project that is discussed in the third paragraph on page 11 of the draft report? Additionally, the draft report includes discussion regarding a Honey Creek Stewardship Project and the installation of BMPs to reduce sedimentation and agricultural runoff reaching the lake. This includes a statement about the practices of Jay Greenwalt. Are these BMPs considered in the draft report? The date of the project is 2013, but what is the status?

   Overall, it is very likely that actions taken through the above mentioned projects have resulted in load reductions of atrazine. As such, BMPs currently in practice in the Carlinville Lake watershed should be considered as Illinois EPA determines whether a TMDL is necessary in this watershed.

   Response: The Agency did include available best management practices information in the Draft TMDL Report. We hope ongoing and future implementation actions will show reduced pollutants in the watershed during the next Integrated Water Quality Report assessment cycle. The tillage practice data has been updated.

10. IFB and Macoupin CFB recommend that Illinois EPA focus its resources at this time on collecting additional data and information to more thoroughly characterize the current water quality of Carlinville Lake. The TMDL process allows for this additional review in what is referred to as "Stage 2." Specifically, Illinois EPA should review the sample results relied upon for the draft TMDL and collect additional samples to build a more robust, updated and accurate data set before moving forward with developing a TMDL for the Carlinville Lake watershed. In addition, Illinois EPA should consider the current BMPs in place in the watershed when determining whether a TMDL is even necessary.

    Response: After reviewing the pesticide data from the ten lakes listed as high priority for TMDL development due to atrazine and/or simazine (refer to http://www.epa.state.il.us/water/tmdl/303-appendix/2014/appendix-a3.pdf the Agency did not find the need for additional data.