

Table B-1  
Surface Water Effects Values  
Midwest Generation

Constituent	CAS	Units	Surface Water Effects Values <sup>(1)</sup>							
			General Use <sup>(2)</sup>				Lake Michigan Basin <sup>(2)</sup>			
			Chronic		Acute <sup>(4)</sup>		Chronic		Acute <sup>(4)</sup>	
Antimony	7440-36-0	mg/L	0.32	(2c)	1.2	(2c)	0.32	(3d)	1.2	(3d)
Arsenic	7440-38-2	mg/L	0.19	(2a)	0.36	(2a)	0.148	(3a)	0.34	(3a)
Boron	7440-42-8	mg/L	7.6	(2a)	40.1	(2a)	7.6	(3a)	40.1	(3a)
Chloride	16887-00-6	mg/L	500	(2b)	--	--	500	(3b)	--	--
Iron	7439-89-6	mg/L	1.0	(2b)	--	--	1.0	(3b)	--	--
Lead	7439-92-1	mg/L	0.0485	(2a,i)	0.231	(2a,i)	n/a	--	n/a	--
Manganese	7439-96-5	mg/L	3.04	(2a,ii)	7.15	(2a,ii)	3.04	(3a)	7.15	(3a)
Nitrate	14797-55-8	mg/L	--	--	--	--	n/a	--	n/a	--
pH	--	s.u.	6.5 - 9.0	(2d)	--	--	6.5 - 9.0	(3c)	--	--
Selenium	7782-49-2	mg/L	1.0	(2b)	--	--	n/a	--	n/a	--
Sulfate	18785-72-3	mg/L	site-specific	(2c)	--	--	500	(3b)	--	--
	<i>Joliet #29</i>	18785-72-3	1350	(2c)	--	--	500	(3b)	--	--
	<i>Powerton</i>	18785-72-3	1430	(2c)	--	--	500	(3b)	--	--
	<i>Waukegan</i>	18785-72-3	n/a	--	--	--	500	(3b)	--	--
	<i>Will County</i>	18785-72-3	1420	(2c)	--	--	500	(3b)	--	--
Thallium	7440-28-0	mg/L	0.003	(2f)	0.086	(2c)	n/a	--	n/a	--
Total Dissolved Solids	--	mg/L	--	--	--	--	1,000	(3c)	--	--

Notes

(1) Illinois Water Quality Standards (WQS) are used as surface water effects values for evaluating hypothetical human and ecological exposure scenarios. In the absence of a WQS, Illinois Water Quality Criteria (WQC) are used. Values are applicable to total (rather than dissolved) concentrations.

(2) Concentration represents an Illinois General Use WQS as defined in 35 IAC 302, Subpart B or an Illinois WQC (lower of aquatic life and human health WQC):

(a) 35 IAC 302.208(c), Numerical Water Quality Standards for the Protection of Aquatic Life

(i) Standard for total lead is a hardness (H)-dependent value, calculated as follows (see also footnote 5):

$$\text{Chronic} = \exp[-2.863 + 1.273 \cdot \ln(H)] \cdot 1E-3 \text{ mg}/\mu\text{g}$$

$$\text{Acute} = \exp[-1.301 + 1.273 \cdot \ln(H)] \cdot 1E-3 \text{ mg}/\mu\text{g}$$

(ii) Standard for total manganese is a hardness (H)-dependent value, calculated as follows (see also footnote 5):

$$\text{Chronic} = \exp[4.0635 + 0.7467 \cdot \ln(H)] \cdot 1E-3 \text{ mg}/\mu\text{g}$$

$$\text{Acute} = \exp[4.9187 + 0.7467 \cdot \ln(H)] \cdot 1E-3 \text{ mg}/\mu\text{g}$$

(b) 35 IAC 302.208(g), Single-Value Standards

(c) 35 IAC 302.208(h)(2)(A), Water Quality Standard for Sulfate; standard is hardness (H) and chloride (Cl) dependent, and calculated as follows (see also footnotes 5 and 6):

$$\text{Chronic} = \exp[1276.7 + 5.508 \cdot (H) - 1.457 \cdot (Cl)] \cdot 0.65$$

(d) 35 IAC 302.204, pH

(e) Illinois WQC for the protection of aquatic life.

(f) Illinois WQC for the protection of human health (applicable to chronic values only).

(3) Concentration represents an Illinois Lake Michigan Basin WQS as defined in 35 IAC 302, Subpart E. Note that of the four subject sites, Lake Michigan Basin WQS are only applicable to the Waukegan Power Generating Station. "n/a" indicates a constituent is not of interest at the Waukegan Power Generating Station.

(a) 35 IAC 302.504(a), Lake Michigan Basin Water Quality Standards for Chemical Constituents. WQS for manganese are calculated using the hardness-dependent GU equations.

(b) 35 IAC 302.504(b)

(c) IAC 302.503, pH

(d) If a Lake Michigan Basin WQS was not available, the General Use WQS was assumed to be applicable.

(4) Chronic values are used as the primary effects values for this evaluation; however, acute values are also presented for discussion purposes.

(5) Site-specific hardness data is not available. However, based on data from the Illinois Water Quality Database (<http://ilrdss.isvs.illinois.edu/WQ/>), a value of 200 mg/L is considered a conservative estimate for this evaluation.

(6) General use sulfate WQS calculated using the average chloride concentration for available data, which are listed below. The Lake Michigan Basin criterion, which is applicable to the Waukegan Station is not chloride-dependent.

Joliet #29 206

Powerton 118

Will County 128

Definitions

"--" = value not available

n/a = not applicable

mg/L = milligram per liter

s.u. = standard unit



# **JOLIET 29**

Table B-2-2  
 Comparison Of Average Groundwater Analytical Results To Surface Water Effects Values  
 Midwest Generation -- Joliet #29 Generating Station - Joliet, Will County, Illinois

Constituent	Units	Effects Value (1)	Groundwater Analytical Results - Average Concentrations (2)											Average (3)		
			MW-01	MW-02	MW-03	MW-04	MW-05	MW-06	MW-07	MW-08	MW-09	MW-10	MW-11			
Antimony	mg/L	0.32	0.00222	0.0021	0.00274	0.00224	0.00167	0.00161	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.00344 U	0.00185
Boron	mg/L	7.6	0.268	0.297	0.387	0.377	0.249	0.254	0.198	0.432	0.359	0.432	0.359	0.432	1.21	0.422
Chloride	mg/L	500	156	223	237	191	177	195	222	213	209	213	209	188	203	203
Iron	mg/L	1.0	0.1 U	0.116 U	0.0656	0.101	0.0685	0.272	0.442	0.272	0.442	0.272	0.442	0.272	0.0885	21.6
Manganese	mg/L	3.04	0.00477	0.00168	0.009	0.0291	0.00711	0.0115	0.0466	0.0221	0.0466	0.0221	0.0466	0.0221	0.0359	0.129
Sulfate	mg/L	1350	119	104	134	127	115	131	119	112	119	112	119	112	301	301
Total Dissolved Solids	mg/L	-	676	789	932	868	714	759	805	860	860	860	860	860	779	1080

Notes

- (1) Illinois General Use Water Quality Standards (WQS) and Illinois Water Quality Criteria (WQC) are used as surface water effects values.
- (2) Average of concentrations reported between December 2010 and April 2017. If a constituent was not detected during this timeframe, the average reporting limit is presented in the table, indicated with a "U" qualifier. Otherwise, non-detect results were included in the average calculation assuming one-half the reporting limit.
- (3) Average of concentrations (averages) presented in the table, assuming one-half the reporting limit for non-detect results.

mg/L = milligram per liter

s.u. = standard units

- = value not available

U = constituent not detected above its reporting limit; reporting limit presented

bold/shading = concentration exceeds effects value

Table B-2-3  
 Comparison Of Maximum Groundwater Analytical Results To Surface Water Effects Values  
 Midwest Generation -- Joliet #29 Generating Station - Joliet, Will County, Illinois

Constituent	Units	Effects Value <sup>(1)</sup>	Groundwater Analytical Results - Maximum Concentrations <sup>(2)</sup>											Average <sup>(3)</sup>		
			MW-01	MW-02	MW-03	MW-04	MW-05	MW-06	MW-07	MW-08	MW-09	MW-10	MW-11			
Antimony	mg/L	0.32	0.0052	0.012	0.016	0.012	0.004	0.0045	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.015 U	0.00611
Boron	mg/L	7.6	0.38	0.74	0.74	1.1	0.44	0.51	0.64	0.72	0.56	0.56	0.56	0.56	2.6	0.813
Chloride	mg/L	500	400	410	380	370	290	370	780	390	320	390	390	320	430	419
Iron	mg/L	1.0	0.1 U	0.5 U	0.22	0.46	0.5 U	0.15	3.8	3.8	3.2	3.4	3.4	3.2	0.42	311
Manganese	mg/L	3.04	0.015	0.0036	0.1	0.33	0.081	0.14	1.1	6	0.12	0.12	0.12	0.12	0.49	0.788
Sulfate	mg/L	1350	240	190	260	360	300	160	600	12000	250	260	600	12000	290	1360
Total Dissolved Solids	mg/L	--	1100	1200	1300	1100	1000	1200	2100	19000	1100	1200	2100	19000	1300	2860

Notes

- (1) Illinois General Use Water Quality Standards (WQS) and Illinois Water Quality Criteria (WQC) are used as surface water effects values.
- (2) Maximum detected concentrations reported between December 2010 and April 2017. If a constituent was not detected during this timeframe, the maximum reporting limit is presented in the table, indicated with a "U" qualifier.
- (3) Average of concentrations (maximums) presented in the table, assuming one-half the reporting limit for non-detect results.

mg/L = milligram per liter  
 s.u. = standard units  
 "-" = value not available  
 U = constituent not detected above its reporting limit; reporting limit presented  
 bold/shading = concentration exceeds effects value

# POWERTON

Table B-3-2  
 Comparison Of Average Groundwater Analytical Results To Surface Water Effects Values  
 Midwest Generation - Peverton Generating Station - Polk, Tazewell County, Illinois

Constituent	Units	Effects Value (1)	Groundwater Analytical Results - Average Concentrations (2)																Average (3)	
			Gravelly Sand Unit (4)								SRU/Clay Unit (4)									
			MW-01	MW-02	MW-03	MW-04	MW-05	MW-06	MW-07	MW-08	MW-09	MW-10	MW-11	MW-12	MW-13	MW-14	MW-15	MW-16		
Arsenic	mg/L	0.19	0.0057	0.0106	0.0096	0.0038	0.0062	0.167	0.0081	0.0076	0.0214	0.0238	0.0218	0.00121 U	0.0094	0.00311	0.00689	0.00417	0.00584	0.0155
Boron	mg/L	7.6	0.184	0.313	0.183	0.739	0.418	2.61	0.787	0.282	1.48	3.26	0.232	0.266	0.933	1.02	1.92	1.35	1.09	
Chloride	mg/L	500	54	55.7	57.7	78	111	151	32.4	45	90	165	38.5	193	237	198	173	191	117	
Iron	mg/L	1	0.0533	0.0354	0.0362	0.0406	0.0642	0.187	0.0364	0.192	1.95323	0.701	0.0464	1.1	1.49	7.3	0.936	1.79	1.41	
Lead	mg/L	0.0485	0.00042	0.00044	0.00043	0.00083 U	0.00083 U	0.00217	0.00041	0.00087	0.00045	0.00084 U	0.00076 U	0.00042	0.00083 U	0.00667	0.00052	0.00042	0.00052	0.00052
Manganese	mg/L	3.04	0.00296	0.00222	0.00385	0.229	0.267	7.84	0.174	2.06	5.53	7.84	0.00798	1	0.291	0.612	0.67	0.474	1.44	
Nitrogen/Nitrate	mg/L	--	4.66	3.37	1.95	0.516	0.266	0.0538	6.22	2.39	0.435	0.439	21.5	0.034	0.117	0.0444	0.367	0.168	2.66	
Nitrogen/Nitrite, Nitrite	mg/L	--	3.51	2.5	1.63	0.295	0.106	0.1 U	6.55	1.44	0.186	0.0647	21.6	0.042	0.0812	0.0653	0.242	0.23	2.43	
pH	n.u.	6.5 - 9.0	7.28	7.4	7.38	7.2	7.13	6.84	7.23	7.02	7.25	7.72	7.27	7.7	7.8	7.46	7.22	7.18	7.3	
Selenium	mg/L	1	0.00231	0.00171	0.00237	0.0027	0.00184	0.00248	0.00688	0.00501	0.00185	0.00502	0.00133	0.00171	0.00175	0.00174	0.00174	0.0132	0.00417	
Sulfate	mg/L	1430	76.3	68.7	64.5	129	182	30.9	127	71.7	212	1860	43.1	372	298	423	948	510	290	
Thallium	mg/L	0.003	0.00165 U	0.00165 U	0.00165 U	0.00165 U	0.00165 U	0.00165 U	0.00165 U	0.00165 U	0.00165 U	0.00165 U	0.00165 U	0.00165 U	0.00165 U	0.00165 U	0.00165 U	0.00165 U	0.00165 U	0.000976
Total Dissolved Solids	mg/L	--	537	489	451	638	778	1700	556	350	839	2340	517	1160	1190	1190	2130	1510	998	

Notes  
 (1) Illinois General Use Water Quality Standards (WQS) and Illinois Water Quality Criteria (WQC) are used as surface water effects values.  
 (2) Average of concentrations reported between December 2010 and May 2017. If a constituent was not detected during this timeframe, the average reporting limit is presented in the table, indicated with a "U" qualifier. Otherwise, non-detect results were included in the average calculation assuming one-half the reporting limit.  
 (3) Average of concentrations (averages) presented in the table, assuming one-half the reporting limit for non-detect results.  
 (4) Groundwater in the gravelly sand unit flows in a northerly direction. Groundwater in the localized silt/clay unit flows in a westerly direction. Summary statistics do not distinguish between these two units.

mg/L = milligram per liter  
 n.u. = standard units  
 -- = value not available  
 U = constituent not detected above its reporting limit  
 bold/italizing = concentration exceeds effects value



# WAUKEGAN



Table B-4-2  
 Comparison Of Average Groundwater Analytical Results To Surface Water Effects Values  
 Midwest Generation – Waukegan Generating Station - Waukegan, Lake County, Illinois

Constituent	Units	Effects Value <sup>(1)</sup>	Groundwater Analytical Results - Average Concentrations <sup>(2)</sup>										Average <sup>(3)</sup>		
			MW-01	MW-02	MW-03	MW-04	MW-05	MW-06	MW-07	MW-08	MW-09				
Antimony	mg/L	0.32	0.00179	0.002	0.00163	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.0016
Arsenic	mg/L	0.148	0.081	0.0125	0.00463	0.00727	0.0081	0.0081	0.00417	0.0081	0.0081	0.0081	0.00523	0.00085	0.0149
Boron	mg/L	7.6	2.12	2.54	1.93	2.16	29.7	29.7	3.57	37.2	37.2	23.7	11.8	12.7	106
Chloride	mg/L	500	49.8	49.8	55.2	49.6	182	182	86.1	49.4	46.5	388	388	388	106
Iron	mg/L	1.0	0.1 U	0.0581	0.1 U	0.0756	4.62	4.62	5.5	12.7	12.7	5.8	0.47	0.47	3.3
Manganese	mg/L	3.04	0.00565	0.0449	0.00529	0.0596	0.483	0.483	0.326	0.493	0.493	0.32	0.0945	0.0945	0.204
Sulfate	mg/L	500	253	232	180	221	861	861	229	646	646	343	345	345	368
pH	s.u.	6.5 - 9.0	9.94	8.31	8.13	7.64	7.07	7.07	7.24	7.23	7.23	6.99	7	7	7.73
Total Dissolved Solids	mg/L	1000	517	513	437	516	2120	2120	934	1620	1620	1100	1480	1480	1030

Notes

- (1) Illinois Lake Michigan (LM) Basin Water Quality Standards (WQS) and Illinois LM Basin Water Quality Criteria (WQC) are used as surface water effects values.
- (2) Average of concentrations reported between December 2010 and May 2017. If a constituent was not detected during this timeframe, the average reporting limit is presented in the table, indicated with a "U" qualifier. Otherwise, non-detect results were included in the average calculation assuming one-half the reporting limit.
- (3) Average of concentrations (averages) presented in the table, assuming one-half the reporting limit for non-detect results.

mg/L = milligram per liter

s.u. = standard units

"-" = value not available

U = constituent not detected above its reporting limit

bold/shading = concentration exceeds effects value

Table B-4-3  
 Comparison Of Maximum Groundwater Analytical Results To Surface Water Effects Values  
 Midwest Generation – Waukegan Generating Station - Waukegan, Lake County, Illinois

Constituent	Units	Effects Value <sup>(1)</sup>	Groundwater Analytical Results - Maximum Concentrations <sup>(2)</sup>										Average <sup>(3)</sup>		
			MW-01	MW-02	MW-03	MW-04	MW-05	MW-06	MW-07	MW-08	MW-09				
Antimony	mg/L	0.32	0.0056	0.015	0.0051	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.00386
Arsenic	mg/L	0.148	0.21	0.042	0.016	0.04	0.0096	0.014	0.0057	0.0012	0.0012	0.0012	0.0012	0.0012	0.0396
Boron	mg/L	7.6	3.1	3.6	3.5	3	49	10	28	16	18.5	16	16	16	18.5
Chloride	mg/L	500	79	57	89	71	720	140	56	430	192	430	430	430	192
Iron	mg/L	1.0	0.1 U	0.16	0.1 U	0.56	15	16	7	0.81	6.51	0.81	0.81	0.81	6.51
Manganese	mg/L	3.04	0.026	0.16	0.015	0.36	0.99	0.75	0.33	0.14	0.385	0.14	0.14	0.14	0.385
Sulfate	mg/L	500	390	370	290	360	1200	390	500	430	534	430	430	430	534
pH	s.u.	6.5 - 9.0	7.92-11.83	7.52 - 10.13	6.67 - 9.26	6.68 - 8.93	6.18 - 7.64	6.76 - 7.94	6.92 - 7.16	6.90 - 7.20	7.09 - 8.56	6.90 - 7.20	6.90 - 7.20	6.90 - 7.20	7.09 - 8.56
Total Dissolved Solids	mg/L	1000	750	770	860	990	3500	1200	1200	1600	1420	1200	1200	1600	1420

Notes

- (1) Illinois Lake Michigan (LM) Basin Water Quality Standards (WQS) and Illinois LM Basin Water Quality Criteria (WQC) are used as surface water effects values.
- (2) Maximum detected concentrations reported between December 2010 and May 2017. If a constituent was not detected during this timeframe, the maximum reporting limit is presented in the table, indicated with a "U" qualifier. For pH, the range is presented.
- (3) Average of well-specific concentrations (maximums) presented in the table. If the maximum is a non-detect result, one-half the reporting limit was used as a surrogate concentration in the calculation. For pH, the range presented in the "average" column is the average minimum and average maximum.

mg/L = milligram per liter

s.u. = standard units

"-" = value not available

U = constituent not detected above its reporting limit; reporting limit presented

bold/shading = concentration exceeds effects value

# **WILL COUNTY**

Table B-5-2  
 Comparison Of Average Groundwater Analytical Results To Surface Water Effects Values  
 Midwest Generation – Will County Generating Station - Romeoville, Will County, Illinois

Constituent	Units	Effects Value <sup>(1)</sup>	Groundwater Analytical Results - Average Concentrations <sup>(2)</sup>										Average <sup>(3)</sup>				
			MW-01	MW-02	MW-03	MW-04	MW-05	MW-06	MW-07	MW-08	MW-09	MW-10					
Ammonium	mg/L	0.32	0.00168	0.00251	0.00344	0.00344	0.00344	0.00344	0.00344	0.00344	0.00344	0.00344	0.00344	0.00344	0.00344	U	0.0018
Boron	mg/L	7.6	1.5	2.91	3.21	4.6	3.51	2.88	4.05	1.77	2.9	1.94	1.77	2.9	2.9	U	2.97
Chloride	mg/L	500	96	125	75.3	109	131	108	159	158	128	158	194	124	124	U	128
Manganese	mg/L	3.04	0.143	0.0578	0.305	0.637	0.0765	0.0622	0.104	0.344	0.246	0.00253	0.00253	0.246	0.246	U	0.20
Sulfate	mg/L	1420	258	407	403	1700	593	373	554	492	309	308	308	309	309	U	540
pH	s.u.	6.5 - 9.0	7.49	8.01	7.15	7.03	7.93	8.59	8.1	7.3	7.5	7.3	7.5	7.5	7.5	U	7.88
Total Dissolved Solids	mg/L	--	807	1040	1060	3050	1320	827	1250	1260	996	789	789	996	996	U	1240

Notes

- (1) Illinois General Use Water Quality Standards (WQS) and Illinois Water Quality Criteria (WQC) are used as surface water effects values.
- (2) Average of concentrations reported between December 2010 and May 2017. If a constituent was not detected during this timeframe, the average reporting limit is presented in the table, indicated with a "U" qualifier. Otherwise, non-detect results were included in the average calculation assuming one-half the reporting limit.
- (3) Average of concentrations (averages) presented in the table, assuming one-half the reporting limit for non-detect results.

mg/L = milligram per liter  
 s.u. = standard units  
 "--" = value not available  
 U = constituent not detected above its reporting limit  
 bold/shading = concentration exceeds effects value

Table B-5-3  
 Comparison Of Maximum Groundwater Analytical Results To Surface Water Effects Values  
 Midwest Generation – Will County Generating Station - Romeoville, Will County, Illinois

Constituent	Units	Effects Value <sup>(1)</sup>	Groundwater Analytical Results - Maximum Concentrations <sup>(2)</sup>										Average <sup>(3)</sup>		
			MW-01	MW-02	MW-03	MW-04	MW-05	MW-06	MW-07	MW-08	MW-09	MW-10			
Antimony	mg/L	0.32	0.0063	0.017	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.00833
Boron	mg/L	7.6	2.6	4.9	4.1	6.2	190	200	210	210	210	210	270	360	231
Chloride	mg/L	500	220	250	250	190	190	200	210	210	210	210	270	360	231
Manganese	mg/L	3.04	0.3	0.21	0.49	1	1	0.2	0.2	0.2	0.2	0.2	0.62	0.005	0.36
Sulfate	mg/L	1420	540	710	610	4800	4800	1700	1700	1700	1700	1000	800	430	1160
pH	s.u.	6.5 - 9.0	6.91 - 8.96	6.94 - 8.97	6.06 - 8.12	5.87 - 7.67	6.73 - 9.77	6.73 - 9.77	6.73 - 9.77	6.73 - 9.77	6.73 - 9.77	7.11 - 8.79	6.85 - 8.18	8.35 - 10.88	6.99 - 8.99
Total Dissolved Solids	mg/L	-	1300	1500	1400	6000	6000	2100	2100	1200	1600	1700	1000	1100	1890

Notes

- (1) Illinois General Use Water Quality Standards (WQS) and Illinois Water Quality Criteria (WQC) are used as surface water effects values.
- (2) Maximum detected concentrations reported between December 2010 and May 2017. If a constituent was not detected during this timeframe, the maximum reporting limit is presented in the table, indicated with a "U" qualifier. For pH, the range is presented.
- (3) Average of well-specific concentrations (maximums) presented in the table. If the maximum is a non-detect result, one-half the reporting limit was used as a surrogate concentration in the calculation. For pH, the range presented in the "average" column is the average minimum and average maximum.

mg/L = milligram per liter  
 s.u. = standard units  
 "-" = value not available  
 U = constituent not detected above its reporting limit  
 bold/shading = concentration exceeds effects value