



July 22, 2024

Mr. Mike Smith
Iowa Department of Natural Resources
Wallace State Office Building
502 East 9th Street
Des Moines, Iowa 50319

Subject: **IDNR Comment Letter Response (AWQR Document No. 109602; HMSP Document No. 109603)
Winneshiek County Sanitary Landfill
Permit No. 96-SDP-01-74P
AECOM #60711359**

Dear Mike,

The Winneshiek County Area Solid Waste Agency (WINNE) received your comment letter regarding the IDNR Comment Letter on the 2023 Annual Water Quality Report (Document No. 109602) and the 2024 Update Winneshiek Hydrologic Monitoring System Plan (Document No. 109603) on June 13, 2024. The following presents our responses:

Water Quality Monitoring

Comment 1. *Section 3. Data Evaluation and Summary states that MW-7A, MW-29A, MW-31A, MW-40A, MW-42A, MW-43A, MW-44A, MW-11 and MW-35 are in assessment monitoring, yet Table 1 indicates that MW-7A, MW-40A, MW-42A, MW-43A, MW-44A are in detection monitoring. Please correct this discrepancy and provide clarification as necessary.*

RESPONSE: AWQR report Table 1 has been corrected. A revised 2023 AWQR Table 1 is attached.

Comment 2. *Table 2 indicates that MW-40A will be sampled for Appendix II parameters in 2023 and again for Appendix II parameters in 2024 and that MW-42A and MW-43A will be sampled for Appendix II parameters in 2024. Please clarify why MW-7A and MW-44A were omitted from Appendix II testing.*

RESPONSE: AWQR Table 2 has been corrected to note Spring 2024 Appendix II sampling for wells MW-7A and MW-44A.

Comment 3. *MW-45A and MW-46A are not shown on figures (installed to replace MW-5AR and MWII-3 respectively according to Section 1.4). Please correct this on future submittals.*

RESPONSE: Monitoring wells MW-45A and MW-46A were not installed before May 2023. May 2023 groundwater levels were used to create water table and bedrock maps. All 2024 figures will be updated to show new wells MW-45A and MW-46A.

Comment 4. *Table 5 indicates "Background level" for inorganic parameters and Table 7 indicates "Upgradient Background Prediction Limit." Please clarify the meaning of these and whether or not they are one in the same.*

RESPONSE: We have updated Tables 5, 6, and 7 to label columns consistently to "Background Standard".

Comment 5. *Please update the Assessment of Corrective Measures to include an evaluation of the potential impact of landfill gas on the cobalt plumes by December 31, 2024.*

RESPONSE: We have collected landfill gas measurements as part of Spring 2024 sampling event. We will measure landfill gas again as part of the Fall 2024 sampling event. We will report the results to the DNR by December 31, 2024, as an update to the Assessment of Corrective Measures document.

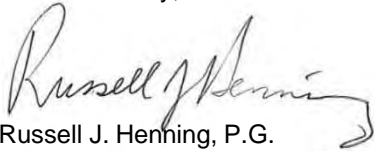
Please provide the clarifications requested in Items 1 and 3 above by July 29, 2024.

2024 Update Winneshiek Hydrologic Monitoring System Plan

Comment 6. *Figures 6 through 20, 22, 26, and 28 through 34 are missing. Similarly, Tables 3, 4, 7, and 8 appear to be missing. Therefore, the DNR has stopped our review of the plan and requests that the submitted document be reviewed for other missing information, corrected, and resubmitted by July 29, 2024.*

RESPONSE: An updated HMSP document will be submitted to DNR which includes all missing figures and tables.

Yours sincerely,



Russell J. Henning, P.G.

Table 1
Monitoring Program Summary Table
2023 Annual Water Quality Report
Winneschiek County Landfill
Permit No. 96-SDP-1-74P

Monitoring Well	Formation	Groundwater System	Current Monitoring Program (March 2023)	Change for next sampling event	Constituents w/SSI	Constituents w/SSL	Total # of Samples in each monitoring program		
							Detection	Assessment	Corrective Action
MW-1	Qt/fluv	Water table	Background	NC	None	None	20	7	0
MW-2R	Oeu	Water table	Detection	NC	None	None	20	0	0
MW-3	Qt	Water table	Detection	NC	None	None	22	0	0
MW-4	Qt/fluv	Water table	Assessment	NC	Barium, Cadmium, Cobalt, Nickel	None	19	7	0
MW-4B	Qt/fluv	Water table	Detection	NC	None	None	22	8	0
MW-5AR	Oeu/Oel	Water table	Detection	NC	None	None	22	3	0
MW-7A	Qt	Water table	Detection	Assessment	Barium	None	22	0	0
MWII-3	Qt	Water table	Assessment	NC	Barium, Cadmium, Nickel	None	23	8	0
MW-24A	Qf, Qi, Oe	Water table	Detection	Assessment	Nickel	None	14	1	0
MW-25A	Qf, Qi, Oe	Water table	Detection	NC	None	None	20	0	0
MW-29A	Qi/Qc	Water table	Assessment	NC	Arsenic, Cobalt, Nickel	Cobalt	13	8	0
MW-31A	Water table	Water table	Assessment	NC	Cobalt, Nickel	Cobalt	11	9	0
MW-33A	Qi/Qt	Water table	Assessment	NC	None	Arsenic, Cobalt	11	2	0
MW-34A	Qi/Qt	Water table	Detection	NC	None	None	11	0	0
MW-37A	Qi/Qt	Water table	Background	NC	None	None	7	0	0
MW-38A	Qf, Qi, Oe	Water table	Detection	NC	None	None	8	0	0
MW-38A	Qf, Qi, Oe	Water table	Detection	NC	None	None	8	0	0
MW-40A	Qf, Qi, Oe	Water table	Detection	Assessment	Cobalt, Nickel	Cobalt	8	1	0
MW-41A	Qf, Qi, Oe	Water table	Detection	NC	None	None	5	0	0
MW-42A	Qf, Qi, Oe	Water table	Detection	Assessment	Cobalt, Nickel	None	5	0	0
MW-43A	Qf, Qi, Oe	Water table	Detection	Assessment	Arsenic, Barium, Cobalt, Nickel	None	5	0	0
MW-44A	Qf, Qi, Oe	Water table	Detection	Assessment	Barium, Cadmium, Nickel, Zinc	None	5	0	0
MW-45A	Qt	Water table	Detection	NC	None	None	2	0	0
MW-46A	Qt	Water table	Detection	Assessment	Barium, Nickel	None	2	0	0
MW-101	Qt/fluv	Water table	Detection	NC	Barium	None	11	0	0
MW-11	Oeu/Oel	Uppermost bedrock	Assessment	NC	Nickel, Zinc	None	6	1	0
MW-19R	Oel	Uppermost bedrock	Background	Detection	None	None	8	1	0
MW-22	Og	Uppermost bedrock	Detection	NC	None	None	12	0	0
MW-35	Oel	Uppermost bedrock	Assessment	NC	Cobalt, Nickel	Cobalt	11	2	0
GU-1	NA	Groundwater Underdrain	Detection	NC	None	None	17	0	0
GU-2	NA	Groundwater Underdrain	Detection	NC	None	None	11	0	0
SW-1	Tributary of Trout River	Surface Water	Detection	NC	None	None	19	0	0
SW-2	Trout River	Surface Water	Detection	NC	None	None	20	0	0
SW-5	Tributary of Trout River	Surface Water	Detection	NC	None	None	4	0	0
Other monitoring points									
MW-2	Qt/Oeu	Water table	Water Level	NC	NA	NA	--	--	--
MWII-2	Qt	Water table	Water Level	NC	NA	NA	--	--	--
MW-32A	Qt/fluv	Water table	Water Level	NC	NA	NA	Dry	--	--
MW-100	Qt/fluv	Water table	Water Level	NC	NA	NA	Dry	--	--
MW-18	Oeu	Uppermost bedrock	Water Level	NC	NA	NA	--	--	--
MW-30	Oeu	Uppermost bedrock	Water Level	NC	NA	NA	Dry	--	--
MW-36	Og	Uppermost bedrock	Water Level	NC	NA	NA	Dry	--	--
MH-1AA	NA	Leachate Manhole	ACM	NC	NA	NA	1	--	--
MH-4-2	NA	Leachate Manhole	ACM	NC	NA	NA	2	--	--

Notes:

Number of Samples including resampling based on sampling events since fall 2014

- SSI = Statistically Significant Increase above background
- SSL = Statistically Significant Level above groundwater protection standard
- NC = No Change for next sampling event
- NA = new monitoring well; insufficient sample size
- ACM = Assessment of Corrective Measures Sampling

Geological Unit Symbols:

- fluv = Quaternary Fluvio-glacial Material
- Qf = Quaternary Fill Placed During Landfill Construction
- Qi = Quaternary Loess
- Qc = Quaternary, Pre-Wisconsin Episode Colluvium
- Qt = Quaternary Till
- Oeu = Ordovician Maquoketa Formation, Upper Elgin Member (Interbedded Limestone and Shale)
- Oel = Ordovician Maquoketa Formation, Lower Elgin Member (Shale)
- Og = Ordovician Galena Formation (Limestone)
- Groundwater underdrain = groundwater from Cell 5 underdrain layer

Table 2
Monitoring Program Implementation Schedule
2023 Annual Water Quality Report
Winneshiok County Landfill
Permit No. 96-SDP-1-74P

Monitoring Well	Recent Sampling Events and Constituents				Upcoming Sampling Dates and Constituents			Full Appendix II Sample Dates	
	June 2023	August 2023	November 2023	January 2024	May 2024	August 2024	October 2024	Previously Collected	Next Event
MW-1	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	7/24/2009, 4/21/2010, 5/5/2014, 6/25/2014, 11/7/2014, 12/22/14, 5/1/2015, 9/22/2015, 12/19/2015, 4/11/2016, 11/11/2016	NA
MW-2R	Appendix I, TSS	--	Appendix I, TSS	Zn, Toluene	Appendix I, TSS	--	Appendix I, TSS	NA	NA
MW-3	Appendix I, TSS	--	Appendix I, TSS	Toluene	Appendix I, TSS	--	Appendix I, TSS	NA	NA
MW-4	Appendix II, TSS	--	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	4/9/2009, 4/21/2010, 5/2/2014, 6/26/2014, 11/4/2014, 12/19/2014, 5/6/2015, 9/18/2015, 11/28/2016, 11/16/2017, 6/8/2023	2028
MW-4B	Appendix I, TSS	--	Appendix I, TSS	Barium	Appendix I, TSS	--	Appendix I, TSS	2/25/2010, 10/31/2014, 12/19/2014, 5/6/2015, 7/1/2015, 9/15/2015, 12/9/2015, 11/29/2016, 11/21/2017	NA
MW-5AR	Appendix I, TSS	--	Appendix I, TSS	--	Abandoned	--	Abandoned	4/13/2009, 4/21/2010, 5/8/2014, 6/27/2014, 11/6/2014, 9/22/2015, 6/29/2020	Abandoned
MW-7A	Appendix I, TSS	Barium	Appendix I, TSS	--	Appendix II, TSS	--	Appendix I, TSS	NA	NA
MW-24A	Appendix I, TSS	--	DRY	--	Appendix II, TSS	--	Appendix I, TSS	6/29/2020	2024
MW-25A	Appendix I, TSS	--	Appendix I, TSS	Toluene, Nickel	Appendix I, TSS	--	Appendix I, TSS	NA	NA
MW-29A	Appendix I, Sulfide, TSS	--	Appendix I, Sulfide, TSS	--	Appendix I, TSS	--	Appendix I, TSS	11/20/2020, 5/24/2021, 3/29/2022	2027
MW-31A	Appendix I, Endosulfani, TSS	--	Appendix I, Endosulfani, TSS	--	Appendix I, TSS	--	Appendix I, TSS	11/18/2020, 5/19/2021, 3/15/2022	2027
MW-33A	Appendix I, TSS	--	DRY	--	Appendix I, TSS	--	Appendix I, TSS	9/29/2021, 9/13/2022	2027
MW-34A	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	NA	NA
MW-37A	Appendix I, TSS	--	DRY	--	Appendix I, TSS	--	Appendix I, TSS	NA	NA
MW-38A	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	NA	NA
MW-39A	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	NA	NA
MW-40A	Appendix I, TSS	--	Appendix II, TSS	--	Appendix II, TSS	--	Appendix I, TSS	11/6/2023	2024
MW-41A	Appendix I, TSS	Appendix I, TSS	Appendix I, TSS	Cobalt	Appendix I, TSS	--	Appendix I, TSS	NA	NA
MW-42A	Appendix I, TSS	Appendix I, TSS	Appendix I, TSS	--	Appendix II, TSS	--	Appendix I, TSS	NA	2024
MW-43A	Appendix I, TSS	Appendix I, TSS	Appendix I, TSS	--	Appendix II, TSS	--	Appendix I, TSS	NA	2024
MW-44A	Appendix I, TSS	--	Appendix I, TSS	--	Appendix II, TSS	--	Appendix I, TSS	NA	NA
MW-45A	--	--	Appendix I, TSS	Appendix I, TSS	Appendix I, TSS	Appendix I, TSS	Appendix I, TSS	NA	NA
MW-46A	--	--	Appendix I, TSS	Appendix I, TSS	Appendix I, TSS	Appendix I, TSS	Appendix I, TSS	NA	NA
MWII-3	Appendix I, Sulfide, TSS	--	Appendix I, Sulfide, TSS	--	Abandoned	--	Abandoned	6/18/2020, 5/25/2021, 3/15/2022	Abandoned
MW-100	Dry	--	DRY	--	Groundwater Level	--	Groundwater Level	NA	NA
MW-101	Appendix I, TSS	Dry	DRY	--	Appendix I, TSS	--	Appendix I, TSS	NA	NA
MW-11	Appendix II, TSS	--	DRY	--	Appendix II, TSS	--	Appendix I, TSS	6/20/2023	2024
MW-19R	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	NA	NA
MW-22	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	NA	NA
MW-35	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	11/5/2020, 6/8/2021	2026
Underdrain Groundwater									
GU-1	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	NA	NA
GU-2	Appendix I, TSS	--	DRY	--	Appendix I, TSS	--	Appendix I, TSS	NA	NA
Surface Water									
SW-1	Appendix I, TSS	Cd, Ag, TI	DRY	--	Appendix I, TSS	--	Appendix I, TSS	NA	NA
SW-2	Appendix I, TSS	Ag, TI	Appendix I, TSS	--	Appendix I, TSS	--	Appendix I, TSS	NA	NA
SW-5	Appendix I, TSS	Ag	Appendix I, TSS	Appendix I, TSS	Appendix I, TSS	--	Appendix I, TSS	NA	NA
Leachate Manhole									
MH-1AA	Dry	--	DRY	--	Appendix I, TSS	--	Appendix I, TSS	NA	NA
MH-4-2	Appendix I, TSS	--	DRY	--	Appendix I, TSS	--	Appendix I, TSS	NA	NA

Notes:
NA - not applicable
NS - no sampling due to low groundwater levels
Dry - well dry at sampling time
60711359/400/405/2023 AWQR/03-AWQR Tables

Table 5
Background and GWPS Water Quality
Summary Tables
2023 Annual Water Quality Report
Winneshiek County Landfill
Permit No. 96-SDP-1-74P

Shallow Interwell Background/GWPS (MW-1 and MW-1R)

Constituent	Units	Samples	Detections	Min	Max	Median	Background Standard	Statistical Test	GWPS	Source
Inorganics										
Antimony (Sb)	µg/l	19	0	<0.161	<1.320	<0.237	0.237	PL(NP)	6	MCL
Arsenic (As)	µg/l	19	2	<0.232	0.662	<0.672	0.672	PL(NP)	10	MCL
Barium (Ba)	µg/l	19	19	58.7	190	104.000	195.850	PL(P-N)	2000	MCL
Beryllium (Be)	µg/l	19	0	<0.0390	<0.530	<0.125	0.125	PL(NP)	4	MCL
Cadmium (Cd)	µg/l	19	0	<0.0351	<0.1670	<0.060	0.060	PL(NP)	5	MCL
Chromium (Cr)	µg/l	19	8	0.423	2.63	<0.760	2.630	PL(NP)	100	MCL
Cobalt (Co)	µg/l	19	10	0.028	0.231	<0.0610	0.260	PL(P-N)	2.1	SS
Copper (Cu)	µg/l	19	3	<0.485	<3.800	<1.220	1.220	PL(NP)	1300	MCL
Lead (Pb)	µg/l	19	2	<0.0967	0.303	<0.211	0.303	PL(NP)	15	MCL
Mercury (Hg)	µg/l	--	--	--	--	--	--	--	2	MCL
Nickel (Ni)	µg/l	19	6	0.424	6.200	<1.000	6.200	PL(NP)	100	SS
Selenium (Se)	µg/l	19	3	<0.630	1.410	<0.928	1.410	PL(NP)	50	MCL
Silver (Ag)	µg/l	19	1	<0.033	0.117	<0.140	0.140	PL(NP)	100	SS
Thallium (Tl)	µg/l	19	1	<0.0255	0.038	<0.050	0.050	PL(NP)	2	MCL
Tin (Sn)	µg/l	--	--	--	--	--	--	--	4200	SS
Vanadium (V)	µg/l	19	10	0.394	1.77	<0.820	1.946	PL(P-N)	35	SS
Zinc (Zn)	µg/l	19	1	<2.000	18.6	<6.950	18.600	PL(NP)	2000	SS

Table 5
Background and GWPS Water Quality
Summary Tables
2023 Annual Water Quality Report
Winneshiek County Landfill
Permit No. 96-SDP-1-74P

Bedrock Interwell Background/GWPS (MW-19)

Contaminant	Units	Samples	Detections	Min	Max	Median	Background Standard	Statistical Test	GWPS	Source
Inorganics										
Antimony (Sb)	µg/l	13	0	<0.161	<1.320	<0.237	0.237	PL(NP)	6	MCL
Arsenic (As)	µg/l	13	3	0.420	1.890	0.672	1.890	PL(NP)	10	MCL
Barium (Ba)	µg/l	11	11	142	554	156	528.000	PL(NP)	2000	MCL
Beryllium (Be)	µg/l	13	1	<0.0390	0.04	<0.190	0.190	PL(NP)	4	MCL
Cadmium (Cd)	µg/l	13	0	<0.0351	<0.167	<0.060	0.060	PL(NP)	5	MCL
Chromium (Cr)	µg/l	13	1	<0.355	1.07	0.760	1.070	PL(NP)	100	MCL
Cobalt (Co)	µg/l	13	7	<0.0274	3.08	<0.0453	3.770	PL(P-N)	2.1	SS
Copper (Cu)	µg/l	13	0	<0.485	<3.80	<1.220	1.220	PL(NP)	1300	MCL
Lead (Pb)	µg/l	13	3	0.102	0.468	<0.211	0.468	PL(NP)	15	MCL
Mercury (Hg)	µg/l	--	--	--	--	--	--	--	2	MCL
Nickel (Ni)	µg/l	13	5	0.662	18.8	1.000	10.100	PL(NP)	100	SS
Selenium (Se)	µg/l	13	0	<0.630	<3.340	<0.928	0.928	PL(NP)	50	MCL
Silver (Ag)	µg/l	13	2	<0.033	0.152	0.140	0.152	PL(NP)	100	SS
Thallium (Tl)	µg/l	13	1	<0.0255	<0.570	<0.0644	0.064	PL(NP)	2	MCL
Tin (Sn)	µg/l	--	--	--	--	--	--	--	4200	SS
Vanadium (V)	µg/l	13	0	<0.255	<2.150	<0.520	0.520	PL(NP)	35	SS
Zinc (Zn)	µg/l	13	0	<2.000	<11.500	6.950	6.950	PL(NP)	2000	SS

Table 5
Background and GWPS Water Quality
Summary Tables
2023 Annual Water Quality Report
Winneshiek County Landfill
Permit No. 96-SDP-1-74P

Surface Water Background/GWPS (SW-1)

Constituent	Units	Samples	Detections	Min	Max	Median	Background Standard	Statistical Test	GWPS	Source
Inorganics										
Antimony (Sb)	µg/l	11	0	<0.119	<1.320	<0.237	0.237	PL(NP)	6	MCL
Arsenic (As)	µg/l	11	0	<0.232	<0.945	<0.570	0.570	PL(NP)	10	MCL
Barium (Ba)	µg/l	11	11	115	143	124	156.503	PL(P-N)	2000	MCL
Beryllium (Be)	µg/l	11	0	<0.0142	<0.530	<0.190	0.190	PL(NP)	4	MCL
Cadmium (Cd)	µg/l	11	0	<0.0351	<0.167	0.060	0.060	PL(NP)	5	MCL
Chromium (Cr)	µg/l	11	0	<0.355	<1.37	0.760	0.760	PL(NP)	100	MCL
Cobalt (Co)	µg/l	11	6	<0.0453	0.437	<0.061	0.569	PL(P-N)	2.1	SS
Copper (Cu)	µg/l	11	4	0.508	<3.80	2.000	2.000	PL(P-N)	1300	MCL
Lead (Pb)	µg/l	11	4	<0.0967	0.644	0.250	0.644	PL(P-N)	15	MCL
Mercury (Hg)	µg/l	--	--	--	--	--	--	--	2	MCL
Nickel (Ni)	µg/l	11	1	<0.581	2.12	0.929	2.120	PL(NP)	100	SS
Selenium (Se)	µg/l	11	1	<0.630	0.916	<0.928	0.928	PL(NP)	50	MCL
Silver (Ag)	µg/l	11	1	<0.0396	<0.300	<0.140	0.140	PL(NP)	100	SS
Thallium (Tl)	µg/l	11	0	<0.0255	<0.570	<0.0644	0.064	PL(NP)	2	MCL
Tin (Sn)	µg/l	--	--	--	--	--	--	--	4200	SS
Vanadium (V)	µg/l	11	6	0.495	2.37	<0.820	2.759	PL(P-N)	35	SS
Zinc (Zn)	µg/l	11	0	<5.21	<11.5	<6.950	6.950	PL(NP)	2000	SS

Notes:

Acronyms/Abbreviations:

MDL = Method Detection Limit

RL = Reporting Limit

GWPS = Groundwater Protection Standard

DQR = Double Quantification Rule

PL = Prediction Limit

P = Parametric

NP = Non-Parametric

N = Normal

LN = Lognormal

NS = No standard available

Est. = Estimated

MCL = EPA Maximum Contaminant Level

SS = DNR Statewide Standard for a protected groundwater source

Median = ND value replaced with median RL

Background period for inorganics is 2014 through 2021.

60711359/400/405/2021 AWQR/03-AWQR Tables

Table 6
Summary of Well/Detected Constituent Pairs with No Previous SSIs
2023 Annual Water Quality Report
Winneshiek County Landfill
Permit No. 96-SDP-1-74P

Well	Constituent	Units	GPS	2023 - 2024 Results				Background Standard
				Spring Event	Summer Event	Fall Event	January 2024 Event	
Upgradient Water Table Wells								
MW-1	Barium	µg/L	2000	106	--	282	--	221.9938 PL
	Cadmium	µg/L	5	<0.1	--	0.209	--	0.051 NPL
	Copper	µg/L	1300	<1.8	--	5.27	--	1.4 NPL
	Lead	µg/L	15	<0.24	--	0.994	--	1.06 NPL
	Nickel	µg/L	100	<1.9	--	20.9	--	6.2 NPL
	Chlorobenzene	µg/L	100	<0.4	--	2.89	4.64	1 RL
MW-37A	Barium	µg/L	2000	111	--	dry	--	221.9938 PL
Downgradient Water Table Wells								
MW-2R	Barium	µg/L	2000	96.7	--	118	--	221.9938 PL
	Zinc	µg/L	2000	<6.4	--	21*	8.48 J	10 NPL
	Toluene	µg/L	1000	<0.43	--	1.42*	<0.43	1 RL
MW-3	Barium	µg/L	2000	175	--	193	--	221.9938 PL
	Toluene	µg/L	1000	<0.43	--	1.2*	<0.43	1 RL
MW-4	Barium	µg/L	2000	134	--	514*	--	221.9938 PL
	Cobalt	µg/L	2.1	<0.17	--	1.54*	--	0.681 NPL
	Nickel	µg/L	100	<1.9	--	5.36	--	6.2 NPL
	Toluene	µg/L	1000	<0.43	--	2.09*	--	1 RL
MW-4B	Barium	µg/L	2000	183	--	267*	413**	221.9938 PL
MW-5AR	Antimony	µg/L	6	<1	--	2.55*	Abandoned	0.42 NPL
	Arsenic	µg/L	10	1.37 J	--	2.63*		0.75 NPL
	Barium	µg/L	2000	152	--	149		221.9938 PL
	Cadmium	µg/L	5	<0.1	--	0.568*		0.051 NPL
	Cobalt	µg/L	2.1	0.258 J	--	1.34*		0.681 NPL
	Lead	µg/L	15	<0.24	--	1.02		1.06 NPL
	Nickel	µg/L	100	<1.9	--	5.42		6.2 NPL
	Silver	µg/L	100	<0.5	--	1.07*		0.3 NPL
	Nickel	µg/L	100	5.11	--	12.8*		6.2 NPL
	Toluene	µg/L	1000	<0.43	--	2*		1 RL
MW-24A	Barium	µg/L	2000	132	--	dry	dry	221.9938 PL
MW-25A	Barium	µg/L	2000	189	--	219	--	221.9938 PL
	Nickel	µg/L	100	<1.9	--	17*	3.93 J	6.2 NPL
	Toluene	µg/L	1000	<0.43	--	2.86*	<0.43	1 RL
MW-29A	Barium	µg/L	2000	187	--	163	--	221.9938 PL
MW-31A	Barium	µg/L	2000	220	--	247*	--	221.9938 PL
	Cadmium	µg/L	5	0.34*	--	<0.1	--	0.051 NPL
	Zinc	µg/L	2000	23.5*	--	<6.4	--	10 NPL
	1,1-Dichloroethane	µg/L	140	1.23*	--	0.859 J	--	1 RL
MW-33A	Barium	µg/L	2000	108	--	dry	--	221.9938 PL
MW-34A	Barium	µg/L	2000	65.5	--	69.3	--	221.9938 PL
MW-38A	Barium	µg/L	2000	133	--	141	--	221.9938 PL
MW-39A	Barium	µg/L	2000	138	--	145	--	221.9938 PL
MW-40A	Barium	µg/L	2000	216	--	228*	--	221.9938 PL
	Copper	µg/L	1300	7.71*	--	<1.8	--	1.4 NPL
	Benzene	µg/L	5	<0.22	--	0.52*	--	0.5 RL
MW-41A	Barium	µg/L	2000	145	141	169	--	221.9938 PL
	Cobalt	µg/L	2.1	0.71*	0.541	1.01*	<0.17	0.681 NPL
MW-42A	Barium	µg/L	2000	83.4	125	101	--	221.9938 PL
MW-43A	Copper	µg/L	1300	<1.8	<1.8	6.4*	--	1.4 NPL
MW-44A	Cobalt	µg/L	2.1	0.251 J	0.603	0.327	--	0.681 NPL
MW-45A	Barium	µg/L	2000	NA	NA	218	137	221.9938 PL
MW-46A	Barium	µg/L	2000	NA	NA	262*	275**	221.9938 PL
	Nickel	µg/L	100	NA	NA	33.8*	35**	6.2 NPL
MW-100	Insufficient groundwater to sample							
MW-101	Barium	µg/L	2000	175	--	dry	--	221.9938 PL
	Nickel	µg/L	100	9.62*	--	dry	--	6.2 NPL
MW11-3	Antimony	µg/L	6	<1	--	2.44*	Abandoned	0.42 NPL
	Chromium	µg/L	100	<1.1	--	2.4*		1.1 NPL
	Cobalt	µg/L	2.1	0.336 J	--	0.934*		0.681 NPL
	Lead	µg/L	15	<0.24	--	0.965		1.06 NPL
Upgradient Bedrock Wells								
MW-19R	Barium	µg/L	2000	82.4	--	84.1	--	221.9938 PL
	Cobalt	µg/L	2.1	0.49 J	--	<0.17	--	0.681 NPL
	Copper	µg/L	1300	3.19 J	--	<1.8	--	1.4 NPL
	Benzene	µg/L	5	<0.22	--	0.445 J	--	0.5 RL
Downgradient Bedrock Wells								
MW-11	Barium	µg/L	2000	15.4	--	dry	--	2080 NPL
	Nickel	µg/L	2000	21.6	--	dry	--	31.915 PL
MW-22	Barium	µg/L	2000	148	--	159	--	2080 NPL
	Nickel	µg/L	100	4.45 J	--	9.26	--	31.915 PL
MW-35	Barium	µg/L	2000	264	--	467	--	2080 NPL
	Nickel	µg/L	100	18.7	--	32.7*	--	31.915 PL
Upstream Surface Water								
SW-1	Barium	µg/L	2000	110	--	dry	--	221.9938 PL
	Cadmium	µg/L	5	0.228	<0.1	dry	--	0.051 NPL
	Lead	µg/L	15	0.617	--	dry	--	1.06 NPL
	Silver	µg/L	100	1.36	<0.5	dry	--	0.3 NPL
	Thallium	µg/L	2	4.67	<0.26	dry	--	0.17 NPL
Downstream Surface Water								
SW-2	Barium	µg/L	2000	101	--	94.1	--	221.9938 PL
	Cobalt	µg/L	2.1	0.622	--	<0.17	--	0.681 NPL
	Lead	µg/L	15	0.867	--	<0.24	--	1.06 NPL
	Silver	µg/L	100	1.43*	<0.5	<0.5	--	0.3 NPL
	Thallium	µg/L	2	3.93*	0.279 J	<0.26	--	0.17 NPL
SW-5	Barium	µg/L	2000	91.4	--	90	87.1	221.9938 PL
	Silver	µg/L	100	1.54*	<0.5	<0.5	<0.5	0.3 NPL
Landfill Cell Groundwater Underdrains								
GU-1	Barium	µg/L	2000	209	--	238	--	NA
	Cobalt	µg/L	2.1	0.844 J	--	0.409 J	--	NA
	Nickel	µg/L	100	18	--	18.3	--	NA
GU-2	Insufficient underdrain water to sample							

Notes:

- * Current result is above background, if confirmed by next sample an SSI will be identified
- ** Confirmed SSI
- N = Assumed to be naturally occurring
- NPL = Nonparametric prediction limit
- PL = Parametric prediction limit
- RL = Reporting limit
- NA = Not applicable or not established

Table 7
Summary of Ongoing and Newly SSIs and SSLs
2023 Annual Water Quality Report
Winneshiek County Landfill
Permit No. 96-SDP-1-74P

Well	Parameter	Units	Spring Event	August Event	Fall Event	Total Number Sample Events (n)	Percent Nondetects	LCL	UCL	IDNR Statewide Standard	Exceeds Standard ?	Background Standard	Sample Dates			UCL < GWPS		
													Initial Exceedance	Resample(s)	5th background sample	1st Year	2nd Year	3rd Year
Shallow (Water Table)																		
MW-7A	Barium	µg/L	323*	366**	451**	16	0.0	154.74	222.50	2000	No	221.9938 PL	6/13/2023	8/29/2023; 11/13/2023	NA	2021	2022	2023
MW-24A	Nickel	µg/L	7.85**	--	dry	15	0.0	7.56	11.02	100	No	6.2 NPL	8/30/2022	6/14/2023	NA	2023	--	--
MW-29A	Arsenic	µg/L	4.37	--	6.49	11	9.1	2.98	6.93	10	No	0.75 NPL	2/6/2020	6/30/2020; 8/26/2020; 11/20/2020	5/24/2021	2022	2023	NA
	Cobalt	µg/L	12.5	--	18.7	11	0.0	8.37	12.77	2.1	YES	0.681 NPL	11/20/2019	2/26/2020; 6/30/2020; 8/26/2020	11/20/2020	--	--	--
	Nickel	µg/L	76	--	87	11	0.0	49.5	69.2	100	No	6.2 NPL	2/6/2020	6/30/2020; 8/26/2020; 11/20/2020	5/24/2021	2022	2023	NA
MW-31A	Cobalt	µg/L	3.75	--	4.62	11	0.0	4.6	15.7	2.1	YES	0.681 NPL	11/5/2019	2/7/2020; 6/18/2020; 8/26/2020	11/18/2020	NA	NA	--
	Nickel	µg/L	39.7	--	30.8	11	0.0	25.7	58.4	100	No	6.2 NPL	11/5/2019	2/7/2020; 6/18/2020; 8/26/2020	11/18/2020	2022	2023	--
MW-33A	Arsenic	µg/L	1.16J	--	dry	11	9.1	16.9	45.7	10	YES	0.75 NPL	11/18/2019	2/12/2020; 6/30/2020; 8/25/2020	11/3/2020	--	--	--
	Cobalt	µg/L	0.396 J	--	dry	11	18.2	1.1	2.5	2.1	YES	0.681 NPL	11/18/2019	2/12/2020; 6/30/2020; 8/25/2020	11/3/2020	--	--	--
MW-40A	Cobalt	µg/L	1.51	--	1.86	7	0.0	1.03	2.24	2.1	No	0.681 NPL	9/23/2021	12/14/2021; 3/7/2022; 6/23/2022	8/17/2022	--	--	--
	Nickel	µg/L	19	--	17.4	8	0.0	8.90	15.40	100	No	6.2 NPL	9/23/2021	12/14/2021; 3/7/2022; 6/23/2022	8/17/2022	2022	2023	--
MW-42A	Cobalt	µg/L	0.518	2.46	2.56	5	0.0	At least 8 samples required to calculate confidence interval		2.1	NA	0.681 NPL	8/31/2022	16/6/2022; 6/7/2023; 8/28/2023	11/2/2023	--	--	--
	Nickel	µg/L	8.62	19.3	14.8	5	0.0	At least 8 samples required to calculate confidence interval		100	NA	6.2 NPL	8/31/2022	16/6/2022; 6/7/2023; 8/28/2023	11/2/2023	--	--	--
MW-43A	Arsenic	µg/L	8.28	8.85	9.81	5	0.0	At least 8 samples required to calculate confidence interval		10	NA	0.75 NPL	8/31/2022	16/6/2022; 6/7/2023; 8/28/2023	11/2/2023	--	--	--
	Barium	µg/L	180	250	274	5	0.0	At least 8 samples required to calculate confidence interval		2000	NA	221.9938 PL	8/31/2022	16/6/2022; 6/7/2023; 8/28/2023	11/2/2023	--	--	--
	Cobalt	µg/L	4.51	4.93	4.75	5	0.0	At least 8 samples required to calculate confidence interval		2.1	NA	0.681 NPL	8/31/2022	16/6/2022; 6/7/2023; 8/28/2023	11/2/2023	--	--	--
	Nickel	µg/L	31	41.5	36.4	5	0.0	At least 8 samples required to calculate confidence interval		100	NA	0.5 RL	8/31/2022	16/6/2022; 6/7/2023; 8/28/2023	11/2/2023	--	--	--
MW-44A	Barium	µg/L	157	239	253	5	0.0	At least 8 samples required to calculate confidence interval		2000	No	221.9938 PL	8/31/2022	16/6/2022; 6/7/2023; 8/28/2023	11/2/2023	--	--	--
	Cadmium	µg/L	0.306	0.416	0.795	5	60.0	At least 8 samples required to calculate confidence interval		5	No	0.051 NPL	8/31/2022	16/6/2022; 6/7/2023; 8/28/2023	11/2/2023	--	--	--
	Nickel	µg/L	28.7	70.2	66.6	5	0.0	At least 8 samples required to calculate confidence interval		100	No	6.2 NPL	8/31/2022	16/6/2022; 6/7/2023; 8/28/2023	11/2/2023	--	--	--
	Zinc	µg/L	18.1 J	27.3	26	5	60.0	At least 8 samples required to calculate confidence interval		2000	No	10 NPL	8/31/2022	16/6/2022; 6/7/2023; 8/28/2023	11/2/2023	--	--	--
MWII-3	Barium	µg/L	293	--	290	20	0.0	225	272	2000	No	221.9938 PL	6/7/2019	8/15/2019; 10/30/2019; 6/18/2020	11/5/2020	2020	2021	2022
	Cadmium	µg/L	0.206	--	1.23	19	52.6	0.112	0.254	5	No	0.051 NPL	10/30/2019	6/18/2020; 11/5/2020; 5/25/2021	9/22/2021	2020	2021	2022
	Nickel	µg/L	45.5	--	42.9	21	0.0	20.0	32.3	100	No	6.2 NPL	6/7/2019	8/15/2019	11/5/2020	2020	2021	2022
Deep (Bedrock)																		
MW-11	Cobalt	µg/L	<0.17	--	--	5	60	At least 8 samples required to calculate confidence interval		2.1	NA	4.9747 PL	10/31/2018	12/17/2018; 6/3/2021; 8/3/2021	9/7/2022	--	--	--
	Zinc	µg/L	98.5	--	--	6	0	At least 8 samples required to calculate confidence interval		2000	No	10 NPL	10/31/2018	12/17/2018; 6/3/2021; 8/3/2021	9/7/2022	2021	2022	2023
MW-35	Cobalt	µg/L	5.33	--	10.8	11	0.0	5.7	7.9	2.1	YES	4.9747 PL	11/15/2019	2/12/2020	11/5/2020	NA	NA	NA

Notes:

- NS = No statewide standard exists.
- NPL = Nonparametric prediction limit; PL = parametric prediction limits
- NA = Not applicable or not established.
- Interwell NPL for organics equals reporting limits for the measurements shown
- Prediction limit exceedances shown on gray background.
- False positive rate for all comparisons to statewide standards is 1.0%.
- Only 2022 data is presented here; refer to appendices for complete historical data used in the statistical tests.