2019 Annual Groundwater Monitoring and Corrective Action Report Addendum No. 1

Ottumwa Generating Station – Zero Liquid Discharge Pond Ottumwa, Iowa

Prepared for:

Alliant Energy



SCS ENGINEERS

25222072.00 | May 4, 2022

2830 Dairy Drive Madison, WI 53718-6751 608-224-2830

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1.0 INTRODUCTION

This 2019 Annual Groundwater Monitoring and Corrective Action Report Addendum (Addendum) was prepared to support compliance with the groundwater monitoring requirements of the Coal Combustion Residuals (CCR) Rule [40 CFR 257.50-107]. The original 2019 Annual Groundwater Monitoring and Corrective Report (Annual Report) was completed on January 31, 2020, to fulfill the requirements of 40 CFR 257.90(e).

The 2019 Annual Report and this Addendum cover the period of groundwater monitoring from January 1, 2019, through December 31, 2019.

This Addendum includes the following tables, figures, and appendix materials to support the information in the original 2019 Annual Report:

- Table 1 Groundwater Monitoring Well Network
- Table 2 Groundwater Elevation Summary
- Table 3 Horizontal Gradients and Flow Velocities
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Tables

- 1 Groundwater Monitoring Well Network
- 2 Groundwater Elevation Summary
- 3 Horizontal Gradients and Flow Velocities
- 4 Groundwater Analytical Results Summary 2019
- 5 2019 Groundwater Field Data Summary

Table 1. Groundwater Monitoring Well Network Ottumwa Generating Station - Zero Liquid Discharge Pond / SCS Engineers Project #25222072.00

Monitoring Well	Location in Monitoring Network	Role in Monitoring Network					
MW-301	Upgradient	Background					
MW-307	Downgradient	Compliance					
MW-308	Downgradient	Compliance					
MW-309	Downgradient	Compliance					

Created by: RM	Date: 12/14/2020
Last revision by: JAO	Date: 3/22/2022
Checked by: KLG	Date: 3/28/2022

 $\label{thm:linear_continuous_co$

Table 2. Groundwater Elevation Summary WPL - Ottumwa Generating Station / SCS Engineers Project #25222072.00

		Ground Wa	ter Elevatio	n in feet abo	ve mean se	a level (an	nsl)				
Well Number	MW-301	MW-302	MW-303	MW-304	MW-305	MW-306	MW-307	MW-308	MW-309	MW-310	MW-311
Top of Casing Elevation (feet amsl)	686.63	673.90	661.07	682.84	683.91	683.47	657.56	655.39	654.94	658.63	654.18
Screen Length (ft)	10.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Total Depth (ft from top of casing)	17.0	25.8	17.5	52.3	51.5	36.6	28.0	25.0	27.5	25.9	17.9
Top of Well Screen Elevation (ft)	679.63	653.10	648.57	635.54	637.41	651.87	634.56	635.39	632.44	637.76	641.24
Measurement Date											
April 26, 2016	pril 26, 2016 682.80 655.63 652.42 655.			655.37	661.67	670.86	N	NI	NI	NI	Z
June 23, 2016	682.58	655.65	652.89	656.53	662.36	670.64	N	NI	NI	NI	Z
August 9, 2016	682.27	655.52	651.76	653.79	660.78	670.35	N	NI	NI	NI	Z
October 26-27, 2016	682.04	655.67	652.17	655.03	661.37	670.21	ZI	NI	NI	NI	N
January 18-19, 2017	681.67	655.46	651.74	654.50	660.87	669.89	648.81	647.42	646.66	NI	NI
April 19-20, 2017	682.15	656.35	654.57	657.48	663.27	670.69	653.62	651.09	650.16	NI	ZI
June 20-21, 2017	3, 2017 681.28 655.13 8, 2017 681.54 655.40	655.65	652.42	654.75	661.26	669.94	649.85	648.26	647.60	NI	N
August 21-23, 2017		650.58	652.39	659.00	668.77	645.78	643.12	641.82	NI	NI	
November 8, 2017		655.40	651.34	653.03	659.76	669.04	647.37	644.99	644.20	NI	N
April 18, 2018		655.71	652.47	655.55	660.99	668.92	649.66	647.91	647.65	NI	NI
May 30, 2018	NM	NM	NM	NM	NM	NM	652.45	651.05	650.98	NI	N
June 28, 2018	NM	NM	NM	NM	NM	NM	652.87	651.43	651.47	NI	N
July 18, 2018	NM	NM	NM	NM	NM	NM	652.27	650.67	650.69	NI	NI
August 14-15, 2018	680.91	656.05	652.57	656.35	661.56	668.66	NM	NM	NM	NI	N
August 29, 2018	681.09	655.89	655.07	657.82	NM	NM	NM	NM	NM	NI	N
October 16, 2018	682.50	656.91	656.17	658.20	663.37	670.24	654.13	NM	651.61	NI	N
January 8, 2019	682.22	656.03	654.65	656.28	662.13	669.84	NM	NM	NM	NI	N
April 8, 2019	682.69	657.23	655.55	659.33	664.01	670.96	654.90	653.70	653.55	NI	NI
August 28, 2019	NM	NM	NM	NM	NM	NM	NM	NM	NM	640.98	642.10
October 23-24, 2019	683.07	660.14	653.86	657.71	663.21	671.28	651.89	651.31	651.28	649.31	647.80
December 11, 2019	NM	NM	NM	NM	NM	NM	649.59	647.39	647.24	NM	NM
Bottom of Well Elevation (ft)	669.63	648.10	643.57	630.54	632.41	646.87	629.56	630.39	627.44	632.76	636.24

Notes: Created by: MDB Date: 5/1/2017

NM = not measured Last rev. by: NDK Date: 3/25/2022

NI= not installed Checked by: KLG Date: 3/28/2022

Proj Mgr QA/QC: Date:

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Table 3. Horizontal Gradients and Flow Velocity Ottumwa Generating Station - Zero Liquid Discharge Pond / SCS Engineers Project #25222072.00 January - December 2019

			Shallow		
Sampling Dates	h1 (ft)	h2 (ft)	ΔI (ft)	Δh/Δl (ft/ft)	V (ff/d)
April 9, 2019	670.00	654.90	455	0.03	0.23
April 9, 2019	665.00	653.70	387	0.03	0.21
October 23-24, 2019	671.28	650.00	621	0.03	0.24
October 23-24, 2019	660.00	651.28	517	0.02	0.12

	Well	K Values (cm/sec)	K Values (ft/d)
Upgradient Well	MW-301	4.6E-03	13
	MW-302	3.2E-03	9.1
	MW-303	1.2E-04	0.35
Shallow Wells	MW-304	3.5E-04	0.98
	MW-305	2.5E-03	7.1
	MW-306	2.8E-03	8.1
	Geometric Mean	1.0E-03	2.8

Assumed Unconsolidated
Porosity, n
0.40

Note: Geometric mean calculations do not include upgradient well MW-301

Note: Multiple gradients were measured for each date to account for variation across the site

Groundwater flow velocity equation: $V = [K^*(\Delta h/\Delta I)] / n$

ft = feet h1, h2 = point interpreted groundwater elevation

ft/d = feet per day

K = hydraulic conductivity $\Delta I = distance between location 1 and 2$

n = effective porosity $\Delta h/\Delta l = hydraulic gradient$

V = groundwater flow velocity

 Created by: NDK
 Date: 3/30/2022

 Last revision by: JAO
 Date: 4/11/2022

 Checked by: NDK
 Date: 4/18/2022

Table 4. Groundwater Analytical Results Summary - CCR Program Ottumwa Generating Station - Zero Liquid Discharge Pond (ZLDP) / SCS Engineers Project #25222072.00

			Backgro	und Well	Compliance Wells										
B			MW	-301		MW-307			MW-308			MW-309			
Parameter Name	UPL		4/8/2019	10/24/2019	4/8/2019	10/23/2019	12/11/2019	4/8/2019	10/23/2019	12/11/2019	4/8/2019	10/23/2019	12/11/2019		
Appendix III															
Boron, ug/L	820		380	680	240	200	190 J	190 J	220	160 յ	1,500	1,300	1,100		
Calcium, mg/L	78.7		43	78	240	230	230	240	240	220	160	150	150		
Chloride, mg/L	86.8		50	110	220	220	200	160	160	150	72	74	66		
Fluoride, mg/L	0.484	UPL only	0.44 J	<0.23	0.28 J	<0.23	<0.23	<0.23	<0.23	<0.23	0.27 J	<0.23	<0.23		
Field pH, Std. Units	6.87		6.61	6.33	6.76	6.68	6.37	6.90	6.78	6.55	7.18	6.98	6.67		
Sulfate, mg/L	199		81	130	100	95	92	300	300	280	410	400	370		
Total Dissolved Solids, mg/L	628		340	510	1,000	1,000	1,000	1,200	1,100	1,100	1,100	1,100	980		
Appendix IV	UPL	GPS													
Antimony, ug/L	0.22	6	<1.00	<0.53	NA	NA	<0.53	NA	NA	<0.53	NA	NA	<0.53		
Arsenic, ug/L	0.53	10	<2.00	<0.75	NA	NA	<0.75	NA	NA	<0.75	NA	NA	1.1 J		
Barium, ug/L	68.8	2,000	25.5	56	NA	NA	140	NA	NA	130	NA	NA	54		
Beryllium, ug/L	LOQ (varies by well)	4	<1.00	<0.27	NA	NA	<0.27	NA	NA	<0.27	NA	NA	<0.27		
Cadmium, ug/L	0.12	5	<0.500	0.040 J1	NA	NA	<0.039	NA	NA	<0.039	NA	NA	0.090 J		
Chromium, ug/L	1.07	100	<5.00	<0.98	NA	NA	<0.98	NA	NA	5.9	NA	NA	1.7 J		
Cobalt, ug/L	4.1	6	<0.500	0.60	NA	NA	11	NA	NA	0.26 ј	NA	NA	3.7		
Fluoride, mg/L	0.484	4	<0.500	<0.23	NA	<0.23	<0.23	NA	<0.23	<0.23	NA	<0.23	<0.23		
Lead, ug/L	0.1	15	<0.500	<0.27	NA	NA	0.71	NA	NA	0.52	NA	NA	2.8		
Lithium, ug/L	34.2	40	15.5	24	NA	NA	12	NA	NA	16	NA	NA	8.2 J		
Mercury, ug/L	LOQ (varies by well)	2	<0.200	<0.10	NA	NA	<0.10	NA	NA	<0.10	NA	NA	<0.10		
Molybdenum, ug/L	1.74	100	<2.00	1.1 J1	NA	NA	<1.1	NA	NA	<1.1	NA	NA	<1.1		
Selenium, ug/L	8.55	50	<5.00	6.2	NA	NA	<1.0	NA	NA	<1.0	NA	NA	<1.0		
Thallium, ug/L	0.14	2	<1.00	<0.27	NA	NA	<0.27	NA	NA	<0.27	NA	NA	<0.27		
Radium 226/228 Combined, pCI/L	2.15	5	NA	0.956	NA	NA	2.46	NA	NA	2.73	NA	NA	1.77		

Blue highlighted cell indicates the compliance well result exceeds the UPL and the LOQ.

Yellow highlighted cell indicates the compliance well result exceeds the GPS.

Abbreviations:

UPL = Upper Prediction LimitGPS = Groundwater Protection Standardug/L = micrograms per literLOD = Limit of DetectionLOQ = Limit of Quantitationmg/L = milligrams per liter

Notes:

J = Estimated concentration at or above the LOD and below the LOQ.

J1 = Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.

 Created by: NDK
 Date: 6/12/2019

 Last revision by: JAO
 Date: 3/30/2022

 Checked by: MDB
 Date: 3/30/2022

 Proj Mgr QA/QC:
 Date:

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Table 5. 2019 Groundwater Field Data Summary Ottumwa Generating Station - Zero Liquid Discharge Pond SCS Engineers Project #25222072.00

Well	Sample Date	Groundwater Elevation (feet)	Field Temperature (deg C)	Field pH (Std. Units)	Oxygen, Dissolved (mg/L)	Field Specific Conductance (umhos/cm)	Field Oxidation Potential (mV)	Turbidity (NTU)
MW-301	1/8/2019	682.22	7.88	5.68	5.68	310	118.3	0.77
	4/8/2019	682.69	7.27	6.61	8.32	501	37.6	1.87
	10/24/2019	683.07	13.71	6.33	4.94	902	9.9	1.60
MW-307	4/8/2019	654.9	12.47	6.76	0.51	1599	-3.7	26
	10/23/2019	651.89	13.38	6.68	0.25	1684	-24.8	12.5
	12/11/2019	649.59	11.5	6.37	0.18	1576	-45.8	43.13
MW-308	4/8/2019	653.7	12.54	6.9	0.66	1539	-23	6.87
	10/23/2019	651.31	13.16	6.78	4.42	1637	-38.7	7.42
	12/11/2019	647.39	10.5	6.55	0.43	1532	-56.6	15.72
MW-309	4/8/2019	653.55	12.4	7.18	0.66	1396	-3.3	72.1
	10/23/2019	651.28	12.83	6.98	0.36	1461	-27.5	42.6
	12/11/2019	647.24	11.5	6.67	0.26	1350	-37.8	413.6

 Created by: JAO
 Date: 3/23/2022

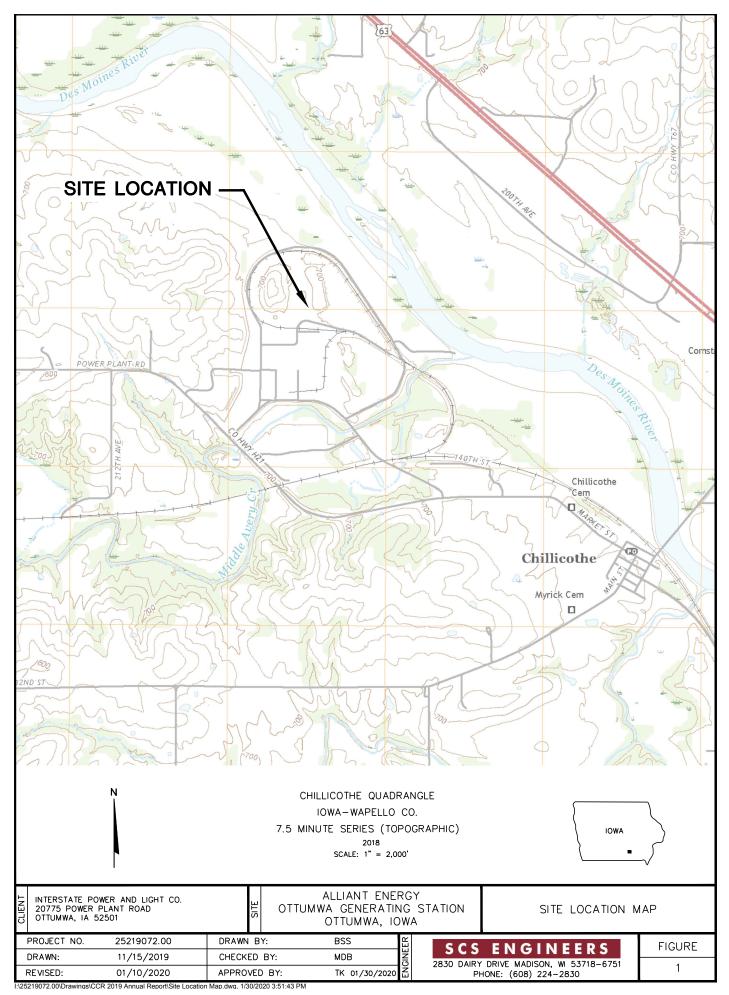
 Last revision by: JAO
 Date: 3/23/2022

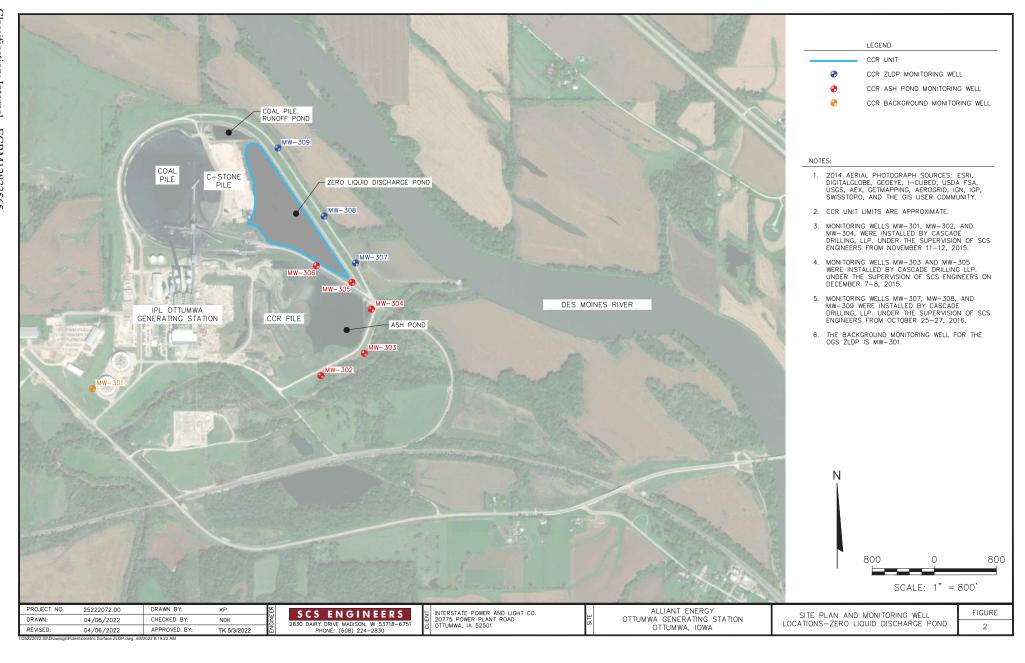
 Checked by: KLG
 Date: 3/28/2022

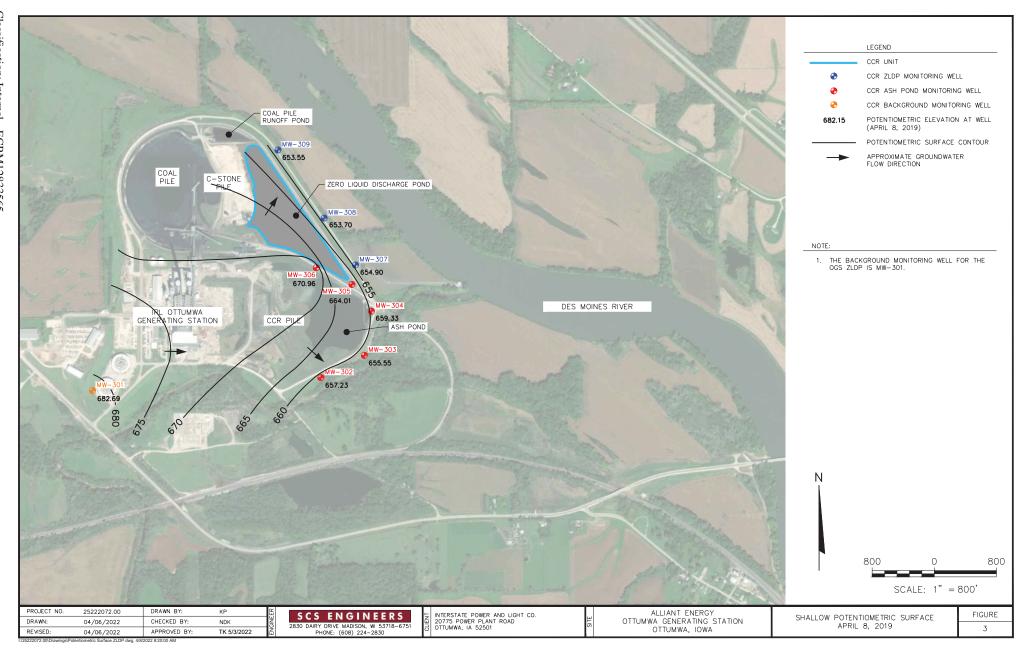
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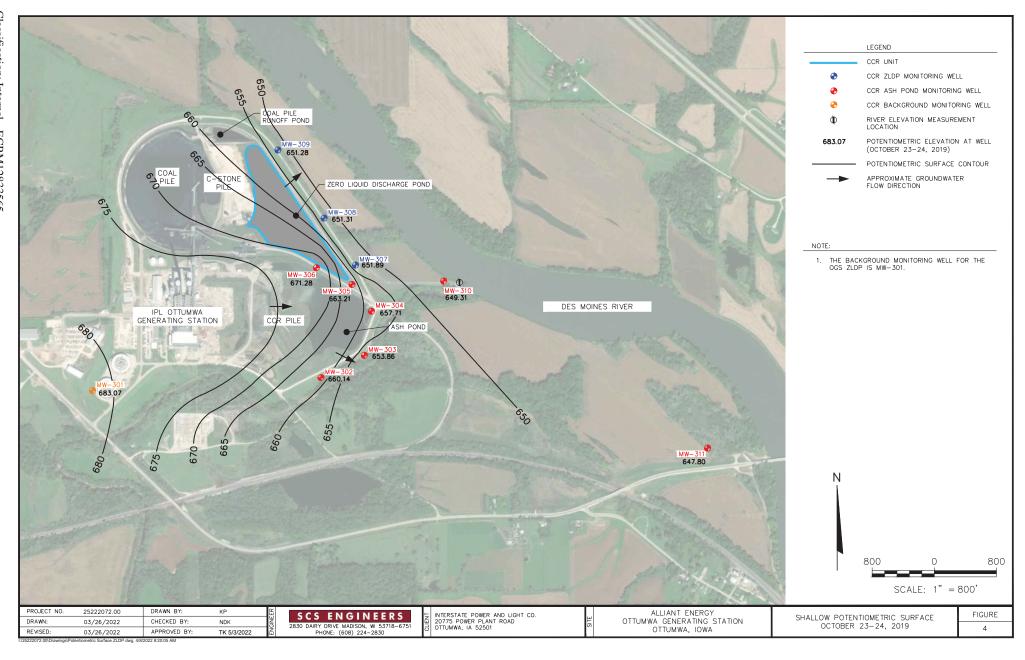
Figures

- 1 Site Location Map
- Site Plan and Monitoring Well Location
- Shallow Potentiometric Surface, April 8, 2019 3
- Shallow Potentiometric Surface, October 23-24, 2019 4









Appendix A Regional Hydrogeologic Information

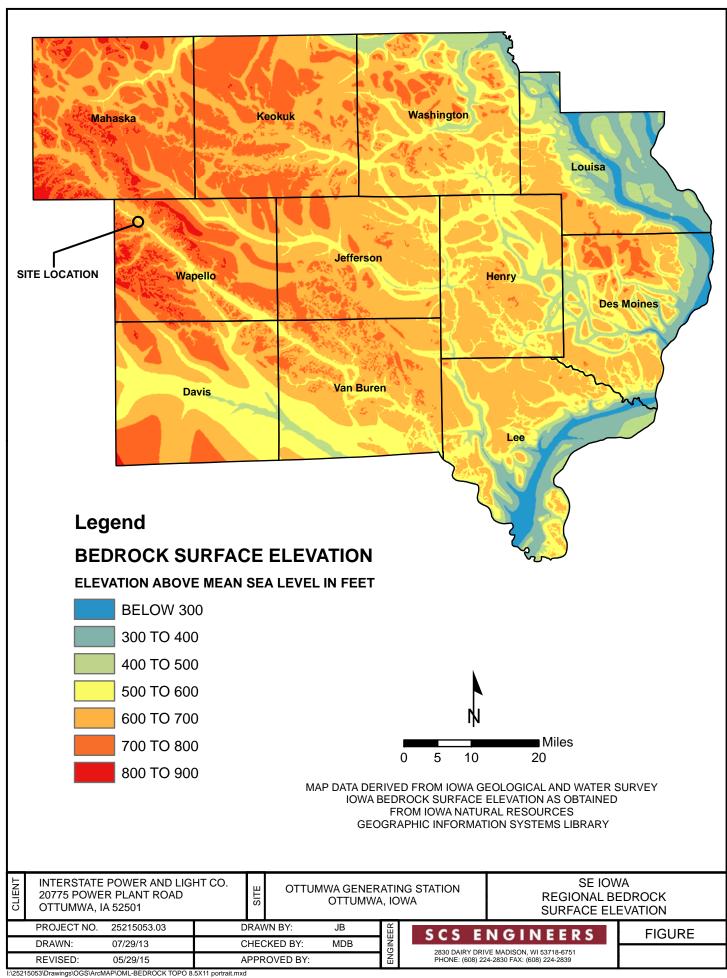
Table OGS-2. Regional Hydrogeologic Stratigraphy Ottumwa Midland Landfill / SCS Engineers Project #25215053.01

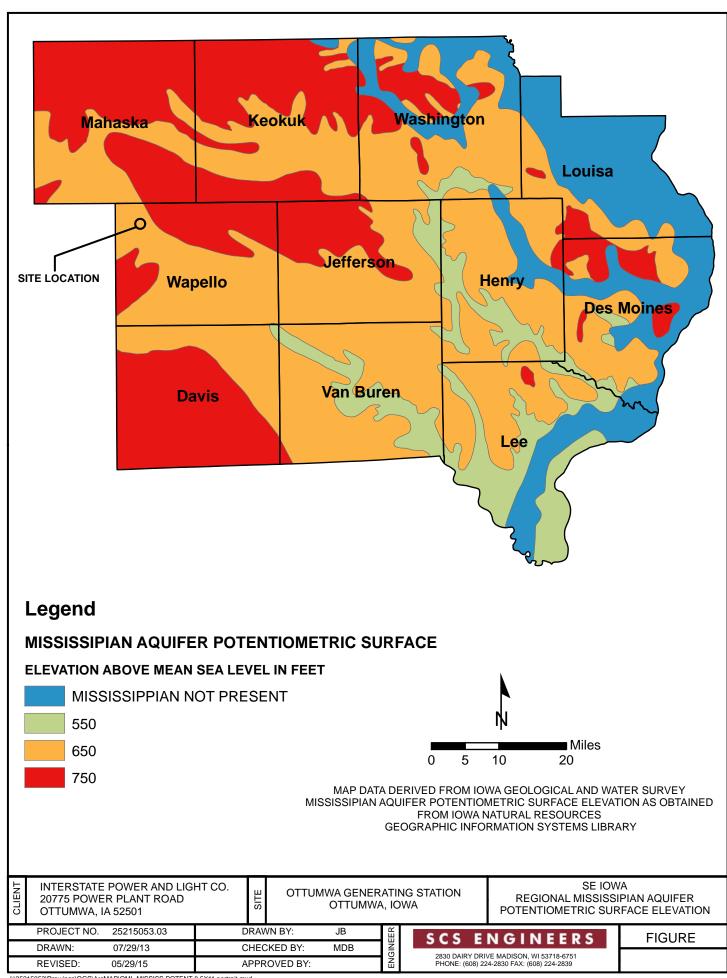
Age of Rocks	Hydrogeologic Unit	General Thickness (feet)	Name of Rock Unit*	Type of Rock
Quaternary (0-1 million years old)	Surficial Aquifers • Alluvial • Buried-Channel • Drift	0 to 320	Undifferentiated	 Sand, gravel, silt, and clay Sand, gravel, silt, and clay Till (sandy, pebbly clay), sand, and silt
Pennsylvanian (180 to 310 million years old)	Aquiclude	0 to 370	Undifferentiated	Shale, sandstone, limestone, and coal
	Mississippian Aquifer • Upper		St. Louis Spergen	Limestone and sandstoneLimestone
Mississippian (310 to 345 million years old	• Lower	0 to 600	Warsaw Keokuk Burlington Hampton Starrs Cave	 Shale and dolomite Dolomite, limestone, and shale Dolomite and limestone Limestone and dolomite Limestone
		0 . 405	Prospect Hill McCraney	Siltstone Limestone
Devonian	Aquiclude	0 to 425	Yellow Spring Lime Creek	Shale, dolomite, and siltstoneDolomite and shale
(345 to 400 million years old)	Devonian Aquifer	110 to 420	Cedar Valley Wapsipinicon	Limestone and dolomite Dolomite, limestone, shale, and gypsum
Silurian (400 to 425 million years old)	bevoilian Aquiter	0 to 105	Undifferentiated	• Dolomite
Ordovician (425 to 500 million years old)	Aquiclude	150 to 600	Maquoketa Galena Decorah Platteville	 Dolomite and shale Dolomite and chert Limestone and shale Limestone, shale, and sandstone
years ora;	Cambrian-Ordovician	750 to	St. Peter Prairie du Chien	Sandstone Dolomite and sandstone
	aquifer	1,110	Jordan St. Lawrence	Sandstone Dolomite
Cambrian (500 to 600 million years old)	Not considered an aquifer in southeast	450 to 750+	Franconia Galesville Eau Claire Mt. Simon	 Shale, siltstone, and sandstone Sandstone Sandstone, shale, and dolomite Sandstone
Precambrian (600 million to 2 billion + years old)	lowa			Sandstone, igneous rocks, and metamorphic rocks

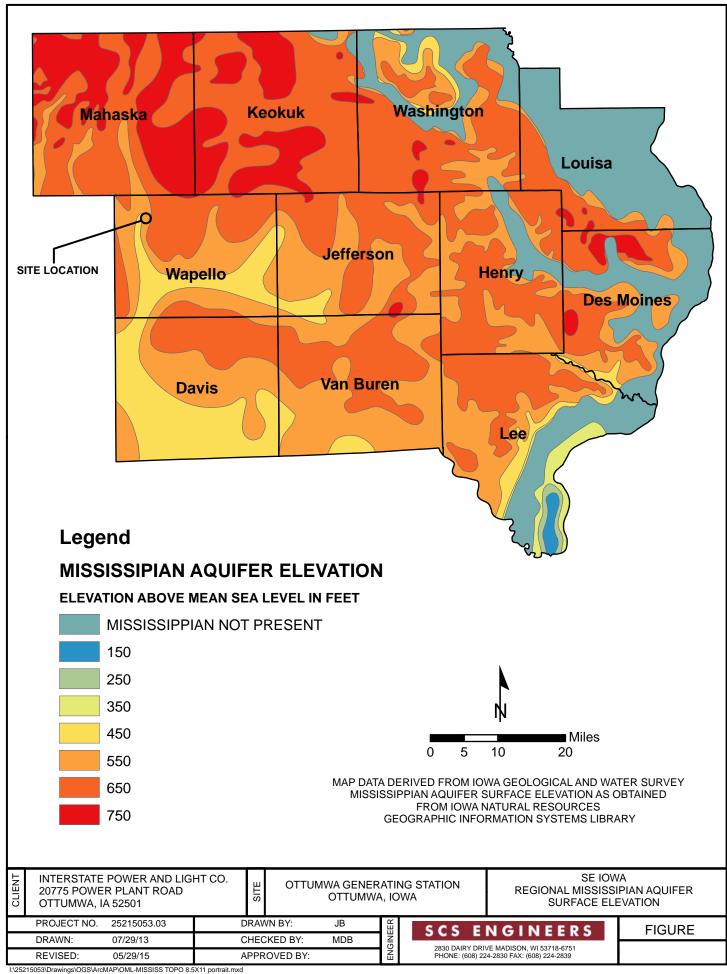
^{*}This nomenclature and classification of rock units in this report are those of the lowa Geological Survey and do not necessarily coincide with those accepted by the U.S. Geological Survey.

Source: "Water Resources of Southeast Iowa," <u>Iowa Geologic Survey Water Atlas No. 4</u>.

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Appendix B Boring Logs and Well Construction Documentation

SCS ENGINEERS SOIL BORING LOG INFORMATION **Environmental Consultants and Contractors** Watershed/Wastewater Waste Management Route To: Remediation/Redevelopment Other \square 1 of 1 Page Facility/Project Name License/Permit/Monitoring Number **Boring Number** MW-301 IPL- Ottumwa Generating Station SCS#: 25215135.40 Boring Drilled By: Name of crew chief (first, last) and Firm Date Drilling Started Date Drilling Completed Drilling Method Todd Schmalfeld 4-1/4 hollow 11/10/2015 Cascade Drilling 11/10/2015 stem auger Unique Well No. DNR Well ID No. Common Well Name Final Static Water Level Surface Elevation Borehole Diameter MW-301 684.3 Feet 8.5 in Feet Local Grid Origin (estimated:) or Boring Location Local Grid Location Lat 400,077 N, 1,899,709 E State Plane S/C/N \square E NW 1/4 of SW Feet
S Feet \square W 1/4 of Section 26, T 73 N, R 15 W Long Civil Town/City/ or Village Facility ID County Wapello Ottumwa Soil Properties Sample Length Att. & Recovered (in) Soil/Rock Description Depth In Feet Blow Counts Penetration And Geologic Origin For Number and Type Plasticity Standard Moisture PID/FID Diagram Content Graphic Liquid Limit Each Major Unit Index P 200 Well Log TOPSOIL. TOPSOIL SANDY SILT WITH GRAVEL, gray (7.5YR 6/1), gravel is 2 ML woh 1 S1 10 W 39 6 WEATHERED SANDSTONE, very weak, light gray matrix (10YR 7/1), scondary color very dark gray 910YR 3/1), 24 50 -8 S2 13 W - 9 50 W **S**3 SANDSTONE 50 13 W S5 4 W

I hereby certify that the information on this form is true and correct to the best of my knowledge. Signature Firm **SCS** Engineers Tel: (608) 224-2830 2830 Dairy Drive Madison, WI 53718 Fax:

15

Endo of Boring at 15 feet bgs.

			Re	oute To:		Wastewater		0.09700	ement								
					Remediation	n/Redevelopment	Other										
														Pag	ge 1	of	2
Facilit							License/	Permit/	/Monito	ring N	umber		Boring		er		_
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	d Sch							11/10	0/2015	5		1	1/10/	2015			1/4 hollow em auger
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Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet		E	ach Major Offit		SC	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
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Signatu	ire	01			##Three Ballacon his across of # Three party constitute of the con	Firm SCS	Engine	ers					,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			Tel: (6	08) 224-2830
M	h	All		fer	Kyle		Dairy Dri		dison, V	WI 537	18						Fax:
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SOIL BORING LOG INFORMATION SUPPLEMENT

Borin	g Numl	oer	MV	V-302							Pag	THE RESERVE AND ADDRESS OF THE PERSON NAMED IN	of	2
San	nple									Soil	Prope	erties		
	s (ii)	S	et	Soil/Rock Description										
o.	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	And Geologic Origin For			_	_	Standard Penetration	43		>		ıts
ber	th /	ပို	h In	Each Major Unit	CS	hic	ram	l E	darc	ture	bi t	icity		mer
S Number and Type	eng	low	ept		S	Graphic Log	Well Diagram	PID/FID	tand	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
S3 1	24			POORLY GRADED SAND, olive yellow (2.5Y 6/6).	D	0 1		<u>_</u>	NA	M		P II		<u> </u>
		23 99	E	TOOKET GRADED STATE, ONTO JOHOW (2.5.1 6/6).	SP									
II.I			E 17											
П			- 10	LEAN CLAY, dark grayish brown (10YR 4/2).	CI	11.77	IE							
6.4	2.4	44	E 18		CL					33.7				
S4	24	44	E 19	POORLY GRADED GRAVEL, fine.	GP	000				W				saturation @ 18 ft bgs.
Ш			E	LEAN CLAY I I II (10VD (10)		2								
П			-20	LEAN CLAY, brownish yellow (10YR 6/8). POORLY GRADED GRAVEL WITH CLAY, gray (10YR	CL	0 480								
			E	5/1), fine.		0								
S5	15	2 3 3 6	-21							W				
		30	E		GD G									
			-22		GP-G0	Po								
П			-23			0								
S6	24	3 4	E 23			5				w				
50	27	3 4 8 9	_24	POORLY GRADED SAND, gray (10YR 5/1), medium		O/H	1	-		"				
U			E	grained.										
П			-25											
- 11		4.0	Ε.,											
S7	24	4 3 6 8	-26		SP					W				
Ш		0 0	E-27											
			E 2'											
			-28	Course of the last house (10VD 5/2)										
S8	24	78 119	F	Same as above, but brown (10YR 5/3). POORLY GRADED SAND, gray (10YR 5/1), fine grained,			-			W				
- 11		119	-29	(weathered bedrock?).										
			Ē											
П			-30	Medium grained.										
CO	22	5 14	- 31							337				
S9	23	5 14 33 50/.4	₹ '`		SP					W				
Ш			_32											
п			E											
- 11			-33											
S10	12	2 50/	L							W				
Ш			=34	POORLY GRADED SAND, olive yellow (2.5Y 7/1), fine grained, (weathered bedrock?).			1							
-			_ 35	grained, (weathered bedrock?).										
- 11			- 33		SP									
S11	3	50/.3	E-36							w				
511			E							''				
Ц			-37	End of Boring at 37 feet bgs.		 	1							
				End of Borning at 57 tool ogs.										
,														
										10				

			<u>Re</u>	oute To:	Watershed/V		Waste Other	_	ement								
					Remediation	/Redevelopment	Other	Ш									
Facilit	y/Proje	ct Nar	ne				License/	Permit/	Monito	ring N	umber		Boring	Pag		of	1
	-			rating S	tation	SCS#: 25215135.40				6	umoer		Boring	1 vaino		W-30	13
				of crew ch	ief (first, last) a	and Firm	Date Dri	illing St	tarted		Da	te Drilli	ng Con	npleted			ling Method
	ld Sch							12/8	/2015				12/8/2	2015			1/4 hollow em auger
	e Well		6	DNR V	Well ID No.	Common Well Name	Final Sta				Surfac	e Eleva		2013	Вс		Diameter
- -	0:10			<u> </u>		MW-303		Fe	et				.0 Fee			8	3.5 in
Local	Grid Or Plane	rıgın			1,903,215		La	ıt	o 	<u> </u>	"	Local C	irid Lo	cation N	r		□Е
NE		of S		1/4 of Sec		T 73 N, R 15 W	Lon	g	0	'	"		Feet			1	Feet W
Facilit	y ID				County						ity/ or	Village					
C	1-				Wapello				Ottur	nwa	Т		G '1	D			T
San	nple				G 11/1	. 15							Soil	Prope	erties		
	tt. & d (in	ınts	Feet			Rock Description eologic Origin For						두					o o
ber Jype	th A	Cor	l In			ch Major Unit		CS	hic	am	Œ	lard ratio	ture	7	city		/ nent
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet			on major ome		n s c	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
7 10			 	FILL, bo	oring location wa	as cleared to 9' bgs by hydrov	vac, then	-				07 14	20				10
S1 S2	1 NR	50	-1 -2 -3 -4 -5 -6 -7 -8 -10 -11 -12 -13	(10YR 5	HERED SANDS' 5/4). Boring at 14.5 ft l	ΓΟΝΕ, medium grained, bro		FILL	DNE				W				
I hereb	y certif	y that	the info	rmation o	n this form is t	rue and correct to the best	t of my kn	nowledg	ge.								
Signati	ire					Firm SCS	Engine								***************************************	Tel: (6	08) 224-2830
13	h	16		fer	Kyle K		Dairy Dri		dison, V	VI 537	18						Fax:

			Ro	ute To:	Watershed/V			Waste	_	ement								
					Remediation	/Redevelop	ment \square	Other										
77 111	75							Tr : 6						-	Pag		of	3
	y/Proje			rating S	Station	SCS#. 24	5215135.40	License/	Permit/	Monite	oring N	umber		Boring	Numbe		W-30	4
					nief (first, last) a		3213133.40	Date Dri	Iling St	arted		Da	te Drilli	ng Con	npleted			ing Method
-	ld Sch	-													•		1	1/4 hollow
	cade		ng	les in		To.	*** ***	71. 1.0		1/201				1/11/	2015			em auger
Uniqu	e Well	No.		DNR	Well ID No.		Well Name W-304	Final Sta	itic Wa Fe		el	Surfac	e Elevat	ion .1 Fee	.+	Bo		Diameter .5 in
Local	Grid O	rigin	(es	stimated:) or Bo			1	1.6				Local C				- 0	.5 111
State		U			, 1,903,287		C/N	La	ıt	°					□ N	ſ		□Е
SE		of N	E 1	/4 of Sec		т 73 м	N, R 15 W	Long		°	<u> </u>			Feet	\Box s]	Feet W
Facilit	y ID			1	County						Γown/C	ity/ or `	Village					
Son	nple		Ι		Wapello					Ottu	mwa	T	Т	Soil	Prope	tiaa		
San	T				C - :1/r)1- D	·							3011	Тторс	lues		
	tt. & d (in	ınts	Feet			Rock Descri eologic Orig							u					83
ype	th A	S	l In			ch Major U			S	oji.	am	Ü	ard	iure	р	city	_	/ nent
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet		La	cii wajoi o	THE		USC	Graphic I.og	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
	1 H	Щ		TOPSO	DIL.				<u> </u>	1111	NO R		N E	20			P	
			_ _1					1	OPSO	2 24								
			= 1	FAT CI	LAY, black (10Y)	R 2/1).												
			-2															
			_3															
			-4															Tea .
			_ 5															
			=															
			-6															
			E						СН									
			E '															
			-8															
			_9															
			=															
П			-10															
_		15	- ,															
S1	23	4 5 4 5	-11 -											M				
Ш			12															
П			E , ,	FAT CI	LAY, yellowish b	rown (10YR	5/4).											
62	19.5	4 4	13											M				
52	19.3	5 5	14						СН					M				
Ш			Ė , į															
			<u>- 15</u>	FAT CI	AY, yellowish b	rown (10YR	3/4).		СН									
			_ _16															
I hereb	y certif	y that t	he info	rmation c	on this form is t	rue and cor	rect to the bes	t of my kr	nowledg	ge.								
Signati	ure	01	-	^			Firm SCS	Engine	ers								Tel: (6	08) 224-2830
15	M	4/		fer	Kyle K	aner		Dairy Dri		dison,	WI 537	18					(0	Fax:

Boring Number MW-304	Page 2 of 3	
Sample	Soil Properties	
Soil/Rock Description		
And Geologic Origin For Each Major Unit Each Major Unit	hic hic lard lard lard lard lard lard lard lard	
Soil/Rock Description And Geologic Origin For Each Major Unit S3 1 12 3 3 FAT CLAY, yellowish brown (10YR 3/4). (continued)	U S C S Graphic Log Well Diagram PID/FID Standard Penetration Moisture Content Liquid Limit Plasticity Index P 200 RQD/ Comments	
S3 12 33 FAT CLAY, yellowish brown (10YR 3/4). (continued)	M	
S4 22 43 E	M	
7 12 = 19		
S5 $\begin{bmatrix} 23 \\ 27 \\ 20 \end{bmatrix}$ $\begin{bmatrix} 27 \\ -21 \\ 21 \end{bmatrix}$	light 1	
S5 23 27 = 21 89 = 21	M	
S6 23 34 E 24	M	
U []		
	СН	
S7 23 5 11 = 26 15 11 = 26	M	
n		
S8 15 44 E	M	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	IVI IVI	
S9 18 4 6 5 31 8 8 9 5 5 1	M M	
S10 24 $\begin{vmatrix} 46 \\ 76 \\ -34 \end{vmatrix}$	M	
FAT CLAY, DARK OLIVE BROWN (2.5Y 3/3).		
S11 $16 \begin{vmatrix} 22 & \frac{1}{2} & 36 \\ 46 & \frac{1}{2} & 36 \end{vmatrix}$	M	
-38 -38 -38 -38 -38 -38 -38 -38 -38 -38		
S12 $\begin{bmatrix} 24 & 43 & 15 \\ 55 & 29 \end{bmatrix}$	СН	
S13 18 23 F-41 3 F	M	
여 ㅑ		

Boring Number	MV	V-304							Pag	ge 3	of	3
Sample								Soil	Prope	erties		
& (in)	set	Soil/Rock Description										
pe Att.	In Fe	And Geologic Origin For	S	S	E	۵	rd	er t		ıty		ents
Number and Type Length Att. & Recovered (in) Blow Counts	Depth In Feet	Each Major Unit	SC	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
R Le an R.	_	FAT CLAY, DARK OLIVE BROWN (2.5Y 3/3).	D	Grap Log	Well	PI	Sta	ž 3	Ë Ë	Pla	P	
S14 24 34	E-43	(continued)	CH					w				
S14 24 3 4 9 14	E-44	SANDY SILT, very dark gray. POORLY GRADED SAND, medium grained, gray (5Y 6/1),	ML	Ш	-			VV				
"	E -45	(weathered bedrock).										
	= 43											
S16 15 30 50/.	46							W				
Ц	E 47											
п	E											
S17 5 33 50/.	├─48 2		SP					W				
3	-49							\ vv				
	E -50											
	F											
S18 50/.4	<u>-51</u>							W				
Ц	- -52	End of Boring at 52 feet bgs.										
		Esta of Boring at 32 feet ogs.										
		-										

			Ro	oute To:	Watershed/V	Vastewater	Waste N	Лапад	ement \square]							
					Remediation	/Redevelopment	Other										
														Pag		of	3
	y/Proje						License/P	Permit	Monitorin,	g Nur	nber		Boring	Numbe		W 20	
				rating S	ief (first, last) a	SCS#: 25215135.40 and Firm	Date Dril	ling S	tarted		Dat	e Drilli	ng Con	npleted		V-30	ing Method
	ld Sch				, , , , ,			0					0	1			1/4 hollow
Cas	cade le Well	Drilli	ng	DAID I	V II ID N	IC WIN	E' 100		//2015	10			12/8/2	2015	ID.		em auger
Uniqu	e well	NO.		DNR	Well ID No.	Common Well Name MW-305	Final Stat	ic wa Fe		3	urtace	Elevat	ion .5 Fee	f	Bo		Diameter .5 in
Local	Grid O	rigin	(es	stimated:) or Bo	ring Location 🖂	İ -		0 1		,,		rid Loc				
State					1,903,023		Lat		0 !					□ N			□Е
SE Facilit		of N	E 1	/4 of Sec	ction 26,	T 73 N, R 15 W	Long		Civil Tow	n/Cit		/illage	Feet	\Box s]	Feet W
r acrire	, ID				Wapello				Ottumy		y, or ,	mage					
San	nple												Soil	Prope	erties		
	% (ii)	S	et		Soil/I	Rock Description											
r	Att.	onno	In Fe			eologic Origin For		S		Е	Q	rd tion	re t		ty (ents
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet		Ea	ch Major Unit		SC	Graphic Log Well	Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
Z g	Le Re	BI	Ď	TOPSO	AT.			n		Ö	PI	Sta	Σိ ပိ	Li	Pla	P.2	≥ 3
			Ξ.	GRAVE			1	OPSO	600								
			E '					GP	500							1	
			-2	FAT CL	_AY							2					
			= ,														
			_3														
			-4														
			E 5														
			Ē														
			- 6														
			E-7														
			E														
			- 8														
			_9					СН									
			E 10														
П			10 	FAT CL	AY, very dark g	rayish brown (10YR 3/2).											
S1	18	3 6 9 11	-11										w				
Ш		911	E −12														
п			= 12														
		3 7	-13	same as	above except, br	rown (10YR 4/3).											
S2	22	14 22	- 14										W				
Ш			E														
П			—15 =														
			- -16														
I hereb	y certif	y that i	he info	rmation o	n this form is t	rue and correct to the bes	st of my kno	owled	ge.								
Signati	ure		11	0	14	Firm SCS	Enginee									Tel: (6	08) 224-2830
-10	1/2	60	SL.	tree	- Kde K	2830	Dairy Driv	e Ma	dison, WI	53713	8						Fax:

Boring	g Numl	oer	MW	V-305							Pag		of	3
Sam										Soil	Prope	erties		
	& (in)	ts	set	Soil/Rock Description										
r be	Att. red	youn,	In Fe	And Geologic Origin For	S	ွ	8	۵	rd	er e		ity		ents
mbe d Ty	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Each Major Unit	SC	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
S Number and Type	Re Le	Ble	De		Ď	Grap Log	Well Diagr	PII	Sta Pel	క రి	E E	Pla	P 2	₩ S
83	22	5 15 14 15	=	FAT CLAY (continued)										
ч			E 17											
П			- 18		СН									
S4	20	3 5 13 15	= 10											
- 11		13 15	-19											
- "														
П				FAT CLAY WITH SILT, dark gray (10YR 4/1).										
S5	24	4 5 7 11	-21							M				
- 11		/ 11												
			-22											
- 11			23	same as above except, very dark brown (10YR 2/2).										
S6	20	7 11 15 20	24							M				
Ц			2 4											
п			25	same as above except, very dark gray (10YR 3/1).										
- 11		10	26	aunic and accord oncopy, rany canning any (100 1110).										
S7	24	4 8 11 12	<u>-</u> 26		СН					M				
Ц			27											
П			20											
S8	24	8 12	- 28							M				
36	24	16 21								101				
- 4			= 20											
П			- 30											
S9	13	4 4 7 12	31							M				
		7 12												
			-32											
П			33	LEAN CLAY, very dark brown (10YR 2/2).										
S10	24	5 6 9	= ,,							W				
Ц			-34											
п			35											
		4.4	26											
S11	24	4 4 5 7	-36							W				
Ц			37		CL									
П														
S12	22	2 2	_ 36	same as above except, very dark grayish brown (10YR 3/2).						w				
312	22	2 2 3 5	39							"				
ч			40											
Π			- 40											
S13	6	3 9 11	_ 41	POORLY GRADED SANDY GRAVEL, fine, brown (10YR		buc.				w				water @ 41.0 ft bgs.
		11	_ 42	4/3).	GPS	500								41.0 ft bgs.
п			<u></u> 4∠		-	200								
1				I	Ĺ	1	I	I	L	Ĺ	1	I	I	I

Form 4400-122A

Borin	g Num	ber	MW	V-305							Paş	ge 3	of	3
San	nple									Soil	Propo	erties		
	Length Att. & Recovered (in)	nts	eet	Soil/Rock Description										
er ype	h Ati rered	Cou	In F	And Geologic Origin For Each Major Unit	S	.e.	l me		ard	ure		city		nents
Number and Type	Length Att. Recovered (Blow Counts	Depth In Feet	Each Major Onti	SC	Graphic Log	Well	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
	1 K	Щ	-43	POORLY GRADED SAND, medium grained, yellowish	SP	0 1	D [N M	20		<u> </u>	<u> </u>	<u> </u>
S14	22	23 50	E	brown (10YR 5/4), (weathered bedrock). (continued)						S				
Ш			<u></u> 44											
п			E -45				I							
01.5		5 10	E -46				I							
S15	6	50	 46		SP		1 =			S				
Ш			-47	-										
			E -48											W-
S16	6	50	- -49							S				
Ц			-49											
			- 50	End of Boring at 50 ft bgs.	1			1						* -
											2			
									7					
														10
														*
														11
														2
											0			
												-		
1		1			I	l	1	1	1		l			

SCS ENGINEERS

SOIL BORING LOG INFORMATION

T ' . 1	C 1, ,	1	C
Environmental	Consultants	and	Contractors

			Ro	ute To:	Watershed/		ı	Waste Mother	_	ement								
					Remediation	n/Redevelopment \square	ı	Other							_			2
Facility	y/Proje	ct Nan	ne					License/I	Permit/	Monito	ring Ni	ımber	T	Boring	Pag Numbe		of	2
IPL.	- Ottu	mwa	Gener	rating S		SCS#: 25215135.4	40									MV	W-30	
_				f crew ch	ief (first, last)	and Firm		Date Dri	lling St	arted		Da	te Drilli	ng Con	npleted			ing Method 1/4 hollow
	d Sch cade l								11/12	2/2015	5		1	1/12/	2015			em auger
Unique	Well 1	No.		DNR V	Well ID No.	Common Well Nar	ne	Final Sta			el	Surfac	e Elevat			Во		Diameter
Local	Grid Or	rigin	☐ (es	stimated:	□) or Bo	MW-306 oring Location ⊠			Fee				Local C	.1 Fee			8	.5 in
State I					1,902,629	PE S/C/N		La	t	o 	<u>'</u> —	"			□N	1		□Е
SE Facility		of N	E 1	/4 of Sec		T 73 N, R 15	W	Long		0 — ———	/C	" 	Tilla an	Feet	: □ s]	Feet W
Facility	עו /			1	County Wapello					Civil T Ottur		ity/ or v	village					
San	ple				·····P									Soil	Prope	erties		
	& in)	ςς.	et		Soil/	Rock Description												JR.
r pe	Att. red (ount	'n Fe			Geologic Origin For			S	0	8		rd	er t		ty		ents
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet		Ea	ach Major Unit			SC	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
a Z	Le Re	Bl	De	TOPSO					ר	177 1		H	St	žΰ	2 2	PI:	Ы	<u> </u>
			E ,					T	OPSO:	1 1/								
			E 1	FAT CL	AY, dark olive	brown (2.5Y 3/3).												
			_2															
			_3															
			<u>-</u> 4															
			_5															
			E															
			<u>-</u> 6															
			- 7						СН									
			E_8															
			E I															
			<u>-</u> 9															
п			E ₁₀															
		0.6	Ē.,															
S1	18	3 6 9 11	E 11											M				
Ц			_12															
П			E -13															
S2	22	5 6	- 13	FAT CL	LAY, gray (10Y)	R 5/1).								M				
		79	-14						GV.									
			- -15						СН									
			E															
I have			-16		un thin f	tmrs and ag	. h'	of1	ovul1	COLDECT 1986								
Signatu		y tnat	uie into	rination o	ii this form is	true and correct to the				ge. 							T 1 //	(00) 224 2222
n	In	B	11	fer	- Kyle 1			Engine Dairy Dri		dison, '	WI 537	18					1 el: (6	608) 224-2830 Fax:
-)				-			na coolis na cocarbination a successiva										

Form 4400-122A

Sample	Boring Number	MV	V-306	*							ge 2	of	2
S3									Soil	Prop	erties		
S3	t. & 1 (in)	nts eet											
S3	ype ype h At	Cou		S	iic	am	Ð	ard	ure	-	city		nents
S3	Numb and T Lengt Reco	Slow Septl	1	JSC	3rapl	Well Diagr	JD/F	tand	Aoist Conte	imit	lasti	200	2QD/ Jomr
S4	S3 22 5 10	10 =	FAT CLAY, gray (10YR 5/1). (continued)			ń	Н.	07 11	M	111	H	H	
S4	Ц	17 = 17	FAT CLAY, gray (101R 5/1).	СН	19 802536 11 31 31								
S4	П		FAT CLAY, dark olive brown (2.5Y 3/3).	1							-		
S5	S4 13 5								M				
S5		17 - 19											
S6	п	= 20											
S6	S5 15 5	6 = 21			egra de				W				
S6	13			СН					VV				
S6		E ⁻²²											
S7 22 25 711 POORLY GRADED SAND, very dark grayish brown (10YR 3/2), medium to coarse grained, (weathered bedrock?). W W W W													
S7 22 2 5 7 11 POORLY GRADED SAND, very dark grayish brown (10YR 3/2), medium to coarse grained, (weathered bedrock?). W W W W	S6 15 7	9 = 24			2.72.5				W				
S7 22 2 5 7 11 POORLY GRADED SAND, very dark grayish brown (10YR 3/2), medium to coarse grained, (weathered bedrock?). W W W W	4	25	* -										
S8 NR 7 3		E	() -)										
S8 NR 7 3	S7 22 2:	5 - 26	POORLY GRADED SAND, very dark grayish brown (10YR						W				
S8 NR $\begin{bmatrix} 73 \\ 43 \end{bmatrix} = \begin{bmatrix} \\ \\ 29 \end{bmatrix}$	Ц		3/2), medium to coarse grained, (weathered bedrock?).										
S8 NR $\begin{bmatrix} 73 \\ 43 \end{bmatrix} = \begin{bmatrix} \\ \\ 29 \end{bmatrix}$	П	E-28	* ,										
$\begin{bmatrix} 1 & 1 & -29 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & $	S8 NR 7								W				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Ц (1	= 29											
S9 $\begin{bmatrix} 18 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 $	П	= 30	**	SP									
	S9 18 1	1 = 31	**						W				
	п	-	%										
	C10 12 WC	OR = 33							337				
S10 13 WOR -34 WOR -34	510 13		11 P			H			W				
End of Boring at 34.5 feet bgs.	4		End of Boring at 34.5 feet bgs.										
								4.					

		INE		and Cont	tractors						SOI	L BOR	ING	LOG	INFO	ORM	ATION
			Ro	oute To:	Watershed/W Remediation	Vastewater /Redevelopment	Waste Other		ement								
														Pa	ge 1	of	1
	-	ect Nan					License/	Permit/	Monit	oring N	lumbe	r	Boring	Numb			
				rating S		SCS#: 25215135.40	D . D .	11: 0:	. 1		1	N . TO '11		1.1		W-30	
		-		of crew ch	nief (first, last) a	ind Firm	Date Dri	lling St	arted			Date Drill	ing Cor	npleted			ling Method
		nmalf Drilli						11/10)/201	5			11/10/	2015			1/4 hollow em auger
Uniqu			8	DNR V	Well ID No.	Common Well Name	Final Sta				Surf	ace Eleva			В		Diameter
-						MW-301		Fe	et				.3 Fee			8	3.5 in
Local State	Grid O	rigin			□) or Bo 1,899,709	ring Location 🖂 E S/C/N	La	t	0	•		Local	Grid Lo		_		
NW		of S		1/4 of Sec		T 73 N, R 15 W	Long		0	t			Feet	□ N : □ S			Feet W
Facilit		r OI D	**		County	1 75 N, K 15 W	Lon	5 —	Civil	Town/0	City/ o	r Village	1 001				Teet - W
					Wapello				Ottu	ımwa		1,5440					
San	nple												Soil	Prop	erties		
	% (in)	22	et		Soil/F	Rock Description											
r	Length Att. & Recovered (in)	Blow Counts	Depth In Feet		And Go	eologic Origin For		S	0	,		Standard Penetration	e 1		75		RQD/ Comments
Number and Type	ngth	W C	pth I		Eac	ch Major Unit		SCS	Graphic	Well Diagram	PID/FID	ndar	Moisture Content	Liquid	Plasticity Index	00	D/Q
Nu	Reg	Blc	Deg					n	Grap	Well	PI I	Sta	වී වී	Liquid	Plastic Index	P 200	8 8
			Ē	TOPSO	IIL.		7	OPSO									
			<u>-1</u>	SANDY	Y SILT WITH GR	AVEL, gray (7.5YR 6/1), g			ĤΤ								
			E_2	fine.													
			E 2														
			_3										14				
			Ē,					MI									
п			E *					ML									
			_5														
S1	10	woh 1	-										W				
			- 6														
п			E-7	WEATI	HEDED CANDS	TONE years week light gray	u matriy		Ш	4 🗏							
			Ė.	(10YR	7/1), scondary col	FONE, very weak, light gray lor very dark gray 910YR 3	/1) ,										
S2	13	24 50	E-8	massive	<i>.</i> .								W				
Ш			_9														
П			E							ΙĦ	-						
		50	-10							IE				1			
S3	5	50	E ₁₁				SA	NDST	NE	IE			W				
Ш			Ē .				O. I			IE							
П			-12														
	_	50	E -13										337				
S4	6	30	= 13										W				
Ш			-14							IB							
П		50	F	1				1	1							1	1

Endo of Boring at 15 feet bgs.

Environmental	Consultants	and	Contractors

		Ro		Vastewater □ VRedevelopment □	Waste I	_	ement										
												Pag	ge 1	of	2		
Facility/Proje				License/Permit/Monitoring Number Boring Number													
			ating Station f crew chief (first, last) a	Date Dri	lling St	tarted	npleted	MW-307 Drilling Method									
Mike Mu	ıeller																
Cascade Unique Well	Drilli No.	ng	DNR Well ID No.	Final Sta		5/2016		Surfa	ce Eleva	10/25/	De	HSA Borehole Diameter					
Omque wen	140.		DINK WEII ID NO.	rillai Sta	uc wa Fe		51	Suria		.1 Fee	BC	8.5 in					
Local Grid C	rigin	(es	timated: (1) or Bor	La		0	1	"		Grid Lo							
State Plane NE 1/4	of S		,707 N, 1,903,070 /4 of Section 26,	E S/C/N T 73 N, R 15 W			0	,	"		Foot			☐ E Feet ☐ W			
Facility ID	TOI D		County	1 75 N, K 15 W	Civil Town/City/ or Village												
			Wapello		Ottumwa Soil Properties												
Sample	-		G 11/5								Soil	Prope	erties		-		
tt. &	ınts	Feet		ock Description cologic Origin For						Ę					o o		
ber Fype th A	, Cou	Depth In Feet		ch Major Unit		CS	hic	ram	EID	lard	ture		icity		/ ment		
Number and Type Length Att. & Recovered (in)	Blow Counts	Dept		ar mager emi		n s (Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments		
S1 24	2232		coarse sand and gravel, (i	ND WITH GRAVEL, tan, fi construction fill sand to fill 8.5 ft bgs).	in	SP					W				water level 6.5 ft bgs.		
S2 14 I hereby certi Signature	4 1 4 4 fy that	-11 -12 -13 -14 -15 the infor	rmation on this form is tr	Firm SCS	t of my kn Engine Dairy Driv	ers		WI 537	11		W			Tel: (6	508) 224-2830 Fax:		

Form 4400-122A

-	g Num	ber	MV	V-307		,					Pag		of	2
San	nple									Soil	Prope	erties		
	Length Att. & Recovered (in)	nts	eet	Soil/Rock Description					-					
ype	h At	Cou	In	And Geologic Origin For	S	ic	am		ard ation	ure	_	sity		nents
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Each Major Unit	SC	Graphic	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
2 8	l M	M	F	LEAN CLAY, dark yellowish brown (10YR 4/4), slightly	D	D		<u></u>	SA	20		P	Ь	0 28
52	24	12	<u>-</u> 16	dense. (continued)	CL		2.2			XX				
S3	24	24	E	SILT, dark yellowish brown (10YR 3/4), fine to medium sand.						W				
			-17											
			E -18		ML									
S4	17	3 3	E 18							W				Bedrock
٠.	.,	3	-19							''				@19.5 ft
			= 20	SANDSTONE, dark brown (10YR 3/3),										bgs.
S5	5	50/0.5								W				More
	5		-21			2 = 9 5				**				competent
			E 22			- 12								@20.5' -24.5' bgs.
			_22											
			-23	,										
			- 24											
			<u>-24</u>											
			25	more weathered.										
			E 26											
			-26											
			27											
24.		100	E	Same as above except, gray (10YR 6/1).										
S6 🗖	1	100	-28	End of boring at 28 ft bgs.										
														*
					-	•								
		=												

Sample Jegic Properties Soil/Rock Description And Geologic Origin For Each Major Unit Soil]	Route	e To:			astewater [Redevelopme		Waste Other	-	emer	ıt										
PI-Ottumwa Generating Station SCS#: 25216148,00 Due Drilling Started Due Drilling Started Due Drilling Completed Drilling Method Due Drilling Started Due Drilling Completed Drilling Method Due Drilling Started Due Drilling Completed Drilling Method Drilling Method Drilling Method Drilling Completed Drilling Method Dril																			Pag	ge 1	of	2	
Boring Prilled By. Nume of crew chief (first, last) and Firm Mile Mueller Cascade Drilling Unique Well No. DNR Well ID No. MW-308 Frect State Plane 402,312 N, 1,902,665 E S S/C/N NE 1/4 of Section 26, T 73 N, R 15 W County Wapello Soil/Rock Description And Geologic Origin For Facility D Soil/Rock																							
District									Date Drilling Started Date Drilling Complete														
Cascade Drilling									Date Drilling Started Date Drilling									ipicicu		ing Menou			
Local Grid Origin Cestimated: Or Bering Location State Plane 402,312 N, 1,902,665 E S/C/N Lat S Local Grid Location N Cestimated: Or Bering Location Local Grid Location N Cestimated: Origin Origin Cestimated: Origin Cestimated: Origin Cestimated: Origin Cestimated: Origin Cestimated: Origin Origin Cestimated: Origin Origin Cestimated: Origin Cestimated: Origin Cestimated: Origin Cestimated: Origin Origin Cestimated: Origin Cestimated: Origin	Cascade Drilling									16			10/25/2016						HSA				
Local Grid Origin										Final Sta	eve	1	Sur										
State Plane											Feet								8.5 in				
NE L/4 of SE 1/4 of Section 26, T 73 N, R 15 W Long										La		·		"									
County Wapello Civil Town/City/ or Village Ottumwa Ottumwa Soil Properties Soil/Rock Description And Geologic Origin For Each Major Do Properties Soil/Rock Description And Geologic Origin For Each Major Do Properties Soil/Rock Description And Geologic Origin For Each Major Do Properties Soil/Rock Description Soil/Rock Description And Geologic Origin For Each Major Do Properties Soil/Rock Description Soil/Rock Descrip				-	,	,	,			Lon	g	0		1		"		Feet					
Sample Soil/Rock Description And Geologic Origin For Each Major Unit Soil/Rock Description	Facility ID				C	County			-	Civil Town/City/ or Village												-	
Soil/Rock Description And Geologic Origin For Each Major Unit Soil/Rock Description					'	Wapell	lo																
POORLY (RADED SAND WITH GRAVEIL, tan, fine to conserved and and gravel, (construction fill sand to fill in hydrovac hole cleared to 9.5 ft bgs). SP LEAN CLAY, brown (10YR 4/3), dense. LEAN CLAY, brown (10YR 4/3), some clay. W LEAN CLAY, brown (10YR 4/3), some clay. W LEAN CLAY, brown (10YR 4/3), some clay. W Increby certify that the information on this form is true and correct to the best of my knowledge. Signature Tel: (608) 224-2830																	_	Soil	Prope	rties	S		
POORLY (RADED SAND WITH GRAVEIL, tan, fine to conserved and and gravel, (construction fill sand to fill in hydrovac hole cleared to 9.5 ft bgs). SP LEAN CLAY, brown (10YR 4/3), dense. LEAN CLAY, brown (10YR 4/3), some clay. W LEAN CLAY, brown (10YR 4/3), some clay. W LEAN CLAY, brown (10YR 4/3), some clay. W Increby certify that the information on this form is true and correct to the best of my knowledge. Signature Tel: (608) 224-2830	% (i	its (iiii)	eet					•															
POORLY (RADED SAND WITH GRAVEIL, tan, fine to conserved and and gravel, (construction fill sand to fill in hydrovac hole cleared to 9.5 ft bgs). SP LEAN CLAY, brown (10YR 4/3), dense. LEAN CLAY, brown (10YR 4/3), some clay. W LEAN CLAY, brown (10YR 4/3), some clay. W LEAN CLAY, brown (10YR 4/3), some clay. W Increby certify that the information on this form is true and correct to the best of my knowledge. Signature Tel: (608) 224-2830	pe Att		In F			F					l so	ပ		8		2	tion	re .t		ity		ents	
POORLY (RADED SAND WITH GRAVEIL, tan, fine to conserved and and gravel, (construction fill sand to fill in hydrovac hole cleared to 9.5 ft bgs). SP LEAN CLAY, brown (10YR 4/3), dense. LEAN CLAY, brown (10YR 4/3), some clay. W LEAN CLAY, brown (10YR 4/3), some clay. W LEAN CLAY, brown (10YR 4/3), some clay. W Increby certify that the information on this form is true and correct to the best of my knowledge. Signature Tel: (608) 224-2830	d Ty d Ty ngth	MC MC	pth				Eacl	n Major Unit			C	aphi	0.0	ell agrai) E	ındaı	netra	oistu nten	quid nit	stici	00)Qi	
coarse sand and gravel, (construction fill sand to fill in hydrovac hole cleared to 9.5 ft bgs). Sp Watter @ 6.5 ft bgs. Sp LEAN CLAY, brown (10YR 4/3), dense. ULEAN CLAY, brown (10YR 4/3), some clay. W W W It because the first true and correct to the best of my knowledge. Signature Firm SCS Engineers Tel: (608) 224-2830	P. C. B. P.	ž m	D O									5	C	Ď Ä	I E	Sta	Peı	S W	Lir Lir	Pla Ind	P 2	5% 00	
S2 13 12 13 SILT, brown (10YR 4/3), some clay. I hereby certify that the information on this form is true and correct to the best of my knowledge. Signature 1 1 1 12 13 SILT, brown (10YR 4/3), some clay. W Tel: (608) 224-2830			-4 -5 -6 -7 -8 -9	I	coarse sa	and and g	ravel, (cared to 9	onstruction fill	l sand to fi∐		SP												
I hereby certify that the information on this form is true and correct to the best of my knowledge. Signature Tel: (608) 224-2830	U N	1 2 2	12		SILT, bro	own (10Y	(R 4/3), s	some clay.															
Signature Firm SCS Engineers Tel: (608) 224-2830			<u>–</u> 15						***************************************														
SCS Engineers 1cl. (008) 224-2630	I hereby cert	ify tha	t the in	form	ation on	n this for	m is tru	e and correc	t to the best	of my kr	owled	ge.											
	Signature	1	/	X	11	21	_	Fi	bCb			1.		п. сс-							Tel: (6		

Form 4400-122A

Borin	g Num	ber	MV	V-308										e 2	oſ	2
San	nple											Soil	Prope	rties		
	Length Att. & Recovered (in)	SO	to to	Soil/Rock Description												8
43	tt.	unt	Fe	And Geologic Origin For							on			_		Its
ype	th A	ပိ	n In	Each Major Unit	CS	nic			am	E E	lard	nre	р	city	_	nen
Number and Type	eng	Blow Counts	Depth In Feet	Bacil Major Offic	S	Graphic	Log	Well	Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
Z E	JK	B		SILT, brown (10YR 4/3), some clay. (continued)	D	D	L	15		<u>D</u>	N G	SO	I I	I I	Д	80
			E	SIL1, brown (104 K 4/3), some ciay. (continuea)	ML											
S3	18	1 2 1 3	_16	SILTY SAND, brown (10YR 4/3).	SM							W	1	1		
		13	E	POORLY GRADED SAND, brown (10YR 4/3), fine	Sivi	+	-									
			-17	grained.	SP											
			E												į.	
		4 12	-18	WELL GRADED SAND AND GRAVEL, dark grayish brown (10YR 3/2), fine to coarse grained, (weathered	CXX		• • • •								8	
S4	13	13 3	- 19	brown (10 Y R 3/2), fine to coarse grained, (weathered bedrock).	SW	000	000					W			2	
			- 19	SANDSTONE, dark grayish brown (10YR 4/2), weathered bedrock.												
			=20													
S5 [6	12 26 50/0.4		Same as above except, brown (10YR 4/3).				E				W				
		50/0.5	-21													
			F					E							9	
			-22													
			F													
			23													
			F	Same as above except, dark grayish brown (10YR 4/2).												
S6 [4	50/0.4	-25	End of boring at 25 ft bgs.					_			W				
				End of boring at 23 it ogs.												
					3											
				or do												
																
				*												
									- 1							
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															E.	
									1							
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Environmental Consultants and Contractors

			F	Route To		Wastewater n/Redevelopment	Waste 1	_	ement									
														Pag		of	2	
	y/Proje			,.	Ct. t'		License/	License/Permit/Monitoring Number Boring Number								WY 200		
					Station chief (first, last)	SCS#: 25216148.00	Date Dri	Date Drilling Started Date Drilling Completed						nleted	IVI	MW-309 Drilling Method		
	e Mu			or oren	emer (mor, mor)	and I min	Date Di	iiiig oi	iarica		1	Jaic Dilli	ing Completed				ing iviculou	
Cas	cade 1	Drill					10/27/2016]	0/27/	2016		HSA		
Uniqu	e Well	No.		DN	R Well ID No.	Common Well Name	Final Sta			el	Surf	1					Borehole Diameter	
Local	Grid O	rioin	П	estimat	ed·□) or B	MW-309 oring Location ⊠	٠	Fe	et			652.5 Feet Local Grid Location					8.5 in	
State Plane 403,189 N, 1,902,070 E S/C/N								.t	°	<u> </u>		" Local C	JIIU LOC	□ N		□ E		
NE		of S	SE	1/4 of	Section 26,	T 73 N, R 15 W	Long	g	o 	<u> </u>		"	Feet]	Feet W	
Facility ID County Civil Town/City/ or Village																		
Can	2010			1	Wapello				Ottu	mwa T	T		G '1	D				
San	nple				g								Soil	Prope	erties			
	t. & 1 (in	nts	Feet			Rock Description											70	
ype	h At rerec	Con	l In I			Geologic Origin For		S	ic	am	日	ard	ure	-	sity		ents	
Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet		E	ach Major Unit		SC	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments	
∠ ਕ	L	B	<u>A</u>	Hyd	rovac borehole to 1	0 ft bgs.		ח	G J	M K		N M	ΣÜ	L	P I	Ъ	<u> </u>	
			-1 -2 -3 -4 -5 -6 -7 -8	LEA	N CLAY, very dar	x grayish brown (10YR 3/2),	trace											
S1 S2 S2 S2		3 3 6 7 2 2 2 2	-11 -12 -13 -14 -15	sand		(gasjan olom (10 i i i 5 2),	, whee	CL					W					
		y that	the inf	ormatio	n on this form is	true and correct to the bes	st of my kn	owledg	ge.									
Signati	re)	_	,	V	7		S Engine									Tel: (6	08) 224-2830	
	41	1/1	/	1	1/1	2830	Dairy Driv	ve Mac	dison, ^v	WI 537.	11						Fax:	

Form 4400-122A

Borin	g Numb	er	MV	V-309										ge 2	of .	2
San	nple											Soil	Prope	erties		
	Length Att. & Recovered (in)	its	eet	Soil/Rock Description												
er pe	Att	Cour	In F	And Geologic Origin For	S	O			E	О	rd atior	ure nt		ity		ents
Number and Type	ngth	Blow Counts	Depth In Feet	Fach Major Unit	SC	Graphic	Log	Well	Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
a Z	Le Re	BI	Ď	SILTY SAND, very dark grayish brown (10YR 3/2), fine to	D	5	Lc	W	D	PI	St	≥ 3	12 13	Pl	Ъ	<u> </u>
			E	medium grained.												
S3		1 1 1 1	-16									W				
			E ₁₇		SM											
			E													
			-18													
S4		3 5 4 6	E -19									W				
			E 19	POORLY GRADED SAND, yellowish brown (10YR 5/4), coarse grained.												
п			-20		SP											
		2.2	Ē.		31											
S5		2 3 7 50	<u>-21</u>									W				
Ш			E_22	WEATHERED SANDSTONE.												
			E													
			23													
			E ₂₄													
			F -													
S6 [25					E				W				
50			E_26									,,,				
			F 20					E								
	2		_27													
				End of boring at 27.5 ft bgs.												
				7 y 7 m												
				- 3												
2											2					
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	SCS ENGINEERS Environmental Consultants and Contractors SOIL BORING LOG INFORMATION															
			oute To:	Watershed/	Wastewater □ n/Redevelopment □		Waste Management Other Other									
													Pag		of	2
Facility/Proje			ating Sta	ation	5.65# 2521.6149.00	License	License/Permit/Monitoring Number Boring Number B-309X									7
IPL-Ottu Boring Drille					SCS#: 25216148.00 and Firm	Date Dr	illing S	tarted		D	ate Drilli	ng Con	npleted	D		ling Method
Mike Mu	ıeller			(, ,							Date Drilling Completed					8
Cascade Drilling Unique Well No. DNIP Well ID No. Garage Well No.								6/2016			10/26/2016				HSA	
Unique Well No. DNR Well ID No. Common Well Name					Final St	atic Wa Fe		el	Surfa	rface Elevation Bor Feet				orehole Diameter 8.5 in		
Local Grid O	rigin	(e:	stimated:) or Be	oring Location 🖂		1.6				Local C		cation		C	111
State Plane				N,	E s/c/n	L	at	<u> </u>	<u> </u>				\square N			□Е
NE 1/4 Facility ID	of S	E 1	/4 of Secti		T 73 N, R 15 W	Lon	ıg	°	<u> </u>		X 7:11	Feet	\Box s			Feet W
racility ID				County Wapello				Ottu		ty/ or	Village					
Sample				тирено			T	Cital				Soil	Prope	erties		
& in)	s	t t		Soil/	Rock Description											1
os Att.	ount	n Fe		And C	Geologic Origin For						d ion	b		×		nts
Number and Type Length Att. & Recovered (in)	Blow Counts	Depth In Feet		E	ach Major Unit		SCS	Graphic Log	Well Diagram	PID/FID	Standard Penetration	Moisture Content	Liquid Limit	Plasticity Index	00	RQD/ Comments
Nu and Ler Ree	Bic	De					n s	Grap Log	Well Diagr	PIL	Sta	[©] [™]	Liquid Limit	Plastic Index	P 200	Co. RQ
		Ē	POORLY coarse sa	Y GRADED SA and and gravel,	AND WITH GRAVEL, tan, (construction fill sand to fil o 9 ft bgs).	fine to l in										
		-1	hydrovac	hole cleared to	o 9 ft bgs).											
		E_2														
		= -														
		_3														
		<u> </u>														
		Ē					SP									
		_5														
		E														
		<u>⊢</u> 6														Water at 6.5
		_7														ft bgs
		Ē														
		- 8														
		<u>_</u> 9	I E ANI C	I AV dark bro	wn (10YR 3/3), medium de	maa	-									
		E	LEANC	LAT, dark bro	wii (10 f K 3/3), illediulii de	iise.										
П		-10														
S1 12	1334	- -11					CL					w				
- 12	3 4	E										**				
Ľ		- 12														
			SILT, dar	rk brown (10Y)	R 3/3), some clay.											
S2 18	3 3 3 3	E					ML					w				
Ц	55	14					IVIL									
		E 15														
				11.0												

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	MI -	Fire	m SCS Engineers	Tel: (608) 224-2830
Mh			2830 Dairy Drive Madison, WI 53711	Fax:
1//				

Environmental Consultants and Contractors

SOIL BORING LOG INFORMATION SUPPLEMENT
Form 4400-122A

Boring Nu	mbe	er	B-	-30	99X												of	2
Sample													Soil	Pr	ope	rties		
and Type Length Att. &	(II)	ıts	eet		Soil/Rock Description							-						
pe Att	red	Blow Counts	Depth In Feet		And Geologic Origin For	co.	0			8	D	Standard Penetration	er ti			ity		RQD/ Comments
and Type Length Att	COVE) MC	pth		Each Major Unit	SC	Graphic	, pp	=	Diagram	PID/FID	nda	Moisture Content	Liquid	Limit	Plasticity Index	P 200)Qi
Tel and	Re	Blc	De			n	Gr	Log	Well	Ö	PII	Sta Per	⊻ చ	Lic	Lir	Pla	P 2	S. S.
			E		SILT, dark brown (10YR 3/3), some clay. (continued)	ML												
3 20		3 3 3 2	E-16		POORLY GRADED SAND, very dark grayish brown (10YR 3/2), fine grained.	SP							W					
			-17 E	7	SILT, dark brown (10YR 3/3).	ML												
Ш.,		1 17	F 18	3	POORLY GRADED SAND, brown (10YR 4/3).	SP							***					D. I. I.
4 15	5	50/0.2	- 19		WEATHERED SANDSTONE, grayish brown (10YR 5/2).								W		1			Bedrock at18.5 ft bgs
5 6	5	50/0.3	E-20										W					
			E															
			-21												-			
			-22	2														
			E-23	3														
			E															
			<u>- 24</u>	ŀ														
			-25	5														
	i i		- -26	5														
			F	-	End of boring at 26.5 ft bgs.		-											
															8			
	24																	

IOWA DEPARTMENT OF NATURAL RESOURCES

MONITORING WELL/PIEZOMETER CONSTRUCTION DOCUMENTATION FORM

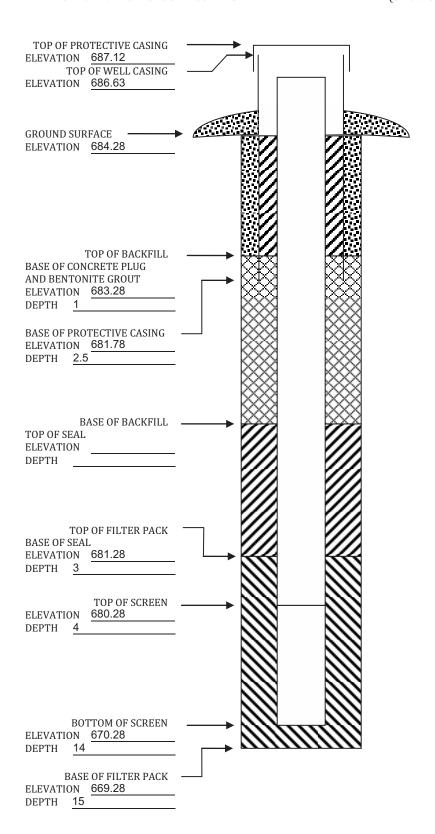
Disposal Site Name: IPL - Ottumwa Generating Station	Permit No.:
Well or Piezometer No: MW-301	_
Dates Started: 11/10/15	Date Completed: 11/10/15
A. SURVEYED LOCATIONS AND ELEVATIONS	B. SOIL BORING INFORMATION
Locations (± 0.5 ft):	Name & Address of Construction Company:
Specify corner of site: SE of Parcel 003052640340000	Cascade Drilling, LP
Distance & direction along boundary: 106' W	301 Alderson St
Distance & direction from boundary to wall:306' N	Schofield, WI 54476
Elevations (± 0.01 ft MSL):	Name of Driller: Todd Schmalfeld
Ground Surface: 684.28	Drilling Method: HSA
Top of protective casing: 687.12	Drilling Fluid: NA
Top of well casing: 686.63	Bore Hole Diameter: 8 inch
Benchmark elevation:	Soil Sampling Method: Spoon
Benchmark description:	Depth of Boring: 15 ft
C. MONITORING WELL INSTALLATION	
Casing material: PVC sch 40	Placement method: Gravity
Length of casing: 4 ft	Volume: 8 cu. ft.
Outside casing diameter: 2.38"	Backfill (if different from seal):
Inside casing diameter: 2"	Material:
Casing joint type: threaded	Placement method:
Casing/screen joint type:threaded	Volume:
Screen material: PVC	Surface seal design:
Screen opening size: 0.010"	Material of protective casing: Steel 6 inch
Screen length: 10 ft	Material of grout between protective casing and well casing: sand
Depth of well: 14 ft	Protective cap:
Filter Pack:	Material: Steel, vented
Material: Red Flint	Vented: ☐ Yes ☐ No Locking: ■ Yes ☐ No
Grain size: #40	Well Cap:
Volume: 4 cu. ft.	Material: PVC
Seal (minimum 3 ft length above filter pack):	Vented: ☐ Yes ■ No
Material: 3/8 inch bentonite chips	
D. GROUNDWATER MEASURMENT (± 0.01 ft below top of in	nner well casing)
Water level: 3.09 ft	Stabilization Time: <5 minutes
Well development method: Surged with block and pumped to	o reduce turbidity. 435 gallons pumped.
Average depth of frostline: 3.5'	

Attachments: Driller's log. Pipe schedules and grouting schedules. $8 \frac{1}{2} x 11$ inch map showing locations of all monitoring wells and piezometers.

Please mail completed for to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E 9th St, Des Moines IA 50319-0034.

Questions? Call or Email: Nina Koger, Environmental Engineer Sr., 515-281-8986, Nina.Koger@dnr.iowa.gov

06/2011 cmz 05/06/2022 - Classification: Internal - ECRM12833565



06/2011 cmz DNR Form 542-1277

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MONITORING WELL/PIEZOMETER CONSTRUCTION DOCUMENTATION FORM

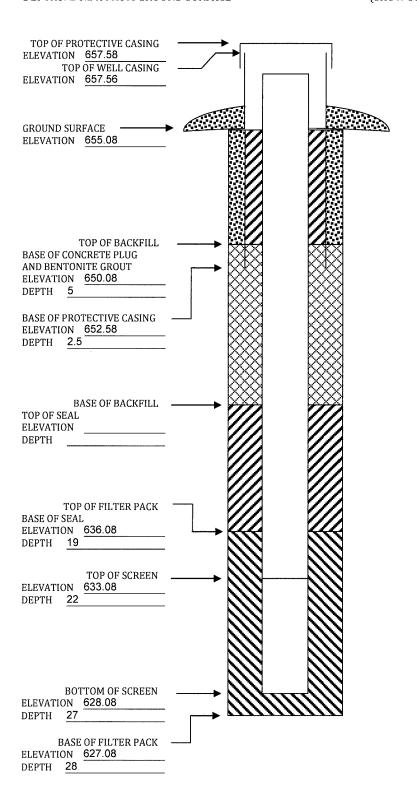
Disposal Site Name: IPL - Ottumwa Generating Station	Permit No.:
Well or Piezometer No: MW-307	
Dates Started: 10/25/16	Date Completed: 10/25/16
A. SURVEYED LOCATIONS AND ELEVATIONS	B. SOIL BORING INFORMATION
Locations (± 0.5 ft):	Name & Address of Construction Company:
Specify corner of site:NE of Parcel 003052620200000	Cascade Drilling, LP
Distance & direction along boundary:683' W	301 Alderson St
Distance & direction from boundary to wall:296' S	Schofield, WI 54476
Elevations (± 0.01 ft MSL):	Name of Driller: Mike Mueller
Ground Surface: 655.08	Drilling Method: HSA
Top of protective casing: 657.58	Drilling Fluid: NA
Top of well casing: 657.56	Bore Hole Diameter: 8 inch
Benchmark elevation:	Soil Sampling Method: Spoon
Benchmark description:	Depth of Boring: 28 ft
C. MONITORING WELL INSTALLATION	
Casing material: PVC sch 40	Placement method: Gravity
Length of casing: 22 ft	Volume: 250 lbs
Outside casing diameter: 2.38"	Backfill (if different from seal):
Inside casing diameter: 2"	Material:
Casing joint type: threaded	Placement method:
Casing/screen joint type:threaded	Volume:
Screen material: PVC	Surface seal design:
Screen opening size: 0.010"	Material of protective casing: Steel 6 inch
Screen length: 5 ft	Material of grout between protective casing and well casing: sand
Depth of well: 27 ft	Protective cap:
Filter Pack:	Material: Steel, vented
Material: Red Flint	Vented: ■ Yes □ No Locking: □ Yes □ No
Grain size: #40	Well Cap:
Volume: 200 lbs	Material: PVC
Seal (minimum 3 ft length above filter pack):	Vented: ☐ Yes ■ No
Material: 3/8 inch bentonite chips	
D. GROUNDWATER MEASURMENT (± 0.01 ft below top of in	ner well casing)
Water level: 8.12	Stabilization Time: 5 minutes
Well development method: surged with bailer and pumped	
Average depth of frostline: 3.5'	

Attachments: Driller's log. Pipe schedules and grouting schedules. $8\frac{1}{2}x11$ inch map showing locations of all monitoring wells and piezometers.

Please mail completed for to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E 9th St, Des Moines IA 50319-0034.

Questions? Call or Email: Nina Koger, Environmental Engineer Sr., 515-281-8986, Nina.Koger@dnr.iowa.gov

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IOWA DEPARTMENT OF NATURAL RESOURCES

MONITORING WELL/PIEZOMETER CONSTRUCTION DOCUMENTATION FORM

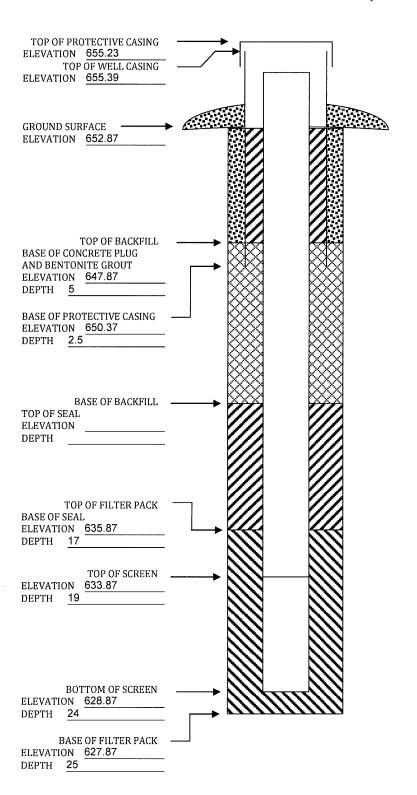
Disposal Site Name: IPL - Ottumwa Generating Station	Permit No.:
Well or Piezometer No: MW-308	
Dates Started: 10/26/16	Date Completed: 10/26/16
A. SURVEYED LOCATIONS AND ELEVATIONS	B. SOIL BORING INFORMATION
Locations (± 0.5 ft):	Name & Address of Construction Company:
Specify corner of site:SW of Parcel 0030502620203000	Cascade Drilling, LP
Distance & direction along boundary:158' E	301 Alderson St
Distance & direction from boundary to wall:417' N	Schofield, WI 54476
Elevations (± 0.01 ft MSL):	Name of Driller: Mike Mueller
Ground Surface: 652.87	Drilling Method: HSA
Top of protective casing: 655.23	Drilling Fluid: NA
Top of well casing: 655.39	Bore Hole Diameter: 8 inch
Benchmark elevation:	Soil Sampling Method: Spoon
Benchmark description:	Depth of Boring: 25 ft
C. MONITORING WELL INSTALLATION	
Casing material: PVC sch 40	Placement method: Gravity
Length of casing: 19 ft	Volume: 200 lbs
Outside casing diameter: 2.38"	Backfill (if different from seal):
Inside casing diameter: 2"	Material:
Casing joint type: threaded	Placement method:
Casing/screen joint type:threaded	Volume:
Screen material: PVC	Surface seal design:
Screen opening size: 0.010"	Material of protective casing: Steel 6 inch
Screen length: 5 ft	Material of grout between protective casing and well casing: sand
Depth of well: 24 ft	Protective cap:
Filter Pack:	Material: Steel, vented
Material: Red Flint	Vented: ■ Yes □ No Locking: □ Yes □ No
Grain size: #40	Well Cap:
Volume: 200 lbs	Material: PVC
Seal (minimum 3 ft length above filter pack):	Vented: ☐ Yes ■ No
Material: 3/8 inch bentonite chips	
D. GROUNDWATER MEASURMENT (± 0.01 ft below top of in	ner well casing)
Water level: 9.85	Stabilization Time: 5 minutes
Well development method: surged with bailer and pumped	
Average depth of frostline: 3.5'	

Attachments: Driller's log. Pipe schedules and grouting schedules. $8\frac{1}{2}x11$ inch map showing locations of all monitoring wells and piezometers.

Please mail completed for to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E 9th St, Des Moines IA 50319-0034.

Questions? Call or Email: Nina Koger, Environmental Engineer Sr., 515-281-8986, Nina.Koger@dnr.iowa.gov

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IOWA DEPARTMENT OF NATURAL RESOURCES

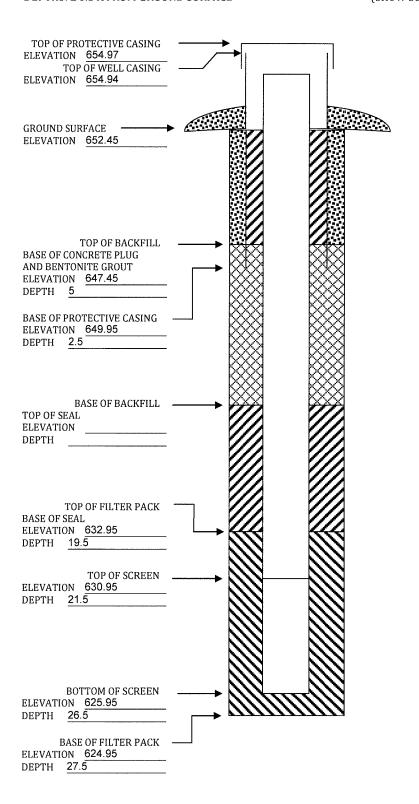
MONITORING WELL/PIEZOMETER CONSTRUCTION DOCUMENTATION FORM

Disposal Site Name: IPL - Ottumwa Generating Station	Permit No.:
Well or Piezometer No: MW-309	
Dates Started: 10/27/16	Date Completed: 10/27/16
A. SURVEYED LOCATIONS AND ELEVATIONS	B. SOIL BORING INFORMATION
Locations (± 0.5 ft):	Name & Address of Construction Company:
Specify corner of site: NE of Parcel 003052620204000	Cascade Drilling, LP
Distance & direction along boundary: ^{480'} W	301 Alderson St
Distance & direction from boundary to wall:438' S	Schofield, WI 54476
Elevations (± 0.01 ft MSL):	Name of Driller: Mike Mueller
Ground Surface: 652.45	Drilling Method: HSA
Top of protective casing: 654.97	Drilling Fluid: NA
Top of well casing: 654.94	Bore Hole Diameter: 8 inch
Benchmark elevation:	Soil Sampling Method: Spoon
Benchmark description:	Depth of Boring: 27.5 ft
C. MONITORING WELL INSTALLATION	
Casing material: PVC sch 40	Placement method: Gravity
Length of casing: 21.5 ft	Volume: 600 lbs
Outside casing diameter: 2.38"	Backfill (if different from seal):
Inside casing diameter: 2"	Material:
Casing joint type: threaded	Placement method:
Casing/screen joint type:threaded	Volume:
Screen material: PVC	Surface seal design:
Screen opening size: 0.010"	Material of protective casing: Steel 6 inch
Screen length: 5 ft	Material of grout between protective casing and well casing: sand
Depth of well: 26.5 ft	Protective cap:
Filter Pack:	Material: Steel, vented
Material: Red Flint	Vented: ■ Yes ☐ No Locking: ☐ Yes ☐ No
Grain size: #40	Well Cap:
Volume: 200 lbs	Material: PVC
Seal (minimum 3 ft length above filter pack):	Vented: ☐ Yes ■ No
Material: 3/8 inch bentonite chips	
D. GROUNDWATER MEASURMENT (± 0.01 ft below top of	
Water level: 9.87	Stabilization Time: 5 minutes
Well development method: surged with bailer and pumped	
Average depth of frostline: 3.5 '	
Attachments: Driller's log. Pipe schedules and grouting a monitoring wells and piezometers.	schedules. 8 ½x11 inch map showing locations of all

Please mail completed for to: Iowa Department of Natural Resources, Land Quality Bureau, 502 E 9th St, Des Moines IA 50319-0034.

Questions? Call or Email: Nina Koger, Environmental Engineer Sr., 515-281-8986, Nina.Koger@dnr.iowa.gov

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Appendix C **Historical Monitoring Results**

Single Location

Name: IPL - Ottumwa Generating Station

Location ID:	MW-307			
Number of Sampling Dates:	3			
Parameter Name	Units	4/8/2019	10/23/2019	12/11/2019
Boron	ug/L	240	200	190
Calcium	mg/L	240	230	230
Chloride	mg/L	220	220	200
Fluoride	mg/L	0.28	<0.23	<0.23
Field pH	Std. Units	6.76	6.68	6.37
Sulfate	mg/L	100	95	92
Total Dissolved Solids	mg/L	1000	1000	1000
Antimony	ug/L			<0.53
Arsenic	ug/L			<0.75
Barium	ug/L			140
Beryllium	ug/L			<0.27
Cadmium	ug/L			<0.039
Chromium	ug/L			<0.98
Cobalt	ug/L			11
Lead	ug/L			0.71
Lithium	ug/L			12
Mercury	ug/L			<0.1
Molybdenum	ug/L			<1.1
Selenium	ug/L			<1
Thallium	ug/L			<0.27
Total Radium	pCi/L			2.46
Radium-226	pCi/L			1.65
Radium-228	pCi/L			0.81
Field Specific Conductance	umhos/cm	1599	1684	1576
Field Temperature	deg C	12.47	13.38	11.5
Groundwater Elevation	feet	654.9	651.89 ft	649.59
Oxygen, Dissolved	mg/L	0.51	0.25	0.18
Turbidity	NTU	26	12.5	43.13
pH at 25 Degrees C	Std. Units	6.7	7.5	6.7
Field Oxidation Potential	millivolts	-3.7	-24.8	-45.8

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Single Location

Name: IPL - Ottumwa Generating Station

Location ID:	MW-308			
Number of Sampling Dates:	3	4/0/0040	40/00/0040	40/44/0040
Parameter Name	Units	4/8/2019	10/23/2019	12/11/2019
Boron	ug/L	190	220	160
Calcium	mg/L	240	240	220
Chloride	mg/L	160	160	150
Fluoride	mg/L	<0.23	<0.23	<0.23
Field pH	Std. Units	6.9	6.78	6.55
Sulfate	mg/L	300	300	280
Total Dissolved Solids	mg/L	1200	1100	1100
Antimony	ug/L			<0.53
Arsenic	ug/L			<0.75
Barium	ug/L			130
Beryllium	ug/L			<0.27
Cadmium	ug/L			<0.039
Chromium	ug/L			5.9
Cobalt	ug/L			0.26
Lead	ug/L			0.52
Lithium	ug/L			16
Mercury	ug/L			<0.1
Molybdenum	ug/L			<1.1
Selenium	ug/L			<1
Thallium	ug/L			<0.27
Total Radium	pCi/L			2.73
Radium-226	pCi/L			1.54
Radium-228	pCi/L			1.19
Field Specific Conductance	umhos/cm	1539	1637	1532
Field Temperature	deg C	12.54	13.16	10.5
Groundwater Elevation	feet	653.7	651.31	647.39
Oxygen, Dissolved	mg/L	0.66	4.42	0.43
Turbidity	NTU	6.87	7.42	15.72
pH at 25 Degrees C	Std. Units	6.8	7.9	6.8
Field Oxidation Potential	millivolts	-23	-38.7	-56.6

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Single Location

Name: IPL - Ottumwa Generating Station

Location ID:	MW-309			
Number of Sampling Dates:	3	1		
Parameter Name	Units	4/8/2019	10/23/2019	12/11/2019
Boron	ug/L	1500	1300	1100
Calcium	mg/L	160	150	150
Chloride	mg/L	72	74	66
Fluoride	mg/L	0.27	<0.23	<0.23
Field pH	Std. Units	7.18	6.98	6.67
Sulfate	mg/L	410	400	370
Total Dissolved Solids	mg/L	1100	1100	980
Antimony	ug/L			<0.53
Arsenic	ug/L			1.1
Barium	ug/L			54
Beryllium	ug/L			<0.27
Cadmium	ug/L			0.09
Chromium	ug/L			1.7
Cobalt	ug/L			3.7
Lead	ug/L			2.8
Lithium	ug/L			8.2
Mercury	ug/L			<0.1
Molybdenum	ug/L			<1.1
Selenium	ug/L			<1
Thallium	ug/L			<0.27
Total Radium	pCi/L			1.77
Radium-226	pCi/L			1.08
Radium-228	pCi/L			0.683
Field Specific Conductance	umhos/cm	1396	1461	1350
Field Temperature	deg C	12.4	12.83	11.5
Groundwater Elevation	feet	653.55	651.28	647.24
Oxygen, Dissolved	mg/L	0.66	0.36	0.26
Turbidity	NTU	72.1	42.6	413.6
pH at 25 Degrees C	Std. Units	7.2	7.2	7.1
Field Oxidation Potential	millivolts	-3.3	-27.5	-37.8

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Appendix D Statistical Evaluation

SCS ENGINEERS

APPENDIX D - STATISTICAL EVALUATION

2019 Annual Report Addendum Ottumwa Generating Station Zero Liquid Discharge Pond

Statistical evaluation completed in 2019 included the following:

- Evaluation of April 2019 detection monitoring results
- Evaluation of October 2019 detection monitoring results (finalized in January 2020)

The April 2019 results evaluation was based on interwell UPLs previously calculated for the OGS Ash Pond using the background monitoring data from upgradient well MW-301. This is a shared background well included in the monitoring systems for both the Main Ash Pond and the Zero Liquid Discharge Pond. The UPL calculations were provided in the 2018 Annual Report Addendum for the OGS Ash Pond.

The assessment monitoring results for December 2019 were evaluated in 2020.

