2019 Annual Groundwater Monitoring and Corrective Action Report

Ottumwa Midland Landfill
Ottumwa, Iowa

Prepared for:

Alliant Energy

SCS ENGINEERS

25219073.00 | January 31, 2020

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 was prepared to support compliance with the groundwater monitoring requirements of the Coal Combustion Residuals (CCR) Rule [40 CFR 257.50-107]. Specifically, this report was prepared to fulfill the requirements of 40 CFR 257.90(e). The applicable sections of the Rule are provided below in *italics*, followed by applicable information relative to the 2019 Annual Groundwater Monitoring and Corrective Action Report for the CCR Units.

This report covers the period of groundwater monitoring from January 1, 2019, through December 31, 2019.

The groundwater monitoring system at the Ottumwa Midland Landfill (OML) is a multiunit system that monitors two existing CCR landfills, the Existing Landfill, and the Phase 1 Expansion, as required by 40 CFR 257.91(d). The groundwater monitoring system consists of two upgradient and three downgradient monitoring wells.

2.0 § 257.90(e) ANNUAL REPORT REQUIREMENTS

Annual groundwater monitoring and corrective action report. *For existing CCR landfills and existing CCR surface impoundments, no later than January 31, 2018, and annually thereafter, the owner or operator must prepare an annual groundwater monitoring and corrective action report. For new CCR landfills, new CCR surface impoundments, and all lateral expansions of CCR units, the owner or operator must prepare the initial annual groundwater monitoring and corrective action report no later than January 31 of the year following the calendar year a groundwater monitoring system has been established for such CCR unit as required by this subpart, and annually thereafter. For the preceding calendar year, the annual report must document the status of the groundwater monitoring and corrective action program for the CCR unit, summarize key actions completed, describe any problems encountered, discuss actions to resolve the problems, and project key activities for the upcoming year. For purposes of this section, the owner or operator has prepared the annual report when the report is placed in the facility's operating record as required by § 257.105(h)(1). At a minimum, the annual groundwater monitoring and corrective action report must contain the following information, to the extent available:*

2.1 §257.90(e)(1) SITE MAP

A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit;

A map showing the location of the site is provided as **Figure 1**. The OML CCR units and all background (or upgradient) and downgradient monitoring wells with identification numbers for the groundwater monitoring program is provided as **Figure 2**.

2.2 §257.90(e)(2) MONITORING SYSTEM CHANGES

Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken;

No new monitoring wells were installed, and no wells were decommissioned as part of the groundwater monitoring program for OML in 2019.

2.3 §257.90(e)(3) SUMMARY OF SAMPLING EVENTS

In addition to all the monitoring data obtained under §§ 257.90 through 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs;

Two groundwater sampling events were completed in 2019 for OML as part of ongoing detection monitoring.

Groundwater samples collected during the semiannual events, in April and October 2019, were analyzed for the Appendix III constituents. For the April event, a resampling was completed for selected parameters at MW-303 in June 2019. A summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring program is included in Table 1. The results of the analytical laboratory analyses are provided in the laboratory reports in Appendices A1 through A3.

2.4 § 257.90(e)(4) MONITORING TRANSITION NARRATIVE

A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels);

There were no transitions between monitoring programs during 2019. OML remained in the detection monitoring program.

In 2019, the monitoring results for the October 2018 and April 2019 monitoring events were evaluated for statistically significant increases (SSIs) in detection monitoring parameters relative to background. For the April 2019 event, an SSI for chloride was identified; however, an alternative source demonstration (ASD) was completed, demonstrating that sources other than the CCR units were the likely cause of the observed concentrations. The ASD report is provided in Appendix B.

2.5 § 257.90(e)(5) OTHER REQUIREMENTS

Other information required to be included in the annual report as specified in §§ 257.90 through 257.98.

Additional potentially applicable requirements for the annual report, and the location of the requirement within the Rule, are provided in the following sections. For each cited section of the Rule, the portion referencing the annual report requirement is provided below in italics, followed by applicable information relative to the 2019 Annual Groundwater Monitoring and Corrective Action Report for OML.

2.5.1 § 257.90(e) General Requirements

For the preceding calendar year, the annual report must document the status of the groundwater monitoring and corrective action program for the CCR unit, summarize key actions completed, describe any problems encountered, discuss actions to resolve the problems, and project key activities for the upcoming year.

Status of Groundwater Monitoring and Corrective Action Program. The groundwater monitoring and corrective action program is currently in detection monitoring.

Summary of Key Actions Completed.

- Statistical evaluation and determination of SSIs for the October 2018 and April 2019 monitoring events.
- ASD report for the SSI identified from the April 2019 monitoring event.
- Two semiannual detection monitoring events (April and October 2019).
- One groundwater sampling event for MW-303 (June 2019).

Description of Any Problems Encountered. No problems were encountered in 2019.

Discussion of Actions to Resolve the Problems. Not applicable.

Projection of Key Activities for the Upcoming Year (2020):

- Statistical evaluation and determination of any SSIs for the October 2019 and the April 2020 monitoring events.
- If an SSI is determined, then within 90 days either:
  - Complete ASD (if applicable), or
  - Establish an assessment monitoring program.
- Two semiannual groundwater sampling and analysis events (April and October 2020).

2.5.2 § 257.94(d) Alternative Detection Monitoring Frequency

The owner or operator must include the demonstration providing the basis for the alternative monitoring frequency and the certification by a qualified professional engineer in the annual groundwater monitoring and corrective action report required by § 257.90(e).

Not applicable. No alternative detection monitoring frequency has been proposed.

2.5.3 § 257.94(e)(2) Alternative Source Demonstration for Detection Monitoring

The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer.

The ASD report prepared to address the chloride SSI observed for the April 2019 sampling event is provided in Appendix B. The ASD report is certified by a qualified professional engineer.

2.5.4 § 257.95(c) Alternative Assessment Monitoring Frequency

The owner or operator must include the demonstration providing the basis for the alternative monitoring frequency and the certification by a qualified professional engineer in the annual groundwater monitoring and corrective action report required by § 257.90(e).

Not applicable. Assessment monitoring has not been initiated.

2.5.5 § 257.95(d)(3) Assessment Monitoring Results and Standards

Include the recorded concentrations required by paragraph (d)(1) of this section, identify the background concentrations established under § 257.94(b), and identify the groundwater protection standards established under paragraph (d)(2) of this section in the annual groundwater monitoring and corrective action report required by § 257.90(e).

Not applicable. Assessment monitoring has not been initiated.

2.5.6 § 257.95(g)(3)(ii) Alternative Source Demonstration for Assessment Monitoring

The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer.

Not applicable. Assessment monitoring has not been initiated.

2.5.7 § 257.96(a) Extension of Time for Corrective Measures Assessment

The assessment of corrective measures must be completed within 90 days, unless the owner or operator demonstrates the need for additional time to complete the assessment of corrective measure due to site-specific conditions or circumstances. The owner or operator must obtain a certification from a qualified professional engineer attesting that the demonstration is accurate. The 90-day deadline to complete the assessment of corrective measures may be extended for longer than 60 days. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer.

Not applicable. Corrective measures assessment has not been initiated.

Table 1

CCR Rule Groundwater Samples Summary

Table 1. CCR Rule Groundwater Samples Summary
Ottumwa Midland Landfill / SCS Engineers Project #25216073

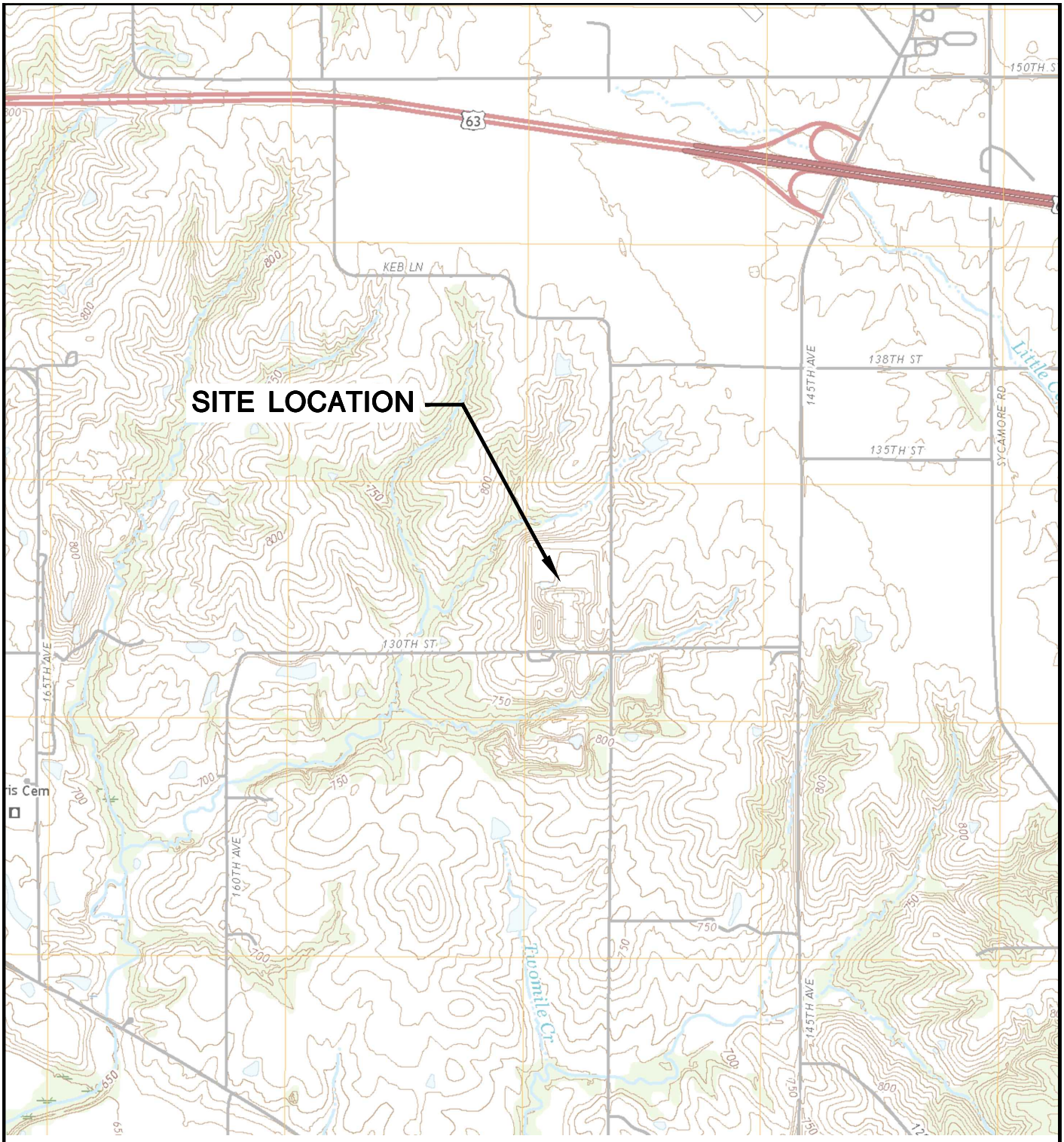
Sample Dates	Downgradient Wells			Background Wells	
	MW-301	MW-302	MW-303	MW-102M	MW-122M
4/16-18/2019	D	D	D	D	D
6/6/2019	--	--	D-R	--	--
10/15/2019	D	D	D	D	D
Total Samples	2	2	3	2	2

Abbreviations:
D = Required by Detection Monitoring Program
D-R = Detection Monitoring Retest Sample

Created by: NDK Date: 1/4/2019
Last revision by: LWJ Date: 12/23/2019
Checked by: NDK Date: 12/23/2019

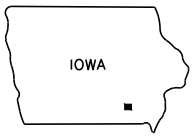
I:\25219073.00\Deliverables\2019 Annual OML GW Mon. and CA Report\Table\[191121_GW_Samples_Summary_Table_OML-1.xlsx]GW Summary

Figures



N

OTTUMWA NORTH QUADRANGLE
IOWA–WAPELLO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
2018
SCALE: 1" = 2,000'



CLIENT	INTERSTATE POWER AND LIGHT CO. 15300 130TH STREET OTTUMWA, IA 52501	SITE	ALLIANT ENERGY OTTUMWA MIDLAND LANDFILL OTTUMWA, IOWA

SITE LOCATION MAP

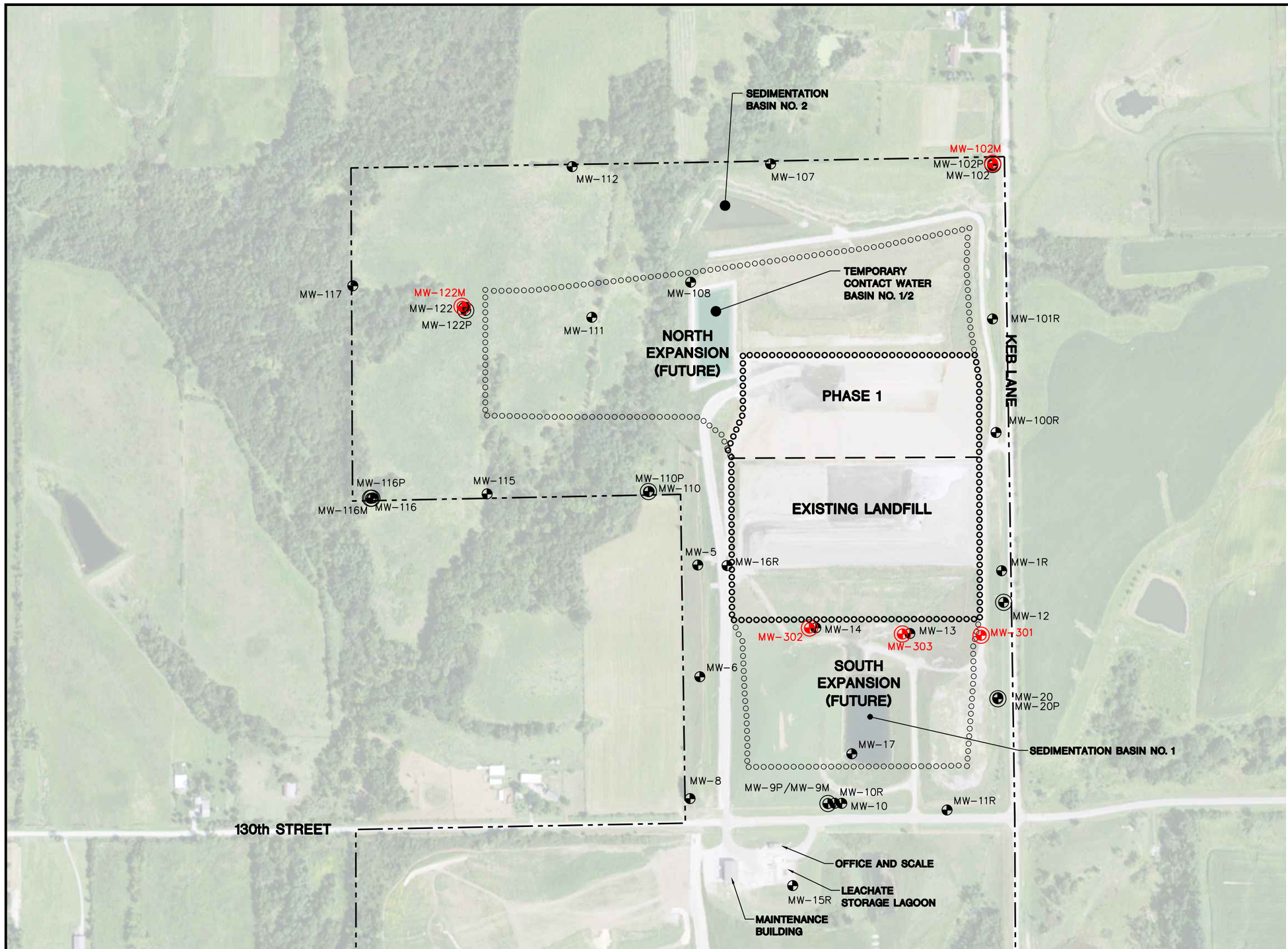
PROJECT NO.	252519073.00	DRAWN BY:	BSS
DRAWN:	11/18/2019	CHECKED BY:	MDB
REVISED:	01/13/2020	APPROVED BY:	TK 01/30/2020

ENGINEER

SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

FIGURE
1

I:\25219073.00\Drawings\CCR 2019 Annual Report\Site Location Map.dwg, 1/30/2020 3:56:54 PM



LEGEND

- APPROXIMATE PROPERTY LINE
- EXISTING WASTE LIMITS
- PERMITTED WASTE LIMITS
- CCR RULE PIEZOMETER
- MONITORING WELL
- ADDITIONAL PIEZOMETER

NOTES:

1. 2015 AERIAL PHOTOGRAPH IS FROM THE IOWA GEOGRAPHIC MAP SERVER–IOWA STATE UNIVERSITY GEOGRAPHIC INFORMATION SYSTEMS SUPPORT & RESEARCH FACILITY.
2. PROPERTY LINE SOUTH OF 130TH STREET FROM SURVEY MAP PREPARED BY GARDEN & ASSOCIATES, OSKALOOSA, IOWA, DATED DECEMBER 20, 1988.
3. PROPERTY LINE NORTH OF 130TH STREET FROM PLAT OF SURVEY MAP PREPARED BY SCS ENGINEERS, MADISON, WISCONSIN, DATED FEBRUARY 20, 2013.
4. EXISTING LIMITS OF WASTE ARE APPROXIMATE.
5. MONITORING WELLS MW–301 AND MW–302 WERE INSTALLED BY CASCADE DRILLING BETWEEN NOVEMBER 16, 2015, AND DECEMBER 3, 2015.
6. MONITORING WELL MW–303 WAS INSTALLED BY TEAM SERVICES BETWEEN APRIL 11, 2016 AND APRIL 26, 2016.

N

400 0 400

SCALE: 1" = 400'

PROJECT NO.	25219073.00	DRAWN BY:	BSS
DRAWN:	11/18/2019	CHECKED BY:	MDB
REVISED:	01/30/2020	APPROVED BY:	TK 01/30/2020

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

CLIENT: INTERSTATE POWER AND LIGHT CO.
15300 130TH STREET
OTTUMWA, IA 52501

SITE: ALLIANT ENERGY
OTTUMWA MIDLAND LANDFILL
OTTUMWA, IOWA

SITE PLAN AND MONITORING WELL LOCATIONS

FIGURE 2

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Appendix A

Laboratory Reports

A1 April 2019 Detection Monitoring

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Cedar Falls
704 Enterprise Drive
Cedar Falls, IA 50613
Tel: (319)277-2401

Laboratory Job ID: 310-153536-1
Laboratory Sample Delivery Group: 25219073
Client Project/Site: Ottumwa Midland Landfill 25219073
Revision: 1

For:
SCS Engineers
2830 Dairy Drive
Madison, Wisconsin 53718

Attn: Meghan Blodgett

Sandie Fredrick

Authorized for release by:
5/23/2019 2:23:39 PM

Sandie Fredrick, Project Manager II
(920)261-1660
sandie.fredrick@testamericainc.com

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Case Narrative

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25219073

Job ID: 310-153536-1
SDG: 25219073

Job ID: 310-153536-1

Laboratory: Eurofins TestAmerica, Cedar Falls

Narrative

Job Narrative
310-153536-1

Comments
REVISION: Client updated metals units to ug/L for all but Calcium

Receipt
The samples were received on 4/17/2019 5:35 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.8º C.

HPLC/IC
Method(s) 9056A: The following sample was diluted due to the nature of the sample matrix: MW 303 (310-153536-2). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Metals
Method(s) 3010A/7470A: The reference method requires samples to be preserved to a pH of <2. The following samples were received with insufficient preservation at a pH of >2: MW 122M (310-153536-3) and MW 301 (310-153536-5). The sample(s) was preserved to the appropriate pH in the laboratory.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Sample Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25219073

Job ID: 310-153536-1
SDG: 25219073

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
310-153536-1	MW 302	Ground Water	04/16/19 09:13	04/17/19 17:35	
310-153536-2	MW 303	Ground Water	04/16/19 08:27	04/17/19 17:35	
310-153536-3	MW 122M	Ground Water	04/17/19 07:10	04/17/19 17:35	
310-153536-4	Field Blank	Ground Water	04/17/19 07:35	04/17/19 17:35	
310-153536-5	MW 301	Ground Water	04/16/19 09:40	04/17/19 17:35	

Detection Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25219073

Job ID: 310-153536-1
SDG: 25219073

Client Sample ID: MW 302 — Lab Sample ID: 310-153536-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	10		5.0	1.5	mg/L	5		9056A	Total/NA
Fluoride	1.5		0.50	0.23	mg/L	5		9056A	Total/NA
Sulfate	83		5.0	1.8	mg/L	5		9056A	Total/NA
Boron	760		200	110	ug/L	1		6020A	Total/NA
Calcium	44		0.50	0.10	mg/L	1		6020A	Total/NA
Total Dissolved Solids	690		30	24	mg/L	1		SM 2540C	Total/NA
pH	7.4	HF	0.1	0.1	SU	1		SM 4500 H+ B	Total/NA
Field Conductivity	1168				umhos/cm	1		Field Sampling	Total/NA
Field Dissolved Oxygen	1.59				mg/L	1		Field Sampling	Total/NA
Field pH	7.49				SU	1		Field Sampling	Total/NA
Field Temperature	13.63				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	44.2				NTU	1		Field Sampling	Total/NA
Groundwater Elevation (ft MSL)	685.35				ft	1		Field Sampling	Total/NA
Oxidation Reduction Potential	8.13				millivolts	1		Field Sampling	Total/NA

Client Sample ID: MW 303 — Lab Sample ID: 310-153536-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	8.1		5.0	1.5	mg/L	5		9056A	Total/NA
Sulfate	600		50	18	mg/L	50		9056A	Total/NA
Boron	850		200	110	ug/L	1		6020A	Total/NA
Calcium	150		0.50	0.10	mg/L	1		6020A	Total/NA
Total Dissolved Solids	1300		60	48	mg/L	1		SM 2540C	Total/NA
pH	6.8	HF	0.1	0.1	SU	1		SM 4500 H+ B	Total/NA
Field Conductivity	2209				umhos/cm	1		Field Sampling	Total/NA
Field Dissolved Oxygen	1.41				mg/L	1		Field Sampling	Total/NA
Field pH	6.97				SU	1		Field Sampling	Total/NA
Field Temperature	14.07				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	99.2				NTU	1		Field Sampling	Total/NA
Groundwater Elevation (ft MSL)	686.13				ft	1		Field Sampling	Total/NA
Oxidation Reduction Potential	-20.0				millivolts	1		Field Sampling	Total/NA

Client Sample ID: MW 122M — Lab Sample ID: 310-153536-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	8.8		5.0	1.5	mg/L	5		9056A	Total/NA
Fluoride	0.70		0.50	0.23	mg/L	5		9056A	Total/NA
Sulfate	8300		500	180	mg/L	500		9056A	Total/NA
Boron	5500		400	220	ug/L	2		6020A	Total/NA
Calcium	400		0.50	0.10	mg/L	1		6020A	Total/NA
Total Dissolved Solids	13000		300	240	mg/L	1		SM 2540C	Total/NA
pH	6.6	HF	0.1	0.1	SU	1		SM 4500 H+ B	Total/NA
Field pH	7.34				SU	1		Field Sampling	Total/NA
Groundwater Elevation (ft MSL)	723.43				ft	1		Field Sampling	Total/NA

Client Sample ID: Field Blank — Lab Sample ID: 310-153536-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Sulfate	2.5		1.0	0.35	mg/L	1		9056A	Total/NA
Total Dissolved Solids	42		30	24	mg/L	1		SM 2540C	Total/NA
pH	6.4	HF	0.1	0.1	SU	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25219073

Job ID: 310-153536-1
SDG: 25219073

Client Sample ID: MW 301

Lab Sample ID: 310-153536-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	45		5.0	1.5	mg/L	5		9056A	Total/NA
Fluoride	0.85		0.50	0.23	mg/L	5		9056A	Total/NA
Sulfate	360		20	7.0	mg/L	20		9056A	Total/NA
Boron	660		200	110	ug/L	1		6020A	Total/NA
Calcium	110		0.50	0.10	mg/L	1		6020A	Total/NA
Total Dissolved Solids	970		60	48	mg/L	1		SM 2540C	Total/NA
pH	6.8	HF	0.1	0.1	SU	1		SM 4500 H+ B	Total/NA
Field Conductivity	1603				umhos/cm	1		Field Sampling	Total/NA
Field Dissolved Oxygen	1.27				mg/L	1		Field Sampling	Total/NA
Field pH	7.10				SU	1		Field Sampling	Total/NA
Field Temperature	13.87				Degrees C	1		Field Sampling	Total/NA
Field Turbidity	8.88				NTU	1		Field Sampling	Total/NA
Groundwater Elevation (ft MSL)	686.38				ft	1		Field Sampling	Total/NA
Oxidation Reduction Potential	-50.2				millivolts	1		Field Sampling	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25219073

Job ID: 310-153536-1
SDG: 25219073

Client Sample ID: MW 302

Date Collected: 04/16/19 09:13
Date Received: 04/17/19 17:35

Lab Sample ID: 310-153536-1

Matrix: Ground Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	10		5.0	1.5	mg/L			04/19/19 18:48	5
Fluoride	1.5		0.50	0.23	mg/L			04/19/19 18:48	5
Sulfate	83		5.0	1.8	mg/L			04/19/19 18:48	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	760		200	110	ug/L		04/19/19 08:00	04/29/19 19:37	1
Calcium	44		0.50	0.10	mg/L		04/19/19 08:00	04/29/19 19:37	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	690		30	24	mg/L			04/18/19 11:02	1
pH	7.4	HF	0.1	0.1	SU			04/17/19 23:38	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Field Conductivity	1168				umhos/cm			04/16/19 09:13	1
Field Dissolved Oxygen	1.59				mg/L			04/16/19 09:13	1
Field pH	7.49				SU			04/16/19 09:13	1
Field Temperature	13.63				Degrees C			04/16/19 09:13	1
Field Turbidity	44.2				NTU			04/16/19 09:13	1
Groundwater Elevation (ft MSL)	685.35				ft			04/16/19 09:13	1
Oxidation Reduction Potential	8.13				millivolts			04/16/19 09:13	1

Client Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25219073

Job ID: 310-153536-1
SDG: 25219073

Client Sample ID: MW 303

Date Collected: 04/16/19 08:27
Date Received: 04/17/19 17:35

Lab Sample ID: 310-153536-2

Matrix: Ground Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	8.1		5.0	1.5	mg/L			04/19/19 19:13	5
Fluoride	<0.23		0.50	0.23	mg/L			04/19/19 19:13	5
Sulfate	600		50	18	mg/L			04/19/19 19:26	50

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	850		200	110	ug/L		04/19/19 08:00	04/29/19 19:40	1
Calcium	150		0.50	0.10	mg/L		04/19/19 08:00	04/29/19 19:40	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	1300		60	48	mg/L			04/18/19 11:02	1
pH	6.8	HF	0.1	0.1	SU			04/17/19 23:39	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Field Conductivity	2209				umhos/cm			04/16/19 08:27	1
Field Dissolved Oxygen	1.41				mg/L			04/16/19 08:27	1
Field pH	6.97				SU			04/16/19 08:27	1
Field Temperature	14.07				Degrees C			04/16/19 08:27	1
Field Turbidity	99.2				NTU			04/16/19 08:27	1
Groundwater Elevation (ft MSL)	686.13				ft			04/16/19 08:27	1
Oxidation Reduction Potential	-20.0				millivolts			04/16/19 08:27	1

Client Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25219073

Job ID: 310-153536-1
SDG: 25219073

Client Sample ID: MW 122M

Date Collected: 04/17/19 07:10
Date Received: 04/17/19 17:35

Lab Sample ID: 310-153536-3

Matrix: Ground Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	8.8		5.0	1.5	mg/L			04/19/19 20:04	5
Fluoride	0.70		0.50	0.23	mg/L			04/19/19 20:04	5
Sulfate	8300		500	180	mg/L			04/22/19 11:15	500

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	5500		400	220	ug/L		04/19/19 08:00	05/01/19 11:26	2
Calcium	400		0.50	0.10	mg/L		04/19/19 08:00	04/29/19 19:43	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	13000		300	240	mg/L			04/18/19 11:02	1
pH	6.6	HF	0.1	0.1	SU			04/17/19 23:40	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Field pH	7.34				SU			04/17/19 07:10	1
Groundwater Elevation (ft MSL)	723.43				ft			04/17/19 07:10	1

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25219073

Job ID: 310-153536-1
SDG: 25219073

Client Sample ID: Field Blank

Date Collected: 04/17/19 07:35
Date Received: 04/17/19 17:35

Lab Sample ID: 310-153536-4

Matrix: Ground Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.29		1.0	0.29	mg/L			04/19/19 20:16	1
Fluoride	<0.045		0.10	0.045	mg/L			04/19/19 20:16	1
Sulfate	**2.5**		1.0	0.35	mg/L			04/19/19 20:16	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	<110		200	110	ug/L		04/19/19 08:00	04/29/19 19:47	1
Calcium	<0.10		0.50	0.10	mg/L		04/19/19 08:00	04/29/19 19:47	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**42**		30	24	mg/L			04/18/19 11:02	1
pH	**6.4**	**HF**	0.1	0.1	SU			04/17/19 23:43	1

Client Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25219073

Job ID: 310-153536-1
SDG: 25219073

Client Sample ID: MW 301

Date Collected: 04/16/19 09:40
Date Received: 04/17/19 17:35

Lab Sample ID: 310-153536-5

Matrix: Ground Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	45		5.0	1.5	mg/L			04/19/19 20:29	5
Fluoride	0.85		0.50	0.23	mg/L			04/19/19 20:29	5
Sulfate	360		20	7.0	mg/L			04/22/19 11:02	20

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	660		200	110	ug/L		04/19/19 08:00	04/29/19 19:50	1
Calcium	110		0.50	0.10	mg/L		04/19/19 08:00	04/29/19 19:50	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	970		60	48	mg/L			04/18/19 11:02	1
pH	6.8	HF	0.1	0.1	SU			04/17/19 23:45	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Field Conductivity	1603				umhos/cm			04/16/19 09:40	1
Field Dissolved Oxygen	1.27				mg/L			04/16/19 09:40	1
Field pH	7.10				SU			04/16/19 09:40	1
Field Temperature	13.87				Degrees C			04/16/19 09:40	1
Field Turbidity	8.88				NTU			04/16/19 09:40	1
Groundwater Elevation (ft MSL)	686.38				ft			04/16/19 09:40	1
Oxidation Reduction Potential	-50.2				millivolts			04/16/19 09:40	1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-236894/3
Matrix: Water
Analysis Batch: 236894

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.29		1.0	0.29	mg/L			04/19/19 09:08	1
Fluoride	<0.045		0.10	0.045	mg/L			04/19/19 09:08	1
Sulfate	<0.35		1.0	0.35	mg/L			04/19/19 09:08	1

Lab Sample ID: LCS 310-236894/4
Matrix: Water
Analysis Batch: 236894

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	10.0	9.97		mg/L		100	90 - 110
Fluoride	2.00	2.00		mg/L		100	90 - 110
Sulfate	10.0	10.3		mg/L		103	90 - 110

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 310-236320/1-A
Matrix: Water
Analysis Batch: 236992

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 236320

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	<0.10		0.50	0.10	mg/L		04/19/19 08:00	04/23/19 21:11	1

Lab Sample ID: MB 310-236320/1-A
Matrix: Water
Analysis Batch: 237665

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 236320

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	<110		200	110	ug/L		04/19/19 08:00	04/29/19 19:06	1
Calcium	<0.10		0.50	0.10	mg/L		04/19/19 08:00	04/29/19 19:06	1

Lab Sample ID: LCS 310-236320/2-A
Matrix: Water
Analysis Batch: 236992

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 236320

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Calcium	2.00	1.99		mg/L		100	80 - 120

Lab Sample ID: LCS 310-236320/2-A
Matrix: Water
Analysis Batch: 237665

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 236320

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	880	806		ug/L		92	80 - 120
Calcium	2.00	2.00		mg/L		100	80 - 120

QC Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25219073

Job ID: 310-153536-1
SDG: 25219073

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 310-236297/1
Matrix: Water
Analysis Batch: 236297

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<30.0		30.0		mg/L			04/18/19 11:02	1

Lab Sample ID: LCS 310-236297/2
Matrix: Water
Analysis Batch: 236297

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	1036		mg/L		104	90 - 110

Method: SM 4500 H+ B - pH

Lab Sample ID: LCS 310-236188/1
Matrix: Water
Analysis Batch: 236188

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
pH	7.00	7.0		SU		100	98 - 102

HPLC/IC

Analysis Batch: 236894

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-153536-1	MW 302	Total/NA	Ground Water	9056A	
310-153536-2	MW 303	Total/NA	Ground Water	9056A	
310-153536-2	MW 303	Total/NA	Ground Water	9056A	
310-153536-3	MW 122M	Total/NA	Ground Water	9056A	
310-153536-3	MW 122M	Total/NA	Ground Water	9056A	
310-153536-4	Field Blank	Total/NA	Ground Water	9056A	
310-153536-5	MW 301	Total/NA	Ground Water	9056A	
310-153536-5	MW 301	Total/NA	Ground Water	9056A	
MB 310-236894/3	Method Blank	Total/NA	Water	9056A	
LCS 310-236894/4	Lab Control Sample	Total/NA	Water	9056A	

Metals

Prep Batch: 236320

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-153536-1	MW 302	Total/NA	Ground Water	3010A	
310-153536-2	MW 303	Total/NA	Ground Water	3010A	
310-153536-3	MW 122M	Total/NA	Ground Water	3010A	
310-153536-4	Field Blank	Total/NA	Ground Water	3010A	
310-153536-5	MW 301	Total/NA	Ground Water	3010A	
MB 310-236320/1-A	Method Blank	Total/NA	Water	3010A	
LCS 310-236320/2-A	Lab Control Sample	Total/NA	Water	3010A	

Analysis Batch: 236992

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 310-236320/1-A	Method Blank	Total/NA	Water	6020A	236320
LCS 310-236320/2-A	Lab Control Sample	Total/NA	Water	6020A	236320

Analysis Batch: 237665

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-153536-1	MW 302	Total/NA	Ground Water	6020A	236320
310-153536-2	MW 303	Total/NA	Ground Water	6020A	236320
310-153536-3	MW 122M	Total/NA	Ground Water	6020A	236320
310-153536-4	Field Blank	Total/NA	Ground Water	6020A	236320
310-153536-5	MW 301	Total/NA	Ground Water	6020A	236320
MB 310-236320/1-A	Method Blank	Total/NA	Water	6020A	236320
LCS 310-236320/2-A	Lab Control Sample	Total/NA	Water	6020A	236320

Analysis Batch: 237882

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-153536-3	MW 122M	Total/NA	Ground Water	6020A	236320

General Chemistry

Analysis Batch: 236188

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-153536-1	MW 302	Total/NA	Ground Water	SM 4500 H+ B	
310-153536-2	MW 303	Total/NA	Ground Water	SM 4500 H+ B	
310-153536-3	MW 122M	Total/NA	Ground Water	SM 4500 H+ B	
310-153536-4	Field Blank	Total/NA	Ground Water	SM 4500 H+ B	
310-153536-5	MW 301	Total/NA	Ground Water	SM 4500 H+ B	
LCS 310-236188/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	

QC Association Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25219073

Job ID: 310-153536-1
SDG: 25219073

General Chemistry

Analysis Batch: 236297

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-153536-1	MW 302	Total/NA	Ground Water	SM 2540C	
310-153536-2	MW 303	Total/NA	Ground Water	SM 2540C	
310-153536-3	MW 122M	Total/NA	Ground Water	SM 2540C	
310-153536-4	Field Blank	Total/NA	Ground Water	SM 2540C	
310-153536-5	MW 301	Total/NA	Ground Water	SM 2540C	
MB 310-236297/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-236297/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Field Service / Mobile Lab

Analysis Batch: 238763

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-153536-1	MW 302	Total/NA	Ground Water	Field Sampling	
310-153536-2	MW 303	Total/NA	Ground Water	Field Sampling	
310-153536-3	MW 122M	Total/NA	Ground Water	Field Sampling	
310-153536-5	MW 301	Total/NA	Ground Water	Field Sampling	

Lab Chronicle

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25219073

Job ID: 310-153536-1
SDG: 25219073

Client Sample ID: MW 302

Lab Sample ID: 310-153536-1
Date Collected: 04/16/19 09:13
Matrix: Ground Water
Date Received: 04/17/19 17:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	236894	04/19/19 18:48	MLU	TAL CF
Total/NA	Prep	3010A			236320	04/19/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	237665	04/29/19 19:37	SAD	TAL CF
Total/NA	Analysis	SM 2540C		1	236297	04/18/19 11:02	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	236188	04/17/19 23:38	JMH	TAL CF
Total/NA	Analysis	Field Sampling		1	238763	04/16/19 09:13	EAR	TAL CF

Client Sample ID: MW 303

Lab Sample ID: 310-153536-2
Date Collected: 04/16/19 08:27
Matrix: Ground Water
Date Received: 04/17/19 17:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	236894	04/19/19 19:13	MLU	TAL CF
Total/NA	Analysis	9056A		50	236894	04/19/19 19:26	MLU	TAL CF
Total/NA	Prep	3010A			236320	04/19/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	237665	04/29/19 19:40	SAD	TAL CF
Total/NA	Analysis	SM 2540C		1	236297	04/18/19 11:02	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	236188	04/17/19 23:39	JMH	TAL CF
Total/NA	Analysis	Field Sampling		1	238763	04/16/19 08:27	EAR	TAL CF

Client Sample ID: MW 122M

Lab Sample ID: 310-153536-3
Date Collected: 04/17/19 07:10
Matrix: Ground Water
Date Received: 04/17/19 17:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	236894	04/19/19 20:04	MLU	TAL CF
Total/NA	Analysis	9056A		500	236894	04/22/19 11:15	MLU	TAL CF
Total/NA	Prep	3010A			236320	04/19/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	237665	04/29/19 19:43	SAD	TAL CF
Total/NA	Prep	3010A			236320	04/19/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		2	237882	05/01/19 11:26	SAD	TAL CF
Total/NA	Analysis	SM 2540C		1	236297	04/18/19 11:02	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	236188	04/17/19 23:40	JMH	TAL CF
Total/NA	Analysis	Field Sampling		1	238763	04/17/19 07:10	EAR	TAL CF

Client Sample ID: Field Blank

Lab Sample ID: 310-153536-4
Date Collected: 04/17/19 07:35
Matrix: Ground Water
Date Received: 04/17/19 17:35

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		1	236894	04/19/19 20:16	MLU	TAL CF
Total/NA	Prep	3010A			236320	04/19/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	237665	04/29/19 19:47	SAD	TAL CF
Total/NA	Analysis	SM 2540C		1	236297	04/18/19 11:02	SAS	TAL CF

Lab Chronicle

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25219073

Job ID: 310-153536-1
SDG: 25219073

Client Sample ID: Field Blank

Date Collected: 04/17/19 07:35
Date Received: 04/17/19 17:35

Lab Sample ID: 310-153536-4

Matrix: Ground Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 4500 H+ B		1	236188	04/17/19 23:43	JMH	TAL CF

Client Sample ID: MW 301

Date Collected: 04/16/19 09:40
Date Received: 04/17/19 17:35

Lab Sample ID: 310-153536-5

Matrix: Ground Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	236894	04/19/19 20:29	MLU	TAL CF
Total/NA	Analysis	9056A		20	236894	04/22/19 11:02	MLU	TAL CF
Total/NA	Prep	3010A			236320	04/19/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	237665	04/29/19 19:50	SAD	TAL CF
Total/NA	Analysis	SM 2540C		1	236297	04/18/19 11:02	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	236188	04/17/19 23:45	JMH	TAL CF
Total/NA	Analysis	Field Sampling		1	238763	04/16/19 09:40	EAR	TAL CF

Laboratory References:

TAL CF = Eurofins TestAmerica, Cedar Falls, 704 Enterprise Drive, Cedar Falls, IA 50613, TEL (319)277-2401

Accreditation/Certification Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25219073

Job ID: 310-153536-1
SDG: 25219073

Laboratory: Eurofins TestAmerica, Cedar Falls

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Iowa	State Program	7	007	12-01-19

Method Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill 25219073

Job ID: 310-153536-1
SDG: 25219073

Method	Method Description	Protocol	Laboratory
9056A	Anions, Ion Chromatography	SW846	TAL CF
6020A	Metals (ICP/MS)	SW846	TAL CF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL CF
SM 4500 H+ B	pH	SM	TAL CF
Field Sampling	Field Sampling	EPA	TAL CF
3010A	Preparation, Total Metals	SW846	TAL CF

Protocol References:

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CF = Eurofins TestAmerica, Cedar Falls, 704 Enterprise Drive, Cedar Falls, IA 50613, TEL (319)277-2401

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

310-153536 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information					
Client: SCS Engineers					
City/State: CITY Clive		STATE IA	Project:		
Receipt Information					
Date/Time Received: DATE 4-17-19		TIME 1735	Received By: LAB		
Delivery Type: ☐ UPS	☐ FedEx	☐ FedEx Ground	☐ US Mail	☐ Spee-Dee	
☒ Lab Courier	☐ TA Field Services	☐ Client Drop-off	☐ Other:_____		
Condition of Cooler/Containers					
Sample(s) received in Cooler?	☒ Yes	☐ No	*If yes:* Cooler ID:		
Multiple Coolers?	☐ Yes	☒ No	*If yes:* Cooler # ____ of ____		
Cooler Custody Seals Present?	☒ Yes	☐ No	*If yes:* Cooler custody seals intact?	☒ Yes	☐ No
Sample Custody Seals Present?	☐ Yes	☒ No	*If yes:* Sample custody seals intact?	☐ Yes	☐ No
Trip Blank Present?	☐ Yes	☒ No	*If yes:* Which VOA samples are in cooler? ↓		
Temperature Record					
Coolant:	☒ Wet ice	☐ Blue ice	☐ Dry ice	☐ Other:_____	☐ NONE
Thermometer ID: 1			Correction Factor (°C): -0.1		
• **Temp Blank Temperature** – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature					
Uncorrected Temp (°C): 2.9			Corrected Temp (°C): 2.8		
• **Sample Container Temperature**					
Container type(s) used:	CONTAINER 1		CONTAINER 2		
Uncorrected Temp (°C):	TEMP 1	TEMP 2	Corrected Temp (°C):	TEMP 1	TEMP 2
Exceptions Noted					
1) If temperature exceeds criteria, was sample(s) received same day of sampling?				☐ Yes	☐ No
a) *If yes:* Is there evidence that the chilling process began?				☐ Yes	☐ No
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?)				☐ Yes	☐ No
NOTE: If yes, contact PM before proceeding. If no, proceed with login					
Additional Comments					

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Cedar Falls Division
704 Enterprise Drive
Cedar Falls, IA 50613

Phone 319-277-2401 or 800-750-2401
Fax 319-277-2425

TestAmerica Des Moines SC
214

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?
Compliance Monitoring _____

Client Name: SCS Engineers
Client #: _____
Address: 8450 Hickman Rd Suite 20
City/State/Zip Code: Clive IA 50325
Project Manager: _____
Email Address: _____
Telephone Number: 319.269.7545
Fax: _____
Sampler Name: (Print Name) Nick Schemmel
Sampler Signature: _____

Project Name: Ottumwa Midland Landfill
Project #: ~~75~~ 25219073
Site/Location ID: Ottumwa
State: IA
Report To: _____
Invoice To: _____
Quote #: _____
PO#: _____

TAT
___ Standard
___ Rush (surcharges may apply)
Date Needed: _____
Fax Results: Y N
Email Results: Y N

QC Deliverables
___ None
___ Level 2 (Batch QC)
___ Level 3
___ Level 4
Other: _____

SAMPLE ID	Date Sampled	Time Sampled	G = Grab, C = Composite	Field Filtered	Matrix: SL - Sludge DW - Drinking Water GW - Groundwater S - Soil/Solid WW - Wastewater Specify, Other	Preservation & # of Containers: HNO_3	HCl	NaOH	H_2SO_4	Methanol	None	Other (Specify)	Analyze For: Metals	pH	TDS	Chloride Fluoride/SO_4	REMARKS
~~MW 301~~	~~0940~~																
MW 302	041619	0913	G		GW	1					1						
MW 303	041619	0827				1					1						
MW 122M	041719	0710				1					1						
Field Blank	041719	0735				1					1						
MW 301	041619	0940				1					1						

Special Instructions:

LABORATORY COMMENTS:

Relinquished By: Nick Schemmel	Date: 4/17/19	Time: 1215	Received By: Lindsay Bindert	Date: 4-17-19	Time: 1735
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

TAL-0033 (0708)

Page _____ of _____

Login Container Summary Report

Temperature readings: _____

Client Sample ID	Lab ID	Container Type	Container pH	Preservative Added (mls)	Lot #
MW 302	310-153536-A-1	Plastic 250ml - with Nitric Acid	<2	_____	2203839
MW 303	310-153536-A-2	Plastic 250ml - with Nitric Acid	<2	_____	2203839
MW 122M	310-153536-A-3	Plastic 250ml - with Nitric Acid	>2	5	2203839
Field Blank	310-153536-A-4	Plastic 250ml - with Nitric Acid	<2	_____	2203839
MW 301	310-153536-A-5	Plastic 250ml - with Nitric Acid	>2	2.5	2203839

Table 2. Sampling Points and Parameters - CCR Rule Sampling Program - Detection Monitoring
Groundwater Monitoring - Ottumwa Midland Landfill / SCS Engineers Project #25216073

	Parameter	MW-301	MW-302	MW-303	MW-102M	MW-122M	Field Blank	TOTAL
Appendix III Parameters	Boron	x	x	x	x	x	x	6
	Calcium	x	x	x	x	x	x	6
	Chloride	x	x	x	x	x	x	6
	Fluoride	x	x	x	x	x	x	6
	pH	x	x	x	x	x	x	6
	Sulfate	x	x	x	x	x	x	6
	TDS	x	x	x	x	x	x	6
Appendix IV Parameters	Antimony							0
	Arsenic							0
	Barium							0
	Beryllium							0
	Cadmium							0
	Chromium							0
	Cobalt							0
	Fluoride							0
	Lead							0
	Lithium							0
	Mercury							0
	Molybdenum							0
	Selenium							0
	Thallium							0
	Radium							0
Field Parameters	Groundwater Elevation	x	x	x	x	x		5
	Well Depth	x	x	x	x	x		5
	pH (field)	x	x	x	x	x		5
	Specific Conductance	x	x	x	x	x		5
	Dissolved Oxygen	x	x	x	x	x		5
	ORP	x	x	x	x	x		5
	Temperature	x	x	x	x	x		5
	Turbidity	x	x	x	x	x		5
	Color	x	x	x	x	x		5
	Odor	x	x	x	x	x		5

Notes: All samples are unfiltered (total).

I:\25216073.00\Data and Calculations\Field Notes\Field Work Requests\[Table_2_OML_CCR_Rule_Sampling_Det

Login Sample Receipt Checklist

Client: SCS Engineers

Job Number: 310-153536-1
SDG Number: 25219073

Login Number: 153536
List Number: 1
Creator: Homolar, Dana J

List Source: Eurofins TestAmerica, Cedar Falls

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Groundwater Monitoring Results - Field Parameters
Ottumwa Midland Landfill / SCS Engineers Project #25219073
April 2019

Sample	Sample Date/Time	Groundwater Elevation (ft AMSL)	Temperature (Deg. C)	pH (Std. Units)	Dissolved Oxygen (mg/L)	Specific Conductivity (µmhos/cm)	ORP (mV)	Turbidity (NTU)
MW-301	4-16-2019/0940	686.38	13.87	7.10	1.27	1603	-50.2	8.88
MW-302	4-16-2019/0913	685.35	13.63	7.49	1.59	1168	8.13	44.2
MW-303	4-16-2019/0827	686.13	14.07	6.97	1.41	2,209	-20.0	99.2
MW-102M	4-18-2019/1105	717.97	--	8.55	--	--	--	--
MW-122M	4-17-2019/0713	723.43	--	7.34	--	--	--	--

Abbreviations:
mg/L = milligrams per liter

Created by: JR Date: 4/19/2019
Last revision by: JR Date: 4/19/2019
Checked by: MDB Date: 4/22/2019

I:\25219073.00\Data and Calculations\Tables\Field Data Tables\[April 2019_OML_Field Data.xlsx]GW Low Flow Stability

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Cedar Falls
704 Enterprise Drive
Cedar Falls, IA 50613
Tel: (319)277-2401

Laboratory Job ID: 310-153649-1
Laboratory Sample Delivery Group: 25219073
Client Project/Site: Ottumwa Midland Landfill
Revision: 1

For:
SCS Engineers
2830 Dairy Drive
Madison, Wisconsin 53718

Attn: Meghan Blodgett

Sandie Fredrick

Authorized for release by:
5/23/2019 2:41:26 PM

Sandie Fredrick, Project Manager II
(920)261-1660
sandie.fredrick@testamericainc.com

Table of Contents

Case Narrative

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill

Job ID: 310-153649-1
SDG: 25219073

Job ID: 310-153649-1

Laboratory: Eurofins TestAmerica, Cedar Falls

Narrative

Job Narrative
310-153649-1

Comments
REVISION: Client updated metals units to ug/L for all but Calcium

Receipt
The samples were received on 4/18/2019 5:15 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.9º C.

HPLC/IC
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Metals
Method(s) 3010A: The reference method requires samples to be preserved to a pH of <2. The following sample was received with insufficient preservation at a pH of >2: MW 102M (310-153649-1). The sample(s) was preserved to the appropriate pH in the laboratory.

Method(s) 7470A: The reference method requires samples to be preserved to a pH of <2. The following sample was received with insufficient preservation at a pH of >2: MW 102M (310-153649-1). The sample(s) was preserved to the appropriate pH in the laboratory.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Sample Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill

Job ID: 310-153649-1
SDG: 25219073

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
310-153649-1	MW 102M	Ground Water	04/18/19 11:05	04/18/19 17:15	
310-153649-2	Field Blank	Water	04/18/19 11:10	04/18/19 17:15	

Detection Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill

Job ID: 310-153649-1
SDG: 25219073

Client Sample ID: MW 102M — Lab Sample ID: 310-153649-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	14		5.0	1.5	mg/L	5		9056A	Total/NA
Fluoride	5.7		0.50	0.23	mg/L	5		9056A	Total/NA
Sulfate	340		20	7.0	mg/L	20		9056A	Total/NA
Boron	1400		400	220	ug/L	2		6020A	Total/NA
Calcium	51		0.50	0.10	mg/L	1		6020A	Total/NA
Total Dissolved Solids	1700		150	120	mg/L	1		SM 2540C	Total/NA
pH	8.2	HF	0.1	0.1	SU	1		SM 4500 H+ B	Total/NA
Field pH	8.55				SU	1		Field Sampling	Total/NA
Groundwater Elevation (ft MSL)	717.97				ft	1		Field Sampling	Total/NA

Client Sample ID: Field Blank — Lab Sample ID: 310-153649-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Fluoride	0.15		0.10	0.045	mg/L	1		9056A	Total/NA
pH	4.5	HF	0.1	0.1	SU	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill

Job ID: 310-153649-1
SDG: 25219073

Client Sample ID: MW 102M

Date Collected: 04/18/19 11:05
Date Received: 04/18/19 17:15

Lab Sample ID: 310-153649-1

Matrix: Ground Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	14		5.0	1.5	mg/L			04/25/19 21:29	5
Fluoride	5.7		0.50	0.23	mg/L			04/25/19 21:29	5
Sulfate	340		20	7.0	mg/L			04/26/19 14:31	20

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1400		400	220	ug/L		04/22/19 08:10	04/24/19 16:45	2
Calcium	51		0.50	0.10	mg/L		04/22/19 08:10	04/23/19 23:36	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	1700		150	120	mg/L			04/24/19 16:01	1
pH	8.2	HF	0.1	0.1	SU			04/19/19 02:37	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Field pH	8.55				SU			04/18/19 11:05	1
Groundwater Elevation (ft MSL)	717.97				ft			04/18/19 11:05	1

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill

Job ID: 310-153649-1
SDG: 25219073

Client Sample ID: Field Blank

Date Collected: 04/18/19 11:10
Date Received: 04/18/19 17:15

Lab Sample ID: 310-153649-2

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.29		1.0	0.29	mg/L			04/25/19 21:41	1
Fluoride	**0.15**		0.10	0.045	mg/L			04/25/19 21:41	1
Sulfate	<0.35		1.0	0.35	mg/L			04/25/19 21:41	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	<110		200	110	ug/L		04/22/19 08:10	04/24/19 16:49	1
Calcium	<0.10		0.50	0.10	mg/L		04/22/19 08:10	04/23/19 23:40	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<24		30	24	mg/L			04/25/19 11:22	1
pH	**4.5**	**HF**	0.1	0.1	SU			04/19/19 02:39	1

Definitions/Glossary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill

Job ID: 310-153649-1
SDG: 25219073

Qualifiers

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-237732/3
Matrix: Water
Analysis Batch: 237732

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.29		1.0	0.29	mg/L			04/25/19 11:36	1
Fluoride	<0.045		0.10	0.045	mg/L			04/25/19 11:36	1
Sulfate	<0.35		1.0	0.35	mg/L			04/25/19 11:36	1

Lab Sample ID: LCS 310-237732/4
Matrix: Water
Analysis Batch: 237732

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	10.0	9.96		mg/L		100	90 - 110
Fluoride	2.00	2.02		mg/L		101	90 - 110
Sulfate	10.0	10.4		mg/L		104	90 - 110

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 310-236645/1-A
Matrix: Water
Analysis Batch: 236895

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 236645

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	<110		200	110	ug/L		04/22/19 08:10	04/23/19 13:52	1
Boron	<110		200	110	ug/L		04/22/19 08:10	04/23/19 13:52	1
Boron	<110		200	110	ug/L		04/22/19 08:10	04/23/19 13:52	1
Calcium	<0.10		0.50	0.10	mg/L		04/22/19 08:10	04/23/19 13:52	1
Calcium	<0.10		0.50	0.10	mg/L		04/22/19 08:10	04/23/19 13:52	1
Calcium	<0.10		0.50	0.10	mg/L		04/22/19 08:10	04/23/19 13:52	1

Lab Sample ID: LCS 310-236645/2-A
Matrix: Water
Analysis Batch: 236895

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 236645

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.0400	0.0357		mg/L		89	80 - 120
Arsenic	0.0400	0.0354		mg/L		89	80 - 120
Barium	0.0400	0.0352		mg/L		88	80 - 120
Barium	0.0400	0.0352		mg/L		88	80 - 120
Beryllium	0.0200	0.0180		mg/L		90	80 - 120
Beryllium	0.0200	0.0180		mg/L		90	80 - 120
Boron	880	733		ug/L		83	80 - 120
Boron	880	733		ug/L		83	80 - 120
Cadmium	0.0200	0.0176		mg/L		88	80 - 120
Cadmium	0.0200	0.0176		mg/L		88	80 - 120
Calcium	2.00	1.80		mg/L		90	80 - 120
Calcium	2.00	1.80		mg/L		90	80 - 120
Chromium	0.0400	0.0340		mg/L		85	80 - 120
Chromium	0.0400	0.0340		mg/L		85	80 - 120
Cobalt	0.0200	0.0169		mg/L		84	80 - 120
Cobalt	0.0200	0.0169		mg/L		84	80 - 120
Copper	0.0400	0.0339		mg/L		85	80 - 120

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 310-236645/2-A
Matrix: Water
Analysis Batch: 236910

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 236645

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Copper	0.0400	0.0339		mg/L		85	80 - 120
Iron	2.00	1.74		mg/L		87	80 - 120
Iron	2.00	1.74		mg/L		87	80 - 120
Lead	0.0200	0.0170		mg/L		85	80 - 120
Lead	0.0200	0.0170		mg/L		85	80 - 120
Lithium	0.100	0.0844		mg/L		84	80 - 120
Lithium	0.100	0.0844		mg/L		84	80 - 120
Magnesium	2.00	1.78		mg/L		89	80 - 120
Magnesium	2.00	1.78		mg/L		89	80 - 120
Manganese	0.200	0.173		mg/L		87	80 - 120
Manganese	0.200	0.173		mg/L		87	80 - 120
Molybdenum	0.0400	0.0319		mg/L		80	80 - 120
Molybdenum	0.0400	0.0319		mg/L		80	80 - 120
Nickel	0.0400	0.0352		mg/L		88	80 - 120
Nickel	0.0400	0.0352		mg/L		88	80 - 120
Potassium	2.00	1.76		mg/L		88	80 - 120
Potassium	2.00	1.76		mg/L		88	80 - 120
Selenium	0.0400	0.0349		mg/L		87	80 - 120
Selenium	0.0400	0.0349		mg/L		87	80 - 120
Sodium	2.00	1.80		mg/L		90	80 - 120
Sodium	2.00	1.80		mg/L		90	80 - 120
Strontium	0.0400	0.0334		mg/L		84	80 - 120
Strontium	0.0400	0.0334		mg/L		84	80 - 120
Thallium	0.0160	0.0135		mg/L		85	80 - 120
Thallium	0.0160	0.0135		mg/L		85	80 - 120
Zinc	0.0400	0.0359		mg/L		90	80 - 120
Zinc	0.0400	0.0356		mg/L		89	80 - 120

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 310-237093/1
Matrix: Water
Analysis Batch: 237093

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<30.0		30.0		mg/L			04/24/19 16:01	1

Lab Sample ID: LCS 310-237093/2
Matrix: Water
Analysis Batch: 237093

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	988.0		mg/L		99	90 - 110

Lab Sample ID: MB 310-237205/1
Matrix: Water
Analysis Batch: 237205

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<24		30	24	mg/L			04/25/19 11:22	1

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill

Job ID: 310-153649-1
SDG: 25219073

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: LCS 310-237205/2
Matrix: Water
Analysis Batch: 237205

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Dissolved Solids			1000	1000		mg/L		100	90 - 110		

Lab Sample ID: 310-153649-2 DU
Matrix: Water
Analysis Batch: 237205

Client Sample ID: Field Blank
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Dissolved Solids	<24			<24		mg/L				NC	24

Method: SM 4500 H+ B - pH

Lab Sample ID: LCS 310-236360/1
Matrix: Water
Analysis Batch: 236360

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
pH			7.00	7.0		SU		100	98 - 102		

HPLC/IC

Analysis Batch: 237732

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-153649-1	MW 102M	Total/NA	Ground Water	9056A	
310-153649-1	MW 102M	Total/NA	Ground Water	9056A	
310-153649-2	Field Blank	Total/NA	Water	9056A	
MB 310-237732/3	Method Blank	Total/NA	Water	9056A	
LCS 310-237732/4	Lab Control Sample	Total/NA	Water	9056A	

Metals

Prep Batch: 236645

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-153649-1	MW 102M	Total/NA	Ground Water	3010A	
310-153649-2	Field Blank	Total/NA	Water	3010A	
MB 310-236645/1-A	Method Blank	Total/NA	Water	3010A	
LCS 310-236645/2-A	Lab Control Sample	Total/NA	Water	3010A	

Analysis Batch: 236895

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 310-236645/1-A	Method Blank	Total/NA	Water	6020A	236645
LCS 310-236645/2-A	Lab Control Sample	Total/NA	Water	6020A	236645

Analysis Batch: 236910

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 310-236645/1-A	Method Blank	Total/NA	Water	6020A	236645
LCS 310-236645/2-A	Lab Control Sample	Total/NA	Water	6020A	236645

Analysis Batch: 236913

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 310-236645/1-A	Method Blank	Total/NA	Water	6020A	236645

Analysis Batch: 236992

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-153649-1	MW 102M	Total/NA	Ground Water	6020A	236645
310-153649-2	Field Blank	Total/NA	Water	6020A	236645

Analysis Batch: 237143

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-153649-1	MW 102M	Total/NA	Ground Water	6020A	236645
310-153649-2	Field Blank	Total/NA	Water	6020A	236645

General Chemistry

Analysis Batch: 236360

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-153649-1	MW 102M	Total/NA	Ground Water	SM 4500 H+ B	
310-153649-2	Field Blank	Total/NA	Water	SM 4500 H+ B	
LCS 310-236360/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	

Analysis Batch: 237093

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-153649-1	MW 102M	Total/NA	Ground Water	SM 2540C	
MB 310-237093/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-237093/2	Lab Control Sample	Total/NA	Water	SM 2540C	

QC Association Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill

Job ID: 310-153649-1
SDG: 25219073

General Chemistry

Analysis Batch: 237205

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-153649-2	Field Blank	Total/NA	Water	SM 2540C	
MB 310-237205/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-237205/2	Lab Control Sample	Total/NA	Water	SM 2540C	
310-153649-2 DU	Field Blank	Total/NA	Water	SM 2540C	

Field Service / Mobile Lab

Analysis Batch: 238763

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-153649-1	MW 102M	Total/NA	Ground Water	Field Sampling	

Lab Chronicle

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill

Job ID: 310-153649-1
SDG: 25219073

Client Sample ID: MW 102M

Date Collected: 04/18/19 11:05
Date Received: 04/18/19 17:15

Lab Sample ID: 310-153649-1

Matrix: Ground Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	237732	04/25/19 21:29	MLU	TAL CF
Total/NA	Analysis	9056A		20	237732	04/26/19 14:31	MLU	TAL CF
Total/NA	Prep	3010A			236645	04/22/19 08:10	HED	TAL CF
Total/NA	Analysis	6020A		1	236992	04/23/19 23:36	SAD	TAL CF
Total/NA	Prep	3010A			236645	04/22/19 08:10	HED	TAL CF
Total/NA	Analysis	6020A		2	237143	04/24/19 16:45	SAD	TAL CF
Total/NA	Analysis	SM 2540C		1	237093	04/24/19 16:01	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	236360	04/19/19 02:37	JMH	TAL CF
Total/NA	Analysis	Field Sampling		1	238763	04/18/19 11:05	EAR	TAL CF

Client Sample ID: Field Blank

Date Collected: 04/18/19 11:10
Date Received: 04/18/19 17:15

Lab Sample ID: 310-153649-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		1	237732	04/25/19 21:41	MLU	TAL CF
Total/NA	Prep	3010A			236645	04/22/19 08:10	HED	TAL CF
Total/NA	Analysis	6020A		1	236992	04/23/19 23:40	SAD	TAL CF
Total/NA	Prep	3010A			236645	04/22/19 08:10	HED	TAL CF
Total/NA	Analysis	6020A		1	237143	04/24/19 16:49	SAD	TAL CF
Total/NA	Analysis	SM 2540C		1	237205	04/25/19 11:22	SAS	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	236360	04/19/19 02:39	JMH	TAL CF

Laboratory References:

TAL CF = Eurofins TestAmerica, Cedar Falls, 704 Enterprise Drive, Cedar Falls, IA 50613, TEL (319)277-2401

Accreditation/Certification Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill

Job ID: 310-153649-1
SDG: 25219073

Laboratory: Eurofins TestAmerica, Cedar Falls

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Iowa	State Program	7	007	12-01-19

Method Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill

Job ID: 310-153649-1
SDG: 25219073

Method	Method Description	Protocol	Laboratory
9056A	Anions, Ion Chromatography	SW846	TAL CF
6020A	Metals (ICP/MS)	SW846	TAL CF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL CF
SM 4500 H+ B	pH	SM	TAL CF
Field Sampling	Field Sampling	EPA	TAL CF
3010A	Preparation, Total Metals	SW846	TAL CF

Protocol References:

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CF = Eurofins TestAmerica, Cedar Falls, 704 Enterprise Drive, Cedar Falls, IA 50613, TEL (319)277-2401

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

310-153649 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: SCS Engineers			
City/State: CITY Clive	STATE IA	Project: Ottumwa Midland Landfill	
Receipt Information			
Date/Time Received: DATE 4-18-19	TIME 1715	Received By: KP	
Delivery Type: ☐ UPS ☐ FedEx ☐ FedEx Ground ☐ US Mail ☐ Spee-Dee ☒ Lab Courier ☐ TA Field Services ☐ Client Drop-off ☐ Other:_____			
Condition of Cooler/Containers			
Sample(s) received in Cooler? ☒ Yes ☐ No		*If yes:* Cooler ID: AA-15	
Multiple Coolers? ☐ Yes ☒ No		*If yes:* Cooler # ____ of ____	
Cooler Custody Seals Present? ☒ Yes ☐ No		*If yes:* Cooler custody seals intact? ☒ Yes ☐ No	
Sample Custody Seals Present? ☐ Yes ☒ No		*If yes:* Sample custody seals intact? ☐ Yes ☐ No	
Trip Blank Present? ☐ Yes ☒ No		*If yes:* Which VOA samples are in cooler? ↓	
Temperature Record			
Coolant: ☒ Wet ice ☐ Blue ice ☐ Dry ice ☐ Other:_____ ☐ NONE			
Thermometer ID: N		Correction Factor (°C): +0.0	
• **Temp Blank Temperature** – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C): 0.9		Corrected Temp (°C): 0.9	
• **Sample Container Temperature**			
Container type(s) used:	CONTAINER 1	CONTAINER 2	
Uncorrected Temp (°C):	TEMP 1 / TEMP 2	Corrected Temp (°C):	TEMP 1 / TEMP 2
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? ☐ Yes ☐ No			
a) *If yes:* Is there evidence that the chilling process began? ☐ Yes ☐ No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) ☐ Yes ☐ No			
NOTE: If yes, contact PM before proceeding. If no, proceed with login			
Additional Comments			

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Cedar Falls Division
704 Enterprise Drive
Cedar Falls, IA 50613

Phone 319-277-2401 or 800-750-2401
Fax 319-277-2425

TestAmerica Des Moines SC
214

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?
Compliance Monitoring _____

Client Name: SCS Engineers Client #: _____
Address: 8450 Hickman Rd Suite 20
City/State/Zip Code: Clive IA 50325
Project Manager: _____
Email Address: _____
Telephone Number: _____ Fax: _____
Sampler Name: (Print Name) Nick Schemmel
Sampler Signature: _____

Project Name: Ottumwa Midland Landfill
Project #: 25219073
Site/Location ID: Ottumwa State: IA
Report To: _____
Invoice To: _____
Quote #: _____ PO#: _____

TAT
___ Standard
___ Rush (surcharges may apply)
Date Needed: _____
Fax Results: Y N
Email Results: Y N

SAMPLE ID	Date Sampled	Time Sampled	G = Grab, C = Composite	Field Filtered	Matrix: SL - Sludge, DW - Drinking Water, GW - Groundwater, S - Soil/Solid, WW - Wastewater, Specify, Other	Preservation & # of Containers: HNO_3	HCl	NaOH	H_2SO_4	Methanol	None	Other (Specify)	Analyze For: Metals	pH	TDS	Chloride/Fluoride/SO4	QC Deliverables	REMARKS
MW 102M	41819	1105	G		GW	1					1		X	X	X	X		
Field Blank	41819	1110	G		GW	1					1		X	X	X	X		

QC Deliverables
___ None
___ Level 2 (Batch QC)
___ Level 3
___ Level 4
Other: _____

Special Instructions:

LABORATORY COMMENTS:

Relinquished By: Nick Schemmel	Date: 41819	Time: 1328	Received By:	Date: 4/18/19	Time: 1328
Relinquished By:	Date:	Time:	Received By:	Date: 4-18-19	Time: 1715
Relinquished By:	Date:	Time:	Received By:	Date:	Time:

TAL-0033 (0708)

Page _____ of _____

5/23/2019 (Rev. 1)

Login Container Summary Report

Temperature readings: _____

Client Sample ID	Lab ID	Container Type	Container pH	Preservative Added (mls)	Lot #
MW 102M	310-153649-A-1	Plastic 250ml - with Nitric Acid	>2	2.5	2203839
Field Blank	310-153649-A-2	Plastic 250ml - with Nitric Acid	<2	_____	2203839

Fredrick, Sandie

From: Lang, Eric
Sent: Monday, April 29, 2019 3:26 PM
To: Fredrick, Sandie
Subject: FW: Eurofins TestAmerica Sample Login Confirmation files from 310-153649 Ottumwa Midland Landfill

Sandie -
Mercury canceled
ICP/MS metals changed to report B, Ca only.

From: Blodgett, Meghan [mailto:mblodgett@scsengineers.com]
Sent: Monday, April 29, 2019 2:53 PM
To: Lang, Eric
Subject: RE: Eurofins TestAmerica Sample Login Confirmation files from 310-153649 Ottumwa Midland Landfill

-External Email-

Eric,

I apologize for not getting back to you sooner – this one seems to have slipped through the cracks here with all the log-ins coming in last week.

We need only the following parameters for these samples:

Chloride
Fluoride
Sulfate
Boron
Calcium
Total Dissolved Solids
Lab pH
Field parameters

Thank you,

Meghan Blodgett
608.216.7362 (o)
608.345.9221 (m)

From: Eric Lang <eric.lang@testamericainc.com>
Sent: Friday, April 19, 2019 4:21 PM
To: Blodgett, Meghan <mblodgett@scsengineers.com>; Kron, Nicole <NKron@scsengineers.com>; Schemmel, Nick <NSchemmel@scsengineers.com>; Karwoski, Thomas <TKarwoski@scsengineers.com>
Subject: Eurofins TestAmerica Sample Login Confirmation files from 310-153649 Ottumwa Midland Landfill

Hello,

Attached, please find the Sample Confirmation files for job 310-153649; Ottumwa Midland Landfill

Please feel free to contact me or your PM, Sandie Fredrick, if you have any questions.

Thank you.

Eric A. Lang
Manager of Project Management

TestAmerica Laboratories, Inc.
Phone: 708-534-5200 Ext: x158

E-mail: eric.lang@testamericainc.com
www.eurofinsus.com | www.testamericainc.com

Reference: [310-353315]
Attachments: 3

Please let us know if we met your expectations by rating the service you received from Eurofins TestAmerica on this project by visiting our website at: Project Feedback

Login Sample Receipt Checklist

Client: SCS Engineers

Job Number: 310-153649-1
SDG Number: 25219073

Login Number: 153649
List Number: 1
Creator: Patrick, Kathryn E

List Source: Eurofins TestAmerica, Cedar Falls

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Groundwater Monitoring Results - Field Parameters
Ottumwa Midland Landfill / SCS Engineers Project #25219073
April 2019

Sample	Sample Date/Time	Groundwater Elevation (ft AMSL)	Temperature (Deg. C)	pH (Std. Units)	Dissolved Oxygen (mg/L)	Specific Conductivity (µmhos/cm)	ORP (mV)	Turbidity (NTU)
MW-301	4-16-2019/0940	686.38	13.87	7.10	1.27	1603	-50.2	8.88
MW-302	4-16-2019/0913	685.35	13.63	7.49	1.59	1168	8.13	44.2
MW-303	4-16-2019/0827	686.13	14.07	6.97	1.41	2,209	-20.0	99.2
MW-102M	4-18-2019/1105	717.97	--	8.55	--	--	--	--
MW-122M	4-17-2019/0713	723.43	--	7.34	--	--	--	--

Abbreviations:
mg/L = milligrams per liter

Created by: JR Date: 4/19/2019
Last revision by: JR Date: 4/19/2019
Checked by: MDB Date: 4/22/2019

I:\25219073.00\Data and Calculations\Tables\Field Data Tables\[April 2019_OML_Field Data.xlsx]GW Low Flow Stability

A2 June 2019 Detection Monitoring - Resample

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Cedar Falls
3019 Venture Way
Cedar Falls, IA 50613
Tel: (319)277-2401

Laboratory Job ID: 310-157626-1
Laboratory Sample Delivery Group: 25219073
Client Project/Site: Ottumwa Midland Landfill - 25219073

For:
SCS Engineers
2830 Dairy Drive
Madison, Wisconsin 53718

Attn: Meghan Blodgett

Authorized for release by:
6/25/2019 4:39:25 PM

Sandie Fredrick, Project Manager II
(920)261-1660
sandie.fredrick@testamericainc.com

Table of Contents

Case Narrative

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill - 25219073

Job ID: 310-157626-1
SDG: 25219073

Job ID: 310-157626-1

Laboratory: Eurofins TestAmerica, Cedar Falls

Narrative

Job Narrative
310-157626-1

Comments
No additional comments.

Receipt
The samples were received on 6/11/2019 10:30 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.9º C.

HPLC/IC
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Sample Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill - 25219073

Job ID: 310-157626-1
SDG: 25219073

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
310-157626-1	MW-303	Water	06/06/19 15:20	06/11/19 10:30	
310-157626-2	Field Blank	Water	06/06/19 15:30	06/11/19 10:30	

Detection Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill - 25219073

Job ID: 310-157626-1
SDG: 25219073

Client Sample ID: MW-303 — Lab Sample ID: 310-157626-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	8.0		5.0	1.5	mg/L	5		9056A	Total/NA

Client Sample ID: Field Blank — Lab Sample ID: 310-157626-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	21		1.0	0.29	mg/L	1		9056A	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill - 25219073

Job ID: 310-157626-1
SDG: 25219073

Client Sample ID: MW-303
Date Collected: 06/06/19 15:20
Date Received: 06/11/19 10:30

Lab Sample ID: 310-157626-1
Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	8.0		5.0	1.5	mg/L			06/20/19 17:42	5

Client Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill - 25219073

Job ID: 310-157626-1
SDG: 25219073

Client Sample ID: Field Blank
Date Collected: 06/06/19 15:30
Date Received: 06/11/19 10:30

Lab Sample ID: 310-157626-2
Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	21		1.0	0.29	mg/L			06/20/19 17:57	1

Definitions/Glossary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill - 25219073

Job ID: 310-157626-1
SDG: 25219073

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

QC Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill - 25219073

Job ID: 310-157626-1
SDG: 25219073

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-243362/3
Matrix: Water
Analysis Batch: 243362

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.29		1.0	0.29	mg/L			06/20/19 15:41	1

Lab Sample ID: LCS 310-243362/4
Matrix: Water
Analysis Batch: 243362

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Chloride			10.0	10.2		mg/L		102	90 - 110		

QC Association Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill - 25219073

Job ID: 310-157626-1
SDG: 25219073

HPLC/IC

Analysis Batch: 243362

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-157626-1	MW-303	Total/NA	Water	9056A	
310-157626-2	Field Blank	Total/NA	Water	9056A	
MB 310-243362/3	Method Blank	Total/NA	Water	9056A	
LCS 310-243362/4	Lab Control Sample	Total/NA	Water	9056A	

Lab Chronicle

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill - 25219073

Job ID: 310-157626-1
SDG: 25219073

Client Sample ID: MW-303
Date Collected: 06/06/19 15:20
Date Received: 06/11/19 10:30

Lab Sample ID: 310-157626-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	243362	06/20/19 17:42	MLU	TAL CF

Client Sample ID: Field Blank
Date Collected: 06/06/19 15:30
Date Received: 06/11/19 10:30

Lab Sample ID: 310-157626-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		1	243362	06/20/19 17:57	MLU	TAL CF

Laboratory References:

TAL CF = Eurofins TestAmerica, Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

Accreditation/Certification Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill - 25219073

Job ID: 310-157626-1
SDG: 25219073

Laboratory: Eurofins TestAmerica, Cedar Falls

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Iowa	State Program	7	007	12-01-19

Method Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland Landfill - 25219073

Job ID: 310-157626-1
SDG: 25219073

Method	Method Description	Protocol	Laboratory
9056A	Anions, Ion Chromatography	SW846	TAL CF

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CF = Eurofins TestAmerica, Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

310-157626 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: SCS Engineers			
City/State: CITY Ottumwa	STATE IA	Project:	
Receipt Information			
Date/Time Received: DATE 06/11/19	TIME 1030	Received By: AP	

Delivery Type: ☐ UPS ☒ FedEx ☐ FedEx Ground ☐ US Mail ☐ Spee-Dee
☐ Lab Courier ☐ TA Field Services ☐ Client Drop-off ☐ Other:_____

Condition of Cooler/Containers			
Sample(s) received in Cooler?	☒ Yes ☐ No	*If yes:* Cooler ID:	
Multiple Coolers?	☐ Yes ☒ No	*If yes:* Cooler # ____ of ____	
Cooler Custody Seals Present?	☐ Yes ☒ No	*If yes:* Cooler custody seals intact?	☐ Yes ☐ No
Sample Custody Seals Present?	☐ Yes ☒ No	*If yes:* Sample custody seals intact?	☐ Yes ☐ No
Trip Blank Present?	☐ Yes ☒ No	*If yes:* Which VOA samples are in cooler? ↓	

Temperature Record					
Coolant:	☒ Wet ice	☐ Blue ice	☐ Dry ice	☐ Other:_____	☐ NONE
Thermometer ID: N			Correction Factor (°C): 0.6		
• **Temp Blank Temperature** – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature					
Uncorrected Temp (°C): 0.9			Corrected Temp (°C): 0.9		
• **Sample Container Temperature**					
Container type(s) used:	CONTAINER 1		CONTAINER 2		
Uncorrected Temp (°C):	TEMP 1	TEMP 2	Corrected Temp (°C):	TEMP 1	TEMP 2

Exceptions Noted		
1) If temperature exceeds criteria, was sample(s) received same day of sampling?	☐ Yes	☐ No
a) *If yes:* Is there evidence that the chilling process began?	☐ Yes	☐ No
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?)	☐ Yes	☐ No
NOTE: If yes, contact PM before proceeding. If no, proceed with login		
Additional Comments		

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

2417 Bond Street, University Park, IL 60484
Phone: 708.534.5200 Fax: 708.534.5211

Chain of Custody Record

(optional)

Report To
Contact: Meg Blodgett
Company: SCS Engineers
Address: 2830 Dairy Dr
Address: Madison WI
Phone:
Fax:
E-Mail: mblodgett@scsengineers.com

(optional)

Bill To
Contact:
Company:
Address:
Address:
Phone:
Fax:
PO#/Reference#

Lab Job #:
Chain of Custody Number:
Page _____ of _____
Temperature °C of Cooler:

Client	Client Project #	Preservative	8								
SCS Engineers	25219073										
Project Name: Ottumwa Midland Landfill		Parameter	Chloride								
Project Location/State: Ottumwa, Iowa	Lab Project #										
Sampler: Zach Watson	Lab PM										

Preservative Key
1. HCL, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. NaHSO4
7. Cool to 4°
8. None
9. Other

Lab ID	MS/MSD	Sample ID	Sampling Date	Sampling Time	# of Containers	Matrix	Chloride	Comments
		MW303	6/6	1520	1	W	X	
		Field Blank	6/6	1530	1	W	X	

Turnaround Time Required (Business Days)
___ 1 Day ___ 2 Days ___ 5 Days ___ 7 Days ___ 10 Days ___ 15 Days _____ Other
Requested Due Date?

Sample Disposal
☐ Return to Client ☐ Disposal by Lab ☐ Archive for _____ Months (A fee may be assessed if samples are retained longer than 1 month)

Relinquished By	Company	Date	Time	Received By	Company	Date	Time
	SCS	6/7/19	1200	DVB	TACF	6/11/19	1030
Relinquished By	Company	Date	Time	Received By	Company	Date	Time
Relinquished By	Company	Date	Time	Received By	Company	Date	Time

Lab Courier
Shipped
Hand Delivered

Matrix Key
WW – Wastewater
W – Water
S – Soil
SL – Sludge
MS – Miscellaneous
OL – Oil
A – Air
SE – Sediment
SO – Soil
L – Leachate
WI – Wipe
DW – Drinking Water
O – Other

Client Comments

Lab Comments:

TAL-4124-500 (1209)

Login Sample Receipt Checklist

Client: SCS Engineers

Job Number: 310-157626-1
SDG Number: 25219073

Login Number: 157626
List Number: 1
Creator: Homolar, Dana J

List Source: Eurofins TestAmerica, Cedar Falls

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

A3 October 2019 Detection Monitoring

eurofins | Environment Testing TestAmerica

ANALYTICAL REPORT

Eurofins TestAmerica, Cedar Falls
3019 Venture Way
Cedar Falls, IA 50613
Tel: (319)277-2401

Laboratory Job ID: 310-167646-1
Client Project/Site: Ottumwa Midland LF 25216073

For:
SCS Engineers
2830 Dairy Drive
Madison, Wisconsin 53718

Attn: Meghan Blodgett

Authorized for release by:
11/1/2019 12:30:56 PM

Sandie Fredrick, Project Manager II
(920)261-1660
sandie.fredrick@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Case Narrative

Client: SCS Engineers
Project/Site: Ottumwa Midland LF 25216073

Job ID: 310-167646-1

Job ID: 310-167646-1

Laboratory: Eurofins TestAmerica, Cedar Falls

Narrative

Job Narrative
310-167646-1

Comments
No additional comments.

Receipt
The samples were received on 10/16/2019 5:25 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.0º C.

HPLC/IC
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Metals
Method 3010A: The reference method requires samples to be preserved to a pH of <2. The following samples were received with insufficient preservation at a pH of >2: MW-122M (310-167646-5) and (310-167646-A-5 DU). The sample(s) was preserved to the appropriate pH in the laboratory.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
Method SM 2540C: Reanalysis of the following sample was performed outside of the analytical holding time due to residue being over 2000mg for Total Dissolved Solids : MW-122M (310-167646-5).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Sample Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland LF 25216073

Job ID: 310-167646-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
310-167646-1	MW-301	Water	10/15/19 09:50	10/16/19 17:25	
310-167646-2	MW-302	Water	10/15/19 11:45	10/16/19 17:25	
310-167646-3	MW-303	Water	10/15/19 08:35	10/16/19 17:25	
310-167646-4	MW-102M	Water	10/15/19 12:00	10/16/19 17:25	
310-167646-5	MW-122M	Water	10/15/19 12:30	10/16/19 17:25	
310-167646-6	Field Blank	Water	10/15/19 23:59	10/16/19 17:25	

Detection Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland LF 25216073

Job ID: 310-167646-1

Client Sample ID: MW-301 — Lab Sample ID: 310-167646-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	46		5.0	1.5	mg/L	5		9056A	Total/NA
Fluoride	0.85		0.50	0.23	mg/L	5		9056A	Total/NA
Sulfate	310		20	7.0	mg/L	20		9056A	Total/NA
Boron	0.60		0.20	0.11	mg/L	1		6020A	Total/NA
Calcium	100		0.50	0.10	mg/L	1		6020A	Total/NA
Total Dissolved Solids	860		60	48	mg/L	1		SM 2540C	Total/NA
pH	7.0	HF	0.1	0.1	SU	1		SM 4500 H+ B	Total/NA
Ground Water Elevation	686.56				ft	1		Field Sampling	Total/NA
Oxidation Reduction Potential	-58.4				millivolts	1		Field Sampling	Total/NA
Oxygen, Dissolved, Client Supplied	0.40				mg/L	1		Field Sampling	Total/NA
pH, Field	6.67				SU	1		Field Sampling	Total/NA
Specific Conductance, Field	1512				umhos/cm	1		Field Sampling	Total/NA
Temperature, Field	13.68				Degrees C	1		Field Sampling	Total/NA
Turbidity, Field	4.75				NTU	1		Field Sampling	Total/NA

Client Sample ID: MW-302 — Lab Sample ID: 310-167646-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	7.3		5.0	1.5	mg/L	5		9056A	Total/NA
Fluoride	1.2		0.50	0.23	mg/L	5		9056A	Total/NA
Sulfate	73		5.0	1.8	mg/L	5		9056A	Total/NA
Boron	0.78		0.20	0.11	mg/L	1		6020A	Total/NA
Calcium	68		0.50	0.10	mg/L	1		6020A	Total/NA
Total Dissolved Solids	680		60	48	mg/L	1		SM 2540C	Total/NA
pH	7.5	HF	0.1	0.1	SU	1		SM 4500 H+ B	Total/NA
Ground Water Elevation	685.44				ft	1		Field Sampling	Total/NA
Oxidation Reduction Potential	-56.4				millivolts	1		Field Sampling	Total/NA
Oxygen, Dissolved, Client Supplied	0.75				mg/L	1		Field Sampling	Total/NA
pH, Field	7.21				SU	1		Field Sampling	Total/NA
Specific Conductance, Field	1067				umhos/cm	1		Field Sampling	Total/NA
Temperature, Field	14.26				Degrees C	1		Field Sampling	Total/NA
Turbidity, Field	102.8				NTU	1		Field Sampling	Total/NA

Client Sample ID: MW-303 — Lab Sample ID: 310-167646-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	7.5		5.0	1.5	mg/L	5		9056A	Total/NA
Fluoride	0.87		0.50	0.23	mg/L	5		9056A	Total/NA
Sulfate	390		20	7.0	mg/L	20		9056A	Total/NA
Boron	0.76		0.20	0.11	mg/L	1		6020A	Total/NA
Calcium	120		0.50	0.10	mg/L	1		6020A	Total/NA
Total Dissolved Solids	1100		60	48	mg/L	1		SM 2540C	Total/NA
pH	7.0	HF	0.1	0.1	SU	1		SM 4500 H+ B	Total/NA
Ground Water Elevation	686.08				ft	1		Field Sampling	Total/NA
Oxidation Reduction Potential	-55.6				millivolts	1		Field Sampling	Total/NA
Oxygen, Dissolved, Client Supplied	0.43				mg/L	1		Field Sampling	Total/NA
pH, Field	6.76				SU	1		Field Sampling	Total/NA
Specific Conductance, Field	1628				umhos/cm	1		Field Sampling	Total/NA
Temperature, Field	15.44				Degrees C	1		Field Sampling	Total/NA
Turbidity, Field	27.9				NTU	1		Field Sampling	Total/NA

This Detection Summary does not include radiochemical test results.

Detection Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland LF 25216073

Job ID: 310-167646-1

Client Sample ID: MW-102M — Lab Sample ID: 310-167646-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	15		5.0	1.5	mg/L	5		9056A	Total/NA
Fluoride	4.5		0.50	0.23	mg/L	5		9056A	Total/NA
Sulfate	350		20	7.0	mg/L	20		9056A	Total/NA
Boron	1.5		0.20	0.11	mg/L	1		6020A	Total/NA
Calcium	14		0.50	0.10	mg/L	1		6020A	Total/NA
Total Dissolved Solids	1400		60	48	mg/L	1		SM 2540C	Total/NA
pH	7.9	HF	0.1	0.1	SU	1		SM 4500 H+ B	Total/NA
Ground Water Elevation	715.50				ft	1		Field Sampling	Total/NA
pH, Field	7.81				SU	1		Field Sampling	Total/NA

Client Sample ID: MW-122M — Lab Sample ID: 310-167646-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	10		5.0	1.5	mg/L	5		9056A	Total/NA
Sulfate	8400		500	180	mg/L	500		9056A	Total/NA
Boron	4.1		0.80	0.44	mg/L	4		6020A	Total/NA
Calcium	400		0.50	0.10	mg/L	1		6020A	Total/NA
Total Dissolved Solids	13000	H	300	240	mg/L	1		SM 2540C	Total/NA
pH	6.7	HF	0.1	0.1	SU	1		SM 4500 H+ B	Total/NA
Ground Water Elevation	708.94				ft	1		Field Sampling	Total/NA
pH, Field	6.6				SU	1		Field Sampling	Total/NA

Client Sample ID: Field Blank — Lab Sample ID: 310-167646-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	0.14	J	0.50	0.10	mg/L	1		6020A	Total/NA
pH	6.1	HF	0.1	0.1	SU	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland LF 25216073

Job ID: 310-167646-1

Client Sample ID: MW-301

Date Collected: 10/15/19 09:50
Date Received: 10/16/19 17:25

Lab Sample ID: 310-167646-1

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	46		5.0	1.5	mg/L			10/22/19 05:13	5
Fluoride	0.85		0.50	0.23	mg/L			10/22/19 05:13	5
Sulfate	310		20	7.0	mg/L			10/22/19 13:37	20

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.60		0.20	0.11	mg/L		10/18/19 08:00	10/21/19 16:35	1
Calcium	100		0.50	0.10	mg/L		10/18/19 08:00	10/21/19 16:35	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	860		60	48	mg/L			10/22/19 11:23	1
pH	7.0	HF	0.1	0.1	SU			10/16/19 22:25	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ground Water Elevation	686.56				ft			10/15/19 09:50	1
Oxidation Reduction Potential	-58.4				millivolts			10/15/19 09:50	1
Oxygen, Dissolved, Client Supplied	0.40				mg/L			10/15/19 09:50	1
pH, Field	6.67				SU			10/15/19 09:50	1
Specific Conductance, Field	1512				umhos/cm			10/15/19 09:50	1
Temperature, Field	13.68				Degrees C			10/15/19 09:50	1
Turbidity, Field	4.75				NTU			10/15/19 09:50	1

Client Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland LF 25216073

Job ID: 310-167646-1

Client Sample ID: MW-302

Date Collected: 10/15/19 11:45
Date Received: 10/16/19 17:25

Lab Sample ID: 310-167646-2

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	7.3		5.0	1.5	mg/L			10/22/19 06:04	5
Fluoride	1.2		0.50	0.23	mg/L			10/22/19 06:04	5
Sulfate	73		5.0	1.8	mg/L			10/22/19 06:04	5

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.78		0.20	0.11	mg/L		10/18/19 08:00	10/21/19 16:38	1
Calcium	68		0.50	0.10	mg/L		10/18/19 08:00	10/21/19 16:38	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	680		60	48	mg/L			10/22/19 11:23	1
pH	7.5	HF	0.1	0.1	SU			10/16/19 22:32	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ground Water Elevation	685.44				ft			10/15/19 11:45	1
Oxidation Reduction Potential	-56.4				millivolts			10/15/19 11:45	1
Oxygen, Dissolved, Client Supplied	0.75				mg/L			10/15/19 11:45	1
pH, Field	7.21				SU			10/15/19 11:45	1
Specific Conductance, Field	1067				umhos/cm			10/15/19 11:45	1
Temperature, Field	14.26				Degrees C			10/15/19 11:45	1
Turbidity, Field	102.8				NTU			10/15/19 11:45	1

Client Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland LF 25216073

Job ID: 310-167646-1

Client Sample ID: MW-303

Date Collected: 10/15/19 08:35
Date Received: 10/16/19 17:25

Lab Sample ID: 310-167646-3

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	7.5		5.0	1.5	mg/L			10/22/19 06:54	5
Fluoride	0.87		0.50	0.23	mg/L			10/22/19 06:54	5
Sulfate	390		20	7.0	mg/L			10/22/19 14:25	20

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.76		0.20	0.11	mg/L		10/18/19 08:00	10/21/19 16:48	1
Calcium	120		0.50	0.10	mg/L		10/18/19 08:00	10/21/19 16:48	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	1100		60	48	mg/L			10/22/19 11:23	1
pH	7.0	HF	0.1	0.1	SU			10/16/19 22:33	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ground Water Elevation	686.08				ft			10/15/19 08:35	1
Oxidation Reduction Potential	-55.6				millivolts			10/15/19 08:35	1
Oxygen, Dissolved, Client Supplied	0.43				mg/L			10/15/19 08:35	1
pH, Field	6.76				SU			10/15/19 08:35	1
Specific Conductance, Field	1628				umhos/cm			10/15/19 08:35	1
Temperature, Field	15.44				Degrees C			10/15/19 08:35	1
Turbidity, Field	27.9				NTU			10/15/19 08:35	1

Client Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland LF 25216073

Job ID: 310-167646-1

Client Sample ID: MW-102M

Date Collected: 10/15/19 12:00
Date Received: 10/16/19 17:25

Lab Sample ID: 310-167646-4

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	15		5.0	1.5	mg/L			10/22/19 07:11	5
Fluoride	4.5		0.50	0.23	mg/L			10/22/19 07:11	5
Sulfate	350		20	7.0	mg/L			10/22/19 07:28	20

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	1.5		0.20	0.11	mg/L		10/18/19 08:00	10/21/19 16:51	1
Calcium	14		0.50	0.10	mg/L		10/18/19 08:00	10/21/19 16:51	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	1400		60	48	mg/L			10/22/19 11:23	1
pH	7.9	HF	0.1	0.1	SU			10/16/19 22:34	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ground Water Elevation	715.50				ft			10/15/19 12:00	1
pH, Field	7.81				SU			10/15/19 12:00	1

Client Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland LF 25216073

Job ID: 310-167646-1

Client Sample ID: MW-122M

Date Collected: 10/15/19 12:30
Date Received: 10/16/19 17:25

Lab Sample ID: 310-167646-5

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**10**		5.0	1.5	mg/L			10/22/19 07:45	5
Fluoride	<0.23		0.50	0.23	mg/L			10/22/19 07:45	5
Sulfate	**8400**		500	180	mg/L			10/22/19 08:02	500

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	**4.1**		0.80	0.44	mg/L		10/18/19 08:00	10/22/19 13:44	4
Calcium	**400**		0.50	0.10	mg/L		10/18/19 08:00	10/21/19 16:53	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	**13000**	**H**	300	240	mg/L			10/23/19 12:05	1
pH	**6.7**	**HF**	0.1	0.1	SU			10/16/19 22:35	1

Method: Field Sampling - Field Sampling

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ground Water Elevation	**708.94**				ft			10/15/19 12:30	1
pH, Field	**6.6**				SU			10/15/19 12:30	1

Client Sample Results

Client: SCS Engineers
Project/Site: Ottumwa Midland LF 25216073

Job ID: 310-167646-1

Client Sample ID: Field Blank

Date Collected: 10/15/19 23:59
Date Received: 10/16/19 17:25

Lab Sample ID: 310-167646-6

Matrix: Water

Method: 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.29		1.0	0.29	mg/L			10/22/19 08:19	1
Fluoride	<0.045		0.10	0.045	mg/L			10/22/19 08:19	1
Sulfate	<0.35		1.0	0.35	mg/L			10/22/19 08:19	1

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	<0.11		0.20	0.11	mg/L		10/18/19 08:00	10/21/19 16:59	1
Calcium	**0.14**	**J**	0.50	0.10	mg/L		10/18/19 08:00	10/21/19 16:59	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<24		30	24	mg/L			10/22/19 11:23	1
pH	**6.1**	**HF**	0.1	0.1	SU			10/16/19 22:38	1

Definitions/Glossary

Client: SCS Engineers
Project/Site: Ottumwa Midland LF 25216073

Job ID: 310-167646-1

Qualifiers

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-258135/3
Matrix: Water
Analysis Batch: 258135

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<0.29		1.0	0.29	mg/L			10/22/19 04:39	1
Fluoride	<0.045		0.10	0.045	mg/L			10/22/19 04:39	1
Sulfate	<0.35		1.0	0.35	mg/L			10/22/19 04:39	1

Lab Sample ID: LCS 310-258135/4
Matrix: Water
Analysis Batch: 258135

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	10.0	10.0		mg/L		100	90 - 110
Fluoride	2.00	2.05		mg/L		103	90 - 110
Sulfate	10.0	10.1		mg/L		101	90 - 110

Lab Sample ID: 310-167646-1 MS
Matrix: Water
Analysis Batch: 258135

Client Sample ID: MW-301
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	46		25.0	70.1		mg/L		97	80 - 120
Fluoride	0.85		5.00	5.41		mg/L		91	80 - 120

Lab Sample ID: 310-167646-1 MS
Matrix: Water
Analysis Batch: 258135

Client Sample ID: MW-301
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	310		100	408		mg/L		96	80 - 120

Lab Sample ID: 310-167646-1 MSD
Matrix: Water
Analysis Batch: 258135

Client Sample ID: MW-301
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	46		25.0	70.4		mg/L		98	80 - 120	0	15
Fluoride	0.85		5.00	5.44		mg/L		92	80 - 120	0	15

Lab Sample ID: 310-167646-1 MSD
Matrix: Water
Analysis Batch: 258135

Client Sample ID: MW-301
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	310		100	409		mg/L		97	80 - 120	0	15

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 310-257277/1-A
Matrix: Water
Analysis Batch: 257738

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 257277

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	<0.11		0.20	0.11	mg/L		10/18/19 08:00	10/21/19 15:40	1
Calcium	<0.10		0.50	0.10	mg/L		10/18/19 08:00	10/21/19 15:40	1

Lab Sample ID: LCS 310-257277/2-A
Matrix: Water
Analysis Batch: 257738

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 257277

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	1.76	1.82		mg/L		103	80 - 120
Calcium	4.00	4.44		mg/L		111	80 - 120

Lab Sample ID: 310-167646-5 DU
Matrix: Water
Analysis Batch: 257738

Client Sample ID: MW-122M
Prep Type: Total/NA
Prep Batch: 257277

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Calcium	400		408		mg/L		1	20

Lab Sample ID: 310-167646-5 DU
Matrix: Water
Analysis Batch: 257828

Client Sample ID: MW-122M
Prep Type: Total/NA
Prep Batch: 257277

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Boron	4.1		4.47		mg/L		8	20

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 310-257784/1
Matrix: Water
Analysis Batch: 257784

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<24		30	24	mg/L			10/22/19 11:23	1

Lab Sample ID: LCS 310-257784/2
Matrix: Water
Analysis Batch: 257784

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	1000	984		mg/L		98	90 - 110

Lab Sample ID: MB 310-257956/1
Matrix: Water
Analysis Batch: 257956

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<24		30	24	mg/L			10/23/19 12:05	1

Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: LCS 310-257956/2
Matrix: Water
Analysis Batch: 257956

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Dissolved Solids			1000	1000		mg/L		100	90 - 110		

Lab Sample ID: 310-167646-5 DU
Matrix: Water
Analysis Batch: 257956

Client Sample ID: MW-122M
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Total Dissolved Solids	13000	H		13100		mg/L				1	24

Method: SM 4500 H+ B - pH

Lab Sample ID: LCS 310-257116/1
Matrix: Water
Analysis Batch: 257116

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
pH			7.00	7.0		SU		100	98 - 102		

Lab Sample ID: 310-167646-1 DU
Matrix: Water
Analysis Batch: 257116

Client Sample ID: MW-301
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
pH	7.0	HF		7.0		SU				0.7	20

HPLC/IC

Analysis Batch: 258135

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-167646-1	MW-301	Total/NA	Water	9056A	
310-167646-1	MW-301	Total/NA	Water	9056A	
310-167646-2	MW-302	Total/NA	Water	9056A	
310-167646-3	MW-303	Total/NA	Water	9056A	
310-167646-3	MW-303	Total/NA	Water	9056A	
310-167646-4	MW-102M	Total/NA	Water	9056A	
310-167646-4	MW-102M	Total/NA	Water	9056A	
310-167646-5	MW-122M	Total/NA	Water	9056A	
310-167646-5	MW-122M	Total/NA	Water	9056A	
310-167646-6	Field Blank	Total/NA	Water	9056A	
MB 310-258135/3	Method Blank	Total/NA	Water	9056A	
LCS 310-258135/4	Lab Control Sample	Total/NA	Water	9056A	
310-167646-1 MS	MW-301	Total/NA	Water	9056A	
310-167646-1 MS	MW-301	Total/NA	Water	9056A	
310-167646-1 MSD	MW-301	Total/NA	Water	9056A	
310-167646-1 MSD	MW-301	Total/NA	Water	9056A	

Metals

Prep Batch: 257277

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-167646-1	MW-301	Total/NA	Water	3010A	
310-167646-2	MW-302	Total/NA	Water	3010A	
310-167646-3	MW-303	Total/NA	Water	3010A	
310-167646-4	MW-102M	Total/NA	Water	3010A	
310-167646-5	MW-122M	Total/NA	Water	3010A	
310-167646-6	Field Blank	Total/NA	Water	3010A	
MB 310-257277/1-A	Method Blank	Total/NA	Water	3010A	
LCS 310-257277/2-A	Lab Control Sample	Total/NA	Water	3010A	
310-167646-5 DU	MW-122M	Total/NA	Water	3010A	

Analysis Batch: 257738

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-167646-1	MW-301	Total/NA	Water	6020A	257277
310-167646-2	MW-302	Total/NA	Water	6020A	257277
310-167646-3	MW-303	Total/NA	Water	6020A	257277
310-167646-4	MW-102M	Total/NA	Water	6020A	257277
310-167646-5	MW-122M	Total/NA	Water	6020A	257277
310-167646-6	Field Blank	Total/NA	Water	6020A	257277
MB 310-257277/1-A	Method Blank	Total/NA	Water	6020A	257277
LCS 310-257277/2-A	Lab Control Sample	Total/NA	Water	6020A	257277
310-167646-5 DU	MW-122M	Total/NA	Water	6020A	257277

Analysis Batch: 257828

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-167646-5	MW-122M	Total/NA	Water	6020A	257277
310-167646-5 DU	MW-122M	Total/NA	Water	6020A	257277

QC Association Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland LF 25216073

Job ID: 310-167646-1

General Chemistry

Analysis Batch: 257116

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-167646-1	MW-301	Total/NA	Water	SM 4500 H+ B	
310-167646-2	MW-302	Total/NA	Water	SM 4500 H+ B	
310-167646-3	MW-303	Total/NA	Water	SM 4500 H+ B	
310-167646-4	MW-102M	Total/NA	Water	SM 4500 H+ B	
310-167646-5	MW-122M	Total/NA	Water	SM 4500 H+ B	
310-167646-6	Field Blank	Total/NA	Water	SM 4500 H+ B	
LCS 310-257116/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
310-167646-1 DU	MW-301	Total/NA	Water	SM 4500 H+ B	

Analysis Batch: 257784

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-167646-1	MW-301	Total/NA	Water	SM 2540C	
310-167646-2	MW-302	Total/NA	Water	SM 2540C	
310-167646-3	MW-303	Total/NA	Water	SM 2540C	
310-167646-4	MW-102M	Total/NA	Water	SM 2540C	
310-167646-6	Field Blank	Total/NA	Water	SM 2540C	
MB 310-257784/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-257784/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Analysis Batch: 257956

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-167646-5	MW-122M	Total/NA	Water	SM 2540C	
MB 310-257956/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-257956/2	Lab Control Sample	Total/NA	Water	SM 2540C	
310-167646-5 DU	MW-122M	Total/NA	Water	SM 2540C	

Field Service / Mobile Lab

Analysis Batch: 257782

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-167646-1	MW-301	Total/NA	Water	Field Sampling	
310-167646-2	MW-302	Total/NA	Water	Field Sampling	
310-167646-3	MW-303	Total/NA	Water	Field Sampling	
310-167646-4	MW-102M	Total/NA	Water	Field Sampling	
310-167646-5	MW-122M	Total/NA	Water	Field Sampling	

Lab Chronicle

Client: SCS Engineers
Project/Site: Ottumwa Midland LF 25216073

Job ID: 310-167646-1

Client Sample ID: MW-301
Date Collected: 10/15/19 09:50
Date Received: 10/16/19 17:25

Lab Sample ID: 310-167646-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	258135	10/22/19 05:13	CJT	TAL CF
Total/NA	Analysis	9056A		20	258135	10/22/19 13:37	CJT	TAL CF
Total/NA	Prep	3010A			257277	10/18/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	257738	10/21/19 16:35	SAD	TAL CF
Total/NA	Analysis	SM 2540C		1	257784	10/22/19 11:23	MDK	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	257116	10/16/19 22:25	JMH	TAL CF
Total/NA	Analysis	Field Sampling		1	257782	10/15/19 09:50	EAR	TAL CF

Client Sample ID: MW-302
Date Collected: 10/15/19 11:45
Date Received: 10/16/19 17:25

Lab Sample ID: 310-167646-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	258135	10/22/19 06:04	CJT	TAL CF
Total/NA	Prep	3010A			257277	10/18/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	257738	10/21/19 16:38	SAD	TAL CF
Total/NA	Analysis	SM 2540C		1	257784	10/22/19 11:23	MDK	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	257116	10/16/19 22:32	JMH	TAL CF
Total/NA	Analysis	Field Sampling		1	257782	10/15/19 11:45	EAR	TAL CF

Client Sample ID: MW-303
Date Collected: 10/15/19 08:35
Date Received: 10/16/19 17:25

Lab Sample ID: 310-167646-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	258135	10/22/19 06:54	CJT	TAL CF
Total/NA	Analysis	9056A		20	258135	10/22/19 14:25	CJT	TAL CF
Total/NA	Prep	3010A			257277	10/18/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	257738	10/21/19 16:48	SAD	TAL CF
Total/NA	Analysis	SM 2540C		1	257784	10/22/19 11:23	MDK	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	257116	10/16/19 22:33	JMH	TAL CF
Total/NA	Analysis	Field Sampling		1	257782	10/15/19 08:35	EAR	TAL CF

Client Sample ID: MW-102M
Date Collected: 10/15/19 12:00
Date Received: 10/16/19 17:25

Lab Sample ID: 310-167646-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	258135	10/22/19 07:11	CJT	TAL CF
Total/NA	Analysis	9056A		20	258135	10/22/19 07:28	CJT	TAL CF
Total/NA	Prep	3010A			257277	10/18/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	257738	10/21/19 16:51	SAD	TAL CF
Total/NA	Analysis	SM 2540C		1	257784	10/22/19 11:23	MDK	TAL CF

Lab Chronicle

Client: SCS Engineers
Project/Site: Ottumwa Midland LF 25216073

Job ID: 310-167646-1

Client Sample ID: MW-102M

Lab Sample ID: 310-167646-4

Date Collected: 10/15/19 12:00

Matrix: Water

Date Received: 10/16/19 17:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 4500 H+ B		1	257116	10/16/19 22:34	JMH	TAL CF
Total/NA	Analysis	Field Sampling		1	257782	10/15/19 12:00	EAR	TAL CF

Client Sample ID: MW-122M

Lab Sample ID: 310-167646-5

Date Collected: 10/15/19 12:30

Matrix: Water

Date Received: 10/16/19 17:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		5	258135	10/22/19 07:45	CJT	TAL CF
Total/NA	Analysis	9056A		500	258135	10/22/19 08:02	CJT	TAL CF
Total/NA	Prep	3010A			257277	10/18/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	257738	10/21/19 16:53	SAD	TAL CF
Total/NA	Prep	3010A			257277	10/18/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		4	257828	10/22/19 13:44	SAD	TAL CF
Total/NA	Analysis	SM 2540C		1	257956	10/23/19 12:05	MDK	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	257116	10/16/19 22:35	JMH	TAL CF
Total/NA	Analysis	Field Sampling		1	257782	10/15/19 12:30	EAR	TAL CF

Client Sample ID: Field Blank

Lab Sample ID: 310-167646-6

Date Collected: 10/15/19 23:59

Matrix: Water

Date Received: 10/16/19 17:25

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9056A		1	258135	10/22/19 08:19	CJT	TAL CF
Total/NA	Prep	3010A			257277	10/18/19 08:00	HED	TAL CF
Total/NA	Analysis	6020A		1	257738	10/21/19 16:59	SAD	TAL CF
Total/NA	Analysis	SM 2540C		1	257784	10/22/19 11:23	MDK	TAL CF
Total/NA	Analysis	SM 4500 H+ B		1	257116	10/16/19 22:38	JMH	TAL CF

Laboratory References:

TAL CF = Eurofins TestAmerica, Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

Accreditation/Certification Summary

Client: SCS Engineers
Job ID: 310-167646-1
Project/Site: Ottumwa Midland LF 25216073

Laboratory: Eurofins TestAmerica, Cedar Falls

The accreditations/certifications listed below are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Iowa	State Program	007	12-01-19

Method Summary

Client: SCS Engineers
Project/Site: Ottumwa Midland LF 25216073

Job ID: 310-167646-1

Method	Method Description	Protocol	Laboratory
9056A	Anions, Ion Chromatography	SW846	TAL CF
6020A	Metals (ICP/MS)	SW846	TAL CF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL CF
SM 4500 H+ B	pH	SM	TAL CF
Field Sampling	Field Sampling	EPA	TAL CF
3010A	Preparation, Total Metals	SW846	TAL CF

Protocol References:

EPA = US Environmental Protection Agency

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CF = Eurofins TestAmerica, Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

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310-167646 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information

Client: SCS

City/State: CITY Clive STATE IA Project: Othumwa

Receipt Information

Date/Time Received: DATE 10/16/19 TIME 1725 Received By: ABB

Delivery Type: ☐ UPS ☐ FedEx ☐ FedEx Ground ☐ US Mail ☐ Spee-Dee
☒ Lab Courier ☐ Lab Field Services ☐ Client Drop-off ☐ Other:_____

Condition of Cooler/Containers

Sample(s) received in Cooler?	☒ Yes	☐ No	*If yes:* Cooler ID:
Multiple Coolers?	☐ Yes	☒ No	*If yes:* Cooler # _____ of _____
Cooler Custody Seals Present?	☐ Yes	☒ No	*If yes:* Cooler custody seals intact? ☐ Yes ☐ No
Sample Custody Seals Present?	☐ Yes	☒ No	*If yes:* Sample custody seals intact? ☐ Yes ☐ No
Trip Blank Present?	☐ Yes	☒ No	*If yes:* Which VOA samples are in cooler? ↓

Temperature Record

Coolant: ☒ Wet ice ☐ Blue ice ☐ Dry ice ☐ Other:_____ ☐ NONE

Thermometer ID: N Correction Factor (°C): 0.0

• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature

Uncorrected Temp (°C): 0.0 Corrected Temp (°C): 0.0

• Sample Container Temperature

	CONTAINER 1	CONTAINER 2
Container(s) used:		
Uncorrected Temp (°C):		
Corrected Temp (°C):		

Exceptions Noted

1) If temperature exceeds criteria, was sample(s) received same day of sampling? ☐ Yes ☐ No
   a) *If yes:* Is there evidence that the chilling process began? ☐ Yes ☐ No

2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) ☐ Yes ☐ No

NOTE: If yes, contact PM before proceeding. If no, proceed with login

Additional Comments

Eurofins TestAmerica, Cedar Falls
3019 Venture Way
Cedar Falls, IA 50613
Phone (319) 277-2401 Fax (319) 277-2425

Chain of Custody Record

TestAmerica Des Moines SC
214

eurofins | Environment Testing TestAmerica

43965

Client Information	Sampler: Louise Jennings	Lab PM: Fredrick, Sandie	Carrier Tracking No(s):	COC No: 310-43905-14130.1
Client Contact: Louise Jennings	Phone: 6085098245	E-Mail: sandie.fredrick@testamericainc.com		Page: Page 1 of 1
Company: SCS Engineers				Job #:

Address: 8450 Hickman Road Suite 20	Due Date Requested:	Analysis Requested	Preservation Codes:
City: Clive	TAT Requested (days): Standard		A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
State, Zip: IA, 50325			Other:
Phone:	PO #: Purchase Order Requested		
Email: ljennings@scsengineers.com	WO #:		
Project Name: Ottumwa Midland LF 25216073	Project #: 31011020		
Site:	SSOW#:		

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	2540C_Calcd, SM4500_H+	6020A - B/Ca	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	D		
MW-301	10.15.19	0950	G	Water			X	X		
MW-302	10.15.19	1145	G	Water						
MW-303	10.15.19	0835	G	Water						
MW-102M	10.15.19	1900	G	Water						
MW-122M	10.15.19	1230	G	Water						
Field Blank	10.15.19	2359	—	Water			+	+		
				Water						

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by: L Jennings	Date/Time: 10.15.19 1525	Company	Received by:	Date/Time: 10/16/19 1126	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Login Container Summary Report

Temperature readings: _____

Client Sample ID	Lab ID	Container Type	Container pH	Preservative Added (mls)	Lot #
MW-301	310-167646-A-1	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-302	310-167646-A-2	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-303	310-167646-A-3	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-102M	310-167646-A-4	Plastic 250ml - with Nitric Acid	<2	_____	_____
MW-122M	310-167646-A-5	Plastic 250ml - with Nitric Acid	<2	_____	_____
Field Blank	310-167646-A-6	Plastic 250ml - with Nitric Acid	<2	_____	_____

Table 2. Sampling Points and Parameters - CCR Rule Sampling Program - Detection Monitoring
Groundwater Monitoring - Ottumwa Midland Landfill / SCS Engineers Project #25216073

	Parameter	MW-301	MW-302	MW-303	MW-102M	MW-122M	Field Blank	TOTAL
Appendix III Parameters	Boron	x	x	x	x	x	x	6
	Calcium	x	x	x	x	x	x	6
	Chloride	x	x	x	x	x	x	6
	Fluoride	x	x	x	x	x	x	6
	pH	x	x	x	x	x	x	6
	Sulfate	x	x	x	x	x	x	6
	TDS	x	x	x	x	x	x	6
Appendix IV Parameters	Antimony							0
	Arsenic							0
	Barium							0
	Beryllium							0
	Cadmium							0
	Chromium							0
	Cobalt							0
	Fluoride							0
	Lead							0
	Lithium							0
	Mercury							0
	Molybdenum							0
	Selenium							0
	Thallium							0
	Radium							0
Field Parameters	Groundwater Elevation	x	x	x	x	x		5
	Well Depth	x	x	x	x	x		5
	pH (field)	x	x	x	x	x		5
	Specific Conductance	x	x	x	x	x		5
	Dissolved Oxygen	x	x	x	x	x		5
	ORP	x	x	x	x	x		5
	Temperature	x	x	x	x	x		5
	Turbidity	x	x	x	x	x		5
	Color	x	x	x	x	x		5
	Odor	x	x	x	x	x		5

Notes: All samples are unfiltered (total).

I:\25216073.00\Data and Calculations\Field Notes\Field Work Requests\[Table_2_OML_CCR_Rule_Sampling_Det

Login Sample Receipt Checklist

Client: SCS Engineers

Job Number: 310-167646-1

Login Number: 167646
List Number: 1
Creator: Lickness, Corina A

List Source: Eurofins TestAmerica, Cedar Falls

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Groundwater Monitoring Results - Field Parameters
Ottumwa Midland Landfill / SCS Engineers Project #25219073.00
October 2019

Sample	Date/Time	Groundwater Elevation (feet amsl)	Temperature (Deg. C)	pH (Std. Units)	Dissolved Oxygen (mg/L)	Specific Conductivity (µmhos/cm)	ORP (mV)	Turbidity (NTU)
MW-301	10.15.19/0835	686.56	13.68	6.67	0.40	1,512	-58.4	4.75
MW-302	10.15.19/1145	685.44	14.26	7.21	0.75	1,067	-56.4	102.8
MW-303	10.15.19/0950	686.08	15.44	6.76	0.43	1,628	-55.6	27.9
MW-102M	10.14.19/1200	715.50	NA	7.81	NA	NA	NA	NA
MW-122M	10.14.19/1230	708.94	NA	6.6	NA	NA	NA	NA

Abbreviations:
amsl = above mean sea level
mg/L = milligrams per liter
µmhos/cm = microSiemens per centimeter
NA = Not Analyzed
ORP = Oxidation Reduction (REDOX)
mV = millivolts
NTU = Nephelometric Turbidity Units

Laboratory Notes/Qualifiers:
none

Created by:	AJR	Date:	6/27/2019
Last revision by:	LWJ	Date:	10/17/2019
Checked by:	JSN	Date:	10/21/2019
Scientist QA/QC:	NDK	Date:	10/31/2019

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Appendix B

Alternative Source Demonstration, April 2019 Detection Monitoring

Alternative Source Demonstration
April 2019 Detection Monitoring

Ottumwa Midland Landfill
Ottumwa, Iowa

Prepared for:

SCS ENGINEERS

25219073.00 | October 14, 2019

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

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Appendix

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PE CERTIFICATION

I, Eric J. Nelson, hereby certify that that the information in this alternate source demonstration is accurate and meets the requirements of 40 CFR 257.94(e)(2). This certification is based on my review of the groundwater data and related site information available for the Ottumwa Midland Landfill. I am a duly licensed Professional Engineer under the laws of the State of Iowa.

(signature) 10/11/2019 (date)

ERIC J. NELSON
(printed or typed name)

License number 23136

My license renewal date is December 31, 2020.

Pages or sheets covered by this seal:
Alternative Source Demonstration April 2019
Detection Monitoring, Ottumwa Midland Landfill,
Ottumwa, Iowa

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1.0 INTRODUCTION

This Alternative Source Demonstration (ASD) was prepared to support compliance with the groundwater monitoring requirements of the "Coal Combustion Residuals (CCR) Final Rule" published by the U.S. Environmental Protection Agency (USEPA) in the Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, dated April 17, 2015 (USEPA, 2015), and subsequent amendments. Specifically, this report was prepared to fulfill the requirements of 40 CFR 257.94(e)(2). The applicable sections of the Rule are provided below in italics.

1.1 §257.94(E)(2) ALTERNATIVE SOURCE DEMONSTRATION REQUIREMENTS

The owner and operator may demonstrate that a source other than the CCR Unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The owner or operator must complete the written demonstration within 90 days of detecting a statistically significant increase over background levels.

An ASD is completed when there are exceedances of one or more benchmark concentrations established within the groundwater monitoring program. The ASD is completed to determine if any other sources are likely causes of the identified exceedance(s) of established benchmark(s) at the site. This ASD was performed in response to results indicating a statistically significant increase (SSI) over background levels during detection monitoring under the CCR Rule.

This ASD report is evaluating the SSI observed in the statistical evaluation of the April 2019 detection monitoring event at the Ottumwa Midland Landfill (OML). The first ASD was prepared for this facility evaluating an SSI observed in the statistical evaluation of the November 2017 detection monitoring event (SCS Engineers [SCS], 2018). The November 2017 ASD concluded that several lines of evidence demonstrate that the SSI reported for chloride concentration in the compliance monitoring well was likely due to natural occurring chloride in the bedrock aquifer at OML.

As discussed in more detail in **Section 4.2** of this ASD, the findings of the April 2019 monitoring event were consistent with those for the previous event.

1.2 SITE INFORMATION AND MAP

The OML facility is located at 15300 130th Street in Ottumwa, Wappello County, Iowa (**Figure 1**). OML is an active landfill, operating under Iowa Department of Natural Resources (IDNR) permit #90-SDP-8-92P.

The locations of the CCR Units and all background and compliance monitoring wells with identification numbers for the groundwater monitoring program are shown on **Figure 2**.

1.3 STATISTICALLY SIGNIFICANT INCREASES IDENTIFIED

The only SSI for the April 2019 monitoring event was for chloride at monitoring well MW-303. A summary of the April 2019 constituent concentrations and the established benchmark concentrations is provided in **Table 1**. Previous results are also included for comparison. A resample of chloride was collected in June 2019 at MW-303 for confirmation of the observed SSI.

The constituent concentrations with SSIs above the background concentrations are highlighted in the table.

1.4 OVERVIEW OF ALTERNATIVE SOURCE DEMONSTRATION

This ASD report includes:

- Background information (**Section 2.0**)
- Evaluation of potential that SSIs are due to methodology or analysis (**Section 3.0**)
- Evaluation of potential that SSIs are due to natural sources or man-made sources other than the CCR Units (**Section 4.0**)
- ASD conclusions (**Section 5.0**)
- Monitoring recommendations (**Section 6.0**)

The chloride results from background and compliance sampling under the CCR Rule are provided in **Table 2**. The laboratory report for the April 2019 detection monitoring event will be included in the 2019 Annual Groundwater Monitoring and Corrective Action Report submitted in January 2020. Complete laboratory reports for the background monitoring events and previous detection monitoring events were included in the previous annual groundwater monitoring and corrective action reports.

2.0 BACKGROUND

To provide context for the ASD evaluation, the following background information is provided in this section of the report, prior to the ASD evaluation sections:

- Geologic and hydrogeologic setting
- CCR Rule monitoring system
- Other monitoring wells

A more detailed discussion of the background information for the site is provided in the ASD for the November 2017 event (SCS, 2018).

2.1 REGIONAL GEOLOGY AND HYDROGEOLOGY

For the purposes of groundwater monitoring, the Mississippian limestone unit is considered to be the uppermost aquifer unit at the OML site as defined under 40 CFR 257.53. Devonian aged units underlay the Mississippian limestone and are composed of shale, dolomite, and limestone. Silurian dolomite underlays the Devonian shale, dolomite, and limestone.

The Des Moines River and associated alluvial aquifers are a major source of surface water and shallow groundwater in the area; however, the alluvial aquifer is not present at the OML site.

Unconsolidated deposits at the site consist of clays overlain by loess, which are not productive sources of groundwater. The uppermost Pennsylvanian bedrock unit is considered to be a regional aquitard. The Cambrian-Ordovician aquifer, comprised of dolomite and sandstone, is commonly the source of municipal and industrial high-capacity wells in the region (Coble, 1971).

Regional information indicates that groundwater flow within the Mississippian limestone is to the south-southeast.

2.2 CCR MONITORING SYSTEM

The groundwater monitoring system established under the CCR Rule consists of two background monitoring wells and three compliance monitoring wells. The background monitoring wells include MW-122M and MW-102M. The compliance monitoring wells include MW-301, MW-302, and MW-303. The CCR Rule wells are installed in the upper portions of the Mississippian limestone aquifer. Well depths range from approximately 150.0 to 204.5 feet, measured from the top of the well casing.

2.3 OTHER MONITORING WELLS

Additional groundwater monitoring wells currently exist at OML as part of the monitoring system developed for the state monitoring program. The well locations are shown on **Figure 2**.

Monitoring wells for the state monitoring program are installed in the unconsolidated deposits and in the Pennsylvanian shale unit, which are not the uppermost aquifer as defined under 40 CFR 257.53. This shallow monitoring system includes water table wells, piezometers in the Pennsylvanian shale, and piezometers in the underlying Mississippian limestone. Well depths range from approximately 20 to 177 feet, measured from the top of the well casing.

2.4 GROUNDWATER FLOW DIRECTION

As discussed in the November 2017 ASD (dated April 2018), shallow groundwater flow at the water table appears to be controlled partially by the landfill underdrain system and partially by the top of the Pennsylvanian shale. Shallow groundwater, near the current fill area, flows toward the landfill and the sedimentation pond.

The April 2019 potentiometric surface map for the Mississippian limestone aquifer (**Figure 3**) shows groundwater flow to the south, consistent with previous potentiometric surface maps, and the regional groundwater flow. The groundwater elevations for the April 2019 sampling event are shown on **Table 3**.

3.0 METHODOLOGY AND ANALYSIS REVIEW

To evaluate the potential that an SSI is due to a source other than the regulated CCR Unit, SCS used a two-step evaluation process. First, the sample collection, field and laboratory analysis, and statistical evaluation were reviewed to identify any potential error or analysis that led to exceedance of the benchmark. Second, potential alternative sources, including natural variation and man-made sources other than the CCR Unit, were evaluated. This section provides the findings of the methodology and analysis review. **Section 4.0** of this report addresses the potential alternative sources.

3.1 SAMPLING AND FIELD ANALYSIS REVIEW

Field notes and sampling results were reviewed to determine if any sampling error may have caused or contributed to the observed SSI for chloride. Potential field sampling errors or issues could include mislabeling of samples, improper sample handling, missed holding times, cross contamination during sampling, or other field error. Field blank sample results were also reviewed for any indication of potential contamination from sampling equipment or containers. Based on the review of the field notes and results, SCS did not identify any indication that the chloride SSI was due to a sampling error.

Because chloride is a laboratory parameter, there is little potential for a field analysis error to contribute to an SSI.

3.2 LABORATORY ANALYSIS REVIEW

Laboratory reports for the April 2019 detection monitoring were reviewed to determine if any laboratory analysis error or issue may have caused or contributed to the observed SSI for chloride. The laboratory report review included reviewing the laboratory quality control flags and narrative, verifying that correct methods were used and desired detection limits were achieved, and checking the field and laboratory blank sample results.

Based on the review of the laboratory reports, SCS did not identify any indication that the chloride SSI was due to a laboratory analysis error. There were no laboratory quality control flags or issues identified in the laboratory report that affect the usability of the data for detection monitoring.

Time series plots of the analytical data for chloride were reviewed for any anomalous results that might indicate a possible sampling or laboratory error (e.g., dilution error or incorrect sample labeling). Time series plots are provided in **Appendix A**. The time series plot of chloride concentrations in samples from MW-303 does not indicate the April 2019 result is an anomaly.

3.3 STATISTICAL EVALUATION REVIEW

The review of the statistical results and methods includes a quality control check of the following:

- Input analytical data vs. laboratory analytical reports
- Statistical method and process for each SSI

Based on the review of the statistical evaluation, SCS did not identify any errors in the statistical evaluation that caused or contributed to the determination of an intrawell SSI for chloride at well MW-303. However, the small size of the intrawell background data set and elimination of early results as outliers may have contributed to the identification of the April 2019 result as an SSI.

When detection monitoring under the CCR Rule was initiated in October 2017, the selected statistical approach was a prediction limit procedure using interwell statistics with two background wells. The interwell approach was chosen because the landfill was already active so we could not assume in advance that data collected during the background monitoring period would represent natural background. In the October 2017 and April 2018 detection monitoring events, interwell SSIs for chloride were identified for compliance well MW-301. These SSIs were attributed to natural variation in ASDs completed for these two events.

Following the completion of the April 2018 ASD, dated October 31, 2018, the statistical method for evaluating chloride data at the three compliance monitoring wells was modified to an intrawell approach. This approach is appropriate for constituents which exhibit natural spatial variability, as has been documented for chloride at the OML facility.

The intrawell upper prediction limits (UPLs) for chloride were calculated based on a parametric approach. Because the background results for compliance well MW-303 were lower than the background results for both upgradient wells, the intrawell UPL for chloride at MW-303 was lower than the previously used interwell UPL.

The first three background chloride results for MW-303 were identified as outliers in the statistical analysis (Dixon's test) and were excluded from the dataset for calculation of the UPL. With these

three results removed, the remaining background results for MW-303 were very consistent, resulting in a low calculated UPL that may not fully capture the natural variability of chloride concentrations at this well.

Further evaluation of the chloride SSI for MW-303 is provided in Section 4.

3.4 SUMMARY OF METHODOLOGY AND ANALYSIS REVIEW FINDINGS

In summary, there were no changes to the SSI determinations for the April 2019 monitoring event based on the methodology and analysis review, and no errors causing or contributing to the reported chloride SSI were identified.

4.0 ALTERNATIVE SOURCES

This section of the report discusses the potential alternative sources for the chloride SSI at MW-303, identifies the most likely alternative source(s), and presents the lines of evidence indicating that an alternative source is the most likely cause of the observed SSI for chloride.

4.1 POTENTIAL CAUSES OF SSI

4.1.1 Natural Variation

The statistical analysis for chloride was completed using an intrawell approach, comparing the April 2019 detection monitoring results to the UPLs calculated based on sampling of the background data from each monitoring well. The intrawell approach allows for spatial variability within the aquifer; however, if the background monitoring period is relatively short, it may not fully represent the temporal variability in constituent concentrations at a specific well.

Chloride is naturally present in the limestone aquifer based on observations of previous studies in the area. Based on regional and site information, discussed below, natural variation appears to be a likely cause of the chloride SSI for well MW-303.

4.1.2 Man-made Alternative Sources

Man-made alternative sources that could potentially contribute to the chloride SSI at MW-303 include on-site management of CCR leachate or contact water, or non-CCR sources such as road salt use, septic systems, or surrounding agricultural land use. Based on the depth to the Mississippian aquifer and the low permeability of the overlying Pennsylvanian shale, it does not appear likely that one or more of these man-made alternative sources is the cause of the chloride SSI.

4.2 LINES OF EVIDENCE

The lines of evidence indicating that the SSI for chloride in compliance well MW-303 relative to the intrawell UPL is due to natural variability include:

1. Regional and site-specific groundwater information indicates that the observed chloride concentrations for MW-303 are within typical ranges for the Mississippian limestone aquifer and below the concentrations at the upgradient monitoring wells.

2. Other CCR indicator parameters, such as boron, were not detected at concentrations exceeding background levels in the sample from MW-303.

3. The hydraulic conductivity of the Pennsylvanian shale aquitard overlying the Mississippian limestone aquifer is very low, and there is limited hydrogeologic connection between the shallow groundwater and the aquifer.

4. Both the original landfill and expansion Phase 1 are designed with low permeability liner systems and underdrain systems that collect groundwater below the liner.

Each of these lines of evidence and the supporting data are discussed in more detail in the following sections. For lines of evidence that were discussed in detail in the ASD for the November 2017 detection monitoring event (SCS, 2018), a brief discussion is provided below, focusing on any updated information collected since the previous ASD, with references to the previous ASD for additional details.

4.2.1 Mississippian Limestone Aquifer Water Quality

Regional and site-specific information indicates that chloride concentrations in the Mississippian limestone aquifer are variable, and the concentrations detected in samples from MW-303 are well within the range of concentrations naturally present in the aquifer. The U.S. Geological Survey (USGS) completed an Open File Report 82-1014, Hydrology of Area 38, of the Western Region, Interior Coal Province of Iowa and Missouri (USGS, 1983). OML is located within the area of investigation, and a chapter from the report addressed water quality in the Mississippian limestone aquifer. The USGS investigation reported chloride concentrations ranging from 0.5 to 3,570 milligrams per liter (mg/L) for the limestone aquifer within the study area, with an average chloride concentration of 137 mg/L. The chloride concentration for MW-303 in the April 2019 detection monitoring event was 8.1 mg/L; therefore, the observed concentration for MW-303 was well below the average concentration of chloride in the limestone aquifer.

In background sampling performed for the Phase 1 expansion, four monitoring wells installed in the Mississippian aquifer were sampled in April 2013, prior to construction of the expansion. The wells included the two wells used as background wells for the CCR Rule monitoring system (MW-102M and MW-122M) and two additional wells in the Mississippian aquifer (MW-110M and MW-116M). The chloride results for the sample event ranged from 20 to 75.8 mg/L, significantly exceeding the April and June 2019 chloride concentrations at MW-303.

The April and June 2019 chloride concentrations for samples from MW-303 were below the interwell UPL (21.9 mg/L) that was previously calculated based on the eight background monitoring events at upgradient wells MW-102M and MW-122M). The MW-303 chloride results were also lower than the April 2019 chloride results for the upgradient wells and the other two compliance wells (MW-301 and MW-302). These findings demonstrate that the MW-303 results are at the low end of the range of natural variability for chloride concentrations in the Mississippian dolomite aquifer.

4.2.2 Leachate Versus Groundwater Concentrations

Although chloride exceeded the intrawell SSI, other CCR indicator parameters such as boron, were not detected at concentrations exceeding background levels in the sample from MW-303. In recent samples from the leachate lagoon, boron and sulfate have typically been detected at concentrations at least an order of magnitude higher than the chloride concentration. Leachate and ash contact water are monitored under the state monitoring program for the landfill. See the November 2017 ASD for additional details (SCS, 2018).

If leachate from the CCR landfill were the source of elevated chloride, then some increase in boron and sulfate relative to background would also be expected. The absence of other CCR indicator

parameters with SSIs, or increasing concentration trends, suggests that the chloride SSI is due to natural variation rather than CCR disposal.

4.2.3 Overlying Pennsylvanian Shale Aquitard

The hydraulic conductivity of the Pennsylvanian shale aquitard overlying the Mississippian limestone aquifer is low, and there is limited hydrogeologic connection between the shallow groundwater and the aquifer. The lack of hydrogeologic connection is evidenced by large differences between water levels measured in wells in the unconsolidated deposits or Pennsylvanian shale and water levels measured in wells in the Mississippian limestone. Water levels in Mississippian aquifer monitoring wells MW-302 and MW-303 are approximately 40 feet below the water levels measured in adjacent Pennsylvanian shale monitoring wells MW-14 and MW-13.

4.2.4 Landfill Liner System

Both the original landfill and expansion Phase 1 have low permeability liners. The original landfill was lined with 4 feet of compacted fine-grained soil having a hydraulic conductivity of no more than 1 by 10^{-7} centimeters per second (cm/sec). Expansion Phase 1 has a composite liner system including 2 feet of compacted clay, a 60-mil high density polyethylene (HDPE) geomembrane, and a leachate collection drainage layer. The original landfill and expansion Phase 1 both have underdrain systems that collect groundwater below the liner and maintain separation between the water table and the liner.

5.0 ALTERNATIVE SOURCE DEMONSTRATION CONCLUSIONS

The lines of evidence discussed above regarding the SSI reported for the chloride concentration in downgradient monitoring well MW-303 demonstrate that the SSI is likely due to naturally occurring chloride in the limestone aquifer at the OML site.

6.0 SITE GROUNDWATER MONITORING RECOMENDATIONS

In accordance with section 257.94(e)(2) of the CCR Rule, the OML site may continue with detection monitoring based on this ASD. This ASD report will be included in the 2019 Annual Report due January 31, 2020.

7.0 REFERENCES

Coble, R.W., 1971, The Water Resources of Southeast Iowa, Iowa Geological Survey Water Atlas Number 4, 1971.

SCS Engineers, 2018b, Alternative Source Demonstration November 2017 Detection Monitoring, Ottumwa Midland Landfill, Ottumwa, IA, April 2018. (2018)

U.S. Environmental Protection Agency, 2015, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule, April 2015.

U.S. Geological Survey, 1983, Water Resources Investigations Open File Report 82-1014, Hydrogeology Area 38, Western Region, Interior Coal Province, Iowa and Missouri; Rolla, Missouri and Iowa City, Iowa, May 1983.

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Tables

Table 1. Groundwater Analytical Results Summary - CCR program - Detection Monitoring
Ottumwa Midland Landfill / SCS Engineers Project #25219073

Parameter Name	Interwell UPL	Background Wells								Compliance Wells															
		MW-102M				MW-122M				MW-301					MW-302					MW-303					
		11/8/2017	4/17/2018	10/16/2018	4/18/2019	11/8/2017	4/17/2018	10/16/2018	4/17/2019	Intrawell UPL	11/7/2017	4/17/2018	10/15/2018	4/16/2019	Intrawell UPL	11/7/2017	4/17/2018	10/15/2018	4/16/2019	Intrawell UPL	11/7/2017	4/17/2018	10/16/2018	4/16/2019	6/6/2019 Resample
Appendix III																									
Boron, ug/L	5,220	1,480	1,550	1,340	1,400	5,220	5,560	4,580	5,500		1,010	854	784	660		848	834	752	760		738	738	661	850	NA
Calcium, mg/L	599	10.4	25.3	12.9	51	383	402	366	400		161	131	135	110		74	77.3	66.9	44		94.9	103	91	150	NA
Chloride, mg/L		12.3	13.5	13.6	14	7.2	8.0	8.6	8.8	67.0	28.9	33.9	26.9	45	10.4	7.8	8.6	9.2	10	7.92	6.9	7.3	7.4	8.1	8.0
Fluoride, mg/L	6.31	4.6	4.5	4.7	5.7	0.5	<0.063	<0.19	0.7		0.77	0.87	0.84	0.85		1.2	1.0	1.1	1.5		0.77	0.80	0.84	<0.23	NA
Field pH, Std. Units	8.63	8.16	8.34	7.80	8.55	6.16	6.65	6.31	7.34		6.56	7.09	6.59	7.10		7.41	7.8	7.25	7.49		6.96	7.32	6.87	6.97	NA
Sulfate, mg/L	17,500	335	352	384	340	9,440	10,400	<0.24	8,300		926	638	837	360		77.5	79.3	80.9	83		232	262	310	600	NA
Total Dissolved Solids, mg/L	18,100	1,410	1,540	1,500	1700	13,400	14,400	13,300	13,000		1,760	1,400	1,550	970		607	690	708	690		783	839	891	1300	NA

Highlighted cell indicates the compliance well result exceeds the UPL and the LOQ

Abbreviations:
UPL = Upper Prediction Limit GPS = Groundwater Protection Standard LOQ = Limit of Quantification LOD = Limit of Detection

Notes:
1. Interwell UPL is based on the parametric prediction limit with 1-of-2 retesting methodolody for all parameters except chloride, fluoride, and TDS.
2. Nonparametric UPL for fluoride and TDS is equal to laboratory limit of quantification.
3. UPLs calculated based on results from background well B-26, from May 2016 through November 2017.
4. Following the completion of the April 2018 Alternative Source Demonstration (ASD) Report, dated October 31, 2018, the statistical method for evaluating chloride data at the three compliance monitoring wells was modified to an intrawell approach.
5. When a resample occurs, shading is only applied to the original sample and the resampled result if both are above the UPL.

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Last revision by: NDK Date: 9/24/2019
Checked by: AJR Date: 9/24/2019

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Table 2. Analytical Results - Appendix III Constituents with SSIs
Ottumwa Midland Landfill / SCS Engineers Project #25219073

Well Group	Well	Collection Date	Chloride (mg/L)
Background	MW-102M	5/4/2016	16.3
		6/22/2016	13.8
		8/10/2016	13.4
		10/26/2016	13.0
		1/18/2017	12.3
		4/20/2017	12.5
		6/21/2017	12.8
		8/22/2017	13.1
		11/8/2017	12.3
		4/17/2018	13.5
		10/16/2018	13.6
		4/18/2019	14.0
	MW-122M	5/5/2016	16.4
		6/23/2016	21.9
		8/10/2016	11.8
		10/26/2016	8.2
		1/18/2017	8.3
		4/20/2017	8.0
		6/21/2017	7.8
		8/22/2017	7.8
		11/8/2017	7.2
		4/17/2018	8.0
		10/16/2018	8.6
		4/17/2019	8.8

Table 2. Analytical Results - Appendix III Constituents with SSIs
Ottumwa Midland Landfill / SCS Engineers Project #25219073

Well Group	Well	Collection Date	Chloride (mg/L)
Compliance	MW-301	5/4/2016	4.24
		6/22/2016	112
		8/9/2016	46.6
		10/26/2016	43.4
		1/17/2017	32.6
		4/20/2017	58.0
		6/20/2017	38.9
		8/22/2017	40.8
		11/7/2017	28.9
		4/17/2018	33.9
		10/15/2018	26.9
		4/16/2019	45.0
	MW-302	5/4/2016	9.2
		6/22/2016	8.1
		8/10/2016	7.5
		10/26/2016	6.0
		1/17/2017	7.7
		4/19/2017	8.0
		6/20/2017	8.0
		8/22/2017	8.5
		11/7/2017	7.8
		4/17/2018	8.6
		10/15/2018	9.2
		4/16/2019	10.0

Table 2. Analytical Results - Appendix III Constituents with SSIs
Ottumwa Midland Landfill / SCS Engineers Project #25219073

Well Group	Well	Collection Date	Chloride (mg/L)
Compliance	MW-303	5/4/2016	13.5
		6/22/2016	11.5
		8/9/2016	8.7
		10/26/2016	7.5
		1/17/2017	7.1
		4/19/2017	6.9
		7/19/2017	7.2
		8/22/2017	7.3
		11/7/2017	6.9
		4/17/2018	7.3
		10/16/2018	7.4
		4/16/2019	8.1
		6/6/2019	8.0

Abbreviations:
mg/L = milligrams per liter

Created by:	LMH	Date:	9/12/2019
Last revision by:	LMH	Date:	9/12/2019
Checked by:	NDK	Date:	9/13/2019
Proj Mgr QA/QC:	SCC	Date:	9/16/2019

I:\25219073.00\Deliverables\2019 April ASD - OML\Tables\[2_Appendix III Constituents with SSIs.xlsx]GW Natural Attenuation

Table 3. Groundwater Elevations – CCR Rule Monitoring Network
Ottumwa-Midland Landfill / SCS Engineers Project #25219073.00

Depth to Water in feet below top of well casing					
Raw Data	**MW-301**	**MW-302**	**MW-303**	**MW-102M**	**MW-122M**
Measurement Date					
May 4, 2016	131.42	75.97	76.36	69.30	63.43
June 22, 2016	131.48	75.98	74.68	79.29	67.03
August 9, 2016	131.69	76.29	74.63	82.38	67.54
October 25-26, 2016	134.18	76.83	76.84	81.09	68.09
January 17, 2017	132.31	76.09	76.80	80.12	68.68
April 19-20, 2017	132.16	77.04	76.89	80.23	68.66
June 20-21, 2017	132.00	77.01	76.81	83.20	69.19
August 21-22, 2017	132.92	77.88	77.70	84.80	70.68
November 7-8, 2017	133.38	78.39	78.14	84.50	72.18
April 16-18, 2018	133.03	77.90	77.72	80.65	69.45
October 15-16, 2018	133.30	78.25	78.07	80.98	69.34
April 16-17, 2019	131.50	76.42	76.27	80.06	69.27
June 6, 2019	NA	NA	76.35	NA	NA

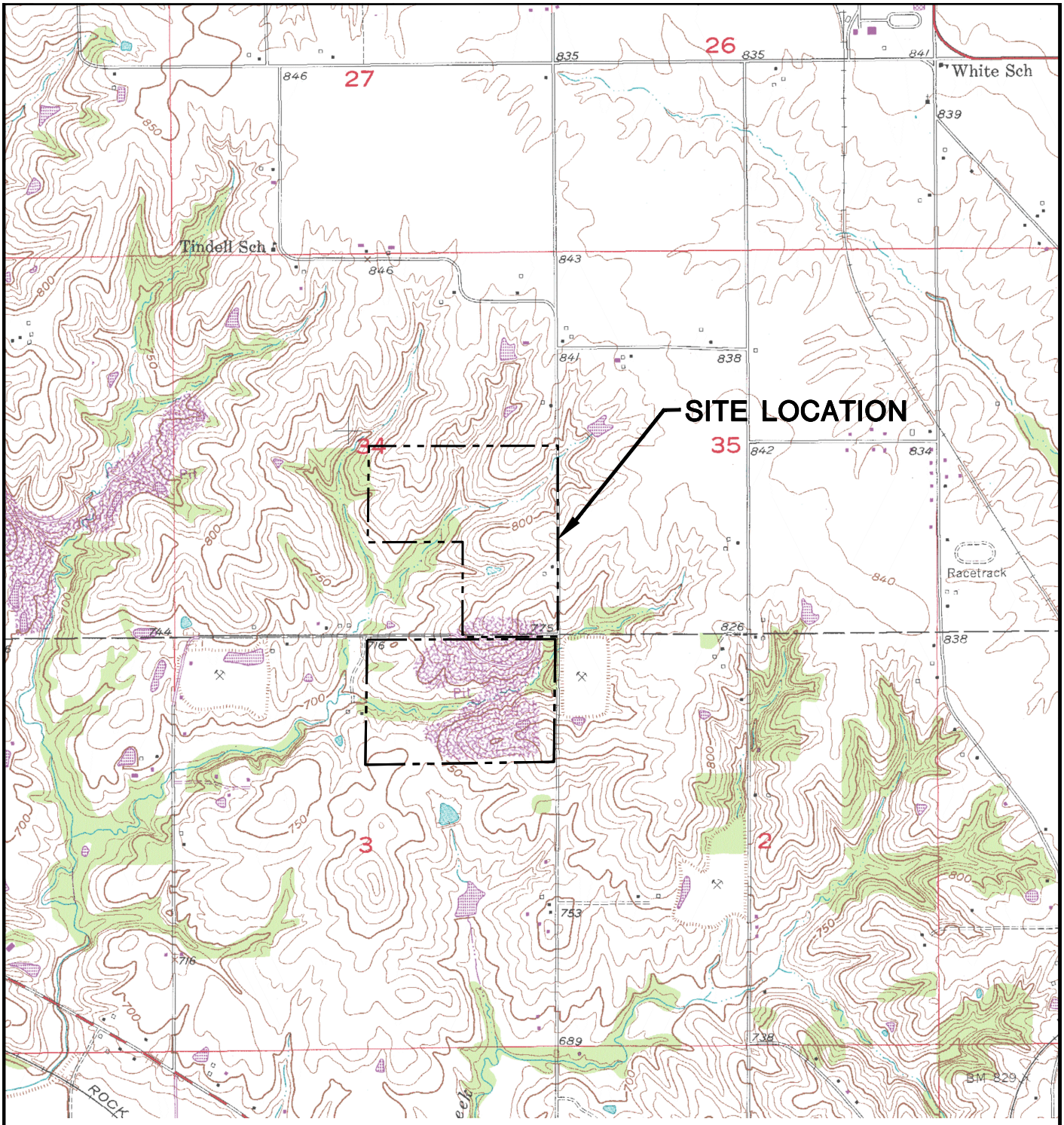
Ground Water Elevation in feet above mean sea level (amsl)					
Well Number	**MW-301**	**MW-302**	**MW-303**	**MW-102M**	**MW-122M**
Top of Casing Elevation (feet amsl)	817.88	761.77	762.40	798.03	792.70
Screen Length (ft)	5.0	5.0	5.0	5.0	5.0
Total Depth (ft from top of casing)	204.5	157.7	150.0	152.1	155.3
Top of Well Screen Elevation (ft)	618.38	609.07	617.40	652.65	642.94
Measurement Date					
May 4, 2016	686.46	685.80	686.04	728.73	729.27
June 22, 2016	686.40	685.79	687.72	718.74	725.67
August 9, 2016	686.19	685.48	687.77	715.65	725.16
October 25-26, 2016	683.70	684.94	685.56	716.94	724.61
January 17, 2017	685.57	685.68	685.60	717.91	724.02
April 19-20, 2017	685.72	684.73	685.51	717.80	724.04
June 20-21, 2017	685.88	684.76	685.59	714.83	723.51
August 21-22, 2017	684.96	683.89	684.70	713.23	722.02
November 7-8, 2017	684.50	683.38	684.26	713.53	720.52
April 16-18, 2018	684.85	683.87	684.68	717.38	723.25
October 15-16, 2018	684.58	683.52	684.33	717.05	723.36
April 16-17, 2019	686.38	685.35	686.13	717.97	723.43
June 6, 2019	NA	NA	686.05	NA	NA
Bottom of Well Elevation (ft)	613.38	604.07	612.40	645.93	637.40

Notes:
NM = not measured

Created by: KAK Date: 5/1/2017
Last rev. by: NDK Date: 6/27/2019
Checked by: AJR Date: 6/27/2019

I:\25219073.00\Deliverables\2019 April ASD - OML\Tables\[3_wlstat_OML_CCR_wells.xls]levels

Figures



LEGEND

APPROXIMATE PROPERTY LINE

OTTUMWA NORTH QUADRANGLE
IOWA–WAPELLO CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 OTTUMWA NORTH 15' QUADRANGLE
1976
SCALE: 1" = 2,000'

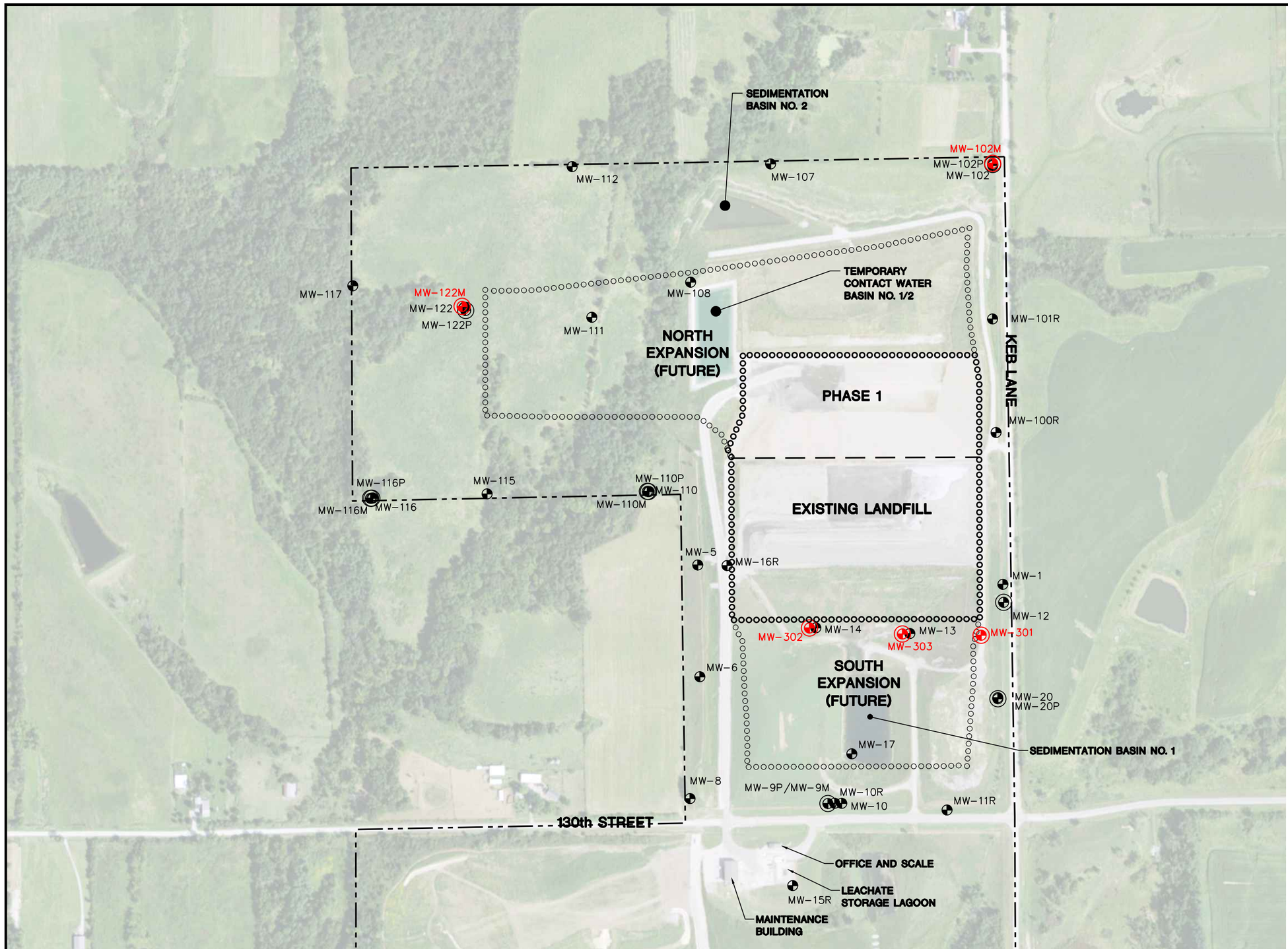
N

IOWA

CLIENT	SITE	
INTERSTATE POWER AND LIGHT CO. 15300 130th STREET OTTUMWA, IA 52501	OTTUMWA MIDLAND LANDFILL OTTUMWA, IOWA	SITE LOCATION MAP

PROJECT NO.	25216073.00	DRAWN BY:	KP	ENGINEER	FIGURE
DRAWN:	09/15/11	CHECKED BY:	MB	SCS ENGINEERS 2830 DAIRY DRIVE MADISON, WI 53718-6751 PHONE: (608) 224-2830	1
REVISED:	11/17/16	APPROVED BY:	TK 04/16/18		

I:\25216073.00\Drawings\ 1 Site Location.dwg, 4/16/201 6:43:14 AM



LEGEND

- APPROXIMATE PROPERTY LINE
- EXISTING WASTE LIMITS
- NORTH EXPANSION AREA
- MONITORING WELL
- PIEZOMETER
- CCR RULE PIEZOMETER

NOTES:

1. 2015 AERIAL PHOTOGRAPH IS FROM THE IOWA GEOGRAPHIC MAP SERVER–IOWA STATE UNIVERSITY GEOGRAPHIC INFORMATION SYSTEMS SUPPORT & RESEARCH FACILITY.
2. PROPERTY LINE SOUTH OF 130TH STREET FROM SURVEY MAP PREPARED BY GARDEN & ASSOCIATES, OSKALOOSA, IOWA, DATED DECEMBER 20, 1988.
3. PROPERTY LINE NORTH OF 130TH STREET FROM PLAT OF SURVEY MAP PREPARED BY SCS ENGINEERS, MADISON, WISCONSIN, DATED FEBRUARY 20, 2013.
4. EXISTING LIMITS OF WASTE ARE APPROXIMATE.
5. MONITORING WELLS MW–301 AND MW–302 WERE INSTALLED BY CASCADE DRILLING BETWEEN NOVEMBER 16, 2015, AND DECEMBER 3, 2015.
6. MONITORING WELL MW–303 WAS INSTALLED BY TEAM SERVICES BETWEEN APRIL 11, 2016 AND APRIL 26, 2016.
7. MONITORING WELLS MW–301 THROUGH MW–303 WERE SURVEYED BY FRENCH–RENEKER–ASSOCIATES ON MAY 19, 2016.

N

400 0 400

SCALE: 1" = 400'

PROJECT NO.	25216073.00	DRAWN BY:	BJM
DRAWN:	11/17/11	CHECKED BY:	NK
REVISED:	03/14/18	APPROVED BY:	TK 04/16/18

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718–6751
PHONE: (608) 224–2830

CLIENT: INTERSTATE POWER AND LIGHT CO.
15300 130th STREET
OTTUMWA, IA 52501

SITE: OTTUMWA MIDLAND LANDFILL
OTTUMWA, IOWA

MONITORING WELL LOCATION MAP

FIGURE 2

I:\25216073.00\Drawings\CCR Rule Pie□o□eters.dwg, 4/16/201□ 6:45:37 AM

KEB LANE

SEDIMENTATION BASIN NO. 2

TEMPORARY CONTACT WATER BASIN NO. 1/2

717.97
MW-102M
MW-102P
MW-102

MW-112
MW-107

MW-117
723.43
MW-122M
MW-122
MW-122P
MW-108
MW-111

NORTH EXPANSION (FUTURE)

PHASE 1

MW-101R
MW-100R

MW-116P
MW-116M
MW-116
MW-115
MW-110P
MW-110
MW-110M

EXISTING LANDFILL

MW-5
MW-16R

MW-1
MW-12
MW-14
MW-13
MW-302
685.35
MW-303
686.13
MW-301
686.38

MW-6

SOUTH EXPANSION (FUTURE)

MW-20
MW-20P

MW-17

SEDIMENTATION BASIN NO. 1

MW-8
MW-9P/MW-9M
MW-10R
MW-10
MW-11R

130th STREET

OFFICE AND SCALE

LEACHATE STORAGE LAGOON

MW-15R

MAINTENANCE BUILDING

715
720
710
705
700
695
690

LEGEND

- APPROXIMATE PROPERTY LINE
- EXISTING WASTE LIMITS
- PERMITTED WASTE LIMITS
- MONITORING WELL
- PIEZOMETER
- CCR RULE PIEZOMETER
- 686.13 POTENTIOMETRIC SURFACE ELEVATION (APRIL 2019)
- POTENTIOMETRIC SURFACE CONTOUR
- APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTES:

1. 2015 AERIAL PHOTOGRAPH IS FROM THE IOWA GEOGRAPHIC MAP SERVER–IOWA STATE UNIVERSITY GEOGRAPHIC INFORMATION SYSTEMS SUPPORT & RESEARCH FACILITY.
2. PROPERTY LINE SOUTH OF 130TH STREET FROM SURVEY MAP PREPARED BY GARDEN & ASSOCIATES, OSKALOOSA, IOWA, DATED DECEMBER 20, 1988.
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7. MONITORING WELLS MW–301 THROUGH MW–303 WERE SURVEYED BY FRENCH–RENEKER–ASSOCIATES ON MAY 19, 2016.

N

400 0 400

SCALE: 1" = 400'

PROJECT NO.	25219073.00	DRAWN BY:	BSS/MBH
DRAWN:	09/11/19	CHECKED BY:	NK
REVISED:	09/27/19	APPROVED BY:	TK 10/10/19

ENGINEER: SCS ENGINEERS
2830 DAIRY DRIVE MADISON, WI 53718-6751
PHONE: (608) 224-2830

CLIENT: INTERSTATE POWER AND LIGHT CO.
15300 130th STREET
OTTUMWA, IA 52501

SITE: OTTUMWA MIDLAND LANDFILL
OTTUMWA, IOWA

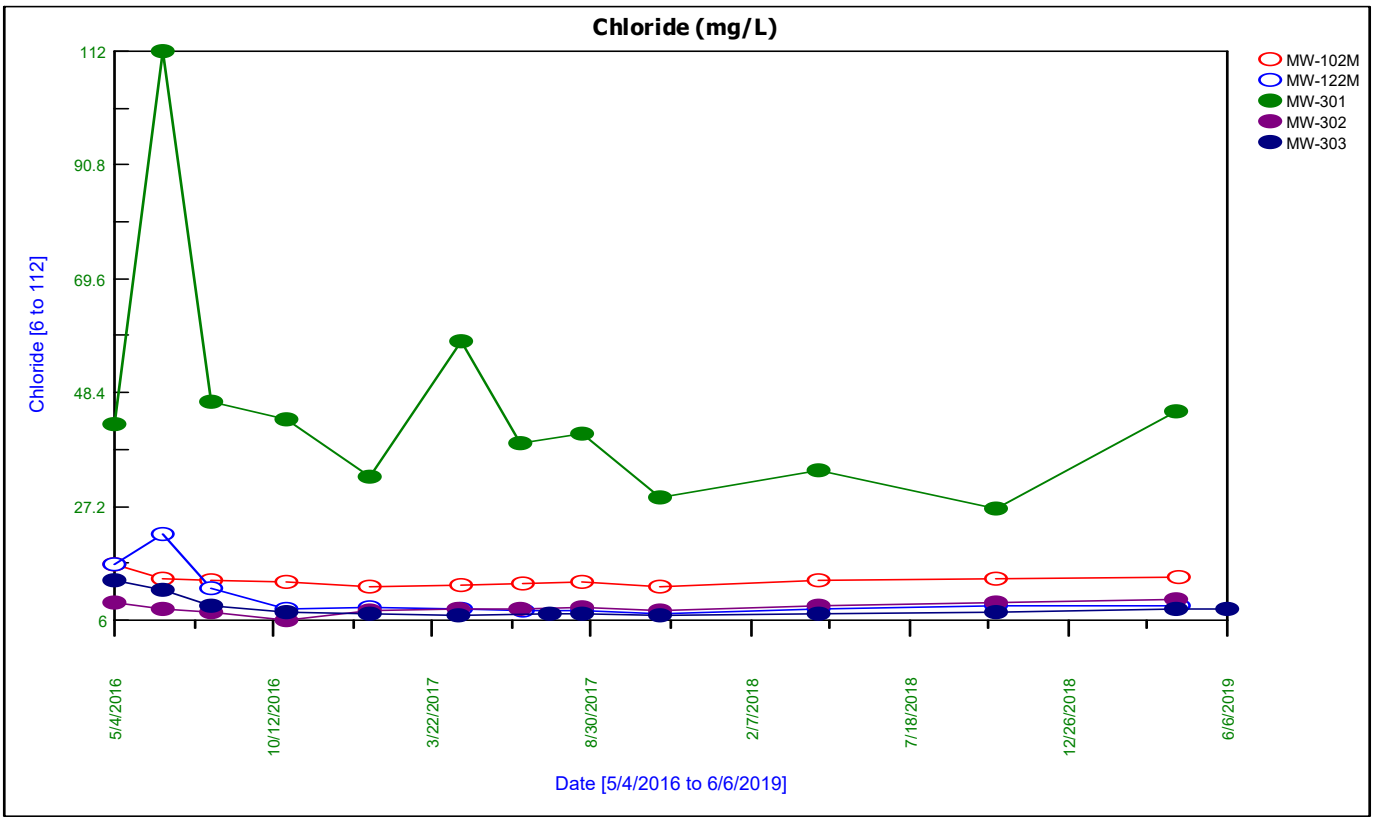
POTENTIOMETRIC SURFACE
APRIL 2019

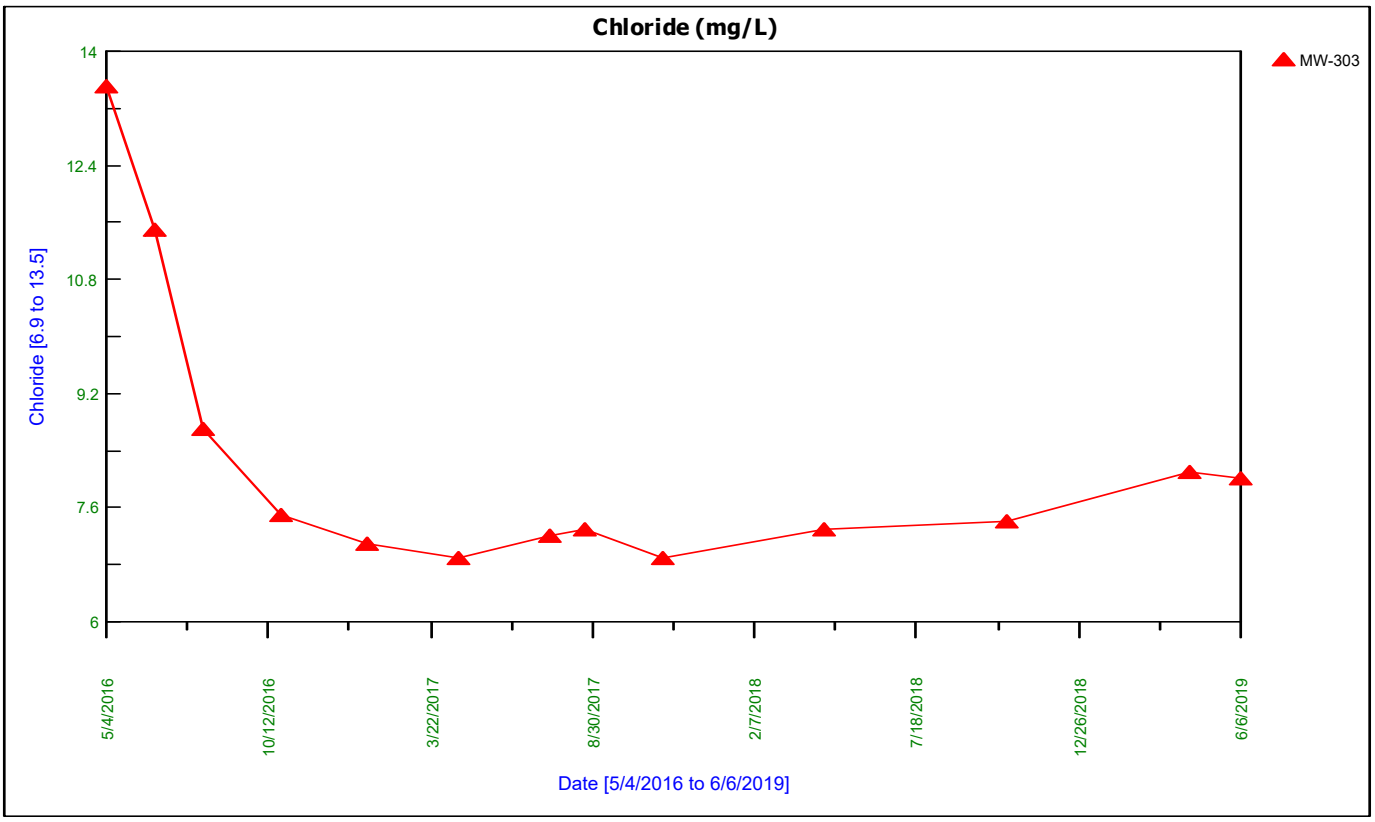
FIGURE
3

I:\25219073.00\Drawings\CCR Rule\Potentiometric Surface.dwg, 10/9/2019 10:20:42 PM

Appendix A

CCR Well Trend Plot – Chloride


Chloride (mg/L)
112
90.8
69.6
48.4
27.2
6
Chloride [6 to 112]
5/4/2016
10/12/2016
3/22/2017
8/30/2017
2/7/2018
7/18/2018
12/26/2018
6/6/2019
Date [5/4/2016 to 6/6/2019]
MW-102M
MW-122M
MW-301
MW-302
MW-303


Chloride (mg/L)
MW-303
14
12.4
10.8
9.2
7.6
6
Chloride [6.9 to 13.5]
5/4/2016
10/12/2016
3/22/2017
8/30/2017
2/7/2018
7/18/2018
12/26/2018
6/6/2019
Date [5/4/2016 to 6/6/2019]